

NOVEMBER 1944

35 CENTS

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# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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**NORTH POLE WEATHER RUN**  
— Page 97

If safety's a must with you

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1 FIREMEN, DOCTORS, TOW-CAR DRIVERS—people who drive in emergencies—rely on "Prestone" anti-freeze. They use "Prestone" anti-freeze... then they're *safe* and they *know* it!



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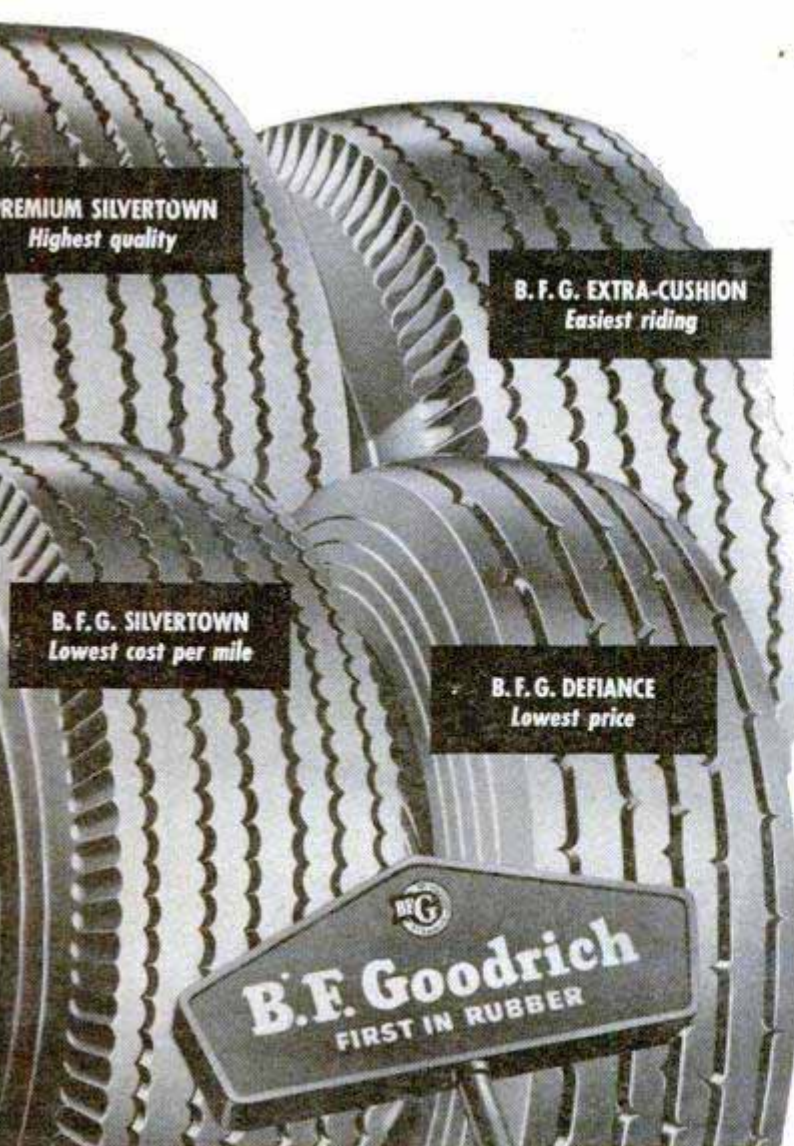
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**U**SERS agree **MORE MILES!** Riding tests prove **MORE COMFORT**—



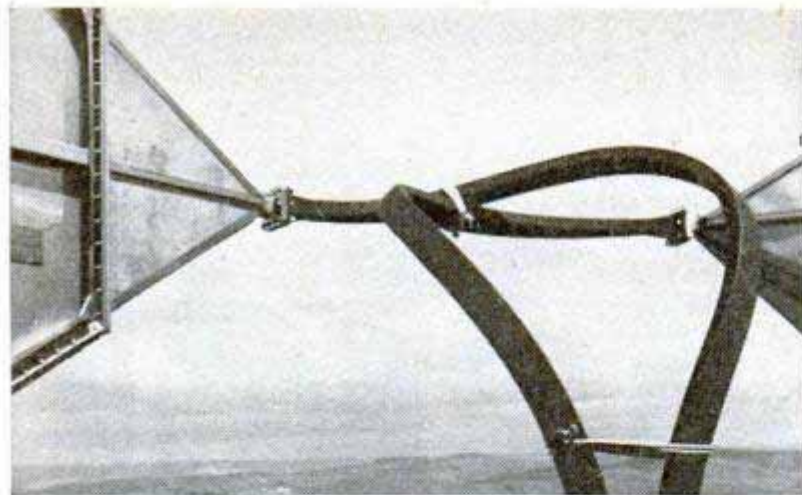
prove B. F. Goodrich regular tires *ride smoother* than regular tires of other makes! They give you **MORE SAFETY**, too, with a stronger cord body, plus a wider, road-hugging tread!

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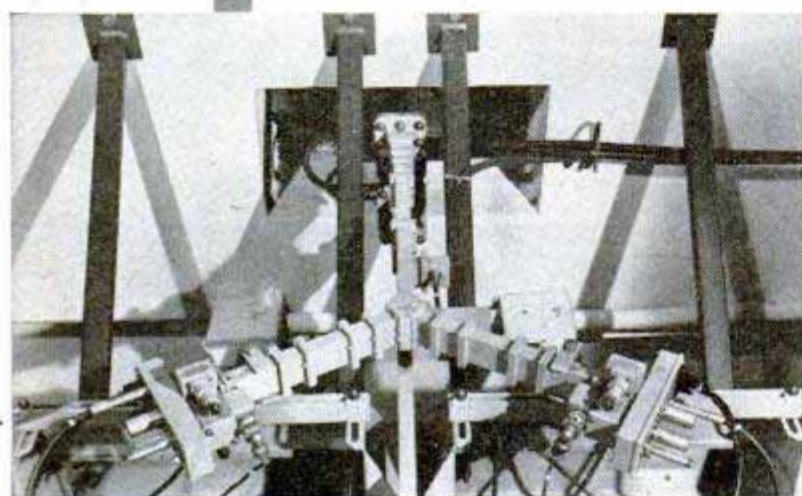
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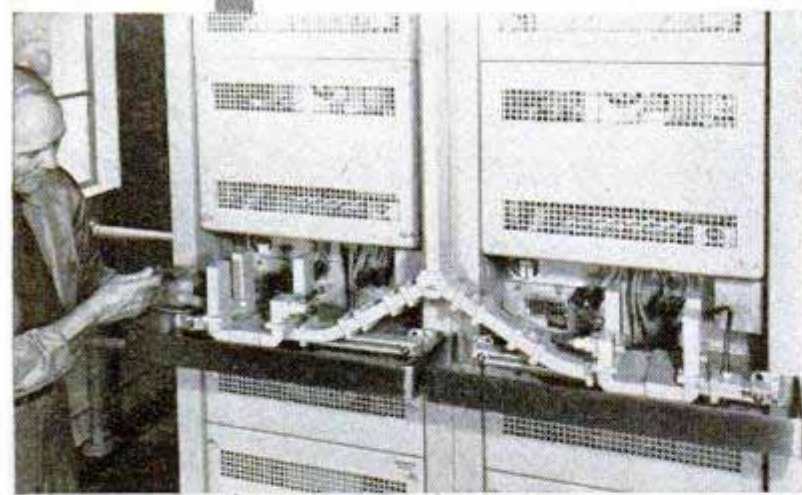
# Pipe Circuits



**3** The waveguide connects with antennas, which are oriented in azimuth with antennas at next station. At right is complete repeater station.



**2** The waveguide continues upward through the roof of the station toward the antennas.



**1** Base of a waveguide circuit in a repeater station of the New York-Boston radio relay system.

**U**NLIKE radio broadcast waves, microwaves are too short to be handled effectively in wire circuits. So, for carrying microwaves to and from antennas, Bell Laboratories scientists have developed circuits in "pipes," or waveguides.

Although the waves travel in the space within the waveguides, still they are influenced by those characteristics which are common to wire circuits, such as capacitance and inductance. A screw through the guide wall acts like a capacitor; a rod across the inside, like an inductance coil. Thus transformers, wave filters, resonant circuits—all have their counterpart in waveguide fittings. Such fittings, together with the connection sections of waveguide, constitute a waveguide circuit.

From Bell Laboratories research came the waveguide circuits which carry radio waves between apparatus and antennas of the New York-Boston radio relay system. As in long distance wire communication, the aim is to transmit wide frequency bands with high efficiency—band widths which some day can be expanded to carry thousands of telephone conversations and many television pictures.

Practical aspects of waveguides were demonstrated by Bell Telephone Laboratories back in 1932. Steady exploration in new fields, years ahead of commercial use, continues to keep your telephone system the most advanced in the world.

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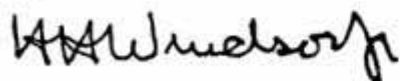
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H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

## To Our Readers

It is with much regret that I tell you that all costs that go into the production of our magazine have made it necessary for us to raise the newsstand price of Popular Mechanics from 25c to 35c per copy. We will make no advance in subscription rates until January 1, 1949, when the annual rate will be \$3.50. As soon as costs come down and we are able to reduce the price, we will do so.



Editor and Publisher

★ ★ ★

## Next Month

EARTHQUAKE experts may be able to predict the "big shakes" in the distant future, but until then the best man can do is to prepare for them. Some of the ingenious ways of protecting everything from buildings to heirlooms are told in a December feature. Another story, "Now They're Weaving Houses," tells about a new and time-saving type of construction. Also in December is the story behind the floats seen in Pasadena's amazing Tournament of Roses.

CRAFTSMEN who like "hand crafts" which can be turned out in a few minutes will welcome the article on gimp braiding next month. Another how-to-do-it feature which will find a wide audience concerns shooting a photo record of the baby in your home. Why not start with the baby's first Christmas? This can grow into a hobby that is easy to master and a lot of fun. Next month's shop feature tells how to build a bandsaw with an 18-inch swing.

HOW to convert your receiver into a wire recorder combination is a December Radio feature.

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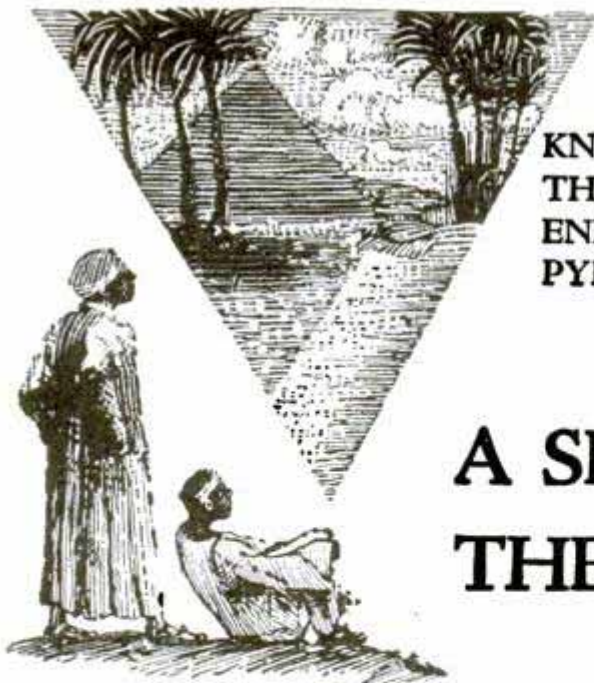
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This One



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5



KNOWLEDGE  
THAT HAS  
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## A SECRET METHOD FOR THE MASTERY OF LIFE

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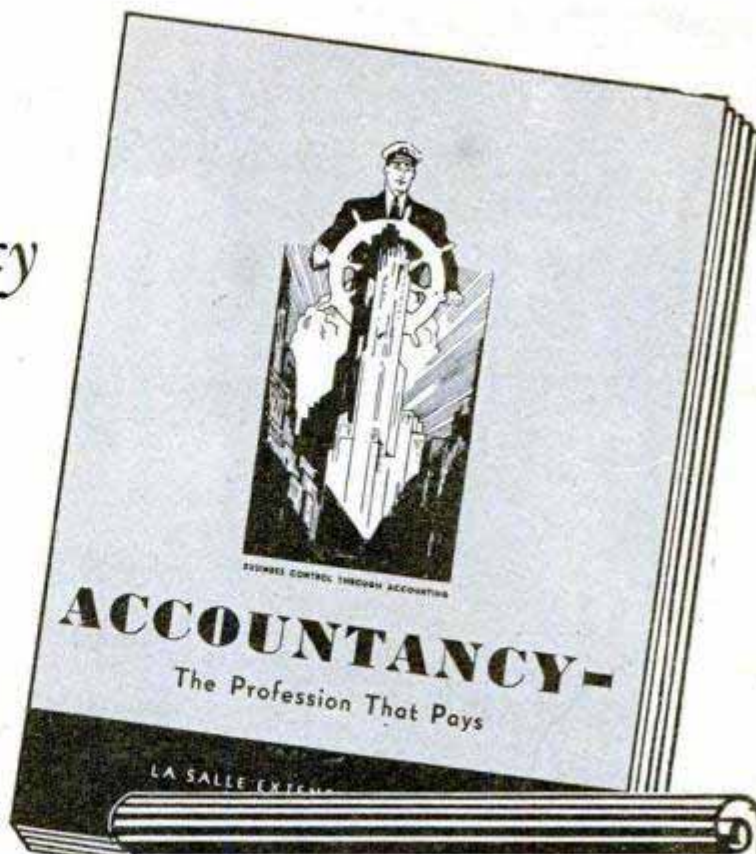
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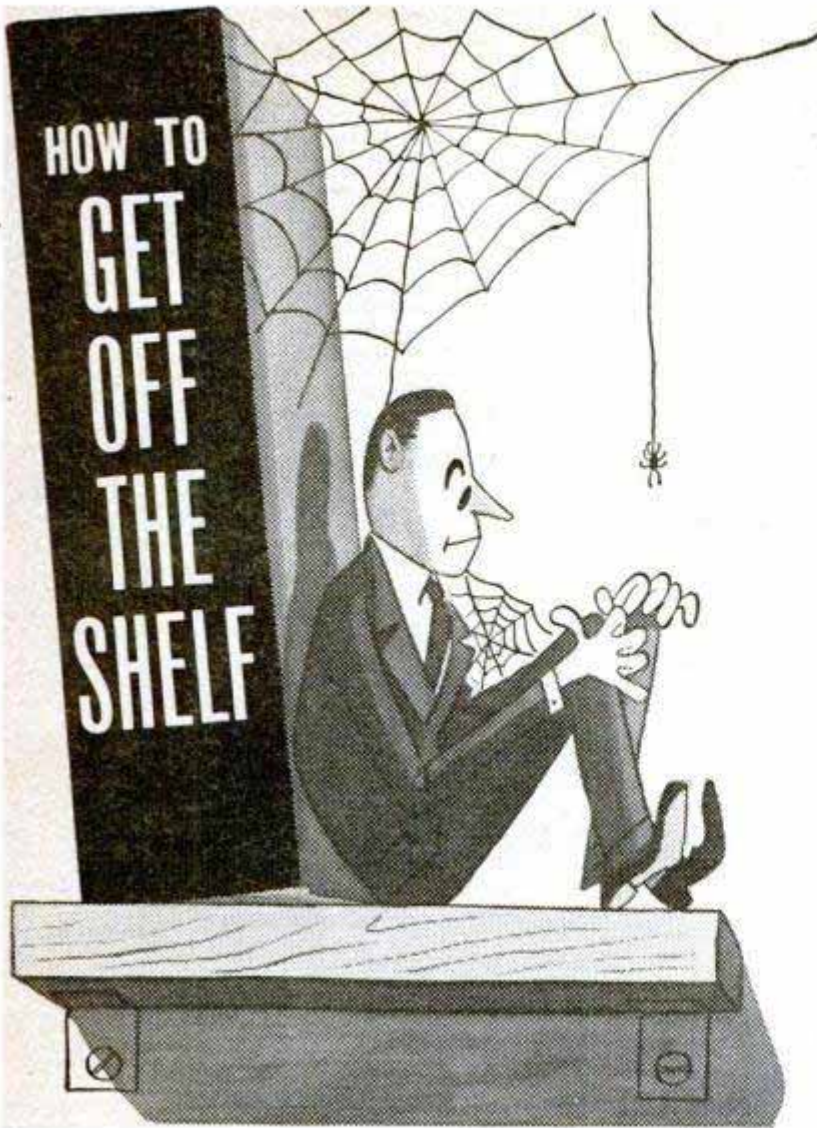
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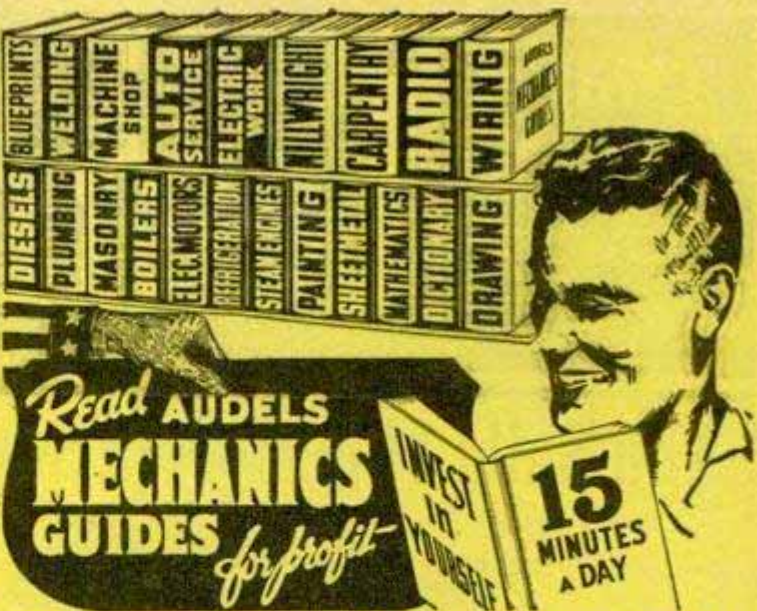
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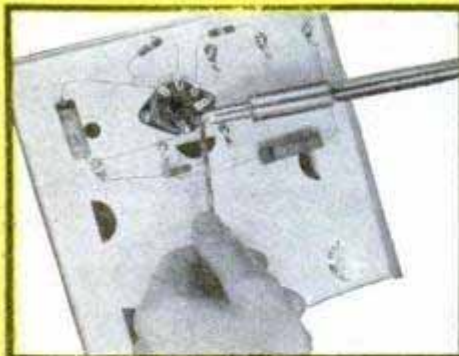
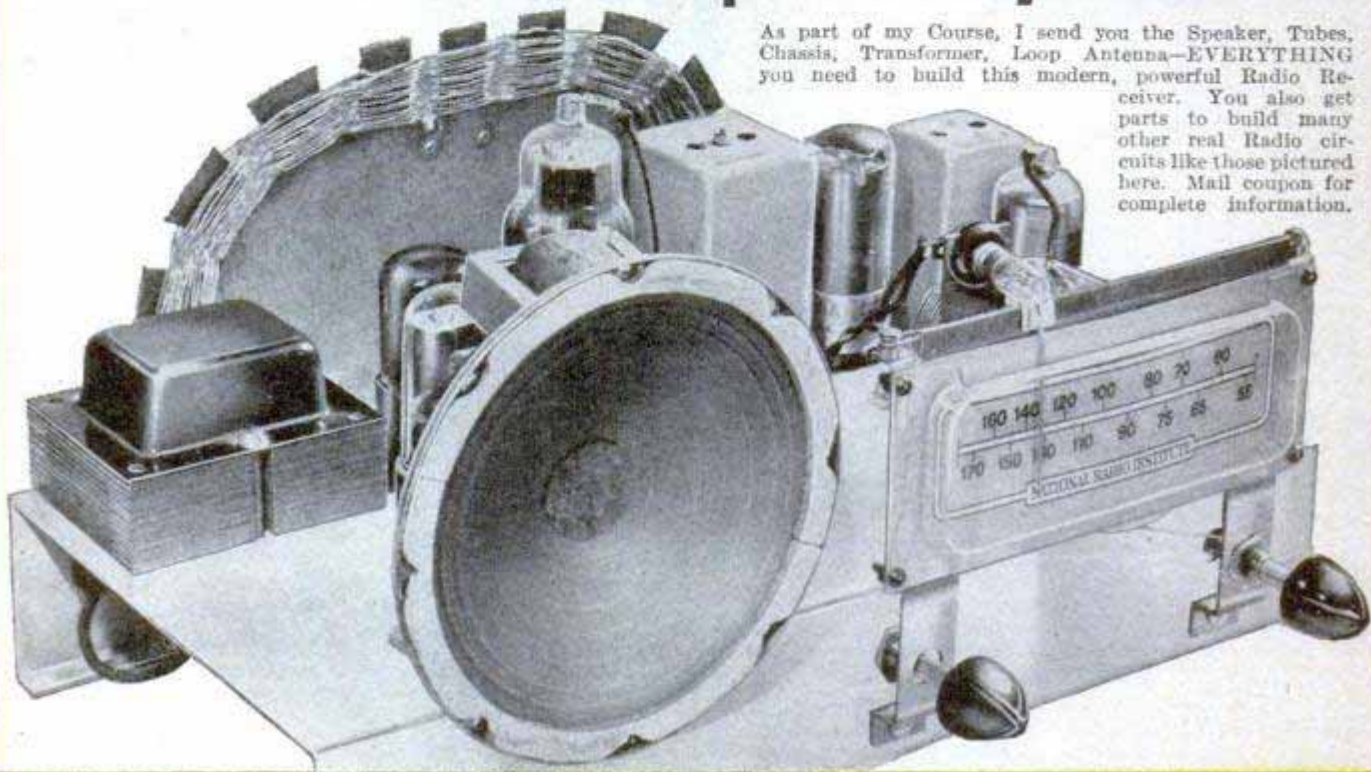
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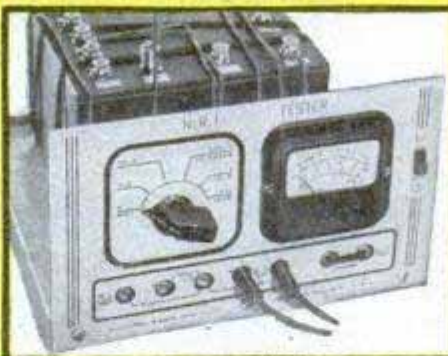
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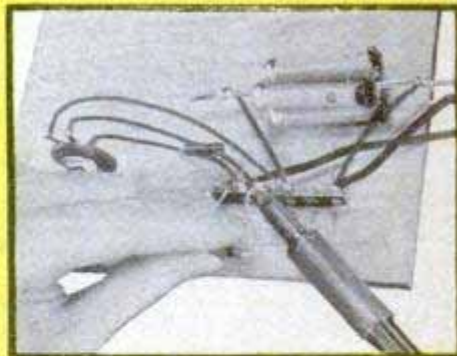
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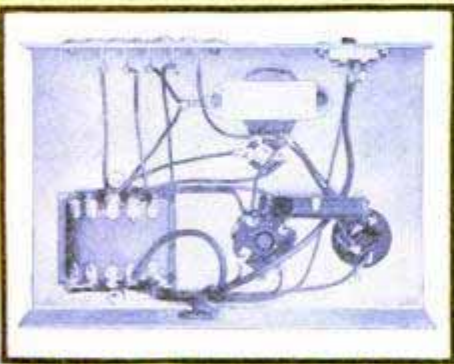


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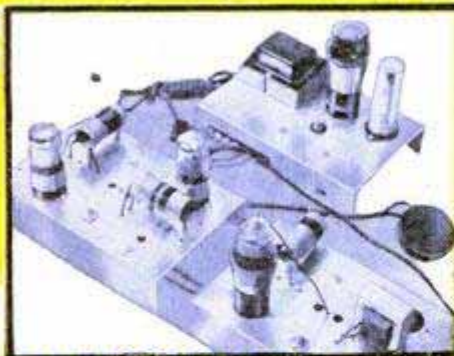
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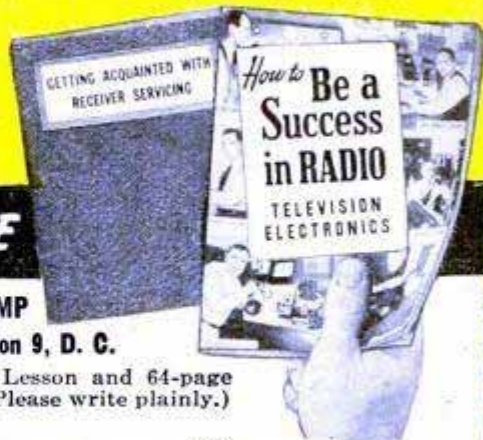
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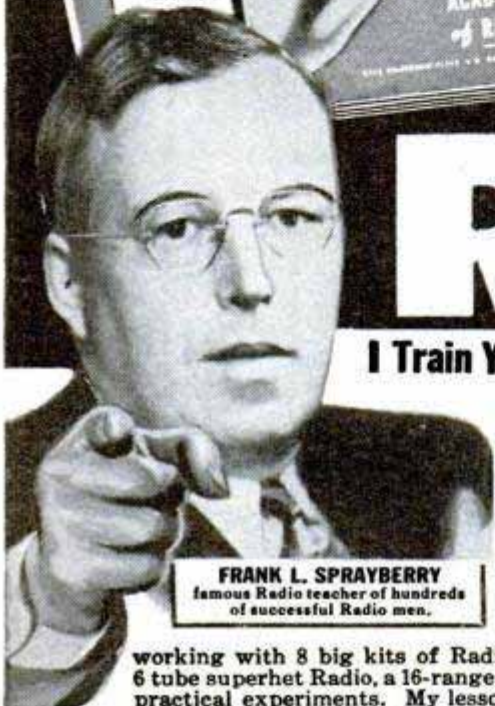
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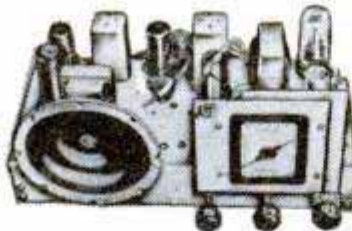
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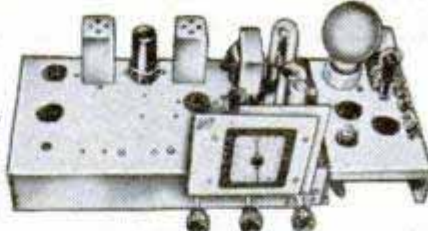
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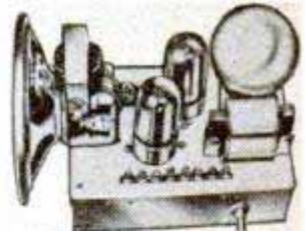
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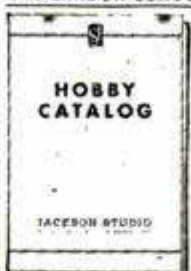
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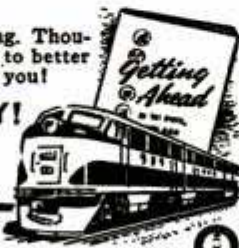
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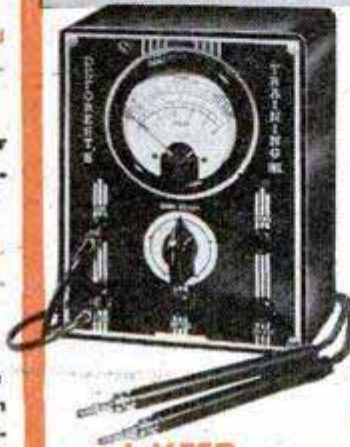
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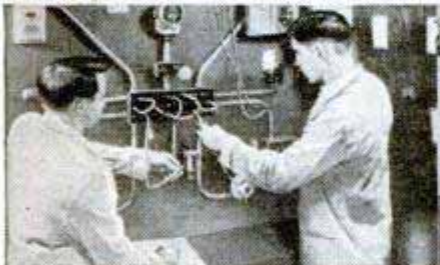
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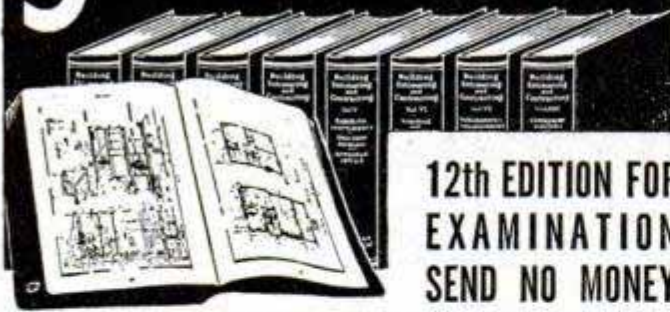
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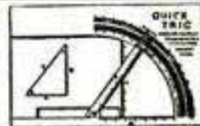


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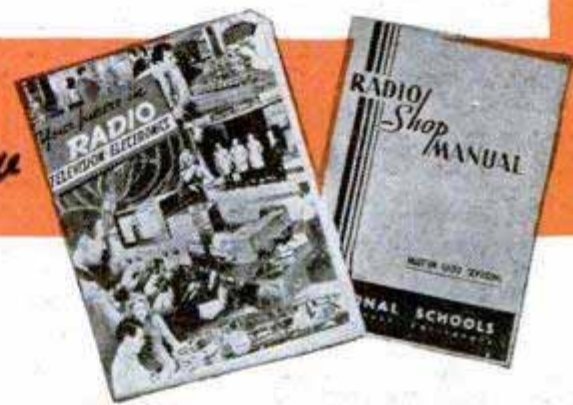
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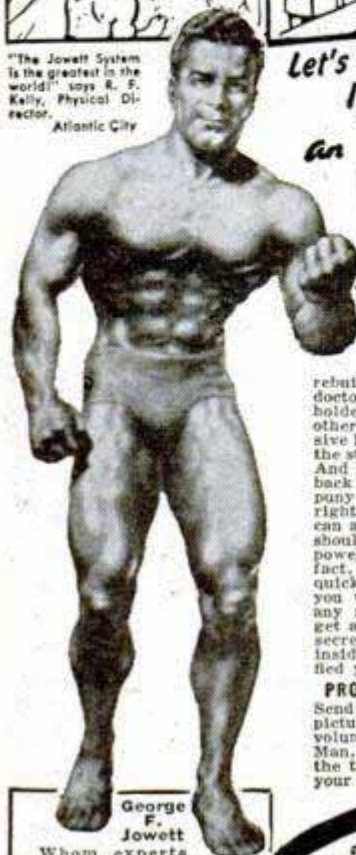
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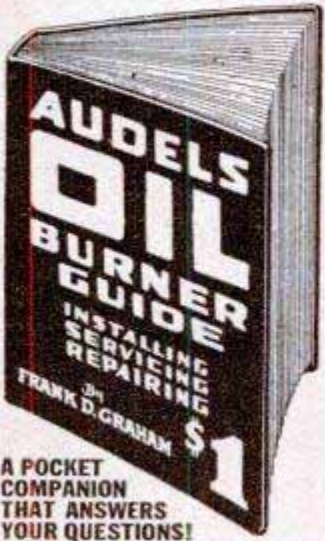
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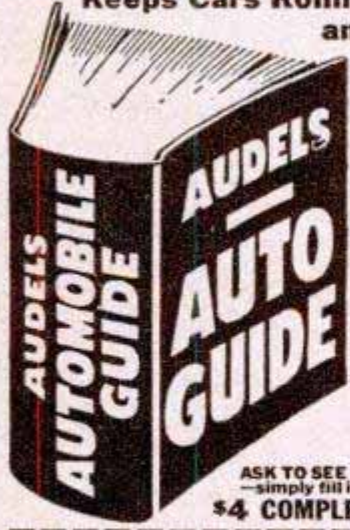
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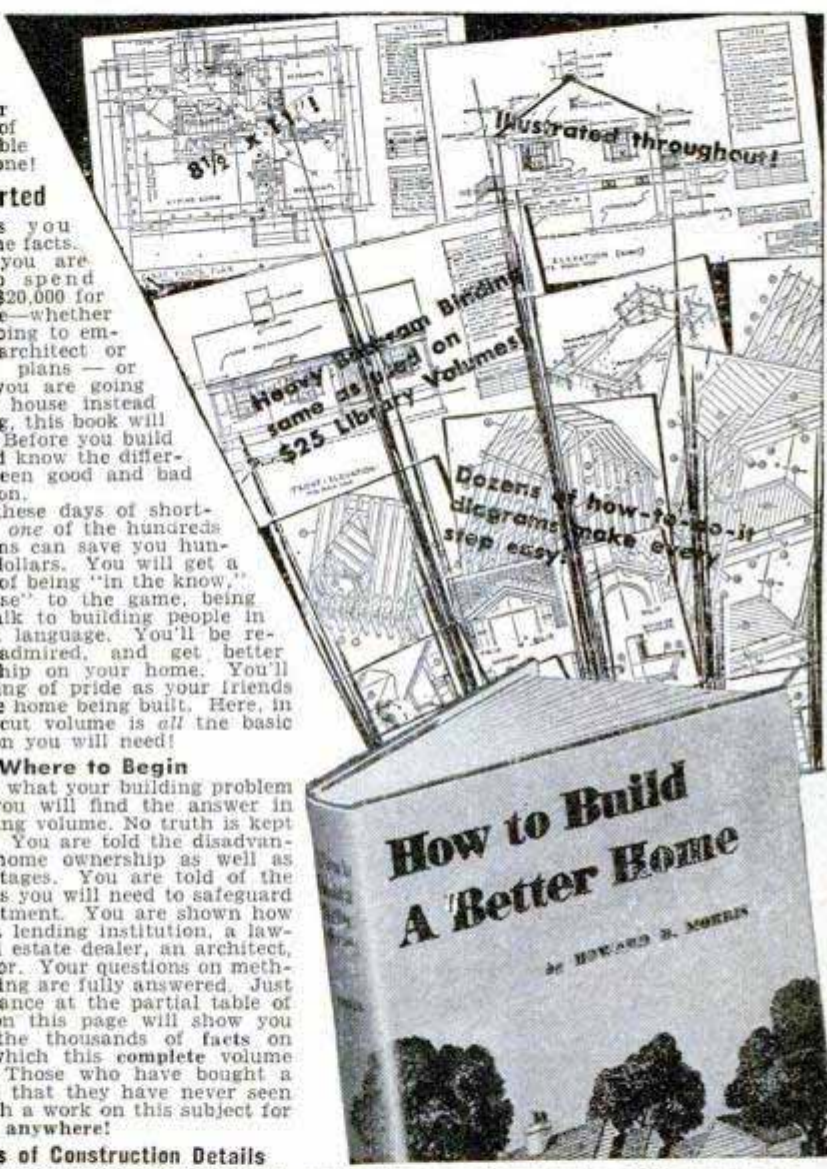
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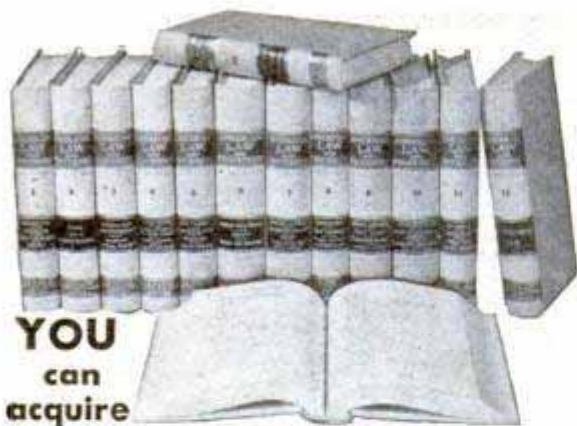
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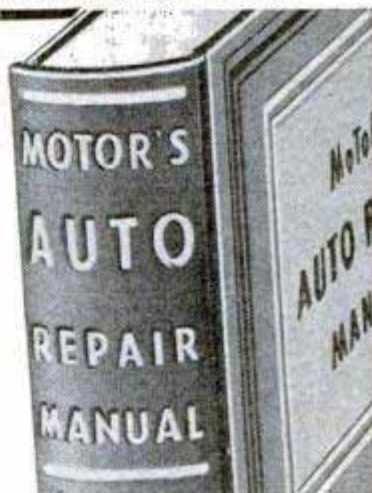
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State of Illinois, County of Cook, ss.  
Before me, a Notary Public in and for the State and county aforesaid, personally appeared H. H. Windsor, Jr., who, having been duly sworn according to law, deposes and says that he is the Editor of the Popular Mechanics Magazine, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), (printed on the reverse of this form to wit: First. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Popular Mechanics Company, 200 E. Ontario St., Chicago, Ill.; Editor, H. H. Windsor, Jr., 200 E. Ontario St., Chicago, Ill.; Managing Editor, R. M. Grant, 200 E. Ontario St., Chicago, Ill.; Business Manager, P. H. Dunakin, 200 E. Ontario St., Chicago, Ill. Second. That the owner is: (if owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Popular Mechanics Company, 200 E. Ontario St., Chicago, Ill.; H. H. Windsor, Jr., 200 E. Ontario St., Chicago, Ill.; H. H. Windsor, Jr., Trustee for H. H. Windsor III and Wm. T. Windsor, 200 E. Ontario St., Chicago, Ill. Third. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (if there are none, so state.) The Equitable Life Assurance Society of the United States, 29 S. LaSalle St., Chicago, Ill. Fourth. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or securities than as so stated by him. Fifth. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is (not daily publication). (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.) H. H. Windsor, Jr., Editor. Sworn to and subscribed before me this 14th day of September, 1948. Vera L. Freehill, Notary Public. (My commission expires July 17, 1950.)

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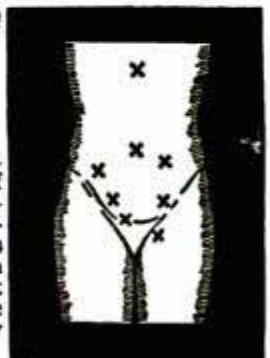
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**BARGAINS** In good used 16mm. sound films. Complete one reel subjects often available at \$2.95. List for stamp. Blackhawk Films, Davenport, Iowa.

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**\$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.

**SAWDUST** Principal ingredient of product universally used. Easily manufactured in cellar or garage. Manufacturer's formula \$2.00. Hoyt, 344 Broadway, So. Portland 7, Maine.

**REAL** Manufacturing formulas. List free. Cummings, Chemist, Gordon Av., Syracuse 4, N. Y.

### PLASTICS

**NEW** Crystal clear liquid casting plastic for hobbycraft and industrial users. "Astrolite" R-250 was developed for biological embedment work at leading university. Exceptional clarity, quick setting, ideal for all casting applications. Send \$2.95 (U.S.A.) for introductory shipment (plastic, hardener, instructions). No c.o.d. orders. Whether you cast for money or fun "Astrolite" will amaze you. Consult our technical staff on all problems relative to plastics. Associated Plastics Laboratories, Dept. B, 3324 Park Blvd., Oakland 10, Calif.

**MAKE** Your own Christmas gift jewelry. Internally carved flowers beautifully colored in Plexiglas ready for assemblage. Kit contains earrings, brooch, and pendant, with silver-plated bow-knot pin. Complete with findings, cement, and instructions \$3.95. Pilot Plastics Co., 69 Beekman St., New York City 7.

**PRACTICAL** Plastics, fabrication—internal carving. New classes now forming. Approved G. I. bill PL 346 & 16. Write Dept. PM, Enterprise School of Plastics, 81 Willoughby Street, Brooklyn 1, N. Y.

**PLEXIGLAS** Sheets, masked. Good assortment \$1.00. Douglas Crowe, Bristol, Tenn.

**INTERNAL** Carvings, drills, dyes, jewelry findings, tools. Plexiglas masked sheets, 12"x12" 1/16" \$1.00, 1/8" \$1.25, 3/16" \$1.55, 1/4" \$1.85. Include 10% postage. Rods, tubes, dyes, cements, buffing compounds. Free listings. Craft Plastics, Somerville, New Jersey.

**PLASTIC** Kits ideal training for hobbyists. Complete instructions, templates and lucite to make ten beautiful useful gifts, picture frames, candle holders, dishes, etc. All for \$2.00 prepaid. Plastics. Lawrence, Michigan.

**AMAZING** Liquid plastic pours cold, hardens in half hour. Clear, colors. Expensive equipment unnecessary. Embed photographs, coins, flowers, seashells. Complete kit only \$3.25. Kristalon Plastics, Dept. A-11, Box 29, Wilmette, Ill.

**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-2118, 1157 S. Kingshighway, St. Louis, Mo.

**SAVE**. Plastics directory lists "right" sources for materials, molds, equipment, incidentals. \$1. Circular free. Plastics Digest, 2917-B Michigan, Kansas City 3, Mo.

**PLASTICS**—Sheets, rods, tubing, coatings. Shells, findings, dyes, craft supplies. Lucite scrap 25-65c pound. Illustrated fabricating manual, price list, 10c. Lucite sample, 35c. Courtesy to dealers. Gem-O-Lite, 5350F Riverton, North Hollywood, Calif.

**DON'T** Throw away broken plastic articles. Use WestCol plastic cement. 40c postpaid. WestCol Mfg. Co., 108 North 3rd, Grand Junction, Colorado.

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

**RENEW** 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. 4723B Troost, Kansas City, Missouri.

**PLASTIC** Injection machine. Flexiglas, jewelry findings, sequins, dyes, cements, tools, drills. Catalog. G. Baker Company, River Edge, New Jersey.

**BARGAINS** In plastics. Lucite, Plexiglas, Catalin. Many colors and sizes. Details free. George Plastics, 6938A George St., Chicago 34, Ill.

**PLASTIC** Materials and supplies for your hobby or business. Catalog and internal carving instructions free. Art Plastics of Calif., 8125 East 14th Street, Oakland 3, Calif.

**LUCITE, Plexiglas.** Any size sheets. Cost square foot (12"x12") 1/16" 96c; 1/8" \$1.25; 3/16" \$1.52; 1/4" \$1.80; 100-\$1.14. Include 10% postage. Almac Plastics, 1150 Broadway, New York 1, N. Y.

## CHEMISTRY

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

**LABORATORY** Supplies at wholesale prices. Catalogue chemicals, apparatus, etc. 15c. Microscopic stains 20c. Both for 25c. National Scientific Company, 2204 W. North Ave., Chicago 47, Ill.

**CHEMICALS** And apparatus for industrial, analytical, and private laboratories. Catalog 10c. Dept. M-26. Biological Supply Co., 1176 Mt. Hope Ave., Rochester 1, N. Y.

**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.

**FREE** Catalog: Chemistry, mineralogy, physics, biology. Tracey Laboratories, Evanston, Illinois.

**HANDBOOK** For chemical experimenters, illustrated, hundreds of experiments, 50c. Experiment booklet 15c. Supply catalog 5c. Reading Scientific Company, Reading, Penna.

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

## HELP WANTED

**ACT.** Sell new Xmas photo greeting folders. Big profits, we deliver, free kit. Spooner, 115 Chauncy, Boston, Mass.

## AGENTS WANTED

**RELIABLE** Man take care store route. Distribute, collect; new product, protected territory. Earn excellent weekly income. B. and W. Nut Co., St. Paul 1, Minn.

**BIG** Money—fast. Sell quality plastic tablecloth (from \$4 doz.), aprons, curtains, etc. Factory prices! Free samples! Durever, 314 C-Albany Ave., Brooklyn 13, N. Y.

**MAKE** Big weekly commissions selling nationally advertised aluminumware, silverware, pressure cookers, canners and gift items. No investment required. Simply take orders, collect commissions, we do the rest. Complete sales kit free. Write Ury Co., Dept. 12C, 222 - 4th Ave., New York 3.

**STRANGE** "Dry" window cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee 127, Akron, Ohio.

**\$5.00 CASH** Advance commission every sale 38-piece "Lady Ann" silverware. Guaranteed quality, value bring sales galore. Also varied line of other silverware and housewares. Write for sure-fire sales outfit. Dexter Silver Co., Dept. PM-11, 303 Fifth Ave., New York 16.

**SPOT** Remover sensation. Removes food, grease, perspiration stains overnight. Lip-stick stain. Special price to sales agents. Retail for 15c. Write for details. D. R. Mackenzie Co., Lincoln Bldg, New York 17, 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. K-192A-PPM, Freeport, Ill.

**\$1 STARTS** You in business. Sell lined ties, 100% wool interlining. Costs you only \$7 per dozen, you make \$5.00 dozen. Send \$1.00 for special introductory offer two ties. Catalog complete line free. Philip's Neckwear, 20 West 22nd St., Dept. K-29, New York 10.

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

**PLASTIC** Tablecloth covers, curtains, drapes, baby pants, bowl covers and other plastic articles selling like wildfire! Make big money now! Free details. Write L & M Co., Dept. 58-M, 510 St. Charles, St. Louis, Mo.

**100% PROFIT**—75c Seller—Knife and scissors sharpener. Homes, hardware, department stores. Exclusive territory open. Sample 25c coin. Keenway, 185 Barbee, Fontana, Calif.

**BIG** Earnings easy when you sell nationally advertised products. Write for free catalog to: F. J. Savarese, 26-39 29th St., Long Island City 2, 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.

**SELL** Ultra-blue stock signs to stores. 1000 slogans, comedy, general, religious. "7x11" cost 6c, sells 35c. Make money. 15 samples ultra-blue signs "7x11" \$1.00 postpaid. Lowy, 8 West Broadway, Dept. 424, New York City 70.

**POCKET** Pal: replaces pocket knives, new, safe, beautiful. Always razor sharp. 50c seller. 321% profit. \$15.00 or more daily. Agents, salesmen, distributors. Sample 10c. Nelson Mfg. Co., 222 W. Kellogg, St. Paul 2, Minn.

**LONG** Needed invention. Established company. Every home, factory, store, farm a prospect. Low price, long profit. Exclusive. Fine outfit. No deposit. Local territory. Write 237 R. C. Building, Red Comet, Inc., Littleton, Colorado.

**MAKE** 100% Profit selling name imprinted Christmas cards and \$1.00 assortments. Personalized napkins and stationery. Request samples. Dunbar, Sanford 2, Florida.

**RAT-SNAP.** No odor, rats dry up. Sells 35c, cost you \$1.50 doz. Sells dealers \$2.50. Allen Co., Pittstown, N. J.

**AGENTS** House to house. Valuable premiums or cash commission. Write today for particulars. Benwood Laboratory Inc., Dept. B, 317 No. Memorial Drive, St. Louis 2, Mo.

**DIRECT** From factory. Make \$100.00 weekly selling watches. Advertised brands with guarantee. Free catalogue. Ergim Watch, 833 Columbus Ave., New York.

**AGENTS**—Garage, gas station contacts! Sell King McCoy spark plug checkers. Most accurate on market, simple guaranteed, fast seller. \$4.95 less 50% to agents. Write King McCoy Inc., 101 Pine St., Dayton, Ohio.

**SELL** Mexican bird pictures, hand made of real feathers in beautiful colors. Sample 8x10, \$2.50; 10x12, \$3.00. Each with frame. Importer C. Staff, 14660 Evanston, Detroit 24, Michigan.

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

**YOUR** Own business, \$100 weekly. Fast selling plastic furniture covers. Floral table covers, aprons, etc. 100% profit. Free sample. Carwell, 330-PF South Wells, Chicago.

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

**EARN** Big money year 'round. Be a one-person-department-store. Take orders for shirts, ties, hosiery, lingerie. Household linens, etc. For information, Corporate Merchandisers, Dept. PM-8, 110 West 34 Street, New York City 1.

**SPECTACULAR** Guarantees, popular prices, make selling easy. Biggest steady repeat profits selling Colt's famous men's, women's guaranteed shoes, hosiery. Experience unnecessary. Free selling outfit. Colt Shoes, 601-J11 Atlantic, Boston 10, Mass.

**QUICK** Money: 100% profit. Show Xmas cards, stationery to friends, coworkers. No experience. Approval samples. Torres Co., 373 Fulton St., Brooklyn 1.

**FREE** Sample. Profitable fast seller. Salesmen, distributors, mail dealers write Flinson, Box 4333-B-C, Kansas City 1, Mo.

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

**FREE** Nylons given if Kendex hosiery runs or snags! World's only women's hosiery sold with a written guarantee that amazes everybody. Mere words could not possibly express the almost unbelievable opportunity you now have to make money. Fantastic and "impossible" earnings now become a reality. Can you imagine a guarantee that replaces hosiery regardless if damage is due to use or abuse and regardless whether it is the fault of the hose or the wearer? Here is sales dynamite that will blast your earnings to the sky! Even if you never sold a thing in your life, three magic words: "guaranteed against everything" will open doors for you—will make women listen and will pour money in your pocket. Kendex stockings are not sold in stores, so you have no competition. Complete line includes beautiful sheer nylons; long wearing, durable service nylons; three different lengths; genuine outside nylons; latest shades; choice of full fashioned with seams or seamless; lowest priced rayons. Also separate complete line of men's hosiery including nylon, lisle, rayon, cotton, mixtures etc.; plain and fancy; long and short. Thousands of pairs shipped daily. No money or experience needed. Nothing to invest or risk. No samples to buy. Nothing to pay, now or later! Simply write orders. We deliver and collect. Liberal advance cash plus huge cash bonus. Write orders spare or full time; exclusively or as a side line. Become a manager and appoint others to sell for you with steady income on their sales! Complete money-making outfit, including salesbooks in color, samples cut from actual hose, instructions, order blanks etc. furnished free and prepaid. Rush name and address on postcard and start making money next week. Kendex Co., Babylon 186, New York.

**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.

**SILVER** Plating liquid (NuSilver). Apply with cloth. Durable, guaranteed, genuine, silver finish. Renews silverplated ware, articles, pieces. Silverplates brass, copper. NuProcess Products, Aurora, Ill.

**AGENTS**—Something new in house numbers. Illuminated number and door bell push-button combination. Write for sample and particulars. Nitenumber Co., Box 5150, Cleveland, Ohio.

**GUARANTEED** Tire patch. Sell garages, filling stations. Protected territory. Economy Rubber Co., Riverdale Station, Box 552-D, Dayton 5, Ohio.

**POSITIVELY** New. 100% profit. Heavy repeat sales. Fast selling, two sided, reversible neckties. Free details. Farrell Company, Dept. 35, 1377 Galbraith, Cincinnati 31, Ohio.

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

**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.

**AGGRESSIVE** Agents wanted to demonstrate guaranteed Copper-Cote ironing pad and cover sets. Endorsed by housewives everywhere. Sure-fire sales plan helps you get started. Generous commissions. Protected territories for producers. Real deal for live wires. The Sheldon Company, Box 1347, Milwaukee, Wisconsin.

**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.

**SELL** The famous \$3 "Fire-Killer" extinguisher with bracket, wholesale or direct; exclusive territory. Demonstrating sample \$2; refilled free. "Fire-Killer," Syracuse 1, N. Y.

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

## EDUCATIONAL AND INSTRUCTION

**SQUARE-ROOT.** Easy short cut, 15c. Prof. Lineback, College Station, Stillwater, Oklahoma.

**FOR An extremely profitable lifetime business operate a collection agency—credit bureau. Easily learned. Free folder. Cole & Associates, Syracuse 2, N. Y.**

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

**U. S. Gov't Jobs. Start high as \$3,351. Men-women. Quality at home for secure positions. 40-page book, sample tests—free. Write Franklin Institute, Dept. H24, Rochester, N. Y.**

**LAW Students! Finish your law correspondence course with our expert coaching. Low cost. Write today, stating your course and how far advanced for free particulars. Glenn Squires, Lock Box 5375, Van Buren Station, Chicago 7, Ill.**

**LEARN Auctioneering by mail. Sample lesson free. Nelson Auction School, Renville, Minnesota.**

**BECOME A Doctor of Psychology or Metaphysics. Teach secret of contentment, happiness. Win degree of Ps.D. or MsD. Solve mental worries. Free book. College of Universal Truth, 5153-C North Clark, Chicago.**

**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! Course approved for Veteran's training. Lewis Hotel Training School, Room NW-368, Washington 7, D.C. (First and only school of its kind—now in its 33rd year.)**

**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-M, Roanoke 7, Virginia.**

**BE A Notary Public. Largest notary supply house equips you for \$16.97, guarantees your appointment by governor. Honor, prestige. You certify legal papers, collect fees. Easy. At home, office, any where. You use official seal made with your name. Notaries needed everywhere. Be one. Write Stationers Exchange, Helotes 18, Texas.**

**WRITE For pay! New guide helps you get started. Complete, \$1.00. Charles Cox, 821-B East Linwood, Kansas City, Mo.**

**CORRESPONDENCE Courses. Used International. Many subjects. Satisfaction guaranteed. Write today. Baker, 3509 Winthrop, Chicago 40.**

**"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. 11011, Pleasant Hill, Ohio.**

**MAKE Up to \$30-\$40 week as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-11, Chicago.**

**BE A real estate broker through home study or classroom instruction. Write for free book. Approved for veterans. Weaver School of Real Estate, 15 E. Pershing Rd., Box CP-1, Kansas City 8, Mo.**

**STUDY Dental technician trade at home. Ten complete lessons \$5.00. Grant Laboratory S, Los Angeles 14, Calif.**

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

**MATHEMATICS, Arithmetic; algebra, geometry, trigonometry, calculus, physics, radio and business math, drafting, architectural, mechanical, electrical, structural, building estimating. Approved for veterans. Mondell, 230 West 41st, New York.**

**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.**

**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-118, 7530 Greenwood, Chicago.**

**BARBECUE Picnic sets. Lawn-sickle mowers. Engines. Motors. Farmco, M-2001, Excelsior Springs, Mo.**

**MAKE \$15.00 To \$25.00 per day. Joe Louis' and Marva Louis' (his wife) toilet articles, cosmetics and other products for men and women are sensational. White people like them; colored people buy on sight. Perfumes, powders, pomades, creams, brown creams, flavors, remedies, and many other fast sellers are our features, \$3.95 buys \$10.03 (23 items) retail deal—send \$1.00, pay postman balance. Be first in your community to offer this new line and you will be happy. Joe Louis Products Company, 6 E. Garfield Blvd., Dept. PM-11, Chicago 15, Illinois.**

**SELL Delicious candies, nuts, gum. Immediate delivery. Write Casterline, 3031-PN Sunnyside, Chicago 25, Illinois.**

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

**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, 1024-B Arch Street, Philadelphia, Penna.**

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

**IF Punchboards are allowed in your territory, we have the hottest thing this side of the Mississippi. You will say you never made money any easier or faster. Wico Products, Logansport, Ind.**

**HOBBY Books. Latest titles. Catalog free. Popular Mechanics Press, (C-43), 200 E. Ontario, Chicago.**

**OLD Cars run like new! Stops vibration, rattle, shimmy. Lox-It Safety Clamps are designed and proven to save lives from car-truck wrecks caused by tie rod-drag link failure. Give make and model. Prepaid on receipt of \$1.50. Best investment and cheapest insurance you ever made. Agents make \$3.00 per dozen selling service stations. Good salesmen make \$200 to \$400 a week. Advertising matter free. Lox-It Manuf. Co., Clarksdale, Miss.**

**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-K, Spencer, Ind.**

**CHRISTMAS Balloons wholesale. Twistee animals. Complete rubber toy line plastic balls, dolls, 12 samples 25c. Ellswood's, LaJunta, Colorado.**

**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.**

**MAKE \$2,000 Next 60 days. New invention cleans clogged drains in jiffy. No chemicals. Nothing like it! Prospects everywhere. Commissions advanced. We deliver. Free sample offer. Campbell Co., Rochelle 3, Illinois.**

**QUICK Sure money selling Annie Blaine flavors. Highland Park 1, New Jersey.**

**BE The Popular Mechanics representative in your neighborhood and earn big profits in your spare time. Write Popular Mechanics Magazine, Room 408C, 200 E. Ontario St., Chicago 11.**

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

**BIG Bargains for big profits. Over 100 sensational wholesale values. Men's used suits \$2, pants 35c, topcoats \$1.25, overcoats \$2, shoes 20c. Experience unnecessary. Free catalog. Superior, 1250-A Jefferson, Chicago 7.**

**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.**

**PLASTIC Christmas cards. Exclusive new plastic, sachet, panoramic and carols Christmas assortments. Five leading 21 card \$1.00 feature assortments. Six portfolios of personal cards. All this plus America's fastest imprint service. Free samples. Elmcraft Card Co., 5930 South Western, Chicago 36, Illinois.**

**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.**

**CHRISTMAS Cards! Jobbers' prices! Fifty different items from 18c to 38c per box. Gift wraps, seals, Christmas tree windows, books, letterheads. Illustrated catalog free! Fantus, 436 North Wells, Chicago.**

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

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

**SELL Books by mail. Mammoth sales and huge profits. Everything furnished. 3c stamp brings complete particulars. Box 177, Madison Square Station, New York 10.**

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

## HIGH-GRADE SALESMEN

**START Your own business on our capital. Always your own boss. Hundreds average \$6,000 to \$25,000 annual sales year after year. We supply stocks, equipment on credit. 200 home necessities. Selling experience unnecessary to start. Wonderful opportunity to own pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. K-U1-PPM, Freeport, Ill.**

**MAKE \$500.00 A week! Be first with "Neo-Fluorescent." Revolutionary invention! New type fluorescent sign replacing neon. Fantastic virgin market with dealers, mfgs., distrib. nets fabulous profits. Free sample offer. Rose Co., 539-WW So. Franklin, Chicago.**



**SUPERMEMORY** Makes data stick like burrs! Write Thor Books, CM-11, Box 1210, Chicago.

**EDUCATED** Memory develops alertness, confidence and success. "Memorology" science of memory simplified, will enable you to amaze your friends and employer. Literature free. Memorology Club, 2016 Sunnyside Ave., Chicago 25, Illinois.

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

**RADIO** Announcing. Train for this interesting, profitable profession at home in spare time! Details free. Radio Arts Center, 2912 South Salina Street, Syracuse, N. Y.

**MAKE** Money in bookkeeping! Introductory lesson 35c; 15 lesson course \$5. Bernard Buchalter, 1280 Ocean Ave., Brooklyn 30, N. Y.

**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.

**TECO** Motor kit—Complete parts for small low voltage a.c.-d.c. motor. Quality product for electrical students in high school, industrial, vocational, and home laboratories. Arranged for demonstrating squirrel cage and wound rotor, series, shunt and compound connections, brush settings, air gaps, and other salient technical points pertaining to electric motor operation. (Not merely a toy). Write Teco Incorporated, P.O. Box 127, Boonton, New Jersey.

**VETERANS**—Send for free 36-page colored photo book. World's Largest Watchmaking School, Desk 40, 808 Ridge Ave., Pittsburgh, Penna., "Workshop of the World."

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

**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.

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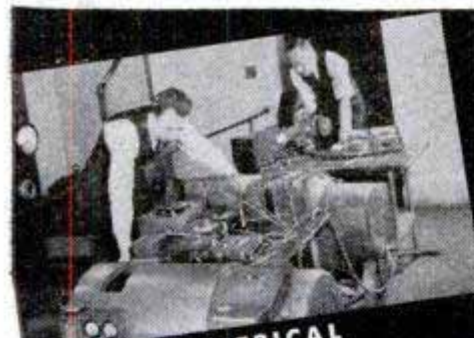
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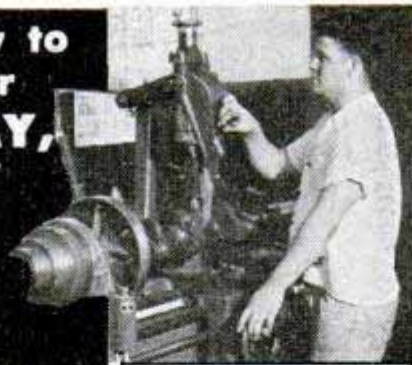
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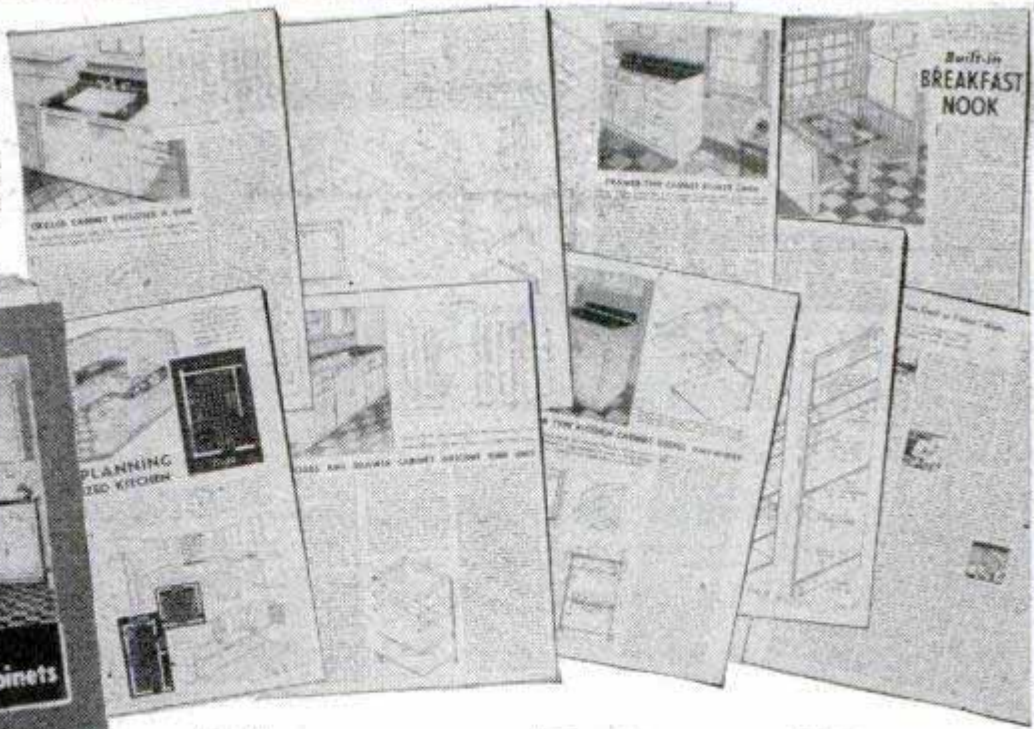
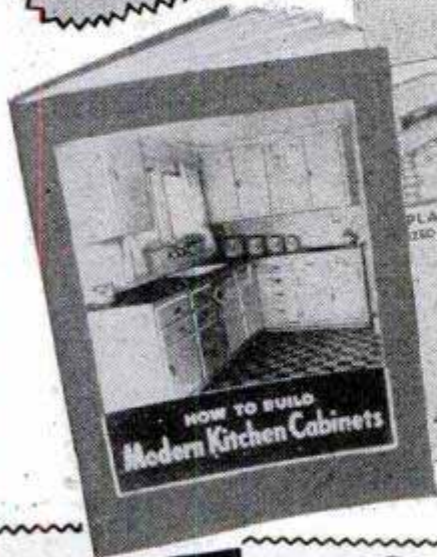
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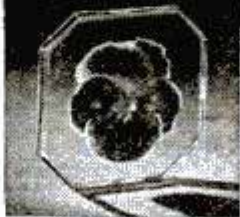
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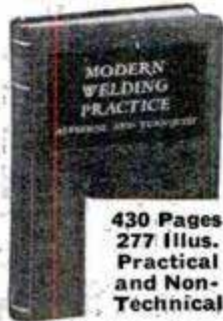


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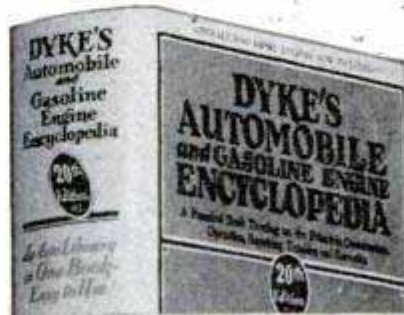
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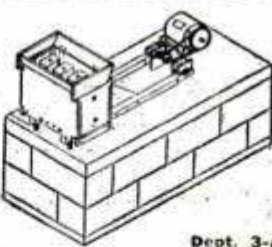
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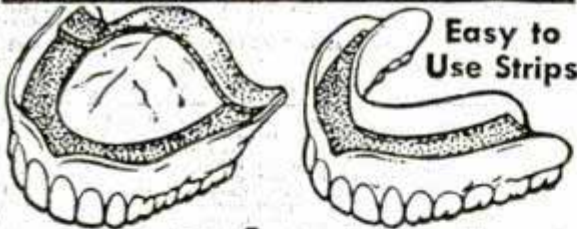
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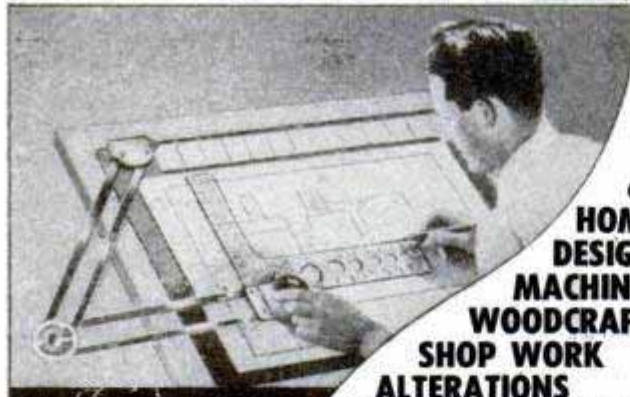
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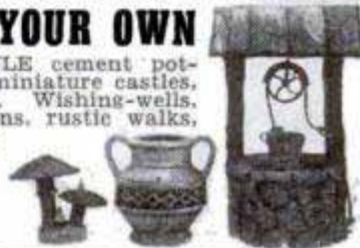
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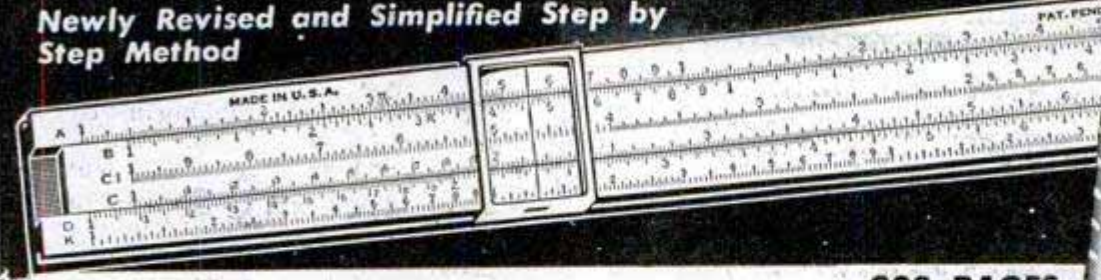
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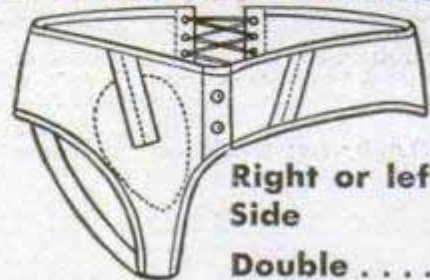
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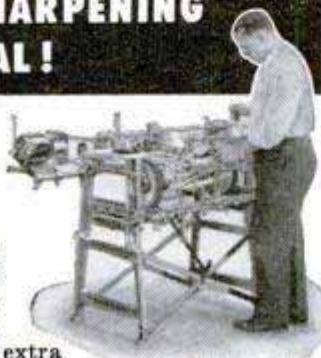
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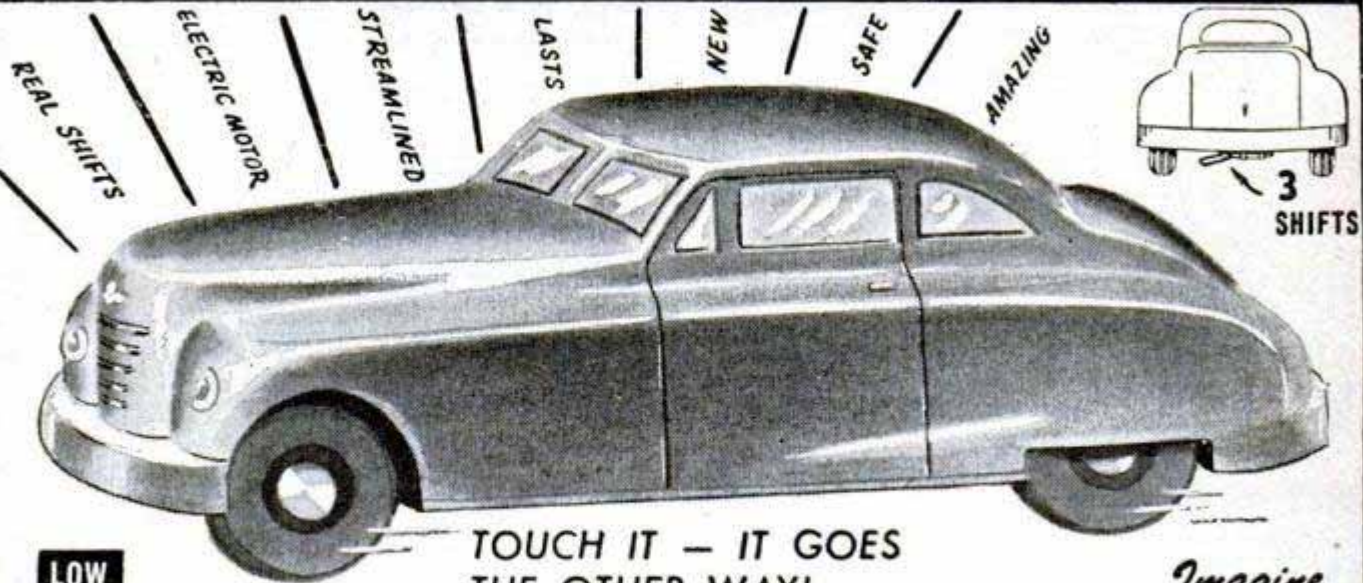


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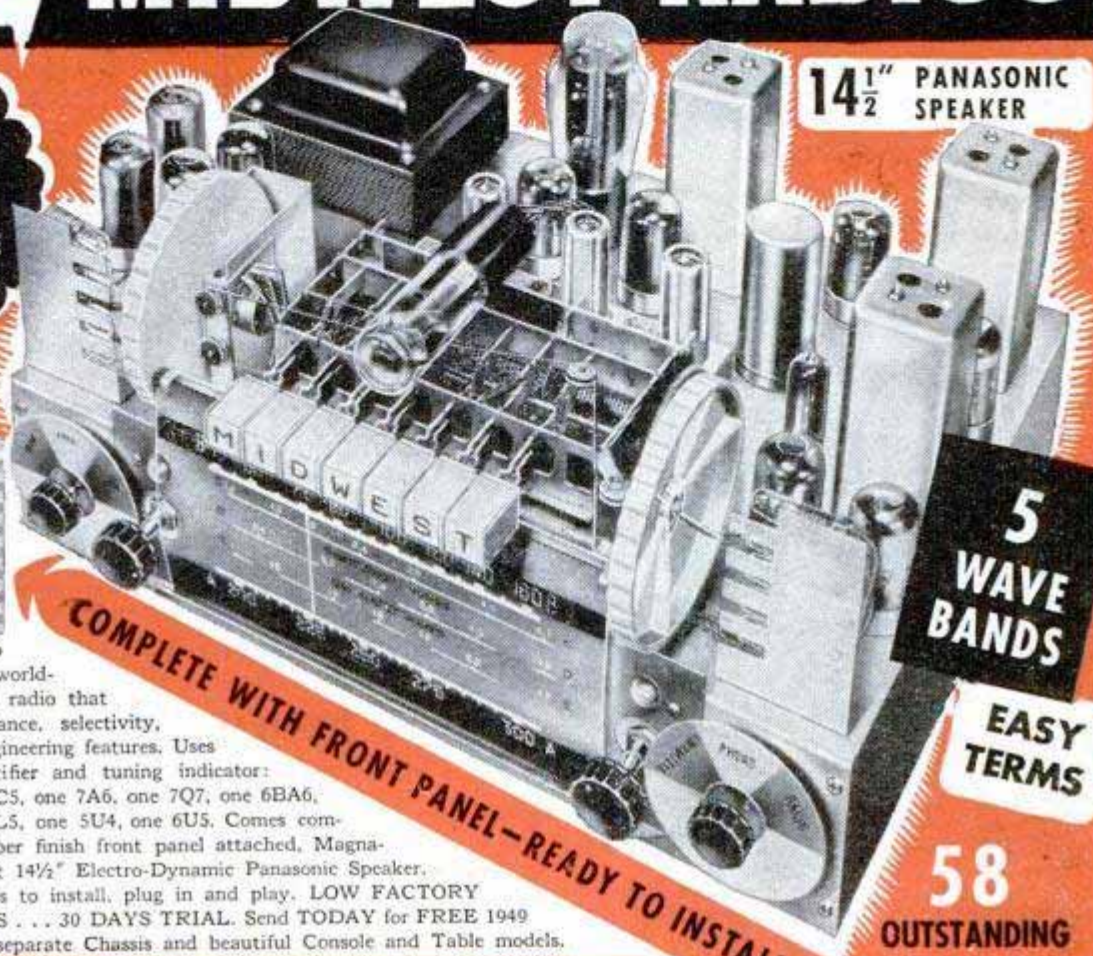
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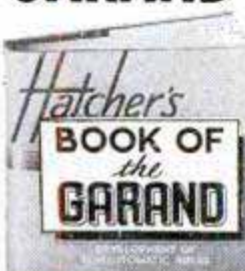
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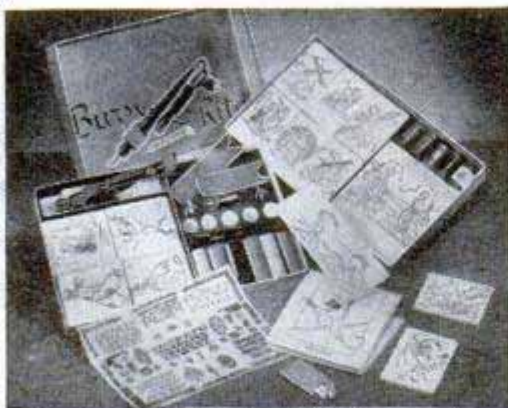
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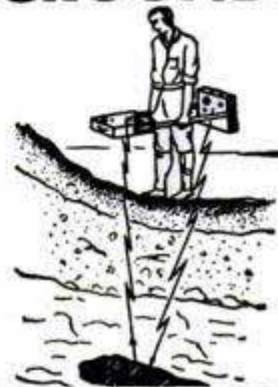
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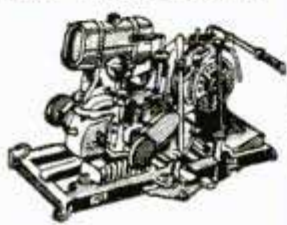
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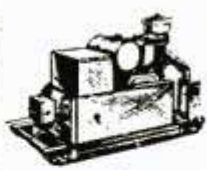
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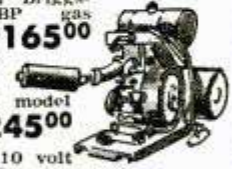
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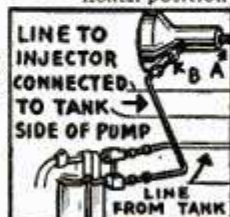
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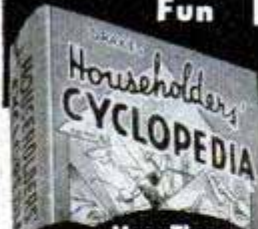
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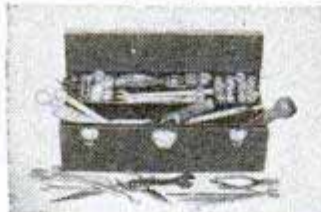
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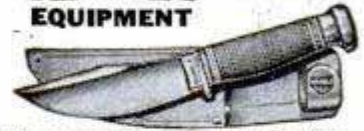
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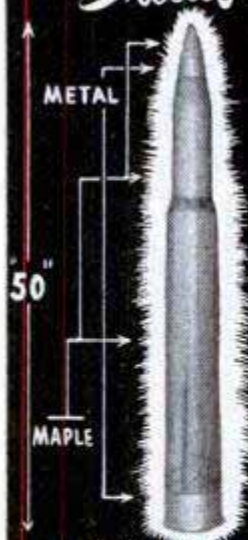
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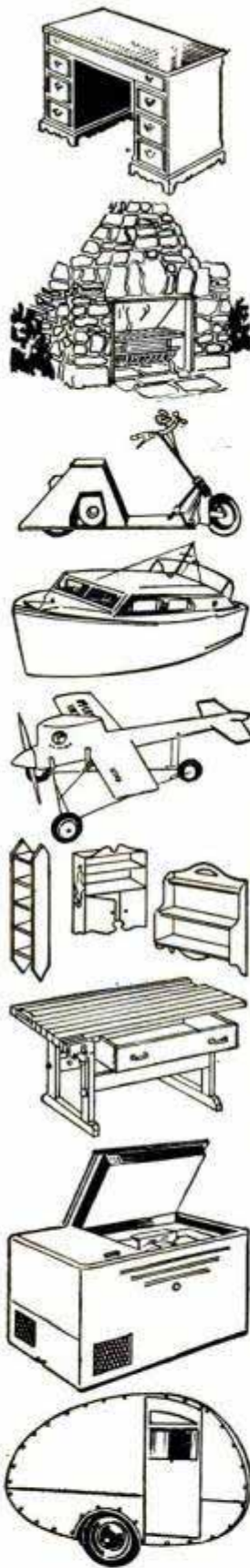
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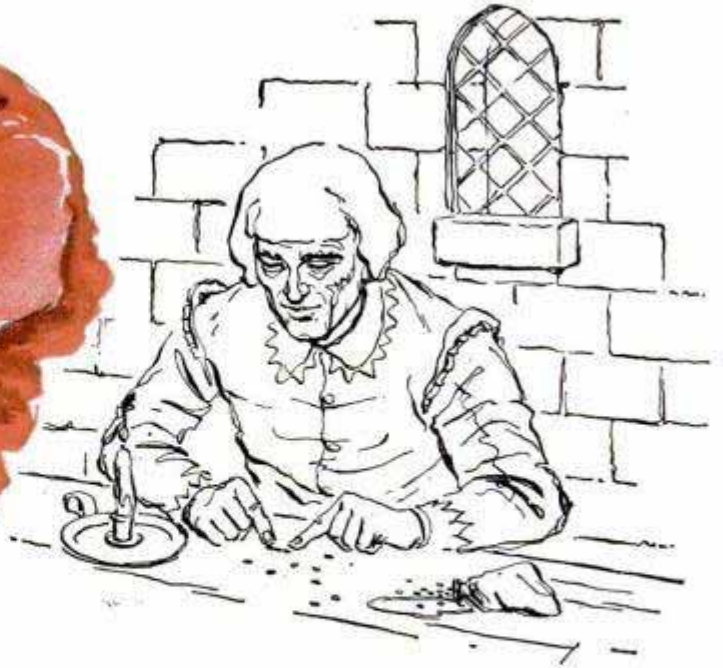
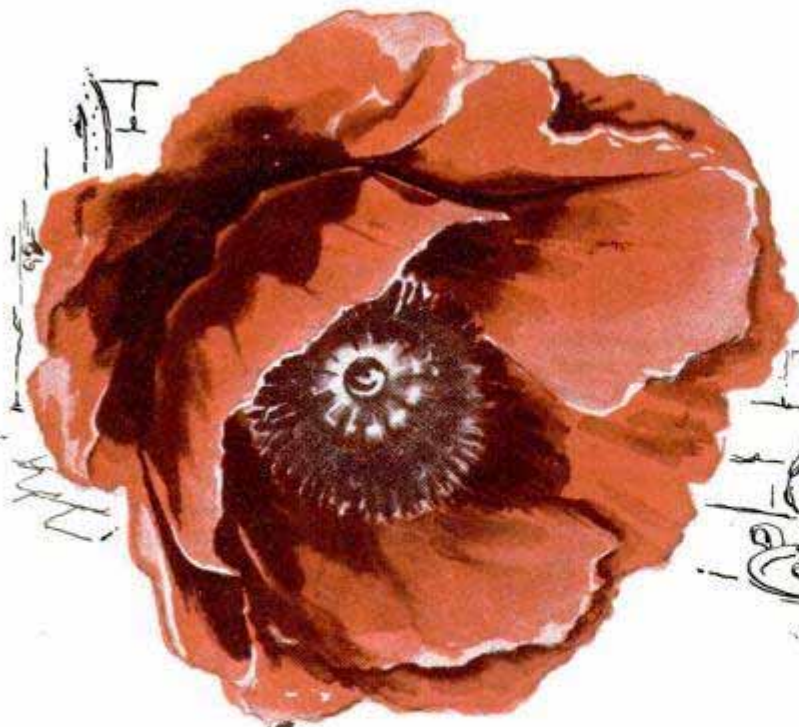
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# Top of the World Weather Run

U. S. Air Force photo

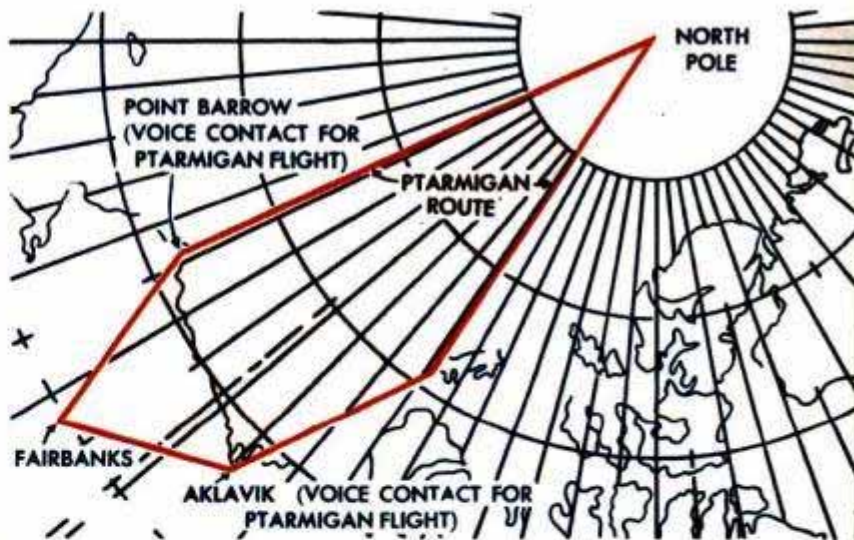
Far out over the Arctic Ocean, a B-29 wings its way toward the North Pole. Right, round-trip course of polar run, which can be flown in either direction

By Aubrey O. Cookman, Jr.

**S**HUTTILING between Alaska and the North Pole on a timetable schedule, Air Force B-29s are seeking an answer to that simple question so vital to picnickers, generals and farmers—"What's the weather next week?"

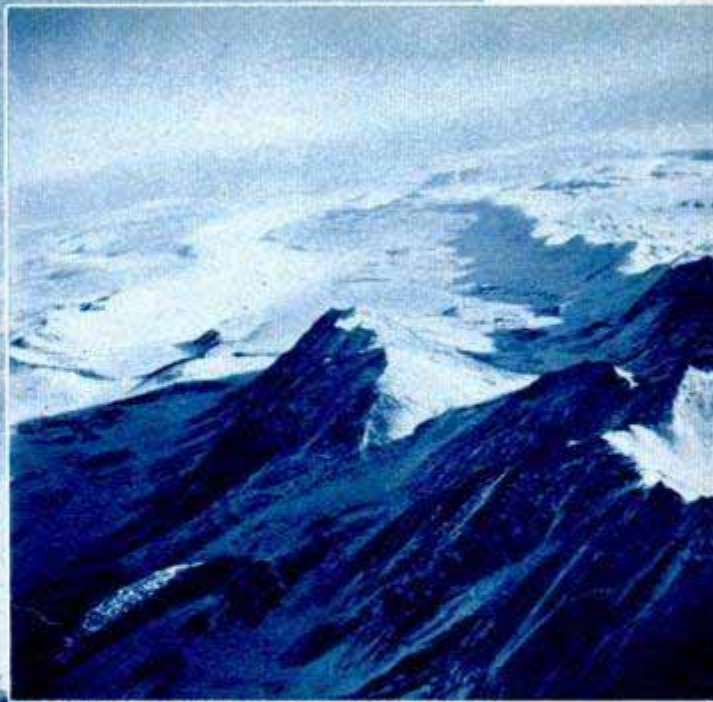
Minus fanfare and plugging along routinely over a hazardous route with monotonous safety, the Superfortress weather men are laying the foundations for long-range forecasting for North America. From total experience—and over 110 missions have already flown the 3290-nautical-mile track successfully—the Air Force hopes to uncover much of the unknown about the arctic-born blasts that sweep across Canada and the United States.

There has been practically no information available on weather north of 70 degrees latitude. Until recently, only a few widely spaced expeditions had ever reached the pole, and their findings were



meager. Ground reporting stations on the arctic icecap were an impossibility. Meteorologists had early recognized the potentialities of aircraft, but the "top of the world" was beyond prewar-aircraft range.

Out of the war, where accurate weather reconnaissance was vital to victory, came the big, fast, long-range aircraft meteorologists had dreamed about as a tool to unlock the Arctic's weather secrets. By



Heavily loaded with gasoline, the weather planes gain altitude slowly. Right, Brooks Range, over which they fly

March, 1947, long months of preparation ended and the first over-the-pole airline was ready for business.

Selected to fly the Ptarmigan missions, so called after an arctic bird, was the 375th Reconnaissance Squadron, commanded by Lt. Col. Karl T. Rauk. Veterans of the Biki tests, the squadron's "home office" is

Ladd Air Force Base at Fairbanks, Alaska. With all the surface casualness of young fellows taking a quiet ride in the country, the crews roar north from there every other day for 15 to 19 hours' work over one of the bleakest routes in the world, two thirds of it over an ice-choked ocean.

The normal 11-man crew consists of a

Turning the props through for an early take-off at Ladd. They were over the pole and back in 16 hours



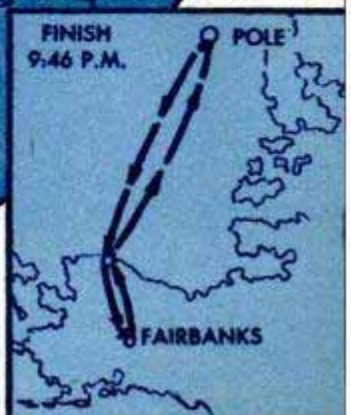
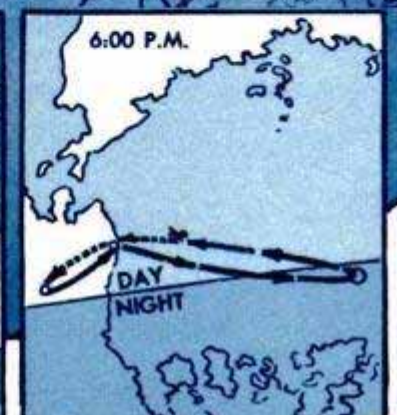
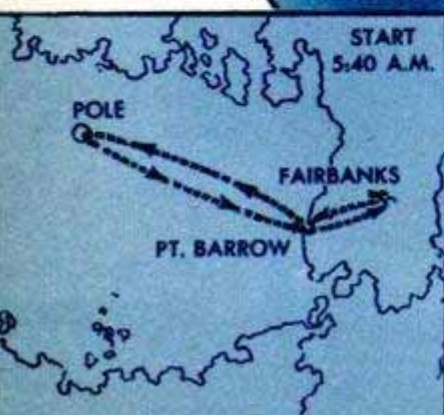
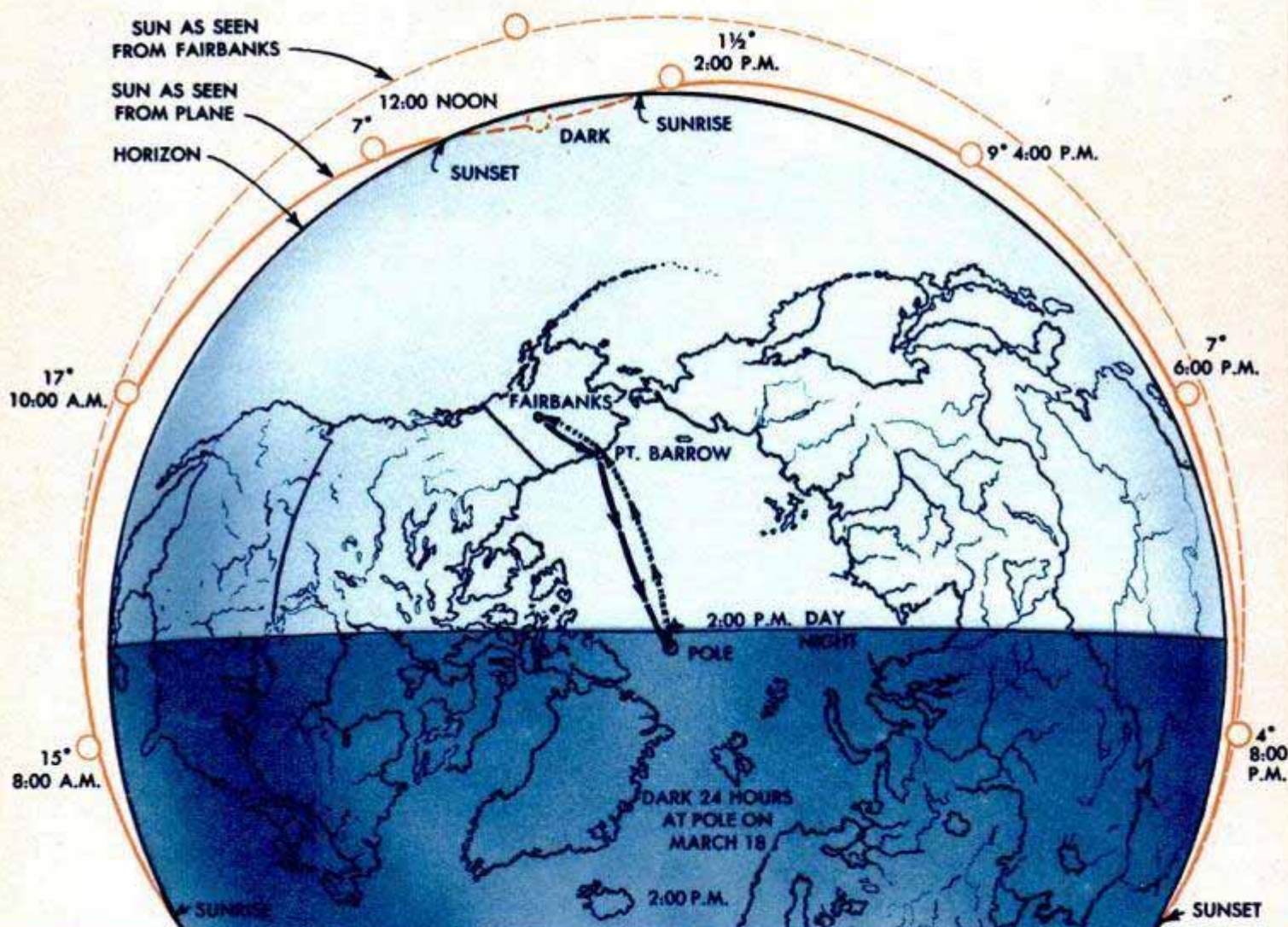




Above, drawing equipment after the preflight briefing. During winter missions, 35 pounds of clothing are carried or worn by each man. Below, an oddity of polar flying. Illustration shows sun's position during mission March 16, when crew witnessed two sunrises and two sunsets during course of 16-hour flight

gloves (nylon, wool and leather), heavy wool underwear, shirt, pants, sweater and a muffler, covered by a wool flying suit with fleece-lined pants and a parka. On their feet are several pairs of socks, felt innerliners, inner soles and a pair of mukluks.

At 4:35 one late summer morning, our typical mission, piloted by Lt. David Laughman of Hanover, Pa., got off the ground. The big B-29s are gasoline-heavy, loading 8000 gallons—at about six pounds per gallon—for the trip, and they use every inch of the runway on take-off. Burning fuel at the rate of approximately 350 gallons per hour, they can expect to arrive



back at Ladd with a safe margin of about 1500 to 2000 gallons.

The missions followed a "synoptic" or fixed track, since regular observations from the same locations and at the same altitude are of more value to forecasters than those from scattered points and at different heights. In effect, it creates a chain of fixed weather stations at places from which reports would otherwise be unobtainable.

Technical meteorological observations are taken every half hour, except when existing conditions warrant additional checks. Less than a half hour after each observation starts, the complete information has been radioed back to Ladd, checked there for transmission errors by the meteorologist from the previous mission, and sent along on a Teletype for international use. It is made available to every nation in the world. Hour by hour, the procedure is repeated during the entire flight.

Depending on the wind, the five-legged course is flown either clockwise or counterclockwise at 18,000 feet. Laughman headed counterclockwise, making his first check point Aklavik, near the northern tip of Canada, then veered up toward his second check station at Prince Patrick Island.

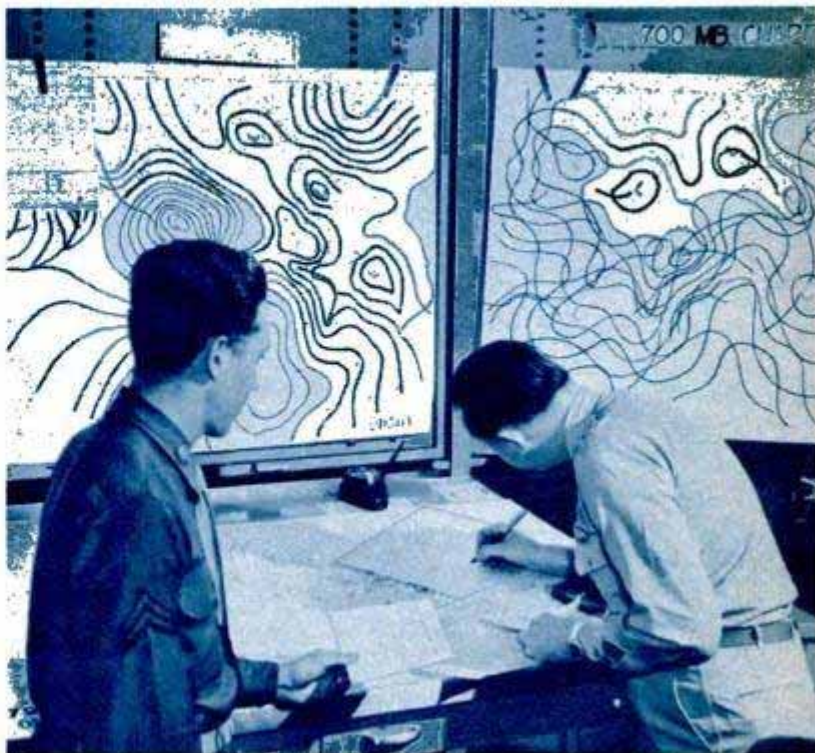
Upsetting a conventional notion, airmen report ice formations in the water below are generally tightest at about 80 degrees latitude, gradually loosening up as they head north.

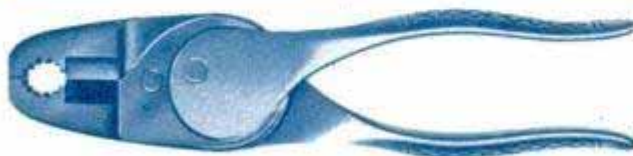
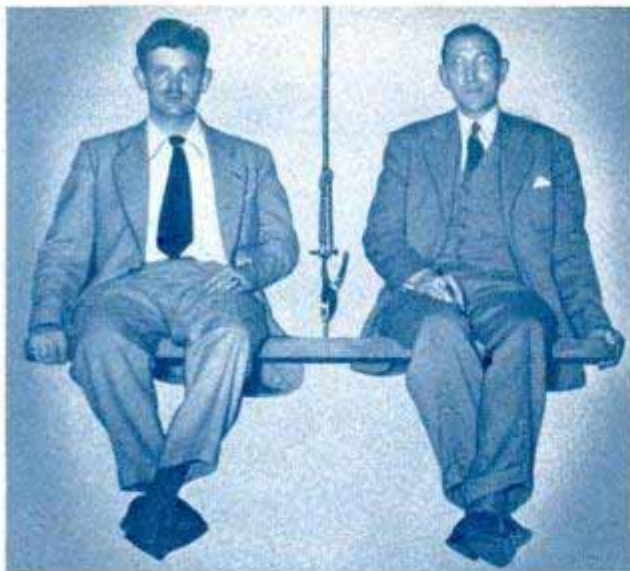
At 12:07 Alaska time, 8½ hours after take-off, Laughman's plane turned around the North Pole and headed home. The first southbound leg, from the pole to Point Barrow, longest of the mission, required

(Continued to page 262)



Above, pilot traces route of next day's mission on briefing map. Wind predictions favored a counterclockwise course. Lower left, light beam from this ceilometer determines cloud heights at Point Barrow check point. Below, weather reports from flight are checked at Ladd for transmission flaws before relay



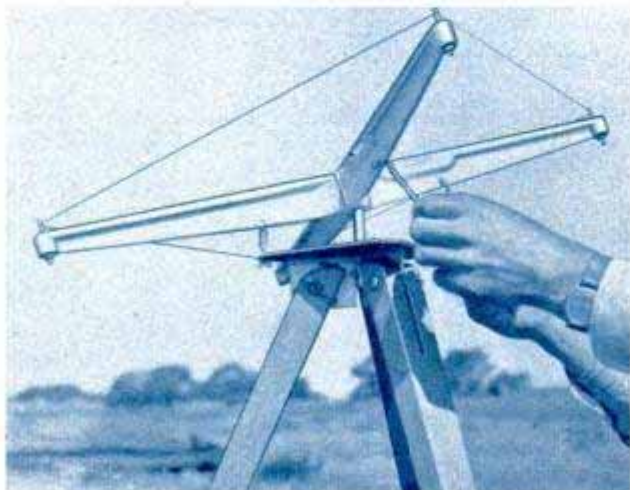


### Cam-Action Grip Locks Pliers

Locked with normal hand pressure, a pair of pliers with a cam-action grip holds so tightly that it can support the weight of two men. The pliers will lock on an object up to  $\frac{1}{16}$  inch in diameter and can be used as wire pullers, bolt cutters, wire cutters and linemen's pliers. They will cut 30-penny spikes and  $\frac{1}{4}$ -inch annealed bolts.

### Sighting Level for Farm Use

Terraces, contours and irrigation ditches are laid out accurately by a leveling device that mounts on a sturdy tripod. Two built-in vials are used to level a square formed by a continuous string wound around posts on the four arms. By sighting across any two sides of this square, a level line of sight is provided. A 10-foot slip rod and target are used with the level.



### Plastic Centers Repair Records

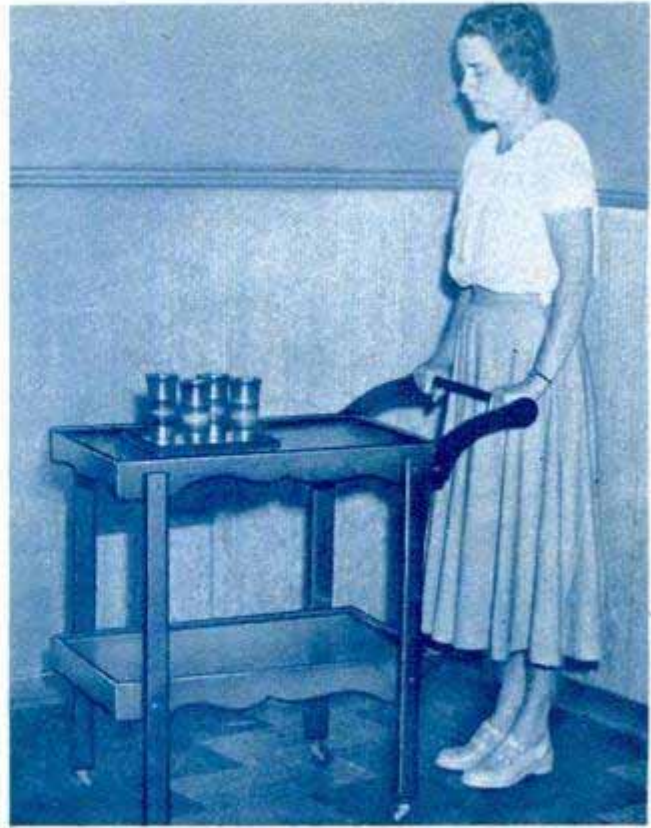
When your record changer damages the pivot holes in your favorite recordings, you don't have to throw them away. You can easily repair the damage by cementing a Vinylite plastic disk around the center of the record. The new center hole in the plastic disk then enables the record changer to operate smoothly.

### Radar Reflector Marks Life Raft

Men afloat on a new-type life raft may be rescued more quickly through a radar reflector on the mast. The float was developed for the British Royal Navy. The reflector bounces radio beams back to any radar station within range, thereby enabling the life raft to be located on the ocean. Made of rubber, the raft holds 10 men, has a fabric floor and is covered by a tent. It contains food and water, a bailer, sponge, paddles and a bellows for inflating the cushions. It is inflated initially by pulling a lanyard which releases carbon dioxide.



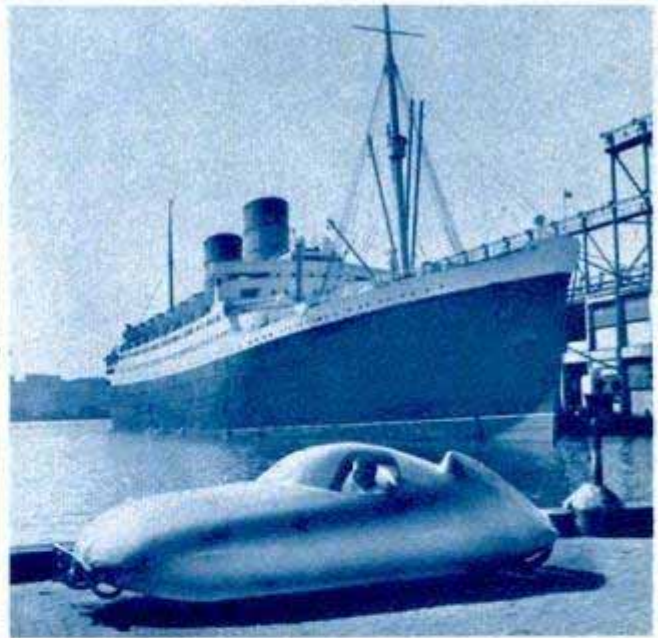




### Kit Contains Precut Hardwood Parts for Tea Wagon

With parts precut and ready for assembly, a tea wagon in kit form can be built in five minutes. The wagon, equipped with casters, has two trays. The parts are

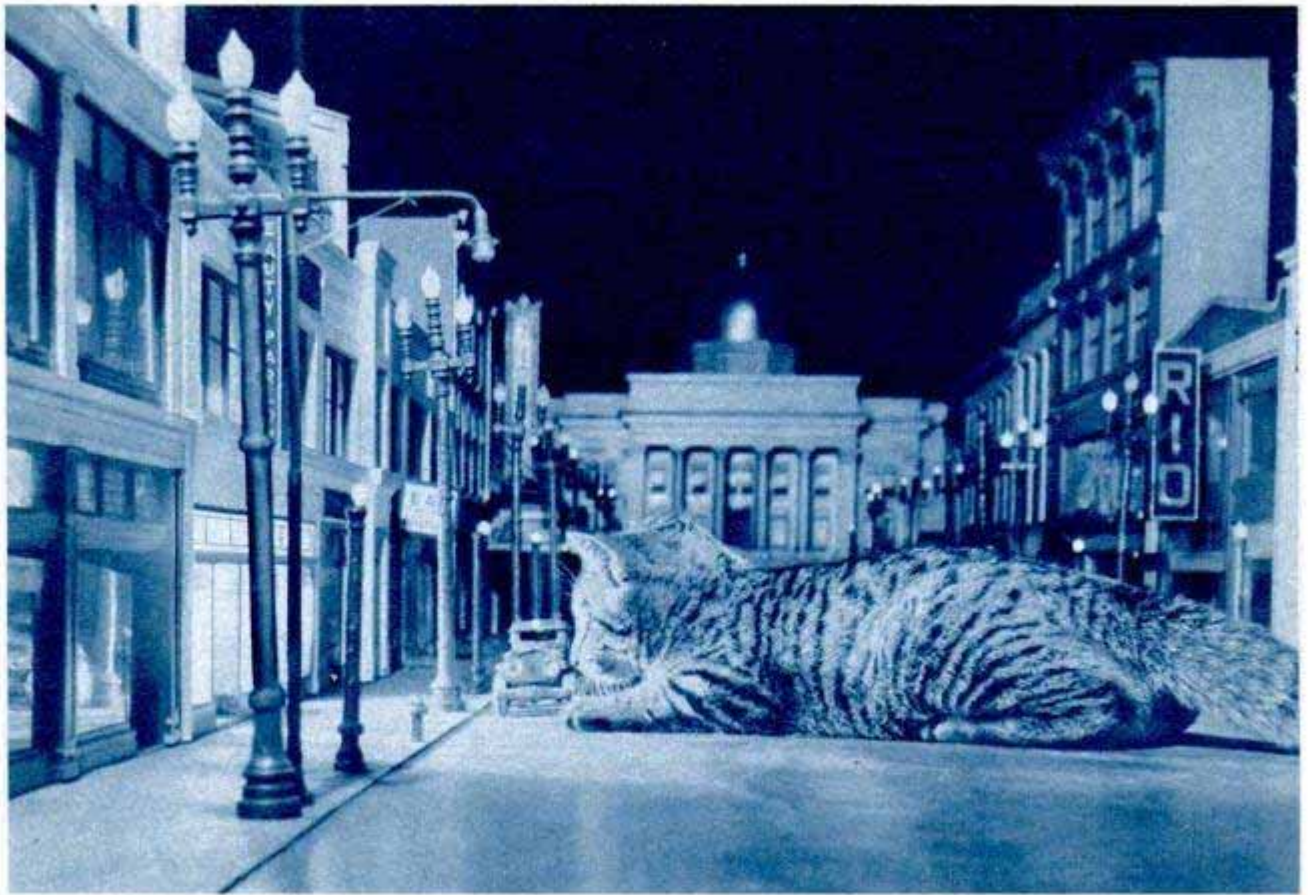
held together with bolts and wing nuts. Made of hardwood, the wagon is delivered unfinished, or finished in mahogany, maple, Chinese red, green, canary or black lacquer.



### Body Lifts Up for Access to Doorless Bubble Car

When Russ Case of New York couldn't find a new car that suited his tastes, he decided to build his own. Eighteen months and \$15,022 later, he brought out a creation unlike anything else on the highway. Case's car is low-slung with a glittering aluminum body. A large Plexiglas bubble

serves as roof and windows. There are no doors; Case merely presses a button and the whole body casing swings into the air to reveal the single, four-passenger seat and the engine. The car is built around a jeep chassis. The steering wheel came from an A-20 fighter-bomber.



Stretched out in front of Lilliput Lane's beauty parlor, Tabbie the cat looks like a dangerous jungle giant

## Lighting Engineers Are Modern Gullivers Along Lilliput Lane

Gulliver's travels didn't take him to Schenectady, N. Y., but if they had, that fictional wanderer would have felt right at home in one section of the General Electric Laboratory. Designed for testing the effects of various street lamps on pedestrian and driver visibility, a scale-model business district, called Lilliput Lane, is complete in every detail except inhabitants. Along its miniature street are automobile sales

rooms, restaurants, a bank, movie theater, beauty shop and other business establishments. A master switchboard at one end of the street enables the engineers to control the lights and to measure illumination qualities. By experimenting on this pint-size shopping district, lighting experts are able to determine the efficiency of new street-lighting fixtures prior to putting them into production.

Below left, looking down the miniature street from the control booth as an engineer turns on the city's lights. Right, a six-year-old visitor plays the role of a modern Gulliver in front of Lilliput's Capitol





## Car Is 40 Inches High

Built from a 1941 Cadillac coupe with parts from other cars, a sports roadster stands only three feet four inches high. A mechanic of Burbank, Calif., scrapped the original body and designed and built a new one around a pair of 1942 Buick front fenders and two 1942 Cadillac rear fenders. The chassis is standard with full-spring suspension. Engine-operated vacuum units raise the hood and radio antenna. The doors are opened by special solenoids operated by push buttons under the instrument board. Baggage is carried under a canvas cover behind the seat. The car was built in six months and is valued at \$12,500.



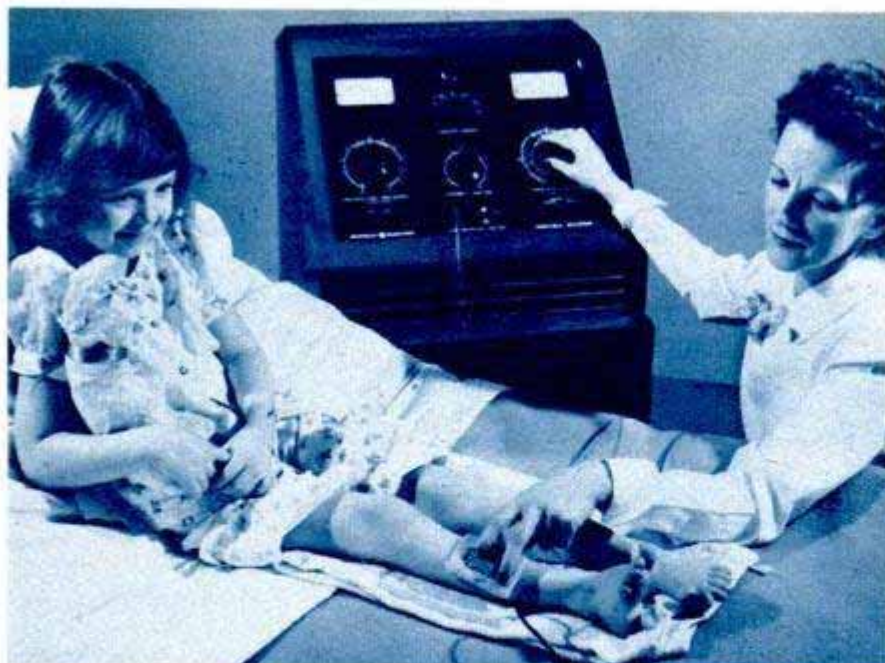
Top, with its low, sweeping lines, the custom-built auto stands only three feet four inches high. Above, dashboard push buttons raise the vacuum-operated hood and radio antenna



## Test Lab for Jets

Jet engines for airplanes are tested under flight conditions in a \$25,000,000 center built by General Electric at Lynn, Mass. Scale models of new designs are laboratory-tested for altitudes up to 70,000 feet and at temperatures from 70 degrees below zero to 150 degrees above in large test stands inside which the atmosphere is precisely controlled. While major component jet parts, such as the turbine and compressor, are tested in the laboratory, the full-size engine is tested under altitude conditions aboard a B-29 flying laboratory.

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

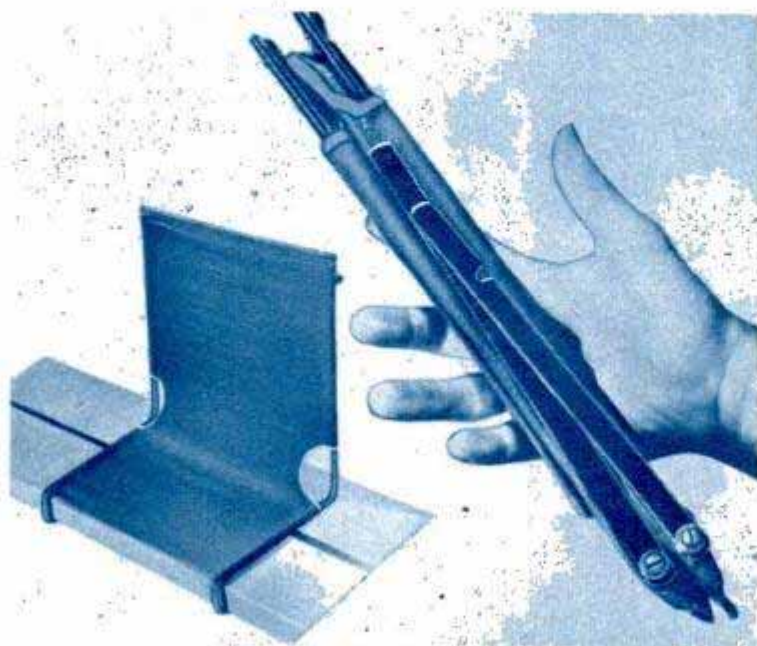


### Electric Exerciser For Paralytics

Stimulating paralyzed muscles with electric current, a variable-frequency wave generator prevents the muscles from wasting away through disuse. Electric current from the instrument alternately contracts and relaxes the muscles 24 times a minute, thus giving them exercise without effort on the part of the patient. The treatment causes practically no discomfort to the patient and can be used to treat almost any type of paralysis.

### Pliofilm Aids Plant Breeding

Pliofilm is bound tightly around the wound of a parent plant in a new method of propagation developed by William R. Grove of Laurel, Fla. The process eliminates the necessity of watering the parent plant and insures an exact reproduction in the new plant. Grove wounds the stem or branch all the way around, then packs the wound with wet sphagnum moss and dirt. Instead of binding the moist mass with burlap, which is customary, he uses Pliofilm bound tightly to the branch with a rubber band. When the roots are sufficiently grown, they can be seen through the bandage. The plant then is transplanted.



### Folding Chair for Bleachers

Bleacher spectators at ball games and other outdoor events can enjoy full back support with a folding chair that hooks over any bench board. The seat is made of steel covered with heavy canvas. When not in use, it can be collapsed into a small roll. It is instantly attached by hooking it over the edge of a board such as a picnic bench, rowboat seat or bleachers.

☐ A Montana man has patented a locomotive headlight that "looks around curves," a pendulum arrangement swinging the light so that it follows the rails as the locomotive takes a banked curve.

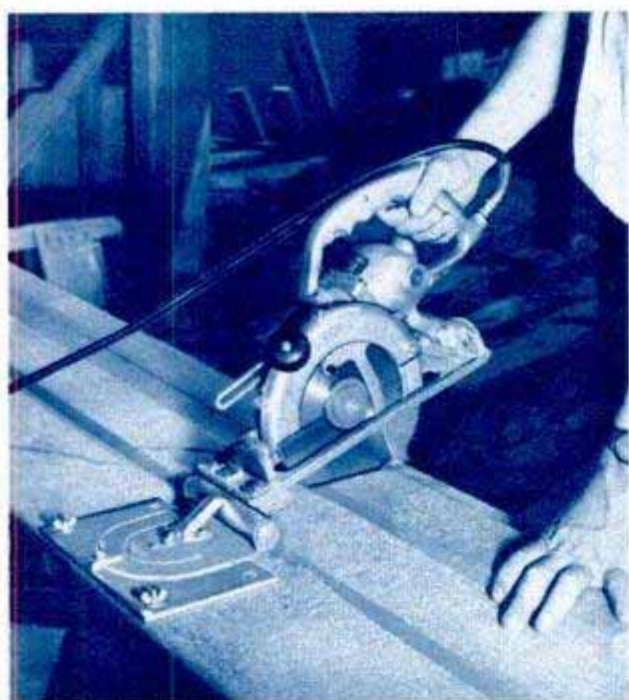


Official British photo

## Plane Wing Pivots in Flight

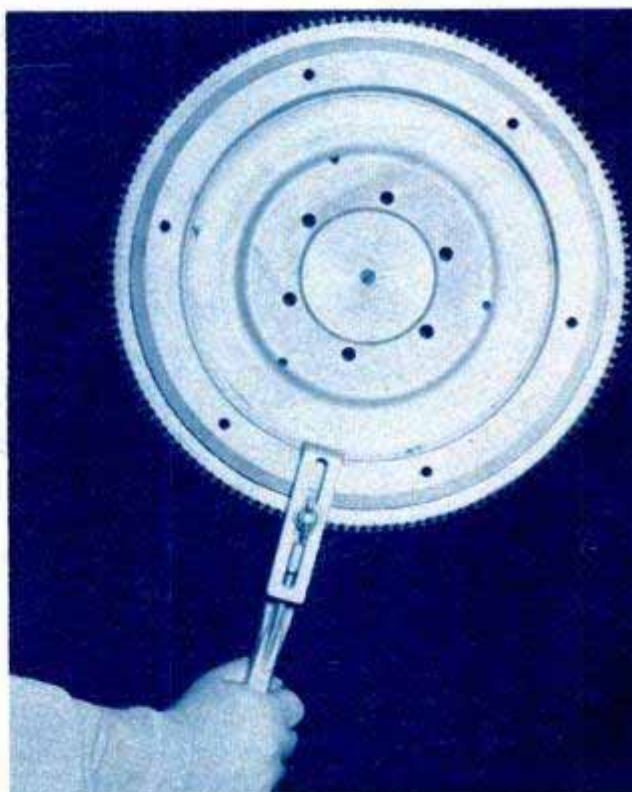
Pivoting at its roots, the wing of a new British amphibian can be tilted in flight for either quick climbing or level cruising. The

wings can also be folded mechanically for storage on aircraft carriers. Built by Vickers-Armstrong, the Seagull is powered by a Rolls-Royce Griffon engine and has contrarotating propellers.



## Portable-Saw Mount

Electric handsaws are converted into rigid precision tools for making cuts at any angle by a mount that fastens to the workbench. Boring two holes in the saw's base plate is all that is necessary to attach the mount. An indicator scale is marked for standard rafter cuts and for angles up to 45 degrees right or left. When the operator releases the saw after the cut, a spring in the mount lifts the saw above the work, leaving both hands free to move the stock. The mount will fit any 6 to 12-inch portable electric saw now on the market.



## Flywheel Wrench

With a wrench that locks firmly on the rim of the flywheel, mechanics can turn over the engine to any desired position without danger of cutting or bruising knuckles. Adjustable notches in the wrench prevent slipping, even on worn and greasy flywheel teeth. The wrench, designed to avoid lost motion between tool and flywheel, also enables mechanics to detect drag when fitting new bearings.



By Gorman McMullen

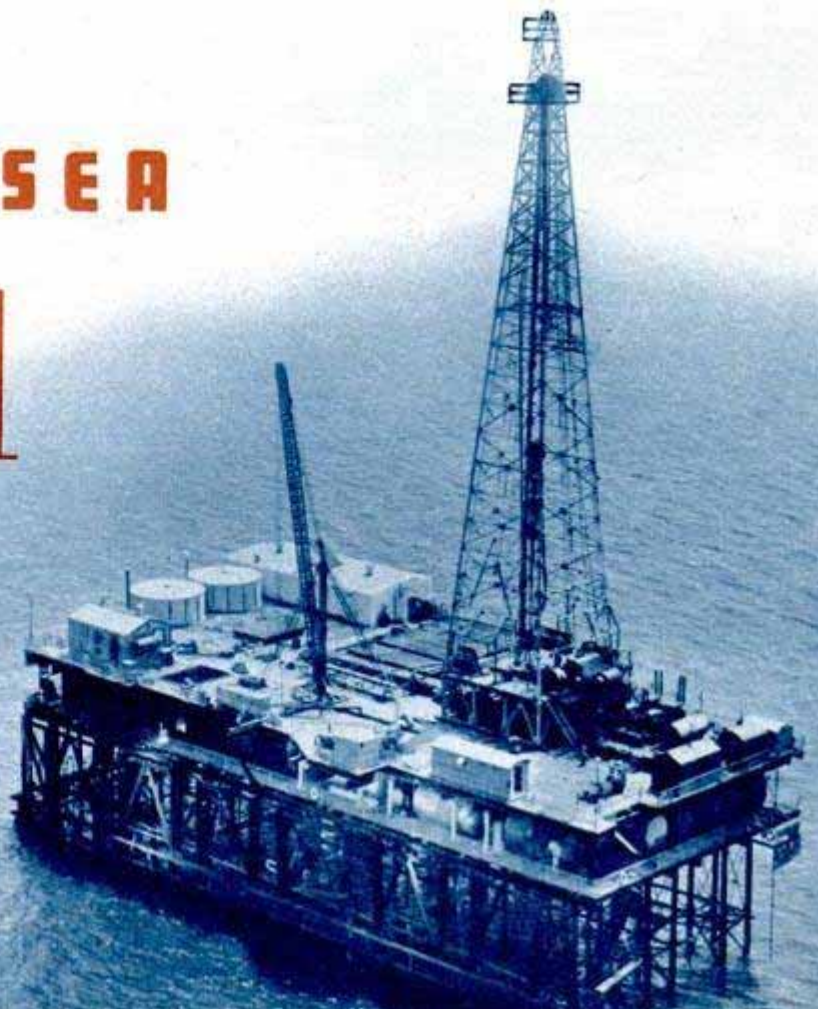
AMERICA'S oil industry has gone to sea—not for the salt air, but to tap a treasure chest of five billion barrels of oil which lie under the warm waters of the Gulf of Mexico. Mammoth steel frames the height of a 10-story building are rising up out of 50 feet of surging salt water eight miles from shore. Converted LSTs, teeming with roughnecks who a few months ago were landlubbers, are defying hurricanes to rush drilling. Men work in shifts around the clock.

That's the scene as the nation's oil industry opens up a new frontier of exploration in an almost desperate effort to find new oil supplies to feed the machines of our modern industrial world.

Drilling in water is not new, not even in salt water. Wells were drilled off the California coast almost 50 years ago. And for many years wells have been drilled in

Man-made island on stilts eight miles off Louisiana shore serves as a platform for the drilling derrick

**DOWN  
IN THE SEA  
FOR OIL**





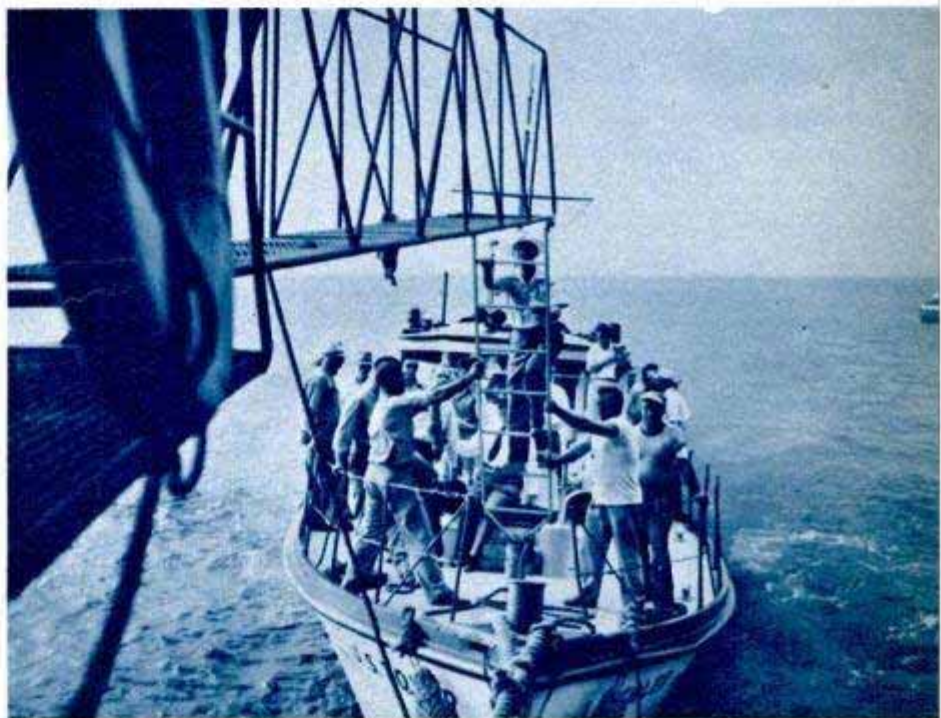
Dots on the map show the locations of offshore operations. The largest single installation is the Grand Isle platform, from which six wells can be drilled by shifting one derrick

water as deep as 100 feet in Lake Maracaibo, Venezuela. In the salt-water marshes along the Louisiana and Texas coasts, new techniques have been discovered to conquer nature and bring out petroleum. Oil was discovered offshore in the Gulf in 1938, a mile off Louisiana in 14 feet of water.

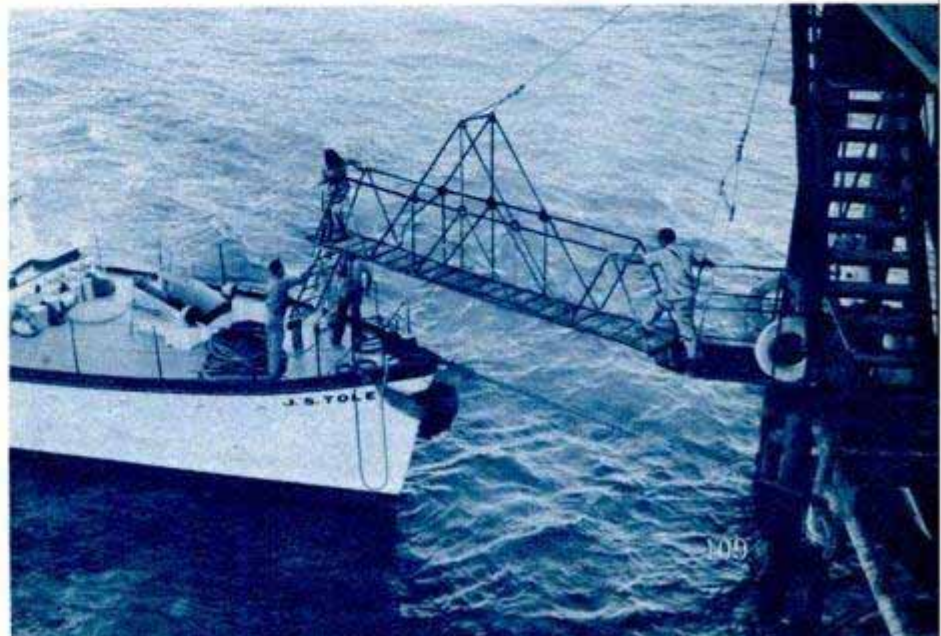
But real deep-water drilling in the open ocean is definitely something new. The largest single installation is Humble Oil & Refining Company's \$1,200,000 drilling platform eight miles off the shore of Grand Isle, La., near New Orleans.

Imagine the framework of a 10-story building plunked down in 50 feet of restless green water. Imagine two platform decks in this network of steel; the lower deck carrying complete living quarters for 54 men, tons of modern drilling equipment and roomy storage facilities; the top deck towering 46 feet above the water and supporting a regular drilling derrick, the same tremendous structure you have seen safely rooted on land. That's how Humble's man-made island, almost out of sight of land, stacks up.

This structure would be quite a feat even in calm water. Built to withstand the unceasing pressure of tons of shifting ocean water, plus the occasional 35-foot waves and 100-mile winds that come with the twice-yearly hurricane seasons, it is an engineering marvel. Engineers drove steel pilings



Swinging catwalk with a ladder at the end is the answer to the problem of boarding the platform during rough weather. Catwalk is hinged and pivoted to move in any direction. Bottom of ladder connects with boat through a socket joint





Welders secure the pilings which will support more than an acre of working space. The pilings are driven to an average penetration of 200 feet

nearly 200 feet into the floor of the Gulf to anchor this drilling platform. The two platform decks are each 100 by 206 feet. More than 5,000,000 pounds of steel were used in the structure. It was built in about 100 days, days which ranged from glassy calm weather to near-hurricane winds.

Difficult as the platform was to build, it was only the first of many headaches for Humble's engineering staff. How would you unload a five-ton storage tank from a boat to the drilling structure when waves are running 15 feet high? How could the workers, who labor in shifts around the clock, climb from a bobbing 60-foot tug in high waves onto a ladder in the platform without injury? How about the super-safety precautions necessary on such an isolated post? The company met and solved these problems.

The matter of transferring personnel from a boat to the platform, which might appear simple to the uninitiated, turned

out to have many complications. A number of schemes were considered and dropped. The simple-appearing arrangement which solved the problem consists of a catwalk extending out from the platform, with a ladder hinged to the outer end of the catwalk and dropping down toward the water.

On the platform end, the catwalk is hinged for vertical motion and pivoted for horizontal motion. A boat coming up to the platform connects the boarding ladder with a ball-and-socket device mounted on the boat's bow. The boarding ladder is hinged for vertical motion, and the ball-and-socket device allows horizontal motion. A pulley-and-counterweight rig keep the catwalk up and level when not in use.

One of these catwalk-and-ladder rigs has been provided on each of the platform's four sides to meet all conditions of wind and tide.

Unloading heavy equipment is a problem that wasn't solved with any one rig. The roughnecks learned a bit of seamanship to add to their experience in handling

heavy weights ashore. With this know-how, they have managed to cope with what the sea has had to offer.

Safety is a word that never leaves the minds of the platform's supervisors. No gasoline-driven machinery is used, either on the platform or on the boats. Diesel oil, used instead of the customary steam to power the drilling equipment, is handled with extreme care. Drilling work is done with a seasoned crew with the greatest caution, and no injury taking a man from his work has yet occurred.

And the first wildcat test is being drilled. Six wells can be drilled from this one rig, by shifting the derrick to different spots on the top deck. The equipment is capable of drilling to a depth of 15,000 feet. The first test has been made and encouraging indications of oil-bearing earth were found.

Future open-ocean drilling platforms are likely to be somewhat smaller because of the cost. Humble is now working on two



smaller structures in the same area, one 50 by 150 feet and another 33 by 66 feet. These platforms will carry only the well machinery, while the crews and materials will be stationed alongside in converted Navy LSTs. This will greatly reduce the cost. Most other oil companies conducting deep offshore operations are using converted landing craft to house personnel and carry a part of the drilling equipment. The Ohio Oil Company plans a unique arrangement for its drilling in 50 feet of water, six miles offshore from Freeport, Tex. There will be one platform to carry all equipment, while another platform, joined by a catwalk, will contain quarters for workers.

Wildcat drilling often has been done ashore on nothing more than a hunch. Where a million-dollar platform has to be built before the drilling bit can dig one foot into the under-ocean ground, such a method is out of the question. Months of work by crews of expert geologists preceded the choice of location for Humble's offshore experiment. Using radar-equipped former Navy submarine chasers, these crews groped their way through fog, high winds and choppy seas to make seismographic tests to locate promising areas.

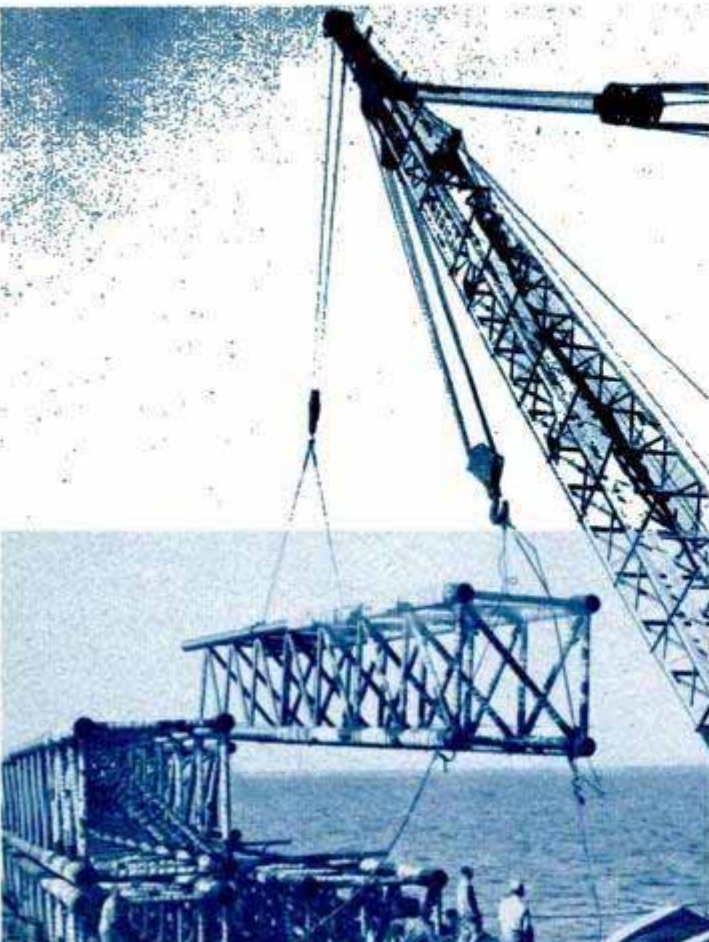
The seismographic technique consists of dropping small explosives in water and recording the results of the blast. This technique is based on the fact that salt earth, in

which most oil in the Gulf coast area is found, reflects sound in a different manner from the regular ocean floor.

Nor did the planners forget the human element, the 54 men who handle the tools which probe the underwater earth, searching for oil. These men work five days on the platform and then are taken ashore for two days off. While off shift but still on the platform, they have a recreation room in which to while away the hours. Radios, games, books and magazines are provided.

The know-how which has made Humble's million-dollar experiment possible was gained in years of shallow-water drilling in the marshes and swamps of Louisiana and Texas. Producing wells now dot these once almost inaccessible areas. Most shallow-water drilling has been done from ingeniously rigged barges. Some barges are submergible, sinking down as much as 10 feet to put the drilling rig directly in touch with the earth. Latest method is to use two

↓ Crane swings a template into place. A network of 25 of these templates forms foundation for platform. Right, pilings are inserted into templates and then sunk deep into the ocean floor to give firm support

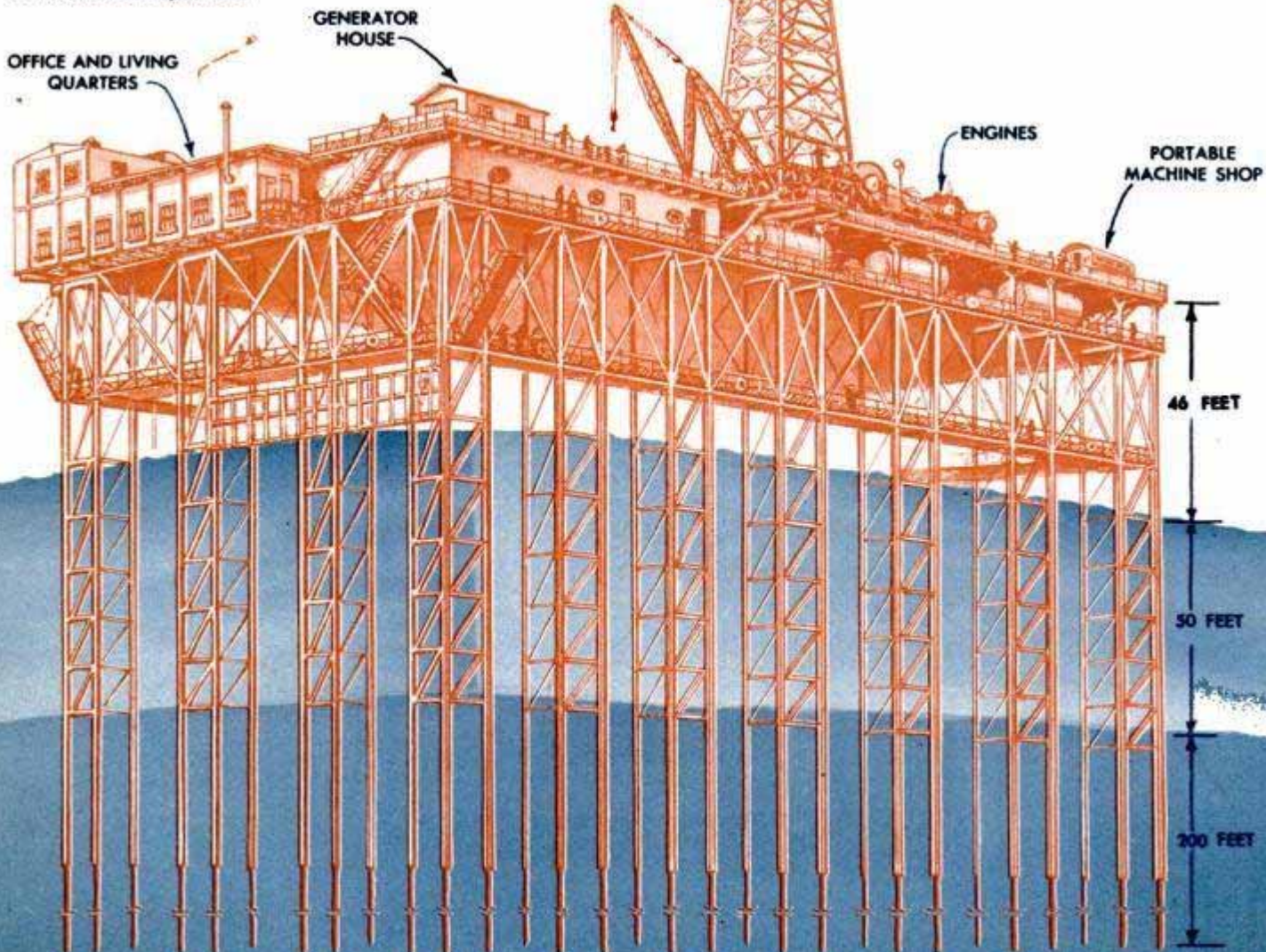




Crane lifts equipment and supplies aboard the platform. The tanks in the foreground hold fresh water

Drawing shows completed platform. Top deck is for drilling operations, lower deck for accommodations

OVER-ALL WIDTH, 110½ FEET  
OVER-ALL LENGTH, 206 FEET



conventional barges with the drilling derrick lying between them supported partly by each barge.

Current interest in deep-water open-ocean drilling is concentrated in Louisiana and Texas. Louisiana at last count had nearly 30 offshore drilling efforts under way or about to be started. Texas has four such operations. The gently sloping Gulf coastal terrain, which means comparatively shallow water out to distances of as much as 30 miles, offers a fertile field for oil exploration. These operations would not be possible any distance off the West Coast, for example, where the ocean jumps to a depth of several hundred feet within a mile.

Oil-industry scientists think that 50 to 60 feet is the greatest depth in which wells can be drilled with present methods. With improvements, perhaps this could be extended to nearly 150 feet.

Will any greater depth ever be possible for drilling? Perhaps, scientists say. A submarine drilling shelf dropped to the ocean floor but operated by controls at the surface might someday make possible drilling at any depth.

Necessity is the mother of invention, these scientists say. And the ever-increasing demand for oil provides necessity aplenty.



### Meter "Prods" Big Machines To Record Vibrations

Called a recording vibrometer, a small instrument measures and records on a paper tape the frequency and amount of vibrations set up by large machinery. A short metal prod, which protrudes from the side of the vibrometer, is held against the vibrating object. Vibrations are transmitted through the prod, magnified 12 times by a spring, and passed to the moving sapphire point that rests on the waxed-paper tape. An electric motor moves tape under the point as it draws curves showing frequency and amount of vibration.



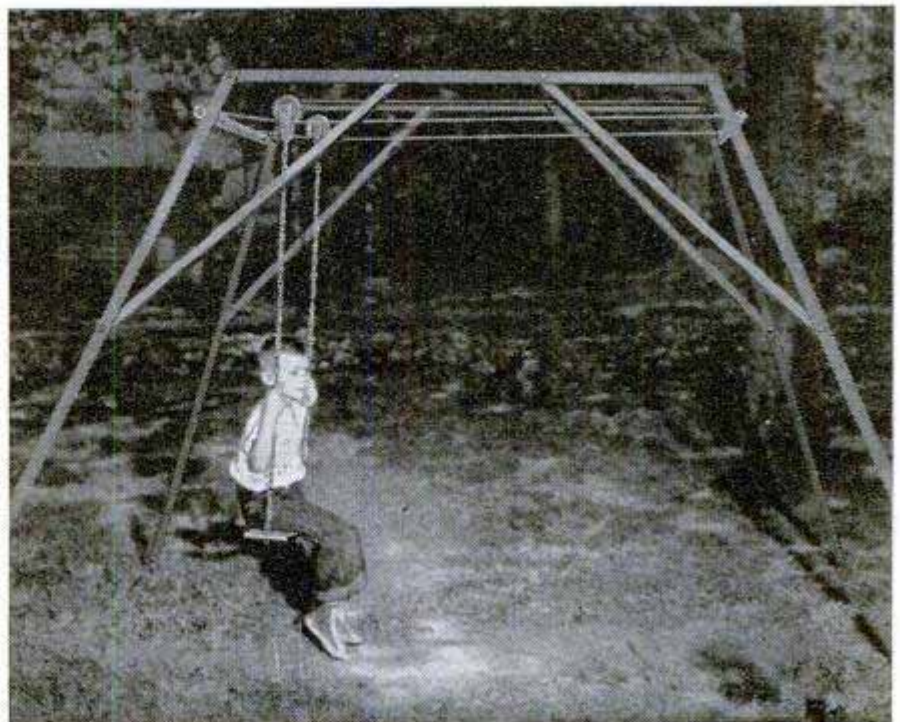
### Metal Television Tube

Television tubes made largely of metal provide a larger picture than all-glass tubes of the same diameter. The metal tube "scans" without distortion almost to the outer edge of the picture screen, while pictures on conventional tubes are frequently distorted by the curve of the glass. The new tube consists of a cone of spun chrome-steel alloy. Only the screen and the stem are made of glass which is sealed to the metal. The 16-inch tube is lighter in weight than an all-glass tube and offers more shielding against stray light and other interference.

### Horizontal Swing Rolls on Cables

There are no ups and downs on a swing that rolls horizontally along a frame staying at the same level from the ground. Suspended from overhead cables, the chains of the swing are attached to two rollers that ride on the cables. It was invented by a Nashville man and is a favorite with the youngsters.

Recently discovered White Dwarf stars are so dense that a cubic inch of their matter would weigh from one to one thousand tons on the earth.





## Lightning Bolts Strike Car and Plane in Lab Tests

In a "lightning laboratory" at Trafford, Pa., scientists are producing their own lightning to test protective devices for homes and factories, and to find out how safe planes and cars are during electrical storms. In one test conducted by the Westinghouse scientists, a 3,000,000-volt lightning stroke, produced by a giant generator, was fired at a rain-swept automobile with a driver inside. The car acted as a cage and the lightning passed harmlessly into

the ground. The driver felt nothing because there was no difference in voltage across his body to produce a shock, even though the voltage of the car and his body rose to about 200,000 volts. In another test, a model of an airplane was struck with a tremendous lightning bolt which hit the plane at the nearest surface, a propeller tip, traveled along the outside of the plane to the lowest surface and then streaked toward the ground.



## Reflector Oven For Open Fires

Made almost entirely of aluminum for light weight and efficient reflection of heat, a collapsible reflector enables the camper to bake biscuits in front of an open fire. Knocked down, the reflector is only one inch thick. Opened, it will take any standard biscuit, pie or cake pan. There are no loose parts to misplace since its sections are permanently fastened together.

☐ Havana has 33 radio stations, more than any other city in the world.

# DEBUT for the '49 NASH



By Wayne Whittaker

AS THE POSTWAR PARADE of U. S. automobiles swings along the boulevards, country highways and Main Streets late this fall, there's a newcomer getting a cheer from the crowds. It is the five-foot-two 1949 Nash, a wallflower of last season, but now all dolled up in a postwar design and getting lots of admiring whistles.

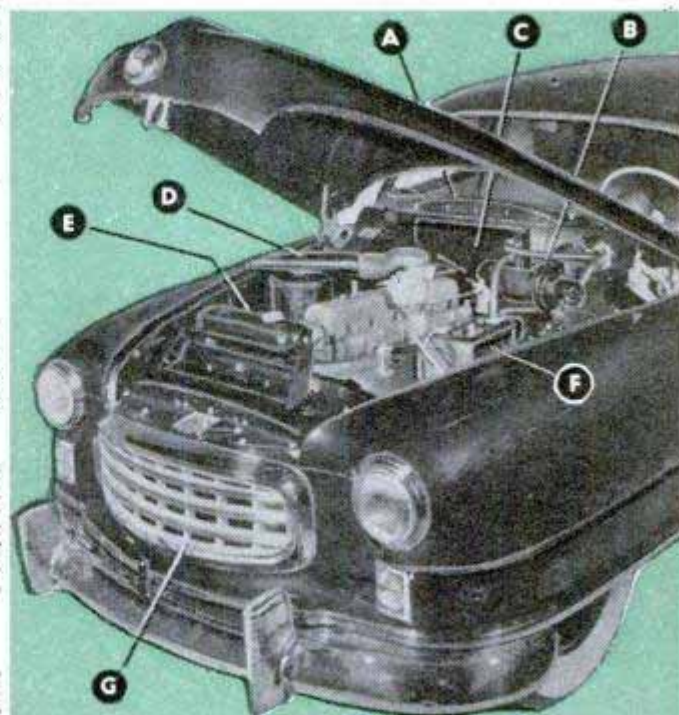
The whistles are followed by some laments that the automotive glamour girls all look too much alike. Did all the automobile-body designers go to the same school? Or was there a government decree that all postwar cars must be wide, low, fenderless and with straight-flowing lines?

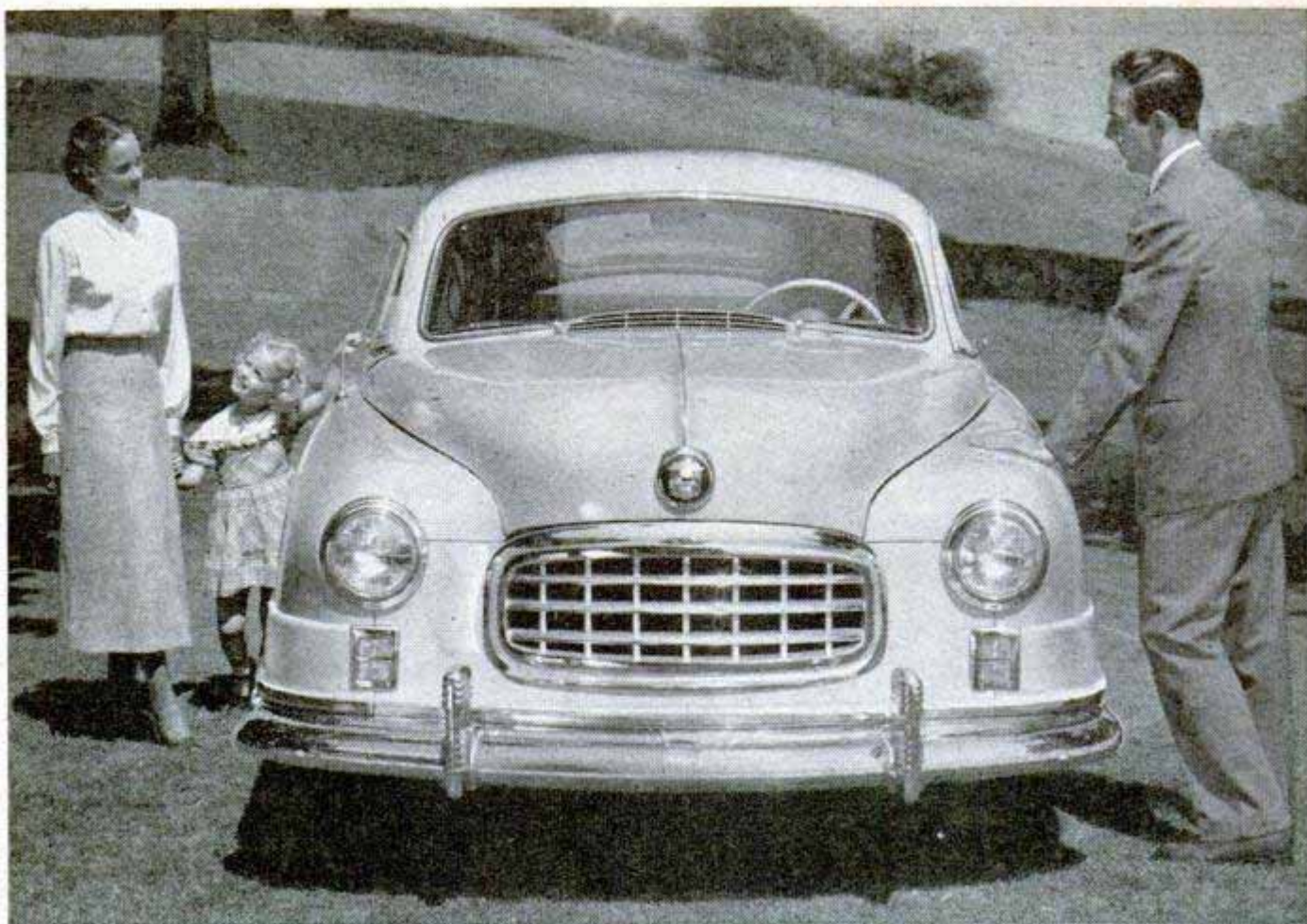
Well, Nash has gone one step beyond the rest in the general campaign to make an automobile look like a Great Lakes cabin cruiser. Its fenderless steel siding completely encloses the front wheels. Maybe this is the automotive version of the "new look." To make the long-skirt enclosure of the front wheels possible, the front tread was narrowed by 2½ inches.

The forward fenders, by the way, are bolted on—which mechanics will be happy to hear. Along with the grille, the fenders can be removed in about an hour for major engine repairs.

Strictly postwar in design, the streamlined Nash is first with fenders enclosing the front wheels

Below: A—Air intake. B—Defrosting motor and blower. C—Cover plate for fresh-air filter. D—Air intake to carburetor redesigned to get under low hood. E—Oil filter is in front of the carburetor air cleaner. F—Battery in fan blast. G—Grille allows ample air flow





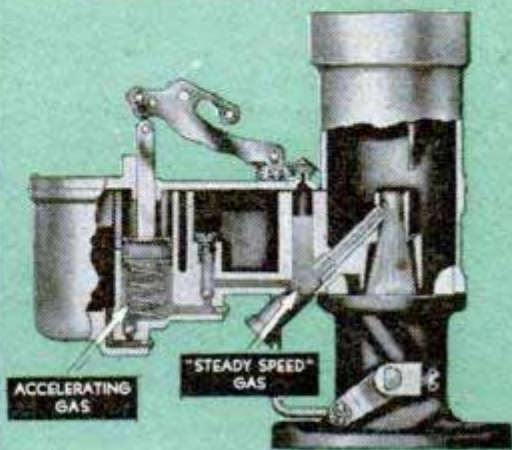
The '49 Nash is wide and low (62 inches) with good visibility. Air vent below windshield is always open

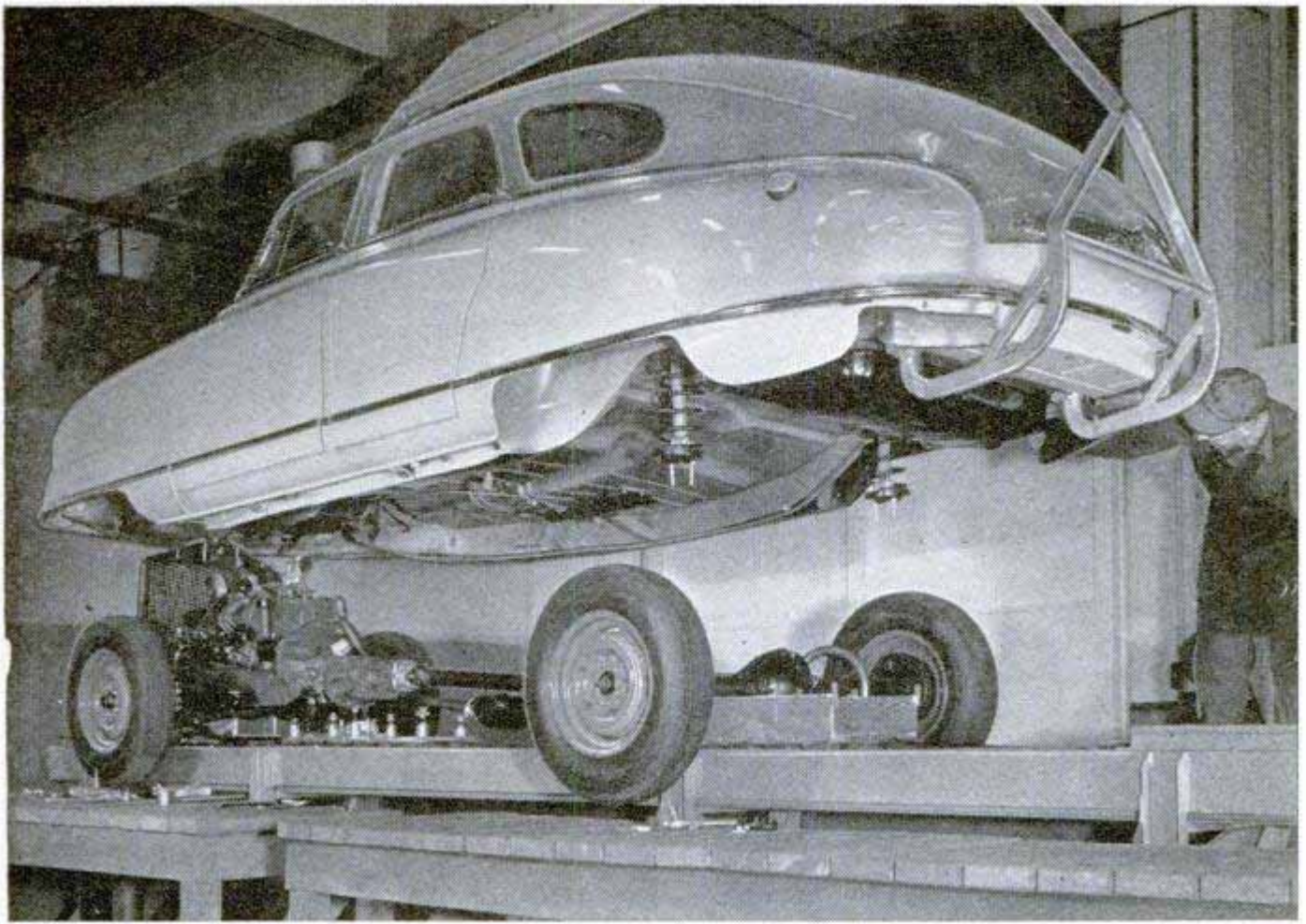
The beautiful '49 Nash is following the trend of Studebaker, Kaiser-Frazer, Hudson and Ford. This will probably start an argument with Nash engineers, who point out that the new Nash Ambassador and "600" models are so drastically changed that all body dies and major assembly-line equipment used in turning out the old models had to be scrapped. But who's comparing the car to a '48 Nash?

After the first approving look at the newest postwar beauty, Mr. and Mrs. Public want to know in the same breath if it has an automatic transmission. The answer is—not yet. Nash has been experimenting with various types of automatic transmissions—in fact tests are now being conducted on 100 cars—but no transmission has been found to satisfy the three-fold Nash requirements. Their engineers insist on a



Left, mounted on massive steering column is cockpit-type instrument group. Below, pickup pump on carburetor acts to smooth fuel flow with engine demand





**Nash body built as single unit including frame is dropped on what remains of chassis on test assembly line**

transmission that will be inexpensive (probably less than \$100), fully automatic, and economical in operation.

That last factor—economy—is high on the Nash list of “musts” and something very close to the heart of George Mason, president of the company. For years Nash has stressed the economy of operation of the “600”—more than 25 miles to the gallon of gasoline at average highway speeds.

**A handy feature on the '49 Nash is this magazine or map rack on back of front seat. It's about 2½" deep**



That proud boast—which test drivers vouch for—is made again this year for the '49 models.

“We could up that mileage figure a bit and still be safe,” said one of the engineers, “with our new Uniflo-jet carburetor. In road tests the new carburetor gives from 1½ to 2½ miles per hour better fuel economy up to 50 miles an hour.”

This new carburetor, developed by Nash, has a special feed system which smooths out the fuel delivery when you “step on it.” The accelerator pump discharges extra gasoline into the passages between the main jet and the high-speed nozzle. This eliminates the abrupt shot of extra gasoline through a separate nozzle and conserves fuel without sacrificing performance.

As in the cases of Hudson and Studebaker, the Nash engines in both new models have been “improved” rather than redesigned. The six-cylinder engines which have proved their worth are the Ambassador's overhead-valve 112-horsepower engine and the “600's” L-head type 82-horsepower engine. The “600” has a



Divided front seat drops back to form single or "twin" bed arrangement without disturbing the luggage space

heavier crankshaft with additional counterweighting to provide smoother operation. The Ambassador crankshaft still has seven bearings—more than any other U. S. car now in production. Incidentally, a shaft of this type was found necessary in the super-high-compression Kettering engine now being tested by General Motors.

Other engineering changes include oil-saving four-ring pistons for the "600" and torque-tube drive for both models. The Ambassador formerly had the Hotchkiss drive but switched to the torque tube in the '49 in order to use coil springs at the rear as well as in front. Now both models have coil springs all around.

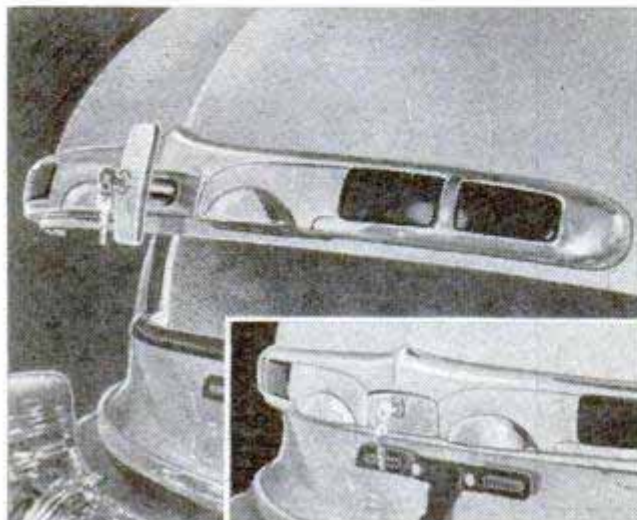
On the Nash proving grounds near Bur-

lington, Wis., the '49 Nash received grueling tests long before it was introduced to the public. As you slip behind the wheel of a shiny new sedan, the first thing you notice is the absence of instruments on the conventional panel. These instruments are grouped directly in front of the driver on what is called the Uniscope, mounted on the steering column. Here are the speedometer, oil, fuel and temperature gauges. What, no ammeter? In place of the ammeter, which Nash engineers say is the least needed and least used of all panel instruments, is a dot which glows when the battery is discharging.

If you are accustomed to glancing at a large speedometer, you will find yourself squinting at the small Uniscope. Perhaps familiarity with it will make its use easier. The "dashboard" is vacant, except for radio; the designers considered padding this panel as a safety feature to protect the vulnerable passenger beside the driver, but the extra cost was deemed greater than the public would pay.

In regard to visibility, the Nash is excellent to the front with the single-paned curved windshield that pushes the posts back. There are still blind spots at either side of the rear windows, although the distance between each rear and side window

(Continued to page 264)

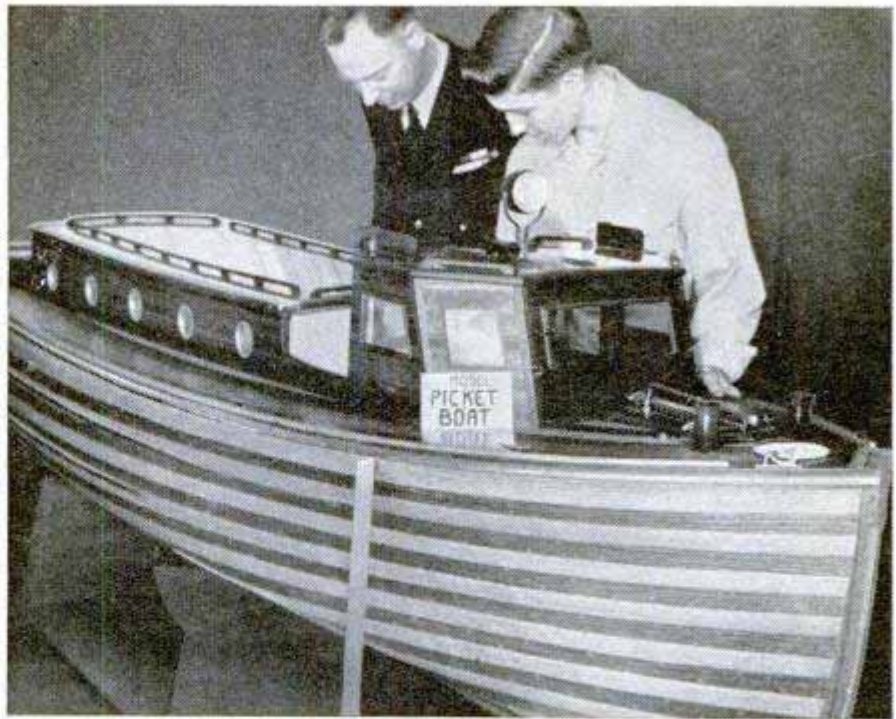


Rear lights are mounted in the trunk lid which has trick lock. Tamperproof handle springs out to open



## Picket-Boat Model Measures Nine Feet

Almost big enough to carry a passenger is a nine-foot model picket boat which was built by a Navy trade-shop group at the Puget Sound Navy Yard, Bremerton, Wash. The hull is made of laminated fir, with the superstructure laminated mahogany. Plexiglas windows have been installed and the top of the main cabin is made of the same material. The engine is not a working model but is a replica in wood. These boats are used for patrol and target pickup work.



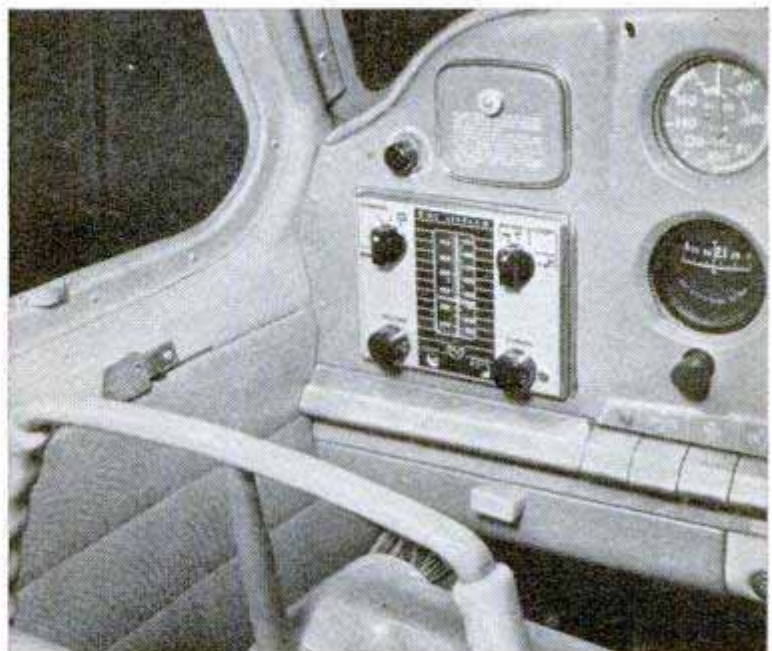
## Helicopter Prospects for Oil

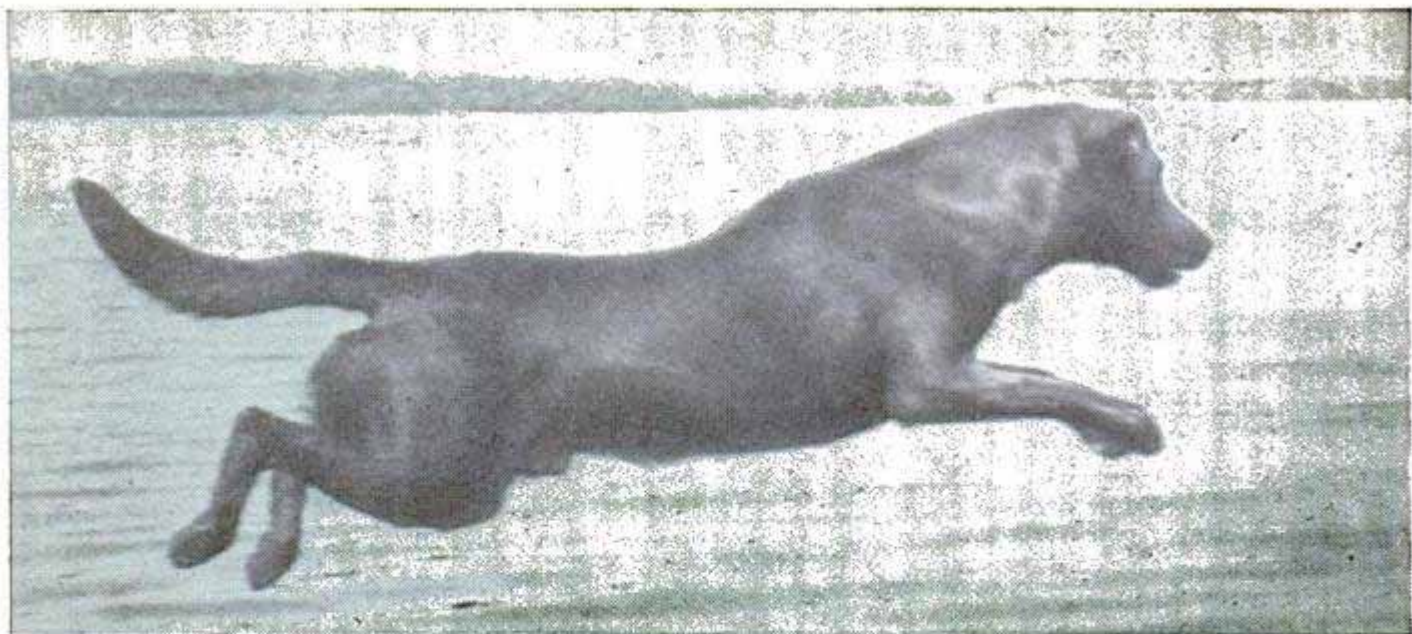
Oil prospectors recently completed a survey of Louisiana swamp country with the aid of a helicopter. The wingless plane set crew members down at almost any point in the bayous and water-soaked marshes which are virtually impassable on foot because of the high reeds. The downdraft of the rotor blades flattened the weeds wherever the helicopter landed. The plane carried a gravity meter, which helps locate possible pools of oil by measuring minute differences in the pull of gravity. To facilitate operation, the instrument extended through the floor of the helicopter.

## Radio for Light Planes Weighs Nine Pounds

So compact it can be mounted behind the instrument panel, a light-plane radio transceiver (transmitter-receiver) provides the pilot with all essential radio communication and navigation facilities. Weighing nine pounds, the radio gives the following services: tower communications, four course ranges, marker beacons, standard broadcast frequencies, loop direction finding and six VHF transmitting channels, in addition to a cabin intercom system.

☐ Alaska's first dial telephone system is now in operation on Kodiak Island.



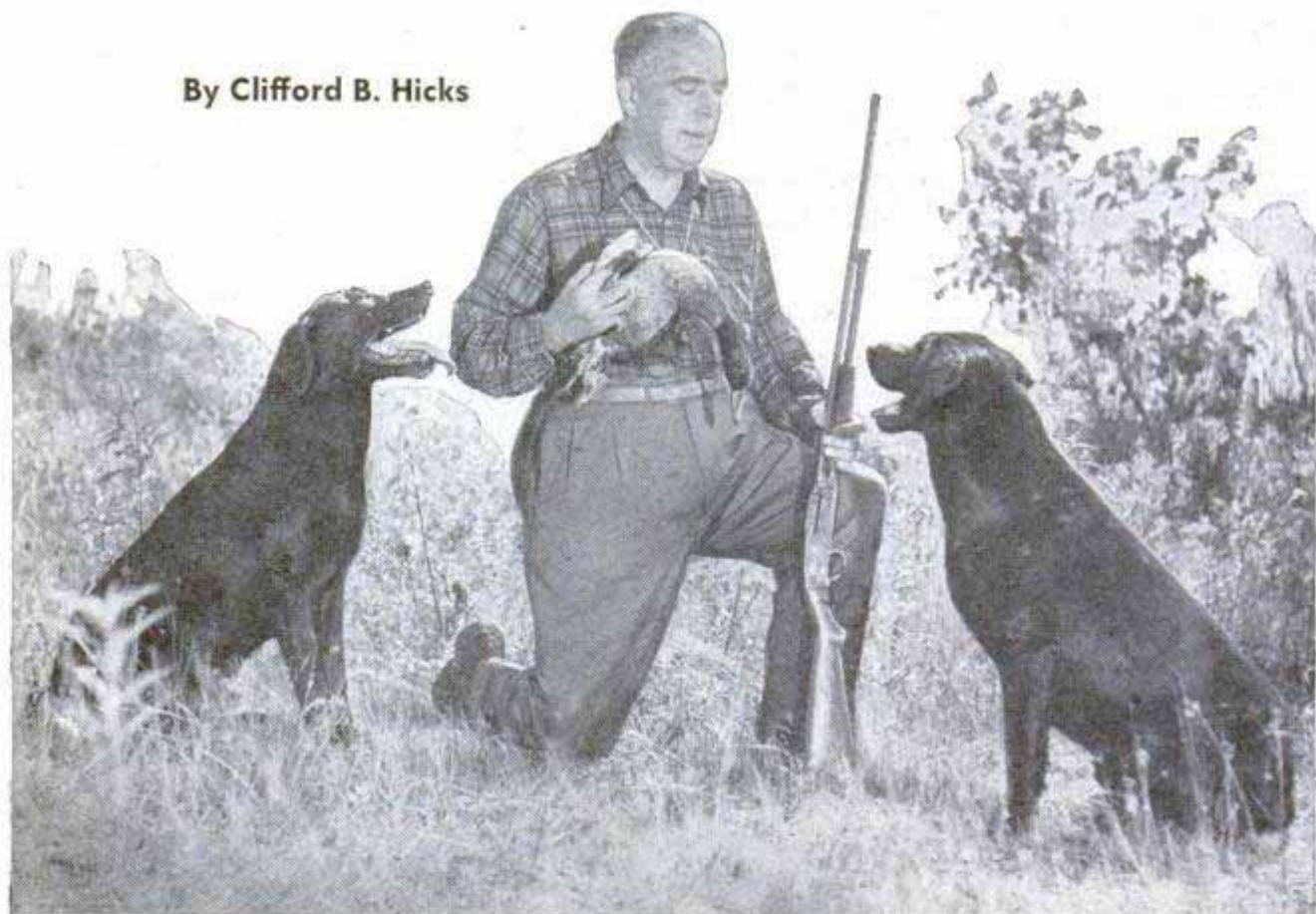


# ***Trainer of Champions***

Bill Walker, whose Labradors consistently cop prizes, says anyone can train a pup to be a top-notch retriever. Just guide the dog's instincts and soon you will be receiving wild fowl by special delivery

Big role in conservation is played by retrievers that locate and bring in wild fowl the hunter can't find. These Labradors are among the best

By Clifford B. Hicks





After a running dive, Nick, Walker's champ, swims to crippled duck, grasps it tenderly and returns to shore

**S**PECTATORS at a sportsmen's show in Chicago watched as gun dogs plunged into a huge canvas tank in a demonstration of wild-fowl retrieves. One man was so thrilled at the sight that he leaned too far over the edge of the tank, tottered a moment, and suddenly disappeared with a splash. There was a streak of black as a big Labrador, without a word of command, dived into the tank, swam to the sputtering man, grasped him by the arm and hauled him to safety. If the dog had been strong enough he would have deposited the bedraggled spectator gently in the hands of his master, Bill Walker.

The dog was Tyke of Barrington, and he's only one of the big Labradors of championship qualities whom Walker has owned or handled.

Walker is not a professional trainer—he's a sportsman who loves hunting and gun dogs. And he has a word of encouragement for any dog owner. "You don't need to be a trainer to teach your dog to be a good hunting companion. A trainer might get results faster, but any man with patience and a respect for his dog can bring it to the same peak of performance."

Tyke's record is outstanding. He won 64 field trials before he died a few years ago. Tyke seemed to know exactly what Walker wanted, even without commands. Just for the thrill, Walker once entered Tyke in a springer spaniel trial—a test in which the dogs flush game as well as retrieve it. Tyke won easily without any training in this type of field work. The big Labrador was considered by authorities to be one of the greatest retrievers that ever lived, even though he was not rated national champ because one of his great-grandfathers was not a pure-bred.



Without ruffling the duck's feathers, Nick presents it to his master. He knows canine courtesy and will back away before shaking the water from his body

Another of Walker's dogs, Nick of Rockingel, has never failed to place in more than 75 field trials in which he has competed with the finest retrievers in the country. But he's not only a show dog, he's a top-flight performer at his everyday job of finding and returning wild fowl to Walker. In four seasons of hunting, the sportsman has lost only one duck. "And that," he says proudly, "was my fault and not the dog's." The sportsman once turned down a \$3000 offer for Nick, whom he regards as his closest friend.

Walker now is working only two dogs, Nick and a one-year-old named Sin-Jin Tim, a pup the sportsman bought for his wife who also is a master at training retrievers. According to Walker, Tim will be the finest retriever in the country in a few years, but he hasn't yet developed the style that marks Nick as a retriever of real championship qualities.

Nick lives for those few moments in the field when he can bring in the waterfowl Walker shoots down. The signal given, he bounds forward in a great dive that takes him eight feet into the water, and hits with the splash of a ship being launched. He swims fast and for great distances—he'll go a half-mile from shore to pick up a duck. He'll nose through reeds or any other obstacles to find the bird. On the return trip, he carries the game as tenderly as a mother holding a child, and deposits it gently in Walker's hand. Then, courteously, he backs away from Walker before shaking the water from his body.

Walker is interested in hunting dogs—especially retrievers—because he feels they can do more for wild-fowl conservation than any other single force. He cites figures. "The hunter has a right to bring home his limit. Yet the toll of killed and crippled wild fowl, downed but never found, is one cause of the big drop in the game birds in this country. Statistics show that the average hunter picks up scarcely 60 percent of the game he shoots—unless

he has a trained dog to bring in the birds for him. If the hunter's limit is eight ducks, and he shoots down 12 or 13 in order to bring home his limit, then he has needlessly killed four or five birds. Figure this destruction over a season's shooting and you'll see that lost birds could well produce nearly 40 percent more ducks for the next season. Every hunter is morally responsible to bring home the game he shoots down. If he can't do this without a dog, then he never should go to the field without a retriever."

Nick, the champion Labrador, performs his job with a mastery and dignity that would thrill any sportsman. "Much of it is instinct," says Walker. "Educating a gun dog is not a matter of teaching him tricks. It's a program to develop the dog's own instincts, not for use by the dog but by the hunter."

Walker points out that even an eight-week-old Labrador pup will waddle after a tossed object and bring it back to the person who threw it. Many generations of breeding for working qualities have brought Labradors to a point where it's just plain natural for them to search out a bird and bring it to their master. A common mistake in training such a dog, according to Walker, is to expect too much too fast—to teach the dog more than he can absorb in one lesson.

"The trainer must know exactly what he expects the dog to do, and must insist on a

With two training "bundles" out, Nick switches from one to the other on gestured command during retrieve



proper performance. Training is based on obedience, so the trainer must have complete control at all times. This doesn't mean he should severely punish the dog for mistakes. If a dog likes you and knows that you are displeased, he'll make every effort to correct his errors. Thus a sharp word often will hurt a dog more than harsh physical punishment. Companionship means a great deal to a dog. The amateur owner who treats his dog as a hunting companion is more likely to produce a superlative field dog than the professional trainer."

He suggests that very little training be given a retriever until the puppy is about six months old. By that time the dog should recognize his name and probably will come whenever his master calls. The first few lessons are similar to those given any good dog: teach him to sit by speaking the word and pushing down on his back; teach him to heel by holding him with a collar; and teach him to "steady" by picking him up and returning him to

**Walker's wife trains one-year-old Tim to grasp a dummy bird solidly but gently. A top-notch retriever won't break the skin or bones of a bird**



**Tyke, one of the greatest retrievers that ever lived, leaps a fence with a pheasant in his mouth. This dog won 64 field trials during his life**

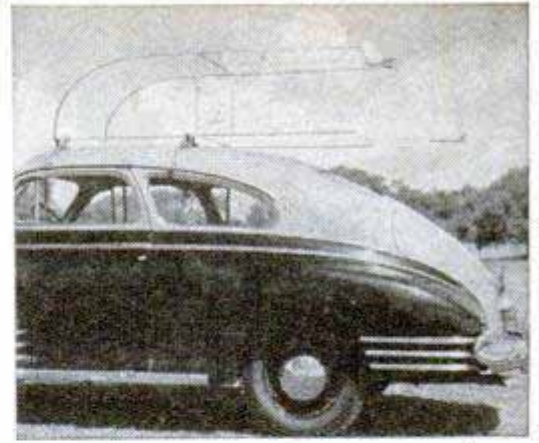
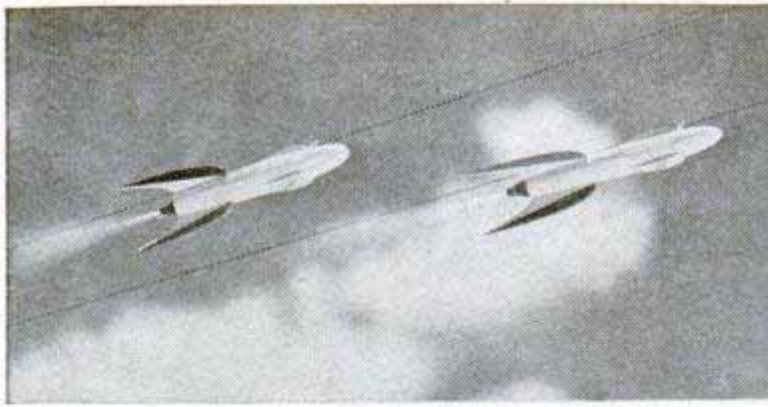
his former position every time he moves.

About this time, according to Walker, the retriever becomes "gamey"—that is, he is fascinated by birds. The trainer encourages this trait by teaching him to retrieve a "bundle" which simulates a bird. Walker uses a small boat bumper covered with canvas, which is about the same weight as a duck and has about the same resistance

to a dog's teeth. Even a dummy made of rags will be satisfactory. Teaching the dog to return the bundle is no trick—instantly he will mark its fall, run to the spot and rush back with it. The principal danger is that he will develop "hard mouth"—grasp the bundle so tightly between his teeth that he would injure it if it were a real bird. A trainer's patience may overcome such a tendency—patience in holding the bundle and insisting that the dog clasp it firmly but gently between his jaws.

Breaking the dog to retrieve live game is the next step, and usually is accomplished with little trouble. Pigeons are good training birds. Their wings are tied together with a bit of cloth as close

(Continued to page 268)



Left, young jet fans ready to start the models racing along wires. Top left, a pair of racers in flight. Above, rubber bands stop models at end of race. Photos show two systems of hanging guide wires

## Jet Models on Wires Race Between Cars

Looking like rocket ships on their way to some distant planet, jet-propelled models hit speeds of more than 125 miles an hour on steel wires stretched between two parked automobiles. Several types of guide-wire hangers are used, some stretching the wires side by side, others support-

ing one wire above the other. Springs keep the wires taut and rubber bands stretched across the wires stop the rockets without damage at the end of the race. The models are propelled by carbon-dioxide cartridges which are punctured by a spring-loaded needle when the starting gun is fired.

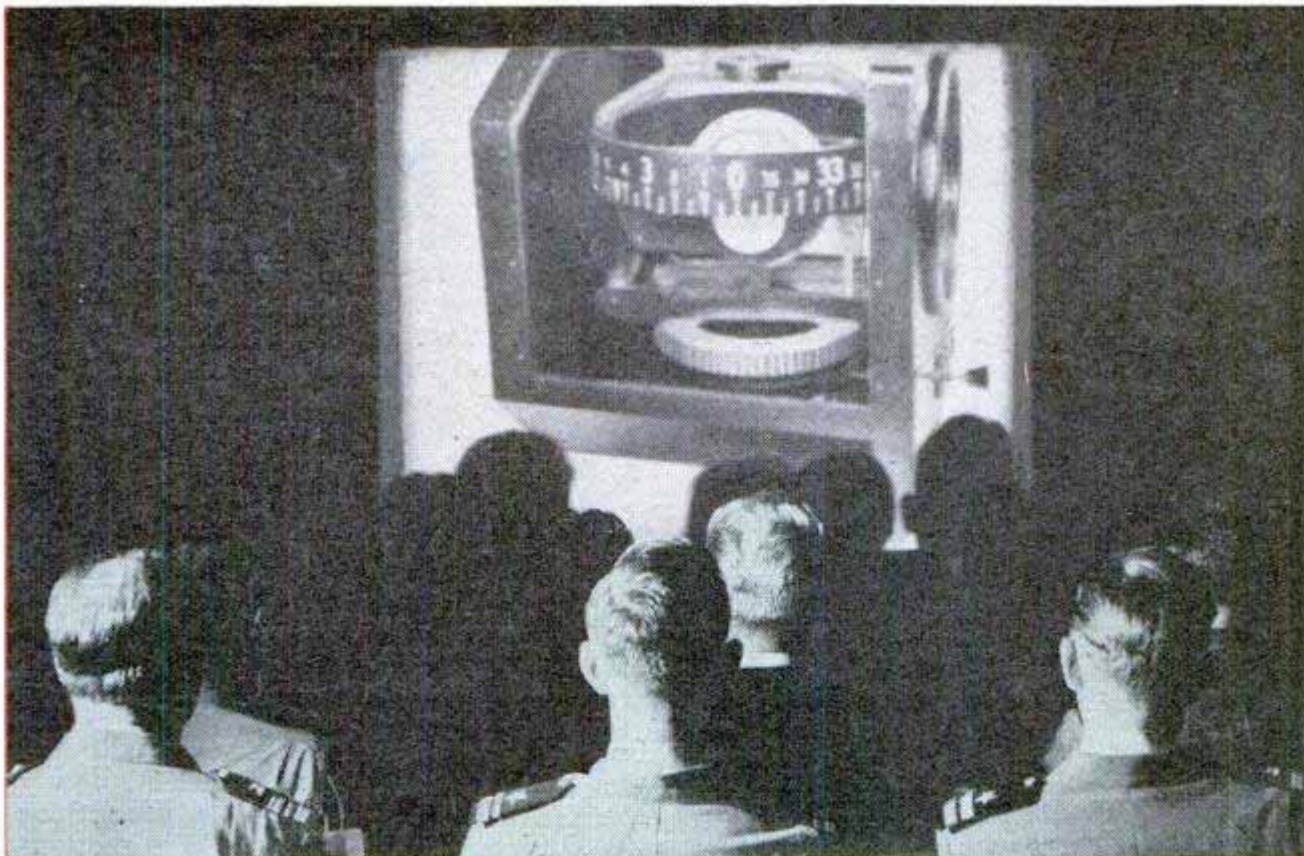
## Auto-Seat Bed Can Be Installed in Any Two-Door or Four-Door Car

Hotel space in your own automobile is provided by an auto-seat bed designed by a St. Petersburg, Fla., war veteran. Easily made up for sleeping, the three-cushion bed can be installed in any two-door or four-door car. Without leaving the automobile, the driver can give a fingertip pull on a cord and the back of the front seat

falls backward to align with the rear seat as a comfortable couch or bed. The front seat moves downward and forward beneath the steering wheel, allowing adequate space for reclining without interfering with the wheel. The bed works on a ball-bearing, wheel-and-track principle akin to that of the roll-up garage door.

Below left, a cord between the cushions releases the front seat. Right, the three cushions make a roomy bed





Navy officers in experimental "studio classroom" get a close-up of a directional gyro on television screen

## is the navy's

**By Bill Reiche**

**N**OW HEAR THIS," the Navy's classic call for attention, may soon be heard by thousands of gobs simultaneously in widely separated bases. How? By making television serve as schoolteacher.

Almost since the day the first image flickered faintly on a Kinescope, video has been touted as a possible medium to train a scattered audience. Its advantages are numerous: a single gifted instructor can reach an infinite number of students; for demonstration it can employ people, scale models, pictures, drawings, charts and movies (including the animated variety); it's alive—unedited and up-to-the-minute.

Project 15U2, being conducted by the Special Devices Center of the Office of Naval Re-

search at Sands Point, N. Y., is launching a three-pronged attack—technical, pedagogical and psychological—to find out whether an excellent theory can be transformed into acceptable practice.

Designed for the enormous training demands encountered in wartime, training by television can do yeoman service in the

View from the rear control room of the Navy studios at Sands Point, N. Y.





E. A. Hungerford, director of research at Sands Point, takes a part in one of his own television programs during Navy tests

days of peace—both with active officers and men and with reservists.

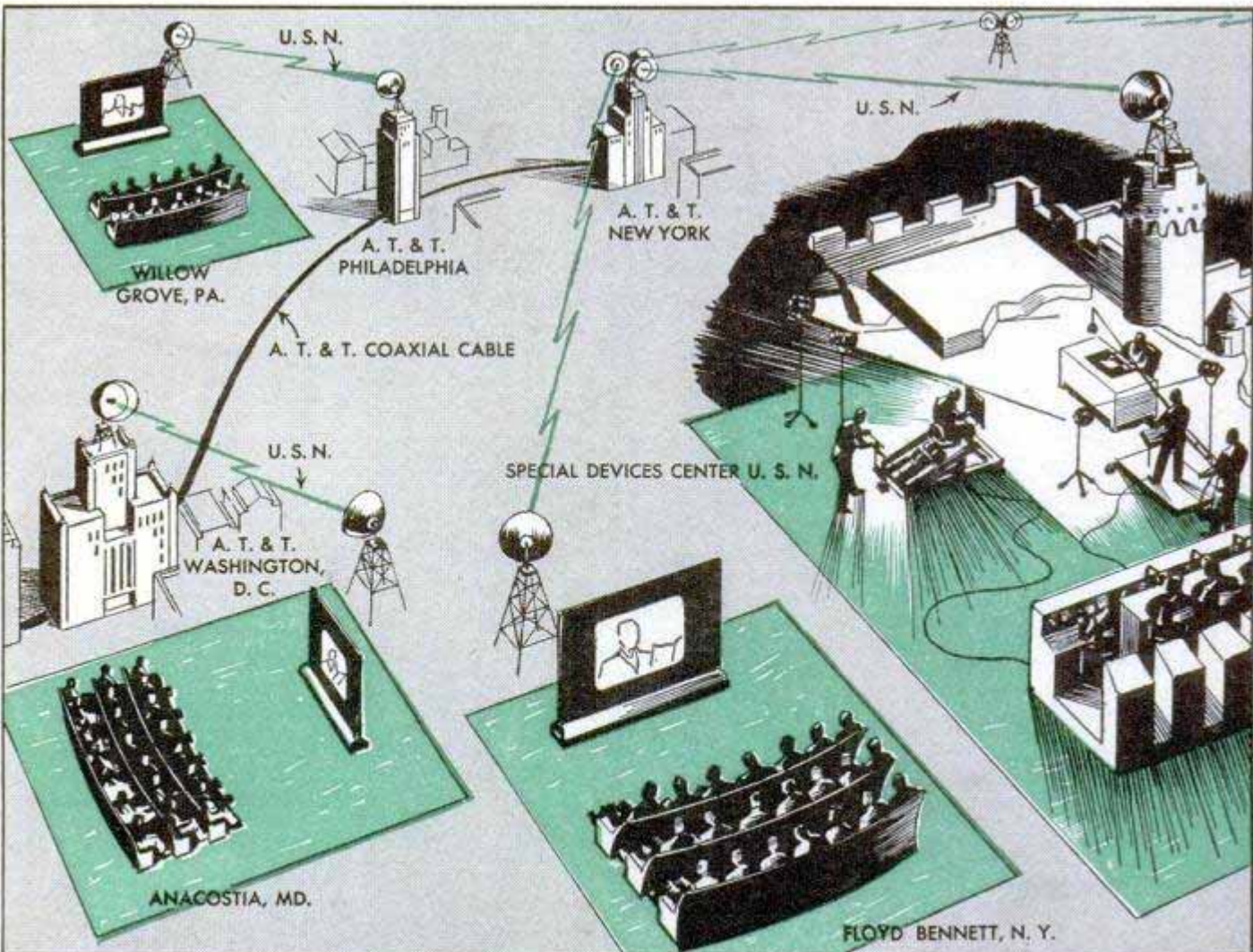
The idea was born after Pearl Harbor, when the best military minds looked for an air raid on the continental United States and probably aimed at the No. 1 prestige target, New York City. Air-raid wardens

were trained by a series of television lessons.

The link that carried the idea forward was E. A. Hungerford, Jr., then an NBC television production executive, who shortly afterward went into the Navy where he was assistant head of the radar section of the Special Devices Division.

Two years ago, after consultation with the Chief of Naval Operations, the Bureau of Personnel and the Bureau of Ships, he drew up a prospectus which has blossomed into Project 15U2. Hungerford and his project television producer, Peter L. Barker, realize they are pioneering and must keep their eyes on the goal of the best teaching to the most men at the least cost.

The laboratory studio at the Special Devices Center has two studio and two mobile cameras and was completely equipped by General Electric, except for the Du Mont mobile units. Three motion-picture projectors are installed so that any one may immediately be cut into the program. The set also includes two 35-mm.





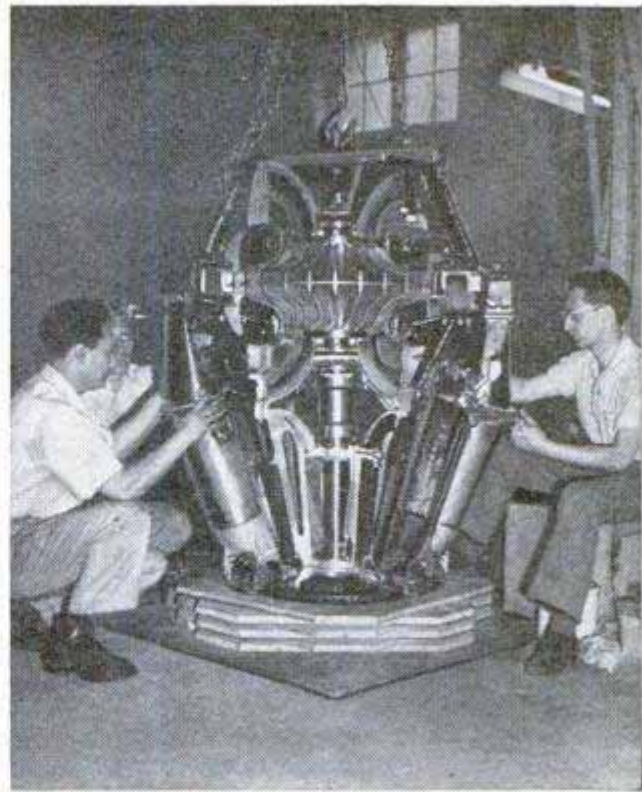
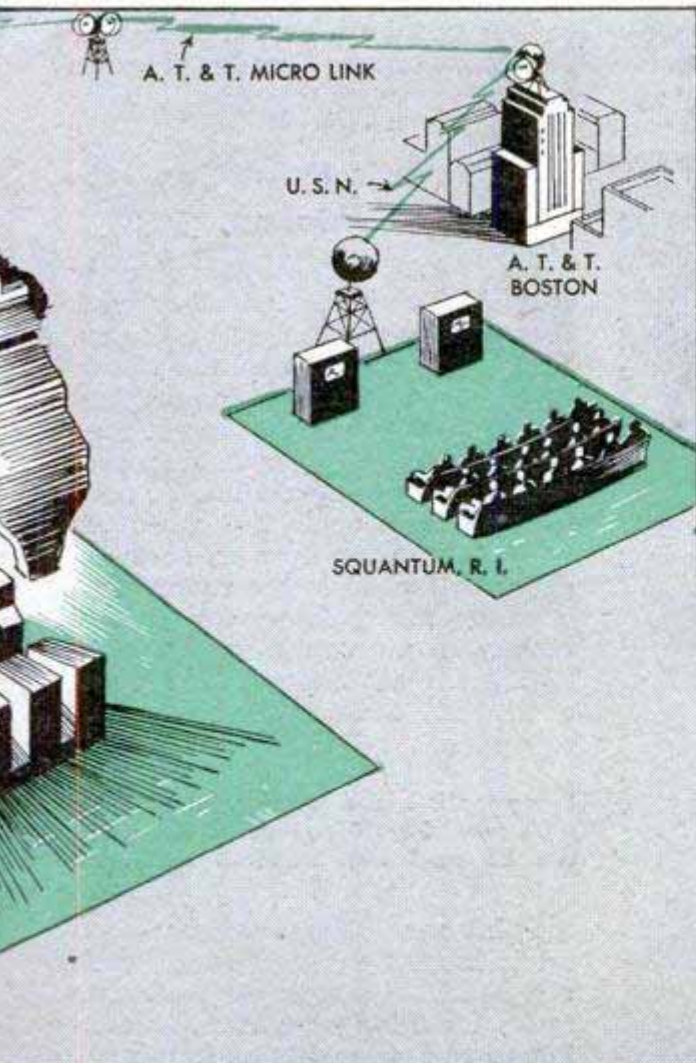
slide units. Two new techniques are being developed in the use of films. One is in making animated sequences, where the accepted Hollywood practice is now to make them slowly and at great expense. The SDC men, instead of making the "movement" very slight from frame to frame, which results in a smooth sequence but a long and costly job, will increase the movement and bridge the gap by carrying the eye from spot to spot by using air-brushing on intervening frames.

A field gun in the studio can be superimposed on a battlefield background by filming the gun against a black background and then piping the image twice into the camera line which is carrying the battlefield. The first time it is brought in, the gun will "cut a hole" in the background to its exact outlines and the second time the gun fills the hole.

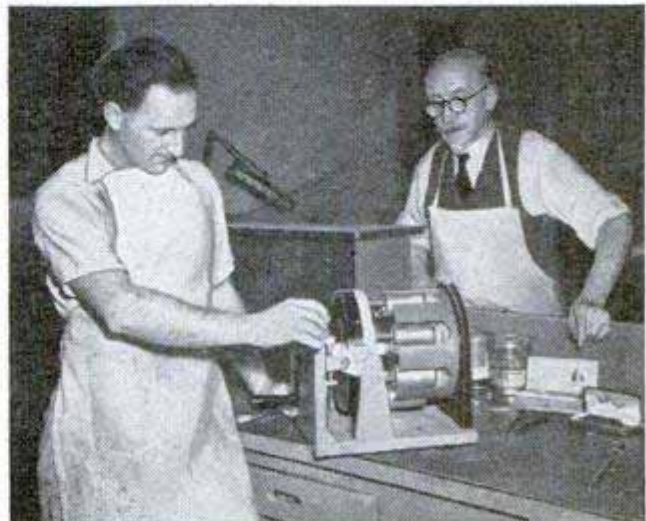
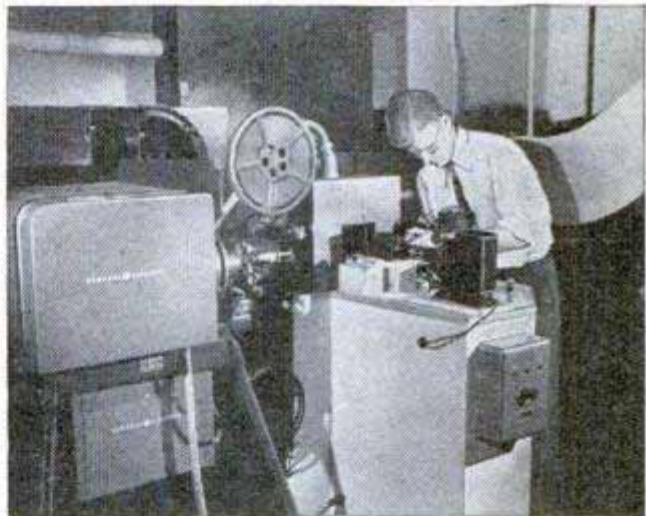
It is expected that television centers will be situated in strategic regional locations, taking into account transmission facilities

(Continued to page 270)

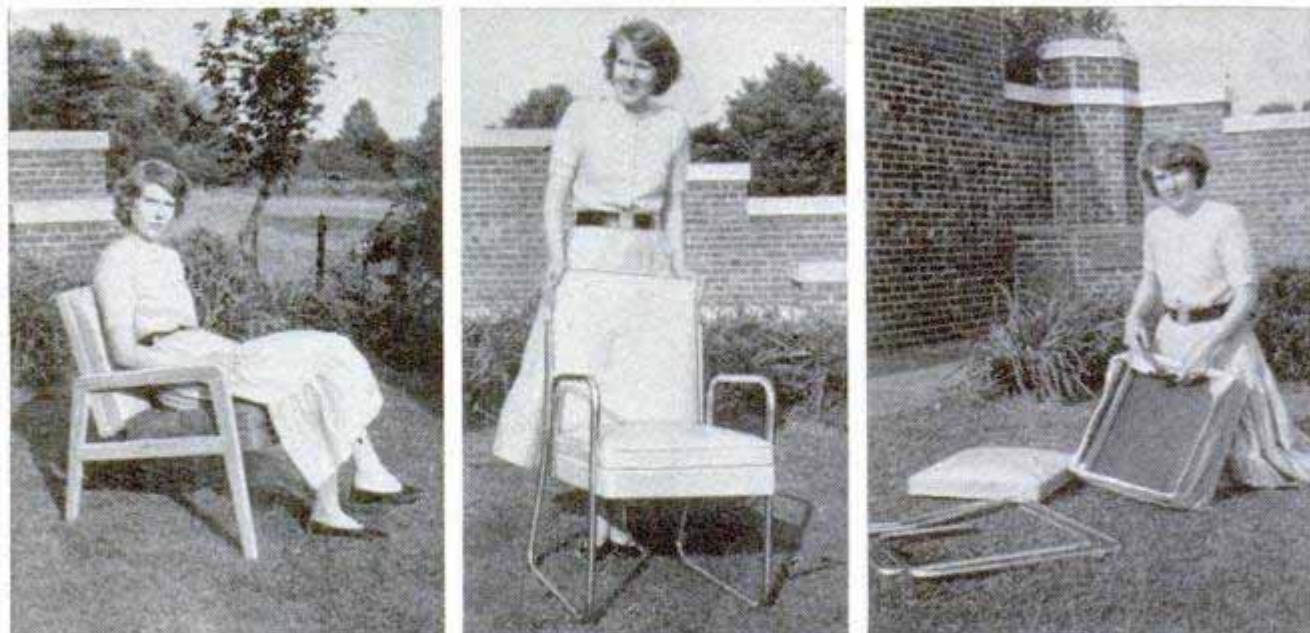
Sketch below shows how one instructor at Navy Special Devices Center, Sands Point, N. Y., can reach thousands of students. Micro links connect with Boston and the coaxial cable to Philadelphia and Washington reaches the local naval training centers



A J-33 jet aircraft engine is rushed from assembly line to television studio for Navy class. Below, a technician readies projection equipment in studio. Bottom, studio craftsmen construct model of a Waterbury speed gear used to elevate guns on a warship



## Cushions Without Springs Can Be Used in Home-Designed Furniture



Left, furniture designed by the home craftsman can be built around these cushions. Center, cushions have no springs, but are soft and retain their shape. Right, skirt on cushion is tacked to the frame for a seat

Soft furniture cushions, made without springs, can be used by the home craftsman in building chairs of his own design. The cushions are cut from plastic sheeting with a leather grain. They are filled with kapok, which unites with the air to form a soft, fluffy material that retains its shape without the use of springs. In one model, the cushion is airtight and has a valve

which automatically fluffs up the stuffing. The home craftsman can tack the skirt extending from the lower edge of the cushion to the seat, and design and build a frame of his own. Only a fraction of the usual time and skill spent on upholstery is required. The cushions are suitable for porch and lawn furniture because they are watertight.

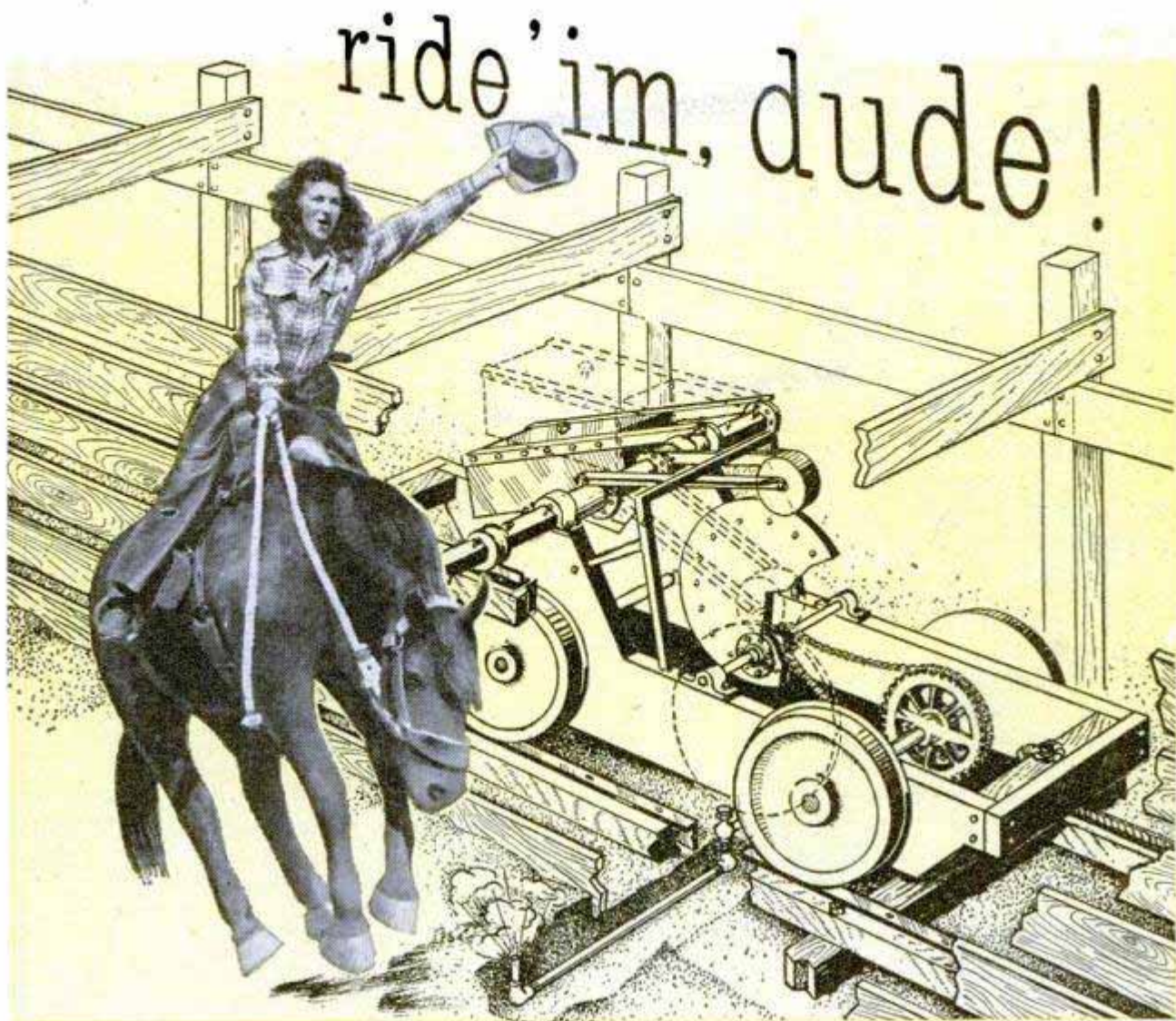


### Lid Converts Paint Can To Spray Container

Paint can be sprayed directly from the original container with a special cover that fits any can. The adapter eliminates the loss of paint in transfer from the original can to the spray container. It consists of top and bottom plates made of cast aluminum. A neoprene gasket seals the container when three wing nuts are screwed down. Attached to the cover plate are a brass regulator valve, a dial gauge, an automatic safety valve and brass air fittings. The paint outlets fit standard spraying equipment.

Spray top is sealed to the paint can with wing nuts. Inset shows air fittings, which can be used with standard equipment

Paint made from tobacco-seed oil is more flexible than linseed-oil paint, although it remains tacky for a longer period, according to two scientists of India.



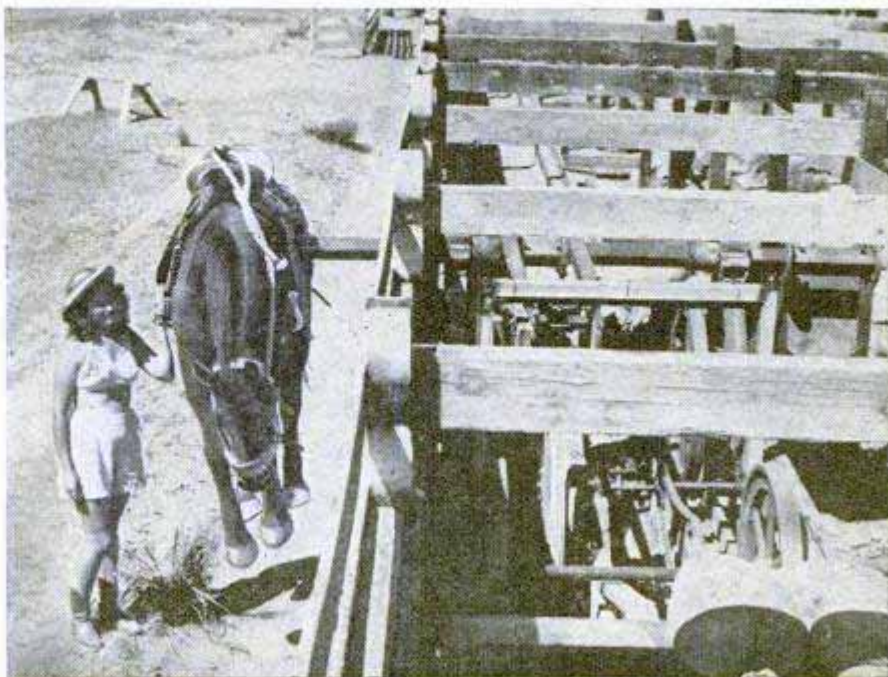
**T**HE GATE OPENS and Gunpowder, the bucking bronco, comes out of the chute plunging and pitching, dust spurring from under his feet. With head lowered, he charges alongside a high corral fence, his rider hanging on for dear life! And yet this is the gentlest horse in captivity. A child of three can ride him, and so can his grandmother. In fact, he will not even switch at a fly. He is a mechanical horse and every move he makes is controlled by an operator.

This man-made horse charges out of a chute and bucks the length of a fence 120 feet long. He can buck twice a second or once a minute. Though he is not supposed to

Bronco-busting is safe when you're riding this mechanical horse that is driven by a machine behind the fence. Even dust clouds are provided

**By Howard D. Clark**

Backstage view of the man-made horse and the machine that makes it buck



throw the rider, no doubt this horse could, if the question arose, offer the severest test of sticking ability that a rodeo rider would care to meet.

Gunpowder's creator, Bill Pace of Buckin' Horse Ranch, Yucca Valley, Calif., knows horses. As a master horseman and skilled mechanic, he constructed the horse, and designed and built the mechanism that makes it travel and buck at his bidding.

Pace grew up with horses in the Southwest, riding all kinds and breaking his share of broncs. He once saw a taxidermist's horse hanging from a post and realized that if he could make that horse buck he'd really have something. So he made a model on a scale of three inches to the foot and designed a mechanical bucking machine. For his full-size model, a taxidermist's horse wouldn't do because it wouldn't stand the wear of "rodeo" action.

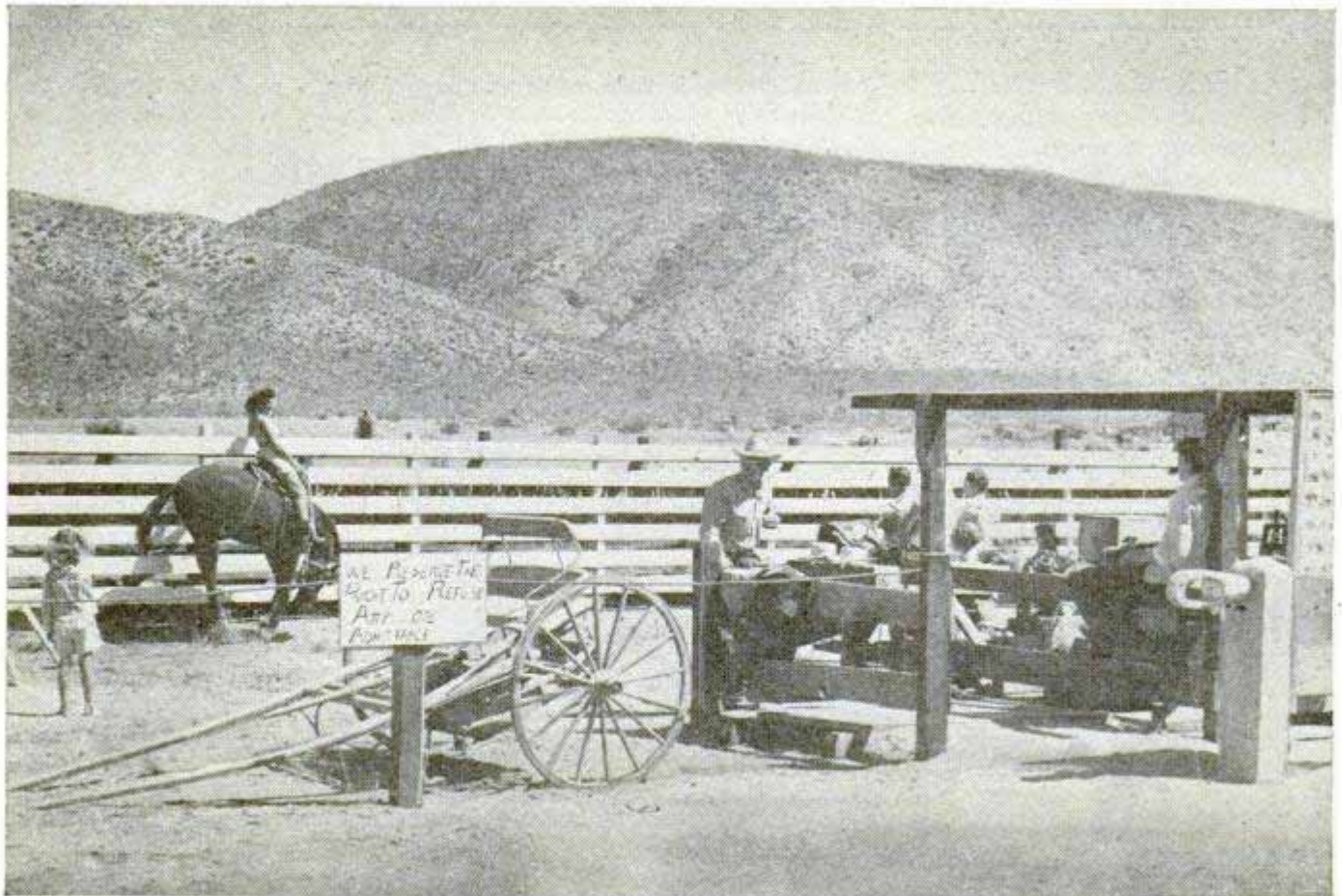
So Pace set about making his own bronco. He made a cast of a dead horse with one-day cement. With this as a guide, he sculptured his bronco in fighting pose, using paper, muslin, glue and steel reinforcing. Its rayon-flock hair would fool its own mother. The bronc has steel eyelashes, rubber ears and natural mane and tail. In styling the tensed form, neck and features, Pace modeled his steed after the quarter horse. It took about four months to make it, but he now has a cast so he can repro-

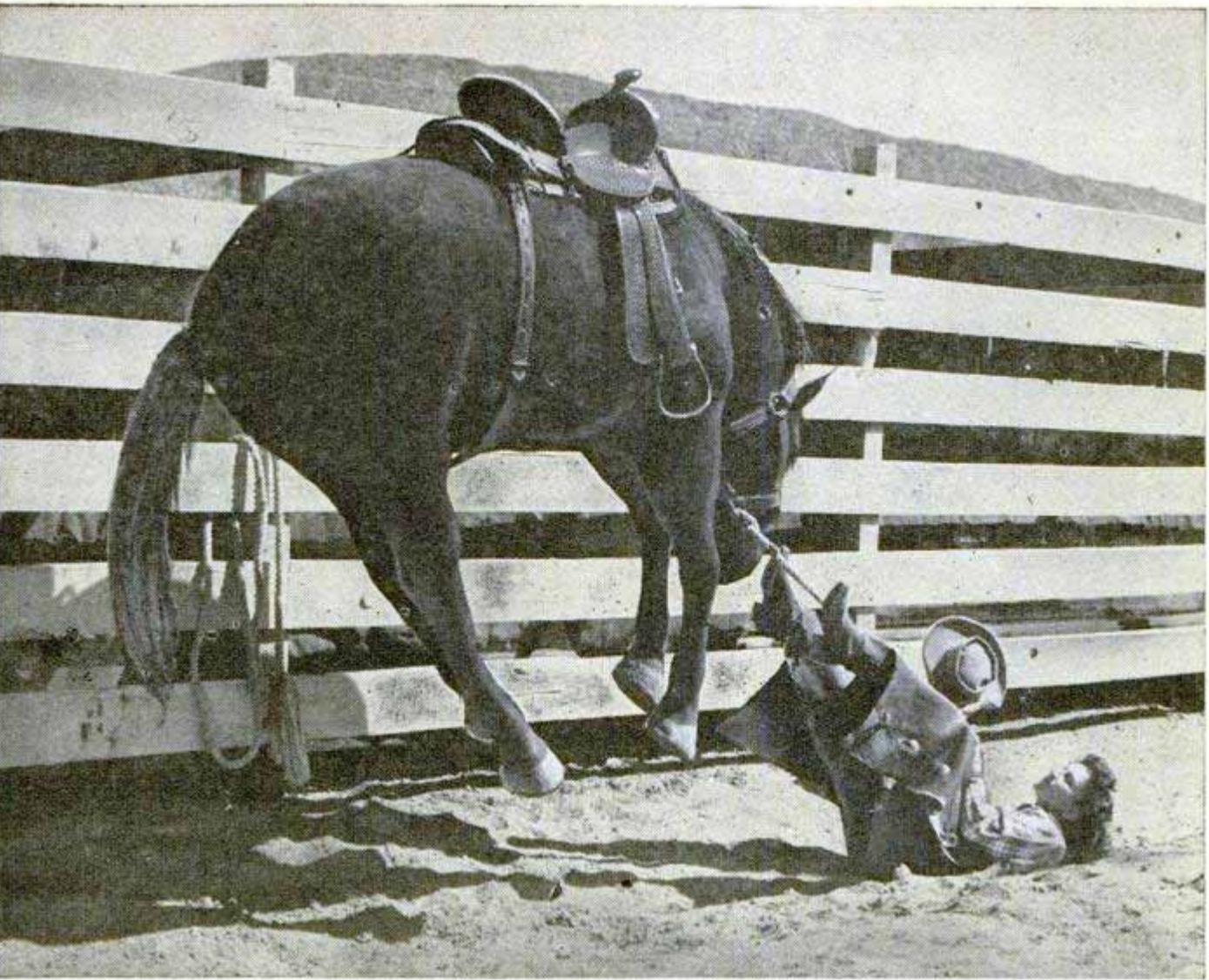
duce it in four weeks. In all, the animal cost \$1600 and the bucking mechanism represents an additional outlay of \$7000.

In its bucking action the horse does not touch the ground, but it seems to do so to the spectator who can see no support. It is suspended on a steel bar extending through the fence to a wheeled chassis which runs on a track behind the fence. The chassis carries the bucking mechanism. When the car moves the horse forward, the bar travels along an opening between the fence planks. The two upper planks of the fence above this opening are supported from the rear. To strengthen the illusion, rubber flaps that are pushed aside as the bar moves along simulate fence posts making the fence look like one piece.

A 5-horsepower electric motor and a 1½-horsepower compressor provide the power that drives the mechanical bronc. The chassis is pulled along the fence by a rope attached to each end of the car and wound around a windlass at one end and a pulley at the other. As the car moves, a chain, driven by a sprocket wheel on the axle, turns an eccentrically mounted cam which raises and lowers the bucking arm by a roller arrangement. This roller is held against the cam by a weight, set to balance the weight of the rider. When he dismounts, the weight raises the roller, stopping the bucking action.

**Speed and vigor of the action are controlled by the operator seated near the entrance with other spectators**





Action shots, like this one of a tossed rider, can be faked. Break in the fence post can be detected here

A favorite with the dudes, the mechanical horse is a safe way for them to be photographed by either movie or still cameras in thrilling poses. When these pictures get back home, they look like exciting rodeo scenes. Pace says his idea germinated at Merced, Calif., during 20 years of giving curious tourists a safe taste of riding that approximated rodeo style.

A leaf spring on the bucking bracket recessed inside the horse takes out jars and shocks, providing life-like resilience. The horse makes a vertical rise of 20 inches during a 3½-foot jump. This, plus the spring action, gives the rider as much thrill as the average dude wants. With added speed it could be made to toss him high in the air, but that never happens. If he does fall off, the automatic mechanism stops the bucking at once and the horse, as any bronc

would, rises and floats over the grounded rider with the greatest of ease. The steed then backs quietly into the chute.

Ever the perfectionist, Pace couldn't overlook the inevitable cloud of dust. A buried air line with outlet pipes spaced to match each rotation of the cam takes care of that. As the horse moves along, the cam engages a valve releasing a quick blast of air from each of a series of pipes under the dirt just as the bucking horse seems to hit the ground.

After building and testing the complete rig at Merced, Pace installed it at his roadside Buckin' Horse Ranch at Yucca Valley. Judging by customer reaction, the bronc would be the hit of the show, anywhere from Coney Island to Golden Gate Park.

**Inventor Bill Pace walks away from his animal after putting a bucking surcingle around it**

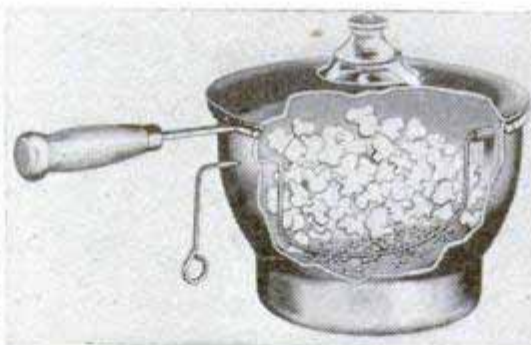




## Nozzle Extension Makes Garden Hose More Useful

Designed to make your garden hose three times as useful, a nozzle extension saves you work when washing your car, flushing down your driveway or watering delicate plants. A mop head attaches to the bent extension tube for washing the car or the

windows of the house. To sweep sidewalks and driveways with water, a high-pressure nozzle is used. A pressure-breaker attachment is provided for gently irrigating soil around the bases of plants without spraying leaves, resulting in a saving of water.



## Glass-Top Popper Has Trick Shaker

You can see the corn exploding in a glass-topped corn popper that features a pendulum-type agitator. Instead of the usual flat bottom, the popper has a popping chamber shaped like a half ball. The pendulum agitator, curved to fit the bottom, keeps unpopped kernels on the area of greatest heat and moves the popped corn up so it won't burn. The glass cover is heatproof and enables you to see when the kernels are all popped. The agitator is operated by an extension arm.

## Automatic Brake Ends Stop-Light Creep and Acts as Hill-Holder

Fully automatic, a braking device locks the hydraulic brakes on when a car comes to a complete stop. There are no buttons to push or other driver-operated controls. By a combination of automatic switches, the braking device holds hydraulic pressure in the brake cylinders as long as the car is motionless, the ignition switch turned on

and the accelerator released. When the accelerator is pushed to resume motion, the braking device releases automatically. The unit does not go into operation again until the car comes to a complete stop. It is especially designed for hill-holding and to prevent creeping by automatic-transmission cars.



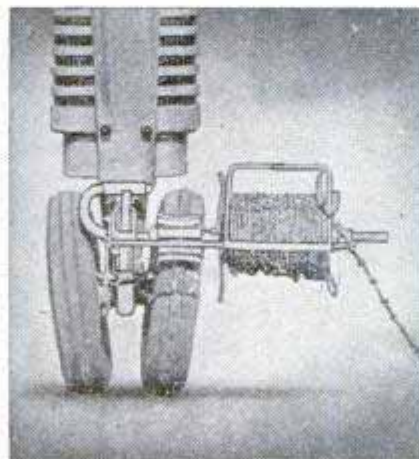
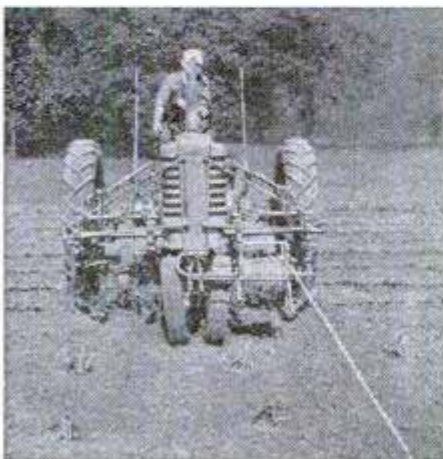
### Casting With Rubber Is Simplified By Coagulation-Control Liquid

Making molds and castings with latex solution is much easier and faster when a newly developed material, which speeds the rate of coagulation, is added to the latex. By adding more or less of this liquid, the rate of coagulation can be controlled. When used for dipping, as in the production of rubber gloves, the latex will produce a film up to  $\frac{1}{10}$  inch thick in a single dip. Without this material, it would require about 20 dips to produce the same thickness. The new material also makes it possible to cast solid rubber articles in one-piece molds. The elasticity of the latex permits removal of the casting from the mold without breaking either. Molds made with the material can be used also for casting liquid plastic, plaster and other materials.

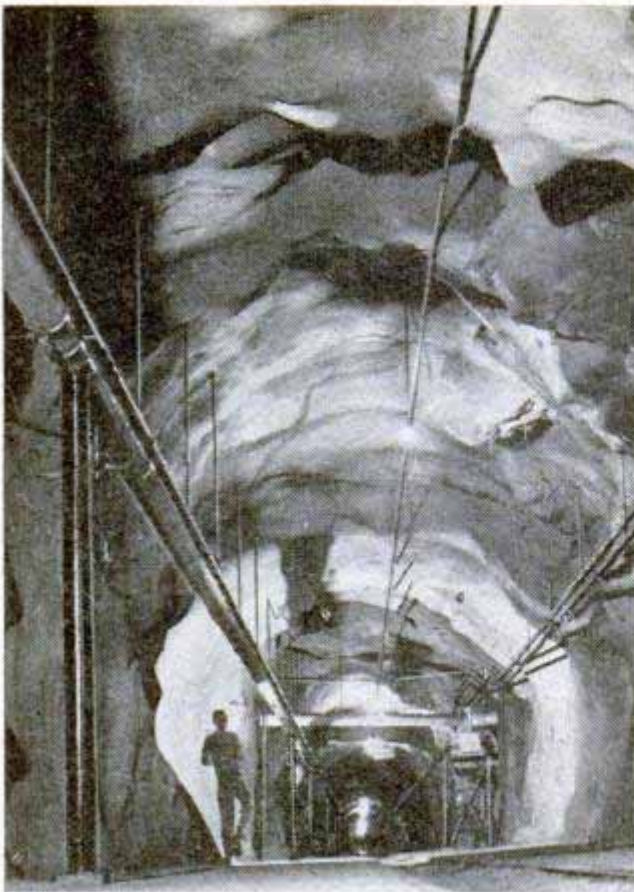


Above left, latex mixed with new material is poured over model, which is easily removed (right) when the latex coagulates. Top, the rubber molds and castings. Center mold made the plastic figures in front of it

### Winder for Tractor Keeps Wire Taut While Rolling it on Spool

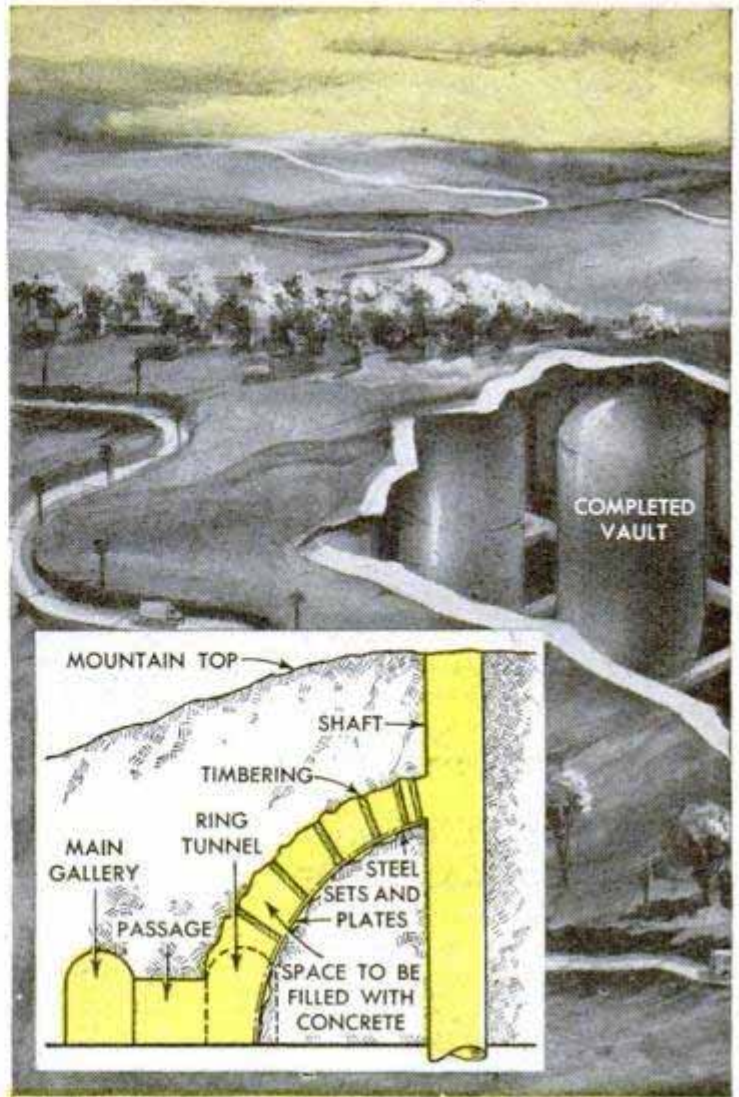


Barbed wire can be rolled or unrolled at a rate of 80 rods every three minutes with a winding attachment for a tractor. The winder is friction-powered by the front wheel and is geared to keep the wire taut while winding it on the spool. The wire is picked up and rolled at the same time, eliminating snarling and backlash.



U. S. Navy photos

Five hundred feet underground, battery-driven train runs through rough-hewn tunnel with fuel lines along sides. Below, steel ladder leads straight up to dome of each tank where visitors look down inside a tank (if empty) to a depth of 300 feet. See sketch, right

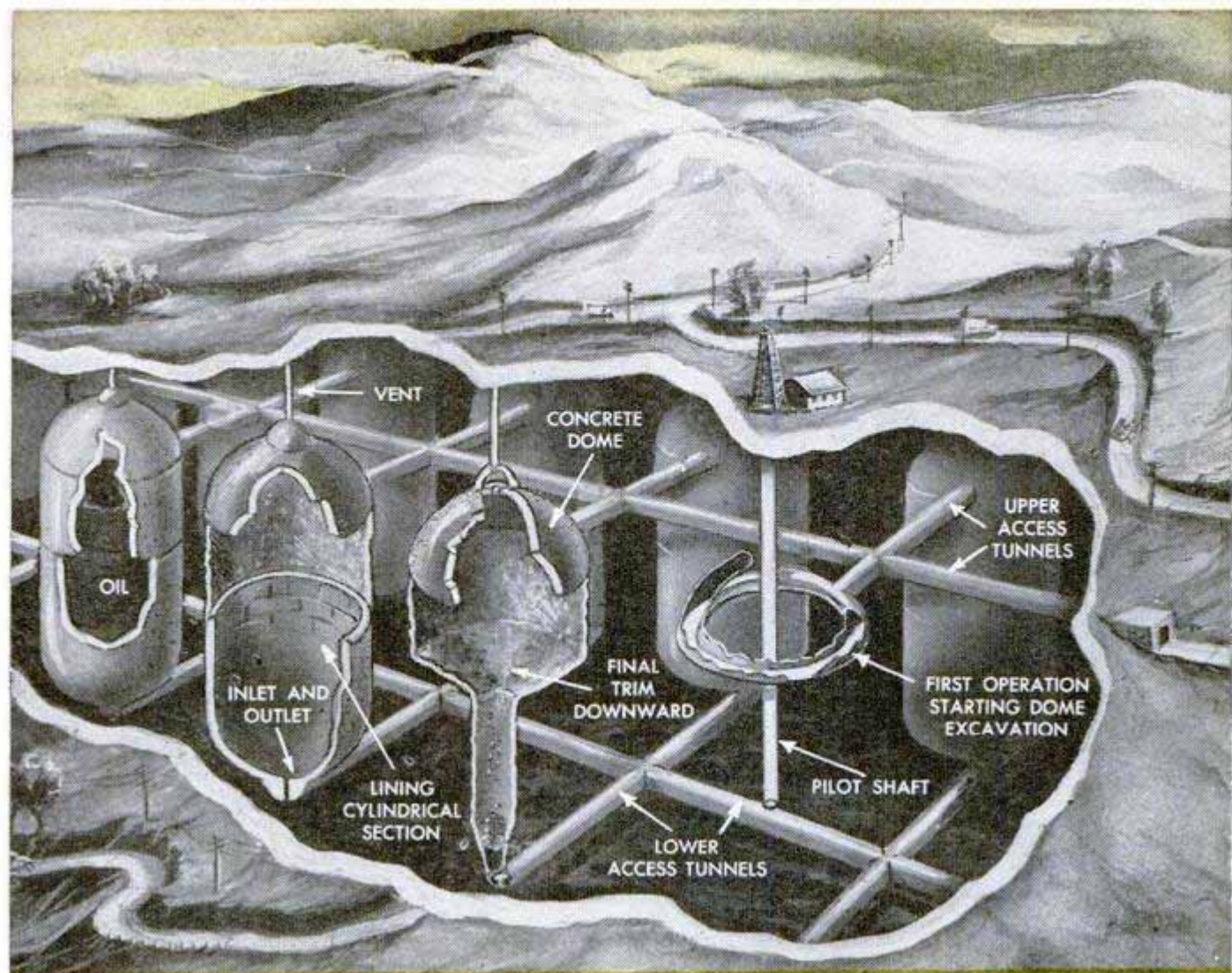


**This is one of the biggest "now it can be told" stories of World War II — far below Pearl Harbor are fabulous underground caverns holding oil for the fleet**

**O**NE OF THE NAVY'S most closely guarded "top secrets" during World War II was the fabulous underground oil-storage tanks hidden hundreds of feet deep in a mountain back of Pearl Harbor, Hawaii. These fuel-storage tanks, considered among the greatest engineering feats of all times, are so huge that a 30-story building could be dropped inside each tank with room to spare. The 20 underground tanks hold 4,000,000 barrels of precious oil for the Pacific fleet—enough fuel to carry a cargo ship 500 times around the world!

Threatening gestures of the Japanese fleet back in 1940 made necessary this 42-million-dollar project at Red Hill. At that time the Navy realized if war occurred in the Pacific the above-ground fuel tanks would be inadequate and highly vulnerable. Inadequate because not enough fuel could be stored to take care of the Pacific





Adapted from drawings by Lill Rethi and Louis Ruyl from the book "Builders for Battle" by David O. Woodbury

## Inside Pearl Harbor's Secret Caverns...

By Richard M. Botts

fleet's vast wartime needs, and vulnerable because these tanks could be wrecked easily by a few well-aimed enemy bombs.

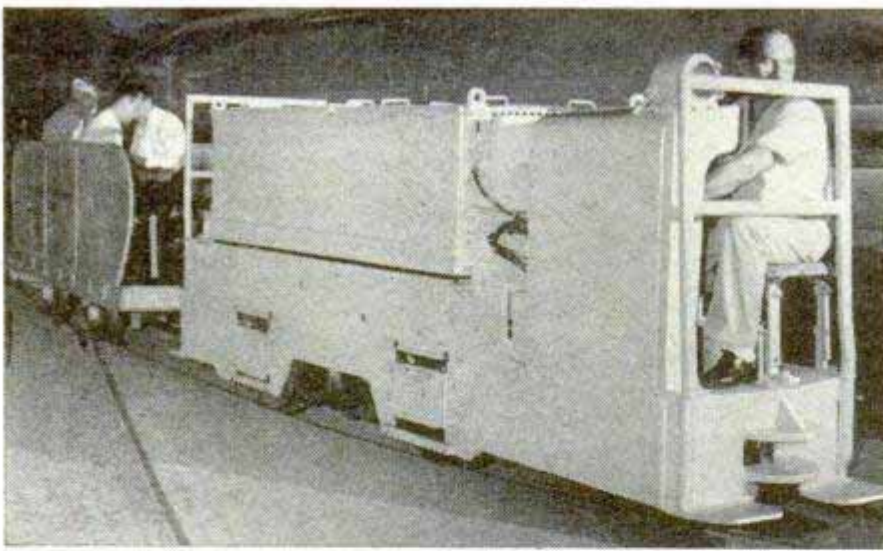
To take care of this situation, the Navy decided to embark on a daring, untried and gigantic experiment. The experiment would be the building of an underground oil-storage area so deep in the earth that not even bombs or earthquakes could menace the fleet's lifeblood.

At first, the civilian engineers planned to store the oil in horizontal tunnels. But this would require much heavy equipment and men all working in narrow, cramped quarters. With the Navy's consent, the engineers decided to build something entirely without precedent—vertical underground tanks, side by side, 200 feet apart and connected by underground tunnels. By carving the tanks out in vertical fashion, beginning at the dome of the tank, most of

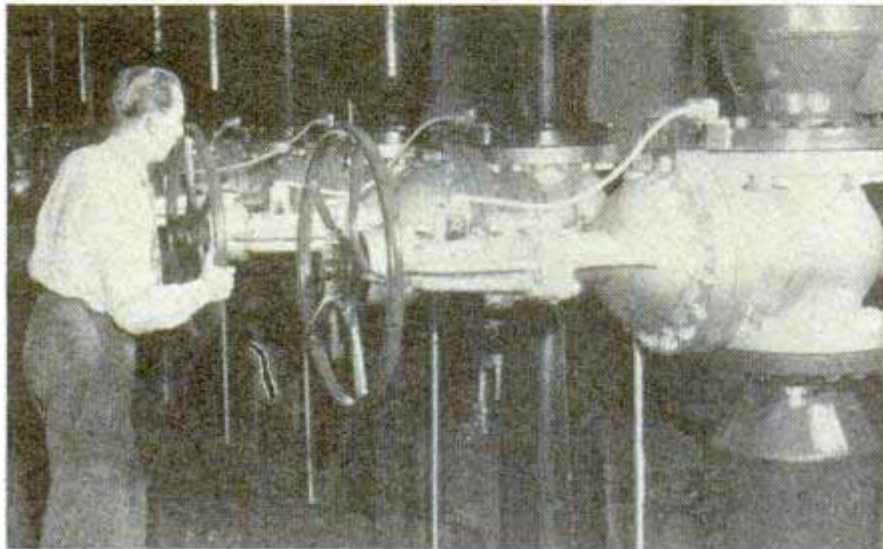
the rock and earth could be disposed of by gravity. In this manner, the engineers figured, they would save much time, money and machinery.

To make the tanks bombproof, construction of the tank's dome began 100 feet underground. But, before actual construction of the storage area could begin, two horizontal tunnels had to be driven through the mountain—one at the 150-foot level, the other somewhat below the 400-foot level.

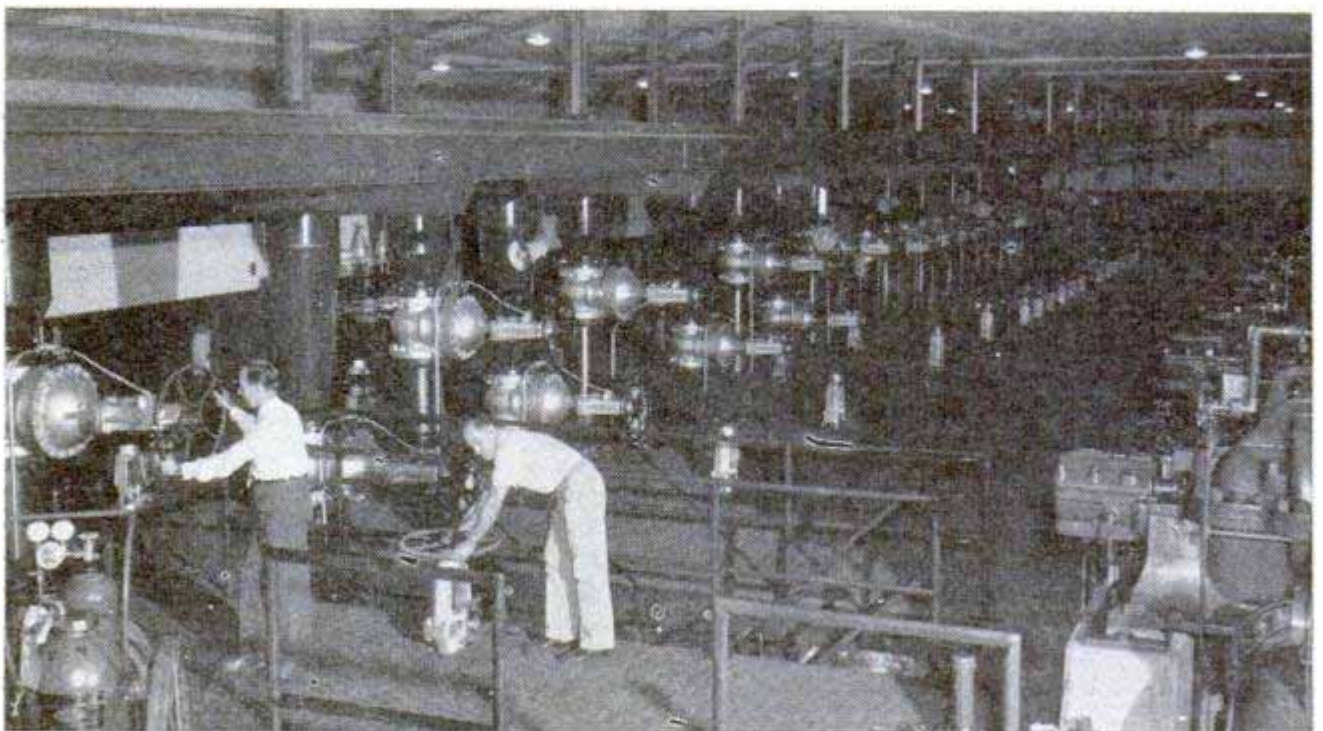
While the tunnels were in progress, a vertical shaft was dug over 400 feet deep bisecting both tunnels. As soon as these two operations were completed, construction of the tanks began. Miners were lowered 100 feet down the shaft to begin building the dome of the tank. It was hot and dark. No light penetrated from the outside and, although blowers were used, the heat sometimes ran to 130 degrees.



"Fuel Line Special" makes three-mile trip through tunnel in 30 minutes



In the main pump room (above and below) huge pumps force the oil from Pearl Harbor up into the tanks three miles away. The room itself is half the size of a city block. In case of power failure from Honolulu, the farsighted Navy has built a special room for emergency generators



Building the dome of the tank required excavating an annular space which was timbered and then steel plates set against the inside rim. When the steel plates were completely welded together the timbering was removed and concrete shot down specially designed chutes to fill the space completely.

Once the concrete had hardened, the really hard and dangerous work began. The miners then began excavating the tanks from the inside out. As the miners dug the rock loose they simply let it fall down the 300-foot shaft to the bottom where it broke up and landed on a conveyor belt. The belt then carried the rock outside without a hand touching it from the time the rock was dislodged from the miner's pick until it arrived outdoors. The conveyor belt consisted of loops of rubber and fabric belt running over rollers driven by electric motors. On miles of this conveyor belt the muck was quickly and easily eliminated.

Begun the day after Christmas, 1940, the Red

Hill underground storage tanks were finally completed in late 1943.

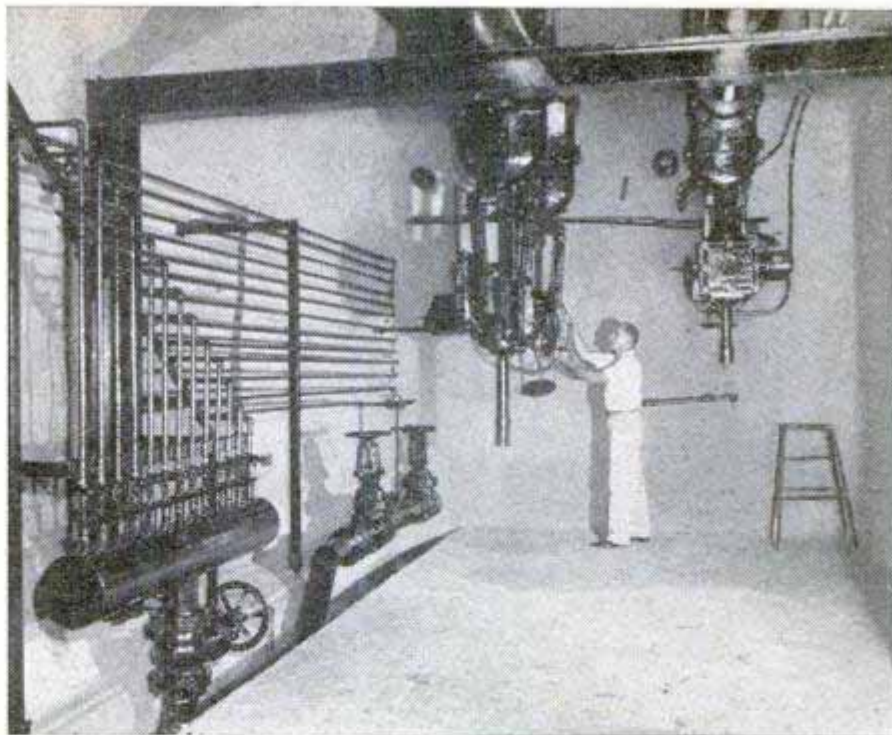
Today, from his offices close to the entrance to the storage tanks at Pearl Harbor, Lt. Comdr. K. A. Beede and his small group of naval and civilian employees run the underground "show." Entrance to the still closely guarded storage cave is obtained by entering a mammoth concrete structure resembling a Quonset hut at Pearl Harbor. The only indication that this leads to the fabulous underground is a sign in the concrete wall reading "Station F."

Once through the steel zigzag door, the visitor must walk 100 feet inside the tunnel to the main entrance door. A ring of the bell at the side of the door brings a guard who cautiously peers through a thin slit in the steel door, views every corner of the tunnel from a large reflection mirror, examines all credentials, passes, and when satisfied that everything is in order, slides a bolt and a gargantuan two-foot-thick steel door swings gently outward and the visitor is passed into the underground wonderland.

The main control room lies right beyond this door. Here are the master controls for all the tanks. A large board indicates which valves are open, which closed, amount of fuel in each tank, the pressure in the tanks, the temperature and the number of feet of fuel in each tank.

Adjoining the main control room is the pump room. About half the size of a city block, these pumps are powerful enough to pump fuel from Pearl Harbor to the tanks three miles distant. Just in case of power shortage from Honolulu there is a special room for emergency generators to supply the power to keep the operation working continuously.

Beyond the pump room, a battery-driven train known as the "Portuguese Jeep" or "Fuel



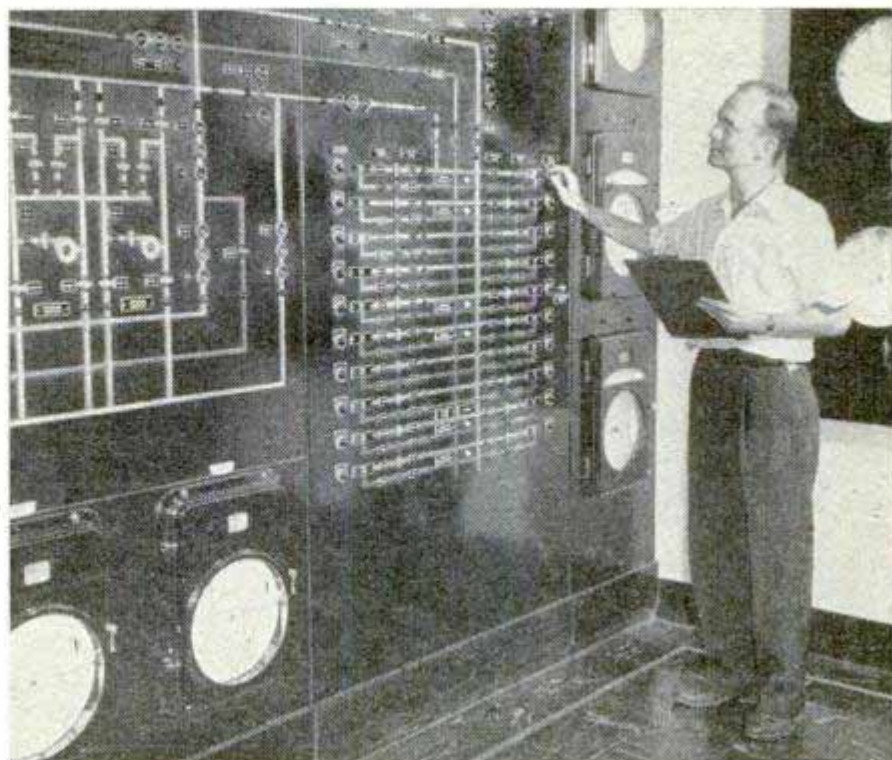
Below each tank is a leak locator, operated automatically or manually. In case of a leak in one of the tanks, oil is drained out immediately

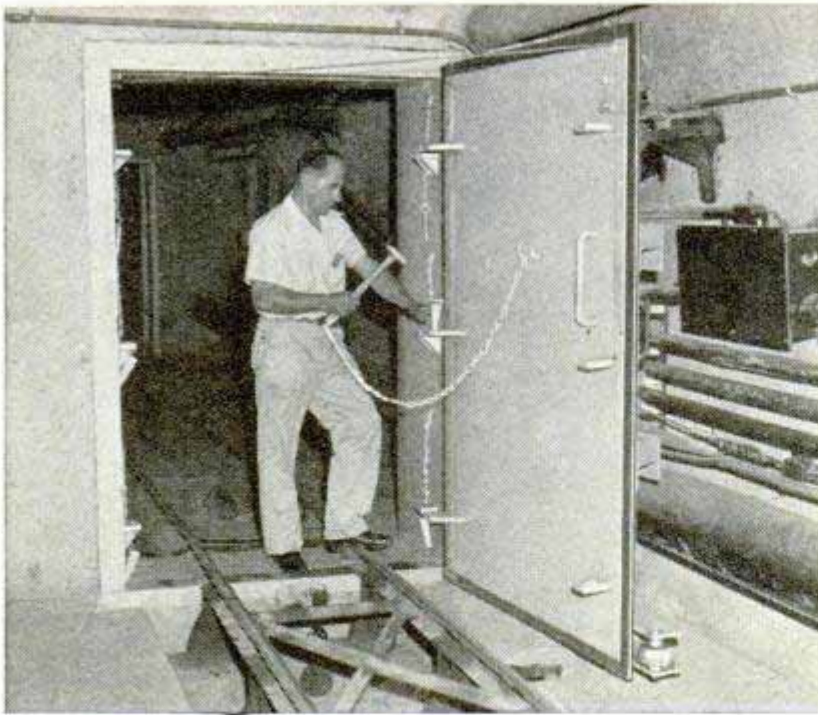
Line Special" awaits the visitor. It is the only transportation between the pumping station and the tanks, three miles away and 500 feet beneath the earth.

The train makes the three-mile trip in about 30 minutes. All along the side of the tunnel are 16, 18 and 32-inch fuel lines. There are no above-ground fuel lines. Lights glow eerily every 50 feet or so which makes the whole route a reminder of a carnival "tunnel of love."

The "Fuel Line Special" stops at the

Main control board shows pressure, number of feet of oil, temperature, and whether there is a leak in any one of the 20 underground fuel tanks





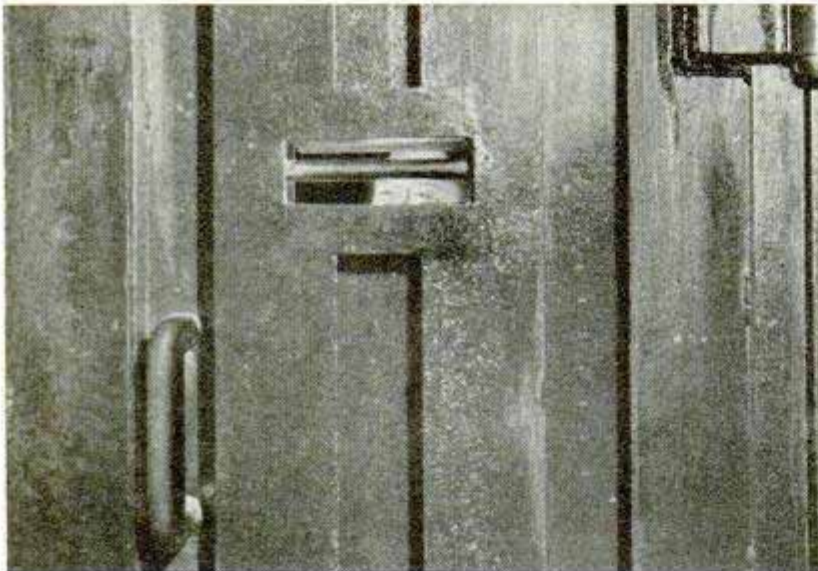
In case of oil flood the track drops into a pit permitting the oil-tight safety door to close automatically

main lower gallery. Here the visitor is 500 feet underground. Above his head are tons of oil. The cavernous lower gallery is built without smoothing the walls and the rough-hewn caverns are sprayed with a mushy pearl-gray Gunitite.

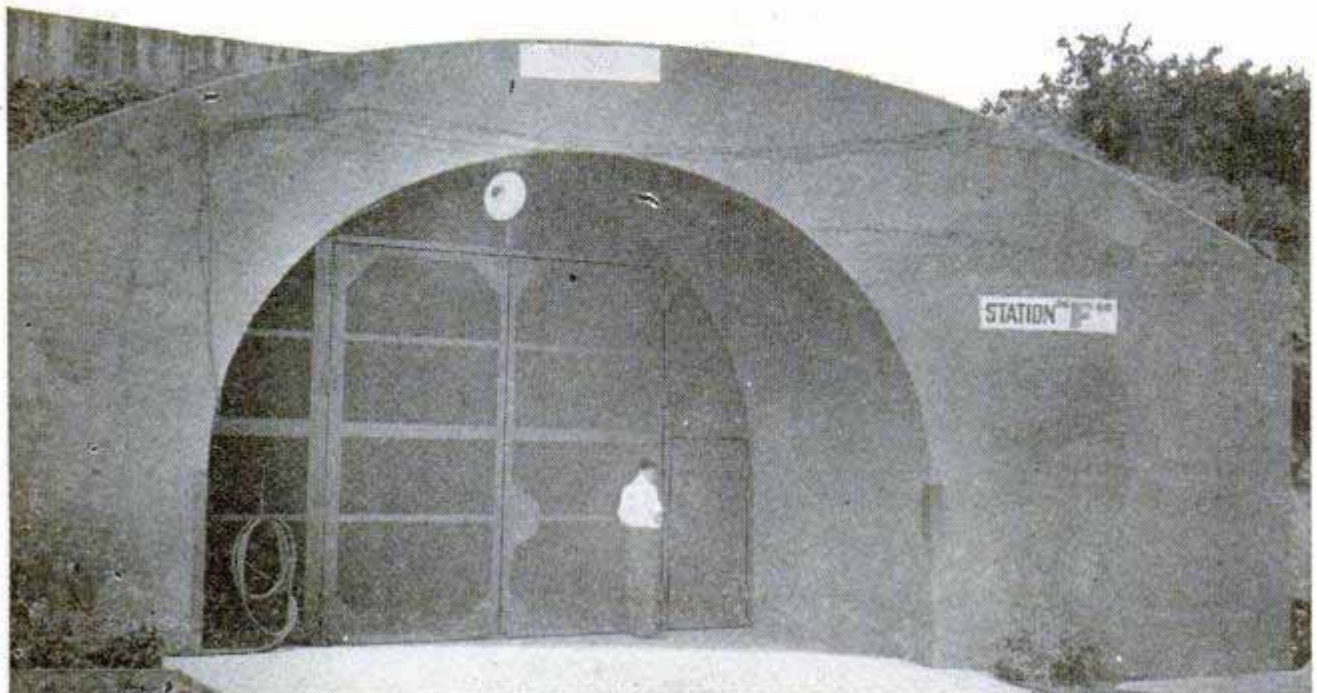
At the base of each tank is a leak locator. This indicator tells automatically if there is a leak in that particular tank. If there is, the oil is drained out, the tank filled with water to the point of leak and a rowboat lowered. Welders repair the leak hundreds of feet underground.

To view the inside of the tank, the visitor must go up an elevator to the main upper gallery. Here he walks into another huge tunnel and climbs a vertical steel ladder about 100 feet. At the top of the dome he may peer down a manhole 300 feet to the bottom of an empty tank.

Of the 4000 to 5000 men who built the tanks, the great majority were Americans of Japanese ancestry!



Through slot in inner main-entrance door (left) all visitors are carefully inspected. The Pearl Harbor entrance (below) resembles a huge Quonset hut made of solid concrete

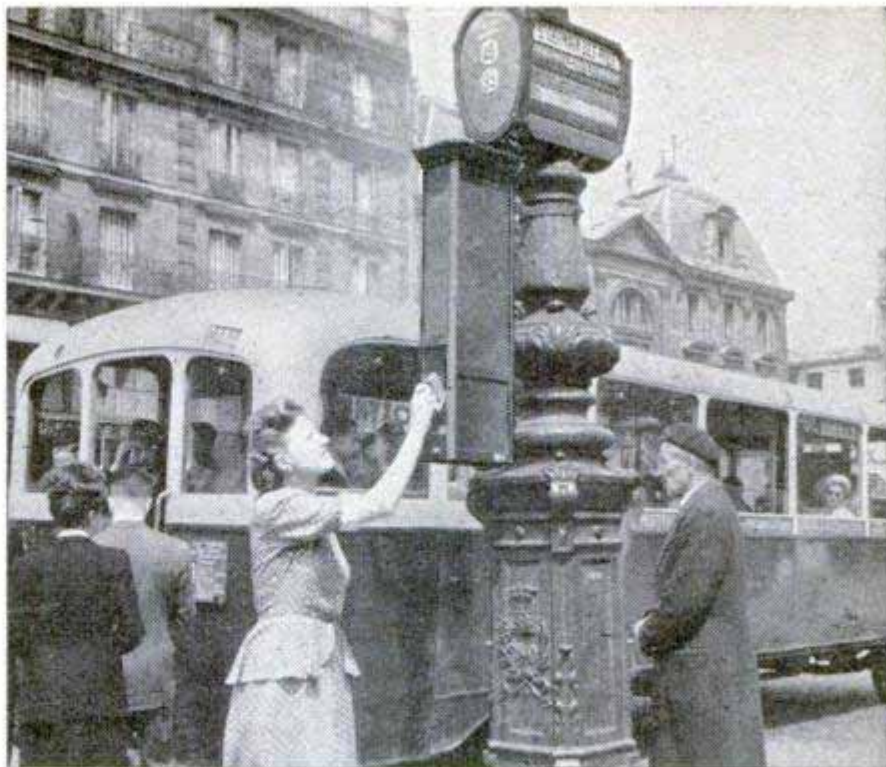


## All Seats "Reserved" On Paris Buses

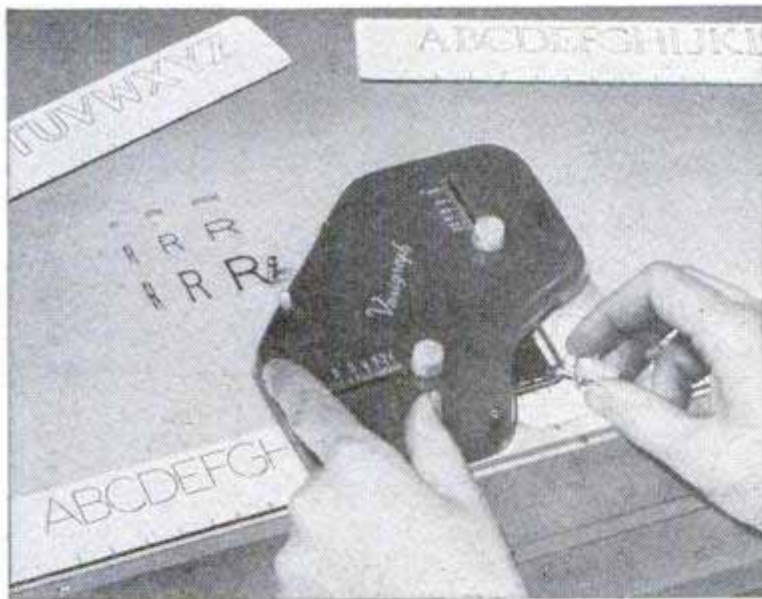
Bus passengers in Paris are assured they can board a vehicle when it's their turn without being pushed aside. The passenger pulls a numbered ticket out of a dispensing machine at the bus stop. Passengers then board the bus according to the numbers they hold.

## Human Bone Bank Would Aid Medics

Human bone can be preserved indefinitely at temperatures of minus 20 to 30 degrees Centigrade, according to medical research conducted on the possibility of setting up bone banks to provide a constant supply for hospitals. By means of such bone banks, large quantities of bone, needed in



certain spinal operations and in the correction of bone defects, would be available at all times.



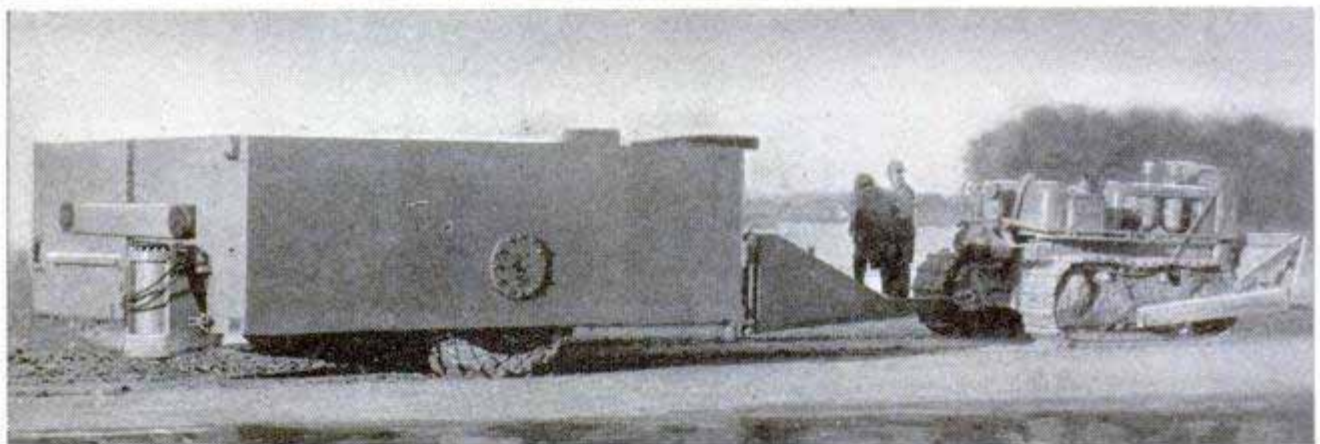
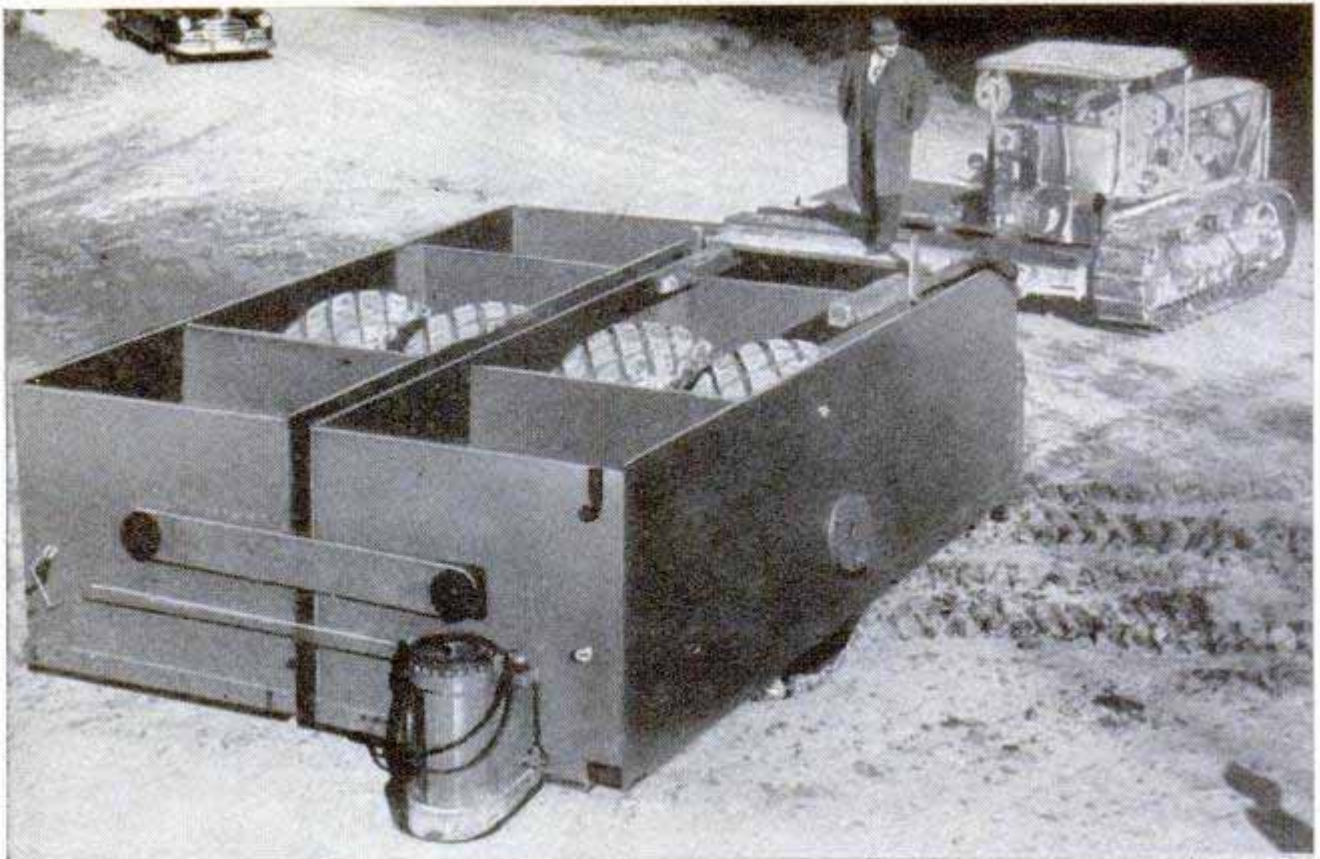
## Guide Gives Varying Letters From Same Template

Letters varying in height and width can be traced from the same template with the aid of an adjustable lettering instrument. The device slides along a straightedge and the template moves left or right beneath the finger-operated point so that the proper letter can be positioned. To reproduce a letter the point is guided along the grooves in the template. The width and height of the letters are controlled by two knobs which can be quickly adjusted to afford variation in sizes from .075 inch to .750 inch.

## Sedan-Type Trailer Towed by Bicycle

Mounted on the bed of a small child's wagon, a bicycle trailer was built entirely of discarded scraps of plywood. Extremely lightweight, the two-wheeled trailer is easily towed by the bicycle. Large openings on all sides give the four-year-old passenger an excellent view.





## 400,000-Pound Tamper Smooths Ground for Runways

Runway foundations prepared with a 400,000-pound roller will permit thinner concrete paving. The giant tamper is pulled by a tractor and exerts a pressure of 9600 pounds per square foot. It consists of a pair of two-wheeled boxes for scrap-iron ballast, each 20 feet long, over seven feet wide

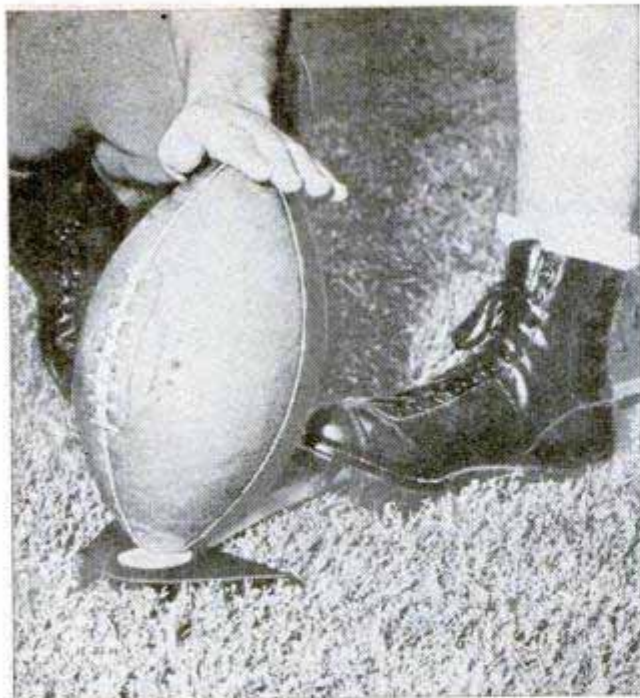
and six feet high. Steel bars hold them together and all four wheels are on a single axle. The 60-ply tires, eight feet high and weighing nearly a ton, have a 30-inch tread. A hydraulic jack at the rear is used for making pressure tests of the subgrade and for lifting the boxes for tire changes.

## Germ-Killing Chemical Is Derived From Organisms in Soil

Derived from a bacillus commonly found in soil and water, a new antigerm chemical, polymyxin, is 25 times more effective than streptomycin in treating one severe skin infection. The new germ killer may replace streptomycin in treatments of some serious diseases. It is under trial at the Johns Hopkins Hospital in Baltimore. Polymyxin is given by hypodermic injection into the muscles every three hours at

present, but further study may lead to less frequent use. Some diseases that may be fought with the new chemical are plague, undulant fever, certain types of meningitis, typhoid fever, blood poisoning and other infections.

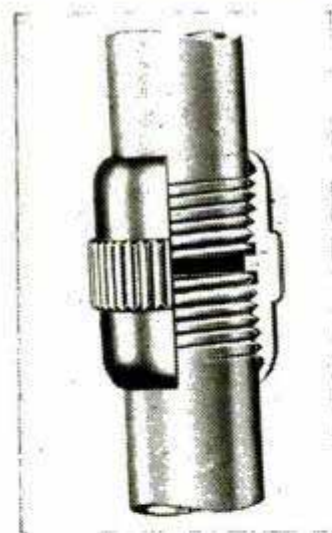
☐ Saw timber in our forests is currently being consumed at a rate  $1\frac{1}{2}$  times the rate of growth.



### Football Place-Kick Tee

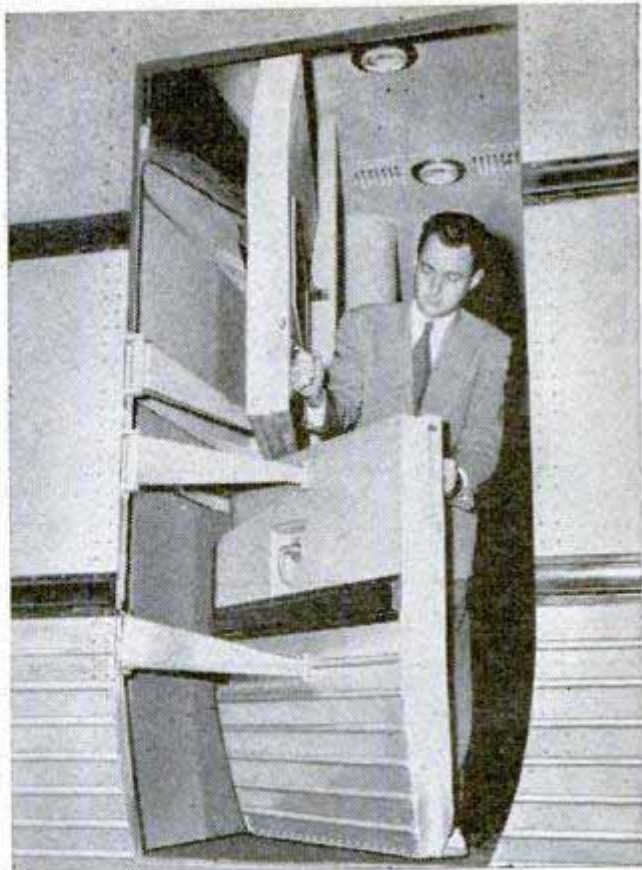
Higher, quicker and truer place kicks can be made with a tee officially approved for use in college football games this season. It elevates the ball one inch off the ground. A six-foot-long hard-rubber tape extending from the tee gives the kicker a straight, line-of-sight approach to the ball.

### Fittings for Electric Conduit Cut Their Own Threads



Cutting their own threads, one-piece steel fittings for thin-wall electric conduits save time and energy during installation and, at the same time, insure rain-tight joints. You merely push the conduit into the coupling, give it two turns with a pair of pliers and the tapered thread inside the connector acts as a die, cutting a tight thread. Although designed to permit repeated usage, their principal advantage is in initial installation.

Our WHERE-TO-FIND-IT index, listing names and addresses of manufacturers and sources of further information for products and articles in this issue, is available free upon request. This index is one of the many services offered to Popular Mechanics readers by the Bureau of Information. For your copy, just write Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11



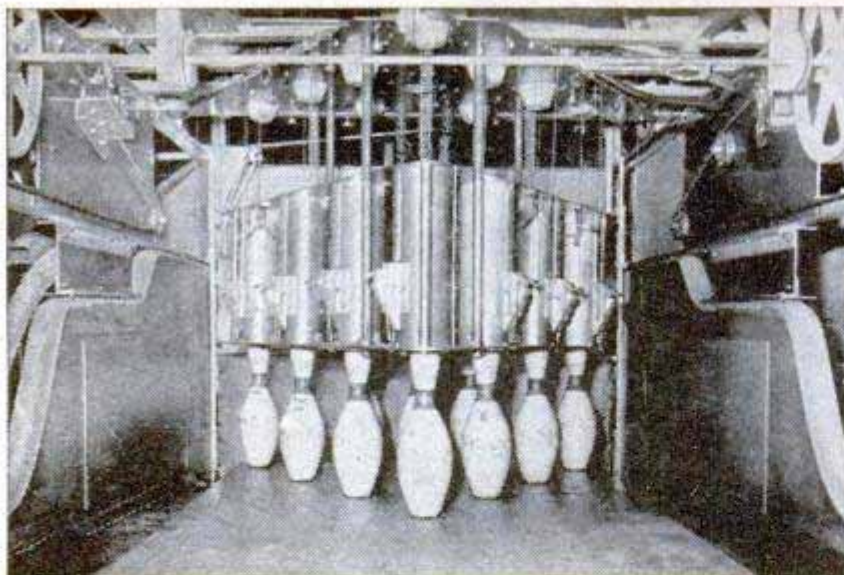
### Inside-Out Train Door

Passengers won't soil their hands or clothing on the vestibule doors of "Train X," a 150-mile-per-hour train designed for the Chesapeake and Ohio Railway. Inside-out doors for the new train have been exhibited at the Railroad Fair in Chicago. The doors pull in on special hinges that expose the inside surface to the passengers and hide outside surfaces which may become dirty. A test model of the new low-slung train is expected to be on the rails by 1950.

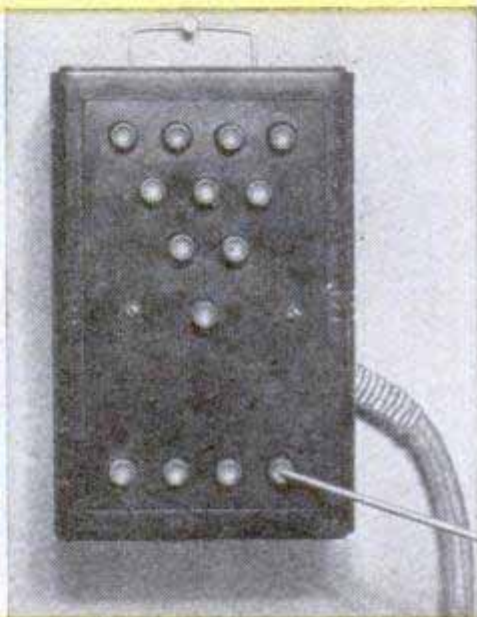
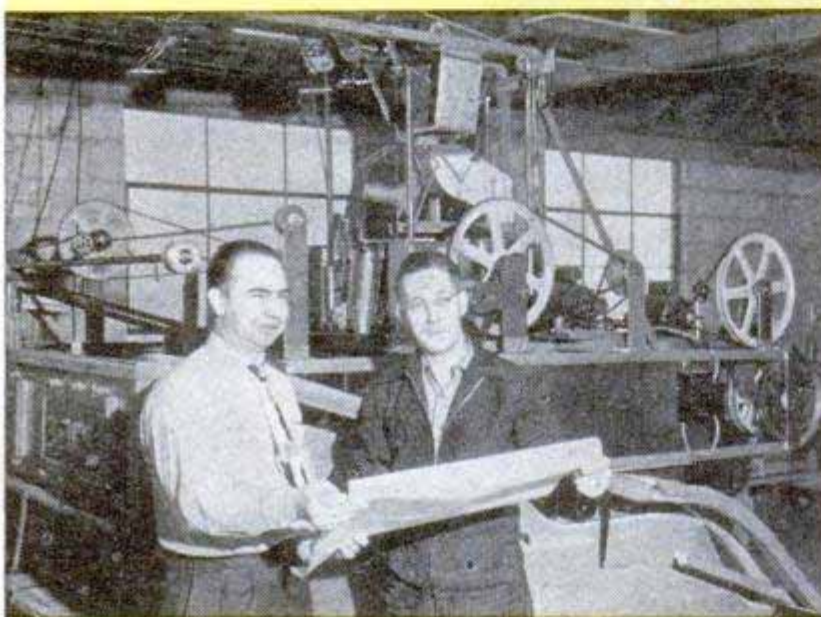
### Lightweight Pipe Wrench

Pipe wrenches made of aluminum are so light that a girl can easily lift the largest size with one hand. The wrenches weigh less than half as much as their steel counterparts, yet meet government specifications for steel wrenches. In tests, the new wrenches have withstood a pressure of 13,500 inch-pounds, which is the equivalent of 900 pounds of load pressure applied 15 inches from jaws.



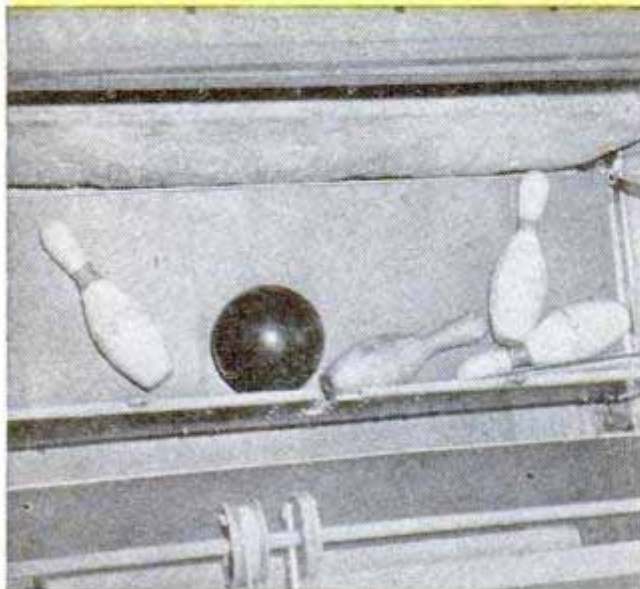


Front view of automatic spotter, after pins have dropped into place. Right, sweeper shoving pins off alley



Two of the Ogden, Utah, inventors of the machine standing before test model of their device. Right, bowler-operated control panel. Pointer is on correction button, used to cancel out button-pushing errors

Below left, pit tray moving up with pins and ball toward trap, at rear, from which pins will be carried to distributing racks. Right, catwalk used by attendants when reaching for "dead" wood around off-spot pins





# a Robot Sets 'em Up

COMPLETE bowler-control is a unique feature of an automatic pin-setting machine currently being tested. Pressing buttons on a control panel sets from one to ten pins in any combination desired.

The machine can be used both during regulation games and for practicing difficult shots. It will repeatedly set individual pins for hard-to-make "leaves" like the 5-7, 5-10, "baby" splits and even "big fours." The present model is the sixth the inventors, John L. Parker, Dr. Leslie Foutz, William J. Wood and Henry W. Leavitt, all of Ogden, Utah, have made during six years of experimentation. They built most of the parts themselves.

Pushing one button sets in motion gears, chains, wheels and automatic levers that bring down a sweeper to clear pins off the alley. The sweeper then returns forward to shield the machine from balls accidentally delivered before the setting operation is completed.

Meanwhile, the swept-off pins are elevated by a pit tray onto a pair of parallel rods and dropped into a trap at the rear. The ball, too wide to drop between the rods with the pins, is rolled onto the return groove as the tray lowers. Gravity takes it back to the bowler in the usual manner.

In the pin trap are two chain-driven equalizing conveyors, running in opposite directions and synchronized with two rotating disks or hoppers on either side be-

low. The equalizers divide the number of pins so that both disks are kept busy, thus speeding the handling.

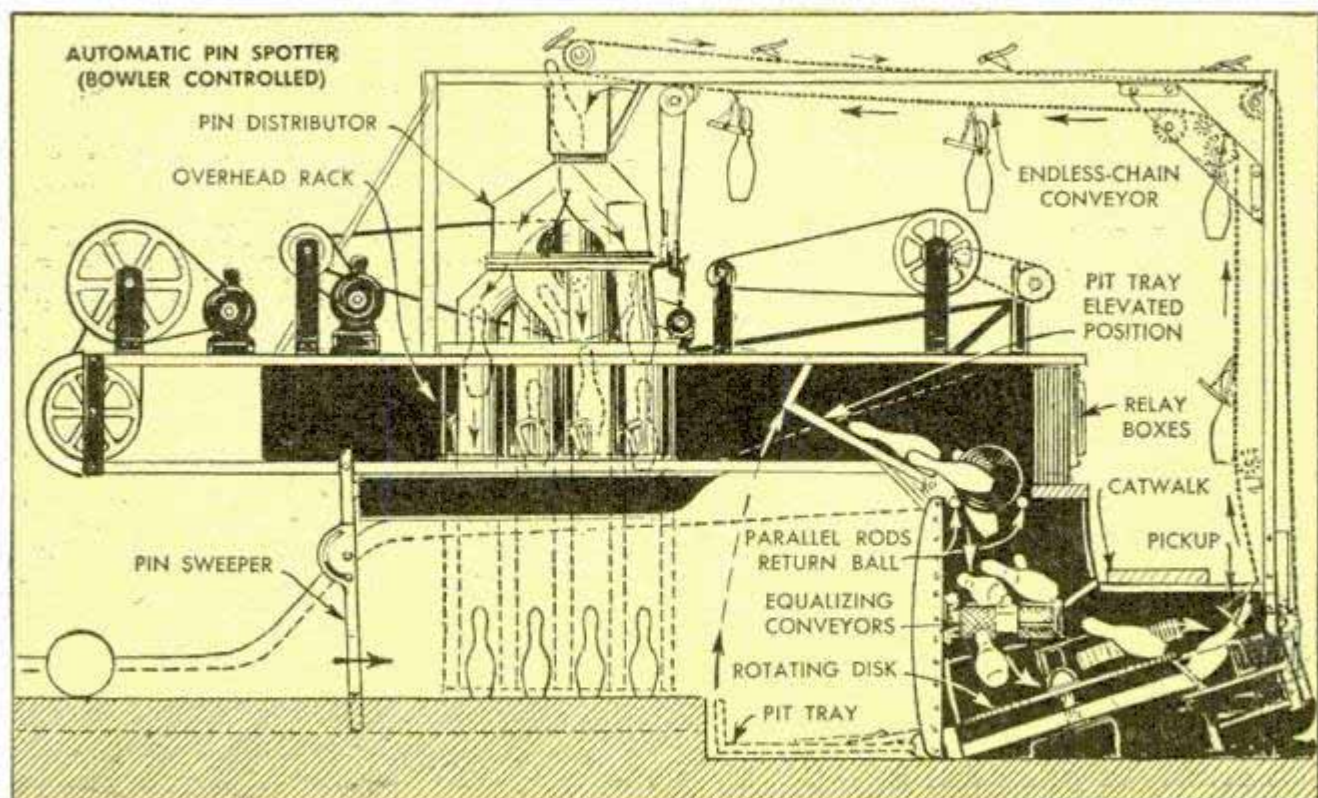
Each disk has a specially formed pin pocket and an arm. As the pins turn in the disk pocket, the arm pushes one at a time into a loader trap, head up.

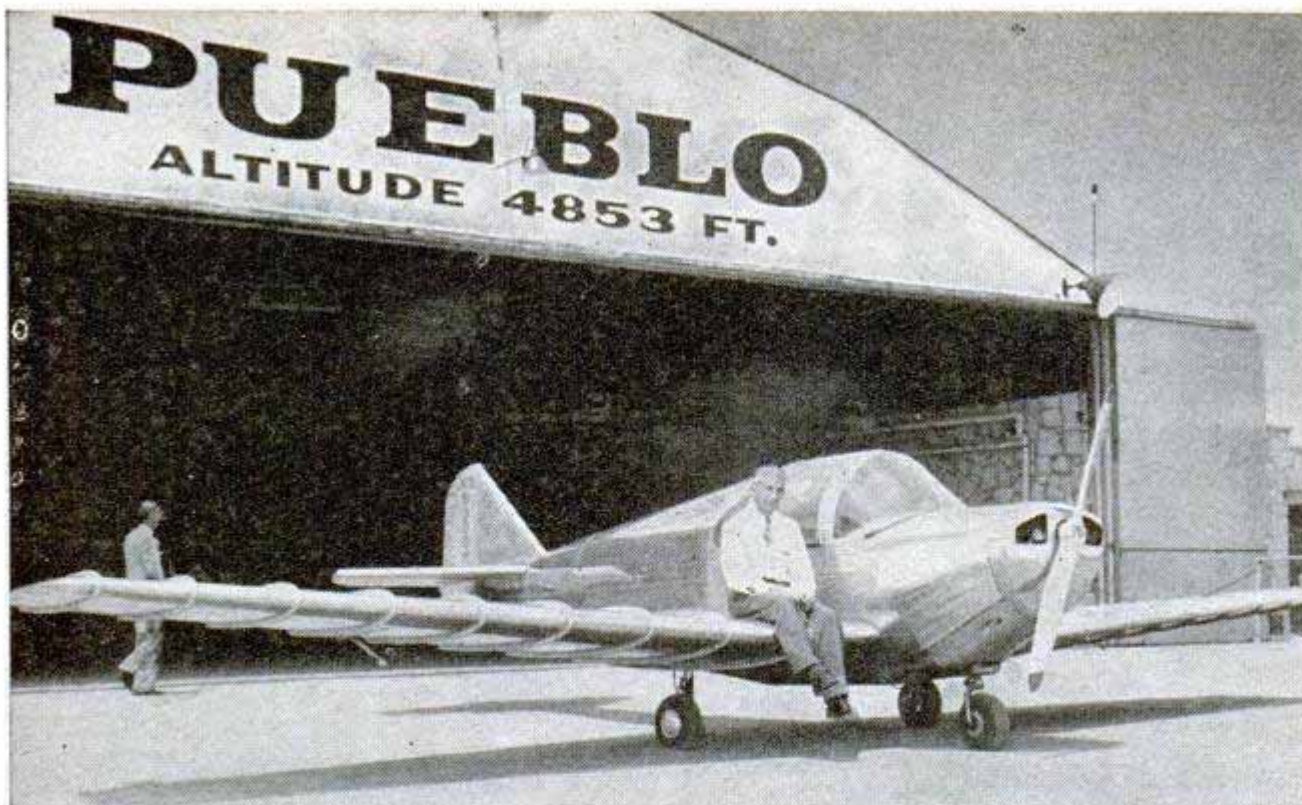
A revolving chain with loops every three feet picks pins up from the trap and carries them forward to an overhead reserve rack, where the lassoed pins are released and distributed to 10 different positions. After they are in place, the upper rack in turn fills vacancies in a lower rack, which is then lowered to one inch above the alley. From that position, the pins are dropped the remaining inch and spotted accurately.

The machine operates with a.c., d.c. or three-phase motors and fits standard alleys without alteration. It is set to the speed of average bowlers and works on 18-second cycles, but it can be made to run faster or slower. At average speed, the automatic setter is faster than a pin boy and spots seven to eight games an hour.

When a pin is left standing off spot after the first roll, attendants remove "dead" wood from the alley with a specially designed stick, leaving the off-spot pin or pins untouched. A catwalk spanning the collecting disks at the rear gives them easy access to the pins. This is the only instance, in sanctioned league or tournament play, where human aid is needed.

Cutaway view of automatic pin spotter, showing sequence of events during its 18-second cycle of operation

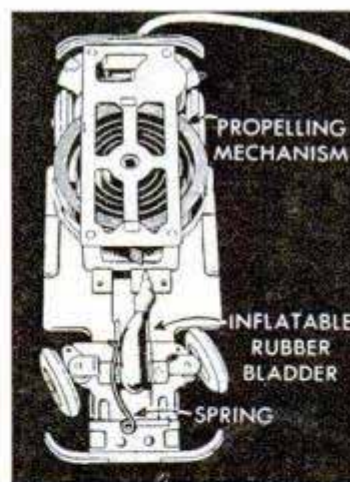
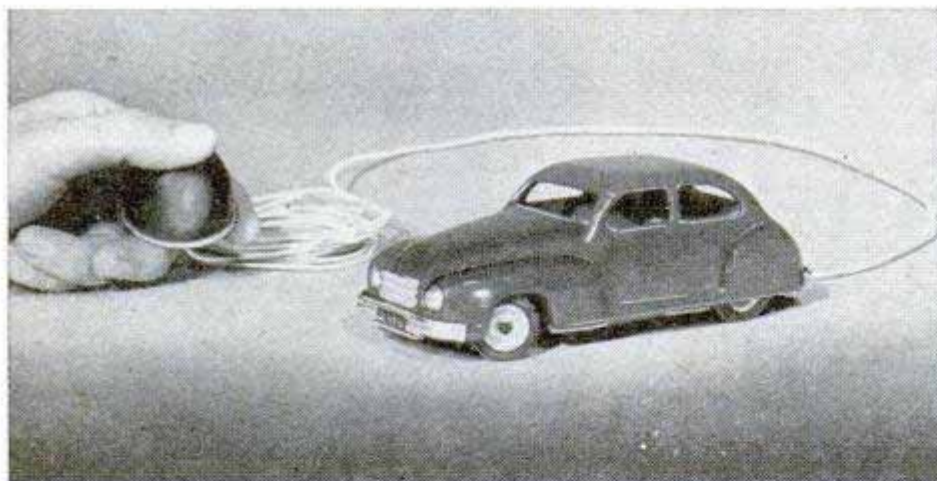




## Corrugated Wing Designed for Speedy Repairs

With wings that appear corrugated, a new low-wing monoplane looks a little like the canvas-covered wood-ribbed planes of earlier days. But the new, all-metal model has many advantages. Wing tips are built in separate pieces so they can be replaced

easily without taking the wings apart if they should be damaged. The sections of both wings are identical and can be used on either side of the fuselage. Part of the internal framework of the wings is covered by the corrugations.



## Toy Automobile Is Steered by Remote Control

Both Dad and the children will enjoy playing with a toy car that is steered by remote control. Spring-driven, the car can be made to turn circles, swing around obstacles or run straight ahead. The steering apparatus is operated by air pressure created when the operator squeezes a rubber bulb attached to the end of a long air line. A spring keeps the front wheels turned toward the right until the bulb is squeezed. This action pumps air into a bladder be-

tween the wheels and, by a mechanical linkage, turns the wheels toward the left. The harder the bulb is squeezed, the farther the wheels turn. When the pressure is relaxed, the wheels swing back toward the right. Made in England, the car is available in this country.

☐ Insects cause four billion dollars' worth of damage to American crops each year, according to the Department of Agriculture.



WE DROVE

TO

# Alaska

PART TWO

By Aubrey O. Cookman, Jr.

Photos by Frank Fritz

**D**RIVING across Canada to Alaska was rougher going, compared with the 1700 miles in the U. S. described last month.

Most of our difficulty hinged around poor road conditions, which slowed progress and made driving hard work, especially in wet weather. Dirt roads made into long stretches of slime by downpours are not pretty pictures to face, even in the best of automobiles.

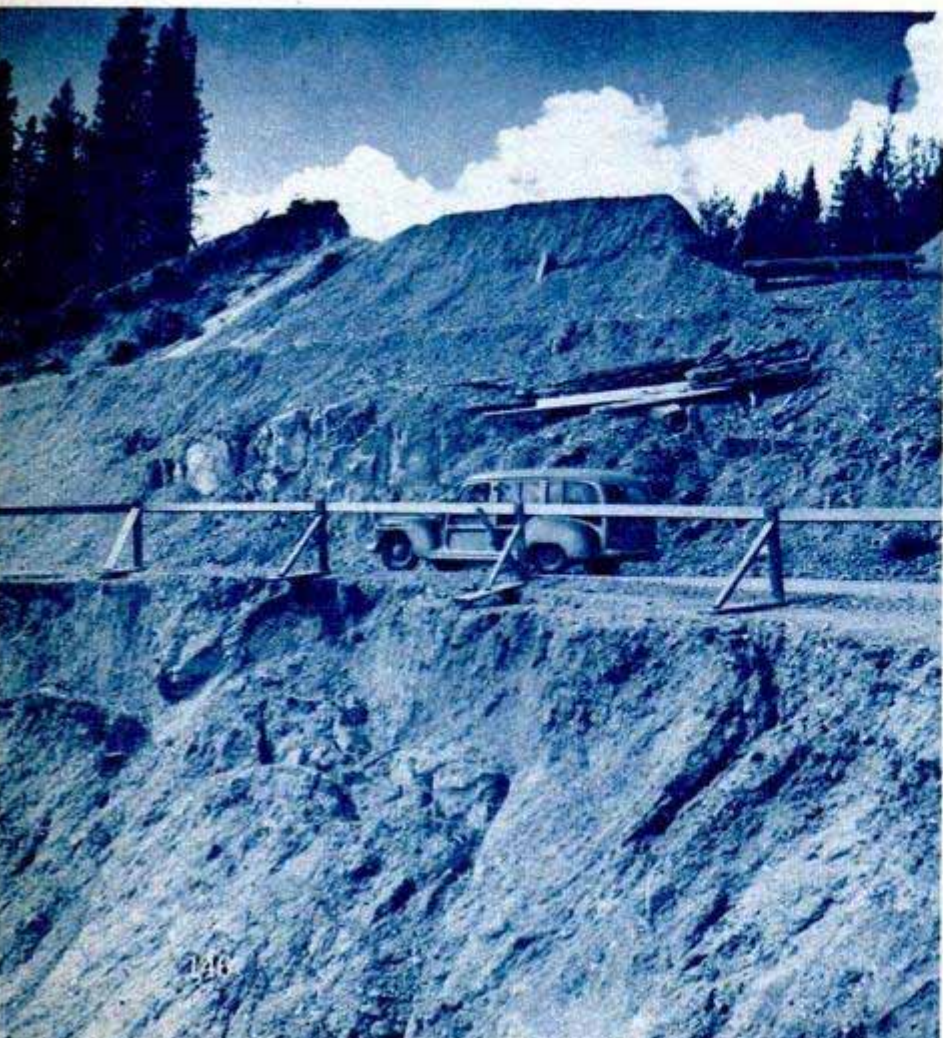
To Canada's credit, it is a problem that should be greatly minimized by next spring for drivers en route to Alaska. Road construction crews were busy at most of the sorest

Start of Alaska Highway, above, at Dawson Creek, B.C. Below, swift-flowing rivers bordering the road provide excellent "sink" for those who draw dishwashing chores





Above, anglers on the Toad River at Mile 457. Hundreds of good fishing haunts adjoin the highway all the way to Fairbanks. Washouts and slides, like the one below, keep maintenance crews constantly on the move. May until mid-June is busiest period



spots, evidence that the Province of Alberta was moving ahead vigorously with its 15-million-dollar highway program for 1948. In some places, entirely new roads were being laid parallel with present routes. At others, as a lesson from this year's floods, the size of culverts was being doubled to handle the drain-off.

Overnight accommodations were excellent and generally less expensive than we had found in the United States. At Calgary and Edmonton we stayed in neat tourist cabins with shower baths, complete cooking facilities and separate beds, at \$5.00 a night for both of us. Farther along, at Fort Nelson, where prices were generally higher, we paid only \$3.00 for a two-bed hotel room.

Tourist-cabin hunting is simplified in Alberta by a government order alphabetically grading cabins according to completeness of their facilities. Using one of these graded lists, it is a good idea to phone ahead in the morning for overnight reservations after you've decided how far you'll drive that day. We found most experienced long-distance travelers starting off very early and halting in the late afternoon, in plenty of time for a leisurely dinner and a full night's sleep.

After 17 miles of rutted road north from the United States border, our Plymouth station wagon reached Cardston. At one of the town's several banks we converted some cash to Canadian money and a larger amount to Canadian travelers' checks, both as a safeguard against loss and for simpler handling. Until you are able to make the conversion, your U. S. dollar will be accepted at par for small purchases.

Poor road marking out of Cardston misled us into lurching and twisting over 12 miles of rough clay before a helpful Canadian advised us that it wasn't Alberta Route 2. Retreating, we picked up the path to McLeod and finally reached High River. It wasn't until there, about 130 miles from the border, that we again traveled on a hard surface comparable to what we used in the United States.

En route we had telephoned a tourist camp in Calgary for a reservation, on the strength of the

motor club's description, and it turned out to be an excellent choice. Phoning ahead early was also fortunate, because the "No Vacancy" sign was already turning away latecomers when we drove up.

Dinner that night in Calgary, first big Canadian city on our route, affords a sidelight on the often-exaggerated meal prices. For two large, five-course steak dinners, at a restaurant singled out for us as one of the three best available, we paid less than four dollars. On the basis of pre-trip scare stories, that was what we had expected to pay for sandwiches and coffee.

There is nothing scenic about the 191 miles from Calgary to Edmonton, capital of the province and reputed to be Canada's fastest growing city. A new road paralleling the present one much of the way will probably be open for use shortly. Just before reaching Edmonton, Alberta Highway 2 skirts the new, rich Le Duc oil field, site of a runaway well that was spurting 14,000 barrels of petroleum daily over nearby farmland. Using the phoning-in-advance technique again, we lined up a good cabin for the second night in a row.

From Edmonton we followed temporary detours for a while, finally getting back on Alberta 2 in time to experience our first puncture en route at Clyde. Filling our gas tank there reminded us of one of the trip's rising-cost items. Gasoline at 44 cents a gallon, though in the imperial measure that is about one fifth larger than the U. S. version, was on the march up to the 65 cents we paid later on the Alaska Highway. Practically the full increase reflects the cost of trucking fuel long distances from the nearest rail facility. The government tax, in British Columbia, for example, is 10 cents a gallon. Food prices likewise mirror the distance from rail or water transportation.

It isn't until you are more than a hundred miles north of



Staff photographer Frank Fritz appears puzzled, above, by the galaxy of signs left behind by tourists eager to boost their home towns



This tent came in handy when hotels were hard to find. It was easy to put up and is shown pitched at camping ground near Watson Lake. Below, the Popular Mechanics travelers found their cooking equipment an asset in regions where eating places were few and far between





His survey of the highway completed for the American Automobile Association, field reporter F. C. Durkin, center, swaps opinions with the author

Edmonton that the real flavor of the wilderness trip begins to appear. From there on, settlements are smaller and more widely spaced, lakes and streams begin to border the roadway and log houses become the rule rather than architectural oddities.

Just beyond High Prairie you temporarily abandon Alberta 2 for Alberta 34 and approach what is becoming a landmark for Alaska-bound travelers—the Little Smoky Inn. It is a small restaurant and store run by a young Waukegan, Ill., couple, Mr. and Mrs. Dick Strazer. Like many others, they set out for Alaska a year ago in an old car that finally wheezed its last not far from their present location.

After young Strazer helped out the local blacksmith for a while, long enough for them to decide they wanted to stay, they located an unused log cabin and set up an inn. Their fare is already attracting a steady stream of loggers, trappers and hungry tourists.

At Little Smoky we also met Henry Bucher, a 20-year-old mining student, chugging along in a 1923 Reo, the most decrepit-looking car seen on the trip. Henry had converted his back seat into a bed and installed a small pantry and hot grill in the space between the back and front seats, virtually qualifying his jalopy as a traveling kitchenette apartment. He

wore coveralls and drove barefoot.

To make room for larger, present-day tires to replace the original bicycle-size set, Henry had to cut the forward sections off both front fenders. Strapped to the top was a washtub, and a collection of oil, gas and water cans rode along in the luggage carrier. A good mechanic, he had coaxed his \$200 car all the way from Missouri and, when last seen at Whitehorse, was still headed north.

We took advantage of our first good locale for camping out at Little Smoky. And, less pleasantly, it was also the setting for the repair of puncture number two,

apparently caused by the sharp gravel and rutted road.

The remainder of Alberta 34, and Alberta 2 all the way to Dawson Creek, was a graveled surface that kept speeds below the 45-mile-an-hour mark. The rolling wheat country was beginning to give way to stands of poplar, birch and pine trees.

To avoid the possibility of delay, it is well to plan your trip so that you don't reach the Big Smoky River about mid-June. Then, or a little later, mountain thaws set in and send trees rushing along in the swift current so fast that they sometimes put the government-operated car ferry out of action for days.

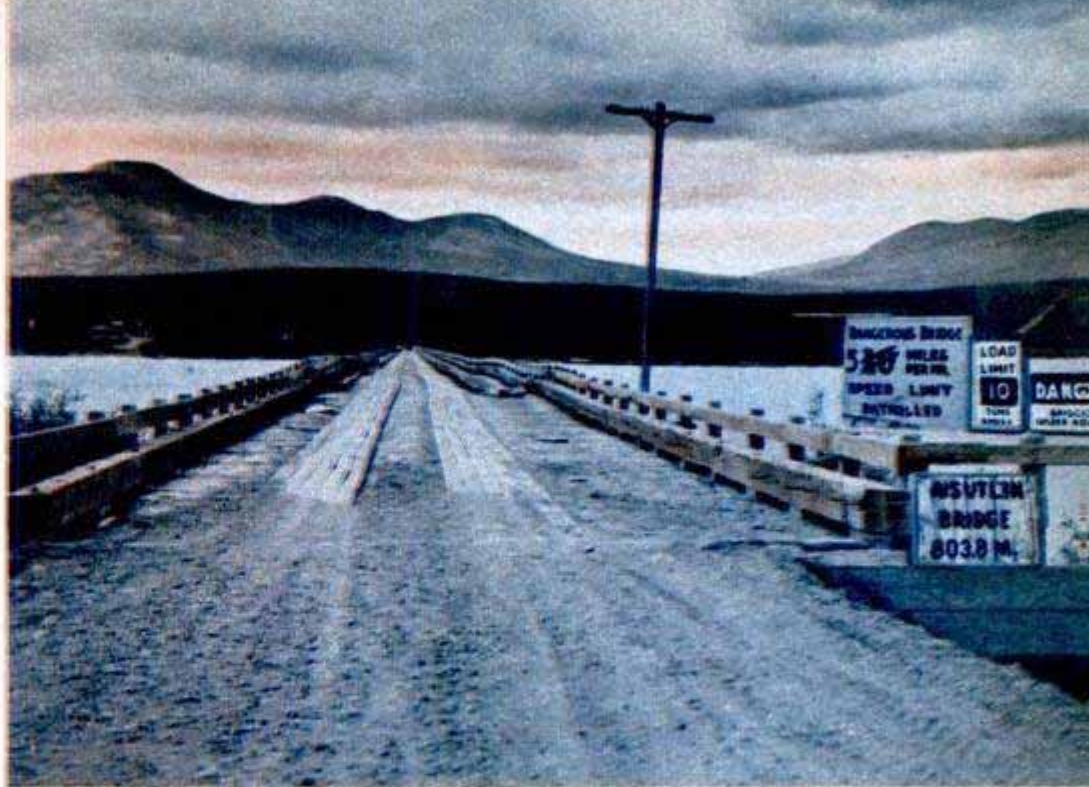
Dawson Creek, B. C., jump-off point for the Alaska Highway, has only a few thousand residents but it looms large when you

Scene of the worst single washout during 1948, the wooden-pile bridge over the Rancheria River had just been restored when this was taken



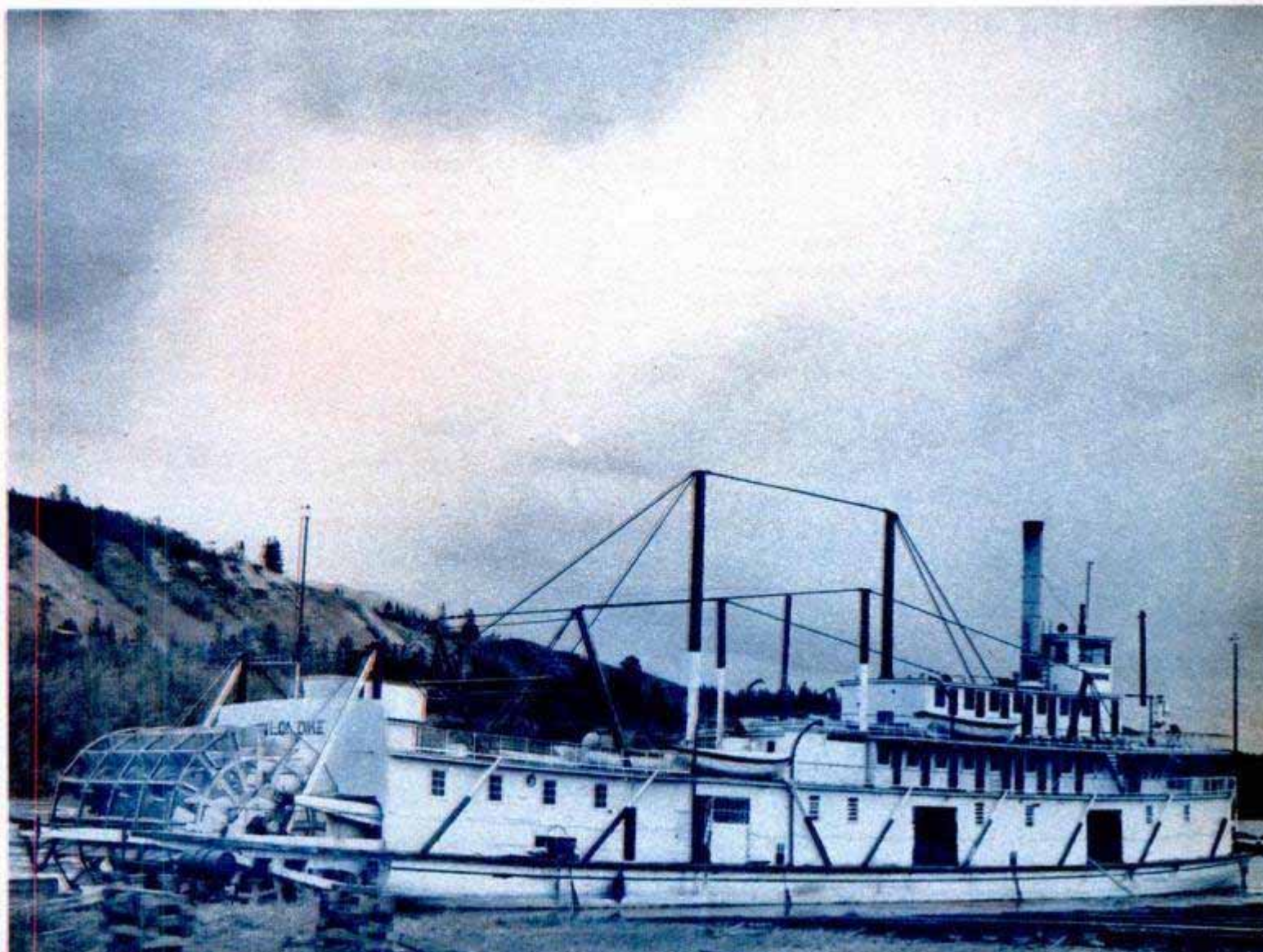
head north. There the railroad ends and you get your last look at a community of any size for nearly 1000 miles of wilderness. It has eight standard-make automobile agencies and service stations. If your car isn't running smoothly, if the tires have gone bad or you need supplies, Dawson Creek represents your last good chance for help for many days.

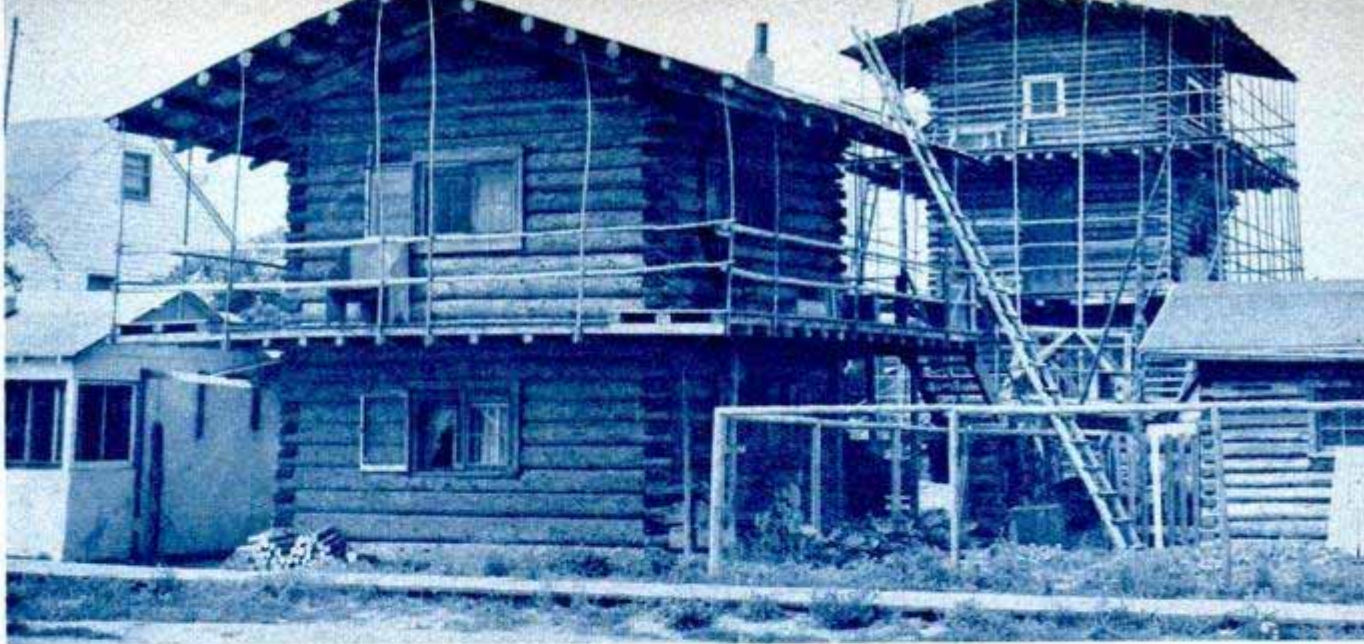
Prudent travelers stop at Dawson Creek's provincial police office to register their firearms and to get permits to kindle fires along the highway. For the safety of motorists, no hunting is permitted for one mile on each side of the highway, but big-game parties break off at Trutch and elsewhere to head for the main range of the Rockies. Fishing is good



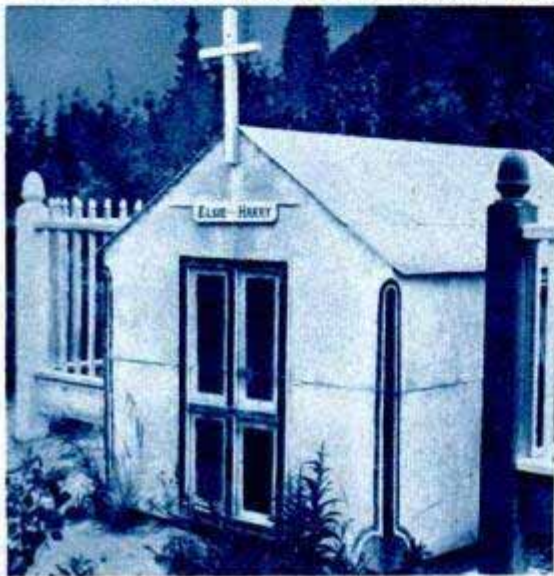
Longest bridge on the highway is the wooden structure over a section of Teslin Lake, at Mile 803. Steel bridges in time will replace most of the wooden ones. Stampede during 1898 Klondike gold rush passed nearby

One of the Yukon River's picturesque sternwheelers, the Klondike was built to carry concentrates from the silver and lead mines at Mayo. Like its sister steamers on the river, it burns four-foot-long cords of wood





Double and triple-deck log apartments distinguish Whitehorse, Y.T., which also has a 100-room hotel



Above, tiny buildings and tents cover graves at Indian cemetery in Whitehorse. Below, air view of Whitehorse, by far the largest town between the start and end of the Alaska road

all the way to Alaska, of course, so go prepared if you are an angler.

At first glance, what impressed us most about the Alaska Highway was its width and smoothness. It is 26 feet from edge to edge, nearly four car widths, and there is room alongside the well-kept gravel surface for emergencies. It is perfectly flat all across, without a trace of ruts.

Mileage markers stretching along the east side of the road are another unique feature. Since most en-route stopping places and historic sites are designated by mile number rather than name, you quickly grow dependent on the neat wooden signs.

At Mile 35 you cross Peace River Bridge, a 2130-foot steel suspension span that is the most impressive single structure along the entire road. Between there and Whitehorse, Mile 918, the scenery resembles that of Colorado and Montana. Snow-capped mountains are in sight most of the way, although the road itself never rises very high, 4256 feet at Summit Lake, Mile

(Continued to page 260)





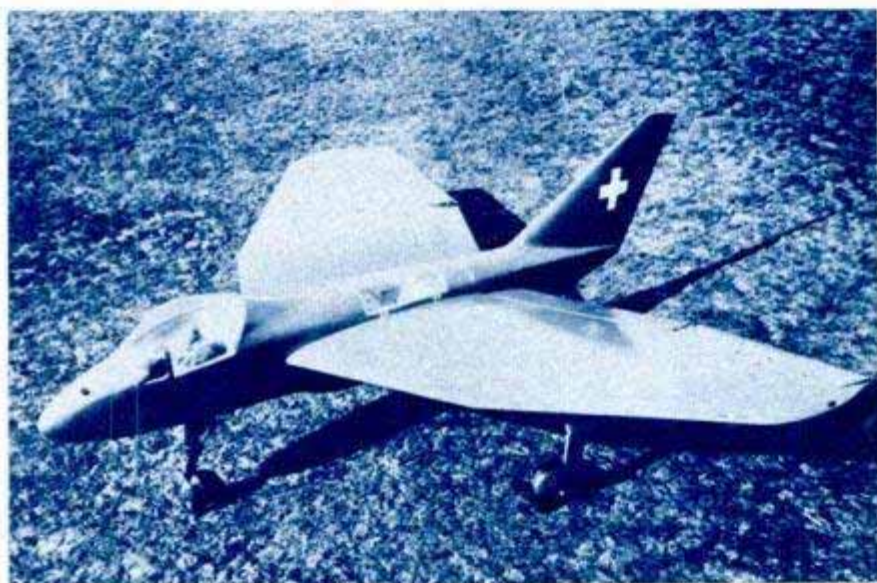
## Artificial Fingers

Fitted with fingers which not only resemble the human hand but function like it, an artificial hand developed by a British prosthetics manufacturer has been engineered to make possible a great variety of work or play for the handicapped. A demonstrator for the company showed the Royal College of Surgeons that he could shave with the hand, use a typewriter and take shorthand, pick up a pin, work in the garden, tie knots, play golf—and even darn his socks.



## Elevators in Wing Of Swiss Glider

With an unusually large wing area, a Swiss glider has no elevators in the tail. Instead, the elevators are mounted on the trailing edge of the wing near the tips. The ailerons are between the elevators and the fuselage. The glider is a two-seater with the passenger riding amidships. The wide wing is swept back to make up for lack of horizontal tail surfaces.

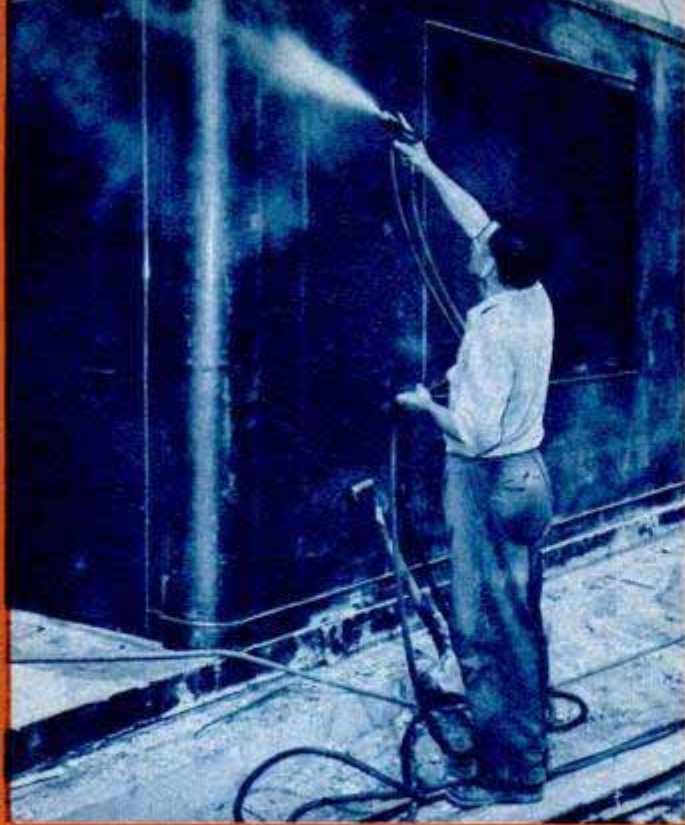


## Fuel-Control Panel Aids Navy Pilots

Navy pilots can read their fuel situation at a glance with a plastic control panel which has illuminated fuel paths. The panel is installed in the Martin P4M Mercator patrol planes which have eight gas tanks with fuel lines leading to any one of four engines. Control knobs are designed so they do not break the light path when turned to the "on" position. This system eliminates any confusion in controlling and selecting fuel flow. The panel is located forward of the throttles.

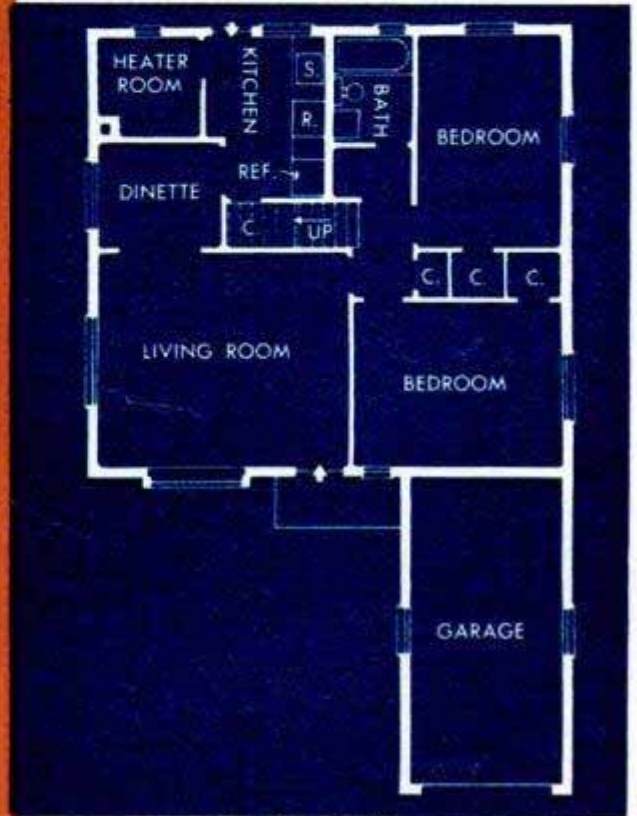


Lighted paths on plastic panel show at a glance the flow of fuel from any one of eight tanks to any of the four engines — two jet and two propeller-driven. Panel is mounted in front of the throttle quadrant



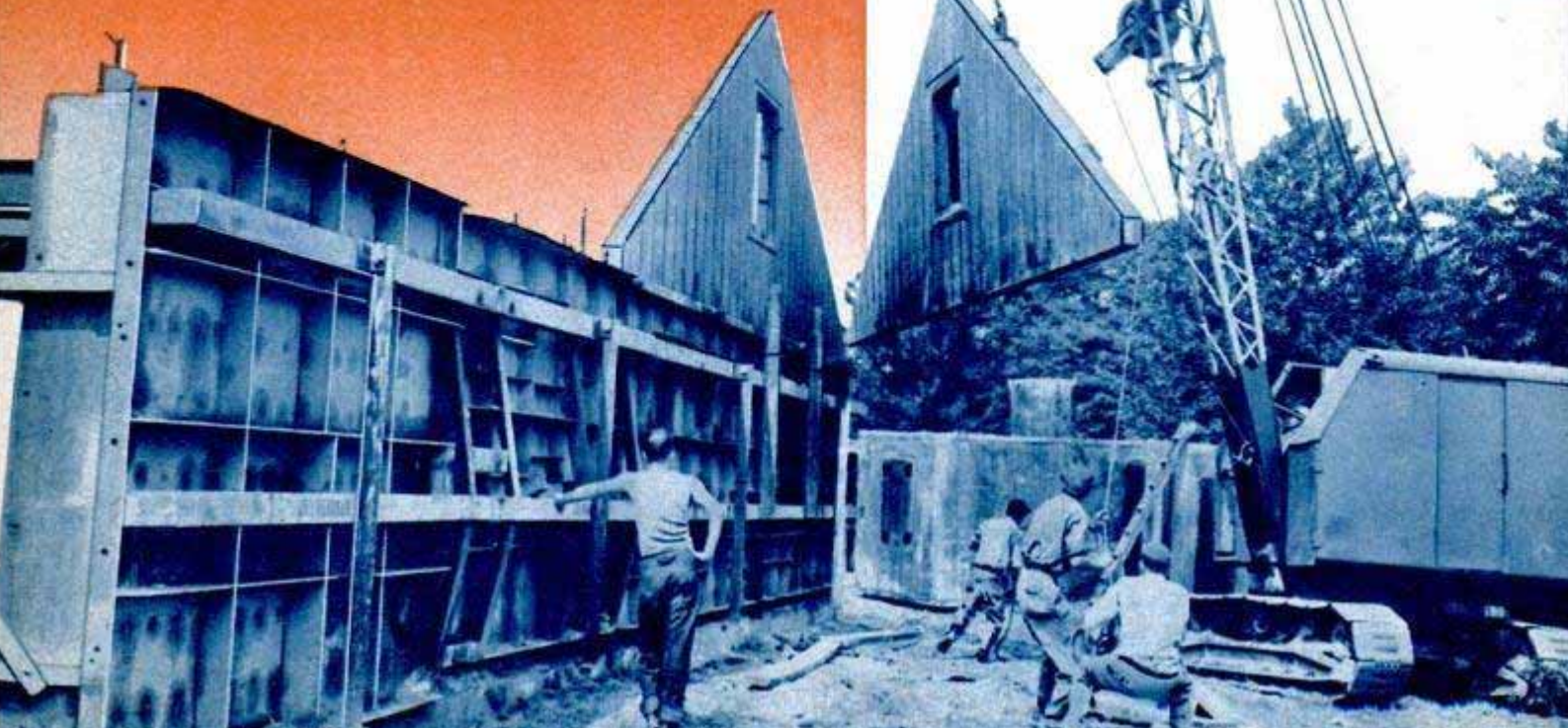
Left, a coating of oil is sprayed on the steel forms to insure a smooth wall surface and also to prevent sticking when the forms are removed

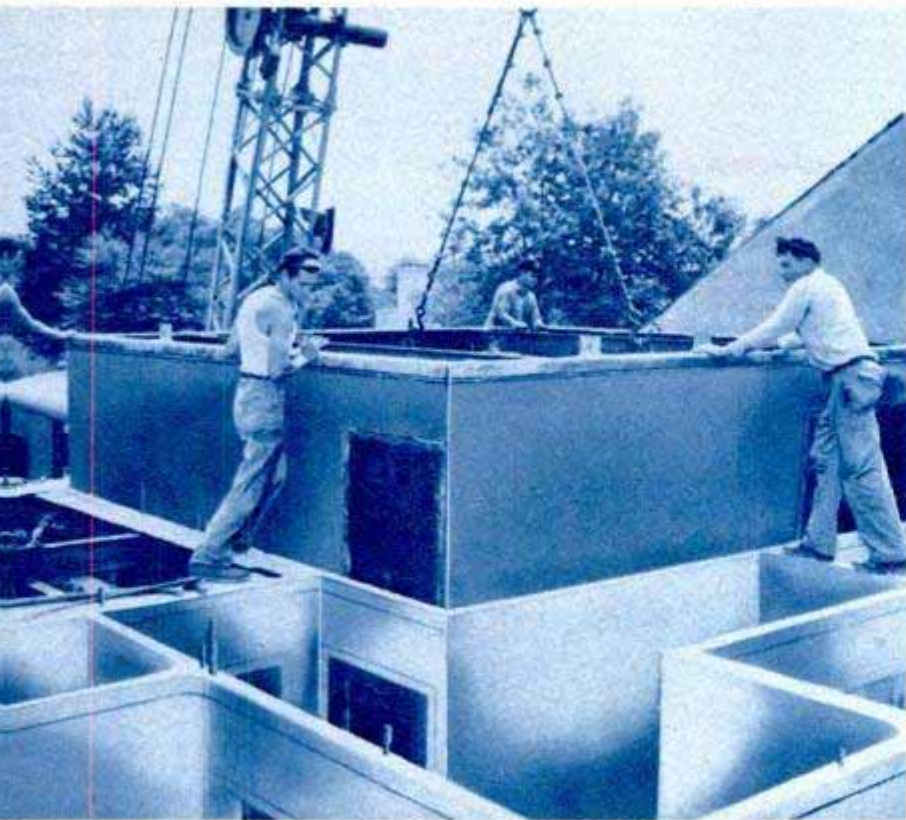
Below, floor plan of the poured house. It has a floor space of 900 square feet without garage. The attic stairway is finished, making it easier to add two upstairs bedrooms as the family grows



# A HOUSE IS Poured

Steel form for the gable is lifted away by the crane after the concrete has set. Outer forms for the lower wall are still in place





Left, removing the interior form from the living room. Right, collapsible forms are used for the windows

**CONCRETE** houses are built in six days by means of huge steel forms that are moved in and out of position by a crane. Individual forms are used for each room and all walls are completed at one pouring. Exterior-wall forms mark the concrete to simulate planking, brick or stone. To pre-

vent condensation, walls have two layers separated by insulation and vapor barriers. The house has no basement. A radiant heating system of copper tubing is embedded in the concrete subfloor. Priced at \$11,900 with all utilities, the house is one of 150 being built on Long Island, N. Y.

The completed house looks like a frame cottage because of the horizontal grooves that give the effect of wide planks. Brick and stone finishes can also be simulated



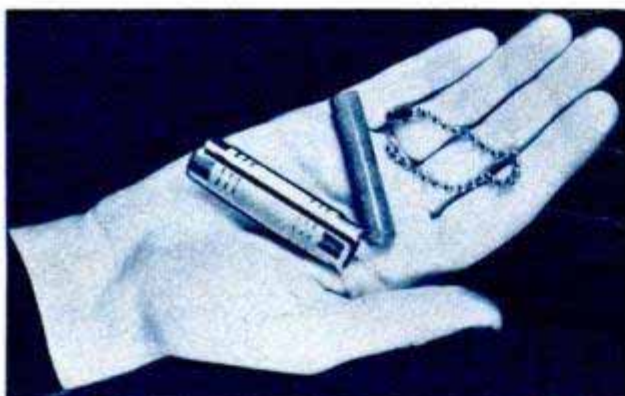


Four passengers don't make a crowd on water cycle. Left, no skill is needed. You just pedal and steer as on a bike

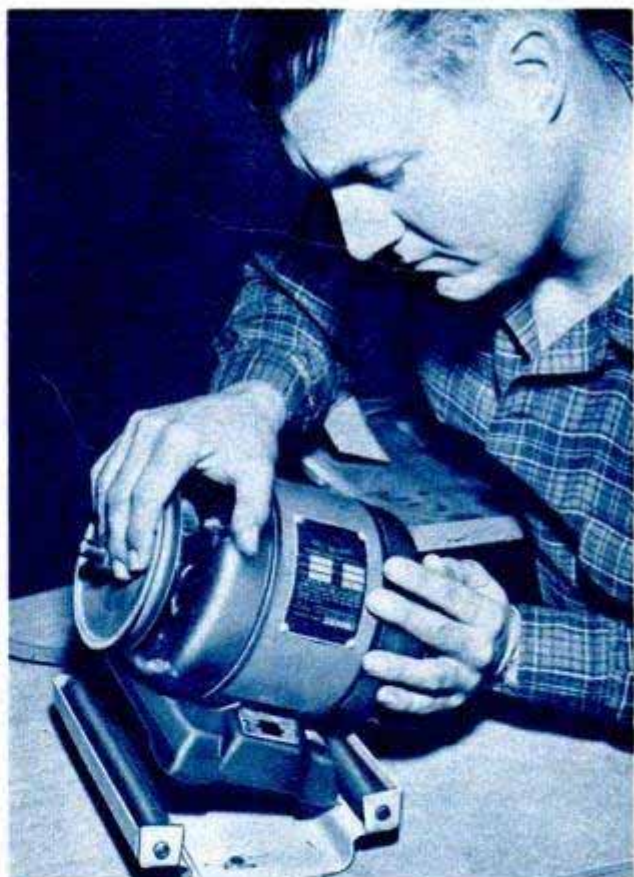
## Paddle-Wheel Boat Is Pedaled, Steered Just Like a Bicycle

Pedaled and steered like a bicycle, a pontoon-equipped water cycle moves forward and backward at about walking speed. Its broad base provides stability and, being extremely buoyant, it can operate on less

than a foot of water. An eight-bladed paddle wheel is driven by a stainless-steel shaft connected to the pedals. The water cycle will support several persons safely and it is said to be capsizproof.



**SKATE SHARPENER** is small enough to be carried in the pocket on a key chain. With it you can sharpen your skates without taking them off. A slot along the case holds the stone in the proper position on the blade. The stone, made of aluminum oxide, is removable and can be replaced when worn. Weighing two ounces, the sharpener has an attached chain



**MOTOR HOLDERS** make it easy to run all the power tools in your workshop with one motor. You just mount a holder alongside each tool and then transfer the motor from one to the other easily. Holders have two rubber-covered rails that clamp the motor securely when you press it down into the mount. Adjustable, they hold any motor up to one horsepower

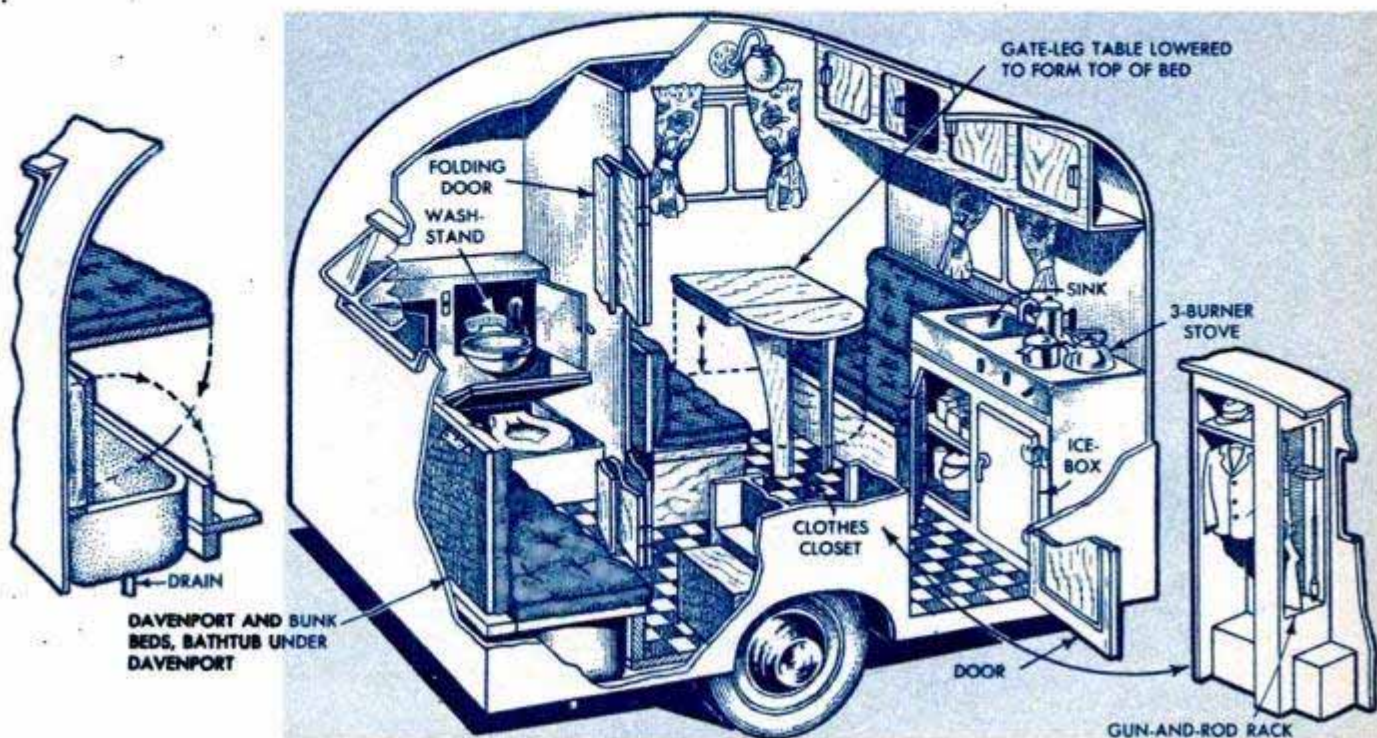


Even a scooter can tow this tiny trailer that has everything you'll need, including a roomy dinette (top)

## ALL THE COMFORTS OF HOME IN TRAILER ONLY 10 FEET LONG

Below, cutaway shows ingenious use of space in trailer. Hinged door closes off "bathroom" area. Note the gun rack for sportsmen

You'll find everything, including the kitchen sink, in a compact trailer only 10 feet long and 7 feet wide. Designed to sleep four adults, the aluminum trailer has a bathtub, flush toilet, Pullman-type washstand and a complete kitchen. The dining nook seats four and the table lowers to bench level, forming a double bed. The bathtub is concealed beneath the davenport which becomes a double-decked bunk when the rear cushion is swung up horizontally. A septic tank under the floor takes care of sewage disposal. During cool weather, a gas fireplace heats the trailer. Both gas and electric lighting systems are provided.





Geological Survey of Canada photos

↑ Canoe-borne field party in search of new ore deposits in Canada's rugged terrain portages around a waterfall

# Canada Hunts Minerals

↓ Geologist from a university prospects with a Geiger counter, which detects radioactive ore deposits





Royal Canadian Air Force photo

Gasoline must be flown to the isolated bases from which the photo planes operate during the search for ore

**S**cientific prospectors are conducting the greatest search in Canada's history — a search for mineral wealth from the International Boundary to the islands of the Arctic Sea and from British Columbia to Cape Breton and Prince Edward Island. Combing the mountains and valleys of Canada are 117 separate field parties equipped with modern instruments from aerial cameras to Geiger counters.

By Harry Chapin Plummer

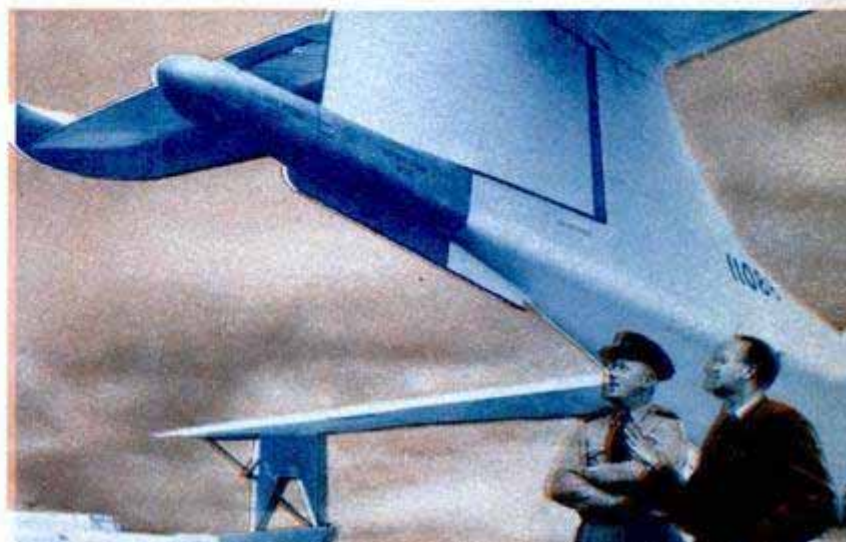
But other metals are not forgotten — investigators

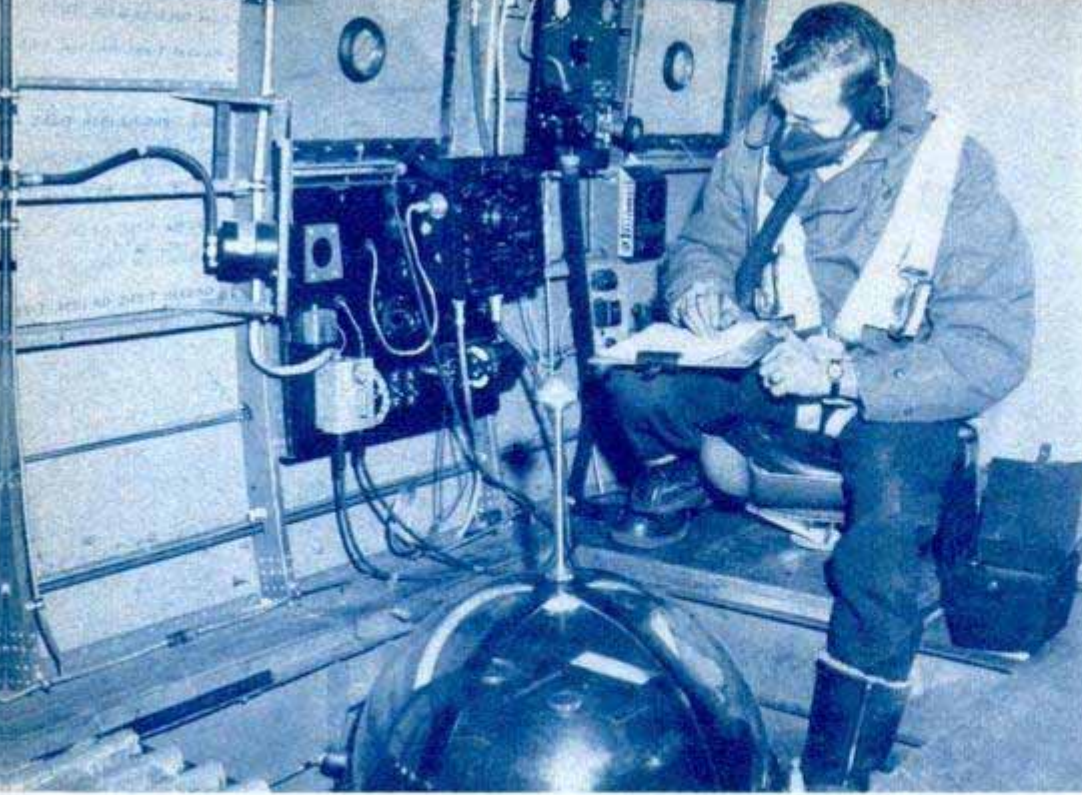
are running down new sources of gold, silver, copper, tin, lead, manganese, fluor spar, nickel, vanadium, zinc, mica, chromite, tungsten and barite. Even sand, gravel and stone, sorely needed for building materials, are on the schedule for investigation.

The parties are searching for minerals and ores that will make Canada less dependent on importations. Heading the list are pitchblende and other radioactive ores of which Canada is now the world's second source (the Belgian Congo is the first).

Teaming up for the search are students of mining schools and universities, pilots of the Royal Canadian Air Force and scientists and officials of several government agencies. The field parties began this season's work in April. Most of them already have been forced to return from their expeditions because of cold, snow and ice.

↓ Scientist and pilot check the recording instrument of the magnetometer, which detects presence of ores from the air. Below right, the magnetometer itself is mounted beneath the tail of the amphibian plane





Planes climb to high altitudes to get large-area photos, and personnel must wear oxygen masks

essential before accurate maps can be made from the aerial photographs. Missions carry the planes as far north as bleak Baffinland, well within the Arctic Circle. Experiments are being made with shoran-controlled aerial photography, which accurately establishes the position of each aerial photo, thereby simplifying the making of maps.

The Dominion Department of Mines and Resources has control over all the survey work on behalf of the government. The RCAF provides

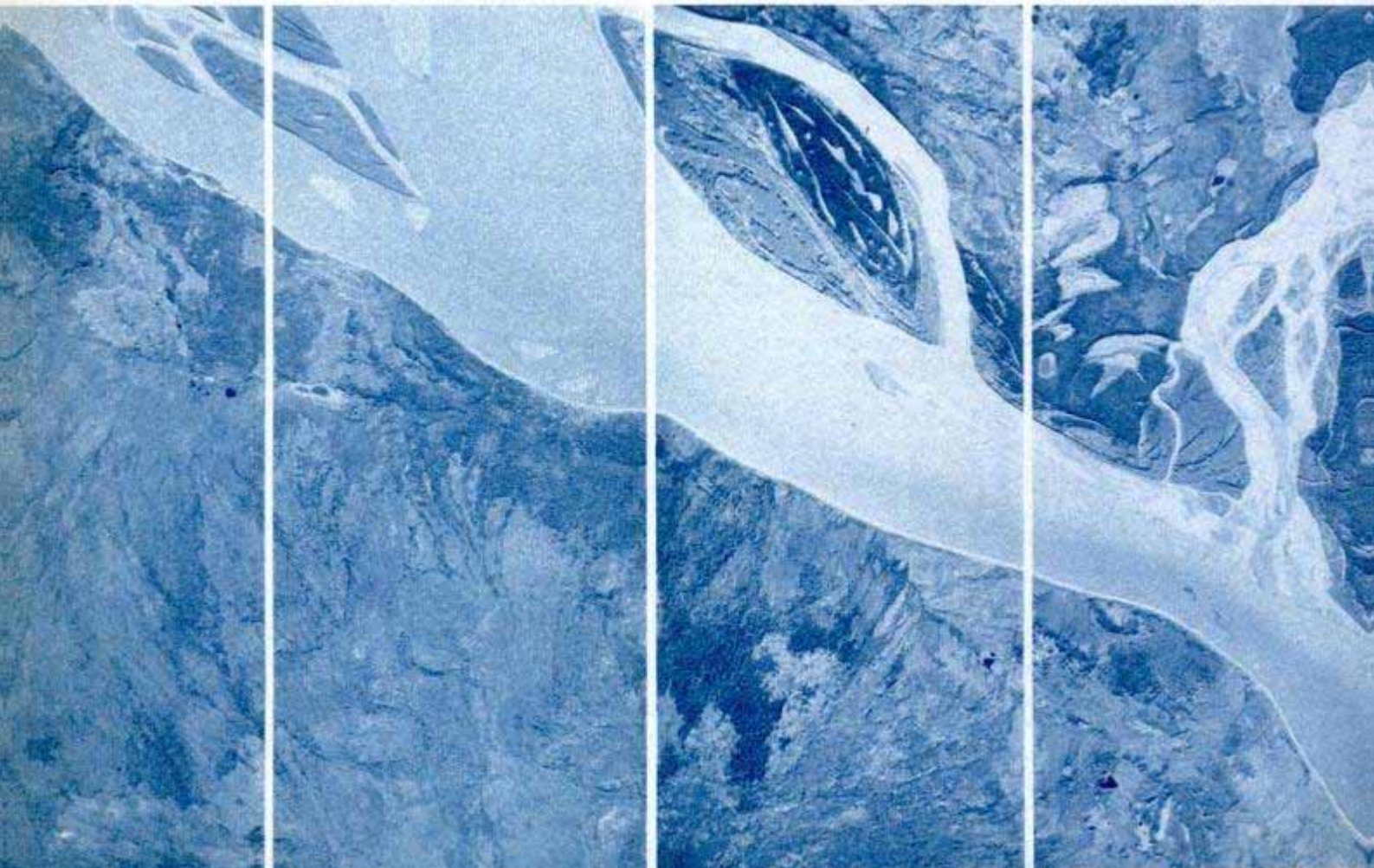
Photography, both ground and air, has played a dominant role in this search for mineral wealth. From aerial photos, geologists can spot areas likely to yield ores of strategic importance.

Sixteen planes—four of them long-range Lancasters—are flying photographic missions. In addition, Air Force amphibians are flying the Geodetic Survey crews who “shoot” the stars to fix points that are

planes, crews and equipment. Negatives are taken to Ottawa where they are developed and printed. Eventually, they are turned over to Mines and Resources, the army or other departments to guide in the drawing of maps.

Aircraft are sent out in detachments with each group assigned one or more areas. In some cases, they operate from isolated bases where ground crews service

Vertical pictures taken in sequence are mounted to show the junction of the MacKenzie River with the Nahanni







Men of the field parties conquer all kinds of terrain. Here a group of prospectors wades up the Athabaska River

the survey planes throughout the season.

Photographing the terrain is a constant battle between aircraft crews and the weather. Areas to be photographed must be free of ice and snow. In early season flights the retreating winter is followed northward and the photos taken as soon as the snow and ice melt. In some areas convection clouds form as the land warms, and it is not unusual for the crews to find only a few days during the entire season when the weather is suitable for photography.

Vertical photography is done at 10,000 to 18,000 feet, and tri-camera work is carried out at 20,000 feet, requiring a sky free from low-lying clouds. Even patchy clouds above or below the aircraft may blur or

spot photographs so much they are useless.

Improved navigational and photographic equipment has enabled the RCAF to extend its coverage. During the 1947 season two photo squadrons covered more than 400,000 square miles. Survey workers hoped to cover 550,000 square miles this year.

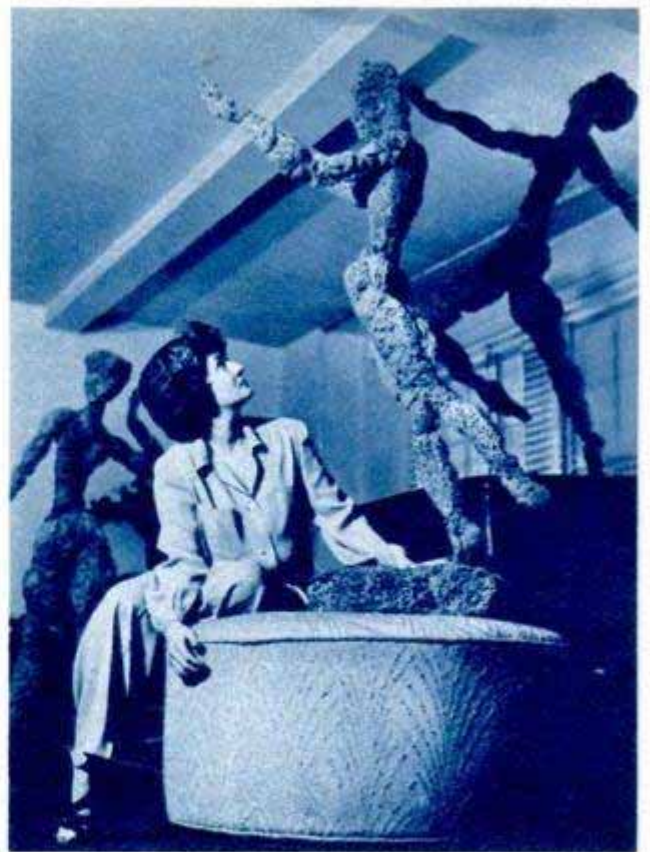
One plane has been fitted with an airborne laboratory including magnetic detection apparatus, a control room which contains a panel of altimeter and magnetic recorders, and a well-equipped observer's station in the nose, where flight lines are calculated and the plane's course directed. The magnetometer makes possible the coverage of mining areas at a rate of 250 square miles a day. Furthermore, it permits the tracing of geological formations that are covered by glaciers, thus providing information that would be impossible to obtain from the ground without extensive drilling.

When the plane's observer gives a signal, all recording apparatus is placed in operation. A record is made on the magnetic and altitude recorders as well as on a strip film. The camera is mounted in the tail and takes continuous photos. When

(Continued to page 256)

Flotilla of scows carries a field party and its equipment across Great Slave Lake





### Sponge Sculpture With a Razor

Sponges become sculptured figures under the talented fingers of Arline Wingate of New York. Miss Wingate recently decided to find a new material for sculpture. At first she tried pine cones, which bruised her fingers. She then hit on sponges as a

pliant material that could be cut easily. She uses brown Mediterranean sponges from 9 to 12 inches in length, bleaching them to a pale yellow. They can be cut easily with a straight razor and trimmed with a pair of scissors. The sculptress first builds up a frame of wire, which she covers with sponges to form the figure.

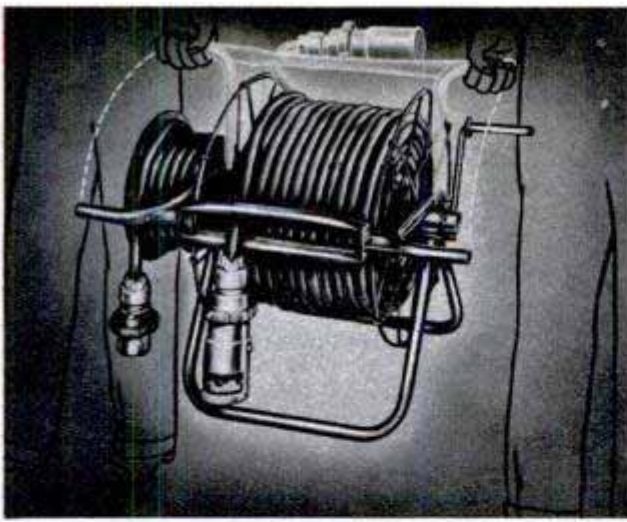


### Crank-Operated Oar

Clamped at the stern, a single paddle propels a boat through the water at speeds up to four miles an hour. The paddle, invented by Roy Croach of Little Rock, Ark., has a crank-type handle. Rotating the handle imparts a "fishtail" motion to the paddle to move the boat. When not in use, the paddle can be placed in a locked position out of the water. It can be used in water only one foot deep.

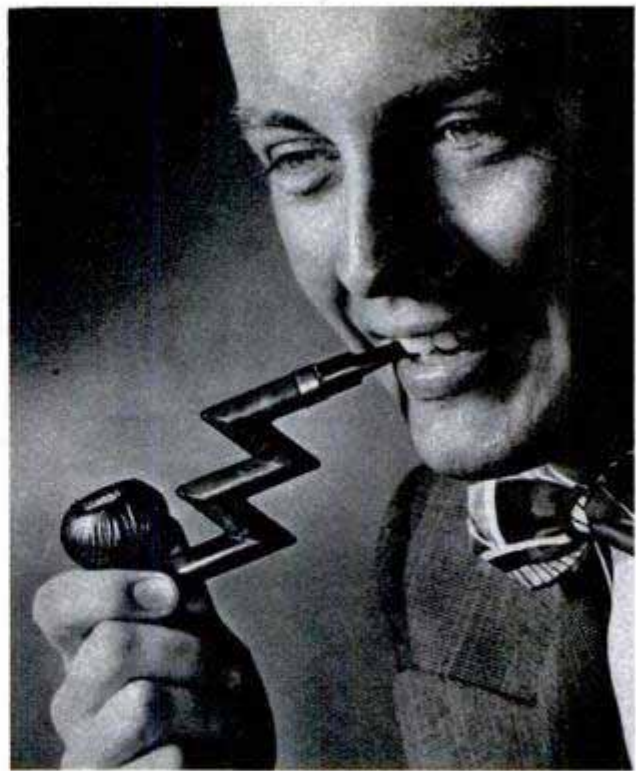


Information, including the names and addresses of manufacturers or distributors, concerning products described in this issue may be obtained by writing Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11



### Reel Holds 300 Feet of Heavy Cable For Easy Carrying by Two Men

Long lengths of heavy electric cable are easily transported by hand with a portable reel that holds up to 300 feet of  $\frac{3}{4}$ -inch, four-conductor cable. Twin handles permit two-man carrying and the tubular supports that form the base act as runners to facilitate passing the reel in and out of trucks. Empty, the reel weighs only 21 pounds. It has adjustable flanges to vary its width and a free-running crank handle to make rewinding easy. The reel can be used, of course, for smaller-diameter cables and with them much greater lengths can be accommodated.



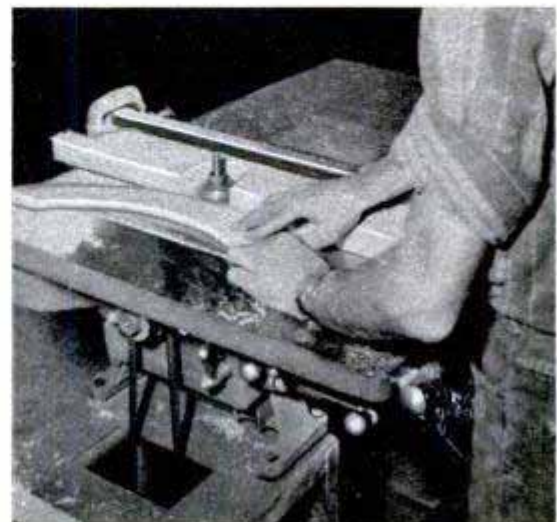
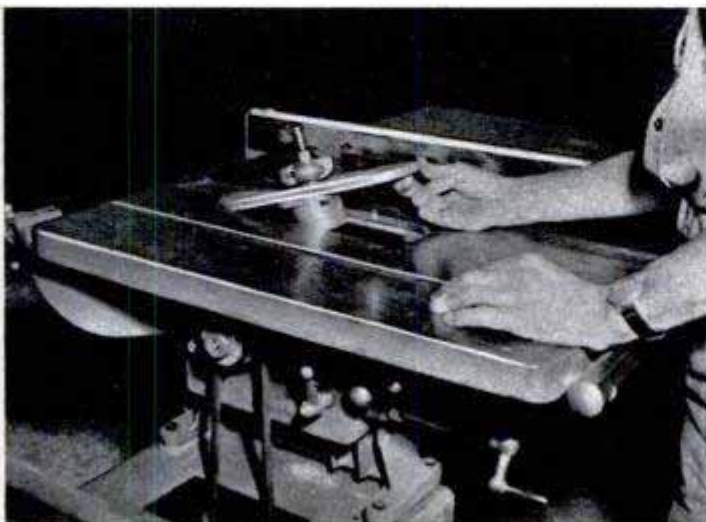
### Smoke Climbs Pipe-Stem "Stairs"

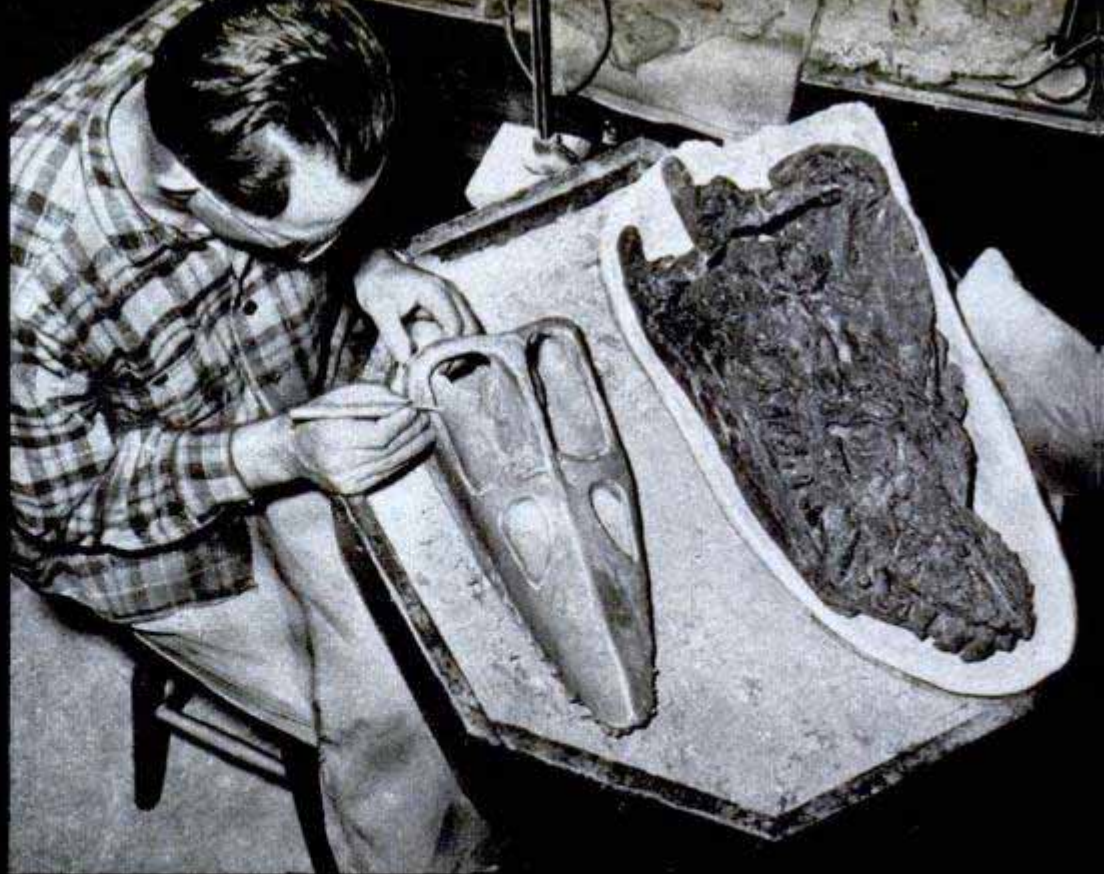
Looking like something out of the comic strips, a pipe with a zigzag stem is said to provide a cool, dry smoke. The stem, molded of Tenite plastic, prevents tobacco tars from draining into the hard-rubber mouthpiece. Fitted with Italian-briar bowls, the stems come in mottled colors.

### Replaceable Table Insert Converts Bench Saw Into Shaper

Ordinary bench saws can be converted into shapers with an attachment invented by Roswell Bearup of Colorado Springs, Colo. The attachment was one of the top prize winners at a recent inventors' congress held in Pueblo, Colo. It fits as a unit on the saw, replacing the table insert. The saw blade is removed and a cone-shaped steel disk bolted in its place. The lower part of the attachment also is shaped like a

cone and is backed by a rubber grommet. An ordinary molding-head cutter is fastened to the attachment. Friction between the two cones drives the cutter, and the rubber acts as a cushion for sudden shocks. Other top prizes at the inventors' show were awarded to E. L. Wilkins of Las Animas, Colo., for a beet harvester and Elmer Lundvall of Greeley, Colo., for a cooling attachment for milking machines.





Panels at left of page show two slabs of sandstone found near Cameron, Ariz., and on which sharp images of the "hand animal's" footprints are visible in relief. Above, aim of paleontologists is to be able to reconstruct the hand animal as this scientist is doing with skull of an ancient sea serpent, using fossilized evidence found in Colorado



## the mystery of the "HAND ANIMALS"

America's hand animals roamed the area covered by this map. They left footprints behind them as evidence and sand formations have preserved these fossil remains for scientists trying to solve the mystery



Right, scientists clear earth away from rock slab which has prints of the mystery animal on underside. The arrow points to Meteor Crater on the skyline



Bottom sketch shows impression made by the handlike hind foot of one species of hand animal. Upper drawings show prints made by hind foot and smaller front foot as another species of the mystery animal walked across a prehistoric mud flat

**F**OR MORE THAN a century in different parts of Europe people have talked about the mysterious monster whose handlike tracks occasionally are found impressed on the rock slabs of quarries.

Resembling the print of a grotesque human hand, the marks seem to have been made by four fingers and a thumb, tipped with powerful claws and coated with a scaly skin.

Possibly a great prehistoric ape, some thought, or a giant opossumlike marsupial had roamed across Europe, leaving this record behind. Others suggested that the tracks were those of some strange amphibious creature. Curiously, every print showed the thumb on the outside of the track instead of inside where it seemed to belong. To explain this oddity one early scientist created in his imagination an evolutionary absurdity, a froglike beast that shuffled along cross-legged.

Gradually European paleontologists came to the conclusion that the tracks were those of a reptile that preceded the dinosaurs. The thumbprint, it was decided, wasn't made by a thumb, but by a little toe or finger which served as a crude prop for the foot.

The creatures were given the name of *Chirotherium* or "hand animal." A few conclusions about probable size and appearance were reached but, with no evidence available except a few tracks, the hand animal remained one of the unsolved mysteries of the past.

Then, a few years ago, the town of Cameron in northern Arizona provided a new clue. Visiting Cameron, Major L. F. Brady of the Museum of Northern Arizona was amazed to see handlike markings on slabs of red sandstone used by a fellow Arizonan to build his fireplace. They were typical *Chirotherium* tracks and Brady learned that the slabs had been excavated from a nearby hillside.

Large areas of northern Arizona, including the Cameron region, are virtual storehouses of the remains of prehistoric life. Fossilized skulls and other bones as well as "trackways" abound. Erosion has cut cliffs into the sedimentary strata and sometimes a paleontologist makes a rare find by walking along the base of a cliff and inspecting its surface. Prospecting for fossils by automobile is even possible for once a scientist found the tracks of prehistoric beasts

By Thomas E. Stimson, Jr.

Photos from paper by Dr. F. E. Peabody, Univ. of Calif. Pubs., Bul. of Dept. of Geol. Sci., 1948



Power tool is used by paleontologist as he removes rock from the fossilized skull of prehistoric creature



Above, photo of hand-animal track and scientist's drawing of details. Below, early conception of the appearance of mystery animal. Bottom, this model of hand animal is based on currently accepted ideas



by glancing out his car window at some rocks that had been heaved up when a telephone pole was set in the ground.

The Triassic beds of the Arizona plateau were laid down during the age of reptiles. The Appalachian Mountains had just appeared and the Rockies and the Pacific Coast ranges were far in the future. At that time, the Arizona region was fairly flat, close to sea level, and was inhabited by giant land reptiles and water-living amphibians. Today, their fossilized bones—in some cases almost entire skeletons—are dug out of the rocks and preserved by paleontologists.

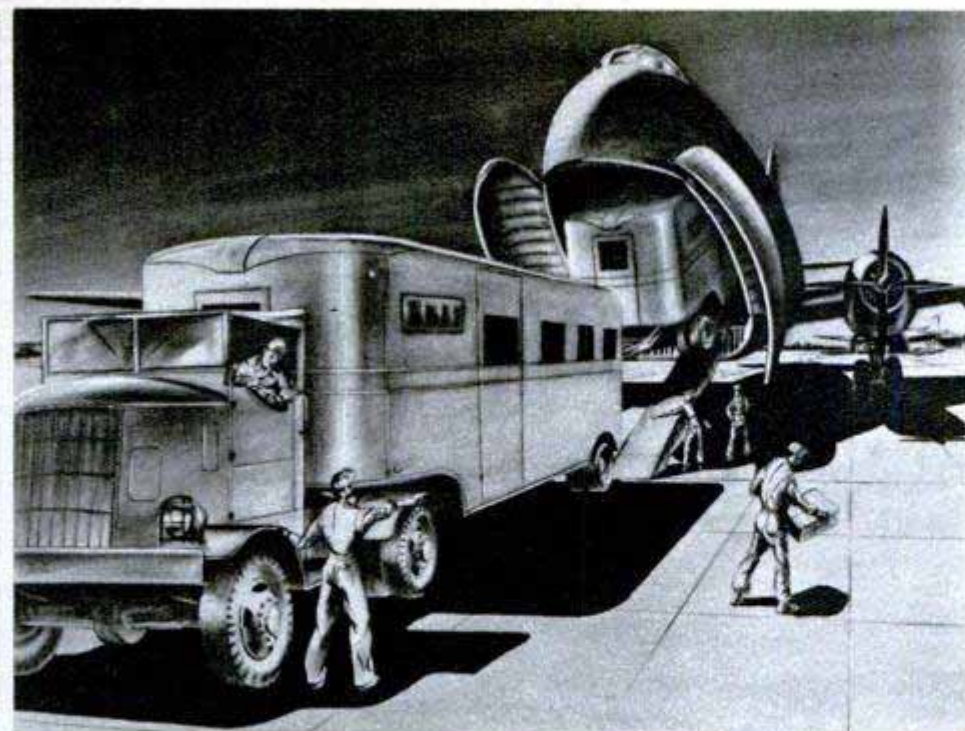
Preservation of the tracks of these creatures has been largely a matter of accident, beginning aeons ago when repeated floods carried fine sand over dried mud flats across which the animals had recently walked. The sand filled in the tracks and, with the passage of time, the layer of sand gradually changed into sandstone. When this stone is turned over today its underside is an exact cast of the original mud surface, including the cracks in the prehistoric mud and any footprints that had been pressed into it. The cast is easier to study and photograph, but if the original form is desired, the paleontologist makes a plaster cast of the rock surface.

The discovery of tracks of the hand animal at Cameron proved that the *Chirotherium* had ranged over much if not all of the Northern Hemisphere and was not exclusively European. A search was made for more prints and, when these were found, some shrewd detective work led to a fairly clear picture of the animal.

Nearly all that science knows about the *Chirotherium* has been deduced from footprints the animals made while walking across muddy ground some 200 million years ago. Only a few unrelated bones of the creatures have been found and in some cases there is a question as to whether they can be those of *Chirotherium* at all.

After the Cameron discovery, the Museum of Paleontology of the University of California sent a number

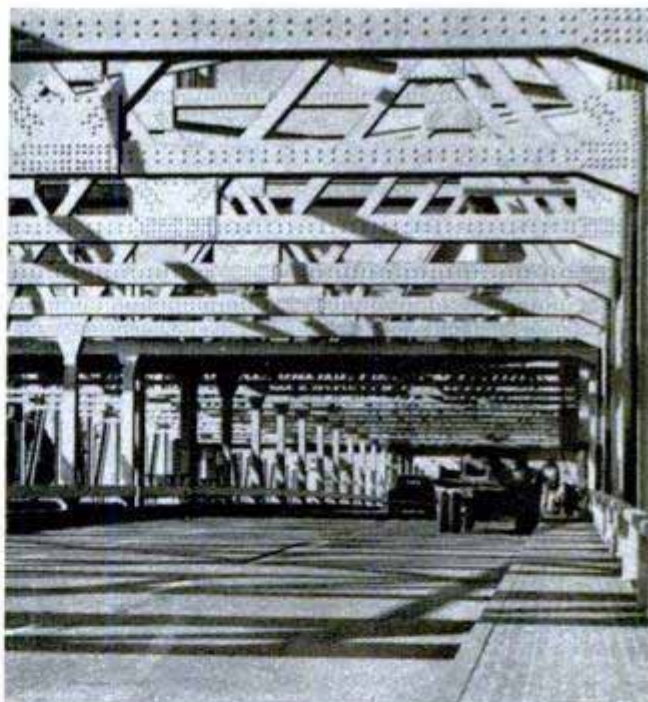
(Continued to page 254)



### Huge Transport Can Carry Two Buses and 56 Men

Big enough to haul two full-size city buses and 56 fully equipped troops, the Air Force's new heavy-duty transport, the Douglas C-124, has a range equal to that of heavy bombers. An unusual feature of

the plane is the large clamshell nose opening through which heavy trailers and other large vehicles are backed into the plane. Its speed has not been announced, but it is described as a high-speed transport.



### Vertical Lift Bridge Goes Up and Down Like an Elevator

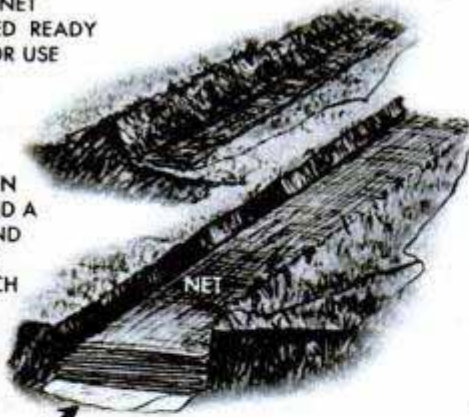
Although it weighs 1,700,000 pounds, a vertical lift bridge in California is raised to the top of its 224-foot towers by four 100-horsepower electric motors. In fact, it is so well counterbalanced that in an emergency it can be raised by just two motors. The bridge spans a man-made channel between Wilmington and Terminal Island, Calif. Cables in each of the four corners hoist the

bridge to the raised position. The pulleys over which the cables run are 14 feet in diameter. Length of the movable span is 240 feet, while the total length of the bridge, including approaches, is three quarters of a mile. The roadway is six lanes wide. Raising the span to its full height, which gives a 175-foot clearance, takes 2 minutes and 15 seconds.

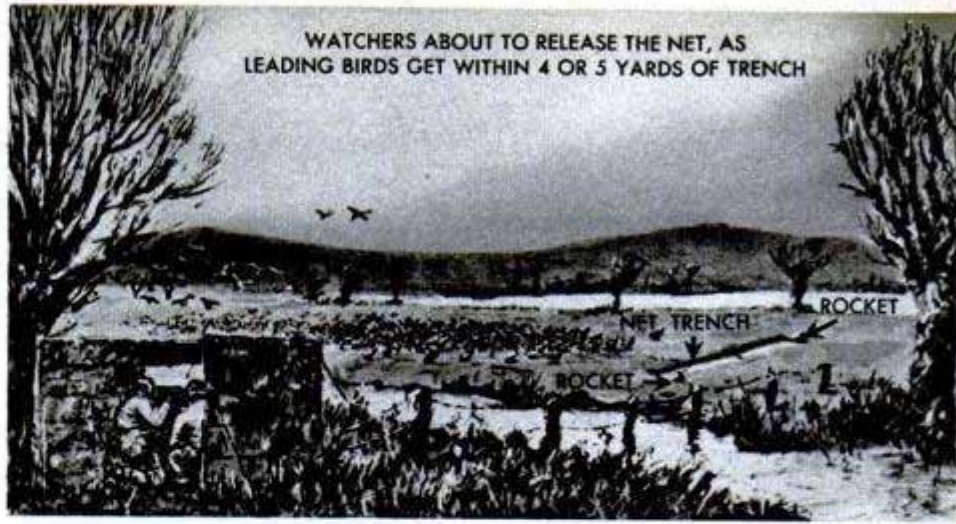
NET FOLDED READY FOR USE

HIDDEN BEHIND A MOUND OR IN TRENCH

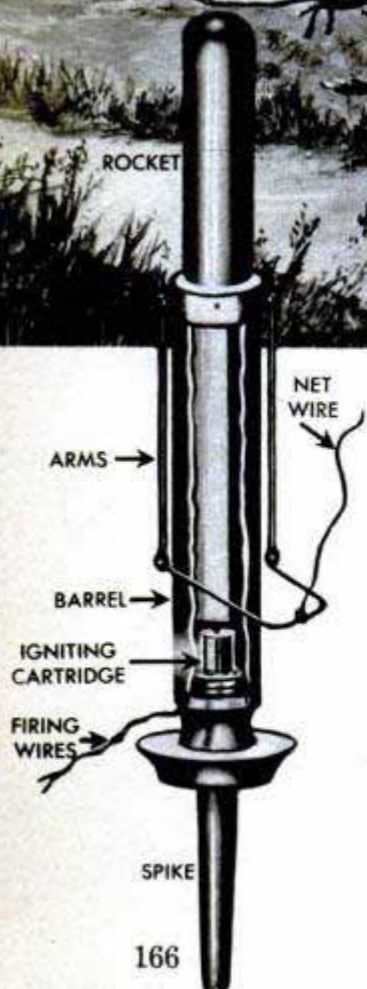
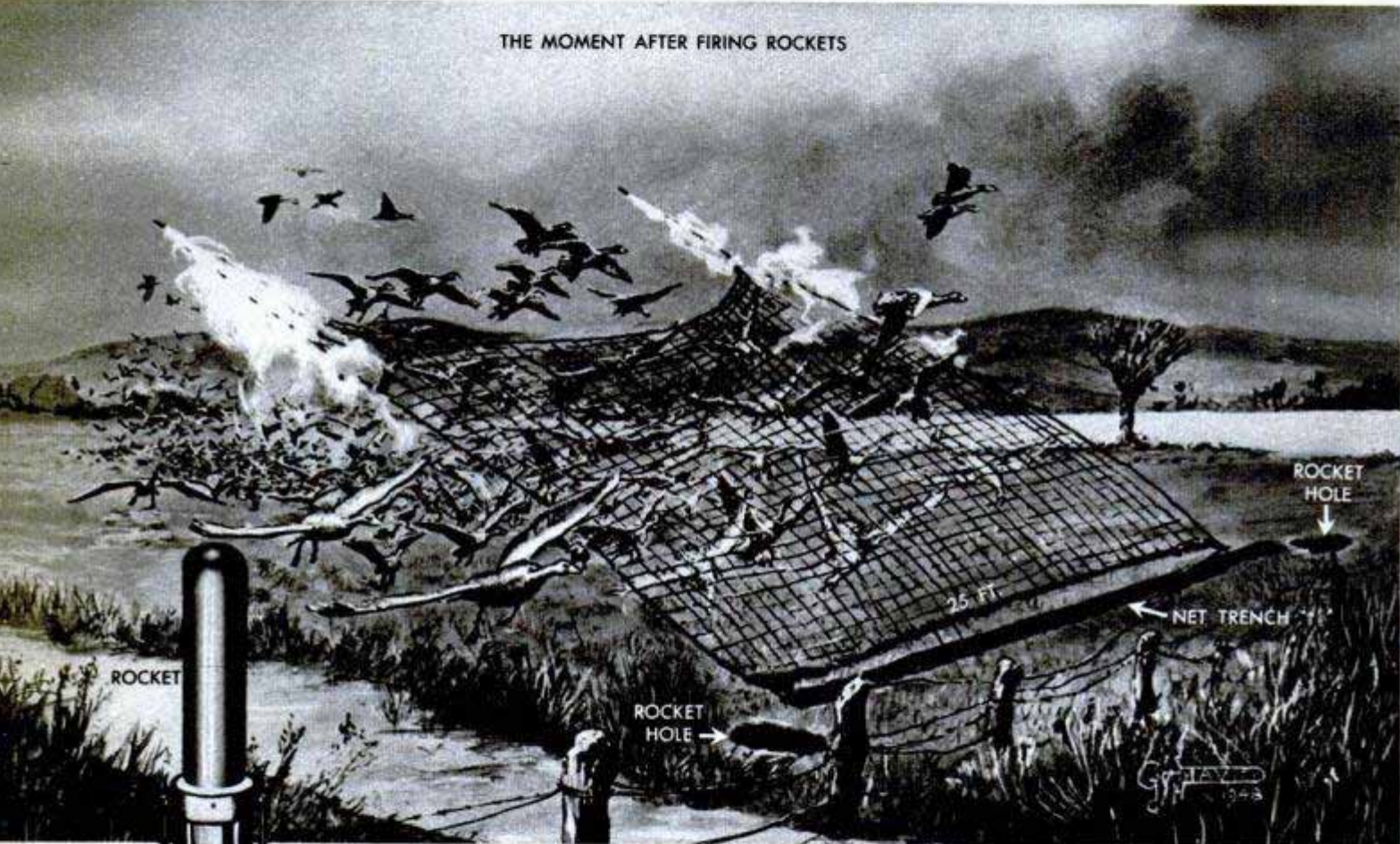
GROUND SHEET



WATCHERS ABOUT TO RELEASE THE NET, AS LEADING BIRDS GET WITHIN 4 OR 5 YARDS OF TRENCH



THE MOMENT AFTER FIRING ROCKETS



To net wild geese, the British conservationists use a rocket-thrown net. Top left, the net is folded and hidden behind a mound or stacked in a shallow trench. Top right, "hunters" in blind prepare to fire rockets as geese approach edge of net. Above, this is what takes place as the rockets go off. The net is pulled up and over the fowl. Being anchored to the ground at two corners, it falls to earth, netting many of the birds. They are then picked up and banded. Left, the type of rocket used to spread the net. It is fired remotely from the blind. Right, once banded, the bird is freed



RELEASING A RINGED GOOSE





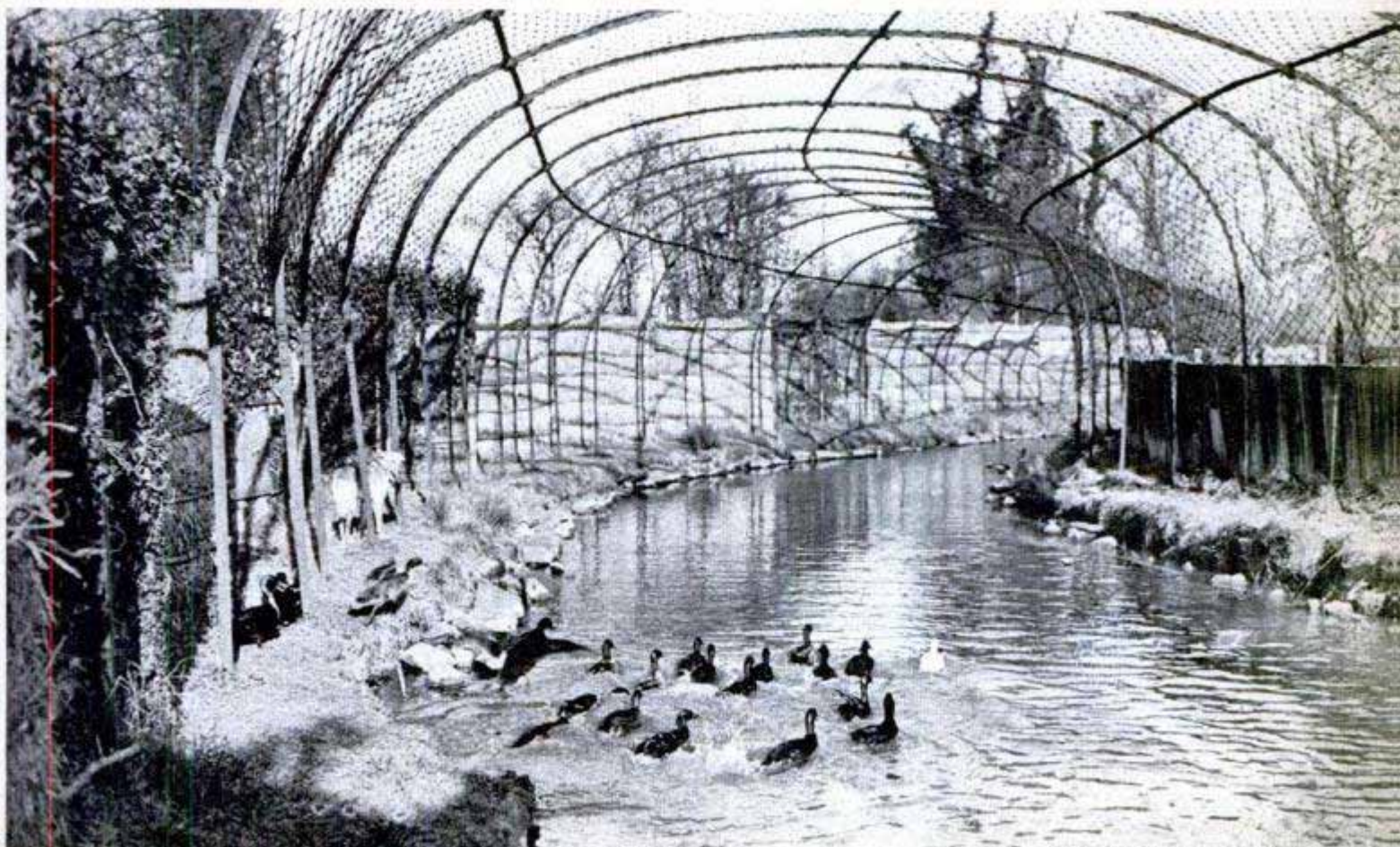
Driving wild ducks into small end of the mesh tunnel where they will be removed and banded

## SCIENCE GOES DUCK HUNTING

HUNTING wildfowl with rockets and nets may not sound like sport, but that's what British conservationists are doing as they seek ways to stop the steady decrease in bird population due to the spread of civilization. They bag scores of birds at a time with rocket-thrown nets and narrowing mesh tunnels into which wildfowl are lured

by tame birds. Once caught, the birds are banded with metal rings bearing identification numbers and released. The numbers are recorded and whenever the birds are recaptured the scientists are able to plot their movements. The program, carried out by the Severn Wildfowl Trust, is providing data about habits of wildfowl.

Wild ducks start up mesh tunnel. Tame ducks follow trained dog at left and their wild brothers tag along





### "Vicinity" Car

Almost as large as conventional autos, a new low-cost car, the Airway, travels 50 miles per gallon of fuel. The car, designed as "vicinity" transportation for shoppers and commuters, is expected to sell in the \$500 to \$750 price range. With a wheelbase of 100 inches and a 50-inch tread, the car seats three in the front. Extra seats may be installed in the rear if desired, or the space may be used for carrying packages. The experimental models, made of aluminum, weigh only 600 pounds. Production models will be made of plastic combined with aluminum. A 10-horsepower



engine drives the car 50 miles an hour. Mounted in the rear, it weighs only 120 pounds. The auto is equipped with fluid drive, plus a low gear for steep grades.



### Crane Moves Snow

Snow removal and grading have been added to a crane's chores by an ingenious operator who detached the boom and added a bulldozer blade. A hook attachment, normally used with the boom, maneuvers the bulldozer blade. The crane had previously been used only for loading machinery and unloading coal.

Scientists at Brookhaven National Laboratory have produced a variety of field corn that grows only six feet tall, short enough to simplify hand or machine harvesting.

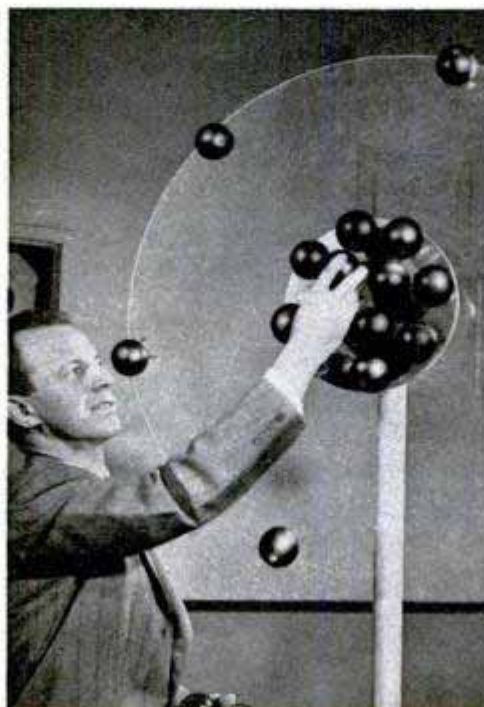
To dramatize chain reaction of the A-bomb, 50 mouse-traps are used. Two corks, representing neutrons, are placed on each trap and when a cork neutron is dropped among the traps (at right), the "bomb" explodes (below) by a chain reaction. As each trap goes off, corks fly around, tripping others

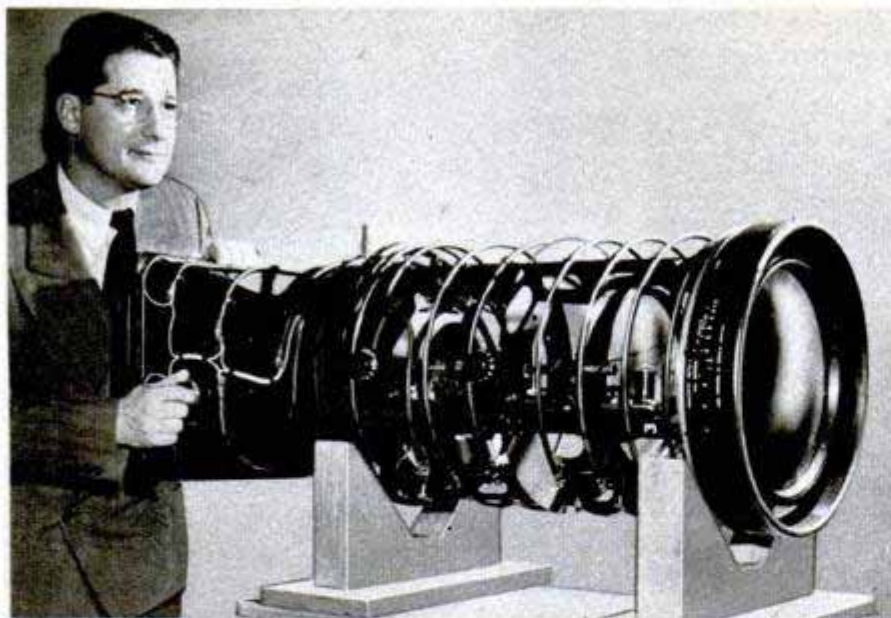


# THEATER OF THE ATOM

Combining science with entertainment, an unusual "vaudeville" show dramatizes atomic power in a truly hair-raising manner (see photo below). The show uses an assortment of interest-holding stage props to portray the story of atomic knowledge from its beginning as a laboratory curiosity down to the present. Sponsored by Westinghouse, it is touring the country, bringing better understanding of the atom to Mr. and Mrs. America.

Below left, a simplified atom motor. From the miniature atom smasher at left, a 200,000-volt charge of electricity leaps across a gap, giving each of the copper spheres a similar charge. Like charges repel, driving the spheres away and spinning the wheel. Center, a model atom shows the cluster of particles in the center nucleus and the electrons on the rim. Right, this hair-raising act is not magic. It is what takes place when you sit down on 200,000 volts



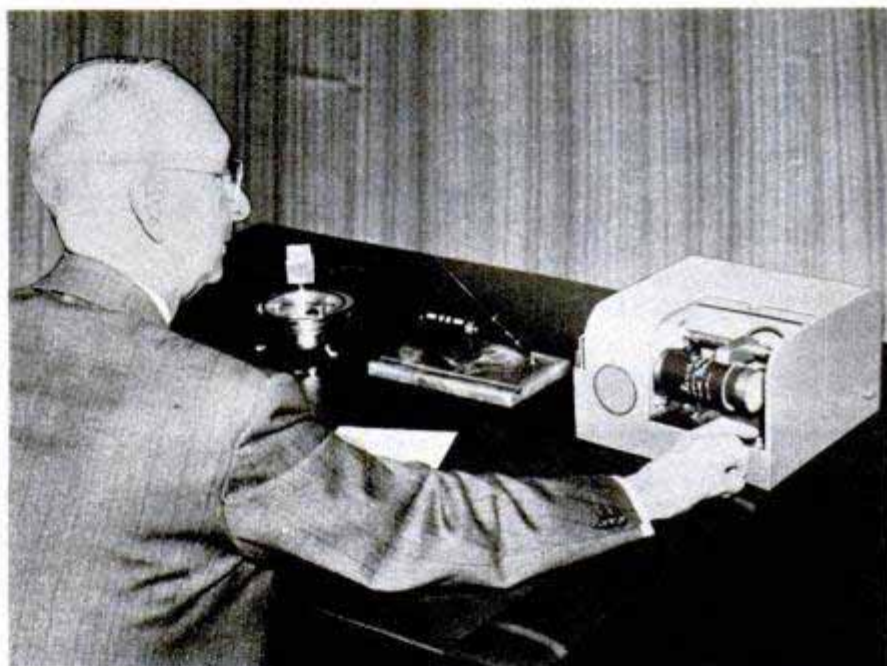


### 15-Inch Camera Lens

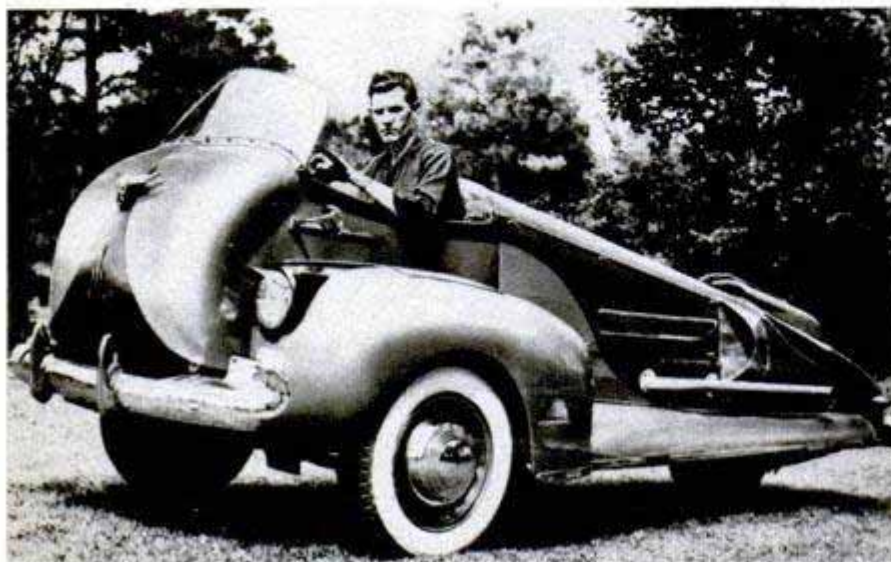
Measuring 15 inches in diameter and nearly 4 feet in length, a giant telephoto lens recently was completed for use by the Air Force in aerial reconnaissance photography. Built by Eastman, the lens consists of five pieces of glass. The f:6.0 lens has a focal length of 60 inches. Tubes containing electric heating elements surround the lens to keep the temperature constant, as variations would affect the focus. The lens will be used with the K-34 aerial camera, which takes pictures on 9 by 18-inch film at altitudes up to 10 miles. Haze is reduced by interchangeable filters.

### Telegraph Office Fits on Desk

Miniature facsimile machines for desk use bring telegraph service within arm's reach of the user. Eventually, the machines will be installed in transportation terminals, offices, hotels and telegraph agencies. Developed by Western Union, the machines save the time of picking up and delivering telegrams by messenger. The sender merely places the message on a cylinder and presses a button. As a stylus passes over the message, electrical impulses are created which flash over the wire to the receiving machine where they are converted back into words by the stylus. Each office machine



automatically becomes a receiver when the central office signals that it wishes to transmit a message.



### Homemade Three-Wheeler Travels 55 M.P.H.

In order to beat the car shortage, Frank Mayes, a farmer who lives near Fayetteville, Ark., built a luxury car himself. The car has only three wheels and is constructed mainly of Ford and Chevrolet parts. Both the driving and the braking are applied to the front wheels, while the single back wheel rolls free. The farmer-mechanic completed the car in 22 months. In trial runs the unique auto has rolled along the highway at speeds up to 55 miles an hour.

## SPEAR FISHERMEN STALK THE BIG ONES

FISHERMEN of Miami's Five Fathom Club are too impatient to wait for the fish to bite—they roam the ocean floor hunting for their game. Weapons used are several varieties of spears, some of them adapted from surplus war implements. One gas gun fires a harpoon with such power that it will pass entirely through a fish four feet thick. Standard equipment for the anglers includes a face goggle, webbed fins made of rubber and an arm lung that gives the wearer an extra two minutes of underwater activity.

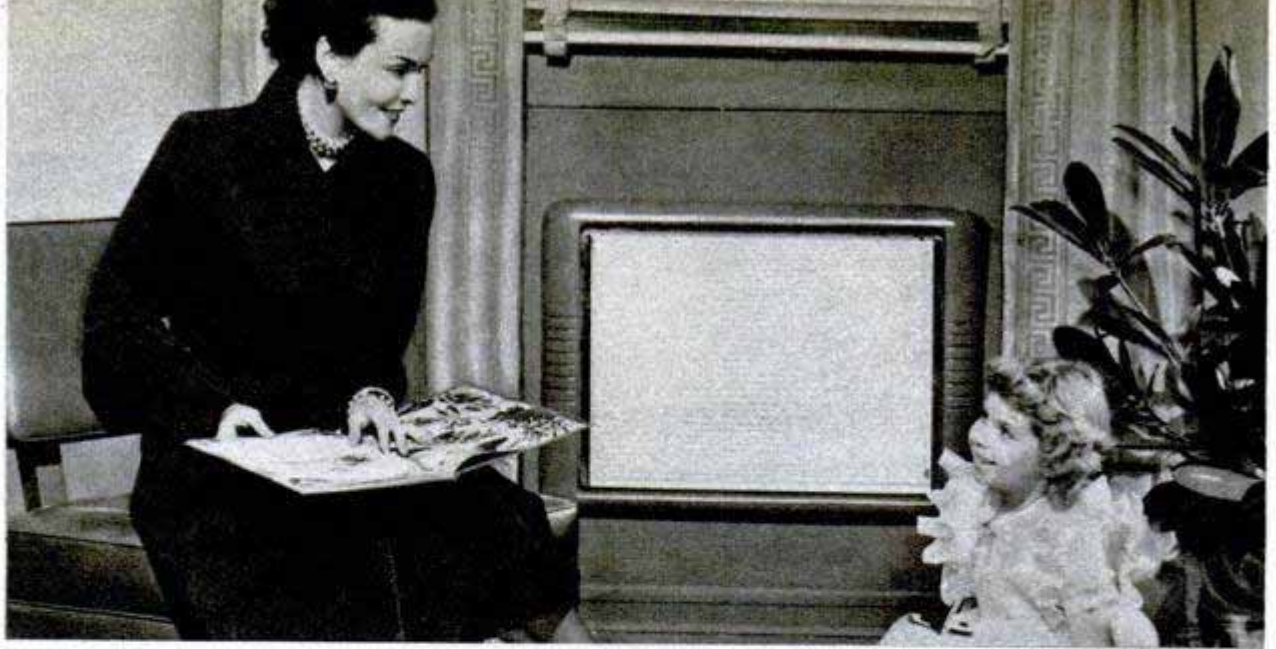


† Angler-inventor demonstrates his rebreather lung which gives him an extra two minutes underwater in case he's speared a big one. Right, equipment includes the lung, goggles and rubber fins for rapid movement through the water. A larger lung permits angler to stay 1½ hours underwater at a depth of 60 feet



† Club member adjusts a gas gun which is used on bigger fish. It fires a five-foot spear with a harpoon head by means of compressed gas. Below, underwater anglers land a 235-pound jewfish with aid of boat tenders

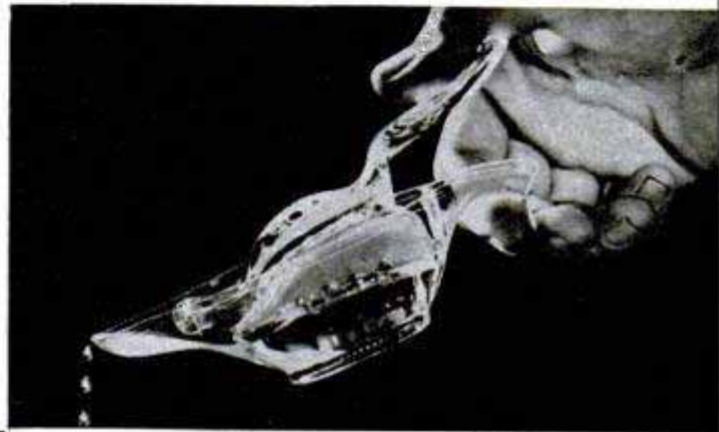




**RADIANT-HEATING PANEL** uses an electrically heated glass plate into which an aluminum element has been fused. Thermostatically controlled, it can be installed in new or old homes to provide comfortable radiant heat. The panels operate on 110 or 220 volts and each one will heat a room of 1400 cubic feet

# WHAT'S NEW *For Your Home*

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



↑ **LEMON SQUEEZER** keeps juice out of your eye as you squeeze small amounts for flavoring. Made of Lucite, it has a removable plastic strainer

← **FLEXIBLE SCREENS** don't have to be taken down for window washing. They are aluminum mesh and can be put up and taken down from the inside

**SERVING DISH** (below left) keeps foods cold or hot for hours. It has a three-quart capacity

**CAN OPENER** (below right) opens strip-sealed cans. Ejector discards strip when can is opened



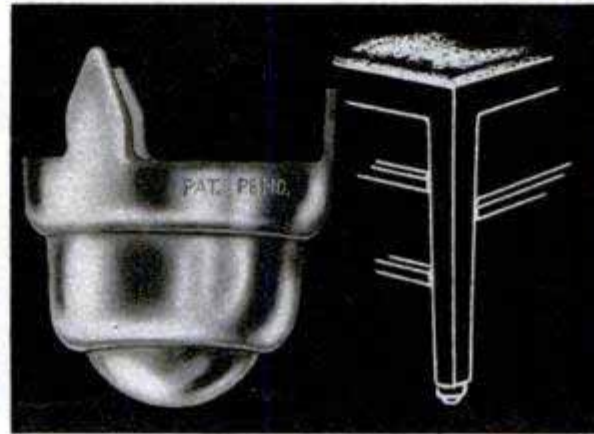
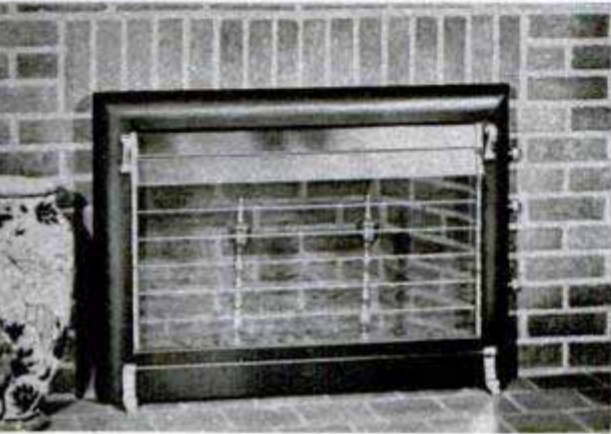


**FIREPLACE SCREEN** (left) has plate-glass louvers that control draft. Closed, below, it prevents loss of room heat up the chimney

**FLOOR POLISHER** (right) fits on vacuum cleaner and consists of a revolving brush that brings out a high luster on wood or linoleum

**BALL CASTER** (below center) is easy to push in any direction. It has a ball-bearing roller. Three prongs attach it to the furniture

**POLLEN REMOVER** (below right) brings relief for victims of hay fever. It removes pollen by washing room air six times every hour



**MOUNTED MIRROR** (below left) can be adjusted to convenient height or tilted to any angle. It is two-faced, one side being a magnifying mirror, the other a flat mirror. The stand, which has rubber-capped feet, telescopes to 24 inches for traveling

**ADJUSTABLE MATTRESS** (below) enables you to select the right amount of softness to assure sound slumber. By pulling on cords strung through buttons on the side, you make the mattress harder. You can make part of it hard, the rest soft, if you desire





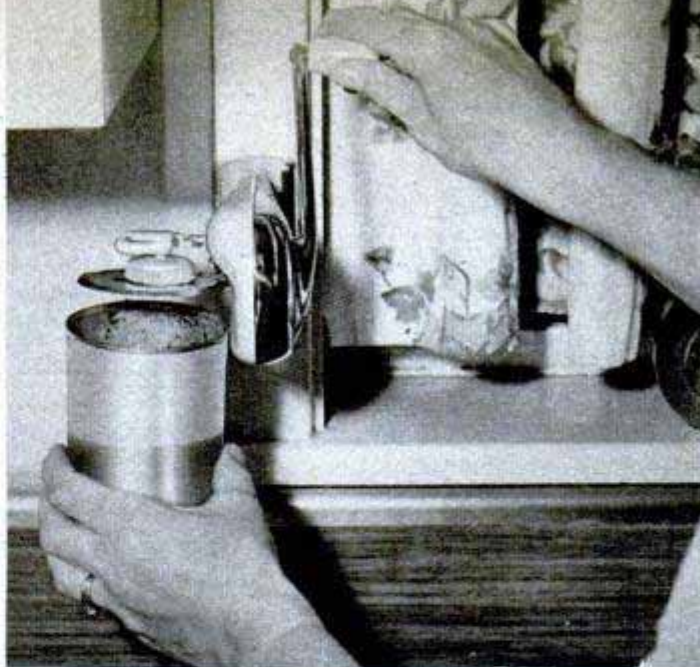
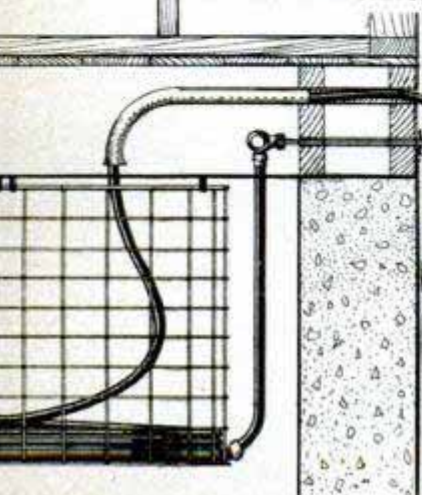
**TAILOR TACKS** are made without stitching by a two-armed marking device that chalks both sides of the cloth with a single twist of the knurled knob

## WHAT'S NEW *For Your Home*

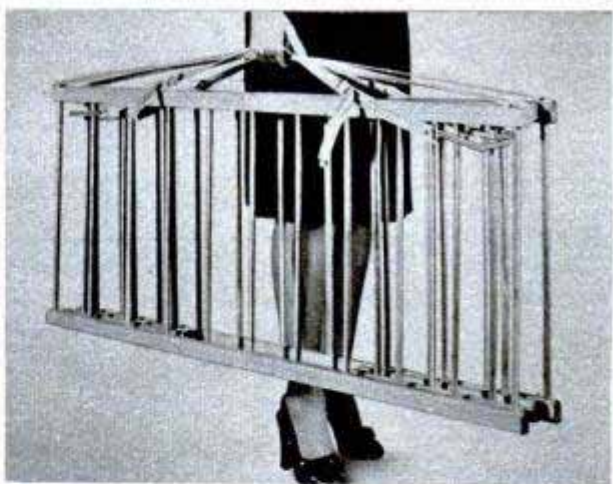
Continued from preceding page

*Sources of supply for these products may be obtained from Bureau of Information, Popular Mechanics Magazine*

**HOSE BASKET** keeps hose connected to tap. It saves time and the hose is ready for use if fire breaks out



**MAGNETIC "THIRD HAND"** for housewives prevents the lid from dropping inside the can as it is being opened. Magnet is a feature of new can opener



↑ **STRAP-ON CRIB** can be taken with you when you go visiting. It converts any bed into a safe crib

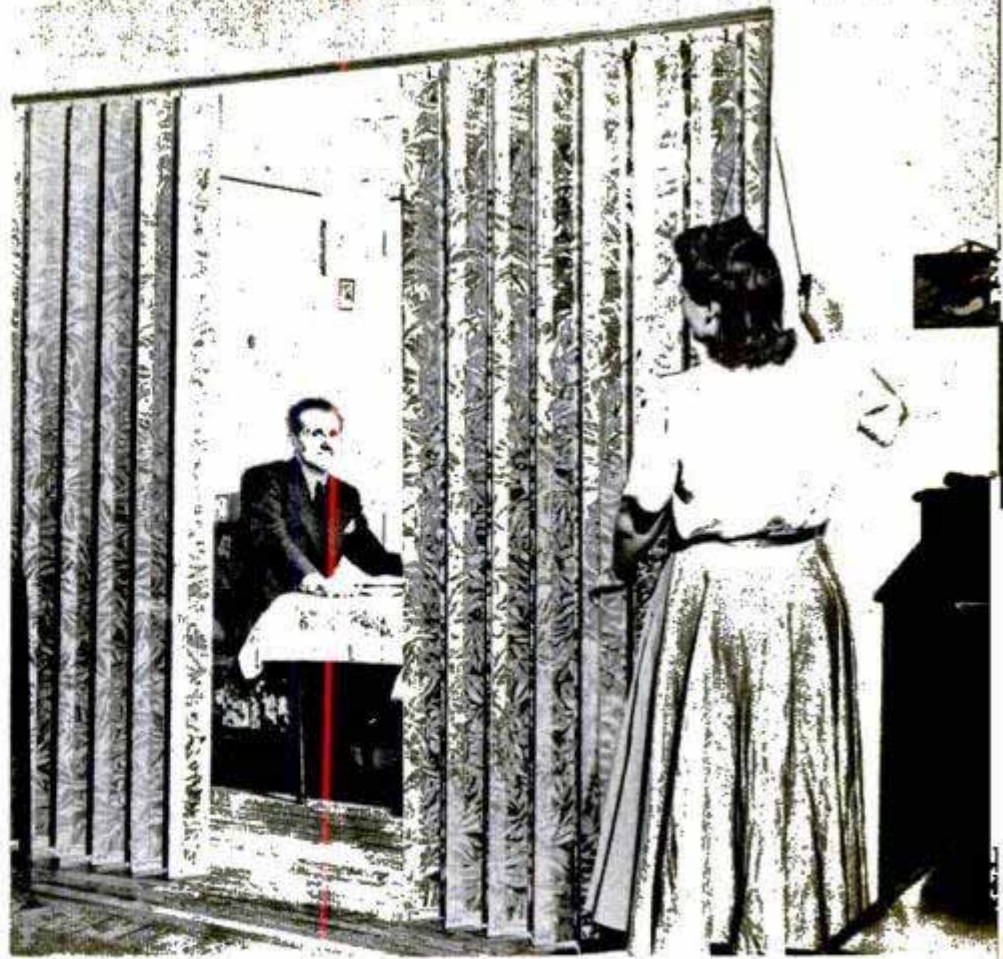
↓ **DISPENSING CAPS** for milk bottles keep milk sanitary. To open the cap, you merely press handle



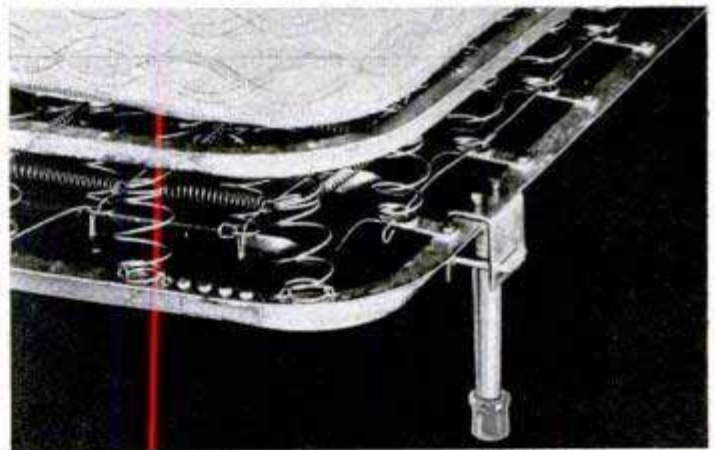




**FOLDING SCREENS** made of a plastic mesh are translucent but give privacy in small homes. Accordion doors use the same material, called Celanese Vimlite



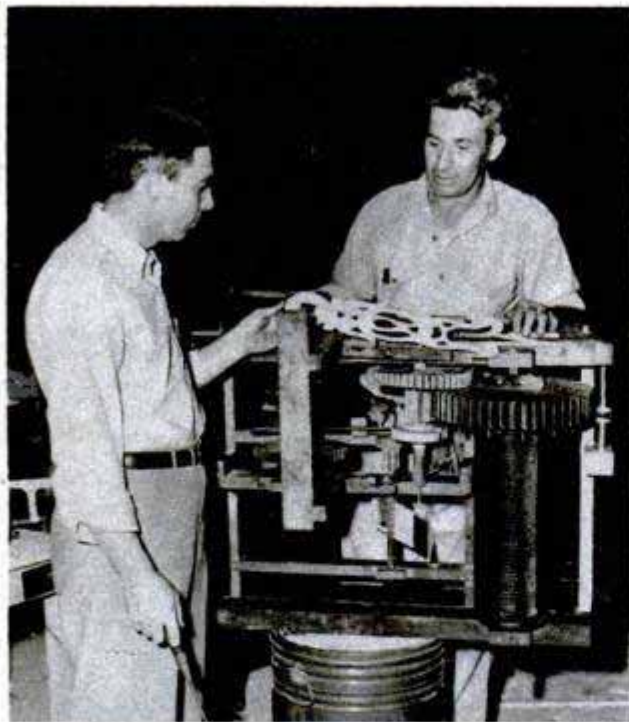
**STEEL LEGS** (right) convert any steel spring into a studio couch or day bed. Rubber-tipped, they attach to the angle iron near each of the corners



**THREE-DECKER TABLE** (below) provides storage space for large kitchen appliances. It is mounted on casters so that it can be wheeled around easily

**MECHANICAL TOOTHBRUSH** (below right) takes the place of the bristle type. Two rubber brushes spin as you turn the crank, cleaning the teeth and massaging the gums. It's used with powder or paste

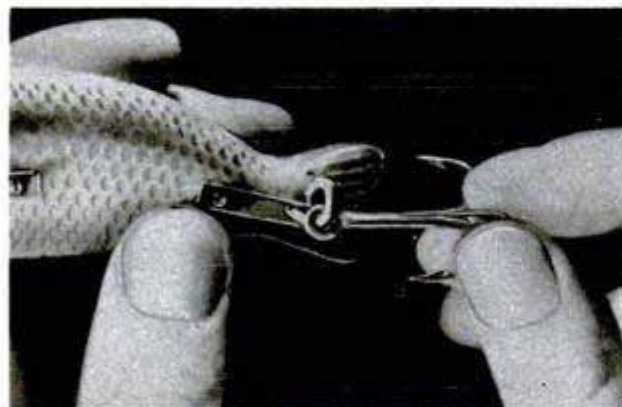
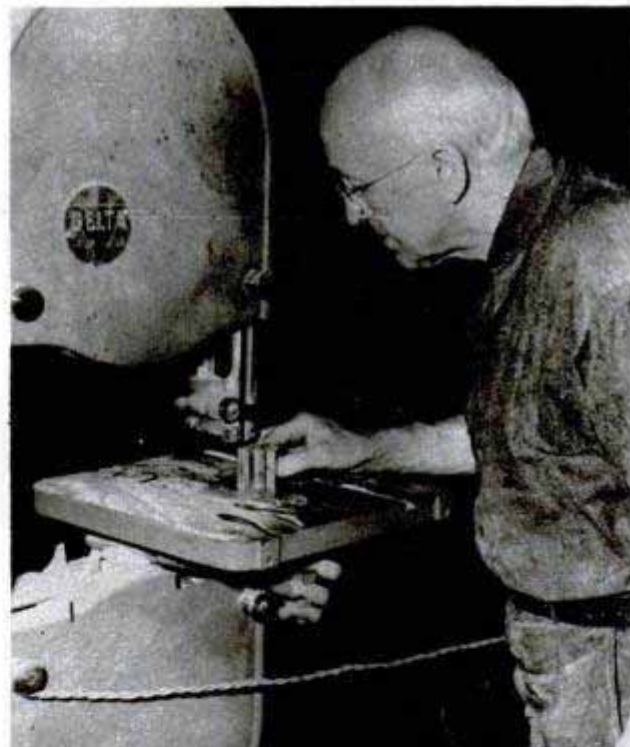




## Old Clock With Wooden Gears Converted to Electricity

Above, paper pattern is cut for new hands. Note large gears in old clockworks. Above right, converted clock is installed in tower. Right, wooden cog is sawed out

Students, a retired college president, a professor and a maintenance man recently converted to electricity a 96-year-old, wooden-gear clock. The clock is housed in a tower on the campus of Marietta College, Marietta, Ohio. Draper T. Schoonover, the retired president of the college, suggested the electrification. He had often cut new wooden gears for the ancient clock in his workshop. He and one of the professors made new cogs for the gears behind each of the four faces. One of the maintenance men cut new hands from plywood and students installed them with collars made from a used automobile-engine head. A special striking mechanism driven by a  $\frac{1}{4}$ -horsepower electric motor was installed. Students wired the clock and once more it tolled out the time, this time driven by an electric motor.

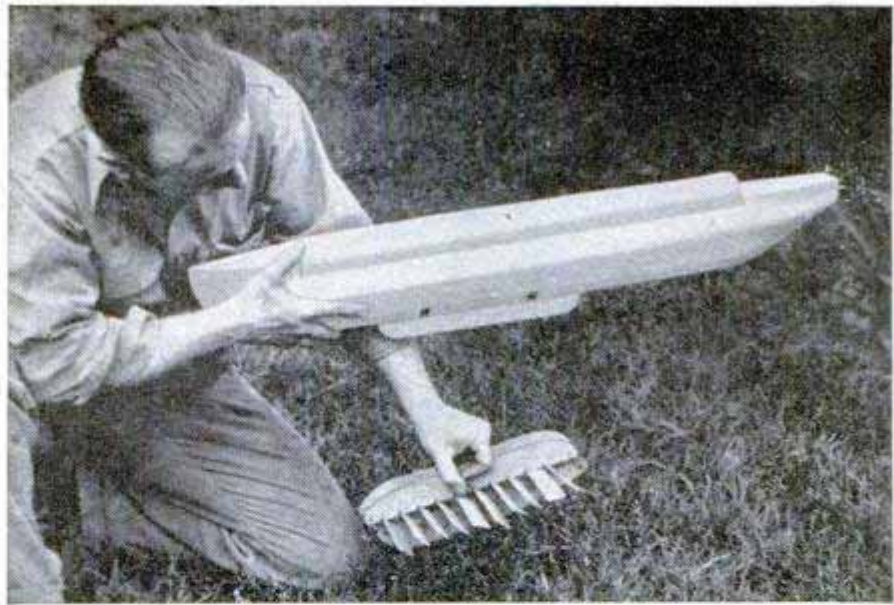


## ← Lure Has Interchangeable Hooks

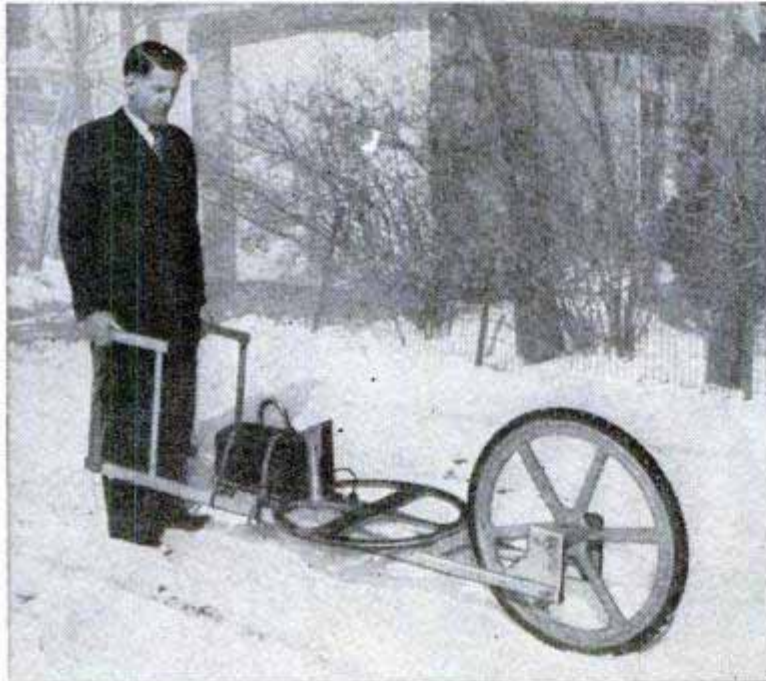
Fishhooks that are damaged or are the wrong size can be removed from a new fishing plug and other hooks substituted in a few seconds. The plug has an open-end eye held in a closed position by a spring piece. When the piece is raised, the fisherman can rotate the eye to an open position, remove the hook and put on another. With the hooks removed, the angler can carry the plugs in his pocket. The plugs are available in several types.

## Wave-Driven Boat

Tired of continually winding his daughter's spring-driven boat, Walter A. Anderson of Omaha, Neb., invented a way for the waves to propel the craft. Now it moves so fast that even in a light chop it passes a rowboat and then has to be captured by a powered craft. Anderson, a civil engineer, first built a balsa hull three feet long. About 18 inches below the hull he fastened an aluminum framework with fins pivoted on their leading edge. As the boat rises to a wave's crest, the fins open 45 degrees, providing forward propulsion. When the boat plunges down



into the trough between waves, the fins close, and their inclined surface continues the forward propulsion.



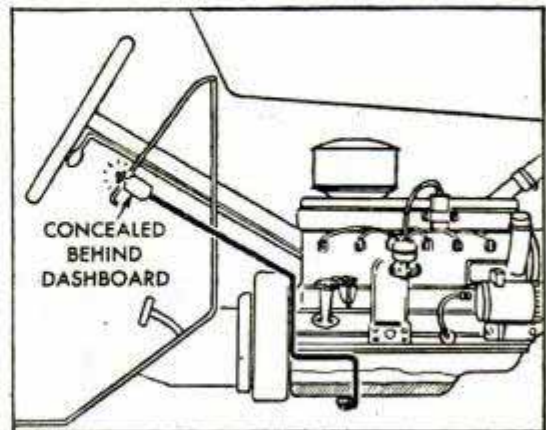
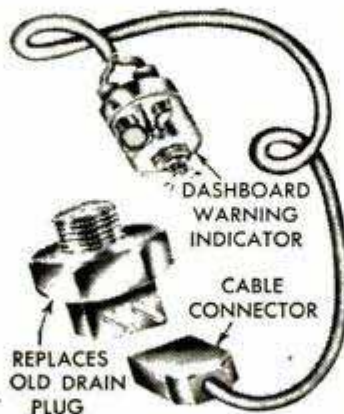
## Plywood Wheelbarrow Carries Meteor Detector

Pushing a plywood wheelbarrow, H. O. Stockwell is prospecting fields near Norton, Kans., for the fragments of a meteor reported to have exploded in mid-air in that area. The unusual wheelbarrow carries an electronic metal detector. Since last year, Stockwell has unearthed four meteor fragments in the Kansas area, the largest weighing 740 pounds.

☐ In the Bell Telephone network today there are 113 million miles of wire, three-fifths of this total being underground and 95 percent of it being rugged cables.

## Dashboard Indicator Shows Oil Level

Motorists can tell at a glance whether their oil is low with an indicator that lights up when the supply drops to the danger point. A plug unit is installed in the oil pan in place of the regular drain plug and connected to the dashboard with a cable. The weight of oil in the pan is transmitted through the plug to a diaphragm, which sets off an electrical current flow as soon as the oil supply goes down. When one quart of oil is needed, an amber light flashes on



to warn the driver. When the oil supply is down two quarts, a red bulb lights up. The indicator operates whenever the ignition switch is on.



Junior Foresters have planted more than 10,000 trees in Omaha. Here a youngster uproots a nursery tree prior to planting it on a city street

Young foresters bore holes in an old stump and drive rotted wood into them. If wood is well watered, the stump will rot out in about a year



**A** 12-YEAR-OLD boy stood defiantly in front of the superintendent of an Omaha housing project. He had been caught deliberately hacking a young tree in the project with a knife.

"You are guilty of a crime not only against this city but against life itself," said the superintendent. "Under the circumstances, I am determined to report your action to the juvenile authorities."

A small man stepped forward and stood beside the boy. He was F. J. Pipal, City Forester of Omaha. "Would you be willing to follow my recommendations in dealing with this boy?"

"Yes, Mr. Pipal. This crime was committed in your department. You may punish him in any way you wish."

# Junior Foresters



Border of about 75 young elm trees was planted along a boulevard in a city park by the Junior Foresters

"Then I propose that we give the damaged tree to this boy. He'll own it. But if the tree dies while in his care, he will return to you for full punishment."

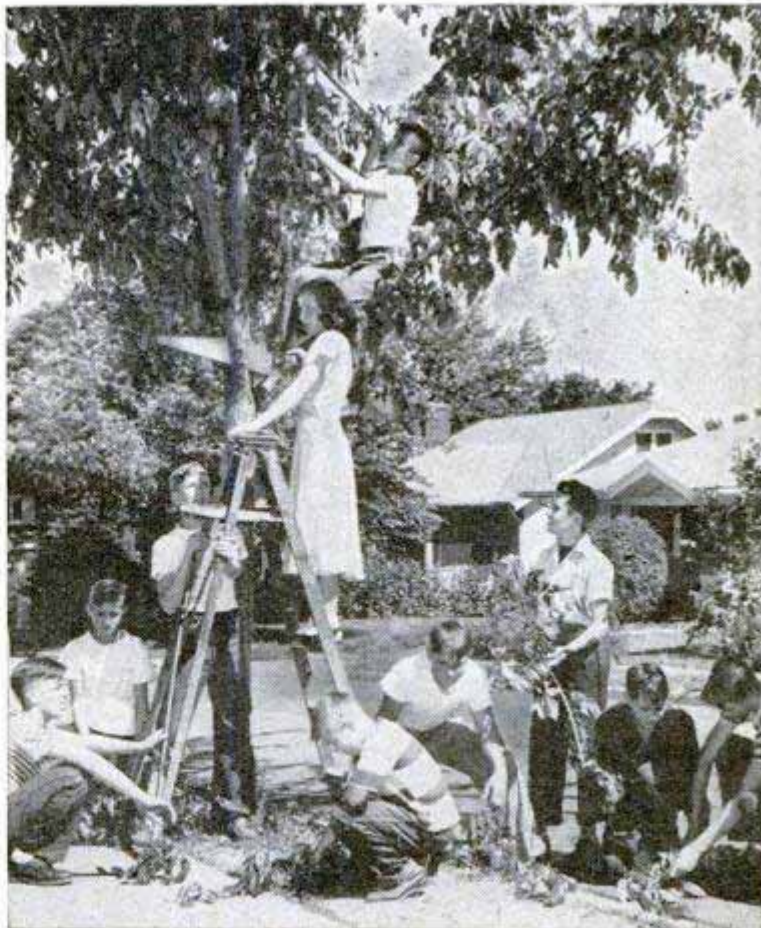
Less than 10 minutes later the boy appeared at Pipal's office begging for advice on how to save his tree. Pipal showed him the techniques of tree surgery, how to remove the damaged portions and bind the wounds.

Months later, with the tree thriving, the boy was an enthusiastic member of a unique organization, Omaha's Junior Foresters. The excitement of planting, protecting and performing surgery on growing trees had captured his imagination in the same way this kind of work has appealed to hundreds of other Omaha children.

The Junior Foresters are dedicated to providing more and better trees for Omaha. More than 1800 members keep sharp young eyes on watch for damage to the city's trees, and in the past seven years the youngsters have planted about 10,000 trees within the city limits. By legal action they are officers of the city. They have received authority from the City Council to intervene with any citizen on questions of public or private trees. Each forester's badge is registered by number in the city hall. The pint-sized arborists are constantly jolting middle-aged residents into action on behalf of

the trees, and frequently they correct the elders' mistakes.

In 1941, shortly after Pipal started work as Omaha's City Forester, he decided that something should be done to make the city children conscious of tree damage. He inaugurated a school contest with prizes for the best essays on the city's trees. Winner of that original contest was a girl who stated in her essay that she was "president of a club whose motto is 'More and Better



Youngsters enthusiastically prune trees surrounding their school in practice work

Omaha World-Herald photo



Junior Foresters cleaned out a cavity in this tree, then filled it with cement. Black paint finished the project until they decided to camouflage their work by painting bark on the cement. Below, boys wield shovels to plant one of their 10,000 trees



Trees for Omaha.' Pipal, in reporting to the girl's mother that the girl had won first prize, asked about the club. "Mildred has a wild imagination," said the mother in resignation. "She's never even heard of a tree club." There was only one thing to do; with the help of Mrs. Mayme Carpenter, a teacher, Pipal started such an organization—the Junior Foresters.

Clubs are organized by schools to include pupils in the sixth and seventh grades, and in some cases the fifth and eighth. The youngsters are in complete charge of each organization. Pipal has taken on the job of guidance and teaching and provides each member with a booklet for study. The clubs and their work form a definite part of the school curriculum.

In the first lesson for each club—how a tree grows—Pipal brings to the classroom a tree eight feet tall, complete with roots and artificial leaves. About one third of the trunk is sliced off lengthwise to show the location of the cambium, inner bark and other parts. Later in the course, the students learn to prune trees, the fundamentals of tree surgery, how to plant trees and kill the insects that may attack them. Much of the work is done on trees in the school yard. The young foresters became so enthused with their surgery on one tree that after they had filled the cavity they spent hours "camouflaging" the cement by painting bark on top of it.

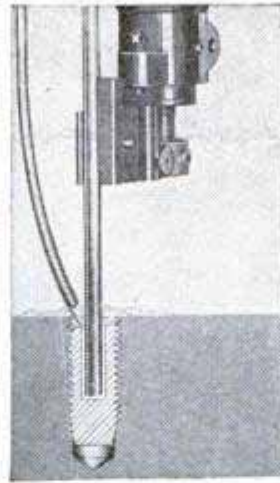
In their eagerness to display their knowledge, the youngsters are lavish in their advice to elders. "For chewing insects, poison their food; for sucking insects, use a contact spray, and for borers keep the tree in such good health that the borers can't get in."

Pipal had no idea when he started the organization that it would prove so exciting to the students. Now he scarcely has time to visit each club and carry on his regular duties. Kids swarm into his office after school. At any time his phone may ring and a voice pipe up, "Mr. Pipal, this is your dendrologist of Bancroft School. I have found a total of 127 species for you." A dendrologist, Mr. Pipal explains, is a person who makes a scientific study of trees.

(Continued to page 252)

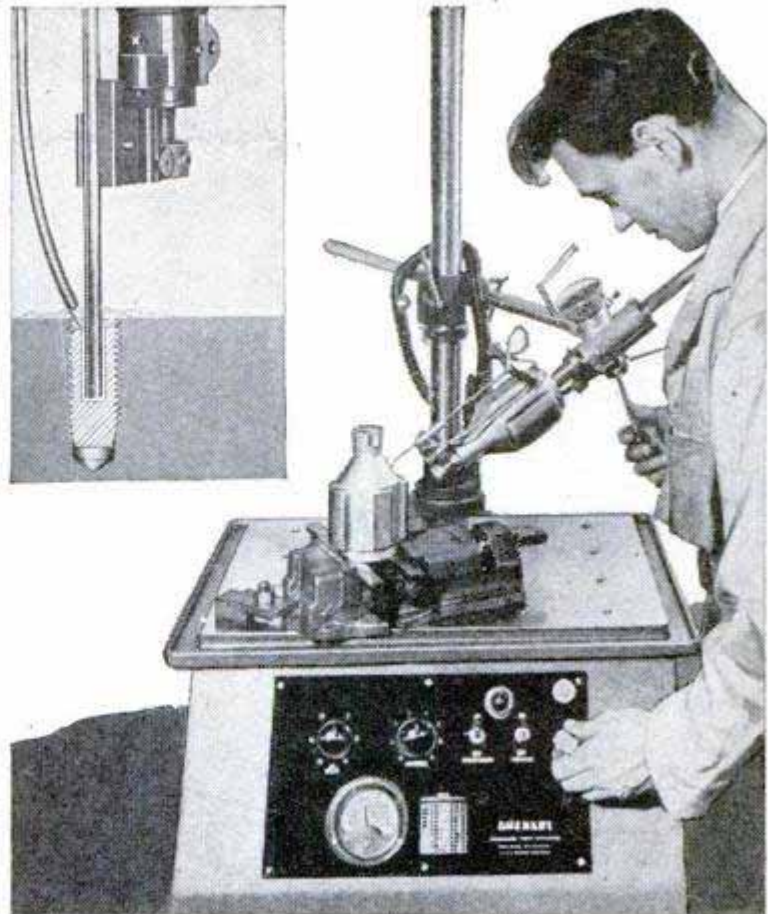
## High-Voltage Arc Removes Broken Studs Without Heating Casting

Taps, studs or reamers that break off inside a casting are removed in a few minutes with an automatic steel disintegrator without distorting or heating the casting. Electrodes direct the high voltage into the broken piece, disintegrating it electrically. The machine can be used in any position and the electrodes are self-feeding. Once adjusted, the machine operates itself. An ordinary  $\frac{1}{2}$ -inch tap is removed in about eight minutes.

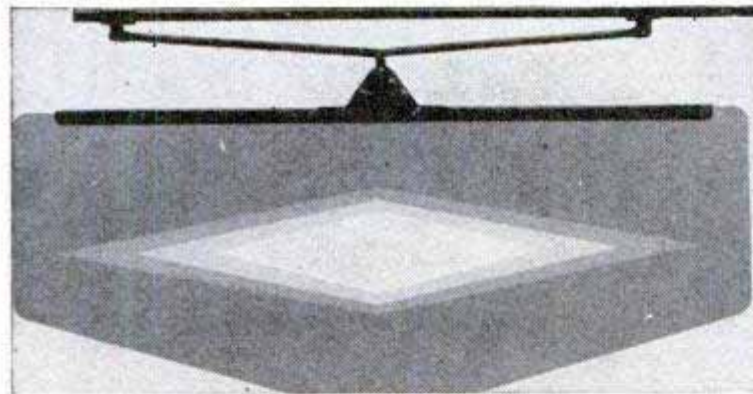


## X-Rays Sent by Telephone For Expert Interpretation

X-ray pictures now can be sent by telephone, a technique that may save the lives of accident victims. Many small hospitals do not have competent radiologists who can interpret X-ray pictures after they have been taken. In the new system, the hospital technician puts the picture on a transmitting machine and "phones" it over the regular lines to a receiver in the office of a specialist, who then interprets the picture for the patient's physician. The process takes about three minutes. The facsimile transmission is similar

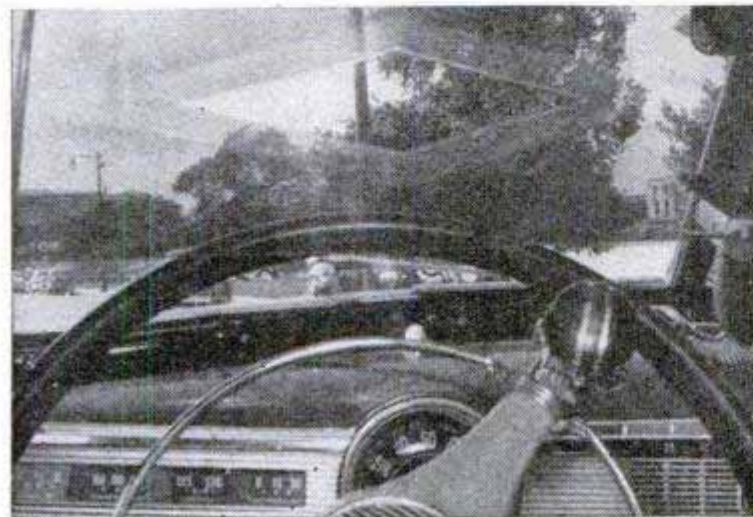


to that used in sending newspaper photographs. With the use of radio instead of telephone, it could serve ships at sea.

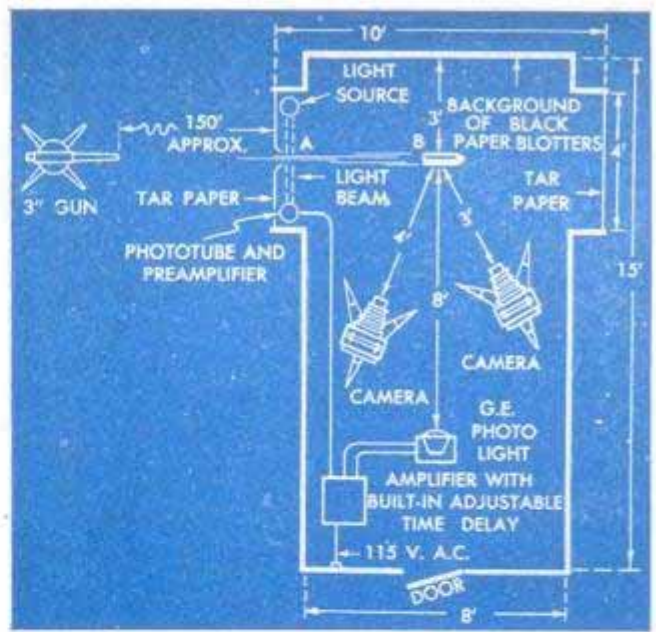


## Antiglare Visor for Car Has Clear-Vision Area

With a clear center section in the shape of an elongated diamond, an automobile visor with graduated color densities provides the driver with glare protection without obstructing his view. Made of transparent plastic, the blue-green color density gradually increases from the clear area to the outer edges. The viewing area in the center is designed to hold back a large percentage of vertical light, thus diminishing glare. The color graduations prevent a sharp contrast between light and dark areas and absorb dangerous light reflections. The visor, which can also be used for night driving, was invented by an optometrist.



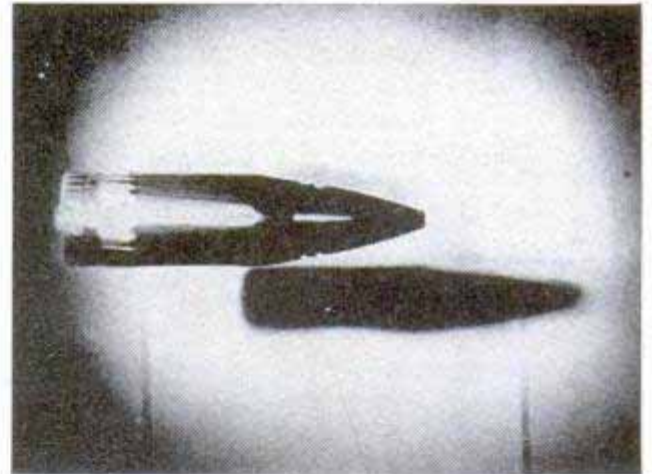
☐ Bathroom mirrors and car windshields are kept free of annoying condensation by wiping the glass with a chemically-treated cloth now on the market.



## Shells Fired Through Studio Wall Are "Stopped" by Camera

Naval shells moving at 1842 miles an hour, more than twice the speed of sound, are "stopped" in their flight by high-speed photographic equipment developed by General Electric. The camera, a press model with a remote-controlled shutter release, is placed in a dark room that has two tar-paper walls through which the shell is fired. The camera is focused and the shutter cocked prior to the firing of the shell. When the gun is fired, the camera shutter, operated remotely, is opened for one-second exposure. As the shell bursts through the tar paper into the dark room it crosses a light beam, setting a timer in operation. After a precalculated delay, the high-intensity flash unit is discharged automatically, producing a light that lasts only two-millionths of a second and exposing the film.

Top left, photographer adjusts amplifier that fires flash (rear) lasting two-millionths of a second. Above, plan of the picture-taking room showing setup of equipment. Below, photo of a shell going 1842 m.p.h.



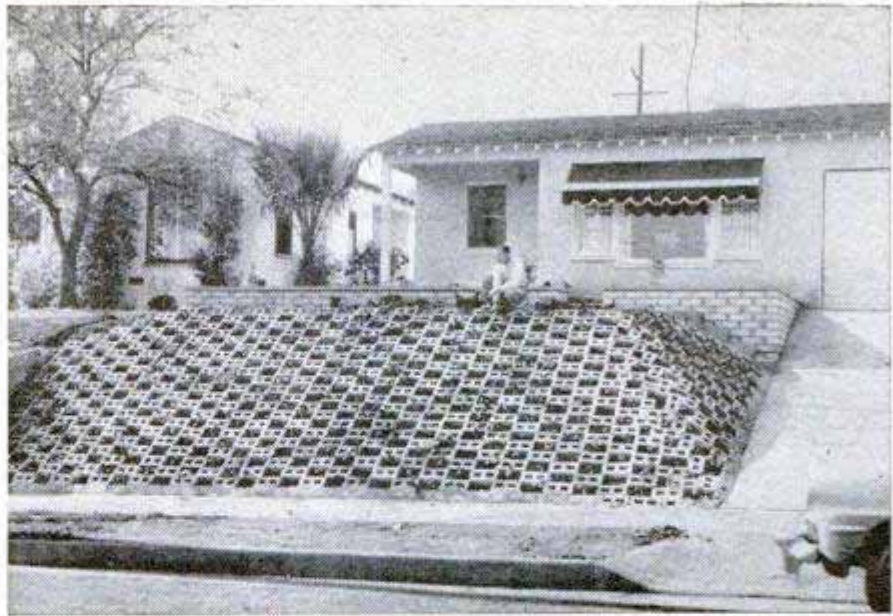
## Portable Enlarger Packs Inside Case

For the photographer with limited space, an enlarger now available can be dismantled and stored in a handy carrying case. The case measures only 6 by 16½ by 19 inches and stores in a small space. Handling all miniature negatives up to 2¼ by 3¼ inches, the enlarger is equipped with a highly corrected three-element lens with a 6.3 opening. Although the enlarger can be easily dismantled, it is a sturdy instrument made of reinforced steel.



## Ivy-Planted Blocks End Lawn Erosion

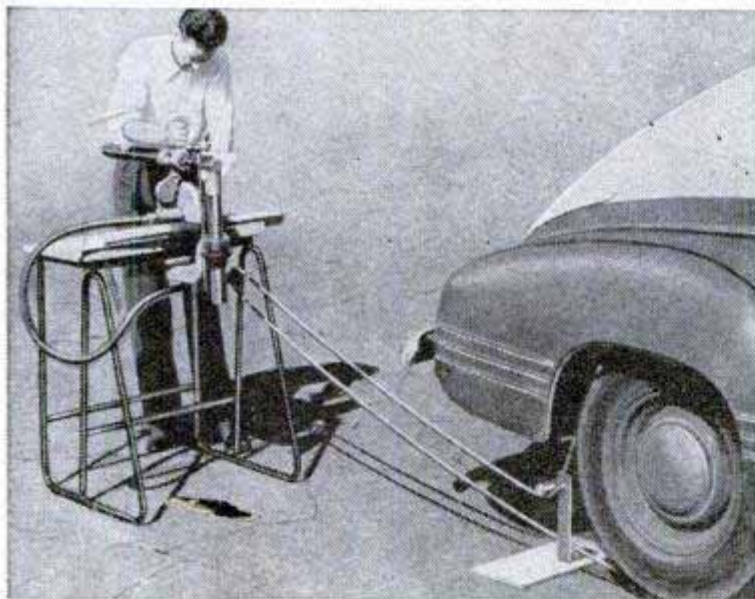
One resident of Alhambra, Calif., saved himself about \$450 by covering his lawn with concrete blocks instead of building a costly retaining wall. He used 250 of the large, hollow-type blocks and planted the open spaces with English ivy to stop erosion. The job cost him \$60 and in time he expects the ivy to spread and completely cover the blocks, producing an erosionproof "lawn."



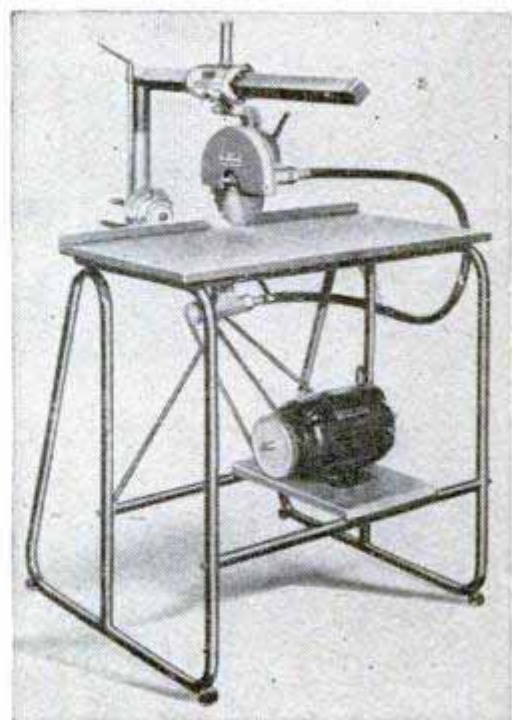
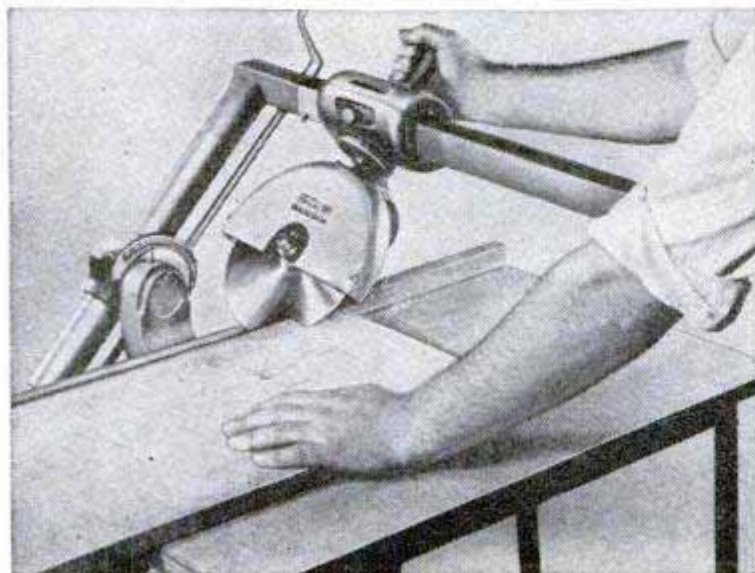
## Portable Bench Saw Can Be Powered by Auto Wheel

Lightweight and small enough when knocked down to fit in the trunk of a car, an all-purpose bench saw can be carried right to the job. With six points of adjust-

ment, the versatile tool can be used for routing, dadoing, shaping, sanding and other operations as well as sawing. A flexible shaft transmits the power from the pulley under the table to the blade. If electricity is not available, the saw can be driven by an automobile wheel, concrete mixer or tractor. The eight-inch blade cuts to three inches and can be turned for ripping and angle cuts, tilted to cut bevels, raised and lowered for depth cuts, and moved along the horizontal arm for cutting action or location.



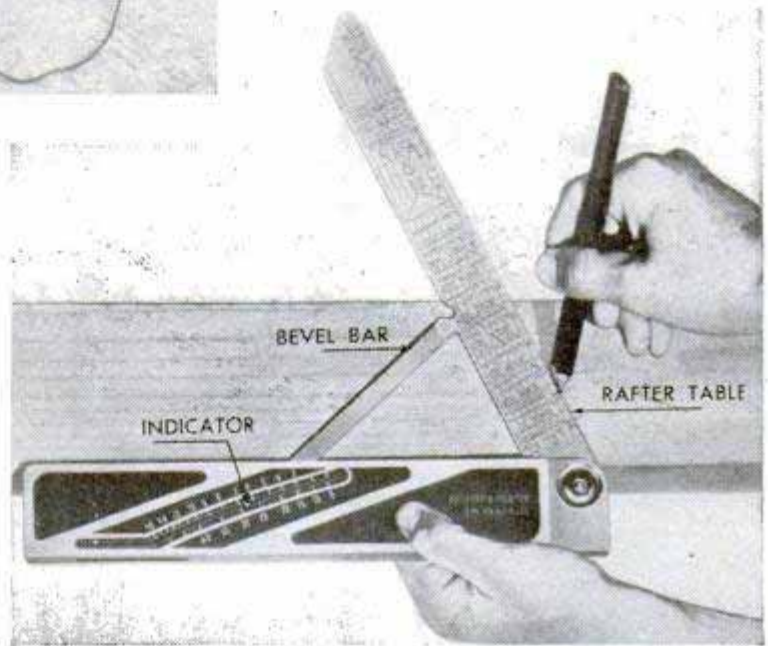
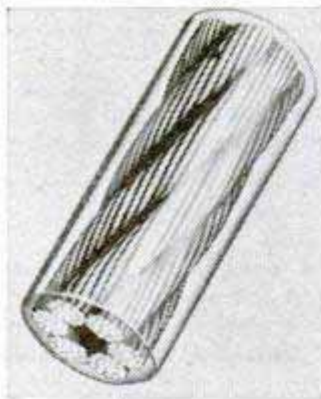
Left, when used in the field, the saw is driven by a belt wrapped around the rear wheel of a car. Lower left, blade tilts for bevel cuts. Below, the complete unit



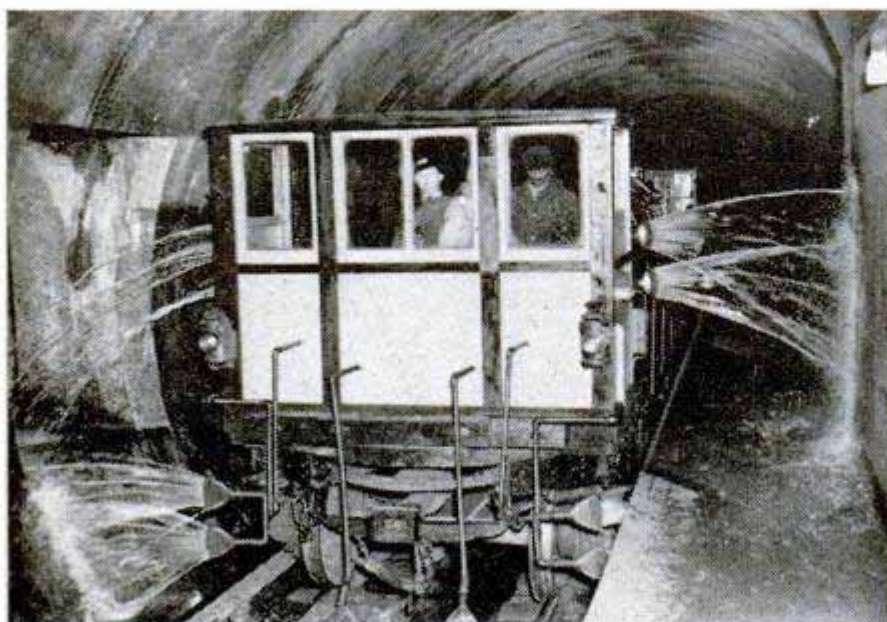


← **REMOTE-CONTROL** racer can be run forward and backward and steered on the end of a 100-foot wire. A knob on the control box regulates the speed of the model, which will go up to 40 miles an hour. The control operates on less than 30 volts and is said to be safe even for children

↓ **NYLON "HOSE"** covers wire cable to make it stronger and more durable. Chemically similar to the nylon used in hosiery, the covering completely surrounds the cable. The coated wire is expected to have many uses ranging from dog leashes to cables for power shovels and elevators

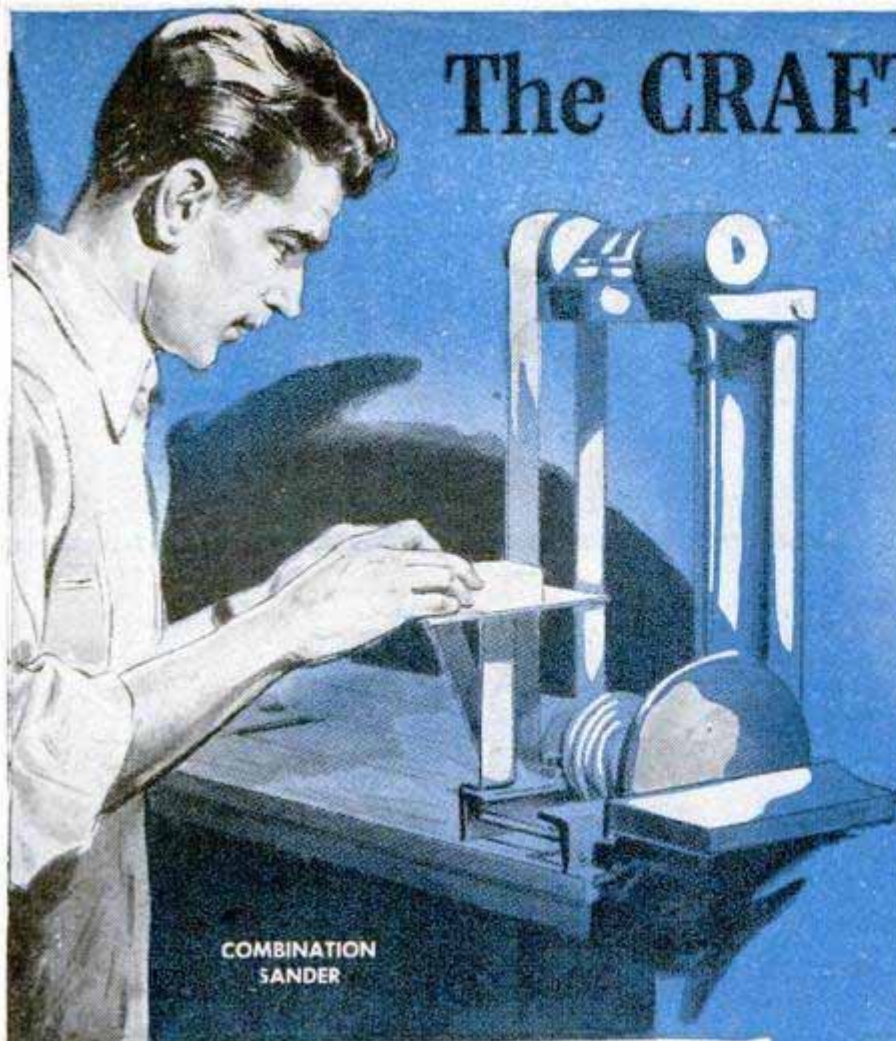


↑ **ROOFING TOOL**, a combined framing square and slide rule, quickly gives carpenters the "pitch" on roofing problems. The tool automatically yields framing figures and at the same time provides a blade for marking cuts. A rafter table enables the carpenter to determine rise per foot run and the length of rafter



← **SUBWAY SHOWER** cleans up Chicago's underground railway system. A special tank car winds through the tunnels squirting water from nozzles on both sides

# The CRAFTSMAN



COMBINATION SANDER



WEATHER STRIPPING

★ Why bother with the tedious job of hand-sanding when it's so easy to build power-driven sanders that will turn out work of professional quality? On page 226 we've detailed two machines. One combines a bandsander with a disk and drum in a single unit designed especially for finishing small parts, while the other is a table-top belt type for smoothing large flat surfaces. With the proper abrasives, these machines also can be used to finish metal parts.

★ Weather-stripping doors and windows will cut heat losses as much as 20 percent, besides helping to prevent cold drafts near the floors and outside walls. A practical article on page 205 describes common types of weather stripping and details the methods of installation.

★ Another timely feature, page 194, which will be of special interest to homeowners with hand-fired heating plants, pictures 10 ways to save coal. The trick in economical hand-firing is to set up a routine of furnace tending that can be changed easily to suit variations in outside temperature, without forcing or banking the fire for long periods of time. The procedure outlined results in a uniform rate of burning that reduces heat loss to the minimum.

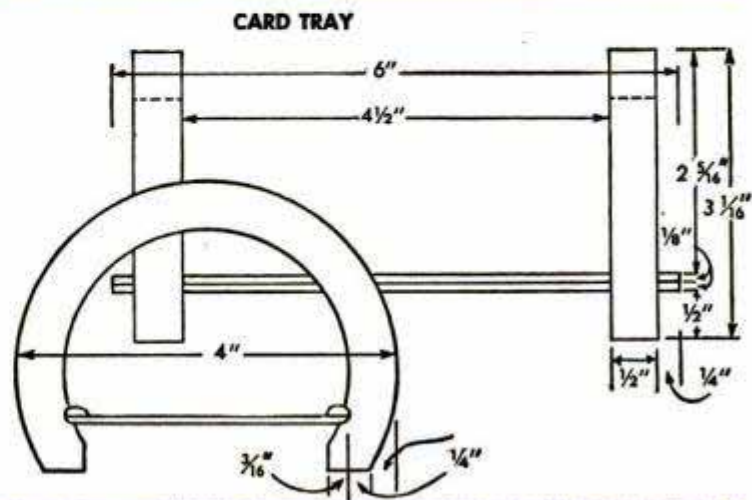
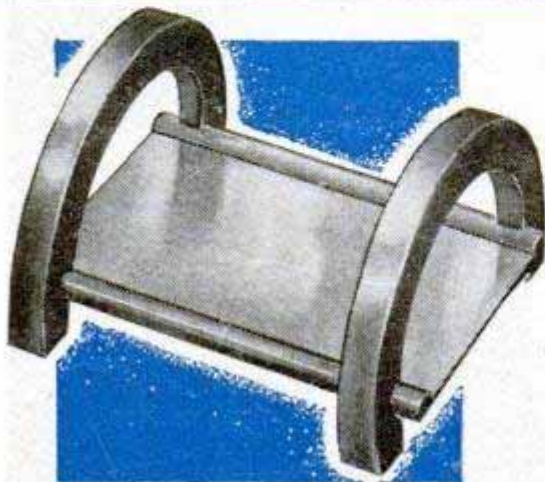
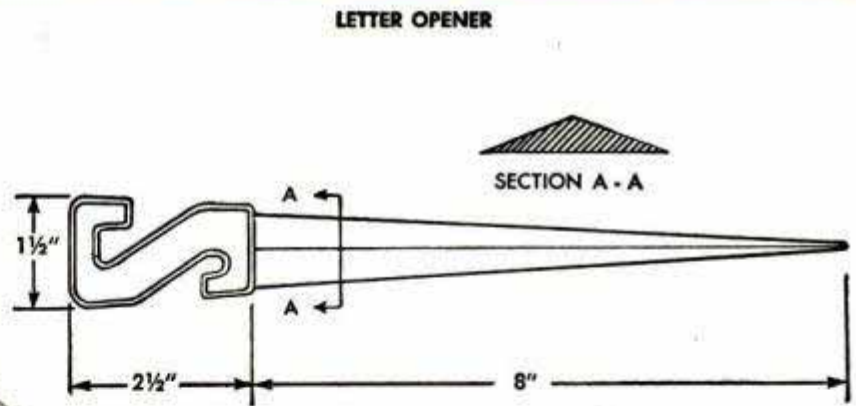
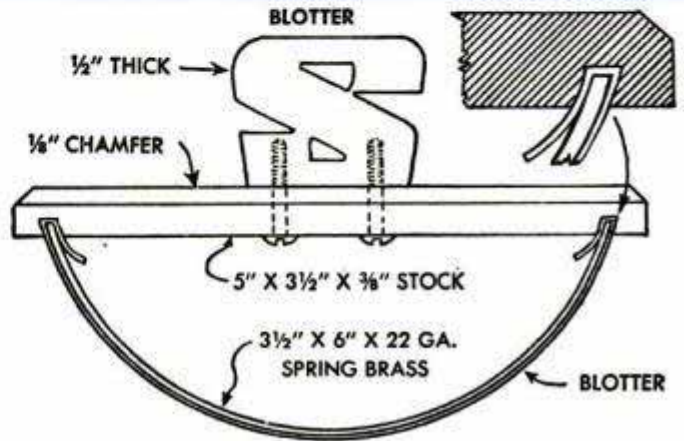
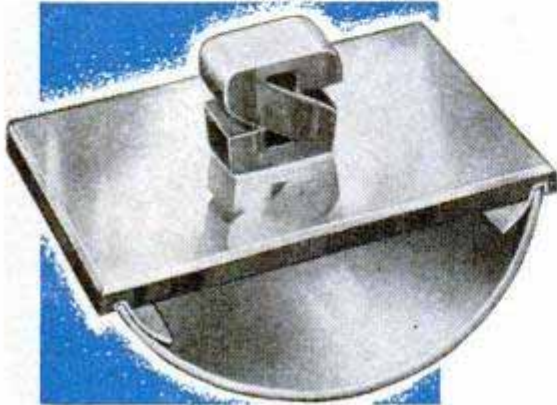
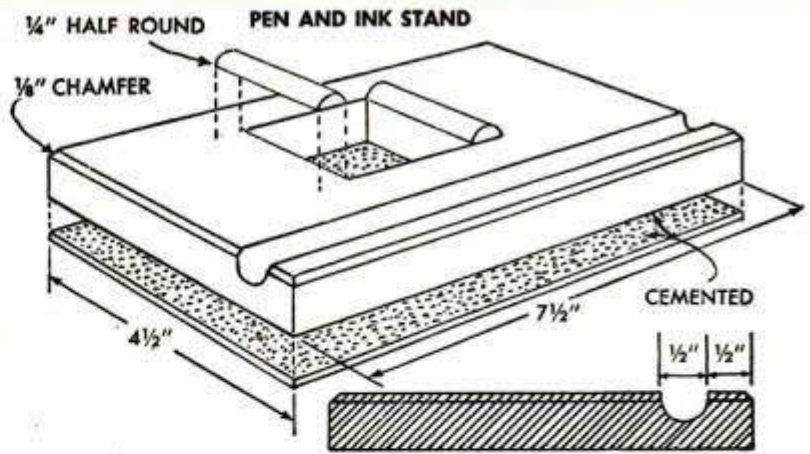
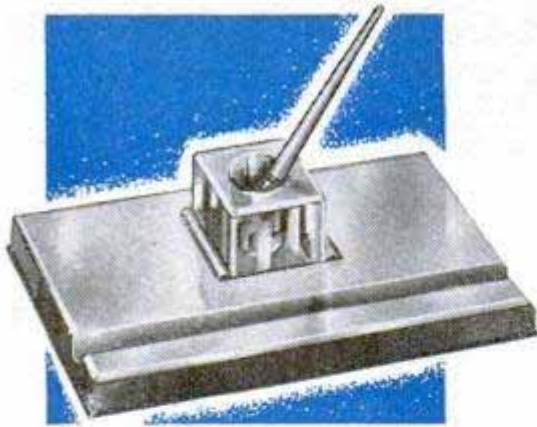
★ Attractive fixtures for circular fluorescent lamps are very simple to build and install without any changes in the house wiring. An article on page 198 gives complete instructions.



FIRING HINTS



CIRCULAR FLUORESCENT LAMPS



# DESK SET from PLASTIC

Plastics in harmonious color combinations can be used for each unit of this set. Letter initials in color provide handles

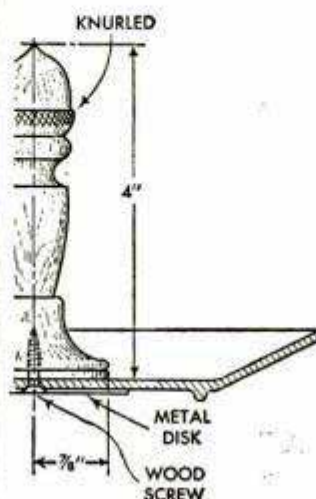
*By S. S. Palestrant*



HERE ARE four unusual projects which are very useful and attractive either when used individually or combined to make a distinctive, initialed desk set. All pieces are made from plastic, the sheet, rod and tubular forms being required if all projects are made. Although the colored plastic used can be any of those available that suit your fancy, combinations of red and green, and blue and yellow are especially attractive. Details give the general design and approximate sizes of the parts. Base pieces of the inkstand and the blotter are made from  $\frac{1}{2}$ -in. and  $\frac{3}{8}$ -in.-thick plastic respectively. The letter "S" shown is typical of the style of letter used for the initial which personalizes the roller blotter and letter opener. Angle slots cut in the base of the blotter take the ends of a piece of flat spring brass which forms a backing for the blotting paper as indicated in the

sectional view. The brass backing should be buffed to a high polish and lacquered to prevent tarnishing. Circular grooves, such as those in the inkstand and card tray, are rough-cut with a fine round file and finished smooth with 8-0 sandpaper. Then they are polished by charging a cloth buffing wheel with rouge. Cement green felt to the bottom of the inkstand to prevent scratching the furniture. Letters are cut to the rough form with a jigsaw or coping saw and are finished with a fine file. A nail file is just right for this job. The sawed edges are chamfered and polished, care being taken first to remove all saw and file marks. The letter, which forms a handle, is attached to the back of the blotter with screws rather than cement. If the letter opener is made from plastic of two colors, the initial must be cemented to the blade. Otherwise, both are formed from one piece.

## China Plate Fitted With Wooden Handle Forms Novel Tidbit Server



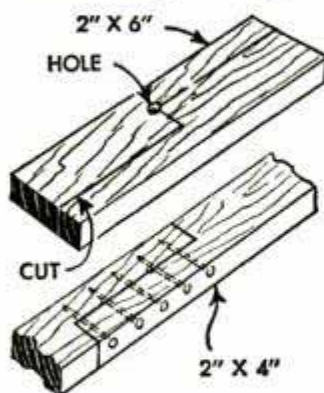
A decorative china plate fitted with a hardwood handle makes an attractive tidbit server. The handle is attached to the plate with a wood screw, the head of which is countersunk in a sheet-metal disk. A hole for the screw can be drilled through the plate with a small brass rod chucked in a drill press or hand drill. A putty dam, built around the hole area, retains an abrasive mixture of silicon carbide and water.

## Preventing Drain-tile Obstruction Due to Tree-Root Growth



Tree roots were obstructing the drain-tile leading from my house as the tile was installed without copper root-stop rings. However, I found a way to correct this difficulty without the expense of digging up the tile, merely by running a length of No. 18 copper wire from the floor drain to the spot where the root obstructions were encountered and allowing it to remain in the tile. The wire, being fairly stiff, was easy to push into the tile and its end was looped through the floor-drain cover. The slow corrosion of this wire produces the copper salts necessary to prevent root growth but does not harm the tree in any way.—John A. Lerch, Cleveland, Ohio.

## Increasing Length of Boards



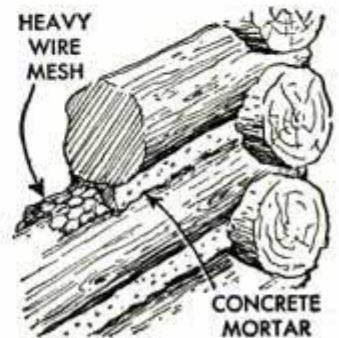
Recently, while making a minor repair, the only board I had for the purpose was a 2 by 6, which was too short. Not wishing to purchase a piece, and as the width of it did not matter, I hit upon the idea of making the 2 by 6 do by ripping it as shown and splicing the 2 pieces together to increase its length. To do this, first divide the length of the board in half and draw a line. Next, divide the board crosswise into 3 equal parts and draw a line lengthwise from the center mark to

one end of the board, locating it a distance from the edge equal to  $\frac{1}{3}$  the width of the board. Do the same on the other side of the center mark and along the opposite edge of the board so that it will be marked as shown in the upper detail. To cut the board into 2 pieces, rip it from each end and stop at the center mark. Then bore a hole as indicated to take the point of a key-hole saw and cut along the center mark. Finally, the 2 pieces are spliced and spiked together which will make a board approximating the size of a standard 2 by 4.

Herbert E. Fey, New Braunfels, Tex.

## Wire Mesh Anchors Chinking

Concrete mortar used as a seal or chinking between the logs in a cabin wall will give better and longer service if the chinking is anchored with heavy wire mesh instead of the usual wooden blocks. The mesh is cut into strips and bent so that the top of the strip touches the upper log. The edges of the strip are nailed to the lower log and the concrete mortar is troweled in place. To assure a good bond, press the mortar firmly between the logs.



Charles F. Dillingham, Nashville, Tenn.

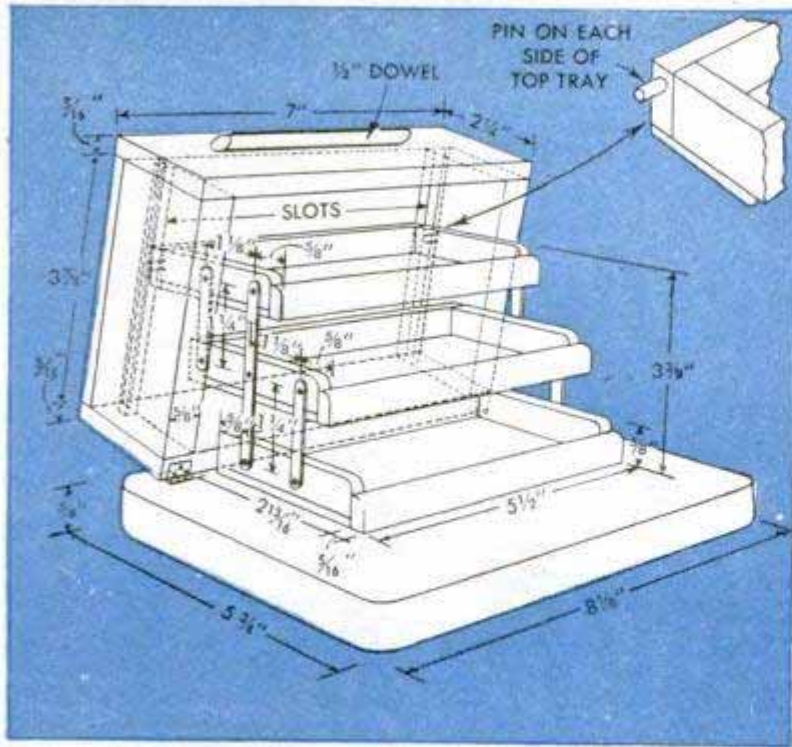
## Notched Block Holds Door Rigid For Installing Lock

The job of installing a new lock in a door already hung is much easier if both hands are left free to work. This can be accomplished by notching a block of wood to fit over the edge of the door. Then, by placing the block on the floor and slipping the notch over the door edge, the door can be held securely in any position by resting one foot on the block. By covering the underside of the block with a piece of inner tube or rubber matting, less foot pressure will be required to keep the board from sliding.



Victor H. Lamoy, Upper Jay, N. Y.

# Intriguing Cigarette Box Has Cantilever Trays



As this unusual cigarette box is opened, the 2 top trays rise and move backward in stair-step fashion, leaving all three trays exposed for easy access to the cigarettes. Made of fine wood in its natural finish or of more common wood\* appropriately painted, the box blends attractively with the living-room furnishings. The trays are linked together with metal strips pivoted loosely with screws, and the bottom tray is glued to the base. The back of the lid is mortise-hinged and 2 small pins at the rear corners of the top tray ride in slots cut in

the inside of the lid endpieces. The pins can be made by driving screws into the tray and cutting or grinding off their heads. A length of 1/2-in. dowel with its ends angle-cut provides an ornamental handle for the lid front. When assembling the box, do not attach the frontpiece until the trays and lid have been aligned and the bottom tray glued in place. For the best results, check all the parts for proper fit before final assembly and finish or paint them individually. Glue felt to the bottom.

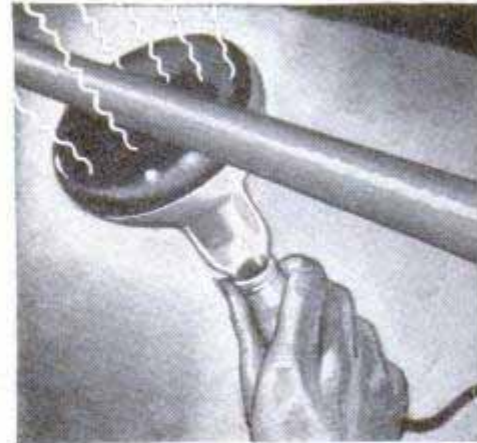
R. W. Madden, Palatine, Ill.

## Door Latch Closed by Bamboo Spring Is Operated From Both Sides

Here's a spring-actuated door latch that can be operated from both sides of a door or gate. Its handle, consisting of a piece of dowel, extends through the latch bar and through a slot in the door. The slot also serves as a stop for the latch. Both bar and brackets are made from hardwood and a strip of bamboo provides a spring which actuates the latch bar. The spring is formed in a U-shape so that, under tension, one end engages a hole drilled in the underside of the latch bar, while the other end is fastened to the inner bracket through which the bar slides. The striker plate, which receives the beveled end of the bar, is a duplicate of the 2 brackets.



☐ A small amount of liquid wax rubbed on refrigerator shelves will retard rusting. However, make sure that the surface is thoroughly dry before applying wax.



**REMOVING ICE** from a wire clothesline, above center, is done in a jiffy when the comb from a safety razor is fastened to the clothes pole and used as a scraper. Comb engages wire as pole is pulled

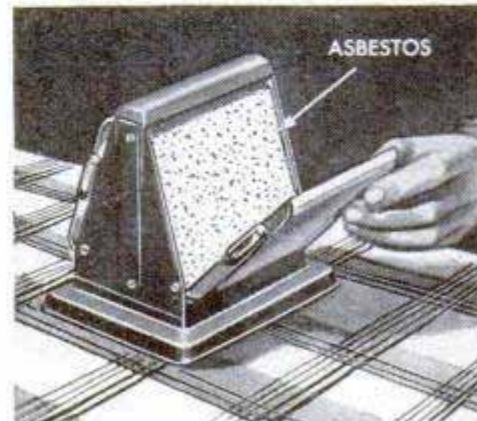
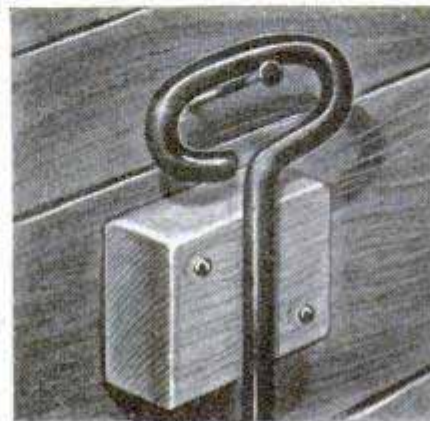
**THAWING WATER PIPES**, above, where it is not advisable to use a blowtorch can be done safely with the heat from an infrared bulb. Be careful in using it that the hand does not touch the unguarded bulb

**IN-A-DOOR BOOKCASE**, left, built in the recess of a shallow clothes closet found in some older homes, modernizes opening and puts it to practical use. Shelves rest on flat side of screw eyes turned into jambs

**WATERPROOFING TREATMENT** for boots and shoes consists of applying hot ski wax to the leather and rubbing it briskly with a stiff brush. Rub with a cloth after wax hardens

**HOT POKER** hung up after firing will not scorch wall if a wooden block is placed a little below the nail on which it hangs to hold the hot end of poker away from wall

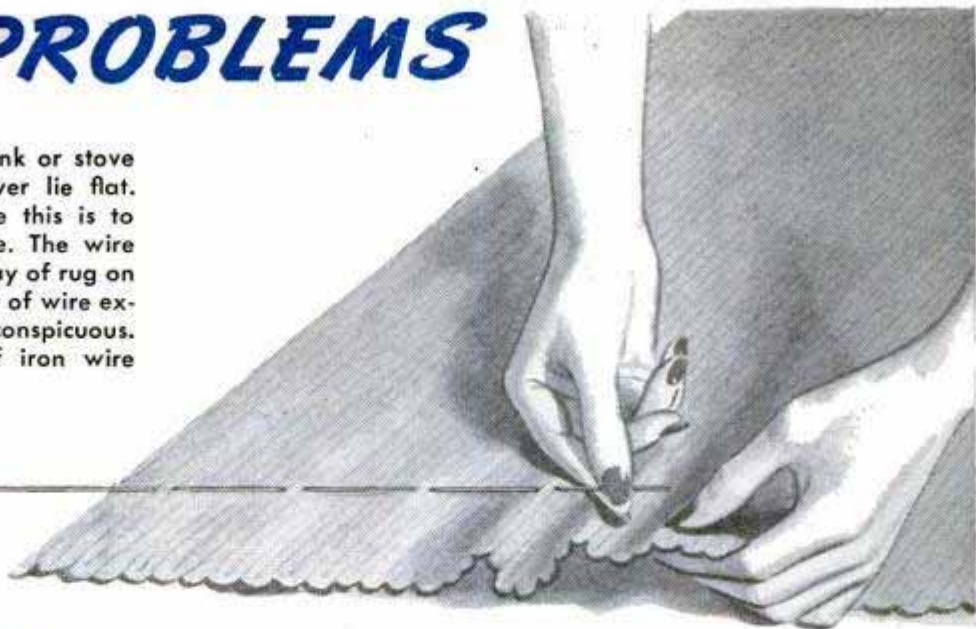
**TOASTING ONE SLICE** at a time in a door-type toaster is done faster if the element on one side is covered with asbestos to direct the heat to the opposite side





# HOME PROBLEMS

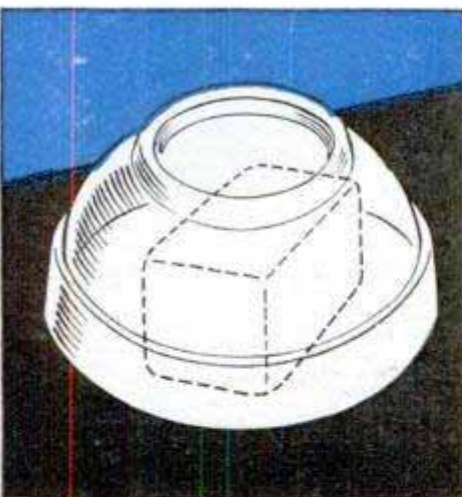
**RAG RUGS** in front of a sink or stove usually bunch up and never lie flat. A simple way to overcome this is to stiffen the edges with wire. The wire is threaded through long way of rug on back side. The small amount of wire exposed on the top side is inconspicuous. Use a soft but fairly stiff iron wire



**FLOWER FROG** for narrow-neck vase, right, is improvised from the top of a scouring-powder can. Leave about  $\frac{1}{4}$  in. of the cardboard container attached to the metal top to center and hold the frog in neck of vase



**STERILIZING CORK** of a vacuum bottle, left, requires that it be submerged. A good way to do this is to impale the cork on end of ice pick. Besides keeping the cork submerged, a handle is had to retrieve the cork

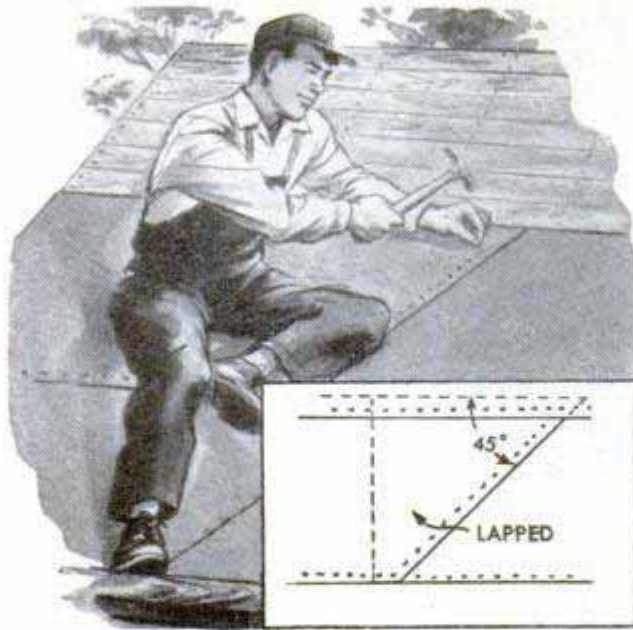


**SOFTENING BUTTER** taken from the refrigerator, above, can be done quickly and without waste due to melting if a bowl is heated and then placed over the butter for a short time

**EGG CARTON** in drawer of child's chest, right, provides individual storage compartments for socks. In addition to keeping them together in an orderly manner, idea promotes tidiness

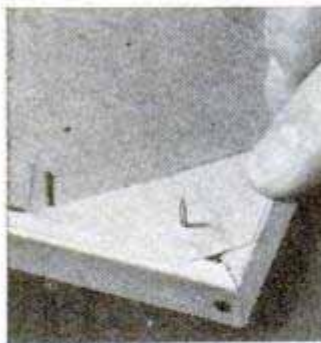


## Installing Roll-Type Roofing To Prevent Leakage



A roof that leaked considerably during a driving rain prompted one man to devise a way of fastening roll-type roofing which he found to be completely waterproof. When lapping the joints, he cut the end of the roll at a 45-deg. angle and fastened the roofing in the regular manner, lapping the lower edge of the strip about 8 in. In this way, the water flows freely over the joints and there is no chance of its seeping between them. The angle joint also can be used when applying a patch or when finishing a job with small pieces of roofing.

## Thumbtacks Keep Picture Level



Wall. If this is done carefully, the tacks will not leave noticeable marks on the wall surface.—R. E. Donovan, Jersey City, N. J.

Taping a thumbtack to each of the bottom corners of a picture frame will keep it from tilting due to vibration. After the frame has been properly positioned, the thumbtacks are pressed lightly into the

## Marking Hockey-Rink Boundaries

It's a difficult problem to mark the boundaries of an ice-hockey rink with lines that last as long as the ice. One solution is to mix equal proportions of table salt and methyl-blue powder in a tin can. Then bend the can to form a spout and sprinkle the mixture on the ice. The salt

will melt the ice temporarily, freezing the color in. If another and contrasting boundary line is desired, use red-ocher powder. Powdered household dyes also are suitable for this purpose.

Edwin Leet, Bethlehem, Pa.

## Preserving Shape of Paintbrush

When paintbrushes are stored, some means should be provided so that they will hold their shape. One inexpensive method of doing this is to store each brush in a cardboard milk carton. To do this, just punch a hole through the bottom of the carton for the handle, insert the brush so the handle projects and then fold the open end of the carton over the bristles, creasing it at the end of the bristles. The folded carton will keep the brush shaped correctly and maintain its chisel edge.

N. P. Smith, New York City.



## Cleaning Checkered Pistol Grips

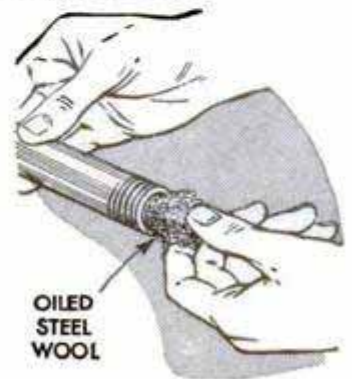
Checkered grips on pistols and rifles often become stained from perspiration and lose their original luster. However, it is easy to keep them clean and shiny by lightly scrubbing them occasionally with a few drops of carbon tetrachloride sprinkled on a suede shoe brush. This type of brush has fine brass bristles which will get into the crevices of the grip without scratching the surface.

D. J. Bachner, Jackson Heights, N. Y.

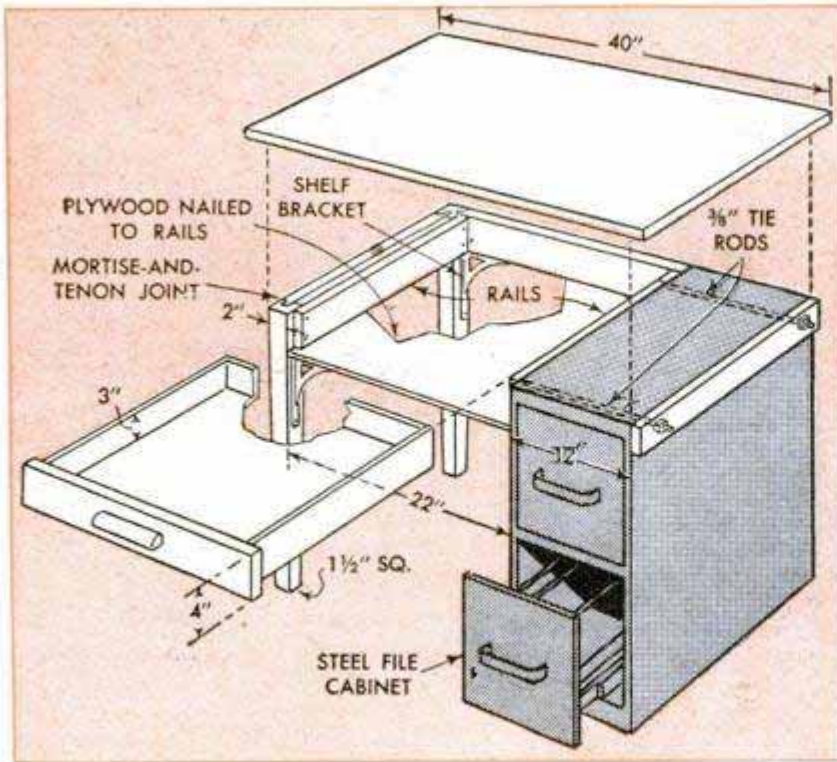


## Steel Wool Plugs Pipe Ends

Before storing lengths of pipe, it's a good idea to plug the open ends to keep out dirt, insects and rodents. Fine steel wool, dipped in oil and then pressed tightly in the pipe, will exclude all foreign matter.



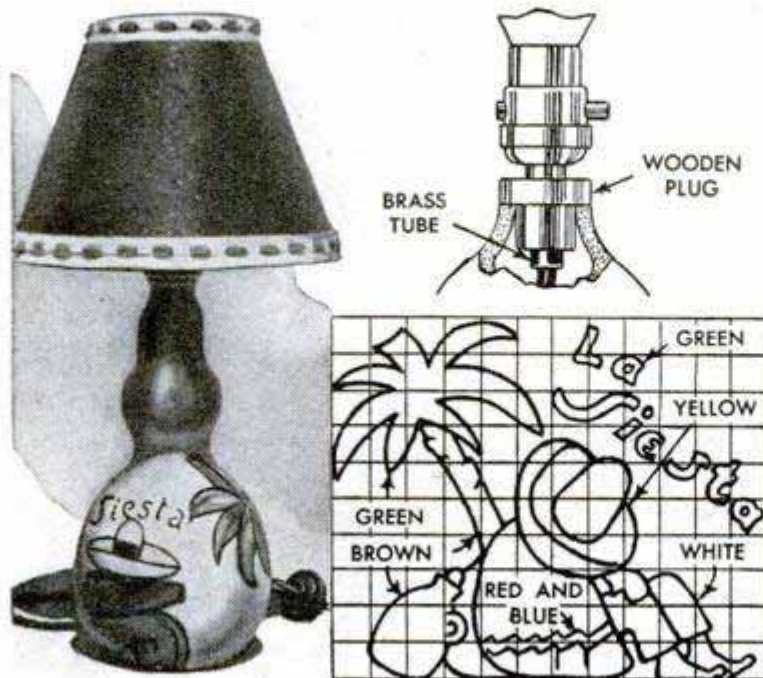
# File Cabinet Forms Pedestal Base for a Desk



An old two-drawer file cabinet of either wood or metal serves as the pedestal for this student desk. With the file cabinet at hand, the job is more than half done as the most involved part of the cabinet work is ready-made. The rest is simple. Drill holes through both sides of the file cabinet near the top. These are for tie rods to hold wooden rails to which the balance of the parts can be securely attached with screws and nails. The two legs are tapered from 2 in. to 1½ in. square at the lower ends and are joined to rails at the side and back with mortise-and-tenon joints. Attach the inner end of the back rail and the plywood bot-

tom of the drawer compartment to the wooden strip on the file cabinet. Use ordinary metal shelf brackets to brace the legs. Cut the top from ¾-in. walnut plywood and note that only the length of the top is given. The width is determined by depth of the file cabinet. The center drawer can be made in the conventional way with the bottom fitted into grooves cut in the sides and front, or the drawer can be assembled with simple nailed butt joints. The plywood bottom may be nailed to the bottom edges of the sides and back. Stain or paint the wooden parts to match the cabinet.

E. A. Rerucha, Franklin Park, Ill.



## Colorful Table Lamp From Bottle Gourd

A colorful Mexican scene painted on a dried bottle gourd provides an unusual and attractive base for a small table lamp. To make the lamp, cut off the top of the gourd and turn a wooden plug as shown to fit in the neck of the gourd. The shoulder should be flush with the outside. Then drill the plug to take a piece of brass tubing and wire a lamp socket, running the cord through the tubing and a hole drilled near the bottom of the gourd. Weight the gourd with gravel or sand and secure the plug to the neck with adhesive tape. A brightly colored shade completes the lamp.

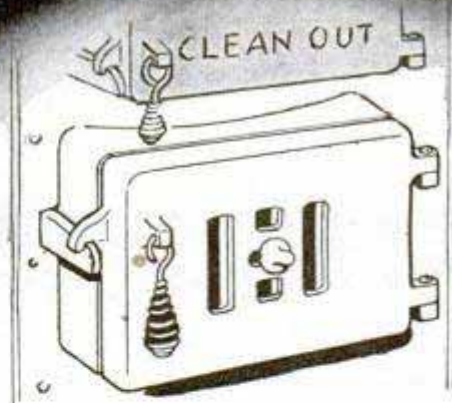


**DON'T BANK THE FIRE BED** with ashes. This only tends to produce clinkers which cause inefficient burning and waste of coal. It is better to keep a deep fuel bed and to regulate the fire with the controls

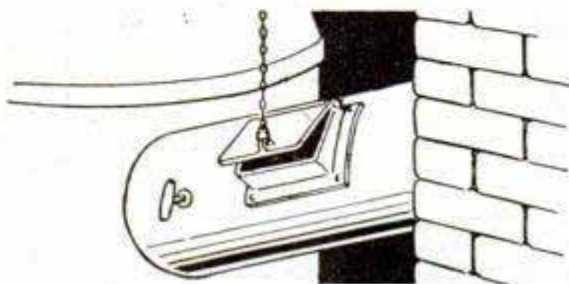
**DON'T LET ASHES ACCUMULATE** in the ashpit. Make it a practice to remove them each morning after shaking down the fire. A clean ashpit assures proper combustion and prolongs the life of the furnace grates



Certain information courtesy  
Chicago Coal Merchants Association

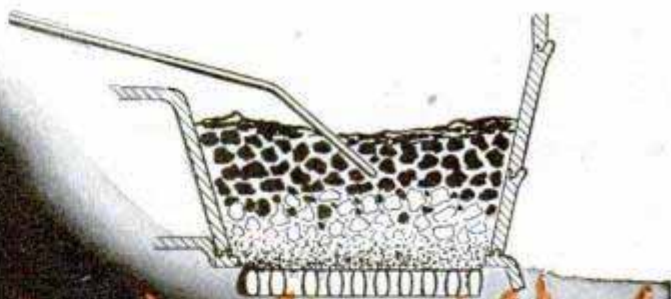


**DON'T NEGLECT TO CLOSE FIRE DOOR** after firing. Leaving it open cools fire and wastes fuel. Keep the slide open in the fire door. Air through opening aids combustion in most heating plants



**DON'T FORGET THE CHECK DAMPER** if the furnace is not equipped with a thermostat. Open it when you want less heat, close it when you want more

**DON'T RAM THE POKER INTO THE GRATES.** Ashes mixed with fire cause clinkers. Bend poker as indicated and use sparingly to break up top crust



**COAL**, when properly fired, provides greater heat value per dollar than any other fuel. But it is estimated that 10 percent of the coal used to heat the average home is wasted through improper hand-firing and

# 10 FIRING HINTS THAT

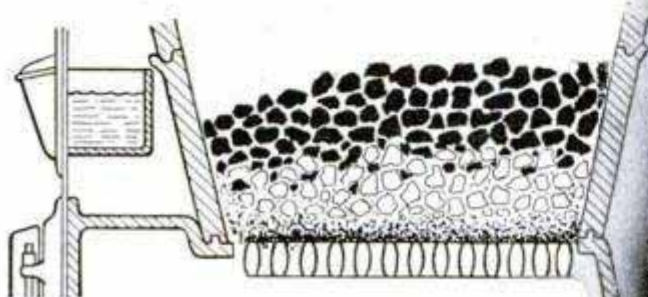


**DON'T REGULATE FIRE BY ASHPIT DOOR** itself; use the draft damper in front. Operate this and check damper simultaneously. When you want more heat, open draft damper and close the check



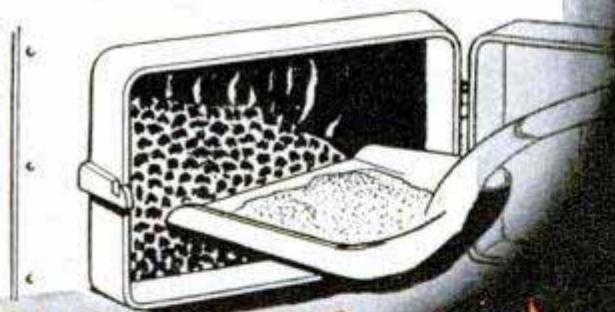
**DON'T LET HEAT ESCAPE** up the chimney. Use the turn damper to control chimney draft by keeping damper as nearly closed as possible without smoke emerging from the fire door. This operation is important

**DON'T SHAKE GRATES** AT NIGHT unless deep ash bed takes room needed for fresh coal. Shake gently and stop when red glow appears in ashpit. Shaking every other day should be often enough in mild weather



**DON'T SHAKE LIVE COALS** INTO ASHPIT. Keeping grates covered with thin ash layer in the cold weather helps hold fire, keeps it burning evenly

**DON'T LET SOOT ACCUMULATE.** Make it a habit to throw rock salt on a hot fire periodically to keep the furnace and the smoke pipe free of soot

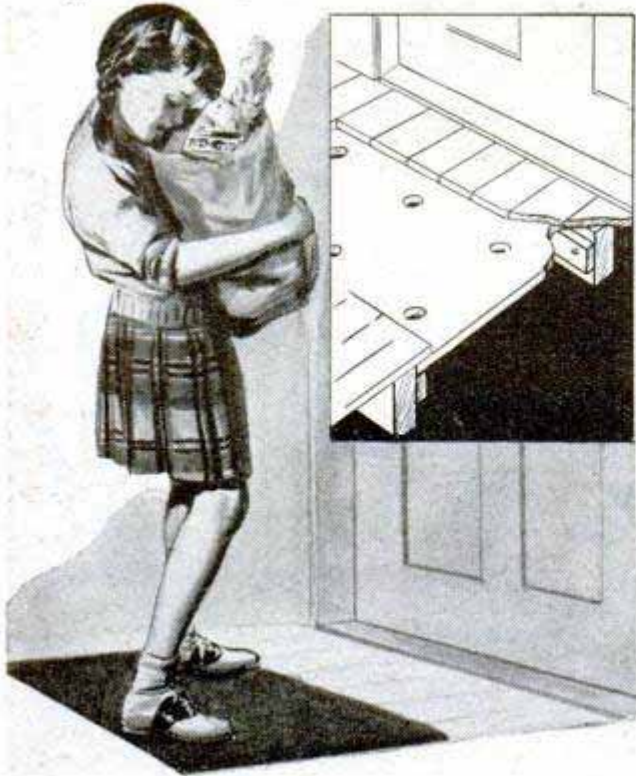


furnace regulation. While there are many factors to consider in arriving at the correct method in each case, these 10 hints on how *not* to fire will reduce waste, minimize smoke and lessen furnace attention.

By Wayne C. Leckey

**HELP YOU SAVE COAL**

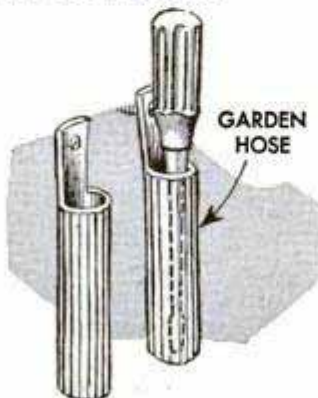
## Recess Cut in Porch Floor Keeps Door Mat in Place



Recessed nearly flush with the floor of a sheltered porch, a fiber door mat takes on real value. It can't be tripped over and stays in place right in front of the door where guests and youngsters will find it ready to use. It is merely lifted out of the recess for cleaning and does not interfere with washing the porch. The cutaway detail shows how the recess is made. Exact location of it is dependent to some extent on the position of the floor joists. If they run parallel with the door, forming the recess is a matter of simply sawing an opening between them slightly larger than the mat and then nailing cleats to the face of the joists to support a board which forms a bottom for the recess. If the direction of the joists is at right angles to the door, it will be necessary to notch out a portion of one joist the required depth. Note that drain holes are made in the bottom of the recess to facilitate washing.

## Hose Sections Form Tool Rack

In order to keep his small tools neatly and conveniently at hand, one home-workshop enthusiast used sections of garden hose to hold tools such as screwdrivers, chisels, etc. The hose sections

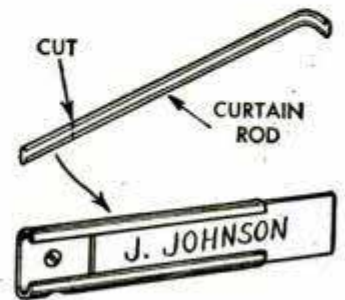


should be cut long enough to cover the lower ends of the tools completely and should have ears formed at the upper ends to take screws with which they are attached to a wall or other mounting. The idea of using garden-hose sections for this purpose is especially convenient for the man who does not want to build a cabinet or who does not have sufficient tools to warrant installing regular racks.

Roger Woodbury, Atkinson, N. H.

## Name-Plate or Card Holders Cut From Curtain Rod

Name-plate holders of a practical size are provided by sections cut from flat, telescoping curtain rods. Sections of curtain rod also will serve as index-card holders for filing cabinets



or for various other uses in the shop or office. The holders may be soldered to metal surfaces if desired.

## Removing Headless Nails



Nails from which the heads have been broken are difficult to remove, especially if they have been driven into hardwood. However, they can be withdrawn with little

difficulty if the end of the nail is gripped with a pair of pliers and a claw hammer is used to lift both pliers and nail, as shown.

Henry Hanscom, Elmhurst, Ill.

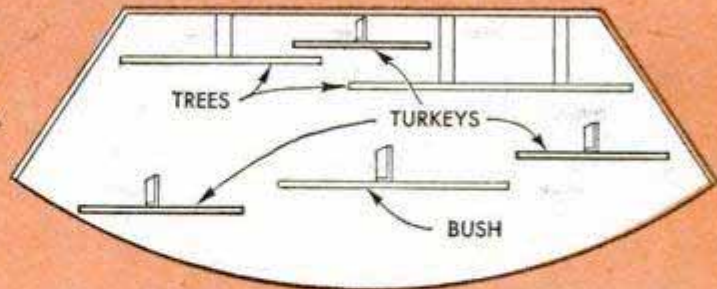
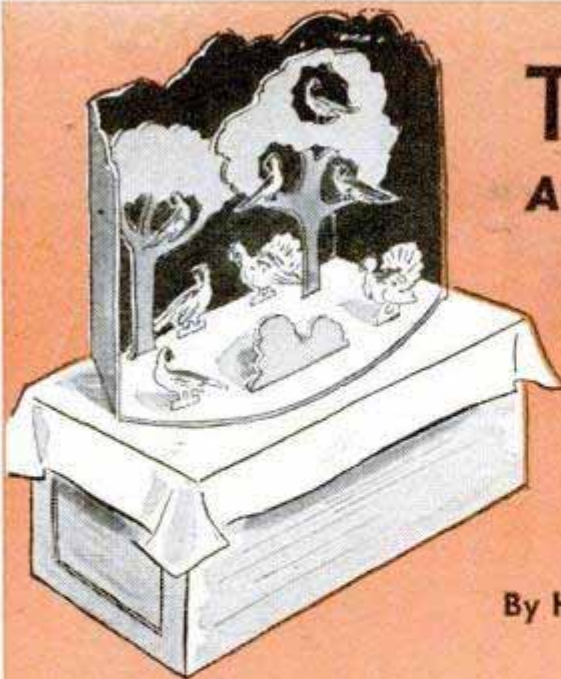
## Lubricating Slide Fasteners

When slide fasteners on overshoes or garments begin to bind and become difficult to operate, lubricate them with graphite. A small amount of graphite applied to the zipper will eliminate the binding. Rubbing it with a soft-lead pencil will do. — Richard Hanscom, Elmhurst, Ill.



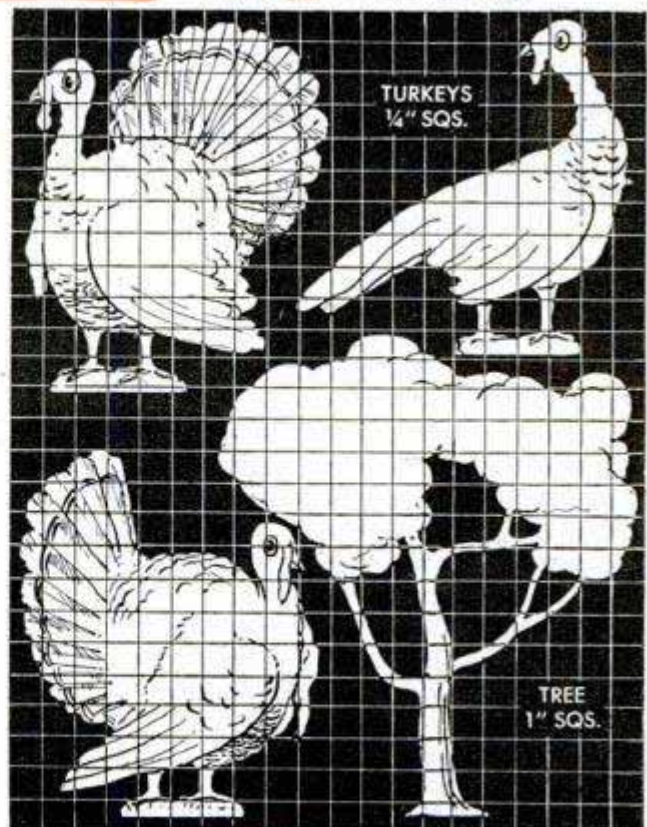
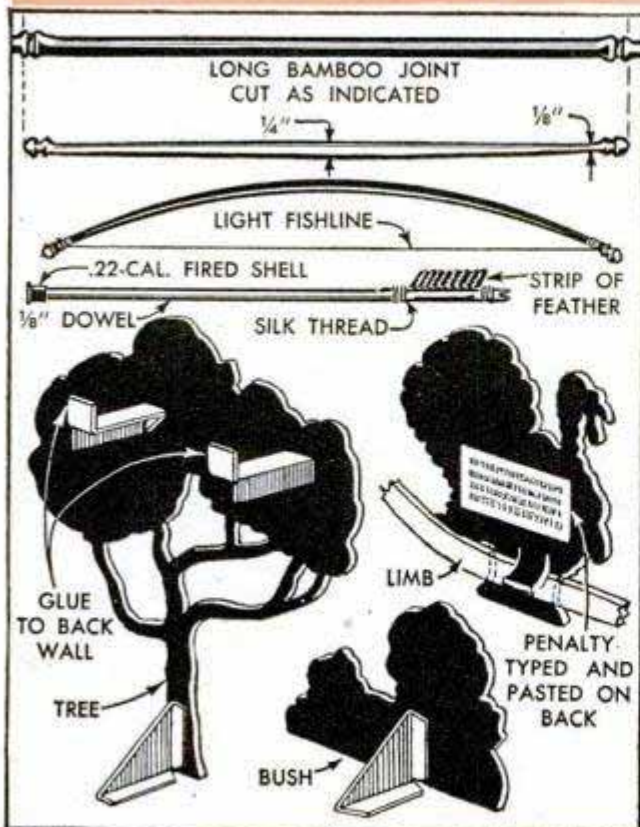
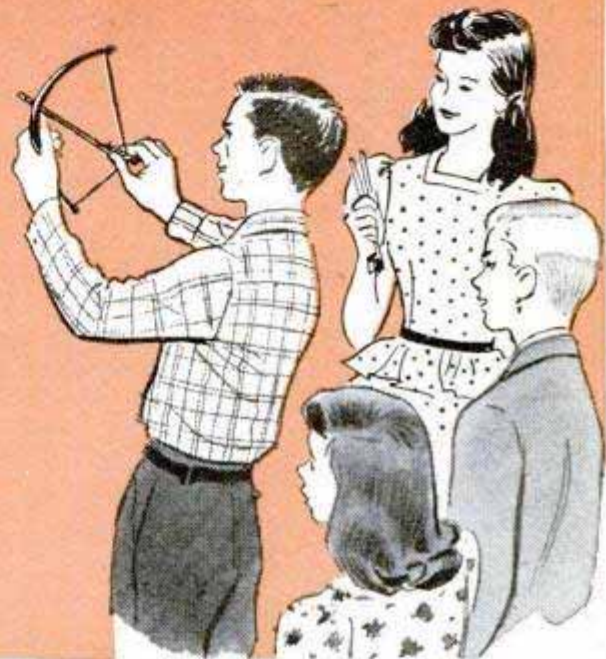
# TURKEY HUNT

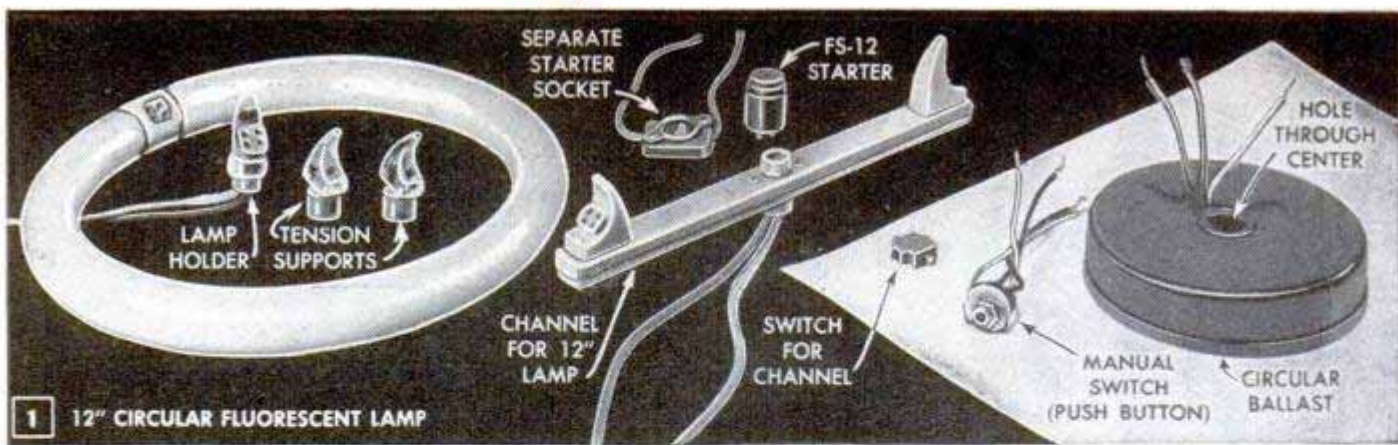
## AN EXCITING DART GAME



By Hi Sibley

Bag a turkey if you will, but the consequence written on its back may have you scouring the town for a red horsehair or walking upstairs on your hands. The game can be a riot at a party, depending on the originality of the penalties. One turkey wins a prize, but the players don't know which one. The backstop is made of stiff cardboard and painted to represent sky and landscape. The trees and turkeys also can be made of cardboard, but they will be more durable if jigsawed from thin plywood. Standards are fitted to the various targets, while tabs permit some of the birds to roost in the trees. A bow is shaped from a piece of bamboo fish pole and strung with a length of fishline. Darts are made of  $\frac{1}{8}$ -in. dowel, tipped with a cartridge shell. Feathers are lashed to the opposite end with silk thread and cement

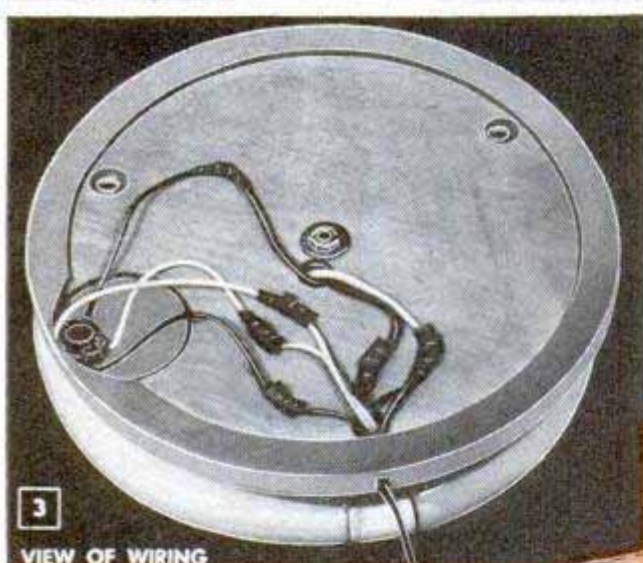




1 12" CIRCULAR FLUORESCENT LAMP



2 FITTING THE BACK



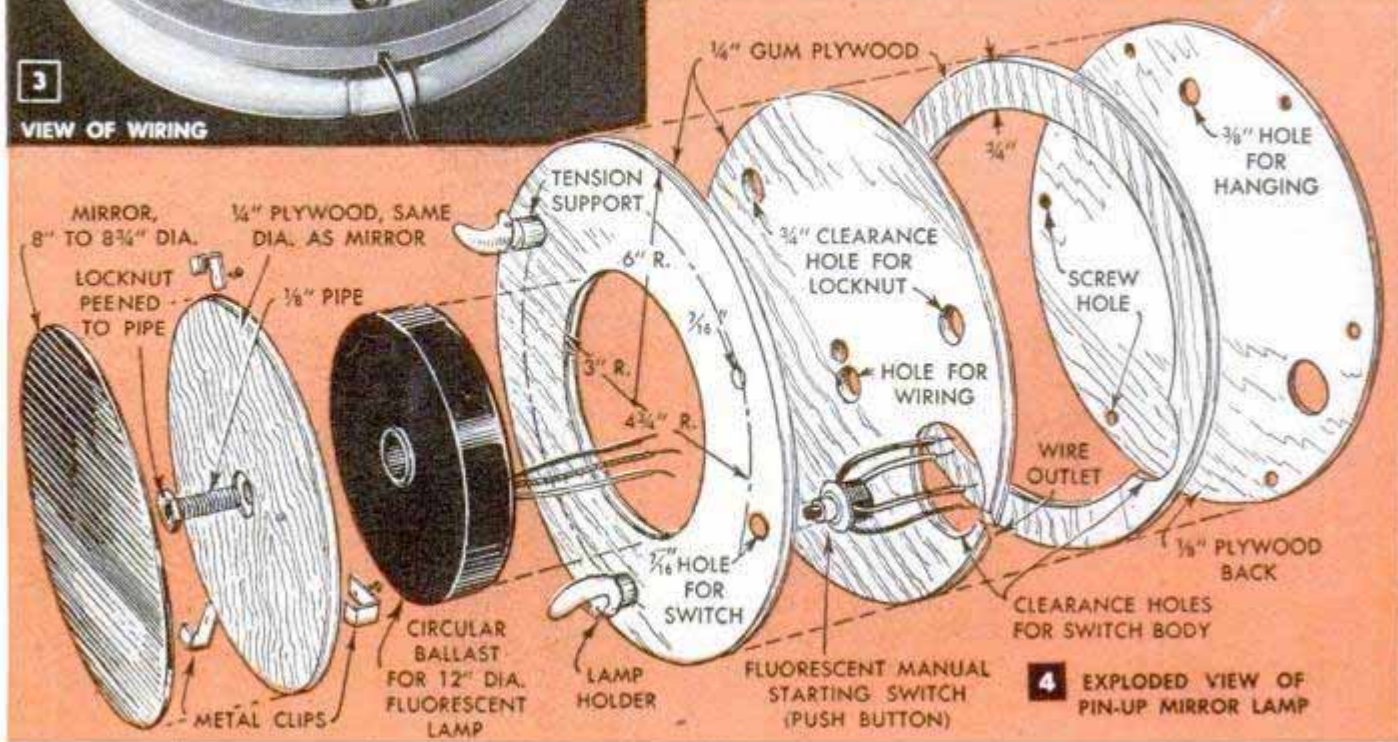
3 VIEW OF WIRING

# RINGS OF

By Sam Brown

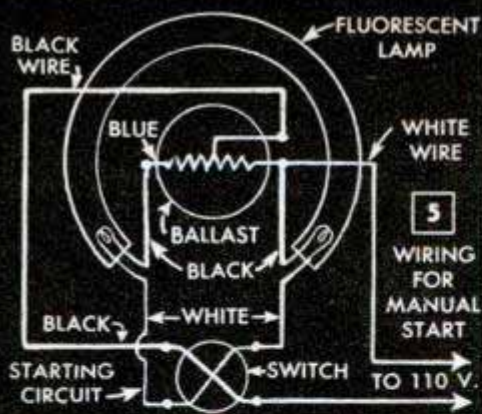
CIRCULAR fluorescent lamps offer new possibilities for making special fixtures in more compact and attractive designs than was possible with the long, tubular lamps. Although a complete range of sizes of the new circular lamps is not yet available, simple ceiling and wall fixtures for the small and medium-size lamps can be made by any craftsman.

Circular lamps can be used for large, illuminated magnifiers or opaque projectors, and are excellent, too, for house-number lights, merchandise-display fixtures and illumination for certain power tools. The square ballast can be housed in most ceiling fixtures and is considerably cheaper than the circular type. The mirror style of fixture is excellent for close work like



4 EXPLODED VIEW OF PIN-UP MIRROR LAMP





# LIGHT

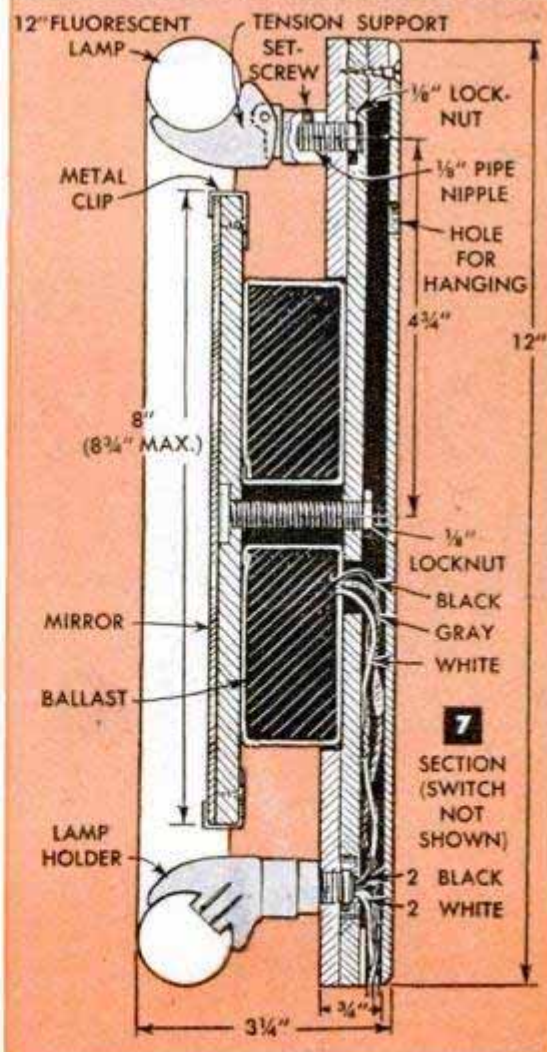
applying make-up. However, it should not be employed as a general long-view mirror unless a special reflector is used, because illumination blacks out the mirror except at close range. Lamps of three sizes nest one within the other, offering scope for added illumination. Single ballasts are available to work these combinations. Lamps also can be arranged in a double deck. Although only three simple fixtures are shown here, anyone can adapt these or design others to fit individual needs, even to using the circular lamps in floor and table units. Study the details carefully and notice how the various parts fit together to form a neat, compact unit.

**Parts:** Other than lamps, the special parts needed are shown in Fig. 1. The supporting or mounting members for the lamp consist of a fixed lamp holder with four wire leads, and two spring-actuated tension supports. A second type of mounting is the channel, which has one fixed lamp holder and one tension support. A special starter, FS-12, is needed for all fixtures using automatic starting. All units require a special size of ballast, which can be obtained in either the rectangular or circular type. Other parts, such as manual switches and starter sockets, are standard fluorescent-lamp equipment.

**Pin-Up Mirror Lamp:** Construction of this unit, which is pictured in Fig. 6, is shown in Fig. 4. The unit uses a 12-in. circular lamp. The body or base consists of three rings of  $\frac{1}{4}$ -in. plywood, which are glued together after the various openings required have been cut or drilled. Fig. 7 shows how the lamp looks in section, the circular ballast projecting forward and serving as a base for the plywood-backed mirror: Note that the mirror is attached to the plywood backing by means of small metal clips, Fig. 4. These are exposed in the finished fixture so care should be taken to space them equally. The backing piece is counterbored to take a standard  $\frac{1}{8}$ -in. locknut which is peened to a  $\frac{1}{8}$ -in. pipe nipple. This nipple passes through the plywood backing plate, the circular ballast unit and also the third spacing disk, Fig. 7. In assembling, a locknut turned

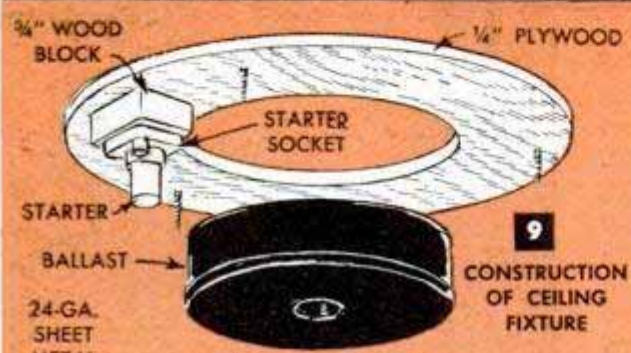


6 12" LAMP EXCELLENT FOR MAKE-UP MIRROR

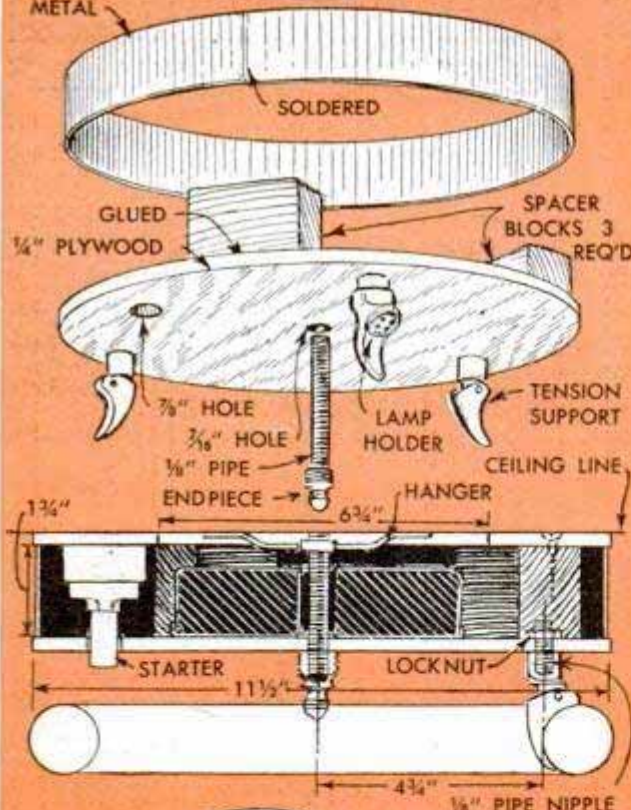




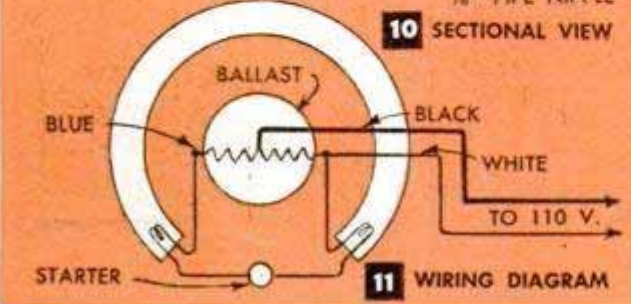
8 SIMPLE CEILING FIXTURE IS EASY TO MAKE



9 CONSTRUCTION OF CEILING FIXTURE



10 SECTIONAL VIEW



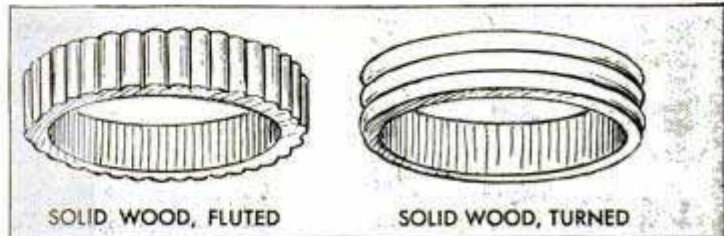
11 WIRING DIAGRAM

onto the projecting end of the nipple draws the parts tightly together ready for gluing and screwing to the mounting disk and spacer. Finish the edges of the plywood smooth to provide a good base for enamel. The lamp holder and tension supports are spaced equally around a circle having a radius of  $4\frac{3}{4}$  in., mounting being made by means of a pipe nipple and locknut. Fig. 2 shows how the back is fitted. The whole unit is easy to make despite its complex appearance in the drawings. The finish should be white or a pastel shade of enamel. Lamp temperature is about 110 deg. so there is no danger of heat discoloring the finish or causing the

wooden parts to catch fire.

**Wiring:** The wiring diagram for the pin-up lamp is shown in Fig. 5. The view of the wiring shown in Fig. 3 looks involved, but it really is simple as the various units have colored lead wires. If the small,  $8\frac{1}{4}$ -in. circular lamp is used, its low-voltage rating permits it to be used with a simple, series type of ballast. This has two leads, and wiring is just a matter of cutting the ballast into one wire of the power line. Medium and large circular lamps require an auto-transformer type of ballast which has three lead wires.

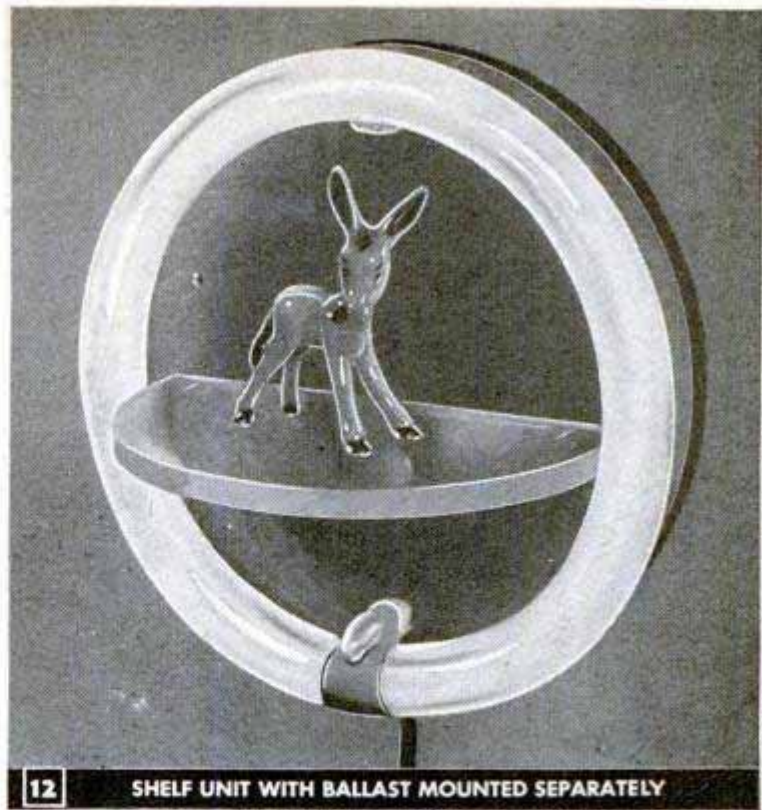
**Ceiling Fixture:** A basic type of ceiling fixture consists of a circular mounting frame or body with a 12-in. circular lamp supported by a three-point mounting. Fig. 8 shows a typical unit, excellent for kitchen or game room. This unit employs the automatic starter, and is constructed as indicated in Figs. 9, 10 and 11. Instead of using a sheet-metal rim to enclose the unit, as specified in Fig. 9, the rim of the fixture can be made a solid-wood turning as suggested by the two left-hand details of Fig. 15. Ornamentation of the rim can be done by fluting, turning or carving. If fluting or turning is used, a hardwood that will harmonize with other wood finishes in the room is best but, if the rim is to be carved, it should be made of softwood to simplify the carving job. If desired, you could use aluminum or stainless steel and corrugate or otherwise ornament it. However, the simple base unit shown, with a gleaming



white finish, is nice enough for almost any location. This fixture can be flush-mounted, as shown in Fig. 10, or it can be dropped down from the ceiling by using a standard ceiling outlet box as a spacer.

**Shelf Fixture:** This fixture, shown in Figs. 12, 13 and 14, illustrates a neat idea in a whatnot shelf, and also serves to show the wiring for the medium and large circular lamps when the ballast is mounted some distance from the fixture. As indicated in Fig. 14, three wires run from the fixture to the ballast. With average lamp cord, the ballast can be installed a distance up to 50 ft. from the fixture without any danger. Advantages of this mounting are a more compact fixture, freedom to use the less expensive square or rectangular ballast instead of the circular form, and no ballast hum. With a good ballast, hum is reduced to the minimum. Note in this unit that only two lamp supports are used, this mounting being practical in all cases except where the lamp hangs straight down from the supports. Also note how the over-all extension from the wall is decreased a little by recessing the supports into the base. The plastic shelf is in the form of a full, half circle, cut either from clear plastic or from colored plastic in blue or yellow. The curved edge is highly polished. The shelf is edge-screwed to the wooden backing disk. Take care in drilling and tapping the plastic for the screws, making the diameter of the holes very slightly smaller than the screws. If the screws fit too tightly, they may crack the plastic when driven into it. If they are too small, any weight on the shelf may strip the threads. Do not pull the screws up too tightly as this also may strip them.

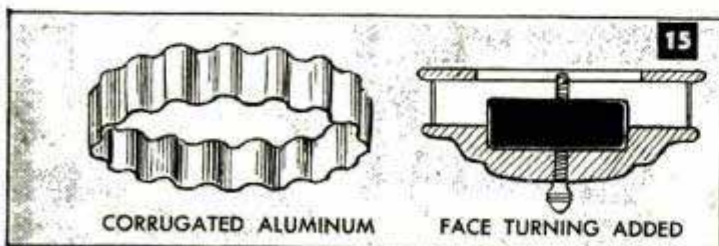
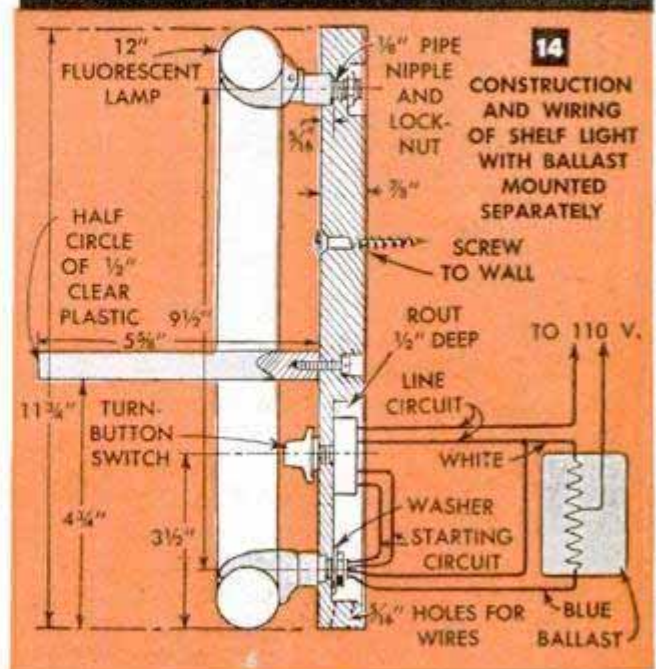
**Channel Mounting:** The channel mounting shown in Fig. 1 is not illustrated with a specific fixture application. This mounting has central connections on both sides for  $\frac{1}{8}$ -in. pipe. In combination with the small  $8\frac{1}{4}$ -in. lamp, fixture-making with the channel mounting is almost as simple as making one for a filament-bulb lamp. The ballast is cut into the power line, or a plug-in type of ballast is used.



12 SHELF UNIT WITH BALLAST MOUNTED SEPARATELY



13 BACK OF  $\frac{3}{8}$ " THICK BASE IS ROUTED FOR WIRING



## Built-in Support for Heavy Pictures Installed During Construction



There'll be no need to search for studs from which to hang heavy pictures or mirrors if wooden supports are built into the walls before plastering. If your home is in the planning stage or under construction, decide now where you intend to hang these items. Pieces of 2 by 6 or 2 by 10, nailed to cleats between the studs at the desired points, will provide sturdy mounting bases and also allow sufficient leeway to position the picture or mirror properly. To eliminate guesswork, it's a good idea to make a record of the location of each support before the walls are lathed and plastered.

Neal W. Houlahan, Glenshaw, Pa.

## Emergency Hose Clamp



RADIATOR HOSE

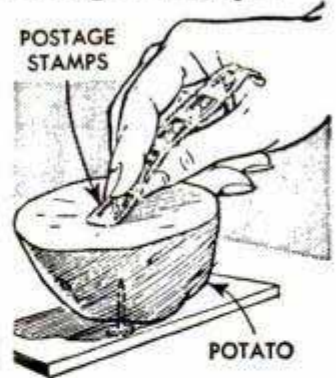
All that is needed to get home or to a garage when a hose clamp breaks on your car is a short piece of wire and a small bolt. Just loop the wire around the bolt head, wrap it around the hose once and twist the loose ends together.

After starting the nut on the bolt, bring the twisted end of the wire over the nut and tighten the nut with a wrench or pliers.

This draws the ends of the wire together and fastens the hose until a new hose clamp is obtained.

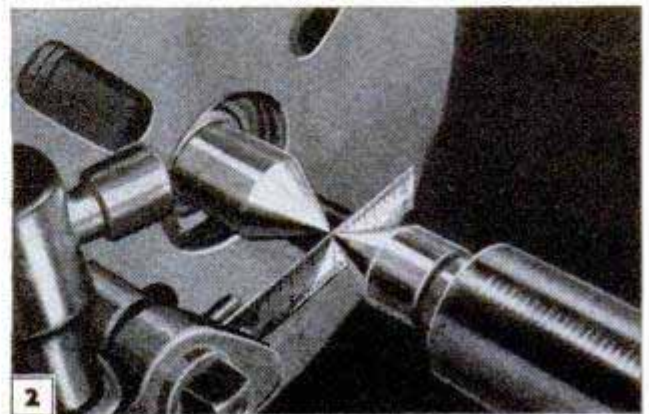
## Potato Moistens Postage Stamps

When sending out greeting cards or invitations, one way to avoid the unpleasant task of licking postage stamps is to moisten them with a potato. To do this, simply cut the potato in half and impale one of the halves on a nail driven through a board. As a potato contains considerable water, one half usually will be sufficient for the job.



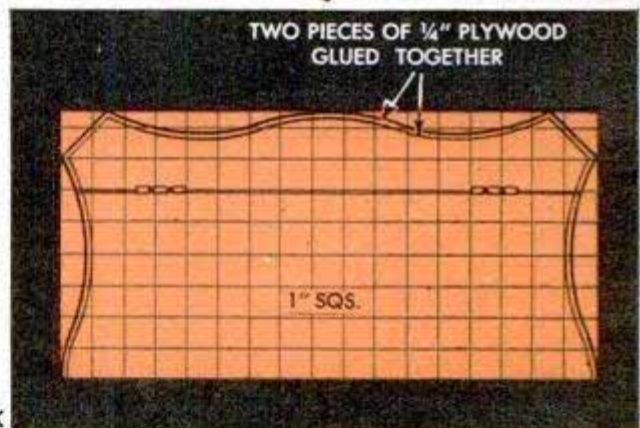
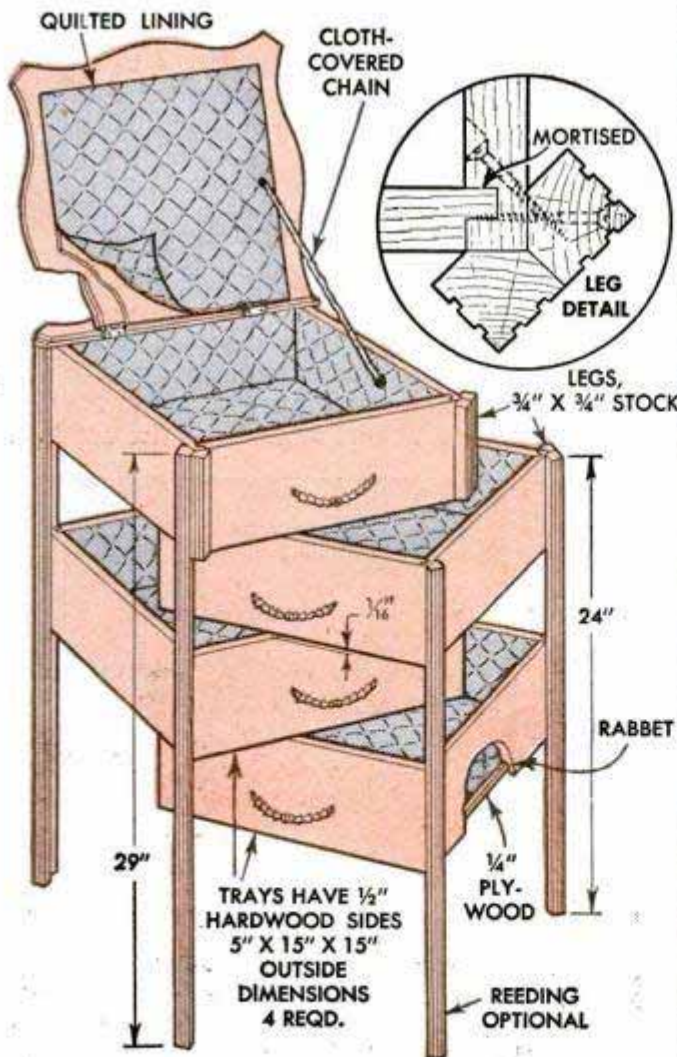
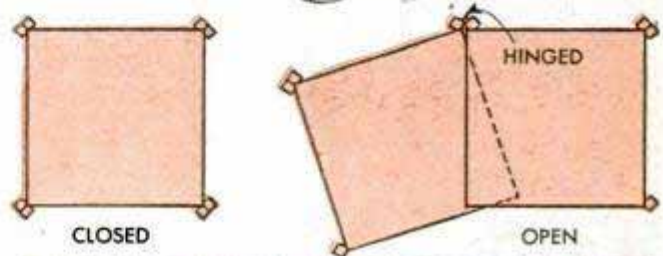
## Measuring Taper-Turning Setover

Setover between the live and dead centers of a lathe can be measured easily and accurately by clamping a narrow rule, marked on both sides, in the tool holder. The rule is clamped between the holder and the cutoff tool, Fig. 1, thereby relieving all pressure on the rule but still affording a rigid mounting. Then, the lathe centers are moved together, Fig. 2, the tailstock quill is locked and the rule is adjusted for height by means of the rocking wedge on the tool post. A standard chart gives the setover for a specific taper.

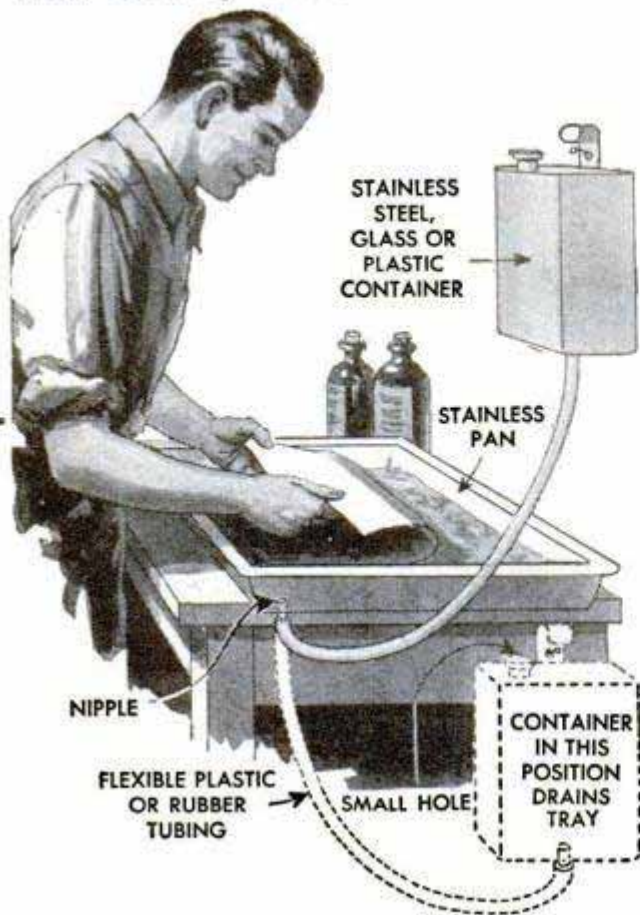


# Baby's BATH-O-CHEST

SWUNG open, this novel chest with its nesting trays affords convenient access to baby's clothes—everything being within easy reach for dressing an infant. The chest is made in 2 separate units hinged together at a rear corner. Four of the 2-piece legs are 29 in. long and the others are 24 in. Short pieces of the leg stock are fastened to the exposed corners of the trays to make the short legs appear full length when the chest is closed. The legs are fastened to the trays with long screws in the manner shown in the circular detail. The interior of each tray and the underside of the lid are lined with quilted satin or rayon which is formed around cardboard and glued in place after the chest is painted to match the nursery.— Charles and Bertram Brownold, Cedarhurst, N. Y.



## Developer Stored Quickly With Gravity Tank



Photostat developer often is allowed to remain in open trays when not in use, resulting in discoloration and loss of strength. One drafting department discouraged this practice and conserved developer by rigging up a simple device to eliminate the bothersome job of pouring the liquid back into the bottle after each use. The device consists of a noncorrodible tank, a cork and a rubber hose. One end of the hose is connected to the bottom of the tank and the other to a drain hole in the developing tray. The hose connections are made by forcing the ends of the tubing over 2 brass nipples, one brazed to the bottom of the tank and the other to the bottom of the tray. Then the inside of the nipples are coated with rubber-base paint. A small vent hole is made in the top of the tank, after which the tank is filled with developer and hung on the wall above the tray. To fill the tray, the cork is merely removed from the drain hole. To drain the tray, the tank is taken from the wall and hung in a position below the tray, as indicated.

C. L. Meehan, Lakeview, Ont., Can.

## Preserving Polish on Car Hood

To keep the hood looking as new as the rest of the car without additional polishing, simply apply a coat of aluminum paint to the underside of the hood. The paint will

deflect much of the heat which ordinarily causes the wax to melt. Be sure to clean the metal surface before painting it.

Jeff Sterns, New Bedford, Mass.

## Igniting Damp Matches Outdoors

When the wooden matches I usually carry on hunting and fishing trips become damp and difficult to ignite, I use the following method: First, I pick out a rock with a smooth, dry surface and rub the match back and forth across it several times, inclining the match so that both the head and tip contact the surface. Friction dries out a small portion of the head and tip, and a final sweep of the match causes it to ignite.



Jack Bronte, Surf, Calif.

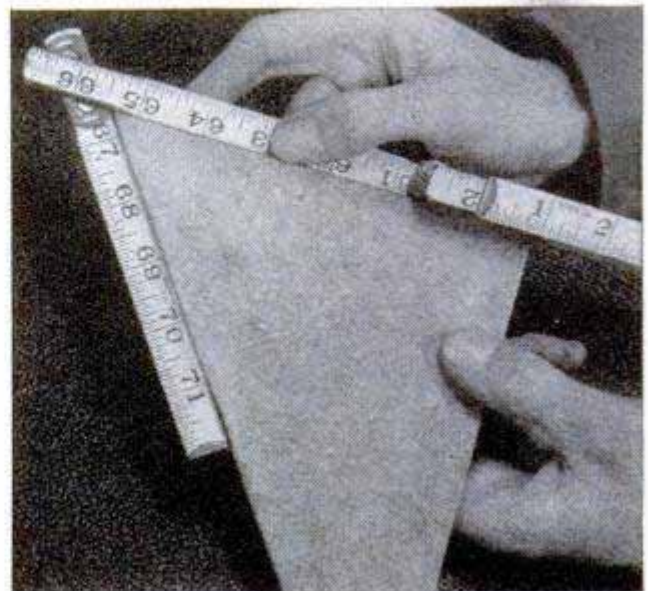
## Spot Rings in Garments Avoided

The formation of spot rings on the cloth when removing stains from garments can be avoided by placing a felt-covered furniture floor cup under the spot before applying the cleaning fluid. In addition to preventing a ring from forming, the brush-like fibers of the felt also keep the material from slipping when the spot is rubbed.

G. E. Hendrickson, Argyle, Wis.

## Folding Rule Transfers Angles

If you do not have a sliding T-bevel to determine the angle of work to be duplicated, a common zigzag rule will serve as a substitute where the measurement is not too critical. In transferring the angle to the work, be careful not to disturb the setting.



# WEATHER-STRIP

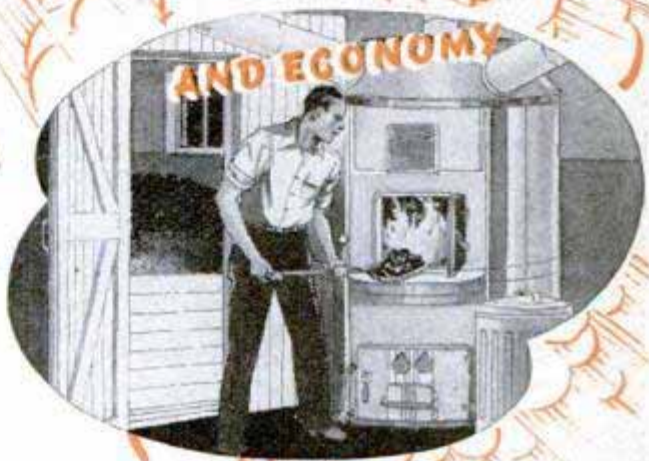


By E. J. Lucas

WHEN sharp wintry winds reach full velocity and temperatures drop below freezing, the unsealed doors and windows of your home may account for as much as 40 percent of the total heat loss during an average day. Weather stripping alone can reduce this loss as much as 20 percent, even without the addition of storm sash and storm doors. There are many kinds of weather stripping, some designed only for temporary use, such as plain felt strips, felt strips with a wood or metal backing, and rubber-coated fabrics. The interlocking types made from bronze, brass or other rustproof metals are designed for permanent installations. The interlocking types are, of course, the best in the long run as they do not require a friction contact to form an effective seal. Doors and windows fitted with these types open and close as easily as before stripping, while the friction-seal stripping makes window sash somewhat harder to raise and lower and doors a bit more difficult to close. Both types, however, make a very effective seal against heat loss.

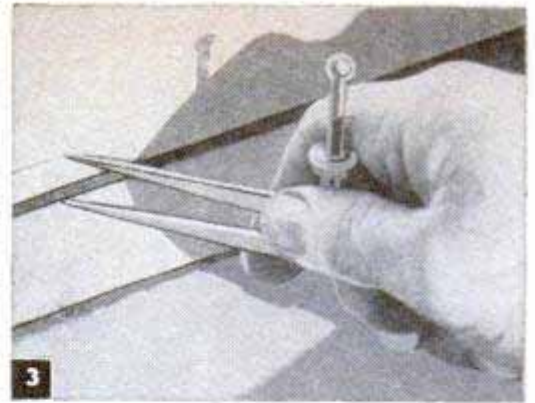
Except along the bottom edge, a door can be weather-stripped with the interlocking type, cut and bent to the shape shown in detail A of the series of detail illustrations A to K inclusive. If this material is not available from local hardware, lumber, or building-materials dealers, a sheet-metal shop can prepare it at small cost. Zinc is quite commonly used as it is easy to work, but any other corrosion-resistant metal, soft enough to be formed to the desired shape, may be used. A splice is made by snipping a tongue out of the sheet metal

One way to test a weather-stripped door for air leaks is by moving a lighted match along opening between door and jamb. Flame flickers if air is entering

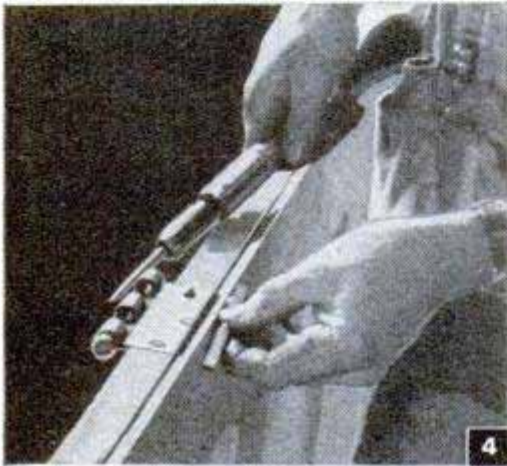




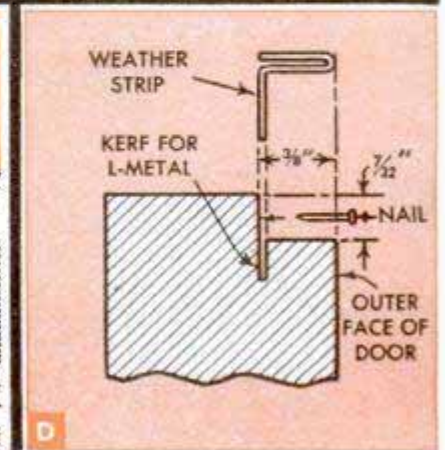
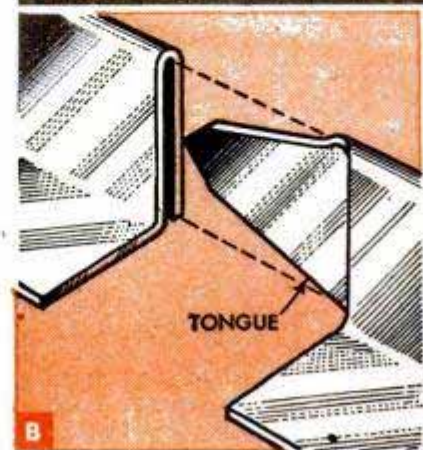
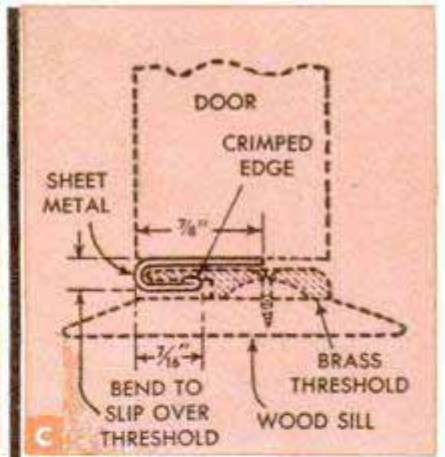
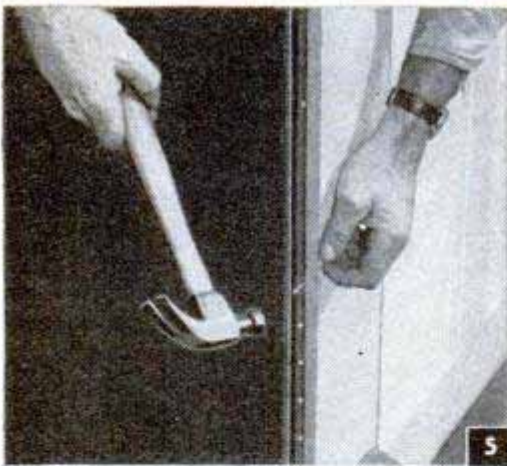
Before weather-stripping a door, true it up to assure uniform clearance between door and jamb. Be sure to plane edges square



as in detail B and inserting it in the folded flange of the other piece. Rustproof nails should be used.



The first step before removing the door is to see that it is hung properly. It may be necessary to plane off some high spots, as in Fig. 2, or to shim up one of the hinges. If the wooden threshold is worn down in places, plane it level. Then, with dividers, scribe a line along the bottom of the door as in Fig. 3, using the threshold as a guide for the lower point of the dividers. These should be set so that the bottom of the door, when sawed along the scribed line, will clear by  $\frac{1}{16}$  in. the top of the brass threshold to be installed, Fig. 10. After marking the bottom of the door, remove the door from the frame, block it on the floor with the hinged edge up, and remove the hinge butts. Using a rabbet plane or an electric hand plane such as shown in Fig. 7, cut a  $\frac{1}{8}$  by  $\frac{3}{8}$  in. rabbet the entire length of the door. With a hacksaw, cut a piece from the outside edge of each hinge

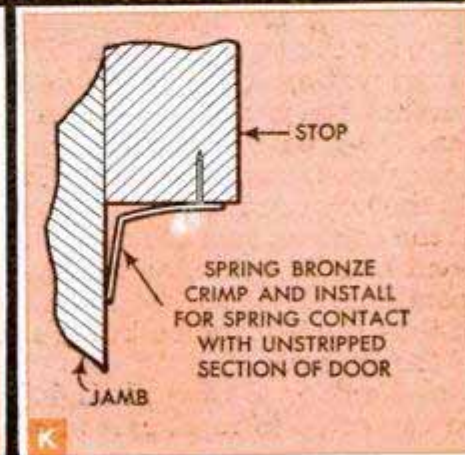
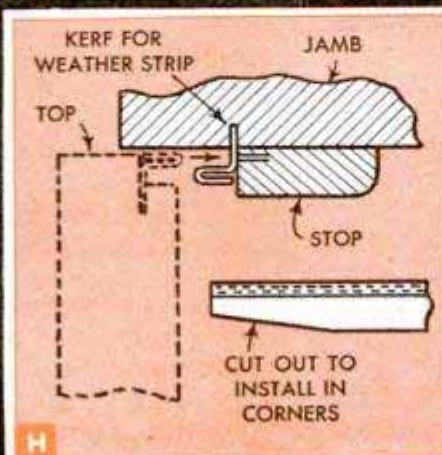
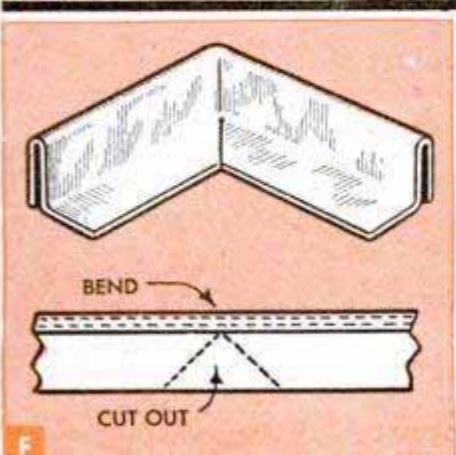
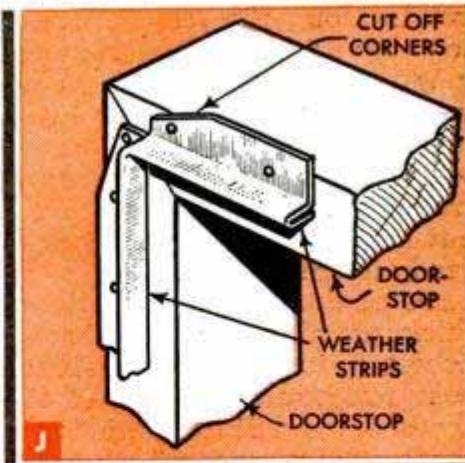
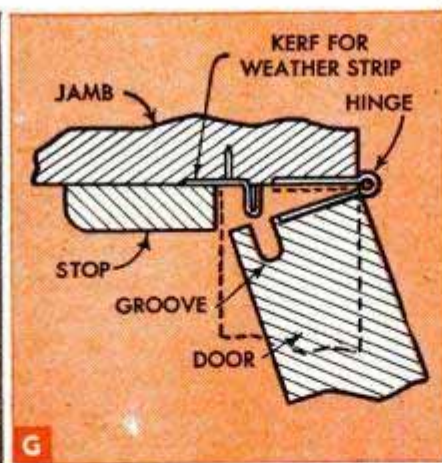
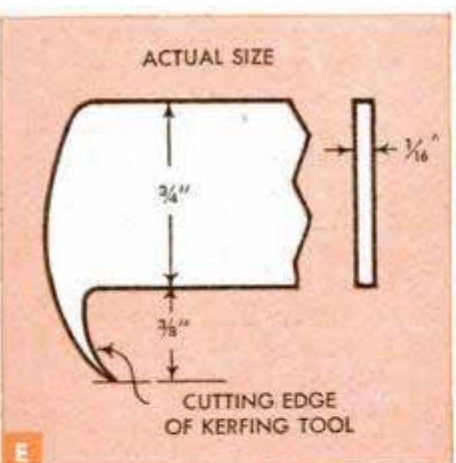
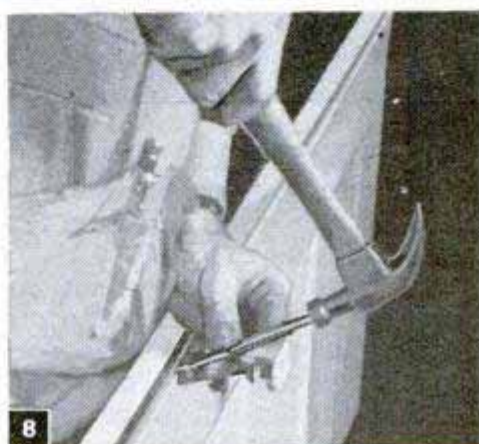
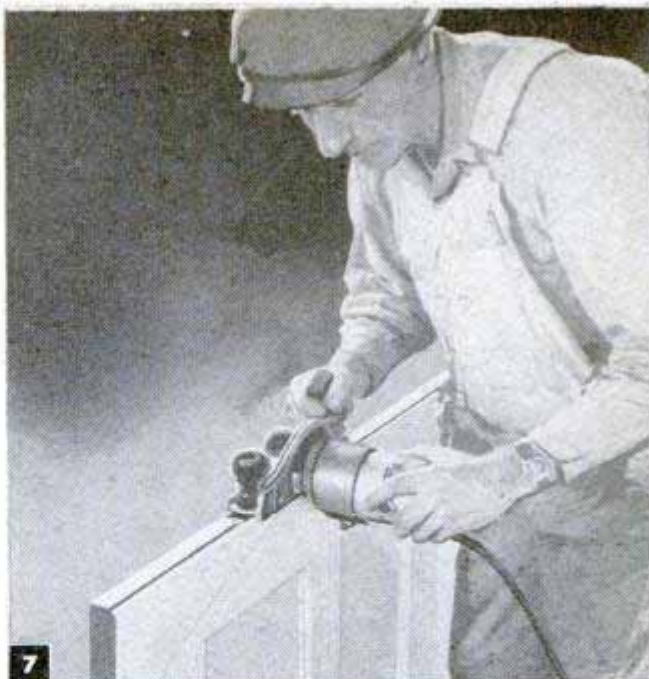




butt just wide enough so that, when the butt is replaced on the door, it will clear the rabbet, Fig. 4.

Now, following the line scribed near the bottom of the door, saw off just enough to clear the brass threshold. If a felt door bottom is to be used, this can be nailed or screwed to the door after rehanging; but if the metal threshold is of the interlocking type with overhanging lip, then be sure that allowance is made for the interlocking bottom strip which is nailed to the bottom of the door, as in detail C, to interlock with the threshold lip. This can be bent to the dimensions given from the same material as the weather strip used on the rest of the door, unless, of course, a similar strip is purchased ready-made. Attach the strip, as shown, with the back of the hook flush with the inside face of the door.

As the lock side and the top of the door are weather-stripped in the same manner, rabbet the outside edge of each as in detail D. Dimensions should be maintained closely so that the edge of the weather strip will not extend beyond the outside face of the door, Fig. 8, as the strip which later is installed on the jamb must be fitted to interlock closely without binding. A suitable kerfing tool to cut the groove for the metal edge can be made from a piece of steel, with a cutting point filed or ground as in detail E. A short length of saw blade not less than  $\frac{1}{2}$  in. wide and bolted to a handle, also will serve this purpose. If there is sufficient clearance between the striker plate and the edge of the door, the weather





strip can be installed for the entire length of this side. Otherwise, cut the rabbet up to the striker plate and then taper the cut with a chisel as in Fig. 6.

The metal strip now can be nailed in place as in Fig. 5, with the outside edge flush with the edge of the door. Fit the strip at the corner by snipping out a vee and bending around the corner as shown in detail F. When necessary to join at other points along the length, pieces are fitted together with a tongue as in detail B.

With work on the door completed, the weather stripping is now installed on the jamb. Detail G shows one method used when installing the strip on a new door frame, the strip being nailed in a groove cut in the jamb. If the door frame is already installed, cut a shallow rabbet in the back of the stop to a depth equal to the thickness of the strip. In this way, it is unnecessary to groove the jamb. In either case, best procedure usually is to install the threshold and fit the metal top strip first, as the two sides are more easily fitted to these later. Install the threshold and the weather strip for the top as in detail H, fitting both to the mating strips on the door. Then the vertical strips are installed, making sure that the groove in the hinged edge of the door closes over the metal without binding. As the kerf cannot be cut to sufficient depth at the corners, snip the metal so that a neat bend can be made, as in detail J, before installing. The metal strip on the lock side of the door is installed in the same manner as the top strip.

If the door is warped slightly, this may be corrected in most cases by planing the



Above, on old door frames a metal threshold is carefully installed so that door will close without binding. Left, when installing metal stripping, space back of striker plate is closed with spring bronze

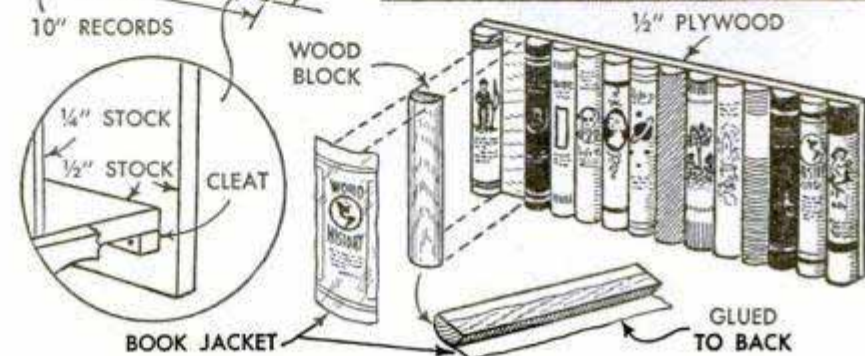
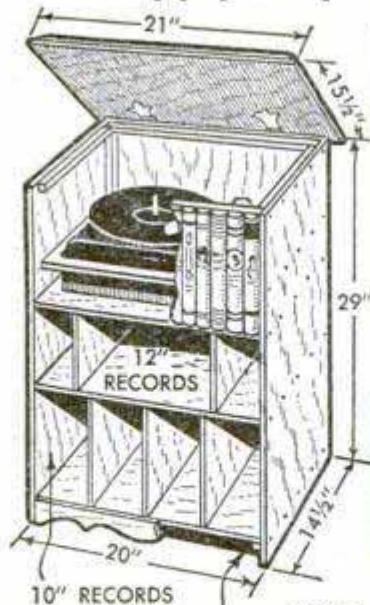
stop to make uniform contact with the outer edge of the door before installing the metal strip. Where the stop on the lock side of the door is planed to fit the warped door, it will be necessary to relocate the striker plate so that the door can be closed securely without rattling. Finally, crimp a strip of spring bronze and nail to the stop, as in detail K and Fig. 9, to close the gap at the striker plate. One way of testing a weather-stripped door for leaks is to move a lighted match slowly along the opening between the door and the jamb as in Fig. 1. If air is leaking in at any point the flame will flicker. Generally, the leak can be stopped by springing the strip slightly.

Methods of applying the interlocking weather strip to windows are essentially the same as those used in fitting it to doors. When the stripping is purchased ready-made, specially formed strips usually are furnished for the meeting rails of ordinary double-hung windows, and also for casement sash. Spring-bronze weather strip of the contact type is usually furnished in rolls from which the required lengths are cut with tin snips. It is one of the easiest of all to apply as it is supplied in uniform widths with adjustable contact edges and a perforated nailing flange. This type of stripping is fitted to both doors and windows in much the same way. To simplify installation, the contact strip often is applied only to the sides and top of the door frame and a metal-reinforced felt door bottom is screwed to the inside bottom edge of the door. Felt weather stripping, with or without metal reinforcing, is a more or less temporary installation.

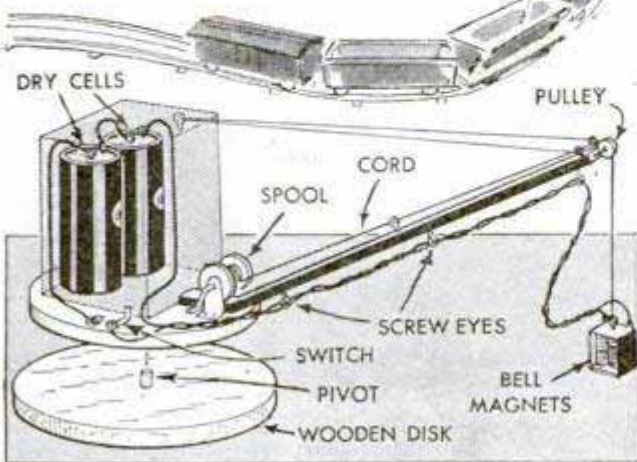
☐ An emergency highway flare is a handy item to have in the car at all times. One is made by rolling a strip of corrugated cardboard and inserting it in a tin can. Melted paraffin is poured over the cardboard.

Built of plywood and partitioned to meet individual requirements, this unusual cabinet provides compact storage space for both loose records and albums in addition to housing a portable record player. The front panel of the record-player compartment is faced with brightly colored book jackets. These jackets are glued separately to a number of wooden blocks which are rounded on one face and fastened side by side to the panel. If the phonograph is to be played through a table radio, the partitioning of the cabinet can be varied so that the radio will fit in the center compartment. A piece of plywood which is cut to fit over the top of the record player provides a shelf for accessories and needle cups which are recessed flush. — George Radbourn, Ottawa, Ont., Can.

## Record-Player Cabinet Simulates Bookcase To Supply Ample Storage Space for Albums



## Homemade Toy Derrick Equipped With Bell Magnets Lifts Metal Cargo

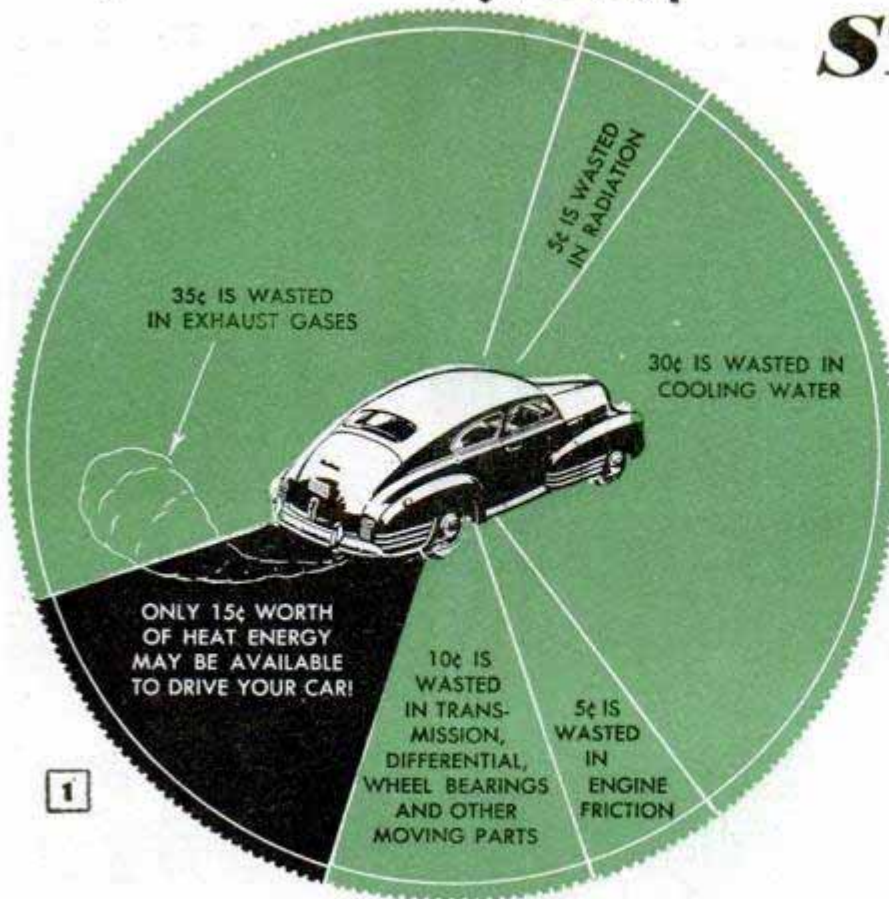


Unloading a carload of metal parts with the electromagnet of this toy crane gives the small boy the thrill of operating a life-size machine. The arm of the crane is a piece of wood nailed to a wooden disk pivoted on another disk which serves as a base. Bell magnets, tied to a length of cord wound on a sewing-thread spool, are wired through a simple switch to 2 dry cells. The latter are enclosed in a realistically painted cab of cardboard or cigar-box wood. The switch may consist of a brass strip loosely attached to the rotating base with a brass screw so that it can be swung to contact another brass screw.

## Conserving Carbon Paper

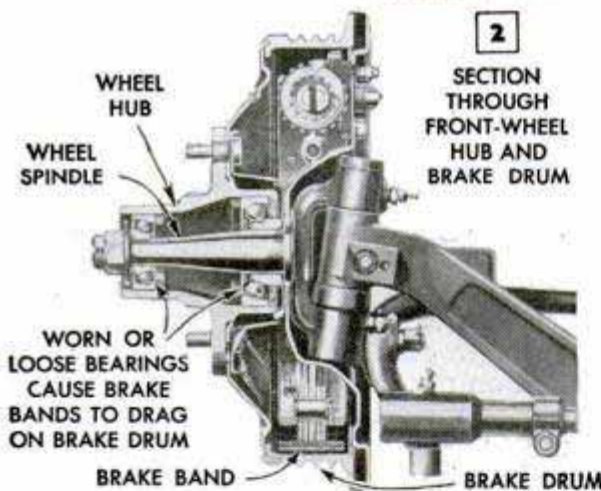
A sheet of typewriter carbon paper need not be discarded when worn, as it still can be used a number of times if about  $\frac{1}{8}$  in. is clipped from each end of the sheet. Thus, when the paper is lined up for insertion in the typewriter, the unused portions of the carbon that originally were between the typed lines are moved opposite the type.

☞ Adding a little vinegar to water used for washing windows will help prevent the glass from streaking and make it shine.

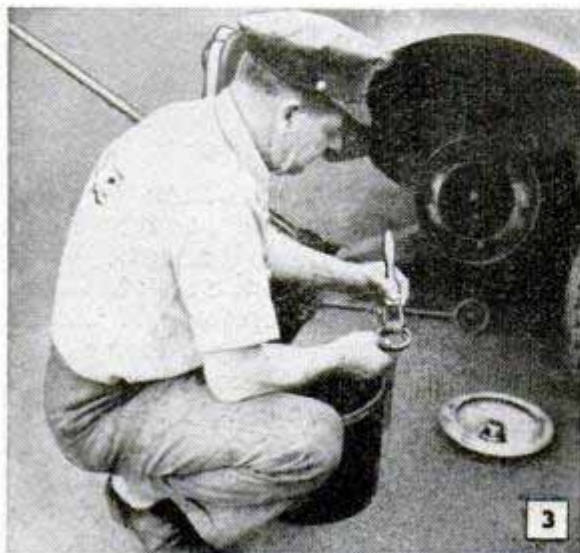


The miles per gallon of fuel your car delivers depends not only on your driving habits, but more on how well you keep all parts of the car adjusted. That is why it is important to keep the ignition and fuel systems at peak operating efficiency, and to check the brakes, lubrication and wheel alignment to reduce rolling resistance to the minimum

## Part I



Loose wheel bearings can be the cause of dragging brakes. Brake shoe contacts bottom of drum



**D**O YOU KNOW that only 15 cents' worth of gasoline out of every dollar spent for car fuel actually reaches the wheels in the form of power to propel the car? The remaining part of your dollar's worth of fuel is expended in friction, exhaust gases, heat radiation and cooling water. A careful study of the diagram in Fig. 1 will show how important it is to fuel economy to keep all parts of the car adjusted to give peak performance.

In this two-part story, C. Edward Packer, a former Service Instructor of the Ford Motor Co., will describe numerous ways the motorist can conserve gasoline by simply keeping the ignition and fuel systems adjusted correctly, and by keeping a careful check on brakes, lubrication, wheel alignment and other friction-producing parts of the car.

Normally, about 10 percent of the engine's power is consumed in the train of power-transmitting parts. Any condition which tends to increase frictional drag in any of the parts will increase the power loss proportionally. Also, a tight or loose wheel bearing, a dented hydraulic-brake line, worn brake-shoe pivots and wheel misalignment, even though slight, can cut gasoline mileage appreciably. If a wheel bearing is sufficiently loose, the bearing slack may cause the bottom brake shoe to drag on the lower part of the drum as in Fig. 2. A slight drag on all four wheels is not apparent in the operation of the car, but it can cut fuel mileage considerably. Bearings that are too tight may heat and develop sufficient drag to affect fuel economy. A flying stone thrown by the wheels or a carelessly handled jack can

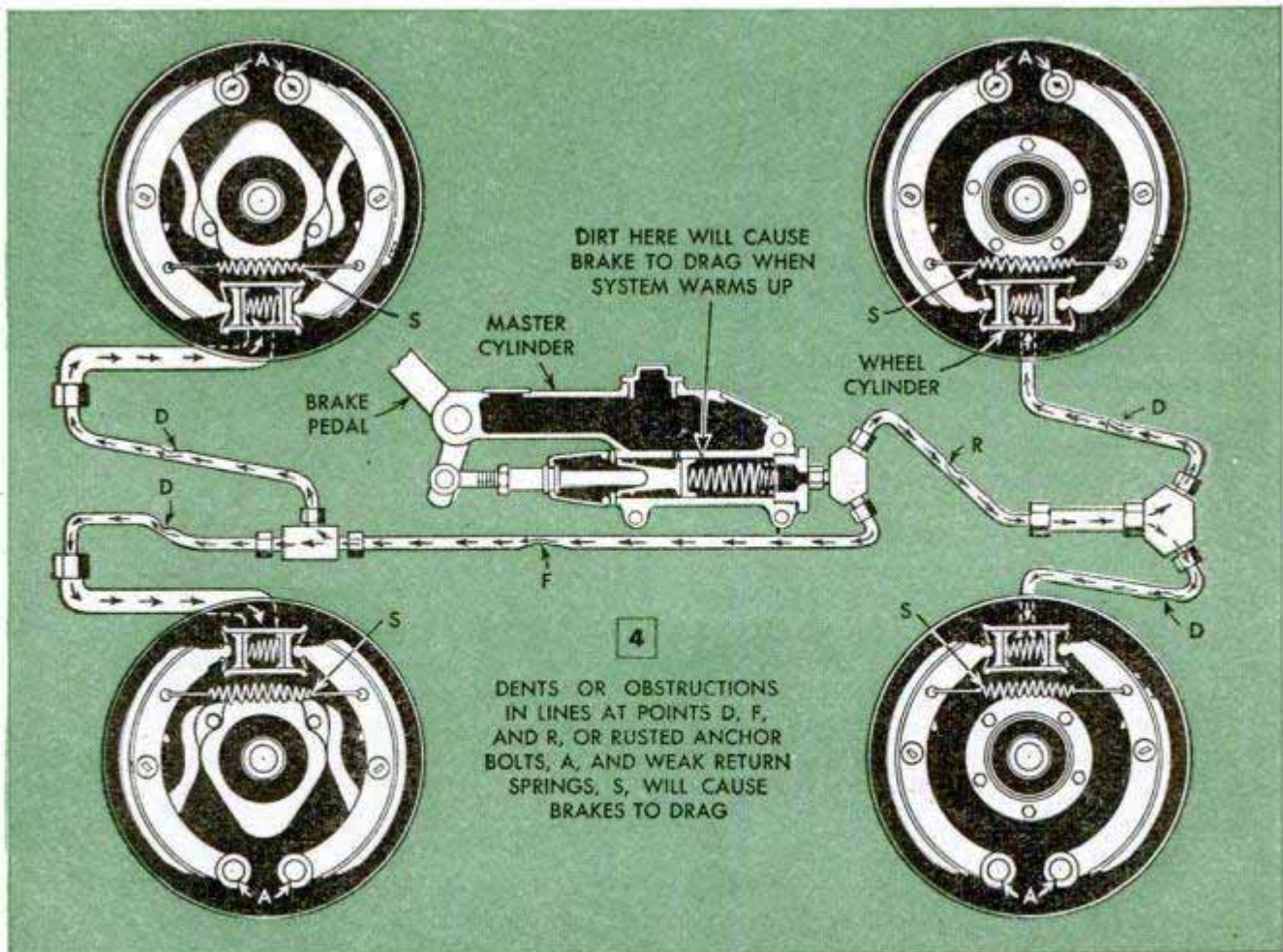
# your **GASOLINE DOLLAR**

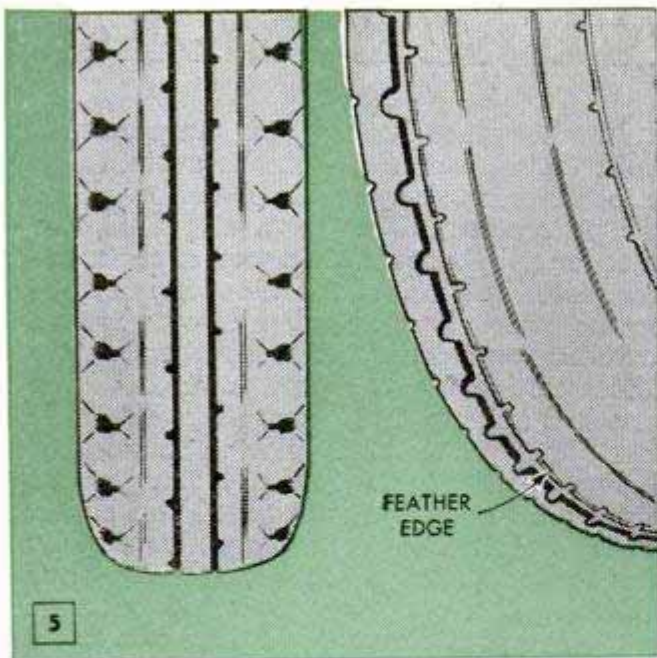
dent hydraulic-brake lines. Such a dent may prevent the brake shoes from releasing fully after application. A dent in any of the lines indicated by the letter D in Fig. 4 will affect only the brake connected to that particular line, but a dent at point F would act equally on both front brakes. Similarly, a dent in the line at R would act equally on both rear brakes.

In most cases, such dents only partially impede the flow of hydraulic fluid and do not noticeably interfere with application of the brakes. But when the pressure on the pedal is released, the tension of the brake-shoe retracting spring, Fig. 4, S, is not sufficient to immediately free the brake shoes completely from contact with the drum. The release is slow, due to the greatly restricted flow of the brake fluid. During this time, the car can be rolled by hand on the level only with great difficulty. Another condition in the brake system that cuts deeply into gasoline mileage is due to dirt clogging the bleeder hole in the master hydraulic cylinder, Fig. 4. With the brake in the released position, the rubber cup on the end of the master-cylinder brake piston uncovers this hole. Then, as the car is driven and expansion of the hydraulic

fluid takes place due to rising temperature, fluid moves out of the brake system and into the master-cylinder chamber above the piston. As the brakes are applied, this bleeder hole is covered as soon as the master piston moves. If the bleeder hole becomes partially clogged, all four brakes will drag on release, perhaps not enough to affect noticeably the performance of the car, but sufficient to cause a considerable loss of power. Similarly, rusted brake-shoe bolts or pivot pins, A in Fig. 4, can prevent the quick and free release of the shoes. Failure of the shoes to release also may be due to weak, broken or missing brake-shoe springs. If a car gives poor gas mileage, these are possible causes to keep in mind as they usually are overlooked when checking a car to improve mileage.

Front-wheel bearings should be washed and relubricated in the spring and fall, Fig. 3. Avoid packing the bearings with too much grease as they will be difficult to adjust correctly. When the bearing is reinstalled, the castle nut should be drawn up until the wheel begins to bind. Then the nut is backed off slowly until the wheel spins with only a very slight drag. If correctly made, this adjustment permits the



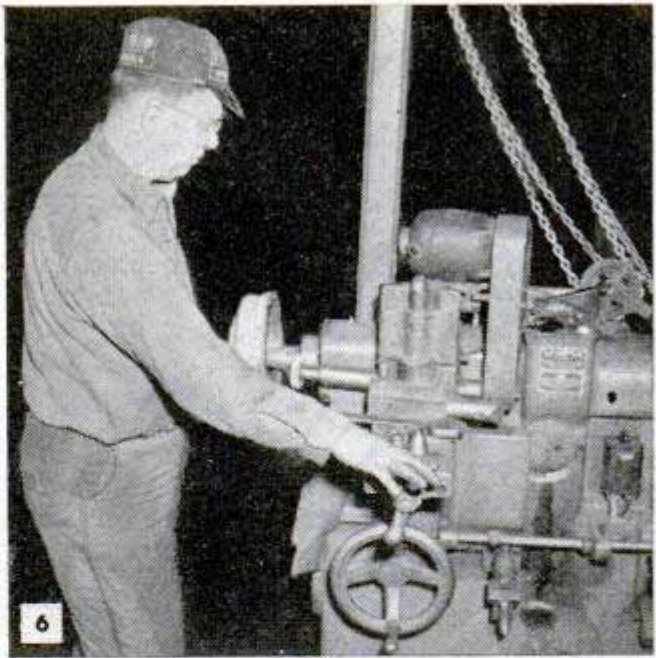


Misalignment of the front wheels causes rapid tire wear. Abnormal road friction requires more power

wheel to run with no noticeable looseness. Rear wheels, if provided with adjustable bearings, should be set up for free running with no measurable looseness. If the bearings are of the straight roller type, any up-and-down play should be corrected by replacing worn parts. Where brakes are of the hydraulic type, care must be taken when brake drums are removed not to depress the brake pedal, as this may drive the wheel pistons out of their cylinders.

Condition of the tires will reveal certain mechanical faults to a practiced eye. For example, a flat spot at only one place on a tire usually indicates a brake drum worn out of round. This can mean that the brake shoe is riding the drum at some point at each turn of the wheel. Proper adjustment of the brakes cannot be made if the drums are out of round or badly scored. Most defective drums can be restored to full usefulness on a brake-drum lathe, Fig. 6. After truing the braking surface of the drum, the shoes must be relined, either with an oversize lining or regular lining applied over a suitable shim to compensate for the enlarged diameter of the drum. After the lining is securely riveted or cemented to the metal shoe, it is ground to the exact radius of the drum as in Fig. 7. When installing the repaired parts, renew the brake-shoe pivot pins and retracting springs if these parts are damaged or weakened by rust.

When feather edges develop along a front-tire tread as in Fig. 5, it indicates either too much toe-in or toe-out, depending on which side of the tire the excessive wear develops. The tire is not only rolling forward, but is being scuffed sideways as well. This takes a lot of power by adding



It's good economy to true up any defective brake drums; otherwise brakes cannot be properly adjusted

to the rolling resistance. Wheel alignment should be checked periodically to avoid fuel waste and excessive wear on the tires. Driving with the tires underinflated likewise results in lowered tire and fuel mileage. Soft tires make the car ride easier, but the added road friction consumes extra fuel. The tires flatten under the load and the undue flexing of the side walls eventually breaks down the fabric on each side of the tread. Underinflated tires also heat excessively when driven at high speeds. This greatly accelerates side-wall wear. The new low-pressure tires, designed to run on 24 lbs. of air pressure, present more square inches of tread to the road, and thus carry the load at reduced pressure. However, these tires should not be used underinflated.

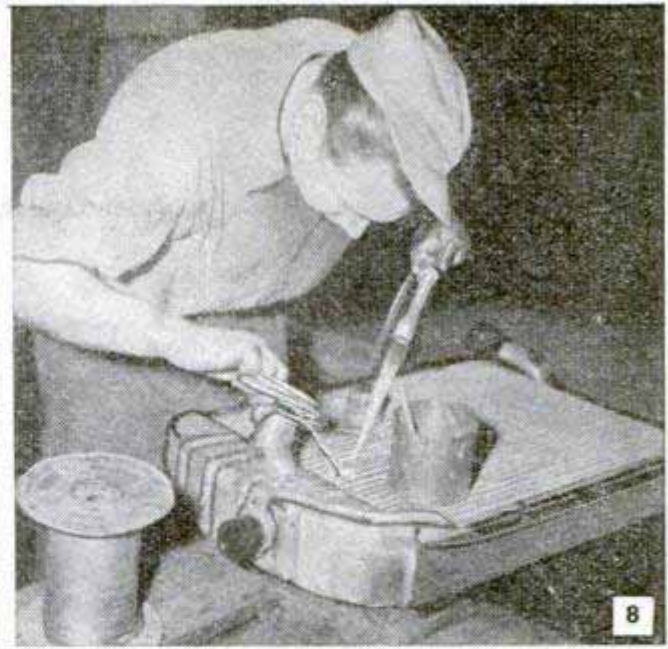
Wheels that dance and bounce due to the poor snubbing action of defective shock absorbers consume extra power. It is comparatively simple to keep these parts in good condition at a minimum cost by regular inspection and servicing.

Incorrect lubricants can almost double the fuel energy required to deliver power through a transmission such as that shown in Fig. 10. Relatively the same losses from this cause can also occur in the rear axle. It is true economy on the part of the car owner to see that the chassis lubricants are adapted to the car and to the change in the seasons. When refilling both the transmission and rear axle with lubricant, follow the manufacturer's recommendations.

Check the clutch-pedal clearance. The pedal should have at least  $\frac{3}{4}$  in. of free movement to assure full engagement. A simple check any driver can make, Fig. 9, will show quite accurately the condition of



After relining, brake shoes should be ground down to the exact radius of the drum to prevent chatter

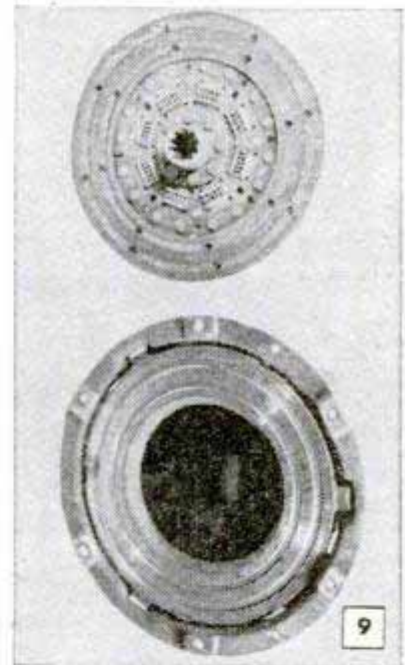


If the engine tends to overheat, clean the cooling system and solder any leaks that show under test

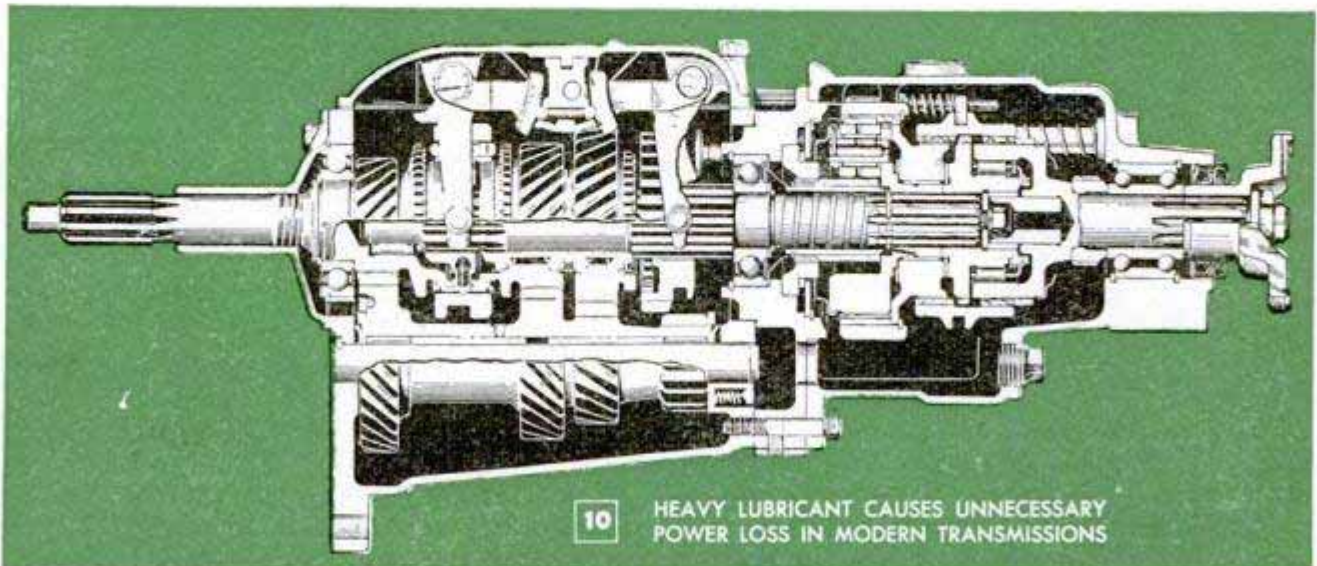
the clutch. Drive at 15 m.p.h. on a straight road in high gear and apply both the brake and the accelerator at the same time. Try to balance the pressure on brake and accelerator so that the car continues to run at 15 to 16 m.p.h. If, under this combined braking and acceleration, the engine suddenly breaks loose and races, it indicates that the clutch is slipping badly. If the clutch is in good condition, this procedure will kill the engine, even though the driver continues acceleration. A slipping clutch not only wastes gas, but it soon burns so that the facing has to be replaced.

If the engine temperature stays slightly above normal for any length of time, clean the cooling system. Use a good commercial cleaner and, if the car has been in use two or more years, have the radiator back-flushed after the cleaner has been removed. If this is not done, loosened particles of lime and rust may clog the small water passages in the radiator. Small leaks sometimes show up in a radiator after cleaning and should be closed by soldering as in Fig. 8. A leaky radiator may cause overheating and waste expensive antifreeze solutions.

(Continued next month)



Below, improper lubricants in the transmission and, center, a slipping clutch can cause high power losses



HEAVY LUBRICANT CAUSES UNNECESSARY POWER LOSS IN MODERN TRANSMISSIONS

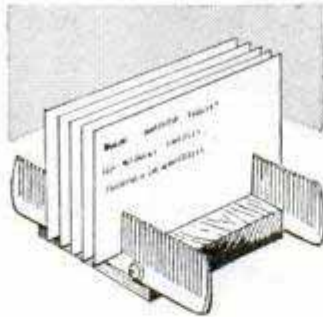
## Sand-Filled Pail Provides Cushion When Removing Hub-Cap Dents



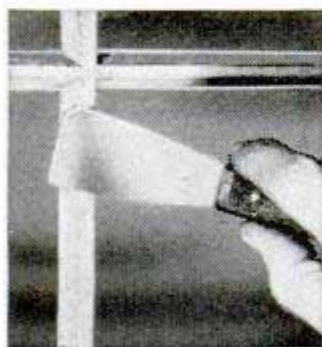
Should you want to hammer out the dents in a hub cap, you will find that a pail filled with dry sand provides the cushion needed to do a good job. A piece of heavy cloth placed over the top of the pail protects the hub cap from scratches.

## Comb Rack Files Shop Data

A handy card index for shop data can be made easily from 2 coarse-toothed combs and a block of wood. Drill 2 holes in each of the combs and fasten them with roundheaded screws and washers to opposite sides of the block. Then insert the reference material between the teeth of the combs.



## Beveled Putty Knife Speeds Glazing

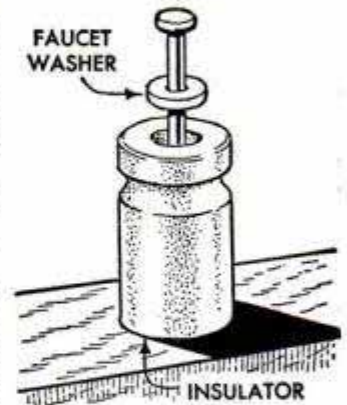


Faster, neater jobs of window glazing can be done with a putty knife ground to a 45-deg. bevel at one corner of the blade. The bevel permits scraping off just the right amount of excess

putty and serves as a gauge to keep the angle of the putty uniform. The bevel also is useful when working in the corners of the pane, as it allows the knife to fit against the putty already in place in the adjacent rabbet of the sash.

## Replacing Knob-Insulator Washers

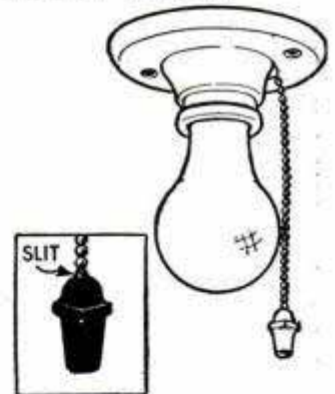
When the leather shock washers used to cushion the nailhead on knob insulators become worn, rubber faucet washers make good substitutes. Being thicker than the leather ones, the rubber washers better protect the knobs from being cracked or chipped when nailing them in place. Also, the rubber has more resiliency, thus providing a tighter grip on the top of the insulator.



W. H. McClay, Pasadena, Calif.

## Pendant for Pull-Chain Socket Improvised From Pencil Eraser

If the small metal pendant on a pull-chain socket escapes your grasp, a better grip is provided by using a slip-on pencil eraser at the end of the chain. Besides affording a larger object to grasp, the eraser makes a neat pendant. To attach it to the chain, simply slit the eraser lengthwise on one side, open it up and place it around the metal pendant.



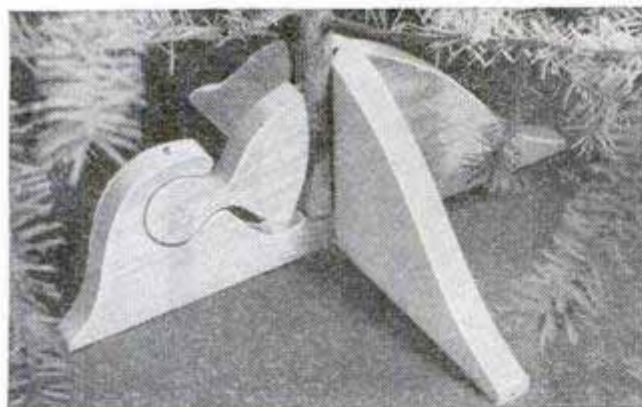
## Thumbtack Seals Glue Tube

Tubes of cement or glue from which the screw-type plugs have been lost, can be capped by inserting a thumbtack in the tube opening. As the head of the thumbtack is easy to grip and the tack does not have to be turned into the tube, it is removed and replaced more quickly than the original plug.



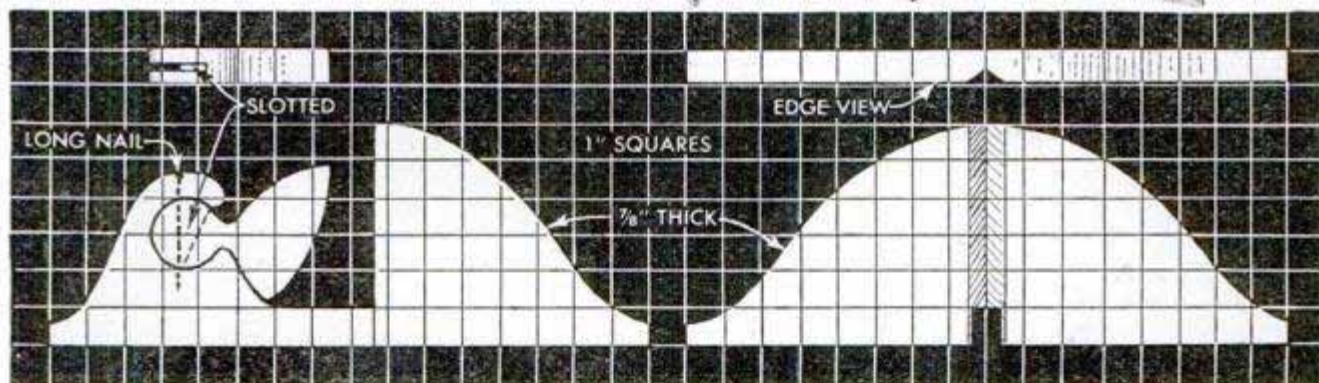


# Weight of Christmas Tree Locks Novel Stand



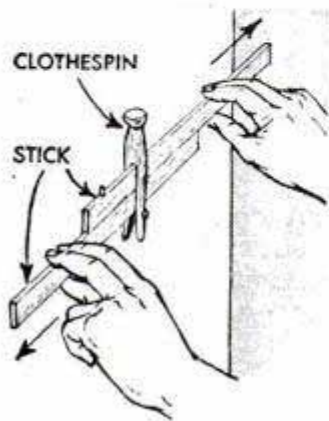
The unusual clamping-dog arrangement of this wooden stand securely holds Christmas trees of any size likely to be used in the home. The weight of the tree causes the dog to grip the trunk tightly, and a V-groove in one side of the crosspiece prevents the tree from slipping sideways. The dog is slotted, and a nail is driven through the curved arm of the frame to hold the dog in place without interfering with the hinging action.

Benj. Nielsen, Aurora, Neb.



# Caliper for Inside Measurements Made From Clothespin and Sticks

Needing a measuring tool to determine the exact width of a linen closet so that shelves could be cut to fit, I devised this three-piece sliding caliper. It's made from a clothespin and two flat sticks, the latter being thin enough to slide snugly, on edge, through the slot of the clothespin. A small pin keeps the two sticks in the slot and stop pins in the edges of the



sticks prevent them from being pulled all the way out. In use, the tool is extended between the walls of the cabinet until the ends of the caliper touch the sides. Then, without disturbing the setting, the caliper is removed and laid on the work.

Edward Rivard, Leonminster, Mass.

# Lighter Fluid Aids Igniting Candles

Lighter fluid applied to the wicks of ceremonial candles overcomes difficulty in lighting them. Within an hour or so of the ceremony, light each candle, allow it to burn a short time, blow it out, and then pour three or four drops of lighter fluid over the wick. The fluid will run into the molten wax where it is retained.

# CONTACT

By George R. Cryder

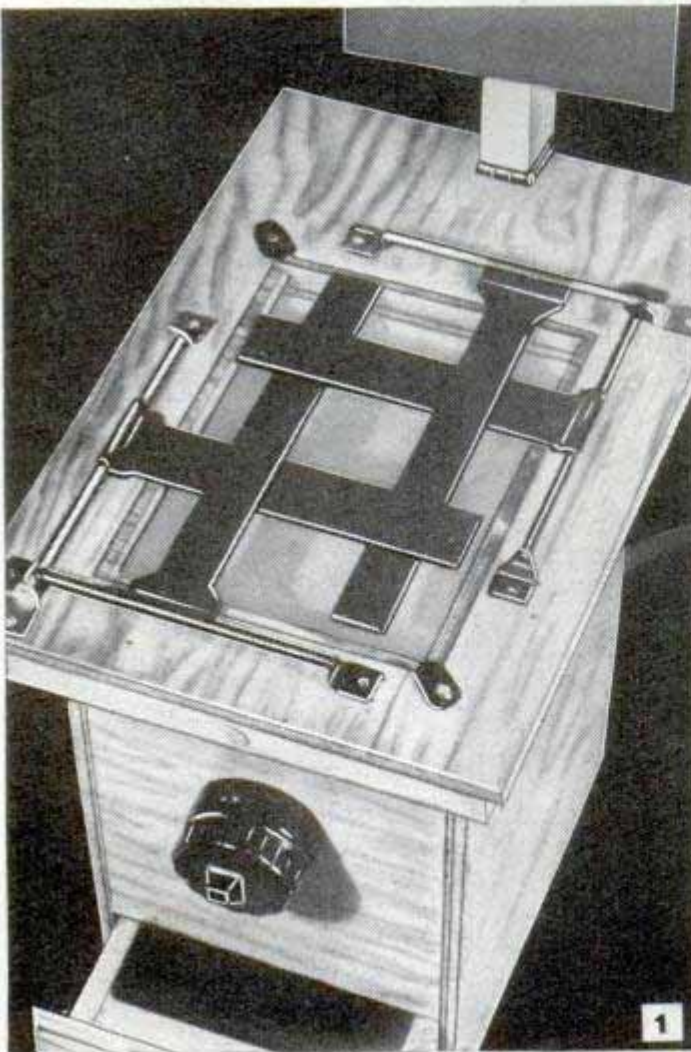


**F**EATUREING a lightproof drawer for printing paper, this easy-to-build contact printer will be one of your favorite pieces of photographic equipment. It handles negatives up to 4 by 5 in. and offers all the refinements of the commercial product at exceptionally low cost. The novel printing-paper drawer, Fig. 2, will save you considerable time and effort by eliminating the need for opening the envelope each time a sheet of paper is needed. Of course, the printer can be built without the drawer if you wish. It also can be made to take larger-size negatives simply by increasing the dimensions and lights proportionately.

Construction of the printer is detailed in Fig. 3. The drawer and the sides and top of the cabinet are of  $\frac{1}{4}$ -in. plywood, while the bottom and the false bottom above the drawer are of 1-in. solid stock. Cleats of 1 by 1-in. material around the upper edge of the cabinet support the top. A pressure handle, made as shown, is hinged to the top of the cabinet and raised by a small steel spring.

The unit is fitted with five lamp sockets and a snap switch, wired as indicated in the wiring diagram, Fig. 3. A red,  $7\frac{1}{2}$ -w. safelight is inserted in the center receptacle and 10-w. lamps in the four others for even distribution of light. The switch controls the printing lamps but does not break the safelight circuit, allowing it to remain on until the plug is disconnected. Opal glass is preferred for diffusing the light but, if it is not available, a suitable substitute can be made by sandwiching a piece of tracing paper between two pieces of clear glass.

Although the platen and glass from a manufactured printing frame were used on the original printer, a platen can be made from two pieces of plywood. Ordinary window glass may be used for the printing-frame glass which is countersunk flush with the top of the cabinet. The bottom of the platen should be covered with felt and the two wooden sections joined with a piano hinge or two small butt hinges. Standard masks were fitted to the printer as shown in Fig. 1. However, if you wish to make your own masks, either very thin sheet metal or col-

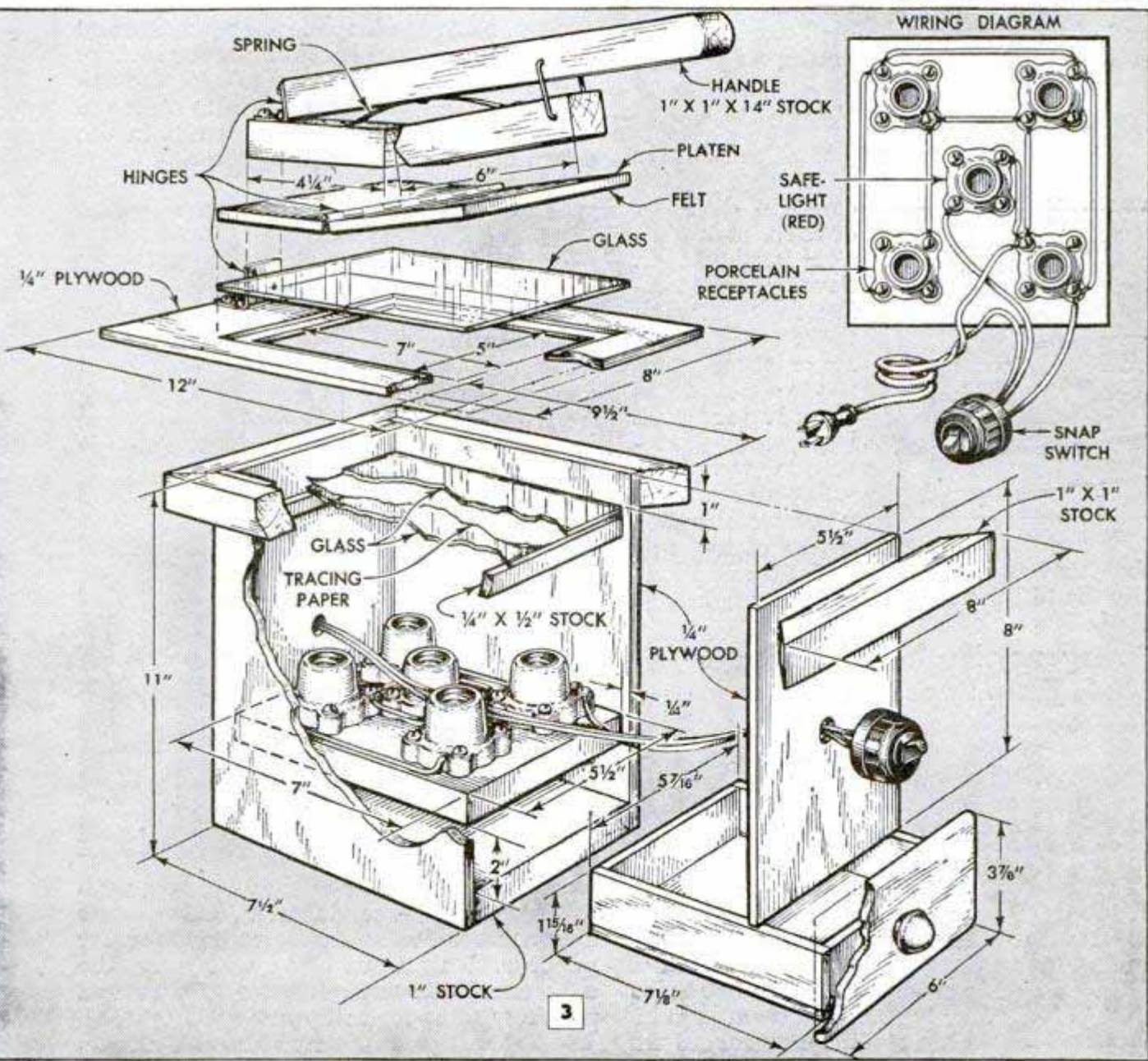
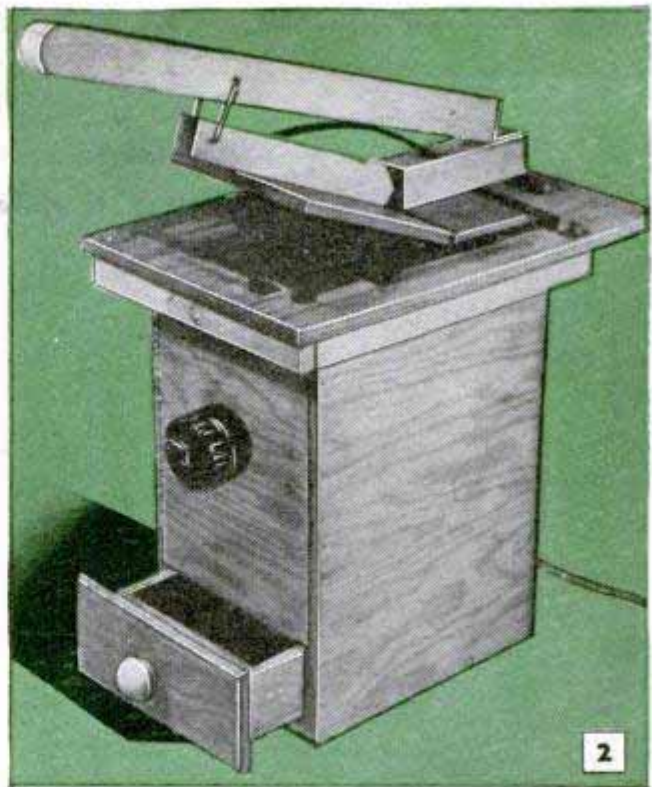


# PRINTER

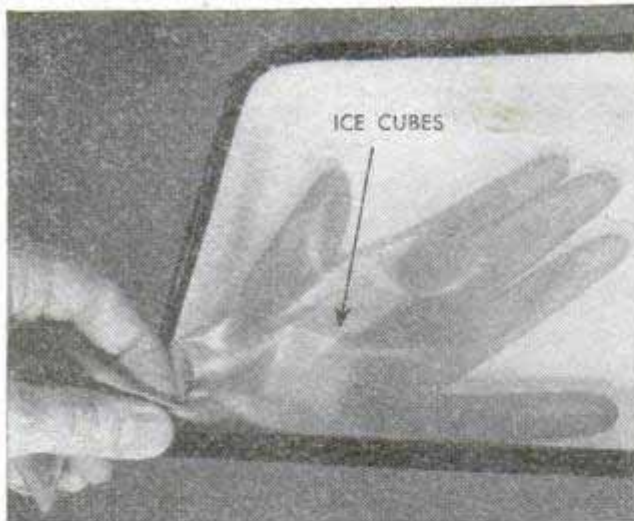
ored celluloid (red or black) will suffice. Should you make them, keep in mind that the strips should be as thin as possible so the edges of the prints will be in focus.

When assembling the printer, make sure that all parts are a tight fit to prevent light leakage. The edges of the cabinet should be glued as well as nailed together for maximum strength. Better light reflection will be had if the inside of the printer is painted a glossy white. Black paper from a printing-paper envelope serves as a lightproof lining for the drawer.

In mounting the printing-frame glass in the top of the unit, be sure that the rabbeted edges of the opening will bring the glass flush with the top. After the printer has been assembled, sand the outside wooden surfaces and stain or paint as desired.



## Rubber Glove Filled With Ice Cools Photo Solutions



An excellent way to cool photo solutions is to place a rubber glove, partly filled with ice, in the tray. The glove will hold several ice cubes and the rubber prevents the solution from becoming diluted. The open end of the glove can be held closed with a rubber band or tied with string.

## Tape Identifies Print Tongs



tape around a leg of one pair of tongs so that his thumb would contact it and identify the tongs readily even in dim light.

Unlike plastic print tongs, which come in different colors, stainless-steel tongs used in developer are easily mixed with those used in hypo. As it is important not to contaminate developer with hypo, one dark-room worker wrapped water-

proof adhesive

## Emergency Flash-Bulb Reflector Made From Paper Plate



A flash-bulb reflector for emergency use can be made from a paper plate. To make the reflector, cut a wedge-shaped segment from the plate and join the edges to form a shallow cone. Then cut a hole in the center to fit

around the base of the bulb. The reflector is held together with staples or paper clips. If desired, you can apply aluminum paint to the inside of the plate, or a good reflecting surface can be had by pasting tin foil to the paper, smoothing out the wrinkles.

## Darkroom Timer Preset By Rubber-Band Stop

Photo timers not equipped with a starting lever, which permits them to be set for a certain interval and later started in total darkness, can be made pre-setting by snapping two or three rubber bands



and the dial pointer as shown. To use, set the timer for the desired interval in light and wrap enough loops of the bands around the pointer to hold it at the proper setting. Then, when you are ready to time the development, all you have to do to start the timer is feel for the rubber bands in the dark and slip them off the pointer.

## Cord Substitutes for Tripod

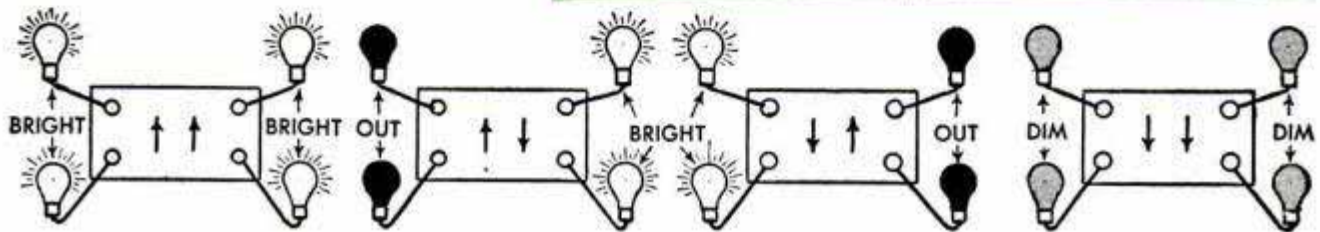
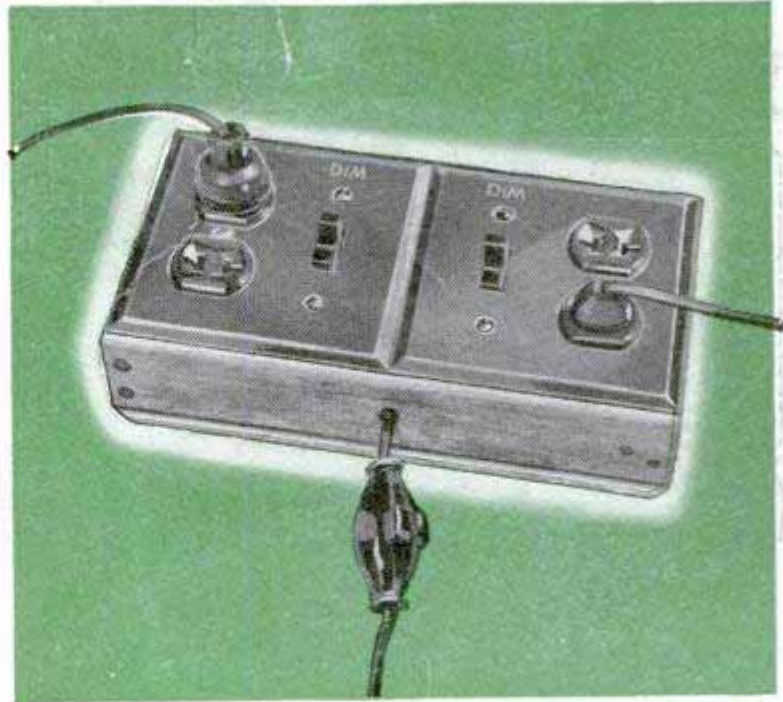
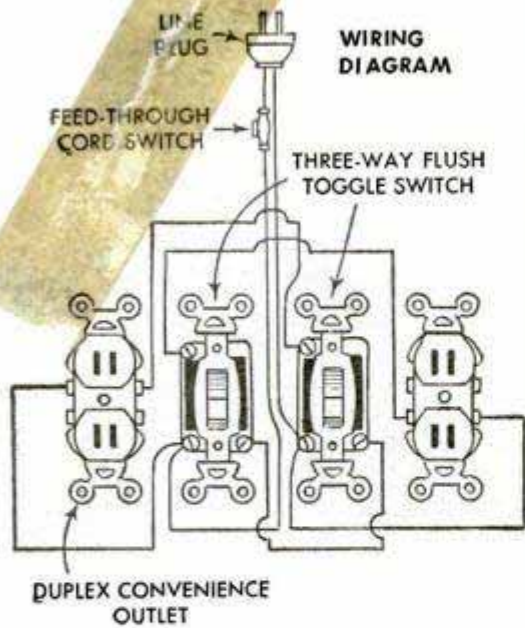
As an exposure greater than  $\frac{1}{25}$  sec. frequently produces blurred pictures when a camera is held by hand, I use a length of strong cord as a tripod to steady the camera against body movement. The cord is tied in a loop long enough to pass under the feet and over the bed of the camera as shown. Thus, by pulling up on the camera, the tension of the cord helps to steady it while snapping the picture. In this



way, I am able to take sharp photos with exposures of  $\frac{1}{2}$ -sec. duration. Carpenter's chalk line provides excellent cord for the purpose. This stunt often will mean the difference between getting a picture and missing the opportunity altogether.

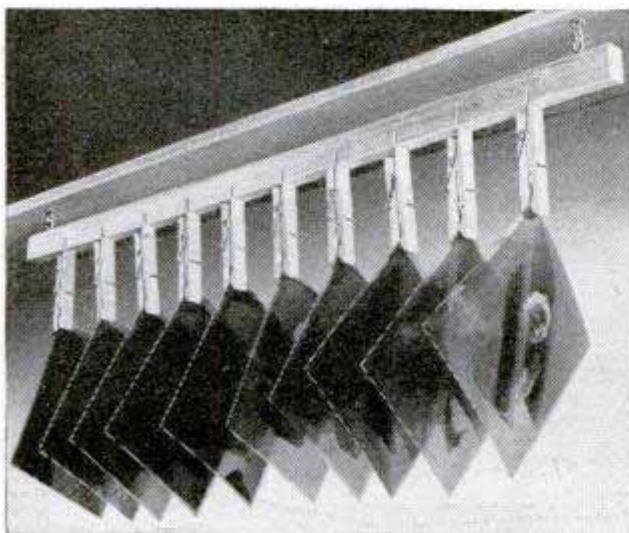
Bob Hurst, Chicago.

# Dimmer Switch Controls Photoflood Lighting



Better indoor shots and more of them can be had from your photofloods if you control the lamps with this handy dimmer switch. Besides lengthening the life of the lamps by dimming them for focusing purposes, the switch makes balancing the light convenient when using lamps for both front and back lighting. Being wired to light the lamps separately or simultaneously, in addition to dimming them, the switch permits a light reading to be taken with either the front lights or the back lights on. The dimming feature also adds to the comfort of your model. The unit

consists of two 3-way, flush-type toggle switches, two duplex convenience outlets, two wall plates and a feed-through switch in the line. The switches and outlets are wired side by side, following the wiring diagram, and are enclosed in a wooden case. The unit will handle four photoflood lamps, but do not use this many simultaneously unless you are sure that the circuit will carry the load. Most house circuits, fused for 15 amp., will safely handle four No. 1 photoflood lamps. If you need more than four lamps or ones of greater size, connect them to two or more circuits.

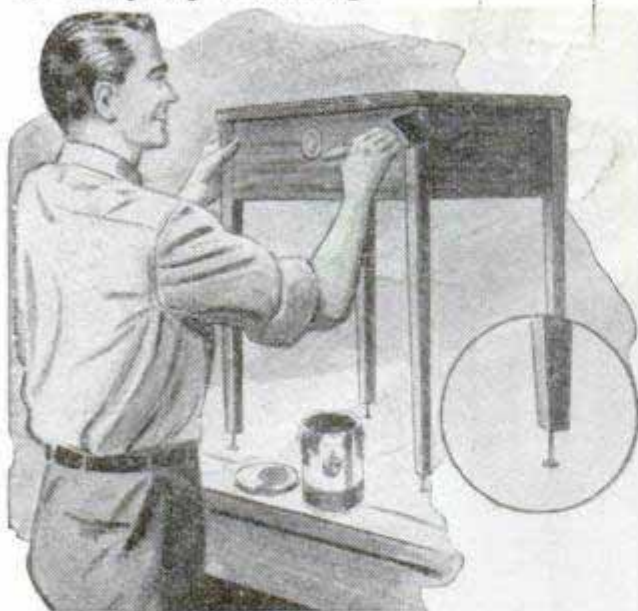


## Negatives Dried on Clothespin Rack

Several spring clothespins and a strip of wood  $\frac{5}{8}$  in. square furnish the material for an excellent negative drying rack. To make the rack, cut one of the legs of each clothespin  $\frac{5}{8}$  in. shorter than the other. Then cut slots about 2 in. apart and  $\frac{1}{2}$  in. deep in one edge of the wooden strip, making them wide enough to take the longer clothespin leg. Finishing nails hold the clothespins in the slots. Two screw eyes turned into the side of the strip opposite the clothespins and near each end complete the unit. It is suspended under a shelf or cabinet by means of small hooks.

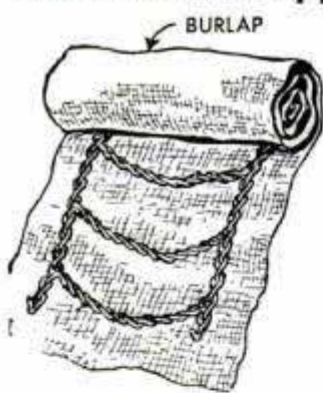
Madison Devlin, San Francisco, Calif.

## Nails in Legs Elevate Furniture To Simplify Painting



To do a better job of painting or varnishing chairs, occasional tables and other lightweight furniture, try driving a nail into the bottom of each leg to raise the piece above the bench top. This makes it easier to brush the finish down to the ends of the legs and keeps paper used to cover the bench top from sticking.

## Tire Chains Wrapped in Burlap



Not only will wrapping tire chains in burlap prevent them from becoming tangled, but it also eliminates the annoying rattle of loose chains in the trunk. Cut a strip of burlap or heavy cloth for each chain, making it

slightly wider and longer than the chain itself. Then, laying the chain flat on the burlap, roll the two together.

Edward J. Monroe, Schuyler Lake, N. Y.

## Slipping of Glued Wood Prevented



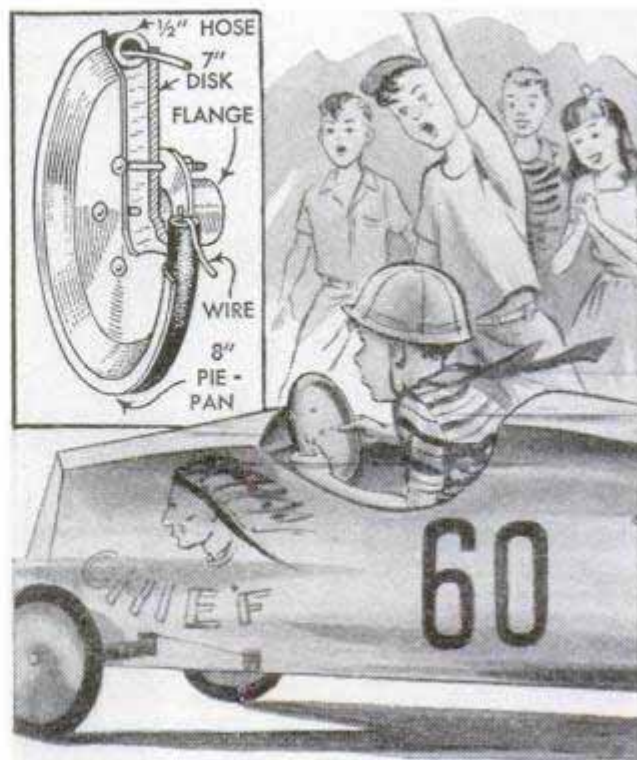
Nailing together 2 pieces of wood being glued to keep them from slipping when clamps are applied is undesirable because it mars the work. However, it is not necessary to nail

the pieces together if a few grains of sand are sprinkled on the glue. As pressure is applied, the sand will be embedded in the wood and prevent slipping and displacement of the parts. The sand should be sprinkled near the center of the work away from edges that will be machined.

## Piepan Provides Steering Wheel For Homemade Racer

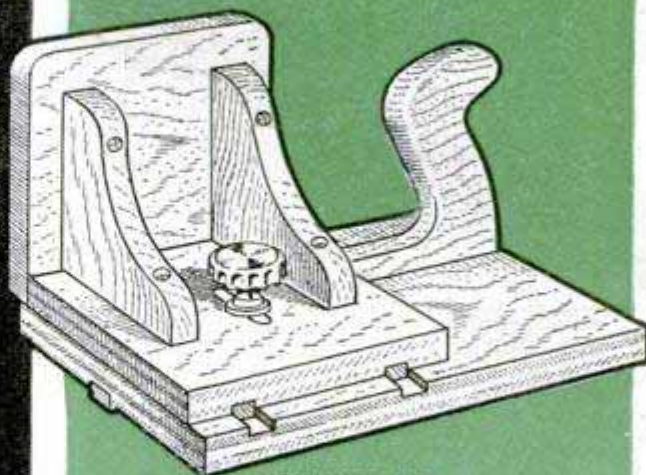
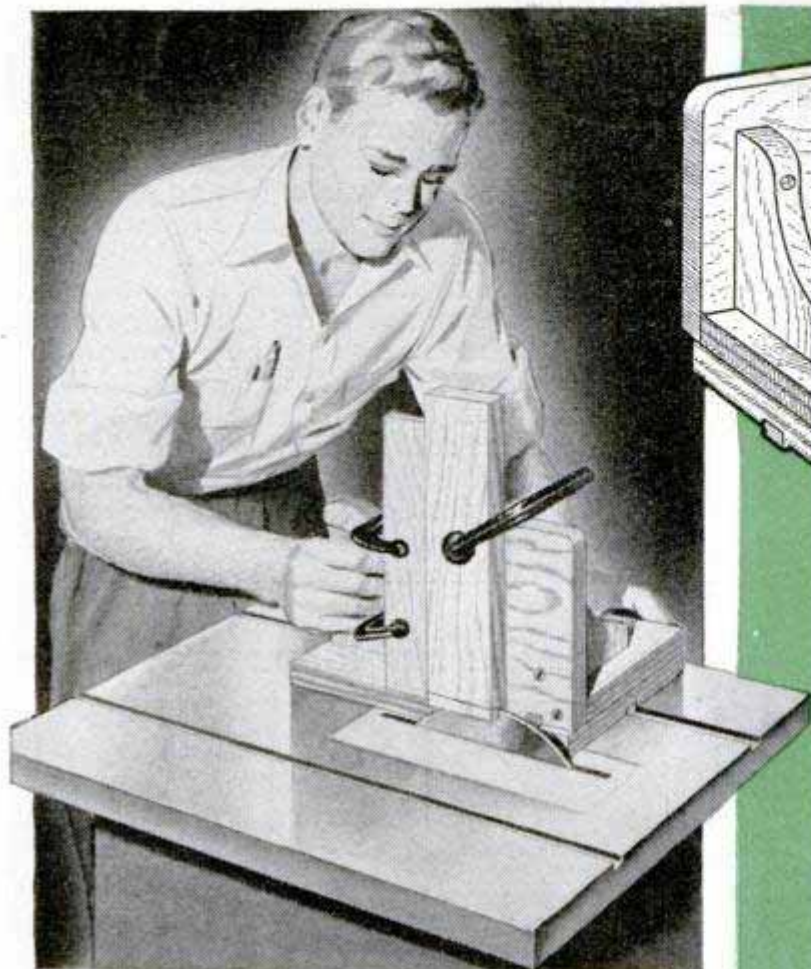
In addition to being sturdy and good looking, this easily built steering wheel for a homemade racer costs very little to make. It consists of an 8-in. piepan and a 7-in. disk of hard-pressed board or plywood fastened to a  $\frac{3}{4}$ -in. pipe flange with 4 bolts. These parts are bolted together loosely and a  $\frac{1}{2}$ -in. rubber hose is cut to length to fit in the groove formed by the piepan and disk. Next, a length of heavy wire (coat-hanger wire will do) is threaded through the hose and its ends are twisted to draw the ends of the hose tightly together. After the ends of the wire have been cut short and tucked into the hose, the piepan and disk are dismantled. Then, bicycle rim cement is spread around the sloping edge of the piepan and the unit is reassembled with the hose in place between the piepan and disk. This time, the parts are bolted tightly to the flange. A length of  $\frac{3}{4}$ -in. pipe provides a steering column, and before the wheel is mounted a locknut is turned on the pipe threads. When the wheel has been screwed on the pipe, the locknut is tightened against the flange to prevent the wheel from backing off as it is turned to the left.

Thos. W. Benson, Philadelphia, Pa.

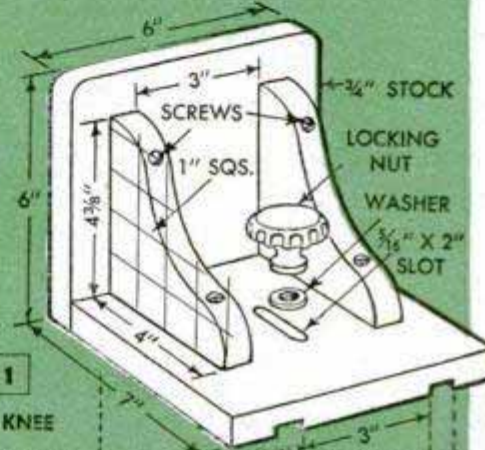




# Shop Notes



ASSEMBLED JIG



1

KNEE

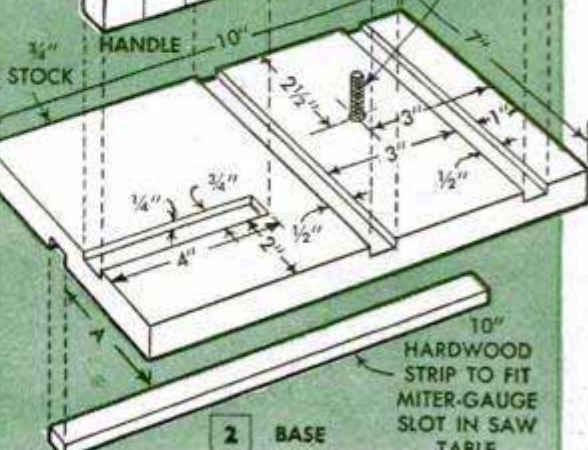
3/8" X 1/2" X 7" HARDWOOD KEYS, PRESS-FIT IN SLOTS

3/4" PLYWOOD HANDLE

HANDLE

1" SQS.

3/16" X 2" BOLT



2

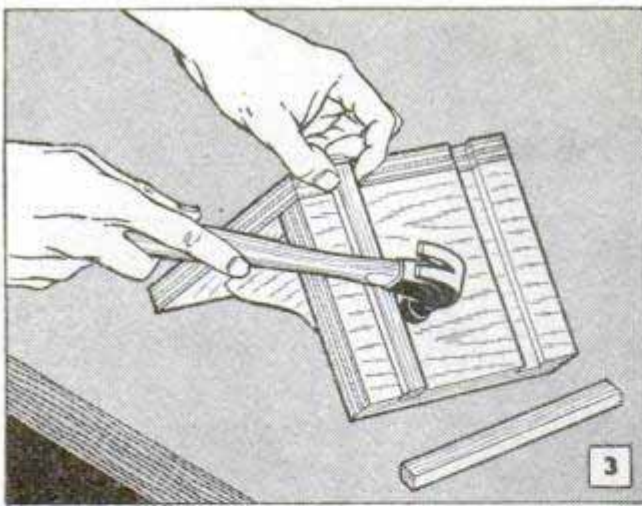
BASE

10" HARDWOOD STRIP TO FIT MITER-GAUGE SLOT IN SAW TABLE

## TENON JIG SLIDES IN TABLE SLOT

NOT ONLY is this wooden jig invaluable when sawing the cheek cuts of tenons, but it is a saw attachment that should be in every home workshop because it affords maximum safety in cutting tenons of small size. The jig is designed to slide in the table groove provided for the crosscut guide, and when its handle is grasped and pushed forward like a hand plane, the jig feeds the work parallel with the blade. Thus, with the work clamped to the jig and the hand away from the blade, the chance of injury is remote when cutting even the smallest tenon.

By using two saw blades spaced with a collar equal to the thickness of the desired tenon, both cheek cuts can be made at one time, after which the shoulder cuts are made in the usual way. In addition to speeding the operation, the jig permits cutting an accurate tenon of uniform width regardless of



the irregular thickness of work being cut.

The original jig was made in two separate parts: the knee against which the face of the work is placed, and the base which has a runner on the bottom to fit the table groove. Figs. 1 and 2 detail these parts respectively. The knee has runners on the underside, Fig. 3, that engage grooves in

the top side of the base, so that the former is adjustable laterally to suit the thickness of the work. The knee is locked in position with a handwheel.

In running the dados for the knee runners, cut corresponding grooves in both pieces at the same fence setting. That is, set the saw fence 1 in. from the blade and run a dado in the knee and one also in the base. Then move the fence for the second cut. In this way, corresponding dados will align perfectly. It is important that the dados be cut exactly at right angles to the base as the face against which the work is clamped must be parallel with the blade. A shoulder or stop for the work is clamped to the face of the knee to suit the end of the work. If the tenons are to be cut on work having square ends, the stop, which is simply a wooden block, is clamped perpendicular to the surface of the saw table. If a miter tenon is to be cut, the stop is clamped in a 45-deg. position or at whatever angle is required. Thus, the stop is used to position the work in relation to its end.

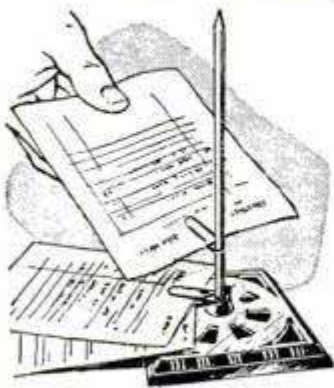
## Heavy Tractor Weights of Concrete Cast in Flat-Rimmed Wheels

Permanent forms for casting concrete weights for rubber-tired tractors are improvised from discarded tractor front wheels having flat rims. Such wheels usually can be picked up in a junk yard. Remove the spokes from the wheels, leaving only short stubs at the rim end to embed in the concrete. Any can of suitable size will provide an inner form for the hub opening. Bolts may be embedded in the concrete and spaced to span the tractor-wheel spokes, or the concrete can be cored to take U-bolts. If regular bolts are used, metal plates are needed to center the weight on the wheel.

A. M. Wettach, Mt. Pleasant, Iowa.



## Clipping Papers to Spindle Facilitates Handling



Shipping orders, invoices, etc., will not be punctured or torn if they are attached to a spindle with paper clips. In addition, this method permits a particular paper to be taken from the spindle without tearing it off or removing

the papers above it. Also, papers can be filed in any desired order by first placing a number of clips on the spindle and then attaching the papers to the clips.

H. Klein, Pittsburgh, Pa.

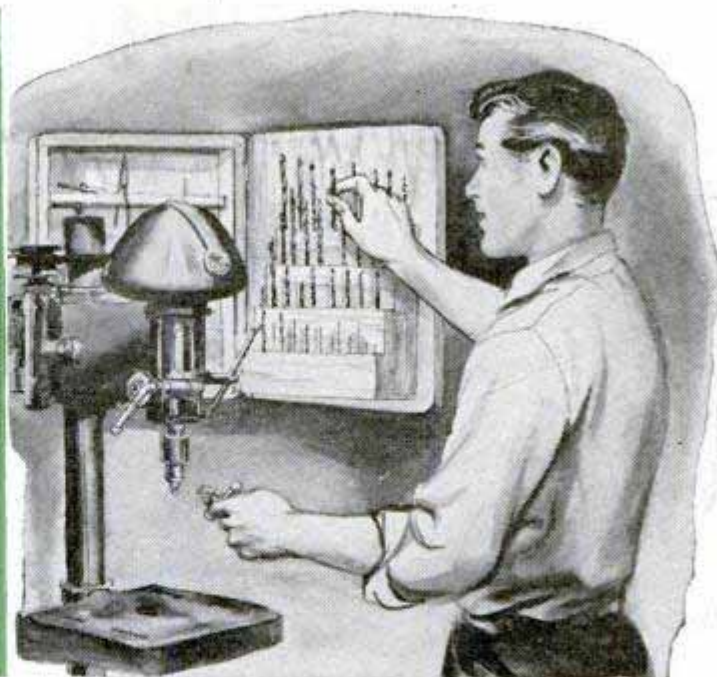
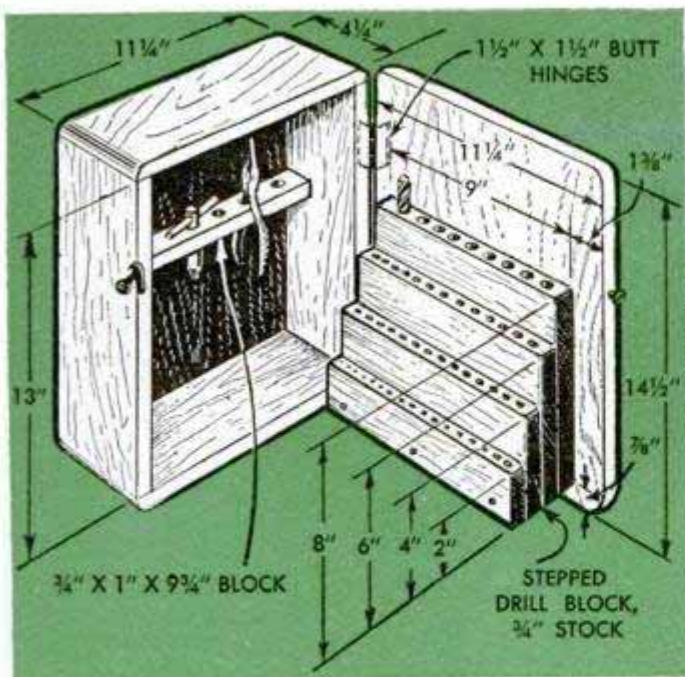
## Magnetized Sheet-Metal Masks Speed Spray Painting

In our sheet-metal shop we use lightweight metal jigs to mask the finished pieces for production paint spraying. However, the jigs had a tendency to lift up when the spray gun was passed over them, thus spoiling the paint job. I corrected this trouble merely by magnetizing the jigs so that they would hold fast to the work. In this way, we saved much time and extra work.

L. Justin Basher, Lancaster, N. Y.



# Wall Cabinet Contains Stepped Drill Rack



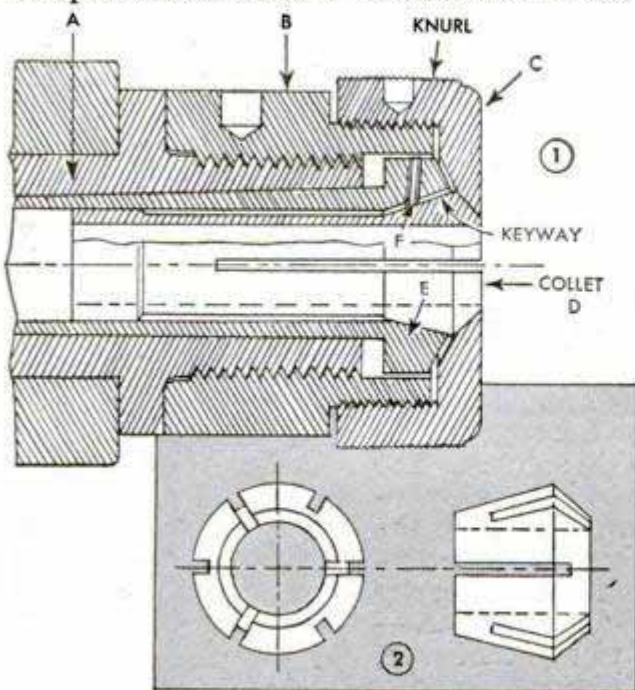
Mounted within easy reach of the drill press, this handy wall cabinet keeps an entire set of drills available for immediate selection. Both cabinet and drill rack are made of  $\frac{3}{4}$ -in. white pine, the rack consisting of four blocks of wood of increasing width fastened to the inside of the cabinet door. A shelf across the back of the cabinet holds wrenches, micrometer and other necessary tools. The drills are stored upright in blind holes drilled in a row along

the top edge of each block, each hole being made with a drill of the next size larger than the one the hole is to retain. After the blocks have been drilled, the holes are labeled appropriately and the blocks are nailed and glued together as shown. Then they are attached to the cabinet door in the same manner. The door is hung on butt hinges and is held closed with a hook or with a hasp and padlock.

Dick Hutchinson, Alhambra, Calif.

## Collet Chuck Is Compressed by Knurled Cap Instead of Draw Rod

Here's a collet chuck that differs from the draw-in type in that a knurled cap instead of the draw rod usually employed compresses the collet. It also has the fea-

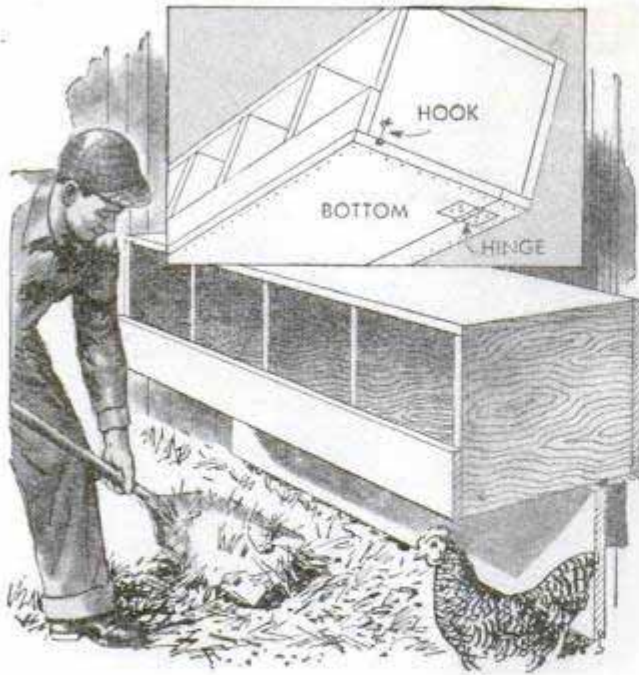


ture of admitting larger collets. The lathe spindle, part A, first is fitted with a hardened and ground taper sleeve, part E. Next, part B is machined and threaded to fit the lathe spindle, after which the part is drawn up tightly against the shoulder of the spindle with a spanner wrench. The outer end of part B has a fine thread for a knurled cap, part C. Note that the hole in the cap is beveled on the inside to match the taper on the front end of the collet, Fig. 1. Pressure at this point, when the cap is tightened, causes the collet to grip the work. A pin, part F, pressed into part E, prevents the collet, D, from turning. If a lathe does not have a hollow spindle, the chuck can be adapted for use by lengthening part B and using the short collet shown in Fig. 2. In this case, of course, only short work could be held in the chuck.

Wm. E. Helsel, Grand Rapids, Mich.

☐ Pipe-threading compound brushed on the teeth of a hacksaw increases the cutting speed of the blade and prolongs its life.

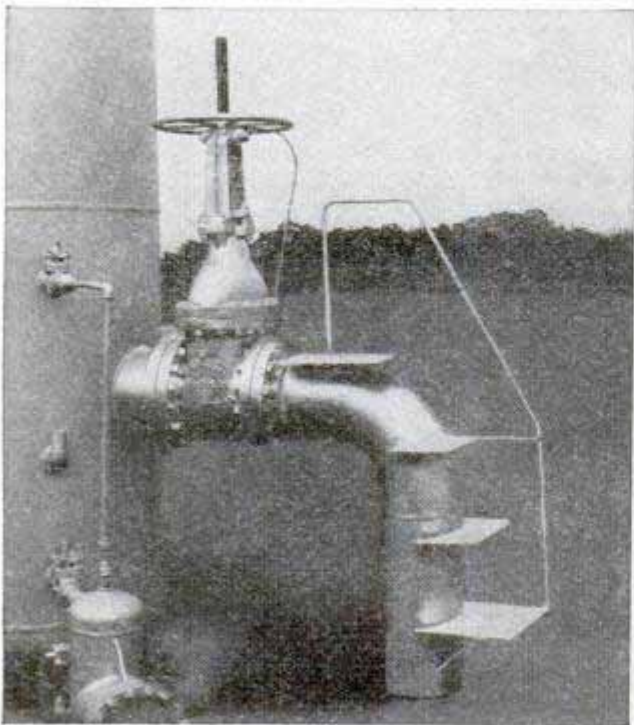
## Laying-Nest Unit Has Hinged Bottom To Permit Rapid Cleaning



When constructing a laying-nest unit, one poultryman found that he could simplify cleaning the unit by hinging the bottom. A hook and eye at each end of the nest holds the bottom in the closed position.  
Opie Read, Jr., Chicago.

## Stairway on Storage-Tank Pipe Facilitates Operating Valve

This steel stairway welded to the inlet pipe of a huge storage tank provides easy access to the valve and a sure footing for the operator. The steps and platform are made from steel floor plates, the steps being cut to fit the curvature of the pipe. A



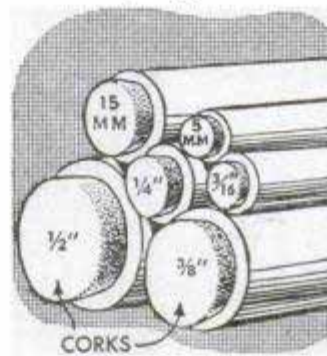
handrail of  $\frac{1}{2}$ -in. rod is an additional safeguard. Painted aluminum, the stairway requires little or no maintenance and does not interfere with changing or working on the valve.—Elton Sterrett, Houston, Tex.

## V-Block Adapts Lathe Dog For Small Work

Where only one lathe dog is at hand and the clamping screw does not advance far enough to handle small-diameter work, the dog can be adapted for this purpose by fitting it with a V-block insert. The insert is made by tracing the inside contour of the dog on a piece of flat brass  $\frac{3}{8}$  in. thick. Then, this is cut and filed to shape and notched to form the V-block.



## Identifying Diameter of Tubing



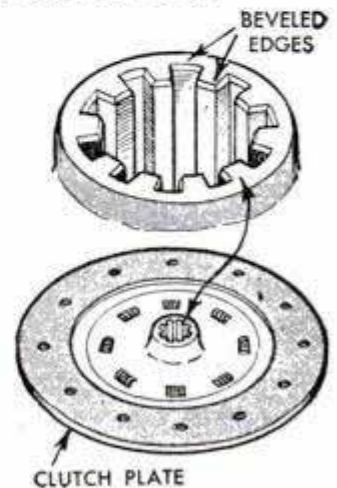
If small quantities of tubing or pipe of various sizes are stored together in one rack, here's a way you can tell at a glance the diameter of each piece. Simply insert a cork in one end of each length of

tubing and print the size of the tubing on the face of the cork. If the tubing is cut from the end opposite the cork, the piece will be identified permanently.

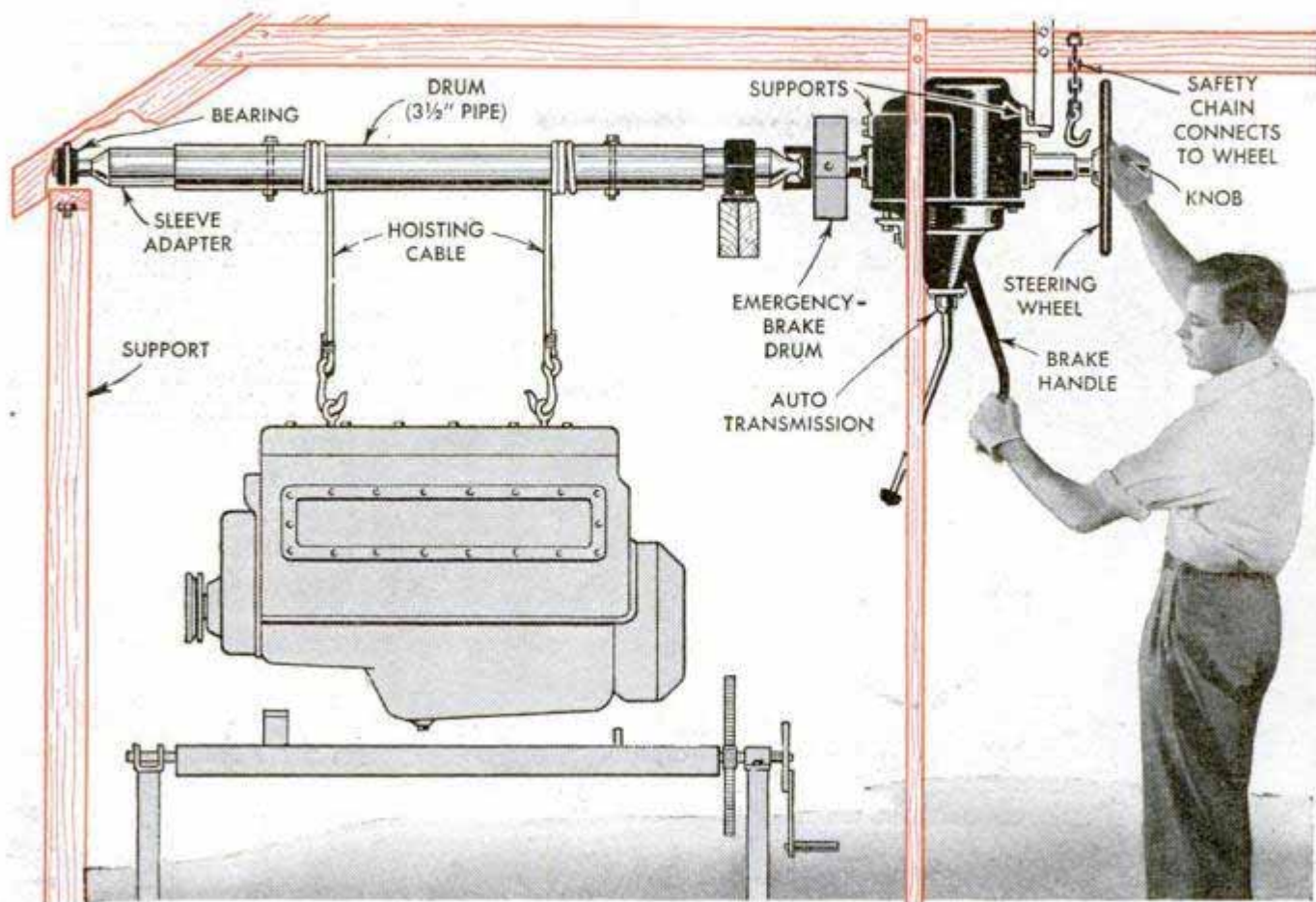
Jo Ro Jung, Jr., New Orleans, La.

## Beveling Clutch-Plate Splines Aids Mounting Transmission

Guiding the transmission shaft into the splines of the clutch-plate hub is simplified by filing a bevel on the edges of the hub splines. The beveled edges permit the end of the shaft to center itself and be easily slid into place.—Erwin S. Plavec, Chicago.



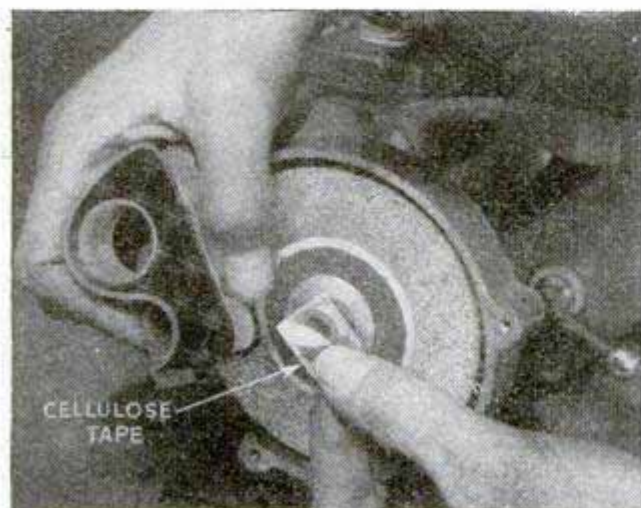
# Transmission Operates Variable-Speed Hoist



By utilizing an old auto transmission of the type having the emergency brake mounted on the drive shaft at the rear of the housing, you can build a powerful hoist for use either on the farm or in the garage. The detail above shows a typical installation with the transmission mounted upside down so that both the shift lever and the emergency-brake lever can be reached easily. The hoist is operated by an auto steering wheel attached to the forward drive shaft of the transmission. A chain with a small hook at one end is attached to the supporting framework so that when a load is raised the chain can be hooked to a

spoke of the handwheel. The drum is a length of 3 1/2-in. pipe which is slipped over the auto drive shaft and centered by means of sleeve adapters. After fitting, the parts are welded in place for maximum strength. The inner and outer ends of the drum shaft are supported in pillow-block bearings as shown. If regular pillow blocks are not available, suitable bearings can be made by cutting short lengths of pipe of the correct inside diameter and welding to lengths of flat iron to form bases. Drill the flat-iron bases so that the bearings can be attached to the frame with bolts.

Peter P. Ruppe, East Detroit, Mich.

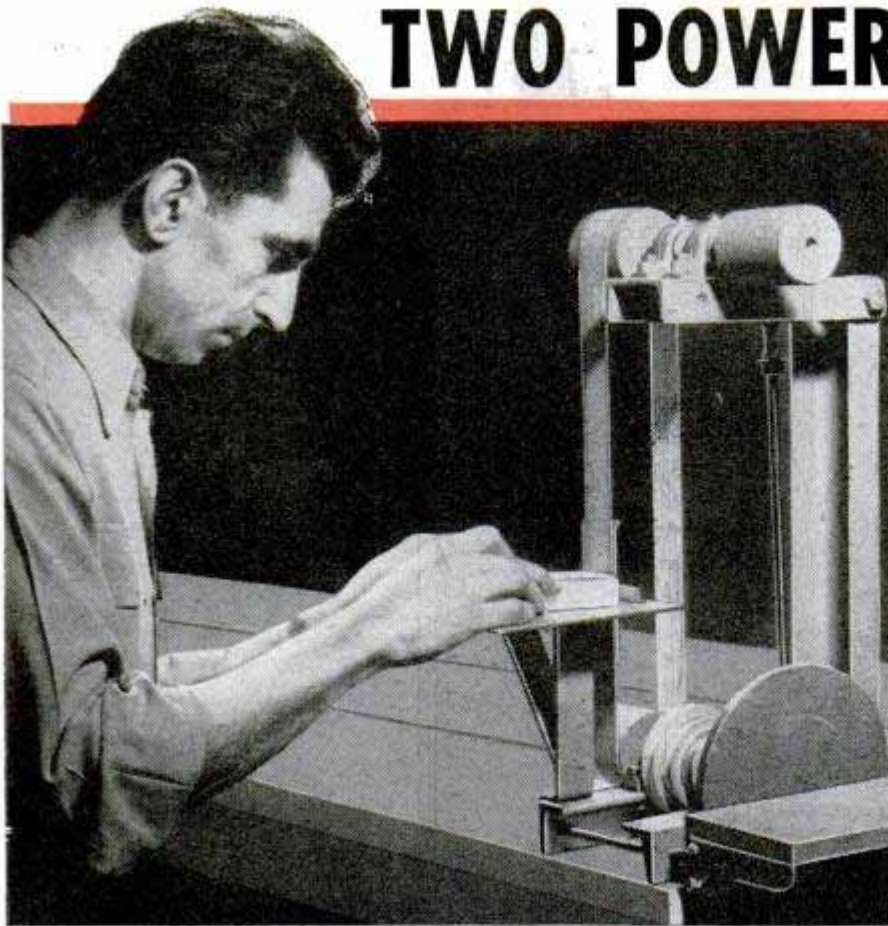


## Tape Seals Hole in Grinder Spindle To Keep Out Abrasive Dust

When using a tool-post grinder for external work, it's a good idea to seal the hole in the tapered spindle with a piece of cellulose tape. This will keep abrasive dust from entering the taper and preventing the internal grinding quills from seating properly. The cellulose tape is removed quickly when the spindle is to be used.

¶ Duplicator stencils, which are used and kept on hand for future use, produce better copies if they are rubbed on both sides with a little light machine oil before storing.

# TWO POWER SANDERS

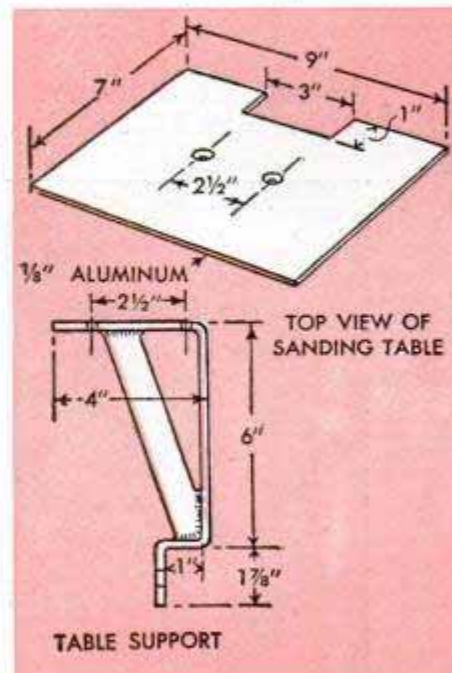
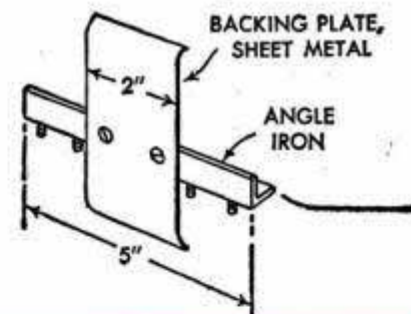


One model combines three sanders in one machine driven by a single motor. The other, a 6-in. belt sander, employs standard shaft hangers for bearings, and features positive tension adjustment. Both machines can be built at nominal cost from scrap parts

By  
**R. Barsamian**

**H**ERE ARE TWO homemade sanders that will handle practically every sanding job in the home shop. One is a combination band, disk and drum sander, while the other is a conventional 6-in. belt sander. Both can be made inexpensively, using standard parts along with odds and ends.

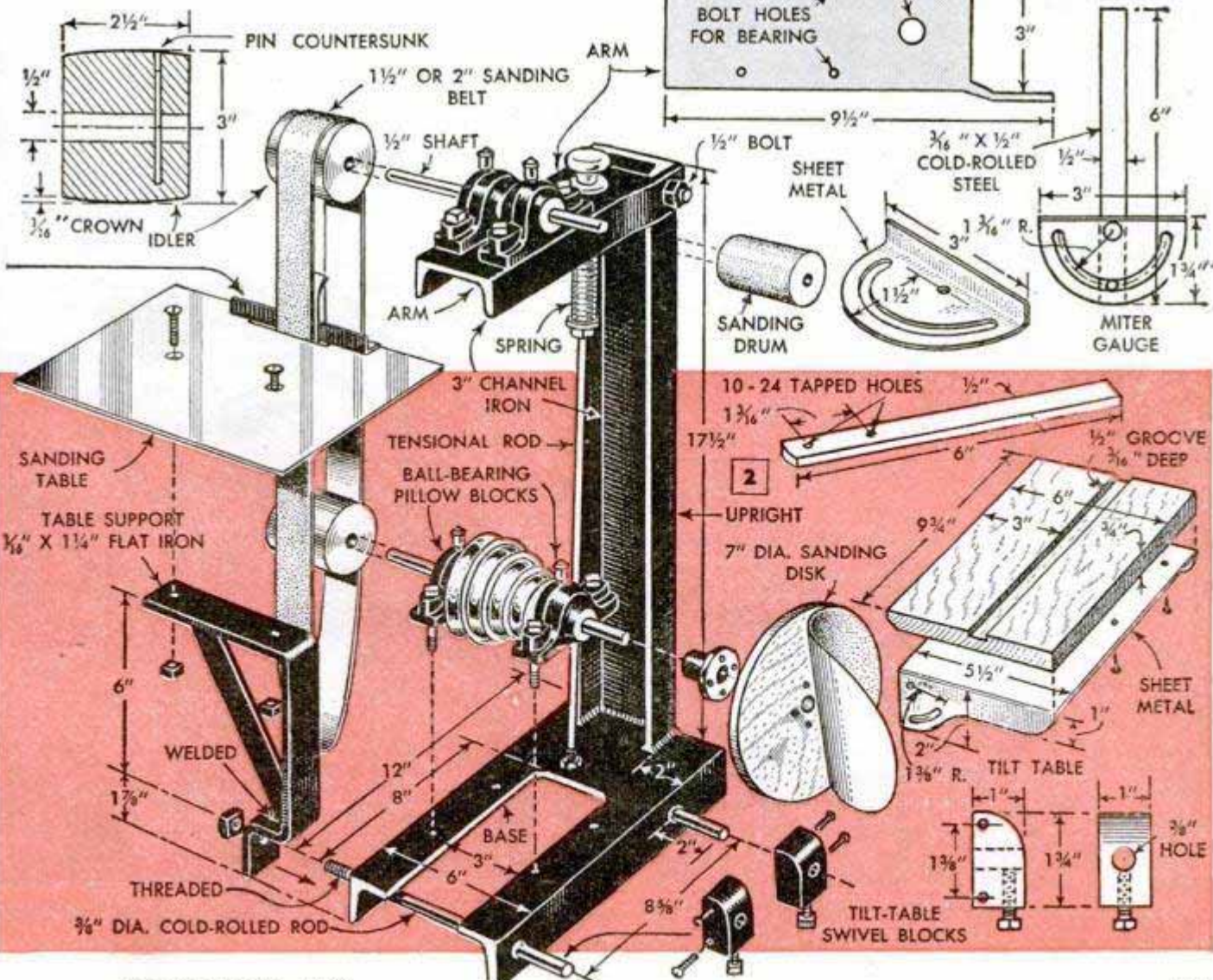
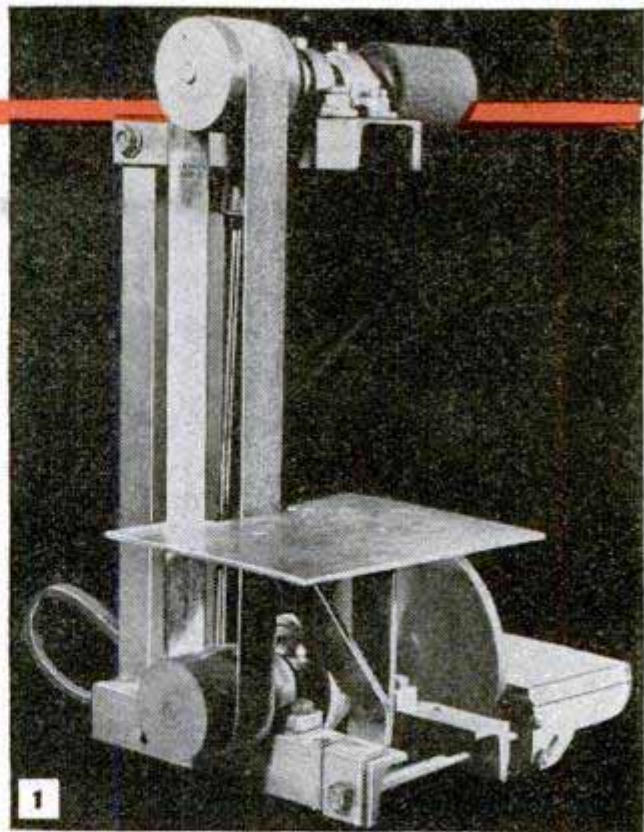
**Band Sander:** Figs. 1 and 2 picture and detail the construction of the combination sander. The framework is assembled from pieces of channel iron, the upright being 3-in. channel welded to a 6-in. channel base. Note that the upright is located 2 in. from one edge of the base and that a 3 by 8-in. opening is cut in the base to permit belting and driving the machine from below. The dimensions given for the frame accommodate a 45-in. standard belt. If a longer one is used, the upright must be lengthened. Holes are drilled in the top surface of the base for mounting two ball-bearing pillow blocks. These carry the drive pulley and double-end shaft which drive the sanding belt and the disk. The arm, which carries the upper bearings, also is a length of 3-in. channel iron with the web cut out at one end, as shown, and the flanges spread apart to fit over the flanges of the channel upright. The arm is drilled and pivoted to the upright with a 1/2-in. bolt, after first being drilled for two bronze-bushed pillow-block bearings and a tensional rod. In drilling the mounting holes for the pillow blocks, extra care must be taken to assure perfect alignment of both upper and lower bearings. This is important, as there is no provision for adjustment of sanding-belt trackage other than the use of shims under the pillow blocks. It is also important that the holes for the tensional rod in both base and arm be aligned accurately to avoid the necessity of shimming the pillow blocks. The hole for the rod in the arm must be elongated slightly with a round file to provide clearance. The rod, which is threaded at each end, is anchored to the base by two nuts and a lock washer. A washer and nut on the upper end provide a shoulder for the end of a 3/8-in. i.d. compression spring which bears against

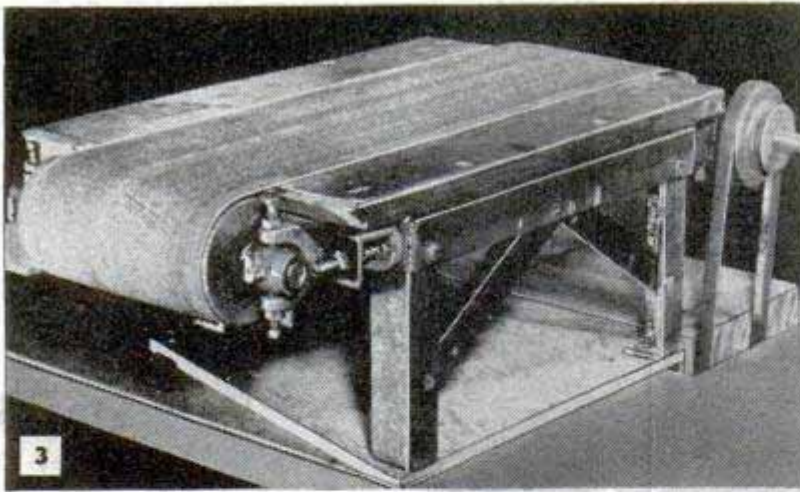


# FILL ALL NEEDS

the underside of the arm. The location of the nut and washer must suit the spring used and tension desired. The end of the rod is capped with a handwheel, which is tightened or loosened to regulate belt tension. The flanges of the channel-iron base are drilled for three studs on which the swivel blocks and table bracket are mounted. Two of the studs are formed by a single rod, one end being threaded before tack-welding the rod in position.

The idler and driving drums for the belt sander are turned to size and balanced right on their shafts. This is done by drilling a 1/2-in. hole in the end grain of hardwood blocks and pinning each block to its shaft with a nail driven crosswise through an undersize hole in both drum and shaft. Note that the drums are crowned 1/16 in. The sanding-belt table, which can be either metal or wood, is supported by a 90-deg. bracket bent and welded from 1 1/4-in. flat iron. This bracket is mounted on the threaded base stud. Note that the table is





notched at the rear edge to take a backing-plate fixture for the belt. This fixture is installed after the belt is on the drums.

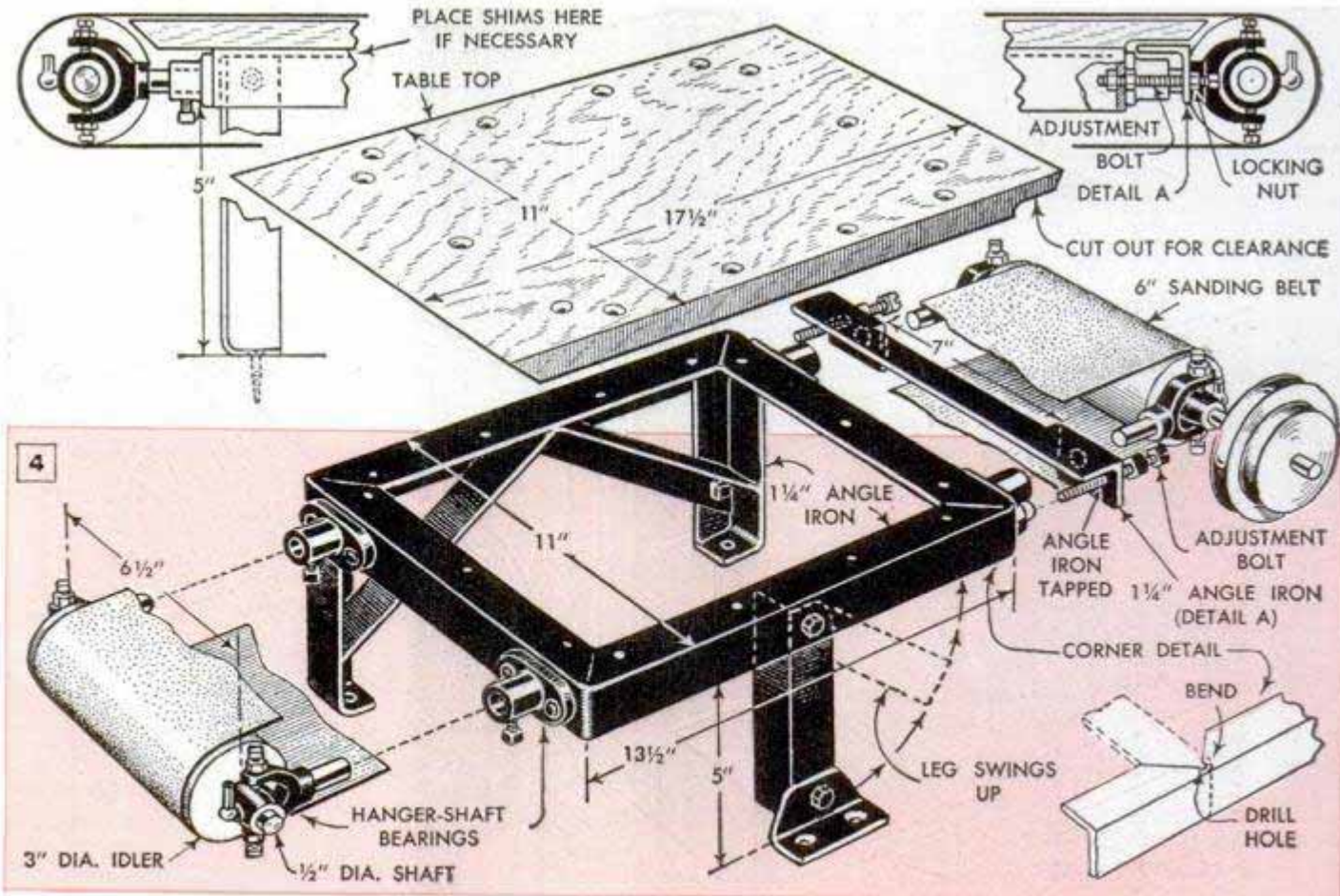
The sanding disk features a tilting table which accommodates a miter gauge. Swivel blocks for the table are cut from 1-in.-square bar stock, drilled to fit over the studs on the base. The top edges of the blocks are rounded to give proper clearance. Note that setscrews are provided to lock the blocks to the studs and that two small machine screws are fitted in tapped holes in the outer faces of the blocks. These screws are for the one-piece trunnion fixture which is bent from sheet metal and faced with a hardwood table, the latter being grooved to take a commercial miter gauge or a homemade one as detailed. The

front edge of the wooden table is beveled 45 deg. The sanding disk is a piece of plywood faced with sandpaper and mounted on the shaft by means of a small faceplate. A regular metal sanding disk can be purchased if you wish. Likewise, a commercial unit can be used for the drum on the idler shaft.

**Belt Sander:** This sander uses standard  $\frac{1}{2}$ -in. shaft hangers and a 6-in. endless sanding belt. The base parts of the hangers are bolted to the ends of a metal framework that is shaped and

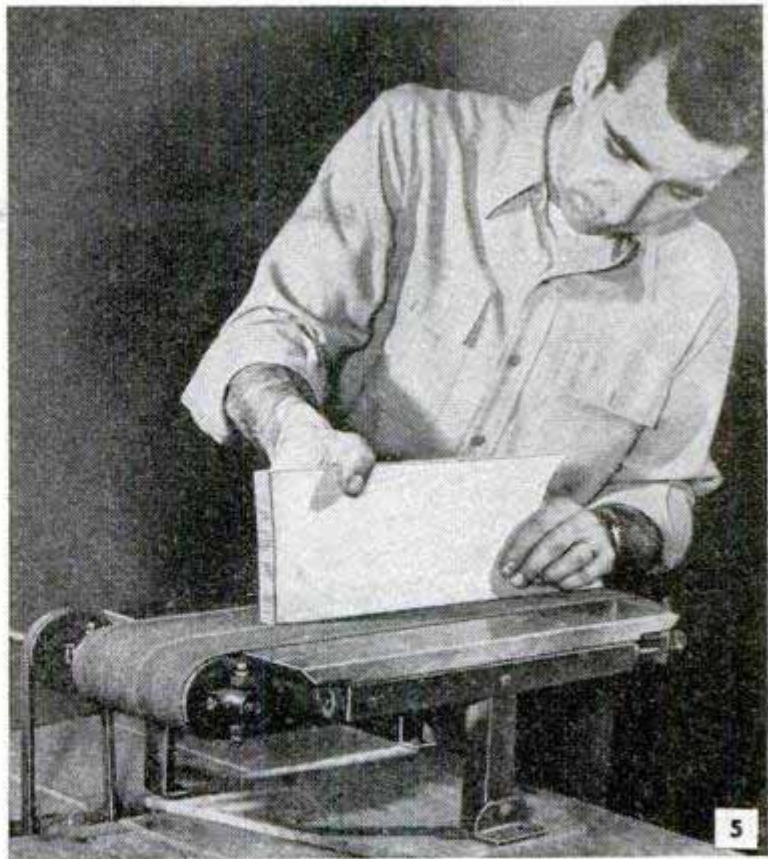
braced as shown in Fig. 4. The top part, to which a wooden table is bolted, is bent from one piece of angle iron by drilling a small hole at the point of bend and then cutting out a 90 deg. segment or gusset as indicated in the detail. Welding the mitered corners, as well as the two rear legs, to the frame, makes an exceptionally sturdy assembly. However, the parts can be bolted together. Note that the front leg pivots to permit mounting and removing the sanding belt.

The idler and driving drums are balanced by pinning and turning them on their shafts. Belt tension and tracking adjustment are provided by a piece of angle iron drilled and tapped at each end for a  $\frac{1}{4}$ -in. adjusting screw and locknut. This piece



also is drilled at each end to slip loosely over the post of each hanger. It may be necessary to cut out a 7-in. section of the angle iron to give clearance for the driving drum. Belt tension and tracking are maintained simply by turning in or backing out the adjusting screws, as the ends of the screws bear against the frame and force the hangers inward or outward. You may find it necessary to rabbet the underside of the wooden table to provide clearance for the tension fixture. Also, shims may be required between the frame and wooden table to bring the surface flush with the sanding drums. While the sander is shown without a fence in Figs. 3 and 5, one can be made by clamping angle-iron supports to the rear legs of the machine and fastening a hardwood fence to them to overhang and clear the sanding belt.

Note that the pillow-block bearings of the band sander, Fig. 2, and the shaft-hanger bearings of the belt sander, Fig. 4, are fitted with either oil cups or grease fittings. A ¼-hp. motor is sufficient to operate the band sander. How-

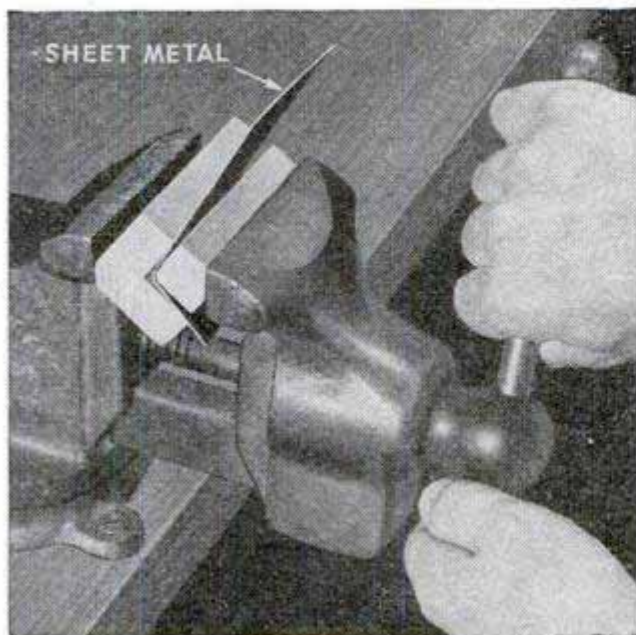


ever, the belt sander should be driven by a motor of at least ⅓ or ½ hp., especially when coarse sanding belts are used.

## Vise Equipped With Hardwood Die Serves as Sheet-Metal Brake

Sheet metal of light gauge can be formed without marring its surface by using a brake which consists of a block of hardwood cut into two parts so that the pieces come together at the desired angle. The metal is placed between the two parts of the block and a vise is used to force the pieces together. Because of the natural "spring back" tendency of most metals, cut

the block apart at an angle greater than the bend required so the metal will be bent slightly more than the desired angle. Also, flatten the corners of the block which rest against the vise jaws to keep the block from slipping when pressure is applied.

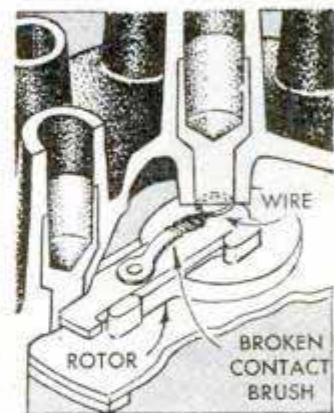


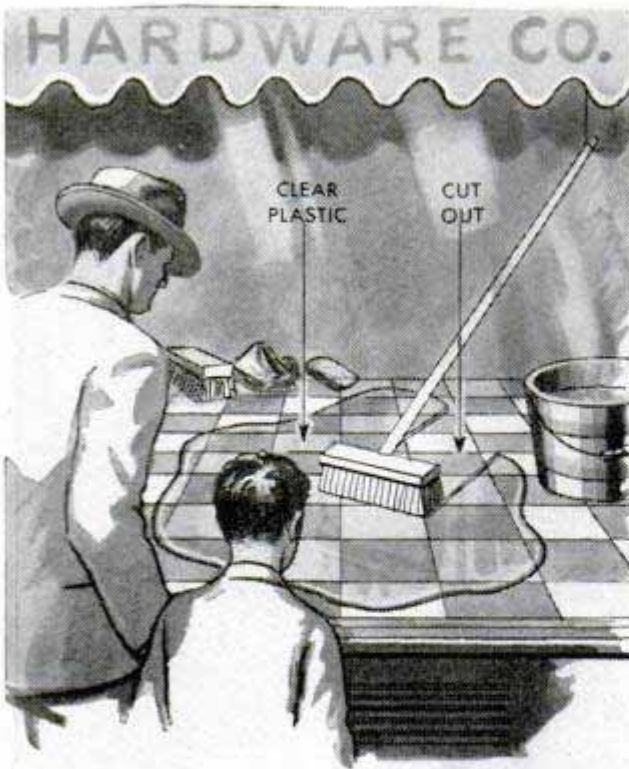
## Hairpin Makes Emergency Repair For Broken Rotor Contact Brush

Motorists caught on the road with a broken distributor-rotor brush will profit by remembering this simple emergency repair. It can be made with any bit of wire, even a hairpin, by twisting the wire around the remaining part of the brush and forming the free end of the wire into an eye.

The eye is bent upward to make contact with the center terminal of the distributor cap. While this is only a temporary repair, it will permit driving to a garage.

John Krill, Youngstown, Ohio.

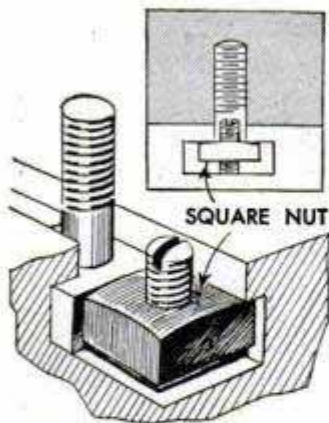




### Sheet Plastic Simulates Water For Show Window

An enterprising hardware dealer added an interesting touch to his window display of mops and scrub brushes by using a sheet of clear plastic to simulate water. He trimmed the edges of the sheet to an irregular shape and cut away a portion of the center to give the appearance that a long-handled brush had been pushed partially through the "puddle." The brush was held in the normal working position by a piece of string suspended from the ceiling and tied to the end of the handle.

### Adjustable Stops in T-Slots Position Angle-Plate Bolts



Attaching duplicate work to the angle plate of a milling machine is easier and faster if the bolts which anchor the work to the plate are held in position with stops. Thus, when the work is removed, the bolts will not slide down in the T-slot.

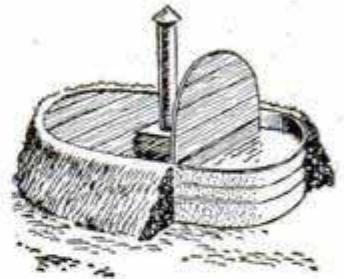
Where it is required that the anchor bolts do not slide in either direction, a stop is placed on each side of the bolt head. The stops are held in the T-slot with headless setscrews, which, when tightened, cause the stops to bear against the underside of the slot overhang. To make a stop, select a

bolt having a square nut of a size that will slide freely in the T-slot. Then make the setscrew by sawing off a short length of the bolt and slotting one end.

W. F. Schaphorst, Newark, N. J.

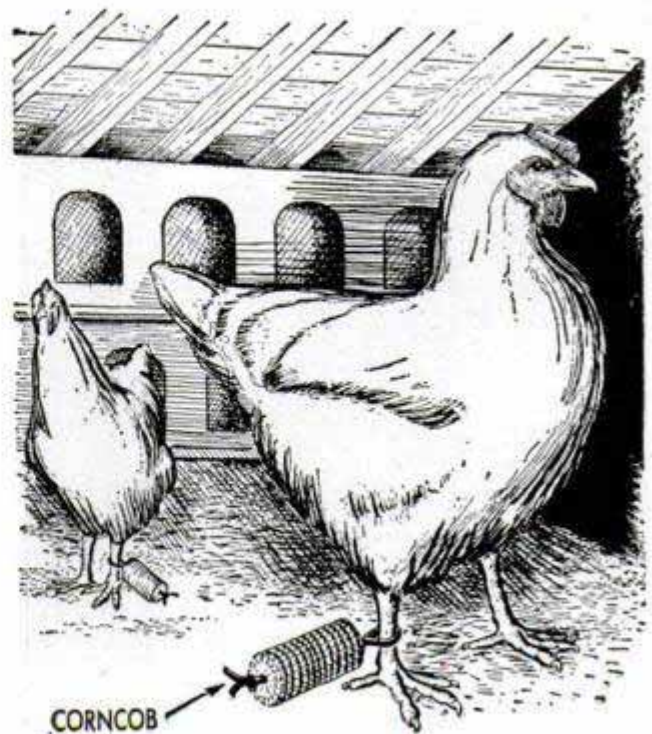
### Winterizing Stock Tank

Insulating a stock watering tank reduces considerably the amount of fuel oil necessary to heat the water to keep it from freezing in extremely cold weather. This is done by banking the tank with partly-rotted straw and fitting the top with a hinged wooden cover. A wooden baffle which extends below the surface of the water is fitted to the cover at the point where it is hinged. The baffle prevents cold air from circulating over the entire surface of the water in the tank when the cover is raised. Thus, heat loss is reduced and the tank heater burns less fuel.

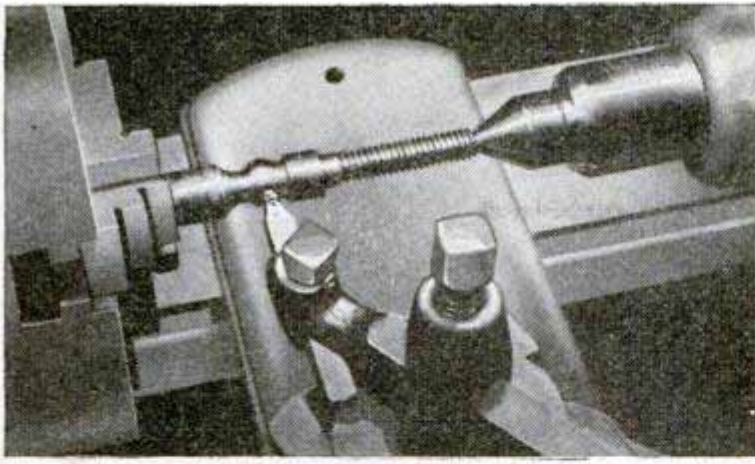


### Corncob Tied to Hen's Leg Discourages Brooding

One poultryman discouraged the brooding habit of some of his hens by tying a piece of corncob to one leg of each hen. The corncob distracts the hen's attention from her desire to brood and also makes her position in the nest uncomfortable. A hole punched through the center of the corncob permits fastening it to the hen's leg with a strip of tape or cloth.







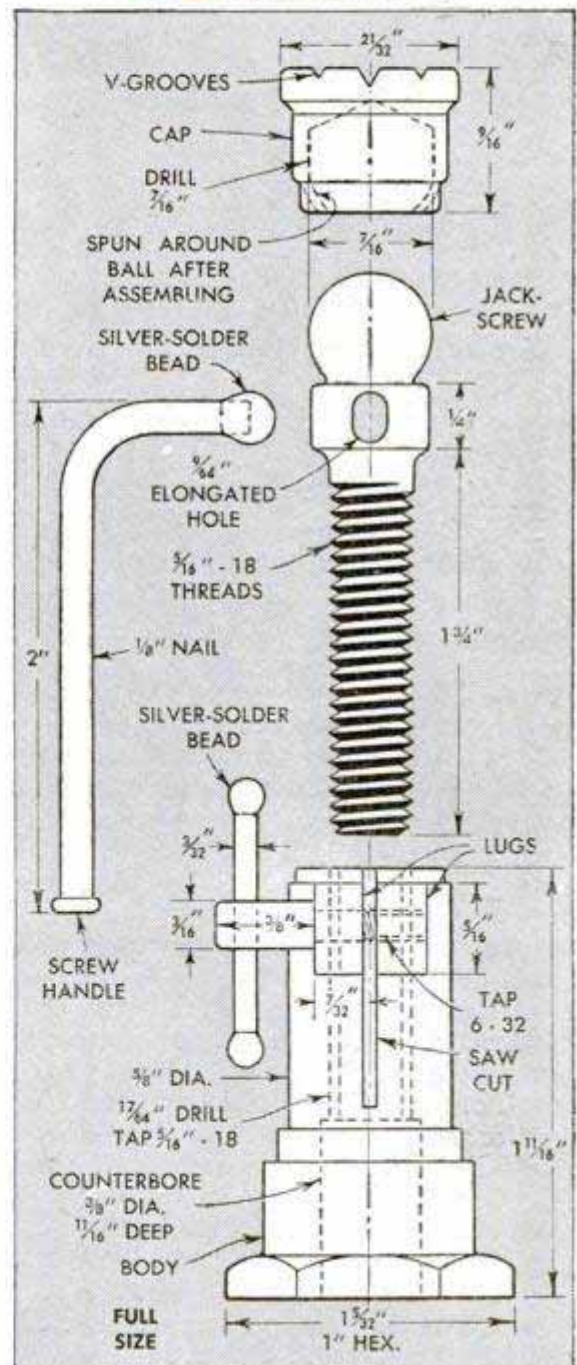
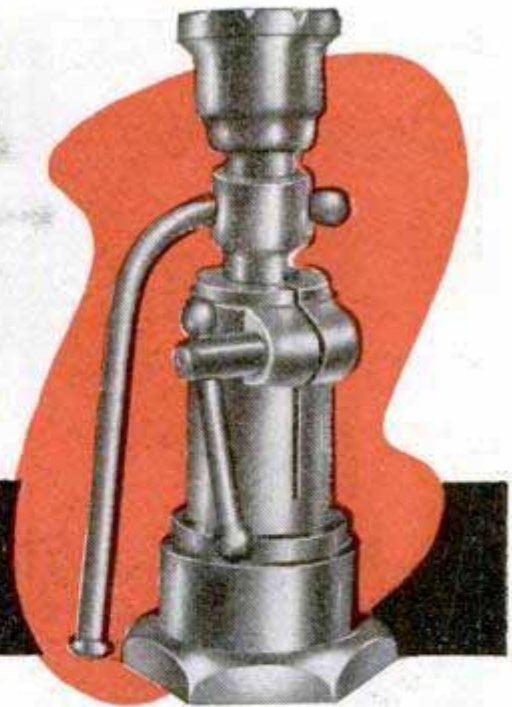
## SMALL SCREW JACK *a metal-turning project*

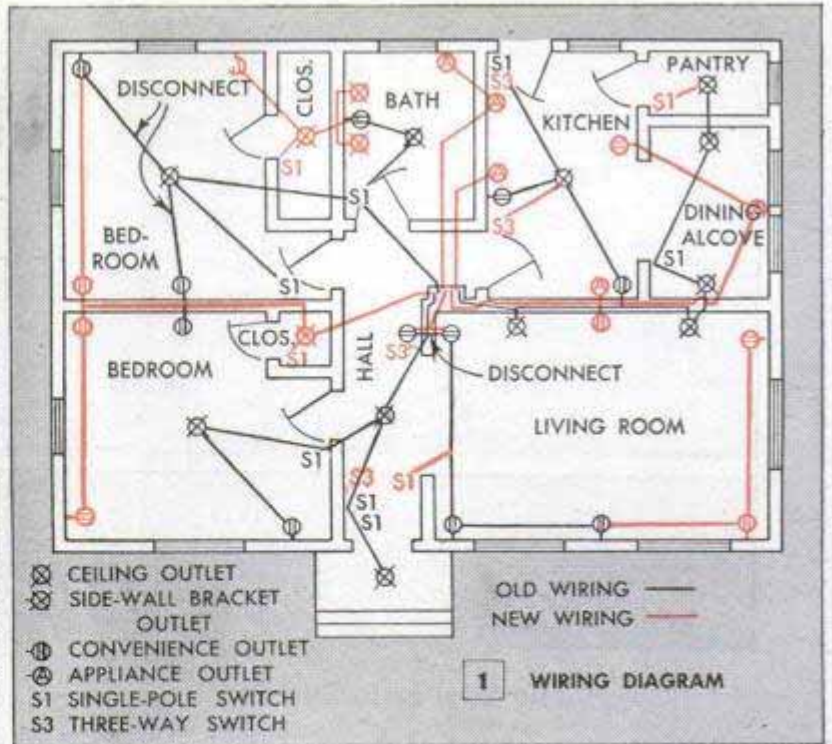
By Walter E. Burton

This little screw jack is really a jack-of-all-trades around the shop. The machinist will find it useful for leveling, internal-clamping operations in machine-tool setups and in assembly work. The jack consists of only 6 parts and the necessary machining operations make it an excellent lathe project. The curved screw handle can be folded down against the body of the jack and a clamping arrangement permits the jack-screw to be locked without disturbing its position. The body of the original jack was made from a piece of 1-in. hexagon aluminum bar, although it can be turned from steel or brass. Other parts are of cold-rolled or hardenable tool steel, the latter being preferred for durability.

Begin making the jack by turning the body to the shape indicated, leaving a ridge about  $\frac{5}{16}$  in. long for the locking lugs. Next, drill and tap a hole through the body for the jackscrew, and slot the lug side of the body for at least half its length. Then shape and drill the lugs, reaming out one of them and tapping the other. After this, make the locking screw and drill a hole transversely through its unthreaded end to take a handle which is made from a nail or  $\frac{3}{32}$ -in. steel wire. Silver-solder beads keep the handle from slipping out of the hole.

The jackscrew is turned and threaded as indicated and an elongated hole for the screw handle is made through the portion of the jackscrew just below the ball. The cap is machined and then recessed with a  $\frac{7}{16}$ -in. twist drill. After completion of the parts, the ball is oiled and the joint assembled by hammering the cap edge around the ball or by spinning, that is, forcing the flat tip of a screwdriver against the edge while turning the assembly in the lathe. The cap should be able to tilt about 10 deg. from the vertical in all directions. The screw handle is made in the same way as the locking handle and V-grooves are filed or milled across the top of the cap to keep round work from slipping.





# REWIRE YOUR HOME FOR

**If your home is more than 10 years old, it probably is not wired adequately to enable you to enjoy fully the convenience of modern electrical appliances**

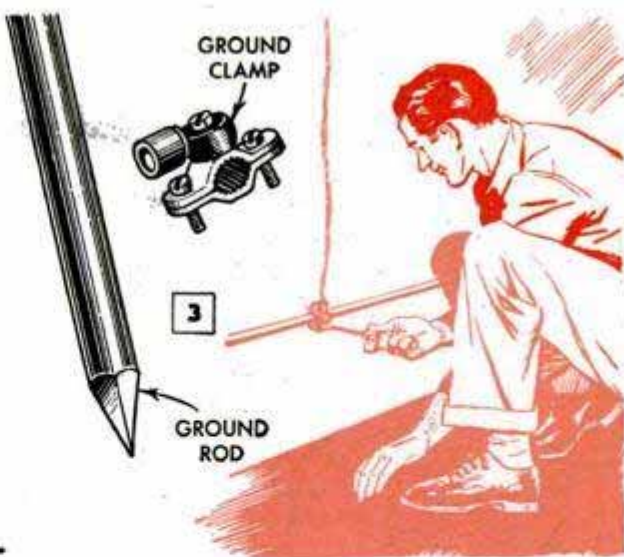
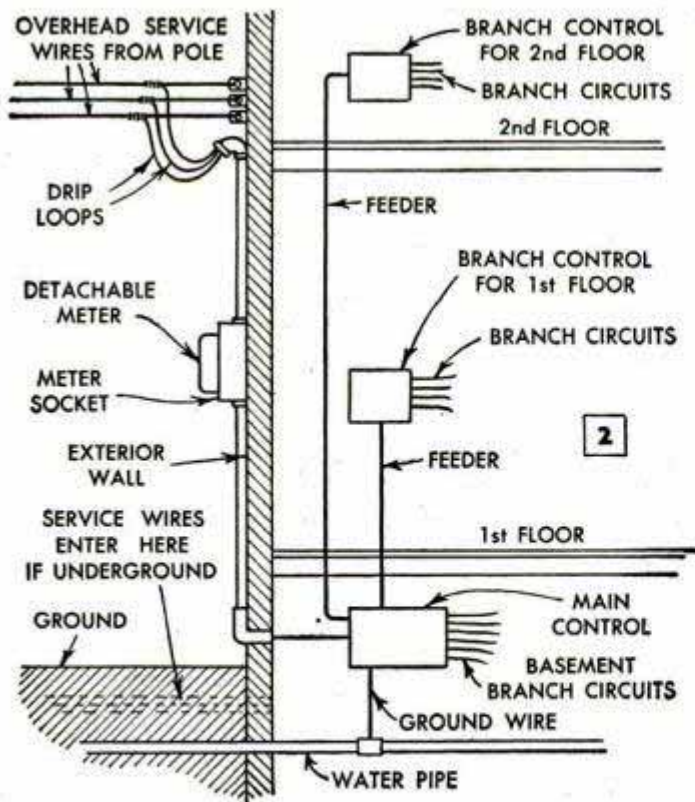
*By Thomas Trail*

**O**LDER homes usually are not wired to make full use of all electrical conveniences now available or being developed. In many houses, the wiring is not of approved sizes to carry modern appliance loads; there are too few switches for control of the lights and an insufficient number of convenience outlets. Rewiring a home to take care of present and possible future requirements is quite simple to do. While most localities have no regulations prohibiting a homeowner from doing his own wiring, it generally is required that the completed job be inspected by a competent electrician for compliance with both the national and local electrical codes. Therefore, before going ahead with a wiring job, the homeowner should study all the local ordinances and codes and should be familiar with the requirements of the national electrical code.

A rewiring job requires careful planning, so the first thing to do is make rough pencil sketches of the present wiring, as shown in black lines on the wiring diagram, Fig. 1. Make a separate diagram for each floor of

the house. If there is a garage or other building wired for electricity, include this on the ground-floor sketch. On each sketch, simply mark the approximate location of each lighting fixture, wall switch, convenience outlet, etc. Next, make pencil notes of the various conveniences and appliances desired. Among those that may be needed are fluorescent lighting, combination receptacles for radio power, aerial and ground, Fig. 4, and switches that permit lights to be turned on and off from any entrance to a room or from the top or bottom of a stairway. Other modern conveniences include door switches in all clothes closets, Fig. 5, that turn on the lights when the doors are opened, and outlets that provide plug-in receptacles easily reached from any part of the room. Locate separate outlets for the kitchen clock, mantel clock, electric iron, washing machine, dishwasher, garbage-disposal unit and a ventilating fan. Any other special lighting problems should be considered and provided for in the rough plan.

If wires are not large enough to handle maximum current requirements, lights and appliances will not deliver their rated output. The national code recommends No. 12 wire as the smallest size to be used on branch circuits. Furthermore, the code specifies that wiring capacity be sufficient to provide at least 2 watts of lighting for every square foot of floor area in the house,



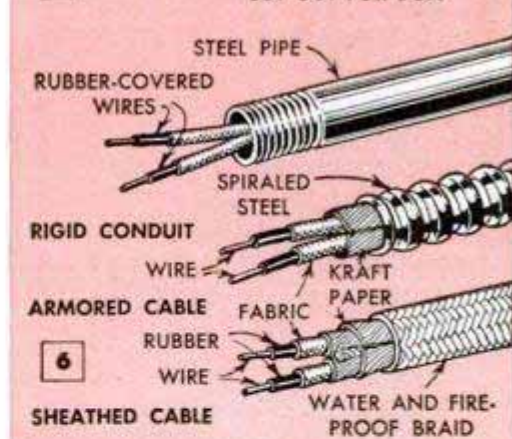
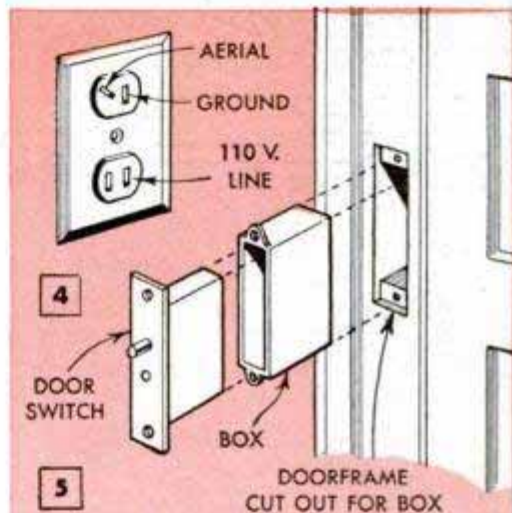
Grounding of neutral wire at service entrance is accomplished by connecting to water pipe with clamp shown above. If water pipe is not available, ground wire is connected to rod driven into ground

# MODERN LIVING

excluding unfinished areas such as the basement and attic unless these require special lighting.

In addition to lighting requirements, capacity for 1500 watts of appliance load must be provided on circuits separate from the lighting and convenience-receptacle circuits. Appliance circuits usually are provided for the kitchen, dining room, utility room and laundry, or whichever of these are on the floor plan. If a total of more than six receptacles is required in these locations, two or more circuits are provided. When planning appliance circuits, remember that other heavy-load appliances such as a home freezer, clothes drier and perhaps a room-type air conditioner may be added in the future. If you are considering these extra units, plan one or more extra circuits or provide sufficient capacity in the branch control center and feeders to take care of the requirements.

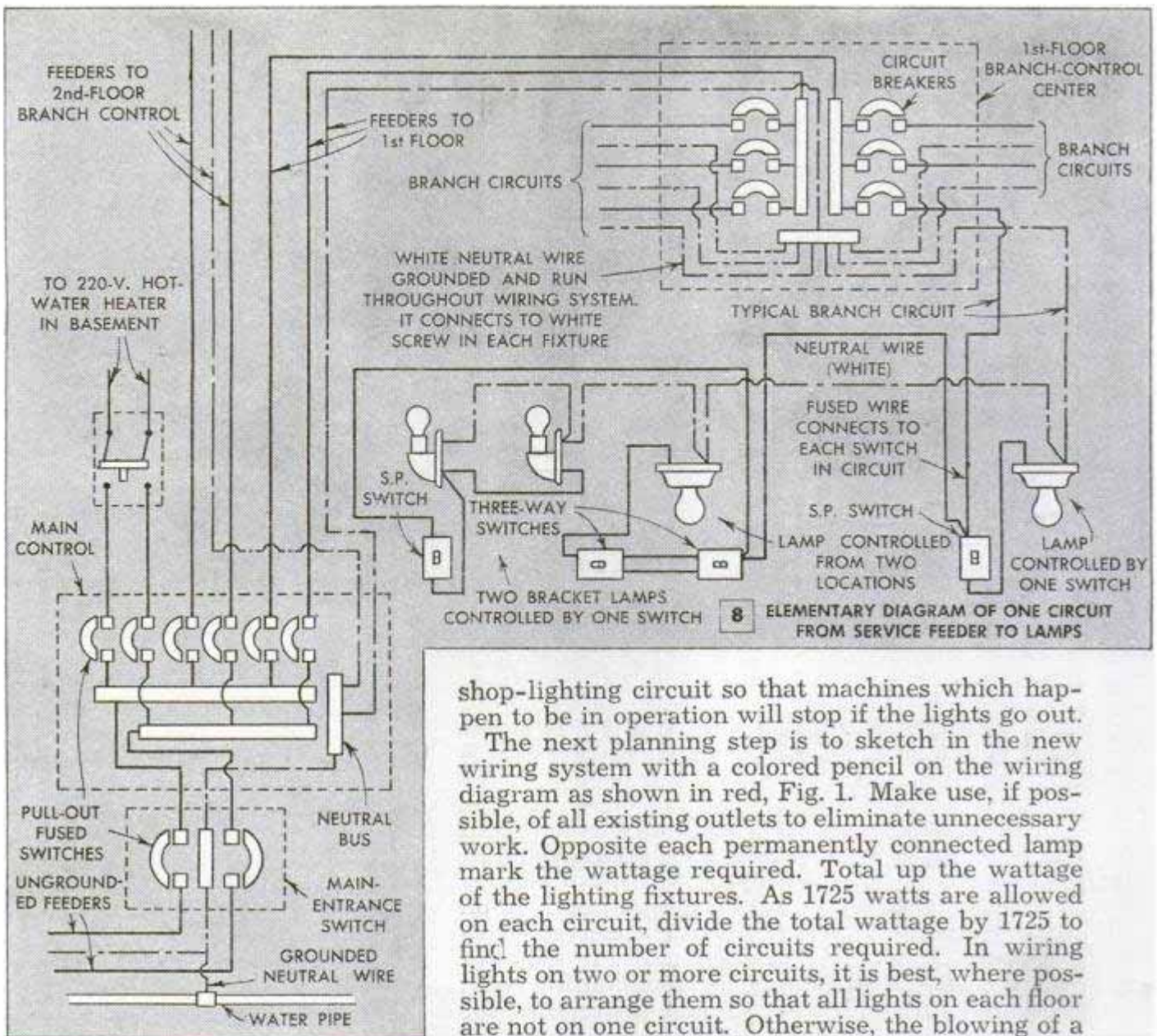
In deciding on the location of convenience outlets and circuits, the following suggestions may be helpful as they follow approved procedure: Place a receptacle in each usable wall space 3 ft. or more in width. Have a receptacle located within 6 ft. (at the floor line) of any location in any usable wall space. Provide receptacles on enclosed porches. All outdoor receptacles must be of the weatherproof type. Receptacles for television sets should be located so that the set can be placed where light from windows will not strike the screen directly. Place at least one receptacle at each work space in the kitchen, workshop, garage and utility room. Locate separate receptacles for fixed appliances such as the garbage eliminator, dishwasher, ventilating fan and bathroom heater. Workshop motors should be on the



**7 CURRENT CAPACITIES OF WIRES**

Size	Size
14-15 amperes	4-70 amperes
12-20 "	3-80 "
10-30 "	2-95 "
8-40 "	1-110 "
6-55 "	

These are Code capacities. The sizes mentioned throughout this article are one size larger to compensate for voltage drop. For feeders use one size larger than table

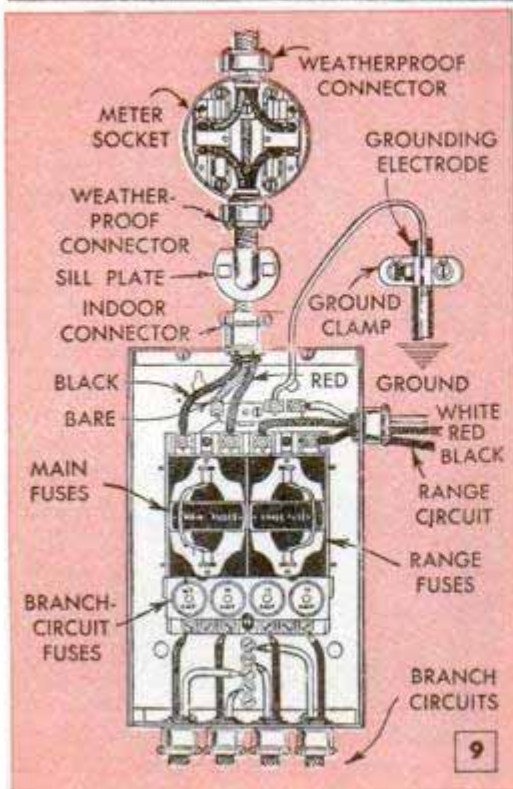


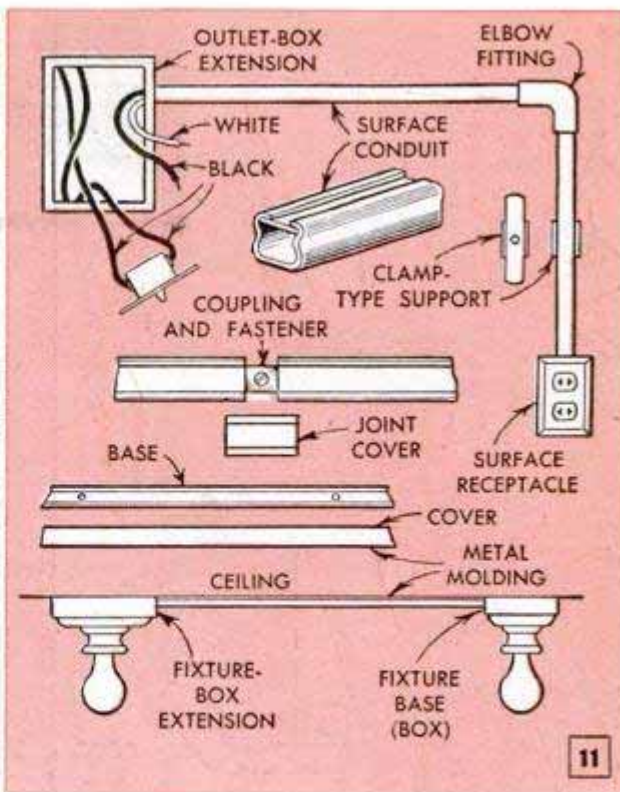
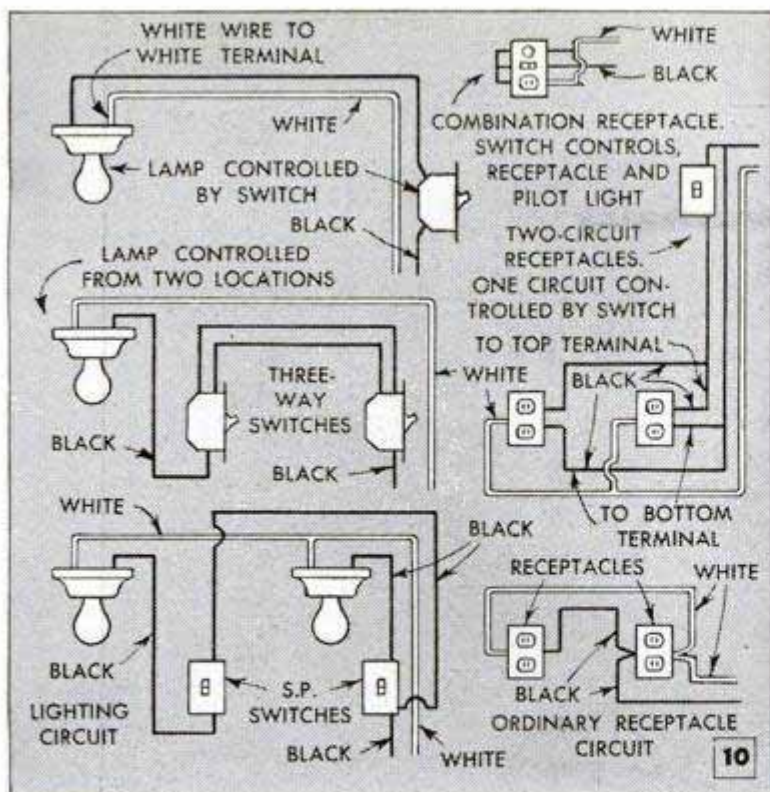
8 ELEMENTARY DIAGRAM OF ONE CIRCUIT FROM SERVICE FEEDER TO LAMPS

shop-lighting circuit so that machines which happen to be in operation will stop if the lights go out.

The next planning step is to sketch in the new wiring system with a colored pencil on the wiring diagram as shown in red, Fig. 1. Make use, if possible, of all existing outlets to eliminate unnecessary work. Opposite each permanently connected lamp mark the wattage required. Total up the wattage of the lighting fixtures. As 1725 watts are allowed on each circuit, divide the total wattage by 1725 to find the number of circuits required. In wiring lights on two or more circuits, it is best, where possible, to arrange them so that all lights on each floor are not on one circuit. Otherwise, the blowing of a fuse will cause all the lights on that floor to go out. To figure the number of receptacle circuits required (other than the special ones feeding kitchen, laundry, etc.) allow one circuit for each six or seven receptacles. As in Fig. 2, it is best to provide a branch control center for each floor in the house. These branch control centers are fed from a main control center located near the point where the service feeder from the power lines enters the house.

When the number of lighting and convenience-receptacle circuits have been calculated for each floor, mark this information on the sketch. Branch circuits should be of No. 12 wire, each circuit being rated at 15 amp. The rated amperage of all the circuits in a branch control center added together will give the total amperage required for that control center. This will apply where two-wire feeders are used between the branch control centers and the main control center. However, three-wire service lately has come into common use in new installations. With three-wire feeders, the amperage will be halved. The correct size of wire required for each branch feeder can be determined easily from the table in Fig. 7. The feeder circuits remaining to be calculated are the individual branch circuits





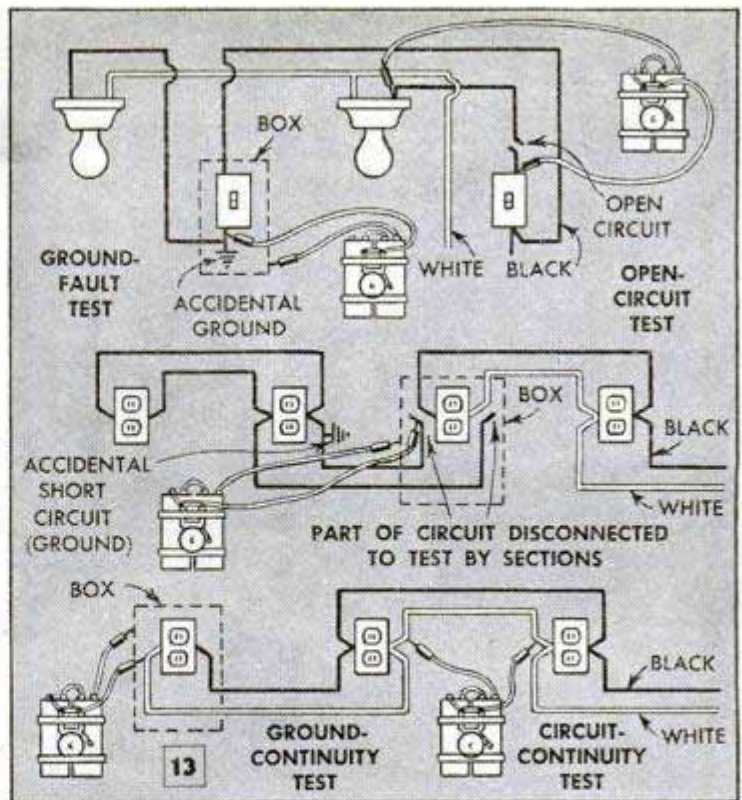
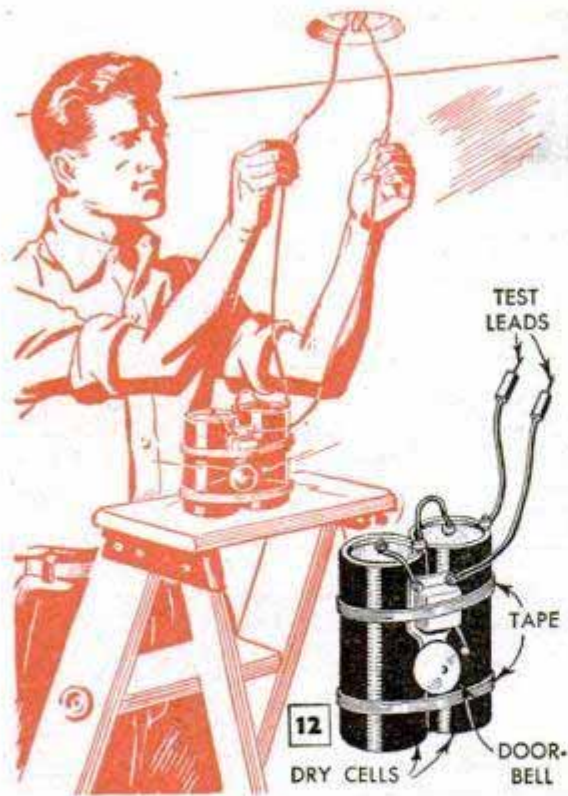
which feed directly to heavy-load appliances such as a water heater or range. If the power company does not require a separate meter on the water-heater circuit, both the heater and the range may be connected to the same branch circuit. To calculate the size of the feeders required, simply divide the wattage of each appliance by the voltage. This will give the amperage required. For example, a water heater consuming 3000 watts at 230 volts will require 13 amp. (3000 divided by 230). Use No. 10 wire for this load. The range load is calculated in the same manner. While ranges usually operate on both 115 and 230 volts, depending upon how many burners are in use at a time, only the 230 voltage is used to calculate the amperage. For a range rated at 7000 watts, the load would be 30.4 amp. Use a three-wire feeder of No. 16 wire.

Branch control centers may be arranged in three ways. They may consist of only 15-amp. circuits for lamps and convenience receptacles. Secondly, they may contain one or more 15-amp. circuits and one or more 20-amp. appliance circuits. Or, they may contain only 20-amp. circuits. A fuse or circuit breaker protects each circuit, but the fuse or breaker must be of no greater capacity than the circuit. The main control center will contain two fuses or a double-pole circuit breaker for each feeder from the branch control center and for each feeder from the appliance branch-circuit feeder where three-wire feeders are used. These overload devices must have a rating no higher than the carrying capacity of the wires they feed. If two-wire feeders are

used, only one fuse is required. The grounded wire, Fig. 3, is not fused.

After the calculations have been made, mark this information on the rough sketch of the circuits and control centers of the new system. The installation of new conduit runs is not difficult. Some local codes permit only thin-wall conduit to be used in certain locations. Check before making the installation. In all conduit work, whether using rigid or flexible metal conduit, Fig. 6, the structure of the house determines to some extent the procedure to be followed. Usually, there is a way to feed flexible conduit either through or around ordinary obstructions, but sometimes it will be found impossible to run conduit to certain locations. Such outlets may have to be relocated or surface conduit, called metal molding, may have to be used as in Fig. 11. A suitable box should be installed in the basement or utility room to contain the doorbell transformer, which should be connected to a branch lighting circuit and protected with fuses.

Of course, rewiring an old house is more involved than wiring a new one. Service will have to be maintained to some lights while other circuits are being installed. Start by installing the service-entrance wires and equipment, as shown in Figs. 8 and 9. The service switch shown in Fig. 9 is ideal for a house utility room where all the rooms are on one floor. Next, run the branch-circuit feeders and the individual appliance circuits. The latter should terminate in suitable receptacles or switch boxes to which the appliances are to be connected. Follow this by removing all the



existing wires from one circuit at a time and installing new, larger-capacity wires. Where armored cable, nonmetallic cable or knob-and-tube wiring is to be replaced, remove all the old wiring. Next, fish in the new armored cable or flexible metal conduit and attach to the boxes. Larger-capacity armored cable may be installed, or three-wire armored cable substituted and the outlets divided evenly between the two circuits.

If rigid conduit is merely to be rewired, pull out the old wires and replace them with larger-capacity wiring of the new S.N. type having a smaller diameter. This can only be used for rewiring of existing conduits or metal molding. Either the same number of wires of larger capacity can be used, or the circuit can be split into two parts and two circuits installed, using three or four wires of the same capacity. Where three-wire branch circuits are used, they must be considered as two separate circuits. Each ungrounded wire is protected at the branch control center by a single-pole breaker or by a fuse, Fig. 8.

As each circuit is completed and the connections made, it is tested and connected temporarily to the old distribution fuses. Figs. 8 and 10 show how various devices and fixtures are connected to circuits. In splicing wires in outlet boxes, solder the joints and cover with rubber tape and friction tape, or use approved solderless connectors. When all the new circuits are finished they may be disconnected from the old fuses and connected to the new branch control centers, or main control center, as the case may be. The feeders are then con-

nected and the branch control centers are mounted in their proper location. Then the feeders are connected to the main control center, but all circuit breakers are left in open-circuit position until the feeders and circuits have been tested. To feed individual branch circuits, appliance circuits, feeders and service feeders, a simple test set is assembled from a doorbell, two dry cells and test prods as in Fig. 12. Fig. 13 shows how to test the various circuits.

If a ground shows up, check all boxes through which the circuit feeds for the cause of the trouble. It may be caused by the end of a bare wire touching some metal part of an outlet box, or the insulation may have been cut on a wire where it enters a box. If the defective circuit can be tested in sections, this may save considerable time in locating the trouble. The same general procedure is followed in searching for an open circuit, except that in the case of an open circuit a defective splice or broken wire usually is the cause of the fault. If all circuits test free of grounds and show complete circuit continuity, then test for ground continuity at each outlet. Sometimes paint will prevent a good ground connection between a box and the conduit or cable attached to it. To insure against defects in the wiring, be sure to tighten all wire-terminal screws, cable clamps, lock-nuts and bushings in boxes. Insulate splices carefully and use fiber bushings in the ends of flexible metal cable. Fasten all switches, outlets and fixtures securely.

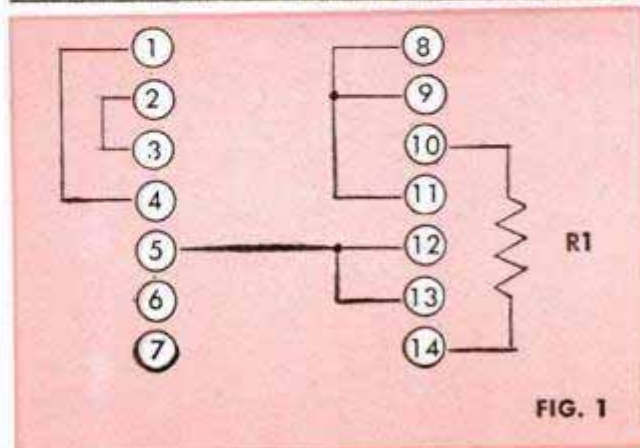
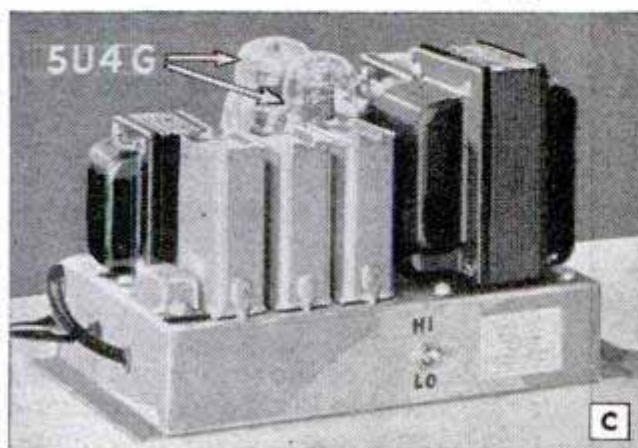
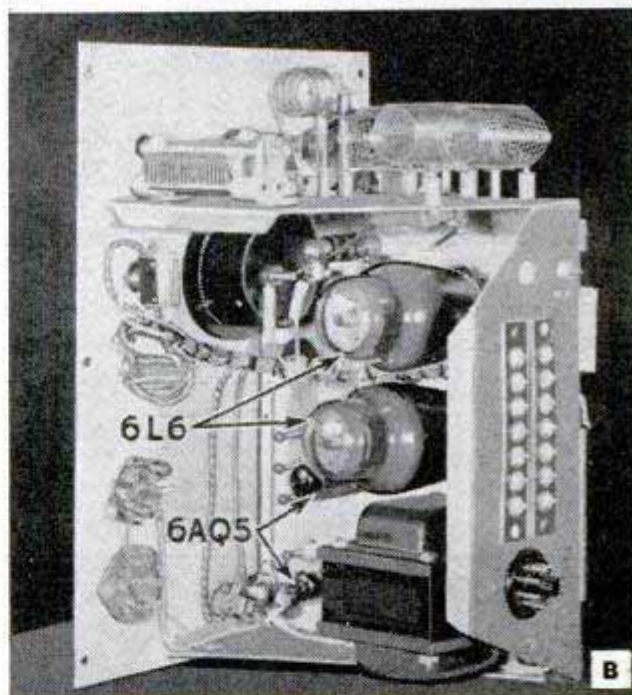
☐ Alum melted in an iron container forms a strong cement for joining glass and metal.

## EIGHT-BAND TRANSMITTER

**A**LTHOUGH no larger than an ordinary table-model receiver, this flexible general-purpose phone and CW transmitter is capable of delivering r.f. power on all amateur frequencies from 3.5 megacycles to and including 148 megacycles. It may be used with any power-supply unit delivering plate voltage up to 450 volts. The tube heaters may be operated from either 6 or 12 volts. Dynamotor power-supply units are available for portable-mobile operation in cars or boats if desired. For fixed-station operation, the tube heaters can be supplied from a 6-volt a.c. transformer winding in the power unit.

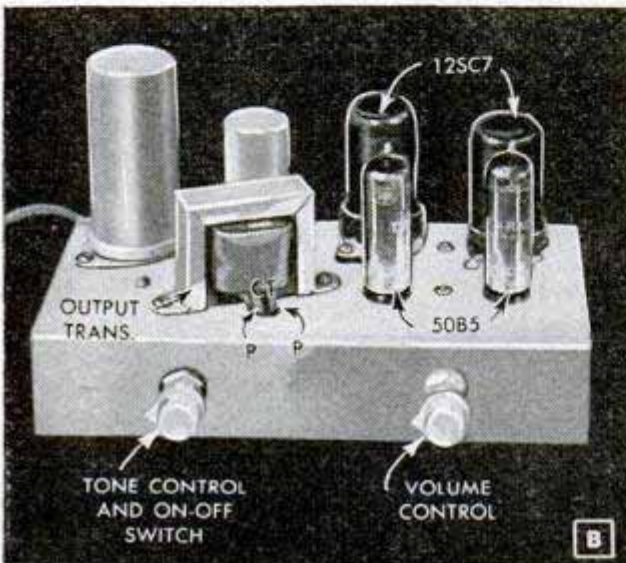
This transmitter is 13¼ in. high, 9¼ in. wide and 8½ in. deep; it weighs only 17 pounds. A type 6AQ5 tube is used as an oscillator/multiplier; a second 6AQ5 is employed as a multiplier. The final amplifier in this Harvey-Wells transmitter consists of the well-known and very popular 807 tube. Two 6L6 glass-type tubes are employed as modulators. The output coupling is a simplified pi-type designed for feeders between 50 ohms and 500 ohms. The front panel controls shown in photo A are labeled as follows: Left to right top row, "drive" for adjusting the grid excitation to the 807 tube; "plate" for the 807 plate tank; "load" for antenna loading. In the second row are the "power/off" switch and "transmit/standby." This last switch may be wired to control the output of the power supply. In the third row at left is the "CW/Phone" switch and, at right, the "grid/plate" switch for shifting the meter to read grid or plate current. The large rotary switch at lower left selects the bands

(Continued to page 246)



# COMPACT HI-QUALITY MULTI-PURPOSE

By Edward Drabek



## RESISTORS

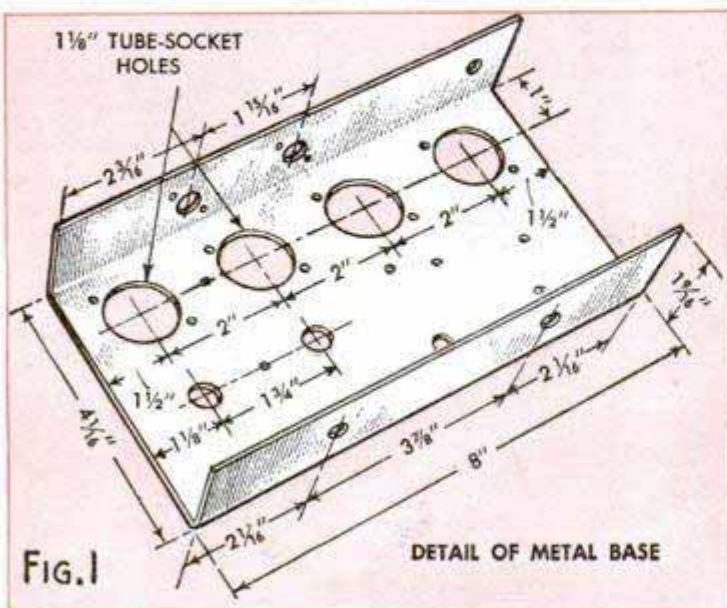
- |   |  |
|---|--|
| 3 Carbon type 6800-ohm 1/2-watt, R1, R2 and R3  | 2 Carbon type 33,000-ohm 1/2-watt, R14 and R15 |
| 2 Carbon type 3.3-megohm 1/2-watt, R4 and R5    | 2 Carbon type 10,000-ohm 1/2-watt, R16 and R17 |
| 1 Carbon type 180,000-ohm 1/2-watt, R6          | 1 Carbon type 150,000-ohm 1/2-watt, R18        |
| 1 Carbon type 220,000-ohm 1/2-watt, R7          | 1 Carbon type 100-ohm 2-watt, R19              |
| 1 Carbon type 27,000-ohm 1/2-watt, R8           | 1 Wire-wound 100-ohm 5-watt, R20               |
| 2 Carbon type 330,000-ohm 1/2-watt, R9 and R10  | 1 Carbon type 22,000 ohm 1/2-watt, R21         |
| 1 Carbon type 1000-ohm 1/2-watt, R11            | 1 500,000-ohm tone control (and switch), R22   |
| 2 Carbon type 100,000-ohm 1/2-watt, R12 and R13 | 1 500,000-ohm volume control, R23              |
- Note—R22 and R23 are audio-taper types

TRULY a mighty midget is this four-tube a.c.-d.c. reluctance or magnetic-type pickup amplifier. It can be used in conjunction with any reluctance or magnetic pickup with an output of as low as 2.5 millivolts since the preamplifier is incorporated in the unit. Built-in equalization circuits eliminate a surprising amount of experimenting with matching networks after the unit is completed. Two inputs are provided, one for the GE variable-reluctance or magnetic-type pickup, and the other for a crystal pickup or an AM or FM tuner. It also makes an ideal amplifier for the four-tube super a.c.-d.c. AM broadcast tuner that was described in the May 1948 issue of this magazine. When used with the variable-reluctance-type pickup for high-quality record reproduction, it gives a frequency response and fidelity limited only by the record itself.

Ample power output is obtained with a pair of 50B5 miniature tubes in push-pull, exceeding an output of 4 watts. Phase inversion in the output stage eliminates the usual bulky driver transformer to provide high-frequency response well over 12,000 cycles. The power supply consists of two selenium rectifiers used in a voltage-doubler circuit, thus eliminating a rectifier tube and providing long, trouble-free operation.

Unusually compact for a versatile unit of this type, it permits the constructor to adapt the amplifier easily to any existing equipment. Photo A shows the amplifier unit used with an FM tuner; operation in conjunction with an automatic record player using a GE reluctance-type pickup is illustrated in photo C. Photos B, D and E show various views of the completed unit. Complete details for the simple chassis base are given in Fig. 1. Any standard base about 4 x 8 x 1 1/2-in. may be used. The one shown was made by bending 1/16-in. sheet metal between two blocks of wood in a vise. All holes may be cut before the metal sheet is bent to shape. When mounting the selenium rectifiers, be sure to observe the polarity as shown in the schematic circuit diagram, Fig. 2. This is very necessary for the proper operation of the power supply.

Shielding of the grid input leads, as indicated in Fig. 2 and the underside-view photo E, is highly impor-



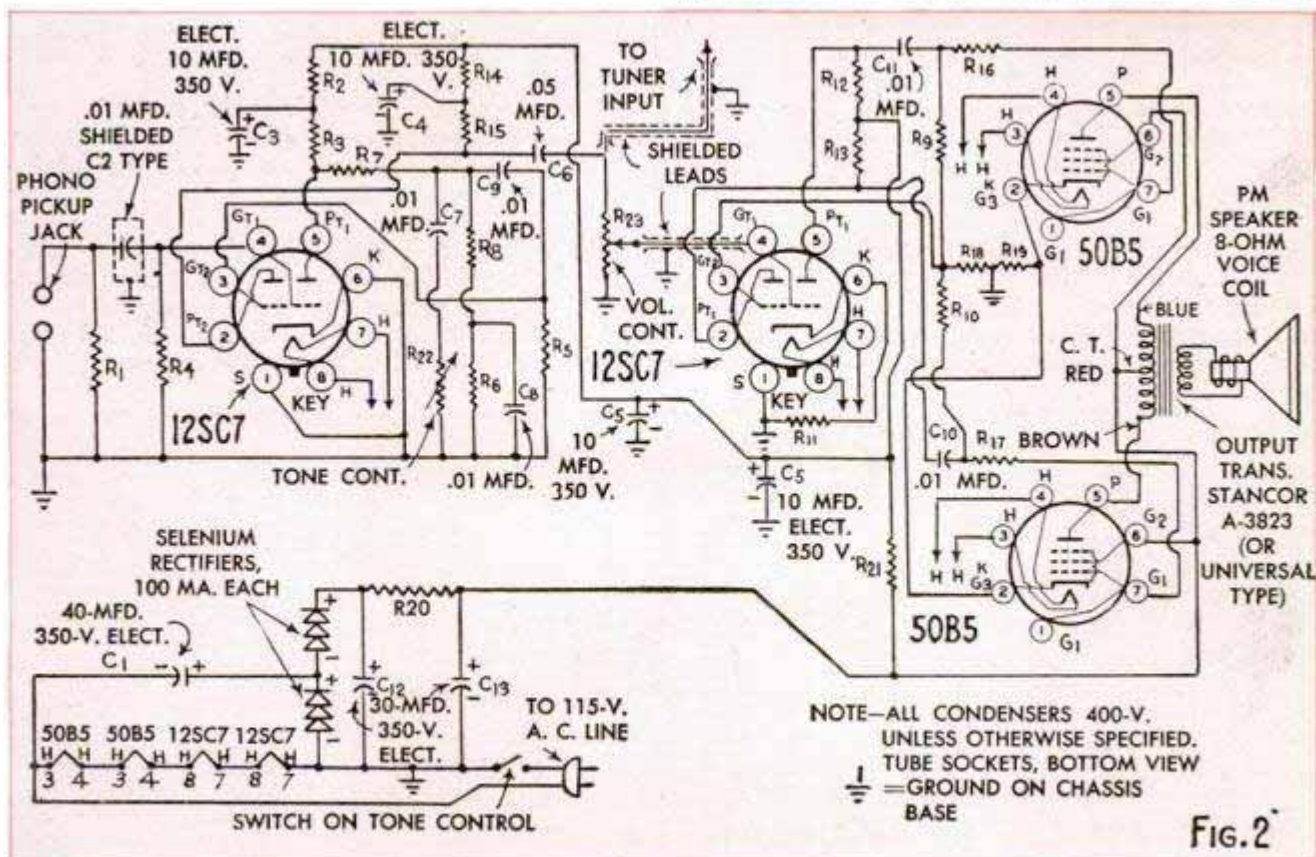
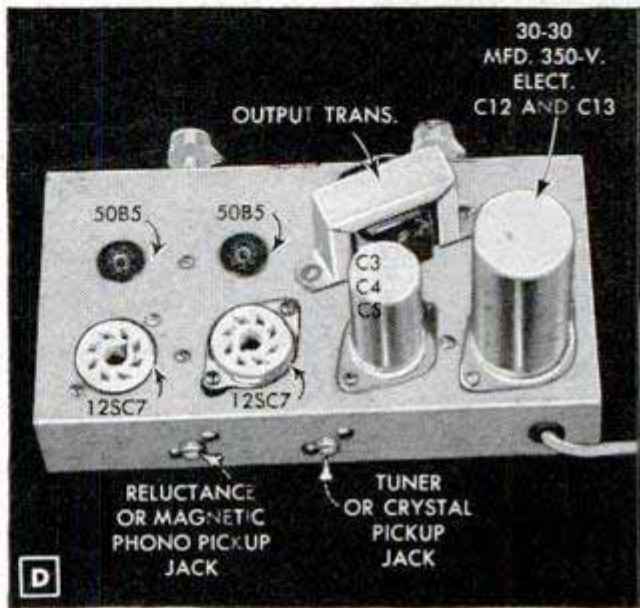


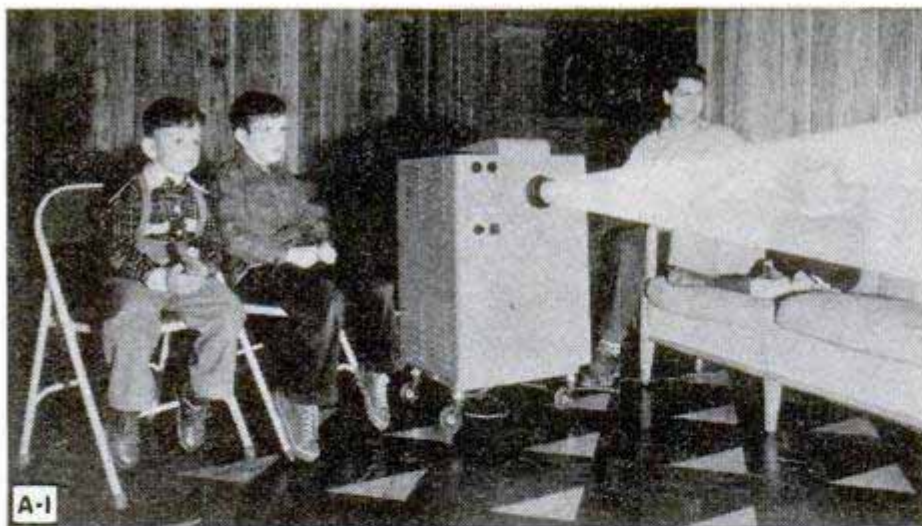
# FOUR-TUBE A.C.-D.C. AMPLIFIER

tant to reduce hum pickup due to the high gain of the preamplifier stage. Please note that the speaker output transformer is mounted on the top of the chassis base and the voice-coil leads run directly from this transformer to the speaker which is a permanent-magnet type with an 8-ohm voice coil. The speaker may be any size from 6 to 12 in. If desired, the speaker output transformer may be mounted directly on the speaker, which is housed in the separate cabinet shown in the photos. When wiring the circuit, use rosin-core wire solder and be sure that all connections are carefully made. All tube connections should be as short as possible, and keep all grid and plate leads well separated to eliminate oscillations. The input 12SC7 tube socket should be mounted on soft-rubber bushings, or grommets, to prevent microphonic noises. The mounting will be noted in top-view photo D.

As this is an a.c.-d.c. amplifier unit, care must be taken in handling it while making tests; one side of the power line is grounded and should not be brought in contact with any external ground. Any possibility of shock may be eliminated by tying all of the negative-B leads together and isolating them from the chassis by means of a .01-mfd. 400-volt tubular paper by-pass condenser. The condenser is merely connected between all negative-B leads and the metal

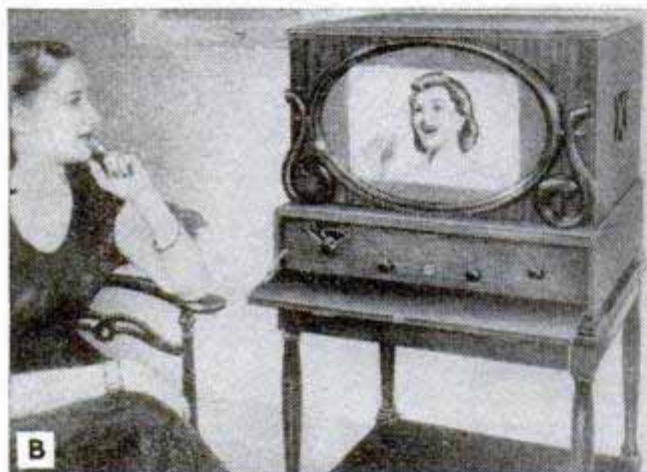
(Continued to page 244)





# TELEVISION TODAY

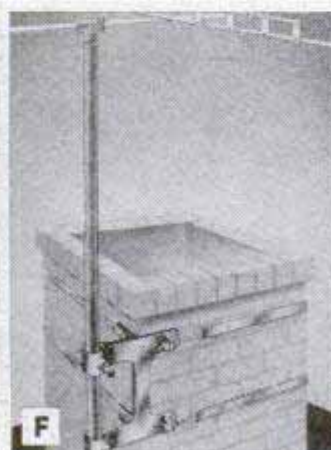
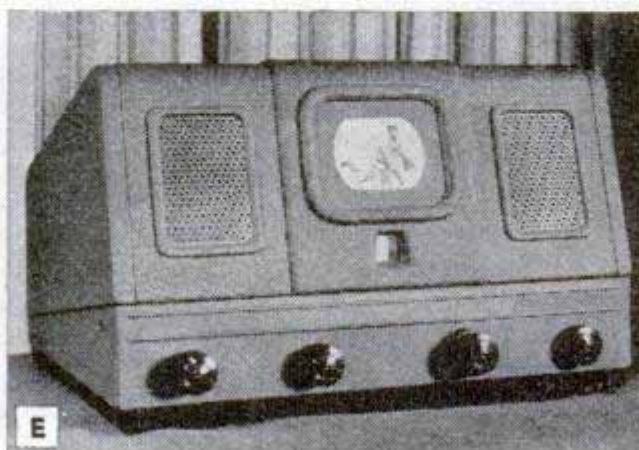
A-1—Life-size television for the rumpus room, restaurants, schools, industrial plants and churches is now possible by means of this mobile projection-type TV receiver that requires no permanent installation. It is capable of throwing a video image varying in size from several inches up to 6 by 8 ft. Photo A-2 shows the wall screen in position



B—Featuring a dual-purpose Polaroid filter screen, which also serves as a mirror in a period-styled cabinet, this TV set employs a 15-in. picture tube

C—Recently announced table-model projection-type television receiver provides a large video image on a built-in screen. The picture is 13½ by 18 in.

D—What appears to be an attractively framed picture on the wall is really a built-in TV set with speaker. The controls for both sound and picture are concealed behind the gold-leaf frame surrounding the screen.  
 E—Inexpensive portable television receiver produces a "candid size" TV picture 2 by 3 in. It may be moved from room to room; a carrying case is available for travel purposes. It covers 13 channels; weighs 15 lbs.  
 F—Chimney-mount antenna base designed to cut time and costs in erecting television and FM antenna systems



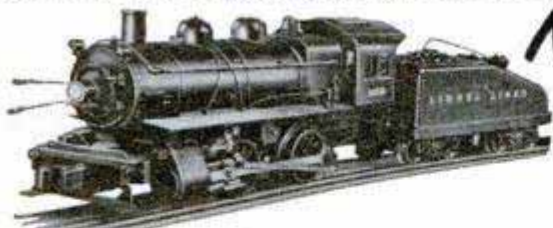


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Madison Square Station, New York 10, N. Y.

I enclose 25¢. Please send me Special Offer of 36-page full color Catalog, Stereopticon views of LIONEL TRAINS, Stereopticon Eyeglasses, and Kit of 6 building cut-outs.

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# THE KODAK LINE-UP HAS A

# Special

Better pictures  
with  
the right camera



2

1

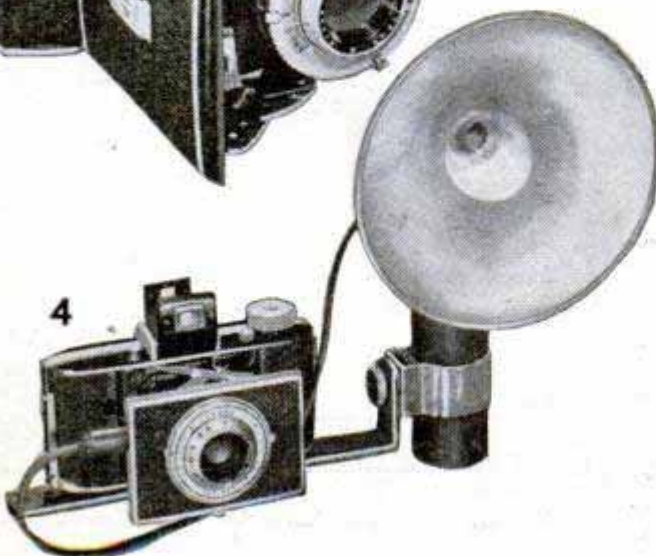
**1 KODAK REFLEX CAMERA**—Twin lenses—4-element  $f/3.5$  for speed, *Lumenized* for brilliance, superbly corrected for sharpness, for beautiful color.  $1/200$  Flash Kodamatic Shutter. Black-and-white pictures,  $2\frac{1}{4} \times 2\frac{1}{4}$ ; Kodacolor snaps, about  $3 \times 3$ . With field case, \$120; Flashholder, \$9.50.

**2 KODAK 35 CAMERA WITH RANGE FINDER**—*Lumenized*  $f/3.5$  lens yields superb color transparencies and prints, sharp black-and-whites for big enlargements. Coupled range finder.  $1/200$  Flash Kodamatic Shutter. Automatic shutter cocking, double-exposure prevention. \$75; Flashholder, \$9.50.



3

**3 KODAK TOURIST CAMERA**—Finest folding model yet. Hard-coated  $f/4.5$  lens,  $1/200$  shutter. Built-in exposure computer. Efficient new-type shutter release on bed of camera. Black-and-white pictures,  $2\frac{1}{4} \times 3\frac{1}{4}$ ; color snaps, about  $3 \times 4\frac{1}{2}$ . \$61.50; also lower-priced models. Flashholder, \$9.50.



4

**4 KODAK FLASH BANTAM CAMERA  $f/4.5$** —Small, light, moderately priced. Makes sharp black-and-white negatives; also full-color Kodachrome transparencies for projection on the home screen and for Kodachrome Prints and Enlargements. *Lumenized*  $f/4.5$  lens,  $1/200$ -second shutter. \$50; Flashholder, \$9.50.

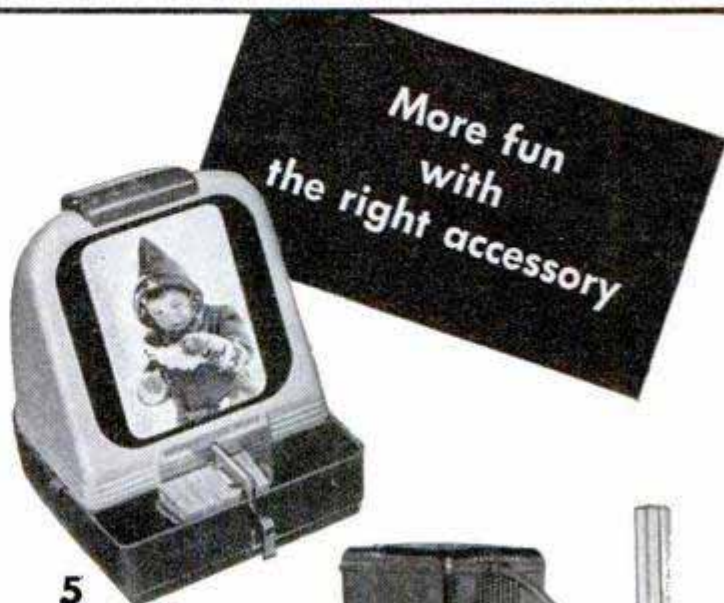
**EASTMAN KODAK CO.**

"Kodak" is a trade-mark

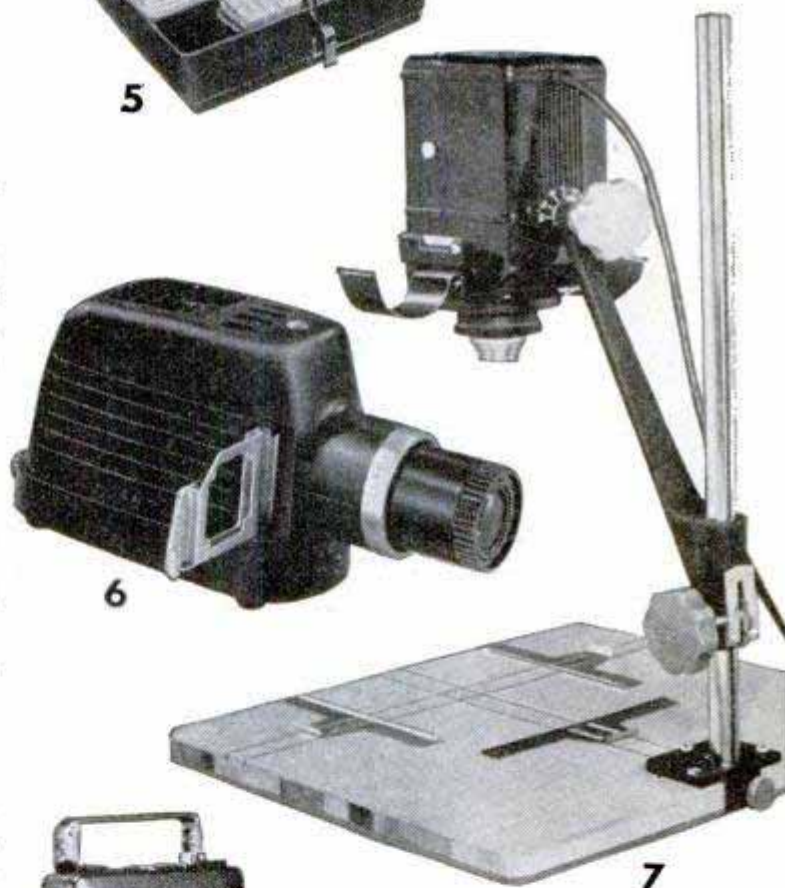
# Gift

## FOR YOUR FAVORITE FAN

**5 KODASLIDE TABLE VIEWER**—entirely new type of projection viewer for 2x2 cardboard or glass slides, or a combination of both. Superb for small group shows, editing, and quick viewing. 7½x7½-inch Kodak Day-View Screen gives brilliant image in lighted room. Has *Lumenized* f/3.5 lens (Kodak Ektanon), slide changer, cooling system, focusing lever. \$95.



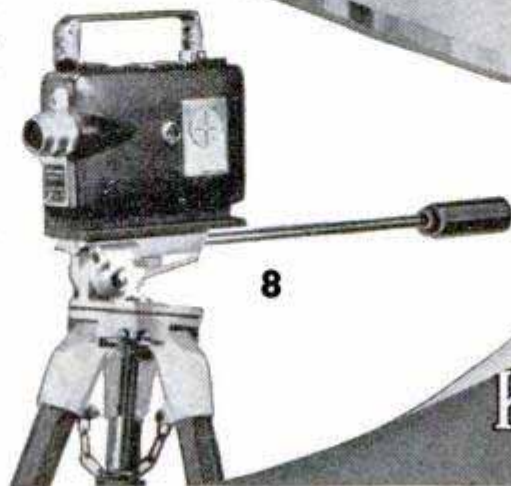
**6 KODASLIDE PROJECTOR, MODEL 1A**—takes 2 x 2 cardboard or glass slides. Projects big, bright images up to 84 inches wide. Sharp focusing with the Kodak Projection Ektanon Lens, 4-inch f/3.5. *Lumenized* optical system increases screen brilliance 50%. \$27.50.



**7 KODAK PORTABLE MINIATURE ENLARGER**—blows up 35mm. or Bantam negatives. Three-lens condenser system, heat-absorbing glass, 50-watt lamp insure high-quality prints. Price, \$48.50. Pack-All Case is ideal storage place... handy for trips. \$15.

**8 KODAK TRIPODS**—all types of camera supports for movie or still cameras—for all-round better pictures. Wide price range. Visit your nearest Kodak dealer for a complete review of the Kodak line-up.

*(Prices, subject to change without notice, do not include tax where applicable.)*



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# introducing the JOLLY TAR



*New*  
**RIEDEL WORK GLOVE**  
for Home  
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Men's and Ladies' Sizes

For greater comfort when you work...and for lots of extra wear...try Riegel's new "JOLLY TAR" Work Glove. Elastic back strap keeps glove on comfortably...permits circulation of air so hands won't become sweaty. Made of special flannel-backed canvas, soft finish inside, with safety cuff for greater protection.

## OTHER STYLES FOR EVERY NEED

canvas, jersey, leather...knit wrist, band top, gauntlet...double palm, reversible, quilted. Ask for the Riegel brand wherever work gloves are sold. Free catalog if requested on business letterhead.

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New York 17, N. Y.

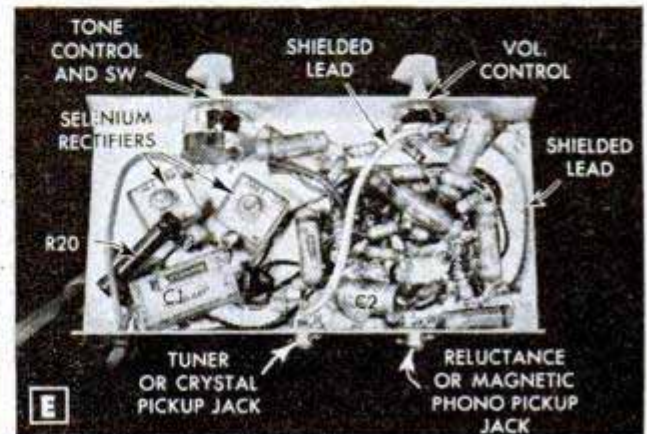


"THIS TRADE MARK IS YOUR GUARANTEE OF VALUE"

## Hi-Quality Four-Tube Amplifier

(Continued from page 239)

chassis base. When used with a variable-reluctance-type pickup, surface noises are minimized in record reproduction. These improved pickups will fit practically any standard pickup arm without alteration, and they actually transform old-style record reproduction into full, rich, mellow tones. Like any high-fidelity, high-quality microphone, the output of this type of pickup is low, and a preamplifier is needed between the pickup and the phono input.



Therefore, the necessary preamplifier is built into this versatile multi-purpose amplifier unit.

The General Electric reluctance-type pickup consists of a natural-sapphire stylus mounted on the end of a small cantilever spring. A lateral motion of the cantilever directs the magnetic flux alternately through the cores of two coils which are connected in push-pull. As the stylus is driven laterally in the record groove, the cantilever moves correspondingly with respect to the pole pieces. Thus, the output voltage generated in the coils is directly proportional to the rate of change of flux. Therefore, the pickup responds accurately to a constant-velocity signal when proper equalization is provided. As the output voltage is generated directly by the motion of the stylus mounting device, there are no long couplings and losses are low. The needle scratch is extremely low with this pickup as it responds only to vibrations in a lateral direction. As there is no vertical response, the usual frictional noises are not transmitted from the record surface.

As the four-tube amplifier chassis is quite small, it may be mounted in the average record-player case, or it may be housed in a separate wooden cabinet of suitable size. Detailed student material list R-372 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.

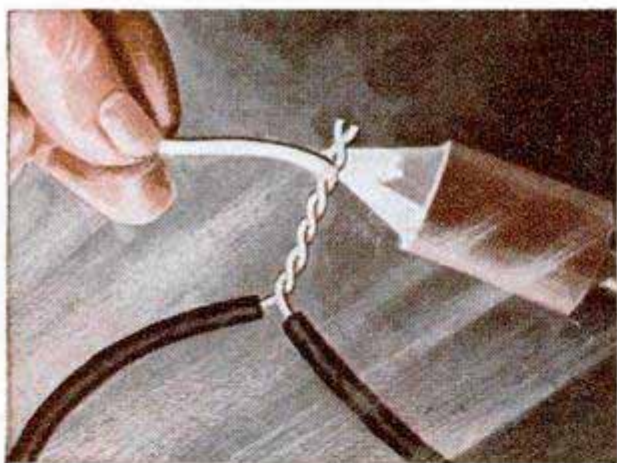
# BEST WAY TO SOLDER WIRE



**1** Be sure current is disconnected. Then, take your flashlight, powered with "Eveready" batteries, and find the broken wire. Next, prop up your flashlight so that it will shine brilliantly on your work.



**2** Make sure wire ends are clean and bright... twist wires to form a joint that is mechanically strong enough to be self-supporting. (It's a common mistake to let solder serve as a strength binder.)



**3** Use a hot iron with the copper tip well tinned. Don't drip the solder on the joint—apply the soldering iron *underneath* the joint and heat the wires until they melt the solder. Apply a moderate amount of solder. After it has flowed freely through the wire strands, remove the iron.

## BEST WAY TO LOAD YOUR FLASHLIGHT

For fixing your radio . . . car wiring . . . any job requiring portable light . . . be sure to load your flashlight with long-life "Eveready" batteries.



## "EVEREADY" FLASHLIGHT BATTERIES

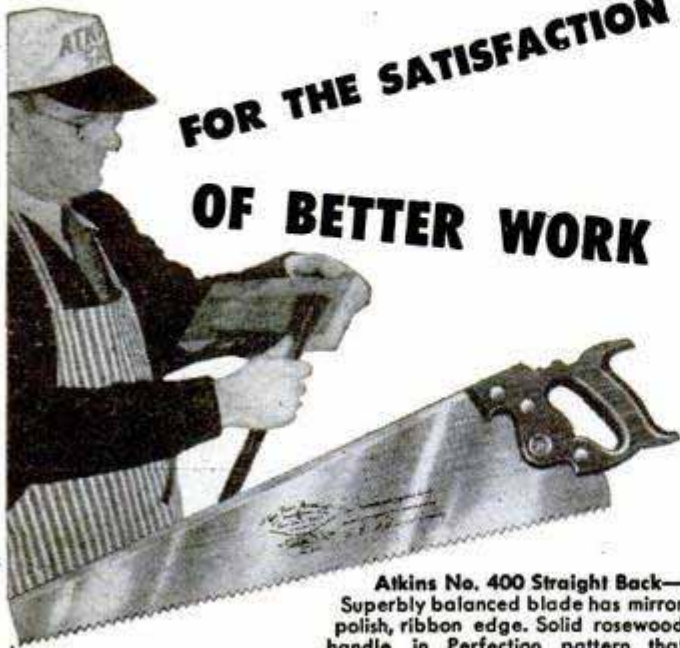
The trade-mark "Eveready" distinguishes products of  
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# ATKINS

FOR THE SATISFACTION  
OF BETTER WORK



**Atkins No. 400 Straight Back**—Superbly balanced blade has mirror polish, ribbon edge. Solid rosewood handle in Perfection pattern that prevents wrist strain. Segment ground 5 gauges for easy clearance. Carefully hardened and tempered. Filed and set ready for use. Ship-point pattern.

It's easier to achieve the fine workmanship that doubles the pleasure you get from your home workshop if you use Atkins Saws. Atkins have the balance and design that make them handle better—the extra keenness that means faster, cleaner cutting. Because they are made of "Silver Steel"—Atkins' special saw steel that takes a keener edge and holds it longer—it takes fewer sharpenings to keep an Atkins cutting smoothly for longer periods. There's an Atkins for every workshop need. To get the most in sawing satisfaction, get Atkins.

## 4 FAVORITES FROM THE COMPLETE ATKINS LINE

**No. 65 Straight Back**—Fine quality suited to general carpentry. Segment ground, Damascus polish blade, filed and set for use. Carved apple handle. Ship pattern.



**No. 2000 Straight Back**—Light but stiff tempered blade, segment ground, polished and etched. New "Perfect-Grip" apple handle is close to blade for easy handling. Ship pattern.



**No. 37 Compass Saw**—17 x 18 gauge hardened, tempered and polished. 8 points per in. Filed and set. Plastic handle.



**No. 39 Keyhole Saw**—Ground 18 x 19 gauge for easy clearance with minimum set. 10 points per inch. Uniform temper. Filed and set. Plastic handle.

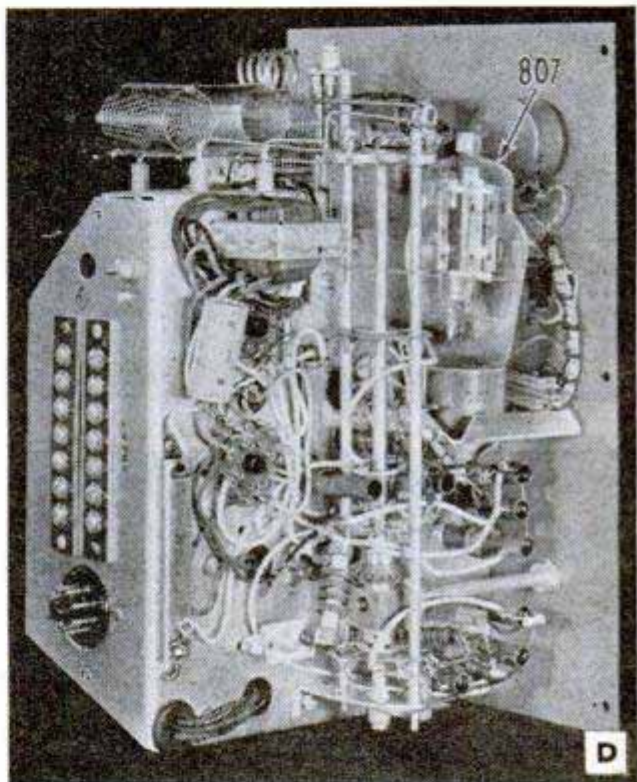


**E. C. ATKINS AND COMPANY**  
INDIANAPOLIS 9, INDIANA

## Eight-Band Amateur Transmitter

(Continued from page 237)

which are as follows: 3.5; 7; 14; 21; 27; 28; 50 and 144 megacycles. The band limits and crystals required appear on the center chart. Crystal sockets are placed at lower right for both  $\frac{3}{32}$ -in.-dia. pins on  $\frac{1}{2}$ -in. centers, or  $\frac{1}{8}$ -in.-dia. pins on  $\frac{3}{4}$ -in. centers. Two views of the upright chassis are shown. Photo B shows the arrangement of the oscillator, multiplier and modulator tubes. It will be noted that there is very little exposed wiring on this side of the chassis. Photo D shows the remarkably compact arrangement of parts and wiring on the opposite side of the chassis. There are two terminal strips provided at the rear



of the chassis so that connections can be made to cover a wide variety of operating conditions. The terminals are numbered as indicated in Fig. 1. With the connections shown for normal phone or CW operation with a 300-volt power supply and 6 volts on the tube heaters, the value of the resistor R1, connected between terminals 10 and 14, is 4700 ohms  $\frac{1}{2}$  watt. Diagrams are also supplied for 400-volt operation with 12 volts on the heaters, and also for exciter service with modulation removed from the 807 plate.

The special power-supply unit, photo C, is available from the manufacturer or a similar unit can be built from diagrams and specifications furnished with the transmitter unit. Complete data is also included for several types of antenna systems.



*Used on  
more new cars  
-sold by more  
dealers!*



replace with a  
**DELCO**  
BATTERY

**DELCO-REMY WHEREVER WHEELS TURN OR PROPELLERS SPIN**

# HANDY ALL-PURPOSE SHELVING



**SURPRISE YOUR HUSBAND!**

Assemble Hines-Shelves yourself—  
two Regular Units measure 68 in. high,  
36 in. wide—6 shelves, 18 sq. ft. of shelf space—**\$15<sup>00</sup>**

What a boon to housewives! Handy, strong Hines-Shelves will solve your home storage problems. Bolted assembly—clear pine frame with Masonite presdwood shelves go together with no nailing or sawing. Shelf height is just right for mason jars, canned goods or books. Satisfaction guaranteed.

#### STORAGE SET-UP

Set up at right is made up of 2 Regular Units and 2 Extension Units. This set-up measures 6 ft. wide and 68 in. high—gives you 36 sq. ft. of shelf space—only **\$28.**

**REGULAR UNITS** (illus. below at left)—3 ft. wide, 34 in. high, 11½ in. deep—3 shelves give you 9 sq. ft. of shelf area. Can be set one over the other as in illustration, only **\$7.50** each.



**EXTENSION UNIT** (illustrated at left)—For making long lines of continuous shelving. Same size as Regular Unit—packaged, ready for assembly. Only **\$6.50** each.

**EDWARD HINES LUMBER CO.**  
2431 So. WOLCOTT AVE. • CHICAGO, ILL.

#### FREE DELIVERY COUPON

Please send me, delivery charges prepaid,..... Regular Units @ \$7.50 each,..... Extension Units @ \$6.50 each.

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## Clinic



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As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

#### Winter Protection for Climbing Rose

**Q**—I have a climbing rose which has nearly covered a large wooden trellis. During the last year much of the growth died out. The trellis is located at the northwest corner of the house and is exposed to severe winter winds. Is the exposure the cause of the canes dying, or is it due to disease?

**B.W.**—Minneapolis, Minn.

**A**—Ordinarily, the climbers are quite hardy, especially those with small blooms in clusters such as the ramblers. In very severe winters they may be damaged somewhat but if the plant is not diseased it will renew itself in a season or two. The large-flowered climbers generally are less hardy. It is possible that the rose disease known as "black spot" has so weakened the plant that it is unusually susceptible to winter injury. The disease can be controlled by spraying with a prepared rose spray during the growing season. In localities where the winters are severe, many gardeners remove the canes from the trellis late in the fall and tie them in a loose bundle. This is laid on the ground and covered with a layer of small twigs. Finally, leaves or coarse straw is used to cover the bundle. Ordinarily, this is sufficient protection.

#### Renewing Finish On Old Piano

**Q**—I have an old upright piano on which the original finish is checked. The checks are fine and run irregularly over all the finished surfaces. I believe the wood is mahogany. Is there any method of renewing the old finish?

**J.M.**—Lima, Ohio.



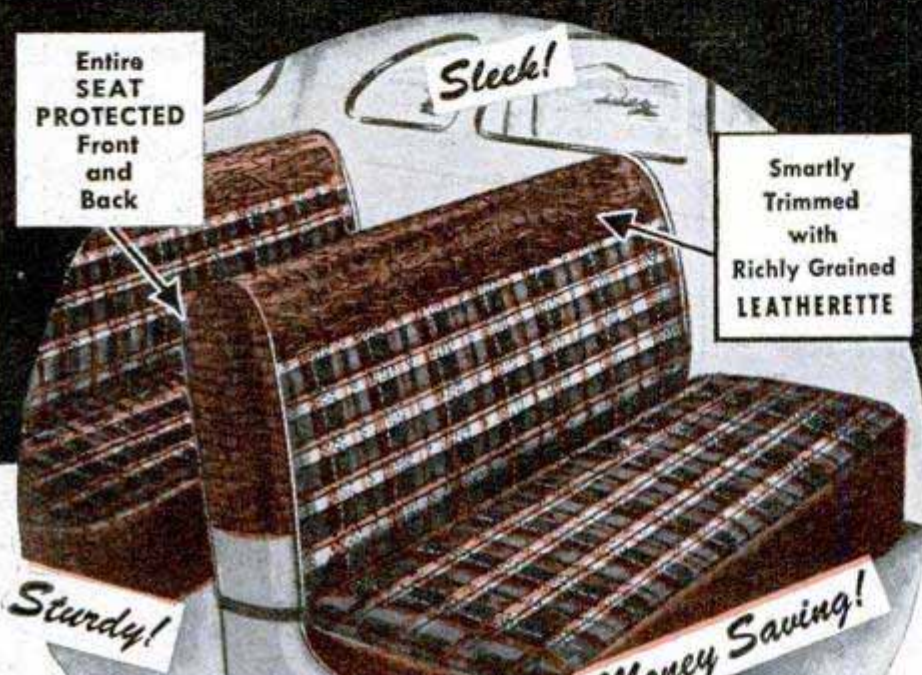
**A**—If you are sure the wood is mahogany and that the finish is not a grained finish over some other wood, then it is possible to do a fairly good job of renewing the original finish provided the checks are merely surface checks and do not go clear through to the wood. One way is to mix fine pumice stone and rubbing oil to a thick paste, place a small quantity in the center of a square of soft cloth and then fold the corners of the cloth over to form a pad. Rub the checked surfaces, first with a circular motion then with a straight back-and-forth stroke. Continue this procedure until the checks are removed, then polish with rottenstone and oil on a pad in the same manner.

(Continued to page 250)



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### Metal Weather Strip for Storm Sash

**Q**—I recently purchased an old house and want to fit storm sash all around to conserve heat. Some of the window frames seem to be warped or pulled out of square. On several, the sills are curved upward at the center, making it almost impossible to get a tight fit of the storm sash. Can you suggest a remedy?

**B.R.**—Waterloo, Iowa.

**A**—Use metal weather strip of the spring-contact type. This will add to the cost of installation but the fuel savings will more than offset the extra initial cost. Measure the window frames carefully and cut the storm sash to fit with an allowance of about 3/16 to 1/4 in. all around. Then nail the metal strip to the edges of the storm-sash frame with the nailing flange flush with the inside corner of both rails and stiles. Apply the weather strip in this manner to the top and bottom rails and to the stiles. When installing the storm sash, use turn buttons rather than hangers for fastening.

### Simulated Wrought-Iron Finish

**Q**—Cabinets in my kitchen are finished in natural pine and are fitted with wrought-iron hardware. Due to hard use, the cabinets and hardware are badly scratched and need refinishing. Is there a way to renew the dull black finish of the hardware?

**A.D.**—Scranton, Pa.

**A**—Remove the hardware and clean it first with a paint cleaner and then by wiping lightly with a cloth dipped in lacquer thinner. Coat the hardware and screws with a flat-black brushing lacquer, using a small brush with fine bristles and taking care to apply a uniform coating to both sides of hinges and latches. This will give a flat, dull finish which closely resembles the original. If the doors of the cabinets are to be refinished, be sure that the finishing material is thoroughly dry before the hardware is replaced.



### Chain Loosens Soot in Chimney

**Q**—My three chimneys are old, unlined and, I suspect, badly coated with soot. One chimney is about 30 ft. high; the other two 18 or 20 ft. high. Only the taller one has a cleanout door. Is there any easy way of removing the soot from these chimneys?

**G.H.**—Rome, N. Y.

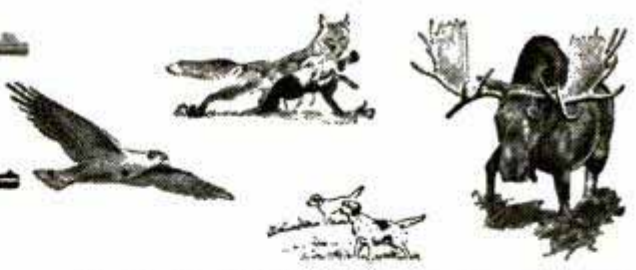
**A**—One way of loosening the soot in a tall chimney is to lower a chain into the flue from the top. The chain should be long enough to reach nearly to the bottom of the chimney. A light wire chain is best, although any chain will do. After lowering the chain into the flue, swing it with a quick circular movement to give a whipping motion. This will cause the chain to strike the sides of the flue all along its length. The action of the chain will loosen the soot very effectively. Cleanouts should, of course, be installed in the two shorter chimneys.



### Control of Snow Mold on Lawn

**Q**—Early last spring, when raking up the few remaining leaves from the previous fall, I noticed several patches on my lawn which appeared a peculiar whitish gray color just after the snow melted. What is the cause of this? **G.R.**—Milwaukee, Wis.

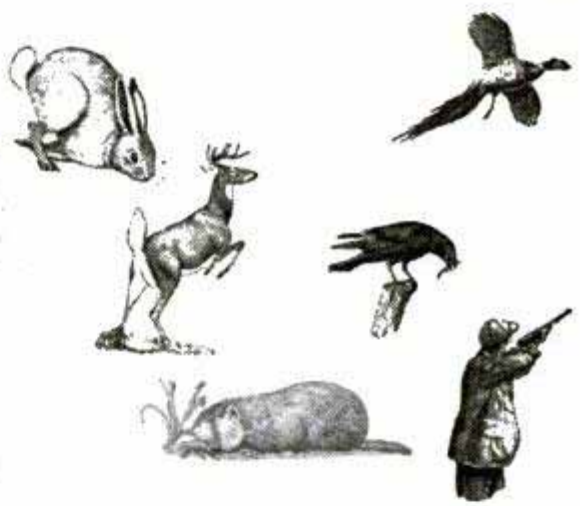
**A**—Judging from your description, the open patches in your lawn were caused by snow mold, a fungus disease favored by deep snow and ice coatings and especially by any mulch such as wet leaves. It can be controlled to some extent by applying mercuric chloride in the fall at the rate of about 3 oz. per 1000 sq. ft.



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(E) STEVEN'S Model 124—Repeating Shotgun. 12 gauge, 3-shot. Featured by a compactly efficient, fast, simple to operate cross-bolt action design. This latest addition to the Savage line brings the shooter new design and sensational new value in the repeating shotgun field.

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## Junior Foresters

(Continued from page 180)

Students learn to remove a stump by infecting it with a piece of rotten wood and then encouraging the rot to grow. They learn the life cycle of trees, the history of species in this country and the story of arborist movements in America.

Junior Foresters are especially proud that J. Sterling Morton, who founded Arbor Day in 1872, was a resident of Nebraska.

Recently, some of the youngsters wrote letters of invitation to Mrs. Joseph M. Cudahy, granddaughter of the founder of Arbor Day and Chairman of the Board of Trustees of the Morton Arboretum at Lisle, Ill. After a visit to the Omaha organization, Mrs. Cudahy said the youngsters are far ahead of most adults in their knowledge, and she proposed that the organization be made nationwide.

Letters requesting information on the Junior Foresters have poured into Pipal's office from city officials in most states, state foresters, teachers and organizations in other countries. He received one letter from a Hindu nobleman who wanted to start a similar movement in India.

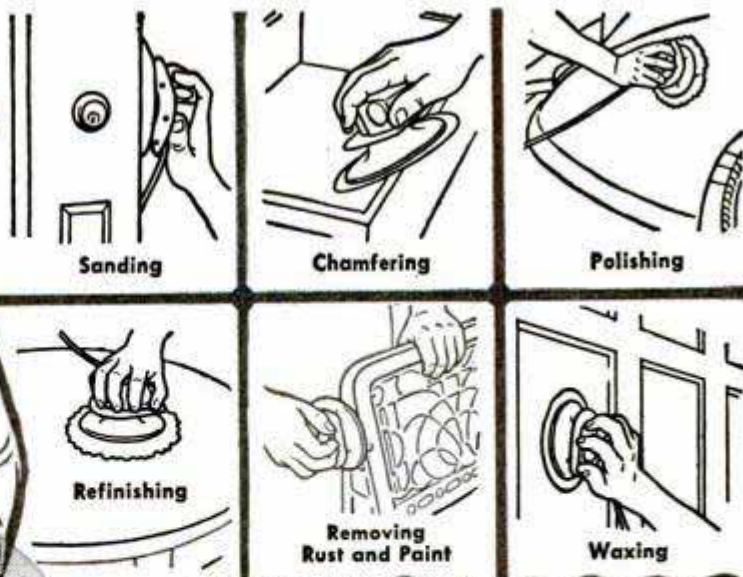
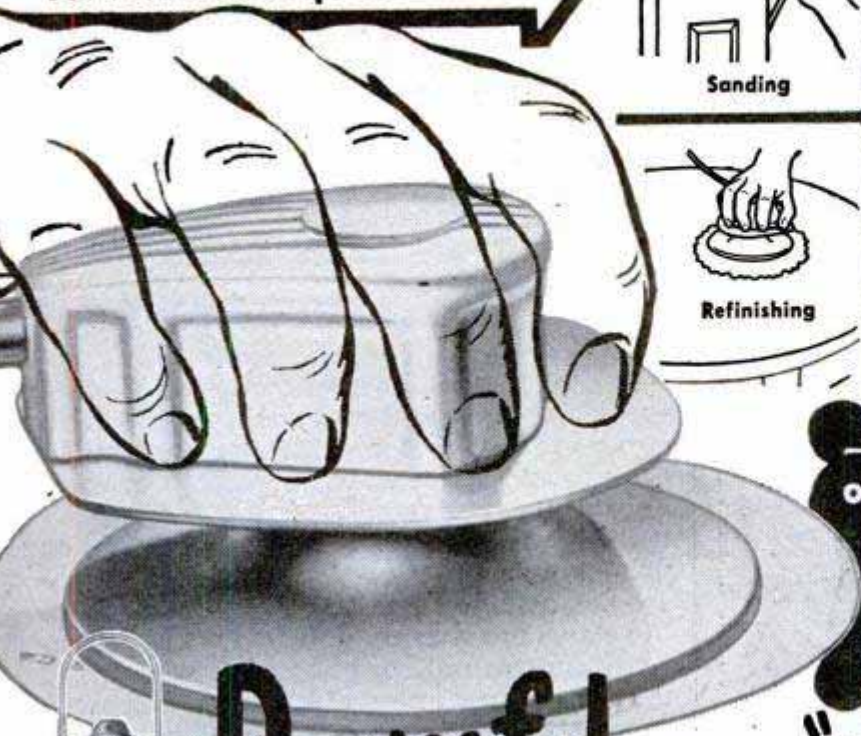
Pipal is amazed by the way his students apply his suggestions. Youngsters of one club ruthlessly ordered him off the school lawn which they had relandscaped and reseeded under his direction. He tells of one of his favorite Junior Foresters, Ronnie, who carried a badge of his devotion to the cause for weeks. One day Ronnie found the neighborhood bully in the top of a tree breaking off the branches. Ronnie insisted that the boy stop. The bully promptly rewarded him with a pair of the blackest eyes in Omaha history. Asked if he was discouraged, Ronnie gazed through puffed eyelids and replied, "I'm going to work even harder now that I can see that these trees really need protection."

Once Pipal described to a club the way leaves of plants take in carbon dioxide and give off oxygen by photosynthesis. Later, four boys asked him a question that stumped him, so he suggested they take the problem to a scientist at Creighton University. Here is the theoretical question the boys pitched at the professor:

"Thirty children 12 years old are in a room with a snake plant. The room is 36 by 28 by 10 feet and the children have enough food to last several days. The temperature of the room is 72 degrees Fahrenheit and it is sealed so no outside air can get in. The leaves of the plant measure 1 by 4 $\frac{1}{8}$  inches. Now, how long can the children stay alive?"

The professor was stumped too.

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Here's a low-priced sander and polisher that *really does a job for you!* It's a powerful, practical tool — not just a toy. The rugged 1/14 HP Duplex Grinder motor gives it the punch *you want* on man-sized jobs.

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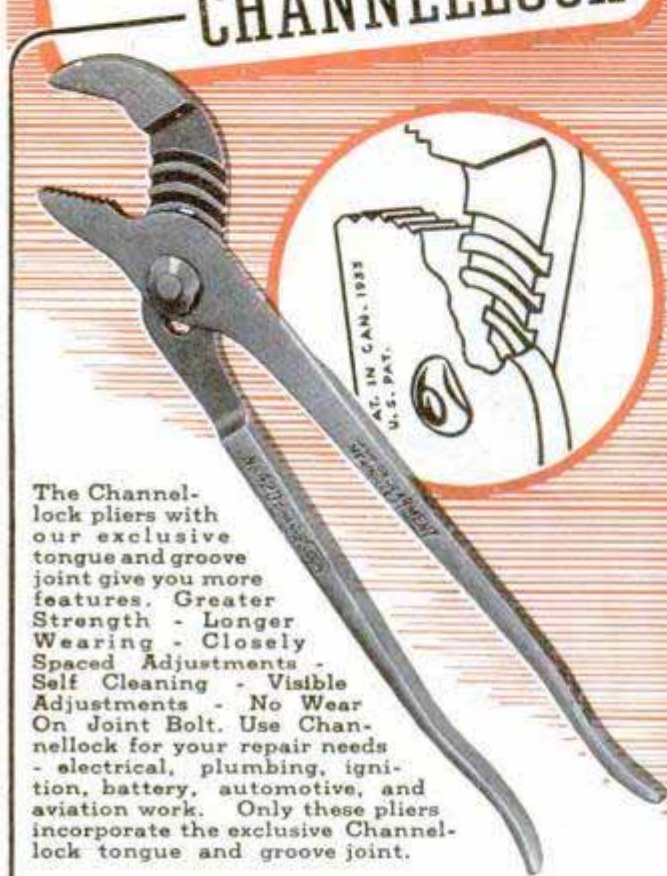
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## The Mystery of the "Hand Animals"

(Continued from page 164)

of field parties into the area. Most of the researchers specialized in seeking bones of animals, but one member of the group, Dr. Frank E. Peabody, was concerned mainly with trackways. Many of these contained prints of the hand animals.

Recently completed, Doctor Peabody's studies of the *Chirotherium* have confirmed or corrected earlier deductions about the creature and have contributed additional information. Much of the field work was done within sight of Meteor Crater in what are known as the Moenkopi strata of the Triassic age.

Doctor Peabody found evidence of eight species of the hand animals, two of which appear to be identical with species found in Europe and six of which appear to be new. Footprints of one small type suggest a creature about the size of a cat while other prints, over a foot long, indicate that some species attained giant size. In some cases, the claws are sharply outlined while others are blunt and almost hooflike, suggesting that the hand animals included herbivorous as well as carnivorous species.

One important discovery was the finding of marks such as would be made by a tail that intermittently touched the ground as the creature moved along. This confirmed earlier conclusions that the hand animal did indeed have a long tail similar to that of the later dinosaurs.

Some *Chirotherium* tracks show front feet almost half as large as the hind feet. Others show the front feet to be considerably smaller. But all tracks of *Chirotherium* show that the animal was essentially quadrupedal. The conclusion is that *Chirotherium* started out as a fully quadrupedal animal, advanced to an incipient bipedal stage with a tendency to walk on the two hind feet alone, and then, over a period of many centuries, gave up the attempt. However, it retained the small front feet to the end of its history on earth.

Usually, a layer of shale rock is found under a sandstone slab that contains tracks. This shale is the ancient dried-out mud. In one rare example, the mud layer was found just as it was when it was deposited 200 million years ago. Peabody collected samples of the mud, wet it and spread it out to dry. The mud broke up into the same patterns of cracks that had been preserved by the sandstone overburden. Small salamanders were induced to walk across the soft mud and their tracks were reproduced with the same fidelity as were footprints of the hand animals.

(Continued to page 256)






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with the new *HYDRA-GLIDE* FORK!

- NEW** "flight-smooth" comfort that irons out bumps like magic!
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You'll think you've got wings . . . when you take off down the highway on this jet-like streamliner! It's so smooth, so comfortable! It handles so easily, hugs the highway so securely, stops so quickly! Amazing Hydra-Glide Fork irons out bumps like magic, gives you effortless steering ease, new riding stability even on roughest roads. Faster-action, oversize front brake gives you increased stopping power. Sealed ray headlight makes night riding a pleasure. These and other features of the 1949 Harley-Davidson bring you new thrills, more fun, more enjoyment than ever before as you take in race meets, hillclimbs, endurance runs, gypsy tours, sightseeing trips. See your dealer today and mail the coupon now.



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Send literature on 1949 models, also free copy of **ENTHUSIAST** Magazine filled with motorcycle action pictures and stories.

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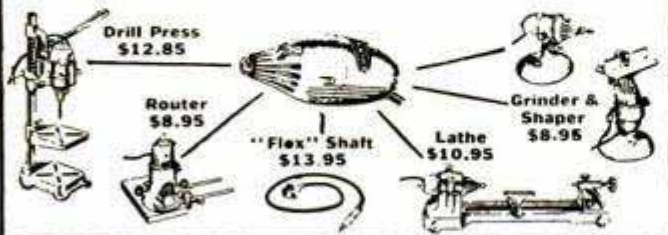


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In studying Chirotherium, Peabody made a number of lizards walk across a prepared mud surface. Comparative studies of the tracks with the skeleton of the lizard provided a kind of equation by which more information about the hand animals was gathered from the tracks that these creatures made.

All in all, the composite picture of the hand animal, confirmed and amplified by Peabody, reveals a large, awkward reptile that resembled somewhat the great bipedal dinosaurs of a later age. In fact, Chirotherium is judged to be part of the family that gave rise to these dinosaurs.

The mystery of the hand animal will not be finally solved until a fairly complete skeleton of the creature is found. The uncovering of a set of foot bones would be a most important discovery for then it would be possible to study the actual bones of the foot that made the curious footprints. There is a good chance that such a skeleton may be unearthed in Arizona.

Expeditions from various universities and museums, exploring portions of the Moenkopi formation each summer, are keeping a sharp lookout for any object that might be a bone of the hand animal. Discovery of one bone may in turn lead to discovery of an entire skeleton and to the final unraveling of the mystery which has been puzzling scientists for years.

## Canada Hunts Minerals

(Continued from page 159)

the flight is finished, all the information can be correlated to give a true picture of the mineral possibilities and the terrain features of the area that has been covered.

At Great Bear Lake and the more recently discovered Ontario uranium ore fields, scientists use both air and ground photos as tools for the recovery of radioactive minerals. The latest technique is to identify mineral specimens by employing a special desensitized film. It distinguishes between uranium and thorium by the relative intensity of the image.

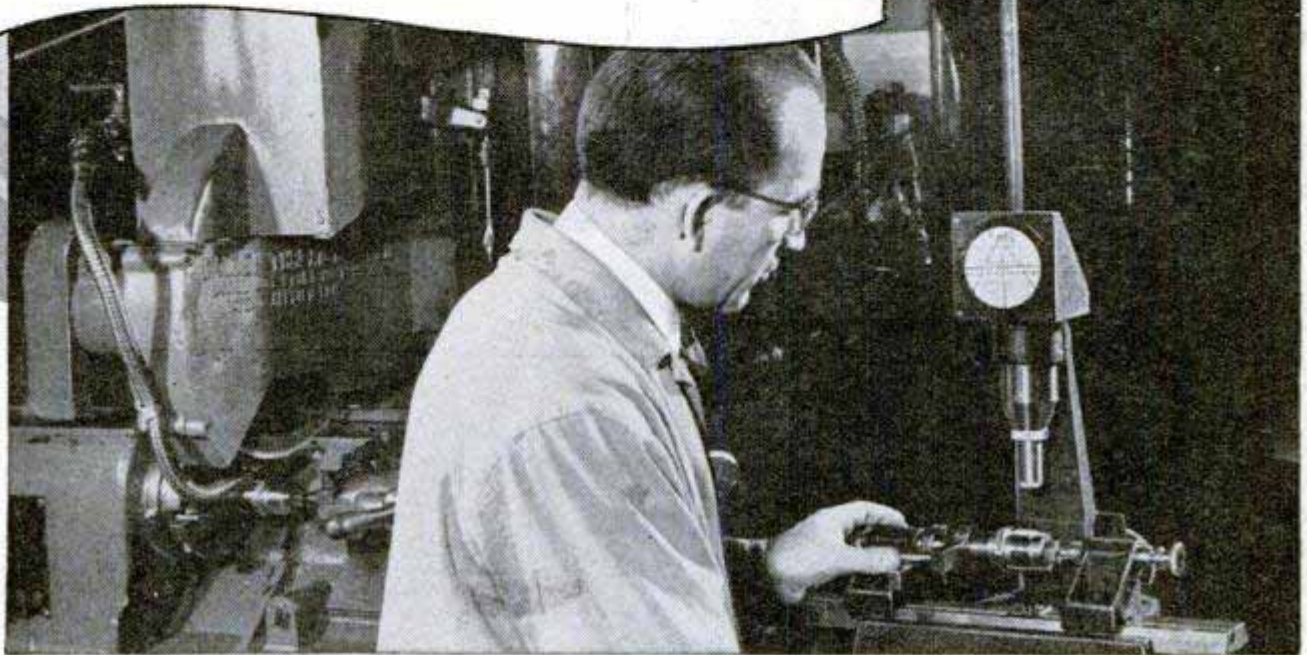
One of the simplest ways of detecting radiation from minerals is to place the specimen on ordinary photographic film in a light-tight box and allow it to remain undisturbed for 36 to 48 hours. The developed negative then will show a distinct image if uranium or thorium is present. The intensity of the image is a rough measure of the degree of radioactivity and thus of the amount of the mineral present.

Radioactivity is detected without photography by a scintilloscope, an instrument

(Continued to page 258)

# Ingenious New Technical Methods

To Help You  
Increase Efficiency



## Light Projector Increases Thread Grinding Production

Production of thread grinding machines can now be increased through the use of a light projecting device called the Thread Pick-up Projector. The thread profile appears in a viewing screen, magnified 20 times, thereby permitting accurate visual adjustments.

In operation the Thread Pick-up Projector is placed alongside the thread grinding machine. A Dalzen Thread Grinder, Model No. 1, is shown above. While the machine is grinding the thread, the operator, using the Light Pick-up Projector, adjusts a "dog" on the next piece to be ground. When the "dog" and piece are then placed in the thread grinder the thread profile is automatically in location and ready for grinding immediately.

Even the most inexperienced personnel can "pick up the thread" using this instrument after only a few minutes demonstration. Grinding is also done more accurately and the viewer permits measurements of reliefs, notches, etc. to .0005 inch.

Efficiency of Production can also be increased through the use of chewing gum. The act of chewing helps relieve nervous tension and seems to make the work go easier and faster. For these reasons, Wrigley's Spearmint Chewing Gum is being made available more and more by plant owners everywhere.

Complete details may be obtained from  
Acme Scientific Company  
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Thread Pick-up Projector



AC-79

# Speed Sweep

**+ Arbitrin**



Speed Sweep, the brush with the steel back, is designed to sweep cleaner, faster, easier, and to outlast ordinary brushes 3 to 1. Arbitrin sweeping fluid, sprayed on the floor before sweeping, disinfects, deodorizes, and removes stains in the process of sweeping. These, plus many more advantages (16 in all) have proved to be the perfect answer to effective, low cost floor sanitation in over 60,000 factories, offices, schools, and stores. Mail coupon for complete facts. *Milwaukee Dustless Brush Co., 530 N. 22nd St., Milwaukee 3, Wis.*

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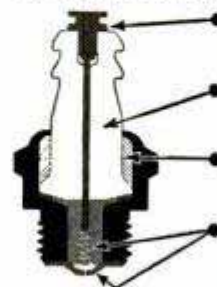
that consists of a short brass tube ending in a cap which holds a magnifying lens. A minute glass prism, with its lower surface coated with zinc-sulphate powder, is cemented below the lens. When a radioactive mineral is held close to the coated surface, some of the radioactive particles strike the grains of powder and cause a succession of momentary flashes that can be seen through the lens.

Still another instrument in use in the great Canadian mineral search is the gold-leaf electroscope. Radioactive ores release the electrical charge on two small strips of gold leaf through ionization of the air. By measuring the rate of discharge, scientists are able to make a reasonably close and rapid estimate of the degree of activity and therefore the uranium content of the test sample. Through such instruments they are saving a great deal of time at the mills and refineries which produce and treat uranium ores such as those at Port Hope and Chalk River, Ontario, where the ores recovered at Eldorado Mines on Great Bear Lake are processed.

Geiger counters in a variety of forms are used to discover and evaluate new fields of uranium. Portable models of the telltale instruments are carried into the field and indicate the presence of ore deposits. Others used in the laboratory measure the amounts of uranium and thorium that are present in samples.

The Canadian Parliament, in 1840, passed the Survey Code which provides help for geology students in carrying out graduate studies. Men from various schools and universities are assigned to field parties and are given an opportunity to continue research work in various geological fields. The plan helps the students in their studies and aids the government not only in its survey work but also by providing a backlog of trained geologists for future work in the discovery and processing of important radioactive ores.

## Announcing **CHAMPION** V-Glow Plugs



- **CHAMPION TERMINAL**—assures better center electrode seal and provides sturdier electrical connection.
- **CHAMPION-CERAMIC INSULATORS**—proved dependable in millions of Champion Spark Plugs.
- **CHAMPION SILLMENT SEAL**—prevents excessive compression leakage between insulator and shell.
- **CHAMPION "THERM-O-FLEX" CONSTRUCTION**—longer element life, more dependable performance.

Follow recommendations of plug types and fuels approved by engine manufacturer.

**CHAMPION**

SPARK PLUG COMPANY, TOLEDO 1, OHIO

Dependable

# CHAMPION

America's Favorite Spark Plug



Weather-wise ducks are flying south, and weather-wise motorists are installing new dependable Champion Spark Plugs. It's the best, most economical insurance of snappy winter engine performance if new ones are needed. New Champions insure quick starts, minimum battery drain, and better gas mileage

all winter long, when gas consumption is usually up. Insist on dependable Champions—America's Favorite Spark Plug—because they're tops in quality, value, performance and dependability. A quacking duck poster will remind you—"HERE COMES WINTER!" Champion Spark Plug Company, Toledo 1, Ohio.

***FOLLOW THE EXPERTS***

**DEMAND NEW DEPENDABLE CHAMPIONS FOR YOUR CAR**

Listen to the CHAMPION ROLL CALL . . . Harry Wisner's fast sportscast every Friday night, over the ABC network

## We Drove to Alaska

(Continued from page 150)

392, being the peak point along the entire distance.

The population thins out sharply. Though the distance between habitation points as small as gas stations averages about 37 miles for 1000 miles, at two places it is more than 90 miles. It is wise to take on oil and gas often, particularly if you plan to drive any distance at night. Making frequent service stops enabled us to complete the trip without once using gas carried along in an emergency container.

Our Plymouth station wagon performed beautifully throughout, but four punctures in 600 miles, with brand-new 6-ply tires, taught us that high-speed driving was poor time economy. Averaging about 40 miles an hour, we didn't have another puncture all the way to Fairbanks.

Food prices increased as we drove north, comparable meals at Fort Nelson running about twice the rate at Dawson Creek. If you have cooking and camping equipment along, you'll find the Alaska Highway's first 1000 miles a good opportunity to make use of them.

North country mosquitoes, earlier described to us as slightly smaller than fighter planes and almost as deadly,

reached their meanest during this stage of the trip. Their size and individual ferocity is greatly overrated, but in numbers they can easily overwhelm the traveler who doesn't carry insecticide bombs, a skin repellent and netting for protection at night.

At Mile 803 the road passes over part of Teslin Lake on a 2300-foot wooden-pile bridge and a little later on, at Mile 837, spans the Teslin River over a half-million-dollar structure.

Before reaching Whitehorse, we talked with Francis C. Durkin, a field reporter for the American Automobile Association. Durkin was returning from Alaska after completing his organization's first official survey of the highway. He was very favorably impressed with the road's condition but recommended holding the absolute top speed well under 50 miles an hour. His inspection over the road's full length had revealed both tourist and car-service facilities, though sparse, to be reasonably good according to U. S. standards.

(Continued next month)

☞ Dandelions, not bad weather, are responsible for small sets of apples, says E. J. Rasmussen of the University of New Hampshire, because the bumblebees, attracted by the flowers, neglect the apple blossoms.

## IS THE MAIL CARRYING YOUR PICTURES?



Have you seen your local Graflex Dealer for entry forms? Or if you haven't a Graflex-made camera, have you asked your dealer to show you the famous Pace-maker *SPEED* and *Crown GRAPHICS*, the RB Series B (the lowest priced) . . . the Super D Graflex with Automatic Diaphragm? Don't wait. There's no obligation . . . so take the first big step to consistently outstanding pictures! Stop in today!

**GET ENTRY FORMS FROM YOUR GRAFLEX DEALER!!**

# 62 PRIZES TOTALING \$5,000.00

A (Teen-Agers)	Action Division	Feature Division
1st	\$150.00	\$150.00
2nd	100.00	100.00
3rd	50.00	50.00
10 Honor Awards (5 in each division)—\$10.00 each		
B (Non-professionals)		
1st	350.00	350.00
2nd	200.00	200.00
3rd	100.00	100.00
10 Honor Awards (5 in each division)—\$25.00 each		
C (Professionals)		
1st	350.00	350.00
2nd	200.00	200.00
3rd	100.00	100.00
10 Honor Awards (5 in each division)—\$25.00 each		
COLOR		
1st	350.00	(Open to all three groups of contestants.)
2nd	200.00	
3rd	100.00	
10 Honor Awards—\$25.00 each		
<b>Special Press Award—\$300.00</b> —open to all groups. Enter any photo published in a newspaper or general magazine between Oct. 1, 1947 and Dec. 1, 1948.		
<b>NOTE:</b> Only pictures made within the above dates, with a GRAPHIC, Graflex, Crown or Century camera, anywhere in the world are eligible in the contest. Contest extends from Sept. 1 to Dec. 1, 1948.		

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these Tools!



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WOOD  
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GLASS  
PLASTICS  
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52-piece  
Set, complete in Case  
FOR ONLY \$19.95\*  
Postpaid

Until  
DEC. 31, 1948  
in the  
United States  
only

## **CRAFTSMAN** Deluxe Rotary Electric Tool

**Complete! . . . Handy! . . . Priced amazingly low!**

Now a sensational "buy" . . . for yourself or as a gift! Truly a whole shopful of tools-in-one . . . this superb CRAFTSMAN Deluxe Rotary Electric Tool will help you turn out all kinds of fine work quickly, easily, accurately . . . for pleasure or profit! Perfect for home or shop, hobby or professional work . . . for maintenance, toolroom, and light industrial production . . . and for scores of other jobs!

Notice all these quality features! Precision-built throughout! Powerful, 18,000 R.P.M. universal motor for 110-120-volt, 25-60-cycle, A.C. or D.C., has improved fan-cooling system; grease-packed precision ball bearing in front; self-aligning rear bronze bearing. Large size brushes, replaceable from outside. Balanced armature and built-up commutator. Built-in condenser reduces radio static. Positive-break on-off switch.

1000-volt tested. Entire tool — not just cord and plug — approved by Underwriters' Labs., Inc. Removable finger-rest over chuck for close, accurate work. Removable pistol-grip handle. Accurate collet chuck assures solid locking of accessories. 5½-ft. heavy rubber-covered cord and unbreakable plug. Over-all length of tool, 7 inches. Weighs only 1¾ lbs., less cord. In handsome, simulated leather-covered case. Buy it NOW at your nearest SEARS RETAIL STORE, or order direct from your nearest SEARS MAIL ORDER HOUSE, using coupon below.

### A complete 52-piece Set . . . with every tool you'll need!

ALL these Accessories (shown at left): 7 Steel Cutters; 1 Mounted Saw, ¾-in.; 1 Saw, ¼-in.; 3 High Speed Drills; 3 Brushes; 8 Mounted Emery Wheels; 1 Cloth Buffing Wheel; 1 Felt Buffer; 2 Rubber Polishing Wheels; 1 Sanding Drum Assembly, with Sleeve; 4 Extra Sleeves; 4 Abrasive Discs; 2 Mandrels (Washer, and Screw-on types). PLUS these Accessories (not shown): 2 Collet Inserts, 3/32 and ¼-in. cap.; 2 Chuck Wrenches; 1 Socket Wrench; 1 Rip Guide; 1 Emery Wheel Dresser; 5 Extra Mandrels (on Saw and Wheels); 1 Set of Motor Replacement Brushes . . . with Rotary Electric Tool, Collet Chuck, cord and plug, in sturdy Workshop Case.

Look what  
it can do!

GRINDS  
SHARPENS  
DRILLS  
SAWS  
CUTS  
CARVES  
ENGRAVES  
ETCHES  
ROUTS  
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CLEANS  
and many  
other uses!

**ACT NOW!** Mail this coupon **TODAY** to your nearest SEARS, ROEBUCK AND CO. MAIL ORDER HOUSE, as listed below: Chicago 7, Ill.; Philadelphia 32, Pa.; Boston 15, Mass.; Kansas City 14, Mo.; Minneapolis 1, Minn.; Atlanta, Ga.; Memphis 2, Tenn.; Dallas 2, Texas; Greensboro, No. Carolina; Seattle 4, Wash.; or Los Angeles 54, Calif.

Please send me the CRAFTSMAN Deluxe Rotary Electric Tool Set, No. 9 C 2652, offered in the United States only, at your special price of \$19.95\*.

I enclose check or money order for \$19.95\*.

\*PLUS additional correct amount for Tax on Sales, if required by your State or City.

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PM 11

**CRAFTSMAN** Hand and Power Tools by SEARS, ROEBUCK AND CO.  
Famous for their Top Quality and Extra Value!

## Top of the World Weather Run

(Continued from page 101)

little more than six hours. Another two hours and the weary crew climbed down to familiar ground at Ladd Air Force Base, mission completed.

From countless flights like that of Laughman and his crew, the Air Force is learning about polar weather, valuable knowledge for war or peacetime purposes. Flyers discovered the weather generally looked worse than it was. The air, they found, was mostly stable, with fog, snow and ice haze the main hindrances.

Contrary to previous conceptions, it was found that both lows and highs are constantly moving across the region. The lows were found to be more intense than those to the south, but the resulting weather was not as severe. Experience soon established the prevalence of propeller-icing hazards and the extraordinary tenacity of rime-ice formations.

The missions recognize no "no flying" time, though the twilight transition periods early in the spring and fall present the greatest difficulty. Then the navigators plan flights to concur with phases and positions of the moon or the brighter planets, Venus, Jupiter or Saturn. During this time, there is a 40-minute leeway each

way, during which the flights have to go or be canceled.

Use of the astro-compass in conjunction with a recently devised new form of navigation, called grid navigation, instead of the magnetic compass, eliminates the shifting North Magnetic Pole as a navigational problem. When possible, navigators prefer to work with the sun because it requires fewer corrections.

During the beginning of the twilight transition periods, when the sun is just a glow on the horizon to the south, missions fly out with the sun. They move through about two hours of twilight as they near the pole, depending on the automatic pilot and the directional gyros to hold a correct heading. Then they fly back through the darkness on the other side of the twilight band after the turn at the pole.

On March 16 this year, just prior to the vernal equinox, one crew had the odd experience of seeing two sunrises and two sunsets during a normal length flight. The sun didn't appear until they were on their way, set when they were almost at the pole, reappeared as they headed south and had set again by the time they landed at Fairbanks.

The science of weather is still relatively

(Continued to page 264)



*"We needed some extra rooms in a hurry,  
so when we found out that Weldwood Glue is so strong . . ."*

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.



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PLASTIC RESIN GLUE

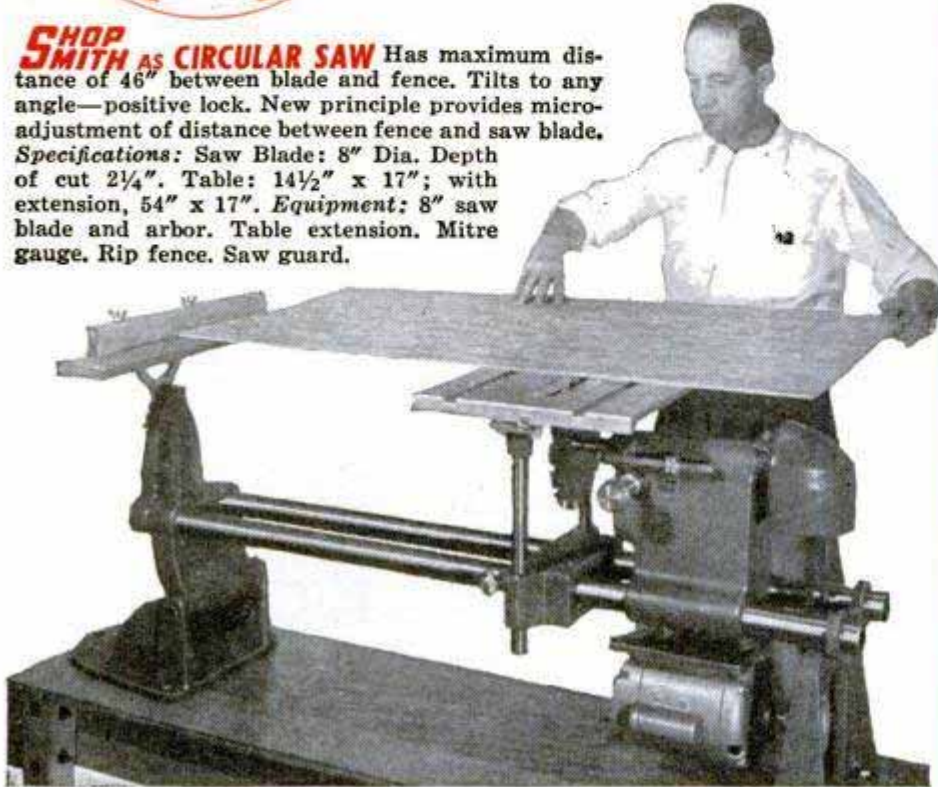
United States Plywood Corporation, New York 18, N. Y.





# A LOT OF POWER TOOL IN A LITTLE SPACE

**SHOP SMITH AS CIRCULAR SAW** Has maximum distance of 46" between blade and fence. Tilts to any angle—positive lock. New principle provides micro-adjustment of distance between fence and saw blade. *Specifications:* Saw Blade: 8" Dia. Depth of cut 2 1/4". Table: 14 1/2" x 17"; with extension, 54" x 17". *Equipment:* 8" saw blade and arbor. Table extension. Mitre gauge. Rip fence. Saw guard.



**Complete 5-in-1 SHOPSMITH — 59" Long  
By 18" Wide — Only \$159<sup>50</sup>. With Special  
1/2 H.P. Ball Bearing Motor, \$195<sup>50</sup>**

You're looking at a new kind of power tool. It's **SHOPSMITH**—a circular saw, wood lathe, disc sander, vertical and horizontal drill press *all in one*. For the first time, a multi-purpose power tool with full usefulness in all five positions . . . and convertible to grinder, buffer, router, drum sander, shaper, scratch brusher. And just 59" long by 18" wide. Yes, **SHOPSMITH** outworks single purpose tools of comparable size . . . and you can change from tool to tool in less than one minute.

**BUILT RUGGED**

**SHOPSMITH** has cast iron head-

stock and carriage. Centerless ground and polished steel ways. Heavily reinforced aluminum table. Four life-long grease-sealed Fafnir ball bearings. Weighs over 200 pounds.

**PRECISION MACHINED**

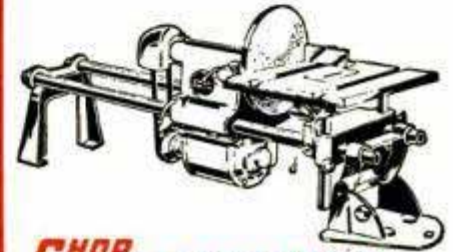
Each **SHOPSMITH** part is precision-machined, factory-tested. Carriage is precision-bored and gauged. Gives cutting tool and work support constant relationship. *You can work more accurately with SHOPSMITH.* Have **SHOPSMITH** demonstrated for you in-the-store. Write for name of nearest dealer and free descriptive folder.

**Magna Engineering Corporation  
465 California Street, San Francisco 3**



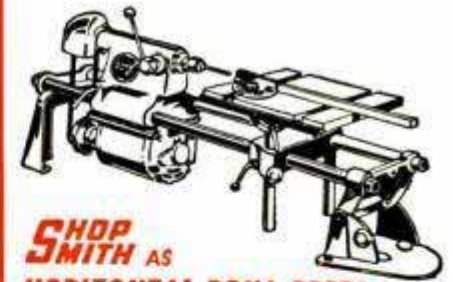
**SHOP SMITH AS VERTICAL DRILL PRESS**

*Capacity:* Drills to center of 15" circle. Clearance: Table to chuck — 27" max. Spindle: 5/8" Dia., 6 spline, hardened tip. Spindle Feed: 4 1/4". 4 grease-sealed Fafnir ball bearings. Variable speeds. Table: 14 1/2" x 17". *Equipment:* 1/2" Jacobs key chuck. Fence.



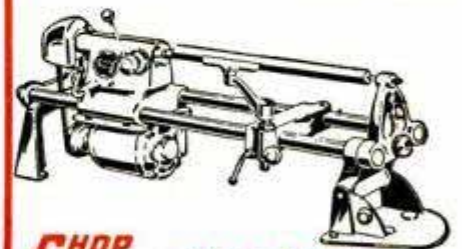
**SHOP SMITH AS DISC SANDER**

Disc Diameter: 12". Table Dimensions: 14 1/2" x 17". Tilting Table. *Equipment:* 12" disc. Mitre gauge.



**SHOP SMITH AS HORIZONTAL DRILL PRESS**

Only **SHOPSMITH** performs this highly useful function. No limit to length of work. Provides accurate method of drilling for doweling, etc.



**SHOP SMITH AS WOOD LATHE**

34" between centers. Swing: 15". Variable speeds. Quill Feed: 4 1/4". *Equipment:* Tool rest. Drive center. Cup center.

# See the NEW TRIPLE TOOL

only \$48.75



Complete with following accessories:

- 3-5" Sanding discs (fine, medium, coarse)
- 1-5" Lamb's wool bonnet
- 1-5" Backing pad
- 1-7B Jacobs chuck with key and patented key holder

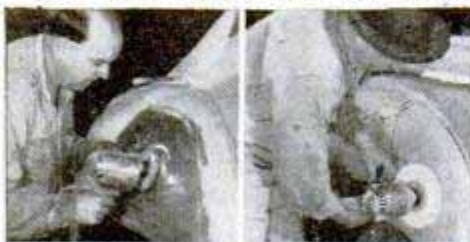
## SANDER-POLISHER-DRILL

Here's the portable power tool you've always wanted. Ideal for hundreds of jobs around home and workshop. New Triple Tool is a 5" disc sander, 5" polisher and 1/4" drill combined! **Three tools for the price of one!** Triple Tool converts from sander-polisher to drill by removing backing pad and attaching 7B Jacobs chuck to spindle. Drills 1/4" in steel; 1/2" in hardwood.

It's light (6 lbs.)—rugged—compact—powerful. Built by manufacturers of famous Bradford Metalmaster Toolroom Lathes. Has all ball bearings with sealed-in lubrication. Helical-cut hardened gears. Push-button spindle lock. Removable side handle. Powerful 115 volt AC/DC motor drives disc at 2300 rpm free speed; 1400 rpm under normal load.

See the Triple Tool in action at your Bradford distributor, or write for catalog sheet giving complete specifications. The Bradford Triple Tool is available for immediate delivery. 25% deposit with order, balance C.O.D.

Dealers: Write for our sales proposition.



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POLISHES  
DRILLS**

WOOD • METAL • PLASTICS

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MACHINE TOOL CO.**

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Precision Since 1840



unexplored. As knowledge of the upper atmosphere increases, the forecasters' requirements change. More study is constantly being directed toward factors such as atmospheric electricity, radiation and ozone measurements, water-drop size and pollen count.

Some of these factors may hold the key to virtually exact weather forecasting, or even to the control of weather, as some confidently believe. But the first big step has been taken now and the USAF's "commuter runs" over the pole are taking the mystery out of arctic weather.

## Debut for the '49 Nash

(Continued from page 118)

has been decreased three inches on the '49.

To start a Nash you step on the clutch. This long-time Nash safety feature has been retained in the '49. It's impossible to start this car in gear. As the motor begins to purr and you move down the bumpy road toward the high-speed track, you are impressed with the comfortable ride.

The Ambassador we tested advanced from 0 to 30 m.p.h. in 6 seconds; 0 to 40, 10

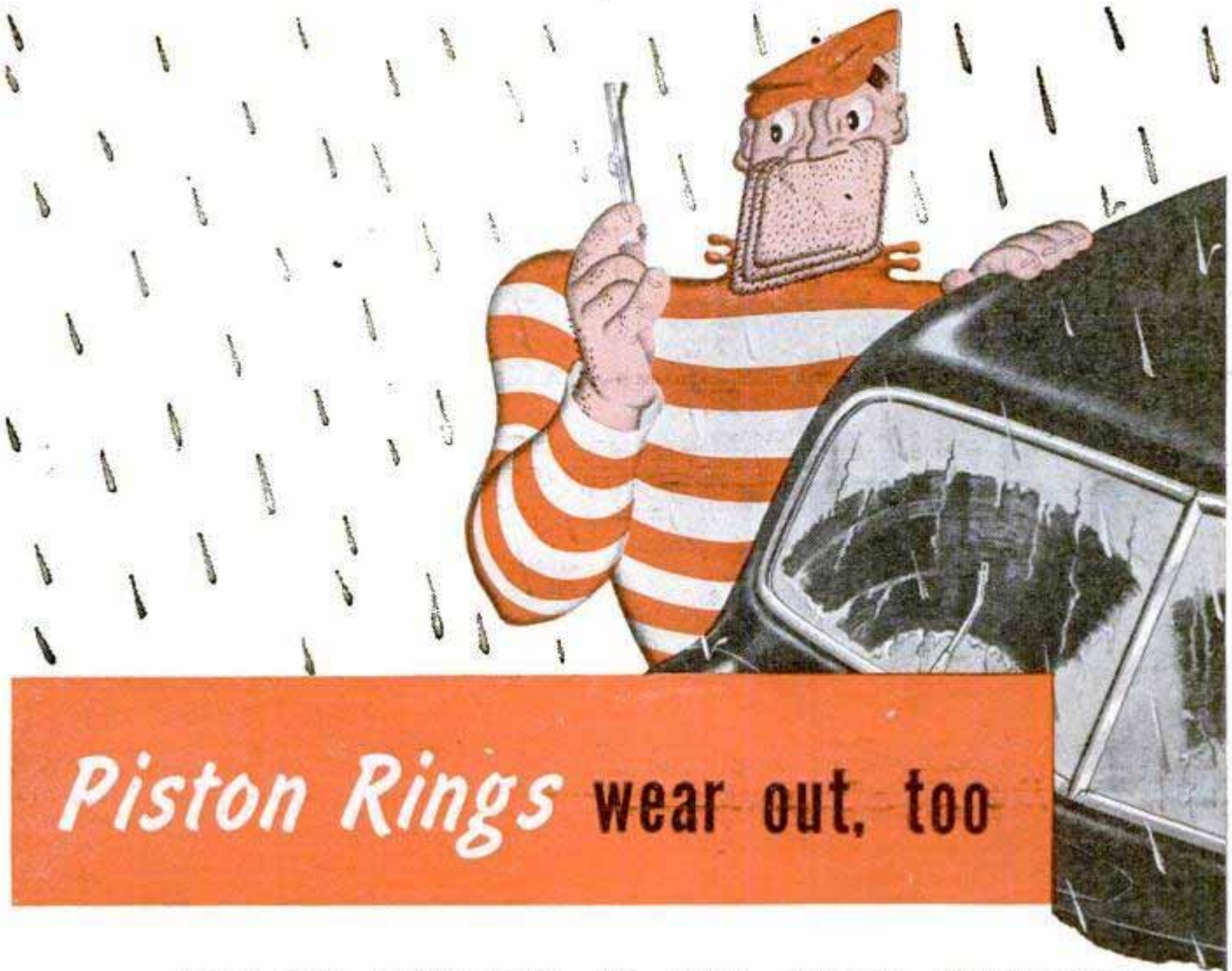
### NASH SPECIFICATIONS

	Ambassador	"600"
Engine.....	6 cyl. over-head valve	6-cyl. L-head
Horsepower.....	112	82
Wheelbase.....	121"	112"
Over-all length.....	208-9/16"	199-9/16"
Height.....	62"	62"
Brakes.....	Hydraulic	Hydraulic
Springs.....	Coil (front and rear)	
Drive.....	Torque tube	
Width of front seat...	5' 3"	5' 3"
Width of rear seat....	5' 1"	5' 1"
Tires (super-cushion)...	7:10x15	6:40x15
Luggage compartment.	28 cubic feet	
Models.....	4-door sedan, 2-door sedan, brougham	

seconds; 0 to 50, 14 seconds; 0 to 60, 20 seconds. Tests starting at 10 m.p.h. with the Ambassador resulted as follows: 10 to 30, 7 seconds; 10 to 40, 12 seconds; 10 to 50, 15 seconds; 10 to 60, 22 seconds.

The new Nash holds the road firmly on curves. This is due to better suspension, redistribution of weight and lowered center of gravity. The car stands only 62 inches high—six inches lower than the '48 Nash and only two inches taller than the new

(Continued to page 266)



## *Piston Rings* wear out, too

### ...AND OIL PUMPING IS THE FIRST SYMPTOM

If you ignore worn-out piston rings you'll wind up with a lot of needless trouble and expense.

So, at the first sign of ring wear—oil pumping, exhaust smoke or loss of power—take your car to a good mechanic.

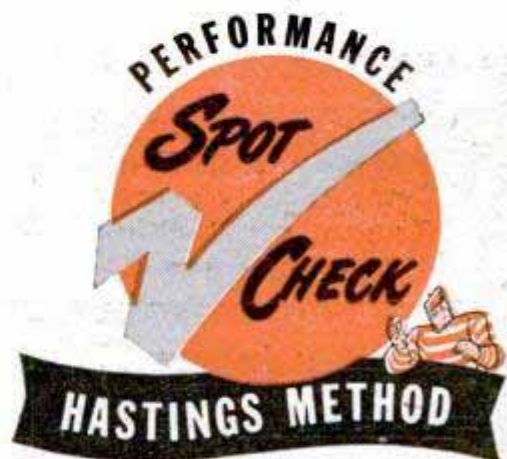
If he suggests new piston rings it will pay you to get Hastings Steel-Vents. They *stop* oil pumping, *check* cylinder wear, *restore* engine performance. It's the best money you can spend on your car.

## HASTINGS *Steel-Vent* PISTON RINGS

 GET AN EXPERT CHECK-UP...WITHOUT OBLIGATION

There's good common sense in having your motor checked over now and then—especially now, when so many repairmen are set up to give a Hastings Spot Check without charge or obligation. Drive in to your repairman, and ask for it.

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now knows  
may help you...

## HEAR BETTER



Get the answers to your questions—plus many interesting and encouraging facts about your hearing—in a new booklet now available to you without cost, called "Modern Science and Your Hearing." Prepared with the help of scientists at Bell Telephone Laboratories, it is published by Western Electric. Mail coupon for your free copy.

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low-slung Hudson. It has ample headroom.

Former Nash owners will be pleased to discover that the Weather Eye ventilation system has been retained with some improvements. The Weather Eye supplies a continuous flow of fresh filtered air. Improvements include better heating at low speeds, a main circulation fan and a more effective water shedder. The vent on top of the hood is never closed. This vent is placed high to avoid highway fumes and dust. The position of this vent should be appreciated by one company which is being sued by the widow of a driver who was asphyxiated. He was parked, according to the suit, behind a taxi with his sedan windows closed and vent open. Exhaust from the taxi entered the low forward vent and filled the sedan with deadly fumes.

Back in the garage after the test run, enthusiastic workmen gather around to point out highlights of the new Nash. These men refute the old theory about no man being a hero to his valet. The fellows who build, service and test the '49 Nash are its biggest boosters. They point out that the '49 retains its "unitized" body construction with the frame built as an integral part of the body. Nash pioneered this type of body construction and their engineers consider the word "chassis" an antique expression.

Another Nash feature which has been improved on the '49 is the bed which is now a twin. This optional equipment, available on all two and four-door sedan models, is easily operated. Each half of the divided front seat can be dropped back, singly or together, to form sleeping space. Two single mattresses fit over the seat cushions. This arrangement provides a single bed while the car is under way.

The Nash engineers have taken a free hand with the luggage compartment. Including four cubic feet for the tire in a vertical position on the right side, the compartment affords 28 cubic feet of storage space. All the rear lights are installed in the trunk lid, a novelty with both good and bad features. When it is lifted at night the lights are hidden from an approaching car. However, a small red warning light shines inside the trunk. The ingenious tamper-proof lock on the trunk has a T-handle which fits flush with the lid. When unlocked, the handle snaps out under spring pressure.

Body styles for both models of the Nash include the four-door sedan, two-door sedan and the brougham. The brougham has two wide single seats in the rear separated by a large triangular armrest. The seats are angled slightly to face toward center.



SWIVEL  
JAW

**NEW!**

SEYMOUR SMITH  
**"Snap-Lock"**  
PLIER-WRENCH

**3**  
**NEW**  
**Features**

1. Swivel Jaw holds odd-shaped pieces.
2. Capacity Indicator pre-sets jaw spread.
3. Release unlocks jaws instantly by a touch of the finger.

Tremendous grip. Use as a plier or, when locked closed, for holding articles to be drilled, welded, ground, etc. 1000's of uses around home, farm, garage, shop. No. 2607, 7", \$1.75; No. 2610, 10", \$2.25. At your dealer or write direct. Free circular.

CAPACITY  
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LOCK  
RELEASE

SEYMOUR SMITH & SON, INC.  
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**BUILD IT, FIX IT**

WITH

**AMBROID**

**"IT STAYS STUCK!"**

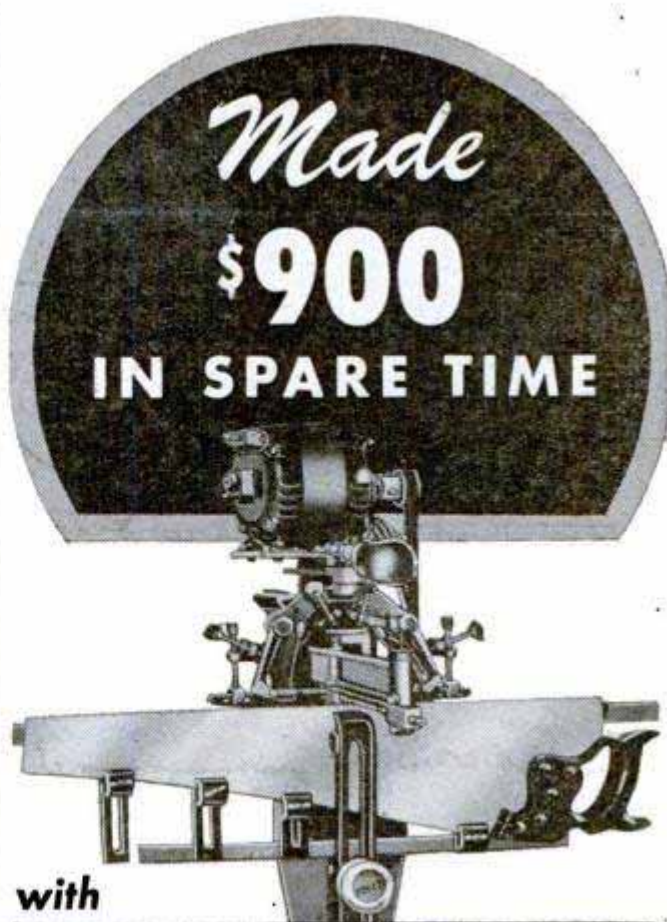


For a quick job with permanent results use multi purpose, fast drying Ambroid liquid cement. For home workshop, household or factory. A quality leader for 38 years. Ready-to-use Ambroid is waterproof, transparent, quick drying, extra strong, flexible, heat and corrosion resistant. For assembling, repairing or mending jobs, keep Ambroid handy. At your dealer's or send 25c for a big 2 oz. tube postpaid. Money back guarantee.

Also 50¢ 4-oz. tube. Pts., qts., gals., for industrial use.

**AMBROID**

303 Franklin St., Boston 10, Mass.



with

**FOLEY\* automatic SAW FILER**

\*Trade Mark Reg. U. S. Pat. Off.

"I did very well last year with my Foley equipment, about 950 saws and 240 lawn mowers, in my spare time. About \$900 for me." L.H.M., New York. A.G.W. in Mass. says: "I have filed over 5000 saws in 8 years and find the Foley Automatic Saw Filer very satisfactory."

Make up to \$2 or \$3 an hour in Spare Time. With the high prices of food, clothing and everything else, just think what you could do with extra money every week! With a Foley Automatic Saw Filer you can file hand, band and circular saws better than the most expert hand filer. "The first saw I sharpened with my Foley Filer came out 100%"—writes C.E.P. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings you more customers. Cash business, no canvassing. No eyestrain, no experience needed.

**FREE BOOK**

**INDEPENDENCE AFTER 40!**

Shows just how you can start at home in spare time in your basement or garage. Just think—with a small investment, no overhead, no stock of goods to carry, you can get right into a cash business—and later on develop into a full-time repair shop. Send coupon today for this practical plan.



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Send FREE BOOK—"Independence After 40."

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Address \_\_\_\_\_

What a Christmas Gift!

NOW...SANDING IS FUN!



## Amazing MOTO-SANDER AND POLISHER

**Saves Time - Saves Elbow Grease!** Here's an inexpensive Sander and Polisher so easy to handle that a child can use it. All you do is guide it! **Moto-Sander** delivers 7,200 strokes a minute... does a magically smooth job... gets into places other sanders can't reach. Has only two moving parts... never needs oiling or adjustment. Uses 110-120 volt, 60 cycle A.C. electric current. Has 8 ft. (Underwriters' Approved) rubber cord. Furnished with 6 sheets assorted grade Garnet paper for sanding, plus 1/8" thick felt pad and sheepskin pad for wax polishing.

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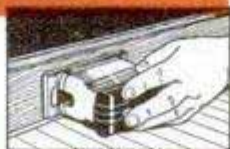
### FINE FINISHES - FAST!

Use **Moto-Sander** to get satin smooth sanded finish on woodwork, stairways, doors, furniture: ideal for finish sanding of boats, painted walls, bird houses or scale models. Use it also for speedy, effortless polishing of waxed furniture, automobiles and other surfaces, simply by removing sandpaper and clamping on polishing pad. **Moto-Sander** is the lightest, most practical electric sander on the market, and is patented.

### MONEY-BACK GUARANTEE

See **Dremel Moto-Sander** at your dealer's. If he cannot supply you, use coupon below to order on 5-day trial, money-back guarantee. **Moto-Sander** will be sent complete and post-paid for \$14.85 (check or money order in full). Or, send only \$2 with order and pay postman balance plus postage upon C.O.D. delivery. Remember, **YOUR MONEY BACK** if not delighted after 5 days' trial.

**DREMEL MFG. CO.**  
DEPT. SP118-L • RACINE, WIS.  
MANUFACTURERS OF THE FAMOUS  
MOTO-TOOL AND MOTO-SAW



EASY FOR  
AWKWARD PLACES



SANDS FLAT  
SURFACES EVENLY



GETS INTO  
TIGHT CORNERS



ROUNDS CORNERS  
LIKE MAGIC



GREAT FOR  
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- Enclosed find \$14.85 (Check or money order in full). Ship **Moto-Sander** at once Postpaid.  
 Enclosed find \$2.00 as part payment on **Moto-Sander**. I will pay postman balance plus postage upon C.O.D. delivery.  
 Please send Free Catalog of Dremel Tools and Equipment.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

## Trainer of Champions

(Continued from page 123)

to the body as possible. An assistant drops the pigeon some distance from the dog. After holding the dog steady for a moment, the trainer signals him forward and the dog makes the retrieve. Nick can return a live pigeon all day without even ruffling the bird's feathers.

At any advanced point in the training, Walker switches his dogs to whistle signals so they will be easier to handle in the field. This is done simply by uttering the command word and then immediately blowing the corresponding blast on the whistle. The dog quickly associates the two, and soon will work by whistle signal alone while in the field.

The trainer maintains that holding a dog steady when a shotgun is fired is no particular problem. Most good retrievers soon will learn to associate the report of the gun with the fall of a bird and will be eager to make a retrieve.

By the time the dog is a year old, Walker says, he should be trained well enough to work as a partner in the field. At three or four years of age he will reach his peak in performance and will remain a top-notch worker for several years.

Walker has taught his dogs refinements that have made them known throughout the country. For example, he can put out six pigeons in tall grass a great distance from Nick. On command, the dog will bring back any chosen bird, switch from one to another or retrieve all six in succession. Thus, when Nick accompanies a large hunting party, he can make retrieves for every Nimrod who brings down a bird, working only on Walker's signals.

Nick also has an exceptional eye for marking the fall of a fowl. This is a trait that cannot be taught—either a dog has the knack of running or swimming straight to the fallen bird, regardless of obstacles in his path, or he must hunt the bird for some time. A good retriever, if he can't find the bird immediately, will make long "casts" in a pattern determined by the terrain, searching every inch of the ground to pick up the scent.

Nick is fearless. He will dive from a high bank far out into the water, will jump a six-foot fence with a pheasant in his mouth and has been known to crash repeatedly against even higher fences with the full force of his body in an effort to break his way through.

According to Walker, Nick is afraid of only one thing—making a mistake. That has always been the mark of a champion.



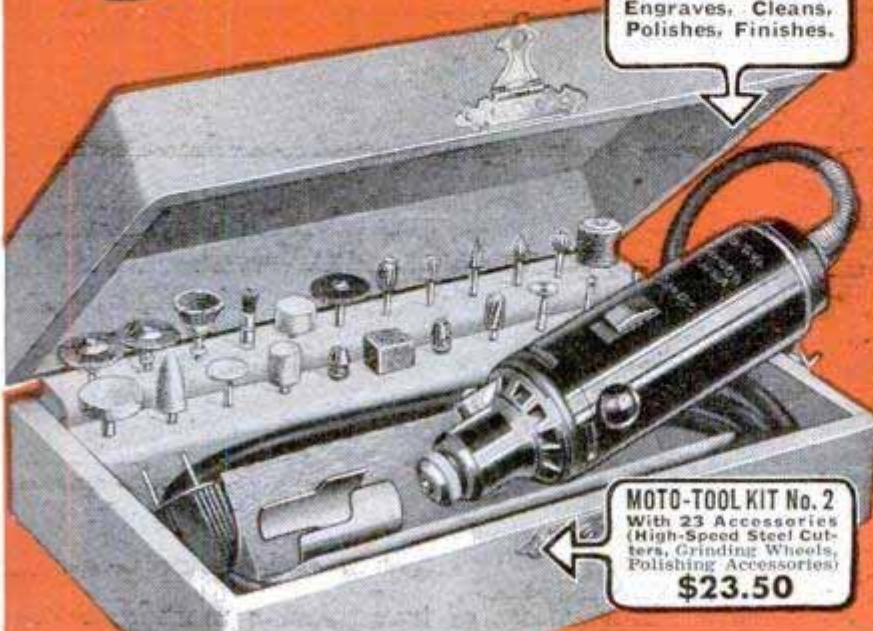
# Moto-Tool

THE "POCKET-SIZE  
MACHINE SHOP"

THE GIFT  
HE'LL LIKE BEST  
AND USE  
LONGEST



Grinds, Routs,  
Drills, Carves,  
Engraves, Cleans,  
Polishes, Finishes.



**MOTO-TOOL KIT No. 2**  
With 23 Accessories  
(High-Speed Steel Cut-  
ters, Grinding Wheels,  
Polishing Accessories)  
**\$23.50**



APPROX.  
27,000 R.P.M.



Great for  
Hobbyists



Saves Time  
and Labor

## A SHOP TESTED TOOL

Moto-Tool is backed by over 12 years of industrial use . . . packs years of extra pleasure . . . yet, due to increased production, pre-war prices still prevail!

### LOOK FOR THESE MOTO-TOOL FEATURES

Oil-less, sealed bearings • Patented automatic chuck lock pin • Oversize armature shaft; hardened, ground, polished • Shock-proof, bakelite housing • Dust filtered air cooling system • Dynamically balanced for vibrationless operation • Exclusive hanger hook • Weight only 13 oz.

## New DRILL PRESS

ONLY **\$9.95**

(Less  
Moto-Tool)

Only Dremel offers you a portable, precision drill press at such an amazingly low price. Just the thing for creating costume jewelry, model making, wood carving, routing, etc. Utilizes Model No. 2 Moto-Tool, which can be raised or lowered, swung in any direction, or quickly removed for off-hand use. Drill Press stands 12" high. Base is 6 3/4" x 4". Weighs approximately 3 1/2 pounds.



### MONEY-BACK GUARANTEE

Buy Dremel Tools from your dealer. If he cannot supply you, use coupon below to order desired items on 5-day trial, money-back guarantee. Items checked will be sent complete and postpaid for check or money order in full. Or, send only \$2 with order, and pay postman balance plus postage upon C.O.D. delivery. Remember, **YOUR MONEY BACK** if not delighted after 5 days' trial.

**DREMEL MFG. CO.**

DEPT. T118-L • RACINE, WIS.

Here's  
**BIG VALUE!**

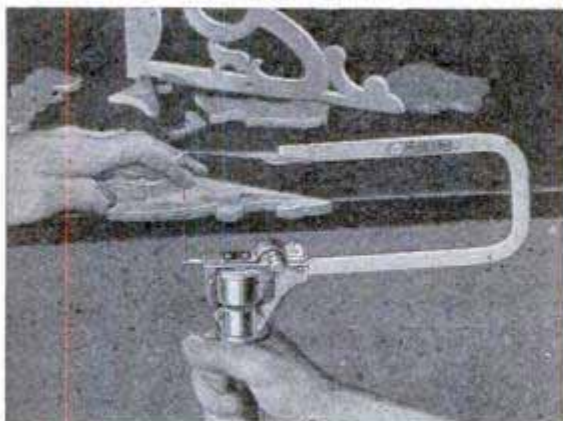


MODEL No. 1  
**MOTO-TOOL KIT**  
ONLY **\$17.50**

This highly popular Kit contains lighter Model No. 1 Moto-Tool and 34 practical accessories in attractive, lacquer-finish wood box. It's the biggest bargain in the field.

# MOTO-SAW

THE AMAZING ELECTRIC SCROLL SAW



This electric coping saw works like magic! Easily cuts intricate scroll designs in medium-hard wood up to 3/4" thick. Runs 7,200 strokes a minute . . . just guide it! Has only two moving parts . . . never needs oiling. Operates on 110-120 volt, 50 or 60 cycle A.C. electric current. As safe as a handsaw . . . thousands of satisfied users. Comes complete with 3 saw blades, at only... **\$5.85**

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IF YOUR DEALER CANNOT SUPPLY YOU WITH DREMEL TOOLS

**DREMEL MFG. CO., Dept. T118-L • RACINE, WISCONSIN**

- Enclosed find \$\_\_\_\_\_ (Check or money order in full). Ship items checked below at once Postpaid.
- Enclosed find \$2.00 as part payment on items checked. I will pay postman balance plus postage upon C.O.D. delivery.
- Moto-Tool Kit No. 2, \$23.50     Moto-Saw, with 3 blades, \$5.85
- Moto-Tool Kit No. 1, \$17.50     \_\_\_\_\_dozen blades (60c per doz.)
- Drill Press (Less Moto-Tool), \$9.95     Free catalog of Dremel Tools and Equip.

NAME \_\_\_\_\_ ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



If a gift for some man has you worried remember nothing could be more appreciated than fine tools. Perfect for use on the job or at home, they will please the most particular male — whether he's 6 or 96. Singly or in sets, Proto Tools are fun to give and a joy to receive. See your dealer today. Write for catalog to Plomb Tool Company, 2255C Santa Fe Avenue, Los Angeles 54, California.

**Long-Lasting,  
Appreciated!**



Set No.  
9900 D

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**PROTO TOOLS**  
Reg. U. S. Pat. Off.

*First in Quality*

MFD. IN U.S.A. BY  
**PLOMB TOOL CO.**

## Television Is the Navy's Schoolteacher

(Continued from page 127)

via coaxial cable or micro-wave relay and the location of the student body. Regions, somewhat in the order of their probable activation, might be: East Coast; Chicago-St. Louis-Detroit; West Coast; Florida and Texas.

The network covering the East by radio relay from Boston to New York and by coaxial cable from New York to Richmond, Va., could cover a multitude of service personnel and this group could be heavily increased if this web were extended to include Norfolk, Va., and Cherry Point, N. C. Transmission time could be acquired by the usual commercial means and could, if necessary, be drafted in emergencies.

A possible alternative to the coax-relay combination might be the Westinghouse Stratovision scheme, whereby airplanes at four miles altitude pick up and relay TV signals from a ground station, making it possible almost to cover the country by eight planes.

Regardless of transmission method, security could be maintained by possible introduction of coded interference in the video and audio signals at the source and filtering them out at the receivers at the various bases.

The Navy plans to keep the class groups small, probably not more than 30, to maintain the intimacy and feeling of personal contact with the instructor. The picture will be projected and the image will not be smaller than three feet by four feet and may be twice that large. The picture must be large enough to show details and not so large that the instructor on the screen overpowers the students.

Instructors will be able to ask questions of any group and receive answers via a parabolic mike in each classroom. In addition, a rater system will enable him to know just how well he has made a certain point by polling the entire group, wherever situated. To a given question he will show four answers and ask the men to push the one button of four on their desks which indicates their choice. The aggregate answers for the whole group will appear in the studio along with the answers from each group and each classroom will have a board indicating its own answers.

After each lesson there will be a question period. Each student will have a mike on his desk connected with the instructor's assistant at the center. The student presses a button on the mike and asks his

(Continued to page 272)



Harvey E. Whitman  
Jackson, Mich.  
Senior 1st Award  
\$4,000 Scholarship



Howard Eichen  
San Francisco, Calif.  
Senior 2nd Award  
\$3,000 Scholarship



Leon Levand  
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Howard K. Graves  
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\$1,000 Scholarship



Ronald Johnson  
Portland, Ore.  
Junior 1st Award  
\$4,000 Scholarship



Tom Goad  
Birmingham, Mich.  
Junior  
Dup. 1st Award  
\$4,000 Scholarship



## Major Award Winners 1948 Competition

# BOYS! \$65,000 IN AWARDS

Build model cars for the 1949 Fisher Body Craftsman's Guild Competition — 734 awards — university scholarships worth up to \$4,000 each — cash — trips — tool chests!



Harold L. Simon  
San Antonio, Tex.  
Junior 2nd Award  
\$3,000 Scholarship

Paul E. Jaquish, II  
Saginaw, Mich.  
Junior 3rd Award  
\$2,000 Scholarship



Richard A. Norton  
Chicago, Ill.  
Junior 4th Award  
\$1,000 Scholarship

Any boy 12 years old or over and not yet 20 on September 1, 1948, may enter the competition to design and build a model car. Junior and Senior Divisions with identical awards let you compete with boys of your own age. No dues or entrance fees. Awards include Model Builders' Tool Chests, cash, all-expense trips to the Guild Convention, and 8 university scholarships worth \$1,000 to \$4,000 each. (Duplicate awards are given if sons of General Motors employes win.) Judges include deans or presidents of 10 leading technical schools and universities.

Write for free membership. Each new member receives a membership card and button, a full set of plans and instructions, *all free*. Competition closes at midnight July 1, 1949. You can win one of these awards! Mail the coupon NOW and get started.

### FISHER BODY CRAFTSMAN'S GUILD

Sponsored by: Fisher Body Division of General Motors  
General Motors Bldg., Detroit 2, Michigan

Gentlemen: Enroll me in the Fisher Body Craftsman's Guild 1949 Model Car Competition. Send me full instructions without charge.

Name \_\_\_\_\_

Address \_\_\_\_\_

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

I was born on the \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_\_\_

Parent or guardian \_\_\_\_\_

Name of school \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Dept. 2 \_\_\_\_\_



## When Your Radiator Springs a Leak...

Keep Smooth-On No. 1 Iron Cement handy for emergency auto repairs. Use it to stop radiator leaks; seal cracks in water jackets, crank or gear cases; tighten loose door hinges, handles, etc. You can save time and money making these repairs yourself. And they'll STAY TIGHT, for Smooth-On expands a little as it hardens. Buy Smooth-On in 1 1/4-oz., 7-oz. or 1-lb. size at your hardware store. If they haven't Smooth-On, write us.

### FREE Repair Handbook

This famous 40-page book shows, as well as the above repairs, many other useful ones you can make around the house. 170 pictures. Send postcard for YOUR free copy today.

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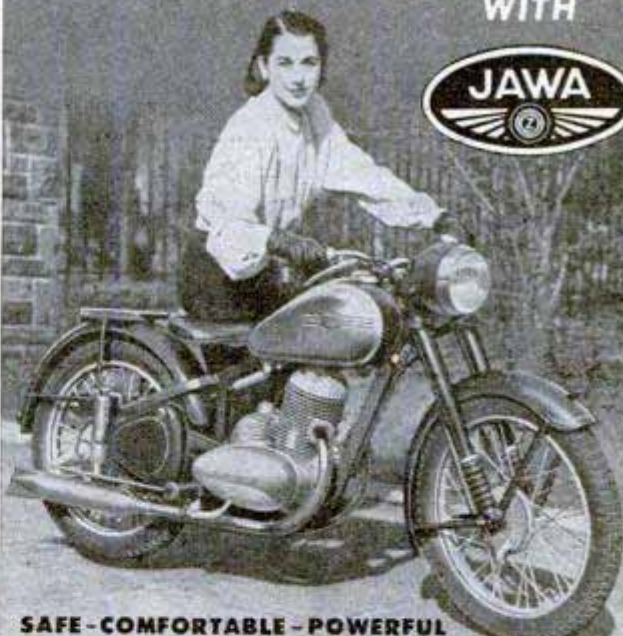
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### SAFE - COMFORTABLE - POWERFUL

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Foot Gear Shift. 95 miles per gallon. 70 Miles per hour.  
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the perfect  
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6

TOOLS IN ONE!

LOW COST!

Duo Sander-Polisher (only).....\$ 36.50  
Set of 21 Accessories.....\$ 12.50  
Duo with Complete set of 21 Accessories.....\$ 49.00

F. O. B. Muskegon, Michigan



**SANDS!** Accessories: 3" pad assembly, 3 grades each of 3" and 5" abrasive discs.



**DRILLS!** Accessories: Drill chuck and adapter for drills up to 1/4" drills supplied by dealer.



**GRINDS!** Accessories: Drum and cone adapter assemblies, 3 grades each of drum and cone abrasive sleeves.



**POLISHES!** Accessories: Two lamb's wool bonnets.



**BUFFS!** Accessory: 5" wool buffing pad.



**WIRE BRUSHES!** Accessory: 1/2" steel wire brush.

The All-Purpose Tool! The Clarke Duo sands, polishes, drills, grinds, buffs and wire brushes. Has hundreds of uses in the home, on autos, trailers and boats. Ideal for hobby-crafters, "handy" men and mechanical-minded boys. Indispensable for the farm. Use it for all types of refinishing, repair and building. Anyone can quickly interchange accessories. Lightweight, powerful, easy to operate. Approved by Underwriters' Laboratories. AC-DC. Get it at your dealer's or order by coupon below.

A Multitude of Uses for the Duo! Buff to apply polish and wax on surfaces. Polish cars, home and office furniture. Grind various shaped surfaces and narrow openings. Sand desks, cabinets and boats, remove paint and smooth plaster. Drill holes up to 1/4 inch in metal, composition and wood. Wire brush to clean small spaces and to remove rust and other materials.

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4511 Clay Avenue, Muskegon, Michigan

Send  Clarke Duo Sander-Polisher (only), \$36.50.  Complete Set of accessories, \$12.50.  Clarke Duo Machine complete with all accessories, \$49.00.  Enclosed money order for \$\_\_\_\_\_  Ship C.O.D. (I pay postage).  Package for Christmas Gift.

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ADDRESS \_\_\_\_\_

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CLARKE . . . PIONEER AND LEADER IN FLOOR  
SANDING, POLISHING AND MAINTENANCE MACHINES

question, which either goes to the assistant personally, or if he is busy, to an automatically activated wire recorder, which will repeat the question to the assistant as soon as his line is clear. The questions can then be combined, to bring out all the salient points, and sent on to the instructor.

The trial operation of the project is now being held with 50 second-class men of the Merchant Marine Academy at Kings Point, N. Y., being used as guinea pigs. They are being instructed by television in a Naval ROTC course, the nearest thing on their schedule to actual Navy instruction, while their 250 classmates are taking the same course by the usual means.

The Kings Point men are considered an ideal test group since they are of high intelligence—their entrance examination is the same as that for Annapolis. They will be observed carefully by three-month periods and it's expected that after the initial period the novelty factor can be safely discounted. The course ends next June 1, when comparative results will be known.

It is hoped that an operational course for organized Naval air reservists on a six-hour-a-week basis may soon be started. Via the TV East Coast network this would reach Squantum Naval Base near Boston; Floyd Bennett in New York City; Willow Grove, outside Philadelphia; and Anacostia, near Washington. Such a course could be used to keep officers on inactive status up to the minute on the latest equipment and techniques.

If the project is accepted by the Navy Department, and indications are that it will be, it is expected that either the TV University might be enlarged to include Army and Air Force training or that these branches of the service might set up their own Kinescope Colleges.

## Rare Gas Aids Fluorescent Lamps

With the addition of a rare gas, known but little used for 50 years, lighting engineers have boosted the efficiency of fluorescent lamps. The gas is krypton, one of nature's rarest elements. A new 85-watt lamp containing krypton provides as much light as a 100-watt lamp filled with argon, saving the user 17 percent in electricity costs without lowering the lighting level. The 85-watt lamp, built by Westinghouse, is interchangeable with the present 100-watt fluorescent lamp. Most fluorescent lamps this large are used industrially.

ⓄTire tubes that will hold air four times as long as ordinary tubes have been developed for military and commercial aircraft by Firestone.

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CONCORD  
KIT-QUARTERS  
FOR  
RADIO BEGINNERS  
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AMERICA'S GREATEST RADIO VALUES**



**here's a swell gift:  
ELECTRIC HAND DRILL  
KIT ONLY \$19<sup>95</sup>**

Kit contains 1/4" capacity drill with universal type 110-120 V. AC-DC motor. Free chuck speed 1100 rpm. Balanced saw grip handle puts "in line" pressure on drill for fewer breakages. Thumb control switch located on top of handle. Metal case holds drill and 20 "mechanic's length" high grade steel twist drills, sizes up to 1/4". 10 for steel and iron, 10 for wood. No. 18N15765P. 8 lbs. **\$19<sup>95</sup>**



**6 tube, 2 band kit  
BUILD IT YOURSELF**

Has a freq. range from 550-1600 kc and s.w. band from 7-16 mc. Two band dial. Three controls. Circuit includes untuned stage of RF amplification. 12SK7 as RF amplifier, a 12SA7 oscillator-converter, a 12SK7 IF amplifier, a 12SQ7 as a det., AVC, 1st Audio Amplifier, 35L6GT power output, and a 35Z5 rectifier. Kit includes all parts and cabinet except tubes, wire and solder. No. 32N24542P-AC-DC. **\$17<sup>95</sup>**

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LP PICKUP**

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**idea of the year... PORTABLE BICYCLE RADIO  
for only \$19<sup>95</sup>**



Battery operated. Can be easily mounted or carried as a personal. Supplied complete with all bicycle mounting hardware and telescopic antenna which plugs into radio. Slide rule dial. Vernier tuning. Full size Alnico #5 speaker. Operates on inexpensive flashlight cells and standard 67 1/2 volt "B" battery. Attached handle. Lightweight. Case beautifully finished. Anti-theft feature. Size: 7 1/4 x 4 1/4 x 3 1/2". 3 lbs. 3 ounces. Battery kit \$1.84 No. 1N420P **\$19<sup>95</sup>**

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Highly-polished, rust-proof, extra-strong aluminum construction. Only 1/4 the weight of the usual cast-iron power tool. Includes many expensive machine features: "Oillite" bronze bearings; roller bearing saw guide; built-in blower; sturdy, accurate protractor to set or reset table to any desired angle quickly. Blade may be turned to any angle for ripping. 14" throat will cut work up to 2" thick on



table 9"x12". 720 strokes. No. 18N15736P-Wt. 12 1/2 lbs. **\$13<sup>45</sup>**

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**10" P M  
\$3<sup>45</sup>**



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motorize your models**

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*has All Three*



- 1 Economy Price** **\$1**
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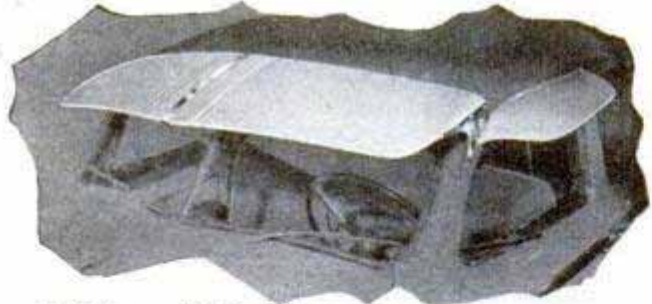
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| <b>\$24.95</b> (Full chrome Brackets)      | <b>\$12.00</b> (pair)                           |
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Visors come to you with prime paint ready for color match with your car. If your Dealer cannot supply you, send check or money order for immediate direct factory shipment.

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Fits vest pocket or purse. Guaranteed accurate. Operated as easily, and as reliable, as machines costing many times as much. Not a toy. Precision made, very durable—guaranteed for life against defects in construction. You positively can't buy a calculator of equal quality for as little money. **ACCEPTED AS THE FINEST LOW PRICED CALCULATOR FOR OVER 35 YEARS!** Operates with a flick of your finger. Adds, subtracts, multiplies, divides—counts up to one billion. Pays for itself over and over in mistakes avoided, and time saved.

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 Available in Hardware Stores Everywhere  
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Installed in a few minutes with ordinary tools. Complete, simple instructions. Just replace regular gas-cock with ERIE TIME-O-GAS. Set knob to burn from 2 to 55 minutes... Device shuts off automatically! Works on manufactured, natural, mixed gas. Use with or without pilot. Pilot lighter included free with each unit. Described in October Popular Mechanics, page 121. Send \$8.95 for postpaid ERIE TIME-O-GAS; or C.O.D. plus postage, or write for free information. Models for incinerators and other gas appliances also available.

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10" LATHE

Saber Saw Blades and Files. Blades six to an envelope. Files in set of 12 different shapes.



SABER SAW



Lathe Turning Tools. Single Tools and sets of 5 and 8. Made of tempered tool steel, with hardwood handles.



15" JIG SAW

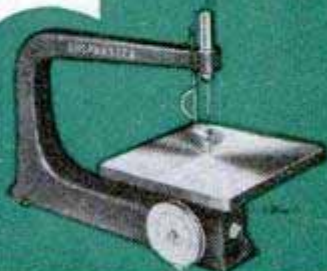
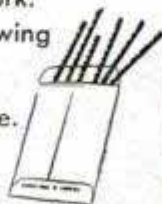
Chucks for Lathe—either Jacobs or 3" and 4" four-jaw chucks.



Rip Fence Assembly. Make your Band Saw do more work. Makes straight line sawing far easier.



Jig Saw Blades—six to an envelope. 7 sizes for all types of sawing.



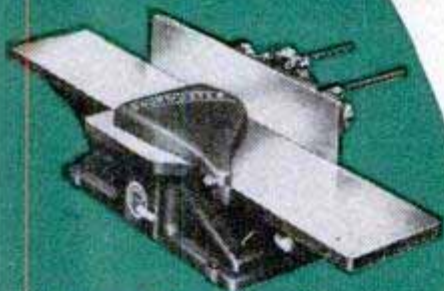
12" DRILL PRESS



12" BAND SAW

## ASK YOUR DEALER FOR Genuine SHOPMASTER Accessories

DO MORE WORK WITH YOUR POWER TOOLS,  
AND DO IT EASIER



6" JOINTER-PLANER



Mortising Kit complete with chisel holder, fence, hold-down, chisel and bit. Drill square holes and mortises with Drill Press, 1/4", 3/8" and 1/2" sizes.

Sanding Drum—2" diameter, for all types of sanding with your Drill Press.



8" Circle Saw Blades, crosscut, rip and combination, and for very fine sawing, hollow-ground combination blades.

Dado Sets—high grade blades plus chip-pers. A "must" for all circle saw owners.



In addition Shopmaster offers Jack Shaft Assemblies, Adjustable Stands, Motors and other equipment. See this complete line at your dealer or, for catalog giving complete details, write:

SHOPMASTER, INC.  
1214 THIRD STREET SO., MINNEAPOLIS 15, MINN.



8" TILTING ARBOR SAW



8" BENCH SAW

*P.S. Christmas is coming. Leave this ad where the rest of the family can take the hint.*



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MINNEAPOLIS, MINN.

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Finer Workmanship...**



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1/4" DRILL

## This Husky Drill Tops 'em All!

From the first time you pull its trigger switch, this Home-Utility 1/4" Drill will click with you! You'll turn out better work, faster—drilling holes, driving abrasive attachments—for everything from building furniture to repairing appliances. It's a *real buy* at \$18.95, with ample motor, husky housings, full-size gears and bearings. And it's well-built by **BLACK & DECKER**, world's leading maker of quality electric tools for 38 years! Order all Home-Utility Tools from your hardware, electrical or implement dealer.

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Products of THE BLACK & DECKER MFG. CO.  
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Take advantage of this special offer . . . send 10c today to Rogers Isinglass & Glue Co., Gloucester, Mass.

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COMES OFF  
without hard scraping!**



Cracked or peeling paint, varnish, enamel, shellac, or lacquer must be removed before the surface can be refinished properly. Wonder-Paste Remover makes this job easy. Simply apply Wonder-Paste with a paint brush directly over the old finish. It will not run! When penetration is complete, the old finish is reduced to a soft sludge that slides off like wet snow.

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- Faster pick-up than a car
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- Solid steel frame
- Highway cruising speed of 45 miles per hour
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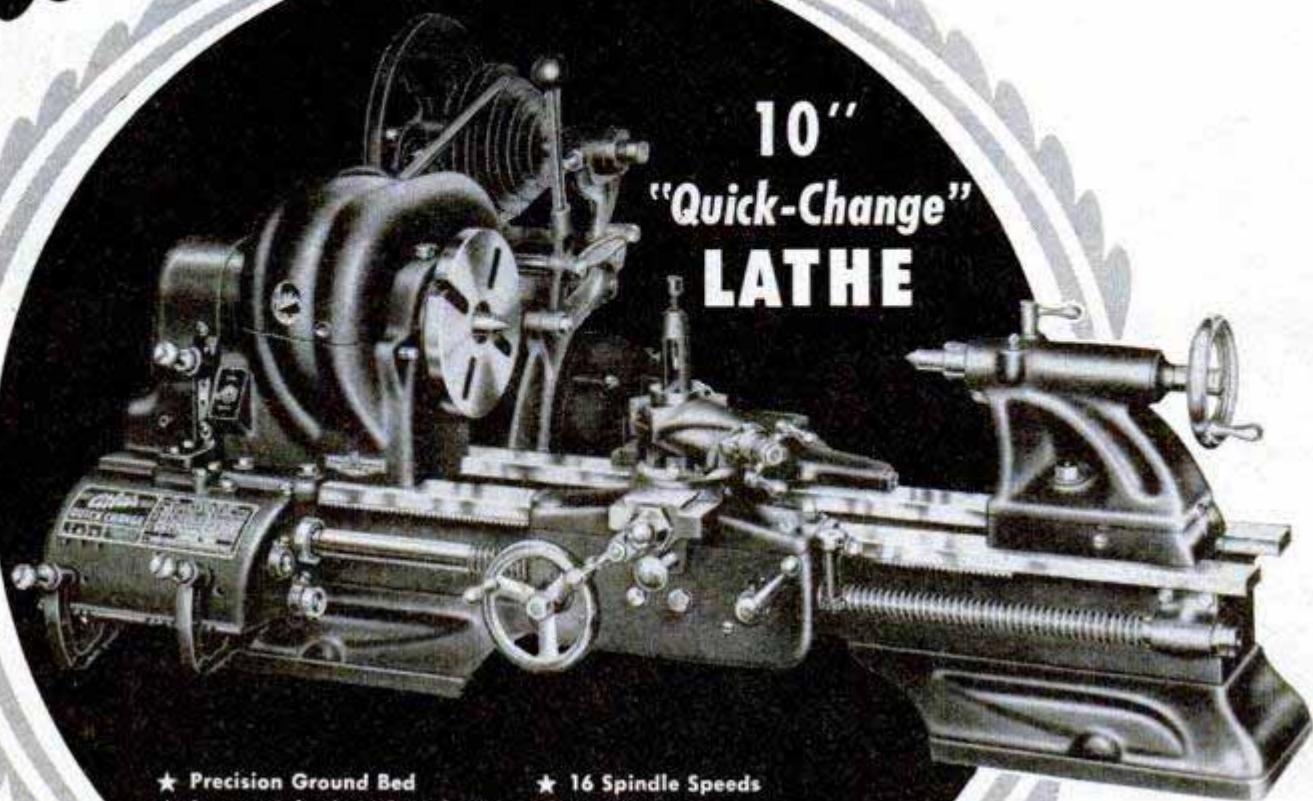
- handlebars, and sport muffler—looks like a custom job
- Costs no more than ordinary scooters

Write for FREE FOLDER and address of nearest dealer

**Powell MANUFACTURING COMPANY**

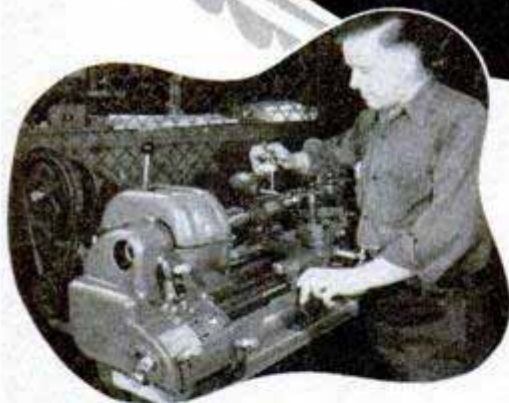
DEPT. PM-8  
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# Atlas



## 10" "Quick-Change" LATHE

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- ★ Instantly Reversible Power Cross and Longitudinal Feeds
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- ★ 16 Spindle Speeds
- ★ V-Belt Drive
- ★ Back Gears for Extra Power



Atlas 10" Lathes with standard change gears, and Atlas 6" Metalworking Lathes also available.

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Thousands of commercial and home shop owners from coast to coast confirm this fact—America's greatest compact metalworking lathe value today is the Atlas 10" "Quick-Change" lathe. Your own comparison—feature by feature—quickly shows you why. In *speed range, bearings, versatility, dependable lasting precision, and economical price*—it has no equal!

Atlas Timken tapered roller bearings enable you to do wood-turning, metal spinning, and plastics machining as well as work at normal speeds. An Atlas gives you precision to ten thousandths on standard machining jobs . . . saves you time and money in home or commercial shop, garage, or industrial plant. Ask your Atlas distributor for full details, or send for the new free catalog.



**MATCHED PRECISION TOOLS**



# NEW *Atlas* BIG-CAPACITY WOODWORKING TOOLS

## 10" TILT/ARBOR BENCH SAW

Now any-size project can be handled in your shop with this big new saw. No. 3070 (one extension) gives you capacity for ripping 4' panels between blade and fence, 12 $\frac{3}{4}$ " table surface ahead of blade. Cuts 3 $\frac{1}{4}$ " deep. Precision-ground grey-iron table. SKF ball bearings.



**NEW**

## 24" JIG SAW

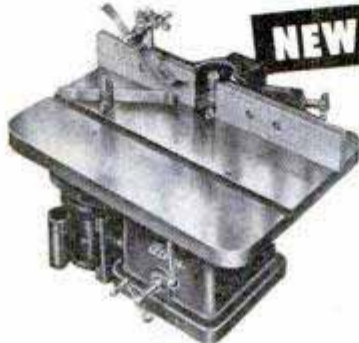
The 14" x 14" table gives you an idea of its massiveness. 4 speeds. Cuts 2 $\frac{1}{4}$ ". Chuck takes blades and sabres to 5/16" wide, files to 1/4" shank. Table tilts 45°R, 15°L. SKF ball bearings.



**NEW**

## WOOD SHAPER

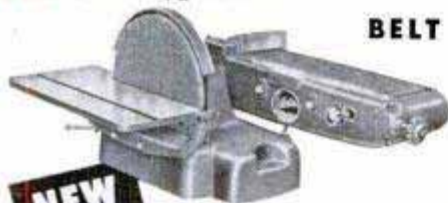
The real aid to "professional" workmanship — panels, reeds, flutes, grooves, bevels, planes, tongues, etc. Has 15" x 21" table which raises and lowers 2". Stationary spindle on SKF ball bearings for lasting accuracy, smooth cutting. Takes all cutters with 1/2" bore.



**NEW**

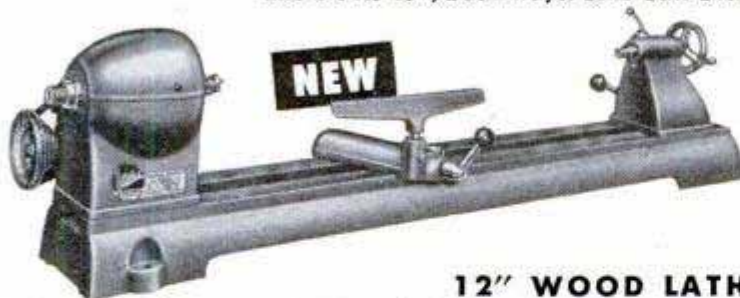
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Takes all the hard work, and inaccuracy, out of hand sanding. Gives you a "professional" finish in a matter of seconds. 10" diam. disc, 4" wide belt sand any width boards, angles, curves — metals, plastics, Table tilts 45°, both ways. SKF ball bearings,



**NEW**

boards, angles, curves — metals, plastics, Table tilts 45°, both ways. SKF ball bearings,



**NEW**

## 12" WOOD LATHE

The last word in a smooth, dependable wood lathe for your shop. It's built with extra-heavy bed, head, and tailstock. Has 12" tool rest. Both tailstock and tool rest have instant lock-levers for quick positioning. No wrenches needed. Handles outboard and inboard turning. SKF ball bearings plus many other new and useful features. Be sure to see it.

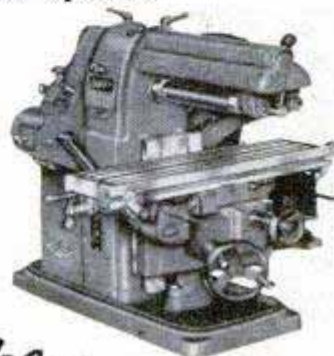
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## To Complete Your Metalworking Shop

*Atlas*

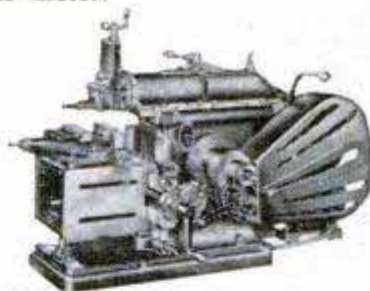
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For pleasure or profit, or both, you can't beat an Atlas drill press for fast accurate drilling and tapping. And with low cost attachments it mortises, routs, sands, carves, shapes. 7 TOOLS IN 1. Bench and floor sizes take drills to 1/2". Exclusive "floating-drive" spindles.



### *Atlas* MILLING MACHINE

Gives you the full range of milling operations — slabbing and facing cuts, end milling, keyways, boring, layout work. Timken bearings. 8 spindle speeds. Operates from 1/2 HP motor.



### *Atlas* 7" SHAPER

Handles all shaping operations within a 7" stroke — dovetailing, keyseating, vertical and angular cuts, gear cutting. Heavily built. Crank type ram drive. Timken bearings. 4 speeds. 5 cross feeds. See catalog for full details.

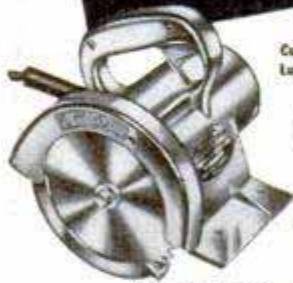
## ATLAS PRESS Company

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Cutting Concrete

Equipped as Table Saw



\$54.95  
in U.S.A.  
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## MODEL 60 Mall Saw

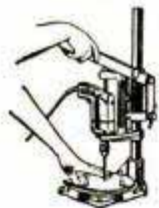
### Cuts Everything From Wood To Steel

This powerful, lightweight electric hand saw cross-cuts, rips and angle cuts wood up to 2" thick, cuts metal with a friction blade—hardened steel, glass, porcelain or concrete with an abrasive disc, grooves mortar joints, scores tile and other compositions. When placed in a special Floor Stand, it serves as a table saw—complete with rip fence and miter guide. Other attachments equip it for shaping, grinding, sanding or wire brushing.



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1/4" HOBBYIST

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Can Be Converted into 10 Other Tools

Interchangeable attachments now available convert this handy Mall-Drill into a drill press, sander, metal shears, hole saw, grinder, wire brush, rotary file, paint stirrer, saw for wood or metal and counter-sinker. 1/4" Model drills wood, metal, plastics,

masonry and concrete. 1/2" Model can also be equipped as a polisher.

See Your Classified Telephone Directory for Nearest Mall Dealer. FREE Book "Mall Portable Power Tools" sent upon request. Write TODAY.

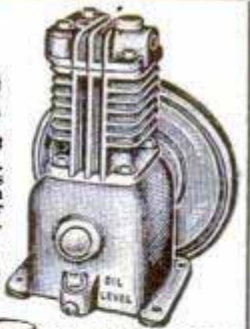


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Preferred by Master Craftsmen

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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 1/8 HP at lower speed. Weight 14 lbs. Operating instructions furnished.



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Has a close range of closing after pop-off pressure is reached. 1/4" pipe thread. Only..... **\$1.50**

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Prevent leakage after compressor stops.  
1/4" .....\$2.75  
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125-150 lb. pressure. Uses 1/4 to 5 H.P. unit  
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**Heavy Duty MOTORS**  
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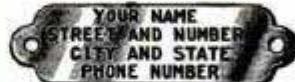
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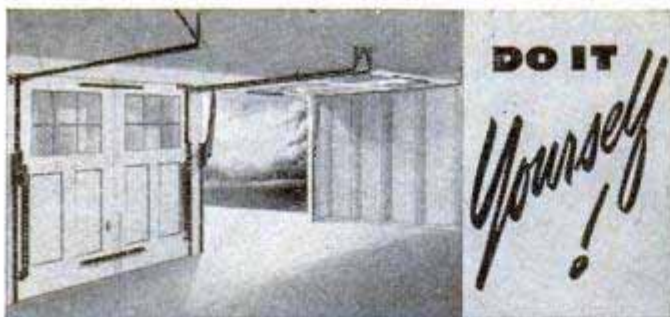
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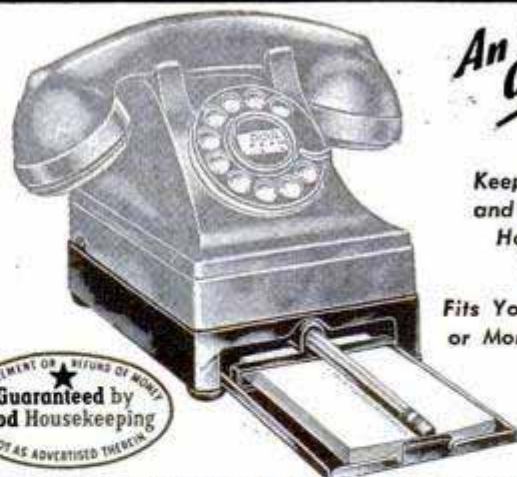
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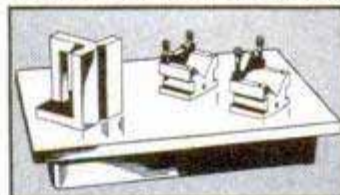
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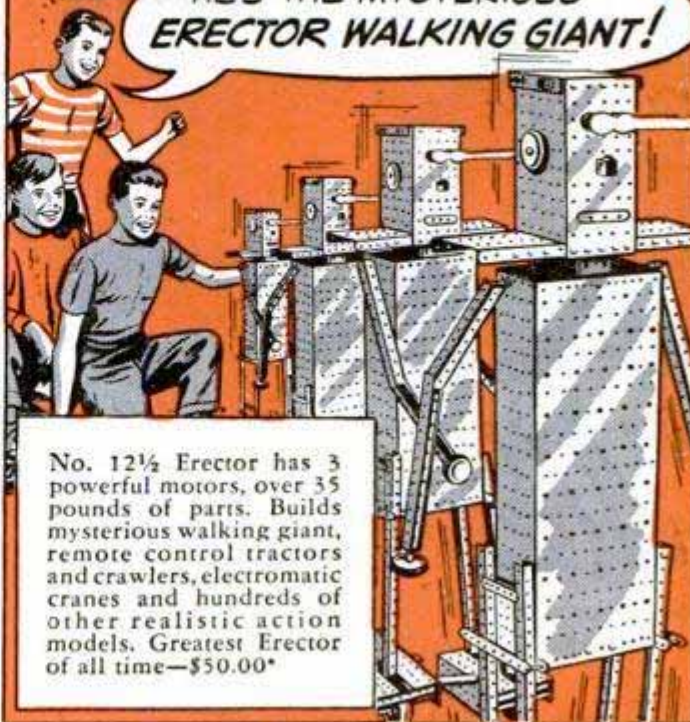
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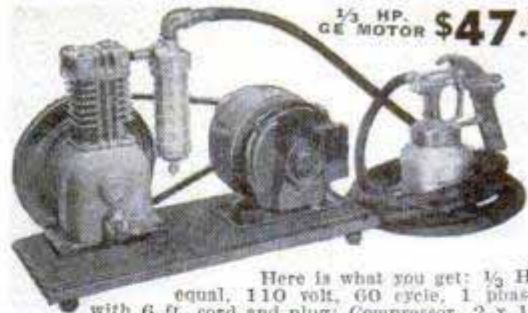
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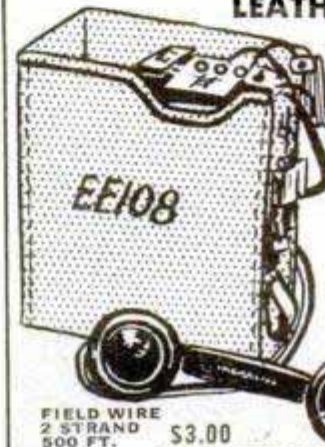
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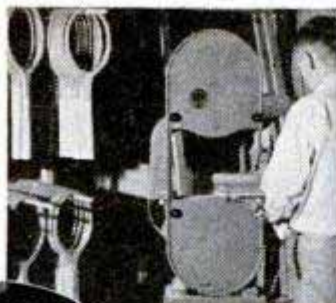
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Above: This Delta Sander cuts costs for finishing, mitering, and squaring of moulded plastic products.



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Below: This Delta Scroll Saw is used for airplane maintenance work.

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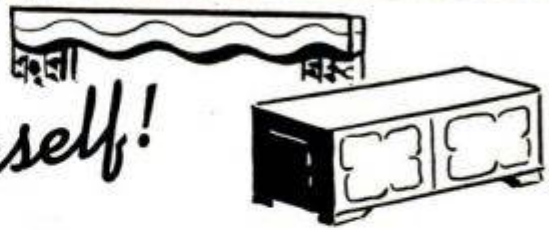


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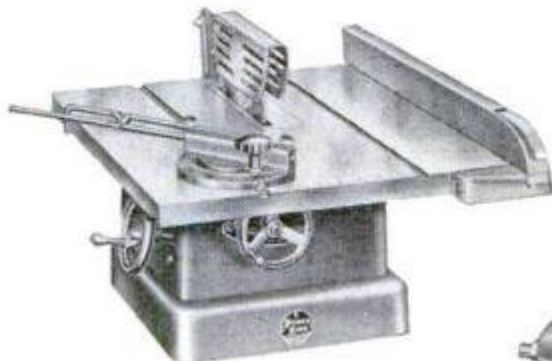
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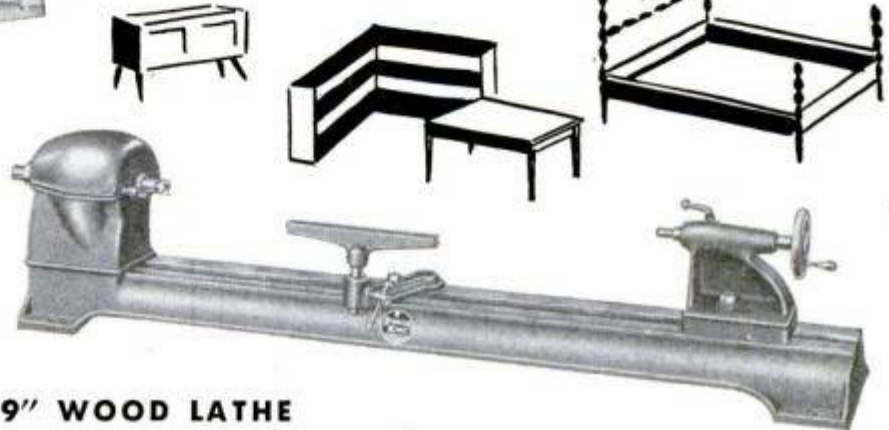
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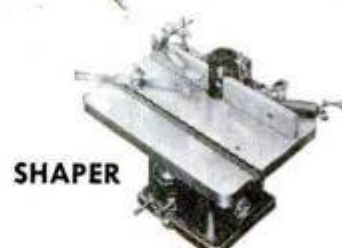
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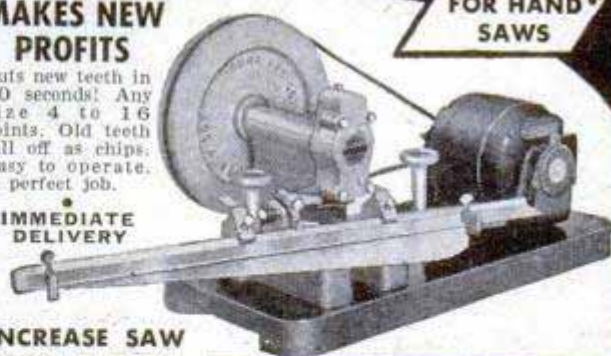
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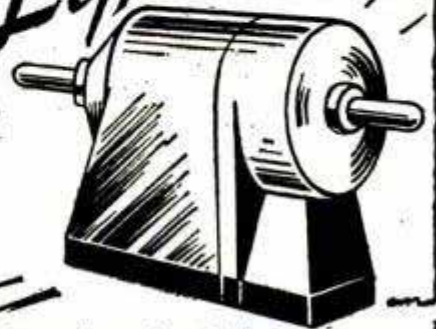
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"DU-ALL"**  
and "PEPPY PAL"  
GARDEN TRACTORS

**PLOW**



**HARROW**



**CULTIVATE**



**MOW**



**RIDE**

These sturdy walking and riding tractors ideal for dozens of uses around the farm, orchard, garden, golf course, estate and poultry farm.

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Shaw Du-All or Peppy-Pal tractors do many jobs quickly and easily. Plow, cultivate, harrow, mow, disk, bulldoze, spray, grind, haul and saw wood. New uses discovered every day.

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**Electrify MOTHER'S OR WIFE'S  
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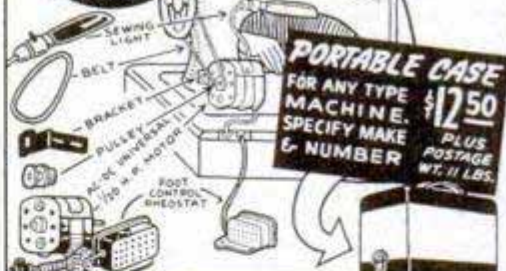
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Standard Grade, Guaranteed 14 months. . . . \$12.00  
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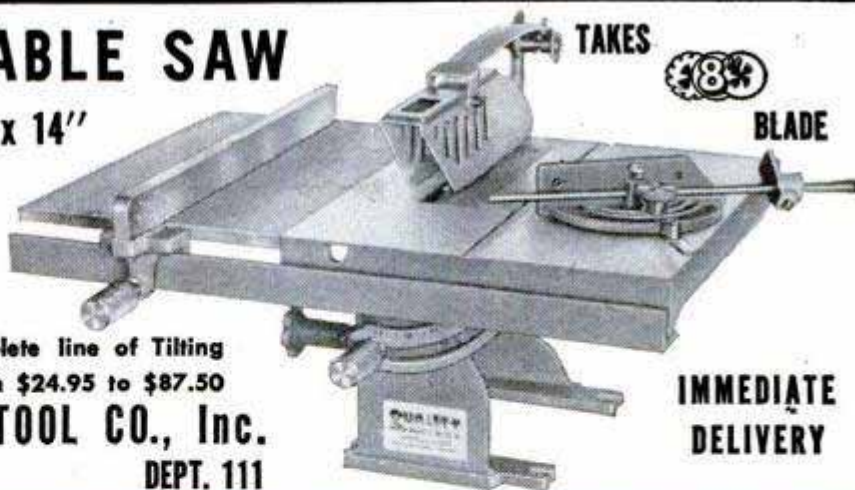
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TABLE INCLUDING EXTENSION 18" x 14"

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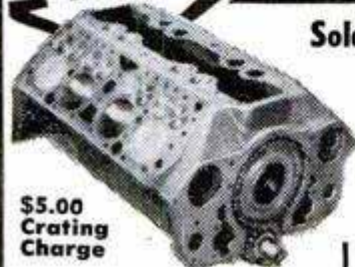


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Rebuilt by skilled mechanics. Assembly has Rebor'd Block with New Pistons, Pins, Rings, Reground Crankshaft, all New Bearings. Guaranteed 90 Days. **Allowance on Old Motor** We ship at outright price. Send your motor prepaid, must be suitable for rebuilding. Send in notarized bill of sale showing title number if any. We refund difference when we receive your motor.

<b>BUICK</b>	Outright	Exch.
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<b>CHEVROLET</b>	Outr't.	Exch.
29-47 6 cyl.	127.50	97.50
<b>CHRYSLER</b>	Outright	Exch.
34-47 6 cyl.	172.50	140.00
35-47 8 cyl.	209.00	170.00
<b>DE SOTO</b>	Outright	Exch.
34-47 6 cyl.	172.50	140.00
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35-47 6 cyl.	154.00	119.00
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35-47 V8	159.00	109.00
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35-47 6 cyl.	195.00	155.00
<b>MERCURY</b>	Outright	Exch.
39-47 V8	159.00	109.00
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37-47 6 cyl.	185.00	145.00
35-47 8 cyl.	209.00	170.00
<b>PLYMOUTH</b>	Outr't.	Exch.
35-47 6 cyl.	149.00	119.00
<b>PONTIAC</b>	Outright	Exch.
37-47 6 cyl.	185.00	145.00
35-47 8 cyl.	209.00	170.00
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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.

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1935-48 FORD V8 &  
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**DUAL MUFFLERS**  
Increases power. Reduces back  
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Complete Set **\$16.95**



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Choice of Black or Tan. All Tops  
Tailor Made for Easy Installation.

Instructions for  
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As Low as  
**\$24.95**

"ZIPPER TYPE"  
REAR CURTAIN

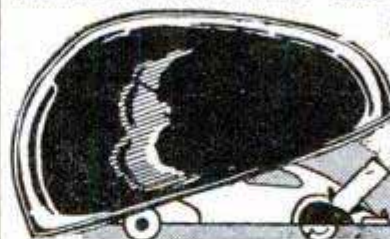
Each top packed complete and consists of main top proper, rear curtain and all needed binding and fittings. (Glass is not supplied—use glass from top being replaced). Best quality, laboratory tested—equal to or better than the original. All metal parts are of heavy bright chrome plated rust resistant. Tops are heavily stitched with treated thread and sewed for durability and appearance.



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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	1935-38	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
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Cpe.	33.00		STUDEBAKER	1948	44.15
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NOTE: Specify color wanted also Model or Series, Body Style, Year & Make when ordering.

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**\$12.95**

Per Pair

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MUFFLERS that give that Motorboat tone

Made of high quality steel For:

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Also Universal type to fit all other cars. Specify year, make & model when ordering.

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FOR ALL CARS & TRUCKS  
Write in for Our Low Prices.  
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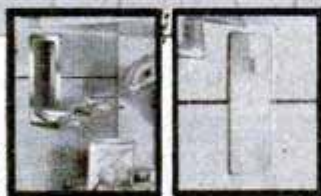
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For Most Cars  
Write in for Our Low Prices.  
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**SEND ONLY \$1.00**  
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**Genie**



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GENIE, the only built-in can opener, fits flush with the wall and is easily installed in tile, plaster, wood or any wall finishing, in either new or old homes. GENIE shears lid from can directly under rim, prevents lid or metal shreds from dropping in food. Streamlined in appearance and made of finest grade steel, with front and opener heavily chrome-plated, built-in box of white baked enamel, GENIE adds beauty to any kitchen.



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Send only \$1.00 and we will ship you a GENIE Can Opener C.O.D. You pay postman balance of \$6.50 plus postage. Or shipped postpaid for payment in full (\$7.50); send check or money order.

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**CRAFTSMEN!** . . . Here's the new, remarkably efficient oscillating Sander and Polisher attachment for Black & Decker Home Utility 1/4" Electric Drill.

Now, in a fraction of the time, and with far less "elbow grease", the DU-FAST SANDER AND POLISHER\* gives you certain, superior finishes every time. . . plus a definite saving in time and money!

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ONLY **\$14<sup>95</sup>** COMPLETE  
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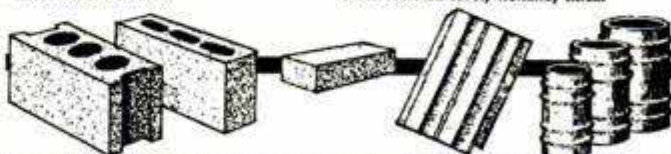
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For Rotating Ham, FM, Television Antennas; Barbecue Spits, Min. RR Turntables, Telescopes  
● Operates on 110V AC, 60-Cycles (Requires only 12 MFD Condenser) ● Appr. 3/4 RPM—Hi-Torque ● Self-Locking Clutch ● Reversible ● Quiet ● Easy to mount ● Instructions.

\$1 Dep. **\$5.95** Postpaid in Cont. U.S.A.  
Bal. C.O.D. Gov't. Cost \$40

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**GIVES YOU 2 DRILLS IN 1**



Converts any 1/4 inch Electric Drill to 1/2 inch capacity. Reduction gears reduce speed 5 to 1, the average speed of 1/2 inch Drill thereby increasing power.

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No. K1. An Ideal Beginners Radio Kit covers 550 to 6000 KC including Broadcast, police, aircraft, amateur marine, and foreign broadcasts. All parts including 3 tubes supplied. 110V 60 cy AC. Transformer operated, calibrated dial complete instructions for assembly. Operates loud speaker (not included). Excellent boy's gift. Ship. wt. 3 lbs. Loud speaker 2½" PM (extra).....\$1.95 Headphones (extra).....\$1.00



**\$8.75**

## BC 645 GENERAL ELECTRIC TRANSCEIVER

No. 201. Complete 15 tube transmitter receiver. Ideal for new citizens band 460 Mc for communication between office and car, home, boat, etc. Conversion article in August ELECTRONICS Magazine. Brand new in original G.E. cartons with tubes. Add postage for 25 lbs.

**\$19.50 . . . . 2 FOR \$35.00**

### ACCESSORIES FOR BC 645

PE 101C Dynamotor 110V 60 cycle power supply for home or office use. . . . \$3.95

## HOME WORKSHOP GRINDER KIT

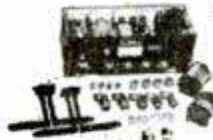
No. 230. Easily assembled 110V AC or DC ball bearing fully enclosed motor from Army surplus dynamotor. Purchaser to make simple changes and shaft extensions, detailed instructions and all parts supplied. Motor approximately 5,000 R.P.M. Ideal for tool-post grinder, flexible shaft tool, model drill press, saw. Shipping weight 6 lbs.



**\$3.95**

## ARMY ELECTRONIC ALTIMETER

No. 200. Brand new 14 tube army transmitter receiver radar unit with indication in feet. Many applications such as electronic burglar alarm, radar set, etc. Complete with 14 tubes, controls, plugs, antennas and instruction manual. Shipping wt. 87 lbs.



**\$34.50**

## TANK TRANSMITTER POWER SUPPLY

No. 223. Army PE125 power supply provides 500 volts at 160 MA from 12 or 24 Volt storage battery. Heavy duty unit with filters starting relays, fuses, tubes, and diagram. Shipping wt. 73 lbs.



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No. 210. One of the Army's best. Built by Kellogg, ideal for factory call system, public address, amateur use. Brand new in original cartons. Add postage for 5 lbs. . . . . \$2.95



## INTERPHONE 2 WAY CALL SYSTEM KIT

No. 1P1. Saves many steps between house and barn, tenant house, workshops, etc.; can be used to watch baby from neighbors. Uses 2 wires and will operate up to 1-5 mile. More than one remote can be used. Kit is complete with tubes, one master, one remote speaker and detailed instructions. Shipping weight 5 lbs.



**\$14.50**

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**Only \$3.95**

No. 259. New B29 navigation instrument which can easily be used to make a good contact printer, strip map holder, etc. The plywood case 14½" x 11" x 10" high is perfect as a tool kit, camera, projector case or for building a portable photograph picnic kit, make up case, etc., has leather handle reinforced covers, 8 covered compartments in bottom. Cost Gov't \$125.00. Add postage for 20 lbs.

GN 58

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No. 275. Makes excellent home lighting plant, operated by wind propeller, waterfall, gas engine, or hand crank. Reduction gear allows full output at slow speed, supplies 6 volts at 2.45 amp., 425 volts at .115 amp. New. Add postage for 28 lbs.



**\$7.95**

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No. 274. Transmitter Receiver Tuning Unit from Army Walkie Talkie. Containing coils tuning condenser, transmitter crystal sockets, etc., excellent for building amateur station. Shipping wt. 1 lb.



**\$1.00**

## METER SPECIAL

No. 237. Beautiful Dejur 3" Square Precision Milliampmeter 0-800 MA range, 0-10 MA basic movement. Probably the best buy ever offered in a war surplus meter. Shipping wt. 1 lb.



**\$2.95**

## BENDIX DIRECTION FINDER LOOP

No. 219. Brand new loop excellent for aircraft or boat direction finder. Also useful as radio aerial to eliminate local interference. Rugged army construction. Shipping wt. 8 lbs.



**\$9.95**

## G.E. 50 AMP CIRCUIT BREAKER

No. 204. New General Electric 50 Amp. 220 Volt AC circuit breakers. 100 Amp. when used on 110V. Add postage for 4 lbs. \$2.95, 3 for \$7.50



**\$2.95**

## MINIATURE ELECTRIC MOTOR

No. 211. Tiny Delco motor only 1" x 1¼" x 2" 10,000 RPM. Operates from 6 to 24V. Excellent for models. Add postage for 1 lb.

## HEATHKIT HIGH FIDELITY AMPLIFIER KIT

No. A2. A truly fine 110V 60 cy transformer operated High Fidelity Amplifier Kit. Ideal for reproducing quality music at home, churches, mortuaries, outdoor gatherings etc. Output over 10 Watts. Complete with all tubes (push pull circuit) transformers, punched chassis and detailed assembly instructions. Shipping weight 20 lbs. High Fidelity 12" P.M. Speaker for above \$6.95 Mahogany speaker cabinet size 14½" x 14½" x 8" for above speaker. . . . . \$8.75



**\$14.95**

## BC375 TRANSMITTER TUNING UNIT

No. 203. A beautiful Army Tuner containing 3 precision variable condensers, tank coils, switches, vernier dials, worth over \$30.00. The best buy in surplus. Shipping wt. over 20 lbs.



**\$2.49**

## FM PUSH BUTTON TUNER

No. 224. Brand new ten push button tuning assembly from Army FM receiver. Contains 4 gang 100 MMF silver plated tuning condenser. Add postage for 10 lbs.



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## G.E. 1000 VOLT 350 MA DYNAMOTOR

No. 213. An ideal dynamotor for mobile operation in taxicabs, police cars, sound systems and amateur stations. Supplies above voltage from 12 Volts or 500V. at 350 MA from 6 Volts. Complete with starting relay, and fuses. New. Our Dynamotor A. Shipping Weight 72 lbs.



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## DM-36 DYNAMOTOR

No. 215. Western Electric 24 Volt input, 220V at 60 MA out. With filter assembly. Ship. weight, 6 lbs.



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## POWER TRANSFORMER - SPECIAL

No. 226. Primary 117V. 60 cycle. Secondaries supply 746 V.C.T at 220 MA, 6.3V. at 4.5A., and 5V. at 4A. Will handle 13 tube radio receivers. Supply is limited, order early. Shipping 3 FOR \$9.95 Weight 11 lbs. each.



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No. 216. Hearing aid type, comfortable, keeps out outside noise, one of the Army's best types. Add postage for 2 lbs. . . . . \$1.00



## THE NEW 1948 HEATHKIT 5" KIT OSCILLOSCOPE

No. 03. Complete kit to build a beautiful 5" oscilloscope. Ideal for studying and servicing television and FM radio. 6 tubes including 5BP1 cathode ray tube. 1500-Volt power supply operates from 110-V 60 cy AC. Has compensated vertical and horizontal amplifiers and 15 cy to 30 KC sweep generator. Detailed instructions make assembly easy. Shipping weight 35 lbs. Nothing else to buy.



**\$39.50**

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Give part number and description. Add postage for weight shown. No orders under \$2.00. We will ship C.O.D.

# HEATH COMPANY BENTON HARBOR 17, MICHIGAN

**"FINEST** precision writing instrument of its kind in the world"

Regular  
84 character  
keyboard  
same as on  
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machines



**5 BIG MACHINE AIDS**

1. TOUCH SELECTOR
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**Smith-Corona**  
PORTABLE TYPEWRITERS

**Supreme HOMESHOP**  
BAND and CIRCULAR  
**SAWS**



**HAIRLINE CONTROL • LESS RESHARPENING FASTER, SMOOTHER CUTTING • LONGER LIFE**  
NOW—for your home shop! Famous SUPREME Band and Circular Saws nationally used by industry—now available in the SUPREME HOMESHOP Line to fit any size or make of home power tool! Special Nickel Alloy Steel. Free from kinks and other imperfections. SUPREME HOMESHOP SAWS are precision-engineered for highest cutting efficiency under heaviest punishment. End saw troubles, cut costs, speed your best work.

**SUPREME BAND SAWS**  
6' 6" — \$1.00    7' 9-1/2" — \$1.10    9' 6-3/4" — \$1.30  
in any of the following widths: 1/8, 3/16, 1/4, 3/8".  
8" Flat-Ground Combination Circular Saw — \$3.65  
**IMMEDIATE DELIVERY — ALL STANDARD SIZES**

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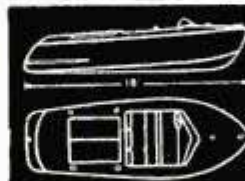


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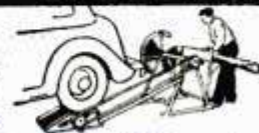
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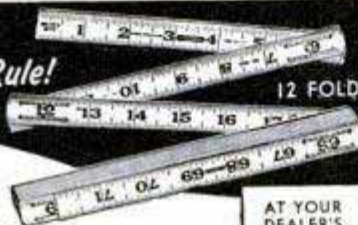


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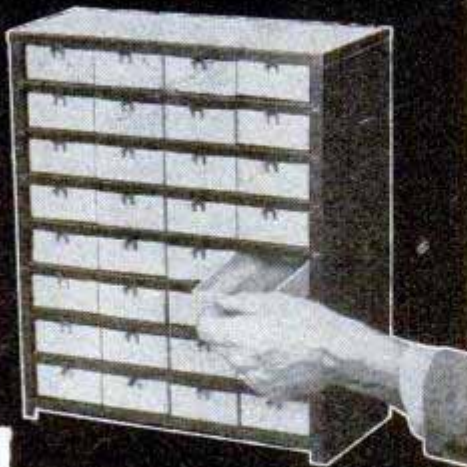
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washers, nuts, bolts,  
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All you need is an electric generator; a small engine to drive generator at proper speed; 2 dual sheaves; 2 V-belts; and a welded angle iron base. No wiring is involved, and you do not need to know anything about electricity to make this assembly.

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We will ship you the GENERATOR ONLY, without pulley or belts, for \$125.00 freight prepaid. If your needs are urgent, we will assemble your set, using above generator and a 6 H.P. Salsbury gasoline engine, manually started, governor controlled, and ship to you \$297.00 freight prepaid. Same unit but with Ensign conversion to run on natural gas \$347.50 freight prepaid.

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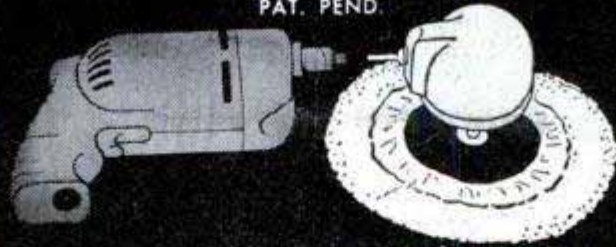
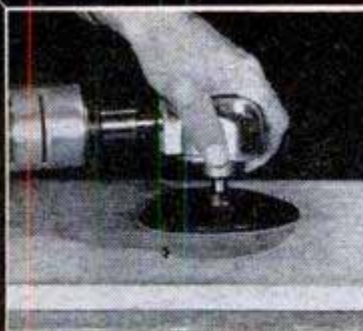
Make amazing Liquid Synthetic Marble at home in your kitchen, basement or garage. Terrific demand! BIG PROFIT! No heat, pressure or machinery needed. No experience necessary. MOLD, TROWEL or BRUSH—make in almost any color.

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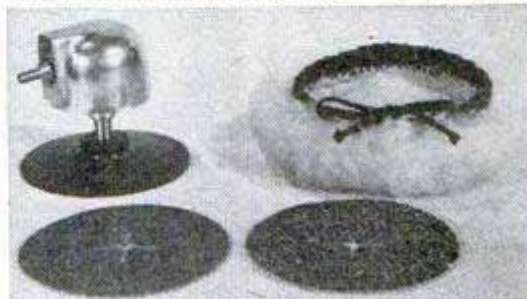


Cup wire brush attachment for removing paint, rust, scale, etc. \$1.75



Jacobs key chuck increases 1/4" drill to 1/2" capacity—reduces speed, increases power. \$5.00

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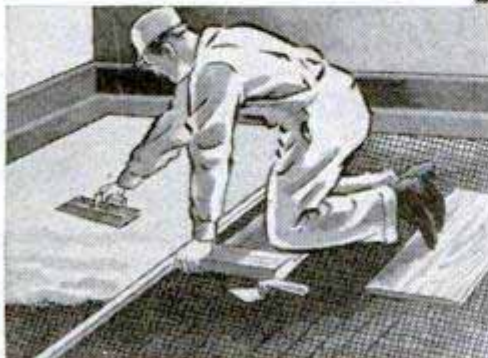
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**25c**  
a packet of  
15 plans



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THE TOOL BOX OF THE WORLD

# WAR SURPLUS AND OTHER BARGAINS

## TRANSFORMER

Jefferson Electric step up or step down transformer. Input, primary 110-117 Volts A.C. Output, from 5 Volts to 650 Volts. Suitable for use with war surplus gadgets, heater relays, radio test filaments, electric trains, house chimes, etc. Weight 10 Lbs. New \$7.95 Each



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**FANCY BRIAR PIPES**  
We have been awarded 100,000 fancy briar pipes by Quartermaster Corps. Assorted shapes and sizes. All popular makes. Buy now for Christmas Gifts. Set of 7, \$3.50



**MICROMETER**  
Chrome plated, precision engineered and carefully tooled to give long life ...  
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This extra long life rechargeable battery is ideal for portable radios, mobile units, bell circuits, alarm systems, rural telephones, Strobe bulbs, etc. 2 V 20 Amps. Only 5" high. Visible ball float hydrometer built in Lucite case. Shipped dry. Any battery service will supply standard battery electrolyte. Used singly or in multiples. Shipping Wgt. 3 1/2 lbs. All new. \$2.75 each



25% DEPOSIT REQUIRED ON C.O.D. ORDERS

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Dutch Brand, made by Van Cleef Bros. 3/4" wide, 3/16" thick. Adheres with strong grip to any surface in any climate. No nailing required. 101 different uses, in aircraft, autos, boats, trailers, etc. Linen backed. 50 Ft. Rolls \$1.50 per roll



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Type Z - 2"x1"x 1/2". Used open or closed. For automatic contacting-light, sound, model train systems, chimes, etc. New. 3 for \$1.



ALL PRICES F.O.B. CULVER CITY, CALIF.

**4 in 1 SCREWDRIVER:**  
3 smaller sizes fit into 6" overall size. Fine steel bits. Solid brass handles. All New. Each \$1.



**HIGH SPEED DRILL BITS**  
Like new! Original value over \$16.00. 25 assorted sizes & lengths \$2.50.



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For greater production at less cost, use Mead Air Press. Hundreds of industrial plants now employ them for staking, crimping, assembly and similar operations. Large model delivers 1200 lbs. pressure on 100 PSI, 7 1/2" clearance — small model delivers 400 lbs. pressure on 100 PSI, 4" clearance. With foot control these presses speed up countless bench jobs, save muscular effort. Write for Free MEAD AIR POWER CATALOG of Air Presses, Air Vises, Air Collets, etc.

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**RUBBER SHEETING** Brand new, 68" x 80". Heavy weight with Grommets. Used as bed mattress cover, hunter and campers tent bottoms, etc. Original government cost over \$12.00 each. Packed 15 to a case. Minimum \$395 order one case. Each.....

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Galvanized sheet steel cover, size 29" long x 17 1/2" high x 18" wide. Reinforced at all corners and edges. Complete with two clamp down fasteners. Trunk type latch lock, O. D. color. Perfect condition. Our price... \$795

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**INSPECTION LAMP ASSEMBLY**  
NEW—Govt. surplus. Lights up the "Hard-to-get-at" places. Fine for the home, mechanics, electricians, etc. Plastic 12" extension. Adjustable to any angle. Each..... \$129  
Send check or M. O. Add 10% for handling and mailing.



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**FASTER... SAFER**  
**SHAPER & Planer \$4.00**  
FITS ANY DRILL PRESS POSTPAID PAT. PEND.

**ORDER TODAY**  
EASY TO USE  
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Machined and balanced — simple to operate — ideal for all precision woodworking. Comes complete with 3 Planer Knives. Set of 3 Moulding Knives — \$1.00 extra.

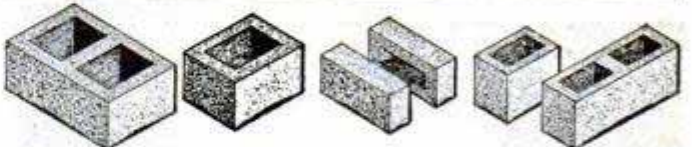


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Give Wings to Work

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New superior method makes square, true, easy-to-lay units which will pass any building code. Small investment, high production, big profits. One \$30.00 machine will make four 5"x8"x12" blocks per minute—1000 per day. Pays for itself in a few days. Sell blocks or save 2/3 building cost by making and laying your own.

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**Don't let this happen to you!**

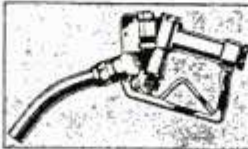
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Follow the thousands operating service stations who are purchasing their own. Investigate! You will find many already in service in your locality. The same nozzle as advertised in Saturday Evening Post and other publications.

Customers are beginning to demand "SAFETY-FILL" service. It sells more fill-ups because:

**CUTS OFF AUTOMATICALLY WHEN TANK IS FILLED**

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Underwriters approved. Mail your order today. Price \$15.22. Prepaid nearest RR station. Send \$3.00 for each nozzle ordered. Balance C.O.D. **SALES AGENTS WANTED**

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Be weatherwise! Use this scientific instrument that accurately measures up to 6" of rainfall. Designed by a meteorologist. Not a toy but a real rain measuring device. Simple, easy to read. Rustproof and unbreakable. Instructions and 11-year record book included. Makes an ideal gift. Satisfaction guaranteed.

If your dealer can't supply you, order direct, giving dealer's name. Send no money. Pay postman \$2.40 plus COD charges, or send check or money order for postpaid delivery. Ask about other weather instruments.



Only \$240

### VICTOR RAIN-GAGE CO.

AIRPORT P. O. ★ WICHITA, KANSAS

## Amazing Invention! GUARDS AGAINST EXPENSIVE DAMAGE

- PROTECT YOUR CAR ●

The **MAGIC BRAIN** of your car! Read about it in Sept. issue of Popular Mechanics on Page 167 . . . New Improved Model **SAVES YOUR** Generator, Battery, Starter, Coil, Distributor, Points, Regulator, etc. You can install the **GEN-O-BATT** in 12 minutes without tools.

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CONTROLS ENTIRE ELECTRICAL SYSTEM OF YOUR CAR

WARNS OF TROUBLE THE INSTANT IT OCCURS  
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## TYPEWRITERS!

ALL MAKES — REBUILT LIKE NEW

For School, Business or Home Use

Write for Information

**M. & M. TYPEWRITER CO.**

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A man likes a gift that's unique . . . different! And that's *Taykit*, the new *pocket-size* camp stove! *Taykit* is perfect for outdoor cooking . . . for home workshop use, too! It's the world's smallest gasoline stove . . . fits pocket or glove compartment. Sets up in seconds. Pressurized blue flame needs no pumping or priming! Made of gleaming Monel — and guaranteed for a lifetime!



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## POCKET STOVE

At hardware and sporting goods dealers, or write:

**TRAVELERS EQUIPMENT COMPANY**

342 Keeler Bldg.

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Say You Saw It in Popular Mechanics



## WHEELS AT BARGAIN PRICES

- ... 4" wheel & tire, 5/16" sleeve bearing .50 ea.
- ... 5" wheel 5/8" solid tire 5/16" shaft hole .65 ea.
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- ... 8" wheel 1" solid tire 1/2" sleeve bearing 1.25 ea.
- ... 8x2" wheel, semi-pneumatic tire 7/16" ball bearing . . . . . 2.50 ea.
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- ... 12x1.75 wheel semi-pneumatic tire 1/2" bronze bearing . . . . . 4.00 ea.
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- ... 6x2" wheel 5/8" ball bearing, solid tires . . . . . 2.95 ea.

**BUILD YOUR OWN**—Wagons—Scooters—Soap Box Racers—Welding Carts—Baby Pens—Etc. To order above wheels write number wheels wanted in space provided, tear out and mail this ad with check or money order and your name and address. If other sizes are wanted write for **FREE LIST**.

**TRULSON MFG. CO., 811 E. 31 St., Dept. PM-17, Kansas City, Mo.**

Check these  
**SMASHING  
BARGAINS**

# WAR Surplus

Listed here are a few samples of the unusual bargains that are being offered in both War Surplus and other merchandise. Take advantage of these specials and order from this ad.

**NAVY STYLE FIELD SHOES**  
NEW. Rugged, comfortable. Reversed uppers, full oak leather inner sole, extra composition outer sole. Add 22c post.

**4.99**

6 TO 12

## SPECIALS

**O. D. Wool Serge**  
**Shirts** 13-15 **2.79**  
**Pants** 28-34 **2.95**

Used, perfect condition. Cleaned and pressed by the Q. M. Corp. 100% wool serge. Add 10c post.

• **Dust Masks**  
NEW. \$1.50 value. Ideal for millers, farmers, paint and insecticide spraying. Add 6c post. **33c**

• **Khaki Suntan**  
**Shirts** 14-17 **2.99**  
**Pants** 29-42 **3.88**

NEW. Made of genuine 8.2 khaki chino material. Trousers with cuffs. Add 10c post.

• **Navy T-Shirts**  
NEW. Full cut. White only. Fine combed yarn. Add 6c post. **69c**

**BOMBER JACKET** **13.99**

**B-15 STYLE**

NEW. Water repel. Mountain cloth outside, full pile lining incl. sleeves, 4 pockets. Wool knit wristlets and waistband. Gen. mouton collar. Add 35c postage.

SIZES 34 TO 46

**ARMY STYLE COMBAT BOOTS**  
**6.88**

NEW. For sportsmen and outdoor wear, 10" high. Reversed uppers, full oak leather sole, with composition outer sole. Add 27c post.

6 TO 12

**77** EACH

**Surplus**

**50% WOOL SHIRTS DRAWERS**

NEW. Shirts: long sleeves, crew neck. Drawers: ankle length. Medium weight, 50% wool, O. D. color. Add 10c post.

**Genuine NYLON**

**PARACHUTE CORD PER HANK**  
**59c**

NEW. Ideal for clotheslines, drapery, venetian blind cords, etc. 550 lbs. tensile strength, 3/16" diameter. Add 7c post.

**50 FT.**

**OFFICER STYLE OXFORDS**  
**6.95**

NEW. Finest quality uppers, best quality oak bend leather outer sole. Half leather lined. Add 20c post.

• BROWN  
• BLACK

**MAIL ORDERS**  
Please remit with order. Be sure to include postage. Satisfaction or money back.

**SIoux FALLS SURPLUS STORE**  
SIoux FALLS, S. D.

**EASY PROFIT IN PAINT SPRAYING**

Paints walls, ceilings, screens, furniture and machinery faster, better. All complete as shown less motor. Carry anywhere. Fully guaranteed. Could be used with 1/4 H.P. motor or less. Price \$35.00 less motor F.O.B. Chicago. \$5.00 deposit balance C.O.D. or see your dealer. With motor \$55.00.

**IDEAL AUTOMATIC PUMP CO., Dept. P.M. 8**  
Chicago 7, Ill.

601 W. Washington Blvd.

# 100 Fireplace Ideas FREE

For Home, Playroom, Cottage, or Camp



If You're Building Your Own Fireplace HERE'S AN EASIER FOOL-PROOF WAY TO DO IT

Choose a design that will look well with the materials you have available. Prepare a concrete or brick slab the size of your fireplace. Center your FYRO-PLACE, the warm-air circulating form, on the base, and build round it. You will have a well-engineered, successful fireplace. You can't fail.



WRITE FOR BOOK TODAY  
Small Book 4 1/4 x 5 1/2 sent free. Larger Book, 8 1/2 x 11, beautifully illustrated, 25c

Ask for Free Data on Outdoor Fireplaces

**PRICE FIREPLACE HEATER & TANK CORP.**  
68 Austin Street, Buffalo 7, New York

## BUILD YOUR POWER TOOLS

WITH OUR GUARANTEED INDUSTRIAL POLY BALL BEARING ARBORS

New Departure Self Lubricating Bearings 10,000 R.P.M.

(No extra charge for left hand threads)

C4—1 1/2" Pictured

B33—\$5.45 PP. C4—1 1/2 x 1 1/2 spindle, housing 2x8... \$7.95 PP.  
5/8 x 4 1/2 Spindle C5—5/8 x 1 1/2 spindle, housing 2x8... \$8.45 PP.  
B15 Plain Spindle C6—3/4 x 1 1/2 spindle, housing 2 1/2 x 8... \$9.45 PP.  
\$3.95 PP. D8—1 x 1 1/2 spindle, housing 2 1/2 x 11... \$18.75 PP.

1 INCH BETWEEN WASHER AND COLLAR

SHAPER ARBORS 3 inches between collars, C4-1 1/2 \$14.25, C5-3/8 \$14.25, C6-3/4 \$15.25, D8-1 \$23.00, B25—1 1/2 x 2" cap, flange mount \$5.95.

PILLOW BLOCKS—Ball Bearing, 1/2 \$3.50, 3/4 \$3.50, 3/4 \$4.25.

**POLY PRODUCTS, 2032-A E. Walnut, Pasadena 8, Calif.**

## Sensational NEW Rejuvenator PORTABLE RADIO

• AC-DC BATTERY SET •

The "Playmate" operates on battery or AC-DC current with built-in Battery Rejuvenator. With 4 tubes and instant operating lifetime Selenium Rectifier. No heating time required for either operation. 3-Position Selector Switch instantly connects the radio for AC-DC power, Battery, or charging. Unusual life from batteries. Wonderful reception. THE IDEAL XMAS GIFT. Take orders among your friends... Profitable.

**MONEY BACK GUARANTEE**

WE PREPAY POSTAGE when remittance in full accompanies the order. WE SHIP C.O.D. plus postage. \$2.00 deposit must accompany order. Unusual proposition is offered to DEALERS... Write Today.

ONLY \$34.45 Including Batteries Postpaid

AMERICAN PRODUCTS CO., 3556 W. Ogden Ave., Dept. P, Chicago 23

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**L\* M CARBIDE SCRIBER**  
NON-MAGNETIC

Tungsten Carbide — carefully ground on diamond laps, brazed into stainless steel 6" handle for marking steel and other metals — for etching, marking, cutting glass. In plastic case with pocket clip.

**\$2.00**  
PRICE POST PAID

**PRICK PUNCH**  
Tungsten carbide tip, silver brazed into 3 1/2" heat treated steel body.

with Carbide Tip... **\$1.50**  
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**LUCAS-MILHAUPT ENGINEERING CO.**  
5053 SOUTH LAKE DRIVE • CUDAHY, WISCONSIN



**GENUINE SWISS**  
2-Push-Button  
**CHRONOGRAPH**  
**WRIST WATCH**



ONLY... **\$7.95**

A Sensationally low price for such a precision time-piece... A **WRIST WATCH** and **STOP WATCH** in one!

**IT HAS EVERYTHING!**

Note These Features...

- It's a **TIMEKEEPER!**
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- It **MEASURES DISTANCE!**
- It **MEASURES SPEED** of Airplanes, Cars, Race Horses, etc.

It has Sweep Second Hand, Chrome Case, Precision Workmanship.

**EXPANSION BRACELET** of matching stainless steel 49c additional.

**SEND NO MONEY!**

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The 1949 edition of the famous Center Tool Co. Catalog is now ready! Every workshop owner should have a copy. 240 pages full of illustrations, descriptions, and prices of the latest tools made by best known manufacturers in U. S. You pay the cost of printing—50c. **We refund your 50c with your first order of \$10.00 or more.** Prompt delivery on most tools. Send check or money order today!

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**STOP! Burning Out Your EMERGENCY BRAKES**

**USE — The MUTH "BRAKE\*-SAVER"**

**LIGHT ON DASH WARNS YOU EACH TIME YOU USE THE EMERGENCY BRAKE... KEEP YOUR EMERGENCY BRAKE IN PERFECT WORKING ORDER FOR ANY EMERGENCY**

No more burned out emergency brakes! If your hand brake is set, a **WARNING SIGNAL LIGHT** on your dashboard reminds you the instant you turn on your ignition key... It flashes a steady amber beam as a **WARNING**... The light blinks out **ONLY** when brake is released... You just can't forget the emergency brake with the **MUTH "BRAKE\*-SAVER"** attached to your car... It **SAFEGUARDS THE LIFE OF YOUR EMERGENCY BRAKE!**... Worth many times its low cost for your **COMFORT** and **SAFETY** on hills and inclines, while driving or parking... A few blocks with your **EMERGENCY BRAKE ON** may ruin your brakes entirely and cause costly replacement. **EASILY INSTALLED BY ANYONE.** **AN IDEAL XMAS GIFT**

**Fits All Cars Or Trucks**

**COMPLETE WITH SIMPLE INSTALLATION INSTRUCTIONS**



**ONLY \$2.49**

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For Light or Heavy Work. 75-200 amps. No previous experience needed. Complete **PLANS** and valuable Catalog 35c.

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**"A WONDERFUL HOBBY WORKSHOP GIFT!"**

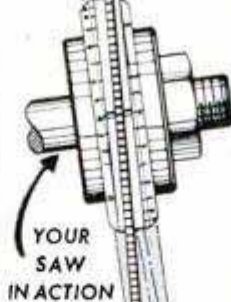
*Just dial* **ANY WIDTH CUT ON YOUR SAW**



WITH **DADO SAWING WASHERS**

**Warren**

Cut clean, accurate, parallel grooves—12 widths, any angle. No chatter, burning, chewing—or sanding! No more blade vibration—no screws to fuss with—just four balanced washers. Simply dial desired width with Micromatic adjustment. Can be left on blade for straight cuts. 5 sizes fit any arbor— $\frac{1}{2}$ ",  $\frac{3}{4}$ ",  $\frac{5}{8}$ ", 1",  $1\frac{1}{8}$ ". A perfect gift for woodworkers. See your dealer or use coupon below!



YOUR SAW IN ACTION

**\$4.95 SET**

**DEALERS, ORDER DIRECT!**

**WARREN WASHERS CO., DEPT. 31**  
70 Medbury, Detroit 2, Mich.  
Enclosed \$4.95 for one set of Warren Washers, postpaid.

MY ARBOR SIZE \_\_\_\_\_

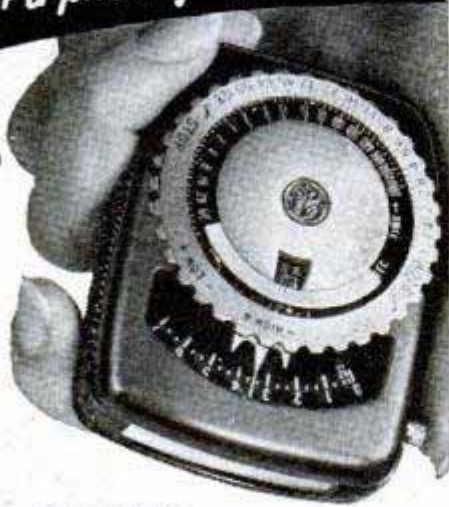
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## exposure **METER**

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.



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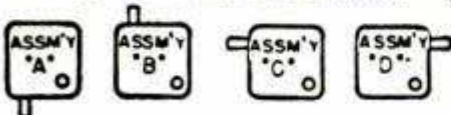
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1600-1			

When ordering be sure to specify assembly and ratio required. Shipping weight in carton 8 1/2 lbs. Prompt delivery. Full Money Back Guarantee.



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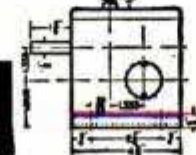
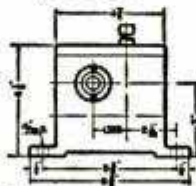
1411 EAST 179th ST. • CLEVELAND 10, OHIO



**\$26.75**

WEST OF ROCKIES

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TIRED WHEEL**  
10 x 1.75, New, perfect, shop worn.  
Only . . . . . **\$1.75**

### WIRE ROPE CABLE

New Aircraft, flexible with high breaking strength. For tow rope, guy wire, clothes line, etc.  
1/16" . . . . . 2c per ft. 1/4" . . . . . 9c per ft.  
3/32" . . . . . 3c per ft. 5/16" . . . . . 11c per ft.  
1/8" . . . . . 4 1/2c per ft. 3/8" . . . . . 14c per ft.  
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Minimum 100 ft.

### WORK TABLE LAMP

Overall dimensions, 37 1/2", weight 1 lb. Has 4 flexible ball joints. 110 volt, Less plug and bulb. Real surplus bargain.



ONLY  
**\$2.95**

### WORK TABLE LAMP

Same as above. 25" long. Has 3 flexible ball joints. Less plug and bulb. Only . . . . . \$2.75  
BULB for above 30 amps. . . . . 38c

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**SIZES FOR 8" to 16" METAL LATHES**  
Build it yourself from our sets of semi-machined castings and save \$5. Can be finished on your lathe alone. Complete drawings and instructions furnished with castings.  
Mill keyways, slots, splines, dovetails, flutes for reamers, special cutters. Produce gears, ratchets, racks; bore, face, etc. with this precision attachment.

**FREE** Illustrated folder and price list of castings, milling cutters, etc. Write today. Mention your lathe.

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for re-plating articles in the home and shop. No tanks necessary. Free particulars.

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Strong, durable chests, attractively finished, will please the better machinist and toolmaker. Free catalog.

GERSTNER TOOL CHESTS  
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LATHE TOOL SET



Be permanently toolled-up for every operation on your Metal Cutting Lathe

The ACE Set is complete—there's nothing more to buy. Drop forged by the manufacturers of cutting tools used by 96 per cent of the plants and shops in industry they are correctly designed, are of special steel, are finely finished, are stronger—will last a lifetime. You can cut easier, faster and more accurately with ACE TOOLS.  
At your Hardware Store—

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"The Tool Holder People"

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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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# OVER 250 SURPLUS BARGAINS

Write for FREE Catalog  
PM-11 Today!

TYPE  
B-3

## FLYING JACKETS

Genuine Air Force issue! Fine quality seal brown leather, adjustable waist and collar straps, sheep lined, zipper closure. Reconditioned. Sizes 36-46. A \$30.00 value! Only



TYPE D-1 JACKET. Similar to type B-3 but lighter in weight. Zip front, long wearing. Reconditioned State size . . . \$9.88

**\$15.95**

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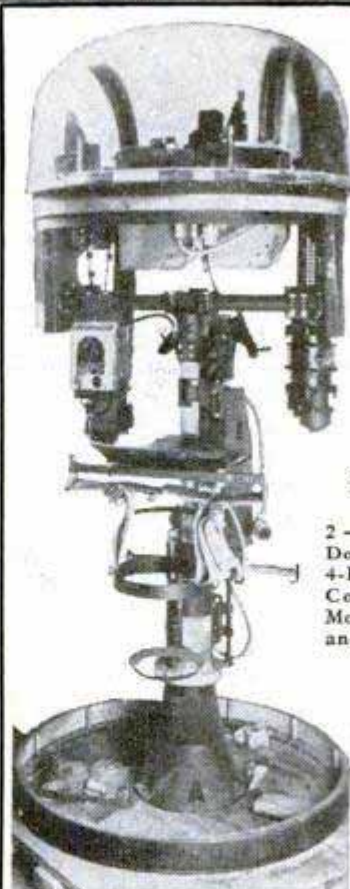
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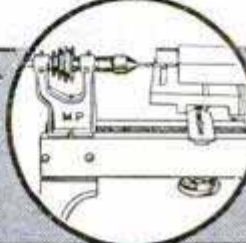
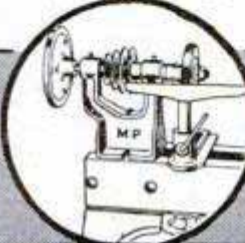
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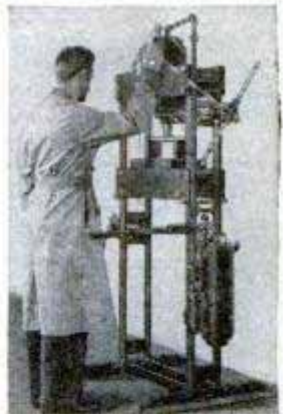
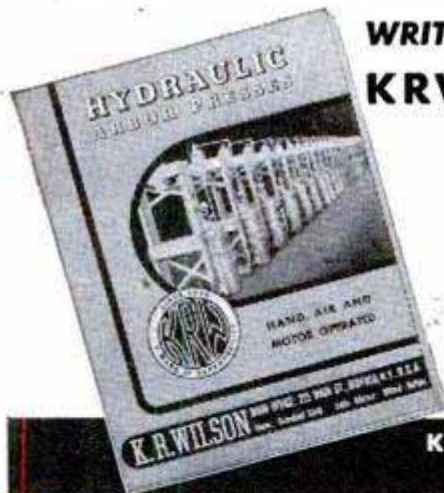
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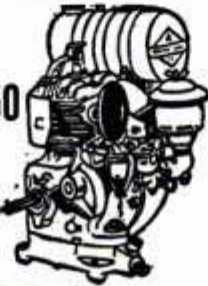
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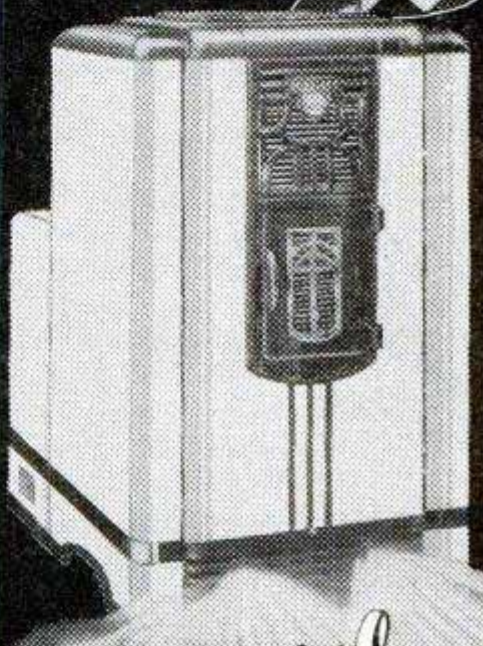
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# SANDEE Specials



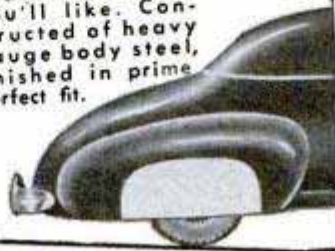
## MUFFLERS Steels & Aluminums with a MELLOW Motorboat Tone

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10" x 1 3/4"	Semi-Pneu.	Ball 1/2", 5/8"	125	\$ 3.00	\$ 5.50	\$10.50
10" x 2 1/2"	Semi-Pneu.	Ball 5/8"	250	\$ 5.50	\$10.00	\$19.00
12" x 2 1/2"	Semi-Pneu.	Ball 1/2", 5/8"	150	\$ 5.50	\$10.50	\$20.00
12" x 3"	Semi-Pneu.	Ball 1/2", 5/8"	225	\$ 5.75	\$11.00	\$21.00
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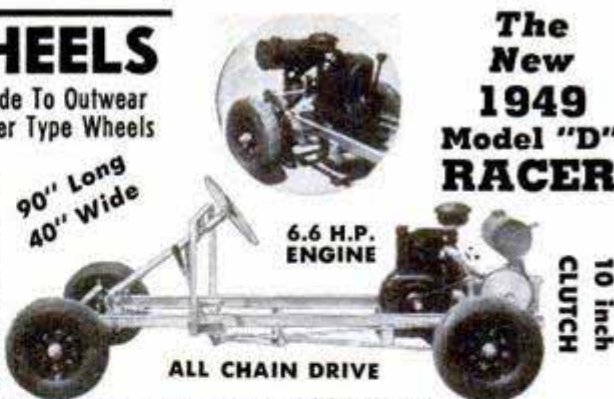
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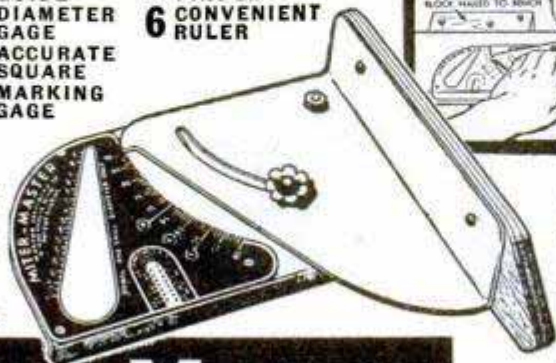
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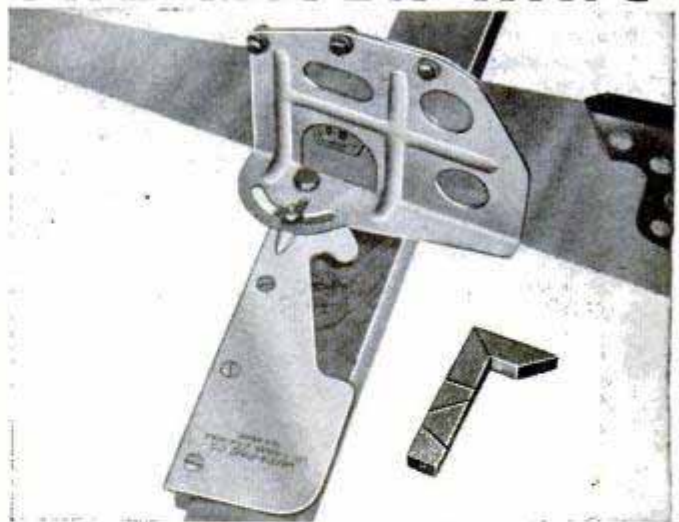
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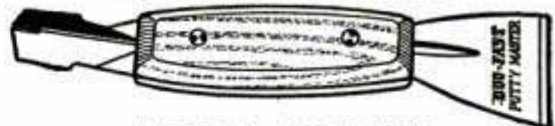
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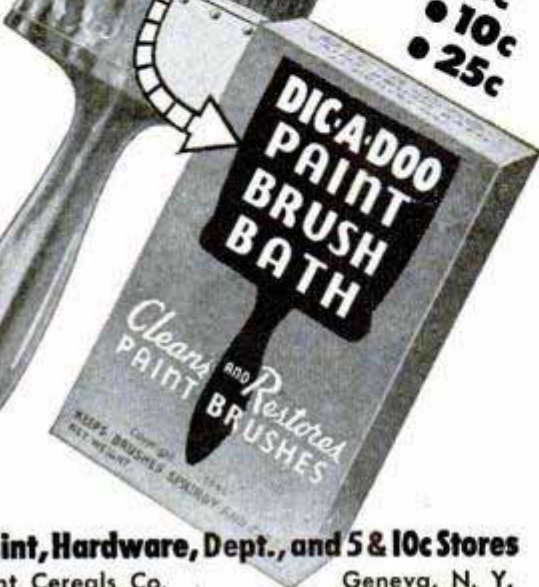
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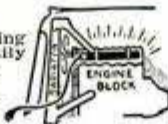


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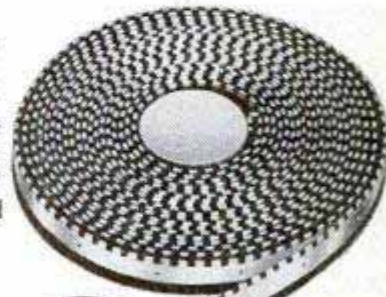
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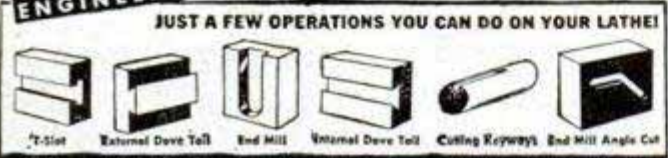
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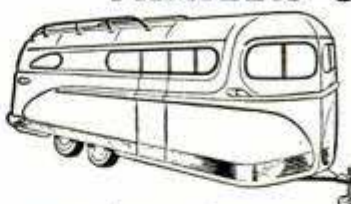
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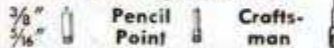
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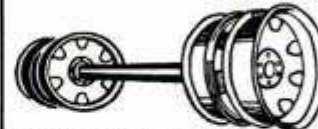
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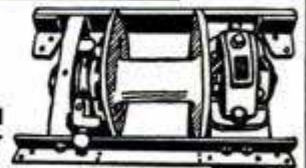
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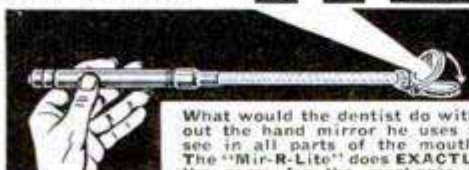
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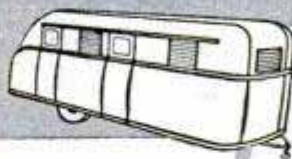
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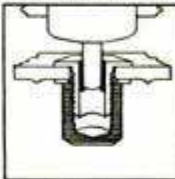
## ALADDIN ANNOUNCES . . .

### 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.

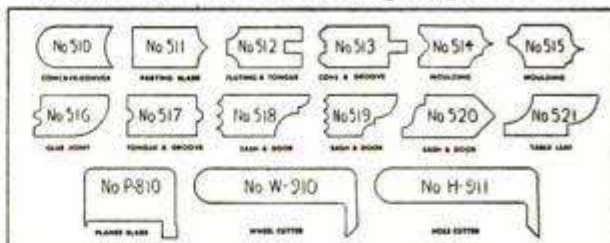
### ALADDIN Wood Shaper for your Circle Saw

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.

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Dealers Write Today

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175 H.P. BRAND NEW

TYPE  
L440-1

RANGER  
6 CYLINDER  
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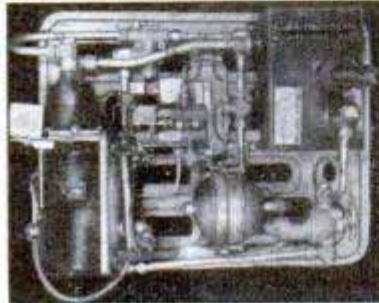


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SHIPPED MOTOR OR RAIL FREIGHT  
SEND \$100.00 DEPOSIT ON C.O.D.  
COMPLETE AS DESCRIBED, ONLY **\$495.00**

WAR SURPLUS  
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ASSEMBLY  
**\$49.50**  
COMPLETE UNIT



Complete to the last detail—and at a price that you couldn't begin to buy half of the parts for. It is completely equipped ready to go—just add the oil and put it to work. Unit is mounted on an alloy rack and contains the following high quality components: hydraulic reservoir 5 x 10 x 9 inches; large Purupulator filter; hydraulic pressure accumulator; pressure relief valves; hydraulic pressure control unit; solenoids; genuine Pesco valves; Pesco hydraulic gear type pump of 1000 lbs. per sq. in. pressure at 1750 R.P.M. (motor turns at 4000 R.P.M.); full 2 1/2 horse power Pesco elec. motor, AC or DC 24 volts, 4000 R.P.M. (will run on 110 AC by use of transformer); all connectors, tubing, fittings, etc. are included. Unit measures 24 x 18 x 6 inches overall. Just add the hydraulic oil and you can put the system to work on any type of hydraulic power action. Has hundreds of uses. For cash with order will include full gallon high grade hydraulic oil plus hydraulic control valve and send shipping charges collect. Shipping wgt. approx. 60 lbs. Guaranteed perfect. Price complete, only..... **\$49.50**

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Each only.....

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HAS HUNDREDS OF  
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Formerly used by AAF for oxygen storage. You can use it now as an air pressure tank 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 and trucks. Ideal as shipping container for gases, chemicals, etc. Bottle is non-shatterable with working pressure up to 500 lbs. psi., and weighs only 5 lbs. when empty. Internal volume 500 cu. in. (approx. 9 qts.). Has 3/8 in. pipe thread at each end. Approx. size 24 x 6 in. They won't last long at this low price. Order now!  
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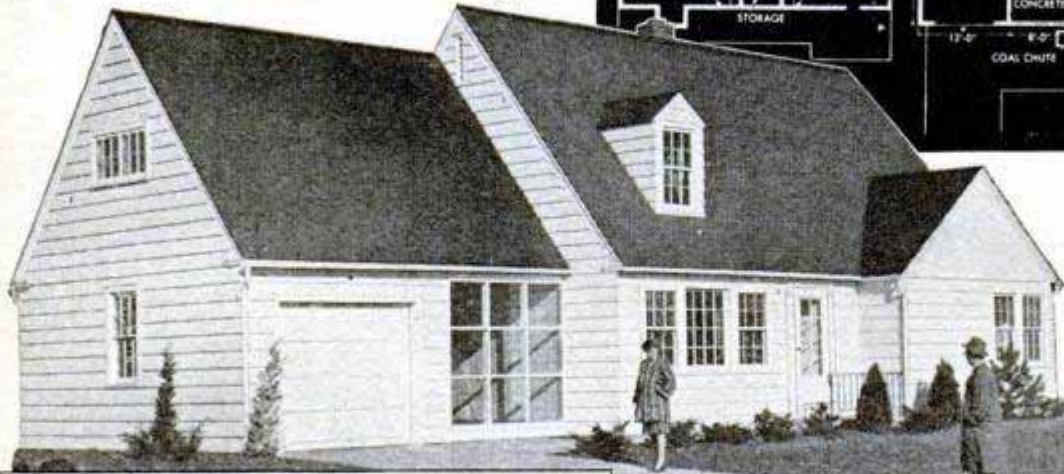
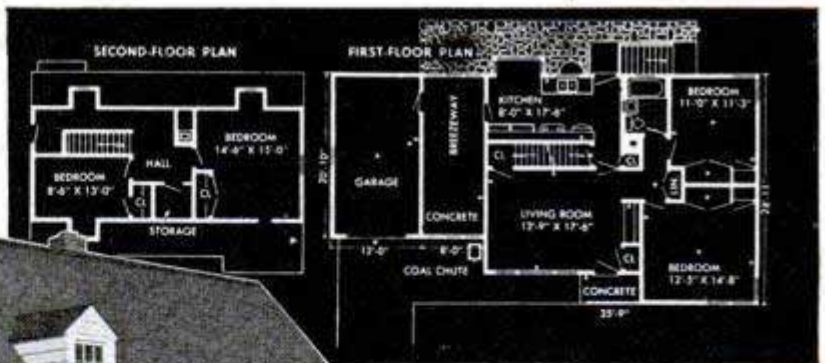
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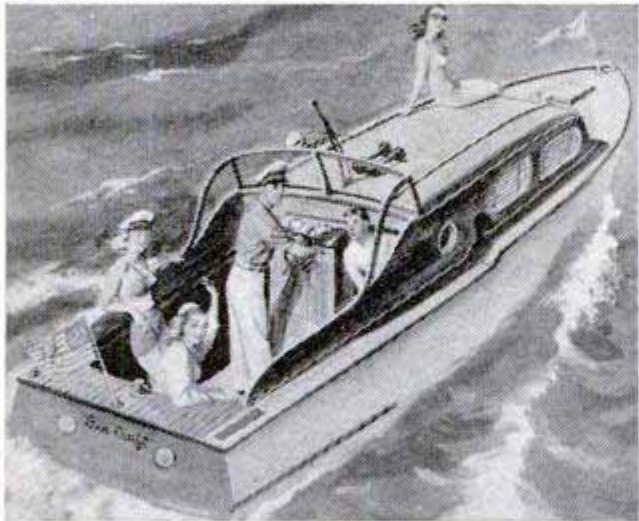
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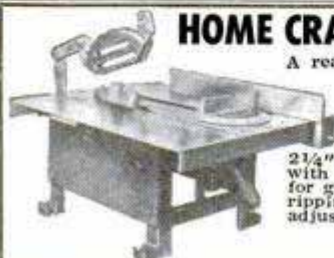


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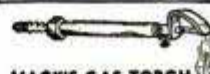
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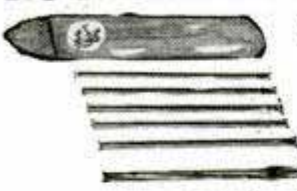
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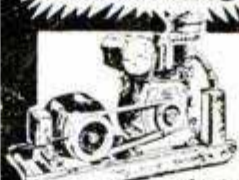
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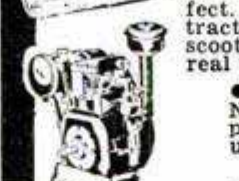
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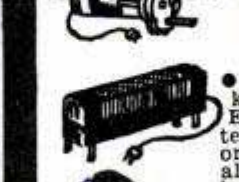
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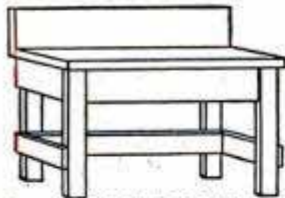
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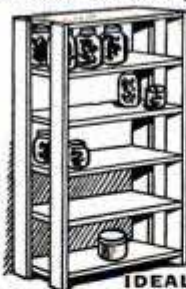
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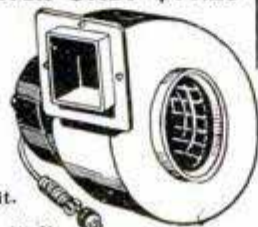
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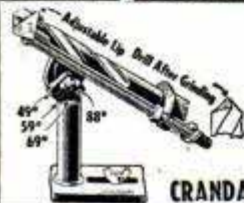
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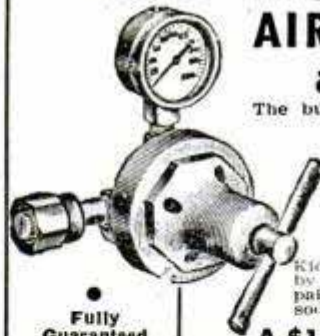
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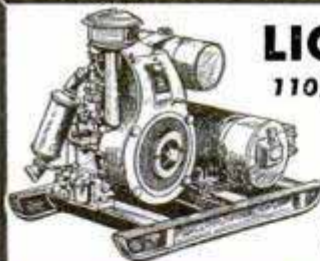
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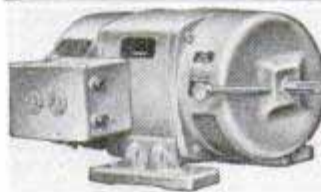
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## OWN THIS FINE 8 PC. COMB. BOX AND OPEN END WRENCH SET

in transparent leatherette roll. Made of hi-grade alloy steel and heat treated. 8 sizes 13/64 to 7/16. At your local dealer.

PRICES Retail \$3.00 per set Dealer \$24.00 per doz. sets DISTRIBUTORS WANTED

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**SENSATIONAL!... HARMIC'S**  
**New Alcohol Blow Torch**  
**with 1800° flame**

ONLY  
**\$2.00**

POSTPAID

Highest quality brass, triple-plated chrome finish. Extra heavy case. No moving parts — no adjustment — just fill with denatured alcohol and light. Absolutely safe.

Its 1800° F. flame is just the thing for preheating work . . . improving the quality of your soldering . . . bending glass tubing. Hundreds of uses in every home workshop.

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TRINITY PRODUCTS

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**TERRIFIC BARGAINS**

**ELECTRIC MOTOR** 1/2 H.P. 27 V.D.C. R.P.M. 4000 No. 750. FOR INTERMITTENT OR CONTINUOUS DUTY. 5/8" 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**

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**BRAND NEW WONDERFUL RATOR MOTOR.** For rotating Ham. FM Antennas, Turntables, Telescopes, etc. Operates directly on 110 V. A.C. 60 cycles (requires only 12 MFD Condenser) 3/4 R.P.M. Fine for operating Ventilating Louvers such as used with Attic Fans, Furnace Dampers or check drafts. Complete instructions incl. Ea. **\$3.95**

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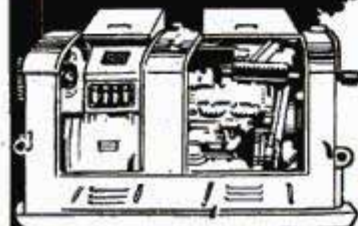
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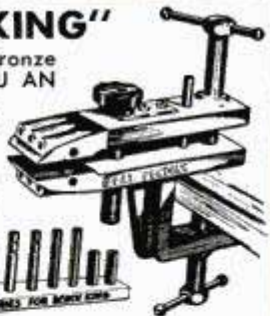
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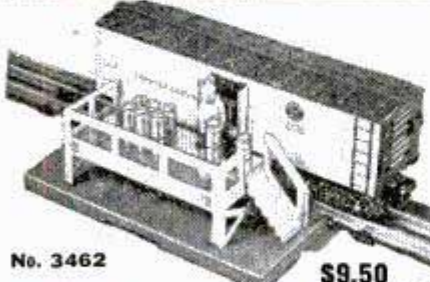


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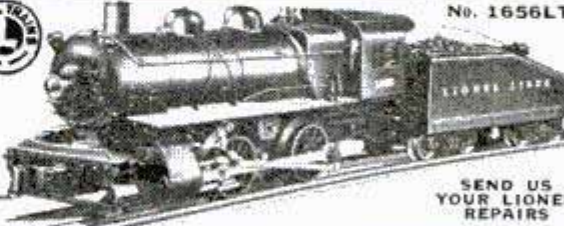
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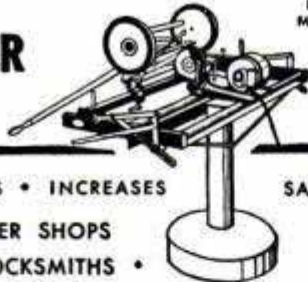
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Sharpens All Reel Type Mowers • Hand, Power or  
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All reel type mowers, from 5-inch edgers to 36-inch power mowers, are quickly sharpened to extreme ends of both left and right twist reel blades. 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.

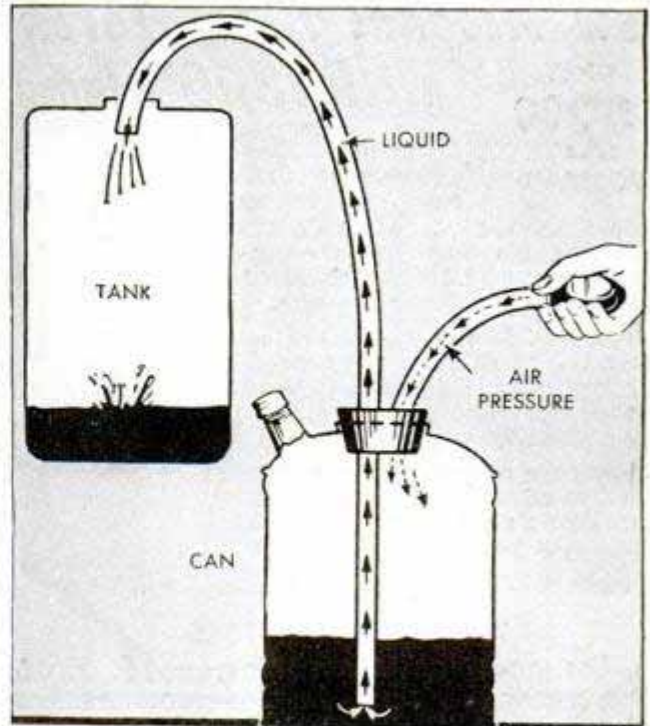
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Liquids such as gasoline and kerosene are transferred from a container to a tank without spilling by a simple air-pressure device. It consists of a tapered plug that fits any standard can, two flexible tubes and a bulb. All parts are made of oil-resistant synthetic rubber. When the bulb is squeezed, air is forced into the first container forcing the liquid through the long tube, which has a built-in filter, and into the tank or container to be filled. It can also be used to start a siphon when the first container is higher than the second.

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If you want to live to a ripe, old age, your best bet is to move to Nebraska, according to a statistical survey worked out by a large insurance company. The survey, which covers only members of the white population, shows that people live longer in Nebraska than in any other state. The West North Central states, Minnesota, the Dakotas, Nebraska, Iowa, Kansas and Missouri, rank highest in the sectional compilation. There, women live to be more than 69 years old, while men average over 65. Shortest length of life is in the Mountain states: Idaho, Montana, Wyoming, Colorado, Utah, Nevada, Arizona and New Mexico. In that section, women average 66.03 years and men 60.98 years. Generally, the white population of the North has the longest average length of life, followed by the South and West in that order.

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**IDEAL FOR AUTO—HOME APPLIANCE AND FARM REPAIRS.** This portable, industrial transformer type welder easily carried right to the job can be operated from any convenient properly wired 110 Volt 60 Cycle Line. Can also be supplied for 220 volt 60 cycle operation and other voltages and cycles at slight additional cost. **EASY-TO-OPERATE.** If inexperienced you can easily learn to do a variety of high grade welding jobs by following the practical, simplified welding and operating instructions furnished. Once you see the **DYNAMIC WELDER** in operation you won't want to be without it. Its simplicity will amaze you. In a year the **DYNAMIC** only costs you about 7c a day. **COMES COMPLETE READY TO OPERATE WITH HELMET, RODS, CABLES, HOLDER, OPERATING AND WELDING INSTRUCTIONS, ETC.**

**SAVES YOU VALUABLE TIME AND MONEY!**

**DESIGNED TO DO HIGH GRADE WELDING** inexpensively—Maintenance Men, Farmers, Mechanics, Machine Shops, Foundries, Auto, General Repair and Job Welding Shops, all using the **DYNAMIC** find it so indispensable and useful that they can't afford to be without it. **WORKS ON IRON, STEEL, BRASS, BRONZE AND OTHER METALS.** Has 8 metallic and carbon arc heat stages. **DOES WORK YOU WOULD THINK ONLY POSSIBLE WITH A LARGER, MORE EXPENSIVE MACHINE.**  
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ONLY

**\$2850** COMPLETE

**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 Particulars

**GET DETAILS** on our 10 day Trial Offer.

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**THIS TWIN CARBON TORCH** illustrated below for use with the **DYNAMIC** is unsurpassed for brazing, soldering, pre-heating and cutting on iron, steel, brass, bronze and other metals. With it you can greatly increase the profitable uses of your welder. Comes complete with instructions, carbons & cables. Does work of an Oxy-Acetylene Torch.

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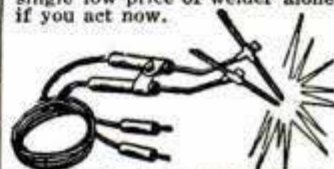
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**Motor:** Universal, 110 volt AC-DC, 1 1/4 HP. Speed, 18,000 r.p.m. 30 load. Weight 11 1/4 lb., height 9 inches, diameter 4 inches. Switch conveniently located on body of motor with plug-in cable.

**Cooling:** Air cooled, by turbine type wheel.

**Bearings:** New Departure sealed ball bearings.

**Finish:** Outer housing all highly polished.

**Template Guide:** One 5/8" furnished with machine.

**Gauges:** Straight and circular of aluminum.



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HUNDREDS OF ASSORTED ITEMS - A \$50 VALUE



FOR CUTTING,  
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GRINDING,  
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WOOD, METAL  
OR PLASTIC.

While supply  
still lasts, only

**\$8.95**

Per  
Complete  
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SET INCLUDES OVER 300 ITEMS

Here is the list.

- 35 Grinding and cut-off wheels, sizes 1 to 5 inches, 1/8 to 3/4 hole
- 10 Mounted stones—3/32", 1/8", 1/4"
- 3 Steel cutters 1/8"
- 5 Steel cutters 3/32"
- 1 Steel circular saw mounted on mandrel
- 1 Drum sander 1/2" mounted on 3/32" mandrel
- 6 Cut-off Wheels on 1/8" mandrel
- 1 One inch buff on 1/8" mandrel
- 1 One inch felt wheel on 1/8" mandrel
- 1 7/8" rubber wheel on 1/8" mandrel
- 2 High speed rotary files 1/4" shank
- 100 3/4" cloth butterfly abrasive discs
- 1 One inch wire wheel 5/8" hole, brass center
- 10 Cloth abrasive discs
- 3 Sheets crocus cloth 9 x 11
- 1 Box paper discs—100
- 1 Bristle brush 3", 5/8"
- 1 Roughing stone 1 hole, brass center
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In sturdy compact container 13 1/4 x 9 1/4 x 2 1/2", weight 8 1/2 pounds; with installed rack for all drills.

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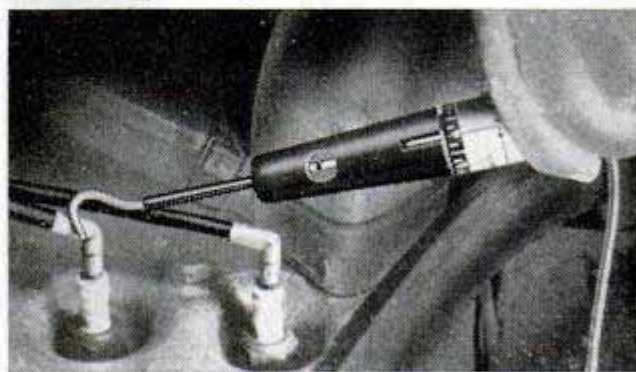
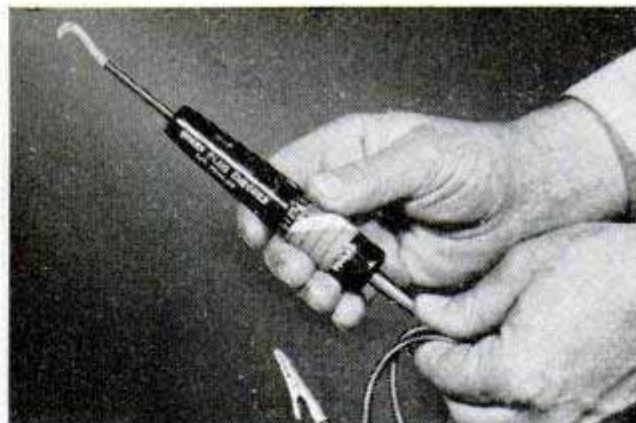
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## Spark Plugs Tested in Two Minutes With Engine Left Running

Spark plugs can now be checked quickly under actual operating conditions without removing them and with the engine running. A new tester determines fouled plugs and indicates if they should be replaced. It also measures spark loss because of leakage or defective insulation. Only two minutes are required to make the check which is done by simply attaching the tester clip to a good ground and measuring the coil output and then checking the condition of the plug.

## Numbers Tattooed on Rattlesnakes Aid Study of Migration Habits

Tattooing rattlesnakes is probably, to most people, about as inviting an occupation as going over Niagara Falls in a barrel, but Prof. Angus M. Woodbury of Salt Lake City thinks nothing at all of the dangerous-sounding work. In the past 10 years he has tattooed identification numbers on 777 rattlesnakes and 529 nonpoisonous snakes so that they can be identified and their movements traced if they are picked up subsequently. He uses a homemade outfit consisting of six fine needles vibrated by an old doorbell mechanism. To tattoo a snake, he holds it down with his foot and applies the identification number on the underside of the body just behind the head, according to an article in the zoological journal, Copeia.

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RADIO**  
*Everything in Radio  
and Electronics*

## Tool Rips Open Sheath On Nonmetallic Cable



Braided or plastic sheathing on electric cables is ripped open without scoring the conductors by a ripping tool that works on both small and large-diameter cables. The ripper consists of two hinged parts between which the cable is laid. When the top is closed, a blade cuts through the sheath between the conductors. Then, as

the tool is pulled forward it slices open the cable. The insulation can then be stripped off quickly.

## Electricity Passed Through Glass Produces Heat Which Melts It

Flawless glass is produced by an electrical heating process developed by General Electric. Electric current, passed through the glass, is converted into heat by the resistance of the material. Used in Europe for a number of years, the technique frequently produced discolored and faulty glass. The American process has overcome this difficulty and the resulting glass is of the highest quality.

## High-Frequency Sound Waves Detect Flaws in Metal

Small flaws in metal pieces are discovered by an ultrasonic instrument that shoots sound waves through the metal at a frequency of one million cycles a second. The metal is immersed in oil, since these waves will not travel through air, and the waves transmitted through the metal to a receiver. The receiver plots the incoming waves on a graph and any flaws in the metal show up as dips in the graph curve.

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Mfd. by PACKARD  
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Ready for use on  
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Use it for:  
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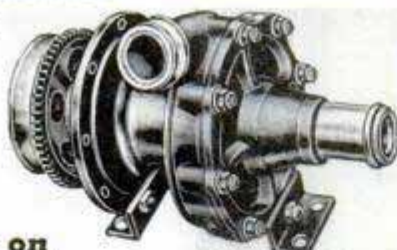
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Complete with pulley  
and mounting brackets,  
ready for use.



Brand New

### Belt Driven — Centrifugal Pump

An extraordinary value for all types of intermittent or continuous pumping in the home . . . farm . . . factory. Built to exact specifications of Packard Motor Car Co. for use in Rolls-Royce Merlin Aircraft Engines. May be run with electric motor, gas engine or power take-off on tractor. Delivers up to 25 gallons a minute with 1/4 H.P. motor; 80 gal. a min. with one H.P. motor. Will deliver up to 44 ft. head or 25 ft. suction. Use 1" outlet hose; 1" or 1 1/2" inlet hose (recommended).

COMPLETE ENGINEERING REPORTS AND  
OPERATING INSTRUCTIONS FREE  
WITH PUMP

Has cast aluminum housing, accurately machined 5" bronze impeller; 3 1/2" V belt pulley and mounting brackets. Shaft rotates on ball bearing; has grease gun fitting.

Original cost approx.  
\$88.00. Shipping weight  
10 lbs. A REAL BUY.

**\$21.50**

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## WESTINGHOUSE AIR COMPRESSOR

BRAND NEW

### WAR SURPLUS BARGAIN

2-Cylinder Piston Type

Ideal for:

- Paint Spraying
- Industrial Uses
- Tire Inflating
- Spraying Insecticide
- Operating Air Tools

For the:

### HOME... FARM... FACTORY

Designed for automotive truck or tractor mounting. Can be run off fan belt or power takeoff. Comes with automatic clutch. Can be installed for use on: farm trucks, jeeps, tractors, tire or garage service trucks, contractor or road building machinery, pneumatic devices, etc.

Can be operated with 1/2 H.P. or more electric motor or equivalent portable gas engine.

Light weight, compact and versatile unit . . . delivers "oil free air" . . . simple in operation; requires minimum of maintenance; operates under all climatic conditions; suggested operating pressure 75 P.S.I.; equally efficient operation in either direction of rotation; approx. displacement 3.27 CFM at 600 RPM, 6.54 CFM displacement at 1200 RPM. Has 2 inch bore—1 1/2 inch stroke. Overall dimensions: width 9", height 11 7/8", depth 6 5/8"; approx. wt. 23 lbs.

A REAL BUY . . .  
worth many times  
this price

**\$26.95**

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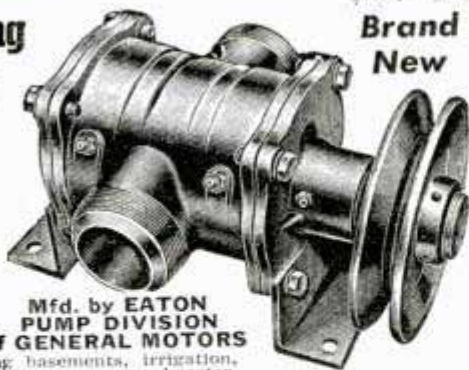
# GROBAN'S—WAR SURPLUS BARGAINS

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## Self-Priming BRONZE PUMP

Positive Displacement

Gerotor Type



Brand New

Mfd. by EATON PUMP DIVISION of GENERAL MOTORS

Perfect for draining basements, irrigation, fire fighting, sprinkling, pressure booster, insecticide and other spraying, fuel transfer, stock watering, industrial pumping, deep well jet pumping and home water systems. Rated 25 ft. suction and 100 ft. head pressure at 65 gallons a minute with 1725 RPM at one H.P.

Complete engineering report and instructions FREE with pump

**\$32.50**

Supplied with mounting brackets and 6" V belt pulley, ready for instant use. Standard 1 1/2" inlet and outlet pipe thread. Dimensions: 9 1/2" x 7 1/4" x 4 1/4". Ship, wt. 18 lbs. A \$142.00 value...

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## Self-Priming ELECTRIC PUMP

APPLICATIONS: oil burners, aquariums, fluid metering, fuel pump, tool post grinder, coolant pump, pressure lubricating pump, general industrial, etc.



Compact — BRAND NEW

MOTOR MFD. BY BLACK & DECKER: double ball bearing series wound, continuous duty, 1/30 H.P. electric motor, rated 12,000 R.P.M. Transformer included for use on 110 VAC current. Also applicable for 24-32 VDC.

PUMP MFD. BY WELDON TOOL CO. with standard 1/4" tubing ports; rated 2 G.P.M.; remove pump and use motor as high speed grinder.

**\$12.95**  
postpaid

## Brand New Three-in-One MULTI-PURPOSE PUMP

Three independent pump sections running off of one shaft, for single or multiple pumping. Use one as a vacuum pump capable of drawing 25 inches of mercury. Use one or two as a liquid pump for hydraulics, insecticide spraying, pond and basement draining, stock watering, aeration, etc.

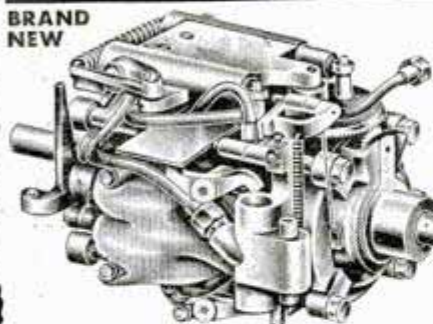


Supplied with 4" V belt pulley. Inlets and outlets 3/8". Easy to use — foot mounting. Constructed of bronze and aluminum to exacting ordnance specifications. Dimensions: 6" x 5" x 4 3/8". Ship, wt. 10 lbs. Government acquisition cost \$74.00. YOUR PRICE.....

**\$19.75**

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BRAND NEW



## WESTINGHOUSE HYDRAULIC TRANSMISSION

Gov't. Acquisition cost..... \$300.00

Use it on chain saws, midget autos, lathes, drills, power machinery, chucking machines, farm machinery, potters' wheels, tractors, trucks, etc. Ideal as hydraulic torque converter. Contains hydraulic pump and hydraulic motor; has reversing

**\$18.95**

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## BRAND NEW



## AIR OR OIL HYDRAULICS

Use hydraulics on arbor presses, hydraulic presses, hay lifts, manure loaders, lift trucks — push or pull, tilt or turn, press or squeeze, open or close, lift or lower — and other hydraulic and industrial applications. Use with either air or oil... of finest precision workmanship.

1. Double action, 1 1/2" bore, 5" stroke, will lift 1760 lbs. in one second with Vickers MF6 Pump. \$8.95  
Wt. 3 lbs. A \$35.00 value..... postpaid
2. Double action, 1 1/2" bore, 9" stroke, will lift 1760 lbs. in one second with Vickers MF6 Pump. \$10.95  
Wt. 4 lbs. A \$45.00 value..... postpaid
3. Use these cylinders on farm trucks, bulldozers, hay lifts, manure loaders, etc. Double action, 1 1/2" bore, 27" stroke. (Will lift 1760 lbs. in 2 seconds with Vickers Pump.) Wt. 8 lbs. A \$55.00 \$12.95  
hydraulic cylinder value for only..... postpaid
4. Double action, 2 3/4" bore, 8" stroke. (Will lift 4400 lbs. in one second with Vickers Pump.) Will withstand 1500 P.S.I. against wall. Wt. 7 lbs. \$14.50  
A \$65.00 value..... postpaid
5. Double action, 3" bore, 12" stroke. All steel hydraulic cylinder, will lift up to 12,000 lbs. (7000 lbs. in 3 seconds with Vickers Pump.) Complete with fittings. Wt. 12 lbs. \$19.50  
A \$78.00 value..... postpaid
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## Hydraulic Control Valves

Brand New



Outlets are standard 1/4" pipe thread and inlet takes standard 1/4" copper tubing fitting.

1. Four-way control valve for use with double action hydraulic cylinder, may be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Brand new. Ship, wt. 4 lbs. A \$38.00 value..... postpaid \$7.95
2. Four-way control valve for use with two hydraulic double action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Brand New. Ship, Wt. 6 lbs. \$10.95  
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3. A two cylinder double action valve with a unique arrangement, allowing the operator to raise both cylinders simultaneously, to lower them simultaneously or to raise one and lower the other at any predetermined rate and speed. Brand New. \$14.95  
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## Vickers MF6 Hydraulic PUMP or MOTOR

Compact, powerful, rated 1,000 P.S.I., .507 cu. in. per revolution, 8 gal. per min. at 3750 r.p.m. Change rotation by reversing flow. Delivers up to 6 H.P. BRAND NEW. \$14.95  
Wt. 4 1/2 lbs., \$60.00 value for... Postpaid



Brand New CHECK and RELIEF VALVE. Adjustable for any pressure..... \$2.95 post-paid

## VICKERS HEAVY DUTY HYDRAULIC PUMP BRAND NEW



For tractors, bull-dozers, construction machinery, lift trucks, industrial applications, etc. Used on Ross carriers. Delivers 18 gal. per minute at 1000 P.S.I. at 1200 R.P.M. using 10 H.P. Has 1 1/2" intake; 1 1/4" outlet; threaded and keyed 3/4" shaft for direct or pulley drive. Wt. 40 lbs. Dimensions: 5 3/4" diameter, 7 1/2" high. Original value \$148.00. NOW..... \$39.50  
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for cutting wood, metal or plastic.

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Compact container. Special rack for drills. Over 260 tools and items.

- 115 Grinding, Cutting and Polishing WHEELS PLUS 150 assorted tools most useful for Home or Shop.**
- 3 Grinding Wheels from 1" to 3" dia.
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  - 6 Rotary Cutters 3/32" Shank.
  - 6 Mounted Grind. Wheels 1/4" Shank.
  - 6 Mounted Wheels 3/32" & 1/4" Shk.
  - 3 Rubber Wheels.
  - 4 Speed Drills 3/32" Shank.
  - 30 Rotary Cutting Burs 3/32" Shank.
  - 2 Mandrels 3/32" Shank.
  - 1 Mandrel 1/4" Shank.
  - 1 Screw Type Mandrel 3/32" Shank.
  - 3 Rotary Bristle Brushes 3/32" Shank.
  - 1 Rotary Wire Wheel Brush.
  - 1 Circular Saw
  - 1 Mandrel for Circular Saw 1/4" Shank.
  - 2 Rubber Cylinders and Mandrel 3/32"
  - 10 Cut-off Discs and grinding wheels.
  - 1 Rotary Drum Sander 1/4" Shank.
  - 15 Bands for Rotary Drum Sander.
  - 15 Rotary Felt Wheels 1" dia.

● The right attachment for every job.  
**ORDER TODAY.** Send check or send \$2.00 deposit with C.O.D. order.

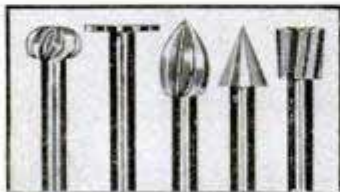
### 18 ROTARY CUTTERS

Ass't Sizes 1/8" or 3/32" Shk. Will fit all electric hand grinders. Ideal for cutting wood, metal or plastic.

\$13.50 Val.

ONLY **\$5.85**

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### SPECIAL • 100 PIECES • \$1.00 Postpaid

Grinding Wheels, Cut-off Wheels, Sanding Discs, Mounted Stones, Sharpening and Honing Stones, Rotary Cutting Burs, Abrasive Cartridges and many other items.

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### Personal Alarm

Thugs and thieves may be frightened away by a personal alarm slightly larger than a cigarette case. The alarm can be carried by women walking alone at night, bank messengers and pay-roll carriers, or can be placed on a bedside table. The alarm requires no batteries or electric current. It operates on a clock spring, emitting a piercing siren sound for 35 seconds and cannot be shut off until it has run down.

### Rat-Repellent Plywood

Rats can't gnaw through a new plywood that is made from hardwood veneer and impregnated fiber. The board is designed for use in poultry houses, storage bins and other farm structures holding food that is attacked by rats. It is moisture resistant, lightweight, pliable and can be painted. The paneling is available in sheets four by eight feet and 3/32 inch thick.

### Typewriter Copies Without Carbons

Eliminating the need for carbon paper, a ribbon attachment for typewriters permits the making of one to five copies of letters at the same time. The attachment, which can be installed in three minutes, feeds ribbons between the sheets of paper to make extra copies. A flip of the wrist inserts or removes the ribbons, once the attachment is installed. In erasing, no backing sheets are necessary as the ribbons will not smudge. The extra ribbons last about twice as long as ordinary ribbons because the paper cushions them from the keys.

## PROTECT YOUR PAINT BRUSHES

With the

# NEW CLIP-ON PAINT BRUSH HOLDER

A sure, easy way to care for your paint brushes Before, During and After painting.

- Fits standard 10 and 12 qt. Galvanized pails.
- Removable clips keep brushes suspended in liquid to proper depth.
- Holds 6 brushes — any size.
- Light weight — all metal construction.

Begin now to give your brushes Better Care for Longer Wear!

Order your CLIP-ON PAINT BRUSH HOLDER Today!

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Complete with Instruction Sheet — "Care Of Your Brushes"

**MONEY-BACK GUARANTEE!**

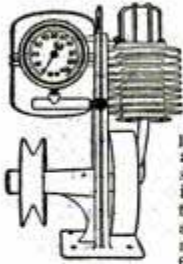
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1959 N. Prospect, Milwaukee 2, Wis.  
Enclosed find One Dollar for 1 Clip-On Paint Brush Holder. (No C.O.D.'s, please.)

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**COMPRESSED AIR  
INSTANTLY, Anywhere!!**



Portable Air Compressor and storage tank. Ruggedly built of best materials using lifetime lubricated ball-bearing on connecting rod and oil impregnated main bearing on shaft. Unusual design forever eliminates valve trouble, the most common fault in air compressors. **PATENTED** unique air intake system increases efficiency tremendously over other compressors so that air output is much greater than that from larger compressors powered by heavier motors. Will deliver appr. 3500 cu. in. air per min. at maintained pressure of 30 lbs., or will inflate a 90 lb. truck tire in less than 1 min. Complete with 100 lb. gauge, fingertip adjustment allows setting of output pressure at any value, which will automatically be maintained. Works from any 1/4 H.P. motor. Useful for spraying paints or lacquers, disinfectants, insecticides, annealing or brazing with natural gas, inflating tires, etc. Price \$14.50 postage prepaid anywhere in U.S. Efficient, adjustable syphon type spray gun complete with 12 ft. of 100 lb. tested hose for only \$7.75 with pint container, also prepaid. 25% required on C.O.D. orders.

Inflating tires, etc. Price \$14.50 postage prepaid anywhere in U.S. Efficient, adjustable syphon type spray gun complete with 12 ft. of 100 lb. tested hose for only \$7.75 with pint container, also prepaid. 25% required on C.O.D. orders.

**Terrific Value**

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**\$20.95**

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 Oilite 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.

Full refund (you pay transportation) if not pleased with drill after trial.

**HEAT GUN**

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.



**Sensational Value in  
AC-DC Pocket Tester**

This analyzer, featuring a sensitive repulsion type meter housed in a bakelite case, represents the culmination of 15 years achievement in the instrument field by a large company specializing in electronic test equipment.

Specifications of the AC-DC Model Volt-Ohm-Milliammeter:

- AC Volts—0-25,50,125,250
- DC Volts—0-25,50,125,250
- Milliamperes AC—0 to 50
- DC Milliamperes—0 to 50
- Ohms Full Scale—100,000
- Ohms Center Scale—2400
- Capacity—.05 to 15 Mfd.



Total Price, prepaid anywhere in the USA—\$7.00  
Similar DC Meter, lacking the AC operated ranges of above, \$5.50 prepaid.

**RT-1248 INTERCOMMUNICATION TRANSCEIVER**

This brand new 15 tube transmitter-receiver was designed for mobile service on 12 volts, and will operate in the "Citizens' Band," where no gov't. license to transmit is necessary. It's a cinch for any experimenter to connect this unit for 110 VAC operation by following the instructions and diagrams supplied, which cover numerous applications, including television. For those intending to use on car or boat, a new dynamotor, exactly as originally supplied, costs only \$15.00. Don't fail to write for FREE descriptive bulletin. RT 1248 transceivers only \$29.95 each, or two for \$53.90.

**RADAGER\***

\*Combination Auto Radio-Battery Charger

Nationally advertised brand 1949 car radio that will fit practically any car. These car radios have plenty of eye appeal plus a host of other features that no other radio regardless of cost can offer.

Built in battery charger that will charge a car battery. The unique circuit of this radio steps up the 6 v input to 110v, that is available in a convenient outlet, for operation of an electric shaver or similar electrical appliance.

The radio is a powerful 6 tube superheterodyne that has a three gang condenser and a stage of radio frequency amplification for increased sensitivity. The radio, complete with built in battery charger and power outlet, is a single compact unit that is easily installed. Sample—\$39.95; Dealer price, \$37.47 each in lots of two or more.

**RT-1655 — 11 tube crystal controlled SUPER-HETERODYNE RECEIVER** that covers the FM band. The ultra modern circuit uses the latest types of tubes including 7 miniature 6AJ5's. Beautiful chassis and aluminum cabinet. Tubes and schematic supplied—\$14.95.

World renowned 700 page tenth edition of the **RADIO HANDBOOK** in cloth binding and hard cover at the sensational reduced price, for a limited time only, \$1.49.

**\$5.95 Takes Both  
BIG BARGAINS**

**1. ALUMINUM GEAR BOX** 18x8x7 that contains two powerful electric motors and two matched gear trains, 62 gears in all varying in size from 1/2 to 4 inches in diameter. This unit is readily converted to rotate a beam antenna or any other similar use.....\$3.00

**2. SENSATIONAL, FASCINATING, AMAZING SELSYNS.** Brand new selsyns made by G. E. Co. Two or more connected together work perfectly on 110 VAC. Any rotation of the shaft of one selsyn and all others connected to it will rotate exactly as many degrees in the same direction, following unerringly as if the units were connected together by shafting instead of wires. This is true whether you twist the shaft of the master unit a fraction of a revolution or many revolutions. Useful for indicating the direction of weather vanes, rotating directional antennas, or controlling innumerable operations from a distance. Complete with diagram and instructions. Per matched pair.....\$4.95



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**SAVE 85%**

**in WAR SURPLUS... SENSATIONAL VALUES**  
at "GADGETEER'S HEAVEN"  
IN MANY ITEMS WE HAVE THE WORLD'S LARGEST SUPPLY

**B-15 STYLE JACKET**  
A Garment You'll be PROUD TO WEAR! Water repellent, wind resistant, nice green, sateen, genuine Zealand Sanforized Poplin, full zipper front with slash pockets and large genuine Mouton Fur Collar. Heavy Alpaca lined for Warmth. Sleeves also lined with Heavy Rayon Rib-knit cuff and bottom.  
Sizes 34 through 48.  
**LOOK AT THE PRICE! \$11.95**



**Navy Melton Cossack Style Jacket**  
NEW All Wool, Sturdy, Warm Zipper front 2 slash pockets, Taped Collar. Wonderful Buy For Utility and long lasting Qualities.  
Sizes 34 thru. 46  
**\$5.69**



**HUNTING KNIFE**  
6" chrome vanadium blade handle, leather grip. In leather sheath.  
\$5.98 Value For Only **\$1.79**

Like above but black Parkered Finish. #307A **\$1.49**

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10" x 2" Parkered Blade 5" Gripped Handle. Weight 1 1/2 lbs. Ideal for Hunting, Clearing Brush, or Trails **\$1.19 ea.**



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Made of heavy water repellent poplin cover. Wool blanket lined, thigh length, sleeve flap for adjustment. An ideal coat for the outdoor man, truck driver, hunter, farmer. Sizes 34 thru 48 **\$7.95**



**MESS TRAY** 6 compartments, rustless, stainless steel. Barbecue, outdoor cooking, save dish-washing. Hospital, Restaurant, Home, or touting. #311 New **83c ea.**  
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**SLEEPING BAG**  
NEW! 100% wool. Heavy type Heavy duty 38" zipper. Grey. Cost \$22.00. \$1.95, extra for used water repellent cover. Sold only with Sleeping Bag **\$3.95**



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#407 Fleets or Chamois lined winter type. Ideal for cycle drivers, racers, sportsman. Used, but in excellent condition. **\$1.59 ea.**

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Matchbox type, jewel floating dial **39c ea.** #152  
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**SHARPSITE. NIGHT DRIVING GLASSES**  
With 57 mm yellow amber lenses. These lenses are 6 base especially PRECISION Grad. and Polished to reduce Glare of headlights from on coming cars, also to focus objects sharply and more clearly during night driving. Absolutely one of the greatest boons for Safe Night Driving, or during stormy, murky weather. Highway Patrolmen, Truck Drivers swear by them. A must for your Vacation or Nite Driving.



**TELEVISION!** These glasses help wonderfully! SHARPEN FOCUS. Aid in eliminating Glare. DISCOVER GREAT-ER ENJOYMENT.  
INTRODUCTORY OFFER ND-1 **\$14 VALUE \$5.89**  
In Men's size or Ladies Harlequin style. SAME GLASSES but clip on. Fit-over style without temple bars **\$4.59**



**HERE ARE PLASTIC KITS**  
UNSURPASSED VALUES for ARTISTICALLY INCLINED HOME HOBBYIST!

Start planning Naval Xmas gifts Now! Kit #1 contains 1 Do. Plexiglas & Lucite sheets in various shapes, 1 ea. bottle of clear cement, 1 ea. bottle color set cement and 4 bottles of colors in Orange, Red, Yellow, Peach, etc. Also a Plastic Handbook of uses and instructions. This set easily worth \$3.95. Our Price **\$2.19**

Kit #2 contains 1 1/2 lbs. of plastic sheet, 1 ea. bottle of clear cement, and the Plastic Handbook. A \$3.50 Value for ONLY **99c**



**TEAR SHAPED PLEXI DOME**  
Overall length 2 1/2" width at widest point 1 1/2" at base 4" 5" deep. #70-1A **\$1.39 ea.**



**Plexiglass Windows**  
in Alum. Frames, for your trailer, boat, or home ornamental use. Priced at the value of the sheet alone.  
#703A - 18 1/2" x 15 1/2" x 3/16" thick **\$2.95**  
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**Signal Corp Control Unit**  
Standard Back Panel 17" x 5 1/2" x 1 1/2" Case size 5 1/4" x 17" x 1 1/2" with numerous relays, condensers, 4 bay switches, 4 bay plugs, jacks, resistors, transformers, etc. Enclosed in Parkered steel case. Parts alone worth more than our asking Price of ONLY **\$2.69**



**Radio ANTENNA Reel**  
Just the thing for tuning beam antennas. Powered by 1/2 hr. 24v. G. E. Motor. Removable 6" Reel. Unit Switch - Can Warn gears. Best of gear. Spinnoid clutch.  
Many engaged in heat reduction only when electrical contact made. Operates in either direction. Ideal for auxiliary power take-off, opening and closing doors, etc. **\$4.29**



**RADIO HEAD SET**  
AN-BH-1  
A Wonderful Buy **\$1.**




**FOLDING STEEL COTS**  
With Tubular Metalworks and sturdy double heavy wire twin springs. A Lite line buy. **\$2.95 Ea.**

**NAVY BUNK BED**  
With steel angle hand-stands, steel frame spring made of twisted heavy gauge wire reinforced with lateral slingers. Can be used as single bed or joined together to serve as double bunk bed. Specially suited to hard wear, cruise children, dormitory, camps, etc. Simple. **\$3.95**  
In sets of two **\$7.75**



**MATTRESS** for above cot or bed. Cotton top, local motor height for shipping cost due to 100lb. net. mattress shown below can be included in our extra ship. cost.  
In sets of two **\$6.95**

**ME-1 PILLOWS** Curled Chicken Feathers. 25" x 17". Blue & white Ticking **.99c** Each  
Both Mattress and Pillows are reconditioned and sterilized in accordance with laws of Calif. and Gov's.



**GENUINE Aviators (AN-6530) Windproof & Dustproof GOGGLES**  
Go-41 Sponge and leather grained frame with ground lens in clear, amber and green. Clear lens in replaceable metal frame with blinged nose bar. Ideal for Motorcycling, etc. **\$1.69 ea.**

**SUNGLASSES** HERE'S THE REAL McCoy!  
ARMY AIR FORCE & base. Precision Polished and Ground. Glare-Free lens with leather case that can be attached to belt. Gold plated adjustable frame. Pearlized crown and pads. A real Pulley **\$17.50 Value for Only \$3.95**



**ARMY AIR FORCE TYPE SUNGLASSES**  
4 lens, polished and ground lens. 3 1/2" Ultra Violet Ray, less gold plated frame, genuine leather & pads. leatherette case. Our price **\$2.39**



**NEW AIRCRAFT ALUMINUM BUCKET SEAT**  
Use for boats, jeeps, tractor seats, etc. 17" x 18" seat, 18" x 24" back. Rib reinforced. Adjustable height tube mounting. Wide, high back gives excellent support. Easily installed. Shipped in original carton. You'll appreciate the buy at **\$4.95**



**CUSHIONS** Mid. for above Bucket seat, but can be used in trucks, autos, boats, tractors. Made to Gov't. Spec. of finest imitation leather, yellow pigskin col. filled with kapok. Will float. Same as shown in LIFE magazine saving a man from drowning.  
New Back Rest, 22" x 16" x 1 1/2" thick **\$2.95**  
Used Back Rest, 22" x 16" x 1 1/2" thick **\$1.35**  
SEAT, New, 17" x 16" x 3" thick **\$3.49**  
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**AT REAL VALUES!**  
3 1/2" dia. 3 strand, cotton .01 ft. **1/4**" dia. Treated Navy layard. in 300 ft. rolls **\$1.95**  
3/8" dia. 3 strand, treated jute **.02 ft.**  
3/8" dia. 3 strand, jute **.07 ft.**  
3/8" dia. 3 strand, sisal **.08 ft.**  
3/8" dia. 3 strand, sisal **.08 ft.**  
These prices speak for themselves, we also have other types and larger sizes in stock. We welcome your inquiry. No sales under \$1.00



**VINYLLITE TUBING**  
Capable of insulating up to 3000 volts. This Plastic tubing used for protecting wire, decorative purposes, water or other fluid hose.  
Price per ft.  
1", Black, Clear, Red **.15**  
1/2", Clear, Red **.12**  
1/2", Grey, White **.10c**  
3/16", White **.02**  
3/16", Clear **.02**  
No Sale Under \$1.00  
Above sizes are only a sample of the stock we carry, should you desire other sizes or types please send us your inquiry.



**AIR CORPS FLEECE LINED JACKET**  
D-1 TYPE  
These have been reconditioned, cleaned, and brushed. If you want a warm, rugged, full sheepskin felt, fleece lined collar, zippered front, leather jacket that has lots of outdoor wear left in it, that you can't heat for value **\$7.95 ea.** at this close-out price. You'd better write in fast, before they are all gone.  
Ideal for Hunters, Farmers, Garage Mechanics, etc. Large Size Only.



**NEW 100% ALL WOOL BLANKET**  
7 x 7 ft. Extra heavy. Also Double warmth. Fits Wood's Robe sleeping bag. **\$4.65**



**COMFO RESPIRATOR**  
dual-disc, Style BM-2101, with 10 extra filters, a \$3.50 value. **\$1.59 each**



**NEW TARPS - HEAVY CANVAS**  
Mildew & Flame Resistant. Cheap Outside Storage. They are Really Moving at These Prices.  
5' x 7' **\$3.95**  
15' x 22' **\$29.95**  
8' x 10' **\$8.50**  
16' x 22' **\$20.95**



Rubberized Linen 7' x 11" NEW **\$5.95**  
Only 3 lb. light weight yet waterproof ideal for outside car storage.



**Waltham 8 Day U. S. Navy Airplane Clock**  
Runs 8 days without re-winding. 15 jewels, adjusted for temperature & up-right position. Watch type escapement. Dial registers 24 hr. day in hr. min. & sec. Also days of the month. Used but guaranteed Reconditioned. A \$50. VALUE FOR ONLY **\$13.95**



'Twas Made for the Air Force THE BEST  
**Loose Leaf BINDER**  
You ever saw - 3 metal pins. Cylindrical locking heavy duty 2 1/8" interlocking bonded covers. End identification window. Ideal for price books, telephone directories, photo albums, students, publications, reference books, artist sketch books, etc. Will hold 50 sheets. 8 1/2" x 11". A \$3.00 Value for Only **59c**  
50 Page Binder. Bond. Filler for 25c Extra.



**For THE FOOTBALL SEASON**  
and for those cold, hard stadium seats RUBBERIZED HAIR CUSHIONS  
#RC1 14" dia. x 1 1/2" **69c ea.**  
#RC2 21" x 12" **69c ea.**  
#RC3 22" x 16" **\$1.19 ea.**  
#RC4 25" x 18" **\$1.19 ea.**  
These cushions are used in many places and are in very good condition.



**LEATHERETTE**  
Heavy Hodge Brown color. With Heavy Backing. Recover your outdoor furniture or your Auto, Truck, Boat or Tractor Seats at a fraction of what you would otherwise pay.  
In 29" Widths, Running Yard **95c**



**PALLEY SUPPLY CO.**  
THE LARGEST FIRM OF ITS TYPE 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 & S firms. 1/2 deposit with C. O. D's. FREE LARGE ILLUSTRATED CATALOG  
DEPT. P. M. 118 - 6321 SAN FERNANDO RD. GLENDALE 1, CALIFORNIA

# SOUTH BEND

## Precision

# MACHINE TOOLS



### NEW 13" & 14½" — 1" COLLET LATHES

The 13" and 14½" swing South Bend Lathes are now available with larger headstock spindles having 1⅜" bore, which permits using the No. 5 South Bend Collet which has 1" maximum capacity. Except for the increased capacity through the spindle and collet, these lathes are the same as the regular 13" and 14½" lathes shown on the following pages.

Prices include 3 ph. motor and control.

Lgth. of Bed Feet	13"—1" Collet Lathes				14½"—1" Collet Lathes			
	Quick Change		Toolroom		Quick Change		Toolroom	
	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price
4	145-A	\$1294.25	.....	.....	.....	.....	.....	.....
5	145-B	1332.25	8145-B	\$1694.25	185-B	\$1581.25	8185-B	\$1963.25
6	145-C	1370.25	8145-C	1734.25	185-C	1621.25	8185-C	2008.25
7	145-D	1408.25	8145-D	1774.25	185-D	1661.25	8185-D	2053.25
8	.....	.....	.....	.....	185-E	1701.25	8185-E	2098.25

### NEW 14 INCH DRILL PRESS

A ruggedly built tool unsurpassed for accuracy, ease of operation and dependable performance. Features free-floating spindle, precision ball bearings, quick-acting belt tension release, etc. Has built-in light for illumination of work. Drill capacity is ½" in steel. Prices include ⅓ h.p. single ph., 60 cycle, 115 V. motor and switch.

Bench Model.. \$129.30  
Floor Model... 144.30



### NEW 7" BENCH SHAPER

The South Bend 7" Precision Bench Shaper has been developed to meet toolroom and industrial demands for an accurate, compact bench shaper that is precision engineered and sturdily constructed.

Ram has 0" to 7" stroke. Tool head has 3" feed and swivel clapper box. Table is 5⅞" x 5" x 6" deep, has 13" horizontal travel, 5" vertical travel. Has power cross feed. Vise opens to 4" and has graduated swivel base.

Prices Quoted  
on Request.



All prices in this catalog are net f.o.b. factory unless otherwise stated



## SOUTH BEND LATHE WORKS

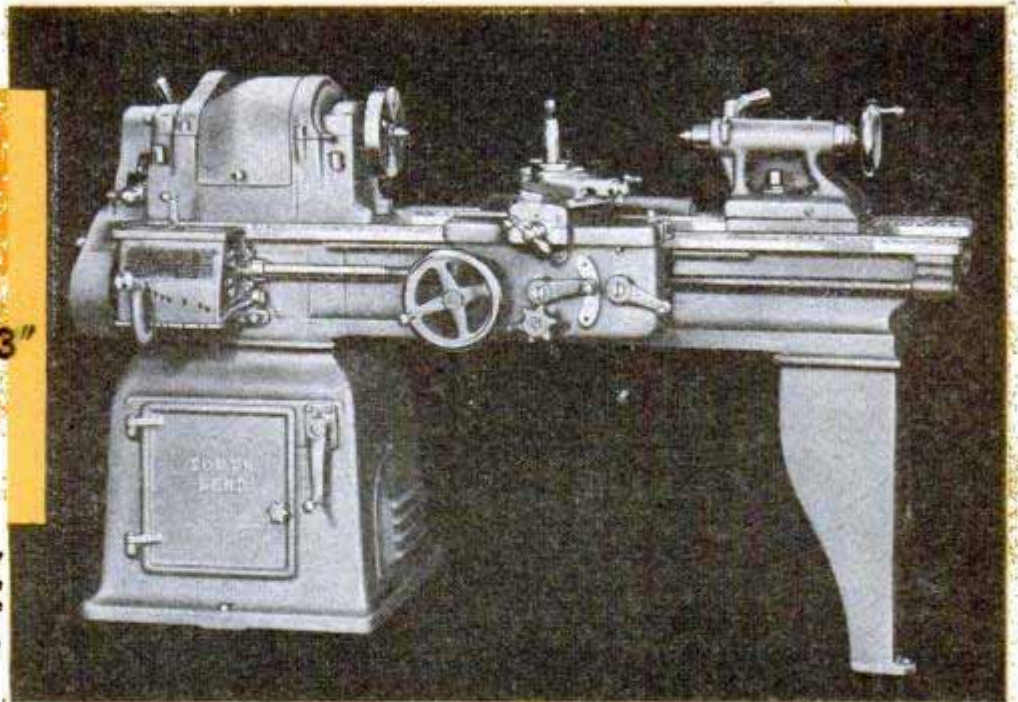
BUILDING BETTER TOOLS SINCE 1906

543 EAST MADISON STREET, SOUTH BEND 22, INDIANA., U.S.A.

# SOUTH BEND

## 16", 14½", and 13" Quick Change Gear Lathes

South Bend 16" x 6'  
Quick Change  
Gear Lathe  
**\$1729.25**



SPECIFICATIONS	16-INCH	14½-INCH	13-INCH
Swing over bed and saddle wings.....	16¼"	14⅝"	13⅞"
Swing over saddle, chip guard removed	11⅞"	10¼"	8¾"
Swing over saddle with chip guard....	9⅞"	8¾"	7¾"
Spindle speeds.....	26 to 885 r.p.m.	27 to 800 r.p.m.	34 to 875 r.p.m.
Thread cutting range.....	4 to 224 R.H. or L.H.	4 to 224 R.H. or L.H.	4 to 224 R.H. or L.H.
Power longitudinal feeds.....	.0015" to .0841"	.0015" to .0841"	.0015" to .0841"
Power cross-feeds.....	.0006" to .0312"	.0006" to .0312"	.0006" to .0312"
Hole thru spindle.....	1⅜"	1⅞"	1"
Collet capacity.....	1"	¾"	11/16"
Spindle centers.....	No. 3 Morse Taper	No. 3 Morse Taper	No. 3 Morse Taper
Size motor.....	1½ h.p.	1½ h.p.	1 h.p.

South Bend Quick Change Gear Lathes are equally efficient on precision toolroom work or close tolerance manufacturing operations. Hundreds of nationally known manufacturers select them when streamlining their shop equipment to meet present day needs. Substantial savings in capital investment, power consumption, floor space, and labor costs have resulted from their installation. They will give you the same efficient service.

The Underneath Motor Drive provides an unusually wide range of spindle speeds. The belt drive to the spindle is silent in operation and develops smooth, steady power entirely free from gear vibration.

Price includes 3 ph., 60 cy., 220 v. A.C. motor and drum control, and regular lathe equipment such as belts, centers, face plates, tool post, etc. Chucks and tools are extra. See following pages.

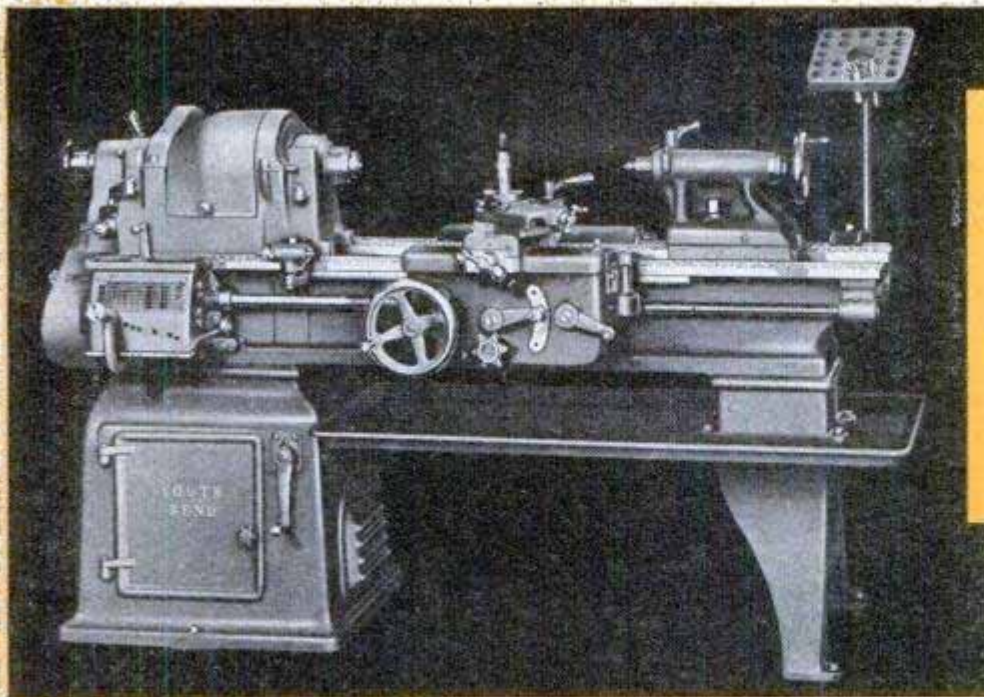
**TIME  
PAYMENT  
TERMS**

25% down, balance 12 mos., moderate finance charge (unless federal law requires otherwise)

### Quick Change Gear Underneath Motor Driven Lathes

Catalog Number	Swing Over Bed Inches	Length of Bed Feet	Distance Between Centers Inches	Approx. Shipping Weight Pounds	Price f.o.b. Factory
<b>16" QUICK CHANGE GEAR LATHES</b>					
117-C	16¼	6	33½	2300	\$1729.25
117-D	16¼	7	45½	2380	1769.25
117-E	16¼	8	57½	2460	1809.25
117-G	16¼	10	81½	2620	1924.25
117-H	16¼	12	105½	2850	2039.25
<b>14½" QUICK CHANGE GEAR LATHES</b>					
183-B	14⅝	5	24½	1995	\$1466.25
183-C	14⅝	6	36½	2070	1506.25
183-D	14⅝	7	48½	2145	1546.25
183-E	14⅝	8	60½	2225	1586.25
<b>13" QUICK CHANGE GEAR LATHES</b>					
113-A	13⅞	4	16	1460	\$1189.25
113-B	13⅞	5	28	1510	1227.25
113-C	13⅞	6	40	1560	1265.25
113-D	13⅞	7	52	1615	1303.25

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**



# SOUTH BEND

16", 14½", and 13"  
Toolroom  
Lathes

South Bend 16" x 6'  
Toolroom Lathe  
**\$2145.25**

## SPECIFICATIONS

	16-INCH	14½-INCH	13-INCH
Swing over bed and saddle wings...	16¼"	14⅝"	13⅜"
Swing over saddle cross slide.....	9⅝"	8-15/16"	8"
Spindle speeds.....	26 to 885 r.p.m.	27 to 800 r.p.m.	34 to 875 r.p.m.
Thread cutting range.....	4 to 224 R.H. or L.H.	4 to 224 R.H. or L.H.	4 to 224 R.H. or L.H.
Power longitudinal feeds.....	.0015" to .0841"	.0015" to .0841"	.0015" to .0841"
Power cross-feeds.....	.0006" to .0312"	.0006" to .0312"	.0006" to .0312"
Hole thru spindle.....	1⅝"	1⅝"	1"
Collet capacity.....	1"	¾"	11/16"
Spindle centers.....	No. 3 Morse Taper	No. 3 Morse Taper	No. 3 Morse Taper
Size motor.....	1½ h.p.	1½ h.p.	1 h.p.

## Toolroom Underneath Motor Driven Lathes

Catalog Number	Swing Over Bed Inches	Length of Bed Feet	Distance Between Centers Inches	Approx. Shipping Weight Pounds	Price f.o.b. Factory
<b>16-INCH TOOLROOM UNDERNEATH BELT MOTOR DRIVEN LATHES</b>					
8117-C	16¼	6	33½	2525	\$2145.25
8117-D	16¼	7	45½	2605	2191.25
8117-E	16¼	8	57½	2685	2237.25
<b>14½-INCH TOOLROOM UNDERNEATH BELT MOTOR DRIVEN LATHES</b>					
8183-B	14⅝	5	24½	2180	\$1843.25
8183-C	14⅝	6	36½	2255	1888.25
8183-D	14⅝	7	48½	2330	1933.25
8183-E	14⅝	8	60½	2405	1978.25
<b>13-INCH TOOLROOM UNDERNEATH BELT MOTOR DRIVEN LATHES</b>					
8113-B	13⅜	5	28	1665	\$1577.25
8113-C	13⅜	6	40	1715	1617.25
8113-D	13⅜	7	52	1770	1657.25

South Bend Toolroom Lathes are equally efficient on precision toolroom work or close tolerance manufacturing operations. Their versatility reduces set-up time to a minimum. Smooth, vibration-free operation permits finish turning or boring with such precision that subsequent machine operations can often be eliminated. A convenient arrangement of controls makes for an ease of operation which reduces fatigue and lowers the probability of error. A wide range of spindle speeds permits machining work with maximum tool efficiency.

Improved Features include: alloy steel headstock spindle; replaceable headstock bearings; double wall apron; quick change gear box for threads and feeds; and semi-steel lathe bed.

In Addition to 3-ph., 60 cy., 220 v., A.C. motor and drum control, and all equipment supplied with quick change gear lathe (see preceding page) the following toolroom attachments are included in price of lathe: handwheel type draw-in collet chuck attachment; collet rack; telescopic taper attachment; thread dial indicator; chip pan; and micrometer carriage stop. Chucks, tools, and collets are extra.

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

# SOUTH BEND

## 10"-1" Collet Lathes

### SPECIFICATIONS

- Swing over bed and saddle wings.....10 $\frac{1}{8}$ "
- Swing over saddle cross slide.....5 $\frac{3}{8}$ "
- Spindle speeds (12).....50 to 1357 r.p.m.
- Thread cutting range....4 to 224 R.H. or L.H.
- Power longitudinal feeds.... .0015" to .0836"
- Power cross-feeds..... .0006" to .0309"
- Hole thru spindle.....1 $\frac{3}{8}$ "
- Collet capacity.....1"
- Spindle centers.....No. 2 Morse Taper
- Cross slide travel.....5 $\frac{7}{8}$ "
- Compound rest top slide travel.....2"
- Size motor..... $\frac{3}{4}$  h.p.



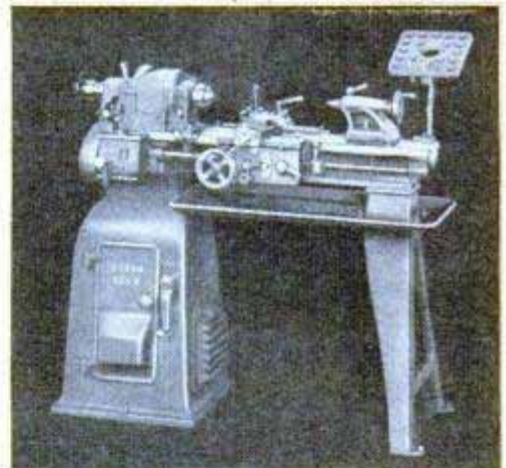
10-inch Swing South Bend Precision Lathes are capable of the most exacting operations on both tool and production work. This accuracy, together with their speed and versatility, contribute to lower machining costs. They contain all the design features that make the larger models so dependable.

Price includes 3 ph., 60 cy., 220 v., A.C. motor; drum control, and regular lathe equipment such as belts, centers, face plates, tool post, etc. Chucks and tools are extra. Toolroom Lathes also include: handwheel type draw-in collet attachment (without collets); collet rack; telescopic taper attachment; thread dial indicator; and micrometer carriage stop.

### TIME PAYMENT TERMS

25% down, balance 12 mos., moderate finance charge (unless federal law requires otherwise)

Bench is included in price of bench lathe.

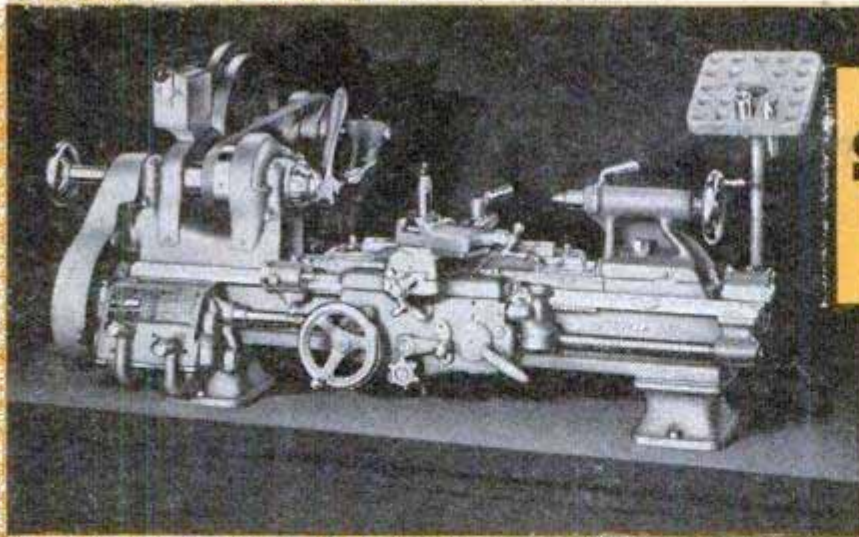


South Bend 10" x 3 $\frac{1}{2}$ ', 1" Collet Toolroom Lathe \$1249.35

### 10"-1" Collet Quick Change Gear and Toolroom Lathes

Catalog Number	Swing Over Bed Inches	Length of Bed Feet	Between Centers Inches	Shipping Weight Pounds	Price f.o.b. Factory	Catalog Number	Swing Over Bed Inches	Length of Bed Feet	Between Centers Inches	Shipping Weight Pounds	Price f.o.b. Factory
<b>QUICK CHANGE GEAR BENCH LATHES</b>						<b>TOOLROOM BENCH LATHES</b>					
187-YS	10 $\frac{1}{8}$	3	14 $\frac{3}{4}$	850	\$ 994.35	8187-YS	10 $\frac{1}{8}$	3	14 $\frac{3}{4}$	960	\$1272.35
187-ZS	10 $\frac{1}{8}$	3 $\frac{1}{2}$	20 $\frac{3}{4}$	880	1011.35	8187-ZS	10 $\frac{1}{8}$	3 $\frac{1}{2}$	20 $\frac{3}{4}$	990	1289.35
187-AS	10 $\frac{1}{8}$	4	26 $\frac{3}{4}$	950	1038.35	8187-AS	10 $\frac{1}{8}$	4	26 $\frac{3}{4}$	1060	1316.35
187-RS	10 $\frac{1}{8}$	4 $\frac{1}{2}$	32 $\frac{3}{4}$	980	1062.35						
<b>QUICK CHANGE GEAR LATHES WITH FLOOR LEGS</b>						<b>TOOLROOM LATHES WITH FLOOR LEGS</b>					
187-Y	10 $\frac{1}{8}$	3	14 $\frac{3}{4}$	810	\$924.35	8187-Y	10 $\frac{1}{8}$	3	14 $\frac{3}{4}$	935	\$1231.35
187-Z	10 $\frac{1}{8}$	3 $\frac{1}{2}$	20 $\frac{3}{4}$	835	941.35	8187-Z	10 $\frac{1}{8}$	3 $\frac{1}{2}$	20 $\frac{3}{4}$	960	1249.35
187-A	10 $\frac{1}{8}$	4	26 $\frac{3}{4}$	860	958.35	8187-A	10 $\frac{1}{8}$	4	26 $\frac{3}{4}$	985	1267.35
187-R	10 $\frac{1}{8}$	4 $\frac{1}{2}$	32 $\frac{3}{4}$	885	982.35						

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U. S. A.**



South Bend 9" x 3' Toolroom Bench Lathe **\$521.45**



South Bend 9" x 3' Model C Bench Lathe

## SOUTH BEND

### 9-Inch Bench Lathes

#### SPECIFICATIONS

- Swing over saddle wings..... 9 1/4"
- Swing over chip guard..... 5 1/2"
- Spindle speeds:
  - 6 speed drive..... 41 to 658 r.p.m.
  - 12 speed drive..... 41 to 1270 r.p.m.
- Thread cutting range:
  - Model A..... 48 pitches R.H. or L.H. 4 to 224 per inch
  - Models B & C... 45 pitches R.H. or L.H. 4 to 160 per inch
- Power longitudinal feeds:
  - Model A..... .48—.0015" to .0853"
  - Model B..... .26—.0021" to .0155"
  - Model C..... .14—.0021" to .0156"
- Power cross feeds:
  - Model A..... .48—.0004" to .0252"
  - Model B..... .23—.001" to .0046"
- Belt, width of pulley step for..... 1"
- Centers, Morse taper..... No. 2
- Collet capacity, maximum..... 1/2"
- Headstock spindle hole..... 3/4"
- Lead screw 29° Acme Thread..... 3/4"—8
- Motor, size required:
  - For 6-speed drive..... 1/4 h.p.
  - For 12-speed drive..... 1/2 h.p.
- Spindle nose threads..... 1 1/2"—8
- Tailstock top set over..... 5/8"
- Tool holder cutter bit..... 3/4" sq.
- Tool holder shank..... 3/8" x 13/16"
- Approx. shipping weights:
  - 3 ft. bed lathe..... 355 lbs.
  - 3 1/2 ft. bed lathe..... 380 lbs.
  - 4 ft. bed lathe..... 405 lbs.
  - 4 1/2 ft. bed lathe..... 430 lbs.

Model A 9-inch Lathes have heat-treated alloy steel spindle, quick change gear box, and friction clutch worm drive for power longitudinal feeds and power cross-feeds.

Model B 9-inch Lathes are same as Model A Lathes except that they have independent change gears, instead of the quick change gear box, for threads and feeds.

Model C 9-inch Lathes are same as Model B Lathes except they do not have the worm drive for power feeds. The cross-feed is hand-operated, and

longitudinal feeds are obtained by engaging half-nuts with the lead screw.

Toolroom 9-inch Lathes are same as Model A Lathes except that they have the following toolroom attachments: collet chuck; collet rack; taper attachment; thread dial; and micrometer carriage stop.

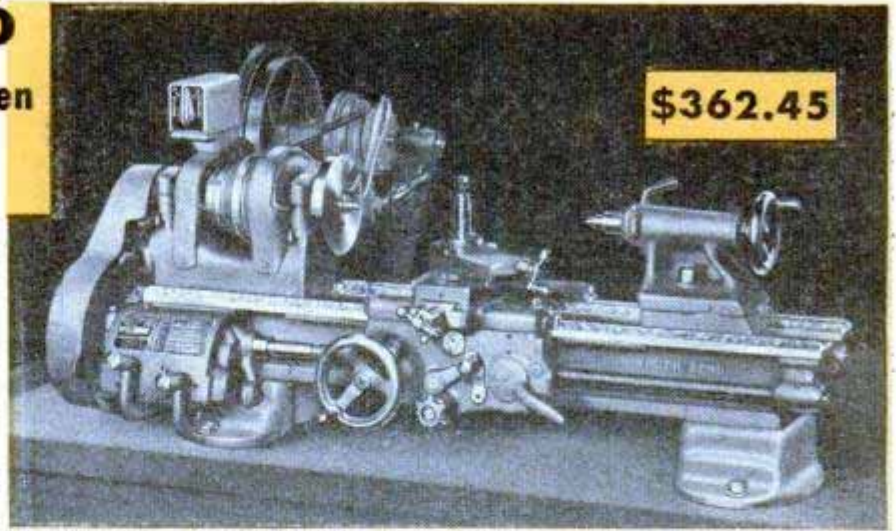
Price includes 1 ph., 60 cy., 115 v., A.C. instant reversing motor, drum control, and regular lathe equipment such as belts, centers, small face plate, tool post, etc. Chucks, collets, and tools are extra.

### 9-Inch Swing Horizontal Motor Driven South Bend Precision Bench Lathes

Length Bed Feet	Be- tween Cent- ers Inches	9" TOOLROOM LATHES		9" MODEL A LATHES				9" MODEL B LATHES				9" MODEL C LATHES			
				6-speed drive		12-speed drive		6-speed drive		12-speed drive		6-speed drive		12-speed drive	
		Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price
3	16	8644-Y	\$521.45	444-Y	\$298.35	644-Y	\$340.45	477-Y	\$240.35	677-Y	\$282.45	415-YC	\$187.35	615-YC	\$229.45
3 1/2	22	8644-Z	537.45	444-Z	314.35	644-Z	356.45	477-Z	256.35	677-Z	298.45	415-ZC	203.35	615-ZC	245.45
4	28	8644-A	553.45	444-A	330.35	644-A	372.45	477-A	272.35	677-A	314.45	415-AC	219.35	615-AC	261.45
4 1/2	34	.....	.....	444-R	353.35	644-R	395.45	477-R	295.35	677-R	337.45	415-RC	242.35	615-RC	284.45

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

# 9" SOUTH BEND V-Belt Horizontal Motor Driven Bench Lathes



The 9" Bench Lathes with 8-speed and 16-speed V-belt horizontal motor drives offer more spindle speeds—an advantage when surface speeds are critical. These lathes are identical in all other respects to those described on the preceding page.

Price includes 1 ph., 60 cy., 115 v., A.C. motor, drum control, and regular lathe equipment such as belt, centers, small face plate, tool post, etc. Chucks, collets, tools, and bench are extra.

### TIME PAYMENT TERMS

25% down,  
balance 12 mos.,  
moderate finance  
charge (unless  
federal law re-  
quires otherwise)

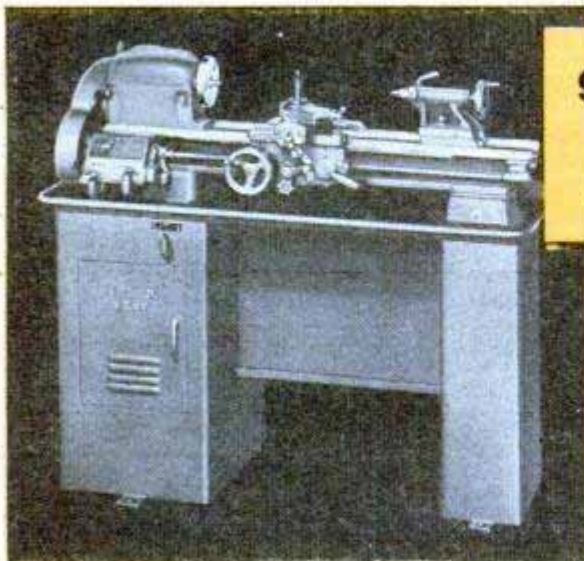
### SPECIFICATIONS

Swing over saddle wings.....9 1/4"  
Swing over chip guard.....5 1/2"  
Hole thru spindle.....3/4"  
Collet capacity.....1/2"  
Spindle speeds  
8 speed drive....46 to 609 r.p.m.  
16 speed drive....46 to 1176 r.p.m.  
Thread cutting range:  
Model A.....48 pitches R.H. or L.H.  
4 to 224 per inch.  
Models B & C.45 pitches R.H. or L.H.  
4 to 160 per inch.

Power longitudinal feeds  
Model A......48—.0015" to .0853"  
Model B......26—.0021" to .0155"  
Model C......14—.0021" to .0156"  
Power cross-feeds  
Model A......48—.0004" to .0252"  
Model B......23—.001" to .0046"  
Spindle centers.....No. 2 Morse Taper  
Size motors  
8 speed drive.....1/4 h.p.  
16 speed drive.....1/2 h.p.

### 9-Inch Bench Lathes with V-Belt Horizontal Motor Drive

Length Bed Feet	Between Centers Inches	Ship. Wt. Crated Pounds	MODEL A		MODEL B		MODEL C	
			8-speed drive	16-speed drive	8-speed drive	16-speed drive	8-speed drive	16-speed drive
			Cat. No.	Price	Cat. No.	Price	Cat. No.	Price
3	16	355	544-Y \$321.35	744-Y \$362.45	577-Y \$263.35	777-Y \$304.45	515-YC \$210.35	715-YC \$251.45
3 1/2	22	380	544-Z 337.35	744-Z 378.45	577-Z 279.35	777-Z 320.45	515-ZC 226.35	715-ZC 267.45
4	28	405	544-A 353.35	744-A 394.45	577-A 295.35	777-A 336.45	515-AC 242.35	715-AC 283.45
4 1/2	34	430	544-R 376.35	744-R 417.45	577-R 318.35	777-R 359.45	515-RC 265.35	715-RC 306.45



## 9" SOUTH BEND Underneath Motor Driven Lathe

Capable of machining work to the most exacting tolerances, this lathe is recommended for precision work in the toolroom, laboratory, or machine shop. Fully enclosed motor drive unit provides twelve spindle speeds, 41 to 1270 r.p.m. See above for other specifications. Price includes 1 ph., 60 cy., 115 v., A.C. motor, drum control, and regular lathe equipment. Chucks, collets, and tools are extra.

### 9" Underneath Motor Driven Lathes

Catalog Number	Model	Length of Bed Feet	Between Centers Inches	Weight Crated Pounds	Price f.o.b. Factory
344-ZN	A	3 1/2	22	570	\$512.45
377-ZN	B	3 1/2	22	560	454.45
8344-ZN	Toolroom	3 1/2	22	630	693.45

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**



SPECIFICATIONS	SERIES 900	SERIES 1000	SERIES 2-H
Collet capacity.....	1/2"	1"	1"
Hole thru spindle.....	3/4"	1 1/4"	1 1/4"
Swing over bed and saddle wings.....	9 1/4"	10 1/4"	16 1/4"
Swing over double tool-slide.....	3-9/16"	3-9/16"	6 7/8"
Swing over compound slide.....	5 1/2"	5 3/4"	6 1/8"
Turret tool feed.....	4"	4"	6 1/8"
Turret face to spindle distance, max.....	20 3/8"	19 3/8"	6' bed—28 1/4"
Double tool slide cross travel.....	3 3/8"	3 3/8"	9 3/4"
Thread cutting range, 48..	4—224 per in.	4—224 per in.	4—224 per in.
Spindle speeds, 12.....	41-1270 r.p.m.	50—1357 r.p.m.	16-880 r.p.m.
Carriage power feeds:			
Longitudinal, 48.....	.0015"—.0853"	.0015"—.0836"	.0015"—.0841"
Transverse, 48.....	.0004"—.0252"	.0006"—.0309"	.0006"—.0312"
Carriage longitudinal travel.....	18"	16"	6' bed—22 1/2"
Turret power feeds.....	.....	.....	.0001"—.0148"
Turret indexing tolerance at 4" from turret face.....	.0005"	.0005"	.0005"
Size motor.....	1/2 h.p.	3/4 h.p.	2-1 h.p.

# SOUTH BEND

## Precision Turret Lathes

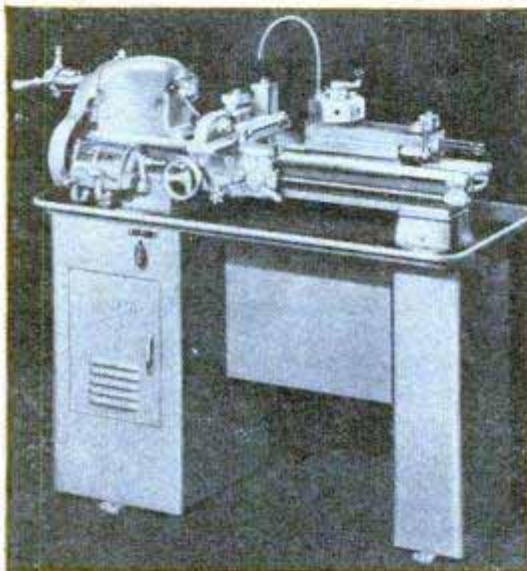
**Series 900.** This turret lathe is specifically designed for second operations on small, precision parts. Its accuracy, and speed of handling and machining produce appreciable economies in manufacturing that are not possible with heavy turret lathes. Price includes 1 ph., 60 cy., 115 v.,

A.C. motor, drum control, power feed universal carriage, handlever bed turret, handlever cross slide, compound rest cross slide, coolant return assembly, and metal column base with built-in oil pan.

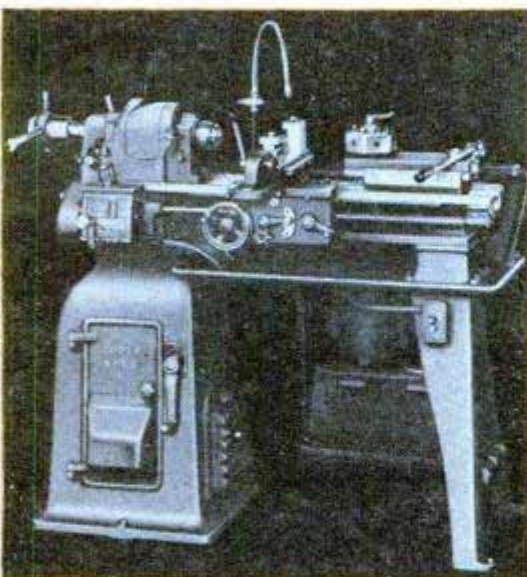
**Series 1000.** Designed for the same types of applications as the Series 900, these turret lathes with their larger capacities are ideal for machining a wide variety of precision parts. Numerous choices of spindle speeds, power longitudinal and transverse carriage feeds, and thread cutting feeds keep production efficient. Price includes 3 ph., 60 cy., 220 v., A.C. motor, drum control, power feed universal carriage, handlever bed turret, handlever cross slide, compound rest cross slide, oil pan, and coolant return assembly.

**Series 2-H.** The production of precision duplicate parts in both machine shops and toolrooms is simplified with 2-H Turret Lathes. They are especially suited for exacting second operations on large work because of their accuracy and ease of operation. Price includes 2-speed, 3 ph., 60 cy., 220 v., A.C. motor, drum control, power feed universal carriage with screw feed double tool slide having front and rear tool blocks, power feed ram-type turret, and oil pan.

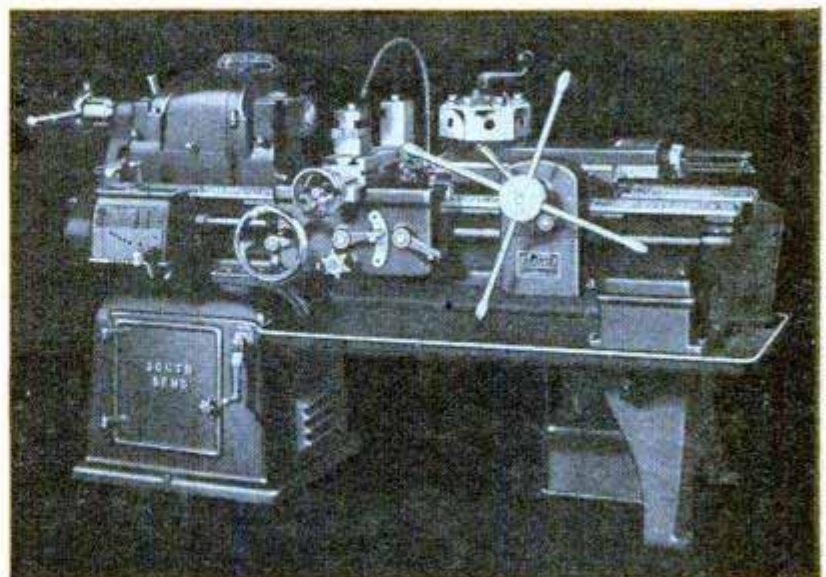
*Prices do not include coolant pump, splash pan or collet equipment.*



Ser. 900, Cat. No. 930-Z Turret Lathe \$805.45

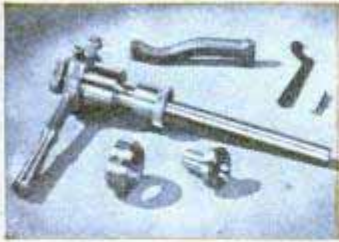


Ser. 1000, Cat. No. 1006-Z Turret Lathe \$1279.35



Series 2-H, Cat. No. 2-CT Turret Lathe (6' bed) \$2692.35

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**



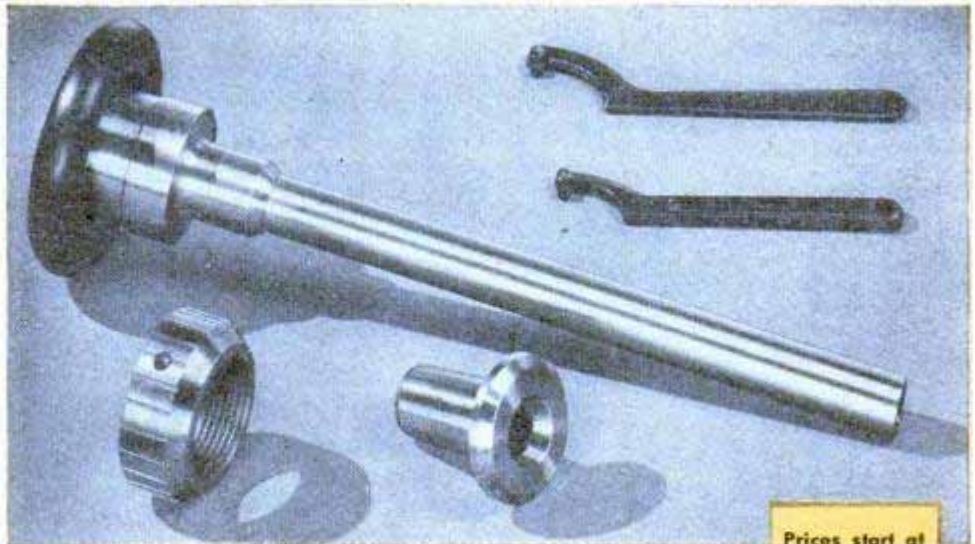
**HANDLEVER  
COLLET ATTACHMENT**

The Handlever Collet Attachment is an aid to rapid production work. Stock can be released and fed through the collet without stopping the lathe.

**Collet  
Attachment**

**HANDWHEEL TYPE**

The Handwheel Collet Attachment is a very accurate type of chuck. It is used for precision toolroom work and for the manufacture of small parts, or wherever extremely close tolerances are required. Bar and tube stock can be fed through the hollow draw-bar that operates the collet. Equipment includes draw-bar, spindle nose cap, spanner wrench, and closing sleeve. Collets are not included.



Handwheel Draw-in Collet Attachment

Prices start at

**\$26**

**DRAW-IN COLLET ATTACHMENTS**

Size of Lathe	Collet Required	Max. Collet Cap.	Handwheel Type		Handlever Type	
			Catalog Number	Price	Catalog Number	Price
9" and Series 900.....	No. 3	1/2"	4306-W	\$26	5206-W	\$ 89
10"-11/16" Collet.....	No. 2	11/16"	4310	42	5210	126
10"-1" Col. & Series 1000.	No. 5	1"	4312	52	5219	158
13"-11/16" Collet.....	No. 2	11/16"	4313	42	5213	126
13"-1" Collet.....	No. 5	1"	4313-Q	52	5213-Q	158
14 1/2"-3/4" Collet.....	No. 4	3/4"	4314	47	5214	147
14 1/2"-1" Collet.....	No. 5	1"	4314-M	52	5214-M	158
16", 16/24", & No. 2-H.....	No. 5	1"	4316	52	5216	158

**Collet Rack and Collet Chest**

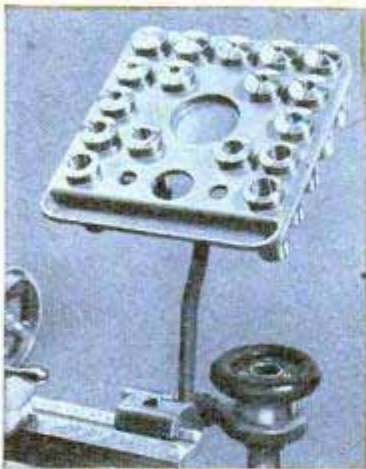
Collet Rack No. 1770-W holds 19 collets, all others hold 17 collets. Collets are not included.

**COLLET RACKS**

Catalog Number	Size of Lathe	Price
1770-W	9" and 900	\$13
1752	10"-11/16" Col.	16
1753	10"-1" C & 1000	18
1772	13"-11/16" Col.	16
1772-Q	13"-1" Col.	18
1791	14 1/2"-3/4" Col.	18
1774	14 1/2", 16" & 16/24"	18

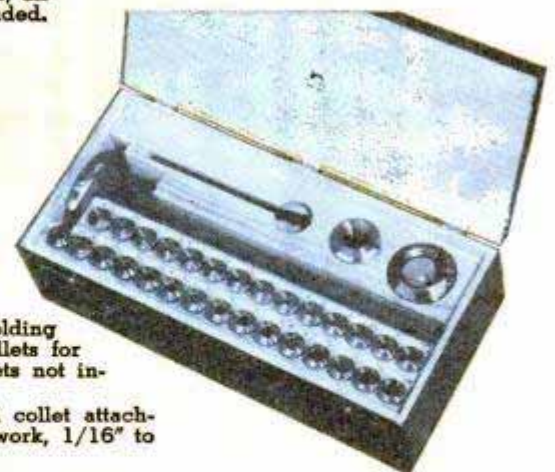
No. 2225—Collet Chest only, for holding handwheel collet attachment and collets for 9" lathe. Collet attachment and collets not included. Price: \$7.50.

No. 2220—Collet Chest, 9" handwheel collet attachment and 29 steel collets for round work, 1/16" to 1/2" by 64ths. Complete: \$123.00.



**COLLET RACK**

Holds collets, centers, spindle sleeve, draw-bar, spindle nose cap, wrench, etc.



**COLLET CHEST**

Holds handwheel collet attachment and 29 collets. Well constructed of wood.

**TIME  
PAYMENT  
TERMS**

When order includes lathe, 25% down, balance 12 mos., moderate finance charge (unless federal law requires otherwise)

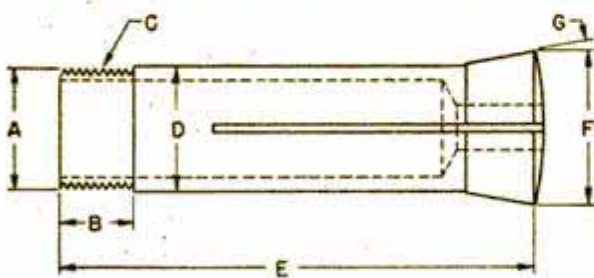
**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U. S. A.**

# Collets and Collet Sets

South Bend Collets, manufactured with the same exacting care as South Bend Lathes, deliver long, dependable service on precision work. Each collet is carefully inspected and tested, and packed in substantial plastic box with transparent lid through which the size can be read for easy selection.

Steel Collets are carefully heat-treated for maximum service and are precision ground to exceedingly close tolerances.

Brass Collets, a South Bend innovation, have many practical applications.



Their low cost makes them desirable for odd sizes that are used only occasionally. They can be readily machined on the job for holding tapered or irregular shapes. When worn, they can be rebored to larger diameters.



Steel Collet



Brass Collet



Collet Packaged in Plastic Box

## Specifications of Steel and Brass Collets

Collet Number	For South Bend Lathes	A Thread Diameter Inches	B Thread Length Inches	C Threads Per Inch	D Body Diameter Inches	E Collet Length Inches	F Head Diameter Inches	G Head Angle Degrees
3	9" and Series 900	.650	3/4	26	.6495	2-11/16	.852	12
2	10" and 13"—11/16" Collet	.855	13/16	20	.8595	3-5/16	1.095	15
5	10", 13", 14 1/2", 16"—1" Collet	1.250	3/4	20	1.2495	3-9/32	1.452	10
4	14 1/2"—3/4" Collet	.950	13/16	20	.9495	3	1.150	10

\*Collets can also be used on any other lathe or machine which they will fit.

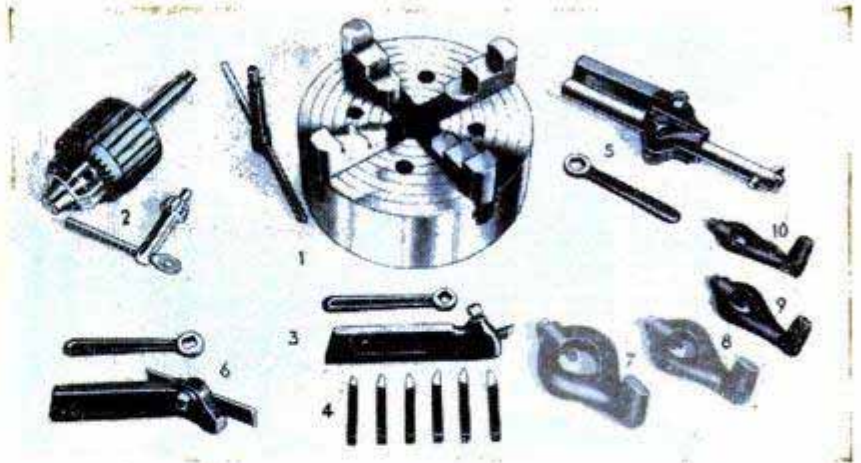
## South Bend Collets and Collet Sets

Collet	Description	Steel Collets		Brass Collets	
		Cat. No.	Price	Cat. No.	Price
No. 3	1 Collet, any standard size 1/16" to 1/2" in 64ths.....	609-W	\$ 3.75	1696	\$ 2.00
	Set of 8 Collets in 16ths, 1/16" to 1/2".....	2047	27.00	2235	15.00
	Set of 7 Collets in odd 32nds, 3/32" to 15/32".....	2476	24.00	2534	13.00
	Set of 14 Collets in odd 64ths, 5/64" to 31/64".....	2477	46.00	2535	24.00
	Decimal Collets (.0625" to .500") each.....	769-W	4.00	1856	2.15
	Metric Collets (1.5 mm to 12.5 mm) each.....	773-W	4.00	1702	2.15
No. 2	1 Collet, any standard size 1/16" to 11/16" in 64ths.....	1721	4.00	1697	2.25
	Set of 11 Collets in 16ths, 1/16" to 11/16".....	2432	39.00	2238	23.00
	Set of 10 Collets in odd 32nds, 3/32" to 21/32".....	2478	36.00	2536	21.00
	Set of 20 Collets in odd 64ths, 5/64" to 43/64".....	2479	71.00	2537	40.00
	Decimal Collets (.0625" to .6875") each.....	769-N	4.25	1857	2.40
	Metric Collets (1.5 mm to 17.0 mm) each.....	773-N	4.25	1703	2.40
No. 5	1 Collet, any standard size 1/16" to 1" in 64ths.....	1722	4.75	1698	2.50
	Set of 16 Collets in 16ths, 1/16" to 1".....	2435	68.00	2241	37.00
	Set of 15 Collets in odd 32nds, 3/32" to 31/32".....	2482	64.00	2540	35.00
	Set of 30 Collets in odd 64ths, 5/64" to 63/64".....	2483	127.00	2541	65.00
	Decimal Collets (.0625" to 1.000") each.....	769-R	5.00	1858	2.65
	Metric Collets (1.5 mm to 25.0 mm) each.....	773-R	5.00	1704	2.65
No. 4	1 Collet, any standard size 1/16" to 3/4" in 64ths.....	1713	4.25	1699	2.35
	Set of 12 Collets in 16ths, 1/16" to 3/4".....	2438	46.00	2244	26.00
	Set of 11 Collets in odd 32nds, 3/32" to 23/32".....	2480	42.00	2538	24.00
	Set of 22 Collets in odd 64ths, 5/64" to 47/64".....	2481	81.00	2539	45.00
	Decimal Collets (.0625 to .7500") each.....	769-K	4.50	1859	2.50
	Metric Collets (1.5 mm to 19.0 mm) each.....	773-K	4.50	1705	2.50

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

## Chuck and Tool Assortments

The chucks and tools in the assortments shown are recommended for use with the various South Bend Lathes. This is the basic equipment required for the average shop for general machine work, such as turning, boring, drilling, cutting-off, chucking, etc. A 3-jaw Universal chuck can be substituted for the 4-jaw Independent at additional cost.



### Contents of Assortment

- 4-Jaw Independent Lathe Chuck fitted to lathe. Sizes: 6 in. on 9" and 10" Lathes; 7½ in. on 13" Lathe; 9 in. on 14½" Lathe; 10 in. on 16" and 16/24" Lathes.
- Jacobs 3-Jaw Drill Chuck. Sizes: ½ in. on 9" and 10" Lathes; ¾ in. on 13" and 14½" Lathes; 1 in. on 16" and 16/24" Lathes.
- Arbor Fitted to Above Drill Chuck.
- Straight Shank Tool Holder.
- 6 Ground Cutter Bits for Tool Holder.
- Boring Tool Holder, Style "B." 9" Lathes take Style "D."
- Cutting-Off Tool Holder, Right-Hand.
- 4 Malleable Lathe Dogs. Sizes: ½", ¾", 1", and 1¼" on 9" and 10" Lathes; ½", ¾", 1", and 1½" on all others.

### Prices of Complete Assortments

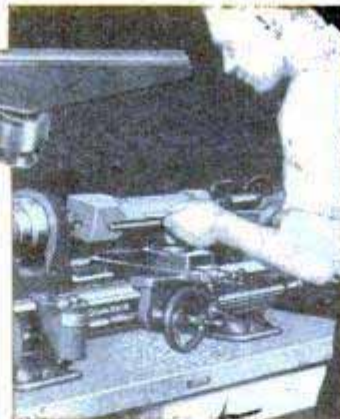
Size of Lathe	Catalog No.	Price
9" & 900.....	105-WT	\$53.89
10"—11/16" Collet.....	110-T	92.72
10"—1" Collet & 1000...	110-L	93.72
13"—11/16" Collet.....	113-T	109.41
13"—1" Collet.....	113-TQ	110.41
14 ½"—¾" Collet.....	114-T	123.28
14 ½"—1" Collet.....	114-TM	136.28
16" & 16/24".....	116-T	144.28

### Wood Turning Rest

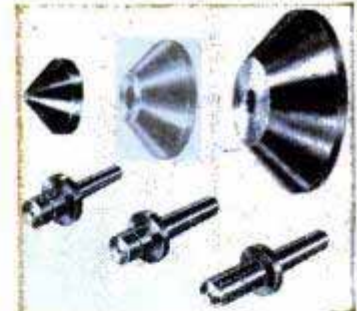
Mounts on compound rest base to convert lathe for wood turning. See page 14 for wood turning centers.

Price includes socket and two T-rests, 4" and 12" wide.

Prices Start At \$10



Size of Lathe	Catalog No.	Price
9".....	896-W	\$10
10".....	1069	13
13".....	1073	15
14 ½".....	1165	19
16" and 16/24".....	1075	19



### Pipe Centers

Cat. No.	Takes Pipe	Requires Shank	Price
2160	½" to 3"	2172-NR	\$4.75
2161	3" to 5"	2172-TH	6.50
2162	5" to 8"	2173-TH	9.75

### Pipe Center Shanks

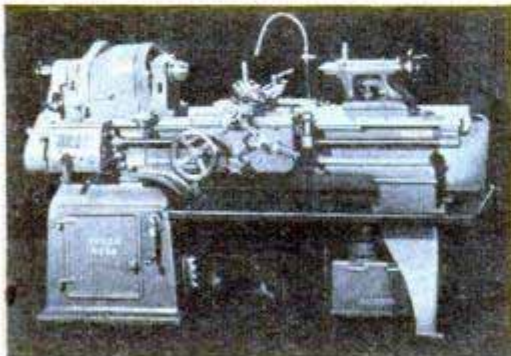
Cat. No.	Taper	Price
2172-NR	No. 2	\$4.75
2172-TH	No. 3	4.75
2173-TH	No. 3	8.00

**TIME  
PAYMENT  
TERMS**

When order includes lathe 25% down balance 12 mos., moderate finance charge (unless federal law requires otherwise)

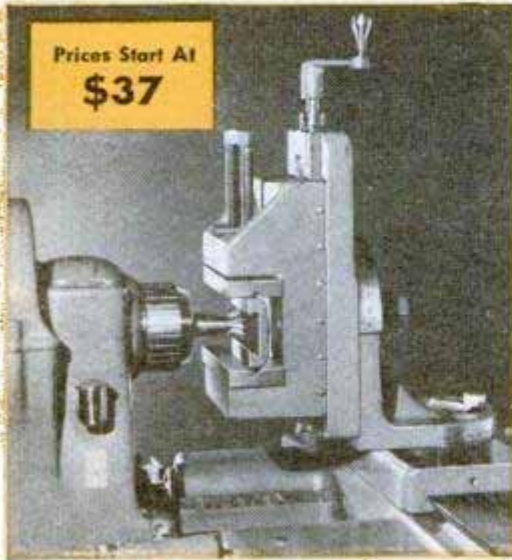
### Chip Pans and Oil Pans

Oil Pans, Splash Pans, and Chip Pans can be supplied for all South Bend Lathes. Oil Pans should be factory-installed for proper fit. Complete information and prices will be supplied on request.



**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

## Milling and Keyway Cutting Attachment



Milling and Keyway Cutting Attachment

This useful attachment is ideal for shops not having enough of this work to justify a milling machine. Mounts on compound rest base of lathe, permitting the power cross and longitudinal feeds to be used for milling, boring and keyway cutting operations on work held in the milling attachment vise. Vise swivels in any direction, 180° horizontal and vertical graduations. Vertical slide adjusting screw equipped with micrometer graduated collar.

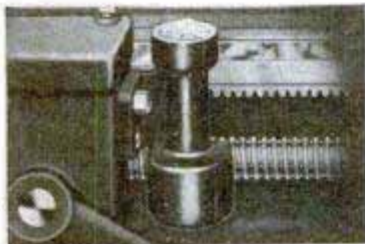
Size Lathe	Cat. No.	Vise Cap.	Price
9" & 900	9-W	1 1/2"	\$37
10" & 1000	1-N	1 3/4"	47
13"	3	2 3/8"	58
14 1/2"	4-K	4"	68
16", 16/24"	5	4"	79

### Arbors for Milling Cutters



Holds cutters with 1" holes. Capacity between nut and shoulder, 1 1/8". 3 spacing collars furnished. All shanks No. 3 Morse Taper.

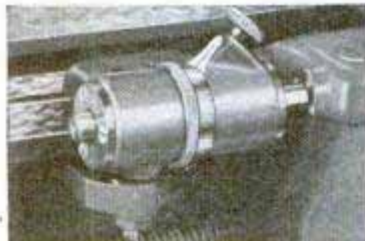
Lathe Size	Catalog No.	Price
9" & 900	109-NH	\$7.50
10" & 1000	109-NH	7.50
13"	109-NH	7.50
14 1/2"	109-NH	7.50
16", 16/24"	109-NH	7.50



### Thread Dial Indicator

Eliminates reversing of lathe spindle when cutting threads. Dial is numbered and graduated to show when to close half-nuts on lead screw to catch the thread on the next successive cut, after returning carriage to starting point.

Lathe Size	Catalog No.	Price
9" & 900	810-W	\$ 9
10" & 1000	1588	14
13"	813	16
14 1/2"	813	16
16", 16/24", 2-H	813	16



### Micrometer Carriage Stop

Locates the carriage at any point along the bed for accurate facing, turning, boring, etc. Has accurately graduated micrometer collar. Stop is hardened on both ends for use on either side of carriage. Can be locked for duplicate work.

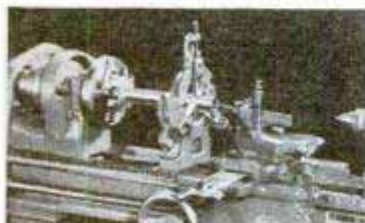
Size of Lathe	Catalog No.	Price
9" & 900	968-W	\$16
10" & 1000	1518	17
13"	973	19
14 1/2"	975-FH	20
16", 16/24", 2-H	975-FH	20



### Follower Rest

Supports long, slender shafts being machined between centers. Attaches to, and travels with, the carriage. Adjusting screws and lock screws are provided for setting the jaws in position. Slots in bottom of follower rest permit quick attachment or removal.

Size of Lathe	Catalog No.	Capacity		Price
		Max.	Min.	
9" & 900	34-W	2"	3/16"	\$5.00
10" & 1000	1353	2 1/2"	3/16"	7.50
13"	376	3 1/4"	3/16"	8.50
14 1/2"	1351	4 1/4"	3/16"	10.00
16"	730	4 1/4"	3/16"	11.00
16/24"	1352	4 1/4"	3/16"	16.00



### Center Rest

Clamps on inside ways of lathe bed and is used for supporting long shafts, boring spindles, etc. The 3 jaws are adjustable, and are made of cast iron. Top of center rest is hinged to facilitate inserting and removing shafts.

Size of Lathe	Catalog No.	Capacity		Price
		Max.	Min.	
9" & 900	125-W	3"	1/4"	\$7.50
10" & 1000	1177	3"	1/4"	11.00
13"	341	3 3/4"	3/8"	14.00
14 1/2"	1174	4 3/4"	3/8"	17.00
16"	720	4 3/4"	3/8"	19.00
16/24"	1175	4 3/4"	3/8"	26.00

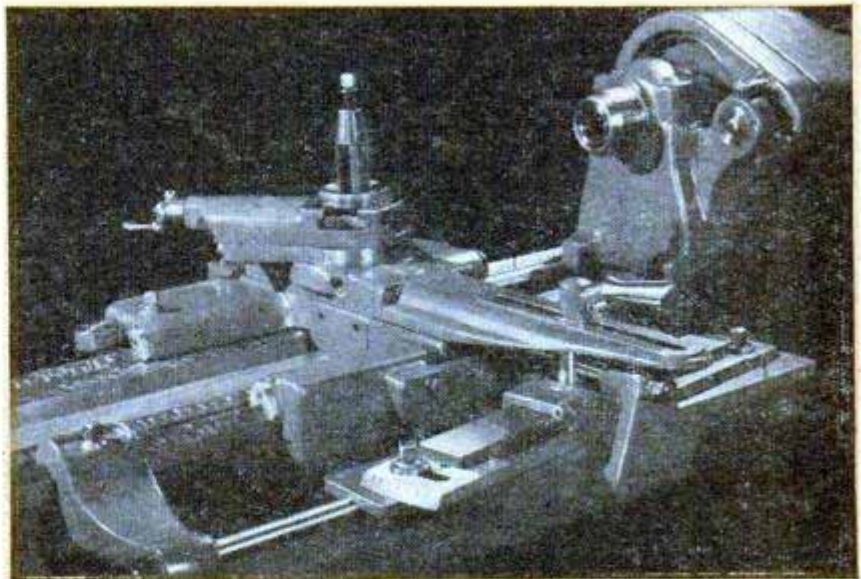
**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

## Taper Attachments

Telescopic and Plain

Taper turning and boring are as easily accomplished as straight turning on lathes equipped with South Bend Taper Attachments. The Taper Attachments are permanently mounted on the lathe carriages, and must be fitted at the factory. Accuracy and smooth operation are assured by their practical design and rugged construction. The swivel bar is graduated in both degrees and taper per foot.

Telescopic Taper Attachments are used only on 10" and larger lathes. A telescopic cross-feed screw eliminates the necessity of disconnecting the cross-feed nut when tapers are machined. The Plain Taper Attachment used on 9" Lathes requires the disconnecting of the cross-feed screw and nut.

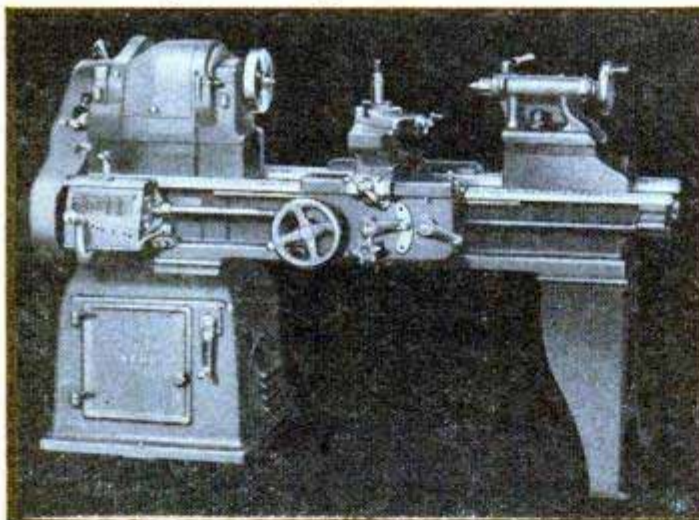


Telescopic Taper Attachment

### TIME PAYMENT TERMS

When order includes lathe 25% down, balance 12 mos., moderate finance charge (unless federal law requires otherwise)

Size of Lathe	Catalog Number	Max. Length at One Setting	Max. Taper per Foot	Max. Taper in Degrees	Price
9" and 900....	428-W	7"	3 1/2"	16 1/2°	\$ 80
10" & 1000....	1545	8 1/2"	3 1/2"	16 1/2°	145
13".....	379	9 1/4"	3 1/2"	16 1/2°	165
14 1/2".....	309	9 1/4"	3 1/2"	16 1/2°	177
16" & 16/24"..	381	11 1/2"	3 1/2"	16 1/2°	198

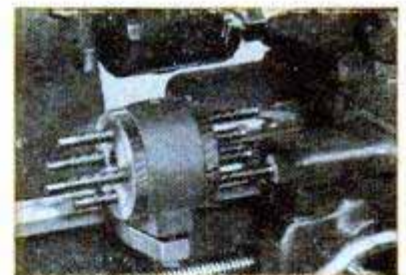


## 16/24" Quick Change Gear Lathe

This lathe has ample capacity for large, awkward jobs such as wheels, fly wheels, brake drums, etc.; yet, it is not too heavy or cumbersome for efficient operation on small parts. Takes 24 1/4" over bed and 18 3/4" over saddle cross slide. Other specifications are same as for 16" lathes on page 2.

Cat. No. 198-E—16/24" x 8' Quick Change Gear Lathe with 3 ph., 60 cy., 220 v. A.C. motor and drum switch..... \$2028.25

Prices of same lathe with 6', 7', 10', or 12' bed on request.



## Four Position Carriage Stop

Used to position cutting tools for repetitive operations. Has four stop screws. Each may be set for a different tool position. Especially useful with a square turret tool block carrying four cutting tools. Clamps to bed on either side of lathe carriage.

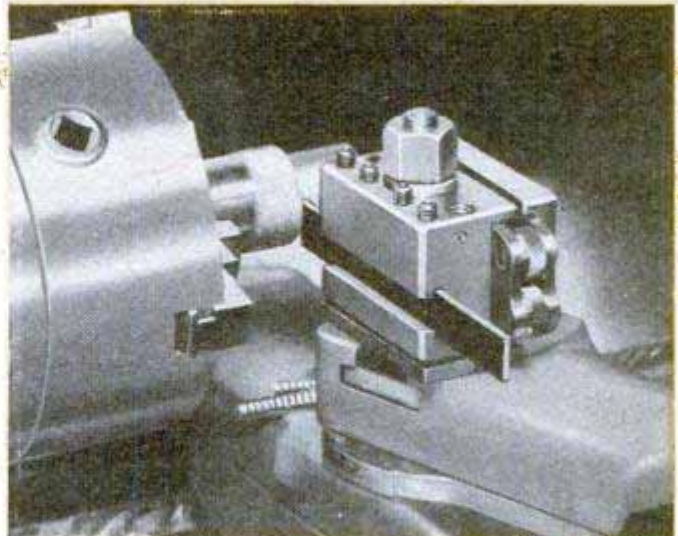
Cat. No.	Size of Lathe	Price
2185-N	9".....	\$18
2185-R	10".....	20
2185-T	13".....	21
2185-F	14 1/2".....	22
2185-H	16", 16/24", 2-H..	23

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

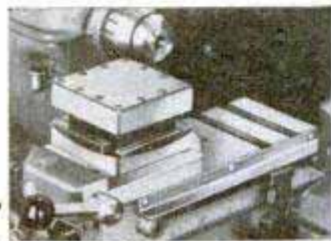
## Universal Tool Block

The new Universal Tool Block replaces the conventional tool post and various tool holders ordinarily used for general lathe work. It provides rigid support for turning, boring, threading, and cut-off tool bits. In addition, it is equipped with a self-aligning knurling head. Screw adjustments for tool height are easily made, and they stay put. No re-adjustment is required when replacing tools. This tool block can be adapted to fit other makes of lathes.

Size of Lathe	Cat. No.	Price
9".....	1413-N	\$11.80
10".....	1413-R	12.50
13".....	1413-T	14.50
14 1/4".....	1413-F	16.50
16" & 16/24"	1413-H	17.00



Universal Tool Block Patent Pending

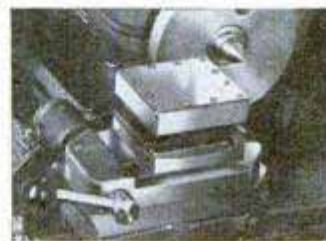


### Square Turret Tool Block

for Double Tool Cross Slide

The turret indexes within .0005", permitting each of four tools to be used in sequence for rough turning, finish turning, facing, boring, cutting-off, or other

operations as required. A quick-acting lever locks the turret securely in each of the four positions. Rocker adjustment is provided for adjusting height of each tool. For use on the double tool cross slides of South Bend Lathes, but can be adapted for use on other makes.



### Square Turret Tool Block

for Compound Cross Slide

Used on compound cross slides for same purpose as tool block described at left. Turret indexes within .0005" to each of four positions and locks by means of lever. Rocker adjustments provided for tools. Ruggedly constructed. This tool block is for use on compound rest cross slides of South Bend Lathes but can be adapted for use on other makes.

Patent Pending

### Tool Blocks for Double Tool Cross Slides

Size of Lathe	Catalog Number	Size Square	Takes Tools	Price
9" & 900.....	41-ND	3"	3/8" x 3/8"	\$42
10" & 1000.....	41-ND	3"	3/8" x 3/8"	42
16".....	42-ND	4"	5/8" x 5/8"	75

### Tool Blocks for Compound Cross Slides

Size of Lathe	Catalog Number	Size Square	Takes Tools	Price
9" & 900.....	40-NC	3"	3/8" x 3/8"	\$48
10" & 1000.....	41-NC	3"	3/8" x 3/8"	48
13".....	43-NC	3"	3/8" x 3/8"	53
14 1/2".....	44-NC	4"	3/8" x 3/8"	75
16" & 16/24".....	42-NC	4"	5/8" x 5/8"	80



### Handlever Double Tool Cross Slide

Ideal for increasing production on repetitive operations. Three 7/16" square cutter bits can be used—two in front tool block, one in rear tool block. Mounts on saddle cross slide in place of compound rest. Can be operated by handlever or power cross-feed.



### Handlever Bed Turret

Turret head indexes automatically when lever is moved to extreme right. Each turret face has independently adjustable feed stop screw which accurately regulates length of cut. Effective feed of turret slide 4". Turret indexes within .0005" four inches from turret face.

Size of Lathe	Catalog Number	Swing over Slide	Price
9" & 900...	2030-W	3-9/16"	\$79
10" & 1000.	2031	3-9/16"	95

Size of Lathe	Cat. No.	Price
9" & 900.....	1611-W	\$210
10" & 1000....	1612	220
13".....	1613	237

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**

## Standard and Safety Lathe Dogs

Lathe dogs should correspond in capacity to the diameter of the work if the work is to be held securely. These lathe dogs are made of heavy malleable iron and are properly designed for maximum strength and long service. The Standard Lathe Dog has square head alloy steel set screw. The Safety Lathe Dog has a headless alloy steel set screw.



## Lathe Dogs for 13" and Larger Lathes

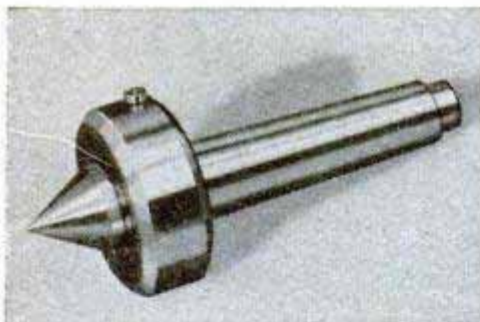
Cap. In.	STANDARD		SAFETY		
	Cat. No.	Price	Cat. No.	Wrench Required	Price
1/2	3843	\$0.85	3826	2385	\$0.85
3/4	3844	1.00	3827	2386	1.00
1	3845	1.10	3828	2387	1.10
1 1/4	3846	1.25	3829	2388	1.25
1 1/2	3847	1.50	3830	2389	1.50
1 3/4	3848	1.65	3831	2389	1.65
2	3849	1.80	3832	2389	1.80
2 1/2	3850	2.05	3833	2390	2.05
3	3851	2.30	3834	2390	2.30
3 1/2	3852	3.15	3835	2390	3.15
4	3853	4.25	3836	2390	4.25

## Lathe Dogs for 9" and 10" Lathes

Cap. In.	STANDARD		SAFETY		
	Cat. No.	Price	Cat. No.	Wrench Required	Price
3/8	3837	\$0.75	3820	2385	\$0.75
1/2	3838	.80	3821	2385	.80
3/4	3839	.95	3822	2386	.95
1	3840	1.05	3823	2387	1.05
1 1/4	3841	1.15	3824	2388	1.15
1 1/2	3842	1.45	3825	2388	1.45

A complete set of lathe dogs is a must in any shop.

## Lathe Centers and Drill Pads

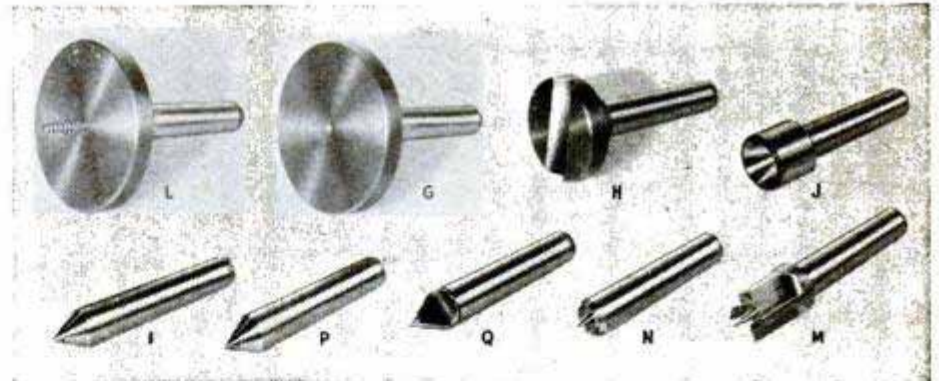


Patent Pending

### Ball Bearing Live Center

Designed for maximum strength and rigidity, the Ball Bearing Live Center is recommended for high speeds, heavy roughing cuts, etc. 60° point runs in substantial precision ball bearing which is easily replaceable.

Catalog No.	Shank Taper	Price
3900	No. 2	\$13.75
3901	No. 3	16.25



L—Screw Center for wood turning. G—Drill Pad to support flat work for drilling. H—Crotch Center supports round work for cross drilling. J—Hollow Center for supporting centerless shafts up to 3/8" dia. I—60° Center. P—Carbide Center. Q—Half Center. N—Cup Center. M—Spur Center, for all wood turning operations.

Description	No. 2 Taper for 9" and 10" Lathes		No. 3 Taper for 13", 14 1/2", & 16"	
	Cat. No.	Price	Cat. No.	Price
L—Screw Center.....	731-NR	\$3.15	731-TH	\$3.50
G—Drill Pad.....	727-NR	2.65	727-TH	2.90
H—Crotch Center.....	728-NR	2.65	728-TH	3.50
J—Hollow Center.....	1896-NR	2.15	1896-TH	2.90
I—60° Center.....	726-NR	2.40	726-TH	3.15
P—Carbide Center.....	1889	4.75	1890	8.50
Q—Half Center.....	926-NR	2.40	926-TH	3.15
N—Cup Center.....	733-NR	2.15	733-TH	2.90
M—Spur Center.....	732-NR	3.15	732-TH	3.50

**TIME  
PAYMENT  
TERMS**

When order includes lathe 25% down, balance 12 mos., moderate finance charge (unless federal law requires otherwise)

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U.S.A.**



## Grinding Attachment

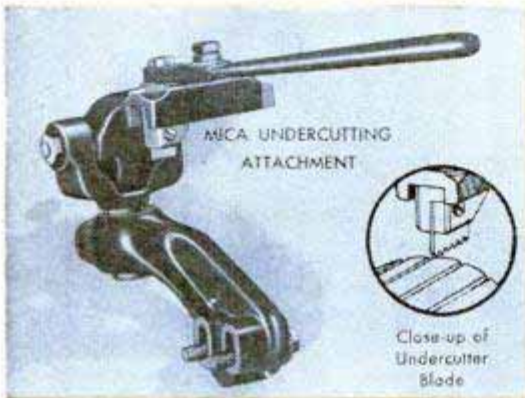
This powerful and efficient grinding attachment is recommended for external grinding. Designed to fit the various sizes of South Bend Lathes, it is easily adaptable for use on milling machines, shapers, planers, or other makes of lathes. The spindle revolves on pre-lubricated, precision ball bearings which are sealed to protect them from damage by dust, grit, and metal particles produced when grinding. Supplied with  $\frac{1}{4}$  h.p., 1725 r.p.m., 115 v., 60 cy., 1 ph. motor and 4" x  $\frac{1}{2}$ " grinding wheel.

Prices with other motors quoted on request.



External Grinding Attachment

Catalog No.	Size of Lathe	Price
301-BN	9" & Series 900.....	\$52
301-BR	10" & Series 1000.....	52
301-BT	13".....	52
301-BF	14 $\frac{1}{2}$ ".....	52
301-BH	16" & 16/24".....	52



Patented

## Mica Undercutting Attachment

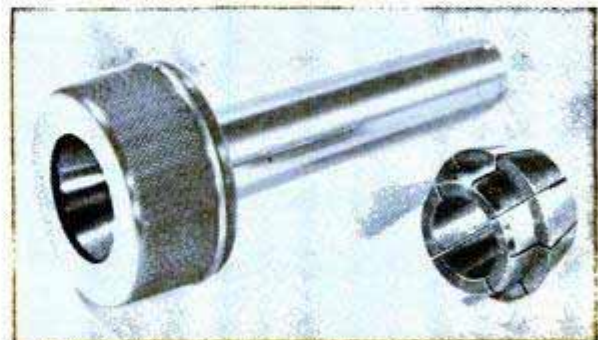
Any shop that repairs armatures for motors, generators or starters will have a lot of use for this practical attachment. It attaches to the saddle of the lathe which insures rigidity and alignment. The blade travels parallel to the commutator bars which insures clean, straight cutting. Upper portion is hinged so the blade holder can be swung back so it does not interfere with turning the commutator.

Price includes one blade .020" thick. Extra cutter blades .020" and .015" thick are available as listed below.

Size of Lathe Description	9"		10"		13"		14 $\frac{1}{2}$ "		16"	
	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price	Cat. No.	Price
Mica Undercutting Attachment.....	675-N	\$19.00	675-R	\$19.00	675-T	\$20.00	675-F	\$21.00	675-H	\$22.00
Extra Blade, .015".....	2028	.20	2028	.20	2028	.20	2028	.20	2028	.20
Extra Blade, .020".....	2029	.30	2029	.30	2029	.30	2029	.30	2029	.30

## Adjustable Collet Bushing Chuck

The adjustable collet bushing chuck provides an extremely accurate, but inexpensive equipment for mounting centerless armature shafts, and similar parts, in the lathe. Can be used in either head or tail spindle of lathe. Collets are made of brass, and may be adjusted for either running fit or driving fit on shaft.



Description	Cat. No.	Shank	Price
Adjustable Collet Bushing Chuck	1615-NR	No. 2	\$6.60
Only.....	1615-TH	No. 3	7.15
Adjustable Collet Bushing Chuck with set of 3 collets, 9/16", 5/8" and .637" capacity for popular armatures.....	1608-NR	No. 2	9.45
	1608-TH	No. 3	9.95

Cat. No. 1659, Extra Collets for round work, any capacity  $\frac{1}{4}$ " to 1" round by 16ths, price each \$1.10.

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U. S. A.**

# SOUTH BEND LATHE ATTACHMENTS

## Accessories for South Bend Lathes

DESCRIPTION	9"	10"	13"	14½"	16"
Bench, angle iron with 26" x 60" wood top, no drawers...	\$32.75	\$.....	\$.....	\$.....	\$.....
Bench Drawer, 20" x 14" x 3⅜", for above bench.....	6.25	.....	.....	.....	.....
Bench, tubular steel with 27" x 51½" top and six drawers..	135.00	.....	.....	.....	.....
Center Knock-out Bar, with knurled handle and brass tip..	2.65	3.25*	4.75*	4.75*	4.75
Chuck, face plate type, with four jaws.....	15.75	20.00*	.....	.....	.....
Chuck, ⅛" to ⅝" Hollow Threaded for holding auto. valves.	15.00	.....	.....	.....	.....
Chuck, ⅜" to ¾" Hollow Threaded for holding auto. valves.	18.00	.....	.....	.....	.....
Chuck, 6" Independent 4-jaw, medium pattern.....	32.50	38.50*	.....	.....	.....
Chuck, 6" Independent 4-jaw, regular pattern.....	60.00	66.00*	66.00*	.....	.....
Chuck, 7½" Independent 4-jaw regular pattern.....	.....	73.00*	73.00*	74.00*	74.00
Chuck, 9" Independent 4-jaw, regular pattern.....	.....	.....	80.00*	81.00*	81.00
Chuck, 10" Independent 4-jaw, regular pattern.....	.....	.....	.....	93.00*	93.00
Chuck, 12" Independent 4-jaw, regular pattern.....	.....	.....	.....	.....	107.00
Chuck, 5" Universal 3-jaw med. pattern, with two sets jaws.	47.22	53.22*	.....	.....	.....
Chuck, 5" Universal 3-jaw, reg. pattern, with two sets jaws.	75.00	81.00*	81.00*	82.00*	82.00
Chuck, 6" Universal 3-jaw, reg. pattern, with two sets jaws.	.....	84.00*	84.00*	85.00*	85.00
Chuck, 7½" Universal 3-jaw, reg. pattern, with two sets jaws	.....	.....	96.00*	97.00*	97.00
Chuck, 9" Universal 3-jaw, reg. pattern, with two sets jaws..	.....	.....	.....	.....	125.00
Chuck, 0 to ⅜" Jacobs Drill, with No. 2 Morse Taper arbor..	6.40	6.40	.....	.....	.....
Chuck, 0 to ½" Jacobs Drill, with No. 2 Morse Taper arbor..	7.74	7.74	.....	.....	.....
Chuck, ⅜" to ¾" Jacobs Drill, with No. 2 Morse Taper arbor	12.90	12.90	.....	.....	.....
Chuck, ⅜" to 1" Jacobs Drill, with No. 2 Morse Taper arbor.	20.90	20.90	.....	.....	.....
Chuck, 0 to ⅜" Jacobs Drill, with No. 3 Morse Taper arbor..	.....	.....	6.85	6.85	6.85
Chuck, 0 to ½" Jacobs Drill, with No. 3 Morse Taper arbor..	.....	.....	8.19	8.19	8.19
Chuck, ⅜" to ¾" Jacobs Drill, with No. 3 Morse Taper arbor	.....	.....	13.35	13.35	13.35
Chuck, ⅜" to 1" Jacobs Drill, with No. 3 Morse Taper arbor.	.....	.....	21.35	21.35	21.35
Cutter Bits, high speed steel, to fit turning tool holders.....	.25	.25	.35	.55	.55
Diamond Dresser and holder for truing grinding wheels....	13.25	13.25	14.25	14.25	15.25
Die Holder with No. 2 M. T. shank, for 1½" round dies....	4.25	4.25	.....	.....	.....
Die Holder with No. 3 M. T. shank, for 1½" round dies....	.....	.....	4.75	4.75	4.75
Double Tool Cross Slide, screw feed type.....	.....	.....	.....	.....	131.00
Gauge, for grinding lathe tool cutter bits.....	.50	.50	.50	.50	.50
Metric Transposing attachment, Quick Change Gear Lathe.	11.00	42.00	47.00	53.00	58.00
Metric Transposing attach., Standard Change Gear Lathe.	13.00	.....	.....	.....	.....
Reamer and cutter grinding stops, for use with grind. attach.	16.00	17.00	19.00	21.00	21.00
Tailstock, handlever type, in addition to regular T. S.....	84.00	100.00	.....	.....	.....
Tailstock, handlever type, in lieu of regular T. S.....	63.00	74.00	.....	.....	.....
Tool, boring, style "B" with sleeve bar and two cutter bits..	6.53	6.53	7.73	10.20	10.20
Tool, boring, style "D" with solid boring bar.....	4.13	4.13	4.80	6.00	6.00
Tool, left hand turning, with cutter bit and wrench.....	1.67	3.80	4.33	5.33	5.33
Tool, right hand turning, with cutter bit and wrench.....	1.67	3.80	4.33	5.33	5.33
Tool, straight shank turning, with cutter bit and wrench...	1.67	3.80	4.33	5.33	5.33
Tool, knurling, with medium diamond knurls.....	4.00	7.53	9.00	10.66	10.66
Tool, left hand cut-off, with cutter blade and wrench.....	.....	3.80	4.80	6.00	6.00
Tool, right hand cut-off, with cutter blade and wrench.....	2.00	3.80	4.80	6.00	6.00
Tool, straight shank cut-off, with cutter blade and wrench..	2.00	3.80	4.80	6.00	6.00
Tool, threading, with 60° formed cutter.....	3.33	5.53	6.67	8.53	8.53
Turret, turnstyle operated, for lathe bed.....	.....	.....	.....	.....	525.00

\*These prices are for 1" Collet Lathes. Prices for regular lathes are slightly less.

**SOUTH BEND LATHE WORKS, 543 E. Madison Street, South Bend 22, Indiana, U. S. A.**

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