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MAGAZINE

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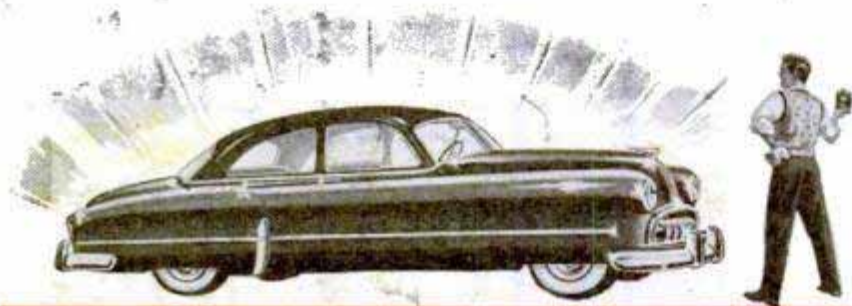


See Page 100



The Owners Report on the
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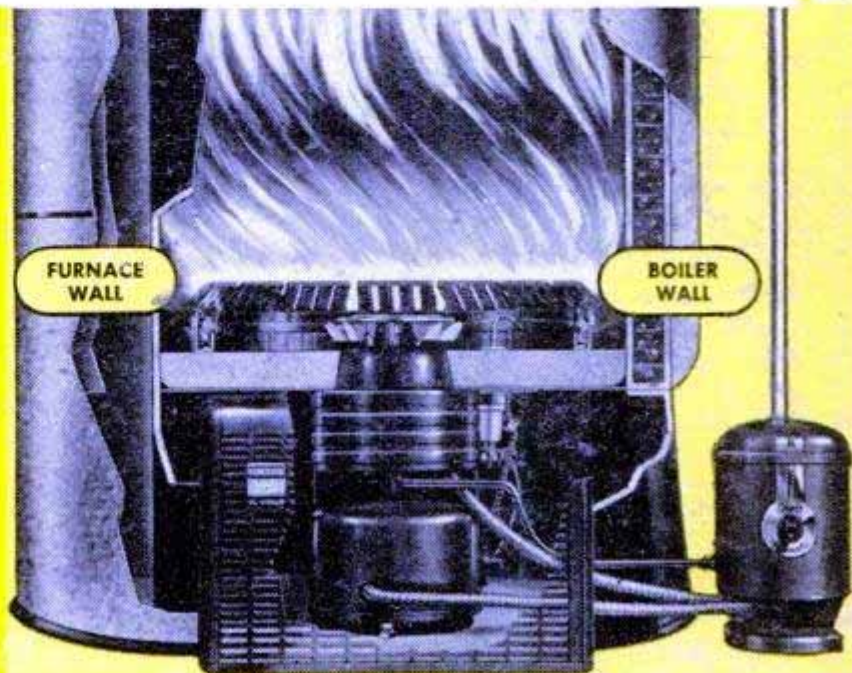
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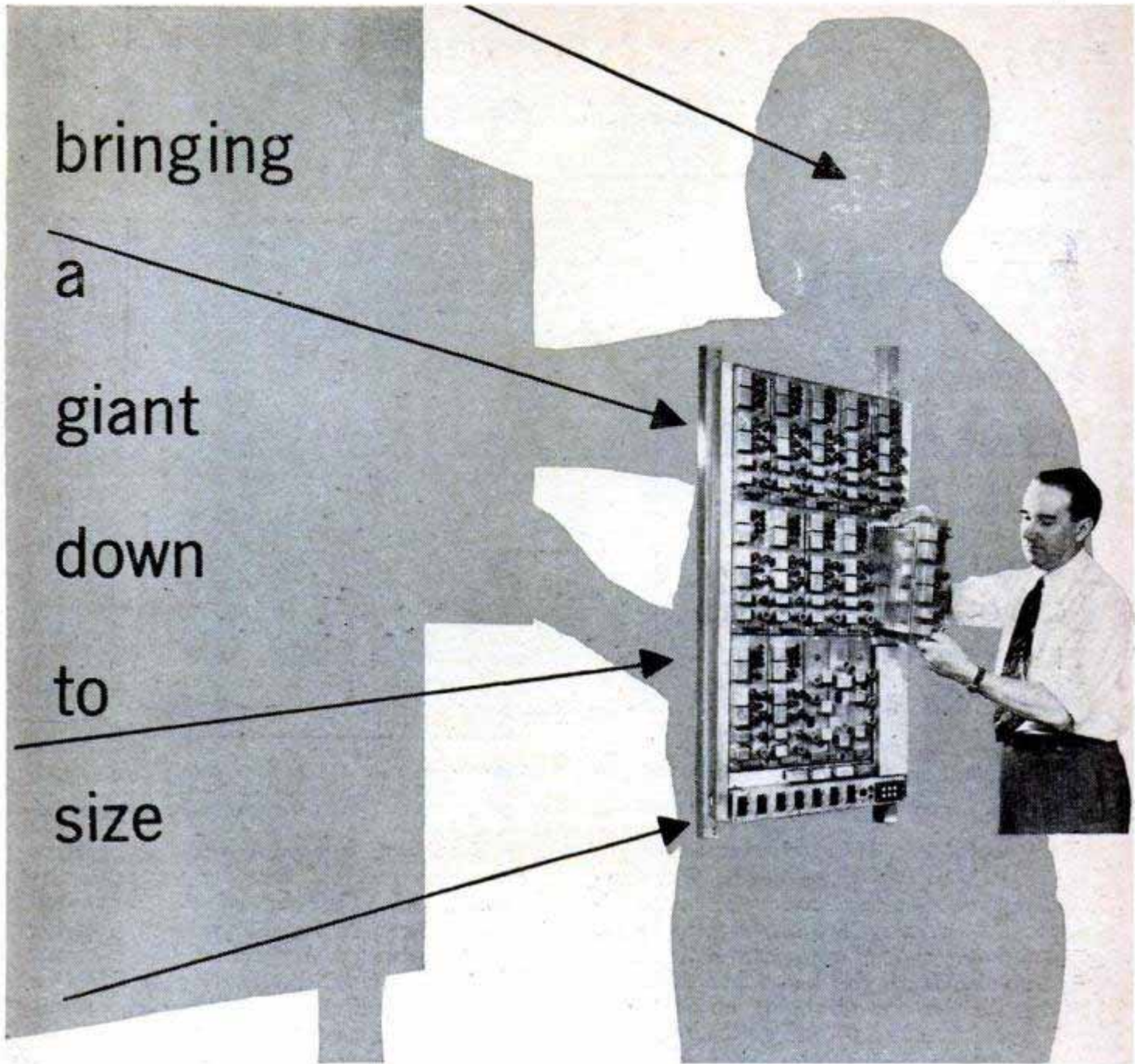
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New type N Repeater installation. Engineer shows ease of servicing—a spare unit can be plugged in with little or no interruption to service when repairs are needed.

“CARRIER SYSTEM” telephony is economical, because many voices use the same pair of wires. But the extra equipment needed once limited it to the longer distances.

Now Bell Laboratories have developed new short-haul carrier, economical down to 25 miles, sending 12 conversations on two pairs of wires in a cable.

Keys to the new system are new circuits, miniature tubes, pocket-size wave filters and Permalloy “wedding ring” transformer cores that will barely slip over a man’s finger. New

manufacturing processes were developed in co-operation with the Western Electric Company. Components are pressed into a plastic mounting strip with heat, a score at a time, instead of being mounted separately.

With this new carrier system more service can be provided without laying more cables. Tons of copper and lead can now be conserved for other uses. It’s another example of how science takes a practical turn at Bell Telephone Laboratories, to improve service and to keep its cost down.

BELL TELEPHONE LABORATORIES

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Popular Mechanics Magazine

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H. H. WINDSOR, Founder

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



this month's cover

THEY'RE AFLOAT in the lonely vastness of the Pacific with only their Mae Wests to hold them up. Most of their hope went down with the plane. But suddenly they hear the drone of a searching aircraft. As the rescue plane approaches, it launches a torpedo toward them. At least it looks like a torpedo as it leaves the plane, but suddenly a parachute blossoms out to lower the big tube into the water. Precisely two minutes later the torpedo suddenly erupts into a 20-foot nylon-rubber rescue craft. What's more, an engine somewhere in the craft springs to life and the boat swings out in a big arc, then moves toward the two men in the water, guided by radio from the plane above. As it spins around them in a tight circle the motor cuts out and the men scramble aboard. They discover enough fuel to carry them 300 miles, food, water, even a canopy. To find out more about this rescue boat turn to page 100

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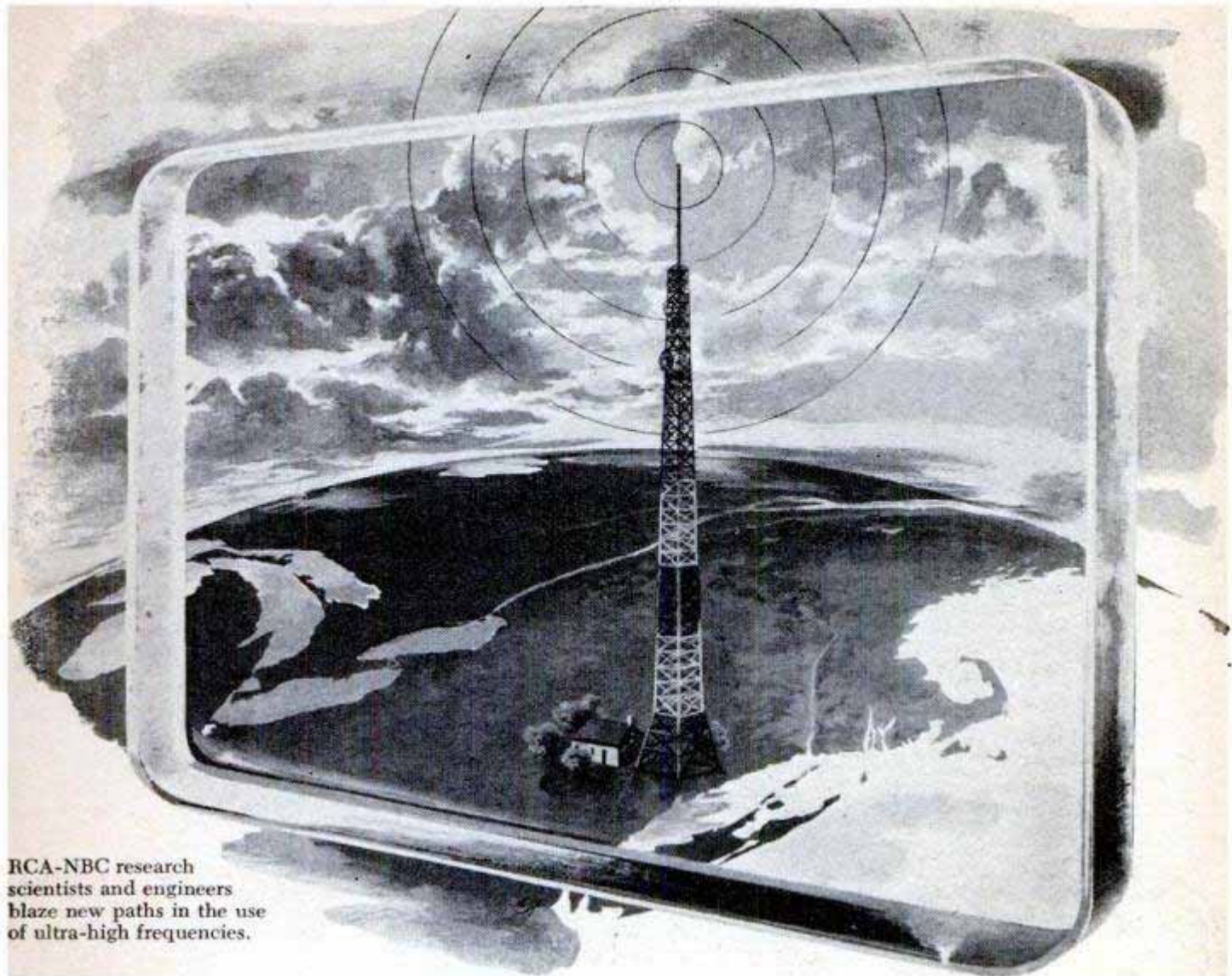


U. S. ARMY

THE MARK OF A MAN!

These crossed flags, insignia of the U. S. Army Signal Corps, mark a man who has measured up to the mark.





RCA-NBC research scientists and engineers blaze new paths in the use of ultra-high frequencies.

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Although television now reaches 45 million people in more than 12 million homes, thousands of communities are still too far from existing stations to be reached by *any* programs. Moreover, under present conditions, many cities with limited program service want, but can't have, additional stations.

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needed to design the best UHF equipment—including transmitters, receivers, and converters. NBC programs on the air during the full broadcast day are used by RCA—and other manufacturers, too—for field tests.

From results of this pioneering, RCA engineers have determined that practical UHF television equipment can be built to serve the public, and that present RCA Victor television sets can be adapted to give equally fine performance on both UHF and VHF.

* * *

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THE EDITORS



Letter to the Editor

I have just finished reading your article, Detroit Listening Post, in the June issue.

In speaking of the hardtop coupe you have aroused a pet peeve of mine . . . You, among others, have credited Buick and Pontiac as the first to invade this field . . . Kaiser was *the first* with this hardtop innovation. I do not say this merely because we have been a two-Kaiser family, a '49 and '51 and we like them fine, but because many of the other so-called experts evade the actual truth in relation to this subject.

Honestly I think you will recall that in 1949 the Kaiser Virginian included the make-believe convertible with a nylon covering. A short while later Buick came out with the same pattern. I am just a person who likes to see credit given where credit is due . . .

Len Vellek,
Tyndall, S. Dak.

Editor's Note: We didn't say Buick was the first to start the hardtop styling. Buick was the first to invade the field and made it completely popular by keeping the price just above the regular coupe. K-F did come out with the first type of hardtop convertible—hardly the hardtop we see today. It had a steel top covered with nylon fabric and windows that slid down all around. The present hardtop is no doubt a development of the Kaiser Virginian, which was quite high priced. Buick's first Riviera was what set the whole industry off on hardtops. It was produced in volume where the Kaiser was strictly a custom job.

Siler Freeman,
Automotive Editor.

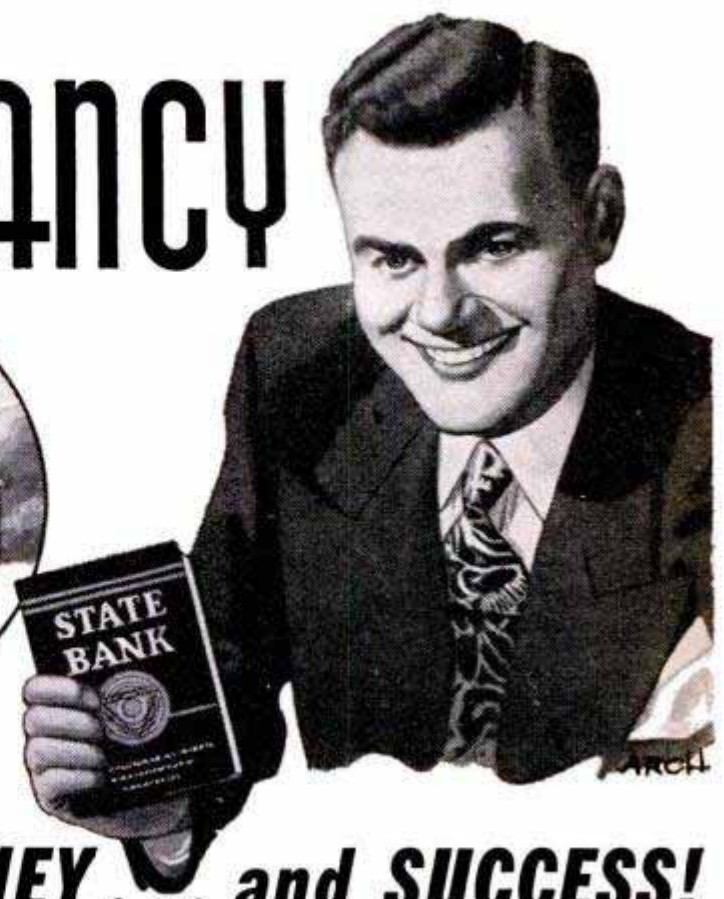
Letter to the Editor

In the June issue I saw a picture of a "cradle" used by baseball players to practice catching. It is stated in the article that this was originated by Branch Rickey.

I do not know whether this has ever been used by baseball players before, but the cradle is at least 40 years old, to my knowledge. I have seen and used it in England, Toronto, Canada and Philadelphia; the last time about 20 years ago in Toronto. The cradle, as I knew it, was made for cricket players to practice catching, particularly the persons who played in the "slips" where

(Continued to page 8)

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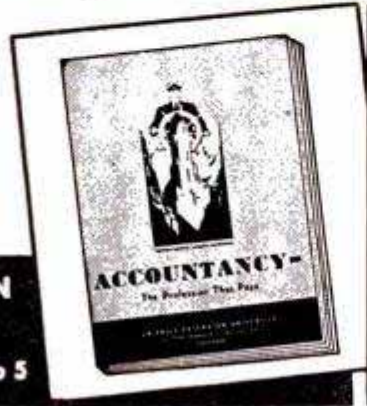
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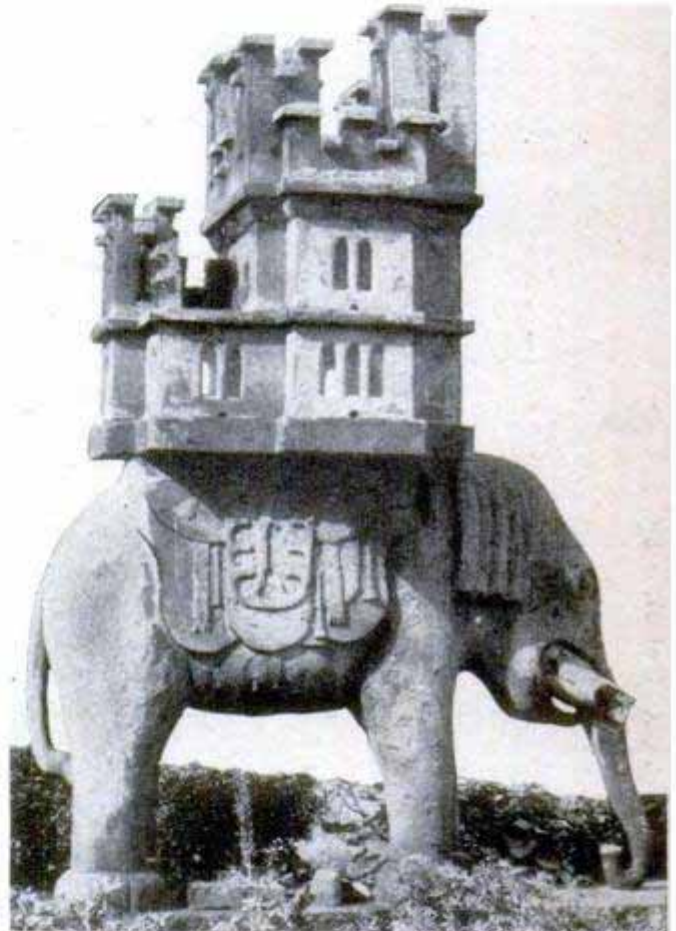
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(Continued from page 6)

they may be anywhere from 10 to 30 feet back of the batsman and are there to catch snicks from the bat. These men, in most cases, have opportunity to use only one hand in making catches and also must learn to catch barehanded as they are not allowed to use gloves. The ball comes out of the cradle at all sorts of angles and heights. I think it could be very good practice for any ball player, but I do not think Mr. Rickey was the original inventor.

William Webb,
Librarian,
Flint, Mich.



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A Bee's Home Is Its Castle

Even the English bee has a castle for its home. This stone elephant, reputed to have been carved about 90 years ago, stands 12 feet tall in an English garden. Its castle is a beehive, whose residents buzz home through small holes beneath the windows.

Letter to the Editor

Thank you indeed for your letter giving the formula used in solving problems pertaining to reels or drums of wire, etc. . . .

In both high school and college teaching I have maintained . . . that the better science magazines, such as *Popular Mechanics*, are an excellent source of material in

(Continued to page 10)

A TRUE I. C. S. STORY taken from an actual letter



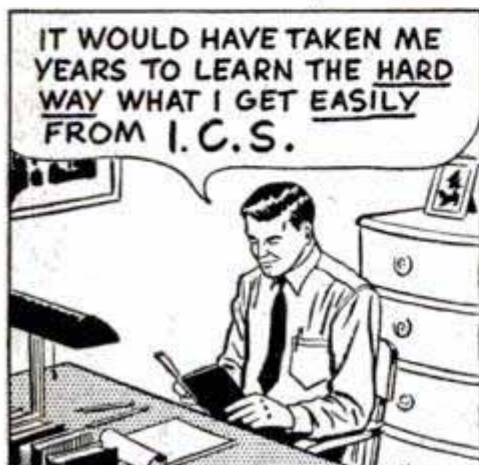
I was a World War II pilot ...



A prisoner of war in Germany ...



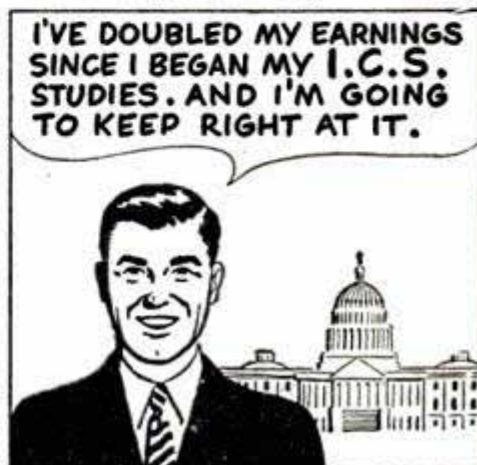
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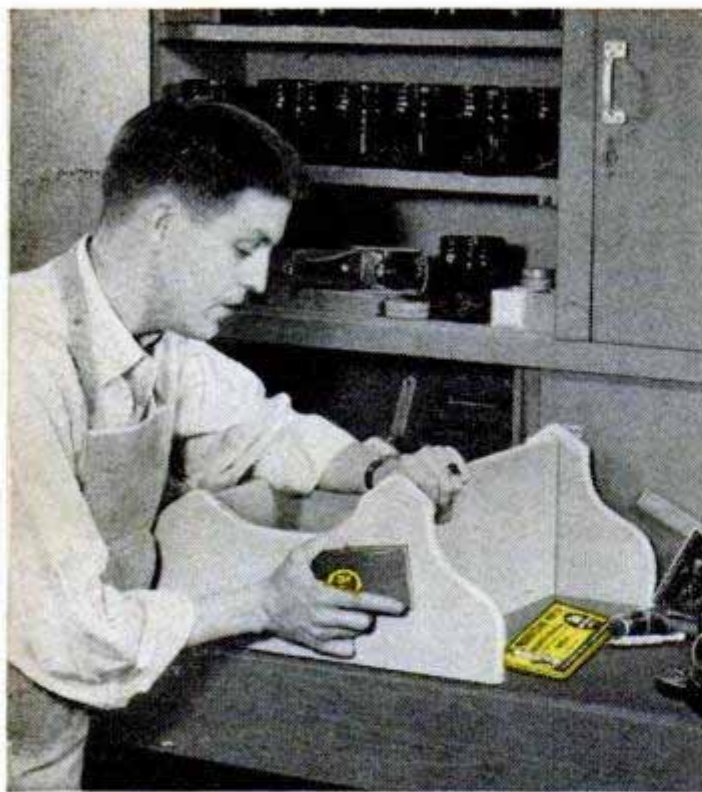
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Self-Service Gas Station

At Fanwood, N. J., a local inventor has installed a self-service filling station where the customer can buy gasoline by dropping coins in a slot. The number of quarters dropped determines the gallons delivered, and when the dial indicator shows the coin supply is exhausted, a horn blows. A special feature of the invention is a thumb valve on the hose nozzle which controls a flow of carbon-dioxide snow to prevent explosions and combat flash fires.



Little Fish Survive

Shallow-water fingerling trout and salmon are indestructible in the crushing pressures of the sea 2000 feet below the surface where a man—even in a diving suit—cannot live. The experiments were conducted by Andreas Rechnitzer of La Jolla, Calif., to observe the reaction of young fish to high hydrostatic pressures. The frail-looking fish withstood pressures up to 1000 pounds per square inch. Now engineers know the fish can survive rapid descents down dams in passages to be constructed.

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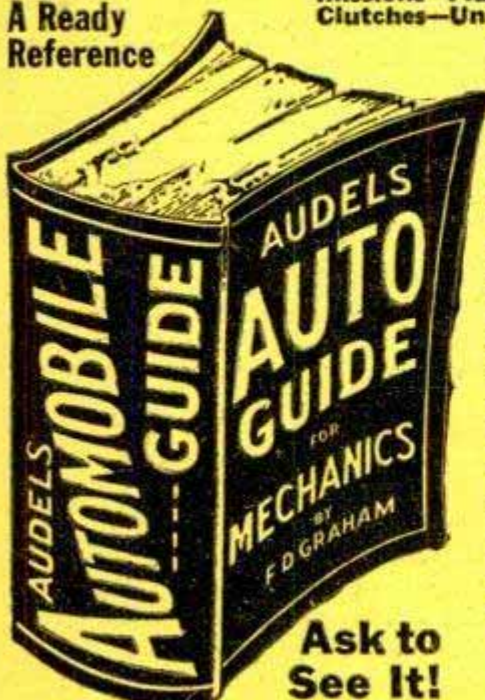
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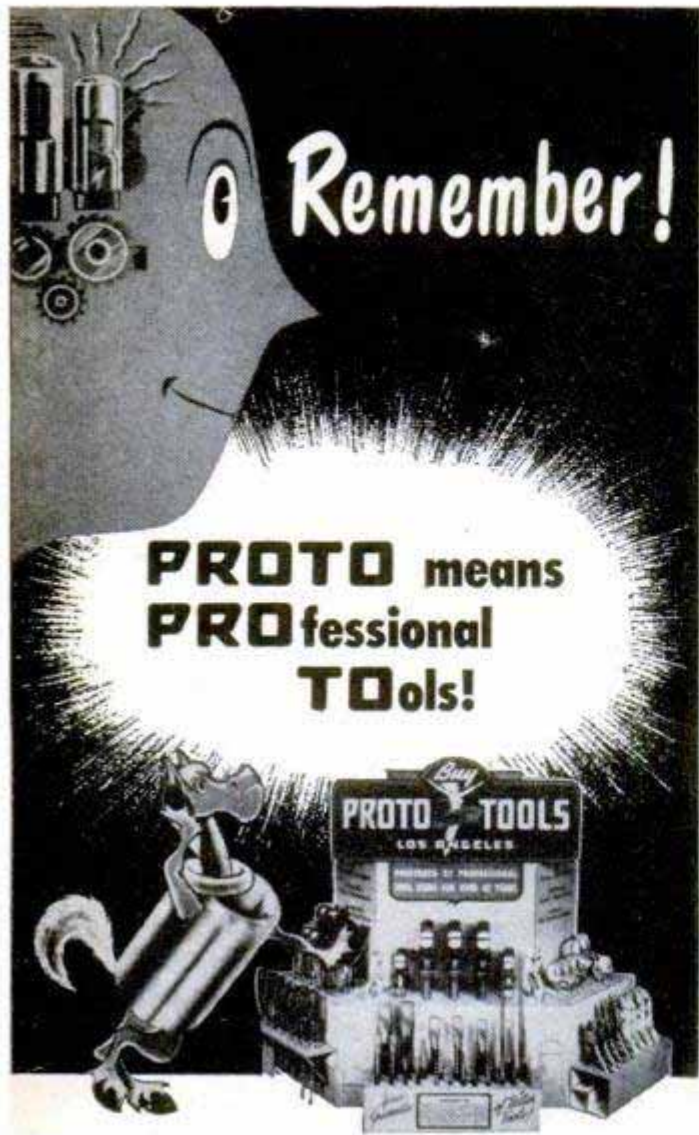
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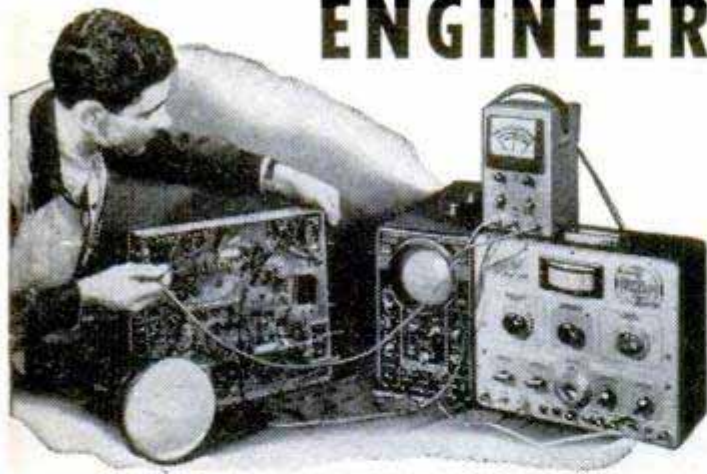
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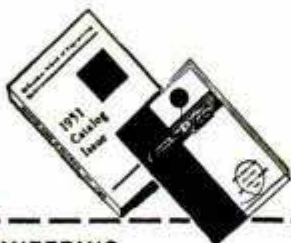
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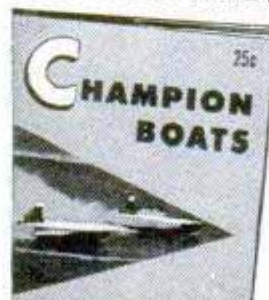
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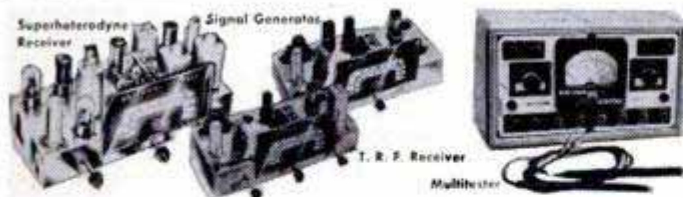
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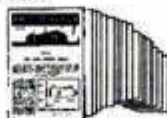
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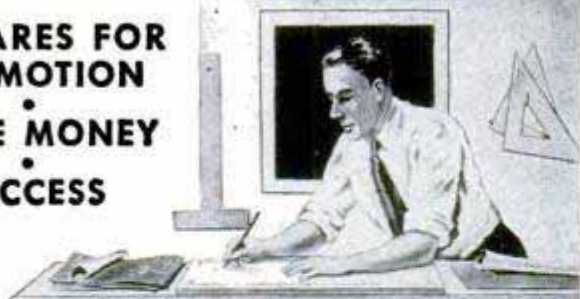
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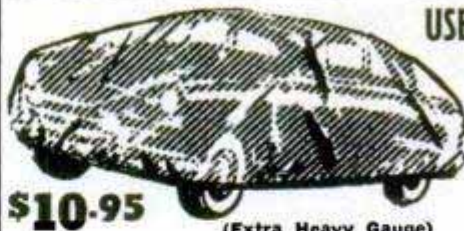
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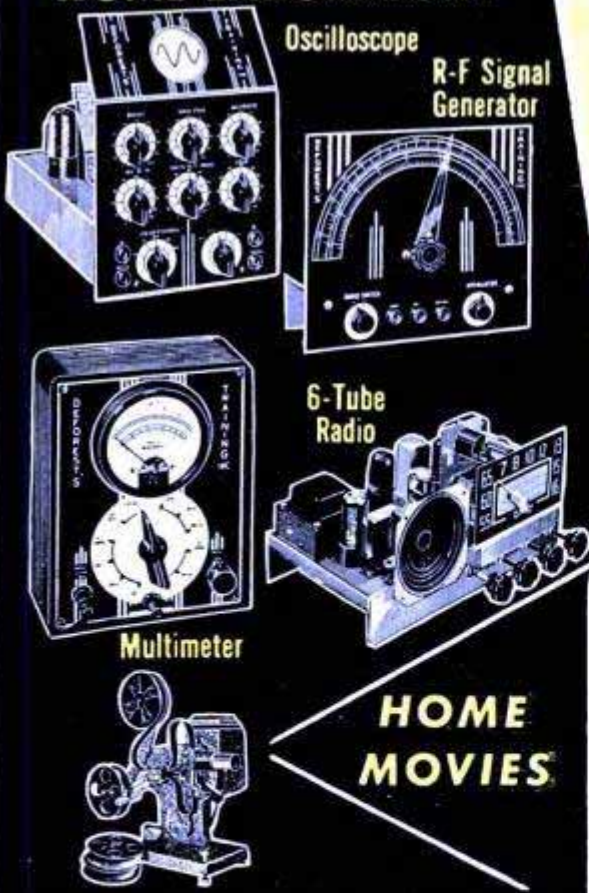
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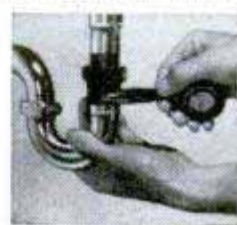
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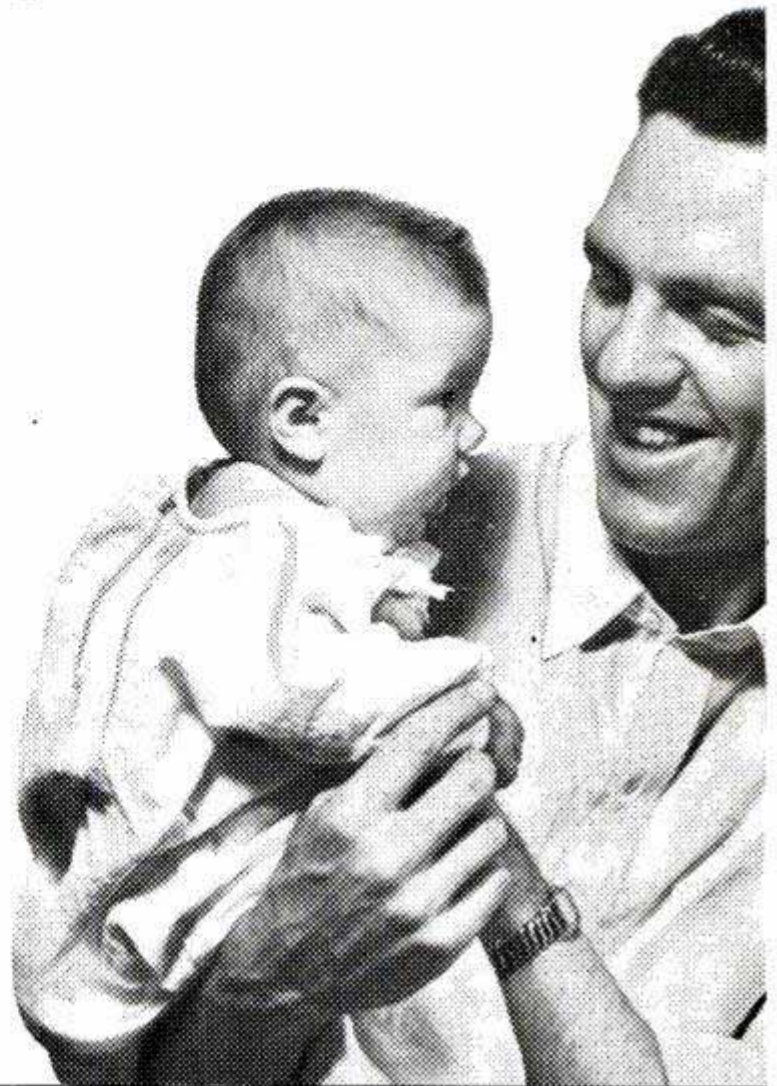
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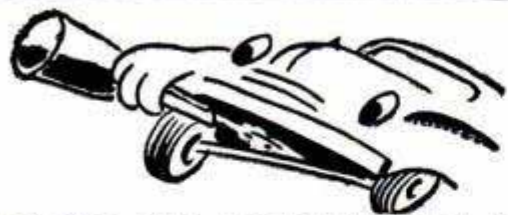
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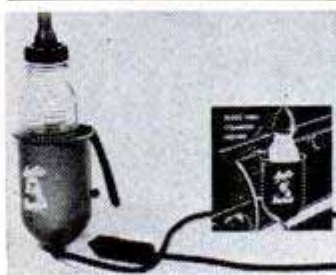
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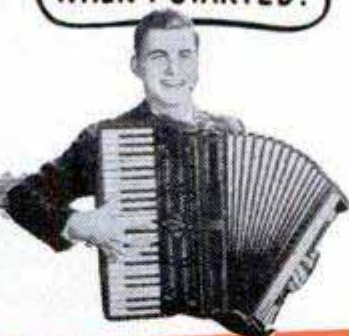


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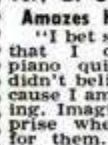
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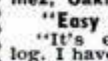
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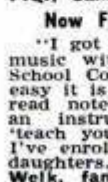


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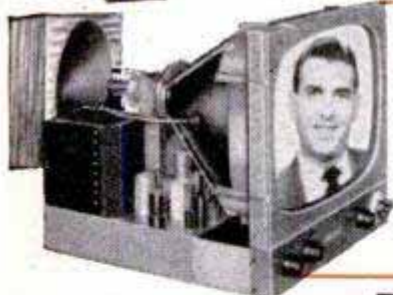
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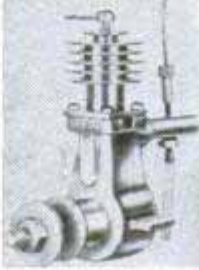
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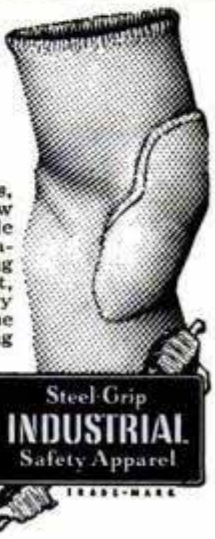
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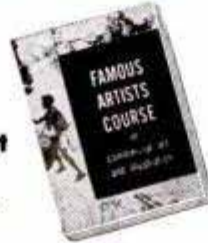


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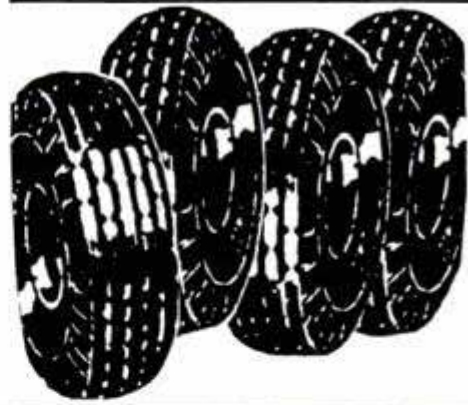
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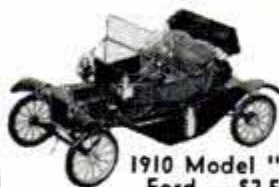
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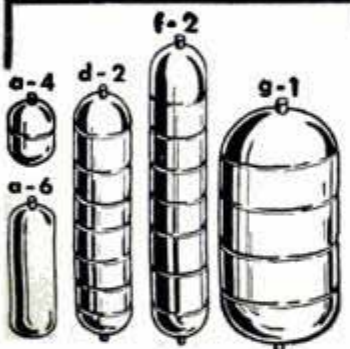
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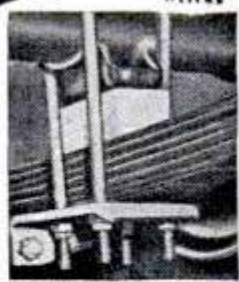
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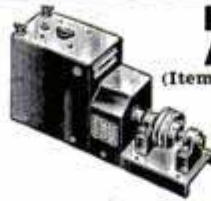
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WHERE To buy at wholesale 100,000 articles. Free list. Also extra-income literature. Maywoode, 1133 Broadway, New York.

FORTUNES Made from sandwiches. New system. Equipment furnished. Dickerson Manufacturing, Drawer 30-A, Springfield, Missouri.

GROW Mushrooms. Cellar, shed. Spare, full time. We pay \$3.00 pound. Free book. Mushrooms, 2954 Admiral Way, Seattle, Wash.

FREE Literature. Your own business. Profitable permanent. Hubbard, 6 North 6th Street, Yakima, Washington.

\$46 FROM Square foot plywood; jigsaw necessary. Literature free, write today. Woodarts, Bridgewater, Mass.

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

BOOKKEEPERS, Keep books, small firms spare time. Manual latest technique by C.P.A., \$3.00. Modern Business, Box 406, Youngstown 1, Ohio.

ESTABLISH Profitable home mail business. Exclusive built-to-order proposition service. Everything handled for you. Booklet free. NMD Agency, Box 88-W, Dorchester 22, Mass.

MAKE Money spare or full time casting metal toys and novelties. Big wholesale and chain store demand for autos, soldiers, ashtrays, banks, etc., keeps manufacturers busy. Production moulds furnished for up to 100 and more castings per hour. No experience or special place necessary. "Cash-in" on holiday orders now being placed. Write for information and illustrations of patterns needed. Metal Cast Products Co., Dept. A, 1696 Boston Road, New York 60, N. Y.

START A venetian blind laundry. Profit opportunity for lifetime business. New machine method. Free booklet on request. F. C. Co., 442 N. Seneca St., Wichita 12, Kansas.

INCOME From local information. No selling. Write Neherco, La Verne, Calif.

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

QUICK Sign painting. Use letter patterns, avoid sloppy work, wasted time. Write for folder. John Rahn, A1330 Central, Chicago 51.

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

NEW Profitable home business repairing zippers. Thousands of customers waiting. No experience required. We furnish everything. Write Texas Specialty Company, 204-B Texas, Texarkana, Texas.

UNPAINTED Bookends, plaques, statues, figurines. List. Haverty Products, 822-17th St., Altoona, Penna.

YOUR Own profitable home business. Preserve live flowers to last for years. New simple discovery. Enormous demand all year 'round. Tremendous profits! Light fascinating work. Send \$2.00 for working equipment, instructions, and valuable sales plans. Satisfaction guaranteed or money promptly refunded. Alfred Hermansen, 210 Fifth Ave., Suite 1102A, New York 10, N. Y.

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

THOUSAND Articles wholesale, "Supply Source Directory" 10c. Ideal Service, Park Ridge 30, Illinois.

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

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

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

FABULOUS Earnings—Fascinating pastime. Growing genuine, living miniature (ming) tree. New sensational business or hobby. Astounding information free. Dwarf Gardens, Box 355B, Briggs Station, Los Angeles 48, Calif.

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

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

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

MADE \$24,500 Using money making plans from Schemer Magazine, world's oldest mailorder publication. Box 275M, Canfield, Ohio. Year \$2.00. Sample 20c.

MINK Raising information free. Complete. Lake Superior Mink Farm. Superior, EE1, Wisconsin.

POPCORN And potato chip equipment. Long Eakins Company, 5160 High, Springfield 99, Ohio.

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

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

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

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

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

MEN—Women. Everybody likes candy. Learn to make professionally. Our 40th year. Ragsdale Candies, D5, East Orange, New Jersey.

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

MONEYMAKING OPPORTUNITIES

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

RESILVER Mirrors at home. Formula 25c. Ideal Service, Park Ridge 6, Illinois.

OPPORTUNITIES Galore. Fifteen newest books and folios. \$2.00 postpaid. Holmes, Kings Highway, Independence, Mo.

MONEY Making secrets exposed! Write Ferriola Service, 511-B Penn St., Chester, Penna.

REAL Moneymaking plans. Free list. Fresco Sales, Box 65, Hampden Station, Baltimore 11, Maryland.

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

CAN You make \$40 a week, typing at home, in your spare time? Write Hood's, Kannapolis 12, N.C. (Enclose stamped, addressed envelope).

\$35 WEEKLY! Home! Two hours daily! 227 unusual money making projects. Walsh, 894 Main, Buffalo 2, N. Y.

MAKE Over \$500 weekly. We send arts, crafts, curious samples sets for \$350. Show your friends, businessmen. Book orders. We pay you good commission on your order. Carpets samples cost \$150. Address: Nativity Viegas, Post Box 1477, Bombay, India.

DRIVING Your car. You can make \$75 weekly; lifetime job. No investment, work, or selling. 40 years established business. Rush name. Harry Walters, Mediapolis 2, Iowa.

HOME Workers—Free particulars, many profitable spare time projects. Allen Industries, 219-B Wright St., Shepherd, Michigan.

OPERATE Paying mail order business. 8 pages information, plus other literature. 10c. Olsen, 1231-D East Third St., Duluth 5, Minn.

PROFITABLE Home mail order business selling folios. Sample, catalog, 25c. Merrill, 9 Stoddard, Glens Falls, N. Y.

\$250 WEEK Reported; home! Free book 505 Odd, Successful Businesses. Expect cdd! Pacific, Oceanside, Calif.

BE Appointed State Notary Public now! Details: Stationers, Helotes, Texas.

WHERE To swap-buy-sell anything. Free lists, information. Toole, 5 Bernardin Apts., Evansville, Indiana.

EARN Extra money! Spare time. Write—D'Yarmett, 245 Church, Newark, Ohio.

GROW Mushrooms. Cellar, shed. Spare, full time. We pay \$3.00 pound. Free book. Mushrooms, 2954 Admiral Way, Seattle, Wash.

MAKE Money at home. 101 ideas for full or spare time earnings. Proven winners. All for 25c. Thomas F. Patrick, c/o State Farm, Pikeville, Tennessee.

"WATERLESS (Lanolin) Hand Cleaner." (Oil base.) Make, sell. No machinery. Build profitable business. Complete formula \$1.00. Ideal Service, Park Ridge 3, Ill.

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

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

LEARN How others earn money at home! Write—A. Sizemore, 4917 Kostner, Chicago 30, Ill.

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

300 PROJECTS You can make in Popular Mechanics 32-page Blueprint Catalog. Send 3c stamp for copy. Popular Mechanics Press, Dept. BP, 200 East Ontario St., Chicago 11, Ill.

FORMULAS, PLANS, ETC.

FIFTY Years supplying the best in modern manufacturing formulas. Lists free. Miller, Manufacturing Chemist, Tampa, Florida.

10,000 FORMULAS, trade secrets, etc. 900 pages. \$3.98 postpaid. Free literature. K. Paullin, Loudonville, Ohio.

ANY Formula \$1.00. Satisfaction guaranteed. Jack, 4292 Parkside Ave., Philadelphia 4.

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

FORMULAS. Latest, best. Catalog and chemical instruction sheet 10c, (refundable). Nelko Chemical Service, 3462-F Merchandise Mart Sta., Chicago 54, Ill.

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

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

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

PLASTICS

HI-PROFITS. Gifts, jewelry. Free catalogue, details. Pilot Plastics, 67C Fulton St., New York City 38.

PLASTIC-Crafters supplies wholesale. Literature 20c. Cosmopolitan, Box 176-PM, New York 8, N. Y.

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

LUCITE, Plexiglas, acetate; casting, molding plastics, findings. Dye manufacturer. Quantity prices. Special bargain lots, immediate shipment. Complete catalog 10c. 25c airmailed. Gem-O-Lite, Box 6863, North Hollywood, Calif.

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

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

CHEMISTRY

CATALOG Of chemicals, apparatus, kits, minerals, uranium ore, 10c. Rex Laboratories, 2849-A Birchwood, Chicago 45, Ill.

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

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

SPECTROSCOPE For quick chemical analysis \$3. Kutting Sons, Los Altos, Calif.

NEW Idea chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biological and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124-A West 23rd Street, New York, N. Y.

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

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

AGENTS WANTED

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

YOU Can easily make \$27.50 a day selling 50 outstanding Christmas boxes. Up to 100% profit. 40 for \$1.00. Imprinted cards, napkins, stationery; also deluxe lines. Write for free Christmas gift cards, and big money-making catalog. Best-selling assortments on approval. Fanmour Corp., 200 Fifth Ave., Dept. S-25, New York 10.

NEW Sensational money maker. Telephone shoulder cradle. Big profits. Protected territory. Free details. Mission, 425-P 38th, Oakland 9, California.

MAKE Wedding profits. Sell invitations, napkins, matches. Samples free. Dunbar's, Middlebush 3, N. J.

300% PROFIT—Postage stamp photos from negatives or prints, perforated sheet form, gummed backs. Free details, samples. National Photostamp Co., 1418D Third Ave., New York 28.

HI-Profits. Gifts, jewelry. Free catalogue, details. Pilot Plastics, 67C2 Fulton St., New York City 38.

CASH In on spare time. Sell wonderful Regal Christmas cards exclusive with us. 25 sell for \$1.00. Also 50 for \$1.25. Over 150 other boxes. Free samples. Kit on approval. Regal Greetings, Dept. 145, Ferrisdale, Michigan.

EXTRA Cash—Quick, easy! Sell friends newest greeting cards. Profits to 50c per \$1.00 box. 21-card \$1.00, comic Christmas, all-occasion assortments, gift wrap ensembles, exclusive items. Experience unnecessary. Special offers. Bonus. Prompt service. Write for free samples name imprinted Christmas cards, stationery, napkins, book matches, feature assortments on approval, free catalog. Elmira Greeting Card Co., C-2309 Elmira, New York.

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

MAKE Money fast. Sell big value Christmas and everyday card assortments to friends, others. 7 leading 21 card \$1.00 boxes. Religious, metallic, comic, secret pal cards. Gift wrappings, ribbons, scented stationery. Many gifts—rain sandals, automatic telephone pencils, totebrushes, napkins. Over 100 items. Amazing profits. Bonus plan. No experience necessary. Write today for samples on approval and special "Get Started" offer. Hedenkamp, 361 Broadway, Dept. PM-15, New York.

IS \$210 A week worth a penny postcard to you? Then rush card with name and address for special free trial plan that sells amazing new automatic refrigerator defroster "Like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. PMC-9, 6 N. Michigan, Chicago 2, Illinois.

NEW Plastic mending tape. Just press on! Repairs clothing instantly. Lightning seller. Samples sent on trial. Kristee 132, Akron, Ohio.

MAKE Extra money quickly! Take easy orders from friends for outstanding Christmas, all-occasion greeting cards, gift wrappings, novelties. Big profits. Bonus. Experience unnecessary. Request feature assortments on approval, free samples name imprinted Christmas cards, stationery, napkins and free catalog. New England Art Publishers, North Abington 505-C, Mass.

SELL Personalized stationery. Big profits. Quick sales. Every one a prospect. Large line. Free samples. Write Royal, 201 N. 3rd St., Minneapolis 1, Minn.

DO You need money? \$35 is yours for selling only 50 boxes of our 300 Christmas card line. This can be done in a single day. Free samples. Other leading boxes on approval. Many surprise items. Experience unnecessary. Free samples personalized Christmas cards, stationery, napkins. Write today. It costs nothing to try. Cheerful Card Co., 333 White Plains, N. Y.

MAKE Money selling ties. Free catalog. Write to Phillip's Neckwear, Dept. 814, 20 West 22 St., New York.

AT Last! Something new and sensational in Christmas cards. Make extra money fast! Show gorgeous satins, velours, metallics never before offered. Gets easy orders! Pays up to 100% cash profit. Free samples 30 Christmas cards with name, 50 for \$1.25 up. 80 assortments. Personalized book matches and stationery, gifts. Several \$1.00 boxes on approval. Write Puro Co., 2801 Locust, Dept. 140-L, St. Louis, Mo.

GREETING Card salespeople—make \$50 quick, or even more, selling America's lead 21 card Christmas assortments. Samples on approval. Everyday assortments, gifts. Free samples personalized Christmas cards. Write today. Lorain Art Studios, Dept. S-44, Vermilion, Ohio.

BRAND New! Amazingly different and smart Christmas cards bring you big money! Take easy orders fast. Pays up to 100% cash profit. Christmas cards with name 50 for \$1.25, up. Big line. Personal stationery and book matches. Get sample assortments on approval, imprints free. Write today. North Star, 31 Glenwood, Dept. X-18, Minneapolis, Minn.

JUST Out! New, thrilling sensation in Christmas cards. Make big money! Show lustre foils, satins, brilliants. Amazing values bring easy orders! Christmas cards with name 50 for \$1.25 up. Also imprinted book matches, stationery, many gifts. Get 30 free samples with name; several \$1 boxes on approval. Joy Greetings, 507 N. Cardinal, Dept. L-60, St. Louis 3, Mo.

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

ABSOLUTELY Free! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 6254, Cincinnati 25, Ohio.

OWN A big moneymaking new and used clothing business. Men's used suits \$2, pants 35c, topcoats \$1.25, jackets 60c, shoes 20c. No experience necessary. Free wholesale catalog. Superior, 1250-A Jefferson, Chicago 7.

SELL Reproductions of world's famous perfumes by outstanding Parisian chemist at fractions of original cost. We defy you to tell the difference. Sample free! Exclusive Imports, 1139-H So. Wabash, Chicago 5, Ill. or 6804-H Fountain, Hollywood 38, Calif.

CALENDARS, Advertising novelties, matches. All styles, including religious, varnished, 12 sheet, girls. Hundreds of advertising novelties, book matches, etc. Fleming Calendar Co., 6539 Cottage Grove, Chicago 37, Ill.

GOLD Lacquered and silver sign letters. Windows, doors, trucks. Standard sizes. Penny each. Free samples. Atlas-P, 544 West 79th, Chicago 20.

CHRISTMAS Cards at jobbers prices! Large selection dollar assortments 35c each in hundred lots. Imprint cards, money folders, gift cards, pictures, etc. Make more profits selling our line! Catalog free! Three sample boxes \$1.00. Elfco, 438 North Wells, Chicago 10.

CALL On friends with sensational Christmas cards in handy assortments. Exclusive designs. Sell for \$1.00. Profit up to 50c. Also popular-priced personal Christmas cards, everyday assortments, stationery, gift items. Samples on approval. Wallace Brown, Dept. C-4, New York 10, N. Y.

ANYONE Can sell Hoover DuPont Nylon uniforms for beauty shops, waitresses, doctors, nurses, others. In white and colors. Exclusive styles. Top quality. Low priced. Exceptional income. Real future. Equipment free. Write fully. Hoover, Dept. R-100, New York 11, N. Y.

\$50 YOURS. Sell only 100 boxes new Xmas cards; other amazing offers. Free samples imprinted cards. Feature box assortments on approval; over 100 profitable items. Work with a national leader. Pen-N-Brush, PM-9, 139 Duane St., New York City 13.

BIG Profits selling Sunshine's famous exclusive Christmas cards. Tremendous values! 21 for \$1.00, holly assortment. All lined envelopes. Snow scenes, religious, gift wraps, stationery, super value imprints, 50 for \$1.25. Many more! Write for samples on approval, free imprint folders. Act now! Sunshine Art Studios, Dept. PM-9, 115 Fulton St., New York 38, N. Y.

ULTRA-Blue stock signs—6c, sell 35c. 1000 slogans, 7" x 11", comedy, religious, general. 15 samples, \$1.00. Lowy, 812-MS Broadway, New York 3.

SENSATIONAL Money maker, washable woolen slacks, skirts, shirts, plaids and solid colors. Nationally advertised "Sanforian" label. Nylon reinforced, children's, teen-age. Terrific repeat business. Bonus plan. Start immediately. Free sales kit. Wash-Em, Westport 14, Conn.

FREE Sample nylon stocking of world's only nationally advertised hosiery line actually guaranteed against runs and snags or replaced free within guarantee period to three months! Complete line from sheerest 15 denier to heavy 70 denier service weight. All gauges. Also complete line men's fine hosiery guaranteed for one full year! Not sold in stores. Good Housekeeping Guarantee Seal. No money or experience needed. Nothing to pay now or later. Easiest and quickest sales. Just show free outfits and write orders. We deliver and collect. Advance cash plus huge bonus to 40%. Big money spare or full time. Become manager—appoint others to sell for you. Man or woman, young or old, beginner or veteran, you can earn more money than you thought possible. Everything needed given free. Rush name and address to Kendex Corp., Babylon 93, N. Y.

BE A Bob-Art representative. Make \$3.00 to \$5.00 an hour in spare time between now and Christmas. Easy—show friends, neighbors, Bob-Art Special Christmas card bargains and other appealing specialties. Also get cash bonuses and valuable merchandise prizes. Send today for sample selling kit with free instructions. Bob-Art Greetings, Dept. 111, 278 Washington Ave., Chelsea 50, Mass.

BELOW Wholesale. Watches, jewelry, appliances, premiums, silverware, cookware. Collins Company, Forsyth, Georgia.

BUY Wholesale thousands nationally advertised products at big discount. Sent free "The Wholesale Plan." American Buyers' Service, 629-H Linden, Buffalo, N. Y.

LADIES' Garters, hankies. Free samples. Holiday, 85B6 96th St., Woodhaven, N. Y.

EVEN Beginners make many extra dollars! Sell big line Christmas, everyday cards, gifts. 21 for \$1.00 assortments, novelties, gift wraps, household items. Big profits. Free samples name imprinted Christmas cards, stationery, napkins. Leader assortments on approval. Bonus. Special offers. Write, Pilgrim Greetings, 111 Summer, Dept. AN-9, Boston, Mass.

SELL Big money Christmas cards! 50 for \$1 up. Free samples, catalog. Hix Craft Greetings, Box 473, Hartford 1, Conn.

GO Into business. Sell 25 Christmas cards 35c. Box retails dollar. Two sample boxes dollar. Buffalo Broadcaster, Buffalo 4, New York.

YOUR Personal lingerie free as bonus—extra cash besides—introducing sensational Curve-Tailored idea to friends. Outfit free. World's Star, Dept. E-36, Grand Rapids, Michigan.

NYLON Uniforms. Immediate delivery, immediate profits. Sell to doctors, dentists, nurses, waitresses, beauticians, housewives. Free sales kit. Superior Fabrics, Dept. P-9, 3936 Market, Philadelphia 4, Penna.

CUTS Everything. Brush, weeds, grass, trees. Fall demand. Farm Products PM, Excelsior Springs, Mo.

\$200 WEEKLY. Sell silverplate, colorful tableware. Yale-Murphy, Meriden, Conn.

BEST Source for nylons. Rich Co., 215 W. 98, New York 25.

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

FREE Merchandise to new customers (\$1.50 retail value—your selection). Sensational "get acquainted" offer. Rush 25c for illustrated wholesale bargain catalog and free merchandise certificate. Save up to 50% on 2000 everyday necessities and novelties. Reliable Jobbers, 311-B North Desplaines, Chicago.

SHINE Shoes without "polish." New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trial. Kristee 133, Akron, Ohio.

SALESMEN, Distributors, fast selling costume jewelry direct from factory. Big picture catalog, free. Pickcraft, M19 Bank, Attleboro, Massachusetts.

SELL Christmas cards, novelties, 100 different assortments. Personal cards low as 25 for \$1.00. Imperial, Dept. P, Los Angeles 13.

LOOK—Big profits, free samples. Personalized Christmas cards, personalized napkins and personalized stationery. G. M. Dunn Co., 484 Broadway, Newark, N. J.

MEXICAN Feather pictures. High profit selling gift shops, etc. Adelphi, Box 57-B, Bellerose 6, N. Y.

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

DRESSES, Used 18c; Coats \$2.00, blouses 35c. Free catalog. Crown, 164-P Monroe Street, New York.

EVERYBODY Uses handkerchiefs; buy from leading manufacturer. Write Stan-chief, 1 Bond St., New York 12, N. Y.

GORGEOUS Christmas cards. \$50 yours selling 100 boxes. 40 with name, \$1. Personal napkins, stationery. Wrappings, novelties, gifts. Free samples. Approval box, Torres, 373 Fulton St., Brooklyn 1, N. Y.

\$50 WEEKLY Selling finest razor blades, other items. Free details. Edison, Department 274, Far Rockaway, N. Y.

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

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

EARN Big money. Cash bonus. Popular sizes and styles. Free hosiery for your family. Duratest, Dept. PM, Warren, Penna.

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. "Raico" XL-Roxbury, Boston 19, Mass.

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

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

WANTED—Purchasing agents. No money or experience required. Write Dept. C, Purchasing Manager, 2719 Lawrence, Chicago, Ill.

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

HIGH-GRADE SALESMEN

REPRESENT America's largest factory selling advertising pencils. High commissions. Attractive line. Union Pencil Company, 389 Broadway, New York City.

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

WANT To make real money? You can positively make \$50.00 a day and up selling a brand new item going to every type of food and beverage store, factories, laboratories, hospitals, etc. First time advertised. Write for free details today. Johnson-Hartmann, 53 West Jackson Blvd., Dept. PM-9, Chicago 4, Illinois.

AD Matches! Sell amazing designs—20, 30, 40 and 240-light book matches. Bigger spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-21, Chicago 32, Illinois.

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-951, 7530 Greenwood, Chicago.

EARN Big money fast! Sell finest-quality advertising work uniforms to garages, factories, filling stations, etc. Free selling kit. Topps, Dept. 539, Rochester, Ind.

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

UP To \$50.00 in a week spare time and tailored suit for yourself without paying one cent. Write for plan and free sample case. Pioneer Tailoring Co., Dept. X-1117, Congress & Throop St., Chicago 7, Ill.

NEW Year party packages. Hat, blow-out, noisemaker, streamers, balloon. Profit plenty. Ellswood's, Pueblo, Colorado.

MAKE Money showing neighbors how to beautify yards with glorious flowering shrubs and trees. Quick-bearing dwarf fruit trees; world-famous Stark patented varieties produce abundant harvests champion-quality apples, pears, peaches, other fruits. Even small plots produce fruit for family-use and to sell. Beautiful sales kit free. Stark Bro's, Dept. 30182, Louisiana, Mo.

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

SALESMEN. Money-making sideline. Calendars and advertising specialties. Highest commissions advanced. Free new cars. Rush name. Advertising Specialties Manufacturing, Brooklyn 36, N. Y.

MAKE Money with famous, easy-selling Bostonian shirts—spare time, full time, sideline. Fabrics, outfit free. Bostonian, 89 Bickford, Dept. G-10, Boston 30, Mass.

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

EDUCATIONAL AND INSTRUCTION

IT'S Fun learning a language by Lingua-phone. At home, quickly, easily, correctly master Spanish, French, German, Russian, —any one of 29 languages through Lingua-phone Conversational Method. Add to service, job, travel opportunities. Send for free book. Approved for Veterans' Training. Linguaphone Institute, 8309 Rock Plaza, New York 20.

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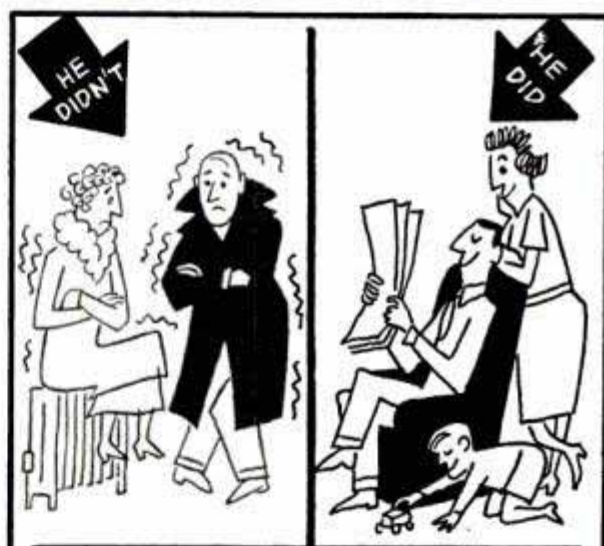
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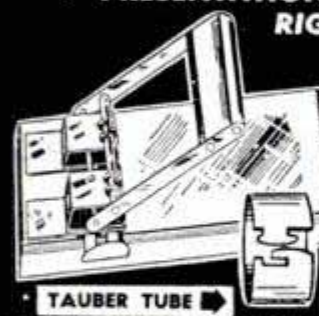


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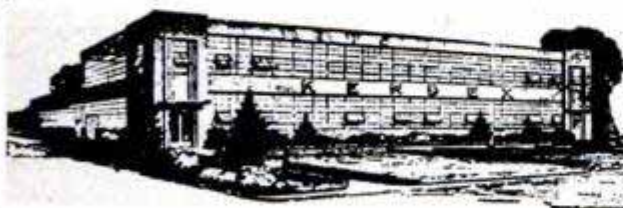
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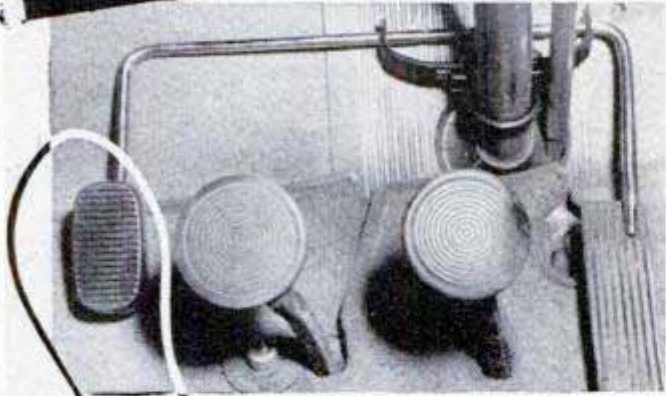
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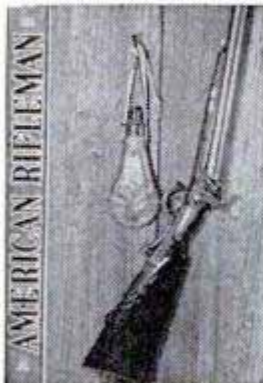
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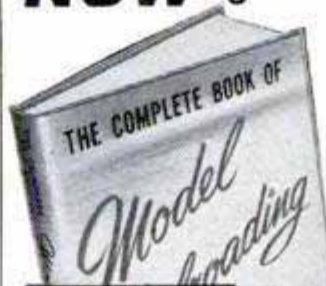
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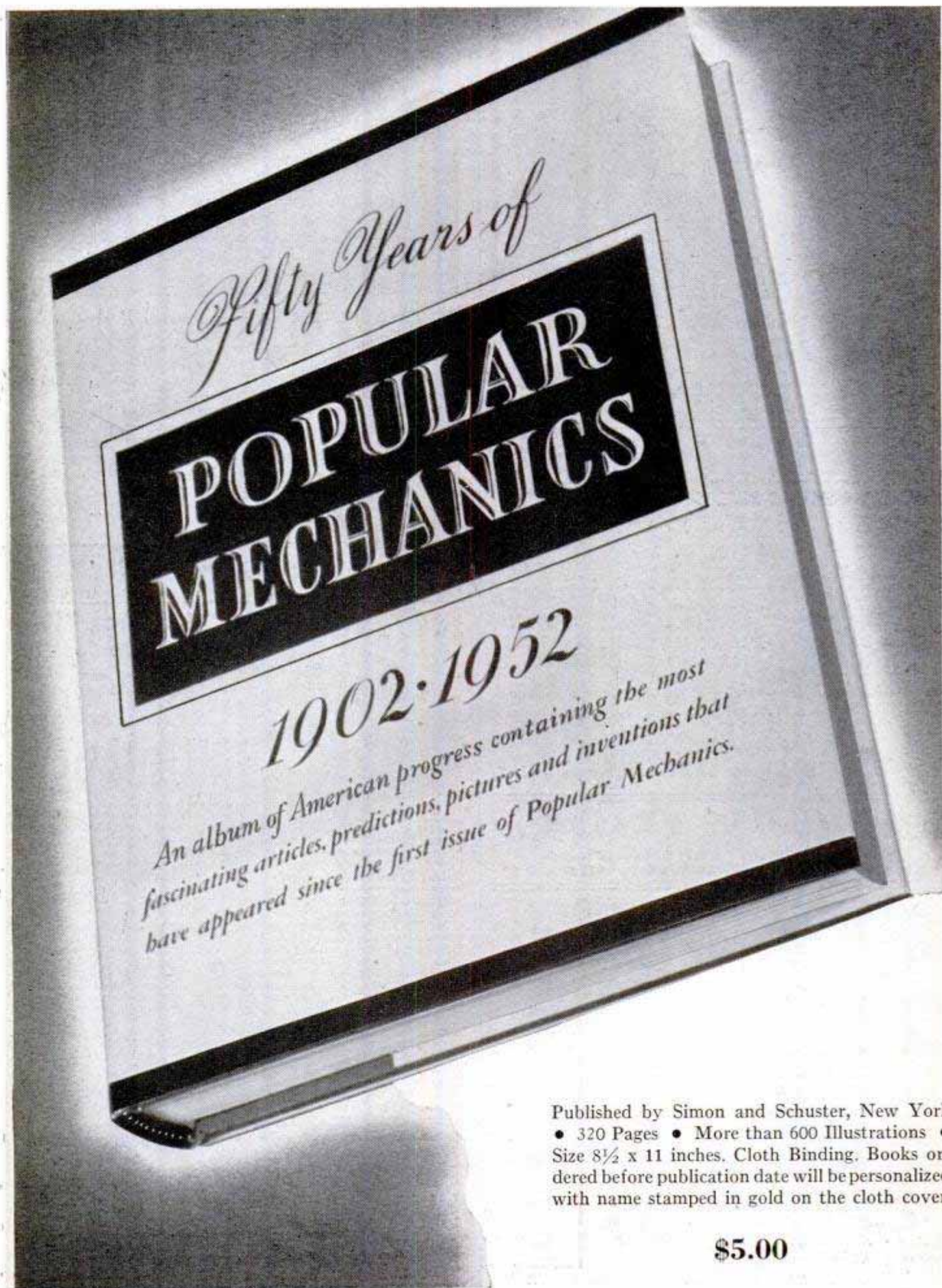
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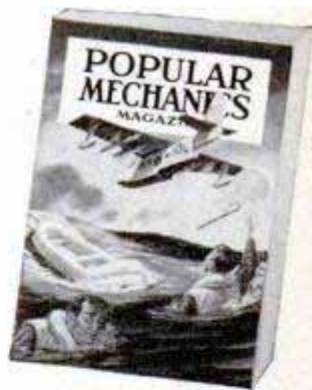
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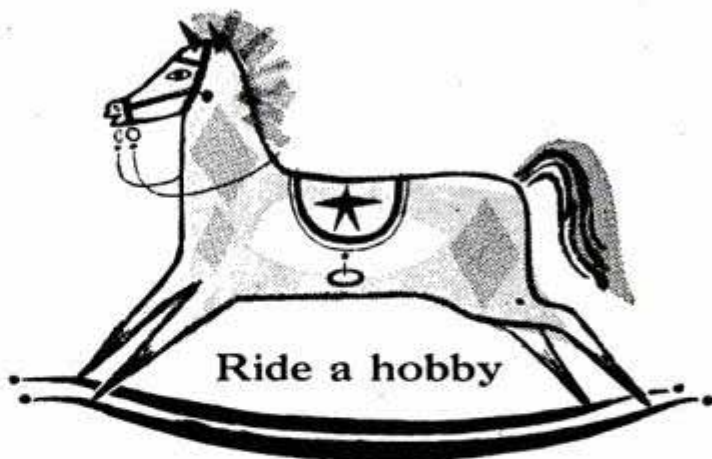
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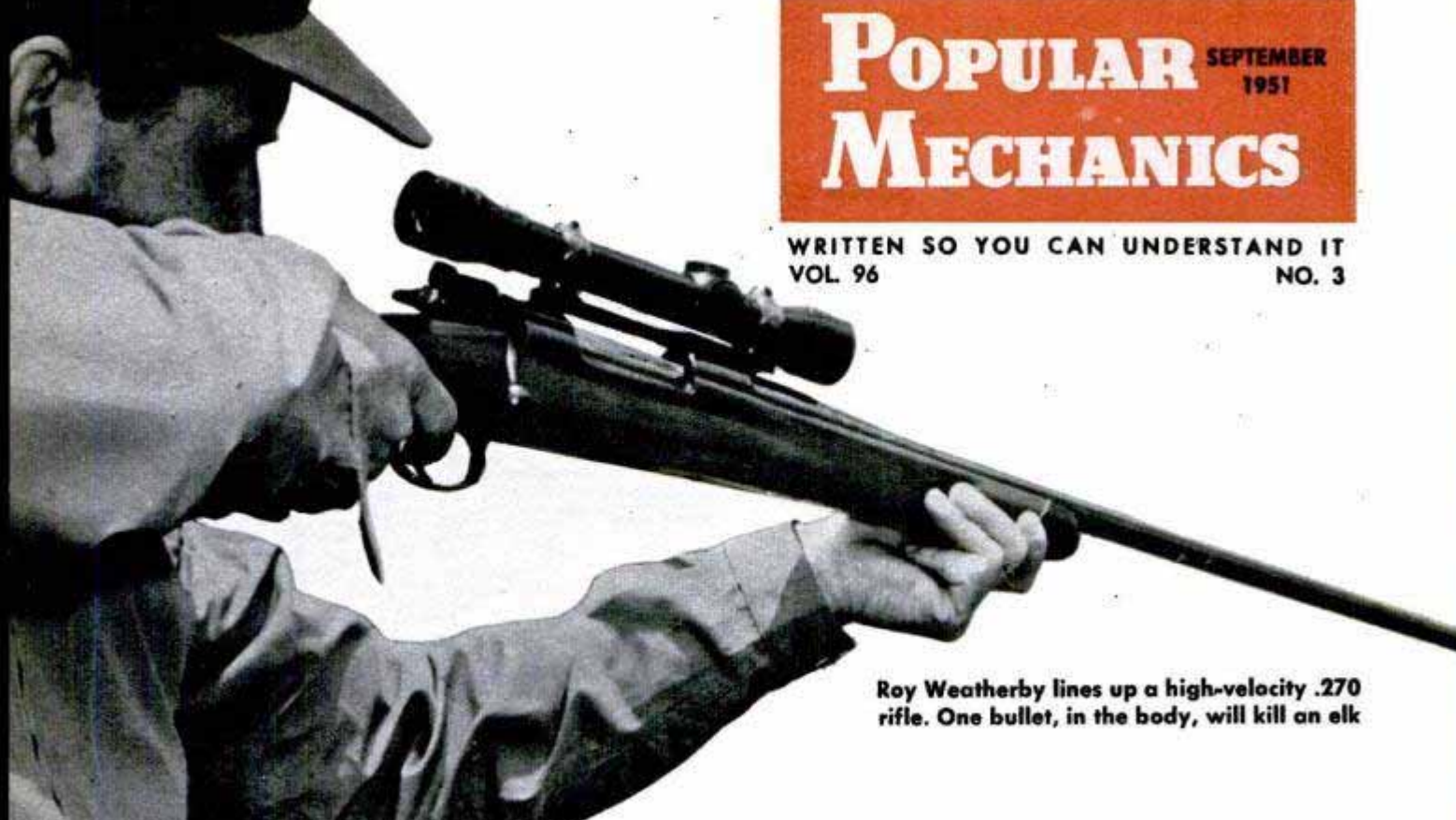
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Roy Weatherby lines up a high-velocity .270 rifle. One bullet, in the body, will kill an elk

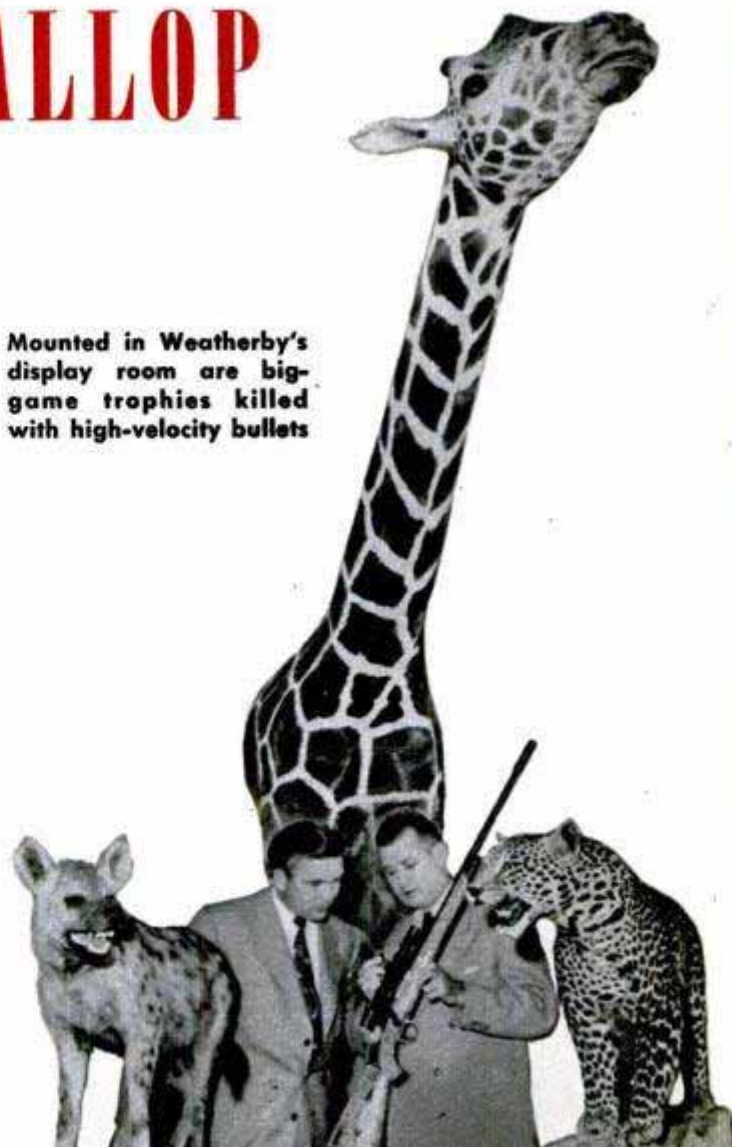
The HUNTER'S BIG WALLOP

By *Thomas E. Stimson, Jr.*

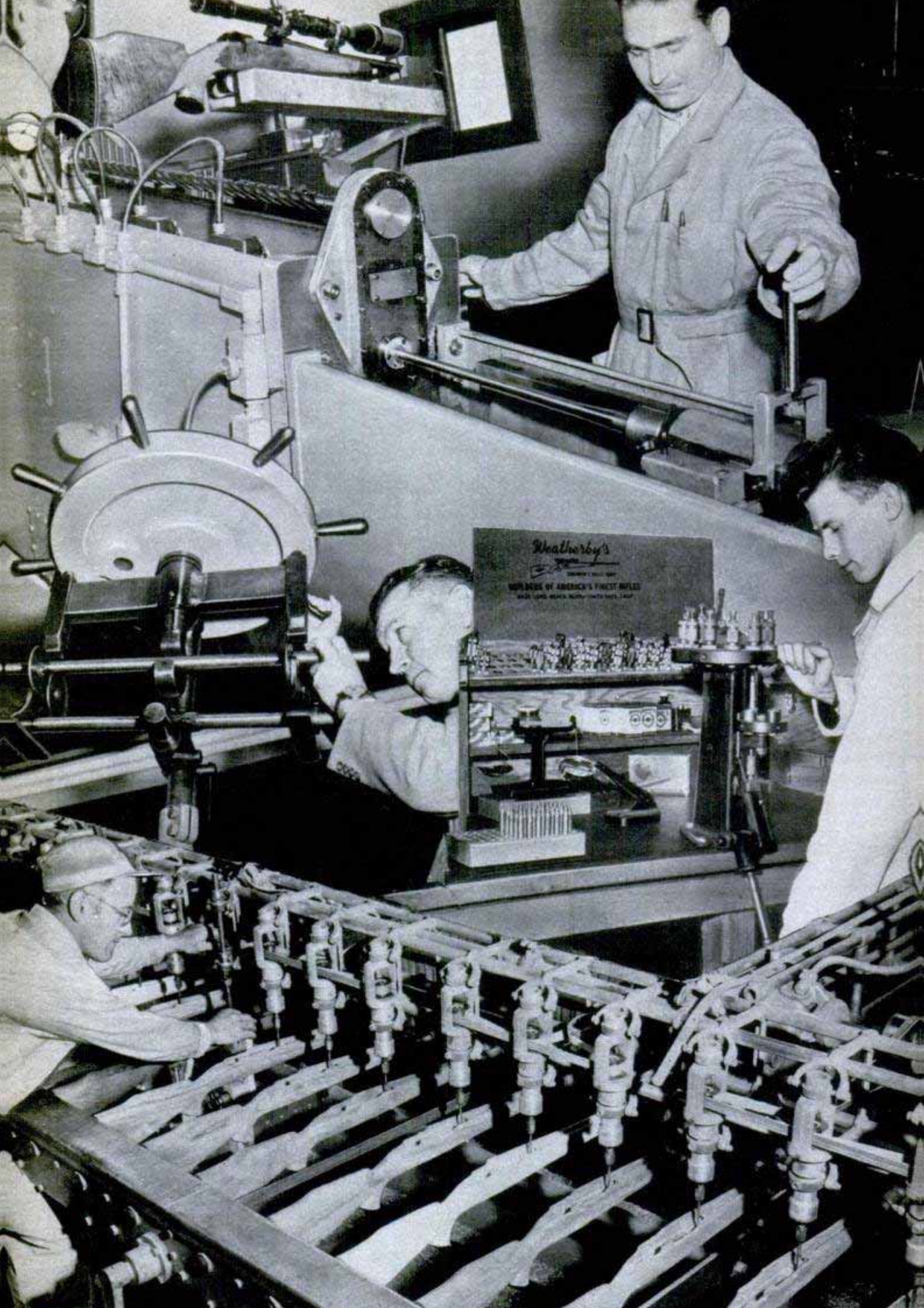
WITH ONE OF the new high-velocity rifles you can kill any animal in the world with one shot. You can chop down a tree six inches in diameter or shoot right through armor plate barely dented by a bullet fired from an ordinary rifle. Modern high-velocity weapons are the most powerful sporting guns ever built.

Targets are actually larger for them because it's no longer necessary to hit an animal in a small, vital spot. A bullet placed anywhere in the body area usually causes instant death. A five-ton elephant is about the only exception; it must still be hit in the heart or brain.

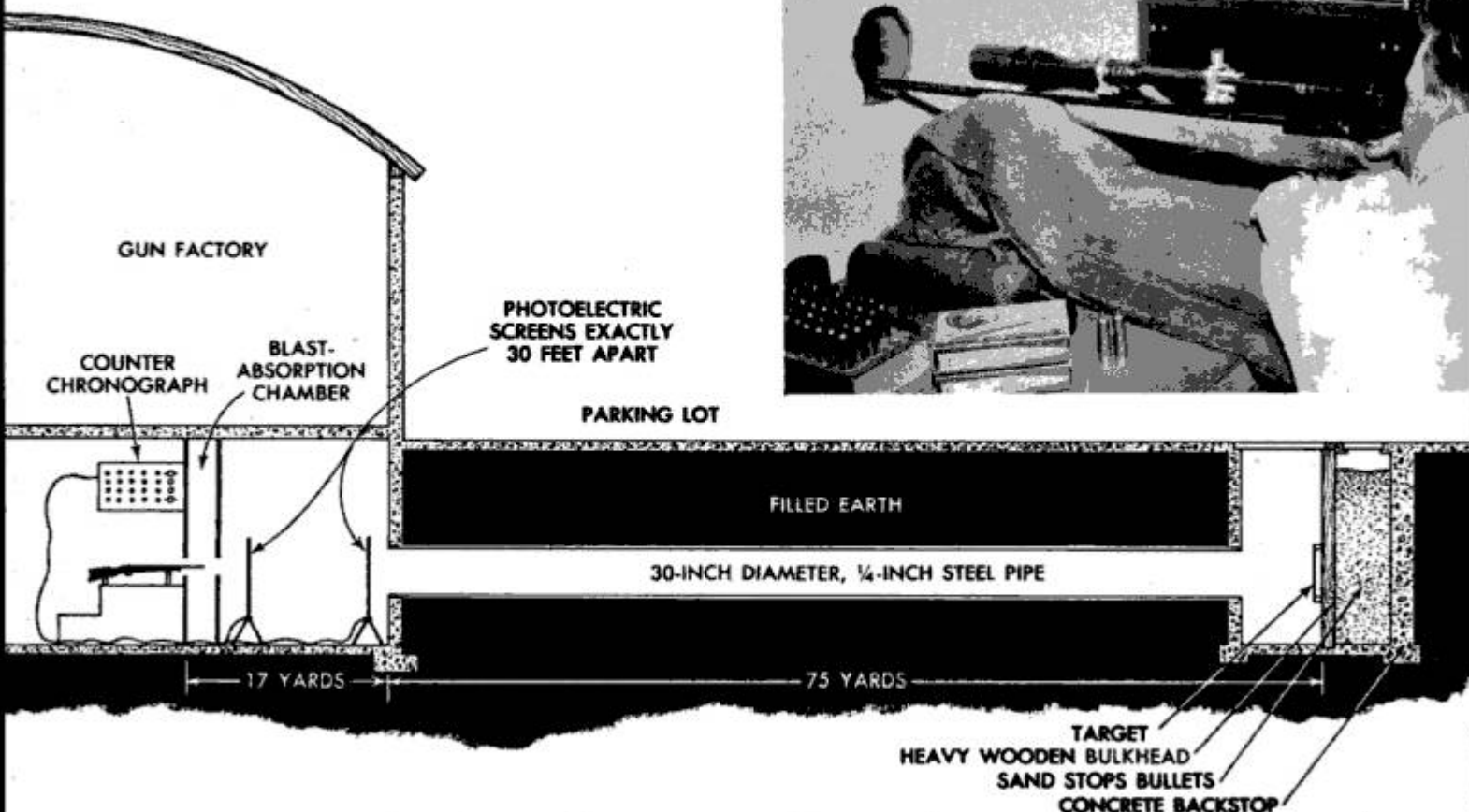
According to one report, high velocity can actually kill an animal without touching it. There's a story that several years ago one of the armed forces fired an experimental high-velocity bullet at a muzzle velocity of 12,000 feet per second. It was aimed to graze the hair of an animal. The bullet didn't touch the skin, yet the animal dropped in its tracks. Death was ascribed to vibration from the grazing bullet, which



Mounted in Weatherby's display room are big-game trophies killed with high-velocity bullets



Right, instrument measures muzzle velocity of new rifle. Below, test-fire range extends underground



was strong enough to shatter the animal's nervous system.

What is a high-velocity rifle? It's one with a chamber reamed out to take a large cartridge that contains much more than the standard charge of powder for its caliber. This overload gives the bullet greater velocity. The bullet leaves the muzzle at 4000 feet per second instead of 3000 feet per second, to cite one comparison between guns of .257 caliber. Not only does the bullet move faster, it follows the line of sight more closely. You don't need to aim so far in front or hold so high above the target when shooting, say, at a running deer.

Specifically, a .300 Weatherby high-velocity bullet has a drop of about seven inches at 300 yards. A 30-06 bullet of the same weight has a drop of almost twice as much. The .300 Weatherby requires 0.284 seconds to travel 300 yards as against 0.348 seconds for the 30-06. A deer running at 20 miles per hour across a field 300 yards away would travel about two feet in the interval between the bullets.

A high-velocity bullet slows down after a few hundred yards, of course, and for the rest of its flight its characteristics are similar to lower-velocity missiles. But if it hits an animal while still traveling at super-speed it literally blows up in the target.

Opposite page shows various stages in making the superrifles. Top left, scope is matched to rifle. Top right, rifling is cut in barrel. Center left, barrel is checked for straightness. Right, loading high-velocity cartridges. Bottom, shaper cutting 18 stocks at once

The animal receives a tremendous punch and dies instantly.

Big-game hunters who use high-velocity rifles report experiences like these: "Killed a 1500-pound Kodiak bear with one shot." "Just returned from Africa where I got elephant and Cape buffalo with one shot each." "The bull elk that I got in Canada dropped as if hit by lightning." "I'm killing hawks at 300 yards."

The arms companies realize the importance of high velocity, and most of today's standard hunting rifles have muzzle velocities that are at least several hundred feet per second faster than earlier models. Eventually nearly all mass-produced sporting rifles will be of the high-velocity type. Today, however, if you want the ultimate in high velocity, you must get your weapon from an independent gunsmith or one of the small factories that specialize in custom-built guns.

One headquarters for such weapons is a new \$250,000 factory recently opened by Roy E. Weatherby in South Gate, Calif. In addition to building high-velocity sporting rifles, Weatherby rechambers standard rifles to take his magnum cartridges. At present he is turning out nearly 200 guns per month in the following calibers: .220, .257, .270, 7mm., .300 and .375. Although the muzzle velocities of his guns are higher than any others except a few experimental rifles, pressures do not approach the danger point with the barrels and actions that he uses.

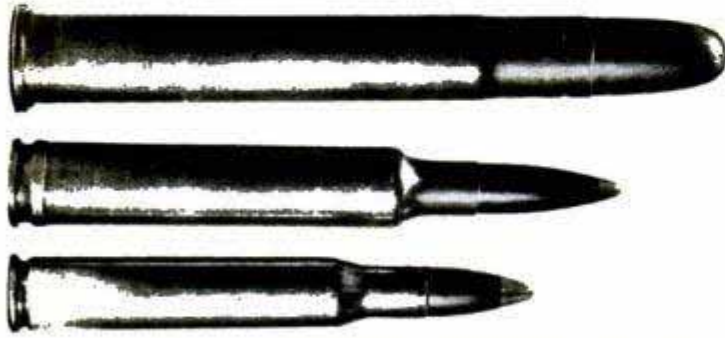
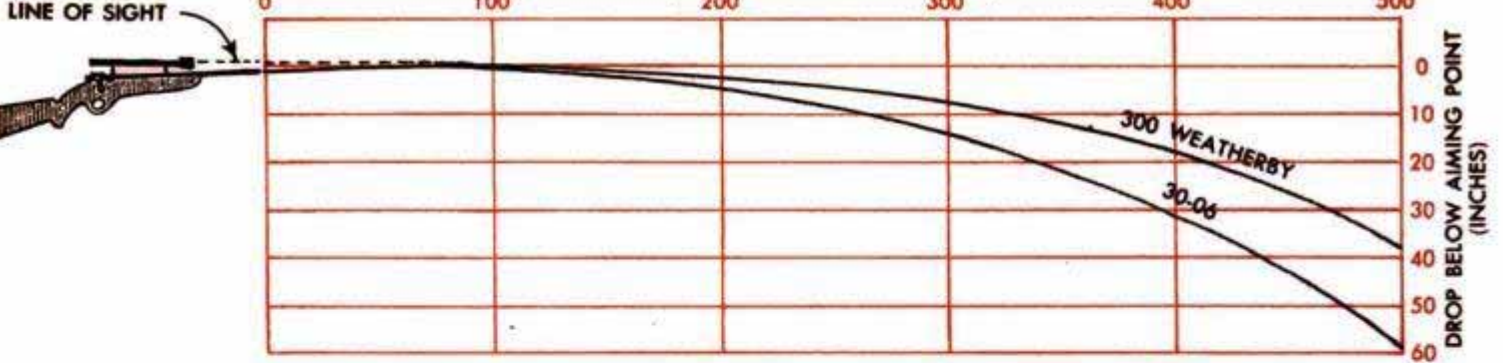


Diagram shows comparatively flat trajectory of a high-velocity bullet, compared with ordinary bullet. Left, .300-caliber magnum is more lethal than .475-caliber above it, far more deadly than 30-06 below

His .300 Weatherby magnum, for instance, has a muzzle velocity 500 feet per second faster than other makes of .30-caliber rifles, using bullets of the same weight, and is 700 feet per second faster than a stock 30-06. At 250 yards the bullet from one of his .300 magnums has almost as much striking energy as a bullet from a 30-06 has at the muzzle.

On a recent trip to Africa to test his weapons personally, Weatherby found that one of his .300 magnums outperformed the

heaviest English elephant gun, a 15-pound weapon that fires a 500-grain bullet of .475 caliber. Weatherby's gun weighs half as much and the bullet weighs only 180 grains, yet has far more killing power. The difference is in the muzzle velocity—2200 feet per second for the elephant gun, 3400 feet per second for the magnum.

For almost all game, except elephants, Weatherby was a dead shot with a .257 magnum using 72 grains of powder to propel an 87-grain bullet. With this weapon he dropped buffalo, zebra and eland with one shot per animal.

Weatherby is strictly a custom builder of fine weapons and his guns aren't cheap. His magnums cost \$235 to \$700, or even more, depending on the kind of wood used for the stock, the amount of decorating and the cost of hunting telescope. Virtually all high-velocity guns are built to take a scope because with these guns a hunter expects to hit game at such great ranges that he needs magnification for accurate sighting.

There's one way to get a high-velocity rifle at much less than the cost of a custom-built weapon. If you happen to own a good, modern bolt-action rifle you can have it rechambered for the heavier Weatherby loads at relatively low cost. Among the guns that can be converted are the Models 54 and 70 Winchesters in various calibers; Models 30S, 720 and 721 Remingtons; 30-06 Springfields with serial numbers above 800,000; 1917 Enfields; Mausers; the .220 Swift and a few others. The price of converting a Springfield is \$33 and includes rechambering the barrel, lengthening the magazine and altering the bolt face.

Weatherby builds all parts of his rifles except the actions and the scopes. The actions are mostly European Mausers built to his specifications. The scopes are selected by the customers. His barrels are chrome-plated inside and then burnished and lapped to a mirror finish, providing a smooth-as-glass surface highly resistant to powder erosion.

Bar of steel on right becomes finished barrel at left. Expensive stock is California mesquite



The hand-finished stocks are made from woods that range from inexpensive walnut to bright-grained California mesquite. One of the latter, carved, sometimes brings \$300 exclusive of barrel and action. Each such stock is tailored to the hunter who is to use it.

Weatherby proof-fires each new barrel and action in his underground shooting range that extends out under a parking lot adjacent to the factory. The muzzle velocity of bullets shot from the gun is measured by an electric counter-chronograph set up on the range. Then the gun is sighted-in for a specified distance so that it hits in the bull at the yardage desired. A paper target through which a number of shots have been fired to demonstrate the accuracy of the weapon is furnished the purchaser with the gun. Weatherby manufactures and distributes ammunition for his magnum guns, and the shells may be hand-loaded for reuse.

High-velocity weapons aren't of much use against small animals and birds except for extermination purposes. A crow or a hawk practically explodes when hit by a fast bullet. Similarly, a fast missile destroys considerable tissue when it hits a deer or moose. But, as Weatherby points out, it's better to lose a small part of a big-game animal and get an instant kill than it is to cripple the beast with low-velocity bullets and then spend hours tracking him. Modern hunters principally are after trophies, he explains, and the meat that they bring home is almost an incidental of the hunt.

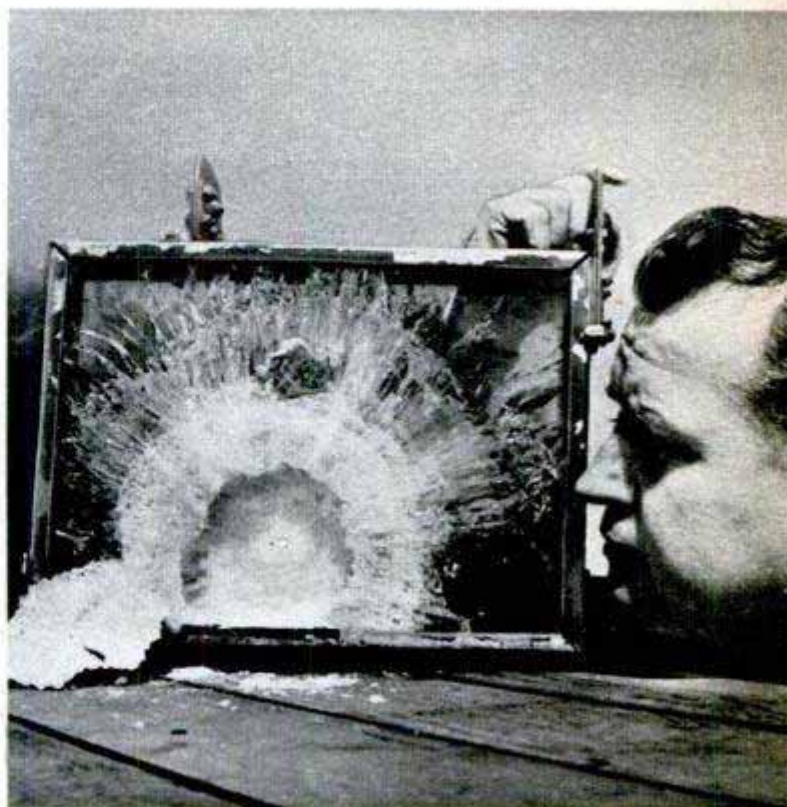
For this same reason a high-velocity gun has no value as a military shoulder weapon. It is actually too deadly for warfare. Aside from the international law that prohibits dum-dum bullets, it's better strategy to cripple any enemy soldier than it is to kill him. The wounded man requires the most care from his own army.

Too, the barrel life of a high-velocity rifle is relatively short because of erosion from the large powder charges. Although suitable for a lifetime of ordinary hunting trips, the barrel of a high-velocity gun would be worn out at the end of a week or so of front-line use.

Weatherby believes that with new slow-burning powders, different priming principles and stronger barrels and actions it will be possible to double the present muzzle velocities of his magnum weapons. When that day comes, of course, a rifle that shoots a large bullet will be virtually obsolete no matter how fast its bullet travels. No one will want to carry a heavy gun that kicks like a mule when with a lightweight rifle he'll be able to kill the biggest game animals on the continent. That day may be no more than 10 years away.



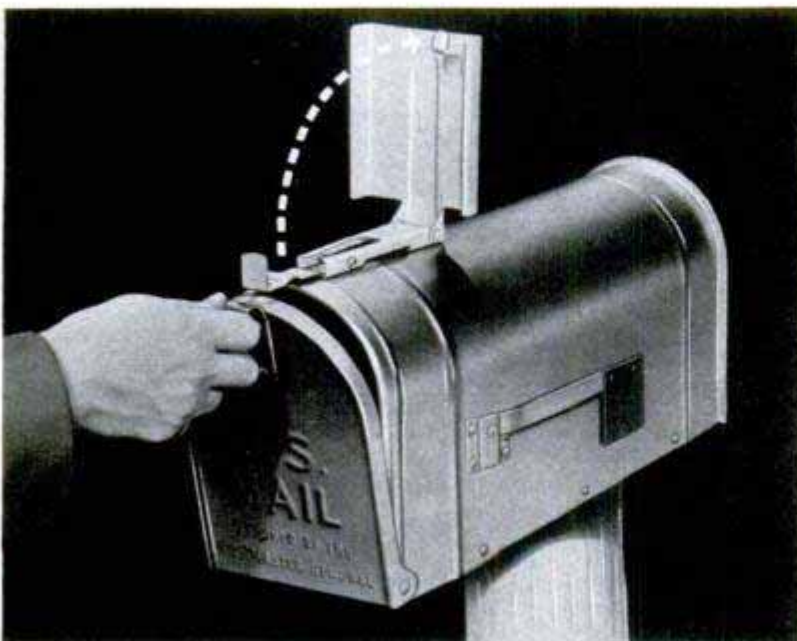
Two .300 magnum shots knocked over this eight-inch tree. Below, when bullet struck a "bulletproof" aircraft windshield it blew up inside the laminates





Submarine Sight-Seeing

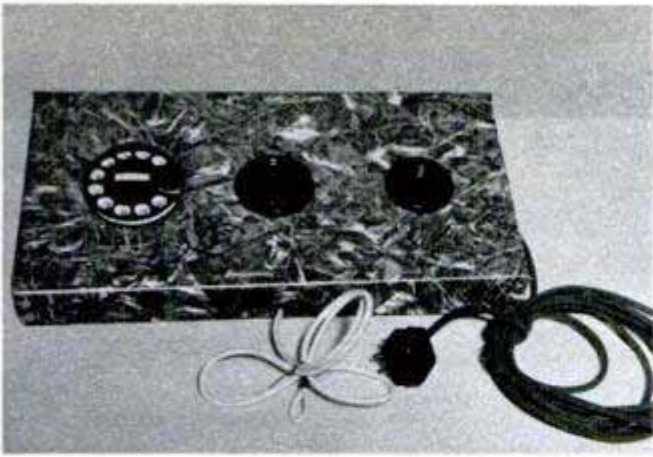
Sight-seers watch fish, turtles and swimmers in action underwater from the observation deck of an unusual vessel at Rainbow Springs, Fla. The passengers in the boat ride in a steel chamber below the water line, looking into the water through large portholes. The vessel, which looks like a barge from the shore, is powered by a 36-horsepower heavy-duty outboard motor. Fourteen persons can be accommodated in the underwater section of the vessel.



Bright Yellow Indicator Signals Mail Deliveries

Rural mail deliveries are signaled by a yellow indicator that pops up when the carrier opens the box. It saves unnecessary trips to the mailbox. A reflector strip along one side of the steel indicator reduces auto and snowplow damage to the boxes.

Sources of available products described in this issue are listed on pages 12, 14 and 16. Sources of further information on other articles are given in the WHERE-TO-FIND-IT LIST, available from Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11

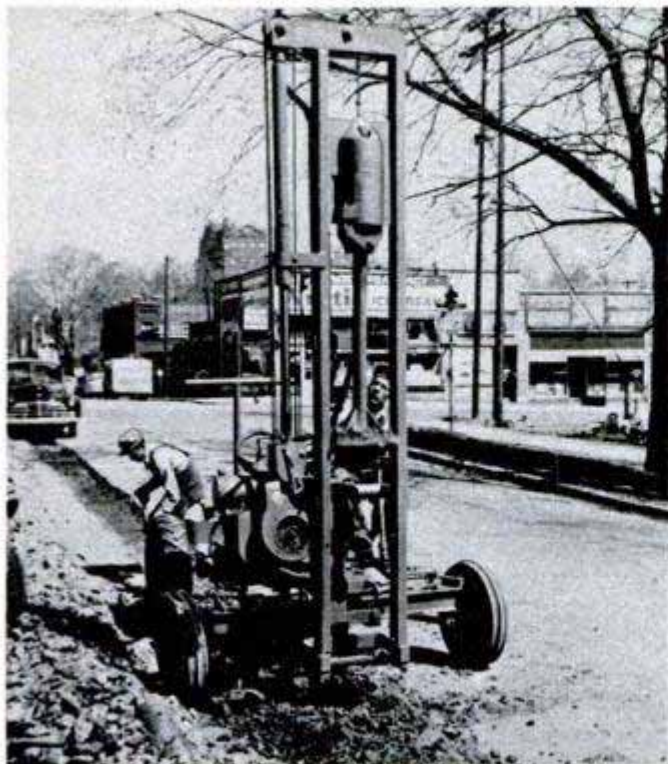


Telephone for Invalid

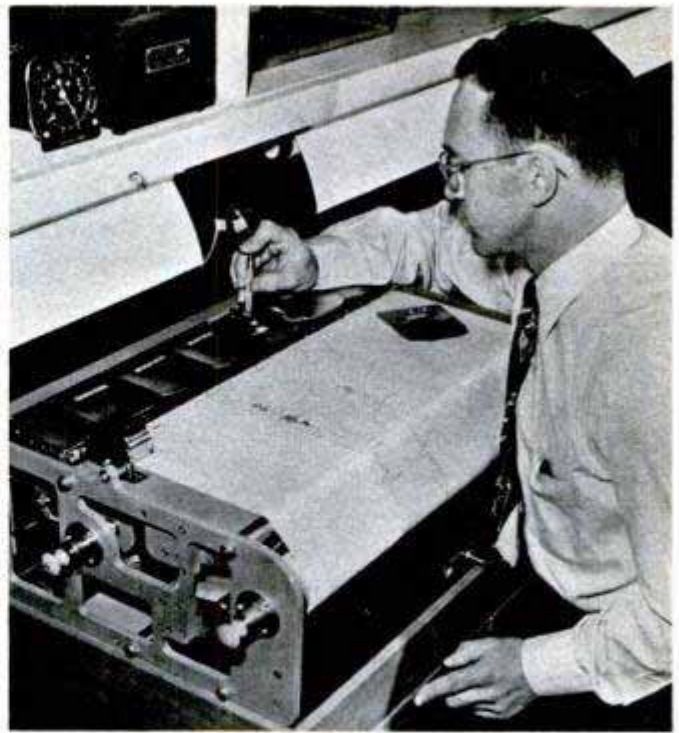
Up in Winnipeg, Canada, there is a spastic patient who is working as an over-the-telephone salesman even though he cannot move either his arms or legs. Thanks to some friends in the Manitoba Telephone System, this patient, John Cavell, has a special telephone which he operates entirely with his head. To cut into the line, he presses a small button with his chin. Then he dials the number with his tongue on a special dial with reduced spring tension. He rests his ear on the flat-mounted receiver and, from this position, talks into the transmitter. When the call is completed he re-presses the button with his chin to hang up.

Plastic Motorcycle Cover

Motorcycles are protected by a Vinylite plastic film cover that can be rolled into a small package that fits into the saddlebag. The cover is flexible at all temperatures and does not crack or peel.



SEPTEMBER 1951



Boeing Aircraft Co.

"Wigglin' Willy"

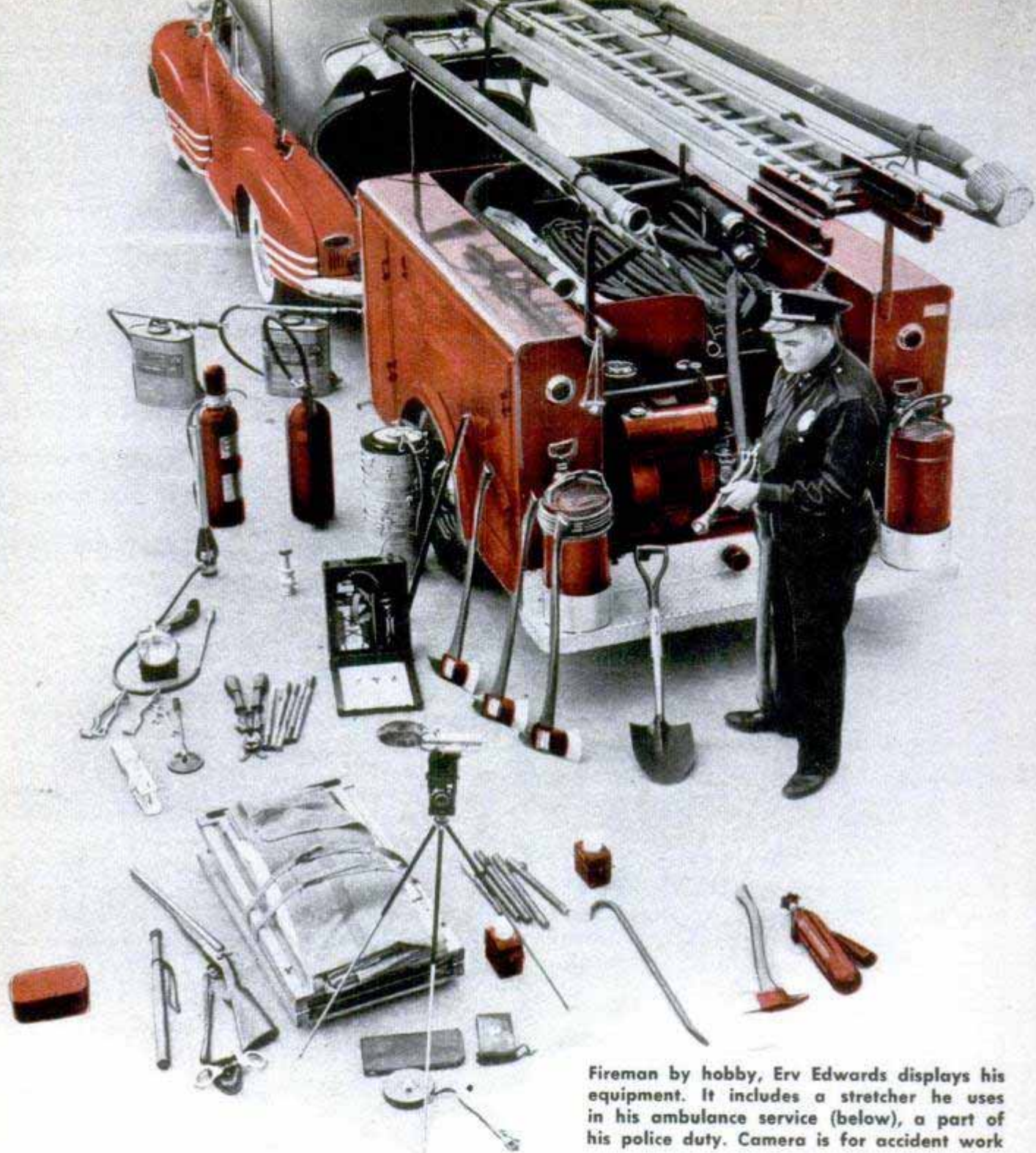
Six pens writing on moving graph paper enable "Wigglin' Willy" to maintain for engineers a running account of the world's fastest bomber's flight tests. Initial test data on the Boeing XB-47 Stratojet was recorded on 79 indicators and it took two weeks to transcribe the results. One pen on the new machine marks off time intervals on a 150-foot roll of graph paper, while the others record such functions as air speed, angle of pitch, normal acceleration and elevator position. The paper moves at speeds ranging from 1½ to 75 inches a minute, and the information is available as soon as the plane lands.

←Breaker-Tamper

Traveling hydraulically from side to side on a tower, a 400-pound steel hammer makes quick work of pavement breaking. The self-propelled machine can also be used for tamping. According to the manufacturer, it compacts all the material removed when a trench is cut for a new pavement, providing a firm base. Operated by one man, the breaker-tamper does the work of four men with jack hammers.

Human Mineral "Mine"

Human hair, skin and nails contain 19 different metals, according to research conducted at the University of Michigan. Minute quantities of heavy metals such as silver, lead, tin, zinc, iron, copper and aluminum were among those detected. Other metals found were barium, boron, sodium, titanium, strontium, potassium, calcium, phosphorus, magnesium and manganese.



Fireman by hobby, Erv Edwards displays his equipment. It includes a stretcher he uses in his ambulance service (below), a part of his police duty. Camera is for accident work



ONE-MAN FIRE DEPARTMENT

By Al. P. Nelson

FARMERS near Sparta, Wis., are mighty glad that Ervin Edwards is around. And they're glad, too, that he has a hobby, because his hobby is fire fighting.

In two years, he has responded to over 50 farm-fire calls, saving four homes and several farm buildings from total destruction. In addition, he has put out many threatening brush fires.

Edwards earns his living as a Sparta policeman and deputy sheriff. His fire service is free—it's a hobby with him. But grateful farmers often make donations to help pay the bills. Once a year he and his wife put on a dance, the proceeds going into the fire-fighting fund. Farmers always turn out in quantity for that affair.

The one-man fire-fighting organization uses a trailer to haul around the equipment. Packed into the two-wheeled trailer is everything needed to handle all but the biggest fires. Sometimes, Edwards is able to hold down even big blazes until help arrives from a distant city. But his special talent is for putting out fires before they get big. His car has a two-way radio and when a telephone call comes in he gets word of it immediately.

In the trailer are ladders, axes, pails and other equipment including a variety of fire

extinguishers. For large blazes, he uses the portable pump to pour water from a farm reservoir or tank onto the fire.

Edwards brought his idea of a personal fire department to the attention of businessmen and farmers around Sparta a few years ago. They agreed that it was a great idea and raised \$2500 to buy the trailer and its equipment.

But the trailer, with all its efficiency, has limitations and Edwards is planning to get a new truck. It will have a 200-gallon water tank—enough to extinguish a sizable blaze.

Like any hobbyist who is worth his salt, Edwards is never satisfied and is always after new equipment. In his case, however, his hobby has a double payoff—it pays dividends to him and to the community.

Edwards saved this farmhouse from complete destruction. Arrows point to only exterior damage from fire

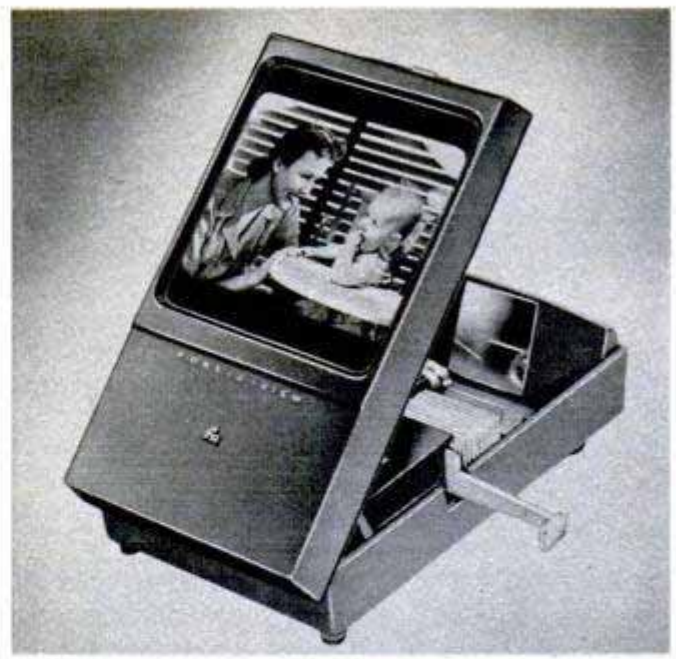
Fireman Edwards and his hobby are as close as the farmer's telephone. Here the whole fire department is shown in action





Fuel From Waste

European homes may soon be kept warm by a new kind of fuel called Wablo, invented by Franz Herren of Aachen, Germany. Consisting of grease from slaughterhouse remnants and coal or sawdust pressed into blocks, the fuel is said to be useful for domestic and industrial heating. The blocks are manufactured with holes running through them in order to increase their combustibility.



Folding Slide Projector

Folding to a compact size that can be carried in a briefcase, a lightweight slide viewer automatically changes slides at the touch of a plunger. Ideal for salesmen who make slide presentations to small groups, the viewer has a six-inch square screen built into the cover. The slides remain in the changer when the viewer is folded for travel. Illumination is provided by a 50-watt projection lamp.

Tiny Radio Transmitter Relays Data From Rocket

Pilotless rockets, speeding through space miles above the earth, send back data by means of a tiny radio transmitter about the size of a cigarette package. At sea level, its signal travels 20 miles, but above 10,000 feet the range increases to 100 miles. Oper-

ating in the 200-megacycle band, the transmitter has a power output of two watts with low distortion and high stability. The data it relays covers many items, from weather conditions to flight characteristics of the rocket.

Two-Way Phone for Fire Fighters Speeds Instructions



Instructions to fire fighters travel long distances over a two-way phone system that attaches to firemen's breathing masks. It is especially useful when the blaze is some distance from parked apparatus or when heavy smoke obscures the view of assisting crewmen on the ground. Each Maskfone has 125 feet of cable on a revolving reel and cables can be interconnected to span greater distances. No batteries are needed since, in effect, the power is generated by the sound of the speaker's voice.



Supervacuum Bottle

You'll never need anything this cold on a picnic, but scientists at Westinghouse Research Laboratories have developed a supervacuum bottle that keeps really cold liquids cold. It is designed to hold four gallons of liquid helium—the world's coldest liquid—at eight degrees above absolute zero for 100 days. The vacuum bottle consists of two copper spheres. The smaller is placed inside the larger sphere and most of the air between them evacuated. The bottle, with liquid helium inside the smaller sphere, is immersed in a tank of liquid nitrogen where the temperature is 300 degrees below zero. In this manner, heat loss is reduced to a negligible amount.

Bottle Provides Oxygen for Fish

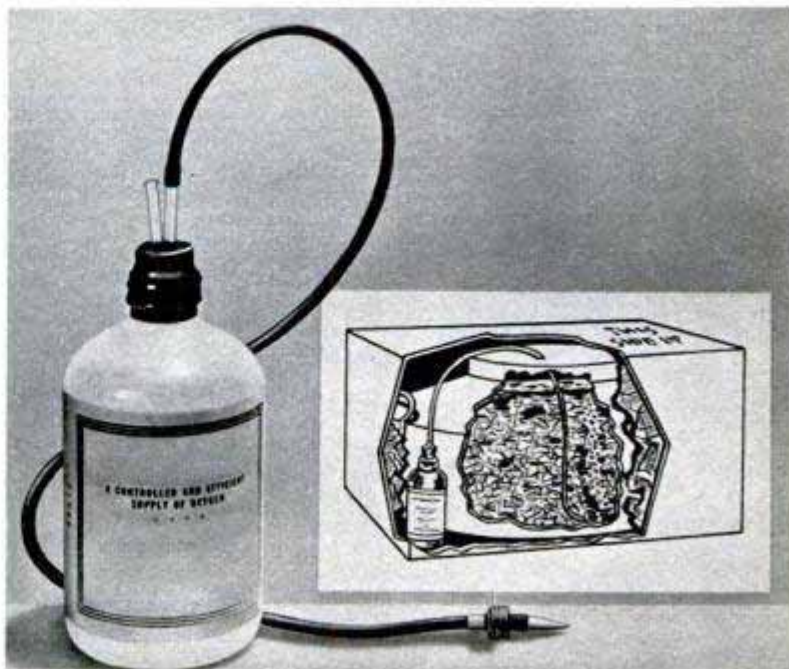
Twice as many live tropical fish can be transported in standard shipping containers if a new chemical bottle is installed to discharge oxygen into the water. Made of Plaxpak plastic, the bottle contains a hydrogen-peroxide solution. Chemical tablets in the top of the bottle are released into the solution shortly before the tank is shipped. A chemical reaction in the bottle discharges oxygen through a tube into the tank.

☐ More than 1,100,000 new motor trucks were sold in the United States in 1950.



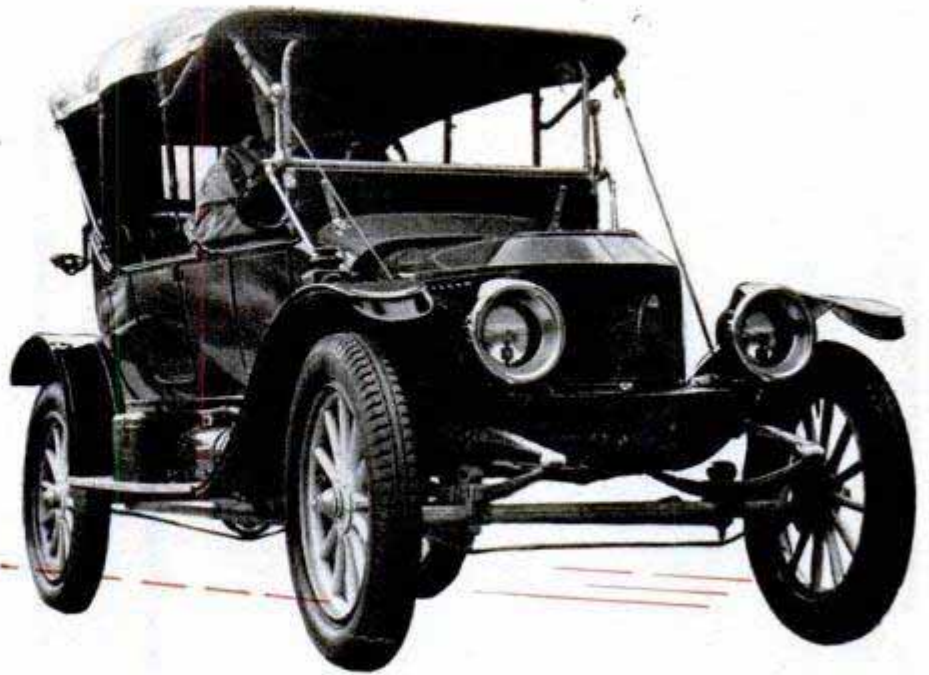
Floating Plastic

Honeycombed with tiny nonconnecting air cells, a flexible expanded plastic is molded into life vests and watertight seals around the face openings in Navy battle suits. Being extremely light in weight, the material has great buoyancy. It also has tremendous shock-absorbing qualities and is expected to be used in body pads for athletes. It can be designed into a life vest that will float a stunned man with his face up, thus preventing him from drowning. A similar plastic is used in life rafts, life-ring buoys and other floating equipment. Because of the solid noncommunicative structure, the plastic rafts will not sink even though punctured many times.



How fast will she go? Jack Brause, in the Stanley Steamer, plans to let her "all out" in the big race

Two old timers will "burn up" the roads from Chicago to New York this month in a trial of the ancient steamer versus the gas buggy. Chicago's Museum of Science and Industry collaborated with Popular Mechanics in readying the 1913 Stanley Steamer and the Stoddard-Dayton of 1911 vintage for the revival.



Stand by for the

RACE OF THE

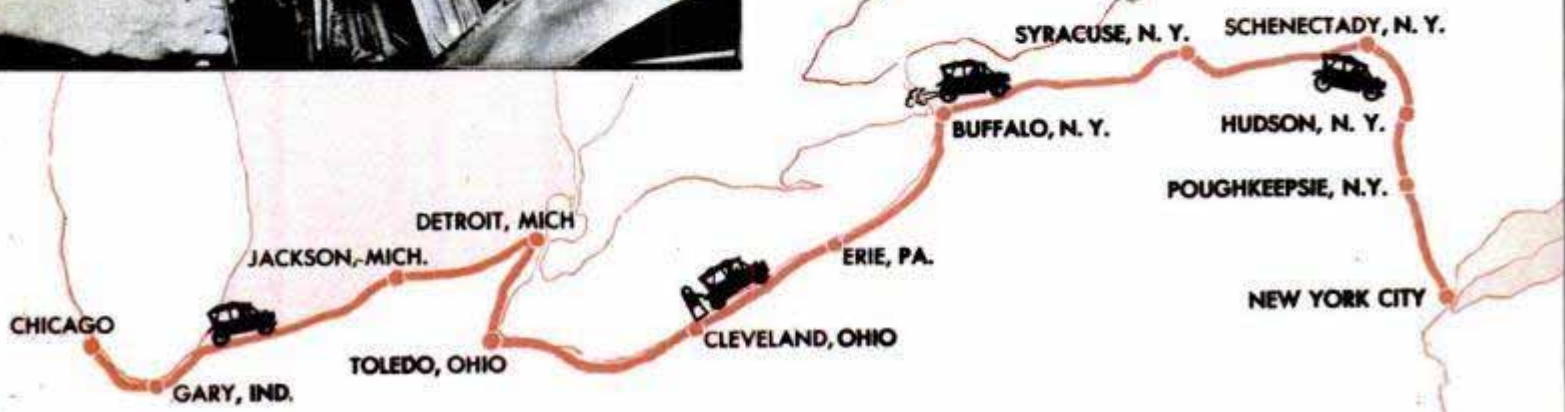
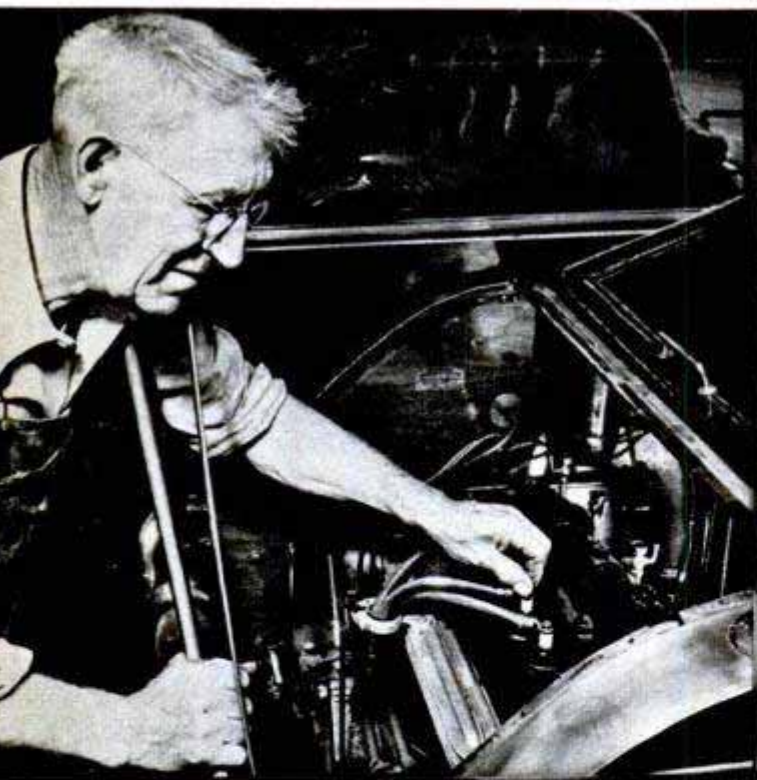
By Aubrey O. Cookman, Jr.

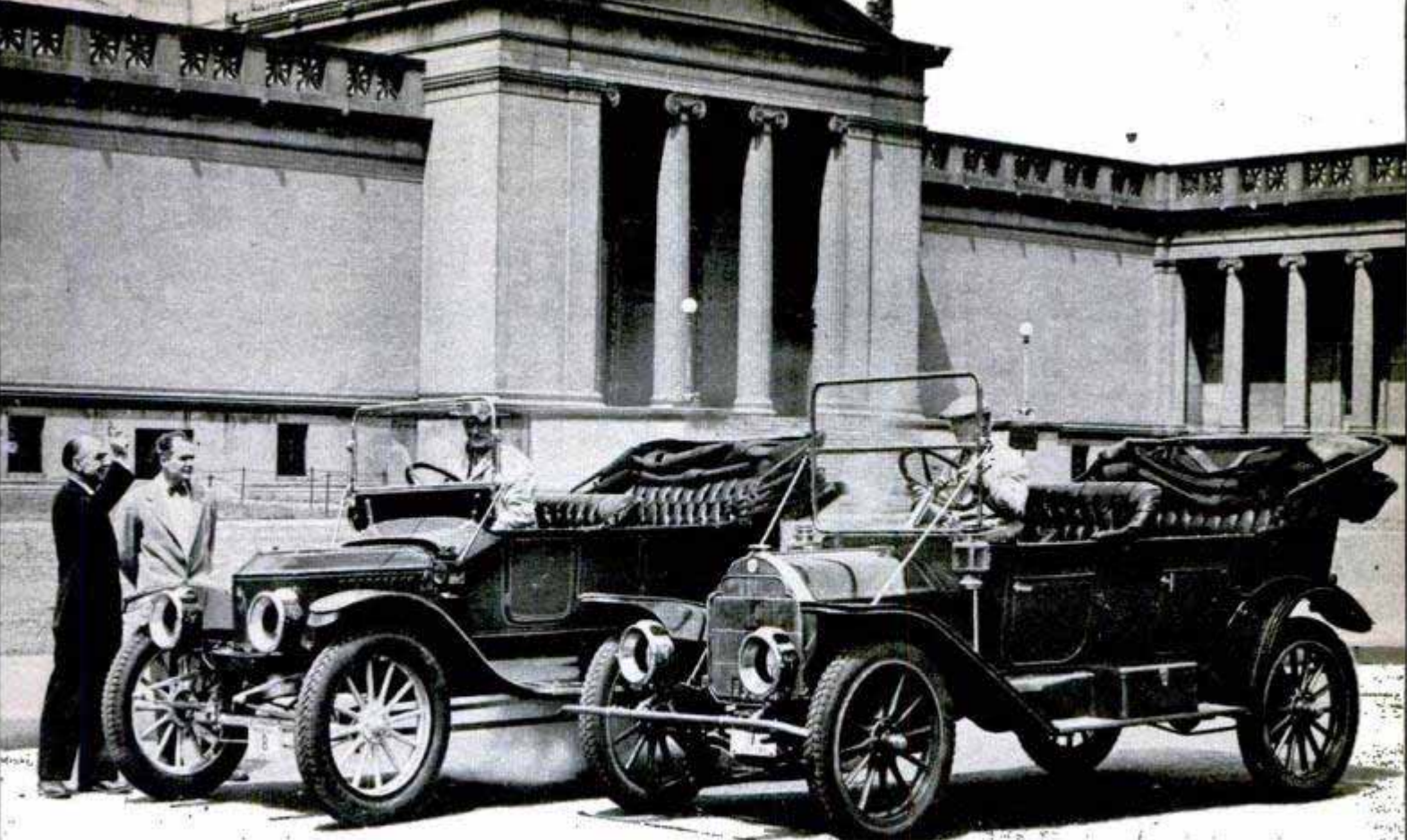
RACING BETWEEN CHICAGO and New York, two perfectly tuned but ancient vehicles this month will attempt to settle an old argument of the automotive world. Could a steamer outrun a gasoline car?

Side by side when Mayor Martin H. Kennelly of Chicago fires the starting gun September 10 will be a 1911 Stoddard-Dayton and a 1913 Stanley Steamer, two out-

Rube DeLaunty, confident he'll win the Chicago-New York dash, checks the plugs on his 1911 "gas buggy"

Some of the cities on the route are shown below. The cars will reach Detroit early the second day





HORSELESS CARRIAGES!

Maj. Lenox R. Lohr lines up the rivals alongside the museum for a practice start. Gas racer is at the right

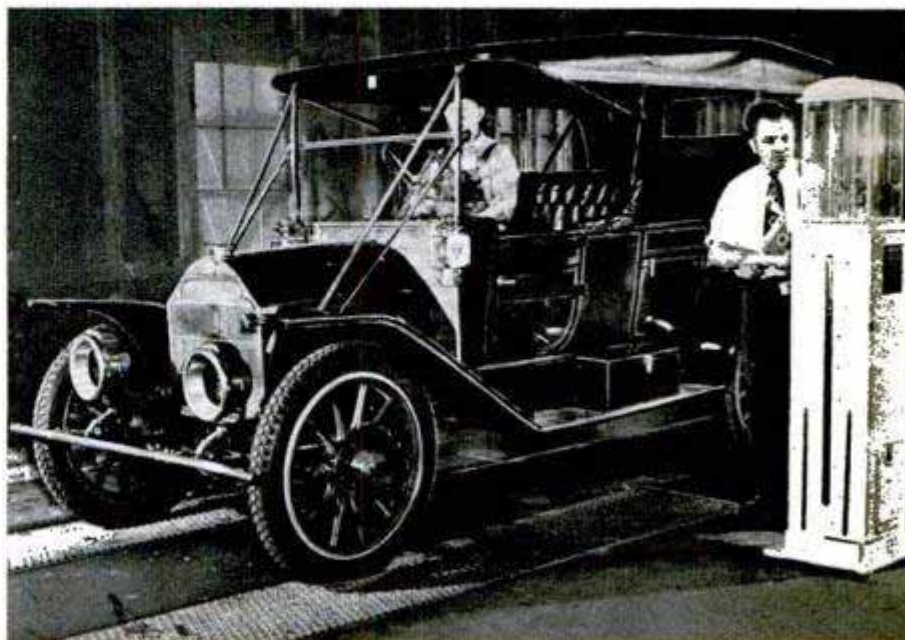
standing early American cars. Both are owned by Chicago's Museum of Science and Industry. Their 1061-mile race is being sponsored by *Popular Mechanics* Magazine as a preliminary to the celebration of its 50th anniversary next year.

Though the last steam-automobile builder stopped production many years ago, die-hard steam adherents have never conceded that the gasoline car is superior. A Stanley, a White or any of dozens of once-popular steamers, they argue, could always outperform comparable gasoline-driven cars. A 1906 mark of 127 miles an hour by a Stanley, they claim, is still tops for vehicles of less than 30 horsepower. "Percolators" of those early days can still pull ahead of modern cars from a standing start.

Many steamcar admirers are convinced that it was mainly the more-aggressive merchandising tactics of Ford, Olds, Willys and others that tipped the scales in

favor of gas buggies. As a clue to the strong competition they once promised, there were over 100 steamcar manufacturers in the U. S. prior to the '20s.

Popular Mechanics' 50th-anniversary race was inspired by endless steam versus gas-power arguments of two elderly museum mechanics. Rube DeLaunty, 69 years



DeLaunty gets the brakes checked at a Chicago vehicle-safety-inspection station

Only expert eyes could identify the assortment of scrap at left, carted in from an Iowa farmer's barn, as the remains of a once-popular 1910 McIntyre car

After months of shop labor, the rusted metal heaped above emerges as the complete, polished car below, in the museum's photo studio



old, and Jack Brause, 76, specialize in restoring for both display and operation some 300 domestic and foreign cars, one of the world's finest collections. Both were in the fledgling automobile industry even before the turn of the century. Since then they have driven or worked on virtually every popular car built.

Neither has much respect for the other's favorite form of automotive power. Rube sneers at the suggestion that the steamcar ever had anything to offer. Jack is equally contemptuous of the gas burner's success.

Learning of the heated controversy, *Popular Mechanics* offered to sponsor a cross-country race that would put the opposing arguments to a decisive test. Rube accepted and said he could win, hands down, with a 1911 Stoddard-Dayton. Jack is already planning a victory speech on behalf

of the 1913 Stanley Steamer he will drive. In addition to public vindication of his claim, each will be spurred on by a \$500 prize for the winner.

Scoring in the race will be based primarily on the shortest elapsed running times between nightly check-in points at Jackson, Mich.; Cleveland, Ohio; and Buffalo, Syracuse and Hudson in New York. Walkie-talkie equipment will keep observers in each of the race cars in contact at all times. An estimated 17 million people along the way will have an opportunity to see the competitors before they reach Rockefeller Center in New York City on Saturday, September 15.

Maj. Lenox R. Lohr, president of the museum and an outstanding authority on early automobiles, and the author will act as judges for any disputes that may arise

during the 1061-mile-long race.

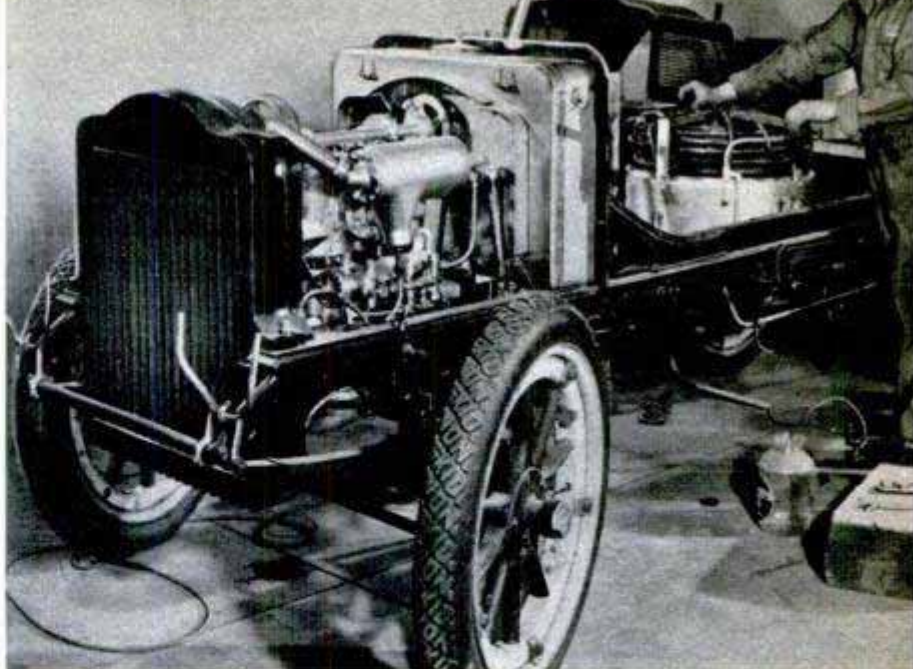
DeLaunty will use a crank to start his four-cylinder gasoline job. Brause will get away swiftly, once 500 pounds of pressure are generated in the Stanley's boiler by a gasoline fire. He'll have to replenish the water in the boiler about every 40 miles. Both mechanic-drivers report their cars are in A-1 running shape, as good as they were four decades ago.

The two colorful old-timers are ideally suited for their roles as protagonists of these rival means of automotive propulsion. Like most of the ingenious tinkerers who kept those first horseless carriages running, Rube was a machinist. His first job was with the Woods Company, building electric automobiles. Later, his own shop in what is now Chicago's Loop became a mecca for motorists with balky new mechanical steeds.

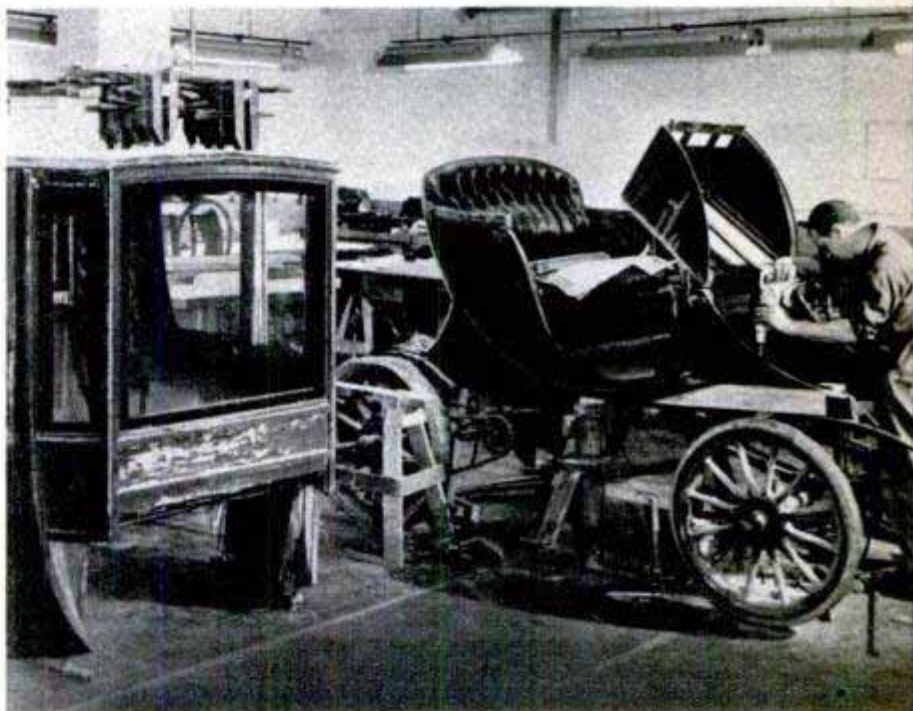
As a sideline, he acted as an "agent" or dealer for many pioneer car makers, including the then popular Locomobile. Agents weren't easy to get and Rube represented them all at the same time, showing whatever advertising materials and price lists seemingly were suited to the wants and pocketbook of the prospect. Demonstrator and display cars were unheard of then because the meager output generally lagged weeks or months behind sales.

He also served as a troubleshooter for the manufacturers. If a man in Milwaukee, for instance, complained that he couldn't operate the car, or that it wasn't running satisfactorily, Rube would be dispatched to iron out the difficulties. Sometimes the builder had neglected something minor but vital, like providing an air hole in the gas tank, and a few turns of a drill or wrench erased the problem.

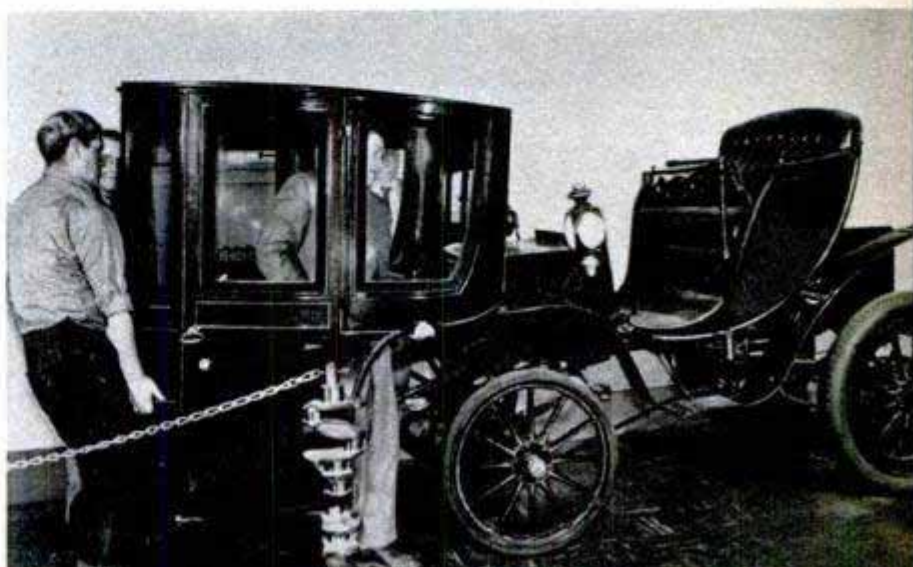
Tales of his motor magic finally got to millionaire merchant John G. Shedd, of Marshall Field and Company, who was then making the bold switch from horses to autos. Having Rube around full time appealed to him as the perfect antidote for the uncertainties of the newfangled transportation. So, in 1904, DeLaunty started a 30-year career



Gradually approaching its original state is this 40-horsepower White Steamer, built in 1906. A White of earlier vintage led the 1905 inaugural parade for Theodore Roosevelt. Below, Ed Komerski of the body shop prepares a horseless-carriage frame for exhibit

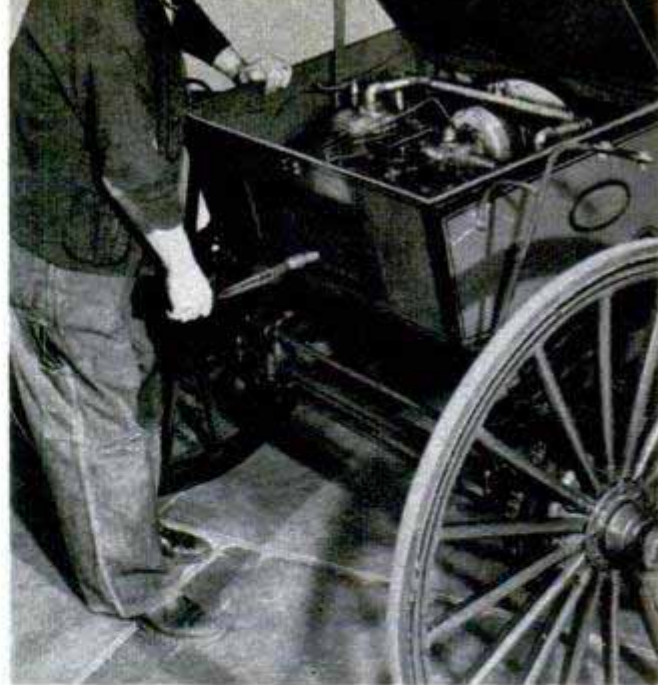


It took four or more strong men to do the job whenever this 1906 Woods Electric "convertible" was ready for its seasonal change





Brause's Stanley Steamer entry will be ready to roll when the pressure in this boiler gets to 500 pounds



Compact and easily accessible, the power plant of this 1910 Schaact was an early try at rear-engine drive

with the Shedd's as a chauffeur and mechanic. Then, before garages and service stations dotted streets and highways, he spent more time doctoring vehicles so they'd run than he did driving them. The blacksmith shop was the handiest and most dependable place to replace broken parts.

Brause, originally a plumber and steam-fitter, spent three decades with Stanley, probably the most famous of all steamcar companies. Most of that time was spent on the road, selling and demonstrating.

In 1910 the government "borrowed" Jack from Stanley while it experimented in Washington, D.C., with steam trucks for the mail service. He kept the three 10-horsepower test trucks moving on a round-the-clock schedule, each collecting from 1600 storage boxes within 24 hours. Just before Stanley halted production in 1923, Brause bought their Chicago service outlet, operating it until 1927 for the 700 owners of the "orphan" car in that area.

Brause and DeLaunty joined the museum staff near the close of the last war. Their headquarters—the institution's old car factory—sprawls over a large part of the big building's basement. One section, the "graveyard," often has up to 50 old wrecks that have been bought or donated. Many would defy identification as an automobile, except by Rube and Jack, who have a kinship with those paleontologists who can start with one bone and reconstruct entire prehistoric animals.

As one of the museum employees remarked, "If you gave those fellows a hub cap they could build a car around it—except that sometimes they have to make the hub caps, too!"

After a relic is assigned a work priority, usually based on its rarity or its interest as a display item, the car is carried or pushed to the "resurrection center." There the remaining parts are stripped off. Every nut and bolt, including those frozen by rust and age, is removed. Rust on all the parts and what small splotches of paint remain are taken off with a sand blaster or buffed away with a flexible-shaft tool. Finally the car is down to the bare frame and ready for methodical reassembly.

Here is where the long memories and experience of Jack and Rube come into play. They refuse to take similar parts that would work from a storeroom filled with old headlamps, timers, speedometers, ornate radiator caps, carburetors and assorted accessories.

(Continued to page 242)



Eleanore Hall of the museum staff admires a 1911-style station wagon, made by Brush



James L. Kraft, noted industrialist and "rockhound," in his workshop putting final touch to a jade ring

They Make JEWELS at Home

By Wayne Whittaker

THOUSANDS of amateur craftsmen are discovering a hobby that was fascinating to the earliest caveman. That hairy ancestor started it when he picked up a pretty agate pebble along some prehistoric beach, polished it in the sand and presented it to his girl friend. She, of course, showed it to the girl in the next cave who, in turn, gave her male protector no peace until he found a prettier pebble.

Possibly the modern lapidary craze in the home workshop has been spreading in similar fashion. At any rate it has reached

such a peak, especially on the West Coast, that one noted "rockhound"—prospector for gem stones—predicts that in 25 years there will be few gem-quality stones left to pick up.

"All the loose crystalline quartz, chalcedony, agate, jasper, jade and other gem stones now found in the rough will be gone," says James L. Kraft, widely known as America's No. 1 rockhound and amateur lapidarist. "Most of these stones will be piled in basements in another 25 years if the present craze keeps its pace."

Mr. Kraft, who in his "spare" time acts

*Photos by Paul Hutchinson
PM Staff Photographer*

Kraft made the jewels on table from a chunk of variscite like the one shown here. The necklace was made from jade that was picked up in pebble form, polished by the sea, and deposited in a cave at Monterey, Calif.





Mr. Kraft holds a jade butterfly beside display cabinet housing part of his collection. His interest in antique jade (left) led to his setting up a home-lapidary shop and his eventual discovery of fine American jade

as chairman of the board of the cheese company bearing his name, speaks with authority. He is credited with the discovery of American jade. A few years ago when he was proving to the experts that jade did exist in the United States, he discovered a mountain of the stuff in California. He bought the mountain near Happy Camp and made no effort to keep his find a secret. He was overjoyed to find an apparently

endless supply of rough jade of gem quality for his home-lapidary wheels. The word spread and rockhounds from far and near swarmed over his little mountain. Today the top of it is entirely missing—also all the loose jade.

Kraft, like most of his contemporaries, is more concerned with the creation of a piece of beauty from rough stone than the intrinsic value of the gem. He prefers the



This quartz crystal was imported in the rough by Kraft from Brazil. It was cut by an expert into a 280-carat stone with 252 facets, a real beauty



← Brooches made by Kraft rival the rainbow. In front row, the second from right end is a turquoise and the fifth one a stone found on Saipan beach



Photo courtesy of Chatham Research Laboratories

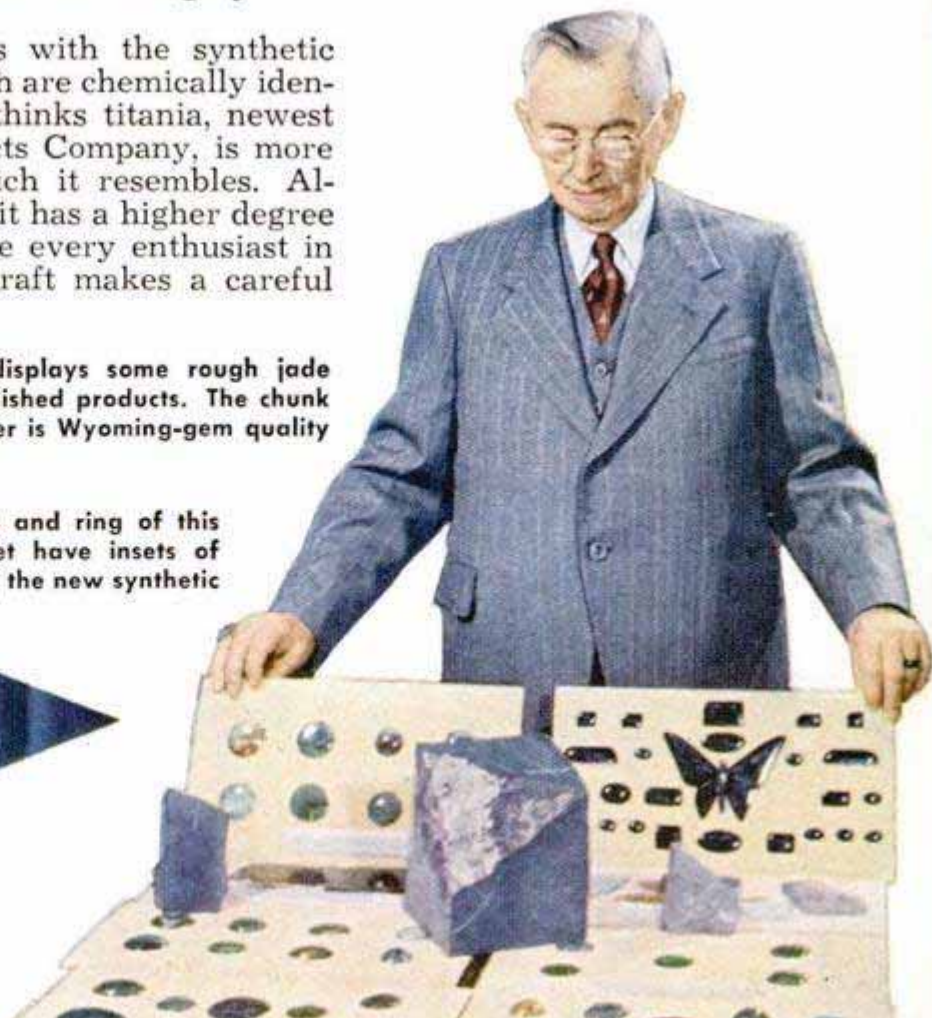
Carroll F. Chatham, who discovered the process for making true synthetic emeralds, inspects emerald crystal

semiprecious stones such as Montana moss agates, variscite, chalcedony, rose quartz, opal, amethyst and, above all, jade. The recent demand for and scarcity of the latter has lifted it almost into the category of a precious stone.

Kraft also collects and works with the synthetic stones, sapphires and rubies, which are chemically identical to the genuine jewels. He thinks titania, newest product of the Linde Air Products Company, is more beautiful than the diamond, which it resembles. Although not so hard as a diamond, it has a higher degree of refraction and dispersion. Like every enthusiast in regard to the new synthetics, Kraft makes a careful

Kraft displays some rough jade and finished products. The chunk in center is Wyoming-gem quality

Earring and ring of this jade set have insets of titania, the new synthetic





Displayed beside antique jade jewel box are synthetic rubies and sapphires, also a split ruby "boule"



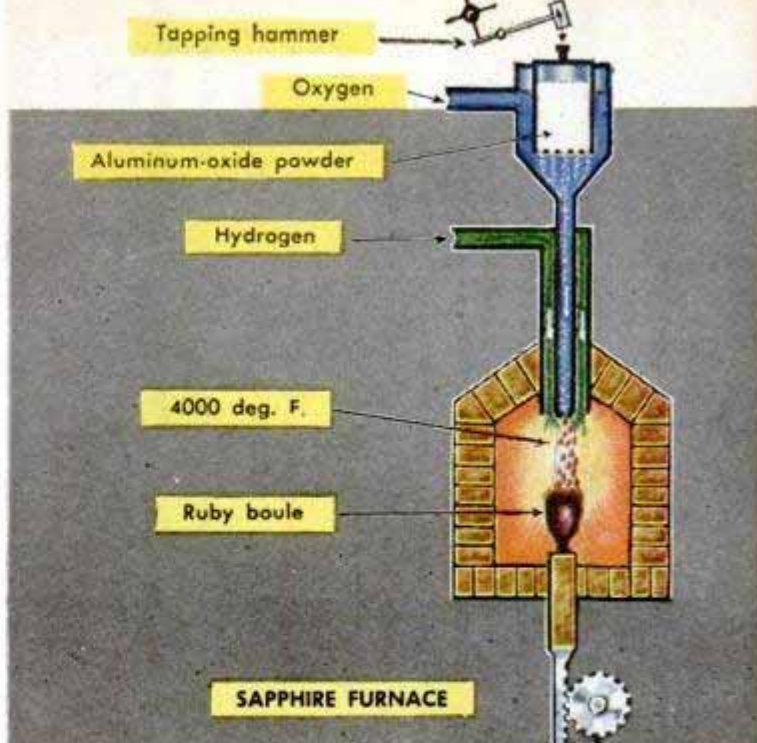
Photo courtesy Linde Air Products Co.

These synthetic sapphires are chemically identical to natural gem. Stones are made from boule at top



Above, model holds carved-jade belt buckle believed to be 5000 years old. Jade ring and agate bracelet were made by Kraft. Below, some synthetic rubies

Photo courtesy Linde Air Products Co.



Duplicating the gem-making process of nature, the sapphire furnace builds up boule of true synthetic

distinction between the words "synthetic" and "imitation." For example, an imitation ruby may be made of red glass, while the true synthetic is chemically identical with the natural ruby and is of the same crystal structure. Only an expert with a powerful magnifying glass can tell the difference.

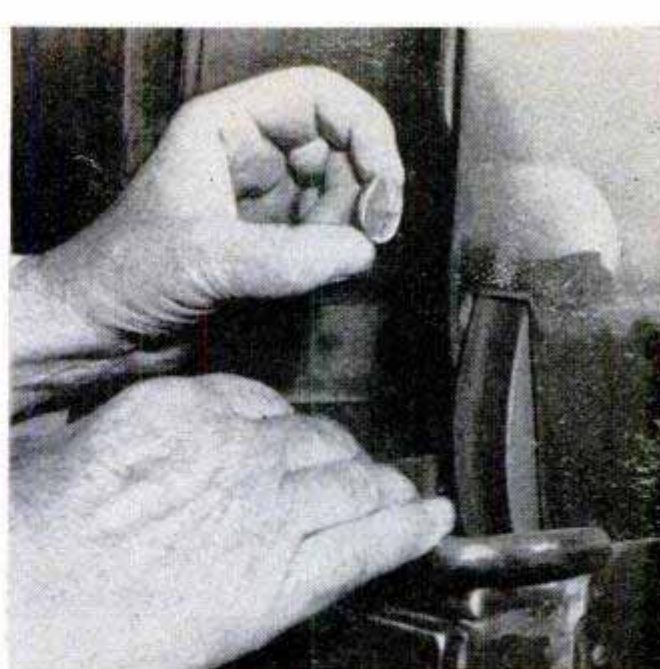
Perhaps one reason for the popularity of gem cutting as a hobby is that it is not necessarily an expensive pastime, but can be geared to any pocketbook. First of all, many raw materials can be obtained without cost. Scores of lapidary clubs organize field trips in their communities for picking up stones. Quartz in its many gem forms is probably the greatest favorite with the home lapidary. These include the violet amethyst, pale yellow citrine or false topaz, transparent rock crystal, rose and smoky quartz. The latter occurs in many shades. Then there is chalcedony ranging in colors from red carnelian to apple green, the variegated agate, onyx and jasper.

One of Kraft's favorites is variscite, a bright, rich green stone with yellow and gray streaks which makes up into attractive gems. If rough stones are not available in one's community they can be purchased at low cost through numerous dealers. They are supplied in the rough, cut into "blanks" of various sizes, or at slightly higher cost in "preform" cabochons which have only to be polished and finished. The cabochon cutting (flat on the back and a smooth rounded top) is the favorite with beginners for it makes a beautiful gem and is far easier than attempting a faceted (brilliant) or emerald (square) cut.

Stones which are easy to obtain from the dealers include jade (black or green),



First step in making stone for a jade ring is to cut the ring blank from slab sliced from the rough



Second step, blank is rounded to dimensions of desired cabochon setting on a silicon-carbide grinding wheel

variscite, aquamarine, amber, garnet, opal, lapis lazuli, tiger-eye, tourmaline and turquoise, in addition to all the quartz family. You can also buy pieces of petrified wood (a reddish-hued favorite is called Arizona) and even petrified dinosaur bones.

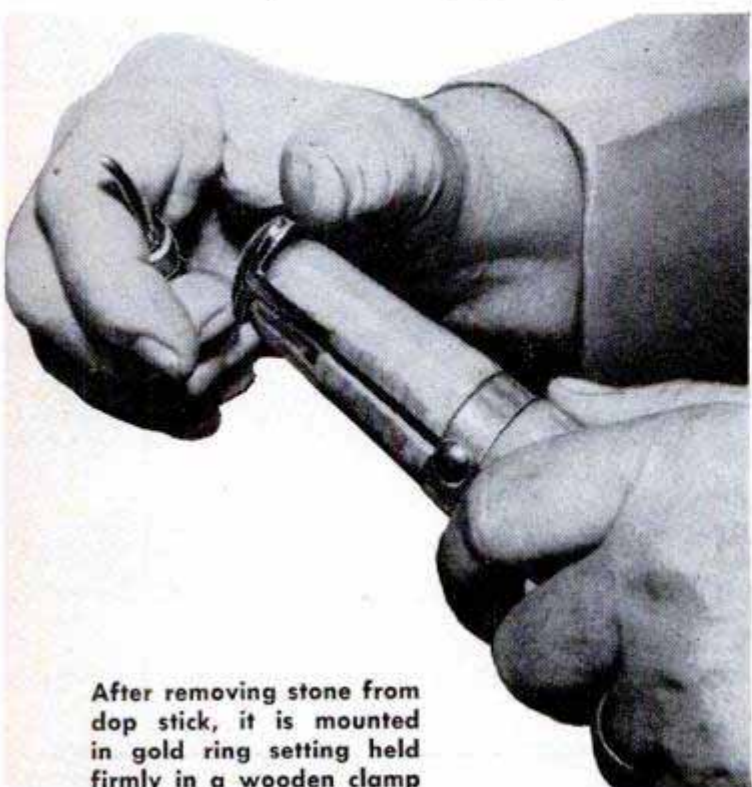
From time to time dealers or traders come up with rare and unnamed stones. Many of these are believed to be odd combinations of stones fused by volcanic heat. Recently a prospector in Mexico discovered a strange stone which he called a "peanut" gem. The rough material looks like garnet crystals cemented in obsidian. When sawed in slabs for cabochons, the "floating" garnets look like a cross-section of peanut

(Continued to page 228)

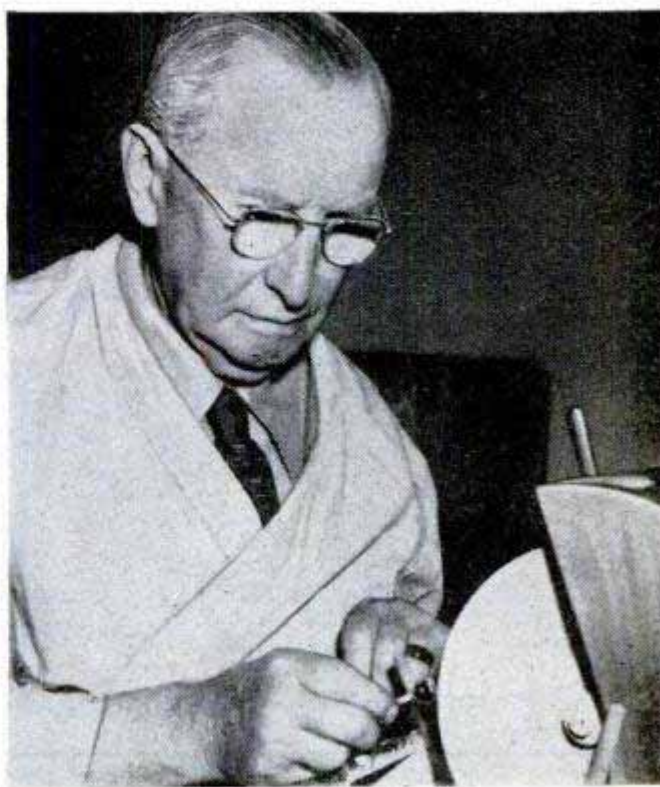


Stone is mounted on dop stick with sealing wax for polishing

Mr. Kraft gives the stone its final polish on hard felt buffing wheel, using tin oxide as polishing aid

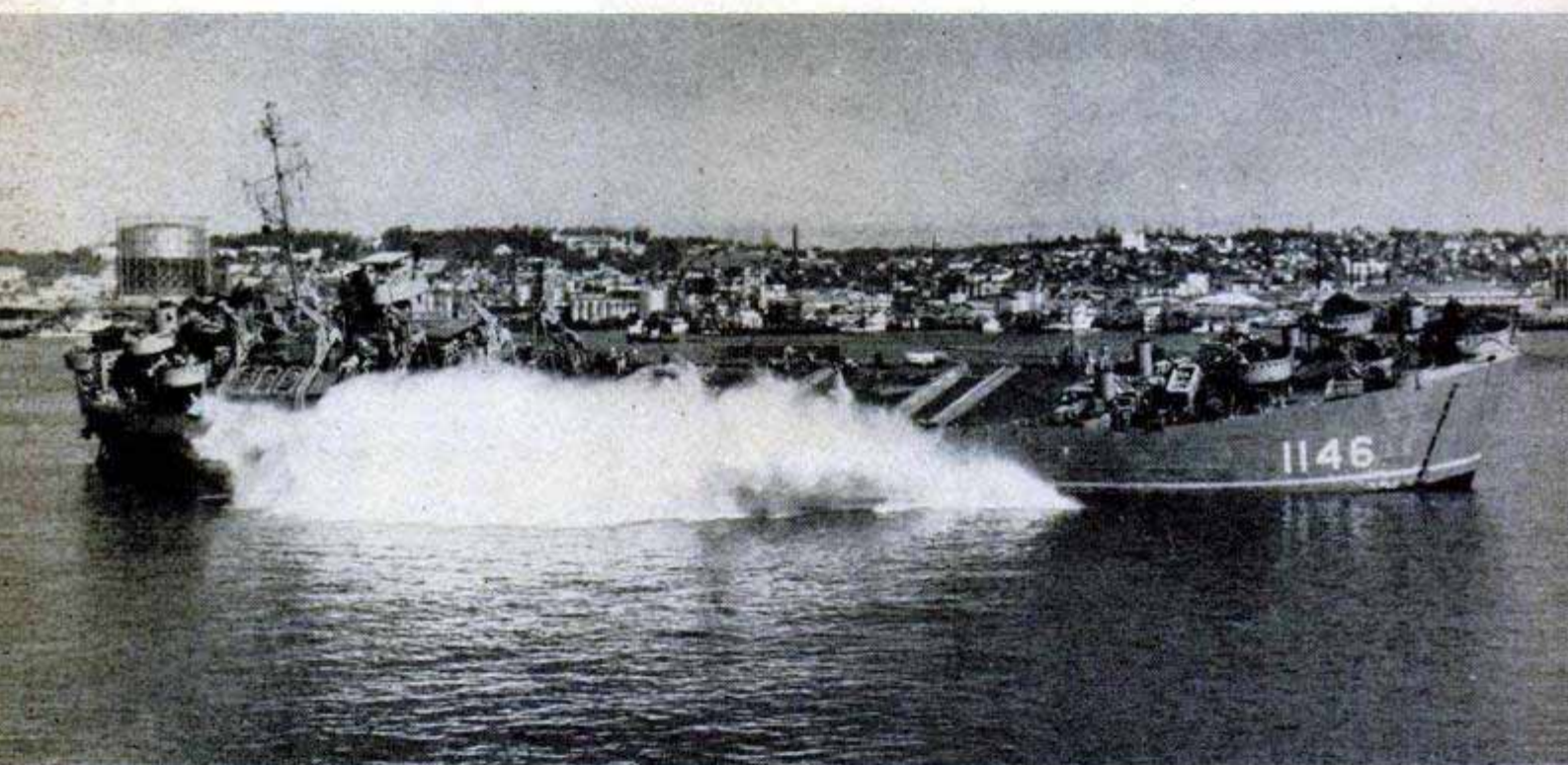


After removing stone from dop stick, it is mounted in gold ring setting held firmly in a wooden clamp

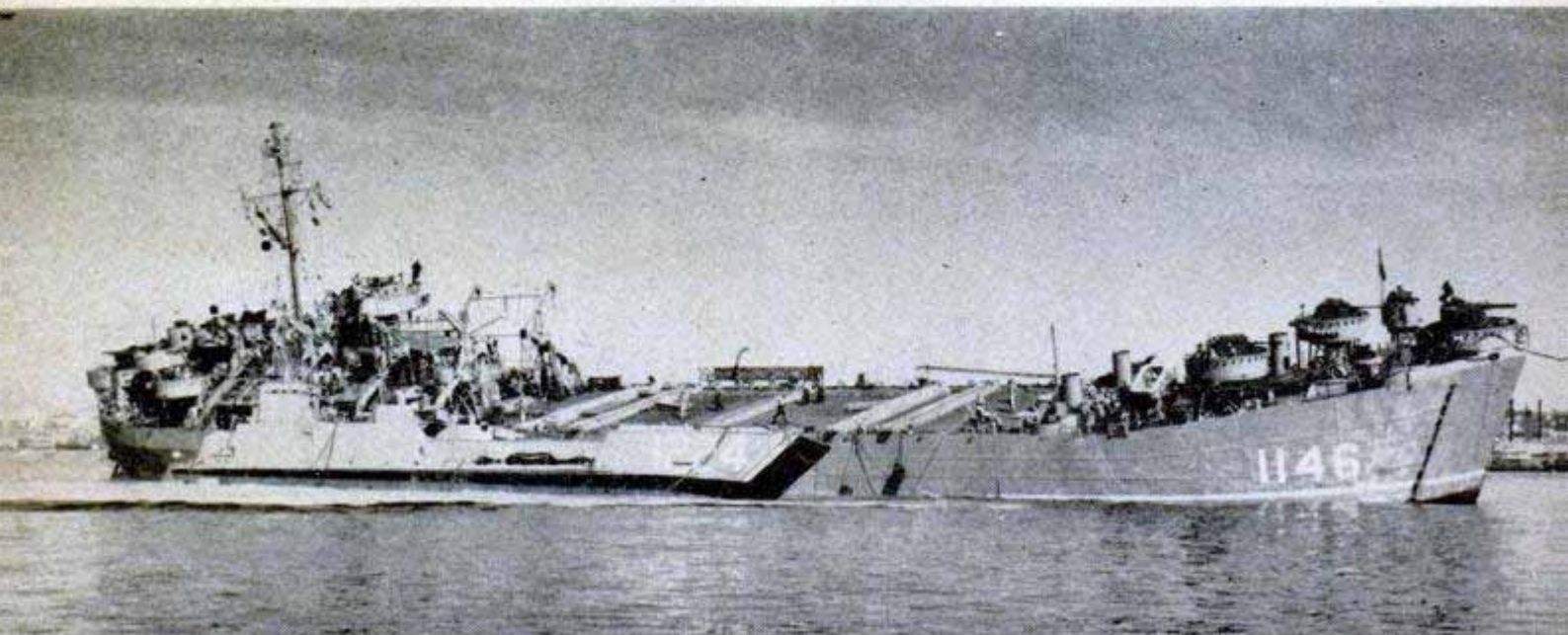


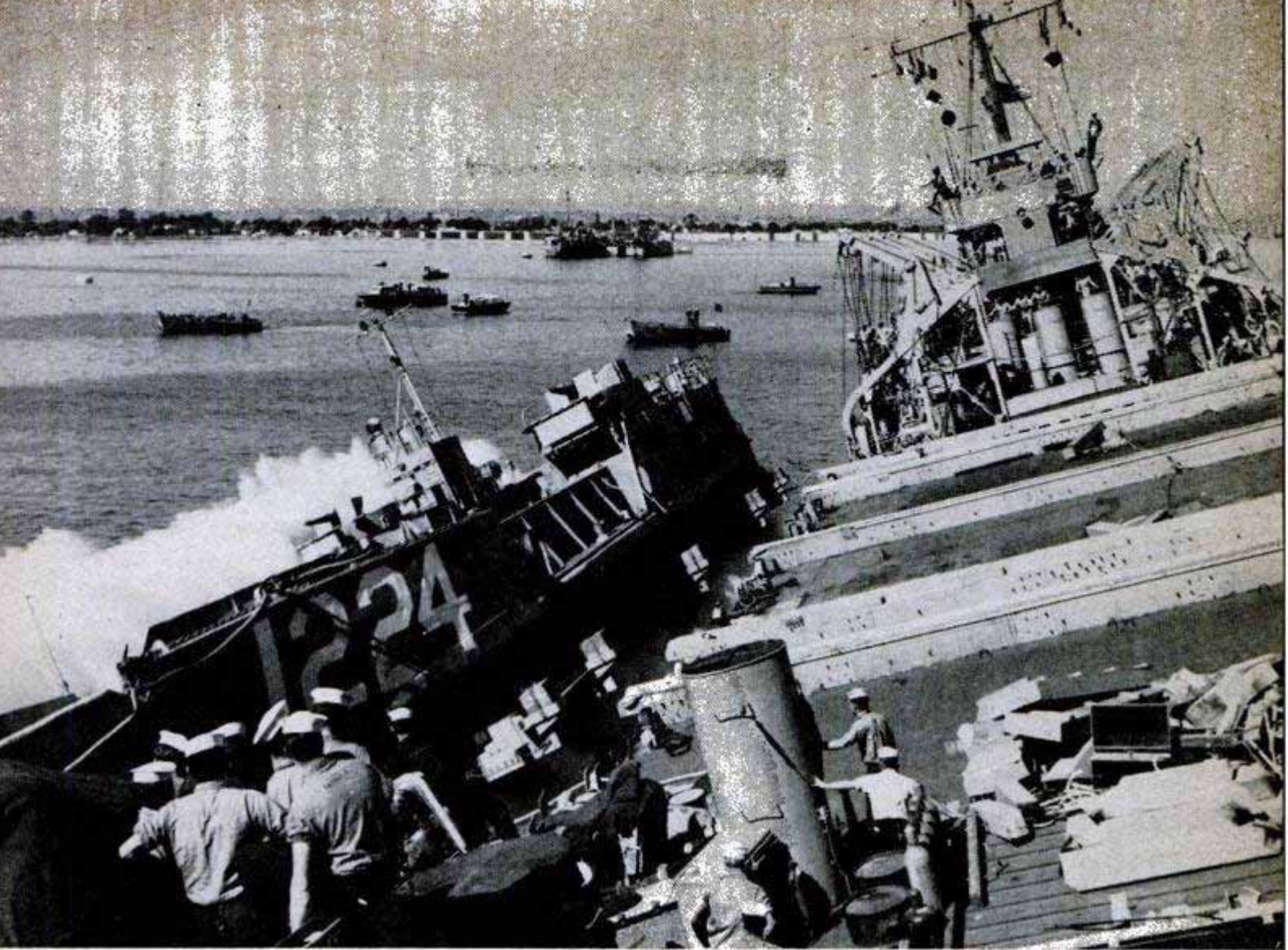


Stopped in mid-air by the Navy photographer, the LSU skids off the deck of the LST on its way into the water



In the world's biggest "bellyflop," the LSU hits the water with a splash that sends up a curtain of spray. Briefly bobbing around like a cork, the LSU soon settles down in the calm water and is ready for boarding.





Shipside view of the LSU as it strikes the water. The greased skids on which it slid can be seen at right

LSU Rides Big Brother to Work

LSUs are handy ships to have around a beachhead—they'll haul anything. The "U" in the initials stands for Utility—a most appropriate name. But useful as it is, the LSU has a few drawbacks—it's slow and its range is limited. To overcome these deficiencies, the Navy developed a pickaback launching technique.

The 120-foot work horse of the waterfront has a normal range of less than 500 miles. It can go farther—many have crossed oceans. But generally it is limited to hauling mountains of supplies ashore from freighters.

With the pickaback system, the Navy hauls the LSU anywhere in the world. Lashed to the deck of an LST, its larger and faster brother, the utility ship has unlimited range. It's a seaworthy combination, too. So well is the loading done that LSU-carrying LSTs ride through tropical storms without damage. Yet so expert is the lashing

that in minutes the smaller ship is cut loose for launching.

Water ballast is pumped into tanks on the LST until the proper list (about 30 degrees) is attained. Then the restraining chains are released and the smaller craft slips waterward on well-greased skids. It gathers speed as it slides and strikes the water with a solid slap, sending spray over everything. To prevent damage that might result if the bobbing LSU should bang against the LST, the trick is to "throw" the smaller craft through the air as far as possible. Because of the terrific smash with which the LSU hits, nobody rides it down. It is allowed to bob around on a "tether" until it can be hauled in close.

If you see an LST carrying an LSU don't let some Navy vet pull an old, barnacled joke on you. If you look like a landlubber, he's apt to describe the LSU as the "biggest lifeboat in the whole dern Navy."



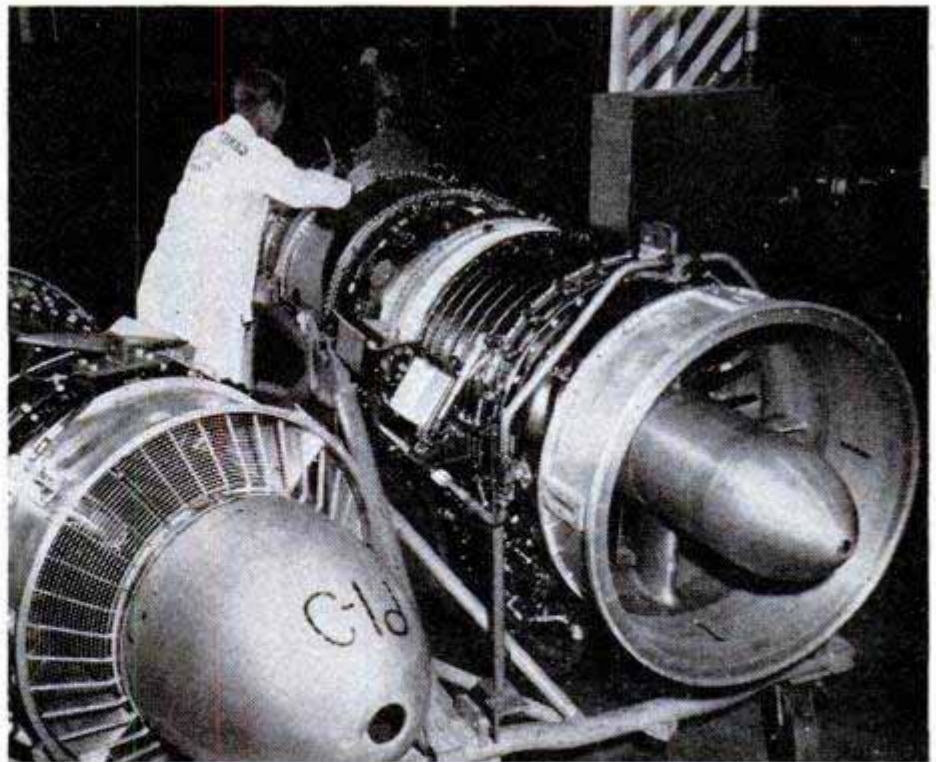
Tank-Track-Type Landing Gear for Airplanes

Built along the lines of a tank track, a new-type landing gear permits airplanes to land on the most hazardous terrain. The pneumatic rubber track depresses when

passing over sharp-edged stones and rocks. It was invented by Count Guido Bonmartini of Italy, who has sold the patent rights to his country and to Switzerland.

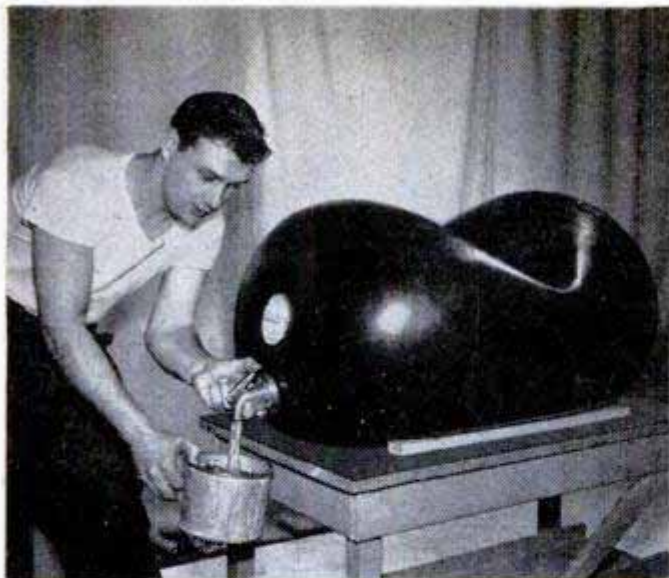
Anti-Icing Features In Turbojet Engine

With a thrust output so much greater than the J-47 that "it isn't even in the same class," a new turbojet engine is said to be an important advance in the world race for jet supremacy. Developed by General Electric, the engine puts out far more thrust than the 5200 pounds of the present J-47. For security reasons, the engine's power is not revealed. The new model has a "cannular" combustion system, consisting of a single combustion space containing individual "cans." Some accessories, housed in the nose of the present J-47, have been placed beneath the engine to provide a greater air-inlet area to the compressor. "Hot noses," achieved by bleeding hot air to hollow nose parts, and



Accessories in the new J-47 engine (right) are located underside instead of in the nose. This permits a greater amount of air to enter compressor

retractable air-inlet screens prevent ice collection on critical parts, making the engine an all-weather model.



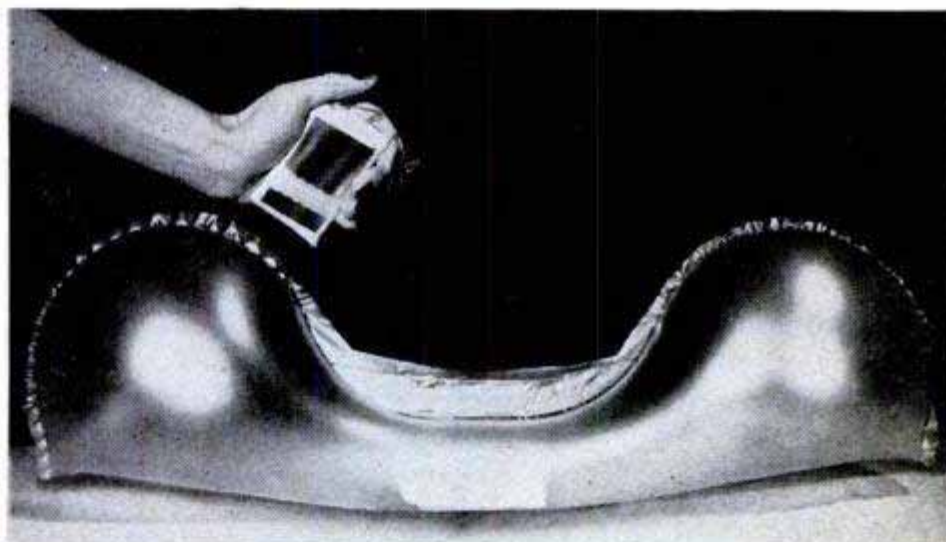
Collapsible "Barrel" Made of Rubber-Fabric

Suitable for the shipment of oils, acids, paints and dry powders, a 55-gallon synthetic-rubber-fabric drum collapses as it is emptied. An advantage of the collapsing feature is that no vent is required as the

liquid is removed. It also saves shipping space when the drums are returned for re-filling. More than 2500 collapsed drums can be shipped in a boxcar that holds only 300 rigid drums.

Tiny Life Preserver Holds 250-Pounder

Palm-sized when deflated, a plastic life preserver will support a person weighing up to 250 pounds. A fastener clips it to clothing or a bathing suit. Even a child's grip can release the carbon dioxide that inflates it into a full-size, two-foot water wing. It inflates when the container is squeezed.



Gondoliers Get Traffic Tickets

Reckless gondoliers in Venice are handed traffic tickets by police who roam the "streets" in small boats. The Venetian taxi driver now is confronted with traffic lights installed along the Grand Canal. More than 400,000 people travel by boat along 500 miles of canals in the city, and a huge increase in water traffic has forced the police to patrol the seaways.

☐ It is estimated that if all the dust in the atmosphere could be gathered together, it would make a cubical mass that would measure 587 feet on a side.



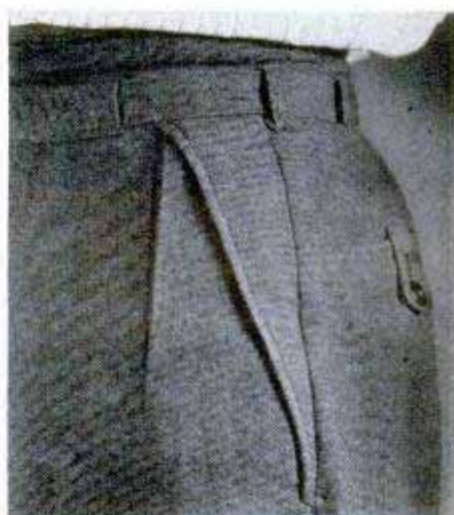
British Jet Flying Boat

First of its kind, a water-based jet fighter built by Saunders-Roe in England has exceeded 500 miles per hour and has landed

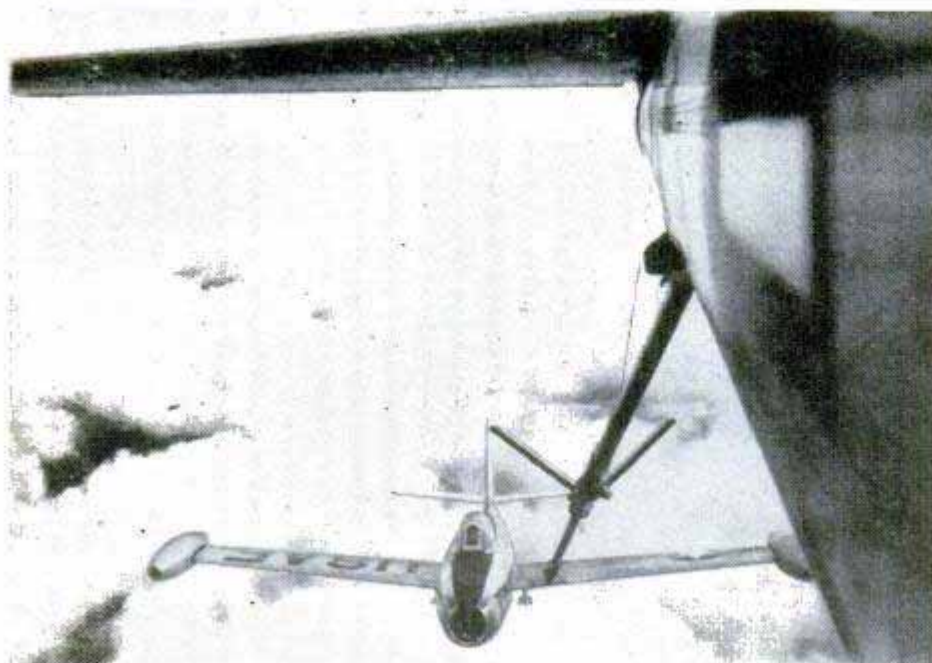
at about 100 miles per hour. It is extremely maneuverable. A trap in the nose air intake prevents water from entering in heavy seas. A single-seater, the SR-A1 has nose ports for four 20-mm. cannon.

Pocket Protector

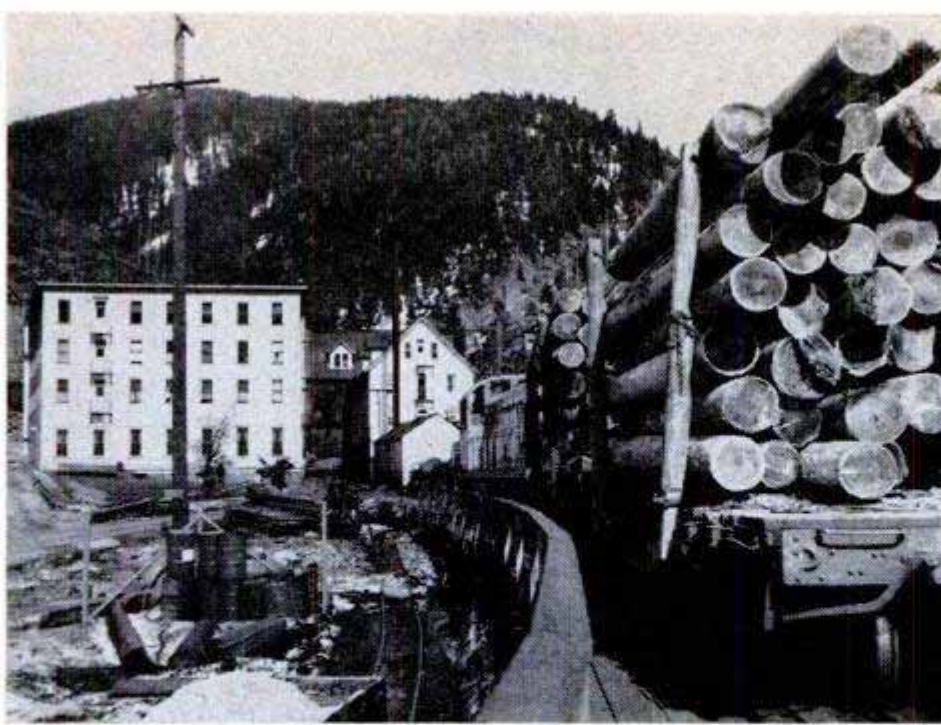
Loose change and other articles are protected by a newly patented spill-proof pocket. Introduced at a Canadian men's fashion fair, the device consists of an extension of material that slants forward over the regular pocket. It is particularly useful when the wearer is sitting in a car seat or in low lounge furniture.



Mid-Air Refueling Increases Range of F-84 Thunderjet Fighters



Only 2½ minutes are needed for a complete mid-air refueling of the Air Force's newest Thunderjet fighters. Several hundred gallons a minute pour through a single entry point just above the leading edge of the wing. This permits the plane to take off with a greater armament load. Fuel added aloft increases its fully loaded combat range. The "G" model of the F-84 is the first operational jet fighter to come off the production line completely equipped for mid-air refueling.

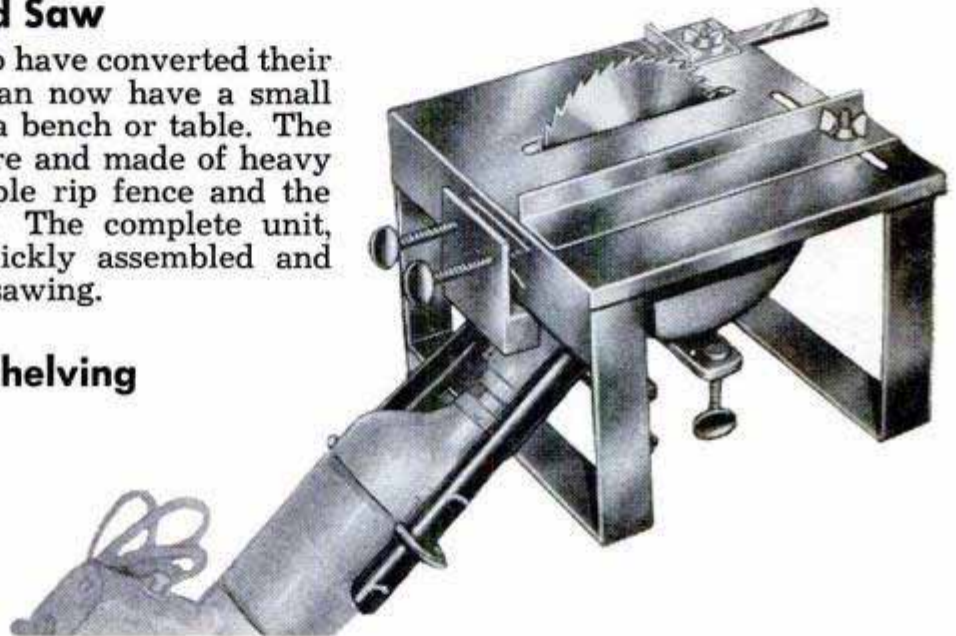


Trains Go Through Hotel Lobby

In the little mountain town of Burke, Idaho, trains run right through the hotel lobby. The town is squeezed into a narrow canyon, with little room for streets or railroad tracks. Consequently cars are parked on the tracks between freight runs, and trains edge through the town within arm's reach of the buildings. The climax to any rail run comes when the train moves through the hotel lobby, where a tunnel had to be cut.

Table for Drill-Powered Saw

Electric-drill owners who have converted their drills into circular saws can now have a small table saw that mounts on a bench or table. The table is seven inches square and made of heavy gauge steel. It has a simple rip fence and the blade tilts to 45 degrees. The complete unit, including the drill, is quickly assembled and clamped into position for sawing.



Channel Strips Make Shelving

Shelves can be built to any dimension with strips of steel channel and spring clips. The framework for the shelves is built up from the steel channel. Then the clips are inserted in the channel. The clips are held in place by friction—the heavier the load on the shelves, the tighter

they grip the channel. Teeth on the clips bite into the wooden shelves.

Hunt for Oldest Readers

How long have you been a reader of Popular Mechanics?

As part of our celebration of the Golden Anniversary of this magazine next January, the editors are seeking the names of our oldest regular readers—those who have subscribed to the magazine or bought it regularly at newsstands for nearly 50 years. Some, we believe, have read Popular Mechanics since it began publication in January 1902, and many have very complete files from the beginning.

If you are a "regular" of 40 years or more, send us your name and address and tell us how long you have read the magazine, and how far back your file of the magazine goes.

Address the Managing Editor, Popular Mechanics, 200 East Ontario St., Chicago 11, Ill.

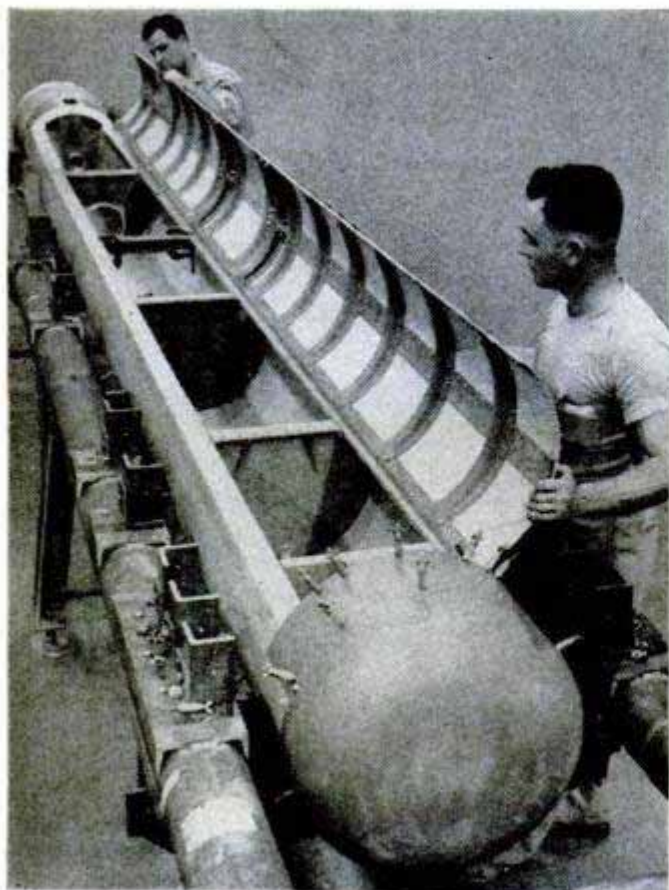
Transparent Screen Provides Clearer Television Picture

Better television pictures are promised with a transparent screen for picture tubes. The transparent coating on the face of the tube will give greater contrast between light and dark areas because the viewer will see through the screen into the dark recesses of the tube. Present tubes are coated inside with a powder which appears white or gray. The shade of this powder is the darkest any portion of the picture can be. With the new transparent coating of zinc fluoride and manganese, the dark areas can be made much blacker. The new screen is under development at General Electric laboratories in Schenectady, N. Y. Dr. Ferd E. Williams discovered the new process.

Survivors climb aboard the new rescue craft after it has been dropped and guided to them by the plane



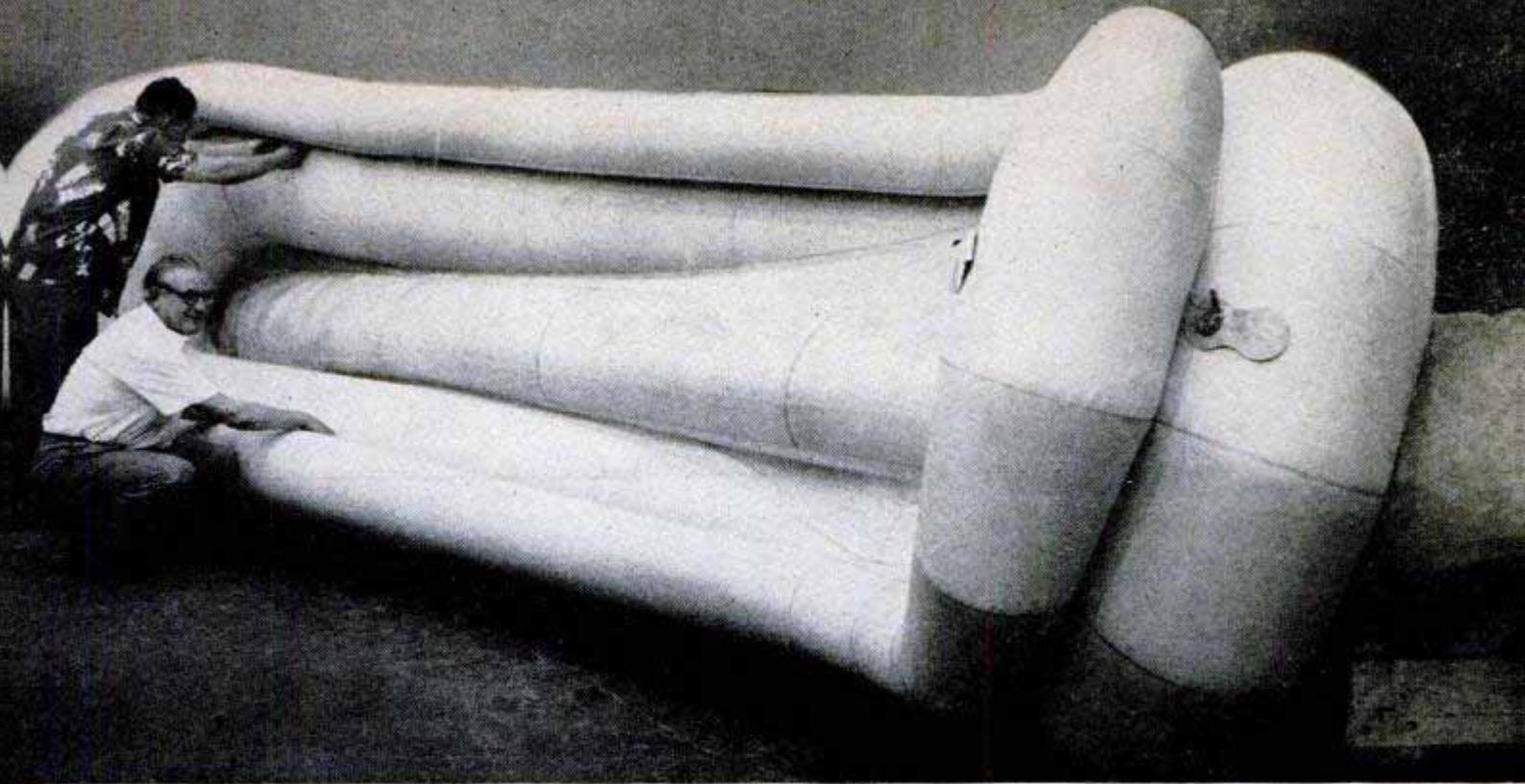
RADIO PILOTS SELF-INFLATING RESCUE BOAT



YOU'D THINK the sleek metal cylinder was a torpedo. As a matter of fact, the stern ring is identical with that of a torpedo, and the 21-inch diameter was selected so the cylinder could be fired from standard torpedo tubes of submarines and surface vessels. Actually, the cylinder isn't a destructive weapon of war, but a new radio-steered rescue craft to save the lives of downed aviators and others lost at sea.

Twenty feet long, the aluminum cylinder is dropped from a plane and does just about everything but lift the waterlogged aviator aboard. When the pilot of a rescue plane sights survivors, he descends to a minimum altitude of 75 feet and releases one of the "torpedoes" from his wing. As the cylinder falls, a chute blossoms forth and drops the tube gently into the water. Two minutes after the drop begins, the cylinder suddenly erupts into a de luxe lifeboat. Carbon dioxide fills the nylon sides and opens up the boat, the original cylinder serving as a stiffener and keel. Then an automatic timer

Aluminum hull is divided into compartments which carry fuel, radio, engine, food stores and distillation kit



Nylon-rubber fabric pops out from under the cylinder cover, expands around cylinder to form rescue craft

switches on a radio aboard the rescue craft.

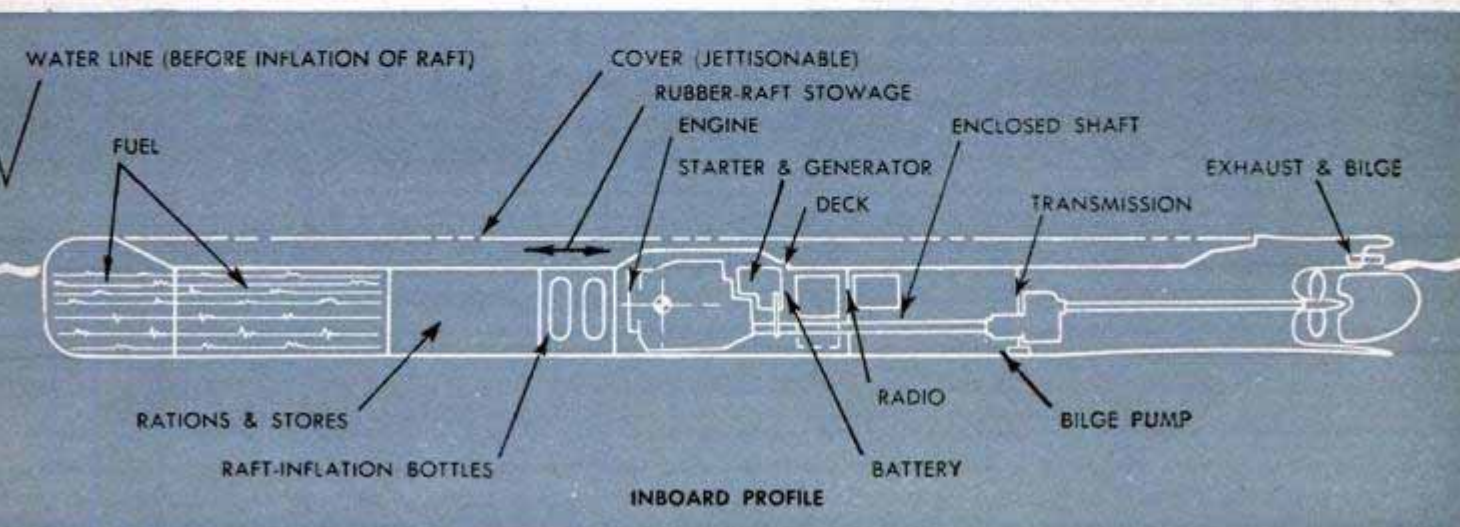
The aircraft pilot now transmits a radio signal that opens the fuel valve and starts the engine. As the boat moves ahead the pilot guides it by radio until it reaches the survivors. Then he puts the craft into a tight turn and kills the engine.

When the survivors climb aboard they turn a switch to release the boat from aircraft control and start the engine. In the craft they find an automatic pilot, a two-way radio, dehydrated food, flares, a canopy, a distillation kit and enough fuel to travel 300 miles.

The versatile rescue boats are being built by the Long Beach Division of Douglas Aircraft Company. They were designed for the Air-Sea Rescue Unit of the Air Materiel Command.

Right, propeller is installed in protective ring. Torpedolike cylinder can be fired from torpedo tube

Cross section shows equipment carried in the cylinder. The cover is jettisoned, exposing the rubber craft



The OWNERS REPORT



THE POPULAR MECHANICS MOTOR SURVEY AS CONDUCTED BY FLOYD CLYMER

I am the owner of a 1951 Chrysler. Model: Windsor Windsor DeLuxe
New Yorker Crown Imperial

I have owned it about 3 months. Speedometer mileage is now 3,724

I use only regular gasoline - I use premium (high test) gasoline

My approximate gas mileage in the city is 15 MPG; in country, 18 MPG.

I CHANGE OIL every 1,000 miles. I ADD OIL - one quart every _____ miles.

My car has: Standard transmission Fluid-Matic Drive

How does the car handle on the road? Excellent

Maneuverability seems to be: Excellent Average Unsatisfactory

Acceleration is: Outstanding Very good Average Poor

Curb and road clearance is: Satisfactory Too high Too low

Why did you buy a Chrysler? Highly recommended

What features about the car do you especially like? The way it handles, Body style,

Motor performance, Fluid-matic drive, Padded instrument panel

Do you like Chrysler's new front-end STYLING? yes; BONDED BRAKES? yes

PADDED INSTRUMENT PANEL? yes; VISIBILITY? yes

INTERIOR FINISH? yes; ORIFLOW SHOCK ABSORBERS? yes

If you own an Imperial, how do you like its DISC-TYPE BRAKES?

HYDRAGUIDE POWER STEERING?

What is your opinion of the new overhead-valve-V8 engine? Too much power for me

What do you dislike about the car? Nothing

Have you ever owned a Chrysler before? No If so, how many? _____

Would you buy another Chrysler? Yes Possibly No

Do you secure good dealer service? Yes Average No

How would you rate your new Chrysler? Excellent Good Average Poor

GENERAL INFORMATION

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

Cylinders: 6 8 Valves: Side Overhead

Based on my present experience, I want my next car equipped with: Standard trans.

Overdrive Chrysler Fluid-Matic Drive Other type of auto. trans.

Please state reasons: Makes it easier to get around in traffic

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

Do you carry the recommended pressure? Yes No How much more? _____ lbs.

Please check all answer boxes (). Your name will be held in strict confidence.

Please mail promptly to:

FLOYD CLYMER
1268 SO. ALVARADO ST.

My Name: _____

Address: _____

City & State: Columbus, Ohio

Why not find the bottom of the instrument panel.

on the '51 CHRYSLER

The true test of an automobile begins when the owner takes the wheel. This is another report from owners of 1951 cars who answered questionnaires sent by Popular Mechanics to 1000 Chrysler owners from coast to coast



By Floyd Clymer

PROBABLY THE FINEST compliment paid the Chrysler '51 by the owners who answered our coast-to-coast 1000-questionnaire survey was the comment of a service-station operator in Hyattsville, Md. He said:

"I learned to respect the Chrysler highly through my auto-service business. The new V-8 engine is the only new one on the market without 'bugs.'"

Least complimentary was a Southern gentleman from Louisville who answered the question, "Why did you buy a Chrysler?" with: "I often wonder."

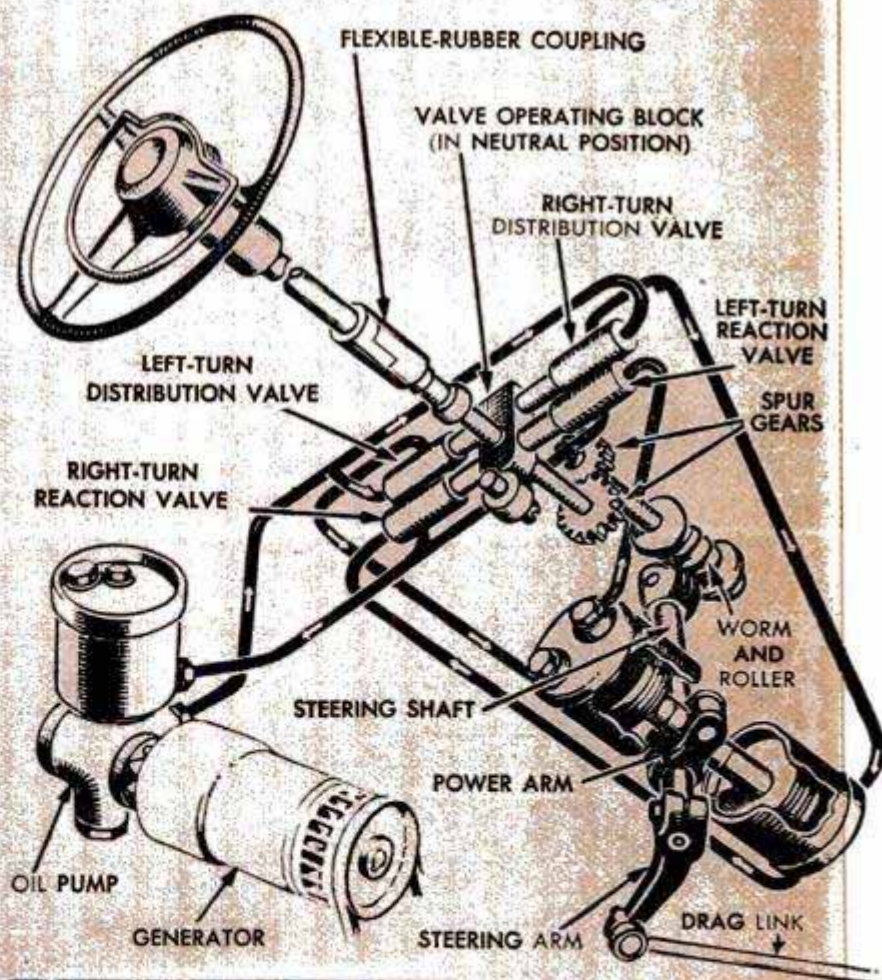
The survey showed that a very high percentage of '51 Chrysler owners are a contented group.

Typical of enthusiastic responses was this one from a St. Paul, Minn., salesman: "To me Chrysler represents the highest quality in an automobile. I wouldn't trade it for a competitive make . . . Chrysler is the leader in bringing out new things to the public and you get more value for your dollar than in any other car."

SEPTEMBER 1951

Clymer tested the four-door New Yorker sedan, a massive 131½-inch-wheelbase model powered by the new Chrysler V-8 engine

HYDRAGUIDE POWER STEERING



Power steering, detailed above, eliminates wheel tugging. The car can be steered with one finger

A good majority of owners expressed enthusiasm about Chrysler's Fluid-Matic drive. A Marshfield, Wis., osteopath said he likes it because it is "trouble-free, easily repaired and there is no 'jerking' as in other transmissions." An Indianapolis housewife declared she had had less difficulty with Fluid-Matic than some of her acquaintances had with other types of automatic transmission. The smoothness of the Fluid-Matic was mentioned by several owners.

There are literally hundreds of reasons why people like a particular car. A Sioux City, Ia., salesman said he bought a Chrysler "for leg room—I am 6 feet 5 inches tall." An Air Force officer in Arlington, Va., said he bought one because of "the automatic transmission, gas economy, design and because my wife wouldn't let me own any other make!" A Milwaukee salesman went out of his way to express his fondness for the "new, banana-oil smell" of his Chrysler.

"The motor of this car is out of this world!" said a Chippewa Falls, Wis., merchant, who owns a New Yorker model.

"Your hat is not knocked off upon entering the car, you can apply the brake without your knee hitting the steering wheel, and you can sit up and see out," remarked a physician in Swampscott, Mass. An Indianapolis attorney, who has owned 15 Chryslers already, also commented that

"the seat is high so you can see all the road." A Jacksonville, Fla., washing-machine distributor said: "I was greatly surprised at the public interest in this car. A great many strangers ask questions, including the request to see the new V-8 engine. These included many filling-station attendants who were greatly interested . . . I just drove on an 8000-mile trip and on two occasions the speedometer showed slightly over 100 m. p.h. No attempt was made to see how fast the car actually would run." A Texas owner says "The V-8 beats any car I've ever driven. It is a 'pip.' The only objection is it shifts into high gear too slowly."

Less enthusiastic comments included the following:

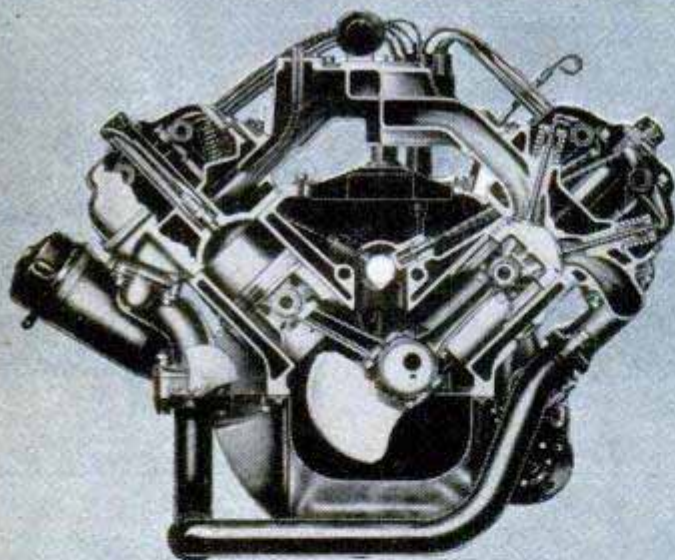
"No light under dash except when door opens . . . should have stainless steel instead of chromium."—A Chicago editor.

"Lacks the feel of a solid, substantial car, which was a major attraction in previous models."—Accountant, Indianapolis.

"Dislike lack of pep in the Windsor model. It is too sluggish for 116 horsepower."—Railway executive, Dallas, Tex.

"I feel that Fluid-Matic shift must have some bearing on my low gas mileage, because I drive very conservatively."—Roofing contractor, Spokane, Wash.

Poor dealer service was responsible for a few complaints, which seems usual re-



Sectional view of the new overhead-valve V-8 engine of the test Chrysler. Note the hemispherical firing chambers. It is a high-compression model (7.5 to 1)

ACCELERATION TESTS

Chrysler New Yorker (4-door Sedan)

¼ mile from zero....20.0 seconds — Drive range only
19.10 seconds — Low and Drive

½ mile from zero....32.10 seconds — Drive range only
31.60 seconds — Low and Drive

0 to 30 m.p.h..... 4.05 seconds — Low range only

0 to 60 m.p.h.....15.40 seconds — Drive range only
14.80 seconds — Low and Drive

(In tests using Low and Drive, shift from Low to Drive was made at 30 m.p.h.)

Top Speed (by speedometer).....115 m.p.h.

Actual Top Speed, about 10% less
(speedometer variation).



After he had tested the Chrysler New Yorker on the road, Clymer put it on a Clayton dynamometer for analysis. It indicated more than 180 horsepower

ardless of the make we report on. A Frederick, Md., salesman brought up another point when he said, "I would rate the new Chrysler 'excellent' if I could get better gas mileage." A great percentage of the owners replying in the survey made no mention of their mileage in an unfavorable way and many thought mileage was excellent. (See chart for the economy test.)

A Des Moines, Iowa, man reported he got 14 miles to the gallon in city driving and was the only owner to complain that the overhead-valve V-8 engine is too powerful. "Too many horses," he said. "Why not a smaller engine with 20 miles per gallon?"

Chrysler's Oriflow shock absorbers received almost unanimous approval as did the interior finish and padded instrument panel. The Imperial model's disk-type brakes and Hydraguide steering also are proving highly popular, according to the survey.

An automotive tester at Aberdeen Proving Ground, Md., does his own service work on his Windsor and reported it dependable, economical to operate and easy to service. His only complaint was that there is a



On a trip across Kansas in a Chrysler Windsor, M. J. Reynolds of Illinois tells Clymer he gets more than 18 miles per gallon

"loud whistle on both sides at the front when everything is shut tight."

A Lima, Ohio, railroad brakeman complimented the Windsor for "giving a great ride on bad roads," but said he has a little trouble opening the doors because of the height of some curbs. (Several other cars have lower doors than Chrysler.)

In certain cases, owners said they had bought Chryslers because they previously had driven Plymouths and liked them. A Chicago liquor broker said he had driven six Plymouths and then bought a Chrysler

Percentages from P. M. Poll

Owners of Windsor and Windsor De Luxe (6-cyl.)	84%
Owners of New Yorker and Imperial (V-8-cyl.)	16%
Average gasoline mileage in country—	
6-cyl. models	16.7 m.p.g.
V-8 models	16.1 m.p.g.
Average gasoline mileage in city—	
6-cyl. models	14.1 m.p.g.
V-8 models	13.3 m.p.g.
Owners using premium gas	61%
Owners using regular gas	39%
Owners who change oil	99%
Average mileage for change of oil	1432
Owners who add oil (and change periodically)	28%
Average mileage for adding oil	977
Owners who thought maneuverability excellent	85%
average	15%
Owners who thought acceleration outstanding	25%
very good	47%
average	24%
poor	4%
Owners who thought road clearance satisfactory	92%
too low	8%

FEATURES

Owners who like body and front-end styling	94%
Owners who like bonded brakes	96%
Owners who like padded instrument panel	98%
Owners who like visibility offered	97%
Owners who like interior finish	98%
Owners who like Oriflow shock absorbers	96%

(These percentages were tabulated from answers to specific questions in the poll.)

OWNERS' RATING OF CAR

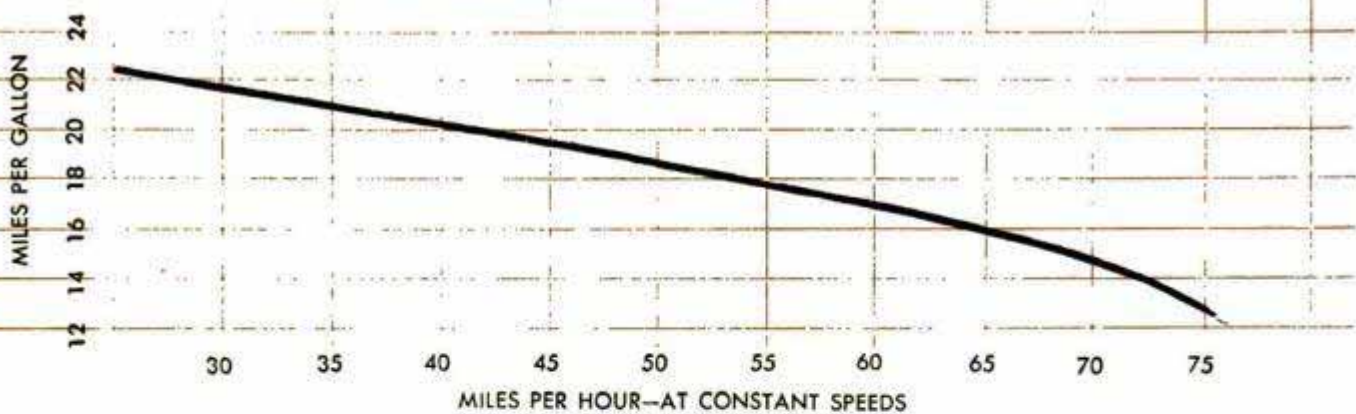
Excellent	67%
Good	24%
Average	7%
Poor	2%

GENERAL INFORMATION

Prefer V-type engine	64%
Prefer in-line engine	36%
Prefer eight cylinders	62%
Prefer six cylinders	38%
Prefer overhead-valve system	61%
Prefer side-valve arrangement	39%
Prefer automatic transmission	97%
Prefer standard transmission with overdrive	2%
Prefer standard transmission	1%
Prefer Fluid-Matic Drive	82%*
(*The above figure means 82% of the 97% preferring automatic transmissions.)	
Prefer makes other than Fluid-Matic	18%
Owners who like low-pressure tires	92%
Previous Chrysler owners	63%
Will buy another Chrysler	77%
Might buy another Chrysler	19%
Will not buy another Chrysler	4%
Dealer service good	73%
average	19%
poor	8%

Most frequent objections:

slow gear-changing of Fluid-Matic transmission, squeaking brakes, two-piece windshield



Economy Test of the '51 Chrysler

because he likes Chrysler Corporation engineering features. Others paid similar compliments to Chrysler as an institution. A manufacturer's agent in Shaker Heights, Ohio said: "I have been well pleased with Chrysler products for more than 25 years, having owned two Chryslers, two Dodges and six Plymouths."

Murrell Belanger, of Crown Point, Ind., owns the car which won this year's Indianapolis 500-mile race. He said: "I have driven Chrysler Eights since 1932 and love them . . . I drive about 70,000 miles a year and have another make of car on which I put 20,000 miles, but it just doesn't compare with a Chrysler."

A Denver policeman said his Chrysler outperforms any other car he ever drove, especially on icy streets. Others also complimented the Chrysler on its performance in bad weather.

A Corpus Christi, Tex., trucking contractor said he likes Fluid-Matic drive because "I am lazy." A Clifton Forge, Va., cost engi-

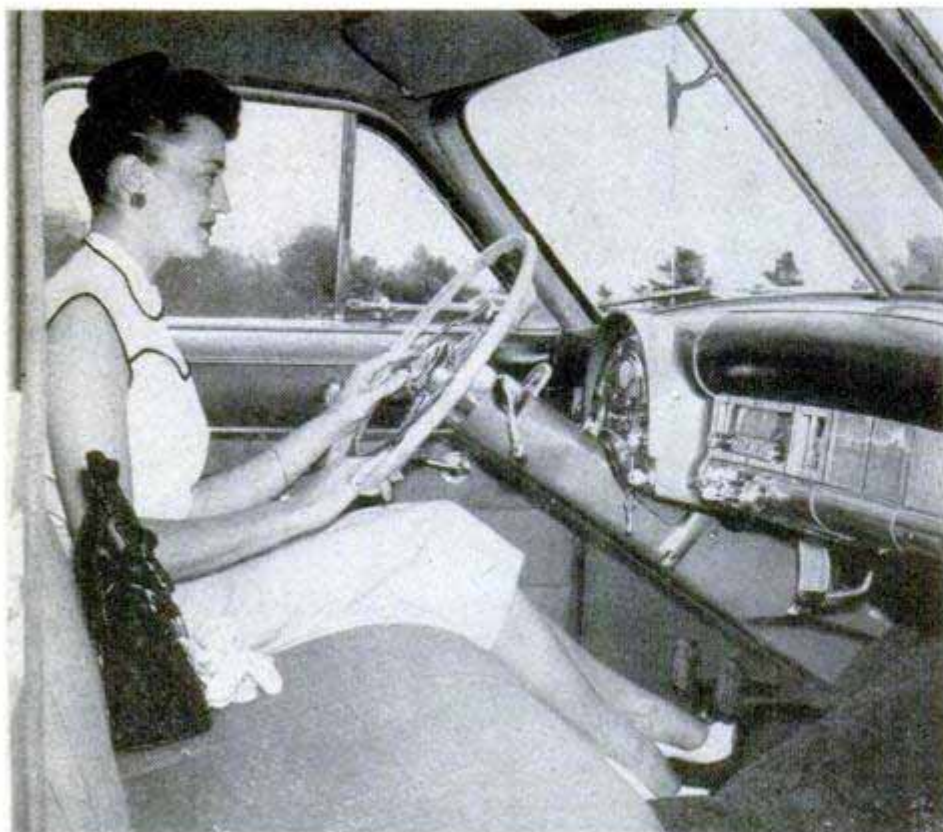
neer said his next car also would have Fluid-Matic because a woman driver can handle it more easily. On the other hand, a Mobile, Ala., man said he wants standard transmission in his next car because "gas mileage and extra costs for any of the special automatic drives are not economical."

A Des Moines, Iowa, owner said that the "hole" in the front grille of his Windsor permits muddy road water to cover the engine when passing or following another car. A woman in Tacoma, Wash., said: "We would have bought our second New Yorker model but it rubbed our driveway, which is under our house. The Windsor doesn't rub, but it still is pretty low."

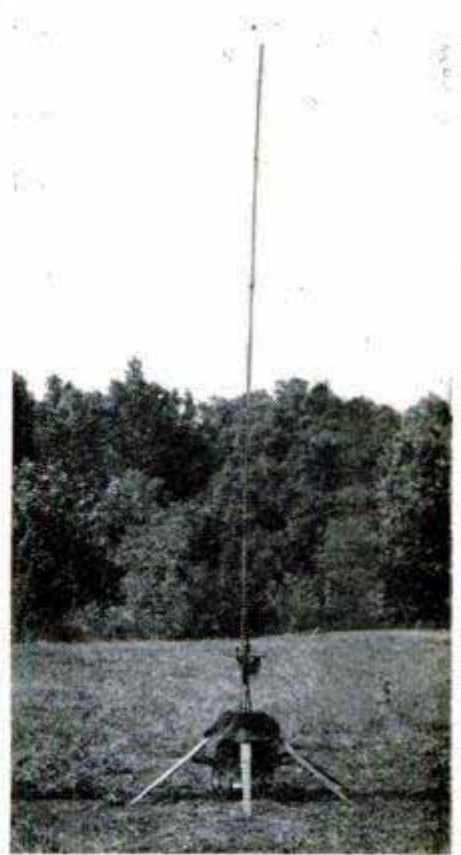
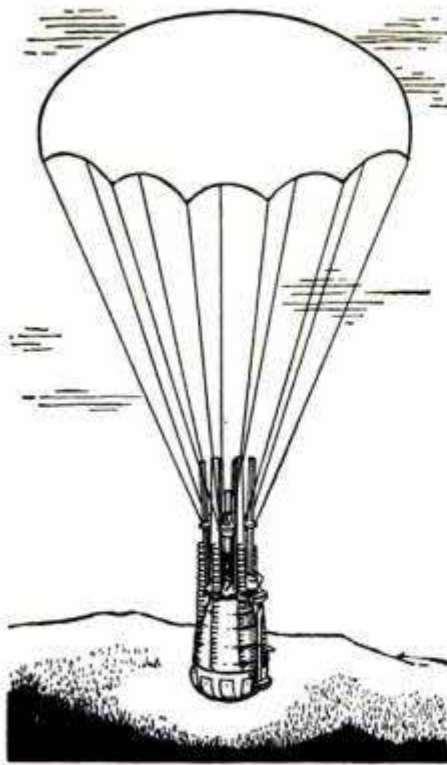
Asked "Why did you buy a Chrysler?" a Wichita Falls, Tex., yardmaster replied: "Habit." But he was unhappy because his dealer sold a radio and clock with the car and was unable to deliver them. A Louisville, Ky., physician disliked: "1) Chrome rusty in six weeks; 2) lack of dealer know-how; 3) leaks; 4) slow getaway; 5) noisy shock absorbers." (His kicks certainly are not in accord with the vast majority of owners.)

To the same question, a Birmingham, Ala., traveling salesman replied: "To get a car to last the next six years." He said it handles on the road "like a dream." He remarked that his New Yorker has "poor clearance for rough terrain." The latter criticism was denied by a Hammond, Ind., factory executive who said: "The fender clearance in Chrysler cars is sensible." He felt

(Continued to page 260)



Chair-height seats make Chrysler a comfortable car on long trips. Top of instrument panel at right is padded for safety



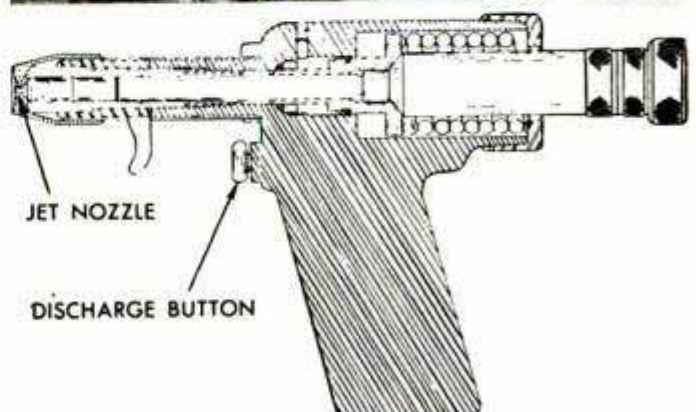
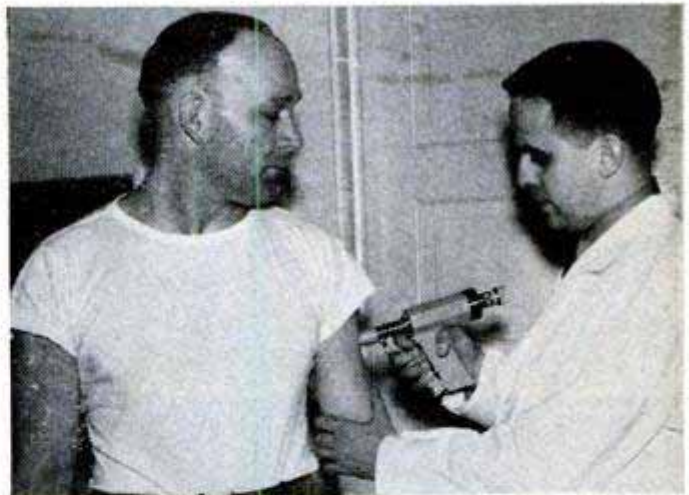
Self-Erecting Weather Station

After it lands, three explosions convert a bomb-shaped container on a parachute into an automatic weather station. It was developed by the National Bureau of Standards to broadcast observations from inaccessible territory. When the station is dropped the parachute opens automatically

and an electric clock that controls subsequent operation is turned on. An initial small explosion on impact with the ground releases the parachute and prevents the equipment from being dragged along the ground. A second charge triggers a leg-release device which raises the unit to an upright operating position and a third extends its telescoped antenna.

Hypodermic Gun Has No Needle

Soldiers who face enemy gunfire unflinchingly but quail at the sight of a hypodermic needle can relax. There's no needle in a multiple-dose injection apparatus shaped much like a pistol, which may be used for the rapid inoculation of large groups with vaccines and antibiotics. The "shot" is forced through the skin by a high-pressure jet. Nothing penetrates the skin except the medication itself. A strong spring suddenly forces the vaccine out in a powerful but tiny spray when the gun's "trigger" is pushed. The jet of medicine penetrates the skin, leaving little or no mark on the soldier's arm.

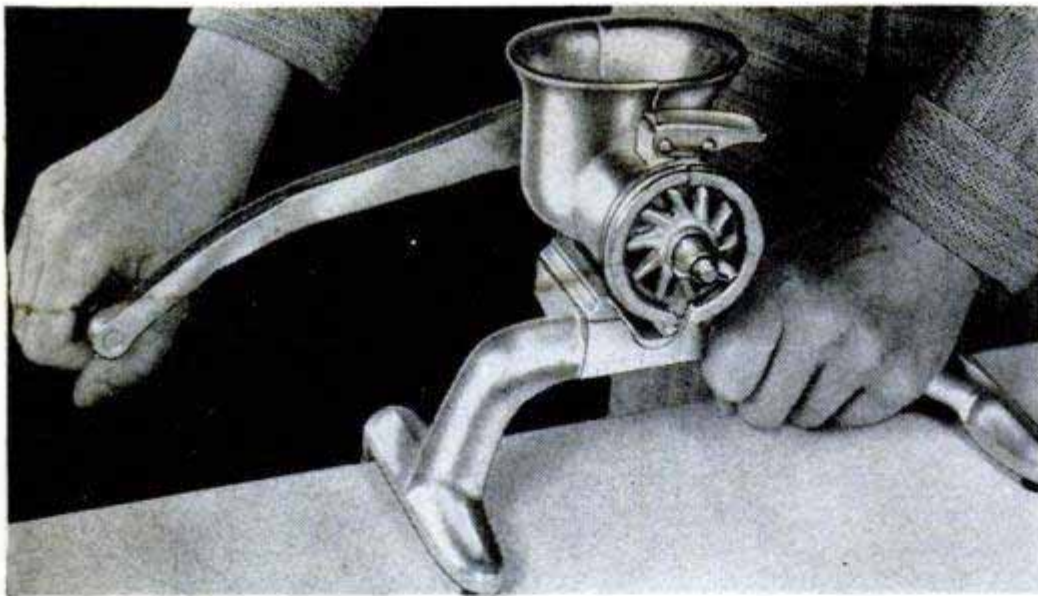


Our WHERE-TO-FIND-IT LIST, giving names of manufacturers and sources of further information for products and articles in this issue, is available free upon request. This index is one of the many services offered to Popular Mechanics readers by the Bureau of Information. For your list, just write to the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

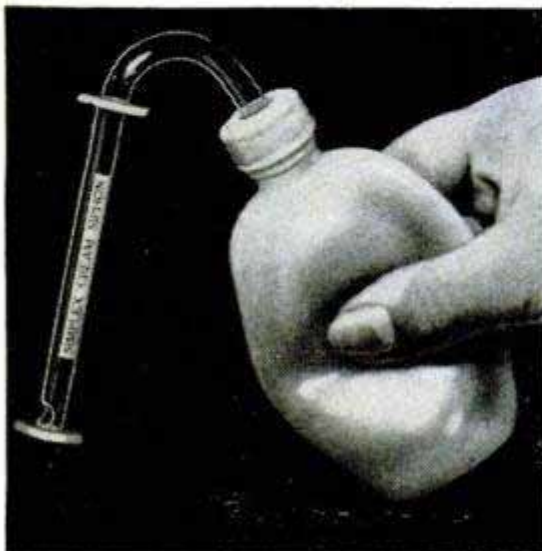
WHAT'S NEW FOR Your Home



COMPACT KITCHEN has everything, including the well-known kitchen sink! Occupying only 4.1 square feet of floor space, the unit combines a refrigerator, storage drawer, drainboard, sink, gas or electric range



CHOPPER requires no clamping down. A broad base that hooks over the counter edge forms a stable support. One hand will keep it from moving. Rubber pads on feet prevent slippage. It has a trough which drains off all excess food juices



← **SIPHON** draws cream off milk without mess. You squeeze the plastic bottle and insert tube in the cream. Release pressure and the cream siphons from the bottle into the container

DISPENSER fits on a → shaving-cream tube. As tube is squeezed, cream is forced into a small sponge which is moistened and used to spread lather over face



POPULAR MECHANICS



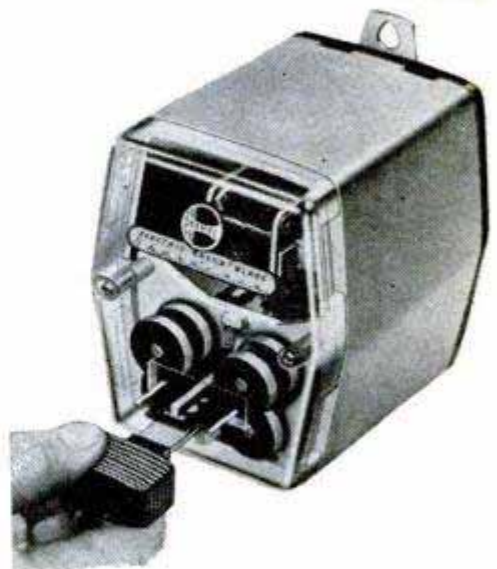
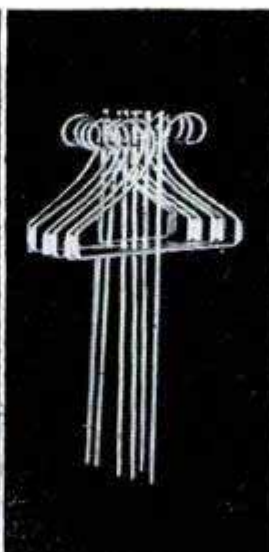
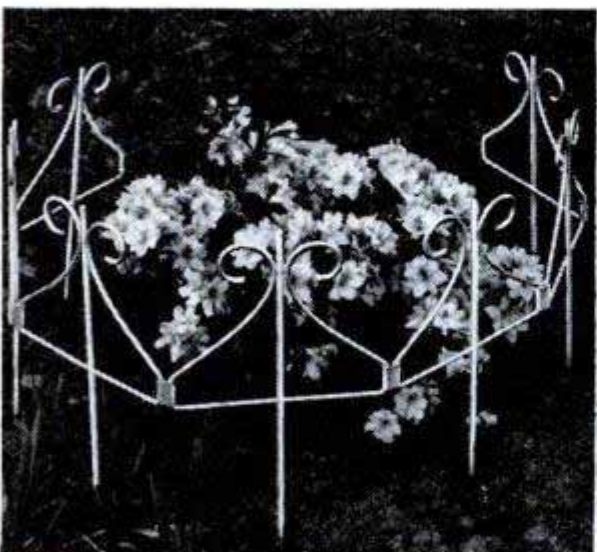
STEEL CORNICE goes up as quickly and as easily as a curtain rod. Made of thin steel enameled in seven decorator colors, the cornice is so light that it can be nailed in place by the housewife in minutes. The slats can be trimmed with ordinary scissors to tailor them to fit any window from 2 to 10 feet in width



POCKET replacement, left, for men's trousers requires no sewing. Cut off the bottom of the worn pocket, slide the replacement over the cut and iron it on. Cleaning won't loosen its grip

FOLDING FENCE, below left, can be stored easily. It comes in 6-foot sections that link up to form longer fences. Or used singly, the sections are excellent for protecting shrubs

SHARPENER, below, makes a razor blade last for more than 100 shaves. It is electric powered and has six leather rollers to hone and stropp the blade to assure you of a sharp edge



YOU'LL BUILD YOUR NEXT HOUSE of *MOLASSES*

A five-room home for \$1000 plus the plumbing and wiring is the hope of a North Carolina scientist. Drive up his molasses-asphalt driveway—see what's going on in his molasses-plastic garage!

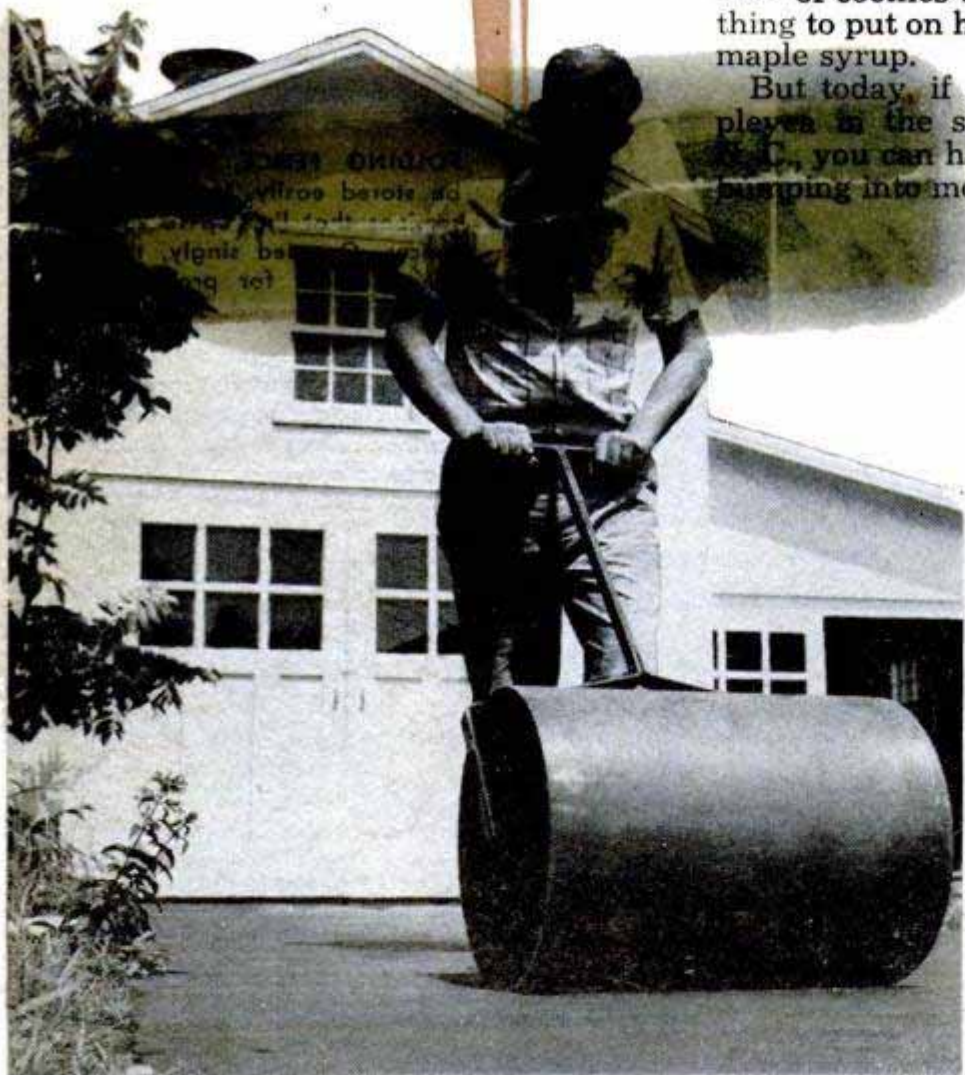
By
Michael Day

MOLASSES USED to be an ingredient of cookies that mother made or something to put on hotcakes if you couldn't get maple syrup.

But today, if you visit George W. Rappleyea in the sleepy town of Southport, N.C., you can hardly turn around without bumping into molasses. Beyond festoons of

Spanish moss behind his home is an entire building made of molasses. It houses the machinery for making more molasses products. To get to it, you walk along a molasses driveway that looks, feels and acts like "black top." Here and there, molasses building bricks are drying in the sun. Inside the building, you walk on a molasses floor, examine samples of hard or flexible molasses sewer pipe that rest on a laboratory table top made of molasses. There are samples of molasses plaques flexible as rubber, molasses

Molasses asphalt is simply raked into place, compacted with roller. Two gallons of molasses paves a square yard



and wire aren't essential but fill notches to save some plastic

plaques as hard as rock.

"What's the point?" asks Mr. Rappleyea, an energetic little white-haired man who used to be vice-president of Higgins Boats, and wouldn't be making molasses houses just for laughs. "That 50-foot molasses black-top driveway you just walked on would cost the average homeowner about \$50. Less if he did it himself. A five-room house built with molasses adobe brick on a molasses slab, finished with molasses stipple spray outside, troweled molasses plastic inside, would cost a man less than \$1000, exclusive of electricity and plumbing. What's more he'd have a house that would stand a hundred years or more—moistureproof, soundproof, self-insulated, termiteproof. It's the cheapest building material in the world."

Naturally, to make these things you don't just take a barrel of pure molasses and start gumming everything up with it. Powdered molasses is the basic ingredient of a new thermosetting plastic that does the trick. By mixing this powdered molasses with plain bunker fuel oil and certain catalysts, Rappleyea has come up with the thick

black concentrate he calls **Plasmofalt** (short for plastic molasses asphalt). By altering the formula slightly, he has made it in three different grades to produce different degrees of hardness.

Rappleyea isn't yet producing the molasses concentrate in quantity, but expects to have it on the market soon.

Plasmofalt, mixed with clay and sand, produces a waterproof adobe brick hard as concrete. A different mixture of the same ingredients makes a cheap, quick-hardening paving material for driveways, highways, parking lots, tennis courts and land-



Plastic molasses sticks to almost anything. Here are construction samples made of bamboo, iron, chicken wire



ing strips. Substitute clay and a fibrous filler for the clay and sand, and a brand-new plastic is formed, which Rappleyea calls Plasmote. This can be mixed with water and sprayed outside a building to give it a tough stucco finish that won't crack or come loose. Troweled like plaster, Plasmote makes smooth inside walls, floors, ceilings and impervious table tops.

There's nothing brand new about using molasses as a building material. For centuries men have known of the terrific "bonding" qualities of the substance. It was done in India years ago, with a molasses concentrate and asphalt. But it took the Indians 17 hours to make up a small batch, and asphalt isn't so cheap anymore. Besides, handling semiliquid molasses is a messy job. Plasmofalt is cheap and easy to handle. It will be turned out at a rate of about 10,000 pounds per hour in a new commercial plant soon to be built in New Jersey.

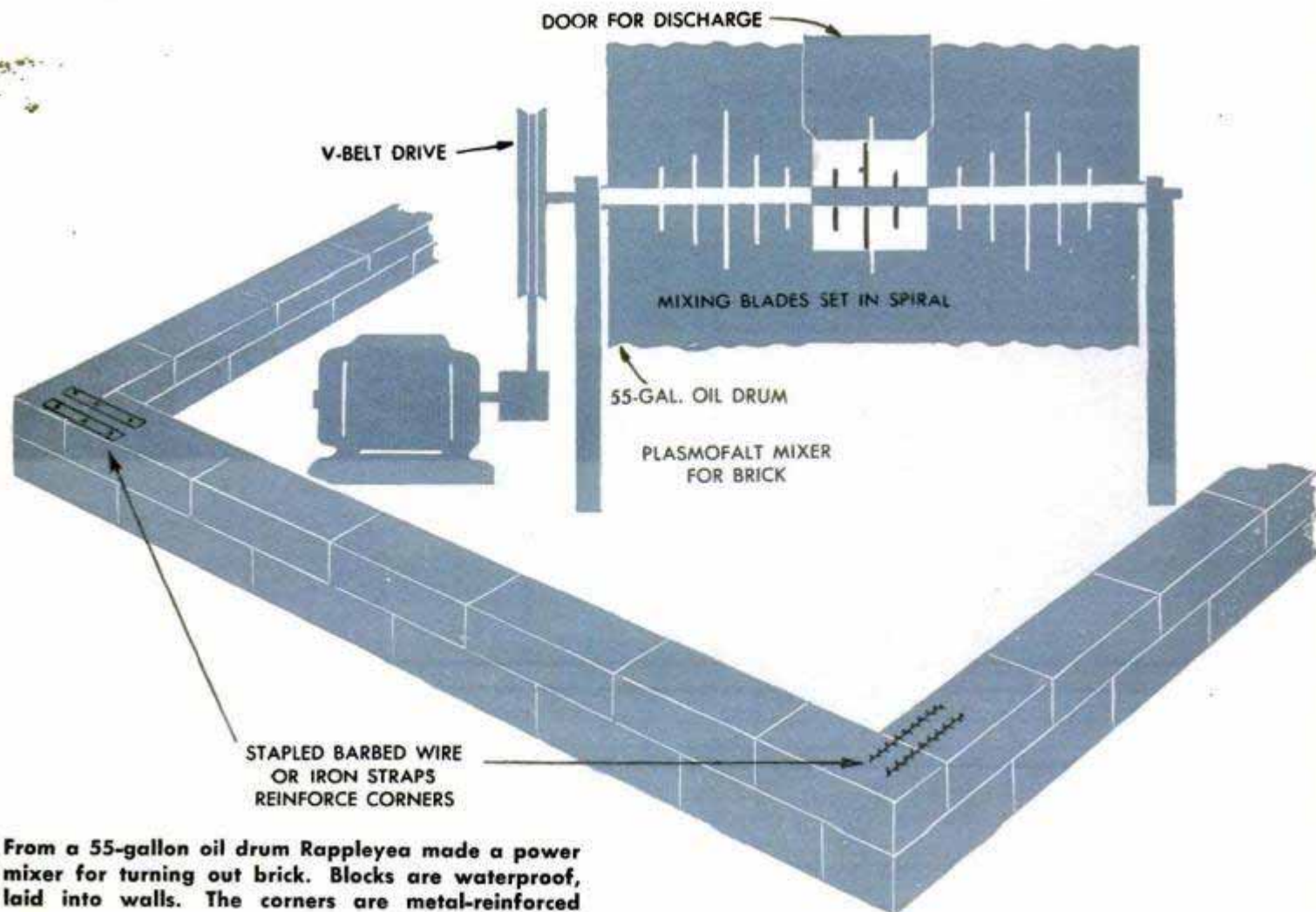
The real secret of Plasmofalt is Rappleyea's dehydrator, which takes the sticky blackstrap molasses and makes a dry granular substance of it—like brown sand. "We had a tough time devising a drier to do the job," he says. "Centrifuges gummed up in no time. Freeze driers solidified the stuff in gobcs. Hot air only did half the job, and if heat was boosted the molasses caught fire."

Today, in the pilot plant of Rappleyea's

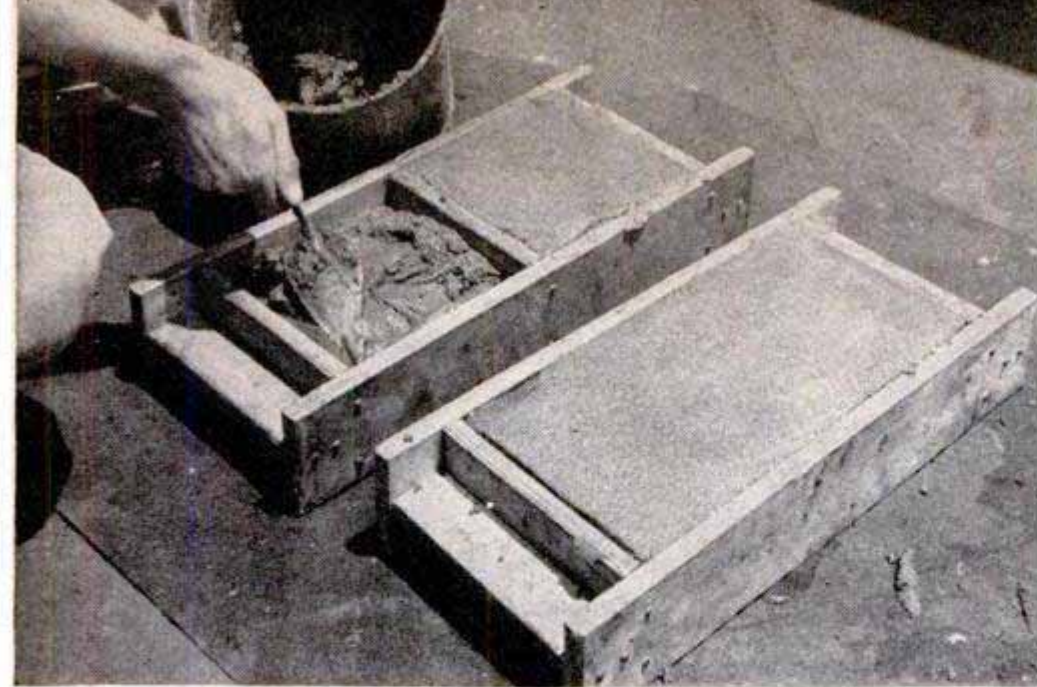


Clay, sand, water and liquid Plasmofalt are mixed into adobe. Mixture then is troweled into brick forms

Tropical Agricultural Research Laboratory in Southport, the blackstrap molasses goes into a hot-air drier of the man's own invention. It looks like a 5000-gallon fuel-oil storage tank standing on end. Blackstrap molasses is pumped into the top of the big drumlike drying chamber under pressure of 2500 pounds per square inch. There it passes through an area of high heat in a



From a 55-gallon oil drum Rappleyea made a power mixer for turning out brick. Blocks are waterproof, laid into walls. The corners are metal-reinforced



Just as soon as the form is filled it can be removed. Mixture retains the shape of the form until it dries



Resulting bricks, after hardening in the sun, are water-proof, hard as concrete, won't crumble in tropics

split second. "It's powdered before it knows what happened," says "Rapp," "and falls to the bottom of the drier like snow. But it didn't happen overnight. For instance, until we put in strong, stainless-steel pipe, feedlines burst under the tremendous pressure. Hot molasses would geyser all over everything—including me and my assistant. We spent weeks cleaning molasses out of our hair and scraping it off the walls and ceiling."

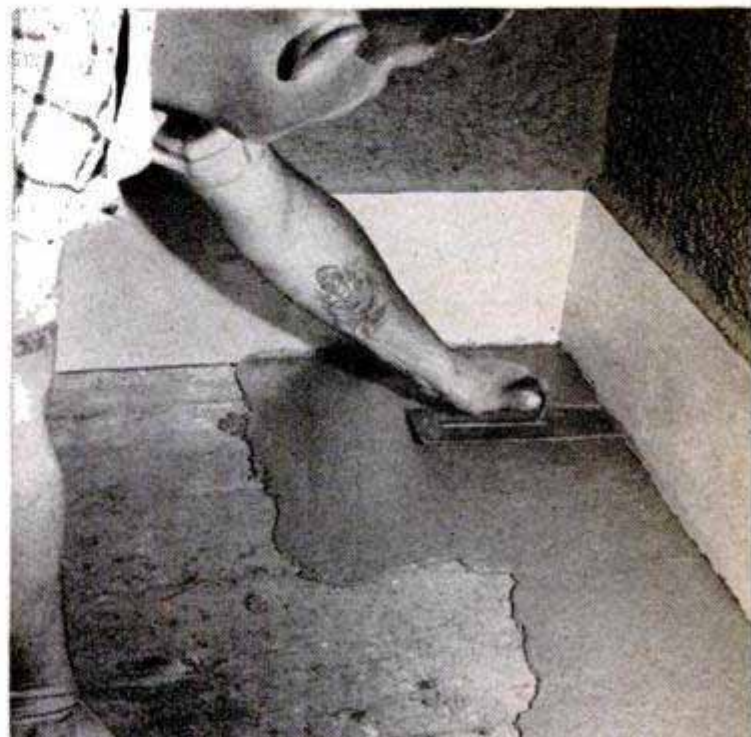
Once mixed with oil and catalytic agents, the powdered molasses flowing from the drier becomes a regular polymerized plastic with remarkable properties. To show how it works, inventor Rappleyea leads you to his back yard. "Anyone can make Plasmobrics himself," he says, pointing to

Jet-black top-dressing is given a driveway. Plasmofalt mixture simply is spread around with a squeegee

a regular mortar-mixing box, where his assistant is busy hoeing up what looks like cement. It's actually 65-percent plain sand, 30-percent clay and 5-percent liquid Plasmofalt. Water is sprinkled on and hoed in until the mixture has the consistency of stiff mortar. The man trowels this into wooden forms near by. One measures 4 by 8 by 16 inches, or about eight times the size of a regular red brick. The other is 4 by 8 by 8 inches. Off come the forms immediately and, oddly enough, the wet bricks stay set. In three days they're dry enough to stand on end, where they remain baking in the sun for 28 days more. They are laid the same way as conventional bricks. Wire is used to reinforce corners.

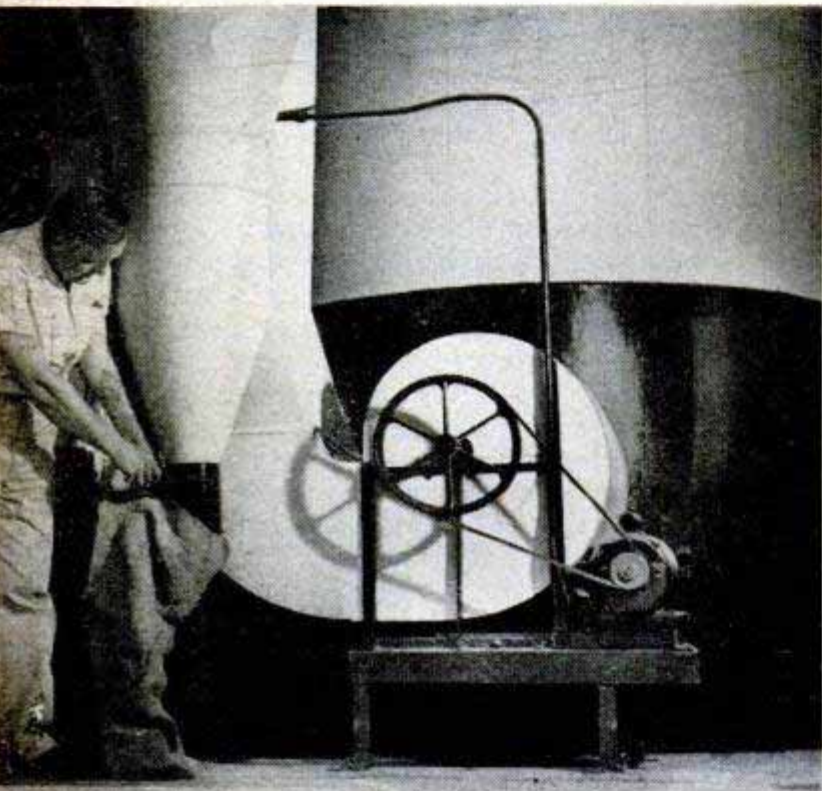
There's nothing new about adobe bricks,

Here's a new smooth-as-tile surface for an old floor. Dry, it will be similar to continuous sheet of rubber



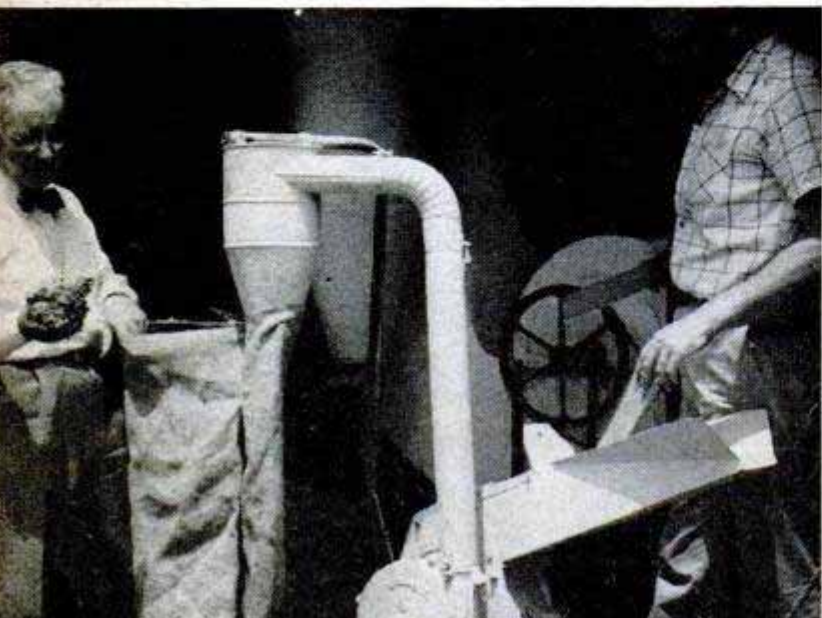


Since Plasmoite sticks to anything, it will make an ideal coating for cheap tropical housing. Half of straw-thatch panel is coated. It's now waterproof, bugproof, stronger



Machine turns blackstrap molasses into a powder. Spray of molasses falls like snow through oven, is drawn off into bags

In some applications a filler is used. This machine shreds cardboard boxes into a fluffy "wood wool" for the mixture



but there's something new about these. The Plasmofalt acts as a binder and makes them as rugged as concrete. Plain adobe has never been practical in wet country because rain washed it away. Plasmofalt makes the brick waterproof. Rappleyea has set his bricks in water for 30 days beside other brick. Plasmobric absorbed two percent moisture, cement brick eight percent, and regular red ceramic brick twelve percent. Plasmobrics have been lying all over the Rappleyea yard in rain, frost and heat for a year. They still look and test as good as new in the jaws of the pressure jack in the laboratory.

"Proper soil is important," says the inventor. "The soil in your backyard might be just the right proportion of sand and clay. A good test is to put a handful in a glass of water, agitate it and let it settle overnight. Sand settles first, and the clay rests on top. Anywhere from 25 to 35-percent clay is fine."

He contends that since the bricks are dirt, "they're cheap as dirt." He has determined that it takes 3050 of the big bricks to make a one-story adobe house of five rooms. "You'd need a dozen barrels of Plasmofalt at \$24 a barrel to do the job," he points out. "That's \$288 for the main shell of your dwelling. You'd set it on a waterproof, Plasmoized adobe slab. Then, use Plasmoite spray on the walls and ceiling—and on the exterior if you want a stucco-type finish. You'll have to buy 2 by 6 rafters and joists." But the whole house should not cost more than \$150 a room, exclusive of plumbing and electricity.

And about that driveway? You can make that yourself, too, if you like and no one will ever be able to tell it from black top. Fifteen pails of plain beach sand to one pail (about two gallons) of Plasmofalt, and you've got about a square yard of driveway. In 24 hours it's ready to use. No heavy compacting machinery is necessary, though the more compacting the harder the surface.

"We compacted our own driveway with an ordinary lawn roller," the inventor reveals. "Just rake out the Plasmofalt as you would an asphalt mix, and start rolling."

The experimental driveway looks as neat and trim as the day it was

(Continued to page 248)



V-shaped blade rams against a tree to slice it off close to ground with one stroke. Blade attaches rigidly to dozer

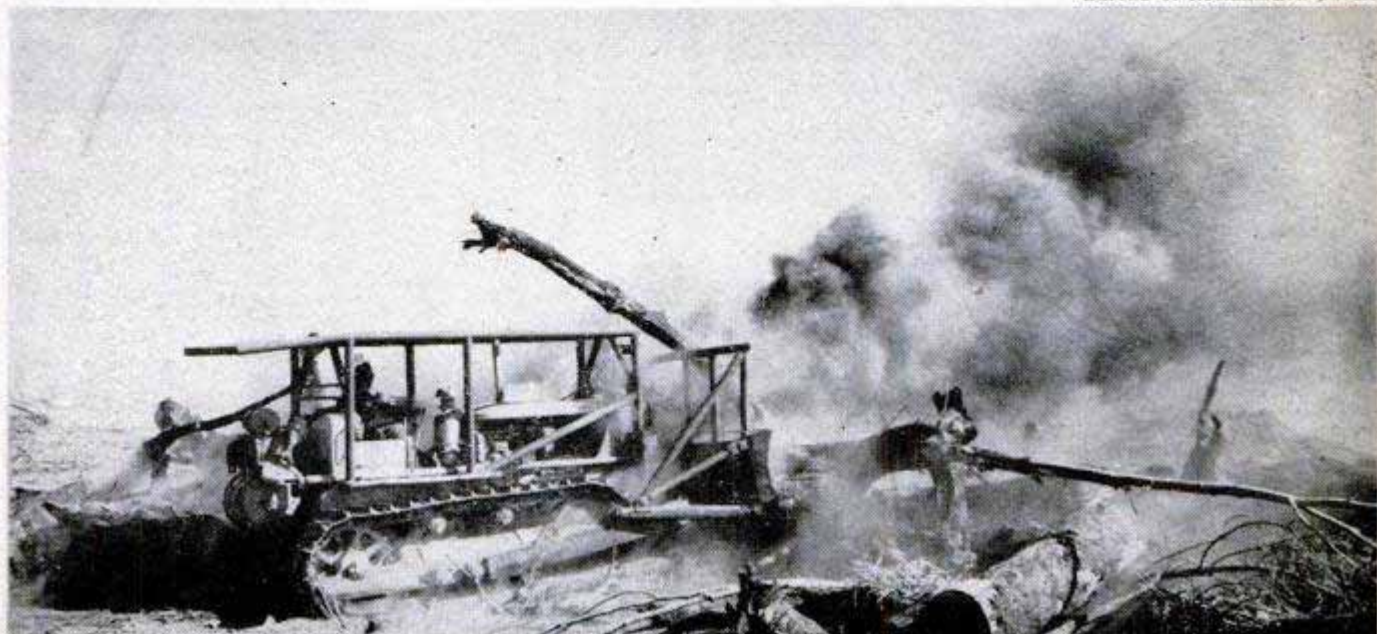
"Sawdozer" Slices Big Trees

Spectacular is the word for the wood-cutting ability of a six-foot, V-shaped saw blade which is attached rigidly to a bulldozer. The saw blade has no moving parts and merely is rammed against the tree by the bulldozer. Its big teeth slice off trees up to 24 inches in diameter with a single stroke. The "sawdozer" is being used to

clear trees from the reservoir area of Boyesen Dam, now under construction by the Bureau of Reclamation in Wyoming. One saw-equipped bulldozer can fell trees as fast as five crews with chain saws. Another bulldozer blade, equipped with tines, scoops up not only timber but also smaller brush for burning.

Tines beneath the bulldozer blade form a rake to scoop up small branches and brush as well as heavier timber

Bureau of Reclamation photos





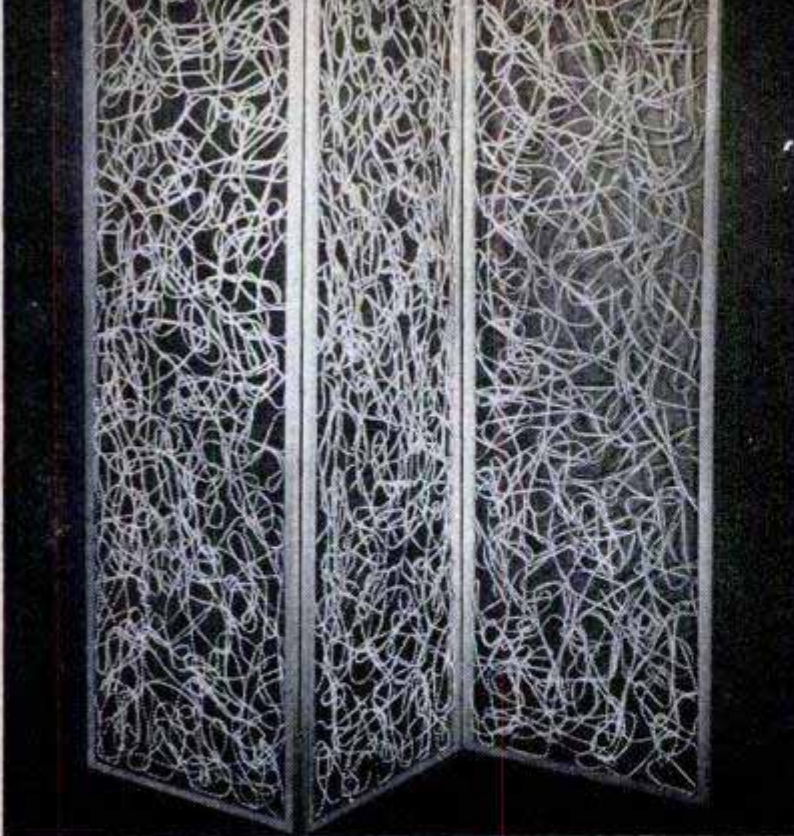
First step in the strange art is to make individual parts of mannequin by "doodling" strips in wet mold



To finish figure, parts are mated with strips of same material, "scribbled" to make invisible joints



Mythical Pan, humorous rabbit and graceful birds show how the flexibility of the material permits unique displays



Screen, made of wood frame scribbled with Celastic, is colorful, blends with any modern home decoration



Legs of mannequin are joined solidly to body but arms are jointed. Figure is sprayed with tempera color

By Ronald J. Cristy

THE SHAPES of doodles on a memo pad may give revealing insight to the psychoanalysts, but to Ben Walters, Inc., window-display concern in New York City, doodling led to a new idea and a new look in window-display materials. Interested in mannequins, Walters just naturally scribbled them and one day produced an interesting effect with a series of circles and figure eights. This led to experimentation with Celastic and resulted in what is now gaining national recognition as "scribble sculpture."

Celastic itself is a colloid-treated fabric which becomes very flexible and easy to work when dipped in a special liquid softener. When wet it will bond to itself and other materials with incredible strength so that assembly procedures are accomplished without resort to any form of fastener.

For his scribble sculpture, Walters has the Celastic sliced into narrow strips which are easily worked into the mass of circular and curling lines necessary to produce the scribbled effect. Most of his standard items are formed in multipiece molds which are dampened and coated with a special parting agent before each application. Because the material dries hard in a very short time, the workers can go from mold to mold, assembling the first scribbled pieces while the last ones are drying. Armatures and the usual basic wire forms are not used, but this does not in any way reduce the

strength or rigidity of the finished product. Durability is a Celastic feature.

Parts are joined together with additional strips of the Celastic material, and errors are easily corrected by resoftening the area and reshaping while the material is still wet. Finishing consists of spraying with tempera colors, although any paint or lacquer could be used, and mounting on a suitable base, usually a shaped piece of glass or plastic.

Walters also uses the Celastic in its original sheet form to make full-round castings, draped backgrounds, face masks and many other items supplied by the window-display industry. Scribble sculpture however, is his pride and joy. In a room full of conventional mannequins, his stand out like lighted windows in a dark building.

Nitrogen Package Keeps Food Fresh

Packaging of dry foods in nitrogen instead of the oxygen of the air keeps them fresh much longer, according to experiments by the Linde Air Products Company. Atmospheric oxygen is a cause of food spoilage and rancidity. When such foods as potato chips, roasted nuts, dry soup mixes and dehydrated foods are packaged in a flexible film filled with nitrogen instead of ordinary air they retain "same day" freshness for months or even a year.



Detroit Listening Post

By Siler Freeman

UNDER NORMAL CIRCUMSTANCES, the automobile industry would now be seriously planning when to change over for new models. All else would be in readiness—the tooling, the dies and the orders to suppliers, with a schedule of deliveries.

But these are not ordinary times. The defense program has already taken a toll on third-quarter production and has muddled the picture on new models. Not that the government has banned 1952 models, but its freeze on machine tools has left some of the nation's automobile manufacturers high and dry.

From present indications, some high-compression engines, which had been planned as the feature of the new models, will now be ready in time. Some of the tooling for these jobs is completed and some is not. Although the machine-tool builders have insisted on being paid for the work done, the engines must now be left on the shelf.

The Ford V-8 and the Mercury engines are certain victims of the tooling muddle. The company is hopeful it can complete the tooling somehow next year and put the engines into production.

Those planning only body changes are in much better shape to change over to the new models. Dies are ready and it is only a matter of when to go down and for how long a period of time.

The only factor that does not have uncertainty about it in the new-model picture is the price. The tags on the 1952 cars will definitely be up.

How high depends on the manufacturers' ideas on the amount of improvements and the Office of Price Stabilization. Chrysler set the pattern for new models when it obtained price relief on New Yorkers and Imperials carrying the new V-8 engine and Hydramatic.

Heretofore, OPS held the price line pretty steady. Ford sought relief several times on models on which they were losing money and were turned down. The OPS formula set down in the Chrysler case was that unprofitable operation is not to be the standard, but that changes and im-

provements which called for added costs would be the basis for price increases.

How far this will go remains to be seen in the forthcoming conferences in Washington on prices when new models come out. The dealers also scored their point to get their historic discount on the increase, and not only the dollars-and-cents boost permitted the manufacturers.

Then, of course, the new-car buyer must pay an additional three-percent excise levy. It is a certain conclusion that 1952 cars will be scarcer and higher priced.

The delayed Saratoga is now in the hands of Chrysler dealers as an addition to their line. It had been scheduled for two months ago but the output of V-8 Fire Power engines did not reach expectations until July.

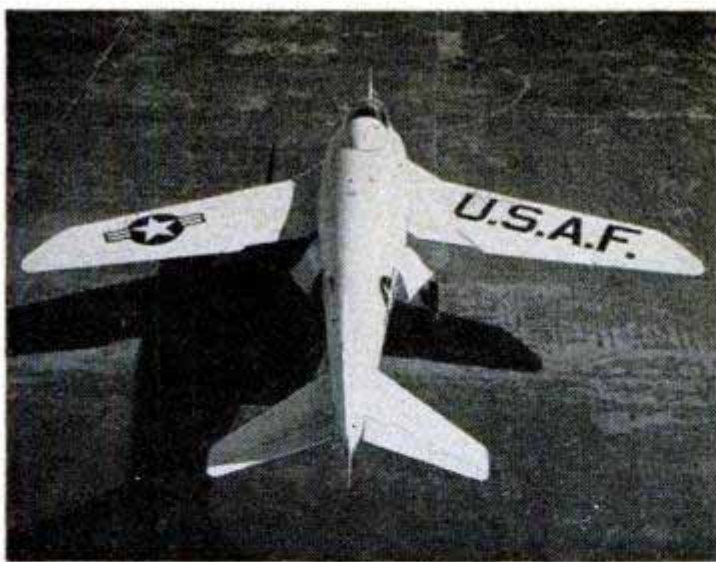
The latest version of Nash's small car, now called the NKI, is causing considerable speculation. George W. Mason, president of the company, is driving one of the jobs and is enthusiastic about the performance. Given the materials and the tooling for a new engine, designed especially for the small car, he would enter the new field as quickly as the company could get ready.

The new engine is 42 horsepower and has a top speed of about 70 miles an hour. It has shown 35 miles to the gallon, which is what Mason has been aiming for.

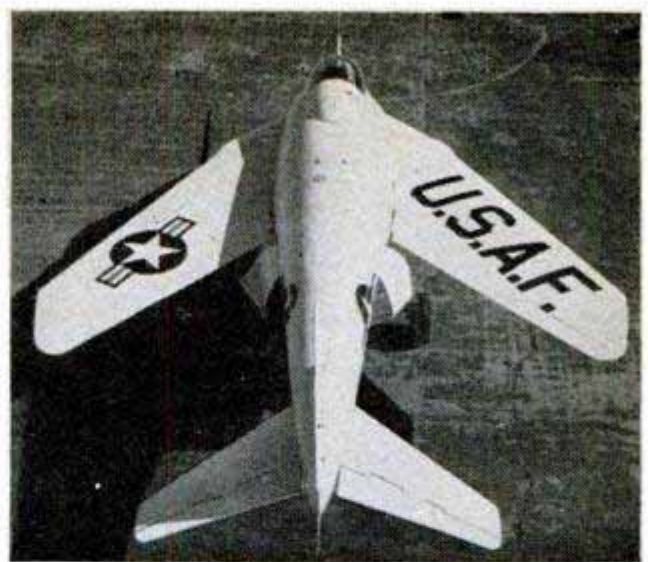
Originally, Nash had planned to use a foreign engine of low horsepower to get the desired economy and at the same time save the expense of tooling for it. But the customers' answers to a survey last year showed they looked suspiciously on a foreign power plant and wanted more horsepower. The Nash engine combines the desired power and economy. But tooling is blocked by the freeze order.

There has been much discussion on lifting the ban on the fifth tire. Whether the manufacturers will revert to the practice of putting it in the trunk at the factory and charging their lower price on it is debatable. They would like to give the car buyer the advantage of their large purchasing power, but the car dealers have profited by the new practice of selling the tire to the

(Continued to page 240)



When taking off, climbing or landing, the Bell X-5 has its wings in a forward position to provide maximum lift



For top speed at high altitude, the pilot pulls the wings back sharply to reduce compressibility

"Retractable" Wings on Flying Laboratory

Wings whose degree of sweepback can be varied in flight will give the Bell X-5 the advantages of conventional design for take-off and of extreme sweepback for speed. Believed to be the first plane to feature such adjustable wings, the X-5 is jet propelled and carries its Allison turbojet engine directly under the cockpit rather than behind the pilot. The tail pipe protrudes beneath the fuselage, giving the plane a

profile like that of a guppy. Each wing has a specially designed fairing to insure that the leading edge presents a smooth airfoil regardless of the sweepback angle. The X-5 is being used as a flying laboratory by the National Advisory Committee for Aeronautics to study the aerodynamic effects of changing the degree of wing sweepback during flight. It is capable of supersonic speeds.



Aluminum Company of America

Lights in Aluminum Arches Control Traffic on Bridge

Indicating which lanes are open to traffic from each direction, the 16 red-and-green traffic lights are mounted on graceful aluminum arches on the Delaware River bridge between Philadelphia and Camden. Spaced at intervals of 750 feet along the

1.8-mile span, the arches permit control of traffic for the full length of the bridge. There are eight traffic lanes on the 79-foot roadway and the number of lanes used in each direction is varied to meet traffic requirements by means of the lights.



Inside this test truck are 308 instruments, showing just what happens to the engine and chassis in operation

FEVER CHARTS PLOT

A BETTER AUTOMOBILE

By Dick Frederic

PLUMES OF DUST swirled behind two shiny black panel trucks as they roared around the banked turns of an abandoned hot-rod track in southern New Hampshire recently. A casual onlooker might have figured them for a pair of delivery wagons gone wild, except for one thing—atop the lead vehicle an airplane pitot tube glittered in the sun and an anemometer whirled at a dizzy speed.

Across the stainless-steel dashboards and the gleaming panels that line the insides of both trucks, lights and dials blinked and whirled in mad confusion. Altimeters and air-speed indicators gave the cabs the look of an airplane. Gasoline on its way to the carburetor bubbled in a tall glass tube beside the steering post; red lights glowed and needles spun every time the driver jammed the gas pedal to the floor. Mercury columns hovered up and down to every waver and murmur of the purring cylinders. Green light danced across the face of a cathode-ray tube beside the driver, painting a continual picture of what was going on inside each cylinder at the instant of combustion and under all degrees of load

and speed. Through ultrasensitive ear-phones, the driver could listen to every pulse of his car—from the racket of a sticky valve to the infinitesimal murmur of metal wearing away on a bearing.

In the back end of the lead truck, a technician flicked switches, taking temperature readings of everything from the oil at the bottom of the dip stick to the cherry-red exhaust valves inside the cylinders.

For years, automotive engineers have known that heat and vibration are the biggest breeders of car breakdowns; that moderate driving produces the best gasoline mileage; that jack-rabbit starts eat up a lot of fuel. But just exactly why these things are so, where they start and how they can be corrected economically has led to a lot of arguments and little else.

About a year ago, Andrew J. White, brusque young head of Gale Hall Engineering in Boston, and a man with genius for devising simple devices to do what everyone considers impossible, got sick of arguing and decided to find answers.

To do this, White bought a farm near Portsmouth, N. H., converted it into a mod-

ern laboratory and, in his spare time, began to fit out a pair of Chevrolet panel trucks until they resemble mobile versions of Frankenstein's laboratory. Actually, each is a self-contained, rolling dynamometer designed to tell the operator exactly what is happening anywhere in the vehicle's innards at any time while it is under way. Exactly 308 dials, switches, lights, meters and indicators stare at you from the stainless-steel panels that line its interior. Inside the hood is a maze of wires leading to dozens of thermocouples, all connected to dials inside the truck.

"If we're driving along at 90 and want to know how hot the rear end is," says White, "we just flick a switch and find out. Our reading also gives us the viscosity of the oil back there."

Just about everything is wired for heat—intake and exhaust manifolds, inside and outside of cylinder walls, muffler, exhaust pipe, air under the hood, radiator top and bottom, air coming into the filter and leaving it, gasoline in the carburetor, fuel in the tank. Name it and you can have its temperature at any time while driving.

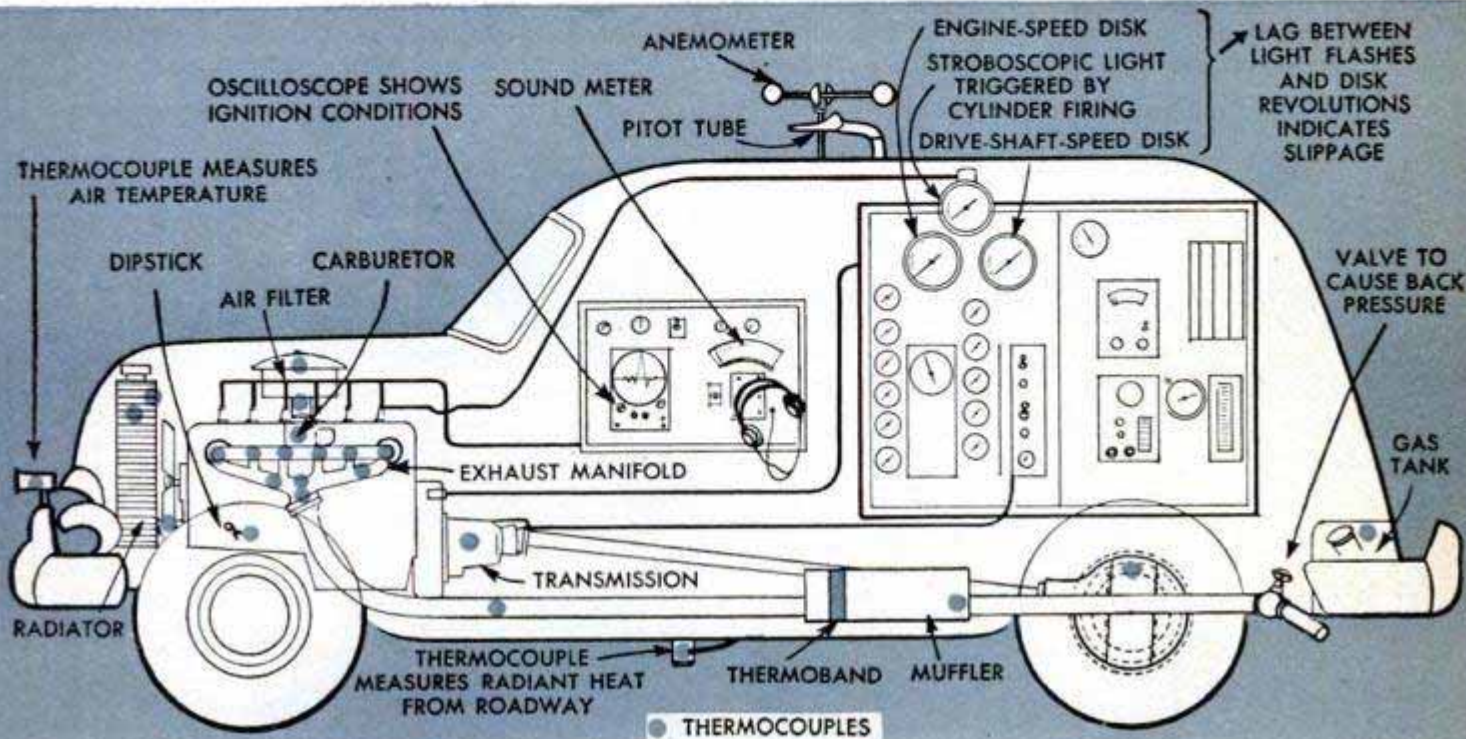
Already the test cars have proved that there's plenty of destructive heat coming from places other than the engine. One thermocouple is hooked to a little chrome barrel under the car and catches heat radiated off the road as the vehicle whips along. "Few people realize," says White, "that you can fry an egg on a concrete road on a hot summer day. We've logged that air rising off the pavement and up against

At any time during a run, White can remove a sample of oil from the crankcase or differential and check its viscosity and condition in a built-in test unit

Below, dots show where thermocouples are located to measure temperatures of parts while car is operating. Other major test instruments are shown in the sketch

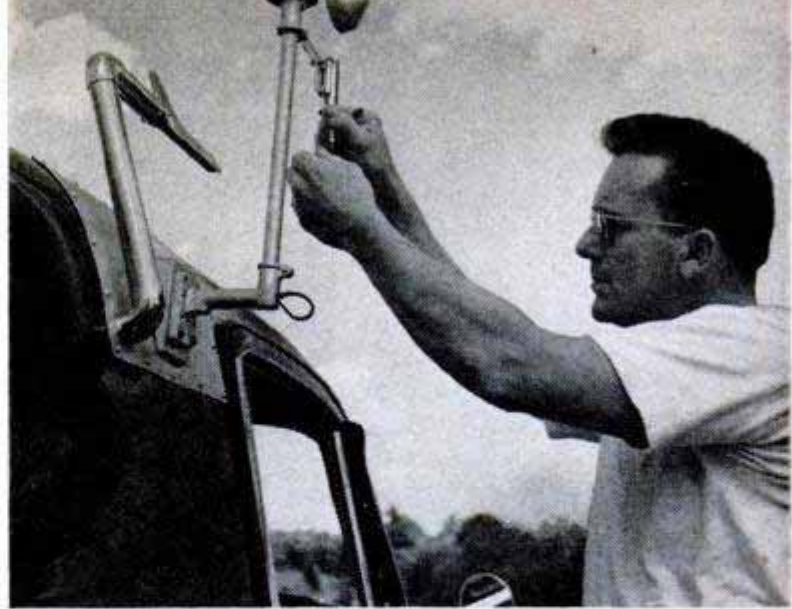


Some of the external instruments are the pitot tube and anemometer on the roof and a thermocouple near the ground that measures radiant heat from highway





Lined with an impressive array of dials and switches, the truck interior is an efficient mobile laboratory



White measures the effect of wind on gas consumption with a pitot tube and anemometer mounted on roof

the bottom of the car at 212 degrees. Our other instruments told us that the oil was boiling in the crankcase. Its viscosity was so low it wasn't able to lubricate the engine properly."

Gasoline consumption is one of Andy White's pet hobbies and his test cars are loaded with instruments to find out where, when and how gasoline goes.

"Want to see how to ruin your gas mileage?" he asks. He flips a switch on a glass vial fixed to the dash panel and a tenth of a gallon gushes into it from the feed line. This is a flowmeter with a calibrated scale in it. Another switch cuts the flowmeter into the system while the car is moving, and blocks off the line from the regular tank. White comes to a stop and idles. The fuel in the glass column drops imperceptibly. Then, brrrrmm — brrrrmm — brrrrmm — brrrrmm — he drums the accelerator against the floor board four times like a nervous

driver at a traffic light. Down drops the gasoline—about a quarter of it at once. Four more times and it's half gone. "And we haven't gone anyplace," he reminds you.

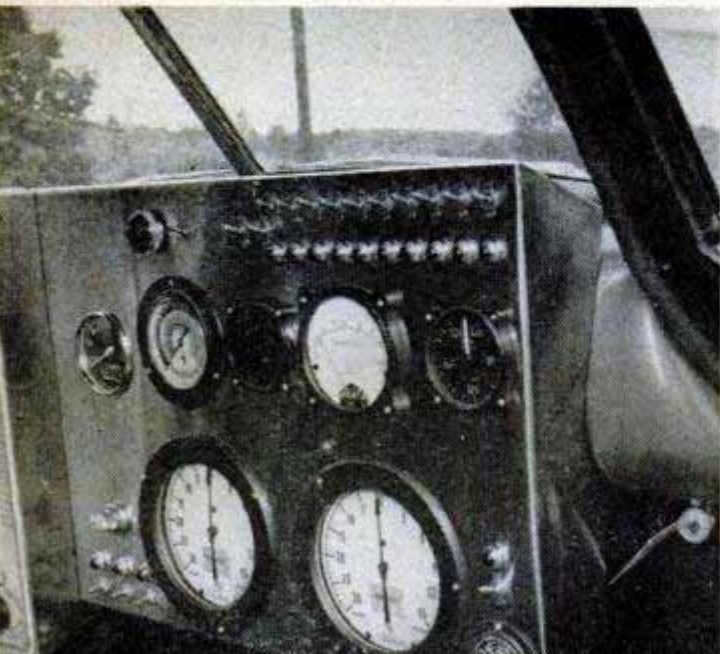
"The average car," says White, "can go 200 feet on four cubic centimeters of fuel. But every time you tramp the accelerator to the floor for an instant, four times that amount of gasoline is sucked through the engine and wasted. Four tramps on the pedal and you sacrifice 3200 feet of transportation—eight, and you've dumped almost 1¼ miles out the exhaust."

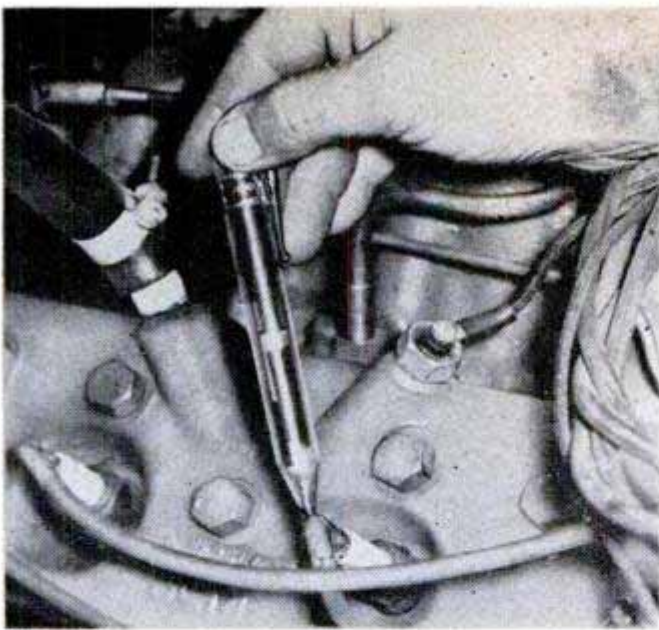
You can watch the needle on a meter (which operates off engine vacuum) climb to 47 miles per gallon as the car rolls downhill—then falls back with a jolt to about two miles per gallon when the driver hits the floor board on a hill to pass another car. Everything drops to zero (including that tenth of a gallon) on a jack-rabbit start. And

(Continued to page 268)

Dashboard of the second test truck has specialized instruments that demonstrate wasteful driving habits

Wearing earphones, engineer Len Bell can listen to noises made by various parts of engine and chassis



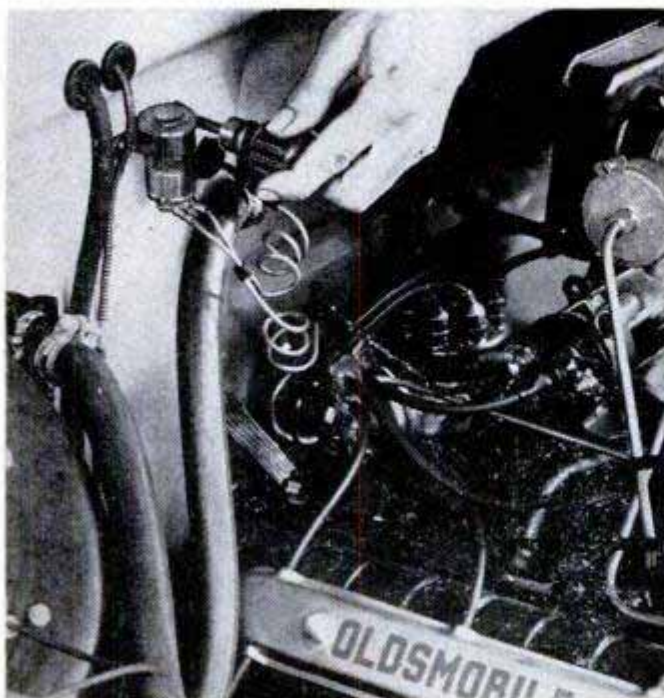


Ignition Tester

Providing a rapid check of voltage at the spark plugs, a pocket-size firing indicator detects ignition defects. The brightness and frequency of the flashes inside the transparent instrument vary with the voltage, giving the mechanic a measure of spark quality.

Mercury Switch Stops Engine When Automobile Overturns

Stopping the engine when the car or truck tips to more than 45 degrees, a simple mercury switch helps prevent fires that often cause fatalities in overturned vehicles. The switch connects to the ignition circuit. When the car tilts excessively, the mercury moves away from the points of the switch, stopping the flow of current. A baffle plate keeps the mercury in position during sudden starts and stops.

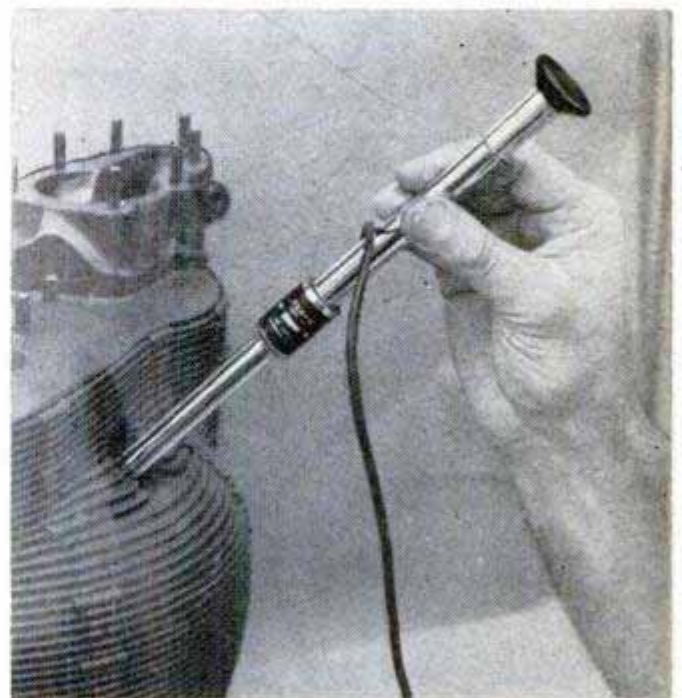


Wiper Clears Side Windows

Driving visibility is aided during rain and snow, particularly when making turns, by a manually operated wiper for the side windows. Quickly removed or attached, it is held rigidly in place by a friction clamp. A small crank operates the wiper from inside the automobile.

Inspection 'Scope "Sees" Inside Conditions

Only a half inch in diameter, a long tubular optical instrument enables inspectors to look at a magnified image of surfaces otherwise inaccessible to the eye. It can be used to investigate inside surfaces of hollow castings, engine cylinders, gun barrels or other interior areas. Electric illumination is built into the tube. A tiny 12-volt bulb provides ample inspection illumination over the area magnified.





Douglas Aircraft photo

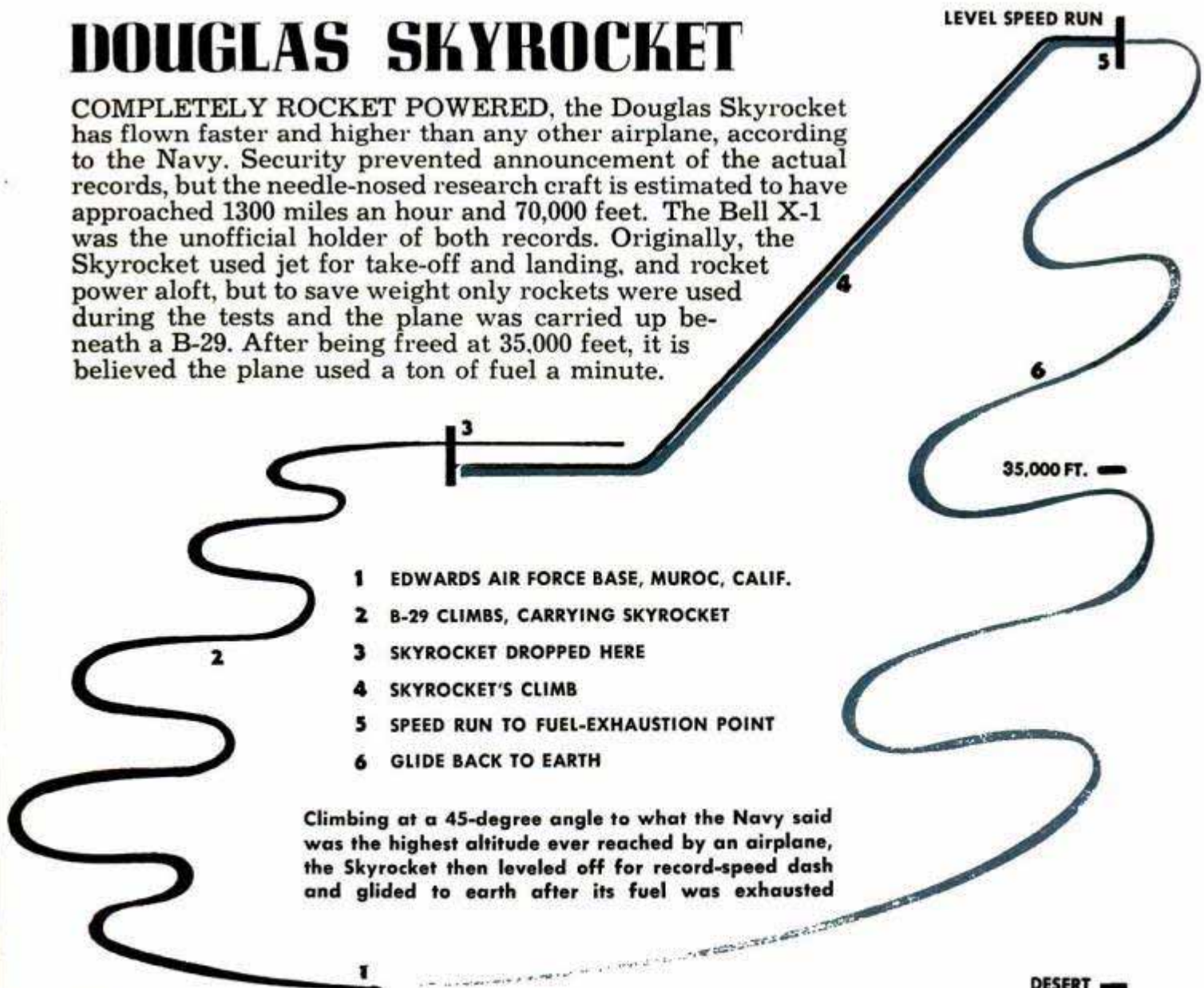
At an altitude of 35,000 feet during speed runs, the Skyrocket was uncoupled from the bomb bay of its "mother ship," a B-29. Then it climbed to about 70,000 feet

70,000 FT. —

DOUGLAS SKYROCKET

COMPLETELY ROCKET POWERED, the Douglas Skyrocket has flown faster and higher than any other airplane, according to the Navy. Security prevented announcement of the actual records, but the needle-nosed research craft is estimated to have approached 1300 miles an hour and 70,000 feet. The Bell X-1 was the unofficial holder of both records. Originally, the Skyrocket used jet for take-off and landing, and rocket power aloft, but to save weight only rockets were used during the tests and the plane was carried up beneath a B-29. After being freed at 35,000 feet, it is believed the plane used a ton of fuel a minute.

LEVEL SPEED RUN



- 1 EDWARDS AIR FORCE BASE, MUROC, CALIF.
- 2 B-29 CLIMBS, CARRYING SKYROCKET
- 3 SKYROCKET DROPPED HERE
- 4 SKYROCKET'S CLIMB
- 5 SPEED RUN TO FUEL-EXHAUSTION POINT
- 6 GLIDE BACK TO EARTH

Climbing at a 45-degree angle to what the Navy said was the highest altitude ever reached by an airplane, the Skyrocket then leveled off for record-speed dash and glided to earth after its fuel was exhausted

DESERT —



Bureau of Mines photo

With a WHOOM coal dust explodes, spewing out burning gas. Research men touched off the explosion in a test

FIGHTING INFERNOS UNDERGROUND

WOODLAND STREAMS around New Straitsville, Ohio, run hot. Acres of forest are dead. Huge cave-ins pockmark the landscape. Everywhere, smoke and steam spew from the earth in geysers. Roads have slumped, tilted and ruptured. Some houses, in a town once numbering 2500 souls but now down to 50, lie in tumbled ruins; others sit at crazy angles.

For 70 years a seething subterranean fire

has been burning through 30 square miles of coal bed under New Straitsville. Already, \$50,000,000 in coal reserves have burned up in this blaze.

Fifteen years ago, few people cared about burning up our coal reserves. There seemed plenty to burn. Even today, after mining some 30 billion tons, we still have a recoverable reserve estimated at one trillion, 200 billion tons—enough to last until

Mine Safety Appliances Co. photo

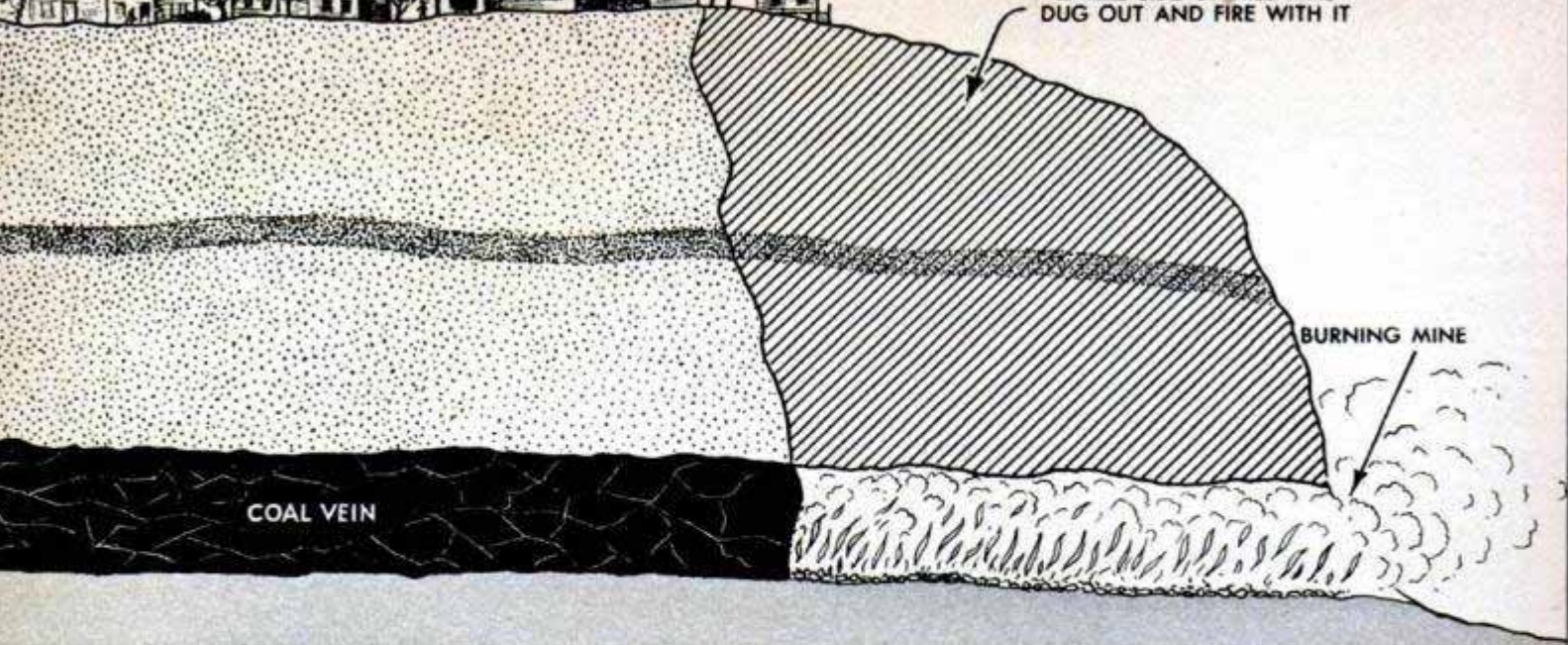
By

Richard F. Dempewolff

Underground boat is designed to be lowered down a mine shaft. It ferries men and their equipment through flooded levels. The fire fighters are wearing two-hour breathing apparatus

SEPTEMBER 1951





In Fairmont, W. Va., a burning coal mine was literally dug out of the ground to save the city from collapse

the year 3563 at present consumption. It sounds like plenty, until you know that millions of those tons are burning up in the ground. "Few people realize," Frank E. Griffith, chief fire-control engineer for the U. S. Bureau of Mines, will tell you, "that several hundred coal-mine fires are burning out the underpinnings of our country right now. Some have been burning for 40 to 50 years."

How did these infernos start? Careless

burning of rubbish atop old stripping operations is a big cause. Near Pittsburgh, a farmer started one by burning timber slash in sinkholes above an abandoned, collapsing mine. Kids playing Tom Sawyer in abandoned mine openings have started dozens. A mine in Gillette, Wyo., was set ablaze in 1885 by a horse thief who used it as a hideout, and the fire burned furiously until bureau men finally doused it last year.

However fires start, the job of putting

Silt is washed from a large hopper, through a pipe and into a borehole. Soil will block the old passageways

Bureau of Mines photo



them out is always tough. Bureau men have had to start from scratch to learn techniques. At the bureau's experimental mine, 13 miles south of Pittsburgh, an army of experts including underground fire fighters has been studying effects of different types of mine fires, characteristics of explosions, conditions of igniting gases and the efficiency of different extinguishing agents. Specially constructed "rooms" in the mine are lined with coal, insulated against surrounding beds by concrete block, and set afire. If you're around that experimental inferno at the right time, you're likely to see a show that will stand your hair on end. Sometimes, in explosion experiments, gas and coal dust go off with a dull WHOOM, and flames hurtle 500 feet out into space, giving the mine entrance the look of a gigantic flame thrower. Asbestos-clothed fire fighters rush into the smoking hole pushing machines that spout white, powdery clouds before them.

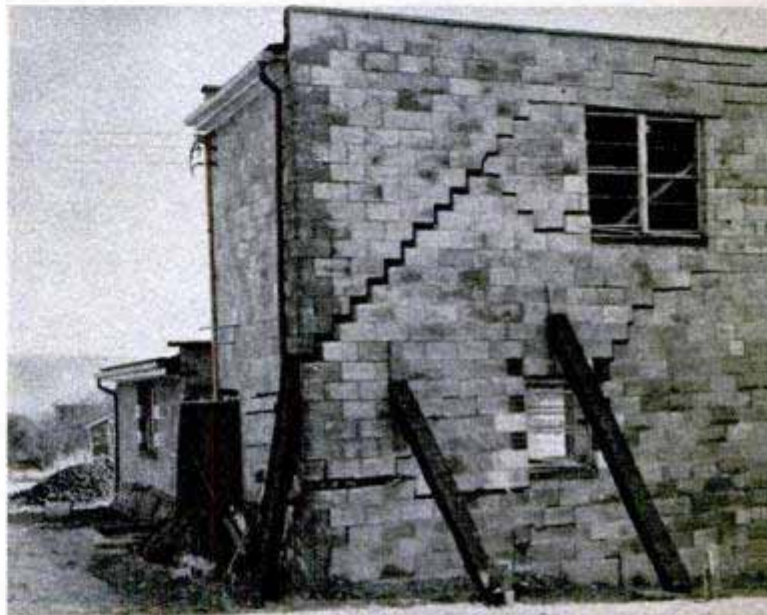
Today, the results of years of these sham battles finally are paying off. Nearly a hundred fires in inactive coal deposits have been investigated. Ten have been controlled in the last two years. Seven others

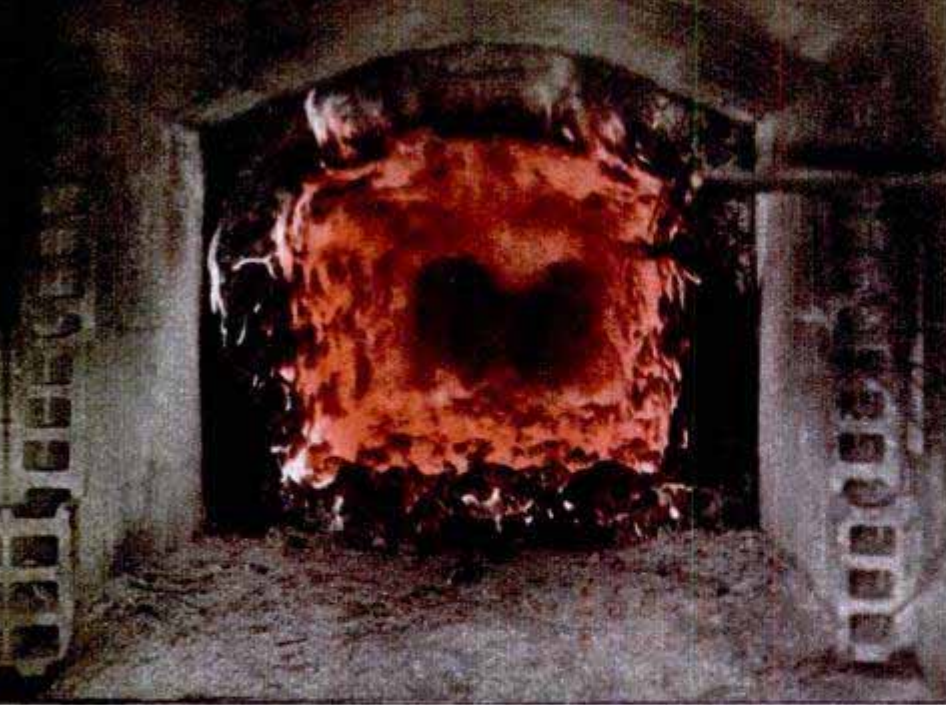
Right, a coal mine blazed deep beneath this building, shifting the earth and cracking the heavy walls. The fire, at Lloydsville, Pa., has been extinguished

At this man's doorstep in Carbondale, Pa., a geyser of steam shoots into air. Water poured into this bore-hole helps cool the hot coal beneath the city



Landscape around New Straitsville, Ohio, was not a pleasant view before the fire fighting started. Smoke and steam from cave-ins spouted 200 feet into the air





At the bureau's test mine, engineers duplicate the frightening spectacle of a live coal-mine fire. Instruments record temperatures up to 3000 degrees. Right, dusting machine spouts powdered limestone into burning mine

are being conquered. Several cities have been saved from collapse.

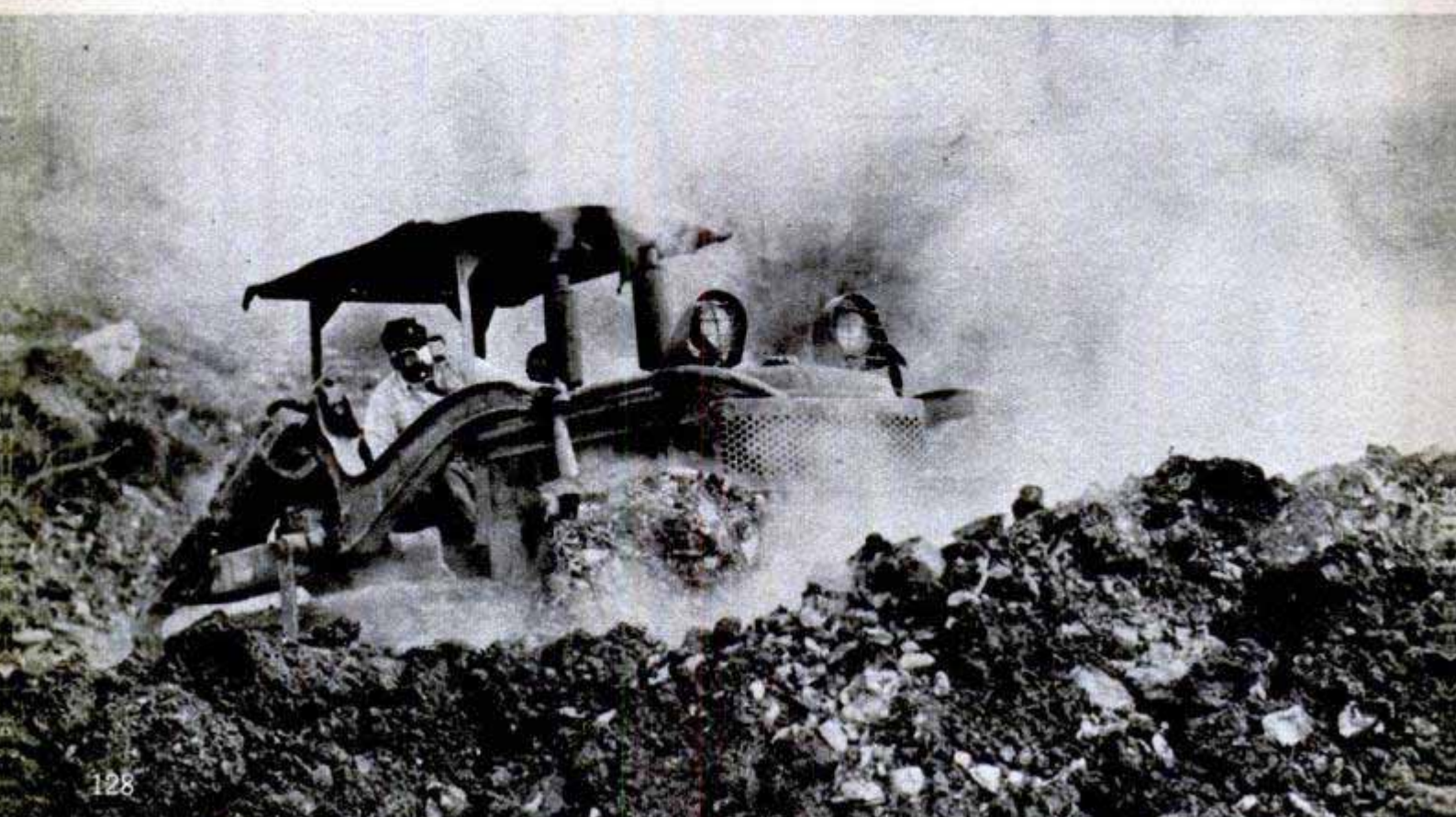
The tactics used to conquer these underground infernos are as varied and tricky as the fires themselves. The battle starts when drill rigs move into a fire area. Holes are bored into the ground all around the fire. By dropping thermocouples into these boreholes, engineers can read temperatures and find the limits of the blaze.

Once the limits of fire are known, the blaze can be smothered, isolated and allowed to burn out or cooled down below ignition point. Bureau men also have an-

other way of licking a mine blaze. In Fairmont, W. Va., engineers literally dug a mine fire right out of the ground. Fire had crept 150 feet back under Fairmont's streets when crews of men with monster power shovels began digging recently. A large portion of a mountainside was removed—along with the fire—and Fairmont was saved from sure collapse.

In most western states, and wherever surface conditions are favorable, mine fire fighters use the smothering technique. First, the shafts and entrances to old workings are sealed with walls of concrete block

Bulldozer operator wears a gas mask as he battles through fumes to push burning coal away from a mine





After rock dust has been blown into the test mine, an engineer checks temperature with optical pyrometer, which tells heat by color of flame

or brick, to cut off air supply from that direction. But that's not enough.

In any mine blaze, when supporting columns and seams burn out, the earth above slumps into the cavity. Great crevasses open on the surface with an earthquake-like rumble. Through such rifts in the earth's crust, air rushes to feed flame.

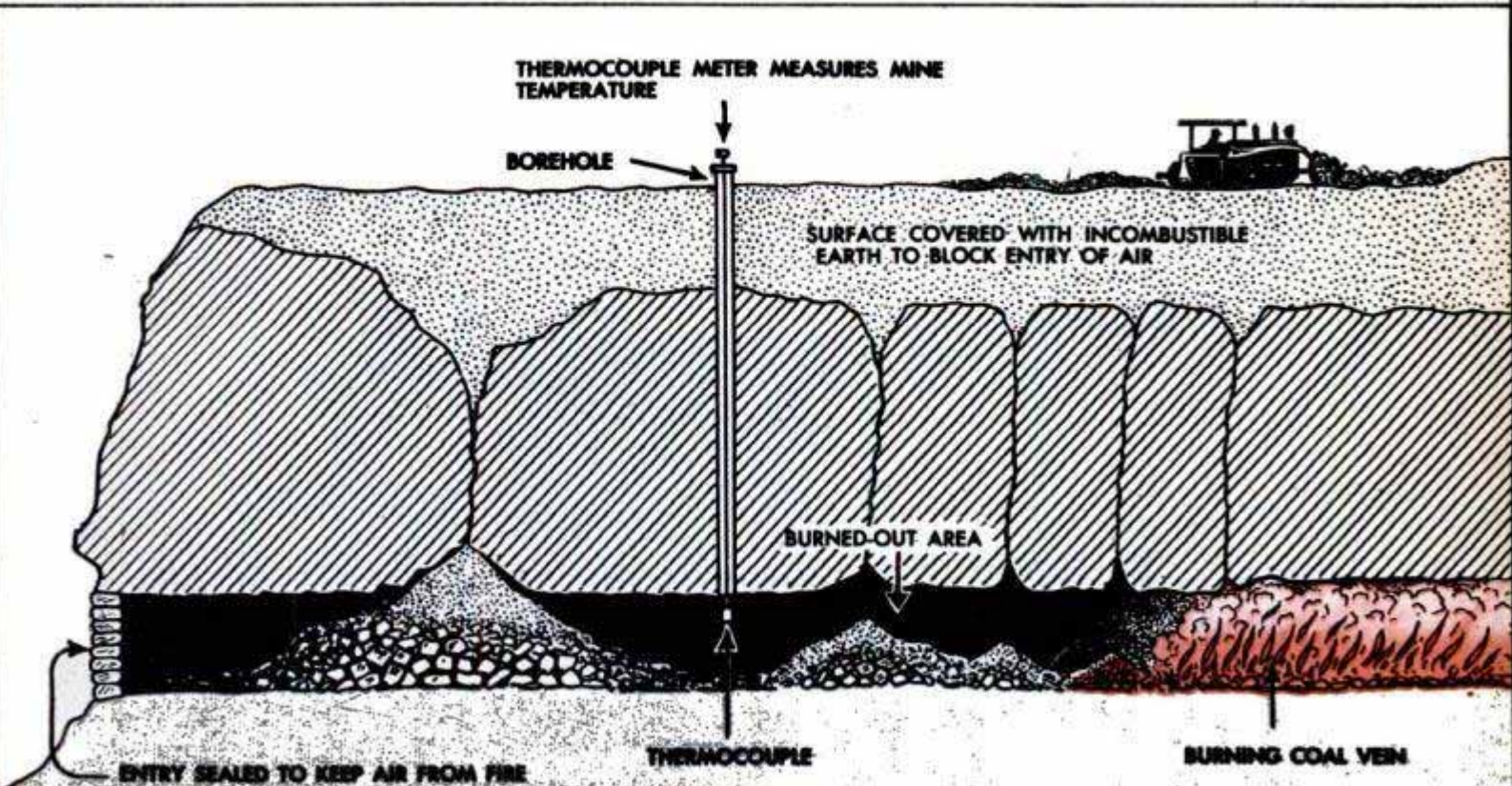
So big power shovels and bulldozers rumble onto the scene, pulverize mountains of soil and spread it over the fire zone, covering cracks and sinkholes. As old cracks widen and new ones are formed, the loose earth filters in and plugs them.

Coal-mine fires sometimes are extinguished by sealing out the air with layers of earth and underground walls

But shutting out a fire this way isn't possible if the burning mine is under a mountain or a city. So other tactics are used. At North Park, Colo., bureau engineers sent out a dragline and heavy earthmoving equipment to a fire that was eating through old workings under a hill. Back of the hill, they cut a trench 850 feet long, 30 feet wide and 85 feet deep right down through the coal bed, filled it with clay, and left the fire to burn itself out. Beyond the trench, 15 million tons of coal lie protected by a sturdy wall.

One of the toughest recent jobs was in Carbondale, Pa., a city of 19,000. Like many mine fires, this one started years ago in a refuse dump on an old strip mine, and finally worked its way under the edge of the city. Residents were puzzled when pets began dying in their cellars. One home developed a miniature steam jet in the basement floor. Another man's furnace wouldn't burn, and neither would the matches he used when he tried to relight it. Carbon dioxide was in charge.

Last June, the bureau put its experts and a contractor on the job. They had to work fast. Where they could, they covered the





Bureau of Mines photo

Workers seal off a fire area with heavy wall of cinder block. Masks protect them from fire's poisonous gas

slumping surface with soil to seal it tight. Boreholes were drilled some 100 feet down to the fire, which then covered about 15 acres. Into these, the fire fighters flushed incombustible silt. About 74,000 cubic yards of earth have been flushed into Carbondale's burning mine.

To help cool the fire, bureau men tried a new experiment. They poured vast quantities of water into boreholes that led directly to the hottest parts of the subterranean furnace. The result was spectacular to see. Steam geysered skyward from many boreholes and, for a while, Carbondale looked like a miniature Yellowstone.

Today, all of Carbondale's boreholes are sealed or capped. About 20, spotted at

strategic points, have thermocouples and pipes leading out of them for constant checks on temperature and gas generation in various parts of the fire. This way, engineers keep track of their dying giant.

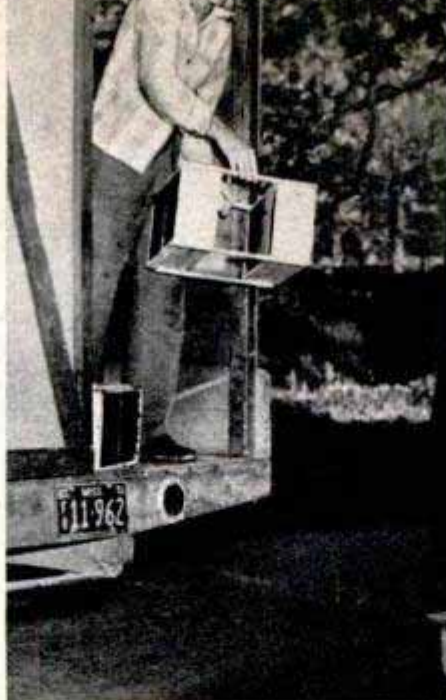
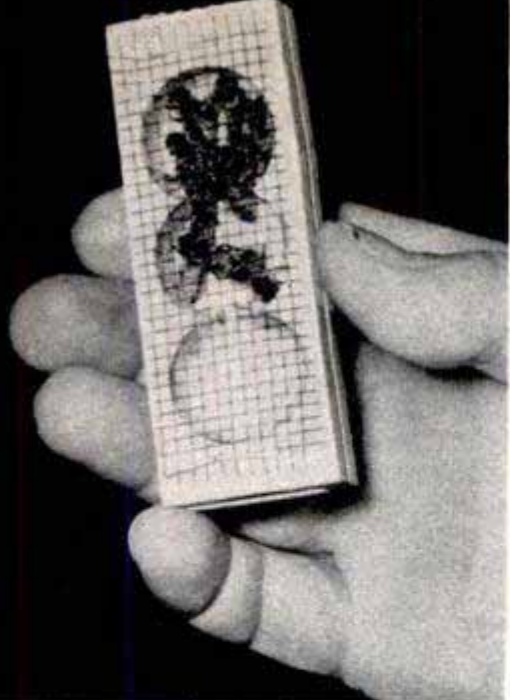
The idea of flushing earth into the ground was also used at New Straitsville. Here the burning beds connected with vast coal deposits beyond them at three points. What the bureau did in 1938, in a vast project carried out under WPA, was to utilize an army of men and machines to drive 12-foot wide tunnels through the coal veins at these three necks. All combustible material was removed from the tunnels, which then were filled with rock. Bulkheads, with slits in them, were built at all openings along the three underground corridors. The ends were sealed and dirt was flushed into the tunnels through boreholes, from above. The water seeped through the bulkheads. But the silt stayed, filled up the spaces in the rubble and formed great barriers through which no fire can burn. One of these barriers is about a mile long and 200 feet underground. The others are shorter. Already the fire has burned all along one barrier and is approaching a second. Some experts believe it will be 100 years before the New Straitsville fire burns itself out, but the millions of tons of reserve coal beyond these barriers have been saved for posterity.

All this is fine, when you're dealing with abandoned mines. When fire gets going in an active coal mine, the story is different.

(Continued to page 236)

Fire burning under a Colorado hill was encircled with ditch up to 85 feet deep, which was filled with clay

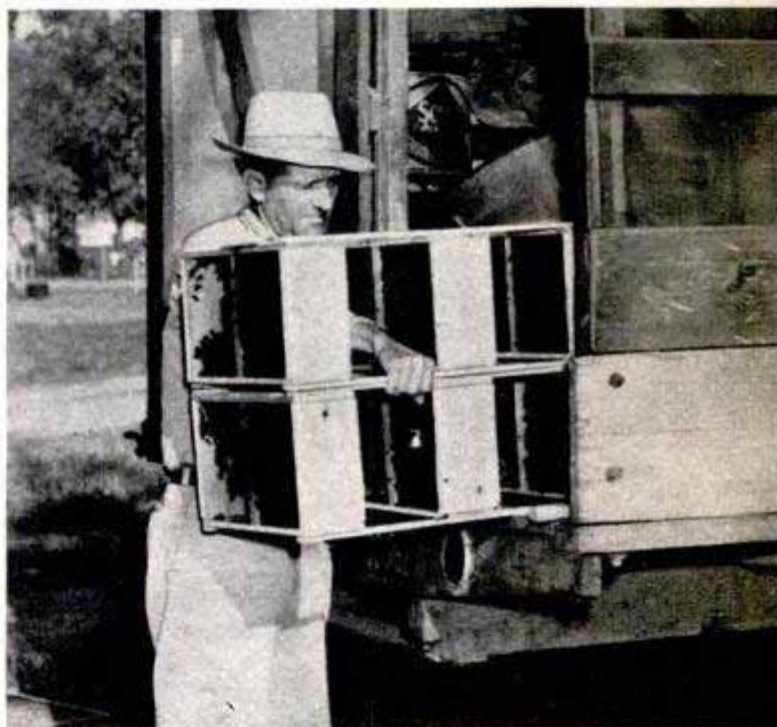




Queen bee attended by a dozen workers rides in small box at left; postmistress Maude Morris stamps crates

BEE POST OFFICE

TWENTY-FOUR MILLION queen and worker bees are mailed annually from a tiny post office at Mayhew, Miss. The shipping season is from March 1 until mid-May, and the bees are sent from a large apiary near Mayhew to every state and to many foreign countries. Without the bees there would be no post-office building in this town and no full-time postmistress. The queens ride in small boxes with a dozen "retainers" and a supply of powdered sugar. Other workers travel in wooden containers with screen-wire sides. Bee by-products shipped by the apiary include stingers, which are removed by tiny tweezers, for use in medical research, and royal-jelly mixture of pollen and honey being tested as a protein-rich baby food.



Below, numerous bee yards at huge Mayhew apiary provide rushing seasonal business for tiny post office

Worker bees in handmade crates are loaded on truck for trip to post office, which is "beehive" of activity



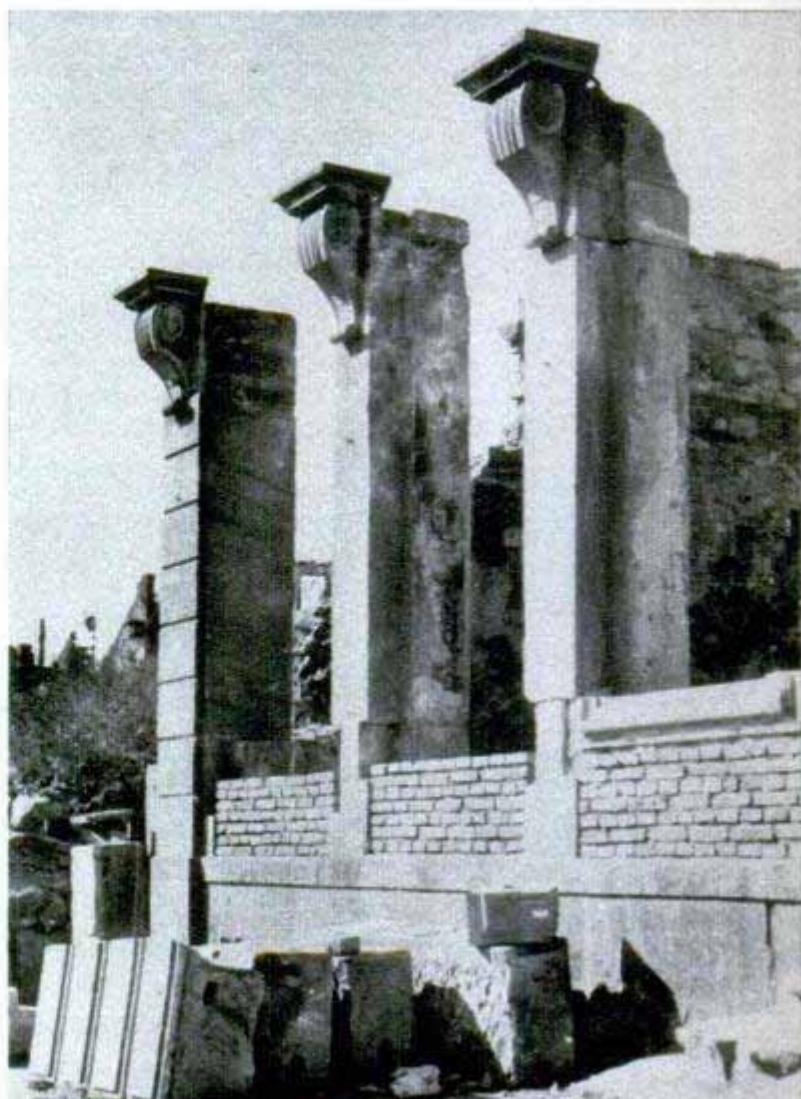
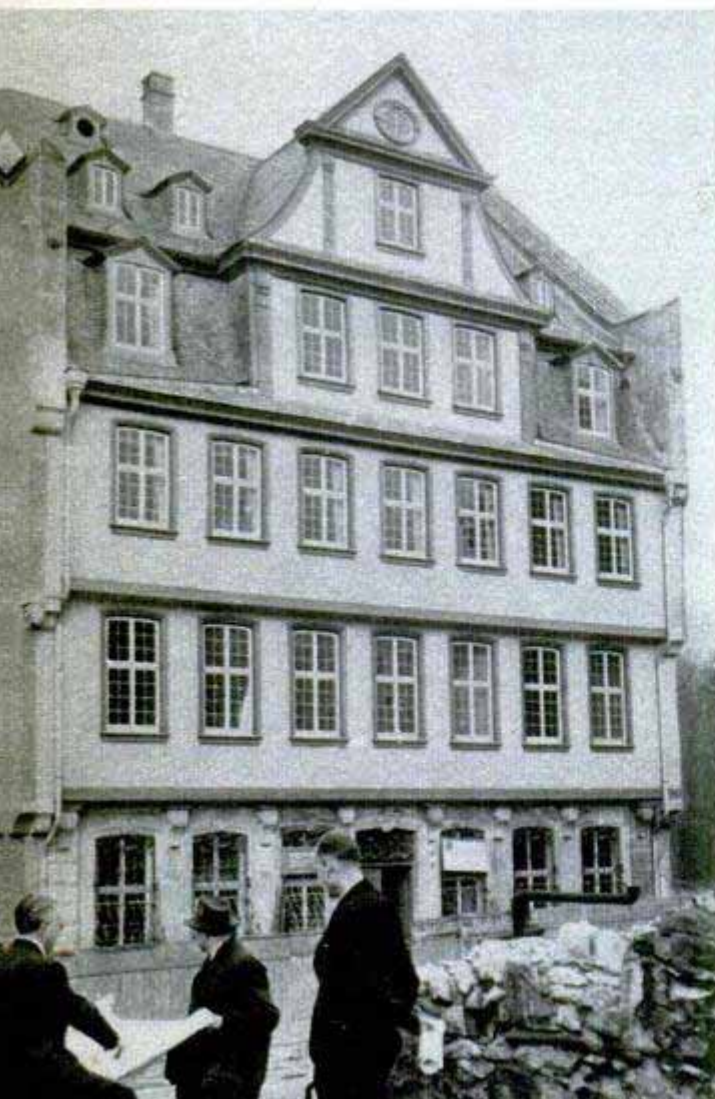
RESTORING

GOETHE'S HOME



A TRUE REPLICA of the birthplace of Johann Wolfgang von Goethe has grown out of a heap of debris, which was all that remained of the German poet's dwelling after a bomb raid on Frankfurt. Reconstruction was possible because plans and photos had been stored away. The work included dainty stucco decorations, hand-painted wallpaper and porcelain stoves to re-create the atmosphere of the 18th-century period when the house was built.

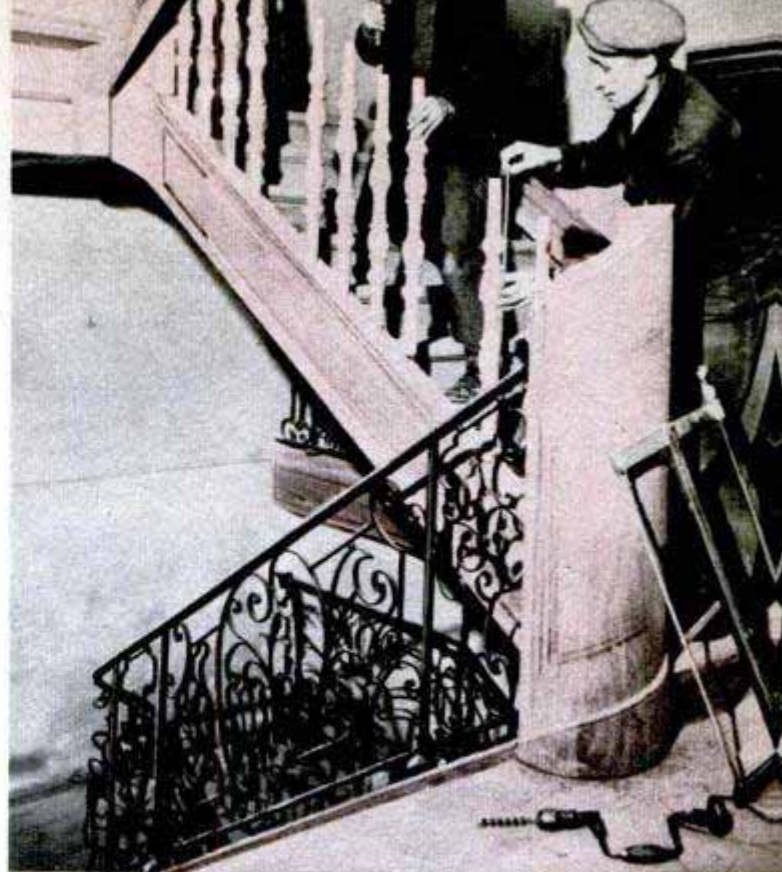
So-called giraffe piano, left, some 200 years old, is repaired before resuming its place in the reconstructed Goethe home, which architects check with original blueprints, below left. Some of the old foundation parts, below, were used in rebuilding the home





Artists compare paints to be sure they will authentically reproduce exact color of hand-painted wallpaper in the house first constructed about 200 years ago

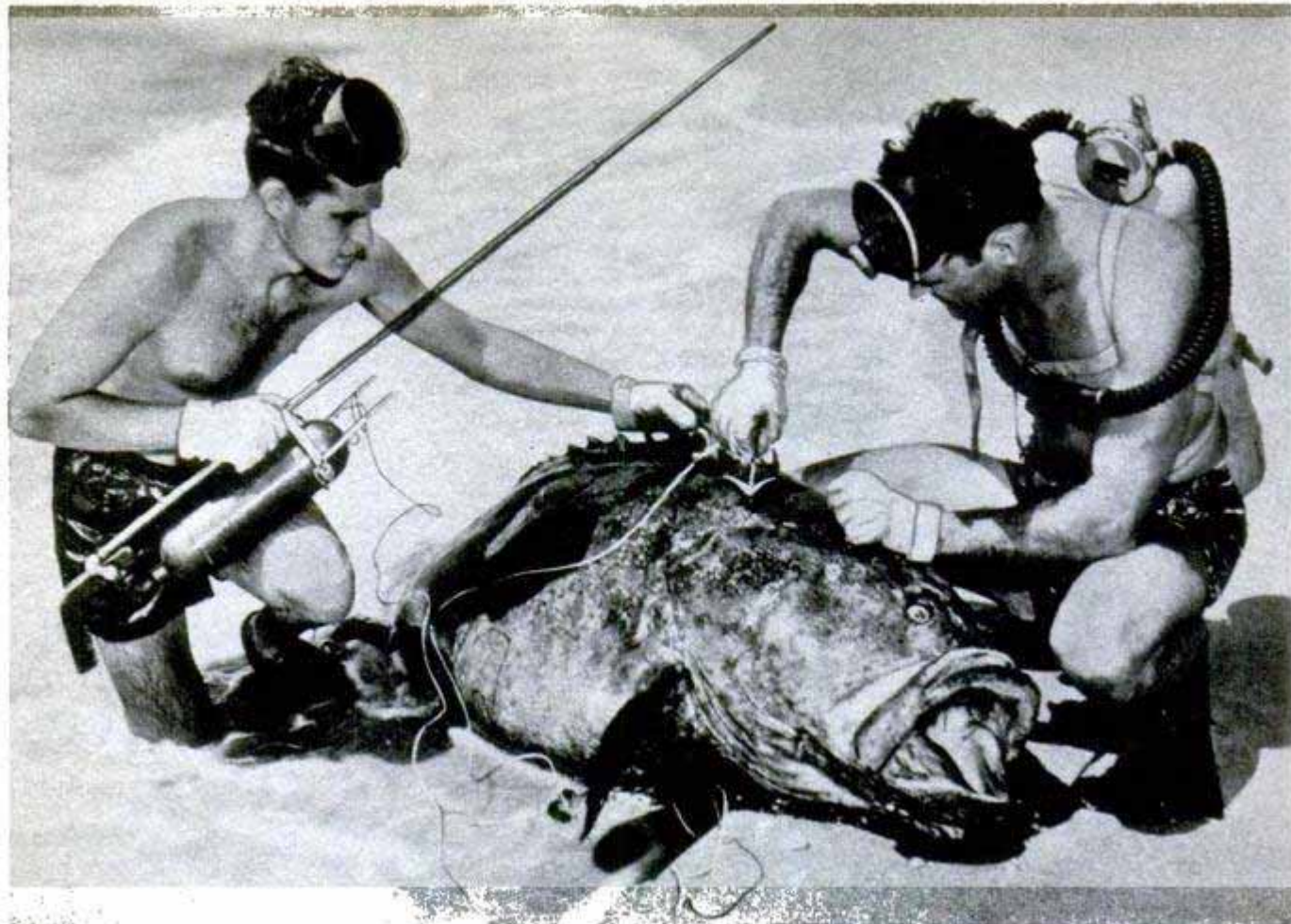
Beautifully decorated copper kitchenware that belonged to Goethe's mother is carefully polished so it can again be put on display in the kitchen



In combing through the pile of twisted rubble, workmen found some of the original iron bannisters, which are again used in rebuilding the interior staircase

Corner of the library where Goethe's father had an extra window installed so he could keep a sharp eye on the youngsters as they played in the street below

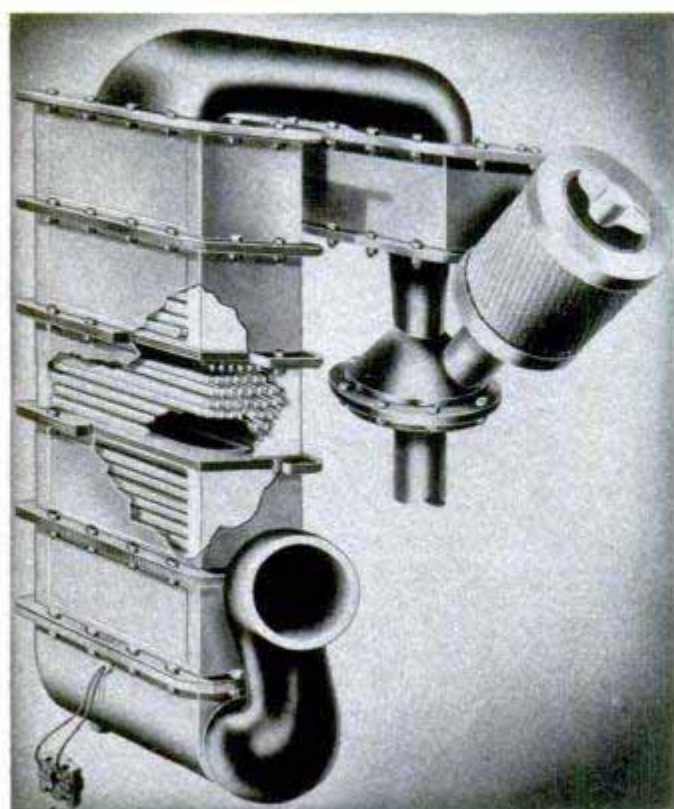




Gas-Powered Spear Gun

Powered by the compressed gas of a carbon-dioxide fire extinguisher, a spear-fishing gun discharges the shaft with enough force to kill even the toughest game fish. Bill McDougall, a Miami underwater-fishing enthusiast, turned the handle of the ex-

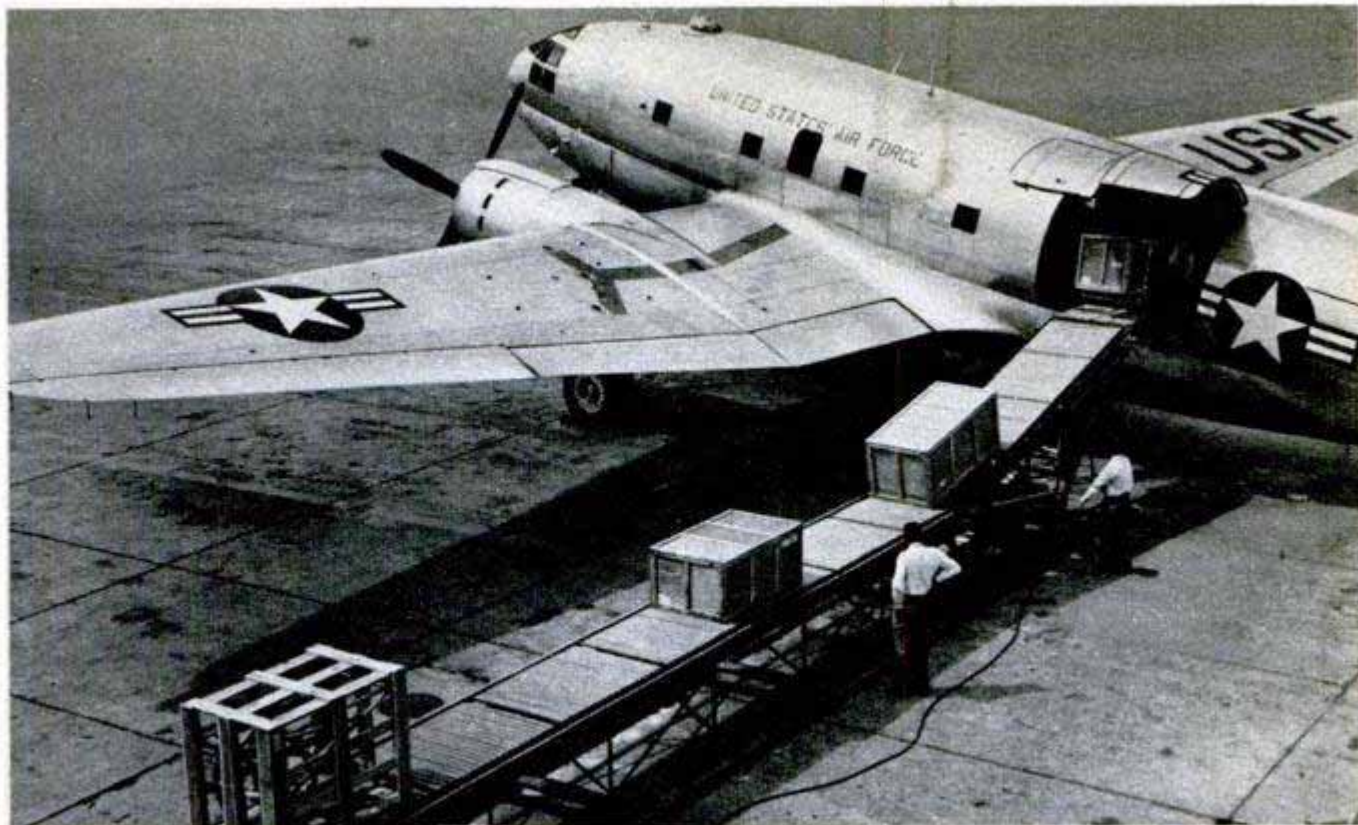
tinguisher around to form a stock, added a long tubular barrel and made himself a gun. It can be fired about 50 times without recharging. For big game fish, a barbed head is fitted over the spear to which a strong wire is attached for hauling in the trophy. Fishermen wearing an Aqua-Lung can achieve depths of 200 feet.



Exhaust Gas Made Safe

Replacing the conventional muffler on a gasoline engine, a catalytic exhaust converts deadly carbon monoxide to carbon dioxide, which is harmless and odorless. As yet, it is available only for vehicles such as lift trucks that use low-grade, nonleaded gasoline, but the manufacturer is testing a model he will market for passenger cars and trucks. Inside the exhaust converter is a catalyst which is mainly platinum plus a number of other elements. It combines with the exhaust gases and, helped by the oxygen of sucked-in air, transforms them into harmless vapors. The exhaust is being sold with lift trucks as optional equipment. It is especially desirable for trucks that operate inside factories where hazardous exhaust is a major health problem.

☐ Glass razor blades, as sharp as those of steel, are produced by a grinding and etching process on which a patent has been issued.



U. S. Air Force photo

114-Foot Conveyor Speeds Cargo Handling

Eliminating trucks and dollies normally used in handling air freight, a 114-foot conveyor carries cargo directly from plane to freight terminal. Half of the conveyor retracts beneath a 58-foot stationary section that has conventional rollers on which parcels are moved by hand. Rollers on the extension are powered and automatically carry freight to or from the cargo hatch of

an airplane. A boom at the end raises or lowers itself to the height of the doors, where a hydraulic transfer leaf makes contact with the plane's deck. In a test it unloaded 4774 pounds of freight in eight minutes—an operation that normally takes an hour or more. The conveyor was built at Kelly Air Force Base, San Antonio, Tex., for the Military Air Transport Service.



"Dew Floating" Speedboat

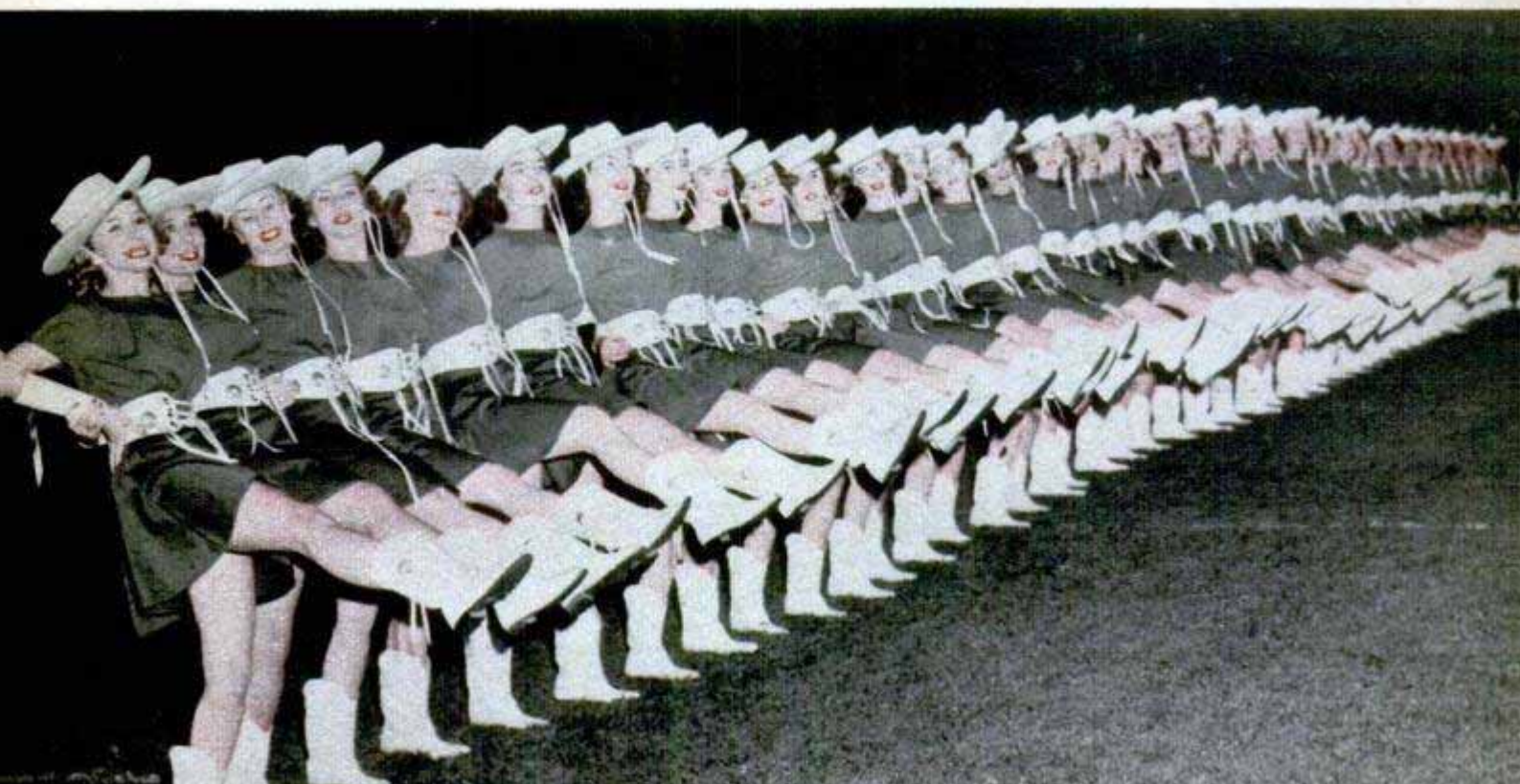
About all it takes is a heavy dew to float a British speedboat that is powered by a 100-horsepower airplane engine. The single-step boat draws about nine inches fully loaded and at rest. When speeding along at about 50 miles an hour, it draws only one

half inch of water! The skin of the hull is formed by two layers of marine plywood with a layer of fabric between them. Total weight of the boat is slightly less than 1000 pounds. Its two-bladed propeller is six feet in diameter. Designer and builder of the boat, called a hydroglider, is W. F. W. Davies of Dudley, England.

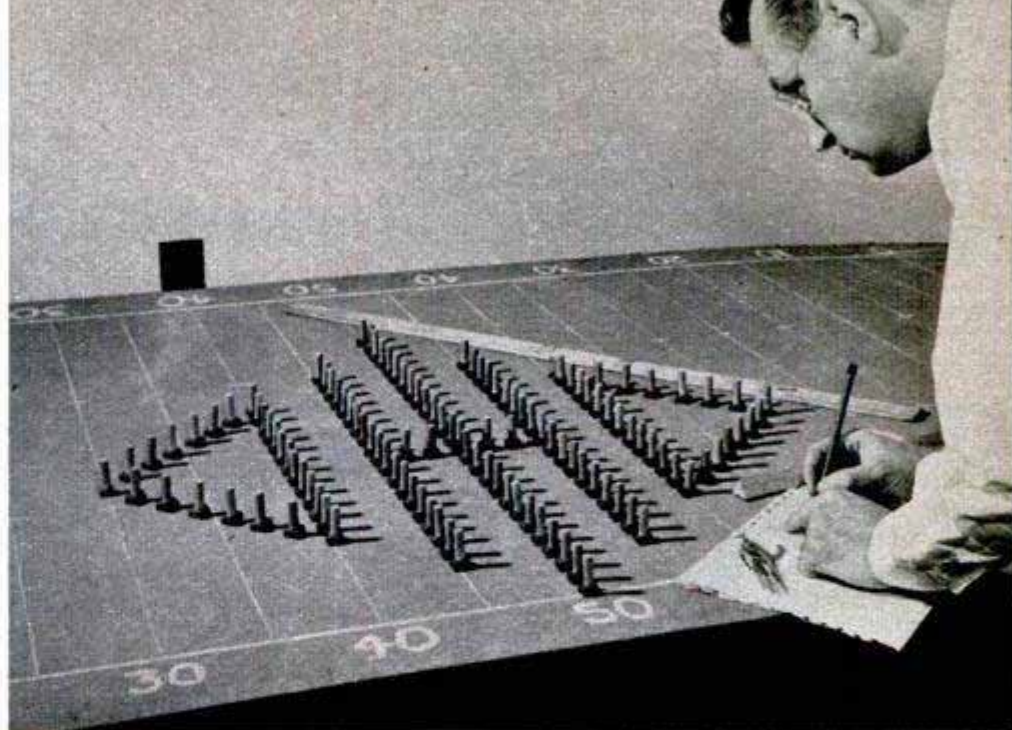


FOOTBALL IS A PAGEANT

Half-time-show stars are Ohio State's drum major, above, and the Rangerettes from Kilgore (Tex.) Junior College



Pieces of dowel rod, with small nuts as their bases, represent bandsmen on Ohio State's planning board. Scaled display shows how formation will look on the field. Jack O. Evans, associate director of the marching band, notes locations on a chart



By

Aubrey O. Cookman, Jr.

YOUNG MEN who won't touch a football all season will do some of the liveliest stepping and most expert playing on college gridirons this fall. Their maneuvers will be carefully planned and diligently rehearsed. Teamwork will be their forte. Many won't weigh 150 pounds in full uniform, but they'll be as loudly cheered as the brawniest athletes on the field.

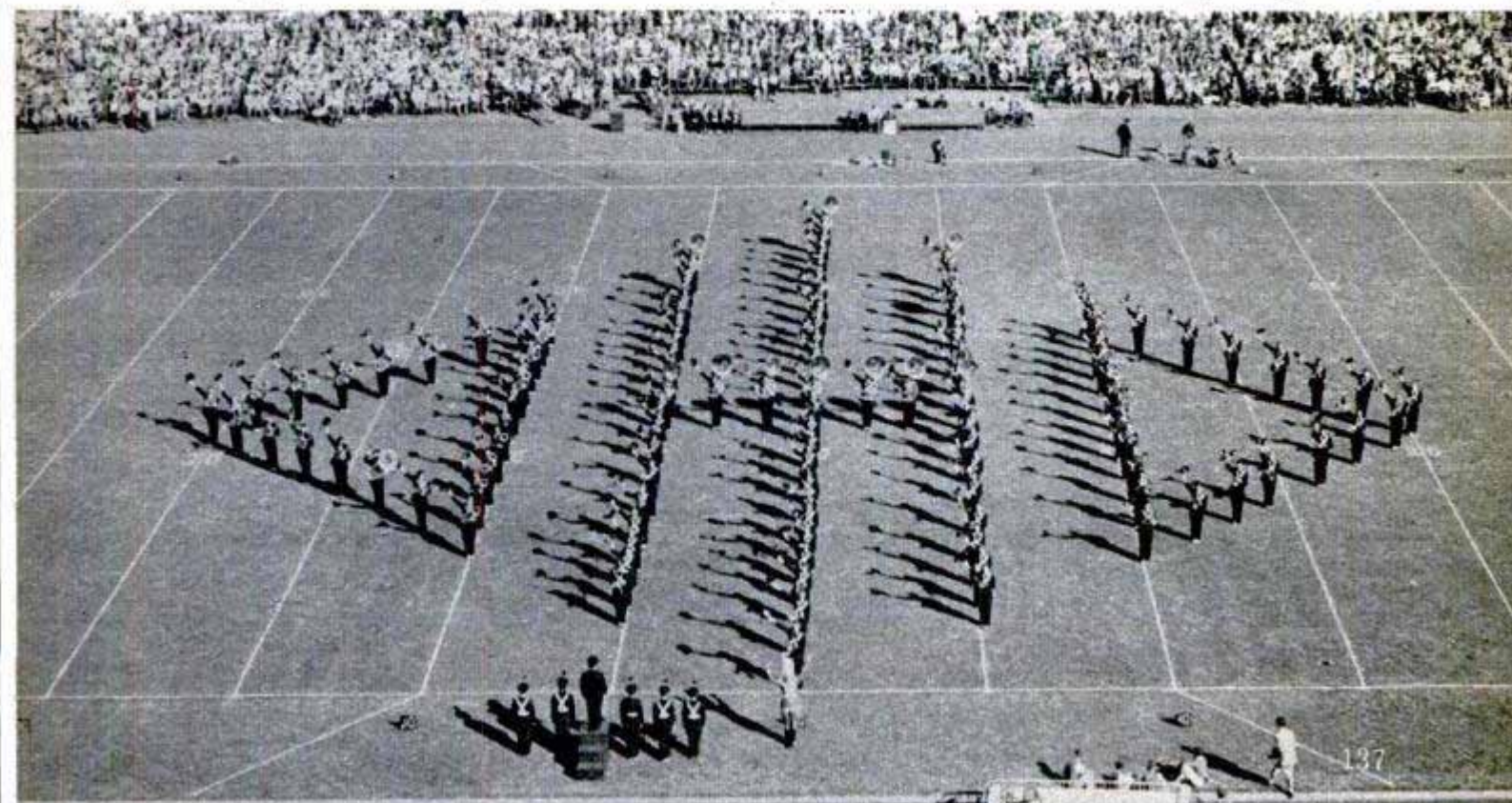
These star performers—the bandsmen—are key figures in the colorful spectacle surrounding today's big college football games. No matter which team wins, the crowd is sure of a spine-tingling show as carefully staged as a Hollywood production. A hundred or more marching and singing musicians from each of the rival

schools will make sure of that at half time.

Decked in their school colors and moving in precise cadence, they shape such intricate and symbolic formations as the Statue of Liberty, tepees, state emblems, profiles of famous people and turning windmills and clocks. They play or sing appropriate selections throughout most of their maneuvers. One band, featuring a cappella vocal arrangements, has over 300 musicians in some formations.

Though they may know what cereal and how many pieces of toast the star halfback ate for breakfast, few fans huddled in the stands on chilly fall Saturdays realize how much effort goes into the band's 15 to 20 minute performance between the halves. At

Caps held high, over 100 marching musicians form famous "Diamond Ohio" (laid out above on planning board)

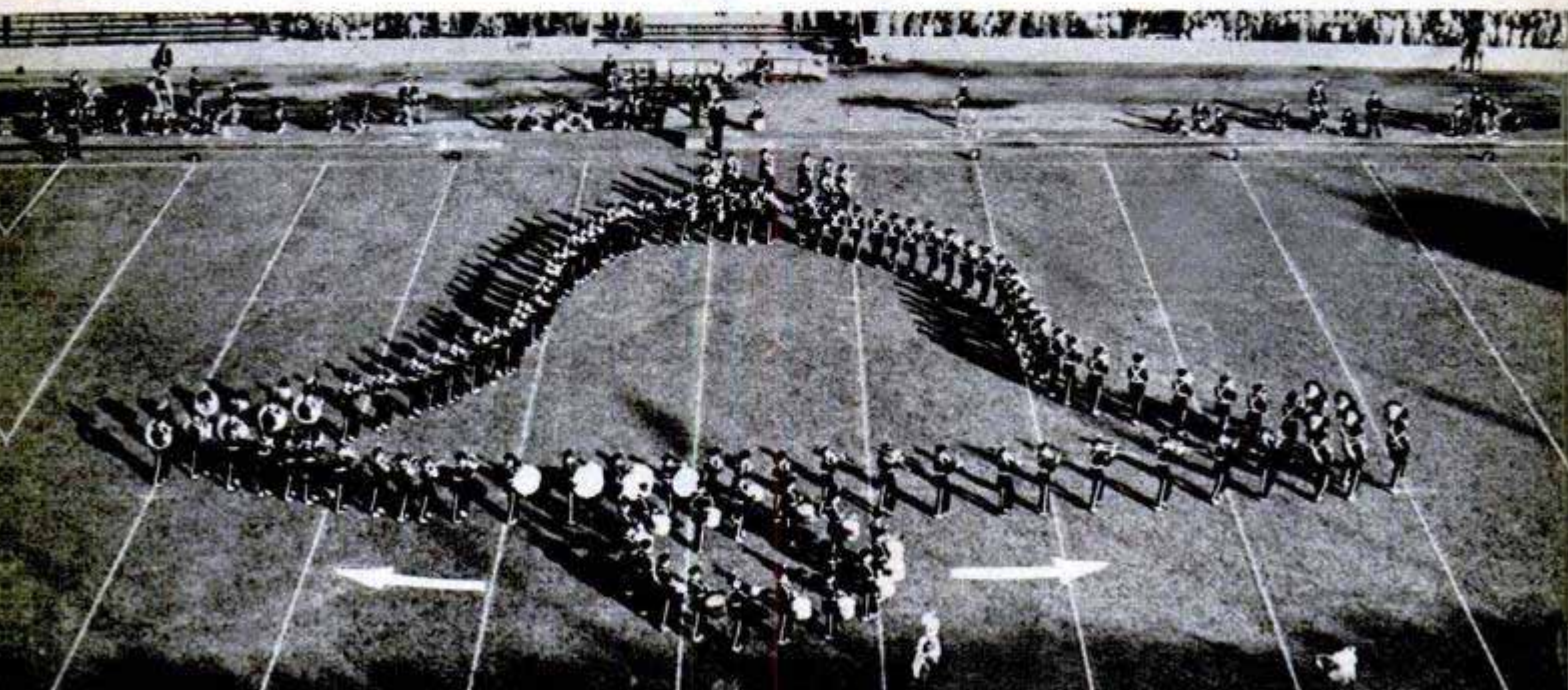




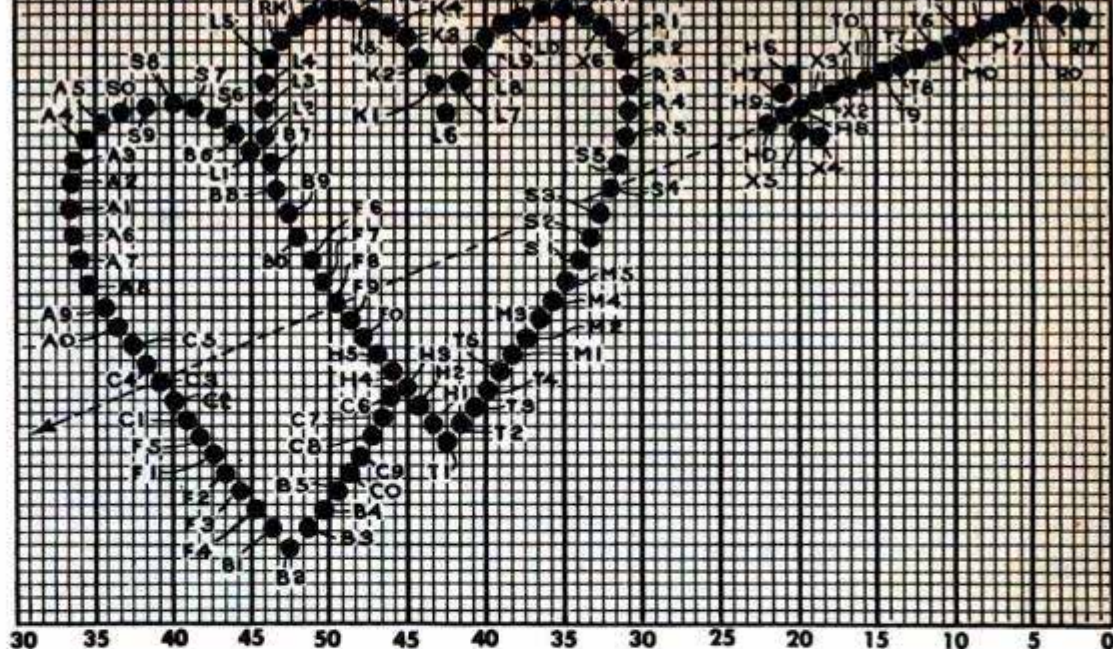
Playing as they move with a very high step, the marchers make the arms of this windmill slowly revolve



As the band plays "Surrey With the Fringe on Top," the wheels on the old-time vehicle (above) turned. Precise marching made Liberty Bell (below) appear to ring. Its crack later was simulated by men moving across bell



Shaping a romantic note on the gridiron. Graph shows alignment as the arrow moves left toward the two hearts and finally pierces them both



institutions famous for their football bands, like the University of Pittsburgh and Ohio State University, units start training a week before the other students begin classes in the fall.

About 150 Pitt musicians, for example, register early for classes and board busses for a camp where they'll do nothing but eat, sleep and drink band for a week. They drill three times daily on a regulation-size football field.

At these preschool camps, each man is assigned a number or a letter fixing his marching location in the band. He retains that designation the entire season. At the same time he gets blueprints or charts of formations for the first game of the season. On them he finds his number or letter, the key to his role in each maneuver.

Generally the show for each game is built around a special theme. During Pennsylvania Week, for instance, Pittsburgh's band director made the half-time performance a tribute to the state. The formations includ-

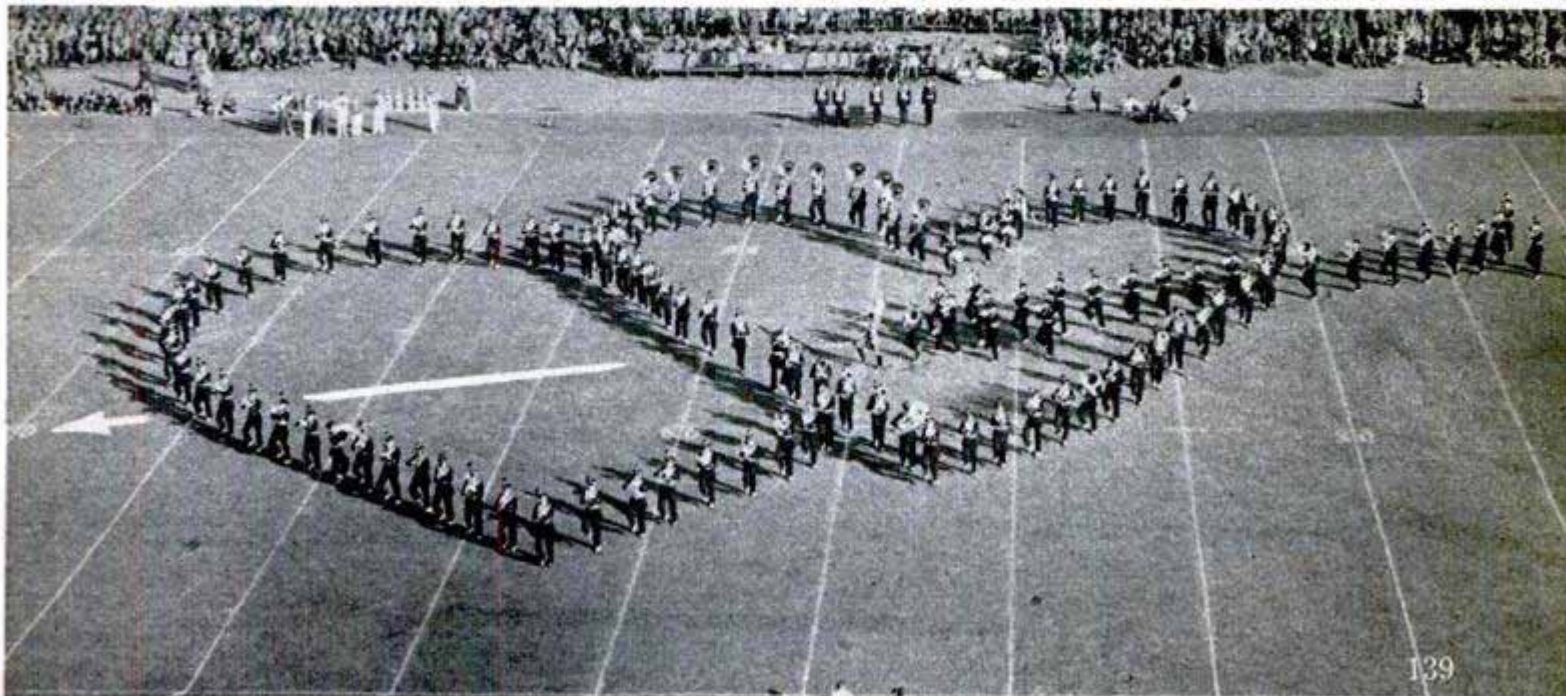
ed a keystone, the state emblem; a Liberty Bell that swung back and forth and finally cracked; a surrey with a revolving wheel, representing the typical vehicle of the Amish and Mennonites of eastern Pennsylvania; and a pick and shovel in recognition of the state's coal industry.

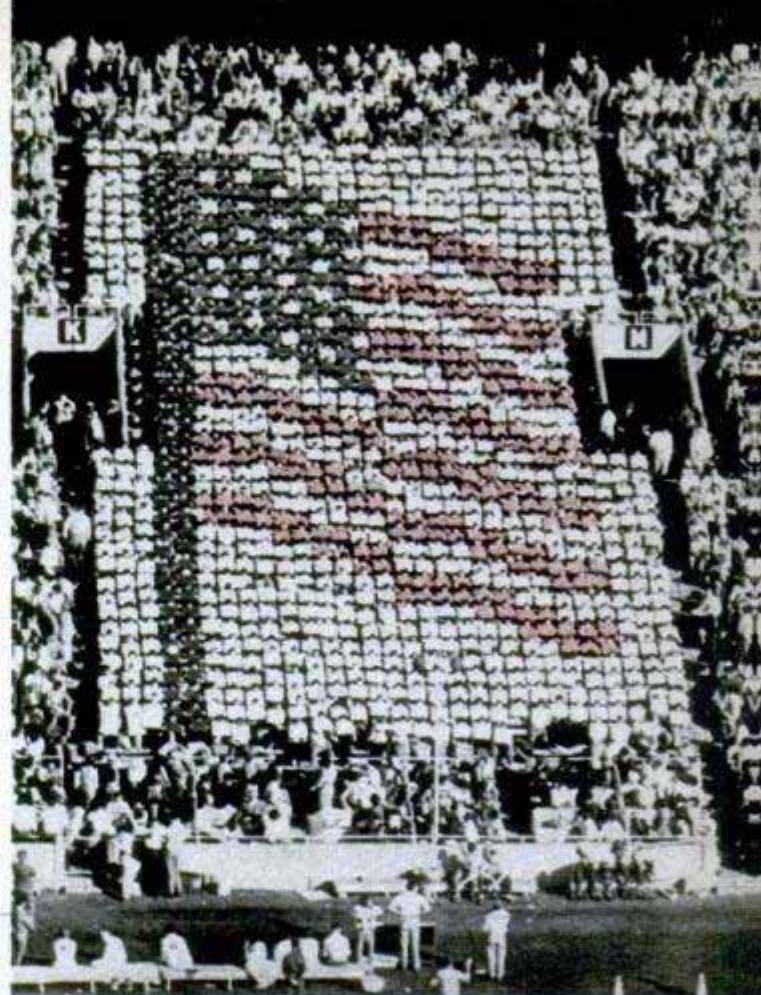
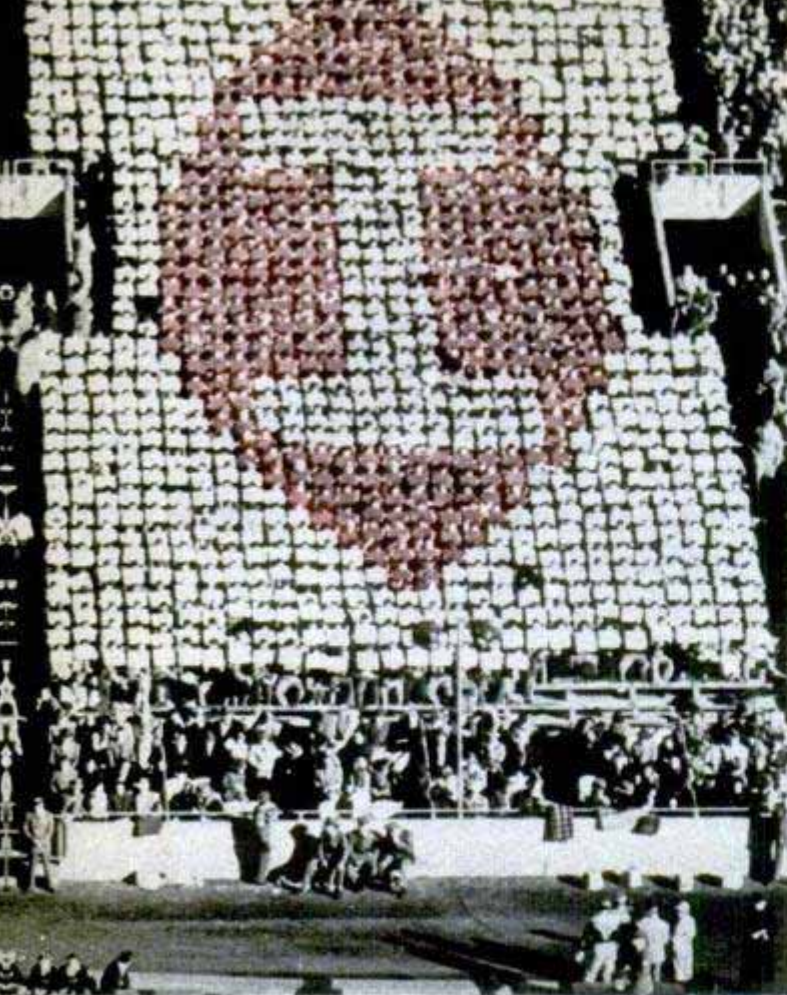
Once a theme is chosen the problem is to decide what formations and music will combine best in portraying it to a stadium audience. The latter must be something familiar to the public, since many times the tune or the words are the key to recognition of the formation.

From the rough-drawing stage, the groupings are put on a planning board, with small markers or objects representing each man. This is done to check the way it will look on the field, since perspective is vital in the legibility of formations from the stands. The height and shape of the stadium also have to be considered.

At Ohio State the planning board is made from a sheet of wallboard with dimensions

Halfway through the hearts (below), in a field staging of the formation charted at the top of the page

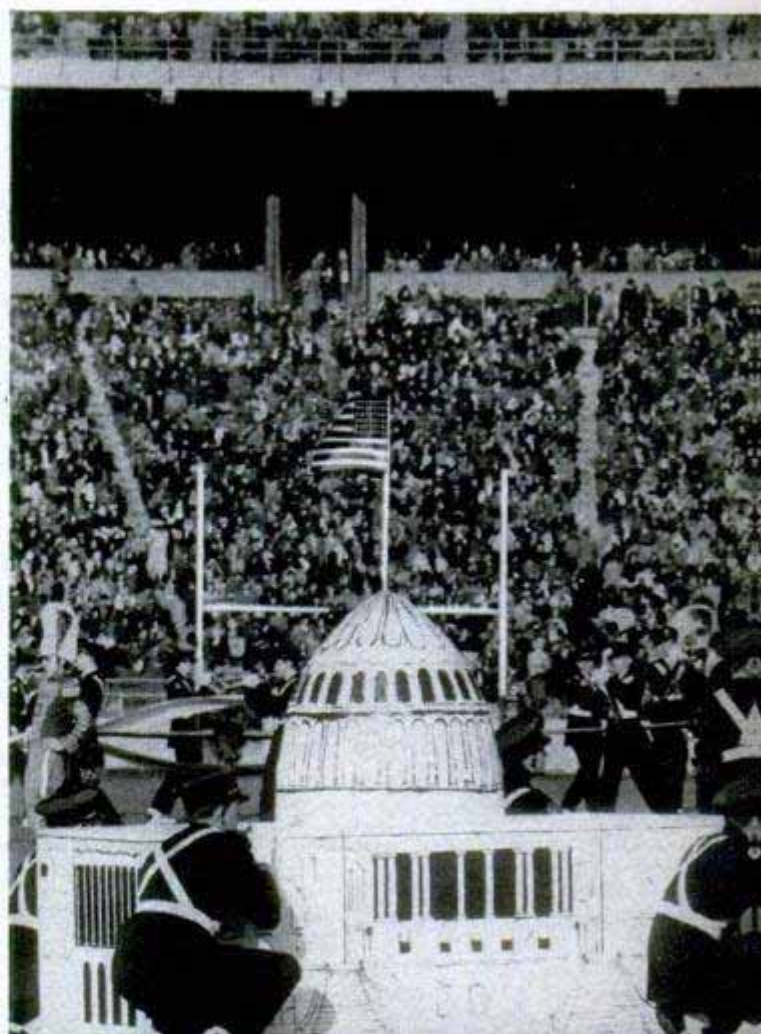
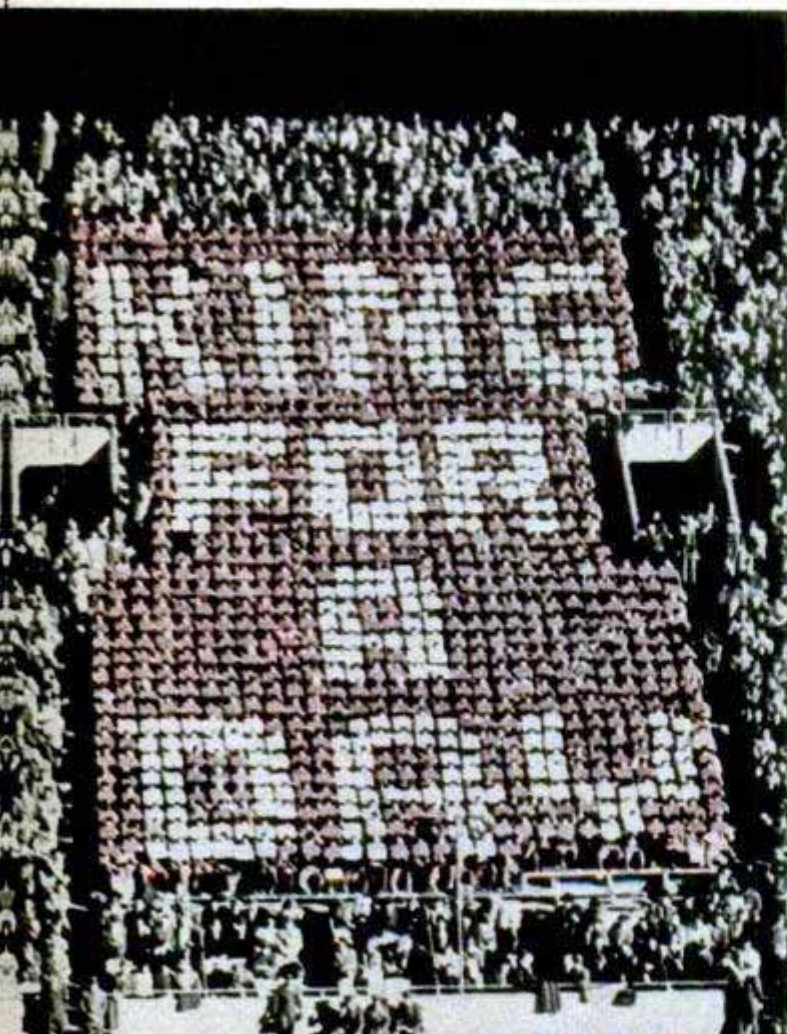




At Illinois, the student cheering section shapes a block "I" within a football with their orange and blue cards. At right they reproduce "Old Glory," raising and lowering the cards so that the flag appears to be waving

Dad isn't forgotten (below) on his "day." Students in cheering sections have the same seats at every game

Props occasionally are used in band formations. The Capitol (below) was in an Ohio State patriotic display



of the field drawn in. For men they use $\frac{3}{8}$ -inch dowel rod, cut to a length proportionate with a man five feet eight inches tall. Each piece is sharpened and screwed into a $\frac{1}{4}$ -inch nut which provides enough weight to make it stand satisfactorily. By measuring proportionate distances from the edge of this miniature, and proportionate heights to various sections of the stadium, the planners can tell exactly how life-size formations will look later from every angle.

When the planning-board arrangement passes muster, the formation is transferred to a sheet of graph paper, with small circles or crosses representing the individual bandmen. Field markings, such as the yardage indicators, the sidelines and inserts that divide the field's width into thirds, serve as guideposts. The goal posts establish the mid-field line.

Each position is assigned to a bandman and identified by his number and letter. Particular attention is paid to placing instruments, because of both their appearance and their sound. Since each formation moves directly into the next, consideration is likewise given the distance any particular man must travel from a previous grouping. The finished charts are duplicated and distributed to the band members.

Charts in hand, the bandmen walk through an initial rehearsal indoors, usually in a gymnasium, to find where they are in relation to the entire figure. Later they shift outdoors to a practice football field and fit music and marching together. Everything is precisely planned, down to the exact number of steps.

The amount as well as the kind of music is important. Very little is used if the formation is a standing one, but considerably more if it involves motion, like the revolving of a wheel or a clock hand. The music, along with everything else in the show, is memorized. Brisk, precise marching doesn't lend itself to perusing music sheets, especially if it is a windy Saturday.

The University of Illinois is usually credited with being the first to time formations to change at specific points in the music, instead of by signaling with pistol shots or whistles. This allows the drum major to drop his role as a leader and become part of the pageantry, pointing up some maneuvers or becoming a feature in his own right.

As one college alumnus expressed it, "We take an awful lot of lickings on the football field, but I've never yet seen a band that measures up to ours. Makes me feel good. I'll gladly make a trip here any time to see those boys put on their half-time show."

Football remains the feature attraction at stadia all over the country this fall, but the bands are playing a mighty strong supporting role!

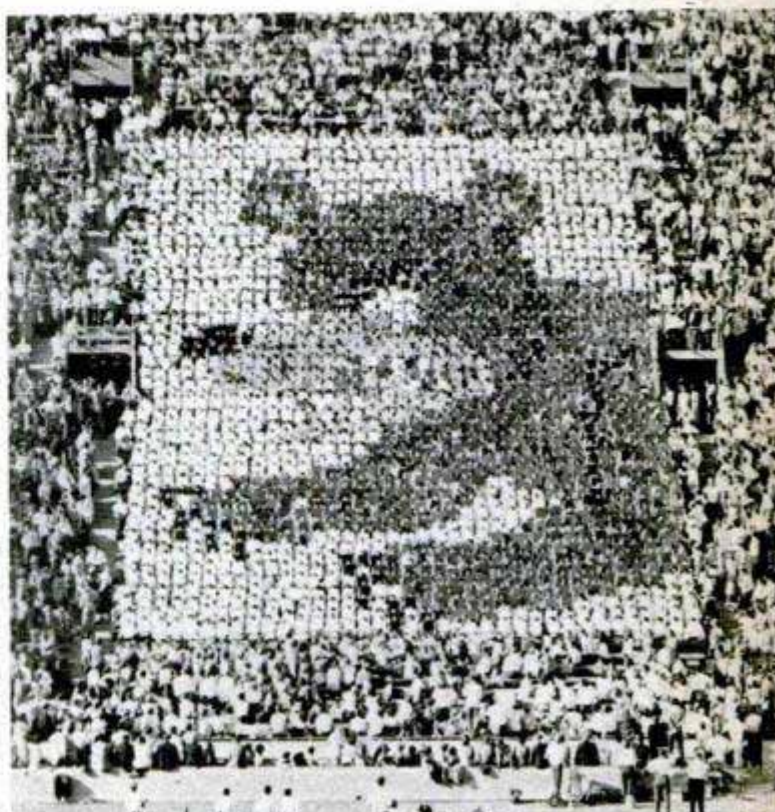


Football doesn't occupy the time of athletes only. This group at the University of California at Los Angeles plans card displays for the cheering section



Following individual instructions, students in stands hold dark or light cards just below their eye level

From across the stadium, this is how the stunt shown in photos above finally appears to the spectators





Toothpick Violin

About 8000 toothpicks have been painstakingly fashioned into a violin by George Pearson of Detroit. The resulting instrument has an excellent tone, and Pearson plays it frequently in orchestras. To make the violin, he formed a solid block of white pine into the shape of the instrument. Then he pasted paper over the block and glued the toothpicks together on top of the paper to form the front and back. Later the paper was lifted from the block and sanded away, leaving only the toothpicks. The sides of the instrument also are made of toothpicks.

Pink Icebergs?

Mariners may soon be startled by pink icebergs in the North Atlantic if a suggestion by Dr. Irving I. Schell of the Woods Hole Oceanographic Institution is followed. Schell advises that spraying icebergs with color dust would make them easier to spot and track and would also simplify counting. He would mark them with the color before they break off the glaciers of western Greenland, birthplace of most icebergs that invade the North Atlantic.



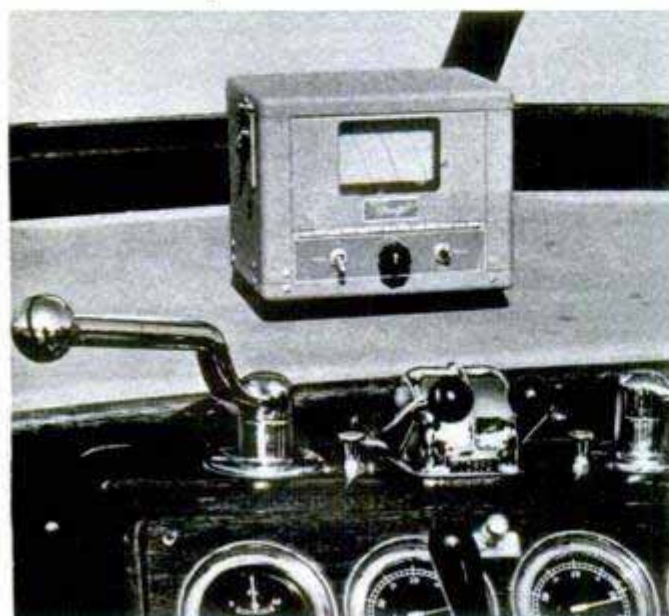
Paste Rejuvenates Engines

Squeezed into the firing chamber through the spark-plug openings, a heat-expanding paste, developed in England, is said to lessen piston slap and oil loss while increasing compression. It has been used for some time in Europe and, according to the manufacturer, is guaranteed not to harm any engine. Many British government agencies, including the Royal Air Force, have used it. When the paste is introduced into the firing chamber, the heat of the explosions expands the material, a granular form of vermiculite mixed with oil, causing it to fill excessive clearances that cause inefficient operation. One treatment is said to last about 10,000 miles. Not claimed to be a cure-all, the paste does not eliminate the need for mechanical overhauls. But it is an interim treatment intended to prolong the efficient life of a worn engine.

Sonar Fish Finder

Game fish have lost another round in their battle against science. A miniature sonar fish finder for sportsmen unfailingly tracks them at depths down to 50 fathoms and traces their course on a moving strip of paper. The equipment, which is about the size of a table radio and weighs 15 pounds, also records the bottom contour, rocks, reefs and marine wrecks. Larger models for commercial fishermen have a range down to 400 fathoms.

Ⓒ Burning natural gas, 78 internal-combustion engines totaling 256,300 horsepower drive generators with an output of 176,000 kilowatts to furnish power for an aluminum plant at Corpus Christi, Tex.



They're Breeding

NEW FOREST TREES

By Ewart Thomas

FAST-GROWING PINE TREES that may mature in half the usual time are being planted in America's forests. They'll be ready for the sawmill in 40 years or less, at about the time their native contemporaries have emerged from the sapling stage.

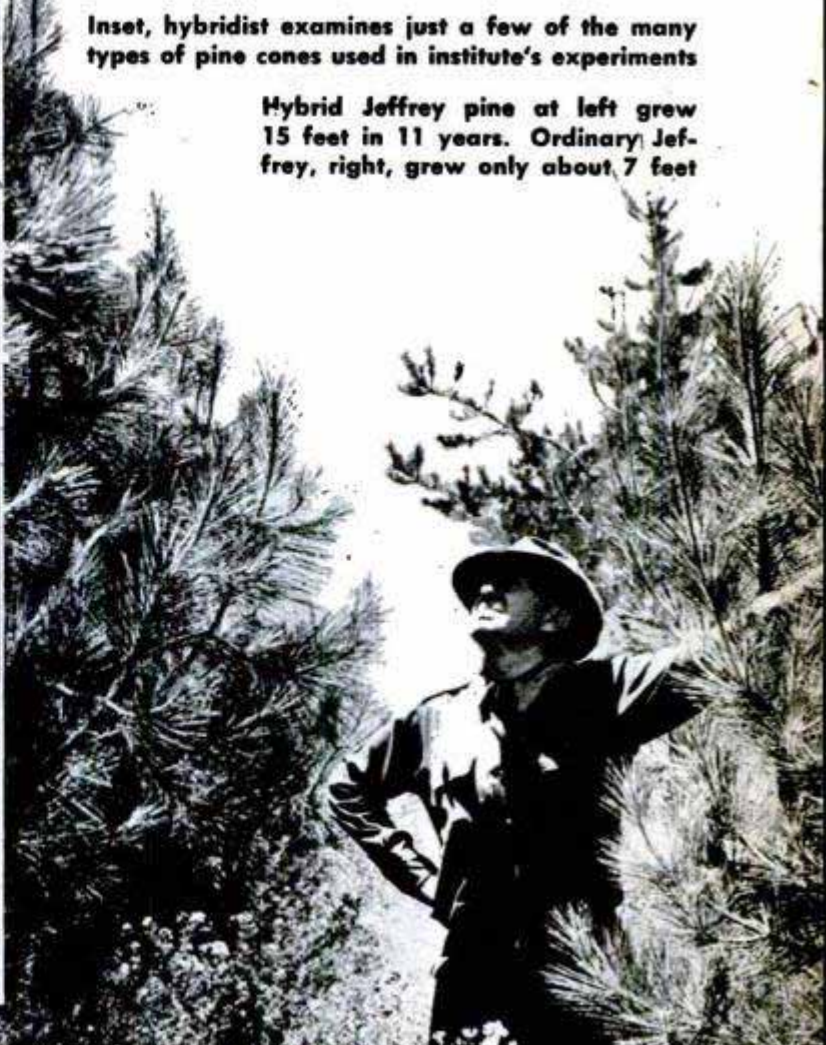
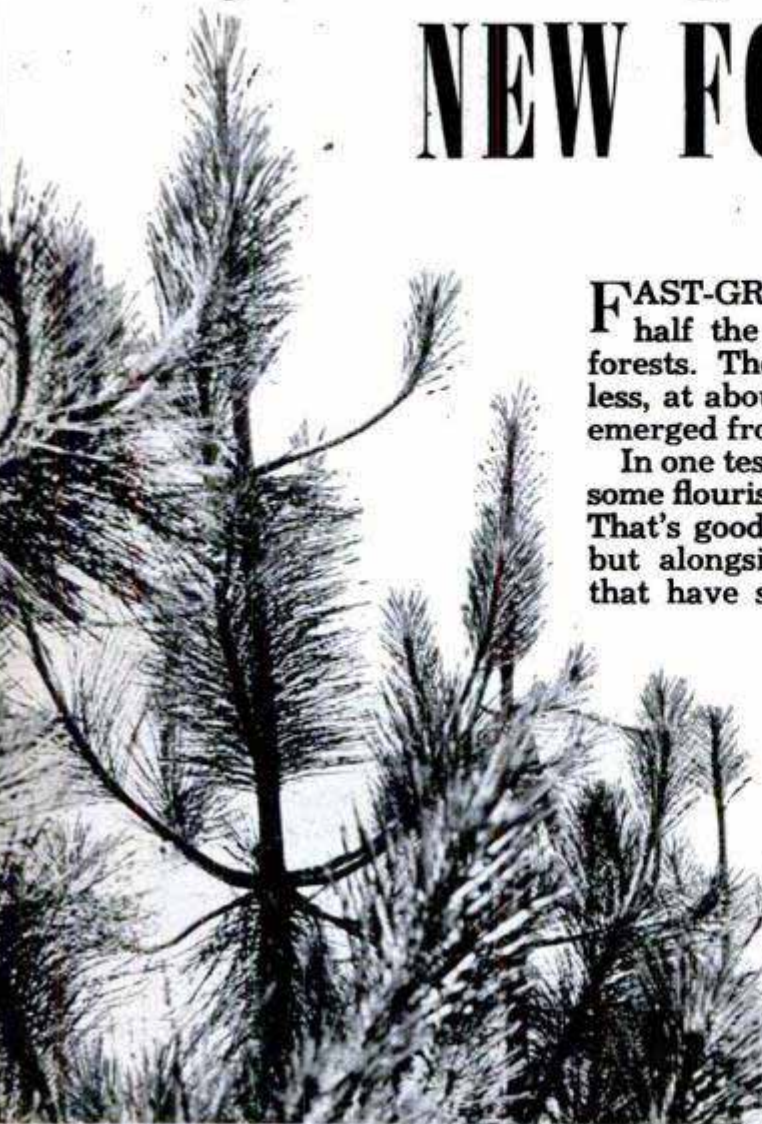
In one test area that was planted 11 years ago, there are some flourishing native pines that are now seven feet tall. That's good average growth for the seed-parent species, but alongside them are Jack-in-the-Beanstalk hybrids that have shot up 15 feet in the same length of time.

The quality of the wood of the two trees is about equal, but the hybrid is more insect-resistant than is the native.

After years of preliminary research, hybridists have learned how to breed pine trees for woodlot and reforestation plantings that in many ways are far superior to native stock. For the Eastern states they have crossed the eastern and western white pine and have created a tree that greatly outgrows, while still young, the faster-growing of its parents. Now they are engaged in crossing the hybrid with the Balkan white pine in an attempt to produce a timber tree of good form that is resistant

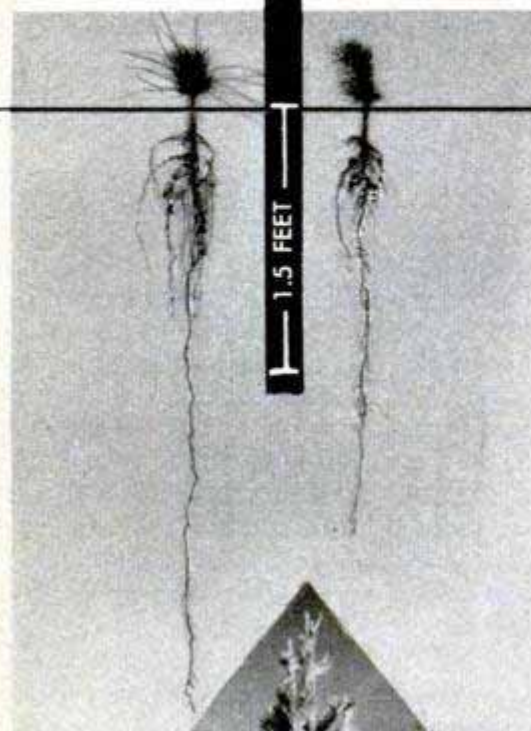
Inset, hybridist examines just a few of the many types of pine cones used in institute's experiments

Hybrid Jeffrey pine at left grew 15 feet in 11 years. Ordinary Jeffrey, right, grew only about 7 feet





Trunk sections of the three-year-old saplings show fast-growth characteristics of hybrids. Hybrid at left produces more lumber in a given length of time. Below, heavy root system of hybrid shows it could survive better in a dry climate than one-year-old ponderosa-pine seedling



to blister rust. Other white-pine hybrids already show a good degree of resistance to rust.

For the northern Rocky Mountains and the Lake states they have a hybrid with the erect stature of the lodgepole pine and a rate of growth almost equal to the jack pine. It was developed as a logical replacement for the native jack pine that is a poorly formed species.

For California and the Southwest they have an Apache-ponderosa cross that combines the deep-root system and rapid diameter growth of the Apache with the rapid height growth of the ponderosa. The hybrid is tailored for rapid growth in arid climates.

For California there is, among others, a backcross hybrid that combines the excellent wood of the Jeffrey pine with the resistance to serious insect pests that is characteristic of the Coulter pine.

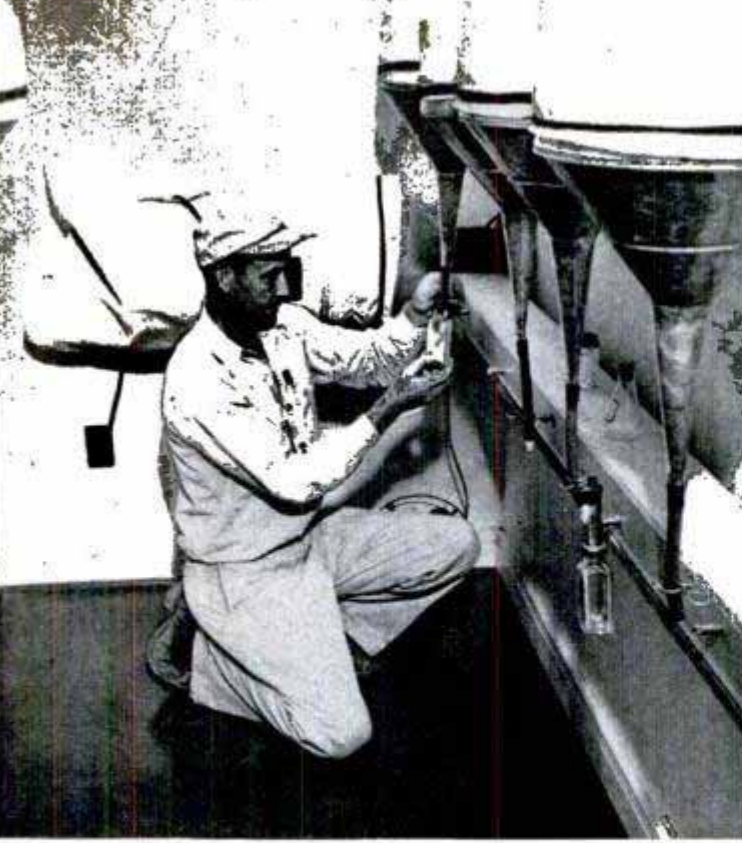
Last year more than 100,000 seeds of these and other hybrids were shipped to many parts of the country by the Institute of Forest Genetics, the western tree-breeding laboratory of the U. S. Forest Service. Next year the resulting two-year-old seedlings will be set out in experimental areas and national forests. In some areas they will be left untended to fend for themselves. If they are unsuitable for the areas in which they are interplanted, they will be crowded out by native stock; if they are superior to native seedlings they will develop into mature stands.

These field trials are the culmination of 25 years of research during which the tree scientists sought out the best seed trees in the forests and worked on the technique for achieving crosses between different species. Only today, relatively speaking, are the hybridists able to say that the breeding of new forest trees is a positive success.

They can't cross an elm with an oak, of course, but inside the same family they often are able to combine two species in a hybrid that retains the desirable characteristics of each. Already thousands of hybrid seedlings have been planted in Western forests to test them against native species.

The Institute of Forest Genetics stems from the foresight of James G. Eddy, a Seattle lumberman who knew the history of forest depletion in New England, the Lake states and the South. He realized that forest depletion had been associated

Monterey pine, grown from a cutting, shot up to 25-foot height when it was only seven years old



Pollen taken from catkins is dried in cloth containers, then drawn off into bottles for refrigeration



Hypodermic needle is used to inject pollen into bag around the cone of a pine ready for pollination. Below, bags are removed when seed begins to grow. Later, seeds are harvested and planted to grow hybrid giants

with the decline of earlier civilizations in other parts of the world. Early in the century he conferred with Luther Burbank on the possibilities of tree breeding; received encouragement and sought a location for a tree-breeding station. The station would be a long-term project, and the site would have to be climatically comparable to all the milder timber-growing regions of the United States.

Eddy and Lloyd Austin, his director, found an ideal spot in what amounts to the foothills of the Sierra Nevada Mountains a few miles from Placerville, Calif. Here in 1925 they established the Eddy Tree Breeding Station on 106 acres of hilly ground. Within 50 miles of the station the altitude ranges from a few feet above sea level to some 10,000 feet.

Numerous hardwoods and coniferous species were set out as specimens but it was soon decided that the pine family was most suitable for intensive work. The pines supply a good deal of the lumber used in this country, they are widely distributed throughout the Northern Hemisphere and some of them are found in almost every kind of climate.

Although the pine produces good lumber it doesn't create the wood as rapidly as man needs it. The work of the station was dedicated to reducing the number of years needed to produce trees of harvest size. One of the first steps was to collect and plant specimens of about 70 of the 90-odd species of pines that are known. Obtained from as far away as Europe and Asia, the collection now forms a living "reference





Small cutting is grafted to another variety. The cutting will feed on vitamins and water in glass bottle

In 1935 the station became, by gift, the property of the Forest Service and in 1940 a renewed effort was made to develop a hybridizing technique. F. I. Richter, W. C. Cumming and A. R. Liddicoet succeeded in developing the process. Today pollen can be collected from the catkins of one species of pine and stored under refrigeration for weeks, months or even years. It may be used weeks later to pollinate a variety whose cones are not receptive until then, or it can be held over until the following spring to pollinate an early variety.

In summer the large seed trees at the institute bear a strange crop of large white cloth bags high in their branches. These are pollination bags that the hybridists fasten over the cone-bearing branch tips to prevent haphazard natural pollination. Then, when the cones are fully receptive, pollen from a desired variety is injected through the cloth bag by means of a syringe. After the pollination period ends the bags are removed, to be replaced a year later with bags in which the ripened hybrid seeds are caught.

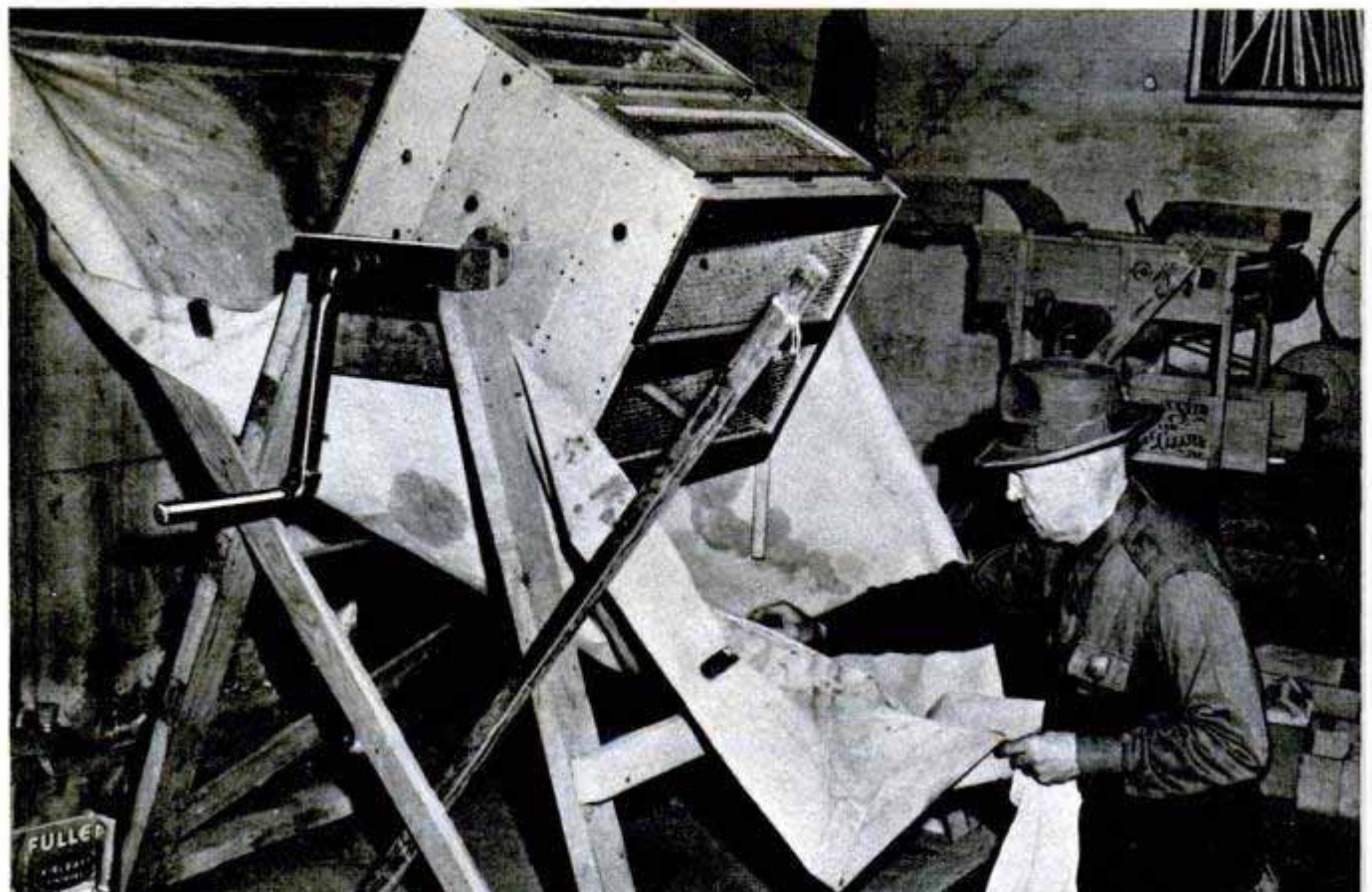
There's a lot of tree climbing involved and the branches of some trees can be reached with the help of a truck-mounted ladder. In the case of larger trees an athletic hybridist tosses a rope over a lower limb, climbs the rope, then uses the upper

(Continued to page 244)

library" from which seeds, pollen and cuttings can be taken at need.

Much of the early work of the station was devoted to selection—the gathering of seeds from the best trees found in the forests with the thought that these seeds would produce trees of exceptional quality. Attempts were made to hybridize different species of pines but proper techniques had not been developed. With a few exceptions, the experiments failed.

Hybrid seed cones are whirled inside this box. Seeds fall through the screen sides and are gathered for storage





Newsstand in a Bus

Right up front alongside the fare box of the busses in the San Bernardino Valley Transit System is a newspaper-vending machine. Passengers pick up their copy of the San Bernardino (Calif.) Sun as they get aboard the bus for the ride to work. Papers are dispensed by the coin-operated machine so the sales do not interfere with the bus driver's duties.



Paratrooper's "Snood"

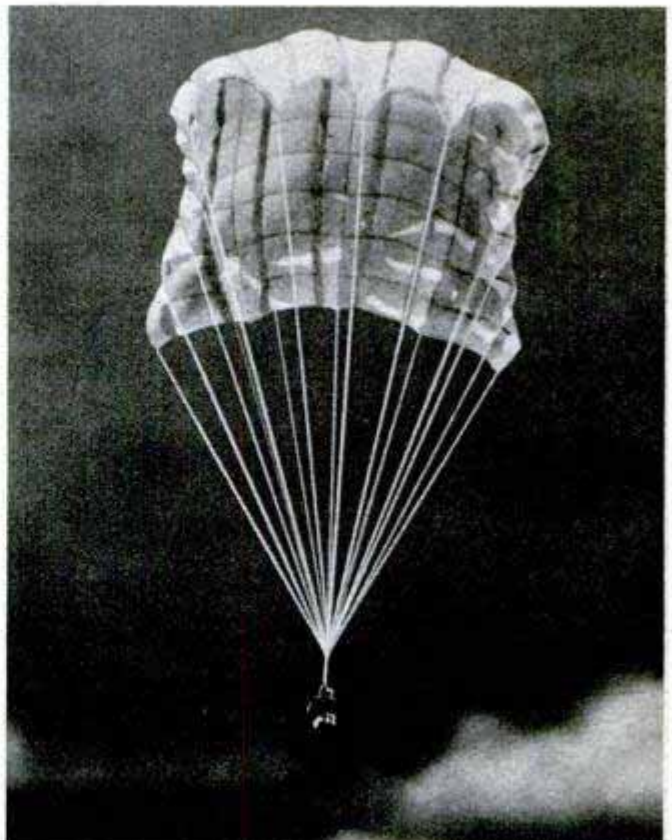
Called a "side saddle" safety harness, a nylon crash webbing will protect airborne troops who sit side by side along the walls of planes. The harness, a triangle of nylon mesh, fits snugly over the wearer and his combat pack, protecting him from the force of crash impacts. There is even a built-in pillow to allow soldiers to catch a nap on long flights.

Cotton-Strip Chute Brings Down Heavier Loads

Cotton muslin strips comprise a new expendable cargo parachute devised by the Air Force's Research and Development Command. It can handle twice as much weight as its rayon predecessor and costs only half as much. Nine strips of the material are attached by cotton tapes to form a 28-foot square. Up-rushing air escapes through spaces between the strips, reducing the opening shock and permitting the chute to carry greater loads. In clusters of three or four they are expected to replace the 64-foot nylon chute now used for heavy cargo drops.

Tasty Water Purifier

Purification tablets of a new type, developed for the Army, are said to provide more sanitary and tastier drinking water than the tablets previously used. According to tests, the new tablets, which contain iodine, are more effective against amoebic and other forms of dysentery than the old chlorine tablets. They also impart less taste to the water.



U. S. Air Force photo

You Name It!

Things are not what they seem. Take a look through the cameraman's magnifying glass and the commonest objects appear strange and weird . . . See how many you can identify, then check your list with the answers on page 228

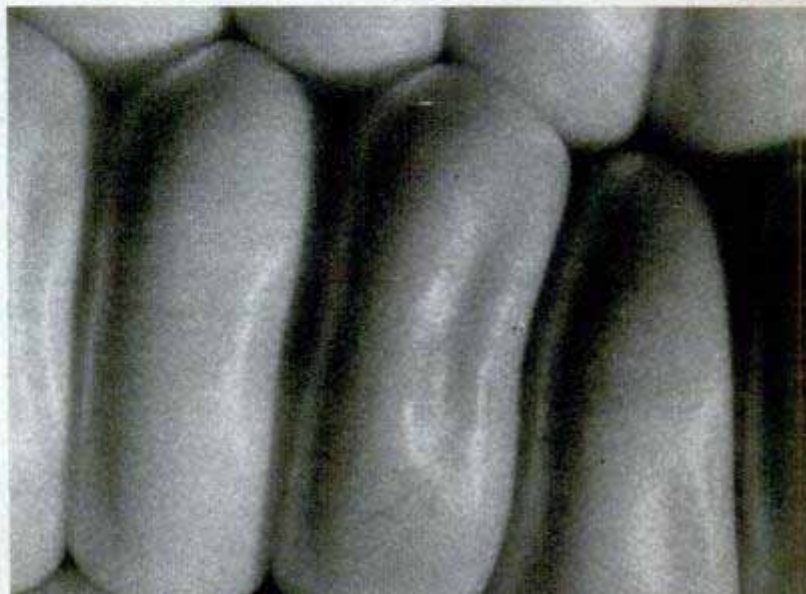
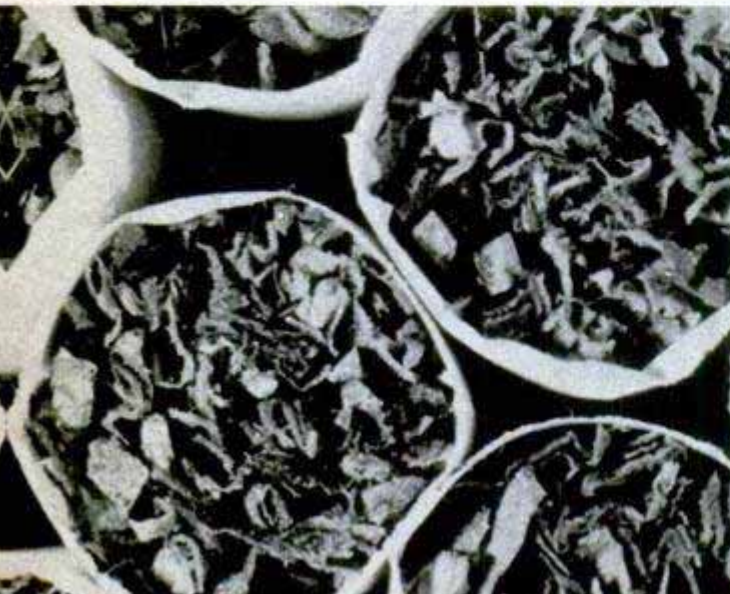


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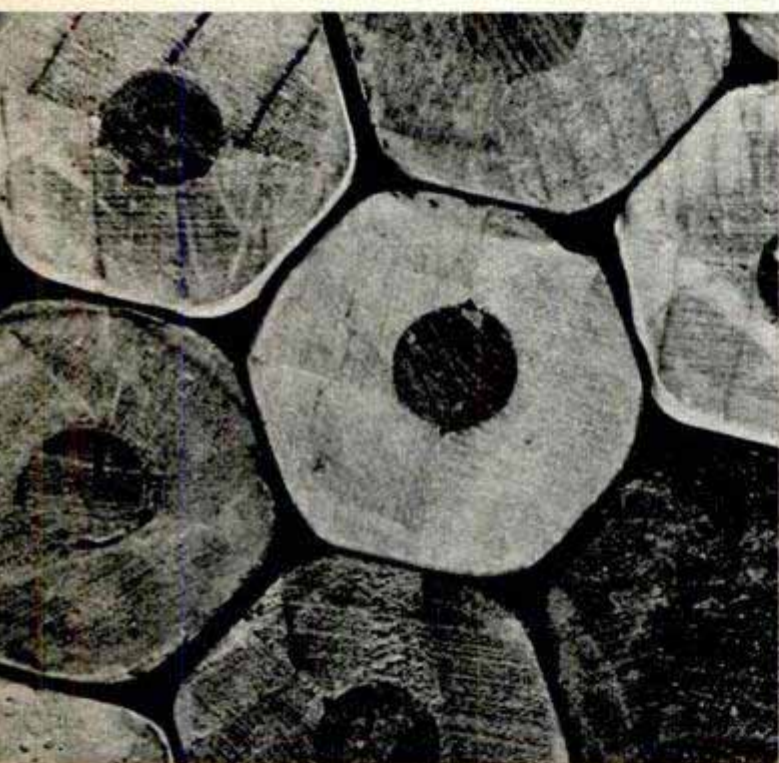




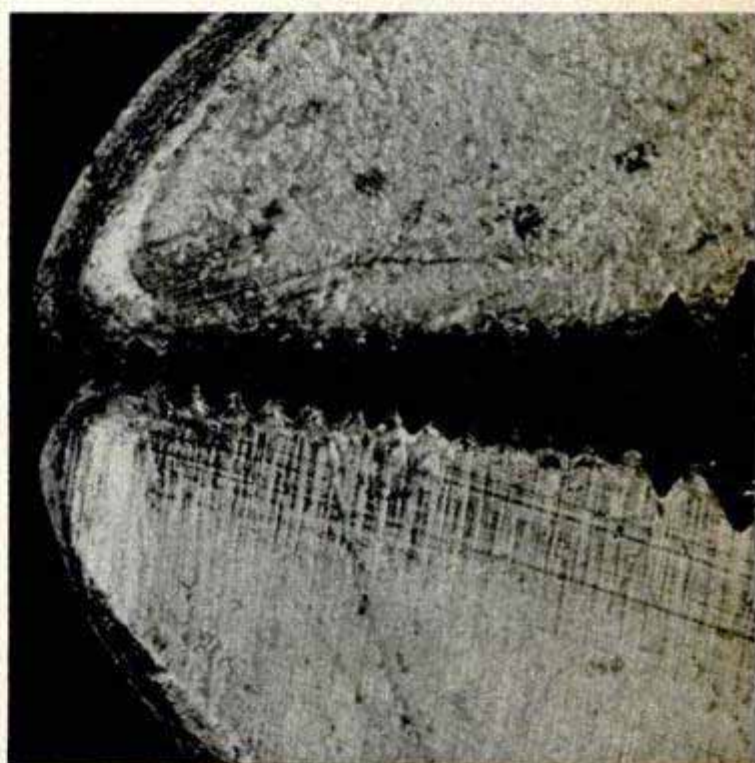
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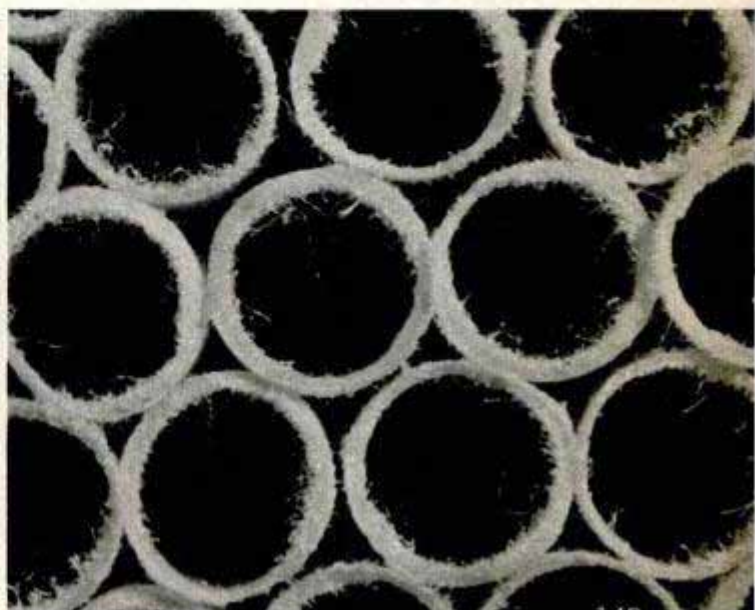
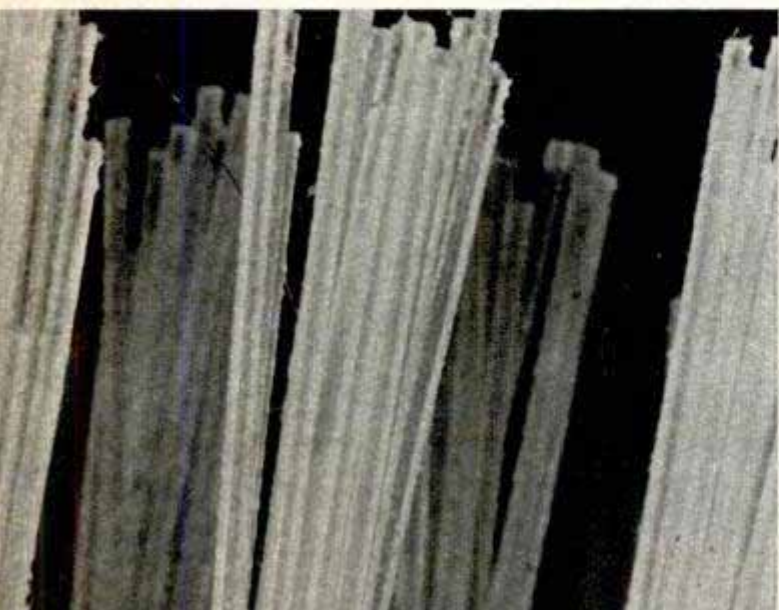
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Wagon-Sled Turns at High Speed



Summer or winter, a combination wagon-sled is an exciting plaything for youngsters. The toy can be pulled around like a wagon, ridden downhill on wheels or, when the wheels are removed, used like a sled on snow. It has an unusual steering mechanism. Both front and rear wheels turn when the steering bar is moved, thus permitting sharp turns at high speed without overturning. It also has a braking device.



Heat-Resistant Paint

Dull red heat of 1300 degrees Fahrenheit won't burn a paint the Du Pont Company is testing. A basic ingredient is titanium tetrachloride. Aluminum flake is added later. Problems yet to be solved are getting it to adhere satisfactorily to metal and attaining resistance to salt-water attack. An expected use of the new paint is on ships to protect interior walls and lessen fire hazards by its heat-resistant qualities.

Steel-Ball Storage For Liquid Nitrogen

Because of its spherical design, a welded stainless-steel chamber built to store liquid nitrogen at pressures up to 5500 pounds per square inch weighs only 7500 pounds. Alternate designs, in barrel shapes, would have weighed as much as 15,000 pounds. The liquid, stored at minus 340 degrees Fahrenheit, is used for U. S. Air Force experiments with rocket-propelled aircraft.

Sources of available products described in this issue are listed on pages 12, 14 and 16. Sources of further information on other articles are given in the WHERE-TO-FIND-IT LIST, available from Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11



Northrop Aircraft photo



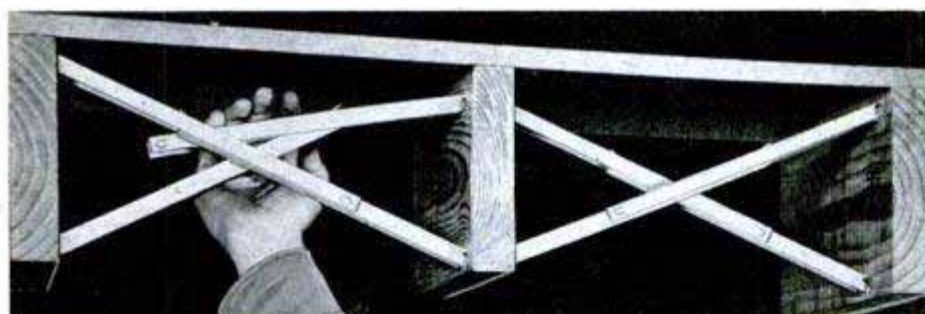
Photos copyright Transatlantic News Features

Crows seek more peaceful meals when this "scarecrow" goes into operation. Right, farm girl prepares charge

"Scarecrow" With Sound

British crops are protected from hungry crows and vermin by a noisy "scarecrow" that frightens away the birds with detonating fireworks and a terrific clatter. Made by a British fireworks company, the scare-

crow consists of a length of burning rope, three metal slats and some fireworks. At 20-minute intervals, the rope, which burns for eight hours touches off a firework. A loud bang, accompanied by flapping of the metal slats, makes the birds take off for more peaceful fields.

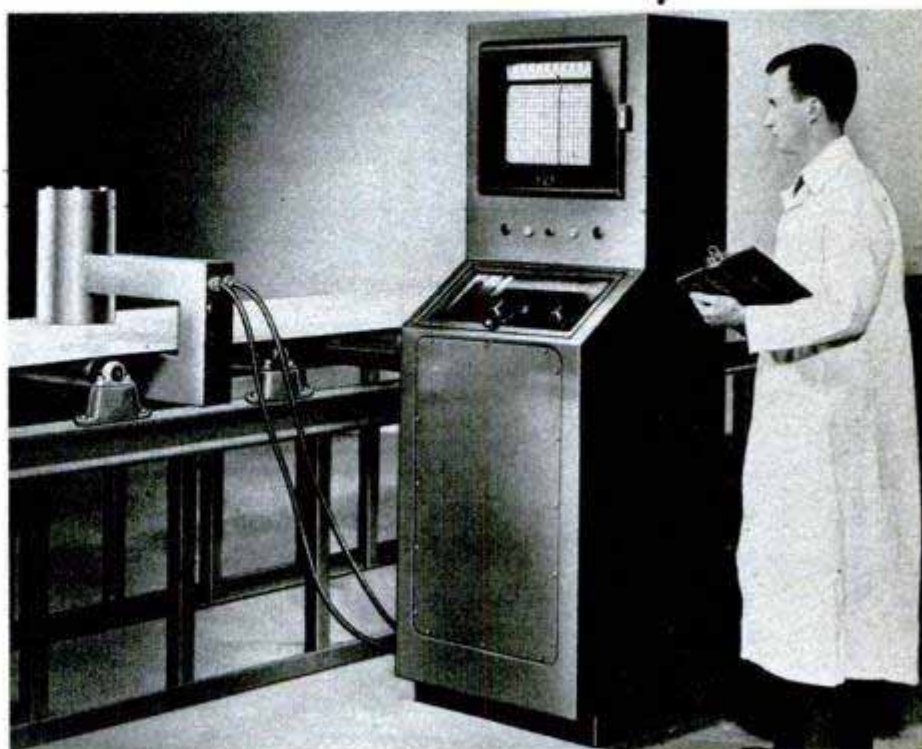


Metal Floor Bridging

Requiring no nails, a new type of metal floor bridging reduces installation time greatly. The bridging comes in two sections which snap together between the joists to lock securely.

Beta-Ray Gauge

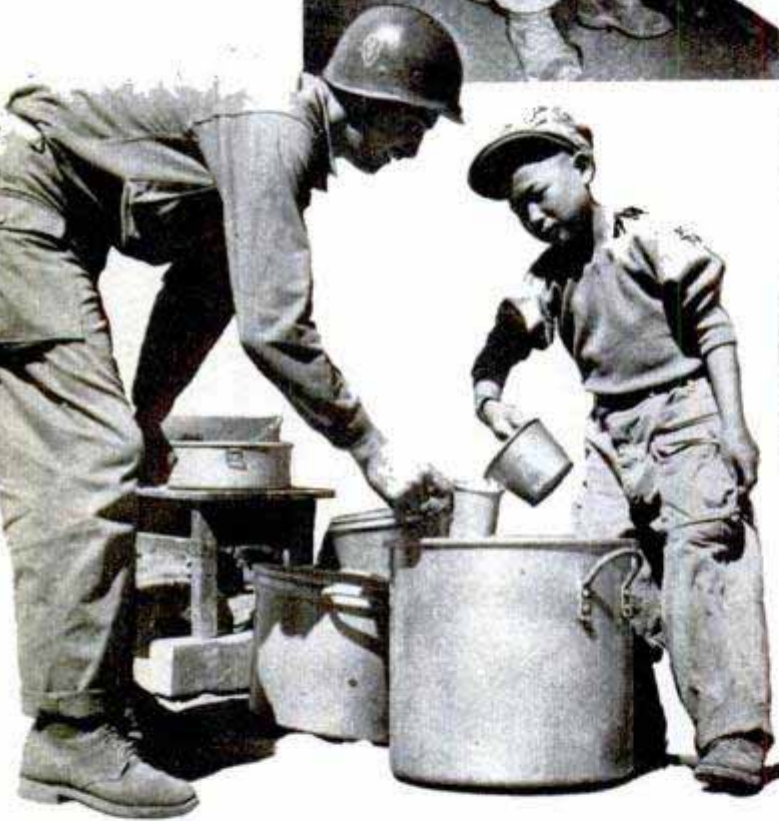
Beta radiation is used to measure thickness of moving sheet materials as they come off the production line. Sheets of steel, aluminum, brass, plastic, rubber and many other materials are measured to within a few millionths of an inch accuracy. A source of beta radiation is placed on one side of the material and a detector on the other side. By precise measurement of the amount of radiation penetrating the material, the gauge determines the material's thickness. The measurements are plotted on a continuous graph.





Army Quartermaster Corps photos

Infantrymen in Korea get enough respite from combat to enjoy an A Ration Christmas dinner. Fresh vegetables and fowl are heaped upon their metal trays



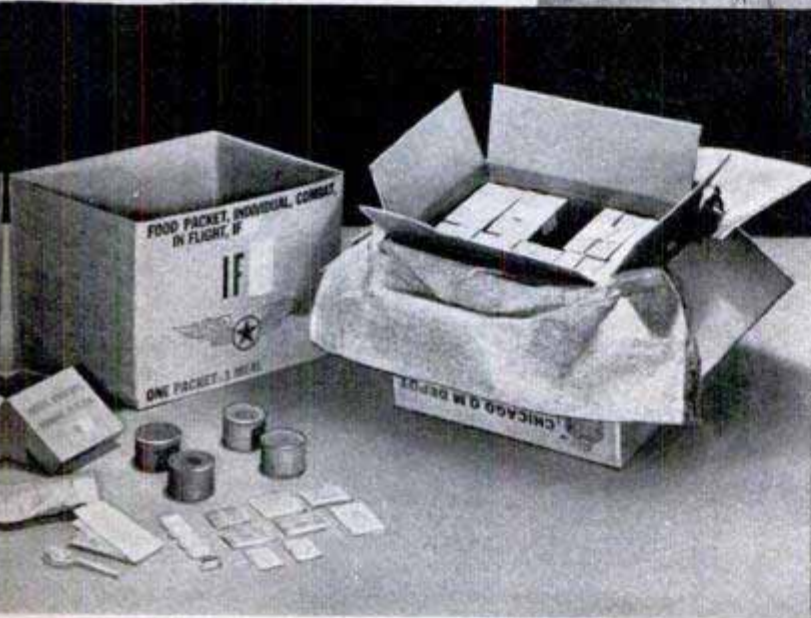
"Up front" in Korea, far from refrigeration facilities, a GI gets a helping of hot soup. Troops in forward areas depend on canned and dehydrated foods

YOU CAN EXPECT 3½ million men for dinner—as well as breakfast and lunch—every day from now on!" Those words that would rip away every shred of a housewife's sanity are a routine daily order at the Army's Quartermaster Corps depot in Chicago. They feed the Army, Navy and Air Force all over the world. Since Congress decided that each soldier in the War of 1812 would have "1¼ pounds of beef or ¾ pound of pork, 18 ounces of bread or flour and 1 gill of rum, whiskey or brandy" to sustain him through a day, the science of feeding has come a long way in

GI RATIONS "UP FRONT"

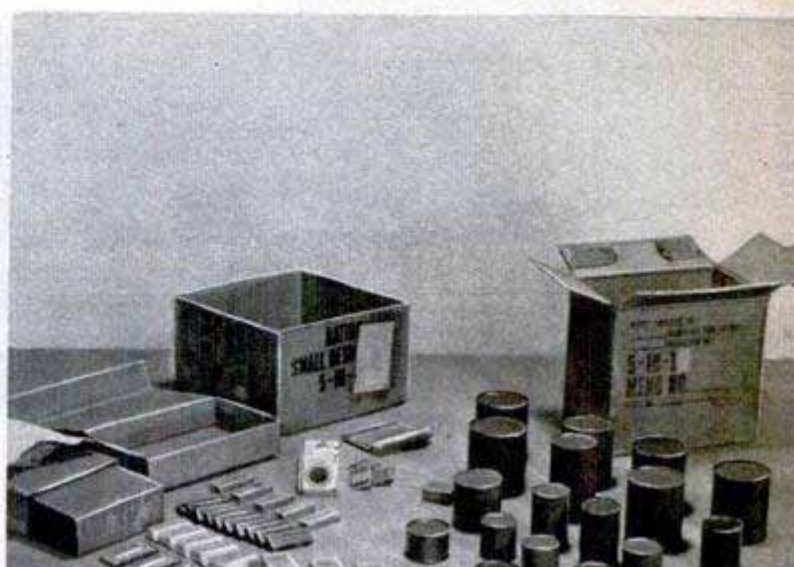
the armed forces. Now regulations fix the minimum amount of calories in each man's daily ration, varying with its location and assignment, and specify the proper nutritional elements it should contain. A ration is the amount of food authorized for one soldier for one day. Men in temperate climates get 3600 or more calories and those in the Arctic receive over 4400. Seasonal variations are also considered. "Teen age" troops get meals that match their growing appetites. Along with providing proper nutrition, the importance of food that also looks, tastes and smells good hasn't been overlooked. Industrial food laboratories and some of the nation's most famous chefs have helped in this regard with research and special cooking instructions. Field

Ration A, most closely resembling the average civilian diet, is served wherever kitchens and refrigeration are available. Large groups without refrigeration facilities, such as troops on maneuvers, subsist on Operational Ration B, which substitutes canned and dehydrated foods for the perishable items. Other canned rations and food packets are tailored to the needs of individuals and small units in combat—in the air, on the sea or in special situations. Among these are survival packs for life rafts, the arctic and tropical regions.



In-flight food packets (above) are provided for crews and passengers on long missions. Each of the small cartons in the box contains cans of meat, fruit, round crackers, cookies and candy. A can opener, eating utensils, soluble milk, soluble tea, coffee and condiments are wrapped separately. Most large planes have heating ovens

Gun crews and other small detachments depend on the Five-in-One ration. The box below contains enough to feed five men for one day, and offers five different menus to avoid monotony. In addition to canned meats, fruit, milk, cheese, puddings and vegetables, it has candy, cocoa, cereal, cigarettes and water-purification tablets





For emergencies in the tropics, when all other sources of food are lacking, there is a compact, low-calorie survival packet that consists mainly of starch jelly bars

Individual troops in the field or in combat get a ration that concentrates on canned meats. The precooked contents can be eaten hot or cold. Each of the six rations in a case provides 3800 calories of food daily



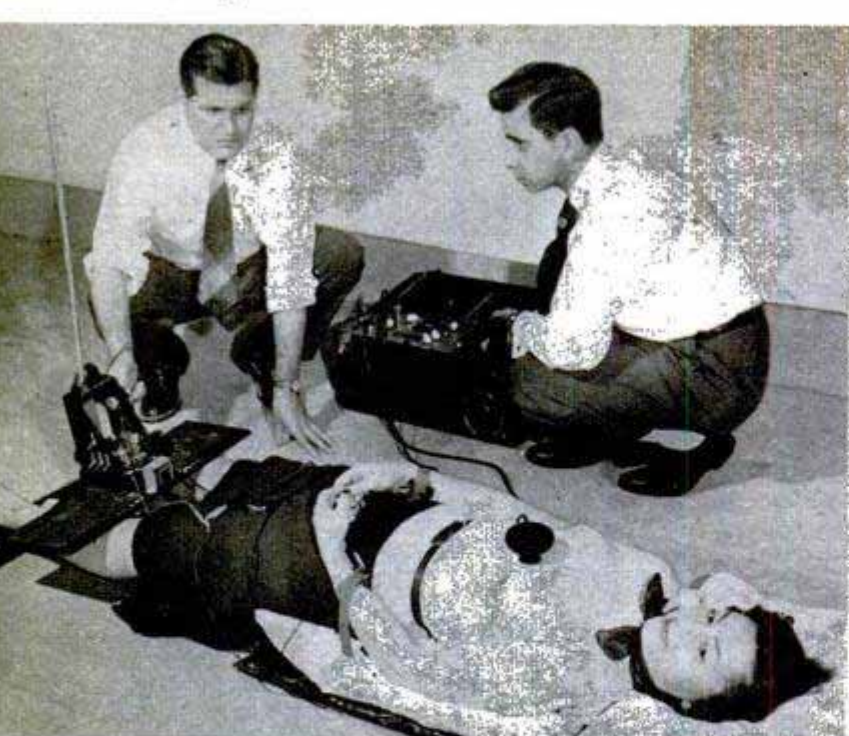


Trail Frigid is a ration for small patrol parties in cold climates. It is packed in a box enclosed in a waterproof bag. Gruel can be made by adding water to the dehydrated meat bars. Also included with the ration are almonds, raisins, chocolate, assorted hard candies and dehydrated soups



In combat, when more complete rations are not available, soldiers have an assault packet that contains a canned meat, such as chicken, a beef and pork loaf or ham and eggs, and another can with cookies and crackers. It is intended for land, sea or air assaults in which the action is expected to last less than 30 hours





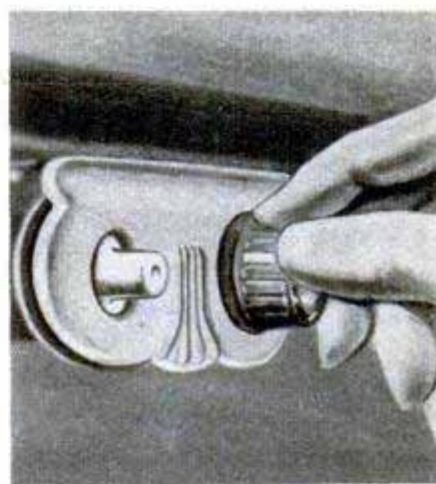
Civil Aeronautics Administration

Pulse Seismograph

Faulty hearts that escape electrocardiograph detection are discovered by a new electronic ballistocardiograph. It operates like a miniature seismograph to record pulse movements. The device consists of a vertical rod mounted on a light wooden span that is placed across the patient's shins. The rod holds a magnet rigidly supported in the field of an electric coil. Each pulse-beat movement of the body shakes the coil and disturbs its magnetic field, sending the information on in the form of electrical impulses to the ballistocardiograph for recording. Developed by medical and electronic specialists of the Civil Aeronautics Administration, it has indicated abnormalities in over 50 cases of known coronary thrombosis.

Automatic Starter For Cold Weather

Automobile and other internal-combustion engines are kept warm even in sub-zero temperatures by a fully automatic starting device. The starter clamps to the engine head or manifold bolt and has four simple connections to the electrical system. As the outside temperature falls it starts the engine and allows it to run a few minutes to restore normal temperature, then shuts it off. Two to four starts are usually sufficient during a cold night. The unit is controlled by a dashboard knob, which glows red when the circuit is on. It will operate only when the gears are in neutral. According to the manufacturer,



the generator may be advanced so that it will charge rather than drain the battery even at idling speed. It uses no more gasoline than would be needed to warm the engine up from lowest temperatures. The automatic starter will work on all makes of cars with solenoid switch starters.



"Rumble Seat" Scooter

Seating two passengers in a rear-facing "rumble seat," an economical open-air taxi is attracting attention in West Berlin. The vehicle is said to do 50 miles an hour with a full load.

MATS Flies 400,000 Passengers

In its third year of existence, the Military Air Transport Service airlifted 400,000 passengers and 60,000 tons of critical cargo and mail in support of the Armed Forces. Most of this traffic was moved over the Pacific to Japan. On return trips MATS evacuated more than 26,000 casualties from Korea.

the

**POPULAR
MECHANICS**

CRAFTSMAN

How to fit and take care of your lathe chuck is described in story on page 203



Dowels woven through strips of webbing form attractive screen pictured above. See page 191



Korta

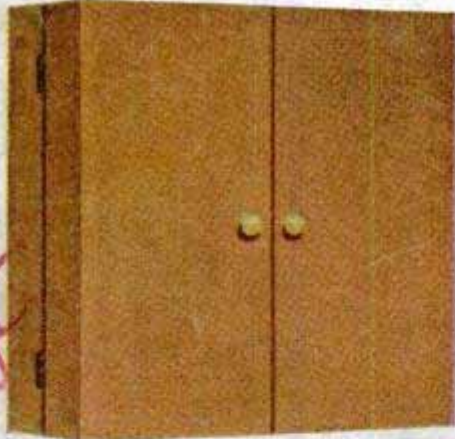
The small-shop bench, above, is a sturdy, compact unit that will give many years of service. Bench illustrated below features six large storage drawers

X801)

WORKBENCHES and WALL CABINETS

PART I

N. 53
P. 57
*Blanning
your Hand
Workshop*





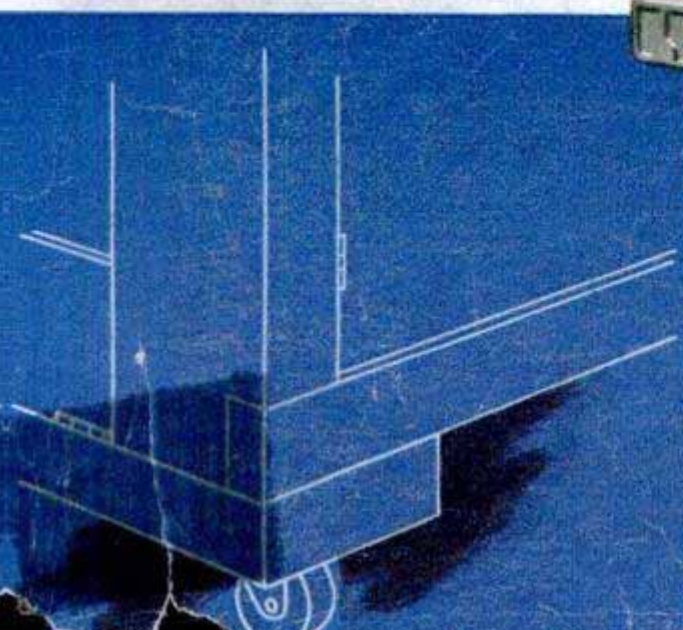
This de luxe bench combined with a spacious wall cabinet meets the needs of the most extensive shop

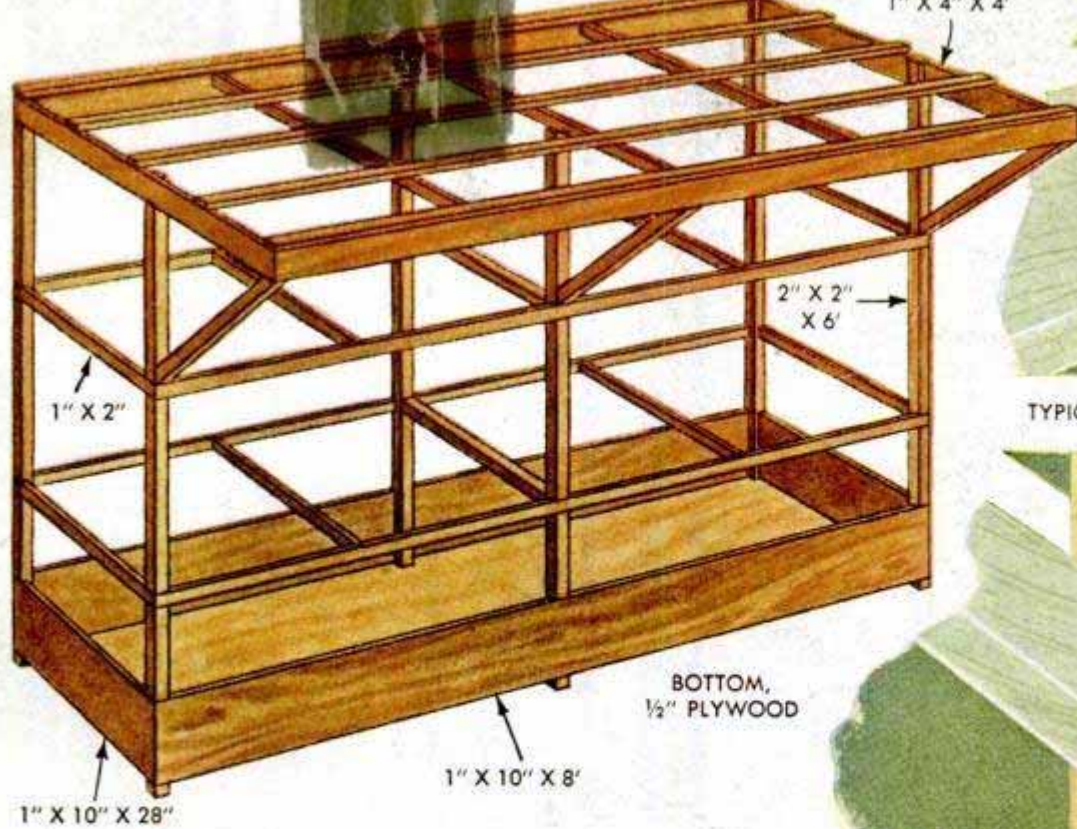
WHETHER you have a pint-sized shop with only a few hand tools or a fully equipped power shop that's the envy of the neighborhood, you want a workbench that "fits in." You need a smooth, spacious working surface and a good vise, plus storage drawers and a tool panel that will keep everything at your finger tips. With this in mind, furniture-designer John Bergen presents the series of workbenches and wall cabinets illustrated on these pages.

Designed for appearance as well as convenience, they include a small-shop bench with heavy plywood top and large storage drawer, a commodious six-drawer bench for the more elaborate shop, a de luxe job, featuring a 7-ft.-long top and sliding doors, and a unique bench for the apartment or utility room, which can be rolled out of the way on retractable casters.

To complement the workbenches, there are two wall cabinets and a tool panel,

Craftsmen who work in an apartment or utility room will appreciate retractable casters on this bench





TYPICAL NOTCHES IN POSTS

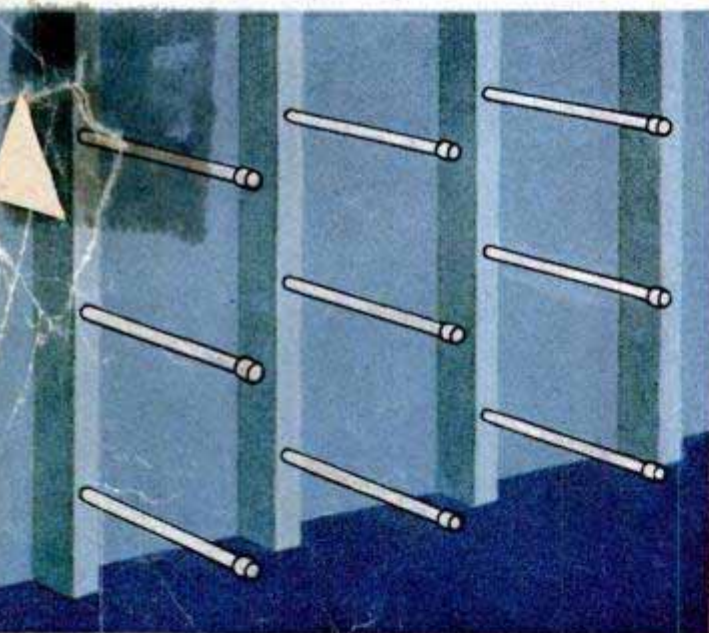


Lumber-storage problem is solved neatly by this good-looking rack. All joints are flush on the outside of the rack, the posts being notched for rails and braces

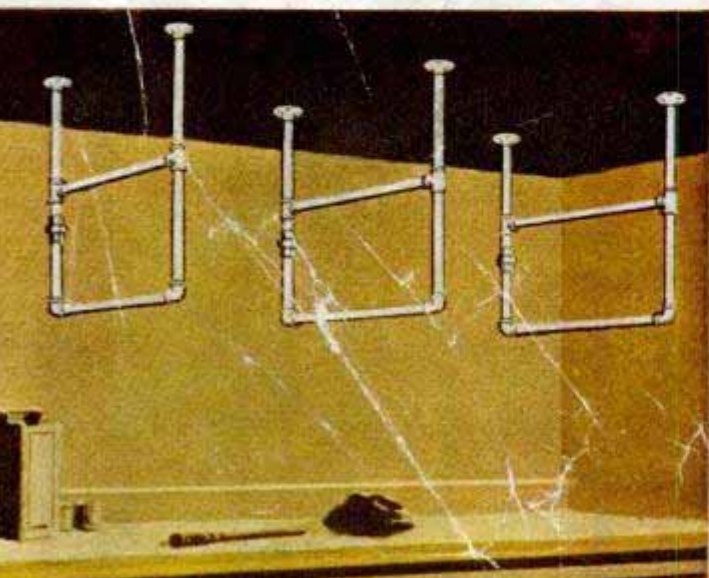
which will meet the requirements of the craftsman with few hand tools as well as the man who keeps hundreds of tools and small parts. Like the benches and cabinets, the lumber rack shown above features "cabinetmaker" construction, and is designed to handle standard 4 x 8-ft. sheets of plywood plus a generous supply of lumber in 2 to 8-ft. lengths. The bottom of the rack is intended to provide a convenient bin for scrap lumber.

Construction of the three larger workbenches is detailed on these pages, while building of the wall cabinets, tool panel and apartment-size bench will be covered next month in Part II. Assembly of the three benches is essentially the same, 1 $\frac{5}{8}$ x 3 $\frac{5}{8}$ -in. stock being used for the rails, corner posts and base members. Hardboard or $\frac{1}{4}$ -in. plywood is suitable for the end and back panels. The fronts of the drawers are of $\frac{3}{4}$ -in. stock with the sides and backs of $\frac{1}{2}$ -in. stock, the method of assembly and installation being the same on all the benches. The top of the small-shop bench consists simply of two sheets of $\frac{13}{16}$ -in. maple plywood glued together. On both the six-drawer bench and the de luxe model, the tops are built up of 1 $\frac{3}{4}$ x 2 $\frac{1}{4}$ -in. hard-maple strips, which are doweled and glued as shown.

Note in the lower right-hand detail on page 161 how the members of the six-drawer bench are tenoned and notched to form an interlocking corner joint. The $\frac{1}{4}$ -in. back panel is glued in rabbets cut in the rails and posts. To

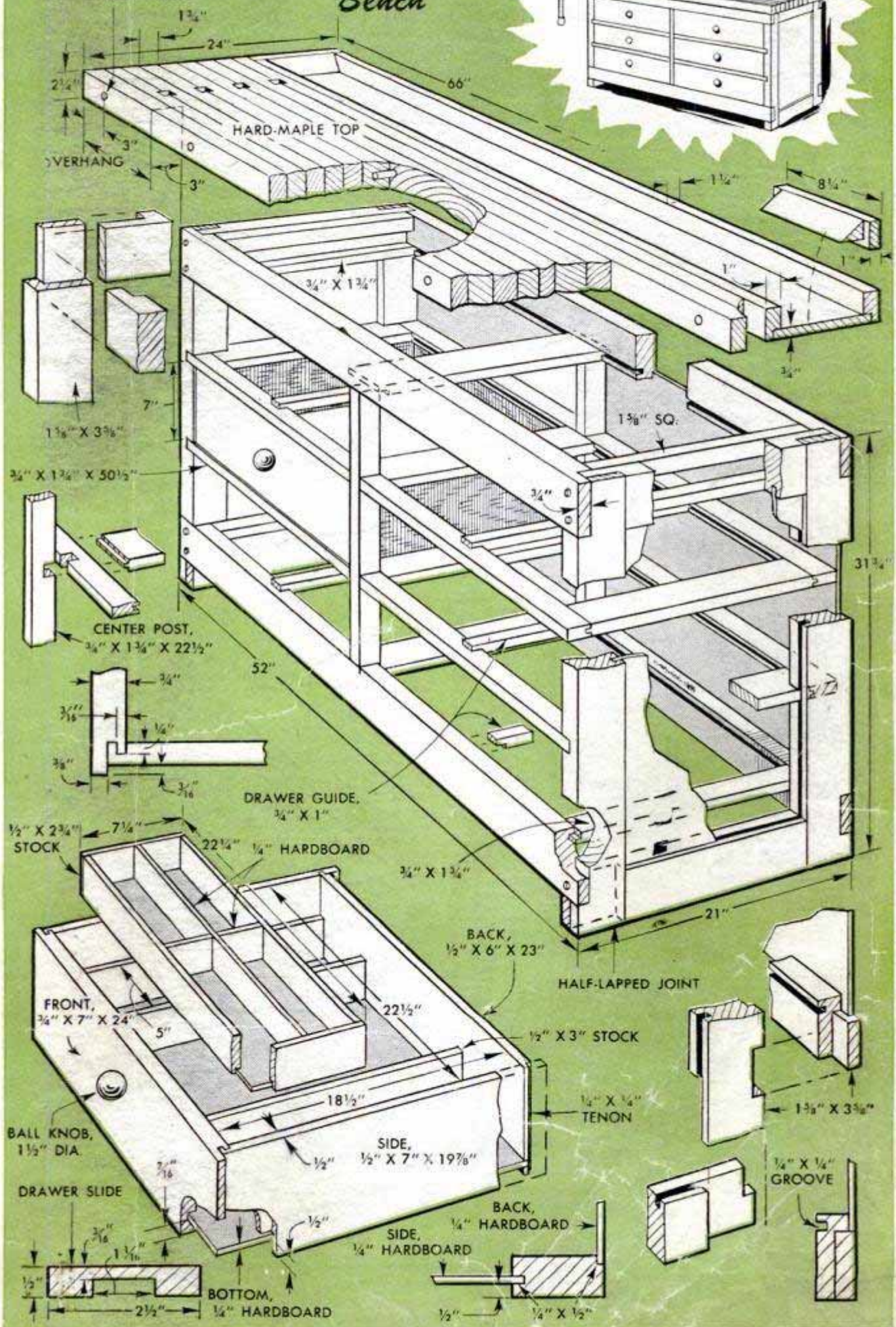


Made from pipe and fittings, these lumber racks are quickly assembled and require minimum space

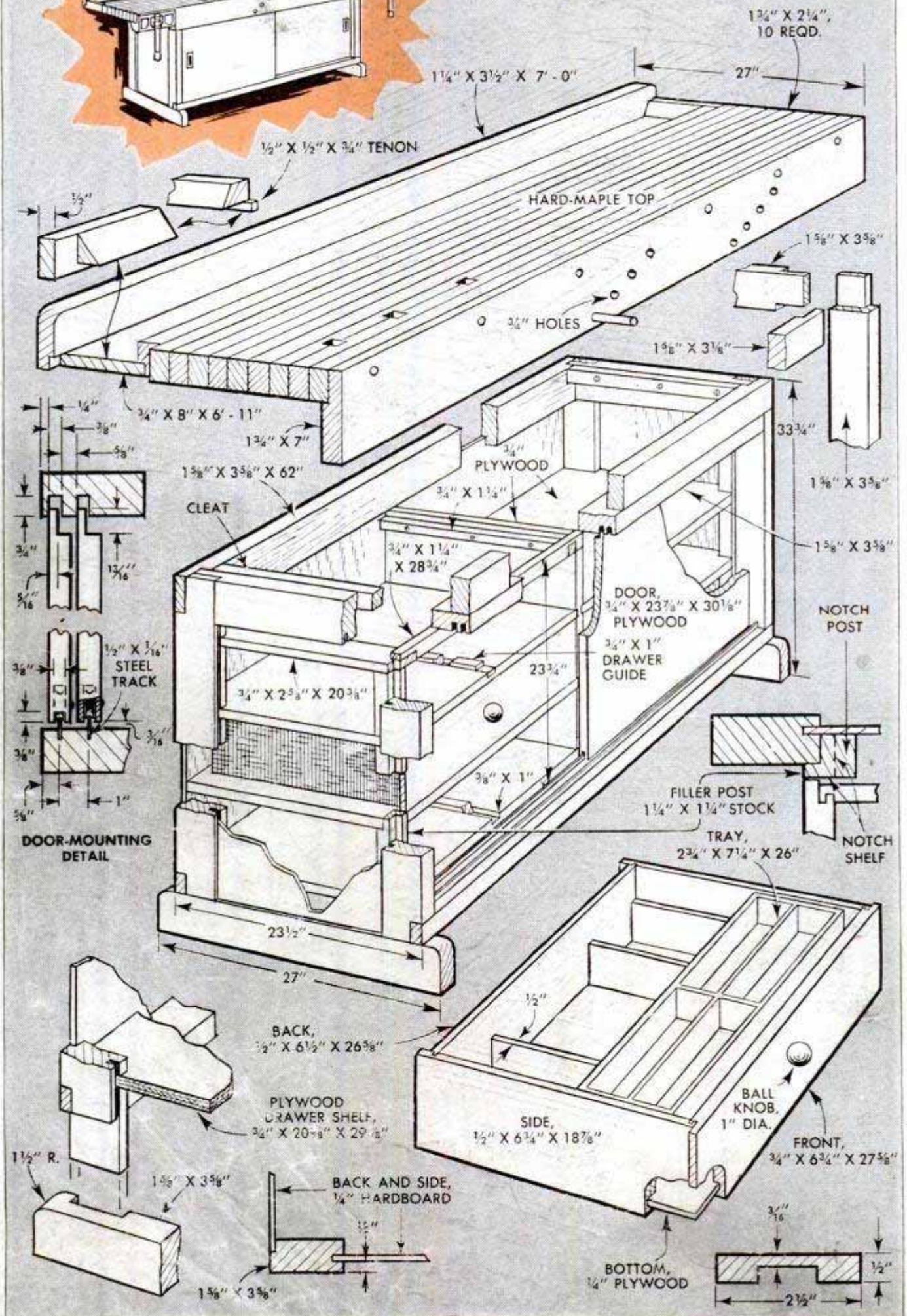


Six-Drawer Bench

1/2" DOWELS, SPACED 15" APART, 5 REQD



De Luxe Bench



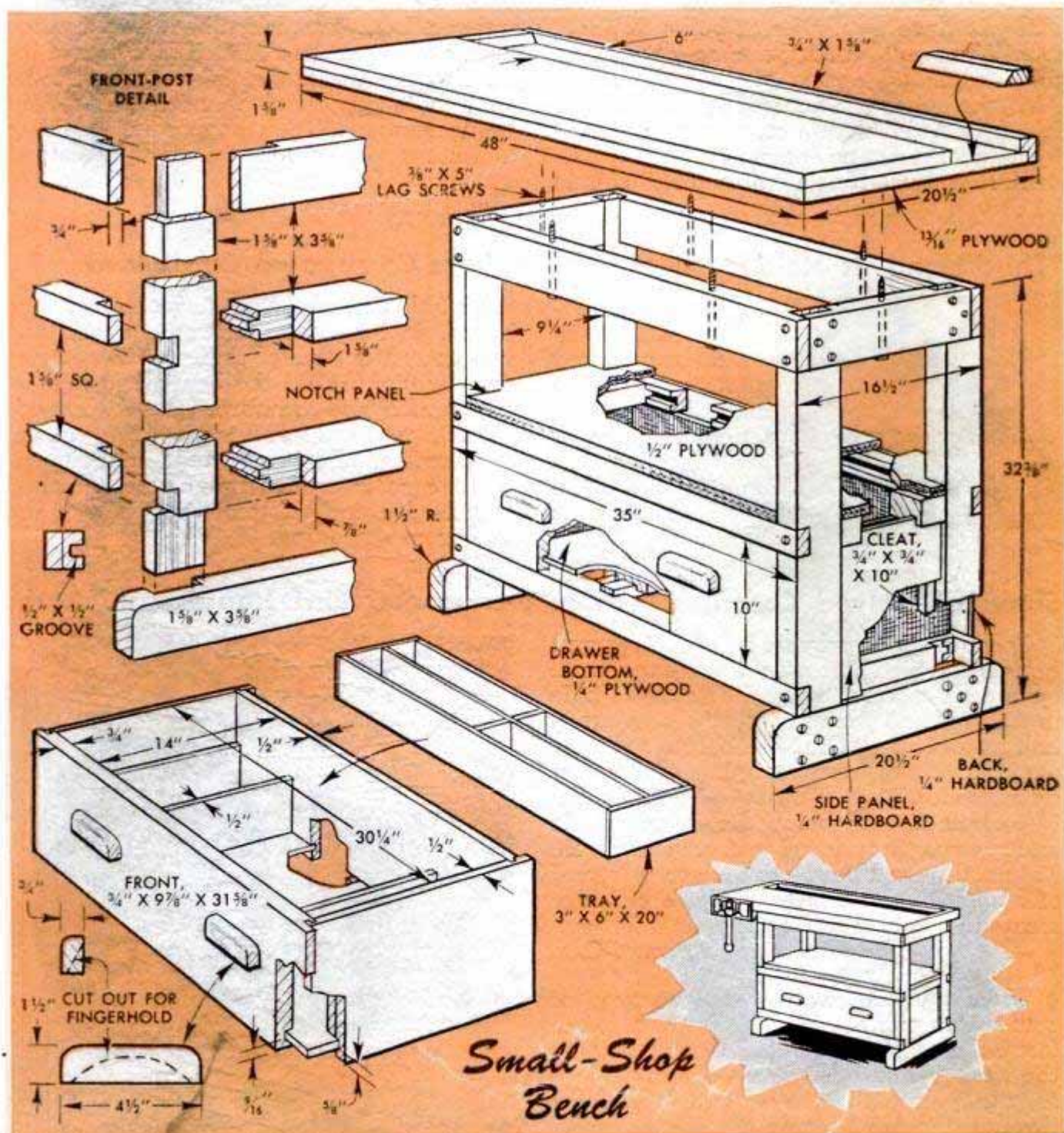
support the tongued-and-grooved drawer frames, notches are cut in the inside faces of the corner posts. The front and back rails of the frames are half-lapped at the center posts. Drawer guides overlap the front rails just far enough to allow clearance for the drawer fronts.

The sliding doors of the de luxe bench ride on sheaves which roll on steel tracks set parallel along the full length of the bottom front rail. Each door is fitted with two sheaves mounted 2 in. from the ends, and the top edge of the door is rabbeted to engage grooves along the underside of the top front rail. These grooves are shown $\frac{3}{4}$ in. deep to allow sufficient clearance for placing the sheaves on the tracks when installing the doors. In this bench, plywood drawer shelves are used instead of frames. Both drawer and storage shelves are set in

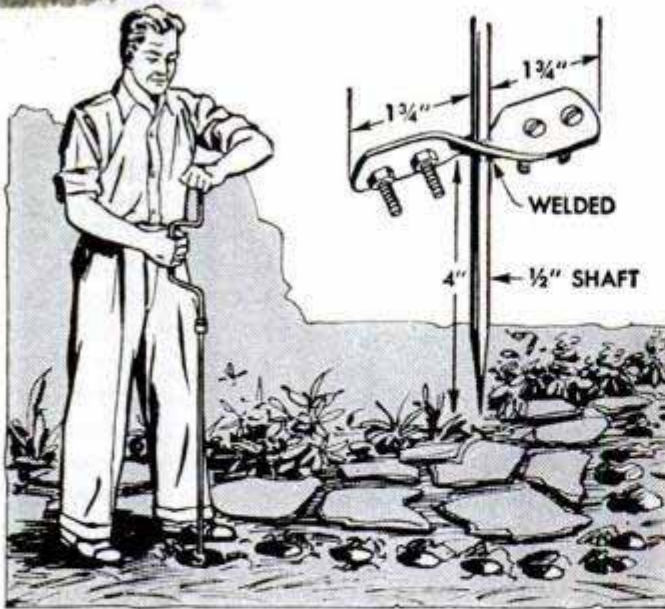
grooves in the plywood center rail and are notched at the outer corners to form half-lapped joints with the notched filler posts. The drawer guides are glued in $\frac{3}{8}$ -in.-deep grooves cut in the top faces of the drawer shelves, and the outer ends are cut back to clear the drawer fronts.

The front-post detail, below, shows the typical cuts necessary for assembling the posts and rails of the small-shop bench. If desired, the posts may be grooved to take the edges of the hardboard side panels, or the latter can be fitted against the edges of the posts after inserting their top edges in the center-rail grooves. In this case, 10-in. cleats are screwed to the posts to add rigidity to the end panels. The removable drawer tray is made in the same way as the one detailed for the six-drawer bench.

(To be continued)



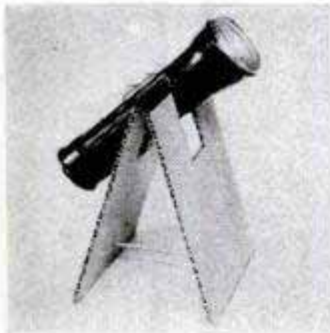
Unique Garden Tool Cultivates Soil or Digs Holes for Setting Bulbs



If you have a number of bulbs to plant, it will be well worth your time to make this simple auger for digging the holes. Also, the auger can be used as a cultivator. It can be fitted with a crank and operated by hand or it can be operated by an electric drill. If you use it as a cultivator, it should be driven by a drill. When cultivating, the

auger is held at an angle so that the point rests on the ground and the blades, in rotating, strike the ground and stir it. When used as a cultivator in flower beds and other places where plants are close together, it can be used in a vertical position as for digging holes except that the blades are not permitted to enter the ground. Instead they just strike the surface, the auger being lifted up and down as you move it along. The tool is made by bending a piece of flat steel to form a propeller shape, which is drilled in the center to slip over a piece of $\frac{1}{2}$ -in. steel rod. Weld the propeller in position about 4 in. from the lower end of the rod. The latter should be pointed for easy entrance into the ground. The upper end of the rod can be bent to the shape of a crank or it can be squared to take a speed wrench. Left plain, it can be inserted in the chuck of an electric drill. If you do not intend to use the auger as a cultivator, the small bolts shown in the propeller will not be necessary as their purpose is to aid in loosening the ground when cultivating. For more effective digging, the edges of the blades may be sharpened.

"Third Hand" to Hold Flashlight Made From Corrugated Cardboard



A stand for holding a flashlight in almost any desired position can be made from a rectangular piece of cardboard approximately 6 x 16 in. The corrugations should run with

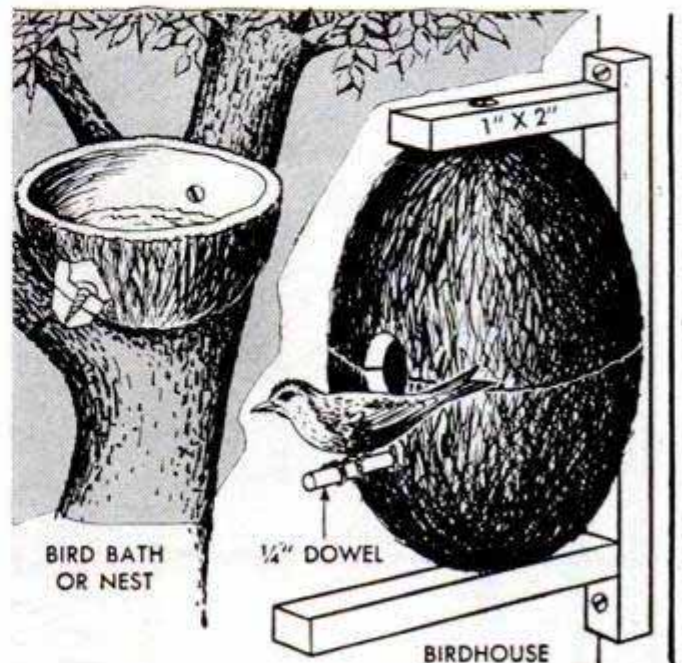
the width. Cut a rectangular opening in the board, making the length 6 in. and the width slightly smaller than the diameter of the flashlight. Fold the board endways at the center and reinforce the folds with tape. In use, the stand is placed as shown, and the flashlight force-fitted into the opening. A cord, inserted through holes punched in each leg and knotted, will prevent the legs from spreading.

Shells of Halved Coconuts Provide Picturesque Bird Houses and Baths

Coconut shells provide dandy little wren houses and bird baths. To remove the meat, open each coconut by drilling a $\frac{7}{8}$ -in. hole in the side and then sawing the coconut in half as indicated. Glue the halves together again, using a waterproof glue, and mount on a wooden bracket made of 1 x 2s. Drill a $\frac{1}{4}$ -in. hole directly below the entrance hole and insert a short dowel to serve as a perch. To make a bird bath, simply screw a half of a shell to the crotch of a tree or other location suitable for the purpose.

H. Moetzing, Toronto, Can.

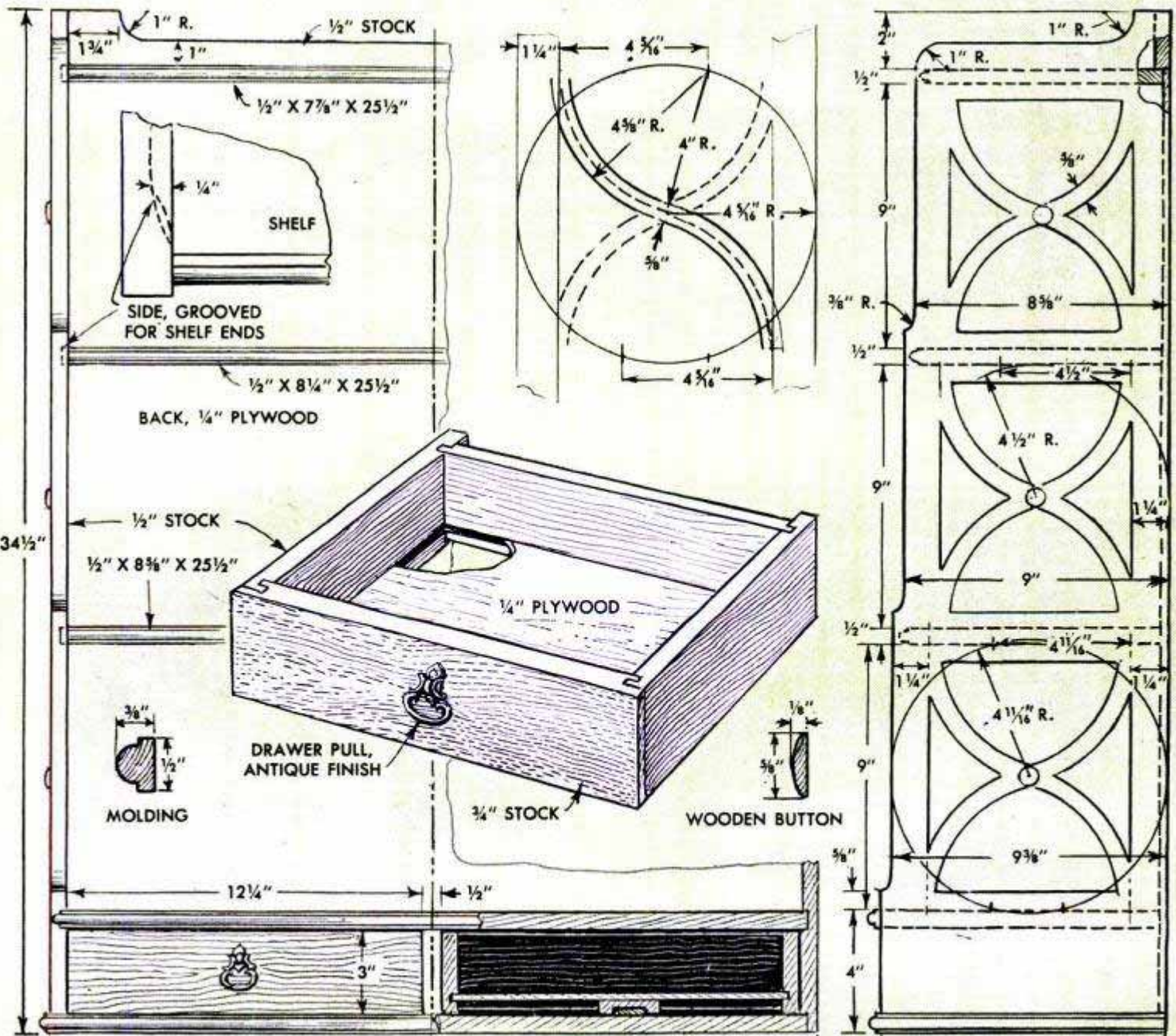
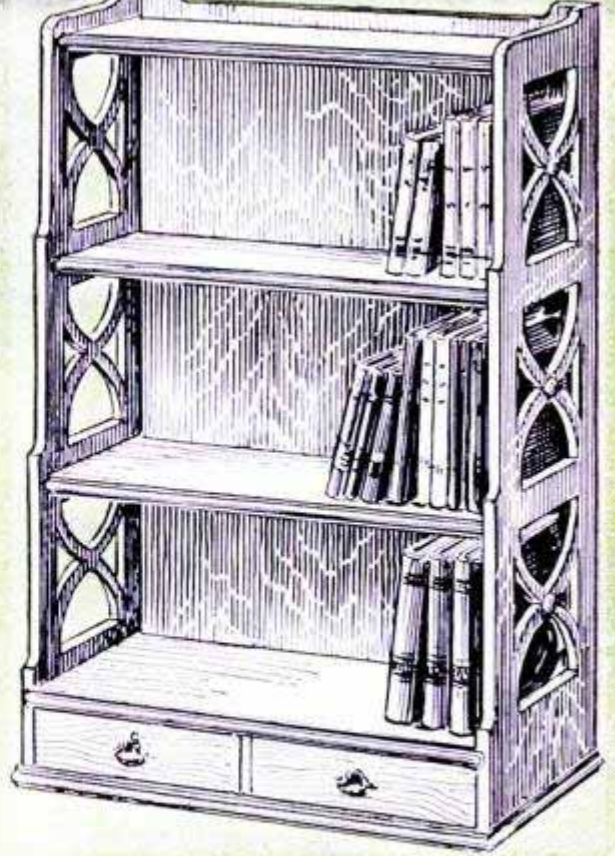
When painting walls with the type of cold-water paint that is supplied in paste form, the paste can be used to fill cracks in the wall. Being the same color and texture as the paint, the paste will not show through the finish when dry.

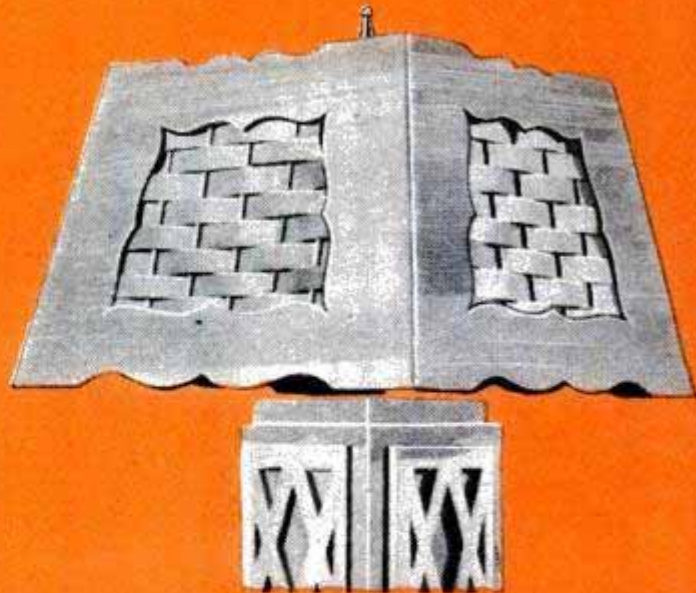


Scrolled BOOKSHELF

By John Bergen

A NOVEL hourglass design in open scrollwork distinguishes this wall bookshelf. Two drawers add to its usefulness and decorative value. If desired, the bookshelf can be built entirely of plywood, or solid stock can be used for the scrolled ends and drawer fronts with plywood for the shelves and back. The shelves are set in blind grooves, or dadoes, cut in the scrolled sides, and the exposed front edges are faced with a cloverleaf molding. The details below show how to lay out the scroll patterns directly on the wood, and also give the radii for cuts on the stepped edges of the side panels. Drawers are of conventional construction.





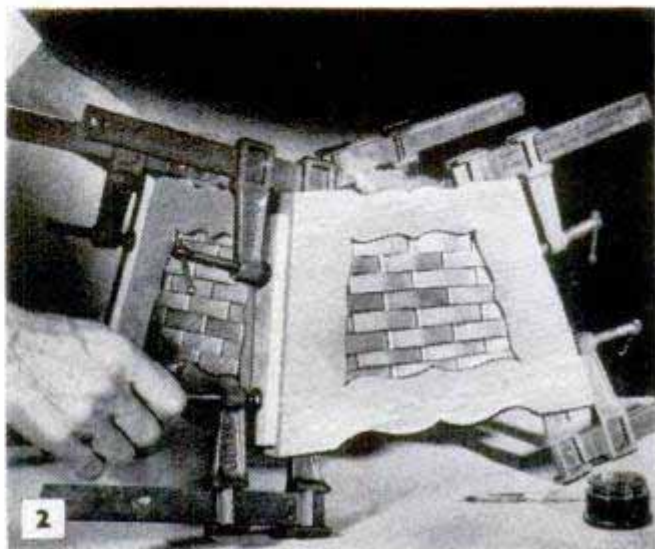
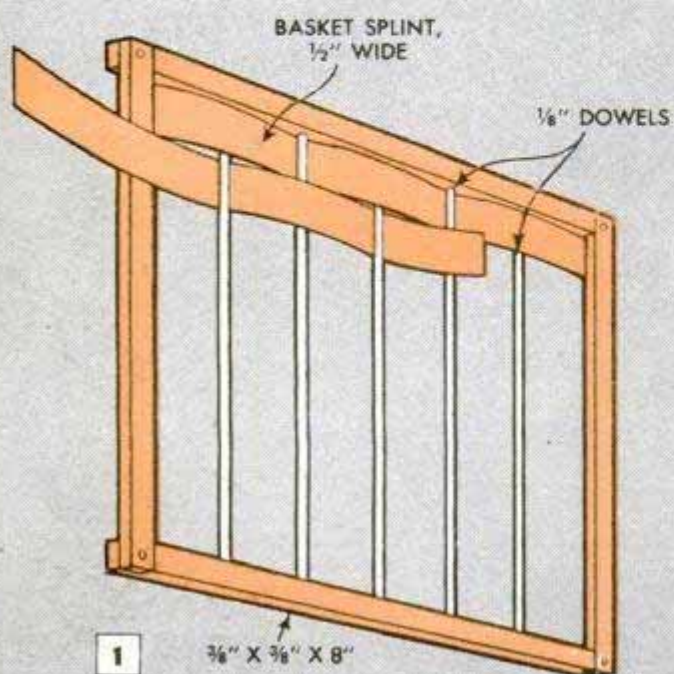
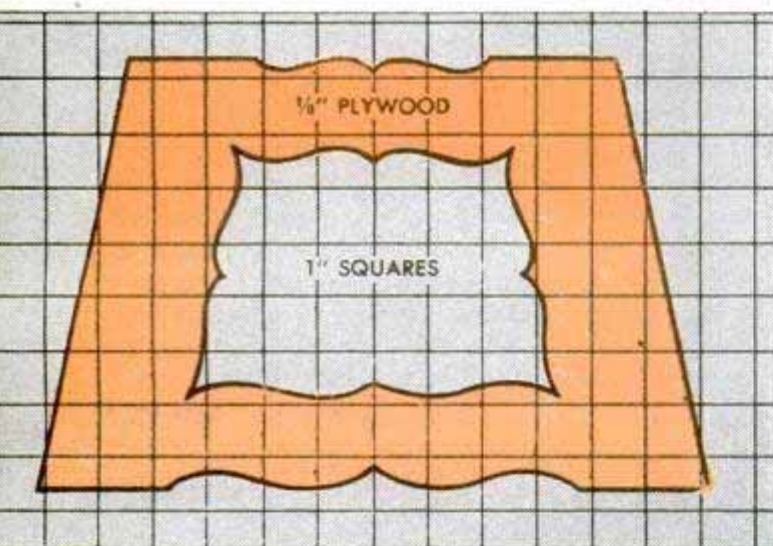
Basket - Weave Shade

MODERN

By Bertram Brownold

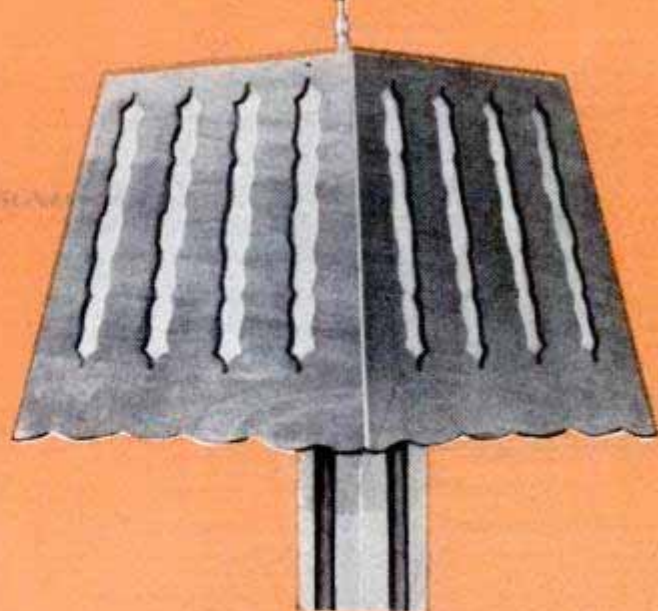
ANY OF THE three lamp shades pictured above will add a distinctive touch to your living room or bedroom. Although they are entirely of wood, the shades provide a soft, side-lighting effect resulting from the novel use of translucent basket splint and louvers made of thin slats. As detailed, these shades are too small for the massive lamp bases frequently used in modern furnishings. However, they easily can be enlarged and their proportions varied somewhat if desired. The plywood portions of the shades may be stained, finished natural with clear varnish or shellac, or painted, depending upon your likes and the color scheme of the room.

The basket-weave shade, detailed in Fig. 1, consists of four scrolled sides of $\frac{1}{8}$ -in. plywood. Each side is backed with an insert





Lower Shade



Scroll Shade

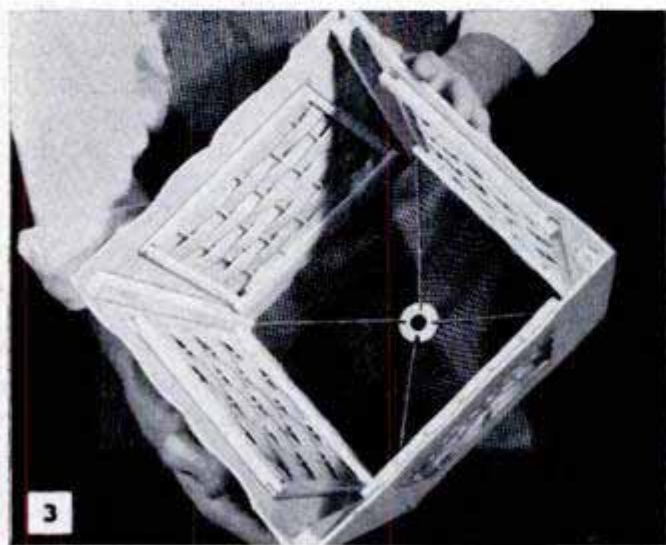
LAMP SHADES IN WOOD

made by weaving basket-splint strips through dowels which are mounted vertically in a wooden frame. The sides are cut to size and jigsawed according to the squared pattern. After the basket splint has been cut into $\frac{1}{2}$ -in. strips, it is soaked in water to make it pliable. The strips are woven through the dowels while still wet and the ends of the strips are tacked to the sides of the frames. Note that the top and bottom pieces of the frames are notched so the side members will fit flush. The completed inserts are glued to the inner faces of the shade sides directly over the scrolled cutouts. The sides of the shade are mitered and glued together as in Fig. 2, glue blocks being installed along the joints, as in Fig. 3.

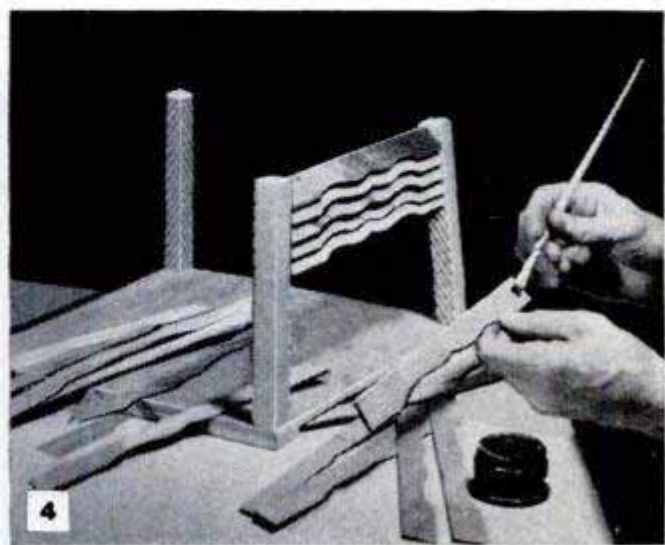
The sides of the louver shade consist entirely of thin wooden slats which are edge-glued in saw kerfs cut at a 60-deg. angle on adjacent faces of the corner members. To

make the shade, first cut the kerfs in the corner pieces as detailed in Fig. 5. This can be done by kerfing one face of a $\frac{5}{8}$ -in. board and then ripping four $\frac{5}{8}$ -in. strips from the board. To kerf the adjacent faces of the strips, join the four side by side with a couple of cleats and cut the kerfs as before. Finally, cut off the ends so each member contains 16 saw kerfs on adjacent faces.

The slats are ripped just thick enough to fit snugly in the saw kerfs. As the scroll, which is shown in the squared pattern in Fig. 5, is the same on all the slats, several of them can be jigsawed at the same time. This can be done by stacking the strips for jigsawing, or by cutting the scroll on one face of a block before ripping off the strips. Note in the upper detail how the 16 slats for each side are laid out and cut, one longer than the other, to give the desired taper to the shade. Gluing the slats in the saw kerfs

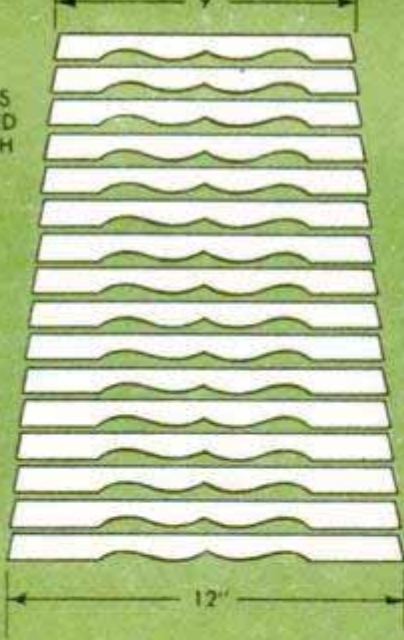


3

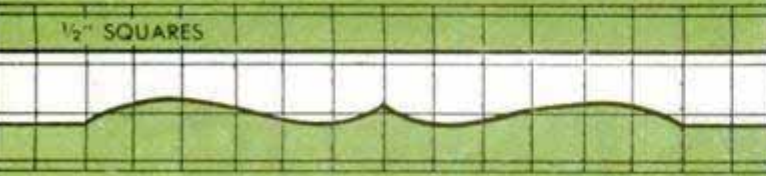


4

HOW SLATS ARE MARKED FOR LENGTH

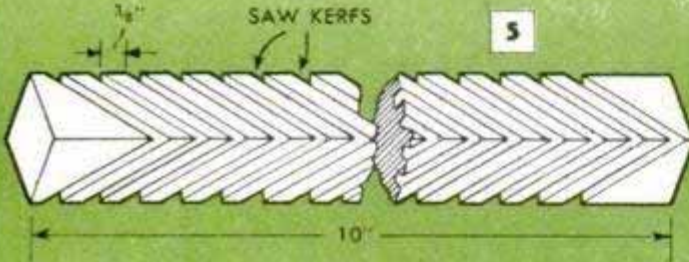


1/2" SQUARES

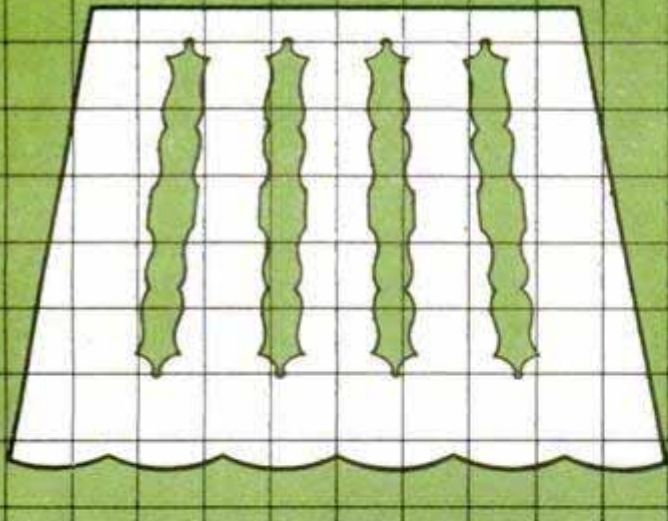


SAW KERFS

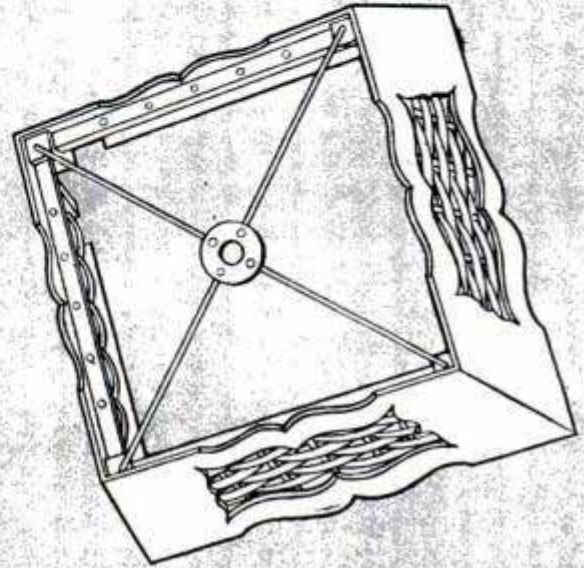
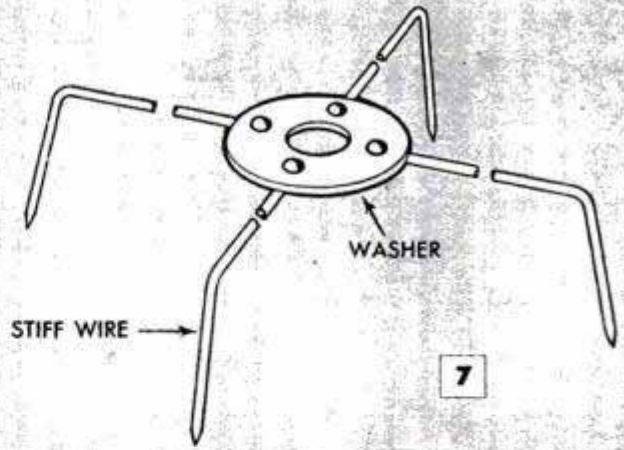
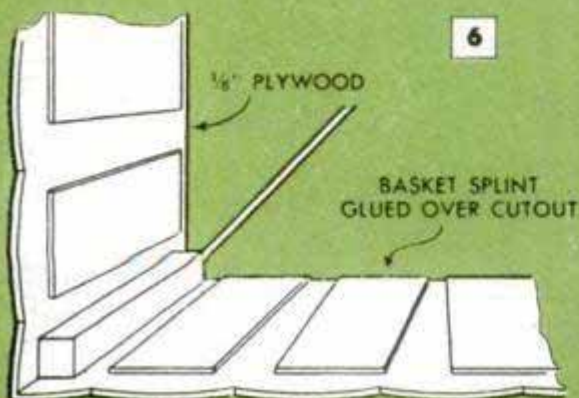
5



1" SQUARES



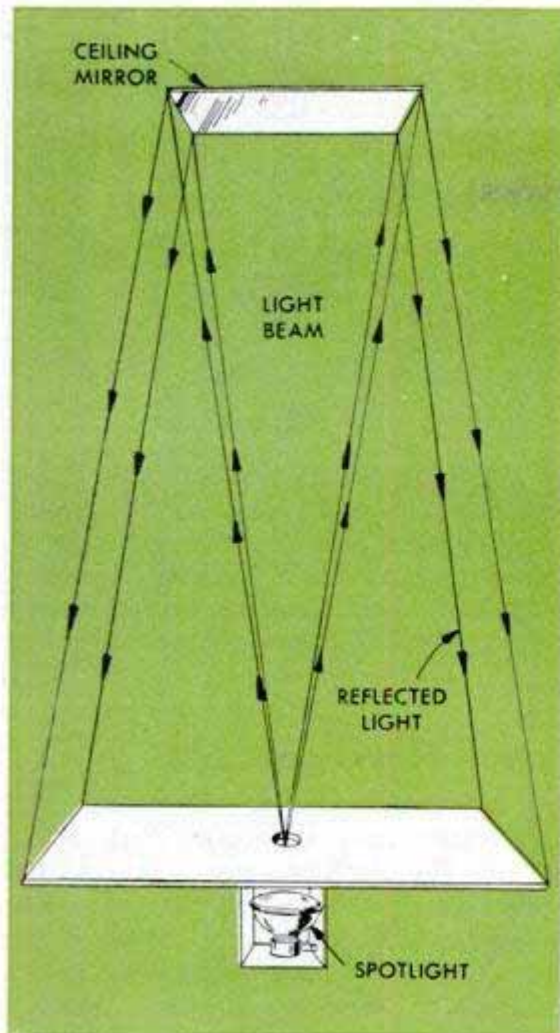
6



is done easily by mounting the four corner members on a wooden base as in Fig. 4. These can be held at the correct angle by setting pegs in the base to engage holes drilled in the lower ends of the corners. Or, the members can be supported with nails driven through the underside of the base. To attain the proper angle for the corner members, temporarily fit the top and bottom slats of the four sides in the saw kerfs.

The scroll shade, detailed in Fig. 6, is made in the same way as the basket-weave shade. Strips of basket splint are glued over the scrolled cutouts, and the sides of the shade are assembled as before. Excellent splint for this purpose can be obtained from the thin wooden containers used for packing vegetables and berries, and the translucency of the wood can be increased appreciably by applying a thin coat of oil over the inside surfaces of the strips.

The finished shade is supported on the lamp harp by four lengths of stiff wire held together with a metal washer as in Fig. 7. The inner ends of the wire are inserted through four holes drilled in the washer and are peened over to lock them in place. The outer ends of the wire are pointed and bent downward at right angles so they can be driven into the corner members. Coat-hanger wire is satisfactory.



Photos courtesy General Electric Co.

GLAMOURIZE Your DINING TABLE

By Morris Tanenbaum

INDIRECT lighting reflected from the ceiling above your dining table adds sparkle to the formal dinner without the tiring glare of direct lighting or the shadowy uncertainty of candles. The diagram above shows the setup, the spotlight under the table being trained on a mirror attached to the ceiling. The light beam passes through a 2 $\frac{5}{8}$ -in. hole bored in a table leaf. The size of the mirror, which is centered over the table, should be one half that of the table

top. Use a projector-type spot lamp of 100 to 150 watts and mount it below the table top in a porcelain socket attached to a bracket. Enclose the light in a metal housing provided with a series of holes or louvers for ventilation. The wooden table leaf adjacent to the hole is protected with asbestos, and a glass centerpiece can be used to conceal the lamp. By forming flanges at the top of the metal lamp house, you can fasten it in place with screws.



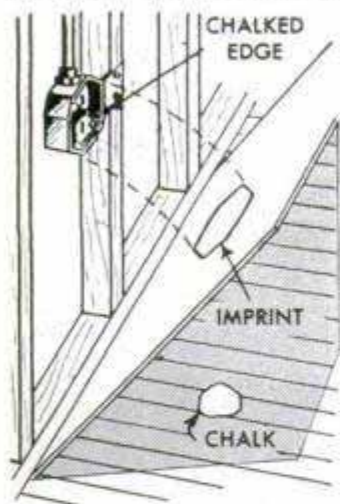


Door Bolts on Baby Crib Lock Sliding Gate

If your baby crib has no safety catch to hold the movable side in the raised position, it might be forced down when the baby leans on it and let the child topple out. To prevent such an accident, attach a door bolt, of the type illustrated, near each end of the crib.

R. A. Bridgewater, Urbana, Ill.

Chalked Edges of Outlet Box Mark Opening in Wallboard



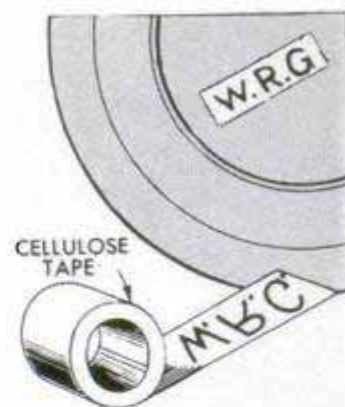
When installing wallboard, a simple and accurate way of locating openings to be cut for electrical outlet and switch boxes consists of transferring the shapes of the openings to the back side of the wallboard before it is nailed in position. To make the transfer, the edges of

the box are coated with carpenter's chalk and the section of board for that area of the wall is placed in position and pressed against the box. This transfers the chalk to the board, leaving a clear mark around the portion of the board to be removed.

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

Tape Identifies Your Picnic Dishes

Print your initials on the adhesive side of strips of cellulose tape and apply them to the undersides of dishes used on picnics or other group gatherings, and you will be able to identify your own dishes easily. The tape will keep the initials legible for a few washings. It is best to use a ball-point pen for the lettering as you can better apply just the right amount of ink with it and thus avoid smearing when you press the tape against the dish.



G. E. Hendrickson, Argyle, Wis.

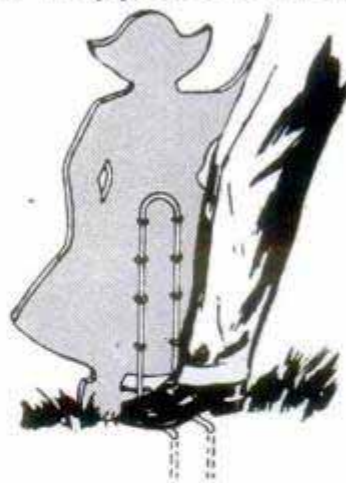
Conserving Flashlight Cells

Simply by keeping three sets of cells for your flashlight and interchanging them daily, if the flashlight is used that often, you can increase the life of the cells. For convenience, each set of cells should be numbered. To assure the maximum amount of recuperation while not in use, the cells should be placed in a closed, glass or plastic container and stored in the refrigerator. However, before putting them back in the flashlight, the cells should be allowed to "thaw" for at least an hour as they will not emit maximum power when cold.

Steve Hannagan, New York City.

Lawn Ornaments Easily Replaced If Equipped With Stepped Anchors

Instead of mowing around a lawn ornament, use an anchor like the one shown, which permits the ornament to be removed and replaced easily. The anchor is a length of $\frac{1}{4}$ or $\frac{3}{8}$ -in. steel rod, which is bent as indicated so that it can be pushed into the ground with your foot. The method of attaching the anchor to the ornament is a matter of preference. In this case, it was stapled.



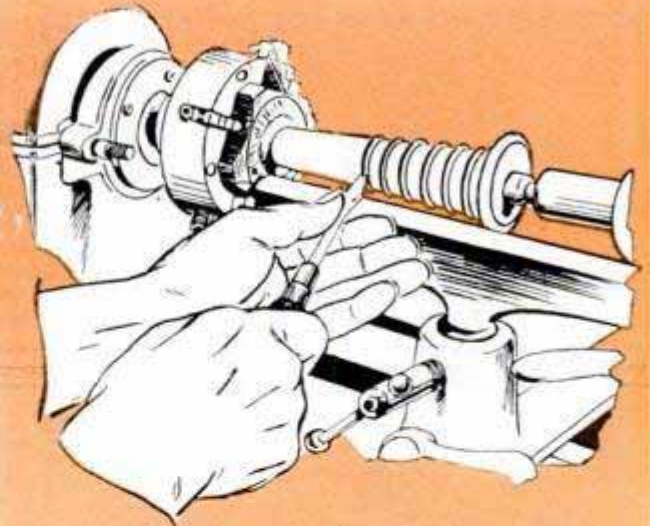
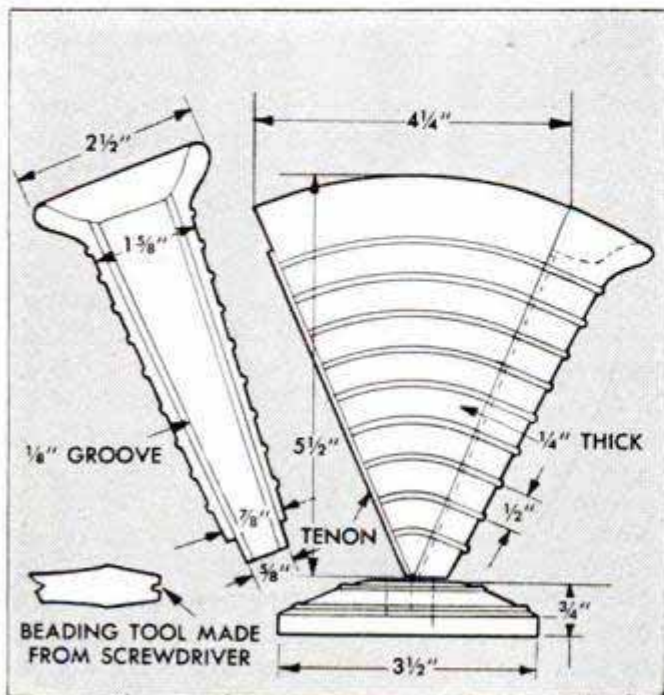
☐ If ink is spilled on a carpet, cover immediately with salt. Scoop it up as it absorbs the ink and repeat until the salt comes off clean. Put on more and leave overnight.



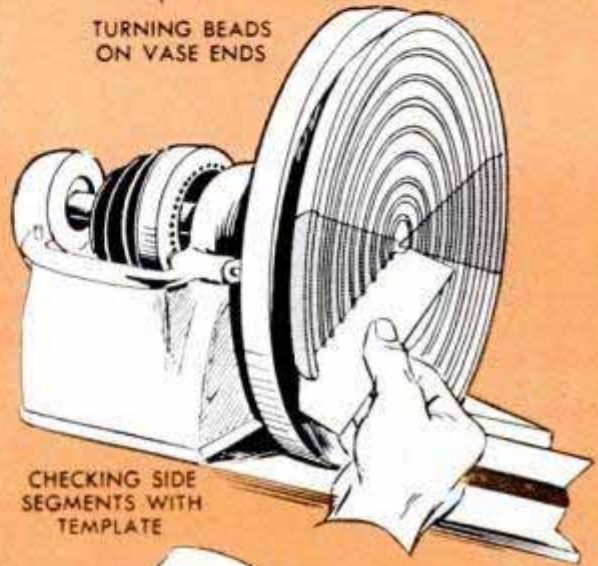
FAN-SHAPED VASE IN WALNUT

By *Benj. Nielsen*

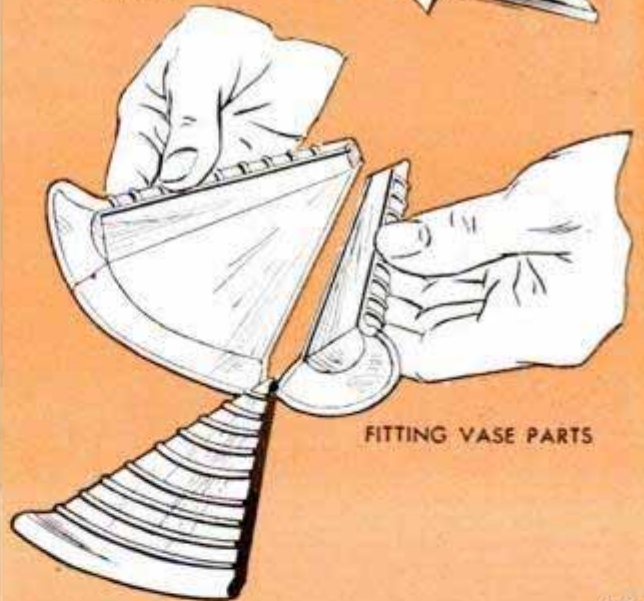
CRAFTSMEN with a liking for tricky lathe projects will find this turned fan vase a fair test of skill. The endpieces of the vase are formed from a split turning having one flared end and uniformly spaced beading along the spindle. After the turning is finished and split apart, the halves are grooved as in the detail below. The sidepieces are segments of a built-up disk which is turned on the faceplate. A tenon is cut on the edges of each piece, and then the four members of the vase are glued together. After the glue is dry the vase is mounted in the lathe, as in the lower right-hand detail, and a tenon is turned at the lower end to fit into a hole drilled in the base. The latter is turned to the dimensions given in the detail below.



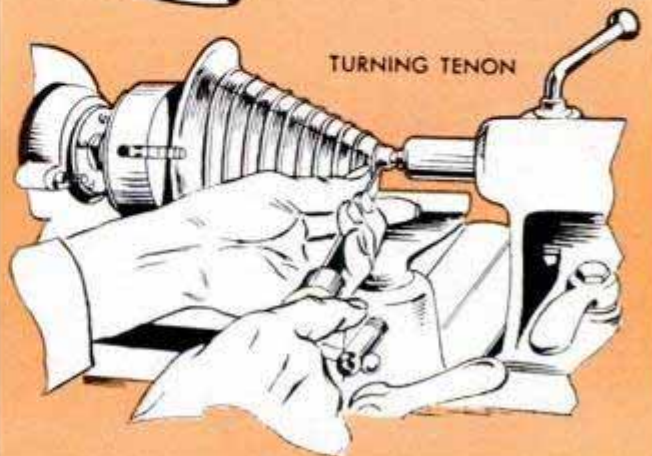
TURNING BEADS
ON VASE ENDS



CHECKING SIDE
SEGMENTS WITH
TEMPLATE

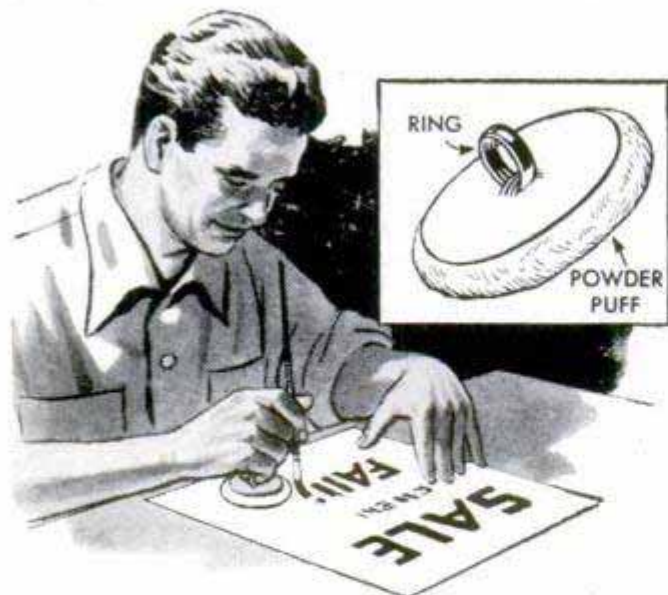


FITTING VASE PARTS



TURNING TENON

Powder Puff and Small Finger Ring Make Hand Rest for Letter Artist



To avoid soiling show cards when lettering them, one artist made a hand rest from an inexpensive finger ring and a small powder puff. The ring was sewed to the center of the puff and, in use, is slipped over the little finger to hold the puff in position.

Renewing Floor "Traffic Lanes"

"Traffic lanes" in the home, or the areas of shellacked floors that receive the most wear, can be renewed easily to match the rest of the floor. Just sand the worn portions and apply two coats of thin, white shellac. Do not use stain unless the entire floor is being refinished.

Dime-Store Lock on Telephone Prevents Unauthorized Use

Unauthorized use of an office or private telephone can be prevented without having to attach special equipment to the instrument. Just put a small lock through the first hole of the dial, as shown in the photograph. This will prevent the dial from being rotated past the finger stop.



BORING TOOLS

By Rudolph G. Kopp

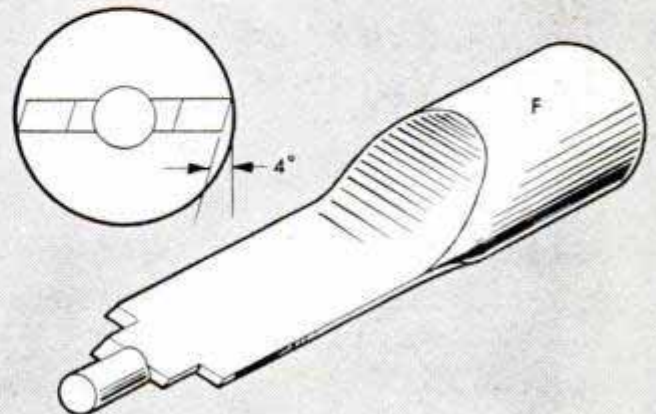
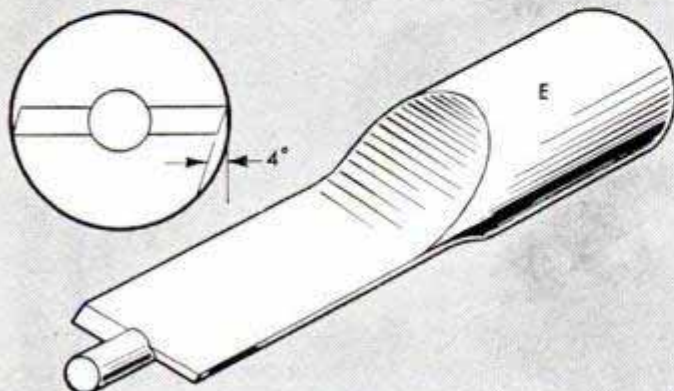
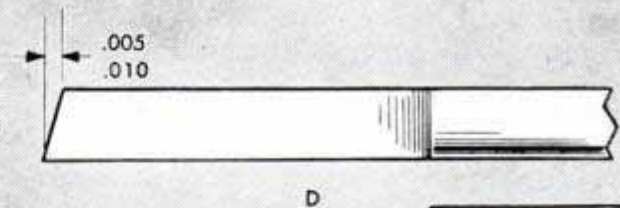
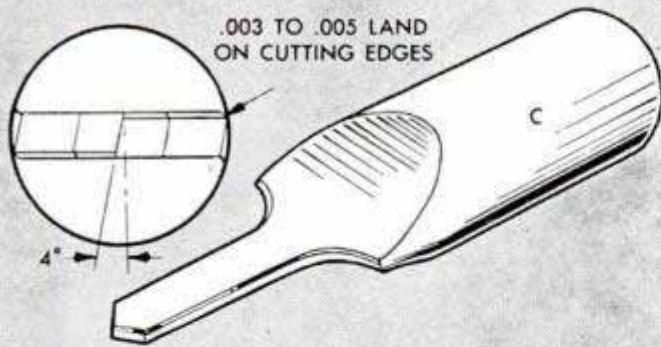
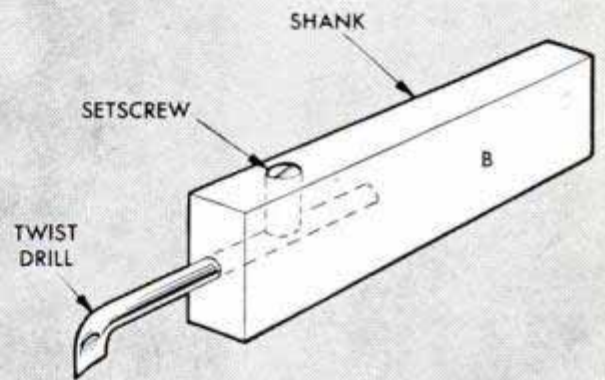
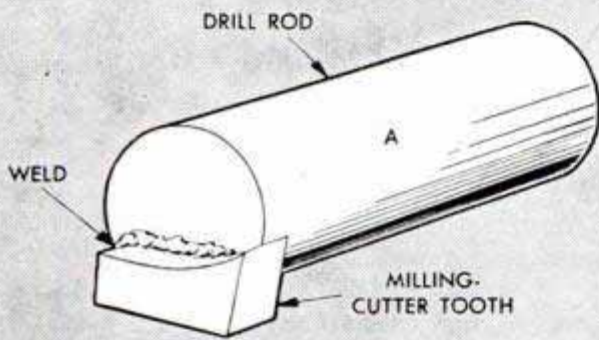
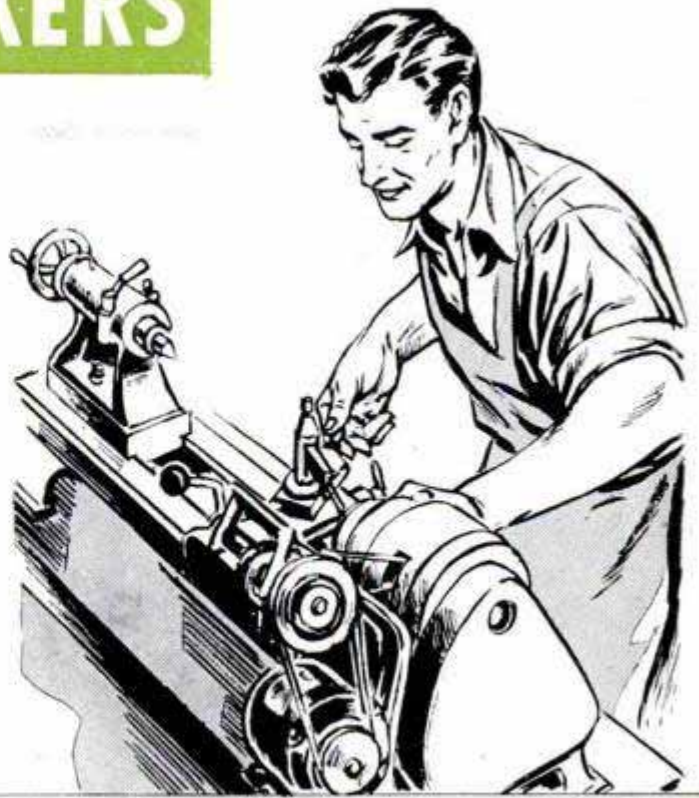
MODEL BUILDERS often solve difficult machining problems on small-scale parts by making special tools suited to the purpose. Frequently the scale to which the model is being built reduces machined parts and also openings, holes, slots and slides to such small sizes that ordinary tools cannot be used. The specifications may call for pin-sized holes to be reamed, or drilled and reamed in one operation, to accurate dimensions. The requirements repeatedly call for flared holes to form jets, or counterbores to form ball seats. Often flats must be milled on parts of decimal-inch size and, on certain types of work, the scale specifications may require accurate milling of tiny slots for slides or attached fittings.

For example, you need a boring tool of minute size to finish a hole in a rough casting to close limits. Details A and B on the opposite page show how to make two types, both useful in handling extremely fine work. Of course, both tools will require a special holder of the type shown in detail B. A tool bit specially ground for reaming and flaring a hole is shown in detail C. By grinding straight cutting edges, or edges with an outside curve instead of an inside curve as shown, you can ream and counter-sink a tiny hole for either a flat-headed screw or a ball seat. Also, by grinding cutting edges square across you have a combination reamer and counterbore for small hex-head machine screws. Detail D pictures a special bit which also serves as a milling cutter, slotter and drill. Made from $\frac{1}{16}$ -in. drill rod and properly hardened and ground, it will do a first-class job as an end mill for facing and squaring cuts. It also is suitable for certain types of contour work and for milling slots or grooves of hairline width. On softer metals, such as brass, die metals and aluminum, it will operate satisfactorily without hardening. Details E and F show versatile boring tools with fixed pilots which serve not only as single and double counterbores, but also for spot-facing on small castings. Note that on all tools the cutting edges are relieved 4 deg., an average cutter relief for fine work.

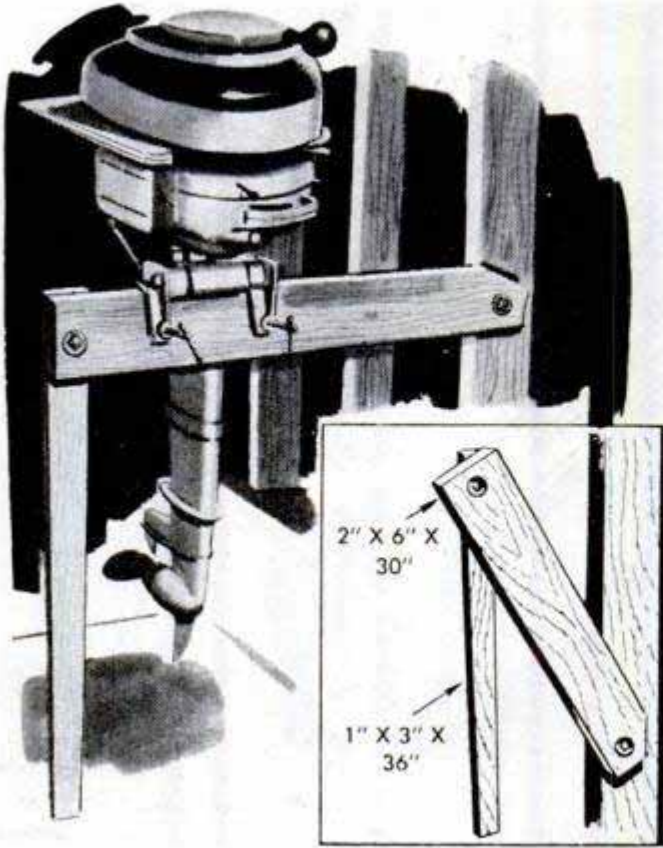
For machining mild steel and harder alloys, the tools must be hardened. For the harder metals, heat the tool to a light yellow and quench in clean water. For machining mild steel and gray (cast) iron, heat to a dark yellow. Although hardening is not

for MODELMAKERS

necessary for intermittent work in brass and softer metals, hardened tools will hold a cutting edge longer. Heat to a reddish-brown purple and then quench in water. Another way of hardening drill rod and spring steel completes the process in two stages. First, heat the metal to a cherry red and quench in oil or water. Then clean the quenched tip with a wire brush and hold it on a piece of metal previously heated to a medium bright red. Watch the change of colors closely as heat transfers to the tool bit. When the latter shows a medium yellow at the tip, plunge quickly in water and move with a circular motion until cooled. Tiny tool bits made from high-speed steel can be air-hardened satisfactorily. Heat slowly to a cherry red and allow the tool to cool without quenching.



Stand Holds Outboard Motor In Vertical Position

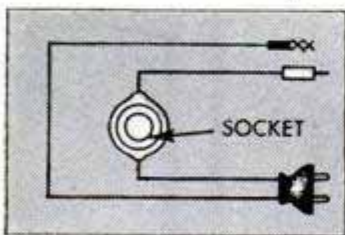


Since most manufacturers recommend that an outboard motor be stored in a vertical position, this simple stand for supporting it is ideal because it can be swung out of the way when not in use. The stand consists of two members pivoted together with a bolt and then pivoted to a stud in the garage or boathouse. Be sure that the pivot bolts are pulled up to just the right tension to permit the stand to be folded yet rigid enough to support the motor safely.

Finding Wall-Cabinet Area

To estimate the total area of a wall cabinet to be painted, first find the front area by multiplying the height by the width. Then multiply the answer by five. Present your paint dealer with this information and he will supply the amount of paint needed.

Tester Circuit Fitted With Socket To Take Variety of Resistors



A common porcelain socket wired in series with a male plug as shown will provide an inexpensive tester for your electrical bench

that will take resistors of various types and wattages. For example, it will take a $\frac{1}{4}$ -watt neon test lamp or a heating element

up to 600 watts. Also, by inserting a female plug in the socket, a toaster or even an electric iron can be plugged in to serve as a resistance. One of the testing wires is fitted with a probe and the other with a clip. The latter should always be the positive side of the line and the probe the negative side.

Paul Woodruff, Chicago.

"Humidifying" Paste-Brush Holder Made From Fountain-Pen Cap

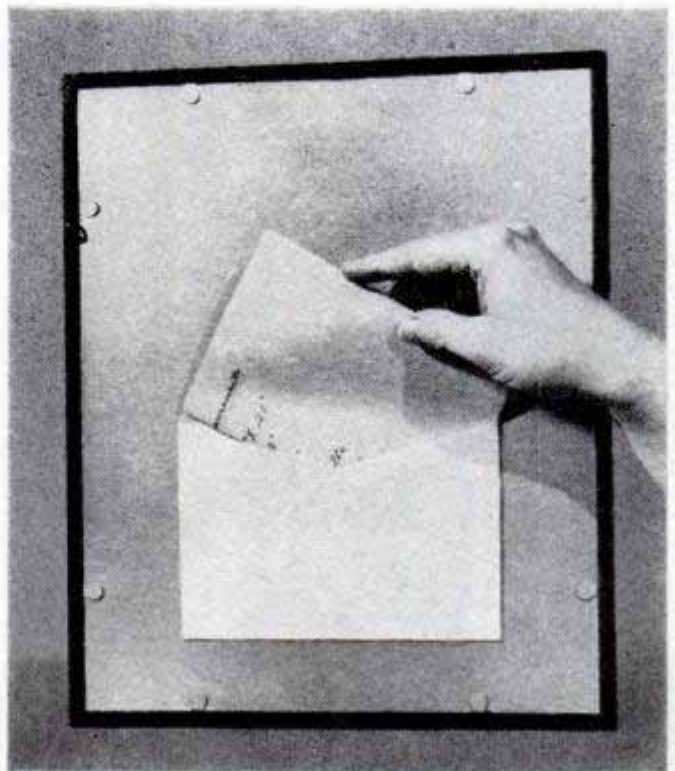
Library paste will not dry in the brush used to spread it if the cap of an old fountain pen is attached to the paste jar with cellulose tape for use as a holder. Place a small piece of sponge in the bottom of the cap and, each time the paste is used, pour a few drops of water into the cap to keep the brush moist.



Room Data and Measurements Stored on Picture Backing

You'll save time when decorating or making repairs on your home if you keep pertinent information and measurements at hand. Information, such as floor areas, window sizes or the amount of paint or wallpaper needed to cover the various rooms, can be stored conveniently in an envelope pasted to the back of one of the pictures hanging on the wall.

R. F. Donovan, Guttenberg, N. J.



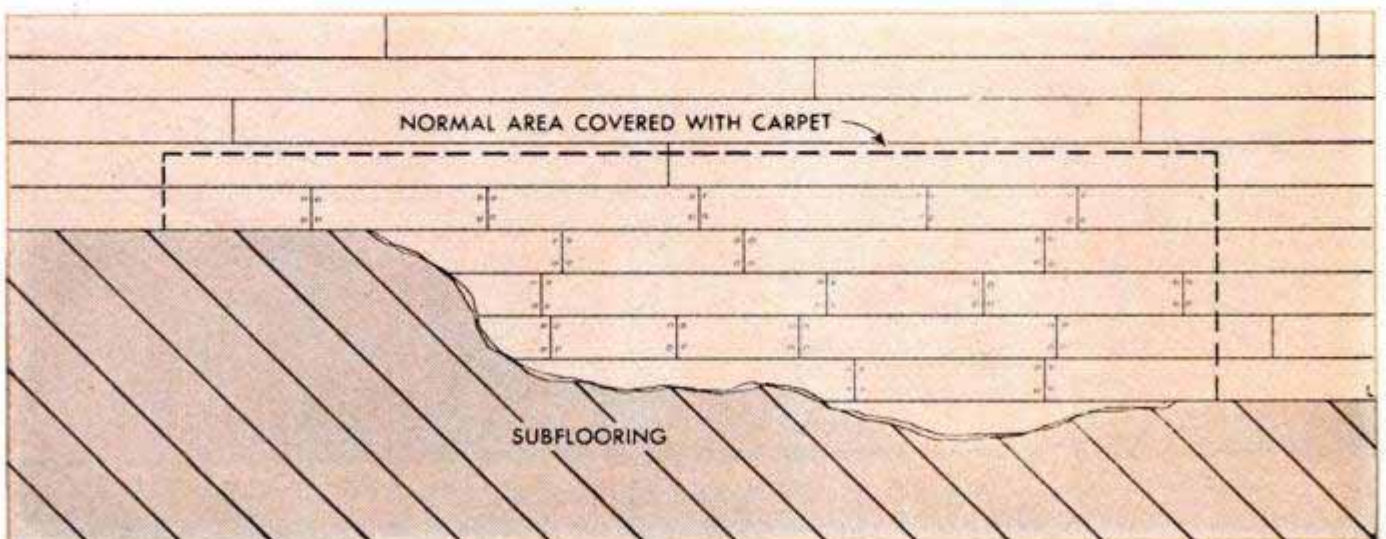
High-Grade FLOORS AT LOW COST

By John P. Arnold



AN AVERAGE 9 x 12-ft. rug covers about 108 sq. ft. of the floor area in each room and this portion of the floor you never see except at house-cleaning time. This fact makes it possible for craftsmen who do their own home remodeling, including the laying of new hardwood floors, to save money. By using selected-grade flooring on the exposed areas between the walls and points just inside the edges of the rug, and then covering the area under the rug with a cheaper grade of flooring, you can effect a substantial saving in the cost of the flooring material in only one room. Where several rooms are involved, the saving runs into real money. In square or rectangular rooms, it's easy to calculate the areas which are to be covered with the selected and inferior grades of flooring. The exposed flooring (selected grade) should extend under the edges of the rug from 4 to 6 in. Remail the subfloor boards wherever they appear to be loose and plane off any offsets at the joints between warped boards. Then cover the subfloor with a layer of building paper and begin laying the top floor at one side

of the room, using the selected grade of material. Be especially careful to get the first board laid perfectly straight. Now, snap chalk lines lengthwise and crosswise of the room to indicate points about 6 in. inside the edges of the rug. These lines serve as witness marks when laying the two grades of flooring. Note in the detail below that the ends of the short pieces of inferior-grade flooring, placed inside the area covered by the rug, are laid with butt joints fastened with finishing nails driven through from the top. Only the selected pieces are edge-nailed to the subfloor. Note also that the butt joints are broken uniformly over the whole area. This makes a stronger, more rigid floor with less tendency to slight movements between adjacent boards, which are the cause of squeaks. When nailing the butt joints from the top, set the nailheads slightly below the surface so that they do not interfere with sanding. After the flooring has been laid it is machine-sanded with coarse and fine abrasives and then filled and finished with sealer, wax or varnish in the regular way.





RUBBER SPONGE provides an excellent wallpaper cleaner. Use dry sponge and wipe excess dirt from it with soft cloth after each stroke across paper. Soiled sponge is washed with soap and water

RIDDING YOUR HOUSE OF ANTS can be done quickly by placing a few pieces of cucumber peel in spots ordinarily frequented by the insects. The peel will be equally effective placed in the yard

LOOSE DRAWER PULLS of the wood-screw type will hold tightly if dipped in fingernail polish. If the hole has become enlarged, it can be filled with a mixture of sawdust and fingernail polish

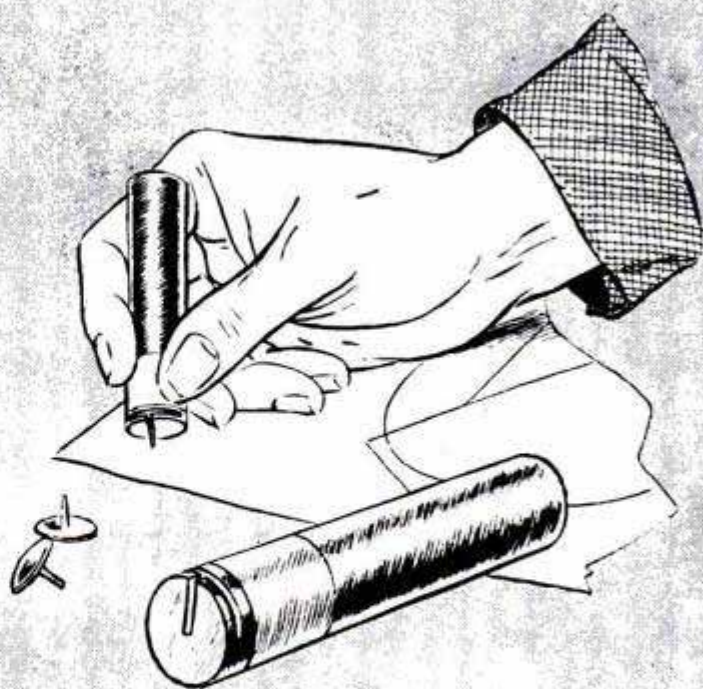
CLEANING WALLS in a bathroom is speeded by running hot water in bathtub for a few minutes beforehand. Steam will condense on tile surfaces and loosen the dirt for easy wiping

JUST BEFORE REMOVING ASHES from a fireplace, burn a few sheets of crumpled newspaper in the pit. This creates sufficient draft to carry dust up the chimney so it won't be scattered on the rug

Solving HOME



SMALL LEAKS IN WATER PIPES can be temporarily sealed by wrapping them with tape and coating the tape with shellac. This will stop the leak for a few days, allowing time for a permanent repair



METAL LIPSTICK CONTAINER is just the thing for pulling and storing thumbtacks. Bottom of the container is slotted, as shown, to lift the tacks. Extra tacks are dropped in container and cap replaced

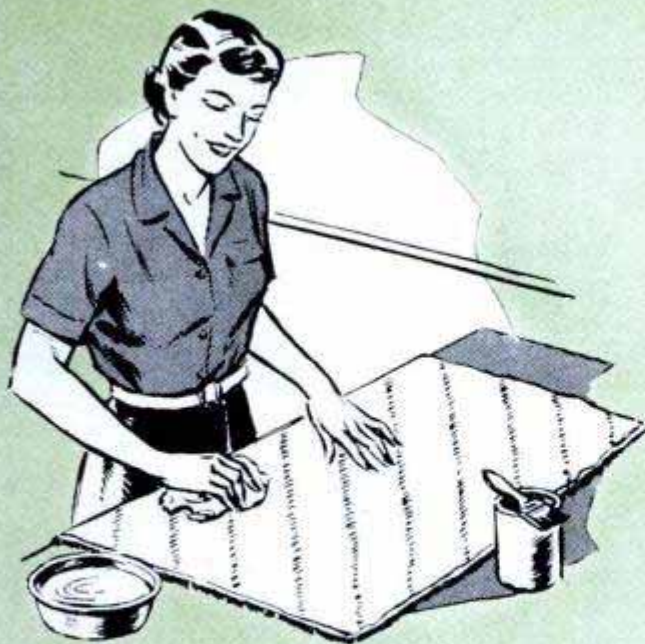


FOR APPLYING PASTE WAX to furniture or woodwork use an old powder puff as an applicator. The powder puff forms a soft pad which does not bunch up under the hand like a cloth. Wash the puff before using.



PROBLEMS

AFTER WASHING A BLANKET or bedspread, hang it between two clotheslines instead of draping it over a single line. This method facilitates drying and distributes the weight of the blanket to two lines, thus reducing the possibility of breaking the line.



WRITE CURTAIN MEASUREMENTS on a tag and tie to your curtain stretcher. Then, for instance, instead of measuring the living-room curtains before adjusting stretcher, just refer to the tag.

A TOY RUBBER HAMMER is a handy kitchen aid for opening stubborn jar lids. Strike the lid a few hard blows with the hammer. This will loosen the lid without danger of breaking the glass.

WHEN SEWING A BUTTON on a coat, place a paper match between holes in the button and sew over match. After sewing, pull out match, leaving thread sufficiently slack for easy buttoning.

SCATTER RUGS WILL LIE FLAT if they are sized with laundry starch. First, seal the underside of the rug with a coat of shellac, apply a thin solution of starch and allow to dry before using.

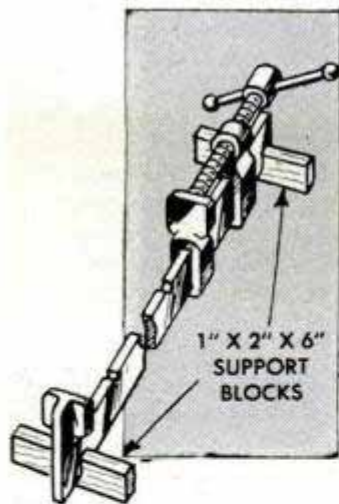
LEMON JUICE OR VINEGAR often will remove light rust stains from the surface of an enameled sink. Apply to the stained area and allow to stand for an hour or so. Then rinse with water.

Headlight Lens and Rim From Car Glaze Doghouse Window



A novel, modern-type window can be installed in your dog's house by using a headlight lens and rim from an early model car. Cut the window opening slightly smaller than the lens, and mount the lens and rim over the opening by driving wood screws through the bolt holes in the rim.

Blocks Cradle Bar Clamps To Hold Them Upright



position at the same time. The blocks are pieces of 1 x 2 x 6-in. stock, which are notched in the centers to receive the bars.

Frank M. Butrick, Jr., Alma, Mich.

Wallboard Removed Intact By Cutting Around Nails

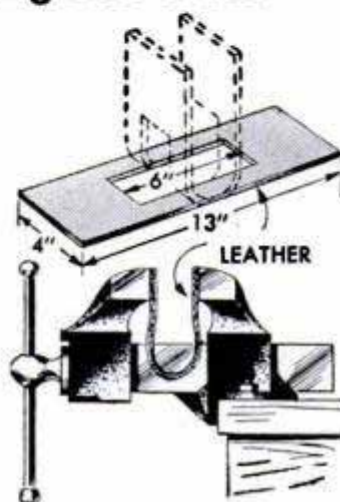
While it is difficult to remove wallboard from walls and ceilings without marring it, the damage can be kept at a minimum and the board left suitable for reuse if it is removed after cutting around the nails with

a hollow punch. The latter can be made from a 6-in. length of pipe or steel tubing, the inside diameter of which is slightly larger than the width of the nailheads. Grind a long bevel at one end to form a sharp cutting edge. In use, the punch is placed over the head of the nail and driven through, after which the board is removed from the wall intact. When reusing, just space the nails between the holes. The holes will be covered by the same wooden strips used to cover the nails.

D. Casperson, El Cajon, Calif.

Leather "Lining" for Vise Jaws Prevents Damaging Soft Work

Softer and more easily installed than ordinary vise clamps, a leather "liner" for vise jaws provides an ideal guard against marring such work as plastic or very soft metals. A piece of leather belting, about 13 in. long and as wide as the vise jaws, is all the material needed. A

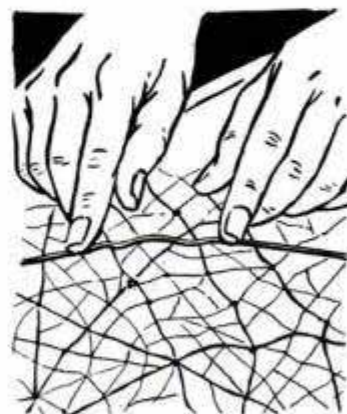


rectangular opening, 6 in. long and of the same width as the slide bar of the vise, is cut in the center of the belting. Then, the belting is folded lengthwise and the opening fitted over the slide bar, as illustrated. Installed in this manner, the liner requires no further means of attaching and can be quickly removed when hard material is to be held in the vise.

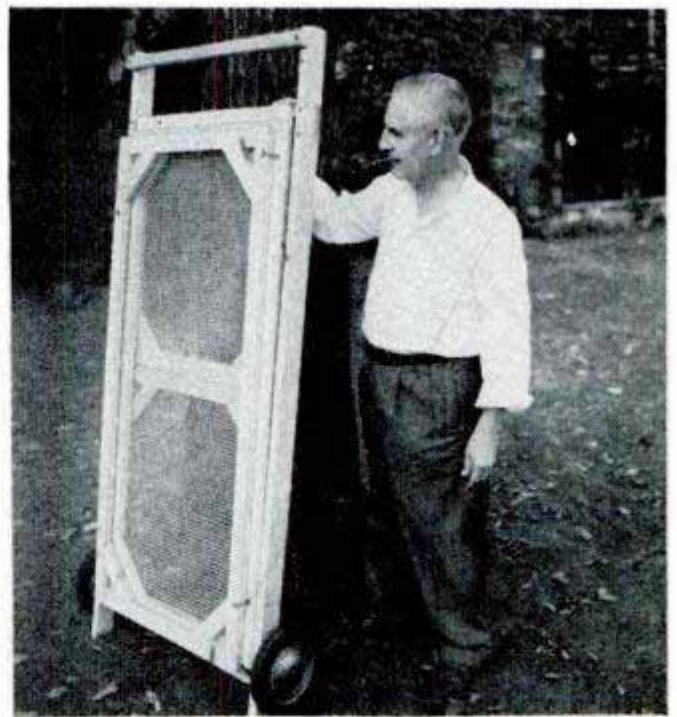
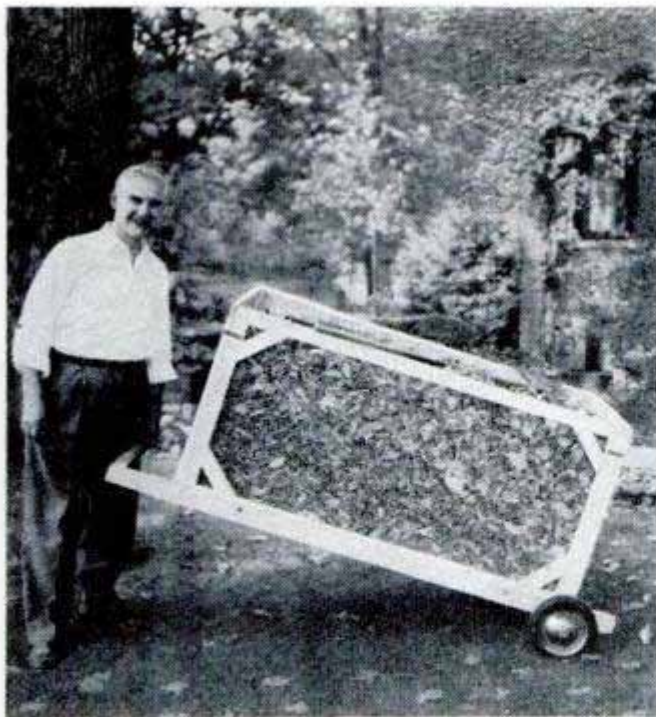
Leonard A. Kroll, Brooklyn, N. Y.

Wire-Solder Map Scale Determines Distances

To get a close approximation of the distance of motor trips, first mark a length of wire solder or other soft wire at intervals corresponding to the mileage scale on your road map. Then lay the wire on the map, bending it to follow the



route in question and note the distance in miles by the marks. Airplane routes can be estimated by marking the mileage on a straightedge instead of a wire.

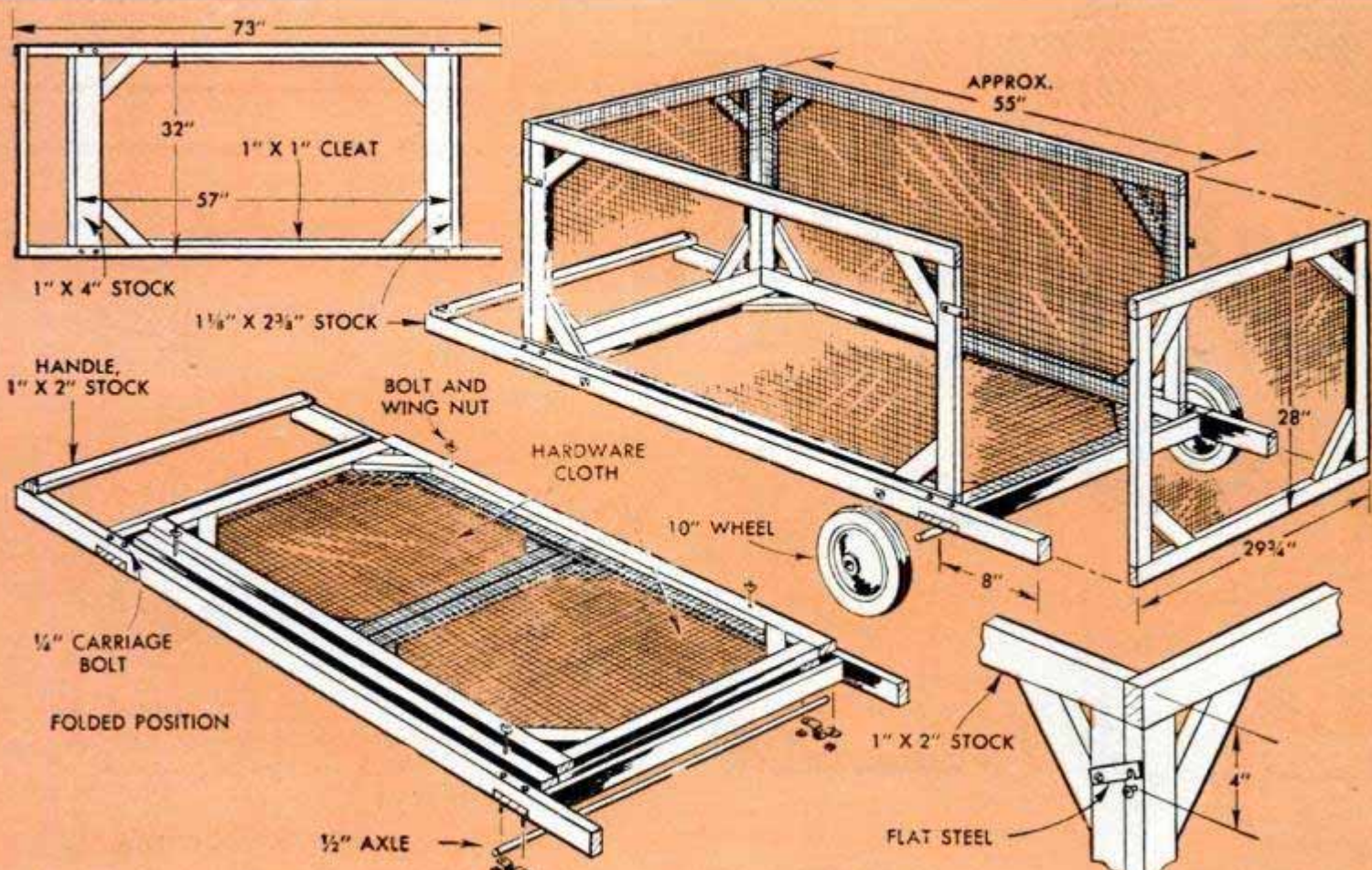


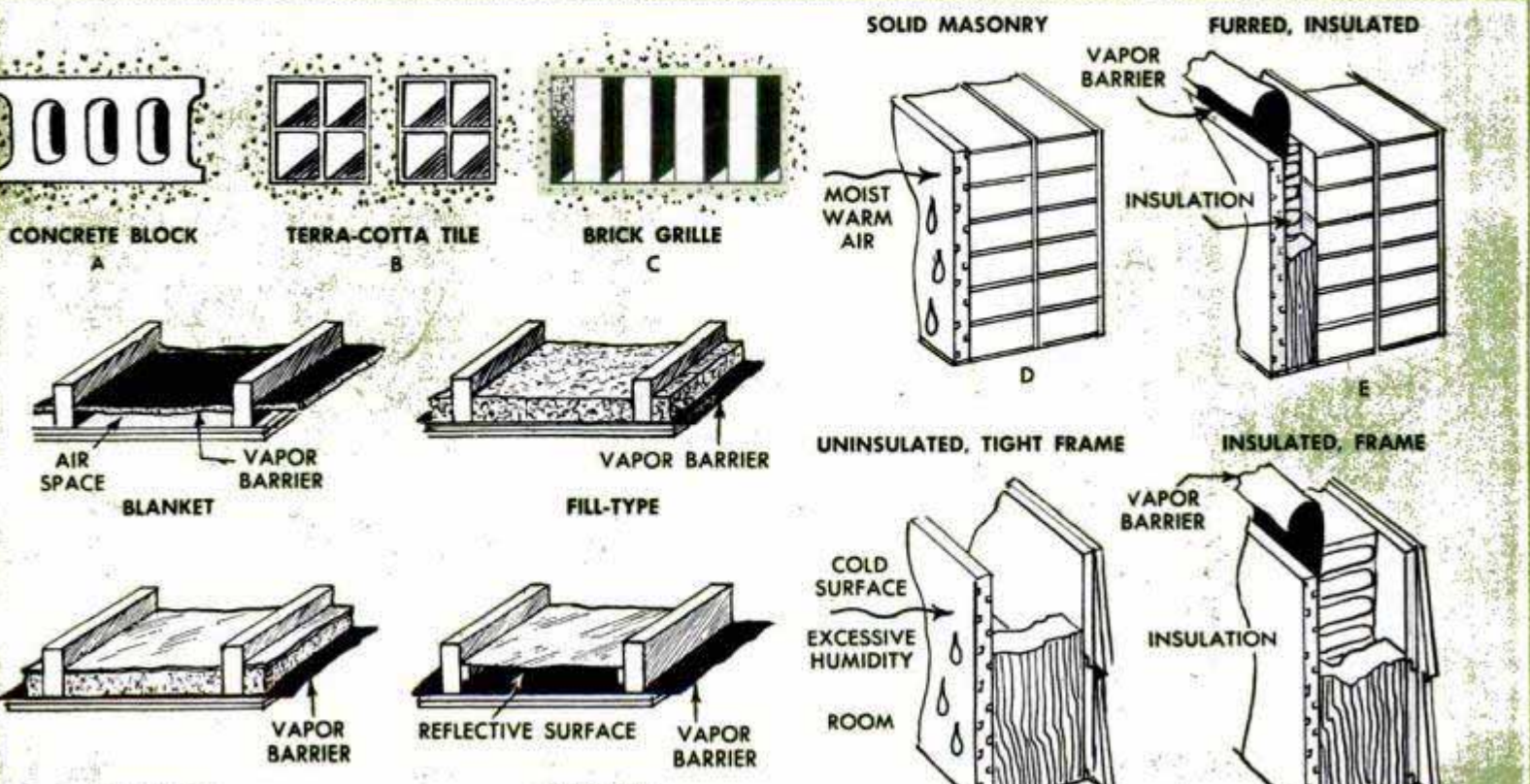
WHEELED BASKET for LEAF DISPOSAL

By Ed Packer

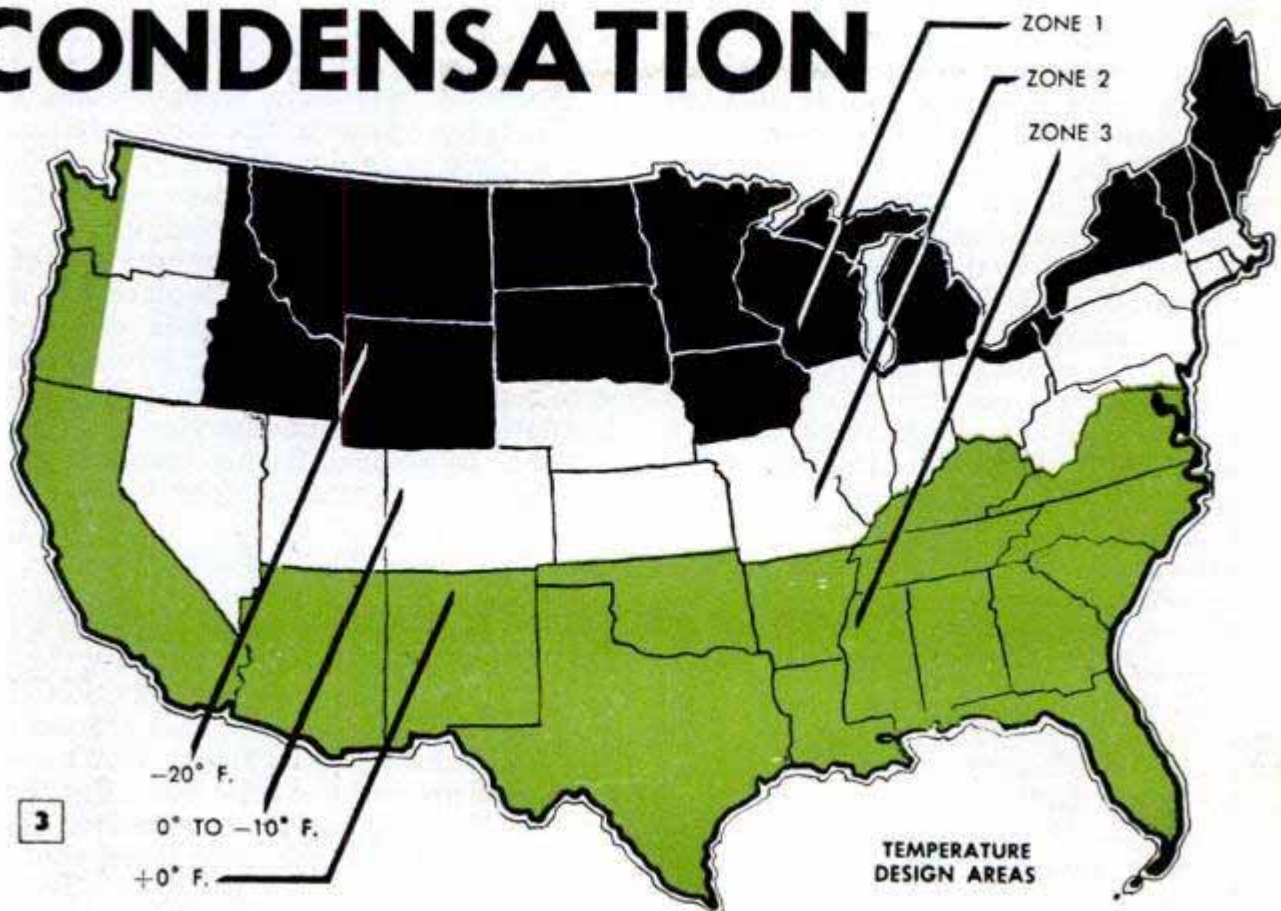
THIS COLLAPSIBLE wheeled basket helps solve the perennial problem of leaf disposal and at the same time saves a lot of extra work, as you can quickly gather leaves from a large lawn and wheel them to a central point for burning or composting. The basket has a capacity of about 20 bu. and collapses flat for storage. The sides, ends and bottom are built as separate

frames and covered with $\frac{1}{2}$ -in.-mesh hardware cloth. Details below give the dimensions and show how the frames are made and then braced. When setting up the rack, the sides are fastened to the bottom frame with bolts and wing nuts, and endpieces are joined to the sides with slotted flat steel latches and screws. Use wheels with semi-pneumatic tires to avoid damaging the lawn.





What To Do About CONDENSATION



By Stanley Schuler

IF YOU LIVE in an insulated home, either new or old, you may have a moisture-condensation problem and not be aware of it. In some homes the damage caused by condensation may never become excessive and may affect only comparatively small areas in the house, but condensation becomes a real problem for the homeowner when it occurs on or within the walls and ceilings of the structure. The end results are certain to be water spots on the room side of the wall, peeling paint and, eventually, badly rotted framing members such as sills, studding, joists, plates and roof boards.

All air contains moisture in the form of water vapor, which ordinarily is invisible. When this vapor comes in contact with a cold surface, it condenses and forms tiny water drops or frost, depending on the temperature of the surface. The tendency of moisture-laden air to move to drier (lower pressure) areas generates what is known as vapor pressure. It is this pressure that forces moisture from a warm room through the walls of the house to the drier, colder air outside the walls. In uninsulated walls, the building materials are kept warm enough by continual heat loss to prevent condensation of moisture within the wall. That's why owners of older, un-

insulated frame houses seldom experience condensation trouble. In newer homes, built at the time when walls were insulated without vapor barriers, insulating materials prevented heat loss through the walls but did not eliminate the passage of moisture-laden air from inside the house. As a result, the space between inner and outer surfaces of the wall becomes very cold in severe winter weather. At some point within the wall the temperature of the air falls below the dew point and the moisture condenses. That's when the trouble begins.

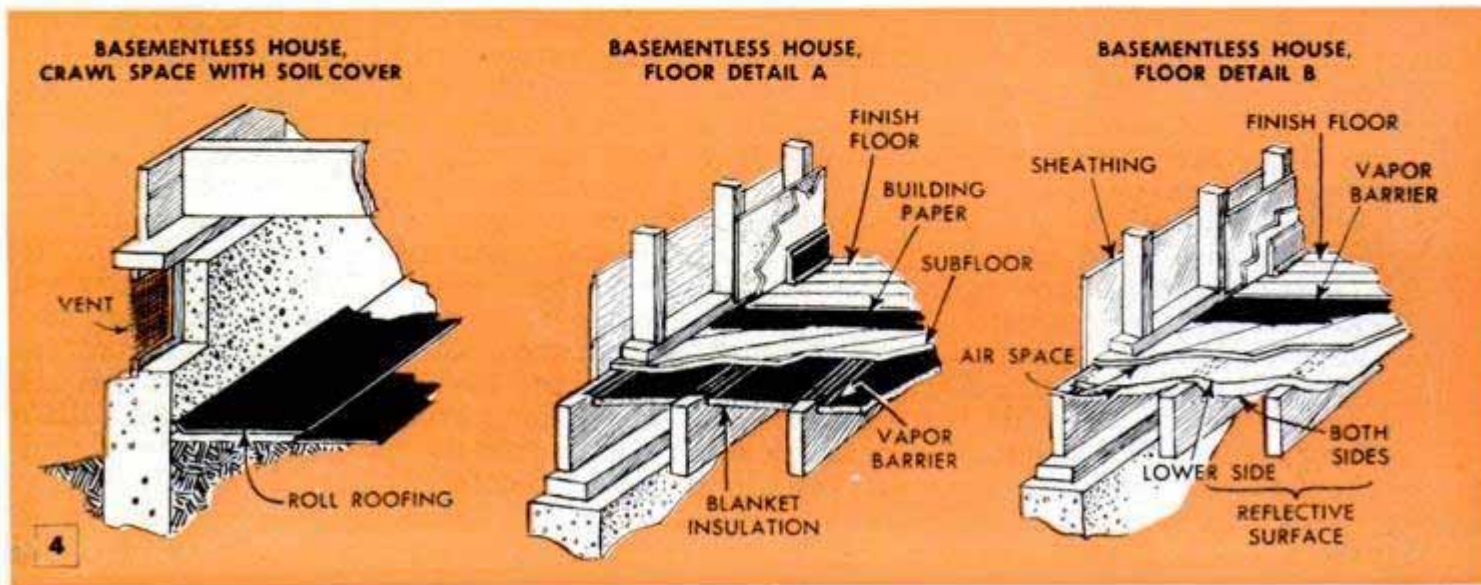
While this brief outline of the basic cause of condensation is not all-inclusive, it does suggest some of the cures for this condition and certain steps that can be taken to control the generation of excessive amounts of water vapor at the source. The cutaway view of the typical 1½-story house in Fig. 1 shows some of the principal sources of water vapor in the average home. Note that the direction of the green arrows indicates an almost vertical travel of vapor from such common sources as the laundry, sink and dishwasher, gas stove and bath. Here, for purposes of illustration, it is assumed that the home is uninsulated and is covered with wooden shingles. In this case, although vapor pressure is more or less constant in all directions, the course of the

warm air will be generally upward through the ceilings and roof as well as through the walls. Snow will melt quickly from the roof area exclusive of the roof overhang at the cornices and over the dormers. This means that both heat and moisture-laden air are passing directly through the ceilings and roof. If the house has a composition shingle roof, heat will still pass through, but more of the green arrows would follow a horizontal course to the walls, as the composition roof is a fairly effective vapor barrier. Add insulation of the blow-in, or fill type, and the arrows would still follow much the same course through walls and ceilings. But add a vapor barrier, either a separate membrane or one attached to the insulation batts or blankets, and the arrows would turn back at the ceilings and walls. That's the answer to the condensation problem in modern homes.

Of course, there are other related factors. For example, in newer homes having no basement there is the problem of condensation on the joists and underside of the floor over a crawl space. Frequently, moisture generated in the crawl space will find its way upward through the walls and into the low attic, forming a damaging condensate in these areas of the building. One remedy is to provide adequate ventilation under the floor by means of openings formed by concrete blocks set sidewise in the foundation wall as at A in Fig. 2, or terra-cotta tile or bricks placed as in details B and C. Ordinarily, vents formed in this manner are placed near the corners of the foundation, rather than at the center. In this way adequate cross-circulation of air will be assured. In some cases, it will help to cover the ground inside the foundation walls with roll roofing laid with 4-in. lapped and cemented joints, as in Fig. 4. Then the underside of the floor should be insulated by either of the methods detailed in Fig. 4, A and B. In older, uninsulated homes

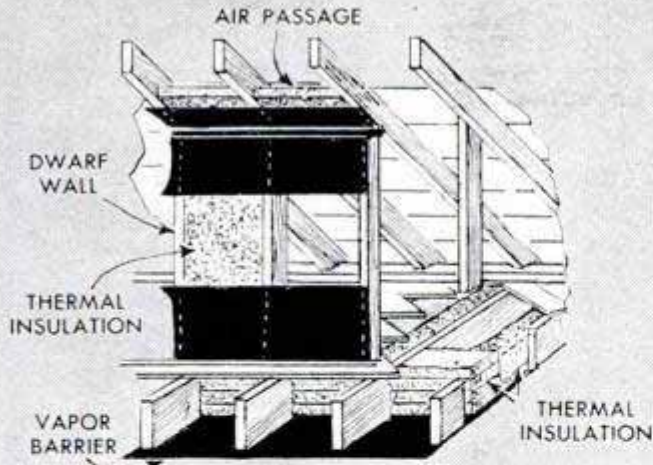
of masonry or of tight, frame construction, and especially those with inadequate heating systems, trouble often is experienced with condensate forming in upstairs rooms, generally on the walls on the coldest side of the house. Here the walls become very cold and the vapor in the air condenses on the surface as in details D and F in Fig. 2. Often this trouble can be overcome, at least temporarily, by providing additional heating facilities to raise the temperature of the air in the rooms and thus indirectly warming the walls. Where the walls are of solid masonry, the permanent remedy, of course, is to replaster the walls over furring strips, insulation and a vapor barrier as in Fig. 2, detail E. In walls of frame construction, install insulation and a vapor barrier as in Fig. 2, detail G.

In any case, to be fully effective, the vapor barrier must be continuous and unbroken over walls, ceilings, and also where used under floors. When applying the barrier in either old or new construction, don't fail to make an adequate seal around ceiling and wall-light fixtures. Don't forget the space around the attic door, Fig. 7, and be sure that the barrier is correctly placed at the junction of the attic floor, roof and side wall, Figs. 5 and 8. Be especially careful when installing membrane-type barriers at the junction of dwarf walls with the attic floor and roof rafters, Fig. 5. Other precautions to be taken when building or remodeling are detailed in Figs. 6 and 8. Frequently, in newer homes with low attics, damp spots will appear on the ceilings for no apparent reason. These spots, which usually show on the north side of the building and near the wall, often are attributed to condensation, when actually the cause is an ice dam on the roof over the cornice as in the right-hand detail, Fig. 6. Water from snow melting on the roof at a higher level seeps downward to a point over the inner edge of the cornice and just over the plate,

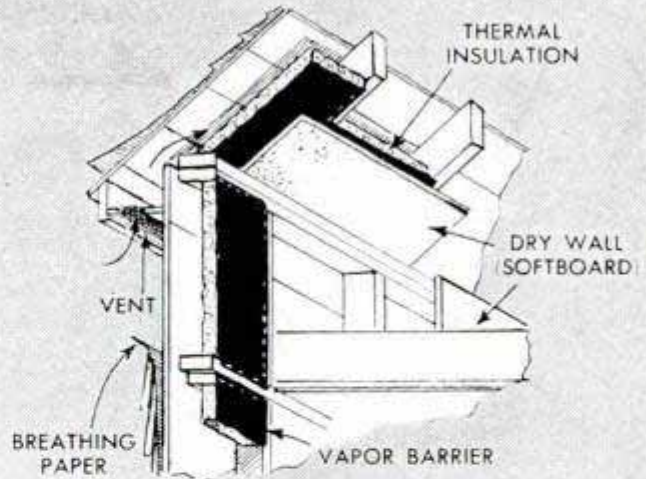


5

JUNCTION OF DWARF WALL, FLOOR AND ROOF

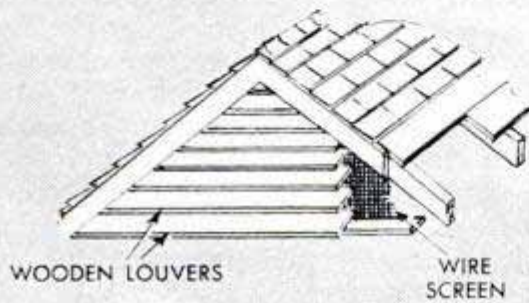


JUNCTION OF ATTIC FLOOR, ROOF AND SIDE WALL

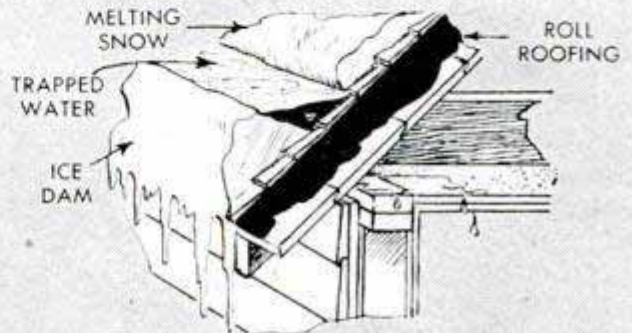


6

LOUVER-TYPE GABLE VENTILATOR

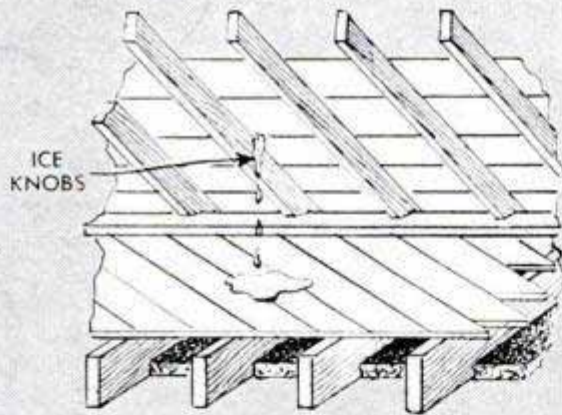


ICE DAMS AT EAVES CAUSE LEAKS

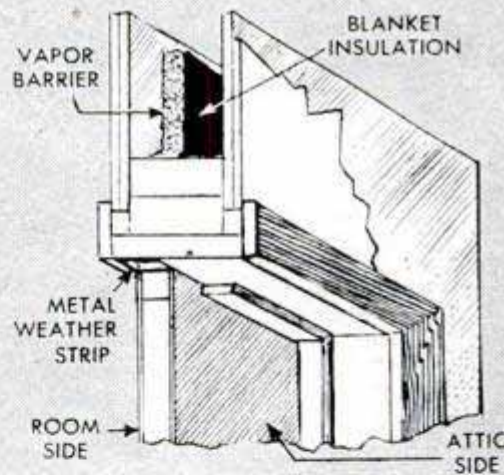


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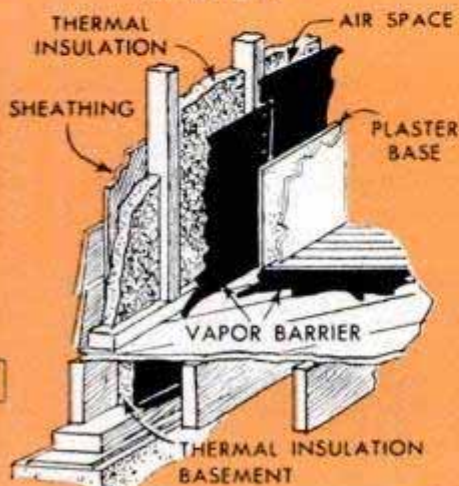
ICE KNOBS FORM ON PROTRUDING NAILS



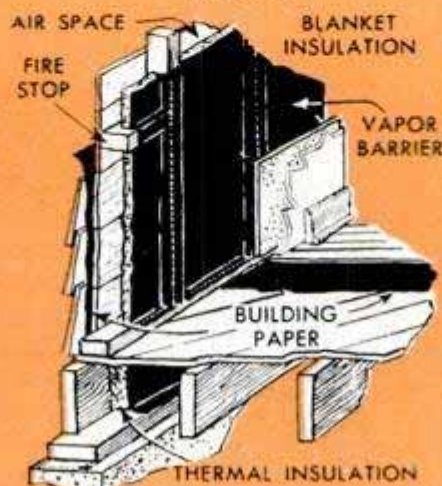
WEATHER-STRIPPING DOOR TO UNHEATED ATTIC



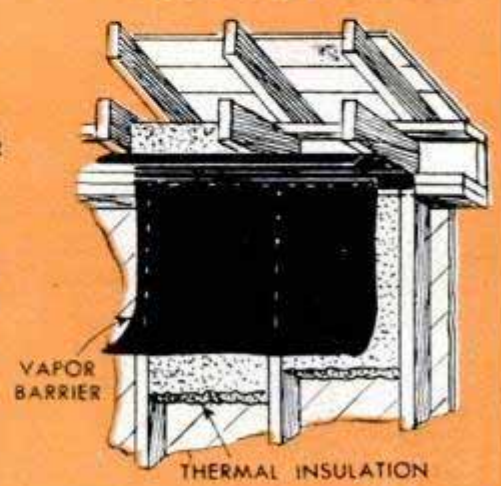
SIDE-WALL CONSTRUCTION, FIRST FLOOR

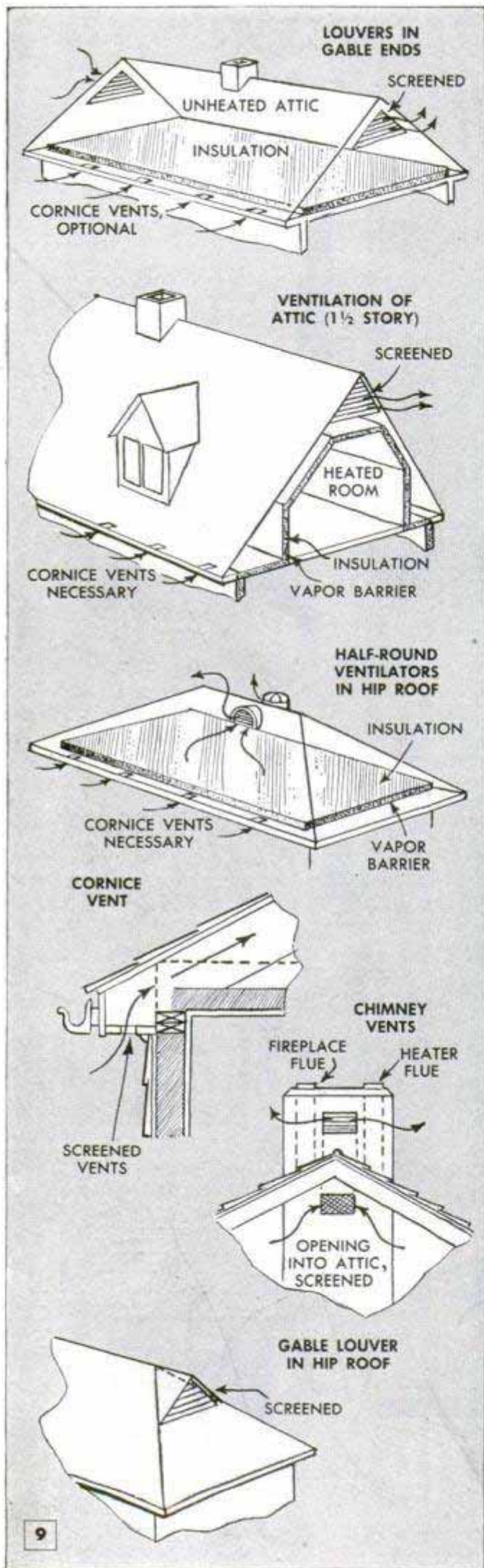


SIDE-WALL, FIRST-FLOOR FIRE STOP



JUNCTION OF ATTIC FLOOR, ROOF AND SIDE WALL





where it freezes, forming a dam. During mild winter days water will be trapped above the dam in considerable quantity and may seep back underneath the shingles to the roof boards, through which it drops onto the plaster or insulation. The remedy is shown in the sketch. Simply place one or two widths of roll roofing under the shingles so that the upper edge of the roofing extends 18 to 24 in. above the plate. Another cause of trouble is presented by long nails driven through the roof boards or shingles so that they project into the attic. The nails are better conductors of heat than wood, and as a result, they become the coldest surfaces in the attic during severe winter weather. Frequently, due to the presence of excessive amounts of water vapor, large ice knobs form on the nails as in the left-hand detail in Fig. 7. When these knobs melt during mild weather they are a source of mysterious leaks into the rooms below. Probably the simplest remedy is to clip the nails off close to the boards, but inasmuch as the basic cause is the presence of excessive moisture in the attic, the permanent remedy is to control the generation of water vapor at the source.

Although ventilation is not a cure for condensation, it does provide the homeowner with a means of controlling excessive humidity, at least to a certain extent. Provision for proper ventilation of an attic is essential, and a cold-air duct with an outside air intake permits drier air to be introduced through the warm-air heating system. Tests have shown that approximately 40 percent of the moisture liberated in the preparation of meals over a period of one week is contributed by the cooking process. The remainder, roughly 60 percent, is liberated by the combustion of gas in a gas-burning range. Many homeowners have found that a kitchen ventilating fan, operated at regular intervals, effectively prevents an excessive concentration of water vapor from this source. Much can be accomplished simply by keeping cooking utensils and the washing machine, dishwasher and the clothes drier covered when in use. It also should be kept in mind that the furnace humidifier, the shower bath, unvented gas-burning space heaters and clothes drying in the basement contribute to the high humidity in modern homes of tight construction. These sources of water vapor can be controlled and, in some cases, eliminated entirely by simple measures carefully carried out. Usually, it is possible to vent a gas-burning space heater and a clothes drier. Shut off the furnace humidifier during mild weather when the cycle of operation lengthens. In some cases, it is possible to eliminate the

humidifier entirely when a gas-burning range is used in the preparation of food. The same would be true of evaporating pans on hot-water or steam radiators. In some homes, particularly in bathrooms, basements and upstairs bedrooms, window-mounted exhaust fans can be used to advantage in minimizing condensation. The capacity of the fan should not exceed 300 cu. ft. of air per minute. If a fan is operated regularly in a home of tight construction, it may be found necessary to install at least one outside air intake near the floor. This will permit fresh air to be drawn in and will prevent possible back drafts through chimneys and ducts.

Ventilation of the attic by natural air movement is essential in most homes, even when ceilings and walls are properly insulated and provided with vapor barriers in any of the four ways detailed at the lower left in Fig. 2. Control of excess water vapor in both old and new homes by means of insulation, vapor barriers and ventilation is now conceded to be generally necessary in the three zones roughly outlined in the map of temperature design areas in Fig. 3. The temperatures given on the map are only approximations of the average winter low temperatures. Some recommendations specify these control measures in any areas where the average January temperature is 35 deg. F. or less. Adequate ventilation of the attic is an important part of these control measures, and the details in Fig. 9 show several approved methods of attic ventilation by means of louvers and screened cornice vents. This is especially true of certain types of homes where the construction makes it practically impossible to prevent a certain amount of water vapor from reaching the attic space. Where proper insulation and installation of vapor barriers eliminate moisture from the attic, ventilation is still necessary to remove excessive heat which accumulates during a hot summer day. In flat-roofed and shed-roofed homes, the problem and remedy are essentially the same: Install cornice vents and leave an air space between the insulation and roof boards to permit free circulation of air. On flat-roofed homes a mechanical ventilator usually is necessary, as air currents alone cannot be relied upon to force hot air out through cornice vents.

The cost of installing membrane-type vapor barriers in homes already built usually is prohibitive. However, ordinary oil-base interior paints are a fairly reliable substitute, provided they are applied over a tight, smooth surface. Before applying the paint, fill cracks with a putty made by mixing paint of the color to be used with a small quantity of whiting. Allow this filler to dry thoroughly before painting.

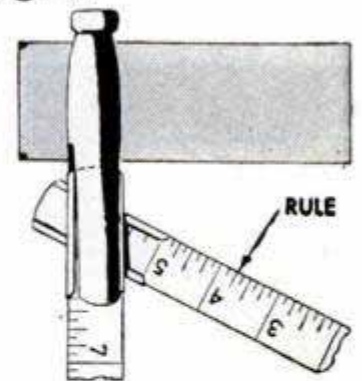
Cloth Padding Attached to Bench Prevents Scratching Furniture



A heavy piece of cloth, such as burlap, denim or a section of a floor rug, tacked at one end to the overhang of a workbench top, provides a convenient padding for furniture placed on the bench. When not in use, the cloth hangs in front of the bench where it is out of the way. When needed, it is merely placed over the bench top. The lower edge of the cloth is hemmed to take a wooden slat, which prevents the cloth from lying in folds on the bench.

Clothespin and Folding Rule Help Transfer Angles

When using his folding rule to transfer an angle — simply by folding two of the sections of the rule to the angle to be transferred — one craftsman guards against disturbing the setting by use of an ordinary clothespin.



After the angle is set, the clothespin is merely forced over the joint of the rule, or apex of the angle.

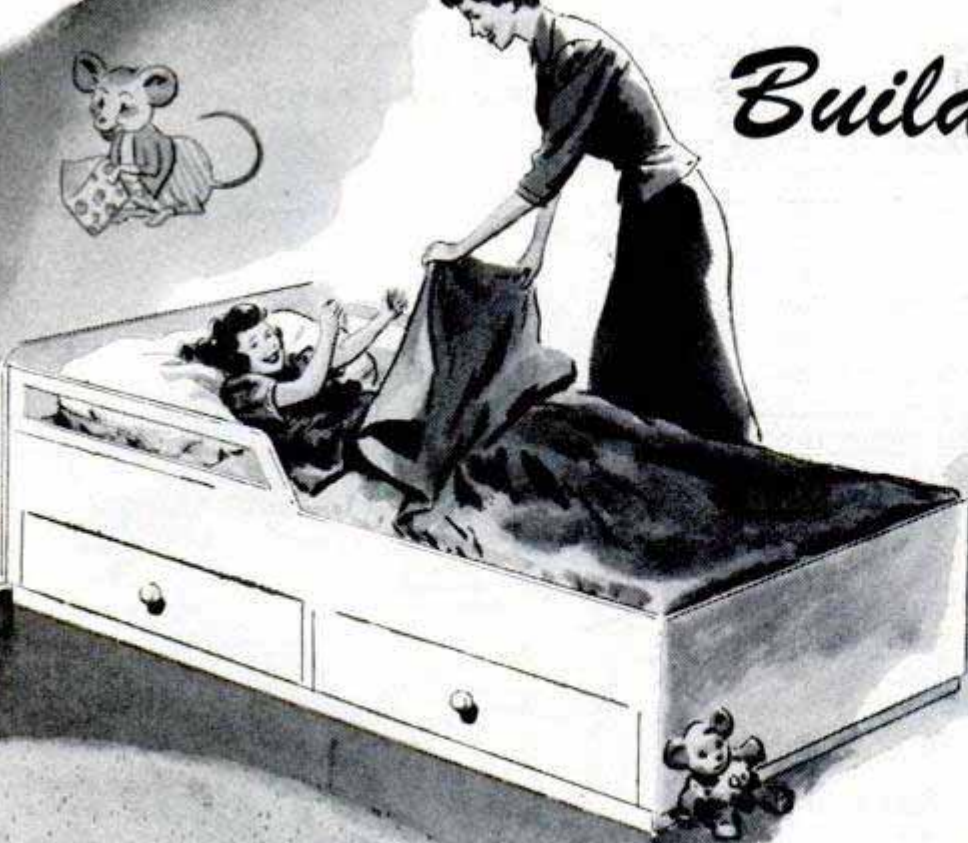
H. O. Schoenfisch, Mountainside, N. J.

☞ To find the cause of a smoky fireplace, notice whether it smokes intermittently or constantly. If the former, the cause is usually from faulty construction that results in permitting downdrafts, which are probably due to an excessively damp chimney.

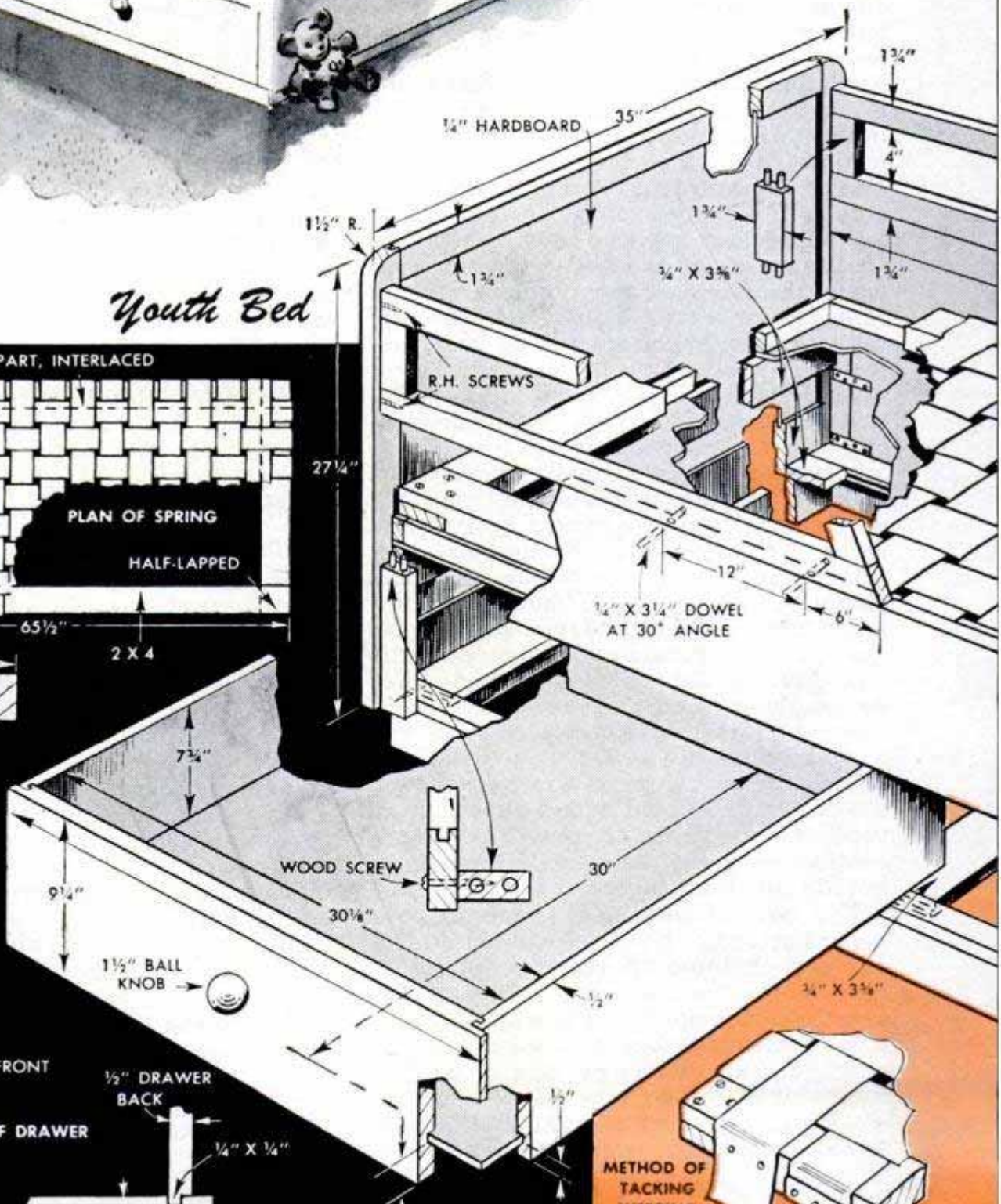
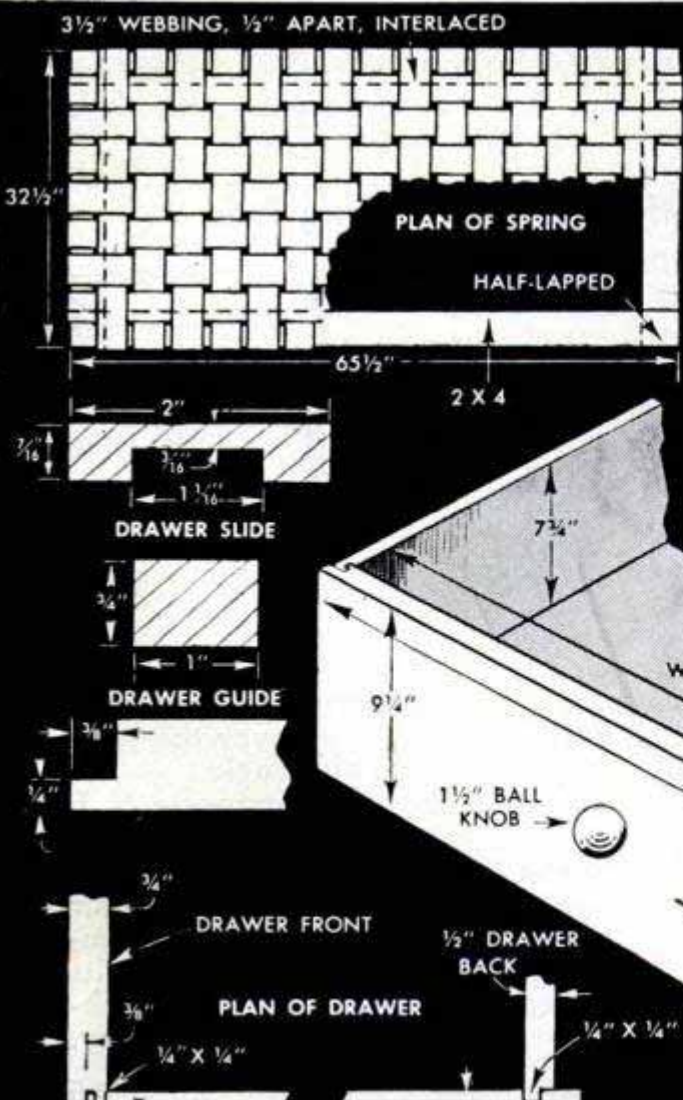


Build Your Own

Part III



Youth Bed



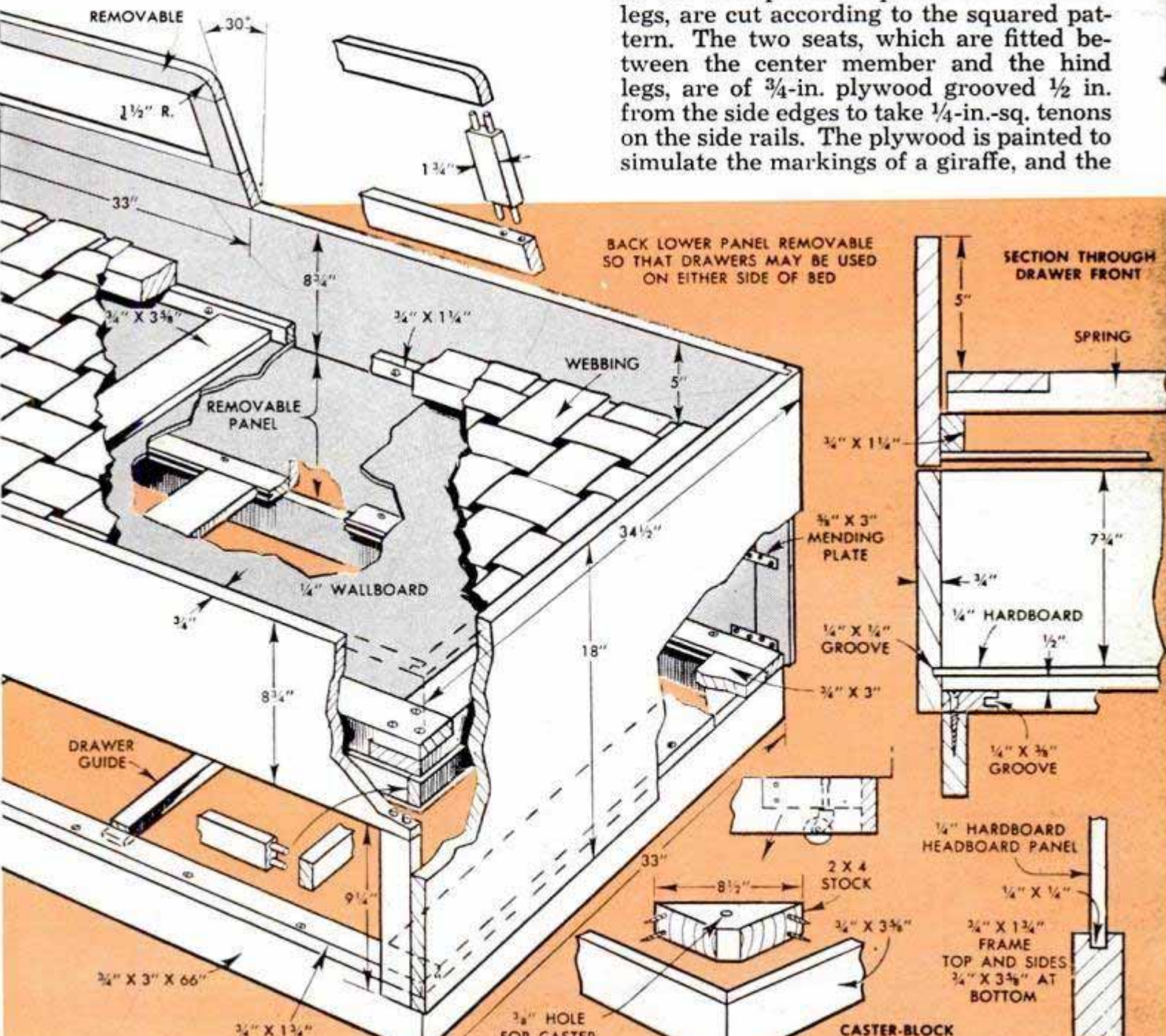
NURSERY FURNITURE

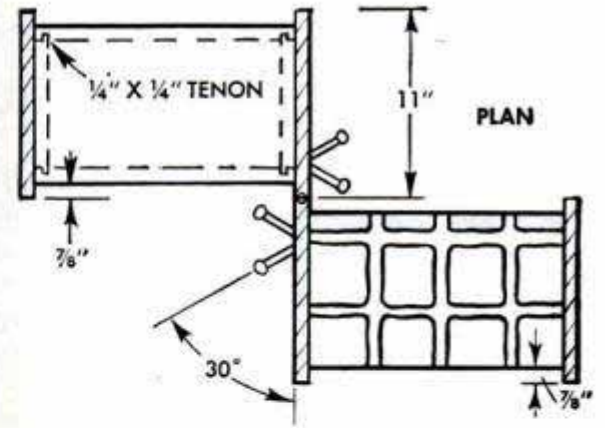
THE YOUTH BED and the giraffe lamp-costumer detailed on these pages complete the set of nursery furniture, description of which began in the July issue. The side rails, footboard and drawer fronts of the youth bed are of $\frac{3}{4}$ -in. plywood while the drawer sides and backpieces are of $\frac{1}{2}$ -in. plywood. The base of the bed, which is of $\frac{3}{4}$ x 3-in. stock, is mitered at the corners. Triangular-shaped blocks of 2 x 4 reinforce the corners of the base and also provide mounting blocks for casters. The side drawer rails, which run the length of the bed, are grooved to receive tenons cut on the front, back and center rails. The rails are assembled, together with the tenoned drawer guides, and screwed directly to the base.

A $9\frac{1}{4}$ -in. upright is screwed to the edge

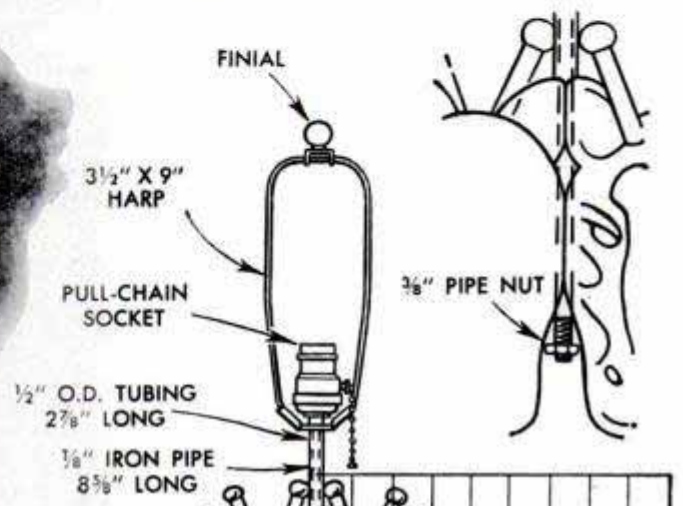
of the drawer frame at each corner of the bed and doweled and glued to the bottom edge of the side rails. The two drawers can be installed so they will open from either the right or left-hand side of the bed, the other side being enclosed with a panel of $\frac{3}{4}$ -in. plywood. This panel is fastened only with mending plates so it can be removed and replaced on the other side of the bed, should it be desired to reverse the drawer arrangement. Cleats are screwed to the inside of the bed on all four sides. These support the spring frame and also provide a nailing surface for a dust panel of $\frac{1}{4}$ -in. wallboard. The side cleats are notched for the ends of the center dust-panel support.

The center section of the giraffe lamp-costumer is cut from a single 22 x 42-in. sheet of $\frac{3}{4}$ -in. plywood. This sheet, as well as the two pieces required for the hind legs, are cut according to the squared pattern. The two seats, which are fitted between the center member and the hind legs, are of $\frac{3}{4}$ -in. plywood grooved $\frac{1}{2}$ in. from the side edges to take $\frac{1}{4}$ -in.-sq. tenons on the side rails. The plywood is painted to simulate the markings of a giraffe, and the



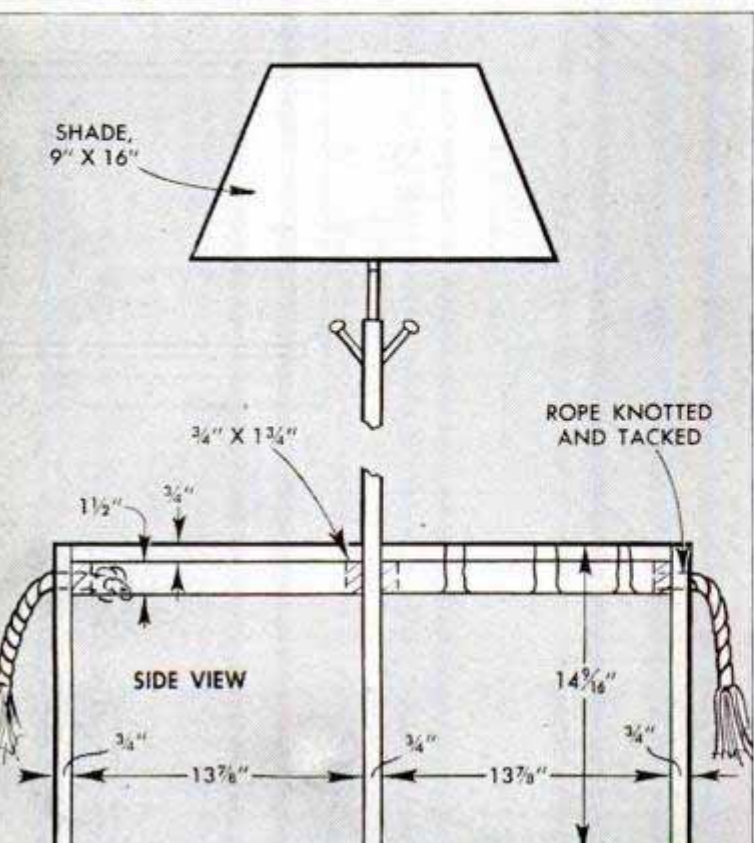
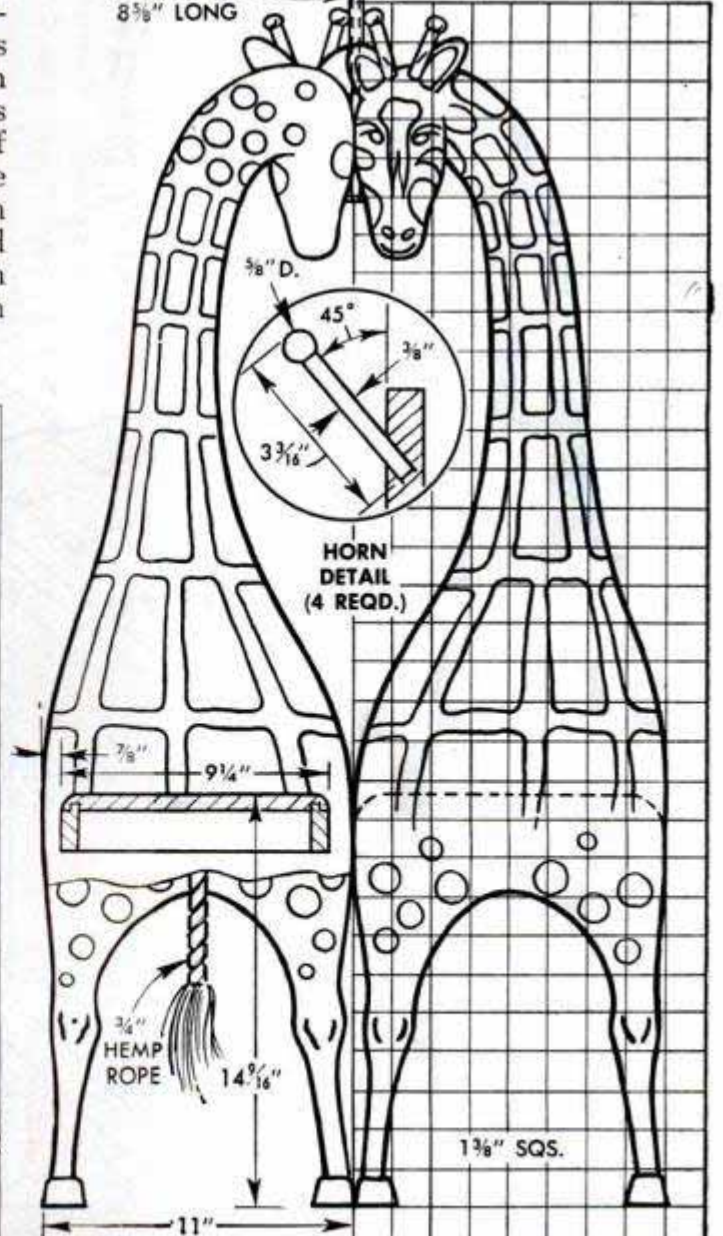


Giraffe Lamp-Costumer



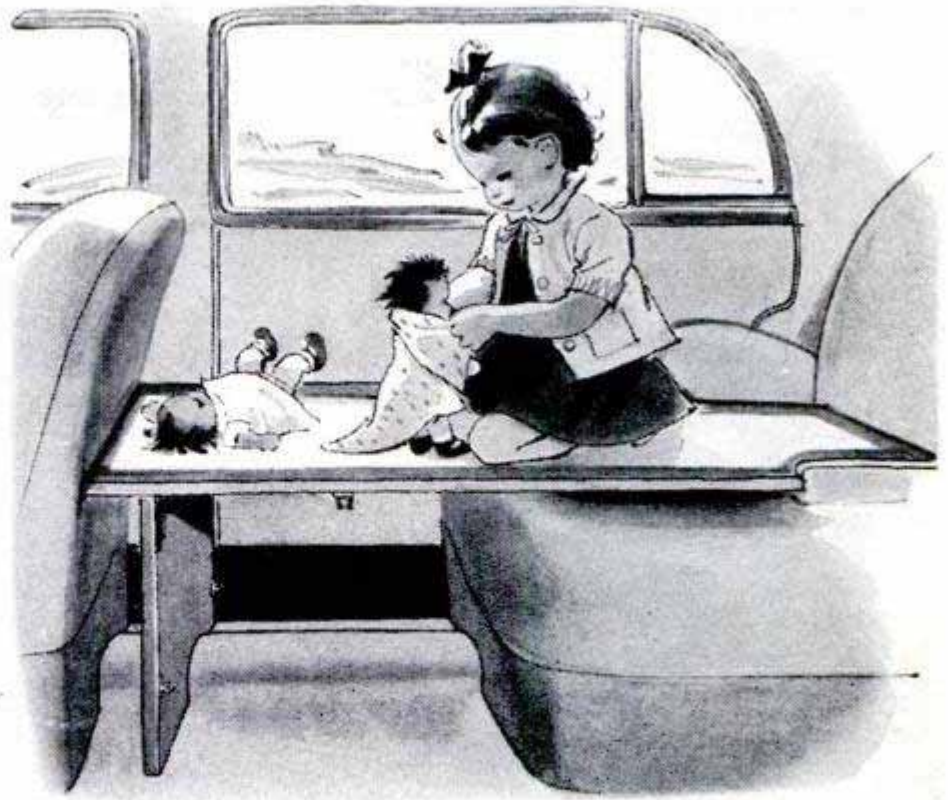
seat may be similarly painted or upholstered. Note that the center member is drilled vertically at the top to take a length of 1/8-in. iron electrical pipe which provides a standard for the lamp. A short length of tubing slipped over the upper portion of the pipe forms a spacer, and a nut turned on the bottom of the pipe holds the standard in place. The lamp cord is passed through the pipe and may be brought straight down or stapled to the edge of the cutout.

(The End)



Plywood Platform in Back Seat of Car Makes "Traveling Playpen" for Child

Provided with ample room for herself and her toys, a small child will enjoy her own "traveling playpen" in the back seat of the family car. Also, there is less possibility that the child will be injured if a sudden stop of the car is necessary. The playpen is nothing more than a panel of $\frac{1}{2}$ -in. plywood cut to fit between the front and rear seats as shown. One end is supported on a wide, folding leg and the other end rests on the rear-seat cushion, this end being cut to fit around the armrests. The leg also is made of plywood and is hinged to the underside of the panel. If desired, cabinet-door friction catches can be attached to the panel and leg to keep the latter folded when stored. After rounding all sharp edges of the platform and sanding it well, finish with sealer and apply two coats of spar varnish to guard against



warpage. Plastic upholstering material makes an easily cleaned padding for the platform, or an old blanket can be used for this purpose.

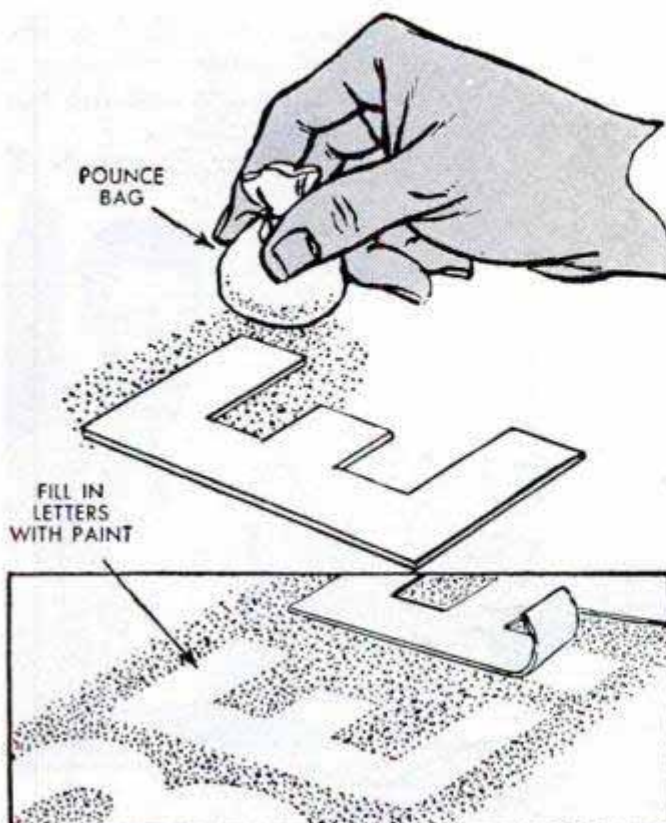
J. L. Bethurum, San Antonio, Tex.

Pounce Bag and Letter Patterns Used to Lay Out Signs

A Minnesota sign painter saves considerable time in making layouts by use of a pounce bag and cardboard patterns of letters. The pounce bag is a small, cloth sack, similar to a tobacco sack, which is about

half filled with talcum powder or powdered charcoal. Several fonts of various styles and sizes of letters are cut from thin cardboard and kept in stock. When making a layout, the desired letters are simply laid in position on the sign and dusted with the pounce bag, thus leaving an easily followed outline of the lettering.

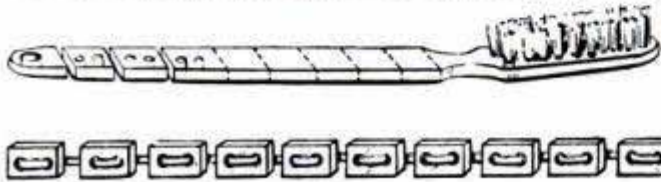
Elmer Vandrey, Truman, Minn.



Bushing Flush-Tank Ball Prevents Loosening

After unsuccessfully trying several methods of preventing the ball valve in his toilet flush tank from unscrewing from the rod that supports it, one homeowner bushed the valve with small pieces of rubber, which overcame the trouble. Several short sections were cut from an ordinary rubber band, and the pieces dropped into the threaded hole of the ball. Then the ball was screwed onto the supporting rod. The small pieces of rubber provided sufficient pressure on the threads to prevent the ball from loosening, yet were resilient enough to permit the ball to be screwed onto the rod easily. Being unaffected by water, the rubber will last indefinitely. However, if exposed to oil, it would rot away in time.

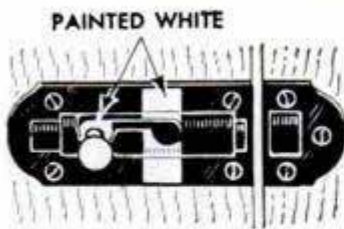
Colorful Jewelry for Children From Plastic Brush Handles



Discarded toothbrushes, or other brushes having plastic handles, can be used to make colorful belts, bracelets or necklaces for little girls. Cut the handles into sections and drill each section as indicated. Then give the sections and a length of cord to the child and let her thread them to make what she wishes.

Fred Cornelius, El Paso, Tex.

White Stripe Painted on Bolt Lock Tells If Door Is Locked



By painting a white, phosphorescent stripe across bolt-type locks, in the manner shown, you can tell from a distance, either in daylight or dark,

if the bolts are open or closed. Note that the stripe is painted across the width of the lock at the point where the bolt handle is located when fully closed. When the painted handle is out of line with the rest of the painted portion, it is easy to see that the bolt is open.—R. Galluzzo, Chicago.

Improved Soft-Faced Hammer

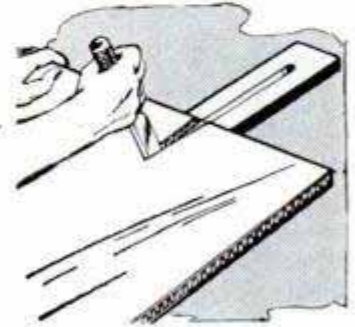
A handy, soft-faced hammer for removing dents from sheet metal and for light forming and planishing operations can be improvised by fitting an ordinary tack hammer with a rubber tip cut from a medicine-

dropper bulb. Cut the rubber tip squarely off at a point about halfway from the rounded end. Then press a small pledget of cotton into the rounded tip to form a cushion and force the tip over the small poll of the hammer. If necessary, use adhesive or cellulose tape to hold the rubber tip firmly in place on the hammer.

John J. Rea, Urbana, Ill.

Yardstick's Usefulness Increased By Slot to Direct Straight Cuts

A guide for making straight cuts in corrugated cardboard can be provided by sawing a narrow slot down the center of a yardstick. The slot in no way impairs the regular use of the stick and, when



placed under or over a sheet of cardboard, provides a straight channel through which a knife blade can be directed.

Lazy Susan and Corrugated Box Speed Drying of Fishline

To dry a fishline quickly and easily, try winding it around a cardboard box taped to the top of a Lazy Susan. Start the line on the box and then rotate the turntable to unwind the line from the reel, holding the reel so that the turns of line will lay side by side on the box. When the line has dried, just "reel it in." A similar setup can be used for rolling yarn into a ball. The hank of yarn is slipped over the box and several thicknesses of folded newspaper are inserted between the yarn and the box to provide the necessary tension.

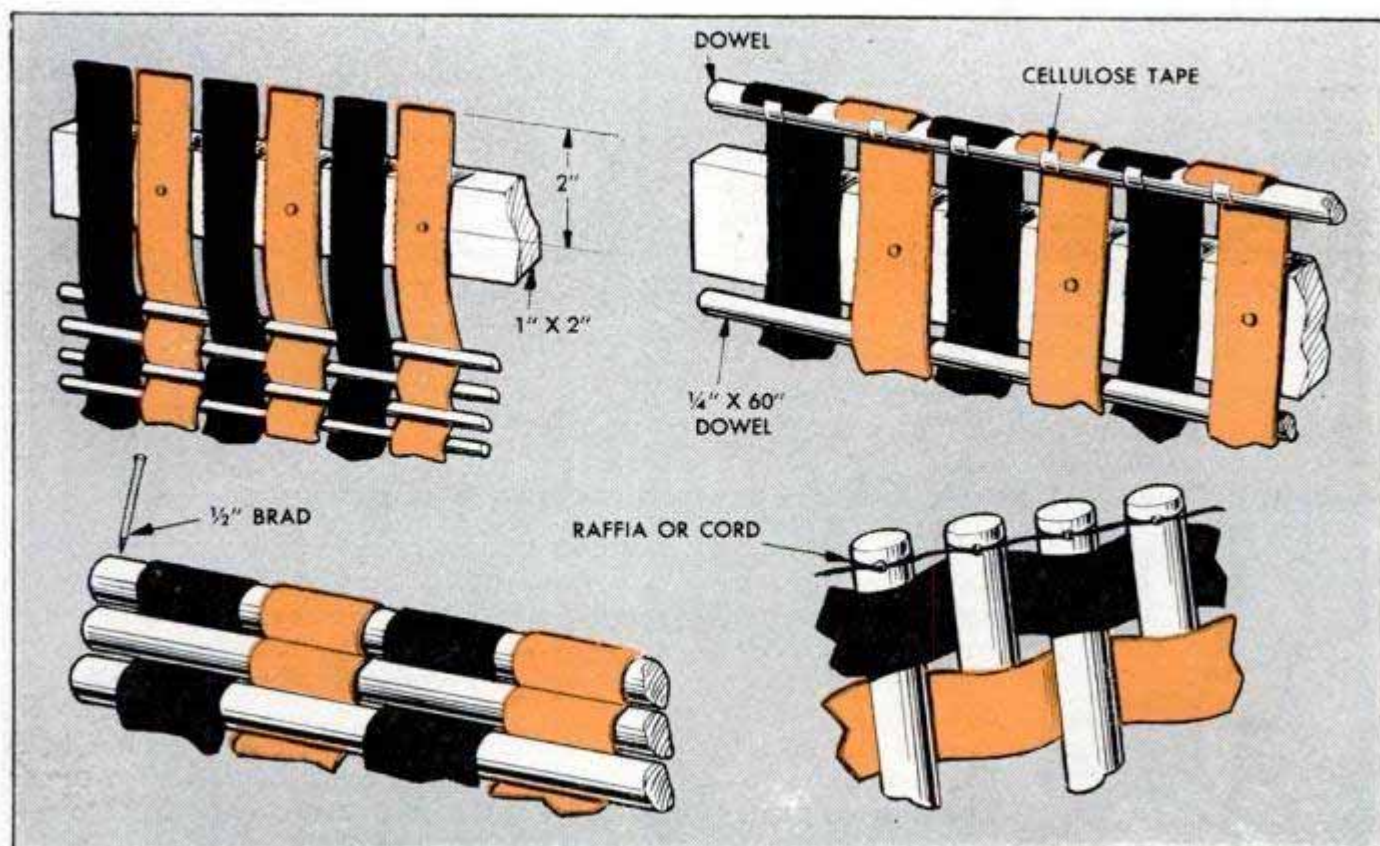
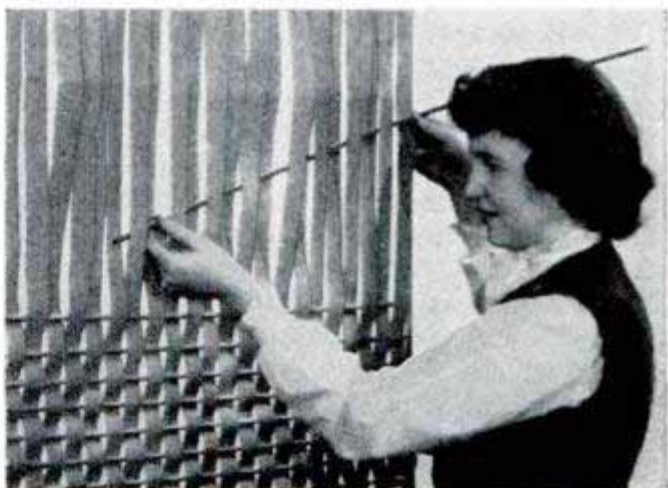
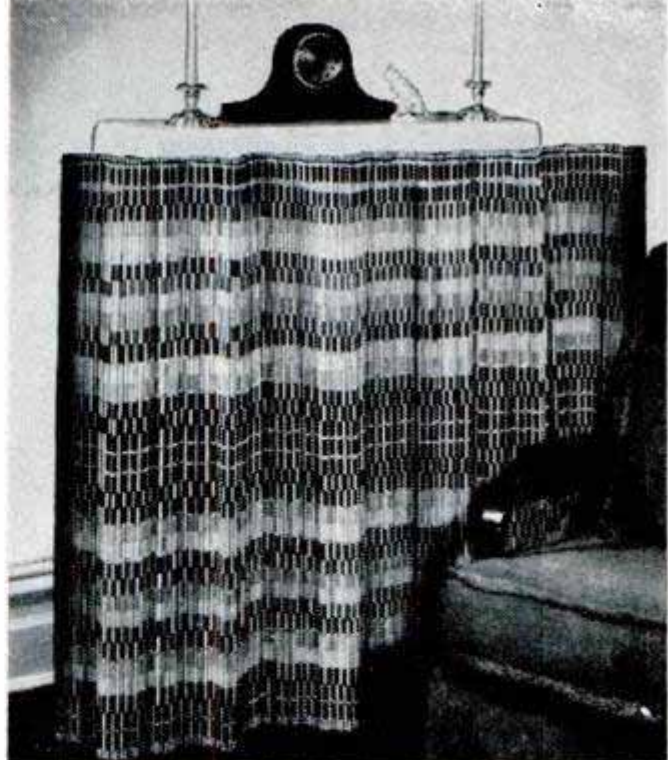
David S. Hogmer, Bronx, N. Y.

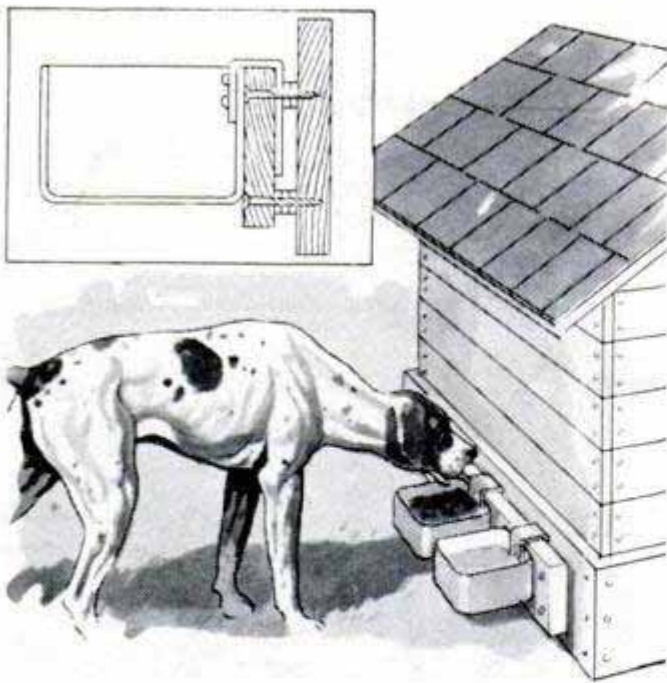


WOVEN SCREEN

By Allan Carpenter

HERE'S SOMETHING distinctively new in weaving—an unusually attractive and colorful folding screen woven entirely without a loom from materials you can obtain almost anywhere. Hardwood dowels, which form the woof in this type of weaving, are woven through a fixed warp consisting of alternate strips of upholstery webbing, carpet tape and gold braid arranged in harmonizing color combinations. In the screen pictured at the right, $\frac{1}{4}$ x 60-in. dowels were used. In preparing the warp, select alternate strips of equal length and tack them to a strip of wood as in the upper left-hand detail. Tack the lower ends to a strip of the same length, then hang from the wall, or a frame, with the warp strips in the vertical position. Weave the dowels through the warp strips in a simple, over-and-under basket weave as pictured in the photo at the right. As the weaving progresses from the bottom upward, keep the dowels pressed tightly down on the warp. When the job is finished, tape the ends of the warp strips to a dowel at the top and bottom as in the upper right-hand detail. Now, after removing the wooden strips at the ends, roll these dowels inward against the first and last dowels of the roof as in the lower left-hand detail. Fasten with brads or tape as shown. Tie the ends of the dowels with raffia or colored cord to hold the warp in place as in the lower right-hand detail.





Spillproof Dog-Feeding Pans Supported by Special Rail

To provide your dog with food and water pans that he cannot tip over, obtain cooking pans having vertical sides and long handles of the type found on dippers. Bend the handles to fit over a wooden rail screwed to the base of the doghouse as shown. Note that washers are placed over the screws so that enough clearance for the handles will be left between the rail and the doghouse.

George Kapitan, Bronx, N. Y.

Trimming Worn Shaving Brush Adapts It for Stenciling

A worn shaving brush can be made into an ideal brush for stenciling. Just trim the bristles square about 1 in. from the handle, leaving them stiff and even to provide a blunt inking surface.

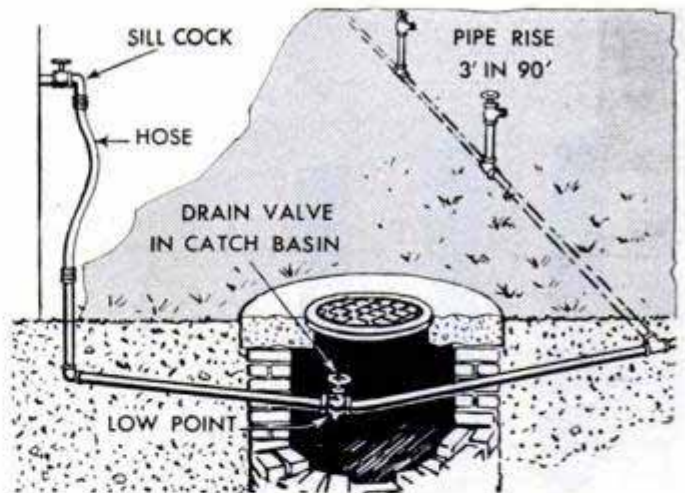


Servicing Cigarette Lighters

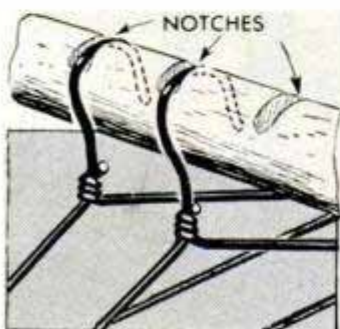
When your cigarette lighter begins to misfire and at best sparks only weakly, it's likely that the wheel needs cleaning. To do this, scrape the accumulated grit and dirt from the grooves of the wheel with the point of a pin or needle and then brush vigorously with an old toothbrush. In time, the follower spring which maintains pressure on the flint becomes weakened by corrosion and rust and should be replaced. Action of the follower spring often can be improved, at least temporarily, by fitting the head of a pin into the forward end of the spring. Cut the body of the pin about $\frac{1}{4}$ in. below the head and insert in the open end of the spring. This will increase the pressure on the flint.

Nonfreezing Sprinkling System Drains Into Catch Basin

While underground lawn-sprinkling systems save a lot of work, it is difficult to keep them from freezing in the winter. However, a system such as the one illustrated is equipped with a valve that permits draining the water from the entire system into a catch basin. This is made possible by laying the pipe on a rise of approximately 3 ft. in 90 ft. and locating the drain at the low point in the line. If there is no catch basin in your yard, a small one can be built by digging a hole of suitable depth, filling it about a third of the way with crushed rock and walling the upper portion of the hole with brick.



Notched Clothes-Hanger Rod Prevents Bunching of Garments

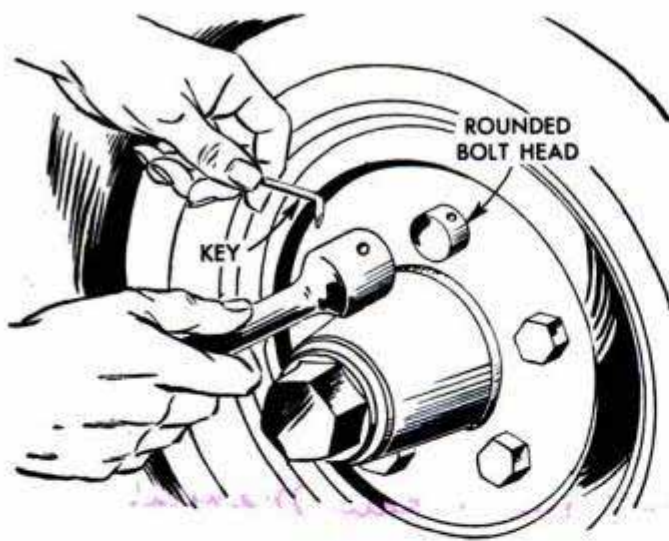


Clothes hung on hangers can be kept from "bunching up" on the hanger rod by cutting equally spaced notches in the top of the rod. Thus, when placed in the notches, the

hangers will not slide on the rod and clothes will be kept in neat order. However, do not cut the notches deep enough to weaken the rod when heavily loaded.

Thomas Trail, Catonsville, Md.

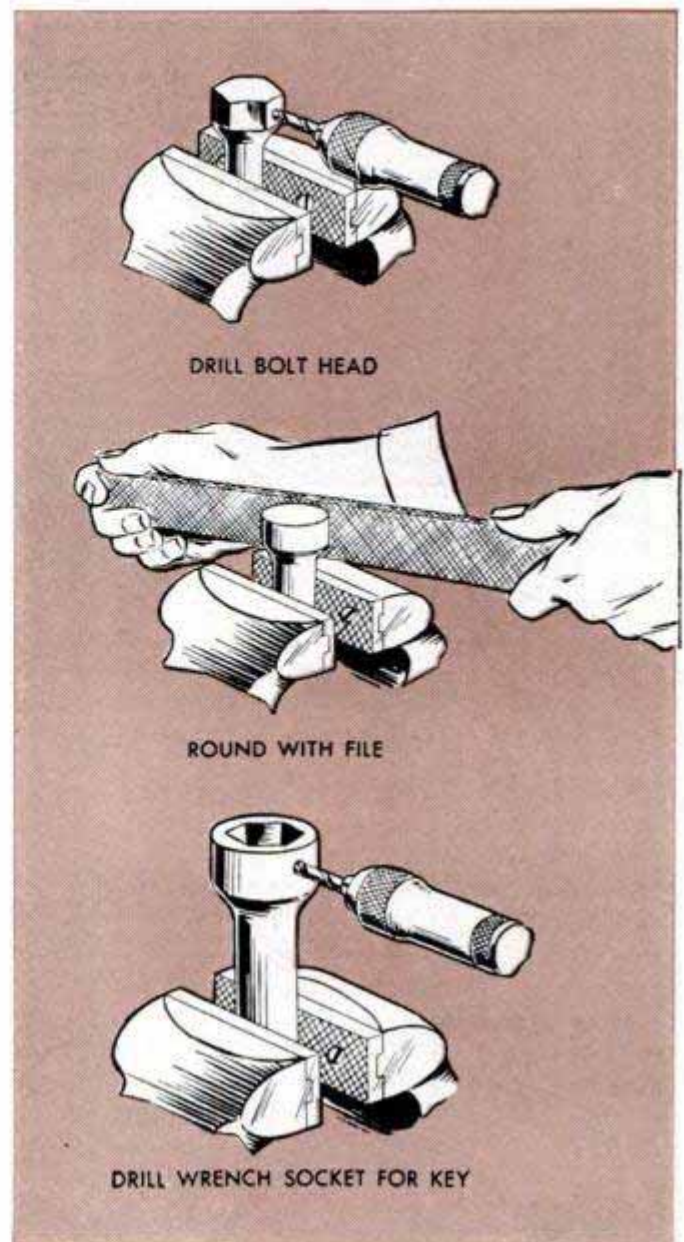
By joining a light bulb and socket with wrappings of cellulose tape at the top of the socket, you can prevent young children from removing the bulb.



THEFTPROOFING *your car wheels*

By M. A. Patrick

PREVENTING the theft of car wheels and tires can be done without adding locks or other parts simply by rounding the hex head of one bolt in each wheel hub and altering the regular socket wrench supplied with the car tool kit. Details above and at the right show clearly how it's done. Pry off the hub caps and remove one bolt from each wheel. Then drill a hole in the bolt head as in the upper right-hand detail, drilling a little over halfway through the head. The hole should be of a size that will take the end of a 20d nail freely. Now file off the corners of the hex head as in the center detail, and round the head sufficiently so that no socket wrench of that bolt size will hold at any point. Finally, drill a hole through one side of the wrench socket as in the lower detail, the hole being of the same size as that drilled in the bolt head.

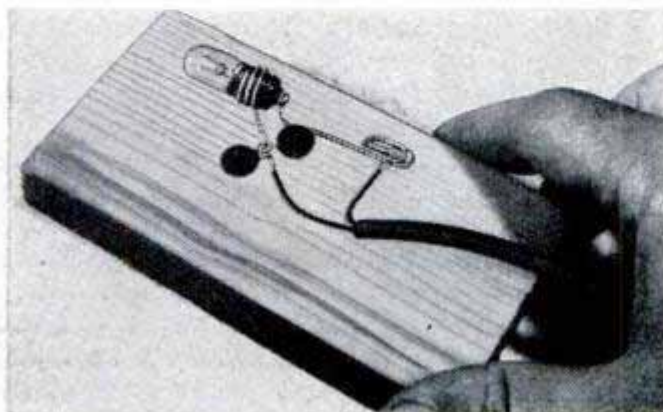


Bend the nail at right angles at a point about $\frac{1}{2}$ in. from the end. Then turn the altered bolt back into the hub, running it up finger-tight. Place the wrench socket over the head and register the holes. Then insert the nail and tighten the bolt.

Socket for Small Light Bulb Made From Paper Clips

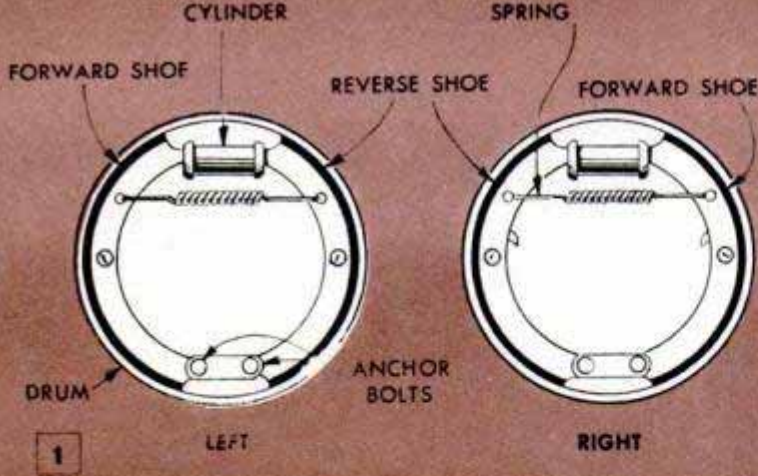
In low-voltage experimental work where a small test lamp might be needed and a midget-base socket is not at hand, one can be improvised quickly by using two com-

mon paper clips and a couple of thumbtacks. Both wire clips are straightened and the end of one is wrapped around the threaded base of the bulb to form a coil that will engage the threads. About $\frac{1}{2}$ in. below the coil, the clip is bent at a right angle and anchored with a tack. Then a small loop is bent into the end of the second clip and it is bent and anchored in such a position that the loop will be held against the contact point at the base of the bulb. Connections from either dry cell or transformer are made by merely twisting the wires to the paper clips or securing them with a drop of solder. These paper-clip sockets also are ideal for wiring a dollhouse.

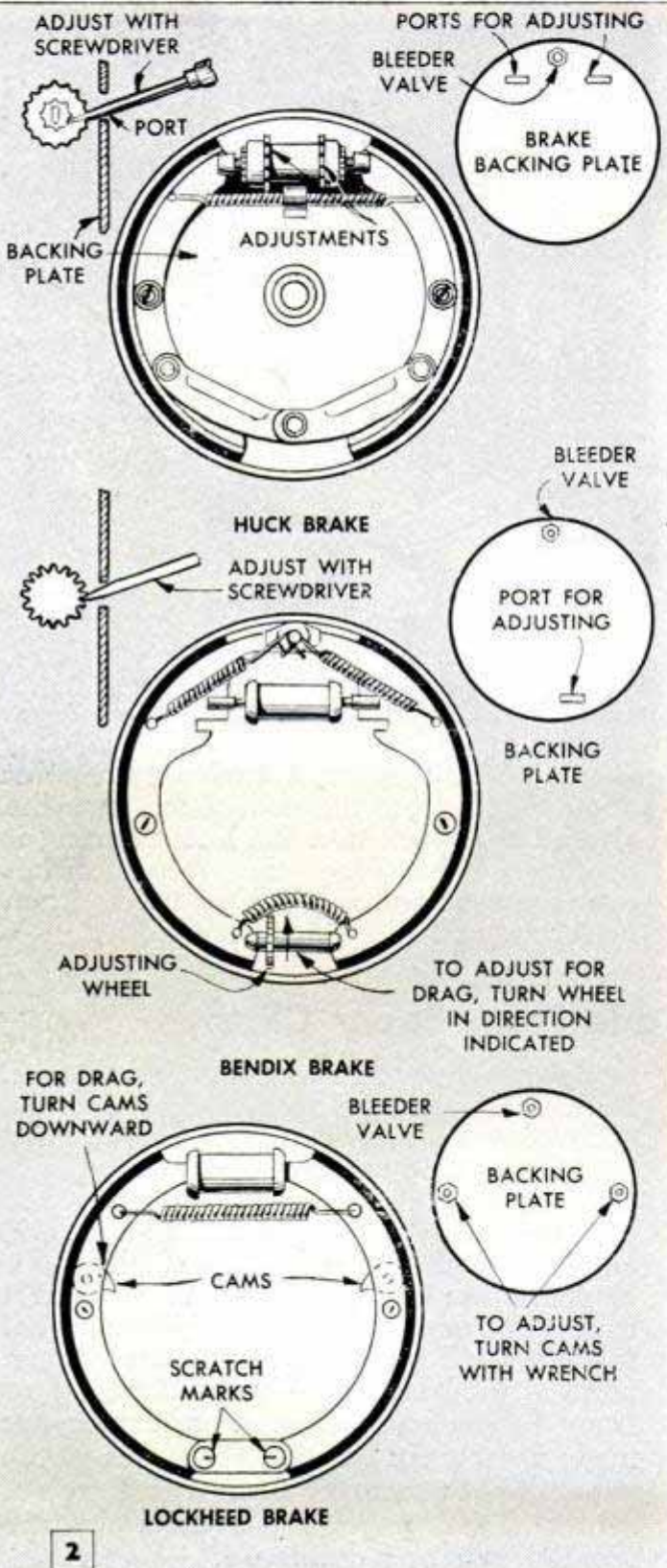


Louis Hochman, Sherman Oaks, Calif.

RELINE *your* BRAKES



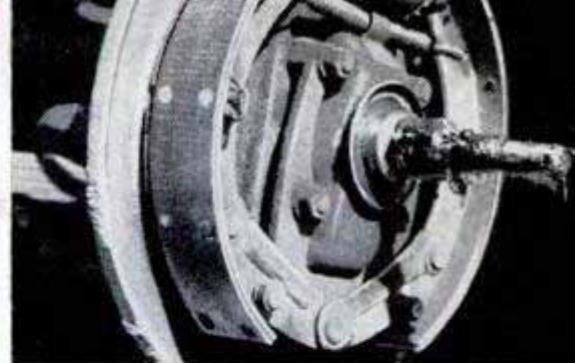
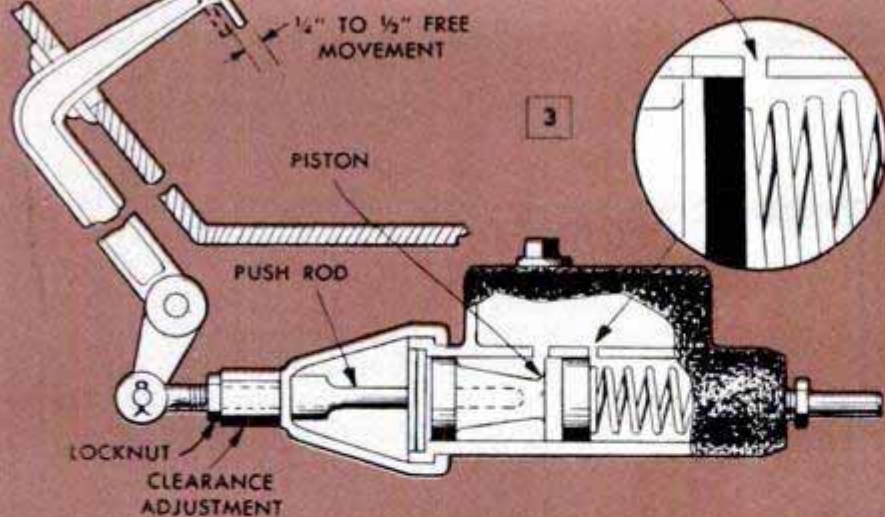
1974 auto Repair Manual
By John R. Dluski



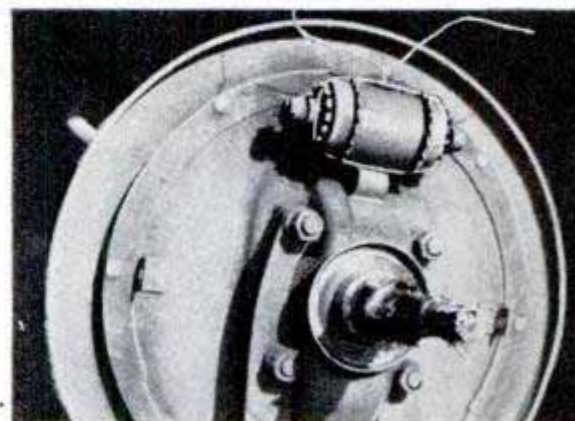
WHEN YOU tramp hard on the brake pedal in an emergency on the highway or at a street intersection — that's when brake performance really counts. Whether or not you stop in time may depend on the condition of the brake linings. You can inspect the linings on your car in five minutes and you can reline the brakes for a fraction of the cost of a reline job and save yourself the inconvenience of being without the use of the car for a day or more. Jack up a front wheel and remove the wheel and then the drum. On new linings, the rivetheads are in countersunk holes and if the linings are worn down within less than $\frac{1}{32}$ in. of the rivetheads that's your cue. If wear continues, the rivetheads will score the contact surfaces of the drums.

Brakes vary as to the location of springs, anchor bolts and methods of adjusting the shoes, but the details in Figs. 1 and 2 give a good general idea of the different types of modern hydraulic wheel brakes. Before tackling the relining job, the first thing to do is to check the toeboard clearance of the brake pedal as in Fig. 3. It will be noted that the specification calls for $\frac{1}{4}$ to $\frac{1}{2}$ in. of free travel of the pedal, but manufacturers' instructions vary on this adjustment. It's a good idea to consult the instruction book for the recommended pedal movement and also for detailed directions on making the clearance adjustment near the end of the push rod on the master hydraulic cylinder. The instruction manual usually will direct you to loosen the locknut and turn the yoke until the required clearance is obtained.

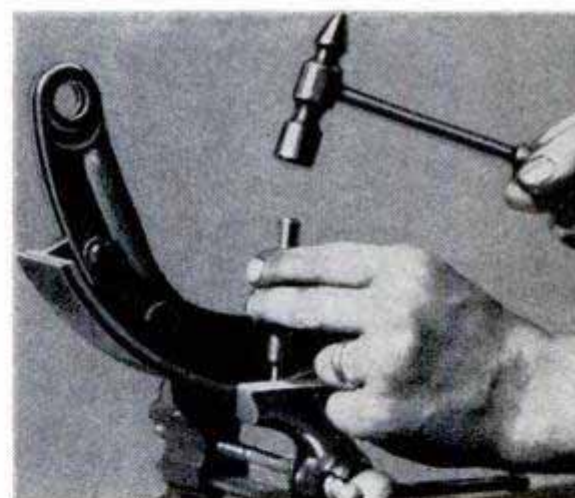
Now, you'll need a complete relining kit, which includes linings for your car and the necessary rivets, a holder fixture for the combination knockout punch and clincher tool, brake-spring pliers and a bleeder hose. With these parts at hand, block the rear wheels securely and jack up the front end of the car so that the



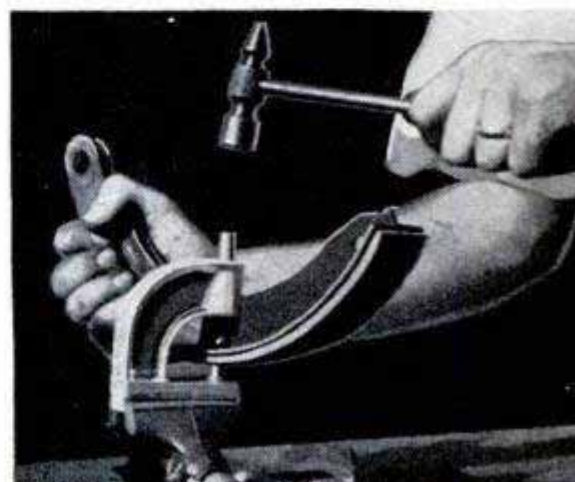
This brake needs a relining job although linings are not yet worn badly enough to permit the rivets to score the contact surfaces of the drums. Note rivetheads



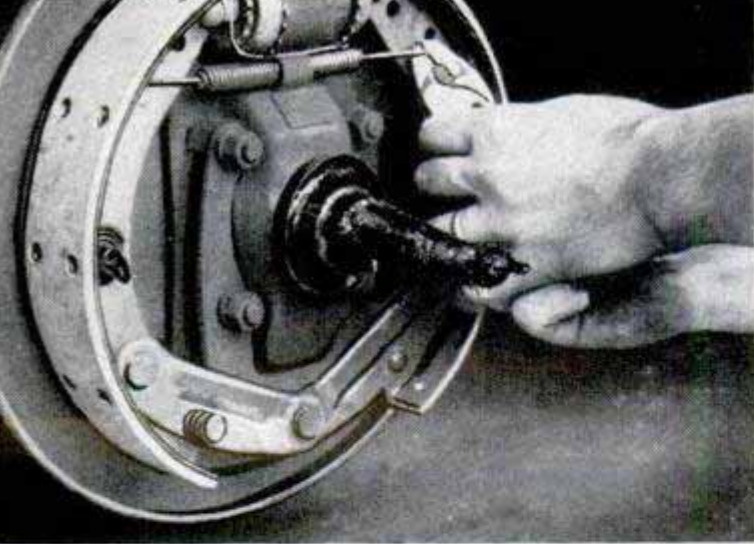
Unless your brakes are provided with piston stops, be sure to wire the pistons in the retracted position before removing shoes. Don't forget to remove wire



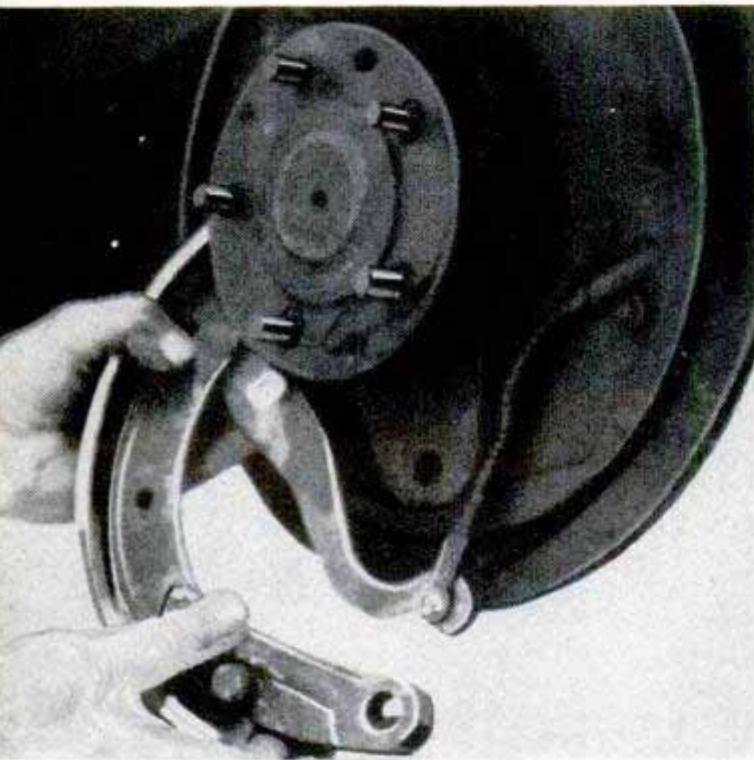
Above, use a punch to remove rivets holding the old lining. Below, when riveting the new lining in place, begin at the center of shoe and work outward



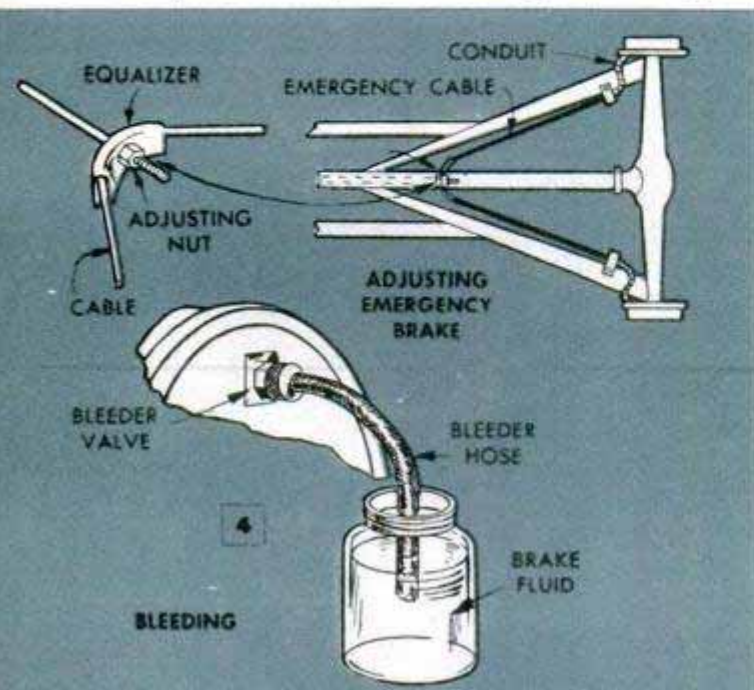
front wheels clear. Then remove hub caps, grease cups, cotter pins, spindle nuts and the outer wheel bearings. Pull the wheels from the spindles. Before removing any parts from the brake assembly, upper right-hand photo, wrap a piece of fine wire around the hydraulic brake cylinder as in the photo at the right and twist it tight. On some brakes, piston stops are provided, making the wires unnecessary. In most brake assemblies, removal of the retracting springs and anchor pins will release the brake shoes. Keep the parts in order so that you can reassemble them correctly. To remove the worn lining, place the shoe in a vise and knock out the rivets with a punch as in the third photo from the top at the right. Be careful not to enlarge or indent the rivet holes in this process. After the old lining has been removed, clean the face of the shoe thoroughly. One lining of each individual set will be marked "forward" and the other "reverse." It is necessary to make sure that you rivet the lining marked forward on the forward shoe, Fig. 1, and the reverse lining on the reverse shoe. These are sometimes referred to as primary and secondary linings. Before riveting, check the alignment of the holes in the lining with those in the shoe. Now place the holder fixture in the vise as in the lower right-hand photo, insert a rivet in one of the center holes through the lining and place the head of the rivet over the fixture anvil as pictured. Clinch the rivet tightly by striking the clincher with a hammer. Then turn the shoe and insert the second rivet in a hole opposite the first. Clinch as before, then work outward toward the ends of the shoe, proceeding in the same manner until all rivets have been inserted and clinched. Apply the lining to the second shoe in the same manner. To avoid a mix-up in the right and left forward and reverse shoes it's a good idea to reassemble them on the brake unit from which they were removed as soon as you finish relining each one. Note that the forward lining is shorter than the reverse lining. After replacing the relined shoes in both front brake units, replace the retracting springs as in the upper photo on the following page, and remove the wire holding the pistons in the wheel cylinder. Now, turn the adjusting screw all the way in to retract the shoes so that the drum will slide over them. The adjusting screws, usually fitted with star wheels, are turned with an ordinary screwdriver inserted through a port in the backing plate as in Fig. 2. Generally it is possible to turn the star wheels by hand when the brake drum has been removed.



After relining the shoes, replace them in the same order as they were removed. Replace the retracting springs and don't forget to remove wire from cylinder



Cable-operated emergency brakes should be checked for free movement of the cables before relined shoes are replaced. Note position of linkage on backing plate



Replace bearings, drums, washers, castle nuts, cotter pins, grease caps and the wheels and hub caps. If grease has been wiped off the wheel spindles it will be necessary to replenish the lubricant, using the type specified by the manufacturer of the car. Adjust the relined brakes by turning each adjusting star wheel until both shoes drag uniformly. This can be determined by turning the road wheel in opposite directions. Then back off the adjustment until the shoes just release the wheel and permit it to turn freely. Relined brakes should always be adjusted a second time after a short period of use.

Now, block the front wheels and jack up the rear axle so that the wheels clear. Remove the wheels. On cars equipped with a Huck brake, removal of the drums is simple as they are attached by means of stud bolts. On cars having Bendix or Lockheed brake units, it is necessary to use a special shock-type puller. Remove the cotter pin and castle nut from the shaft and screw the puller on the threaded end of the shaft. Strike the end of the puller sharply with a hammer to loosen the drum. Remove the other drum in the same way. Then remove the brake shoes and wire the wheel cylinders, if necessary. If your car has a cable-operated emergency brake, disconnect the cable from the rear shoes, as in the center photo at the left. Reline the shoes in the same manner as the front shoes but, before reassembling them, have a helper tighten the emergency-brake lever. Note the movement of the cable inside the backing plate. If both cables move uniformly, the linkage is probably in good working order. After reassembling the shoes, drums and wheels, adjust the road brakes as before. Then adjust the emergency brakes, tightening the adjustment until the shoes drag, and backing off the adjustment until the wheels turn freely, Fig. 4. After all adjustments have been made, try the brake pedal. It should take up firmly after passing the clearance point of free movement. If the pedal feels soft, or spongy, it will be necessary to bleed the air out of the system. This is a simple operation and is done on each individual brake unit, as in the lower detail in Fig. 4. First, fill the master cylinder with brake fluid, attach the bleeder hose to the bleeder valve at the top of the backing plate and insert the other end of the hose in a glass jar half filled with brake fluid. Then open the bleeder valve about $\frac{1}{2}$ turn. Have a helper pump the brake pedal several times, until bubbles no longer appear on the surface of the fluid in the jar. Then close the valve and remove the hose. Repeat on the other three brake units, refilling the master cylinder each time with the recommended brake fluid.

Boat Oar Adapted for Sculling by Adding Second Leather and Collar

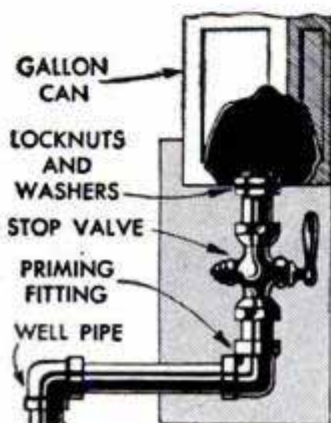
As I like to scull my rowboat when duck hunting or casting for bass and trout, I fitted the transom of the boat with a third oarlock in order to use one of the regular oars for sculling. To hold the handle of the sculling oar at the proper height, I added a second leather and a leather collar to the oar several inches below the original leather. The collar permits releasing the oar without having it slip from the sculling lock. The original leather is left in place for conventional rowing.

Clinton R. Hull, Costa Mesa, Calif.



Overhead Tank Primes Jet Pump

Owners of hunting lodges and summer camps often experience considerable trouble priming a jet-type well pump from

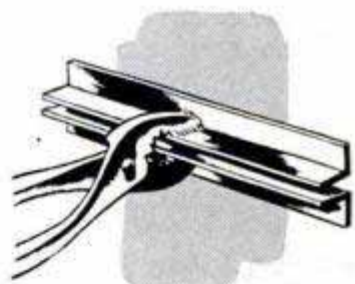


which the water has been drained between visits or over the winter. The problem is to get sufficient water into the pump at one time to maintain a seal. By providing a priming tank in the manner detailed, the job is greatly simplified. A 1-gal.

can, a stopcock or valve, and a few pieces of pipe are the materials required. Turn the pipe fittings together tightly as shown and attach the can with brass locknuts and washers. Open the cock and pour water into the can until the well pipe is filled and water rises in the can an inch or so. Then close the cock quickly and start the pump. The chances are that it will catch the first time.—Harry J. Miller, Danboro, Pa.

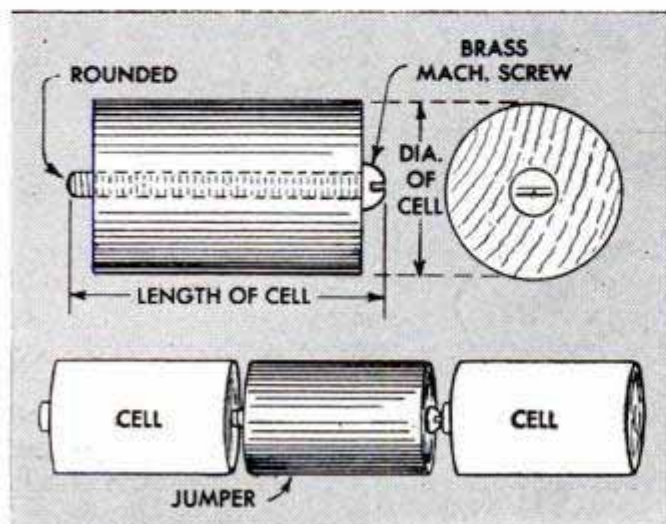
Improvised Sheet-Metal Seamer

A sheet-metal seamer, for crimping seams or other sharp bends, can be inexpensively made from two lengths of angle steel and a pair of ordinary utility pliers. The steel pieces are welded to the jaws of the pliers, as shown. The proper length of the steel pieces, or the width of the seamer, will usually vary with each seaming job to be done. Therefore, as the expense is slight, it is convenient to make several seamers of various widths to have on hand.



William Watson, Racine, Wis.

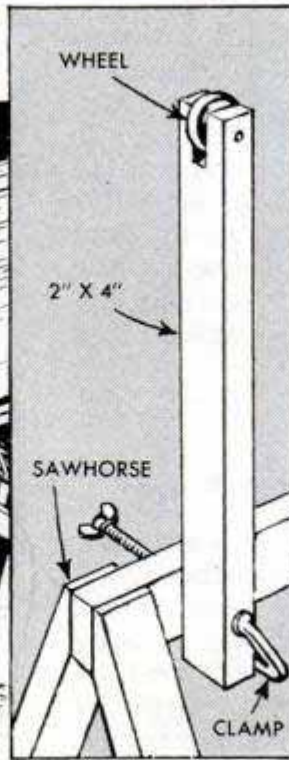
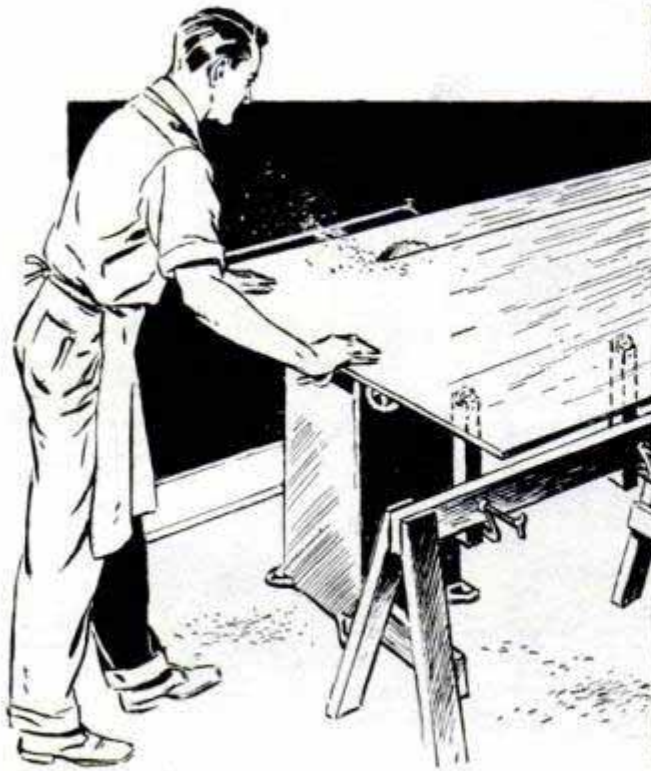
Homemade Jumpers in Flashlight Permit Use of Fewer Dry-Cell Batteries



Dowel-rod jumpers, of the same diameter as a flashlight battery, can be used to replace two cells in a five-cell flashlight or one cell in a three-cell flashlight. In either case the original bulbs are replaced with lower-voltage bulbs and a slight reduction in light is tolerated for the sake of battery economy. Undersize holes are drilled lengthwise through the dowels, and round-headed brass machine screws are turned through the holes. The screws must be exactly as long as the cells they replace. Thus, the dowels simply hold the screws in place while the latter serve as the contact between the cells.

Arthur Trauffer, McClelland, Iowa.

Wide Work Supported on Saw Table By Roller Units Clamped to Sawhorse



Owners of small circular saws will find these portable supports especially helpful when cutting large pieces of work such as plywood or hardboard panels. The supports also can be used to steady long lengths of work as they come off the saw table. Each support is a length of 2 x 4 with a slot cut in one end and a roller bearing or roller-skate wheel bolted to turn in the slot. The outer race of the bearing, or surface of the wheel, should extend slightly beyond the end of the support. When needed, two or three supports may be attached to a sawhorse at the desired height with C-clamps.—R. S. Leland, Sherborn, Mass.

Stepped Holder Keeps Small Tools Grouped Conveniently at Hand

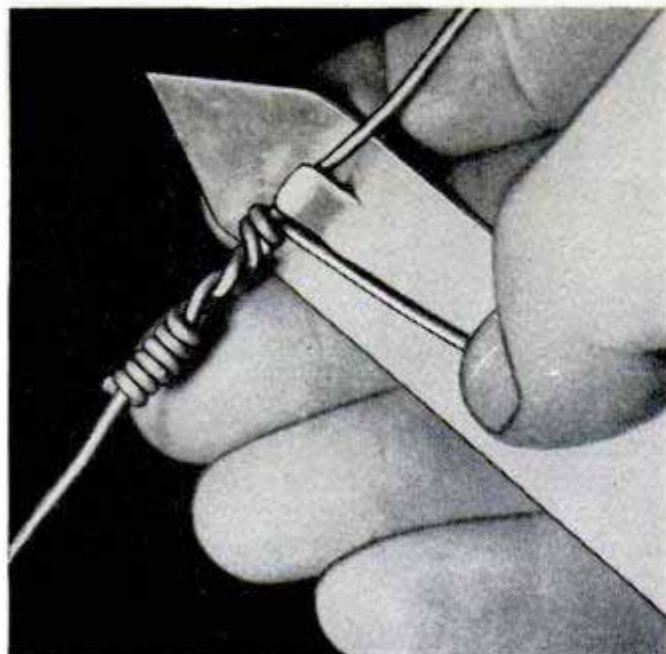
Small tools that never seem to be at hand when needed will always be available if you keep them in this portable holder. It is made inexpensively from four blocks, which are glued, nailed or screwed together to form a stepped holder. The blocks can be any length desired, and are 1 in. thick with widths of 1, 2, 3 and 4 in. When set on edge and fastened together, blocks of

these widths will produce a stepped holder in which holes are drilled to take a variety of tools as pictured in the photograph.—J. T. Stinchcomb, Culver, Ind.



Punch-Type Can Opener Provides Ideal Wire-Splicing Tool

A can opener of the type used to punch holes in beverage cans makes an ideal tool for splicing wire. The two ends of wire to



be spliced are first twisted together, making two or three turns by hand. These turns should be quite open to provide a place for soldering, when needed, and so that the portion of the wire under the greatest stress will not be bent too sharply. The splice is finished by hooking the can opener in position, as shown, and using it as a lever for making the outer turns of the splice coil very close together.

John M. Avery, Dexter, N. Y.

Cleaning Cloth Kept in Hub Cap

Have you ever finished changing a tire or making some other minor repair on a remote country road and then searched the car in vain for a cloth with which to wipe dust and grime from your hands? After experiencing this difficulty, one motorist placed clean cloths in each of the rear-wheel hubs so that they would always be available when making repairs on the road.

John Krill, North Lima, Ohio.

TRANSPARENCY VIEWER

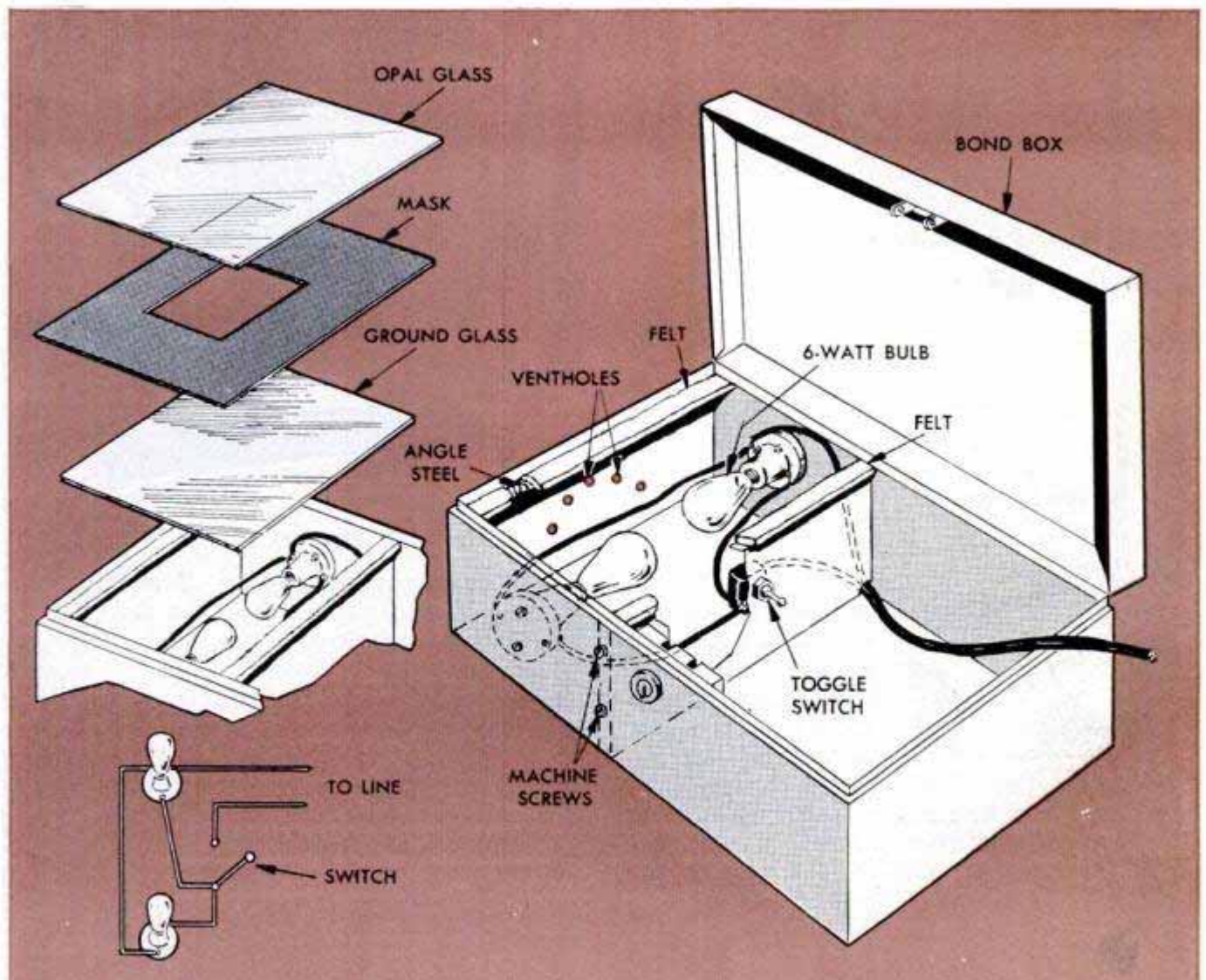
From Bond Box

UNABLE to find a commercially built, electrically operated viewer which would handle transparencies up to $2\frac{1}{4} \times 3\frac{1}{4}$ in. and yet be small enough to be tucked under the arm, L. H. Georger of Buffalo, N. Y., made himself a neat one by starting out with a metal bond box. In addition to the viewer, there's room for storing as many as 200 transparencies. When not in use, the cord can be placed inside and the box locked, preventing unauthorized use and affording excellent protection for your prized transparencies.

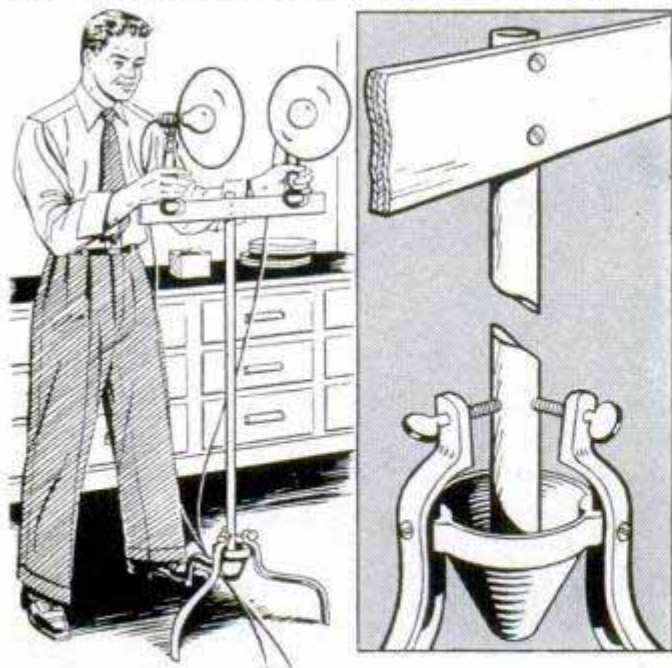
A suitable bond box can be purchased at almost any book or stationery store. The partition which is added to divide the box into two compartments is cut from 20-ga. sheet metal, drilled for a toggle switch and flanged at each end for installing with small machine screws. Note that a small opening at one corner of the partition is provided for the electric cord. Ventholes are drilled in the lamp-house end of the bond box and suitable holes also are made for attaching two candle-base porcelain sockets to take 6-watt, 120-volt bulbs. The opal glass, mask



and ground glass are supported by the partition and a sheet-metal angle bolted to the ventilated end of the box, the edges being covered with strips of felt cemented in place. Extra masks of different sizes can be made for viewing 35-mm. transparencies, $2\frac{1}{4} \times 2\frac{1}{4}$ -in. etc. The lamps are wired in parallel according to the diagram and fitted with a 10-ft. length of cord.



Broomstick and Xmas-Tree Holder Provide Photoflood-Lamp Stand

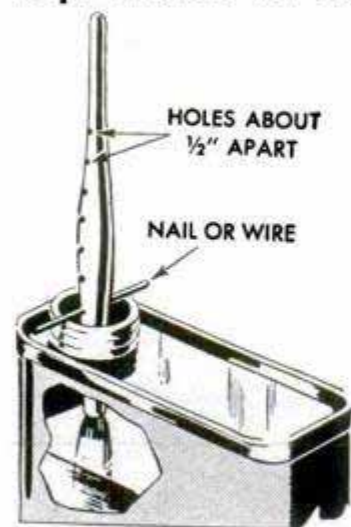


A Christmas-tree holder, that ordinarily must be stored for the greater part of the year, can be put to good use as a base for a photoflood-lamp stand. Simply attach a plywood crosspiece to the handle of a discarded broom, as illustrated, and fasten the broom handle in the holder as you would a Christmas tree. Clamp-on photofloods then can be clipped onto the crosspiece.

Making Settings After Dark

A miniature flashlight, similar to those sometimes carried on key chains, is useful for making settings in the dark. By keeping it in a clip attached to the camera, the light will always be at hand when needed.

Brush Hung in Rubber Cement Kept Pliable for Use



Photographers who use rubber cement for photo mounting will find that one sure way to keep the cement brush in a usable condition is to suspend it in the container with the bristles submerged in the liquid. To provide the necessary height adjustments, drill a row of equally spaced holes through the

handle of the brush. A finishing nail or short length of wire is passed through one of the holes and rests on the rim of the

opening in the container. To lower the brush as the contents of the container are used, withdraw the wire from the first hole in the handle and insert it in the next hole above.

Light Near Darkroom Clock Dimmed With Special Unit

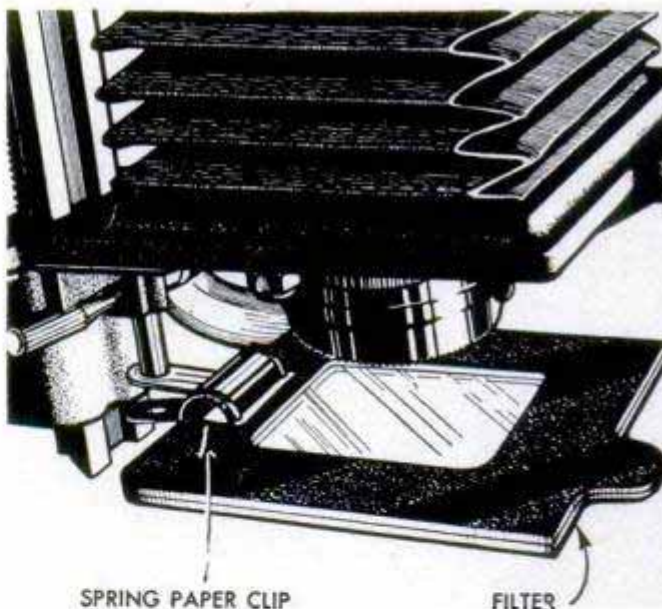
If the red light in your darkroom is too bright to be used for illuminating the clock while prints are being processed, a device to dim the light, such as the one in the photograph, can be attached to the lamp socket. It can be purchased at most electrical-supply stores.



H. Leeper, Canton, Ohio.

Quick-Change Filter Holder Utilizes Large Paper Clip

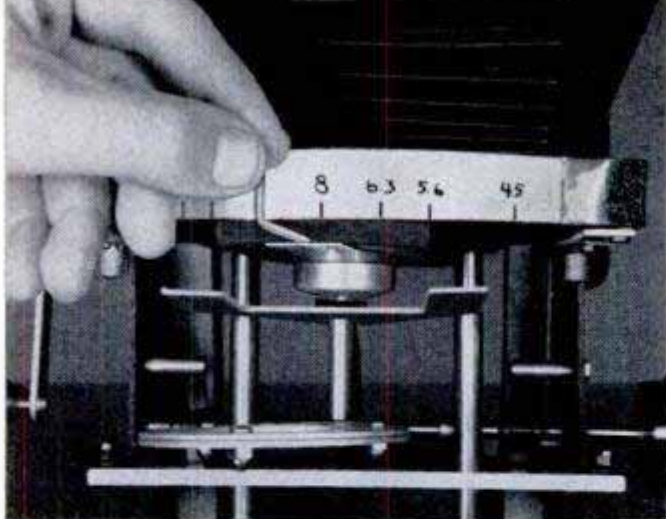
One photographer speeded the process of using filters on an enlarger by substituting a spring-type paper clip for the regular filter holder. Held in the clip, as shown, the filters can be removed and replaced much more quickly than before. When it is necessary to adjust the projector lens,



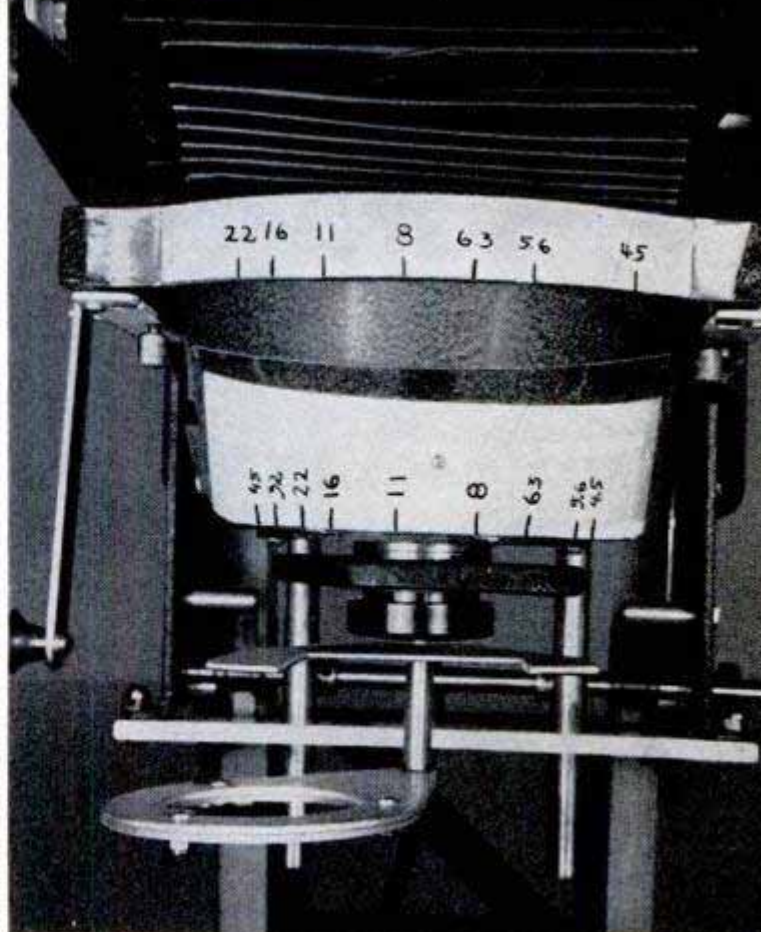
the filter is not in the way. The hole in a handle of the paper clip was simply enlarged to fit tightly over the rod which supported the original holder. Then the handle was bent slightly so that the clip would hold the filter in a horizontal position.

M. B. Clary, Seattle, Wash.

Small ferrotype tins can be stacked without being scratched if they are placed in between the pages of magazines.



Above, the extended diaphragm scale is clearly visible even in the uncertain light of the darkroom. The pointer is adjustable. Right, when alternate lenses are used they are fitted with separate scales



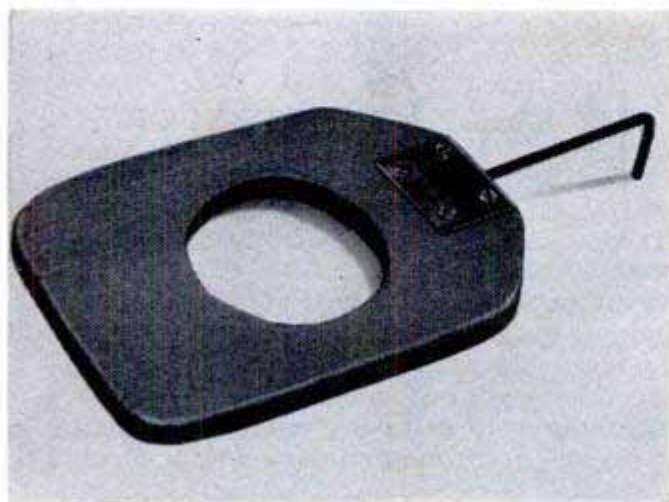
EXTENDED SCALE FOR ENLARGER LENS

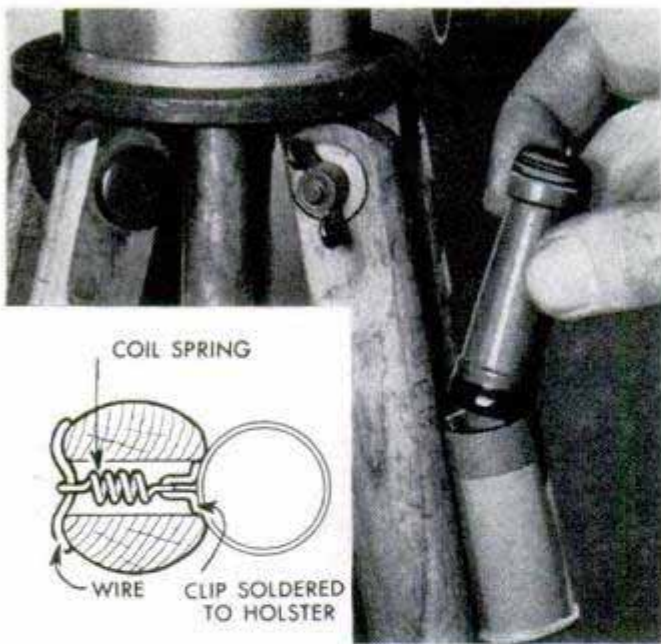
By M. Richard Marx

IN THE UNCERTAIN glow of a darkroom safelight, it's usually difficult to see the small diaphragm scale on the enlarger lens clearly enough to make precision changes in settings. One photographer solved this problem by fitting his enlarger lens with a wire-pointer attachment and a scale fastened to the edge of the lens board. First, a piece of $\frac{3}{8}$ -in. hardwood was cut to the shape shown below to fit snugly over the diaphragm ring of the lens. Then an "L" pointer was bent from wire and attached to the block with a pressure plate cut from sheet metal. Finally, a strip of white paper was glued to the lens board and the stops and divisions transferred to the paper with pen and ink, the pointer being used to locate each division. Placing cellulose tape over the scale will protect it. For an auxiliary lens, use a separate scale, as shown.



Photos above and below show how a hardwood block and L-shaped pointer are fitted to the diaphragm ring





Holder for Ground-Glass Magnifier Attached to Tripod Leg

One photographer, who frequently uses a tubular-shaped magnifier to focus images sharply on the ground glass, made a holder for the magnifier by utilizing a small bouillon-cube can. After padding the can by placing a pledget of cotton in the bottom and covering the sharp rim at the opening with adhesive tape, a short length of wire is formed into a clip and soldered to the side of the can as shown in the detail. To attach the holder to a leg of the tripod, the latter being a split type, one end of a short

coil spring is hooked to the clip. Then, the spring is stretched through the opening in the leg and the other end hooked to a second short length of wire. Attached in this manner, the holder can be removed easily.
Walter E. Burton, Akron, Ohio.

Paper Clip Used on Photo Guide Aids in Making Camera Settings

When making camera settings from a dial-type photo guide, a paper clip will assist you in two ways. Placed in the proper position, it will mark selected settings for quick reference or recheck. The clip also will hold the various dials in place so that they will not accidentally be shifted while the guide is being handled. Should you ever put your camera away loaded and later forget what type of film it contains, a glance at the guide, with the paper clip still attached, will give you the answer.



Andrew Brennan, Philadelphia, Pa.

Brilliant, spot-free "glossies" can be assured by first washing the plates with a soapy, cellulose sponge.

Popular Mechanics Blueprint Service

With the vacation season past and long winter evenings just ahead, it's time to plan your winter's workshop program. It's just as easy and just as much fun to make practical and worth-while projects as it is to "tinker." At the same time, you will be saving money and, if you have a young son or daughter, here is a good opportunity to get them interested in a recreational as well as an instructive hobby under your supervision. *Popular Mechanics* has 330 interesting projects in blueprint form which range from a simple scrollsawed wall plaque to large boats and house trailers. Every project is completely detailed and dimensioned in perspective and exploded views so that even the most inexperienced person can follow it easily. A postal card addressed to Popular Mechanics Book Department, 204 East Ontario Street, Chicago 11, Illinois, will bring you a free catalogue of all our plans. For example, we have:

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FITTING A CHUCK *To Your Lathe*

SN 56

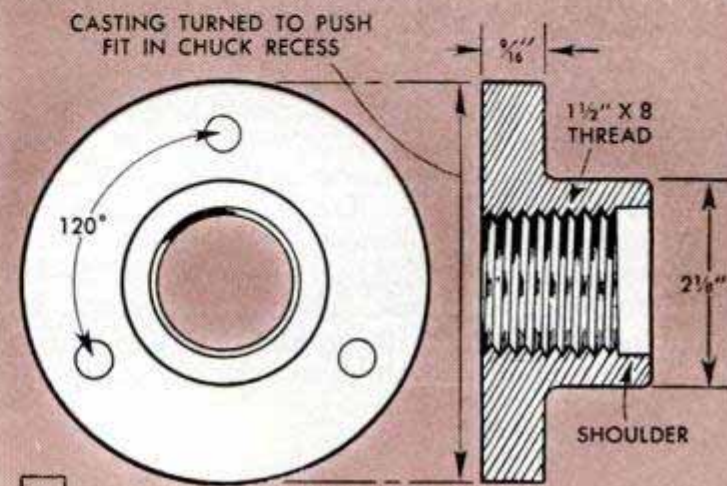
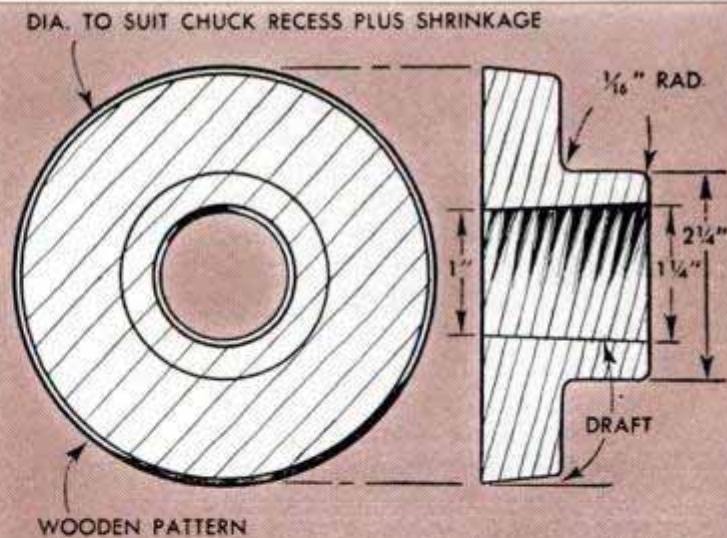
ONE OF THE MOST interesting turning jobs you'll want to do after buying your metal-turning lathe, and one that will save you money, is machining the chuck back when fitting the new chuck to the lathe. As supplied by the manufacturer, the chuck back is a rough casting and must be machined all over and internally threaded to fit the spindle nose. Most lathe chucks of professional quality are recessed to take the chuck back in a light, press fit and this calls for some accurate machine work.

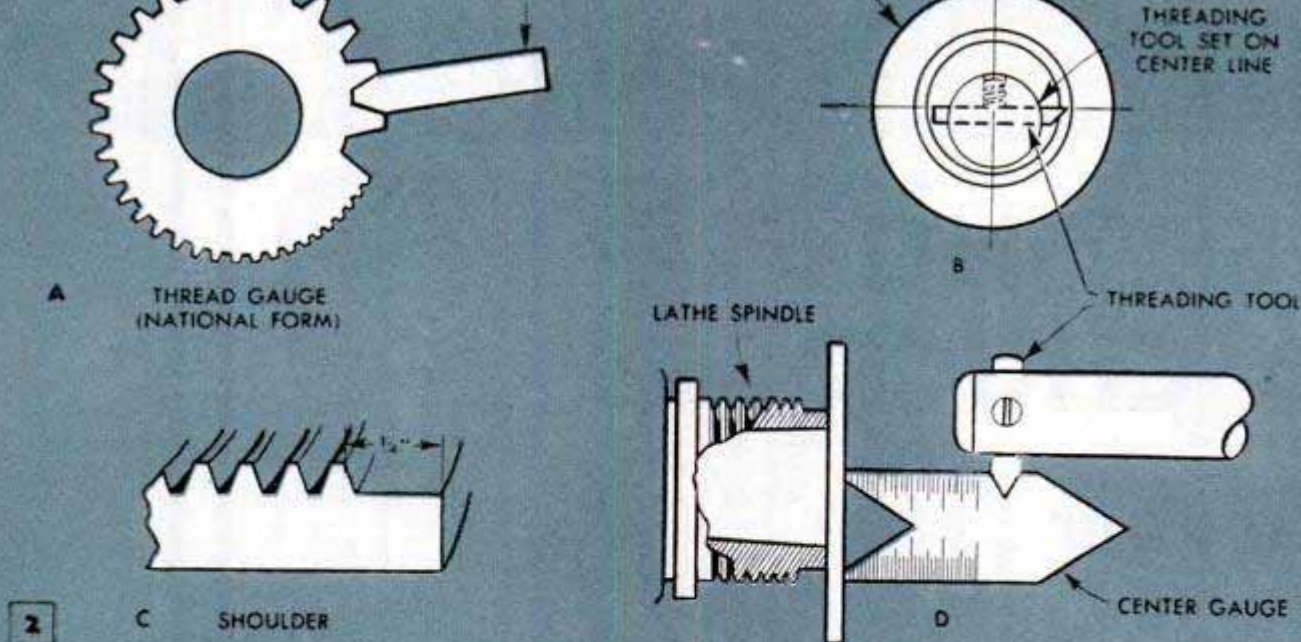
For mounting a small, light chuck, the back can be turned from a tool-steel round. But for the larger, heavier chucks, it is best to use the cast back supplied by the manufacturer or make your own by turning a wooden pattern, as in Fig. 1, and having the back cast at a local foundry. The dimensions given are for a spindle having a diameter of 1½ in. with 8 threads to the inch, and may be varied to suit your particular spindle. To allow for machining, the casting pattern is made ⅛ in. oversize, and sufficient draft is provided so the pattern can be easily withdrawn from the molding sand. Note, also, that the center hole is tapered sharply. After turning the pattern, sand it smooth and apply two or three coats of shellac, sanding between coats.

To machine the rough casting, center it, hub outward, on the lathe faceplate and clamp it in place. Machine the flange and outer surface of the hub to size, and bore the hole for the threads, remembering that the hole must be 1½ in. in diameter less the depth of the threads. Then, grind an internal threading tool to the proper shape, checking it with a thread gauge as in Fig. 2, detail A. Give this tool slightly more front clearance than an external threading tool to prevent the heel of the tool from rubbing against the work. Insert the tool in a heavy boring bar, setting the tool exactly on the horizontal lathe center line as in detail B. Unscrew the faceplate from the spindle, and adjust the threading tool



A chuck that is fitted properly and handled carefully will give many years of satisfactory service





square with the work by fitting the point into a center gauge. The gauge is positioned on a disk held against the end of the spindle as in detail D. Adjust the boring bar in its holder with as little overhang as possible to prevent springing, and then replace the faceplate on the spindle.

When the threads are nearly completed, unscrew the faceplate from the spindle, with the work attached, and test the threaded hub of the chuck back for fit on the lathe spindle. If the threads are too tight, replace the faceplate on the spindle and take several finishing cuts with the thread-cutting tool. Repeat until a perfect fit is obtained.

Note in detail C that a $\frac{1}{4}$ -in. shoulder must be cut on the inside of the newly threaded hub. This allows the chuck back to be turned firmly against the shoulder on the spindle nose. The inside edge of the hole in the hub should be beveled slightly and the machined surfaces polished smooth with fine emery cloth.

Now, the work can be removed from the faceplate and the hub of the chuck back screwed onto the lathe spindle. The chuck back is faced square and the flange is turned to a firm push fit in the chuck recess. Take light finishing cuts, and frequently press the chuck over the flange to check the fit.

When the chuck back fits perfectly, remove it from the spindle. Chalk the face of the flange heavily and insert it in the chuck recess. Then tap the flange with a soft hammer to transfer the location of the bolt holes in the chuck to the chalked surface of the flange. Drill the bolt holes in the chuck-back flange $\frac{1}{16}$ in. larger than the diameter of the bolts used to fasten the back to the chuck. This is important, as binding of the bolts against the sides of the holes will impair the accuracy of the chuck.

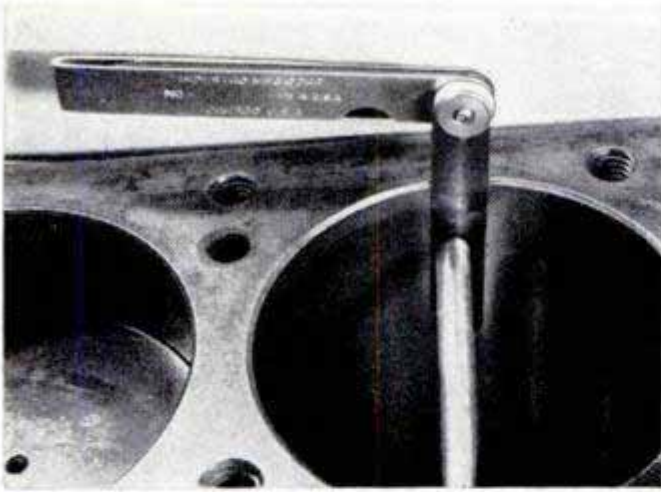
After bolting the back to the chuck, mount the chuck on the lathe spindle, and use a dial indicator on the outer diameter of the chuck to check the alignment.

To insure long life and satisfactory results from your chuck, keep it clean. Be sure that no chips or dirt become embedded in the seating surfaces of the spindle, chuck or threads. The shoulder, face and pilot of the headstock spindle determine the accuracy of the chuck, so be careful not to nick or bump the shoulder and pilot.

When mounting the chuck, oil the threads of the spindle and chuck back. To turn the chuck onto the spindle, hold the chuck in the hand and turn the spindle pulley with the left hand until the chuck is just tight enough to hold securely. Do not switch on the lathe motor to screw the chuck onto the spindle and don't spin the chuck up to the shoulder, as doing this is likely to make the chuck difficult to remove. Lubricate your chuck frequently with No. 10 oil.

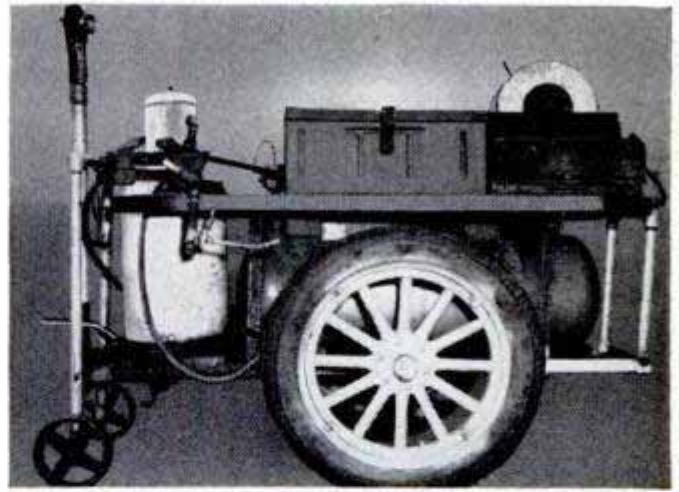
Overloading the chuck by mounting work that has a diameter larger than that of the chuck body extends the jaws to the point where undue strain is exerted on the screws or scroll. In addition, always use a wrench of the size provided with the chuck. Using a larger wrench for greater leverage will result in permanent damage to the scroll or screws, and also to the chuck jaws. If the jaws seem to be jammed, do not force them. Instead, disassemble the chuck and find the cause of the obstruction.

The chuck probably will need cleaning. When doing this, be sure to remove any chips that have worked into the jaw slots, screws or scroll. Oil all moving parts before reassembling. When the chuck is not in use, store it in a cabinet or on a shelf where it will be protected from dirt, chips and accidental damage.



Cylinder Wear Measured With Feeler Gauge

In an emergency, one mechanic was able to gauge fairly accurately the amount of wear in the cylinders of an engine by using a length of steel rod and a feeler gauge. The rod was cut and the ends rounded slightly so that it would just fit crosswise inside the cylinder at the top where it was not worn. As the length of the rod then represented the original diameter, the amount of wear was determined by holding the rod at right angles to one wall of the cylinder and using the feeler gauge to check the space between the end of the rod and the opposite wall of the cylinder.



Portable "Garage" Services Farm Implements in Field

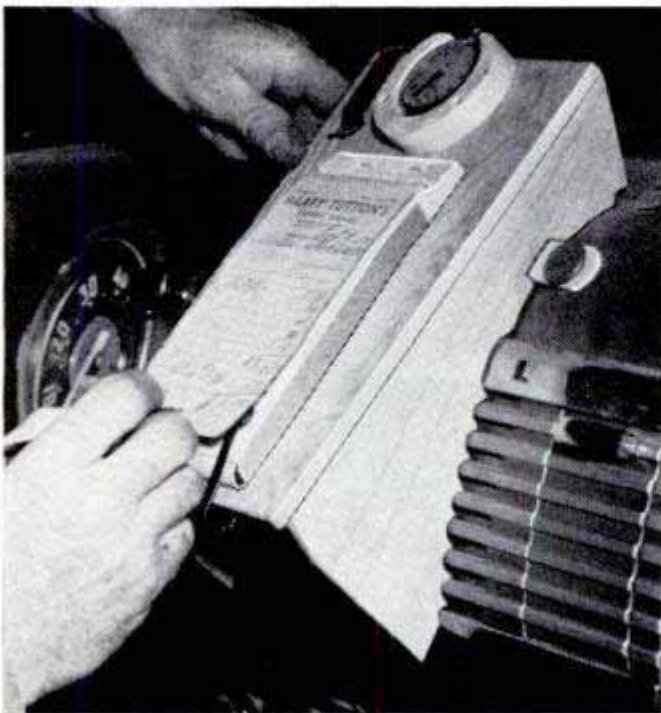
Originally designed and built as a power sprayer for paint and insecticides, the owner of this unit saw its possibilities for saving time when servicing farm equipment. He added a reel for a long air hose and tire chuck, built in a pressure greasing unit and fitted a two-wheeled front truck to support the trailer in the level position when the drawbar is unhooked. A small air-cooled engine supplies power for the compressor and grease gun and a hardwood plank attached to angle-steel brackets on one side of the unit serves as a bench for making minor repairs.

Small "Desk" for Truck Driver Mounted on Instrument Panel

Drivers of delivery trucks and cars will find this "desk" a real help in doing paper work involved in their jobs. Consisting of two sides and a top, the desk is made of solid stock and attached to the instrument panel by means of a thin strip of metal, the

latter being screwed to the underside of the desk and the ends bolted to the panel. To cut the profile of the panel in the edges of the sidepieces, first make a rough cut and then use a small compass to transfer an outline of the more intricate contours. A circular shaped piece of wood, approximately $\frac{1}{2}$ in. thick, is screwed to the desk to provide a convenient holder for a pocket watch. A large, spring-type paper clip or the type of clips shown will hold papers or pads to the desk.

Peter G. Gordon, Lansing, Ont., Can.

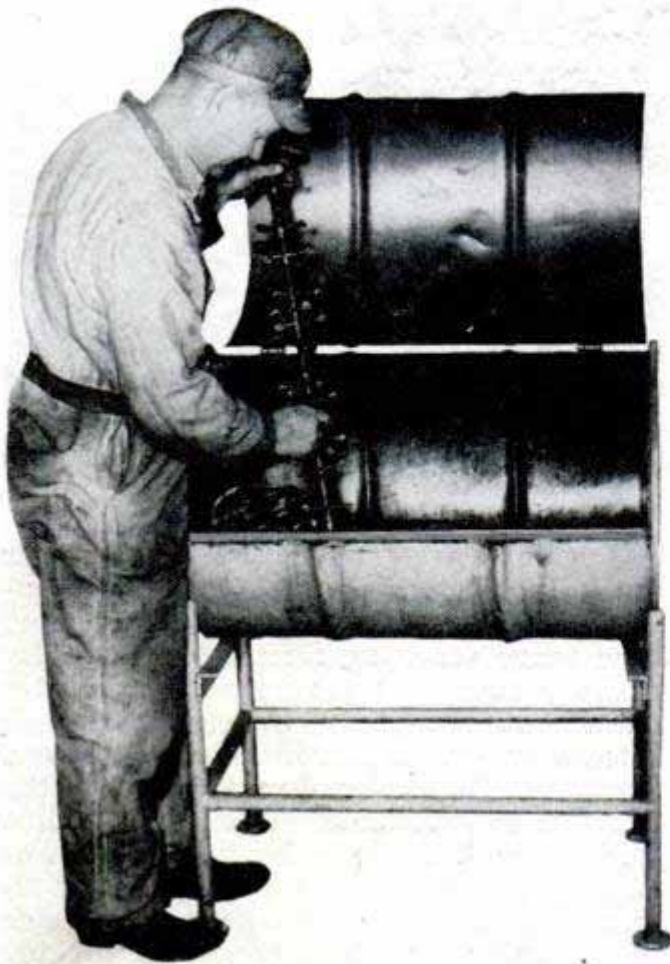


Removing Grease-Pencil Lines From Lettering Layouts

Laying out painted signs on oilcloth and other glossy-surfaced material usually requires the use of a grease pencil, but the pencil marks always present a problem when it comes to removing them after the sign is painted. In using turpentine, the tendency has been to smear the lettering. However, one sign painter found that a wad of cotton dipped in boiled linseed oil could be rubbed lightly over the work to remove the lines without spoiling the lettering.

Paul Will, Chicago.

Section Removed From Oil Drum To Make Washer for Car Parts



By cutting out one side of an oil drum and hinging it in place, a mechanic made an ideal washer for car parts. The portion of the drum removed was approximately one third of the circumference, the ends of the drum being left intact. To have the drum at a convenient height, it was mounted on a stand of pipe and angle steel welded together. The legs of the stand were fitted with flanges so it could be bolted to the floor. If desired, the pipe legs can be bushed and casters substituted for flanges to make the washer portable.

L. H. Houck, Jefferson City, Mo.

Improved Bushing Reamer

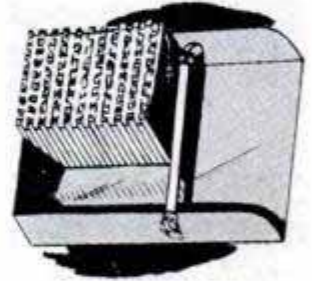


On a job that required enlarging the holes in several small fiber bushings, a cotter pin and a strip of emery cloth were used to improvise a reamer for this purpose. One end of the cloth was gripped between the legs of the cotter pin and then wound around the pin to provide a diameter just slightly less than the diameter of the holes

to be reamed. The cloth was wound in the same direction as the rotation of a hand drill, which was used to rotate the improvised reamer. This idea could be applied to many other jobs of this type where only a slight enlargement is necessary and a reamer is not available.

Dowel Tipped With Rubber Holds Linotype Slugs

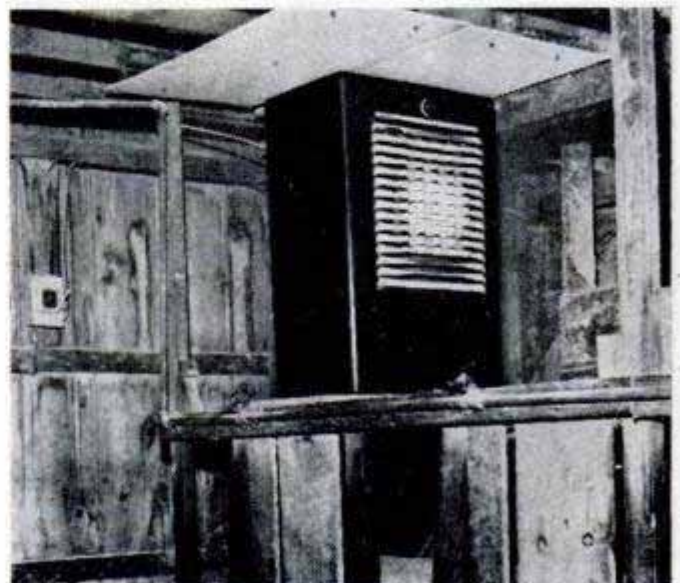
To hold Linotype slugs in position in galleys while moving them about, one printer makes a special holder from a short length of dowel rod and two rubber pencil erasers of the slip-on type. The dowel is cut to a length slightly less than the inside width of the galley and the erasers are pressed over the ends. Then when the slugs have been placed in position in the galley, the holder is pressed against them to hold them in place. Because of the wedging action of the eraser-tipped dowel the slugs cannot slide out.



Dairy Barn Quickly Warmed By Blower-Type Heater

A bottle-gas heater, mounted on an overhead platform in his cow barn, allows one farmer to raise the temperature of the interior to 35 degs. in 10 to 30 min. As the added warmth is needed only at milking time, the rapidity with which it can be supplied is a special convenience. The heater (in this case a 45,000 B.T.U. blower-type unit) provides heat for the comfort of the milkers and helps prevent chapping of the cows' udders which sometimes is caused by washing them in cold weather.

A. M. Wettach, Mt. Pleasant, Iowa.



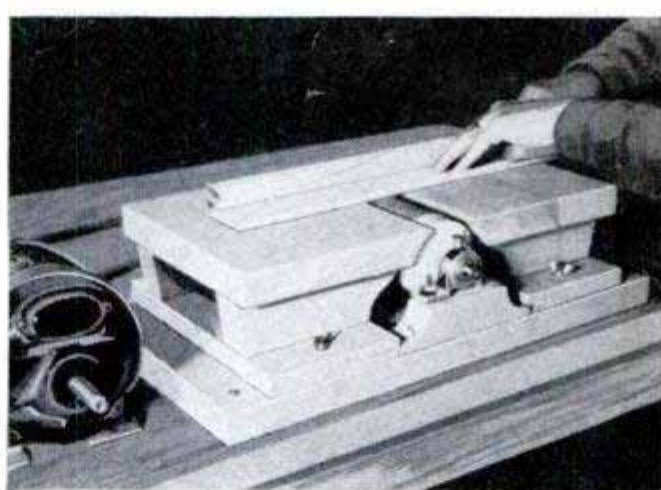
DRUM SANDER

For Your Workshop

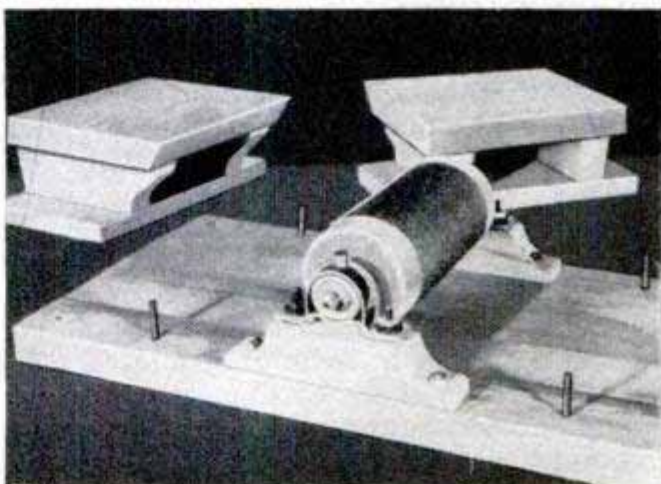
By Dick Hutchinson

FOR LITTLE MORE than the cost of the wood, plus a pair of pillow blocks, you can make this efficient drum sander that will handle almost any surface-sanding job in the shop. Common lumberyard stock is used for the base as well as the two table units. Both of the units are made removable from the base to facilitate renewal of the abrasive. As it is important that the drum run dead true, it must be turned to size after being mounted on its shaft. This is done by drilling a hole lengthwise through the block and then cross-pinning it to the shaft with finishing nails set well below the surface. The assembly is mounted between lathe centers and turned down. Be careful to see that the drum is of the same diameter at both ends. To compensate for the double thickness of abrasive paper at the point where it is lapped, a shallow groove is run lengthwise in the drum as indicated. The height of each table unit is determined by the pillow blocks, plus the height of the brackets supporting them.

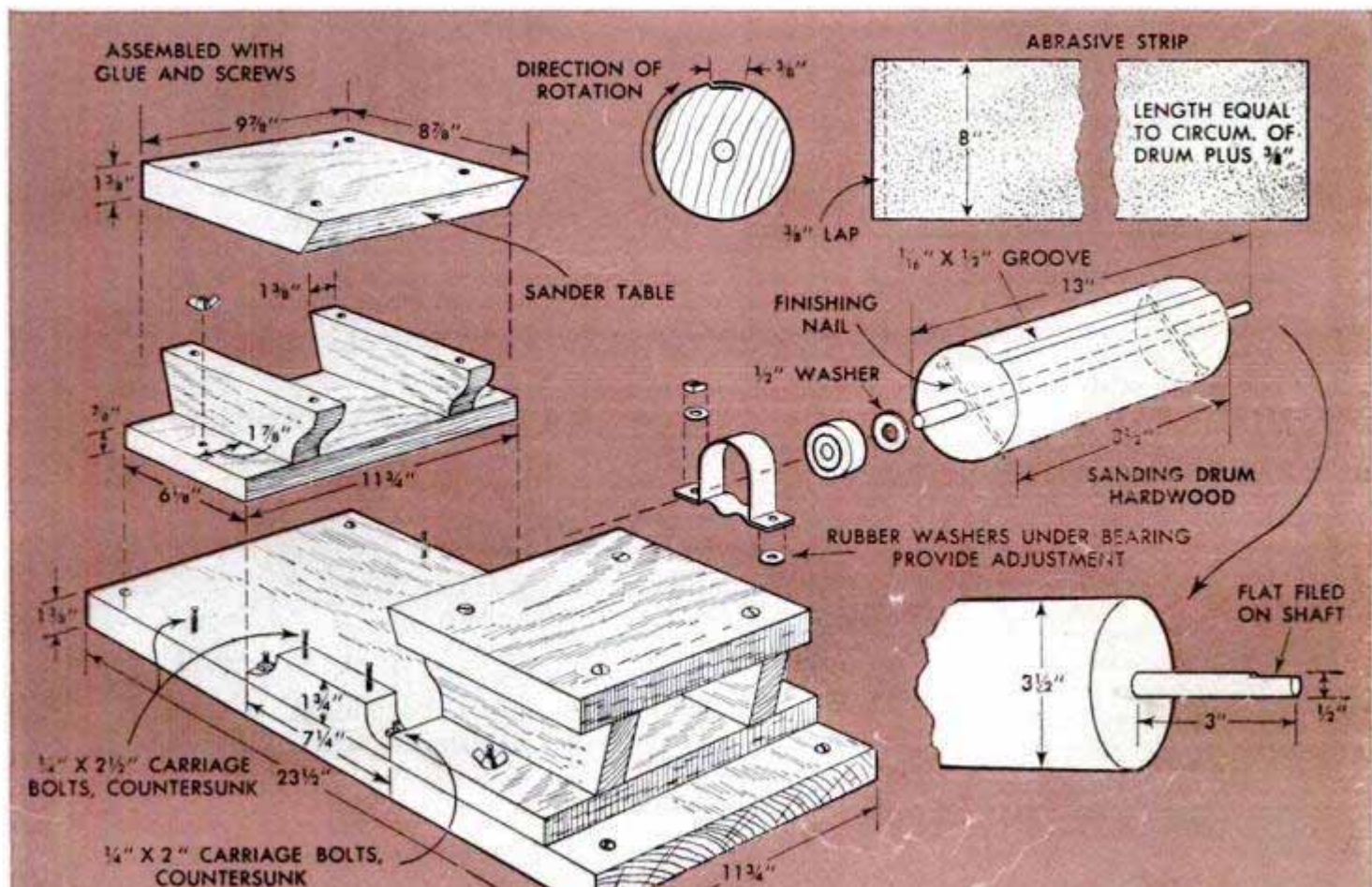
The abrasive strip is cut $\frac{3}{8}$ in. longer than the circumference of the drum to allow an overlap at the joint. To obtain a good glue joint, remove the grit from the end of the strip by soaking and scraping clean.



Two-piece table, bolted to the base of the sander, accommodates stock up to $7\frac{3}{4}$ in. wide. Wooden strip may be clamped over table to provide fence



With the table removed, the abrasive drum is fully exposed for sanding curved work. Rubber washers or strips of rubber inserted under pillow blocks permit making fine adjustments in height of the drum





String Wrapped Around Cardboard Quickly Cut Into Equal Lengths

To save time when cutting a number of short lengths of string for tying shipping or labeling tags, use a piece of cardboard and a paper cutter of the type in the photograph. First, cut the cardboard to a width slightly more than half the required string length. Then wrap the string around the cardboard, anchoring the ends in slots cut in the cardboard. Trimming about $\frac{1}{4}$ in. from one edge of the cardboard will cut as many short strings as there are wrappings around the cardboard.

Preserving Metal Water Tanks

Painting metal water tanks once a year with a good grade of aluminum paint will help prevent rust deterioration. The tank should be emptied, thoroughly cleaned and allowed to dry before being painted. Apply paint inside and out, giving the tank at least two coats if it has never been painted before, and one coat yearly thereafter.

H. W. Strobe, Danville, Pa.

Hunt for Oldest Readers

How long have you been a reader of Popular Mechanics?

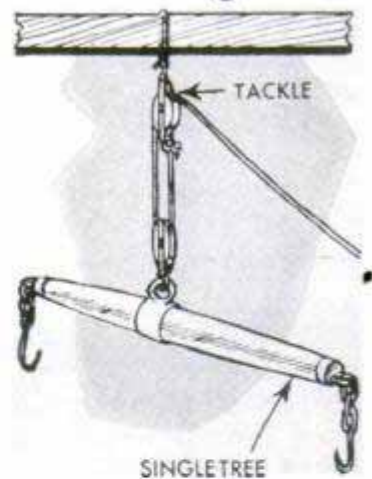
As part of our celebration of the Golden Anniversary of this magazine next January, the editors are seeking the names of our oldest regular readers—those who have subscribed to the magazine or bought it regularly at newsstands for nearly 50 years. Some, we believe, have read Popular Mechanics since it began publication in January 1902, and many have very complete files from the beginning.

If you are a "regular" of 40 years or more, send us your name and address and tell us how long you have read the magazine, and how far back your file of the magazine goes.

Address the Managing Editor, Popular Mechanics, 200 East Ontario St., Chicago 11, Ill.

Skinning Gambrel From Singletree

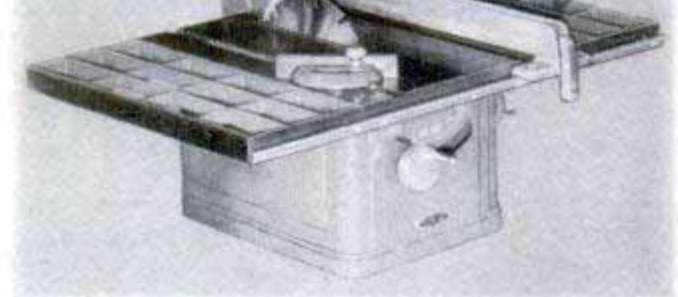
When butchering a beef many farmers use an ordinary singletree as a skinning gambrel. The singletree is supported by a tackle block as detailed, and the beef carcass is prepared by first skinning out the hind legs and then cutting away the flesh on each leg



above the hoof to expose the tendon. The trace hook at each end of the singletree is then hooked around the tendon of each leg. In this manner, the carcass is easily raised by stages as the skinning progresses. A short singletree can be used in the same way to raise the carcass of a hog for cleaning and removing the bristles.—Kenneth Gabrosek, Fly Creek, New York.

Leas Refback & Company
Saw Has Easily Removed Motor
For Use on Other Tools

*W. Worthington & South, Norman
Chicago, Ill.*



Tilting arbor, grid table extensions plus many accessories, such as dado cutter, molding head, cutoff wheels, etc., all combine to make this ball-bearing saw ideal for the home craftsman. Also, the motor can be removed easily and used to operate other tools for a one-motor shop.

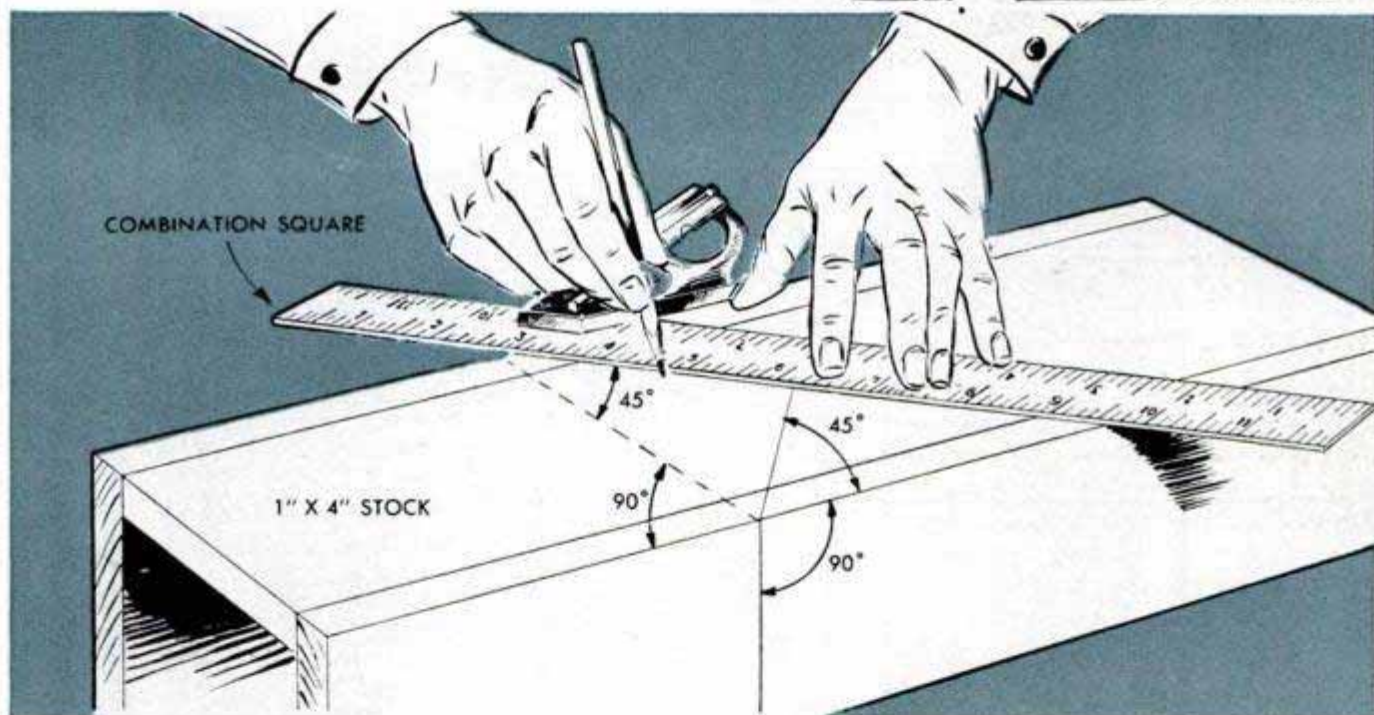
Stiffening a Socket-Wrench Joint

If you've ever tried to fit a socket wrench equipped with universal joint over a nut in a hard-to-reach place, you'll appreciate this simple kink. Just slip a short length of light coil spring over the joint. This will hold the joint stiff but will not interfere with the operation of the wrench.



Make Yourself a MITER BOX

The common wooden miter box is a handy item to have for repairs around the home and can be made in a few minutes from a scrap board. Cut a straight 1 x 4 into three convenient lengths and nail them together, as shown, using three nails on each side, one at the center and one near each end. Additional nails are driven after cutting the saw kerfs. From both ends of a reference line drawn across the bottom of the box at 90 deg. to the sides, lay out 45-deg. lines. Then extend perpendiculars from opposite ends of each 45-deg. line to the top edges of the sides. Set the box right-side-up, locate the saw on the diagonals between opposite perpendiculars and cut two saw kerfs down through the sides.

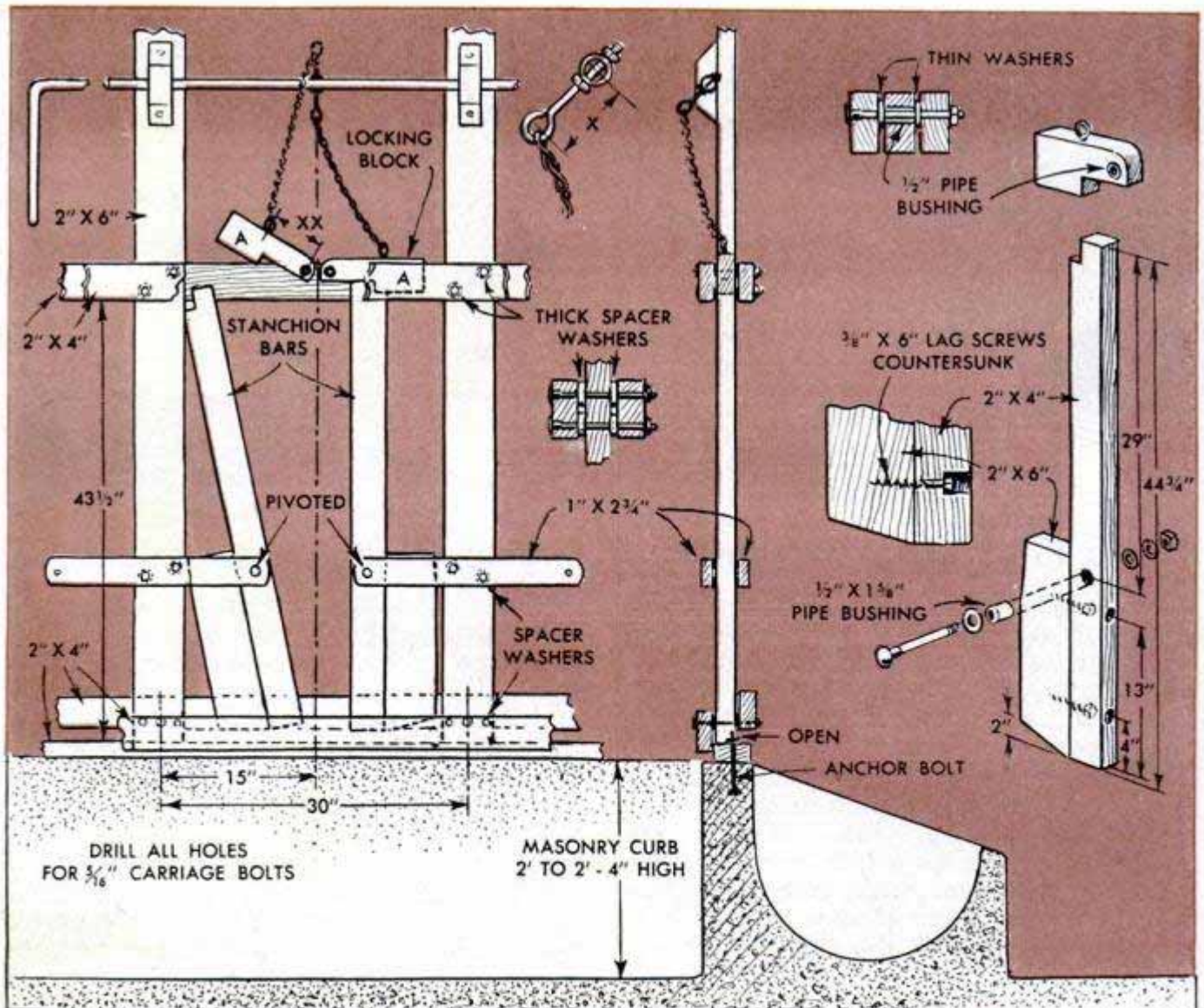
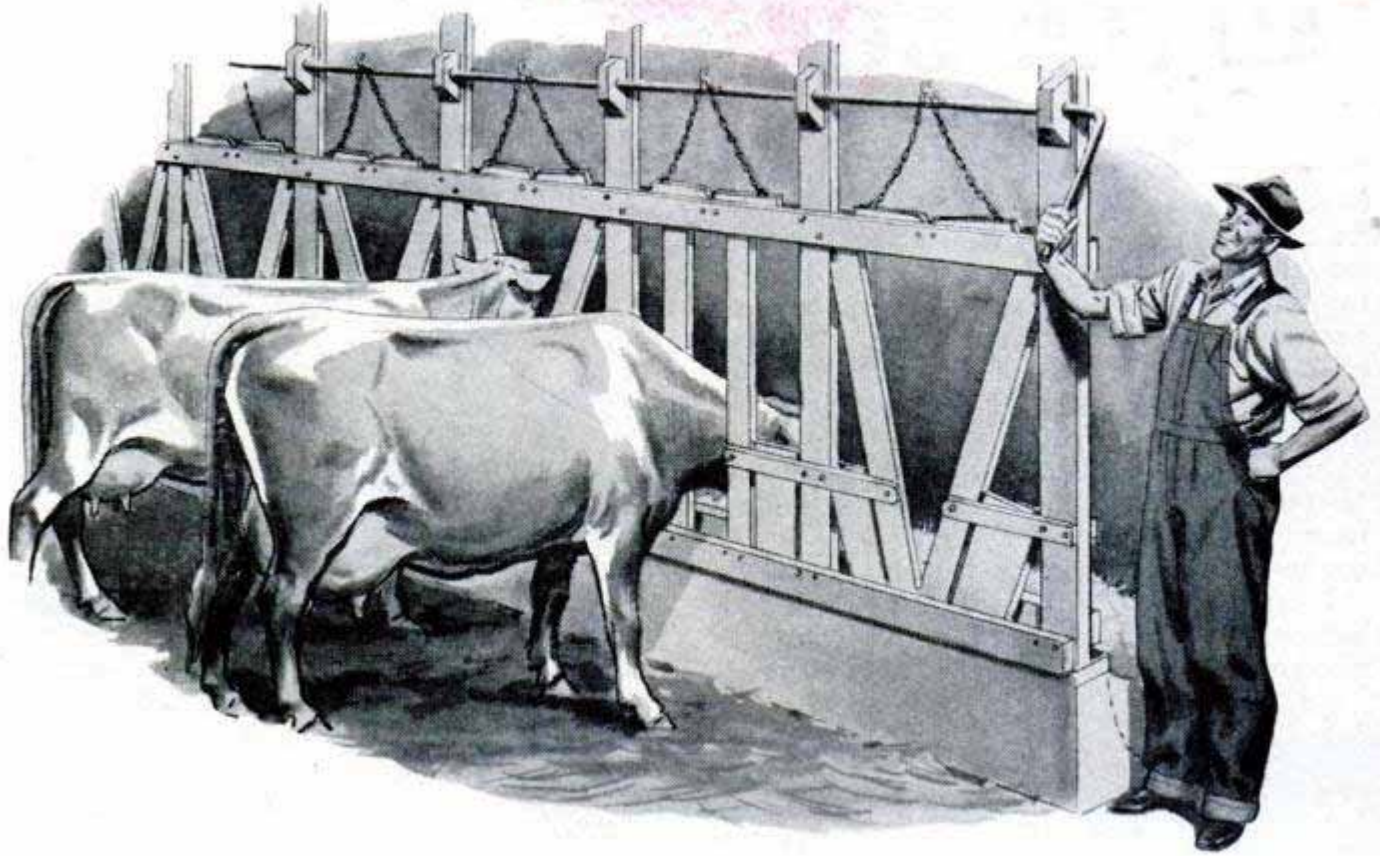


Proper Pre-Storage Treatment of Engine Minimizes Deterioration

A few days before putting a water-cooled engine in storage, drain the radiator and refill with water containing rust preventive. Immediately prior to storing, run the engine an hour or so on unleaded fuel having the proper octane value. Then change the oil, drain the radiator and start the engine again, running it one minute to circulate the oil and dry out the block. Stop the engine by removing the air cleaner and pouring a cup of oil containing rust preventive into the intake. Pour slowly, at first, then rapidly so as to stall the engine with the last of the oil. Remove the spark plugs and pour about a tablespoon of oil into each

cylinder. Then turn the engine over twice. If it is the type having overhead valves, remove the valve cover and check for moisture. If present, allow to dry thoroughly and then brush or spray a coat of oil over the valve springs, stems, rocker arms and other parts. Then replace the cover. Drain the carburetor and fill with a mixture of light oil and kerosene. Moisture accumulation due to sweating can be avoided by storing the engine in a dry, well-ventilated place. Turn the engine over with a crank periodically during storage to redistribute the oil and to alternate the valve springs being held under compression.

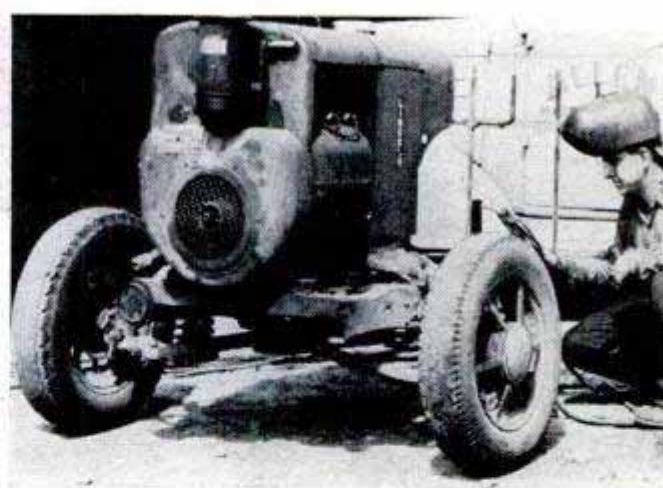
AUTOMATIC STANCHION ROW



FOR DAIRY

IDEALLY SUITED to use on the farm where dairy cows are allowed free range at all times except when feeding and milking, this automatic stanchion row can be built in any barn in units of five or ten individual stanchions. As shown in the sectional view on the opposite page it is designed to be built on a concrete curb 2 ft., or 2 ft. 4 in. high. The entire stanchion row is controlled by a single lever at one end as shown in the upper illustration. Pulling up on the lever, as pictured, raises the locking blocks A and permits the stanchion bars to open, releasing the animals. At milking or feeding time, as each cow returns to her individual stanchion and lowers her head to reach the feed in the concrete manger, the stanchion bars close and lock automatically. For purposes of clarity, the single eyebolt is shown in two positions in the detail on the opposite page. The chain at the left in the detail is shown taut, the eyebolt being in a raised position. When the eyebolt is in the down position, the chain is slack, as shown at the right. Actually, in the assembly, both chains are attached to one eyebolt, as in the upper illustration. Dimensions X and XX on the detail must be worked out for each installation to assure that the locking device works freely on each unit. Adjustment of each eyebolt is provided by threading the body of the bolt for a distance equal to at least half its length. The main frame of the stanchion row is set up first, bolting the upright members to the ceiling. Horizontal members are bolted to the uprights with spacers between the members to permit free movement of the stanchion bars and locking blocks, as shown in the sectional view. Although the horizontal and vertical members of the frame can be built of pine or fir, the unit will be much more serviceable and durable if built entirely of hardwood, such as oak. Note that both stanchion bars and locking blocks are fitted with bushings to prevent undue wear. The control rod is made from a length of $\frac{3}{4}$ -in. pipe and extends the full length of the stanchion row. Ordinarily, the control rod is placed about 18 in. above the horizontal members, but it can be placed somewhat higher when more clearance is necessary. After the unit has been completed, sand the inner edges of the stanchion bars and round the corners slightly.

This Automatic Stanchion is covered by Babson Patent No. 1953875 but may be built by (or for) you for your own use. Permission to build this stanchion or copy these plans for resale purposes is NOT granted.



Welding Generator Is Mounted On Knee-Action Trailer

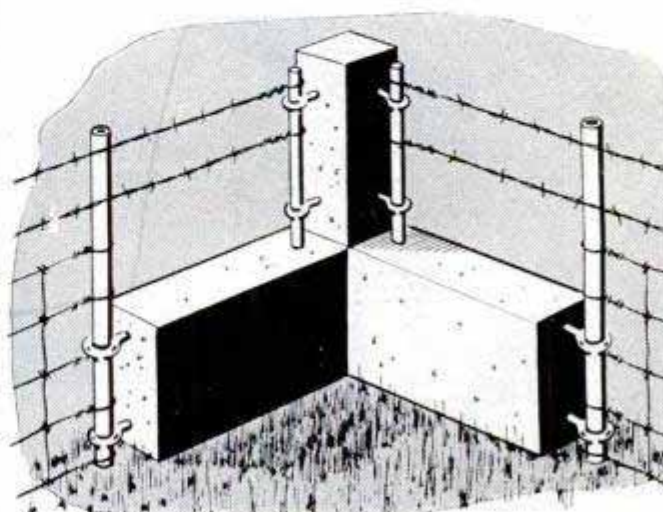
Needing a trailer for his welding generator that could travel over rough roads without damage to the equipment, one farm serviceman mounted the generator unit on a knee-action front end taken from an old car. All that was necessary was to provide mounting pads for the welder on top of the knee-action unit and add a suitable drawbar made from steel channel. A toolbox and racks for welding rods and materials can be added to suit individual requirements.

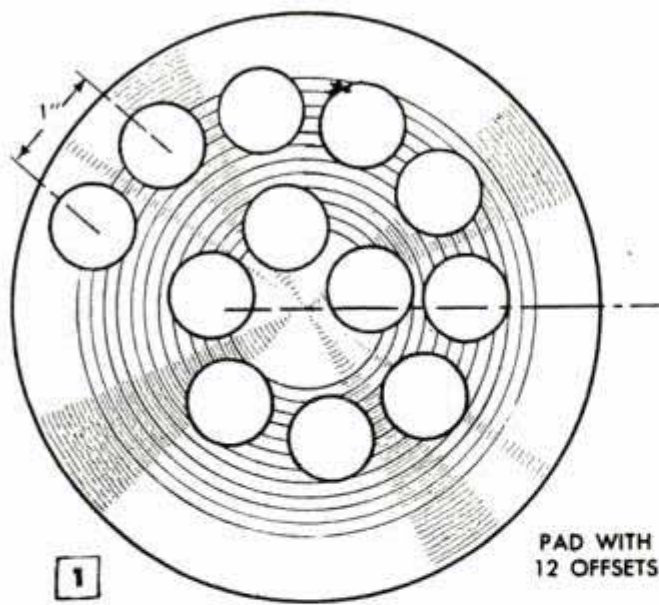
Removing Rust From Steel

Try this kink to remove light rust from steel surfaces. Rub the rusted areas with sweet oil and do not remove for at least 24 hrs. Then sprinkle unslaked lime over the oil and scour the rust off by rubbing with a coarse cloth.

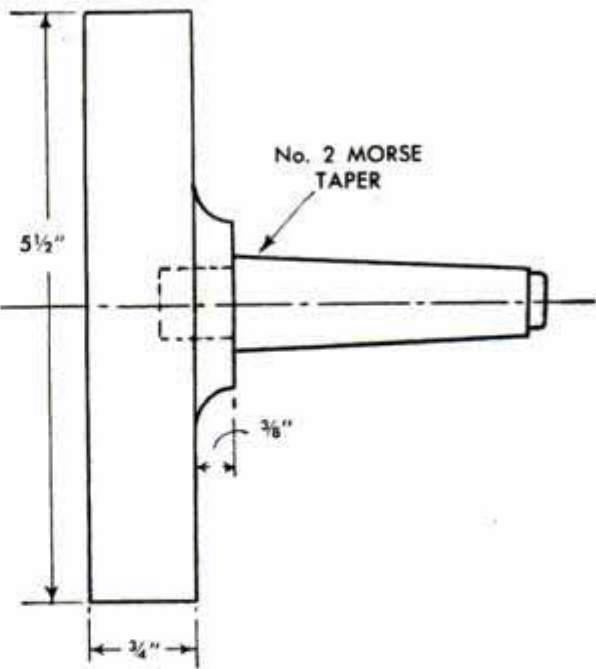
Corner Posts of Poured Concrete Eliminate Diagonal Bracing

Heavy concrete corner posts made up as shown in the detail will eliminate the need for diagonal bracing in the fence corners. The ends of the wire are attached to lengths of galvanized pipe which are inserted through large eyebolts set in the concrete.



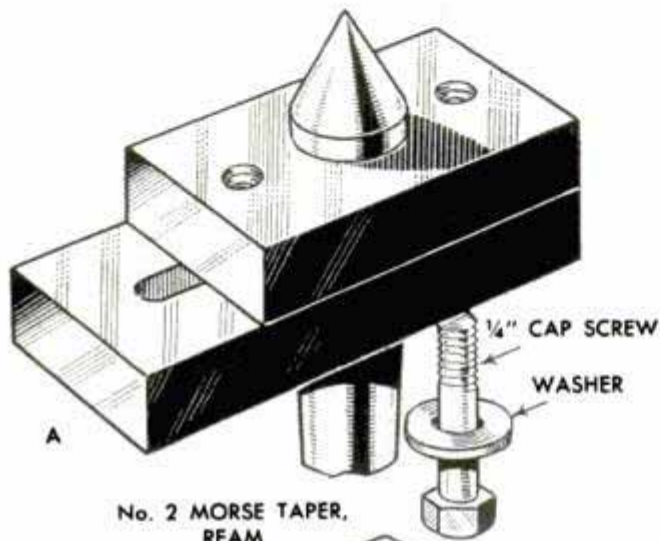


PAD WITH 12 OFFSETS

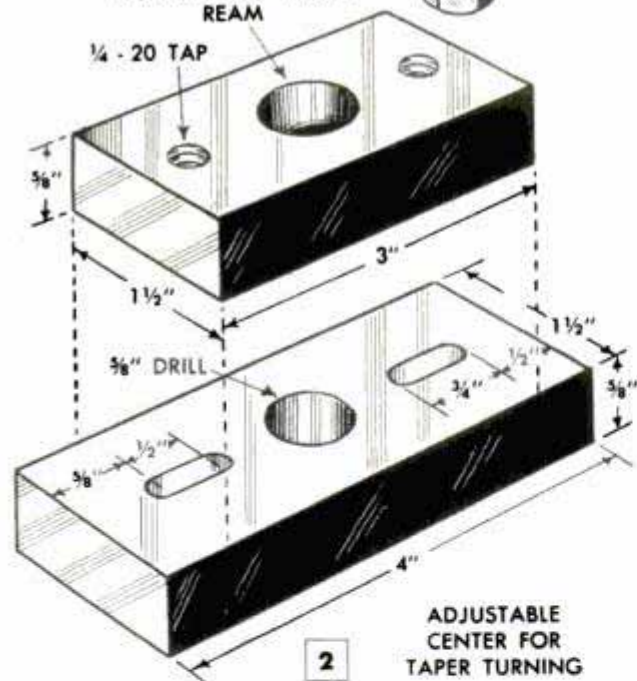


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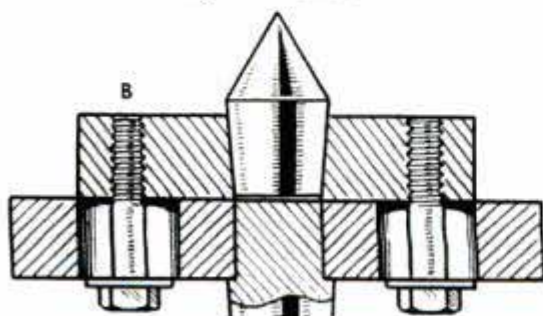
C. W. Woodson



No. 2 MORSE TAPER, REAM



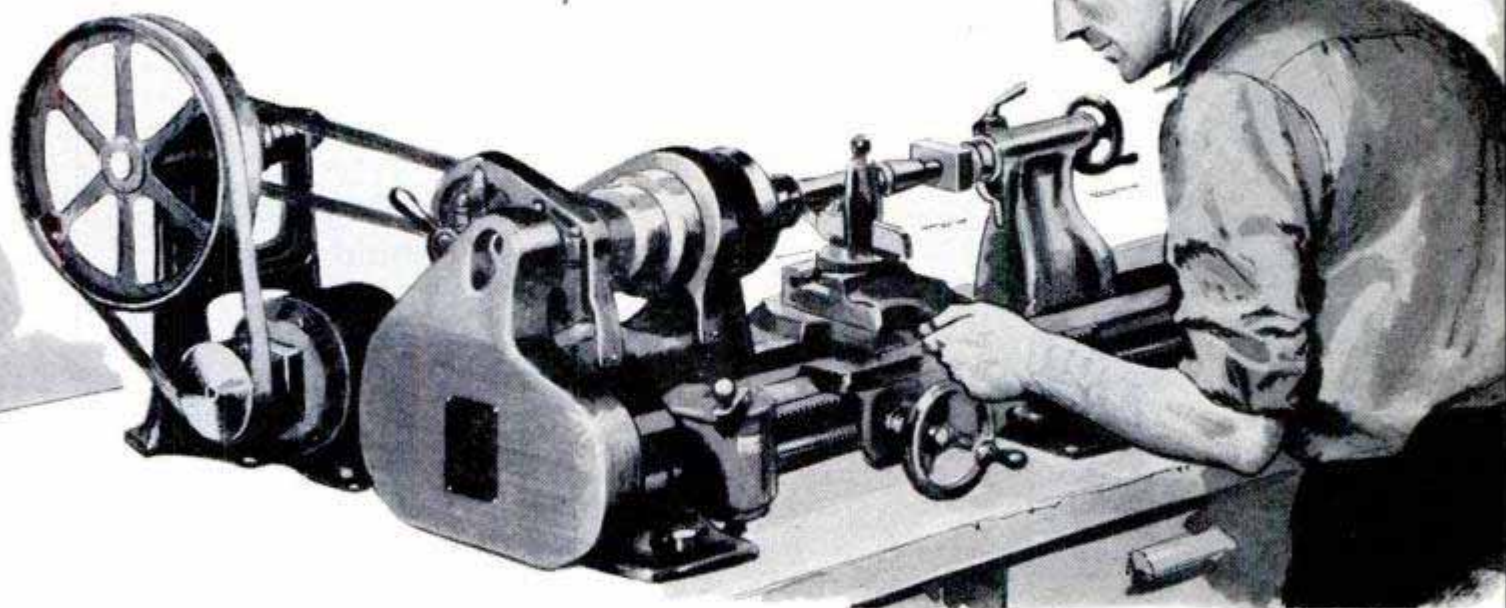
ADJUSTABLE CENTER FOR TAPER TURNING



IN THE SMALL SHOP, nearly all ordinary taper turning can be handled with the lathe compound or with offset centers, thus saving the cost of a taper attachment. Steep tapers on short turnings are easily turned by hand-feeding the compound, the work being held in the chuck. Offset centers of the adjustable and nonadjustable types designed to fit in the tailstock quill are easily made from stock materials. For repetitive work, a single-offset nonadjustable center, made as in the upper detail in Fig. 3, is especially handy as setup time is reduced to the minimum. It consists of a rectangular block of steel through which holes are drilled and taper-reamed for a tapered chuck arbor and a standard 60-deg. lathe center. The holes are accurately offset to give the degree of taper required. A similar type of center providing three offsets is shown in the lower detail in Fig. 3, also in Fig. 4, the latter being made by drilling and taper-reaming three holes in an ordinary drill pad to take 60-deg. centers in three different positions. On all three types the distance from the master center, or the degree of the taper, is stamped on the body of the unit so that the center for turning the desired taper is easily selected.

Some lathe operators prefer to mount the work to be taper-turned on a ball center of the type detailed at the right in Fig. 4. When turning tapers on large-diameter work, the ball center gives somewhat better results as the semicircular contact surface tends to prevent heating and scoring of the center hole in the work. The semicircular hole, or recess, in the end of the work is formed with a round rotary file. The ball-

TAPER-TURNING ATTACHMENTS

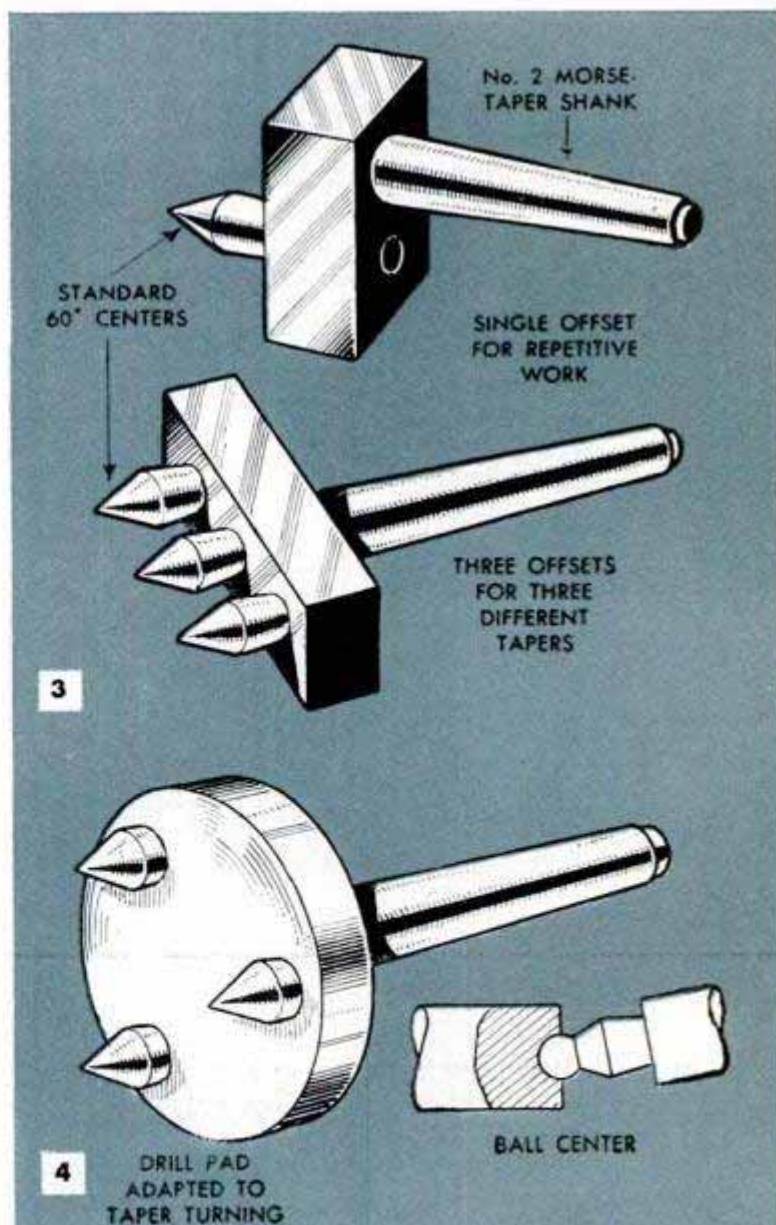


type center can be used in any of the units pictured and is especially useful in the offset units having multiple centers. All centers, either of the 60-deg. type or the ball type, should be machined and ground all over and if subjected to continuous, heavy-duty work, they should be hardened.

Another type, similar to the drill-pad adaptation detailed in Fig. 4, is shown in Fig. 1. This consists of a pad and separate tapered shank, the large end of which is shouldered and ground to a drive fit in a hole drilled and reamed in the center of the pad. After assembly, the face of the pad is scored with a spiral line as indicated, the spiral advancing $\frac{1}{8}$ in. per turn. Then a spiral line of holes is laid out on the spiral pattern as indicated. The holes are drilled to a uniform depth of $\frac{5}{8}$ in. and taper-reamed to take a single removable center either of the 60-deg. type, or the ball type.

An adjustable offset center, preferred by many machinists, is detailed in Fig. 2, A and B. This is built up by using two $\frac{5}{8} \times 1\frac{1}{2}$ -in. tool-steel blocks, the shorter block carrying the offset center being held in position on the longer block by means of cap screws inserted through slots cut in the larger block. Loosening the screws permits the smaller block to slide in either direction from center to the desired amount of offset. As shown in the sectional view B, Fig. 2, the offset center is fitted in a tapered hole while the stationary tailstock center is shouldered and ground to a drive fit in a straight hole drilled in the longer block. The slots in the stationary block should be filed or milled to exact width.

Taper turning by means of offset tailstock centers saves small machine shops cost of taper attachment



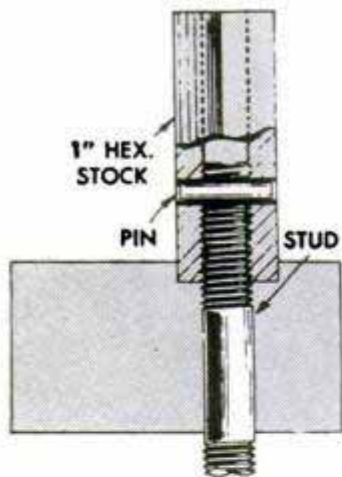
Water in Stock Tank Kept Cool By Oil Drum and Burlap Sacks



Water in a stock tank can be cooled to some extent by using an oil drum and two burlap sacks. Just place the drum in the tank bottom end up and drape the sacks over it as shown. Water drawn up into the sacks will evaporate and cause the drum to be cooled, which, in turn, will cool the water.

Stud Driver With Stop Pin Easily Backed Off Thread

The advantage of this stud-bolt driver is in the cross pin, which serves as a removable seat for the stud. When the latter has been driven, the pin is tapped out to provide easy removal of the driver from the stud. Made to fit two different sized studs, the driver is a 3-in. length of 1-in. hex stock, drilled and tapped lengthwise from each end, one hole running into the other. At the point where the holes meet, a hole is drilled transversely for insertion of the pin. The latter is cut from 1/4-in. drill rod and chamfered on both ends.



Mill-File Cleaning Tool Made From Steel Bar

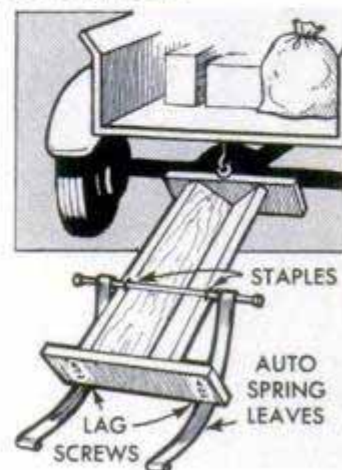
An excellent cleaner for a single-cut mill file can be made from a piece of 1/2-in. cold-rolled bar steel in the following manner: First, the file to be cleaned is held by its edges in a vise, the face being slightly above the top of the vise jaws. Now, holding the

steel bar as you would a chisel, place it on the file near the tang and push the edge of the bar firmly across the face of the file, keeping the stroke in the same direction as the teeth. This will produce matching "teeth" in the edge of the bar, forming a comb which is used to rake the file teeth clean by merely meshing the comb with the grooves in the file.

John Eichberger, Franklin Park, Ill.

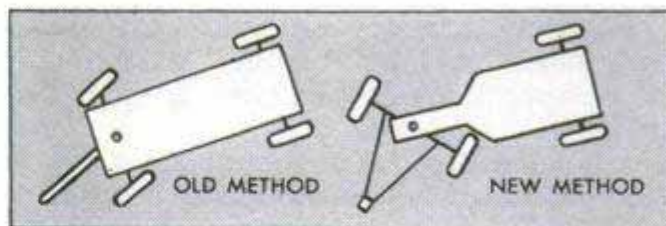
Skids Protect Feeding Trough When Towed Behind Truck

To permit towing a heavy feeding trough safely with a truck, one farmer equips it with skids made from the main leaves of two car springs and a length of steel rod. The leaves are screwed to the under edges of the trough end and the rod passed through the eyes of the leaves, as shown, and stapled to the top edges of the trough. A large screw eye is turned into the edge of the trough to permit hooking it to the truck.



Fifth-Wheel Steering Arrangement Adapted to Spray Trailer

In order to increase the maneuverability of his spray trailer, one farmer converted the conventional front-wheel assembly, which was taken from a car, to a fifth-wheel arrangement. First, the wheels were

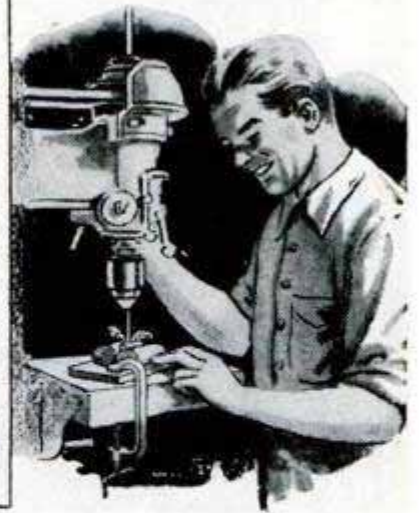
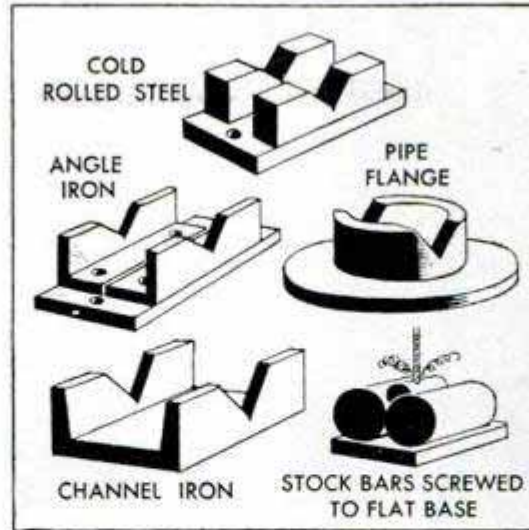


locked by welds at the steering knuckles. A short length of 6-in. channel steel was drilled to take the kingpin and welded across the top of the axle, web side up. Then, a ball-thrust bearing and kingpin assembly were mounted on the channel steel, the bearing being taken from the transmission of an old Mack truck. Finally, the sides of the trailer bed were cut back, as shown in the diagram, to provide wheel clearance when making sharp turns.

☐ A crack in a distributor cap can be temporarily sealed by applying nail polish.

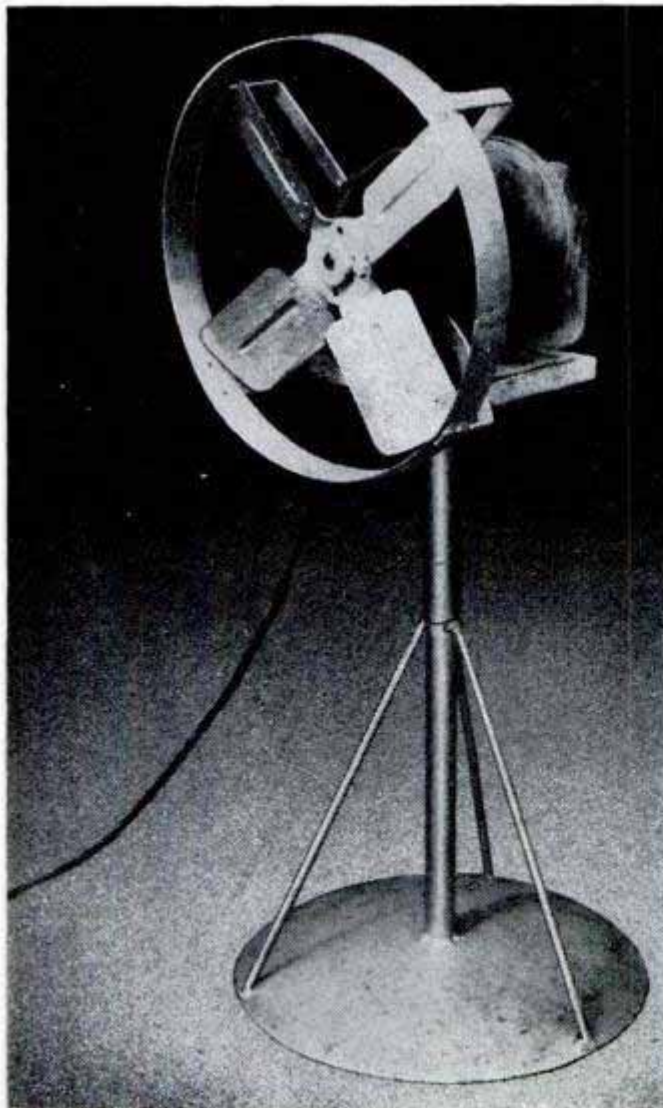
Designed to take advantage of the various shapes of stock materials, the drill-press V-blocks shown can be made with a minimum of machining. The upper illustration shows a block made from cold-rolled steel to which two heavy side bars are screwed. The bars should be clamped together and the notches cut on a shaper or miller. The block at left center is made in a similar manner, the notches being cut in vertical members of two lengths of angle iron. These are screwed to a cold-rolled steel base. Illustrated at right center is a V-block that is made by cutting notches in a large pipe flange, while the block at lower left is simply a short length of channel iron with notches cut in the flanges. Of course, it is important that the two notches cut in each of the four blocks mentioned be exactly the same size and

V-Blocks for Holding Round Drill-Press Work Designed to Utilize Stock Materials



depth so that when used the work will be supported at a right angle to the drill. However, the block shown at lower right can be made without cutting any notches, as it consists only of two round-stock bars that are screwed side by side to a cold-rolled-steel base. Here, the work is cradled between the two rods which form a vee.

Parts Salvaged From Scrap Pile Used to Make Welding-Shop Floor Fan



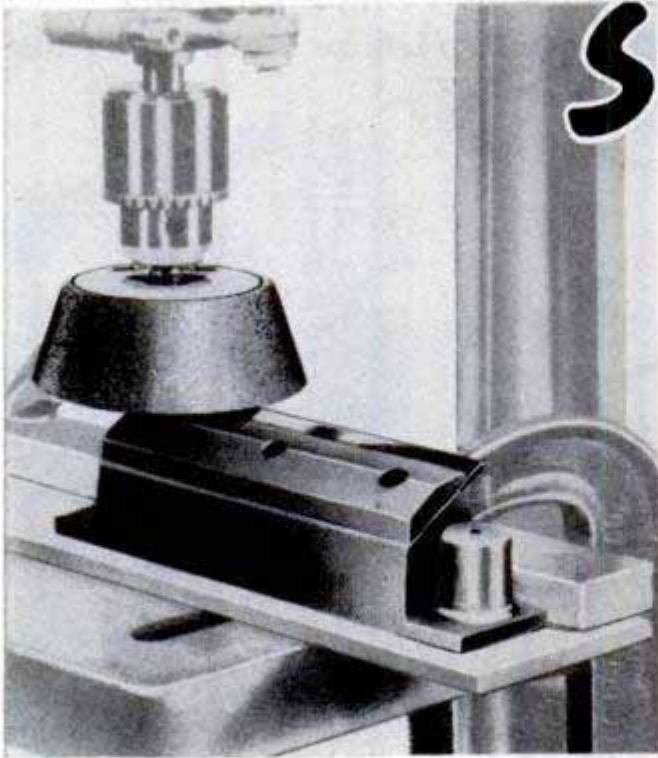
Needing a floor fan to drive off fumes and smoke when working in a closed shop, a welder made one that cost him little more than the $\frac{1}{4}$ -hp. motor. All other parts were taken from the scrap pile. A fan from an old-model car was fitted directly to the shaft of the motor and a simple guard was formed from a strip of sheet metal. This was held in position by four flat-steel braces that were welded to the guard and bent at right angles to bolt to the motor. To make the stand for the motor, a steel pipe was welded to a disk-harrow blade and braced with three steel rods as shown. A $\frac{1}{2}$ -in. steel plate was welded to the top end of the pipe and drilled to provide for bolting the motor. If desired, the front of the guard can be covered with coarse-mesh screen as a further safety measure.

Glycerin Speeds Handling Papers

Office workers or others who handle large quantities of papers or currency will find that a small amount of glycerin rubbed on the hands will make their job easier. The glycerin provides friction between the fingers and the papers, making the use of cumbersome rubber "fingers" or other mechanical devices unnecessary. A light application of glycerin will last for several hours and is not harmful to the skin. It can be obtained at any drugstore.

Alton M. Weiss, Nedrow, N. Y.

SHOPPING

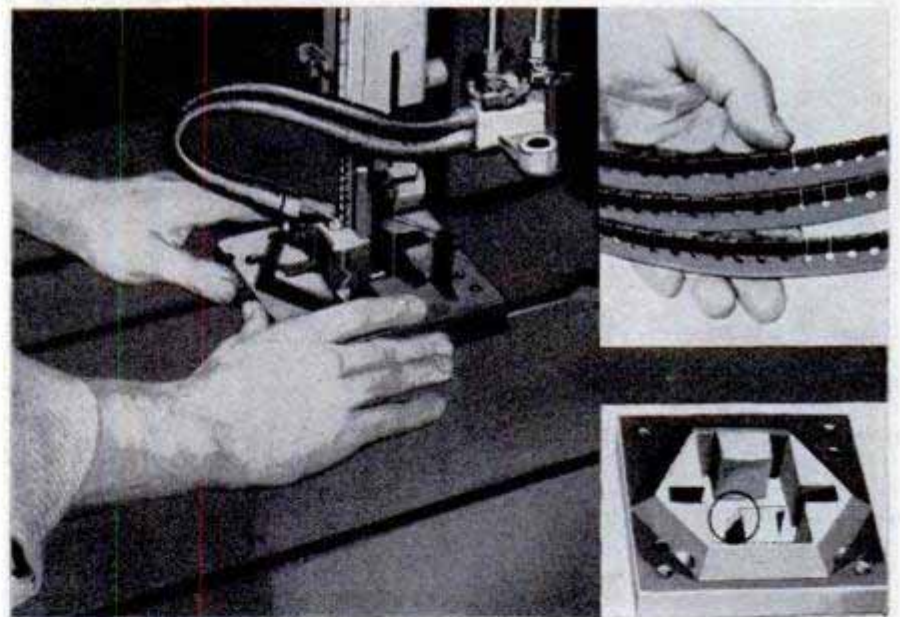


COMBINATION SHARPENING and reinstallation jig for 4 and 6-in. jointers has been developed for use with a cup-type grinding wheel driven by a drill press. The cup wheel is furnished with the jig and is fitted with a special arbor for use in the drill-press chuck. In use, the jig holds the knife at the correct angle for grinding. Installation of the knives in the jointer head is made easy by a gauge built into the jig



VERTICAL ROTARY ATTACHMENT for small screw-cutting lathes replaces the compound slide and permits work to be handled in the horizontal plane at any angle to the lathe spindle. Thus, jig boring, circular and radial milling, graduating and cam work are possible to do on small lathes in the popular sizes. Spindle nose is threaded to take standard lathe chucks and other attachments designed for use with these lathes

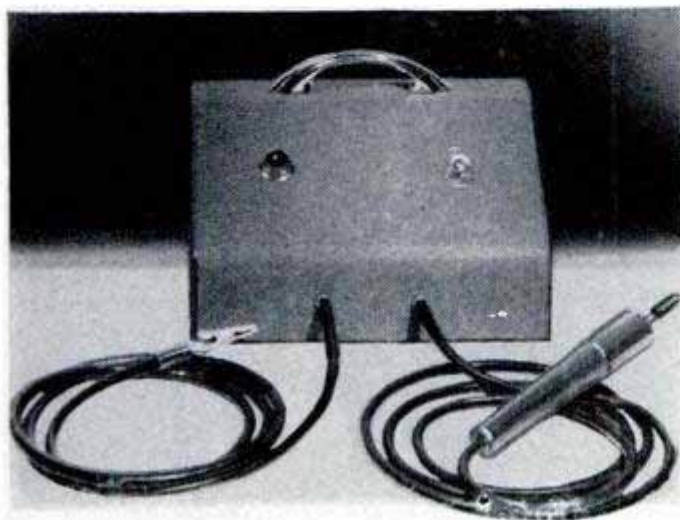
ABRASIVE BAND for use on industrial contour-grinding machines has been recently made available for grinding hard alloys; also glass, quartz, marble and granite. It consists of an alloy-steel band to which spaced abrasive matrices are attached by a welding process, and in the cutting action there is an equalized balance between the bonding and abrasive grits which constantly exposes new abrasive as the band wears. Made in two designs and two grit sizes to permit a variety of operations on hardened metals and wear-resistant, nonferrous alloys



ELECTRIC PAINT REMOVER peels paint, enamels and varnish to the bare wood in one easy stroke. The 200-watt heating element heats quickly to operating temperature. Unit is fitted with a 2-in. scraper blade of special design for lifting the softened paint film from the surface. In use, the remover is placed on the paint with the bottom, or shoe, parallel with the surface and is moved in a short, back-and-forth stroke

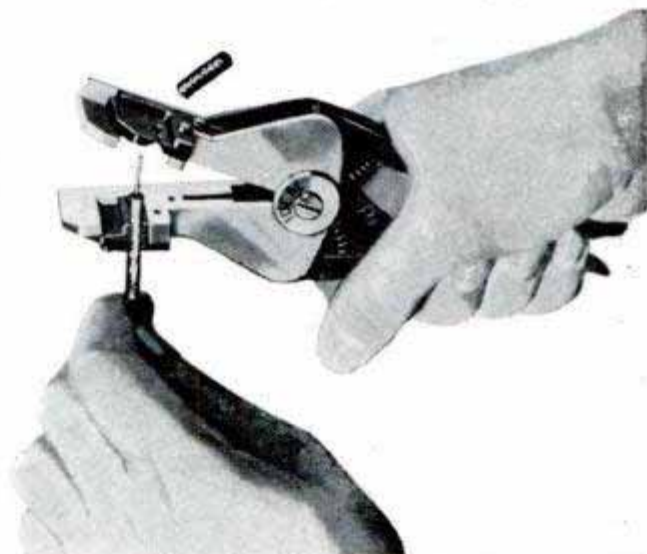
FOR TOOLS

FACE SHIELDS with interchangeable visors designed to protect against injury from impact of flying particles and chemical splash are available with three new headgear types furnished with and without spark guards. Basic headgear is fitted with a crown strap which supports the weight of the visor without the necessity of a tight fit around the wearer's head. Basic unit is constructed of hard, preformed fiber and is adjustable to a range of head sizes. Sweatband is padded to prevent chafing. Finger-controlled friction joints on each side of the headband permit quick adjustment of tension for holding the spark guard and visor in the desired position

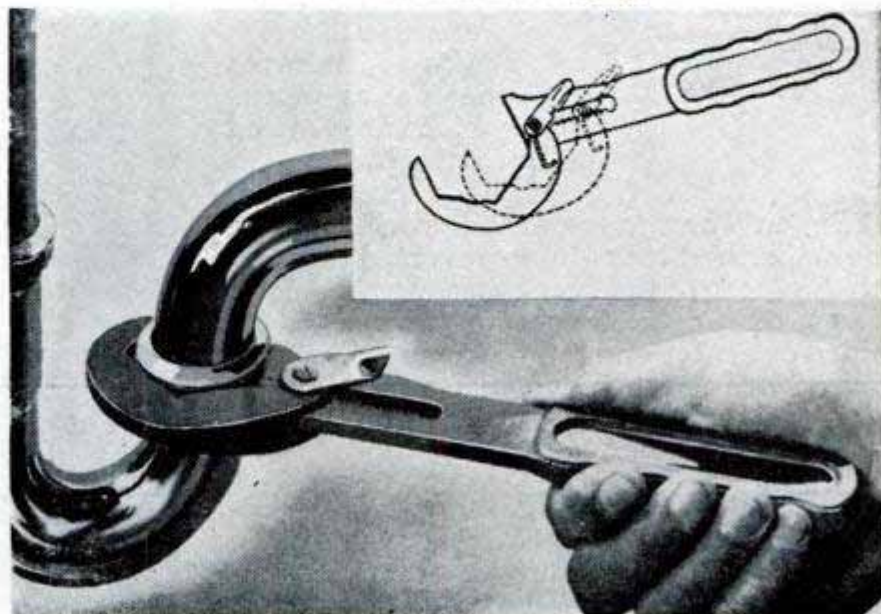


RESISTANCE SOLDERING UNIT is safer, faster on duplicate and multiple soldering operations on small parts. Unit is of the instant-heat, resistance type and operates on essentially the same principle as an arc welder. When used according to the manufacturer's instructions, unit is shockproof and highly efficient

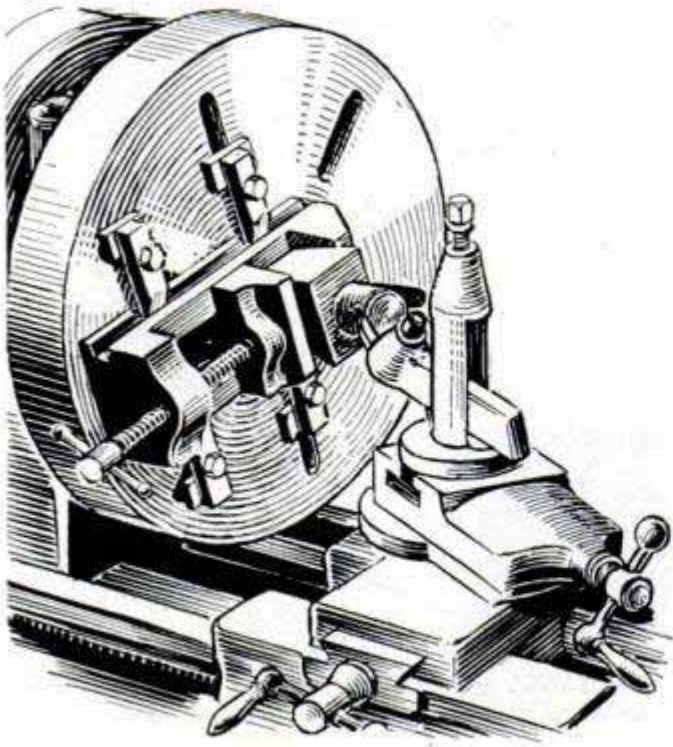
POCKET-SIZE WIRE STRIPPER now being manufactured features an automatic camming action that eliminates crushing of stranded wire while stripping. Squeezing the handles causes the tool to grip the wire, cut the insulation and strip it free in one operation. Made in four models and sizes to handle all common wire gauges from No. 8 to No. 22. Blades are interchangeable on all models. A fifth model is especially designed for radio and television servicemen. Average weight of about 10 oz. makes it easy to use the stripper continuously over long periods of time without causing undue fatigue



ADJUSTABLE WRENCH is especially designed for use on chrome-plated nuts without marring or otherwise damaging the plated surface. The jaws are instantly adjustable from 0 to 2½ in., an adjustment range which makes the wrench particularly useful to plumbers when assembling chrome-plated fittings on lavatories, bathtubs and sinks. The movable jaw is locked in any position by means of a spring-actuated ratchet arrangement which holds firmly

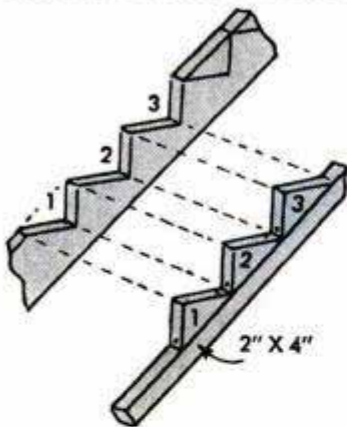


Odd-Shaped Faceplate Work Held With Drill-Press Vise



Odd-shaped work that is difficult to hold securely in a lathe chuck can sometimes be placed in a drill-press vise and the vise clamped to a faceplate. For safety purposes, the handle of the vise should be fastened down, and if high speeds are needed to turn the work, a weight should be attached to counterbalance the vise.

Stringer for Basement Stairs Made From Waste Blocks



Instead of using two planks to make a pair of stringers for a basement stairway, one carpenter does the job with only one plank and a 2 x 4. To do so, he saves the waste blocks which are sawed from the plank when cutting one

stringer. Then to make the other stringer, he nails the blocks in an inverted position to the 2 x 4. In the event three stringers are required for an extra-strong stairway, the third or center one can be made from waste blocks of the other two stringers.

Long-Life Fence Posts

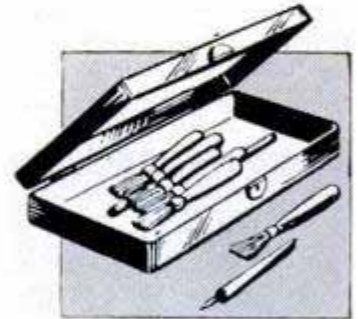
Improvement cutting in wood lots besides being good for the trees usually can be made to yield a number of fence posts. The posts should be stripped of about 30

in. of bark and placed in an oil drum filled with a solution of pentachlorophenol, 5 percent and range or fuel oil, 95 percent. After a 48-hour soaking, such posts will last at least 20 years, as compared with untreated posts which last only from 3 to 5 years.

Charles L. Stratton, Hollis, N. H.

Artist's Brushes Protected When Stored in Fly Box

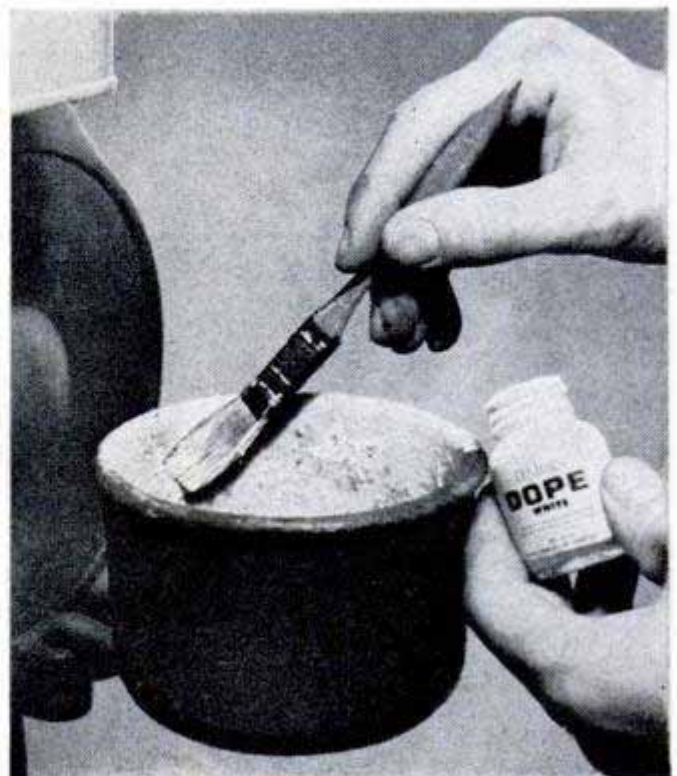
Fly boxes, of the pocket type used by fishermen for storing and carrying dry flies, make excellent storage cases for small quills and brushes used by artists and sign painters. Remove the felt pad



from the bottom of the box so that the full depth is available for storage of brushes. Before the brushes are placed in the container they should be thoroughly cleaned in turpentine or other suitable solvent, and then dipped in lard oil to prevent hardening of any residues remaining in the bristles.

Rustproofing Quenching Pots On Bench Grinder

The quenching pots on a bench grinder can be kept from rusting by coating the inside with collodion or airplane dope. First remove any accumulation of rust and then apply two or three coats to the inside surfaces, allowing each coat to dry thoroughly before applying the next one.

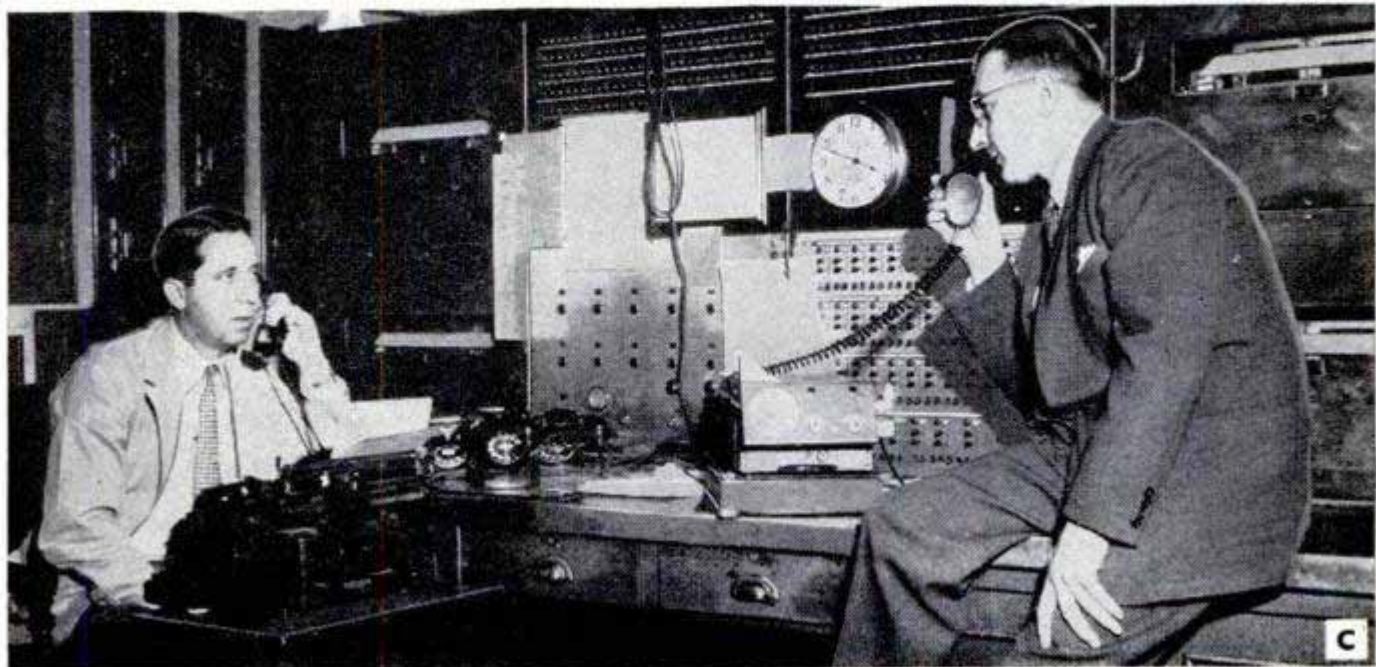


ROCKEFELLER CENTER *Trains for Civil Defense*

BECAUSE of its concentrated 15 modern buildings, Rockefeller Center might form a bull's-eye on Manhattan Island for enemy A-bombs. Keenly aware of this possibility, the center is girding itself for any emergency. After months of study, organization and training, the center recently conducted a series of tests under simulated air-raid conditions.

The total organization includes more than 1000 volunteers, and utilizes a wide variety of special equipment including Motorola FM two-way "handie talkie" portable radiophones and "pack sets." These permit instantaneous contact between points anywhere on the 12-acre development. Photo A shows one emergency squad in action putting out a fire in a corridor.

Photo B shows warden William Rodgers in the 16-story Eastern Air Lines building receiving a call for medical assistance from an upper floor over the house-phone system. He is relaying the request for aid to medical headquarters by means of the portable radiophone. The nerve center of the defense organization is the control board, photo C, located on the second floor of the 70-story RCA building. As the man at the left receives calls from the building wardens, instructions to first-aid and fire-fighting squads are relayed by the dispatcher.



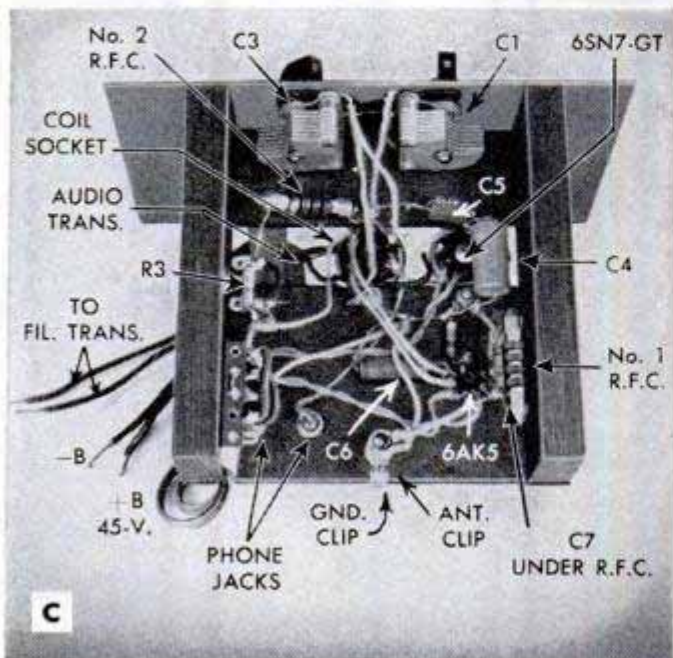
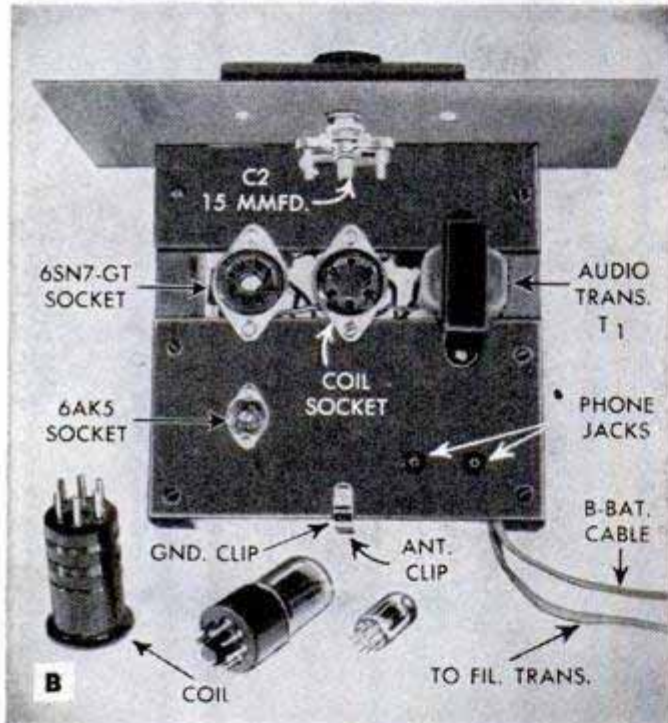
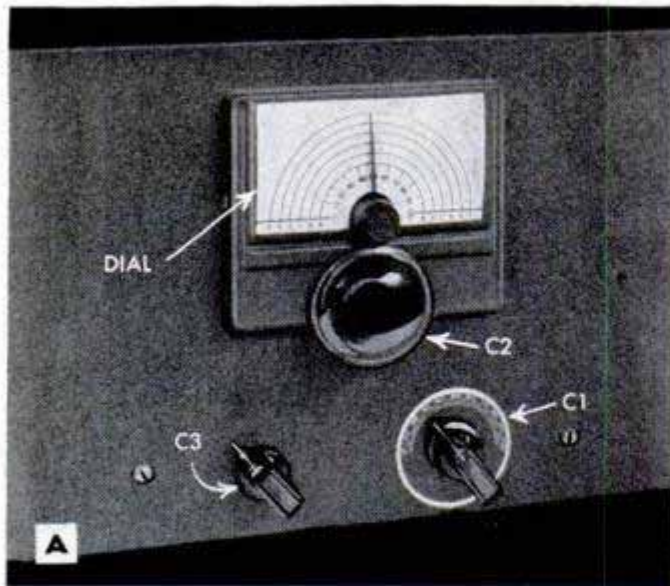
SIMPLE 80-METER CODE RECEIVER

By S. A. Johnson WØLBV

PERHAPS you have had a desire to become a radio amateur and participate in private two-way radio communication or experimentation, but have been discouraged in taking it up because of the 13-word-per-minute code examination. The new novice-class license, made available July 1, 1951, was good news for such would-be radio amateurs, as the code requirement is reduced to only five words per minute. This means that with a little practice using a key and a buzzer, and some concentrated listening with a homemade receiver like the one described in this article, you can build up sufficient code speed to pass the test and get on the air. The examination consists of the code test, sending and receiving at five words per minute and a short, simple examination in radio theory and law designed to test the very basic qualifications of the applicant. This novice "training on the air" license is issued for a one-year period only.

Once on the air, the "novice ham" can get the experience needed to go after a more advanced type of license. The new license sets aside frequencies within the 80-meter code band—and this band is ideal for the newcomer. It is a good year-round band, especially for middle-distance "rag chews" and it is a band for which it is easy to build equipment. The receiver described for construction in this article is an example of the kind of simple equipment that can be built, and it is adequate for the reception of code signals in the novice band. In addition, it will pull in the 80-meter phone stations and the 49-meter short-wave broadcasting stations, including DX. Only a short 10 or 15-ft. indoor antenna is required and this receiver can be used as part of a station without the necessity for an antenna changeover relay or other complications. It is designed with the idea that it is to become a part of a complete station for the novice. A suitable transmitter will appear in the October issue of *Popular Mechanics*. Photos A, B, C and D show various views of the completed receiver. The use of a short antenna improves selectivity—an important feature in a set which has only one tuned circuit for the sake of simplicity. A schematic circuit diagram with parts specifications appears in Fig. 1; the plug-in coil, Fig. 2, is wound clockwise.

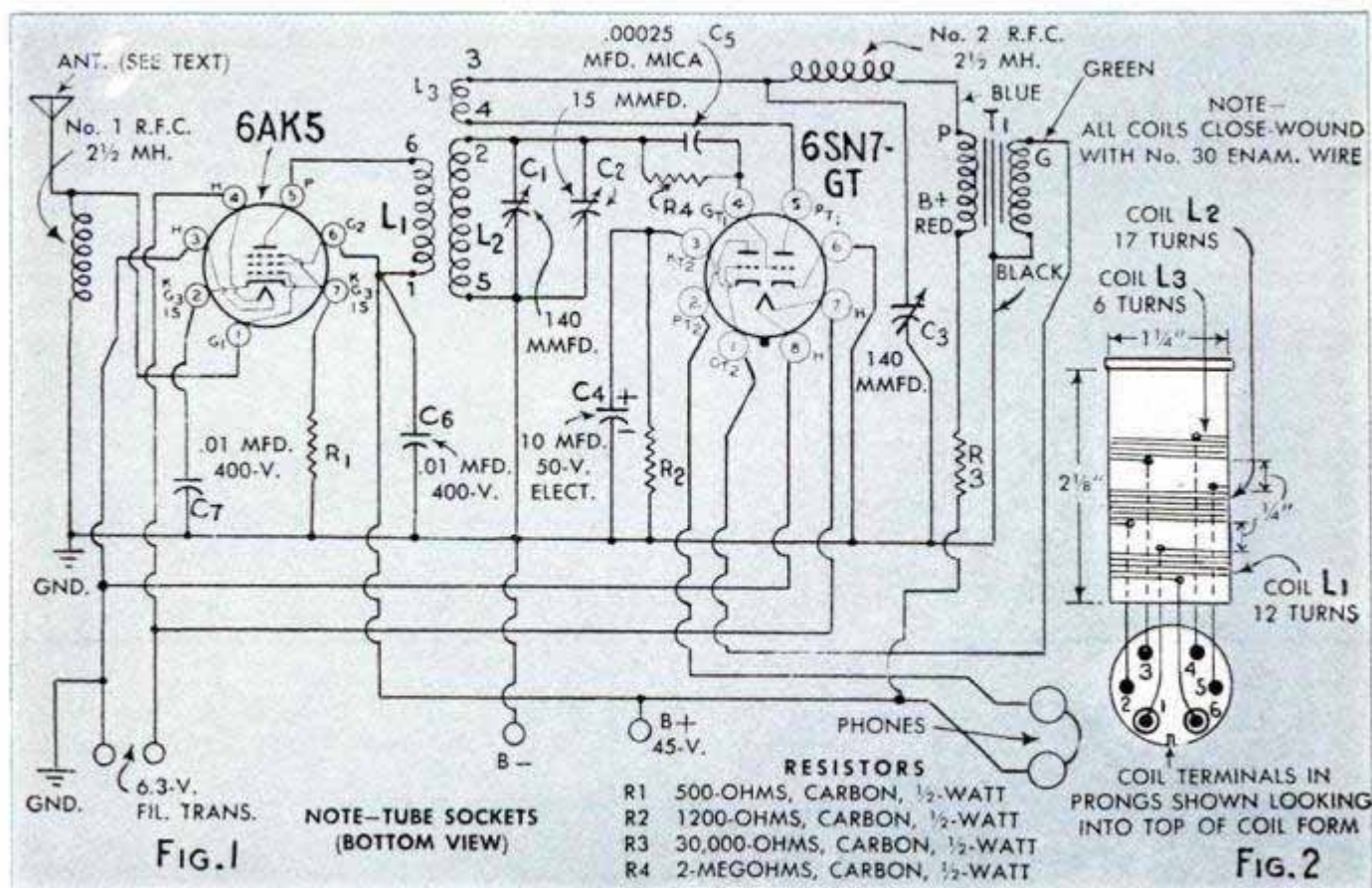
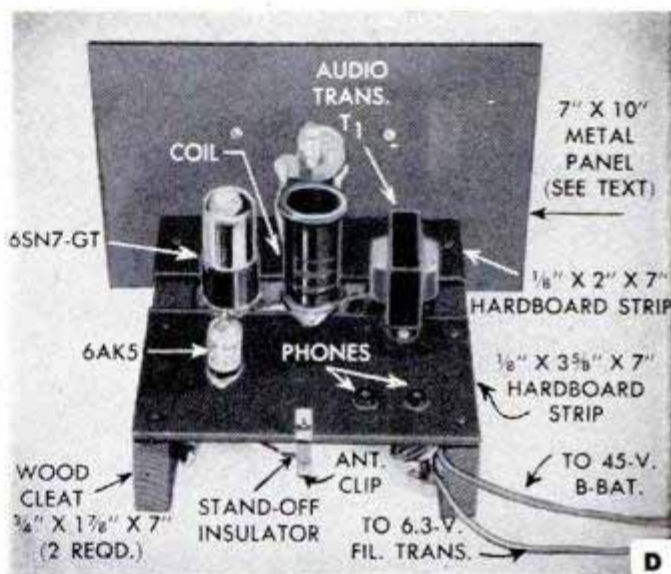
The set is built up on a simple chassis made of a couple of strips of hardboard mounted on wooden cleats. The strips are spaced the proper distance to permit



FOR THE NEW NOVICE HAM BAND

mounting the large sockets, thus eliminating the need for drilling. The chassis may be given a coat of dead black to harmonize with the black-crackle-finish metal panel. A 45-volt, B-battery and an inexpensive 6.3-volt 1-amp. filament transformer supply power for the receiver. An external ground connection is recommended for the set, as it will reduce noise and hum. In tuning the set, advance the regeneration control C3 until a soft "plop" is heard. Then rotate C1 (the band-setting condenser) until you hear stations in the 80-meter band. An easy way to locate this band is to first tune in 80-meter phone stations—the 80-meter code band is lower in frequency—just below the phone band. Lower in frequency, of course, means that condenser C1 is more fully closed than for the phone stations.

After the band-setting condenser has been set, final tuning is done with the C2 vernier hand-calibrated center dial, which tunes broadly and makes it easy to separate stations. No on-off switch is provided for in the diagram, Fig. 1, as it goes in series with the primary of the filament transformer and can be mounted at any convenient point on the operating table. Of course, the transformer is merely turned off to silence the receiver. This arrangement will be altered if the receiver is used in connection with the transmitter. The detailed student material list for this receiver is R-403.



SMALL CUBICAL

By Dr. Richard C. Hitchcock

THIS FOLDED exponential horn, in a 20-in. cube, has remarkable range of frequency response. Previous exponential horns have pleased the music lover and high-fidelity enthusiast, but they were either too high for use in a living room or, if they were low enough, they lacked high-note response. It is well known that high audio frequencies leave a speaker diaphragm as a narrow beam, and with earlier low speakers the beam was too low to reach the listener's ear.

A simply constructed acoustic prism solves this problem as shown in the accompanying diagrams. The speaker is inclined 30 deg., and the prism also bends the high notes 30 deg., so that you can hear the beam even if you are standing. A good 8-in. PM speaker is small enough to reproduce the high notes of fine music, yet large enough to move air for the bass tones. The bass tones come from the back of the diaphragm, and the exponential horn carries them around so that they emerge from the front of the assembly. Low tones bend readily as they have no beam effect.

Since no absorption is required, or desired, the efficiency is high, and $\frac{3}{8}$ -in. plywood is adequate for construction. All joints should be carefully glued and nailed. The 8-in. speaker should be an extended-range type with a power-handling ability of about 7 watts. From the 8-in. driver, the horn reproduces low notes as well as 15-in. speakers. Further, the use of a single reproducer eliminates crossover networks and intermodulation distortion. This distortion is present in many two and three-element loudspeaker systems. It is prevented in this design because the horn loads the

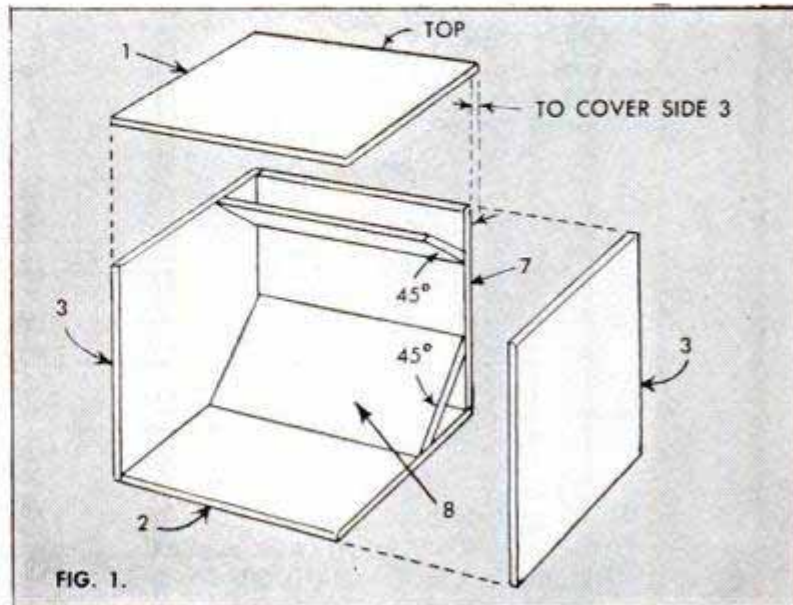
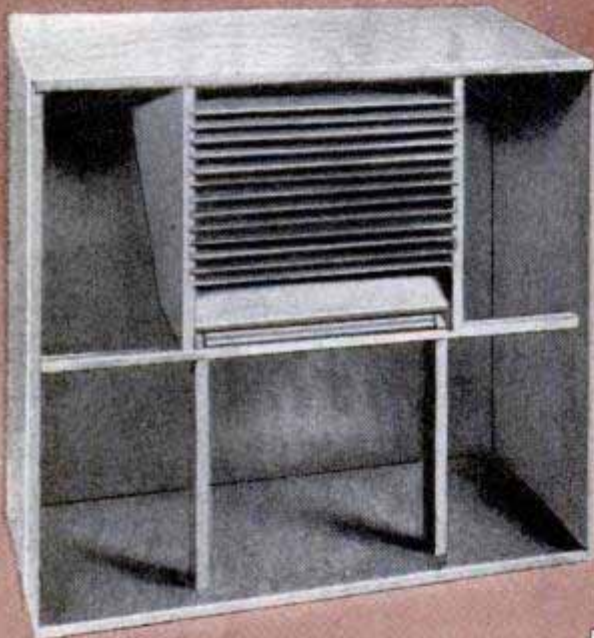


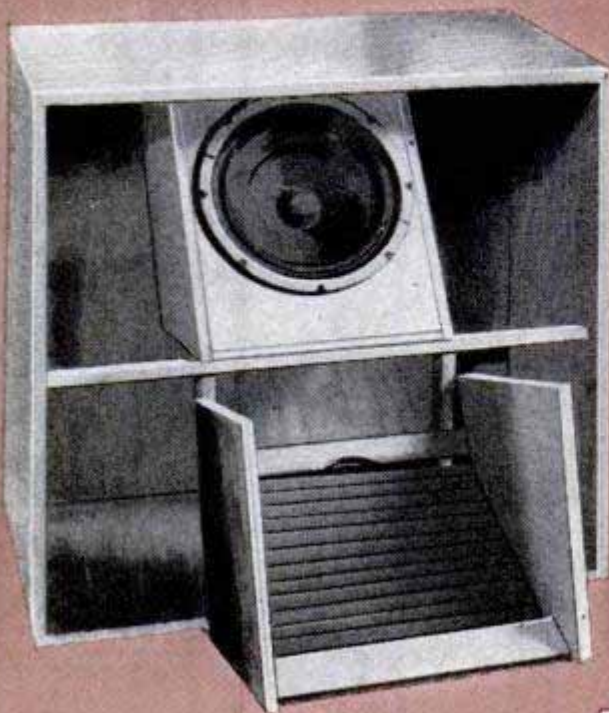
FIG. 1.



A



B



C

EXPONENTIAL HORN

single diaphragm. You will find that this speaker-horn combination sounds as loud with 7 electrical watts input, as 28 watts to a speaker equipped with an infinite baffle (a tight box lined with absorbent material). You gain an additional advantage as your amplifier has less distortion at lower power outputs, and less than 7 watts will drive the horn so clearly that you will not have to turn up the gain on your amplifier.

Photos A, B and C show various views of the completed unit. The acoustic prism, which bends the high notes, is a series of parallel and horizontal sheets glued into the sidepieces, $\frac{3}{8}$ in. apart. These sheets can be heavy cardboard, plastic or metal. Fig. 1 shows the first step in assembly with the right-hand side and top removed. The speaker panel, housing and braces are detailed in Fig. 2. All dimensions can be easily checked in the material list. Fig. 3 is a cross section through the middle, showing the prism. Note that the back of the speaker housing is open to the horn. Fig. 4 shows the acoustic prism, partly and fully assembled. The front grille detail is quite simple as will be noted in photo A. Either heavy grille cloth or brown flock-coated grille screening may be used. This grille screening is galvanized wire mesh, flocked on both sides. Another grille material now available is Lumite-plastic grille cloth. It requires no backing and is of the wide-mesh basket-weave type.

Operating as an auxiliary speaker, this folded exponential horn can be used with any high-grade radio receiver or audio amplifier. With an amplifier, such as the super-fidelity type described in the February 1951 issue of *Popular Mechanics*, excellent results are possible.



MATERIAL LIST

Item	Reqd.	Name	Dimensions	Inches
1	1	Top	20 X 20 X $\frac{3}{8}$	
2	1	Bottom	20 X 19 $\frac{1}{4}$ X $\frac{3}{8}$	
3	2	Sides	20 X 19 $\frac{3}{8}$ X $\frac{3}{8}$	
4	1	Speaker Panel	10 $\frac{1}{2}$ X 8 $\frac{1}{2}$ X $\frac{1}{2}$; 30°, 30°	
5	2	Sides, Speaker Housing	9 X 13 X $\frac{3}{8}$ (See Fig. 3)	
6	1	Slant Panel	8 X 19 $\frac{1}{4}$ X $\frac{3}{8}$; 45°, 45°	
7	1	Back	19 $\frac{1}{4}$ X 19 $\frac{1}{4}$ X $\frac{3}{8}$	
8	1	Slant Panel	12 X 19 $\frac{1}{4}$ X $\frac{3}{8}$; 45°, 45°	
9	1	Bottom Speaker Housing	9 $\frac{1}{4}$ X 10 X $\frac{3}{8}$	
10	1	Brace	1 X 19 $\frac{1}{4}$ X $\frac{1}{2}$	
11	2	Brace	1 X 9 $\frac{3}{4}$ X $\frac{3}{4}$	
12	2	Prism Sides	7 X 9 X $\frac{3}{8}$	
13	2	Prism Braces	$\frac{3}{4}$ X $\frac{3}{4}$ X 9 $\frac{1}{4}$	
14	17	Prism Vanes	Cut to fit prism sides (Item 12)	

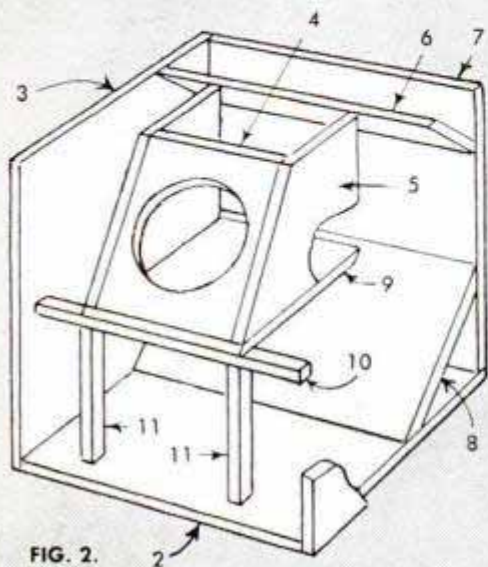


FIG. 2.

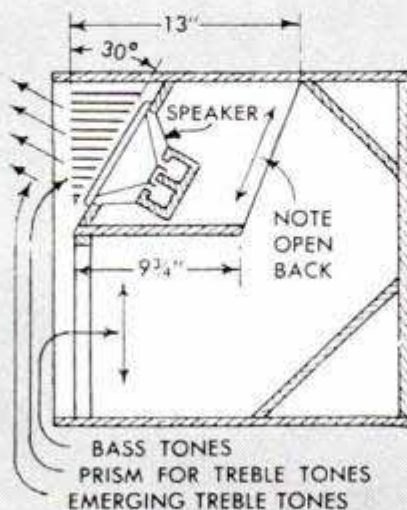
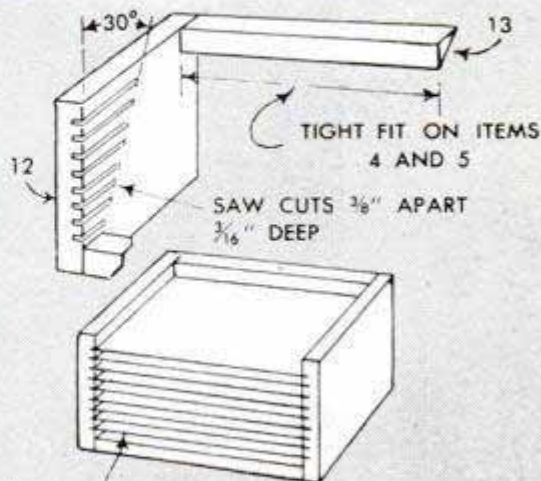


FIG. 3. CROSS SECTION SHOWING PRISM



VANES: 14 CARDBOARD, PLASTIC OR METAL

FIG. 4. ACOUSTIC PRISM

RADIO and ELECTRONICS TODAY



A—Geiger counter employs loudspeaker instead of headphones for safety of uranium-ore prospectors working in rattlesnake-infested regions. Headphones prevented the prospector from hearing the rattlesnakes and brought some unpleasant surprises. The loudspeaker can be heard up to 35 ft. away under ordinary conditions. Neon blinker also records count

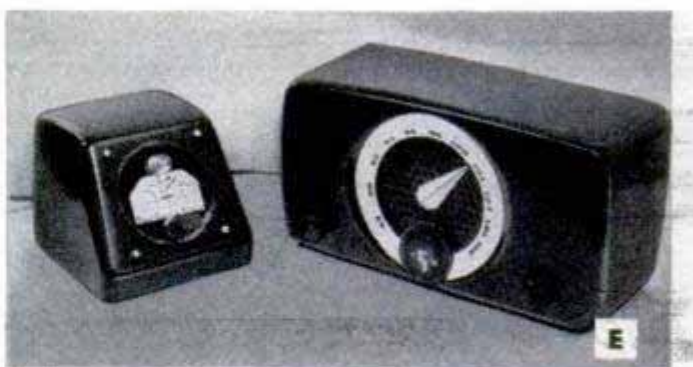
B—Electronic secretary not only answers the phone during absence of office personnel and records the caller's message, it also includes a complete standard wire recorder which serves as a handy dictation machine. These electronic telephone-answering machines tell the caller when his party will return to the office or where he can be reached in an emergency

C—Increased range is claimed for this portable FM radiotelephone. It is a compact two-way self-contained radio station, weighing only 14 pounds, and the rated output is 2 watts. The FM transmitter employs 10 tubes; there are 12 tubes in the receiver, all contained in one compact crystal-controlled unit. Operates efficiently on either wet or dry batteries

D—If you are one of the many TV-set owners using a "rabbit ear" indoor antenna, you probably will be interested in this camouflaged version in a flowerpot base recently demonstrated in the Chicago Merchandise Mart. The extended rods are seated in turning sockets for easy tuning positions. The ceramic flowerpot comes in green, yellow, black and maroon

E—The small electronic device shown at the left of the table-model receiver is an automatic alarm that is attached by a plug to any radio or TV set and acts as a silent sentry during the periods of the day or night when the home receiver is turned off. In case of attack, civil-defense authorities have control signals transmitted from one or more broadcasting stations which activate the alarm and turn on the radio or TV set for loudspeaker signals to awaken and alert the household so that CD warnings and instructions can be transmitted in emergencies

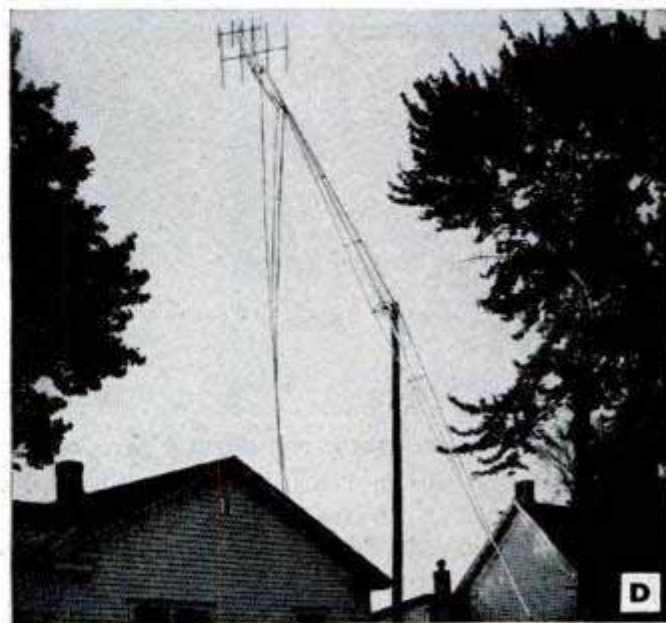
F—Small light-duty turntable comes in several useful variations including vertical, horizontal and upside-down types for special-purpose applications



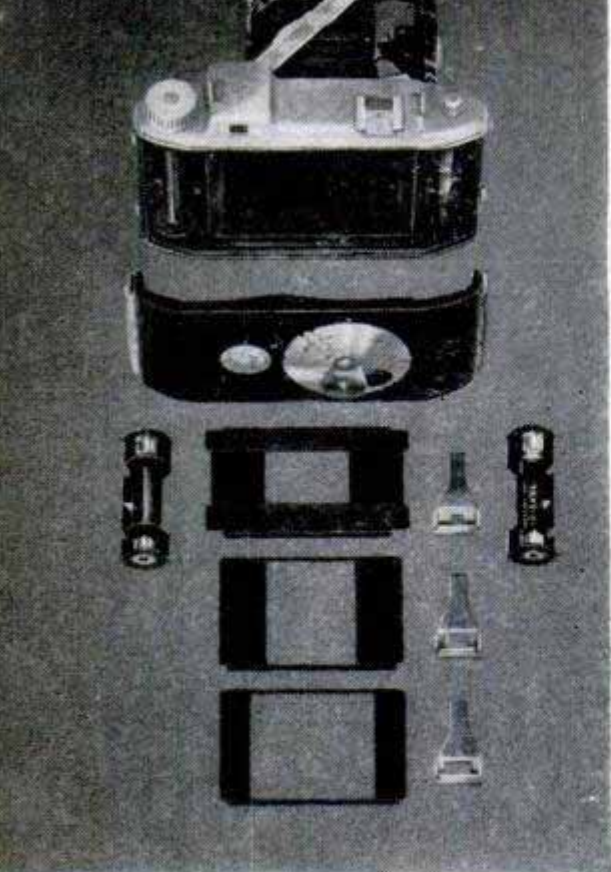
FRINGE-AREA TV ANTENNA EASILY SERVICED

GOOD television reception in rural areas, remote from broadcasting stations, usually depends on the height of the TV antenna aboveground. A local welding engineer, in an area where a height of 65 ft. was necessary, worked out the installation illustrated which has been enthusiastically received by residents of the community.

Its advantages are easily understood at a glance, as all the owner has to do to bring down the TV array for repairs is to unfasten the lower end of the balanced mast, as in photo A, and pull down the top end with a rope as illustrated in B, C and D. Then make the necessary soldered connections to broken twin-line leads, or other repairs, and rotate the mast back up into position. A heavy 35-ft. pole eliminates the need for a tower, and no guy wires are required. Built of ordinary pipe in $\frac{3}{4}$, 1 and $1\frac{1}{4}$ -in. sizes, with the heaviest pipe in the center, the mast is welded throughout. The pipe alone, of course, is far too weak to bear the strains imposed upon it so the welder designed an ingenious system of "fiddle" braces and struts, which strengthen the mast for the terrific strain which the center, or hub, must bear when it is rotated in "propeller" fashion. There are four sets of these braces. The long hub braces extend 20 ft. from the center. The mast is mounted on the supporting pole by means of a metal sleeve, which slips down over the top of the pole and to which a bearing is attached. A heavy kingpin, welded horizontally at the center of the mast, fits in the bearing to provide the means for balanced pivotal rotation.

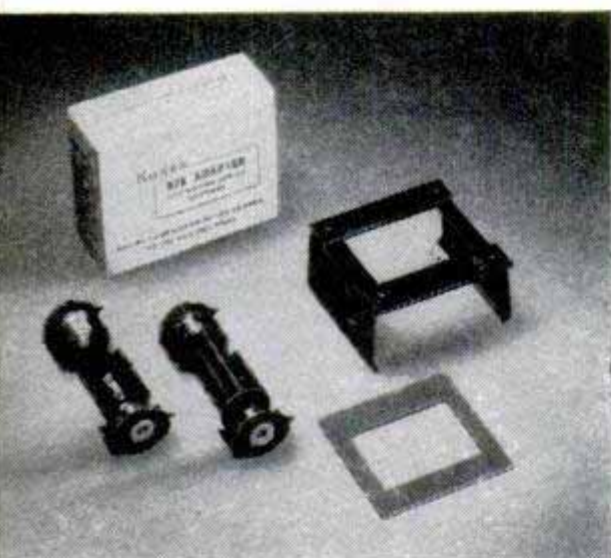


Color Cues



Inexpensive kits adapt Kodak Tourist and Reflex Cameras for Kodachrome Film

Kodak Tourist Adapter Kit, \$15.50 (left), and the Kodak 828 Adapter for Kodak Reflex Cameras, \$5.35 (lower left), permit picture taking in gorgeous full color on Kodachrome or Kodacolor 828 Film. The Tourist Adapter Kit, for de luxe "Tourist" models, also lets you take economical half-size and square pictures on all Kodak 620 Films. Both kits include back-frame masks, view-finder masks, and special spool baskets.



For dramatic skies without changing other color tones

By polarizing sunlight, a Kodak Pola-Screen can change a vacation snapshot into a prize-winning photo. For color, black-and-white. Accessory Kodak Pola-Screen Viewer slips over handle—"previews" varying sky tones you can obtain. Pola-Screens, from \$6.50. Viewer, \$6.50.



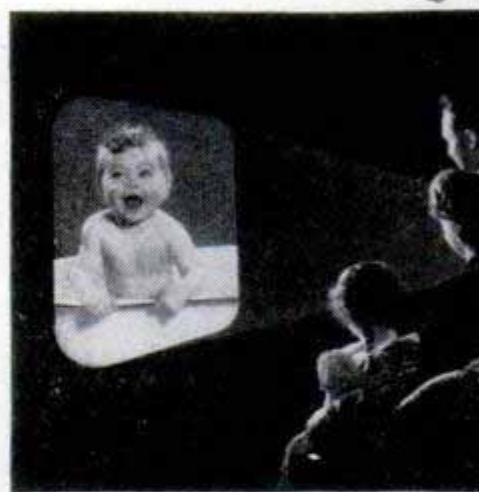
Get in the picture yourself

The Kodak Auto-Release automatically trips shutter 10 seconds after you set it. For cameras with cable release socket. \$4.50 (cable release not included).



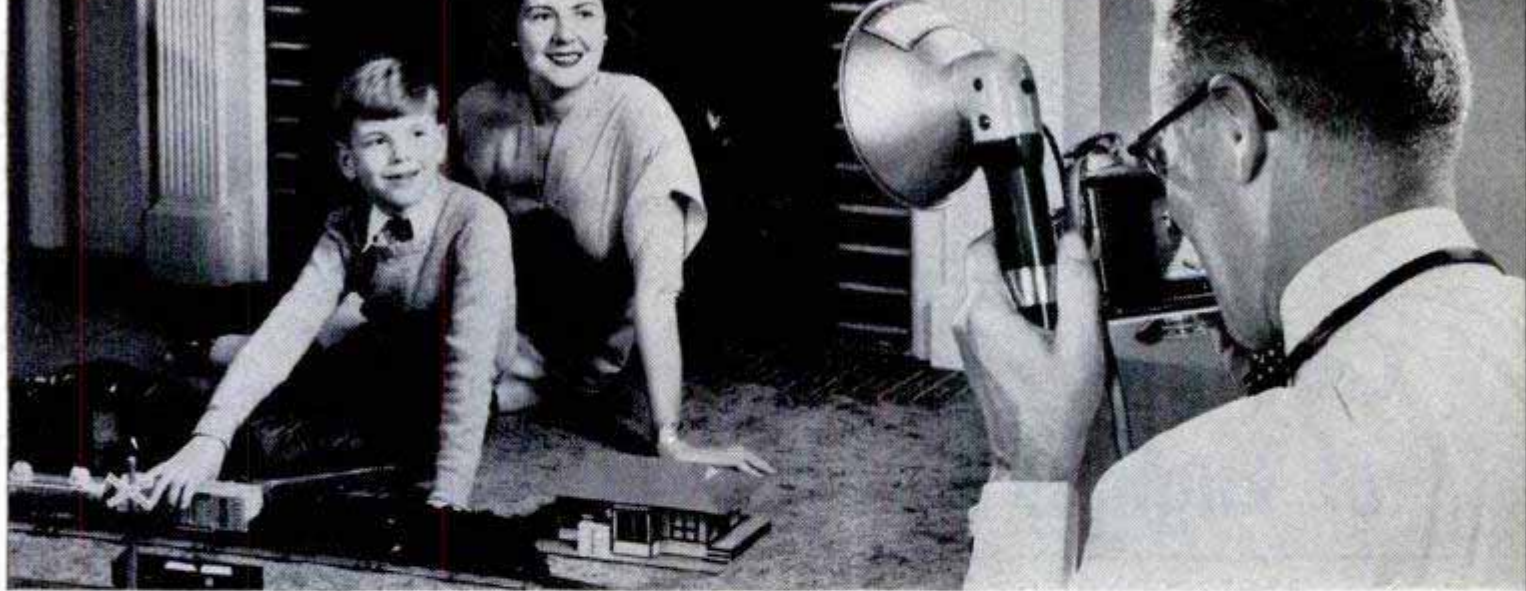
Share color prints with friends

From 35mm. or Bantam-size Kodachrome transparencies you can now get Kodacolor Prints (3½x5 inches), \$.36 each, plus \$.40 for negative on first print from each slide.



Share duplicate slides, too

For friends with projectors or viewers, there's no more welcome gift than "dupes" of your favorite slides. One to three duplicate slides, mounted, \$.25 ea.



"Never-fail" flash! Ingenious new device assures correct flash synchronization every time!

In single flash or multiple flash, you may have experienced costly flash failures. Or perhaps you've been disappointed with shots "out of synch." But now there's a simple adapter made by Kodak that puts an end to worries like these once and for all. It's the Kodak B-C Flashpack. Here's how it works:

If your present flash unit accepts two "C" batteries end to end, remove these batteries. Take the Kodak B-C Flashpack, insert a 22½-volt photoflash battery, and substitute this combination for the two "C" batteries.

Replace the reflector and you're ready to take pictures. The battery in the Flashpack charges the condenser, which releases an unflinching abundance of energy to ignite the lamp. Fires up to three extension units in perfect synchronization. Disk for shorting out battery contact in extension unit is supplied with Flashpack. Price (without battery), \$2.95.

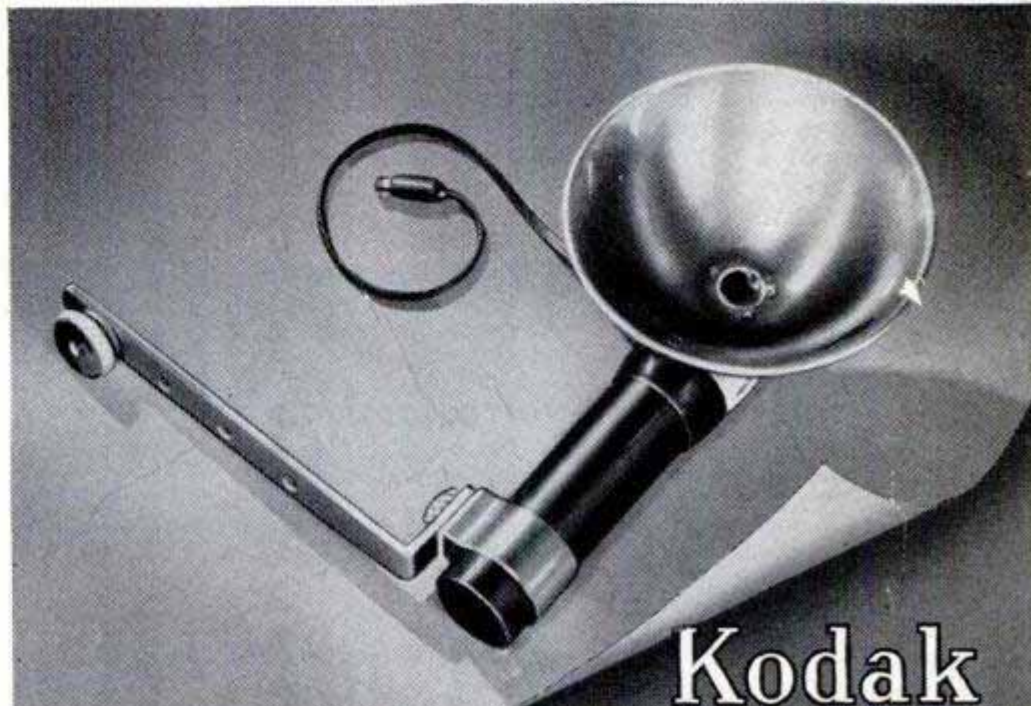


Highly popular Flashholder

Kodak Flashholder, Model B, with Flashguard, attaches easily to any camera that has a flash shutter. Back of reflector carries exposure data. Kodak 2-Way Flashguard (not illustrated), a hood that slips over reflector, offers protection in case lamp shatters. Diffuse side of Flashguard produces softer illumination for color shots. Price, complete, \$12.35.

Be sure to see all of these accessories at your dealer's.

Prices subject to change without notice, include Federal Tax where applicable. Consult your dealer.



Kodak

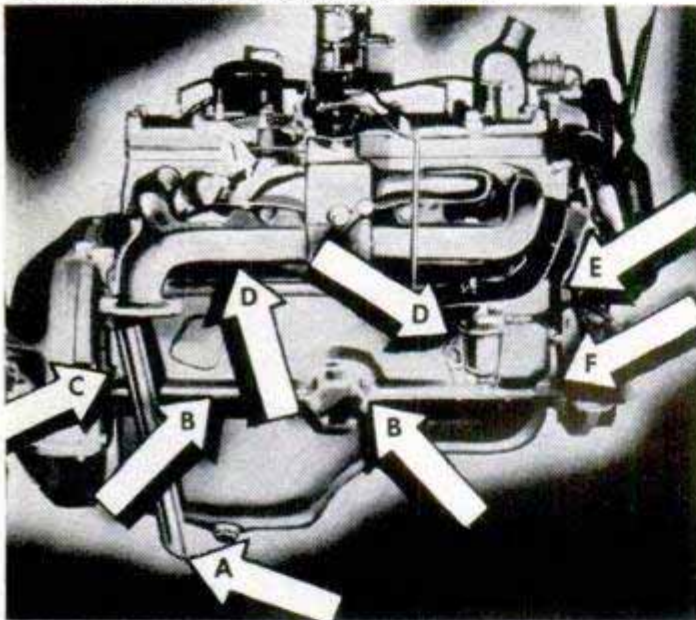


Care and Feeding of Engines

BY S. P. CORP

PROSPECTING FOR OIL?

Are you hunting for the oil that disappears from your crankcase? Oil leaks can cost you real money. Hot weather is a good time to hunt for them. Gaskets dry out and let oil seep through. Such leaks and others can be located by placing a large piece of clean paper on the garage floor and driving the car over it so the paper is under the engine, after the engine has been run enough to be thoroughly heated.



Let car stand over paper all night, then check spots of oil in relation to the engine. Look for leaks at the points indicated in the picture:

- A. DRAIN PLUG**—Check oil pan drain plug for a leak.
- B. OIL PAN AND GASKETS**—Look all along gasket surface; check tightness of screws.
- C. REAR MAIN BEARING OIL SEAL**—Oil on under side of clutch housing indicates a leak here.
- D. VALVE COVER GASKETS**—Make sure they are tight and not misplaced. This is the gasket around the top of a valve-in-head engine.
- E. TIMING GEAR COVER GASKET** around cover at front of engine should be tight. Can be seen best when car is on hoist.
- F. FUEL PUMP**—Oil on engine block below fuel pump or under side of oil pan at this point indicates fuel pump mounting bolts are loose or that gasket is cracked.

YOU MAY NEED NEW RINGS

If your car is *burning* oil, you need new Sealed Power Piston Rings. Sealed Power MD-50 is the best oil control ring ever built, the only ring with the Full-Flow Spring. Sealed Power Chrome-Faced Rings deliver triple mileage. Write for free illustrated booklet, "7 Ways to Save Oil." Address Sealed Power, Dept. G-9, Muskegon, Michigan.

You Name It!

Here are the correct answers to the "You Name It!" Photo Quiz on pages 148 and 149.

- | | |
|----------------|----------------------|
| 1. Red cabbage | 6. Crystallized salt |
| 2. Walnut | 7. Pencils |
| 3. Cigarettes | 8. Pliers |
| 4. Corn on cob | 9. Hairbrush |
| 5. Feather | 10. Soda straws |

They Make Jewels at Home

(Continued from page 93)

brittle. Most lapidaries have some nameless stone of rare beauty in their collection.

There are four basic steps to cutting a gem: sawing, grinding, sanding and polishing. There are numerous lapidary outfits on the market to perform these operations ranging in price from about \$30 (without electric motor) on up. Most outfits include a grinding wheel, convex sanding lap, a leather or felt polishing buff, diamond saw, a lubricating attachment with a metering spigot, polishing compound, dop sticks and dopping wax. The simplest outfits are designed for cabochon cutting in many shapes and the more elaborate ones have accessories for faceting and sphere cutting.

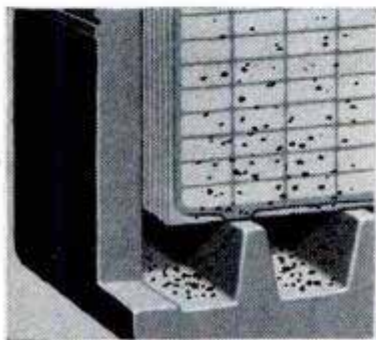
Kraft says anyone with a little patience can turn out a satisfactory cabochon. He demonstrated the steps with a piece of jade in the well-equipped shop in the basement of his Wilmette, Ill., home. First he took a chunk of rough Wyoming jade, clamped it in the holder, and with slight pressure on the saw arm neatly sliced off a slab about one quarter of an inch thick, the desired size for a ring setting.

Then he cut a square piece of approximate gem size from the slab. On the grinding wheel he then shaped the jade into an oval, holding the stone in his fingers and rotating it constantly against the edge of the grinding wheel. The back of the cabochon is smoothed off by holding it against the flat side of the grinding wheel. Lubricants are used for both sawing and grinding, a mixture of kerosene and motor oil for sawing and water for the grinding.

After the stone has been formed it is fastened to the end of the dop stick with wax. This makes it much easier to handle for the two final operations. The stone is moved around with a sweeping motion on the sanding lap, or wheel, and lifted frequently so that it will not overheat as this is a dry operation. Kraft explains that there is less danger of cracking jade than most stones. The sanding operation continued until all ridges and grinding marks were gone. Then he carefully washed the stone, dampened

(Continued to page 234)

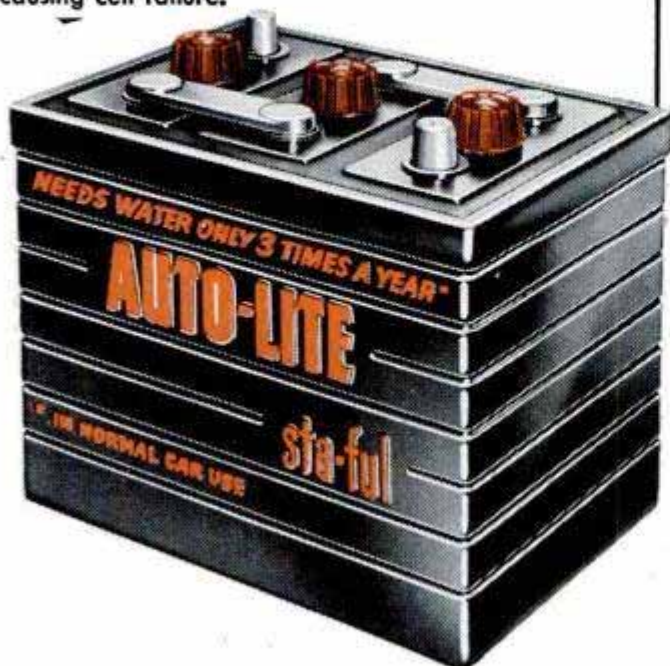
The inside story of your battery- See how it works!



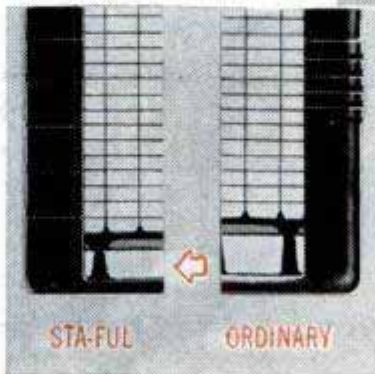
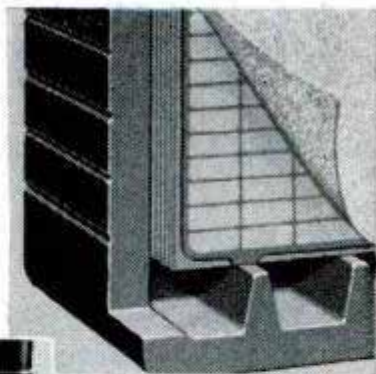
1 In ordinary batteries, small particles keep flaking off positive plates, so ordinary design batteries must have large sediment wells at bottom of case to hold these particles.



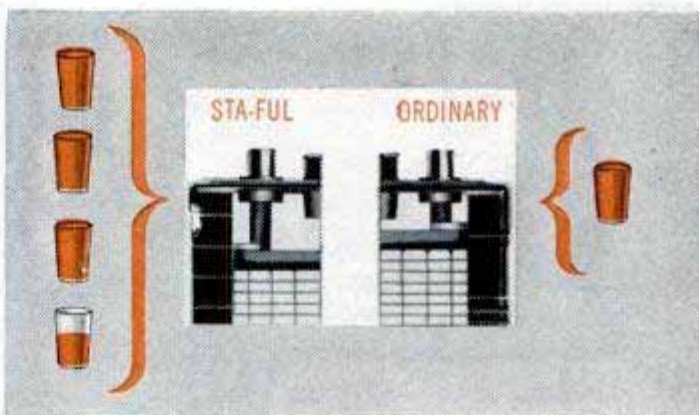
2 If sediment wells in ordinary design batteries aren't big enough to hold flaking particles from positive cells, particles pile up and short circuit cells, causing cell failure.



3 In the Auto-Lite "Sta-ful" Battery, every positive plate has a Fibre-glass retaining mat protecting it and holding the active materials in place to reduce shedding and flaking.



4 Side-by-side view shows that the "Sta-ful" Battery doesn't need all the extra space at bottom as ordinary design batteries do. So extra space in "Sta-ful" Battery is moved to top where . . .



5 . . . extra space can be used to hold more battery electrolyte, giving room for over 3 times the liquid reserve in the "Sta-ful" as in ordinary batteries. That's why the "Sta-ful" needs water only 3 times a year in normal car use. "Sta-ful" Batteries give longer life, too, in tests conducted according to minimum life cycle standards.

AUTO-LITE BATTERY CORPORATION

Toledo 1

Ohio

Auto-lite sta-ful
...needs water
only 3 times a year

IN NORMAL CAR USE

You Can Apply

**YOUR
UPSON CEILING**



**RE-COVER UNSAFE AND UNSIGHTLY
CRACKED CEILINGS WITH**

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I enclose 10c for your 32-page Idea Booklet and free detailed Instruction Sheet for applying Upson Ceilings.

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1 Nail furring on 16' centers, right over old plaster.



2 Nail Upson Fasteners to furring strips, 8' apart.



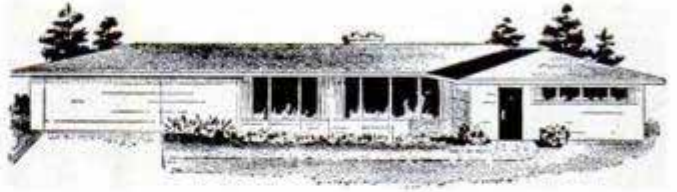
3 Clinch Fasteners. See Direction Sheet for simple method.



4 Apply mouldings supplied by your lumber dealer.



Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

Linoleum Repair



Q—The linoleum on my kitchen floor is cracked in several places and to repair cracks and breaks I've been advised to use linoleum shavings, crushed and mixed with linseed oil. Will this make a satisfactory repair and, if so, how do I obtain the linoleum shavings?

W.R., Ind.

A—This method of repairing worn linoleum cannot be recommended without some reservation. As a rule only inlaid linoleum can be repaired satisfactorily in this manner and then much depends on where the breaks are in relation to the pattern. The main problem, of course, is to obtain a filler of the right color to match the pattern so that the repair will be more or less invisible. Shavings can be taken from a waste piece of the same type and pattern as that on the floor. Use a sharp hand plane set to take a thin shaving. Discard the first shavings and use only the second shavings as these will not be discolored. Crush the shavings to fine granulations and mix with raw linseed oil. Allow the mixture to soak for a time, then add a very small amount of japan drier and sufficient whiting to make a thick paste. Press the paste, or putty, into the crack with a putty knife and allow it to become thoroughly dry before using the floor. Then smooth the patch with fine steel wool and coat with wax or linoleum varnish.

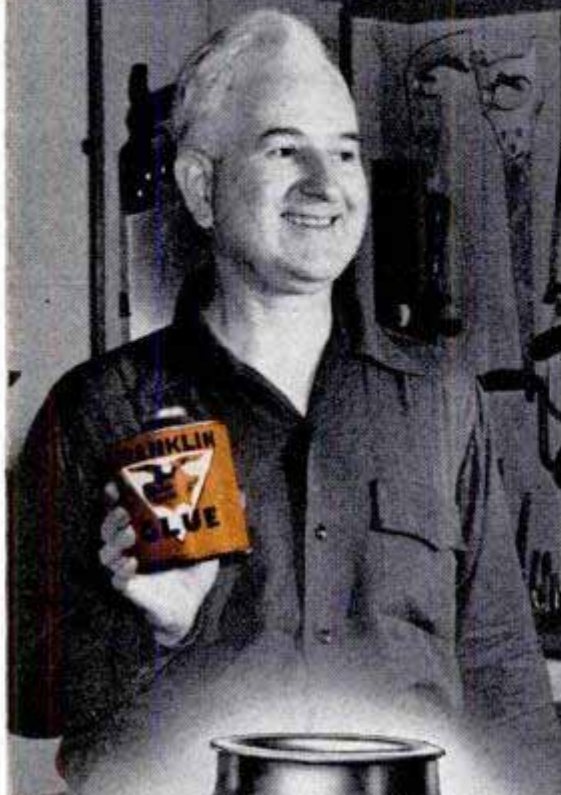
Inside Window Trim

Q—I'm finishing a room in knotty-pine paneling and am puzzled as to how to trim the windows. Because of the added thickness of the paneling, it has seemed to me that regular trim placed over the boards would make the windows appear too deeply inset, especially in a small room. Can you suggest a method? Also, can I attach the paneling to the walls by driving screws through the plaster and into the lath?—R.M., Calif.

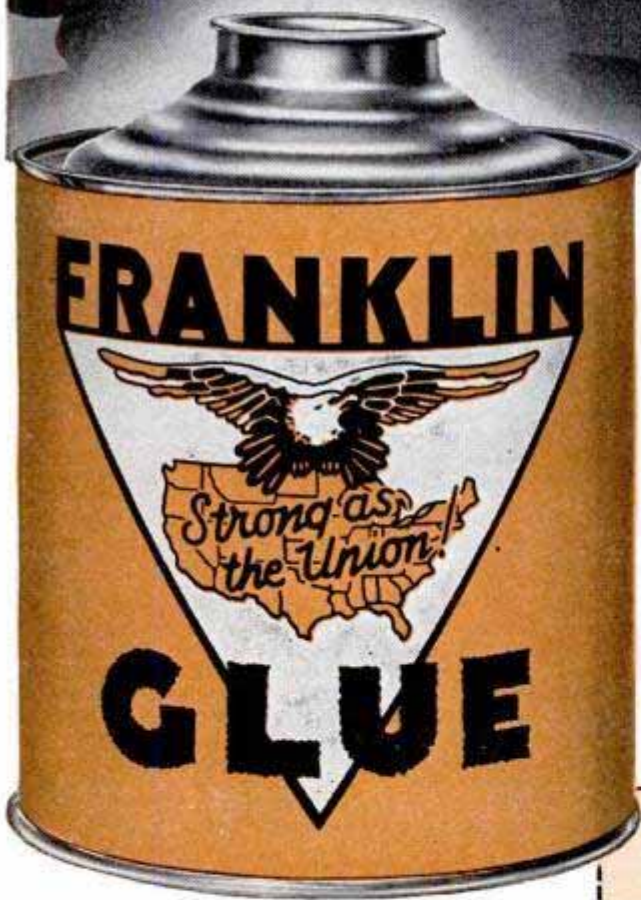
A—We are assuming you plan to apply pine paneling directly over the plastered wall without furring strips. This is not an orthodox practice although, of course, it is done. It's a good idea to apply a vapor barrier over the plaster and under the paneling. Although on most jobs conventional window trim is used over the paneling, the trim is sometimes omitted and the exposed edges of the window frames are built out with strips that extend beyond the outer face of the panel boards about 1/8 in. The exposed edge of the strip is often fluted or beaded to add an ornamental detail. The fluted or beaded strips are mitered at the upper corners of the window frame.

(Continued to page 232)

want better results
in your workshop...



The one best thing
for you to do
Is use the genuine
Franklin Glue!
No mixing, heating,
odor, mess.
It costs no more;
in fact costs less!
It's liquid. hide;
keep on your shelf.
Makes glue joints
stronger than wood itself.



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Enclosed 20c (15c plus 5c postage and handling charge) for trial tube of Franklin Liquid Hide Glue.

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ADDRESS.....

SIX SIZES: Available in tubes 15c; quarter pints 50c; half pints 85c; pints \$1.50; quarts \$2.65; gallons \$7.50.

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Build your lady of the house a cheerful Western Pine kitchen . . . turn that idle basement into a family fun room . . . with these easy-to-work, lovely-to-live-with Western Pines*.

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To find out how to begin, and what to do, send today for *Free Idea Packet No. 311*. Contains helpful illustrated how-to-do-it instructions, and colorful new booklet, "Enchanting Homes of Western Pines," with 71 imagination-sparking pictures. Write to Western Pine Association, Dept. 311-N, Yeon Bldg., Portland 4, Oregon.

THESE ARE THE WESTERN PINES

*IDAHO WHITE PINE
*PONDEROSA PINE
*SUGAR PINE

Space Heater

Q — Several times last winter, during exceptionally cold weather, our oil-burning space heater did not operate properly, especially during the night. The flame burned low, smoked considerably, and several times went out entirely. We are still wondering what was wrong. Can you tell us what was the cause and how to remedy it?
C.Y., Minn.



A—Of course, there could be several causes for the faulty performance of the oil-burning space heater, but from your description we are inclined to suspect that the trouble was due to an accumulation of frost in the chimney flue which greatly restricted the passage, perhaps even closed it entirely at some time during the cold nights. It is unlikely that the frost would form in sufficient quantity to restrict the draft and affect the operation of the heater, except in periods of extremely low temperatures. This makes this particular trouble the exception rather than the rule. In your case, the construction of the chimney and the degree of exposure to cold winds are undoubtedly contributing causes. Although you did not say, we assume your heater is equipped with an atmospheric, or gravity, damper. We suggest that you try adjusting this damper to a more nearly closed position at night. Although this lowers the efficiency of the heater and also increases the fuel consumption somewhat, the closed, or nearly closed, position of the damper permits more heat to escape to the chimney. This generally raises the temperature of the flue sufficiently to prevent the formation of frost.

Top-Dressing Lawn

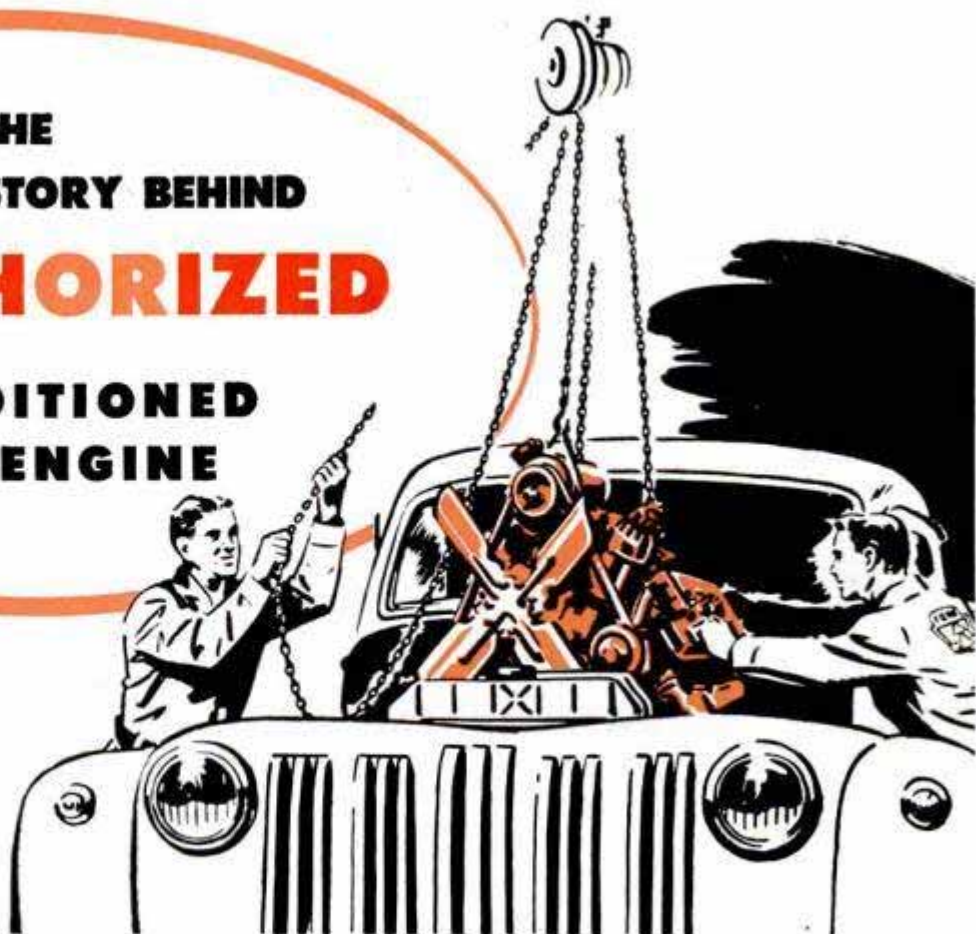


Q — My lawn is rather rough, although the whole area is very nearly level, and the sod is thin. The grass is growing in individual bunches over a large part of the area, and there is considerable weed growth. The soil seems to be mostly clay with very little topsoil. It has seemed to me that the best way to renew this lawn is to top-dress the whole thing either

with black soil or with peat moss and apply a commercial fertilizer before seeding. But which top-dressing should I use? — H.S., Okla.

A—In general, we'd recommend that you use black soil as a top-dressing, as it already contains plant food suitable for the growth of lawn grasses and the humus content is normally quite high. Although the early spring is the regularly accepted time for the application of a top-dressing, it can be done successfully at any time during the growing season, particularly on an old lawn in poor condition. First, apply a weed killer to get rid of the weeds. Allow the grass to reach a height of at least 3 in. Then scatter the top-dressing and rake it to a depth of about 1 to 1½ in., never more, for each application. In raking the dressing, try to lift and expose as many of the grass blades as possible. In the absence of rain, sprinkle the lawn daily for a week or more. Grass seed may be sown on top of the dressing and the lawn rolled lightly after raking the seed into the soil. If seed is sown either in the fall or early spring, sprinkle the lawn regularly until germination takes place and the first blades of new grass appear. At the beginning of the following season apply a second top-dressing to a depth of 1 in., raking and seeding as before. Thereafter, apply a lawn fertilizer once or twice during each season to sustain growth.

**THE
TECHNICAL STORY BEHIND
THE **AUTHORIZED**
RECONDITIONED
FORD ENGINE**



**Why it delivers
new-engine power and
economy for about
half the cost of
a new engine**

**Factory-precision reconditioning assures
Ford Quality**

New engine power and economy because: Every AUTHORIZED Reconditioned Ford Engine is *completely* rebuilt. Over 150 brand new or thoroughly reconditioned Genuine Ford Parts. Cylinders re-bored and honed to rigid factory specifications. Checked with the same rigorous tests as a new engine. And it's *warranted* the same as a new engine!



Modern multi-reboring machine insures accurate alignment of cylinder bores!



Crankshaft bearing surfaces precision-ground, polished; new Ford main bearing liners fitted.



Honing of cylinder bores assures proper seating of rings for new-engine performance!

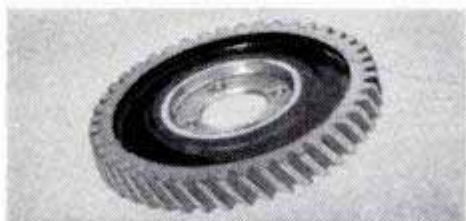
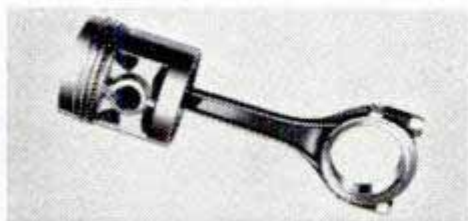


Each engine is checked under its own power for peak performance, just like a new engine!

So see your Ford dealer about this low-cost way to get the new engine power hundreds of thousands of other Ford owners enjoy. (Of all car manufacturers, Ford alone authorizes reconditioners to offer authorized reconditioned engines). Your Ford dealer can arrange for one day installation and easy terms. See him today.

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Over 150 completely reconditioned or new Genuine Ford Parts, like the controlled expansion piston and the laminated timing gear shown above, keep your Ford all Ford!



**Look for
this emblem**

... on the engine and parts you buy. It's backed by the Reconditioner's Warranty. Any defect in material or workmanship appearing in 90 days or 4000 miles ... whichever occurs first ... will be remedied at no extra charge.

**FOR SURE
QUICK STARTS**

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Battery Cables



Most battery cable trouble starts at the terminal because of corrosion or bad fit. Bowes "Seal Fast" battery cable terminals positively will not corrode. They are specially engineered, tailored to fit the posts snugly, assuring longer cable life and full power from your battery. Stop battery cable trouble before it begins. For sure, positive starts insist on Bowes "Corrodeless Terminal" Battery Cables—then you'll get all the power your battery is designed to give you.

BOWES

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SPARK PLUGS

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**SMOOTHER
MOTORING**

There is a Bowes Spark Plug specially designed for your car! Oversize Special Alloy Electrode—with welded construction for positive connection assures longer life. One-piece, leakproof construction.

Every Bowes Plug is individually tested to assure complete motoring efficiency. **INSIST ON BOWES SPARK PLUGS FOR SMOOTHER MOTORING.**



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INDIANAPOLIS 7, INDIANA

the buffing lap and started the final polishing. Some kind of polishing agent is generally used in this process. The stone was then removed from the dop stick, cleaned free of wax and was ready to be set. All sorts of settings from dealers are available for the home lapidary if he chooses to set his own stones. Mounting stones is a simple operation.

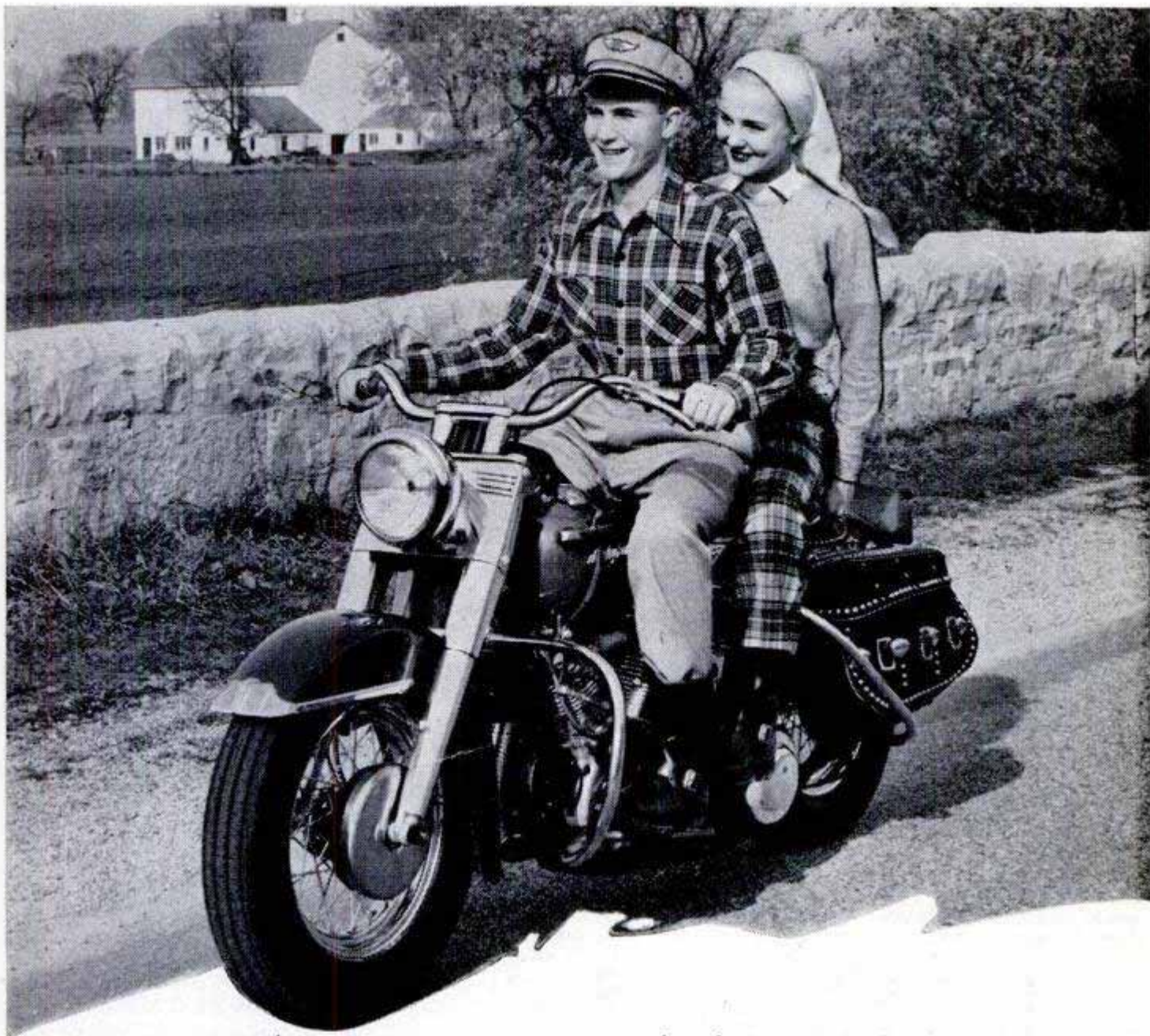
Practice is all that it takes, according to Kraft, to make jewels of extraordinary beauty that rival the work of a professional lapidary. His vast collection of semiprecious gems of almost every imaginable stone, running the gamut of the rainbow, proves this. Other proof is found in the distinguished wearers of the jewels made in his basement shop, among them Britain's Princess Elizabeth, who wears a set of Kraft-cut jade.

Thousands of amateur gem cutters do not own so much as a single buffing lap. In many large cities they use the facilities provided in schools or park-district workshops where adult classes are conducted by recreational leaders. In Chicago, for example, more than 20,000 persons attended these gem-cutting classes last year. Students worked with almost every known stone with the exception of the diamond, the emerald and synthetic emerald.

The latter, unlike the synthetic sapphire and ruby, is not available to the garden variety of home lapidary. However, sometime in the distant future emerald crystals may be obtainable in limited quantities. The synthetic emeralds are much harder to "grow" than sapphires and rubies, and the story behind them is one of the most intriguing in the history of gems. The true synthetic emerald was developed by Carroll F. Chatham of the Chatham Research Laboratories, San Francisco, and the process is secret. Chatham, who has been experimenting for 20 years, is now growing 1000 carats of average gem quality a month, but he reports the process is still in a "developmental" stage. This means that cut stones of perfect quality cannot be consistently produced at present. At any rate, the synthetic emeralds may never be too plentiful for it takes nine months to grow a finished crystal of a size suitable for cutting. Meanwhile, Chatham is deluged with orders from all over the world, which he, as a one-man corporation, cannot begin to fill. Experts agree that the Chatham emerald matches the beauty and durability of the genuine stone in every test.

One of the biggest thrills of the amateur lapidary is amazing his friends with his craftsmanship. If he is like James L. Kraft, his generosity with his cut gems will also

(Continued to page 236)



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Every mile is money saved, every moment a thrill... when you ride this swift, smooth "streamliner"! It takes you comfortably to daily work or distant points... at amazingly low cost. It brings you endless good times at race-meets, tours and other exciting motorcycling fun events. With it you can play a vital part in your local defense program. Easy terms. See your dealer. Mail coupon.



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POINTERS FOR HOME PAINTERS



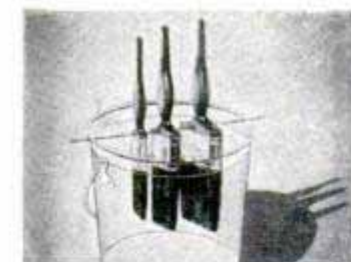
**How to increase your painting skill . . .
make your brushes last longer**



When painting flat surfaces, use long, steady strokes. Don't bear down on your brush. Heavy strokes don't distribute paint properly.



Brush oil-based paints out in thin, even coats. This makes the finish more durable, and thin coats of paint dry much faster.



Clean brushes with thinner after daily use. Suspend brushes in thinner overnight. Bristle tips should not touch bottom of can. Work out thinner before painting again.



For storage, clean brush with thinner, then scrub bristles on a board with warm water and cleanser, rinse in clear water, comb bristles, wrap in paper to store.

For best results use NYLON PAINT BRUSHES

Job after job, you'll get best results with a well-tipped nylon paint brush. Durable Du Pont nylon bristles don't break off, even on roughest surfaces. They last 3 to 5 times longer than ordinary bristles . . . paint smoother . . . are clean and sanitary. Nylon paint brushes are made by leading manufacturers in all types and sizes. Look for the word NYLON on the handle.



Better Things for Better Living
... through Chemistry

The best brushes have
**DU PONT NYLON
BRISTLES**

surprise his guests. Kraft has given away hundreds of jade pieces to employees and friends. He also presented a boulder of Wyoming jade weighing 2495 pounds to the Chicago Museum of Natural History. It is one of the largest chunks of jade found on this continent.

Being a lifelong enthusiast over stones, Kraft frequently carries a piece of jade in his pocket "just to feel of." Once when he was in Tiffany's Fifth Avenue shop he amazed a clerk by showing him a sample of white jade from his California mountain and asking if a set of dinner plates could be made from the material.

"The clerk recognized the material as jade and was startled," Kraft recalls. "He told me, yes, indeed, that it would make into a fine set of plates, and that Tiffany's would like a carload of the stuff. Of course, he thought I was crazy." Kraft grinned. "Well, I guess every lapidary and rock-hound is a little that way."

Fighting Infernos Underground

(Continued from page 130)

Such a blaze calls for direct attack with men and machines tested for the job in the bureau's experimental mine.

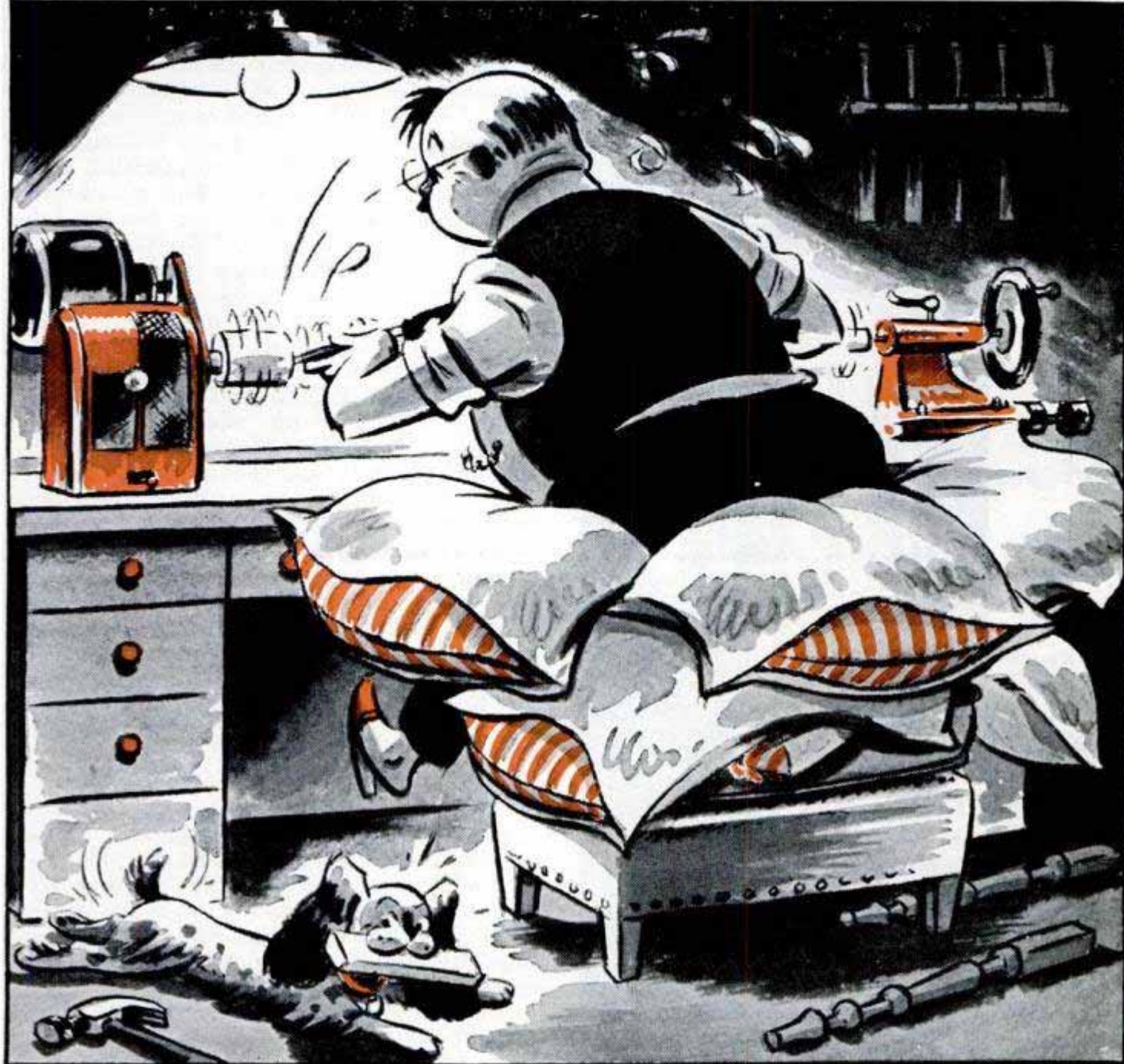
Frank Griffith, who is a big ruddy-faced fellow with an unassuming, capable manner, has led his engineers into many such fires. "You never know what they'll do," he says. "I've seen heat from one burning pillar of coal [left by miners to support the mine roof] loose volatile gases which exploded and carried the fire to the next pillar, and so on in rapid succession until an immense underground area was a raging inferno."

Most regular chemicals can't be used to douse a coal-mine fire. Carbon tetrachloride, for instance, makes phosgene—a war gas—when it hits burning coal. So, modern underground fire fighters use other extinguishing agents. Looking like Martians, they charge into a fire pushing a small cart with a big hose sticking out in front. This machine works like your vacuum cleaner in reverse. Into its hopper goes powdered limestone. Whirling fan blades whip it out through the hose in a billowing cloud that settles over the burning coal, smothers and cools it.

But there's more to think of than just dousing flame in a burning mine. Fighters must constantly be alert to shifting air currents, which may carry explosive gases into a blaze, or blow the fire into new parts of a mine.

In active mine fires, miners are sometimes trapped, and the fire fighters must

(Continued to page 238)



MARFAK MADE HIS CAR RIDE SO CUSHIONY HE'S SPOILED



Forget about "rough riding." Get longer lasting *Marfak* chassis lubrication, and enjoy "cushiony" driving for 1,000 miles or more! Tough, stretchy *Marfak* is made to resist wash-out, jar-out, squeeze-out. It protects against wear and friction far longer. Get *Marfak* lubrication today. See your Texaco Dealer, *the best friend your car ever had.*



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It bears the name... look for it!

Jacobs Plain Bearing Key Chuck... the most widely used drill chuck in the world. You can trust the tool that has one.

Jacobs Rubber-Flex Hex-Key Chucks on home workshop power tools prove that their makers put quality first.



Jacobs Rubber-Flex Hand-Tite Chuck. One-piece RUBBER-FLEX jaw assembly holds tools true and tight. No loose jaws or springs.

IF IT'S A

JACOBS

IT HOLDS

The Jacobs Manufacturing Company
West Hartford 10, Connecticut

move in fast to save them if possible. They'll take unusual chances, too. Griffith tells of one mine in Ohio, where a miner noticed some loose roof material. He pried at it, and the whole ceiling came down, bringing a trolley wire and a short circuit with it. Fire took off. Four hours later, Griffith and his crew groped their way four miles underground, met up with one blaze, and doused it with rockdust. "We started up ahead," he recalls, "when suddenly the whole tunnel ahead of us took off like a giant flame thrower. Fortunately it went ahead of us, not into us. Heat and gas did it." Some 66 men were trapped behind that fire. They had fled to side rooms off the main corridors of the mine, barricading themselves with piles of coal chinked with their clothing to seal the tunnel. But old airways behind them sucked the gas through from the fire, anyway, and by the time fire fighters got to them, all had died.

Miners arrange "brattice" cloth—huge drapes—to direct air currents into dead ends, where they work, to carry off explosive gas fumes. The penalty for failing to rig one is usually grim. One miner in Ohio left his down one day some years ago. A static spark from his mining machine set off a gas explosion, which flashed over a powder magazine and set it off. Seventy men were killed.

So, for obvious reasons, bureau fire fighters prefer to fight mine fires from above-ground. But even this has its hazards. At a southern Pennsylvania mine, a fire started in bales of hay. Men sealed up five openings, drilled holes to the exact fire location, and shot carbon dioxide right into the blaze to smother it. The holes were capped, and the mine left to simmer down. Two weeks later, air samples showed the mine was safe enough to open. The boys began to unseal all the openings simultaneously. Griffith was with a group at one opening when the seal was removed. "I felt the suction of air as it was being hauled back into the mine," he recalls. "A second later, the whole mine exploded. Evidently the gas had hit some burning coal. Two of us were standing near the opening, and we really took off."

What hit them was a column of air ahead of the flame. It knocked them 10 feet and sent them sprawling—a lucky thing, because a split second later, jagged flame shot from the headframe like the flash of a big gun and passed over them.

Anyone interested in preserving the nation's coal can be thankful it did. Without men like Frank Griffith, and the rugged lads he directs, it wouldn't be long before we found ourselves without any solid earth to stand on, at least at the rate we've been going.

Here is some interesting news about your automobile

Just suppose you are driving at 40 miles an hour on a level road. The power, of course, comes from the gasoline you feed your motor. Yet 50% of the power generated by the motor doesn't do a thing to make your car go farther or faster, or climb a steeper hill.

Why? Because that power never gets to the rear wheels. It is used to overcome *engine friction*. And we don't ask you to take our word for it—America's automotive engineers have *proved* it.

Now, along comes a motor oil that proves it *further reduces* this engine friction. Which means the engine delivers the same power with *less gasoline*.

It's simple as ABC: The *less engine friction*, the *less gas* it takes to run your car.

This has been strikingly demonstrated in recent months. Hundreds and hundreds of cars—cars of all makes and ages—cars that had been using *every* nationally known brand of motor oil—were given the Dynamometer Test. This is a machine devised by engineers to measure the power an engine delivers to the rear wheels.

And what happened? After the oil in these cars had been changed to Macmillan, the *same power was developed with an average of 8% less gasoline*.

The minute you change to Macmillan, you'll get an increase in power and gasoline mileage. You cut down on "drag"—your gasoline "pushes" easier than before. After the second or third drain, the average motorist gets an increase in gasoline mileage of 8%!

That's because Macmillan has not only reduced engine friction but also has reduced carbon and gum deposits in the combustion chamber, on rings, valves, and valve stems. This results in higher compression because of better piston seal—smoother operation, and less tendency for the motor to ping.

Do you know what this means in money? Figuring gasoline at an average of 25¢ a gallon, it means you save 2¢ a gallon—simply by changing your motor oil to Macmillan.

That's a big saving— isn't it? Yet it's small when you realize *how much more* you save in repair bills. Because: The less friction, the less wear and tear on your car. New motors stay newer longer.

Finally, remember this Macmillan Motor Oil not only *fight friction* but *removes carbon* from your motor—cleans your motor as you drive.

Ask for this fine motor oil at independent dealers where you see the sign of the big red "M." It means Money in your pocket, Mileage in your car. Try the *OIL* that makes your *GAS* go farther!



President

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P.S. If you are unable to locate a Macmillan dealer, write to me and I'll be glad to direct you to the one nearest you. R.S.M.

Detroit Listening Post

(Continued from page 118)

customer as an accessory and charging him the full retail price.

Buick's delay on its new V-8 power plant may prove of benefit to its customers, when it is finally brought out. This should be on the 1953 models, provided conditions clear up by that time.

Buick engineers have perfected a new combustion chamber, something which is reported to be unique. It will require some accurate machining.

Chrysler focused attention on the combustion chamber in its new V-8 high-compression power plant. It changed the shape of the burning area with good results. Buick engineers are also said to have designed a newly shaped burning area.

Although no official word is given out from the factory, reports from Oldsmobile indicate the Super 88 may replace the 98 in the future. The plan for 1952 is to concentrate on lower-priced models.

Chrysler's success with the hydraulic steering device has inspired others to consider similar systems for their new models. Cadillac and Buick Roadmaster may be the next to offer it to customers. Packard is also interested in a device which will offer easier steering and parking. Chrysler has

not found the \$175 price tag on Hydra-guide any obstacle to its sale.

An interesting but little noticed change is noted on the floorboards of the new cars. It is due to the increasing popularity of automatic transmissions.

Because the left foot has nothing to do, the automotive engineers are trying to re-educate the drivers to exercise it on the brake and use the right foot exclusively for the gas pedal. To accomplish this, the brake pedal is being moved casually from its former position toward the left side and is made larger so the left foot can operate it without interference.

If you examine the Buick Special, you will find the brake pedal at least 2½ inches to the left and nearly doubled in size. Packard also has moved the brake pedal. Ford and Studebaker changed the contour to encourage the driver to try his left foot on it. The manufacturers approach changes like this with extreme caution.

The pioneers haven't had a field report on the success of their schemes to reactivate the left foot. The position of the steering post may halt the leftward drift with the brake pedal. But some daring engineer may just happen to place it directly under the left foot and make it plain that it is for that foot, while the right foot is for the gas pedal only.



THE MOST

Versatile TOOL

ON YOUR BENCH!

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Made only by CHAMPION DEARMENT

In almost any job you can think of—Pliers are necessary—and Channellock pliers are the best you can buy. Whether you are working on your car, electrical repairs, plumbing work or just tightening nuts and bolts Channellock pliers do it better.

And remember, Only Champion DeArment makes Channellock—
More than 3/4 of a Century of experience
in producing highest quality tools. Send
for Catalog D15—today.

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Meadville, Pa.

Channellock pliers are listed
in the Yellow Pages of
most Telephone Directories

under "Tools"

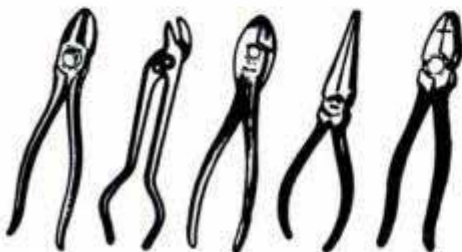


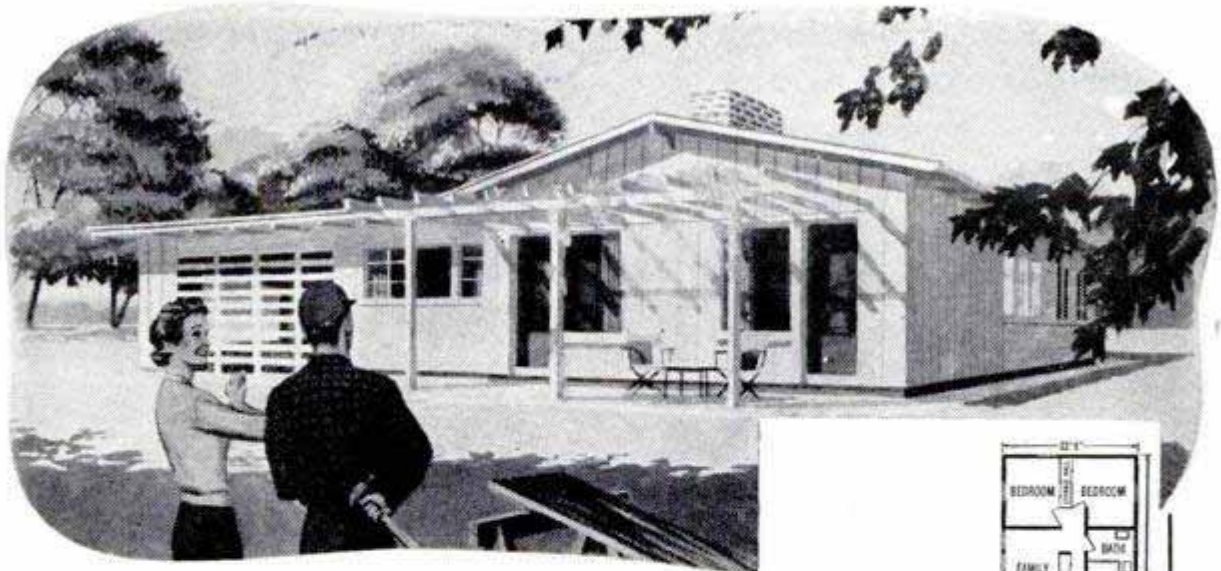
ONLY Champion DeArment makes

CHAN NEL LOCK

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U. S. PATENT OFFICE





Believe it or not—

YOU CAN BUILD THIS HOUSE YOURSELF!

... Save up to *half* the cost! Use **WELDWOOD® Plywood** and new **Easi-Bild Patterns!**

You'll be surprised how easily you can build this attractive, comfortable house, using the simple, step-by-step patterns offered here.

These full-size Easi-Bild† patterns do away with hard-to-read blueprints. They show exactly how to make all angle cuts on the rafters, gable studs, etc. Every step, from staking out the ground to hanging the closet doors, is clearly pictured and explained.

Use the coupon to order Easi-Bild patterns for the house. Or, if you're not quite ready to build, get the Shopping Guide now. This provides floor plan, interior views and a complete list of materials required. With it, you can get accurate cost estimates for all needed materials. Also, you can use it to file your building permit.

†T. M. Easi-Bild Pattern Co.

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You can build the above house, originally designed with only one bedroom. And then add the two other bedrooms and carport whenever you're ready.

One New Jersey couple built the complete 3-bedroom house, with heating system, for \$9000, even including hired labor costing \$2400.

(An architect estimated their house to be worth \$18,000... *double* what it actually cost.)

There's a sunlit family dining room with built-in barbecue grill, a parlor with fireplace, 3 bedrooms, bath, kitchen, laundry and carport, with work and storage space.

One of the biggest time-effort-and-money-savers in this quality house is Weldwood Plywood*... inexpensive fir for sub-flooring... side and roof sheathing... Weldwood Hardwoods for wall and built-in units. The large 4' x 8' panels go up fast and easily. Learn how you can build this house yourself and save up to half, or merely *manage* the job and save up to one-third!



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Name _____

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Stand By for the Race Of the Horseless Carriages!

(Continued from page 88)

They'll settle only for cars equipped as they were originally. Despite the extra time and labor this authenticity involves, they have the complete backing of Major Lohr, who privately owns one of the country's better antique-automobile collections.

From their personal knowledge, augmented by stacks of age-yellowed catalogues, handbooks and advertising pamphlets that described the car when it was new, they can plot near-perfect restorations. Henry Stemme, the museum's shop superintendent and an experienced patternmaker, then goes to work. After a mold is made from his pattern, a rough casting is poured, machined and made ready for assembly.

Wooden-spoke wheels, trunk racks, tool boxes, steering wheels, running boards and similar outmoded items are likewise turned out by the shops. Rebuilding a Brush, for example, calls for a wooden frame and axles. A socket for the whip, used to chase off dogs, was another peculiarity of early models.

The bicycle-size tires are generally either missing or petrified. Replacements have to come from the museum's dwindling

stock pile of pre-1920 model tires, or from a large rubber firm now making one commonly used size for car collectors.

Reassembly of the working parts has to be especially accurate and complete, since one of the requirements for display cars is that they run, and run reliably. Far from being strictly showpieces, some are even loaned or rented out for parades and celebrations. Many ran several times daily for months in a pageant at the Chicago Railroad Fair.

Interiors and seats oftentimes present problems. Patent leather, frequently used to cover seats and even fenders in the old days, is difficult to find now. But Ole Injerd, the museum's upholstery man, always comes up with enough to satisfy the immediate demand. Careful attention also has to be paid to the stitched and braided trim authentic for the make and model.

Now, looking unmistakably like an automobile, the car is ready for the paint shop, to get another stamp of genuineness. Some of the oldsters were almost as quickly recognizable by their distinctive colors as they were by their lines. The familiar bright red, yellow and blue of the racy Stutz Bearcat is one example. Others likewise held, for years, to strong prime colors

(Continued to page 244)

UNCLE WALTER

IT SMELLS GRAND



AROMA SWEET AS ANY ROSE -

IT PACKS RIGHT



PACKS TO PLEASE YOU -
GOODNESS KNOWS!

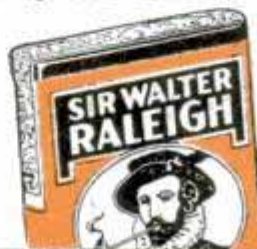
IT SMOKES SWEET



WITH EVERY PUFF
YOUR PLEASURE GROWS!
with Sir Walter Raleigh!

IT CAN'T BITE!

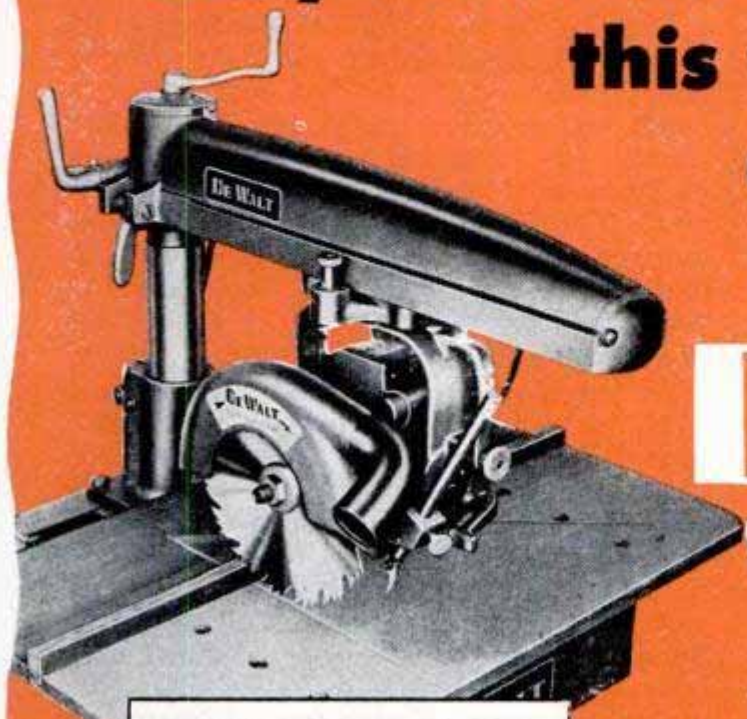
SIR WALTER RALEIGH'S BLEND OF CHOICE KENTUCKY BURLEYS IS EXTRA-AGED TO GUARD AGAINST TONGUE BITE, AND SIR WALTER RALEIGH NEVER LEAVES A SOGGY HEEL IN YOUR PIPE. STAYS LIT TO THE LAST PUFF.



*It costs
no more
to get
the best!*



**Easy to make it yourself with
this versatile,
all-purpose,
low-cost**



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"power shop"**

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motor included**

does everything in woodworking!

MANY MACHINES IN ONE!

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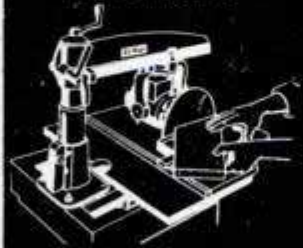
It's a ROUTER



It's a JIG SAW



It's a LATHE



It's a DISC SANDER

Here, in one compact, space-saving unit, is the ideal all-purpose machine for your home workshop.

DE WALT—world-famous radial power saw—works wonders with wood, metals or composition materials. It's super fast! It's super safe! In fact, it is so easy to operate and so flexible that with each quick change of a cutting tool, you have another precision machine. It's *many* machines in one!

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X-acto Crescent Products Co., Inc.
440 Fourth Avenue, New York 16, New York

that almost became regular trademarks.

Though hand striping today is almost an extinct talent, in Louis Loftus the museum has a man who can execute the required fine hairlines along the fender rims and the fancy curlicues and swirls on the wheel spokes. When Louis' handiwork dries the car is ready to roll.

Looking back over a half century in the industry, Rube and Jack can rattle off dozens of improvements that were slow to catch on and become popular. The 1909 Brush, for instance, gave the public an early taste of the "knee action" ride principle. The Schaact, early in the century, was rear-engine driven. The Benz, in 1893, had a shifting lever on the wheel—a "change" that was greeted with enthusiasm nearly a half century later.

An early convertible, though not quite equaling the quick changeover facilities of today's models, was the 1906 Woods Electric. Four or five strong men could lift and bolt on an enclosure for cold-weather travel. Before World War I the Owen Magnetic featured a noiseless electric transmission that required no mechanical clutch. Scripps-Booth boasted of its electrically operated push-button doors in 1914, just about the time Pierce-Arrow pioneered headlights in the fenders.

Jack and Rube saw them all, and drove or worked on many of them. Now, through the old cars they help to restore so authentically, they are passing along those memories to generations that never saw America's first cars chugging along brick streets and dusty roads.

This month, though, they're concentrating on reminding the oldsters and showing the youngsters that fast automobiles aren't strictly phenomena of the '50s.

They're Breeding New Forest Trees

(Continued from page 146)

branches in order to climb to the crown.

Another phase of the work involves propagation by cuttings and grafting. One "study" tree has had possibly a dozen different branches from other varieties grafted to its limbs, and all are flourishing.

Interest in reforestation with new breeds of trees is international and many forest scientists from other countries have visited the institute to study at firsthand the methods developed there.

Huge reforestation projects will be vital in the future but already there are enormous areas in the United States that need to be restocked with timber. "It would be shortsighted to plant these areas with the

(Continued to page 246)

In 20 minutes- without rubbing- CAR-PLATE waxes your car with

longer-lasting protection!

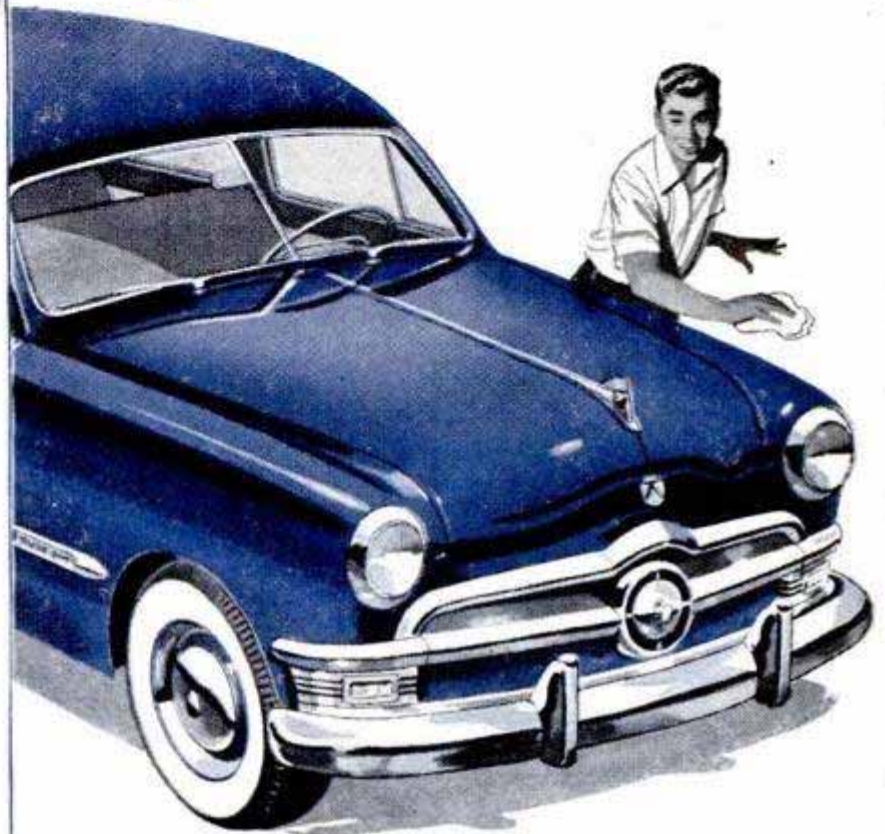
Raindrops prove it
in test after test!



"Water beads" demonstrate protection!
When rain "beads up" on a clean car (see above), you know there is a solid film of wax on the finish to give tough protection against the weather. On a Car-Plate finish the wax protection lasts for a longer period of time than with any ordinary wax or polish.



When rain flattens into pools (see above) on a clean car, you know there is little or no wax protection left on the car's finish. When ordinary waxes or polishes are used, the wax protection doesn't last as long as when you use Car-Plate!



The easy Car-Plate way to wax
your car is the best way!

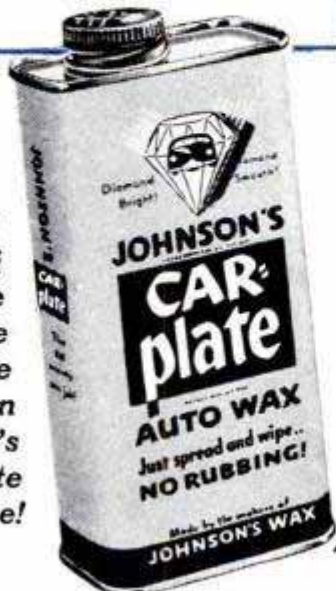
These pictures prove it! In test after test, the Car-Plate finish was still smooth and gleaming with wax protection after weeks of driving . . . while other waxes and liquid polishes had worn away!

Today . . . get Johnson's Car-Plate at your service station or wax dealer's. Spread it on the cleaned finish* . . . let it dry . . . then wipe it off. That's all you do to give your car the smoothest, brightest, longest-wearing waxing it has ever had!

*The easy way to prepare the finish of your car for a Car-Plate waxing is to clean it super-clean with Johnson's Carnu. For exceptionally dirty cars, ask your dealer for Johnson's Heavy-Duty Cleaner.



Even a hard-rub
professional
wax job costing
\$15 and more
doesn't give
your car more
protection than
Johnson's
20-minute
Car-Plate!



Johnson's CAR-PLATE

— the 20-minute auto wax described in Reader's Digest!



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keeps all his shop and garden tools gleaming and rustfree—he "Krylon-izes" them.



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Krylon seals metal, wood, leather, paper surfaces in a tough, waterproof ACRYLIC coating. Protects, beautifies, makes things last longer. Won't change color or crack.

Krylon will do things for you nothing else can—for there's never been anything like Krylon before! You press the red cap, and spray on a coating of tough *Acrylic*. Acrylic is the miracle material that seals out water, air, moisture, dirt; rustproofs metal. You can become an expert sprayer in 30 seconds! Krylon is waterproof, non-flammable. Won't discolor, crack or dry out. The touch of a damp cloth cleans "Krylon-ized" objects. Get Krylon today! KRYLON, INC., 2601 N. Broad St., Philadelphia 32, Pa.

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(transparent as glass)



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(goes farther, stays whiter, cleans easier, lasts longer than enamel)



ALUMINUM
(use wherever you'd use aluminum paint)

native stock when hardier, faster-growing trees can be made available," one of the hybridists remarks.

"Likewise, there are some forest areas that today are understocked because the native trees are not resistant to disease or aren't flourishing for some other reason. It seems possible to create just the kind of hybrids that would be most suitable for these areas.

"In the case of a desirable timber pine it's now possible to extend its range by adapting it to greater differences of altitude or by providing it with a greater resistance to cold."

As an instance of this the institute has been able to cross the knob-cone pine, a scraggly but frost-resistant tree, with the rapid-growing but frost-tender Monterey pine. The hybrid offspring has much of the frost resistance of its knob-cone parent and should be useful for timber production and as a fast-growing ornamental, or for erosion control in localities that are somewhat too cold for the Monterey parent.

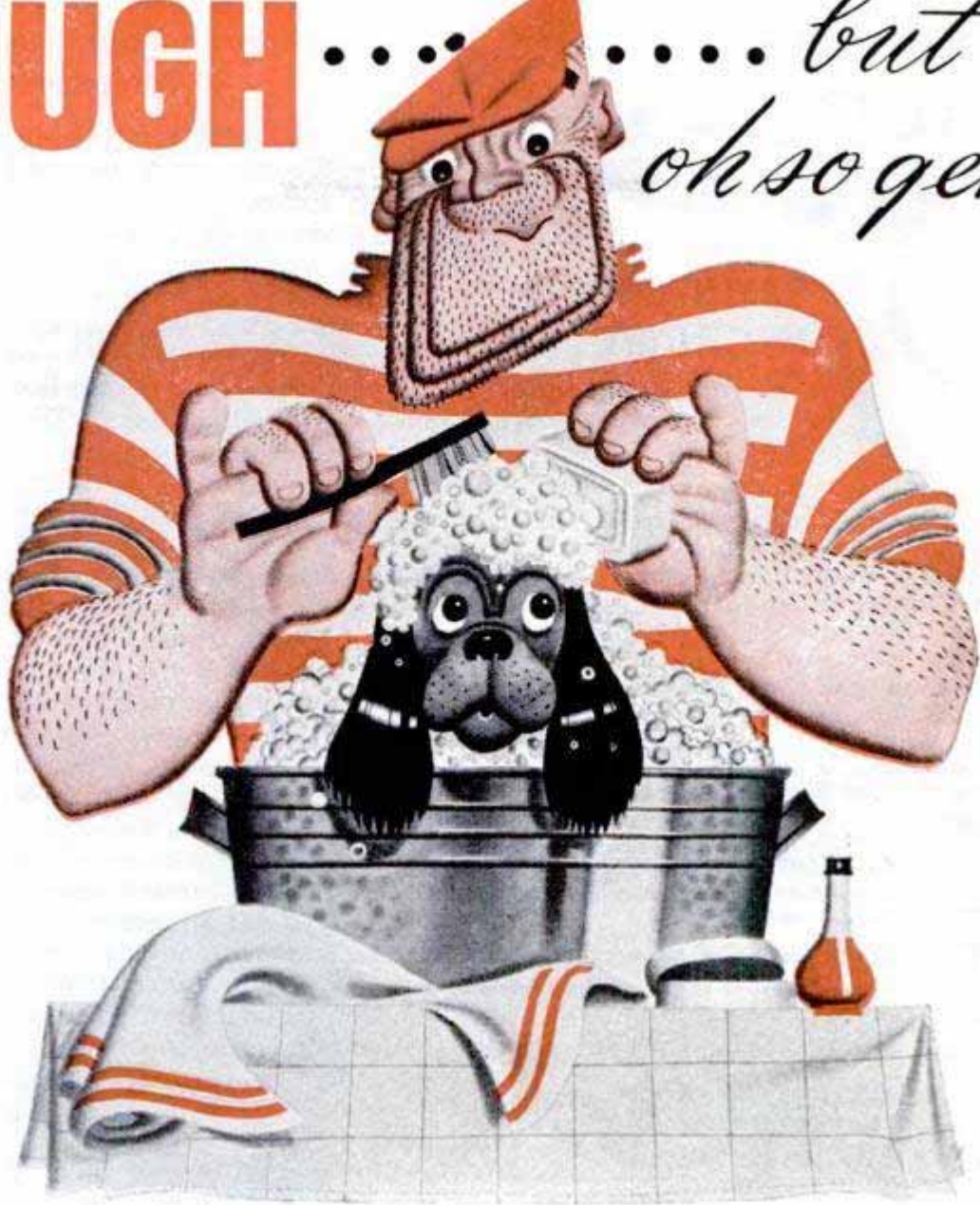
Forests of hybrid trees are expected to be self-perpetuating even though some of the second-generation hybrids would be worthless. Experiments over several generations at the institute show that many of the second generation of hybrids are almost as good as the first-generation hybrids. In a stand of such trees there would be enough superior trees to continue repopulation and to crowd out the inferior seedlings. Hybrids of many crop plants are sterile but this is not true of the pines.

Today the institute is conducting more than 100 different experiments with hybrids in its seedbeds, in addition to the work being conducted in the forests. In the past it was expected that years, even decades, would elapse before a new hybrid could be evaluated; now methods have been developed so breeders can evaluate certain important characteristics while the seedlings are still in the nursery.

Projects being worked on now include the mass collection of hybrid seeds and determination of the best methods of mass-producing hybrid stock. These studies are necessary for bringing down costs. The Institute of Forest Genetics does not produce hybrid seed or stock for sale but only for its own experimental purposes. It is pointing the way to a future increase in production of both lumber and pulpwood.

☞ It may be a hot day when you read this so it will probably comfort you to know that in February 1947 up in the Yukon at a lonely airport called Snag, the mercury dropped to 82 below zero, lowest official temperature recorded in North America.

TOUGH *but*
oh so gentle



TOUGH ON OIL-PUMPING • GENTLE ON CYLINDER WALLS

When your car first starts using too much oil, look out for worn-out piston rings. They cause oil-pumping . . . loss of power . . . destructive engine wear.

Fortunately, it's comparatively easy and inexpensive to replace worn-out piston rings—but the more you delay, the more you pay.

At the first sign of oil-pumping, replace your rings with Hastings piston rings. They're engineered for *replacement* service. They *stop* oil-pumping, *check* cylinder wear, *restore* engine performance.

It's the best money you can spend on your car.

KEEP YOUR CAR OUT OF THE DANGER ZONE

Ask your motor service man for a Danger Zone check-up. And write for the free Hastings Danger Zone booklet which shows you how to save money on engine repairs. Dept. P, Hastings Manufacturing Co., Hastings, Michigan. Hastings Ltd., Toronto.



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TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS STEEL TAPES PRECISION
GROUND FLAT STOCK • HACKSAWS, BAND SAWS and BAND KNIVES

You'll Build Your Next House of Molasses

(Continued from page 114)

laid. "We've torn it up and laid it down a dozen times," he says, "testing different formulations. They're all good. Some are harder than others. We even used rubber crumbs for a filler to add 'give.' The only thing that didn't work was sea shells. They crumbled under wear." An odd thing about Plasmofalt paving is that if you gouge it, it will heal itself in time. That's one reason the military is interested in it for landing strips. Another is its simple convenience and compactness for shipment.

To make a landing strip 60 feet wide and 3000 feet long, a military supply ship would only have to tote along 40 barrels of Plasmofalt concentrate. One such barrel could be sent ashore, mixed with 10 barrels of "Bunker C" fuel oil from the ship's bunkers, to make a total of two tons of synthetic asphalt. This would be worked into exactly 30 tons of ordinary sand from the beach—and out of one barrel, you suddenly have 32 tons of paving material. Since most people don't spend much time around landing strips, you get an even better idea of what this means when you know that only 20 barrels of the concentrate are enough to make a road 18 feet wide and a mile long.

Probably the most versatile of all the molasses products is Plasmote—which is simply Plasmofalt mixed with clay and a filler. This will come ready-to-use in 10-gallon moistureproof bags, which Rappelyea hopes to sell for about 60 cents a gallon.

Thinned with water, it can be sprayed on the outside of an old house like stucco, troweled on old uneven floors to level them and give them a continuous surface like rubber tile, spread on table and counter tops to give them a flat surface impervious to acids and alkalis, laid on interior walls like plaster or molded into forms. Since it's waterproof, it's ideal for lining anything from showers to old-farm outbuildings. Eventually, the material will come impregnated with a variety of color, so no painting will be necessary.

"We're still finding things it will do," says the inventor, who sees in it a perfect spray-on coating for cheap tropical housing. "Spray it over thatch, inside and out, and you've got a waterproof, bugproof, beautifully insulated dwelling."

The material has a slight rubbery quality when dry, and sticks to any surface, as Rappelyea puts it, "like a friend with no money." He discovered its adhesiveness when he threw a handful of wet Plasmote on a junk pile, where it fell between two

(Continued to page 250)

NEW and DIFFERENT work shoe gives COMPLETE FOOT COMFORT!

STAR BRAND

Cush-N-Bilt

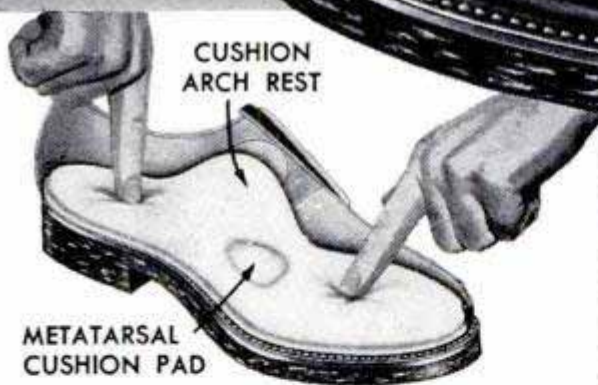
WORK SHOE

#286

cushion innersoles of sponge rubber absorb the shock of every step you take!

Are you one of those men whose feet take a beating on the job? This *new* shoe was specially engineered for your kind of work! Look at its construction features that absorb work shock, give rare on-the-job comfort, foot support. *LOOKS* like a dress shoe, *FEELS* like a slipper . . . yet specially built for hard work and long wear!

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Resilient innersole, made of a molded cushion of extra-soft sponge rubber is covered with a walking surface of genuine cowhide leather. It rises on the inside, gives snug support and comfort to the arch. Metatarsal pad massages and relaxes busy muscles. Your entire foot rests in comfort while you work!

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**OIL RESISTANT, NON-SKID
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BUILT IN

STEEL SHANK ARCH SUPPORT

braces the arch, holds down foot fatigue!

GENUINE rich, cordovan-colored

COWHIDE LEATHER UPPERS

that give easy-going comfort, longer wear!

Fine Goodyear Welt Construction

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white tape
made

ONLY
98¢*



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- blade 1/2" wide made of finest high carbon steel—tempered—Bonderized—enamelled—baked.
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- every "Evans White-Tape" is unconditionally guaranteed.
- exclusive Evans automatic brake gives smoother push-pull action with absolutely no "creeping" of tape into case.
- underside is white, too. Mark with ordinary pencil, remove mark with flick of thumb.
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pieces of lumber. Later he couldn't pull the two pieces of wood apart.

Rappleyea has tested Plasmote all over his place, in different forms, using make-shift machinery to mix and apply it. A homemade revolving oil drum with paddle rod axle—like a baker's dough mixer—churns the raw materials. To make his filler, he has a homemade "chewer" that makes "wood wool" out of old cardboard boxes. Cardboard goes in one end, is torn to pulpy shreds by teeth on a revolving drum, and comes out looking like yellow cotton with dried leaves tangled in it. This gives the plastic a fibrous binder. For spraying the stuff on buildings, the inventor got an old Model-A Ford front end, put on a compressor head and a tank, and devised a one-gallon container over the spray nozzle.

His handyman puts water-thinned Plasmote in the container and sets the Model-A going. Out spurts the stucco finish. Unlike stucco, which takes two weeks to apply and dry, then is subject to cracking, checking and chipping, the Plasmote is ready to paint in 24 hours, refuses to crack and can be applied in no time. And it only costs 20 percent as much. The handyman covered Rappleyea's entire factory building—about the size of a six-room house—in exactly eight hours. It took only 20 gallons of material to cover the building.

To show how it can work on an old building, the inventor is now "Plasmoizing" a 150-year-old cookhouse on his property. It was falling apart. Using the spray, he has put a complete new surface over the inside walls and ceiling, using about \$6.00 worth of Plasmote. The handyman is now troweling the thick material on the old, uneven wood floor.

"You use a mixture of mostly sand to fill in the low spots," points out the inventor. "Then a thin layer of standard Plasmote is laid on top." When the floor of the cookhouse is finished, the outside will be sprayed—right over the old shiplapping. "We usually nail tarpaper and fine chicken wire over the surface," says Rappleyea, "so we don't have to fill in all the hollows and consequently use three or four times as much Plasmote."

When complete, the old cookhouse will be what he calls "tight as a battery box upside down"—sealed inside and out against weather, termites and moisture. All for a materials cost of about \$25.

Besides its unique qualities, Rappleyea expects the demand for his molasses plastic to be high largely because of its low price—which he believes will always be low. "Blackstrap molasses has jumped from nine to thirty cents a gallon since we started,"

(Continued to page 252)

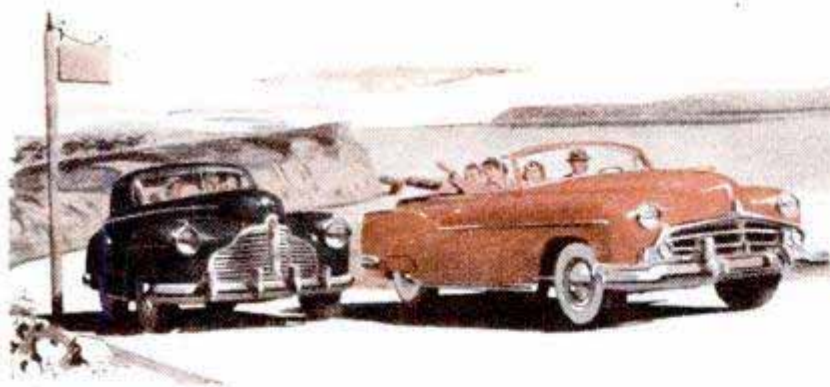
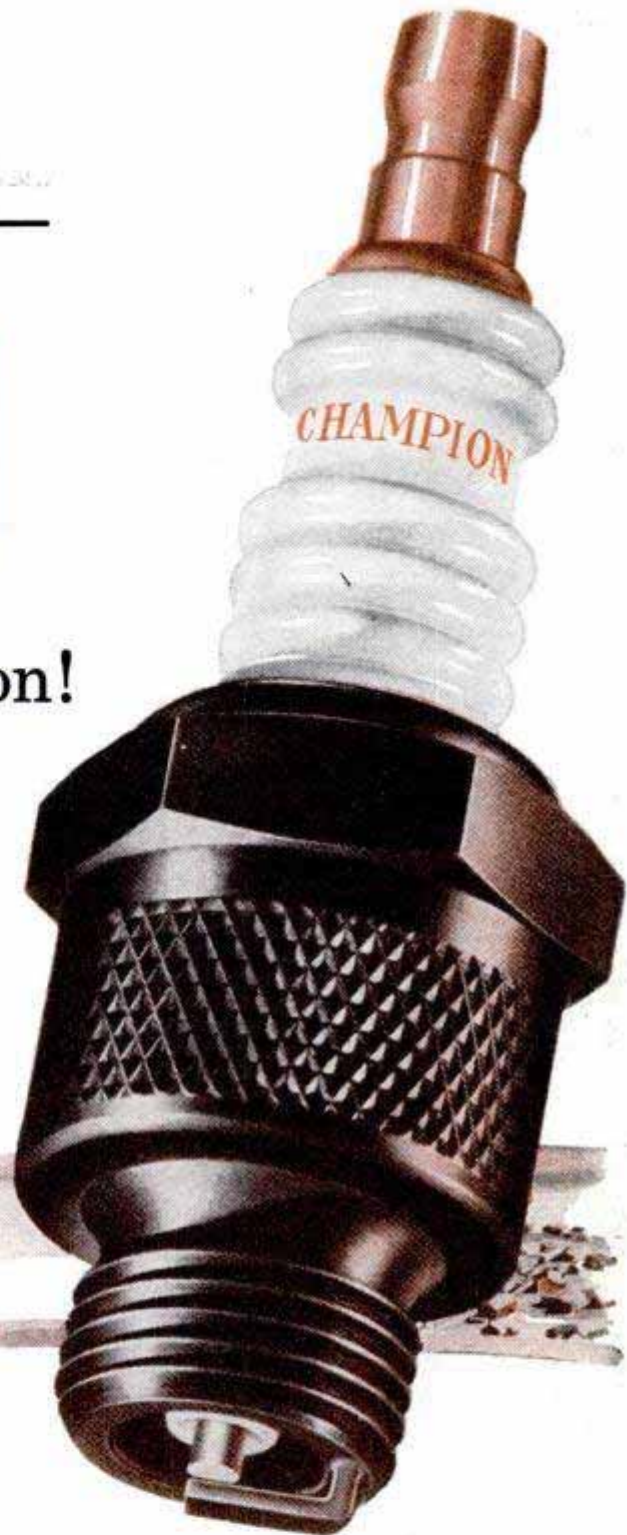
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a Quick Responsive Car—

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For Powerful Acceleration!



BE A CHAMPION DRIVER . . . *Regular Spark Plug Service
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Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network

he points out. "That's still cheap. But if it gets any higher, we'll switch to wood molasses, which is just as good and much cheaper. Sure it will be synthetic molasses, but Plasmofalt is synthetic asphalt. How synthetic can you get? As synthetic as necessary."

A number of people have questioned the inventor about the wisdom of using sugary substance like molasses for building material. "One woman wanted to know what we'd do to prevent ants and flies from eating her molasses driveway," he chuckles. "I told her all Plasmofalt driveways and roads would have to be posted with ant-sized signs saying 'Please Do Not Eat The Highway.'"

Actually, since the molasses has been completely polymerized, there is no sweetness or food value to be found in it. The Rappleyea experimental driveway only has a normal quota of ants and none of them look like they're eating it. "But," says the inventor, "you've got to admit that a molasses house really would be 'Home, Sweet Home.'"

Robot Orchestra

Robot musicians, built by a Japanese craftsman, work as an orchestra to play

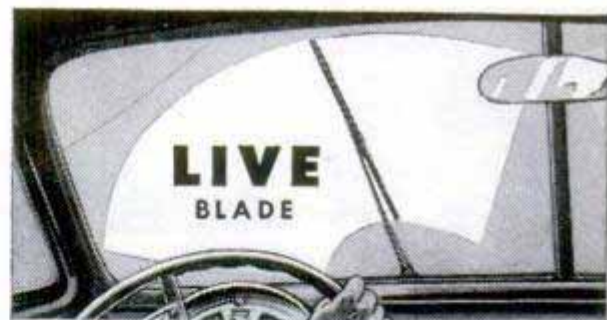
several popular tunes. The orchestra consists of 17 members made of brass, each about 18 inches high. They play a variety of musical instruments. Before each number the director salutes the audience, then turns and starts directing the musicians.



WHAT LASTS FOREVER?



THIS DEAD BLADE still looks new but it blurs rain, smears muck, streaks glass. DEAD blades make dead drivers!



THIS LIVE ANCO BLADE wipes clean, clears rain, clears road muck . . . lets you SEE. Protects your loved ones.

WHAT LASTS FOREVER? Nothing does. This is especially true with Windshield Wiper Blades—even though made of finest natural rubber. Corrosive windshield film, wind burn and hot sun BAKE the life out of wiper blades, often in six months or less. DEAD blades cause dangerous windshield smear. DEAD blades make dead drivers. Make sure your car has live, new windshield wipers.

Change Your Wiper Blades

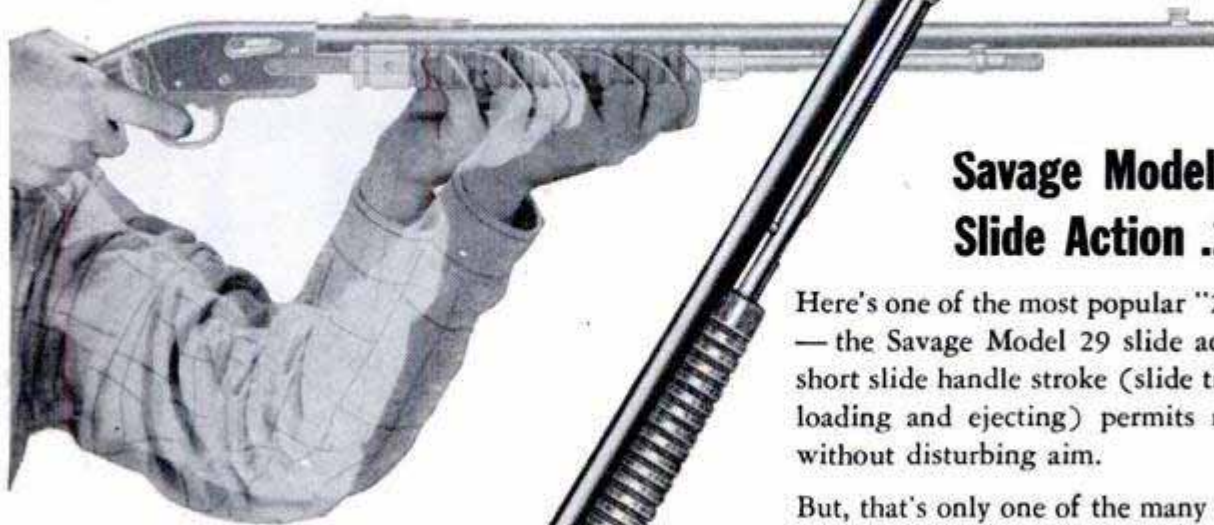
Next time you buy gas, change to LIVE,

NEW ANCO BLADES . . . RAIN-MASTER for Flat windshields . . . CLEAR-FLEX for Flat or Curved windshields. They fit all cars—wipe quicker and cleaner than any other blades.

Mr. Dealer: ANCO Wiper Motors give lots more power, lots less stall. Controlled wiping arc prevents blade slap. Six models only . . . COMPLETE replacement for ALL Cable Linkage, Bar Linkage, and Direct Drive original equipment vacuum wiper motors.

THE ANDERSON COMPANY
GARY, INDIANA

The .22 with the **SHORT SLIDE ACTION**



Savage Model **29** Slide Action .22 Cal. Rifle

Here's one of the most popular "22" rifles ever built — the Savage Model 29 slide action repeater. The short slide handle stroke (slide travels only 1½" in loading and ejecting) permits rapid fire shooting without disturbing aim.

But, that's only one of the many features you'll find in this rifle. Its tubular magazine permits continuous firing at any desired speed . . . holds 14 .22 long rifle, 16 long or 20 short cartridges . . . knobbed assembly screw allows quick take-down . . . one-piece bolt removable without tools for cleaning . . . extra long knurled slide handle adaptable to the reach of any shooter . . . stock of American walnut . . . in all, one of the finest hammerless, slide action .22 rifles you can buy.

But, "seeing is believing," so see the accurate, dependable Savage "29" at your dealer's and check its features for yourself. Write for free catalog of Savage, Stevens and Fox shotguns and rifles.

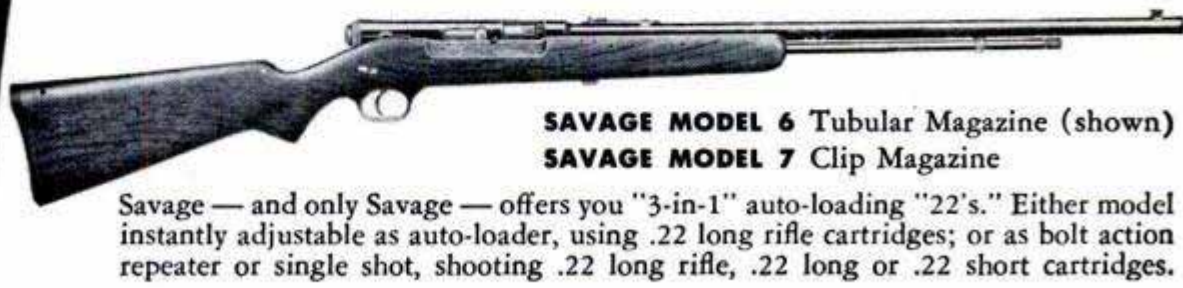
SAVAGE ARMS CORPORATION
Firearms Division Chicopee Falls, Mass.



SAVAGE • STEVENS • FOX Rifles and Shotguns

SAVAGE • WORCESTER Power and Hand Lawn Mowers

SAVAGE "3-in-1" .22 AUTO-LOADERS



SAVAGE MODEL 6 Tubular Magazine (shown)
SAVAGE MODEL 7 Clip Magazine

Savage — and only Savage — offers you "3-in-1" auto-loading "22's." Either model instantly adjustable as auto-loader, using .22 long rifle cartridges; or as bolt action repeater or single shot, shooting .22 long rifle, .22 long or .22 short cartridges.

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and FEWER PARTS
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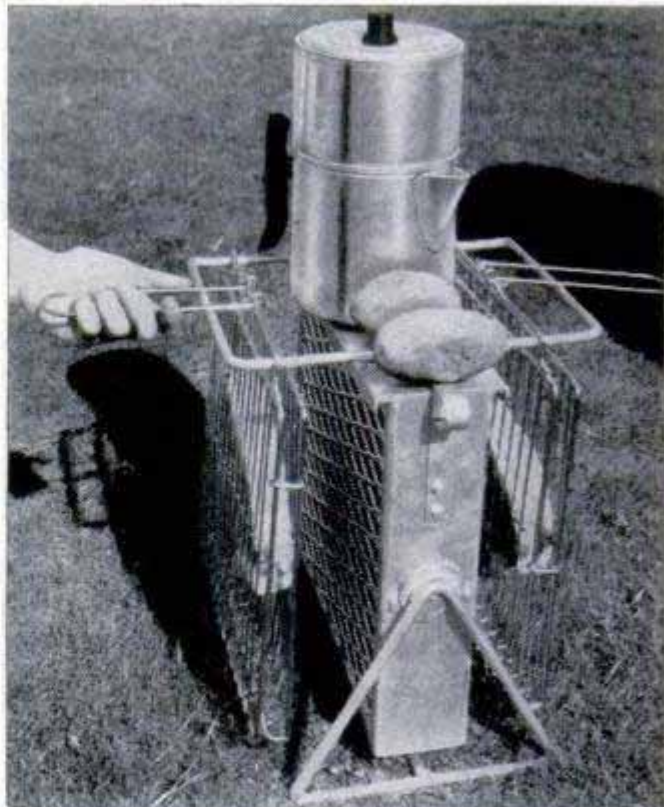


**Ride
a Bike
- it's
Fun!**

For lasting satisfaction you can't beat a Bendix* Coaster Brake. Built to give you quicker stops—easier pedaling and longer coasting—it's the outstanding performer in its field. Your bicycle dealer will put on the brake you want—so just say "Bendix Coaster Brake." *REG. U. S. PAT. OFF.

**DOUBLE THE FUN
WITH A  Bendix
COASTER BRAKE**

ECLIPSE MACHINE DIVISION of
Elmira, New York



Charcoal Barbecue

Pivoting on a broad non-tipping base, a two-way barbecue can be used horizontally to make coffee and heat a skillet or vertically to broil steaks. The unusual design also makes it easy to light. You fill it with charcoal and light a fire under it. When the charcoal starts to glow, you can begin cooking. Two sandwich-type steak holders hook over the handles when the unit is used vertically for broiling.

☐ Of the nation's 60,000 private airplanes, 10,500 are used by farmers and ranchers for tasks such as pest control, crop improvement and livestock operations.

the right prescription
for today's biggest engine ailment
— hydraulic valve clatter!

MARVEL *mystery oil*

Tops as a top-cylinder lubricant, Marvel is unequalled for freeing and protecting valves . . . *all* vital power-producing parts. A *proven* lubricating formula used in the most intricately designed engines for more than 30 years.

BE ENGINE WISE...MARVELIZE NOW!

Use M.M.O. in the Marvel Oiler, gas tank, or as a crankcase additive.



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For Better Work — FASTER — EASIER

THE ZEPHYR Electric Drill



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Handy . . . Speedy . . . Powerful. Has many uses around the home . . . in the shop . . . on the farm. Built to Last. Full 1/4" Capacity.

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Horizontal Drill Stand— for Polishing, Buffing, Grinding, etc.

Price \$1.00



Adjustable Vertical Drill Stand— for drill press operations

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De Luxe Electric Work Saver Kit

Includes above ZEPHYR Drill, plus 28 accessories for buffing, cleaning, drilling, grinding, mixing paint, polishing, sanding, sharpening, waxing, and wire brushing.

Price \$26.35

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Soon to be released—a new Duro-Chrome Mechanic's catalog. Crammed with pictures and detailed descriptions of the latest ideas in tools. Shows the right Duro-Chrome Quality Tool for every mechanic's needs, PLUS hard-to-find and "special job" tools your dealer has or can get for you.

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Extra quality into every tool; for example, gets 25% more wear on Sockets, by exclusive Hot Broaching process.

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Write your name and address in margin space

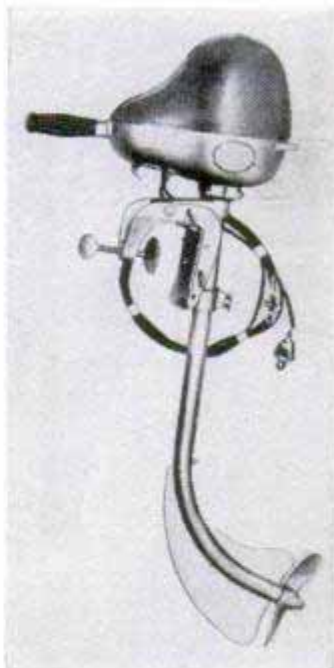


Check-Cashing Machine Delivers Bills in Rolls

Checks are cashed automatically and an accounting record made of the transaction by a dispensing device that attaches to an adding machine. The entire operation requires only five seconds as compared with the 30 seconds taken by the normal method. The paper money is dispensed in banded rolls of varying amounts.

Motor Doesn't Scare Fish

Powered by an automobile battery, a new electric outboard motor runs so quietly it does not disturb the fish. The motor runs several hours on a six-volt battery and has twice the power and speed on a 12-volt battery. It is equipped with a steering brake, set by a thumbscrew, which holds the motor on the desired course and leaves the operator's hands free for fishing. The electric motor weighs only 25 pounds.



Some weed seeds are such hardy pests that they can lie dormant in a field for 30 years, then sprout and flourish.

"Shopsmith saved me \$100



**on this modern
17" television set"**

"I built my own TV set. Seventeen-inch tube. Assembled chassis. Birch veneer cabinet. Modern design. The cabinet materials cost me \$34.50. I figure I saved over \$100. And I had the fun of doing it myself. What's more, it's just what I want in size, design and finish.

"On this job alone, SHOPSMITH saved half its own cost. I used it for everything—sawing, sanding, drilling and turning. It took me less

than 60 seconds to change from tool to tool. In fact, I saved hours on jigs and adjustments, thanks to SHOPSMITH's time-saving features and precision settings.

"For accuracy, capacity, flexibility and all-around usefulness, you can't beat SHOPSMITH. It's a man-size tool, weighs over 200 pounds. Let me show you just a few of the things you can do with it."

SHOPSMITH is a complete power workshop . . .

- 8" circular saw
- 12" disc sander
- 33" wood lathe
- 15" drill press
- Horizontal drill

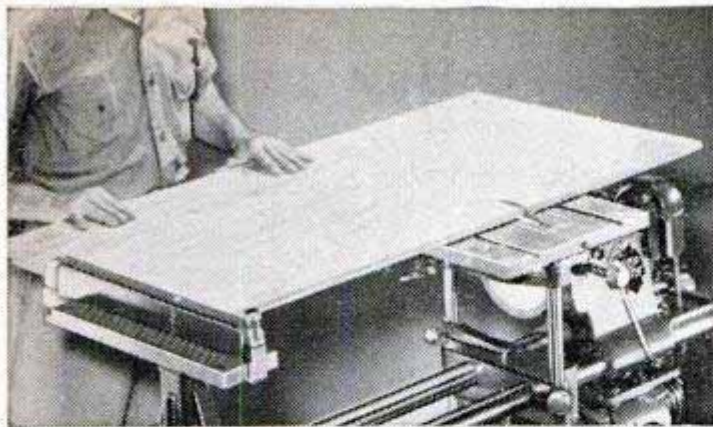
Five-tool unit complete except for motor*..

\$189.50

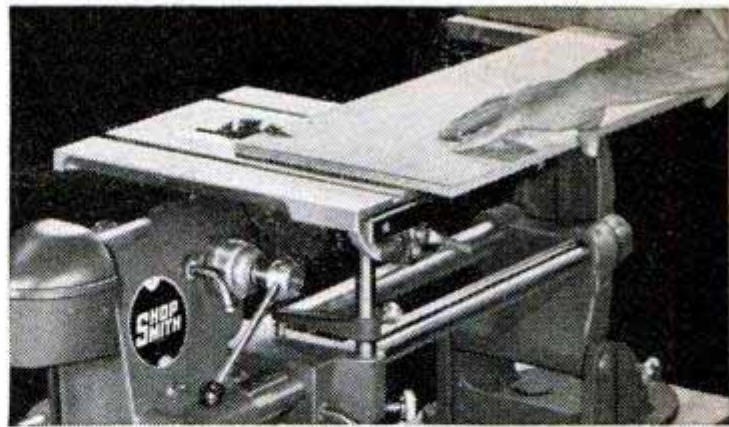
*Special 1/2-hp., capacitor-type motor \$34.50



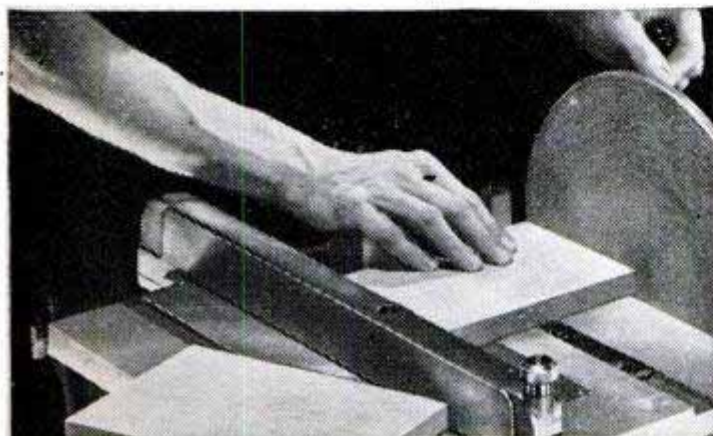
SEE SHOPSMITH DEMONSTRATED AT LEADING HARDWARE AND DEPARTMENT STORES OR ANY MONTGOMERY WARD STORE. WRITE FOR FREE CATALOG.



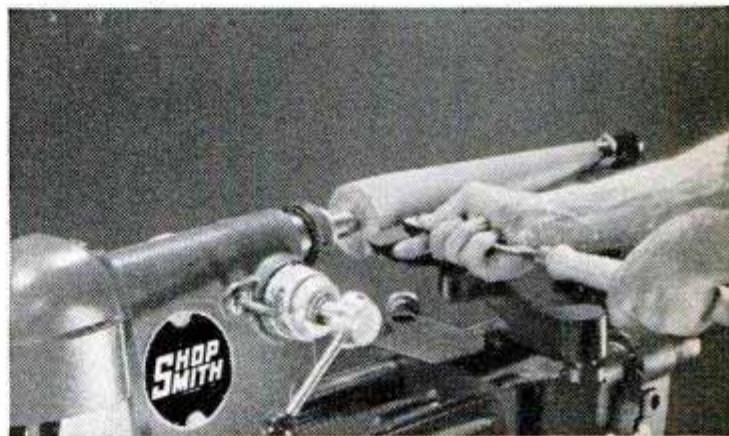
1 "Sawing large panels. SHOPSMITH has the capacity of a production-type saw. By putting the rip fence on the table extension, you get a maximum blade-to-fence distance of 48"—or right to the center of a standard size plywood panel."



2 "Accurate cuts are easy with SHOPSMITH. Large miter gauge has automatic spring stops. Self-aligning fence has rugged front and back locks. For quick, accurate fence settings, the micro-quill adjustment makes hairline adjustments easy."



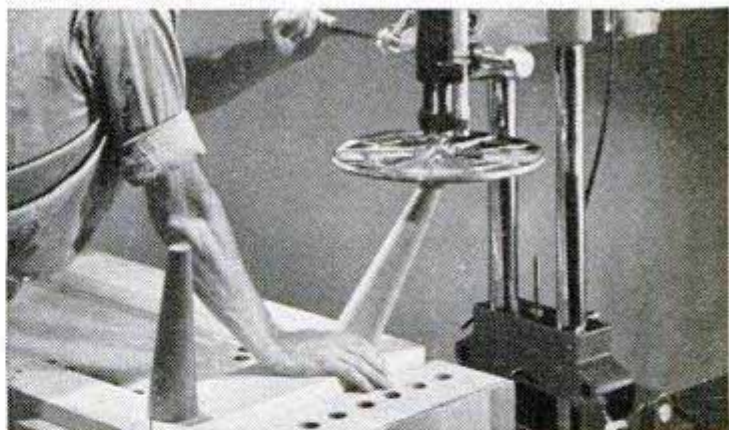
3 "Duplicate sanding is still another exclusive SHOPSMITH feature. You set up SHOPSMITH as a disc sander using fence and miter gauge as ready-made jigs. Set depth stop-nuts and feed disc into work. Pieces come out exactly the same length with precision-sanded ends."



4 "It's a lathe, too! Yes, SHOPSMITH is a heavy-duty wood lathe with 15" swing and 33" between centers. In turning pieces like the legs for my TV cabinet, the SHOPSMITH tool rest certainly proves its worth. Always slides parallel to work, and locks quickly, securely."



5 "Parallel drilling is another operation that's a cinch with SHOPSMITH. Rip fence serves as instant-set guide. Large table supports big workpieces. Vertical drill press features 4" quill feed, 4 ball bearings in headstock, extra-big capacity."



6 "Another SHOPSMITH extra. To level legs of cabinet, I swung SHOPSMITH to vertical position, attached sanding disc and set depth stop-nuts. With workpiece upside down, I fed disc into each leg until it stopped. All legs were identical in length."

FREE! 16-page information-packed catalog. Gives full details and specifications on SHOPSMITH and accessories. Write for it.

MAGNA ENGINEERING CORPORATION, Dept. 177-B, at factory nearest you:
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BURGESS BATTERY COMPANY
FREEPORT, ILLINOIS • Niagara Falls, Can.

The Owners Report On the '51 Chrysler

(Continued from page 106)

it afforded a maximum amount of safety. A Los Angeles doctor said: "The new Hydraguide steering is out of this world. It requires no effort. Surely all cars must come to power steering as the next improvement. Chrysler always shows the way to new things in car design."

Chrysler's "reliability of the factory in standing behind its cars" was mentioned by several owners, including a Rocky River, Ohio, salesman, as a prime selling point. "Durability of all Chrysler products," as mentioned by a Taunton, Mass., sales manager, was another. A Norfolk, Va., contractor thinks that his Chrysler "gets more gas mileage than most lighter cars."

The Chrysler owners' report in general had a definitely enthusiastic and favorable tone. This was exemplified by the remarks of a Manassas, Va., minister, who wrote: "My wife recently said, 'I think we have the best automobile on the road today—our car has everything one could hope for!'"

And now for my own test of Chrysler. I drove the 1951 New Yorker four-door sedan from Detroit via Indianapolis to Denver, then over the Rocky Mountains to Los Angeles, approximately 2900 miles, including some extra test miles over rough back roads and in the desert.

The New Yorker is a big, roomy, 131½-inch wheelbase car that needs (and has) a lot of "horses." The new 180-horsepower engine is really something to shout about, and even when the car was new it had a lot of "zip" and acceleration. It is a thrill to drive and without doubt is a definite advancement in high-compression overhead-valve engines (7.5 to 1), due partially to the hemispherical design of the cylinder heads. The power (180 horsepower) to weight (4225 pounds) ratio is outstanding. Its power seems to flow without effort and vibration is practically nil. The ignition system is waterproofed.

Even more surprising than the thrill of the power-packed engine is the new power-assisted Hydraguide steering (maybe because it's an innovation). Until you get used to Hydraguide, there is an inclination to "oversteer," so slight is the pressure required to turn the wheels. One finger will do the job even when parking. There is no sensation or "feel" of the tires on the road. The device works only when the engine is running, and seems to "steer like a truck" when turning the wheels without the engine running after becoming accustomed

(Continued to page 262)

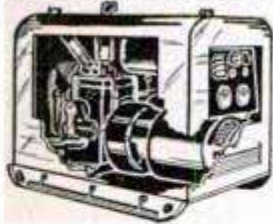
IMMEDIATE DELIVERY — LARGE STOCK — MANY SIZES

GENERATING PLANTS

3 KW-120 VOLTS-60 CYCLE
Single Phase

**ALTERNATING CURRENT
HEAVY DUTY — DESIGNED FOR
CONTINUOUS OR INTERMITTENT
SERVICE**

PLENTY OF CURRENT TO OPERATE
YOUR— • OIL BURNER • REFRIGER-
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PUMP • POWER SAW • BROODER •
CREAM SEPARATOR • INCUBATOR •
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CHINES • BLOWERS • YARD LIGHT-
ING • OTHER APPLIANCES



(Item #133)

Totally enclosed power unit with 2 cylinder water-cooled Hercules Model BXB engine direct coupled to generator. Magneto ignition, crank start, 4 gallon gas tank, 3 qt. oil capacity. Skid mounted with handrails for carrying. Instrument panel, killer button, oil pressure, water temp. gauges, volt-meter, ammeter. Shipping wt. 560 lbs.



(Item #88)

395.00

Item #133
Write for information on
other size generating
plants ranging from 600
watts to 25 KW.



(Item #86)

GENERAL MOTORS — ALLISON

BRAND
NEW

**CENTRIFUGAL PUMP
200 GALLONS PER MINUTE**

- For Draining Basements • Fire-Fighting •
- Irrigation • Fuel Transfer • Swimming Pools
- Home Water Systems • Dewatering

This General Motors-Allison Centrifugal Pump—designed for use on U. S. Air Force Mustang fighters, now converted for commercial, home, and industrial high volume pumping applications. Inlet, 2 1/2" standard pipe thread, twin outlets with 1 1/4" pipe thread, ball bearing supported 3/4" shaft. Easy, fast simple priming. Rotation, counter-clockwise facing shaft. Shipping wt. 35 lbs.



(Item #130)

Suction Lift	Head Pressure	Gal. Per Min.	H.P.	R.P.M.
10'	75'	260	6.0	3500
10'	65'	200	5.2	3500
10'	80'	40	1.5	2500
10'	50'	140	5.0	3500
10'	30'	100	3.0	2500

Gov't. acq. cost
\$145.00.
F.O.B. Chicago
Now Only

39.50

D. C. GENERATORS

For welders, plating, truck and marine use, D.C. appliances, lights, etc. Aircraft quality—lifetime grease sealed ball bearings. Heavy duty.



Item #131—Brand new Electric Auto-Lite 12 volt Direct Current electric generators, rated 18 amps. Complete with blower and pulley. Use for trucks, tractors, boats, battery chargers, etc. Part No. GEF-4805A. In original sealed U. S. Army cartons. \$50.00 value. Shpg. wt. 27 lbs.

15.00

Item #90—Type P-1, rated 200 Amps.—28 Volts, 2500 RPM. Mfd. by General Electric, Ford, Delco-Remy and Westinghouse. Gov't. Acq. Cost \$300.00. Shpg. wt. 53 lbs.

22.50

Item #91—Type R-1, rated 300 Amps.—30 Volts. Mfd. by Jack & Heintz. Gov't. Acq. Cost \$380.00. Shpg. wt. 59 lbs.

35.00

**Vickers HYDRAULIC
PUMP**



(Item #39)

**PISTON
TYPE**
Ideal
for use
with hy-
draulic
cylinders
and valves

described in this page ad. Vickers constant displacement piston type pump delivers .507 cubic inches per revolution, 8 gallons per minute at 3750 RPM, 1000 PSI. Has 1/2" diam. shaft, 3/4"-18 thread inlet and outlet ports. Rotation—clockwise.

19.90

**HYDRAULIC CONTROL
VALVE**

(Item #26)

Four-way control valve for use with two hydraulic double-action cylinders.



Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Ship. wt. 6 lbs. A \$60.00 value.

12.95

BYRON-JACKSON "PUP"

\$3800.00 value

**CENTRIFUGAL PUMP UNIT
COMPLETE WITH FULL ENGINE
AND PUMP INSTRUCTIONS**

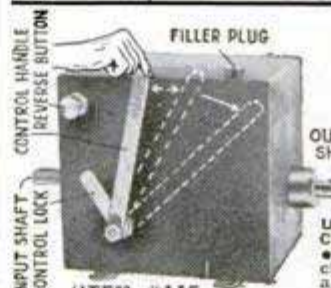
2 STAGE MODEL "PUP"
PUMP DRIVEN BY AN 8 CYL-
INDER MODEL C-36 CHRYSLER
INDUSTRIAL ENGINE.
ENGINE SPEED 2400 RPM —
100 H.P.
600 GPM AT 175 PSI —
PARALLEL CONNECTION
300 GPM AT 375 PSI —
SERIES CONNECTION



Item #132)

IDEAL FOR: Pick-up, Gath-
ering, Fire Fighting, Salt Water Disposal, Sprinklers,
Irrigation, Dewatering, Construction, etc.
These skid-mounted Pumping Units are standard production models with parts and service readily available. Designed for a wide range of operating conditions particularly where wide variation in head and capacity are required. Twin suction and discharge ports are cast on the same side and so arranged that external piping is interchangeable for either parallel or series pumping applications. Overall dimensions, 114" L x 20" W x 62" H. Weight 2480 lbs. Now, complete with operating instructions, performance data. F.O.B. Chicago.

1495.00



(ITEM #115)

**HYDRAULIC
SPEED
REDUCER**

with FINGERTIP CONTROL

USE FOR: • Reamer Drives • Midget Cars • Feed Mills • Canning Machines • Conveyors • Lathes • Milling Machines • Motor Boats • Cream Separators • Garden Tractors • Pumps

Variable output speeds ranging from 0 to input speed now available. Merely move control handle until desired speed is attained. Then turn locking handle to maintain the setting. Internal relief valves prevent overloading. Use input power of 1/4 to 1 1/2 H.P. This Westinghouse-Oil Gear Unit converted to commercial use from 40 MM anti-aircraft traversing mechanisms consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. These components are contained in a crackle-finish steel oil reservoir (capacity 2 qts.). Adjustable relief valves set at factory for 100 inch pounds of torque may be reset up to 180 inch pounds. Independent reverse control allows full output power and speed selection in either direction of rotation. Both input and output shafts measure 5/8" diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speeds not to exceed 750 R.P.M. Over-all dimensions 7 1/2"x7 1/2"x11 1/2". Gov't. acquisition cost, \$428.00. Shipping weight 31 lbs. Complete with 2 qts. of oil and full instructions. F.O.B. Chicago

54.50

AIRCRAFT QUALITY HYDRAULIC CYLINDERS

Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc., etc.

ITEM #70—Purolator hydraulic oil filter. Permanent element type, 3/8" female pipe thread ports. Capacity 16 gallons per minute. A \$13.00 value.

4.95

ITEM #4—All steel double action hydraulic cylinder. 1 1/2" bore, 27" stroke. Clevis mounting. Will lift 1000 lbs. with 1000 P.S.I. line pressure. Perfect for positioning and feeding movements.

4.95

ITEM #127—Double acting hydraulic cylinder, 1" bore, 17" stroke, 1/2" diam. shaft, 1/4" tubing thread ports. Over-all length closed—61 1/2". Clevis mounting at both ends. Perfect for clamping and feeding. Postpaid

5.95

ITEM #33C—Double action hydraulic cylinder, 1 1/2" bore, 41 1/2" stroke. Clevis mountings at both ends. Uses 3/4" pipe fittings. Postpaid

8.95



(Item #42)

ITEM #16C—Double acting hydraulic cylinder, 1 1/2" bore, 26" stroke. Will lift 1760 lbs. with 1000 PSI line pressure. Weight 8 lbs. A \$55.00 value.

16.95

ITEM #103—Double acting hydraulic cylinder, 2 1/2" bore, 17" stroke. Clevis mounting. Will lift 4900 lbs. with 1000 PSI line pressure. 1 1/4" diam. shaft, 3/8" tubing thread ports. Overall length closed—38".

21.50

ITEM #31C—Double action hydraulic cylinder, 3 1/2" bore, 11" stroke. Aluminum alloy cylinder wall and all steel 1 1/4" piston rod. Clevis mounting at base and shaft, 19 1/2" overall length closed. Will lift 9625 lbs. using 1000 PSI from Logan Heavy Duty Hydraulic Pump. Uses 3/8" tubing fittings. Value \$102.00. Shipping wt. 11 lbs.

22.50

ITEM #6—Double action hydraulic cylinder, 3" bore, 24" stroke. Will lift 7070 lbs. with 1000 PSI line pressure. Steel barrel, 1 1/2" stainless steel shaft. Gov't. acq. cost \$176.00. Shpg. wt. 26 lbs. F.O.B. Chicago

28.00

ITEM #42—Double action hydraulic cylinder, 4" bore, 18" stroke. Rated lift capacity with 1000 PSI line pressure is 12,500 lbs. Ship. wt. 30 lbs. F.O.B. Chicago

32.50

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COATED**

The ultimate in a fine binocular. Tremendous 16 Power. Featherweight (weighs only 25 ounces!). Precision made in every detail. COATED providing sharper, clearer images. Individual eye focussing. Objective lens is 50mm (2 inches) across!

\$69.50

COATED!!

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6x30 — \$27.95

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10x30 — 39.50

Three (3) superb FEATHERWEIGHT glasses. Weigh only 16 to 18 ounces each. COATED for sharper, clearer images. Each measures a compact 4 1/2" x 6". Only in power and price do they differ. Each offers an excellent field of view.

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- 7x40 Coated (Center Focus)..... 52.50
- 7x50 Coated 39.50
- 8x40 Coated 54.50
- 10x50 Coated 62.00
- 12x50 Coated 65.00



**15 to 40
POWER**



**\$29.50
COATED**

SIX TELESCOPES IN ONE! American-made Wollensak telescope. Instant focussing at 15x, 20x, 30x, and 40x, etc. Turn power tube to click—no guesswork. Telescope measures 9" closed, 27" when extended. Weighs only 18 oz.! Has rustproof chrome tubes, large 40mm objective lens. All 12 optic surfaces are COATED. See .22 bullet holes clearly at 300 feet. Use also for astronomical observation. \$29.50 price includes tax and fine leather case.

**6 POWER
BINOCULAR
Now \$16.95**

7 POWER — \$21.95

COATED! Pocket size—weigh only 4 oz. and 7 oz. respectively! Precision constructed PRISM binoculars. Not field glasses. Field of 375 ft. at 1000 yds.! Made of lightweight, durable black and chrome metal. Achromatic lens. Genuine leather case and straps. Carry the United Seal of Quality.



WEIGHS 17 OUNCES!

**7 x 35
COATED
\$45.50**

An all purpose 7 power binocular that will give you exceptionally sharp, brilliant images. Has individually focussing eye pieces. For sportsmen wanting long range viewing. Another opportunity to save by buying from UNITED. Genuine leather case and straps included. SAME MODEL IN CENTER FOCUS with individual focussing right eye piece. 7x35—\$49.50. 7x40—\$52.50.

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Display Salesroom open Monday thru Friday 9:00 AM—3:30 PM

to power steering. Power steering definitely is here to stay and more and more new models of various makes will have it soon. But hold your breath: It costs a little less than \$200 at present for this "lazy man's" steering gear.

For a big four-door sedan, the roadability of the car is good, although I would prefer stiffer springing in front. The front end is inclined to "float" a little at high speed and, believe me, it really has high speed. It is the fastest stock four-door sedan I've

1951 CHRYSLER SPECIFICATIONS

ENGINE	New Yorker & Imperial Models	Windsor & Windsor De Luxe
Type.....	V-8-cyl., OHV	6-cyl., "L" head
Bore and stroke.....	3-13/16 in. x 3 5/8 in.	3-7/16 in. x 4 1/2 in.
Piston displacement...	331.1 cu. in.	250.6 cu. in.
Brake horsepower.....	180	116
Compression ratio.....	7.5 : 1	7.0 : 1
Transmission.....	Fluid-Matic (4-speed automatic transmission on Windsor, 4-speed plus fluid coupling) Fluid-Torque Drive (4-speed auto. trans. plus torque converter) on Crown Imperial models, optional on Imperial models.	3-speed conventional on Windsor, 4-speed De Luxe (optional on Windsor.)

GENERAL

	Imperial	New Yorker	Windsor
Shipping weight (4-door sedan)...	4315 lbs.	4225 lbs.	3595 lbs.*
Wheelbase.....	131 1/2 in.	131 1/2 in.	125 1/2 in.
Tread, front.....	57 1/8 in.	57 1/8 in.	56-5/16 in.
Tread, rear.....	58-9/32 in.	58-9/32 in.	59-9/16 in.
Height.....	65 1/2 in.	65 1/2 in.	65 1/4 in.
Over-all width.....	76 in.	75 1/2 in.	75 1/2 in.
Over-all length.....	213 1/8 in.	213 3/8 in.	207 3/8 in.

*Wind. De luxe — 3743 lbs.

Interior Dimensions (4-door sedan)

Front-seat width.....	57 in.	57 in.	57 in.
Rear-seat width.....	58 7/8 in.	58 7/8 in.	58 7/8 in.
Leg room, front.....	41 7/8 in.	41 7/8 in.	41 7/8 in.
Leg room, rear.....	41 1/2 in.	41 1/2 in.	41 1/2 in.
Headroom, front.....	39 in.	39 in.	39 in.
Headroom, rear.....	35 1/2 in.	35 1/2 in.	35 1/2 in.
Tire size.....	8.20 x 15	8.20 x 15	7.60 x 15
Recommended pressure.....	24 lbs.	24 lbs.	24 lbs.
Road clearance.....	8 3/4 in.	8 3/4 in.	8 3/8 in.
Turning circle.....	L-45'-1", R-44'-1"	L-45'-1", R-44'-1"	L&R-40'-4"
Steering wheel, lock to lock.....	5 1/2 turns	5 1/2 turns	5 1/2 turns
Steering ratio.....	20.4 : 1	20.4 : 1	18.2 : 1

CAPACITIES

Oil.....	5 qts.	5 qts.	5 qts.
Water.....	25 qts.	25 qts.	15 qts.
Gasoline.....	20 gal.	20 gal.	17 gal.

ever driven. For mile after mile on long open stretches, with practically no traffic, the speedometer needle showed from 112 to 115 miles an hour. The speedometer, like those on all other makes I've tested, is fast by about 10 percent, but even so this new Chrysler really "flies." There is good stability and a "safe" feeling in the car even at high speed. The new Oriflow shock absorbers do a fine job of controlling the ride at all speeds. Leg and head room is wonderful. Chair-height seats with soft Airfoam-rubber cushions offer a very comfortable

(Continued to page 264)

UNMATCHED at this Low Price!

CRAFTSMAN
OUR OWN TRADE MARK

**Tilting-Arbor
Bench Saw**

Saw Only
\$57.50*
Cash

Complete with blade, miter gauge,
rip fence, two pulleys and V-belt
\$6 Down, \$5 Monthly



Complete Outfit
\$129.95*
Cash
With guard, motor,
extensions, bench,
light and Powr-Panl
\$13 Down



**FLOATING
DRIVE**

Greatest improve-
ment in Tilling-Ar-
bor Saws in years!

Special floating motor mount lessens strain on saw. Smothers vibration, permits much easier tilting; protects motor from sawdust; automatically controls belt tension. Eliminates the need for a special motor.

**Only \$6 Down puts this big,
sturdy Saw in your shop!**

Meets the most exacting requirements of professional craftsmen! Look at these superior features! ONE wheel controls BOTH angle and depth of cut. Special high-speed tilting and depth adjustments; no locking device needed. ONE lever locks fence at BOTH front and back. "Super-lubricated" ball bearings have much larger oil chambers. Largest table area of any bench saw in this price range!

Precision-ground cast semi-steel table. 8-in. combination blade (1/2-in. bore) has 2 1/2-in. depth of cut; tilts any angle to 45°. Saw has blade; miter gauge; rip fence; machine and motor pulleys; V-belt; motor mount. Complete Outfit (as shown) includes saw guard assembly (with automatic leveling guard, splitter, non-kickback pawls); CRAFTSMAN 1/2-H.P. 3450 R.P.M. ball-bearing capacitor motor (110-120 volt 60-cycle AC); 2 side table extensions; front roller extension; adjustable steel power tool bench; tool light; and Powr-Panl for plugging in. See this sensational saw at your nearest Sears Retail Store TODAY!

*Prices slightly higher south of the Ohio and west of the Mississippi rivers.



Handy Accessories for Your Bench Saw

CRAFTSMAN 6-in. Dado Set, \$9.50. Dados, rabbets, grooves. 1/2 or 3/8-in. arbor.

CRAFTSMAN Molding Cutter Head, \$4.50, and Cutter Bits (styles \$2.95 per set, up). Make your own moldings! Has dozens of uses! 4-in. diameter cutter head (with Allen wrench), fits most bench saws with 1/2 or 3/8-in. arbor. 1-in. wide bits cut styles as shown.

CRAFTSMAN Carbide-tipped Saw, \$10.95 and up. New! Safer — has only 8 teeth projecting only .020 in. above non-cutting edge. Tungsten carbide tipped blades last 20 times longer than ordinary circular saw blades! No need to resharpen at frequent intervals. For ripping, cross-cutting or mitering. 5/8 to 10-in. diameters; all arbor sizes.

Sears Easy Payment Plan makes it easy for you to buy your Bench Saw NOW . . . pay for it as you use it!

CRAFTSMAN Hand and Power Tools by **SEARS, ROEBUCK and CO.**
Famous for fine quality . . . precision performance . . . low price!

QUALITY PLUS
PRECISION . . .

Shopmaster

Tools and
Accessories

for
**BUDGET-MINDED
Hobbyists**



8" Tilting Arbor Bench Saw \$76.95

7" Tilting Arbor Bench Saw \$47.95

8" Tilting Table Bench Saw \$51.50

10" Tilting Arbor Bench Saw \$86.95

10" Floor Model Tilting Arbor Saw \$105.00



12" Drill Press \$46.95

12" Floor Model Drill Press \$54.00



15" Jig Saw (Tilting Table) \$27.95

Saber Saw \$17.95



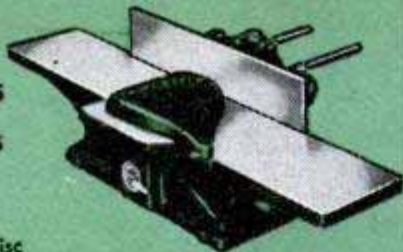
6" Jointer-Planer \$79.95

4" Jointer-Planer \$47.95

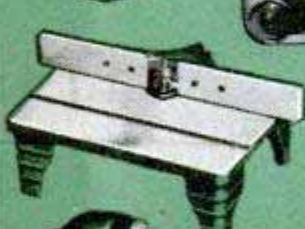


12" Band Saw \$79.95

10" Band Saw \$46.95



Belt and Disc Sander \$51.50



Spindle Shaper \$45.95

10" Wood Turning Lathe \$45.95



Zone 2 prices, slightly lower in zone 1.



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driving position, and the larger center arm rest in the New Yorker is very convenient for long-distance driving.

Brakes are highly satisfactory with no sign of "fading" either at high speed or on long, steep mountain grades and pedal pressure is light. Chrysler's Safeguard hydraulic brakes, power-assisted by vacuum were on my test car, which aided the smoothness and ease of brake-pedal operation and made quick stopping possible. While Chrysler engineers are pioneers of hydraulic brakes, they still stick to the mechanically operated parking brake located on the propeller shaft.

Inside the car are many fine features. The panel (speedometer and instruments) is rather "cheese cakey" but Chrysler seems to favor such styling and it is attractive. The crash pad is a good idea and adds to safety. The hand brake is easily operated by a "T" lever at the left of the steering column.

I used the new Fluid-Torque Drive model with four-speed automatic transmission. It is smooth, with no jerking; the new converter multiplies the torque a maximum of 2.34 to 1, thus giving tremendous acceleration. In my opinion it is much better than the ordinary fluid coupling where the converter is not used.

I think some improvement could be made on the shift lever and the position indicator. It's a little difficult to operate between low and reverse. This is no serious objection, but is not in keeping with Chrysler standards. There should also be a light on the indicator for night operation. There is still a clutch pedal, which must be used before moving the shift lever after starting the engine. You can then forget the pedal, which Chrysler has plainly marked "Safety Clutch." Unless the clutch pedal is depressed after the engine starts, the car will start moving if the lever is in "R," "D" or "L" position. At speeds above 55 miles per hour you cannot "kick down" to a lower ratio. At any speed the upshift to high after removing foot from throttle is delayed too long. It's too sluggish. The downshift could be smoother.

The body is not only roomy but solid. The vision is outstanding, both front and rear. There are few blind spots and there is a clear view in every direction. I found no dust or water leaks in rainstorms. No squeaks or rattles developed.

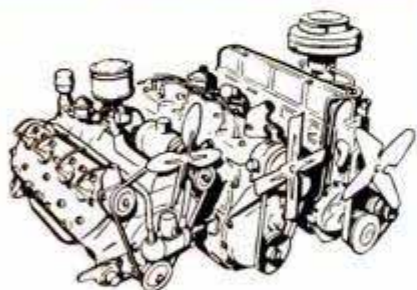
The windshield is two-piece, of which I approve, as replacement costs are less than the curved, one-piece style.

The electric windshield wipers have two speeds and function well.

Chrysler still sticks to the cowl ventilator

(Continued to page 266)

"New-Engine" Your Car Now With A Wizard-ized Engine for \$16 Down



FORD PLYMOUTH CHEVROLET
as low as as low as as low as
\$16⁰⁰ \$17⁰⁰ \$14⁰⁰
Down Down Down

Terms vary by area, make, and model of car.

The Biggest Money-Saving Idea In Car Maintenance In Over 20 Years!

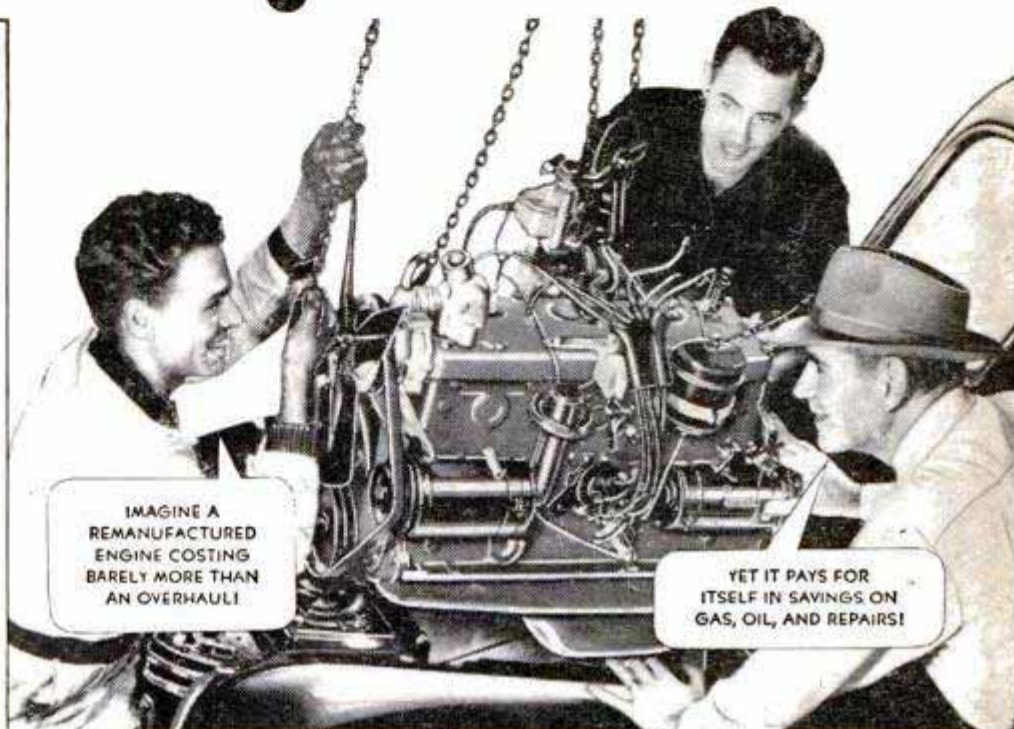
Now you can say goodbye to high upkeep costs and never-ending repair bills . . . enjoy new car power with a Wizard-ized Engine.



Not just "rebuilt"—but fully remanufactured in 5 large factories. Every original manufacturing step repeated, using original factory block. Backed by over 3000 Western Auto Stores and Associate Stores!



Every moving part brand new top quality, or completely remanufactured to function like new. That's why you can buy a Wizard-ized Engine with new car confidence.



IMAGINE A
REMANUFACTURED
ENGINE COSTING
BARELY MORE THAN
AN OVERHAUL!

YET IT PAYS FOR
ITSELF IN SAVINGS ON
GAS, OIL, AND REPAIRS!

*Your easy, low-cost solution for "tired" Chevrolets, Fords, Plymouths, Pontiacs, Mercurys, Dodges, Chryslers, DeSotos, Oldsmobiles, Studebakers, and other

popular makes. Wizard-ized Engines are fully remanufactured in 5 large factories. Engine accessories used from your old engine, or may be replaced new.



Get Another 50,000 Miles or More from Your Car With A WIZARD-IZED ENGINE THAT Pays for Itself!

Thousands have discovered this easy new way to stop constant costly engine repair bills—simply by replacing their old engine with a low-cost guaranteed Wizard-ized Engine . . .

No other engine—no overhaul—can give you more miles for so little cost. And, you get . . .

The same engine guarantee that comes with a new car—plus free 500-mile service check of our installation. Each Wizard-ized Engine gets a . . .

Complete factory inspection and then a final test-run. Our installations are made by trained mechanics in fully equipped garages. You can buy a Western Auto Wizard-ized

Engine with new car confidence! And, best of all, it's . . .

Priced far below a new engine . . . or about the same as a bearing, ring and rebore overhaul.

Why waste money on extra gas, oil, and repairs for a worn-out engine? You can enjoy a Wizard-ized Engine for . . .

Less than 1/2¢ per mile . . . and you get years of new miles without the high cost of a new car!

See your Western Auto man now . . . about his guaranteed trade-in allowance for your old engine!

EASY TERMS AS LOW AS **\$3⁰⁰** weekly
(Terms vary by area, make, and model of car.)

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The Engine You Can Buy with New Car Confidence!



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Instant Flame

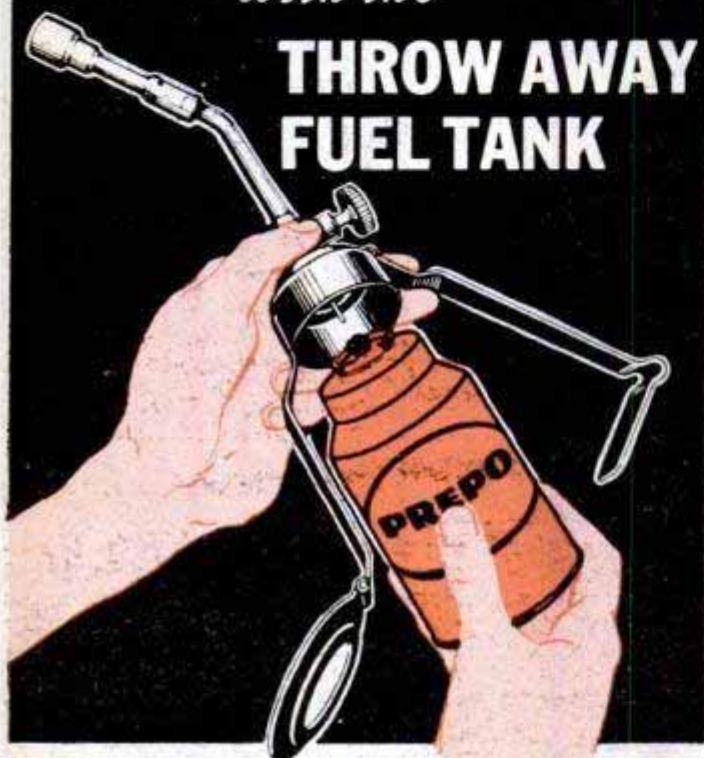
with a
Twist of
Your
Fingers!



The new principle
with the

TORCH

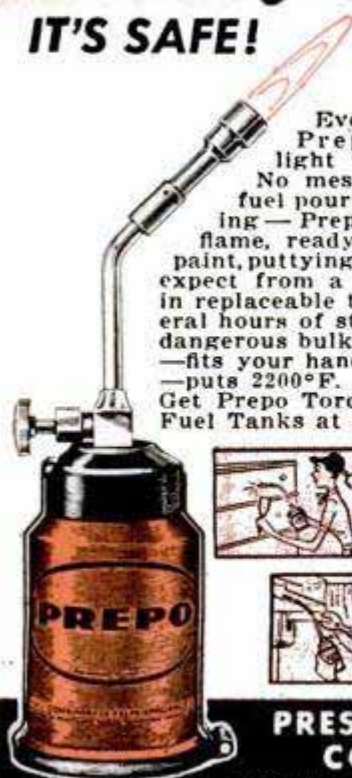
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operated by a lever. I like it, as the air enters high above the ground, eliminating much dust and fumes from vehicles in front. The hood is long and on rough roads there is a little hood vibration. I think a shorter and more sloping hood in front would aid close-to-the-ground vision and eliminate any hood "flutter" on rough roads. With the short V-8 engine, a shorter hood could be used. The hood locks from the inside and therefore offers protection for under-hood equipment that might otherwise tempt thieves.

The starter is conveniently located and is operated by a turn of the key . . . it's good. The choke is automatic. The trunk space is large, and the lid opens easily. The ventilation system is excellent, either in hot or cold weather. The radio is average.

For a large four-door sedan, heavily loaded, I consider the gas mileage very good (see economy chart). The new engine is designed to use regular gasoline. I experimented with both premium and regular gasolines of various brands and, while 61 percent of the Chrysler owners reported using premium gas, I found nonpremium gas to be satisfactory for ordinary use in the V-8. Only a few times in very hot weather did the engine "ping" when using regular gas.

In the 1951 A.A.A. Grand Canyon Economy Run from Los Angeles to Grand Canyon, Ariz., a Chrysler Imperial won Class G, averaging 21.178 miles per gallon at 40.-765 miles per hour for the 840.05 miles. At the same time, a Chrysler Windsor did 20.-886 miles per gallon.

After beating the new V-8 over all kinds of roads (some off the highway in mountains and desert) in every conceivable kind of test, I'll say Chrysler has come up with a "toughie." I abused it and tried to find the "bugs," but I found none of consequence. I couldn't make it heat, rattle or squeak. It responded to every conceivable kind of test and came through with flying colors. I've never found the perfect car and I don't expect to; there are things about every make that I like or dislike. I do like the new Chrysler. For my money and under present conditions it's a top buy.

I interviewed several Chrysler owners on my trip west and I'll say they are a bunch of boosters. Many are "die hard" Chryslerites . . . I mean owners who buy Chryslers over and over again; many wouldn't own any other make.

Chrysler engineers again have rung the bell with new advanced ideas in design and construction in the 1951 models. The late Walter P. Chrysler would be proud of the corporation he founded and the cars it continues to build.



Wilbur Shaw says . . .

"It's hard to describe this new Chrysler without going off the deep end!"

Here's why America's most famous driver picked Chrysler to pace the 1951 Indianapolis 500 Mile Race . . . as recorded on tape during his first drive in our beautiful new car.

"It's a whale of an automobile . . . the most powerful—and probably one of the fastest stock sedans manufactured in the U. S."

"It's pretty hard to describe this car without going off the deep end!"

"This engine . . . (the revolutionary new 180-horsepower Chrysler FirePower Engine) . . . I can't get over the amount of power and snap . . .!"



"As astonishing as the performance of this engine is, it's only half the story! The rest is power steering . . . (Hydraguide, an exciting new Chrysler first) . . . the first on any U. S. passenger automobile, and a new Chrysler Fluid-Torque Drive."

"This steering combined with the automatic transmission . . . is the nearest thing to an automatic pilot for a car I can imagine."



"That makes a lot of automobile in one package . . . In fact, I think so much of this car that I've selected it as the pace car in the 1951 Indianapolis 500 Mile Race."

★ ★ ★

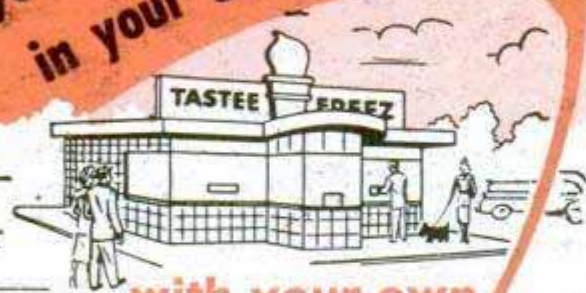
Remember . . . the above words are Wilbur Shaw's own, reported on a tape recorder in the car. Your own reactions will be equally enthusiastic. With the revolutionary new FirePower Engine—with Hydraguide, the first power steering in a passenger car—with Oriflow Shock Absorbers that double your comfort on rough roads—Chrysler brings you the most thrilling developments in the automobile in many years. Your nearby dealer will be happy to let you feel these new thrills for yourself.

Mr. Shaw's comments are reprinted through the courtesy of POPULAR SCIENCE Magazine.

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finest engineered cars in the world

you! can earn
\$5,000 to \$10,000 a year
in your **SPARE TIME**



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TASTEE-FREEEZ STORE

Privately Owned —
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CONES — CUPS
Sundaes
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Pints — Quarts
Served Fresh From
the Freezer!

Increase your family income. Work evenings and weekends to start. Build up to full time and add more stores with the tremendous profits you earn. Become a part of this nation-wide chain of Tastee-Freeez stores. Dish out the most delicious soft ice cream treat ever conceived for thrilling the taste of millions. Nutritious dairy product, smooth and refreshing... frozen seconds before serving. Our machine is the only truly automatic freezer on the market. So simple even a child can operate it.

EASY TO START — NO EXPERIENCE NEEDED

For men or women who may have retired too soon and have time on their hands — for those whose health demands easy work — for ex-servicemen who are seeking a sure-fire, money-making opportunity — in fact for any person or family desiring a bigger income, TASTEE-FREEEZ is the ideal business. Only \$2500 capital required to purchase all the equipment necessary to operate. If qualified, financing can be arranged, thus reducing the cash outlay. Your profits begin immediately. No franchise to buy. This is your golden opportunity to have your own business — a secure future and an income beyond your fondest dreams. Get all the facts. Prompt action may prove to be the turning point in your life. Write or wire NOW!

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FRANCHISED TERRITORIES AVAILABLE. 67 franchises now operating. A few choice territories open to men who can supervise installations and operation of Tastee-Freeez stores. Must be able to finance self at the start. For details of our franchise plan address your letter to Dept. DM.

Fever Charts Plot a Better Automobile

(Continued from page 122)

the most economical speed, according to all the instruments, is not the steady 40 miles an hour you've heard about, but a loping 20. Anything above 50, and all the needles drop into the red, or "very poor" section, and that tenth of a gallon runs out like water through a funnel.

With his fuel-consumption indicators, White has verified a number of things that contribute to poor mileage. The dials showed, for instance, that running a standard vacuum windshield wiper without a booster cuts down the miles per gallon by 10 percent!

"Since the gas-consumption meter works off engine vacuum," says White, "we found out why. With a windshield wiper running full open, we were dropping six to seven inches of vacuum in the engine. We flicked switches, took temperature readings in the engine and learned something else: As a result of the vacuum loss, our mixture was leaned out. As a result of that, engine heat was soaring. The temperature of the exhaust valves registered 2300 degrees. They start going soft at 2100 degrees. No wonder valve heads warp and no wonder fuel that never gets to burn shoots through leaky exhaust valves when the wipers are on! Electric wipers on every car is the answer to this one. It's got to come."

Other road tests already have proved that when tire pressures are eight pounds too low, cars burn seven percent more fuel.

"But most of all," says White, "we've found that fuel economy is lost under the foot of the man at the wheel."

The instruments prove that a heavy throttle, a jerky driver, a man who guns on hills and turns, is losing a third of his potential mileage. Best is the steady pacer, who "feels" his throttle on hills. "Ease up on the gas pedal when you climb a hill sometime," says White. "Most people will be able to come halfway up on the accelerator before power starts falling off. Depressing the extra distance just wastes fuel."

From his driver's seat, White can watch the green patterns on the oscilloscope screen beside him and tell you exactly what's happening inside any one of his six cylinders. The cathode ray is activated by the electrical system in each cylinder. You can see the sparks jumping in a strong, even pattern across the screen. But how they jump can tell a story of incomplete combustion, leaky valves, or any other abnormality, depending on the pattern they make. "If we're

(Continued to page 270)

BUILD YOUR OWN ARC WELDER OR LIGHT PLANT

JACK & HEINTZ R-1 D-C GENERATOR

Save \$250 to \$500

Only \$27.50

instructions included rated 300 Amps. 30 Volts. Ship. wt. approx. 70 lbs.

PRICE F. O. B. K. C. MO.

CONVERTS TO ARC WELDER 300 AMPS: 350 AMPS. OR LIGHT PLANT CAP. LOAD OVER 7500 WATTS

Stock No. 517—D C Generator P-1 Delco 200 amp 28 Volt. Gov't. cost \$300.00. Instructions for converting to welder or light plant included. Including directions and diagram for converting to COMBINATION WELDER AND LIGHT PLANT. Wt. approx. 70 lbs. **\$17.50**

CARBON PILE GENERATOR VOLTAGE REGULATOR
For use with 24 or 32 Volt D. C. Generators. Also recommended for the P-1 and R-1 type generators in "build your own" Light plant. Only **\$6.50**

ROMEC FUEL PUMP

Or use as hydraulic pump or for Vacuum drawing. Rated 150 Gallons per hour at 1750 R.P.M. Has cushioned self lubricating 1 1/2 splined shaft. Ports are 1/2" and 1/4" Pipe thread. Here's non-pulsating dependable performance data \$7.50 post-included. Stock No. RD-4550.

WEAVERS HYDRAULIC HAND PUMP

BRAND NEW INCL. BUILT IN CHECK & RELIEF VALVE. For hydraulic jacks, presses, hoist, etc. For operating hydraulic cylinders to pump oil or hydraulic fluid under pressure. Has built in check valve, and is capable of delivering 1000 lbs. pressure. Wt. 10 1/2 lbs. A \$50.00 value. Instructions incl. Price **\$12.50**

Valuable Gears — Bargains — Speed Reducers

10-1 or 5-1 ratio, 90 degree angle. Shaft driven 1/2" spline shaft with 3 mounting holes 5/16". Gears held in forged and machined aluminum housing with two needle bearings, one bronze bearing, and three high speed shielded bearings. Sealed self lubricating chamber. Price **\$5.95** paid

New Amplidyne MOTOR GENERATOR

#5AN31N18A—Use as 24/32 Volt D.C. motor, pulls 1/2 H.P. or 0/60 V. D.C. Can be adapted to 110 V. A.C./D.C. 10,000 R.P.M. 1/2 H.P. by simple changes in connections. This unit can be adapted to independent and rural lighting, power, etc. Instructions incl. (Stock #790). Gov't cost \$140.00. Wt. 30 lbs. Only **\$7.50**

SENSATIONAL SELSYNS

Two or more connected together, work perfectly on 110 V. A.C. For weather vanes, rotating directional antennas or controlling distance operations. Complete with diagram and instructions. Wt. 3 1/2 lbs. PER PAIR **\$6.95** Postage paid

Hydraulic Solenoid Control Valve

BENDIX. No. 81560 24V. D.C. For remote control operation and to operate one single action or double action hydraulic cylinders with 24 V. D.C. Recommended pressure 800-1500 P.S.I. connections are 3/8"-18thd. Diagrams & Data incl. \$35.00 value. **\$3.50** ea. **\$6.50** per pair

Brand New PUROLATOR GASOLINE FILTER

For all cars, trucks, tractors or boats. Permanent type. Data incl. **\$4.95** Postpaid

CUNO OIL FILTER — Brand New

Aircraft type. Filters oil without cartridge replacements. Just turn handle and cartridge is clean. Standard 3/8" inlet and outlet ports to accommodate 12 gallons per minute. STOP CHANGING OIL. Instructions incl. **\$4.95** Postpaid

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 BE ADAPTED TO 110 V. A.C. OR R.E.A. line by simple arranging armature brush leads. UNUSED. **\$5.95**

Instructions incl. **\$4.95**
ELECTRIC MOTOR 1/2 H.P. 24 Volt D.C. R.P.M. 2500. Amp. 22 #HCA24. Gov't

cost \$75.00. Brand New. **\$4.95**
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ELECTRIC MOTOR 6 Volt D.C. Delco — New Ideal as wiper motor, car heater motor, toy applications 1/4" dia. 1 1/8" long shaft. 2 mounting studs. **\$2.35** Plus \$3.35 New. Only Postage

D. C. GENERATOR

Brand New For Farm—Home—Ranch. Delivers 430 Volts D.C. at 3450 R.P.M. Ball bearing supported. Fan cooled armature. Self lubricating bearing. #211220-A **\$7.50** Wt. 21-lbs. Now only

ECLIPSE MOTOR & GEAR UNIT

Brand new including built in 24 V. D.C. motor. Has 1-horizontal and 1-vertical take off shaft. Overall gear ratio to motor is 40-1, can be adapted for 2-1 or 20-1 ratio. Ideal as OVERHEAD GARAGE DOOR OPERATOR DRIVE FOR SMALL HOIST WELP PUMP JACK, LAWN MOWER DRIVE, DRIVE FOR POST DRILL, etc. Wt. 23 lbs. Gov't cost, \$221.00. Instructions free, including simple directions for converting unit for 110 V. A.C. so as to be belt driven by a separate motor. **\$12.95** f.o.b. Only KC, Mo.

AIR FILTERS

Aircraft type. Removes dirt, dust, etc. For industry, home & laboratories. For forced warm air, conditioning units, etc. Made of heavy metallic mesh with metal frame. Permanent, needs no refills. Size 4 1/4"x6 3/4"x2". Special price for quantity users. Wt. approx. **\$3.50** ea. 8 lbs. \$25.00 value.

Brand New Wonderful ROTATOR MOTOR

For rotating TV, Ham, FM antennas, turntables, etc. Applicable for 110 V. A.C., 60 cycles or for 24 V. A.C. & 12 V. D.C. Approx. 7 R.P.M. Free swing, reversible, light weight, rugged, quiet. Motor & gears oil sealed. Simple instruction and diagrams for converting incl. Wt. approx. 4 1/2 lbs. Stock #6918. \$50.00 value **\$7.95** post-Now only

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Including built in relief and by pass valve. Capacity 400 G.P.H. 1/2" drive spline shaft, 3/4" pipe inlet and outlets. Rotates either direction or in any position. Ideal for gasoline, oils, water and various types of sprayers. Engineering data incl. (Stock #600) only **\$7.95** Post-Data incl. **\$7.95** paid

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about to warp a valve head, we'll know it before it happens," he boasts. "And our other instruments will tell us what's causing it."

A water flowmeter brings the radiator fluid into the cab of the truck, so it can be watched continually; a velometer measures the air going through the carburetor. Two instruments behind the driver's seat tell the horsepower output of the engine at any given moment. Voltages throughout the electrical system are continually registered on dials in the back end of the truck.

Through the earphones of his sound-level meter, White listens to any part of his vehicle simply by moving the pickup around. It's so sensitive you can hear the whish of a pin dropping through the air 30 feet away. Through this instrument, White listens to the click, click, click of his engine valves; the whirring of gears, or a tiny vibration in the rear end that may some day cause serious wear.

In the car is the device for measuring slippage in the clutch or fluid transmission—a big source of power and fuel loss. White calls it a "stroboscopic gain gauge." On one inside wall of the truck is a strobe light, triggered by the firing of a cylinder. Its light flashes across to the other side, where two disks, each with a black dot on its rim, are spinning. One disk is driven by the crankshaft, in front of the transmission; the other by the drive shaft, behind the transmission. If there's no power loss in the transmission or clutch, the dots rotate in unison, passing a marker point on the dial rim simultaneously and the strobe light flashes at the same instant. Any lag, however, and the dot on the drive-shaft disk gets farther and farther behind on its rounds. By measuring the distance it lags, White can tell just how much slippage there is, and how much horsepower is being used to churn oil or clutch plates instead of to turn the rear wheels.

"Our strobe gain gauge," says White, "is going to tell us exactly how much extra fuel is used up because of this lost-power delivery. Also, we're going to settle the argument about just how many miles per gallon are sacrificed in automatic transmissions for the convenience of not having to shift."

Streamline and design aren't left out of White's calculations. A tiny instrument on back of the truck measures the vacuum and drag created when the vehicle is under way. His anemometer and pitot tube give him his air speed for the same reason. "What a head wind does to gasoline consumption is pathetic," he claims. "Already

(Continued to page 272)



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Realism and facts are what Andy J. White is after. His big ambition is to take his roving dynamometers out to Indianapolis and run them around the track wide open until everything in them starts to collapse, so he can watch and tabulate the failure of each part. That way, he figures, he'll learn a few things no one ever knew before.

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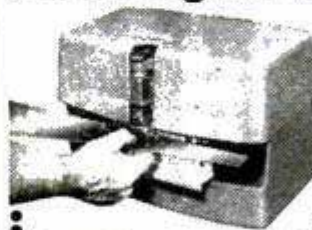
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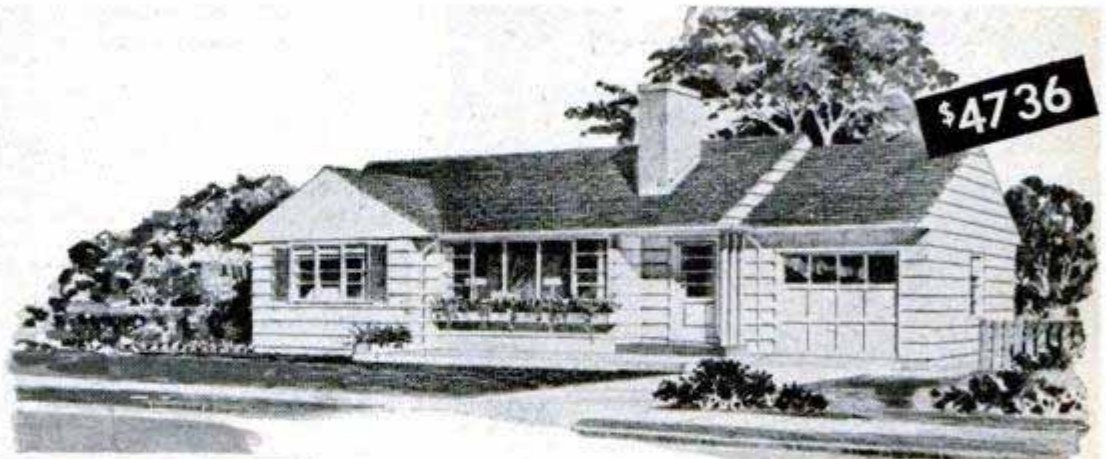
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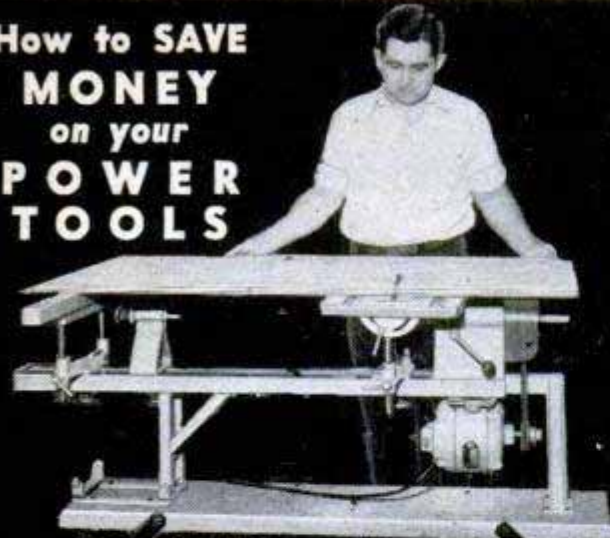
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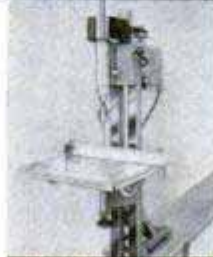
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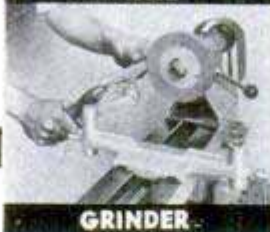
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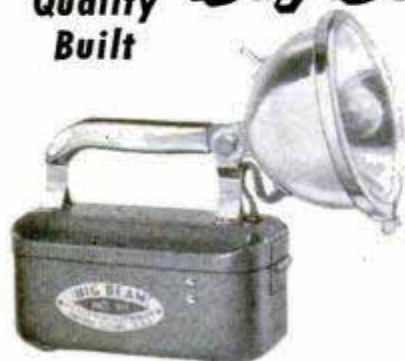


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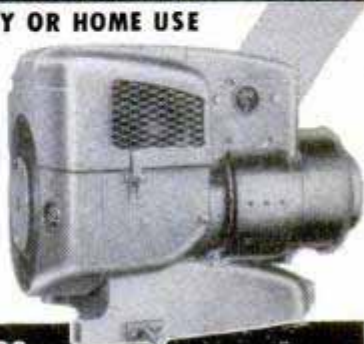
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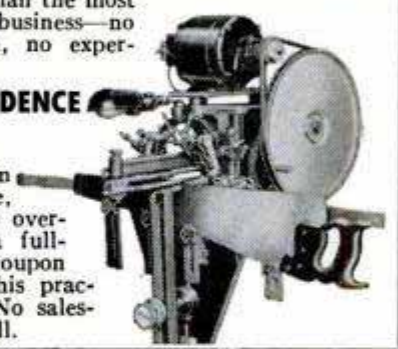
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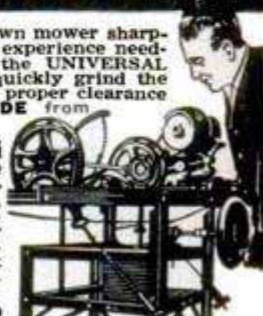
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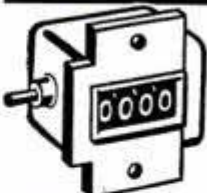
SIDE MILLING CUTTERS				STAGGER TOOTH CUTTERS				PLAIN MILLING CUTTERS			
Dia.	Width	Arbor Hole	Price Each	Dia.	Width	Arbor Hole	Price Each	Dia.	Width	Arbor Hole	Price Each
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4"	3/16"	1 1/4"	3.95	5"	1/16"	1 1/4"	\$2.49	4	4	1 1/4	9.95
4"	1/4"	1"	3.49	4"	3/16"	1 1/4"	2.49	4	3	1 1/4	9.95
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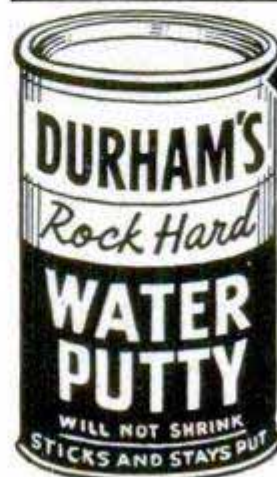
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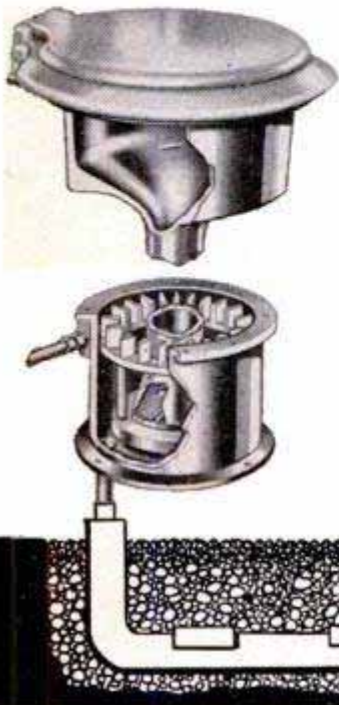
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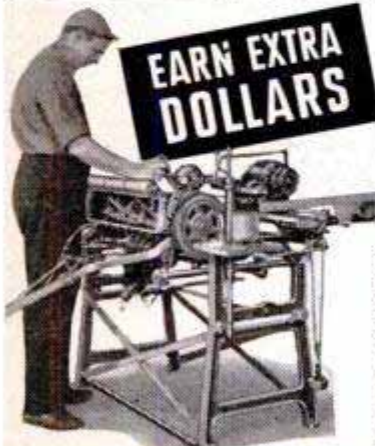
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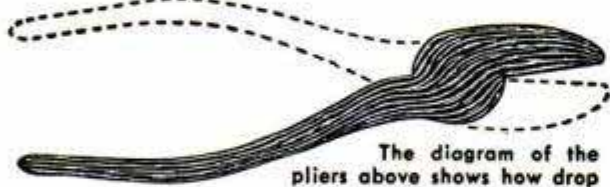
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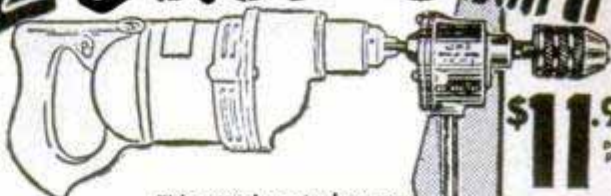
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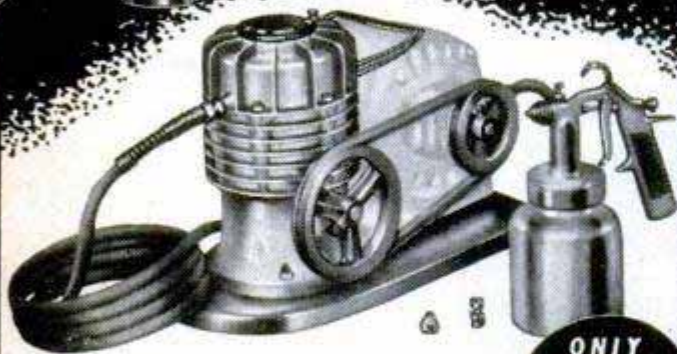
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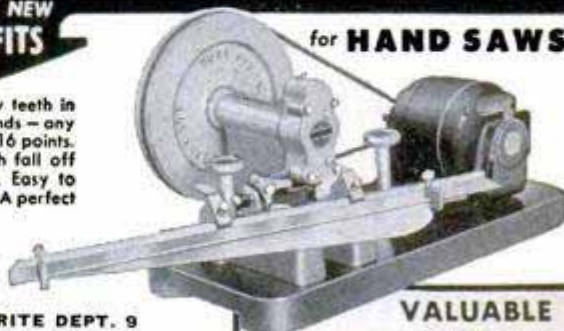


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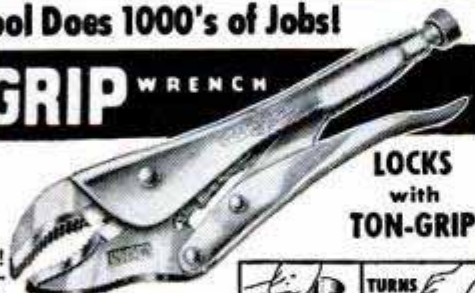
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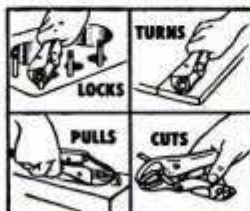
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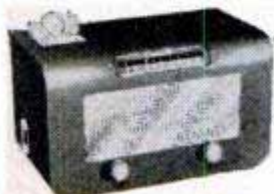
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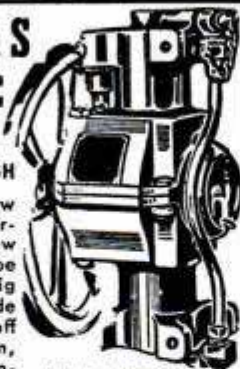
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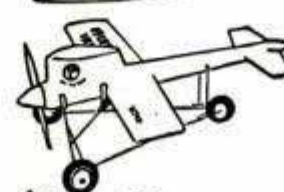
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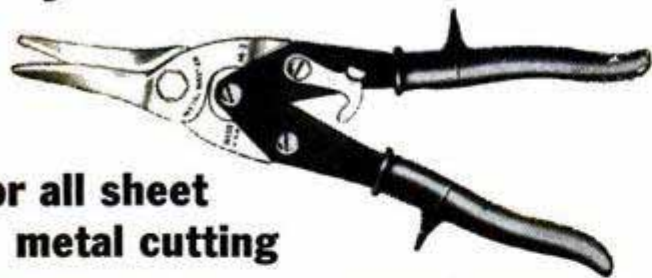
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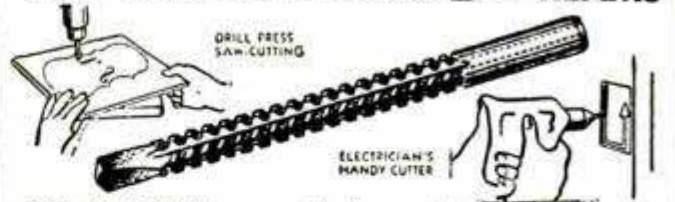
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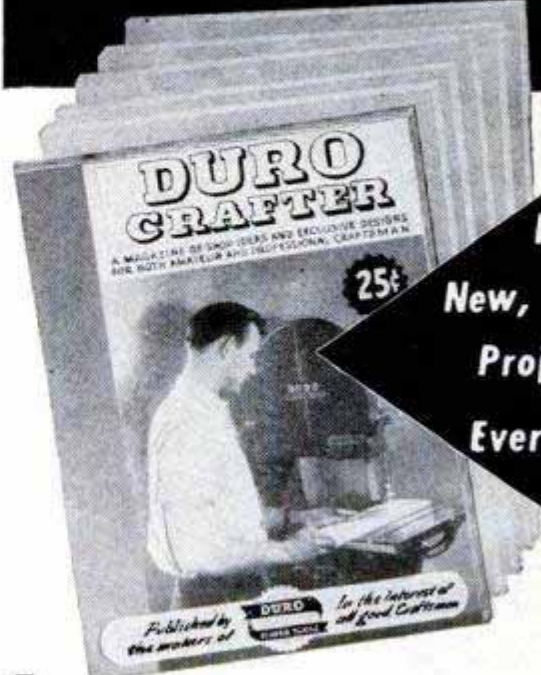
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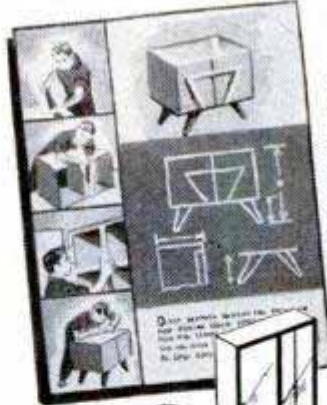
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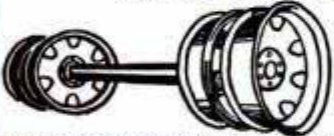
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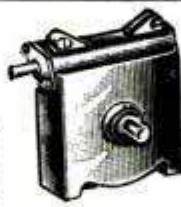
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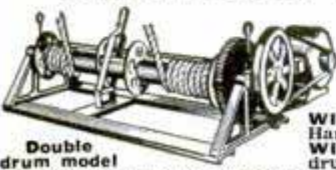
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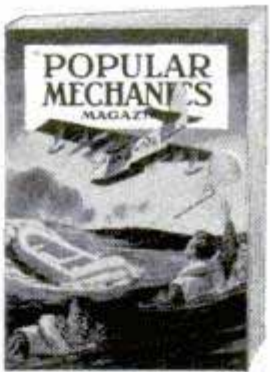
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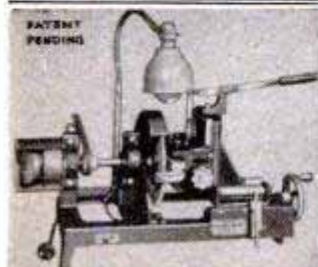
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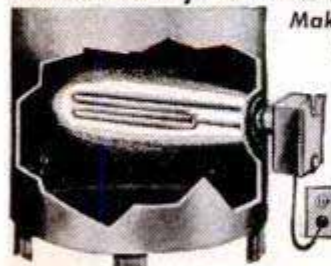
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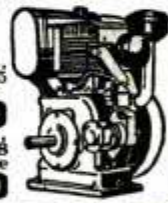


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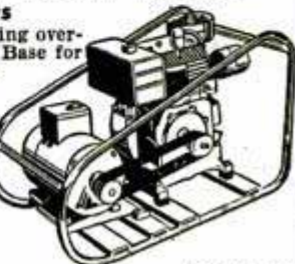
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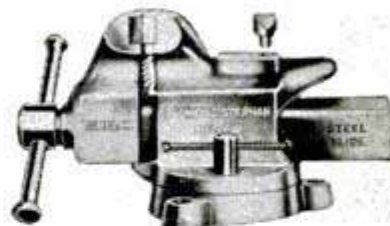


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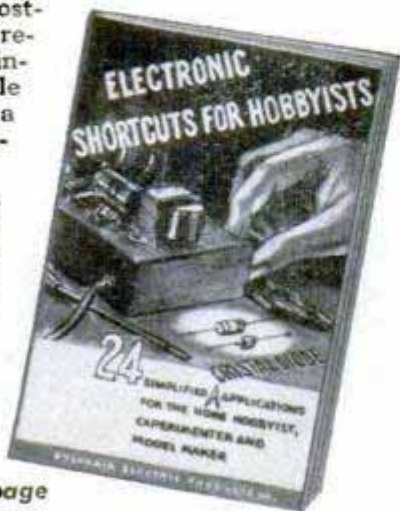
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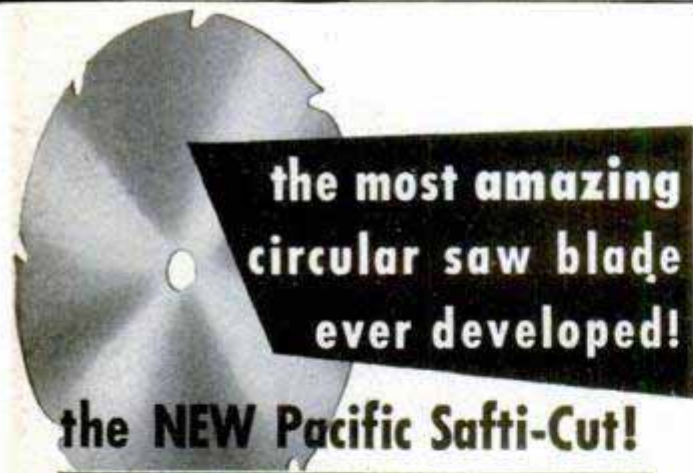
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by Susan



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Answer: It costs less than 1/2¢ a dozen to advertise the big-name brands of oranges.

That's only half the story. Advertising lowers your cost two ways:

Cuts the selling costs. And by helping make mass production possible, lowers the production costs, too.

So advertising saves you many times that 1/2¢ per dozen.

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 Gives 20,000 lb. thrust (push pull) using 1500 PSI line pressure as obtained from our hyd. pumps. Or will produce 40,000 lb. thrust with 3,000 lb. line pressure. CAN ALSO BE OPERATED ON LOW PRESSURE AIR SYSTEMS. 4" Bore, 1 1/2" dia. piston shaft, 18" stroke, length 30 1/2". Equipped with ball bearing loaded clevis type mounting and swivel type high pressure steel pipe bracket for easy use. Ideal for road, farm & shop machinery, presses, etc. Cost Gov't \$394.00 **29.95**

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 Double action cylinder. Has a bore of 1-3/8" and shaft of 1". Stroke is 9". Overall length 15 1/2". Built for 1500 lbs. continuous duty. 3000 lbs. intermittent. Will lift or push up to 2300 lbs. . . . Can be adapted to hundreds of uses. **9.75**

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 Has piston with built-in relief valve to limit cylinder strokes. Inlet and outlet parts have 1/2" std. pipe ports. 1/2" A.C. tube to cyl. (1/4" x 18 thread) **9.75**

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GEROTER TYPE PUMP
 Logan Geroter type. For operating hydraulic systems on trucks, tractors, etc. Delivers 8 GPM at 1200 RPM at 1000 PSI with 5 H.P. Can also be used as Hydraulic fluid motor. 3/8" std. pipe ports, 1/2" splined shaft for pulley or direct attachment. 5 1/2" dia., 7" long. Used but condition guaranteed. **19.50**

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 Self contained, 2 H.P., constant torque at all speeds with variable volume reversible, piston pump (controlled by outside lever) supplying piston hydraulic motor. Automatic pressure, dash pot for smooth control. Power output RPM -0 to 1/3 input RPM in both directions. Input RPM 1800 continuous, 4000 intermittent. Dash pot can be removed for greater RPM. Ideal for lathes, duplicator or set-up on mills, conveyors, small cars, drives, gearings, etc. **32.50**
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LEAR ELECTRIC MOTOR. 24 volt, 6 amps, series wound reversible motor with overload clutch. Motor turns 11,000 R.P.M. Has 11 to 1 gear reduction box turning 1000 R.P.M. at take-off. Adaptable to flex or rigid drive. Limit switch box. Size 10" x 4". **57.95**

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 Any above ammeters. **3.95** Only **4.95**

ABOVE AMMETERS HAVE 2" FACE EXCEPT 0-300 WHICH HAS 3" FACE
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 Heavy Duty G.E. Gear Head Motor. 1 1/2 H.P., 24 volt DC, 125 amp reversible motor will drive reduction gear box unit 44.5 to 1, resulting in 168 R.P.M. at 5/8" diameter take-off shaft. Motor contains electro magnetic break.

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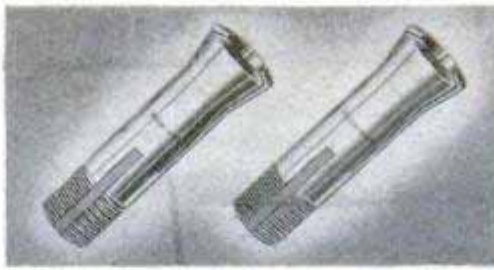
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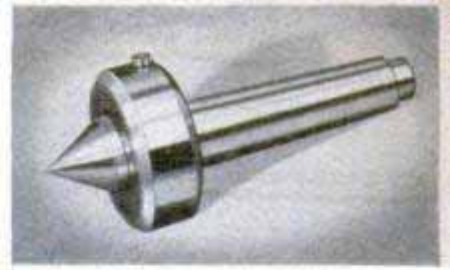
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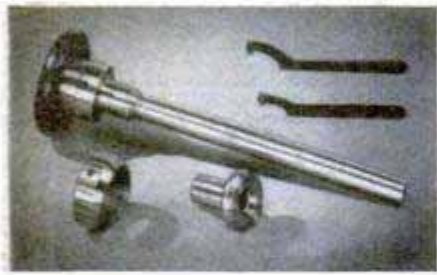
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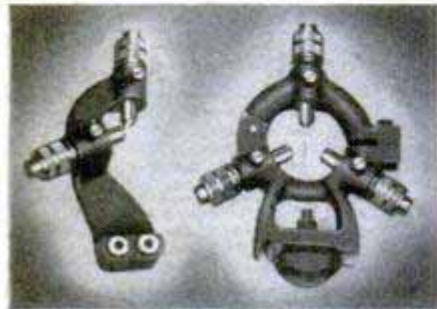
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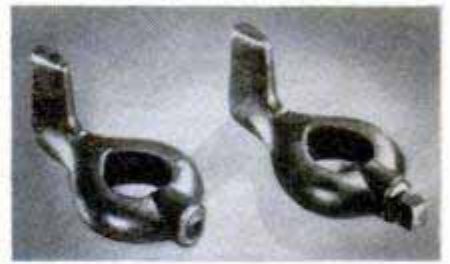


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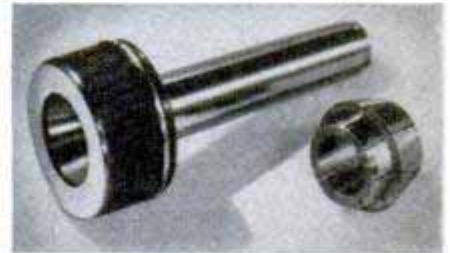


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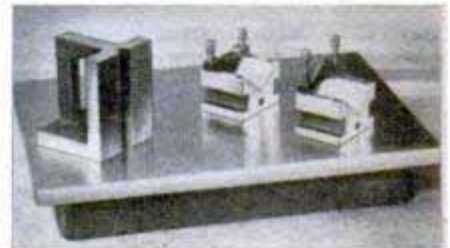
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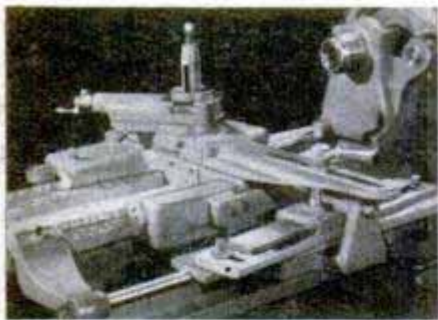


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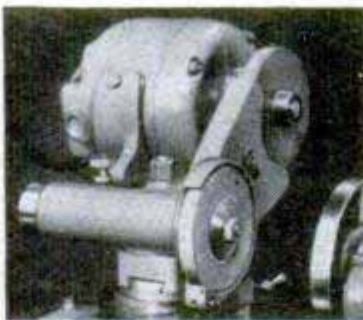


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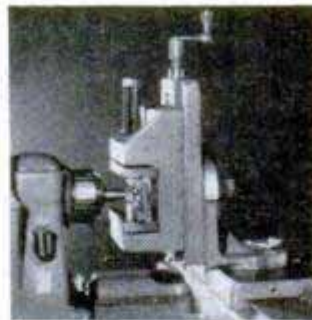
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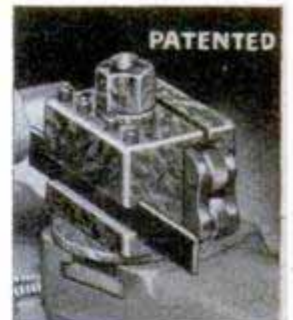
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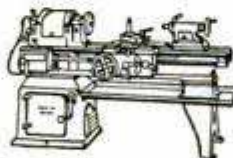


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