

AUGUST 1957

35 CENTS

POPULAR MECHANICS

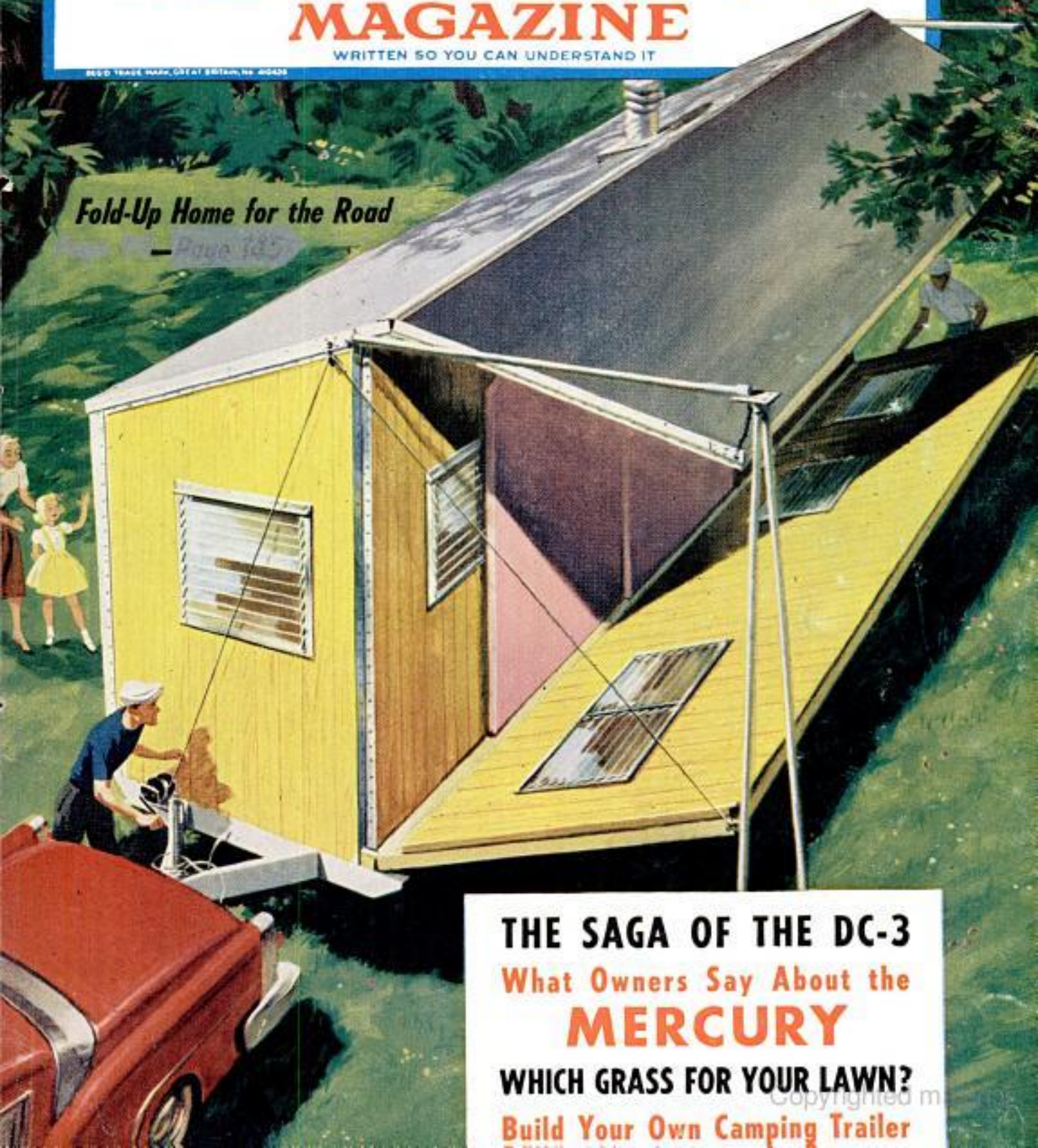
MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG. TRADE MARK, GSE AT BRITAIN, No. 40428

Fold-Up Home for the Road

— Page 107



THE SAGA OF THE DC-3

What Owners Say About the
MERCURY

WHICH GRASS FOR YOUR LAWN?

Build Your Own Camping Trailer

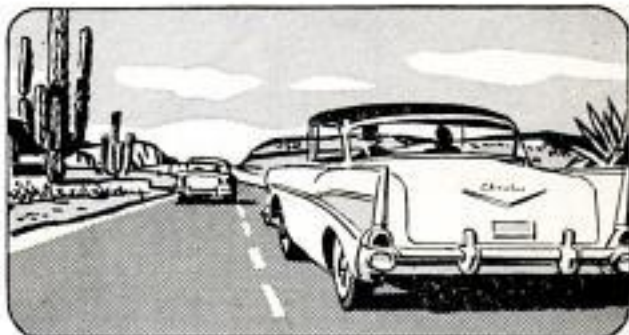
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"You have more to say about gas mileage than you think!"

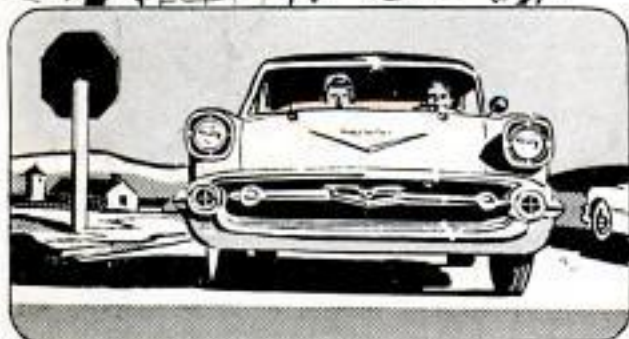


Mauri Rose

One of America's top professional drivers for over 25 years, three-time Indianapolis 500-mile winner.



"Speed plays an important part in your car's gas consumption. Stock cars are built for peak efficiency at cruising speed, not top speed. Speeders not only take unnecessary chances, but also waste gas."



"A pro knows it doesn't pay to race away from stops. Accelerating hard in low gears eats holes in gas mileage. And it's not worth the wear on your engine . . . you get there just as soon taking it easy."



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But just wait until you visit your hardware dealer's and see the low price on this powerhouse. You can take this SpeedDrill home for under \$20.00—a value equal to drills selling up to \$35.00. Ask to see model 20 Thor $\frac{1}{4}$ " SpeedDrill. SpeedWay Manufacturing Co., division of Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.

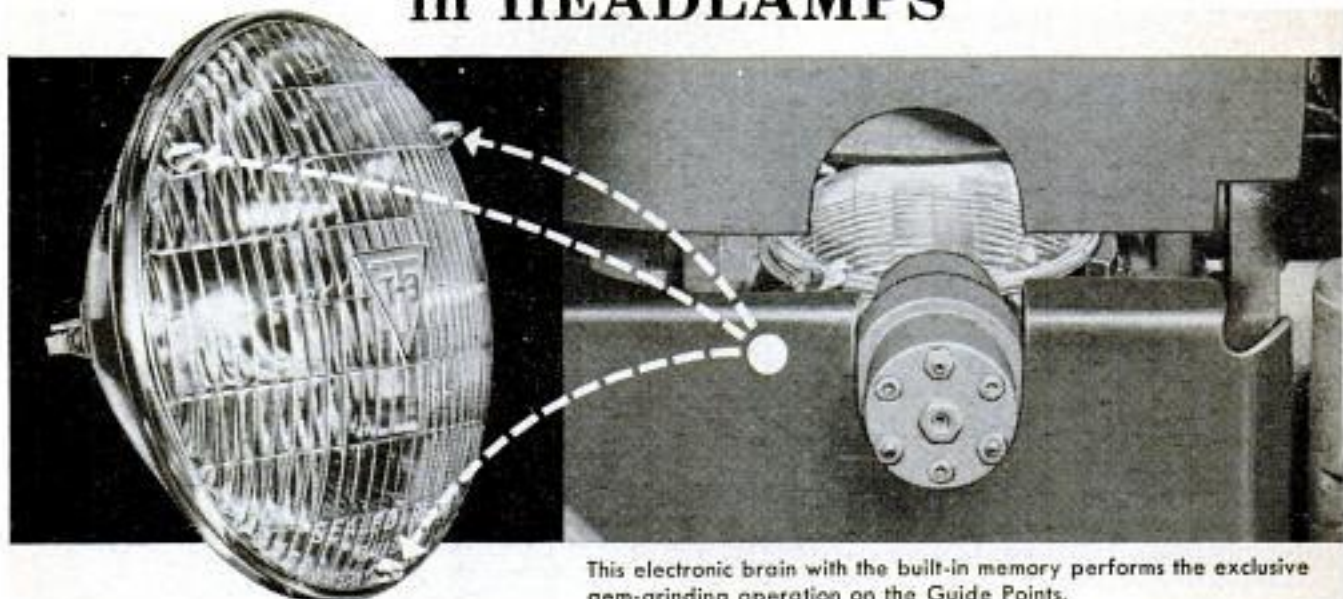


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Next Month...

Two things are under wraps in this photo. One we will unveil in next month's PM. It is the new Edsel car. You'll read all about it in September. That other thing, though, will stay under wraps: It's PM photographer Don Honick who is most at home under his focusing cloth



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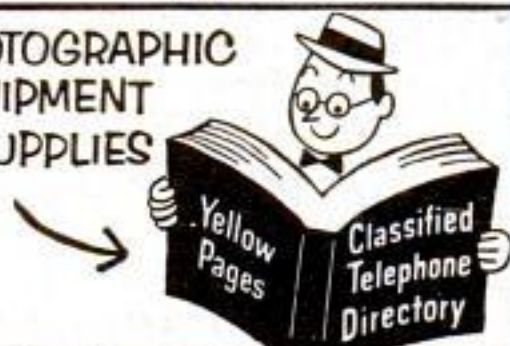
AUGUST 1957

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Looking for Something?



PHOTOGRAPHIC
EQUIPMENT
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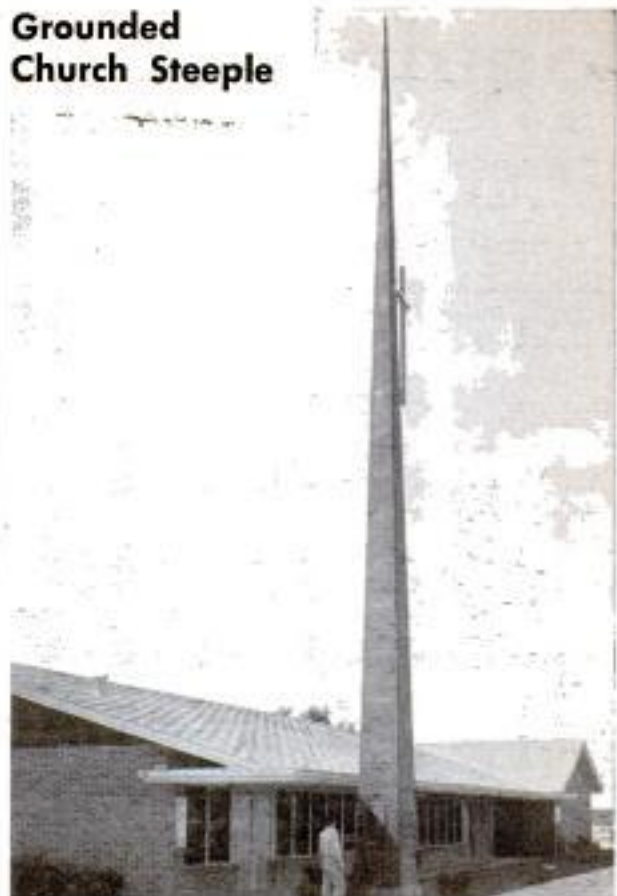
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Grounded Church Steeple



Built on the ground instead of the roof, the steeple of Memorial Presbyterian Church in Phoenix, Ariz., is 60 feet high and made of copper sheet. The base is supported by steel pipe in concrete and the copper covers a plywood frame, braced by angle iron. The aluminum cross near the top of the spire measures 10 feet high.

New Alloys Mean Faster, Longer Flights

Two new alloys may permit jet aircraft and guided missiles to travel faster and farther. Both alloys possess high strength at high temperatures. Magnesium-thorium, developed by Dow Chemical Co., is a replacement for aluminum and magnesium. W545, a product of Westinghouse Electric Corp., contains iron, nickel, chromium, molybdenum, titanium and boron. Magnesium-thorium is 30 percent lighter than aluminum alloys and has withstood 700 degrees F. for 100 hours without change in its basic properties. W545, when heated to 1200 degrees F. and subjected to 75,000 pounds per square inch, has resisted such conditions for 300 hours without breaking.

☾ Volcanoes on Mars erupt about as frequently as those on earth, according to a report before the American Astronomical Society.

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ACROSS THE DESK



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quarters with year-round climate control and seldom emerges when the thermometer rises above 80 degrees on a summer day.

To the Editor:

My father owned a large selection of tools, a good many of which were made by my grandfather who was a combination blacksmith and Methodist preacher. He also had a fine library. Anyone was welcome to come to his home, use his tools or read his books, but take them off the place—Never! Consequently he never lost a book or a tool.

Now that the do-it-yourself vogue is here, and as most of us have a good many close neighbors, Father's method is out if you want to keep your friends.

I would like to submit a little advice to people who borrow tools and people who are obliged to loan them.

If you are a chronic borrower of tools, the best way to break yourself of the habit is to go buy some. You have no idea of the inconvenience you are causing your neighbor. Nine times out of ten he will never tell you.

Of course there may be times you need a tool that you would seldom use: Make arrangements with the owner when the tool

(Continued to page 8)



To those who want to enjoy
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IF you're that person, here's something that will interest you.

Not a magic formula—not a get-rich-quick scheme—but something more substantial, more practical.

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(Continued from page 6)

is to be returned and return it *at that time*. Regardless of the condition of the article you borrowed, clean it up and oil it before you take it back. If it is an edge tool, sharpen it if you know how. Never, *never* lend a borrowed tool to anyone else. You may think the owner is a good fellow and won't mind, but you can be assured he will.

Now, to the fellow who has tools and has borrowing neighbors: First, mark all your tools so there is no doubt of ownership. Have a place for each tool so that you know when one is missing. If you have a lot of tools loose in a drawer or locker, you won't miss a tool until you need it and by that time you may forget it is loaned and think it's mislaid.

The biggest handicap in loaning tools is not having the tool when you need it. It never fails that the tool you loan is the very one you need. I have overcome some of the troubles of loaning tools by having a good many duplicate tools which I have accumulated just to loan.

W. J. Langworthy,
Texas City, Tex.

To the Editor:

Among the interesting articles in your March issue the report on Fords leads the list. As the owner of a sedan and pickup

made by Ford, and running back to the Model-T, I know the subject.

Your reports show that the majority of the buyers of all makes are always satisfied. This is merely human nature, because many people won't admit they have been displeased, much as many marriages exist merely because a divorce reflects on their intelligence.

It seems to me that a majority of drivers know little about what cars should be, or could be, and therefore are pleased with newness and novelties. It is much like asking juveniles to vote on a balanced diet. Lollipops, bubble gum, soda pop, hamburgers and hot dogs would lead the list.

This driver's complaint is with several things, one being the ratio of useful space to total bulk. Cars are designed by artists and the engineers squeeze the machinery into the design. Cars should be designed around the passenger (with particular thought given the driver). The first requisite should be a reasonably level and roomy floor; wells, humps, tunnels, etc., have no place in a comfortable car.

Next should be considered the line of sight. Up, down, forward, sideways and to the rear. Modern cars are too low to give easy vision to the driver. Curved windshields are noisy, expensive and distort

(Continued to page 10)

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Have you *mastered* the job... learned everything there is to know about it?

If your answer is "yes," success is right around the corner. But if the answer is "no," then your experience doesn't amount to much. And chances are these things are true about you: you just "coast" along with things... you do nothing and go

home all tired out. **BEWARE!** Those are danger signals. Unless you take a fresh look at things, you'll be doing the same job at the same salary for the next five years. And the next five.

What you can do about your future

If you want to succeed... make more money, earn the respect of your family and community... you have to take the bull by the horns. Success doesn't just come along. You have to meet it halfway. So act NOW and make your experience mean something. Add I. C. S. training to your record and start going places. Do it at home, in your spare time, for a few cents a day.

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(Continued from page 8)

vision. In my dream car the windshield will be just a flat sheet of clear glass, slanting inward from top to bottom. Eliminated would be corner posts projecting into the front doors, windshield wings and window frames. The Model-A had a window which on the first turn of the crank moved to the rear and then down. It worked on a lot of Model-As, why can't it be used today? The windshield wing is a thumb-nail buster, a vision obstruction and the source of a nerve-destroying wail.

In my dream car the driver will be moved nearer the center, his left elbow will be free to move and his seat will be adjustable. The cushioning will be firm; soft cushions are not the answer to driving comfort, especially on long trips. I like the firm cushions of my pickup much better than the squashy seats of the sedan.

J. Carleton Esty,
Lavallette, N. J.

Are You Science Minded?

A good many science-minded readers have pointed out an error in the quiz "Are You Science Minded?" in the June issue. The problem: One kilowatt is equivalent to 2,654,200 foot-pounds per hour. One horsepower is equivalent to 33,000 foot-pounds per minute. How many kilowatts are equal to one horsepower?

The correct answer is $\frac{33,000 \times 60}{2,654,200}$.

We regret the error in the copy furnished to us by Science Service, and salute our science-minded readers.

To the Editor:

Billy Osborne of Elkhorn, Wis., is the envy of the youngsters in his neighborhood as his father made him a power-driven car from salvaged parts. The car is powered by a lawn-mower motor, the wheels are those of a wheelbarrow, the steering wheel was salvaged from a car and the attractive little seat was made from plywood.

Wally E. Schulz, Elkhorn, Wis.



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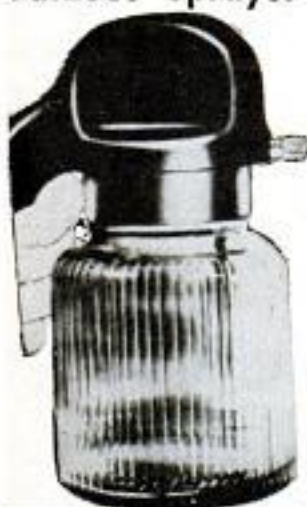
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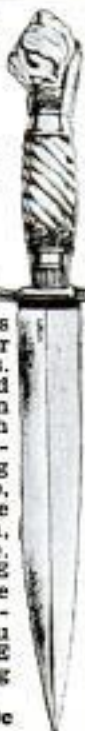
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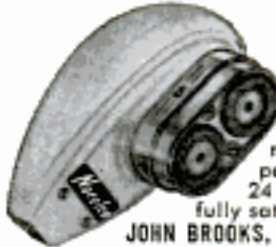
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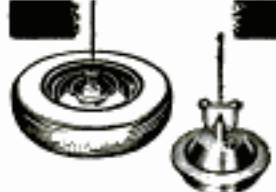
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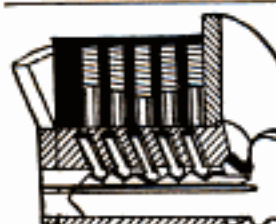


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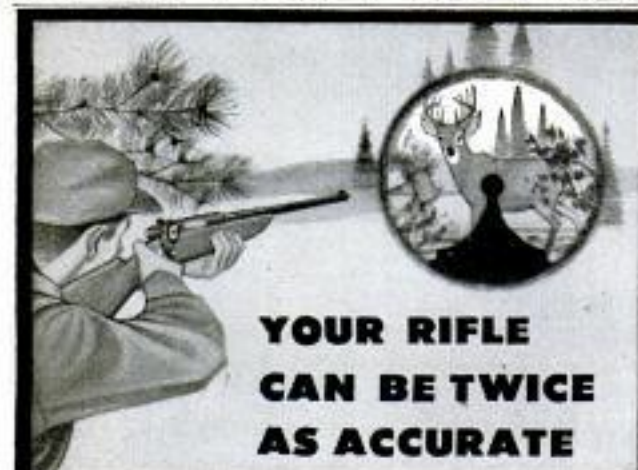
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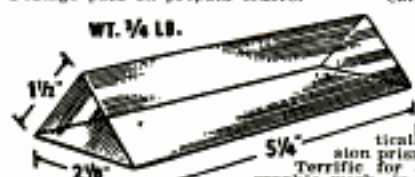
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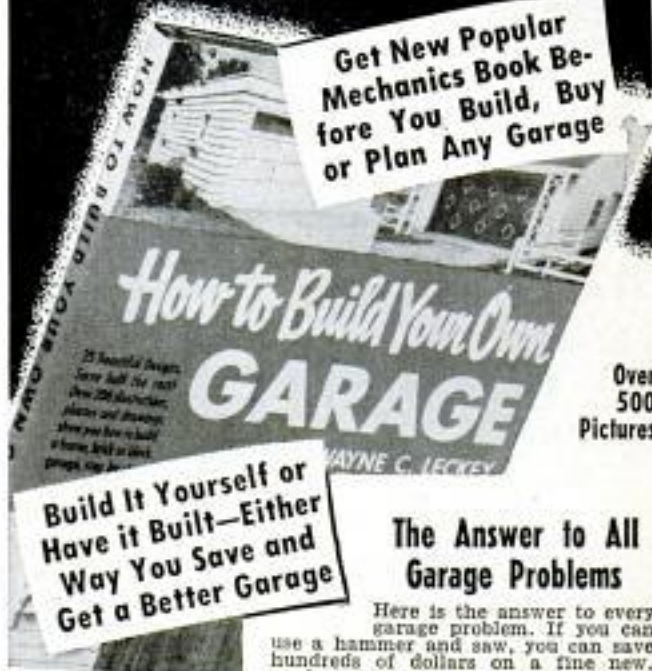
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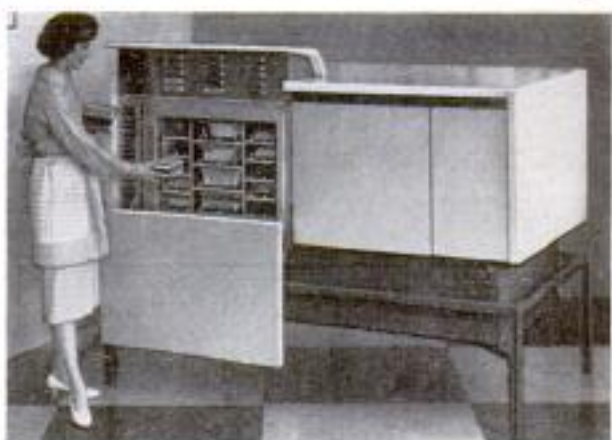


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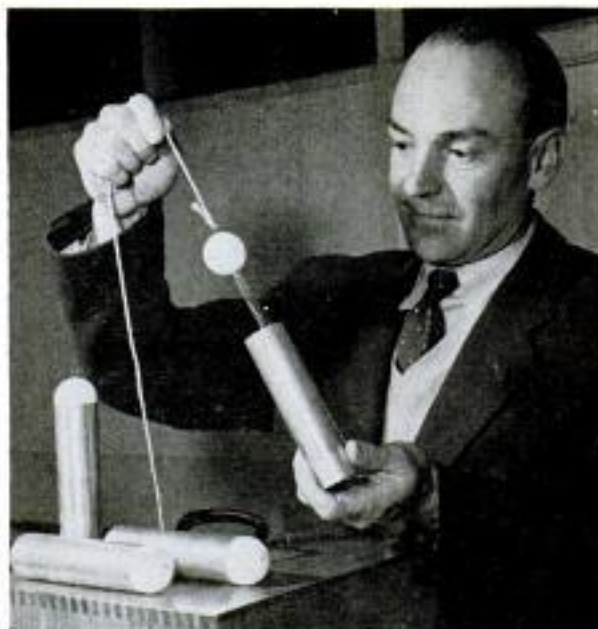
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START Your own business on credit. Your own boss. 1527 dealers sold \$3,000 to \$32,000 in 1956. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. H-U-PPM, Freeport, Ill.

START Your own business with our sample kits. Newest idea in selling. Re-order merchandise as you need it. Write today for full particulars. Division Sales, 3341 W. Roosevelt Rd., Chicago 24, Illinois, Dept. K.

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

"HOW To Start a Business" booklet sent free! If you know any trade, go into business for yourself! Learn the 9 easy steps to follow. We've guided 5,000 others to success. Revealing free booklet yours for the asking! Write! National Business Consultants. Office AT, Los Angeles 61, Calif.

PRINT Without a printing press! Amazing new method! Print colorful signs, banners, cards, posters, glassware; anything at home. Big profits. Money-making opportunity! We supply everything. Beautiful sample, home-business plan free! Write Screen-Print Company, AT, Los Angeles 61, California.

GROW Expensive herbs for us! Big profits home-business of your own. Year around profitability! We supply everything necessary! Send for free rare seeds and revealing plan. National Herb Exchange, Dept. AT, Gardena, Calif.

MAKE Extra money. Cash or commissions. Everybody buys easy-to-sell advertising book matches, Union label. All sizes. Cuts for all businesses. Powerhouse selling kit free. Steady repeat business. No experience necessary. Superior Match Co., Dept. MX-857, 7528 S. Greenwood, Chicago 19.

MAIL Order advertising agency executive reveals sensational no-risk advertising and merchandise methods. Start in office or home; minimum capital; positive profits. Free details: Impact! 3407 Prospect Avenue, Dept. 11-8, Cleveland 15, Ohio.

UNUSUAL Bank account business building opportunities. Dahle, Box 7-PM1, Omaha 10, Nebraska.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, Hertel Station, Buffalo 16-C1, New York.

SELL And repair vacuum cleaners. Write for new free catalog. Easy to read, all cleaners and parts. Eder Vacuum Cleaner Co., Dept. 15K, 13345 Livernois, Detroit 38, Mich.

DRYCLEANS Clothing for only 10¢ per garment. Lightning seller. Saves dry-cleaning bills. Samples sent on trial. Kristee 110, Akron, Ohio.

HIGHEST Profits all magazines. Sure success plan. Free catalogue, supplies, prizes. Subscription Service Co., Box 2070, Birmingham, Ala.

BE Your own boss. 234 pages of amazing opportunities. Free details. Leclair, P.O. Box 63, Brownsburg, Quebec, Canada.

WORK Home, pleasant, profitable. Own hours. Hundreds of ideas. Information free. Master's, 5145 Norwood, Arlington, Calif.

UNUSUAL Opportunity. Free literature. Quill Industries, 3607-09 So. Hamilton, Chicago 8, Illinois.

PROFITABLE Hobby. Free details. 2 samples \$1.00. Handmade Glass Figurines, 18724-A Martha, Saratoga, California.

FREE Information! Reweaving course \$2.00. Harris, Box 7112, New Orleans 19, Louisiana.

YOU Can earn up to \$600.00 mailing only 100 of our catalogs, unusual profits. Write Manufacturers, 370 Alabama Ave., Brooklyn 7, N. Y.

WANTED: Home producers, to be subcontractors. Cast plastic products for manufacturers in our clearing house service. Thousands of easily made items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 8-PM, East Boston 28, Massachusetts.

FREE Folder, "\$3,000 Yearly, Sparetime, Backyard, Raising Earthworms!" Oakhaven-38, Cedar Hill, Texas.

SELL Merlin electronic garage door operators. Make from \$50 to \$75 on every sale. Operate from your home. M. J. Fitzgerald Co., 2815 West Vilet Street, Milwaukee 8, Wisconsin.

WE Establish you in your own mail order discount business. Catalogs, sales letters, etc., printed your name can cost you nothing. No stock investment. We ship orders. Sell gifts, appliances, housewares, cookware, cutlery, dinnerware, silverware, jewelry, watches, etc., at big discounts. Catalog, details free. Topval Corp., Lindenhurst 718, N. Y.

PROFITS For you from the sea. Material for one pair of beautiful Squilla claw earrings, plus fast selling designs, instructions and jewelry supply catalog, 50¢. Modern Shellcraft, Station A, Box 22, St. Petersburg 2, Florida.

THEY Hand him \$100! Free packet. "Secret Journal." 919 secrets-plans! Work home. Publicco, Oceanside, Calif.

NOW Buy in small lots direct from importer. Below wholesale. Everything for everybody. Current illustrated bulletin 25¢. Young Company, Pleasantburg, 3102, Greenville, S. C.

DOLLARS Every day! Sensational mail item. Make 200 per hour, kitchen table. Angora House, 1058-2, Springfield, Illinois.

SPARETIME Income: Prepare confidential reports for nationally known bureaus. Send \$1.00 for instructions and addresses. Post Service, Box 16, Rice Lake, Wis.

MEN—Women! Work at home spare-time. Big money. Number of companies will buy all you produce. Easy work. \$5.00-\$15.00 hour possible. Start now. Send only \$1.00 for copyrighted money-maker. Lynn Publishers, Lynn 3, Mass.

START Home business. Absolutely new. Never before offered. Amazing money making opportunity. Physical handicap no obstacle. Unlimited opportunities. Free samples and information. Peter J. Hahn & Sons Co., 4445 W. Belmont Ave., Chicago 41, Illinois.

BUILD Fascinating hobby-business engraving plastics! Make colorful titleplates, bas-reliefs, pendants. Sample engraving, details 25¢. Desco Distr's., 5262-B Van Nuys, Van Nuys, California.

OPERATE Easy-to-start, profitable home mailorder business! B. Mann, Woodcliff Lake, N. J.

MAKE Attractive, durable, building plastic, easily, 800% profit. Exclusive district. Bays Laboratory, Cedaredge, Colo.

CANDIED Popcorn and potato chip equipment.—Eakins, Box 933-AT, Springfield, Ohio.

EARN To \$100.00 per hour snow-flocking Xmas trees, centerpieces, etc. Flocking, 7061 Belmont Avenue, Chicago 34, Illinois.

\$80.00 WEEKLY Sparetime. Start home Venetian blind laundry. Protected territory. Interesting information free. Burt, 2434EP, Wichita 13, Kansas.

WANT To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes, disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6234 Broadway, Chicago 40, Illinois.

TURN Bottle caps into cash. Learn how 50¢. Specimens included \$1.00. Metro, Dept. G, Box 151, Oak Park, Illinois.

I Got rich in the dry cleaning business—so can you. Write for free details. Imperial School of Dry Cleaning, 1700 Touhy Ave., Chicago 36, Ill.

NEW Snow cone machines. All prices. P.O. Box 7803, Dallas, Texas.

IMPORTING—Exporting. Modern dropship method. Profitable. Details free. The Hazen Company, 6601-8th Ave. N., St. Petersburg, Fla.

WHOLESALE—Thousands nationally advertised products. Buy, sell. Amazing profits. New, free plan. Associated Wholesalers, 1016-D Starr, Burlington, Iowa.

PROFITABLE Future in your own mail order business. Free details. Zed Gwartney, Desert Hot Springs, Calif.

\$200.00 WEEKLY Reported! No selling. Free booklet. Franklin Credit, Roanoke, Virginia.

OPERATE Mailorder folio business! Free details. Ballard's, 425 East Catherine, Louisville 3, Ky.

MAKE Flexible molds. Cast plaques, figurines. Free sample. Tooker, 1045-B Fairview, Hamilton, Ohio.

NATURAL Molding rubber, extra thick. Free sample. W. Wooley, 1016-A Donald, Peoria, Illinois.

INTERNATIONAL Mailorder business. Complete setup service—Not just instructions. Hermes, 152 West 42, New York City 36.

BIG Money raising fishworms and crickets. Free literature. Carter Farms, Plains, Georgia.

START Home business making statuary, plaques, novelties, garden furniture, artificial marble flooring, liquid marble. Make your own flexible molds. Amazing profits. Only \$1.98. Free literature. Popular Mechanics Press, 631 No. St. Clair St., Chicago 11.

UNUSUAL Mailorder opportunity. Tested. We supply everything. Girard's, Azusa, Calif.

WANT More business? Here's an amazing opportunity to increase your sales. Talk to thousands of interested readers of "Mecanica Popular." Our Spanish Edition covers the Latin American countries like a blanket. They're real mailorder buyers. Classified rate 75¢ per word. Try an ad in our next issue. Classified Advertising Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

VENDING Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 26, 715 Ensor Street, Baltimore 2, Maryland.

HOME Workshop books. Free catalog. Popular Mechanics Press, 631 N. St. Clair St., Chicago 11.

MONEY In saw and lawnmower sharpening sparetime at home. Free book. Virgil Foley Company, Columbia Heights, Minnesota.

FREE Folio "\$5,000-\$45,000. Unlimited Vacations." No merchandise. equipment. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

\$70 WEEKLY—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757A, Los Angeles 34.

TO \$100.00 Weekly. Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34.

FREE Book "505 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

BREED Rare tropical fish at home. Earn big money! Learn secrets! Help fill huge demand. Amazing opportunity! Free plan. Tropical Fish Breeders, Los Angeles 61, Calif.

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

COPUBLISH Mail Sale Advertiser, leading mail order paper. Details, latest copy, dime. Vanroy Shirk, Lebanon, Penna.

LEARN Real estate by listening to records. Lee Institute, Brookline 46, Mass.

I Want to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. Include literature if possible. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

FREE "Franchise Profit Letter" describes nationwide opportunities. Exclusive distributorships, dealerships, agency operations. Write today. National Franchise Reports, 333 North Michigan, Chicago 1.

LEARN Photo-negative portrait retouching. Men, women. \$5 hour possible spare or full time at home. Easy, glamorous. Work for photographers by mail order. Full details sent free. Duval, 100 So. Vermont, Los Angeles 4.

YOUR Own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., over 1000 items. Join thousands of successful independent dealers. Send for free catalog and dealer price list. H. B. Davis Corp., Dept. 11, 145 W. 15 St., New York City.

11,000 NEW Prospects daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola, California.

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.

OPERATE Profitable mailorder business! Splendid opportunity. For details write: Thomas Bond, 1637H West Vernon, Phoenix, Arizona.

COLOR Concrete with chemicals. Marble-glass cement benches, pottery. Home-shop. Hundred beautiful designs, made without molds. Birdbaths to waterfalls. Your chance for fame, fortune, 10¢ brings sample, pictures. Hollywood Cementcraft, 8527-R Wonderland, Hollywood 46, Calif.

CASH From sawdust, seventy methods. Tin-cans, thirty methods. Newspapers, eighteen methods. Instructions 50¢ each. All three \$1.00. Charles Company, 12-DXT, Norwood, Ohio.

BE Appointed state notary public now. Write, Stationers, Boerne, Texas.

WE Love our mailman—He leaves over \$1000.00 monthly in our rural mailbox. My college professor husband drafted a scientific home mailorder method. We bought a Texas ranch, live as we always wanted. Now we sell the Ranch Mailorder Method. Operates anywhere. Inquire: Eveningshade Ranch, Boerne, Texas.

BAKE New greaseless doughnuts in kitchen. Sell stores. Free recipes. M. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

FIX Typewriters. Inexpensive home course teaches factory secrets. Free booklet. Athey, Tarentum, Penna.

MONEY For you! Big profits! Cast plaster figurines, bookends, plaques at home with XL rubber molds. No experience needed! Write for illustrated, 40-page catalog, only 25¢! Plastic Arts Studios, 3463 So. Madison Street, Department 5, Muncie, Indiana.

GROW Orchids at home. Profitable, fascinating. Year 'round, Maine to California. No greenhouse. Successful home grower shows you how to provide proper temperature and air conditions in any well lighted room. Full details and real orchid seeds free. Orchidland, 100 So. Vermont, Los Angeles 4.

PLATE Baby shoes, jewelry, gifts, bronze and colored pearl. Free booklet. Platex, 11029 South Vermont, Los Angeles 44.

START Your own subscription service. Every family buys magazines. No capital needed. We tell you how, furnish all supplies free. Liberal commissions. Write McGregor Magazine Agency, Dept. 110, Mount Morris, Illinois.

SELL By mail. Tested methods. Alfano, 19 Pine Street, Closter 2, New Jersey.

AMAZING Earnings operating home sharpening service. Write George Page, 1820 Cleveland Ave., Niagara Falls 2, N. Y.

INDUSTRIAL And institutional mail-order business. New, unexploited opportunity. Hermes Advertising, 152-C West 42, New York City 36.

WE Pay \$3.50 lb. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have over 25,000 customers. Free book. Washington Mushroom Ind., Dept. 172, 2954 Admiral Way, Seattle, Wash.

EARN \$10,000 Yearly raising Angora rabbit wool for us. Information 25¢ coin. American Angora Company, Malta 12, Montana.

FREE Catalog. Contains hundreds of businesses, farms and income properties throughout U.S., Canada. Specify type and location desired. Deal direct with owners. U. I. Buyers Digest, 1608 Hillhurst, Dept. PM-3, Los Angeles 27, Calif.

MAKE \$6 To \$10 per hour sharpening saws and lawnmowers. Our Acme equipment used by thousands of successful shops throughout United States and Canada. Free literature. No obligation. Max Mfg. Co., 138 Stockton Ave., San Jose 26, Calif.

MAKE Chipped glass nameplates. Resilvering mirrors. Electroplating. Outfits furnished. John Sprinkle V60, Marion, Indiana.

MAKE \$46 From square foot plywood; jigsaw necessary. Free information. Woodart, Bridgewater, Mass.

LIQUID Rubber. Make flexible molds. Free sample. Chaney, 1907-A East Road, Jacksonville 11, Florida.

"MAILORDER Laws and Regulations," explains necessary licenses, different taxes, legal requirements, etc., \$1.00. Tasker, 1603 Peach Street, Alexandria, Virginia.

MONEYMAKING OPPORTUNITIES

AGENTS, Salesmen—Complete line plastic foam products. Hanger covers, slippers, bath mats, ironing board pads, 40-65% discounts. Foamade Industries, Dept. B32, Oak Park 37, Michigan.

EMBOSS Your handwriting. Gold or silver. Free sample. Agents wanted. Modern Printing, 1710 N. Third, Milwaukee 12, Wisconsin.

HOME-Business pays big! Start spare time and grow with our help! We guide you every step of the way in any business you may choose. Free details, write National Business Consultants, Office P6C, Los Angeles 61, Calif.

PRINT Without printing press—At home! New miracle discovery lets you change cents materials into dollar profits. No selling. Customers come to you. Tremendous demand in every area. Possible \$250.00 week profit to you. Free revealing secrets plan, actual valuable samples, confidential facts. Hurry, supply limited! Screen-Print Company, 28C, Los Angeles 51.

MAKE Money writing short paragraphs! No tedious study. I tell you what to write, where and how to sell; and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell, right away. Send for free facts. Benson Barrett, Dept. C-27-H, 7464 Clark, Chicago 26.

START Big-pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room CM-3-J, Chicago 26, Ill.

\$100.00 WEEKLY Spare time with a tape recorder! Proven facts free! Dixieland Publishers, Asheboro 4, N. C.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, Hertel Station, Buffalo 16-D1, New York.

"50 NEW Home-Business Ideas" booklet free. Coast Industries, B8C, Los Angeles 61.

\$100.00 WEEKLY Spare room. Raise redworms soilless way. Odorless. Charles Morgan, Box 116E, Bushnell, Florida.

MEN And women wanted to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$9.80 an hour without previous experience. Full particulars free by mail. Send postcard to Roberts, 1512 Jarvis, Room CR-2-S, Chicago 26, Ill.

ATTENTION Typewriter owners. Make handsome profits. Write today. Groves Company, 682, Hastings 3, Nebraska.

12 MAIL-Order plans—\$1. CWR, Box 4903, Philadelphia 19, Penn.

PRINTING Wholesale—Save 50%. Start brokerage. Elicha, 3035 Marvin(B), Toledo, Ohio.

DO It yourself. What? Repair TV, build furniture, make barbecue, plumbing repairs, build boats, do house wiring, remodel home, lay tile, modernize kitchen, repair home, and scores of other things you can do yourself. Books covering each subject, only 25¢. Send for descriptive list. It's free. Popular Mechanics Press, 200-LB East Ontario St., Chicago 11, Ill.

BUY Wholesale! 30-80% discounts! Appliances, gifts, typewriters, tools, watches, sporting goods, jewelry, cameras, housewares, etc. Consolidated Distributors, Clifton 28, New Jersey.

HOTTEST Mail order plan ever! Sell photos, films, art novelties. Huge proven profits! Free details! Ampro, 429 South Western Ave., Dept. 1, Los Angeles 5, California.

ADS Running under this heading sell printing. Ask me for proof. I'll gladly send you amazing facts. Ask for Folder "P." F. W. Johnson, 200 E. Ontario St., Chicago 11, Ill.

AMAZING Successes through franchises! Become exclusive franchise holder your territory. Information rushed. National Franchise Reports, 333 North Michigan, Chicago 1.

FREE Folio "\$5,000-\$45,000. Unlimited Vacations." No merchandise. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

GENERAL Contest Bulletin. Lists contests monthly. Sample, 25¢. 1609 1/2 East 5th, Duluth, Minn.

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.

BIG Money raising, fishworms and crickets. Free literature. Carter Hatchery, Plains, Georgia.

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

SELL Titania gems. Far more brilliant than diamonds. Catalog 10¢. Dismonte, 2420-M 77th, Oakland 5, California.

VENDING Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 27, 715 Ensor Street, Baltimore 2, Maryland.

FREE Book "565 Odd, Successful Businesses." Work home. Pacific, Oceanside, Calif.

PRIZE Contests provide fabulous and confidential home income opportunities! Here's how and where to win your share! Send stamp! National Contest Bulletin, Box 2685-P, Miami 16, Florida.

MAKE \$5,000 Yearly sparetime raising mink, chinchillas, nutria, etc. Free booklet reveals proved plans. Write Pura, 348 Mt. Pleasant Road, Toronto 1, Canada.

WE Pay \$3.50 lb. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have over 25,000 customers. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Wash.

DOLLARS Every day! It's magical—You keep all the dollars. Setup free. Otto Miller, Box 584-W, Oshkosh, Wis.

JOIN The prosperity parade with a mail order bookshop in your own home. Valuable information free. Practical Publications, 3974-F Milwaukee, Chicago 41, Ill.

MAKE Money, mailing sample business cards. Vosacek Printing, 4444PT Ute, San Diego 17, Calif.

MEN — Women! Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-2-S, 1512 Jarvis, Chicago 26, Ill.

TURN Pennies into dollars at home! Free details! ABC, Box 849, San Francisco 1-C, California.

HOMEWORKER Supplies, profitable items. Lists free. Schulthies, Box 449, Irwin, Penna.

HUNDREDS Of plans, ideas, businesses. Executives income. Work home. Information free. Masters, 5145 Norwood, Arlington, Calif.

CRICKETS And brooder, stocked for big hatch, \$25.00 or booklet 25¢. Kean, Ladonia, Texas.

EARN Money. Lucky-Star-Plan. Details. Strine Sales, Thurmont, Maryland.

THEY Hand him \$100! Free packet. "Secret Journal." 919 secrets-plans! Work home. Publicos, Oceanside, Calif.

DOLLARS For you in mailorder. Dime brings magazines, information. Palm, Box 1321, Baton Rouge, La.

\$50.00 WEEKLY Sparetime. Start home Venetian blind laundry. Protected territory. Interesting information free. Burt, 2424ER, Wichita 13, Kansas.

REPEAT Income for life. New ideas for established product. \$1,000,000 a day market. New plan makes \$1,000 a month possible with small investment. Sells on sight! Hot reorder item! Collect royalties for life! Travel-Pak, 2151 American Ave., Long Beach 6, Calif.

TYPISTS! Make money at home! Mailers, 2 Madison, Greencastle, Indiana.

EARN Money in spare time at home. No selling. Send \$1.00 for complete information. Satisfaction guaranteed. Catalina Enterprises, 1219 N. 6 Ave., Tucson, Ariz.

SELL Merchandise by mail using four color catalogs! Fifty fast selling items! Orders filled for you! Sample, plans free! NMMA, 618 Washington, Boston 24-A, Massachusetts.

YOU'LL Like goat milk! Profit and health with dairy goats. Booklet plus year's subscription monthly magazine: Special \$1. Dairy Goat Journal, Columbia, H-32, Missouri.

FORMULAS, PLANS, ETC.

FREE Formula catalog. Anything analyzed. Reasonable. Western Chemical, Salem, Oregon.

FORMULAS; All kinds, latest, best. Literature free. Kemixal, Park Ridge, Ill.

PRACTICAL Formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

LATE, Modern manufacturing formulas. List free. Moon Chemical, Martville, New York.

FORMULAS For latest money-making discoveries. New! Good! Valuable literature free! Miller, Chemist, 1517-D, Tampa, Florida.

CHEMISTRY

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 25¢. Dept. M-50. Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

ILLUSTRATED Catalog: Chemistry, mineralogy, biology 30¢. Tracey Laboratories, Evanston, Illinois.

AMAZING New Book of Science. Experiments, formulas, and catalogue of laboratory supplies. Only 25¢. National Scientific Co., Dept. PM-8, 500 West Road, Lombard, Illinois.

PLASTICS

NEW Liquid casting plastic, clear, colors. Embed real flowers, coins, photos. New manual shows fine things you can make at home and sell at big profit. Send 25¢. Castolite, Dept. J-101, Woodstock, Illinois.

PLASTIC Casting, laminating, embedding supplies; formulas, manufacturing methods for hundreds of profitable items. Catalog 25¢. Oel, Box 261, Union, N. J.

COLORED Plastic storage bags. Send \$1.00 to Lo Ray Co., 2025 Charleston, Chicago 47, Ill.

FIBERGLASS Patio sheets 58¢ sq. ft. Plexiglas 95¢ sq. ft. Liquid casting plastic \$1.90 qt. Send 10¢ for literature. United Plastics Products Co., Dept. 7, Roebling, N. J.

LEARN Plastics fabrication for spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 13, Ore.

LAMINATING Supplies. Free price list. Solomonson, 46 Cornhill, Boston 6, Mass.

PLEXIGLAS, Fiberglass, polyester, epoxy, acetate, vinylite, styrofoam, acrylicite. Instructive wholesale-retail catalog, free. Gem-O'-Lite, 5529 Cahuenga, North Hollywood, Calif.

BOXES, Plastic. Free list. Althor, 170 Bay 23 Street, Brooklyn, N.Y.

AGENTS WANTED

NEED Money? \$50 yours. Sell only 100 boxes new Christmas cards. Other amazing offers. Free samples imprinted cards. Feature box assortments on approval; free catalog. 100 profitable items. Work with a national leader. Write today. Pen-'N-Brush, Dept. PM8, 139 Duane Street, New York City 13.

60% PROFIT On cosmetics — Famous nationally advertised Hollywood cosmetics pay 60%. Make \$25 day up. Hire others. For free samples, details, write Studio Girl, Glendale, Calif., Dept. 1276G.

AGENTS Sell fur-like cape stoles. Large profits. Free photos. J. A. Mfg. Co., 174C Westwood Avenue, Long Branch, N. J.

MAKE \$50-\$300 Extra money fast. Show big value \$1.00-\$1.25 Christmas, everyday greeting card assortments, gift wrappings, costume jewelry, gifts, stationery. Profits to 100%. Cash bonus. Write for newest assortments on approval, free gift offer, free album name imprinted Christmas cards, catalog, details. Hedenkamp, 361 Broadway, Dept. PM-51, New York City.

IF You want to earn money fast, I'll send you free sample stocking of newest stretch DuPont nylons to sell at only \$1 a pair. American Mills, Dept. 620, Indianapolis 7, Ind.

EARN \$10,000 Yearly — Only two sales daily. World's best seller. The Holy Bible (illustrated). Protestant or Catholic. Margareta's, P.O. Box 92, Hazelton 7, Penna.

MAKE Your spare time profit time! Over 600 beautiful, unusual gifts, greeting cards, household gadgets, toys, jewelry, baby items, and gift wraps you can sell to friends, neighbors, relatives. Write at once for big, colorful free catalog just off the press. Samples on approval. Hurry. Get details on sensational money-makers! Greetings Unlimited, 7-41 Park Square, St. Paul, Minnesota.

BEAUTIFUL Feather pictures, 200% profit! Free details; sample 20¢ stamps. PM, Apartado 9036, Mexico City.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, Hertel Station, Buffalo 16-A1, N. Y.

\$1,000.00 A Month for making dramatic 3-second demonstration of amazing lightweight Presto fire extinguisher. New chemical used by airforce snuffs out fires instantly. Only \$4.95. Terrific commissions. Millions want it. Free kit. Merlite, 114 E. 32nd, Dept. P-552, New York City 16.

SHINE Shoes without polish. New invention. Lightning seller. Shoes gleam like mirror. Sample sent on trial. Kristee 67, Akron, Ohio.

AMAZING Greeting card assortment pays 53¢ cash profit on \$1.25. Make \$85.00 fast! Gift bonuses besides. Outstanding new Christmas cards, novelties, free imprint album. Samples on approval. Act fast, get golden egg banks free. Creative, 4401 Cermak, Dept. 512-G, Chicago 23.

RUN Spare-time greeting card and gift shop at home. Show friends samples of our new 1957 Christmas and all occasion greeting cards and gifts. Take their orders and earn to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 70, Ferndale, Michigan.

NEW Bathroom deodorizer. Hangs on wall. Banishes odors bathroom, kitchen. Lightning seller. Samples sent on trial. Kristee 66, Akron, Ohio.

200% PROFIT. No-Kro stops battery and cable corrosion. Guaranteed. Whirlwind seller. Protected territories. Write No-Kro Company, Chanute, Kansas.

EXCLUSIVE Line of personal initialed buckles, belts, cap badges, 3,000 emblems, uniforms, shirts, caps, etc. Hook-Fast, Dept. PM, Roanoke, Virginia.

WHOLESALE Catalog! Clothing, linens, housewares. Write Bostonian, 14 Dock Sq., Boston 8, Mass.

AGENTS — 300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 1217-D West Newport, Chicago.

YOUR Ad in this space will get some good agents for you. Yes, I'll prove it. Write for Folder "A" right now. F. W. Johnson, Classified Advertising Manager, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

GOLDMINE Of 600 money makers. Copy free. Specialty Salesman Magazine, Desk 5-B, 307 N. Michigan, Chicago 1.

GOLD Or silver letters, numbers. Windows, doors, trucks. 1" to 6". 500% profits. Free samples. Atlas-T, 544 West 79th, Chicago 20.

PRINTING. Advertising salesmen—Excellent moneymaking sideline selling decalcomania name plates, small quantities. Automobile initials, sign letters. Free samples. Ralco, XL, Boston 19, Mass.

YOUR Own business—Used suits \$1.50, overcoats 65c, mackinaws 35c, shoes 12½c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Nathan Portnoy Associates, 605-AA West 12th Place, Chicago 7.

EASY Handwork makes fast-selling articles. Sample free. Sunmade Company, Brockton 64, Massachusetts.

SELL Famous \$3 fire extinguishers. Fast sales, liberal profits. Write Fire-Killer, Box 182, Hazleton, Penna.

CHRISTMAS Cards—Impressive albums of deluxe and popular-priced greetings with customer's name imprinted. 150 lavish designs for business and personal use. Wide selection for every taste and budget. You can earn \$300 to \$500 commissions, even in spare time, between now and Christmas. Sales experience unnecessary. We furnish free fully equipped sales kit complete with albums and easy-to-follow selling instructions. Dependable service guaranteed by old established manufacturer. Write Process Corp., 1952 S. Troy, Dept. FA, Chicago 23, Illinois.

MAKE Money quick, easy, taking subscriptions from every family in your community. Liberal commissions. We tell you how, furnish all supplies free. Write McGregor Magazine Agency, Dept. 100, Mount Morris, Illinois.

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How Much Oil Has Russia?

AT MOSCOW last February Russia's Supreme Soviet was told that the current Five Year Plan would have to be cut back. Somewhat later an 11 percent reduction in military production was announced. Why?

A major reason is insufficient oil to fuel the modern machinery of peace and war.

Just how is the Soviet empire faring in the world quest for oil? Konrad Kellen sums up the situation in the American Petroleum Institute *Quarterly*. Mr. Kellen was for five years chief of Radio Free Europe's information service, specializing in affairs behind the Iron Curtain, and now is head of its Broadcast Review Staff.

Here are some significant excerpts from his report:

Both in quality and quantity, the Soviet petroleum industry seems now inadequate to sustain *prolonged* wartime operations.

Although total Soviet oil production (1956) increased by 20 percent over the previous year, progress in refining and transportation was not proportionate. Refined products are in short supply, while there is an excess of crude oil in storage.

The Communists will continue their subversive activity in the Middle East, where the next best thing to Soviet possession of the world's largest oil pool is to deny this vital oil to the West.

One area in which the Soviets have made considerable progress is exploration. Russia has only 5.3 percent of the world's proven oil reserves. However, despite unusual difficulties caused mostly by the top-heavy Kremlin bureaucracy, Soviet geologists have in the last few years discovered large fields, including some in the frozen wastes of the Arctic. As a result, Soviet air bases and Red Army installations in this region have been made independent.

The Baku fields still remain one of the largest single producing areas. The quality of Baku oil is high and most Soviet aviation and motor fuel is produced in this area. Refining methods, however, remain in general inferior to those in the West. The octane rating of Soviet gasoline is generally low. Baku, moreover, is showing signs of exhaustion. Production from the old field there has been level since 1951 despite enormous drilling and exploration efforts.

Offshore Caspian Sea operation, begun last year, has proven so successful that the Soviets have erected hundreds of rigs south of Baku.

One of the world's largest oil regions, in the Ural-Volga area, is now reaching peak productivity . . . exceeds in size the East Texas field. This area accounted for 62 percent of Russia's total oil output during the second half of 1956.

Other promising districts being explored: Surrounding the Black Sea, the Donetz Basin, the Kuibyshev region, the Bashkir and Tatar "republics" and the Ukraine. The only major producing area in the Soviet Far East is on Sakhalin Island.

The average Russian cannot readily afford to purchase a single gallon of gasoline for his personal use. There are relatively few privately owned automobiles, and petroleum products are even scarcer than other consumer goods.

Though refining has not been able to keep up with production increases, improved refining methods are being steadily introduced.

One of the major bottlenecks is transportation. The Soviet oil-tanker fleet, which operates principally in the Caspian and Black Seas, is still very meager. Plans call for a considerable increase in tanker construction: 460,000 tons over the next five years. But even with the use of tankers from Poland and Rumania, the Soviet Union still has less than two percent of the world's tanker fleet at its disposal.

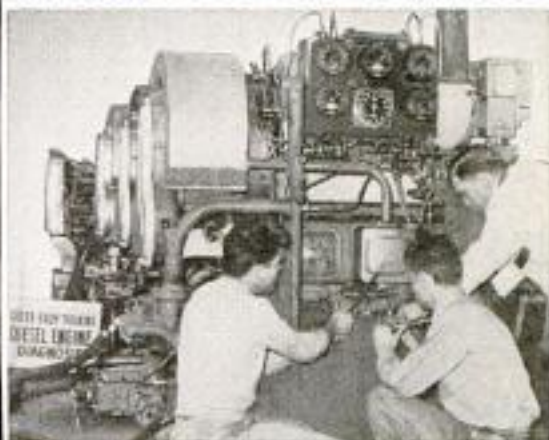
A notable feature of the transport system is the constant need for transshipment from pipeline to tanker, tanker to rail, rail to barge, etc. Pipeline construction is also being increased.

Today the Russian petroleum industry stands at a crossroads. Its production of 1,640,000 barrels of oil daily compares very unfavorably with U. S. production, which last year averaged 7,151,000 barrels daily. Yet during 1956 Soviet oil production increased by 18 to 20 percent, a larger increase than any other oil-producing area. New explorations and production methods can make the difference. ★ ★ ★

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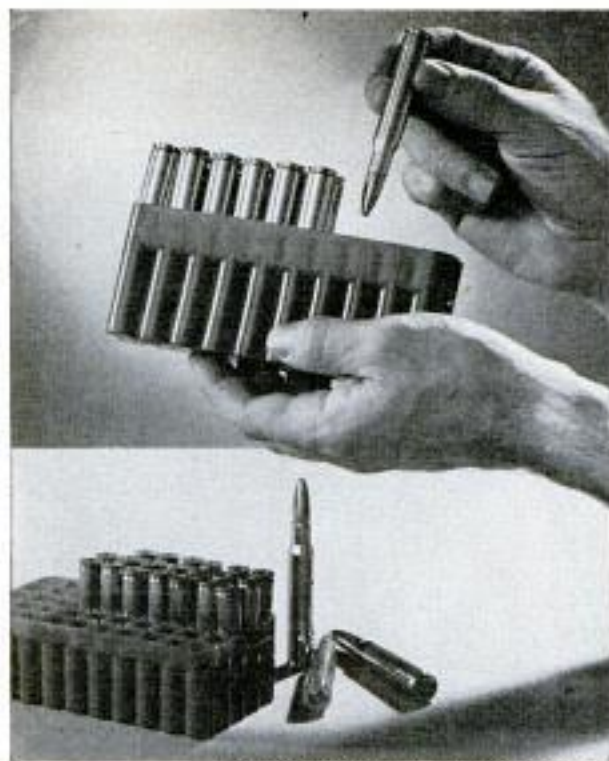
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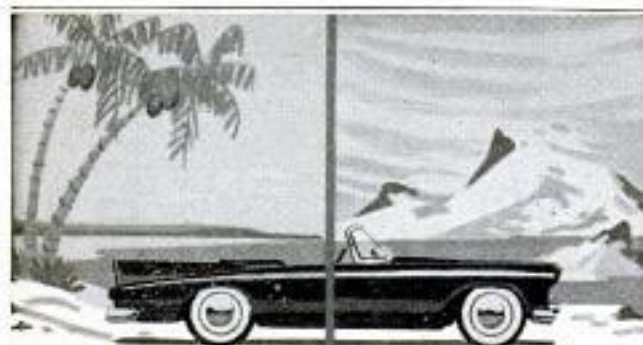
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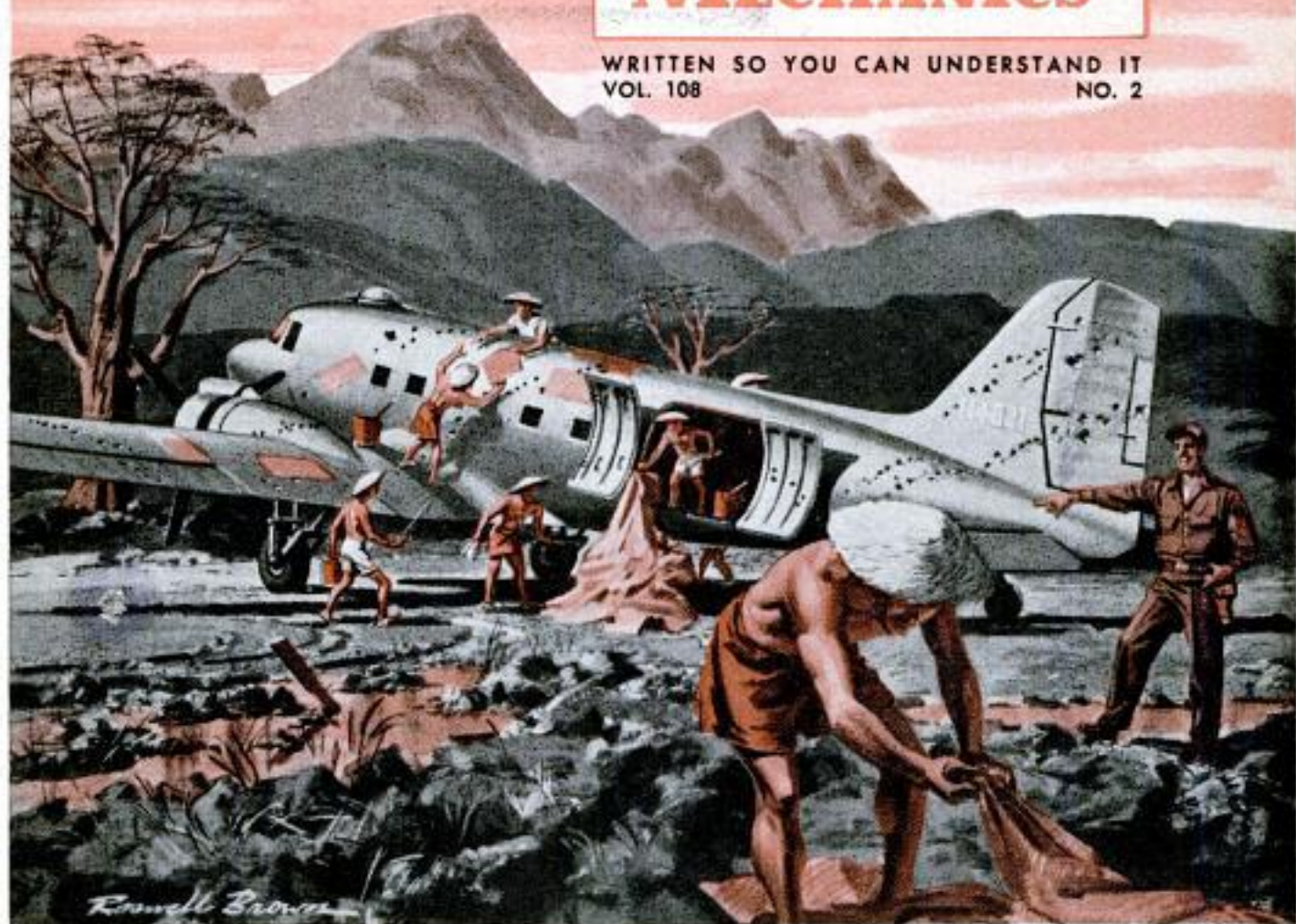


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The Saga of the DC-3

By Joseph Stocker

Reprinted "FM Highlights"

THEY CALLED the airplane "Whistling Willie, the Flying Sieve." It happened in China during World War II when Jap strafers caught a DC-3 on the ground and riddled it with machine-gun fire. Coolies patched up about 1000 holes with pieces of canvas.

Then it took off for India with 61 refugees aboard, a plane that was intended—under normal circumstances—to carry 21 passengers and a crew of three.

En route the plane ran into a tropical storm. Rain loosened the canvas patches and wind passing over the holes caused a variety of shrill whistles which increased until the ship sounded like a thousand screaming banshees.

For two hours the intrepid airplane lumbered through hostile skies. Finally it landed. As its weary pilot swung to the ground, an Army major on the base came up to him and growled, "Why did you bother to radio ahead? We could hear you 50 miles away!"

To old-time pilots familiar with the DC-3 and its Herculean capabilities, this incident probably won't seem unusual. They've long since regarded the "gooney bird," one of their affectionate nicknames for the DC-3, as the world's toughest, longest-lived and most unconquerable airplane—an airplane that refuses to die.

It was in 1936—more than two decades ago—that the DC-3 was born. As the most



DC-2½, a Chinese "gooney bird" with its right wing blasted off, flew back to its base using a 10-foot shorter DC-2 wing



Snow almost engulfed an abandoned Air Force DC-3, but some young Icelanders waited for the right moment and flew it out

Gooney birds have been everywhere, done everything—they were even made amphibious with wheels attached to pontoons



efficient and economical transport produced up to that time, it revolutionized air travel.

Then came the Martins, Convoirs, DC-4s, 6s and 7s, the "Connies" and "Super Connies," the "Stratocruisers" and the Viscount jet-props and, more recently, the first of the jet transports. By all the rules of a fast-moving business, the DC-3 should have been obsolete and gone from the skies long ago. After all, how many 1936-model automobiles are still operating today?

But the old gooney bird isn't about to vanish. Of the 10,926 DC-3s manufactured by the Douglas Aircraft Co., some 4500 are still flying throughout the world. Thirty-four scheduled airlines in the U.S. and 113 foreign airlines are still using them. Additional hundreds are in use by non-scheduled carriers, private operators and the military of many nations. In both hemispheres, over countries civilized and not-so-civilized, gooney birds fly every day, carrying cargoes that range from coal to cattle and fish to flowers, not to mention, of course, people. And in Russia, where just about everything is claimed to have been invented, the plane most generally used for commercial travel is the Ilyushin LI-2, the Soviet version of the DC-3.

Accomplishments Immortalized

However, it's right here in the gooney bird's own native country that its accomplishments have become immortalized in aviation history. During World War II, despite the fact that it was already outdated, it proved to be both a hero and an almost indestructible workhorse. Even in the first desperate days of Korea, it flew tons of supplies to enable a thin line of defenders to check the unexpected Communist thrust. And during the peace years it carried America into the Air Age, spawned the cut-rate aircoach and airfreight era and gave more people their first ride in an airplane than anything else on wings.

Indestructible? Well, consider the DC-3 airliner over Arizona that was caught in a violent downdraft. More than 10 feet of its 95-foot wingspan was sheared off in flight when it struck the ground.



Air Force DC-3s (C47s) dropped thousands of paratroopers, tons of supplies on every front in World War II

But the pilot brought his storm-buffed plane and passengers in for a safe landing.

It seems that other extreme weather conditions can't keep this airplane from flying, either. The Air Force abandoned one on a high glacier in Iceland when huge snow drifts almost swallowed it up. But some young Icelanders, operators of a small airline, bought it as salvage for \$1600. The next spring they found that the snow, as it dried and froze, had shrunk away from the DC-3, leaving it as well-preserved as if it had been "mothballed." So they simply tracted a runway across the snow, climbed aboard, started and warmed the engines and took off. As far as the Air Force knows, that bird is still flying.

Then there was the gooney bird in Burma that was rammed at tree-top altitude by a pursuing Jap Zero. The Zero crashed, but the DC-3, with almost all of its rudder chewed away, flew on to its base. And it emerged from the war as the only transport plane officially credited with downing an enemy fighter!

DC-3 Restaurant Roof

Another DC-3 was used by a South African roadside restaurant owner who bought it as war surplus to serve as a roof for his building. It perched there for 12 years until an enterprising firm bought it, restored it and as far as is known it's still flying today.

Still, an airplane can't last forever—or so it seemed to the U. S. government's Civil Aeronautics Board. Hence, shortly after World War II, the CAB set a deadline when the DC-3 would not be certificated for airline use. Somehow, though, the gooney bird persisted in flying, and safely so. Three times the CAB extended its dead-

line. Finally, in 1951, it washed its hands of the whole troublesome business by decreeing that the plane could continue in service "indefinitely." And, as if to confirm its judgment, the Air Force shortly afterward gave Douglas an Exceptional Service Award, proclaiming the DC-3 as "the best single airplane ever built."

The gooney bird, or "Dizzy Three," as it's sometimes called, had its origin in a letter. It was a brief, two-paragraph note written in 1932 by Jack Frye, then vice-president of Transcontinental and Western Airlines, to Donald Douglas in Santa Monica, Calif. Would Douglas be interested in designing an air transport capable of carrying 12 passengers? Although occupied mainly with military airplanes, he decided to give it a whirl, resulting in the DC-1 (the letters stood for Douglas Commercial).

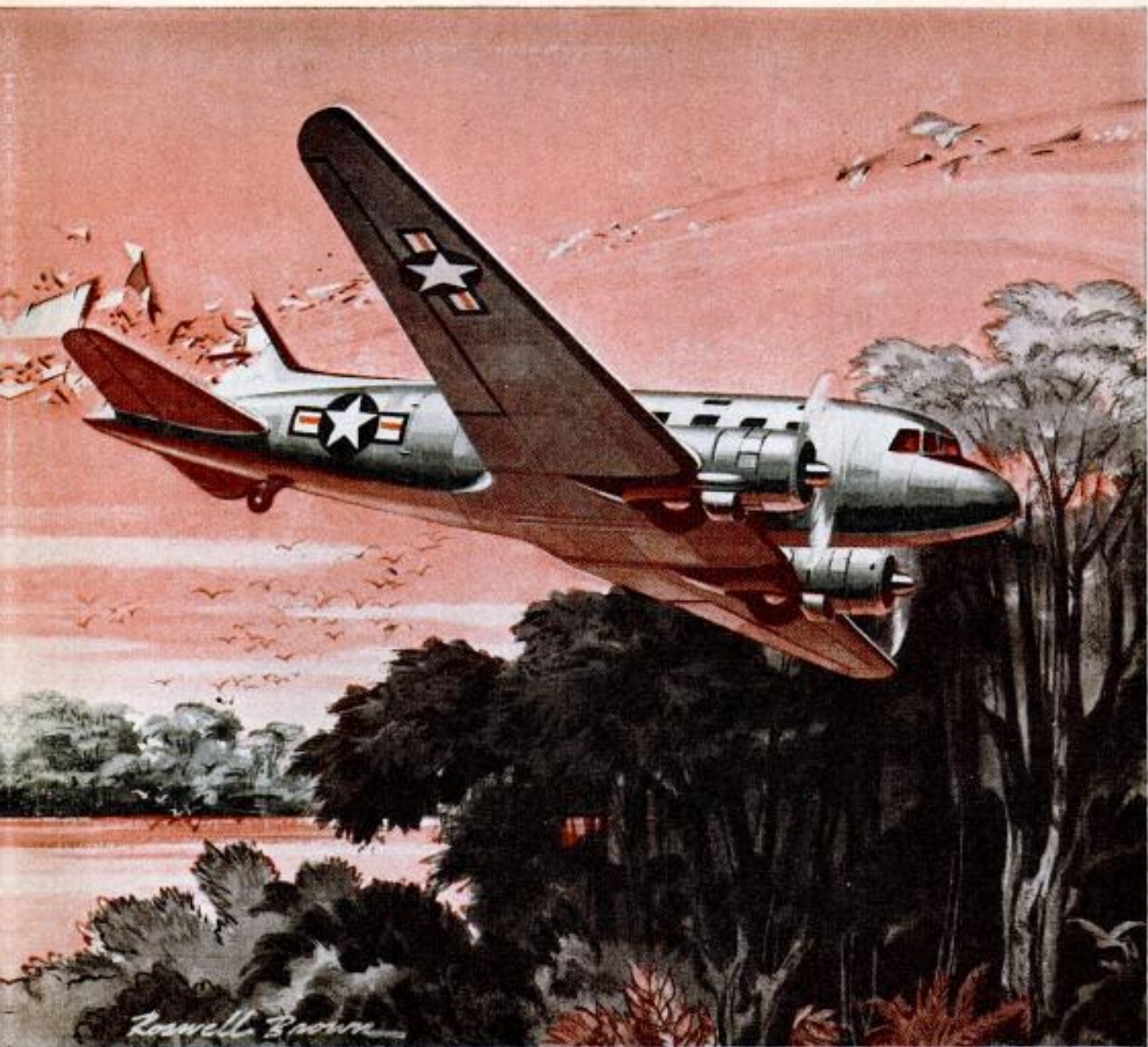
The DC-1 was a success. It flew from Winslow, Ariz., to Albuquerque, N. Mex., on one engine and broke 19 world's records. But only a single prototype was built. Even while it was being tested, Douglas went to work refining and enlarging it, and the result was the DC-2, a 14-passenger ship.

It, too, was a success. Don Douglas built 138 of them and might have kept right on building them except American Airlines thought he could do even better. What they wanted was a larger and more luxurious airliner.

Thus was born the DC-3, a 21-seater. "That figure 21," says a Douglas official, "was one of the happiest, luckiest figures we ever hit on."

Safe, Easy to Fly

Powered by two 900-horsepower Wright Cyclone engines, the plane was safer and



Invincible DC-3, rammed by a Jap Zero, made it back to base with its rudder gone . . . the Zero crashed

easier to fly than any other transport then in existence, and its pay load was one third greater. It cruised at 185 miles per hour and could clip off 210 in a pinch. Where other transports had to fly through storms, the DC-3 could fly over them. It had two separate sets of instruments in the cockpit, each independent of the other in case one failed. And, best of all, it had "George," the brand-new automatic pilot developed by the Sperry Gyroscope Co.

An eccentricity of the gooney bird, however, disturbed the pilots. The plane's wings had a slight but clearly visible tendency to flap while in flight. Accordingly, the pilots gave it another nickname, the "Flying Vagrant" (no means of support).

But their apprehension was soon relieved when they learned that the Douglas engineers had built this into the plane to relieve structural wing tension. In fact, one of the early DC-3s was flown into what appeared to be an innocent accumulation of clouds. But inside was a freak downdraft so severe that passenger seats tore bolts from the floor. Yet the plane made it and afterwards no structural defects could be found.

This wing tension feature proved to be a major reason for the plane's extraordinary durability.

Eccentric or not, the DC-3 was an immediate success. Airline after airline, here and overseas, converted to it—and just in



time, too. For the wolf was clawing at the collective door of commercial aviation. Transports then in use were slow, uneconomical and unreliable. Timetables were a joke. And crashes frightened the public away from flying.

But thanks to the DC-3, public confidence soared, and so did the airlines' profits.

Don Douglas originally thought he would produce only 50 gooney birds. Then, when airline presidents began lining up at his office door, he revised his estimate and calculated that he might be able to sell 500. He doubted then if the market would absorb much more.

But he didn't figure on a second world war.

When it broke out, the Allies desperately needed air transports. Manufacturers were already making four-engine planes, but they weren't far enough along yet. The DC-3, on the other hand, was in business. Its "bugs" had long since been ironed out. And so orders poured in at Douglas, and DC-3s poured off the assembly lines, hastily donned their wartime coats of olive drab and flew off to the war.

Dressed in this uniform, with its familiar "bucket" seats, the DC-3 was known variously as the "Three," "Old Fatso," the "Doug," the C-47 (Air Force version), R4D (Navy) and the Dakota (British). Years later a well-known general named Eisenhower called it something else. He said it had been one of the most valuable weapons of the war.

It was truly that. It hauled men and supplies to every battle front and brought back litters of wounded. It re-opened the life line into China by hurdling the Hump in some of the worst weather on the face of

For 12 years a war surplus gooney bird served as the roof of a restaurant, and then it flew again





Crash-landed DC-3 is salvaged with the help of New Guinea natives who dragged it out of heavy jungle

the globe. It dumped paratroopers behind enemy lines and pulled gliders full of troops. It was shot at and shot up, and still it flew.

One gooney bird set some kind of a record by taking off from Burma with 74 people aboard, including Jimmy Doolittle, on his way home after bombing Tokyo. The ship had been airborne just a few minutes when Doolittle poked his head into the cockpit. "If I'd known you were crazy enough to try to fly this thing with this many people aboard," he said, "I'd have walked home."

DC-2½ Flies

But perhaps the most valiant gooney bird of all was one belonging to the China National Aviation Corp. Jap bombers spotted it on the ground and blasted a wing off. The pilot radioed Hong Kong and requested a new one. But Hong Kong had only a DC-2 wing—10 feet shorter and designed to carry a load several thousand pounds less than a DC-3 wing. "Okay," said the pilot, "bring that."

The wing arrived and was attached to the DC-3. The plane looked weirdly lopsided, but when its pilot leaned forward on the throttles, it took off and flew like a charm.

What did they call it? Why, the DC-2½, of course!

The exigencies of wartime forced fliers to do quite a number of things with the gooney bird that would have given Douglas engineers the willies if they'd known. The ship had been designed, for instance, to carry a maximum load of 25,000 pounds. But pilots couldn't always afford this luxury. For example, when 27 DC-3s crossed the South Atlantic in 1942, bound for the Hump in history's first mass ocean flight, they lurched off the runway with 35,000 pounds each.

On at least one occasion the gooney bird was used as a bomber. Some Air Force pilots, tired of being sitting ducks for Japanese anti-aircraft fire over the Hump, loaded up one night with old carbide and gasoline drums, plus a few fortifying fingers of alcoholic "jungle juice." Then they flew over a Jap airfield in Burma, unloaded their homemade bombs, fired Tommy guns and carbines through the cockpit windows and flew merrily home. They were court-martialed for unauthorized use of government equipment and really didn't care.

When the war ended, four-engine airplanes were the vogue. Douglas produced its last DC-3 in 1946 for a Brazilian airline, and figured that was about the end of the old gooney bird.

But they figured wrong again. For, instead of going to the junk heaps, war-surplus DC-3s were snatched up by the thousands, at bargain prices, and put back into operation. Feeder lines bought many of them and opened up rural America to air travel. They've been in operation ever since.

This is explained to some extent by the fact that the gooney bird can get into and out of short landing strips. And these predominate in many remote parts of the world, especially South America, Asia and Africa. Thus, the DC-3 is—and, for a long time will continue to be—the backbone of air travel in those regions. As one pilot put it: "Millions of people in South America were familiar with the DC-3 before they ever saw an automobile. Two thirds of the people in Central America have had their traveling eyeteeth cut on the DC-3, but have never ridden on a train nor seen one."

Every now and then there's talk of some new twin-engine transport which, it is confidently said, will supplant the DC-3. But so far it hasn't been replaced.

(Continued to page 232)



Accordion-Pleated Bus Bends for Corners

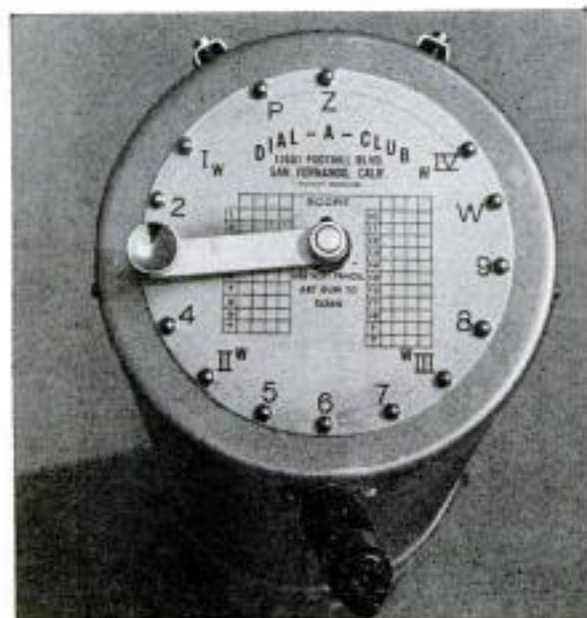
Buses with accordion pleats in the middle are being used in Colorado. Built in Germany of steel and aluminum, the buses are 60 feet long, carry 64 passengers and are powered by horizontal-type diesel engines. A central turntable enables the rear section of a bus to follow the front section. The turning radius is less than 40 feet, compared to the 60-foot turning radius of most buses. Ten wheels support the chassis, which has a conventionally steered front axle and a "self steering" rear axle.



Bus hostess prepares light refreshments for the passengers

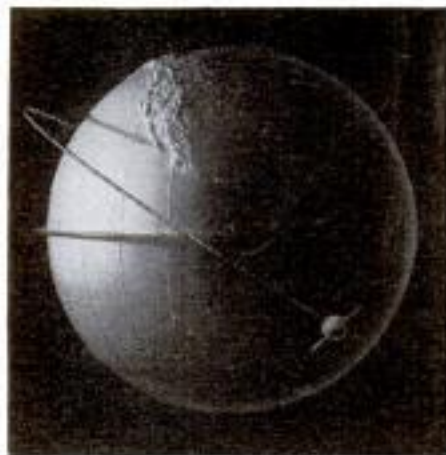
Caddy Cart Has Dial to Select Club

Dialing to obtain the desired golf club from an aluminum container is the latest caddy-cart innovation. Turning the dial indicator to the club number exposes the club for removal through a slot in the container. It holds 10 irons and four woods in separate clips on a rack inside the protective housing which is rainproof and detachable from the wheels for storage. The cart also features a permanent score card etched in the metal top of the container and a built-in shock-absorber spring.

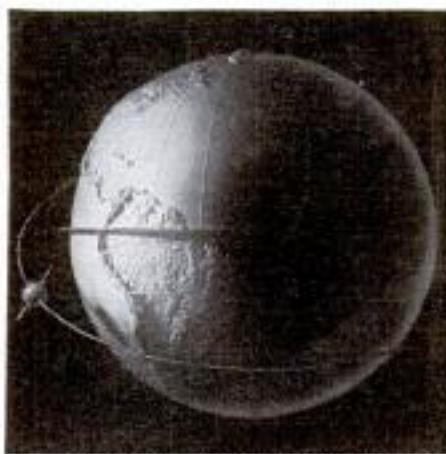
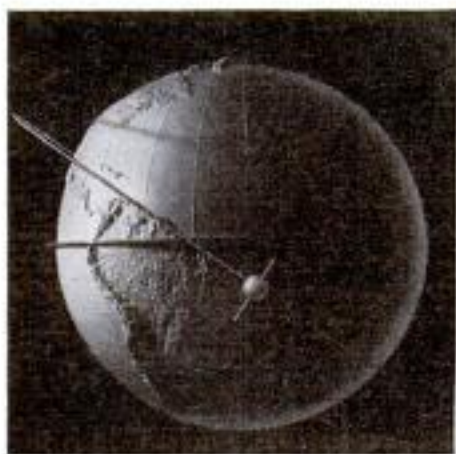


How You Can

To calculate little moon's orbit, place globe so hoop makes angle of 35 degrees with equator. Photos show earth's movement for every two satellite revolutions



Lower photos show how the satellite's orbit wobbles as it revolves around the earth. Fifty days after satellite starts on its journey, the orbit will be back on its original plane again



Globe by Geophysical Map Company, Inc.

DURING THE NEXT 18 months, half a dozen 72-foot three-stage Vanguard rockets will roar skyward. If scientists are lucky, at least one of those mammoth vehicles will soar 300 miles up, reach a speed of 25,000 feet per second and fling into space a 21-inch gold-plated magnesium manmade moon weighing 21½ pounds.

Within minutes after the first successful rocket stands on its tail above a column of fire at Cape Canaveral, Fla., the satellite will be orbiting. The job of finding it and plotting its course will be a tough one—about the same, in fact, as trying to locate a golf ball spanning the sky in 45 minutes at 60,000 feet.

Solution of this problem will be met by two radio and two optical programs. The Minitrack radio system and big Baker, Nunn telescope cameras will provide official ears and eyes. The other two programs

will be carried out entirely by amateurs, assisting International Geophysical Year scientists by providing additional sky coverage.

Plans are being made available for a radio receiver which "hams" can use to pick up signals from the satellite.

Diagrams and directions for an official "moon watch" telescope you can build yourself are detailed on page 170. Qualifications for official moon watchers, the amateur visual observers of the program, are described below. They are necessarily rigid. But even if you don't qualify for an official team in your area, the telescope will provide a fascinating sky instrument. With it you can track the satellite for your own satisfaction and go on to discover the fascination of stargazing long after the satellite has disappeared.

To bring interested readers all available

POPULAR MECHANICS

Naval Research Laboratory
Washington, D. C.

Spot the Satellite



By Richard F. Dempewolff



information regarding amateur participation in the satellite visual-observation program, *Popular Mechanics* asked the project directors to answer a series of pertinent questions regarding who can join, how to join and how to moon watch for the program—or just for fun.

Who will be able to see the satellite?

In the United States, anyone south of an imaginary line running from New York City to a point on the West Coast about 150 miles north of San Francisco should be within view of the planned orbit on several occasions during the satellite's life. Present plans call for the sphere to orbit between the two fortieth latitudes. People slightly beyond the fortieth latitudes may spot it during twilight hours in good weather.

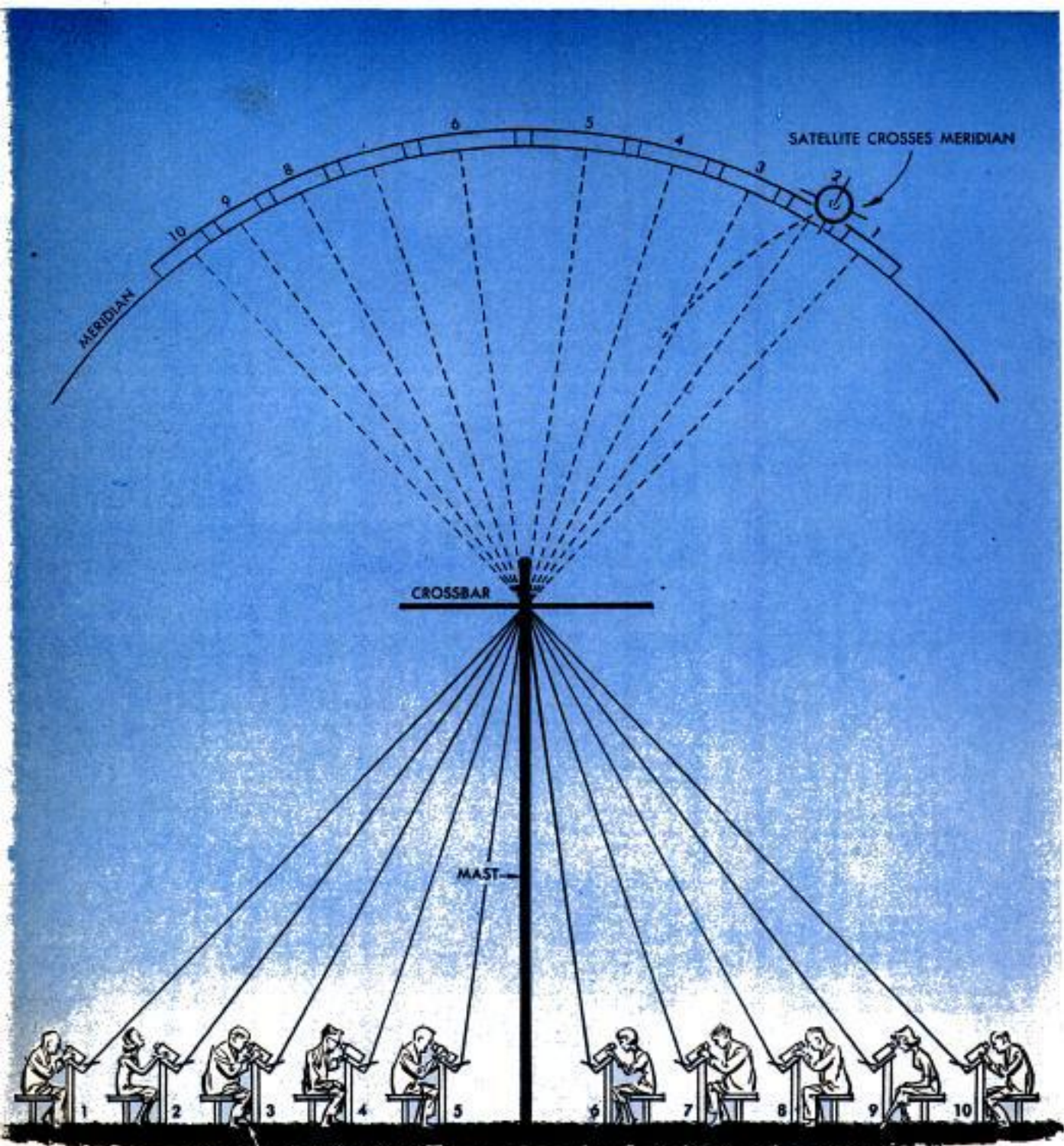
Can the satellite actually be seen with the naked eye?

The sphere's gold-plated magnesium skin

will be highly polished to reflect the sun's rays. However, it is so small that at 300 miles it will have a magnitude of only six or seven, the same as the faintest star that can be seen by the naked eye under ideal weather conditions. Since the orbit will be elliptical, carrying the satellite on a course between 300 and 800 miles from the earth's surface, it is highly doubtful that many people will see it without optical aid. At 800 miles it will be as faint as a 9th or 10th-magnitude star, and virtually invisible. However, an inexpensive pair of six-power binoculars, or a small homemade telescope such as the one shown in this issue of *Popular Mechanics*, is all you'd need to bring the sphere into visibility.

What will be the best time to see the satellite?

The satellite can only be observed visually during evening or morning twilight,



THIS MAN SEES SATELLITE FIRST

Drawing shows a typical setup for a "moon watch" team. Each watcher covers an assigned sector of the sky

when the observer is in the shadow of earth's rim, while the sphere, above the shadow, is illuminated by bright sun. Appearance of the satellite during these twilight periods is not always guaranteed. Motion of the sphere's orbital plane, plus rotation of the earth, and the earth's own movement around the sun, present a complex pattern of constant change. You can do your own predicting of the satellite's probable location from day to day with a

globe, a wire hoop from a lampshade (about six or eight inches larger in diameter than the globe) and a flashlight to simulate the sun. With the light fixed a few feet away to shine on the globe from one side, here's what you do:

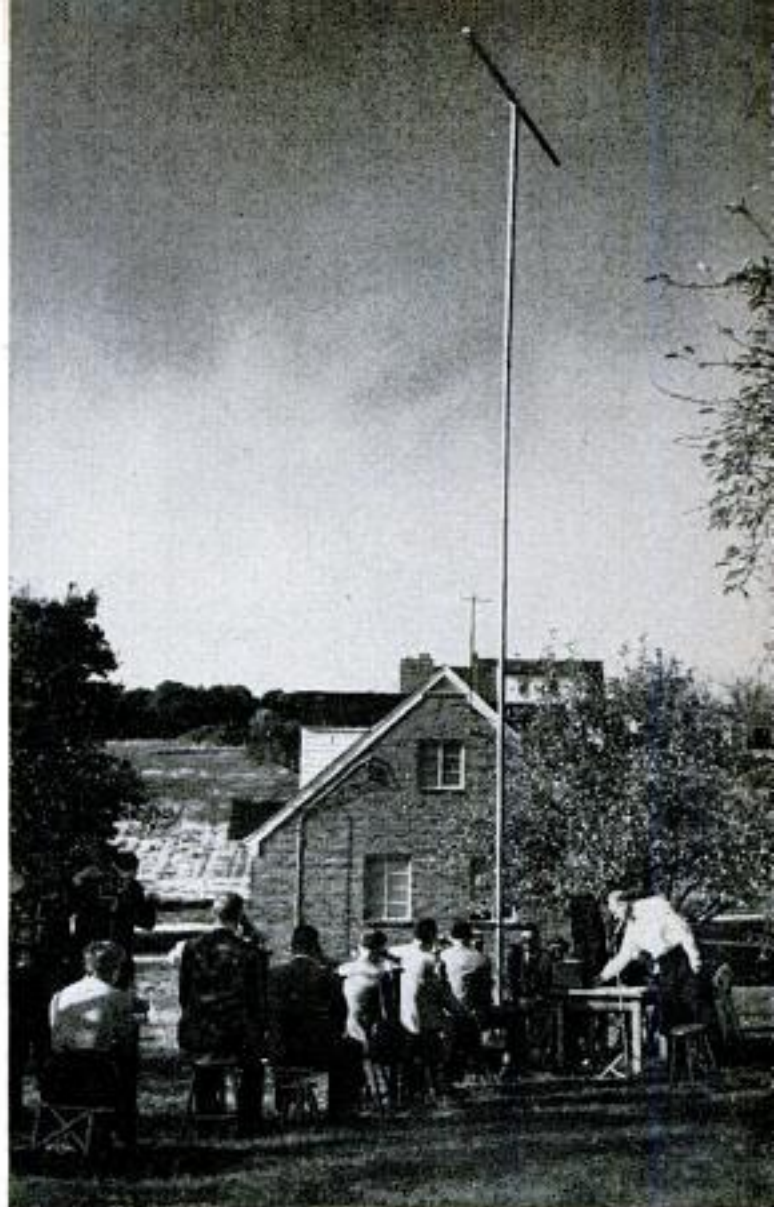
1. Fasten a clamp on the hoop so it stands on a table as shown in the illustration on page 75.
2. Cut "legs" in a coffee can that has had its top and bottom removed so that it fits over hoop and clamp.

3. Trim the top of the can so that when the globe is placed on it, the globe rests approximately in the center of the hoop.
4. Place the globe on the can so the equator lines up with the hoop, then twist the globe slightly until the equator makes an angle of about 35 degrees with the line of the hoop. Daub white paint on the wire hoop at the two spots, top and bottom, where it crosses the equator.
5. The hoop represents the satellite's orbit. Now, since the satellite starts from Florida, mold a little ball of clay or putty on the hoop above this point on the globe.
6. You're ready to start projecting the satellite's day-to-day orbit. In a darkened room, the light shining on the globe's left side will create detectable "twilight" zones, between lighted side and dark side, where the satellite should be visible on its rounds.
7. During one revolution of the satellite, the earth will rotate 1700 miles eastward. Make believe the satellite has completed one orbit. Don't move the hoop yet. Instead, rotate the globe 1700 miles (about 25 degrees in longitude lines at the equator) eastward. Note how the twilight zone, where the satellite is visible from earth, has moved westward.
8. But another change occurs, too. The entire tilted orbit of the satellite swings around the earth like the wobble of a coin settling to a table top. For every revolution of the earth, you must turn the hoop so the white markers move about $6\frac{1}{2}$ degrees westward along the equator. The area beneath the hoop where it crosses the twilight zone is where the satellite will be visible after one revolution. By continuing this procedure, you will get a graphic picture of where, from earth, the satellite will be visible during successive revolutions, provided it is on the course planned for it.

The picture sequences at the beginning of this article show how successive motions of satellite, earth and orbit create a constantly changing pattern. When twilight occurs under the satellite's perigee (300 miles above the earth), the earth's shadow will not miss it by much. So there will be only 40 minutes to watch for it before darkness sets in and shadow consumes it. Morning twilight under perigee will also last only 40 minutes before the earth's surface speeds eastward into full daylight. By the same token, at apogee (800 miles above earth), the satellite will be high above the earth's shadow across a wide arc of sky, and there will be at least 100 minutes of observing time, during which a lucky spotter may see the sphere pass overhead twice.

How long will the satellite stay aloft?

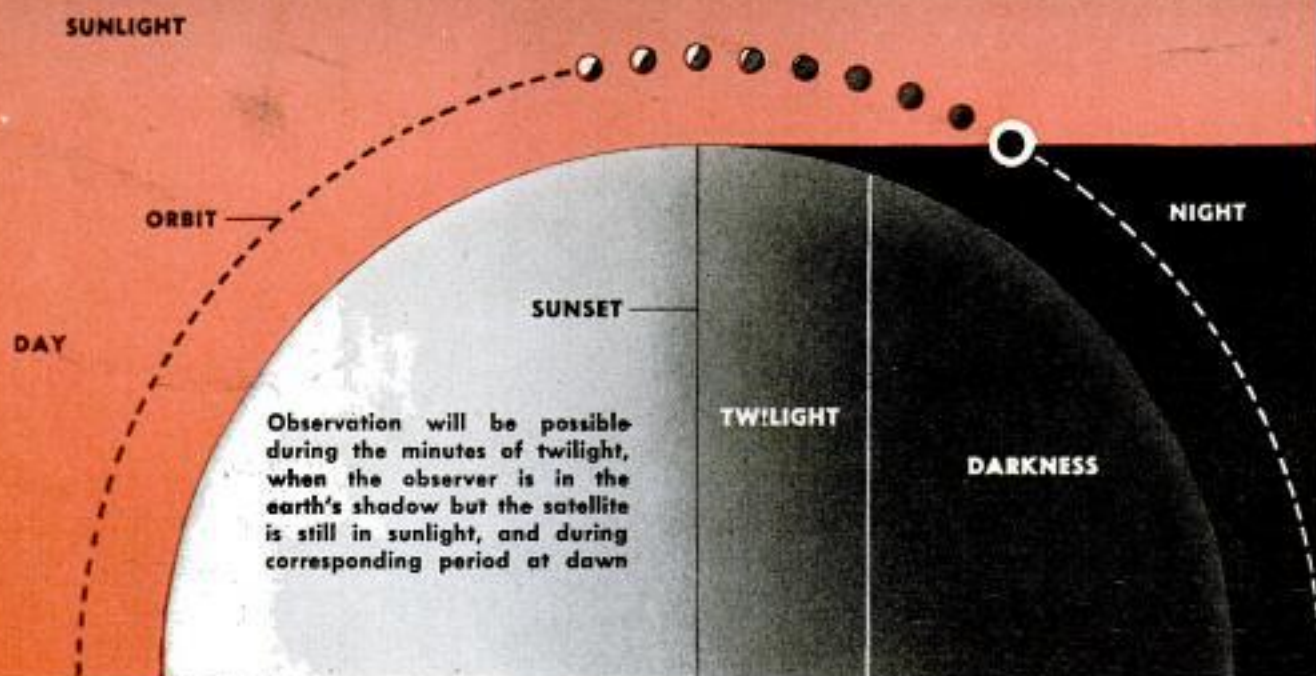
Nobody can be sure. Several months is a safe guess. The answer to this question depends partly on the density of earth's outer atmosphere that will act on the satellite to slow it and eventually bring it



Rehearsal for moon watch. The reflecting telescopes are aimed at the intersection of crossbar and mast

Coffee can, wire hoop from a lamp shade and a school globe can be used to calculate satellite's orbit and predict places on earth where little moon can be seen





plummeting downward. This is something we know little about, and one of the things that the satellite will tell us by the way it behaves.

Can any interested amateur sign up for work on a moon-watch team?

Dr. Armand Spitz, coordinator of visual operations for the program, has invited interested amateur astronomers to participate in operation moon watch. Due to the

satellite's life will depend upon altitude achieved. Recent calculations indicate outer atmosphere may be much thinner than previously believed, so estimated lifetimes shown here may be considered conservative

technical aspects of the work, only truly competent stargazers should apply.

How is operation moon watch set up?

Since a precise observation of the satellite's position is useless unless the observer's exact geographical position is known, it has been necessary to organize "fences" of volunteer observers along certain meridians on the earth's surface. These observers, sitting in a north-south line are arranged so that they cover a single arc of sky by aiming their telescopes through a point on a 35-foot mast, as shown on page 74. Each man covers only 12 degrees of sky along the line, with little overlap. Hence, only one or two men on any team will see the orb cross his scope. When a man sees the tiny pin point of light enter his rim of vision, he calls "I see it." When it passes out of view, 10 to 20 seconds later, he shouts "I saw it." Recorded on tape, via lapel microphone, along with continuous radio time signals from a short-wave set beside the observer, the shouted signal will enable experts to compute the position and course of the orb in space, since the exact position of every moon-watch telescope is known. The "see" and "saw" code, incidentally, has given this phase of the project the nickname "operation see-saw."

Can anyone with a telescope send in position reports to help?

Because of the precision required, the central computing bureau can only accept observations sent in by the leader of a moon-watch team. Hence, no "lone wolf" can contribute usefully. Moon-watch alerts will be held during twilight hours. Planes equipped with a small light approximating

(Continued to page 234)

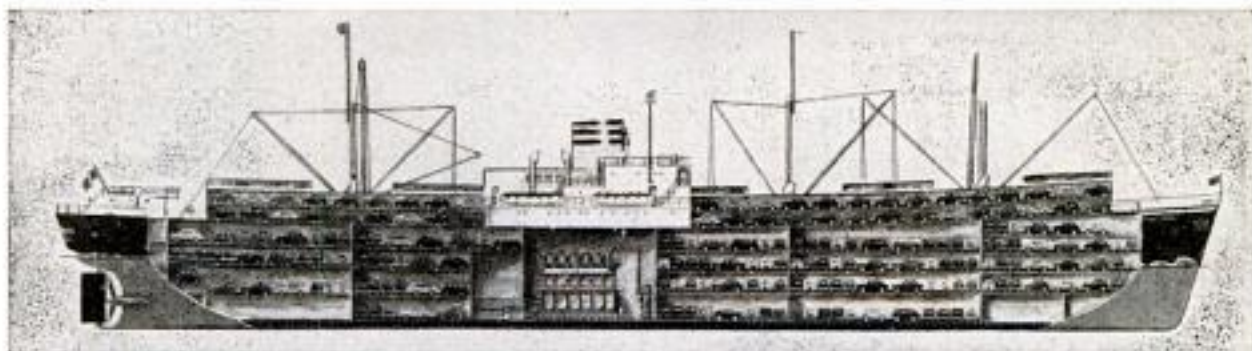
LIFETIME OF SATELLITE

300 miles: almost one year

200 miles: about 15 days

100 miles: less than one hour





Italian Ship Carries 1000 Cars

Italterra, a 7155-ton Italian freight vessel, now is being converted at Genoa into a ship that will carry only cars — 1000 of them. With this capacity, the *Italterra* is said to be the world's largest car carrier. The craft will be used in the exporting of Italian-made cars, and is expected to cut shipping costs.



Quick-Starting Charcoal Package Burns 90 Minutes

Completely sealed and dustproof box of charcoal briquets, below, needs only a lighted match to start a glowing barbecue fire that lasts an hour and a half. The molded pulp package has vent channels on the bottom, plus a center chimney. After

five minutes, the box has burned away. But the back-yard chef should wait until the briquets are covered with grey ash before spreading them into a bed of glowing coals. The package contains enough charcoal to barbecue two big steaks.





From East Germany comes the P-70 coupe with a plastic body, steel roof

IRON CURTAIN CARS



Below, the Wartburg convertible combines a folding roof with a transparent hardtop

Two toning gives the Wartburg station wagon a stylish look. It has a three-cylinder engine



Below, sleek and small, this sports roadster has a top speed of 85 miles per hour. None of these cars is sold in the U. S.



CARS from behind the Iron Curtain are beginning to show signs of luxury and style. Here are some examples:

The P-70 coupe has an all-plastic body with a steel roof supported by slender steel pillars. Its water-cooled 42-cubic-inch engine develops 22 horsepower. Top speed is about 60 miles per hour. It has front-wheel drive.

The Wartburg wagon has wrap-around side windows at the rear and a folding panel in the roof. The seats recline and lie flat to form a double bed. The body is designed to appeal to campers and sportsmen. The three-cylinder two-stroke engine has a power rating of 37 horsepower.

The Wartburg Bellevue combines the convertible with the hardtop. The forward-hardtop portion of the roof is transparent. It is claimed that you can light a cigarette in the back seat with the roof down at 60 miles per hour.

An East German sports roadster looks like a version of the Mercedes 190SL. It, too, is a three-cylinder front-wheel-drive design rated at 50 horsepower. Top speed of this sporty car is said to be about 85 miles per hour.



"Shuttle Darts" Game Tests Catching Skill

Two hand-held dart boards and a shuttlecock with a rubber suction cup are used in a new Australian game called "shuttle darts." Each player holds one of the target boards. Standing from 20 to 60 feet apart, the players alternately throw the shuttlecock at the target held by their opponent,

above right. The catcher tries to land the shuttlecock on the bull's-eye of the target, above left, for a score of three points. Less accurate catches count two and one points. Each player must throw the shuttlecock within the other person's "reasonable reach."

"Freeze Dry" Foods May Be Stored in Cupboard

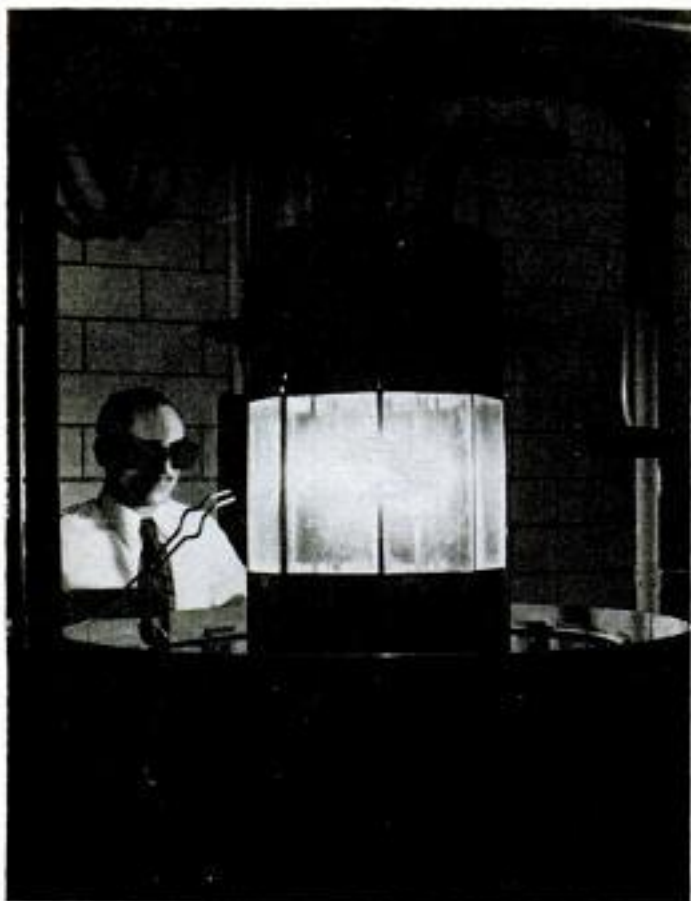
Laboratory "freeze dry" methods soon may provide spoilage-free foods and medical supplies. Raytheon Manufacturing Co., Pittsburgh, Pa., is testing electronic processing equipment (below) which preserves fresh and cooked foods for storage at room temperatures without refrigera-

tion (below right). The freeze-dry method is similar to what happens to laundry drying outdoors in freezing weather; moisture changes from the frozen state to vapor, which is removed. Immersed in water, the "re-hydrated" foods can be cooked without loss of flavor, texture or nutrients.





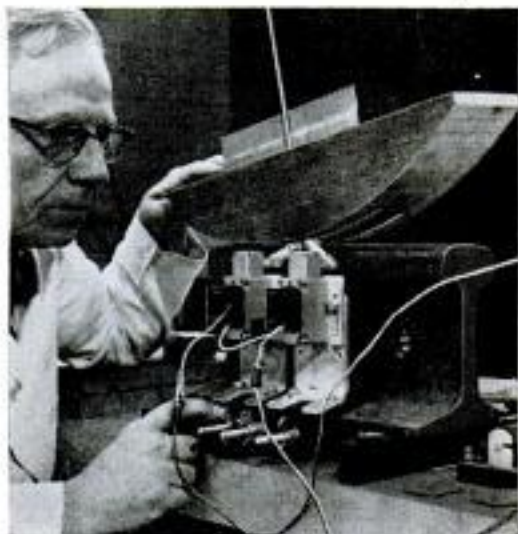
Scientists, above, check samples at railroad laboratory. Weatherometer, below, reproduces entire summer of heat and rain within a few hours to test the quality of paint



Railroad Laboratory Cuts Operating Costs

HOW DOES A RAILROAD know when it's time to overhaul a big diesel locomotive? Scientists at the New York Central lab find the answer by burning a sample of lubricating oil in an electronic spectrometer. The instrument automatically records the presence of any of 16 chemical elements. If the device indicates even a trace of copper, the research workers know there is a worn bearing. Silicon in the oil usually means a faulty air filter is letting dust from the road bed into the wearing parts. Boron indicates that water is leaking into the oil. The technicians also analyze samples of diesel fuel to determine what organic material is in it which, in turn, indicates how well it will burn. A typical day's collection of samples of fuel and lubricating oils, as well as worn parts, is shown in the photo, above left. The New York Central estimates that chemical analysis of lubricating oils saves \$16,000,000 a year in the cost of locomotive overhauls. Analyzing fuel oil permits the railroad to burn non-premium fuels at one to two cents a gallon below the price of premium diesel oil. Since the railroad consumes about 22 million gallons a month, the savings in fuel costs also amount to millions of dollars a year. The laboratory also is testing a new-type gas turbine that burns inexpensive powdered coal.

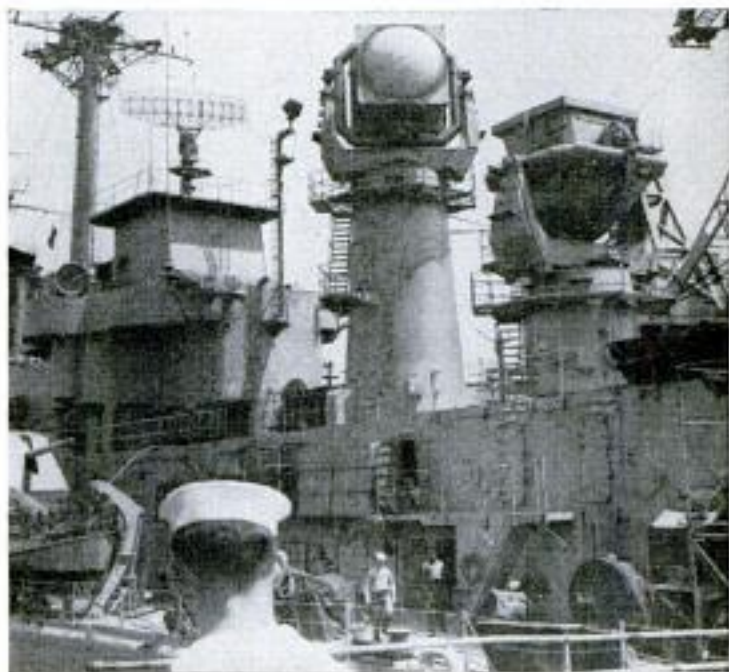
Research technician, below, experiments with track switches to be used in automatic yards





Guided-Missile Cruiser Gets Super "Eyes"

Two super-radar units, able to scan the air many miles beyond the horizon, have been installed aboard the guided-missile cruiser USS *Canberra*. They will be used in the detection of potential enemy supersonic aircraft, and in the guidance of ship-to-aircraft Terrier missiles, four of which are shown in their launching position in the photograph above. In the photograph at right, one radar is facing the camera, while the other is directed up in the air. The radars can track different targets simultaneously and control missiles fired singly or in salvos.



Mountain Models Locate Oil Pools

Forces that wrinkled the surface of the earth to produce mountains can be simulated by a machine developed by scientists at the Gulf Oil Research Center in Pittsburgh, Pa. The machine-built miniature mountains help oilmen study the types of mountainous structures likely to conceal oil pools. Sheets of clay compounded to represent the strength, density and other qualities of rock strata are deposited in the machine. Pressures are applied against the sides of the box and mold the earth model into folds representing hills and mountains. The process can be stopped at any stage of "mountain building" while scientists study cross-sections of the "underground" strata.





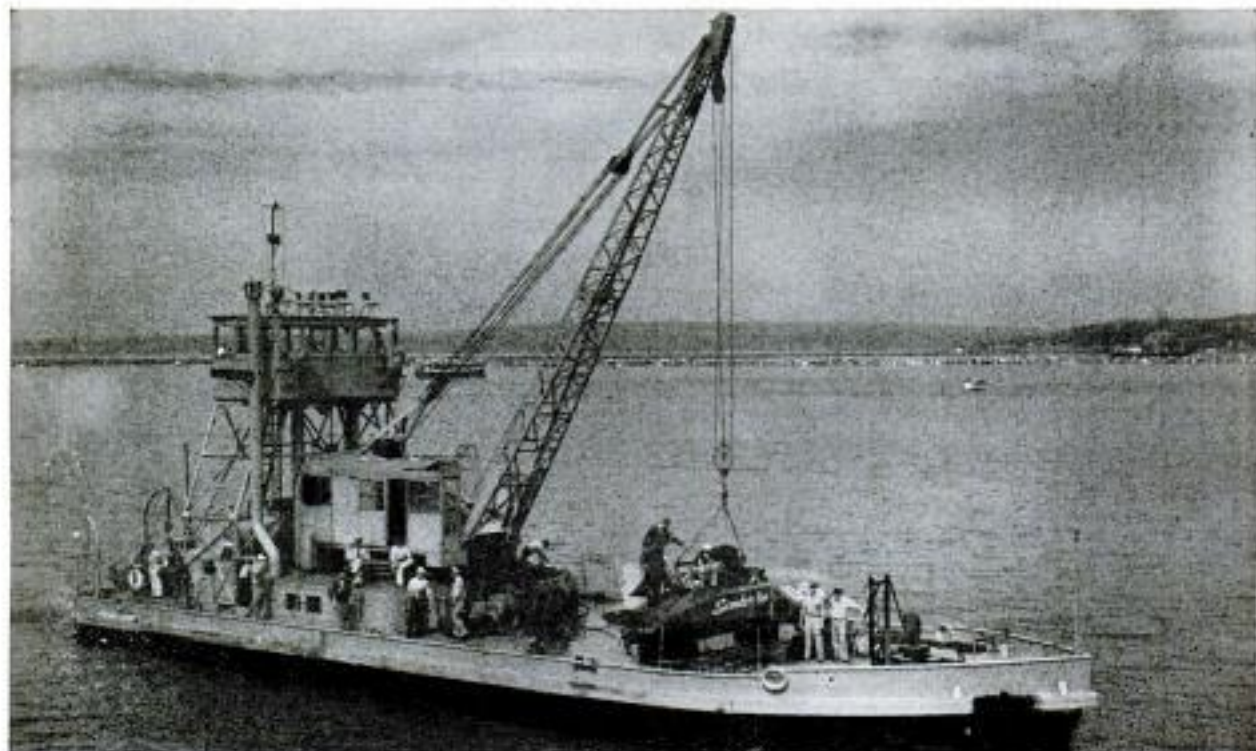
Miss Thriftway, 1956 Gold Cup winner, paces Hawaii Kai III by length at Lake Mead

Gold Cup Racers Aim at 200 Miles per Hour

By Kent Hitchcock

Honorary Vice-President, American Power Boat Association

Salvage equipment and skin divers work fast to recover expensive boats that capsize at races and regattas





Fabulous *Slo-Mo-Shun IV* had big air fin to help boat track straight at high speed. Ted Jones is at wheel

THRILLS and excitement—the roar of powerful motors—the flying “rooster tails” and the terrific speeds—these are the ingredients that have skyrocketed unlimited hydroplane racing as a spectator sport. Two million people will watch the big jobs race before the end of this season and a vaster audience will watch and listen over TV and radio.

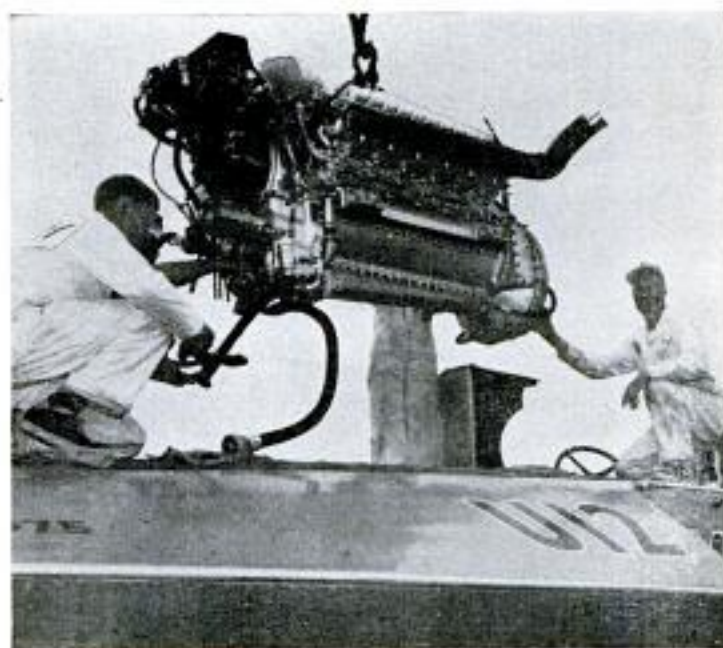
The unlimiteds, often called the Gold Cuppers, are shoving the 190-mile mark on straightaway runs. Experts think a new world record of around 200 miles per hour for propeller-driven boats will be set this year.

The annual contest for the Gold Cup is the big race. Unlike any other trophy in speedboat racing, the Gold Cup is defended on the home waters of the winner of last year's race. *Miss Thriftway* of Seattle won the cup in Detroit in 1956, so this year Seattle plays host. Half a million frenzied spectators will jam the shore line adjacent to the course and hundreds of private boats will be tied rail-to-rail in every available location.

After Seattle the unlimiteds will race in Detroit August 31 for the Silver Cup, an event that annually draws some 350,000 spectators. The race for the President's Cup on the Potomac is next, followed by the International Cup race at Elizabeth City, N. J., with the



Hawaii Kai III carries big Rolls-Royce engine for power. Below, Allison aircraft engine is power plant of most unlimited hydroplanes. The engine has 1700-cubic-inch displacement and develops a whopping 2500 horsepower when “souped up” for racing



TRIM TAB PREVENTS
"PROP WALKING" TENDENCY

HORIZONTAL STABILIZER
PROVIDES LIFT TO HELP
KEEP BOAT IN
"PROP RIDING" ATTITUDE

STABILIZING FIN

SHAFT BEARINGS
LUBRICATED WITH WATER
PUMPED UNDER PRESSURE
FROM ENGINE

WATER-SPEED
INDICATOR CABLE

SIDES ARE 3/8-INCH
FIVE-PLY MAHOGANY

RÜDDER IS OFFSET LEFT
— UNLIMITED HYDROS
ALWAYS TURN LEFT

BOTTOM IS 1/4-INCH
FIVE-PLY MAHOGANY
WITH SHEETING
BONDED TO IT

"CHOPPER" TYPE PROPELLER
TURNS 12,000 REVOLUTIONS
PER MINUTE

"VENTILATED" SPONSON

SPONSON FIN
HELPS PIVOT BOAT
WHEN TURNING

V-SHAPED SPOILER
UNDER BOW

THRIFTWAY, TOO



Above, Miss Thriftway, 1956 Gold Cup winner, carried driver in "conventional" place aft of the engine. Below, Thriftway, Too showing driver in the cockpit at forward end of the boat



season winding up at Lake Mead, Nev., with the Sahara Cup race October 12 and 13.

All this is a far cry from the dreary unlimited picture of 10 years ago. The fastest heat in the 1947 Gold Cup race was turned at an average of 56.8 miles per hour by a boat powered by a 1500-horsepower engine. Meanwhile the little 135-cubic-inch hydros were averaging 70.5 miles per hour with tiny Ford V-8 "60" engines. Spectators stayed away from unlimited racing.

Curiously, the boat that changed the whole Gold Cup picture and that set phenomenal records on the water was conceived as a pleasure boat. In fact, it was used strictly for pleasure until its owner, Stanley Sayres of Seattle, found he was breaking the world record every time he took a friend out for a spin.

The extraordinary craft was designed by Ted O. Jones, who was working at Boeing at the time and who applied aircraft engineering principles to the three-point hydroplane design. The boats are called three-pointers because at high speed they ride on the trailing edges of their two outboard

sponsons and on one blade of the propeller.

The hydros are tricky. If the bottom of the hull isn't shaped exactly right the boat will not get up off the water. On the other hand, too much air under the hull makes the boat kite and possibly flip backward.

Slo-Mo-Shun IV, the boat Jones designed for Sayres, looked much like the other hydros but there were some important differences. *Slo-Mo* trimmed out in perfect balance at high speed. It had a "spoiler" under the bow to break up the flow of air and keep the bow from rising too high. There was a big air fin to help the boat track straight at high speed, offsetting the sidewise thrust of the propeller.

The unlimited hydros had a tendency to break apart in rough water even though their speeds were not sensational. They were heavy, but poorly reinforced. Jones used aircraft principles of construction to produce a light boat that could take a beating and not fall apart. Tanks and instrument installations were other sources of failure, and again Jones went to aircraft procedures.

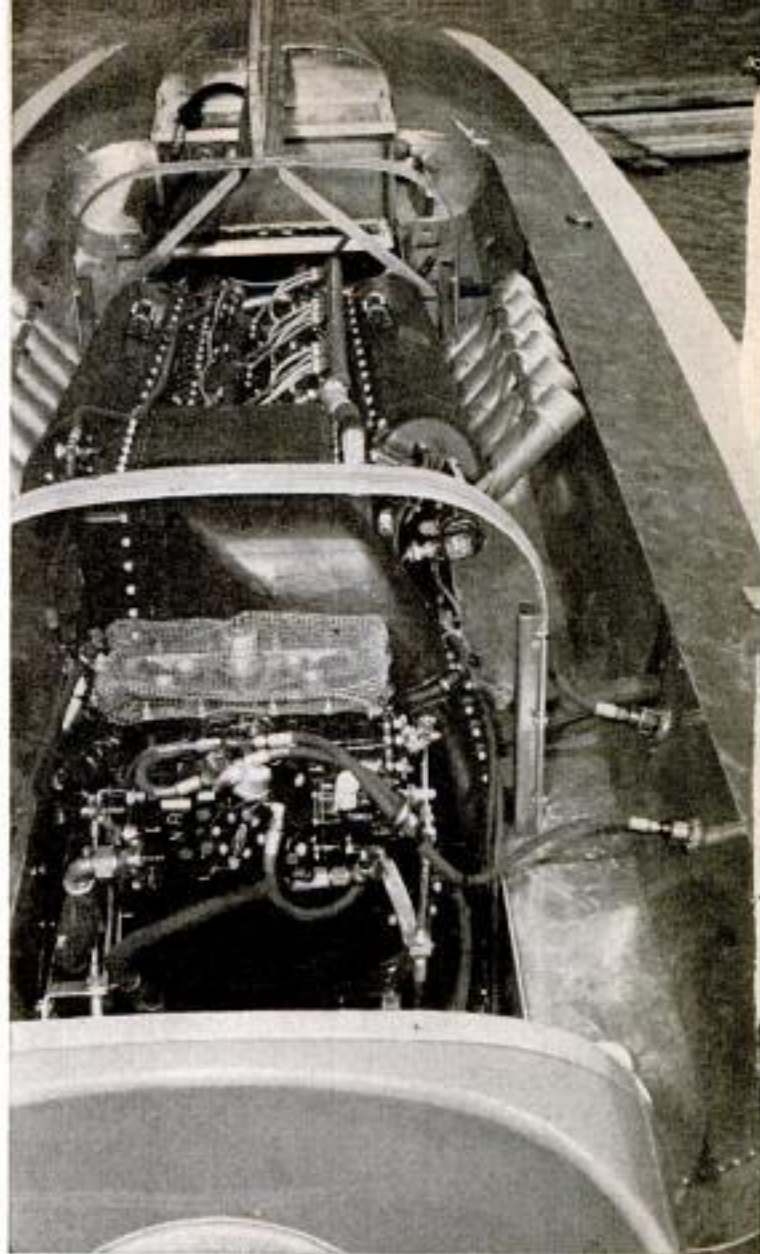
At high speeds a floating pop bottle or a small piece of drift will smash right through the bottom of a racing hydroplane. Jones sheathed the sponson runners and the bottom of the hull with dural plate. He put in a special gearbox to reduce the chance of mechanical failure. He installed hydraulic steering and placed the rudder to the left of the centerline to get it out of the prop wash.

After a number of trials and adjustments, *Slo-Mo* got up and literally flew across the water. Sayres found that the needle of his water speedometer was banging against the pin on every run, and the speedometer was calibrated to 150 miles per hour. The boat rode so smoothly that it seemed impossible to Sayres that he could be going faster than the world speed record of 141 miles per hour, set by the late Sir Malcolm Campbell in 1939. And he was using a stock Allison aircraft engine.

The speedometer was checked and found accurate. A special 200-mile-per-hour speedometer was built for the boat, the first ever designed. *Slo-Mo* went on to set a world speed record of 160.323 miles per hour and later won the Gold Cup and Harmsworth Trophy races.

Today, unlimited hydroplanes designed by Ted Jones hold every unlimited record in the book and most of the important cups and championships. Even the boats designed by others show the Jones influence. The annual battle for the Gold Cup has become a feud between Seattle and Detroit, home of many of the fastest Eastern boats.

In the past you virtually needed to be a



Big Rolls in engine compartment of *Thriftway, Too*. Note quick connections of various lines and cables

millionaire to own and race one of the big boats. It's by no means a cheap sport today. You can spend \$50,000 on a boat and its equipment. A single propeller, for instance, costs \$500 and if you want real quality you can buy a propeller machined from a forging for \$1000. Different water conditions and different courses demand different propellers for peak performance. Counting spares, an owner may invest \$4000 to \$8000 in propellers alone.

An owner wants spare engines, too. A blown engine used to mean a boat was out of the race. Now the owners with the necessary cash carry spare engines, each complete with its own gearbox, all ready to drop into the hull. A trained crew can change an engine in 40 minutes.

Ted Jones has an improved design of boat on the water this year and the unlimited-hydroplane fraternity is looking it over with a critical eye. Jones has retained all the principles of the airfoil hull and the tunnel between the sponsons in the new



Side view of *Thriftway, Too* being hoisted from trailer. Exhaust ports of left engine bank are aft of intake

boat, *Thriftway, Too* and has added new features. One of them is that the driver sits ahead of the engine instead of behind it. Riding in front, he isn't cooked by the heat of the big engine and he isn't deafened by the thunder of its exhaust. He gets a smoother ride in rough water, has better visibility and is in less danger in case of fire, explosion or shaft failure. The quiet cockpit allows the use of a short-wave radio to the pit.

The new *Thriftway, Too* weighs 6552 pounds, more than most hydroplanes, and is 34 feet long, four to six feet longer than most. Beam is 13 feet. The hull is of a special 5-ply mahogany plywood, a quarter inch thick on the bottom. For extra protection a dural plate is bonded to the bottom of the hull.

Six fuel tanks of 44 gallons capacity each are placed so that the trim of the boat does not change as the supply of fuel diminishes. The tanks are of stainless steel covered with glass fiber.

The boat's vertical stabilizing fin is larger than in previous boats and has the usual trim tab on its trailing edge that helps offset propeller torque. A new feature is a pair of small horizontal fins near the top of the vertical fin. These small airfoils help lift the stern of the boat up off the water at high speed.

Thriftway, Too has a large engine compartment that at present contains a supercharged Rolls-Royce aircraft engine delivering about 2500 horsepower souped up for racing. Jones wanted the compartment large enough to install two engines if necessary but the boat proved so fast in

early season trials that he may not need a second power plant. Instead, he may install a small engine ahead of the main power plant simply to drive the blower. This would relieve the main engine of a drag of at least 500 horsepower and would allow the supercharger to be driven at constant speed, materially reducing the chances of blower failure.

Propeller shaft of the new boat is $1\frac{3}{4}$ inches in diameter, of tough "K" Monel, and the propeller is $13\frac{1}{2}$ inches in diameter. The selection of propellers made up for the boat ranges from 20 to 24 inches in pitch.

Jones hopes that *Thriftway, Too* will start a new era in unlimited hydroplanes, with a corresponding upward jump in the world record for propeller-driven boats. But already he is looking ahead to something else. He has a jet hydroplane in mind, and has done some preliminary planning. In appearance the jet boat would look very much like *Thriftway, Too* with the same over-all dimensions but with a higher, fatter cowling to hold the jet engine. The vertical fin would be taller. The hull would be entirely of dural, glass-fiber covered.

These plans are based on using the J-47 jet engine, a power plant that develops 6200 pounds of thrust. This is a bigger engine than the jet used by Donald Campbell in setting his world water record of 225.63 miles per hour in the *Bluebird*, and Jones sees no problem in getting the speed up to 300 miles per hour. A pure jet boat would be strictly for setting records; eventually we may have competition racing between boats powered with gas turbines hooked to the propeller shaft. ★ ★ ★



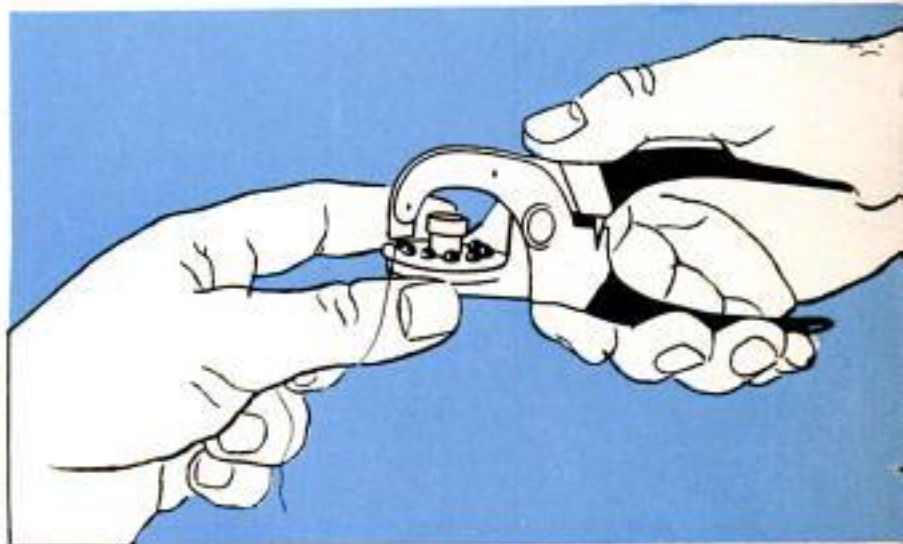
Experimental Tilt-Wing VTOL Plane Given Flight Exams

Flight testing of the first tilt-wing VTOL (Vertical Take-off, Landing) aircraft readied for such trials is under way. The

Vertol 76, powered by gas-turbine engine aft of the cockpit, has wings that can be adjusted for vertical or horizontal flight.

Fisherman's Crimpers Install "Dialed" Shot

"Dial type" mechanical crimpers permit fishermen to attach split lead shot to their lines without wasting time, teeth or tackle. A disk, holding shot, is inserted in the crimper and the line laid over the split in the shot. Pressure on handles of the crimper pinches the shot on the line. To remove closed shot without harming the line, the crimper also has a steel blade that splits open the shot. The kit includes the crimper, of rust-proof alloy, and three cartridges of popular-size split shot.



Hydraulic Lift Alters Motor Height

Boaters can control the depth of outboard-motor propellers with a new hydraulic lift. Two cylinders containing pistons raise or lower the motor as much as seven inches. The lift is controlled by a pump handle which can be installed on the transom or dashboard. By altering the depth of the propeller the boater can travel faster in deep water and avoid obstacles in shallow water.





PUSH-OFF



FLOATING

The Balloon Men Land Hard!

AIR FORCE OFFICERS are "parachuting" with balloons near Holloman Field, N. Mex. They are simulating and studying the shock effects of a pilot hitting the ground with a parachute attached to his ejection seat. The buoyancy of a helium-filled balloon allows the officer to be "thrown" up in the air about 100 feet. He descends the same speed that he would by parachute. The answer to shock-free landings may be a cushion of collapsible material on the bottom of the ejection seat.



LANDING



Swimmer Changes Clothes In Portable Tent

Changing clothes on the beach is no problem with an opaque tent that assures complete privacy. It is opened and closed with a zipper. Designed by a Melbourne, Australia, handbag maker, the tent can be folded into a package with a handle for carrying.

Wide-Beamed Steel Boat Is Almost Unsinkable

Two airtight compartments, plus an overflow device in the stern to drain excess water automatically make a "rocket" boat almost unsinkable. This 425-pound craft is 14 feet long, 6½ feet wide, and 3 feet high. Built of 16-gauge, cold-rolled steel, the vessel has rust-preventive primer and enamel applied inside and out. The boat seats four and uses a 25-horsepower or larger outboard motor.



Weather Gun Fires Pellet To Measure Wind Velocity

Measurement of low-altitude wind velocity—necessary for more accurate launching of missiles—is achieved with an experimental U. S. Army weather gun that fires a small steel ball up into the wind. Nicknamed "Breeze Buster," the gun fires its pellet at an angle calculated to make it fall back close to the gun's muzzle. The greater the wind, the greater the angle. When the steel ball falls back and hits close to the gun, the tilt of the gun is checked with a calibration chart to obtain reading of the wind velocity. This method is faster than using weather balloons, less expensive, and in time of war could not be observed by the enemy as would the balloons.





Trailer Home Folds For Travel

Seven piano hinges make this home ready to roll in 30 minutes.

By Kenneth Anderson

BUYING A TRAILER HOME presents a dilemma to families who want either a temporary lake-front cottage or a semi-permanent house. If they choose a mobile unit with a lot of living space it may be too large to move on all highways. If they select a trailer that conforms to all state laws, it's too small for active family life.

In Ohio, for example, a trailer home more than eight feet wide can cross the state only on the toll road. In Indiana, the state collects a fee of 75 cents a mile for moving a

Ready for visitors just a few hours after selecting homesite—price of this mobile home is about \$5000



Plenty of room for other vehicles to pass, even on a two-lane country road. This mobile home is designed to move over all highways without restrictions



Above, the 35-foot wall section is being raised by turning winch to shorten the length of steel cable





2 Steel bipods at corners help support the roof and 35-foot wall section while trailer is being folded or unfolded. Bipods are furnished with the trailer



3 Two people are needed to operate the winches at the front and rear of the trailer. Here, the floor and outside wall are being lowered after raising the roof



5 Photo above, from rear end of trailer, shows same stage of erecting the wall section as photo at left



6 Now, above, the end walls and two interior walls swing into position, as indicated by the arrows

mobile home wider than eight feet. The solution must be a trailer that's only eight feet wide on the road, but containing all the conveniences of a conventional house.

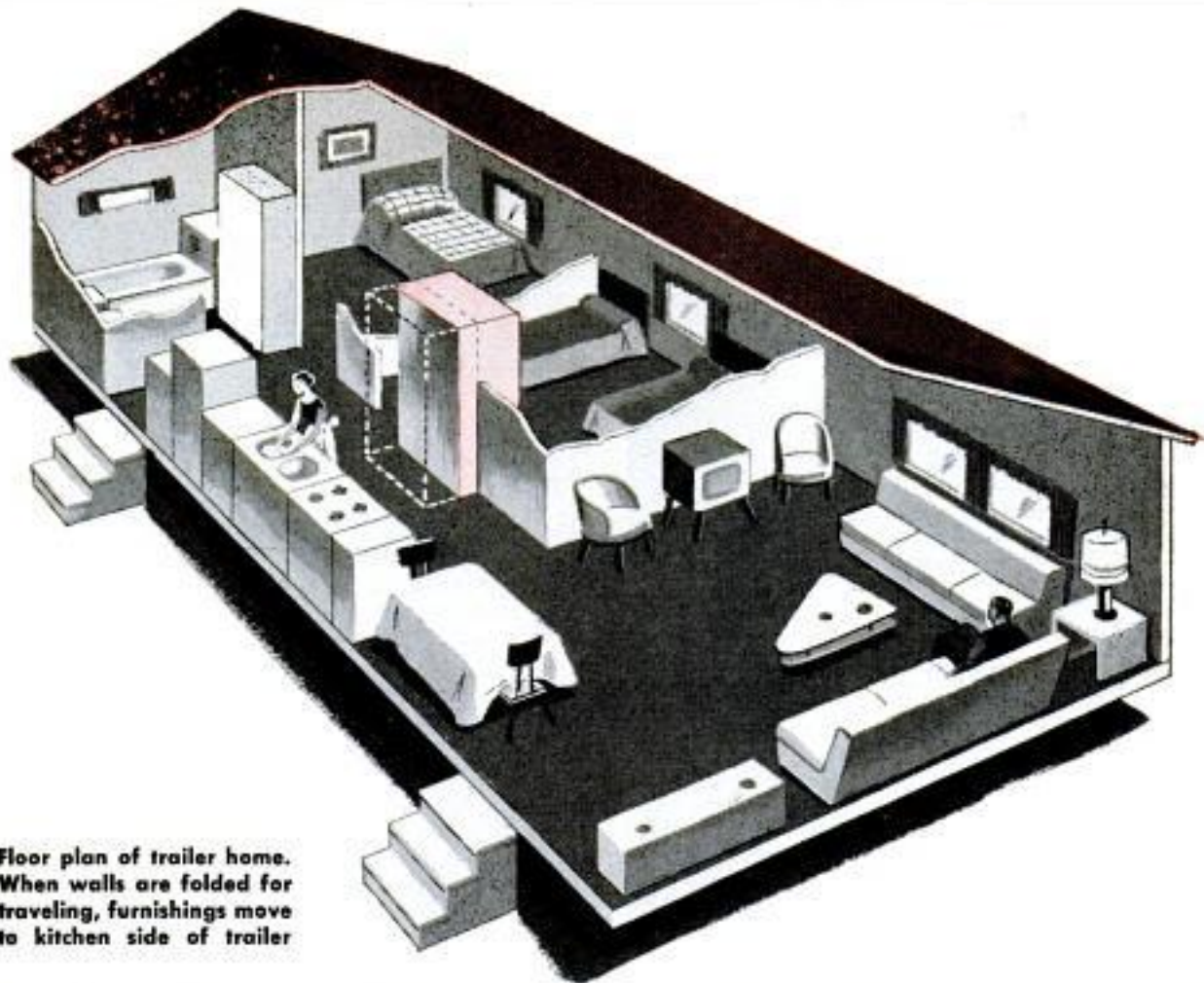
The Schult Corporation has designed such a mobile home, with over 500 square feet of living space in a package that's only eight feet wide and 35 feet long when it travels. Schult solved the problem by putting piano hinges in the walls, roof and floor. To pull up stakes, you simply move all the furniture to one side of the trailer and fold up the other side.

For a semipermanent stay, it takes a total of six man-hours to set up housekeeping. There are weather-tight cap strips and moldings to apply, plumbing connections and other minor tasks. At the end of that time, however, you have a two-bedroom ranch-style house for approximately \$5000.

Folding or unfolding the trailer requires a pair of steel bipods, a set of jacks, which are furnished with the mobile home, and a stepladder. A steel tube at the top of each

Adding finishing touches, below, makes the trailer home weather-tight. Caps and moldings are furnished





Floor plan of trailer home. When walls are folded for traveling, furnishings move to kitchen side of trailer

bipod slips into a socket at the peak of the roof, making a temporary steel scaffolding that bears the weight of the roof, floor and wall sections as they are raised or lowered. Raising or lowering the sections is done by turning winches that shorten or lengthen steel cables which are hooked to corners of the house segments. Folding or unfolding becomes just a matter of hooking the cables to the proper section and turning the

As semipermanent home, the trailer can be equipped with all the conveniences of a conventional house



winch. The end and interior walls swing into position with a gentle push and are fastened with screws.

This trailer has marine-varnished redwood exterior walls and is mounted on a steel frame. It weighs around 12,000 pounds, but it can be moved with a medium-to-heavy car equipped to tow that much weight. For hauls in hilly country, a truck or tractor is recommended. ★ ★ ★

As indicated in drawing at top of page, this bedroom closet moves into kitchen when trailer travels





Plastic Swimming Pool Bolted at Site

Resembling an oversize boat, a plastic swimming pool is bolted together at the site. The shell is then lowered into a hole and backfilled. Young William Kovacs (above) of Ft. Myers, Fla., is ready with trunks and towel for the big day when the pool is finished.

Long-Range Interceptor Missile Heads Ground-to-Air Defense

Twin ramjet engines and a rocket motor enable the Bomarc IM-99 interceptor missile to shoot down enemy aircraft at a far greater distance than any missile presently used in air defense, according to the Air Force. This ground-to-air missile is designed to operate at extreme altitudes at supersonic speeds. It is launched vertically by a liquid-fuel rocket motor. When the missile reaches a certain speed, the rocket cuts out and twin ramjet engines take over. The 47-foot missile is built by Boeing.

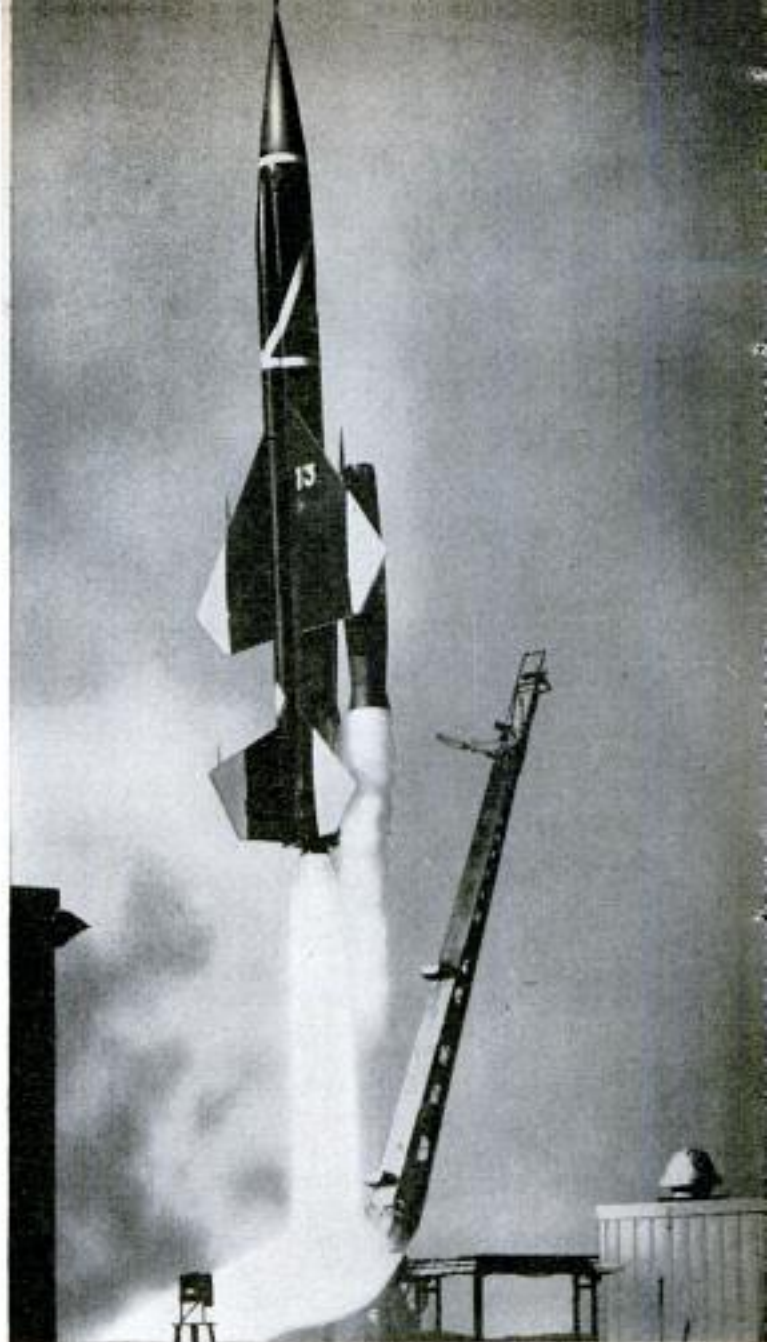


Table-Model Facsimile Unit Sends or Receives Printed Items

Even untrained workers can use a table-model, 37-pound facsimile unit to send or receive line drawings, printed documents or written messages over an ordinary telephone circuit. The transmitter-receiver scans the original item on a rotating drum with a photoelectric cell and prints a one-color duplicate on plain paper with an inked wheel.

Electric-Power Growth

By 1977 the U. S. will be using enough electricity to light a 100-watt bulb in every 114-foot square throughout the one-billion, 900-million acres of the country, according to a General Electric Company scientist. This represents the 625-million-kilowatt capacity of electricity-producing equipment to be built in the next 20 years, compared to more than 120 million now in existence for present needs.



Detroit Listening Post

By Art Railton



THEY'LL SOON be here—the 1958 models, that is. And then the merry-go-round will start again. New models, new beauty, new temptations to buy. Every one bigger and handsomer than its predecessor.

Before the shouting and tumult begin, let's take a quiet look at the industry's plans for your future.

This reporter has been asking Detroit planners questions like these:

"Where are you going? What's ahead? Will cars continue to be bigger, lower, faster and more luxurious? More expensive to buy and operate?"

The answers were simple and straightforward: "We are going forward. We shall never go backward. Tomorrow's cars will be like today's only more so. That's progress and America thrives on progress."

But, we asked, is there no room for a workaday car that can be driven with ease, parked handily, paid for quickly? Perhaps something different from the main line of luxury vehicles? Maybe a second car?

Detroit sees nothing in its immediate future like this. If America wants a second car (and it apparently does), it can get a good used car for less than it costs to buy a simple, utility machine and it will be a full-size car at that.

But, we asked, what about repair bills, operating costs, sheet-metal costs? Aren't these apt to be too high on tired cars with four-barrel carburetors, power accessories, big displacements as well as automatic transmissions?

The answer: Americans never have been concerned about operating costs. Americans want luxury, size and the satisfaction that comes with today's cars. They will never accept a small, underpowered, uncomfortable, austerity vehicle.

We walked away wondering why so much of our mail is from Americans who complain about poor fuel economy, excessive overhang, too much power, unnecessary ostentation.

We wondered about the 125,000 Americans who are buying foreign cars this year.

Detroit Not Worried

But Detroit is not concerned. It believes in progress and progress means bigger, thirstier, more expensive cars. It means thicker carpets, softer tires, lower roofs, more power assists, more expensive fabrics.

Detroit feels this way not because it's ornery, but because the public wants it that way. You get more basic transportation for the dollar in Detroit than any place in the world, if you buy the so-called standard models. But nobody buys them! Buyers want extras, deluxe trim, more power. You can't blame Detroit for that.

But this column is aware of a small minority (which is becoming larger every year) that is demanding more sensible cars. This group feels that a car is a device to make walking unnecessary. It is simply a convenience, not a social symbol. And this group, this minority, has no visible future except in foreign cars. But Detroit cagily covers its bet: Ford is pushing its small British-made cars and now General Motors announces Buick dealers will sell the German built Opel, Pontiac dealers will sell the British-built Vauxhall Victor, both small family cars. How long American labor will stand by while Europeans build "American" cars is unknown.

Edsel First Out

It's hard to keep the secret, but we will. We have seen, photographed and driven the Edsel. Look for the full details next month. It will be out late in August.

Other new models will be out in September and October with, perhaps, a straggler holding out until November.

Buick will come roaring back after an admittedly quiet year. It is expected to offer aluminum brake drums, a new transmission, air suspension. Its new deluxe Roadmaster 75 will be even bigger than this year's Cadillac (which will be bigger next year).

Ford will have the same body as this year with some identification changes. There is expected to be a four-passenger Thunderbird and it probably will offer air suspension at extra cost. Ford has apparently decided it's gone as far as it can with the wagon-wheel taillight. The 1958 cars are rumored to have six small lights on the back arranged horizontally.

Chevrolet is ready to take off after Ford and it is betting it will finish the year in first place. But, it frankly admits, it is out of the fin business. It has not been happy that the 1957 Chevrolet tail looked like an imitation of Chrysler's fins.

Lincoln's lines are square. There will be no upflying fin here either despite a move in that direction in the 1957 model.



Trapeze Take-off For Ryan Vertijet

Drawing shows how exhaust gases are piped to wing tips for control

SUPERSONIC FIGHTERS and fighter-bombers that take off straight up are on the drawing boards. They will be able to hover like helicopters, climb like rockets and nose over in a horizontal attitude to travel faster than the speed of sound.

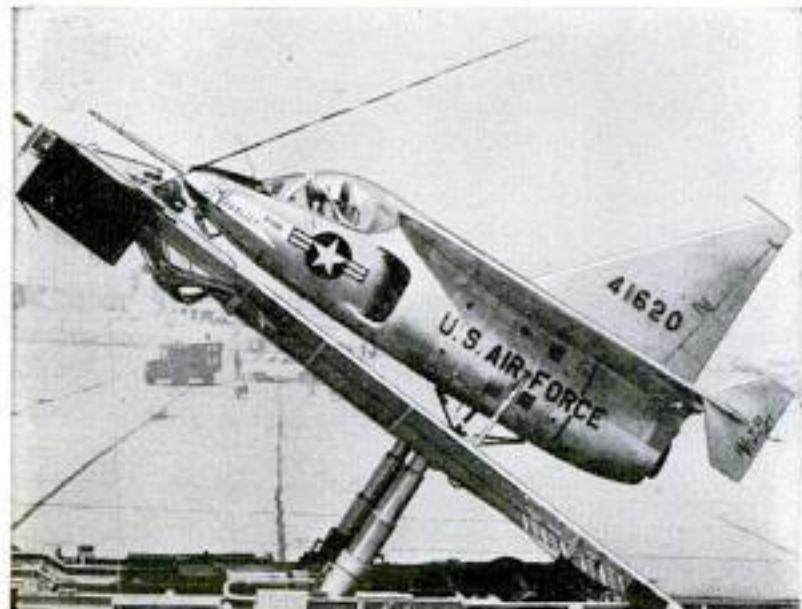
These developments are based on the successful testing of Ryan Aeronautical's X-13 Vertijet, an experimental aircraft that uses a jet engine for propulsion and pipes some of its exhaust gases to its wing tips for precise control while hovering or maneuvering at slow speeds.

The Vertijet has no conventional landing gear, saves the 10 percent of the gross weight usually devoted to landing wheels, struts, flaps and actuators. Instead, it has a single hook under its nose. The hook engages a trapezoidal mechanism on the bed of the ground trailer on which the plane is carried to any convenient launching site. The bed of the trailer is hydraulically tilted to the vertical, after which the pilot starts his engine and rises off the "trapeze." To land, the pilot puts the plane in a vertical position again, close to the ground, and slowly moves toward the raised trailer bed until his hook engages the trapeze, after which he shuts off the engine.

With its nose pointed to the sky the Vertijet can remain motionless a few feet off the ground or it can travel sideways faster than a man can walk. The plane can climb straight up to 10,000-foot altitude faster than any conventional aircraft and it has a forward speed in excess of 330 miles per hour. The pilot's seat automatically tilts for either vertical or horizontal flight.

Ryan officials predict that in the future a Vertijet may take off and land from a one-inch nylon rope stretched between two trees or buildings.

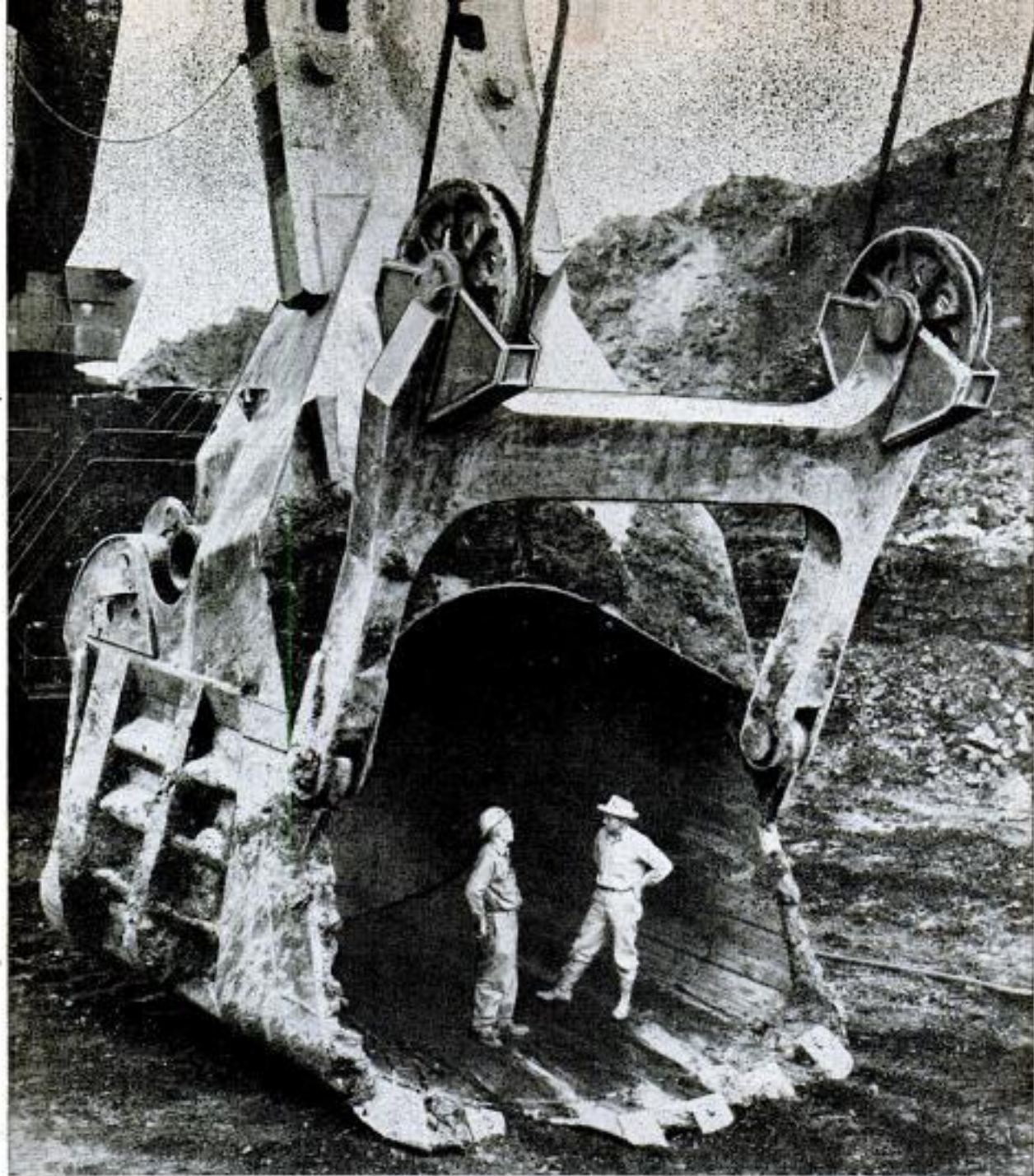
Pilot's seat tilts automatically as craft is raised to vertical take-off position. Plane is held by hook under nose. This type of landing gear cuts weight 10 percent, allows greater fuel and armament capacity



Vertijet can remain motionless few feet above ground. Rolls-Royce Avon jet engine develops 10,000-lb. thrust

Diagram below illustrates path of Vertijet taking off from trailer, changing to a horizontal position



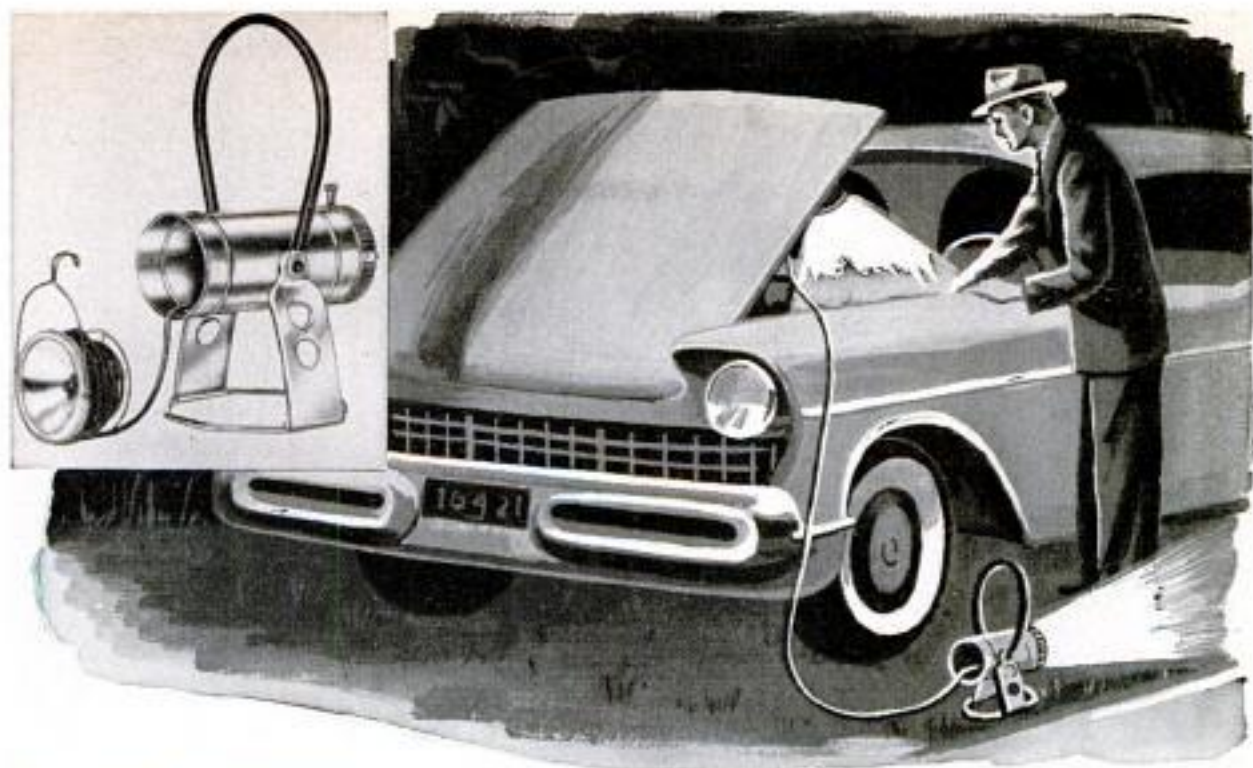


Two men are dwarfed by the River Queen's mammoth dipper, which can dig 100,000 tons of earth in 24 hours



Power Shovel Has 80-Ton Bite

MORE THAN 80 TONS of earth per scoop is the capacity of a monstrous power shovel now operating in western Kentucky. Named the River Queen, it is higher than a 13-story building—140 feet to the top of its boom—and at 2400 tons it weighs more than most naval destroyers. The 55-cubic-yard dipper can dump its load nearly 300 feet from the digging point and pile it up more than 100 feet high. At a rate of one digging-dumping cycle per minute, the River Queen could excavate 100,000 tons of earth in 24 hours. Despite its size, the shovel is operated by one man in a glass-enclosed cab 30 feet above the ground. An eight-foot wiper keeps the windshield clean. Fifteen motors power the shovel, including two 1500-horsepower synchronous units. The River Queen is mobile, and designed to uncover seams in an open-pit coal mine.

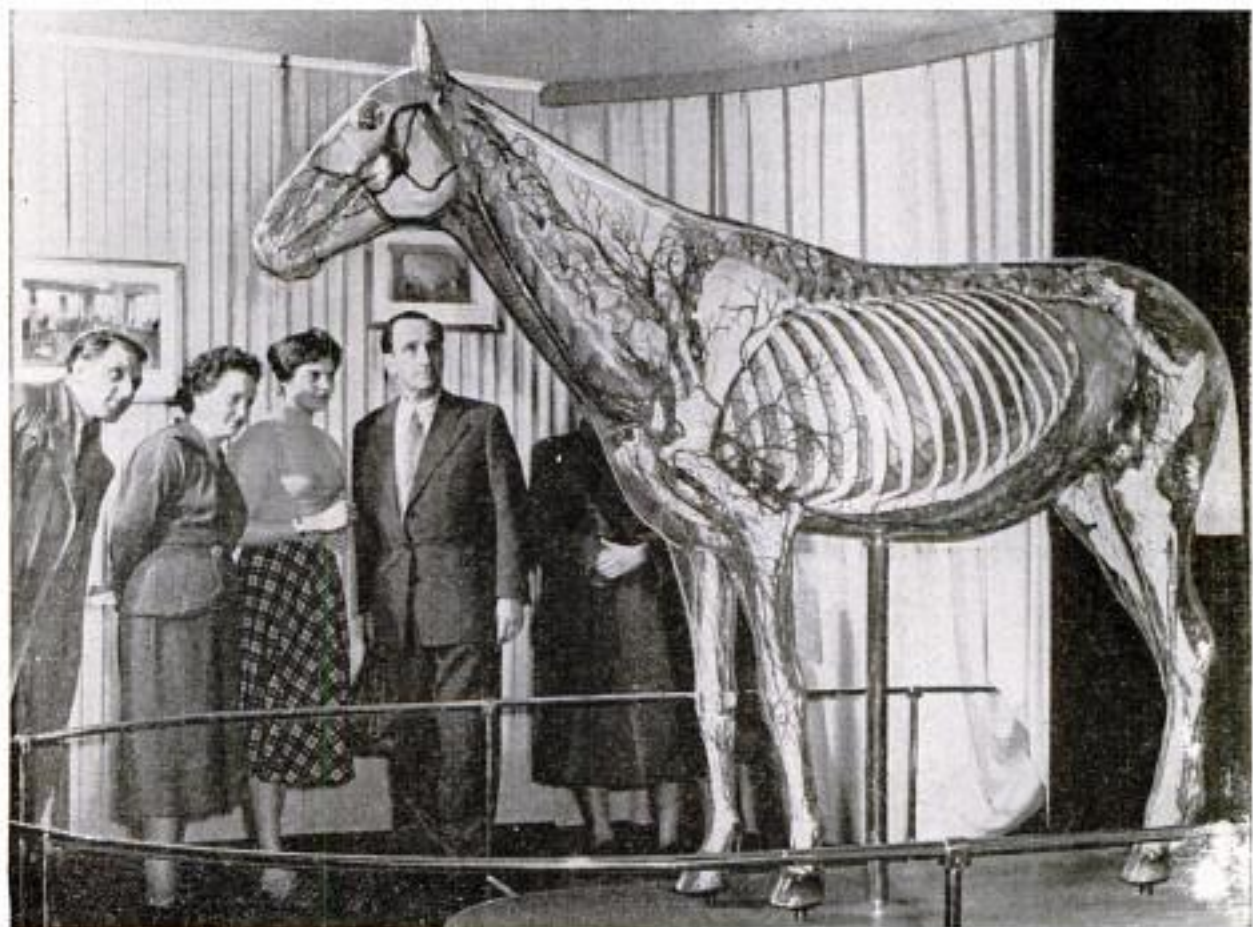


Two-in-One Lantern

Motorists with engine trouble at night can use a two-in-one lantern (above). They can set a red-flashing warning light in the road and, at the same time, work on the car with a clear-beam light on the end of a 25-foot extension cord.

Life-Size Glass Horse

Visitors to the Museum of Hygiene, Dresden, Germany, look through a 6¼ by 8-foot glass horse (below). Sixty-three bulbs light up its organs. A tape-recording explains anatomy and functions.





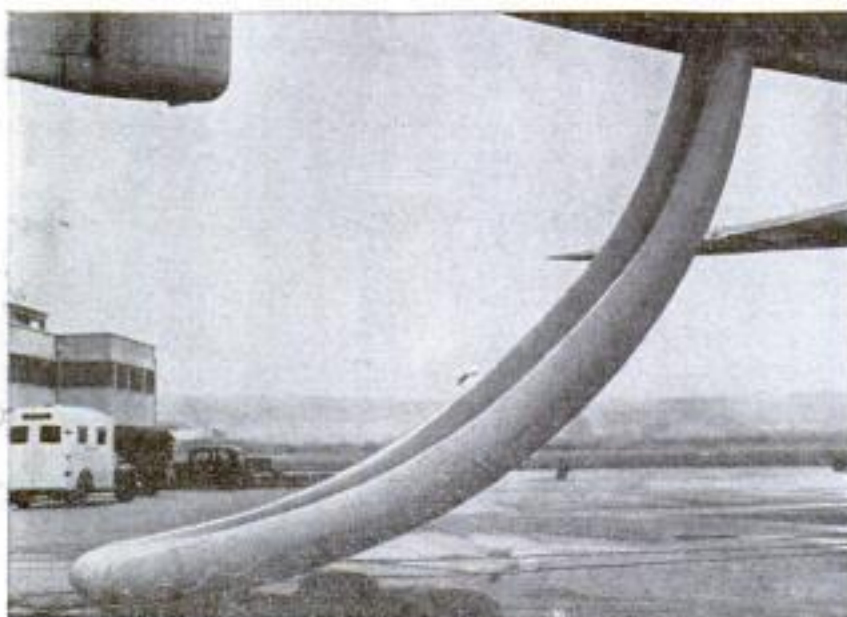
Sculpturing With Newspapers

What can you do with old newspapers? Mrs. Winifred McPherson of Cape Town, South Africa, sculpts with them. Differing from papier-maché work, the method used by Mrs. McPherson is to crumple paper into a rough shape. Then she glues on small pieces of paper to give the statue form. When dry, the sculpture is painted.



British Aircrews Use Escape Chute

Nicknamed "Beverley's Tongue," the curved object in the picture is an inflatable chute anchored to the floor of a British Air Force Blackburn Beverley transport plane. It was developed so that aircrew members could slide out of the plane in a hurry if an emergency occurred while the aircraft was on the ground. The chute can be stowed in a valise in the rear compartment and can be inflated in 15 seconds.





Huge Drill Bores Holes of Almost Any Size or Angle

With a few quick adjustments, a versatile drilling machine can cut into the ground at angles up to 45 degrees. It also can drill holes up to 75 feet deep without the use of extensions. By changing augers, the ma-

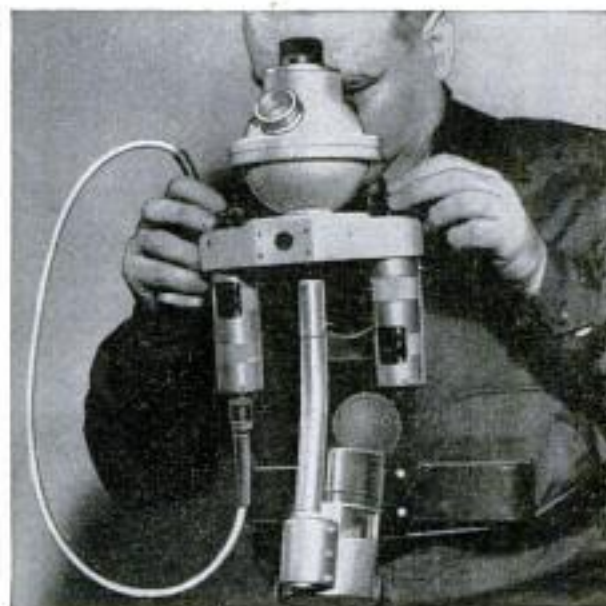
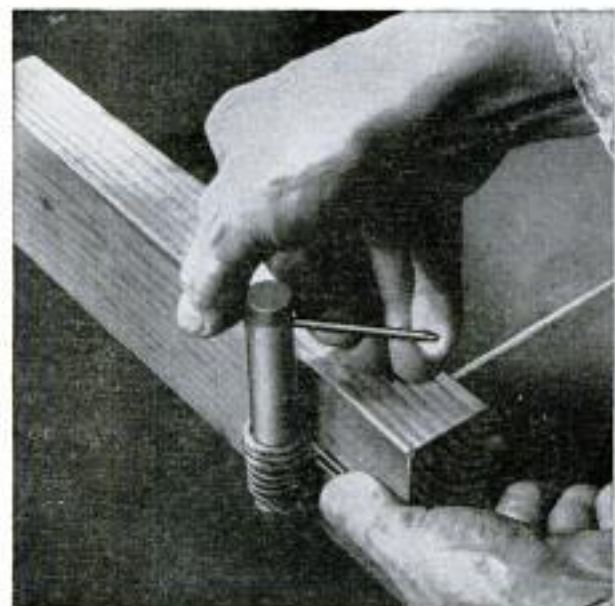
chine can cut holes from 20 inches up to 10 feet 6 inches in diameter. A control allows the operator to pull the auger from the hole and move it aside before he spins the dirt from the cutting edges.

Clothesline Tightener

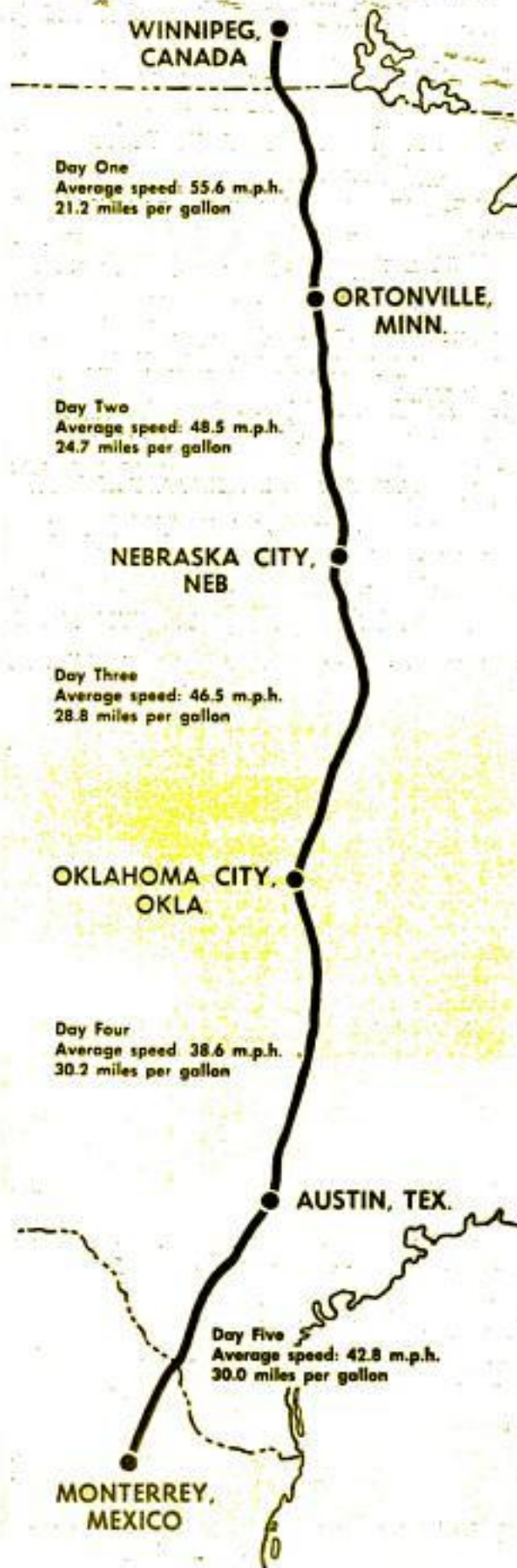
As much as 16 inches of slack wire, rope or plastic clothesline can be wound on a new line tightener. Line tension holds the 4½-inch pipe firmly to the crossarm against the pressure of a coiled spring. No nails or bolts are needed for installation. A nail in the pipe serves as a lever.

Portable Magnetometer

Prospectors can carry along a new portable magnetometer used for the location of minerals and oil-bearing formations. Weighing only 12 pounds, the instrument can be operated over bog, snow and water where conventional magnetometers of larger size cannot easily be handled.



HERE'S THE PM TEST RESULT



Gas was precisely weighed before it went into tank

What You Can

By Arthur R. Railton

ECONOMY RUNS have never impressed me very much. Not that they are dishonest, but they involve such precise tuning and such tender-toed driving that they don't come close to being typical of ordinary motoring.

There wasn't one car in the 1957 Mobilgas Economy Run that averaged less than 18.5 miles per gallon and that included all sizes from Imperial down.

Let's face it. You're bound for disappointment if you buy a 1957 car and expect that kind of gas mileage. To get such economy you'll have to drive with radio dead, with windows up. You'll worry through stoplights and turn what should be a pleasure trip into a nerve-wracking endurance contest.

So when American Motors invited me to go on its economy run from Canada to Mexico, I accepted, but on one condition: That I be given a duplicate of the official test car to drive as I wished so I could compare my mileage with what the experts got. American Motors agreed.

Here's what happened: My gasoline economy ranged from a low of 21.2 miles per gallon the first day to a high of 30.2 miles per gallon on the fourth day, depending on how I drove. The most the experts

←Economy went up as speed went down, except on fifth day when a special driving technique was used



Official test Rambler stops briefly for customs check at Canadian border on first day of the Mexican run

Learn on an Economy Run

beat me by was 18.8 miles per gallon, the least was only 2.2 miles per gallon.

The car I drove was a stock 1957 Rambler four-door sedan with a six-cylinder engine and overdrive. It had an economy rear axle (4.1 to 1), a lean metering rod in the carburetor and a 180-degree thermostat. You can order a duplicate of it from any American Motors dealer. The official test car was identical. It was driven by two American Motors engineers, Les Viland and Carl Chakmakian.

DAY ONE: Winnipeg, Canada, to Ortonville, Minn., 345.4 miles.

I drove as I would drive my own car on a long trip, with utter disregard for economy. We often hit 90 on the speedometer, once ran it up to 100. I accelerated fast and usually dropped out of overdrive for passing other cars.

We had the advantage of a strong tail wind and the disadvantage of temperatures around 32 degrees.

Like the usual tourist, we stopped for coffee on occasion. Our average speed for the day was 55.6 miles per hour (the test car averaged 45.7 miles per hour). Our gasoline economy was 21.2 miles per gallon (the test car averaged 39.96 miles per gallon).

We finished the day's run about 20 minutes ahead of the test car. That's how much time we saved by hurrying (of course, we did stop to relax which the test

car did not). To save that much time, we used about eight gallons more gasoline than the test car.

DAY TWO: Ortonville to Nebraska City, Neb., 365.2 miles.

At the start we had a moderate tail wind. Temperatures were cool, but warmer than the first day. Roads were good, traffic light.

I drove more carefully this second day. Instead of cowboying it, I drove with an eye on the speedometer. I held it between 65 and 70 all morning.

Heavy rains made it necessary to drive

Art Railton, *PM's* automotive editor, gets back into car after clearing customs at the Mexican border





In Texas the Rambler inched through flood waters like these, which certainly did not help gas mileage any!

slower (and at one time to stop briefly) during the afternoon.

Economy was better, proving the merits of sensible driving. I averaged 48.5 miles per hour (the test car averaged 41.0). My gasoline economy jumped to 24.7 miles per gallon (the official test car averaged 34.0 miles per gallon).

My mileage was up 3.5 miles per gallon and the test car's was down about 6 miles per gallon. There was now only a 10-mile-per-gallon spread.

DAY THREE: Nebraska City to Oklahoma City, Okla., 418.5 miles.

I borrowed another trick from the test car. I inflated the tires to 34 pounds (I had

End of the test was Governor's Palace at Monterrey. On this final day, Railton's car averaged 30 m.p.g.



been carrying 27 pounds) just like the test car. I reduced my speed still more, holding it steady between 55 and 60 where possible. We were on the Kansas Turnpike much of the day and that made it easy to maintain a constant speed.

Thanks to the hard tires (which, by the way, caused no discomfort on smooth highways) and the lower speed, my gasoline mileage went up again. Our average was 28.8 miles per gallon (the test car averaged 31.78 miles per gallon. The gap was now only 3 miles per gallon. Our average speed was 46.5 miles per hour (the test car was only slightly slower, 45.9 miles per hour).

DAY FOUR: Oklahoma City to Austin, Tex., 434.6 miles.

This was the day we hoped to prove that an average driver, after a little practice, can match the experts. We drove even more slowly, holding speed down to a top of 50 and running between 45 and 50 most of the time. We accelerated very, very gingerly, making a real fetish of economy.

Then came the flood. We were forced by torrential rains to stop several times. Creeks washed across the highway. At times we had to forget economy as we inched through deep water in low gear.

We arrived at Austin very, very late indeed. And tired, too. Our average speed, discounting stops for rain and lunch, was 38.6 miles per hour (the test car went faster than we did, averaging 40.6 miles per hour). Our gasoline economy was a miserly 30.2 miles per gallon (the test car's was 32.4 miles per gallon).

What had originally been a 19-mile-per-hour spread between our mileage and the test car's was now only 2.2 miles per gallon.

(Continued to page 228)



Floor-Tile Remover Cleans 14-Inch Swath

Four 3½-inch-wide steel cutter blades on a new electric floor-tile remover make a 14-inch swath. This portable machine weighs 155 pounds and is powered by a ½-horsepower electric motor for 115 and 230-volt current. The remover has a built-in blade-grinding attachment.

Liquids Are Shipped In Plastic Holders

Housed inside a paperboard shell, a polyethylene-resin container with molded-on spout may become useful in shipping, storing and dispensing liquids. The cutout handle in the box facilitates handling and pouring. The spout can be snapped open.



AUGUST 1957



Fractional Thickness Of Film Measured

As little as 1/10,000 inch of paint film, electroplating or metal overlay can be measured by a new quality-control instrument. Portable, it is plugged into a 110-volt outlet. When the instrument's probing coil touches a product, the thickness of paint or overlay is registered on a dial.

Electronic Flash Unit Plugs Into Wall Outlet

Made in East Germany for export, the electronic flash unit, below, weighs less than a pound. It requires no batteries but plugs into an alternating-current outlet. The unit has a built-in transformer and charges in five seconds.

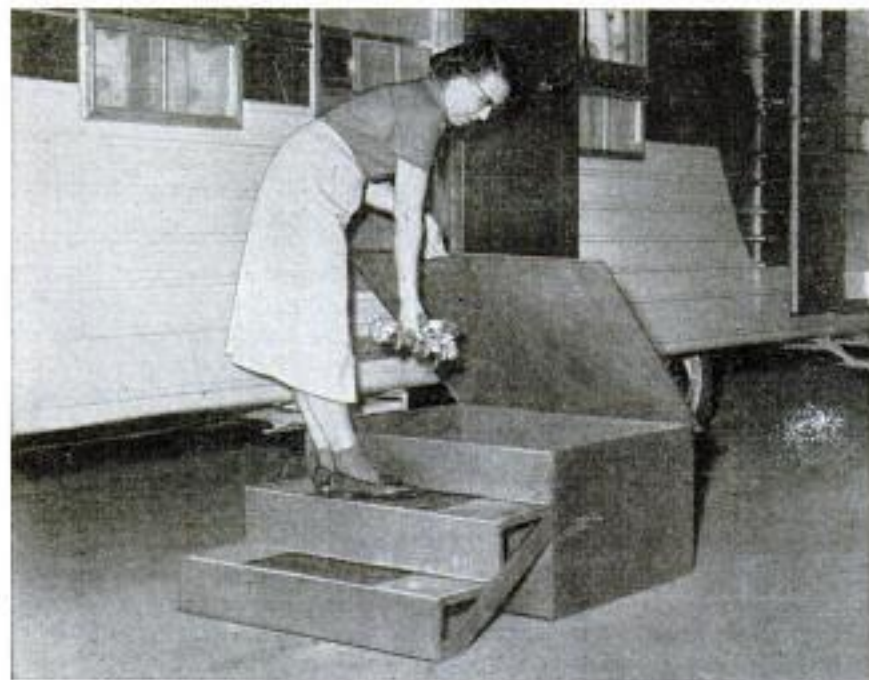


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"Quadricycle" Saves Gasoline



Confronted with the European gasoline shortage, Ruiz Luciarte of Paris invented this pedal-operated "quadricycle." The vehicle has four wheels, weighs 35 pounds, has 18 speeds and is reported to be highly maneuverable.



Trailer Porch Is Storage Box

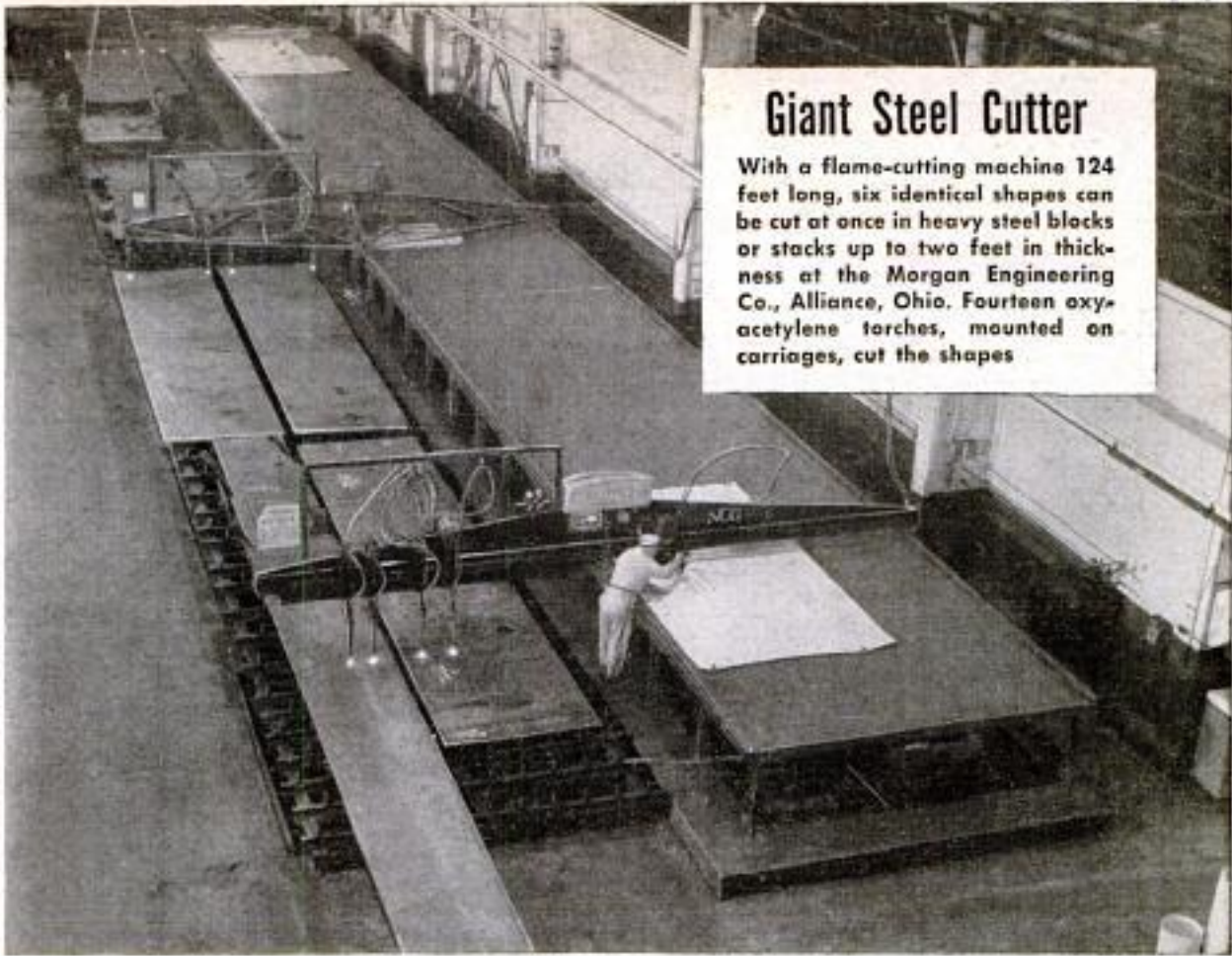
Mobile-home owners who need outside storage space for such items as children's toys can now buy a steel porch that doubles as a storage box. The box is 18 inches high, the proper height for most mobile homes, and the top surface is about nine square feet. The steps, which are 11 inches wide with six-inch risers, can be detached from the box for easier handling if the trailer is moved. The storage porch weighs about 100 pounds.



Thirsty Dogs Serve Themselves

Here's one trick any dog can perform—turn on the water for a cool drink on a warm day. A float keeps the water at canine-drinking level. As the dog drinks, the dish refills itself automatically. The pan and float come with four feet of hose and coupling. The float arm bends to change the drinking level.

2588



Giant Steel Cutter

With a flame-cutting machine 124 feet long, six identical shapes can be cut at once in heavy steel blocks or stacks up to two feet in thickness at the Morgan Engineering Co., Alliance, Ohio. Fourteen oxy-acetylene torches, mounted on carriages, cut the shapes

Converted Weapons Carrier Travels Mountain Roads

Once a wrecked three-quarter ton Dodge GI weapons carrier, the vehicle below was rebuilt as a "super Jeep" for covering rugged mountain terrain. C. W. Arrowwood of Oakland, Calif., had the controls moved 12 inches to the left and installed a cab from a 1949 Hudson coupe. A convertible-top motor was added to lower or lift the 200-pound spare tire and rack.



AUGUST 1957

Vacuum in Air Sampler Caused by Gas Jet

Pollution experts now obtain samples of air with a vacuum-operated instrument that fits in the hand. The explosionproof sampler is a miniature jet engine powered by low-pressure liquefied gas. A valve to control the gas is the only moving part. Gas in motion creates a vacuum which draws air into the instrument. The sampler replaces bulky pumps used in the past.



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X322



Which Grass for YOUR Lawn?

By Clifford B. Hicks

WHAT CROP is the most valuable in the United States? Corn? Wheat? Cotton? In terms of investment, surprisingly enough, it is turf—grass for your lawn and parkway, grass for landscaping public buildings, grass for garden paths and golf courses. More money is spent on grass than on any other single crop. It costs us annually about \$15 per person to keep the green grass growing in the United States. Multiply that figure by the number in your family and you'll find you have a significant investment in turf.

The information on these pages can help you get a good return on your investment in your own lawn. Much of this information was provided by Dr. F. V. Juska, Turf Research Agronomist, U. S. Department of Agriculture.

The map at the top of the opposite page shows the grasses which are well adapted to the various regions of the country. Find your own region and you'll find the grasses

suitable to your locality. Naturally, the lines on the map are arbitrary, and a grass suited to an area along one side of a line may be equally well adapted to the adjacent area just across the line.

At the bottom of the opposite page, and continuing in the color panel, is a list of the various grasses, with some of the characteristics of each. By comparing these characteristics you can decide which grasses you can use to good advantage in establishing a new lawn.

In the listing of each grass type on the opposite page also appears information on whether the grass is established by seed or vegetatively (by planting sprigs, stolons or plugs which spread to form the turf); when to seed or plant it; the seeding rate or manner of planting, and essential information on maintaining that type of lawn.

Also, beginning on the opposite page is general information on establishing and maintaining almost any type of lawn.

Region 1A—Northern (Cool, Humid)

Bluegrass strains: Kentucky, Merion, pos trivialis. Bent grasses: Colonial (Astoria, Highland); Velvet. Fescues: Creeping red; chewings, Pennlawn. Grasses for southern transition zone: Meyer zoysia; zoysia japonica; U-3 Bermuda.

Region 1B—Northern (Cool, Humid), Pacific Northwest

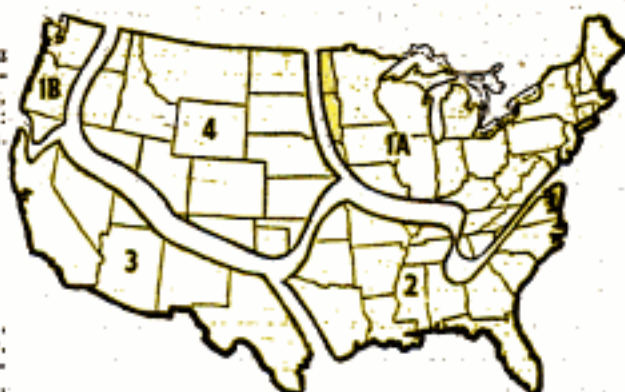
Same grasses as region 1A.

Region 2—Southern (Warm, Humid)

Bermuda grasses (Tiflawn, Tiffine, Ormond, and Tifgreen); Emerald zoysia, St. Augustine, carpet grass, centipede grass. Grasses for northern transition zone: bent grasses, Meyer zoysia, U-3 Bermuda.

Region 3—Southwest (Irrigated)

Zoysia matrella, Bermuda, carpet grass, St. Augustine, Meyer zoysia, zoysia japonica.



Region 4—West Central

Crested wheat grass, blue grama, buffalo grass, red fescues.

Where irrigation is possible: Kentucky bluegrass, bent grass.

TIPS ON ESTABLISHING AND MAINTAINING A LAWN



When to Establish a Lawn

Depends on where you live and what type of grass you select. In general, if you live in regions 1A, 1B or 4 as shown on the map, seed in early fall. This gives the cool-season grasses a chance to establish themselves during the fall rains, before they go dormant for the winter. There is less competition from weeds, and the grass plants have time to develop a good root system before they are subject to the heat and drought of summer.

In general, if you live in regions 2 or 3 on the map, you'll do best to plant your lawn in the spring, as most of the grasses adapted to these regions thrive and spread

out in hot weather and may go dormant during winter.

Another rule of thumb: Establish Bermuda, carpet grass, blue grama, centipede grass, buffalo grass, St. Augustine grass and the zoysias in the spring, the bent grasses, bluegrasses, fescues and crested wheat grass in the fall.

Does Your Lawn Need Lime?

High soil acidity can ruin many lawn grasses. The only way you can be sure of the acid content of your own soil is to send a sample to your county agent, state agricultural college or state department of agriculture for testing. The presence of moss suggests too much soil acidity, but it may also indicate low fertility, too much water or too much shade. The accompanying map



TYPES OF GRASSES

BENT GRASSES

Bent grasses should be used only if the homeowner is willing to spend considerable time, care and money on maintenance. They are especially adapted to the New England states and the Pacific Northwest. All bent grasses survive in the shade but prefer the sun. They are fine textured and spread to form a dense turf. Establish a new lawn in September, sowing at a rate of four ounces of seed per 1000 square feet. Seedbed must be well fertilized, and bent grass should be fertilized once a month during growing season. It must be watered regularly during hot, dry

periods. Disease is the biggest problem; in some localities fungicides may have to be applied every seven to ten days during periods favorable to the development of disease. All bent grasses should be mowed below $\frac{3}{4}$ inch, some below $\frac{1}{2}$ inch, with a reel-type mower. Many mowers will not cut this low. Varieties of bent grass include: Creeping bent grass, which is not generally recommended for lawns. Velvet bent grass has the finest texture but is not as aggressive in spreading and is slow to recover from injury. Colonial is best adapted for lawn use. Strains of Colonial include Highland, Astoria and Rhode Island.

shows, on the left, the so-called "lime line," an arbitrary line dividing the country into acid and neutral or near-neutral soils. If you live anywhere in the area covered by the map, your soil may well require lime, but only a soil test can tell you for sure.

If you need lime, apply 75 to 100 pounds of ground limestone per 1000 square feet. Apply it before you spread the topsoil. Usually a similar application repeated every six to eight years will be sufficient. You can spread lime on an established lawn any time of the year, but fall is somewhat preferred.



Preparing the Seedbed

Remove the topsoil. Then remove all building debris and spade, plow or Rototill the subsoil. Establish the grade of the lawn. For good drainage you need a drop of at

least one foot in 50 linear feet. Apply lime and fertilizer as required. Then spread the topsoil evenly, working out any large lumps to provide a smooth, fine seedbed. If you haul in additional topsoil, it may require fertilizer, too. For best results you should have at least four inches of topsoil.

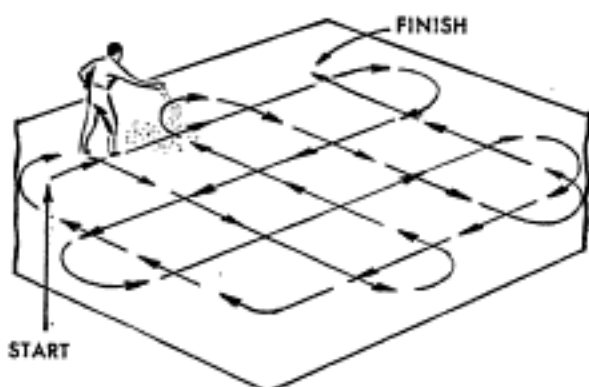
Pregerminating The Seed

Some types of grass, such as Merion blue, have long germinating periods, up to a month or more. You can appreciably shorten this time by pregermination treatment. Put the seed in a cloth bag and soak it in cold water overnight. Then wash the bag under a faucet until the water runs clear. Spread the seed in sunlight, let it dry thoroughly, turning it occasionally. Then sow it. In some cases this will cut germination time in half, speeding the establishment of a new lawn.



BERMUDA GRASSES

Also known as wire grass, Bermuda is a persistent, long-lived perennial. It is very aggressive, spreading vigorously so that it may become a pest in gardens adjoining the lawn. Very drought-tolerant, it stays green during long dry periods. Dense turf with excellent wear resistance. Requires bright sunlight, will not tolerate shade. Almost all Bermuda grass is established vegetatively, usually by planting stolons or plugs one foot apart from spring until early August. Should be well-fertilized while it is spreading, then fertilized four times each growing season.



Sowing the Seed

Measure off a test plot of around 500 square feet. You then can weigh out the amount of seed recommended for a plot of this size and sow it. If you find you have the wrong setting on the seeder or are applying too much or too little by hand, you can change the rate before spreading the rest of your seed. It may help you distribute the seed if you mix it with sand or fine soil.

For any given area, divide the seed into two equal parts. Sow one part by working up and down the length of the plot, the other by working crosswise.

Cover the seed lightly by hand raking, then firm the soil by rolling it.

Planting Plugs or Stolons

Many grasses yield seed that is not true to type, or no seed at all. Such grasses must be established vegetatively by planting round plugs of sod or stolons (rooted runners). This is especially true of the zoysias,



Should be mowed below $\frac{3}{4}$ inch. Varieties include: Ormond, with a medium-fine texture; Tiffine, with a very fine, very dense texture and excellent disease resistance; Tiflawn, with a medium-fine texture and very rapid growth; Tifgreen, a new and improved variety; and U-3 Bermuda, with excellent wear resistance, the most cold-tolerant strain of the Bermudas.

BLUEGRASSES

These are the old stand-bys for cooler regions. Most of them have medium-fine leaves and form a dense turf. Shade-tolerant in the South. If not watered, bluegrasses may go

centipede, St. Augustine and the hybrid strains of the Bermudas.

Prepare the seedbed as for seeding. Plugging tools are available which will cut the sod into plugs two inches in diameter, and also dig holes of exactly the same size in the seedbed. Plant the plugs at measured intervals, no more than a foot apart, closer for more rapid coverage. Use a taut string as a guide in spacing the plugs. Tamp them firmly into place. One square foot of sod will provide about 36 plugs.

Plant stolons or sprigs in a shallow trench, spacing them only six inches apart. At this rate, 15 to 20 pounds of stolons will cover 1000 square feet.

Watering Your Lawn



It is most important that the surface of a newly seeded lawn be kept damp. Seed that has once been exposed to moisture in contact with the soil, and then permitted to dry out, very likely will not germinate.

Sprinkle a newly seeded lawn at least once a day and oftener if needed. Only the surface needs to be moist at this time, but it must never be permitted to dry out completely. Sprinkle with a fine mist to avoid dislodging the individual seeds. In general, less frequent sprinkling is permissible if you are establishing a lawn planted with plugs or stolons. However, more water should be applied at any one time to ensure moisture throughout the root zone.

Once the lawn has been established, it is important that the roots obtain water. Don't sprinkle lightly and frequently, as the roots will tend to be shallow, reaching toward the surface for water. Never sprinkle less than an inch of water on an established lawn. You can easily determine how much water you are applying by plac-

dormant during hot, dry spells and lose much of their color, but resume growth in the fall. They require watering, as long, dry spells may cause permanent injury. Establish in August or early September, seeding at a rate of two pounds per 1000 square feet. Fertilize the seedbed well and apply a high-nitrogen fertilizer fall and spring. Mow at 1½ inches or higher. Kentucky is the best-known strain of bluegrass, and has a medium-fine leaf and vigorous rootstock. *Poa trivialis* will withstand shade and dampness but suffers damage in heat and drought. It is good for shady lawns. No creeping rootstocks. Merion is superior to other bluegrasses in disease tolerance,

ing two or three coffee cans or other straight-side containers at various distances from the sprinkler. An inch of water in the bottom of the can, of course, indicates an inch of water on the lawn. In many localities, sprinkling for a given period of time is not a true indication of the amount of water you are applying; water pressure fluctuates in some residential areas and, unless you check, you may be applying much less water than you think.

On the other hand, too much water can harm creeping fescues and some other grasses, and is a waste of a critical natural resource.

In general, water lawns only when they need water. Wilting and browning of grass are your cues. Then apply water to wet the soil to a depth of six inches or more.

Mowing

Start mowing in the spring as soon as the grass reaches the recommended mowing height. There is one important rule to observe if you are to avoid damage to the grass: *Don't remove more than half the leaf at one time.*

Guided by this rule, you can leave clippings to add organic matter to the soil.

Bluegrasses and fescues should be mowed at 1½ to 2 inches; bent grasses, zoysias and Bermudas at ¾ inch, though some bent-grass strains should be mowed as low as ⅜ inch. Close clipping, especially during hot weather, will weaken or kill the bluegrasses. Centipede, St. Augustine and carpet grass are best maintained at a clipping height of one inch. Always keep a mower sharp, no matter what type it is. A dull mower will crush the leaves as it cuts, and such damage will move down the leaf. It encourages disease and may cause the grass plant to die. The crushed cut of a dull mower gives a lawn a brown cast.



drought tolerance, appearance and vigor, although susceptible to rust in some areas. It is extremely slow to germinate. Requires high-fertility soil, should be heavily fertilized spring and fall, lightly several times during summer. One drawback: It is more expensive than other bluegrasses.

BUFFALO GRASS

A native grass, good for lawns in the West Central states. Fine-leaved, it spreads rapidly by surface runners to form a dense, matted turf. Begins growing in late spring and continues until frost. Highly wear-resistant. Grayish green in color, turning to light straw

Fertilizing

Each type of "complete" plant food (a mixture of chemicals) is labeled with three numbers. Examples are 10-6-4, 5-10-5 and 10-10-10. There are other combinations. In each, the first number indicates *nitrogen*, the second *phosphorus*, the third *potassium*. Each of these elements is essential to plant growth. Any one of the numbers indicates



the percentage of that particular element in the analysis. By adding up the numbers, you can determine the percentage of *actual* plant food. For example, a 10-6-4 formula actually has 20 percent plant food; the remainder is inert material to make it easier to spread.

By simple calculation from the formula on the bag you can determine how much *actual nitrogen* you are applying. Apply no more than two pounds of actual nitrogen per 1000 square feet at one time. For example, 1000 square feet can take 20 pounds of a 10-6-4 formula, 40 pounds of a 5-10-5 formula or 50 pounds of a 4-12-4 formula.

For most lawns you can't go wrong applying this much fertilizer in the spring and again in early fall. However, there are several exceptions to this general rule. Merion blue, for example, requires high-nitrogen fertility, and should be fertilized several times each year with a high-nitrogen fertilizer. Bermudas, zoysias, St. Augustine and other warm-season grasses should be fertilized frequently through the summer.

Liquid fertilizer should be applied only as a quick booster. Rely on solids for longer lasting effects.

Organic fertilizers (made from sewage sludge, tankage and other waste products)

(Continued to page 218)

after frost. Can be established vegetatively or by seed. Sow 12 ounces of seed per 1000 square feet. Get treated seed for faster germination. Fertilize in the spring. Mow at 1½ inches or higher. Little watering required.

BLUE GRAMA GRASS

Another drought-resistant grass for the West Central states, it thrives in heavy soils. Medium-fine leaves, low growing. Growth ceases during drought but resumes when water is available. Readily established from seed. Seeding rate is one pound per 1000 square feet. Fertilize at least each spring. Mow at 1½ inches or higher.

CARPET GRASS

A low-growing perennial that spreads above ground by creeping stems which root at every joint. Can be established vegetatively, but the simplest method is by seed, which is abundant and cheap. Produces a dense, compact turf under close clipping. Grows best in sandy to sandy-loam soils. Tolerant to heavy trampling. Grows in partial shade if soil is moist. Resistant to insect and disease damage, but is not tolerant of salt-water spray. Thrives under limited fertilization on poor soils, but is sensitive to lack of iron. Mowing frequently to height of one inch with a rotary mower is recommended.

CENTPEDE GRASS

A low-growing grass which spreads by stolons to form a very dense mat. Requires little maintenance and is good for recreational areas. May spread to become a pest in flower beds. Will survive without fertilization, but produces dense turf upon application of high-nitrogen fertilizer. Establish vegetatively. Plant plugs or stolons six inches apart. Five to ten square feet of sod will establish about 1000 square feet of lawn. For best results, fertilize fairly heavily in spring, then lightly every month or six weeks during growing season. Inexpensive. Mow at ½ to 1 inch. Water when turf begins to show signs of drought.

CRESTED WHEAT GRASS

Excellent for cool, dry areas. Coarse leaves, somewhat hairy in appearance. A deep root system sustains the grass through long, dry spells, even though grass may go dormant. Establishment largely depends upon available moisture, and it can be seeded in fall or spring over much of its region of adaptation. Seeding rate is two pounds per 1000 square feet. Fertilize both spring and fall. Cut at 1½ inches or higher. Little watering required.

FESCUES

Hardy and robust, they are especially adapted to shady, dry areas. There are many strains that vary widely in texture and growth. Creeping red fescue has bright green leaves, creeps by underground stems. It is frequently mixed with bluegrass in prepared lawn seed. Chewings fescue is similar but does not creep. Pennlawn fescue is a new and improved strain of creeping red fescue. It has greater tolerance to leaf spot, better foliage density, faster rate of spread and greater ability to withstand close clipping. Establish fescues by seed, sowing at a rate of two to three pounds per 1000 square feet. Mow at 1½ inches or higher. Less fertilizer required than for most lawn grasses. One light application fall and spring will usually do the job.

ST. AUGUSTINE GRASS

A creeping, coarse grass that thrives in shaded areas and will withstand salt spray. Dense, wear-resistant sod. Establish vegetatively. Should be well fertilized with nitrogen, especially in sandy soils. Fertilize at least once each year, preferably at start of growing season.

ZOYSIAS

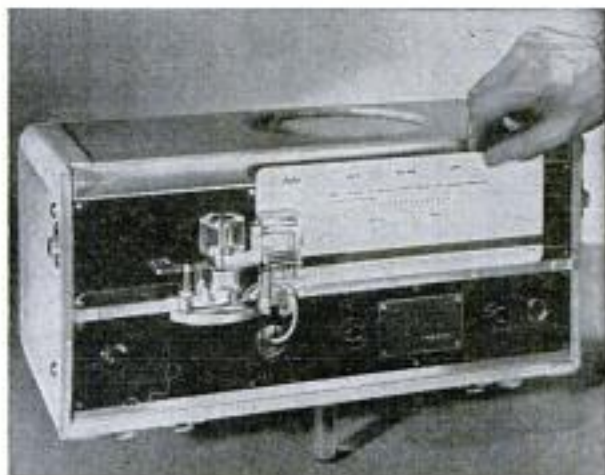
Excellent turf, but adapted mainly to the South and the "twilight zone" between South

(Continued to page 220)



Language Students See, Hear, Read New Words on Machine

Electronic language machines, operating on the tape-recording principle, present spoken and printed words and pictures in teaching vocabulary and grammar to students. A card is inserted manually in the machine and is moved mechanically until the lesson is completed. On this card students read the words under study, hear the same words pronounced and see illustrations explaining these words. The machine works from a 110-120-volt, 60-cycle, alternating-current outlet. The tone-control knob on the front panel starts the card carrier and amplifier. Headphones or an external speaker can be plugged in, disconnecting the internal speaker.



Homemade Tri-Winger Built to Sow Seeds and Dust Crops

Tom DeKellis, olive rancher of Oroville, Calif., is flight-testing his triple-wing plane. He made it from spare parts to use for sowing seeds and dusting crops. A 450-horsepower Pratt and Whitney engine powers the aircraft as it carries a 3000-pound pay load. Its fuselage can hold a Jeep. Wingspan is 36½ feet. Length is about 27 feet. Over a fixed, four-wheel landing gear, twin booms carry a pair of fins and rudders with trim tabs worked by a bicycle chain. It cruises at 70, can fly 90 and lands at 25 miles per hour.





Round Boats Keep Fish Guessing

Two circular craft, designed for fishermen, may overshadow futuristic "flying saucers" in appearance. One angler-bearing boat (see top photo) is a \$14,000, custom-made model that seats eight, is powered by two motors on opposite sides of the vessel, and has an electronically operated, underwater color TV camera and screen. The second craft (see photo at left) looks like the USS *Monitor* of Civil War fame and is the third such boat built by 85-year-old Bert Ross of Ottawa, Kans.



Huge Cylinder Takes Three Weeks for 800-Mile Trip

Towed three miles per hour by two tractors, a 110-ton cylinder required three weeks for transfer from a Parisian plant, where it was built, to atomic facilities at Marcoule, France—a distance of 350 miles.

The colossal tube is 100 feet long and 17 feet high. These dimensions added 450 miles of detours to the trip in avoiding bridges. Engineers tore down three houses and built a special road for this move.





At almost 40 miles per hour the 63-foot *Marlin* outruns most craft in its area. This boat carries crew of four

SEAGOING GAME WARDENS

By Jack B. Kemmerer

THE SLEEK, 63-foot *Marlin* wallowed in a choppy sea off the west coast of Catalina Island, 24 miles from the California mainland. A dense fog had settled down in the area, grounding even the sea gulls.

An expectant hush hung over the crew, as the short-wave radio crackled out a terse message. "This is it, boys. Let's go," the captain said grimly. He switched on the vessel's radar and eased the throttles ahead



Fish shipped to canneries by truck are checked by a warden at the cleaning table. Tonnage of fish processed is taxed by State of California



On 28 miles of Los Angeles docks, a warden sees that no undersized fish are unloaded from tuna boats to processing plants

Marine Patrol radios Coast Guard to send out a towboat for disabled fishermen who had a radio receiver but no transmitter



to nose the *Marlin* carefully along in the sticky fog hugging the island's rocky coastline.

In a few minutes a tiny pip on the radar screen revealed a boat, close inshore, getting nearer and nearer as the *Marlin* closed in. Suddenly, the captain turned on his craft's two powerful searchlights, outlining the strange boat a few yards dead ahead.

What's going on? An enemy vessel mining a harbor—or a narcotic smuggler with a fortune in dope headed for the mainland?

Neither one! The searchlights also revealed a huge fish net being hoisted aboard the unidentified craft—a purse seiner—with sardines still enmeshed in the net. Again, the Marine Patrol of California's Department of Fish and Game had convinced another fish poacher that it was unwise to operate illegally in restricted waters covered by vigilant, seagoing game wardens.

Jack London Served as Deputy

The Marine Patrol is not a new service in California. The state's fish commission appointed a game warden in 1870 to patrol and enforce the laws concerning salmon and other fish along the coastal rivers of central California and also in the San Francisco Bay and Delta areas. Assignment of this man—using a small sailboat to carry out his duties—was the beginning of today's modern Marine Patrol Service. It was during this period that Jack London served as a deputy game warden with the hazardous Marine Patrol which was the basis of his book, *Tales of the Fish Patrol*.

The real beginning of the patrol fleet took place in 1897 with the launching of a 40-foot, gasoline-powered launch, the *Quinnat*. The new patrol boat boasted a top speed of seven knots and soon made quite a name for itself among lawless fishermen operating in the Sacramento-San Joaquin Delta area. The peak of its long colorful career was reached when two game wardens were killed during a pitched battle with an organized gang of fish poachers.

Contrast between present-day patrol boats and the *Quinnat* is as great as contrast between the California of 1897 and that of 1957.

The department presently operates the 83-foot *Albacore*, based at Sausalito and assigned to the patrol of the rough waters between the Golden Gate and the Oregon line. The *Bonito*, a 63-footer, is based at San Francisco, covering the San Francisco area south to Morro Bay.

Electronically Equipped Boats

A pair of 63-foot vessels, *Marlin* and *Bluefin*, are based at Los Angeles' Terminal Island. Their patrol assignments take them from Morro Bay south to the Mexican border and include all of the numerous offshore islands, such as Catalina. All of the vessels are radar-equipped and also carry depth finders and short-wave radio in addition to their own private communication system.

Besides these large, well-equipped boats, the Marine Patrol operates eight smaller vessels, ranging in size from the 21-foot *Minnow* to the 45-foot *Tuna*.

(Continued to page 222)

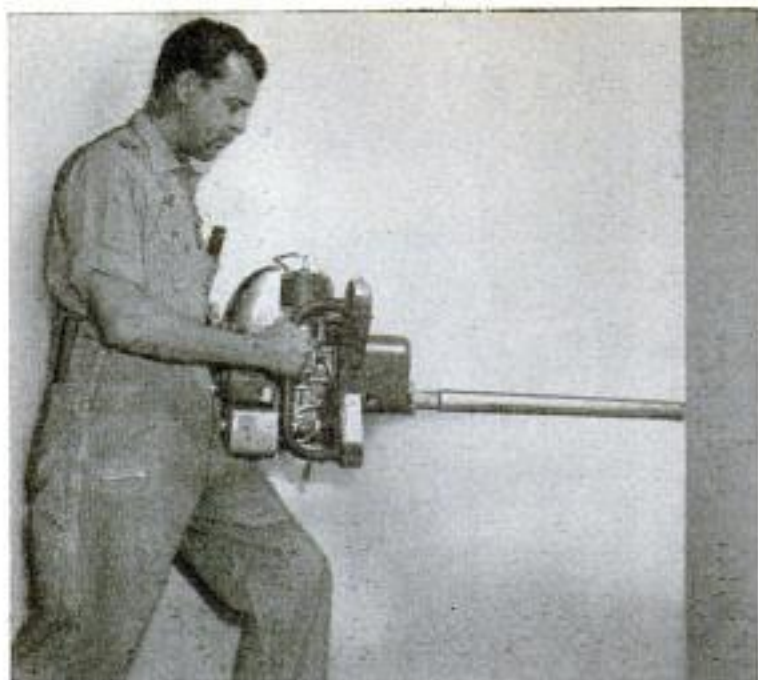


Marlin's Capt. William Plett checks Catalina fishing



Warden sits in small skiff to write citation for fishing without a license. This is a very frequent violation. Short-wave radio at Terminal Island headquarters links office to patrol boats and land-based wardens.





Portable Diamond Drill Cuts Six-Inch Cores

One man can handle the rotary drilling machine, above left, which weighs 47 pounds with a gasoline engine. A smaller 37-pound model uses an air-driven motor.

Diamond or tungsten-carbide bits and cores, above right, ranging from $\frac{7}{8}$ inch to 6 inches in diameter, can be used on the drill to cut through almost any material.

Special Reactor Tank For Chromium Recovery

Pure chromium metal can now be produced electrolytically for use in superalloys for jet engines. The U. S. Bureau of Mines said the key to the long-sought process is a special cell, or reactor tank, in which the metal is deposited. The cell is charged with an aluminum complex which aids recovery of chromium from its ores.

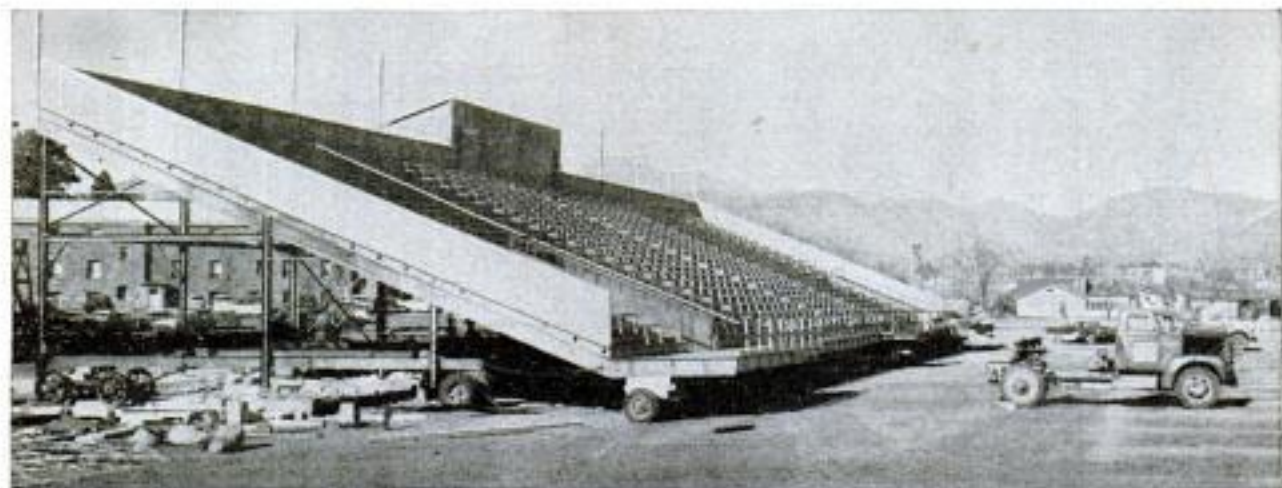
Mobile Unit Aids Arthritis Victims

Mobile physical-therapy units which visit the homes of arthritis victims are operated in 16 states by chapters of the Arthritis and Rheumatism Foundation. Manned by registered therapists, the units are station wagons or light panel trucks fitted with heat lamps, pulleys and other physical-therapy devices.

Rubber Tires Move 2500-Seat Stadium to New Site

Workmen in Flagstaff, Ariz., put a 200-ton stadium on 22 sets of rubber-tired dollies to move the steel structure to a new athletic field two blocks away. The 2500-

seat stadium was cut loose from the old concrete floor and raised by jacks to position over the dollies. Winch trucks moved the stadium, 100 feet at a time.



Pint-Size Trucks Handle Many Jobs

Miniature dump trucks weighing only 800 to 1400 pounds can carry loads up to 3500 pounds at speeds ranging from 1 to 20 miles per hour. One man can load, drive and dump a truck, available in a variety of body styles. With caster steering, the vehicle can be turned in its own length. Drive wheels are located directly under the load and can carry the truck up a 25-percent grade, if necessary. A locking brake can be set to hold the little truck immobile. Concrete can be hauled in one model, and another can be used for underground construction in tunnels. The trucks are available with either an air-cooled gasoline or a diesel engine. Over-all length varies with the model from 70 to 103 inches. Over-all widths range from 31 to 51 inches, and the trucks' wheel-bases range from 43½ to 58 inches.



Truck With Hoppers Hauls Dry Cement and Aggregate

Dry concrete aggregate now is hauled long distances by truck for mixing with water at the construction site. This procedure avoids dangers of overmixing, seepage and other long-haul losses brought on by wet mixes. Five 14-cubic-foot steel hoppers

are placed in the truck bed to hold the dry cement. The hoppers themselves separate the bed into five compartments for concrete aggregate. When the truck is dumped at the site, the aggregate and cement automatically mix and are ready for the water.



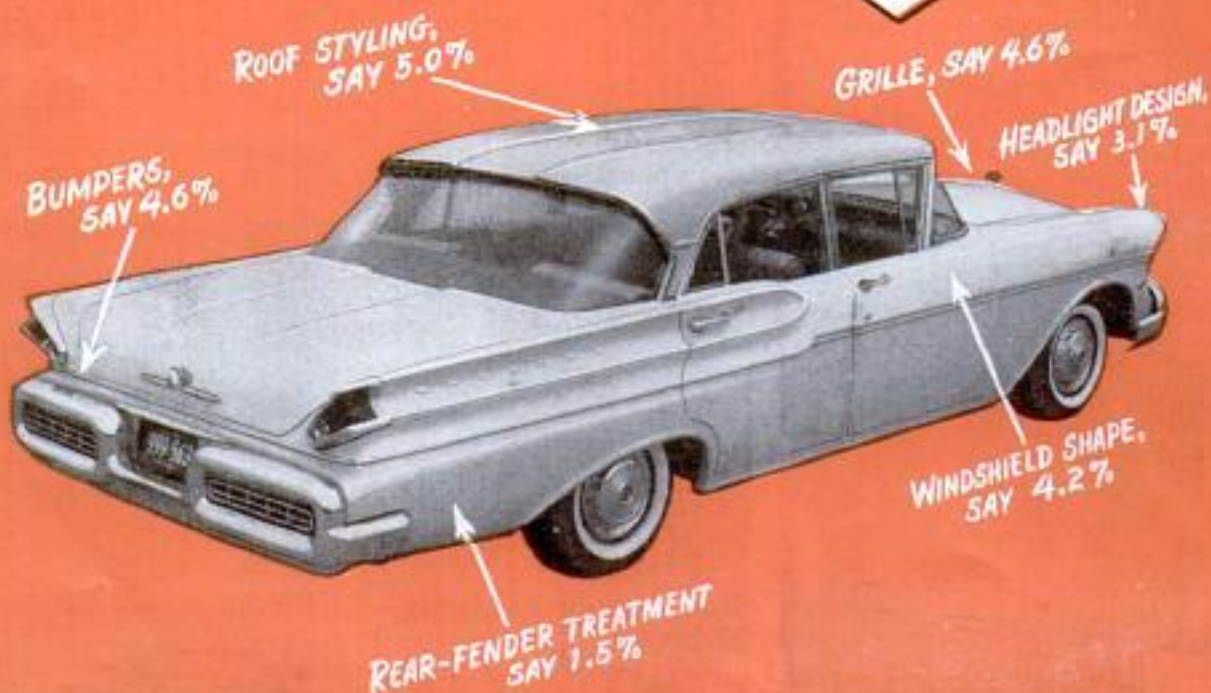


OWNERS REPORT:

Best-Liked

What Do They Like About
Mercury's Distinctive Look?

Least-Liked



You have no difficulty identifying Mercury's distinctive rear styling



MERCURY STYLING MAKES BIG HIT WITH OWNERS



Opinions of Mercury owners in 42 states are summarized in this PM Owners Report

By Mercury Owners

STYLING IS TOPS—that's what owners of the 1957 Mercury say about their new cars.

Never in a *PM Owners Report* has there been such emphasis on styling as among Mercury owners. They are excited about the Mercury look and nearly 50 percent give styling as the one feature that most convinced them to buy. Styling also topped the best-liked list with 52.7 percent mentioning it.

"I like the square, sculptured look as opposed to the Buck Rogers styling of the Chrysler cars and the rounded look of the GM cars."—Michigan lineman.

"I was impressed with the beauty. The sleek bumpers, free of exhaust vents, torpedoes and other items. The beautiful grille. The taillights blended into the body lines."—California carpenter.

"The car is different from all the rest. The only car on the road that has a beautiful body style all its own."—Illinois claim adjuster.

"Receive many complimentary comments. Many say, 'Didn't like design at first, but it grows on you.'"—Ohio architect.

"Best looking. Plain straight lines. No frills."—Michigan retired owner.

What Is an Owners Report?

Popular Mechanics sends questionnaires to 1000 owners of a different make of car each month. These owners are picked at random from state registration lists by an independent organization. Owners' replies are tabulated and quoted to provide you with a summary of what owners think of their new cars.

Next month: The 1957 Dodge



You'll have no difficulty getting into the back seat. Mercury's wide-opening door gives 16-inch foot room



However, long-legged front-seat passengers may find their knees are tight against the padded dashboard

Second on the list of best-liked features is handling ease, mentioned by 38.1 percent of the Mercury owners.

"Car has balance. Ease of handling."—Michigan foreman.

"An exceptionally easy car for my wife to drive."—Nebraska telephone executive.

"Handles well in a cross wind."—South Dakota parts manager.

Third of the best-liked features is riding quality with 35.8 percent mentioning it.

"Smooth on rough roads. Takes bumps smooth."—West Virginia news dealer.

"Very comfortable even on long trips and I have taken two of over 2000 miles each already."—Michigan nurse.

What Are Complaints?

There's no doubt about it—owners seem to be getting more conscious of gasoline economy. *PM Owners Reports* show that Mercury owners are no exception. The most frequently mentioned complaint is poor gasoline economy with 25.4 percent of the owners mentioning it.

"I have had five Mercurys before and got from 16 to 21 miles to the gallon. Now

with this 1957 Mercury I get 10 miles to the gallon. Costs too much for a common man to drive."—Minnesota owner.

"I know a heavy car takes more gas, but this one seems to overdo it. It's too expensive for me."—New Jersey inspector.

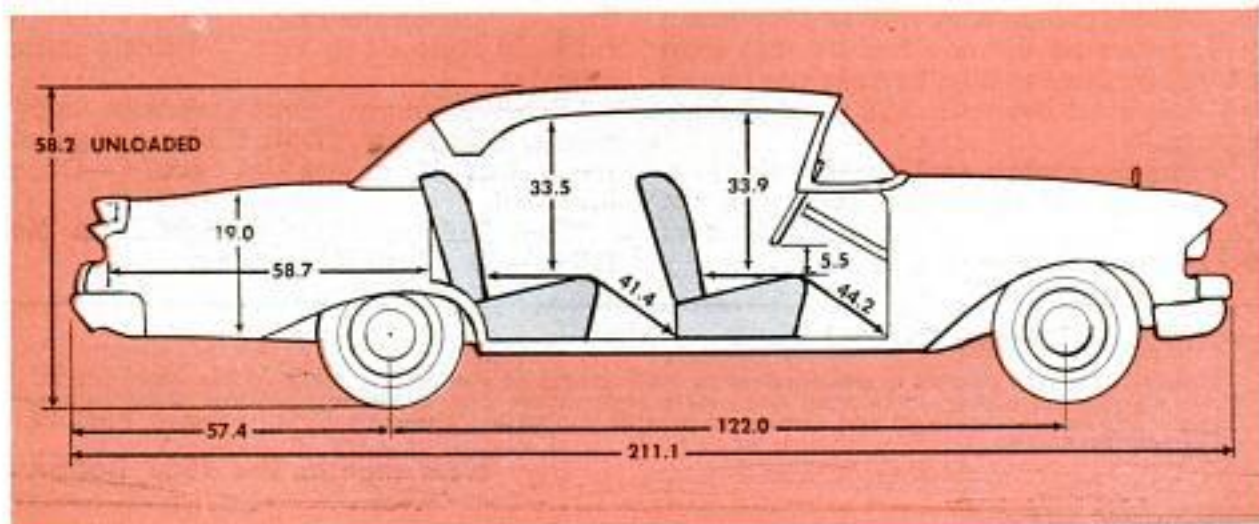
"Just finished a 5000-mile trip. Actual gas-and-oil check made. Car used no oil. Averaged 11 miles per gallon of gasoline."—California oil worker.

"Much work was done on the carburetor even to get it up to 13 miles per gallon."—California retail sales driver.

Second most frequent complaint is poor workmanship (18.8 percent).

"This is our fifth new car since 1949 and we never before had any complaints about the car or dealer. There is nothing seriously wrong with the car, but there is always something not in working order. The signal lights did not work properly, the heater and defroster didn't work. The speedometer wasn't connected. They worked on the heater for several hours. It ran fine for one day. It's been repaired twice since and again it's not working. The radio is not

(Continued to page 210)



THE OWNERS' OPINION OF THE '57 MERCURY

Had trouble with engine?

No trouble	69.3%
Some trouble	21.5%
Considerable trouble	9.2%

What was engine trouble?

Carburetor	9.6%
Valves	2.7%
Water leaks	1.5%
Oil leaks	1.5%
Camshaft	1.2%

Performance

Would like faster acceleration?

Yes, would	33.8%
No, would not	55.8%
Undecided, no answer	10.4%

Would like more top speed?

Yes, would	14.8%
No, would not	55.5%
Undecided, no answer	29.7%

What is car's horsepower?

Knew correct hp.	66.9%
Did not know hp.	33.1%

Have checked gas mileage?

Yes, have checked it	72.1%
No, have not	21.2%
Don't care about mileage	6.7%

Styling

Best-liked exterior feature?

Rear-fender shape	19.2%
Lowness	18.5%
Taillight design	12.3%
Bumpers	6.5%
Length	6.5%
Roof treatment	4.6%
Grille	4.6%

Least-liked exterior feature?

Roof treatment	5.0%
Bumpers	4.6%
Grille	4.6%
Windshield	4.2%
Headlight design	3.1%
Rear-fender shape	1.5%

Best-liked interior feature?

Dashboard design	25.8%
Upholstery	13.1%

OVER-ALL RATING

Excellent	Average	Poor
61.4%	25.4%	13.2%

Least-liked interior feature?

Floor hump, wells	8.1%
Front ash tray	6.2%
Floor carpeting	4.6%
Glove compartment	4.2%

Miscellaneous

Push-button shift convenient?

Yes, more convenient	64.6%
No, less convenient	19.8%
Makes no difference	15.6%

Power-boost fan worthwhile?

Yes, it is	43.2%
No, it is not	6.3%
Can't tell difference	50.5%

Front seat comfortable for 3?

Yes, it is	70.8%
No, it is not	29.2%

What car will buy next?

Mercury	53.5%
Other Ford product	4.2%
General Motors car	9.2%
Chrysler Corp. car	6.5%
Some other car	1.9%
Don't know yet	24.7%

How is dealer service?

Excellent	43.5%
Average	32.4%
Poor	24.1%

Would buy from him again?

Yes, would	36.9%
No, would not	25.8%
Undecided, no answer	37.3%

What make car was traded?

Mercury	50.8%
Other Ford product	17.7%
General motors make	12.7%

Chrysler Corp. make..... 3.5%

Some other make..... 5.4%

No trade, no answer..... 9.9%

Why did they buy Mercury?

Exterior styling	49.2%
Previous ownership	15.8%
Trade, deal	2.3%

What should be changed?

Nothing at all	35.4%
More gasoline economy	11.9%
Improve performance	7.7%
Push-button shift	6.9%
Better workmanship	6.5%
Ash tray	4.2%

Best-Liked Features

Exterior styling	52.7%
Handling ease	38.1%
Riding comfort	35.8%
Roominess	16.3%
Performance	16.2%
Roadability	13.1%
Visibility	7.7%

Most-Frequent Complaints

None at all	21.9%
Poor gas economy	25.4%
Poor workmanship	18.8%
Body rattles, squeaks	16.3%
Push-button shift	13.5%
Not enough power	9.6%
Door fits	8.5%
Speedometer	6.9%
No "Park" on trans.	5.8%

Mercury is very low

Like this lowness	88.1%
Don't like it	9.2%
No answer	2.7%

Mercury is very long

Like this length	80.4%
Don't like it	13.1%
No answer	6.5%

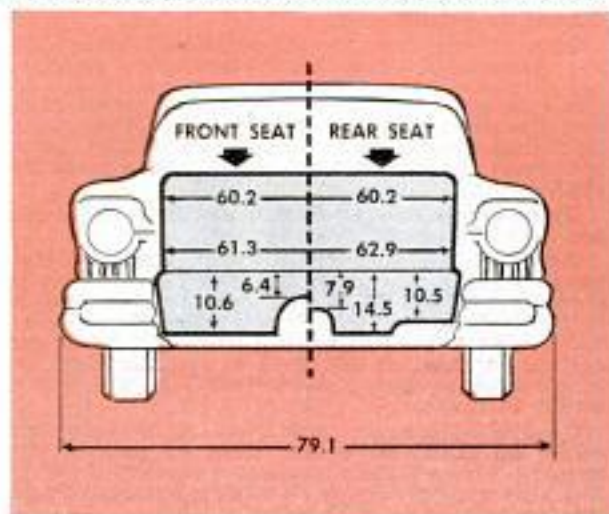
Mercury is very fast

Like this speed	72.7%
Don't like it	3.1%
It's not so fast	11.1%
No answer	13.1%

What Do Owners Think of Industry Trend in Design?

Approve	88.5%
Disapprove	7.3%
No answer	4.2%

Being left-handed will help a Mercury owner. There are plenty of jobs for the left hand and foot to do



AN ENGINEER ANALYZES '57 MERCURY

By Dale Kelly SAE, Registered Professional Engineer

MODEL TESTED: Montclair four-door sedan with the extra-cost 368-cubic-inch engine. Also on the test car were a four-barrel carburetor, dual exhausts, Merc-O-Matic transmission, power steering and power brakes.

Rear-axle ratio: 3.22 to 1. Wheelbase: 122 inches.

Tires: 8.00 by 14. Weight: 4238 pounds with gas tank half-full (55 percent on the front wheels, 45 percent on the rear).

Mileage on car at time of test: 2900 miles. Barometer: 28.96 inches. Temperature: 78 degrees F. Pay load: 200 pounds.



ACCELERATION TIME FROM STANDING START, IN SECONDS

	0 to 20	0 to 40	0 to 60	0 to 80	1/4 MILE
Ignition timed for regular gas (90 octane Research)	2.8	5.9	10.6	18.0	18.2
Ignition timed for premium gas (97 octane Research)	2.1	5.3	10.0	18.0	17.8
Ignition timed for super fuel (105 octane Research)	No improvement noted				

(All tests in "Drive" range, using first, second and third gears.)



FUEL ECONOMY IN MILES PER GALLON

	Steady 30 m.p.h.	Steady 50 m.p.h.	Steady 70 m.p.h.	Traffic Route
Ignition timed for regular gasoline (90 octane Research)	18.5	16.2	13.2	10.3
Ignition timed for premium gasoline (97 octane Research)	18.8	16.5	13.1	10.5

On the traffic route the car makes 10 full stops per mile and is driven fast enough to average 15 miles per hour.

ESTIMATED AVERAGE ANNUAL GASOLINE BILL: \$194 for 10,000 miles.

Based on the exclusive use of premium gasoline. It is felt that almost all owners will prefer the improved performance that the use of premium fuel provides in this car.



SPEEDOMETER ERROR (miles per hour)

Speedometer speed	20	30	40	50	60	70	80
True speed	19	28	37	45	54	63	73

ODOMETER ERROR

Distance registered when car covered an actual 100 miles: 104 miles.



DRIVER'S VISION (for an average driver—5 feet 9 inches tall)

Distance at which part of road in front of car could be seen (A in sketch)	18.5 feet
Distance at which full width of road in front of car could be seen (B in sketch)	26 feet



GROUND CLEARANCE (unloaded car)

Radius of worst dip that could be crossed (solid line)	29.5 feet
Radius of worst hump that could be crossed (dotted line)	20 feet
Deepest rut car could be driven in	6.9 inches
Curb clearance for door opening	12 inches

MISCELLANEOUS

STEERING

Wheel turns from straight ahead to steer outside front wheel in a 100-foot-diameter circle: 0.85 turns

Diameter of smallest circle within which the wheels could complete a circle (curb-to-curb): 43 feet

Diameter of smallest walled circle within which the entire car could complete a circle (wall-to-wall): 45.5 feet

Steering-wheel turns, lock-to-lock: 4.2 turns

Steering-wheel diameter: 17 inches

TRUNK CAPACITY

Number of standard cartons (1 cubic foot each) that could be packed into trunk: 17 cartons

CENTER OF GRAVITY (unloaded car):

22.8 inches

WATER RESISTANCE

Fair. In the splash-pan test the brakes and ignition were not affected and no water entered the car. In the high-pressure car wash both front ventilator panes leaked; no water entered the trunk.

OBSERVATIONS

Instruments: Because the glass that covers the speedometer is tilted, there is absolutely no glare or reflection on it. Unfortunately, there are no five-mile-per-hour graduation marks on the scale and the scale itself is rather short. The signal light that shows when the parking brake is on is not very conspicuous at night and almost invisible in daylight.

Glove compartment: Rather small. But you can see into it without bending over.

Transmission: Accelerating wide open in Drive range from a standstill, it shifted from first to second at about 35 m.p.h. and from second to third at about 65 m.p.h. Accelerating from standstill with a light throttle, it started in second and shifted to third at about 20 m.p.h. Flooring the accelerator produced a downshift at any speed under 60 m.p.h.

General: Gasoline tank held 20 gallons and could be filled at better than 14 gallons per minute. Power-brake reserve provided four to five full applications with engine stopped. Parking brake held on a 14-percent grade.



It takes two hands to get into Mercury's glovebox

I DROVE THE Mercury Montclair four-door hardtop nearly 1000 miles in California and Nevada. It was powered by the 290-horsepower, 368-cubic-inch engine with a 10-to-1 compression ratio. This engine is optional on the Montclair at extra cost. The 255-horsepower, 312-cubic-inch engine is standard equipment.

Mercury has a carburetor air intake that automatically selects and delivers either cool outside-the-hood air (which is denser and gives more power) or heated under-the-hood air, or a mixture of both for top engine efficiency.

With the big engine, performance was fantastic. On a dry lake bed, the speedometer registered the maximum reading (120 miles per hour). It checked out fast, like most others, by about seven percent.

The lower center of gravity has greatly improved ride and stability on curves. There is a minimum of frame twist. The front suspension is improved with a swept-back design. The front wheels are pulled over, rather than pushed into, the bumps. This is definitely an improvement. The car has an extremely soft ride, in fact softer than I like. There is a noticeable, but not excessive, front-end dip when braking fast. However, the big surprise is that the car has little front-end roll or mushiness when cornering at high speed, despite soft front suspension. The driver has the feeling that the car is heavier than it really is. When cruising at any speed, there is a minimum of engine vibration, although there is considerable fender-tip vibration at above-average speed on rough roads.

Brakes are better than average for a car of Mercury's weight. Fade was less than average for an American car.

I wouldn't rate its economy as tops. If the people who buy cars insist on more horsepower, more speed and performance, they must continue to pay more money for the fuel. High speed and high performance certainly do not contribute to economy. The gas tank now holds 20 gallons (up from 18 gallons), but the owner won't get any

Driving the Mercury Montclair

By Floyd Clymer

more miles from a full 20-gallon tank with this high-performance engine than he did with a full 18-gallon tank last year.

The hood hinges in front, opening from the rear. It is counterbalanced to open and close easily. The front hinges permit an inside-the-car latch, something that has become unusual on a new automobile. This latch should help reduce petty thievery of under-hood accessories.

Vision is good. Due to the flat roof line, rear headroom is more than first appearances indicate. The inside rear-view mirror is too small. However, the outside rear-view mirror is the best I have used. It is easily seen through the windshield corner. Rear-fender tips serve as good guides for parking. The taillights are of a wrap-around design. They give good rear-end protection and also extend four inches along the sides of the fenders for added safety.

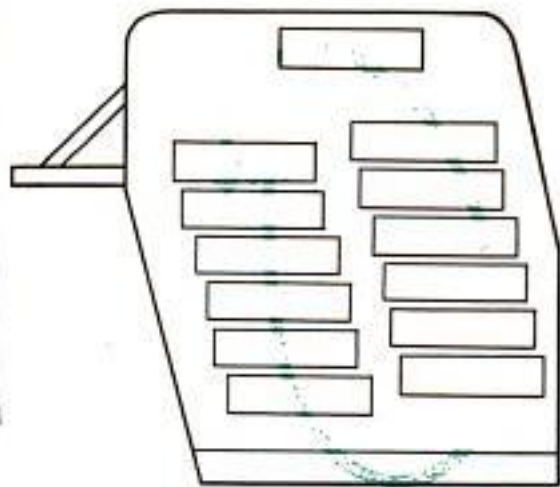
The doors feel solid, opening and closing easily. I do not care much for the door locks. Key operation could be lighter and smoother. The body also seems solid although a couple of rattles developed in the test. In a heavy rain, some water came in around one front window.

The instrument panel is well located and visibility is excellent. The horizontal-ribbon speedometer is steady and easy to read, but the spaces between its 10-mile-per-hour calibrations are too small. The face is shrouded for reflection-free visibility.

Although conveniently located in the center of the dash, the glove compartment is not good. Its lid is hinged at the top and requires two hands to open. There is little room inside.

Mercury's power-seat control is fun to use. Atop the dashboard is a dual control. One control selects any of five seat heights, the other selects any of seven fore-and-aft positions. Code numbers designate the particular seat position so you can easily set it to suit you. When the engine is turned off, the seat automatically moves back for ease of entry and exit. When the ignition is

(Continued to page 216)



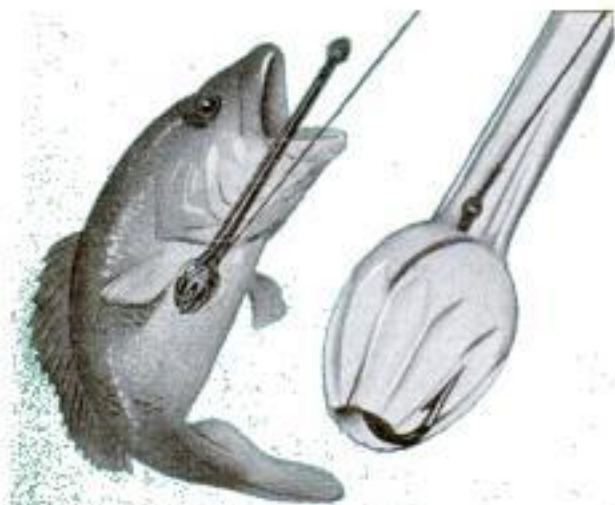
Elevator File—Going Up!

File records are no more than three seconds away from an operator using a new elevator-type filing machine. Depressing a latch-type button automatically delivers the desired file tray to correct working position for a sitting or standing person, who does not have to wait until the machine completes a rotational cycle of the files. The file holds 200,000 three-by-five-inch records in 13-inch-deep trays.



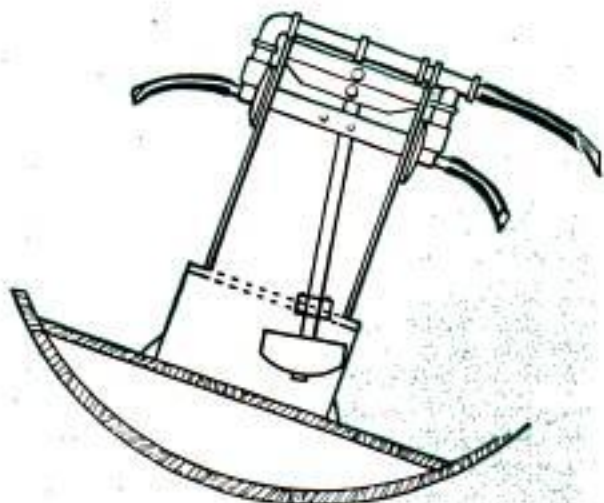
Tulip-Headed Tool Removes Hook From Fish

Resembling a closed tulip, a seven-inch-long plastic fishhook remover is guided along the line into the fish's mouth. The shaft of the hook slips into a slot and the barb slides into one of the grooves on one head of the remover. A push dislodges the hook, and the remover is taken from the fish's mouth. One end of this device is sized for pan fish, and the other end is adapted for larger fish.



Rock 'n' Roll Pumps Boat Dry

Wave motion provides the energy to operate a new bilge pump. The pump, which requires no motor, no priming and no attention, is designed for pleasure yachts and fishing craft. When the boat rocks, a pendulum operates a double-end piston which draws water from two suction hoses running to the bilge. The water is discharged through one of two hoses at the top of the pump.





Rubber Balls and Food Tins Make Acoustic Ceiling

Fifteen thousand sponge-rubber balls and 30,000 baby-food cans solved the problem of how to dampen low-frequency sounds in the new ballroom of the Hotel Chase in St. Louis. The contractor cut the balls in half and nailed the halves, flat side down, on top of the roof form. The cans were placed over the rubber hemispheres and a three-inch layer of concrete was poured around them. When the form was dismantled, the balls were removed. The tops of the cans were cut off and the metal interiors were rustproofed.



Workman places empty baby-food tins over rubber balls cut in half and nailed to concrete form. Two-by-fours held cans in place while concrete was poured

Hydraulic Lift Pivots Truck Van on Railroad Flatcar

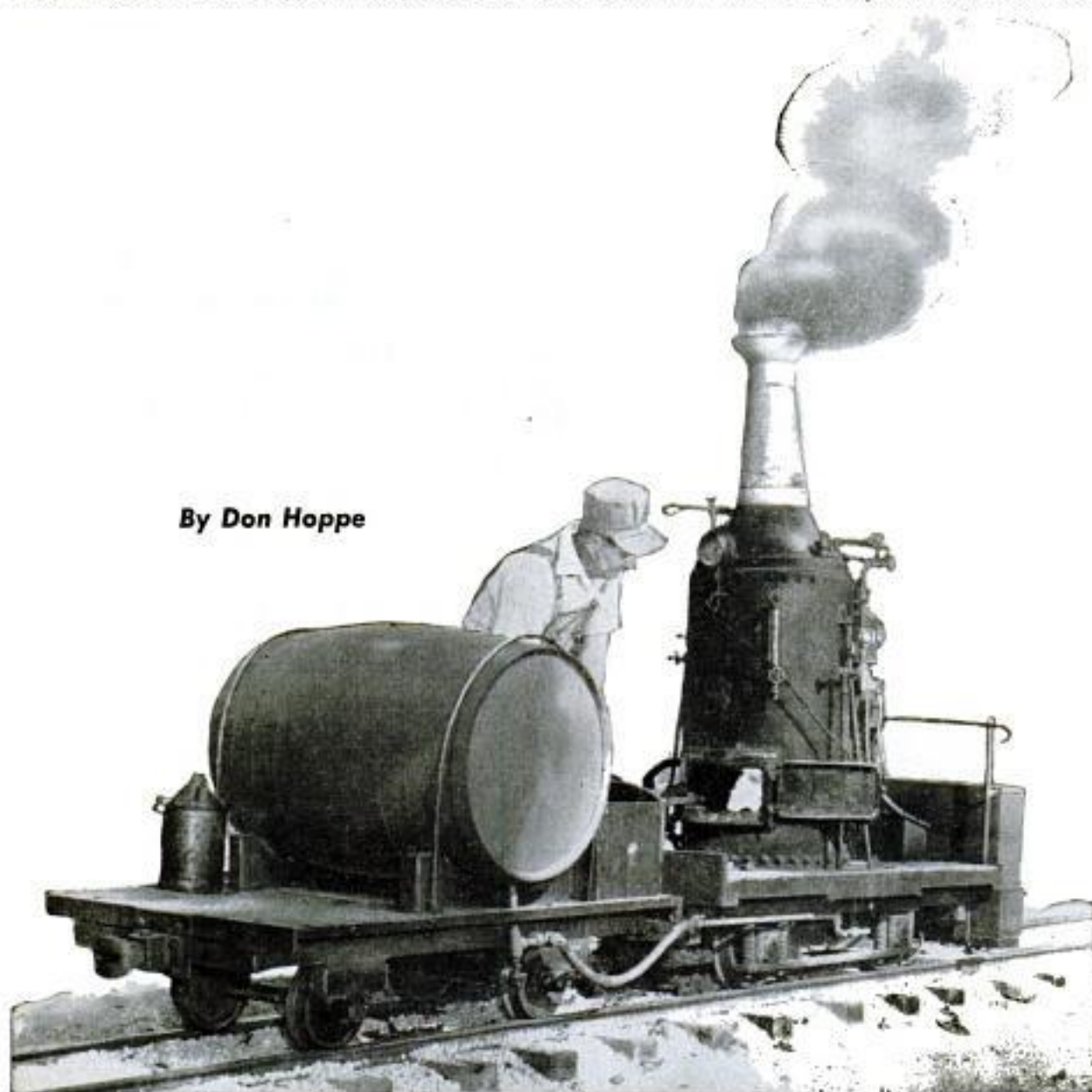
One semitrailer-truck driver can back a van onto a railroad flatcar from the side and, using a hydraulic lift, line up the van with the car. Using the new equipment, the driver completes the operation in four minutes. The lift permits the van to be separated from its wheel assembly and fastened to the flatcar for a more stable

ride. Several flatcars can be loaded simultaneously with this technique, as compared to the standard system requiring each semitrailer van and wheels to be loaded from the end of an individual flatcar. Only minor modifications are necessary in adapting this loading system to currently used flatcars and semitrailers.





Old-time station is built approximately to scale. Below, Buchmann fires up the vertical-boiler locomotive



By Don Hoppe



Eastbound train, right on time, steams across the main trestle, which is 40 feet long, 16 feet high

DID YOU EVER dream of owning and operating your own passenger-carrying steam railroad? Bob Buchmann of Elgin, Ill., did, and then made his dream come true.

A former O-gauge model-railroad fan and a collector of railroad lore, Buchmann first thought seriously of building a real live-steam railroad about 10 years ago. And for 10 years, the H. T. & W. remained a persistent idea while Bob enjoyed a successful career in the hardware business.

Finally, in 1955, the Buchmanns decided that the time had come to turn their dream into reality. By this time, Mrs. Buchmann had also become a railroad enthusiast. For six months they searched for just the right piece of property. Then they found their present site: a 16-acre tract of beautiful rolling woodland covered with white oak and hickory trees and abounding in small game. The location was nearby, just three miles east of Elgin and 29 miles from Chicago.

Small System, Big Problems

Buchmann soon found that building the H. T. & W. presented all the problems found in building a full-size railroad. A regular railroad surveyor had to be employed to establish the correct grades and alignment for the 1¼ miles of track that wind through the woods.

Bob chose the 15-inch gauge for the H. T. & W., which stands for Hoot, Toot and Whistle. Incidentally, there really was an H. T. & W., the old Hoosiac Tunnel and Wilmington, which operated in Maine for many years. The 15-inch gauge is equal to a scale of three inches to the foot, or one-

quarter the size of the prototype. The system uses 12-pound rail.

Being partial to the old-time steamers, Buchmann decided on the 1860s for his prototype and contracted with Norman Sandley of the Sandley Light Railway Equipment Works to build four circa-1860 passenger coaches and a steam locomotive. Sandley painstakingly duplicated every detail of an 1860-style coach. Each of these eight-passenger cars has authentic hardware including link-and-pin couplers, clerestory windows, handbrake wheels and fully sprung trucks. The color scheme is dark green with orange trim—a popular motif of the '60s.

Sandley was able to supply an upright boiler-type engine immediately while another, a duplicate of the old "General" of Civil War fame, is still under construction. Although vertical-boiler types were not built after the 1840s, they were very reliable engines and were often kept in service for many years. The B. & O. for instance did not retire its last upright-boiler engine until 1893, so old "No. 1" is not out of place on an 1860 line. The H. T. & W.'s "mud digger," as they were sometimes called, is also unique in that the cylinders and driving mechanism were taken from an old Stanley Steamer automobile.

Problems With Right-of-Way

The rolling stock was only a small part of Buchmann's problems however. The real challenge was in the right-of-way construction. That beautiful rolling woodland, which makes the H. T. & W.'s route so unique, presented some first-class engineering difficulties. On the lower side of



H. T. & W.'s ornate eight-passenger cars are one quarter actual size, have authentic link-and-pin couplers

the property a 16-foot fill was needed and over 6000 yards of earth had to be trucked in. A 40-foot trestle had to be built to span an entrance road to the parking area. This trestle is constructed entirely of eight by eight-inch white-oak timbers, which weigh about 500 pounds apiece. During construction a severe rainstorm caused a washout of about 1500 yards on the big fill, which

Maintenance is a continuing job. Engineer Buchmann oils journals while his wife cleans the marker lights



had to be replaced. It took about a year to complete the entire construction job. At one time 15 people were employed, but for the most part the work was done by Bob and one or two assistants.

With the grading completed, a limestone ballast was applied, and over 5000 creosoted ties were laid. The rail was fastened with miniature railroad spikes. Two switches and sidings and a high-banked horseshoe curve are also included in the system.

Complete 1860 Station

A railroad needs buildings, too, so Buchmann built a replica of an 1860 station which is complete with rest rooms, refreshment bar and ticket office. He also constructed a train shed and loading platform, and then decided that no better spot could be found for his own home than the center of his growing railroad empire. Now his house is located in a clearing in the woods. A spur track from the main line runs to the garage under his house and here the rolling stock can be stored and repaired during bad weather.

Throughout most of the year the H. T. & W. operates on a seven-day-a-week schedule. During the winter months the road operates on Sundays whenever weather conditions permit.

The H. T. & W. is a growing system and new construction is always under way. A water tower and a turntable have been completed. Old No. 1 alternates with the only non-1860 piece of equipment the line owns, a gasoline work engine to keep traffic open. All aboard! ★ ★ ★

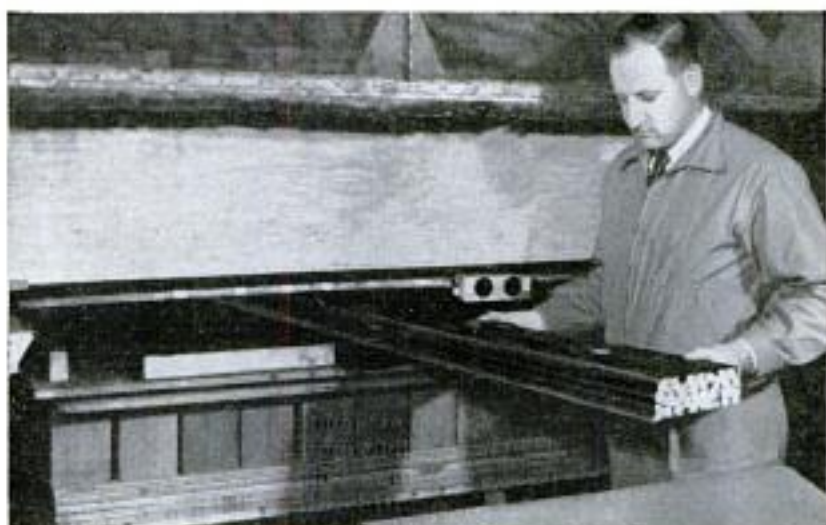
Tape Recorder Is Versatile Toy

Invented in Germany is a toy tape recorder as versatile as a regular machine. Operated by transistors and two flashlight batteries, it features both forward and rewind action. The tapes can be played back through any radio or through earphones. The recorder was introduced at a recent trade fair, and costs about \$22.



Pressed Cornstalks Make Wall Panels

Building materials can be produced from old cornstalks by a heat-and-pressure method developed at Purdue University. An example of the use of cornstalk building panels is shown in the photograph, above left. The treated stalks are covered with a wood veneer while an outer aluminum coating protects the panels against weather and fire. The panels need no studing but are connected at the eaves by

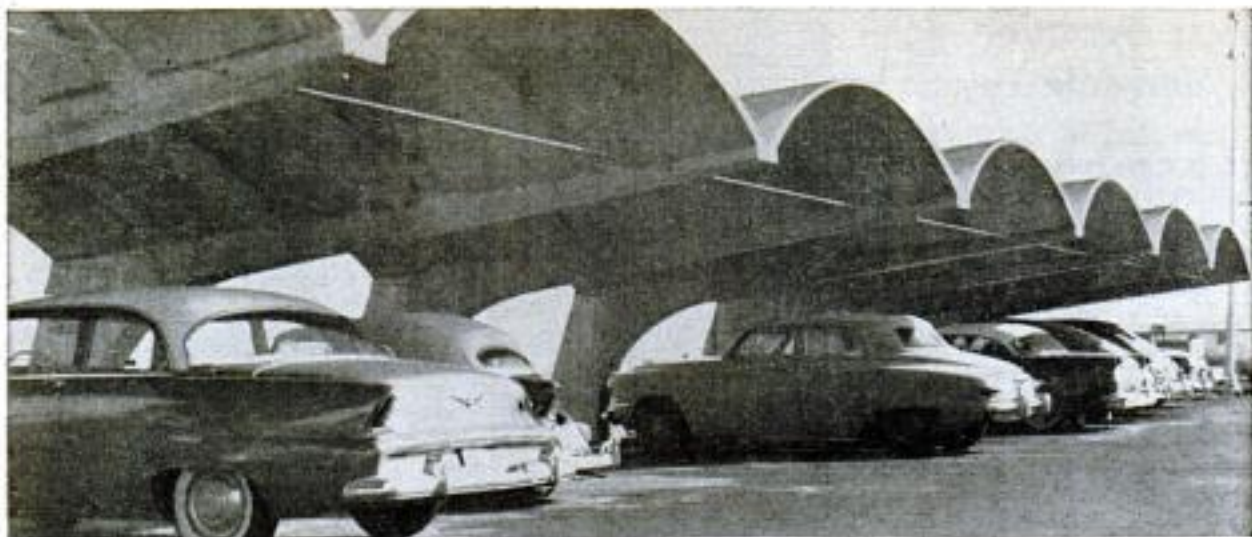


gusset plates. The pith of the stalks reportedly has excellent soundproofing and insulating qualities. The stalks are processed, above right, by removing the leaves and wax, spraying them with insect and rodent repellents, and applying a plastic binder. Heat sets the plastic while the stalks are in a pneumatic press.

Direct-Dial System For Mobile Phones

Owners of automobile and truck two-way radio-telephones in Richmond, Ind., may now make or receive calls by a dial system instead of having them go through an operator. This is possible with a transmitter-receiver station connected with the local telephone company. It automatically transfers radio calls to the telephone system and vice versa. The system is used by physicians, salesmen and others.





Concrete Carport Roof Seems to Defy Gravity

At first glance, drivers hesitate to park under an all-concrete carport roof that is supported on one side only and seems certain to crash to earth. The weight of the roof is supported by the cantilever principle. Two half-inch steel wires run from one end of the roof to the other to increase its strength. Added strength is provided by the multiple arches that form the roof.



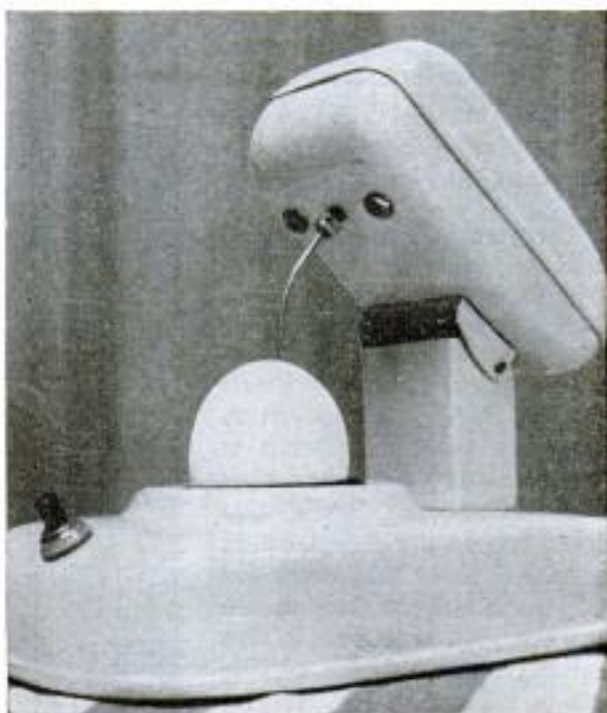
Duplex Table Has Tilting Top

Two table tops, supported by a steel-tube upright on an adjustable horizontal base, serve as one double or two single tables. The tops are raised or lowered together. The larger top tilts and moves out or in on an arm.



Egg Beaten in Shell By Electric Whipper

Egg beating in the shell is accomplished by this new electric appliance. When the tilting head is lowered, the curved wire enters the egg and whips it inside by rotary action.



THEY FIND WATER ON THE DESERT



Jeep truck and trailer bearing generator are important field equipment in new technique for finding water

THE WATER PROSPECTOR was going over his findings with the owner of a large ranch in New Mexico.

"Drill your new well inside the circle I've marked on this map," he advised. "That's where you'll find the greatest volume of water that's fit to drink.

"There's water to the west of the circle, to be sure, but not in as large amounts. And don't waste any money in the south where you had planned to drill. The water there is loaded with salts."

This information, vital to the ranch, came from a new kind of prospecting technique known as induced polarization. It is an electrical method of searching for water developed by the New Mexico Institute of Mining and Technology.

With it a trained geophysicist can decide whether or not water exists underground. If there is water, he can give its approximate depth or depths. He can determine where the best water from the standpoint of quality will be found, and he can indicate the locations that will deliver the greatest yields.

This is big news to cities, towns and ranches in arid areas in all parts of the world. To some communities that have been outgrowing their water supplies it means the possibility that new underground reservoirs can be located and tapped. To other towns now using water with an objectionable taste it offers the chance of finding and tapping new supplies which have a lower mineral content.

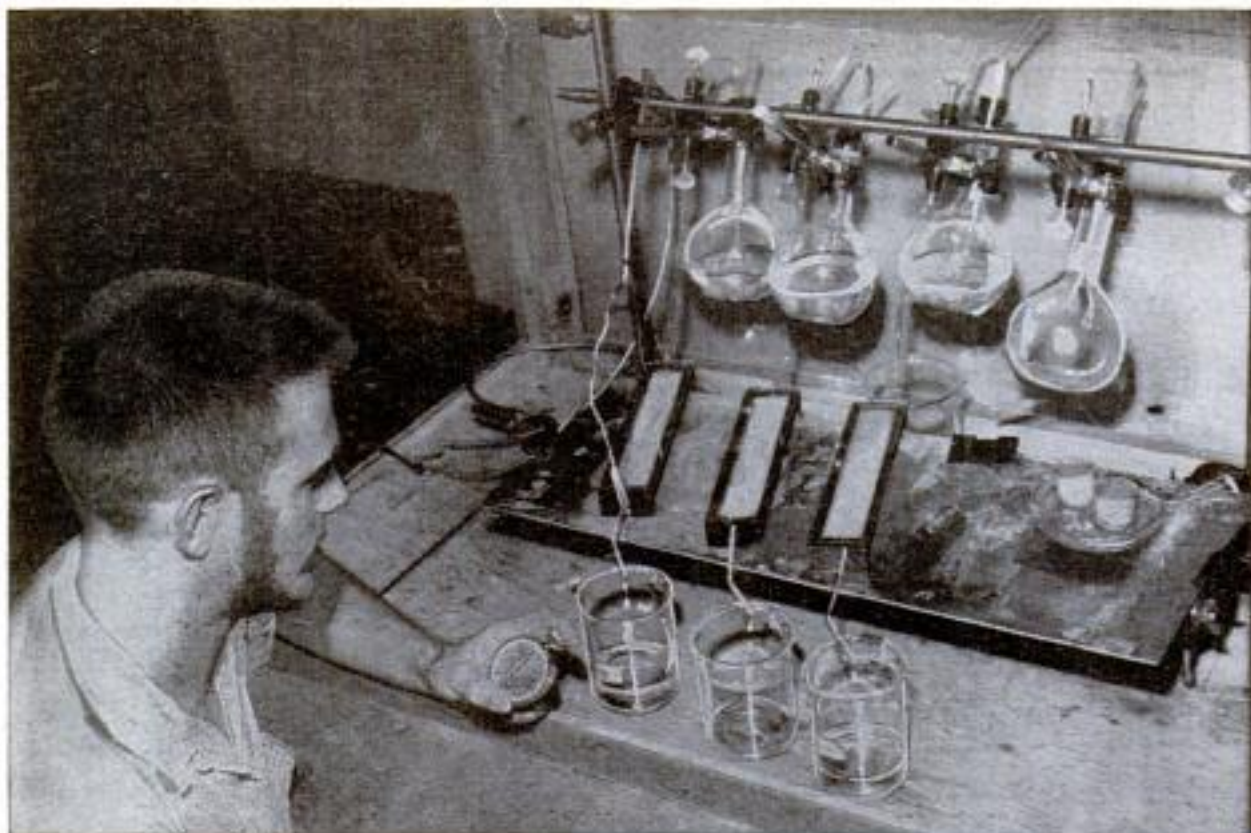
Many barren valleys in the Southwest are completely deserted even though there may be plenty of water underground. In some valleys you can dig for water with the toe of your shoe. The water is there but it isn't fit to drink. It's not good for irrigation; it won't even support "browse" for cattle. Yet in the same area there may be enough good, fresh water to irrigate

By

Thomas E. Stimson, Jr.

Pickup electrodes used in tests are buried in ground at selected intervals





Effect of underground formations on electrical responses is studied by running water through soil mixtures

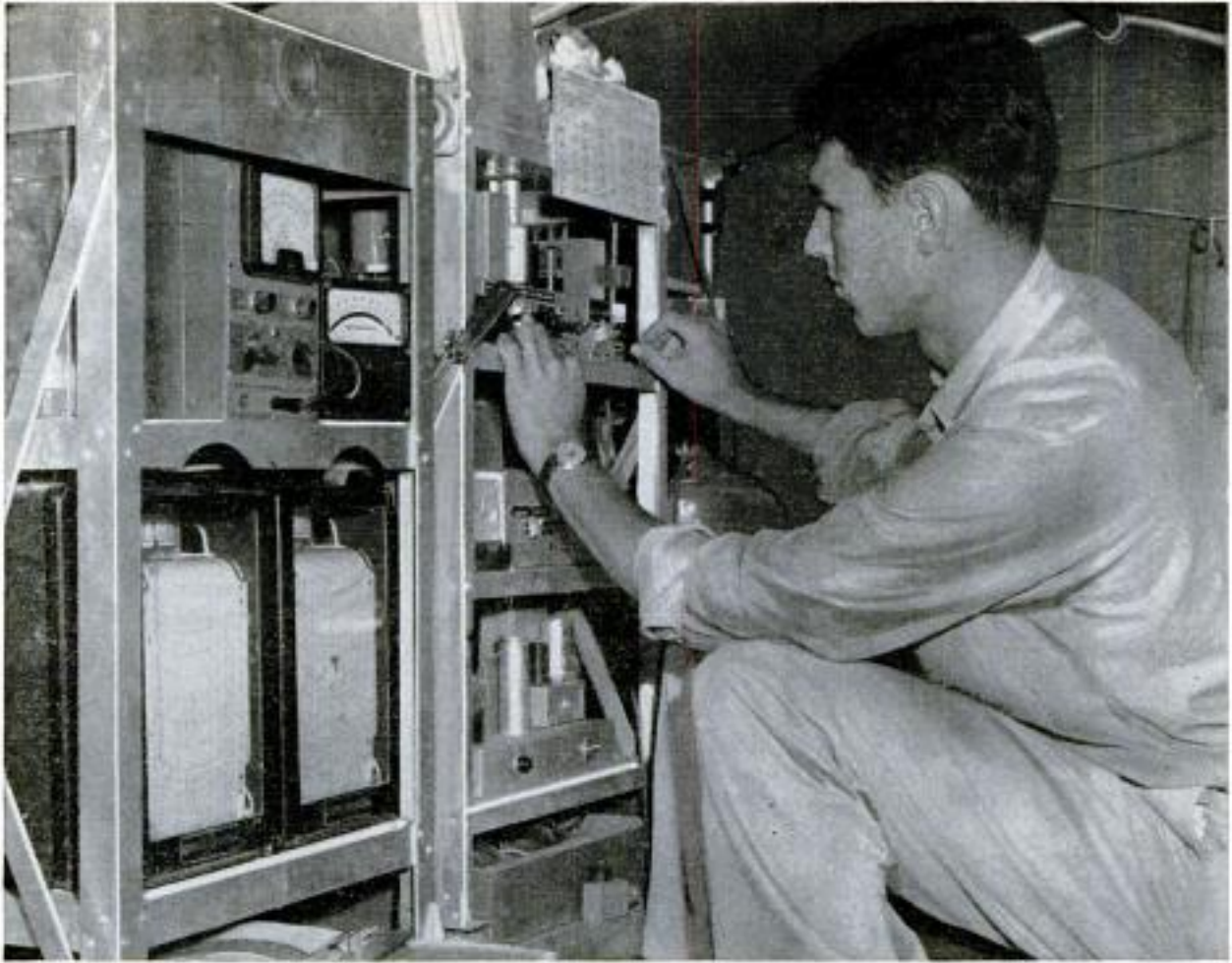


several sections of land or to supply all the needs of a small town. The new prospecting method offers the chance of locating the good water.

Arid areas such as New Mexico and Arizona don't receive very much rain to begin with, and only a small fraction of the rain that does fall from the clouds ever reaches the underground reservoirs. Half the rain over the lowlands evaporates in the dry air before it reaches the ground. Much of the rest is absorbed by vegetation or evaporates from the surface.

The underground reservoirs are recharged mainly by moisture that falls on the mountain ranges and then percolates underground. Here it follows porous channels downhill and then finally drains into the reservoir

During "charging" of ground, sign beside high-voltage electrode warns of danger. Deep probes require 1000-foot spacing



Recording apparatus in field truck makes a record of fading current in ground which helps to locate water

areas under the valley floors. But the reservoirs may be loaded with natural minerals including chlorides and sulphates. The water becomes unpalatable or even laxative. It is too hard for use in boilers (mineralization may run 1500 parts per million) and may not even be fit for irrigation purposes.

Hard water can be demineralized, of course, but this is too expensive a process for agricultural water or even for most domestic uses. The best trick is to intercept the water on its way downhill, before it becomes contaminated with minerals.

Much of the water draining out of a mountain range percolates down under the alluvial fans at the entrances of canyons, following old, buried channels that give no indication of their presence on the surface. Locating these channels is one of the jobs that the new prospecting technique can do.

In this method, the ground is energized for a short time by feeding 600 volts of direct current through it by means of electrodes spaced several hundred feet apart. Then, as soon as the current is shut off, the rate of decay of the induced field voltage in the ground is measured. This is something like charging a very inefficient storage battery and then measuring the rate

at which it discharges itself. The analogy is not quite accurate but it conveys the idea.

The decay rate of the current in the ground is measured in millivolts. By means of amplifiers this current is made to operate a pen that draws an inked curve on the paper of an automatic recorder. The length and shape of this curve, plus other information, tell a great deal about the subsurface conditions.

If the curve is flat it means that no water exists in the area examined. A steep rise in the curve indicates that water is present. Changes in the slope of the curve may indicate water at more than one depth. The degree of polarization, indicated by this curve, is an indication of the purity of the water. The speed of decay, also indicated by the curve, is related to the grain size of the underground structure. Slow decay indicates coarse grains, from which water can be pumped more rapidly than from a fine-grained structure.

There are other geophysical methods of prospecting for water. Shallow seismic refraction is one. Here small charges of explosives are detonated just below ground level, creating vibrations that bounce back from buried strata. By this method the

(Continued to page 206)

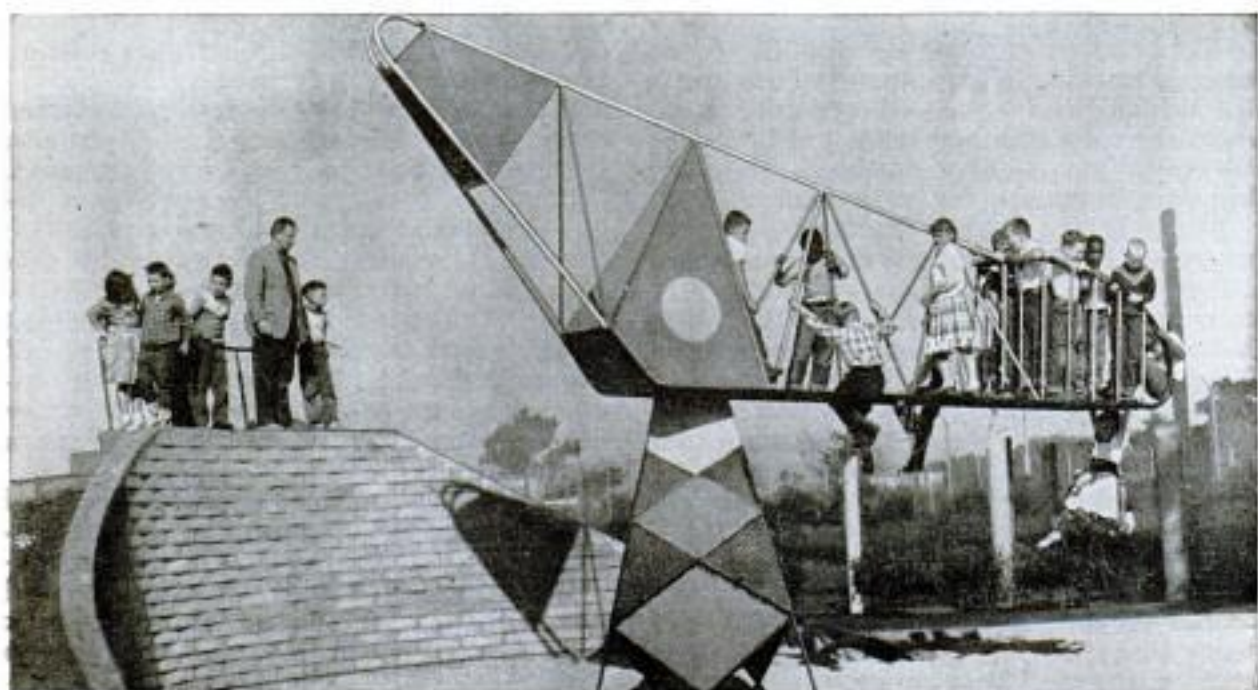
HOT SHIP AND LAND



Children can climb, crawl, hide, slide or jump into sand from "The Thing," above

Left: It's a bird, it's a plane, it's anything your imagination wants it to be

Carefully balanced swing ride, below, whirls or stops as children shift weight



BASIC PLAY URGES of children—running, sliding, jumping, hiding, swinging or floating things on water—were the focal point of design of a new playground in Monterey, Calif.

The playground was conceived by Hank Ketcham, who draws the "Dennis the Menace" cartoons. Sculptor-artist Arch Garner helped bring the play equipment into being.

The only things the kids have to furnish are their apparently boundless imagination and limitless energy. Some of the units of equipment, like the 30 by 40-foot free-form conglomeration of steel rods and sheets called "The Thing," give vent to many play urges. Kids can climb on it, slide on it, crawl on it or jump from it. They can pretend it's an airplane or spaceship, a fish, a bird or perhaps a prehistoric monster.

For youngsters who prefer to play in water, there's a plastic-foam island, 12 feet in diameter, floating in a shallow lake. Nearby is a 30-foot-long winding brook in which kids can float boats or twigs.

Children also can ride their tricycles or coaster wagons on a miniature highway marked with such appropriate road signs as "No Left Turn," "Watch for Slow Moving Vehicles," and "Speed Limit 5 miles."

The playground was designed with safety in mind. Each unit is mounted in concrete so it will not pull loose under stress of play.

The Monterey Junior Chamber of Commerce is making the playground plans available to other Jaycee groups and recreation authorities. ★ ★ ★



"Umbrella Tree," above, has 12 ladders which children climb to a steel framework. They slide down on "fireman" sliding poles



Like a giant bedspring, this 12-foot-high spiral of steel pipe satisfies the urge of children to jump on something that will bounce up and down





Guided-Missile Plane Flies for Royal Navy

Great Britain's de Havilland Sea Vixen, an all-weather fighter, will carry guided missiles for the Royal Navy. Powered by two Rolls-Royce Avon engines, the Sea Vixen has power-folded, sweptback wings, steerable nose-wheel and air brakes for carrier operation. This plane will replace the de Havilland Sea Venom as the Royal Navy's chief all-weather fighter.



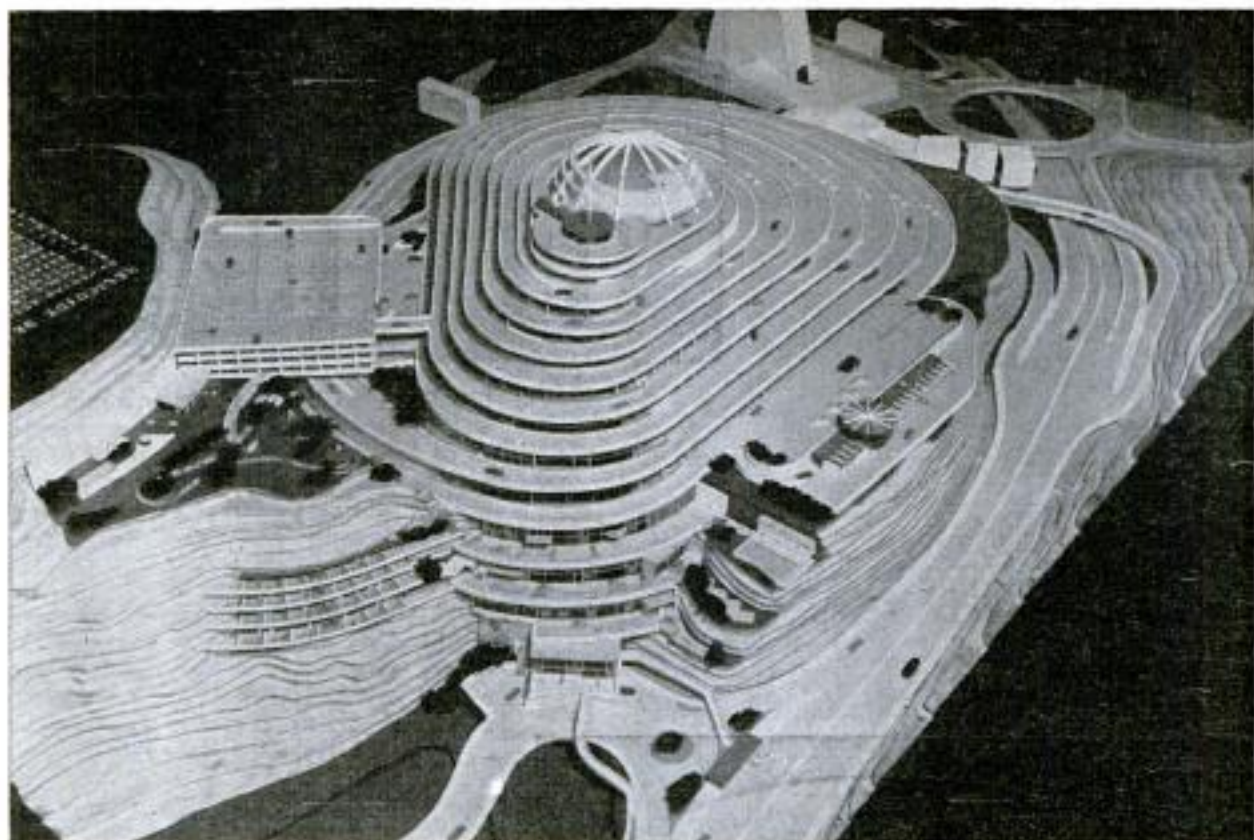
Pivot Control Turns Mower

Touch the right or left turn button of the control box for this electric-power lawn mower and a lever drops to the ground. The lever lifts the wheel on one side, allowing the mower to pivot in the direction you want it to move. The controls limit the turn to a fraction of an inch or allow a complete circle. When the mower pivots, the carrying arm at the rear elevates the electric cord, keeping it out of the path of the mower blades. The mower cuts easily and accurately under bushes and low-hanging limbs.



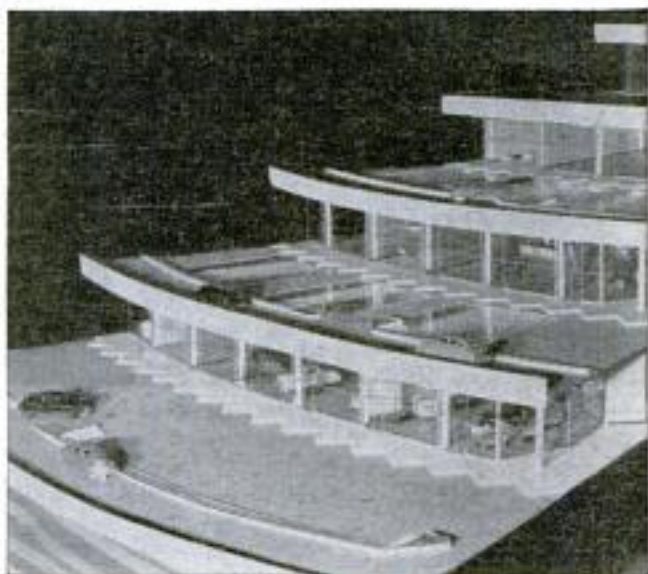
Drive-in Phone Used From Car

Weatherproof, curbside telephone service now is available at three locations in Chicago. If a driver in that city wants to call a friend, he just pulls his car over to one of the curbside booths and places the call without having to get out of his car. The Illinois Bell Telephone Company has installed the three units as an experiment to determine public acceptance of this unusual service.



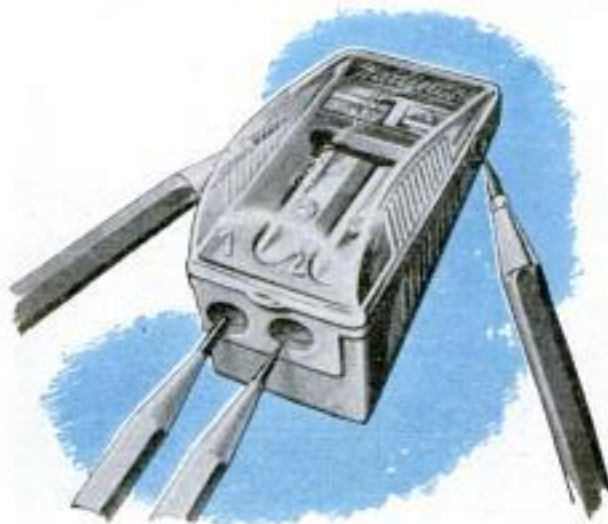
Spiral Shopping Center To Cover Caracas Mountain

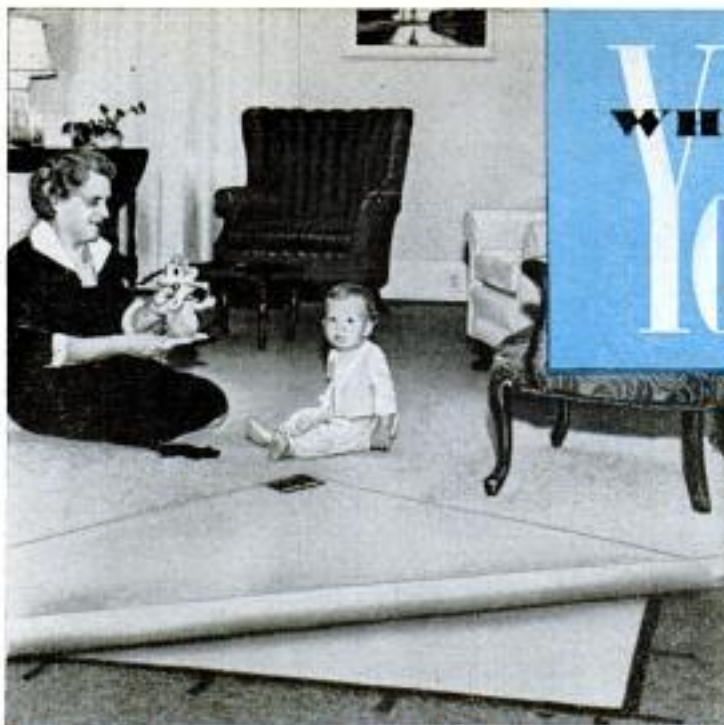
Brain child of Venezuelan architect Jorge Romero Gutierrez, a 25-story business and commercial center, shown in the model above, is being erected on the contours of a mountain which overlooks the city of Caracas. The helicoid structure, when completed in 1960, will contain 320 stores, a hotel, swimming pool, industrial showrooms, business offices and garages. Cost will be about \$25,000,000. A spiral ramp will allow cars to drive to any level, right, where shoppers can park. There will be Escalators and elevators for pedestrians.



Four-Way Pencil Sharpener Stops at Sharpest Point

With a new type of pencil sharpener manufactured in West Germany, you can shave either the lead or the wood casing separately. As illustrated in the drawing, right, the No. 1 blade shaves only the wood casing and it automatically stops cutting before the lead touches the blade. The No. 2 blade cuts only the lead and stops when the sharpest point is reached. Two cutters on the sides sharpen mechanical-pencil leads. One takes up to standard size, the other sharpens heavier than standard leads.





WHAT'S NEW FOR Your Home

ELECTRIC HEATING MAT under a rug, left, will keep the chill away when people sit or play on the floor. The mat is available in five sizes and designed to protect against electrical contact or overheating

Radiant Products, Inc., Monroe, N. C.

CEILING DIFFUSER, left center, improves overhead air distribution by controlling a room's air motion below 50 feet per minute, the standard draft-free condition. Built-in rings help eliminate dirt smudges

Conzor Engineering Corp., Danbury, Conn.



SHELVES, left below, can be added and sections made into different combinations with frames of steel tubing. The shelves hook into holes, which are three inches apart. Suction cups on legs anchor the units

Shelfmaker Products Corp.,
319 Jefferson St., Newark 5, N. J.

WALL LAMP, below, can be moved up or down without the aid of pulleys or counterweights and the cord is always enclosed. Made of aluminum, it can easily be changed to different locations where the extra wall brackets have been installed

Maypole Clamp Lamp Co.,
727 Delaware Ave., Youngstown, Ohio



PLASTIC SINK, right, with separate dish-washing and rinsing compartments makes the chore easier and saves water. Available in four different colors, it fits in a standard-size kitchen sink. Ribs on the bottom keep the drain open. The dish-washing compartment has a capacity of 11 quarts of water, while the rinsing section holds approximately two quarts

Federal Tool Corp.,
3000 W. Pratt Blvd., Chicago 54

REDWOOD PICNIC TABLE, right center, is portable and collapsible. It can be folded to only 13 inches in width, and rolls on four-inch rubber casters. Unfolded, it can be moved on steel "sled runner" supports. The table is six feet long, the top is four feet, five inches wide and it is made of 1¼-in.-thick vertical-grain redwood planks

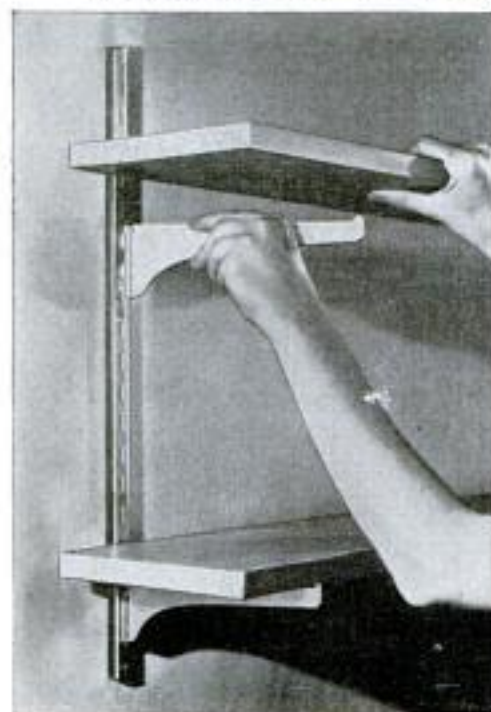
Magma Mfg. Co.,
5217 Eden Ave. S., Minneapolis 24, Minn.

VERTICAL MEAT GRINDER, right below, has several advantages. It makes feeding almost automatic and prevents splattering. A new cutting action slices the meat and doesn't mash it through. The parts are made of lightweight cast aluminum, simple to disassemble and clean. The grinder is available built-in or in a table-top model

Nutone, Inc., Cincinnati 27, Ohio

SHELF FIXTURES, below, are brass-plated, adjustable and easy to install. The bolt-less brackets fasten to the standard's slots with a new, patented friction grip. The standards are available in three, four, five and six-foot lengths, with slots spaced one inch apart, and the brackets in six, eight, ten and twelve-inch lengths. Both of the fixtures have a lacquered finish

Knape & Vogt Mfg. Co., Grand Rapids, Mich.





Converted Submarine Carries Liquid Rubber

Like beating swords into plowshares, an Italian industrialist is converting wartime submarines into tankers to transport liquid rubber to ports near rubber-goods factories.



Swedish Baby Carriage "Walks" on Feet

Instead of wheels, a Swedish baby buggy has 20 metallic feet fixed to its axle like spokes of a wheel. The carriage "walks" up and down stairs in a rocking motion.



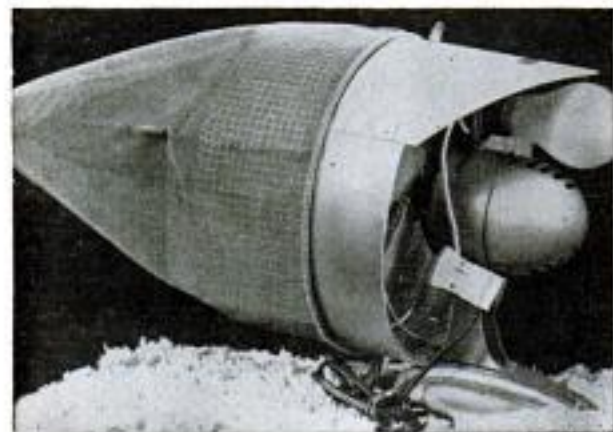
"Pod" of Strange Plane Transports Ton of Chemicals

Improved weight distribution determined the lines of this oddly built airplane. With the cockpit in the rear, it carries a ton of crop-spraying chemicals in its podlike fuselage. Metal tubes support the unique tail. The plane was built in Australia by the Kingsford Smith Aviation Service, Ltd.

Light Lures Bugs into Electric-Fan Trap

Bugs attracted by the lights on electric fans are caught in the air currents and hurled inside a mesh bag. The bag is re-

moved and dipped in hot water to kill the insects. Large-size traps can be used in orchards and gardens.



RADIO TELEVISION ELECTRONICS

THE SEARCH for high fidelity continues. Today, moderately priced electronic components are capable of reproducing almost all sounds within the limits of human hearing. Higher-priced units can duplicate the loudness level of complete symphony orchestras with so little distortion or alteration of sound, that even a trained ear can barely detect the difference between the original presentation and the recorded reproduction. Still, the quest goes on, and some recent developments attest the fact that the ultimate has not yet been achieved.

For the true hi-fi enthusiast, faithful reproduction of recorded music is not enough. He must capture the "feel" of the concert hall, the presence of the orchestra, to gain optimum enjoyment. To meet this demand, stereophonic playback equipment and prerecorded stereo tapes have appeared on the hi-fi scene in ever-increasing numbers. Such systems are relatively expensive because they require duplicates of all components used in the normal set—two pickups, two amplifiers, two speakers—but the change from monaural to stereo playback is as striking as the difference between ordinary phono reproduction and real high fidelity.

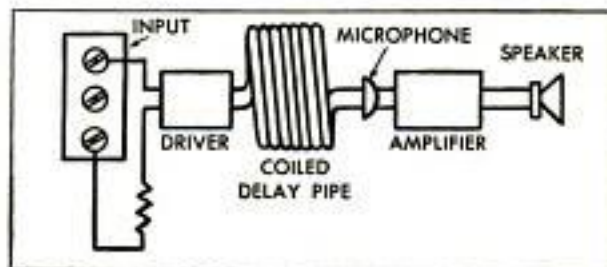
Stereo recordings are made by positioning two (or more) microphones so that each one picks up the sounds from a particular section of the orchestra. The output from each microphone is recorded on a separate tape track. During playback, the two tape tracks are separately reproduced so that a listener seated between two correctly positioned speakers is effectively placed in the very center of the orchestra. So lifelike is the reproduction that one can almost discern the exact location of the various instruments.

An interesting new development in the stereo field is the listening chair shown in the drawing, above. The chair, designed by the Stereo Products Company for personalized listening in the home, for stereo demonstrations at exhibitions and in stores, and for possible theater use, contains a concealed loudspeaker and volume control in each of its wings. The sound, therefore, is brought directly to the listener's ears for a true binaural effect previously available only through the use of special earphones.

At present, stereo recordings are avail-

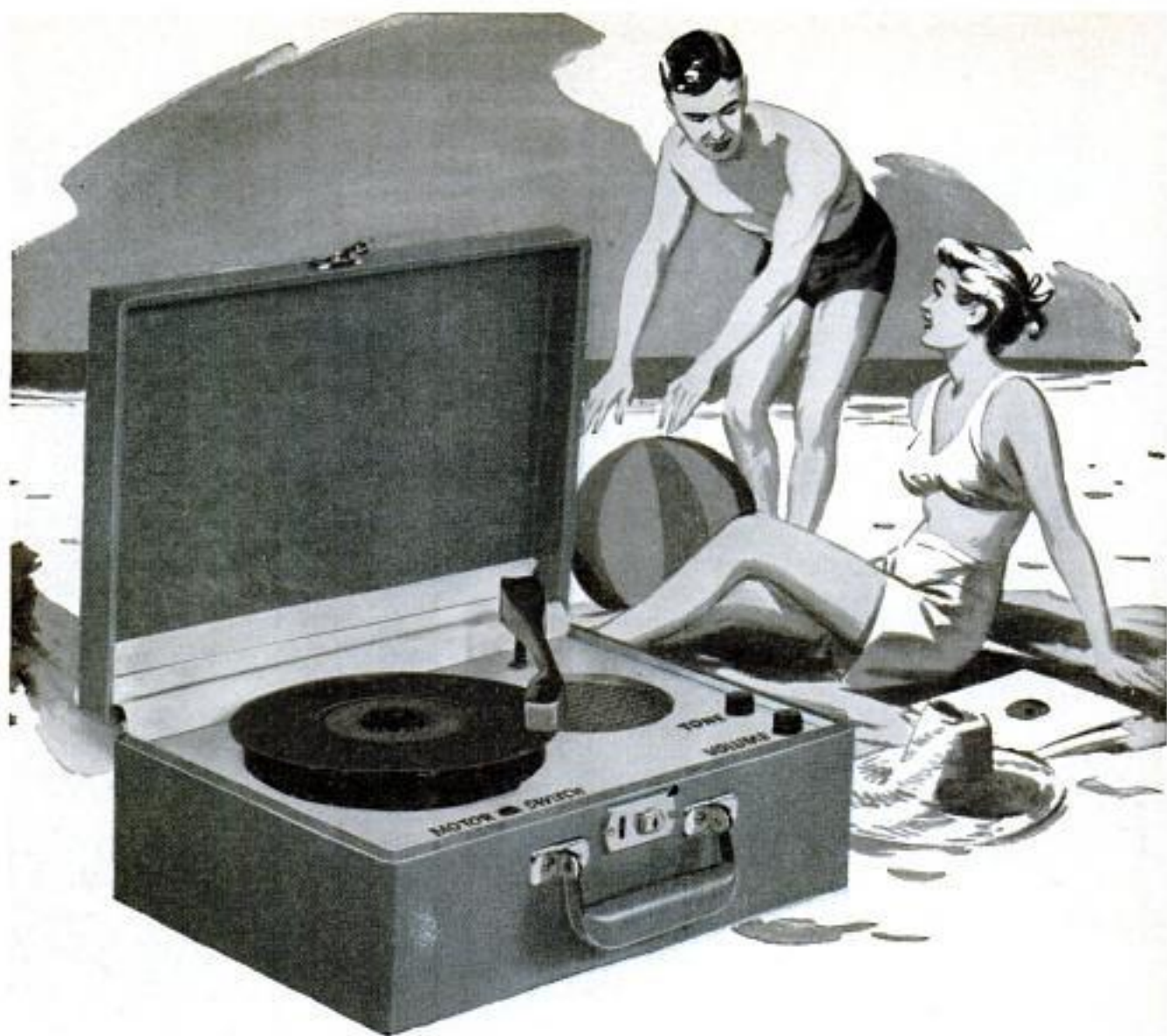


In the Interest of Higher Fi



able only on tape, since a foolproof method for reproducing two individually recorded sound tracks from a conventional disk remains to be developed. Yet, there are thousands of phonographs whose output could be measurably improved through the addition of concert-hall realism. This is accomplished quite effectively with the

(Continued to page 224)



Companion Phono Plays Records Anywhere

By Samuel Sosenko

HERE IS an easy-to-build phonograph which will permit you to enjoy your favorite platters even during those hot summer months when most record collections are neglected in favor of picnics, beach parties and other outdoor activities. This unique little unit can accompany you everywhere and will play at the flick of a switch with never a thought as to the location of the nearest electrical outlet. Built around a newly developed 6-volt phono motor and a fully transistorized amplifier, it operates on a set of self-contained batteries which are good for several hundred hours of use.

Performance-wise this portable phonograph leaves little to be desired. The amplifier delivers up to 250 milliwatts of power, enough to provide comfortable listening

volume even in noisy locations and relatively large rooms. A 5-in. speaker, adequately baffled, gives far better tone quality than is usually associated with portable equipment and an effective tone control permits treble-frequency attenuation to suit your own listening preference.

Building the Amplifier

Layout and construction of the amplifier are shown in the three illustrations of Fig. 1. To prevent undue cluttering of the chassis-layout diagram, illustration A, only the most important dimensions are specified. The dimensions not given can easily be determined by placing the actual parts on the chassis, as shown in illustration B.

Slots A are for the transistor sockets which are fastened in place with retainer

clips furnished with these units. Those labeled B are used for mounting transformers T1 and T2. These transformers have mounting tabs which are inserted through the slots and bent underneath the chassis. Holes E are centered on opposite sides of each transformer to permit transformer-lead feed through from the top to the bottom of the chassis. The purpose of the other holes can be determined by a careful comparison of the three illustrations.

Short lengths of spaghetti (insulating-fiber tubing) should be used to cover the transformer leads at the point of chassis feed through to prevent damage to these fragile wires.

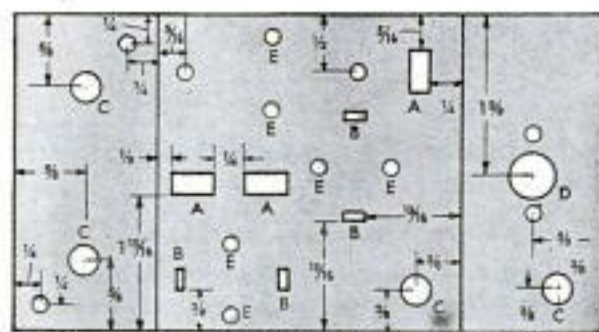
Be sure to mount the transistor sockets exactly as shown in the pictorial diagram, Fig. 1C. Note the close spacing between the emitter pin (E) and base pin (B), and a somewhat wider separation between the base and the collector (C) pins. The transistor leads are similarly spaced for easy identification, so that these can be properly inserted in the sockets. This should be done only after all wiring has been completed.

Since some of the miniature components, particularly the small electrolytic capacitors are easily damaged by excessive heat, a solder gun or small-tipped iron should be used for all wiring. The iron should be applied to the component leads just long enough to permit the solder to flow and make a good electrical connection.

After the wiring is completed, check it against the schematic diagram, Fig. 3, to make sure that no wiring errors have been made. Then, cut the transistor leads to a length of approximately $\frac{1}{4}$ in. and plug these into the sockets. Make sure that the transistor leads coincide with the pin spacing of the sockets. Incorrect insertion of the transistors will prevent the amplifier from operating and may cause the transistor to be damaged.

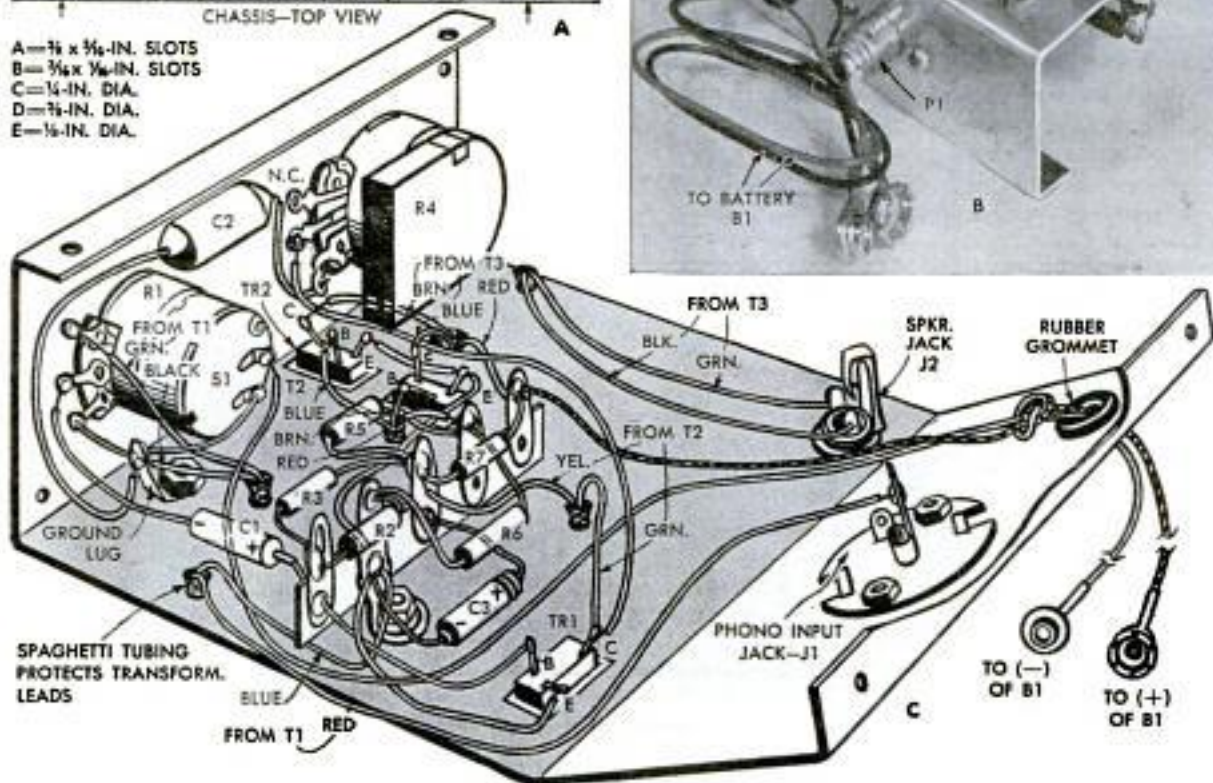
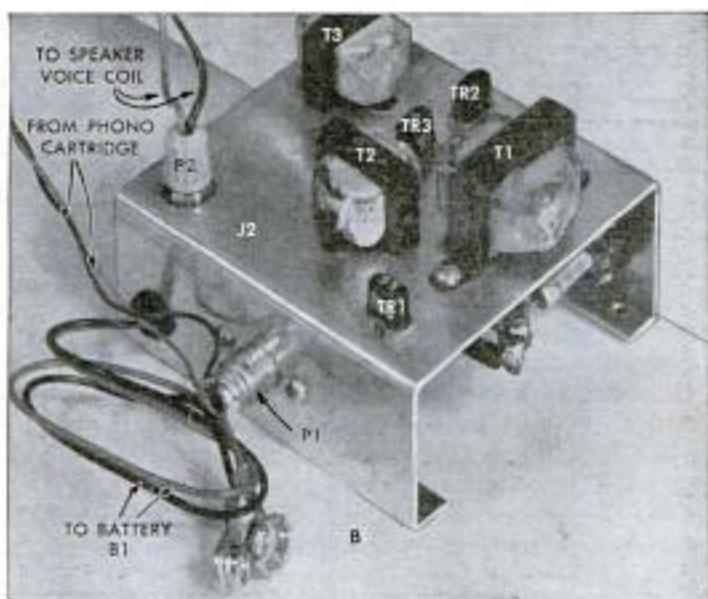
Choice of Phono Motor

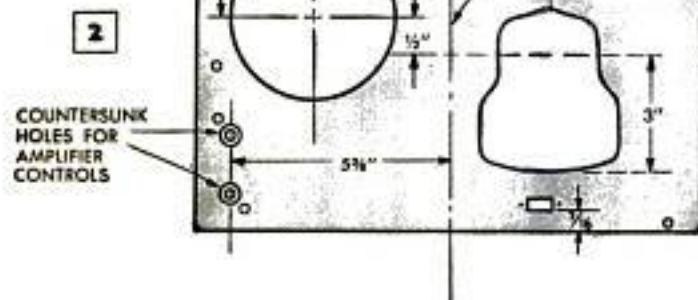
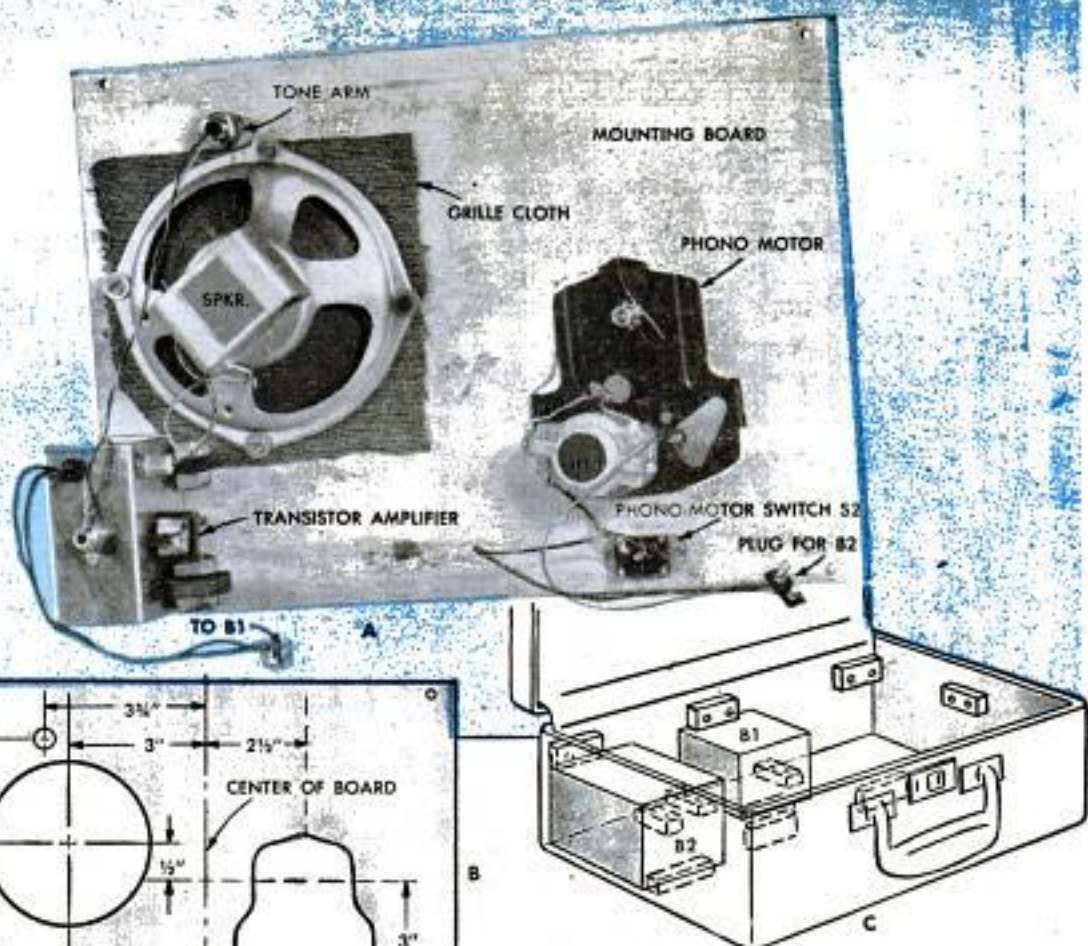
The choice of phono motor depends entirely on the type of records included in your collection. Because the small 45-r.p.m. records take up little space and are easily carried about, a single-speed 45-r.p.m. motor, General Industries Model BX-45, was



CHASSIS—TOP VIEW

- A— $\frac{1}{8} \times \frac{1}{8}$ -IN. SLOTS
- B— $\frac{3}{16} \times \frac{1}{8}$ -IN. SLOTS
- C— $\frac{1}{4}$ -IN. DIA.
- D— $\frac{3}{8}$ -IN. DIA.
- E— $\frac{1}{8}$ -IN. DIA.





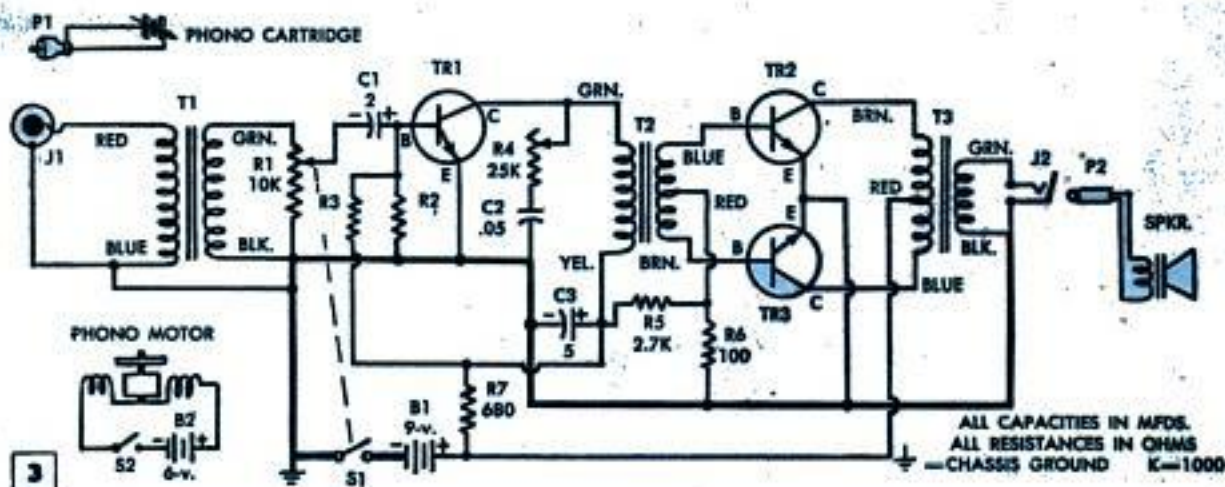
dividual styli for standard and microgroove records.

Tone Arm and Cartridge

used in the original unit. If desired, more versatile three-speed motors such as the General Industries Model BX (16 $\frac{1}{2}$, 33 $\frac{1}{2}$ and 45-r.p.m.) or the Trans-Aire Model T-240 (33 $\frac{1}{2}$, 45 and 78-r.p.m.) may be substituted. The latter requires a phono cartridge with a compromise 2-mil stylus or, preferably, a turnover-type cartridge with in-

The transistor amplifier has ample gain to permit the use of any crystal or ceramic phono cartridge. Since the instrument was not designed for high-fidelity reproduction, there is little point in employing an expensive unit. Just about any general replacement-type pickup arm and cartridge will fit the bill. A number of good quality units of this kind are listed in

(Continued to page 226)



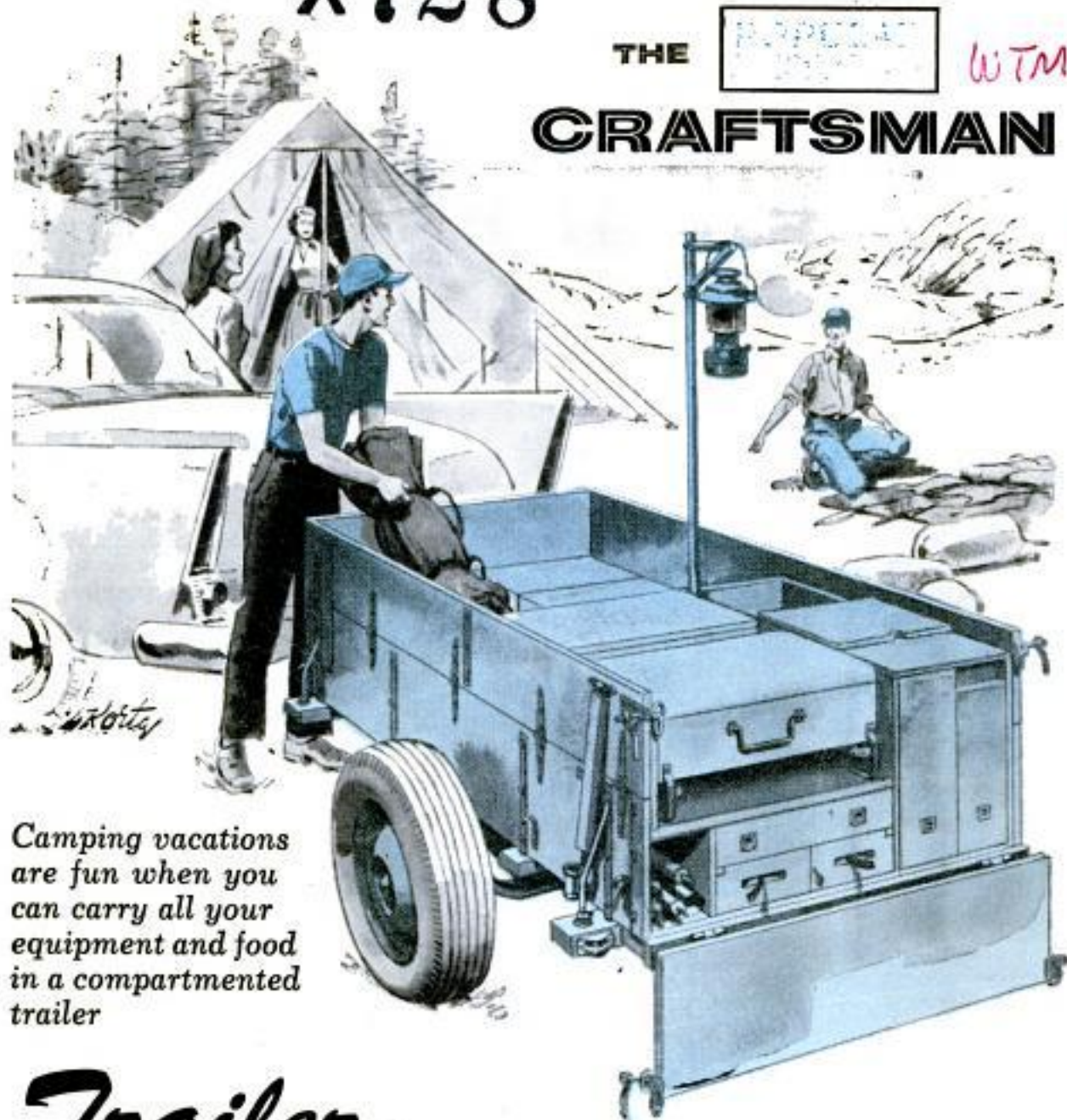
X728

THE



WTM 59

CRAFTSMAN



Camping vacations are fun when you can carry all your equipment and food in a compartmented trailer

Trailer

By George Laycock

FOR CAMPERS

THIS TWO-WHEELED TRAILER with removable "kitchen" unit and clothing and equipment lockers is used by one family of outdoor enthusiasts for carrying all the items needed for camping on week-end trips, or when vacationing in the country. When not in use for camping, the kitchen and locker units can be removed in a few minutes to permit using the trailer for other purposes. The self-contained units can be stacked in the garage in winter with all the camping gear conveniently stored in the compartments ready for the next camping trip.

The dimensions and arrangement of shelves, cabinets and drawers as given in the drawings, may be changed so that the units can be accommodated in a trailer you now have or in a suitable trailer that can be rented locally. The only disadvantage of using a rented trailer is doing without the hinged sideboards. The latter afford handy work and serving tables when opened and supported by two wooden braces attached to each, as shown in the illustration and Fig. 1. The braces pivot on hinges that are screwed to one end of the braces and to the sideboards near the top.

Kitchen Unit

Made of 1-in. pine lumber, $\frac{1}{4}$ -in. exterior-grade plywood and $\frac{1}{8}$ -in. tempered hardboard, the kitchen unit, Fig. 5, detail A (blue area), has shelves and drawers for waist-high storage of canned and boxed foods, a platform with adequate space for a two or three-burner kerosene or gasoline stove, and a pot-and-pan compartment as shown in Figs. 1 and 3. Also, there is a covered bin for such staples as flour and sugar. A $6\frac{1}{2} \times 9\frac{1}{2}$ -in. space under the left side of the kitchen unit is used for carrying tent poles, pegs, shovel, ax, lantern pole and other long pieces of equipment that can be accommodated. Plywood is used for the bottoms of the drawers and shelves and the bottoms of all units to reduce their net weight. If you prefer, $\frac{1}{4}$ -in. hardboard can be used instead of plywood.

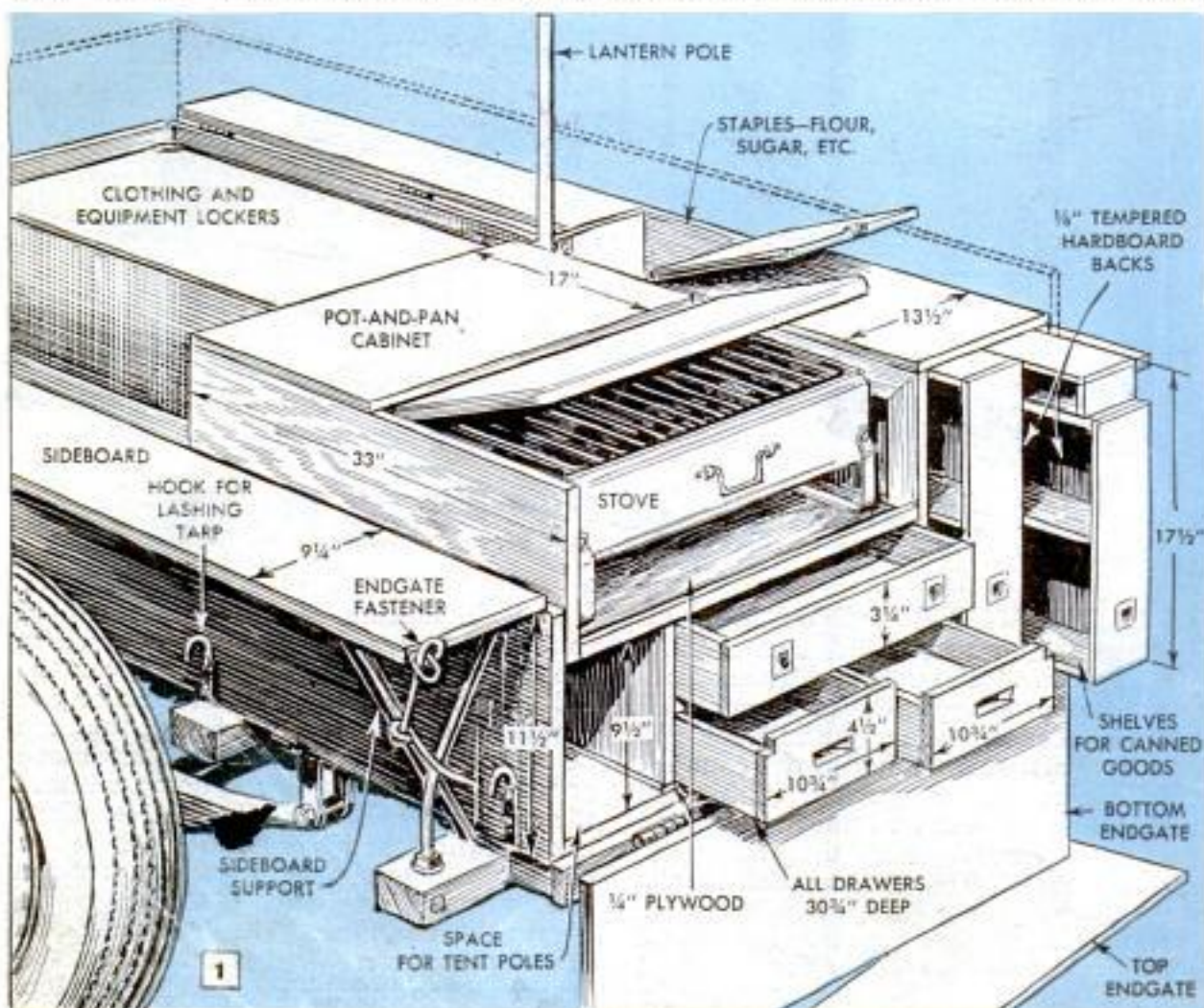
Clothing and Equipment Lockers

Two large lockers that fit in the forward part of the trailer provide convenient storage for camping apparel and miscellaneous equipment. The uncomparted space

in the trailer, Fig. 5B, is ideal for bulky objects such as tent, sleeping bags, luggage and other large pieces of equipment. The only camping equipment that need be carried in the car is the box containing the gasoline lantern, Fig. 2, which is carried in the trunk. This leaves the interior of the car uncluttered for the exclusive use of the passengers.

When en route, the sideboards and two-piece endgates are closed and secured at the corners with fasteners of the type shown. These are simply standard endgate fasteners, complete with tail nuts, which make it easy to tighten and release both endgates and sideboards quickly. Chain links attached to the eyes of the fasteners are designed to slip over hooks located at the sides of the upper tailgate. The fastener for the lower endgate, or tailgate, fastens to a hook bolted to the side of the trailer. A custom-fitted tarpaulin with heavy-duty rubber bands cut from an inner tube used as tie-downs (not shown), permits quick removal and replacing of the tarpaulin to assure complete dust and rain protection.

Lockers and "kitchen" are constructed as self-contained units so they can be removed quickly to permit use of trailer for other purposes. Also, units provide handy storage place for camping equipment in winter



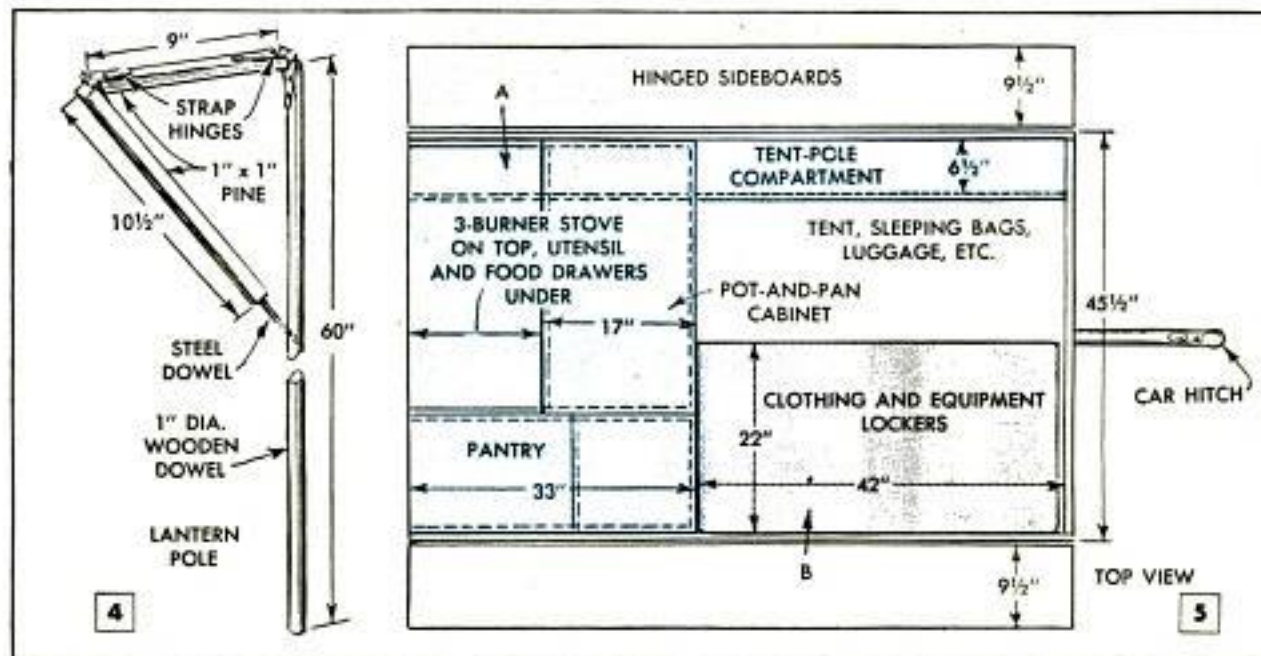


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3

Fig. 2, gasoline lantern is carried in plywood box and has plywood cutout fitted over top of lantern to protect it from damage when traveling. Fig. 3, hinged sideboards are handy work and serving tables



4

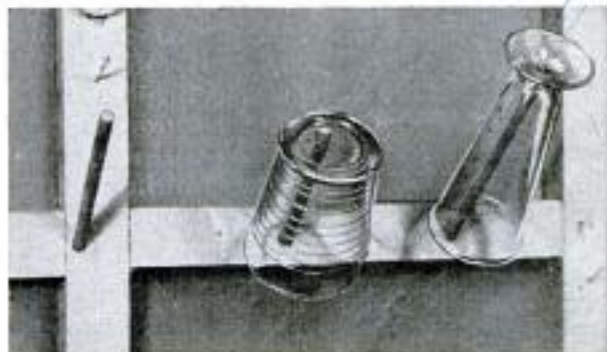
5

The lantern pole is made of two lengths of pine and a 1-in.-dia. dowel hinged as shown in Fig. 4, so that it can be stowed in the tent-pole compartment. When in use,

the pole is held upright by two pipe clamps screwed to one of the inside corners of the staples bin. Finish all units inside and out with paint or varnish. ★ ★ ★

Darkroom Graduates and Funnels Stored on Dowel Hangers

Dowels in a darkroom wall provide a convenient way to store glass graduates, funnels and similar items. Supported upside down, such items will drip dry. Drill the holes for the dowels at a 45-deg. angle and make them slightly undersize so they can be driven snugly in place. In the case of funnels, use dowels small enough to pass readily through the spouts.





Holder Suspended From Table Keeps Ink Bottle Level

Suspended from the edge of a drafting table with a single screw so that it can swing, this bottleholder assumes a level position no matter at what angle the table is set. The wood base of the holder either is routed out to take the ink bottle, or several brads are driven into the base to retain it. A metal or plastic ring that slips over the bottle neck, and two rubber bands, assembled as shown, hold the bottle securely. If desired, a hole can be drilled through the base to hold the stopper.



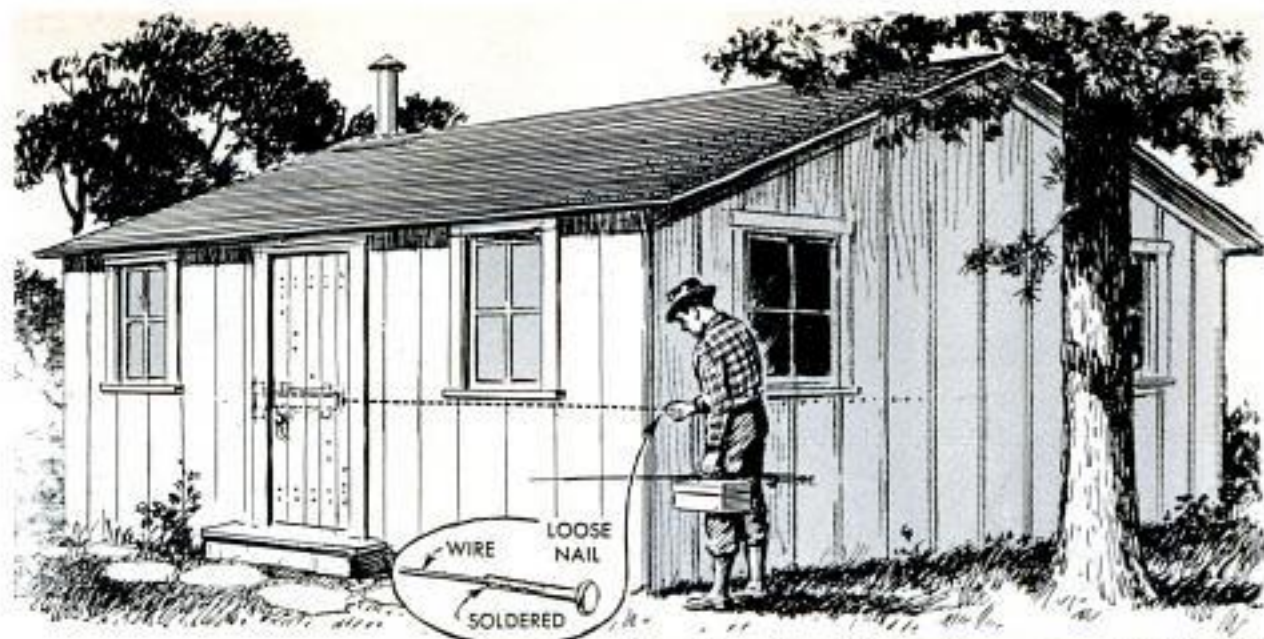
Easel-Type "Clipboard" Holds Without Clamps

Neither tacks nor clamps are required to hold sheets of paper flat and smooth for writing on this practical "clipboard" that is made from two pieces of hardboard of equal size. One piece is cut to form a frame as indicated. This is hinged to the solid piece of hardboard with strips of adhesive tape. Sheets of paper then are sandwiched in the assembly. A rubber band can be used to hold the free ends of the board together. Before assembling, sand all the edges, rounding the corners slightly.

Ordinary Table Salt Can Be Made to Serve Many Purposes

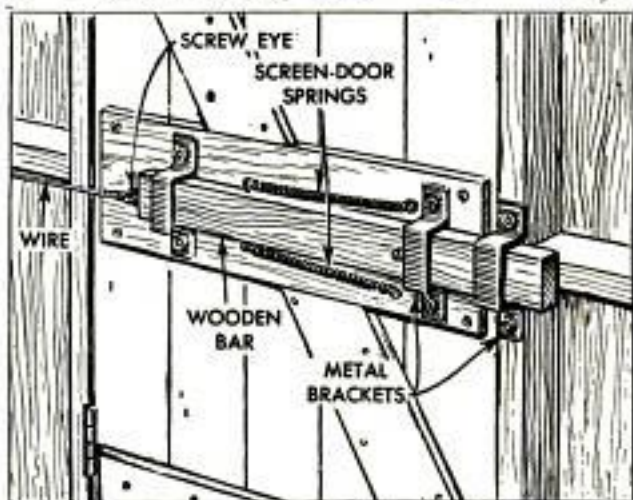
In addition to seasoning food, common table salt has many other uses. Silver spoons tarnished by eggs are easily cleaned by rubbing them with damp salt. To prevent food from sticking to a griddle or omelet pan, clean them with salt instead of washing. Deep vases may be cleaned by allowing a solution of salt and vinegar to stand in them for an hour. Shake well, then wash and rinse. To hasten the thawing of frozen meat, season it with salt when it is taken from the freezer. If salt is used in the bottom part of a double boiler, the cooking time will be shortened. Cracked eggs can be boiled without the whites running from them when a tablespoon of salt is added to the water. When milk has been accidentally scorched, place the pan in cold water and add a pinch of salt to remove the scorched taste. For a faster job and fluffier egg white, add a pinch of salt when whipping them. To be assured of whole nut kernels for special recipes, soak the nuts in salt water 12 hours before cracking them.

A salt-water bath will kill chiggers, or ease the itching caused by mosquito and other insect bites. Fruit stains are removed from the hands by rubbing lemon juice and salt on the stains followed by a clear-water rinse. A pinch of salt slowly swallowed will often stop an annoying tickling in the throat. Salt eaten before taking bitter-tasting medicine will render it tasteless. Salt can be used for removing mildew from linen. Mix salt, starch and lemon juice into a paste and apply to both sides of the fabric. Then lay it out in the sun until the stain disappears and wash in the usual way. To keep bluing from streaking clothes, add a cup of salt to the rinse water. Perspiration stains are more easily removed from cotton clothing if soaked in salt water a few hours before washing. To brighten the colors in an old carpet or rug, sprinkle it with salt before sweeping or vacuuming. When a felt hat becomes soiled with soot, cover the soiled part with dry salt and then brush it off.



CABIN LOCK

You can't lose the key to this lock. There isn't any, for the lock is a sliding bolt actuated by a trick latchstring. You'll have to make the whole thing yourself so you'll always know how to unlock it. The latchstring is a length of light wire long enough to reach from the rear end of the bolt to a point just outside the wall of the cabin. The free end of the wire passes through a small hole drilled through the siding near a corner of the structure. Solder a roofing nail to the free end of the wire. Then make and assemble the bolt on the door as detailed at the right. Fit a false knob, with an escutcheon on the outside of the door. Now you're ready for two-man operation, one to swing the door closed while you retract the bolt. The door is opened simply by pulling out on the nail-head as pictured above. This retracts the bolt and swings the door inward. For one-man operation you will need to add an extra part, not shown in the details. To do this, retract the bolt and wedge it in posi-



tion. Then drill a hole through from the outside of the door. The hole should center through the bolt and be of a size to take a 16d spike loosely. Then as you go out, retract the bolt and insert the spike to hold it retracted and permit the door to close. Hold the door in the closed position and pull out the spike, permitting the bolt to slide forward to the locked position.

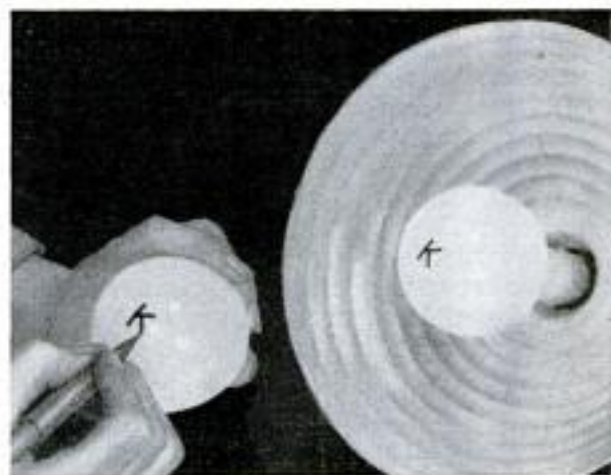
Austin H. Phelps, Omaha, Neb.

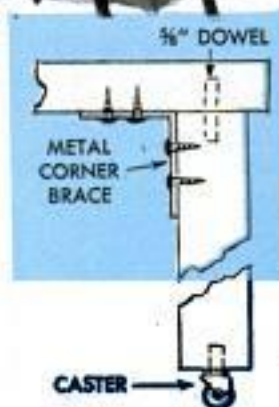
Kelvin Photo Lamps Marked For Easy Identification

When using standard 3200-deg. Kelvin floodlamps for indoor color photography, mark a large "K" on the ends of the lamps with India ink to identify them. Unmarked Kelvin lamps can be confused with regular photoflood lamps, which are the same size. Use of the regular lamps would upset color balance and result in poor transparencies.

Henry Hanscom, Elmhurst, Ill.

☛ To lift corners of linoleum, use a plumber's force cup. Rub soap on the edges of the cup for a tight grip.





THE SWING IS TO DOOR FURNITURE

By Tom Riley

THERE WAS A TIME when a door was just a door. Now it can be anything from a bed headboard to a patio screen. These thick, smooth panels, called flush doors, are making craftsmen out of everyone since in many cases they require merely finishing the edges and the job's practically done. The suggestions given here are but a few of the many ways that standard flush doors can be utilized to produce modern pieces of furniture that are both inexpensive and practical.

Types of Doors

Flush doors are available with solid or hollow cores. If they are to be used as is,

hollow-core doors, which are lighter and cheaper than the solid-core type, will do. However, where it is necessary to cut the door in several sections, it is best to select a solid-core door. When a hollow core is cut crosswise, other than at the center, it exposes a series of core strips which must be cut back and a strip of solid wood inserted, as in Fig. 12, to fill in the open end. Rather than rip a door lengthwise, it is best to select a door of the approximate width desired. You'll find that most flush doors are available in widths ranging from 18 in. to 36 in. wide in 2-in. multiples. The average interior-type door measures 1 $\frac{3}{8}$ in. thick and 80 in. long. And, of course, you can get them faced in either common or fancy wood grains.



2

To stretch the budget on a sofa, purchase two cushions with matching bolsters and a flush door of the right width. Attach ready-made legs to the door and center the cushions as shown. Let the ends of the door serve as end tables. You'll wind up with a smart sofa for a song

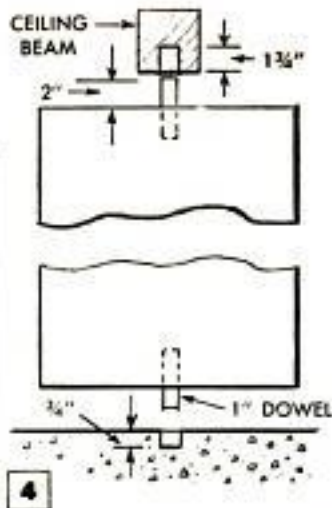
Right, a 30-in. flush door with the edges taped makes a simple Hollywood headboard for a double bed. The space at the projecting ends can serve to support small shelves or an attractive pedestal storage cabinet as shown below



3

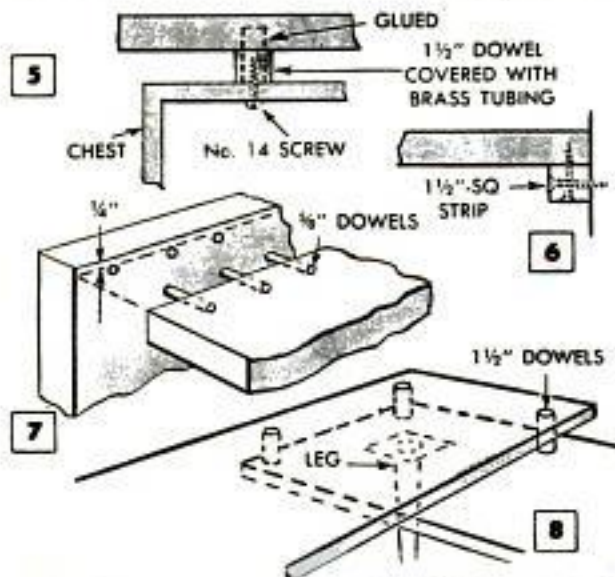
Above, a 30 x 80-in. hollow-core door cut in half will make headboards for twin beds. Black in sawed ends and trim exposed edges with wood tape





4
Blind holes in floor and ceiling for dowel pivot pins allow doors to be removed by lifting up to free lower pin at the bottom

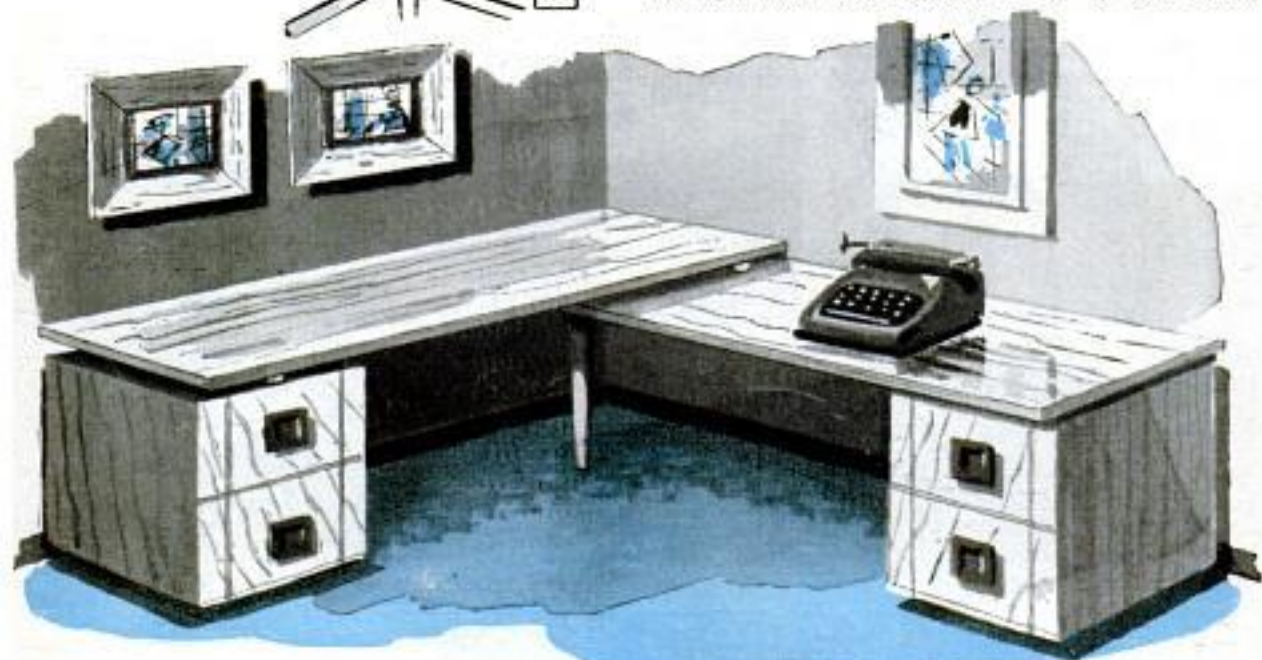
Two or more doors pivoted at top and bottom can be used like a vertical Venetian blind to keep out sun

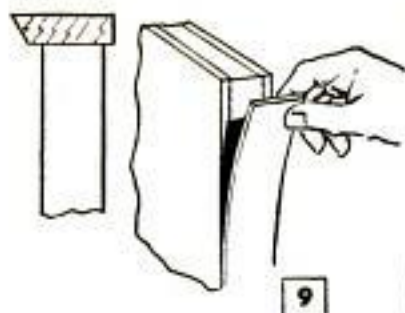


The edges of flush doors vary considerably. Some have softwood showing, others have hardwood. Some are quite rough, others very smooth. Often you can cull a stack and find a door with edges that need only to be varnished or lacquered. The new hardwood tape in ribbon form offers an easy way to conceal the edges and make them match the surface. The tape is applied with contact cement, which bonds instantly and without clamping. Another way of treating the edges is to rip 3/4-in. strips of matching stock and use as trim to form a rim around the door as in Fig. 9.

Novel Applications

The pass-through table idea shown in Fig. 1 is a novel and practical answer to the "Tudor" corner desk is two doors resting on two-drawer file cabinets. New handles and paint camouflage files, leg supports doors at the corner





9

problem of space. Here a table of doors fitted with casters and extended through an opening between the kitchen and a dinette permits one table to serve both rooms by pulling it from one to the other. A simple two-piece screen that raises and lowers like a window can be used to close off the opening.

Another novel use for flush doors is pictured in Fig. 4. A series of doors pivoted vertically on a porch or roofed patio so they may be adjusted make a vertical "Venetian blind" that affords both privacy and ventilation.

The "tudor" king-size desk, pictured and detailed in Figs. 5, 6, 7 and 8, shows how a double desk can be arranged in a corner of a room without undue crowding.

Twin two-drawer cabinets support the door tops at the ends and a tapered leg supports them at the corner. Short dowels raise one door above the other to bring it to regulation desk height. The other should be 24 to 26 in. to provide the best working height for a typewriter. Cleats screwed to the wall can be used instead of the leg to support



10

A 24-in. closet door supported at the ends 29 to 30 in. off the floor and equipped with several padded stools makes a quickie breakfast bar



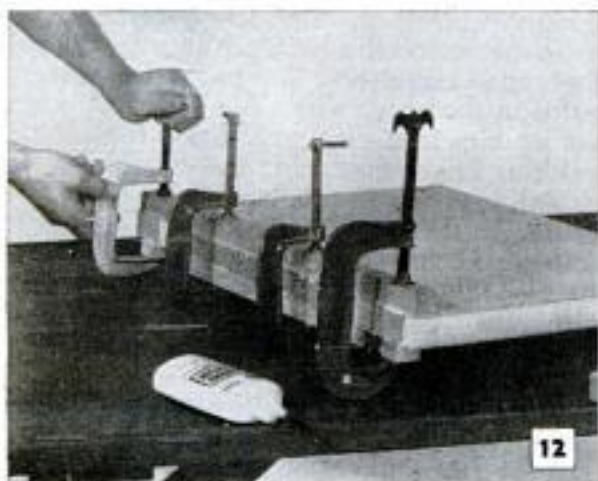
11

Infinite variety of coffee tables can be made from flush doors, king-size and otherwise. Add custom or ready-made legs

the doors at the corner. Fig. 7 shows how door stock can be joined together with dowels to form a simple desk that is supported at the opposite end with a cleat attached to the wall. ★ ★ ★

When hollow-core doors are cut, open-core end is filled with hardwood strip glued and clamped

Solid-core door requires no filling of edge after cutting. This is true of hollow door when cut at center



12



13



Magnet on Typewriter Frame Holds Eraser at Hand

A permanent magnet located at any convenient place on the typewriter frame holds your eraser always within easy reach. A small machine screw or stove bolt is inserted in the center hole in the eraser and held in place with a washer and nut. File the end of the screw flush with the nut.

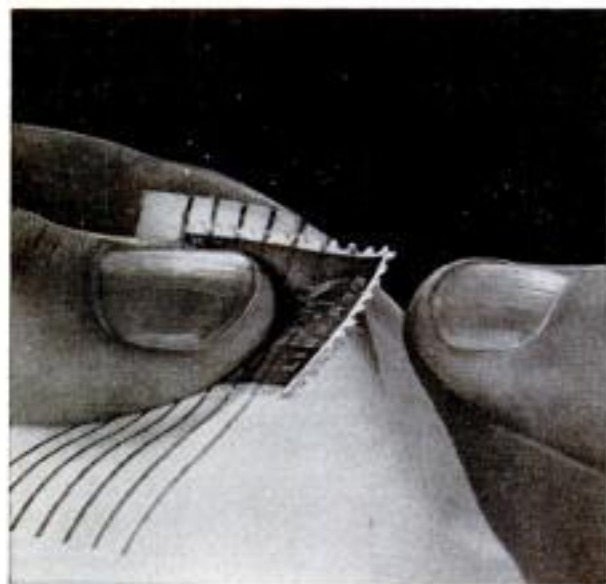
Boiling Water on Propane Tank Determines Gas Level

To determine approximately how much propane gas is left in a storage tank, one man pours boiling water over the container. When his bare hand is passed down the tank immediately afterward, the metal will feel warm where the tank is empty. Near the gas level the tank will feel cold since the liquefied gas will absorb the heat.

E. J. Hannigan, New York City.

← Easier Removal of Stamps

Stamps removed from envelopes will receive minimum damage if the usual method of removal is reversed. Instead of pulling the stamp from the envelope, peel the envelope away from the stamp. Hold the stamp in the center as indicated so it is slightly curved, then pull the envelope down away from the stamp at each corner.



Talcum-Coated Window Glass Used to Check Focusing

When a ground glass is not at hand for checking the focus on a camera, ordinary glass can be adapted for temporary use by coating it with talcum powder. First, wipe a thin coating of petroleum jelly on the glass, then sprinkle on the powder.

Safe Tests for Finding Cause of Blown Fuse

Should a fuse blow in your switch box, do not replace it with a piece of wire, metal foil or a penny. A fuse is a protection and the fact that it blows indicates that there is either an overload or a short circuit in the line. Shut off the main switch, remove the blown fuse and replace it with a 25 or 60-watt lamp bulb. An overloaded circuit is indicated if the bulb burns dimly. Some appliances or lights must be disconnected permanently and new circuits added to provide the increased current necessary. To determine which appliance is causing the overload, have someone stand by the switch box and watch the bulb while you disconnect various appliances. When you remove the appliance or appliances causing the overload, the bulb brightens. When

a blown fuse is replaced with a bulb and it burns brightly, it indicates that there is a short circuit in that line. Again have someone watch the bulb while you disconnect appliances and lamps and unscrew bulbs in fixtures. When the test bulb goes out or becomes dim, you have found the trouble. The remedy for the trouble is, of course, to repair the item in which the short exists. Now remove the bulb, replace it with a new fuse and turn on the switch. If the fuse again blows, there is trouble somewhere inside the walls. Turn off the switch and call an electrician. As an added safety precaution, always keep a flashlight handy near the switch box. Never attempt to change fuses in the dark.

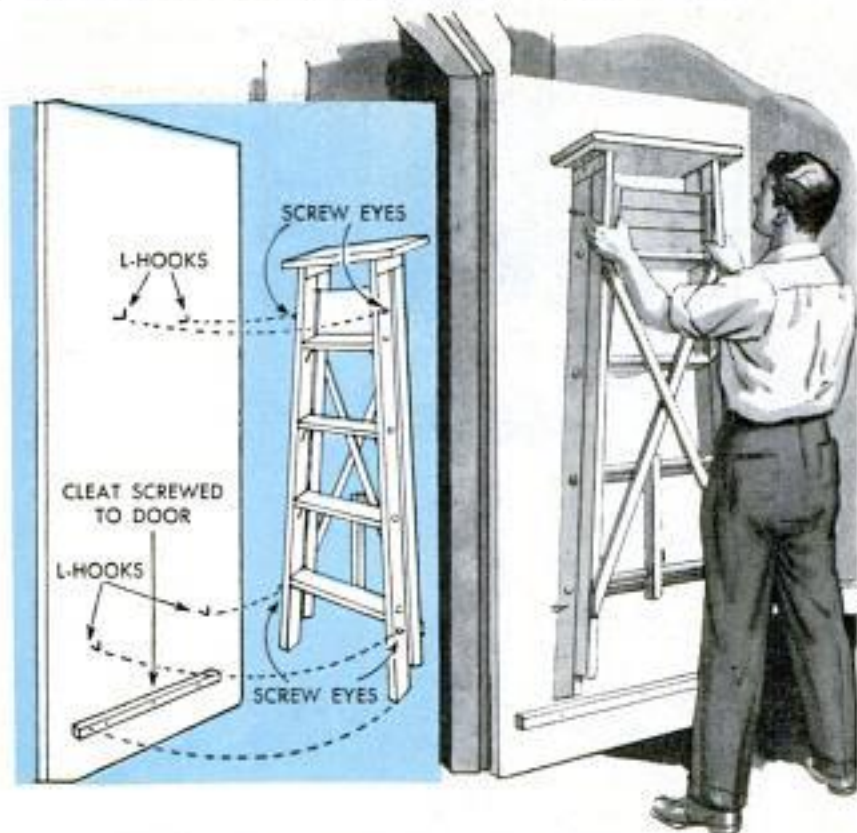
Thomas E. Moyer, Long Beach, Calif.

not to be reprinted
— per Shop Notes

WTM 59

Ladder Stored on Closet Door Is Readily Accessible

When a small stepladder is kept in a closet and used to reach a trap door in the ceiling, it will be more accessible and take less space if it is stored on hooks on the inside of the closet door. This is done by means of four screw eyes driven into the sides of the ladder as shown, and four L-hooks driven into the closet door at corresponding points. A narrow wooden cleat nailed horizontally near the bottom of the door will support the ladder and relieve the hooks of the ladder's weight. A length of felt weather stripping or other similar material nailed on the back edge of the top step of the ladder will prevent it from damaging the finish on the door.



Stains Removed From Porcelain

Most stains can be removed from porcelain fixtures in a bathroom or kitchen by scrubbing the stained areas with a mixture of powdered chalk wetted slightly with small amounts of ammonia and water.

Arlene E. Schulz, Cicero, Ill.

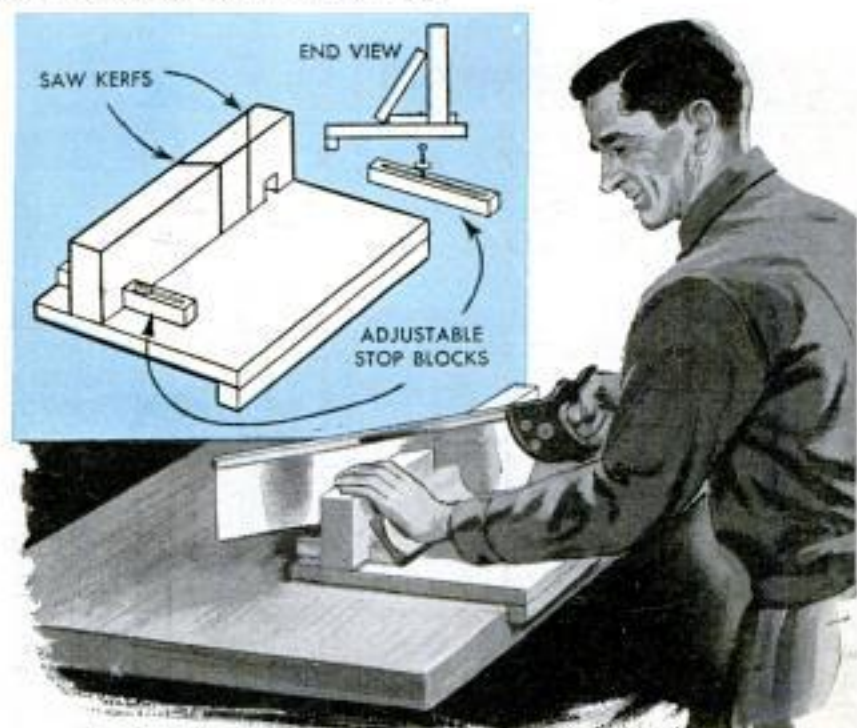
Your Car Should Be Waxed when water no longer rolls off in beads, but spreads into a smooth, shiny layer. This condition indicates that the finish is open to the elements and should be protected with a coating of wax immediately. Always apply wax with the car parked in the shade.

Roger Darling, Revere, Mass.

Wooden Miter Box for Cutting Compound Miters

With this miter box, compound miters for that occasional picture frame or small molding can be cut accurately and easily. Make the box as shown in the detail, using hardwood for the sliding stop blocks, the position of which determines one angle of the compound cut. Screw the upright to the base before making the saw kerfs, being careful to space the screws to hold each section in place after the kerfs are made. Stock to be cut is positioned in the box by first using a cardboard template to determine the correct angle for the joint.

—George A. Chiddie, Winston-Salem, N. C.

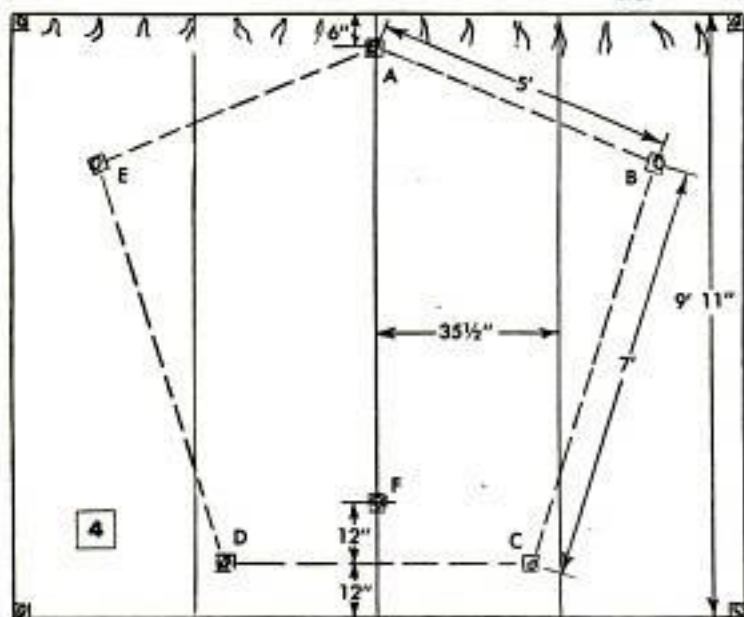
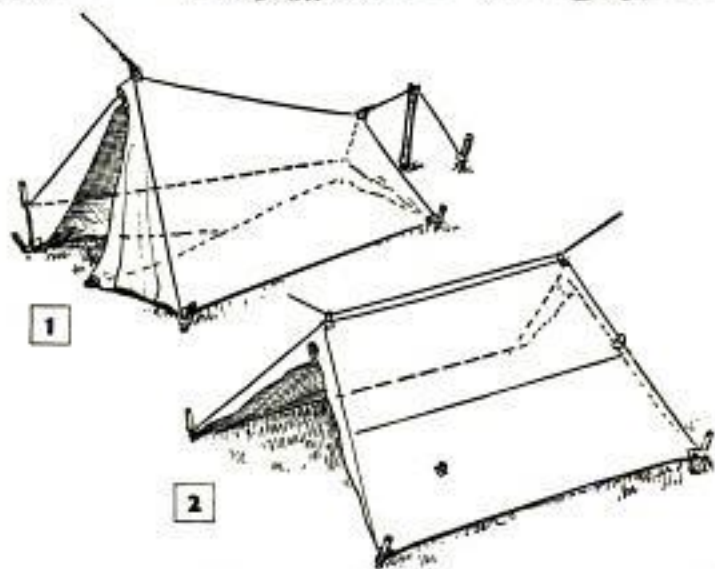




WTM 59

Featherweight Tent for Two

By Austin H. Phelps



A VERY PRACTICAL TENT that is light enough to be carried in a knapsack yet will provide shelter for two adults, was made by one outdoorsman simply by sewing together four 36 x 120-in. lengths of treated 6-oz. canvas as shown. After the lengths of canvas are sewed together, $\frac{1}{2}$ in. of the border is folded under and stitched.

Reinforcement patches are sewed on the corners as shown in Fig. 3. Then, rope grommets are made as in the detail and sewed to the patches. Also, reinforcement patches for attaching the peak and guy ropes are sewed to the canvas as indicated in Fig. 4. Patches are positioned at the points shown by first locating A and F on the tent. Then, C and D are found by measuring 30 in. to the right and left of the seam that passes through F as shown. E and B are located by striking arcs with a 7-ft. radius from C and D and intersecting them with an arc of 5-ft. radius drawn from A.

For wet weather, the tent is set up as in Fig. 1, with the peak rope at A, guy rope at F, the back secured to stakes at C and D and the front at B and E. For more floor space, the tent can be erected as in Fig. 2, with peak ropes at A and F and stakes at each of the four corners.

Garment-Airing Rack Hangs on Clothesline

Numerous garments on hangers may be equally spaced for airing on a clothesline by hanging them from this rack slung from the line. It is merely a length of 1 x 2 wood with two or three screw hooks to suspend it from the line, and several screw eyes spaced 12 in. apart on which to hang the garments.

Wax-Base Floor Cleaner Used on Wall Paneling

Wax-base cleaners, such as used on wooden floors, can be used to clean wooden wall paneling. When the paneling is extremely soiled, go over the surface with fine steel wool to loosen the grime, then apply the cleaner again.

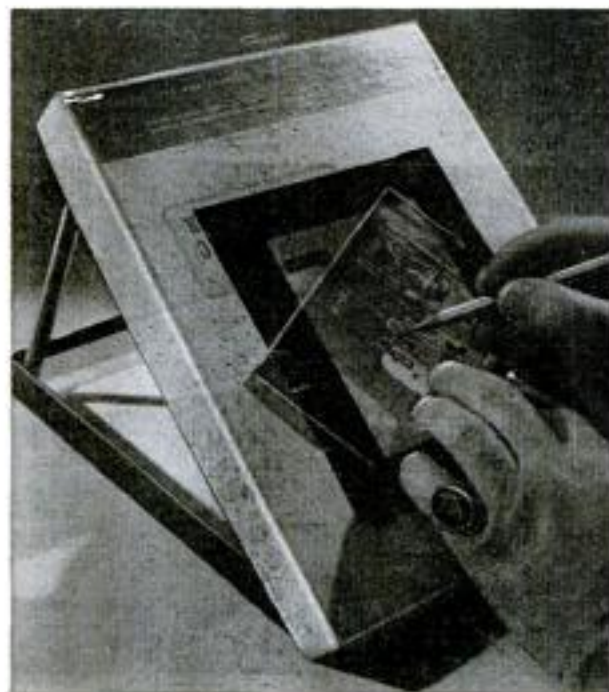
Portable Retouching Outfit Made From Photo-Paper Box

Self-contained and portable, this retouching outfit is made from an empty photographic-paper box. Cut a hole in the lid of the box to accommodate a 4 x 5-in. sheet of glass that is taped in place. A short length of dowel is used to hold the lid up at an angle. Facing the opened box towards a window or light will provide sufficient illumination, since the white surface of the inside of the box will reflect the light through the glass. Retouching materials and other accessories are stored inside the box when not being used.

Ken Murray, Colon, Mich.

Washing-Machine Barbecue Has Motorized Spit

What was once the family washer is now the family barbecue grill and a mighty efficient one which contains a built-in motorized spit. John Kostick of Binghamton, N. Y., shows what you can do with a little ingenuity and a discarded wringer-type washing machine. The wringer mechanism which operates the spit was slowed down by fitting it with a larger gear and pulley, and a drill chuck was fitted to the wringer end to hold a stainless-steel spit rod. The agitator was removed, of course, and the tub lined so charcoal could be used. A hood, or windbreak, made the grill complete.



Solving HOME PROBLEMS



MILDEW STAINS on a shower curtain can be removed by first washing the curtain in hot suds, then rubbing the stains with a lemon. Allow the curtain to dry in the sun. Iodine stains can be removed by using the same method



WAXING METAL CURTAIN RODS not only assures that curtains or draperies will slide easier, but also minimizes the chances of stains caused by rust spots forming on metal of the rods

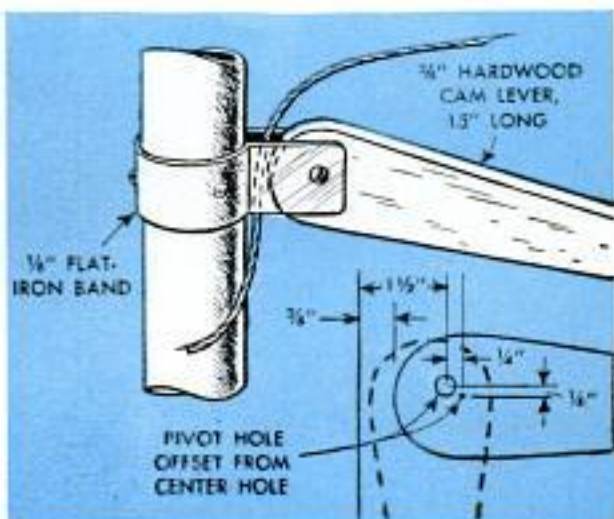
AN S-SHAPED "BRUSH" bent from flat iron is ideal for job of painting inner edge of check rail of top half of double-hung sash that cannot be lowered. Wool pad on brush holds paint



PREVENT GLASSES AND TUMBLERS FROM STICKING together when stored in stacks by fitting a paper muffin-tin liner on the bottom of each glass tumbler



CLOTHESLINE CAN BE TAKEN DOWN or put up in moments when ends of line are gripped by wedging effect of cam levers made and attached to poles





IF A BLOTTER IS NOT AT HAND to blot an ink spot, try using cleansing tissues. The highly absorbent tissues will soak up the ink as quickly as a blotter and there will be less chance of smearing the ink



WHEN AN ICE BAG IS NEEDED IN A HURRY and none is available, one can be improvised from a large plastic bowl cover. Fill the cover with ice cubes, tie the opening securely and it is ready for use



NEED A WRENCH for driving small screw eyes, cup hooks and the like? Do the job easily and with a minimum of finger strain by slipping an ordinary wooden clothespin over the loops and using it as a wrench



EXTRA NEEDLES ARE HELD safely in a receptacle made by plugging one end of an empty spool with modeling clay. Needles are held securely by the clay, but project enough for easy removal

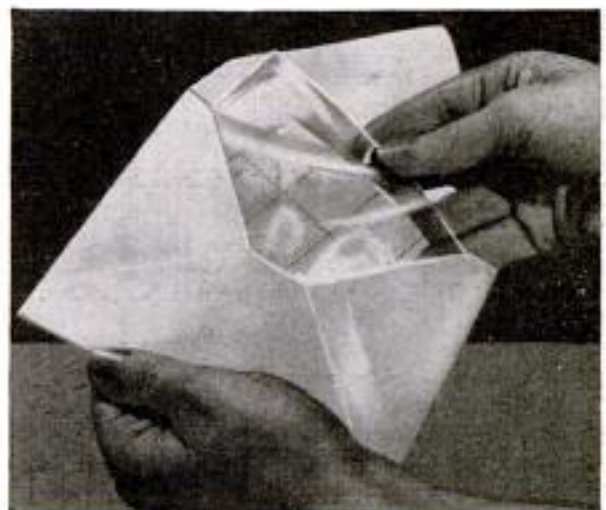


REMOVING THE COTTON from the neck of a small pill bottle is no problem when a moistened wooden matchstick is used. Insert the moistened stick in the cotton, twist once or twice; lift out the cotton

WHEN A SUITABLE BRUSH for applying wallpaper paste is not available, you can use a paint roller with equal or better results. The roller will apply the paste evenly and with much less chance of splashing



WHEN MAILING A NUMBER OF STAMPS in a letter, place them between the folds of a piece of waxed paper. This prevents them from sticking to the letter, even though the mucilage becomes dampened





Positive Pin Stop for Drawer Fits Vertical Hole in Back

Because this simple drawer stop does not project inside the drawer, it does not interfere with the contents, nor do the contents interfere with the operation of the stop. It consists of a short dowel or finishing nail slipped into a blind hole drilled vertically in the drawer back so that the stop projects about $\frac{1}{2}$ in. The stop should fit the hole so that it can be lifted out readily with the fingers when it is necessary to remove the drawer.

Enlarger Provides Ample Light For Photo Retouching

A photographic enlarger is an excellent light source when retouching prints in a darkroom. Place the print on an inclined surface, such as a masking easel, on the enlarger base and turn on the light, with the lens diaphragm wide open. The enlarger can also be used as a floodlight for studio work. Simply remove the enlarger lamp house, which contains the reflector and bulb, replace the bulb with a flood-type bulb and use as a reflector.

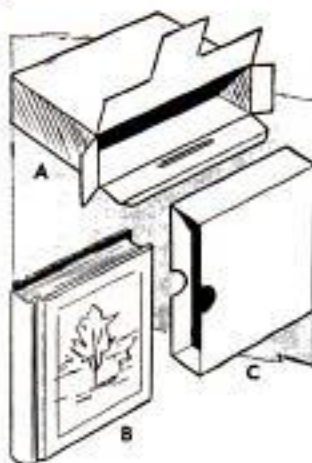
Edward L. Fisher, Milwaukee, Wis.

Plaster Figures Are Strengthened When Treated With Plastic

Plastic impregnating resins now available permit the hobbyist who works with plaster to add both beauty and strength to figures cast of this material. The resins penetrate the porous surface of the plaster and combine with it to form a dense, impact-resistant finish. Color, which can vary from a brownish black to old ivory, is imparted to the plaster at the same time.

Book Carton Provides Dust-Free Storage

To keep books from gathering dust on library shelves between readings, one man alters a book-club mailing carton by simply removing the folding flaps and cutting a half-round finger slot in each edge as in details A and C. The book, B, is thus protected from dust, is easily withdrawn for reference and the back is always exposed when placed on a shelf or in the bookcase.—A. Zanelli, Tampa, Fla.



When buffed and polished with paste wax, the treated plaster will appear to be wood or ivory. The unbuffed finish provides an ideal surface for applying enamel or lacquer if an opaque finish is desired, since the plastic-impregnated plaster will not absorb paint as will ordinary plaster which is quite porous.

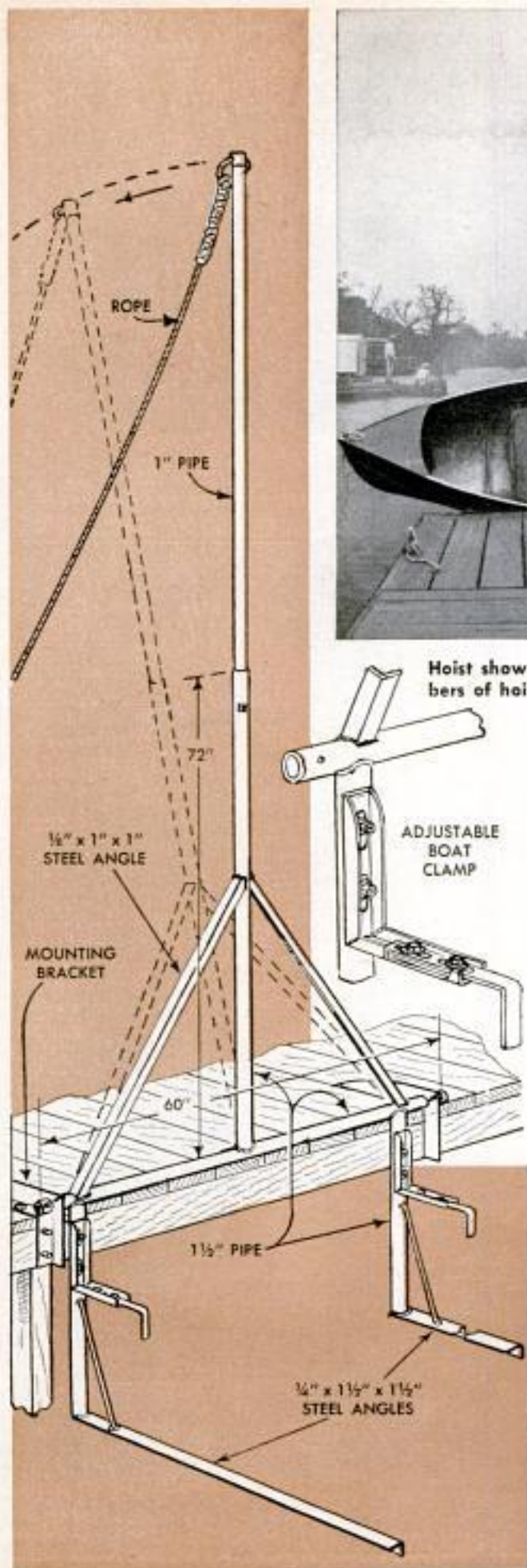
Thomas A. Dickson, Los Angeles, Calif.

Fountain-Pen Point Protected By Lead Shot in Cap

Reduce the chances of damaging the point of an open fountain pen when it falls to the floor by adding weight to the opposite end. This can be done by dropping a few pieces of lead shot in the cap, followed by a little melted sealing wax to keep the shot in place. Use only a small amount of wax and shot, so they do not interfere with the point when the cap is replaced on the pen.



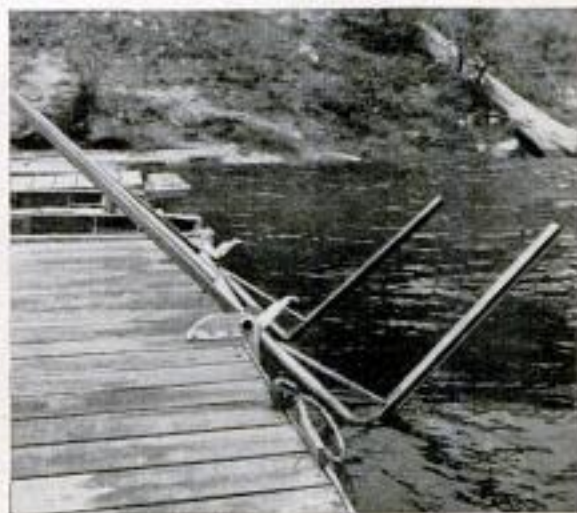
*PLASPREG
FURANE
PLASTICS
INC
4514 Bixby St., Los Angeles 39, Calif.*



Hoist shown in photos is designed for 14-ft. boat but all members of hoist can be made longer to accommodate larger boats

HOIST EASES BOAT CLEANING

CLEANING A FLEET of small boats was a difficult and time-consuming job for one operator of a boat-rental service, until he built the hoist shown in the photos and drawing. The device is made of welded steel angles and pipe, and pivots on two brackets mounted on the dock. To remove a boat from the water for washing, the hoist is moved to a vertical position as in the drawing, and the boat is floated over the arms so that the boat clamps can be hooked on the gunwale. Then, the boat is raised out of the water as shown in the photo at the top of the page.—L. A. Wilke, Austin, Tex.

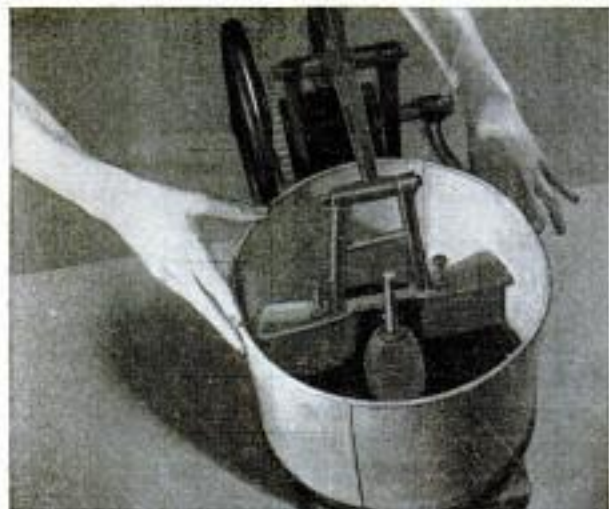


Can you NAME 'EM?

MANY of the work-saving appliances used in modern kitchens are descendants of items great-grandmother used 100 years ago. Other appliances of that era became outdated when the tasks for which they were designed were taken over by food-processing plants. By examining the appliances in the photos, part of Simmons collection on view at the Staten Island Historical Society, can you determine what they are? ★ ★ ★



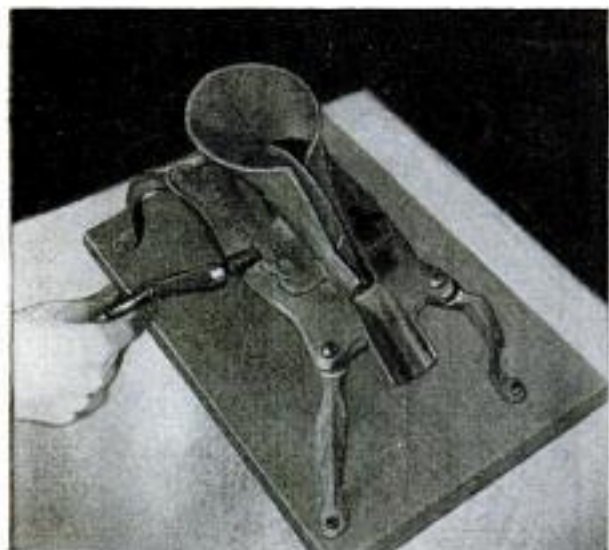
1. Let's start with a tough one. Can you imagine what this giant-sized roasting pan with a slotted lid was used for in great-grandmother's kitchen?



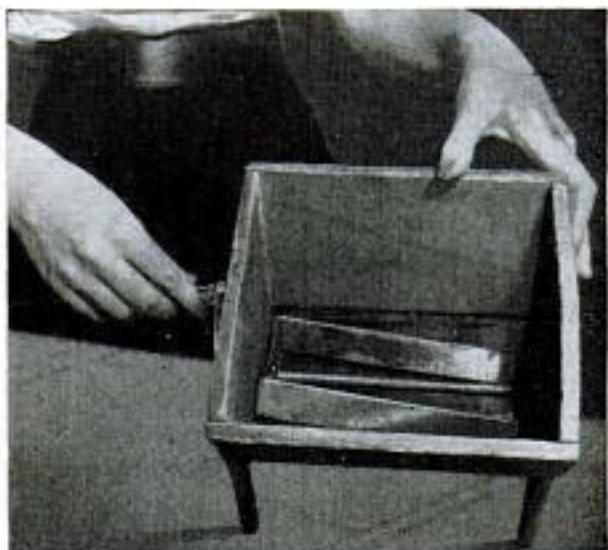
2. The electric-powered modern counterpart of this device is not a midget washing machine, despite the resemblance. What would be your guess as to its use?



3. This item was an accessory to the heating plant. Its descendant is enjoying increasing popularity in our modern society. Can you identify the appliance?

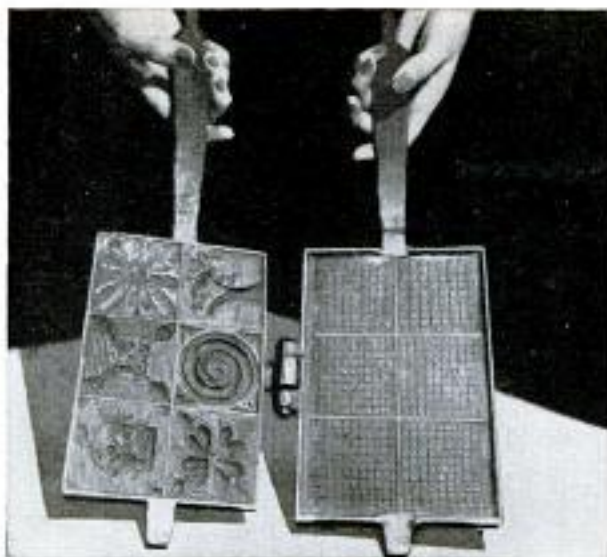


4. Once considered indispensable during the canning season, this appliance disappeared with the advent of commercial food processing. What job did it do?



5. Necessary for making bread a century ago, this device, now redesigned, still is used in modern kitchens. Can you identify this very ordinary utensil?

(see Aug 58, 163)



6. Not a fancy cookie press, this utensil would be more at home with breakfast bacon and eggs. Your modern-day models are simpler. But what is it?



7. Although this unit looks like a section of tubes from a steam boiler, it actually helped to make great-grandmother's housework lighter. What is it?



8. This one should not be too difficult. The modern version probably is made of aluminum instead of cast iron, but does the same job. Know what it is?



9. Not a nutcracker or curling iron, this odd-looking gadget was used for a task that no longer is performed. Do you know on what it was clamped?

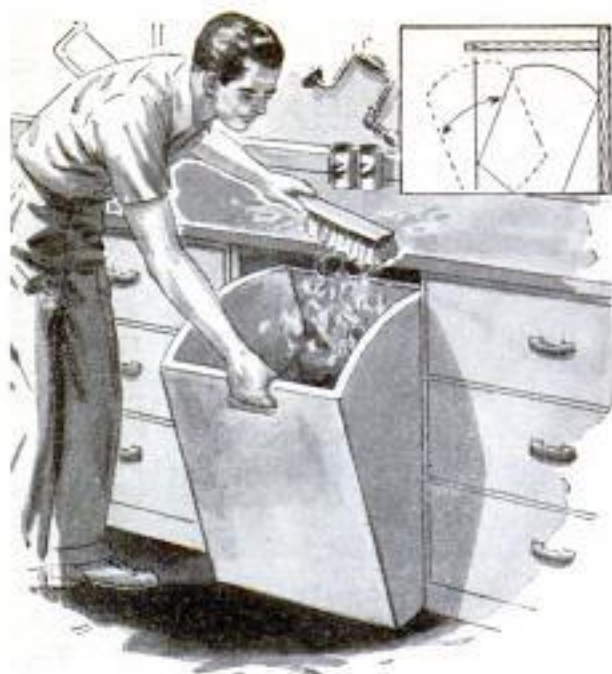


10. If you remember what this corrugated roller-and-plate combination was used for, you are a real old-timer. Can any of you youngsters identify it?



Answers to
quiz will be
found on
page 164

11. Although it does not look much like a kitchen appliance, this fearsome machine helped to produce some fine food. What would you guess it to be?



Tilting Shavings Bin Fits Under Workbench

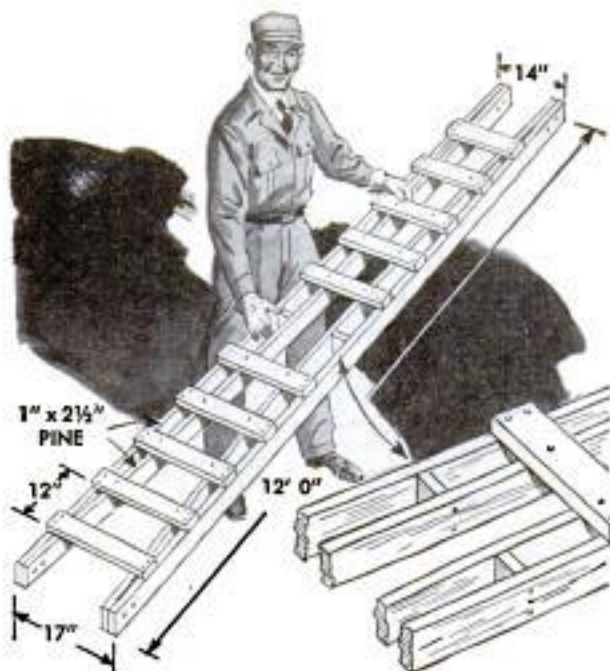
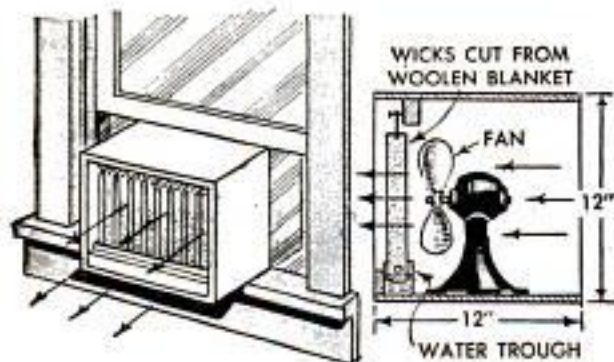
This bin tilts outward just like the old-fashioned flour bin. But note in the detail that it is not hinged at the lower corner like its counterpart. Rather it tilts on a V-bottom. This feature permits it to be easily removed for emptying.

G. E. Hendrickson, Argyle, Wis.

Wick-Type Room Cooler Is Quickly Improvised

In localities where humidity remains at a comparatively low level for long periods of time this room cooler will prove quite efficient. It consists of a wooden box with open ends, a small electric fan, a row of wicks and a long, rectangular water tank, or trough. Upper ends of the wicks are attached to a cleat nailed inside the box near the room end. A small, metal rod passed through holes in the lower ends of the wicks keeps them taut. The fan is placed just behind the wicks. Glass, plywood or hardboard closures are placed on each side of the box.

Carl S. Bates, Chicago.



Ladder Rails Curve-Braced For Maximum Rigidity

Like a ladder that feels solid and sure? Here's one that won't tip, sway or fold, even when made a full 16 ft. long. It's lighter than any you can build using 2 x 4 rails and 1 x 4 rungs. Rails, braces and rungs are cut from 1 x 2½-in. stock. Width is given as 17 in. at the lower end and 14 in. at the top, but you can increase these dimensions if desired. The rungs are nailed to the rails and also to the curved braces. Ends of the curved braces are clinch-nailed (or bolted) to the rails.

Answers to Quiz on Page 162

1. If you didn't know this one, don't worry. Even the museum does not know its name or use.
2. A forerunner of the modern electric-powered meat grinders and food mixers, this machine chopped mincemeat.
3. This is a reflector oven, used for roasting meats in front of a fireplace. The hand-operated spit has been replaced in modern rotisseries by one that is rotated by an electric motor.
4. This is a cherry pitter, used to prepare the fruit for home canning. It was faster than hand pitting, but food-processing plants do it faster.
5. You probably knew this one. It's a flour sifter, operated by a hand crank on the side.
6. If you like waffles, you might have recognized this one, since the right-hand plate has a pattern similar to that used on modern waffle irons.
7. When great-grandmother needed light for her housework, she made her own candles with the aid of a candle mold, such as this one.
8. Muffin pan is right for this one, although it does somewhat resemble an egg poacher.
9. This device was used to compress corks that were forced into the necks of bottles.
10. A fluting iron. The plate was heated on top of the coal stove to permit ironing pleats or flutes in cloth.
11. Sausage stuffer is what this machine is called. It's not likely that you will see one in a neighborhood delicatessen.

Carry Luggage On Top



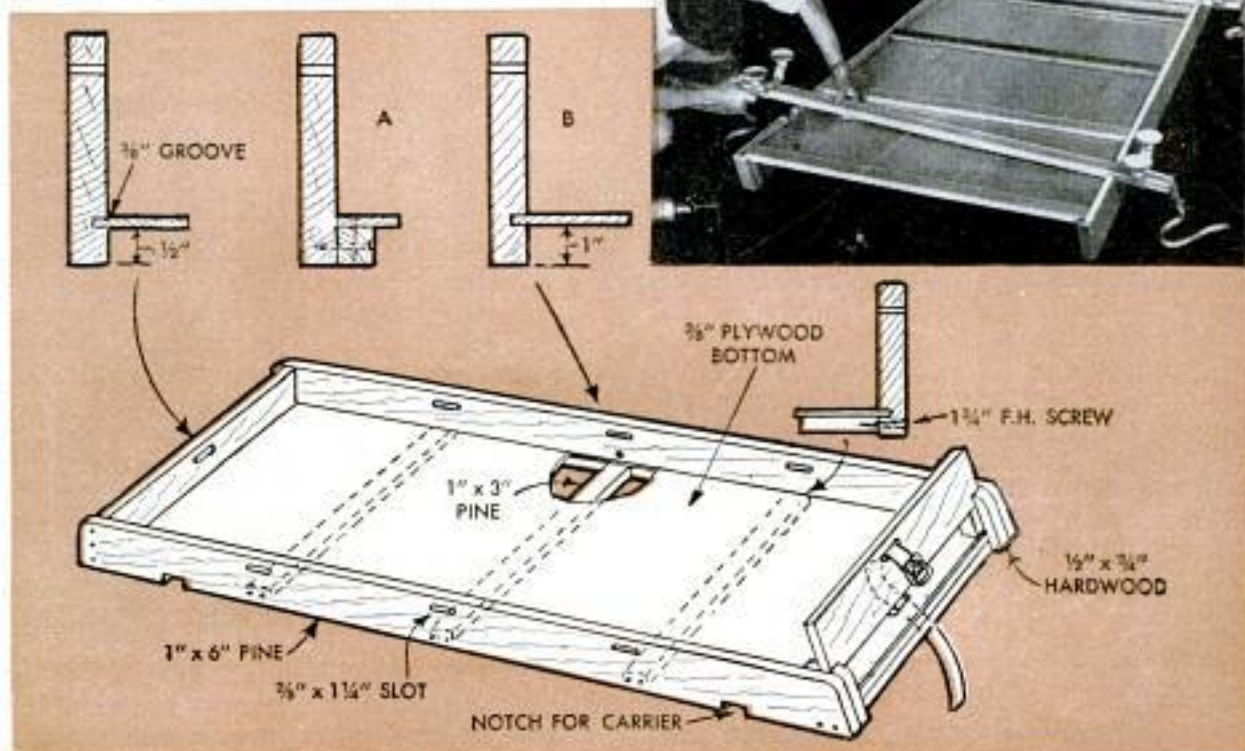
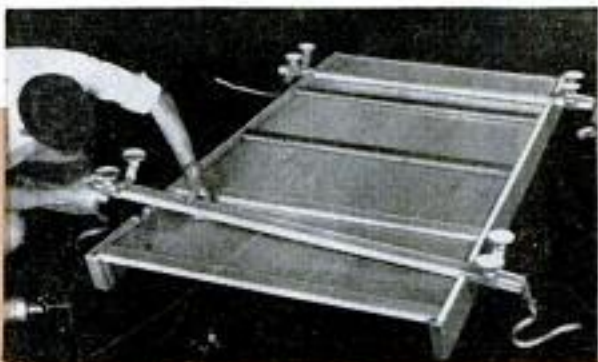
THERE'S NO NEED to crowd luggage and other vacation or camping gear inside your station wagon when everything can be carried on top in this handy luggage rack bolted to a bar-type auto-top carrier. This leaves the inside of the wagon uncluttered for comfortable riding during the day with ample sleeping space for two or three. As shown in the drawing and details, the rack is made of $\frac{3}{8}$ -in. plywood and 1-in. lumber cut to fit the space requirements of the wagon for which it is to be used. When placed in the back of the wagon as shown in the second photo from the top, the rack also can be used for carrying brick, loose sand, gravel and other material.

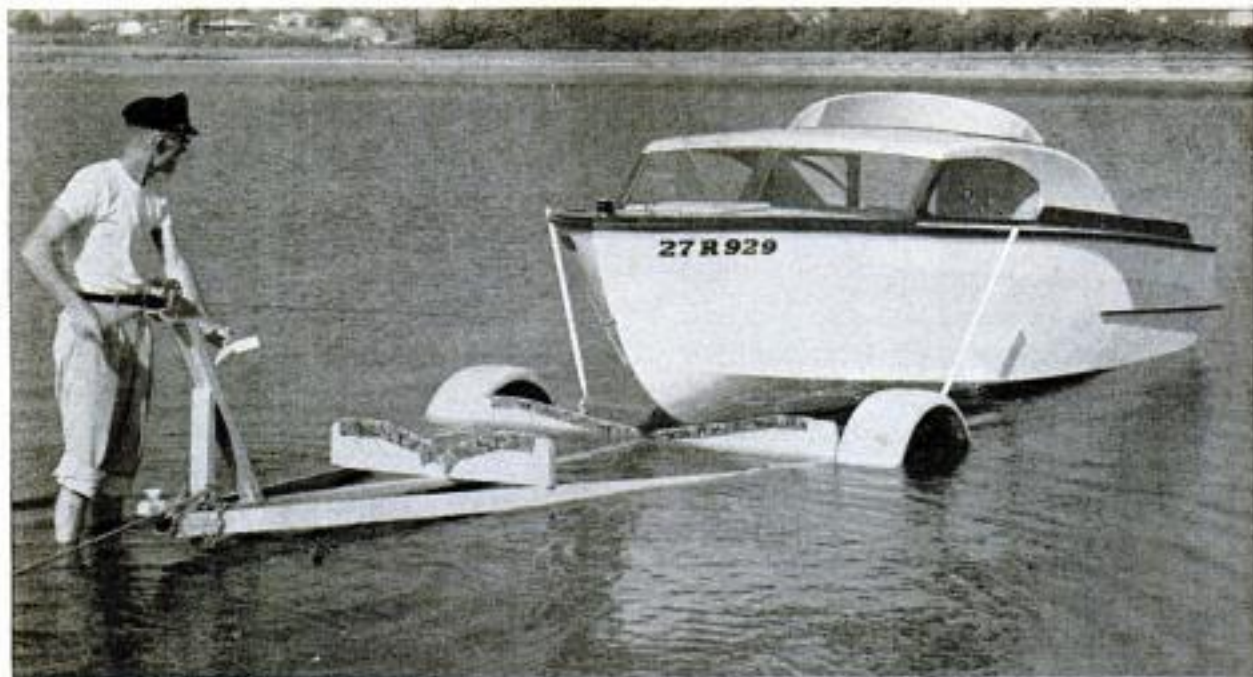
Tom Riley, Atherton, Calif.



Luggage rack used inside wagon as truck bed for hauling sand, gravel, etc. Below, carrier bars are bolted to bottom of rack before securing it on top of wagon

Below, plywood bottom may be nailed to strips as in detail A, or glued in grooves as shown in detail B





A winch, plus the upright guides, make it a comparatively easy task to get *Sea Knight* back on its trailer

SEA KNIGHT

17-Ft. Plywood Cruiser

PART IV

By Glenn L. Witt
NAVAL ARCHITECT

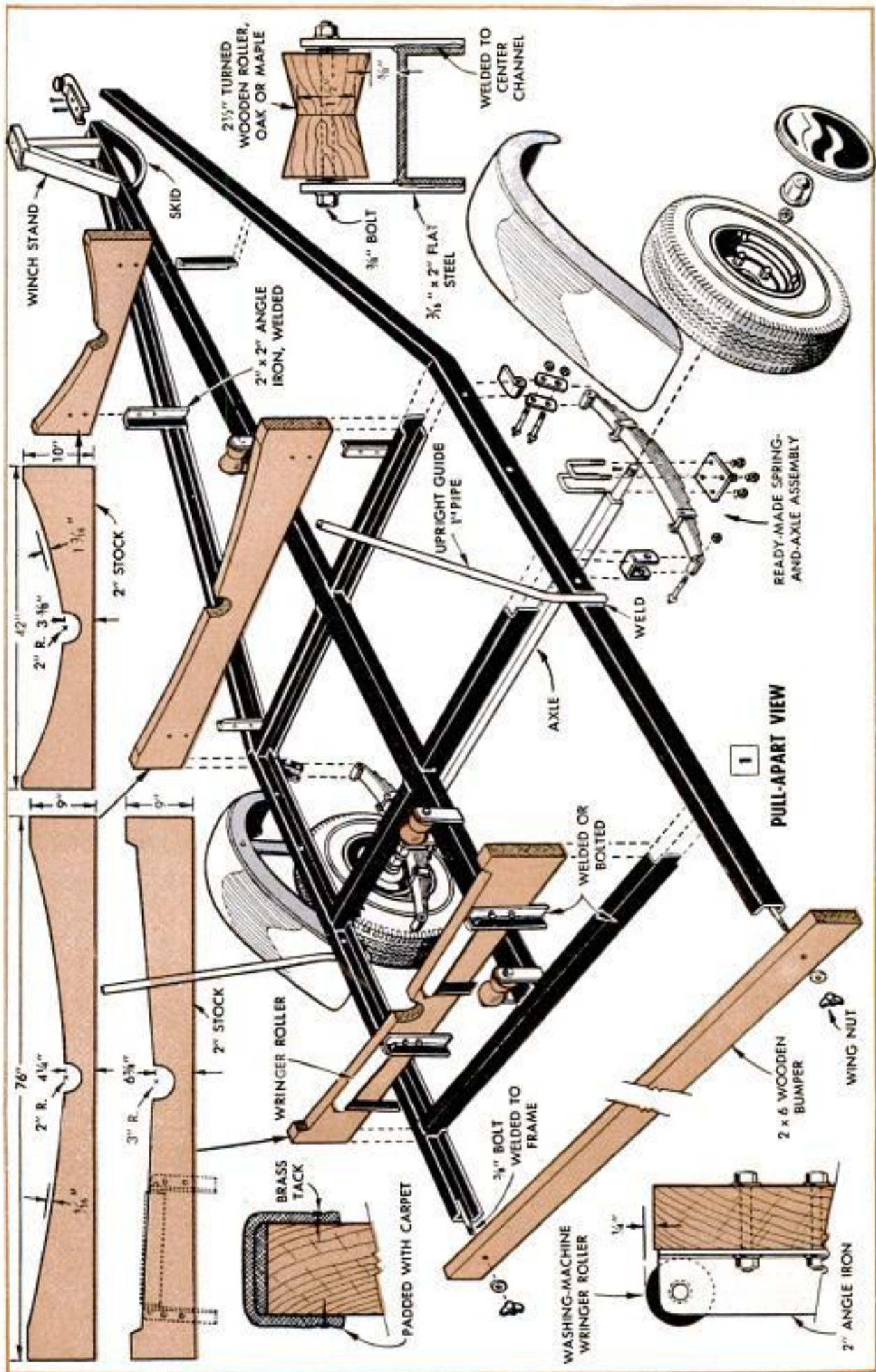
CONTINUING THE DISCUSSION of the motor well, the latter has a watertight tray of $\frac{1}{4}$ -in. plywood that fits flat on the 1 x 3-in. transom brace and extends at right angles to the transom and the motor-well bulkhead. The tray is supported by cleats to which it is nailed with 1-in. ring nails. Use glue or mastic on all the joints to insure watertightness and drill two 1-in. holes through the transom to drain water that may enter the storage compartments. Finally, the aft decking is fitted just under the cap rail and extended inboard to the side of the motor well. Floor battens can now be fitted in the notches provided in the frames and glued and fastened with 2-in. No. 10 screws. Notice that the 1 x 3-in. blocking on the aft side of the bulkhead acts as a ledge for the cockpit flooring. The latter is in three sections so that the center

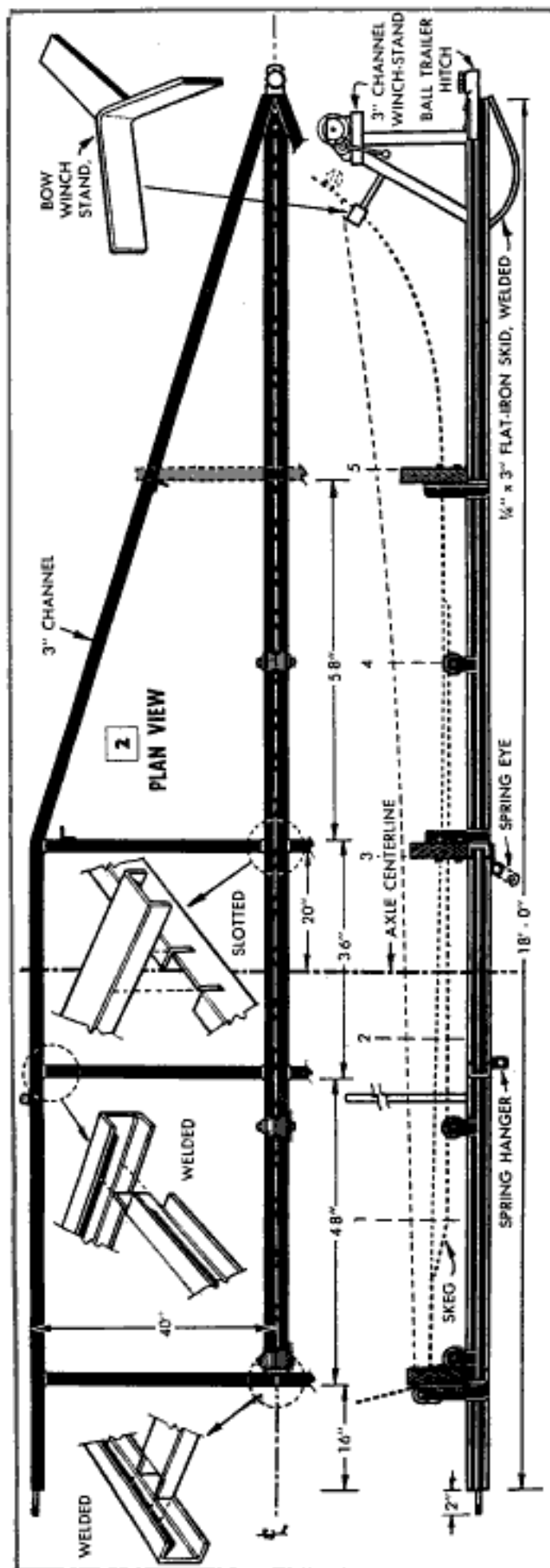
section can be removed. This section rests on the floor battens. The outer sections of the floor are blocked to the chines at the proper height and notched around the protruding frames.

Fig. 44, Part III, shows how the hatch on the forward deck is framed with $\frac{1}{2}$ -in. strips to provide a lip for the hinged hatch cover. A standard hold-down fixture is used to secure the cover. The cabin doors are of $\frac{3}{4}$ -in. plywood and are hinged accordion-fashion to fold against the helm box. Equip the door with a barrel bolt or a rim lock if locking the cabin is important. An 18 x 18-in. opening is cut on the starboard side of the bulkhead and fitted with a hinged cover to let down and form a table.

Mahogany trim: The sheer bumper rail, bow toe rail, quarter-round trim strip and the lower bumper rail are all located as indicated. All should be bedded in mastic and securely nailed or screwed. In attaching the sheer bumper rail, which extends from the bow to the stern, sand the edge of the side-deck planking to provide a flat for the rail so it will lie as vertical as possible. The quarter-round trim strip is applied at the juncture of the cabin sides and side decking. This is bedded in mastic and nailed with $\frac{3}{4}$ -in. ring nails. The cabin roof should be covered with glass fiber completely down to the trim rail at the junction of the cabin side and mahogany coaming. The helm box is made of 1-in. mahogany following the general shape shown to accommodate the particular steerer used.

Painting: After filling all holes and giving your boat a thorough sanding, exterior surfaces to be painted are primed with a good marine primer, followed with at least





two coats of marine enamel. The interior surfaces are sealed with a clear-resin sealer before painting to suit. The decking and floor boards should be painted with a nonskid deck paint. All areas to be left natural are first filled and stained and then given at least three and preferably five coats of marine varnish.

Cabin windows and windshield: The side windows are $\frac{1}{8}$ -in. plastic. These are set in the grooves in the coaming and bedded in compound to assure watertightness. The plastic is cut large enough to lap the opening $\frac{3}{8}$ in. at the top. Use $\frac{1}{2}$ -in. No. 4 screws at the lap and space them 3 in. apart. You'll find in installing the cabin windows that the plastic will have to be flexed considerably to fit it in position. Safety glass or thicker plastic can be used in the windshield. Bed the glass in compound and hold it in place with prefinished $\frac{3}{8}$ -in.-mahogany strips nailed with brass nails. The 15-gal. water tank, detailed in Fig. 55, Part III, is located under the berth between frames Nos. 4 and 5. A 13 x 13-in. sink may be installed in the counter top and piped to drain overboard just above the water line on the starboard side. Any angle-type galley pump may be used to draw the water from the water tank. Use plastic hose for this and be sure to have a vent in the tank inlet. A portable toilet having a disposable bag is preferred to the standard marine-type water closet as no through-the-hull fittings are necessary. The berth cushions are tailored in two sections to fit the space and can be of either kapok or foam rubber, 3 in. thick. By locating the cabin light on the helm side of the bulkhead it will be convenient to connect it to the electric wiring in the event an electric motor starter is used. Up forward on the top rail a combination light should be installed, whereas, aft, a white stern light with a telescoping pole should be used. The fittings on the deck may be kept basically simple. A heavy lifting ring, or mooring bit, is bolted to the front deck with angle chocks mounted on the toe rail. Aft, streamlined towing cleats should be mounted on the side decks near the transom both port and starboard. You may desire a flying bridge which can be provided by using a fixed-type, curved plastic windshield that comes with a rubber gasket to fit the contour of the cabin roof. One 15 in. high and 62 in. long is recommended.

Building the trailer: The trailer pictured and detailed in Figs. 1 and 2 was designed expressly for your *Sea Knight*. The bed is constructed of 3-in. steel channel, while the bumper and boat-cradle forms are made of wood. The 1½-in. drop-type axle used on the original was purchased from a trailer-supply house. It has a load capacity of 2000 lb. and provides a wheel tread of 88 in. which gives a maximum trailer width of 96 in. which is allowable in most states. Select a good commercial hitch that must be bolted or welded directly to the frame of the car. Avoid a hitch that merely clamps to the bumper. Weld husky safety chains to the trailer and provide a means of bolting them to the car. The winch, stand and wheel skid are optional. The winch, if used, should be equipped with about 35 ft. of cable and a safety hook for attaching it to the boat bow eye. The cradle forms are cut from 2 x 10 material to conform to the bottom of the boat. The two rollers at the transom can be improvised from washing-machine wringer rolls. The keel rollers are located as shown in Fig. 2. The rollers under the skeg of the boat should be adjusted for height after the boat is on the trailer.

Upright guides: The pipe guides locate and guide the boat directly to the center of the trailer even during a good breeze. They should be padded and welded to the trailer so the bumper rails just touch the guides. The wooden bumper which carries the license plates and the stop and tail lights is made so it can be removed when launching. The metal parts of the trailer should be primed with zinc-chromate primer before



Blueprints Available

Those who prefer to build *Sea Knight* from plans larger than the ones presented in the magazine may purchase a set of blueprints, 22 x 34 in., by writing Blueprint Department, *Popular Mechanics Magazine*, 200 E. Ontario St., Chicago 11.

enameling wood and all to either match or contrast with the boat.

Launching: To launch your boat, tie a 100-ft. length of cable or 5/8-in. rope to the trailer and to the car. A 25-ft. length of 3/8-in. rope is coiled and left on the fore-deck within easy reach. Unhook the trailer and push it as rapidly as you can down the bank. Then, as soon as it reaches water deep enough to float, grab the line coiled on the deck and give the boat a good shove. Forget about the trailer for the moment and pay out the line until the boat drifts clear of the trailer. Then simply pull in on the bow line and moor the craft to the shore. The trailer is pulled from the water by the 5/8-in. cable attached to the car. To recradle the boat on the trailer, push the trailer, with the cable attached, into the water. Then fasten the winch line to the boat and push the boat out to align it with the trailer. The winch makes it a simple matter to draw the boat up on the cradle of the trailer, after which the latter is pulled out of the water with the car and finally hooked to the car hitch. ★ ★ ★

To Save Both Time and Work

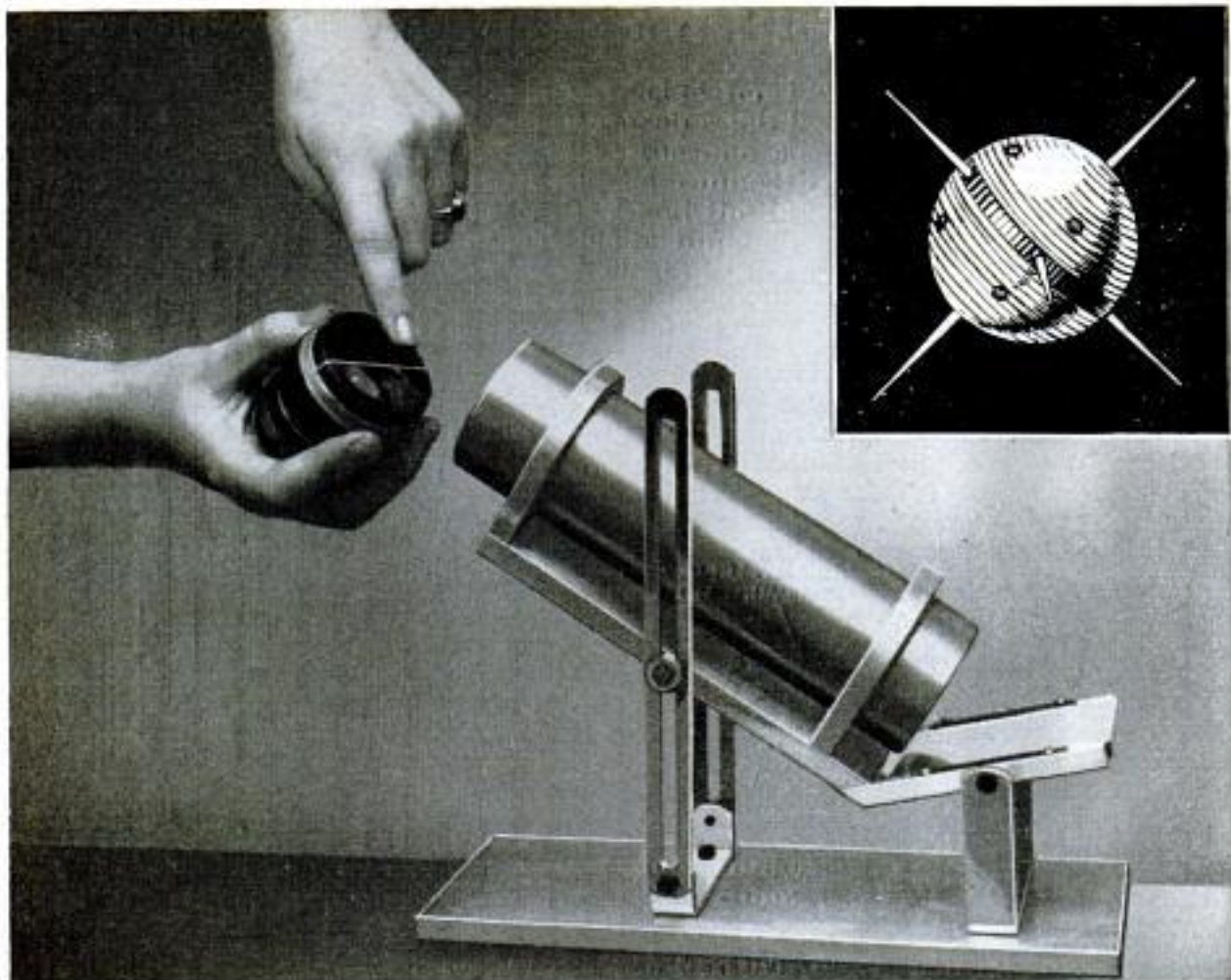
If you wish, you can buy the patterns for the stem, frames, transom, breasthook and chine blocking already drawn full size. And, to further simplify construction, you can buy these parts in kit form accurately cut in mahogany from Glen-L Marine Designs, P.O. Box 568, Compton, Calif.

Finishing Fabricated Panels Made of Plywood Scraps

Home craftsmen probably use more plywood than any other wood and eventually accumulate a sizable stock of remnants. In many cases these leftovers can be used up in a fabricated panel and one of the best ways to hide the built-up core of such panels is with a covering of muslin. The muslin should be of good quality and free from nubs. It is glued smoothly to the surface, and when dry, the pores of the muslin are filled by rubbing in a commercial wood fill-

er. Spackle is inexpensive and quite suitable for this purpose. The filler is carefully sanded with fine paper, taking care not to roughen the threads of the cloth. Then the surface is dusted and painted. When a hard glossy enamel is used, you can build up a durable finish which resists denting, making it ideal for a desk top. If a glossy finish is not desired, it can be toned down by rubbing with pumice and oil.

William B. Rasmussen, Posser, Wash.



Wire across diameter of eyepiece must be in vertical position in telescope to divide star field at meridian

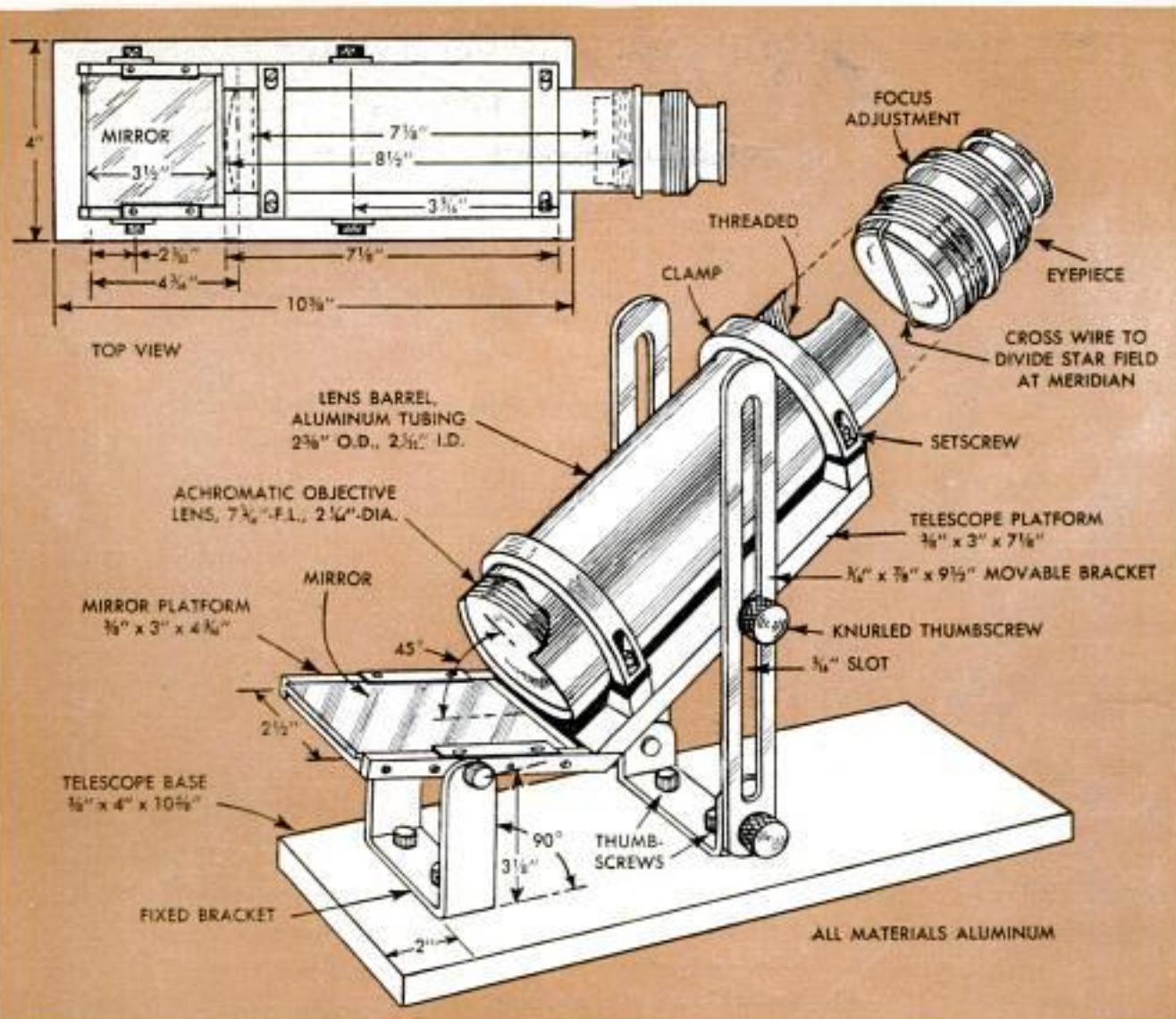
Build a "Moon Watch" Telescope

WHETHER OR NOT you join one of the amateur-astronomer teams of "operation moon watch" to help Smithsonian Observatory scientists track the manmade satellite, you can have plenty of fun satellite hunting on your own or just stargazing with this easy-to-build telescope. It is of a type designed for official use at moon-watch stations. The lenses give a wide-angle view ($12\frac{1}{2}$ deg.) at a magnification of $5\frac{1}{2}$ times. With it you can observe the planets in our own solar system and investigate some of the constellations in our galaxy.

Parts for the instrument, including two lenses, an aluminum tube, mirror and material for platforms and a base, cost less than \$30. For the eyepiece, a wide-angle Erfle lens with a focal length of $1\frac{1}{4}$ in. is recommended. The threaded focusing mount on this lens facilitates installing it in the lens barrel of the telescope. If the Erfle lens is not available, any lens of similar field, focal length and mount diameter can be substituted.

The second lens needed is the objective, which should be 51 mm. ($2\frac{1}{4}$ in.) in diameter, with a focal length of 180 mm. ($7\frac{1}{16}$ in.). The lens should be housed in a metal cell with an outside thread of 40 turns per inch to fit the threads in the lens tube.

The eyepiece and objective are mounted at opposite ends of an aluminum tube (machining grade) $8\frac{1}{2}$ in. long with an o.d. of $2\frac{3}{8}$ in. and i.d. of $2\frac{1}{32}$ in. The threads on the inside of the tube must be cut to match the threads on the eyepiece and objective for a good fit. If it is impossible to cut the threads yourself or to have the work done at a machine shop, the lenses can be press-fitted into the tube after the inside wall at each end has been machined to accept them. A simple spring ring will hold the objective in place. The eyepiece should be fitted snugly so that friction prevents it from turning, since the wire that crosses the diameter of the lens shown in the photo and drawing must remain in a vertical position when observing. The purpose of the cross wire is to divide the star field at



the meridian, cutting the observable sky exactly in half.

The lenses are positioned in the tube so that their facing surfaces are exactly $7\frac{1}{8}$ in. apart. If even approximate precision is achieved, this will provide a focusing range of 10 ft. to infinity.

With the lenses mounted, the basic telescope is complete. But, to enable you to have an overhead view while looking obliquely into the eyepiece, the telescope is equipped with a mirror mounted at a 45-deg. angle in front of the objective lens. This will permit you to place the telescope on a table and use it from a sitting position. The easiest way to do this, is to clamp the telescope on a $\frac{3}{8}$ -in. board

or aluminum platform as detailed. The mirror platform, made of the same material, is simply screwed to the telescope platform and the mirror is clamped in position on top of it as shown.

Almost any kind of pivot arrangement that will permit adjusting the viewing angle of the telescope can be used. The one shown consists of two slotted uprights pivoting on U-shaped brackets screwed to the base. Thumb screws turned into tapped holes in the platform permit the telescope to be tilted to the desired position and locked in place. Mirror and telescope tilt as a unit on a fixed bracket. Thumb screws at the top ends of the bracket arm provide a lock for the mirror platform. ★★★

Rings Lost In Bathtub Drain Retrieved Through Trap

Small articles like rings and beads that pass through the drain of a bathtub can be retrieved usually from the bathtub trap. The trap cover is visible generally, coming slightly above the floor. It is threaded on the trap and has a square or hexagon boss

to which a wrench can be applied to loosen it. When a trap cover cannot be turned with a wrench, you cut two small notches in the edge on opposite sides of the cover, so that the cover can be tapped loose. Apply cup grease to cover when replacing.

Jig Permits Uniform Spacing of Fence Pickets



When building a picket fence, you can save time and do a neater job by using a wooden jig, such as the one shown. The width of the upright determines the spacing between the pickets, and the block at the top permits the jig to be hung on the upper rail of the fence. A cleat at the bottom end of the jig holds a picket in the desired position while it is being nailed to the rails.

Enno R. Haan, Evanston, Ill.

Adhesive Tape on Thumbnail Aids in "Starting" Pen

To aid in starting ink flow of a pen in intermittent use, one artist attaches a small square of adhesive tape to his left thumbnail. After dipping the pen, a quick pass of the point over the tape cleans it effectively and causes ink to flow uniformly from either a crow-quill pen or ruling pen.



and causes ink to flow uniformly from either a crow-quill pen or ruling pen.

Handy Toolkit for Small Jobs Made From Large Juice Can

Hand tools and several types of fasteners are carried in this home toolkit that is made from a large juice can. Two steel flats are screwed to the can with a length of broomstick between them to provide a handle. Four shallow tins are screwed to the flats to hold the fasteners.



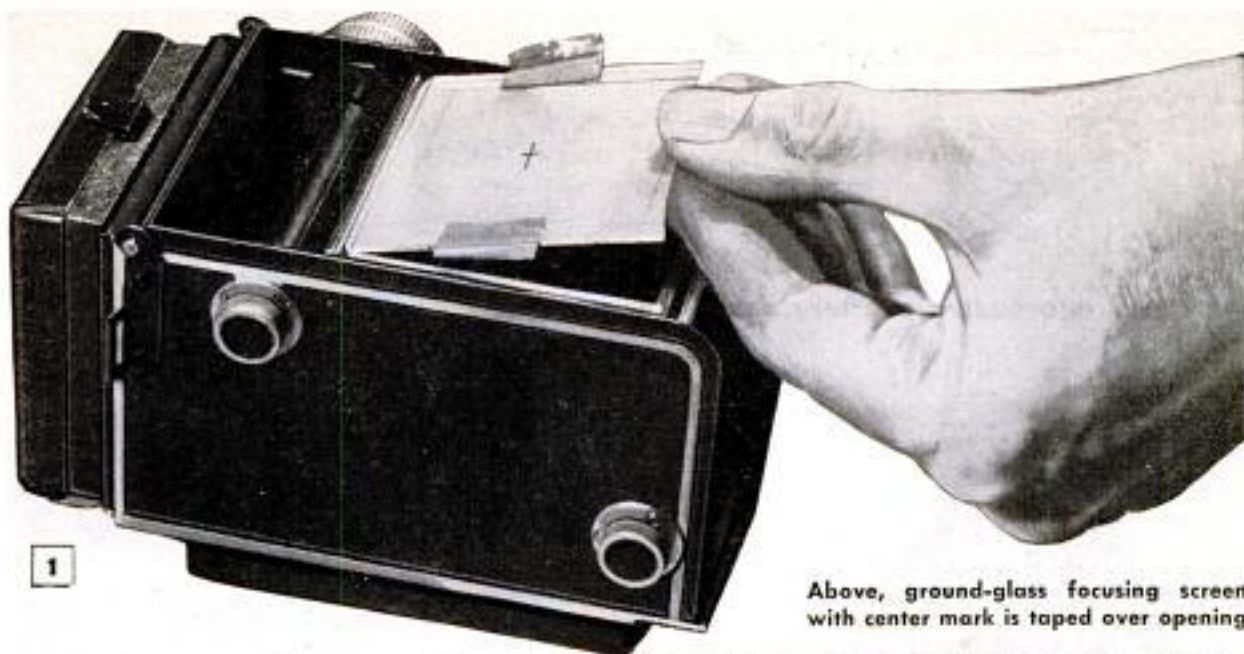
Sectional Wooden Platform For Bathroom Darkroom

Converting the bathroom into a temporary darkroom is an easy matter with this sectional wooden platform which fits over the bathtub. Constructed of cypress or redwood slats, the platform serves as a convenient worktable, while the tub below is used for washing film or prints. The platform should be built in sections so it can be stored easily in a closet or corner of the bathroom when not in use.

Virginia Hanson, Venice, Calif.



ⓘ Never shake a can of varnish before using it; stir it. Shaking will cause small bubbles on the finished surface.



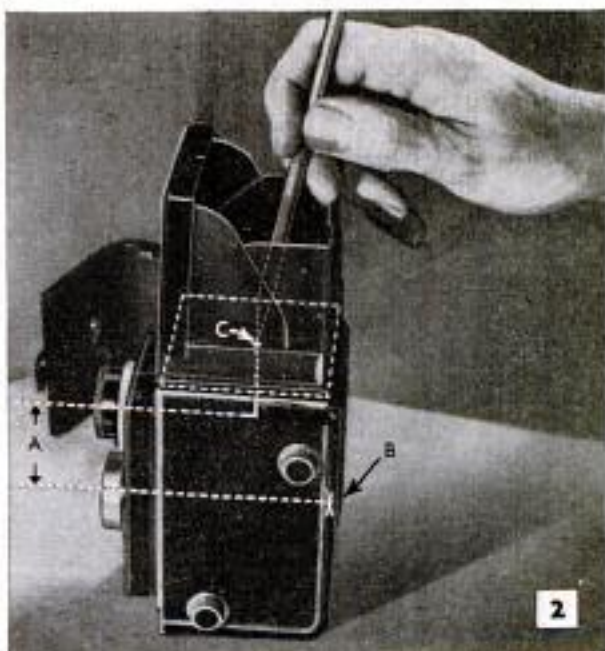
Above, ground-glass focusing screen with center mark is taped over opening

Correcting for PARALLAX

SHOOTING WHAT YOU SEE in the viewer at a range as close as 12 in. can be done with a twin-lens reflex camera if you first compensate for the difference in the fields of view of the taking lens and the viewing lens. This is known as parallax and must be corrected to avoid cutting off part of the picture. To do this, first remove the back of the camera and tape a square of ground glass over the film opening as shown in Fig. 1. Next, mark a cross, B, with a pencil on the ground glass at the exact center of the picture area. With the camera mounted on an elevator-type tripod, focus it on some distant object and then swing the camera until a prominent part of the image coincides with the mark on the ground glass.

Now, without moving the camera, make a mark on the view finder as in Fig. 2, C, to coincide with the same detail. Remove the ground glass and load the camera. Finally, measure the distance from the center of the taking lens to the center of the viewing lens, A, Fig. 2.

Compose the image on the view finder as you want it and prop a steel tape against the object as in Fig. 3 so the lens-to-lens measurement, in this case $1\frac{1}{16}$ in., coincides exactly with the mark on the viewer. Without disturbing the position of the camera, elevate it on the tripod until the dot on the viewer centers on the end of the tape. Place the proper auxiliary lens on the taking lens and shoot. You may find from test shots that the amount the camera must be raised is slightly less than the actual measurement between the lenses.



Above, camera is focused on object 200 ft distant and dot made in center of viewer, C, to coincide with prominent point in image. Below, steel tape propped against subject provides target at which to aim camera in registering lens-to-lens measurement with mark C and finding amount camera must be raised



YOU CAN HANDLE THOSE Small Concrete Jobs

X195

Photos and information courtesy Sakrete, Inc.



EXTRA-STRONG MIX



MEDIUM MIX



MIX WITH TOO MUCH WATER





Three steps in fitting block in concrete-block wall are shown above. A ribbon of mortar first is troweled along edges of top of lower block. Also, although not shown, mortar is spread along edges of end of adjacent block. Next, block is lowered into place and tapped into mortar on lower block and adjacent block

SSMALL CONCRETE REPAIRS, and even moderate-sized masonry-construction jobs, are within the scope of any homeowner now that the problem of determining the correct proportions of material in concrete and mortar has been solved for him by convenient ready-mixed products. Simply adding water to the dry mixes produces quality material that can be used with assurance for any job. The only possible error to be made with the ready-mixes is to add too much water, and if a quantity

of the dry mix is held out until the final mix is completed, such an error can be corrected by adding more of the dry material. The three photos on the opposite page demonstrate the three types of mix possible when water is added. The first two are good, the last is not, too much water having been added. The extra-strong mix should be used whenever possible; the medium mix will be used for most jobs, as it will flow more readily. Tools required for working with concrete are a shovel, hoe



Typical of many small-to-medium-sized jobs that can be done around the home with the aid of ready-mixed cement products is this one, where a concrete fillet between the wall of a concrete-block garage and a driveway has broken up. First step is to remove all loose material and wire brush the area carefully. Next, the area is soaked down thoroughly with a hose to assure that old material does not absorb water from fresh mix. Final step is to trowel on extra-strong mixture of sand-cement mix. Larger repairs would require use of sand-gravel-cement mix





First step in sidewalk repair is to remove old concrete and undercut crack to assure "keying in" repair



Old concrete then must be thoroughly wet down to prevent it absorbing water in fresh concrete mix



Crack in walk then is filled with concrete, which is tamped thoroughly to compact it into all spaces

for mixing the dry mix with water, a pointed trowel, a wooden float and a rectangular finishing trowel. A square of plywood or solid stock may come in handy for carrying small quantities of mortar or mixing small quantities of concrete.

When making repairs on concrete, certain general rules can be followed: All loose material must be removed. Cracks in concrete should be chiseled out so they are wider at the bottom than at the top. Thus, when concrete is poured into them, it is "keyed" in the old material and will not readily break loose. Before pouring concrete in such cracks or other openings, saturate the old work with water. This will prevent the old concrete from absorbing water from the fresh mix and destroying its strength. Concrete does not harden because of the evaporation of the water; a chemical action takes place that produces heat and causes the cement particles to bind themselves to the sand and gravel aggregates and to each other to form a solid



Wooden float then is used to smooth freshly poured concrete. Steel tool is used for final finishing

mass. Water is necessary for this chemical action, and its removal will result in weak, crumbling concrete that will have to be replaced almost immediately. Too much water in a mix is just as detrimental to quality. The excess water will float away the light particles of cement, leaving only the aggregates. If you pour a too-wet mixture of concrete and it seems to dry too rapidly, turning yellowish from the sand, it would be best to chop out the concrete before it sets and do the job over. The weak material will crumble and wear quickly, but there will be just enough cement left in the mix to require chiseling to remove it. Digging it out before it sets is the easier way, and will require much less time.

Mortar mixes are a boon to the homeowner who wants to build a fireplace, barbecue pit or the foundation for a small building. The correct proportions of sand, cement and lime assure consistent color and quality of work, making it possible for anyone to be a competent mason. ★ ★ ★

Photographs Attached to Wall By Thumbtacks Hidden on Back

Photographs can be hung on a darkroom wall, without a visible means of support, by pushing several thumbtacks through a strip of tape and sticking it to the back of the print with the tack points exposed. A strip at the top and bottom of the print will provide a firm anchorage and leave no puncture marks in the print.

Robert C. Florian, Chicago.

Glass Block is Developing Tank

For a sturdy and comparatively inexpensive container for processing sheet film, obtain glass building blocks of the type that are open at one end. Various sizes are available.—Jeanne Stasack, Chicago.



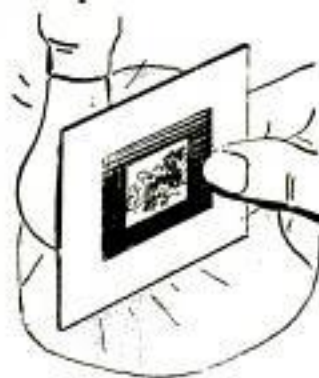
Detergent Photoprint Solution Permits Spot-Free Drying

One or two drops of a liquid dishwashing detergent in a quart of water makes a solution that will allow fast, spot-free drying of photoprints. After the prints have been washed, soak them for about two minutes in the solution. The treatment works on both glossy and matte papers.



Color Transparencies Checked With Aid of White Paper

When a regular viewer is not available, color transparencies can be checked with the aid of a sheet of white paper. Place the transparency on the paper and hold both up to a light with paper nearest the light. Because the light shining through the paper is diffused, the color values of the transparency are much more apparent than if the film were illuminated by direct rays from the light source. Black-and-white negatives can be checked in the same manner.

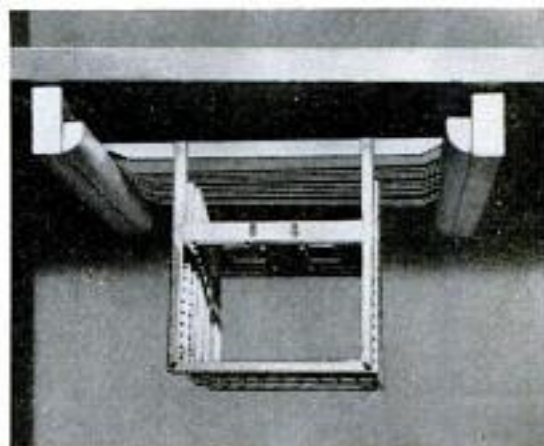


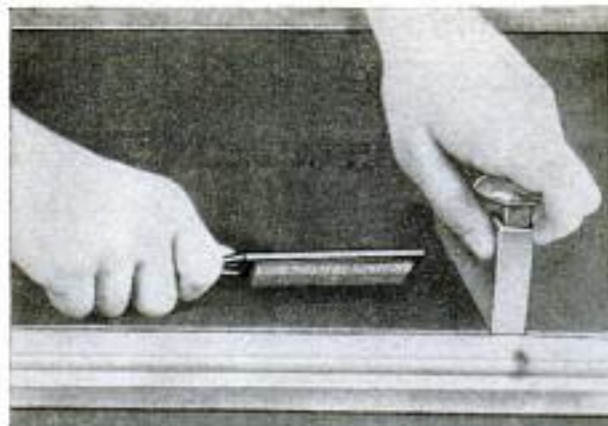
John Krill, North Lima, Ohio.

Two Simple Methods for Storing Film Hangers in the Darkroom

One simple means for storing cut-film developing hangers is to use dowel supports which are inserted in holes drilled in a wall. The dowels should be spaced from 2 to 7 in. apart, those closer together being used to support hangers upside down for drying. The second method is to support the hangers from L-shaped wooden tracks fastened to the underside of a shelf. The tracks are formed by nailing a 1/2-in. strip to the side of a piece of 1 x 2-in. stock, which in turn is screwed to the bottom of the shelf. Space the tracks

wide enough to admit the hanger crossbars, using one set for empty hangers and another for loaded ones.



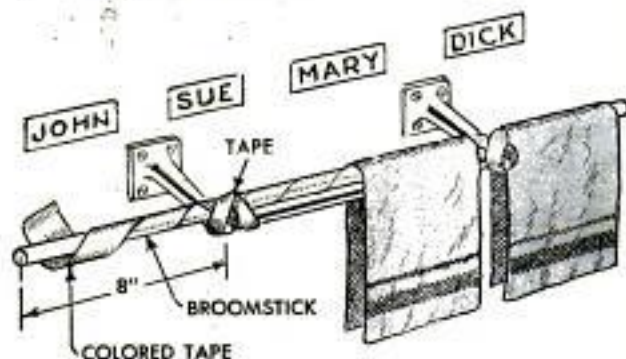


File Card Stretches Screening

Gripping screen wire to stretch it smoothly on a frame is no problem if a file-cleaning wire brush is used. Grip the brush handle and force the bristles of the brush into the mesh of the screen as shown. Because the brush grips a fairly wide area, narrow "ripples" in the finished job, caused by pulling on only a few strands of wire, are eliminated.—Ed Packer, Chicago.

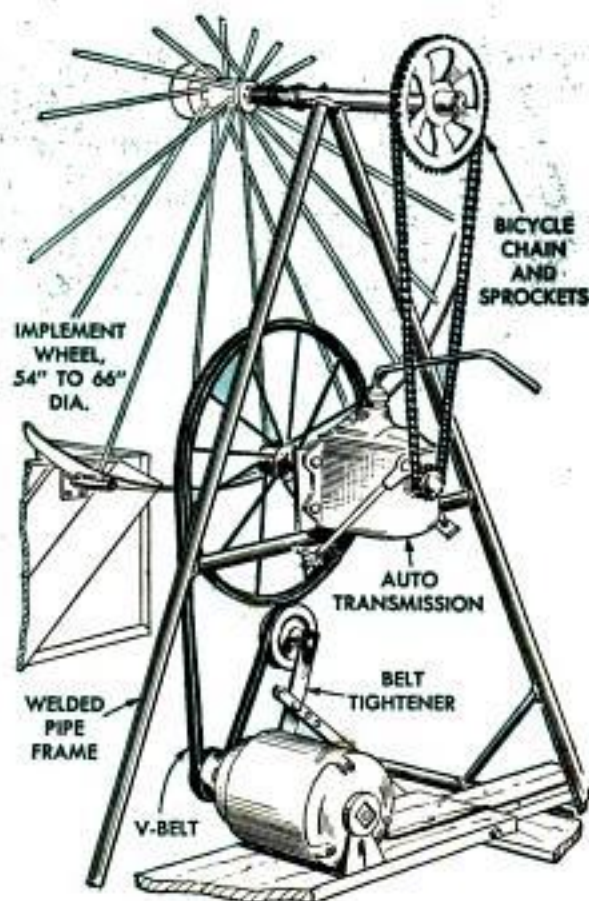
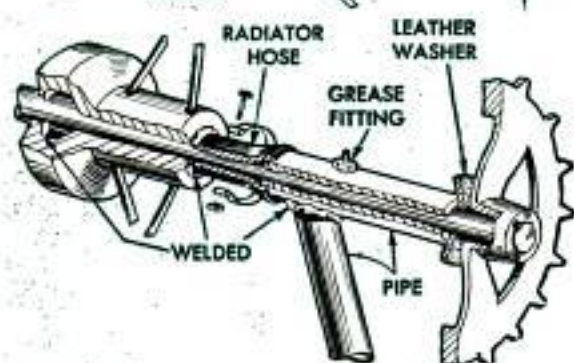
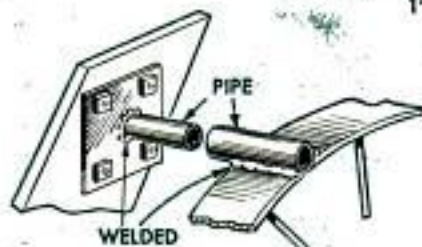
Towel Rack Capacity Enlarged To Accommodate Extra Guests

When your regular towel-rack facilities are insufficient for house guests, the racks can be lengthened temporarily with pieces of dowel or broomstick. The extensions may be wrapped with colored, water-resistant tape to match or contrast with the bathroom decor. Tie or tape the extensions to the regular towel racks as shown and place a strip of tape bearing the name of each guest on the wall above each towel position. The extensions can be removed quickly and stored for future use.

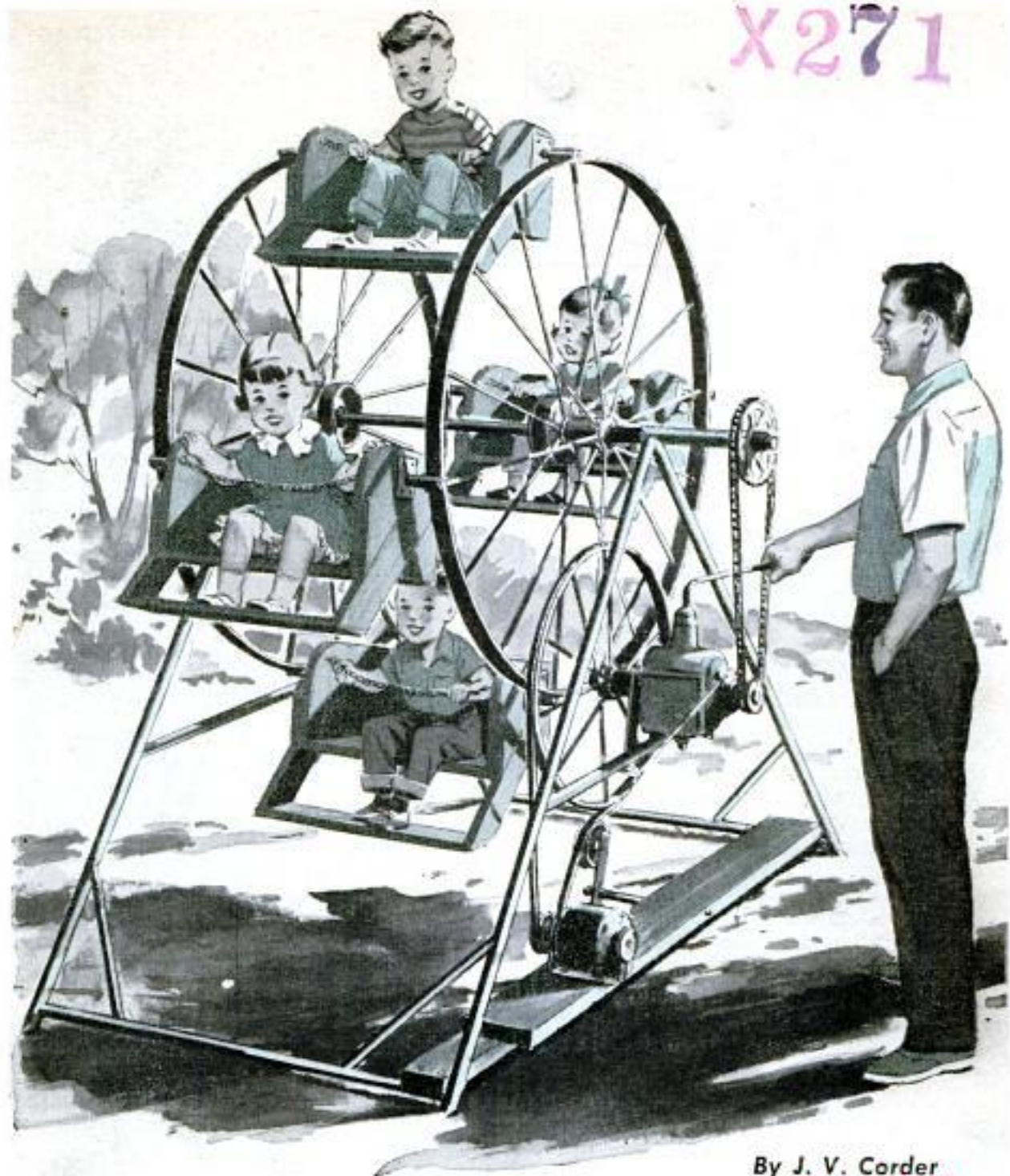


Tape Is Gauge on Circular Saw

Instead of using a crayon or pencil mark on the table of a circular saw to indicate the lengths of a number of pieces of stock to be cut, fix a piece of masking tape to the table. The tape is seen readily through a layer of sawdust and can be removed and reused several times.



X271



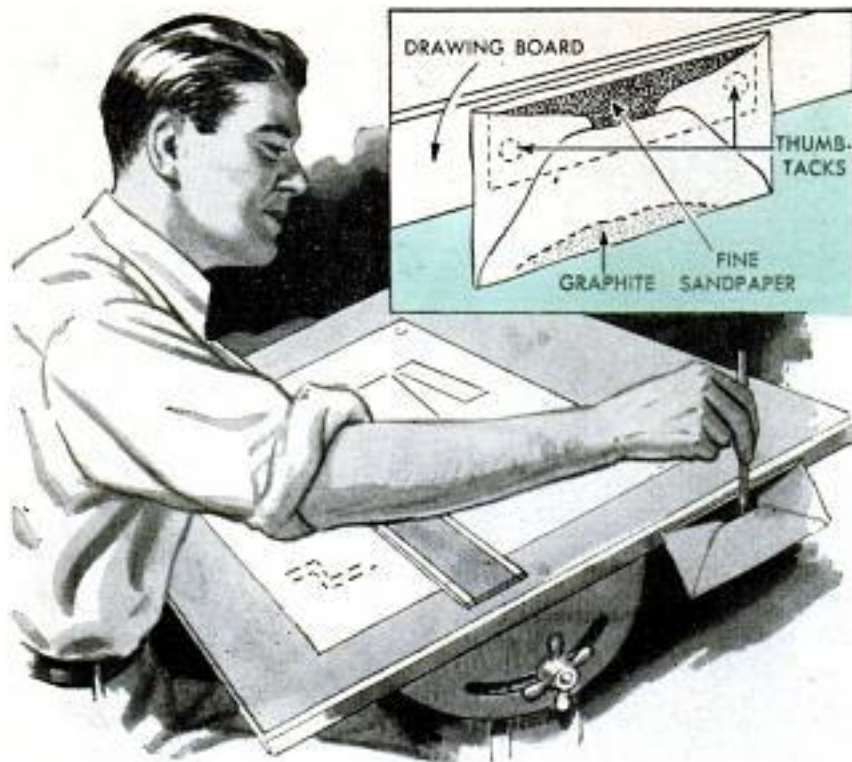
By J. V. Corder
 2517 35TH ST.
 Des Moines 10, Iowa

Back-Yard Ferris Wheel Has Three Speeds

DRIVEN through an auto transmission by a $\frac{3}{4}$ -hp. electric motor, this Ferris wheel may be operated at three different speeds by merely shifting the transmission. The frame consists of two A-frames of 2-in. pipe welded together, the two units being tied together at the lower ends by short lengths of pipe welded in place. The upper end of each A-frame terminates in a short horizontal pipe, which serves as a bearing for the wheel axle. Note in the lower center detail how a leather washer and a piece of

radiator hose serve as grease retainers.

Seats swing between two large implement wheels, such as cultivator or hayrake wheels, which are welded to the axle. The seats are pivoted as shown in the upper detail on the facing page, and fitted with safety chains. Lower detail shows the drive mechanism. Sprockets and chain used on implements may be substituted for those of a bicycle if desired. Large belt wheel is about 30 in. in diameter. Note belt tension is provided by idler pulley. ★ ★ ★



Envelope Catches Pencil Dust

Instead of keeping a piece of sandpaper on his drawing board for pointing pencils, which often soiled the drawings, one draftsman used the idea shown. A strip of sandpaper was placed inside an envelope having the flap removed, and the assembly tacked to one edge of the drawing board as indicated, locating it within easy reach. In this way, the envelope served as a pocket in which the graphite or wood dust was retained, and the sandpaper was always covered to prevent it from soiling either artwork, or hands.

A GOOD WOOD SCRAPER CAN BE MADE from a piece of hacksaw blade by grinding off the teeth and then sharpening one end to a keen scraping edge. If the characteristics of the steel permit, turning the cutting edge by burnishing or tapping with a hammer will give the tool better scraping action. Such a tool is especially handy for getting into places not accessible with the conventional scrapers. Old power-hacksaw blades are ideal for this purpose as they are heavier than those used in hand hacksaws.—Walter E. Burton, Akron, Ohio.

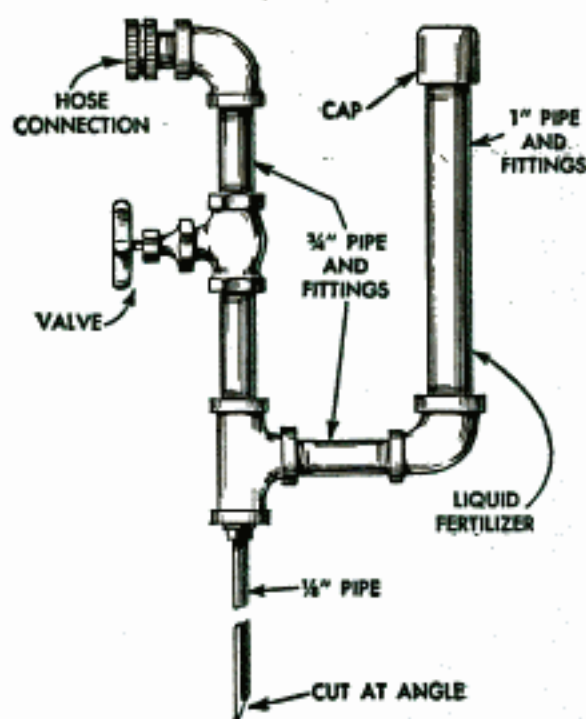


Models Displayed on "Wall" Made of Perforated Hardboard



Models built by one young hobbyist are made part of the decor of his room by hanging them on a display "wall" of perforated hardboard. The latter is nailed to the room wall over furring strips, which space it from the wall so that hooks can be fitted into the perforations. After giving the hardboard a prime coat and a coat of finish paint, the clouds, sky, roadway, railroad track and sea were painted on in brilliant, natural colors. Final step was to hang the models on the board with the proper hooks.

The Masonite Corp.



Root Irrigator Made From Pipe and Fittings

With a few short lengths of pipe and fittings you can improvise this subsurface root fertilizer and irrigator in less than an hour. Also, the device can be used for trenching under a sidewalk when installing a sprinkler system, and similar jobs. For trenching, it is only necessary to connect the device to a water supply, insert the end of the $\frac{1}{8}$ -in. pipe shaft in the soil and turn on the water at full pressure. A shaft length of 3 ft. is sufficient for most trenching jobs.

When using the device as an irrigator, its valve should remain closed until the shaft is started into the soil. The water can then be turned on with sufficient pressure to permit the shaft to dig its way into the ground. Once the shaft reaches the desired

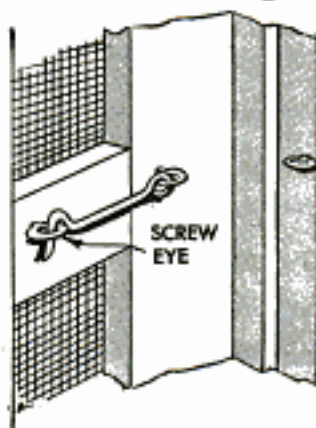
depth, pressure should be reduced so that the water can be absorbed by the soil without washing it away. Small holes drilled into the shaft will increase the absorption rate for irrigating purposes.

When the device is used for applying liquid fertilizer to the roots of shrubs, small trees and other plants, the procedure is the same, except that the water must be turned off when the fertilizer is being poured into the 1-in. pipe reservoir. After replacing the cap on the pipe, the water is turned on and the fertilizer mixes with the water as it enters the shaft. Only enough fertilizer as is needed for a single application should be poured into the reservoir, since it has no shutoff valve.

Doug Beaton, Burbank, Calif.

Screw Eye Prevents Hook Damage

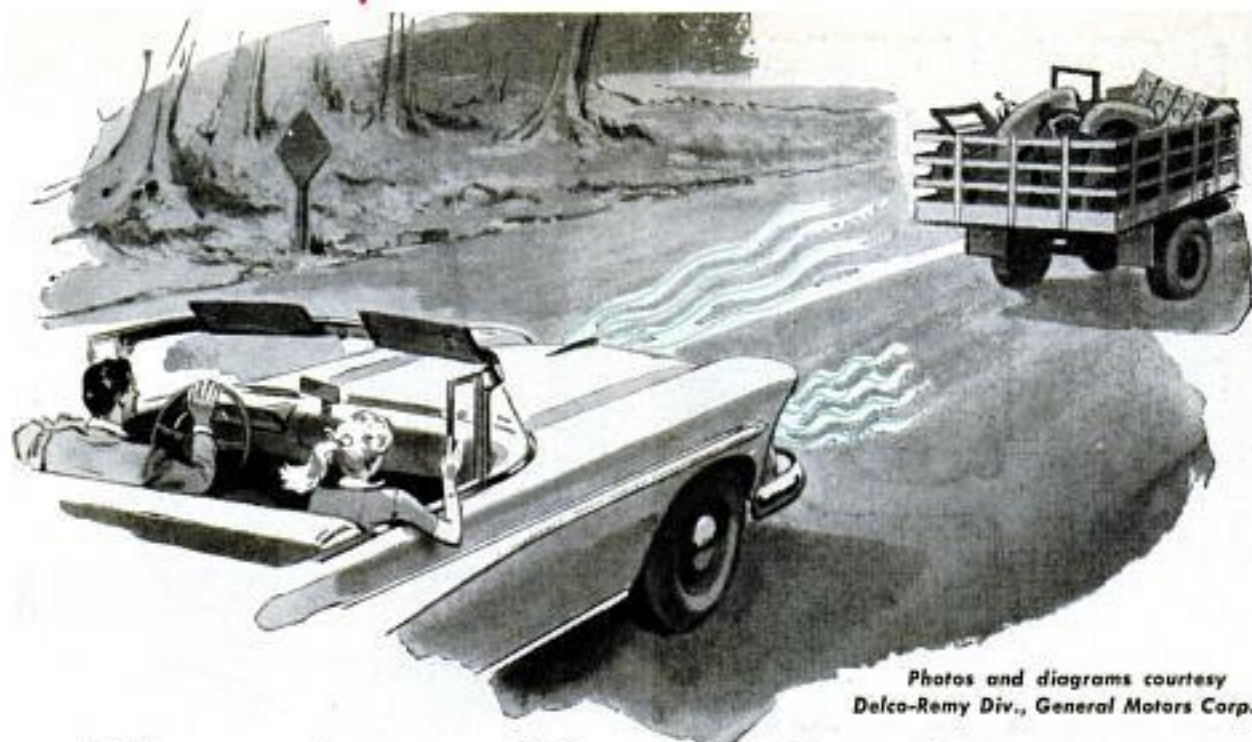
Avoid catching or tearing clothes on the hook of a screen or combination door by installing an extra screw eye on the door to take the end of the hook as shown. This also will prevent the free end of the hook from grooving the door.



Guard for Glass-Cutter Tip

No need for a glass cutter to rattle around in a drawer or tool kit between jobs, where the cutting tip can be dulled or damaged. Protect the tip with a "bumper sheath," made from a short length of small-diameter rubber tubing.





Photos and diagrams courtesy Delco-Remy Div., General Motors Corp.

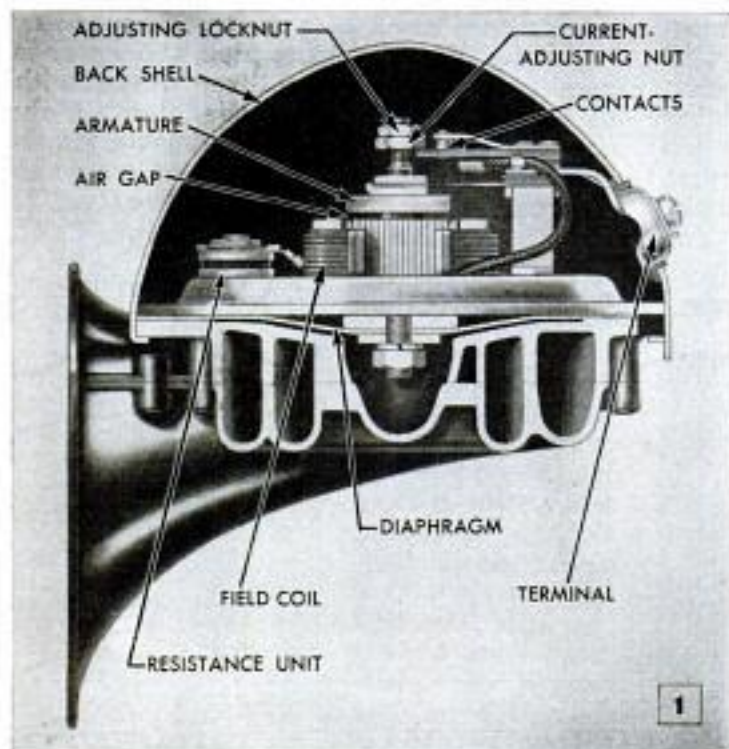
New Auto Horns Are Better

By W. K. Mitchell

THREE DEVELOPMENTS in recent years have combined to make imperative the need for improving horns on modern automobiles. First is the increase in the number of cars on the streets and highways, second is the installation of more auto accessories and third is the better

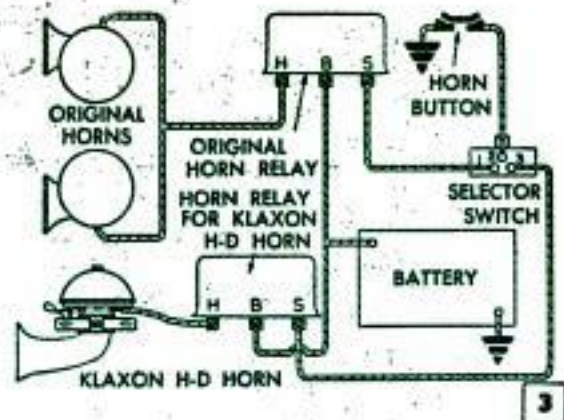
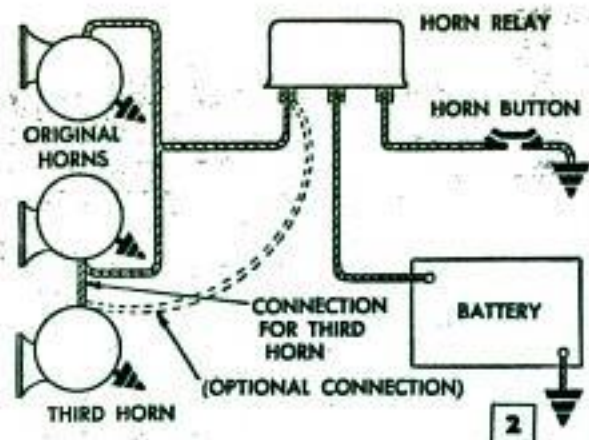
soundproofing of automobile bodies. In congested traffic, motorists find it necessary to sound their horns more often, which adds to the regular din of traffic, but at the same time, soundproofed automobile bodies, plus the noises caused by radios, heaters and other accessories make it increasingly difficult for drivers to hear the horns of other cars. Therefore, while an improved horn must be one that is heard more clearly, at the same time it must not appreciably add to the sound level of traffic.

"Third tone" horn is typical seashell-type, air-tone horn. Frequency rating is higher than horns on most modern cars



Two solutions to the problem now are available. The first is a "third tone" horn, Fig. 1, designed to produce a tone that blends harmoniously with the tones of the pairs of horns in use on most cars. The second is a high-frequency, penetrating-note horn, Fig. 6, designed for highway use.

The third-tone horn is a typical seashell-type, air-tone horn, and is tuned to B-flat, which has a frequency rating of 468 c.p.s. This is a higher note than either of the two matched horns on most cars, which are tuned to E-flat at 311 c.p.s. and G at 390 c.p.s., respectively. Blending the tones of the three horns produces a chord that is more pleasing than the two-note signal and, since it covers a wider



Wiring diagram shows two methods of connecting third-tone horn to present pair of horns in car

range of frequencies, is more easily heard through the noise of traffic and sounds inside the car.

The high-frequency horn is designed for maximum signal penetration on the highway, and is similar to horns in use on some highway buses. It can be mounted on any passenger car in combination with the original horns in the same manner as the third-tone horn. One recommended installation for the high-frequency horn, Fig. 3, utilizes a special switch that permits the highway horn to be cut out of the circuit when the car is being driven in the city. The highway horn has a fundamental frequency of 313 c.p.s. in combination with an overtone frequency of about 3000 c.p.s. Tests have shown that a high-frequency signal has the best chance of penetrating

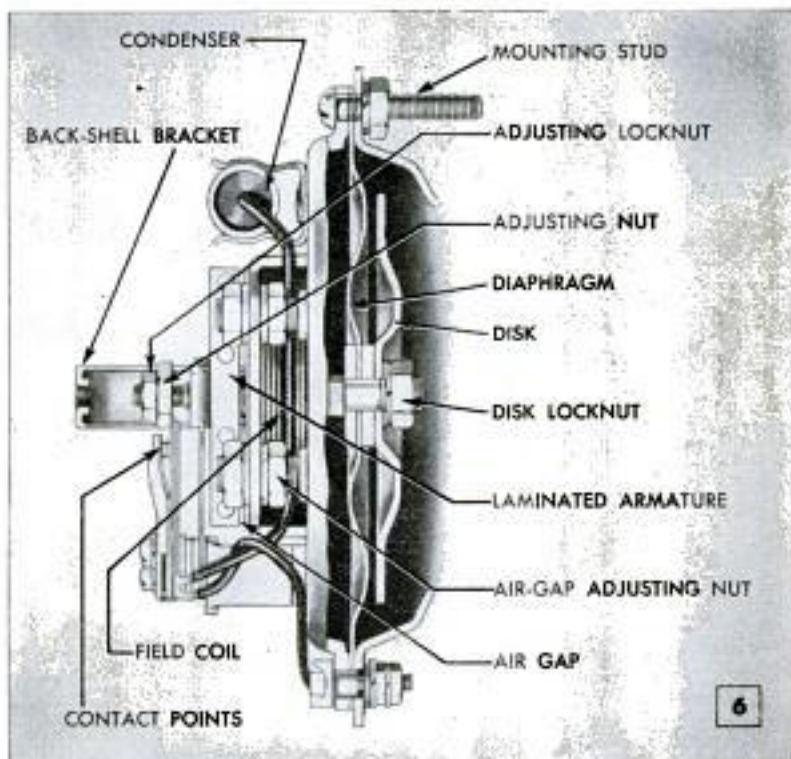
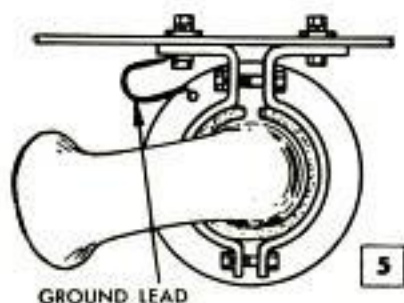
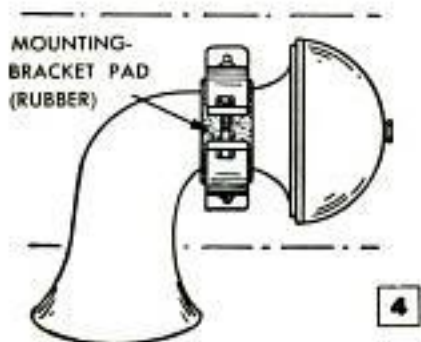
High-frequency highway horn is wired so it can be switched off in city because of its strong signal

interference noises such as caused by rushing wind, heater fans and the like, that are in the low-frequency range.

As indicated in Figs. 2 and 3, either type of horn can be wired in the circuit with the original horns, or may be wired with a switch that will permit the horns to be used in three different ways. First, all three horns can be sounded simultaneously, second the original horns may be sounded alone and, third, the additional horn may be sounded alone.

Figs. 4 and 5 show the method used for attaching the high-frequency highway horn. A bracket with a rubber pad is required to prevent its sound from being transmitted through the car body. Also, a separate ground is needed to assure that the horn operates satisfactorily. ★ ★ ★

Details at left show special bracket and individual ground wire required for highway horn shown at right





Wood Shaving Floats Lure To Extend Casting Range

Next time you clean your workshop, drop a handful of wood shavings into your fishing-tackle box. The shavings can be used to extend your casts or to drop a lure under overhanging branches where it would be impossible to reach with a cast. Drop a shaving on the water, curl side up, and place a baited hook or lure on it. Let your reel run free so wind or current will float the shaving to the "target." When the shaving is on the spot, jerk on the line to free the hook or lure. Since a shaving is lost on each cast, carry a generous supply.

Applicator for Liquid Asphalt Is Plastic Squeeze Bottle

Calking cracks in concrete with liquid asphalt, usually a messy job when a putty knife or stick is used to apply the material, has been made a cleaner, simpler operation by one homeowner who utilizes a plastic squeeze bottle fitted with a spout for dispensing catchup. Although keeping clean was the first reason for using the bottle, ease of application with the spout of the plastic bottle proved of equal advantage.

Patricia Vonderau, Bay Village, Ohio.

Hooks Bent From Wire Solder Used to Hold Paintbrushes

Instead of suspending paintbrushes on a metal rod over a container of thinner when they are being cleaned, one man uses hooks made from wire solder. The flexibility of the wire makes it easy to adjust the brushes to the proper level, regardless of the amount of thinner or the length of a brush handle. When a brush is needed, the soft wire solder is straightened easily to permit removal of the brush.

R. Mathiot, Lake Grove, Ore.

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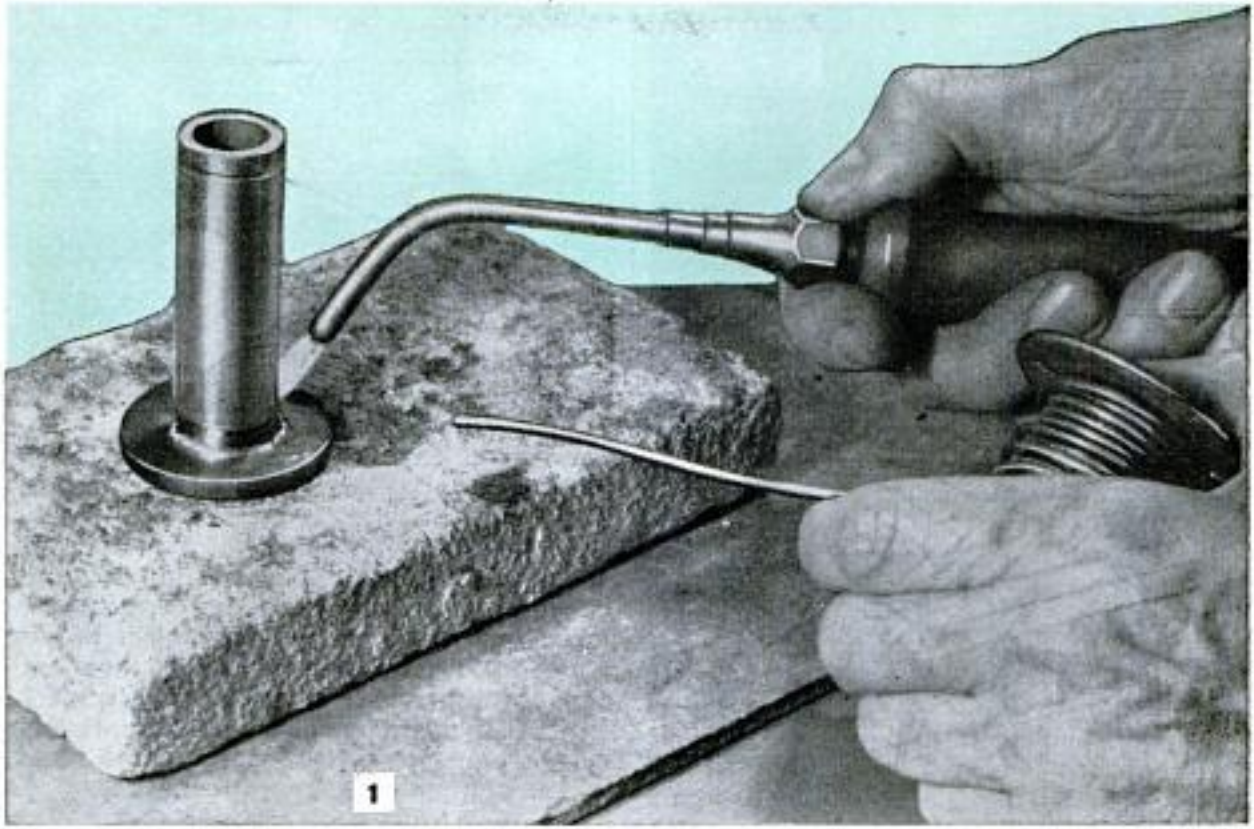
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X633 SHOP NOTES



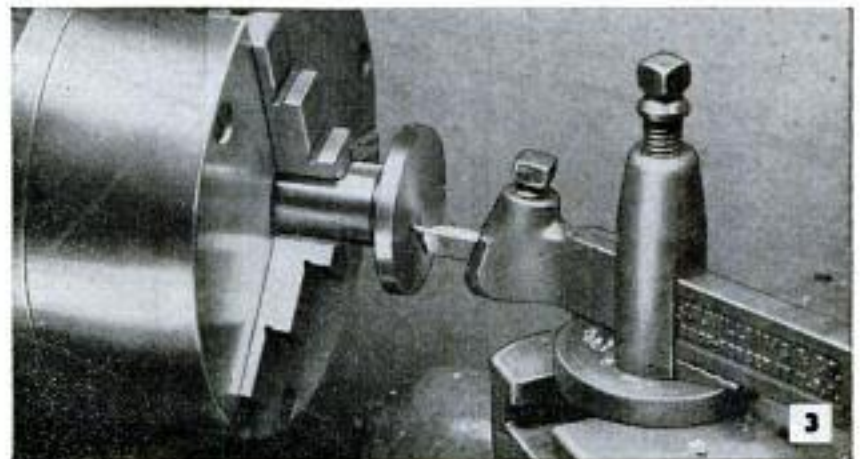
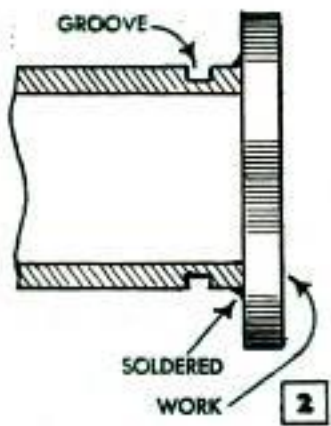
"SOLDER CLAMPING" SMALL PARTS

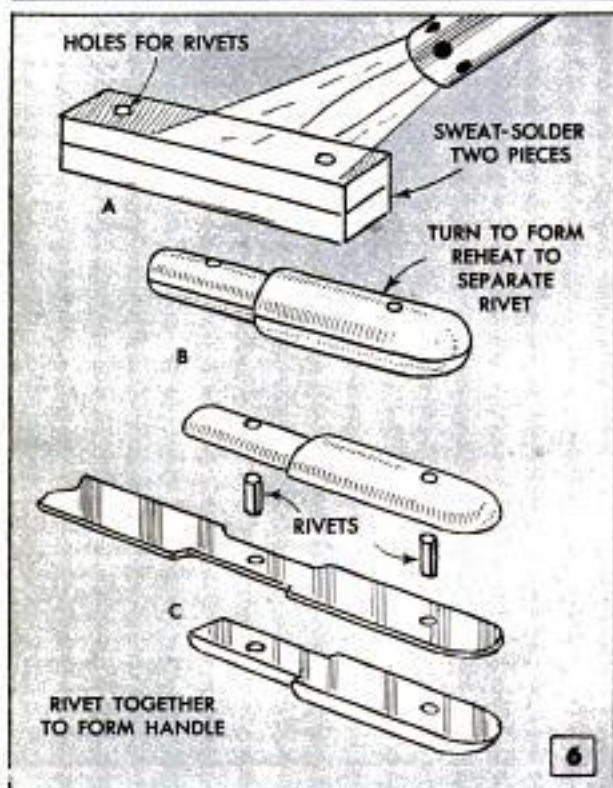
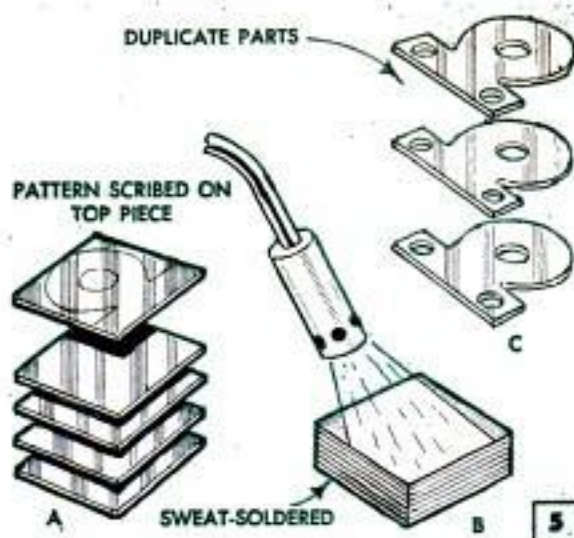
By Walter E. Burton

ORDINARY SOLDER can serve as a clamp in the shop. It can hold thin stock for machining in the lathe or on the milling machine, hold a number of sheets sandwich-fashion for sawing duplicate parts to pattern and hold two pieces of stock together securely while making split, or half, turnings from metal. Of course, there are other applications but these are the most common and perhaps more widely

used. After the necessary operations have been carried out on the parts which have been "solder clamped" they are released from the holder, or from one another, by the application of heat.

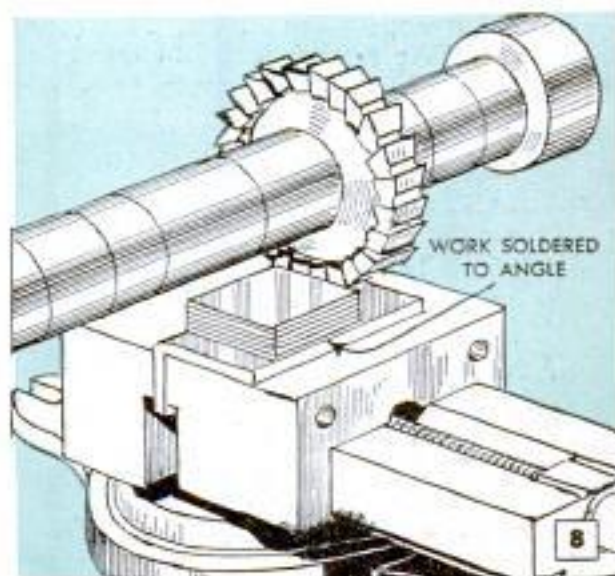
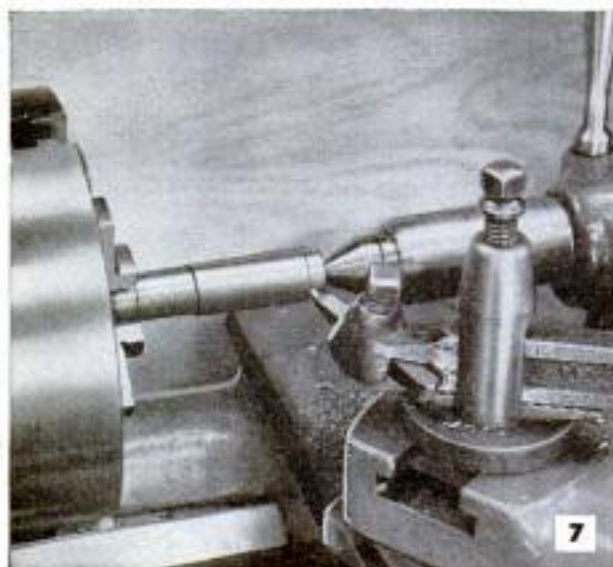
All metals that are easily soldered can be clamped in this manner. Usually it is necessary to sweat solder the flat surfaces of blank and holder, or the flat surfaces of duplicate blanks. To do this, the joining





surfaces of the metal must be thoroughly cleaned and polished with a fine abrasive. This is especially important where the stacked parts will be subjected to considerable stress as in turning or milling. After cleaning, avoid touching the cleaned surfaces with the fingers. Next step is to flux and tin the joining parts on both sides, except the top and bottom pieces in a stack, which, of course, are tinned only on one side. Then, when working a stack from which duplicate parts are to be cut, mark the pattern or design on the top piece, Fig. 5, detail A, and sweat solder together as in Fig. 5, detail B. Cut to the pattern line as in Fig. 4, where the material and design are of such a nature as to permit jigsawing, and finish by filing or milling the sawed edges. Drill whatever holes are necessary to complete the duplicates, then separate by reheating, Fig. 5, detail C.

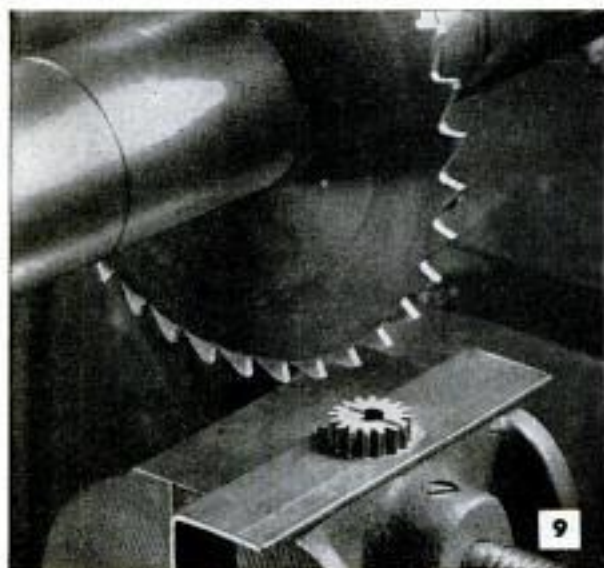
Truing a thin disk of sheet metal in a lathe is a trick seldom attempted in shops unless the work schedule is sufficiently flexible. But in some cases special require-



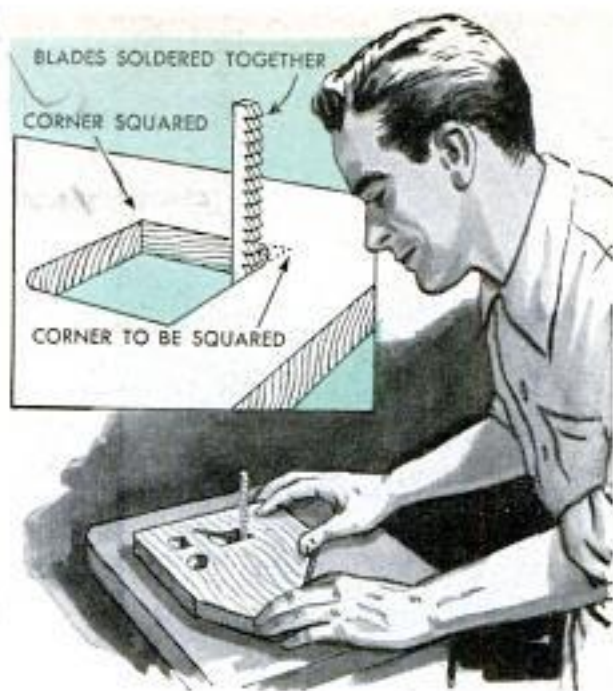
ments call for the setup to be made. Even chucking a disk as thick as $\frac{1}{8}$ in. poses a problem with conventional equipment, but the job can be set up quickly by using a "solder chuck," Figs. 1, 2 and 3. First, chuck a short length of brass tubing having a wall thickness of at least $\frac{1}{8}$ in. True both ends and cut a groove near each end, (or true and groove only one end if desired) the grooves being about $\frac{1}{8}$ in. wide and $\frac{1}{16}$ in. deep, Fig. 2. These grooves tend to retard the dissipation of heat along the length of the tube when soldering the work in place, Fig. 1. Chuck tube and work as in Fig. 3, and turn and face to the dimensions required by the job. When the specifications call for truing a disk of metal less than $\frac{1}{8}$ in. in thickness, use a solder chuck of an outside diameter about $\frac{1}{2}$ in. less than the required finish diameter of the disk. A chuck of this size will give better support to the edge of the work while turning.

If you like to make special hand tools, a comfortable handle can be made from a split turning of metal as in Fig. 6, details A, B and C. First, sweat solder two pieces together as in Fig. 6, detail A. Drill holes for rivets, then chuck and turn to desired size as in Fig. 7. Although not shown, knurling the large diameter of the handle may be worthwhile. When the turning is finished, reheat to separate the parts and attach to the tool shank with rivets.

Two applications of solder-clamping work for milling are pictured in Figs. 8 and 9. Quite accurate duplication can be accomplished as in Fig. 8 by stacking the rough-cut parts, soldering to a short length of brass angle and mounting in the milling vise. Another application is shown in Fig. 9 in which a small pinion is soldered to the angle holder and clamped in place for a slotting operation. ★ ★ ★



AUGUST 1957



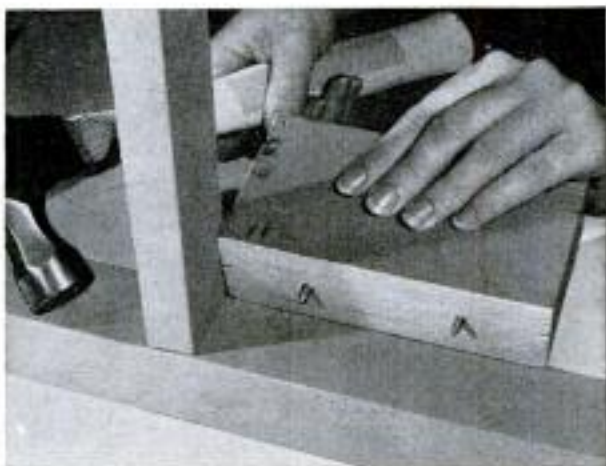
Saber-Blade "Broach" Squares Hole Corners

Confronted with the problem of quickly and accurately squaring the corners of rectangular jigsawed openings, one wood-shop foreman sweat-soldered two saber blades together and then filed the blank end slightly so it would fit into the blade chuck of the machine. The rigidity and additional cutting width of the blade thus produced handled the job quickly and with a minimum of runout per piece.

Stanley Roberts, Puente, Calif.

Block Aids Toenailing

Even a light upright that is to be toenailed will not slip sideways when the lower end is braced against this block. It is a scrap of 2 x 4 into which two headless nails are driven so the points project slightly as indicated in the photograph. To use, place the block edgewise against the upright. Tap lightly to sink nail points.



SN 59

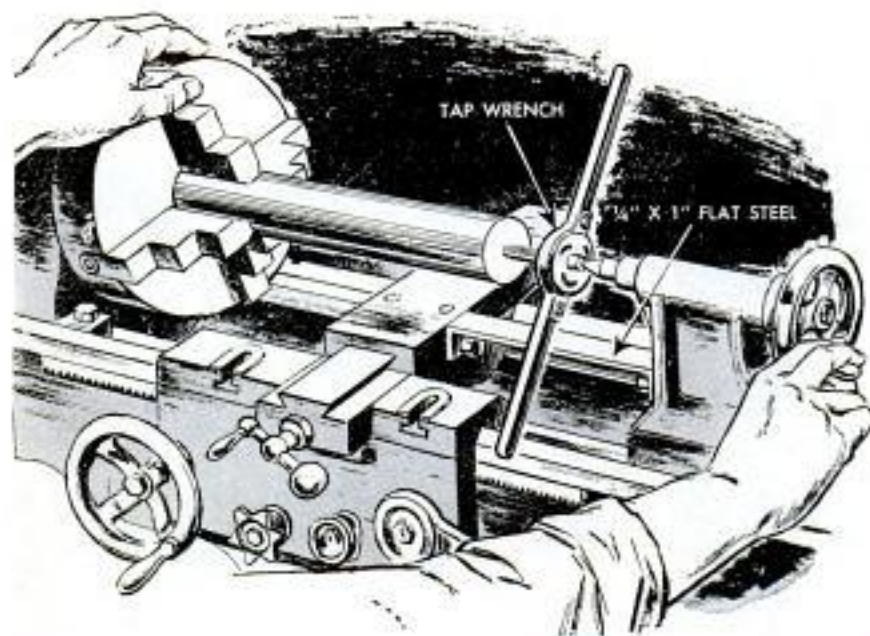
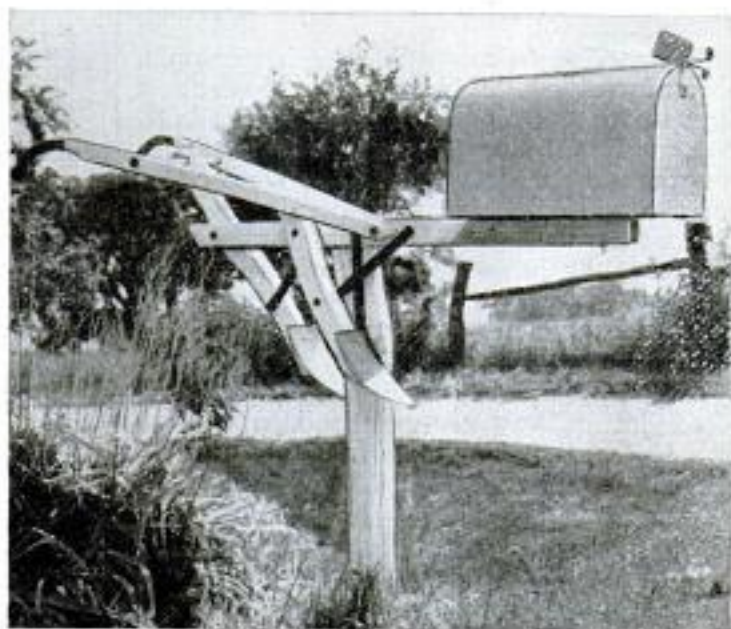
Wood-Turning Tools From Used Files

Discarded files make excellent wood-turning tools when cutting edges are ground on the ends as shown in the drawing. After a standard file handle is installed on the tang of each tool, they are ready for use on that next turning job. When grinding the cutting edges, keep the metal cool by dipping the files in water at regular intervals. Use an oilstone to remove any featheredges and to hone the finished cutting edges.



Horse-Drawn Cultivator Is Mailbox Support

An old wooden cultivator mounted on a post by one farmer provides a colorful support for his rural mailbox as shown in the photo. The box is mounted on the end of the beam for easier access. To secure the beam to the post, a U-shaped length of flat steel is fitted over the center of the beam and fastened to the post with lag screws. Two bolts secure the mailbox to the beam. To avoid injury to children, the steel shovels on the cultivator have been replaced by wooden replicas. All metal parts and ends of the handles are painted red, with white on the other parts.



Accurate Tapping With Lathe

Holes can be threaded accurately in work in a lathe when the tailstock is connected to the carriage by a length of flat steel as shown. By loosening the clamp screw on the tailstock and allowing it to move freely on the lathe bed, the carriage handwheel can be used to move the tailstock forward and exert just the right pressure on the end of the tap. This permits the lathe center to support the tap constantly as it advances.



A — INSERT IN HOLE



B — TIGHTEN FULLY



C — REMOVE BOLT



USE THE RIGHT HANGER

WHEN YOU PLAN to hang a picture, cabinet, shelf or other fixture on the wall it's important to use the right hanger for the job. The weight to be supported, the size and shape of the object and the type of wall construction must be considered when selecting the hanger. As an example, framed pictures and small mir-

Designed for plastered walls, this hanger, or hook, will hold pictures or mirrors weighing up to 15 lb.

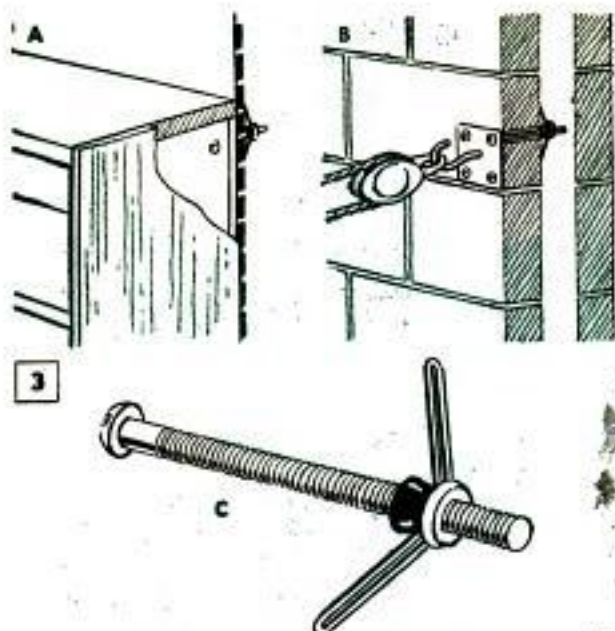
rors weighing up to 15 lb. can be safely hung on conventional plastered walls with the right-size hanger of the type shown in Fig. 2. But such a hanger, or hook, designed for framed pictures, won't do for a cabinet or chest like that pictured in Fig. 1. You'll need a fastener with a sectional sleeve which expands into a series of radial locking lugs when the screw or bolt is tightened, Fig. 1, A, B and C. Such hangers come in three sizes and lengths for light, medium and heavy loads. Similar hanging problems are solved by use of the hanger shown in Fig. 3, detail 1. Typical applications on plastered and hollow-tile walls are shown in details A and E. Such hangers, or toggle bolts as they are sometimes called, often are recommended for light and medium loads on plasterboard (dry-wall) walls.

Anchor plates, or "rails," that are fastened to masonry wall with a special adhesive often are used for attaching furring strips in preparation for installing solid-wood paneling. The individual fastener consists of a nail pressfitted in a perforated sheet-metal plate on which the adhesive is applied, Fig. 6. The plate is then pressed against the wall with the nail projecting outward. Ordinarily the plates are

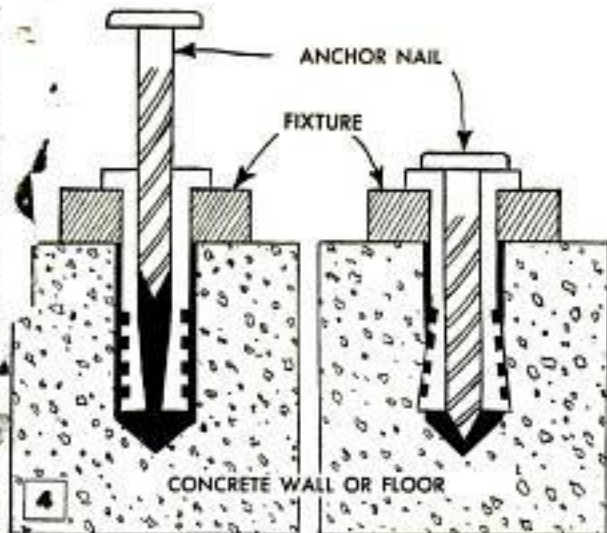


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SOUTHINGTON, CONN.



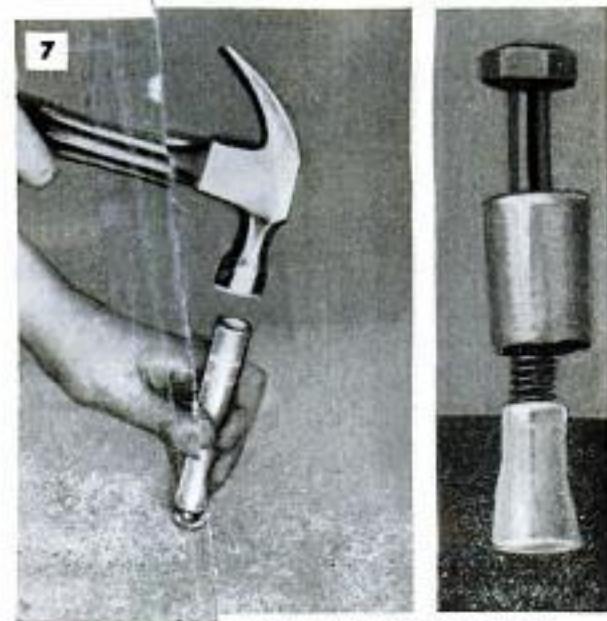
Above, fastener is similar to that pictured in Fig. 1. Suitable for light to medium loads. Below, special fastener is attached to wall with adhesive.

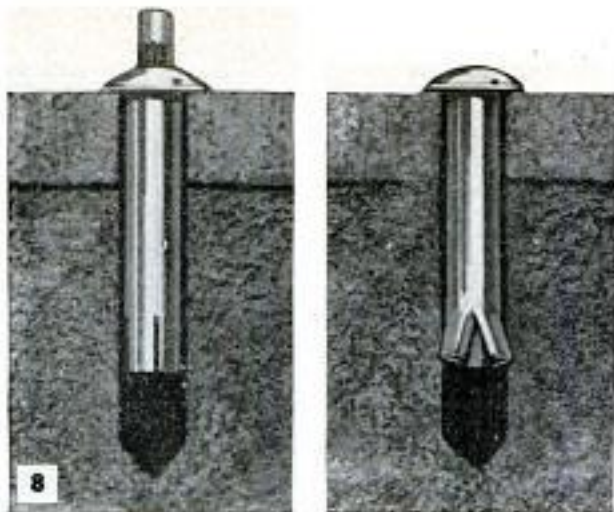


spaced horizontally about 12 to 18 in. apart. When the adhesive is thoroughly dry the wooden strips are positioned and forced down over the nail points with light blows of a hammer. Then the nail points are clinched as in the right-hand detail, Fig. 6. This method of attaching furring strips to masonry walls is somewhat faster than the usual procedure.

Figs. 4, 7 and 8 show several newer fasteners of the expanding-sleeve type designed for installation in masonry walls and floors. The type shown in Fig. 4 employs a drive nail, similar in appearance to a masonry nail, which is driven into the anchor to expand the lower end of the sleeve as detailed. The type shown in Fig. 8 is quite similar except that a headless pin serves as an expander when driven in flush. Either type makes a neat installation of motor, bench or machine pedestal on floors, also holds fairly heavy loads on

A heavy-duty fastener of the expanding type is designed for heavy loads on masonry walls and floors

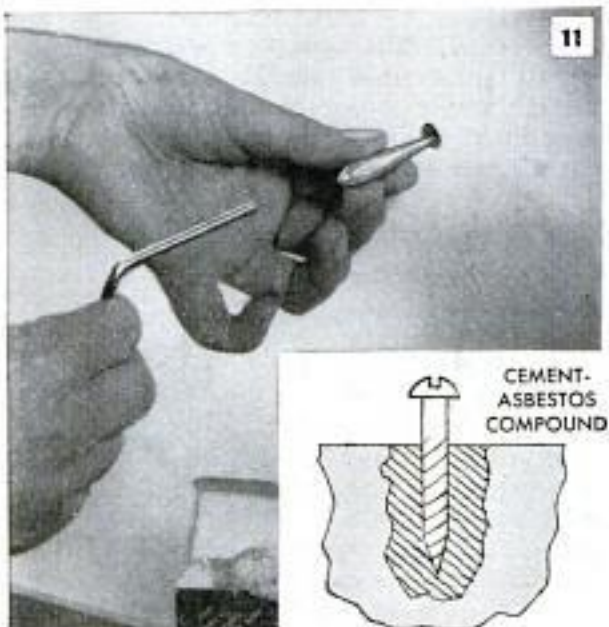




walls. The heavy-duty fastener shown in Fig. 7 is designed for heavy loads. It consists of two parts, a tapered sleeve and tapered expander into which a machine bolt is turned when making the installation. The fastener is installed with a special setting tool as in the left-hand view, Fig. 7. To install, it is necessary to drill a hole in the masonry with a carbide drill as in Fig. 9.

Small framed pictures and individual plate racks can be attached to the walls with the gummed-tape hanger shown in Fig. 10. These hangers are safe for very light loads. Also, for very light loads a prepared cement-asbestos compound pressed into a hole drilled in plastered walls makes a good anchor for a screw, Fig. 11. Another anchor, especially designed for light loads on hollow-tile, glass-block and marble walls, is shown in Fig. 12. It requires only a shallow hole. When the screw is tightened the rubber sleeve expands.

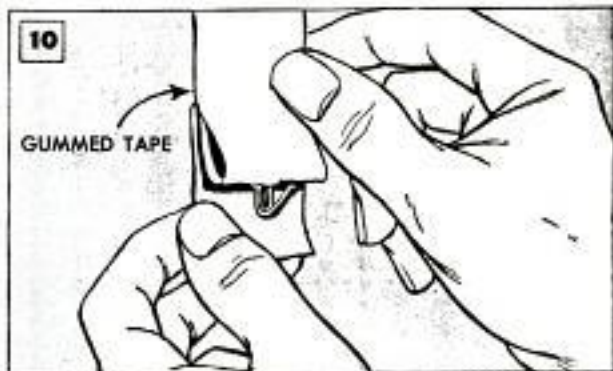
Cement-asbestos compound forced into hole provides secure anchor for wood screw which serves as hanger



AUGUST 1957



Holes for expanding-type fasteners are drilled in masonry with a hand (star) drill or carbide drill



Below, this fastener is installed in a very shallow hole. Suitable for hollow-tile, glass-block, marble walls

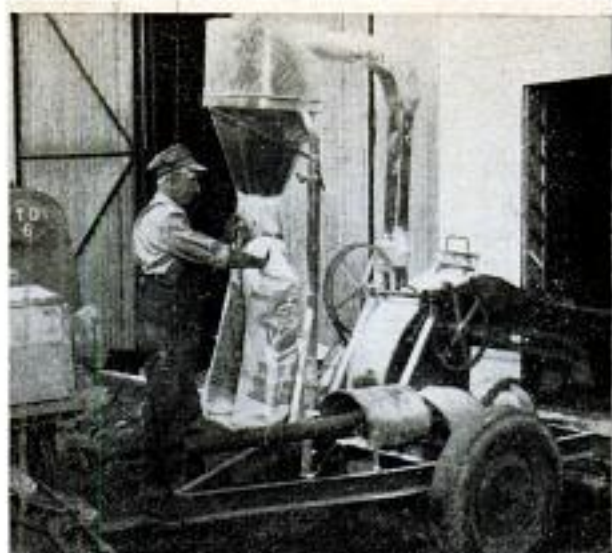


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Barrel Feeder Reduces Waste

Every farmer will appreciate the labor and feed-saving features of this unit at a glance. The wooden barrel and its stand are placed just outside the feed-lot fence. A short pipe nipple is screwed into a hole drilled in the bottom of the barrel. Next comes an elbow, a short nipple and tee. The rest of the pipe assembly is readily seen from the photo. Liquid feeds, such as skim milk and buttermilk, are poured into the barrel and immediately dispensed in equal amounts to two troughs placed inside the feed-lot fence. Feeder is fitted with a cover to keep out insects, snow and sleet.



Drive Through Differential Steps up Feed-Grinder Speed

This novel grinder drive is rigged from a truck rear axle. The differential is locked with a weld, one axle and housing are removed and the opening closed dust-tight with a steel plate welded on. The other axle is connected to the tractor power take-off by means of a telescoping shaft with universals. Then the drive-shaft end of the differential is direct-connected to the grinder shaft. Thus the right-angle drive from the tractor power take-off is through the truck axle to the differential ring gear and from the ring gear to the pinion. This gives a positive drive, the speed of which can be controlled to a nicety. The grinder and drive unit are assembled on a two-wheeled trailer as pictured.

Donald K. O'Brien, Gahanna, Ohio.

Undercoating Tank Completely Eliminates Condensation

When one motorist was troubled with excessive condensation inside the gasoline tank of his new car, he solved the problem by removing the tank and covering it completely with undercoating. Although the lower surface of the tank had been sprayed when the car was undercoated, the upper

portions and filler neck of the tank had not because of their inaccessibility. The temperature differential between the coated and uncoated portions of the tank caused water vapor in the air inside the tank above the gasoline to condense against the surface of the uncoated metal.

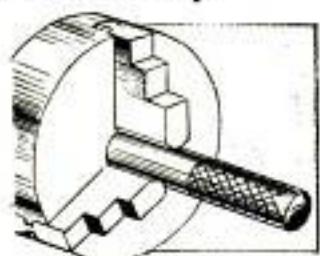
Removing Corroded Fittings

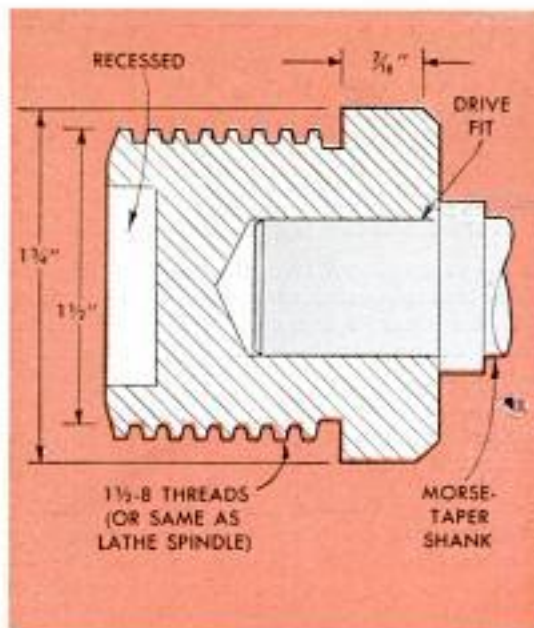
One service man carries solder-filled brass fittings in his kit to remove corroded fittings that cannot be turned out with a wrench without crushing out of round. The solder-filled fitting prevents crushing the angle fitting even though heavy pressure is applied with the wrench.



Handling Lathe Chuck Safely

To minimize the possibility of damage to lathe chucks while handling, one shop uses knurled handles, or spindles, which are locked in the jaws at the time the chuck is removed from the lathe. Handle aids in removing chuck and facilitates storage and handling in the toolroom.





Threaded Tailstock Arbor Takes Lathe Faceplate

A threaded tailstock arbor is a useful lathe accessory, especially when the lathe must be used for widely diversified operations. The thread on this arbor is a duplicate of that on the spindle, making it possible to mount the large or small faceplate or the three or four-jaw chuck for holding work for drilling or machining. A hand-controlled feed and a scale on the tailstock quill (on later model lathes) give you a direct reading for work involving precise depths, such as drilling blind holes or boring larger diameters with an adjustable boring tool. A large faceplate turned onto

the arbor supports work of large size or irregular shape for drilling.

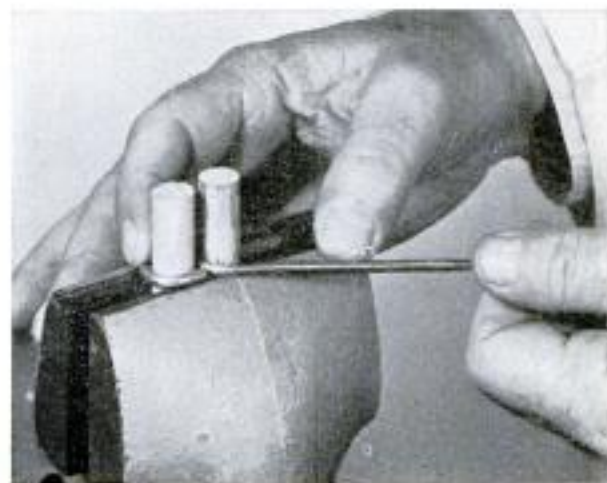
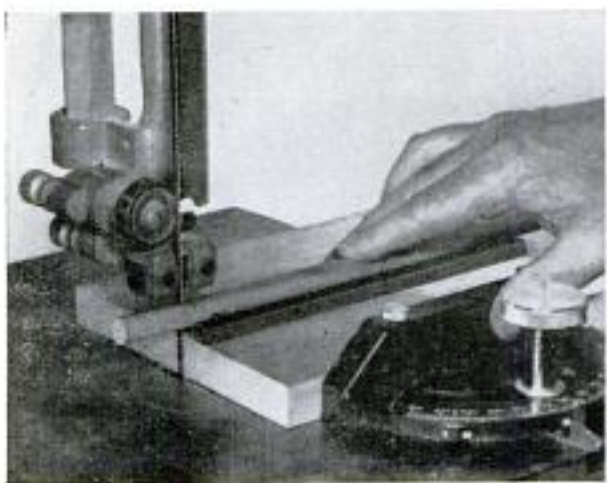
Dimensions given in the detail are only approximations. The unit must be proportioned to suit the lathe on which it is to be used. A suitable shank is obtained by machining a broken or discarded drill bit of the type having a tapered shank, No. 1, 2 or 3 Morse taper as the lathe requires. Cut off the drill bit, or the broken portion as the case may be, and shoulder the shank to take the threaded arbor head as in the sectional view. Then place in the headstock and cut the thread and recess as indicated.

V-Belt Jig Holds Dowels For Cutting on Bandsaw

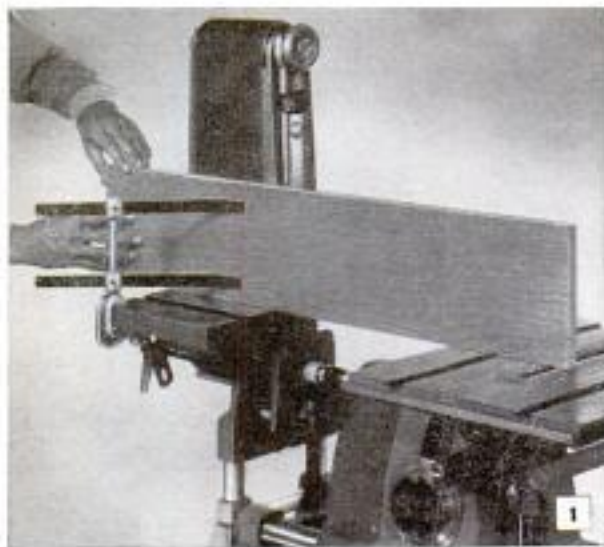
Cutting dowel stock to length on a bandsaw calls for a jig that not only squares the dowel with the blade, but prevents it from turning. Cut two short lengths from a V-belt and nail to a piece of wide stock. Then guide with the miter gauge.

Bending S-Hooks In Improved Jig

When you need an S-hook or a repair link for a chain, here's a jig that does the trick. Place two short lengths of dowel in the vise (steel rods will do) and space them apart a distance equal to the diameter of the wire. Then make the bend as shown.



How Would You Do It?



1. Q—How can you sand a very wide and very rough board when the sander is vertical?

A—Use the setup shown, with a hold-down, if one is available, to assure constant pressure on the workpiece. If the stock is long, use additional support so there is no problem in controlling the workpiece

2. Q—What motion is required for sanding end grain of stock squarely?

A—When sanding the end grain of work, hold the stock flat against the fence then slide it down to make contact with the belt. Keep the edge to be sanded parallel with the surface of the belt



3. Q—When sanding spherical shapes on a belt sander, how do you avoid making flat spots?

A—Sand spherical shapes against the rear of the sander where the lack of a backup plate allows the belt to flex. Work near the center of the belt so pressure does not cause it to shift to one side

4. Q—Which way should sander table be tilted when sanding the beveled end on stock, and why?

A—Whenever possible, tilt the table away from the belt for bevel sanding such as indicated. The open angle formed is better than a closed one, which could cause the work to jam between table and belt

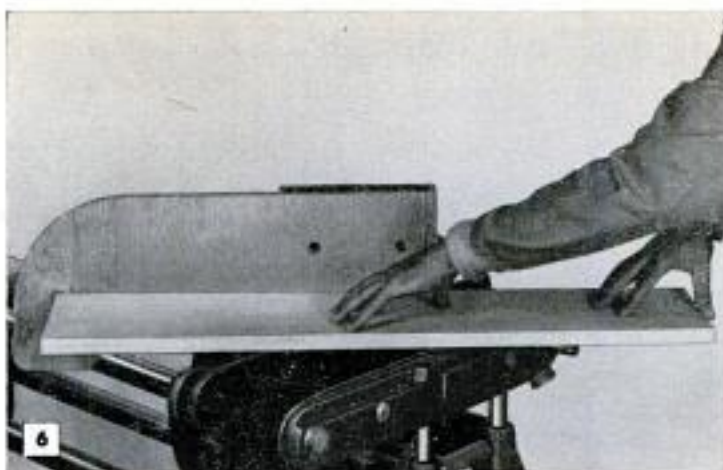
5. Q—When end sanding heavy stock, such as 4 x 4s, what belt-sander setup assures squareness?

A—To assure square sanding on the ends of heavy stock, the work is supported on two sides. One method is to clamp a block or the miter gauge to the table, providing support on the second side as shown



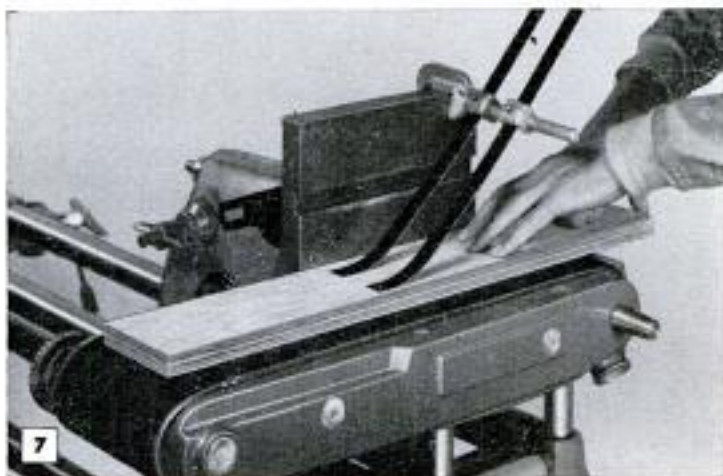
6. Q—It sometimes is necessary to rough sand boards wider than the abrasive belt of a belt sander. How is this done?

A—Pass stock diagonally across belt, using setup shown. Extension fence bolted to table provides additional support. Final sanding is done on fine-grit belt, with fence parallel to belt. Work is turned end-for-end to sand its full surface area



7. Q—To assure a smooth finish, in which direction should work be moved on a belt sander when surface sanding?

A—Work is always moved against rotation of belt. Keep contact with table throughout pass. Photo shows how to use spring hold-down if one is available. Position hold-down so springs do not snap down against belt after work passes under them



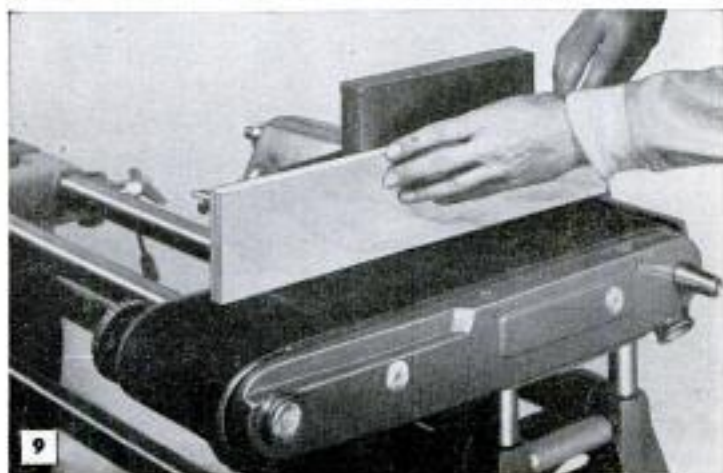
8. Q—Although not ordinarily considered for the job, a belt sander can smooth inside curves. How is this done?

A—Most curves can be sanded against the idler drum in the manner shown. If you have much of this type of work to do and the table or fence does not reach far enough to hold work square with the belt, make an auxiliary fence and bolt it on



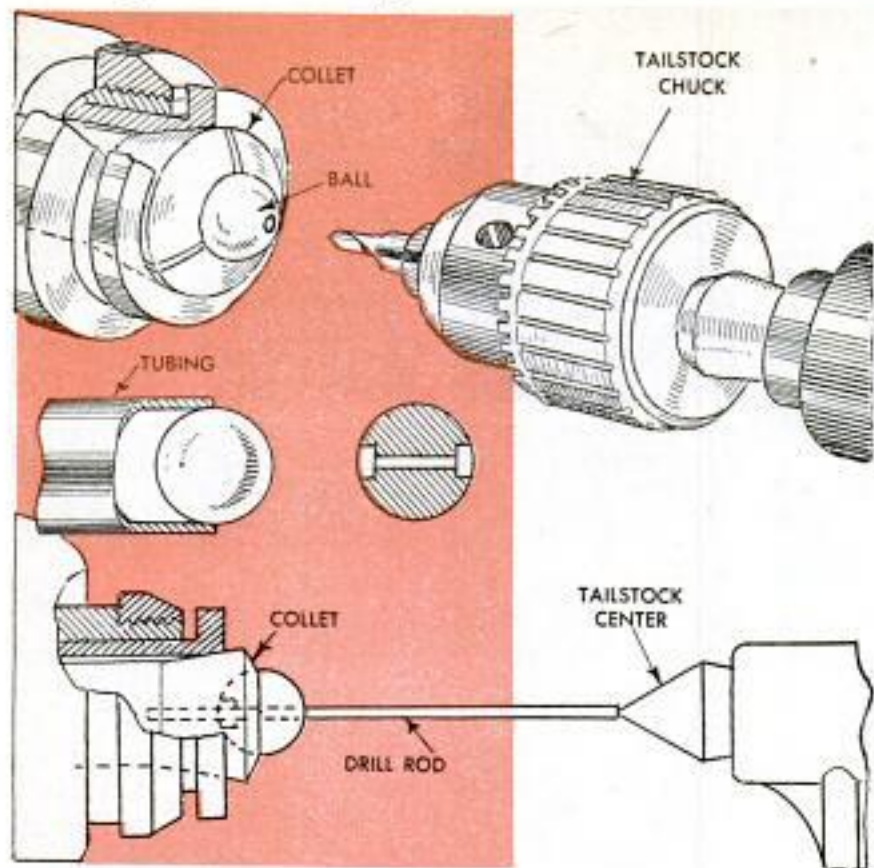
9. Q—When edge sanding work on a belt sander, how can the table or fence be used to assure sanding square edges?

A—Set up the fence or table as shown in the photograph. When making a pass with a piece of stock, hold it firmly against the fence all the way. An auxiliary fence, needed when sanding longer pieces of stock, is simply a board bolted to the fence



Drilling Hole Through Exact Center of Small Steel Ball

SN 59



Drilling a hole through the center of a small steel ball can be done fairly easily if the ball is held in a collet chucked in a lathe as indicated. Start the hole with a center drill chucked in the tailstock, then complete the job with a twist drill of the required size. If counterboring is necessary, do it before removing the ball from the collet. Counterboring the opposite end of the hole is done by aligning the hole with a length of drill rod centered on the tailstock center as shown in the lower detail. If the ball to be drilled is of too large a diameter to be fitted in an available collet, force the ball into a length of tubing of a suitable diameter. The tubing will seat the ball perfectly and hold it securely.

Shop Sander Makes Quick Work Of Polishing Power Tools

When the precision-ground tables of workshop machines become discolored and rusted through neglect or infrequent use, an orbital-type sander does an effortless job of reconditioning them. Fitted with a fine-grade aluminum-oxide abrasive, the sander will quickly remove rust spots without scratching the metal. For an even higher polish, the sander can be fitted with a felt pad and the tables buffed with rouge.

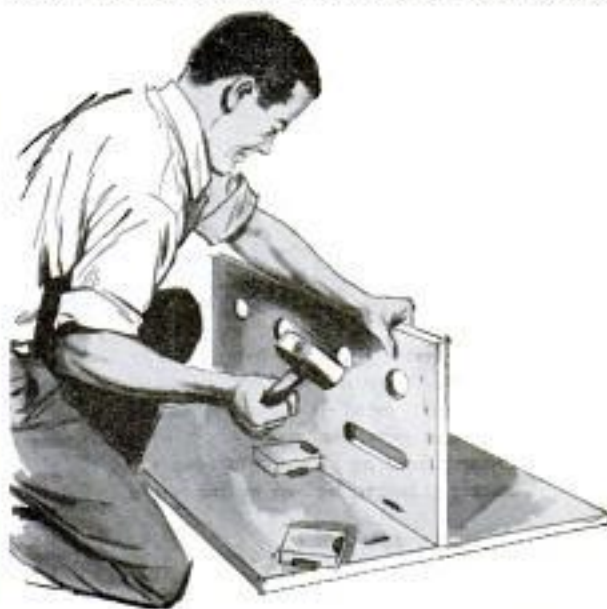
Thor photo



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Easy Removal of Tack Welds Assured With Steel Blocks

The disassembly of steel members tack-welded together temporarily is simplified by using steel blocks. The top of each block is tack-welded to the surface of one member and the lower edge of each block is tack-welded to the adjacent member. The latter weld is at right angles to the first. To remove the blocks, strike them on the tack-welded edge. Then grind off welds.



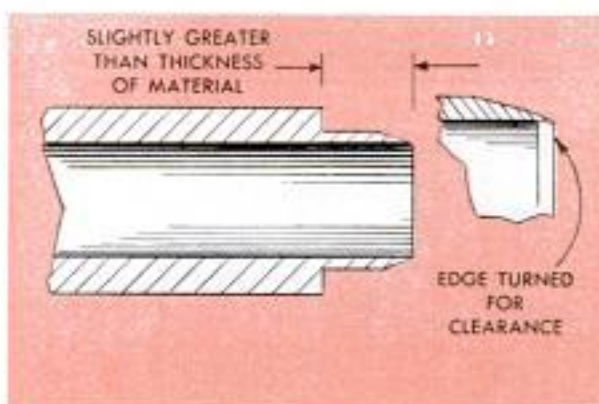
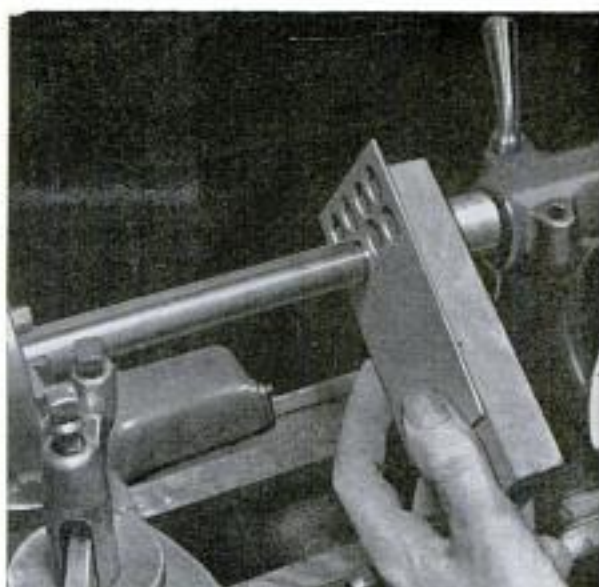
POPULAR MECHANICS



Rotary Knife Cuts Perfect Disks

SN 59

No other tool does the job of cutting disks from cardboard, leather or plastic quite as neatly as this rotary knife. It's made from a length of seamless steel tubing the inside diameter being equal to the diameter of the disk desired. One end of the tubing is shouldered, beveled and turned slightly by spinning to form a keen cutting edge. Spinning can be done with a length of drill rod flattened slightly at one end. The simple setup for cutting the disks is shown in the upper right-hand photo. Use a drill pad in the tailstock spindle, or quill, and back the work with a block of hardwood. Run the lathe at its lowest speed



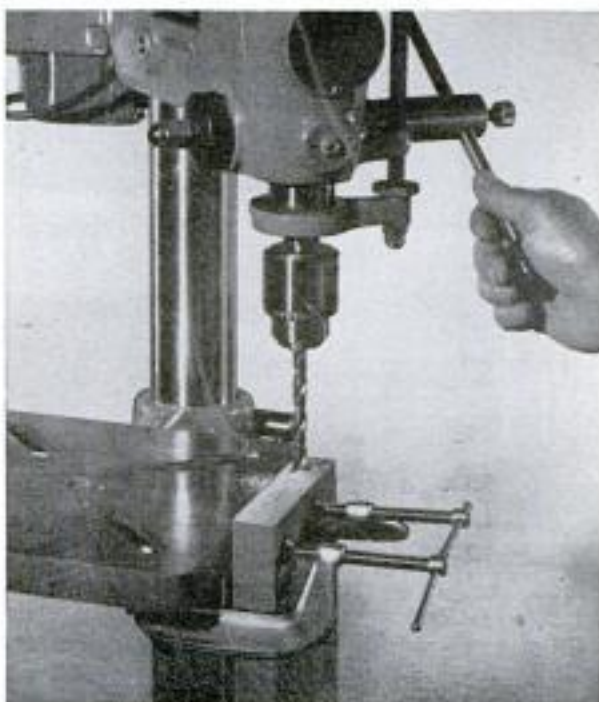
and feed the material to the knife with the tailstock handwheel. Feed the rotary knife slowly to prevent undue heating.

End-Drilling Long Stock Accurately on Floor-Type Drill Press

Using the setup pictured you can drill holes in the ends of fairly long pieces of stock. Swing the table sidewise to center the stock under the drill. If necessary lower the drill-press head and the table to bring upper end of the stock to the position shown. Clamp in place with lower end of stock bearing on the drill-press base.

Leak in Water Pipe Closed by Welding

A leak in a 6-in. water pipe rising vertically in a corner was repaired without removing the pipe. After draining the pipe, the welder simply cut out a rectangular section opposite the leak. This enabled him to reach the damaged portion with his torch. A piece of sheet asbestos placed back of the pipe protected the plastered walls against damage from heat. After closing the leak with a weld, the rectangular section of the pipe was welded in place.



SHOPPING

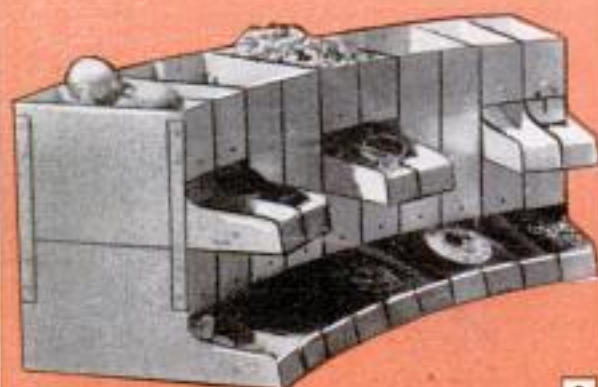


1. PNEUMATIC SCREWDRIVER drives screws from a refillable cartridge. It weighs $6\frac{1}{2}$ lb., is approximately 18 in. long. Drives oval, round, flat, fillister or hex-head screws in lengths varying from $\frac{7}{16}$ to $1\frac{1}{2}$ in. long. Handles screws with regular slotted heads or Phillips heads. Driving head is so designed that it cannot score surface of work. Torque is adjustable to seat screws to any tension

Shakeproof Div., Illinois Tool Works
2501 N. Keefer Ave., Chicago 30

2. SMALL-PARTS BIN is assembled from a number of hopper-type units placed side by side and forming a semicircular assembly as pictured. Placed on bench this arrangement eases the job of assembling when a number of small parts must be handled rapidly and efficiently. Each individual bin is arranged with a sloping bottom so that parts feed into hoppers by gravity. Bins are available in various sizes

Speed Assembly Equipment Co., Box 344, Fords, N. J.

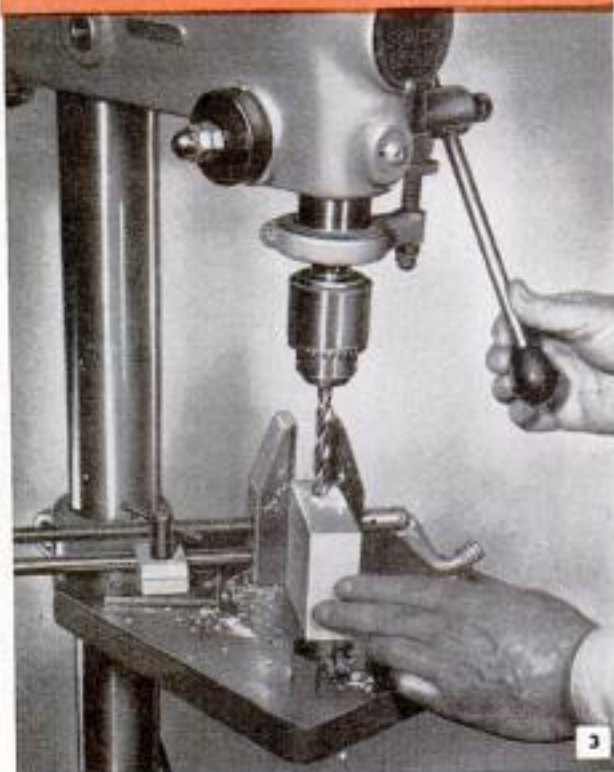


3. UNIVERSAL WORK HOLDER is a vise, clamp and fixture in one unit. Removable base plate permits jaws to open to 9 in. for use as a clamp. Add the base-plate with its special clamp for attaching to bench or machine table and you have either a vise or fixture. On the bench the jaws can be located flat, vertically or at any desired angle. On a machine, such as the drill press, unit is a universal holder

DeWalt, Inc., Lancaster, Pa.

4. MASONRY FASTENER, or anchor, drills its own hole. Comes as a kit containing several sizes of anchors with expanders and a holder-driver by means of which the anchors are installed with a hammer. In this procedure no star drill is required as anchor cuts its own hole. For power installation, using a portable impact hammer, anchors are provided with a snap-off chucking end which is held in power-tool chuck

Phillips Drill Co., Michigan City, Ind.



FOR TOOLS

5. DUST COLLECTOR is designed to meet the needs of the home shop. Can be connected direct to individual machines or used as a tank-type vacuum cleaner. Portable and very powerful, static lift capacity is sufficient to pick up metal chips and filings, sawdust and shavings, even nuts and bolts. Accessories include 13 swivel brushes and nozzles. Container has a capacity of 2.83 bushels of loose material

Rockwell Mfg. Co., Delta Power Tool Div.,
400 N. Lexington Ave., Pittsburgh 8, Pa.

6. PORTABLE JIGSAW cuts 2-in. stock, zips through hardwood, metals, plastic and composition materials of varying thicknesses. Makes pocket cuts in baseboards, walls and floors with a speed and precision not possible by other methods. Features a roller-type blade guide which takes the thrust of heavy cutting at a point just above the surface of the work, thus reducing blade breakage to the minimum

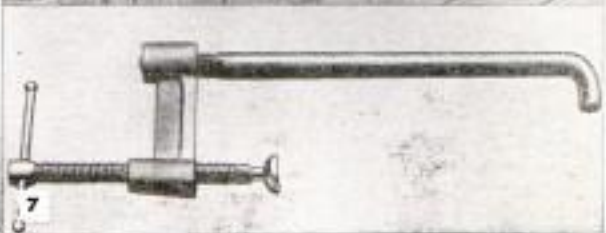
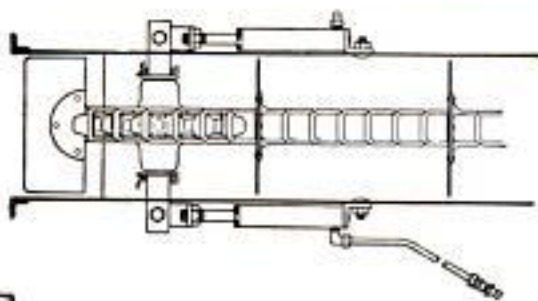
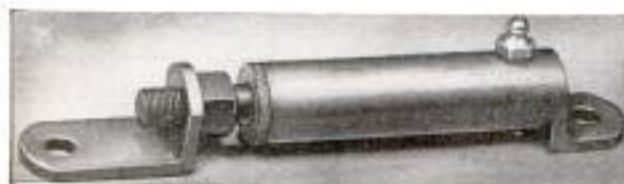
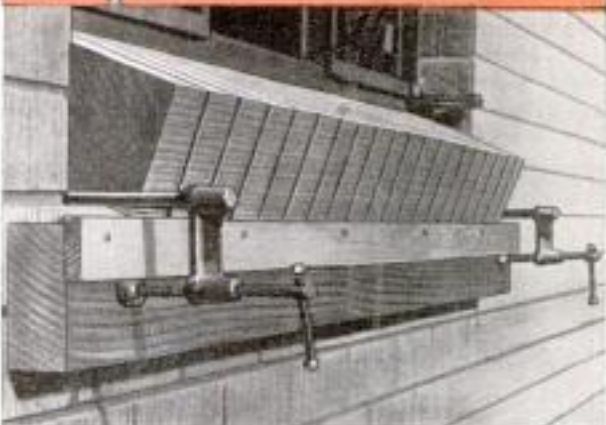
Skill Corp., 5033 Elston Ave., Chicago 39

7. FORM CLAMP eliminates common problems encountered by masons when setting brick window sills. The clamp, shown in the lower photo, holds form securely in place, permitting mason to give his entire attention to spacing of bricks and uniformity of mortar joints. Upper photo shows two clamps in normal position. Length of clamp screw provides sufficient range of adjustment for all applications

Gates & Sons, Inc., 80 S. Galapago, Denver, Colo.

8. CHAIN-DRIVE TIGHTENER is useful for tightening and maintaining tension on sprocket idlers carrying long lengths of flat-link chain such as that used on elevators and conveyors. Units are mounted as shown in the detail, one being attached to each end of the sprocket shaft. Grease forced into the cylinder through the fitting actuates a piston, moving the shaft in its guides and tightening the chain

Harvard Products Co., Harvard, Neb.



On the MARKET

for Do-It-Yourselfers

1. SHINGLE CLIP locks the butts of composition shingles securely, prevents them from being turned up or torn off by high winds. Individual clips are simple to install. Just press them into place as pictured. Made from aluminum alloy to resist corrosion.

2. METAL POLISH restores tarnished metals to their original luster. One application maintains the finish over a long period of time due to a protective film deposited on the surface by a special agent contained in the polish. Will not harm finest silverware.

Robert Mitsch Co., 631 N. Vance St., Carey, Ohio

3. SPECIAL CEMENT has been developed for anchoring ornamental-iron railing posts and porch columns in masonry. Comes in the form of a dry powder which, when mixed with water, has the special property of expanding as it dries, the effect being similar to that of a conventional expanding anchor. The material sets in 15 min., dries hard in about 2 hr.

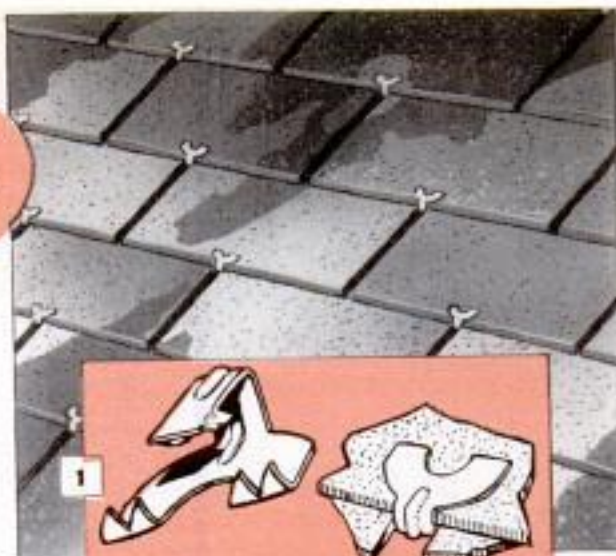
Tennessee Fabricating Co.,
1490 Grimes St., Memphis, Tenn.

4. ALL-PURPOSE BLACK PAINT is an anticorrosive finish for metal, also is effective on wood or masonry. Can be used above or below ground. Dries quickly when applied with brush or spray. Has unusual covering power because of its easy spreading qualities.

Maintenance, Inc., Wooster, Ohio

5. FLOOR COVERING is applied with a trowel, looks like linoleum when dry. Left-hand photo below shows how material is applied to subfloor. Photo at the right pictures the finished job. Mixed color pattern develops as mixture is troweled onto subfloor.

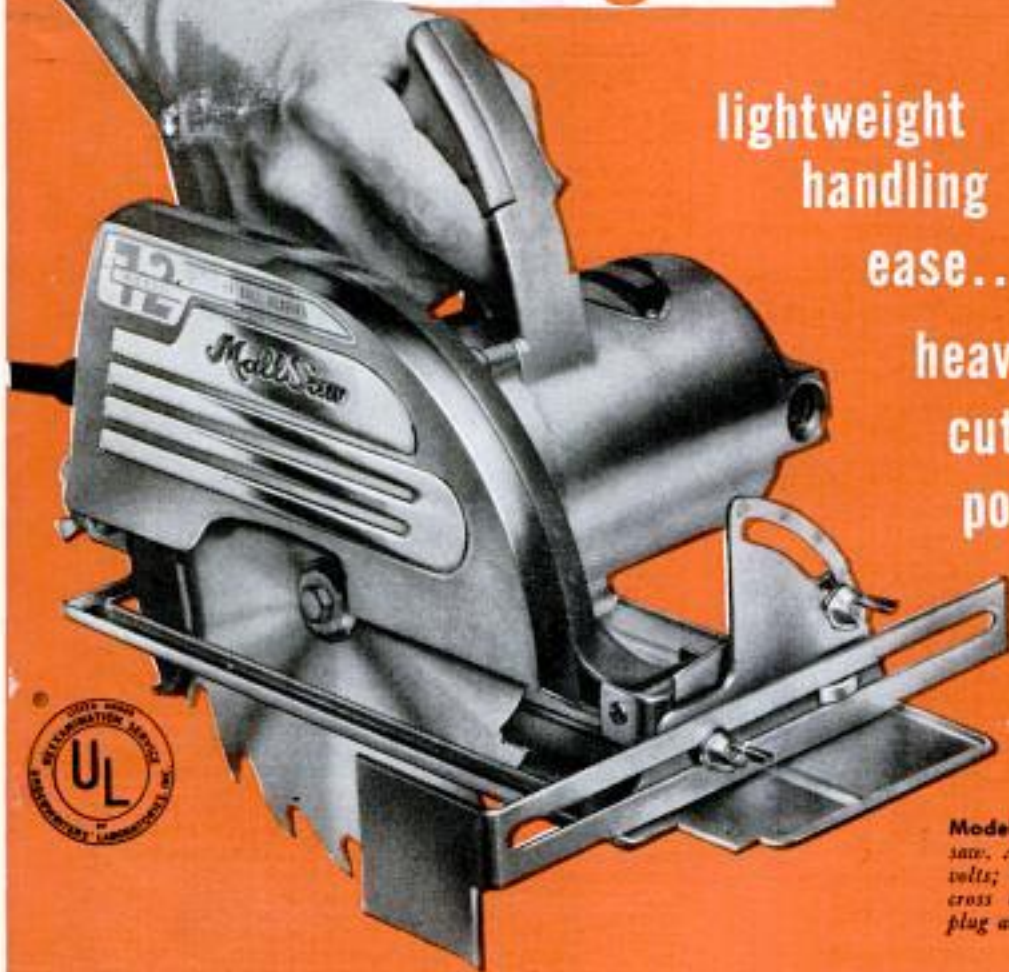
Husley-Cox Associates, Shoreham Bldg., Washington D. C.



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Belt and Orbital type sanders.



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Cuts tile and metal with quick blade change!

This rugged, compact saw is the favorite of many carpenters because it has the power and performance of a heavy duty model. Yet it has the handling ease of a lightweight tool—an ideal power saw for the home workshop!

Blade changing is quick and easy for plasterboard, tile, sheet metal and other tough cutting jobs. Try it yourself! When you feel its power you'll know the Remington Model 72 Saw by Mall is no ordinary saw. It is built with the quality and precision that have made Remington famous for 141 years in sporting firearms and ammunition.



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How to select a paintbrush



A good brush performs better... wears longer... saves you money

In selecting a good paintbrush, the first thing to look for is (1) a full head of bristles in a firm setting.

Then, look closely at the individual bristles. They should be (2) finely tapered with slightly curled tips.



Make sure a generous portion of the bristles have tips which are (3) split—"flagged."



Your final assurance of a brush which will give excellent painting performance is bristles which (4) vary in length.



A brush with these qualities has a greater working and paint-holding capacity—eliminates excessive dipping. It will (5) release a finish smoothly and evenly on any surface. You save time, paint with ease, do a professional-looking job.



Now, better performance with improved TYNEX® nylon bristles

When buying a paintbrush, look for (6) the trademark TYNEX on the handle. Quality paintbrushes made with bristles of TYNEX nylon give you better performance. They pick up a full load of paint



at every dip and lay on a smooth, streak-free coat. And brushes bristled with TYNEX have durable bristles that (7) clean easily...rinse thoroughly...dry quickly—are always ready for re-use.

FREE—additional facts everyone should have on choosing and using a paintbrush. To get this valuable information without cost or obligation, just send your name and address to E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept., Room 658, Du Pont Building, Wilmington 98, Del.



7

TYNEX is the registered trademark for Du Pont nylon bristles.

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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.



Waterproofing Door

Q—During hard rainstorms water comes under my garage doors. These doors are of an older type, are carried on a track and run inward along the inside of the wall when opened. There is no offset between the floor and the ramp. Is there some way to keep the water out?—M. K., Ga.

A—We assume there is no possibility of building an awning over the doors. Usually this proves quite effective where the design of the building will permit such an installation. If this is not possible then it will be necessary to install a threshold to prevent the entrance of water. One installation we know of that proved effective consisted of a length of 1-in. pipe anchored in a groove cut in the concrete to a depth of about $\frac{1}{2}$ in. The length of pipe is cut to a close fit between the doorjamb. Equally spaced holes are drilled through the pipe and countersunk to take flatheaded screws. These are turned into lead anchors driven into holes drilled in the bottom of the groove. After the pipe has been screwed in place in the groove the space on each side is filled with waterproof mastic or hot asphalt. Care must be taken to see that the pipe is located on the center line of the doors when the latter are closed. It probably will be necessary to trim the bottom ends of the doors and then adjust them to assure a smooth, sliding fit over the pipe threshold.



Paint Removal

Q—While painting my gutters and downspouts last fall I accidentally spilled gutter paint on a concrete walk near one corner of the house. Using paint thinner I managed to remove most of the paint but a discoloration still remains. The paint was a dark, red color and naturally it left a dark, unsightly stain that gives no indication of wearing off. Is it possible to remove this and if so what do I use?—L. K., Minn.

A—You should be able to eliminate the discoloration by using a paint remover of the wash-off type, although it will take several applications in

(Continued to page 204)

AUTO-LITE **POWER TIP** "fires up" winners in 1957 Mobilgas Economy Run



IMPERIAL CROWN . . . Winner in both High Price Class and Sweepstakes



CHRYSLER SARATOGA V-8... Winner in Upper-Medium Price Class



DE SOTO FIREDOME V-8 . . . 2nd Place in Upper-Medium Price Class



DODGE CORONET 500 V-8 . . . Winner in Low-Medium Price Class



PLYMOUTH BELVEDERE V-8 . . . Winner in Low Price Class



Victory sweep by Chrysler-built cars proves that Auto-Lite Spark Plugs with **POWER TIP** deliver top performance and economy at all speeds.

The 1957 Mobilgas Economy Run gives dramatic evidence of Power Tip's ability to give top performance and economy in all kinds of driving . . . at all speeds. For 1568 miles, in the mountains, on the highway, and in city traffic, Power Tip sparked the winners to victory. Here's how Auto-Lite Spark Plugs with Power Tip operate . . .

At *low speeds*, the projecting spark plug tip . . . the Power Tip . . . gets hot fast, operates hotter to burn away fouling deposits which impair engine performance in city driving. At *high speeds*, the Power Tip is actually cooled by the richer air-fuel

mixture to check costly and dangerous high-speed pre-ignition caused by overheated spark plugs.

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green, yellow & orange

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(Continued from page 202)

order to accomplish a satisfactory job. Apply the remover over the whole area with one-way strokes of a paintbrush, laying the material on heavily and covering the area as quickly as possible. Allow the remover to "work" for 15 min. or more, then wash off with cold water, or as the instructions on the container direct. Working over the affected surface with a stiff-bristle scrub brush may aid in loosening the paint pigment from the porous surface of the concrete. Continue this procedure until no discoloration shows after the surface dries.



Cedar Closet Lining

Q—I want to line two clothes closets with red cedar but I have hesitated to do this as I'm told that it will not serve as a reliable moth repellent. It also is said that the wood gradually loses its characteristic odor. Is this correct?

—E. L., Pa.

A—Red-cedar closet lining is not generally considered as effective as are chemical moth repellents now available. Likely this is because the chemicals are sprayed or otherwise applied directly to the fabrics and are toxic to adult moths and larvae alike. Cedar closet lining is said to be a reasonably effective deterrent to adult moths but the volatile elements are not considered sufficiently toxic to reliably dispose of moth larvae which may be in the clothing when it is placed in the closet. However, we would not hesitate to line closets with cedar if original plans call for this type of lining. Red cedar which has been selected and milled especially for closet lining is attractive, retains its color almost indefinitely, does not readily warp or shrink and is easily installed.

Removing Paint From Tile

Q—While painting the ceiling of my bathroom I spilled some paint on the tiled wall, just a few drops, but unfortunately I did not discover these until after the paint had dried. Now it seems impossible to remove the paint without damaging the tile, which are of plastic, yellow and black in color. I am told not to use any kind of paint remover as it will dull the surface of the tile. Is there any other way to remove the paint?—F. N., Calif.

A—Your information is correct. It is not safe to use paint removers on plastic tile. Any attempt at scraping off the paint drops is likely to scratch or score the surface of the tile. However, in one instance we know of, paint spatters were removed from plastic tile with a safety-razor blade fitted in a holder such as that supplied for scraping paint spatters from glass. You might try this. It could prove successful if you use extreme care. Ammonia (household) will soften most paints, also alcohol. If you try either one, apply with an artist's brush or with a small pledget of cotton.

Shellac Does Not Harden

Q—Some time ago I refinished a workbench top with shellac. The finish went on nicely but it never dried or hardened properly, is still slightly sticky, or tacky to the touch. It gathers dust which is impossible to wipe off cleanly. I sanded the bench top thoroughly before applying the shellac. What did I do wrong?—S. D., Mich.

A—Probably nothing in preparation of the surface and application of the shellac, if we judge correctly from your description of the procedure. However, we would guess right away that you used shellac from a container which was not properly sealed after using a part of the contents in some previous application. The only permanent remedy for the condition of the present finish is to remove it by washing off with alcohol, or an application of paint-and-varnish remover. Sand the surface to expose bare wood and then refinish with fresh shellac. It's a good idea to apply a wash of shellac as the first coat. Thin to a watery consistency with alcohol, apply, and allow to dry about 1 hr. Then smooth with fine steel wool and apply a second coat of shellac as it comes from the container.

DOWN
IN BED



DOWN IN
THE MOUTH

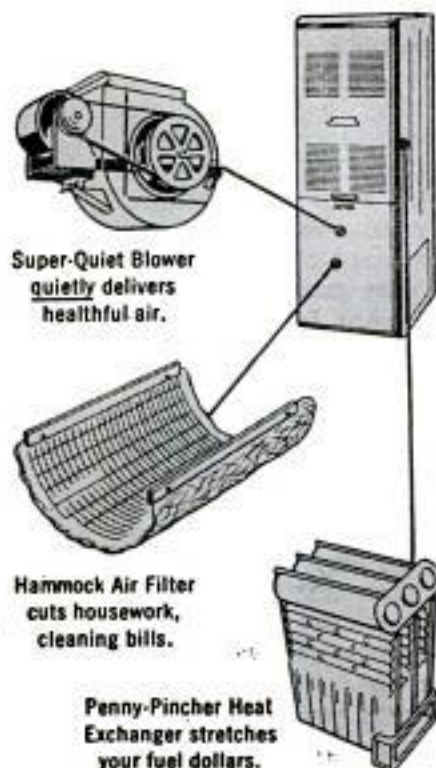


DOWN IN
THE POCKET



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Exchanger stretches
your fuel dollars.

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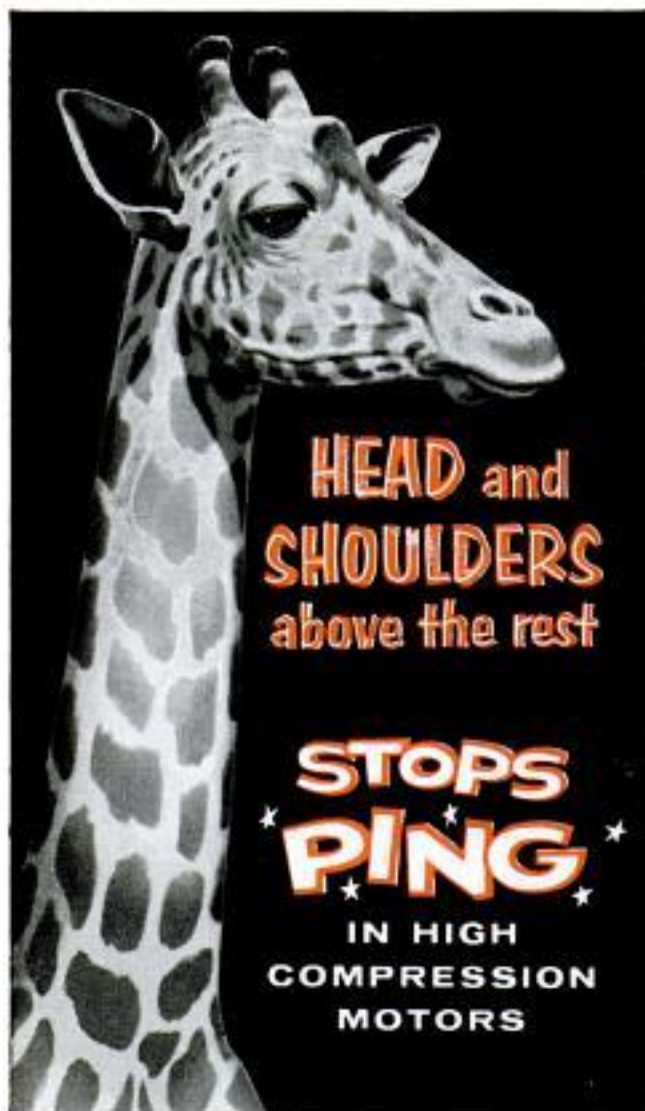
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Refined from 100% Bradford Pennsylvania Crude Oil...

**KENDALL REFINING COMPANY,
BRADFORD, PENNA.**



They Find Water on the Desert

(Continued from page 133)

rock basin or trough under a valley can be charted. From this information it is possible to locate channels and dips in which water may collect.

Another procedure is the earth electrical-resistivity method. Electric current is introduced into the ground by a pair of electrodes spaced some distance apart and the electrical resistance of the ground is measured. As the distance between the electrodes is increased, a greater proportion of the current flows at greater depths, giving an increasingly deeper picture of the resistivity of the earth. In theory, a water-bearing stratum can be located because of its change in resistance. In practice it often happens that dense clay or dry gravel gives the same response.

About three years ago at the Socorro campus of the New Mexico Institute a student observed that clayey sand that was saturated with water could be polarized by passing a current through it, and that the decay of this polarization could be measured. Hardly anyone would consider this important, but to water-conscious New Mexico it held some promise of being adaptable to prospecting for water. A team consisting of Victor Vacquier, Paul Kintzinger, Charles R. Holmes and Richard H. Frische was formed to investigate it. The studies have been going on ever since, and today the institute feels that a valuable method of seeking water in alluvial deposits has been developed.

The phenomenon is unique because it occurs only under certain conditions. Clean sand mixed in water cannot be polarized, nor can a mixture of sand, clay and water. It is only when the clay forms a coating around the individual grains of sand that the effect takes place. Fortunately, this is the condition that exists in nature. The electrical effect seems to be based on the movement of current-carrying ions between adjoining clay membranes.

The field equipment for prospecting for water consists of a Jeep truck and trailer carrying a 10-kw. generator, recording equipment and thousands of feet of insulated wire. In making a survey a pair of high voltage wires is unreeled and strung out to be attached to electrodes that are driven into the ground at a spacing of several hundred feet. Two other electrodes that will pick up the induced current are driven at closer distances to the truck and are connected by wires to the recording equipment.

The high voltage is switched on for some

(Continued to page 208)

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Folding Landing Net Eases Anglers' Plight



Fishermen tired of snarling landing nets in bushes, car trunks, or on other obstacles now can carry a fold-up net on their belts or in tackle boxes. Drawn by its wooden handle from a leather case, the net's spring-steel frame instantly expands to a 14-inch diameter. Netting is heavy green nylon. The angler can replace the net in its three-inch case by detaching one end of the frame and winding the steel around his hand in a small circle, bunching the netting into the center of this circle to fit the case.

Lavender Potato Chips?

Soon you may be eating potato chips dyed lavender, peach, strawberry, lime green and other tints. Two Long Beach, Calif., men have a patent on the process.

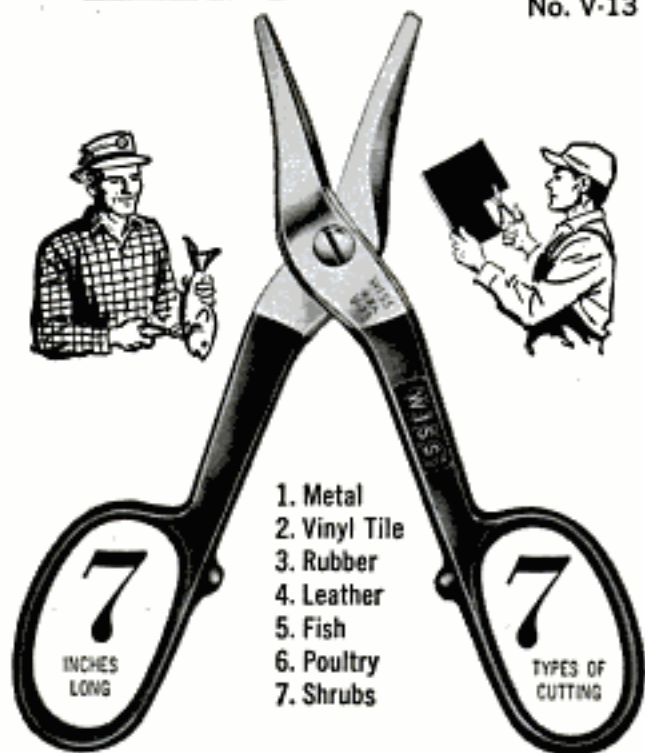
Blower-Brush Combination

Dust and lint can be removed from sensitive equipment and lenses by applying a blower-brush device. The brush is made of sable.



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For powerful straight cutting. Four different sized models. Good for all sheet metal work, 25-20 gauge.

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Vinyl handle grips optional and extra.

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30 seconds, then switched off, and the decay rate of the induced current in the ground is automatically recorded. Then the whole operation is repeated, this time with the electrodes spaced farther apart, for a deeper probe.

Prospecting by induced polarization isn't cheap. No one could normally afford to hire a trained crew to find the best place to drill for water on a 20-acre farm. It cost possibly \$3000 to keep a three-man crew in the field for a month, during which time they can survey 30 square miles of land. They can make a spot survey in a week.

The New Mexico Institute stresses the fact that it is not in the business of prospecting for water. Rather, its interest is in developing methods for use by engineers.

At the same time that the new prospecting method has been under development, Dr. E. J. Workman, president of the institute, has been conducting long-range studies of the speed at which water percolates through the ground.

To find out, Doctor Workman is using the hydrogen bomb as an unwitting tool. One by-product of a hydrogen-bomb explosion is tritium, an isotope of hydrogen that normally is present in the atmosphere in the ratio of one atom of tritium to one million million million atoms of hydrogen.

Ever since the explosion of the first hydrogen bomb three years ago, the tritium content of the atmosphere has been about 100 times greater than normal. Thus, beginning three years ago, all the rain that has fallen has been "marked" water because of its high tritium content.

Today, in several New Mexico towns that get their water from wells, the water supplies are being monitored to learn when water with a high tritium content will appear. When found, the marked water will tell a great deal about the distance it has traveled underground, its speed of travel, the degree to which it has mixed with older water (giving an indication of the size of underground reservoirs).

Leaders in the Southwest believe that the lack of water there is going to bring important economic changes to the region. They feel that industry can make better use of the existing water than can agriculture. They base this on the estimate that an industrial community can support 60 times more people than an agricultural one on the same amount of water.

Another change they foresee is a switch from cattle to tourists. Head for head, they say, there's more money to be made from a tourist than from a cow and they add, jokingly, that eventually in the Southwest the largest herds of beef cattle will be scenery on dude ranches. ★ ★ ★

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They're AccuRated

DUNLOP TIRE AND RUBBER CORPORATION, BUFFALO 5, N. Y.

Mercury Styling Makes Big Hit With Owners

(Continued from page 120)

working."—New York truck driver.

Third complaint is another familiar one to readers of Owners Reports: Body noises and rattles (16.3 percent).

"Doors and dash develop squeaks and rattles that can't seem to be eliminated. Take car to local dealer an average of two or three times a month, but do not seem to get rid of rattles. They always return after a few days."—Arizona railroad conductor.

Push-Button Trouble

Mercury introduced a push-button control for its automatic transmission and apparently all was not well in the first cars built. The push-button control placed fourth on the complaint list with 13.5 percent of the owners mentioning it (another 5.8 percent of the owners complain about the absence of any "Park" bar in the push-button console—which will be discussed later).

"Keyboard transmission control continually chatters, even after a new one was installed. Service department claims it is due to the solenoid that prevents transmission going into reverse."—Tennessee sailor.

"I don't like push-button shift. Too much waste motion. Shift lever under steering wheel is more convenient."—New Jersey store manager.

"There are too many buttons to push for initial start."—California businessman.

"I like everything but the keyboard control. You have to move your eyes from the road to hunt for the key to punch."—Oklahoma teacher.

Fifth on the complaint list is a lack of power and performance.

"It doesn't take off fast enough."—California warehouseman.

"It is lazy. Won't do but 90 miles per hour. Passing gear doesn't respond as it should."—Illinois maintenance engineer.

"My car is not fast. It has 120 on the speedometer and it will hit only 96 or 97. It has been worked on by Mercury mechanics unsuccessfully."—Virginia owner.

Exterior Styling Quotes

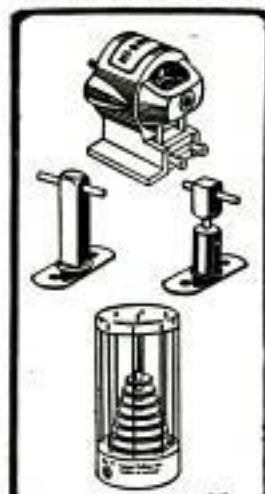
The PM questionnaire asks owners what they like most about styling and what they like least. Here are some quotes of likes and dislikes in order of frequency of mention:

"I like the styling from the rear doors back."—Illinois sales manager.

"The lowness and straight lines."—New Jersey sailor.

(Continued to page 212)

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Order your choice of four miniature battery-operated motors—one for every use—from 1 1/2 to 12 volts—and today's BIGGEST VALUES IN THE HOBBY FIELD. These motors, with the accessories in kits listed below, provide all types of drives for hobby items, toys, research and industrial devices. Make wonderful gifts.

- *No. 8-100 Hi-Drive Motor, 3-6V. \$2.50
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- No. 3-100 Tiny Atom Motor, 1 1/2-3V. \$2.00
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- * Item Illustrated. Ask for FREE Cat.

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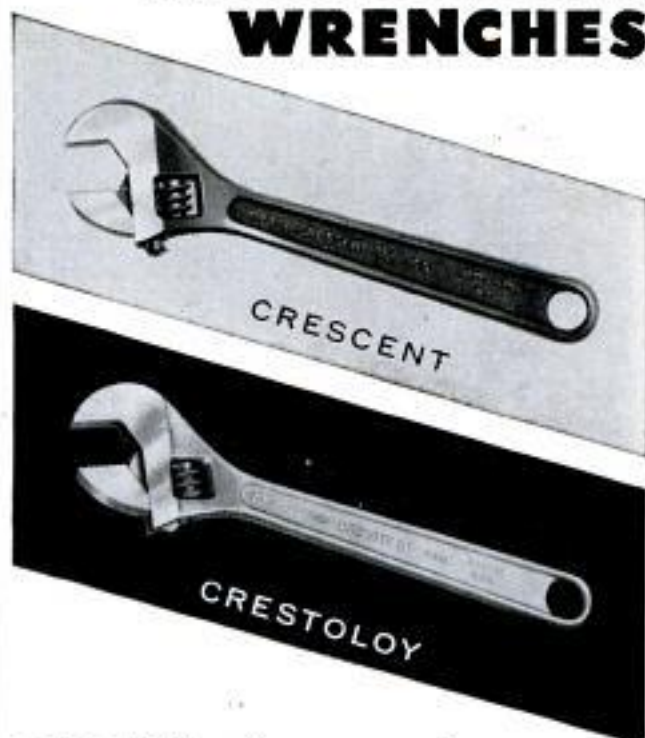
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STOP WASTING MONEY on worn-out piston rings!

Oil-pumping is the first sign of worn-out piston rings. And worn-out piston rings mean power drop-off—costly wastage of gas and oil—expensive repairs later on.

The sooner you act, the less it will cost. See your motor specialist the minute oil-pumping warns you there's trouble ahead. When he recommends new piston rings, ask him for Hastings. They're engineered exclusively for replacement service . . . to provide the additional lubrication worn engines need . . . to stop oil-pumping, save gasoline and restore lost performance. Truly the best money you can spend on your car.

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PISTON RINGS

TOUGH on oil-pumping • **GENTLE** on cylinder walls

Buy these Hastings Products with confidence:
Piston Rings, Casite, Wear Reducer,
Oil Filters, Spark Plugs

"The V-shaped taillights."—California owner.

"Don't like trough in roof. It collects water and when brakes are applied, water spills down windshield."—Arizona owner.

"Rear bumper looks too much like the front bumper."—California teacher.

"I think the front grille should be changed."—Florida businessman.

More Best-Liked Features

Here, in order of frequency of mention, are quotations describing other best-liked features of the Mercury:

"Roomy. Plenty of legroom front and rear."—South Carolina specialist.

"The first car I ever owned that has more legroom than I need."—New Jersey crane operator.

"It has the big Turnpike Cruiser engine and that gives plenty of performance. I drag it on the local strip."—Oklahoma contractor. (*The big T.C. engine is optional at extra cost—Ed.*)

"Most of the 10,000 miles were put on delivering rural mail over all kinds of roads. More than 50 miles per day and the trouble-free performance has sold me on Mercury. I stop at more than 450 boxes every day."—California rural mail carrier.

"Has great roadability on curves."—Ohio paper hanger.

"Stability on the road."—Michigan Air Force planner.

"Excellent vision. No blind spots."—California foreman.

"Can see equally well from back or front seat."—Maryland farmer.

"Interior is well designed, beautiful."—Texas engineer.

"Plenty of trunk room."—California dairy worker.

"I like the push buttons."—California housewife.

"Trouble-free engine."—Colorado owner.

"Quick starting, hot or cold."—Ohio rubber worker.

And More Complaints

Here are additional quotations that describe more complaints in order of frequency of mention by owners:

"Doors not properly adjusted. Sometimes cannot be opened. Trunk hinges poor. Broke one."—Montana farmer.

"Speedometer cable has broken once, been fixed and is bad again."—Mississippi oil-company employee.

Eighth on the list of complaints is the lack of any Park lock in the push-button transmission control. Because the test cars PM used had this lock installed, we asked Mercury why none was installed on some

(Continued to page 214)

Paint Peeling?

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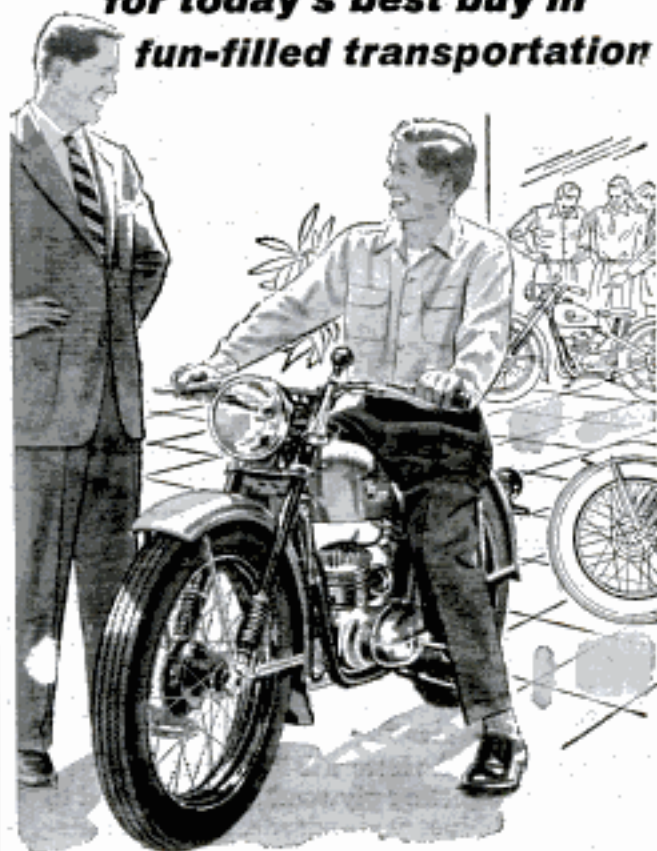
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earlier models. Mercury's explanation is that production difficulties made it necessary to deliver about 45,000 Mercurys without the Park bar on the shift control. Mercury officials state that any owner who has not yet had this Park bar installed can have it done at no charge by going to his dealer, although some owners seem to disagree:

"When we bought our Mercury we were told that the Park lock would be installed later. Now, four months later, they tell us they may not put one on at all."—California teacher.

"Prior to delivery, the dealer removed the Park lock from the transmission control panel. My wife is unable to set the parking brake firmly enough to hold the car on a hill."—Ohio Air Force worker.

"I never feel safe parking my Mercury, especially on a hill. The foot pedal to the parking brake does not hold the car, as the cable stretches. Should have a transmission lock."—Massachusetts restaurateur.

"Transmission cannot be parked in gear. Thus if a child should hit the brake-release button, the car may roll away."—Maryland salesman.

"The parking brake has given way on me and the car rolled free. There's no way to hold the car on a steep hill when parked. I shall never again buy a car with this type of brake on it."—Massachusetts housewife.

"After delivery the Park lock was removed. New cars coming through have them. I have waited four months for this missing part which has been paid for. Are we forgotten?"—New York businessman.

"Flat roof design is weak. Slight hand pressure on inside top will move it easily."—California mechanical engineer.

"Rug on floor is an inch thick. Arizona is no place for deep-pile rugs."—Arizona retired Army officer.

"Front bumper not supported well enough on ends. I hit a dog but not hard enough to kill it and it bent bumper back and cut fender."—Georgia granite worker.

"Paint job is thin. White paint spattered on bronze."—Nebraska Air Force officer.

"Leak in top of gas tank. Dealer has tried to fix it twice."—Georgia housewife.

"Ignition switch is placed where one cannot see it."—California manufacturer.

There it is, the story of the 1957 Mercury as told by the folks who know it best—the owners themselves. ★ ★ ★

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Hydrocortisone, a drug used to treat arthritis, has proved in experiments on animals to be an antidote against the poisonous bite of a rattlesnake.

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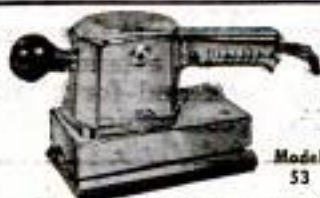
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Driving the Mercury Montclair

(Continued from page 123)

turned on again, the seat comes forward to the preselected position. This, of course, is an extra-cost option.

Although it is not used on the test car's 368-cubic-inch engine, the power-booster engine fan is something I like. At speeds above 30 or 40, a fan is not needed for engine cooling. This automatic device disengages the fan when it is not needed. It makes for more quiet operation and should improve fuel economy and increase engine power somewhat at high speeds.

Mercury's bumpers are massive and afford excellent protection. There are no bulletlike projections. Being flat, they are practical in parking or when pushing another car. On some models (including the test car), large red reflectors are mounted in the rear bumper. License plates are well protected as they mount in a recessed section of the bumper.

I like the location of the push-button shift panel and also like the fact that the starter is operated by pushing the neutral button. This combines two operations in one (placing the transmission in neutral and operating the starter).

While the transmission park lock is a good feature, I don't like its method of operation. A bar located below the push-buttons applies the park lock when pushed in. When pulled out, the lock is released. Once you get used to this, it may be all right, but parking-lot attendants and drivers changing back and forth from other cars may find it confusing. ★ ★ ★

Insects Grow to Death

Growing insects to death may be the method of an insecticide still in the experimental stage. A Harvard University scientist has succeeded in isolating a hormone from male silkworm moths. When a tiny amount of this substance is applied to insect larvae, that area develops into that of an adult insect while the rest of the body remains in larval form. The creature soon dies because of this malformation. An advantage of the process is that an insect is not likely to develop an immunity to a hormone, but can become resistant to poisons such as DDT.

Glass Fiber Takes a Lot of Heat

Glass fiber is being produced that can withstand heat of 5000 degrees Fahrenheit. The material, made experimentally at the University of Pittsburgh, is intended for use in jet planes and guided missiles.

Here it is!

THE NEW 1958 ROBEL JUNIOR RACER

designed by
STAN OSBORN



Model 3075-P complete with Briggs & Stratton 2¼ h.p. gas engine, only \$199.50 FOB Berwick, Pa. AS SHOWN, completely assembled.

Hurry! Place your order now for one of these new "do-it-yourself" Father & Son Chassis! Speeds can be safety-locked at factory at 5, 10, or 15 MPH. 1957 Briggs and Stratton engine with re-wind starter. Designed and safety engineered by Stan Osborn.

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- Two-wheel brakes!
- Polished aluminum steering-wheel!
- 70" long...30" wide!



Model 3075 chassis only \$99.50 FOB Berwick, Pa. AS SHOWN. (same as above less power plant)

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PH-8

Which Grass for Your Lawn?

(Continued from page 110)

have no phosphorus or potassium, although this may be mixed in by the manufacturer. If not, it should be done by the user.

Killing Weeds and Crab Grass



The best weed killer is a healthy, vigorous stand of grass. This will tend to choke out existing weeds and prevent encroachment by others.

However, chemical weed killers are a part of good lawn management. Available under several trade names

and in a variety of forms, 2,4-D will kill many broad-leaved weeds. Follow the manufacturer's directions explicitly. Such directions vary accordingly to the formulation. Do not apply when rain is forecast within the next 48 hours, as rainfall will wash off much of the chemical.

Weed killers can be used on broad-leaved weeds any time the weeds are growing actively, from spring through fall. However, best results are obtained by applying them in early fall, as turf grasses will fill in the sod prior to the emergence of crab grass the following spring. Weeds that are killed in the spring frequently are replaced by germinating crab grass, which means you have solved one problem but inherited a worse one.

Crab-grass killers, too, are effective when applied precisely according to instructions. However, where one application of 2,4-D will kill most broad-leaved weeds, crab grass must be given at least three successive treatments spaced seven to ten days apart. The crab-grass killer should be applied any time after crab grass emergence up to the two-leaf stage of growth. Another excellent measure for controlling crab grass is to rake the lawn vigorously in late summer to make the crab-grass blades stand up, mow closely, then rake up the clippings. This will reduce invasion of crab grass in subsequent years by eliminating a big share of the seed.

General Lawn Maintenance

To reseed an established lawn, rake the bare areas vigorously. Fall seeding in late August or early September gives the best results with cool-season grasses, but fair results can be obtained with spring seeding providing it is done before April 1 and kept

(Continued to page 220)

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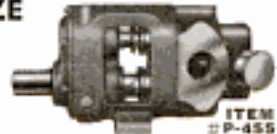


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well-watered. To convert an established lawn to Bermuda or zoysia, plant sprigs, stolons or plugs throughout the existing turf on one-foot centers any time from May to late August. The grass will spread.



Rolling a lawn lightly in the spring will press down any plants that have been heaved by winter freezing and thawing. However, never try to use a roller as a means of leveling a lawn. Frequent rolling will compact the soil.

Aerate the turf if the soil becomes compacted.

This means spiking holes in it, a practice which permits water and fertilizer to penetrate deeply for heavy root growth. Hand tools are available to do the job, or you can rent a machine from an equipment dealer or a landscape gardener. Also you can have the work done on contract. ★ ★ ★

(Continued from page 110)

and North. In areas farther north, zoysias will live but will not spread. Zoysias need bright, hot sunlight. Most of them will spread during such days to crowd out many other lawn grasses and weeds, forming a beautiful, uniform turf. They are drought tolerant and resist disease, insects and wear. Zoysias turn a dead, unattractive brown in winter, though this may be a very short period in the Deep South. Establish them vegetatively in the spring, planting plugs one foot apart. One square foot of sod provides up to 36 two-inch plugs. Meyer zoysia is a fine-leaf strain of zoysia japonica, with a silky feel. Grows well in unfavorable soils. Unsatisfactory in heavy shade. Especially adapted to the twilight zone. Expensive. Emerald zoysia is superior to other strains in the Deep South. Tolerates shade. Slower spreading than Meyer zoysia. Zoysia japonica is not as dense as most zoysias, but has excellent winter hardiness and will survive farther north. Can be planted by seed or vegetatively. If seeded, sow two pounds per 1000 square feet. Insist on hulled seed. In general, zoysias should be fertilized in spring after last killing frost. An application of fertilizer every month or six weeks through the summer will make turf thrive. Mow below one inch.

Iodine in Drinking Water

Because chlorine tablets do not kill all the organisms in drinking water, the Army has adopted iodine as a water-purifying agent. Iodine tablets in a soldier's canteen water will kill amoeba cysts which chlorine will not. Inexpensive iodine preparations are gaining popularity in dairy, hospital and restaurant sanitation and may one day replace chlorine in purifying public-water supplies.



1 More road horsepower—Tests by independent engineers proved new Champions give cars of all makes an *immediate* boost in road horsepower—the real power actually de-

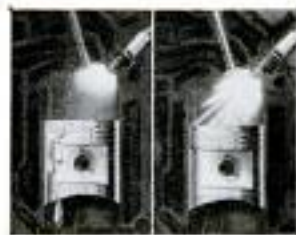
livered at the rear wheels. Most cars gained from 6% to 31%! No wonder 9 of 11 cars that broke the Indianapolis speed record this year were powered with Champion spark plugs!

If you haven't changed your plugs in about 10,000 miles—

You can make your car 4 ways newer with Champion spark plugs



2 Quicker starts—Tests with cars whose plugs had gone 10,000 miles or so show that new Champions can cut starting time by as much as 71%—with an average of 39%!



3 Less engine wear—Old, misfiring plugs (left) dilute oil with raw gas. New, full-firing Champions (right) protect the oil. *When you change oil, check your spark plugs!*



4 Lower cost-per-mile—As photo above shows, Champion's great new Powerfire electrode stands up better than ordinary types under same use. Insist on 5-rib Champions!



CHAMPION

LOOK FOR THE 5 RIBS

Seagoing Game Wardens

(Continued from page 115)

California has 1200 miles of coastline, 1500 miles of navigable inland waterways, plus an additional 500 miles surrounding the islands located off the mainland. A look at California's Fish and Game Code reveals that not one foot of this vast area is without some type of law restricting the use, possession or size of nets that may be used.

A constant patrol of the entire area at one time is impossible. In addition to the wardens who man the patrol boats, 25 marine wardens are stationed along the lengthy coastline, maintaining a patrol of fish markets, canneries, piers, landing places and beaches.

These land-based marine wardens fill an important job, and their work is tied in very closely with that of the patrol boats. With radio-equipped cars they are in constant touch with headquarters and the patrol boats operating in their areas. These wardens, experts in the intricate laws affecting commercial fishing, often spot illegal activities from their land patrol—such as fishing in restricted areas, undersize or out-of-season catches and the use of illegal nets—and in a matter of seconds they can have a fast cruiser speeding to the scene.

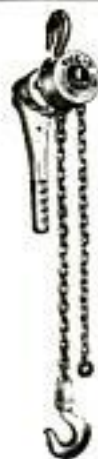
Foremost Fishing Port

Commercial fishing is rated as California's fourth largest industry, with 85 percent of the catch taken south of Santa Barbara. Los Angeles Harbor is cited as the world's foremost fishing port with more than one third of the entire nation's fresh and canned-fish requirements being produced in that harbor each year.

More than 1100 commercial fishing boats, manned by about 3700 fishermen, bring in approximately 419 million pounds of tuna, sardines, mackerel, anchovies and miscellaneous fish each year. In one three-month report, the Los Angeles Harbor fish canneries paid commercial fishermen over \$13,000,000 for their catches of tuna, sardines and mackerel.

With all of this activity located south of Santa Barbara, the Marine Patrol's efforts are concentrated largely on the southern coasts, with headquarters at the Harbor's Terminal Island.

In charge of this patrol district—Region V—is Chief Tom Schilling, whose main weapons are two seagoing "bloodhounds," the 63-foot *Marlin* and the *Bluefin*. Specially built and equipped for this work, each is powered with twin 630-horsepower Hall Scott engines, capable of a maximum speed of almost 35 knots, with an easy cruising



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speed of 22 knots. Each boat carries a crew of four men: The captain, a boarding officer, deck hand and an engineer.

"These boats are sufficient," says Chief Schilling, "to catch any craft that feels guilty enough to run from us."

In this great south-coast fishery with hundreds of commercial fishing boats roaming the ocean, many regulations affecting their work must be checked and enforced. All the sea is theirs, so a law prohibits purse seining within a three-mile strip along the California coast as well as around Catalina Island, these areas being reserved for the sport-fishing boats. Here, too, is a huge industry which affords the sport fisherman an enjoyable outing along with fresh fish for his table. He buys an annual license for \$3 to fish anywhere in the state, including the ocean, and a portion of his money goes into Fish and Game funds to protect his interests.

Sport Fishing Checked

By the same token, the Marine Patrol boats check sport fishermen for licenses, and the land-based wardens keep a close watch on surf fishing, skin diving and lobster and abalone fishermen. In the past season, in addition to commercial fishermen, more than 496,000 sport fishermen tried their luck from party boats; another

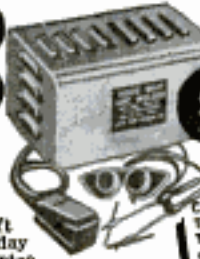
half-million anglers used their own boats, ranging from small skiffs to deluxe cruisers. Region-V wardens issued 1412 citations, which brought in \$42,059 from fines and seizures.

Electronic "detectives," radar, depth finders and short-wave radio, are of immense help in commercial law-enforcement work. Major violations are few and far between, with most boat captains recognizing the necessity of the various regulations intended to preserve the fish which mean their livelihood. However, there seem to be a few fishermen willing to gamble, and these occasional violators feel the heavy hand of the Marine Patrol.

Three Repeater Stations

As most violations take place at night, the radar equipment has more than paid its own way. A large amount of information concerning possible violations is picked up by the land-based wardens, and this is immediately passed on to the patrol boats via short-wave radio. With the radio communication maintained and through the use of three repeater stations, all wardens of Region V can communicate directly with one another and also with Terminal Island headquarters from anywhere in southern California to the Mexican border. ★ ★ ★

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In the Interest of Higher Fi

(Continued from page 141)

Xophonic (see photograph and diagram on page 141), a hi-fi accessory recently introduced by the Radio Craftsmen Corp.

Unlike stereo, the Xophonic does not impart the sense of location which pinpoints the positions of the instruments within an orchestra. It does, however, create a feeling of depth and spaciousness which seems to convert a small living room into a large auditorium.

In the concert hall, the sound from the performers reaches the listener directly, and also by means of reflected paths from distant walls and high ceilings. These reverberations, or echoes, which add so much to the depth of the original rendition, are lost when the recording is reproduced in the living room. The Xophonic restores these reverberations and adds a definite sense of presence to the reproduction.

How It Works

In use, the input terminals of the Xophonic are clipped to the voice-coil lugs of the speaker in an existing music system. The electrical signal at that point is converted into sound waves by a driver unit and these are forced through a coiled delay pipe. At the other end of this pipe the sound is picked up by a microphone, amplified, and then reproduced by a built-in loudspeaker.

Due to the time delay in the delay pipe, the sound from the Xophonic speaker emerges about $\frac{1}{20}$ second after it has been reproduced by the speaker of the main system. While not discernible as a direct echo, it does add considerable life and sparkle to both old and new records.

Xophonic reproduction requires no special recordings. The unit can be used with any music system, be it phono, tape, radio or television, with equal effectiveness. Furthermore, its location with respect to the main system is of little consequence for its effect will be the same whether it is placed directly on top of the main speaker or widely separated from it.

Yes, the art of recording and reproduction of sound has progressed with giant strides in the past decade. High fidelity is no longer the dream of a few, but a practical reality within the reach of almost everyone interested in good music. And so, engineers and experimenters are raising their sights to the limit in an effort to achieve "true" fidelity, the ultimate whereby even the most critical listeners and the most sensitive test instruments are unable to differentiate between the original rendition and the recorded reproduction. ★ ★ ★

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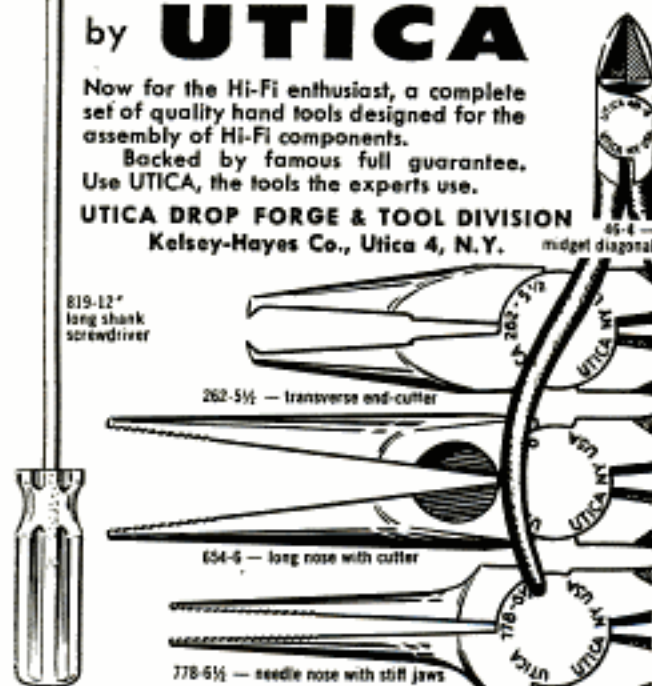
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Companion Phono Plays Records Anywhere

(Continued from page 144)

distributors' catalogs for about \$3 or \$4.

A 7-in. arm was used in the model but a shorter one may be employed by slightly changing its position on the mounting board so that the arc of the stylus, when moving from one edge of the record to the other, passes through the center of the turntable.

The Carrying Case

A suitable carrying case can be purchased from most "dime" stores or luggage shops. The one originally used is 13 in. long, 9½ in. wide and 5 in. deep, but the

LIST OF MATERIALS

CONTROLS: R1=10,000-ohm miniature potentiometer with switch (S1), audio taper; R4=25,000-ohm miniature potentiometer, audio taper.

RESISTORS: (All ½-watt, carbon). R2=1000 ohms; R3=27,000 ohms; R5=2700 ohms; R6=100 ohms; R7=680 ohms.

CAPACITORS: C1=2-mfd./12-volt electrolytic; C2=.05-mfd./200-volt tubular; C3=5-mfd./12-volt electrolytic.

TRANSFORMERS: T1=200,000/1000-ohm input, Thordarson TR28; T2=5000/7500CT-ohm driver, Thordarson TR2; T3=825CT/3.4-ohm output, Thordarson TR29.

TRANSISTORS: TR1, TR2, TR3.—Sylvania 2N35, or equivalent NPN units.

MISCELLANEOUS: 5-in. PM speaker; phono motor (see text); pickup arm with cartridge (see text); carrying case (see text); s.p.s.t. slide switch (S2); veneered plywood for mounting board, to fit case; 9-volt battery (B1), Burgess D6, and snap-on connectors; 6-volt battery (B2), Burgess P4P1, and matching plug.

HARDWARE: Aluminum chassis, 2½ x 2¼ x 1¼, ICA No. 29075; transistor sockets (3); phono input jack and plug; miniature phone plug and jack, Telex No. 9240 and 9231 or equiv.; knobs for tone and volume controls; 5-lug terminal strip; ground lug; rubber grommet; assorted screws, nuts and lock washers; hookup wire; rosin-core solder.

dimensions are not particularly critical. The base portion, however, must be sufficiently deep to accommodate the parts beneath the mounting board, while the lid must be deep enough to cover the tone arm and turntable without touching these.

To prevent the lid from accidentally closing on a record, a lid support should be installed. A tone-arm latch can be fastened to the mounting board to secure the arm while the unit is being carried about.

Wood cleats are nailed to the sides of the case to hold the mounting board approximately level with the top of the case, and similar cleats at the bottom serve to hold the batteries in place.

Before soldering the B2 battery plug to the motor and switch leads, insert the bare ends of these wires in the battery-socket holes to determine the polarity required for clockwise rotation of the turntable. This simple check may prevent improper attachment of the plug which would result in reverse rotation of the motor. ★ ★ ★

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4. What tree is given its name because of the long needles it bears?

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What You Can Learn on an Economy Run

(Continued from page 102)

This was the difference between the expert and the novice. Despite bad weather, we had broken the 30-miles-per-gallon figure, proving that by careful driving the average motorist can get excellent economy.

DAY FIVE: Austin to Monterrey, Mexico, 382.0 miles.

On this final day, we decided to cheat! The rules under which the official test car operated (with NASCAR sanction) stated that it could not coast in neutral. Not bound by such rules ourselves, we decided to see if coasting would help.

We accelerated quickly up to 65 miles per hour, shifted into neutral and coasted down to 45 miles per hour. Then back up to 65 for another coast down to 45 again. We took advantage of hills where possible.

We timed the periods we were under power and found that we rarely had the power on more than half the time. Often we were under power only a third of the time.

For the whole day, we averaged 42.8 miles per hour (the test car, which was driving steadily in its turtle-beating-the-hare fashion, averaged 38.9 miles per hour). Our gasoline mileage was 30.0 miles per gallon (the test car's was 33.57 miles per gallon).

The weather was hot, being 95 degrees in Mexico. This helped, but working against us (especially against our coasting technique) was a brisk headwind.

We drove this last day without regard for careful throttle action. We accelerated quickly and then coasted. We probably would have increased our economy if we had accelerated to 65 more carefully. We averaged almost four miles per hour more than the test car yet came within 3.5 miles of their economy figure. This was certainly proof that the hurry-up-and-coast technique is economical.

WHAT DID WE LEARN? Here are some principles we learned on the five- day test:

● Driving fast costs money and may not save much time. By driving fast steadily, you may be ahead if your time is worth money (as it would be if you were anxious to get somewhere on a vacation, for example). Time saved may be more valuable to you than the gasoline. If you're on a sightseeing trip, time costs nothing and you would be ahead to drive more slowly. Fast driving often makes you more tired. This

(Continued to page 230)



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How many of these screwdrivers do you know?



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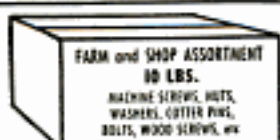
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usually leads to more frequent rest stops. These stops may cancel out the time you save by driving fast.

• Keep your throttle foot from being overactive. Accelerate gently. Plan your passing so you won't have to brake to keep from overrunning the car ahead when you cut back into line. Every time you apply the brakes you toss money out the window. On the entire run from Canada to Mexico, the brakes were rarely applied. Even in traffic, I found that I could drive without brakes if I planned my moves.

• Inflate your tires to the maximum pressure recommended (34 pounds in Rambler's case). On smooth highways you won't notice any difference in the ride and it will boost mileage about 0.6 mile per gallon.

• Coast where possible. There are some states, however, in which it is illegal to coast downhill with the transmission in neutral. This is a carryover from the days of inadequate brakes. It is doubtful if there is any need for such a law today except in mountainous terrain. Many automatic transmissions have free-wheeling characteristics in high anyway. The on-again-off-again coasting technique is a relaxing change and is fun for a while. It is an excellent way to overcome the hypnotic effects of turnpike driving. By installing a kickdown switch on the steering column you could eliminate the need to use the clutch and shift lever on overdrive-equipped cars. This technique, however, may annoy other motorists because of the irregular speeds.

• Obviously, you should have your car in good tune. But there is no economy in spending \$50 for an overhaul to save \$10 worth of gas. If your engine is in good shape, checking ignition timing, spark plugs and point setting should be enough. Be sure your car rolls freely.

• Don't buy premium gasoline unless your engine requires it to prevent knock. There are no extra miles per gallon in premium fuel if your engine doesn't need it—and it costs more.

• Finally, if you want real economy, buy a car designed for it. Order an economy rear axle and a lean carburetor metering rod. Don't overload your car or stack suitcases on a roof rack and hope for good mileage. It takes gasoline to overcome the air drag of roof loads. Last, drive carefully. One damaged fender can offset all the savings you may make on gasoline. ★ ★ ★

Ⓞ Don't drive with the windows closed if you use dry ice to cool your car on hot summer days. The evaporating carbon dioxide could asphyxiate you.

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Here are some secrets of successful barbecuing — the best fuels to use, ways to maintain proper draft, and hints on firing up and cooking that will enable you to capture the authentic barbecue flavor in the foods you serve to family and friends. So that your fare won't be confined to wieners and hamburgers, Tom Riley also tells you how to prepare and serve such barbecued delicacies as ribs, roasts, fowl, fish, special sauces, and various vegetables.



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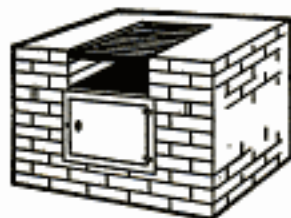
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Complete step-by-step building instructions with diagrams, photos and drawings make construction a cinch. There are designs for brick, field country stone, cement, concrete block and poured concrete, and many examples of each. With the know-how gained from this book, yours can be the most popular back yard in town and, besides you'll have lots of fun.



Partial Contents

Which Barbecue for you? Barbecue Fireplaces, Portable Grill, Masonry Grill, Barbecue Pits, Chinese Ovens, Infra Red Roasters, Combination Barbecues. Construction plans, Basic Fireplace Foundation, Barbecue Fireplace of poured concrete, stone construction, Firing Up! Types of Charcoal, Hardwood, Softwood, Compressed Sawdust, Cooking Temperature, Flame Tested Recipes, Charcoal Broiled Steaks, Barbecued Spareribs, special section of cooking methods employing various vegetables not usually associated with outdoor cooking, and much more.

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next time,

say STANLEY!

It's not your eyes, it's those invisible markings. If you can't see 'em, you can't read 'em! Next time get a rule with markings you *can* read. Ask for a rule that lasts longer. Be precise . . . say Stanley, it's a *good* rule.



Take this Stanley 6 ft. No. 106. No comparable rule reads easier longer. It never shows early symptoms of "outside stick fadeout." The numbers are bold, black Gothic. The graduations are sharp, clear indentations. And all markings are protected with a long-wearing plastic finish. The joints are smooth working, too, and they stay that way. They have been *permanently lubricated*. Don't get your eyes checked, get a new rule, and this time say Stanley when you buy.

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FIELD-TESTED SINCE 1922

The Saga of the DC-3

(Continued from page 70)

The reason is partly its stubborn sturdiness. "You can wreck one," said a pilot, "but you can't wear it out." Yet the reason is also economic. Most of the Threes now in use were picked up as surplus, for a few thousand dollars, and have been written off the books as fully depreciated. Replacements are expensive. The average operator isn't going to spend big money on new ships and sweep his DC-3s out of their hangars so long as he can keep 'em flying.

Meanwhile, Douglas has compiled some interesting statistics on them. They've flown, as nearly as can be estimated, about 87 billion passenger miles and some 75 million hours. They've carried 400 million commercial passengers, or approximately the population of India. These figures do not include military operations. And DC-3s still comprise about 35 percent of the world's air-transport fleet and do all types of other jobs, from radar-testing to pest-control forest-spraying.

Typical Old-Timer

Recently Douglas checked up on a typical old-timer among the gooney birds, belonging to a midwestern feeder line. It found the plane had piled up more than 50,000 hours and 7½ million miles. This becomes all the more remarkable when one considers that an automobile which has traveled 150,000 miles is looked upon as a mechanical Methuselah.

When will the DC-3 finally disappear? Experts at Douglas and fliers generally, having predicted before and felt foolish afterward, are no longer willing to make a prediction, except possibly this one: The DC-3, they say, probably will still be aloft long after many of the pilots and passengers now flying in it are dead and gone.

Already it has spanned almost half the history of flight itself. And this fact alone occasions a nostalgic feeling among most fliers and many passengers—a feeling that is illustrated by a recent occurrence.

A military DC-3 landed at a Chicago airport and taxied to its parking place. The pilot flipped off his switches. Then, instead of climbing out of his seat, he just sat, staring dreamily out a side window.

"Well," said the co-pilot, "are we going to get out of the airplane or aren't we?"

The pilot didn't answer. Instead he pointed to a nearby fence.

"See that spot?" he said. "That's where I saw my first DC-3. I was just a kid then, and did that plane look big. Well, here I am flying one. I feel as though I've lived a whole lifetime since that day." ★ ★ ★



Steel Tire Mask Is Blowout Guard

Constructed of $\frac{5}{16}$ -inch boiler plate, the tire mask in the photograph above is designed to protect aircraft-maintenance workers at the Miramar, Calif., Naval Air Station in the event of a blowout while inflating a tire. It's equipped with two coaster wheels and has two slits through which an air hose may be passed.

Nitrogen Helps Christmas Trees

University of Washington scientists report that applying nitrogen fertilizer to young Douglas fir trees doubles their size, speeds their growth and improves their appearance for the Christmas market.

Machine Sells Inflated Balloons

Balloons filled with air or gas and tied with a string now are dispensed by vending machines. The size of the inflated balloons can be adjusted through a gas meter in the mechanism. The vending machine makes the balloons available 24 hours a day for parties and advertising promotions.



How to get beautiful finishes for your wood or plywood projects

Painted, stained, or "natural," a good wood finish depends on how uniformly the hard and soft portions have been sealed. Firzite® controls "wild grain," prepares the surface for any type of finish.



WELDWOOD SEA SWIRL® wall paneling "pickled" with White Firzite.

NATURAL EFFECTS. To retain the natural beauty, color, and grain contrasts of all wood, use clear-as-crystal, non-yellowing Satinlac®. Easy to brush or spray on, Satinlac is its own best sealer, requires no undercoat, protects the wood thoroughly without the built-up look of conventional finishes. Quick drying.

BLOND OR PICKLED EFFECTS. White Firzite is specially adapted for Blond and Pickled effects on all woods. Easy-to-apply White Firzite wipes clean, produces clear "woody" effects without a "painty" look.

STAINED EFFECTS. For the deep, rich tones of professional looking staining, use colors-in-oil mixed with Clear or White Firzite. On softwoods, however, use Clear Firzite as a pre-sealer prior to staining. An ideal sealer, Clear Firzite assures even absorption of stain, prevents garish wild grain.

FINISHING OFF exposed lumber and plywood edges. New Weldwood Flexible Wood-Trim® is real wood veneer in handy 8' rolls. Use Weldwood Presto-Set Glue on Wood-Trim and press in position. Trim with a razor blade, sand and finish along with the rest of the job. Available in 6 woods for virtually any woodworking project.



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Before you paint or start a dirty job in the house, garden or garage, rub Du Pont PRO-TEK hand cream on your hands and arms. It keeps sticky stains away from your skin . . . then washes off quickly, taking the grime with it. Get Du Pont PRO-TEK at drug, hardware, paint and auto supply stores.

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DUPONT Better Things for Better Living
... through Chemistry



How You Can Spot the Satellite

(Continued from page 76)

the satellite's faint glow will fly across the field of view of many moon-watch stations, to give members a dress rehearsal. To achieve such essential cooperative effort, teams must be registered and located according to prearranged plan.

What are the chances of a qualified amateur to join a team?

At last count before press time, 68 moon-watch stations had been set up. Others are being organized. A total of about 100 teams will probably be operating by the time Vanguard I soars skyward. Southern California, Arizona, New Mexico and Texas need observers most.

How does one go about signing up for a place on a moon-watch team?

An inquiry to the member of the moon watch National Advisory Committee who is nearest you is all it takes. A list of names and addresses of these committee members appears below. Don't expect an answer to anything but a specific inquiry regarding the satellite-observing program. ★ ★ ★

NATIONAL ADVISORY COMMITTEE

G. R. Wright, Chairman, 202 Piping Rock Dr., Silver Spring, Md.

Thomas A. Cragg, 246 West Beach Ave., Inglewood 3, Calif.

Walter A. Haas, 1203 N. Alameda Blvd., Las Cruces, N. Mex.

Edward A. Halbach, 2971 S. 52nd St., Milwaukee 14, Wis.

Rolland R. LaPelle, R. D. No. 3, Meadville, Pa.

Charles H. LeRoy, 621 Saxonburg Rd., Pittsburgh 38, Pa.

Russell C. Maag, 904 S. Ohio, Sedalia, Mo.

Mrs. Margaret W. Mayall, 4 Brattle St., Cambridge 38, Mass.

Miss Grace C. Scholz, 410 Mason Hall Apts., Alexandria, Va.

Steadman Thompson, 1284 Edgehill Rd., Columbus 8, Ohio.

Clyde Tombaugh, 626 E. Alameda Blvd., Las Cruces, N. Mex.

Please address all visual observing applications to any individual member of the advisory committee.

Arctic-Antarctic Radio

For the first time, arctic-to-antarctic radio contact has taken place between two Navy hams, using amateur equipment and frequencies on the 20-meter band. One operator was on the USS *Eldorado* near the North Pole. The other radioman completed the hookup from Station KC4USA near the South Pole.

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 - Compressor, 2 cyl. 10.4 cfm \$49.95 Ppd.
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 - Pres. Regulator 0-250 psi... \$3.29 Ppd.
 - Air Kit, complete... \$39.49 Ppd.
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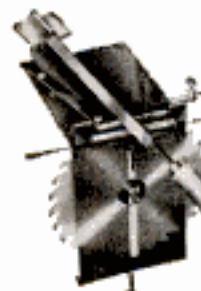
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SEND NO MONEY. Don't hesitate to ask for information—there's no obligation to go ahead unless you want to, after receiving my letter. If you're "yearning" to increase your "earning" power right in your own home, send postcard or letter for details about this stimulating New puzzle game. **First Prize Cannot Be Less Than \$3,000.00 and If Lucky, Your Grand Award Can Be \$20,000.00.**

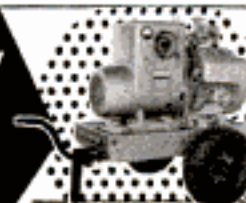
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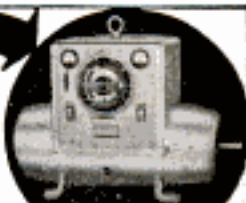


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Air-conditioning "boots" are inserted through the window of each car stopping at the Blue Onion drive-in restaurant in Las Vegas, Nev. Each of 30 outlets comes from a central air-conditioning system in the building. The units have hand-operated volume dampers and directional vanes.

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long slender scoops attached to a bar across a small boat propelled by an outboard motor. Gently vibrating rods shake ripe kernels from the plants into the scoops.



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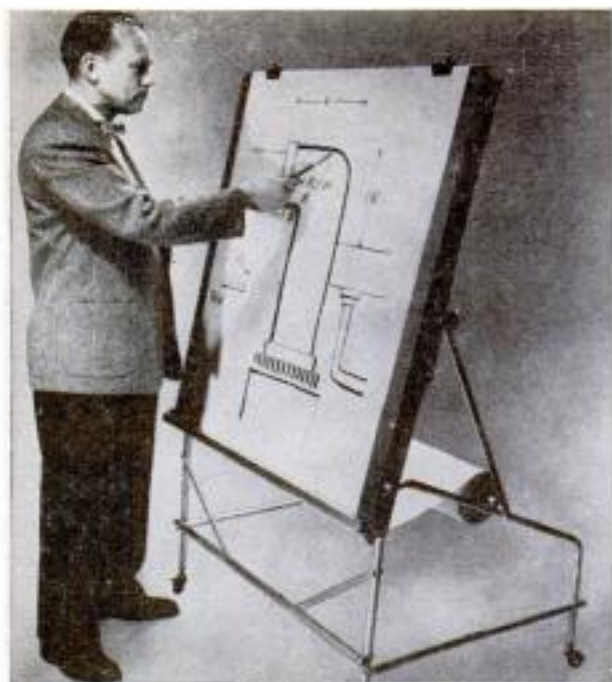
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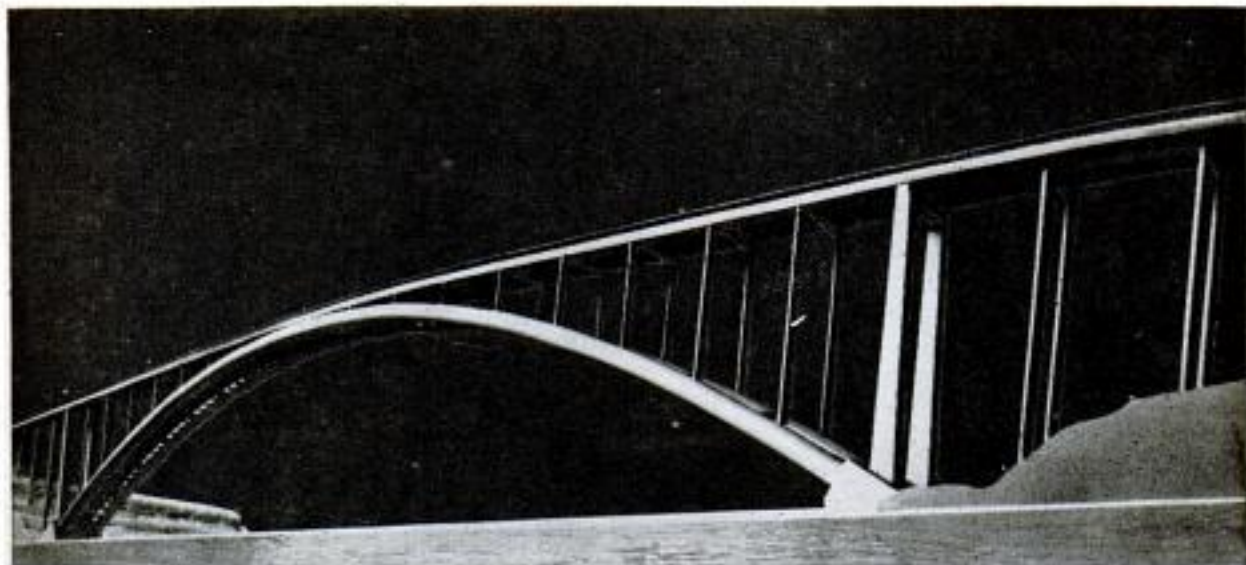
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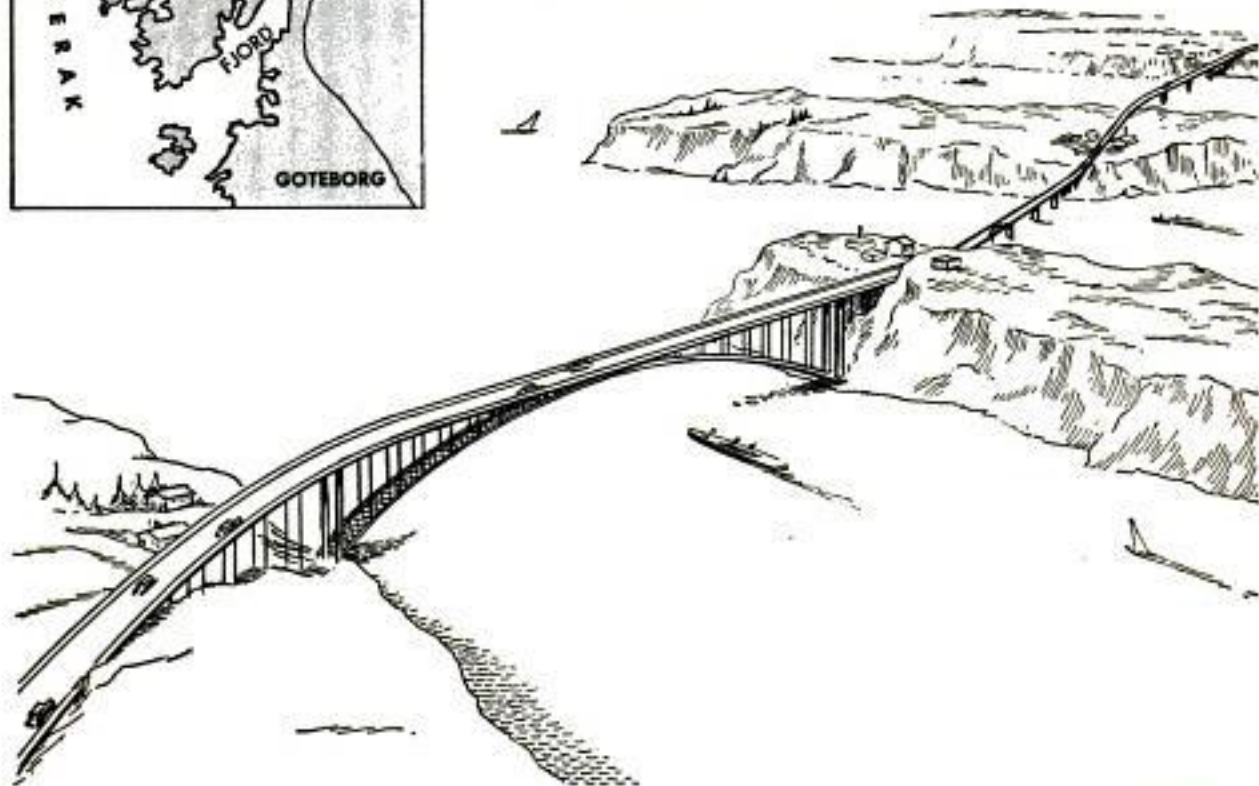
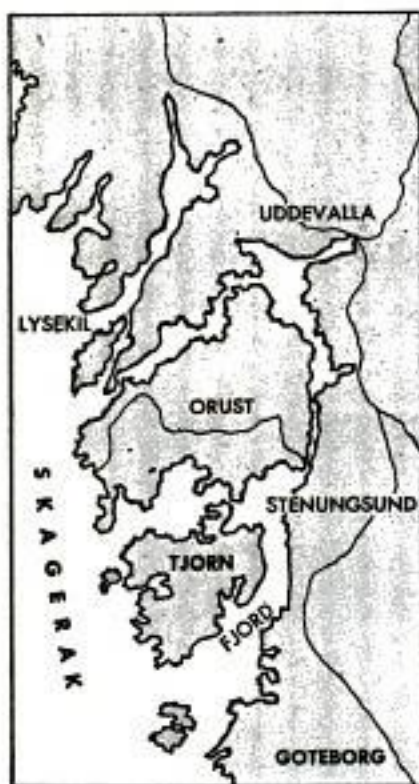
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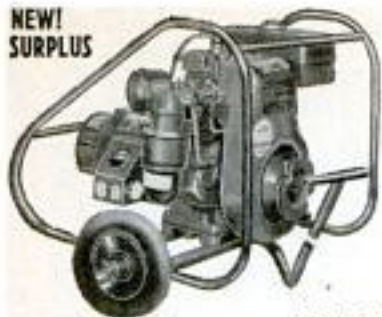


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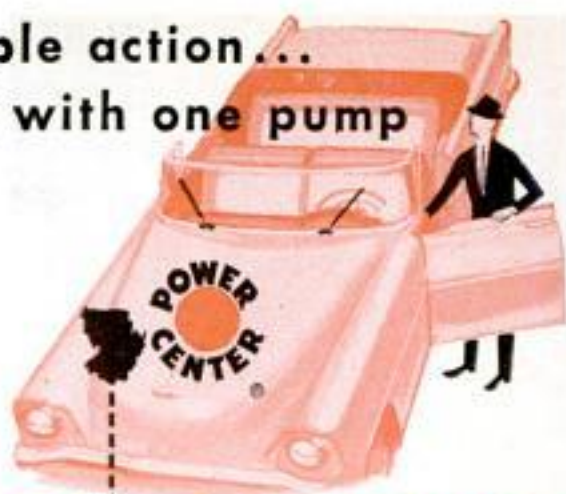
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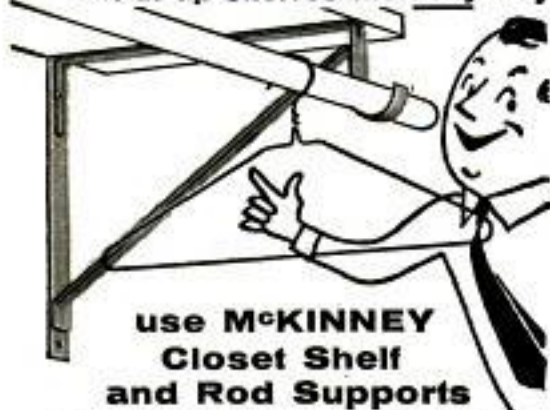
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GILLIOM POWER TOOLS, Dept. 80-H, Lambert Field, St. Louis 21, Mo.

YOU can build your own SUMMER CABIN or GUEST HOUSE with this natural outdoor material

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The one-room house pictured above is built with Homasote beveled siding, subflooring, walls and ceiling. All materials and complete building instructions are listed on East-Bld® Pattern #84—available at your lumber dealer. This pattern details each step of the job, with photographs, cut-away drawings, and full-size sawcut patterns to make every inch of the job professional.

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*T. M. Reg. East-Bld® Pattern Company

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HOMASOTE COMPANY, Department H-5, Trenton 3, New Jersey

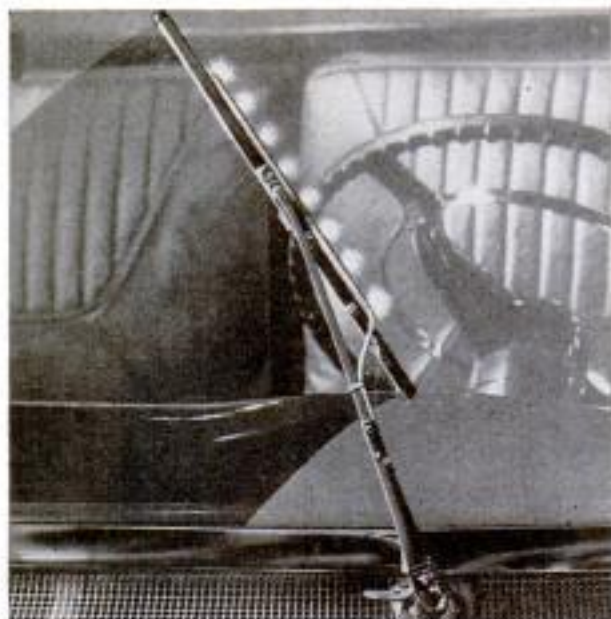
Send me the 68-page Homasote Handbook, for which I enclose 10¢ for handling.

Name

Address

City..... Zone..... State.....

Windshield Washer Sprays Path for Wiper



Hays Dist. Co., 410 Michigan Ave., East Lansing, Mich.

Clamp-on windshield washers will reduce frustrations of motorists used to watching the water stream blow away in the wind. This new washer makes driving safer by spraying an even flow of water in the path of the wiper blade. Water is fed through a plastic hose into an aluminum tube that has eight small jets for ejecting water on the windshield. Made in two models, the washer can be connected to nozzles installed in cowl panels or hoods.

Drugs Affect Special Brain Areas

Studies with rats indicate some drugs affect sections of the brain associated with fear and pain, while others affect the part which governs reward. The research is being conducted by Prof. Neal E. Miller of Yale University in connection with the treatment of mental illness.

Booster Tube for Radar

Radar signals will be increased from eight to fourteen times with a booster tube called "amplatron." When added to air-traffic-control radar units being built for the Civil Aeronautics Administration, their range will increase from 200 miles to 350.

Removes Photo-Chemical Stains

Photographic-chemical stains—the bane of photographers who develop their own pictures—can be removed with a liquid called Remover K-14. It will not harm clothing or skin, the manufacturer says.

Anchor Chemical Co., P.O. Box 2775, Cleveland 11, Ohio

FREE PLAN tells how to start your own business **FILING SAWS**



Here is a steady repeat CASH business you can start in your own basement or garage in your spare time and make up to \$3 or \$5 an hour. You can file hand, band and cross-cut circular saws on the Foley Saw Filer. No eye-strain—no experience needed. "The first saw I sharpened with my Foley Filer came out 100%!" —writes Clarence E. Parsons.

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DYNAMIC WELDER COMPANY, 1808 S. Federal Street, Dept. D2-H, Chicago 16, Illinois

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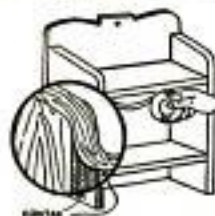
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You know those rare days when everything's right? Air smells good. Food tastes terrific. Even the old face looks good in the mirror. Today can be that kind of day. Just do two things. Call your doctor for a thorough medical checkup for cancer. Then write out a check—a nice fat one—to the American Cancer Society, and mail it to "Cancer" in care of your local Post Office.

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YOUR CHOICE! SAME PRICE!

2½x - Overall lgth. 9½"
20 ft. field of view at 100 yds.
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NEW PAL-MASTER SCOPES for TARGET • BENCH REST or HUNTING

Choice of 3 different powers **995 WITH MOUNT**
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COMPARE THESE QUALITY SCOPE FEATURES:

- 1—ADJUSTMENTS Positive Internal Direct reading Windage & Elevation/Knobs
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MOUNT INCLUDED with SCOPE

SIDE or TOP MOUNTS available with scope to fit most rifles. When ordering specify type mount, gun model number and brand.

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PALLEY DIVING LUNG KIT

BUILD YOUR OWN! - SAVE up to \$100. Our special folder has complete instructions showing how its done. Kit includes Air Bottles, Pressure Regulator, Safety Belt, Air Hoses, Mouthpiece, Clamps, Valves, Shoulder Harness, etc. Everything needed. Price of this Kit with 2 Air Bottles (1 hour time) \$150 Value **45.95**

SEE CATALOG below for our complete stock of Diving Equip. Includes Flippers, Tanks, Goggles, Guns, Lungs, etc. in both New and Surplus types.

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I.C.C. Approved to 1000 P.S.I.
22 cu. ft. cap. 5" x 19" \$10.95
38 cu. ft. cap. 7½" x 9" \$14.95

FINEST STEEL BAYONET

Genuine Infantryman's bayonet, made of the very finest tool steel. Fluted sides and precision honed edge. Blade is 8" long making it an ideal knife for skin diving use or as a hunting knife. Comes complete with a reinforced leather scabbard. **2.89**

1/6 HP. 115 VAC MOTOR

Another Palley Bargain Buy! MOTOR, HANGER MOUNT and DUAL V-BELT pulley included. An ideal shop motor. Operates on 115V., 60 cycle, 1-phase and draws 3.8 amps. Turns 1725 RPM. Pulley is 2" dia., and takes 1/2" & 1/4" V-belts. Hurry - stock limited. **Only 7.95**

NAVY WADING SUIT

Ideal for Surf or Deep Stream fishing. Also whenever necessary to protect body or clothes from mud, molasses, etc. Made of heavy duty rubberized canvas with vulcanized seams, built-in boots & gloves. Sizes: Med., Lg. **12.95**
See Catalog below for complete stock of Treading, Fishing and Camping Equipment.

16 POCKET VEST

Originally used as an Air Corps Emergency Vest. Ideal for Hunter, Riflemen, etc. Has 14 individual, outside pockets which can be used shells, glasses, etc. Also has a leather holster for pistol, 2 large (11 x 2") inner pockets. Sturdy, yet lightweight with adjustable tie straps on back for a snug fit. **3.49**

NEW ARMY CANTEEN & REISSUE CUP AND BELT

A one quart canteen and aluminum cup fit into the insulated canvas cover. Choice of web type pistol belt or cartridge belt with pockets. The canteen is new Korean War Surplus. **2.29**

AIR PRESSURE TANK

G-1 Type, Stainless Steel. Shatterproof and rustless. Built to withstand up to 400 PSI with high safety factor. Has 1/4" pipe ports. Ideal for use in Air Storage for painting, spraying, etc. Can also be used for water storage, as a buoy, etc. Size: 12½" dia. x 24" length.
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A WINDOW
???**

IF YOU HAVE, you know how cumbersome it is to hammer the little triangle points into the frame to hold the glass. The FLETCHER DIAMOND POINT PUSHER illustrated will automatically sink glaziers points into the frame by simply pushing the handle. It is excellent too for framing pictures and mirrors. It costs less than a dollar.

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Oxygen Masks Aid Passengers In Decompressed Plane Cabin

When air pressure in future, high-altitude jet airliners suddenly drops below the danger point, emergency oxygen masks will lower from the ceiling into the hands of each passenger. These masks are made of porous, sponge-rubber cups connected by tubes to the plane's oxygen supply. A gas-regulator system and the porous cups will mix air and oxygen properly. The masks function automatically as the pilot guides the aircraft to low-altitude breathing levels.

Penicillin Produced Artificially

Synthetic penicillin has been produced at Massachusetts Institute of Technology. As a result, 10 new types of the substance are being tested for possible medical use. It is not expected to be inexpensive enough to compete with the fermentation process of deriving penicillin from molds, but it is hoped the material will have several new medical applications.

Faster Drill for Oil Wells Uses Percussion Hammer

Delivering 600 blows per minute, a newly developed hammer drill can bore through oil-field rock up to four times as fast as conventional twist drills. The percussion drill is suspended like a plumb bob at the bottom of the hole and is powered by the circulation of "drilling mud" which carries away the pieces of drilled rock.

PORTABLE LIGHT PLANTS

1500 WATT PLANT
115v. 60 cycle AC Push Button Start. Powered by a 3 1/2 HP. Clinton engine. Combines big output with easy portability. Provides emergency power for operating any oil burner, sump pump, freezer, television, lights, communications systems, etc. which require up to 1500 watts. (Item 22) Wt. 110 lbs. Reg. \$475. Factory price... **\$239.50**



1750 Watt Plant Powered by 4.5 Briggs engine. Electric starting & battery charging built-in! Factory price... **\$279.50**

MASTER-LITE 2500 Watt Plant
110/120 v. 60 cycle AC. A power-plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lb. Reg. price \$640.00 (Item 21) Factory Price... **\$329.50**



3500 Watt Plant Push Button Start (Item 23)
115 v. 60 cycle AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. \$760. Factory Price... **\$379.50**

DUAL VOLTAGE 110/220 for Item 21 or 23 - \$30 additional.

1000 Watt Belt Drive AC Generator

Lightweight portable generator. Will provide 1000 watts of 115 volt 60 cycle AC power for lights, saws, drills, etc. or other appliances requiring up to 1000 watts. Operates at 3600 r.p.m. - drives with any gas engine, tractor or power take off. Can even be mounted on an automobile engine to operate off a fan belt. Complete with duplex receptacle box, safety fuse and 4" pulley. Not recommended for heavy duty. Wt. 27 lbs. (Item 825) only... **\$79.50**



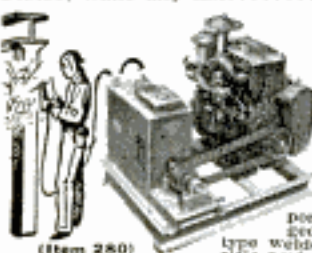
750 Watt Generator, similar to above. (Item 826)... **\$59.00**

Heavy duty 1200 Watt Generator only. Wt. 50 lbs. (Item 45a)... **\$139.50**

Heavy duty 2500 Watt Generator only. Wt. 80 lbs. (Item 21a)... **\$169.50**

GIANT METAL SHEARS

"PEKTO"
Nine inch cutting blade made of special high carbon alloy steel, perfectly aligned and ground. Easily cuts steel plate up to 12 gauge or 1/4" thick. Overall length 48". Wt. 23 lbs. (Item 156) Regular \$49.50. While they last... **\$14.95**



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Now! a portable rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to 1/4" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and triple V-belt or flat pulley. Easy to hook up and easy to operate. **WELDER ONLY - DUAL CONTROL MODEL.** Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 35a.) Wt. 110 lbs. \$469 value... **\$119.50**

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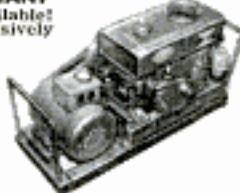
COMPLETE POWER MASTER (illustrated above) powered by a 14.6 hp., air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compares with welder costing \$1200. Factory Special... **\$449.50**

WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **\$10.50**

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EXCLUSIVE! NEW! LIGHTWEIGHT WATER COOLED DIESEL GENERATOR PLANT

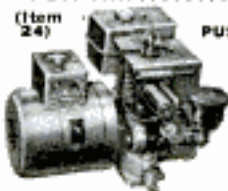
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Diesel generator set.
Powered by a
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Operates at
consistently 1750
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240 lbs. representing a triumph of Diesel Engineering. Complete with fuel filter, oil
pressure gauge, control box with duplex receptacle
and voltmeter. (Item 830)
Special factory price... **\$399.50**



**700 WATTS
PUSH BUTTON START**
115 v. 60 cycle AC
Powered by a rugged
2.2 HP easy starting
Briggs engine. No
wiring necessary;
just plug in and operate. Plenty of current
for any oil burner,
freezer, brooder,
emergency lights,
etc. which require
up to 700 watts. Ideal for television and
radios. Complete with Voltmeter and built-in
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24.) Wt. 75 lbs. Easily fits in car trunk.
Especially prepared for storm knock-out
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1200 Watt Plant (Item 45) same as Item 24
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with 50% greater output... **\$199.50**

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3.5 HP Item 830a... **\$249.50**
Wt. 116 lbs.



Double Acting Hydraulic Cylinder

A powerful cylinder mfr'd. by Massey Harris
which develops both a pushing and a pulling
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lbs. Reg. \$68 value. Special... **\$14.95**

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8" stroke - 3" bore... **\$34.00**
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We have all sizes of cylinders available.

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open center valve with built-in
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1 double, or 2 single acting
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mounted, finger tip control. Wt. 16
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JET STEAM MASTER

Now, a super efficient portable steam
generator that produces live steam at
100 lbs. pressure in
60 seconds from a
cold start! Produces
large volume of high
pressure steam on 2
pints of fuel oil. Instantly
cleans sticky grease,
oil, dirt, rust, old
paint, etc. off
implements and road
machinery. Pays for
itself in a few weeks.
Sterilizes soil. Sterilizes
as it cleans—milk
equipment, etc. Fully
automatic—oil fired with
new, built-in lifetime
bronze water circulating
pump. Draws water from
faucet or bucket. Simple
and safe—anyone can use
it! Equipped with safety
valve. Complete with 12 ft.
hose and new triple efficiency
steam gun that automatically
mixes in soap solution if
desired. Wt. 250 lbs. Item 463.
Special factory price... **\$349.50**

9 TON HYDRAULIC PRESS

A tremendously powerful hydraulic
press, capable of exerting 18,000
lbs. pressure. Pays for itself many
times over—straightening bent
connecting rods, king pins, crank-
shafts, axles, link pins and
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pressure under precise
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large and small anvils and
bars to straighten any kind
of curve or bend. (Item 404)
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Burlington, Wis.

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**GIANT 2500
WATT PLANT**
110-120 v. 60 cycle
AC. Absolutely the
best made - exclusive
dynamically balanced
armature; heavy
windings develop
up to 2500 watt
overload for motor
starting. Skid
mounted - portable.
Powered by an
easy starting Briggs or Wisconsin 6 HP
engine—complete with all accessories
easily disconnected for other uses. Big outlet
box, voltmeter, no wiring necessary. Ample
current for all purposes. Factory warranty.
(Item 31) Wt. 210 lb. Reg. price \$585. Special at... **\$299.50**



Same plant with electric
self starter (Item 31a)... **\$359.50**

DUAL VOLTAGE 110-220 available on any
of above models for \$28.00 additional.
We make every type and size of light plants
—Write, giving us your requirements!

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Instant hot water from
any faucet for just
pennies—sounds unbelievable—but it's true!
You just slip **MASTER MECHANIC'S** new
Faucet Water Heater
over any water faucet,
plug it in a wall outlet
and you've got
steaming hot running
water instantly for
dishes, shaving, washing
baby's bottle, etc.

Simple and safe—operates on ordinary 110v.
house current—costs only 2 1/2 cents per hour
for hot water. Ideal for homes, barns, cabins,
trailers, etc. Easily regulated from lukewarm
to full hot. Fully guaranteed! (Item 408)
Wt. 2 lbs. Factory price f.o.b. Burlington, only... **\$4.95**

HEATING & VENTILATING FAN
(Item 10) Easily installed in
furnace pipes. Forces even heat
to all rooms. Over range re-
moves kitchen smoke and odors.
Powerful, continuous duty motor.
110-120v. AC. Mount in
wall or ceiling to ventilate any
area. Quiet, super-efficient fan moves huge
volume of air. (400 to 600 CFM.)

8" Pipe, Wt. 5 lb. **\$6.85**
9" Pipe, Wt. 6 lb. **\$7.85**
10" Pipe, Wt. 7 lb. **\$8.85**
12" Pipe, Wt. 8 lb. **\$9.85**

HEAVY DUTY FAN. Semi-enclosed motor,
suitable for spray booths, restaurant ex-
hausts, poultry houses, etc. 10" Fan, wt. 8
lbs. (Item 10E)... **\$11.95**
12" Fan, wt. 10 lbs. (Item 10D)... **\$12.95**

HIGH SPEED BARN FAN similar to above,
but larger, high speed motor moves huge
volume of air.
12" Fan (Item 10F)... **\$14.95**
14" Fan (Item 10G)... **\$17.95**

EXTENSION CORD
Heavy duty and very flex-
ible. Neoprene 14-2 cable,
25 year quality. Wt. 12
lbs. (Item 185) 100 ft.
Complete with rubber plug
and outlet. A ter-
rific buy at only **\$8.95**

No. 10-2 Power Cable. Heavy duty, very flex-
ible, 30 ft. with male and female fittings.
Wt. 4 lbs. (Item 815b)... **\$5.15**
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No. 8-2 Conductor Power Cable. 30 ft. heavy
duty, very flexible rubber covered with male
& female plug (Item 817)... **\$12.95**

9 TON HYDRAULIC PRESS

A tremendously powerful hydraulic
press, capable of exerting 18,000
lbs. pressure. Pays for itself many
times over—straightening bent
connecting rods, king pins, crank-
shafts, axles, link pins and
nuts - or pushing out worn
bearings and bushings. Developed
pressure under precise
control and visible
at all times on accurate
gauge. Complete with both
large and small anvils and
bars to straighten any kind
of curve or bend. (Item 404)
Wt. 110 lb. Actual list price
\$365. Our special
close-out price... **\$69.50**

SCREW TYPE PRESS. Nine ton capacity. See
July Pop. Mech's. ad for details—or write.
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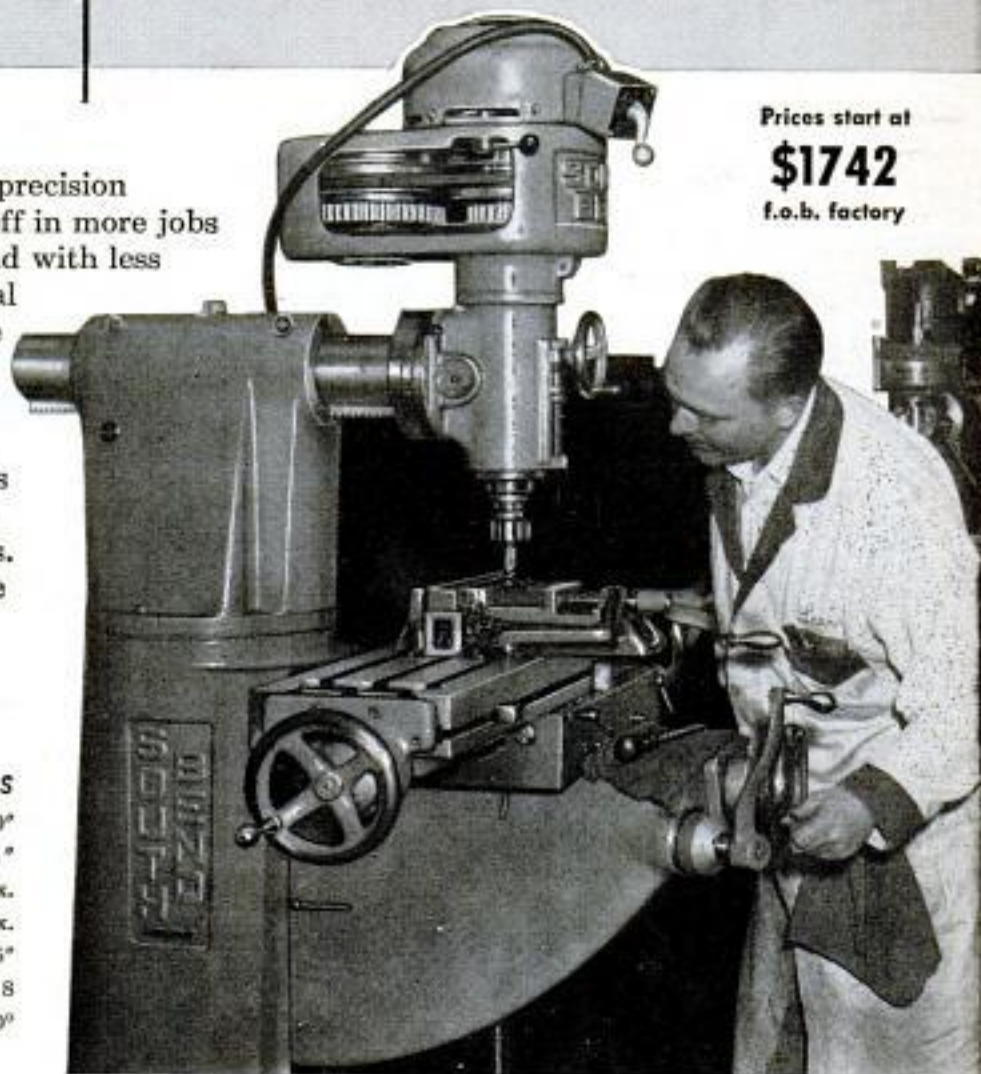
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Ram travel.....	.15"
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