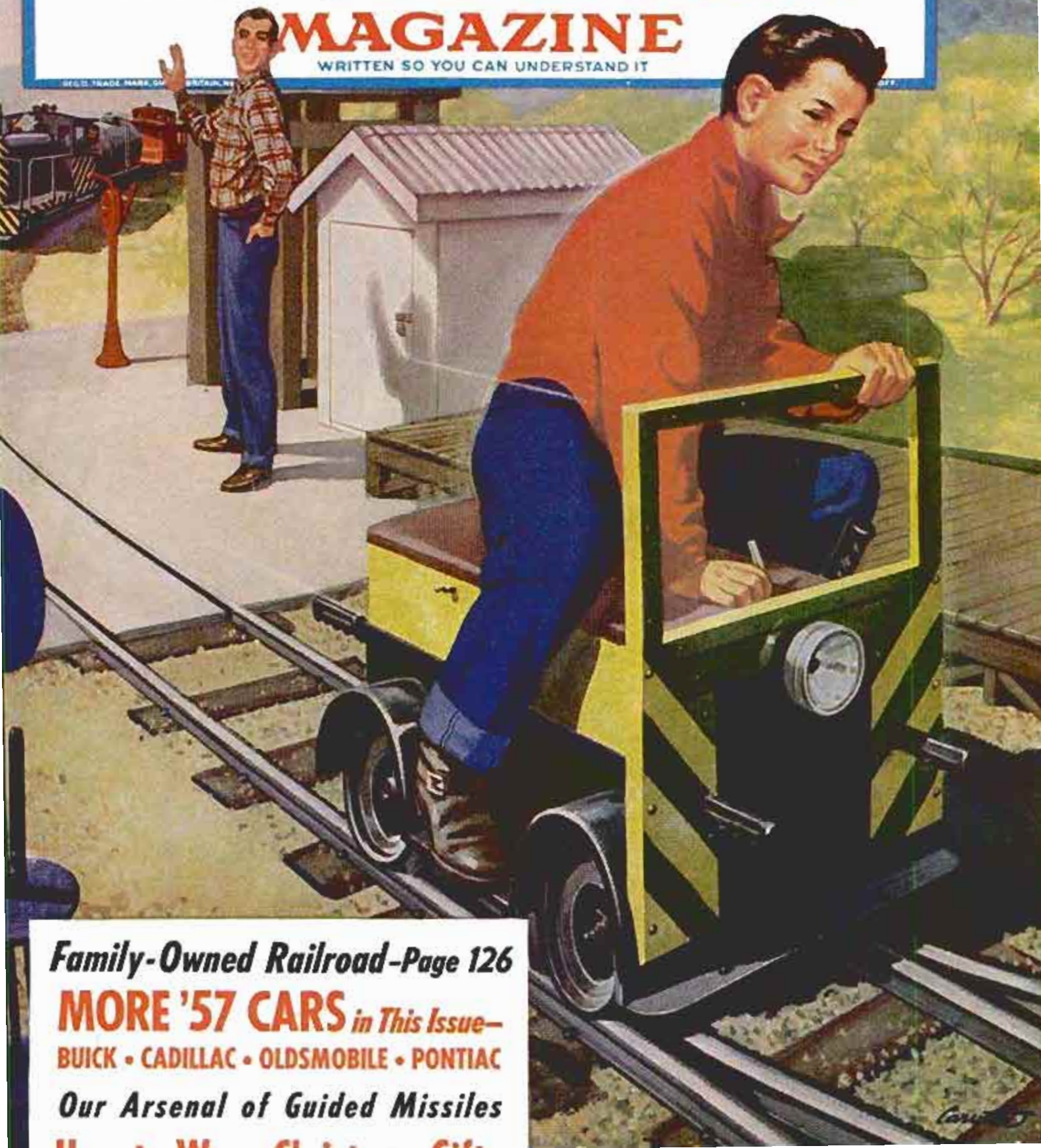


# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT



**Family-Owned Railroad—Page 126**

**MORE '57 CARS** in This Issue—

**BUICK • CADILLAC • OLDSMOBILE • PONTIAC**

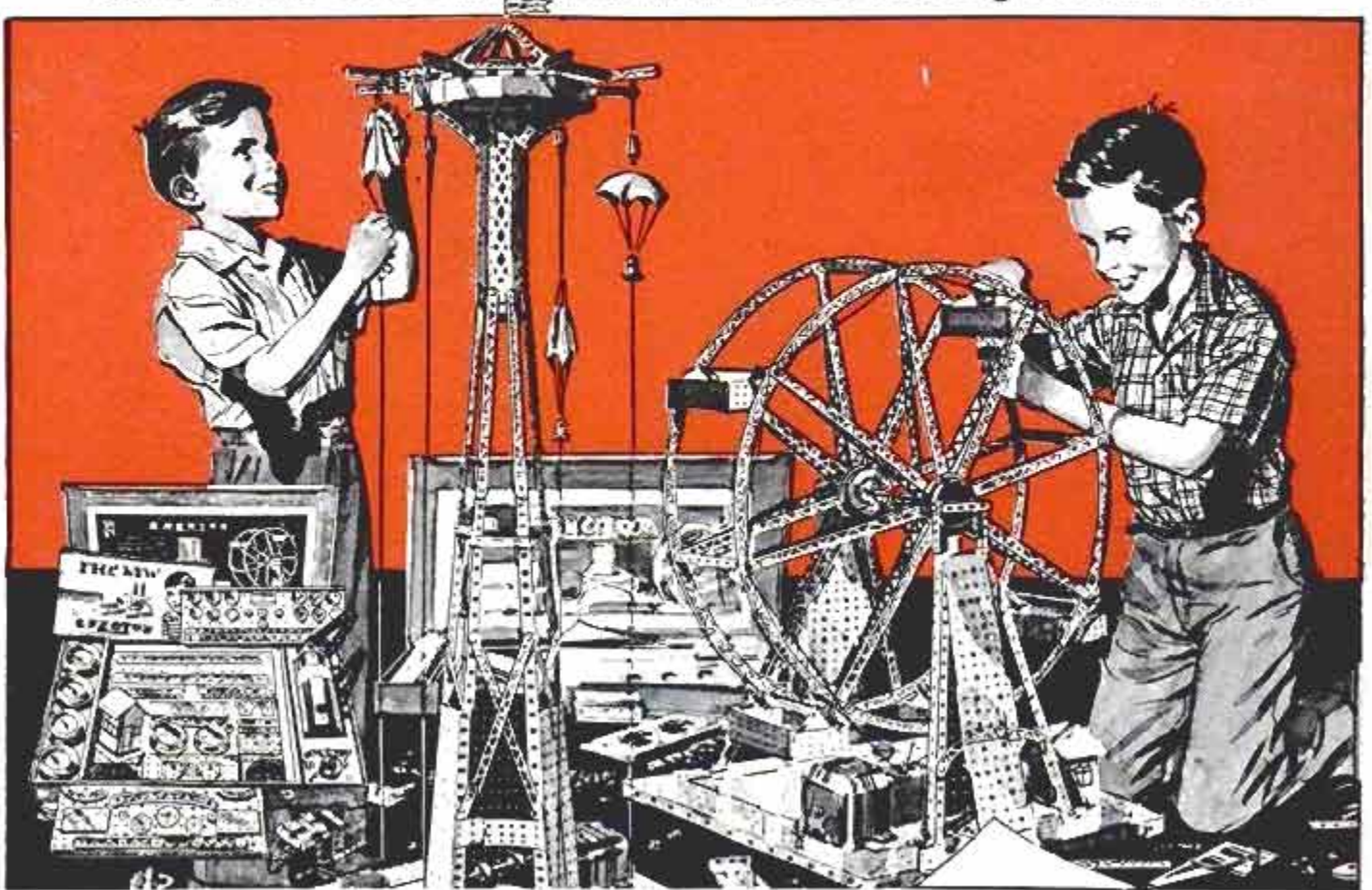
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**X-RAY ON CHEVROLET**



**This is the '57  
that gets whistles from engineers!**

*Fuel injection on expensive foreign cars is an achievement—but in Chevrolet's class it's close to an industrial miracle! That's one of the big things that have engineers excited about the '57 Chevrolet. But look at some other precedent-breakers:*

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*\*Optional at extra cost.*

*From the '57 Chevrolet's bold prow to the tip of its flight-flared rear fenders everything bears the stamp of advanced engineering . . . engineering that must be seen and sampled by anyone interested in tomorrow's automotive design. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.*

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# New versatile Screwdriver Kit only \$36<sup>95</sup>

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H. H. WINDSOR, Founder

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



## Next Month

NOW IS THE TIME to plan that vacation cabin you've always talked about. During the winter months, draw up a plan for action, come spring. A feature next month gives tips on selecting a site and illustrates various types of cabins. Some 16,000 summer homes have been built in our national forests. You too can have a beautiful one-acre site for your own use at low cost. For your family's sake, don't miss this feature

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Volume 106 DECEMBER 1956 Number 6

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for other items and manufacturers of available products



# A Christmas Gift you'll both enjoy ...together!

Here's a gift kit built around the Stanley Router that makes working together easy and fun. It includes the big  $\frac{1}{2}$  hp router that does 90% of all woodworking jobs, 5 most useful bits, a straight and circular guide, an instruction manual and 4 free Easi-Bild patterns of things to make. Ask at your hardware store for Stanley Router Gift Kit —

only  
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complete

Another fine gift for the man of the house is this new Stanley  $6\frac{1}{2}$ " heavy duty builders saw. It is powered by a completely ball bearing, Stanley-made motor. The exclusive "Motor-Saver" Drive protects this power against the shock of sudden impact should blade strike a nail or other foreign object. H68 makes all cuts necessary to build a standard home.

only **\$64<sup>95</sup>**

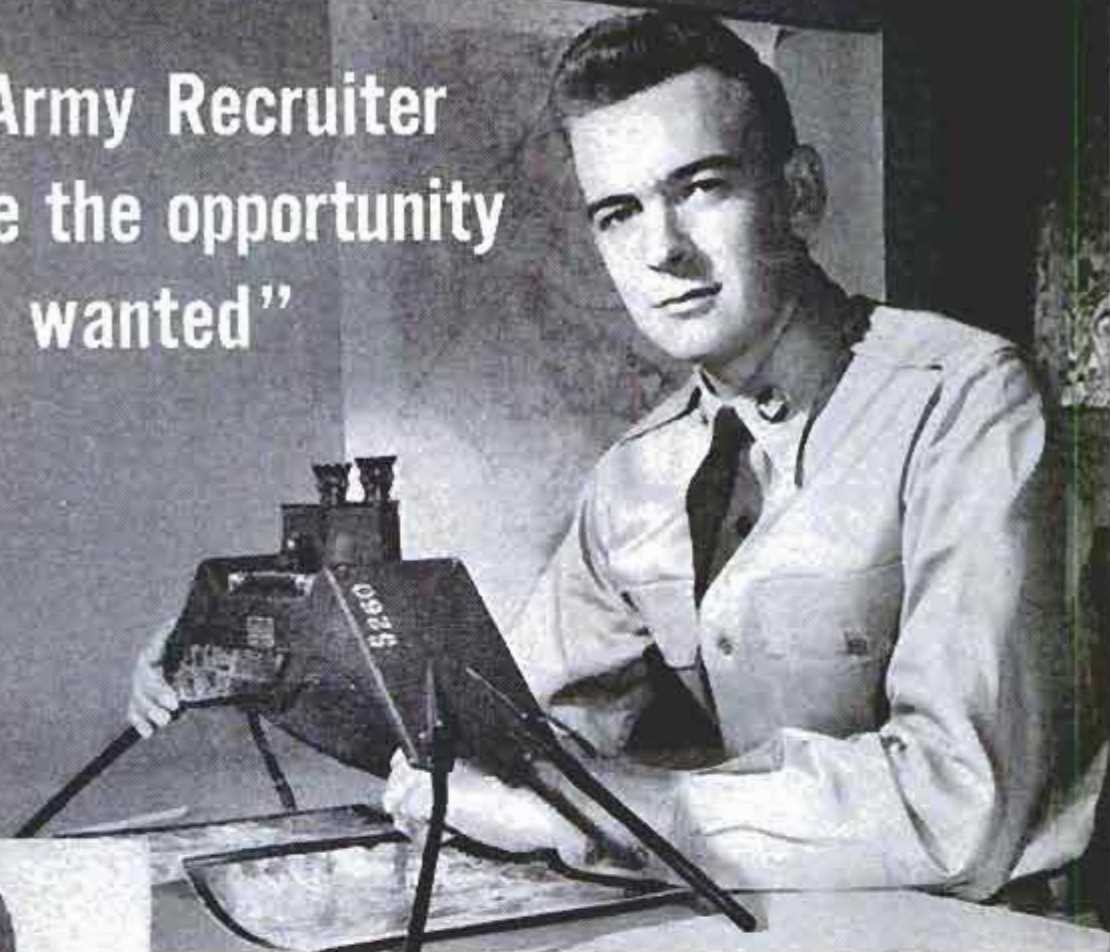
Specify Stanley at your hardware store. Your dealer has these fine tools or can get them for you. For free catalog No. 400, write Stanley Electric Tools, Division of The Stanley Works, 62D Myrtle Street, New Britain, Connecticut.

Cutting a 2 x 4 at 45°

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*Pvt. William H. Poteat Jr.*

Pvt. William Poteat, Jr.  
Marion, North Carolina  
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**ACROSS THE  
DESK**



**To the Editor:**

In order to deal with the multifarious and difficult problems which continuously arise in the criminal and juvenile courts, a judge naturally persists in probing for causes of delinquency and in devising new methods for meeting this challenge to our society.

It has occurred to me that in a large number of these homes where delinquency exists, there is often a lack of sufficient public schooling and also a lack of good reading matter for parent and child.

In order that I may have at hand in the court a copy of your publication, *Popular Mechanics*, perhaps other periodicals too, if any, which will act as a specimen for me to give to a defendant or family and would contain the information as to your address and cost of subscription, I wonder if you would be good enough to mail me, say, half a dozen copies of some of your back issues. If and when they are exhausted, I will write for more.

In light of the fact that as judge I have the power to send juveniles and adults to institutions for long or short periods at considerable cost either to the individual or to the country, it would appear that there should be some method in the way of supervision here in cases where we consider it proper to allow the offender to return home on probation, and have some supervision by the court over the family life, leisure time and activities and some constructive reading that will outline some useful types of leisure-time activities for the youth involved, and help to reorient his thinking and attitudes about life.

With best regards, and many thanks for any help you may be able to give in this matter, I am

Chauncey M. Depuy,  
President Judge,  
39th Judicial Dist. of Pennsylvania,  
Chambersburg, Pa.

*Popular Mechanics is proud to have a part in Judge Depuy's program and applauds his effort to find a remedy for delinquency—adult and juvenile—in constructive reading that presents useful kinds of leisure-time activities.*

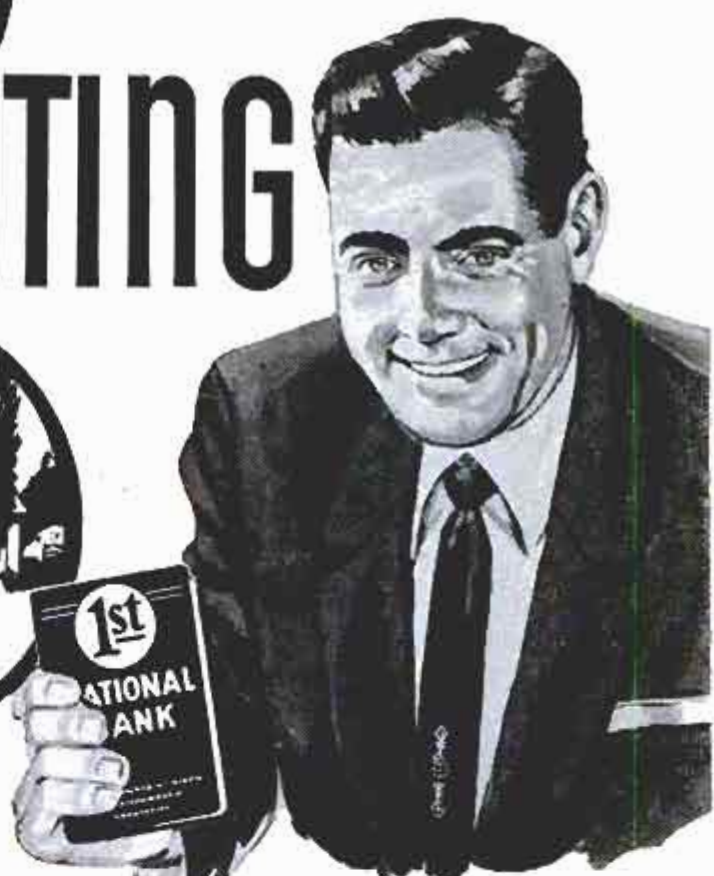
**To the Editor:**

Why do we never see any articles or comments, editorially or news-wise, about

(Continued to page 8)



# 5 reasons why ACCOUNTING



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**REASON #1.** If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Even back in "depression years," accountants earned more than many men in other major professions.

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(Continued from page 5)

the lack of reasonable quality in so many of the new cars? What is so taboo about the fact that some of the makers of high-production cars actually do so little to prevent the shoddy workmanship and sloppy assembly that are so well known?

How many readers of *Popular Mechanics* have had the experience of owning a late-model car slapped together by the "quick and dirty" method? How many times have we observed the numerous examples of

poor and skimpy paint jobs, the badly misaligned exterior body parts and shiny trim, and the quick-rusting chrome?

How many readers have had the aggravating experience of repeated expense and loss of valuable time in having many factory-built defects repaired, mainly because certain car makers did not and still do not build more quality into their cars?

Right now is the time for car owners to notify the car makers with repeated reminders that they have responsibility to all of us; that in return for the ever-increasing cost of cars we want at least better workmanship.

R. Blagden,  
Box 42, R.R. No. 3,  
East Hampton, Conn.

☆☆☆

The three-man shovel (left) has never become the standard of comparison in the United States. However, in far-off Korea they are quite common. This is a product of an over-abundance of manpower and a lack of machinery.

(Continued to page 10)



## New greaseless way to keep your hair neat all day



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POPULAR MECHANICS





When the other kids ask...

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Sure... you're his hero. You *know* that. But sometimes it can get kinda tough if the other kids don't seem to understand about the "old man."

It's not that you *like* to be chained to the same old job. Maybe you just *had* to leave school too soon. Maybe the war inter-

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Blueprints</li> <li><input type="checkbox"/> Sanitary Engineering</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Mine Surveying and Mapping</li> <li><input type="checkbox"/> Plumbing Drawing and Estimating</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Electrical Maintenance</li> <li><input type="checkbox"/> Electrician <input type="checkbox"/> Contracting</li> <li><input type="checkbox"/> Lineman</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial <input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Subjects</li> <li><input type="checkbox"/> Mathematics</li> </ul> | <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Leadership and Organization</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> </ul> <p><b>MECHANICAL AND SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gas—Electric Welding</li> <li><input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Internal Combustion Engines</li> <li><input type="checkbox"/> Machine Design-Drafting</li> <li><input type="checkbox"/> Machine Shop Inspection</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration</li> <li><input type="checkbox"/> Sheet Metal Worker</li> <li><input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio TV Eng'ng</li> <li><input type="checkbox"/> Radio and TV Servicing</li> <li><input type="checkbox"/> Radio Operating</li> </ul> | <p><input type="checkbox"/> Television Technician</p> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Brake Equipment</li> <li><input type="checkbox"/> Car Inspector</li> <li><input type="checkbox"/> Diesel Engineer &amp; Fireman</li> <li><input type="checkbox"/> Section Foreman</li> </ul> <p><b>STEAM AND DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Diesel—Elec. <input type="checkbox"/> Diesel Eng's</li> <li><input type="checkbox"/> Electric Light and Power</li> <li><input type="checkbox"/> Stationary Fireman</li> <li><input type="checkbox"/> Stationary Steam Engineering</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton, Rayon, Woolen Mfg.</li> <li><input type="checkbox"/> Finishing and Dyeing</li> <li><input type="checkbox"/> Loom Fix'g <input type="checkbox"/> Textile Des'ing</li> <li><input type="checkbox"/> Textile Eng'g <input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warping and Weaving</li> </ul> <p><b>MISCELLANEOUS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Domestic Refrigeration</li> <li><input type="checkbox"/> Marine Engineering</li> <li><input type="checkbox"/> Ocean Navigation</li> <li><input type="checkbox"/> Professional Engineering</li> <li><input type="checkbox"/> Short Story Writing</li> <li><input type="checkbox"/> Telephony</li> </ul> |
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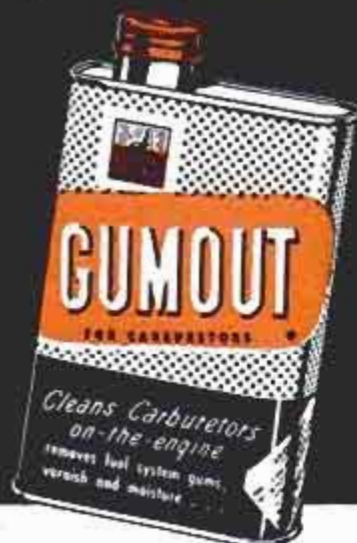


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(Continued from page 8)

## Filipino Motor Bike

From a reader in the Philippines, Timoteo Llevares of Maasin, Leyte, comes this photograph of the motorized bicycle which



he improvised, using a Travis motor of three-quarter horsepower and a V-belt transmission. Llevares is in the plumbing trade. He reports better mileage and speed on the motor bike as it appears here than with the power applied to the front wheel.

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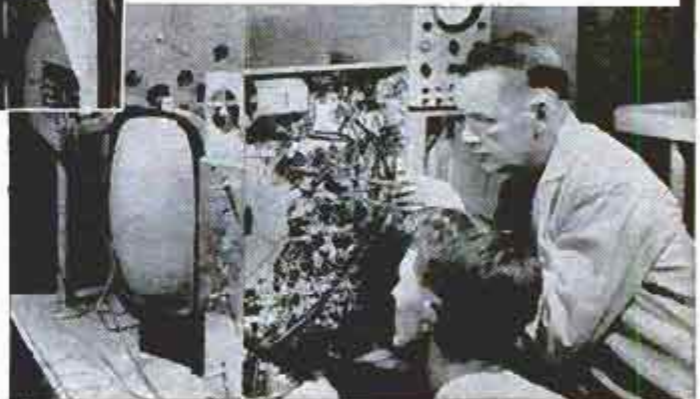
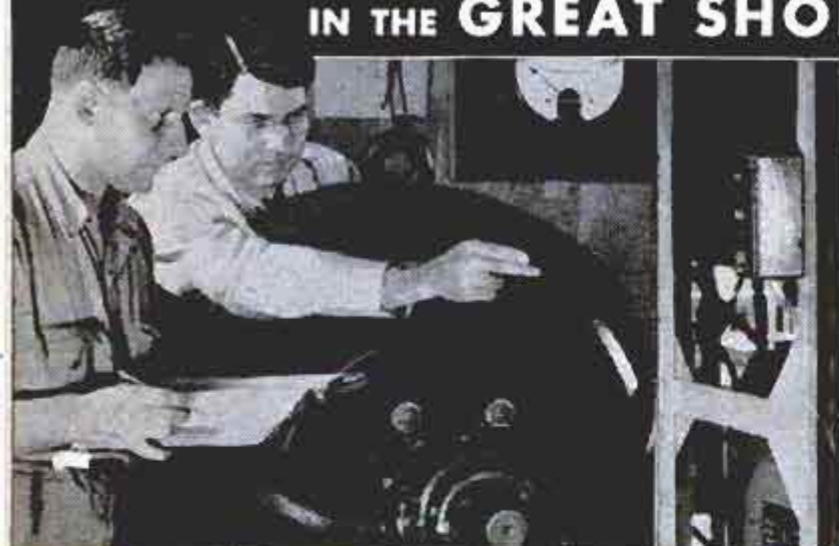
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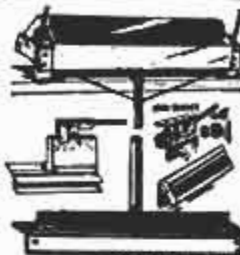
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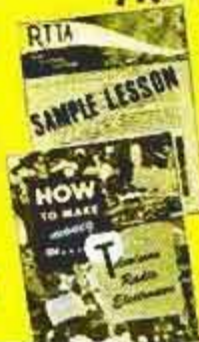
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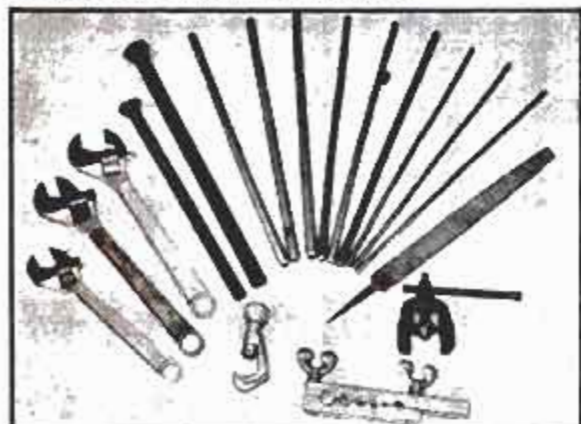
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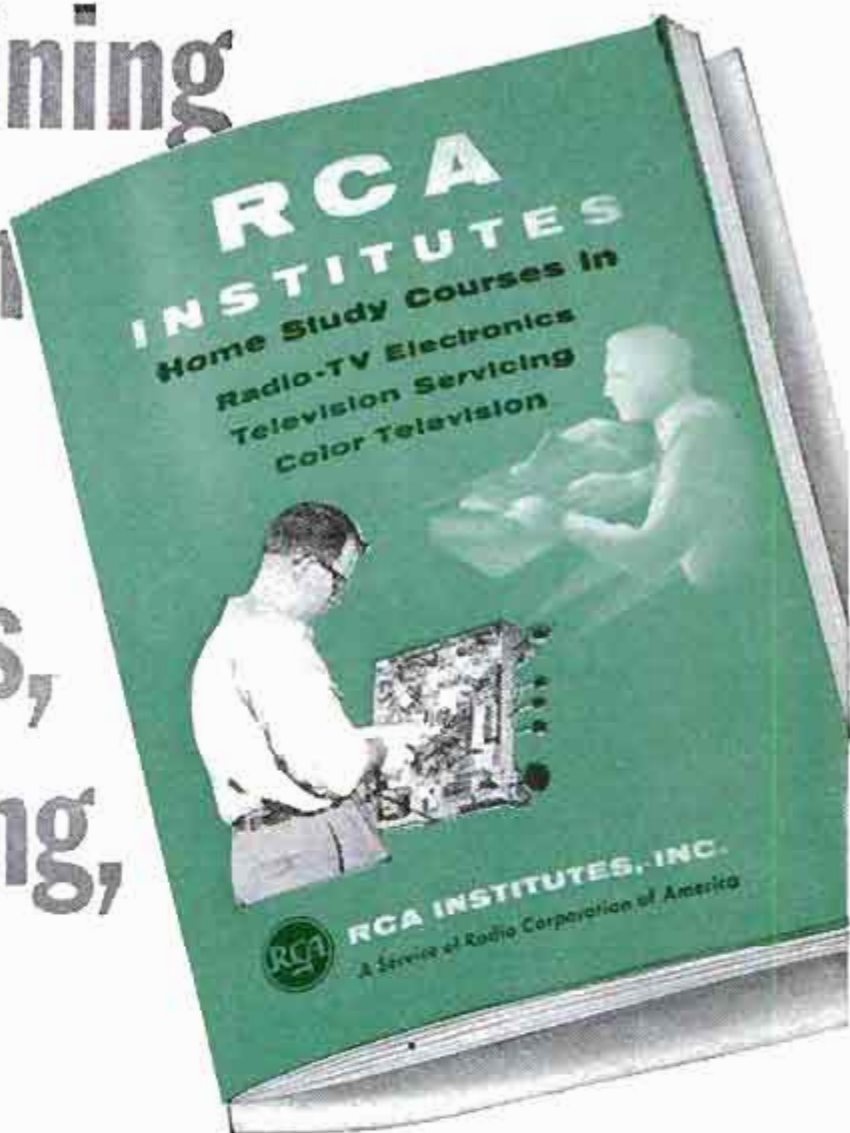
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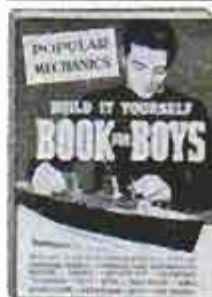
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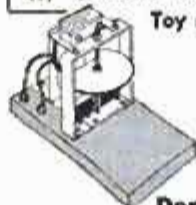
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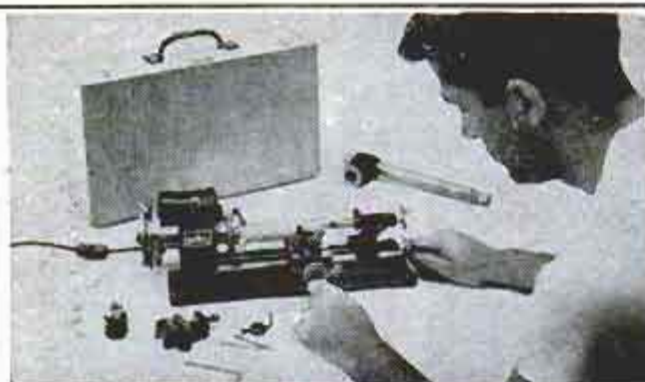
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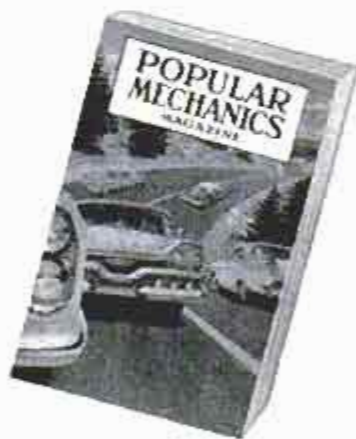
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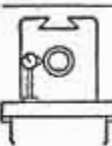
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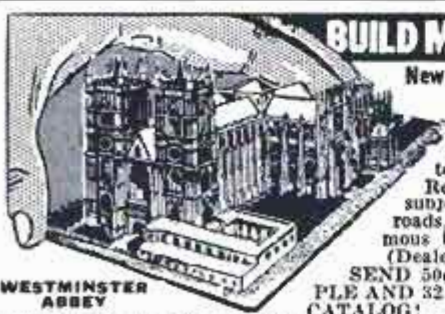
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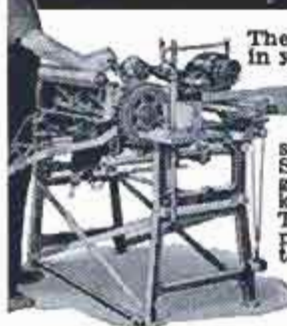
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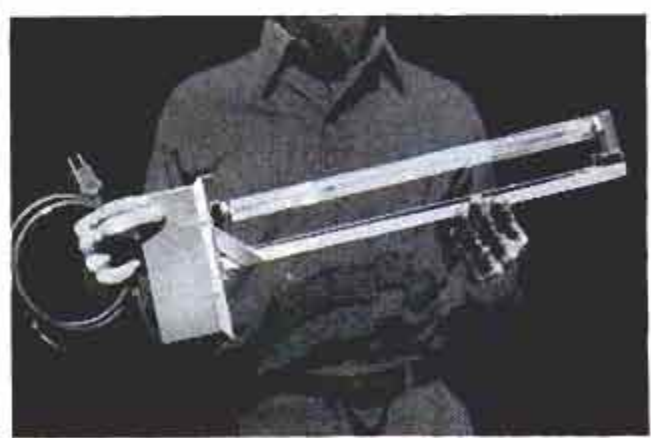


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WOW! 135 All different Germany 10¢. Zeppelins, semi-postals, airmails, high values. Big bargain lists and approvals included. Jamestown Stamp, Dept. A12PMC, Jamestown, N.Y.

100 DIFFERENT Turkey 35¢. Approvals. Santo, 590 Ft. Wash. Ave., New York City 33.

100 DIFFERENT Austria 10¢ or 100 different Switzerland 25¢. Approvals. Aronson, Box F, Newton Centre 59, Mass.

25 DIFF. Australia 10 cents with approvals. Scheerer, Box 301, Pottsville, Pennsylvania.

FREE Sample! Interesting, informative, illustrated. National Stamp News, Anderson, South Carolina.

100 DIFFERENT World 10¢. Free set. Bellel, Mapledale, Hazel Park, Mich.

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WEDDING, Pipex, triangles, animals, free with approvals. Choice, Box 366, Miami Beach 39, Florida.

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OLYMPIC Sport sets. 14 stamps. 10¢ with approvals. Norton, Box 926, San Antonio 6, Texas.

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**BE** Your own boss. Write: Bailey, Box 604, Inglewood, California.

**RAISE** Nutria—America's newest opportunity. Luxurious fur. Easily and economically raised. Disease free. Guaranteed market with exceptional profits. Visit or write. Cabana Nutria of Illinois, Rushville, Illinois.

**RAISE** European mutation nutria. Vegetarian, odorless, valuable fur. Terrific potential. Voight Mink Farms, Atlanta 2, Texas.

**FRANCHISES** Make profits! Become exclusive distributor, dealer, agency operator. Request information. National Franchise Reports, PM-528, 333 North Michigan, Chicago 1.

**LIQUID** Marble—Brushed! Sprayed! Mold novelties, tile! Particulars free. Marbleizing Service, Edwardsville, Illinois.

**PROFITABLE**—Shear sharpening. Proven facts. Write. W. Zell, Summitville, Indiana.

**YOU** Can make money at home in spare time taking magazine renewal subscriptions. No capital or experience necessary. All supplies furnished. Write today! McGregor Magazine Agency, Dept. 500B, Mount Morris, Illinois.

**GROW** Mushrooms. Cellar, shed. Spare, full time, year round. We pay \$3.50 lb. We paid John Betts \$7,977.78, he started as amateur. Free book. Mushrooms, Dept. 172, 2954 Admiral Way, Seattle, Wash.

**FLEXIBLE** Rubber molds for plaster and Marbleite figurines. Sample and large illustrated catalog 25¢, refunded on first order. K-C Novelties, Dept. 36, Southampton, Massachusetts.

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

**INTERESTED** Mail order? Samples leading mail order magazines 10¢. Palm, Box 1221, Baton Rouge, La.

**CASH** Income—Collecting local information. No selling. Free facts. Dorait, 2217 So. Walnut, Muncie, Ind.

**ONE** Sale by mail or local, then automatic repeats—Needed items! Pickett, Mt. Airy, Maryland.

**\$10.00 PER** Hour net profit in monument cleaning business. Free details. X-Per Monument Cleaning Company, 466 Potomac, P.M.-2, Buffalo 13, New York.

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

**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.

**YOU** Can own business. Over 100 proven plans. Send \$2 to J. Whitmarsh, 462 Central, Lake Orion, Mich.

**MAKE** \$46 From square foot plywood; jigaw necessary. Free information. Woodarts, X-7, Bridgewater, Mass.

**OPERATE** Profitable mail-order business. Wonderful opportunity. Write for details. G. W. Walker, Box 34, Stuyvesant Sta., Brooklyn 33, N. Y.

**\$60 WEEKLY**, Spare time, easy! Home Venetian blind laundry. Free book. Burt, 2434A, Wichita 13, Kansas.

**MONEY** Making plans. Details free. Weldon Erney, 1256PM, Emmaus, Penna.

**RECEIVE** Hundreds of offers, samples, catalogs, gifts, magazines, booklets. Send 25¢. Glenn H. McElhannon, Greenwich, Connecticut.

**FREE** List (unusual businesses) for homeworkers. Ballard's, 425 East Catherine, Louisville 3, Ky.

**YOUR** Own mailorder business. Manual 25¢. George McCutcheon, 638 W. Creighton, Fort Wayne, Ind.

**FREE:** "How to make quick, easy money." Gee, La Verne, California.

**LAMINATE** Pictures, important cards, articles. Pays wonderful profits. No experience. No investment. Free details. Howard Laminating Service, 551 S. Sumter St., Sumter, So. Car.

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

**HAVE** Profitable home mailorder business selling quilt pieces, remnants—Full, spare time! Over 20,000,000 "repeat" prospects! Rush name for details of this amazing moneymaking business! Coleman, Box 821-A, Newark 1, N. J.

**\$450 SAFE** Investment, 6 hours monthly, 100% yearly dividend. No selling. Charms, Box 12, Signal Mtn., Tenn.

**FREE** Cadillac, \$10,000 yearly. Cars, appliances wholesale. Strateway, 6228F, Charlotte 7, N. C.

**IMPORTS** From all over the world. Will establish you as dealer. Free catalog. International Associates, Box 1143-C, Chicago 90.

**START** Home mailorder business with few dollars. Mailorder courses, homework plans, selfhelp, do-it-yourself books that tell you how. Specify needs. 25¢ brings details. W. Zimmerman, 28 Schuele Avenue, Buffalo 15, New York.

**WANTED!** Home workers to assemble luggage and cases for ready market. Instructions, materials, tools, everything supplied. Free details. Abarsi, 807-BO Sunset, Los Angeles 12.

**AMAZING** New wholesale business. Tremendous profits. Free folio. McCann, 1612 Johnson, Amarillo, Texas.

**WANT** More business? Here's an amazing opportunity to increase your sales. Talk to thousands of interested readers of "Mechanica 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.

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

**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.

**LEARN** Sewing machine repairing easy. Neighborhood sparetime gold mine. Supplies! Free brochure. Taylor Service, Box 2126, San Bernardino, Calif.

**RAISE** Rabbits on \$500 month plan. Plenty markets. Free details. White's Rabbitry, Dept. 122, Mount Pleasant, Michigan.

**HOW** To make up to \$100.00 a week in spare time—by mail. Tested, money-making plan. Free details. Personal Press, 1413-PM Great Northern Bldg., Chicago 4, Illinois.

**FREE** Literature describing moneymaking mailorder plans. National Service, Richland, Georgia.

**GROW** Orchids at home—Profitable, fascinating. Year 'round, Maine to California. No greenhouse. Gorgeous cattleyas, cymbidiums, etc. Successful home grower shows you how. Full details free. Flowerland, 100 So. Vermont, Los Angeles 4.

**BUY** Wholesale! Discounts to 80%! Appliances, cameras, sporting goods, tools, watches, housewares, etc. Free catalogs. Buy-Rite, Box 258A, Hawthorne, New Jersey.

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

**IMPORT-Export** opportunity, profitable, world-wide, mail-order business from home, without capital; or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger F701, Los Angeles 24.

**MAKE** Flexible molds. Cast plaques, figurines, free sample. Tooker, 630-R Chestnut, Hamilton, Ohio.

**11,000 NEW** Prospects daily. Baby record books, shoes, albums. Sell mailorder. Everything furnished. Free literature. No-Co-Ro, Capitola, California.

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

**WHOLESALE** Catalogue! Appliances, cameras, watches! Cam Company, 6806PM 20th Ave., Brooklyn 4, N. Y.

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

**POPOORN** And potato chip equipment. Eakins, Box 933-A6, Springfield, Ohio.

**FREE** Folio "45,000-445,000, Unlimited Vacations." No merchandise, equipment. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

**\$250 WEEK** Cleaning venetian blinds. Patented machinery. Free literature. Robinson, 7213B, Indianapolis 1, Indiana.

**FIX** Typewriters. Inexpensive home course teaches factory secrets. Free booklet. Write. Typewriter, Tarentum 1, Penna.



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

**WANT** To make big money at home? \$5 profit in an hour possible with invisible reweaving. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 8334 Prairie, Chicago 19, Illinois.

**BRUSH** Plating outfits for plating articles in the home and shop. No tanks necessary. Good income spare or full time. Free particulars. Gunmetal Co., Ave. H, Decatur, Illinois.

**50% PROFIT** Baking new greaseless doughnuts in kitchen. Grocers buy daily. Free recipes. M. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

**\$1,000 MONTHLY** Possible in collection agency business. Free details. Write Cole Associates, Syracuse 2, N. Y.

**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.

**WHOLESALE** Buyers! New 1956 "blue book" gives names of over 3000 jobbers, manufacturers who supply anything. Free details. Associated Wholesalers, 1016-D Starr, Burlington, Iowa.

**REBUILD** Batteries; repair dolls; make rubber stamps; "60 Ideas" free. Universal, Box 1076-A, Peoria, Ill.

**PLASTERCRAFT** Molds, liquid rubber, plasters, floccs, candle supplies. Catalog and manual free. Blue Rapids Supply, Blue Rapids, Kansas.

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

**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, E.E.I., Wisconsin.

**NEWEST** Spare, full-time home business. \$5 to \$10 hour possible. Paint with suede—The finish with touch and eye-appeal. Beautify auto dashboards, signs, radios, toys, figurines, lamps—1001 others. Complete, step-by-step instructions sent for no-risk examination. Free details. Coast, Los Angeles 61.

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

**MANUFACTURE**—Polishes, cleaners, cosmetics, anything. Literature free. Kemtzer, Park Ridge, Ill.

**EARTHWORMS**: Easy backyard business. Tremendous demand. 600% profit. Instruction book 50¢. 1000 young breeders \$4.50 postpaid. Starr Earthworm Farms, Orland, Calif. America's most publicized grower.

**IMPORT-Export**! Mailorder opportunities. Details. Warner, Box 6, Fort Scott, Kansas.

**SPLENDID** Mail order opportunity. Write Thomas Bond, 1637Q West Vernon, Phoenix, Arizona.

**HIGHEST** Commissions all magazines. Free catalogue, supplies, prizes, exclusive extras. Subscription Service Co., Box 2070, Birmingham, Alabama.

**MAKE**, Sell perfumes, household products. Jordan, 743 South Dorrance, Philadelphia 46, Penna.

**"MAILORDER** Laws and Regulations." \$1.00. Explains licenses, taxes, legal requirements. Tasker, 105 East Custis, Alexandria, Virginia.

**COPUBLISH** Mail Sale Advertiser, leading mail order paper. Details, latest copy, dime. Mail Order Field, P.O. Box 11, New York 60, N. Y.

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

**I'LL** Set you up in your own business free! The "free" means without investing in merchandise or advertising. Free details. Mail Order Field, Box 11, New York 60, N. Y.

**MAIL** Catalogues featuring real merchandise. Charles, Box 32-P, New York 63, N. Y.

**MAIL** Order Manufacturing Guide. Complete details 30 products anyone can manufacture, wholesale. Ideal mail order sellers. 25¢. Albert Daufeldt, Atalissa, Iowa.

**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.

### MONEYMAKING OPPORTUNITIES

**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 712, 1512 Jarvis, Chicago 26, Illinois.

**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-Z, 7464 Clark, Chicago 26.

**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.

**WORLD-Wide!** Mail-order business at home. Complete instructions \$2.00. World Importers, P-212, 939 Vanderhoeven, San Antonio 9, Texas.

**LEARN** Technical metaphysics and insure your future. Easy, inexpensive correspondence course. Simplest method known. Diploma. Write: Premier College of Technical Metaphysics, 2532 McKenzie St., Vancouver 8, B.C., Canada.

**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 712, Chicago 26, Ill.

**919 SECRETS!** Free complete plan "Secret Journal Hidden Dollars." Work home successfully, weekends! Publico, Oceanside, Calif.

**FRAUDS** To watch out for. Thousands taken daily. 25¢. Barnes, Box 332, Glens Falls, N. Y.

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

**GROW** Mushrooms. Cellar, shed. Spare, full time, year round. We pay \$3.50 lb. We paid John Betts \$7,977.76, he started as amateur. Free book. Mushrooms, Dept. 173, 2954 Admiral Way, Seattle, Wash.

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

**TAKE** Money-worry out of your future. \$1.00 investment brings you full details on unique, money-making plan. Easy, practical, highly profitable. Send to M. Llorrac, Box 226, Fremont, Mich.

**PRINTING**, Office supplies wholesale. Save 50%. Royal, Box 368-A, Cleveland 27, Ohio.

**\$60 WEEKLY**, Spare time—easy! Home Venetian blind laundry. Free book. Burt, 2434A, Wichita 13, Kansas.

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

**OLD** Bicycles made into exercisers, merry-go-rounds. Rehabilitation equipment, toy cars, boat drives, wheel chairs, lawn carts, etc. Plans and instructions for each \$1.00, six for \$3.00, 12 for \$5.00. R & R Industries, 396 Wildwood Avenue, Akron, Ohio.

**INCOME** Tax instructions amazingly simplified. No lessons. \$5-\$10 per hour spare time. Particulars free. Reynard, Box 1265-A, Peoria, Ill.

**EXECUTIVES** Tell who gets hired and why. Details free. National Publications, Box 3731, Washington 7, D. C.

**MAIL** Postcards. Receive dollar orders. Keep dollar. Details free. Gryder, Box 187, Barberton, Ohio.

**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 712, Chicago 26, Ill.

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

**BUY** Wholesale! Save 66%! Appliances, furniture, jewelry, toys, sporting goods, tools. Free details. National Buyers Service, Box 3338EB, San Francisco.

**RAISE** Rabbits on \$500 month plan. Plenty markets. Free details. White's Rabbitry, Dept. 123, Mount Pleasant, Michigan.

**MIMEOGRAPHING** Services pay sensational local profits. Exciting secret plans exposed! Rush name. Mozelle Mimeo Shop, Bonham, Texas.

**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.

**PLEASANT** Profits—Let us show you how to start your own complete scissors and tool sharpening business. Free details. Serr-Edge Inc., 9729 Lorain, Cleveland 2, Ohio.

**FREE** Book "505 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.

**START** A profitable subscription business in spare time! We need men and women (young or old) as representatives for all leading national magazines. Liberal commissions on all subscriptions. Supplies free. Send this ad with your name and address to: Agency Bureau, Dept. FM, Hearst Magazines, 250 West 55th St., New York 19, N. Y.

**EARN \$50.00** Daily making mats, shoes and mud guards from old tires. S and S Patents Inc., 1307 North Clark St., Chicago 10, Ill.

**100% PROFIT**. No investment. Stamp brings details, samples. Miller, Box 584, Brooklyn 1, New York.

**DOLLARS** Every day! Amazing new magic mail plan. Set-up free. Miller, Box 588X, Oshkosh, Wis.

**GENERAL** Contest Bulletin. Lists contests monthly. Sample, 25¢. 1609½ 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.

**RAISE** Money for church, club, school. New plans. Free details. Theron Fox, 1296½ Yosemite, San Jose, Calif.

**SELL** First quality nylon hosiery and lingerie. Continental Wholesale Company, Box 1047, Reidsville, North Carolina.

**CONTESTANTS!** Contests, helps. Write. Contests, 166 Catherine St., Red Bank, N. J.

**ATTENTION** Typewriter owners. Make handsome profits. Write today. Groves Company, 662, Hastings 8, Nebraska.

**JOIN**. Book repair club. Make money. Martin, Colgate, N. Dak.

**"MONEY** Getter's Bulletin," sample 25¢. Donovan, 791 Greenbelt, Levittown, N. Y.

**INCOME** Tax instructions amazingly simplified. No lessons. \$5-\$10 per hour spare time. Particulars free. Reynard, Box 1265-A, Peoria, Ill.

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

### EXPORT — IMPORT

**INTERNATIONAL** Import index lists new exclusive imports. Free list. International, Box 636, Newark 1, N. J.

**\$5.00** GENUINE Imported German pipes 8½". Highly decorated. \$2.00 post-paid. World Importers, P-312, 939 Vanderhoeven, San Antonio 9, Texas.



## FORMULAS, PLANS, ETC.

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

**10,000 AUTHENTIC Formulas.** Information, lists free. Brockway, 716 Gage, Topeka, Kansas.

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

**FREE Formula catalog.** Anything analyzed \$35.00. Western Chemical, Salem, Oregon.

**PRODUCT Analysis,** manufacturing formulas, processes developed. Moderate fees. Plastics, Box 1574, Boston 4, Mass.

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

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

## PLASTICS

**NEW Liquid casting plastic,** clear, colors. Embed real flowers, insects, photos, coins. Saw, drill, carve. Send 25¢ for handbook, "How to Cast with Liquid Plastic," and proved success plan showing how to make money at home. Castolite, Dept. P-101, Woodstock, Ill.

**LAMINATING Supplies.** Free price list. Solomson, 46 Cornhill, Boston 8, Mass.

**PLEXIGLAS, Lucite.** Square foot cost. 1/16", \$1.15; 1/8", \$1.20; 3/16", \$1.58; 1/4", \$2.21; 3/8", \$3.23; 1/2", \$4.36. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, 23-25 Sussex Avenue, Newark, N. J.

**PLEXIGLAS Cut-offs.** Special 5 lb. \$1.50 plus postage. Catalog 10¢. Coleman Sales, 5926 Cornell, Dearborn, Mich.

**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.

## CHEMISTRY

**SPECTROSCOPE** For quick analysis \$3.00. Kutting, 26278 Arastradero, Los Altos, Calif.

**CHEMICALS, Glassware.** Catalog 25¢. Laboratory Sales, Box 161-E, Brighton, Mass.

**BEGINNER'S Modern chemistry** plus sample uranium ore. \$1.00. Future Chemists of America, Oakdale, Pennsylvania.

**ILLUSTRATED Catalog:** Chemistry, mineralogy, biology 20¢. Tracey Laboratories, Evanston, Illinois.

**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.

**ANALYZE Like professionals do.** Kit \$5.00. Steiner, Suite 940, 127 N. Dearborn St., Chicago 2, Ill.

## AGENTS WANTED

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

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

**AGENTS—300% Profit** selling genuine gold window letters; stores and offices. Free samples. Metallic Sign Letter Co., 431-D North Clark, 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.

**BIG Profits** selling ties (\$2.00 value) \$6.50 dozen. Free catalog. Empire Cravats, 611-PM Broadway, New York 12.

**EXCLUSIVE Line** of personal initialed buckles, belts, cap badges, 3,000 emblems, etc. Hook-Fast, Dept. PM, Roanoke, Va.

**FOG-Stop windshield cloth.** Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee Co., Dept. 55, Akron 8, Ohio.

**SELL Profitable personalized rugs.** For information write Bobby's, Dept. M10, Manitou Springs, Colorado.

**BUY Wholesale!** 100,000 name brand products! Save 66%!! Big profits selling others spare time! Free details! National Buyers Service, Box 3338EE, San Francisco.

**FREE!** Beautiful feather pictures 200% profit! Apartado 9036, Mexico 1, D. F.

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

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

**CALIFORNIA Sweet smelling beads.** Sensational sellers. Particulars free. Mission, 2328-PM W. Pico, Los Angeles 5, California.

**SCHOOL Seniors—Be popular** with classmates. Have spending money galore. Details free. Craftcards, Box 235-L, Pittsburgh 19, Pennsylvania.

**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.

**AMAZING 500% Profit offer.** See under "Auto Supplies." GE Engine Heater Sales, Milwaukee 7.

**BIG Money-making opportunity.** Exclusive line work uniforms, jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit free. Master Co., 424 Water, Ligonier, Ind.

**\$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-64P, New York 18.

**FLUORESCENT Letter sign kit.** Write for details. Coloray Corporation, 370 Brannan, San Francisco 7.

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

**STRANGE Dry window cleaner.** Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee Co., Dept. 58, Akron 8, Ohio.

**REAL Diamond rings.** Sell direct. Make big middleman's profit. No investment. Experience unnecessary. Free catalog, details. Gleamlight, 109B No. Columbus, Mount Vernon, N. Y.

**START Your own business** on credit. Your own boss. 1598 dealers sold \$5,000 to \$32,000 in 1955. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. L-U-PPM, Freeport, Ill.

**DAY-Glo signs.** Free sample. Cook, 51 Martin Avenue, Saratoga Springs, New York.

**AGENTS Wanted** to sell encyclopedias, dictionaries, atlas. Big profit. Write Darwin Gilmore, Braymer, Mo.

**NEW Invention.** \$4.95 fire alarm, paying up to \$1,100 a month. No wiring. Unlimited market. Dramatic demonstration. Free kit. Merlite (Alarm Div.), 114 E. 32nd St., Dept. P-63P, New York 18, N. Y.

**FAST Selling money makers!** Metallic ironing board cover; purse-shopping bag; many others including \$1 retailers. Quality Products, Dept. A, Box 748, Passaic, N. J.

**BIG Money in valentines!** Easy to earn with 5 different valentine packs. Best sellers for every occasion all year—Mother's, Father's Day, Easter, birthday, all-occasion assortments, gifts, stationery. Over 100% profit on bargain specials. Samples on approval. Midwest, 1113 Washington, Dept. 706-X, St. Louis 1, Mo.

**SELL Unique imports.** Large profits. No investment. Write Bond Specialties, 1637A West Vernon, Phoenix, Arizona.

**FRANCHISES Open.** Steady income. Top quality low cost chamois. Chamtana, Hudson Falls, N. Y.

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

**\$100.00 WEEKLY** Operating home mail-order business. Everything furnished. Grand National, 2131 Railroad Ave., Loleta, Calif.

## BUY IT WHOLESALE

**BUY Wholesale.** 30 to 80% discounts. Brand name nationally advertised merchandise. Giant catalog 98¢. Clark Sales, Dept. 2, 6315 Whitewood, Detroit 10, Mich.

**WHOLESALE.** 17-Jewel watches. Folder sent free. Wm. Lipscomb, 118 Haviland, Greenville, S. C.

**WHOLESALE—Ball point pens,** solid perfumes. Traxler, Box 118, Rockford, Ill.

**WHOLESALE Catalog!** Appliances, cameras, watches. Distributors, Box 106A, Hudson, New York.

**FREE Wholesale catalog.** Name brand appliances, furniture, cameras, watches, luggage, tools, toys, sporting goods. Make Christmas savings-profits! Housewares, 924-P West 79th Street, Chicago 20.

**BUY Wholesale!** Discounts to 80%! Appliances, cameras, sporting goods, tools, watches, housewares, etc. Free catalogs. Buy-Rite, Box 258 D, Hawthorne, New Jersey.

**FREE Gift catalog.** Wholesale catalogs, name brands. Edith's, Deep River, Conn.

**FREE Wholesale catalog!** Appliances, watches, gifts, etc. Myers Company, 1745 High, Topeka 2, Kansas.

**LOOK, 20 To 80% discounts.** Free circular. Radaker, 510-C Park Ave., Anderson, Ind.

**WHOLESALE Catalog!** Huge discounts! Name brand appliances, housewares, etc. Morning Star, 1562 Rosalie, Clifton, N. J.

**BUY Your family needs wholesale.** Five catalogs yearly one dollar. Refundable on first order. J. Whitmarsh, 462 Central Ave., Lake Orion, Mich.

**WHOLESALE Catalog!** Appliances; housewares; jewelry! Postcard! Midwest, 156-M, Pontiac, Illinois.

**BUY Wholesale!** Nationally advertised appliances, radios, watches, etc. Catalog \$1.00 (refundable). D'Auria, Box 355-PM, Jackson, Michigan.

**BARGAINS, Joblots, closeouts.** 2000 items. Tremendous savings, clothing, toys, gifts, jewelry, television, etc. 25¢ brings wholesale catalog. \$1.00 merchandise certificate included free. Reliable Jobbing, 311-B North Desplaines, Chicago.

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GIANT New 1957 "O" Gauge catalog for scale—Tinplate model railroaders, 92 pages 8½x11, 2600 items, 180 car kits, 46 locomotives, hard-to-find model building parts. Price \$1.00 (refundable on \$10.00 order). All-Nation Hobby Shop, 178 N. LaSalle, Chicago 1.

WILD Animals, imported life like scale models. Over 100 different. Illustrated catalog 25¢. Walters Hobby Shop, 207M French, Utica 4, N. Y.

ELECTRIC Trains. See advertisement Utopia Sales, under classification Games, Toys, Novelties.

WANTED—Miniature operating steam, turbine or diesel power plant for display purposes. Stationary or marine type with boiler, engine, generator, pump, etc. Prefer scale working model. What have you? Reuther Eng. & Mch. Co., 126 South 14th St., Newark 7, N. J.

MINIATURE Artificial trees. Complete kits available. See advertisement page 26.

RAILROADERS! Fabulous Fifth Annual Reference Guide to every imaginable electric train extra for Flyer, Lionel or Marx. 25¢. Catalogs: HO—35¢, 256 pages. All hobbies \$1.00 (refundable). Hobby House, 800-P Huron Road, Cleveland 15, Ohio.

POWER Models. Unusual steam gasoline and traction engines, fittings, metals. Comprehensive catalog \$1.00. Chas. Cole, Ventura, Calif.

BUILD Miniature passenger hauling live steam locomotive with file and drillpress. We do machine work, you bolt it together. Catalog 50¢. Little Engines, Lomita, Calif.

SHIP And yacht model fittings; blueprints. Send 35¢ for illustrated catalog listing hundreds of items. A. J. Fisher, 1002-1 Etowah Ave., Royal Oak, Mich.

SHIP Models. Most complete line in New England. Kits, fittings, plans, books, tools, engines, motors. Illustrated catalog 30¢. James Bliss & Co., Inc., Dept. SM, 342 Atlantic Ave., Boston 10, Mass.

BALSA Wood and model aircraft. 40-page catalog 25¢. Sig Co., Montezuma, Iowa.

LIONEL, American Flyer trains sold, repaired. Big discounts. Bulletin free. Catalog 25¢. Mack Bros., 2043-P Chicago Ave., Chicago 22.

### HOME CRAFTSMEN

JIGSAW Patterns for boys! Large variety, gifts, novelties, useful, pinups, lawn ornaments. \$1.00. Pauls Plans, 4633 North 18th, Milwaukee 9, Wisconsin.

STYLECRAFT Sure fire hits. "Pre-traced" leather kits. Handbags, billfolds, filigree belts, over fifty other projects. Patterns on leather. Why trace? Just carve, assemble and lace. Large assortment "precarved" kits also available. Send 25¢ for catalog, free folder. Refundable first order. Apache Leather Company, 2804 E. Washington St., Phoenix, Arizona.

DO-It-Yourself booklets 25¢. 24 subjects. Free catalog. Popular Mechanics Press, 631 N. St. Clair St., Chicago 11.

KNOCKDOWN Cedar chests and lumber. Free price list. Bedford Lumber Company, Shelbyville, Tennessee.

ALL Crafts, supplies. Large free catalog. National Handicraft, 199 William Street, New York City 38.



FREE Catalog. 1566 patterns and designs. Craftplans, 1321-A South Michigan, Chicago 5.

**WOODWORKING** And cabinetmaking course for beginning and advanced home craftsmen. Only complete low-cost home training program available. Write for free booklet. Interstate Training Service, Dept. G-3, Portland 13, Ore.

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.

129 NEW Full-size jigsaw patterns. Artist-drawn. \$1. Craftplans, 1321-A South Michigan, Chicago 5.

**LEARN** Art metalcraft and jewelry making. Complete, inexpensive, home training course now available. Special tools and materials furnished. Write for free booklet. Interstate Training Service, Dept. L-3, Portland 13, Oregon.

**LEATHERCRAFT.** Send 10¢ for new 76-page catalog of tools, supplies, kits, including metalcrafts, enameling, ceramics, all other crafts. Complete stock. Reasonable. Since 1910. Sax Bros., Dept. PM1, 1111 N. 3rd, Milwaukee, Wis.

18 FULL-Size patterns. Save money with easy-to-use, professionally designed full-size patterns. Make money selling beautiful, useful furniture. Make modern step and cocktail tables; metal lamps; cupola; 12-foot outboard. All patterns test-built; sold with money-back guarantee. Get your free list of these convenient, economical patterns today. Popular Mechanics Press, 200-HH E. Ontario Street, Chicago 11, Ill.

**ARIZONA Bargain:** Five beautiful polished reconstituted turquoise gemstones and findings-gemstone price list all for only 25 cents. Melcrafts, Box 27, Cactus 2, Arizona.

**LEATHERCRAFT.** Copper enameling, mosaic tile, shellcraft, metal tooling, beadcraft, many more crafts. Free big catalog. Kit Kraft, Dept. 2312, Studio City 1, Calif.

FREE. Complete illustrated catalog, leathercraft kits, supplies. J. C. Larson Co., 820 S. Tripp, Dept. 6727-L, Chicago 24.

101 FULL Size patterns. Smart, new, gifts, novelties, lawn figures, shelves, action windmills, alphabets. Plus "Make Money Jig Sawing." Only \$1.00. Mastercraft 125M, 7041 Olcott, Chicago 31, Ill.

119 JIG Saw patterns. Full size, just trace on wood and saw. Clever original designs. \$1.00 postpaid. Burgess Vibrocrafter, Dept. C-26, Grayslake, Illinois.

100 JIGSAW Patterns \$1. Lawn, novelties. Full size. Colors indicated. Hal Barebo, O'Fallon, Mo.

**BUY** Wholesale nationally advertised power, hand tools, thousands other products at big discounts. Free "Wholesale Plan." American Buyers', Hertel Station, Buffalo 16-F1, N.Y.

89 FULL Size Jig saw patterns of beautiful shelves, ornaments, toys, novelties. Plus "How, Where to Sell." Only \$1.00. Mastercraft 124M, 7041 Olcott, Chicago 31, Illinois.

**LEATHERCRAFT.** Kits, copper, artist's supplies. New catalog. Midas, 7705 State, Huntington Park, California.

**MAKE** Expensive enameled copper jewelry, ash trays at fraction of retail price. Easy instructions, supplies, beginners' kits in 77 page catalogue, 25¢. Bergen, 301 S.W. 17th Avenue, Miami, Florida.

**LAMP** Size cypress knee with nipple installed \$2.00. Cy Products, Dept. 2-B, Lafayette, La.

**EPOXY** Adhesive. Bonds everything. \$1.50. Agents wanted. Avan, 2323 Wolf-ram, Chicago 18.

**TABLE** Legs—Beautiful sturdy birch—Turned, tapered, or bent laminated. 15" high, set of 4 only \$3.75 postpaid. Brackets to attach included. Makes hundreds professional designs. Write for free catalog quality furniture kits, legs, tops, plywood. Birchwood Industries, Dept. 2, Fitchburg, Mass.

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**SIGNS:** Beautiful moulded plastic. Sample letter 35¢. Colors, P.O. Box 108, Spencer, Indiana.

**GRANDFATHER** Clock movements, dials, kits. Wholesale catalog 25¢. Mason-Sullivan, Noroton, Conn.

**MINIATURE** Chippendale spinning wheel picture plans, easy to follow with simple instructions, 7½" high. Sent postpaid anywhere in the U.S., \$2.00, send check or moneyorder to Craftshop, 1353 Olive Way 1, Seattle 23, Washington.

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**BUILD** Your own power tools, ventilating fans, etc. Complete supply catalog. The Hawthorne Co., Otsego, Mich.

**DON'T** Hibernate this winter! Bud in the spring in a building career. "Around the clock" estimating and blueprint reading system. Accurate, easy and fast. A good field for women. Only \$6.98 c.o.d. Building Construction College, P.O. Box 48434, Hollywood 48, Calif.

**MAKE** Your cabinet. 20 metal drawers, 8" long x 1½" high x 4½" wide. With index handles. 20 metal dividers. 24 gauge metal. \$8.95 postpaid. Johnson Metal Products, Chalmers, Indiana.

**CLOCK** Movements—Gorgeous dials, plans, kits. See ad page 271.

18 FULL-Size patterns. Save money with easy-to-use, professionally designed full-size patterns. Make money selling beautiful, useful furniture. Make modern step and cocktail tables; metal lamps; cupola; 12-foot outboard. All patterns test-built; sold with money-back guarantee. Get your free list of these convenient, economical patterns today. Popular Mechanics Press, 200-HH E. Ontario Street, Chicago 11, Illinois.

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**BEAUTIFUL** Gift, seven gem bracelet, specify, myrrickite, agate, snowflake, tiger-eye, assorted stones, gold or silver. \$3.00 p.p. Monterey jade lucky piece. 50¢ earrings to match, \$1.50. Baroque gem wholesale price list available. Santa Cruz Mountain Gems, P.O. Box 924, Los Gatos, Calif.

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**WHOLESALE** Name brand watch catalog free. Watches, 1562 Rosalie, Clifton, New Jersey.

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**COSTUME** Jewelry supplies. Catalog and samples. 35¢. Largest line in America. Milady-Fair Co., G.P.O. Box 1328, New York City 1.

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**JEWELER'S** Precision tools and supplies for every hobbyist. Illustrated handbook free. Howard Supply, 36-14 11 St., Long Island City 8, New York.

**HELBROS** Watches, jewelry 70% discount. Catalog 25¢. Dorinda, Huntington Station 7, N. Y.

**WATCH** And clock repairing books. Free information. North American, Dept. 16M, 2320 N. Milwaukee, Chicago 47, Illinois.

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120 FINEST Quality, double edge blades \$1.50 postpaid. Guaranteed. Free samples. Kalnals, 1934 N. Hoyne, Chicago 47, Ill.

**ELECTRIC** Razors, all brands, big discounts. Terry Burke, 256 Howard, Brockton 14, Mass.

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**FOAM** Rubber furniture cushions. Factory seconds. 50% discount. Free catalog. Perma-Foam, 2360 Rhode Island Ave., East Orange, New Jersey.

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CASH For Indian bird stones; antique northwest coast totems, mask, carvings. Send photos. Robert Stolper, 8852 Cynthia Street, Los Angeles, California.

**SCRAP** Mercury (quicksilver) containers supplied—Tantalum, tungsten, silver, platinum. Metallurgical Products Company, Established 1909, 35th & Moore Sts., Philadelphia 45, Penna.

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FLORIDA Jobs, opportunities, property rentals, sales, hundreds of offers now. Tampa-St. Petersburg area, complete listing \$1.00. Florida Research, Box 215, Clearwater, Florida.

CHARLES Lewis please contact sister Opal, c/o Main P.O., Box 453, Cincinnati, Ohio.

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CHICAGO Remails 25¢, mailing addresses \$3 month. Mailings, 5345 South Halsted, Chicago 9, Illinois.

PUERTO Rico. Remails from tropical splendor island, 25¢. 8 color view cards \$1.00, remailed free. U. S. postal rates. Better use air-mail. Ponce Distributors, Rambla 59, Ponce, Puerto Rico.

INDIAN Named. Nanuet, N. Y. Letters, cards remailed 25¢. Box 485, Nanuet, N. Y.

LETTERS Retailed, etc., from Canada 35¢. I affix Canadian air stamp. Ross, 83 Belhaven Rd., Toronto 8, Ont.

WASHINGTON, D. C., remailing 25¢. Six viewcards Washington \$1.00 remailed free. Joanco, Box 3006, Arlington 2, Va.

MONTREAL 34, Que., Canada. Remails 35¢. R. Cote, 1567 E. Laurier.

ORIENT And Pacific Islands. Letters reairmailed \$1.00 each. Capt. H. F. Williams, 442P Merritt Ave., Oakland 10, Calif.

LETTER Remailing, receiving-forwarding address for rent. McLaughlin, 800 Stewart, Columbus 6, Ohio.

COLUMBUS, Ohio. Remails 25¢, etc. John Volan, 1437 N. High St., Columbus 1, Ohio.

SECRET Mail receiving, forwarding system. \$3 month. Hedgpath, Box 830, Alhambra 23, California.

REMAIL 25¢. View card 10¢. Souvenir folder 50¢. Souvenir \$1.00. Nicholas, 402 West Elmore, Dallas 24, Texas.

LETTERS Stamped remailed air, \$1. Jack Wilson, 12 Western Highway, Parramatta, Sydney, Australia.

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\$389 SCINTILLATOR \$189. \$495 Scintillator \$229. Box 943, Billings, Montana.

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FOR Treasure locators, geiger, scintillation counters, mineralights, M-Scope. Fisher Research Laboratory. See advertisement page 287.

URANIUM Gold, silver treasure. New power-packed highly sensitive metal detectors, Geiger counters and mineralights. Kits and assembled models from \$12.50. Lightest weight, guaranteed, free literature. Electronic Applications, Dept. M, Box 8, Arlington 10, Virginia.

FIND Buried treasure, gold and silver, with Goldak's sensational 3½ lb. "find-it" locator, only \$49.50. Write for free literature on complete line of mineral, metal locators; Geiger and scintillation counters. Goldak, 1541 W. Glenoaks Blvd., Glendale, Calif.

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HEARING Aid batteries, wholesale. Free list. Habs, Box 51, York, Penna.

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100 DOUBLE Edge razor blades, \$1.00. Moneyback guarantee. Dor-Len Sales, Box 21, Galesburg 1, Illinois.

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CHRISTMAS Gift special. Pen/pencil set, value \$8.95, now \$3.95. Curtis Bush, Phenix City, Alabama.

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100 6½"x9½" BROWN Envelopes, unprinted, \$2.25. M. Fortney, R3, Dillsburg, Penna.

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CIGARETTES—Make 20 for 9¢. Facts free. Moberly, Box 810, Owensboro, Kentucky.

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ELECTROLUNCH—Electric lunch bucket. Electric Lunch Kit Distributors, P.O. Box 53, Waukegan, Illinois.

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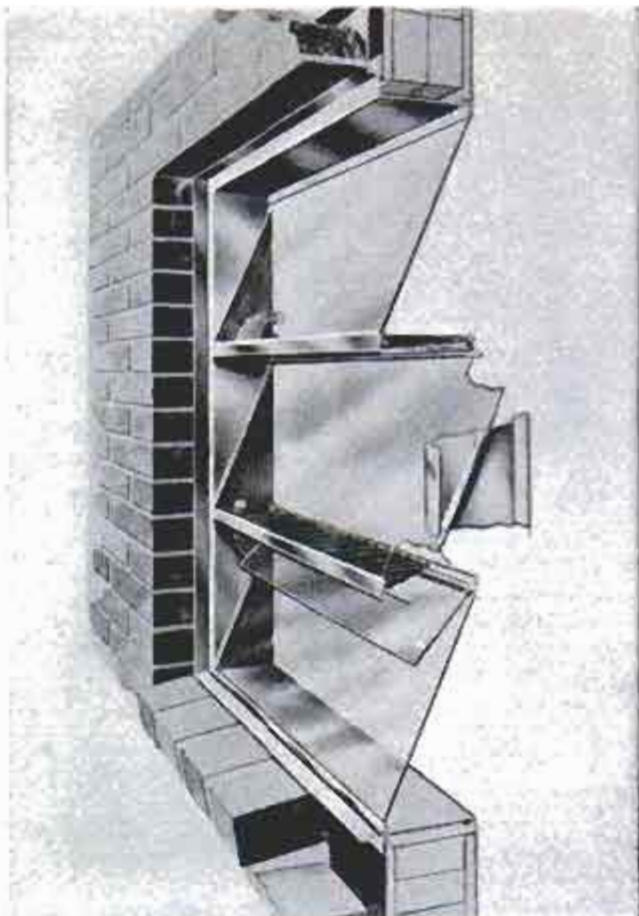
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## Miniature of Waikiki Beach Area Shows Plans for Future

Students in Cornell University's College of Architecture have finished a model of Hawaii's Waikiki Beach as it might look in the future. Aimed at preserving Hawaii's original charm while accommodating many more tourists, the model shows new park and beach areas, new hotels located to im-

prove the view and highways with cloverleaf turns to solve the traffic problems that plague the area. The remodeling project was undertaken as a class project when the instructor, Prof. Frederick W. Edmondson, learned that Hawaii in the next 10 years plans an increase of tourists from 100,000 to 280,000 a year, but found concern about congestion and deterioration in Waikiki Beach, Hawaii's major tourist asset. The model will be shipped to Hawaii for study.



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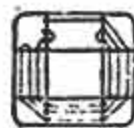
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Alaskan fire department's pumper is driven to hole in ice and suction hose is dropped through oil to water

Finding a water supply with which to combat fires when temperatures drop to 20 and 30 degrees below zero is the problem of fire fighters in Alaska. One fire chief solved it by cutting a hole through the 36-inch ice on a lake near his town and inserting a 55-gallon oil drum. Both ends were removed from the drum which was filled with diesel oil. Floating on the water, the oil keeps the water below from freezing. When water is needed for fire fighting, a pumper is brought near the ice hydrant and a suction hose is dropped down through the oil into the water.

## Water From Frozen Lake Fights Fires

Oil drum buried in 36-inch ice is filled with oil to prevent freezing



## Paint Repels Engine Heat

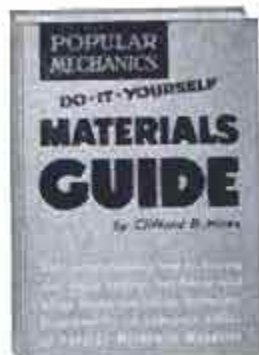
Heat-resistant paint developed by the Army Engineers has proven itself on diesel-engine-exhaust systems. Laboratory tests show the paint to be in perfect condition after 1200 hours of exposure to temperatures above 1400 degrees. In field use, the paint looked no different after 18 months of high temperatures. The paint is brushed or sprayed on. It air-dries in an hour or can be cured by the heat of the engine.

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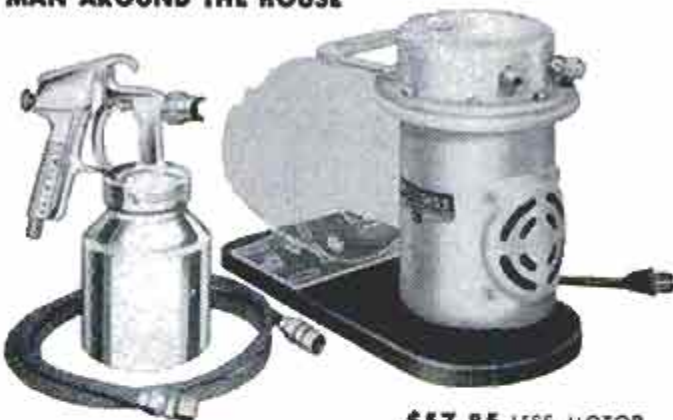
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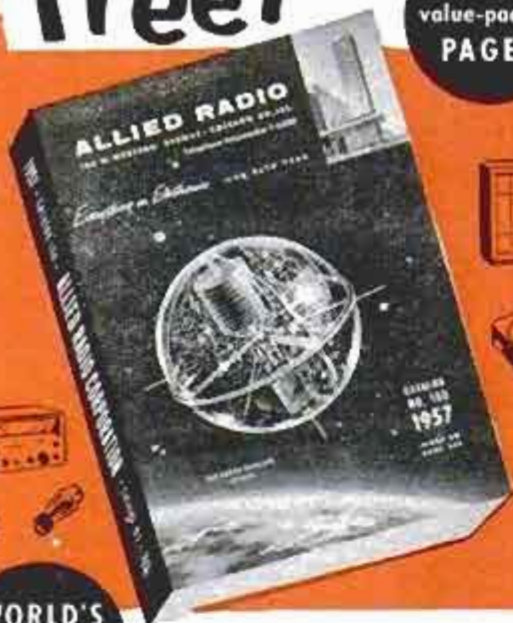
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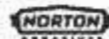
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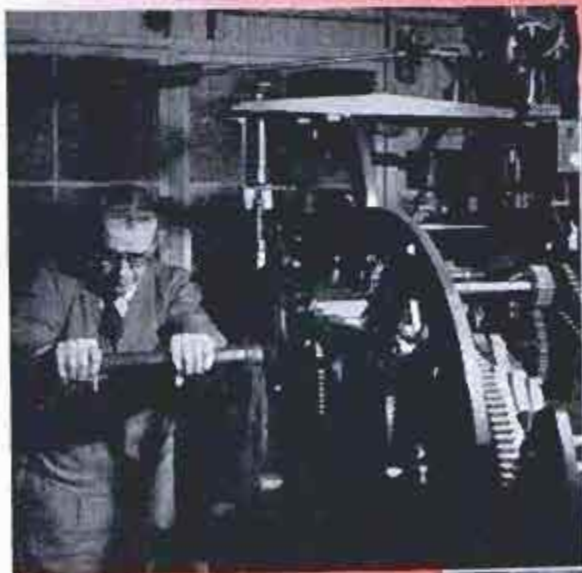
## They Keep the Tower Clocks Running

**T**HERE'S ONE GROUP of expert mechanics who still go to work exactly as their predecessors did hundreds of years ago. They are the clock tenders who lug their heavy toolkits up countless stone, steel and wooden steps every week all over the United States. The only modern innovation is that in very severe weather they also carry electric heaters. There are neither elevators nor steam radiators in the towers where the great clocks tick away the hours.

What with radio time signals and most

Port in tower-clock dial (arrow) makes repairing, painting or oiling easier. Below, a counterweight is drawn into the steeple. The gear cluster at right turns shafts to three faces

By  
Creighton Peet







Rudolph Lamm, head of Howard Clock Sales and Service Company, checks clock-mechanism timing

people having wrist watches, tower clocks aren't as common today as they were 112 years ago when the Howard Clock Sales and Service Company opened up in New York. But striking tower clocks in churches, courthouses and college buildings are still an essential part of the daily life of many small communities.

#### 47,000 Clocks Serviced

A clock may run along, striking punctually for a dozen years, but as soon as it goes dead, an urgent call is sent out and a man flies to fix it. In all, the Howard Company services some 47,000 indoor and outdoor clocks in the United States. Chief among its tower clocks are those in New York's City Hall, Trinity Church and Central Park Arsenal, Chicago's Wrigley Tower, St. Augustine Cathedral, the University of Kansas, the Firestone Tire and Rubber Building in Los Angeles and the old State House in Annapolis, Md.

To keep these tower clocks running, the Howard Company has on hand a vast stock of spare parts, which it boasts is sufficiently varied to repair any clock it ever made; of these clocks, company records show that several dating back to the 1880s are still in service. Two floors and a basement in lower Manhattan are lined by shelves loaded with gears, axles, motors, faces, hands, bells, striking hammers, relays, mercury switches and other pieces of equipment. Assorted pendulums are stacked in a bin like cordwood, and the moment obsolete, odd-sized gears are called for, replacements are ordered from a factory.

Up to about 30 years ago, when most



Behind a glass clock dial a repairman oils gears of rod that makes clock's hands turn at different rates

tower clocks and chimes were electrified, all power came from heavy counterweights, some traveling in chutes in the tower to the building's basement; the Howard repair crew was made up of mighty muscle men. Some of the counterweights operating the striking hammers on big bells weighed two or three tons; even with extensive gearing, the weekly chore of lifting these weights on high was no joke. One notable clock mechanism still operated by a 1200-pound counterweight, which travels up and down in a slender stone spire, is that in New York's old Trinity Church. All bell-striking mechanisms were electrified years ago, but it was felt that although an electric power failure might stop the clock, nothing could halt the descent of the counterweight. Accordingly, once weekly for the past 25 years Walter Humphreys has spent half an hour turning a big iron handle to pull up the weight and keep Trinity's three sets of clock hands moving.

#### Birds No Longer Trouble

Clock-tower repairmen seldom have the trouble with pigeons and starlings that they used to. Most tower clocks are now enclosed in small dustproof and pigeon-proof rooms, and ornamental openings in the towers are covered with chicken wire on the inside. But swarms of bees, wasps and hornets must occasionally be smoked out, and repairmen have reported corners filled with dark, undulating blankets of bats. Howard Company workers still remember their biggest and last pigeon war, which took place one night in 1929. Six men mounted the Trinity Tower equipped





New clock assembly is laid out. The pine hour and minute hands are balanced by the short, white, iron rods

with crates into which they popped some 250 birds and their nests. The men then went up Broadway a few blocks to St. Paul's, where they bagged another 150 birds, which were given to pigeon fanciers. In the next few days all openings in both church towers were covered with wire netting.

Snow and ice piling up on hands of clocks seldom cause trouble, but when this happens, repairmen simply throw out of gear one shaft leading to the hands on that face of the tower. In times past, hands cut from thin iron or sheet tin have caused trouble, for they bend or flap just enough in a high wind to lock and stop all movement. In restoring the clock on the Williamsburg, Va., Capitol Building, the Howard people first tried replacing the original metal hands with new ones, but finally installed today's standard, light Georgia-pine hands covered with oil and smalt, a silicate compound which sheds rain and snow. Rudolph Lamm, president of Howard, was much impressed with the works of this clock, first installed in Virginia in 1742. He discovered that each

Bronze figures which swing at bell in New York Herald Square clock get an oiling. Hammers which actually strike the bell are in the rear







Above, campus-clock mechanisms are polished. Below, weekly for 25 years Walter Humphreys has climbed three flights to wind Trinity Church clock

shaft and its gears were made of a single piece of steel, apparently filed out by hand. At today's labor rates, such a clockwork would be worth more than if it were made of solid gold.

As might be anticipated, tower-clock repairmen have their biggest scramble making the change-over to and from daylight-saving time. All other work is forgotten on those days, when everybody in the New York shop starts climbing towers at 8 a.m. Saturday and finishes by 2 a.m. Sunday. The last clock changed is always that of City Hall. Scattered clocks around the country are changed either by janitors or local watchmakers.

Since 1842, when Edward Howard first devised his basic clock and bell-striking mechanisms, practically no changes have been made in this firm's tower clocks, except electrification. The electric motors moving the hands of fairly large clocks are exceedingly small. This is possible because tower-clock hands are balanced with short iron rods which act as counterweights so they will turn very easily. Also, the pine hands used nowadays are surprisingly light. Another factor is that the power from a tiny motor is enormous when magnified by the gearing in a clock mechanism. A  $\frac{1}{2000}$ -horsepower motor geared down 60 to 1 is adequate to operate the hands of a clock with a single face eight feet in diameter. To operate four sets of such hands on all sides of a tower, a  $\frac{1}{150}$ -horsepower motor is sufficient. For four dials 40 feet in diameter, a  $\frac{1}{12}$ -horsepower motor is needed.

Motors operating bell-striking mechanisms also are only  $\frac{1}{12}$ -horsepower; but where the gear ratio to operate four sets of hands is 4-to-1, it is 30-to-1 to lift the bell hammers, some of which weigh up to 300 pounds. Cams worked through reduction gears allow the hammer to fall against a bell as often as needed to strike the hour. Cams for chimes are mounted on a single shaft, one for each bell. In function the cam lifts the hammer until it pushes against a flat spring, building up pressure. Falling from the point of the cam, the hammer strikes the bell which remains stationary. However, another spring below the hammer keeps it from remaining in contact with the bell, so the bell vibrates properly.

Most great tower clocks built in recent years have ports or doors in their faces large enough for a man to reach out and adjust, paint or replace the hands. Years ago, repairmen recall, there were stone towers with no openings except a small one for the shaft holding the hands. It was necessary to sling a bosun's chair over the top of the tower to make any outside repairs on such a clock. The Howard Company services only one such clock today. It is located in Brooklyn. ★ ★ ★

Electric power raises New York City Hall bell hammer. Lower spring keeps hammer away after striking







It takes U. S. Fleet Marines only 45 minutes to erect this "igloo," which can be heated or cooled, as needed

## Marines Erect Large, Air-Conditioned, Glass-Fiber "Igloo"

It takes only 45 minutes for six marines to erect a glass-fiber "igloo" now undergoing tests by certain ground units of the Fleet Marine Force. The structure weighs

2800 pounds, is 20 feet wide and can be built in lengths of 20 to 60 feet. The unit is equipped with its own heating and air-conditioning units.

## Roofer's Hoist Saves Time

Roofers can now drive up to a house and start applying hot roofing material within minutes by employing a hoist designed and built by F. M. Gibbs of Los Gatos, Calif. The entire bed of the truck is lifted to the working level by a series of pulleys, eliminating the need to pull hot tar up to the roof in buckets. Extensions are available so that the hoist can be used on two-story buildings.

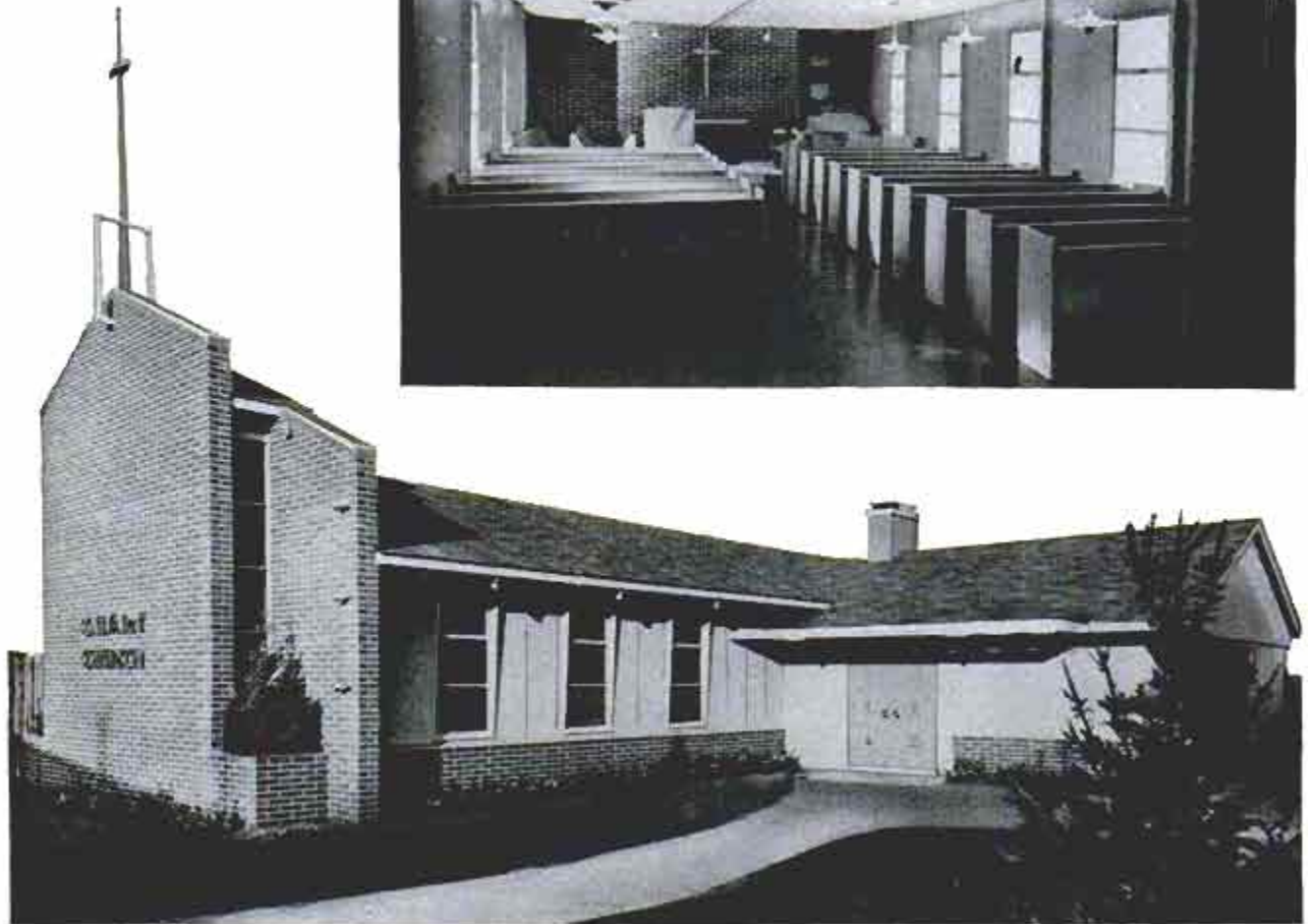


## Both Tire Beads Broken at Once

You can remove a tire without taking the wheel from the car with a wheeled unit that breaks both beads on a tire at once. The two arms gripping the tire develop about 2500 pounds of pressure on each side of the tire. Easy to use, the bead breaker operates from an air line. It handles all sizes and types of passenger tires, including tubeless tires and tires on safety rims. Unit is mounted on a neoprene-wheeled dolly.

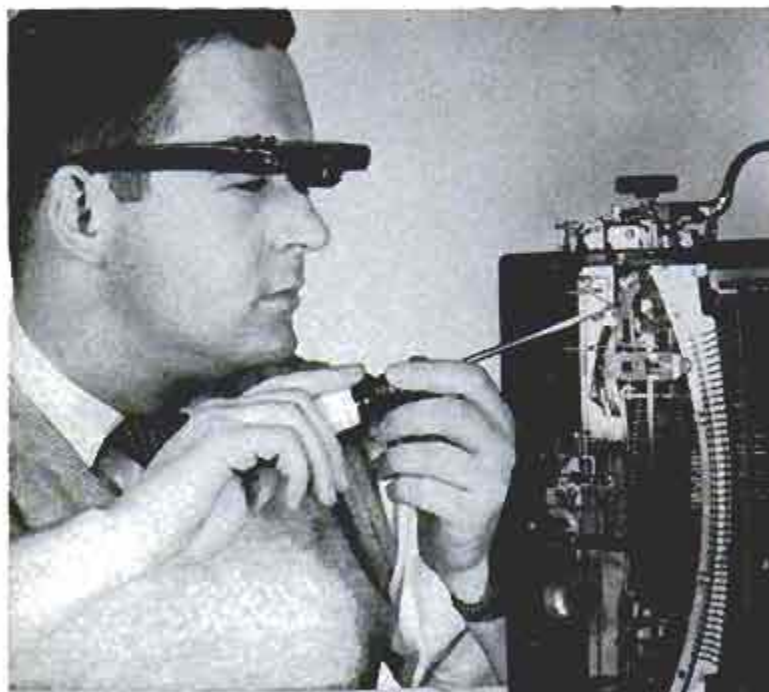


## Prefab Church Seats 180



Put together with a variety of floor plans and elevations, a prefabricated church that accommodates 180 persons is available at moderate cost. The church package supplied by the manufacturer includes the pews, an organ, altar, pulpit and other fittings. This costs \$35,000 but does not include

foundation and masonry work, plumbing, heating, electrical wiring and fixtures. A room at the rear of the church is separated from the church proper by an accordion steel sliding door. Many optional items are offered such as full kitchen equipment, bathroom fixtures and spire.

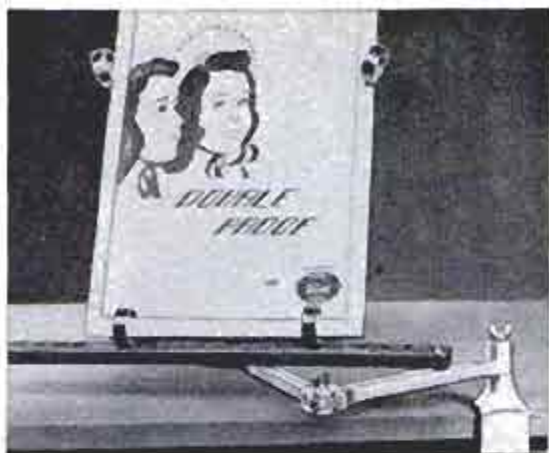


### Brow Lamp Focuses Light On Worker's Hands

Light is directed where you're looking by a flashlight unit that clamps to your brow like spectacles. Because it frees both hands, it is especially useful to mechanics, night nurses, repairmen and campers. The beam can be angled by pushing the bulb up or down with the fingers. A surprising amount of light is furnished by the unit, which has a standard bulb and miniature batteries.

☛ Average diameter of 300 comets analyzed by Dr. N. T. Bobrovnikoff of Ohio State University was 66,000 miles, more than eight times the diameter of the earth.





## Flexible Easel

Bedridden artists and stenographers alike can use an easel mounted on a jointed, swing-out arm. Strong spring clips at the bottom and sides hold canvas, magazines, newspapers, letters or copy to be rendered into drawings. The base of the arm is firmly clamped to the nearest piece of furniture. The unit is not yet being manufactured. It was recently put to good use by a young amputee in



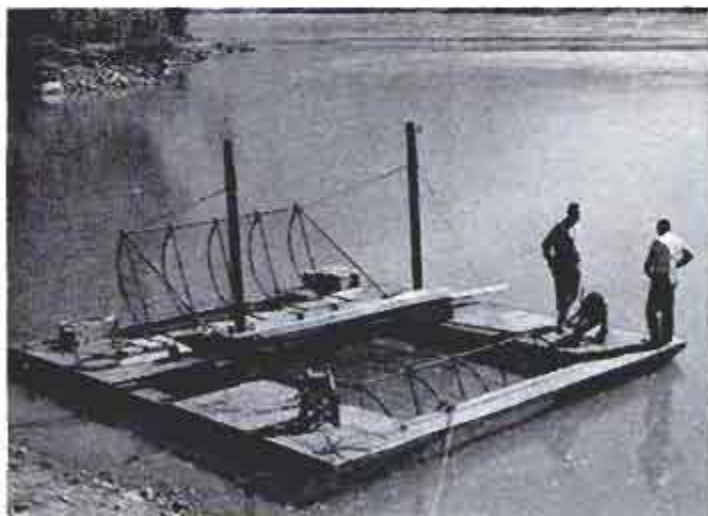
Fitzsimons General Hospital, Denver, Colo. Because of his artificial hands, he could not paint unless an assistant held the painting. The new easel, which gripped the canvas, enabled him to paint unaided.

## Automatic Fish Trap Uses River Power to Net Salmon

River power is used for catching salmon on the Fraser River in British Columbia. The current of the stream operates a device resembling a paddle wheel that consists of two basket nets plus a pair of auxiliary paddles. The contrivance may be moored in any part of the stream. Fish that are swimming up the river and that are trapped in one of the nets are automatically dropped into a trough as the net

rotates overhead. From the trough the fish slide into an underwater "live fish" tank. The captured fish are later tagged with plastic markers and are returned to the river. The trap was built by the Canadian Department of Fisheries as an improvement on a crude fishing wheel used by Indians in the Yukon. It permits tagging operations with fewer man-hours of work and with less damage to the fish.

Live salmon are tagged with plastic markers by Canadian conservationists after being caught in this trap





# OUR MISSILE ARSENAL

**F**OR AT LEAST seven centuries man has been firing rockets into the sky. The Chinese fired rockets as weapons as far back as 1232.

But only in the past few years have rockets played a part in defense. Today we have rockets and guided missiles of fantastic complexity. The chart below shows those in our arsenal or under development.

Missiles are guided to their targets in

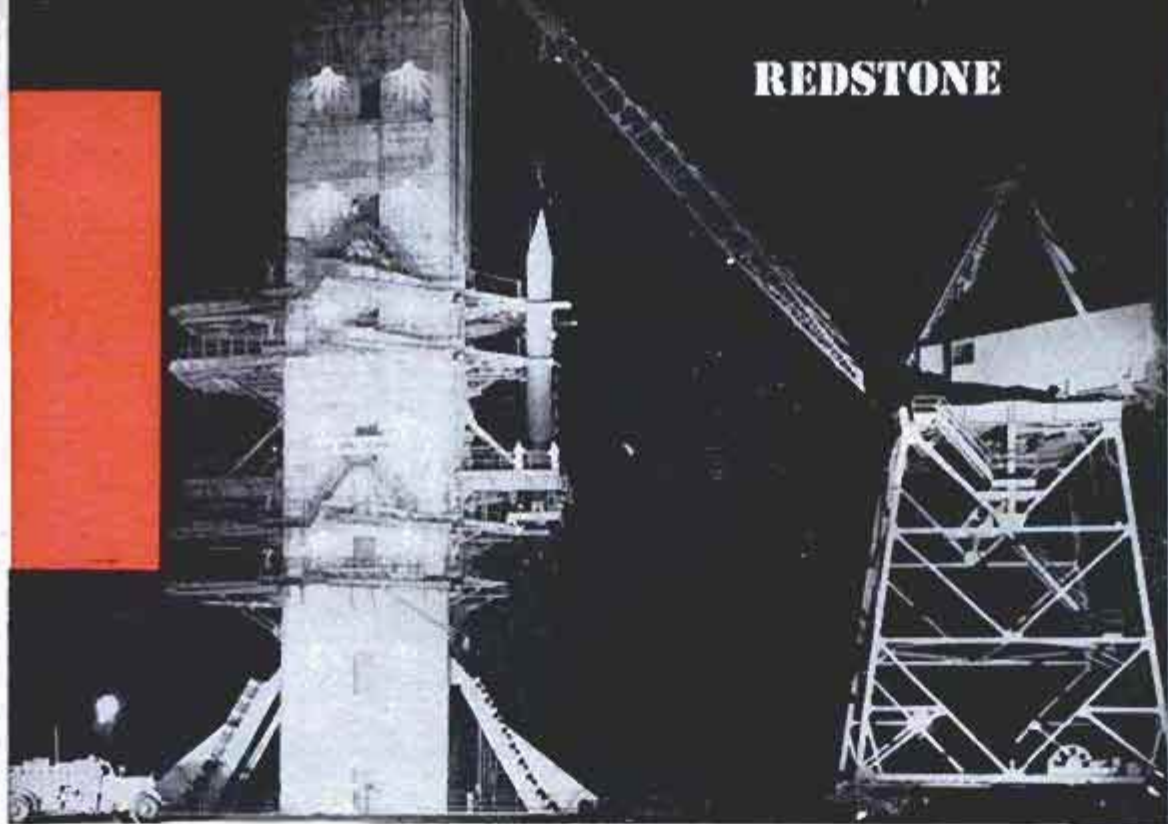
three ways: By firing them on a particular trajectory, like an artillery shell; by altering their course through radar and radio signals from land, ship or plane; and by building electronic "brains" into the missiles themselves, enabling them to find and track their targets.

Biggest goal of all is the ICBM—the intercontinental ballistic missile, the "ultimate weapon." ★ ★ ★

NAME	DEVELOPED BY OR FOR	LENGTH	WEIGHT (POUNDS)	RANGE (MILES)	REMARKS
<b>SURFACE-TO-SURFACE TYPES</b>					
Redstone I	Army	69'	—	300+	Currently our largest missile; Can carry nuclear warhead
Redstone II	Army	—	—	1500+	Under development; intermediate-range ballistic missile
Honest John	Army	27'	5950	20	Unguided artillery rocket now in service; can carry nuclear warhead
Thor	Air Force	—	—	1500	Under development; intermediate-range ballistic missile
Corporal	Army	40'	12,000	125-200	In service; speeds up to 5000 m.p.h.; can carry nuclear warhead
Matador	Air Force	39'5"	12,000	620	In service; guided pilotless jet aircraft; speeds up to 650 m.p.h.; can carry nuclear warhead
Navaho	Air Force	—	—	5000	Under development; 1000-2000-m.p.h. pilotless bomber
Snark	Air Force	74'	35,000	2000	In production; currently has longest range; 500-600-m.p.h. pilotless bomber; steers by celestial navigation
Regulus	Navy	32'8"	14,300	500	In production and in service; pilotless bomber; for ship-to-ship use; also aboard subs
Atlas	Air Force	100'?	225,000+?	5000+?	Under development; intercontinental ballistic missile; the "ultimate weapon"
Titan	Air Force	—	—	5000+?	Under development; intercontinental ballistic missile; the "ultimate weapon"
<b>SURFACE-TO-AIR TYPES</b>					
Talos	Navy	—	—	—	—
Bomarc	Air Force	66'	8500	—	Supersonic ramjet; long range
Terrier	Navy	14'8"	3350	15	In service; ship-to-air; beam guidance
Tartar	Navy	—	—	—	Ship-to-air; smaller than Terrier
Nike	Army	25'	1000	20	In service here and overseas; beam guidance
Hawk	—	—	—	—	Recently put into production
<b>AIR-TO-SURFACE TYPES</b>					
Petrel	Navy	24'	1500	—	Operational antisubmarine missile; can be launched from helicopter
Rascal	Air Force	20'	—	100	Remote guidance from standby plane
Dove	Air Force	—	—	—	In production; for naval targets; electronic guidance
Bullpup	Air Force	11'?	—	—	Under development; electronic guidance
<b>AIR-TO-AIR TYPES</b>					
Ding-Dong	Air Force	—	—	—	Under development; can carry nuclear warhead
Falcon	Air Force	6'	112	6	In production; armament for fighters
Sparrow	Navy-Air Force	12'	300	6	In service; rides radar beam
Sidewinder	Navy	8'	—	—	In production; infrared homing system; greater range and speed than Sparrow



## REDSTONE



U.S. Army photos

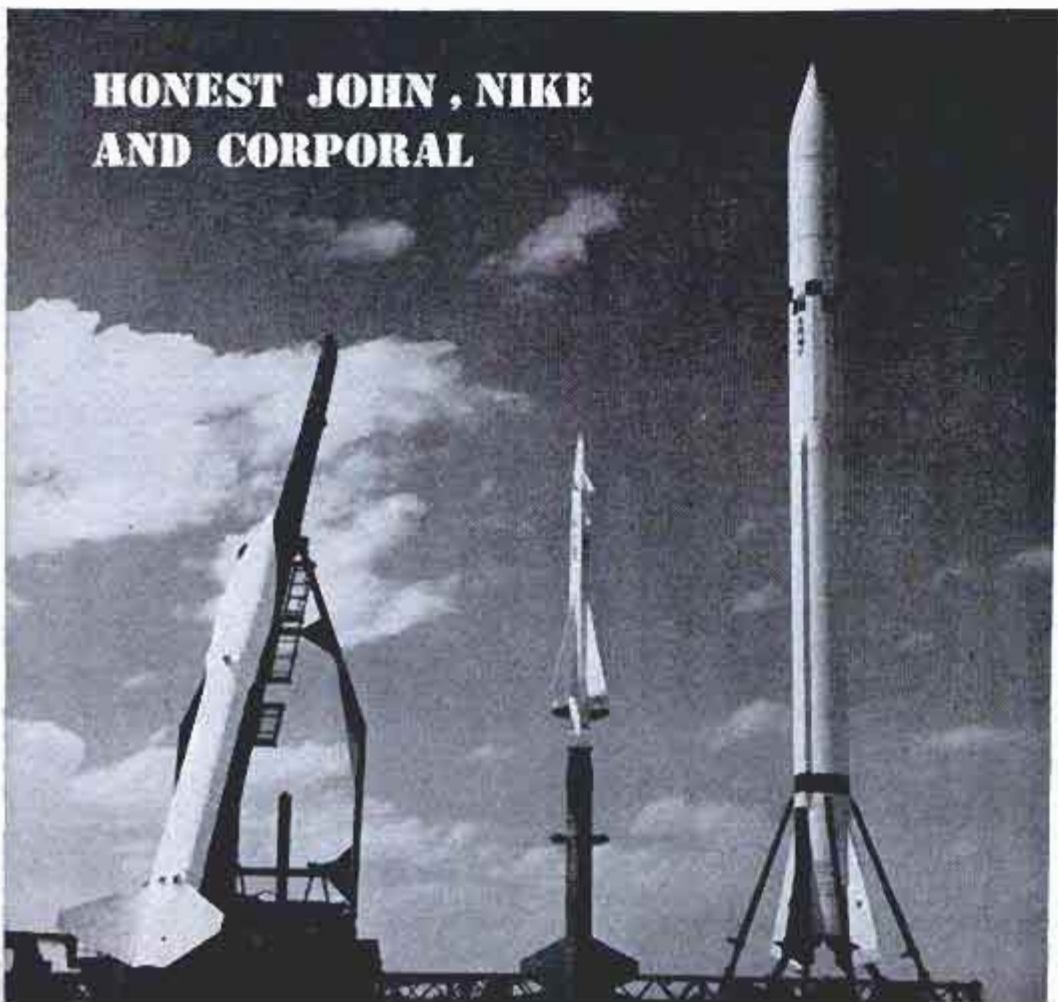
Redstone is largest current rocket. Recent tests were aimed at firing triple-motored Redstone 3000 miles. Above, Redstone is hoisted to test stand. Right, it thunders into the air



## SURFACE-TO-SURFACE MISSILES

Here's "first family" of big missiles. Honest John is a medium to long-range artillery rocket. Corporal can carry a nuclear warhead. Nike is high-speed antiaircraft missile

## HONEST JOHN, NIKE AND CORPORAL






## HONEST JOHN



U.S. Army photo

Honest John roars from a launcher during a training session for troops in Germany. Its primary use is as a long-range artillery piece, blasting enemy concentrations or supplies with either conventional or atomic explosives. It was one of the first big combat-ready rockets

## SURFACE-TO-SURFACE MISSILES

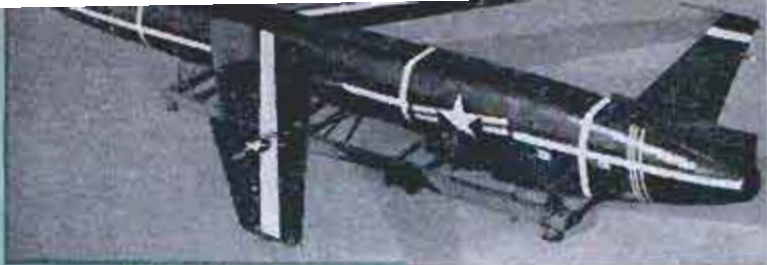


Regulus blasts off the deck in the first released photo showing the launching of this missile from a submarine. This is the Navy's first operational offensive missile. Primarily intended for ship-to-ship use, it has also been fired from carriers, cruisers and guided-missile ships

## REGULUS







Northrop Aircraft photos

Snark carries rocket boosters to help it roar aloft. An air-breathing missile, it is basically a pilotless jet aircraft with a limited altitude and speed. However, it is our first real intercontinental missile, with a range of about 2000 miles. Biggest disadvantage is that, because of its relatively low speed, it is possible to knock it down with anti-aircraft fire. Snark has a built-in guidance system which enables it to alter its course and "find" its target



## SNARK

New version of the Matador is shown in these photos. It is longer and carries a larger nose section than the first Matadors built. New type is under test and will be given an entirely new airborne guidance system for tactical missions. In effect another guided, unmanned bomber, Matador has a ceiling of about 45,000 feet and a range of more than 600 miles

U.S. Air Force photos



## MATADOR







U.S. Army photo

Nike is the Army's answer to attacking aircraft. Photo shows launching site of a Nike battalion with eight missiles ready for firing. They are supersonic long-range guided missiles designed to locate, track and destroy aircraft by means of electronic brain

## SURFACE-TO-AIR MISSILES



Talos is the Navy's supersonic antiaircraft missile. Relative merits of this missile and the Nike have been a subject of debate. Department of Defense has announced that both missiles will be used in air defense of this country

U.S. Navy photo

**TALOS**

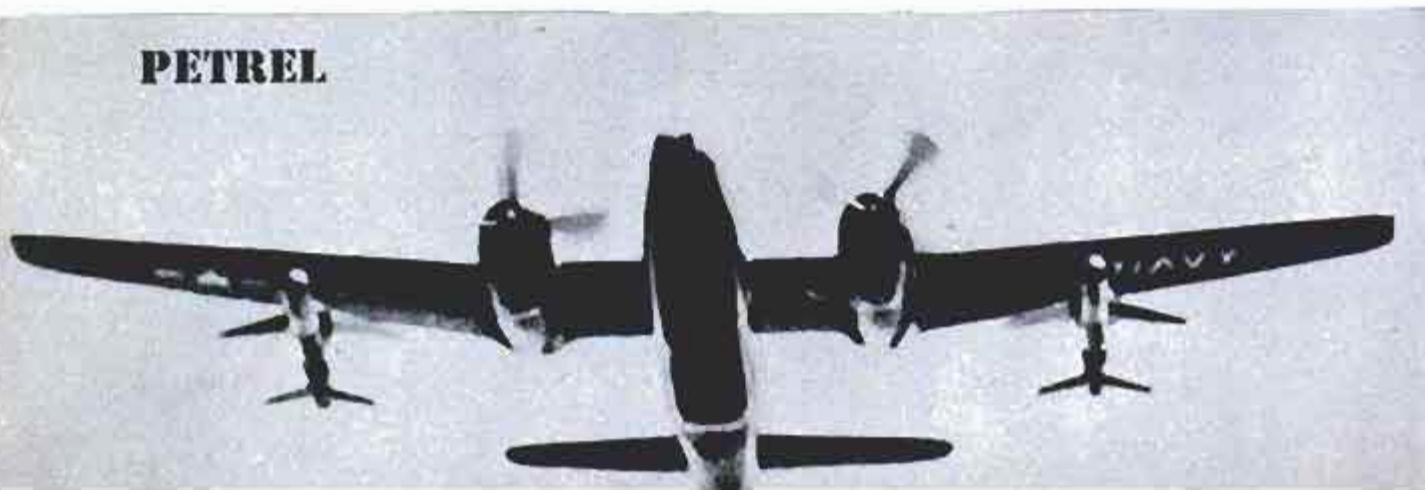


## AIR-TO-SURFACE MISSILES



Petrel is carried by Navy planes primarily for use against enemy ships at sea. It can be launched from patrol aircraft well beyond a ship's antiaircraft defense. Guided by an electronic brain, it "thinks" its way to target

**PETREL**







**SPARROW**

Sperry photo

Sparrow is a relatively small (eight-foot) rocket with a range of approximately six miles. The plane carries guidance gear for controlling the Sparrow in flight

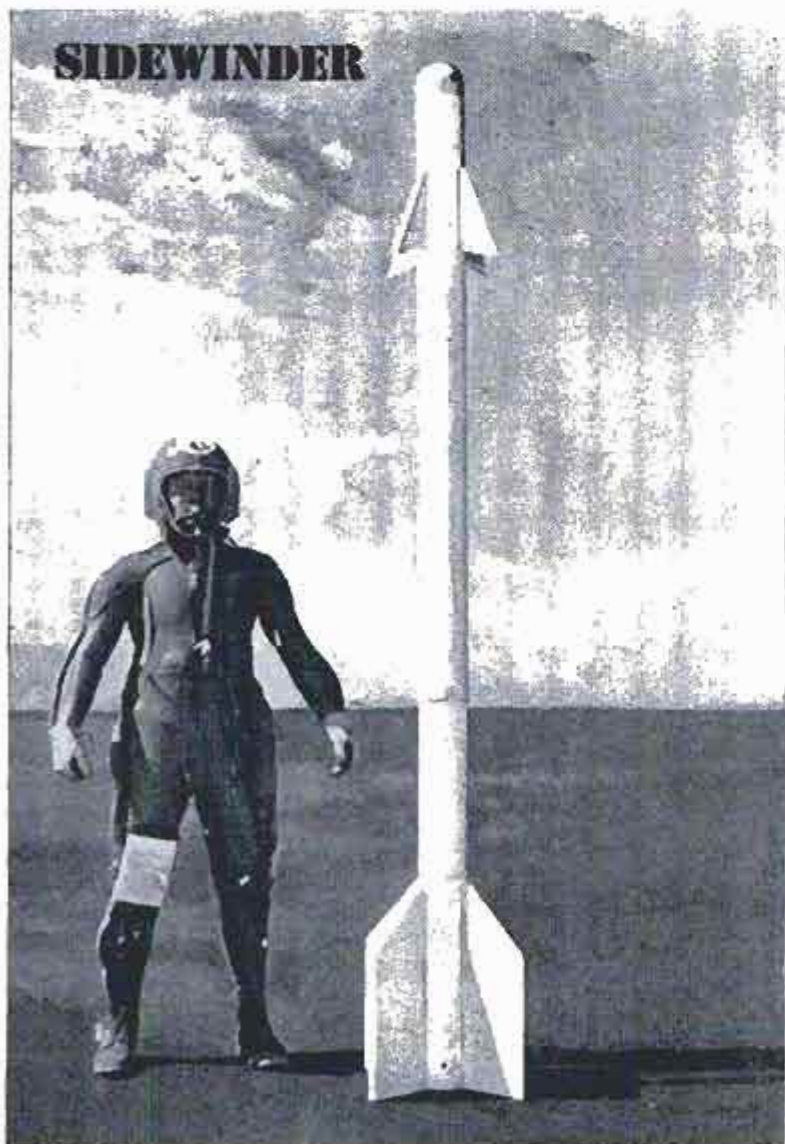


## AIR-TO-AIR MISSILES

Sidewinder is the latest missile in the Navy's hands. It can kill supersonic planes at altitudes up to 50,000 feet. Its greatest advantages are simplicity and low cost

Air Force's Falcon is smallest guided missile in production. Falcon is fired automatically by radar, tracks a maneuvering target with its own guidance system

U.S. Air Force photo





# Detroit Listening Post



By Leo Donovan

**Y**'OU'VE SEEN 'EM, now what do you think? You're the boss from here on in and this column, for one, would like to know what your verdict is.

There are still more to come, but the volume cars are all out and dealers are ready for you to sign on the dotted line.

Still to come is the Mercury Turnpike Cruiser which will be out this month. Lushest of the Mercury line, it features some clever new twists and gimmicks. This division is seriously aiming at Buick's business.

Chrysler is holding back its new 300C until later. This car will be easily distinguishable from other Chryslers. No longer will it share a front grille with Imperial. A fresh and distinctive grille (with a lot of the Chrysler Ghia in it) will set it apart.

Built on a Windsor shell to keep it light, the 300 will have a front end you'll notice and power plant that will give a fabulous power-weight ratio. No, it isn't 400 horsepower, but it's within a stone's throw!

## Packard Still to Come

The only full-line car that hasn't debuted by now is Packard. It's expected in January. As reported here a couple of months back, it has to be a Studebaker with Packard trim. This is a sad day for a great tradition. Another car has gone—let's hope it's only temporarily. How long can this go on, this gradual diminution of makes? That worries the industry—and auto writers, too. After all, what will we write about if all cars are made by the same company?

Optimists at Packard say they will have a new, big and distinctive model ready for the 1958 season. Let's hope they're right—but that's months and millions of dollars in the future in this business.

That about cleans up Year 1957 except for the Eldorado Brougham which some magazines have been saying will be out "shortly" ever since late last summer. Nothing definite yet, except that, as stated here before, it is expected in February.

**Continental doesn't seem to be smiling**

richly any more. It's difficult to know what is going to happen to the idea of a "timeless" car in this price class. Right now the Continental plant is being used to build Lincoln hardtops. Continental explains that this is being done only because Lincoln needs the cars in a hurry. But there's no denying that Continental doesn't need Mark IIs in a hurry—if that's true now, what will happen when the Brougham comes out?

Continental has announced a convertible, but it's a custom job and is not being built in the factory at all. Whether it will be added to the Continental line as a production item is questionable right now.

The Congressional inquiry into safety a few months back caused some fears here in Detroit that cars might soon be taxed according to horsepower. Apparently, the word is out that such fears are ungrounded. Horsepower and displacement are up, up, up. And some strange things have happened. For example, the Oldsmobile 88, a car that competes in the low-medium field, has a displacement of 371 cubic inches, six more than Cadillac, seven more than Buick and 46 inches more than its competitor Dodge!

## Mixed-Up Business

This is, as has been said before, a crazy, mixed-up business. An industry publication reports that a 1957 Ford sold in a used-car wholesale auction five days before it was officially introduced to the public! To be sure, it sold for well over the suggested retail price. Not so lucky were 27 Fords (1957 models) sold at wholesale the week after introduction. These went for prices ranging from \$400 to \$600 below the suggested delivered prices.

These obviously had to come from franchised Ford dealers. Other 1957 Fords showed up in used-car lots simultaneously with the unveiling of the cars in the new-car showrooms. And magazines are told to keep such information secret because it would make dealers mad if anything leaked early!

Oh, well, there are bigger things to worry about. For instance, Dr. Emil Seletz of the University of California school of medicine recently told the International College of Surgeons that we average human beings are not physically equipped to drive a modern, high-powered car.

Something about our inadequate corticospinal reflex responses—if that means anything to you. At the time the doctor spoke, the 1957 cars were not out so he must have been talking about the obsolete 1956 models. If he's right, it's obvious that none of us is equipped to handle the super-powered wonders of 1957!





An optical roller-coaster ride is experienced by autoists on this Richmond-San Rafael humpback bridge

## ***Humpback Bridge Has Built-In Dip***

MOTORISTS, driving the new four-mile toll bridge between Richmond and San Rafael, Calif., brace themselves for a roller-coaster ride. However, the jolting drop never comes, despite an obvious optical dip in this second-longest over-water span bridge in the world. Surpassed only by the San Francisco-Oakland Bay giant several miles to the south, this \$68,000,000 colossus has a built-in structural dent. Engineers constructed a scientific humpback in the bridge's center for two reasons: To save the cost of additional steel girders needed for support, and to make this land-linking steppingstone as earthquakeproof as possible. A three-percent maximum grade is barely noticeable to autoists guiding vehicles along the bridge's two decks, each carrying six lanes of one-way traffic.

Expected the first year of operation are 4,000,000 drivers who will save 2,000,000 hours of travel time by using this route instead of ferryboat transportation replaced by the bridge. Appearancewise, this man-built monster is impressive in a 65,000-gallon paint job. Towers rise 325 feet above waters

of San Francisco Bay, while pilings plunge 222 feet beneath the same surface. Two cantilever spans over the main bay channels provide 185 feet of clearance for ships.

This built-in dip has saved on construction costs and has strengthened the structure against possible earthquake damage

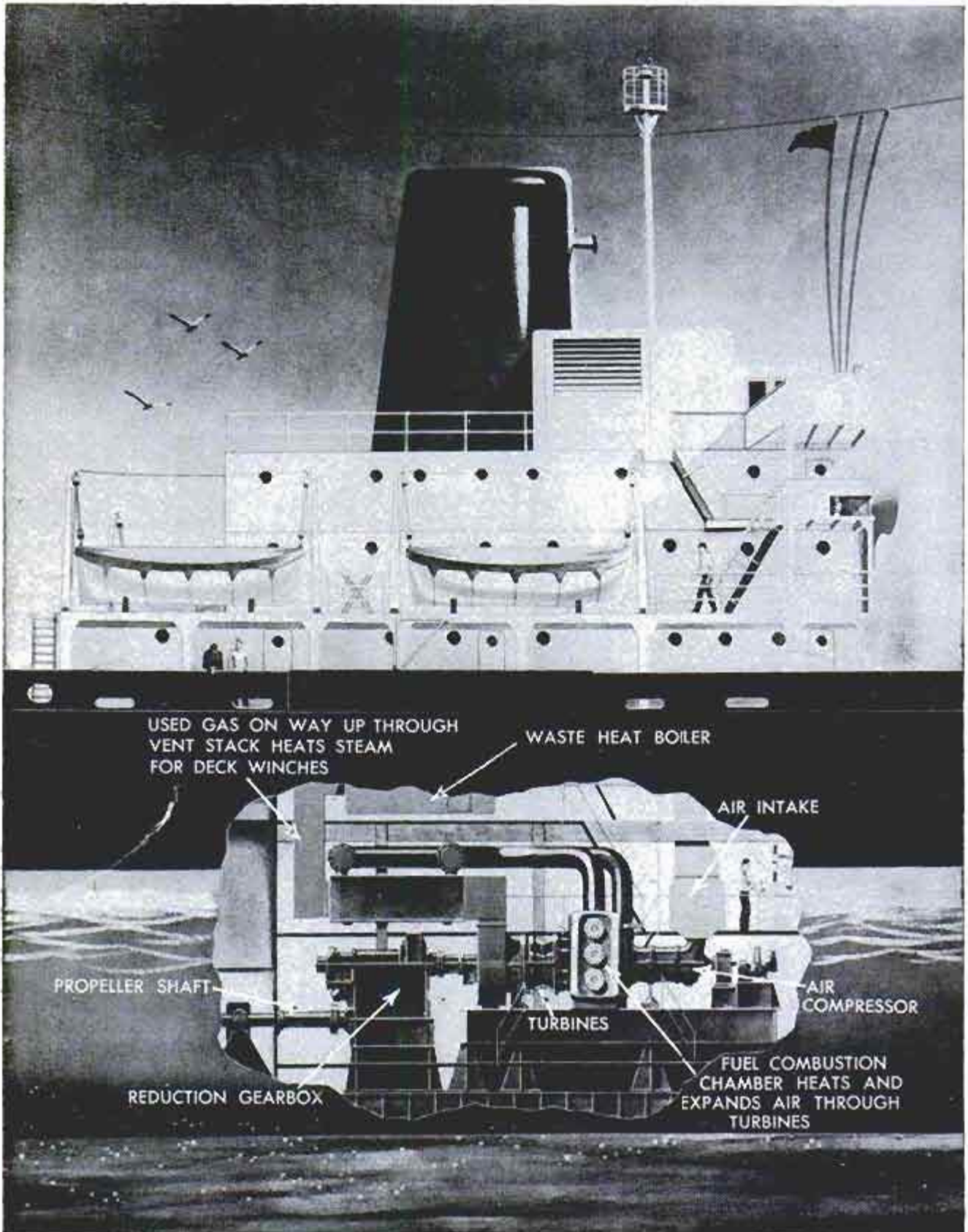




# Gas Turbines Pep Up Old Liberty Ship

By Richard F. Dempewolff

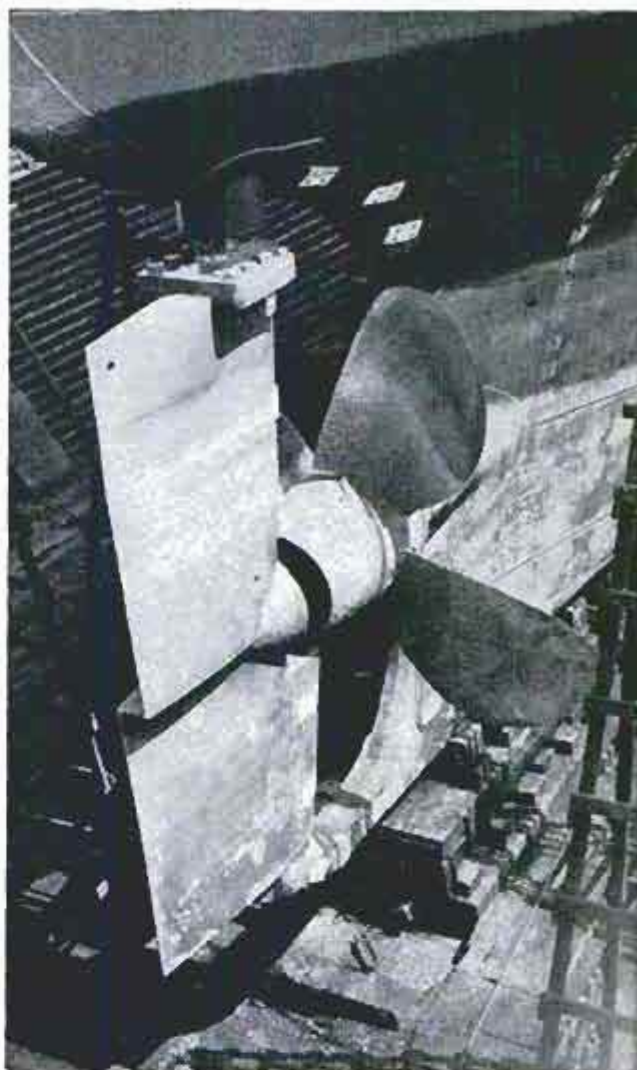
Artist's conception of the General Electric gas turbine installed aboard the old Liberty ship, John Sergeant





SHIP CAPTAINS heading in toward the Virginia capes recently, saw what should have been a lumbering old 10-knot Liberty ship acting more like a pleasure cruiser than a wartime relic. Slicing swells at a brisk 18 knots, the long, lean freighter whipped through tight circles and figure eights. Periodically, white geysers suddenly sprayed its fantail, and foam boiled under the stern as it slammed into reverse from "full ahead," rumbling to a dead stop in less than four times its length—and in less time than it took bug-eyed observers in distant pilot houses to focus glasses on what was happening.

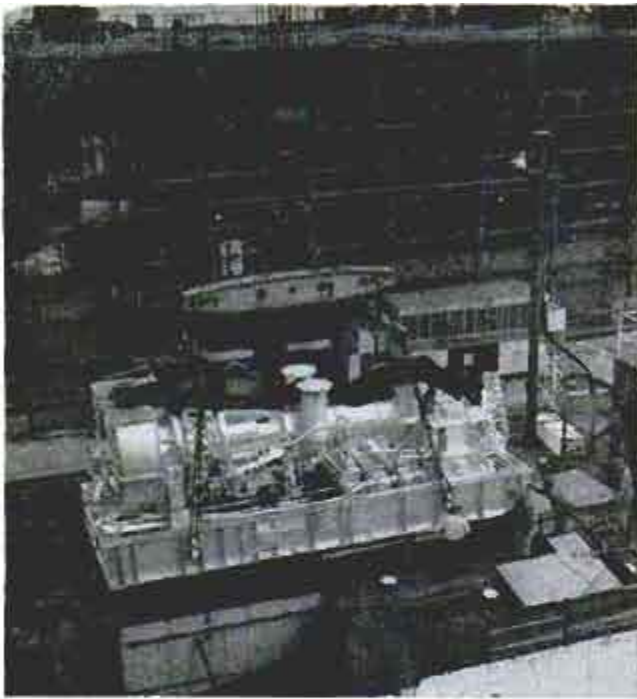
The *John Sergeant* is a far cry from 1400 sister Liberties huddled in mothball clusters from Olympia, Washington, to New York City (see *Popular Mechanics*, September 1956). As it rode out of Newport News Shipbuilding and Drydock Company's yards this fall, the ship sported a 107-foot rakish bow in place of its former 82-foot pug nose, stretching its lines 25 feet beyond the old 427-foot Liberties. Deep in the hull, the secret responsible for its unusual speed whined softly above the dull roar of burners, while men with noise meters grinned at readings well below those that an ordinary engine room would put out. A new prefabricated power package makes the *John Sergeant* the world's first large merchant ship propelled entirely by gas turbine. That's why the ship's name bears the unique prefix GTS (gas-turbine ship) instead of the usual SS.



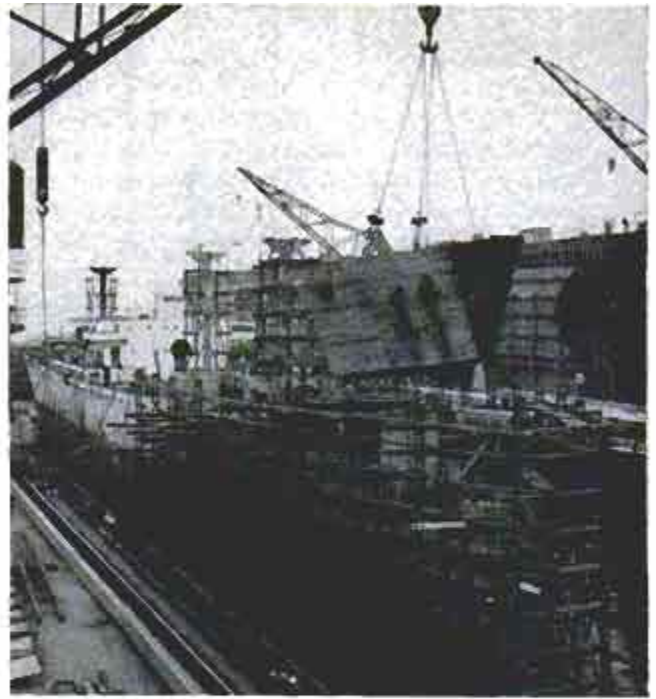
Above, 17-foot variable-pitch propeller, installed with turbines, enables ship to stop dead in two minutes and 40 seconds. Below, first cruise of ship







New gas turbine for *John Sergeant* develops over 6000 horsepower, is one third the size of old engine

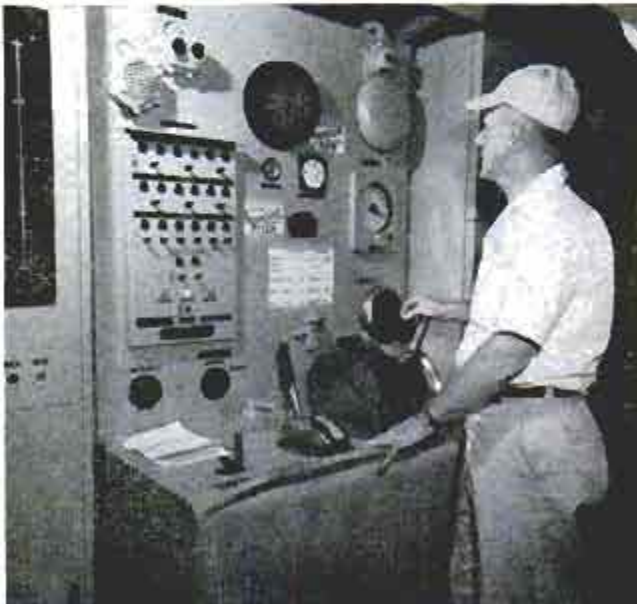


To help increase speed, a sleek new clipper bow, 107 feet long, replaced the old 82-foot snub-nosed bow

Operating on much the same principle as a turboprop aircraft engine, the 6000-horsepower plant sucks in outside air, compresses it, heats it and expands it through turbines that are forced to spin. In turn, they revolve the shaft with smooth, quiet vibrationless power—humming like a giant blower instead of a roaring engine. John J. McMullen, chief of construction and repairs for the U.S. Maritime Service, who spearheaded the *John Sergeant's* rebirth, calls it "the greatest advance in marine prime movers since the diesel."

At the end of the ship's shaft there's another innovation—a 17-foot reversible-pitch propeller with mammoth blades that swivel hydraulically. Up in the pilot house

Model of the ship's engine room shows the modern compact arrangement of controls and instruments



during the recent trials, Capt. E. D. Edwards flipped the single lever control to "crash astern," while the *John Sergeant* was surging forward at full speed. Behind him, underwater, giant blades swung from "full ahead" to "full astern" position in a record 15 seconds, instead of the full one minute required to brake and reverse the shaft of a conventional ship. In two minutes and 40 seconds the *John Sergeant* was "dead in the water." An ordinary ship this size would have taken seven minutes to do the same thing, according to McMullen.

McMullen says, "The unit on this ship has a design horsepower of 6000, but we've been getting 7500. On the North Atlantic, it will be much more because cold air is already partly compressed. You can figure an extra 40 horsepower for every degree drop in outside temperature. On a production basis, the unit will cost about \$50 per horsepower less than steam equipment.

Actually, the *John Sergeant* is only one of four experimental Liberty ships now undergoing conversion as part of a \$12,000,000 program. Reason for the program is to investigate new, economical means of propulsion that can take our mothballed merchant ships out of the "slow barge" category in case they're ever needed again. "Ships incapable of 15 knots should not be considered adequate for logistic support in modern war," the Maritime Commission pointed out recently. When the *John Sergeant* has completed a year of service under the U.S. Lines insignia, McMullen hopes she will prove the answer to atom-age modernization of old 10-knot Liberty-class ships.

★ ★ ★





## Dutch Lowland Roads Rest on Wood Shavings

Dutch engineers have solved the problem of building roads in rural Holland, where the low, flat land is just barely above sea level, by the use of baled wood shavings. A few feet below the land's surface, road builders find muck and mud, and bales of the shavings are placed in

tight formation in this mud. Then earth is shoveled over the bales, packed down and allowed to settle. Later, additional earth is rolled on and finally the macadam surface is added. Virtually the entire shavings output of the Dutch factories is being baled for road-building needs.

## Electronic Eye Helps Blind Switchboard Operators

Weighing less than an ounce, an electronic eye has been developed by the Bell Telephone Laboratories as an aid to blind operators of private-telephone switchboards. A tiny light-sensitive phototransistor fits on the tip of an index finger. When the operator hears the signal of an incoming call she searches along lines of lamps on the board. When she hears a signal from the phototransistor through her headset, she plugs into the jack associated with that lamp, completing the connection.

☛ Argentina is spending about \$62,000,000 for highways in 1956.







## Truck Bodies Travel Piggyback

Special 75-foot railroad flatcars, each carrying three truck bodies, are the newest addition to piggyback transportation of trucks by the railroads. Each of the bodies, called "Mobilvans," is designed to ride on a highway-truck chassis. Instead of shipping an entire trailer by rail, the loaded Mobilvan bodies are lifted by fork truck

from the chassis to the flatcar and locked securely in place. The expense of hauling the dead weight of the chassis and wheels and of tying up expensive trailers is eliminated. The system is being used cooperatively by the Pennsylvania Railroad, The Rail-Trailer Company and the Spector Freight System of Chicago.

## Dutch Houseboat Sports a Built-In Garage

Houseboats are common in Amsterdam, The Netherlands, but houseboats with their own built-in garages are uncommon anywhere. This one, 75 feet long and 18 feet

wide, is a seven-room house with central heating and a shower in addition to the garage. A family of four occupies the house, which is tied to the riverbank.





# AN ENGINEER LOOKS AT THE NEW CARS

By Dale Kelly, SAE

With most of the 1957 cars now in the dealers' showrooms, we asked Dale Kelly, PM's automotive engineer, to give you his thoughts on certain of the year's innovations. At this writing, Kelly is beginning full-scale tests of the 1957 Ford, Chevrolet and Plymouth. He tests only standard production models of these cars. *Popular Mechanics* does not believe its readers are interested in unscientific "quickie" tests of hand-built engineering prototypes. These are not at all the same cars that you will buy. They are free from the defects of mass production. However, because we realize you are interested in an informed opinion, we are bringing you this preliminary account of some of the new engineering features based on information provided by the car companies. Actual test reports of production cars will appear in early issues.

**T**HE 1957 CHEVROLET offers, as optional equipment, the first fuel-injection system used on an American production car.

The system differs from that used on the Mercedes-Benz (and elsewhere) in that gasoline is not injected into the cylinder, but into the inlet manifold just ahead of each inlet valve and, secondly, injection is a steady stream rather than separate pulsations.

Fuel injection avoids a number of weaknesses inherent in carburetors. In the best carburetor there is some variation in the amount of liquid gasoline getting into the different branches of the manifold. If every cylinder is to receive enough gasoline for full power, the carburetor must be so adjusted that some receive more than this, the excess therefore being wasted.

One remedy is to heat the manifold enough to vaporize nearly all the gasoline. Vapor mixes better with the air and distributes more uniformly among the cylinders. Unfortunately, this expands the air also and reduces the weight of air the engine can draw in. Consequently, power is reduced.

Another remedy is to use a manifold small enough to keep the air moving fairly fast even when the engine is running slowly and at light load. But this also reduces power. In some cases it has been necessary to use multiple carburetors, up to one per cylinder.

In fuel injection, the amounts of gasoline reaching the various cylinders are virtually identical, even though the inlet manifold is cold and large in cross-section. Economy and power both benefit.

The Chevrolet version of fuel injection cuts the gasoline flow completely off when the car is coasting against engine drag, so that fewer unpleasant odors and less dead-

ly carbon monoxide are discharged from the exhaust.

## Smaller Wheels

Fatter tires with less air pressure on smaller wheels (14 instead of 15 inches in diameter), are being used to soften the ride and to give an appearance of lowness. The center of the 8.00 x 14 tire is only an eighth-inch closer to the ground than that of the 6.70 x 15 tire it replaces.

It is widely felt that the biggest brakes that can be put on the 15-inch wheels are unduly prone to overheat and fade under repeated severe usage. With the smaller 14-inch wheels carrying the new heavier cars, this situation will hardly get better. It may get worse, unless there is a radical change in the type of brake used.

## Supercharged Hawk

Studebaker uses a supercharger in the 1957 Golden Hawk to get 275 horsepower out of the 289-cubic-inch Studebaker V8 engine. This is the same power rating the Hawk had last year. But last year it used the 352-cubic-inch Packard V8. The supercharger enables Studebaker to get equivalent power with 63 fewer inches.

This supercharger is essentially a centrifugal blower or compressor, driven by belts from the front of the engine, that gives a five-pound-per-square-inch boost to the air entering the carburetor, delivering it at 20 pounds per square inch instead of the normal atmospheric pressure of 15.

Used with a small engine, a supercharger makes it possible to combine exceptional economy with adequate performance.

## Chrysler's Front Suspension

The Chrysler family of cars uses ball-joint suspension in front (this is neither

(Continued to page 258)



**BUICK**



Just over an inch longer, the Super four-door hardtop looks about a foot longer because of its lower lines



Characteristically Buick is the front-grille design. The hood line has been lowered drastically in 1957

## General Motors Offers

LAST SPRING when rumors of great engineering changes were running through the industry, President Harlow E. Curtice of General Motors said "no revolution is coming."

He insisted that there's no place in the business for revolutionary changes. Cars evolve and improve gradually, he said.

Well, General Motors' cars are out for you to see and you'll probably agree that Mr. Curtice was right.

Despite its all-new body and frame, Buick is still recognizable as a Buick. Despite Cadillac's new X-frame, its entirely new sheet metal, it's still definitely a Cadillac—you don't have to read the label. The same is true of Oldsmobile and Pontiac (the last-named is not all new this year, being a major facelift).

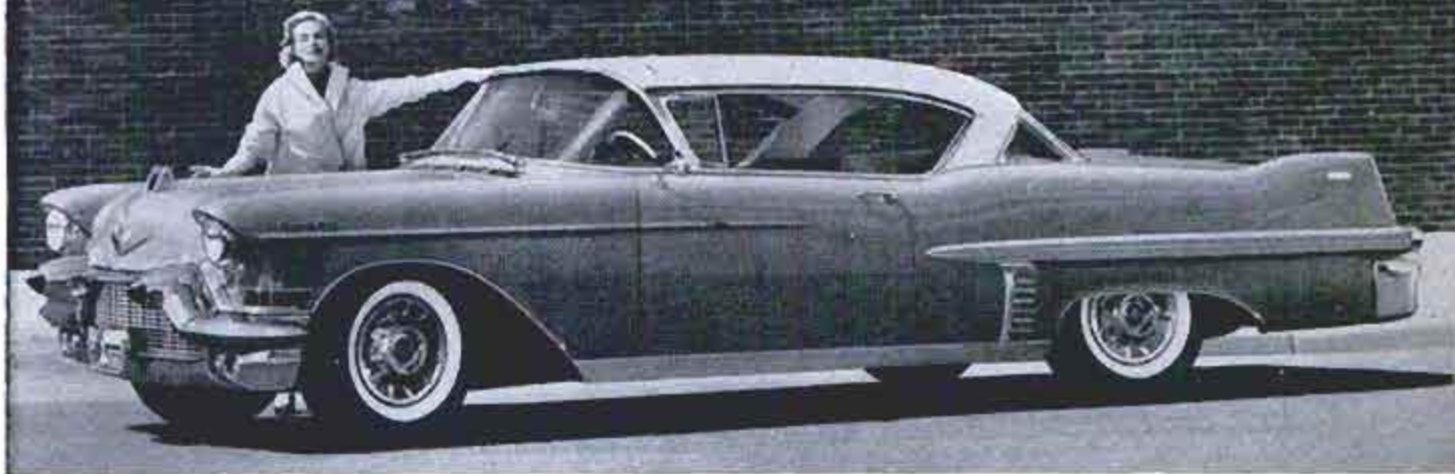
But the cars are different, drastically different in certain spots. Some models are more than three inches lower. Many are

New is the Century Caballero, a wagon with no pillars between doors. Grooved roof is for decoration only





**CADILLAC**



Low, long and luxurious are words to describe the Coupe de Ville. It is two inches lower than the 1956 version

## Three All-New Cars

longer, but not much. Interior dimensions, engineers say, are unchanged or, in some cases, improved.

But the most obvious difference is the lowness. Stand beside one of the new models and you'll find yourself looking down on the roof. And you stoop lower when you enter. But once in, you get a more stable ride because of the lower center of gravity.

Cadillac's X-frame has no side rails. Instead, the body is secured to outrigger mounting brackets. This permits lowering the car and increases torsional rigidity, says Cadillac. Other new frames (Buick and Oldsmobile) are more conventional.

All GM cars now have ball-joint front suspension as, in fact, has the whole industry). All but Pontiac and Chevrolet have sharply raked corner posts on the windshields that bring the lower edge of the glass much farther back. Cadillac and Buick retain the 15-inch wheels, the others



Those dark spots in the center of the bumper guards are molded rubber inserts to reduce parking damage

Tailfins on the Eldorado Biarritz are inboard. There is no continuous bumper. It consists of three sections





# OLDSMOBILE



Super 88 four-door sedan, like all Oldsmobiles, rolls on 14-in. wheels. Note the enlarged windshield



Traditionally, Oldsmobile has had bold, uncluttered front grilles and the 1957 version is no exception

at GM have changed to 14-inch wheels.

Let's be specific, taking the cars in alphabetical order.

## Buick

The enlarged V8 engine develops 300 horsepower in all models but the 250-horsepower Special. Displacement is up sharply to 364 cubic inches. Compression is 10 to 1 (9.5 to 1 on the Special).

Dynaflo transmission is unchanged from last year. ("Pregame tips" of a new transmission were right; Buick changed its mind at the last minute.)

Buick continues full cutouts on all wheels and all models. The hood line is lower, as is the trunk lid. Roadmasters are distinguished by two strips of chrome extending up over the trunk lid along the roof to the windshield. Buick continues its

More than two inches lower and four inches longer this year is the Starfire 98 Holiday four-door hardtop





**PONTIAC**



Pontiac's Star Chief four-door hardtop is lower and has a rocket-shaped two-toning along its full length

torque-tube drive with coil springs on all wheels. Optional on all models is a safety speed reminder that buzzes when a certain speed is reached (if the buzzing annoys you, you can shut it off or raise the speed setting by a knob on the dashboard).

New at Buick is a four-door wagon called the Caballero, featuring hardtop, pillarless construction and a grooved roof.

### Cadillac

You'll get 300 horsepower at Cadillac also, or if you wish you can have 325 in your Eldorado as an optional extra. Compression in all engines is 10 to 1, displacement is 365 cubic inches (one inch more than Buick).

Except for limousine models, all four-door Cadillacs have hardtop, pillarless

(Continued to page 254)



Notice something missing? You're right. The Silver Streaks are gone. The protruding hood ornament, toe

Already long and low, the Star Chief convertible becomes more so when the continental tire mount is added







## X Ray Pictures Entire Mouth

Eliminating the many small X-ray pictures which must be taken to show the entire mouth of a dental patient, a panoramic X-ray machine has been developed by the National Bureau of Standards in cooperation with the U. S. Air Force. The new machine rapidly takes a single panoramic X ray of the entire dental arch. The film is exposed by a narrow X-ray beam passing through the patient's head from the source box on one side to the film box on the other.

## Do-It-Yourself Carport

Homeowners who need low-cost weather protection for the family car can look to a do-it-yourself carport kit which requires only four hours for assembly. All necessary materials are included in one package and only ordinary tools are needed to complete the assembly. Displaying trim, modern lines, the carport should harmonize with most popular home designs.

Assembled in four hours by homeowner, this carport has trim appearance



## Flexible Padlock Of Steel Cable

At first glance a new padlock looks like a steel measuring tape. Actually the lock consists of a small metal case containing a steel cable that forms a shackle. The tip of the cable is pulled out, looped through or around one or more objects and reinserted in the case. When the key is removed the cable is locked securely. When it is fully extended, the cable is 36 inches long.



# KEEPING UP WITH THE ATOM

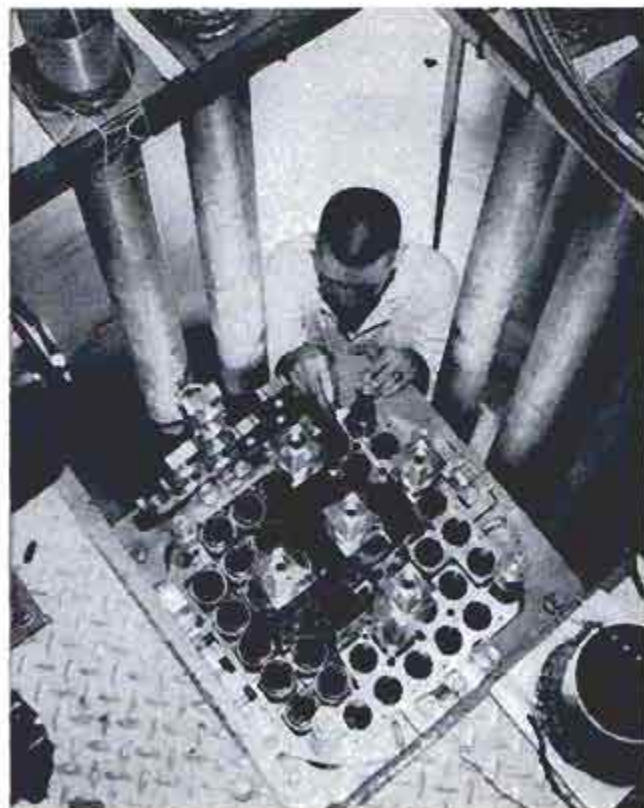
**T**HAT BUGABOO of the atomic age, the disposal of radioactive wastes, is under continual study. With a new "eye" engineers can "view" what happens to such wastes that are buried in the soil. The "eye"—actually a sodium-iodide crystal—is used in studies of the disposal grounds at the huge Hanford atomic plant.

The crystal is inside the windowless aluminum cylinder shown in the engineer's hands at right. Engineers lower the cylinder into test wells drilled in the ground. The crystal determines which isotopes are contributing radioactivity. This information is transmitted to a strip-chart recorder on the trailer. The test wells are sampled at regular intervals to determine what is happening to the radioactive wastes beneath the surface.

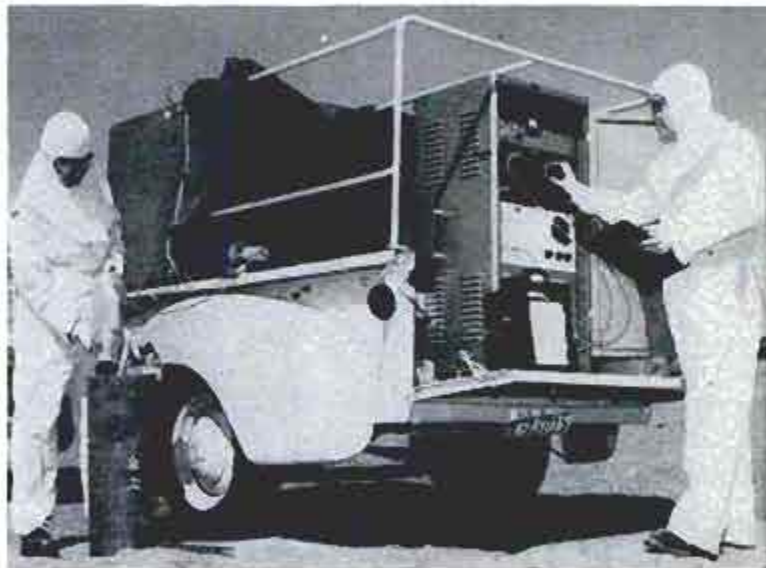


Ever wonder what the heart of a nuclear reactor looks like?

In the photo below you are looking down into the core of a small reactor. The fuel elements are the rectangular tubes, which contain a form of uranium. They



DECEMBER 1956



slip into individual sockets in the core.

This reactor is a research project which is helping in the design of the Army Package Power Reactor. You'll hear more about the APPR in coming months. It is a reactor designed to provide electric power at remote military bases, and therefore may be applicable to other remote installations as well. All the parts will be transportable even by air. Personnel will be protected by a combination of iron and water shielding.

This reactor may well pave the way for other small reactors which could produce electric power anywhere on the globe.



And speaking of electric power from the atom, the United States is spending at a rate of \$60,000,000 a year on research into power reactors. A spokesman for the AEC predicts that nuclear energy will be producing electricity about as cheaply as conventional fuels by 1966. He believes that some 25 million kilowatt-hours will be produced in nuclear power plants by 1970.



Can heart attacks be predicted? Possibly, if a new research program using tagged atoms is successful.

Cholesterol, a form of fat, is widely believed to be one of the major causes of heart attacks. Now radioactive hydrogen and carbon are being used in research to tag the buildup of cholesterol. If the research is successful, physicians may be able to trace cholesterol buildup, and warn patients well in advance that they are subject to heart attacks.

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Workmen crank entire wall section of residence into position. Safety dog prevents falling if cable breaks

## Mechanical Lifters Raise Wall Sections Into Position

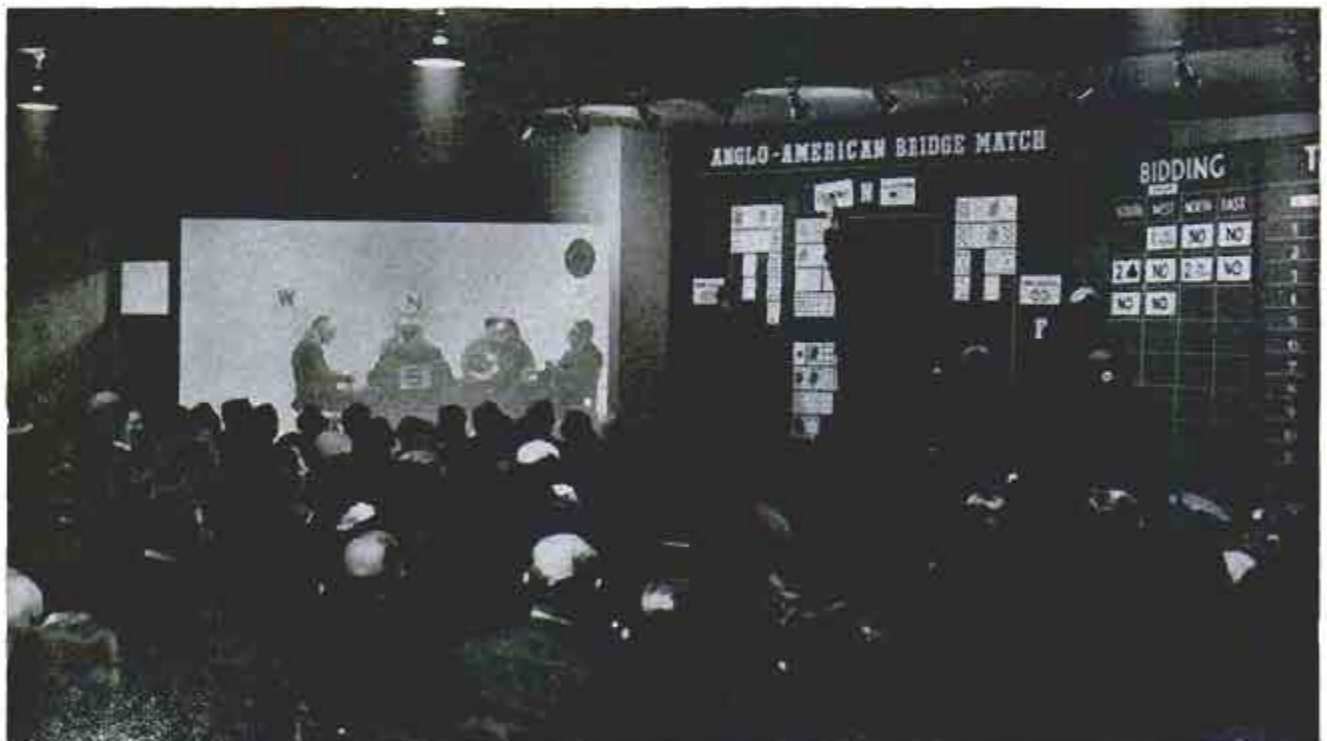
Carpenters can easily raise finished walls into position with crank-operated jacks employing a cable and a winch. The hinged base of a jack is temporarily nailed to the floor. The cable anchor, nailed to the top

of the wall, mounts two rollers which follow upward along a track on the jack pole. A spring-actuated safety dog on the cable anchor prevents the wall from falling should the cable break.

## Large Scoreboard Posts Kibitzers on Progress of Bridge Match

British bridge enthusiasts flocked to a London department store recently to watch a contract-bridge match between American and English teams. Since it was impossible for so large a crowd to look over the shoulders of the players, a giant scoreboard was set up to show the cards held by each player, the bidding and the

play. The players sat in a glass-enclosed room, and assistants recorded each play on the scoreboard as soon as it was made. At the end of each hand, a bridge expert interpreted the play for the spectators. The window of the playing room was covered with a layer of fine cheesecloth so that the cards would not be reflected in it.





# White Land of Mystery

*At last our scientists are making a mass attack on the weird phenomena of Antarctica, breeding ground of the world's weather, home of the aurora and cosmic rays and mile-deep ice blankets*

**By Richard F. Dempewolff**

**E**ARTH'S FIFTH-LARGEST continent spreads a white-pinnacled land mass more than a thousand miles in every direction from the South Pole. Yet, until now, scientists have known more about the topography of the visible surface of the moon than of this sleeping giant caught in the grip of an ice age. Locked in its frozen

spaces are a hoard of mysteries that have puzzled scientists ever since they were first observed by the few explorers bold enough to venture there.

Right now, 75 geophysicists from the United States are joining scientists from 11 other nations in a historic assault on the white continent's secrets. They comprise

Folded antenna for a new back-pack radio springs into a straight wand when one end is thrown outward







Inside an insulated hut, a Signal Corps team sets up equipment to test radio transmission through the deep blanket of ice. Lightweight hut can be towed into place by a Weasel, below, or parachuted already assembled from a flying boxcar. The huts have precut openings for heater stacks and ventilation



Navy technician, below, protected by tent that can be erected in five minutes, sets up instrument to check earth's magnetic field



the south polar team for the International Geophysical Year—worldwide scientific investigation of the earth and its star, the sun, scheduled for 1957-58 (*Popular Mechanics*, December 1955). From 39 observing stations—some of them deep in the continent—these men will pry into such things as Antarctica's unique weather-breeding phenomena. They'll scrutinize the moving ice blanket that reaches a depth of more than a mile on the continent's 10,000-foot polar plateau. Modern sonic and electronic eyes will probe to find what's under it. Antarctica's auroral, cosmic and ionospheric phenomena will be studied during the bitter polar night from plastic viewing domes. Observations will be compared with simultaneous effects all over the world.

On Operation Deepfreeze I, some 30 private, government and military scientists laid the groundwork for the big push. Dressed in bulky thermo clothes and fur-ruffed hoods, they moved inland to locate base sites and make preliminary observations.

Special building beneath surface of the snow is used for the study of the aurora and air glow. Men climb a shaft to the observation room where they watch through three viewing domes, one of them equipped with an all-sky camera. The fourth dome is used for a telescope and for special instruments which are used in tracking meteors



For years, meteorologists have suspected Antarctica of being the world's most potent weather breeder. Great air masses fan out from the pole, sweeping constantly across the ice with gale and hurricane force. Whisking thick veils of drift off the barrier cliffs, they roar northward over four oceans.

One of the lustiest of these gales is a roaring mass of air that pours northward continually from the Adelie Coast. Its howling gusts have been estimated up to 200 miles per hour. Deepfreeze pilots exploring the area south of Adelie Land have discovered a vast trough some 300 miles wide. Formed by a range of 14,000-foot mountains along the Ross Sea and a great dome of continental ice reaching 13,000 feet to the west, the trough slopes upward from the coast, perhaps as far as the pole. Dr. Paul A. Siple, senior scientist for the expedition, believes this enormous funnel may be the answer to the big wind. During the six-month winter night, he says, temperatures on the high polar plateau may skid to minus 120 degrees. That cold, heavy air cascades down the chute, some spilling through mountain passes onto the Ross Shelf, but most of it barreling to the coast and spreading across the sea in a roaring polar gale.

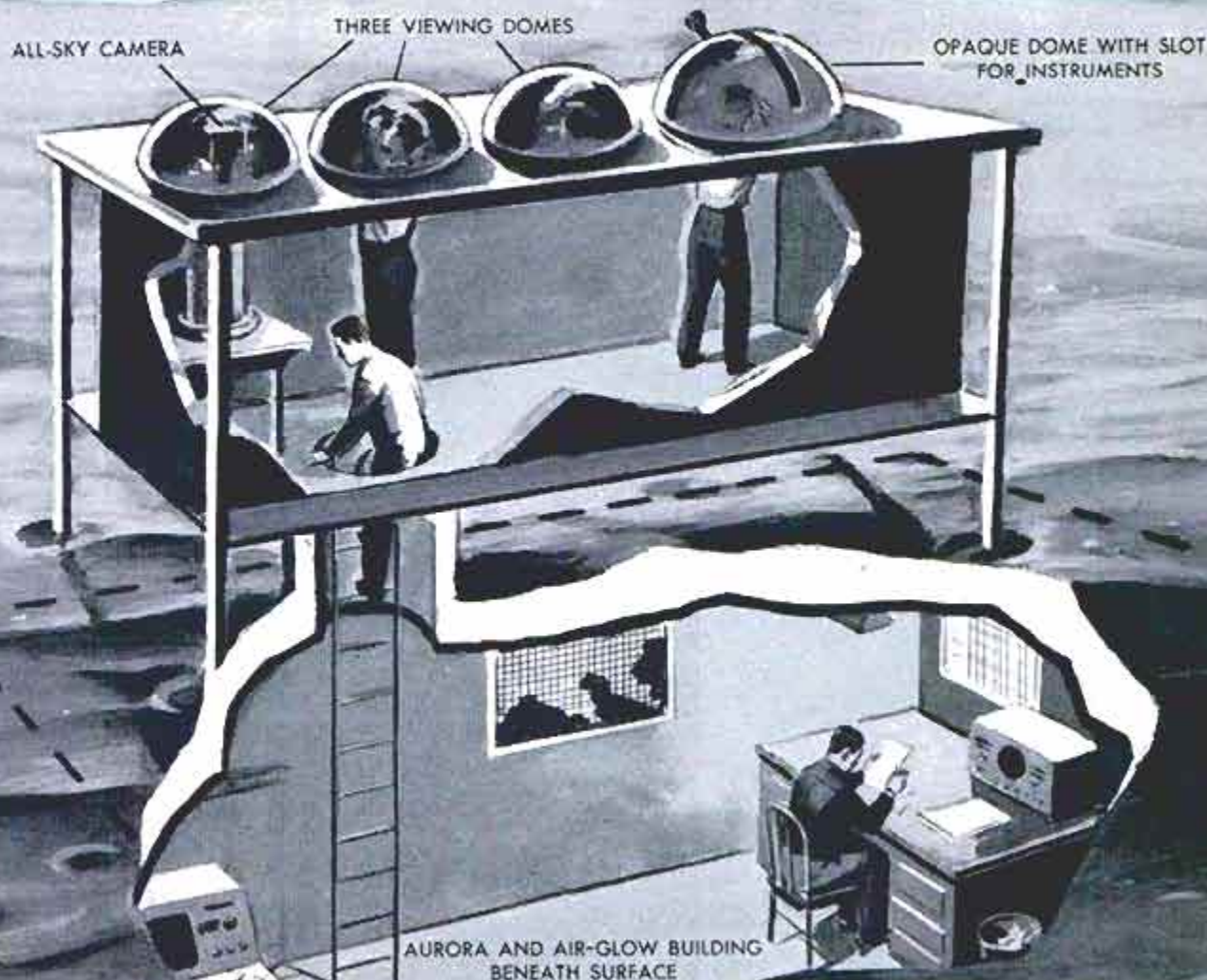
A frigid air mass of such dimensions is bound to affect weather, wherever it blows.

"We have found evidence of polar Antarctic air everywhere up to 40 degrees latitude," Dr. Morton J. Rubin, IGY meteorologist, told me. "We think we've spotted occasional bursts at the equator."

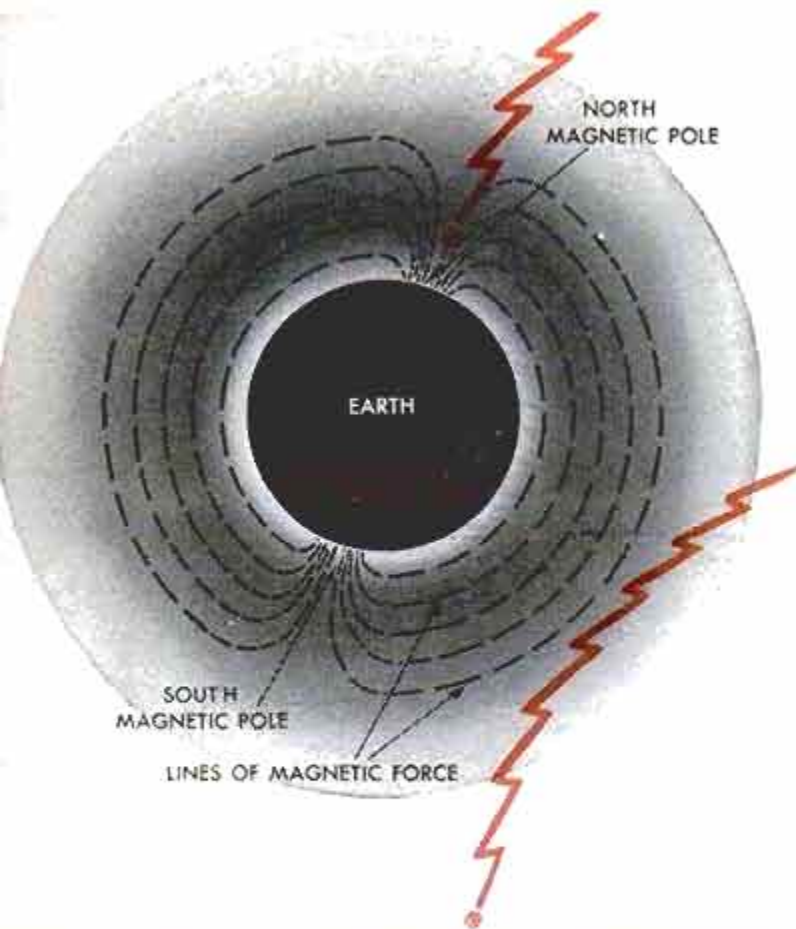
Weather created in these zones eventually may affect the northern hemisphere. So, what happens in Antarctica today may have its effect in New York and Chicago months from now.

Using Antarctic weather for long-range forecasting is a prospect most weathermen have dreamed about. But who would man observation posts in a land no one can live in except for limited periods? Now, for the first time, some 40 weather stations scattered across the bleak continent will report to Weather Central at Little America, and surface weather maps based on actual observations will give meteorologists their first picture of south-polar weather being born. Doctor Rubin explains that besides the regular bases, satellite stations will be planted miles out on the barrier by several nations. The Australians will have a number of remotes that will automatically radio surface reports for a broader picture.

An interesting experiment is the use of "grasshopper" robot stations to provide continuous weather reports along the route that must be flown by planes ferrying supplies to our own South Pole base this fall. The little automatic weather stations have







Drawing shows how the earth's magnetic field tends to deflect charged particles except at the poles

a tuning device that can be set to transmit wind force and direction, temperature and pressure every six hours. The tiny box on a stick is parachuted from a plane. When it hits the ground, spidery legs spring out from the central shaft and it sets itself up-right on the ground.

Even more exciting to meteorologists than surface weather maps will be the first charts of south-polar air, drawn from network reports. "In winter," Doctor Rubin points out, "the tropopause disappears or becomes diffuse." This means that the stratosphere, which rides some seven miles high over the United States, may often be found at sea level in Antarctica. Mountains and polar plateaus poke two miles up into it. For this reason south-polar flying is risky. Hazards of high-altitude flight face the pilot on the ground. Full supercharge, jet assist and miles of run are needed just to take off in the thin air.

To probe through the earthbound stratosphere and into weather-making strata above, all bases will send aloft self-tracking rawinsonde equipment. At little America, these balloons, carrying a radar target, will be released through a hatch from a building under the snow. Soaring to heights up to 100,000 feet, they will be tracked through various wind layers by a dish antenna housed in a black plastic dome on a tower above the surface. From similar hatches will go other balloons, with radiosondes dangling beneath them to radio back to earth soundings of temperature, air pressure and humidity.

Actually, Antarctica is a weatherman's museum of curiosities. Across the polar plateau's snow desert, barometric pressures read lower—by one inch of mercury—than any place in the world. This is due, says Rubin, to shuddering temperatures that average 20 to 40 degrees lower than the Arctic.

Out on the white "desert," these pioneers will study the weird snowstorms that start from clouds only waist high. They'll probe atmospheric conditions that cause spectacular displays of light in the sky. Several times in McMurdo Sound we watched white halos—sometimes as many as three—form around the sun. Superimposed on one of these was a tremendous white cross of light. Such displays, as well as dazzling arches of color across the polar sky opposite the sun, and great shimmering columns of white light called "sun dogs" that bracket the sun, are caused by refraction of the sun's rays in high-hanging frozen mists made up of millions of ice spicules.

(Continued to page 244)



Scientist collects sample of snow in paper bag. Snow is melted, and radioactive tritium then tells how long ago the snow fell. Below, movie camera records cosmic-ray penetration of atmosphere near the pole







Thermometers and scales are used to check the temperature and density of snow prior to building airstrip

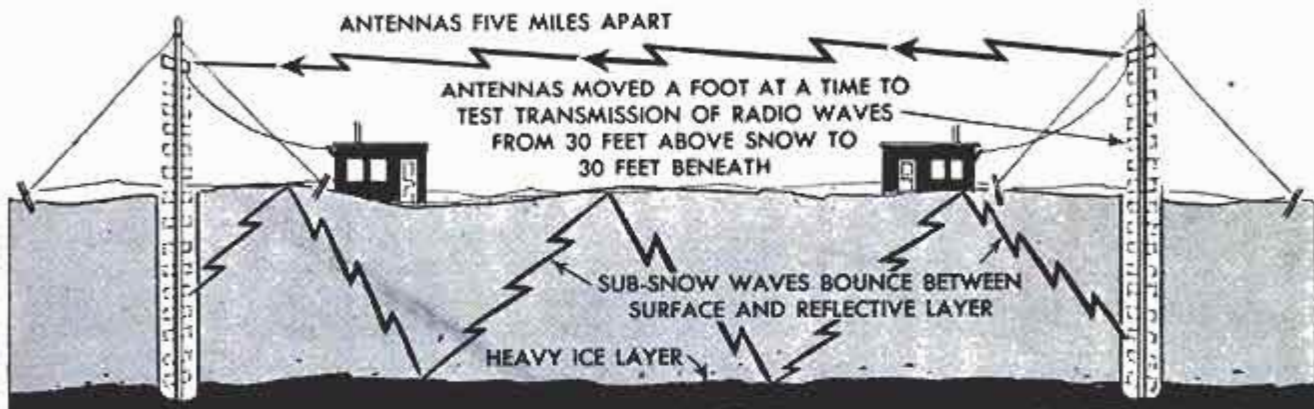
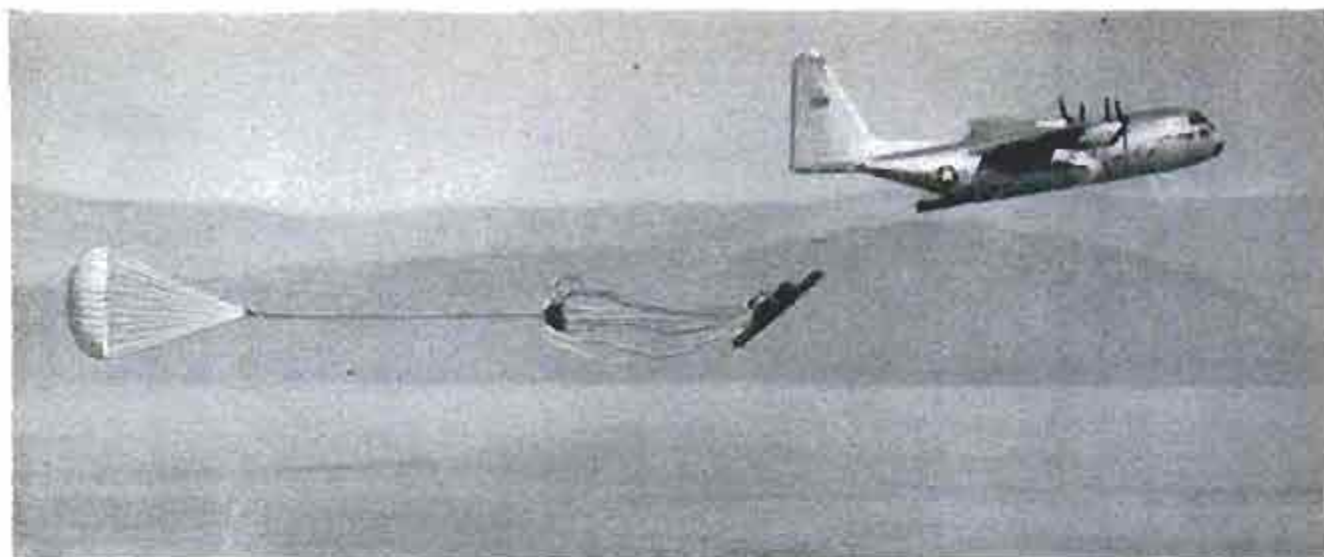


Diagram shows how radio waves can be transmitted through snow by bouncing them between surface and heavy ice layer. Below, captive penguins are force-fed in preparation for trip to States in refrigerated comfort







## Air Force Freighter Sets New Load Record of 27,000 Pounds

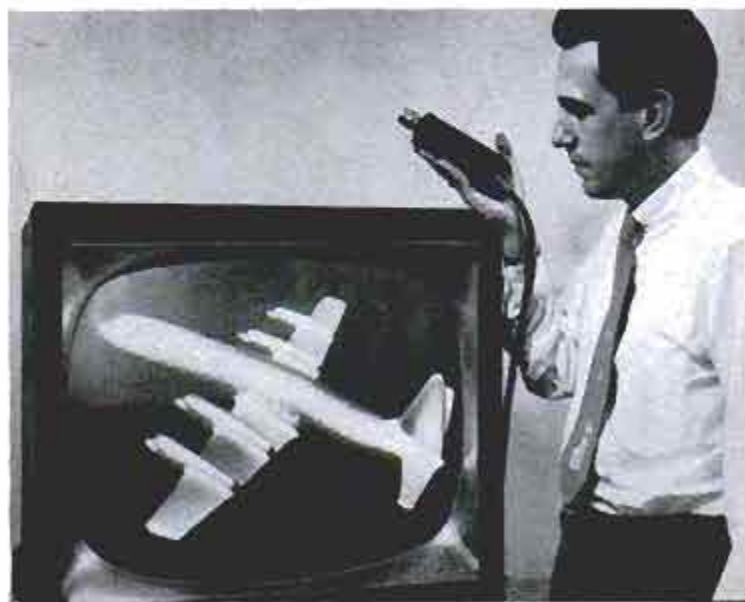
Flying at an altitude of 2000 feet, an Air Force Hercules C-130, a prop-jet troop-and-cargo carrier, has dropped the heaviest single load ever launched from an airplane. The load consisted of 27,000 pounds

of iron on a platform, which was lowered to the ground by six 100-foot cargo parachutes. The big drop was made on test flights of the C-130, which is soon to go on active service with the Air Force.

## Tiny TV Camera Relays Pictures of Plane's Moving Parts



Aircraft engineers can study any part of a plane in flight with the aid of a 1½-pound television camera the size of a flashlight. The rugged, heat-resistant unit, attached by cable to a TV set inside the plane, can be mounted outside to relay pictures of fluttering tufts attached to the tail that reveal the air-flow pattern. It can be fitted inside a landing-gear housing to relay a continuous picture of the gear being raised and lowered against the force of the slip stream. During lab tests, it can give a close-up scrutiny of jet engines running on the test block or be placed inside the wing during stress studies under simulated conditions. It may even be used as an inspection tool between flights to peer into inaccessible corners. The camera was developed by Lockheed Aircraft.







## Italian Designers Plan 125-M.P.H. Bus of Tomorrow

Extreme lightness and a 125-mile-per-hour speed are claimed for an ultramodern bus designed by the Viberti Company of Italy. The bus will eventually be powered by a gas-turbine engine, but a test model is being made with a conventional piston engine. To achieve lightness, the vehicle is

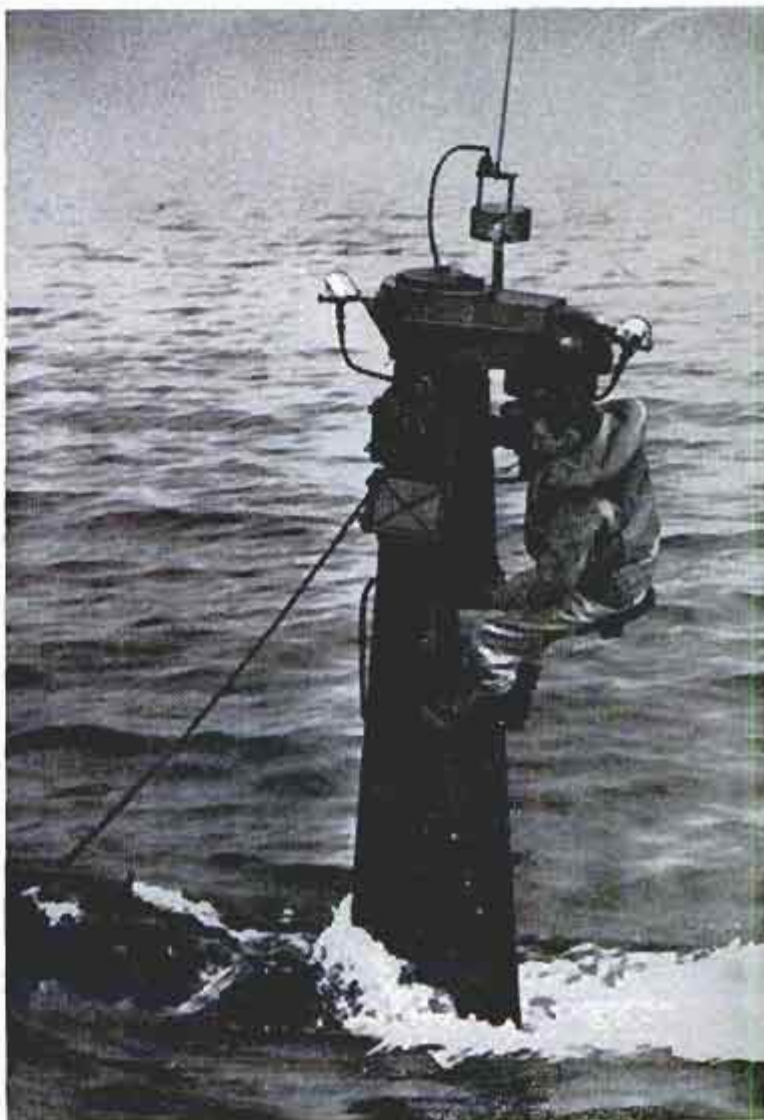
built of plastics without any metal framing. Independent suspension is featured on all four wheels. The tail is like that of an airplane. The interior is air conditioned and has facilities for serving food and watching television. The driver's seat is exactly in the center for good visibility.

## Snorkel Simulator Tests Sub Detectors

Mounted on a torpedo-shaped hull at the U. S. Naval Air Station, Patuxent River, Md., a captured German snorkel is being used to test new antisubmarine-warfare detection devices. Called the snorkel simulator, it is guided around Chesapeake Bay by remote control or by a man sitting in a seat rigged on the side of the tube. Planes from the test center are then dispatched to search out the simulator.

## Hot-Water Rockets To Assist Take-Offs

Hot-water rockets, which produce thrust by emitting steam from high-pressure nozzles, are being considered as replacements for liquid and solid-fuel rockets now used in jet-assisted take-offs of aircraft. German scientists say hot-water rockets would use one fiftieth the fuel of other types and be operated for only 12 cents per ton per second. They suggest the plane be mounted on a wagon which would be accelerated by hot-water rockets up to a velocity where ramjets could take over.







Above, church photographed across lake with normal lens. Below, same church shot through telescope

## Camera Uses Telescope as Telephoto Lens

A powerful telescopic lens for use with a 35-millimeter reflex camera can now be assembled using a telescope plus two adapters and a light-tight sleeve. One adapter supports the camera and the other fits the telescope to any standard tripod. This sleeve connects the eyepiece and the lens of the camera. When used with a 20-power eyepiece, the telescope is equivalent to a 1000-millimeter telescopic lens. With a 30-power eyepiece, it is equal to a 1500-millimeter lens. Total cost is less than \$150.



## Hand-Held Foghorn for Boat Skippers Operates on Gas Cylinder



Fog becomes less dangerous for boat operators if they have a new self-powered foghorn aboard their craft. The horn is powered by Freon gas stored in a cylinder. Touching a switch releases the gas into the six-inch horn, which can be heard more than a mile over open water. The cylinder holds enough gas to deliver 450 two-second blasts. It can be recharged at nominal cost.

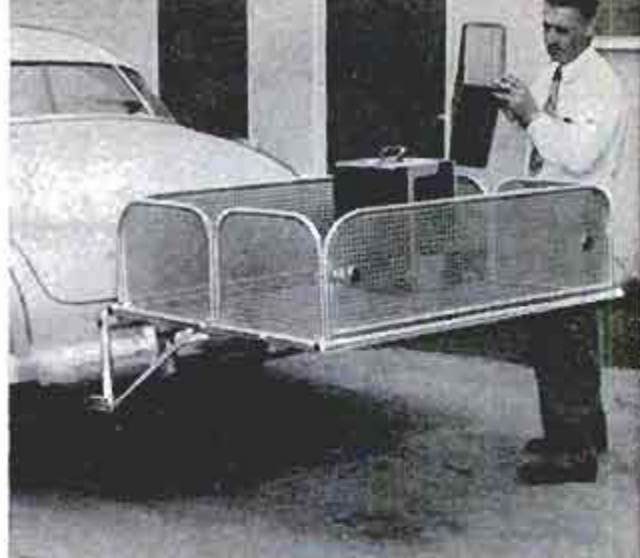
## Ice Not Necessary for Rain

Two University of Chicago meteorologists have a new theory of how clouds make rain. It is that rain from summertime clouds most often results from giant chemical particles in the air, rather than from ice particles as had been thought. The particles are usually sulphates over land, salt particles over the ocean. The particles pick up moisture until they become so heavy they fall as raindrops. No ice crystals are involved, since many clouds release rain at above-freezing temperatures.





Stoiadin folds up four rear panels against the front half when he wishes to carry only half a load snugly

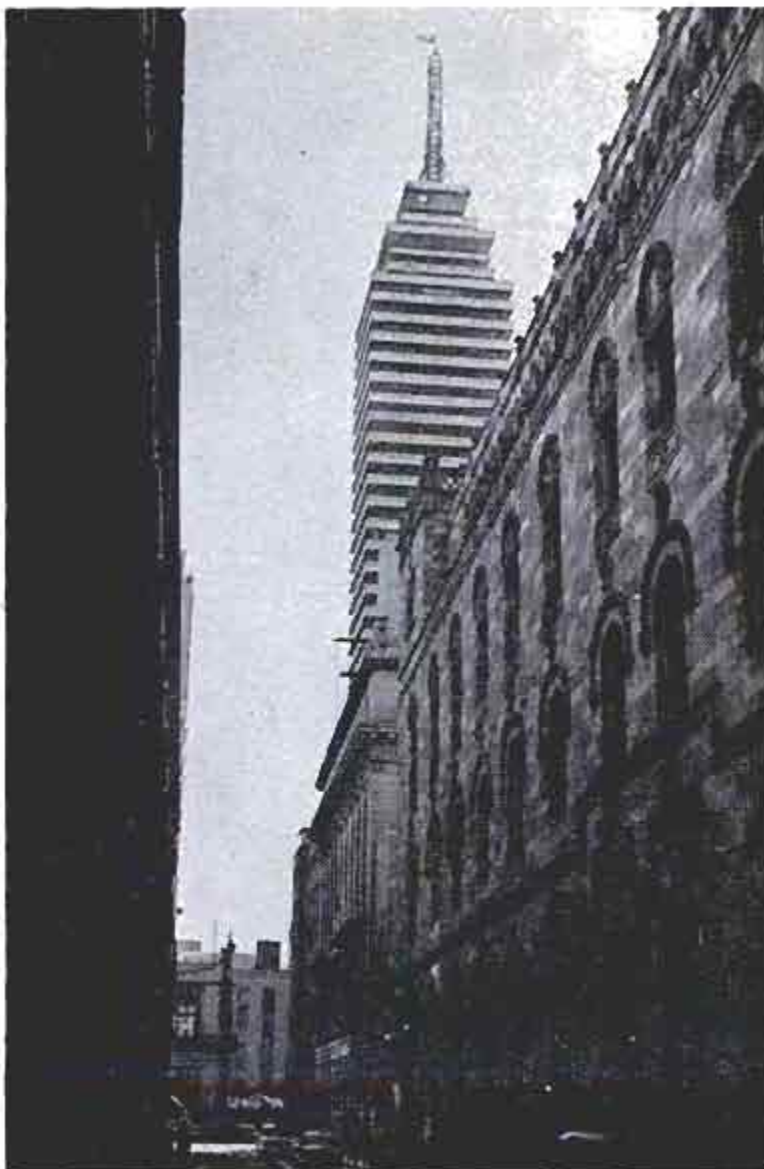


With all of its welded-steel panels extended, the bumper carrier provides plenty of room for suitcases

## Cantilevered "Rear Balcony" Carries 500 Pounds of Luggage

Louis Stoiadin, Los Angeles real-estate salesman, can carry an extra 500 pounds of luggage when he takes a trip—thanks to a rear-bumper carrier he built for his car. The cantilevered structure is supported by fittings which extend under the car to at-

tach to the car frame and rear bumper. The unit is made of steel tubing welded together. Folding side panels are made of perforated sheet steel. The carrier is hinged so that it can be folded into a more compact unit for carrying smaller loads.



## 43-Story Skyscraper On Floating Foundation

Forty-three-story skyscrapers are not unusual anymore, except in Mexico City where a porous, spongy subsoil is causing the capital of Mexico to sink slowly into the ground. The Palace of Fine Arts, for example, has settled until one third of it is now below street level. In spite of this hazard, engineers are now completing a 43-story skyscraper, which they say will not sink. It has been designed to rest on a floating foundation which partly supports the dead weight of the structure. A hole 45 feet deep and 1190 square yards in area was dug and lined with watertight walls and floor. Like a huge concrete ship, this foundation floats in the subsoil.

## Applause Heats the "Met"

Applause saves fuel at the Metropolitan Opera House. When applauding, the average patron generates one sixth to one third more body heat than at other times, lessening the demand on the heating plant. A full house of 3500 persons generates about a million B.T.U.s—enough to heat 20 six-room homes on a winter day.





Omar Crabb, mink-ranch owner, discusses a pair of 3-week-old Sapphire kits with Francis Shoulak, manager

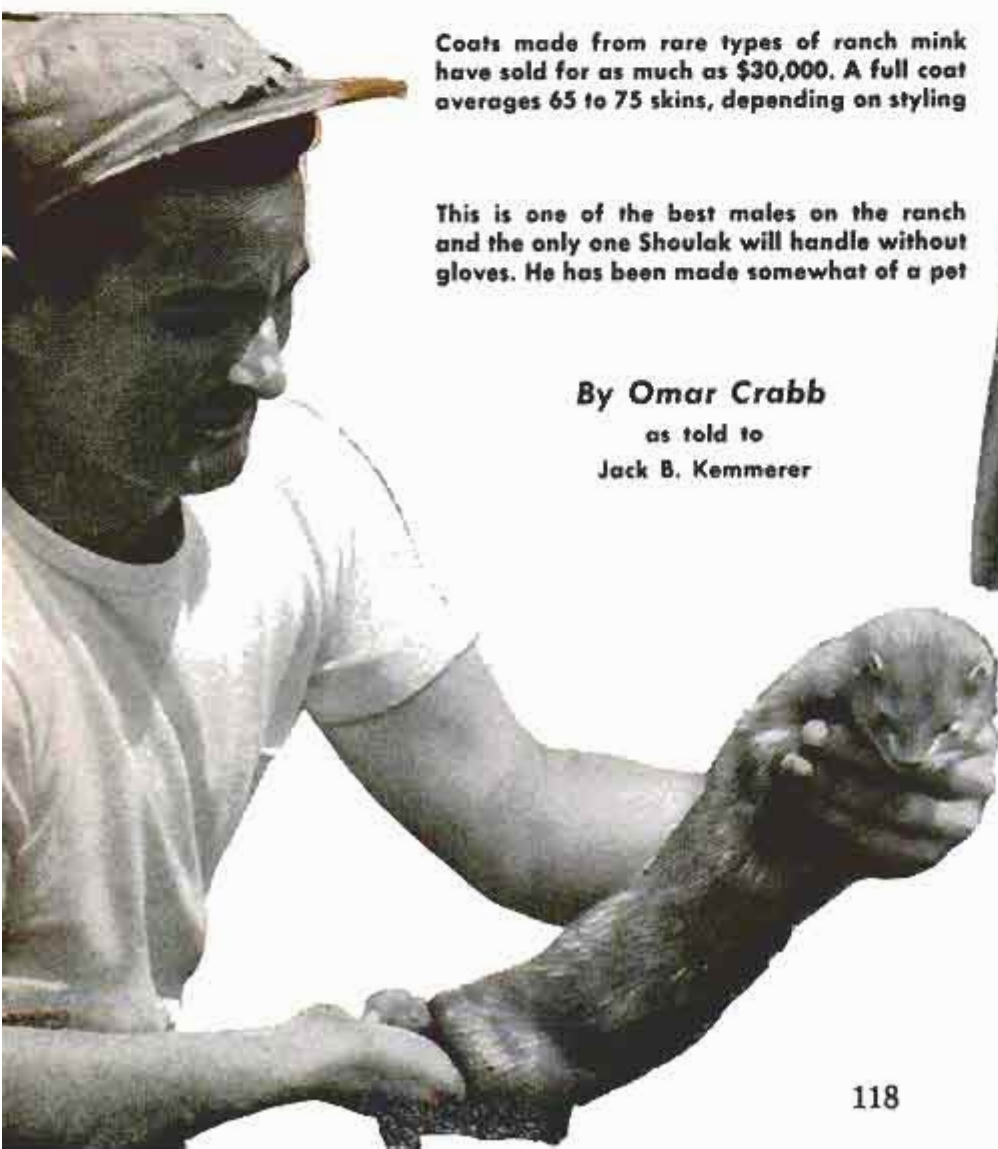
# There's a Nice Future in Mink



Coats made from rare types of ranch mink have sold for as much as \$30,000. A full coat averages 65 to 75 skins, depending on styling

This is one of the best males on the ranch and the only one Shoulak will handle without gloves. He has been made somewhat of a pet

By Omar Crabb  
as told to  
Jack B. Kemmerer







The kits in this litter are fine-quality mink and will be sold to other ranchers as live breeder stock

**R**AISING MINK as a spare-time activity or hobby is not a get-rich-quick business, even though many persons, who know nothing of fur-bearing animals, seem to think they can make a fortune overnight breeding mink. It is one hobby that doesn't require a large sum of money to start. With a small investment, a little study of mink and some pleasant work, you can have a hobby of breeding-mink almost anywhere.

About 12 years ago, in Rouleau, Saskatchewan, Can., I was in the insurance business and had a mink rancher as a client. Becoming acquainted with the animals, I liked them and decided to fool around with a pair in my spare time.

After about two years I felt that here was a hobby that presented a good future if handled properly. Starting with \$800, I bought 19 females and 5 males for \$25 each; the rest of the money went for pens and equipment. You don't need this much, however. You can get two excellent females and one male for about \$400, and the three pens required for the mink can be built cheaply. Of course, if you have the money a bigger investment will realize good returns much faster.

While mink ranching doesn't require a college degree, it does require special knowledge, like any business venture. The

beginner must know what the fur trade considers an ideal mink pelt and why such a pelt is superior.

#### Cold Weather Not Necessary

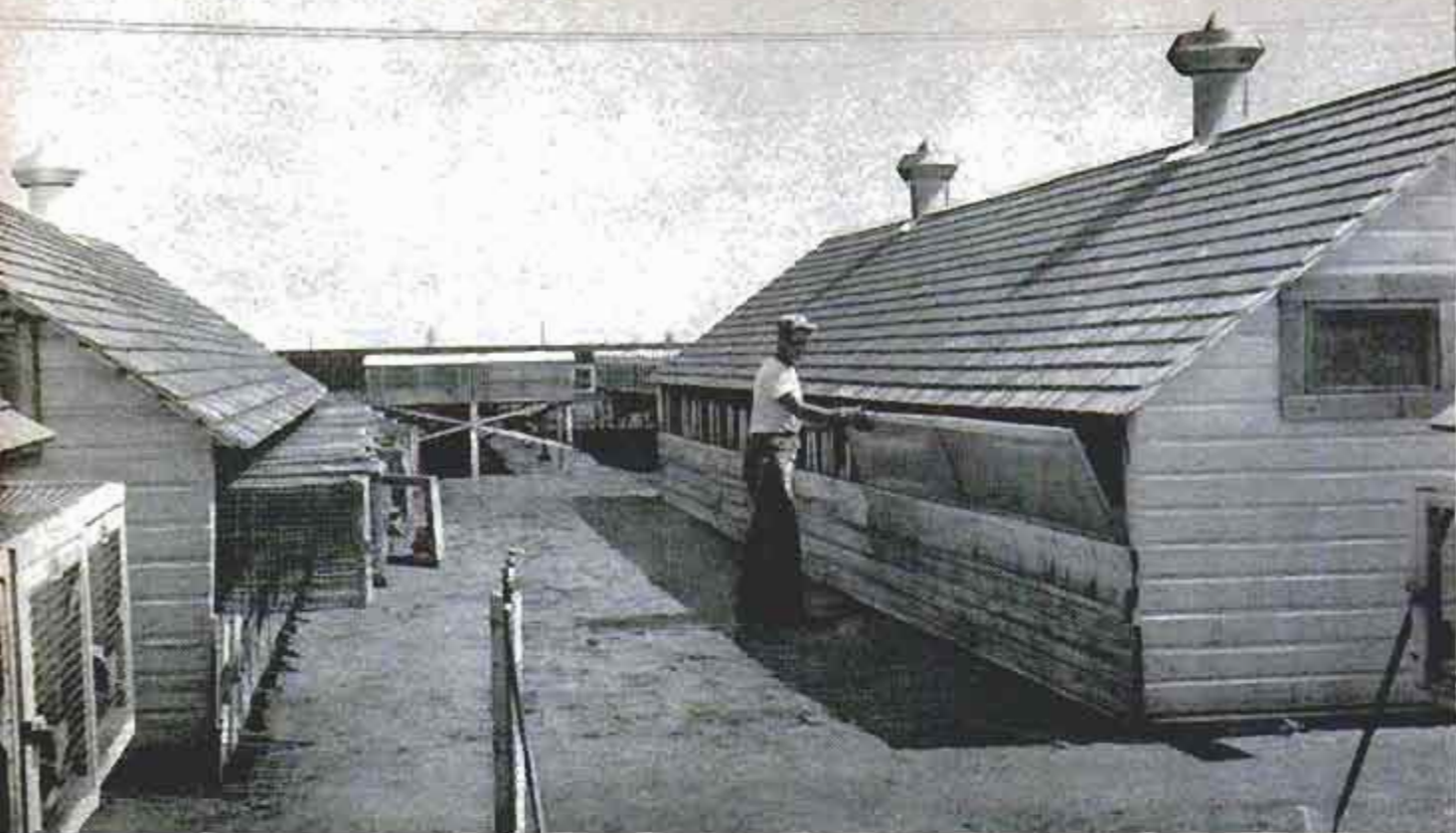
Contrary to popular belief, extreme cold weather and favorable locations are not necessary to produce high-quality pelts. Mink ranches in California produce top-quality skins, and ranches in back yards of city homes raise a hundred or more mink each year.

Quality ranch mink is superior to wild mink because the pelts have a more even texture, light leather and more beautiful uniform color. With trapping of wild mink decreasing yearly, they must be raised commercially if our ladies are to continue to wear mink.

The first few years I sold a few pelts and live kits, but didn't take any profits. Instead I built the ranch by improving the breed and increasing the number of mink.

Today, the ranch is 125 feet by 750 feet with a six-foot guard fence around the entire place to keep the mink in when they escape from their pens. It consists of four sections—each a separate unit. We have 1000 pens in covered sheds for housing during breeding and whelping time. The second section is 1000 outdoor pens, with cottage roofs, used during pelting time and





Pens for summer use are built outside of sheds. To keep out severe Canadian winter, sideboards are put on

summer months. The third is our completely modern feed house, and the fourth a 100-ton cold-storage plant.

#### Feeding Equipment

A well-planned, properly equipped feed room is very important on a large ranch such as mine, one of the largest on the Canadian plains. Equally important is the cold-storage plant. A beginner, however, doesn't need all this equipment. Some sort of refrigeration and a meat grinder are sufficient.

Two sets of records are clipped to each pen and are carefully kept up. A third set is kept in a safe



We feed horsemeat, lungs, tripe, liver and some fish. This is ground and mixed with cereals such as bran, brewer's dried yeast, bone meal and milk powder. Heavy fat, tallow or suet should never be fed as the animals can't digest it. However, when a mink is on her own she is apt to eat almost anything. One day a female escaped from her pen with two kits. I knew she couldn't get past the guard fence, so I wasn't worried. Two weeks passed and while we would see her around the ranch, we could never catch her. One day I saw her dart into a hole near the feed house. Digging up the hole we found her and the two kits comfortably set up in a nest with two dead rats, one bird and a chicken for food. I don't know where she got the chicken as none of ours was missing.

Several companies make a prepared cereal, but I never feed it alone and don't recommend feeding any cereal in excess of 15 percent of the total ration.

#### Wheat-Germ Oil Used

In January we add wheat-germ oil to all rations and this continues until the kits are born. Cod-liver oil is used if any of the mink seem to be in poor condition. The ration differs from time to time, with the greater meat content being fed from weaning time until September.

We have a power slicer, grinder and a food mixer that will mix 900 pounds. In summer we feed 700 pounds per day and in the fall it goes up to about 1800 pounds. It costs five cents per day to feed a mink.





Female which had escaped from pen was shown one of her kits. She grabbed it by neck, and was recaptured

March is the mating month and our busiest time. It is important that the mink be in good condition; not too fat, active and not too lean.

Mating time is the period when the stock is improved through inbreeding, cross-breeding and addition of new blood. In order to know the results, records must be kept. We keep records, in triplicate, of every mink.

The indoor pens are made with heavy wire on all four sides and a detachable nest box on the rear. They are so constructed that any mink can be locked in either the pen or nest box. A slide in the nest box serves this purpose. Each pen is numbered, with the same number on the nest box. A set of records of that mink is attached to the roof of the shed above the pen, the duplicate to the nest box, and the third set in the ranch safe.

#### Litter Averages Four Kits

For mating, the male is herded into his nest box and taken to the female and as the nest-box number corresponds with the pen, we always know where each male belongs. Mink have one litter a year, and a male serves many females in one season. I have had males father 103 living kits in one season.

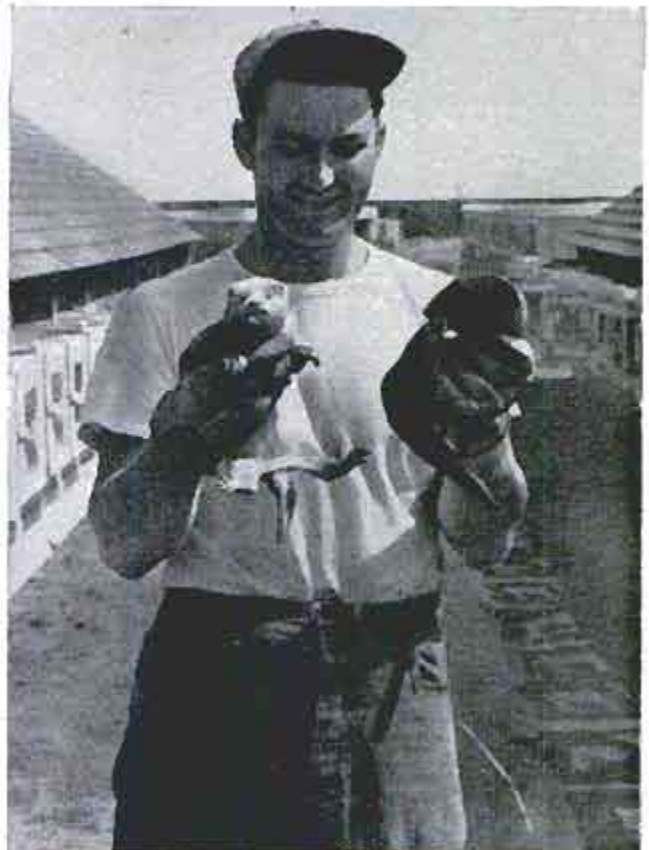
Mink carry their young from 44 to 75 days and usually all kits will be born by June. Our average this year was four kits to the litter, though I have a female that raised 10 kits in her second season. These kits are pelted in November or will repro-

duce the following year if kept as breeders.

When whelping, females are temperamental and special precautions must be taken. No unusual noises, no visitors and I don't even count the kits until they are two weeks old.

(Continued to page 238)

The kit which ranch manager Shoulak is holding in his right hand is a Sapphire, the other is a Kobuk







Long-range radar searches for coastal protection require far-reaching antennas. This may be the answer



### Umbrella-Type Radar Antenna Mounted on Super Constellation

Ready to undergo tests, a new radar antenna to be mounted on large aircraft resembles an umbrella or a flying saucer.

The radome is mounted on a U. S. Navy WV-2 Super Constellation, like those now in operation on coastal defense.



### X-Ray Trees to Find Decay

Scientists are now cruising the Iowa woodlands "looking inside" trees to study the extent of decay. Until now such work has been done by dissecting individual tree trunks. But this year tree doctors are looking into tree hearts with a new lightweight X-ray unit developed at Iowa State College. The 13-pound outfit is strapped to the trunk of the tree and shows decayed areas, water-filled cavities and squirrel nests that may be hidden deep in the trunk. Secret of the little X-ray unit is a small lead cylinder with a pellet of irradiated thulium in its center.



## Plastic Poured Into Molds Forms Fishing Lures

Lifelike, brilliantly colored fishing lures are made at home in minutes with a plastic molding kit. The 21 different patterns available include worms, frogs, crayfish, a minnow and several insects. Each kit has one aluminum mold for one to three different specimens. Liquid plastic is dropped into the mold and drawn with a stylus into the smaller parts to make delicate wings, antennae, or legs. Then the mold is heated one to three minutes and quenched in cool water. After removal from the mold, the lures are ready for use. Different colors can be mixed.

Right, liquid plastic is poured into the aluminum mold and distributed with a stylus to form the legs, feelers and other fine parts. Below, next step is to heat the mold. Below right, lifelike lures are ready for use. Mixing plastics gives various colors



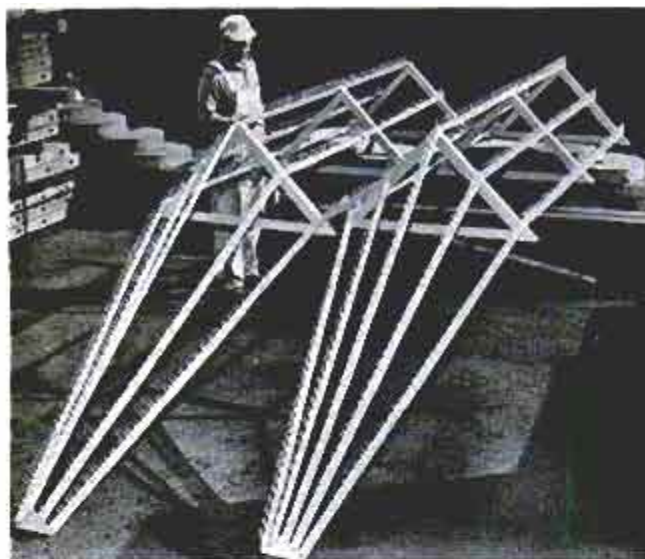
## Backward Truck Becomes Versatile Farm Derrick

Ingenuity and an old truck produced one of the most useful pieces of machinery on the farm of Merle Harlow in Whitman County, Wash. Harlow shortened the truck, then reversed the gears and steering. To the odd result he added a standard hydraulic loader. Now the machine loads or lifts almost anything.

Truck appears to back into position because the gears are reversed



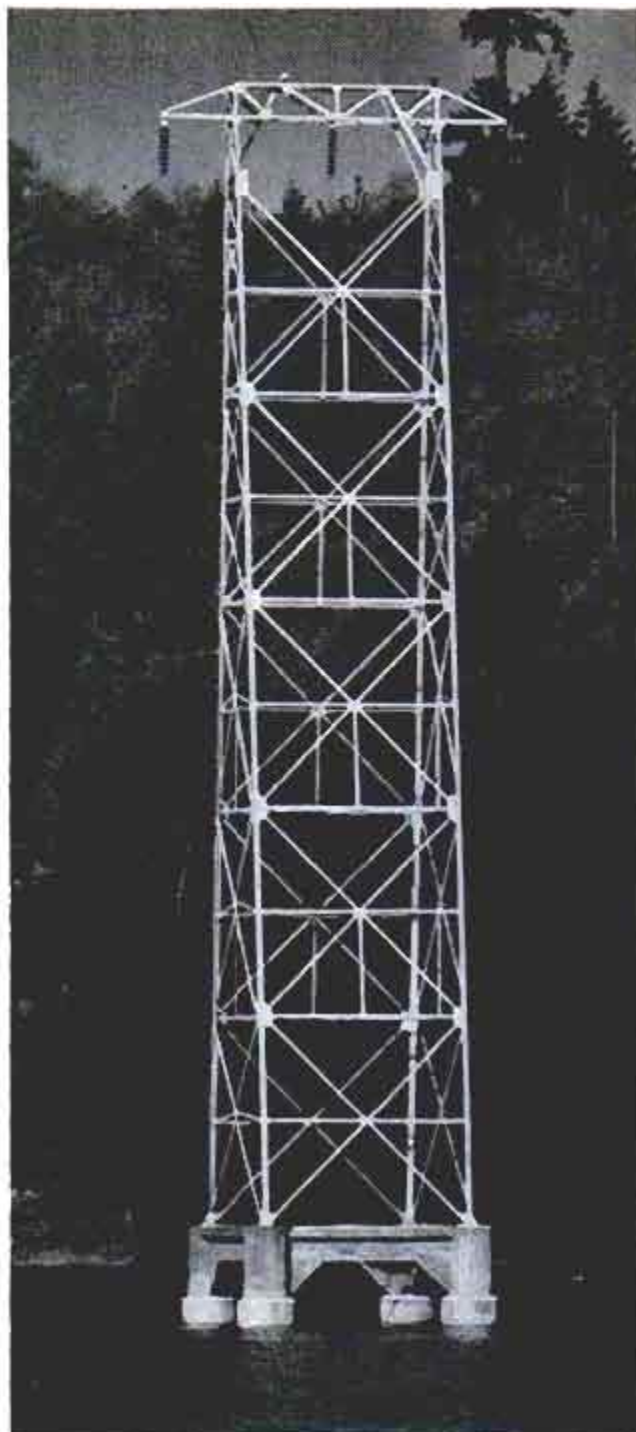




Worker paints spikes after they have been spot-welded to angle irons. Tower in Puget Sound, right, was favorite roost of gulls before frame was mounted

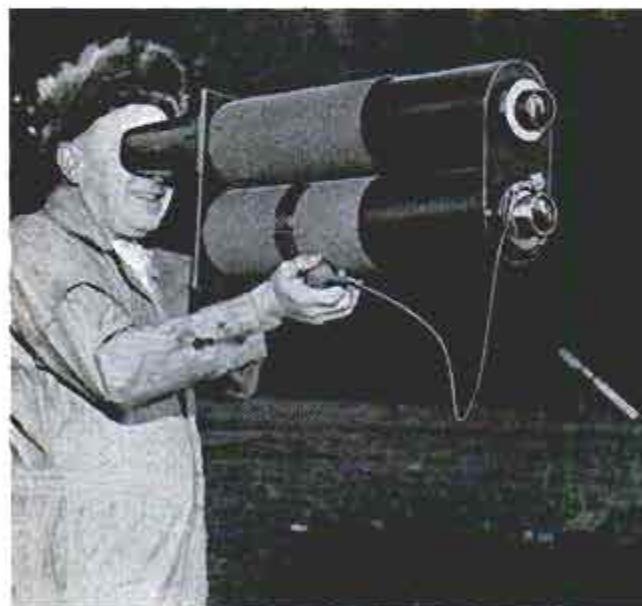
## Spiked Frame Atop Tower Bars Fish-Dropping Gulls

Power-company engineers at Tacoma, Wash., have solved the knotty problem of keeping sea gulls off the top sections of transmission towers in and near the bays of Puget Sound. The gulls like to eat their lunch atop a tower, dropping clams, shells, fish and algae on the frame below. Salt water from the food rusts away the steel fabric of the tower. The birds, as scavengers, rid the bay shores of dead fish and other refuse. They are protected by federal law. The engineers' solution was a spiked frame set over the top cage section of the tower. U-shaped, 2½-inch wire staples were spot-welded to one-inch angle irons fitted together, ten inches apart, in five rows. The \$130 cost of the spiked frame compares with the \$1000 cost of replacing a rusted frame cage section.



## Double-Barreled Camera Shoots Distant Deer

Two cardboard shipping tubes form the twin telescoping "barrels" of a long-distance camera built by taxidermist Dorf Jones of Olympia, Wash. Jones uses the long focal-length camera to get close-up shots of fleeting deer. The camera lens, with a bulb-and-cable shutter release attached, is mounted on the front end of the assembly. Above it is a lens that throws an image on the ground glass viewer mounted above the film holder at the rear. Jones steadies the camera with a shoulder rest and peers into a hood to watch the ground glass as he slides the front assembly ahead or back to obtain a sharp image. Camera parts came from an old German camera.







Lockheed Air Terminal, Inc., Burbank, Calif.

Cargo can be loaded and unloaded rapidly in any kind of weather through tunnel, called the "Aerobridge"

## Telescoping Tunnels Help Load Cargo Planes Faster

First tests indicate that a new aid in the loading and unloading of air freighters will save about an hour in turn-around

time for each plane served. A covered tunnel with rollers built into the floor is extended from the side of the freight terminal

when a plane pulls up into position. Totalling 84 feet in length when extended, the covered tunnel makes it possible to handle freight easily in all weather. Packages weighing up to 10,000 pounds slide down the rollers easily. A DC-4 carrying 18,000 pounds of cargo was unloaded in 18 minutes, and then reloaded in 35 minutes.



Cargo rollers speed up loading and unloading, increase plane utilization

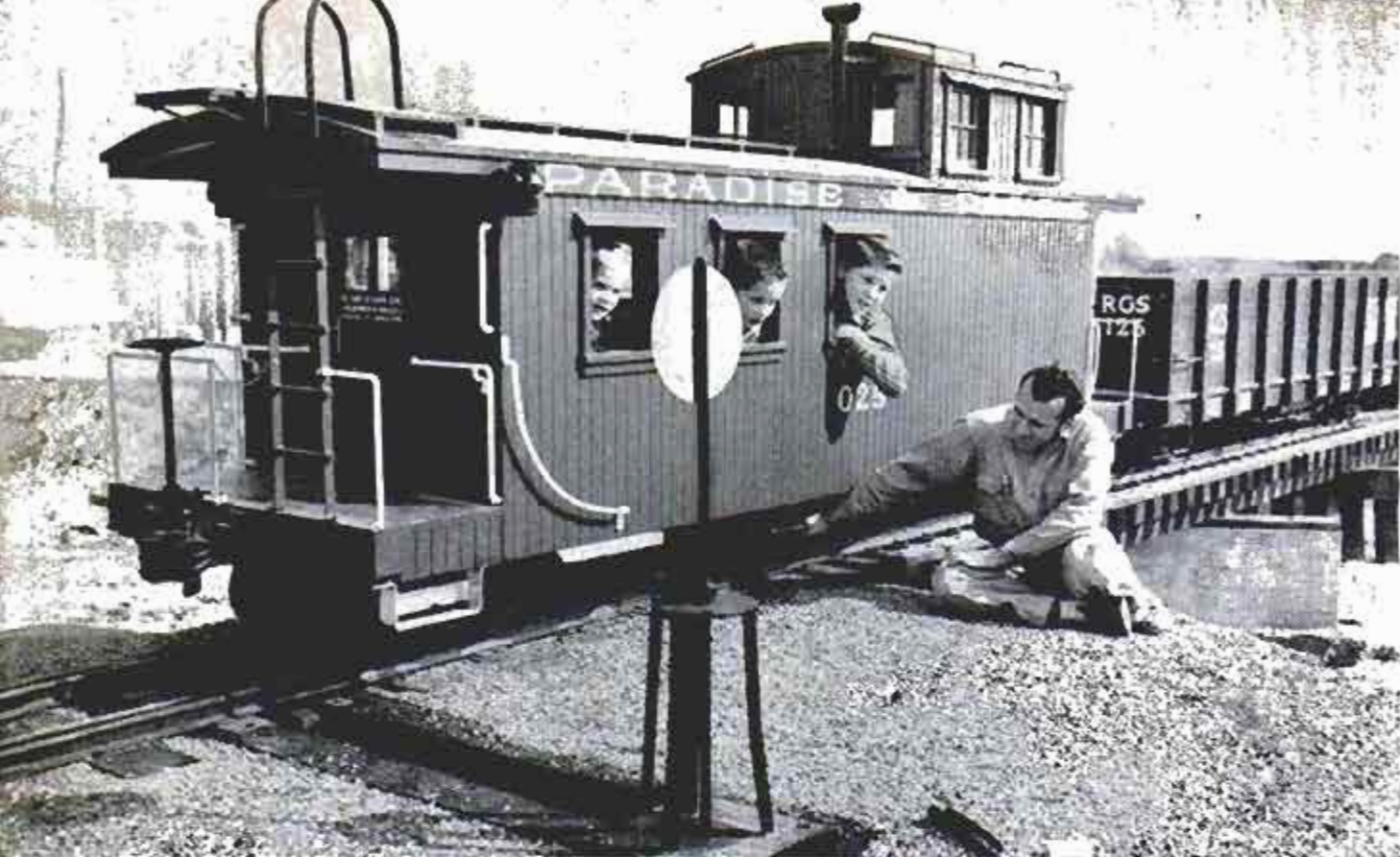
## Mile-a-Minute "Sports Car on Water" Has 80 Horsepower

Sporting two Mercury Mark 55H motors, rated at better than 40 horsepower each, a boat that is a kind of sports car of the outboard-boating field has been tearing

around Wisconsin lakes at better than 60 miles per hour. Built by the Kiekhaefer Corp. as a showpiece, the boat has proven popular enough for limited production.





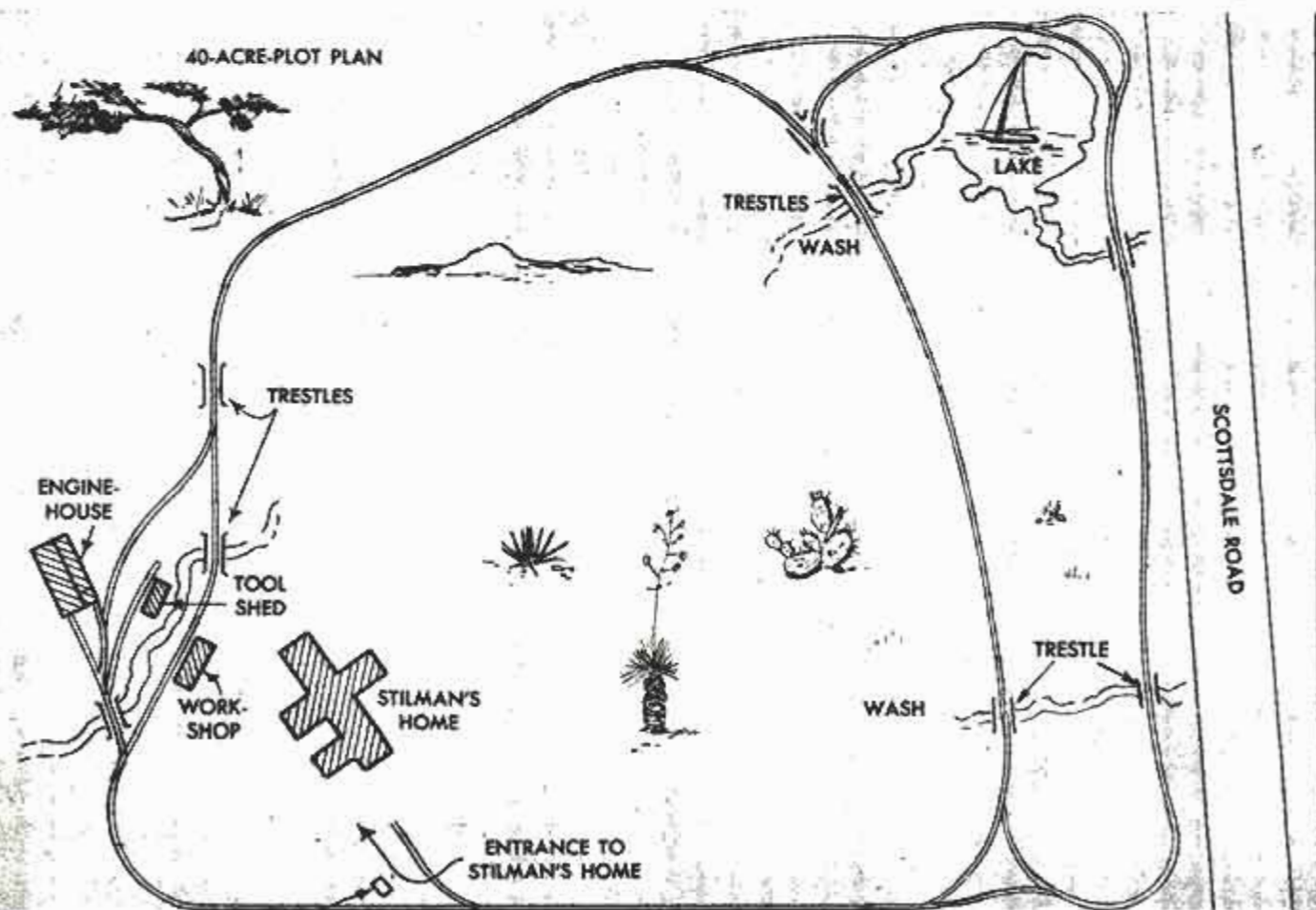


The three sons of Guy Stillman, owner of the railroad, look from caboose as Charles Schlosser fastens bolt

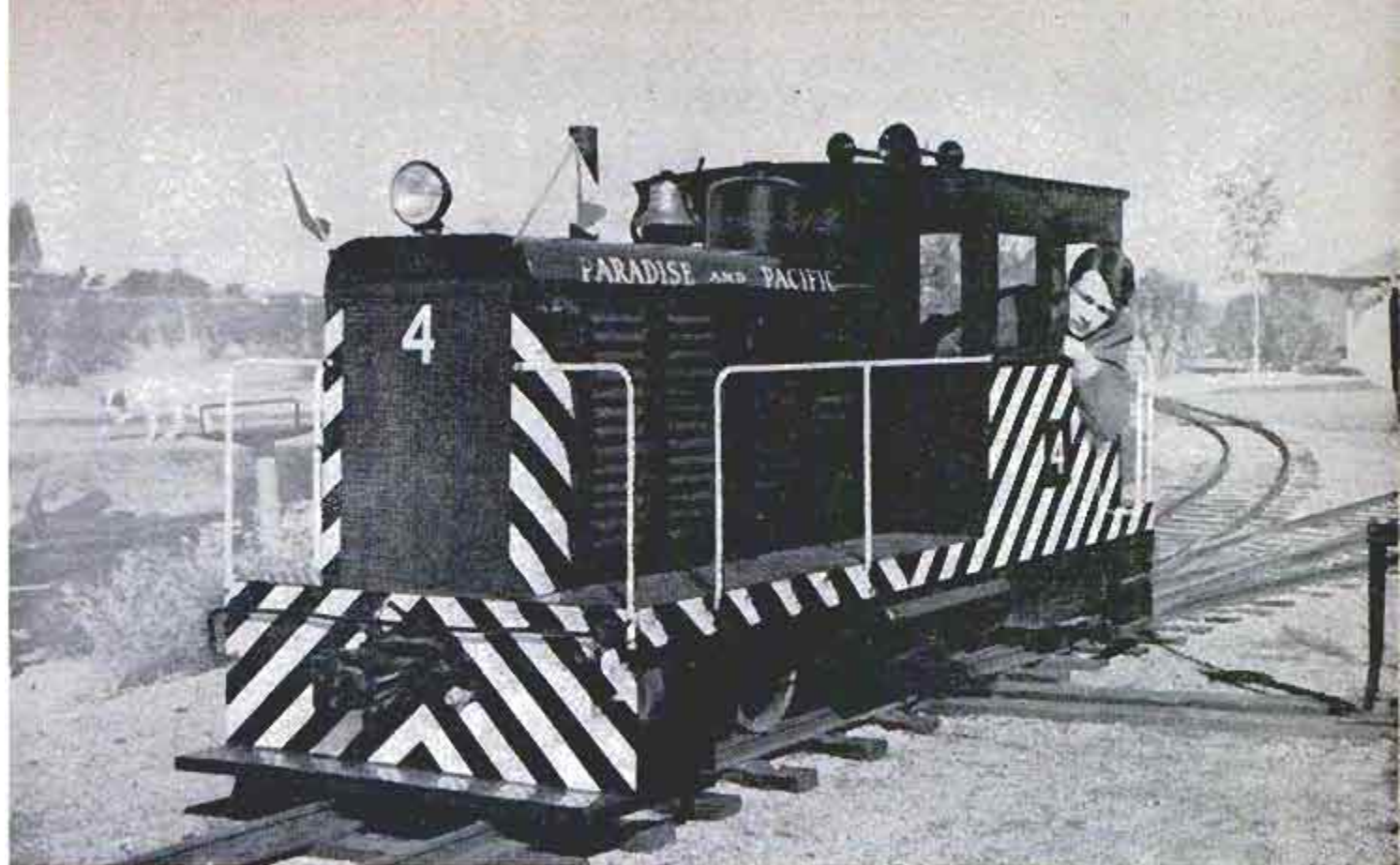
*Out on the Arizona desert you may catch a glimpse of an undersized diesel locomotive hauling a train around a loop. It's Guy Stillman's*

## **FAMILY-OWNED NARROW-**

This is a diagram of the 1¼-mile run over which the diminutive Paradise and Pacific Railroad operates







Model of a 44-ton industrial switcher, this locomotive weighs 3200 pounds and is the line's workhorse

## GAUGE RAILROAD

By  
Henry F. Unger

**T**OURISTS NEAR SCOTTSDALE, Ariz., have been known to slam their brakes to the floor at what appears to be a mirage in miniature on the Guy Stillman estate. The reason for all the excitement is the passenger-carrying Paradise and Pacific Railroad rumbling along at 25 miles per hour on its 1¼-mile track.

The miniature locomotive, and all the rest of the equipment on this narrow-gauge railroad, is scaled at five inches to the foot—almost half the real size. Stillman, originator, owner, president and engineer of the Paradise line, has a gay time piloting his locomotive, tank car, two freight cars and caboose. So do his children and their friends.

In this built-to-scale train, Stillman has duplicated a tank car of the Colorado and Southern Railroad, two gondola

Charles Stillman bends over to take a curve on his tiny "contact" machine, while traveling the line







Although seating only two persons here, each of these model gondolas can actually hold 10 persons easily



Doodlebug work train, operated by a neighbor, hauls equipment for workmen on the far end of the track



Above, tank car is backed into its home base by the locomotive. All rolling stock is kept in this shed

Below, Guy Stillman, owner of the Paradise and Pacific Railroad, applies muscle to spikes on the line



cars of the Rio Grande Southern and the Denver and Rio Grande Western railroads, and a bright red caboose of the Denver and Rio Grande Railroad. Workhorse of the lot is a locomotive modeled after a General Electric 44-ton industrial switcher. Weighing 3200 pounds, this locomotive operates with a 20-horsepower Crosley gasoline engine.

Four years ago Stillman teamed up with Charles Schlosser, a draftsman, to create the back-yard line. Resulting cars now measure 12 feet in length and 40 inches in width, with the caboose twice as long. The locomotive, 8 feet long and 40 inches wide, is outfitted—as is the caboose—with automatic air brakes. These safety features have been installed for Stillman's boys: Charles, 10; Chris, 8, and Brook, 5.

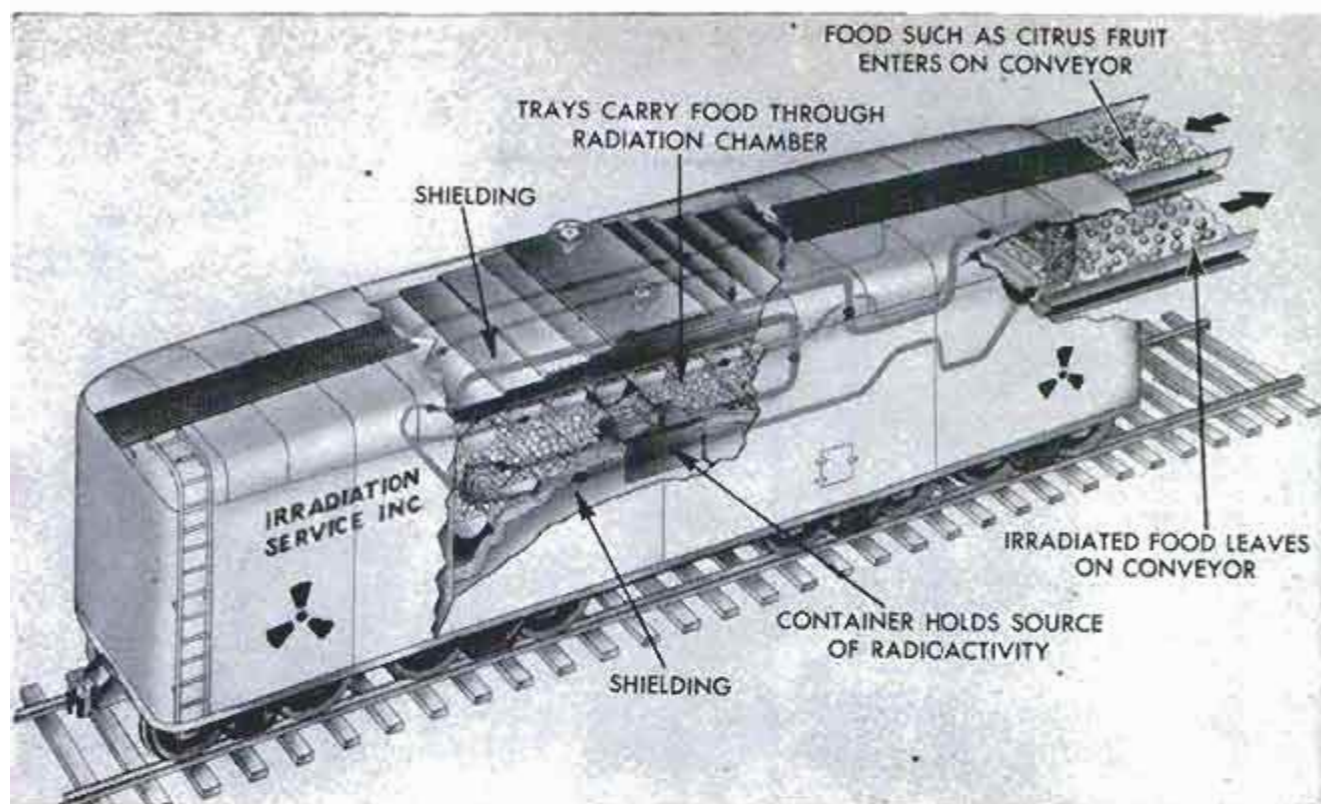
Desert flash floods have made maintenance of the track difficult, but recruited workers build up the train's road bed with quantities of nearby decomposed granite and clay. The track now rises 22 feet from a low section on the estate to a guarded entrance at the Stillman home.

Three model mine cars, patterned on actual vehicles in use at copper mines, serve to haul dirt (one yard per car) from a spot next to the track. An automatic belt device does the loading. The tank car also "earns its way" in periodic moistening of the road bed, which has 5000 ties laid one foot apart.

Supplementing his miniature-railway equipment, Stillman has a small "contact" machine for errand-running on the line. This runabout can go 30 miles per hour on the track's 1½-percent grade. A "doodlebug" train hauls equipment for workers.

Neither a toy nor mirage to Stillman and Schlosser, their railroad is scale-model management of real-life railroading. ★ ★ ★





## Roaming Railway Car May Preserve Food by Irradiating It

Food may soon be preserved by exposing it to gamma rays inside a mobile irradiation chamber. L. E. Brownell and his associates at the University of Michigan have made a detailed study for such a chamber to be built inside a railway car. Such a facility could irradiate potatoes on Long Island to inhibit their sprouting, process citrus fruit in the Southwest, then move on to the Midwest to sterilize insects in grain and cereal products. The source of the radiation could

be spent fuel elements from a nuclear reactor. Conveyor belts would dump the food into trays which would move past fuel elements four times before loading the food on another conveyor for reloading outside. Because of the shielding, the car would weigh 173 tons and would ride on four four-wheel trucks. It would cost an estimated \$93,400 to build. One such car could handle one half to 11 tons of food per hour, depending upon the dosage required.

## Surveyor's Radar Tapeline Measures 50 Miles at a Crack

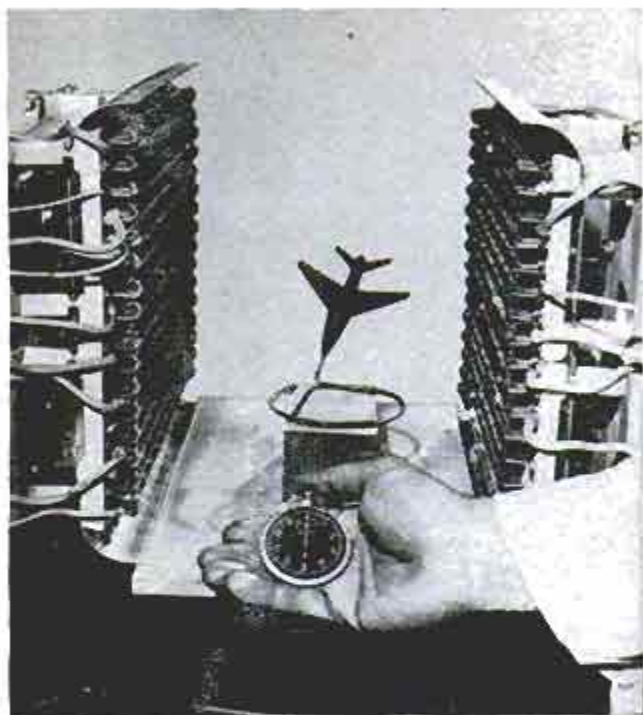
U. S. Army photo

Radar now is giving Army surveyors seven-league boots. With new radar equipment, they can measure off 50 miles in a single leap instead of 20 or 30 small hops. Two Jeep-mounted units with portable masts are set up at distant points and play catch with a radar signal, bouncing it back and forth thousands of times a second. Computers count the catches and measure the distance according to the time the signal takes to make 10,000 round trips. The radar tapeline is accurate within a few feet over a distance of 50 miles.

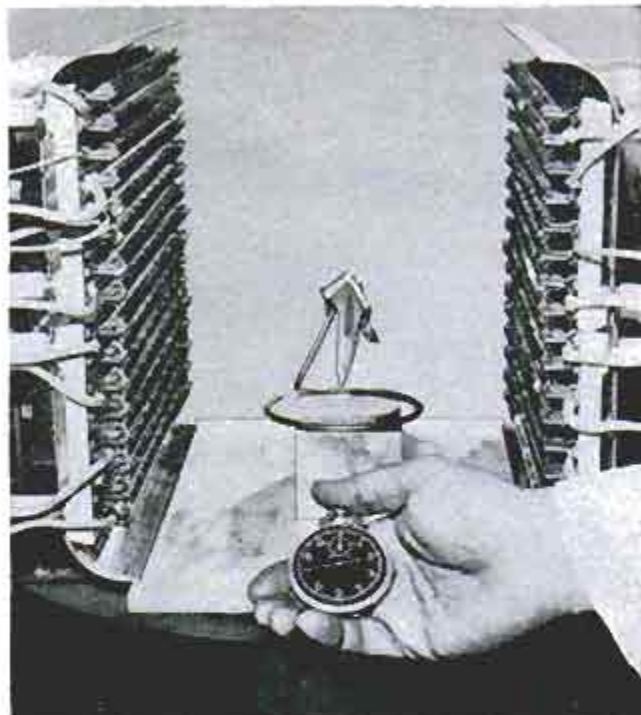
☐ Pan American World Airways has announced plans to be the first airline to operate turbojet aircraft in Latin America when its DC-8 jetliners are ready in four years.







Airplane model made of standard aluminum aircraft skin is placed in thermal laboratory test furnace



Seven and a half seconds later it has wilted. Aluminum loses 10 percent of strength at 250 degrees

## Heat Wilts Airplane Model During "Thermal Barrier" Tests

After only  $7\frac{1}{2}$  seconds of intense heat, an airplane model made of standard aircraft "skin" wilts like a dishrag in tests conducted by Northrop Aircraft. The experiments are part of the search for heat-resistant metals necessary for high-speed

planes. Ninety percent of the strength of the model is lost at the friction heat generated at 2000 miles per hour. The model is flanked by infrared quartz lamps that can generate heat up to 2000 degrees as science makes an onslaught on the heat barrier.

## Triple-Deck Train Bunks

Three-deck bunks that save space and cost less than standard berths are being introduced on the German Federal Railways. During the day, the bunks fold down into comfortable seats. Twelve

tourist-class cars equipped with the space-saving bunks are now in use between German cities.



## Fishing Lure

Bait is carried in a new double-threat fishing lure. Bacon rind, flavored cotton or worms are inserted through its "eye." The lure has a spiraling action which imitates the action of an injured fish, and is said to attract large fish.







## Renault's Experimental Gas-Turbine Car Has Speed of 200 M.P.H.

Strictly in the experimental stage, the Renault "Flashing Star" has a gas-turbine engine of 260 horsepower. Built like a racing car, the vehicle is extremely light-

weight and has a top speed of more than 200 miles per hour. The turbine develops its peak horsepower at 28,000 revolutions per minute.

## Duck Decoy Takes Beating And Springs Back to Shape

You can't damage a vinyl-plastic duck decoy even by running over it with your automobile. The plastic springs back into shape despite the roughest treatment. Even when peppered with shotgun pellets from a distance of only 30 feet, the decoy will not sink. The plastic seals itself to keep water from penetrating. Each decoy weighs about a pound and is weighted to keep it floating upright.

## Duck Call for Hunters Requires No Blowing

Operated by a Neoprene bellows which the hunter shakes, this duck call requires no blowing, yet according to the manufacturer, produces authentic duck noises. The bellows is attached to a hardwood sounding throat. Shaking the bellows results in short, feeding noises. The loud initial call is made by pulling the bellows out and releasing it.



DECEMBER 1956







Doc Cruickshank stands beside his modern 1000-watt transmitter. He holds original two-watt PM transmitter

Maybe you never heard of Wingham, Ontario. Because a man once read in *Popular Mechanics* how to build a radio transmitter, Wingham today is

# The World's Tiniest

By George Cadogan

WINGHAM, Ont., Can., with a population of 2700, boasts that it is the smallest community in the world with its own TV station. Every citizen of this Canadian town will vouch for this statement.

Unusual ingredients are combined in the formula for this success story: One snow-storm, an issue of *Popular Mechanics*, a man named W. T. "Doc" Cruickshank and 30 years of work.

The initial effort began on a blustery,

snow-filled day in February 1926 when radio was not yet out of diapers, especially in rural areas of Canada up near the shores of Lake Huron and Georgian Bay.

As Doc sat in his shop, he was the only radio retailer and service man in a radius of 50 miles of Wingham. The nearest transmitting station was 100 miles away at Toronto. Detroit—150 miles distant—had a station that came on the air at 4 p.m.

On this particular day it seemed too

CKNX control room overlooks the main studio. In 30 years' time this station has risen to \$750,000 value





stormy to go out selling. All repair jobs were up-to-date, so Doc idly examined a copy of *Popular Mechanics*.

When he came to an article explaining how to make a simple transmitter, he decided to give it a try. Digging through boxes of repair parts, he soon came up with a supply of coil and other component parts. In an hour he had made the tiny transmitter. The unit was completed with addition of a telephone piece for the microphone and storage batteries for power.

Tinkering with the set a day or two later, Doc had a telephone call from a citizen to whom he had sold a receiving set. Yes, Doc was on the air! During the first few weeks, call letters of Canada's newest radio station were JOKE. In the spring the owner learned he would need a license and was assigned call letters 10BP. With power from two to ten watts, 10BP was on the air daily at noon for an hour. Thursday night a special program of music and news was broadcast from Wingham, and this often included reports of hockey games completed moments before.

Six days and nights weekly Doc worked at his shop or out selling. On Saturday night he would tuck his five-pound transmitter under his arm and carry it home for the

# Town With TV

Sunday-morning broadcast of religious music from the piano in the living room of his house.

The Wingham transmitter, with not more than 10 watts of power, was picked up as far away as Detroit. Power gradually was increased to 100 watts. Also, 10BP joined DX Programs which had headquarters at Newark, N. J., and was on the air daily from 4 to 5 a.m., when air lanes were comparatively free. Postcard schedules notified transmitters and listeners as to which stations transmitted on particular dates.

**This 650-foot transmitting tower receives microwave signals from the TV-station studio 20 miles away in Wingham, Ontario, during winter**







A TV camera is being focused on an act by the CKNX Barn Dance Gang—a favorite live entertainment show

With wattage of only 100, Doc's station was heard in Canada, the United States and Central America. He also had listeners in England, South Africa and Europe, and received a letter noting reception of 10BP messages in Taranaki, New Zealand.

One dark day in 1935 the government advised Doc that he and other Canadian "hams" would have to vacate the air lanes for commercial stations. However, in April 1935, Doc was granted a federal license to operate a commercial station at 1200 kilocycles with call letters CKNX.

Beginning with advertising announcements at 50 cents each, CKNX revenue the first month was \$65.50. Over \$2 a day!

Wingham adopted the slogan naming itself "The Radio Town of Canada," as Doc raised CKNX by 1941 to a full-time staff of 13 persons. Gross revenue that year was \$27,000. Savings of \$2200 by Doc served as a down payment on a transmitter to increase power to 1000 watts. RCA Victor went along with this rural entrepreneur and installed a \$30,000 transmitter.

CKNX, now "The Voice of Western Ontario," had its silver anniversary in 1951. Gross revenue was \$200,000 annually; there was a full-time staff of 35; and Doc had completed payments on the station. For Wingham, TV was just over the horizon.

In Canada the government-owned Canadian Broadcasting Corporation had complete control of TV development. CBC selected Toronto, Montreal and other major cities for its own exclusive TV stations. There were to be no private networks competing with the government network.

The Canadian government did provide for TV channels to be available in every area of the country. Channel 8 was assigned to the Owen Sound area to the north of

Wingham, even though private TV in such a sparsely populated area was considered economic suicide.

Then, the National Broadcasting Corporation of the United States applied for Channel 8 for a station to be built at Buffalo. An international agreement between Canada and the United States provides that TV stations on the same channel must be 171 miles apart. If Buffalo got Channel 8, Wingham and this rural area of Ontario could never have TV.

Doc entrained for Ottawa, where he presented modest plans for a small-scale TV station costing \$125,000. He asked for TV Channel 8. The commissioners heard him out and promised to reserve Channel 8 but asked Mr. CKNX to work out plans for a more powerful video station.

Shortly, Doc was shocked to learn that a suitable station at Wingham would require investment of \$500,000 and needed \$250,000 revenue annually to meet expenses. Doc's employees loyally said they'd go out on a limb with him. He queried Ottawa, which replied, "Go ahead."

One of the major items in the \$500,000 problem involved \$223,000 for transmission equipment. RCA Victor agreed to help. Next, the supplier assisted financially on the 650-foot tower, costing \$100,000. Building of a new high school vacated premises now used by the station.

Normally, it takes a year between planning and performance of a new TV station. CKNX did the job in three months with a staff of 65.

Doc estimated first-year losses would be \$30,000. After five months of operation CKNX-TV was almost even, with sufficient revenue anticipated to meet first-year operating expenses. ★ ★ ★



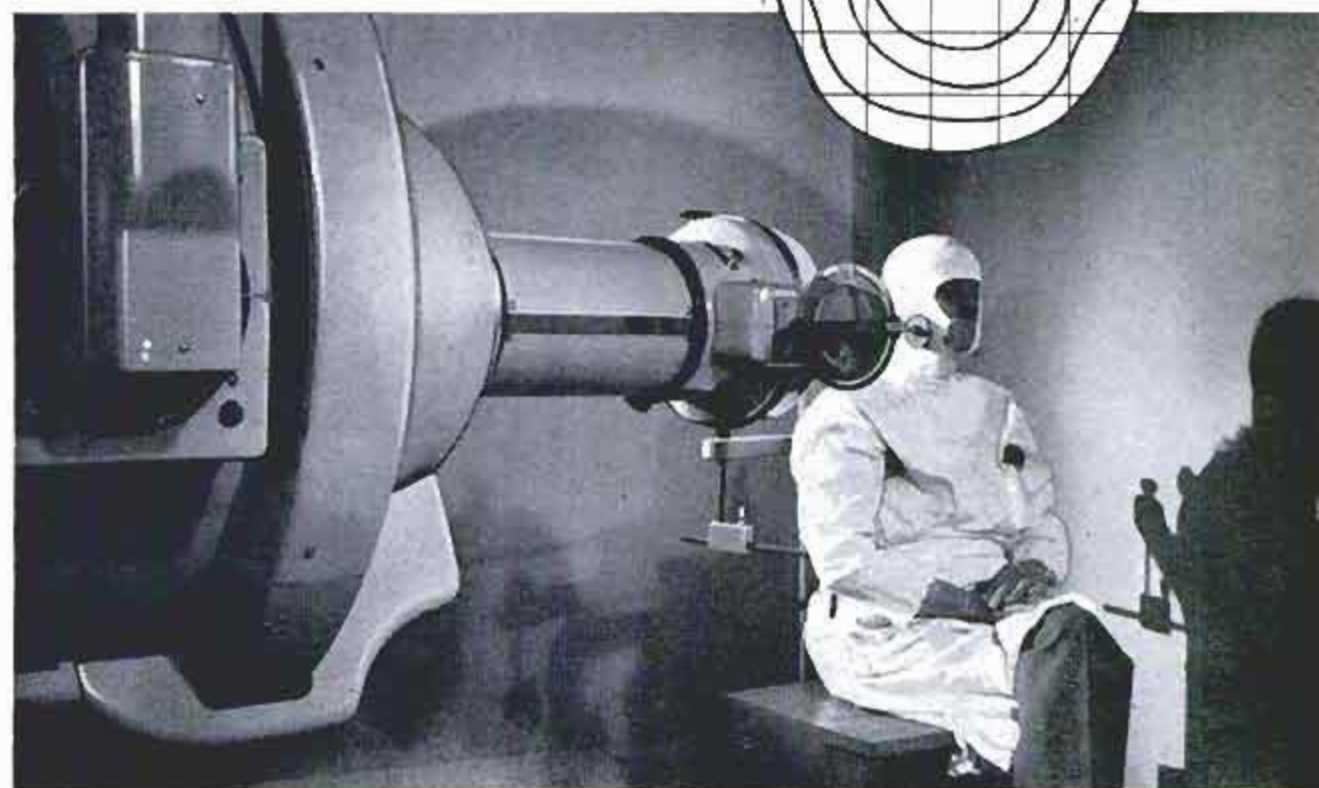
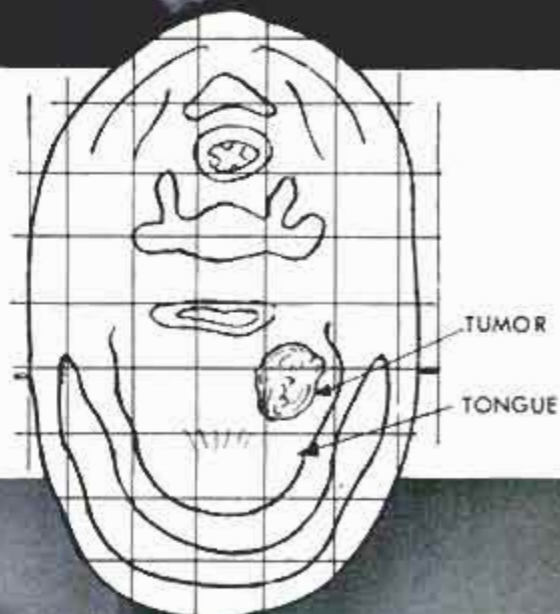
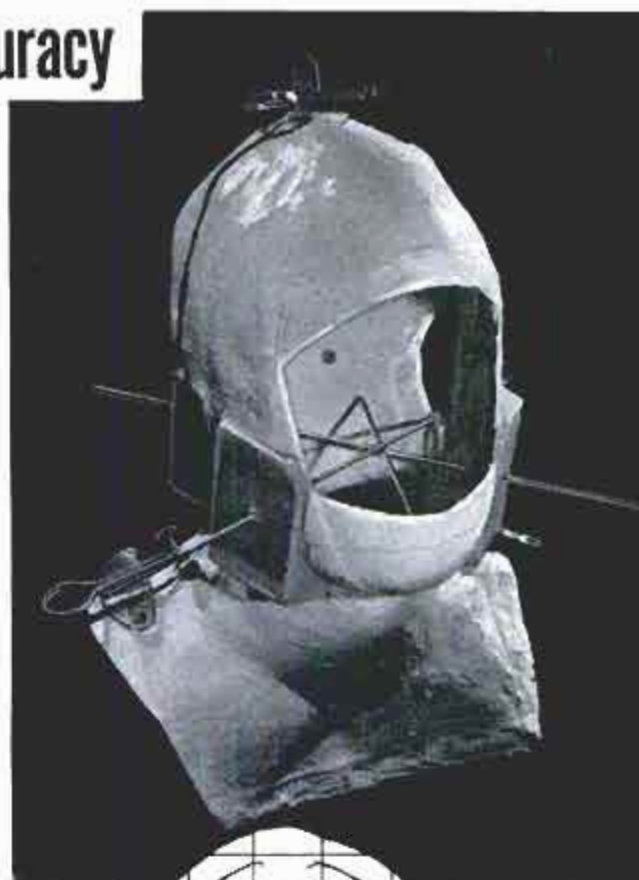
# Plaster Helmets Insure Accuracy In Treating Cancer

CERTAIN TYPES of cancer can be disintegrated right in the body, without surgery. This is done by focusing radiation through the body to the point of the tumor once a day for several weeks. The major problem in this type of treatment is to control the beam of ionizing rays so precisely that it will saturate the malignant tumor but not damage the surrounding healthy tissues.

To provide the accurate aim and necessary protection, a plaster-bandage helmet has been perfected at the Veterans Administration Hospital in the Bronx, N. Y. The helmet is made on the patient's head, then split and taken off and fitted with clamps so that it can be put together again easily. Then, using the helmet, radiologists plan the actual paths the rays must take, using thin stainless-steel rods. They make sure the rods cross at the point where the cancer is located, and that none of the rays will strike an unusually sensitive area.

Finally, the helmet is put back on the patient, and the radiation is applied so that the rays travel along the paths established by the steel rods. After treatment, the helmet is stored for future use.

Upper right, steel rods inserted through the plaster helmet to determine paths of rays. Right, chart used by radiologists in conjunction with helmet to chart course of rays. Below, treatment in progress







## GIANT DRAKE

Both sets of front wheels steer. When afloat, steering is done with the two propellers which swing in any direction astern

WITH EIGHT WHEELS, all of them powered, the Army's latest amphibious vehicle, the Drake, can outride the heaviest surf. The truck, measuring 42 feet long, has air suspension and all-aluminum frame and hull. Axles and wheels retract into the hull to decrease resistance while the vehicle is in the water. Two six-cylinder engines power the truck, both having fluid-torque transmissions. A central tire-pressure system enables the driver to inflate or deflate the tires while the vehicle is moving. Load capacity of the Drake is in excess of eight tons and, in ship-to-shore work, it can haul items as large as an eight-ton truck. The tire-pressure system will keep the tires inflated despite loss of air due to bullet holes.



If you want proof of the Drake's seaworthiness, here it is. Despite this tumbling through the surf, it remained afloat. Below, the three generations of the Duck family. From left to right: The first 2½-ton Duck, the 4-ton Superduck, the Drake





# Electronic Eye Fights Back At Bullets

ONE OF THE fighter pilot's major bugaboos is fire caused by enemy bullets exploding the fuel tanks. The mental image of a man's plane disintegrating around him in a hot ball of fire, or plunging earthward beneath a squirming column of black smoke, isn't conducive to peace of mind.

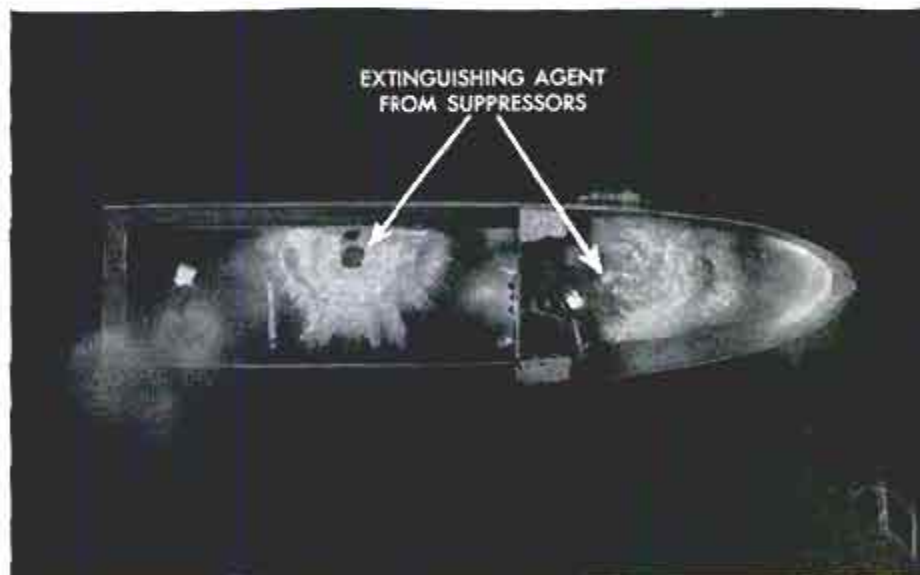
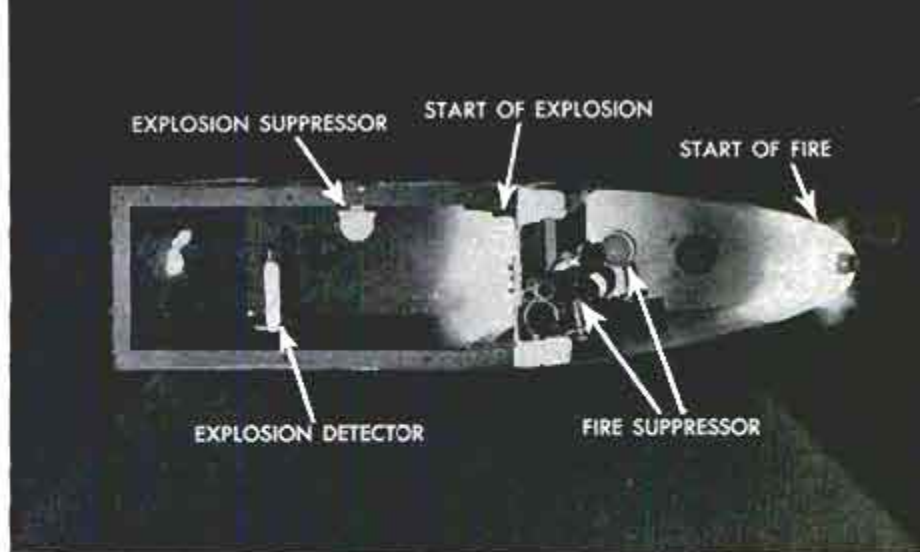
Now, electronic "eyes" that can "see" a 2000-mile-per-hour tracer bullet, and hit back at it before the projectile travels 11 inches into an aircraft's fuel tank, may soon protect jet fighters from such explosions.

Recently, at the Army's Aberdeen Proving Grounds, Air Force research men have been machine-gunning fueled planes on the ground, trying to explode them—without much success. Reason: A new unit developed by Republic Aviation. Here's how it works: An electronic eye, installed on the inside wall of the wing tank, detects infrared rays at the very start of the explosion or fire. Instantly, it triggers a gunpowder charge that shatters plastic capsules containing an extinguishing agent inside the tank. Rapidly expanding mist blankets the fire area at a speed of 300 feet per second.

"An explosion in an aircraft fuel tank," explain Republic engineers, "is at its worst within  $\frac{7}{100}$  second. This system nips it within  $\frac{1}{1000}$  second."

The system also guards against false alarms. In case of a slow fire, it "counts" flickers to make sure the light is from an actual fire. But if the fire is intense, it doesn't wait to count.

Cutaway model of F-84 airplane wing is used in these four pictures which show how fire-explosion suppressor works. At top, bullet enters leading edge of wing at right, starting a fire, and proceeds into vapor-filled fuel tank at left to start an explosion. A fire suppressor smothers the blaze at right while capsule shattered by detector explodes mist in fuel tank. Mist blankets the impending explosion, leaving the wing undamaged





## They told him it couldn't be done — so he built it himself: **A HARDTOP CONVERTIBLE**

**A**FTER FOUR YEARS of trial and error, Raymond P. Meyette, a Fort Lauderdale, Fla., automobile mechanic has done what one company said was impossible: He has designed and built a true hardtop convertible.

"In the past, most of those who tried it either had to end up using a two-part top or sliding the top rearward on channels," Meyette explains. "In either case, this involved hinges or rattles and leaks."

The Meyette solution provides for the quiet and effortless raising first of the trunk deck, then of the one-piece hardtop that is stored upside down beneath the deck. The lid is electrically operated; the top hydraulically. Both are controlled from the dash and may be raised or lowered



By George X. Sand



while the vehicle is actually in motion.

The car Meyette rebuilt started out as a 1952 Nash Ambassador sedan. The top, cut from the rear section of a Kaiser sedan top, pivots from points high up on the quarter panels.

When lowered into the storage compartment, which occupies the rear-seat area of the body, the top is upside down. Before it is lowered, however, the lid of the storage compartment lifts up and then closes as the top disappears.

The pivoting feature does away with the need for moving the top backward on rails. The trouble with such a design, says Meyette, is that the largest part of the top ends up where there is the least room. By pivoting the top, the big portion of the top is stored behind the seat where the body height is greatest.

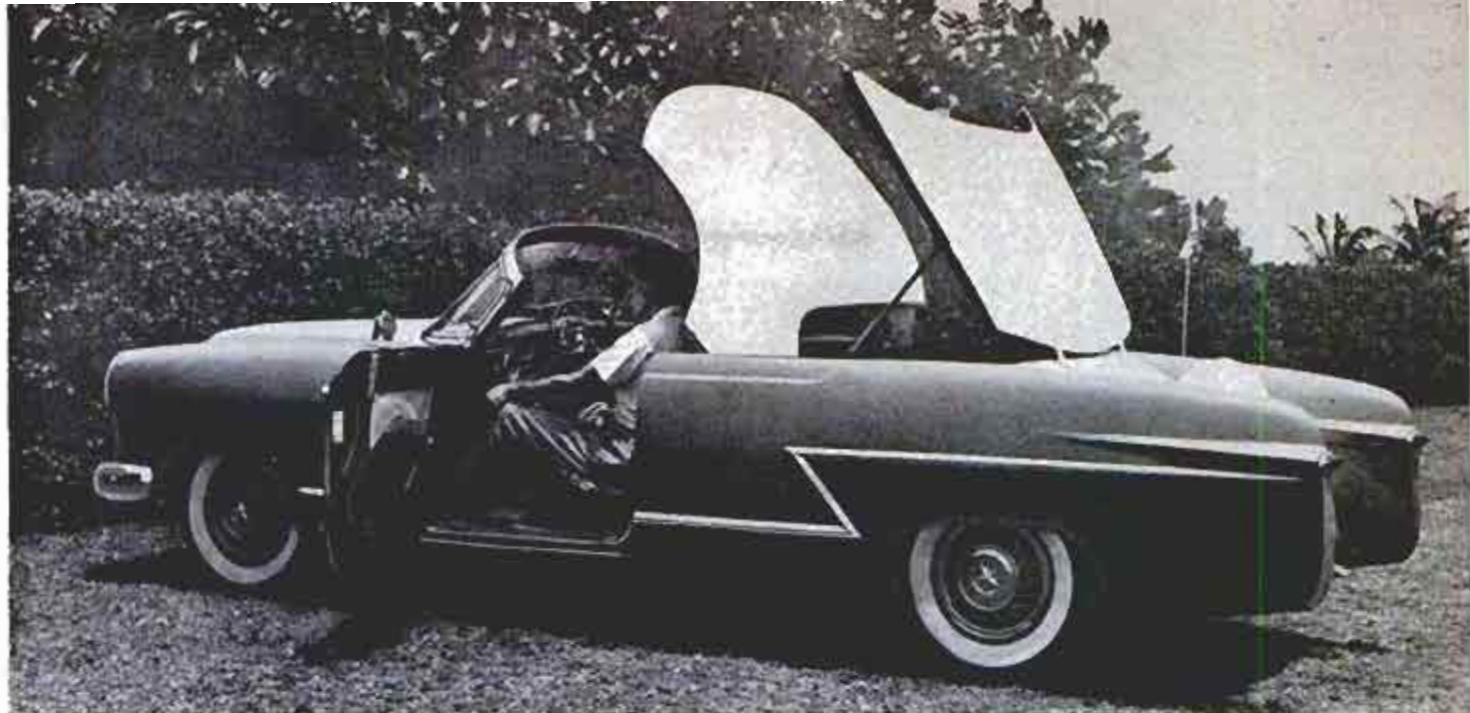
While he used the top from a Kaiser, it

had to be re-formed to match the car's windshield and back panel. Actually, the entire body is handmade; the only original parts left are the wheel housing and floor.

Because he used many standard parts (many of which he bought at junk-yard prices), the inventor says he has less than \$100 invested in the whole car. "Of course," he hastens to add, "this doesn't take into consideration 4000 hours of my time."

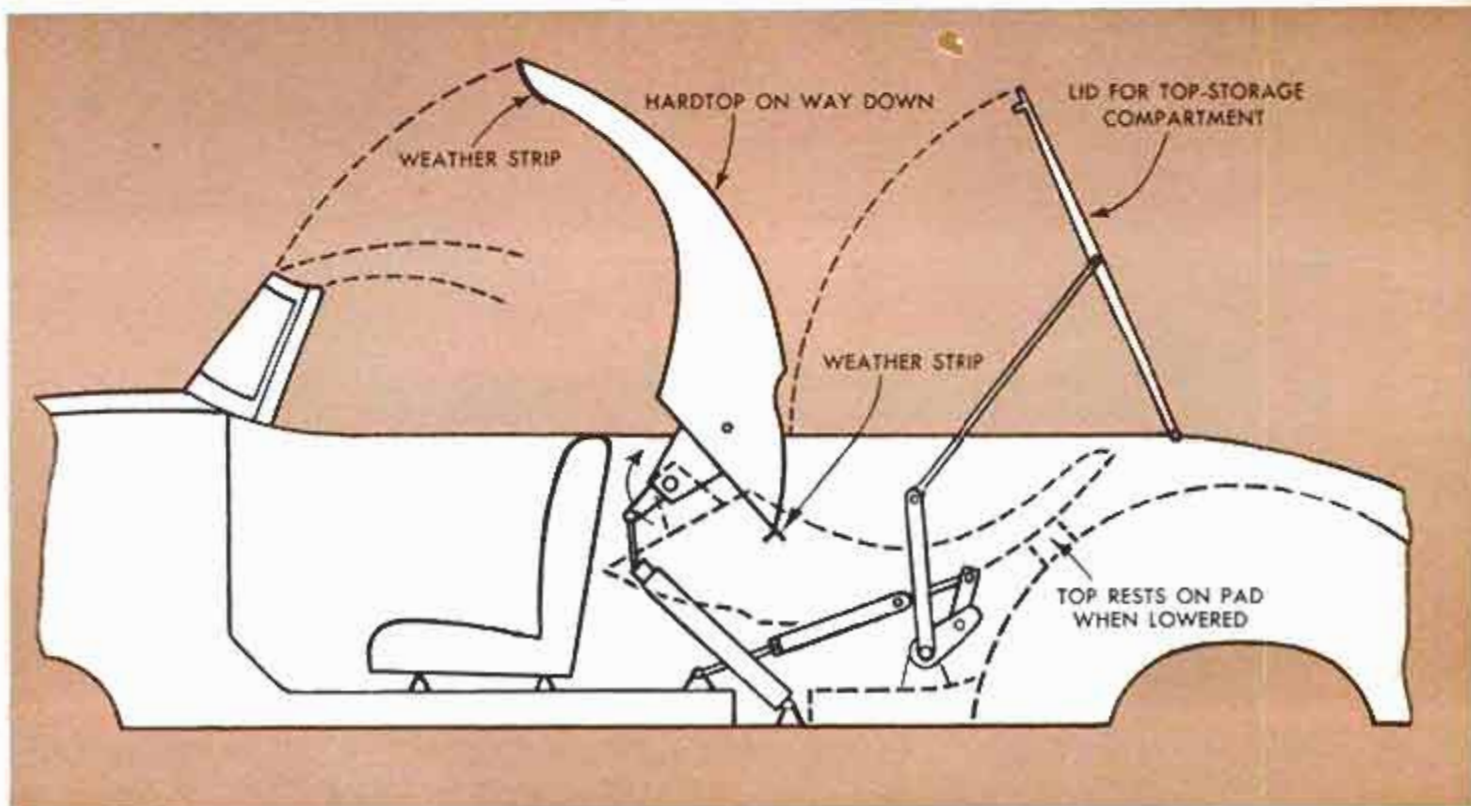
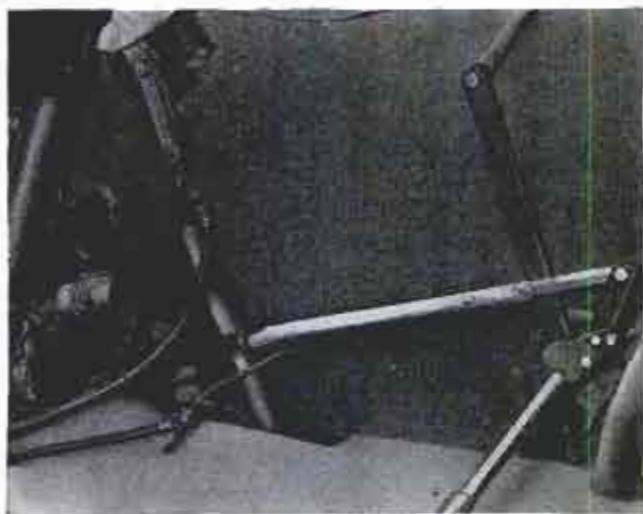
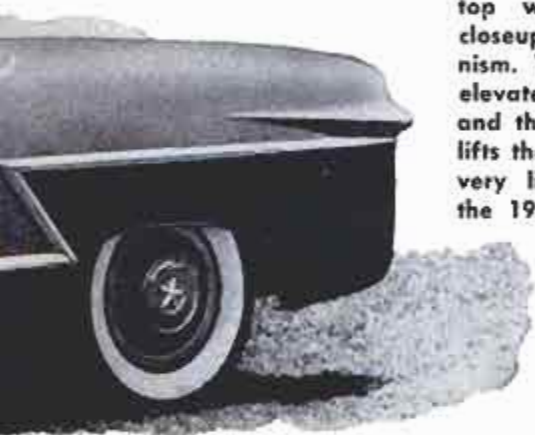
Tinkering with cars is no new hobby for Meyette. He started back on the farm in Vermont at the age of 12. He owned a 1922 Star that had no doors. Getting in and out was simple except for the shin-scraping location of the shift lever and emergency brake. Meyette solved the problem by designing and building a workable steering-column shift and dash-mounted emergency brake, not too much different from those in use today. ★ ★ ★





During the raising operation, the top looks like this. First the deck lid opens, then the top comes up

At bottom of page is a diagram of how the top works. Right, a closeup of the mechanism. The screw drive elevates the deck lid and the hydraulic ram lifts the top itself. Left, very little remains of the 1952 Nash styling







## Colored Lights Teach Piano

It's easy for a beginner to learn the basic chords on a new piano. Directly behind the keyboard are small lights in various colors. Colored dots in the music book indicate which chord should be played. The player strikes the keys which are marked by that color. A plastic indicator, placed above the keys, identifies the right-hand notes necessary to carry the basic tune.

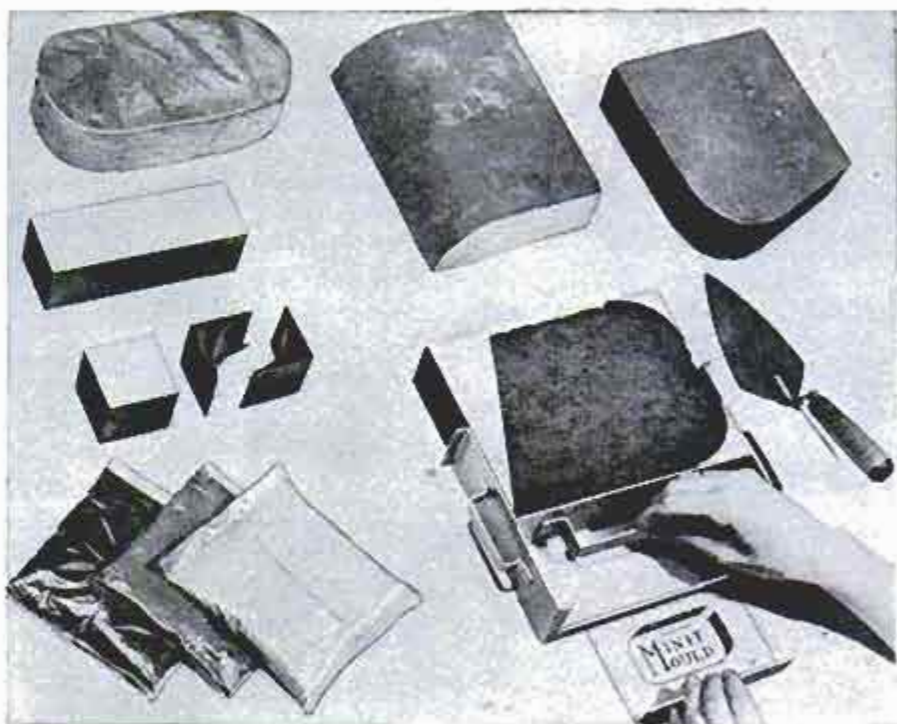
Chords to be played by the left hand are indicated by tiny colored lights

## Concrete Blocks Made in Minute

Colorful concrete garden blocks for a garden walk, terrace or fireplace can be turned out at the rate of one a minute with a special mold and at less than the cost of a postage stamp. The mold makes blocks in different shapes, sizes and colors, with the basic size being 2 by 6 by 8 inches. Supplied with the mold, in kit form, are forming blocks, trowel, coloring pigment samples and an idea folder.

*Letters returned apparently out of business.*

Kit for making concrete blocks has mold, blocks, trowel, pigment samples



## Multiple Piano

One man can play three pianos at once, each in a different octave, thanks to an Italian invention. Two pianos are connected electrically to the one at which the player sits. As he depresses the keys on his piano, electrical contacts are closed and corresponding keys on the "slave" pianos are depressed by electrical magnets. The pedals work the same way.



## Concrete Vibrator Contains Motor

One man can handle a 25-pound concrete vibrator that contains its motor in the vibrating head. The unit's 25-foot electric extension cord is plugged into the nearest 115-volt outlet. The conventional vibrator, used in industrial construction to take out the bubbles in newly laid concrete, is powered through a flexible shaft by an outside engine manned by an extra workman. The motor of the unit is protected from overheating with a safety thermostat.



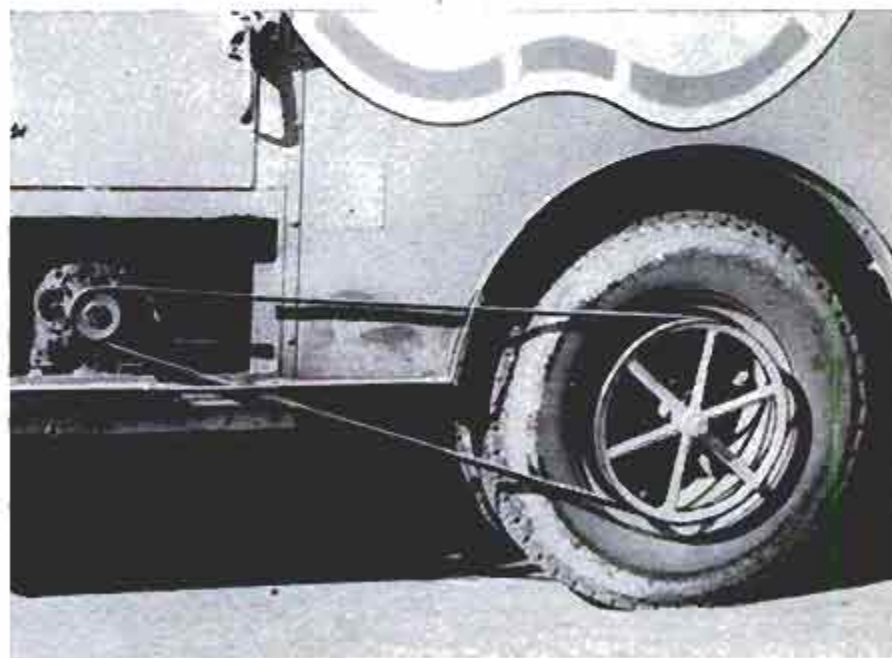
## Container on Hoist Becomes Truck Body

Almost any type of material can be handled through a new truck-loading system. The loading mechanism can be mounted on any truck of suitable capacity and consists of a pair of hydraulic hoisting arms that can lift up to nine tons. The arms are used to hoist a special container onto the truck, which then becomes the truck body. Various containers handle solids, powders, liquids and gases.



## Truck Refrigerator Is Self-Powered

Meat delivery trucks of one packing company are refrigerated while on the road by means of a V-belt run from the refrigeration unit to one of the rear wheels. Providing the proper speed for the refrigeration unit at normal driving speeds, this self-powered unit provides adequate refrigeration during the day. At night and during loading at the plant, the unit is plugged into a power source to operate.







## WHAT'S NEW FOR Your Home

**TWO-IN-ONE OVEN**, when divider is in place, permits cook to broil food at one temperature in top section while baking pastries at another temperature in the bottom unit. Divider removed, the entire space serves for broiling or baking. French doors provide access. Automatic or manual controls on oven allow homemakers to leave the kitchen while food cooks

Frigidaire Div., General Motors Corp., Dayton 1, Ohio

**SNAP FASTENERS** will snap closed and stay closed, after having been renewed by a heavy, nickel-plated steel device. This product is made for regrouping fingers of the receiving part of the fastener, which have become spread apart by normal use and laundering of sleepers, creepers, pajamas, shorts, shirts, jackets, work uniforms and similar clothing

Sauber Mfg. Co., Snap-E Div., Virgil, Ill.



**NO-STOOP DUSTPAN** prevents backache from bending. By pressing with the foot on the tab beneath the dustpan handle, the housewife forces the front lip of this device to hug the floor and prevent dirt from escaping. The housewife moves the dustpan merely by shifting it with her foot. A reverse lip retains dust in the pan, which is high-impact plastic

Reliance Products Sales Corp., Woonsocket, R.I.

**UNUSED SPACE UNDER BEDS** can be put to work. Attach a 30 by 36-inch drawer (5400 cubic inches of storage space) or two 24 by 30-inch drawers (3600 cubic inches of storage space each) to single or double wood or metal beds. Dustproof and fastened without tools, drawers ride off the floor and on their own tracks. Drawers are five inches deep and have covers

Nash Mfg. Co., 10024 Carnegie Ave., Cleveland 6, Ohio







**RING-TYPE CLOTHESPINS**, while allowing the hands freedom for work, can be adjusted for desired tension by bending the bottom of the pin in or out. Plastic, these pins can be kept on clotheslines by pushing them through to the ringlet. No smudge or pull marks, splinters, snags or tears mar the wash

Ringlet Clothes Pin, Inc., West Boylston, Mass.

**WASHER-DRIER** equipment fits into space 25 inches wide if stacked with units one on the other. Combinations include mounting washer and drier free standing side by side, built into the wall, or under standard-height counter surfaces. Most convenient installation height is 30 inches above the laundry floor

Westinghouse Appliance Div., Mansfield, Ohio



**FAST-PEELER** made with a stainless-steel cutter, removes a continuous thin strip of peeling in a groove down the middle of an orange, grapefruit or tangerine. The fruit can be taken easily from the peeling remaining. Homemakers, needing an effective garnish for the family feast, can use the peeled strip

Impact, Inc., 2108 Payne Ave., Cleveland 14, Ohio



**FURNITURE KIT**, complete with glue, nails, screws and instructions, needs only a do-it-yourselfer and his screwdriver and hammer to assemble the bedroom or living-room piece ordered. Kit provides predrilled Appalachian ash units with stain, sealer, shellac, sandpaper, cloth, brushes, steel wool

Show-Off Inc., Jamestown, N. Y.







Bell 47J Ranger, capable of carrying more than 1000 pounds of payload, will be delivered early in 1957

## Quick-Change Kits Convert Helicopter for Different Uses

Called the Ranger, Bell Aircraft Corporation's new commercial helicopter is a convertible. Powerful enough to carry more than 1000 pounds of passengers or cargo, the plane can be converted through

the use of quick-change kits from a business craft to a cargo craft, to a two-litter ambulance or to a rescue helicopter with an internal hoist. The helicopter will be ready for delivery early in 1957.

Below, left, Ranger set up as two-litter ambulance. Right, converted to flying office for business executive





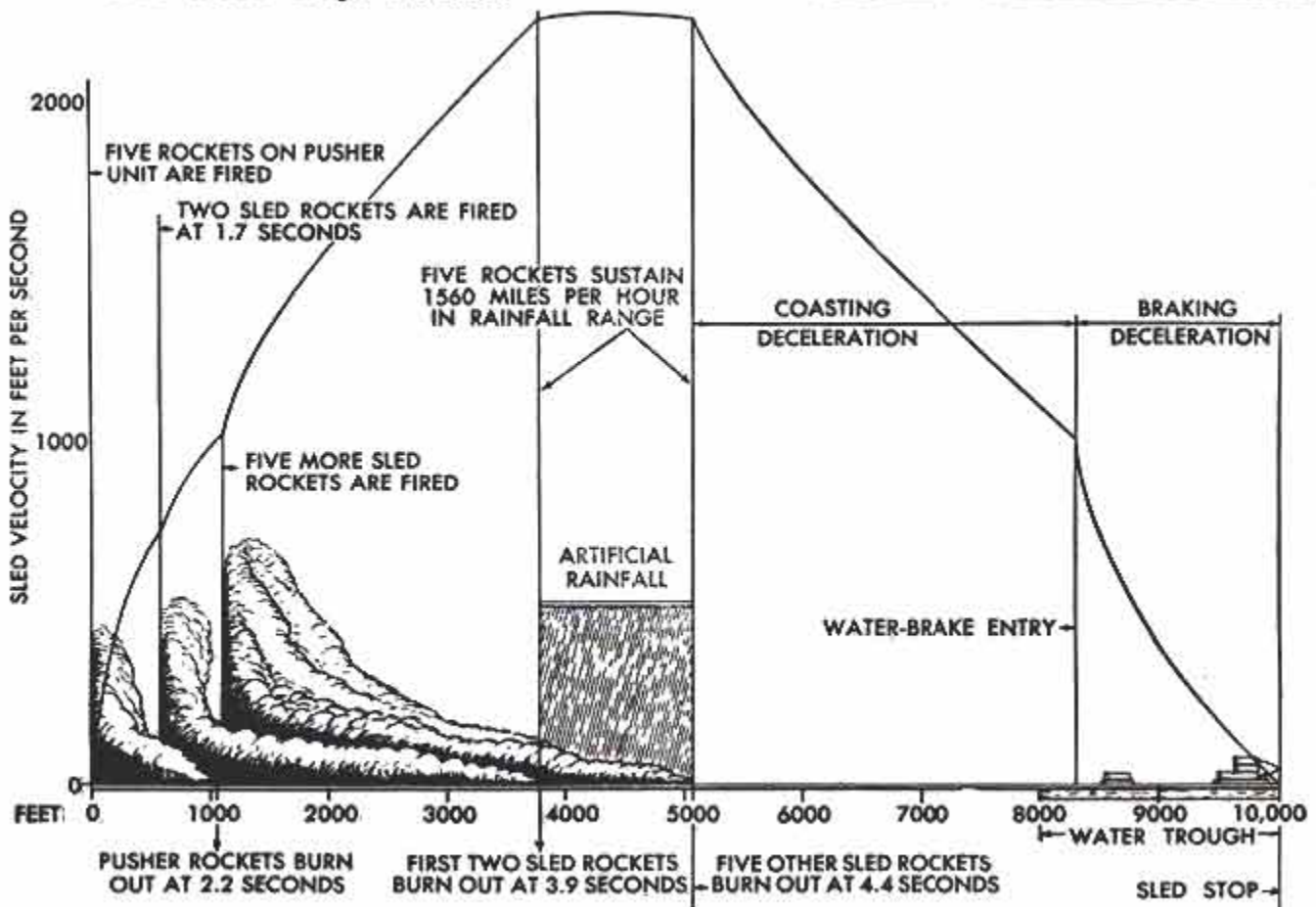
# Convair Rocket Sets Record

DESIGNED to race through a simulated rainstorm at supersonic speeds, a Convair rocket unit recently set a world's record for recoverable sleds of 1560 miles per hour. This mark was made on the 10,000-foot track at Edwards Air Force Base in California. Scheduled tests at double the speed of sound will feature a unit equipped with 12 rocket bottles (seven on the main sled, five on a pusher sled). The latter accelerates the test unit to 620 miles per hour on the first 950 feet of track, prior to main-sled blast of 25 times the force of gravity.

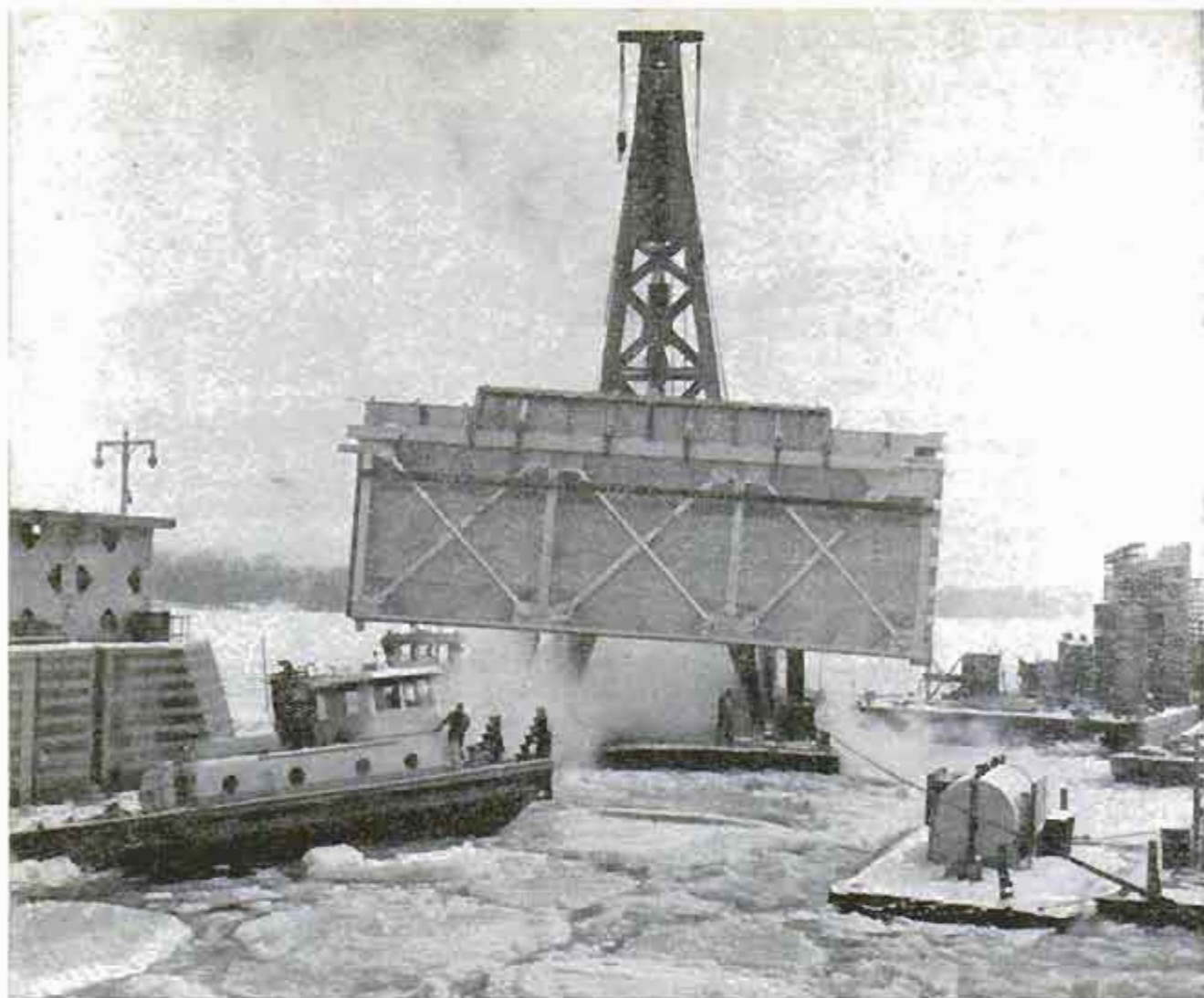
Weighing 800 pounds, the sled has four steel slippers keeping it on the track for the 9½-second run. A miniature broadcasting set beams acceleration data. Recording oscillographs measure sled speed by registering intervals to .0001 second between 50-foot track lengths. Rainfall is simulated by controlled sprinkler nozzles on six-foot stands along 1200 feet of track. A built-in "water brake" stops the sled.



Brig. Gen. J. S. Holtner, commander of Edwards Air Force Base Flight Test Center, looks over main rocket sled. Below, test starts







Diesel tender *Coon* clears path for U. S. Corps of Engineers' derrick boat *Hercules*, whose 87-foot boom can lift 125 tons. With reconditioned 70-ton gate leaf aloft, *Hercules* edges into lock chamber for reinstallation

## ***IT'S A COLD DAY When They***

Pikemen keep ice from piling up ahead of *Hercules* inside lock chamber. Propeller wash from three diesel tenders was required to keep ice moving down sides of derrick boat. Lower edge of gate leaf is top left







In ice three feet thick and minus-17 weather, tender *Bates* nudges barge from lock chamber, as *Hercules* enters

**E**ACH LOCK-CHAMBER miter gate in the 27 government locks and dams on the Upper Mississippi receives a face lifting every 15 years. In 20-below-zero temperatures and with ice three feet thick, military engineers work from December to mid-March to guarantee that five million tons of shipping move in the 8½-month navigation season. Lock chambers, con-

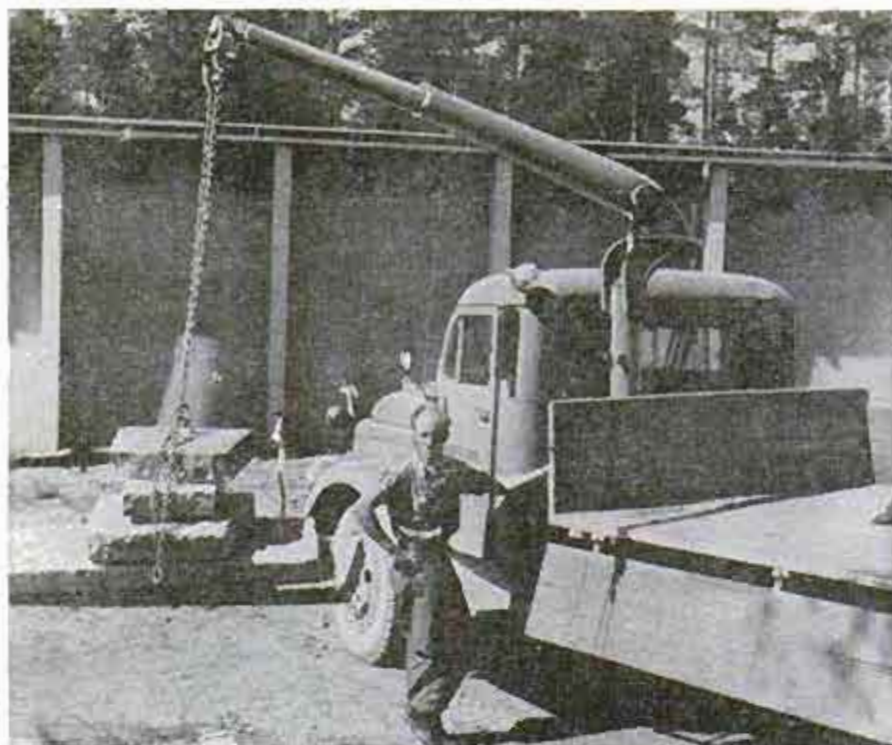
taining upper and lower gates of two leaves each, can be "de-watered" by placing temporary dams at the far end and jacking gate leaves from chamber floors. Or, a single temporary dam at the upper chamber's end retains pool level, while derricks transfer leaves from water to barge for sandblasting, repair, paint and new quoin-seal installation. ★ ★ ★

## *Repair Those Mississippi Locks*

Diver goes into 14 feet of water to inspect and clean pintle on which gate leaf pivots. Pikeman will keep ice from fouling air line. Temporary dam, placed above upper gate before removal for repairs, is in background







## One-Man Loading With Truck Crane

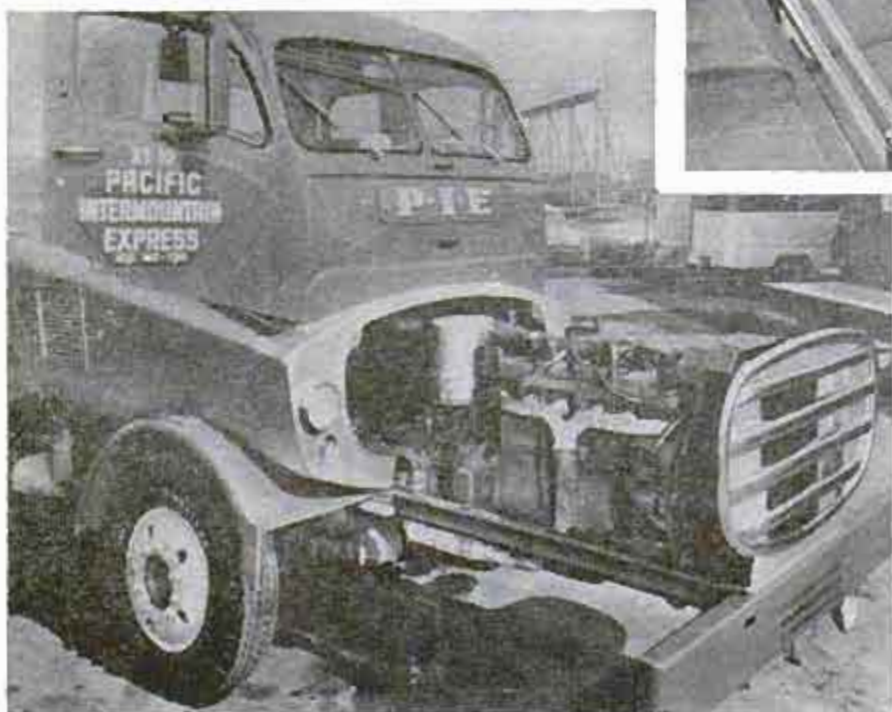
Built in Sweden and licensed for manufacture in other European countries, a hydraulic crane that can be attached to most trucks permits one man to do the loading and unloading of cargoes. The crane requires only 7½ inches of space in back of the truck cab and, when retracted, extends 7½ inches above the roof. Accessories make it possible to move any type of load, including sand and gravel. Hydraulic leg supports prevent tipping of the truck when heavy items are lifted.

## Engine of Test Truck Slides Out for Servicing

Engine and transmission of a pilot-model truck, tested by Fruehauf Trailer Co., are mounted on sliding rails and pull out like the drawer of a desk. The whole unit can be replaced in two hours. Normal maintenance work is easier and less expensive. The engine powers a new tank trailer which has no frame in the conventional sense. Instead, the power package, wheels and axles are built into the tank itself to save weight. The trailer is eight inches wider than it is high. Another Fruehauf trailer handles bulk flour as if it were a liquid, loading and unloading it by hose.



Above, this is a tank car, but the "liquid" it carries is dry! It loads and unloads bulk flour by pumping it through a hose



Left, handy for the mechanic is a pilot-model truck. To service it, he merely disconnects the drive shaft and pulls out the engine just like a desk drawer



Helicopters are ideal for spreading insecticides over huge land areas including forests. Downwash from rotor deposits mist from spray-boom's nozzles in even swath  
U. S. Department of Agriculture photos



*Insects ceaselessly fight to take over the earth. In the second of three articles on the farmer's greatest enemies, a top entomologist pins down*

## GOAL NO. 2

# WINNING THE WAR AGAINST INSECTS

By **W. L. Popham**, *Director, Crops Regulatory Programs, U. S. Department of Agriculture*

**I**NSECTS NEVER TIRE in their ceaseless battle against man over the inheritance of the earth. Recently scientists have come up with some startling new weapons for farmers to use in this elemental struggle for survival.

Here are some examples:

Treated cotton seeds are growing into plants that actually bite back at the insects. The plants have a built-in insecticide. This year, cotton growers lucky enough to get some of the chemically treated seed achieved early season insect control without so much as hitching up the sprayer or duster.

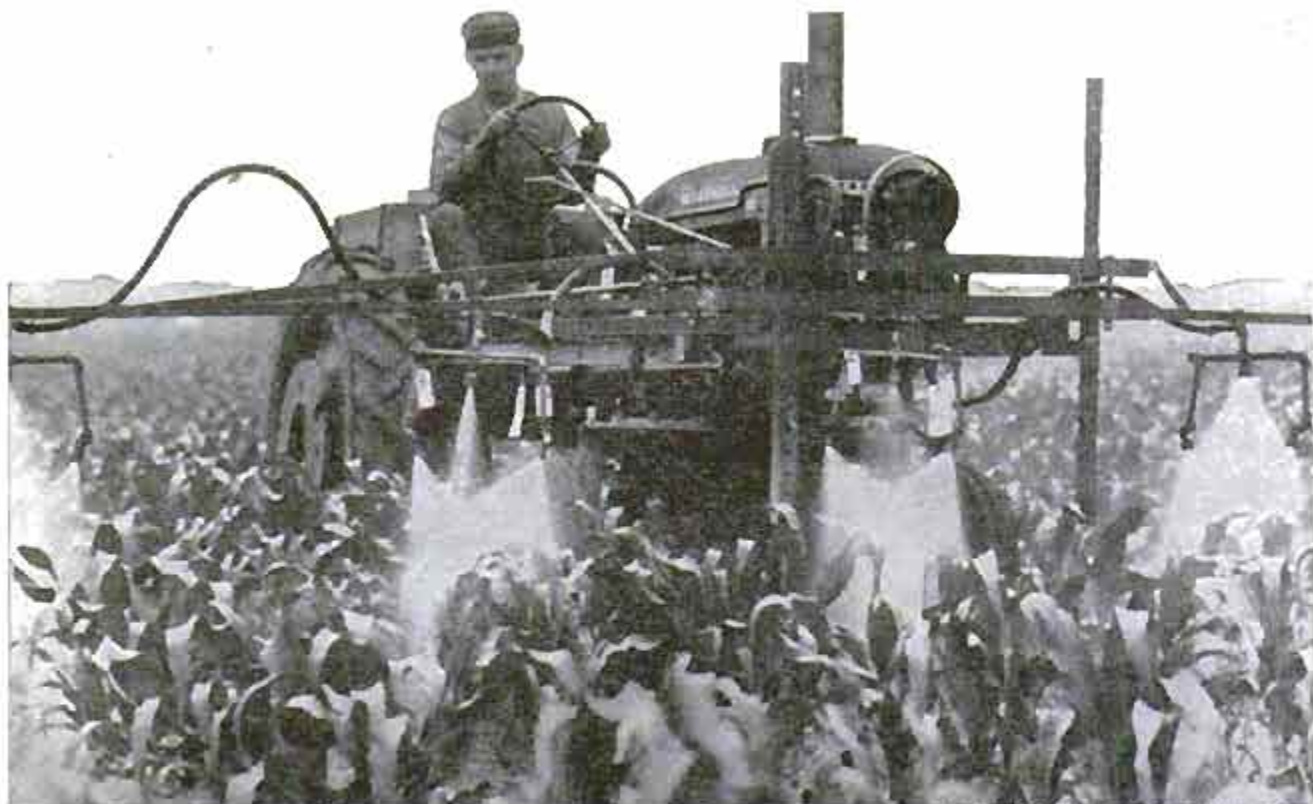
In the Midwest, up-to-date farmers are growing varieties of wheat with a built-in, genetic resistance to that pest, the Hessian fly.

Out West, specialists are using a new technique to put a stopper on the khapra beetle, one of the biggest insect threats ever to reach our shores. Warehouses filled with

Scientist releases imported bugs which become parasites on corn borers. Such insects help kill out borer infestations







U. S. Department of Agriculture photo

**High-clearance sprayers spread DDT without damage to growing corn to help keep the corn borer under control**

stored grains and seed—and khapra beetles—are swathed in as much as  $9\frac{1}{2}$  acres of gas-tight plastic, and then fumigated.

Eastern homeowners are actually spreading a contagious disease to kill off Japanese beetle grubs. They are dotting their lawns with disease spores which spread death only to Japanese beetle larvae and certain other white grubs. There's an epidemic, and the Japanese beetle disappears.

### Controls for Most Insects

If you could line up the more than 10,000 insect pests of the United States, you could jot down a control measure for nearly every kind. A hundred years ago, our forefathers would have been hard put to control a tenth of them. That is one way to measure progress in our fight against pests.

The fantastic ability of insects to reproduce and their equally fantastic capacity

**Flexible tubes of a rotary duster apply insecticide to both sides of cabbage plants. Below right, khapra beetle, today's biggest insect threat, is killed by fumigating entire warehouse swathed in gas-tight plastic**

H. D. Hudson Mfg. Co. photo







Young trees, subject to insects that resist normal sprays, are treated with a potent gas under huge tents

for survival are two of the reasons that our successes against them seldom represent total victory. Here in the United States, insects still destroy an estimated \$4,000,000,000 worth of our agricultural production each year.

Nor is there much that is spectacular underlying the successes. Victory usually comes from study, hard work and try-and-try again.

Responsibility for finding ways of controlling insects falls on the entomologist—the insect scientist—but the total struggle frequently involves chemists, engineers, plant and livestock authorities, the government, industry and farmers. Success often requires the teamwork of all of these. An example is the case of the European corn borer, our number-one corn pest.

There was hardly a stir among farmers

Recent development is the mist blower for treating large areas and tall trees. Below right, each man wears one repellent-treated sock. Wood ticks, carriers of Rocky Mountain fever, will not climb legs of treated socks

David C. Kennedy Co. photo

U. S. Department of Agriculture photo







Shipments of plants from around the world are inspected for destructive insect pests at our ports of entry

when in 1917 the corn borer was discovered for the first time near Boston. But as the pest gained a foothold and began to move in on the Corn Belt the need for "doing something" became obvious.

Beginning to do something meant learning about the insect, for then as now, effective control methods were built upon a knowledge of the pest—how it lives, reproduces and adjusts to environment.

For example, our scientists found that borers spent the winter in the stalks and other remnants of corn harvest left in the field; that if these stalks were burned or buried deep enough the borers could not

survive the winter, and their life cycle would be broken. This bit of knowledge was the key to a U. S. Department of Agriculture quarantine levied against the corn borer in 1927. Stalk clean-up by burning and deep plowing slowed the spread of the insect, but not well enough some believed to warrant the cost of the program. The quarantine was lifted in 1933. The corn borer quickly spread across the Corn Belt.

#### No Natural Enemies

Research continued and our scientists discovered a primary reason for the borers'

(Continued to page 228)

Modern speed sprayer replaces old hose and nozzle in fruit orchards to fight new and old insect enemies

John Bean Division, Food Machinery and Chemical Corp. photo

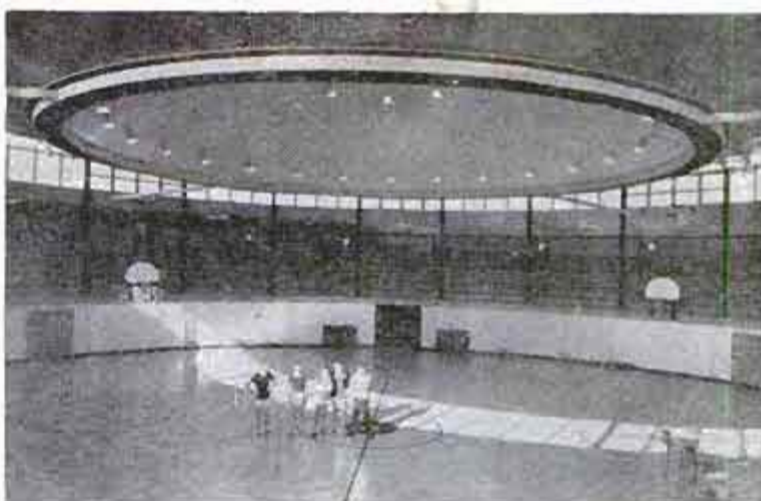




# One-Piece Steel Roof Covers Auditorium

HIGH construction costs, the biggest problem in the building of schools today, have been offset by a unique type of construction in which sheet-steel roofs of unique sway-back design are used. The first roof of this type has been installed on the auditorium of new St. Patrick's High School in Kankakee, Ill. The architects say that the cost is 25 percent lower than conventional construction. Similar roofs are planned for an additional four auditoriums to be built in the near future.

The roofs are made of  $\frac{3}{8}$ -inch steel plates welded into a vast single sheet. The weight of the steel is supported around the edges of the roof, which is 108 feet in diameter and from the air looks like a gigantic hub cap. The rim of the roof rests on 24 slender steel columns which need no buttressing.



Tensions on roof are similar to those on spokes of wheel. Roof cannot collapse because weight pulls down on supports

During construction, the concave roof was tested by filling it with water. Such a pool, weighing 315 tons, would form only if 12 inches of rain fell while all of the roof drains were clogged.

The elimination of internal supports gives spectators in the auditorium an unobstructed view of the basketball floor. The auditorium seats 2200.

Water up to five feet deep is run onto roof during tests. Steel dome at center is 50 feet in diameter



Classrooms in school are covered by ordinary flat roof and are wedge shaped around edge of auditorium







U. S. Army photos

## Helmet for GIs Contains Two-Way Radio

GIs may soon be "talking through their hats." The Signal Corps Engineering Laboratories have developed a radio helmet for the individual rifleman. The helmet, which resembles a football player's headgear, contains a two-way radio that weighs only a pound. The set consists of two packages

about the size of a deck of playing cards, one containing the batteries and earphone, the other the transistors and circuits. The rifleman talks into a microphone that fits into the helmet when not in use. The radio is designed for short-range use, but an antenna increases the range to a mile.



## Tractor Opens Gate In Electric Fence

Consisting of four metal rods that are hinged so they block the opening, an electric-fence gate can be driven through without requiring the driver to leave the tractor seat. The rods are connected to the usual electric fence and contain the normal electric charge to keep animals from pushing through. The rubber tires of the tractor or car prevent shock to the driver. Spring action closes the gate behind the vehicle.



## Water Purifier - *see attached*

Taste and odor in drinking water can be destroyed by chlorine dioxide, an effective bactericide that does not leave chlorine taste or smell. This chemical takes color out of water containing dissolved iron or manganese and is harmless to humans and animals in the minute quantities used in water treatment.





Up to 30 men can sleep in this tent which can be used as storage shed, office space or temporary housing

## Inflatable, Rubberized Tent Serves for Storage or Shelter — see "A"

Designed originally for military purposes and to serve up to 15 years, an inflatable rubberized tent can be used as garage, storage shed, temporary office or home, first-aid shelter or as exhibit housing. It sleeps 30 men. The unit consists of semicircular arches, inflatable to provide nine feet of headroom at the tent's center over the 30 by 19 feet in floor area. Col-

lapsed for transport, the package is four feet six inches long, 1½ by 1½ feet high and wide and 100 pounds in weight. Windows are clear, flexible plastic, easily opened if needed. Doors at either end of the tent can be closed or opened from each side by zipper fasteners. Hooks provide support for electric and telephone wires. The tent floor is detachable.

## Toy Warfare Goes Modern With Electronic Cannon

Warfare on the toy level is almost as modern as the real thing, as shown by a toy electronic cannon that fires at the push

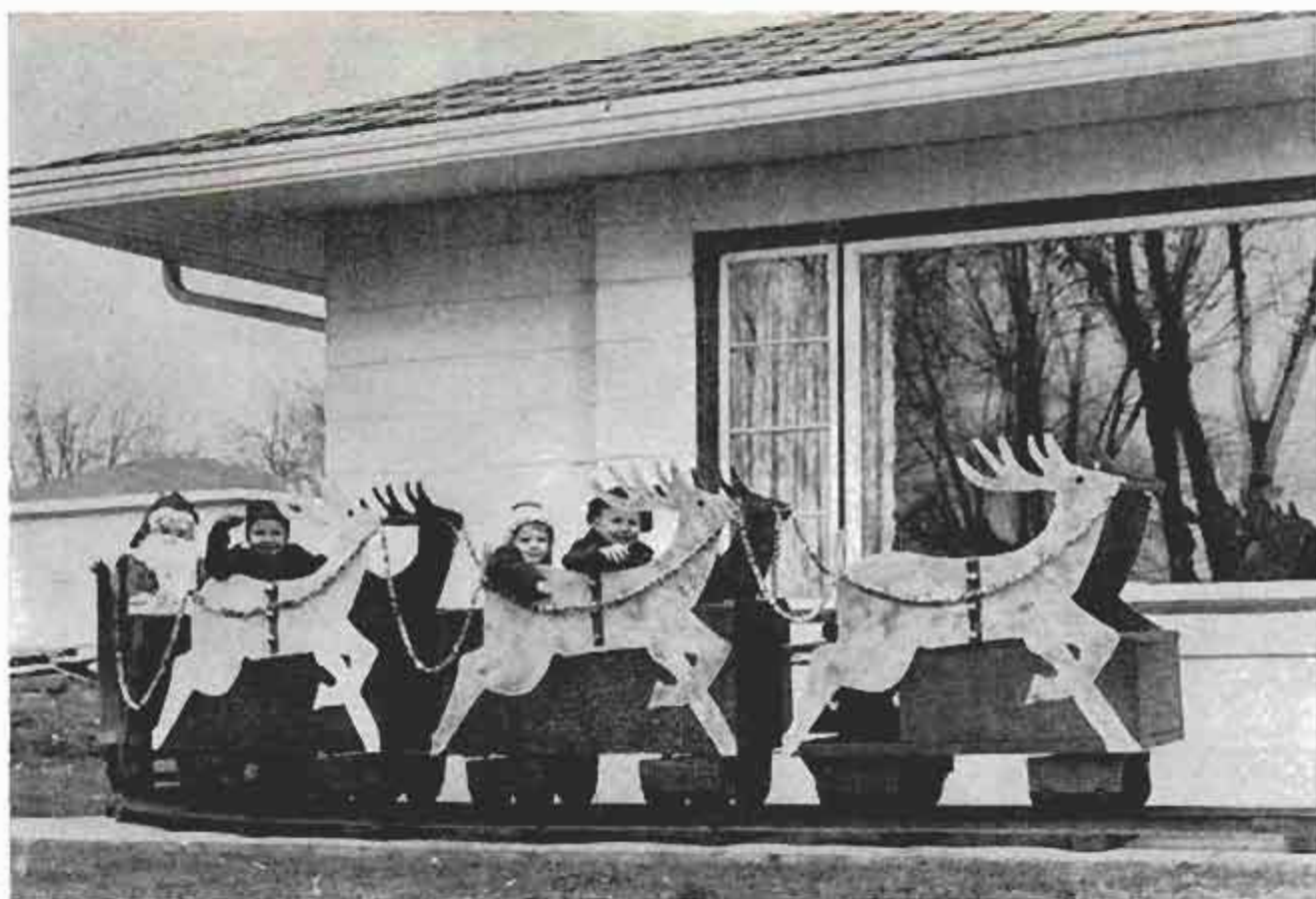
of a button. Mounted on a realistic truck body, the cannon's mount can be turned and the gun raised or lowered by push buttons. A dial on the truck indicates the elevation of the gun to the junior cannoneer. When fired, the gun shoots a harmless, plastic, sponge-rubber-nosed projectile. Current to operate the gun is supplied by two flashlight batteries.



## Chicago Midway Sets Record In Airport Plane Movements

Chicago's Midway airport led the world with 381,737 plane movements in 1955. This volume equaled combined air traffic of London, Paris, Rome, Copenhagen, Oslo and Geneva, with 8886 movements left over. New York's LaGuardia and Chicago's Midway terminals handled more traffic last year than these European cities, plus Amsterdam, Brussels, Zurich, Hamburg and Stockholm, with remaining volume equaling that of Portland, Me.





## Santa Claus Express Encircles Home During Holidays

Christmas time in Jefferson, Wis., means rides on the "Christmas Express" for the children of the town. The Christmas Express is a child-sized train, decorated with cutouts of reindeer and a sleigh, which runs on a track encircling the home of its builder, Robert C. Hearne. Built originally in time for the holiday season of 1954, the train has become an annual affair. It was designed by Hearne, who cast the wheels

in the foundry where he is employed and built the rest of the train up out of steel, wood and composition board. Powered by a 1½-horsepower gasoline engine, the train runs on a 170-foot track which completely encircles the house. The track is made of 12-gauge iron strips bent into channel form. As an added festive touch, the noses of the reindeer light up. A standard automobile battery provides current for these lights.



## Toy Fire Engines Really Pump Water

Latest development in realistic toys is a toy fire engine which is connected to a tiny water hydrant, which in turn is attached to a garden hose. Miniature firemen can have plenty of fun, squirting the tiny hoses at imaginary fires and at each other. The hose can shoot a stream of water 25 feet with pressure on full.

Water sprayed from an airplane extinguished a 50-acre forest fire near Wenatchee, Wash., in the first case on record.



# Radio Television Electronics



Novel amplifier permits hands-free telephoning and spot conferences. Incoming speech is amplified to normal-hearing volume and return conversation from anyone nearby is automatically directed into handset



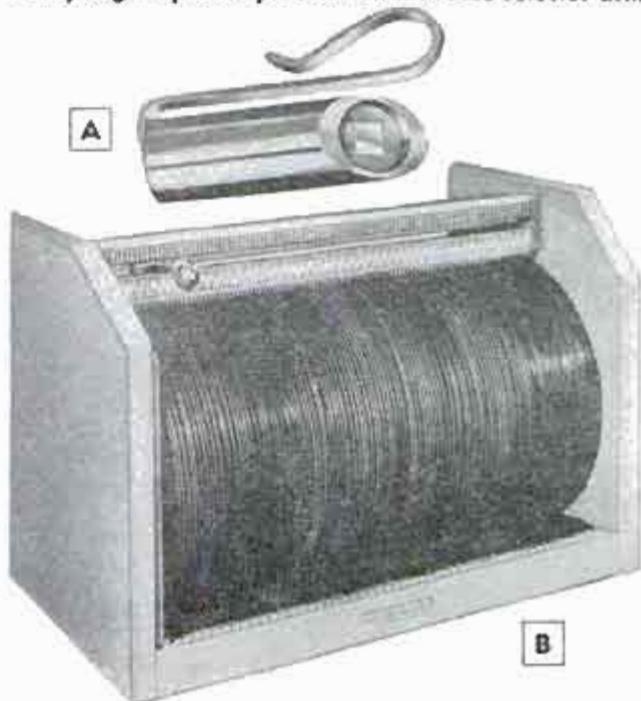
You can change TV stations from distances up to 20 feet from your set with this remote-control tuner called IT. Channel-changing portion consists of a reversible d.c. motor which can be clamped to the channel-selector shaft of most sets. Installation requires only a special key which is supplied with each unit. Finger-tip pressure on touch bar of control unit changes channels in any desired direction

## New Products

New electrostatic speaker claims flat frequency response from 400 to over 20,000 c.p.s. with less than 1 percent harmonic and intermodulation distortion. Accompanying divider network matches the 16-ohm output of any high-fidelity amplifier. It provides the polarizing voltage required by the electrostatic speaker and sends the proper signals to this unit and to any low-frequency woofer with which it will be used



Records will sound better and last longer when tiny Dis-Charger, Fig. A, is clipped to record-player tone arm. Unit draws off static charge as record is played, releasing injurious and noise-producing dust clinging to record grooves. Fig. B: New record file solves storage problem for hi-fi records. Discs are held vertically in numbered rubber slots and ejected by slight upward pressure on movable selector arm





# MAGIC MIKE

(A SAFE AND SIMPLE  
WIRELESS BROADCASTER)

By Otto Fried

**W**IRELESS broadcasters have provided countless hours of fun for young and old for many years. These simple devices permit you to make announcements and play phonograph records through your radio from a remote location without any direct connection to the radio itself. The circuit shown here differs from many similar units in that it is battery operated. This eliminates the shock hazard often associated with line-powered units and provides freedom of location not limited by the availability of line outlets.

There are practically no critical components in the circuit and many experimenters may already have most of the required parts, or suitable equivalents. Even the tubes could be replaced with regular 7-pin miniature 1S4s, such as used in most portable radios. The primary advantage of the subminiature tubes actually employed is the low current drain which considerably increases battery life.

## Alternate Circuits

The electrical schematic diagram of the broadcaster is shown in Fig. 1. The model was designed only for voice broadcasts, but the addition of only four extra parts, wired as shown in Fig. 4, will enable you to broadcast phonograph records as well. To find sufficient space on the front panel for mounting the additional parts, the 67½-volt battery, B2, can be replaced with a



## LIST OF MATERIALS

**RESISTORS** (all ½-watt): R1=39,000 ohms; R2=82,000 ohms; R3=470 ohms.

**CAPACITORS:** C1=.01-mfd. 200-v. paper; C2=50-mfd. 25-v. electrolytic; C3=100-mmfd. disk ceramic; C4=50-mfd. 6-v. electrolytic; C5=70-480-mmfd. mica trimmer.

**MISCELLANEOUS:** SP=3-in. speaker, RCA 231S1 or equiv.; T1=Input transformer, Stancor A4744, 4-ohm pri. to 25,000-ohm sec.; T2=2-winding oscillator coil, Miller 5480-H; L1=5.5-hy. 50-ma. filter choke; V1, V2=1AC5 tubes; B1=1.5-v. standard flashlight battery; B2=67½-v. battery; RFC1=2.5 mhy. r.f. choke; S1=s.p.s.t. toggle switch.

**HARDWARE:** Plastic case, Waldom BC-140; bracket for B1; subminiature 8-prong sockets (2); insulated binding post; aluminum for front panel and bracket; solder lugs (2); 1-terminal tie point; battery connectors for B2; fiber washers (2); machine screws; hex nuts; hookup wire, rosin-core solder.

## ADDITIONAL REQUIREMENTS FOR PHONO CIRCUIT

J1=Phono pin jack; S2=S.p.d.t. switch; R4=1-meg., ½-w. resistor; C6=.01-mfd. 200-v. paper capacitor.

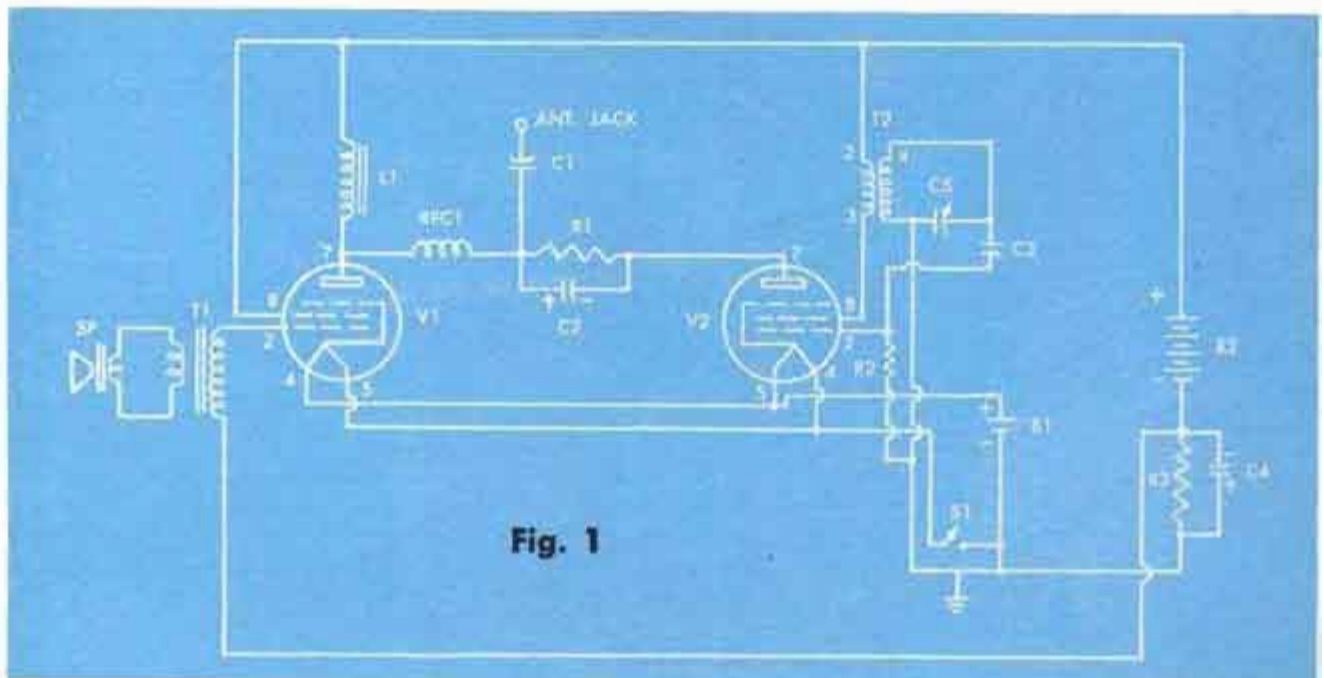
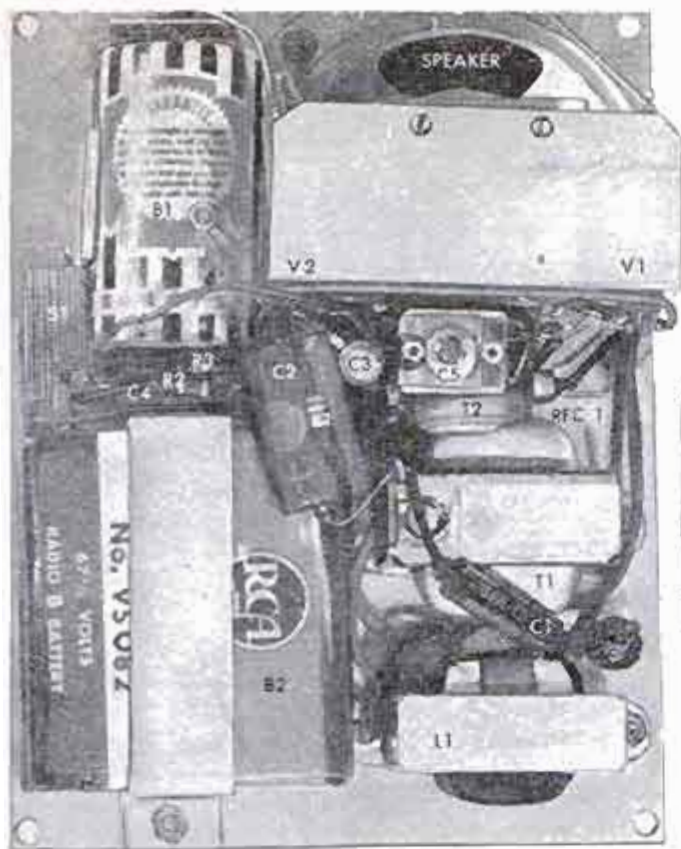


Fig. 1





Photo, above, shows completed wireless broadcaster with all parts mounted on aluminum front panel. Point-to-point wiring and method of mounting tube socket bracket to speaker are shown in pictorials

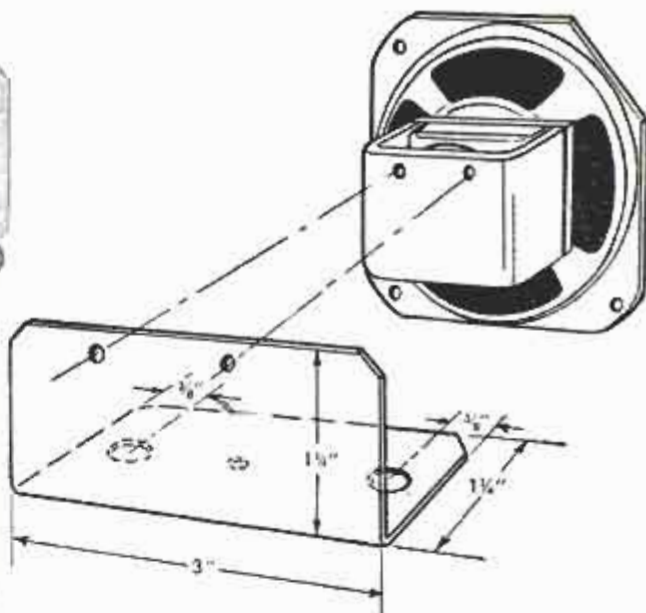
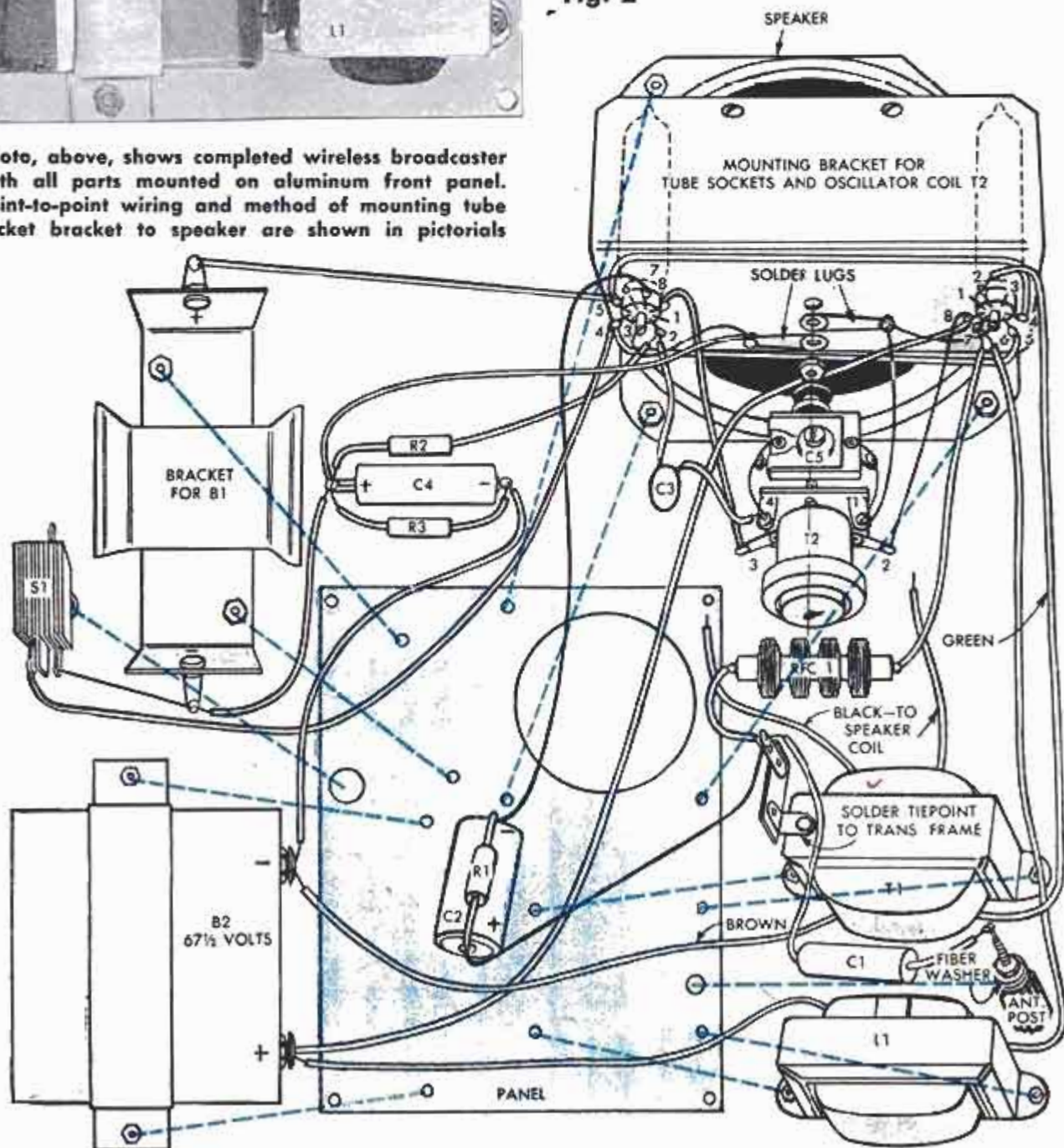
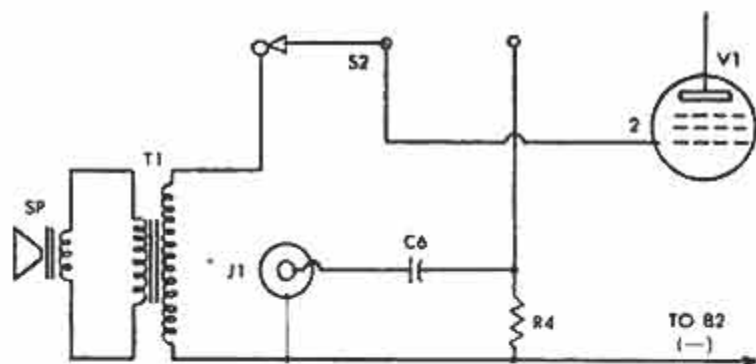
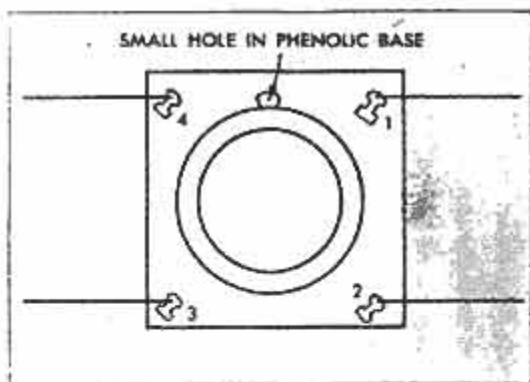


Fig. 2







Figs. 3 and 4, above, show oscillator coil lug numbers and circuit changes for voice and phono broadcasts

smaller hearing-aid type. If you wish to use the unit only as a record broadcaster, the speaker and input transformer may be omitted, and a direct connection from the junction of R4 and C6 to the control grid of V1 should be made.

### Construction Hints

Before starting the construction, it is a good idea to collect all the necessary components and fit them on the front panel in the proper positions, see Fig. 2. You can then drill the necessary panel holes. Both the panel and the tube-socket mounting bracket can be made from a piece of  $\frac{1}{16}$ -in. aluminum which is easily cut and drilled with ordinary hand tools.

Begin the assembly by mounting the tube sockets and oscillator coil. The sockets have no retainer clips, but they fit snugly into their  $\frac{3}{8}$ -in. holes. Before mounting the oscillator coil to the bracket, place two fiber washers, a hex nut and two solder lugs, in that order, on the threaded shaft of the coil. Then insert the shaft through the bracket hole between the two tube sockets and fasten it securely with another nut. The coil should be oriented so that the small hole in its phenolic base, Fig. 3, faces away from the panel.

The binding post which serves as antenna connector must be insulated from the metal panel by means of insulating fiber washers. Since the speaker is mounted at the edge of the panel, the upper right corner of the speaker frame must be clipped off so that the panel can be fastened to the case. A perforated metal grille inserted between the speaker and the panel will protect the speaker cone from damage and add a pleasing appearance to the completed unit.

The trimmer capacitor, C5, should be mounted between lugs 1 and 4 of the oscillator coil by bending the capacitor tabs so that they will make direct contact with the lugs. This makes a rigid assembly so that the capacitor will not move during adjustment. Before fastening the completed panel to the case, drill a 1-in. hole in the back

wall of the case, opposite the trimmer capacitor, so that this unit can be adjusted from the outside.

### Adjustment

To determine if the oscillator of the broadcaster is operating, connect a short wire to the antenna post, turn the broadcaster on, and bring it close to a radio which is tuned to a station between 600 and 1400 kc. Then, using a screwdriver, adjust the trimmer capacitor through the hole in the rear of the case. At some point, a loud whistle will be heard in the radio, indicating that a signal is being generated.

Now tune the radio to an "empty" spot on the dial (where no station is heard) and readjust the trimmer capacitor until you hear a background hiss through the radio. This indicates that the broadcaster and radio are tuned to the same frequency, and it is merely necessary to talk into the speaker of the broadcaster in order to be heard through the radio. It may be necessary to touch up the radio tuning slightly for best reception.

### Using Your Broadcaster

A wireless broadcaster is in reality a miniature radio station. Its use is sanctioned by the Federal Communications Commission only if the power output from this device is small enough so that no interference is caused to neighboring radios. The range of the unit, therefore, must be limited to approximately 50 feet. Normally, this range can be obtained with a wire 10 or 15 feet long attached to the antenna post of the broadcaster. Never use an antenna longer than necessary to give good results through your own radio.

The length of the antenna will slightly affect the frequency of the broadcaster signal. It might be necessary, therefore, to change the setting of the radio or to retune the trimmer capacitor, C5, whenever you use a different antenna. A little experimentation will acquaint you with the characteristics of the unit, and you'll agree that the results are worth the effort. ★ ★ ★





*Gift wrapping as the experts do it is neat and conservative, and often symbolizes the occasion or the hobby, vocation or personality of the recipient*

"Sasbeen" Ribbon photo

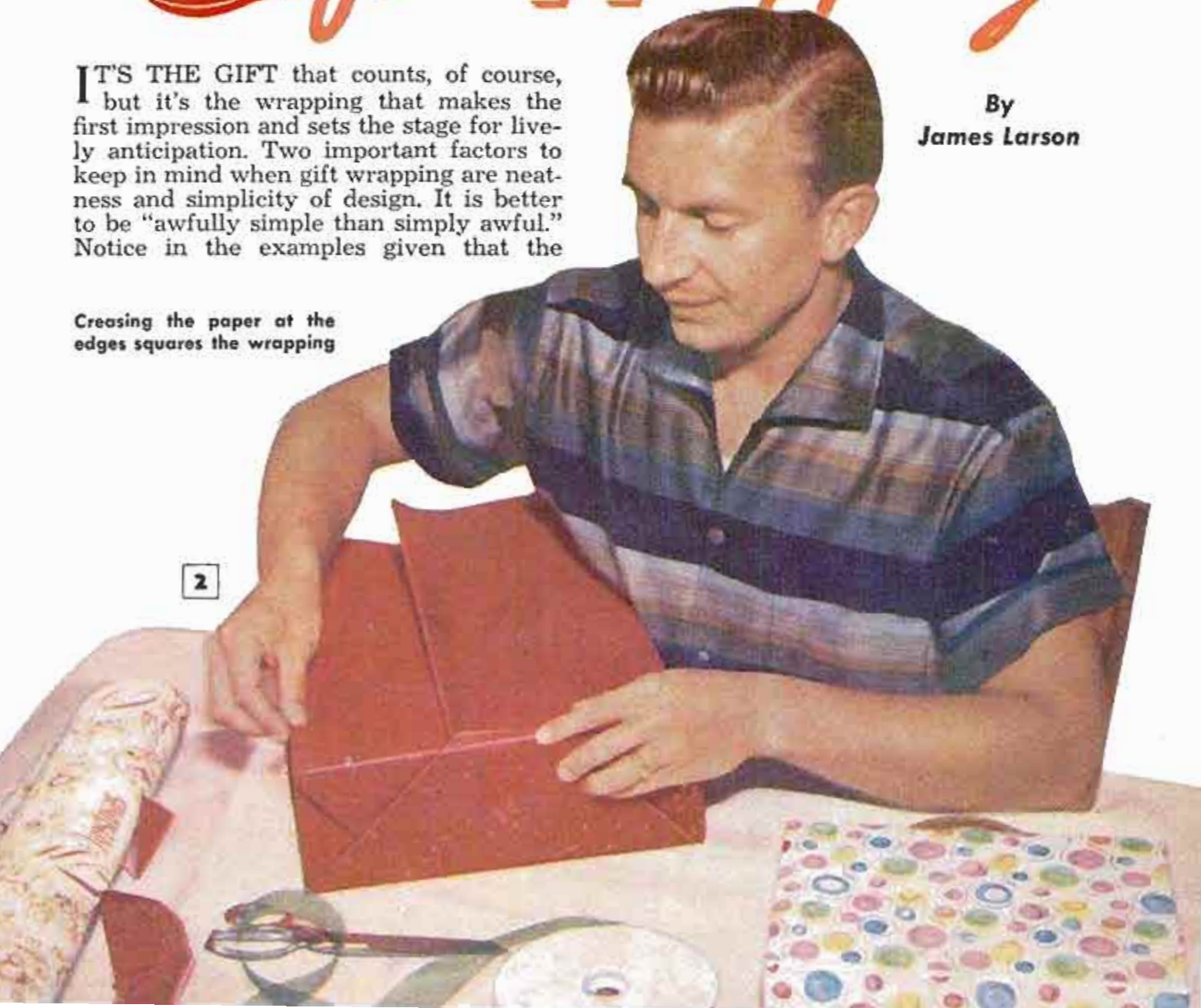
# Gift Wrappings

**I**T'S THE GIFT that counts, of course, but it's the wrapping that makes the first impression and sets the stage for lively anticipation. Two important factors to keep in mind when gift wrapping are neatness and simplicity of design. It is better to be "awfully simple than simply awful." Notice in the examples given that the

By  
**James Larson**

Creasing the paper at the edges squares the wrapping

**2**







3

Above, silverware gift personalized by using three pieces as decoration. DAD spelled with cigarettes

designer depends on the paper for coloring and not on ribbon decoration. Also notice that mostly metallic papers are used, their plain colors being highlighted by simple decorations of ribbon bows or practical, useful objects peculiar to the occasion, or to the personality, hobby or vocation of the recipient.

Figs. 3, 12, 14 and 15 are good examples of wrappings designed for the occasion. In Fig. 3, Dad's birthday gift is wrapped with paper in a conservative color. A little ribbon decoration and lettering done with cigarettes completes the package. For a bridal shower or wedding-anniversary gift of silverware, three pieces of silverware stitched to the wrapping and augmented with a ribbon bow definitely key the gift package to the occasion.

What could be more appropriate for a baby-shower gift than a stork decoration as in Fig. 12? The stork is shaped from a



4

Small gift package gains stature when wrapped as above and tied with artificial flowers. Package at right wrapped with velour paper. Shirt cuffs and collar are simulated with the same paper. Tie is ribbon with silver cord for clasp. Stitching is imitated with glitter glued on, and cuff links are small tree ornaments. Below, metallic-paper wrapping decorated with dime-store glass flowers produces a colorful package of unusually neat appearance



5

6





large safety pin. Bits of stiff ribbon through the eye of the pin simulate wings; a round toothpick takes care of the beak from which is hung the paper diaper carrying a tiny doll or the name card.

A wrapping symbolic of his hobby or vocation will tickle the vanity of any man. Such a wrapping is not intended to give an inkling as to what's inside nor represent the gift itself. Examples given in Figs. 1, 6, 8 and 10 should start you off. The "candy cane" saw decoration pictured in Fig. 1 is ideal for the handyman. It is a keyhole saw wrapped in red paper and then wound spirally with narrow white ribbon. A ribbon poinsettia adds the floral effect.

Tree decoration at right formed with Hawaiian lei glued on and ornamented with small tree ornaments and silver cord with star at top. Below, artificial fishing fly symbolizes recipient's hobby. Hook should be shielded



Alex's Floral Supply photo

7



"Sasheen" Ribbon photo

8

A corsage of live or artificial flowers is an ideal decoration on a gift preceding a social engagement. The corsage can be removed and worn



9

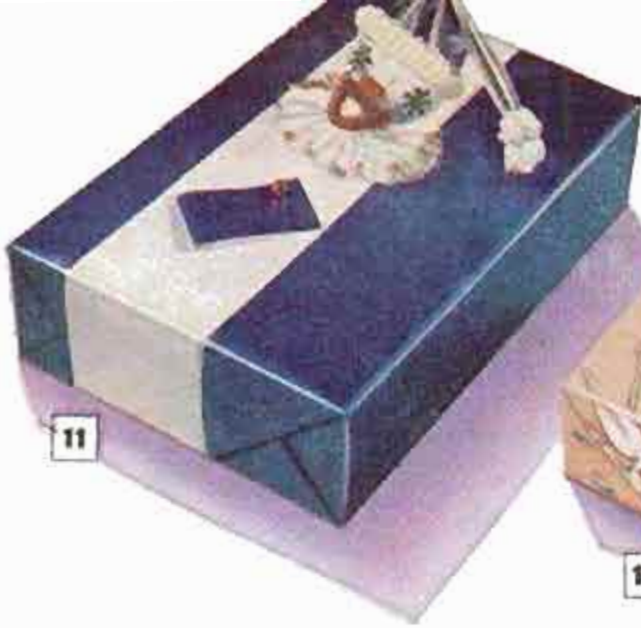
For a gift to a man who has a home workshop, try the wrapping below. The decoration is a circular-saw blade. "Sasheen" ribbon forms bow, which is wound to simulate wheel spokes

"Sasheen" Ribbon photo



10





11



12

Metallic paper, a Santa Claus head and a wide ribbon band combine to produce the neat, attractive wrapping above. What could be more appropriate for the baby-shower gift than the stork decoration at the right? The stork is bent from a safety pin, wings are stiff ribbon and the beak a round toothpick. Paper diaper holds a tiny doll

Aleen's Floral Supply photo



13



Aleen's Floral Supply photo



Aleen's Floral Supply photo

14

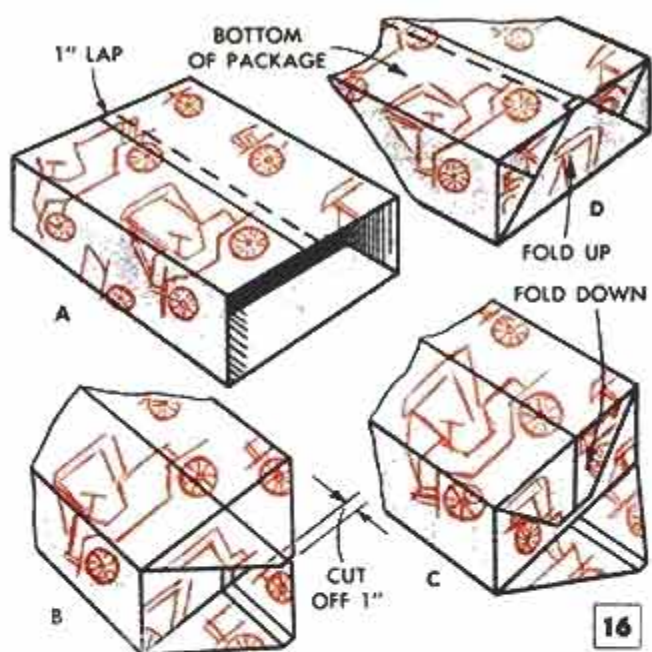
Packages above show what can be done with colorful paper and simple decorations. Left-end package is decorated with Puffed Wheat and ribbon, while the one at the right end is done with Styrofoam and artificial leaves. Wrappings below are ideal for Christmas packages

Aleen's Floral Supply photo

15







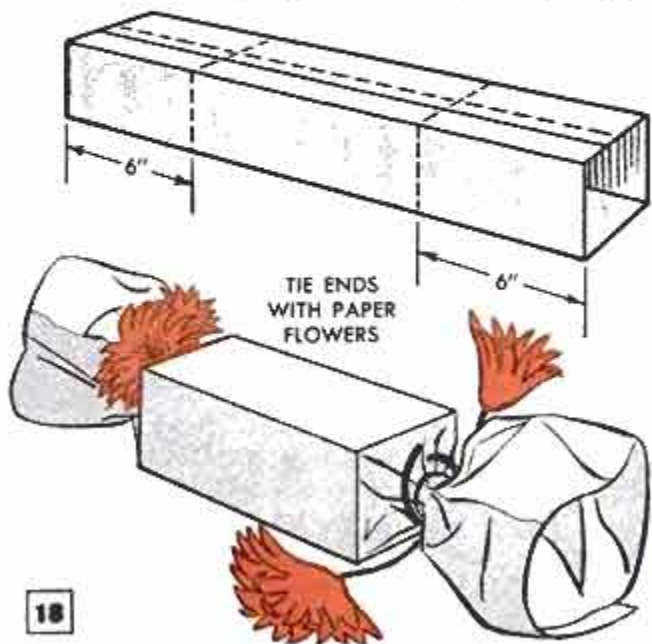
Steps in wrapping packages to get neat square ends

For the sport-shirt fancier, try the wrapping shown in Fig. 6, which also gives the key to the shirt inside. The package is wrapped in velour crepe paper or similar material, after which collars and cuffs are simulated with the same material and glued in place. Stitching is imitated with glitter glued on, and cuff links are tiny ornament balls glued in place. The tie is ribbon with gold cord for the clasp.

The standard, but welcome, necktie gift shown in Fig. 8 becomes more personalized when decorated with a practical symbol of the receiver's hobby—in this case a colorful fishing fly. Point of the hook should be shielded with several wrappings of cellulose tape.

Fig. 10 is a wrapping for the "Big Wheel" with a power saw in his home shop. Done in a wheel motif complete with ribbon spokes, the decoration on this package is a circular-saw blade. Cellulose tape is

This method of wrapping makes small package larger



18



17

Amount to cut off varies with different packages

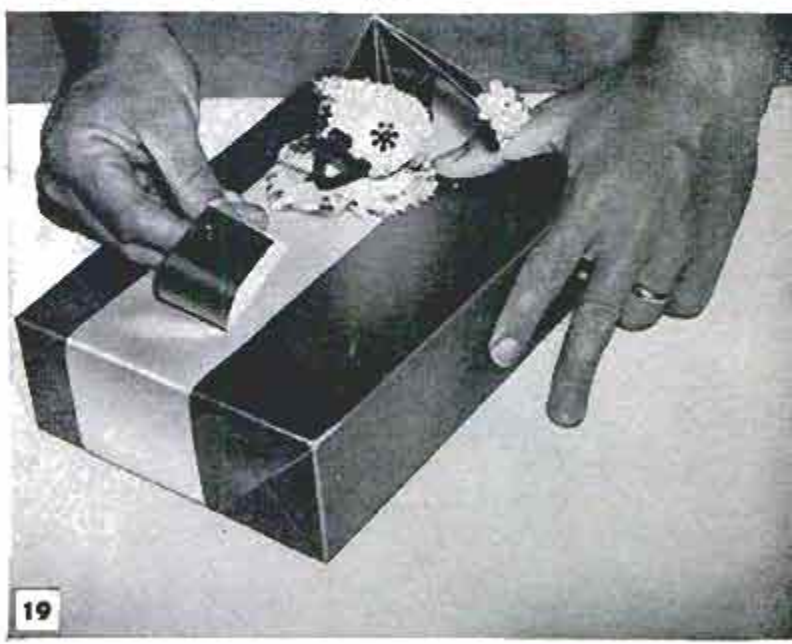
folded over the saw teeth to prevent possible injury.

Your "precious things come in small packages" type of gift that always seems so inconspicuous in size will increase in stature if wrapped as in Figs. 4 and 18. Paper or other artificial flowers are used as ties at the ends. Other ties suitable to the occasion may be used.

For a gift preceding a social engagement the package in Fig. 9 depicts a dual-purpose decoration. The package is wrapped in metallic paper and decorated with a corsage of live or artificial flowers, which are removed and worn by the recipient.

When wrapping Christmas gifts it is hard to beat the simplicity and good taste of the wrappings shown in Figs. 7, 11, 14 and 15, and the right and left-hand packages of Fig. 13. The white tree, Fig. 7, is shaped with a Hawaiian lei glued in place

Using folded strip of wrapping paper as name card



19



Word NOEL spelled out on base-metal trays. Metal is available at most hobby shops. Letters are outlined with glue, then sprinkled with glitter. Ribbon streamers complete this unusual wrapping



Aleen's Floral Supply photo

and ornamented with small tree ornaments, silver cord and a small gold star. In Fig. 11, a Santa head and white ribbon contrast with a blue metallic paper to produce a neat effect. Notice in Fig. 19 how a folded strip of the paper serves as the name card.

The two Christmas packages of Fig. 13 are very easy to wrap. The snowman is made of Puffed Wheat kernels and decorated with a marshmallow hat and red cinnamon-candy buttons. Arms, ear muffs and hat top are chenille, all glued in place. The lantern decoration in the right-hand detail is shaped from half-round pieces of Styrofoam, sprayed with gold glitter and completed with dime-store leaves and ribbon. Candle flame is a piece of red chenille.

Notice in the two center wrappings of Fig. 13 how simple ribbon decorations relieve the lines of striped paper.

Fig. 14 shows what can be done with gold metallic paper, Styro-

foam eggs, gold cord, sequins and evergreen sprigs. The eggs are shaped to resemble tree ornaments, colored and then decorated with pearl-headed pins and sequins.

Green metallic paper, artificial snow and small pine cones are combined to produce the wrapping in Fig. 15. The green-fern effect is achieved by using a flattened fern as a stencil and spraying the snow over it.

The word NOEL is spelled out on the package in Fig. 20 on base metal, obtainable from hobby shops. The metal is formed into trays. Each letter is first drawn on a tray with glue, then sprinkled with glitter and the surplus shaken off, allowing a little to adhere to the wrapping paper. Trays and ribbon are glued to the wrapping.

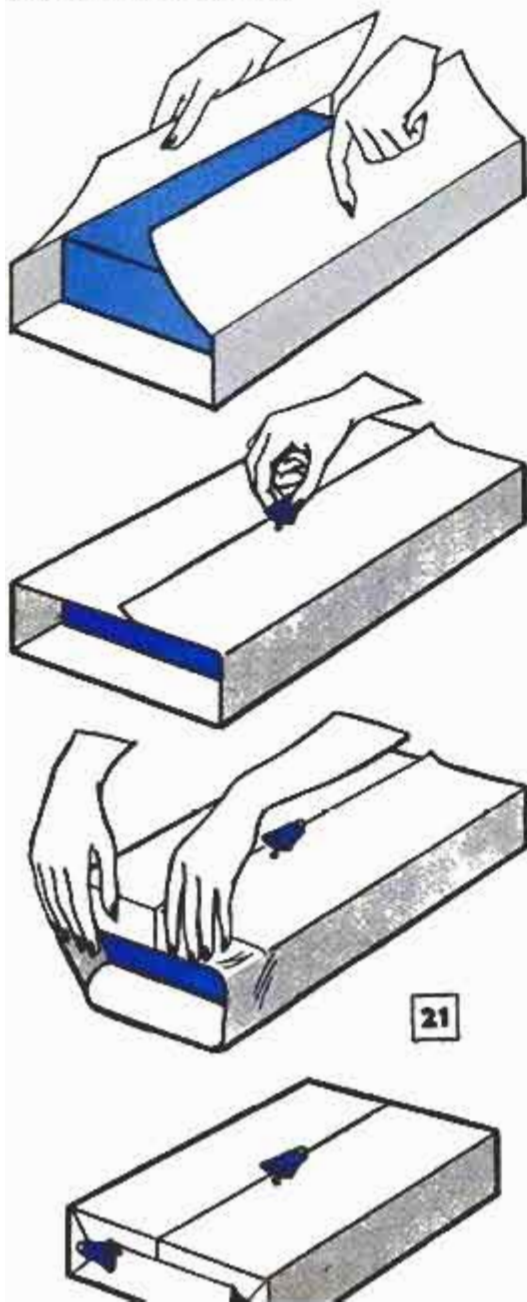
When designing a gift wrapping remember the plainer the paper the more elaborate the decoration may be, and the busier the design the more conservative must be the decoration. But no matter how well the design is worked out, the whole effect will be lost if the package is not wrapped neatly.

Fig. 16 shows one method of wrapping. First, size the wrapping carefully to the package, allowing 1 in. overlap in width, and letting the ends project an amount equal to the thickness of the package plus  $\frac{1}{4}$  in. Then proceed as indicated by steps A, B, C, D, cutting off one flap as in Fig. 17.

The wrapping method illustrated in Fig. 21 shows how to fold a wrapping without cutting the ends, but requires accuracy to produce a neat package.

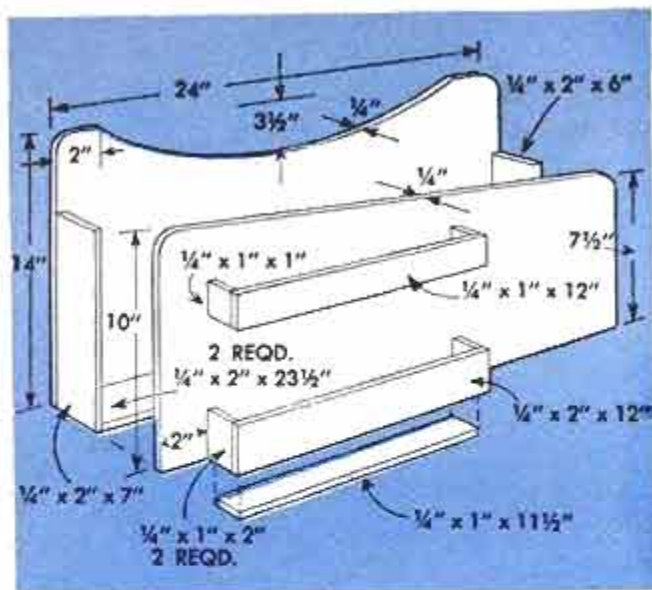
After folding and securing one end of the wrapping, creasing the edges as in Fig. 2, especially on metallic papers, squares the package for neater appearance.

★ ★ ★



Steps in wrapping gift without cutting the ends of the paper





## Wall-Type Magazine Rack Held at Eye Level

With this magazine rack mounted on the wall next to your favorite easy chair, reading material is held at eye level for easy selection. All parts are cut from  $\frac{1}{4}$ -in. plywood to the dimensions indicated in the detail. Sand smooth all edges that will be

exposed in the finished assembly, and check the pieces for proper fit before assembling the rack. Glue the pieces together, reinforce with brads or wood screws and finish the rack with stain and varnish. Ted Fenn, Chicago.

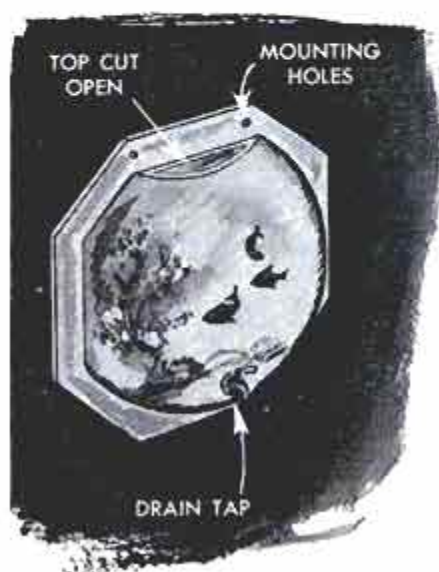


## Three-Dimensional Star Ornaments Made From Aluminum or Tin Foil

Attached to the branches of a Christmas tree with bits of wire, these star ornaments shine brightly when viewed from any direction. Use aluminum-coated insulation paper or heavy tin foil, and lay out circles of various sizes on one side of the material. Adjust the compass and divide each circumference into five equal parts. Then draw lines between the points to form a star and cut them out accordingly. Staple two identical stars together at the center and fold them apart for a three-dimensional effect.—Ken Murray, Colon, Mich.

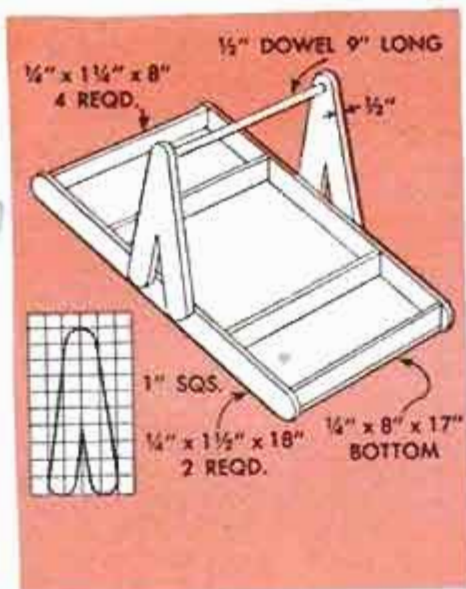
## Wall-Mounted Aquarium Made From TV Lens

This intriguing three-dimensional aquarium mounted on a wall at eye level is made from a liquid-filled magnifying lens such as is used to enlarge the picture of a small television set. The first step is to drill a hole in the bottom of the lens and drain the oily liquid. Next, saw off the upper portion of the plastic lens as indicated and clean the inside. Then, cement a drain tap in the hole at the bottom and mount the aquarium with screws.—Robert Benderoth, Whippany, N. J.



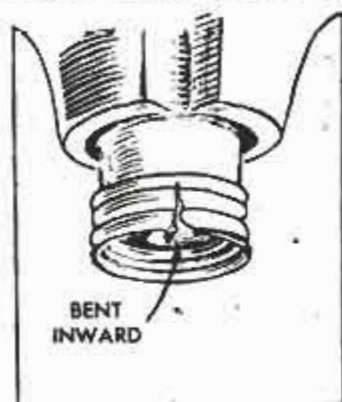


# Handy Snack Tray for Serving Television Viewers



With this handy tray the housewife can save steps when serving a snack to guests watching TV. Unlike ordinary serving trays which require two hands for carrying, this tray has a dowel handle over the center of the tray. End supports for the handle are cut to the shape indicated after first drawing on the wood from a full-size paper template. The tray itself is assembled from pieces of  $\frac{1}{4}$ -in. plywood.

## Light Bulb Kept Tight



When a light bulb in a rigidly fastened socket frequently becomes loosened because of vibration, a slight alteration in the socket will eliminate the problem. Disassemble the socket to get at the thread-forming

portion and make a cut,  $\frac{1}{4}$  to  $\frac{3}{8}$  in. long, in the socket as indicated. Then bend one edge of the cut inward so that it bears against the lamp base, allowing the bulb to be screwed into the socket, but resisting motion in the opposite direction.

## Determine Area of Odd Shape By Weighing Hardboard Cutout

The area of a flat surface that has an irregular shape can be determined easily by tracing and cutting the shape from a piece of hardboard, then dividing the weight of the cutout by the known weight per sq. in. of the hardboard. As an example:

Size of hardboard—15 x 10 in.

$15 \times 10 = 150$  sq. in. (total area)

Weight of hardboard—22.5 oz.

$22.5$  divided by  $150 = .15$  oz. per sq. in.

Weight of cutout—12 oz.

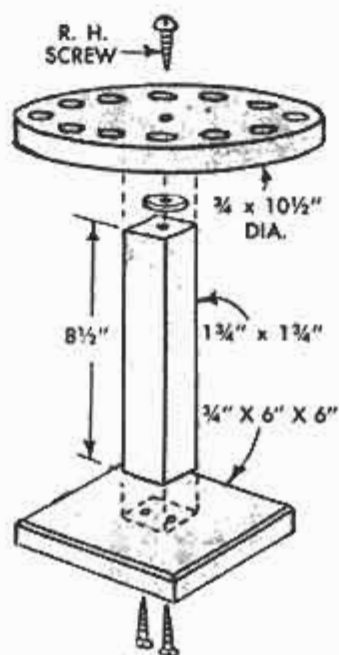
$12$  divided by  $.15 = 80$  (area of irregular shape in sq. in.)

The same method can be used to determine the area of large surfaces, such as a lake, except that the tracing must be an accurate reproduction made from a map with a scale of at least 1 in. equaling 1 mi.

## Lazy Suzan Keeps Small Tools Handy

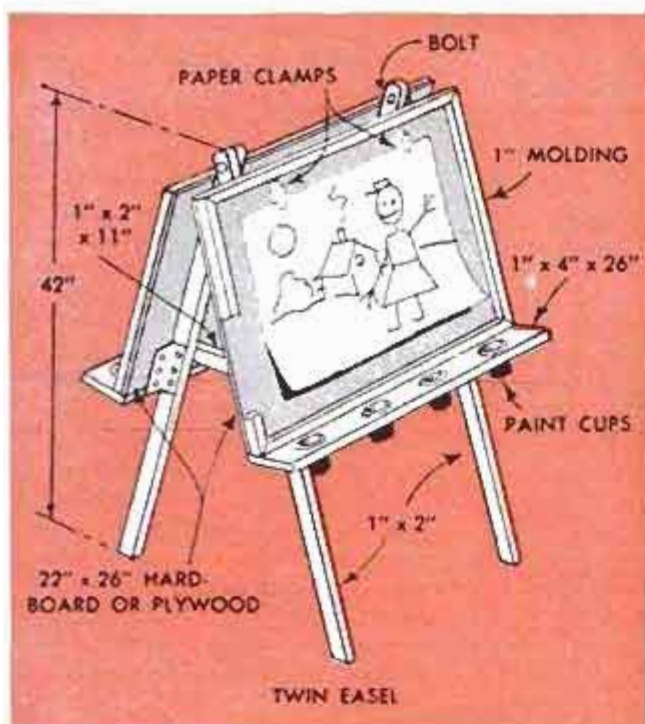
Screwdrivers, punches, wood chisels and other small tools will be readily at hand if they are kept in a rack like this one. Movable from place to place, it also rotates for easy tool selection. The rack is made of wood, the holes in the disk varying in size according to the tools kept in them. Bore the holes for the tools from both sides to prevent chipping.—Victor H. Lamoy, Upper Jay, N. Y.

☐ A piece of aluminum foil beneath the scarf on a dresser or vanity table will protect the furniture finish against stains and damage from spilled cosmetics.





## Twin Easel Provides Ample Work Space for Two Young Artists



For your next home-workshop project, why not make this double easel for your children, or as a gift for other young artists? If they like to paint, they will appreciate having an easel of their own, and it will give them an incentive as well. Instead of scattering material all over the dining-room table, or elsewhere, they will have a definite place to do their painting. The twin easel in the photo above was not designed to fold, but hinged brackets in place of the cross braces will make it collapsible. The four legs are each 42 in. long and cut from 1 x 2-in. stock, which is

also used for the cross braces. Two pieces of plywood, 22 x 26 in., provide the work surfaces, and are framed with 1-in. molding. Trays are made from two pieces of 1 x 4-in. stock 26 in. long which have four large holes drilled in them to accommodate paint cups. The trays are screwed to the plywood panels which are attached to the legs with L-shaped brackets. Legs are joined at the top with  $\frac{1}{4}$  x 2-in. bolts, which also are used for the braces, installed 18 in. down from the top. Protect the wood with a hard-gloss finish that will prevent staining and permit spilled paint to be wiped off easily.

## Shield Protects Wooden Surface From Glancing Hammer Blow

When assembling finished parts with nails this shield will protect the surface from a glancing hammer blow. In a square of  $\frac{1}{8}$ -in. hardboard, drill a hole large enough for the nailhead to pass through. Place the shield on the surface of the work as shown, and drive the nail flush. Remove the shield and seat the nail with a nail set. A thick rubber tile will do too.

## Car-Trunk Lock Altered to Permit Removal of Key When Lock is Open

If the key to the trunk of your car cannot be removed when the trunk is open, place the key in the lock, turn it to the unlock position and yank it straight out with a pair of pliers. In most cases, the burr which prevents removal of the key will be broken off by the key as it is pulled free.

David Dawson, New Berlin, N. Y.





WTMS 0

# LACHLAN MACLEAY

## THE TOWBOAT THAT MASTERED THE WILD MISSOURI



Federal Barge Lines, Inc., photo

Federal Barge Line's new Missouri River towboat, the LACHLAN MACLEAY, celebrated her maiden voyage May 1956 by pushing a record-breaking 9000 tons of freight in 11 barges to Kansas City. Especially designed for the shallow, fast-winding Missouri, the MACLEAY is equipped with four propellers, each powered by a 900-hp. diesel engine, and 10 rudders. Although she measures 162 ft. long and 45 ft. wide, she draws only 5½ ft. of water. Her four stacks make her unique among river towboats and quickly identify her

By Louis Martin Reitz

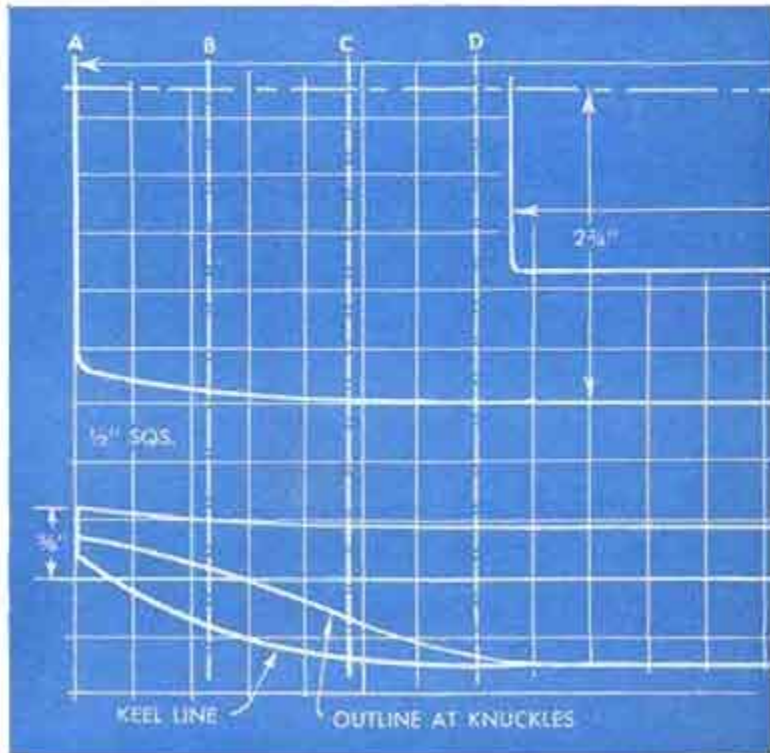
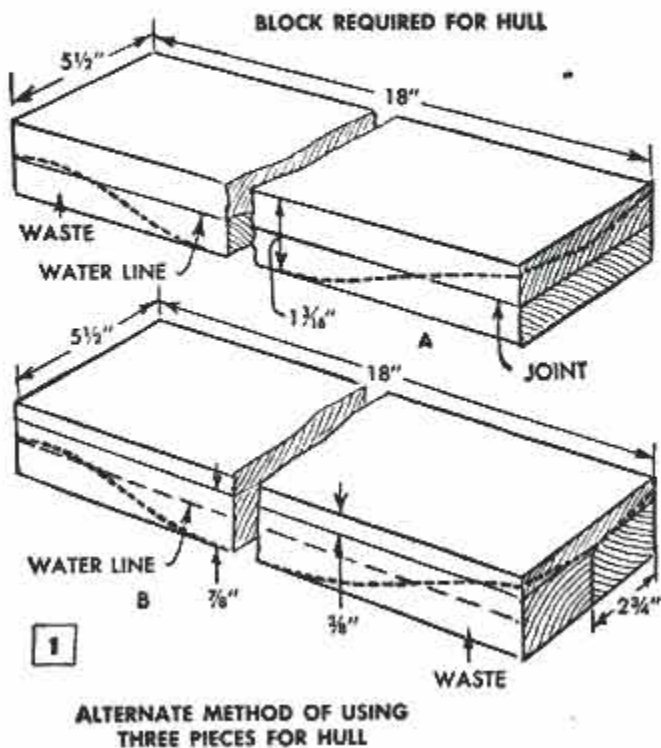
### PART I—THE HULL

SAND BARS of the Big Muddy mean nothing to the towboat *Lachlan Macleay*. When she runs into one of the many that block the shallow channels of the swift Missouri, she simply changes from a pusher to a puller. Here at the head of the tow she literally washes away the river road block with her four huge propellers to clear her loaded barges. Unique in towboat design, the *Macleay* is equipped with 10 rudders. One is mounted aft of each propeller to guide the towboat when going forward and three smaller, backing, or

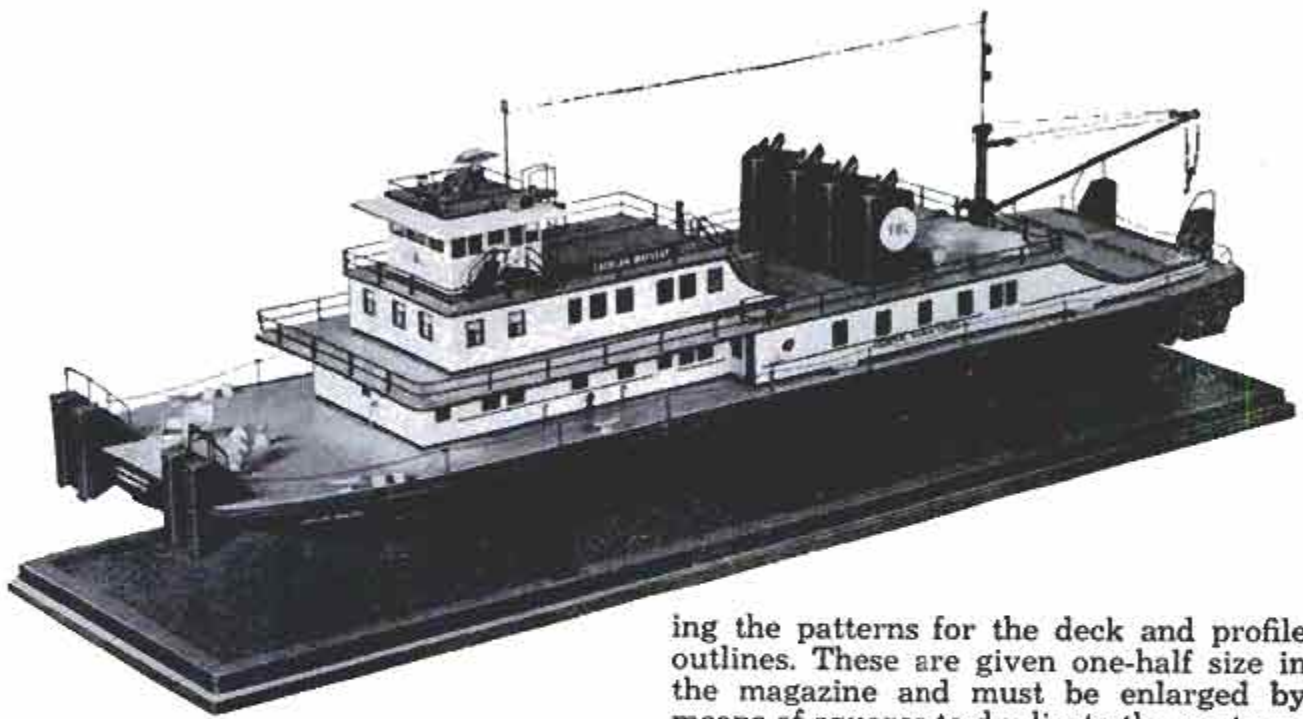
flanking, rudders are mounted ahead of each pair of propellers to steer the *Macleay* when her four powerful engines are reversed. Fitted with towing knees at both bow and stern, she can handle tows up to 1000 ft. long with a cargo capacity of nearly 10,000 tons.

#### Modeling the Hull

This 18-in. prototype is built to the scale of approximately 1/8 in. to the foot. You have a choice of carving a keel model as described here, or a simplified water-line







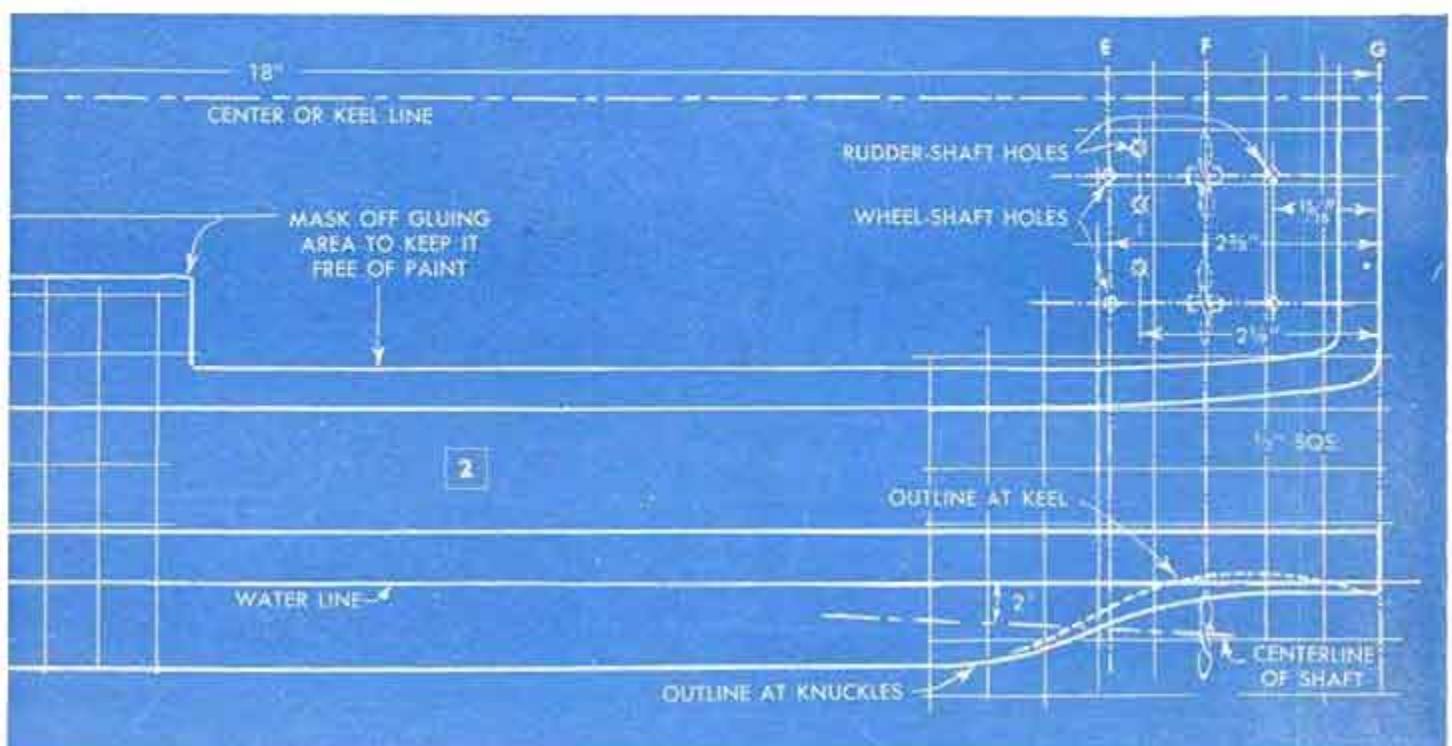
model. Fig. 1 shows two ways to build up the block for the hull. The original model was carved from a two-piece block as in detail A, letting the joint serve as the water line. This method also permits the center of the upper layer to be cut out to lighten the model, after which a piece of hardboard is used as a deck. Where a bandsaw is not at hand for sawing a block 5½ in. wide, you might find it easier to work with a block consisting of three pieces as in detail B, in which case the two lower parts can be sawed and carved separately before gluing the three together. Of course, if you prefer, you can start out with a single solid block.

Follow the drawings in Fig. 2 for mak-

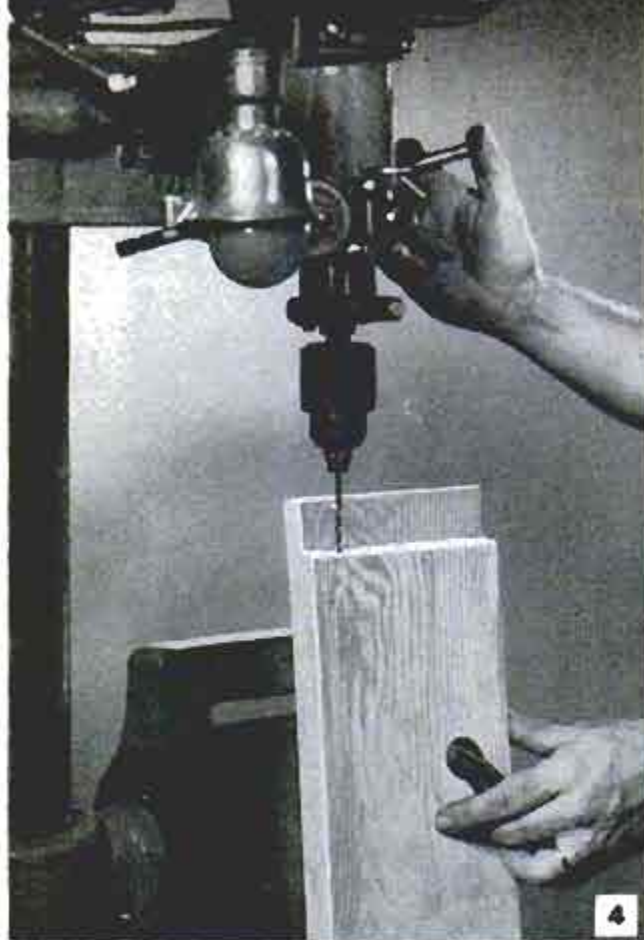
ing the patterns for the deck and profile outlines. These are given one-half size in the magazine and must be enlarged by means of squares to duplicate the contours at the bow and stern. Mark off on the patterns the locations of the station lines A, B, C, etc., as well as the locations of the holes for the rudder and wheel shafts. For the most part the hull is "brick shape" and maintains the same deck contours at the stern and bow.

#### Tunnels Can Be Omitted

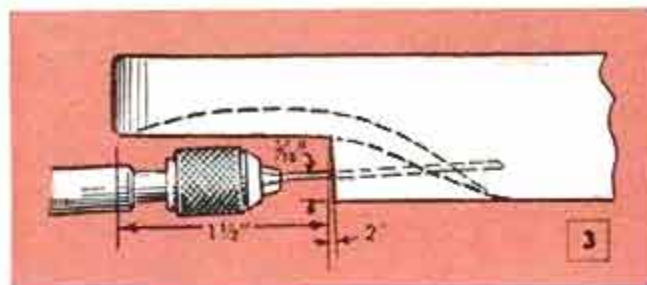
On the underside of the hull at the stern are recesses called tunnels in which the wheels, or propellers, are mounted. This is a feature of the *Macleay* which permits the use of propellers some 12 in. greater in diameter than the normal draft of the boat. As the propellers are mounted to bring the blades just even with the bottom of the hull, the tunnels provide necessary







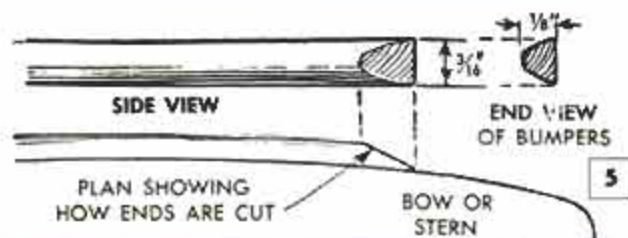
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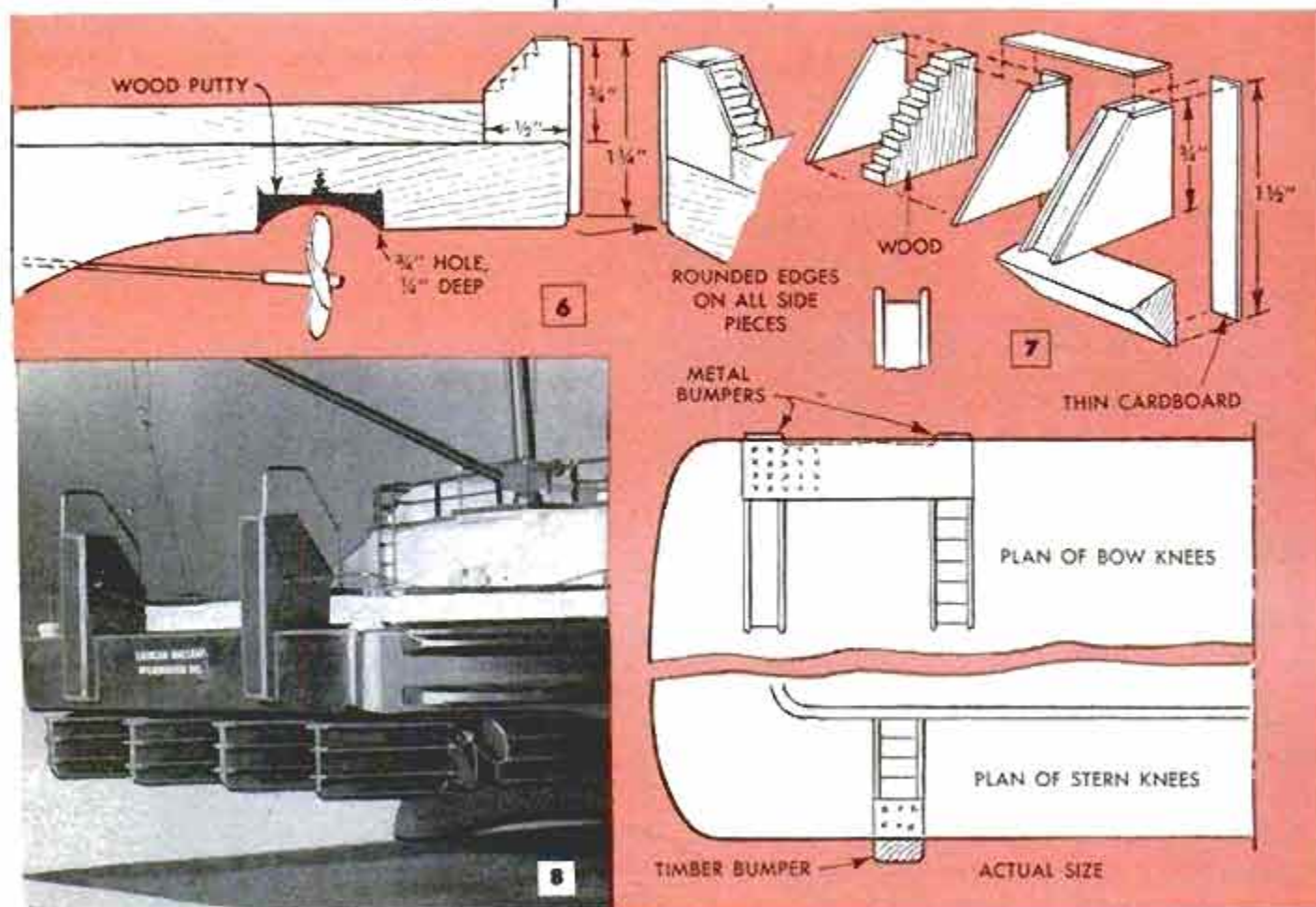
3

clearance for the prop blades at the top. When the boat is not under way, the tunnels, being above the water line, are filled with air, but once the propellers start churning, they pull water into the tunnels. Reproducing the tunnels on the model requires extra work and they can be left off if you wish, without spoiling the appearance of the model in any way.

Now trace the deck plan on the hull block and mark the locations of the wheel and rudder-shaft holes. Saw off the rounded corners at the bow and stern and tack these waste pieces back on temporarily so that all of the profile outline can be traced on the edges of the hull block. Next, drill the rudder and wheel-shaft holes through the block. The holes for the propeller shafts should be drilled at this time too. Figs. 3 and 4 show how this is done by first sawing a notch on the underside of the stern. This provides a flat surface for starting the holes and drilling them at the required 2-deg. angle.



5



6

ROUNDED EDGES ON ALL SIDE PIECES

7

METAL BUMPERS

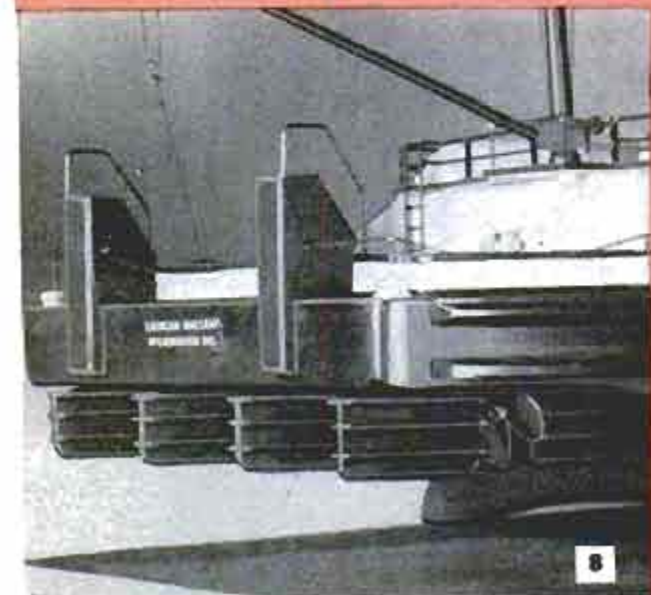
THIN CARDBOARD

PLAN OF BOW KNEES

PLAN OF STERN KNEES

TIMBER BUMPER

ACTUAL SIZE



8



Before you can start carving the hull you must make a set of carving templates. These are given actual size in Fig. 9 to make it easy to trace them off onto thin cardboard. In studying Fig. 2 you will notice that the hull between stations D and E maintains a rectangular cross section, the lower edges, or knuckles, being merely rounded. There is a separate template included for checking this portion of the hull.

The templates represent the sectional shape of the hull at each respective station line and are used to check the contour at these points as the carving progresses. While the templates are given as half-templates, and can be used in this form, they can be drawn their full width. A centerline is marked on each one and this point is held in line with a centerline drawn on the underside of the hull when the template is used to check the contour.

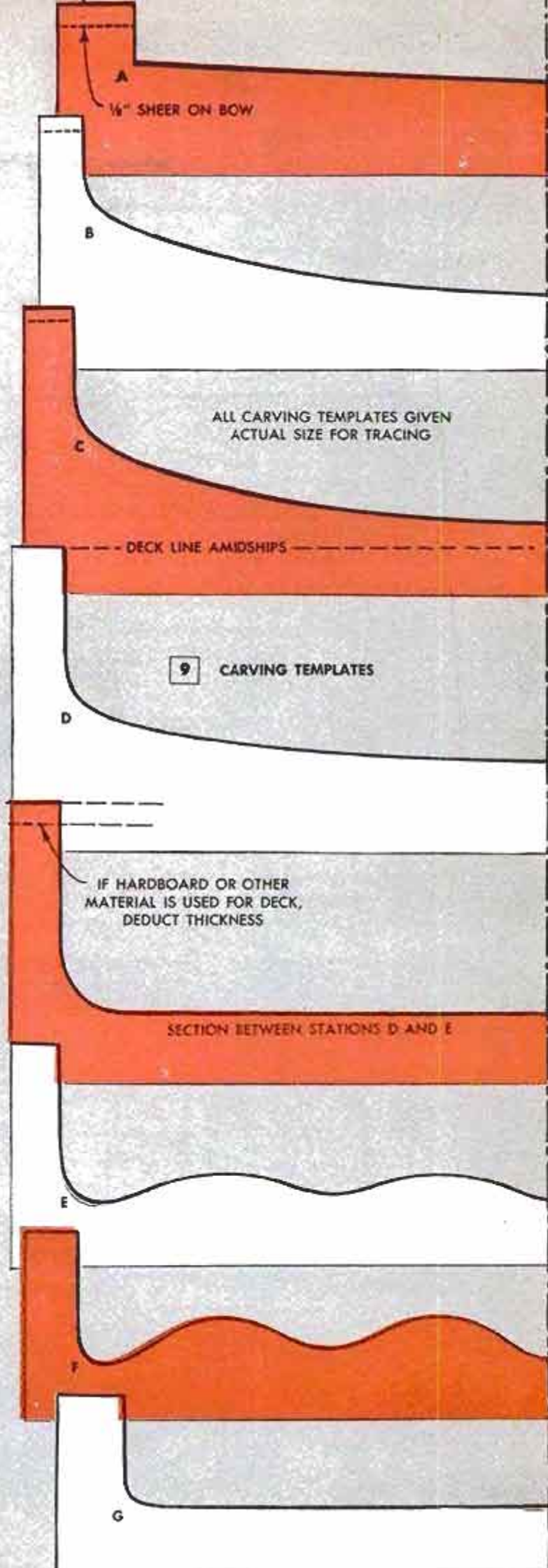
With the profile outlines on the edges of the hull block start roughing away the waste from these lines down to the keel, or centerline. A sharp chisel, a wood rasp and sandpaper can be used for this. A gouge will be needed to form the tunnels at the stern. If the tunnels are omitted, clearance for the propellers can be provided by boring a  $\frac{3}{4}$ -in. hole in the underside of the stern above each propeller as shown in Fig. 6. Wood putty can be used to dish the hole.

The bumpers are next. These are applied to both port and starboard sides of the hull and are shaped as indicated in Fig. 5, two being applied on each side with glue,  $\frac{3}{8}$  in. apart. At this point, fill all holes and dents with wood putty or patching compound. When dry give the hull a careful sanding with medium and then fine-grade sandpaper.

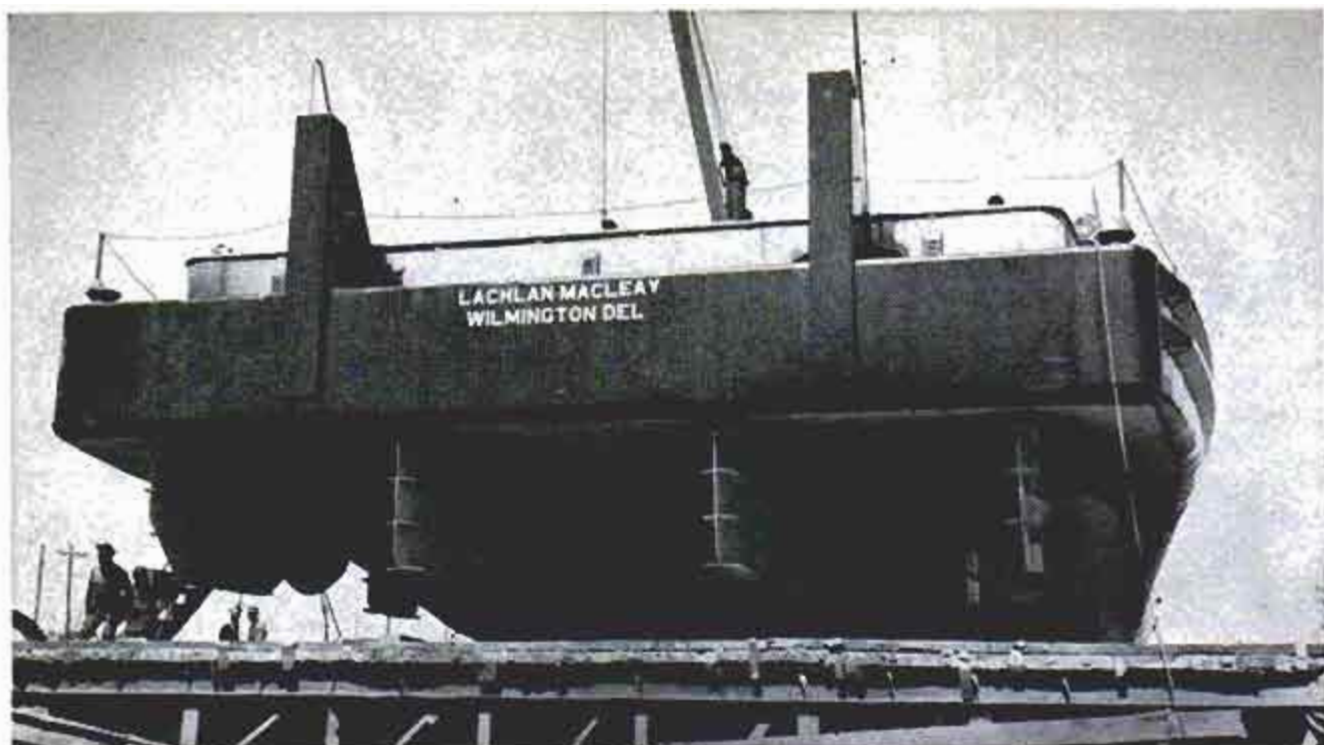
The *Macleay* is one of the few towboats equipped with towing knees fore and aft and its knees are purposely made high so they will make contact with a barge whether it be loaded or empty. Fig. 7 details the knees for the model. Single knees are added at the stern, while double ones are fitted at the bow. The actual-size plan views in Fig. 7 show where the respective knees are located. Each one is fitted with a handrail.

#### Prime the Hull Now

This is a good stage to give the hull a priming coat. For this you







Stern view of the *Macleay* in dry dock shows her four giant 80-in. propellers and four of her ten rudders

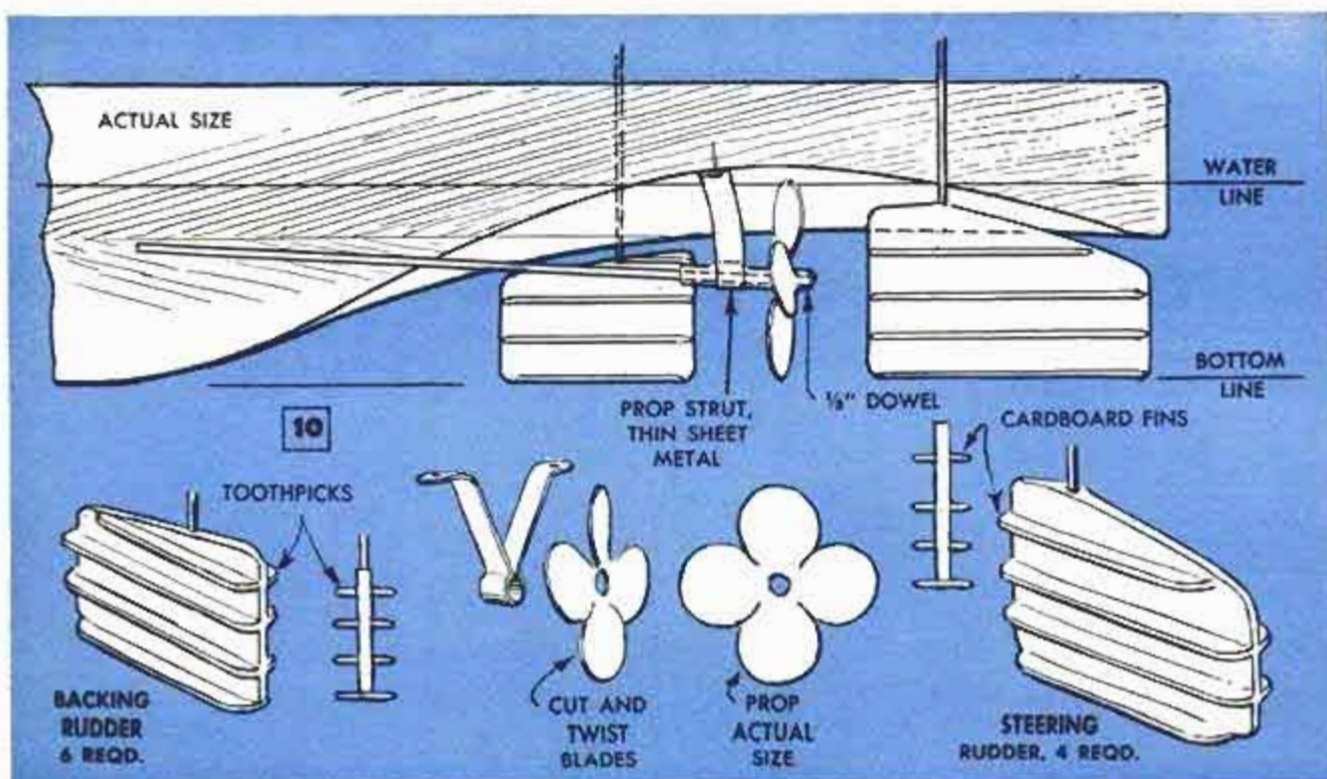
can use wood filler, primer or even shellac. Apply several coats and after each is thoroughly dry sand the surface between coats with 4/0-grade paper.

The four propellers and ten rudders come next. These are detailed in Figs. 8 and 10 and are shown actual size for tracing. The ends of the propeller shafts are supported by V-struts that are formed from thin sheet metal. The propeller housing is simulated with a piece of  $\frac{1}{8}$ -in. dowel and a tiny brass nut cemented to the end is used to represent the huge nut that holds the propeller on the shaft. Each pro-

peller is cut from sheet metal and then twisted to give pitch to the blades. The rudders are made by cementing the flat section of toothpicks to cardboard.

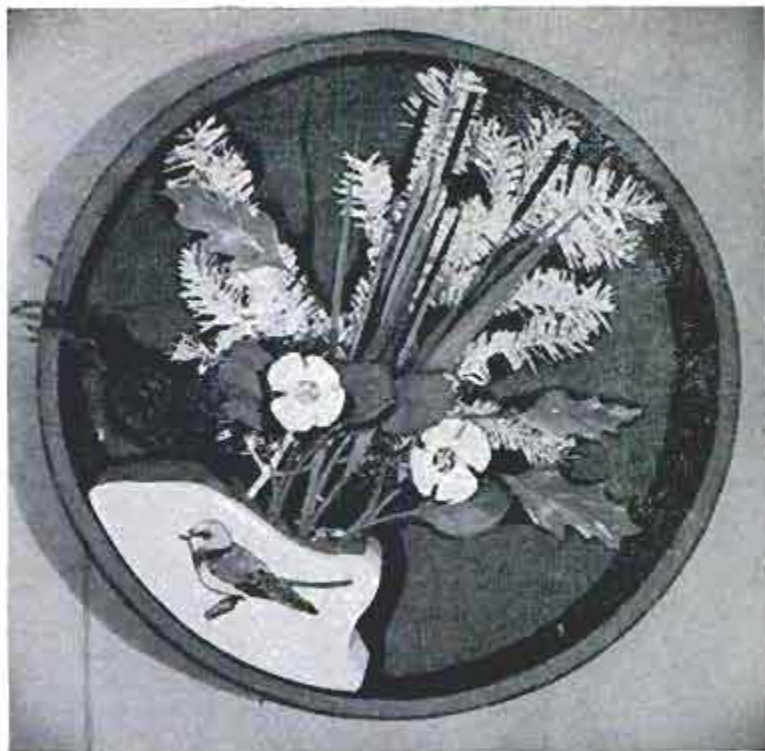
Start giving your model its final paint job. The best job is had with a small spray gun and lacquer. The hull should be painted black, including the towing knees and their steps. The deck is done in medium gray. Avoid applying too thick a coating, especially in the case of details. This is particularly so in the case of handrails. Apply just enough to cover.

(To be continued)





WTM 58

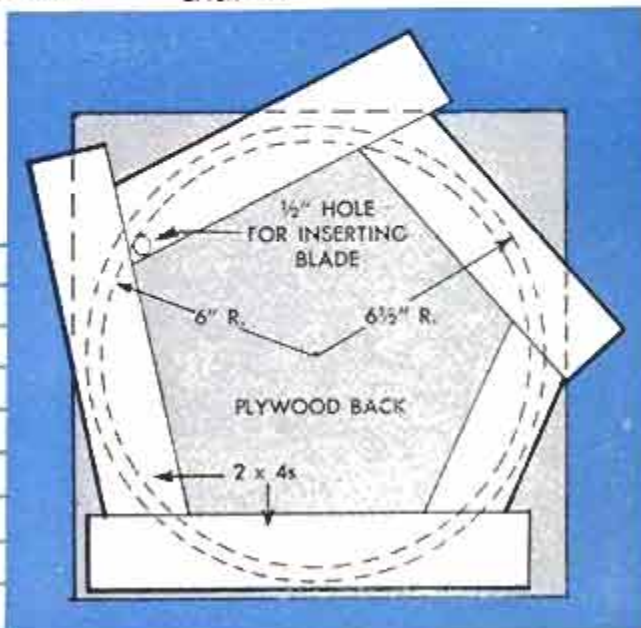
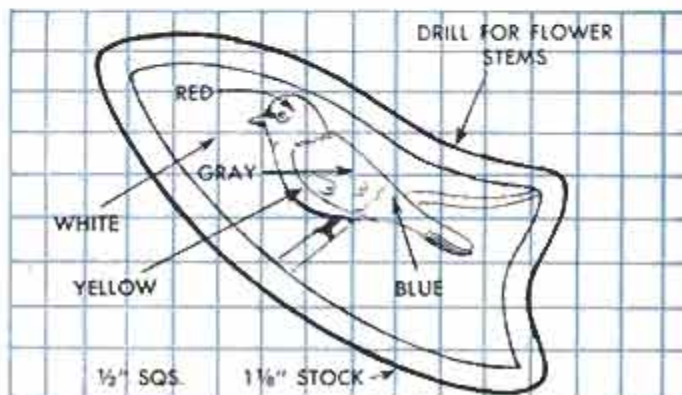
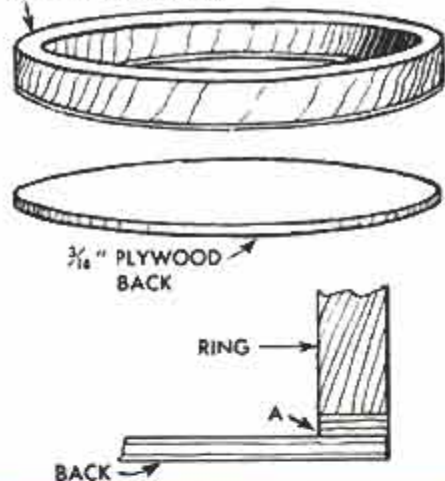


# ORNAMENTAL SHADOW BOX

By Dick Hutchinson

CIRCULAR IN SHAPE, and containing a wooden vase that appears to be ceramic, this unusual shadow box is an ideal project for the craftsman who enjoys using a jigsaw. The circular frame is made by assembling a five-sided frame of 2 x 4s and gluing them to a 13½-in. square of ½-in. plywood. When the glue has thoroughly dried, the frame is sawed to shape. The plywood provides a one-piece reinforcing ring (A) on the back edge of the frame. Next the inner surface of the frame is sanded and a 13-in. disk of ¾-in. plywood is cut and glued to the back of the frame. The outside surface of the shadow box is sanded, including the edge of the backing disk. The vase next is cut to shape and drilled to accommodate artificial flowers. A recess can be cut in the front of the vase, and the bird can be hand-carved and painted, or a decal can be used. Trace outline of vase on back inside surface of the box, and paint all but that area a flat black. Vase is painted white, then glued in place.

RING AFTER SAWING





## Power-Line Insulators Become Novel Candleholders

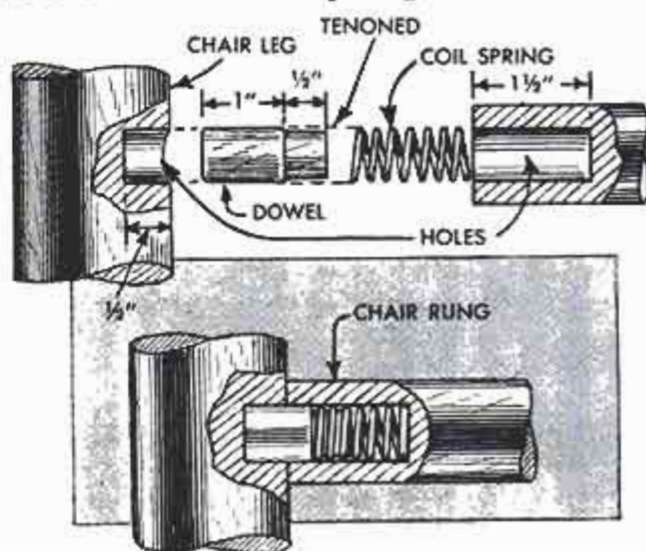


The candleholders shown in the photograph are actually inverted porcelain insulators of the type commonly used on high-voltage power-line poles. A small threaded hole at the center, used for turning the insulator onto a wooden dowel set in the crossbar of the utility pole, is just right for holding a candle. Smaller-diameter candles can also be held if the hole is reduced in size by lining with aluminum foil. Fill the recessed area surrounding the sleeve that contains the candle with potting soil and plant ivy or other vegetation. To prevent the underside of the insulator from marring the surface on which it rests, glue felt to the four legs. You should be able to get used insulators from your local power company.—Kenneth L. Lucas, Redwood City, Calif.

## Broken Chair Rung Repaired With Dowel and Coil Spring

When a chair rung breaks close to one end it can be repaired by using a short dowel and a compression spring. Cut the rung straight across inside of the break and center-drill a 1½-in.-deep hole in it the same diameter as the mortise in the leg of the chair. Then cut a dowel and a compression spring of the same diameter equal in length to the depth of the hole in the rung. With a file, turn a tenon on one end of the dowel to fit inside the spring. Apply glue to the mortise and slip the spring and dowel assembly into the hole in the rung. Then with the dowel depressed, fit the rung back in position. When the dowel is released it will seat itself.

Bruce D. Stewart, Winder, Ga.



## Wire Cutter Pulls Tacks



Having a large number of carpet tacks to pull, and no tack puller at hand, one housewife discovered that a small wire cutter similar to that shown would do the job. The jaws of the cutter are squeezed together under the head of a tack, and with the help of a small stick or pencil for fulcrum, the tack is pried out.

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

## Applicator From Shoe-Polish Can Prevents Rust on Tools

Many craftsmen faced with the problem of preventing corrosion or rust on tools will find this oil applicator helpful. Roll enough felt weather strip into a pad that will fit snugly inside a shoe-polish can. Then saturate the pad with oil. Take the pad, using the can as a handgrip, and spread a film of oil over the tools. When completed, place the lid of the shoe-polish can over the pad. The lid not only stays on tight over the pad in the shoe-polish can, but also keeps it oily and clean for many more uses.

Arthur Patterson, Minneapolis, Minn.

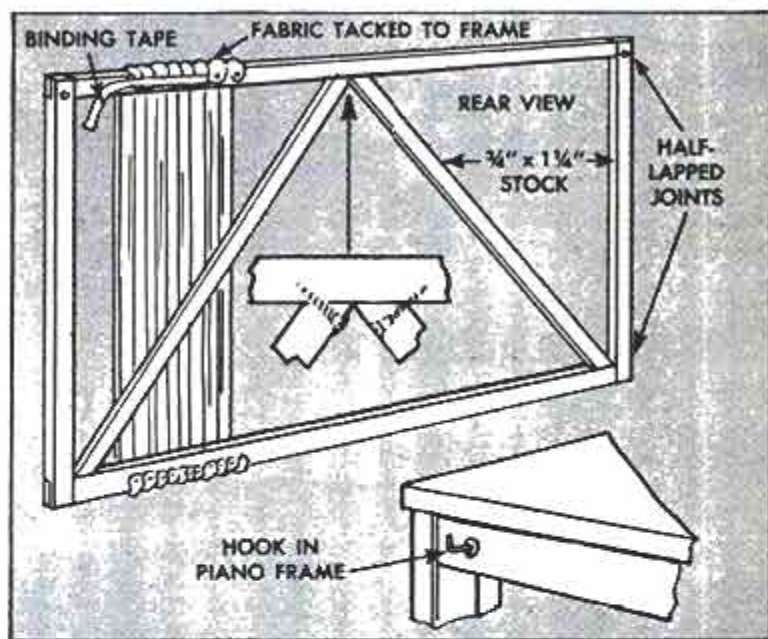




## Fabric-Covered Frame Dresses Piano Back

By Hi Sibley

Does your upright piano present a furniture-arrangement problem because the unattractive back cannot face the center of a room? Here is a solution to the problem that not only will hide the back but will make it a part of the overall room decor. Simply cover a wooden frame with drapery material and hang it on L-hooks turned into the back of the piano. Dimensions of the drapery frame should be slightly less over all than those of the piano back. Use  $\frac{3}{4}$  x  $1\frac{1}{4}$ -in. stock and half-lap the joints. Cross-bracing is necessary to prevent buckling when the fabric is stretched and tacked.



## Easy Way of Locating Screws When Silencing Squeaky Floors

Hardwood floors that develop squeaks can be silenced effectively by driving short wood screws up from the basement or crawl space. The problem, of course, is spotting the screws directly under the loose boards. The best way to do this is to use a magnetic compass and a magnet. The magnet is placed on the floor at the spot where the

squeak occurs and the compass is held below the floor. The magnet will attract the needle of the compass and make it easy to tell when you are directly under the magnet and the loose boards. Be sure that the screws are short enough so as not to pierce the top surface when pulled up tight.

W. G. Eslick, Wichita, Kans.



# SOLVING Home Problems



**HALVES OF WOODEN CLOTHESPIN** screwed to back of broom-closet door make dustpan holder. Split clothespin with saw and sand edges smooth

**WAXED-PAPER STRIP** folded and placed over Thermos-bottle cork prevents cork from loosening. Simply stretch folded strip tightly over cork, hold ends of strip and screw the bottle cap tightly in place



**SPONGE-RUBBER BALL** pressed over top hook of a garment hanger holds coats, sweaters and caps securely and at the same time prevents stretching of delicate fabrics due to small area of hook tip

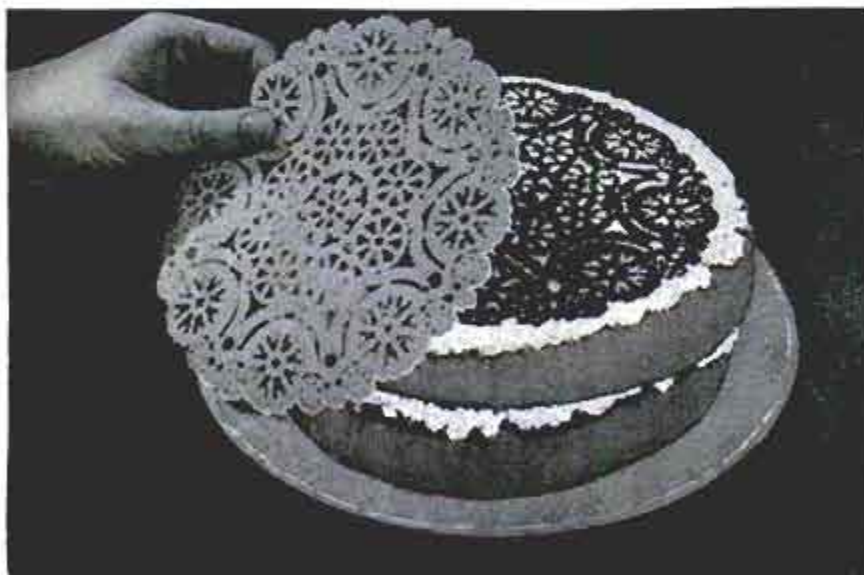


**PAPER CUP** is just the right size for molding nontip party candles. Just save candle stubs of all lengths, place one of the right length in the center of paper cup with wick. Melt stubs and fill cup



**CAKE TIN** is made into a handy Lazy Susan by placing a drop of solder at center on underside to serve as a pivot point. Placed on a cupboard shelf, tin holds bottles of food extracts and packaged spices

**PAPER DOILY** makes a novel cake decorator. Try it next time you frost a cake. Spread frosting (chocolate is best, due to dark color), press the doily over it lightly, sift powdered sugar and lift off carefully

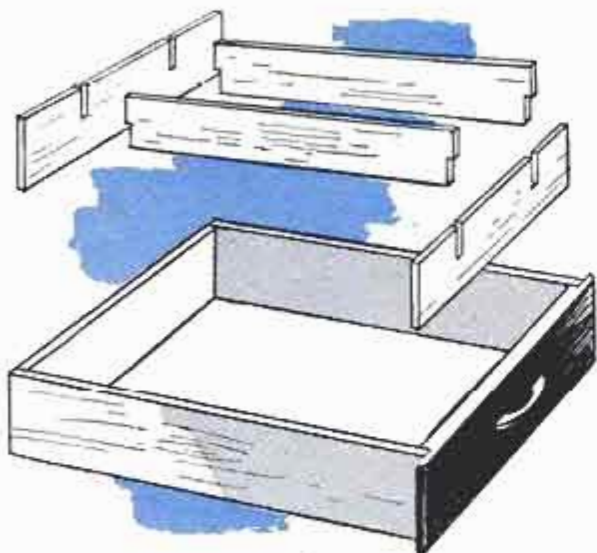






**CLOSET-DOOR HINGES** that squeak can be lubricated with soap. Rub barrel of hinge with soap cake, which will not stain clothing brushed against it

**DRAWER DIVIDERS** of unusual construction require no nails, screws, or cleats for installation. The notched ends of dividers drop into slots cut in end pieces which are fitted into the drawer at front and back. End pieces should fit snugly



**LEATHER TONGUES** of those comfortable hiking shoes sometimes slip to one side or the other and cause pressure on the instep. This can be prevented by cutting two adjacent slits near top of tongue and threading lace through as shown



**MIXTURE OF LEMON JUICE AND SALT** rubbed into the breadboard occasionally will act as a mild bleach to keep board clean and white. Use slice of lemon and dry salt

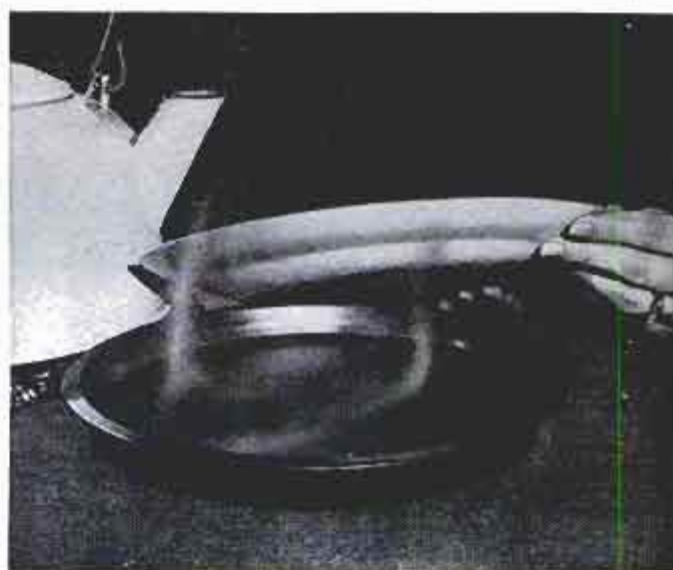


**ADHESIVE-TAPE SPOOL** is just the right size to hold tape measure that gets kinked and frayed when stored loosely in sewing kit. Snap cover keeps tape measure in place

**METAL LEGS** of tubular furniture, also bench legs of pipe, are often fitted with crutch-tip "silencers." Thin edge of tube or pipe may cut through rubber tip in time. This is prevented by inserting a metal washer in each tip



**CAKE TIN** partly filled with hot water keeps a plate of food warm for a fairly long period of time. Not as effective as a chafing dish, of course, but it will do in an emergency. It's a good idea to place tin on hot pad





## Clothespins Replace Thumbtacks on "Bulletin Board"



Several spring-type clothespins screwed to a strip of wood make an ideal "bulletin board" for youngsters. Almost any size picture, one of their own or one cut from a newspaper or magazine, can be accommodated by the row of pins as shown. An advantage of this method is that there are no thumbtacks or push pins for the children to misplace, as there would be with a regular bulletin board.—Karl Greif, Vestal, N. Y.

☐ Your children's new shoes can be made less slippery by roughening the soles with a metal-bristled suede brush.

## Bubble Lamp on Switch Plate



When the basement lights frequently were left on all night even though the switch plate was fitted with a signal lamp, one homeowner added the upper portion of a Christmas-tree bubble lamp. The latter is cemented to the metal shield

on the signal lamp. When the signal lamp is lighted, indicating the basement lights are on, the Christmas-tree lamp begins bubbling to attract attention.

Grover Brinkman, Okawville, Ill.

## Tumbler Serves as "Spotting Block" When Removing Stain From Cloth

Next time you want to remove a fresh stain from clothes quickly, place an inverted cup or tumbler under the fabric to serve as a "spotting block." The fabric is pulled down the sides of the tumbler and held in position with a rubber band. It then is easy to hold the cloth and tumbler with one hand while rubbing the stain with the other.



## Ordinary House Bricks Become Decorative Book Ends

Attractive book ends can be made by wrapping ordinary bricks in brightly colored and patterned paper. Wrap the bricks as you would a package, first in brown kraft paper and then in the decorative paper. Cellophane tape can be used to seal

both coverings, or you can make a hidden glued seal for the outer paper. Bookbinding material, gift wrapping, cloth and wall-paper, as well as foil, can all be adapted for this purpose.—R. Teiser and C. Harroun, San Francisco, Calif.





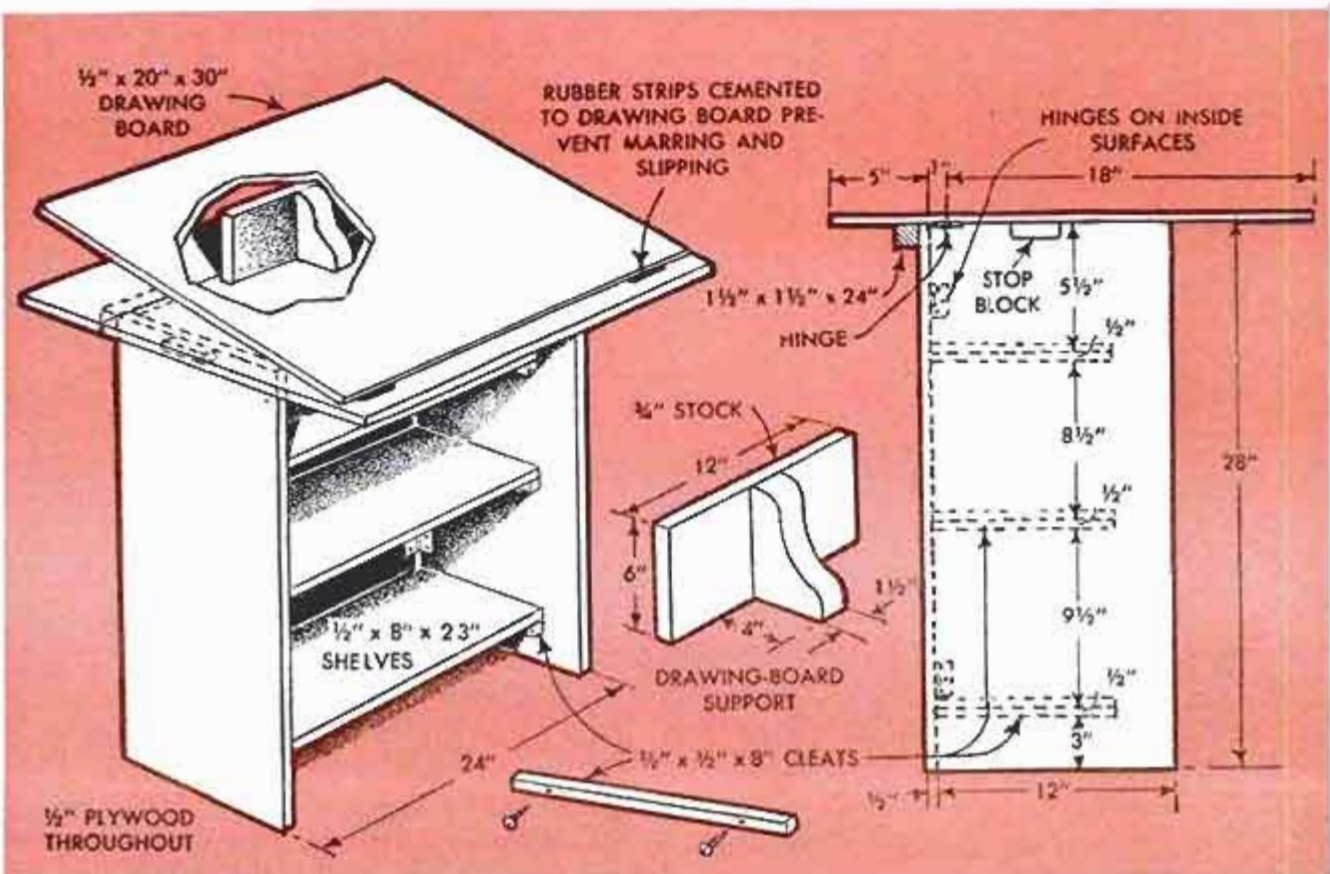
# Student's Desk-Bookcase Folds Flat

By Doris Fry Wiley

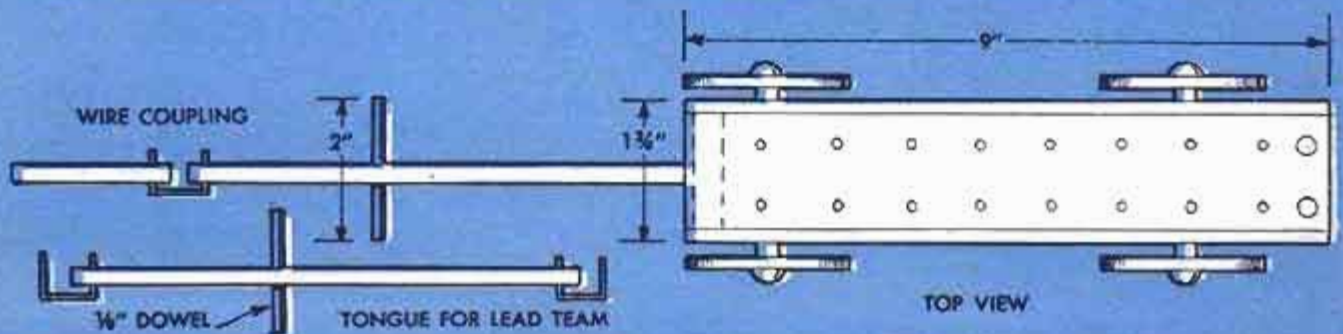
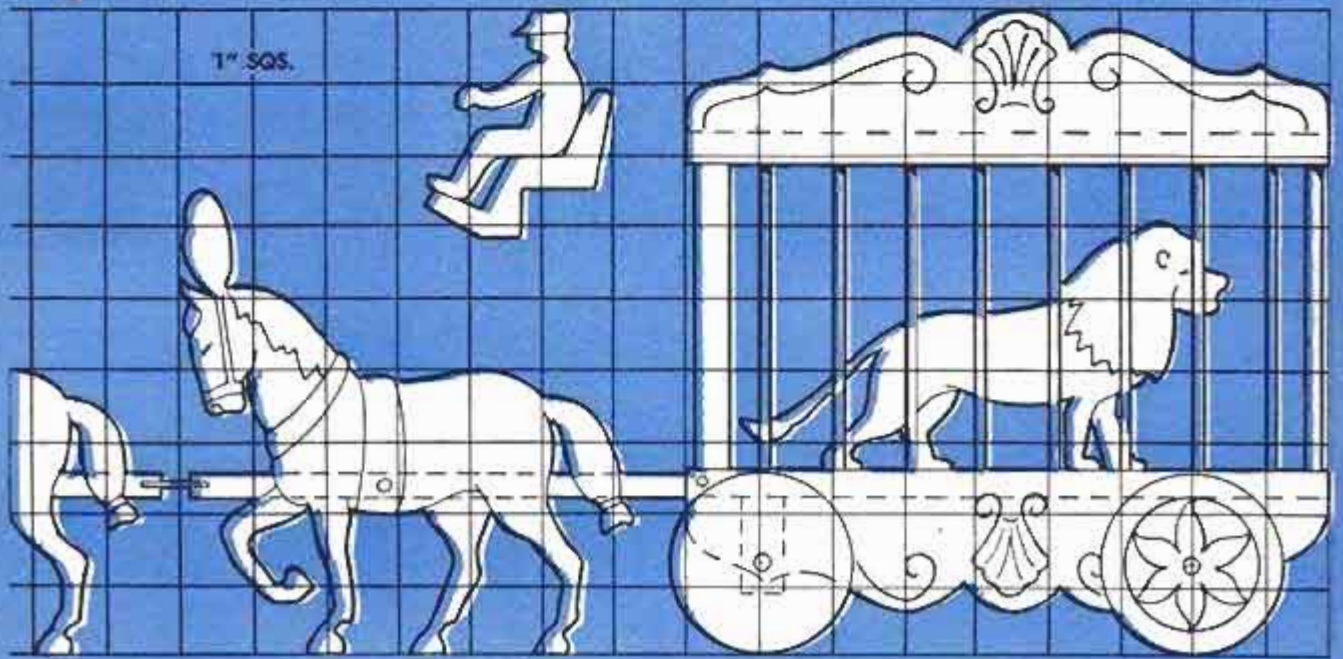
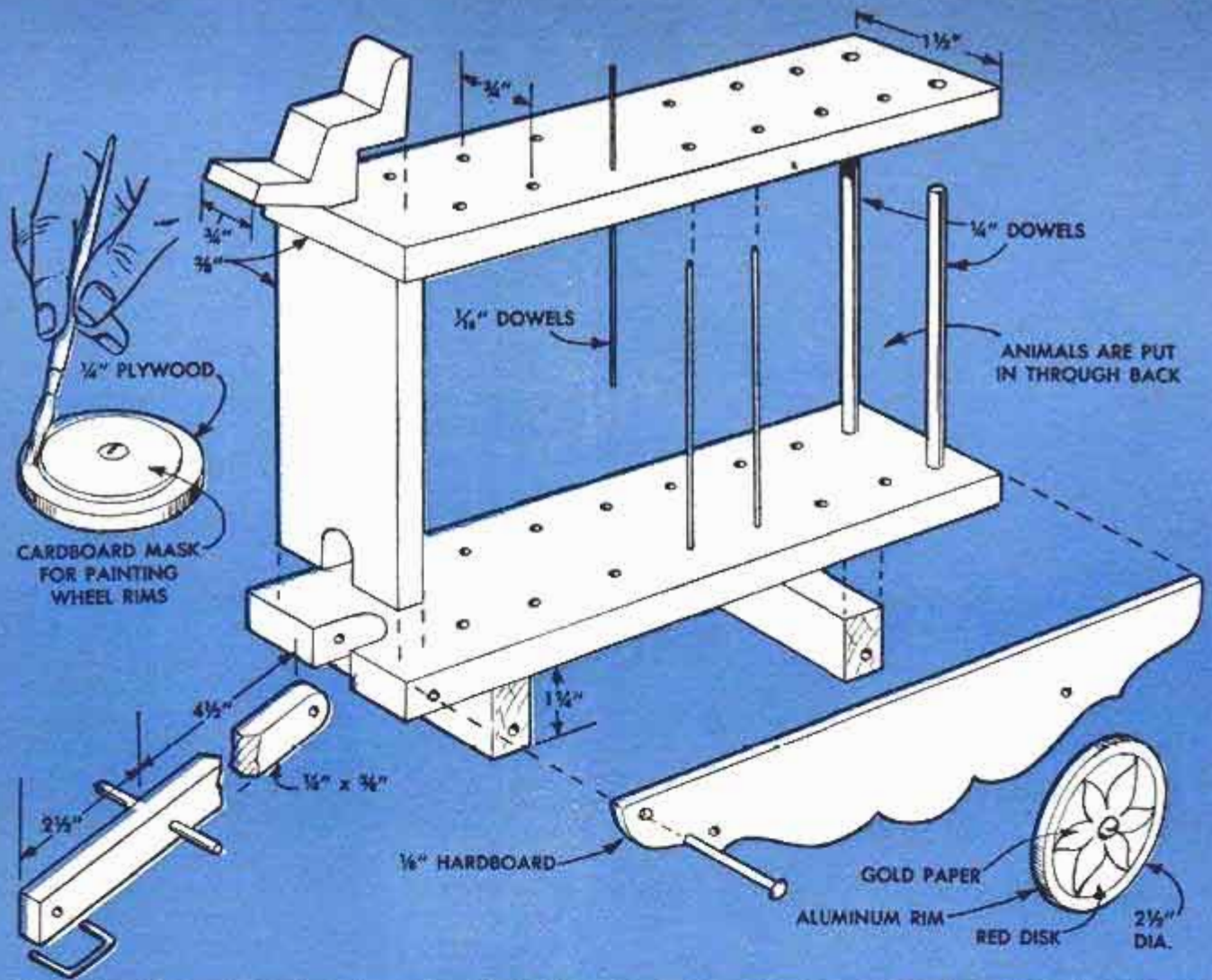


When folded this desk is only 6 in. thick, yet it opens out to provide a top 24 x 30 in. The drawing board and its support are optional items needed only for an art student. There is ample storage space for books and school supplies on the three shelves

WHEN YOUR college student comes home for Christmas vacation have this desk ready for the return trip. It folds flat for transportation or storage, and is ideal for a student sharing cramped quarters. The desk is made from  $\frac{1}{2}$ -in. plywood, except for the drawing-board support which is  $\frac{3}{4}$ -in. solid stock. The support and drawing board are optional features that should be included only for an art student who requires them. To permit the sides of the desk to fold inward flat against the back, use offset hinges, or attach regular butt hinges to spacer blocks that are the thickness of the shelf cleats. The 1-in. offset in the joint of the desk top allows it to fold down over the sides when they are folded against the cleats. The opened sides are positioned at right angles to the back by stop blocks on the underside of the top, and are held open by the shelves which slip onto the cleats. To fold the desk, first remove the shelves, then fold the sides in and the top down. Finally, invert the unit and place the shelves on edge on the overhang of the top.









# CIRCUS WAGON

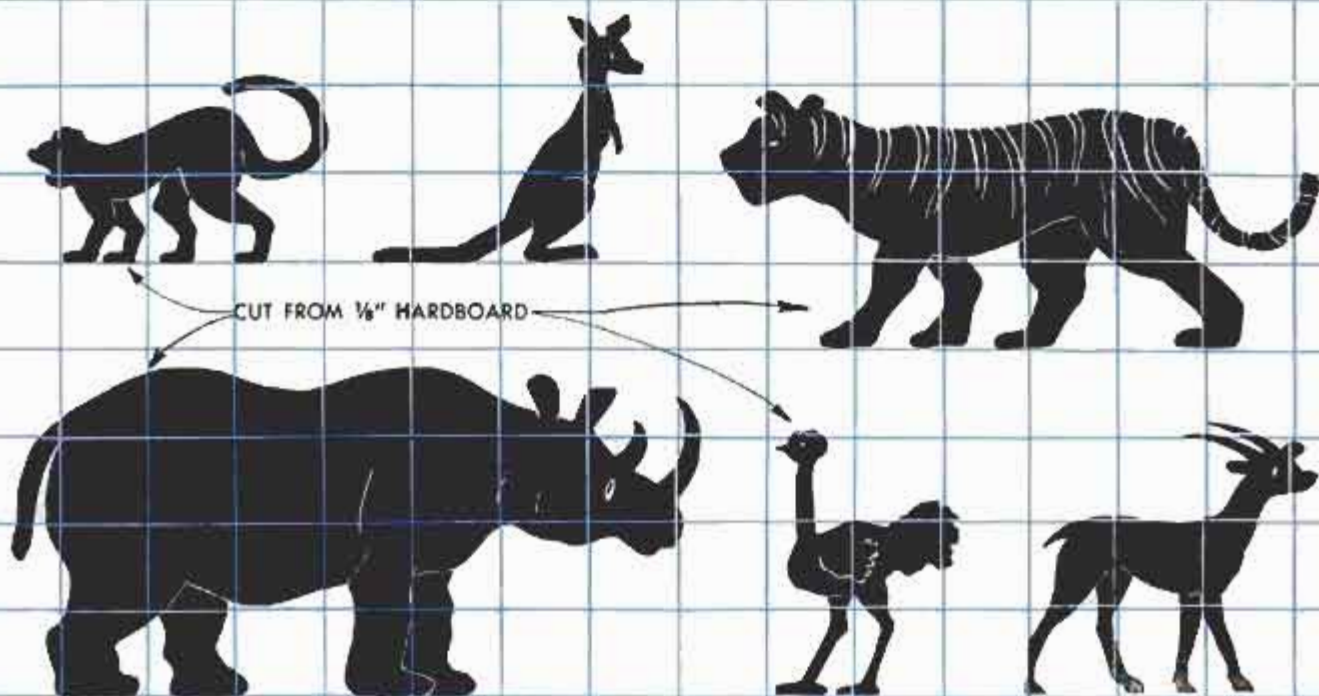
## With Animal Cutouts

By Hi Sibley

**P**RANCING HORSES and wild animals interest almost any child, and when they are combined with a gaily colored circus wagon, the result is an exciting toy that will provide hours of playtime fun for any youngster who receives it. Simplicity of construction is the feature that will be appreciated by the builder of the wagon, as it requires only a couple of feet of stock lumber, some 1/8-in. hardboard and a few short dowels. The top and bottom of the wagon are drilled in one operation, assuring alignment of the holes for the cage bars. If perfectly round wheels are desired and no wood-turning lathe is available, cut 1/4-in. slices from a 2 1/2-in.-dia. dowel instead of using 1/4-in. plywood as suggested. The ornamental side pieces of the wagon are jigsawed in pairs or, if a number of wagons are to be made, can be "mass produced" by sawing a stack of pieces at one time. The horses, wild animals and the driver are jigsawed from 1/8-in. hardboard. The driver is cemented in position on top of the wagon. To support animals and horses in a vertical position, cut bases of 1/8-in. hardboard and cement to their feet.

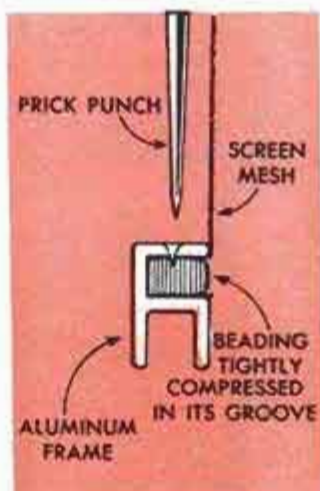
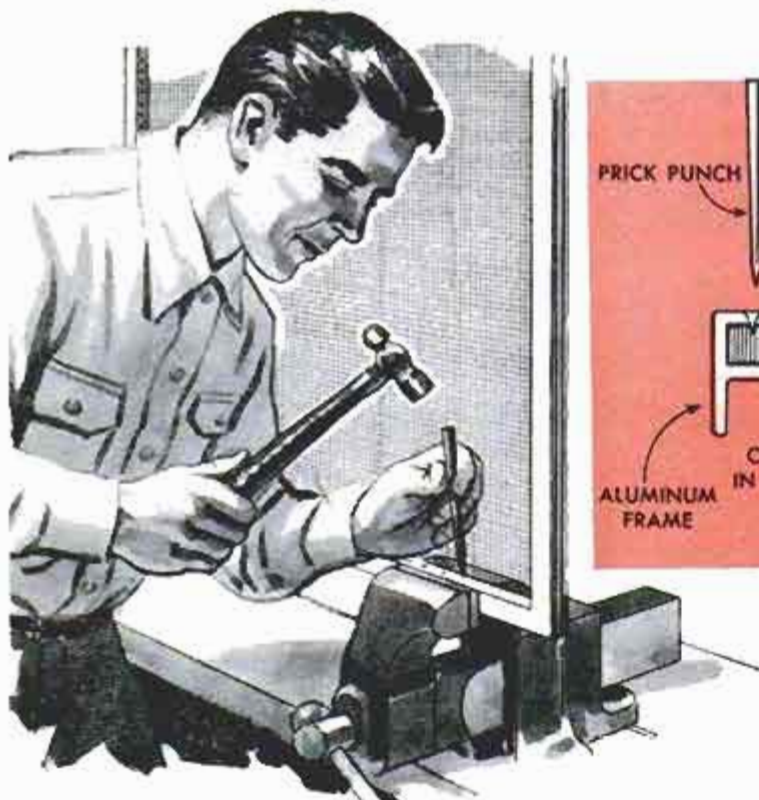


Bases for the animals must be narrow enough to permit them to be inserted in the back of the cage. To save time in making the animals, pictures can be cut from a child's animal book or from magazines and cemented to hardboard, then jigsawed to shape. Paint the side pieces of the wagon blue with gold decorations. The front of the wagon is red, the cage bars are black and the floor is gray. Horses are cream colored and have red harnesses and plumes. Horses are held in harness by drilling holes through the belly bands so they can be slipped over the dowels in wagon tongues. Enlarge animals to suit wagon. ★ ★ ★





## Prick Punch Tightens Loose Screening in Aluminum Frame



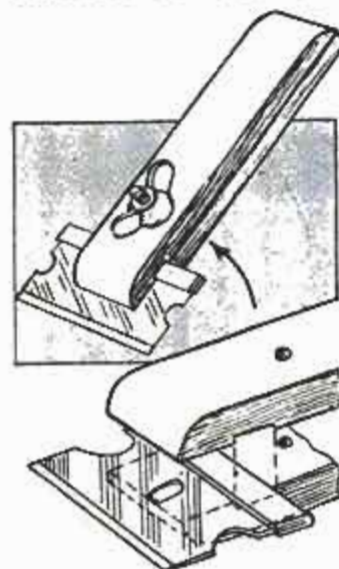
Loose screen wire in combination windows and doors, which is held by a retaining bead, may be tightened by means of a series of punch marks along the inside edge of the frame as shown. To do this, punch deep indentations 1 in. apart along the inside of the frame, using a prick punch. The burrs formed by the indentations penetrate the mesh and beading to prevent the screening from being pulled loose. If the screening is exceptionally loose, remove the beading on three sides and restretch the material. When reinstalled, punch the framing as indicated above.—Andrew Vena, Philadelphia, Pa.

## Knife Frees Sticking Piano Keys

When two adjacent keys on a piano tend to stick together, slip a thin knife blade between them at the inner end and draw it forward. This will usually dislodge the hair-pin, straight pin or scrap of paper that has been causing the binding. If no obstruction is found, depress one key at a time and work it from side to side. Persistent sticking may be due to trouble within the instrument and should be repaired by a piano tuner.

C. S. Onderdonk, Jr., Margate City, N. J.

## Handle for Razor-Blade Scraper



Consisting of two strips of wood  $\frac{3}{16} \times \frac{3}{4} \times 4$  in., this handle will accommodate almost any single-edge razor blade. A notch is cut near the end of each strip to receive the "spine" of the blade and the strips are tapered as indicated. A screw and wing nut are used to hold the strips together against the blade. You'll find

it handy for scraping paint from glass.

P. Casperson, El Cajon, Calif.

## Glass Christmas-Tree Ornaments Shatterproofed With Shellac

The unpleasant job of picking up tiny pieces of broken Christmas-tree ornaments can be avoided if you make them shatterproof. To do this, pour a little white or orange shellac inside the ornament, swirl it around and pour out the excess. Allow it to dry overnight before replacing the hanger device. The hardened film of shellac will hold broken pieces together when the ornament is dropped. Lacquer should not be used for this treatment since the solvents might dissolve the coloring matter with which the insides of some ornaments are tinted.



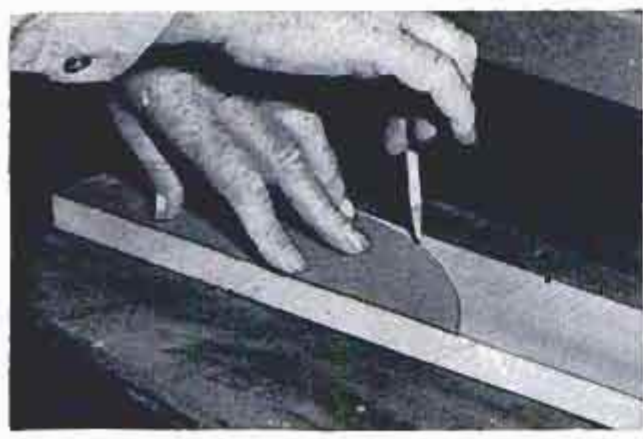
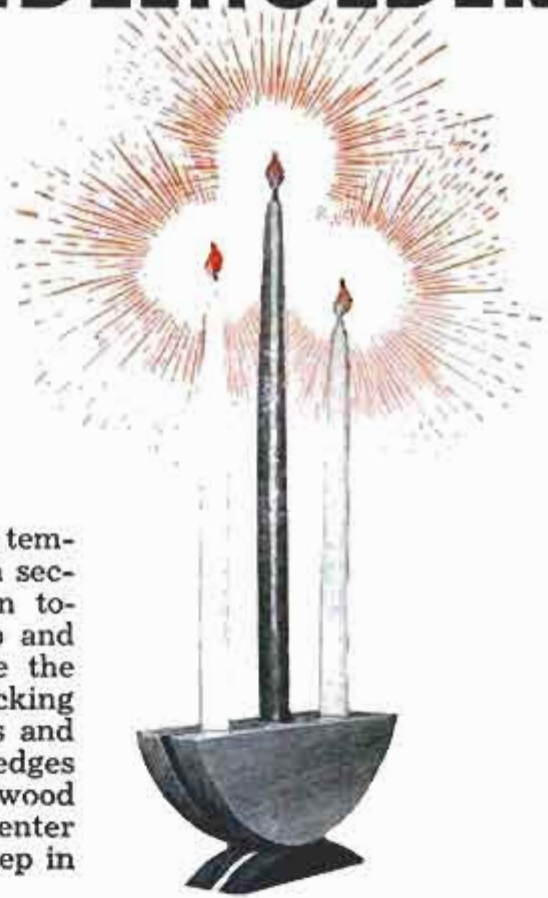


# TWO-TONE CANDLEHOLDER

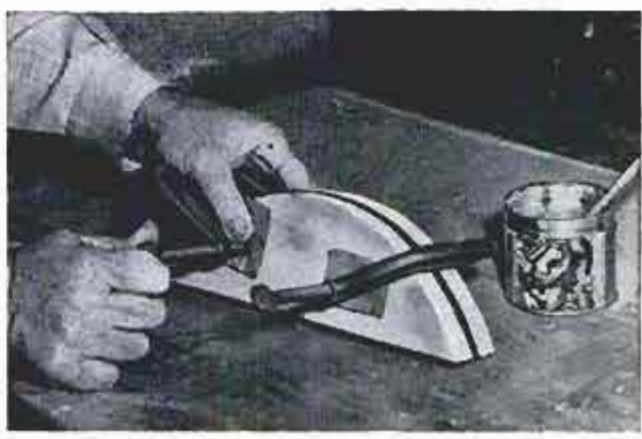
By Shep Shepherd

HERE'S AN INTERESTING candleholder that blends with both light and dark wood furnishings. It has a top section comprised of a 1/4-in. piece of dark wood sandwiched between two lighter pieces of 1-in. stock, and a base with a reverse combination.

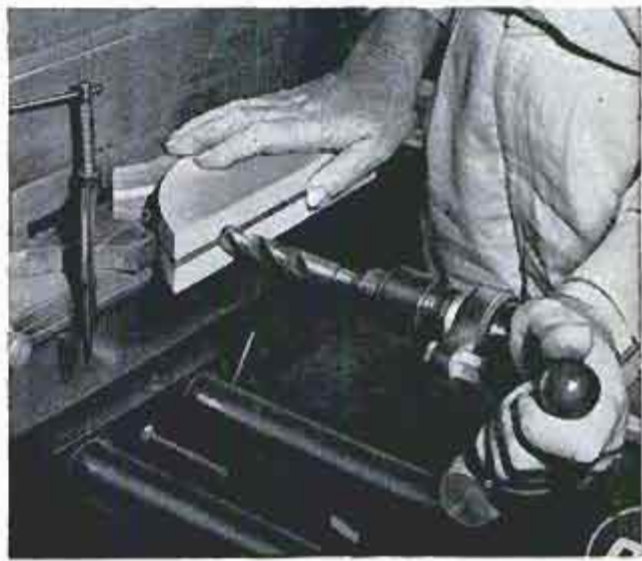
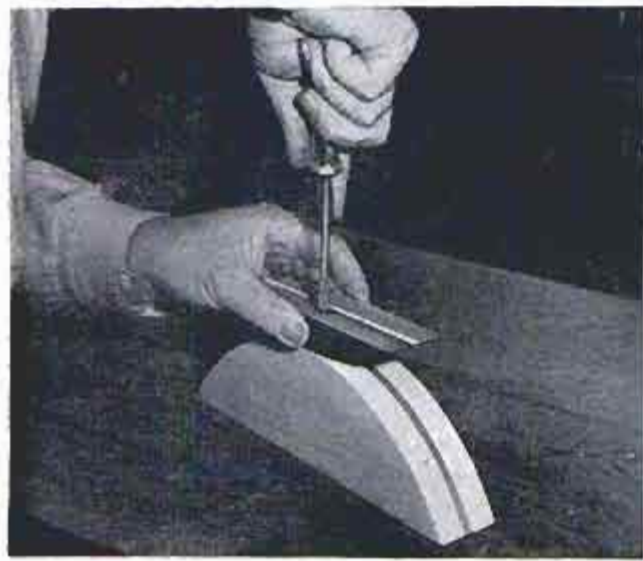
To make it, you will need two templates, the one for the top pieces being a segment of a 12 1/2-in. circle with a chord of 11 in. and the bottom template a segment with a 6-in. chord, which is cut from a 10-in. circle. First draw the two circles. Then, placing a ruler across each one, mark a straight line of the required length which touches the circle at both ends. Cut out the templates and trace them on one of the pieces of each section. Then nail the three pieces of each section together, placing the marked piece face up on top and cut them out on a bandsaw or jigsaw. Separate the pieces and sand the sides but not the edges, checking for proper fit. Apply glue to the joining surfaces and clamp each section together. When dry, sand the edges flush and apply a coat of varnish. Using two wood screws, fasten the base to the top at the exact center of their respective arcs. Drill 3/4-in. holes 1 in. deep in the top edge and varnish the holder again.



A template is used above to outline matching pieces while below is shown the curved base being attached



Glue is applied and the three pieces clamped together. Candle holes are drilled after attaching the base





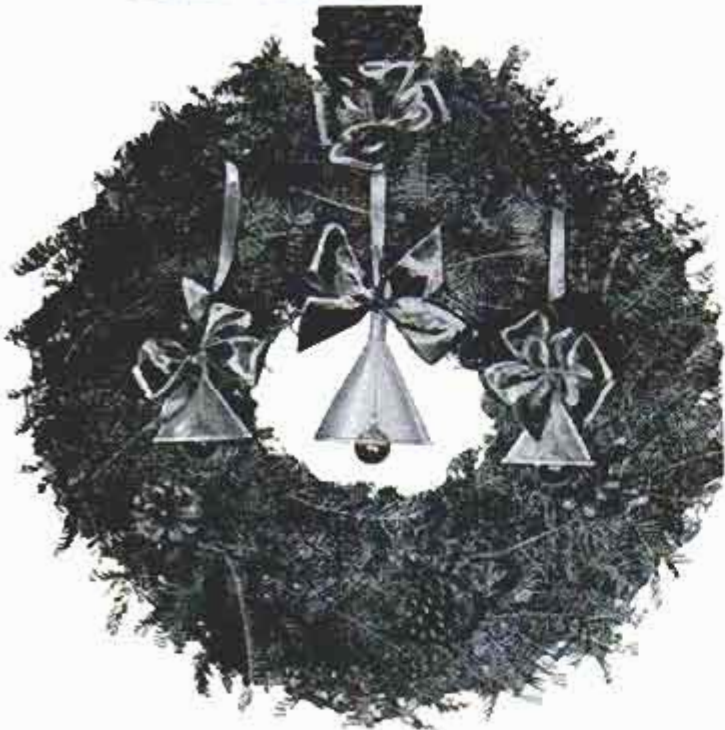
# Decorate with Christmas Bells



**G**LASSWARE, TIN CANS and kitchen utensils are the basic materials for these attractive Christmas bells that are combined with more conventional materials to produce striking effects. In the upper illustration on this page, the young lady shows a Christmas bell that actually is a food grater. The bell clapper is a wooden mixing spoon. After the holidays, the utensils, newly purchased for their decorating task, can be sent to the kitchen for more prosaic duties.

The other pictures on this page show bells made from plastic funnels, available in a variety of sizes and colors at the local ten-cent store. The funnels are suspended from an evergreen wreath on colored ribbons and decorated with gaily colored bows. Regular glass Christmas-tree ornaments act as clappers. Goblets, because of their shape, lend themselves naturally to representing bells when inverted, as shown in the upper photo on the opposite page. Here again, a small Christmas-tree ornament is used for a clapper. A ring of tinsel, plus a paper flower, is used to decorate the neck of the goblet, and a candle, on which are pasted cutout figures, sits on top of the inverted goblet to provide a centerpiece.

Empty tin cans are another source for bells. After they have been washed clean, a hole is punched in the bottom to receive a knotted length of ribbon that is used both to hang the "bells" on a cluster of evergreen bows, and to hold the tree-ornament clapper. Christmas wrapping paper is pasted to the outside of the tins. Another item from the kitchen which seems unrelated to Christmas, but which has a bell shape, is an egg whipper of the type formed as a wire helix. Very little modifying is necessary on the whipper, since it becomes an abstract representation of a bell simply by adding a clapper. A ribbon tied to the handle provides a means of hanging it. ★★★



Upper photo shows a bell that is simply a food grater with a wooden mixing spoon for a clapper. The two lower photos illustrate bells made from plastic funnels. Christmas-tree ornaments provide the clappers





Goblets have a natural bell shape, readily lend themselves to being made into Christmas bells. Clapper is a Christmas-tree ornament suspended from length of ribbon cemented to bottom of inside of goblet. A ring of tinsel and a paper flower add color to the bell, a decorated candle makes it a gay centerpiece



Tin cans are still another source for bell material. Knotted lengths of ribbon threaded through holes punched in the bottoms of the tins hold tree-ornament clappers and permit suspending bells. Holiday wrapping paper is pasted over the outside of the tins



Modern and fanciful are these abstract representations of bells that are made from egg whippers. The wire-coil whippers require only the installation of clappers to become bells. Although definitely modern in design, the bells are compatible with traditional materials, as is shown in the photo







### Gifts Hung on Christmas Tree With Drapery Hooks

To lend an additional note of festivity to the Christmas-gift tradition, as well as enhance the tree decor, hang small gifts on the tree. This is done easily by fitting drapery hooks to the cord or ribbon used to tie the gifts. The hooks also can be used for other holidays and celebrations throughout the year to hang festoons, garlands and other decorations.

### Conical Christmas Ornaments

With a few scraps of reflective paper you can make these bright, unusual Christmas-tree ornaments. Cut the material in circles and then cut each circle in half. Shape one half into a cone, by drawing the two corners together, and staple the edges. The conical bottom is made from the other half of the circle of material overlapping the edges. Install a string loop in the top for hanging, and then glue the bottom up inside, as shown in the illustration.



# Christmas-Tree Rotator

By John R. Stone

WHY NOT SURPRISE the children this year with a Christmas tree that displays all of its gay ornaments and sparkling tinsel while it rotates slowly to the tune of soft yuletide music? With a television-antenna rotator modified to turn in one direction only, some simple wiring and a few common parts the novel rotator can be assembled in a few evenings.

The heart of the unit, the rotator, can be purchased reasonably at any electronics surplus store. Since most TV rotators are designed to turn 360 to 370 degrees and then reverse, it is necessary to remove one of the stop lugs from the unit as shown in Fig. 4, to permit continuous turning. Another lug positioned lower on the shaft, that actuates a switch for an indicating light on the control box, need not be removed.

### Control Box Modified

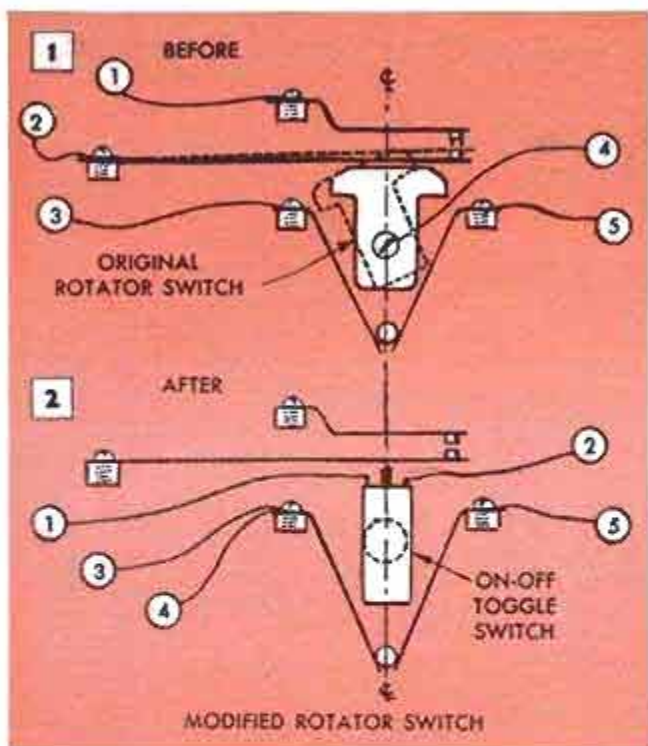
Modification of the control box is next. The spring-return switch on the box must be replaced with an ordinary on-off toggle switch. First, take the bottom off the control box to gain access to the screw holding the original switch. Remove the wire under the screw and the switch. Then, replace the old switch with the on-off toggle switch and reposition the wires as shown in Figs. 1 and 2.

To provide a means of supplying current to the tree lights, two copper contact rings are stapled to a 5-in.-dia. disk cut from hardboard and mounted on the rotator casting. Another 5-in. disk is fitted with an electrical outlet with  $\frac{1}{8}$  x 1-in. brass strips attached as shown in Fig. 5, and mounted on the rotator shaft.

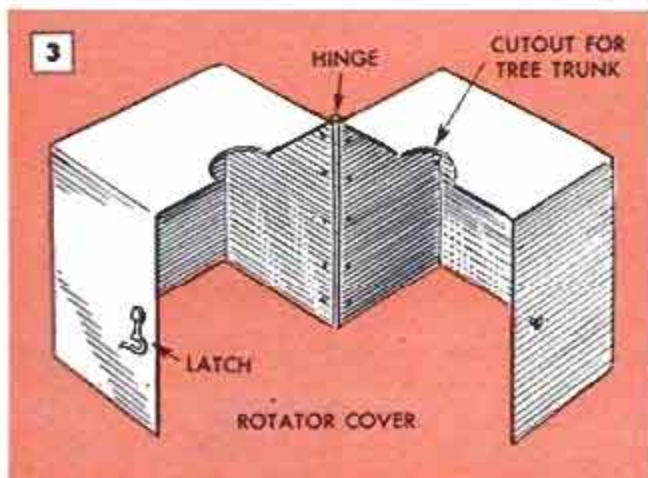
Any tree stand that will accommodate the rotator and is sturdy enough to safely support the tree will be satisfactory. For a 5-ft. tree the base should be at least 18 in. square and can be made of two lengths of 2 x 4 crossed at the center and half-lapped to lie flat on floor. A  $1\frac{3}{8}$ -in.-dia. hole drilled in the center and fitted with a 6-in. length of steel pipe provides the mounting for the rotator, to which it is clamped securely as shown in Fig. 6.

A cabinet made of plywood as shown in Fig. 3, is used to cover the entire unit. For music, a record player is hid behind the tree and turned on with the rotator. ★★★

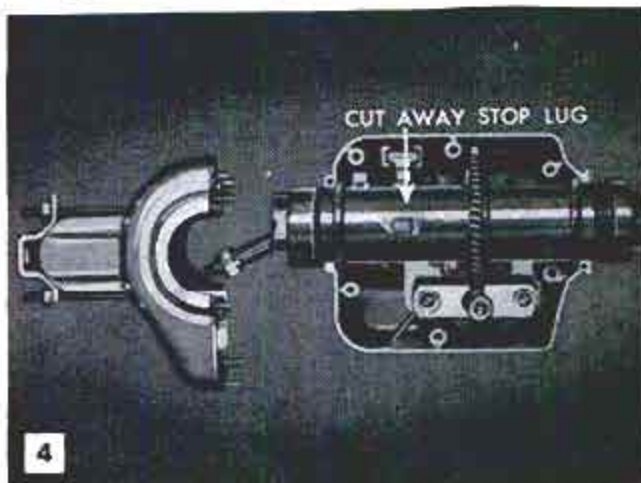
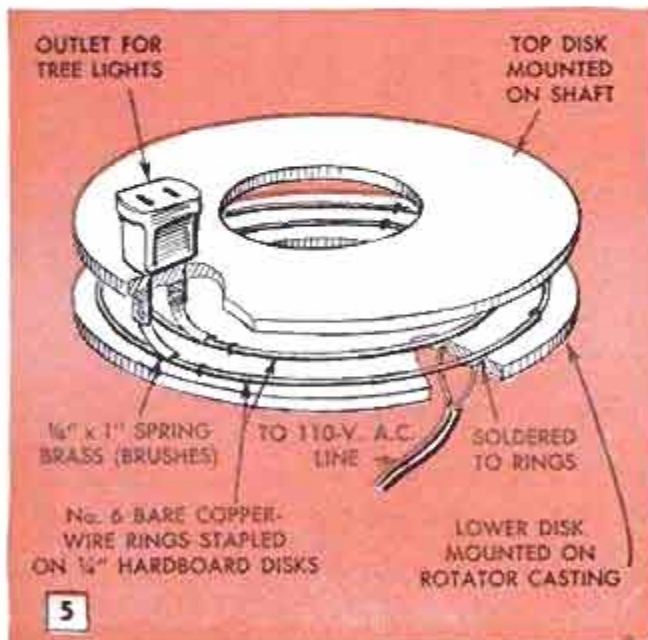




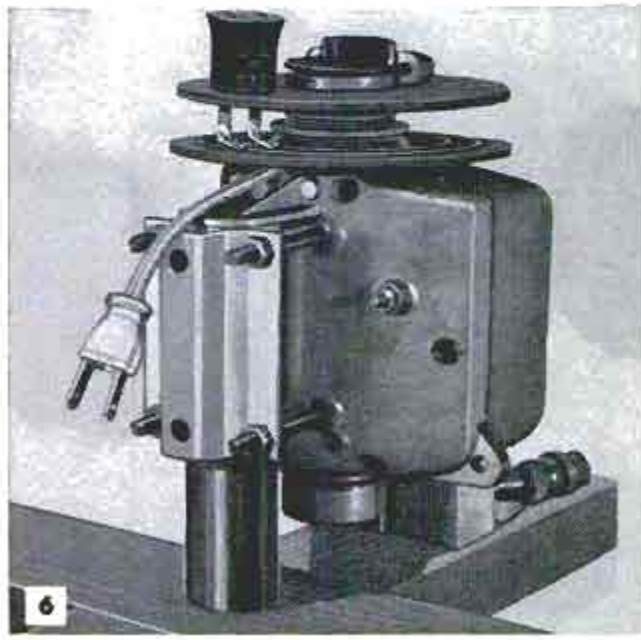
Above, repositioning of three wires and installation of toggle switch complete control-box modification



Above, easily removed rotator cover protects unit and prevents contact with moving parts. Below, for continuous supply of current to tree lights, contact rings must be in accurate alignment with brushes



After main stop lug is removed, above, shaft turns continuously in same direction. Below, mounting for unit consists of wooden support block under housing and steel-pipe upright anchored in tree stand





# Aluminum Reflector for Portrait Photography

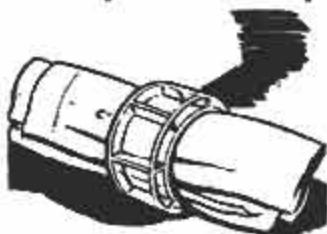
A sheet of aluminum roofing material, 30 x 36 in., nailed to a wooden frame and mounted on a camera tripod as shown,

serves as an excellent reflector for home portrait photography. A socket is attached to the center cross piece of the framing so

that the reflector can be removed easily from the tripod for storage. If a socket is not available, one can be made by soldering a 1/4-in. stove-bolt nut on a large washer and drilling three holes along the outer edge of the latter. A plated washer and nut should be used for this purpose. A ball and socket arrangement on the tripod head permits the photographer to direct reflected light where it is desired on a subject. Such a reflector is ideal when only one flash or flood lamp is used.—H. J. Kennard, Gonzales, Tex.



## Ready-Made Napkin Rings



When the last of a roll of cellulose tape in a dispenser has been used, salvage the plastic ring and use it as an attractive napkin ring. To add

color, paint the inside surface of the ring with nail polish, or apply decals to the outside surface.

H. B. Walters, Los Angeles, Calif.

## Clothespin Floats Boat Key

A boat key will be easy to locate in your coat pocket, and also will float if accidentally dropped into the water, if it is pivoted in a common clothespin as indicated. File the threaded end of the bolt or screw flush with the nut and peen it to prevent the nut from coming off.

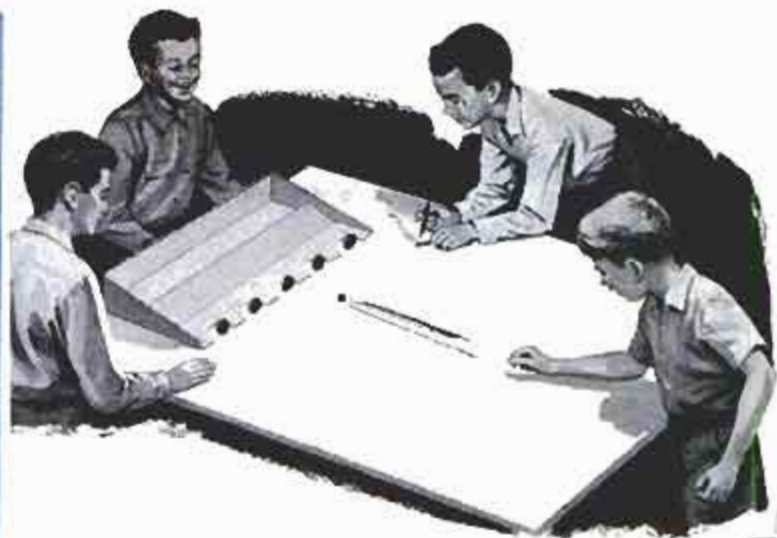
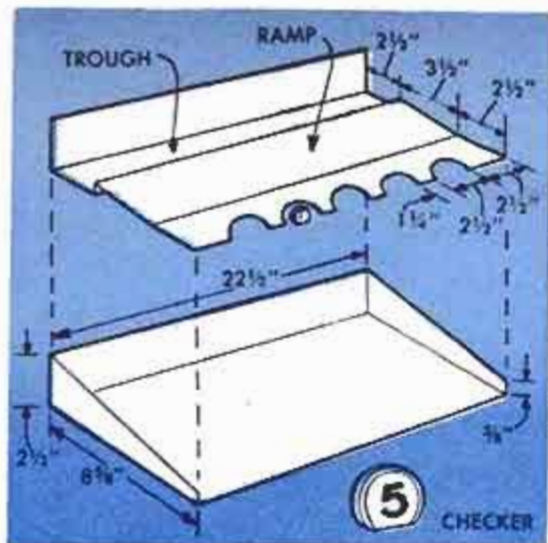


## Proper Humidity Protects Both Health and Home

Is your home difficult to heat? Does it seem your family has too many colds during the course of a winter? Lack of humidity in the home may be the reason. Tests have shown that the average home is drier in the winter than the Sahara Desert. One of the reasons for this is that a home is built to permit a constant change of air from the outside to prevent an accumulation of stale air. Outside winter air is dry and immediately begins absorbing moisture when it enters a warm house. Loosened joints in furniture and peeling wallpaper are two more noticeable examples of the damage caused by dry air. When someone sneezes in a room with low humidity, the sneeze carries into the air thousands of tiny droplets that contain germs, salt and water. Dry air immediately begins absorbing the moisture from the droplets and the germs are

suspended in the air, waiting to be inhaled by someone else. In properly humidified air, the droplets are kept intact and the salt-and-water solution in them destroys the germs before they can cause trouble. When dry air absorbs moisture from the skin, a person feels chilled and a higher room temperature is required to maintain comfort. Properly humidified air will permit keeping a home several degrees cooler, with a subsequent saving of fuel. Modern humidifiers are easily installed in a heating plant, are automatically filled with water from the house water supply and require cleaning only once a year. Their cost is moderate and is saved many times over in lower fuel bills, less maintenance and the prevention of damage to a home and its contents.—The Humidifier Association, Cleveland, Ohio.





## Marble Game Quickly Improvised for Evening's Fun

Here is an interesting game that anyone can make and play the same evening. The only materials required are two pieces of stiff cardboard, five checkers and 10 colored-glass marbles. Cut and bend the cardboard according to the dimensions given above and glue the two pieces together. A flat spot is cut on the circumference of each checker for a base and a number taken from a calendar pasted on one side.

The game may be played on a large table or on the floor. One player stands behind the game and arranges the five numbered checkers in any order he chooses with the

numerals facing himself. His opponent, standing behind a line 6 ft. from the game, tries to guess which checkers have the highest numbers and knock them down first with the 10 marbles at his disposal. Should he upset all five checkers before using all the marbles, the checkers are set up again for the remaining marbles. After the score is tallied, the positions of the players are reversed and the playing continued. Any number of contestants may play and special rules or handicaps introduced as desired.

Frank Shore, New York City.

## Washers Level Furniture To Prevent Wobbling



When a piece of furniture wobbles because of variation in the lengths of its legs it can be steadied by using shims or washers. Remove the glide or dome from the short leg and insert sufficient shims or washers under it to lengthen the leg, then replace the dome. On furniture equipped with casters, slip washers down over the shank of the caster to produce the same result.

Remove the glide or dome from the short leg and insert sufficient shims or washers under it to lengthen the leg, then replace the dome. On furniture equipped with casters, slip washers down over the shank of the caster to produce the same result.

## Removing an Asphalt Tile

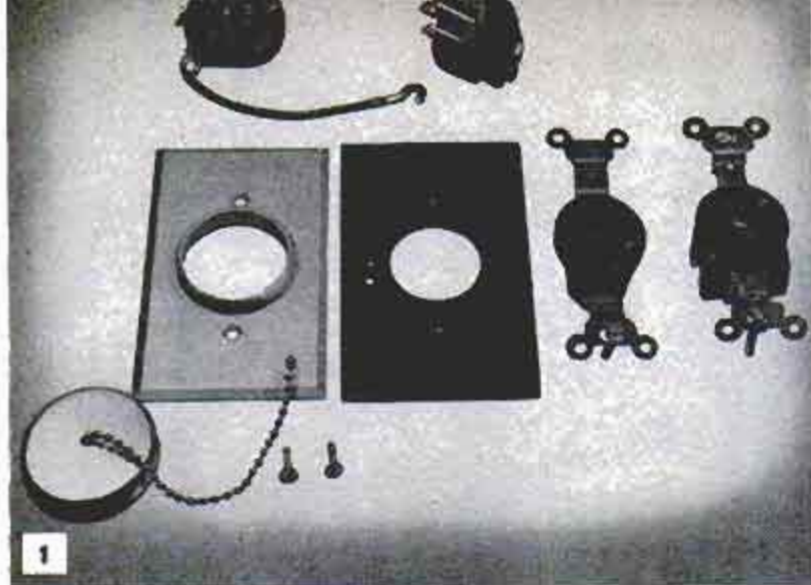
Removing an asphalt tile without damaging those adjacent to it can be done with the aid of an electric iron. Place a piece of wrapping paper on the tile to protect the sole of the iron, then thoroughly heat the tile so it becomes pliable and lifts easily.

## Paper-Backed Aluminum Foil Is Metallic Gift Wrapping

Expensive-looking metallic wrapping paper can be made easily with aluminum foil. Coat the dull side of the foil with clear shellac and, as soon as it becomes tacky, join it to a sheet of strong white paper. Secure perfect bonding by rolling it with a print roller, or with a rolling pin.







Weatherproof outlet shown above has screw cap used to close opening when not in use. Next to rubber gasket is conventional receptacle for two-prong plug; at far right is receptacle for three-prong grounding plug. At top is grounding adapter and plug for conventional outlet receptacle

Above right, 1/2-in.-dia. extension cord, No. 14 wire with three-prong, ground wire attached is suitable for heavy current load and amply protected against weather. Ground wire permits metal parts of floodlighting units and other equipment not carrying current to be grounded for safety



## PROTECT YOUR

ONE ENTHUSIASTIC HOMEOWNER worked an entire December afternoon installing a lighted star on the peak of his house only to find — after the extension ladder had been returned to the garage — that the lamp at the highest point on the star was not burning. Typical luck? Maybe. But he could have avoided another ladder session by following this simple suggestion: Before installing outdoor Christmas lights, first screw each lamp firmly into its socket and then test the entire string. Thus, burned-out lamps, defective wiring, plugs and receptacles can be spotted before installing them in places difficult to reach. Or the homeowner might follow the practice of commercial displayers by using, each season, only new lamps in sockets that are to be mounted in hard-to-reach places to minimize the likelihood of any burn-outs.

There is more to outdoor lighting than the mere arranging of lamps to form pretty patterns or to illuminate an attractive bit of shrubbery or detail of your house. Before the lamps can put on their show of brightness and color, they must be supplied with electric current; and to get that current to them requires wires, plugs, sockets,

outlets, fuses and switches that are designed to withstand moisture.

### Weatherproof Receptacles

The recommended way of supplying current to outdoor-lighting systems is by means of weatherproof receptacles placed outside the house. There is a flush type that mounts on a standard box, with a rubber gasket under it and a screw cap for keeping moisture out when nothing is plugged in, Fig. 1. Another type of outdoor receptacle is contained in a metal housing having a hinged lid to keep out rain and moisture. Weatherproof outdoor switches are available for controlling such outlets.

A three-prong grounding-type receptacle, Fig. 1, right side of photo, recommended for such outlets permits plugging-in of a cord having a ground wire, so that metal parts of floodlighting units and other equipment that do not carry current can be grounded for safety. If all available outlets are of the conventional two-wire type, there is available a grounding adapter for use between the outlet and three-pronged grounding cap, Fig. 1, top of photo. This adapter has a short length of flexible





# Christmas Lighting

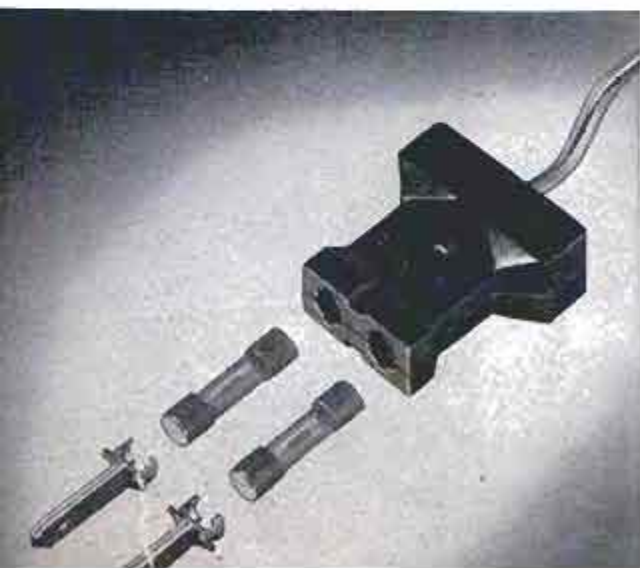
wire that is connected to the outlet box which in turn should be connected to a water pipe or other ground.

The practice of getting current from indoor lights by running wires through doors and windows, even when the wires are protected by inserted boards or other devices, is not recommended. If it is neces-

sary to use an extension cord outdoors, it should be of a type suitable for use in wet locations, and should be large enough to carry the load without overheating. Plugs, connectors (current taps), and other attachments should be weather resistant as well. With ready-made portable rubber-cord sets, covering of cord and attachments

Fused plug disassembled to show cartridge fuses installed between plug prongs and wires for extra protection of Christmas-light string

Rubber washers used between outdoor lamps and sockets keep water out. Avoid connecting a lamp set in such a way that it carries a heavy current to other lamps





often is vulcanized to make a one-piece job. At one end, the cord has a suitable grounding plug, Fig. 2. On the other end there is a current tap to match the plug on the unit being served.

When the available extension cord is itself waterproof, but its plug and connector are not, or are doubtful, you can weatherproof the latter two by wrapping plastic or rubber sheeting around them as shown in Fig. 5. Another method is to wrap the extension-cord connector and the plug of the attached lamp string, plus an inch or two of each wire with friction tape. If you install plugs and cord taps yourself, use weatherproof molded types and apply a seal around the cord where it enters the attachment.

### Safe Circuit Load

The amount of electricity (in amperes) a branch circuit, such as is commonly used for Christmas lighting, can handle safely is limited by the size of wire used; and the ampere rating of the fuse or circuit breaker should be such as to keep the current within that limit. When a circuit is fused for 15 amperes the total electrical load should not exceed 1800 watts for each receptacle; 2400 watts for a 20-ampere-fused circuit. To compute the load, merely add the wattage of all lamps and any other electrical devices that may be operating on the same circuit. Overloading may show itself by frequent blowing of fuses. When the fuses used on a circuit pass more amperes than the size of wire can handle, the wire will feel hot. Even on a circuit that

closely approaches an overloaded condition, the wires and connectors may feel quite warm.

### Christmas-Lamp Sets

A typical Christmas-lamp string suitable for outdoor use consists of a pair of flexible wires with outdoor-type sockets and plugs. Rubber washers are used to prevent water from entering the sockets around the bulbs as shown in Fig. 4. One end of the cord is fitted with a two-pronged plug for connecting to a receptacle while the other end usually has a connector so another string can be added. If the lamps are mounted on metal cutout forms or other metal supports, it is advisable to connect all isolated metal frames, etc., to a ground wire, since grounding wires are not incorporated into lamp sets. Use wire no smaller than No. 14 for this purpose. Also, avoid connecting a small-wire lamp set in such a way that it will have to carry a heavy current to other lamps.

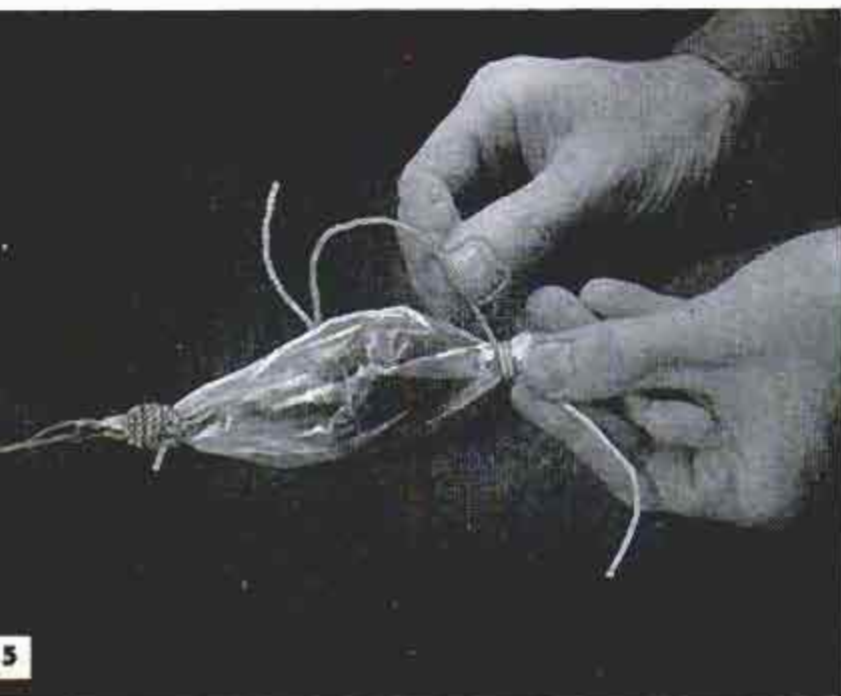
Christmas-lighting sets having plugs equipped with tubular fuses, as shown in Fig. 3, have one fuse for each prong, making it necessary to check both of these fuses if the lamps do not burn.

A typical Christmas-light flasher, Fig. 6, is a device which is connected between a lamp and a source of current for the purpose of making the lamp flash at intervals. After connecting a flasher, give it a little time to warm up, since it operates much like a thermostat.

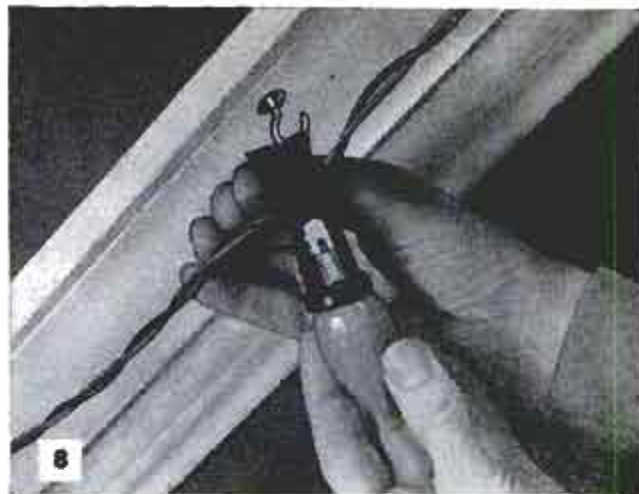
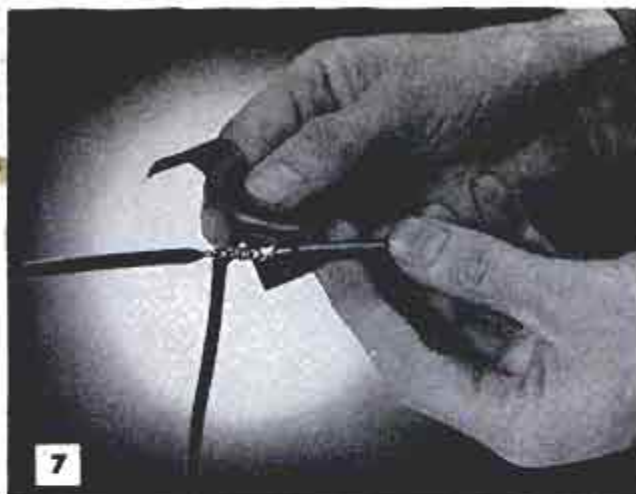
Although less convenient to install than the pin-type, the pigtail socket sometimes

Plastic sheet of type used for food containers is wrapped, tied and taped around plug and connector to assure waterproof connection between lamp string and extension cord

Light flasher installed between connector and plug of two light strings will cause lamps in string at left to flash 15 times per min.







**7** When connecting pigtail socket to continuous current-carrying wire, bared end of pigtail is coiled around wire, then soldered and insulated again

**8** Cup hooks provide best support for Christmas-lamp strings when installed along roof gable. Wires are tied to hook with tape at junction with socket

is used for making lamp strings, streamers and other lighted displays because it occupies less space and can be made without special materials. To splice a pigtail to a continuous wire, Fig. 7, remove about 1 in. of the insulation from the pigtail and wrap it in a tight spiral around the bared section of the continuous wire. Solder the joint securely and reinsulate it.

can be protected by placing strips of wood over them as shown in Fig. 9, with L-shaped pegs bent from light rod and pushed into the ground to anchor the boards. Another means of protecting a flexible cord is to run it through an old garden hose slit lengthwise. When two cords are connected, the joint can be waterproofed with rubber tape. ★ ★ ★

Lamp strings can be fastened to buildings either by means of insulated staples or brass cup hooks, Fig. 8. Hooks are the preferred fastening because staples have to be pulled out to release wires, leaving small holes in the wood while the hooks can remain permanently.

When using flexible waterproof cords on the ground to supply lighting units, they

Extension cord is protected by wooden strips held in position over cord by L-shaped rods driven in ground. Or cord can be placed in slit garden hose

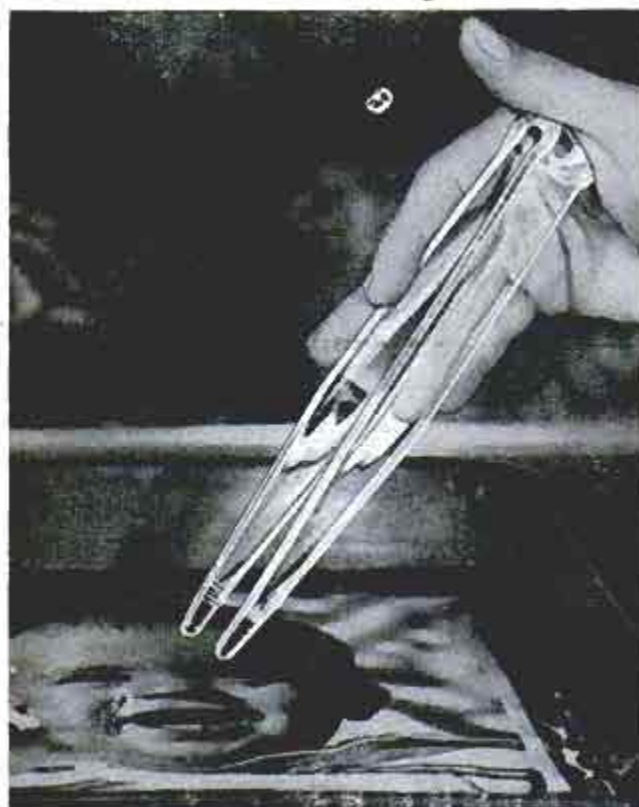
Photos and information courtesy General Electric Co.



**9**



## Electronics Probing Tweezers Are Excellent Print Tongs



Probing tweezers used by electronic technicians are ideal for use as photoprint tongs. Available at radio and television supply houses, the tongs are larger than standard print tongs and have serrated tips, which permit easier handling of wet prints.

Robert C. Wilson, Brentwood, Mo.

## Foil Streamers for Decoration

For party decorations or for trimming a Christmas tree, use kitchen aluminum foil to make reflective streamers. Place a few sheets of the foil together and trim the corners to form a disk shape. Starting from the outside edge cut continuous ribbons any desired width, and for added length join ends together with cellophane tape.

Ken Murray, Colon, Mich.



## Hardware Cloth Permits Wheel Traction on Ice

When placed under the rear wheels, two pieces of  $\frac{1}{2}$ -in.-mesh hardware cloth, 1 ft. wide and 3 ft. long, are handy for getting a car away from the curb on icy pavement without sliding into adjacent cars. The cloth can be folded or rolled into a small package for storing in trunk.



## Small Hektograph Duplicator

Ends from gelatin-covered paper rolls used in flat-bed duplicators can be salvaged for use as small hektograph duplicators. Tack a piece to a smooth board and write or draw on the surface with a special pen or pencil made for this use. Up to 75 copies can be reproduced from this master by pressing one sheet of paper at a time down over it and absorbing the impressions.

H. N. Webster, Nutley, N. J.



## Better Blueprint Reproduction With Colored Carbon Paper

Blueprint or blue-line reproductions of typewritten letters and drawings seldom are clear either because of the opacity of the paper or because a worn typewriter ribbon was used. Although backing up the paper with blue carbon paper will improve the quality of the reproduction, a better result is obtained when the paper is backed up with yellow, orange or red carbon paper. The latter three colors will produce a much stronger line in a reproduction.

L. E. Reichenbaugh, Tulsa, Okla.

☐ To obtain good results when painting, the air must be warm and dry with a 40-deg. or higher temperature. The surface being painted should also be dry, free from dirt and preferably located in the shade.





"Working end" of den has typewriter and file drawers within easy reach under ample desk-counter top

## Decorate With Hardwood Plywood

### PART III—Conclusion

WHEN DECORATING your home with hardwood plywood as described in the October and November issues of *Popular Mechanics*, an effective treatment of the den or study is a wall covering of flat-sliced oak. The fine, distinctive grain creates an

"Relaxation corner" of teen-age girl's room contains record player and radio as well as handy bookshelves

atmosphere conducive to quiet reading or study.

Here the grain of the plywood was run horizontally instead of vertically to make the room appear larger. Except for the meeting edges (which were beveled), these

Dressing-study corner has large desk, built-in drawers and walk-in cedar-lined closet and blanket storage



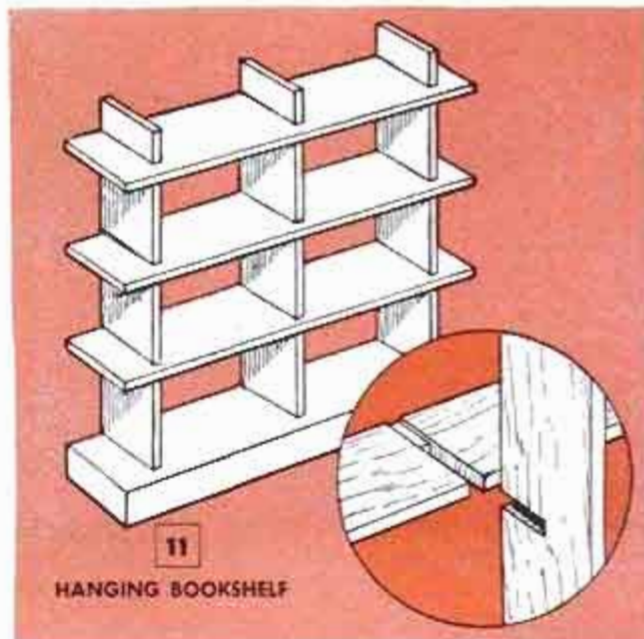




Accurate cutting of shelves allows a snug fit and assembly to integrated unit without nails or glue



After assembling hangers as below, draw all fasteners tight. Make sure all threaded rods are vertical



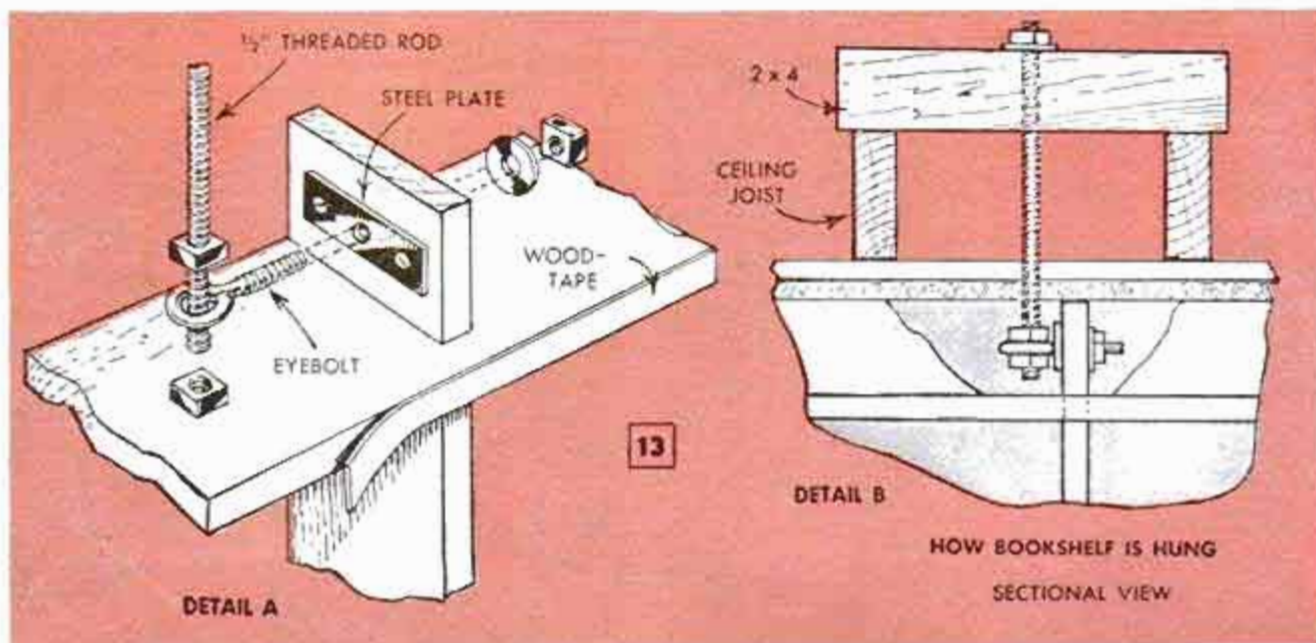
panels were not grooved as were the mahogany panels in the living room. The built-in features of the den (bookshelves, wall map and large desk) relieve the plainness of the unbroken wall panels.

The counter top, which extends 9 ft. along one wall and 10 ft. along another, is 30 in. deep—deep enough to cover cabinets for hi-fi components with ample record storage, typewriter swing-out unit, file drawers, plus 12 other drawers for the many items desired in a "working study."

### Hanging the Bookshelves

While the counter, drawers and cabinets are of standard assembly, the bookshelf units, because of their weight, presented a mounting problem. This was solved by suspending them from the ceiling joists.

Built of  $\frac{3}{4}$ -in. hardwood plywood in egg-crate construction, Figs. 10 and 11, the shelf units were suspended with hangers made from stock items from the local hard-







Closest wall, rear, has extra door above bed for access. Door holds socks and handkerchiefs on back

ware store. Figs. 12 and 13 show how steel mending plates were bolted to both sides of the vertical members of the units to take an eyebolt drawn up tight. Then a 1/2-in. threaded rod was affixed as shown in Figs. 12 and 13.

At this point, raise the bookshelf so that the rod ends touch the ceiling. Mark the rod positions and drill through the ceiling for insertion of the rods up through lengths of 2x4s drilled edgewise and long enough to bridge two ceiling joists.

Before raising the shelf unit into place, cut 2x4s to a length that will permit wedging underneath the unit to hold it. When in position, secure it as shown in detail B, Fig. 13.

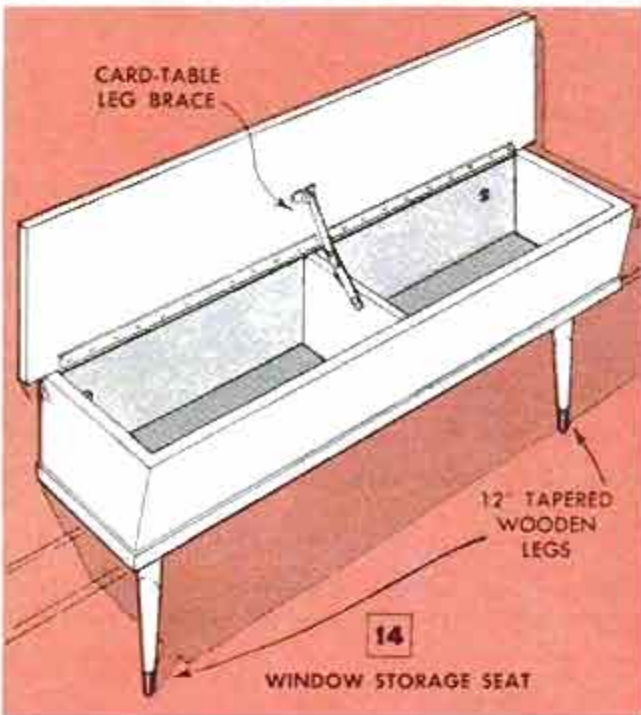
In the event the floor above is not open, use heavy duty hanger bolts run through the ceiling and into the ceiling joists. Space them accurately so that when the shelf is raised, they will pass through the eyes of the eyebolts. Draw tight with washers and nuts.

Once the shelf unit is firmly in position against the ceiling, the bottom can be fastened against the wall by long finishing nails or wood screws, driving them at an

Simple desk top for five-year-old will have drawer units and other appointments added as need arises







Window seat holds much that is "vitally necessary" to a teen-ager. Brace keeps lid open when desired

angle up from the bottom shelf and into a wall stud.

The bottom shelf can be faced with an apron of  $\frac{1}{4}$ -in. plywood, 2 in. wide, to match the paneling. This apron covers the edge of the plywood as well as partially hiding the strip-lighting fixture placed under this shelf to illuminate the counter top. The space between the ceiling and the upper surface of the top shelf can be finished with a soffit cut from matching plywood and glued to the edges of the vertical members of the shelf. The soffit also hides the hangers and keeps dust from collecting in this area.

The shelves are given the final touch, carpenterwise, by covering the end grain with Woodtape, as was shown in the November issue.

### Boy's Room in Walnut

The boy's room was paneled in flat-sliced walnut. The grain of the walnut is vertical, allowing the repetitive pattern to be shown to its best advantage. Built-ins include a desk, combination blackboard and a train board which, as a boy's interests change, can be used as a worktable for hobbies. Both the table, which is hinged to the wall, and the desk are made of  $\frac{3}{4}$ -in. hardwood plywood to match the wall paneling.

A money-saving feature in the children's bedrooms was introduced in the use of stock pine trim (base, cove and door trim). The grain will, of course, differ and if, after finishing the trim along with the paneling, you do not like the effect, cover the trim with a paint that will harmonize with or accentuate the paneling.

Space under the eaves was utilized for a cedar-lined closet. To facilitate removal of clothes, especially shirts and short suit coats, a door was built into the wall above the pillow level of the bed (see photo, page 199). This cabinet-type door has 4-in.-deep shelves on the back to hold handkerchiefs and socks.

### Girl's Room in Birch

Birch with its graceful grain was used to panel the room for a teen-age girl. Probably more so than the straight grains of oak and mahogany, the birch lends itself to such feminine built-ins as a vanity, and yet preserves a dignity that appeals to adults.

The normal structural features (which should be utilized in any attic remodeling) permitted many built-ins such as a walk-in cedar-lined closet (see page 197, lower right photo), built-in drawers and a 6-ft.-long desk. Other features include a vanity, bookshelves, storage headboard and window seat, Fig. 14, made of  $\frac{3}{4}$ -in. plywood and covered with a cushion.

### Hints on Hardwood Plywood

In Parts I and II, as well as in this concluding article, an attempt has been made to show how hardwood plywood, with many different grains available, can be used by the homeowner to beautify and increase the value of his home.

However, two things should be kept in mind when using these fine woods. First, it is wise to keep all woodworking tools sharp. This is important.

Second, fine woods should have fine finishes. Choose yours with care and apply it according to the manufacturer's instructions. A fine finish will bring out the grains inherent in these plywoods and will provide a surface that requires a minimum of maintenance. ★ ★ ★





## Measuring Spoons and Cups Aid in Preparing Medicines

Keep sets of measuring spoons and cups in your bathroom medicine chest for giving accurate doses of medicine. The cups will also prove handy for mixing or diluting concentrated medicines.

Mrs. Michael Fey, New York City.

## Paper-Clip Ornament Hangers

Ordinary oblong paper clips pulled apart lengthwise into an S-shape may be used very successfully in hanging Christmas-tree ornaments. Put the narrow end through the metal loop on the ornament and slip the other end over the branch of the tree.

## Aluminum-Foil Decorations Applied on Gift Packages

A novel way of decorating gift packages and greeting cards is to apply designs cut from aluminum foil. Coat the dull side of a large sheet of the foil with white shellac. After it is dry, use a pair of scissors to cut the designs from several thicknesses at a time. To apply the decorations, lay them in place with the coated side down and press with an iron set at "silk" heat. The design will adhere immediately.

Ken Murray, Colon, Mich.



## Keep Wooden Pegs Around Shop For Miscellaneous Uses

A collection of small wooden pegs is a handy addition to any workshop, the pegs being useful for plugging holes and as midget dowels for use in place of nails. Made from scrap pieces of wood, both round and square pegs should be included in the collection. Roughly square each one, and point one end with a pocketknife. Round pegs can be made by driving a square one through a round hole in a piece of steel. Suitable diameters are from  $\frac{1}{16}$  to  $\frac{3}{16}$  in. and in lengths from  $\frac{1}{4}$  to  $\frac{3}{4}$  in.

Walter E. Burton, Akron, Ohio.



## Checkbook Used as Photo Album

Empty travel-check folders provide ideal pocket photo albums. Make your photo size  $2\frac{1}{4} \times 2\frac{3}{4}$  in. on a sheet of 3 x 4-in. single-weight paper, then trim the paper so there is a  $\frac{3}{16}$ -in. border on three sides and a  $\frac{7}{16}$ -in. border on the other side. In the wide side punch two holes  $1\frac{5}{8}$  in. apart so they fit over the clasps in the folder. Assemble the photos in the folder, fold down the clips and the album is completed.

Don Honick, Chicago.





### Aluminum-Foil Drapery "Linings" Keep Trailer Interiors Cooler

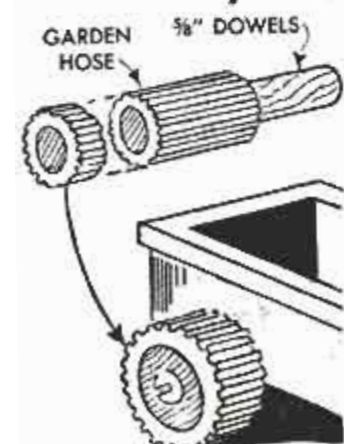
Sheets of aluminum foil now are being used as functional "linings" for drapery and Venetian blinds in mobile homes during hot, sunny weather. The metal foil reflects the rays of the sun and measurably reduces the heat transmitted through the windows into the interior of the trailer homes.—Ed Packer, Oak Park, Ill.

### Removing Tight-Fitting Cork

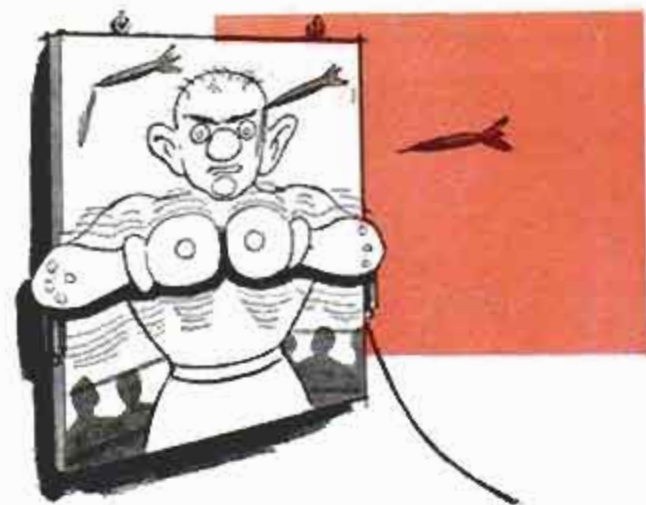
When you have difficulty removing a cork from a beverage bottle, even with a corkscrew, try the following stunt to simplify the task: Hold the end of the bottle neck over a flame of the kitchen range for about a minute, rotating it slowly. The heat will cause the glass to expand, and usually the cork can be removed easily with a gentle tug.

Herbert Kondo, Champaign, Ill.

### Dowel Inserted in Hose Provides Toy Wheels



quantity of wheels in a short time. Holes for the nail or screw axles were drilled in the wheels.

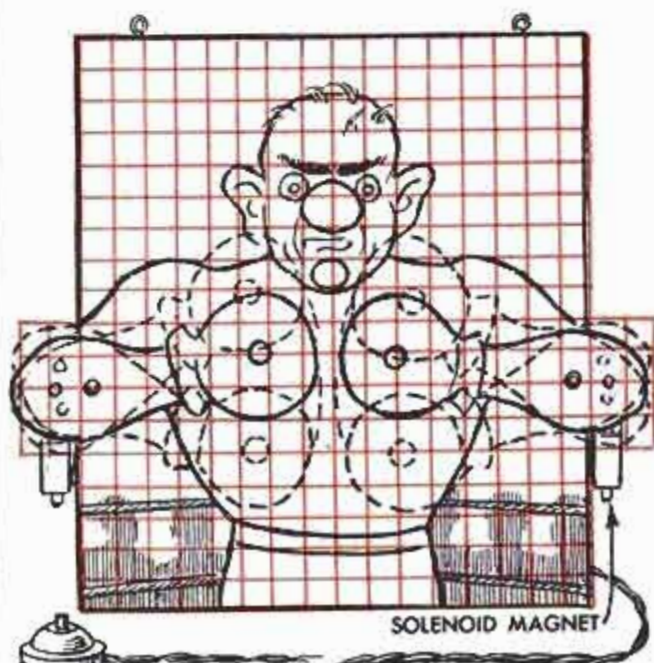


## TRY YOUR LUCK

By Howard P. Wyranch

**T**HROWING DARTS is a lot more exciting and competitive when you have to get the jump on your opponent's reaction and timing. That's what it takes to score on either of these novel electric dartboards which are animated and triggered by a player who tries his best to block his opponent's shots during each turn of play.

The bat is the animated part of the baseball dartboard and the details on the opposite page show how it is pivoted and actuated by a solenoid which is wired to a doorbell transformer and push button in the manner indicated. Pressing the doorbell button energizes the solenoid and in turn swings the bat across the board. Regulation baseball rules are followed. The pitcher throws the darts trying to hit the strike zone and not the bat, at least not in the hit zone. The batter works the doorbell button and tries to swing the bat to inter-





WTM 58

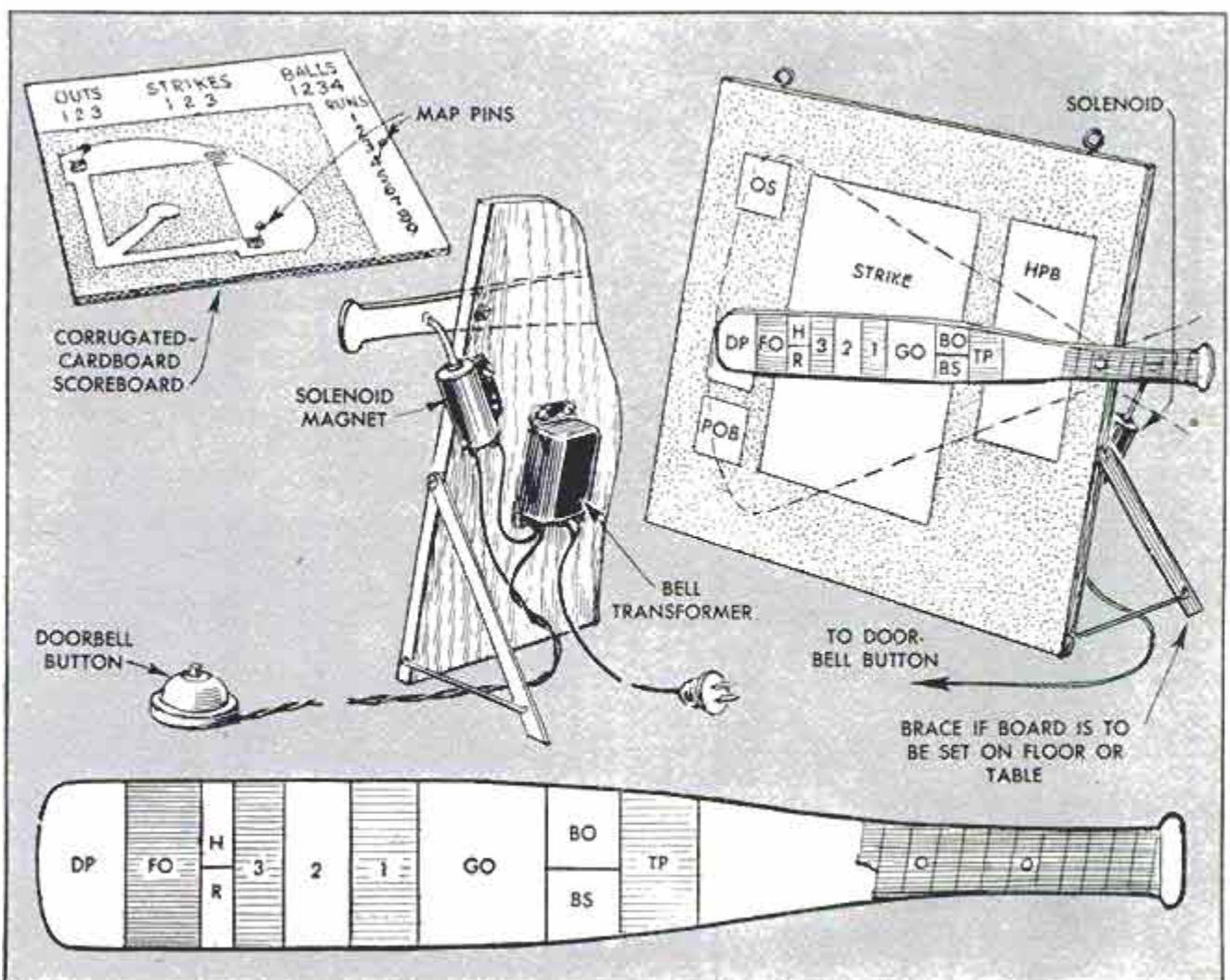


# WITH AN ELECTRIC DARTBOARD

cept the dart and get a hit. A dart that misses the strike zone is a ball. Letters HPB mean hit by a pitched ball; OS means out stealing; POB means picked off base and SB (partly hidden by bat) means stolen base. Score is kept on a separate playing-field scoreboard. DP on the bat means double play; FO means flied out; HR stands for home run and so on.

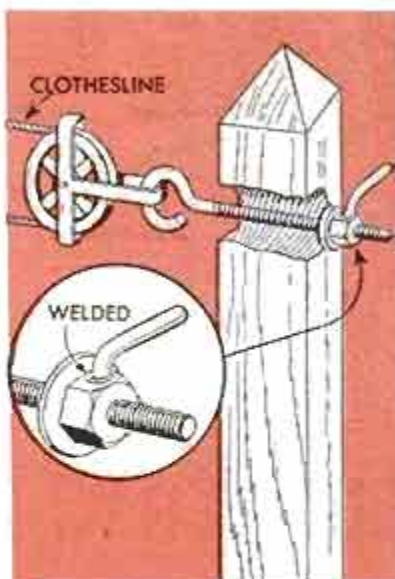
by two solenoids. Five darts are thrown by each player each round and points are scored as follows: Five for a punch to the body and 10 to the head. Five points are lost for each dart blocked by the moving arms. If the red button on the chin is hit, a KO is scored, but if the blue circle is hit on either glove, the player is kayoed. A dart below the belt penalizes the player 10 points and two darts below the belt forfeit the round. ★ ★ ★

The boxing dartboard has two moving parts, the boxer's arms, which are actuated





## Adjustable Eyebolts Eliminate Sagging Clotheslines



A continuous clothesline strung on pulleys can be kept from sagging if eyebolts are used in place of eyescrews for holding the pulleys. Each eyebolt is equipped with a special nut that has a handle welded to it as shown in the detail. Whenever the clothesline becomes a little slack a few turns with the handle draws the eye of the bolt closer to the supporting post and tightens the clothesline.—W. J. Shupenia, Smoky Lake, Alta., Can.

## Modern "Silver Fox" Finish For Hardwood Furniture

If you would like an unusual and attractive finish for modern furniture built in the home workshop, try "silver fox." The finish works best on wood that has an alternating hard and soft grain, such as close-grained white oak, ash and certain types of mahogany. After sanding the wood smooth, wipe it with a damp cloth to raise the soft grain. Allow it to dry for 24 hr., then resand. Now, mix black lacquer, 1 part, to thinner, 2 parts. Spray or brush eight or nine coats of the thinned lacquer on the wood at about 15-min. intervals. Let the lacquer dry thoroughly, then smooth carefully with fine sandpaper. When the black lacquer is very smooth on the hard part of the grain wash the surface of the wood with water. Wipe off the extra moisture with a dry cloth. After the moisture has completely dried, wipe on white flat paint or white paste filler. Remove the surplus white paint from the hard grain with a cloth dampened with turpentine. The wood now should appear to have a basically black surface with white lines following the grain of the soft portions. Allow the finish to dry overnight, then apply four or five coats of clear lacquer. Rub the lacquer with pumice and a soft cloth and apply several coats of paste wax.

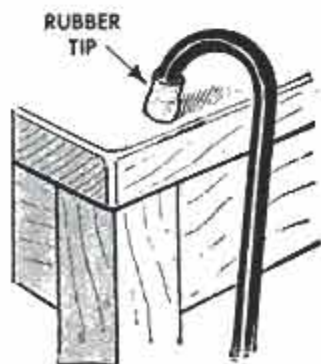
James R. Nolan, Fort Worth, Tex.

### *Two unpainted chests*

that you buy ready-made take all the work out of building the smart vanity table featured in the January Craftsman section. You simply bridge the tops with a lift-off drawer assembly, paint it to suit your fancy and the job's done

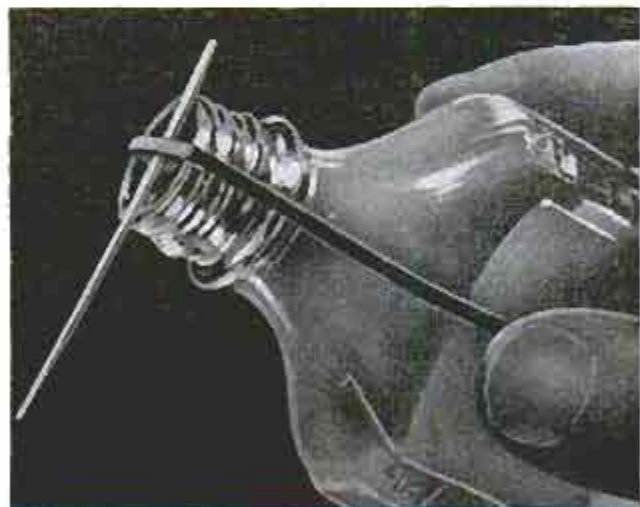
## Rubber Tip Holds Cane On Edge of Table

To prevent a cane from slipping off when hung on the edge of a table, place a rubber tip on the curved end. Another tip placed on the bottom of the cane will steady it when walking on a glazed surface.



## Rubber Band Holds Toothpick On Bottle Neck When Pouring

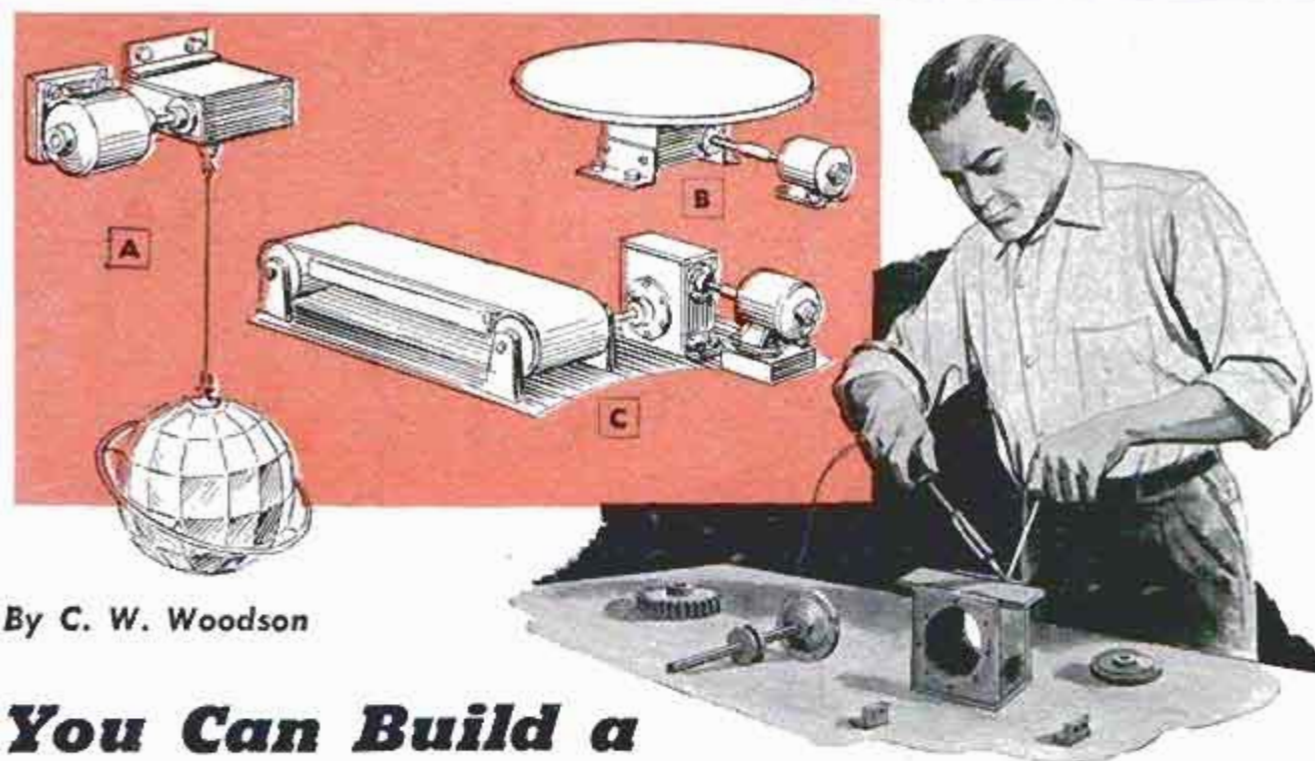
Holding a toothpick over the mouth of a bottle to permit pouring a narrow stream of liquid into a smaller container can be done more easily if a rubber band is snapped lengthwise around the bottle as shown. Using the band, rather than a finger, lets you see what you're doing.







# SHOP NOTES



By C. W. Woodson

## You Can Build a SPEED REDUCER

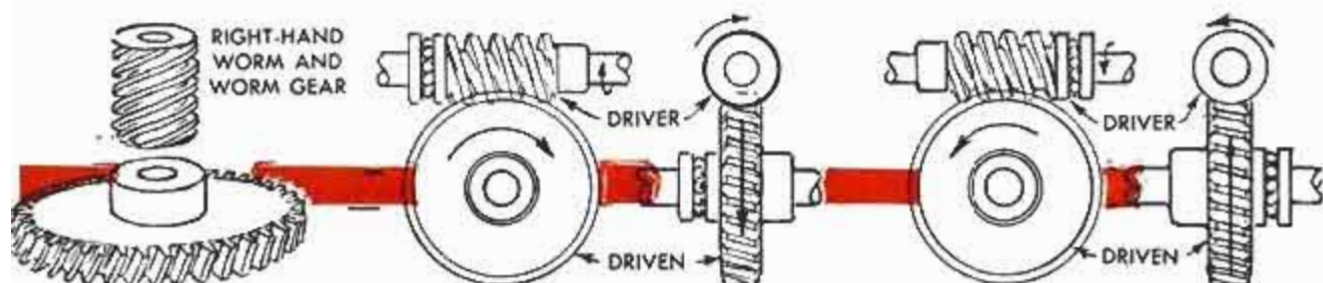
BY USING various gear combinations, both single and compound reductions, it is possible to build a speed-reducing unit to suit almost any purpose such as operating timing devices, animated signs, rotating window displays, moving belts and various other slow-moving installations. Sketches A, B and C above suggest different applications of reducing units.

With different types of gear trains ratios up to 3000 to 1 are practical, the higher ratios being obtained by compound gearing using a double set of worms and worm gears. The lower ratios are achieved with spiral miter gears, or a pinion and bevel gears. The lower ratios are achieved with a worm and worm-gear combination usually is used, the advantage of the worm gear being its comparatively small size, which makes it possible to house it in a small gearbox. For single-reduction drives

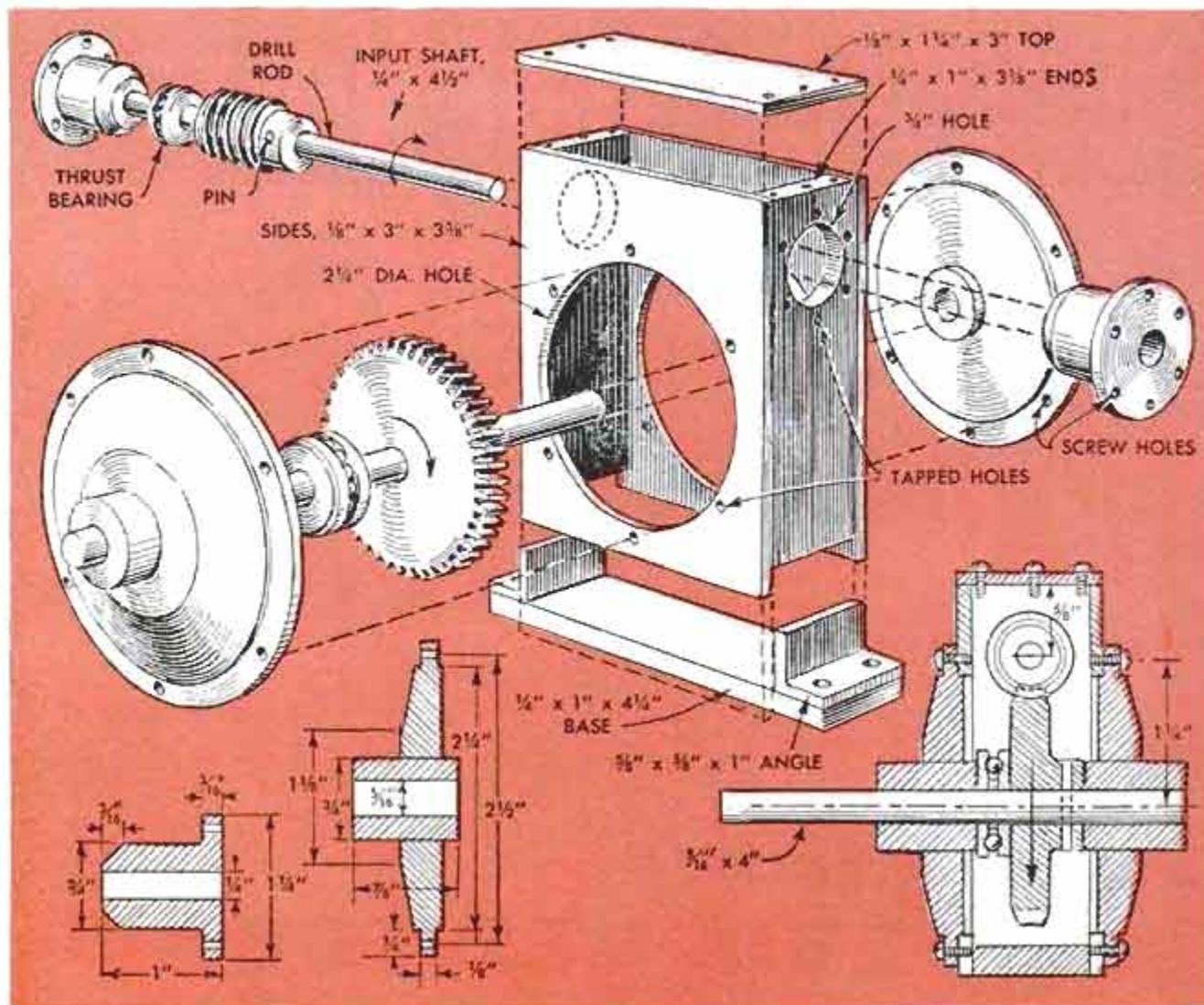
where the input and output shafts can operate at right angles, the single-thread worm and worm gear are perhaps the most suitable for light duty. With the single-thread worm-and-gear combination, the gear is moved a distance equal to the thickness of one gear tooth at each complete revolution of the worm.

Taking as a typical example a worm gear having 50 teeth, this size gear will give a 50 to 1 reduction when driven by a matching single-thread worm. Put another way, one complete revolution of the worm gear will require 50 revolutions of the worm. Much greater reductions in output-shaft speed are possible with gears of the same ratio by driving from a small pulley on the motor to one of larger diameter on the input shaft of the reducing unit, although, of course, the gear ratio remains the same.

When planning any type of installation



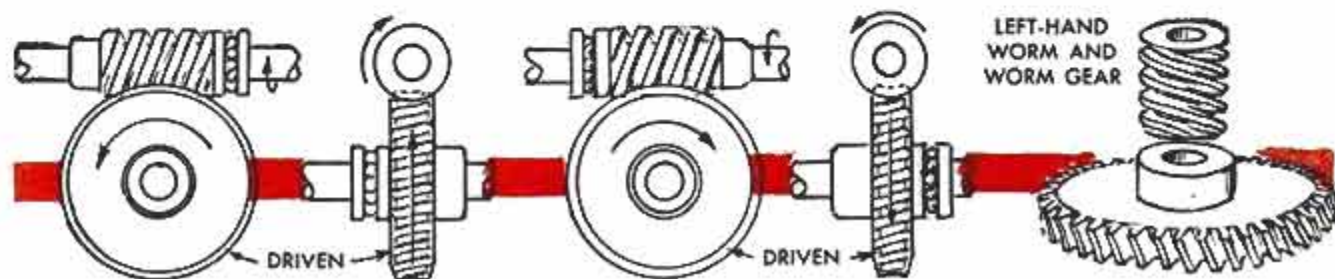




utilizing a gear-reduction unit, it is necessary to decide beforehand whether to use a direct-connected motor drive to the input shaft through a flexible coupling or a V-belt drive from the motor to the input shaft of the reducing unit.

Reduction gears should always be mounted in an oil-tight housing so that they can be run in oil. Small gear-reducing units are easily made by using stock worms and worm gears and mounting these in a steel or brass housing as detailed above. This unit is fitted with plain bearings on the input and output shafts, the thrust being taken by ball thrust bearings on both the output and input shafts. The shafts are mounted in simple flanged bushings which are attached to the outside of the housing with screws. The housing is made from  $\frac{1}{8}$

and  $\frac{1}{4}$  in. brass plates joined with soft solder, which has sufficient strength for a housing of the dimensions given. The top is attached with screws to provide access to the interior of the housing and for replenishing the supply of lubricant. As dimensioned, the reducing unit detailed above is designed to be direct-driven by a  $\frac{1}{12}$ -hp. motor. By making proportionate increases in sizes of the gears and housing the same general design can be utilized in making much heavier units. In the larger sizes the parts should be joined with screws rather than solder. All joints should be fitted with oilproof gaskets. On the larger units there will be a considerable reduction in frictional drag if ball bearings are used instead of sleeve bearings although, of course, more machining is necessary. ★ ★ ★





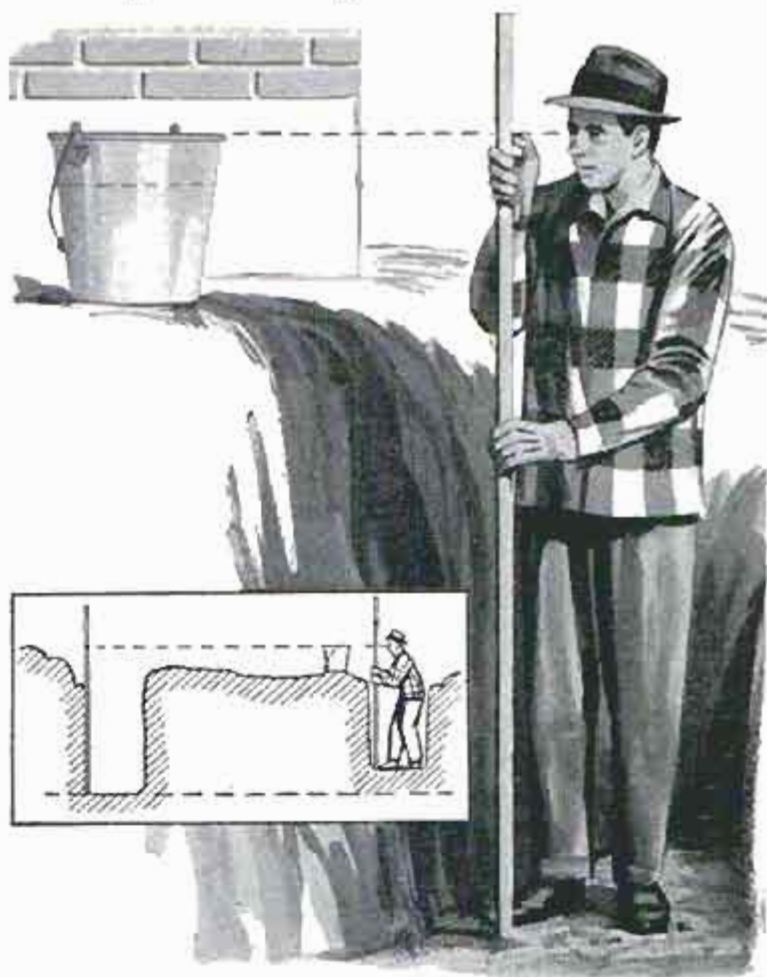
## Improvised Surveying Level Requires Only Pail of Water

When you need a surveying level for such jobs as grading your yard, or for laying draitile, you can improvise one from a pail of water that will be accurate enough for all practical purposes. Place the pail on high ground and adjust it until the water is the same distance from the rim at three equidistant points around the rim. Sight from a pole, such as a clothesline prop, across the leveled rim of the pail to another pole as indicated. A friend can mark the other pole at the point where you sight, and the relative heights at the lower ends of the poles can then be determined by measuring down from the marks.

R. G. Cooper, Trenton, Ont., Can.

### Heat Restores Ink Flow

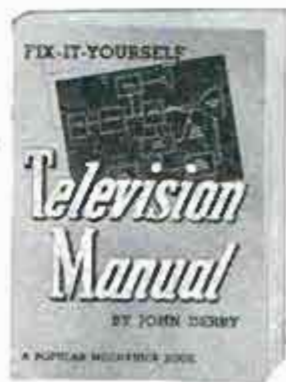
If ink in a ball-point pen does not flow freely, hold the point end of the pen in the palm of your closed hand for a minute or two. The heat from your hand will soften the dried ink in the pen and allow it to flow.—Frank A. Javor, North Bergen, N. J.



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# Christmas Shopping



1

**1. BOY-SIZE TOOL CHEST** comes complete with all basic hand tools needed for building craft projects in wood. Chest, or cabinet, is designed to hang on wall, provides safe, accessible storage for all tools in the kit, which includes new "dial an angle" rule  
A. C. Gilbert Co., New Haven, Conn.



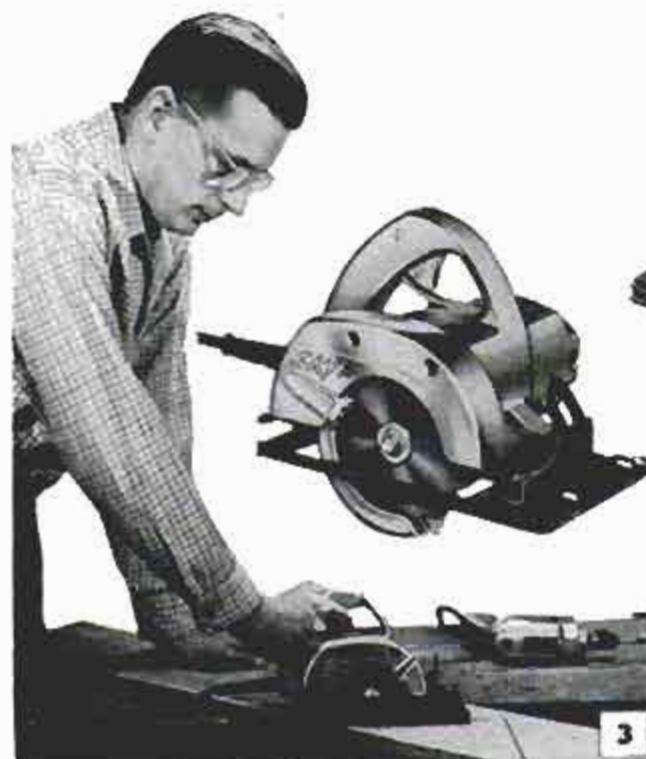
2

**2. PORTABLE ELECTRIC DRILL** is especially suited to needs of the homeowner, electrician, sheet-metal worker and plumber. Handles any accessory adapted to use with 1/4-in. portable drills. Pistol grip gives positive control on a wide variety of operations  
Mall Tool Co., 7740 S. Chicago Ave., Chicago 19

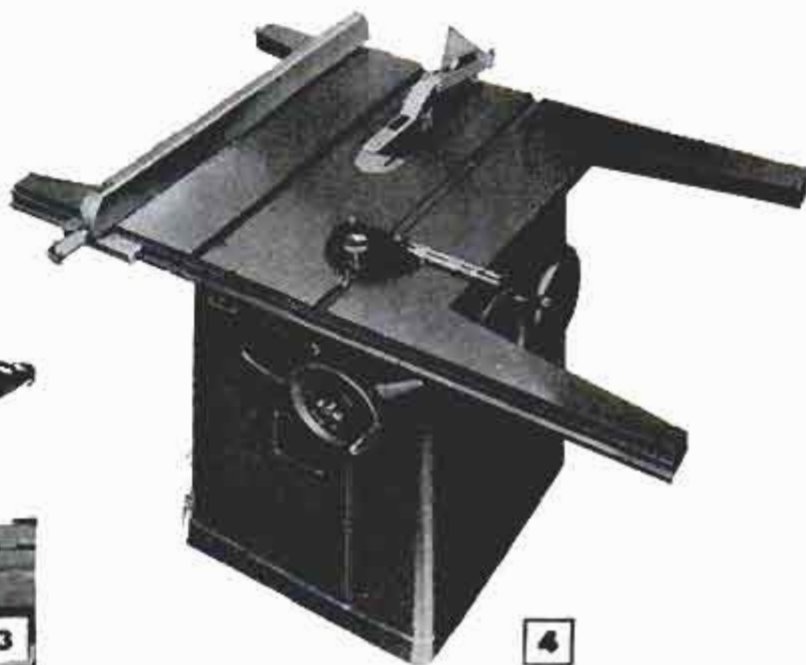
**3. PORTABLE ELECTRIC HANDSAW** is one of the smallest portable-power units available. Blade is 4 1/4 in. in dia., cuts 1-5/32 in. deep in 90-deg. position. Blade tilts to 45 deg. Extra-wide soleplate permits right or left-hand cutoffs, makes unit easier to guide  
Skil Corp., 5033 Elston Ave., Chicago 30

**4. TILTING-ARBOR SAW** has several new features. Motors up to 3 hp. can be mounted on the single-trunnion tilting assembly. Arbor takes 10-in. blades. Ripping fence rolls across table on ball bearings and locks at any point. Depth gauge is new, accurate  
Yates-American Machine Co., Beloit, Wis.

**5. PORTABLE ROUTER** with newly developed accessories is becoming one of the most versatile tools in the shop. New guide permits greater range on both curved and straight routing. Extreme high speed of cutters results in clean, sharp moldings and grooves  
Stanley Electric Tools, Div. of Stanley Works, New Britain, Conn.



3



4



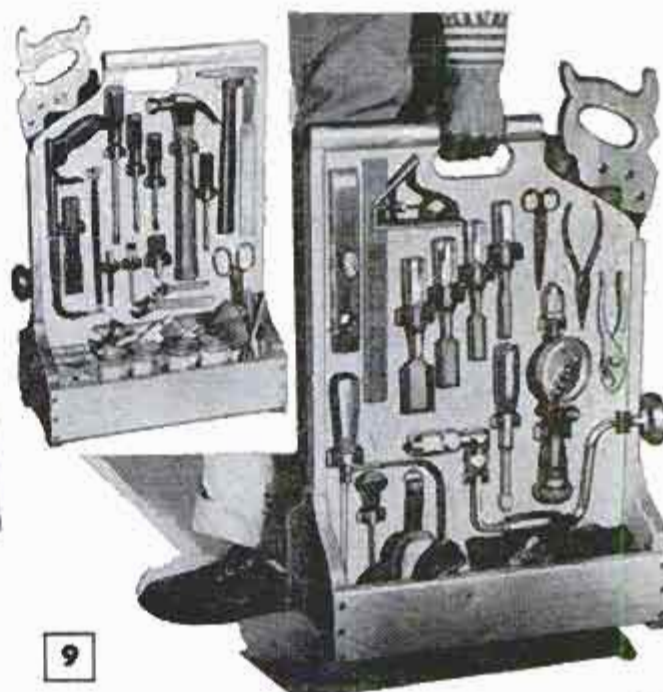
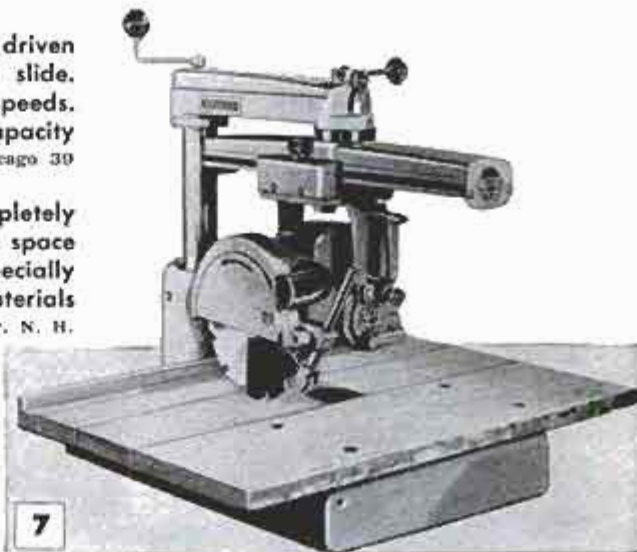
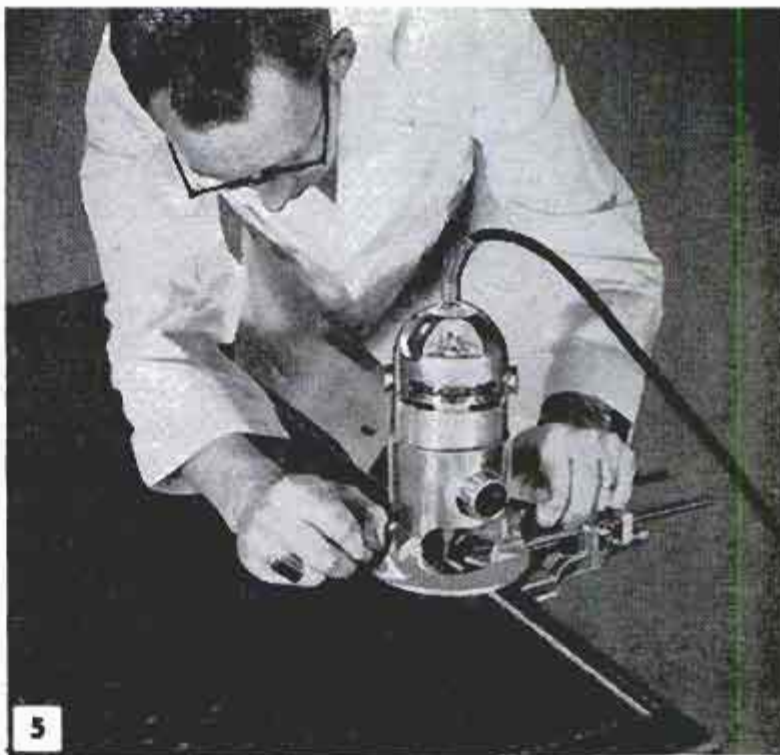
# for Tools

**6. NEW BENCH-TYPE CIRCULAR SAW** is fitted with a  $\frac{3}{8}$ -in. arbor that raises, lowers and tilts with single handwheel. Comes with or without floor stand. Table is 20 x 27 in. (without extensions) with 15 $\frac{1}{2}$  in. of table surface in front of 10-in. blade. Fence is self-aligning  
 Montgomery Ward, Chicago 7

**7. RADIAL SAW** does all operations on the top of the work rather than from the underside. This unit has dual-voltage motor which operates on 115 or 230 v. with a simple wiring change. Has double overarm, secondary arm pivoting over center of worktable. Takes 9-in. blades  
 Delta Power Tools Div., Rockwell Mfg. Co.,  
 400 N. Lexington Ave., Pittsburgh 8, Pa.

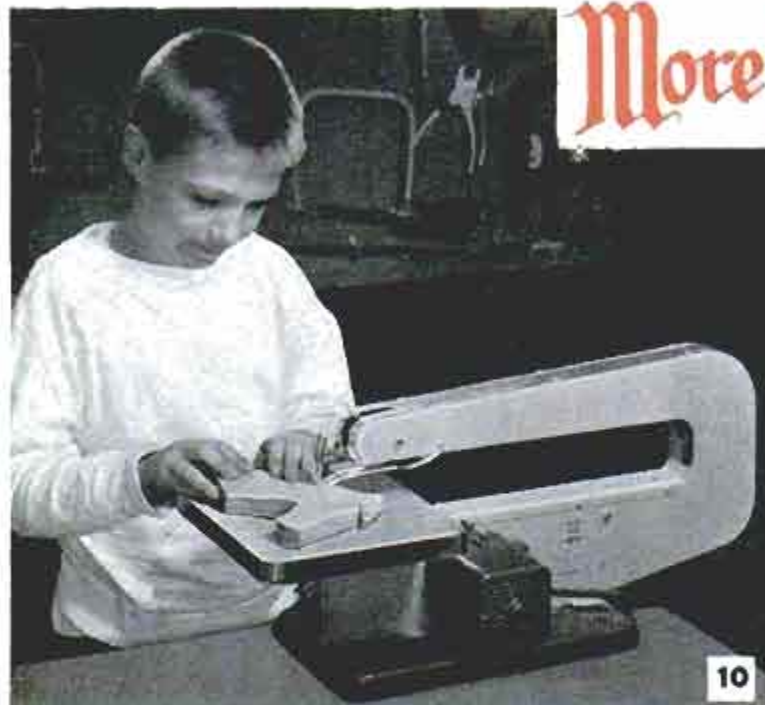
**8. JIGSAW** has one-piece cast-iron frame. Blade is driven by a yoke-type eccentric mechanism having a nylon slide. This type of drive gives very smooth operation at high speeds. Blade rotates to any desired position. Frame has 16-in. capacity  
 Duro Metal Products Co., 2651 N. Kildare Ave., Chicago 39

**9. TOOL TOTE** comes as a precut kit or as a completely assembled, finished unit. Center panel provides hanger space for all tools needed in household kit. Saw slides into specially made "scabbard." Trays provide space for finishing materials  
 Yield House, North Conway, N. H.





# More Christmas Shopping



**10. JIGSAW** has a built-in motor of the rotating-armature type. Distance between blade and frame is 15 in. Cuts stock up to 1¾ in. in thickness. Table tilts to 45 deg., also raises and lowers, making it possible to equalize wear on blades when cutting thin hardwood or extremely intricate scrollwork. Has novel type safety blade guard

Dremel Mfg. Co., 2420 18th St., Racine, Wis.

**11. OSCILLATING SANDER** makes 3450 orbital sanding strokes per minute, gives a mirror-smooth finish on hard and soft woods. Pad is sized to take just ½ of a standard sheet of sandpaper. Motor operates on 115-v. a.c. only, gives plenty of power for heavy, continuous sanding. Comes with 3-wire cord, weighs 7½ lb.

Portable Electric Tools, Inc.,  
320 W. 83rd St., Chicago 20



**12. VIBRATOR-TYPE MOTOR** drives this jigsaw at high speeds, producing smooth, clean cuts on scrollwork that do not require sanding before finishing. Has 15-in. throat capacity, the blade cutting to the center of stock 30 in. wide. Uses 4-in. pin-end blades. Hook-type blade holders are adjustable

Synco Corp., Oxford, Mich.

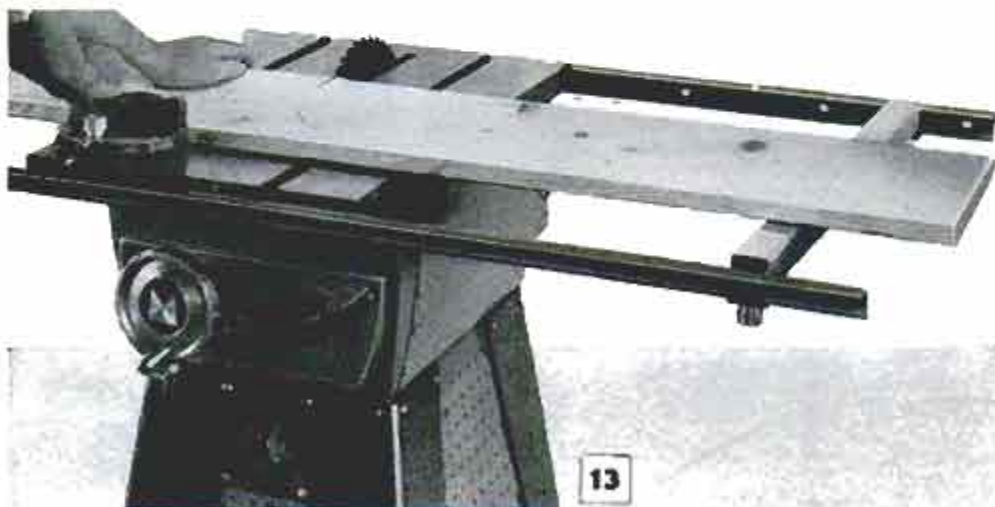


**13. FLOOR-TYPE CIRCULAR SAW** with tilting arbor has new type sliding table extension that provides rigid support for crosscutting extra-long pieces of stock. Rails carrying the sliding extension can be mounted to extend either right or left, or centered on table to extend an equal distance from both edges

Magna Power Tool Corp., Menlo Park, Calif.

**14. MICROSCOPE** makes a lasting and practical gift for students with a scientific turn of mind. Fitted with a triple revolving objective turret giving 100, 200 and 300-power magnification simply by turning the turret to any one of the three positions giving the power desired. Kit includes sample slides

Jal-Mar, 115 W. 42nd St., New York City 36





# for Tools

**15. METAL-TURNING LATHE** for your workshop swings 10 in. over the bed, 6¼ in. over the cross slide. Takes 28 in. between centers with 4-ft. bed. Available with motor and countershaft mounted behind headstock as pictured, or on cabinet stand with motor and countershaft underneath

South Bend Lathe Works,  
South Bend 22, Ind.

**16. 3-WHEEL BANDSAW** gives 2-wheel bandsaw capacity in a much more compact and efficient design. All moving parts except cutting teeth of blade in working area are entirely enclosed. Frame is cast iron. Guards are formed from heavy sheet metal

Sears, Roebuck & Co., Chicago 7

**17. COLD-GLUE INJECTOR** forces any liquid glue into loose joints of chairs and cabinets at high pressure, making it an indispensable tool for craftsmen and furniture rebuilders. Injector nozzle, or tip, is tapered, enters small hole drilled into joint at an angle. Pressure on plunger forces glue through the hole into the loose joint. Joint is immediately clamped and held tight until glue is dry. This procedure makes it unnecessary to disassemble the unit

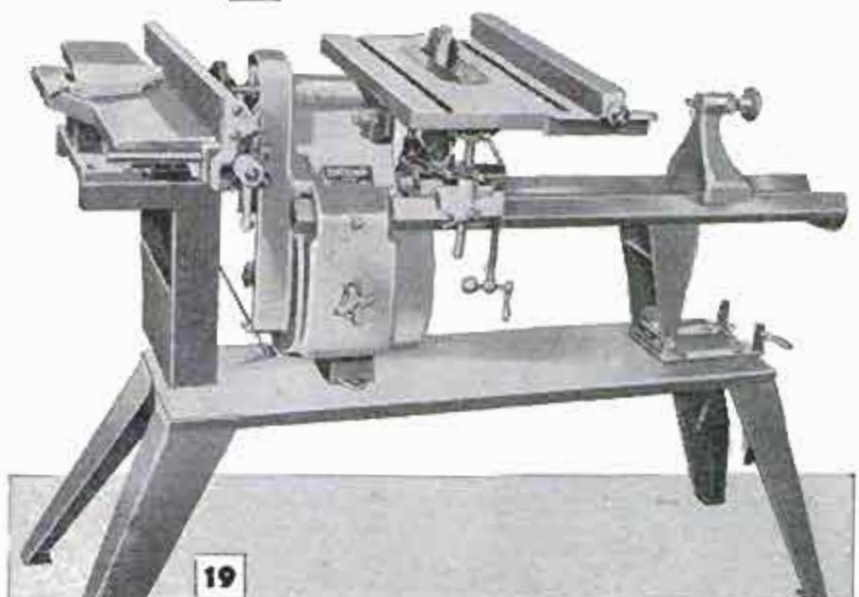
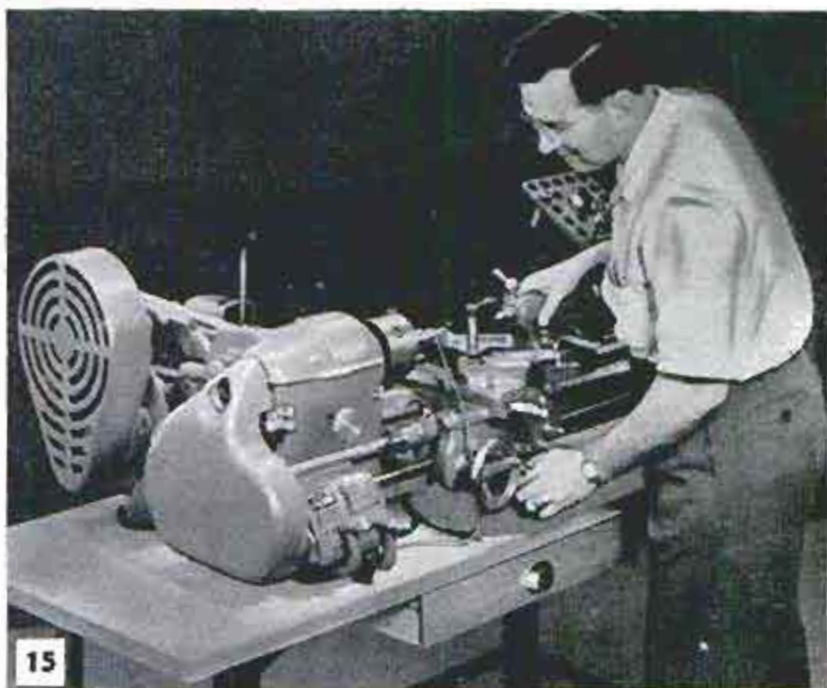
The Drumcliff Co., Dept. L-81, Towson, Md.

**18. PORTABLE ELECTRIC SAW AND DRILL KIT** includes a working drawing showing how to build the compact cabinet-bench unit pictured. Bench top folds inside cabinet which contains compartments and perforated hardboard panels for tool storage in addition to space for storing the drill-saw kit shown on bench

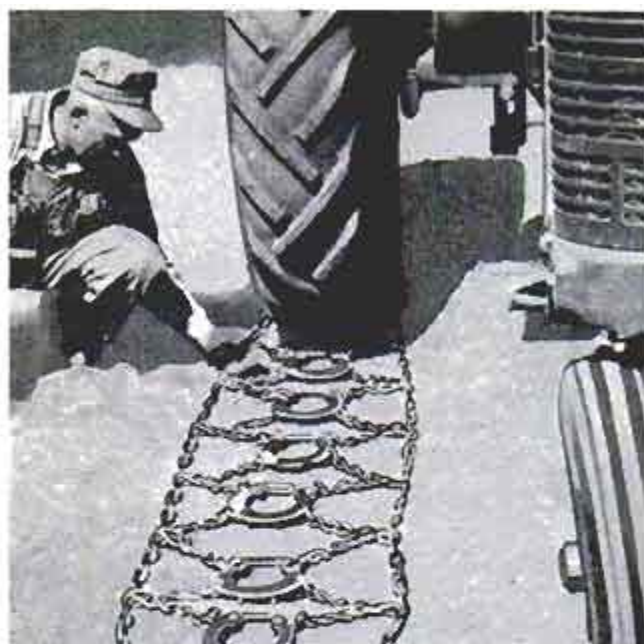
Black & Decker Mfg. Co., Towson, Md.

**19. COMBINATION POWER SHOP** does all the operations necessary in basic cabinet construction. Takes up only a corner of the basement or garage. Accessories for sanding, grinding, cutting moldings, faceplate turning and drilling are available, also jointer pictured and a special table extension for long stock

Power Tools, Inc., Beloit, Wis.







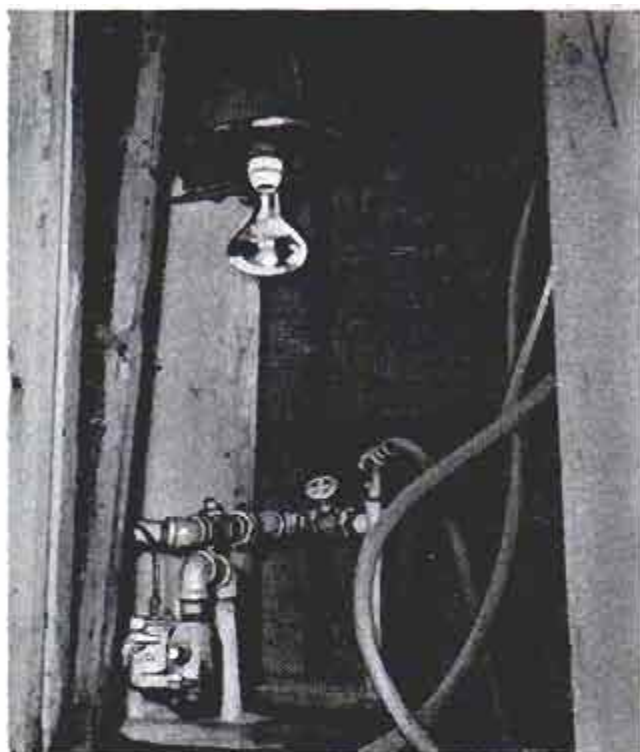
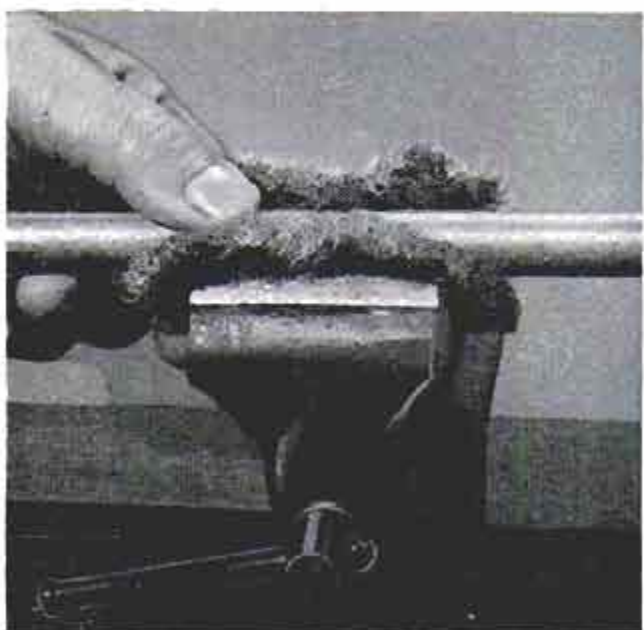
### Horseshoes on Tractor Chains Improve Traction on Ice

More traction on frozen ground and ice is provided by this set of tractor chains that has heavy horseshoes welded to the cross chains. An extra set of chains was attached to the same links as the original cross chains, then both were cut at the center to permit installation of the horseshoes. The cut cross chains are positioned in V-shapes as indicated so that each horseshoe is held at four points.

A. M. Wettach, Mt. Pleasant, Iowa.

### Steel Wool Grips Tubing in Vise

To hold metal tubing in vise jaws that are worn, or which are not exactly parallel, seat the tubing in a folded steel-wool pad. When placed in the vise, the tubing will be gripped firmly, and yet be protected from damage by the cushioning pad.



### Pump House Warmed by Heat Lamp Ends Worry Over Frozen Pipes

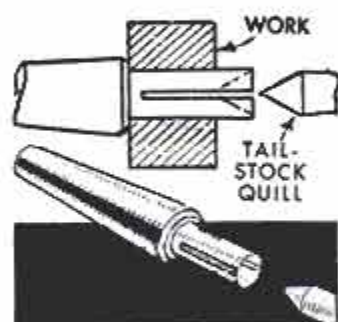
To prevent water lines from freezing in his pump house one farmer installed the heat-lamp fixture shown in the photograph. A porcelain light socket was mounted in the center of a metal lid from a 5-gal. grease bucket, which was then suspended from the ceiling with wire tied through the loop flanges on the edge of the lid. The walls of the pump house are insulated to protect against average cold, but during severe cold weather a switch located in the farmhouse is used to turn on the heat lamp.

C. F. Marley, Nokomis, Ill.

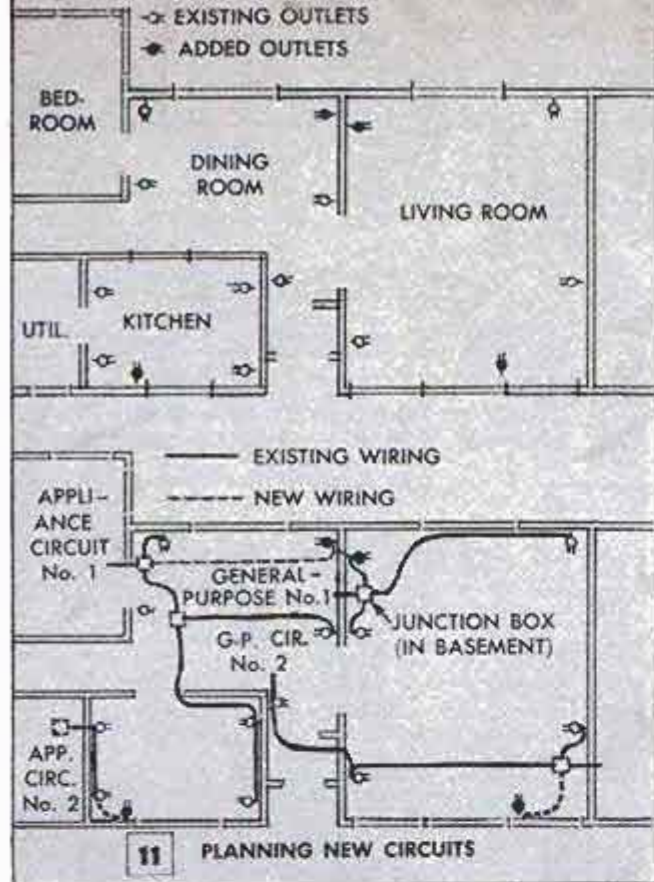
### Expanding Lathe Mandrel Is Quick Acting

When turning small parts this simple lathe mandrel, made from a discarded tapered-shank twist drill, will speed up repetitive work by its easy method of mounting.

Turn the wide end to the diameter of the hole in the work, and center-drill this end as indicated by the dotted lines in the detail. Then cut this same end lengthwise into three expandable fingers. When the work has been mounted on the mandrel, the tail-stock lathe center is forced into the tapered hole expanding it sufficiently to securely hold the work for light lathe operation.







# Is Your Wiring Adequate?

## PART II

By J. B. Mullen

**M**ANY OLDER HOMES have 110 or 115-v. electrical service and the current that can be safely drawn from such existing systems is usually no more than adequate to handle the normal number of lighting fixtures and appliances which have been common for a number of years, and which are designed for comparatively low current requirements. Usually such systems were installed with the minimum number of circuits and convenience outlets and fall far short of present-day needs.

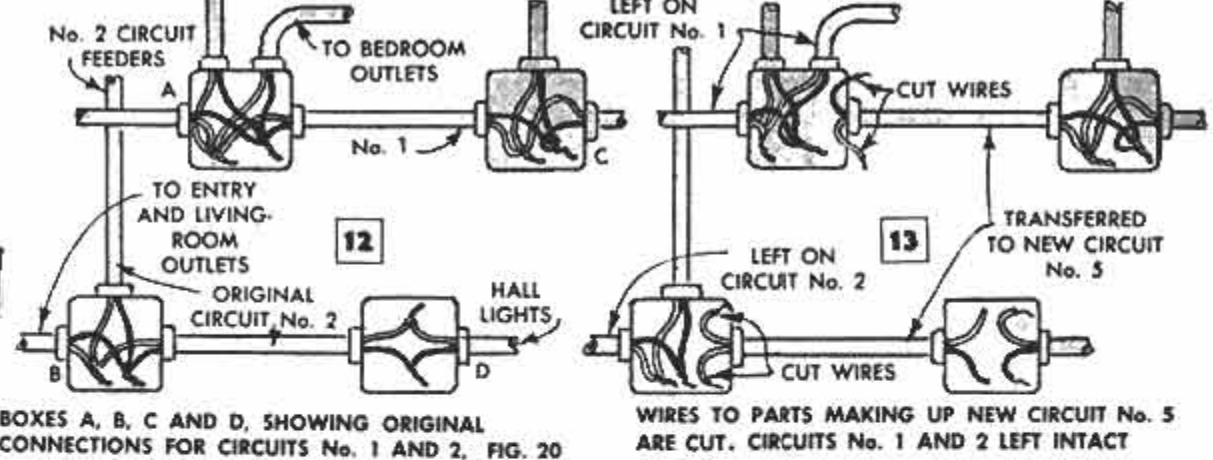
When newer appliances of heavy current requirements are to be added to the household equipment, it is important to plan adequate main and branch electrical service. Usually it is recommended that 3-wire service be installed from the power source to the service panel, making 115-230-v. current available at the main entrance switch. From this point on, the answer to the question of whether to rewire the house completely or to install new branch circuits is dependent on several factors and can be determined only by a complete survey of the existing installation. Inspection of existing wiring should include examination of wire splices and insulation in all junction boxes. Switches that fail to act

positively on make and break should be replaced, as defective switches may heat to the danger point if left on over long periods of time. Note also the length, location and number of extension cords that are normally used with the existing wiring, keeping in mind that all ordinary extension cords are No. 18 wire and will handle only limited current. Examine the system carefully to determine whether or not it is properly grounded. In some early installations the neutral, or grounded, wire was fused. This should never be done, as a blown fuse on the grounded, or neutral, wire removes the protection of grounding beyond that point.

A survey of the existing wiring conducted in the manner described (see also Part I of this series) will indicate wiring defects, show where new outlets are needed (also how many) and whether it is practical to regroup outlets into new circuits. Where additional outlets are necessary to bring the installation up-to-date, it will help to begin by making a simple floor plan, Fig. 11, indicating by symbols the existing outlets and those to be added.

Fig. 20, detail A, the upper plan, shows the wiring of four general-purpose circuits in a home. Circuits No. 3 and 4 are adequate, but circuits No. 1 and 2 are found to be overloaded. Because of this it is decided to take parts of these two circuits





BOXES A, B, C AND D, SHOWING ORIGINAL CONNECTIONS FOR CIRCUITS No. 1 AND 2, FIG. 20

WIRES TO PARTS MAKING UP NEW CIRCUIT No. 5 ARE CUT. CIRCUITS No. 1 AND 2 LEFT INTACT

### POINTS TO CONSIDER WHEN PLANNING LOCATIONS OF OUTLETS, LIGHTS AND SWITCHES

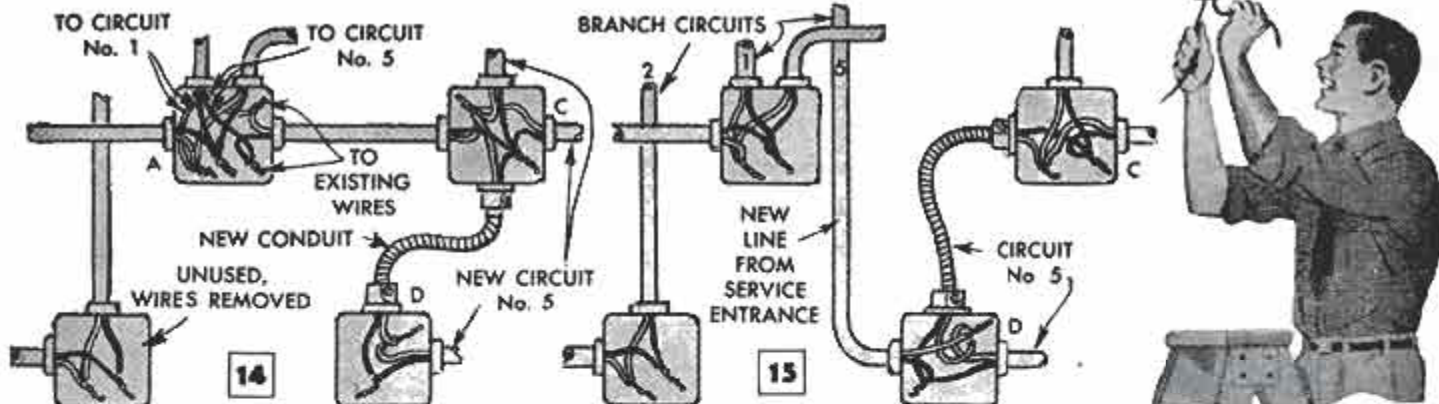
FOR	CONVENIENCE OUTLETS	SPECIAL OUTLETS for	PERMANENT LIGHTING	SWITCHES	
Living Room Recreation Room General Living Areas	Placed so that no point along floor line of usable wall space is more than 6 ft. from an outlet	FM radio Television Room air conditioner	From ceiling, wall, cove or valance lights Switched convenience outlets may be substituted in living rooms	On latch side of each frequently used doorway  Rooms with entrances more than 10 feet apart should have multiple control switches	
Dining Areas	Near hostess' chair. Placed so that no point along floor line of usable wall space is more than 6 ft. from an outlet. One above counter or table space when next to wall		Ceiling light over table		
Bedrooms	Place outlets on each side and within 6 ft. of each bed location. Apply Living Room rule to remaining space	Room air conditioner	From ceiling, wall, cove or valance lights		
Kitchen	For each 4 ft. of work counter For refrigerator For planning desk At table space	Electric range Dishwasher-disposer Home freezer Clock Ventilating fan	Provide general light and light over sink Others over work counters as needed		
Laundry	For hot-plate, etc.	Automatic washer Electric drier Iron or ironer Ventilating fan	At washing area At ironing area		
Bathrooms	Adjacent to mirror	Built-in heater Ventilating fan	Light both sides of face at mirror One in enclosed shower compartment		
Hallways	For each 15 ft. of hallway		One at least; two in long halls		
Entrances	Near front entrance (weatherproof)		At front entrance At trades entrance		Inside front entrance Inside trades entrance
Stairways			Light at head and foot		Switches at head and foot for each light
Closets			For each closet		
Porches, Terraces, Patios	For each 15 ft. of usable outside wall (weatherproof)		For each 150 sq. ft. of porch	Inside door to porch	
Utility Room or Basement	One at workbench One near furnace	Fuel-fired heating equipment Electric water heater	For each enclosed space At workbench Near furnace At foot of basement stairs	At head of stairs or at entrance	
Attic	One for general use	Summer cooling fan	One for each separate space	At bottom of stairs	
Garage or Carport	One for general use	Food freezer Workbench Door opener	Interior light Exterior light if detached garage	At door Multiple switches at garage and house	

NOTE: The requirements given here for number and placement of outlets, lights and switches are the bare minimum requirements. For additional suggestions and more details,

ask your electric power supplier or an experienced electrical contractor about the accepted Standards of Wiring Adequacy, approved by the National Adequate Wiring Bureau.

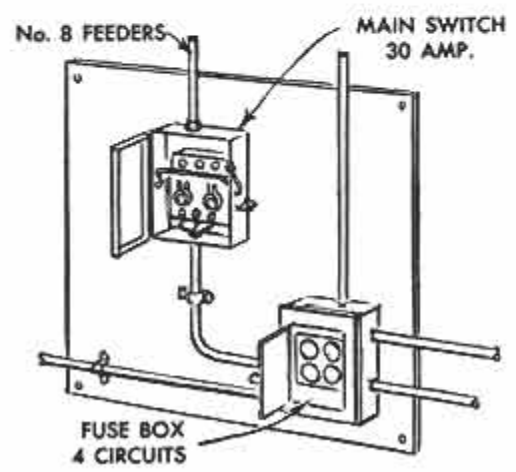
Table courtesy National Adequate Wiring Bureau



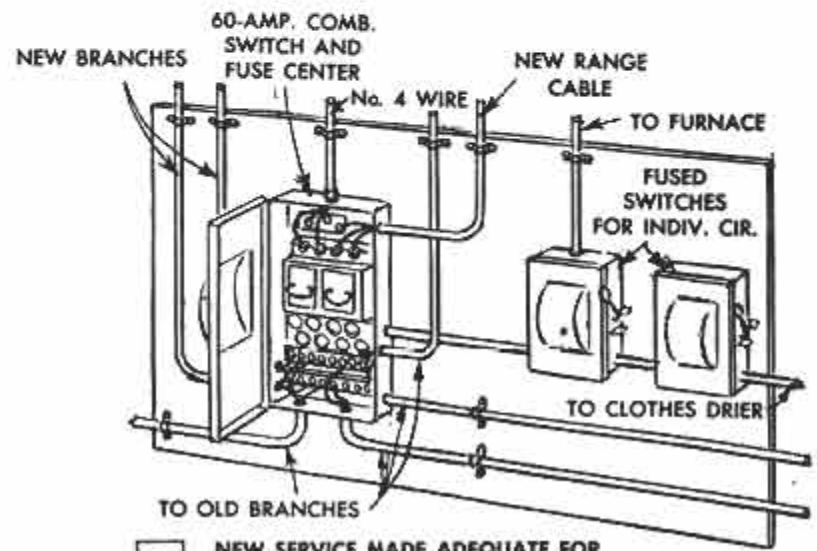


14 WIRES FISHED THROUGH EXISTING CONDUIT FEED NEW BRANCH. CABLE CONNECTS TO PART OF OLD CIRCUIT No. 2

15 ALTERNATE METHOD: CONDUIT FROM MAIN FUSE CENTER FEEDS NEW CIRCUIT. UNUSED CONDUIT, WIRES, PULLED OUT



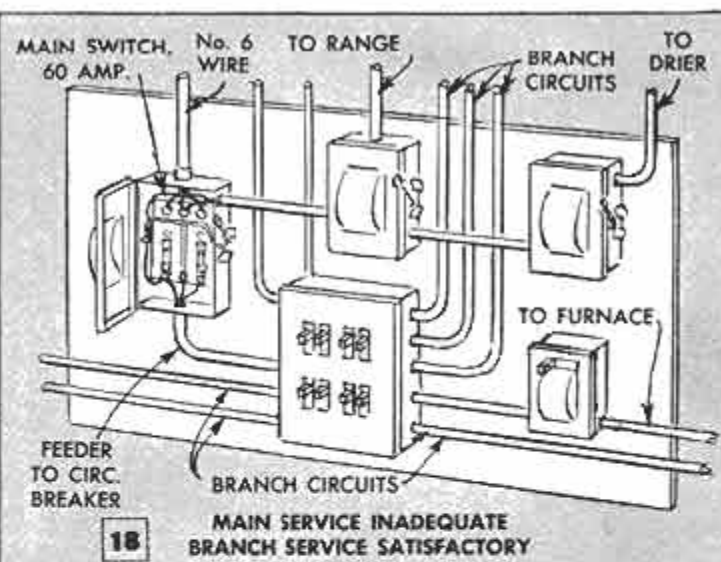
16 SERVICE, MAIN SWITCH AND BRANCH CIRCUITS INADEQUATE



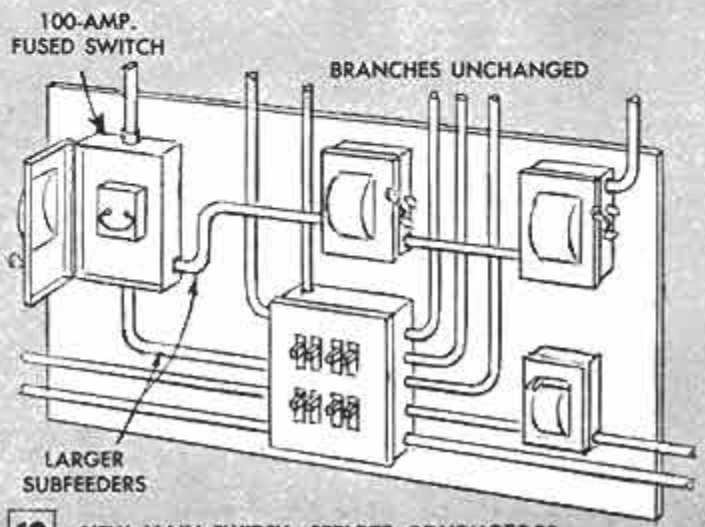
17 NEW SERVICE MADE ADEQUATE FOR PRESENT AND ANTICIPATED LOAD

and make a new circuit, No. 5, in the lower plan. Figs. 12 to 15 inclusive show how this can be done. Boxes A and B, Fig. 12, are opened and the wires to the parts of the old circuits beyond these points are cut. In some cases, additional wires can be fished through the same conduits from the service entrance to feed the new circuit, Fig. 14. In this instance, new wires from the fuse box are brought through junction box A to junction box C. The separated part of the old circuit No. 2 is connected to the new circuit by means of a new length of conduit running from box D to box C. An alternate method is to run a new conduit from the fuse box to box D and then to box C, Fig. 15. All conduits and cables not used should be removed, as they can no longer serve any practical purpose in the installation.

The plan for added circuits and new outlets may require that changes be made at the "service entrance," the term quite generally applied to the main service panel on which are mounted the main switch and fuse cabinet for the branch circuits. The units shown in Fig. 16 are more or less typical of the service entrance in older installations. Changes can be quite simple or more involved, depending on what extent it is necessary to enlarge the system. Variations, according to the requirements, are

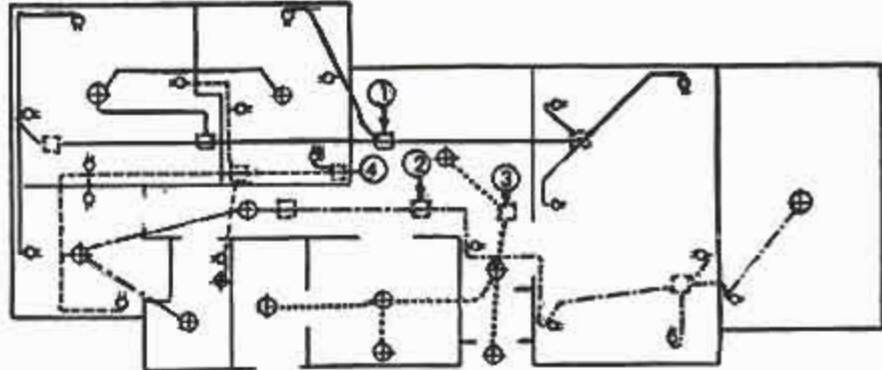


18 MAIN SERVICE INADEQUATE BRANCH SERVICE SATISFACTORY



19 NEW MAIN SWITCH SERVICE CONDUCTORS

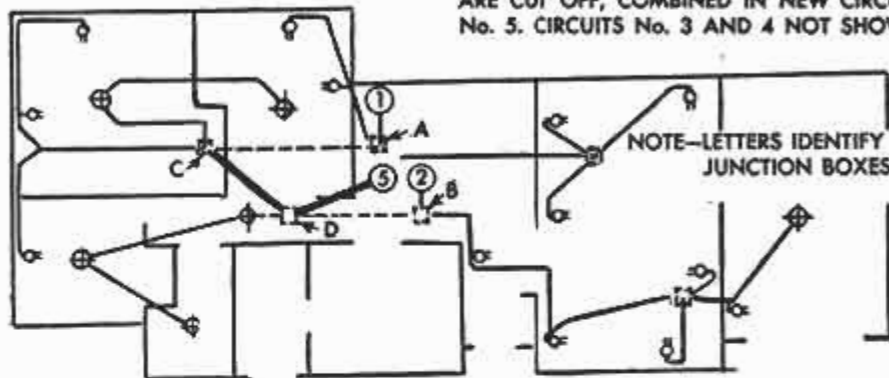




SYMBOLS	CIRCUITS
○	1 ———
⊕	2 - - - -
①	3 ······
⊞	4 - - - -

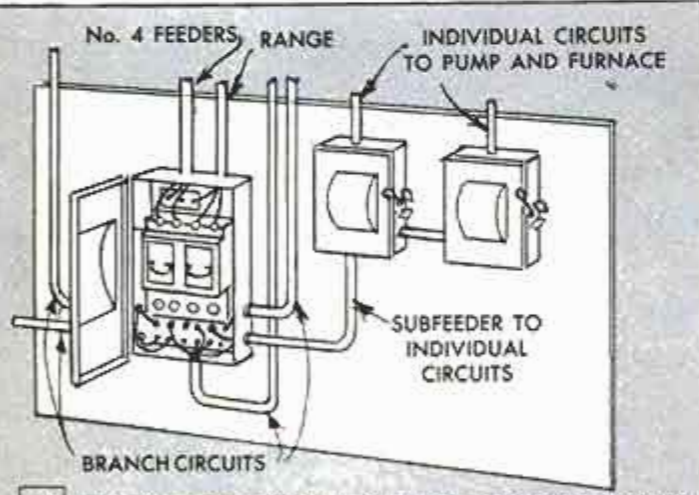
A. ORIGINAL WIRING OF GENERAL-PURPOSE CIRCUITS. CIRCUITS No. 1 AND 2 ARE OVERLOADED. REFER TO FIGS. 12, 16 AND 17. SWITCHES, APPLIANCE CIRCUITS OMITTED

B. PARTS OF OLD CIRCUITS No. 1 AND 2 ARE CUT OFF, COMBINED IN NEW CIRCUIT No. 5. CIRCUITS No. 3 AND 4 NOT SHOWN

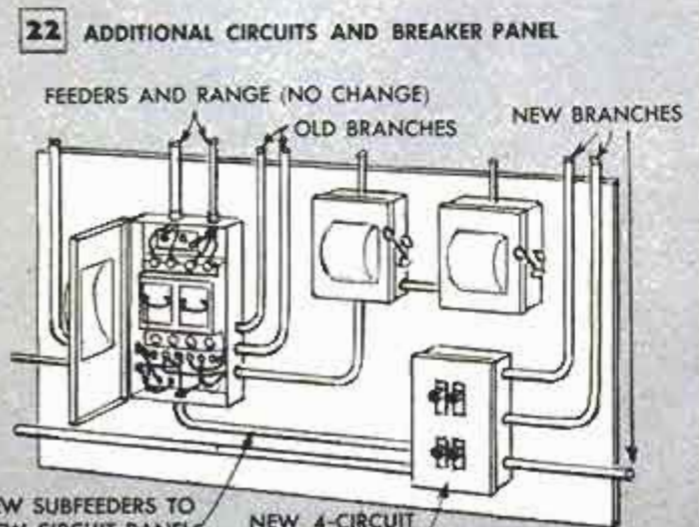


20 REGROUPING OF OUTLETS AND ADDITION OF NEW CIRCUIT

KEY	
———	OLD WIRING USED
- - - -	OLD WIRING REMOVED
———	FEEDERS TO NEW CIRCUIT No. 5



21 FEEDERS LARGE ENOUGH, BUT NOT ENOUGH BRANCHES



22 ADDITIONAL CIRCUITS AND BREAKER PANEL

shown in Figs. 17, 18, 19, 21 and 22. Usually the installation in Fig. 17 is considered adequate for a 60-amp. service with fused switches on the individual circuits and main feeders of No. 4 wire. In making any change it's usually best to begin with a combination unit. This consists of a main switch and fuses and branch circuit fuses or circuit breakers, all enclosed in a single cabinet, or box, as such a unit is commonly called.

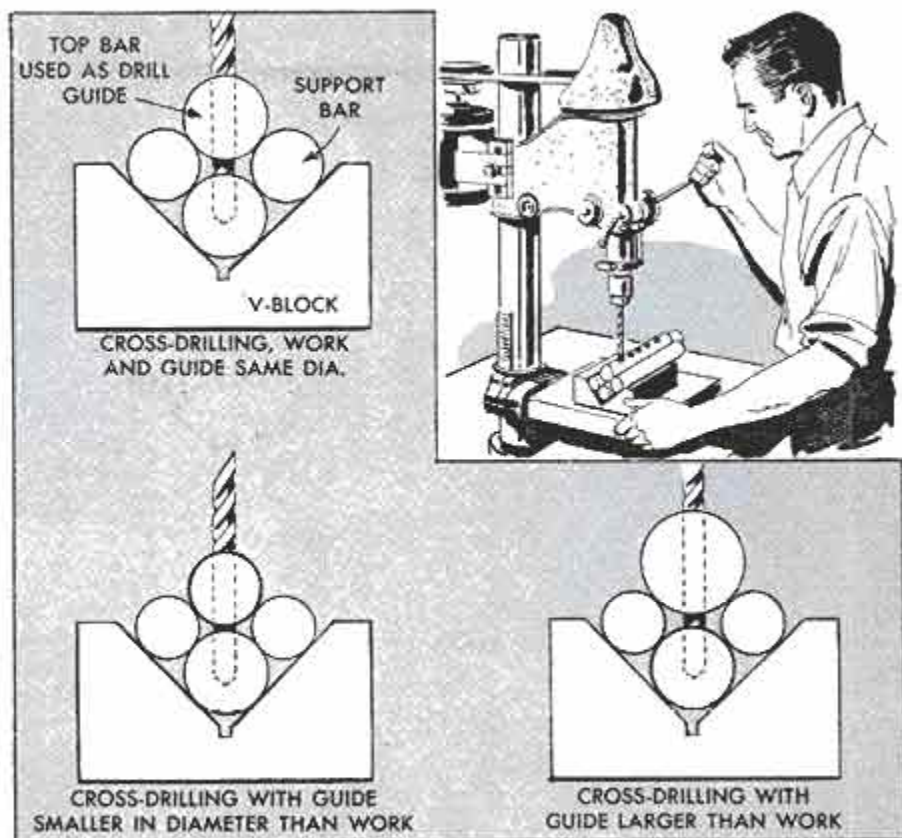
In planning additions to an existing installation always consider the necessary "balance" of the main service and branch service. Fig. 18 is an example. Fig. 19 shows the installation of a new main switch and service conductors, No. 2 feeders and larger subfeeders being installed to provide adequate main and branch service. Fig. 21 shows a panel with adequate main service but not enough branches to take care of requirements. Fig. 22 shows how a breaker panel and additional circuits are added to provide for present and possible future needs.

It should be understood, of course, that the methods detailed are purely representative and are not intended to in any way supplant the recommendations of your electrician or any electrical code. ★ ★ ★

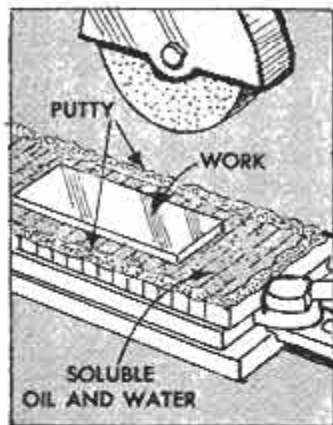


# Cross-Drilling Registering Holes in Round Stock

When more than one piece of round stock is to be cross-drilled, and the holes must register, the first piece can be used as a drill guide or template, when mounted in a V-block as shown. Both support bars must be of equal diameter to assure perfect register. The three setups detailed show how the diameter of the stock to be drilled may vary without changing the position of the hole. When holes to be drilled are larger than one fourth the stock diameter there is danger of the bit damaging the V-block as it breaks through. To avoid this make the setup on two V-blocks and space them enough to clear the drill bit.



## Surface Grinder Work Kept Cool In Soluble Oil and Water Bath



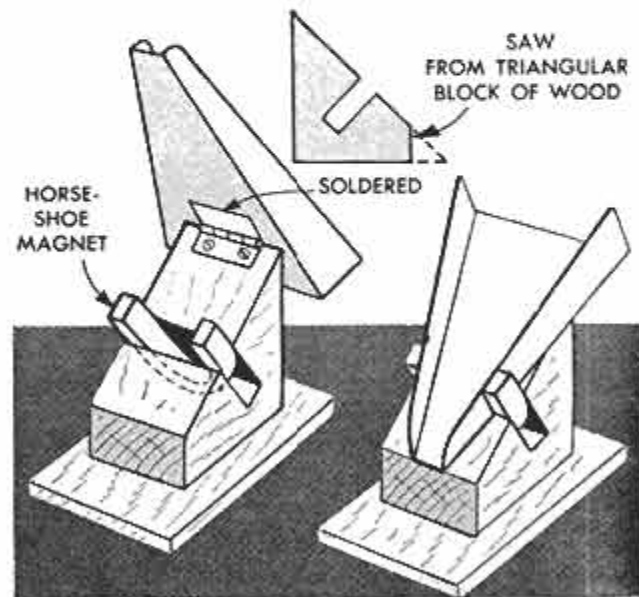
When grinding flat work on a surface grinder build a wall of putty along the edge on top of the magnetic chuck and fill the recess with soluble oil and water. The solution will keep the work cool and prevent it from warping.

## Magnetic Tray Separates Parts

Separating brass and steel nuts, bolts, washers and the like is a quick job with an easily built magnetic separator. A horseshoe magnet is fitted into a slot cut in a triangular-shaped block at right angles to the sloping face. A tapered aluminum tray, which is hinged at the top edge of the block, is shaped so its edges touch the inside corners of the projecting poles of the magnet. When small parts made of mixed metals are poured into the upper end of the tray, parts made of nonferrous metals slide off the tray at the lower end. Those of ferrous metals, such as steel and iron, are retained between the magnet poles.

## Safety Switch for Home Workshop

Children as well as adults can be protected against injury from power tools in the home workshop when a master switch and warning light are installed outside the shop entrance. The switch should be mounted in a box fitted with a cover that can be locked shut. When not working in the shop the switch is turned off and the cover locked preventing operation of the tools. The warning light works together with the switch and indicates when the shop is in use and serves as a reminder to turn off the power when leaving.





SN 58

# HOW WOULD

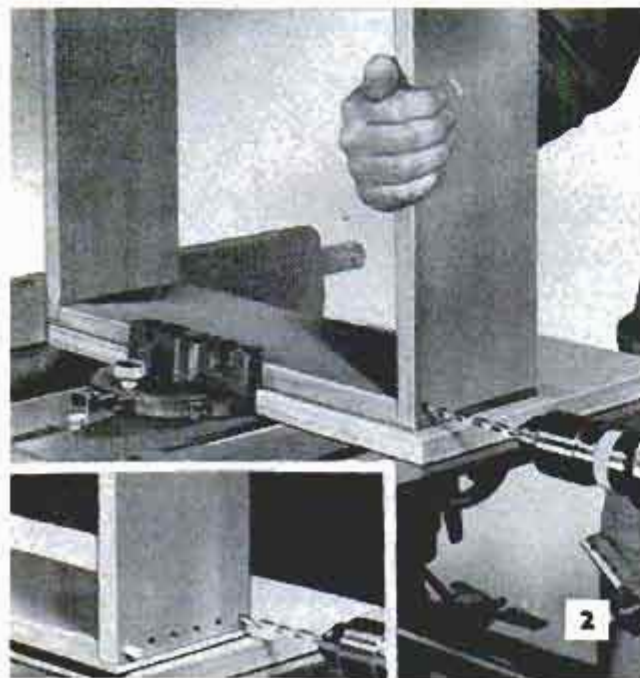


**1. Q—You have made a decorative box and want to finish it with a raised, textured grain. How can a drill press be used to produce this finish?**

**A—**Create the finish by brushing the wood with a coarse wire brush fitted on an arbor and chucked in the drill press. The arbor can be a threaded rod or a long bolt on which the brush is held by nuts. Safety goggles are a must for this operation

**2. Q—Pegged joints will add strength to drawers made for furniture. What is an easy way to line up the dowel holes in various parts of the assembly?**

**A—**Line up and clamp the parts as pictured, holding them on either a horizontal or vertical drill press. Drill the first hole and insert the first peg to assure alignment, then drill the rest of the holes as indicated in the inset photograph

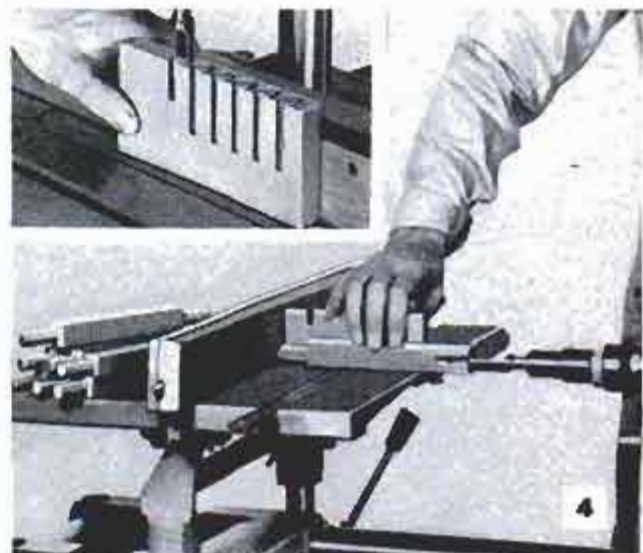
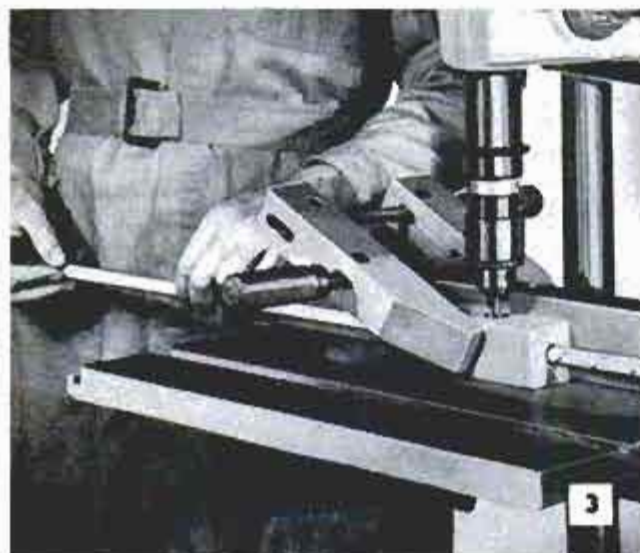


**3. Q—Dowels used for "pegging" a joint should have spiral grooves in them to permit stronger gluing. How can a drill press be used to cut the grooves?**

**A—**Make a jig consisting of a block of wood with a hole bored through it to accommodate the dowel, and clamp it to the table. A 1/16-in. router bit in the drill press cuts a shallow groove in the dowel as it is pushed through the block and rotated

**4. Q—What drill-press accessory can be used to make dowels to match a piece of work, and how can dowels be cut directly onto a work piece?**

**A—**A plug cutter is used to cut the dowels from a scrap piece of the wood used for the job as shown in the inset. Dowels are formed on the ends of work pieces by the cutter. Corners are sawed off squarely to shoulder the ends

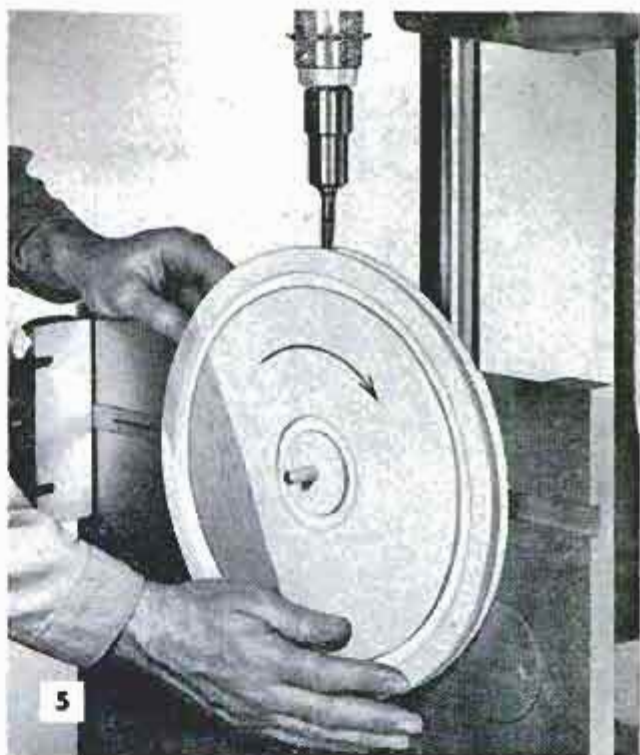




# YOU DO IT?

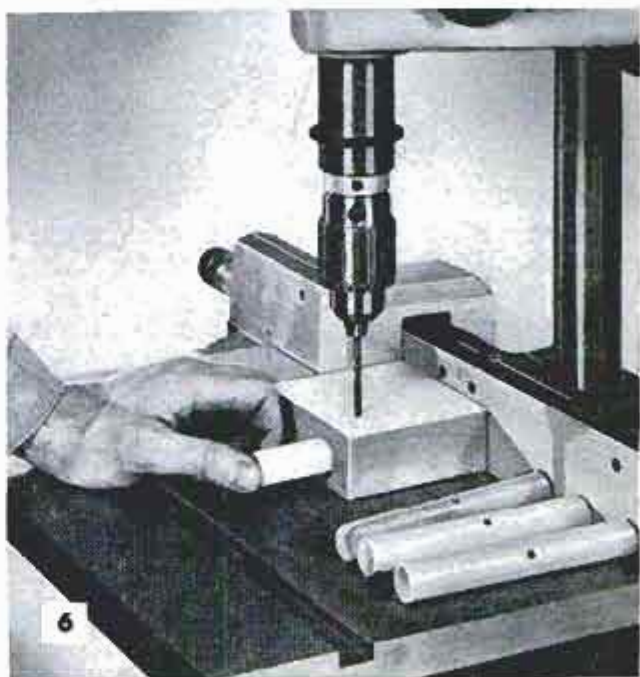
**5. Q—After making a wooden wheel or disk it is necessary to cut a groove in the outer edge. How can a drill press be used to cut the groove?**

A—A pivot jig fitted in the slot of a tilting drill-press table will permit the wheel to be rotated under a router bit chucked in the press. If there is no center hole, use a "V block" consisting of two 2 x 4s on which the wheel is rotated under the router bit



**6. Q—How can holes be drilled accurately in the center of a number of wooden dowels that are to be used as drawer handles?**

A—Drill a hole in a block of wood large enough to accommodate the dowels, then cross-drill the block at right angles to make the jig shown. The jig holds the drill bit in a vertical position so it will not slip off the rounded surface of the dowel

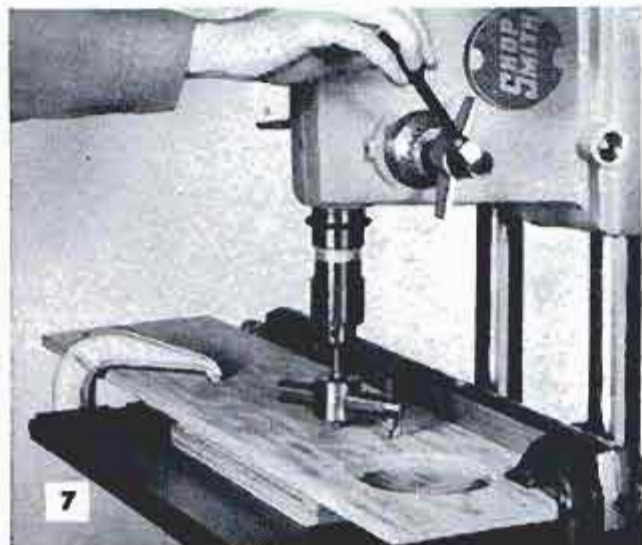


**7. Q—What tool is used for cutting large holes—1-in. dia. and larger—on a drill press, and what is the prime safety factor to be observed when it is used?**

A—Large holes are cut, rather than bored, by the use of a fly cutter as shown. The cutter is adjustable to any diameter within the limits of the extension arm. For safety, the work always should be clamped firmly to the table of the drill press

**8. Q—What simple setup can be used on a drill press to accurately drill holes all around the edge of a large-diameter wooden disk or wheel?**

A—Equip the drill-press table with a pivot pin to fit a center hole in the wooden disk, or temporarily drive a wood screw through the center, so the disk can be rotated past the drill bit. This will work with either a vertical or horizontal drill press





## Roller Chain Clamped in Vise Holds Pipe for Threading



When a pipe vise is not at hand, a length of roller chain, such as bicycle chain, clamped in a bench vise will hold a length of pipe for threading. Loop the chain over the pipe as shown and when the jaws of the vise are closed the chain will be pulled tight around the pipe.

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

## Rubber Tip on Speed Indicator Provides Better Shaft Contact

Most speed indicators are equipped with small tips, which may slip and be difficult to center on large work. In such cases a rubber nipple, of the kind used on auto distributors, slipped over the end of the indicator shaft, will provide a much larger pressure surface when it is brought in contact with a large, slow-speed shaft.



## Notched Eraser Polishes Rods

An abrasive ink eraser can be used to polish slender metal rods rotated in a lathe or drill press. Notch the eraser at one end with a hollow leather punch or a round file to an arc slightly smaller than the diameter of the rod to be polished. When held against the rod, the notch keeps the eraser from slipping off the work, and the smaller arc creates friction for polishing, allowing also for wear.



## Barn-Door Stanchion Gate

Just swing this stanchion gate across the doorway of the barn to catch and hold any calf, steer or cow. Strap hinges are welded to one side of the gate and slip over heavy screw hooks placed in the doorframe. The other side of the gate is equipped with a latch which locks into the frame, or into the opposite door of a double opening. The stanchion is closed by pulling on a rope, and is held closed by a catch which slips into an adjustable clamp. Lifting a bar on the catch frees it, releasing the animal. A spring on the end of the stanchion bar returns it to the open position.







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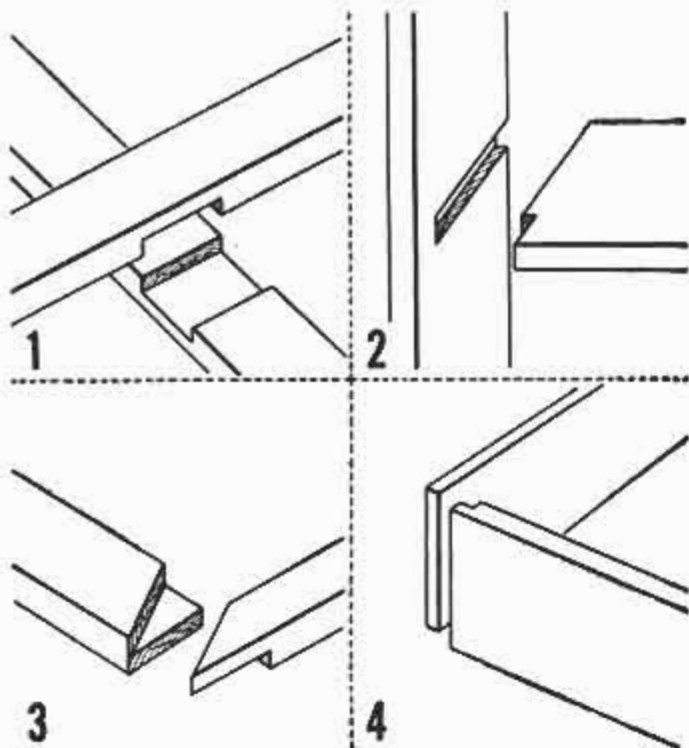
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## Faulty Receptacle

**Q**—Recently I noticed, quite by chance, that the plug on a light cord was rather hot to the touch. The plug seems to be in good condition, also the cord, which is connected to a 150-w. lamp. Why does the plug heat, when it is not overloaded? What should I do about it?  
L. K., Pa.

**A**—Poor contact between the prongs of the plug and the spring contacts in the receptacle is one common cause of heating of the plug. Faulty contact results in arcing, and while this may be very slight, it still is sufficient to generate considerable heat over a period of time. You may be able to remedy the trouble temporarily by bending the prongs of the plug slightly. As a rule it is best to replace the receptacle at the outset, as heating due to a defect at any point in the wiring system increases the fire hazard. Replacing a faulty receptacle is a fairly simple procedure, but unless you feel fully qualified, call your electrician. If you do the job yourself, be sure to open the main switch at the service entrance before removing the cover from the receptacle.



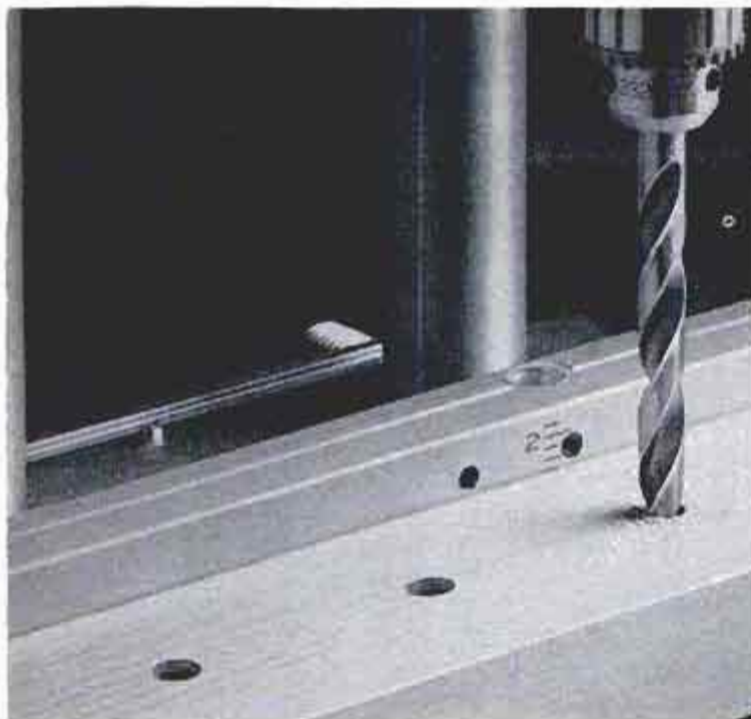
## Lumber Rack

**Q**—I want to build a lumber, or stock, rack for my basement workshop. I want the rack attached to the wall which is built with an offset, the 2x6 sill being exposed. Do you have a suggestion for making a rack of this type?  
E. H., Ore.

**A**—We are assuming from your description that the wall is either poured concrete or concrete masonry to the grade level and that the studding extends down to the sill, a part of the total basement height being above grade. If this assumption is correct then one way is to determine the length of the rack required, stand 1x2 strips, preferably hardwood, on the floor against the wall and mark the upper ends flush with the top of the sill. Cut to length. Be sure to mark the location of each strip on the wall, as there may be some variation in length. Plan to locate the strips about 3 ft. apart along the wall. Next, cut pieces from the same stock about 10 in. long, the same number of short pieces as there are long pieces. Screw one end of each short piece to the top of the sill so that the strip projects out at right angles to the

(Continued to page 226)





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(Continued from page 224)

wall. Each short piece should be located at the point where each long piece is to be placed, the wall having been previously marked. Then simply place the long piece under the projecting short piece and drive a screw into the end of the long piece. This gives you a vertical strip standing against the wall with the short piece projecting 10 in. from the wall to form a top shelf, or rack. Proceed in the same manner at each spacing. Then screw shelf brackets to the vertical strips, spacing them vertically as desired.



### Cementing Glass

**Q**—Is it possible to cement cracked glass successfully? I want to salvage a cracked glass panel which is very old and has been hand-painted with a very attractive design which I wish to preserve if at all possible. The panel is about 8 x 12 in. and a corner has been broken out. I want to cement it if possible and replace in the old frame in which it was originally fitted. Can it be done?—C. S., Me.

**A**—Yes, but it's a tricky job at best. If the break is clean and the edges unchipped the chances of success are somewhat improved. It will not be possible to conceal the break entirely. It will be visible when the panel is viewed at an angle. If you wish to try, then perhaps the best way is to place the panel on a level, flat surface with a single sheet of paper underneath. The paper must be flat. Do not use a sheet that has been folded. There are a number of cements suitable for joining glass, but we believe you would have better success by using an ordinary household cement. Place the cement on both joining edges of the glass and wipe off the excess. Allow the cement to set to the tacky stage, then press the joining edges of the glass together, making sure that they are not offset at any point. Be sure to allow plenty of time for the cement to dry before moving the panel.

### Lawn-Sprinkler System

**Q**—I'm thinking about installing a lawn-sprinkler system this coming spring, using plastic pipe underground. What troubles me is the possibility of freezing damaging the pipe and how to provide for draining the system after the season's use. Will freezing break plastic pipe, and will it be necessary to provide for draining the system? I am planning to lay the pipe in trenches about 16 in. deep with a sufficient number of sprinkler heads to cover the entire lawn.—C. C., Ky.

**A**—Ordinarily plastic pipe is sufficiently flexible to prevent its bursting should the water in the pipe freeze. However, there are other factors such as the nature and type of soil in which the pipe is laid and the heaving action of frost. The latter action may be sufficient to cause breakdown of the pipe sections, one reason being that when subjected to prolonged cold plastic pipe becomes rather brittle. If the pipe is filled with water at the time of freezing, slight movement of the earth due to frost action may break it. For these reasons we think it would be advisable to provide a means of draining the entire system at the end of each sprinkling season. In a level lawn this may pose something of a problem, but usually it is possible to connect the system to the basement drains or to a nearby natural waterway. Of course, it will be necessary to provide a shut-off valve in the line leading to the drain, also it will be necessary to calculate the fall to the drain from all areas of the lawn in order to assure complete drainage of the system when the valve is opened. Before making the installation we suggest that you get in touch with the manufacturer of the pipe you intend to use and get his recommendations for this type of installation. Also, it might be helpful to ascertain the average frost line for your locality so that trenches can be dug to the proper depth.



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fine gifts—and be proud of you for being smart enough to buy Disston. Disston, you know, is the saw carpenters use. If Dad already has a 5½-pt. or 8-pt. Disston, get him a 10-, 11-, or 12-pt. for fine finishing work.



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## Goal No. 2

### Winning the War Against Insects

(Continued from page 152)

unusual ability to develop huge populations in American cornfields. The borer had arrived in the United States unattended—it had left its natural enemies on the other side of the Atlantic. In 1920 scientists of the Department of Agriculture began a search that lasted for two decades and resulted in the successful introduction from Europe of several parasitic flies and wasps that prey upon the borer. Today these beneficial insects, working practically unnoticed in our cornfields, are proving quite successful in holding down borer infestations in the eastern states, and effecting limited but growing control of borers in the Corn Belt.

In further evidence of the value of basic knowledge: Modern control methods in general use by Corn Belt farmers take into account the fact that throughout the Midwest there are two broods of the borer each growing season. The first brood feeds in the leaf whorls and on the silks and ears; the second tunnels into the stalks and ear shanks of maturing corn. Entomologists have searched out corn plants that inherently discourage leaf feeding by the first brood borers. They have found other plants with enough stalk strength to withstand tunneling by the second brood. It is reasonable to expect that one day varieties of corn highly resistant to attack by the corn borer will be widely grown in this country.

Corn strains with these resistance characteristics are being combined into high-yielding commercial hybrids. Chemists have developed certain chemicals into highly effective borer-killing insecticides to knock out the first brood before it begins feeding; engineers have developed high-clearance machines that deliver sprays into the leaf whorls of young plants without mechanical damage to the crop. This year farmers are using a new weapon—DDT granules—that they can sift into the leaf whorls from a rig that looks like a grain drill on stilts.

The corn-borer story serves to illustrate that despite our achievements with methods, materials and machines we can only insure our well-being in the face of such menacing pests by constantly searching for better weapons and by the farmer's effective use of those weapons.

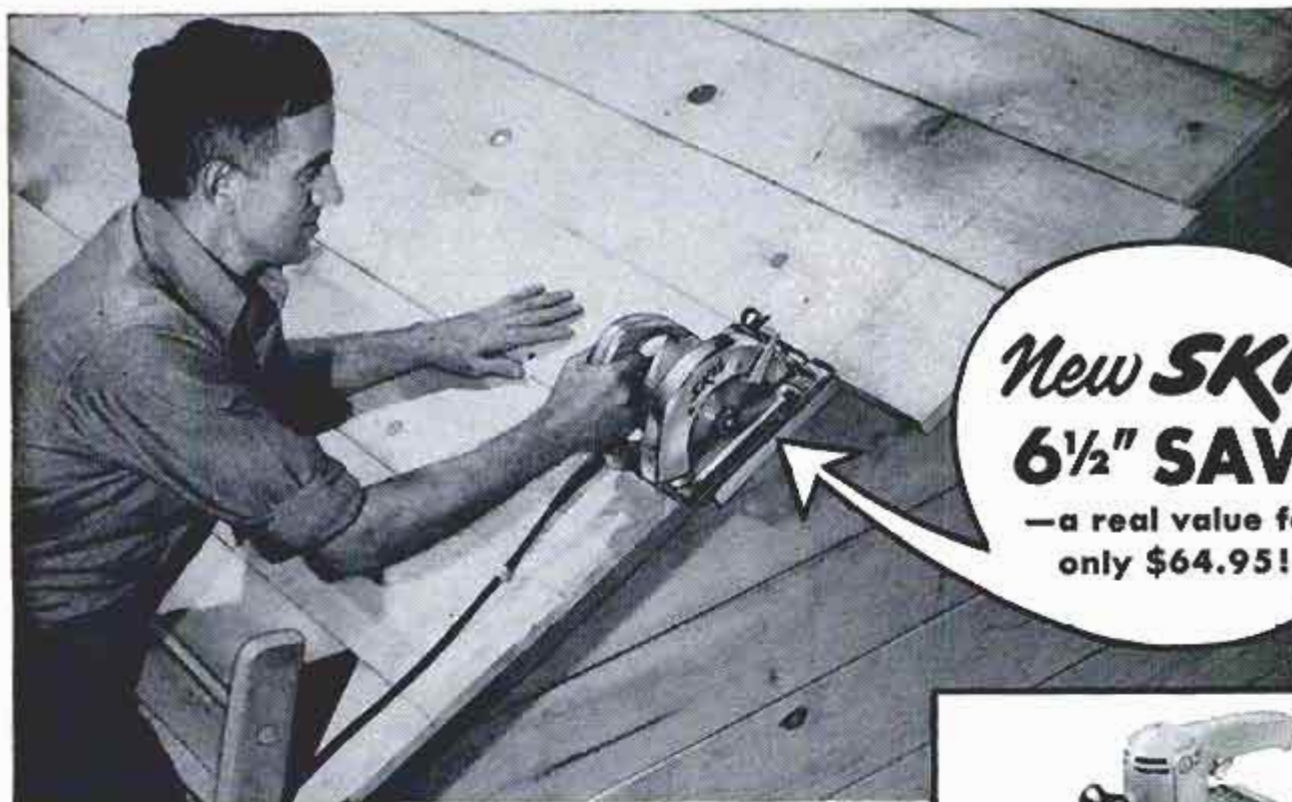
Now let's take a more analytical look at our original "success" stories about cotton insects, the Hessian fly, and the khapra and the Japanese beetles.

Thimet, developed by the American Cyanamid Company, is a systemic insecticide

(Continued to page 230)



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\*Friction Proofing is Wynn's trade mark for its exclusive metal conditioner which reduces friction between moving metals by chemically smoothing and sealing the surfaces. Manufactured by Wynn Oil Company, 1151 West Fifth Street, Azusa, California, U. S. A.

that "bites back." It is one of the newest and perhaps the most powerful single weapon ever directed against cotton pests. Unlike other cotton insecticides, Thimet is not sprayed or dusted upon the growing cotton. Instead, seed is treated with the chemical, usually by seed suppliers. An organic phosphate, Thimet is absorbed into the seed and grows up with the plant. Thus, being in the "system" of the plant, rather than a surface veneer of spray or dust, Thimet does no harm to beneficial insects, cannot be washed away by rain. But for nine weeks or more, plants sprouting from the seed so treated will kill thrips, aphids and mites. It has even proved lethal to the boll weevil when he moves into the field before Thimet's killing power wanes.

The Hessian fly is an old-timer--and a long-time enemy of the man who grows wheat and barley. It is believed to have reached the United States in 1776 on the bedding straw of Hessian soldiers.

Farmers throughout the winter-wheat belt annually save themselves about \$60,-000,000 by carefully following two simple, but fundamental, practices: They seed their wheat late enough in the fall so that the autumn generation of flies is denied green sprouting grain upon which to lay eggs; they plant varieties of wheat of a genetic make-up that resists feeding by the fly.

The khapra beetle, an "inside" insect that attacks stored grains and seeds, is a newcomer to the United States. It was first discovered in a warehouse in Tulare County, Calif., in 1953. The khapra beetle is so tiny that it can hide in cracks that insecticide sprays won't penetrate; so prolific that a single pair can produce literally millions of offspring in a period of six to eight months; so destructive that it could become America's worst stored-grain pest. Unlike the casual reception given the corn borer, state and federal officials moved in rapidly on this insect. They carried out a survey to define the limits of infestation and established a quarantine to prevent further spread. They have pinned it down to some 410 grain and seed storage structures in California, New Mexico.

Scientists found that the beetle could be killed with a high-powered fumigant, methyl bromide. But how was a gas of this kind to be distributed evenly throughout a tremendous storage building? All it required, they found, was enough fumigant, enough gas-tight plastic and adequate means of circulating or distributing the gas within the enclosure. Made-to-order nylon plastic tarps, clamped together with airtight seams, are spread over acres of buildings, then fans circulate tons of fumigant.

(Continued to page 231)



ASSEMBLE YOUR OWN

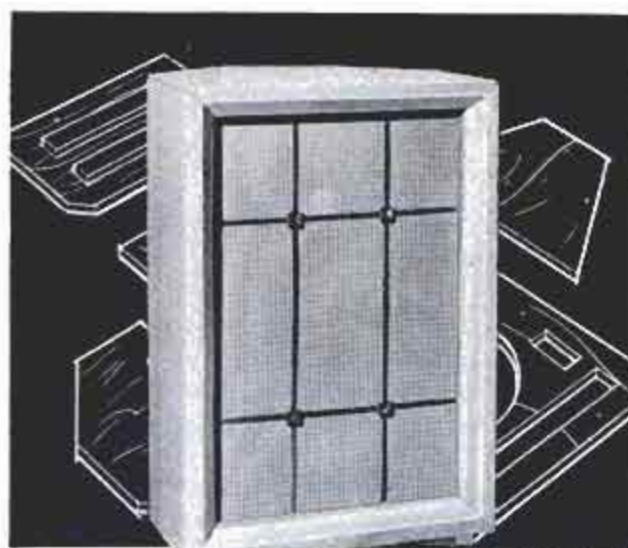
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Give your Electro-Voice speaker cabinet a fine furniture finish. Finishing kits, \$5. Decorative Metal Trim kits from \$4.80.



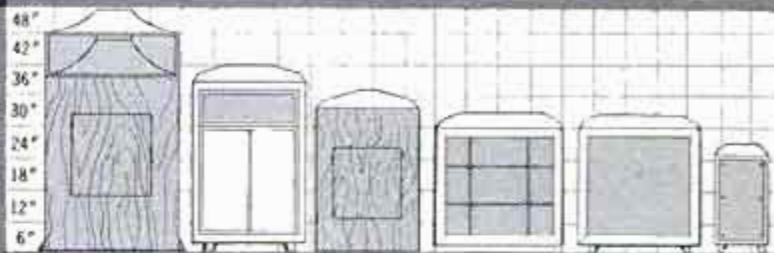
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WRITE FOR BULLETIN PM612

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Export: 13 East 40th Street, New York 16, U. S. A. Cables: ARLAB  
Canada: E-V of Canada Ltd., 1908 Avenue Road, Toronto, Ontario

In 48 hours the job is done. So far, these teams have eradicated the beetle from 68,055,203 of the 108,737,000 cubic feet of storage found to be infested.

### Most Annoying Pest

If you are not acquainted with the Jap beetle, you probably live where it doesn't. It's hard to imagine a more annoying, more destructive pest. Throughout eastern United States where it currently operates at a cost to inhabitants of several million dollars a year, the beetle makes visible and violent trouble from May through September. It has a taste for 275 different plants, takes pernicious pleasure in spattering a line of fresh wash and can panic the most steely nerved man by slipping inside his collar. When the beetle isn't winging about it is below ground in the form of a white grub gorging on the roots of lawn grasses.

Shortly after the beetle was found in the United States—in 1916 at Riverton, N. J.—its eradication was attempted, but because of the inadequacy of controls available at the time, failed. It has been under federal and state quarantine continuously—a program of commodity and vehicular inspection has slowed its progress so that today the infestation is confined to the East. It is surprising that the spread has not been much more rapid, because the Jap beetle

is a great hitchhiker. The grubs can be moved about in the soil on the roots of plants; the adults ride in cars, trucks, trains, buses and airplanes. Quarantine inspectors keep close tabs on airports and frequently, by quick action, wipe out infestations at or near these points.

Scientists meanwhile have had marked success in developing ways of controlling this pest. They have imported from Japan wasps that parasitize the beetles; they have found DDT and methoxychlor sprays and dusts effective against the adults. A half-dozen organic insecticides washed into the soil will kill the grubs. Most remarkable, however, has been the development of the so-called milky disease as a control. USDA entomologists found that they could exploit a weakness in the make-up of the beetle: its susceptibility to a spore-forming fungus. They learned how to obtain large quantities of disease spores by artificially infecting insects, then after proper incubation grinding the bodies and mixing the resulting product with a suitable dust carrier. A spot of spore dust every two or three feet on the lawn will penetrate into the soil and slowly but surely kill off the grubs beneath. Once there, it will kill as long as there are grubs for it to attack.

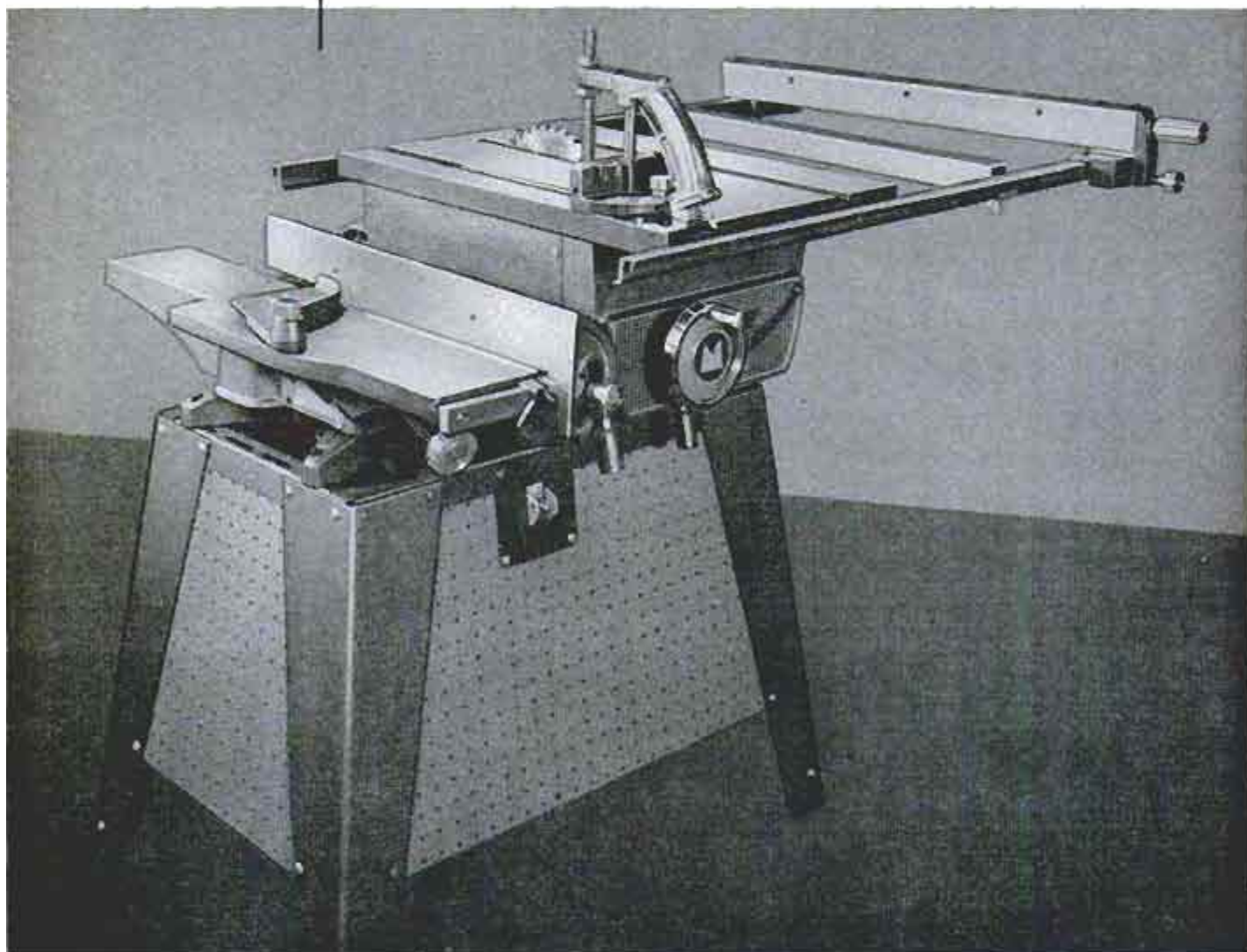
The success with milky disease has set

(Continued to page 234)



# **NEW!**

## **MAGNA INTRODUCES LARGEST CAPACITY SAW-JOINTER**



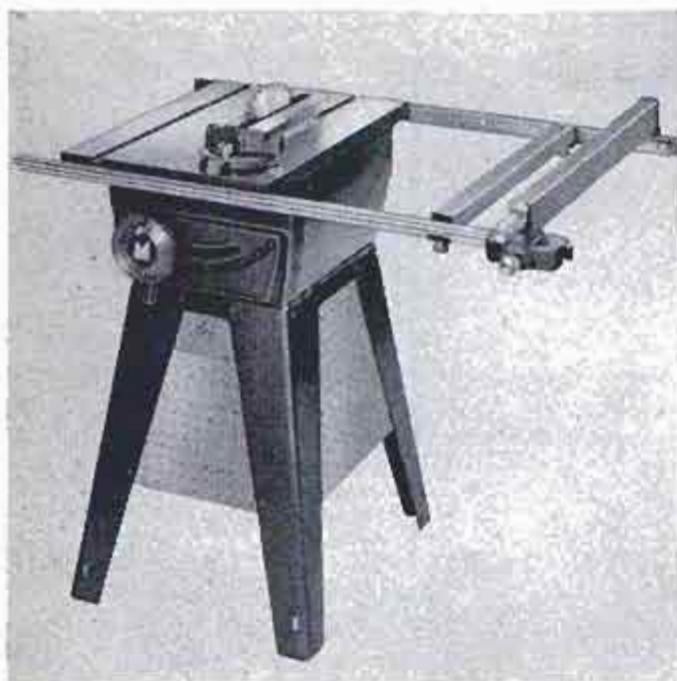
**OPERATES  
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AT ANY  
HEIGHT!**

The new Magna Saw-Jointer combines two of America's finest power tools: the revolutionary new Magna 9-in. Saw with "The Helping Hand"—a built-in extension which makes the largest effective table on the market; and the big Magna 4-in. Jointer with the longest table and largest fence in its class. The Jointer operates at *any* height of the saw blade, eliminating frequent adjustment required by other saw-jointer combinations. You can buy the Magna 9-in. Saw now and convert to this big Saw-Jointer later, with the inexpensive Magna Saw-Jointer Adaptor Kit.

**Own the Magna Saw-Jointer for as little as \$3 a week!**



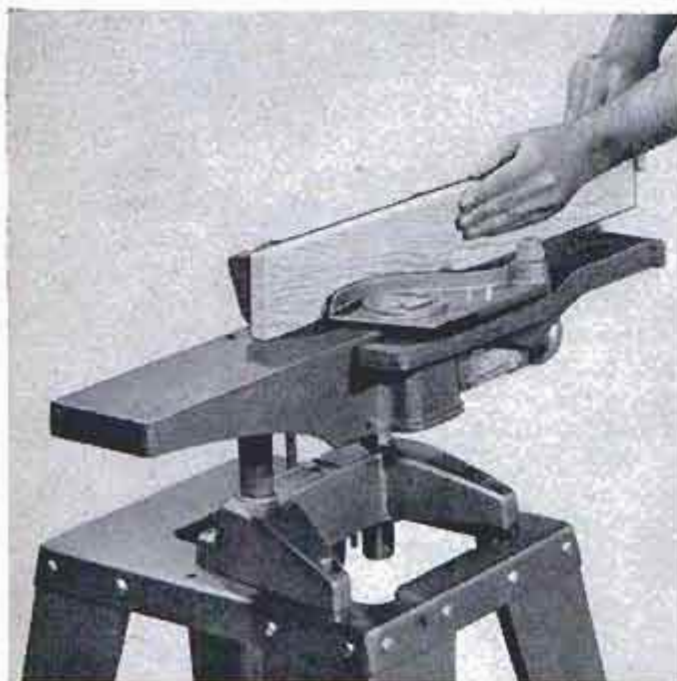
# MAGNA 9-in. Saw with "The Helping Hand"



The only tilt arbor saw with "The Helping Hand"—a built-in extension which makes the largest (34" x 24") effective table on the market, allows bigger rip and cross-cut capacity than any other saw • Epicyclic Speed-gear Control gives you full 45° tilt with only 10 turns of knob, (40 to 60 turns on other saws!) • Single-knob control—push for projection, pull for tilt • Self-aligning Fence locks front and back with single knob • colored Safety Zone Table Insert cannot catch work piece • exclusive pressure-cast tub front bolted rigidly to table, coordinates all controls • externally adjustable Tilt Stops • 3 Auto-stops on Miter Gauge • Magna Saw-Jointer Adaptor Kit contains all you need to convert to Magna Saw-Jointer!

MAGNA 9-IN. SAW (without motor or stand) — ONLY \$99.95!

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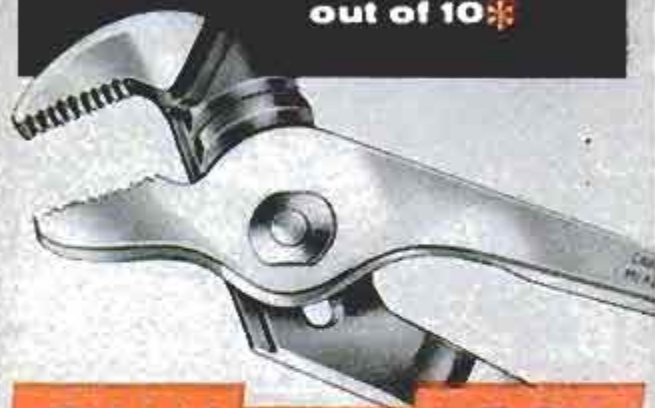
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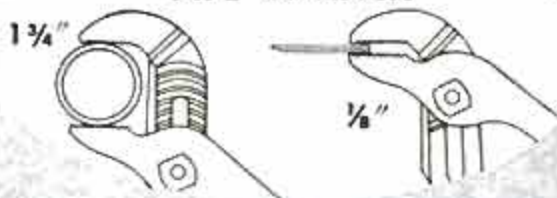


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scientists hot on the trail of other diseases for use against other insects. In the Southwest, growers can control the alfalfa caterpillar by treating it to a virus disease applied with field sprayer or by plane. In preliminary studies, diseases have shown great promise against such forest insects as the European and Virginia pine sawflies; against our chief orchard pest the codling moth, and against several important insect pests of vegetables and corn. One big advantage of spreading bug diseases over using insecticides: The diseases offer control without danger to man and animals.

Still other weapons that entomologists have found useful against insects include materials that attract and materials that repel the pests, and atomic energy.

#### Baits for Insects

Attractants are not a new idea (grandfather used poisoned baits to control cockroaches), but they are getting new emphasis. Fly baits—generally a mixture of insecticide and sweetening—are in use on dairy and poultry farms and at city dumps and other urban locations where flies breed. Attractants are proving a key weapon in the all-out effort to eradicate the recently discovered Florida infestation of the Mediterranean fruit fly. There, two attractants are in use—a hydrolyzed protein that is particularly attractive to the female flies, and oil of angelica, an ingredient of perfumes and liqueurs that draws the males.

At the other extreme are the chemicals that keep the bugs at bay. There are several good mosquito repellents on sale at the drugstore, but none that compares with a USDA-developed chemical now under test by our armed forces. This repellent, which can be rubbed on exposed parts of the body or impregnated into clothing, not only repels six species of mosquitoes, but does so two to three times longer than standard repellents. It also repels chiggers, ticks, fleas, deer flies and stable flies.

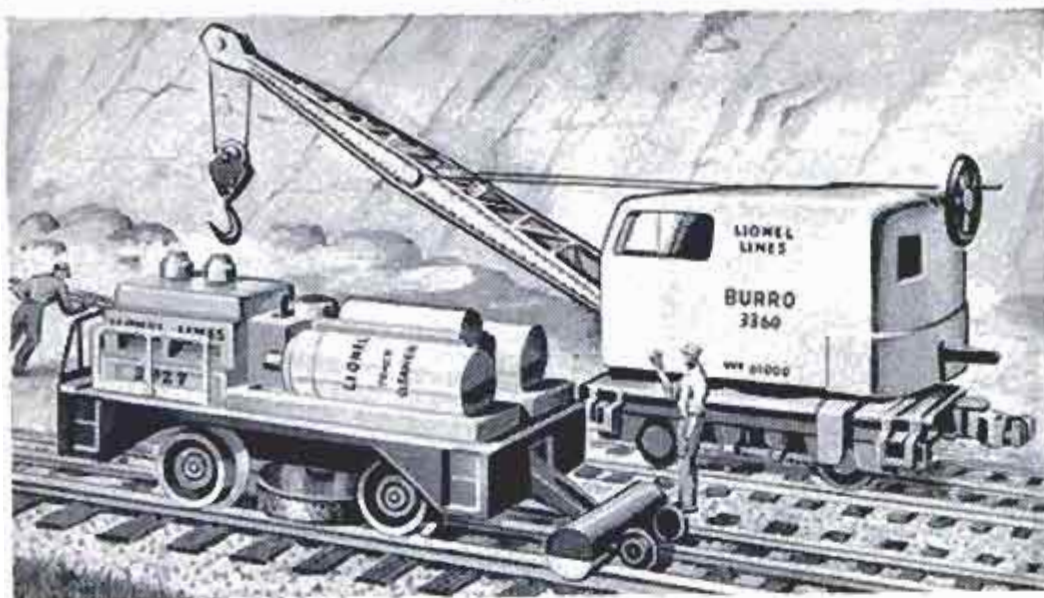
The use of radioactive tracers that measure the flight of insects or the movement of insecticides within an insect, a plant or an animal, has become a useful research tool. In at least one instance, however, atomic energy has had direct application in insect control.

Since 1933 when the screw worm, a vicious attacker of livestock, was inadvertently established in the Southeast by a shipment of infested cattle from the West into Florida, entomologists have been seeking some way to eradicate it—and thus end its annual \$10,000,000 tax on the livestock industry. Atomic energy may supply the answer. Study showed the scientists that

(Continued to page 236)



# Greatest things on rails . . .

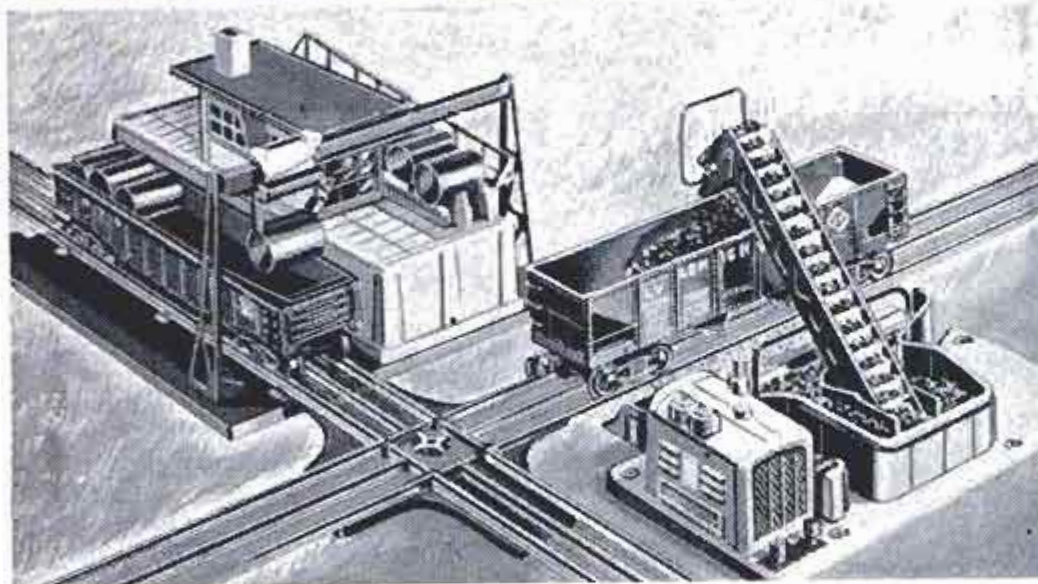


## new operating burro crane

**No. 3360.** A real work-horse! Self-propelled, it can actually pull its own work cars! Rotating cab and working boom!

## new track cleaning car

**No. 3927.** This car will actually wash and wipe track. When pulled by loco, motor-driven rotating brush cleans track with Lionel "Track-Clean", NO OTHER TRACK FLUID SHOULD BE USED.

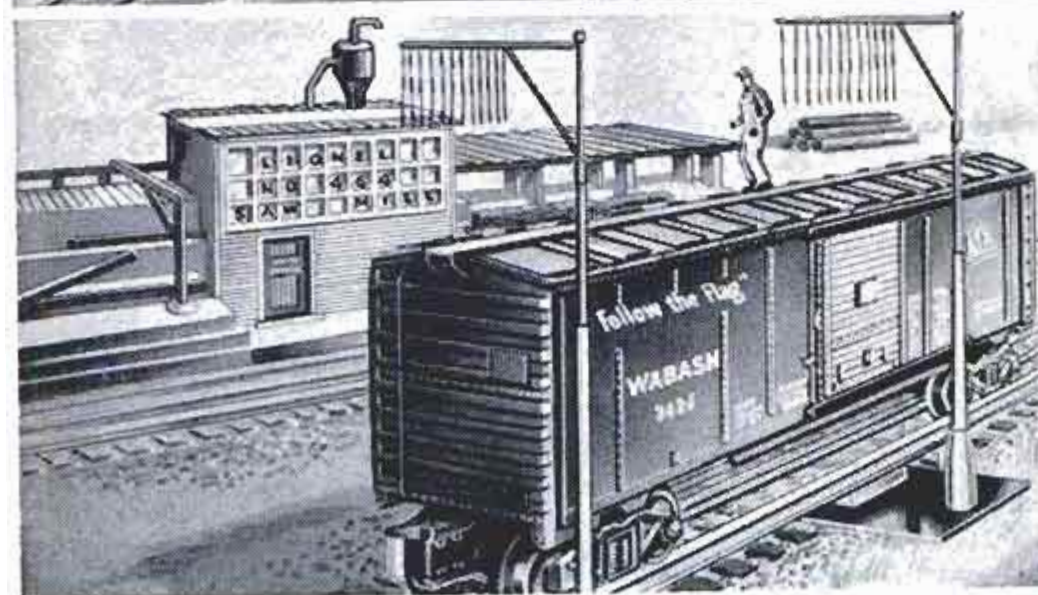


## new operating culvert loader

**No. 342.** Puts a heavy-duty look in your yards. Traveling crane picks pipe sections off platform, loads them into gondola car. Workmen's shack houses remote control mechanism!

## operating diesel- type coal conveyor

**No. 397.** Carries coal from bin and loads into car by remote control! Includes coal, controller, connecting wires! Car not included.



## new operating lumber mill

**No. 464.** Conveyor belt picks up logs in bin via remote control, feeds 'em into mill, and delivers dressed lumber. Complete to sound of buzz saw.

## new operating brakeman car

**No. 3424.** Low bridge warning signal pole makes man fall to avoid being hit. Second pole brings him up-right! Includes car and warning signal poles.

# and now LIONEL has 'em!

The Lionel Corporation, 15 East 26th Street, New York 10, N. Y.



exposing male screw-worm flies to radioactivity (gamma rays from radioactive cobalt) would make them sexually sterile, but otherwise would not affect their normal activity. They found too, that female flies would readily mate with the sterile males, but would produce only infertile eggs. Why then, USDA scientists reasoned, could not great numbers of male flies be sterilized and released to infiltrate the natural screw-worm population? Theoretically, one release would reduce the number of fertile eggs deposited in proportion to the ratio of the number of sterile to normal males. If there were 10 times as many sterile as normal males, one tenth as many fertile eggs would result. A second release would cut even deeper into the natural population, and eventually, after enough releases, the natural population would no longer exist.

Two years ago, USDA entomologists, with the consent and encouragement of the Dutch Government, tried out this theory on the screw-worm-infested West Indies island of Curacao. Releasing the sterile males at the rate of 400 per square mile at twice-a-week intervals, they accomplished eradication within four months. They are now drawing up plans to attempt the eradication of the screw worm from southeastern United States.

Whether it be atomic energy or deep

plowing, entomologists overlook no bet in insect control. Generally, though, they depend upon insecticides as their chief weapon.

A great deal has been written about the chemical revolution in insect control that began with the development of DDT during World War II. Since then more than a score of powerful organic chemicals have bolstered man's insect-fighting arsenal. One is aldrin, a chlorinated hydrocarbon that has been responsible for fantastically effective control of grasshoppers. As little as two ounces of the insecticide has killed millions of these pests.

Today, Americans are fighting insects at a cost of hundreds of millions of dollars each year. They are spending additional millions for entomological research and for large-scale insect-control programs.

Tomorrow, the cost may be even greater if we wish our high standard of living to continue or improve. Our growing population, our increasing world responsibilities, and our limited and gradually diminishing natural resources force us into ever-greater competition with insects for our food, our possessions and our health. There is no doubt that man will ultimately—perhaps completely—triumph, but remaining uncharted courses are many—and there must be no relaxation in our efforts. ★★

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SMOKES SWEET!  
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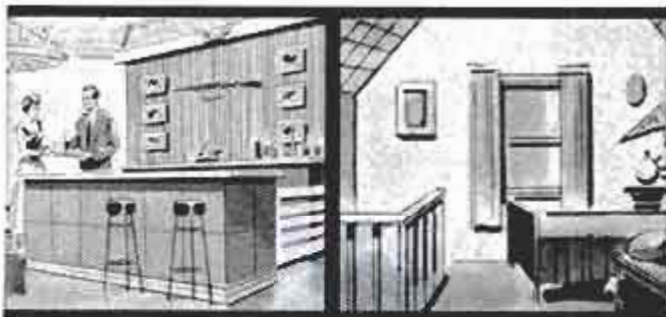


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## There's a Nice Future in Mink

(Continued from page 121)



Horsemeat is sliced, ground and fed to mink after being mixed with a cereal. Ranch feeds 2000 mink

A female has very sharp teeth and is vicious when with kits. We always wear heavy leather gloves in handling them. One of my former employees, weighing 250 pounds, was afraid of the mink, and of course they knew it. Whenever he handled them they would squirm and try to bite. One day he dropped one and without stopping to look, headed for the feed room. It was a sight to see that 250-pounder running like mad with a three-pound mink close on his heels.

### Sales Start in August

There are many types of mink, but we specialize in Kobuks, Gothiers, Stewart-blues and Sapphires. The sale of live mink starts in August with the majority being sold from September on. Most of the mink, however, will be pelted and their skins sold at auction through the large fur houses.

Pelting starts in November, depending on climate. When it is cold and moist, mink "fur up" quicker, meaning the fur is prime. All mink do not fur up at the same time, making it easier to handle them.

Quality of the fur determines what mink to pelt. Also, any female that didn't produce quality kits or was a poor mother is pelted; males that weren't aggressive in breeding also lose their skins. This is the time to weed out the herd and keep only mink that will improve the stock. I seldom keep mink more than three years because

(Continued to page 240)



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## \* in Christmas Boxes



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**CRESCENT TOOLS**  
*Give Wings to Work*

**YIPEE - A SAWHORSE IN A Jiffy**

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Explore, learn Electricity, Magnetism, Electro magnets, complete kit and instructions with 22 experiments and models... \$3.95

**TRANSISTOR RADIO KIT**—all parts & instructions—powerful... \$7.95

Also—Rods, discs, bars, horseshoes. Send stamp for catalog—Specify your requirements—100% SATISFACTION GUARANTEED.

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Don't you get more joy out of any job when you're dressed in easy comfort?

It's the best of reasons for working in Anvil Brand tough utility clothes and Tom Long durable casual wear.

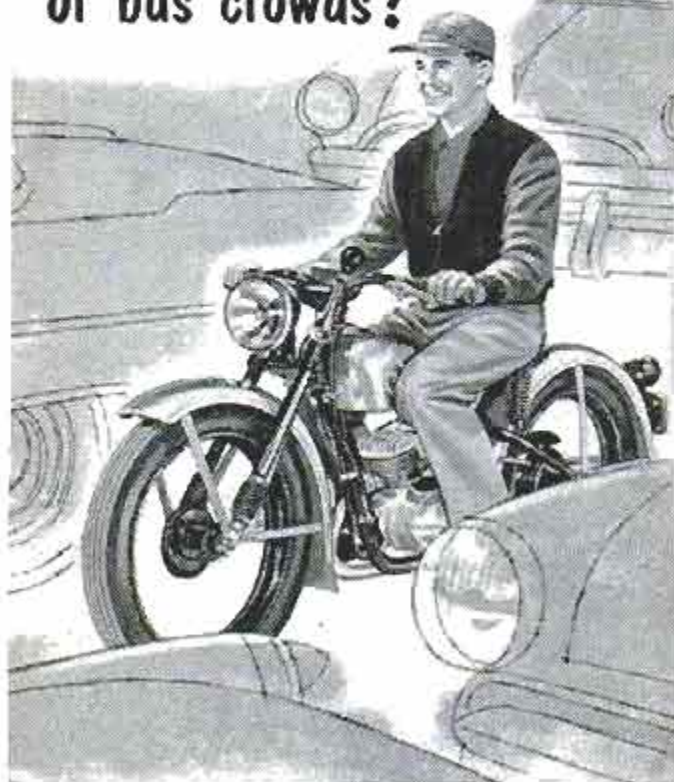
Here are two brands expressly built for active men, in separate or matching shirts and pants, dungarees, coveralls and hobby styles; tough materials assuring longest wear.

You have a treat coming when you outfit in Anvil or Tom Long. At leading stores.

**ANVIL BRAND FACTORIES** HIGH POINT, N. C.



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or bus crowds?



it's fun to whisk to work on  
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**HUMMER**

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You make only the small down payment... the Hummer can help him earn enough to cover the low monthly payments, have pocket money too!

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in that time they are outdated by new kits.

Mink selected to lose their skins have been exposed to the weather in the outdoor pens, making their fur thicker. When killing, the fur must not be damaged and death is usually accomplished by breaking the neck or using gas.

Skinning a mink is not hard, but the beginner would be wise to study his mink brood carefully or have help from an experienced skinner. After the mink are killed, the skins are scraped, cleaned and put on pelt boards to dry. The skin must be snug on the board but not stretched. It will dry in about 24 hours.

Meanwhile the sale of live mink continues. I ship all over Canada, the United States and England. Mink are shipped in special crates with food enclosed and must be watered daily during shipment. The largest sale ever made to one buyer was 15 mink for \$4000 to a beginner in England. The last I heard he had a fine ranch and one of the largest in England.

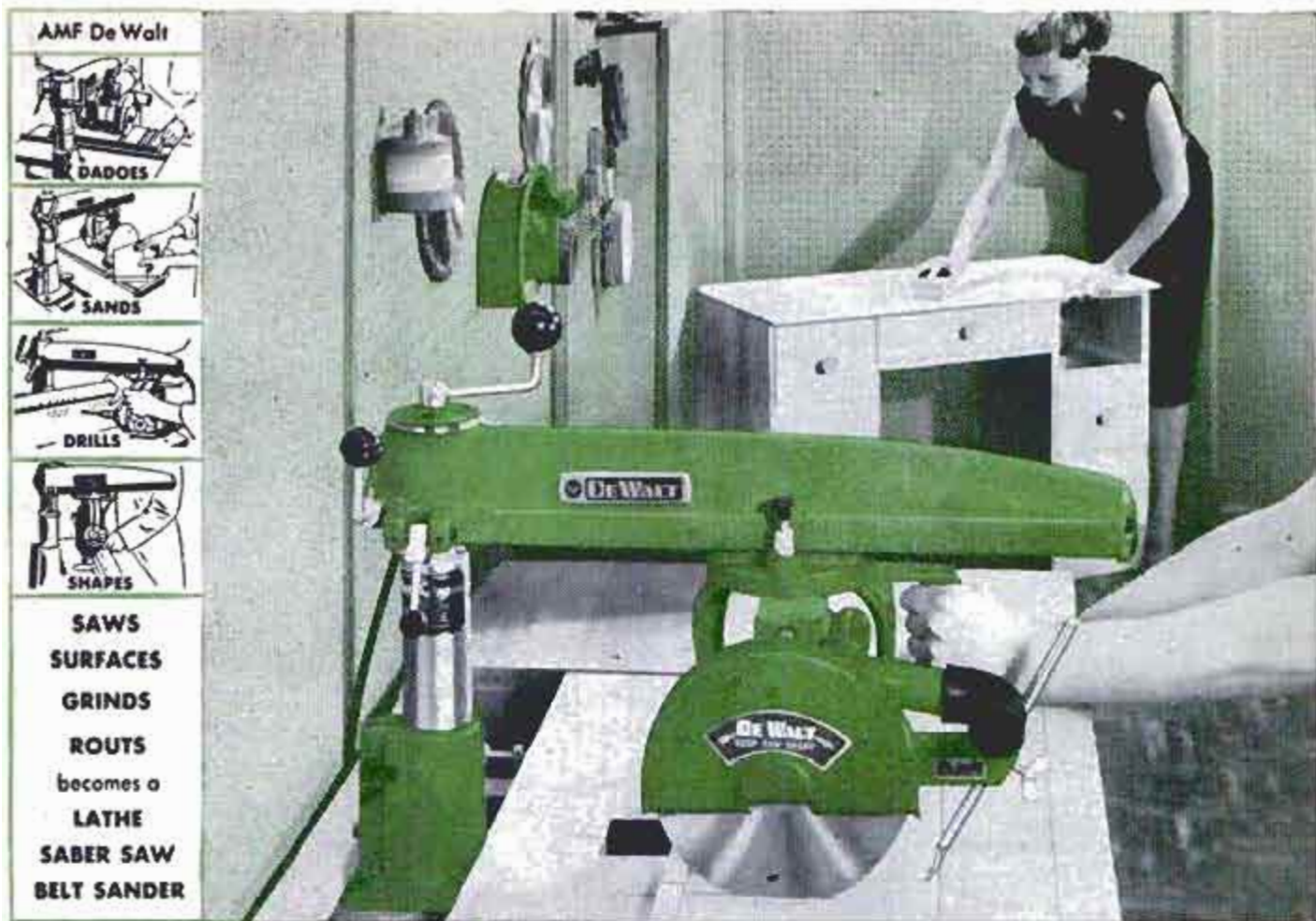
Most beginners buy one male and three females, and prices vary according to the type selected. Gothiers and Stewart-blues are worth \$100 each, Kobuks bring \$150 and Sapphires cost \$300 each. We have about 400 mink for sale this year and expect to pelt 1400, with pelts bringing an average of \$30 each.

Many times each year I sell breeder stock to beginners and they always ask for any special information I might have. The best advice I know is always to buy the best breeder stock available. If you don't have enough money for quality stock, wait until you do. Next, have the pens ready for the mink and always keep pens, food and mink clean and dry. With this information, a fondness for animals and an authoritative book on mink anyone can become a successful mink rancher. ★ ★ ★

### Samples of Air Brought From Space

Army Signal Corps scientists have captured six bottles of air from the borderline of outer space—75 miles up. The precious samples were gathered by steel bottles in the nose cones of two 20-foot Navy-developed Aerobee rockets launched from the White Sands Proving Ground in New Mexico. The special bottles popped open one at a time as the rockets reached peak altitude, then snapped shut, each trapping eight quarts of thin air. They were then parachuted to earth. From the air, scientists hope to learn whether or not common gases begin separating into layers at high altitudes.





Only \$239 delivered, complete with 9" saw blade and 3/4 hp motor

## Only AMF DE WALT makes making things so easy!

With a versatile AMF DeWalt® Home Power Shop, you can make home repairs, build furniture, handle even major projects like a *professional!*

AMF DeWalt is the *first* all-purpose power tool designed on the modern mechanical arm principle that outmodes all other power tools. It's actually 12 professional power tools in 1—a *complete home workshop!*

- **Arm swings and locks at any position** for miter cuts—gives easier, safer *top-side cutting* that eliminates errors... you see your mark *and* your cut.

- **Builds into workbench!** Because entire arm *swings clear* of work area, you can cut and assemble on the same work bench! *Save valuable space* and get *extra convenience too!*

- **Powerful 3/4 hp motor is U.L. Approved**—guaranteed for full year—tilts and turns to any angle.

Motor carriage rolls smoothly on ball bearings in protected trackways. Simply change circular tool on direct-drive motor shaft and you have another power tool—at *no added cost!*

- **Superior safety and accuracy!** Exclusive DeWalt Safety Key Switch prevents unauthorized use. DeWalt's patented design and rugged precision construction provides safety *and* unmatched accuracy that assures years of superior workmanship.

**INSIST ON A DEMONSTRATION.** See why, *feature by feature*, AMF DeWalt is the finest home power shop you can buy. A small down payment on DeWalt's Easi-Budget Payment Plan\* will put an AMF DeWalt in *your workshop now.*

**OWNERS!** Valuable new *Owner's Manual* just off the press, "Easy Ways to Expert Woodworking," \$4.95 postpaid. Order yours today!

\*Does not apply in Arkansas or outside U. S. continental limits

SEND COUPON FOR FREE ILLUSTRATED BOOKLET!

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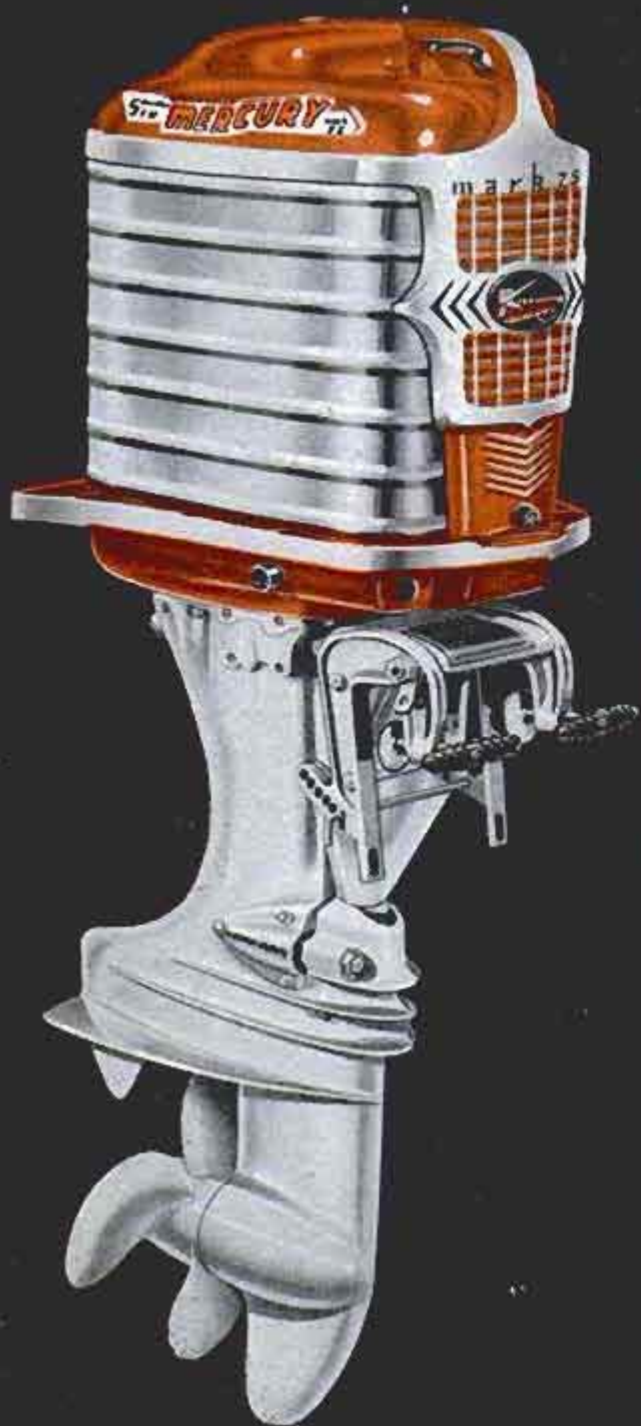




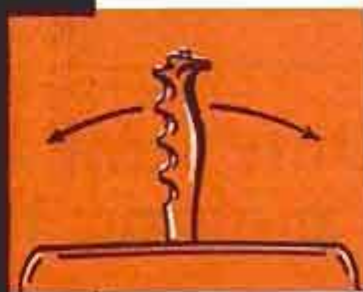
# »»»»» MERCURY PIONEERS TWO

## 1. World's first 6 cylinder 60 h. p. outboard!

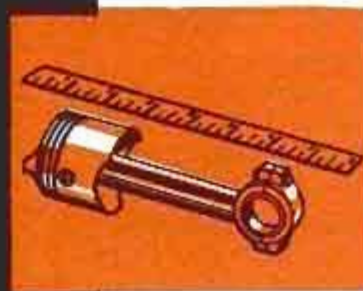
### NEW MARK 75 MARATHON



● Now in production! Real outboard power—and safer, smoother, more maneuverable than any engine you've ever handled! Revolutionary 6-cylinder design... a firing impulse every 60 degrees of crankshaft rotation... the smoothness and flexibility of the finest foreign sports cars... single lever control... greatest operational ease of any outboard... direct reversing... with no bulky reverse gears! With super hot ignition, these 6 cylinders start instantly, idle smoothly and slowly... give new definition to low speed operation.



**NEW SIMPLIFIED SINGLE LEVER CONTROL.** Throttle, reverse, neutral all on finger-tip remote control.



**16 $\frac{2}{3}$ % LESS PISTON SPEED.** Slow-travelling, short-stroke pistons prolong engine life. Other engines, even at lower rpm, have up to 20% more piston speed than this built-to-last Mercury Mark 75 Marathon!



**EQUAL TO A V-12 IN SMOOTHNESS!** Naturally, a 6-cylinder 2-cycle engine has the same number of firing impulses per revolution as a 12-cylinder 4-cycle V-12! Mercury's famous Full-Jeweled Power\* guarantees smooth power longer, too!

\*Anti-friction ball and roller bearings throughout.

# MERCURY OUTBOARDS for 1957 »»»»»



# REVOLUTIONARY NEW OUTBOARDS!

## 2. New 10 h.p. Mercury for super-slow trolling!

### NEW MARK 10 TROL-TWIN



• The new Mercury Trol-Twin was designed expressly for fishermen! New glide-angle underwater structure slides smoothly over stumps, rocks and through thickest weeds, puts cylinders at their best idling angle for hours of slow trolling. Single lever control . . . throttle, neutral and reverse all on one-hand control. Big displacement for power to plane your boat . . . get fishing fast.

Prop-Jet Exhaust buries exhaust under water and with it the sound. Ask your Mercury dealer about his new easy terms today! You'll be glad you did.



**FINGER-TIP TROLLING.** Just flick the exclusive Speed-r-Troll Switch! No ordinary throttle can give you idling speeds as low as this . . . or so steady!



**ONE-HAND CONTROL!** Twist the tiller handle for speed. Twist again for neutral or reverse. One control does everything.



**EXHAUSTS THRU PROPELLER HUB!** Exclusive Mercury Prop-Jet Exhaust buries exhaust under water . . . leaves it far behind.

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**NOTHING TO  
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**No. 900  
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SANDER**

Outsands, outlasts others. Exclusive "no jump" Multi-Motion action. Get this modern "King of Portables."

**\$39.95**

That's because both sanders are super-powered with the famous Syncro Reciprocating Motor—today's greatest research triumph! This unique, direct-drive motor has no belt, cam, gears; no rotating parts to wear out. It is guaranteed against burn-out during ownership. Syncros are so easy to use, so powerful, durable! Why push and "fight" old-fashioned portable sanders when Syncro Multi-Motion sanding—with genuine Syncro Reciprocating Motor—is yours so economically? See at tool dealers—write for Catalog, Reciprocating Motor data!



Model 900 sands edges without splintering wood.

No fan to cause "sanding-dust" cloud.

Ideal for heavy duty dry wall jobs.



**No. 504  
FINISH SANDER**

Sand the latest way! Feather-light. Powerful. Easiest for vertical use. Exclusive Multi-Motion action. So economical!

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with Genuine  
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Motors

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SANDERS

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WORLD'S LARGEST RECIPROCATING MOTOR MAKERS

**White Land of Mystery**

(Continued from page 112)



Photo theodolite permits surveyor to photograph his sightings, make his calculations later from photos

As you read this, Chet Twombly, IGY physicist, periodically climbs a ladder from subsnow quarters at Little America to an enclosed, heated tower. He peers up at the night sky through plastic domes to watch antarctica's most spectacular phenomenon of all—the aurora australis, south-polar counterpart of the northern lights. Beside him, an all-sky camera, slung above a convex mirror reflecting the horizon-to-horizon display, takes continual movies of the vivid shifting draperies and rays of green, pink and purple lights that fill the sky. Most unreal and indescribable of all natural phenomena, the aurora is thought to be caused by charged particles streaming in from solar storms to the earth's ionosphere. Caught up in the earth's magnetic field, the particle streams funnel toward the magnetic poles where they bombard ionospheric gases, creating luminous glows—much the same way electron streams excite the gas in a neon tube.

The aurora holds considerable interest for IGY scientists since ionospheric storms are closely linked to radio blackout—a treachery especially peculiar to polar regions but felt all over the world.

Tied in with the aurora and radio interference is the earth's magnetic field, with

(Continued to page 246)



# IDEAS FROM WELDWOOD



**The Sail Scooter.** Sporty sailer you can build at lowest possible cost. Sail Scooter is portable, can be carried on top of your car.



**Sportsman's Cabinet.** 2-sided cabinet on swivel base. One side holds clothes, shoes, etc. Opposite side for tackle, rifles, shells.



**Kitchen Cabinets.** Pattern has all information to build cabinets, broom closet and sink enclosure. 200 sizes of cabinets specified. Step-by-step directions.



**TV and Hi-Fi Enclosure.** Cabinet (right) has turntable, space for tuner, amplifier. Cabinet (left) holds speaker. Center holds TV set.

## Projects of the Month

This month we're suggesting four money-saving projects. They're all *simple* to make with Easi-Bild patterns, and Weldwood plywood.

Easi-Bild\* patterns are *full size*. You just trace the pattern, cut out the pieces, and assemble. If you know a saw from a hammer, you can build any of the 250 Easi-Bild projects. (See coupon for details.)

When you send for the patterns, or buy them at a store, you'll see the name "Weldwood" on the list of materials. In top grade plywoods . . . in beautiful hardwoods . . . in finishing materials like Firzite® and Satinlac® . . . and in glues and Contact Cement, Weldwood products are favorites of amateur and pro. For any project—any need—rely on Weldwood products, and the dealer who sells them.

W. M. Reg. Easi-Bild Pattern Co.

## This month's hint

If you don't have a vise—or four hands—nailing together picture frames or anything else with mitered corners is a problem.

To make the job easier apply Weldwood Contact Cement to all joints and let it dry (follow directions on container). Then, simply press the pieces together. The frame will bond instantly and solidly and you'll have no trouble putting in necessary nails.

—C. D. H., Lumberton, North Carolina.

## The Weldwood Question Box

**Q.** I'm doing cabinetwork at home. What kind of plywood is best?

**A.** You can use fir, pine or hardwood plywoods (like mahogany, oak, etc.). The hardwoods are the best looking. But, if you're going to paint, take a tip from cabinetmakers and choose Weldwood Old

Craftsman Pine Plywood. It's easy to work and paint. There's no discoloration and much less grain "showthrough." Weldwood Old Craftsman Pine doesn't need as much sanding, paint or painting time.

The choice of materials is up to you. But remember—the "pros" pick pine!

United States Plywood Corporation, Pattern Dept.  
P.O. Box 215, Pleasantville, New York

Please send me the following checked items:

- Pattern #272—TV and Hi-Fi Enclosure (\$1.00)
- Pattern #201—Kitchen Base and Wall Cabinets (\$1.00)
- Pattern #248—The Sail Scooter (\$1.50)
- Pattern #266—Sportsman's Cabinet (\$1.00)
- 57-page Pattern Catalog (55¢)

PM 12-56

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United States Plywood Corporation

Weldwood—The Best Known Name in Plywood






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**LUFKIN** WHITE CLAD MEZURALL 10' TAPE RULE \$1.49 

Ideal for the handyman. Snow white tape, bold black figures, polished metal case.

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For accurate long measurements. Handsome maroon vinyl case. Snow-white line with jet black markings.

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poles in the arctic and antarctic. Both poles and lines of force shift occasionally. In recent years the north magnetic pole moved hundreds of miles from northern Canada to the west coast of Greenland. The south magnetic pole is somewhere out on the ice prairie in Wilkes Land, west of McMurdo Sound. Tedious methods have been used to pinpoint these elusive spots. But until now, no one has done better than make a close approximation.

This year Rochus Vogt, a young nuclear physicist from Heidelberg University working under Fulbright grant at the University of Chicago, nailed them down by a unique method. In a specially built steel shack on the USS *Arneb's* stern weather deck, Vogt stood guard over nuclear counters that clicked off a crackling barrage triggered by cosmic particles penetrating the earth's atmosphere. "Around the magnetic equator, lines of magnetic force far out in space deflect cosmic rays, so fewer particles get through," he explains. "But at the poles, where lines of force funnel into the earth, particles penetrate in vast quantities, which incidentally accounts for the auroral displays." By plotting counts collected down through the Pacific to Antarctica, up through the Indian Ocean on the trip home, and using data previously collected during a north-south Atlantic voyage, Vogt had three pole-to-pole profiles showing cosmic-ray penetration of the earth's magnetic field. Then by applying mathematical formulas, the three sets of particle-count curves were projected to junction points in Greenland and Antarctica—dead centers of the magnetic poles. Vogt's figures proved the earth's magnetic grid, as previously plotted, was slightly askew—a fact important to some missile designs, the radio and electronics field, and invaluable to further magnetic and cosmic-ray studies during the IGY.

While men like Vogt and Twombly hit at the causes of cosmic interference, other men during Deepfreeze tackled it from an immediate practical level. Amory H. "Bud" Waite, electronics engineer for the Army Signal Corps Laboratories, rumbled over the snowfields with five companions in a Weasel laden with a new lightweight backpack radio with disjointed antenna that snaps into a 12-foot whip at the flick of a wrist. On the barrier near Little America, these men set up a private camp composed of two insulated huts.

Out on the ice desert, Waite and his boys dug holes in the snow and sank 30-foot transmitters out of sight. They busied themselves sending signals at frequencies from 40 to 10,000 megacycles over, through

(Continued to page 248)





So light, a card table can be your workbench.

## The Whole Family Has Fun!

— with your gift of a **Dremel Moto-Jig Saw**

There's no finer gift than a Dremel Moto-Jig Saw. It adds new thrills to woodworking—makes it a happy family hobby. It's good, constructive recreation and very educational for children—teaches them to be creative.

### It's Super Safe

Only Dremel has a specially designed blade guard that keeps young fingers away from the blade—makes it **SUPER SAFE**. Now the whole family can enjoy working with a power saw. It's portable too—even a card table can be your work bench. These features have made Dremel the No. 1 choice for handicraft work in cub scouting, elementary schools, churches, 4-H clubs, etc.

### A Professional-Quality Tool

A precision-built craftsman's saw—not a toy. It's run by a powerful **ROTARY MOTOR**—not a reciprocating vibrator. The new **ROCKER-ACTION** principle actually outperforms all others, even much more expensive ones. It practically eliminates blade breakage. Cuts  $1\frac{3}{4}$ " wood. Absolutely no maintenance or burnout problem.

### Prove it to Yourself

Go to your hardware or hobbycraft store. Inspect the Dremel Moto-Jig Saw closely—compare it with others before you buy. You'll find Dremel is far superior in every way. Invest in wholesome, family fun—buy a Dremel Moto-Jig Saw.



### Model 15

15" throat—cuts to center of 30" circle

**\$29.95**

### Model 8

8" throat—cuts to center of 16" circle

**\$23.50**

Prices include **ROTARY MOTOR**

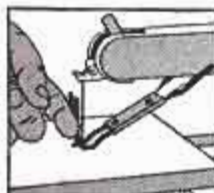


New, Exciting Pattern Packets. Eight new, Pattern Packets supply you with plenty of useful, interesting things to make.

Get started now by ordering Packet No. 1. It includes full-size patterns for 16 projects (tie rack, earring holder, two games, etc.) Send coupon with 75c today. Write for folder on other packets.

**SEE YOUR DEALER.** If he can't supply you, order direct on 5-DAY trial, money-back GUARANTEE!

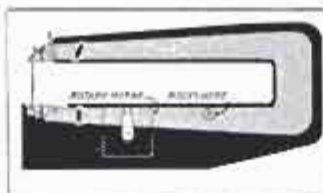
### ONLY DREMEL HAS THESE FEATURES



Super-safe blade guard protects young fingers from injury.



Table tilts for bevel cutting. Table can be raised or lowered also to utilize every part of the blade.



New **ROCKER-ACTION** principle replaces old-fashioned spring-tension assembly. Blade remains uniformly taut—cuts faster—blades rarely break.

**DREMEL MFG. CO., Dept. 116M, Racine, Wisconsin**

Enclosed is  check  money order for \$\_\_\_\_\_ in full payment for one Model\_\_\_\_\_ Dremel Moto-Jig Saw. If not satisfied, I can return it in 5 days and get my money back.

Enclosed is \_\_\_\_\_c for Pattern Packet No. 1.

Send me free  Folder on 8 Pattern Packets  Power Tool Catalog.

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(Pattern No. 568 —  
50¢ Stor-All Workbench)

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## STOR-ALL WORKBENCH?

Build it yourself the Easi-Bild\* Pattern way. You don't need any skill or experience, just follow the pattern.

Trace simplified pattern on wood; saw, and assemble. The pattern lists materials and shows each step of construction.

For a complete new catalog of over 250 illustrated Easi-Bild Patterns—send 35¢ to EASI-BILD, Pleasantville, New York.

\*T.M. Reg. Easi-Bild Pattern Company

## EASI-BILD PATTERNS



Easi-Bild Patterns specify PLASTIC WOOD for a real professional job. Handles like putty—hardens into wood.

**"PLASTIC WOOD"**

and under the snow at depths down to 30 feet. "Signals travel more than twice as far over frozen terrain as they do over temperate hills and fields," Bud says. "And through the snow we can get distance." If it works, auroral disturbances will never trouble polar explorers again. Signals will propagate through Antarctica's top layers of snow, bouncing back and forth between surface and ice layers beneath to all parts of the continent—disrupted only by crevasses and mountains jutting through the icecap.

Antarctica's icecap is a feature that will come under the close scrutiny of IGY glaciologists. The great continental glacier, formed by eons of snowfall compacted into a six-million-square-mile blanket that may be nearly two miles thick in spots, flows outward constantly like pancake batter on a cold griddle. The expedition's "Mr. Ice," Doctor Siple, spent days skiing across the barrier. The continental glacial ice, he says, spreads outward at a rate of 4½ feet a day clear around the continent. Great pieces crack off the edges with deep, booming roars each year and float northward as icebergs, some of them hundreds of square miles in area.

IGY glaciologists are bringing core drills to Antarctica to probe through the thick cap so that layers may be studied and age of the icecap determined. Samples of snow can be tested for age by several methods. Each antarctic summer produces "melt lines"—thin bands of solid ice in the snow—that can be counted visually. But Ernie Wood, IGY scientist with Deepfreeze, used a newer method this year. Taking samples from deep in the icecap, he melted them and drained the water into plastic bottles. These, sent to the University of Chicago, will be tested for radioactivity. Tritium in the snow, emanating radiation with a known half-life, will reveal when the snow fell—even though it may have been blown to its present location by howling winds.

The changing, rumbling coastal ice of Antarctica is earth's last outpost of life. A few miles beyond the barrier cliffs nothing moves or grows except the wind and perpetually drifting snow. But the continent's edges swarm with creatures that draw a living from the sea. Expedition biologists, with pronged crampons clamped to their boots, scaled glaciers and ice cliffs on the trail of petrels, penguins and skua gulls. The latter, with four-foot wingspread, are voracious scavengers that live on the periphery of penguin rookeries, stealing eggs and chicks which they carry off and devour. They have a trying habit of dive-bombing people who come close to their nests.

(Continued to page 250)



# "WE PAID FOR OUR HOME with a Foley Saw Filer"



Here is the true story of Leslie Patrick—as told by his wife, who wrote us about their success in a town of 12,000.

"I can truthfully say that when Mr. Patrick got his Foley, he made a good and wonderful investment. When we moved here in March, 1946, we had only a Model A Pickup and all our belongings were in it. Since then, my husband has done so well with his Foley Saw Filing Machine and repair shop that we bought a house and paid for it and have two nice boys; bought a new car and built an addition to our house; and he has got a lot of new machines in the shop that a person needs in business. Nicest of all, it is all paid for."

## Make up to \$3 or \$5 an hour

With the Foley Automatic Saw Filer you can sharpen hand, band, and circular saws just like new. Start in spare time, in your garage or basement. No experience needed. Build up a steady, repeat CASH business which will buy YOU a home or new car. Send coupon for FREE BOOK—"Money Making Facts". No salesman will call.

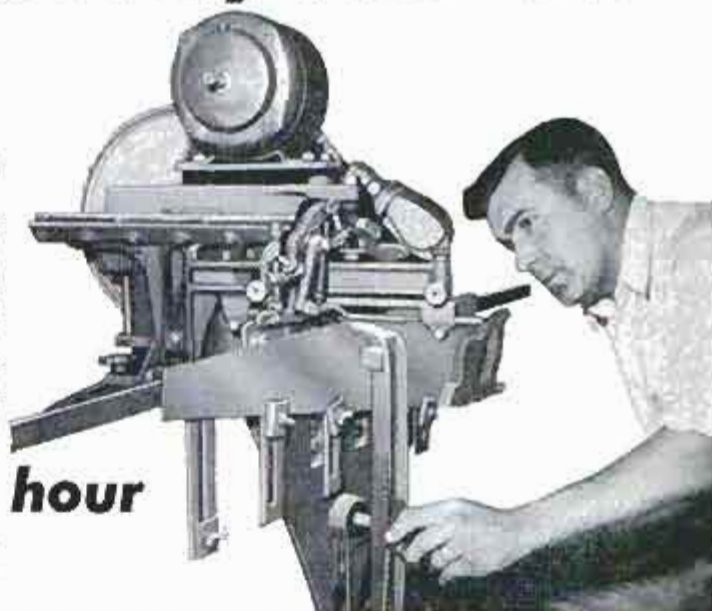


FOLEY MFG. CO., 1216-6 Foley Bldg., Minneapolis 18, Minn.

Send Free Book "Money Making Facts".

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YOUR ENGINE AT ALL SPEEDS WITH  
AUTO-LITE RESISTOR SPARK PLUGS WITH

## POWER TIP

LOOK FOR THE PROTRUDING TIP!

### NEW, IMPROVED CALCULATOR FOR WOODWORKERS only 25c

Instantly gives information on lumber, nails, concrete mixes, painting materials, etc. Convenient, simple to read. Just set dial for nail specifications, to convert linear to board feet, find bit sizes for screws, compare characteristics of woods. 6" diameter heavily varnished cardboard. Send 25c, no stamps, please to Greenlee Tool Co., 2112 Columbia Avenue, Rockford, Illinois.



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power interruptions  
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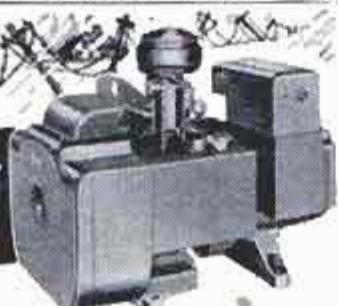
## ONAN Emergency ELECTRIC PLANT

Provides dependable stand-by electricity for heating system, pumps, freezer, lights, appliances. Keeps home safe, livable. Automatic start and stop. Find out how little it costs!

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A SIZE FOR EVERY NEED  
500 to 75,000 watts.  
Compact, quiet-running.  
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...Everywhere  
around the house!



## A Whole Tool Kit...by Itself!

A turn of the End-Screw transforms trim, gleaming Vise-Grip into a Locking Wrench... Super-Pliers... Pipe Wrench... End Wrench... Clamp... or Wire Cutter! Magic double-lever action provides 2,000 lbs. gripping strength—locked on by a squeeze of the hand. Does more jobs easier than any other tool made! 7" and 10", cutter optional, \$1.85 to \$2.60. At your favorite hardware store.

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IN ALL KINDS OF WEATHER

Whether it is 100 in the shade or 30 below zero, your car will start quicker and run better with a Bendix\* Electric Fuel Pump. It's easy to install and costs less per mile of operation than any electric fuel pump on the market. Sold by independent garages and service stations.

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Get a warmer, more comfortable home AND save up to 20% on fuel costs with INNER-SEAL weather stripping on your doors, windows, storm windows!

INNER-SEAL is waterproof, tough, flexible; easy to install; lasts for years. Spring steel wire molded in neoprene-coated sponge rubber assures tight seal. Has Good Housekeeping guarantee.

Buy it in exact-length "do-it-yourself" paks or in bulk at hardware, variety stores, building suppliers. Get free weather stripping booklet "Why Shiver" from dealer or write Dept. PM.

**BRIDGEPORT FABRICS, INC.**

200 HOLLAND AVE., BRIDGEPORT 9, CONN.

Four kinds of seals from little gray crab-eaters to 500-pound Wedells bask beside cracks in the bay ice. Having seldom seen men, none of Antarctica's creatures fear them. We patted the stomachs of lazy seals and sat on them, drawing no response beyond a grunt or resentful glance.

One stomach you don't pat is the sea leopard's. Cousin to the seal, this 12-foot spotted monster moves swiftly across the ice and will attack people at the slightest provocation. Great jaws with sharp, reptilian teeth can inflict serious damage. These, and the killer whales that cruise along the ice edge, bumping it to knock off seals or people which they eat with equal relish, are the Antarctic's dangerous creatures.

One of the first scientists ashore was Dr. Oliver L. Austin, Jr. The stocky polar veteran headed out across the ice for a penguin rookery. With him went a few assistants and 500 U. S. Fish and Wildlife legbands.

The rookery is on a ridge of bare volcanic ash under the lip of an ancient glacier on Cape Bird. Up on top the party found some 50,000 Adelie penguins on pebble nests crowded a foot or two apart. All were busily engaged in hatching out a summer crop of fuzzy chicks.

Of 17 varieties of waddling dress suits that inhabit the Southern Hemisphere, Antarctica boasts only two. The familiar Emperor is the deluxe model, growing to 40 inches and often weighing 90 pounds. The smaller Adelie reaches a scant 18 inches and tips the scale at about 12 pounds.

Penguin welcome parties waddled down the 300-foot slope to greet Austin, waving flippers and hamming it up. Though curious enough to approach within two or three feet of people, penguins resent being picked up.

On short hikes penguins walk upright, handling flippers like balancing poles. On long hauls, when tired or frightened, they toboggan, propelling themselves by paddling their toes against the snow and using their flippers like oars.

Both male and female penguins take turns insulating eggs against polar frigidty during the 40-day incubation period. The phenomenal energy required to incubate an egg in sub-zero weather is something ornithologists would like to know more about. Even more fantastic is the Emperor penguin, who breeds during the long antarctic night when winter temperatures often hit 80 below. Boy and girl Emperors, up to their necks in snow, hold the eggs on top of their feet and squat on them. Eggs are passed from one to the other beneath the snow.

(Continued to page 252)





**FULL 2 AMP. RATING.** This husky 1/4" drill packs power way beyond its size. It's light, compact, smooth running. No. 1814 Drill with Geared Key Chuck . . . . . \$27.50



**12 TIMES FASTER** than hand sanding. Does wet or dry sanding on wood or metal. Sands in any direction. Leaves no marks. No. 580 Orbital Sander . . . \$49.50



**FASTEST-CUTTING JIG SAW** in its field. Exclusive Millers Falls "angle" blade gives cleaner, smoother performance in either wood or metal. No. 480 Jig Saw . . . . . \$49.50



**NEW DRILL-SAND-SAW KIT.** Includes a 1/4" "Dyno-Mite" Drill, direct mounting Jig Saw Attachment, and sanding, polishing and buffing accessories. No. 4 Power Tool Kit . . . . . \$44.95



**TOP-QUALITY BASIC DRILL KIT.** Contains 1/4" "Dyno-Mite" Drill, flexible rubber pad, polishing bonnet, rubber pad adapter, and 2 sanding discs. No. 5 Electric Drill Kit . . . . . \$29.95



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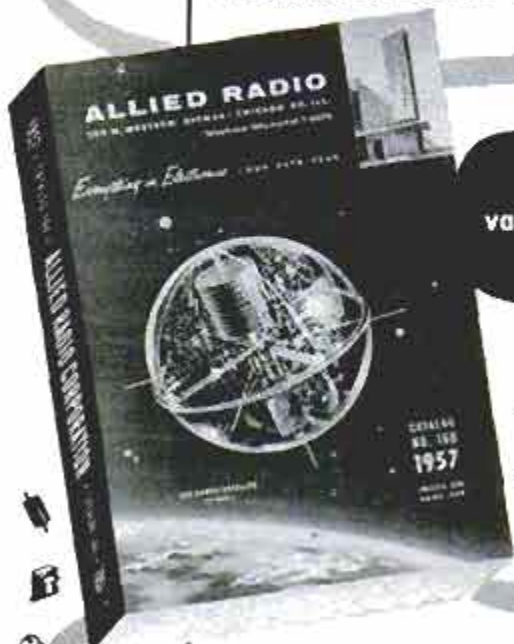
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In late summer when the chicks mature, the whole colony heads north through sea ice, following shrimp. With his 500 Adelies banded, Austin hopes to track some of these wanderers and determine something about penguin life span, about which little is known. He also hopes to put aero-medical men on their trail during the breeding season to learn where they get their phenomenal resistance to cold. "There could be a practical application for us in cold weather adaptation, via food and clothing," he says.

A wide variety of new polar tools and techniques have been tested in Antarctica. Navy hydrographers, perched on volcanic pinnacles around McMurdo Sound, charted stations for making new, accurate maps of the area. Explorers still are using charts drawn by early British expeditions. This year, a Marine surveyor experimented with a new photo theodolite, which takes pictures of sightings that can be charted later in a laboratory.

New ideas in cold-weather clothes and gear were seen everywhere throughout Deepfreeze ships and camps. Doctor Siple has a heat-radiating sleeping-bag pad he devised and will take with him to the South Pole base for testing this year. Liquid, warmed from any nearby source, is circulated through a pad by motor.

There are plastic goggles without lenses, consisting of a barrel about four inches long projecting from the eyes. They are designed to prevent tears due to wind. A mountain-climbing party tested new water-repellent clothing insulated with perforated plastic. Designers claim it will allow body moisture to escape without letting heat out or cold in.

How many of these ideas will wash out is anyone's guess. But the big push is on to make the silent continent a safer place for men to live and work. ★ ★ ★

## Loudspeakers to Give Tornado Warning

Experiments are being conducted by the U. S. Weather Bureau to test Doppler radar, in the hopes of discovering the coming of a tornado before its lethal funnel is formed. Doppler radar spots its target by its relative speed. The high speed of the tornado winds, contrasted to the quieter air around them, would produce an audible sound on Doppler radar sets. The new equipment is expected to give not only a screaming warning of a tornado's approach, but also to indicate its bearing within one degree, and its speed and direction of movement. Advance knowledge of these storms would save lives, prevent damage.



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**300 AMP. D. C. GENERATORS**  
IDEAL FOR WELDING GENERATORS

**ITEM #91** Type R-1, rated 300 Amps. — 30 Volts. Mfd. by General Electric & Ford, Government Acquisition Cost \$380.00. Shpg. wt. 35 lbs. Dimensions: 16" x 10" x 7". Complete with instructions to connect as Welder. **35.00**  
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**ITEM #90** — When connected as a welder, this unit will deliver 200 amps for a sustained period and 250 amps for intermittent service. This generator is widely used for shop-built portable welders. Rated 200 amps, 28 volts, 2500 R.P.M., using 10 H.P. Dimensions: 15" L. x 6" W. x 8 3/4" H. Splined drive shaft. Gov't. Acq. cost \$300.00, Shpg. Wt. 51 lbs. F.O.B. Chicago. **22.50**

**ITEM #99** — 12 V. — 50 Amps. — Leaver-Neville generator for autos, trucks, road machinery, boats and battery chargers. Precision aircraft quality construction, with life-time grease sealed ball bearings and heavy insulated windings. Standard 4-bolt square mounting flange, spline shaft. Dimensions: 16" L. X 8 1/2" Dia. Wt. 23 lbs. Gov't. Acq. cost — \$92.00  
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**ITEM #55** Silent, high efficiency, Helical Gear Type Ball Bearing Hydraulic Pump or Motor. Rated 8 Gal. Per Min. At 1500 R.P.M. — Delivers 1000 P. S. I. Using 6 H.P. — Reversible Rotation — 3/4" Pipe Thread Inlet and Outlet Ports — 1/4" Drain Port — 3/4" shaft with keyway and flat for either direct or pulley drive. Dimensions — 5 3/8" high, 7 1/4" long, 5 1/8" wide. Shipping weight 18 lbs. F.O.B. Chicago. **45.50**

**DOUBLE ACTION HYDRAULIC CYLINDERS**

**ITEM #31C** — 3 1/2" bore, 11" stroke. Alloy steel cylinder wall. Micro-Honed and all steel 1 1/2" diameter piston rod, 19 1/2" over-all length closed. Clevis mounting at base and shaft. Will lift 9625 lbs. with 1000 PSI Pump Pressure. Uses 3/8" tubing fittings. (Fittings to pipe thread: two 3/8" MPT @ 35c.) A \$102.00 value. Shipping weight 11 lbs. FOB Chicago. **25.00**

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Total head-feet	Speed	H.P.	GPM
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35	1600 RPM	1 1/4	90
20	2400 RPM	1 1/2	75

Back plate may be rotated for most convenient inlet position. Gov't acquisition cost \$96.00. Shipping weight 31 lbs. F.O.B. Chicago. **29.50**

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**ITEM #315**—Rated 24 volts D.C. 90 amps, 4000 R.P.M. Has 1/2" spline shaft on both ends of motor. Ball bearing construction, as specified for use with electric wheelchair design Popular Mechanics March issue, 1953. Convertible for use on 6 to 12 volts. Shipping Wt. 21 lbs. Dimensions: 11" x 5" x 6 1/2". F.O.B. Chicago. **13.00**

**1-H.P. —12 Volts—100 Amps ELECTRIC MOTOR 5600 RPM**  
Double shaft, ball bearing construction. ITEM #308.  
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1—Brand new Blackhawk Model P-151—Hydraulic hand pump with built-in oil tank and release valve. Rated from 1200 P.S.I. — to 8400 P.S.I. — 20" handle. Dim. 8"x6"x6" Item #22. **22.50**  
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**INTERNATIONAL MILL & TIMBER CO.**  
Dept. PM126 Bay City, Mich.

## General Motors Offers Three All-New Cars

(Continued from page 105)

construction. The tailfins are changed; no longer is the taillight assembly uppermost. Now the fins are tall, slender airfoils and taillights are mounted low, just above the bumper. Front bumpers have conical rubber inserts in the tips of bomb-size bumper guards.

Eldorado models have rear fenders not unlike those of the Firebird gas-turbine car. Two models are available, the Biarritz convertible and the Seville hardtop—the Brougham will be out in February). Both have rear-end styling more suggestive of a competitive sports car than a boulevard charmer.

### Oldsmobile

Oldsmobile, too, has sharply increased displacement and horsepower. The V8 engine has 371 cubic inches (seven more than Buick or Cadillac). It develops 277 horsepower. Four-barrel carburetion is standard on all models. Compression is 9.5 to 1.

Printed circuits are used in the dashboard wiring, a first in the industry, says Olds. Instead of 14 separate connections, there is only one—a plug-in one at that. This simplifies assembly and virtually eliminates short circuits under the dash.

Brake drums are flanged to reject heat and minimize fading in high-speed stops. Water deflectors keep linings dry under the worst wet-weather conditions.

The propeller shaft is of three-joint design to permit lowering the body in the rear end, as an added virtue, to reduce gear noises.

Heater controls are power operated, another Oldsmobile first, and warmup time is cut sharply by a novel system of blowing warm air directly on the driver during the first moments of operation. Once he is warm, the heater is changed to indirect heating to warm the whole car. With this system, you feel heat 30 percent sooner than usual.

Other engineering changes include aluminum main bearings (in all but number five), aluminum rod bearings, new cams, larger hydraulic valve lifters and an exclusive antivarnish feature to prevent sticking. Pistons now have closed skirts and valves, intake and exhaust, are larger.

### Pontiac

They're gone—the Silver Streaks, that is—for the first time in over 20 years. And without them, the Pontiac looks wider and lower.

(Continued to page 256)





## Useful bookshelf-desk of Western Pine is beautiful, easy to build

Built in, or as a separate piece of furniture, this good-looking unit combines a wealth of useful features.

Straight-grained, smooth-textured and economical, the mellow Western Pines cut cleanly with either hand or power tools, take any paint or stain beautifully. Left natural, they may be waxed then rubbed to a silken natural glow.

See these carefully selected, well-seasoned woods at your local lumber dealer's.

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Like Chevrolet, Pontiac retains the same body shell as last year. This limits the amount of lowering that can be done, but car height is down somewhat thanks to the 14-inch wheels.

Big Pontiac news is engineering. Horsepower is up sharply to 252 with two-barrel carburetion, 270 with four-barrel. Displacement is 347.04 cubic inches. The new crankshaft (necessary because of increased stroke) has enlarged bearing diameters and increased rigidity. Pistons are new. Pontiac now vents its intake valves to the atmosphere to minimize the chance of oil being sucked into the combustion chambers during coasting (you smell the bad results of this suction when the car ahead of you begins to coast and clouds of oil smoke pour from the tailpipe).

The block is new and more rigid. The distributor has been redesigned and has a window opening for adjustments while the engine is running. Radiator pressures are now 13 pounds (up from 7 last year) to raise the boiling point about 31 degrees.

Styling changes include a completely new rear-fender design with bold, distinctive taillights and a projectilelike ornament as part of the side treatment. The front grille is all new, but most noticeable is the absence of the chrome striping that has said "Pontiac" for years. ★ ★ ★



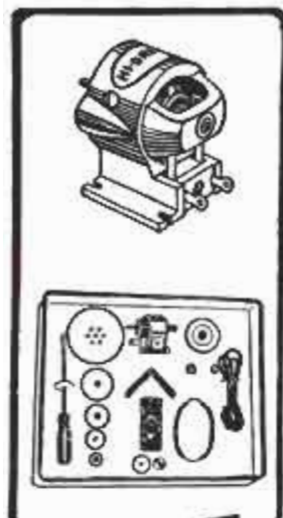
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☐ Although water covers almost three fourths of the earth's surface, man takes scarcely more than one percent of his food from inland waters and the sea.



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## An Engineer Looks at the New Cars

(Continued from page 101)

new nor exclusive, being used on virtually all cars this year). Ball joints provide for the vertical motion required by springing and the horizontal motion required for steering. The lower control arm is now in two sections, the forward section being sort of a strut.

The conventional coil spring has been replaced by a torsion bar coupled at the front to the lower control arm and fixed at the rear to the frame, with an adjustment to compensate for any sag that may take place as the car ages. This is new and is the only torsion-bar suspension on a domestic car this year.

Suspension is still by conventional upper and lower control arms (parallelogram type) and there should not be much change in ride and handling. More important is the fact that the entire suspension and steering system is isolated in rubber—this does much to eliminate the transmission of road shock into the car.

### Four Headlights

Four headlights are optional in several makes and standard on at least one. In a typical system with four lights arranged horizontally, high-beam lighting is provided by all four lights and total power is 150 watts instead of the 100 common to two-light cars.

On the low beam the two outboard lights deliver a total of 100 watts instead of the 80 watts put out by low-beam systems previously in use. With the increased power there is, of course, more light on the road, but probably no more than could be obtained with a two-light system of equal power. Glare for the oncoming driver is certainly not less and may be more.

The best of present-day generators delivers about 420 watts. Unless this capacity is increased there will, of course, be less power available for battery charging, heater, radio and other accessories. To take care of cars with the new system, service stations will have to stock two additional types of light units, in addition to the two they already carry for the present six and 12-volt cars.

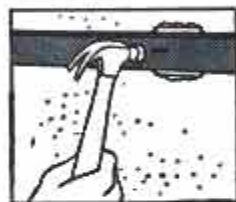
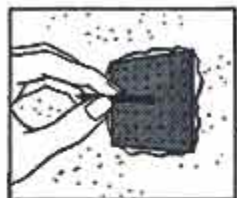
## Find 40-Million-Year-Old Eggs

A bird's nest, containing 13 fossilized eggs laid about 40 million years ago, has been found on a ranch near Crawford, Neb. X rays, seeking embryos in the eggs, may determine size and shape of these ancient birds.



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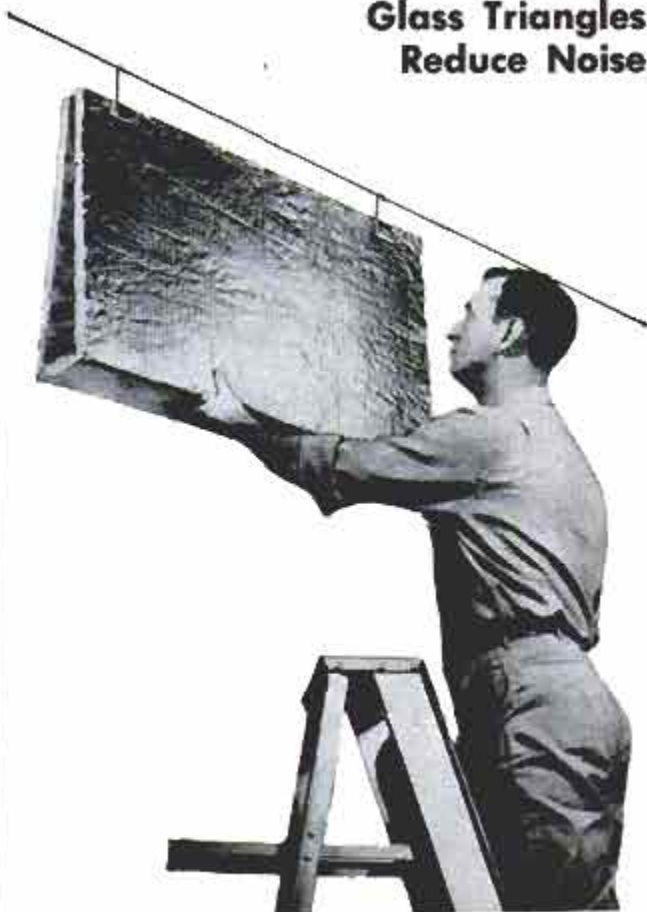


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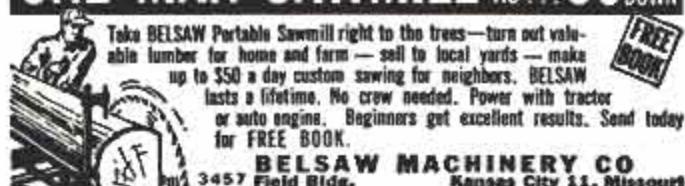
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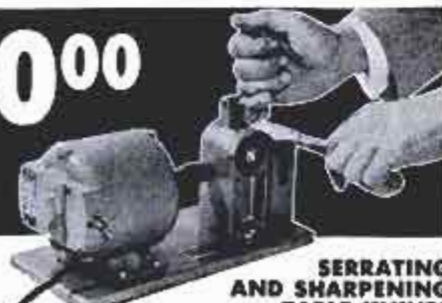
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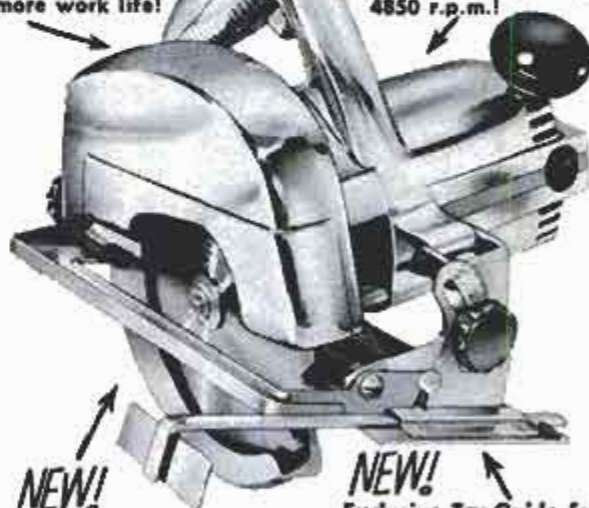
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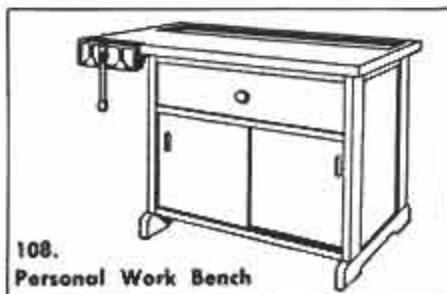
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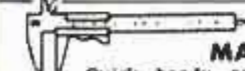
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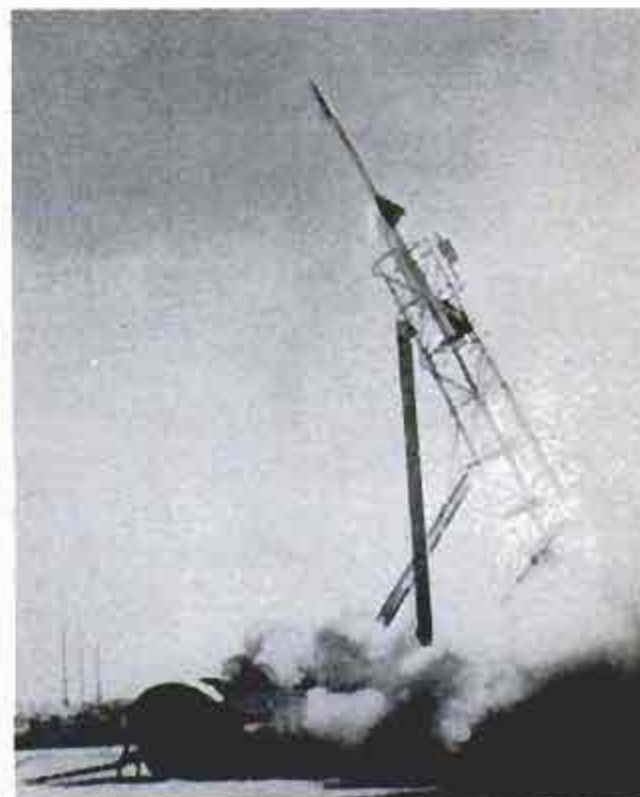
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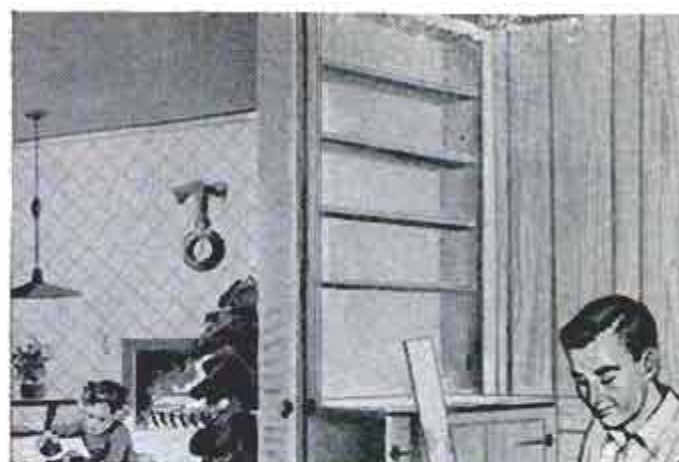


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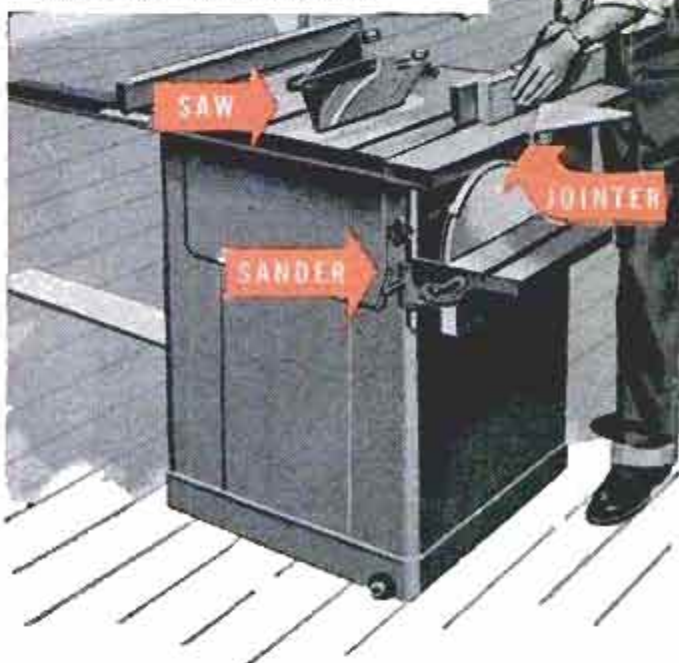
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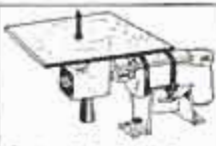


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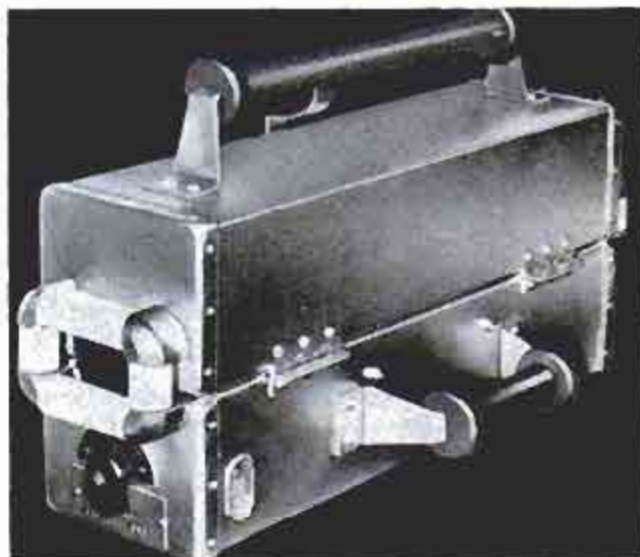
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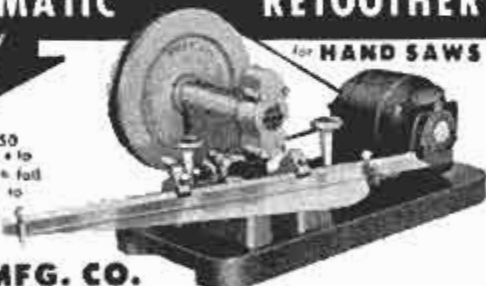
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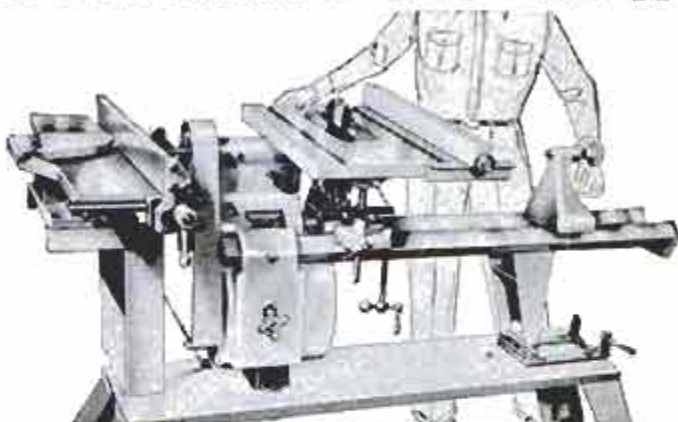


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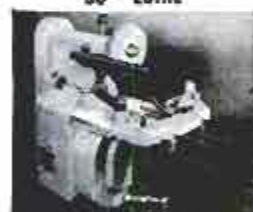
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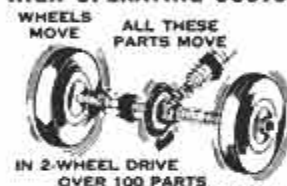
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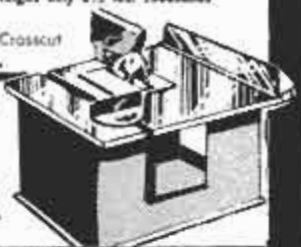
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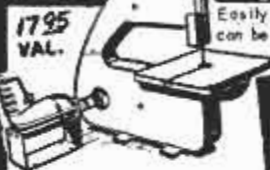
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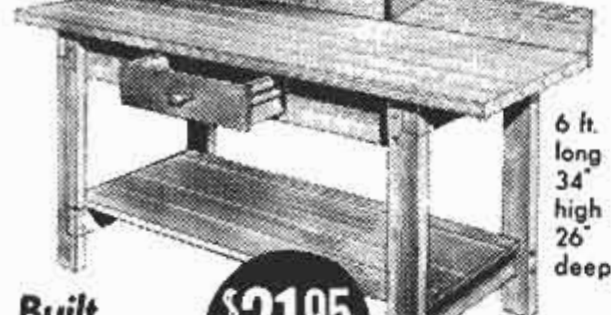
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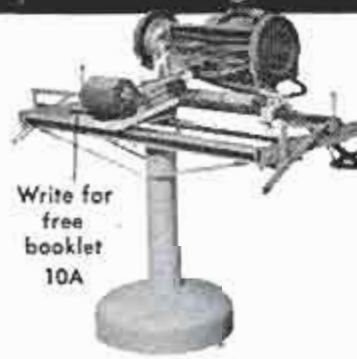
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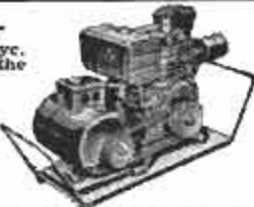
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115 v. 60 cyc. AC. Powered by a rugged 2.2 HP. easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines. Regular \$275.00 value..... **\$143.50**

**1200 Watt Plant** (Item 45) same as Item 24 but larger generator and engine with 500% greater output..... **\$199.50**

**MASTER-LITE 2500 Watt Plant** 110/120 v. 60 cyc. AC. A powerful 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 4.5 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 \$645.00. (Item 21) Factory Price..... **\$329.50**

**DUAL VOLTAGE 110/220** for Item 21—\$30 additional. We make every type and size of light plants—Write, giving us your requirements!

## PORTABLE BOOM HOIST

Here is a big 3000 to 10,000 lb. capacity boom hoist at a fraction of the actual cost to the Gov't.—that can pay for itself on one job! Entire hoist is made of high strength alloy steel. Can be mounted as a stationary crane in yards or on buildings; or as a mobile crane on trucks for use as a wrecker. Massive telescoping steel boom is quickly extended from 10 to 20 ft. with a built-in winch. Ideal for erecting buildings, hoisting materials, loading machinery, unloading RV cars, lifting boats from water, laying in sewer pipe, etc. (Item 80) Wt. 850 lbs. Orig. cost over \$350. Special F.O.B. Shelby, Ohio..... **\$89.50**

## EXTENSION CORD

Heavy duty and very flexible. Neoprene 14-2 cable. 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only **\$8.95**

**No. 10-2 POWER CABLE.** Heavy duty, very flexible 20 ft. with male and female fittings. Wt. 4 lbs. (Item 818a)..... **\$5.15**  
20 ft. without fittings (Item 818a)..... **\$4.15**

**No. 12-2 POWER CABLE.** Very flexible rubber covered special outside shield for grounding power tools, etc. 50 ft. (Item 199) Wt. 8 lbs. **\$6.95**. 100 ft. (Item 200)..... **\$12.95**

**No. 8-2 Conductor Power Cable.** 30 ft. heavy duty, very flexible rubber covered with male & female plug (Item 817)..... **\$12.95**

## 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 1/8" thick. Overall length 40". Wt. 23 lbs. (Item 156) Regular **\$40.50**. While they last..... **\$14.95**

## LESS THAN WHOLESALE



**MASTER DC ARC WELDERS**  
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 28a.) Wt. 110 lbs. \$459 value..... **\$119.50**  
**WELDER ONLY—INDUSTRIAL MODEL** same as above but with ceramic rotary type rheostat providing 74 different heat settings for all types of welding (Item 28b) \$500.00 value..... **\$139.50**  
**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. **\$449.50**  
**Factory Special..... \$449.50**  
**WELDING KIT.** Two 10 ft. leads, welding helmet, electrode holder, ground clamp. **\$10.50**  
Sold only with welder at..... **\$10.50**

## Rugged, ball bearing WINCH

Sturdy ball bearing winch—super tough aluminum alloy construction. Powered by an easy starting 2 1/2 HP Briggs gas engine thru gear reduction drive—it exerts up to 3000 lbs. of terrific force for hoisting materials or pulling. Combination gear and pulley reduction results in tremendous multiplication of engine power. Idler pulley clutch arrangement and built-in drum brake (with ratchet hand lever) enables operator to ease loads down gently and lock at any point desired. Drum handles 400 ft. of 3/8" cable or 600 ft. of 1/2" cable. Ideal for contractors, farm implement trailers and unlimited other uses! (Item 795) Wt. 125 lbs. Only..... **\$149.50**  
**HAND WINCH**—Same winch with large crank handle for extra leverage and 2 speed drive. (Item 794) Wt. 60 lbs. **\$59.50**

## HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range 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. 8 lb..... **\$6.85**  
9" Pipe, Wt. 6 lb..... **\$7.85**  
10" Pipe, Wt. 1 lb..... **\$8.85**  
12" Pipe, Wt. 8 lb..... **\$9.85**  
**HEAVY DUTY FAN.** Semi-enclosed motor, suitable for spray booths, restaurant exhausts, 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**

## JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 30 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, 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; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. **\$349.50**  
Special factory price..... **\$349.50**

## 52 pc. SOCKET SET

Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome thin wall alloy absolutely the best. Contains a complete set of 28 sockets in 1/2" drive, 3/4" drive and 1" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all unexcelled, guaranteed. A beautiful set of tools that will handle any job; in a big doghouse steel box. Wt. 17 lbs. (Item 205) **\$27.95**  
List price \$69.00. Factory special.....

## Double Acting Hydraulic Cylinder

A powerful cylinder mfr'd. by Massey Harris which develops both a pushing and a pulling action. Will push 8,100 lbs. with a 1000 PSI pump pressure. Cylinder is 3 3/4" O.D. with 8 1/2" stroke—standard heavy duty clevis on both ends. Has standard 1/2" pipe thread openings. Can be used for tilting buckets or blades, raising or lowering implements, hydraulic presses, etc. Can also be used as an air cylinder. (Item 802) Wt. 17 lbs. Reg. \$68 value, Special..... **\$14.95**

## HYDRAULIC HOSE COUPLERS

Connect or disconnect hydraulic lines without loss of oil. 1/2" pipe threads. (Item 819) per set..... **\$4.95**

## 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, crankshafts, axles, link pins and bars—or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and fits to straighten any kind of curve or bend. (Item 464) Wt. 110 lb. Actual list price \$305. Our special close-out price..... **\$69.50**

**SCREW TYPE PRESS** Nine ton capacity. See Nov. Pop. Mech's ad for details—write. Complete, Wt. 150 lbs. (Item 797)..... **\$49.50**

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### SPECIFICATIONS

**Swing**—13 $\frac{1}{8}$ " over bed and saddle wings, 8" over cross slide.

**Distances Between Centers**—28", 40", 52" maximum.

**Collet Capacity**—1" maximum (Collets interchangeable with South Bend 10"-1" Collet, 14 $\frac{1}{2}$ ", 16" and 16-24" lathes).

**Spindle Speeds**—Six to Sixteen 40 to 940 r.p.m. or 20 to 940 r.p.m. approximately.

**Power Longitudinal Feeds**—48 R.H. or L.H., .0015" to .0841".

**Power Cross-Feeds**—48, .0006" to .0315".

**Thread Cutting**—48 R.H. or L.H. pitches, 4 to 224 per inch.






### HARDENED BED WAYS

Hardened and precision ground bed ways can be supplied in lieu of regular at small extra cost—also hardened and ground cross-feed screw.



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The spring-type  
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