

WHAT OWNERS SAY OF THE THUNDERBIRD

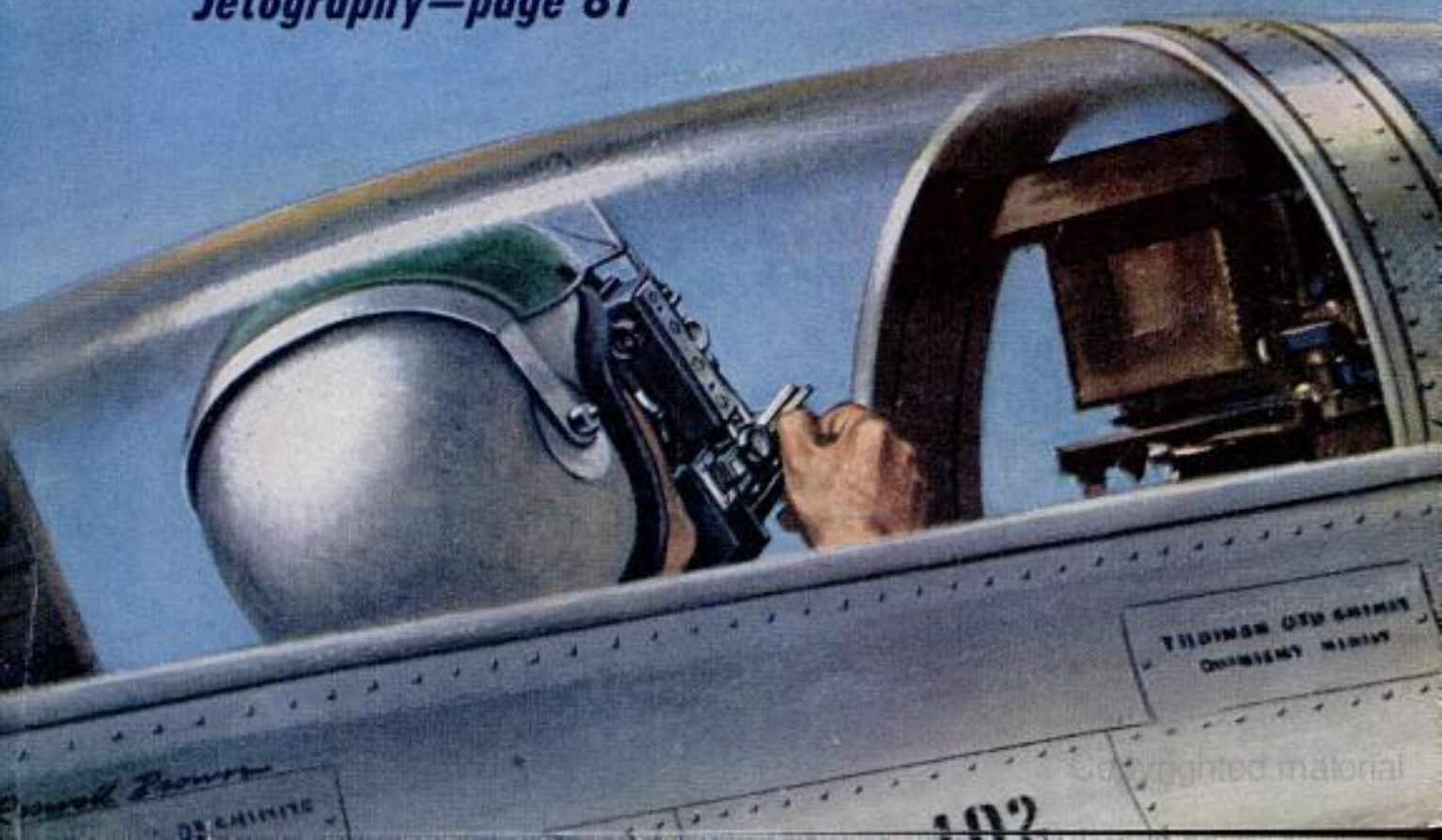
POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

DECEMBER 1955

35 CENTS

*New Profession in the Sky—
Jetography—page 81*



THUNDERBOLT CHINIC
CHINIC THUNDER

102

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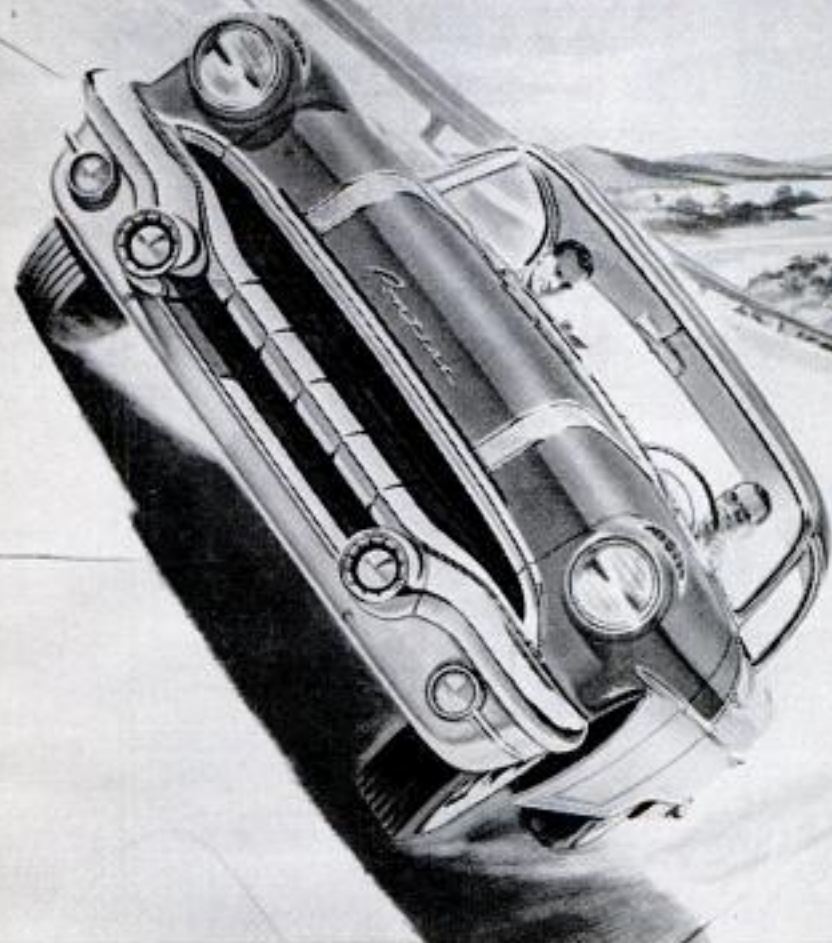


After adhesive becomes tacky, snap the tiles into place. Do not slide tiles or adhesive will push up between the tiles.



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General Motors' new Strato-Flight Hydra-Matic that gentles this mighty "go" to smoothness beyond belief.*

You don't need a test track to prove that here is the lift of a lifetime.

Traffic tells you. Here's "stop-and-go" response as fast as thought itself. A hill helps. High or low, it's left behind without a sign of effort. And passing definitely pins it down.

Gun it and instant, flashing power sweeps you swiftly by the loitering car ahead. No drag, no lag—just safe and certain "go"!

There's plenty more to charm you. The safety of big new brakes, a steady ride, advanced controls. Glamorous new beauty.

But, above all, it's that fabulous new "go" that gets you!

Drive a Pontiac today for a glorious double thrill. There'll be pride in your heart, a torrent at your toe-tip. What more could anyone want?

**An extra cost option*

PONTIAC MOTOR DIVISION OF GENERAL MOTORS CORPORATION

DECEMBER 1955

'56 PONTIAC

This One



Y10U-RHU-477C

If you drive one of these cars . . . BUICK, CADILLAC, CHEVROLET, CHRYSLER, DODGE, FORD, HUDSON, MERCURY, NASH, OLDSMOBILE, PLYMOUTH, PONTIAC, STUDEBAKER, here's a sure-fire way to get all the horsepower and performance you paid for!

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FOR THE SECOND STRAIGHT YEAR OUR OFFICIAL RECORDS SHOW THAT EVERY SINGLE CAR PARTICIPATING IN THE ANNUAL SOUTHERN 500 STOCK CAR RACE SANCTIONED BY NASCAR WAS EQUIPPED WITH CHAMPION SPARK PLUGS PURCHASED AT THE TRACK. LAST YEAR THE ENTIRE FIELD OF 52 RAN ON CHAMPIONS. THIS YEAR 69 OUT OF 69 USED CHAMPIONS WITH 13 DIFFERENT MAKES OF CARS COMPETING. THE FIELD WAS MADE UP OF FORD, CHEVROLET, MERCURY, PONTIAC, OLDSMOBILE, BUICK, CADILLAC, PLYMOUTH, DODGE, CHRYSLER, NASH, STUDEBAKER AND HUDSON. THIS IS ABOUT AS FINE PROOF AS YOU WOULD WANT THAT YOUR SLOGAN "BETTER BY FAR FOR EVERY CAR" IS 100 PER CENT RIGHT.

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Any car is better with 5-rib Champion Spark Plugs!

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

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



Next Month

ONE OF OUR most valuable natural resources, oddly enough, is the wide blue yonder—the “empty” space above our heads. For a generation, prophets have been sounding solemn warnings that someday we’ll run out of airspace. Now it has happened. Skyway traffic jams are occurring above metropolitan areas. So far the airways themselves have not become too crowded. But soupy weather can turn a terminal point into a nightmare of stacked-up planes, while down on the ground still other planes are waiting to take off. Unlike some of our other natural resources, we can’t “grow” more airspace. What’s to be done about this critical problem? The CAA is coming up with some remarkable instruments to find unique solutions. The men above are working with a new type of radar display which tabs and tracks every aircraft above a busy city. Some possible solutions are described in a feature next month, “We’re Running out of Airspace”

Information not listed on articles in the index, starting on page 74, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by writing to the Bureau of Information, Popular Mechanics, 200 E. Ontario, Chicago 11, Ill.

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For the Craftsman . . .

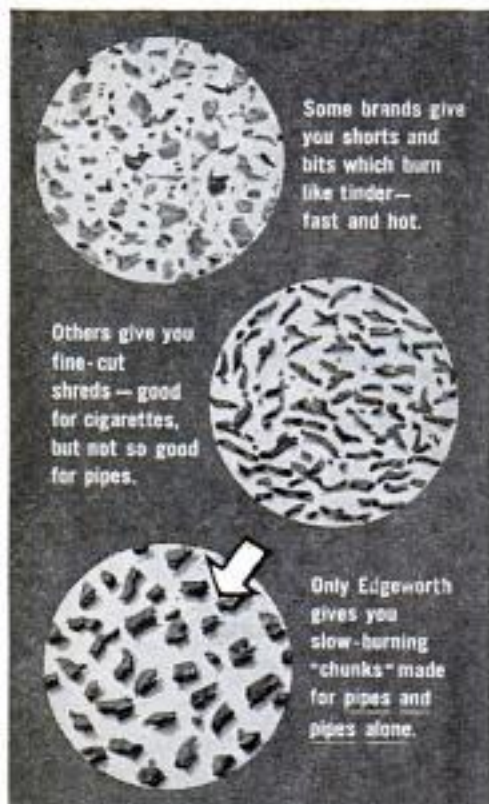
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for other items and manufacturers of available products

"Old Timer" Shows Young Pipe Smoker Reason EDGEWORTH SMOKES COOLEST

Compare the Cuts of Pipe Tobacco



AT YOUR DEALER'S



Shows Meaning of "Ready-Rubbed"

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Your true tobacco expert will tell you that white burleys are the world's coolest smoking tobaccos. Edgeworth is a blend of white burleys only—aged for years. It leaves our plant with just the right moisture content for a cool, no-

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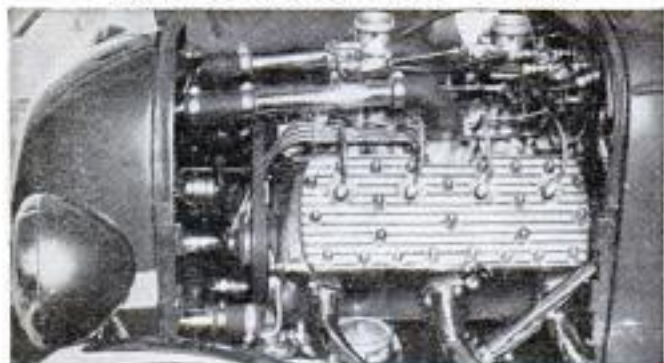
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PLACES
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U. S. AIR FORCE**



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**ACROSS THE
DESK**



Now We Speak German, Too

Another foreign-language edition has joined the *Popular Mechanics* family. Printed in German for distribution in West Germany, Austria and Switzerland, the first issue of *Populare Mechanik* is meeting enthusiastic reception with its initial printing of 130,000 copies.

For many years *Popular Mechanics* has



had worldwide readership with subscribers on every continent. In 1946 a French edition, *Mecanique Populaire*, started our foreign-language family, circulating through much of continental Europe and French Canada. The Spanish edition followed a year later. A Danish edition began publication at Copenhagen in 1949 and in 1950 a Swedish edition was launched. Now it's *Popular Mechanics* in Germany.

All foreign editions are essentially translations of the original American magazine. Each has made a successful niche for itself in the country of its particular language, and *Populare Mechanik* is expected to find great popularity in German-speaking Europe. The economy of West

(Continued to page 8)

This **FREE SAMPLE LESSON** will prove you can become an expert **BOOKKEEPER... ACCOUNTANT** OR **C.P.A.**



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Accountant's
success could
be yours.

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By the LaSalle Problem Method..

• Practical Accounting

Assignment 1

THE BALANCE SHEET



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"The accounting profession is probably the best paid in the world. It does not require a high degree of intelligence or special training. It is not known to be."

"There is need for accountants. There is ample opportunity for advancement. There is no prospect that the supply will overtake the demand, with the result of even the payment of it."

LaSalle Extension University
A Correspondence Institution
CHICAGO

THIS SAME LESSON HAS STARTED HUNDREDS OF THOUSANDS toward well-paid accounting careers—in business, government, and as C.P.A.'s. Even without previous knowledge, progress is rapid—earning power climbs fast. This sample lesson shows why.

IF you have been envying the high incomes and good jobs enjoyed by thousands of men and women Accountants today . . . incomes ranging from \$4,000 to \$10,000 and more per year . . . why not launch such a career for yourself?

Do you doubt that you can?

Then let us send you—without cost or obligation—the same Lesson Number One with which LaSalle has started several hundred thousand

men and women toward successful accounting careers. We want you to see for yourself how this remarkable method, originated by LaSalle, makes Accountancy simple, interesting, practical, and certain . . . how it leads you step-by-step to a complete mastery of Accounting—and on up to the coveted degree of Certified Public Accountant if you so aspire.

It doesn't matter whether you've had previous bookkeeping experience, or whether you don't know a debit from a credit. Whether you wish to qualify as an expert bookkeeper, advanced accountant, cost accountant, auditor, government accountant, income tax specialist, or public accountant . . . you'll find in LaSalle's Problem Method the exact plan to prepare you rapidly and inexpensively—in spare hours at home—without losing a day from your present job.

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been trained by the
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(Continued from page 6)

Germany is booming and its people are actively improving their standard of living after the lean war years. They are interested in the scientific achievements reported in *Popular Mechanics* and in learning new ways to improve their homes and perform their shop work.

Populare Mechanik is printed at Strasbourg and distributed from Offenburg, Germany.

To the Editor:

I was surprised to see my plaster-cast cutter shown on page 154 of the September number, and more surprised to learn that it was developed in Europe. As you can see from the enclosed patent No. 1,967,888, I invented this device in 1934. The General Electric X-Ray Corporation built and sold these cast cutters for many years. The patent has now expired and evidently some manufacturer in Europe has started making them.

W. K. Kearsley,
611 S. Grandview St.,
Mount Dora, Fla.

EDITOR'S NOTE: Mr. Kearsley, one of General Electric Company's most famous inventors, was the subject of a feature article in our January 1952 issue entitled "The Tinker With Million-Dollar Ideas."

Now in his early 70s, he is living in retirement at Mount Dora.

To the Editor:

Last year I designed the "House You Asked For" which you featured in the October 1955 issue. I thought you might like to know that since the magazine came out we have received exactly 6569 letters about the house. We have sold several hundred sets of plans from coast to coast



and even in foreign countries. Inquiries are still coming in and we expect the number to exceed 7000 before the end of the year. This certainly speaks volumes for the pulling power of your excellent magazine in the housing field.

Rudolph A. Matern,
90-04 161st St.,
Jamaica 32, N. Y.

(Continued to page 10)

A great gift... a smart buy too!

... the new 1956

HARLEY-DAVIDSON

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Want the complete story? See your nearest Harley-Davidson dealer or write for free literature. HARLEY-DAVIDSON MOTOR Co., Dept. PM, Milwaukee 1, Wisconsin.

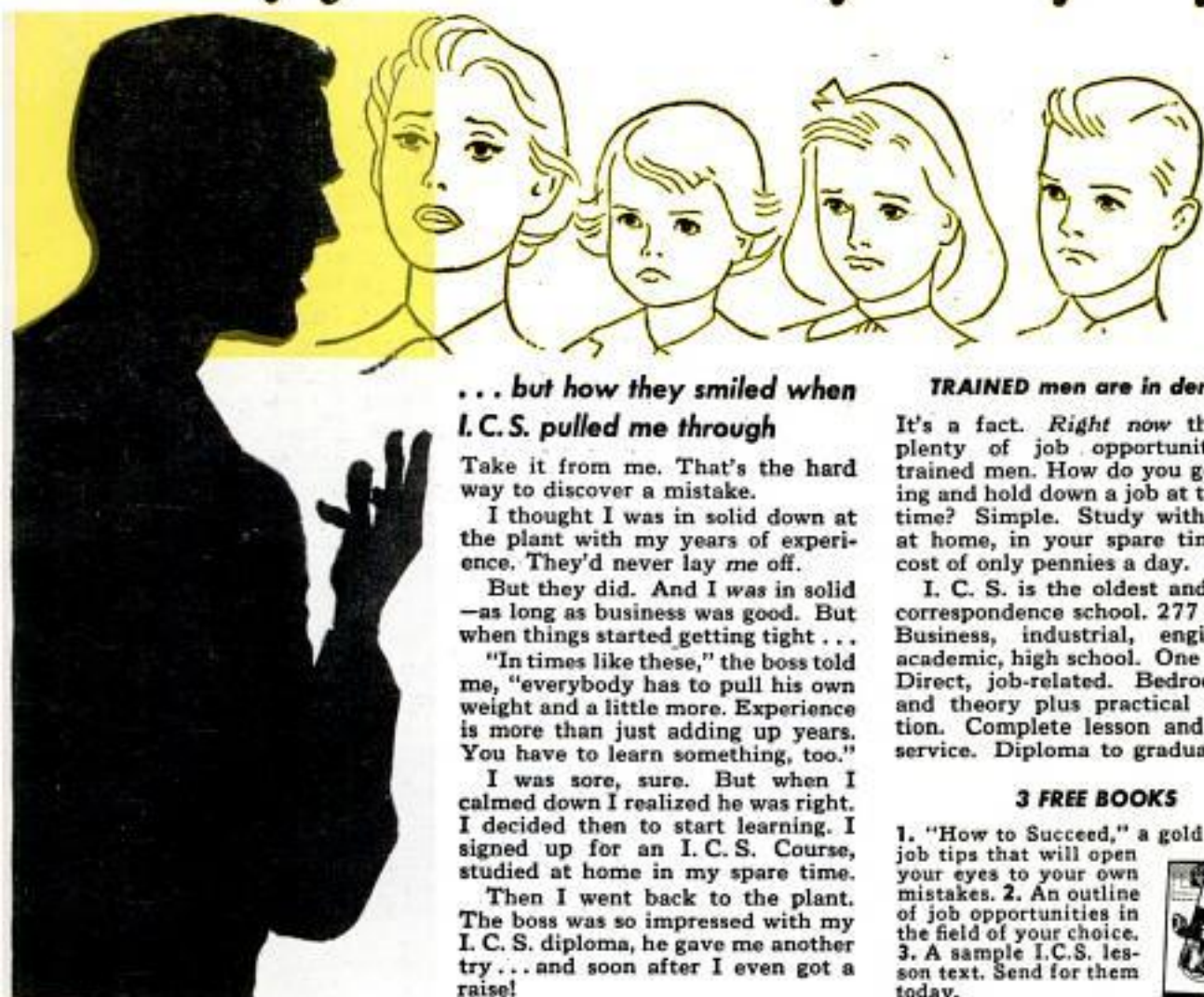
As little as \$17.00 per mo.... up to 100 miles per gal.

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I saw my job failure in my family's eyes



... but how they smiled when I. C. S. pulled me through

Take it from me. That's the hard way to discover a mistake.

I thought I was in solid down at the plant with my years of experience. They'd never lay me off.

But they did. And I was in solid—as long as business was good. But when things started getting tight...

"In times like these," the boss told me, "everybody has to pull his own weight and a little more. Experience is more than just adding up years. You have to learn something, too."

I was sore, sure. But when I calmed down I realized he was right. I decided then to start learning. I signed up for an I. C. S. Course, studied at home in my spare time.

Then I went back to the plant. The boss was so impressed with my I. C. S. diploma, he gave me another try... and soon after I even got a raise!

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Lab. Technician <input type="checkbox"/> General Chemistry <input type="checkbox"/> Natural Gas Prod. & Trans. <input type="checkbox"/> Petroleum Engineering <input type="checkbox"/> Plastics <input type="checkbox"/> Pulp and Paper Making | <p>CIVIL, STRUCTURAL ENGINEERING</p> <ul style="list-style-type: none"> <input type="checkbox"/> Civil Engineering <input type="checkbox"/> Construction Engineering <input type="checkbox"/> Highway Engineering <input type="checkbox"/> Reading Struct. Blueprints <input type="checkbox"/> Sanitary Engineering <input type="checkbox"/> Structural Engineering <input type="checkbox"/> Surveying and Mapping <p>DRAFTING</p> <ul style="list-style-type: none"> <input type="checkbox"/> Aircraft Drafting <input type="checkbox"/> Architectural Drafting <input type="checkbox"/> Electrical Drafting <input type="checkbox"/> Mechanical Drafting <input type="checkbox"/> Mine Surveying and Mapping <input type="checkbox"/> Plumbing Drawing and Estimating <input type="checkbox"/> Structural Drafting <p>ELECTRICAL</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electrical Engineering <input type="checkbox"/> Electrical Maintenance <input type="checkbox"/> Electricians <input type="checkbox"/> Contracting <input type="checkbox"/> Lineman <p>HIGH SCHOOL</p> <ul style="list-style-type: none"> <input type="checkbox"/> Commercial <input type="checkbox"/> Good English <input type="checkbox"/> High School Subjects <input type="checkbox"/> Mathematics | <p>LEADERSHIP</p> <ul style="list-style-type: none"> <input type="checkbox"/> Foremanship <input type="checkbox"/> Industrial Supervision <input type="checkbox"/> Leadership and Organization <input type="checkbox"/> Personnel-Labor Relations <p>MECHANICAL AND SHOP</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gas—Electric Welding <input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy <input type="checkbox"/> Industrial Engineering <input type="checkbox"/> Industrial Instrumentation <input type="checkbox"/> Industrial Supervision <input type="checkbox"/> Internal Combustion Engines <input type="checkbox"/> Machine Design-Drafting <input type="checkbox"/> Machine Shop Inspection <input type="checkbox"/> Machine Shop Practice <input type="checkbox"/> Mechanical Engineering <input type="checkbox"/> Quality Control <input type="checkbox"/> Reading Shop Blueprints <input type="checkbox"/> Refrigeration <input type="checkbox"/> Sheet Metal Worker <input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking <p>RADIO, TELEVISION</p> <ul style="list-style-type: none"> <input type="checkbox"/> Industrial Electronics <input type="checkbox"/> Practical Radio TV Eng'ing <input type="checkbox"/> Radio and TV Servicing <input type="checkbox"/> Radio Operating | <ul style="list-style-type: none"> <input type="checkbox"/> Television Technician <p>RAILROAD</p> <ul style="list-style-type: none"> <input type="checkbox"/> Air Brakes <input type="checkbox"/> Car Inspector <input type="checkbox"/> Diesel Locomotive <input type="checkbox"/> Locomotive Engineer <input type="checkbox"/> Section Foreman <p>STEAM AND DIESEL POWER</p> <ul style="list-style-type: none"> <input type="checkbox"/> Combustion Engineering <input type="checkbox"/> Diesel—Elec. <input type="checkbox"/> Diesel Eng's <input type="checkbox"/> Electric Light and Power <input type="checkbox"/> Stationary Fireman <input type="checkbox"/> Stationary Steam Engineering <p>TEXTILE</p> <ul style="list-style-type: none"> <input type="checkbox"/> Carding and Spinning <input type="checkbox"/> Cotton, Rayon, Woolen Mfg. <input type="checkbox"/> Finishing and Dyeing <input type="checkbox"/> Loom Fix'g <input type="checkbox"/> Textile Des'ing <input type="checkbox"/> Textile Eng'g <input type="checkbox"/> Throwing <input type="checkbox"/> Warping and Weaving <p>MISCELLANEOUS</p> <ul style="list-style-type: none"> <input type="checkbox"/> Domestic Refrigeration <input type="checkbox"/> Marine Engineering <input type="checkbox"/> Ocean Navigation <input type="checkbox"/> Professional Engineering <input type="checkbox"/> Short Story Writing <input type="checkbox"/> Telephony |
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(Continued from page 8)

To the Editor:

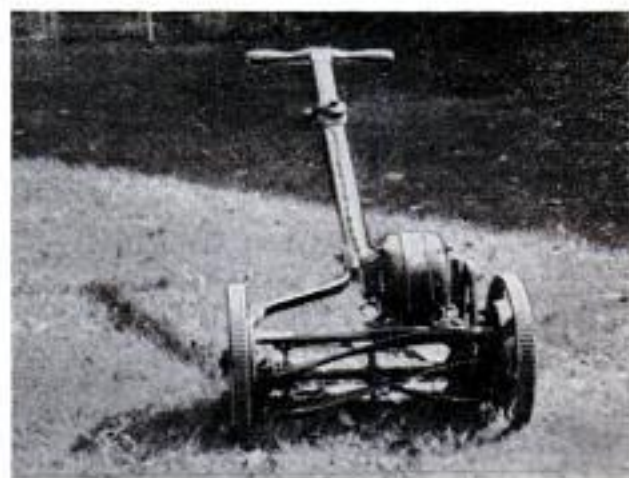
I read with great interest your article on electric heating in the October issue of *Popular Mechanics Magazine*. I think you did a splendid job of covering the situation.

You might be interested to know that in Cowlitz County of which Longview, Wash., is the principal city and only 45 miles northwest of Vancouver, over 80 percent of our new homes are installing electric heat while about 500 homeowners annually are converting from solid fuels to electric heat. In our service area, we have approximately 18,000 residential customers of which nearly 4000 are using electric heat.

Lacy M. Peoples,
Commercial Manager,
Public Utility District No. 1,
Cowlitz County, Wash.

To the Editor:

In the August 1955 issue there is a description of a lawn mower that has been converted to electric power. The enclosed picture is of my mower which I converted



to electric power 30 years ago and which has been in use continuously ever since.

E. L. Dreher,
Claremont, Calif.

To the Editor:

Your article about the bus train (PM, Sept. 1955) I'll say is phenomenal, and I am not a railroader.

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"Fix sets part time in my shop. Made about \$500 first three months of the year. Could have more but this is about all I can handle."—Frank Borer, Lorain, Ohio.

"I've come a long way in Radio and Television since graduating. Have my own business on Main Street."—Joe Travers, Asbury Park, New Jersey.

"I didn't know a thing about Radio. Now have a good job as Studio Engineer at KMMJ."—Bill Delsell, Central City, Nebraska.



BROADCASTING: Chief Technician, Chief Operator, Power Monitor, Recording Operator, Remote Control Operator. **SERVICING:** Home and Auto Radios, Television Receivers, FM Radios, P.A. Systems. **IN RADIO PLANTS:** Design Assistant, Technician, Tester, Serviceman, Service Manager. **SHIP AND HARBOR RADIO:** Chief Operator, Radio-Telephone Operator. **GOVERNMENT RADIO:** Operator in Army, Navy, Marine Corps, Forestry Service Dispatcher, Airways Radio Operator. **AVIATION RADIO:** Transmitter Technician, Receiver Technician, Airport Transmitter Operator. **TELEVISION:** Pick-up Operator, Television Technician, Remote Control Operator.

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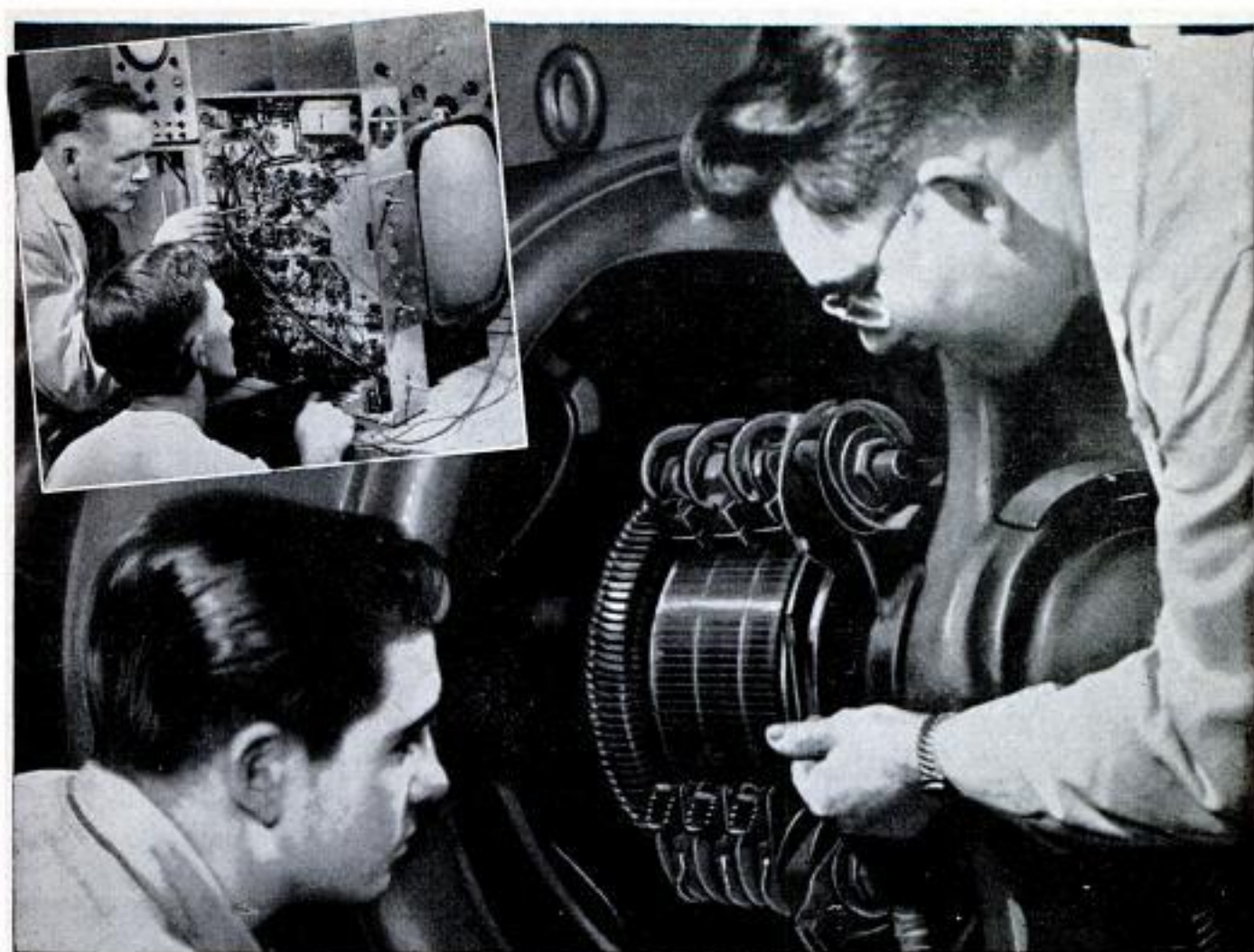
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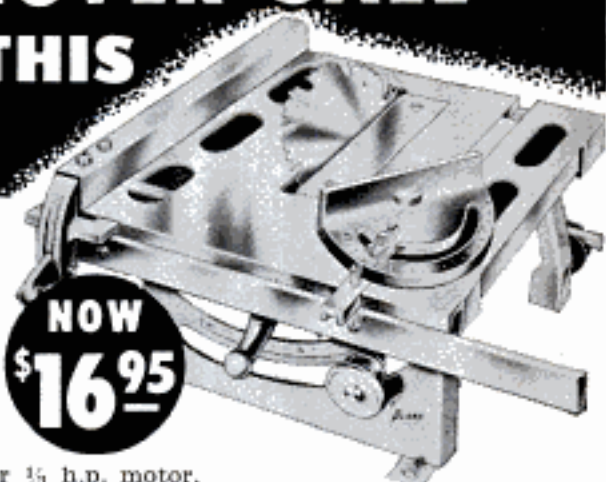
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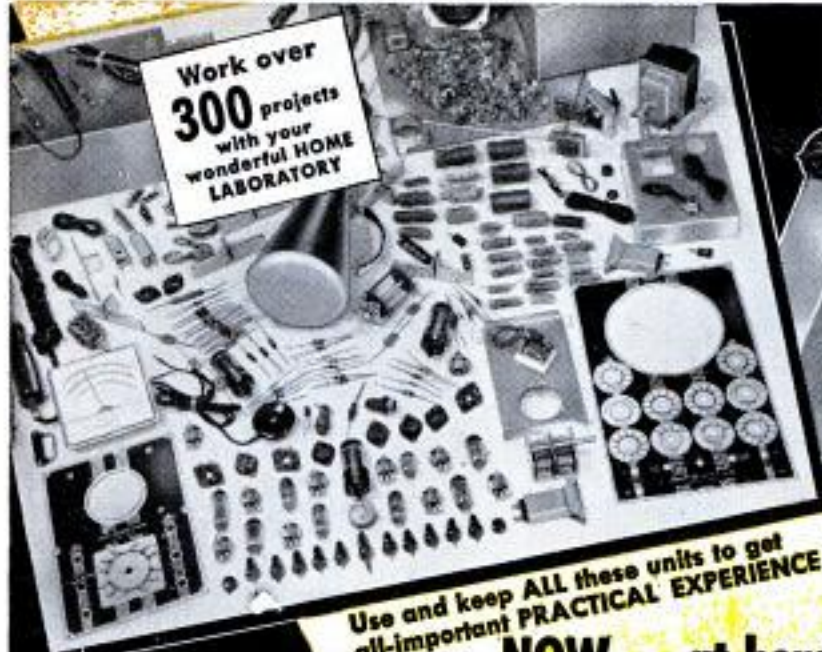


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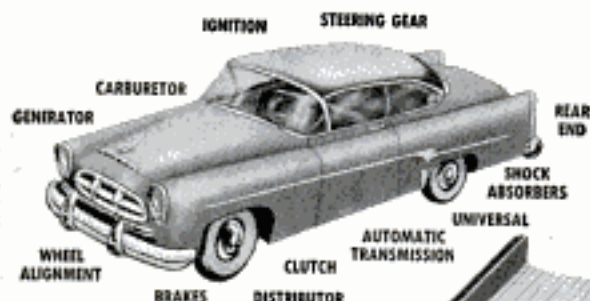
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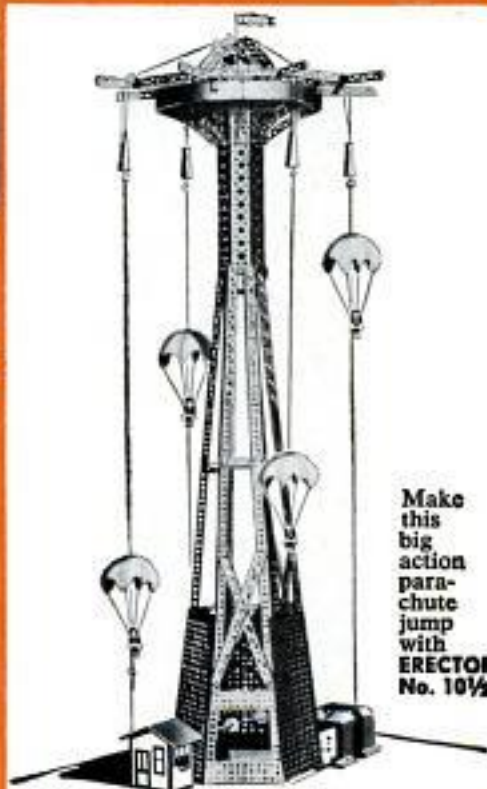
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3000-20	68.02	3100-20	70.02
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4800-20	113.02	4900-20	115.02
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5200-20	123.02	5300-20	125.02
5400-20	128.02	5500-20	130.02
5600-20	133.02	5700-20	135.02
5800-20	138.02	5900-20	140.02
6000-20	143.02	6100-20	145.02
6200-20	148.02	6300-20	150.02
6400-20	153.02	6500-20	155.02
6600-20	158.02	6700-20	160.02
6800-20	163.02	6900-20	165.02
7000-20	168.02	7100-20	170.02
7200-20	173.02	7300-20	175.02
7400-20	178.02	7500-20	180.02
7600-20	183.02	7700-20	185.02
7800-20	188.02	7900-20	190.02
8000-20	193.02	8100-20	195.02
8200-20	198.02	8300-20	200.02
8400-20	203.02	8500-20	205.02
8600-20	208.02	8700-20	210.02
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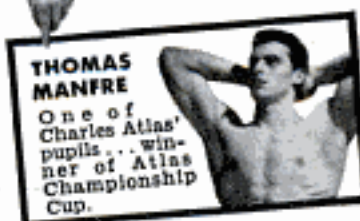
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NEW Idea. Use your vacuum cleaner to make extra money. Customers everywhere. No cleaning. Full details \$1.00. R. Petersen, Box 78-E, Alpine, Calif.

USED And new watches \$2 up. Free list. Southern Watches, Gray, Georgia.

\$1,000 MONTHLY. Home, mailorder, free advertising method. Revealing information. Seidel, 6000-AL Sunset, Los Angeles 28.

UNPAINTED Novelties, shelves, doll furniture, etc. Henry Kiewiet, Kalamazoo 84, Michigan.

HUGE Profits bronzing and pearlcoating baby shoes. Free instructions. Box 521, Waterloo, Iowa.

A Monthly repeat business which you can operate in your own community. For free details write Grasak, Dept. A-101, P.O. Box 494, McKeesport, Penna.

HURRY—Don't miss this chance, over 1000 ideas to make money. Free circular. Hooser Vendors, PM, 3117 Broadway, Indianapolis, Ind.

OPERATE Shopping center from your living room. Get investigated list of 30 lowest priced name brand wholesale catalogs in the world for \$2.00. B. Ruman Investigating Co., 573 Sheridan, Niles, Ohio.

200 NAMES. Addresses newly engaged girls—\$1.00, 1,000, \$3.00. Sotter, Box 422, Huntington Park, Calif.

HOW You too can succeed in the mail order business. Free details. Albert D'Agostino, 144-17-A 29th Rd., Flushing 54, N. Y.

HOW And where to obtain money. Many ways to use your time to make big money. How I started with \$38 and built assets over half million dollars. Complete information postpaid \$2.00. Money-back guarantee. Particulars free. Business Consultants, 5853 N.E. 2nd Avenue, Dept. "C," Miami 37, Florida.

OPERATE "Escalator" mailorder system, selling our products or any products. Most revolutionary mailorder system known. Postcard: Selbyco, Decatur 163, Illinois.

\$500 MONTHLY For life! Your own mail-telephone collection service for businessmen, doctors. Easy, profitable everywhere! Write: Financial, B-740-P12, Chicago 90.

SELL "Political greeting cards." Republicans and Democrats buy like wildfire. Wonderful mailorder item. 25c brings samples and wholesale prices. Neil H. Tasker, 105 East Custis, Alexandria, Virginia.

INCORPORATE Your business in Delaware. Do business anywhere. Quickest. Cheapest. Write Faulstich, 684 N. Sangamon St., Chicago 22.

NOW You can own a business. How? Find out by rushing a postcard to Paul Ribnikkar, 203 Ribnikkar Bldg., Kramer-Boron, Calif.

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\$46 FROM Square foot plywood; jigsaw necessary. Details free. Woodart, Bridgewater, Mass.

MAKE Extra money between now and Christmas. Sell subscriptions to all popular magazines. Liberal commissions. For supplies write DeSales Magazine Service, 60 East 42nd St., New York 17, N. Y.

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BECOME A game warden, professional hunter! Join forestry, park, fishery services. Good pay! Opportunities open! Free revealing "Select-Job Chart," details, job-getting secrets. Write Home Study Institute 1036-RDR, Los Angeles 19, California.

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FLORIDA Opportunities! Hundreds of jobs, businesses, farms, groves, homes. Free details! Florida Opportunity Journal, Vero Beach 14, Florida.

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EARN Big money. Manufacture better mousetrap. Disposability assures recorders. \$1.00 brings complete plans. Dispos-O-Mouser, Box 2693, Dept. PM125, Sacramento, California.

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.

EXPORT. Career. Profitable hobby. Wade, 8/119 Hamilton Terrace, London N.W. 8, England.

START Your own moneymaking mail order business! Write—R. Pickett, Mt. Airy, Maryland.

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HOME Money making opportunity. Quentin Trent Publishing Company, 10216 Kercheval, Detroit 14, Michigan.

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.

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\$9.00 RETURNS \$160.00. Repeats. 25c coin for sample. Ezee, Bayport 7, Mich.

CLOSEOUT 50,000 GE subzero automobile engine heaters. Listed \$8.95, sample \$3.95. Terrific quantity discounts. Illustrated literature and mailorder plans \$1.00 (refundable first order). Wisnieski, Milwaukee 7, Wisconsin.

\$200 WEEKLY Cleaning Venetian blinds. Free book. Burt, 2434A, Wichita 13, Kans.

SELL Helbros watches-jewelry. 70% discount. Wholesale catalog 25c. Dorinda, Box 77, Huntington Station, New York City.

MAKE Spare time money preparing and mailing sales literature. Adams Surveys, 3513-AT Sunset Blvd., Los Angeles 26, Calif.

SCHEMER Magazine. Canfield 1, Ohio. Mailorder and business plans. Year \$2.00, sample 25c.

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, Miami 16, Florida.

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SPARETIME Profits taking subscriptions all magazines. Wholesale catalog free. Cassell Publishers, Westfield, New Jersey.

GENERAL Contest Bulletin. Issued monthly. Sample, 25c. 1609 1/2 East 5th, Duluth, Minn.

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1956 IMPORT-Export directory, \$1.00. Comstock, 1702 Roberson, Springfield, Missouri.

SAVE Buying nationally advertised merchandise. Catalog 50c. D'Auria, Box 355-PM, Jackson, Michigan.

MAKE \$5 Per hour and up net after taxes. Donald Wicks made \$43.00 in a few hours. You can too! Write for free book and sample of products. Theodore Wilson Products Co., P.O. Box 922, Dept. 14, Seattle, Wash.

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PLEXIGLAS, Lucite. Square foot cost 1/16", \$1.15; 1/8", \$1.52; 3/16", \$1.86; 1/4", \$2.21; 3/8", \$3.28; 1/2", \$4.36. Colors add 10%. Send 15% for postage. Aristocrat Plastics, 23-25 Sussex Avenue, Newark, N. J.

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CHEMICALS, Supplies. Catalog 25c. Laboratory Sales, Box 161-A, Brighton, Massachusetts.

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

BOOKLETS; 60 pages each! "Beginners Chemistry," "Chemistry," "Einstein's Relativity," "Physics," "Atomic Theory," "Electron Theory," "Scientific Oddities," "Light," "Sound," "Heat," "Electricity," "Radio," "Astronomy," "Useful Tables," "Geometry," "Mathematical Oddities," "Scientific Terms." (Order by titles.) 10c each. Franks, 3121 South Racine, Chicago 8.

CHEMISTRY For beginners, all ages, everywhere. Fascinating, systematic. First lesson 25c. Plastics information, formulas, trade secrets. Parkway Laboratory, McKees Rocks, Penna.

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MAKE Extra money. Sell front door name plates to friends, neighbors. Retail \$1.98; you make \$1.00! Free selling kit. Modern Engraving Co., P.O. Box 194, Boston 14, Mass.

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

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GO Into business for yourself. Sell nationally popular name brand items of jewelry, watches, appliances, housewares, toys, gifts, premiums, prizes. No inventory, no investment. Send for free big new catalog now. Halen, Inc., 125 Fifth Ave., Dept. P.M., New York City, N. Y.

BIGGEST Distributor profits! Hire agents, salesmen! Amazing new wonder car polish with magic Dow Corning silicones. Steady, repeat seller. Rush name for free details, no-risk sample offer. United, 1035 East 10th Street, Brooklyn 30, N. Y.

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BIG Money in valentines! Easy to earn with 4 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. 699-G, St. Louis 1, Mo.

MAKE \$5 Per hour and up net after taxes. Donald Wicks made \$48.00 in a few hours. You can too! Write for free book and sample of product. Theodore Wilson Products Co., P.O. Box 922, Dept. 13, Seattle, Wash.

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USED And new watches \$2 up. Free list. Southern Watches, Gray, Georgia.

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

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NEW Way to make money! Sell nothing. Don't even step out of your home unless you want to! Let others do the work. Experience unnecessary. We show you how. No money for stock. We ship your orders, paid or c.o.d. Catalogue, money-making plans, etc., free. Write Topval Corp., Lindenhurst 41, N. Y.

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

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THOUSANDS Nationally advertised brand name products. Discounts to 80%. Meder, 550-PM Fifth Avenue, New York City 36.

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POGO Sticks. Will carry 150 lbs. guaranteed! \$4.50 postpaid. U. S. Industries, 603-A Macy Street, Los Angeles 12, Calif.

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CLOSEOUT, Imitation diamond rings, wholesale priced at \$3.00 dozen. Money back guarantee. Brockman, 1440 Meridene Dr., Baltimore 12, Maryland.

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THOUSANDS Articles wholesale! Catalog \$1.00 refundable. Evanich, Stamford (Catskill), N. Y.

FREE Lists. 640,000 items wholesale. P. Cottage Industries, Omaha 12, Nebr.

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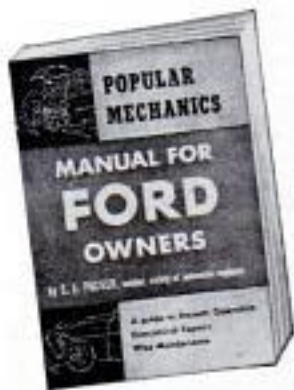
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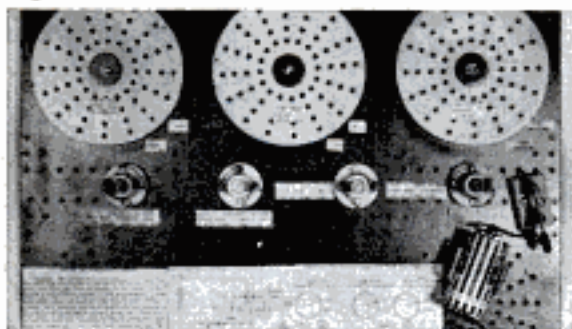
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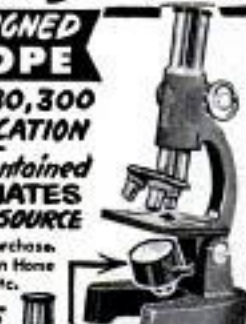
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Radiation Detector Buzzes Alarm To Warn of Danger

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Convair's supersonic all-weather interceptor, the F-102A, has the new "wasp-waist" design and redesigned canopy

AT 40,000 feet and near the speed of sound, you're gulping oxygen, struggling against a Herculean G-force that slams you into the seat, as heavy-armed and sweating you try to focus your camera—a camera which weighed a mere 10 pounds groundside, but now weighs 30.

There, off to starboard and headed straight at you on collision course, hurtles a jet fighter. You've planned it this way, of course—briefed and plotted every move and turn. But things can go wrong. Sweat trickles down your back. Your legs are rubbery, but somehow, fighting that strangling G-force, you work out of your seat.

You've got but a split-second in which to aim your camera, focus and fire.

Now! You trigger the shutter, then brace as your pilot wings under and up to avoid a mid-air collision. After that comes the prayer—that you got that head-on photo the engineers need for wing evaluation, or perhaps to enliven a magazine's cover.

You're a "jetographer," a practitioner of the sonic age's most nerve-shattering brand of photography.

"You never really get used to it," says Roy Wolford, for fifteen years Northrop Aircraft's chief photographer and one of the nation's few "old hand" jetographers. "Old hands" are rare because jetography

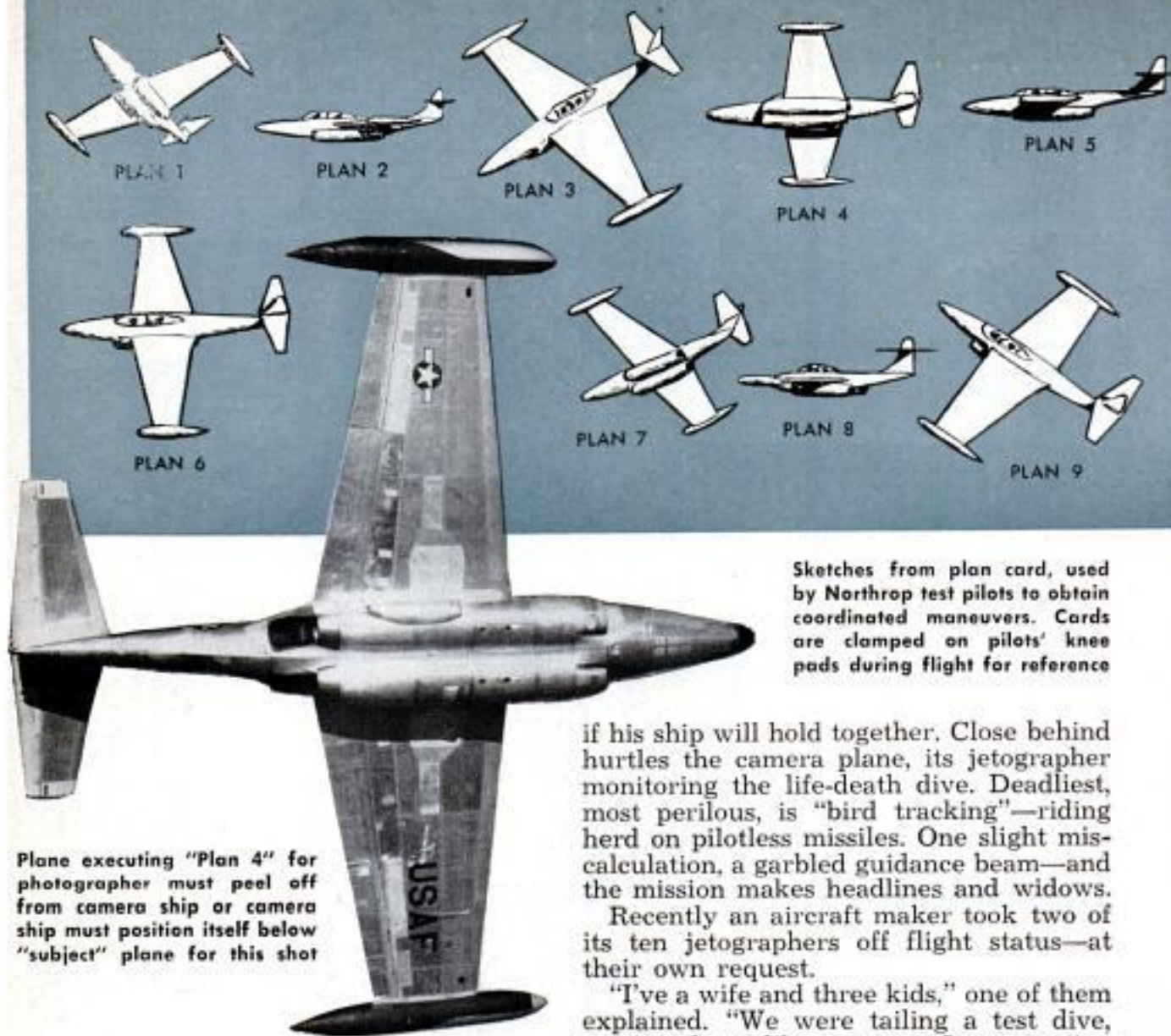
There's no time for thrills when you're shooting jets at f.11, at the speed of sound. Meet the men of a brand-new profession—

JETOGRAPHY

By James Joseph

Jetographers, like Northrop's Val Hawes, can shoot only above and 45 degrees ahead and behind from jet





Plane executing "Plan 4" for photographer must peel off from camera ship or camera ship must position itself below "subject" plane for this shot

Sketches from plan card, used by Northrop test pilots to obtain coordinated maneuvers. Cards are clamped on pilots' knee pads during flight for reference

is a newborn art of the sonic era. Nationwide there are probably 100 qualified jetographers. Most of them shoot for such major plane builders as North American, Boeing, Douglas, Northrop and Lockheed.

Jetographers are a special breed with a special mission. Their job: to photograph at perilously close range and at screeching speeds the test flights of every jet craft and missile. Occasionally a jetographer works on assignment from public relations, snaps a magazine cover. More routinely he's attached to his company's flight-test and engineering staff.

What of a missile screaming airborne from its test launcher? Tracking alongside is a camera plane, its jetographer filming the launching sequence, his lens focused on the "bird's" fins and control tabs. What's the pattern of fuel jettisoned from a fighter's wing tanks? To find out, engineers assign a cameraman to monitor the drop—to work within 50 feet of the subject plane, both jets throttling just under the speed of sound. More nerve-jangling are "structural integrity" flights—where a test pilot full-throttles from 45,000 feet to find out

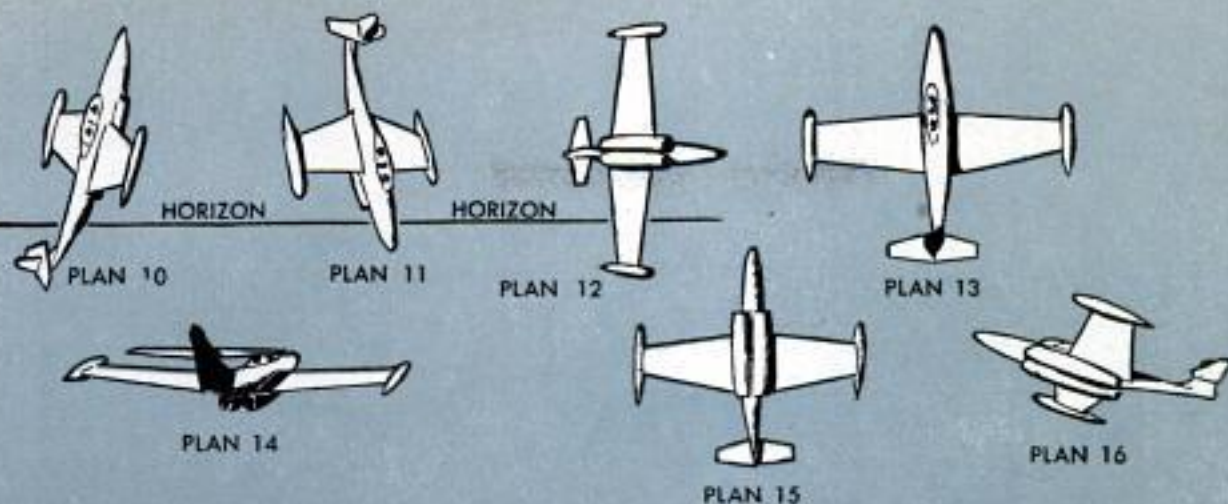
if his ship will hold together. Close behind hurtles the camera plane, its jetographer monitoring the life-death dive. Deadliest, most perilous, is "bird tracking"—riding herd on pilotless missiles. One slight miscalculation, a garbled guidance beam—and the mission makes headlines and widows.

Recently an aircraft maker took two of its ten jetographers off flight status—at their own request.

"I've a wife and three kids," one of them explained. "We were tailing a test dive, coming down like a comet. I was getting the thing on film. The test jet pulled out fine. My ship didn't. Something jammed

Propeller-driven planes are seldom used nowadays, but here Northrop's Sam Orr shoots from A-26 dome





... or maybe it was the G-force that did it. Ground wasn't 1000 feet below as we wrenched free from that jet stream and leveled. That's when I checked in my pressure suit and Fairchild K-20."

As for Northrop's Roy Wolford, he voices no objection when a staffer asks for safer, saner duty. "If a man's had enough, that's OK... and no questions asked." Then he grows emphatic. "We're not glamour boys or daredevils. We think of ourselves as technicians—as essential researchers in the development and advancement of modern aircraft."

Wolford himself came close to being the nation's first jetographer casualty. It happened on Oct. 21, 1947.

Roy was aloft, crouching in the forward gunner's seat of a prop-powered Black Widow F-61. Up front sat the pilot. Ahead of them—and just letting down for a landing at California's Muroc Air Force Base—

churned the YB-49, Northrop's 8-jet flying wing. Roy and his pilot had tracked out of Hawthorne, Calif., filming that YB-49 flight. Like any first flight—especially a jet's—it was tricky. Anything could happen.

Suddenly a voice cut through the radio's static.

"Your right engine's afire!"

The warning came from an F-80, one of the mission's half dozen escorts. Roy looked starboard, saw the pall of smoke billowing from the F-61's twin-boom tail. The booms were already aflame, the fabric sloughing off, the rudder nearly burned through. A fuel line had ruptured, pouring lethal stuff into the red-hot outlet of the starboard engine's supercharger.

Roy shoved \$3000 worth of cameras off his lap (he'd been shooting movies for a newsreel pool and color for Northrop's engineering department). Fighting to get free of that fiery coffin, he didn't worry

Jetographer Sam Orr's once-in-a-lifetime picture of a Scorpion F-89D firing barrage of 104 air-to-air rockets





Lockheed's Erik Miller snapped Air Force "Acrojets" in formation. Camera ship must roll over for this shot

Preflight conference between Northrop test pilot Dale Johnson and jetographer Jim Wilkinson to plan shots





Formation photos are among the most difficult to get. Jetographer must trip shutter at the precise moment

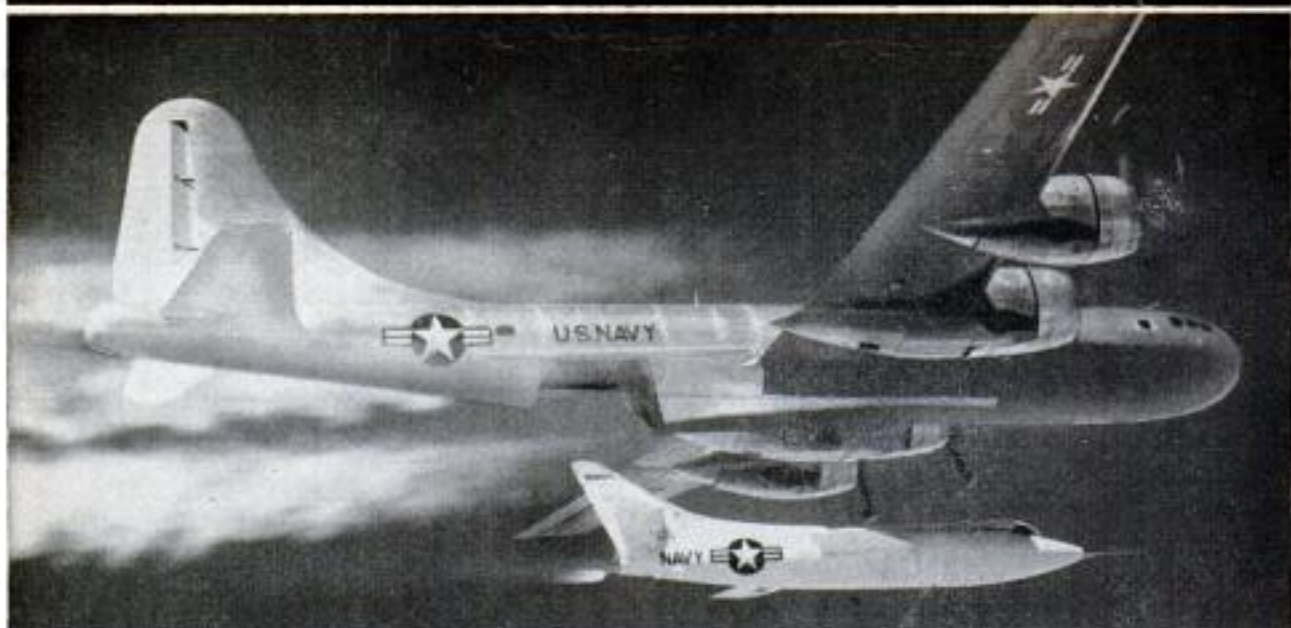
about cameras or footage. The pilot went over the starboard; Roy out the port. Hanging from the shrouds, Roy watched as the Black Widow flipped belly up, spasmed and dived groundward. The cameras spilled from the cockpit, landed hard but safe, their film intact. But some hare-brained good Samaritan found them, used all that irreplaceable first-flight film to fence off the crash area.

Today, Roy admits, a jetographer would find it all but impossible to bail out of a similar tight spot. In huddled briefings, jet-borne cameramen have just about decided that, for them at least, there'll be no escape next time a photo plane runs afoul of bad luck. Why? Because shooting from a jet, there's no way to get rid of those heavy cameras. You can't toss them over-side, not at near-sonic speeds. Most cockpits are too cramped to stow them. So they lie on your lap. And that's the danger, for it takes both hands to trigger a jet's ejector seat. One flip and the canopy is jettisoned. Now, with both hands, you actuate the escape mechanism. Sshhh! you slam out of the cockpit. But the cameras, being lighter, accelerate faster. There's nothing to prevent battery case, cameras and photo meters from shredding your face with a lethal uppercut, and your hands are too busy to fend them off.

"Sure," a jetographer shrugs, "you'd get out alive—but after those cameras clobbered you, you'd need a new face."

Bundled into flight gear and loaded down with cameras, Northrop's Paul Wheeler is ready for a flight





Walt Tufts held his breath at 37,000 feet so he could take off his oxygen mask to make sure of this shot



F-89D Scorpion executes a "Plan 5" position so the photographer can shoot rockets firing from wing pod

One of the few "old hands" in the jetography business, Roy L. Wolford, Northrop's chief photographer



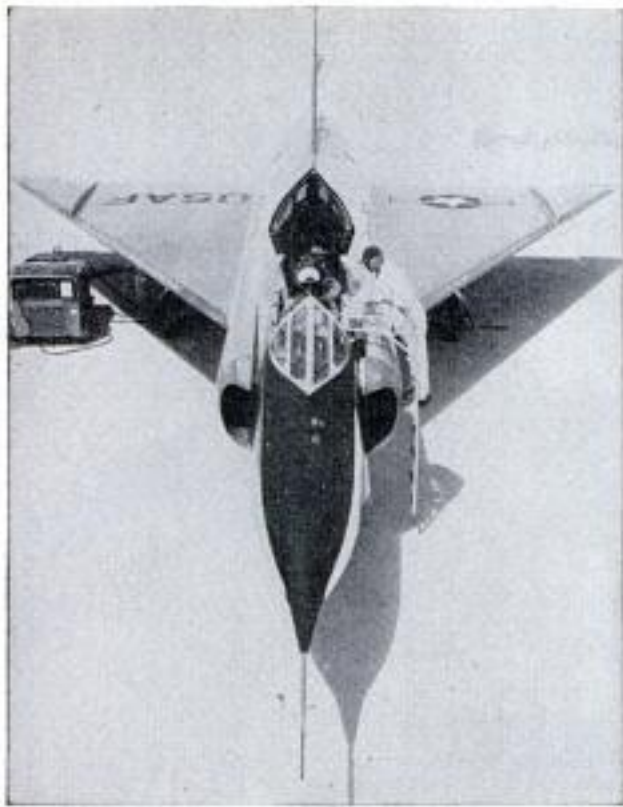
No one's yet proved or disproved this suspicion, but aerodynamics predict it.

Why, then, do the nation's few score jetographers run the risk? The \$125-\$200 weekly they earn doesn't explain it. Neither does the occasional \$50 a day bonus which the best of them command for extra-hazardous duty.

"Gets in your blood," a jetographer explains, "It's the trickiest, most rewarding kind of photography. It's an art—snapping a jet cavorting at the speed of sound—and the art's growing right along with the jet age."

The problems are many. In the slow-going days of prop flight, a cameraman could open a hatch, lean overboard and snap. Today he's sealed in, pressurized, air conditioned and breathing oxygen from ground all the way to 45,000, even 60,000 feet. As the camera plane wings-over and climbs, G-forces build, multiplying the photographer's weight and the weight of his camera and gear. At 2 Gs, a 10-pound camera weighs 20 pounds; at 5 Gs it weighs 50 pounds. The same increases apply to the jetographer's head, to his fingers and legs. Just raising a camera from his lap becomes a feat of strength. Focusing—as grueling as weight-lifting. Then, too,

(Continued to page 256)



Supersonic Jets Get New Shape to Increase Speed

Supersonic jets now rolling off the assembly lines have lost their straight, slim lines and developed some effective curves because of a newly discovered principle of aircraft design. Hailed as "one of the most significant military scientific breakthroughs since the atomic bomb," the new principle will increase the speed of aircraft by 25 percent or more as they go through and beyond the sonic barrier. The inventor, Richard T. Whitcomb, scientist at the National Advisory Committee for Aeronautics' Langley Laboratory at Hampton,

Va., has labeled the principle "the area rule." In simple terms, an application of the area rule results in a pinching in of the fuselage at the point where the wings join it, producing a wasp-waisted body. This design eliminates some shock waves, and their resulting drag, permitting a smoother, faster passage of the plane through the air. The first two planes to appear with the new look are the Grumman F9F-9 (called the F11F-1 in the new version) and the Convair YF-102. It is also to be used on the Navy's Chance-Vought F8U-1.

"The Thing"—Bad News for Enemy Tanks

Called "The Thing," a new fast-firing armored vehicle has been adopted by the Marine Corps for its amphibious forces. It is mainly an antitank vehicle and mounts

six 106-mm. recoilless rifles along with four .50-caliber spotting rifles which are used to establish the range for the larger weapons. The vehicle has light armor.

Nemesis of enemy tanks bristles with armament. Note the .50-caliber spotting rifles used to find range





Rear, a Super four-door hardtop; right, a Roadmaster (chrome bands on trunk identify it); left, a Special

'56 BUICK

Buick offers a new idea in "age-labeling" of cars by stamping model year "1956" on the grille medallion



ALL BUICKS now have the same engine—the 322-cubic-inch V8. Horsepower, however, is different: 220 on the Special, 255 on the Century, Super and Roadmaster. The additional 35 horsepower on the more expensive Buicks result from higher compression ratio (9.5:1 compared to 8.9:1 on the Special) and more carburetion (four barrels compared to two barrels on the Special).

Styling changes are minor: Wider front grille; full wheel cutouts on all models, not just on two-door models as in 1955; rear fenders are longer with less chrome showing around the taillights.

Performance in the lower speed ranges has been improved by adding a second stator to the Dynaflow transmission. This, plus the bigger engine, is said to give the 1956 Special the same performance from 0 to 30 as the 1955 Century.

Brakes have new linings, grooved along their full length to relieve the high-pressure zone in the center of the shoe and also to aid cooling. Brake area on the Special is increased.

Steering ratio is 17.5:1 with power steering, which is considerably faster than previously. The rear axle, including the differential, is completely redesigned.



Called a sport sedan by Chevrolet, this Bel Air four-door hardtop has no center pillar to obstruct vision



Luxury member of the station-wagon line, the two-door Nomad combines utility and beauty in one vehicle

'56 CHEVROLET

WITH A NEW grille and spearlike two-tone paint treatment, the 1956 Chevrolet is instantly recognized from any angle. Big news is the four-door hardtop model. Except for the front end, most of the styling changes have been in the handling of trim and interiors. The grille has been drawn forward into a shallow V and made wider to give the front end a lower look.

Four engine choices are available: The familiar overhead-valve Six with 140 horsepower this year; a 162-horsepower V8 for hand-shift models; a 170-horsepower V8 for Powerglide; and a Super Turbo-Fire V8 of 205 horsepower as an optional power pack with four-barrel carburetor, dual exhausts, 9.25:1 compression.

New this year for Chevrolet is a nine-passenger station wagon, the third seat of which is removable for hauling cargo.

Also new are the following: High-lift camshaft on the two most powerful V8 engines; a full-flow oil filter for reduced engine wear; directional signals standard on all models.

Major change in Chevrolet styling is in its front grille. It is wider and has been made more pointed





All new this year is the front-end styling of the Hudson. Shown here is the 1956 Hornet V8 four-door sedan

'56 HUDSON

Hudson has a new grille that makes it instantly recognizable as it comes down the highway. The grille, a broad mesh design, features a bold "V" in its center, a styling motif that is repeated in Hudson's side treatment as well as in its interiors.

A narrow band of gold color that runs horizontally along the rear fender makes three-tone cars actually four-tone and two-tone cars three-tone.

All 1956 Hudsons use the 12-volt electrical system. Three basic engines are available and, in addition, two optional

six-cylinder engines. Horsepower is up in all of them.

The Hornet V8 engine develops 220 horsepower with a compression ratio of 9.55:1 and a 352-cubic-inch displacement.

The Hornet Six develops 165 horsepower with a 7.5:1 compression ratio. An optional twin-carburetor kit increases the power to 175 horsepower.

The Wasp Six develops 120 horsepower and can be obtained with twin carburetion which boosts output to 130 horsepower.

A redesigned dashboard features a horizontal thermometer-type speedometer. A crash pad of foam plastic covers the top of the dash. Reclining seats that make up into beds are optional.

Continental tire adds 10 inches to the length of the hardtop. Narrow panel on rear fender is gold colored





Speed-line styling along the side panel of the Ambassador hardtop is new for 1956. This is the V8 model

'56 NASH

Nash has four horsepower ratings for 1956, ranging from 130 to 220. Included in the engine list is the new Statesman overhead-valve Six, which is said to have the highest ratio of horsepower to displacement of any six in the United States.

Principal style element of the Nash continues to be its inboard front headlights—a treatment that was adopted from the Nash-Healey sports car. For 1956, the parking lights, mounted in the fenders where the headlights are on other cars, have been enlarged and placed inside a

Rear fenders of the Nash have been raised and the taillights have been made larger and distinctive

miniature grille to give the leading edge of the fender a diagonal appearance.

The rear fenders have been restyled and raised almost three inches. The taillights are greatly enlarged.

Other changes for 1956 include: Adoption of the 12-volt electrical system; rear-view mirror is enlarged; front brakes on the Statesman are wider; parking-brake handle is now on the left side of the steering column; Ambassador wheels have been widened and tire size increased.

Nash continues its all-welded, no-bolt body construction which, their engineers claim, offers superior energy-absorbing characteristics in collisions.

You can always spot a Nash by its inboard headlights. Parking lights in fender have been enlarged





Four-door hardtop of the Oldsmobile Super "88" features a new pattern of slash two-toning along the side

'56 OLDSMOBILE

Oldsmobile, which pioneered the slash-type two-toning so common today, has two variations of it this year. The two-toning of the "98" series is distinctively different from that of the "88" models.

Principal styling change is the grille which is now a wide, slender oval of utmost simplicity. Rear-fender styling is new.

Oldsmobile offers the improved Hydra-Matic with the jerkless shifts that result from the addition of a second fluid cou-

pling, actually a dump-and-fill clutch. Mechanics can set the ignition points without removing the distributor cap this year, thanks to a small access door in the side of the cap. The parking brake is now operated by the left foot and a Park position is incorporated in Hydra-Matic for the first time.

Horsepower on the Super "88" and "98" models is 240, compression on all Oldsmobiles is now 9.25:1. The engine on the "88" model develops 230 horsepower.

Grille is adapted from the styling of the Delta dream car. Parking lights are in outer ends of the bumper





Fenders, hood and trunk have been raised on the President V8, now the largest car in the low-price field

'56 STUDEBAKER

New sheet metal plus a sportster that will go 120 miles per hour give Studebaker lots to talk about in 1956.

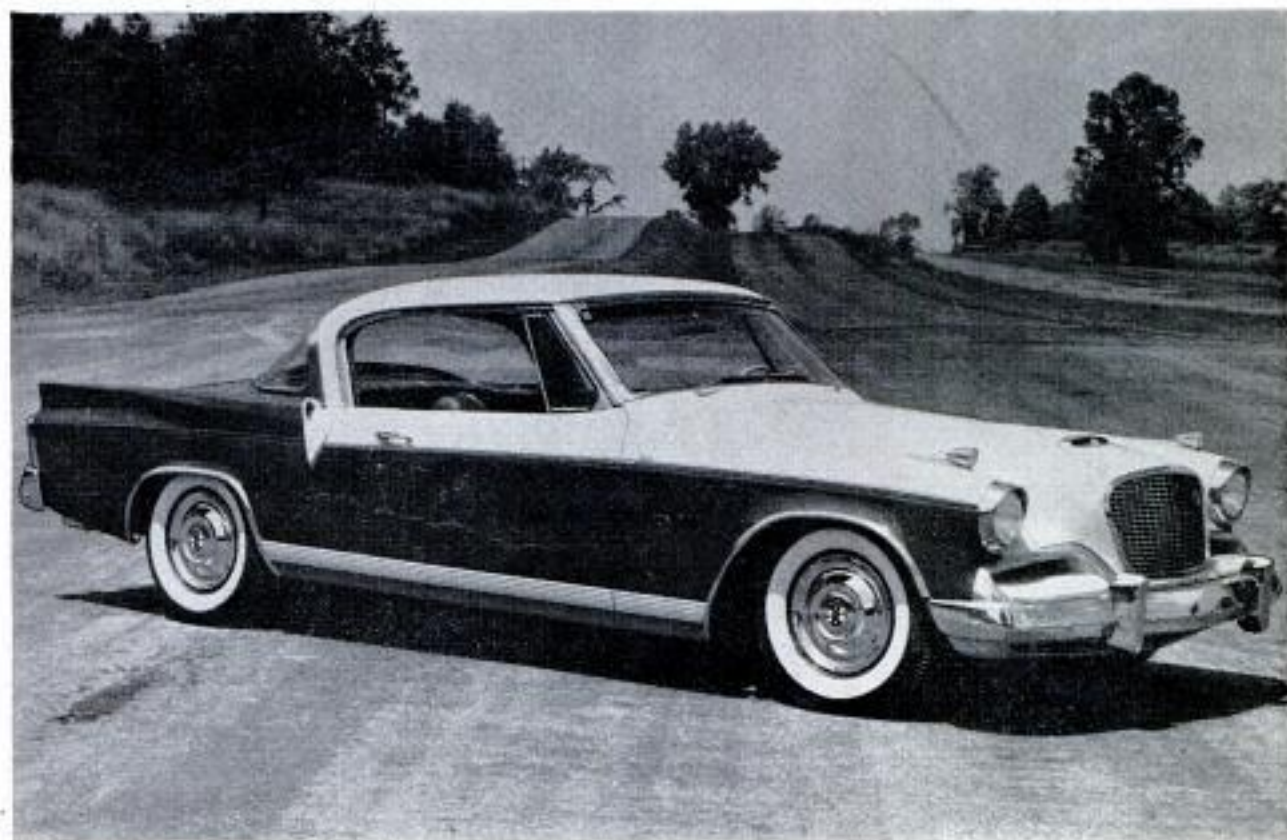
Sedan models have hoods and trunks squared up to make them appear much larger. All Studebakers are now in the low-price field. The Champion 6 has 101 horsepower, the Commander V8 has 170 horsepower, the President V8 has 190.

The Hawk sportsters come with horsepowers of 190, 210, and 275. The 275-horsepower Golden Hawk has tailfins and the performance of a racing machine.



Hawk's trunk lid has a promising styling trick: The decorative texturing of a previously ignored area

Studebaker's "bomb" is the Golden Hawk. It weighs only 3375 pounds, has 275 horsepower, will go 120





Officials in diesel railcar at left send verbal orders which are relayed to controls in robot train at right

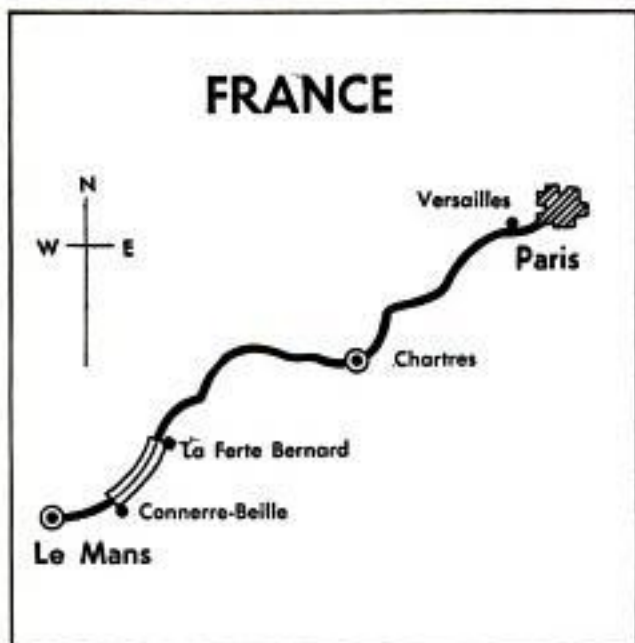
Train Speeds Along Rails Without Crew

WITHOUT CREW or passengers, a radio-controlled electric train hummed along the rails at a speed of almost 75 miles per hour in a test run. The robot train made the run

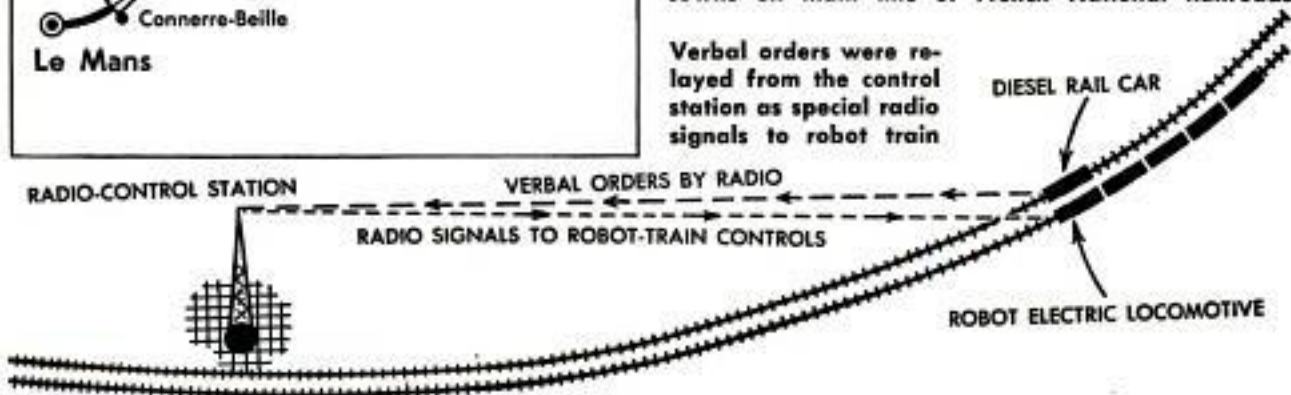
on one section of the main line of the French National Railroads between Paris and Le Mans. Radio was used to release the brakes, control the supply of current to the traction motors and apply the brakes at the end of the run. A diesel railcar running on a parallel track carried railway officials, who sent verbal orders by radio to control the train. At a radio-control station, these orders were retransmitted as special radio signals to control mechanisms on the train. Three weeks previously the locomotive's sister engine set a world-record rail speed of 205.6 miles per hour.

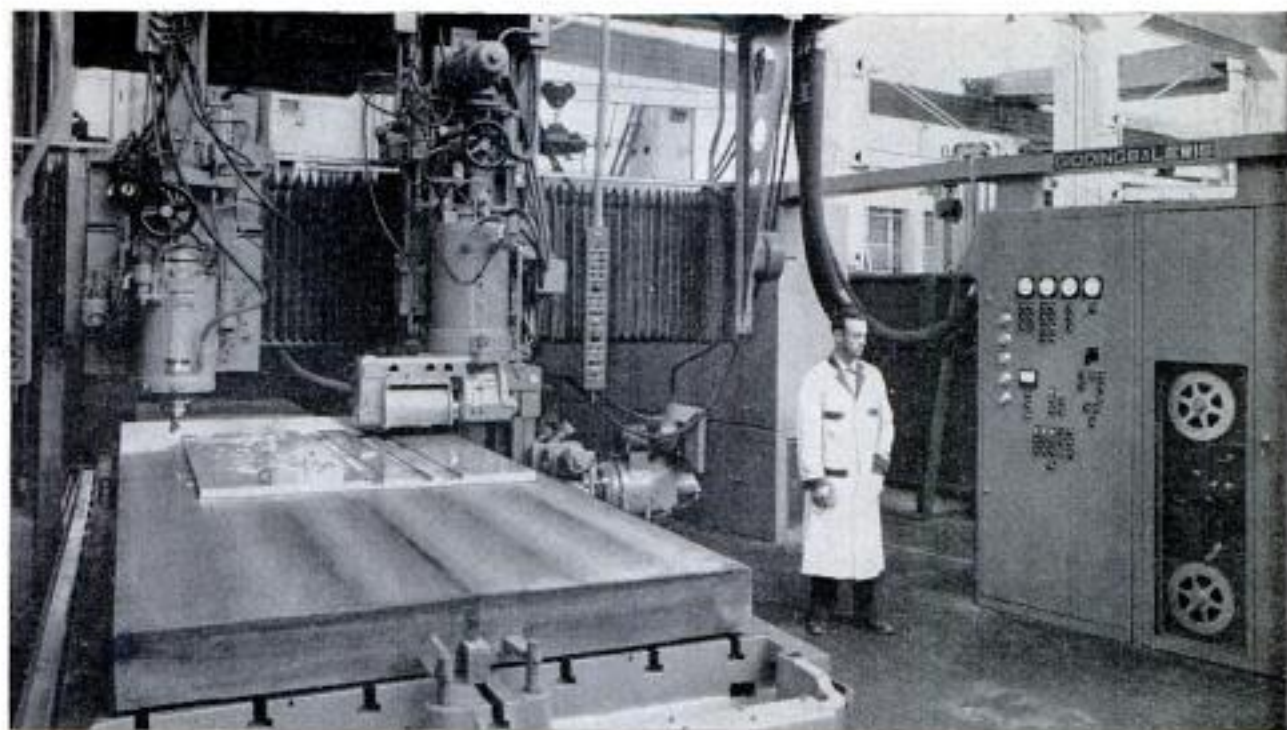
The New York, New Haven and Hartford Railroad has also announced experiments in which officials control the train from a truck on an adjoining highway.

← Test run of crewless train was made between two towns on main line of French National Railroads



Verbal orders were relayed from the control station as special radio signals to robot train





Tape Recording Guides Milling Machine

Guided by orders stored on magnetic tape, a new milling machine makes all the intricate cuts necessary to turn out wing and skin panels for jet planes. An engineer converts the plans for a panel into decimal numbers, which then are perforated into a paper tape. The paper tape then is run through a computer, which coordinates the information into precise time-and-motion orders to the machine. It also records these orders on magnetic tape. The magnetic

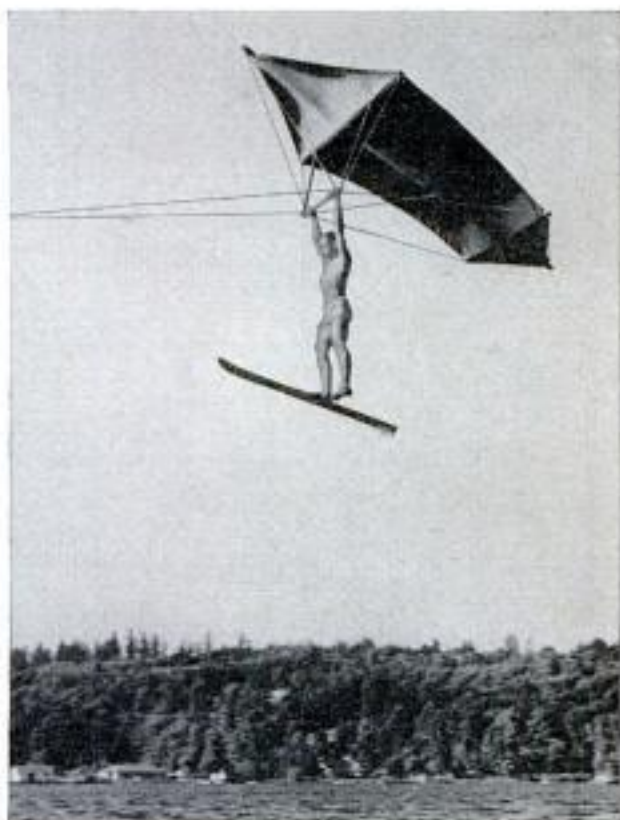
tape is used to control all functions of the machine. One advantage of the system is that the magnetic tape can be prepared thousands of miles from the machine tool if necessary. No templates are required and no sample must be cut in order to make the tape recording. Such recordings can be stored indefinitely, then brought out for use whenever they are needed to produce more parts of the same type, an important factor in production for national defense.

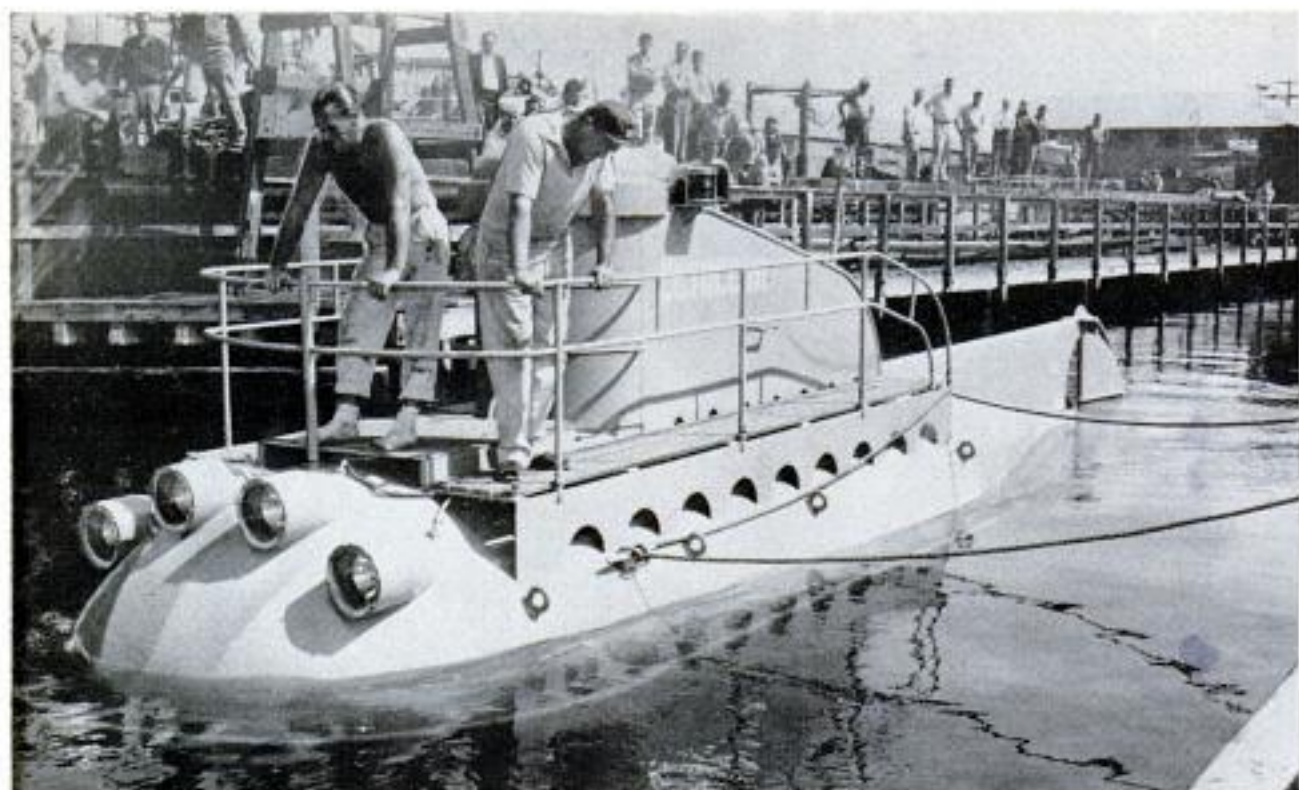
Kite-Borne Water Skier Soars High Above Waves

Water skiing wasn't exciting enough for Tony Baird of Everett, Wash., until he built a kite that now enables him to soar high above the waves. As his brother Gordon tows him in a speeding motorboat, Tony grasps a bar attached to the huge kite and is soon aloft. When the boat slows down, he drifts back down and lands like a seaplane—but on only one ski. With the kite, he has achieved an altitude of 100 feet, which he believes is a world's record.

Name Elements 99 and 100

Two great scientists who died within the last year, Albert Einstein and Enrico Fermi, have been honored by the naming of elements 99 einsteinium and 100 fermium. The symbol for einsteinium is plain E, that for fermium, Fm. Now all discovered elements are named, since 101 was previously named mendelevium after the Russian, D. Mendeleev, who announced the periodic system of the elements in 1869.



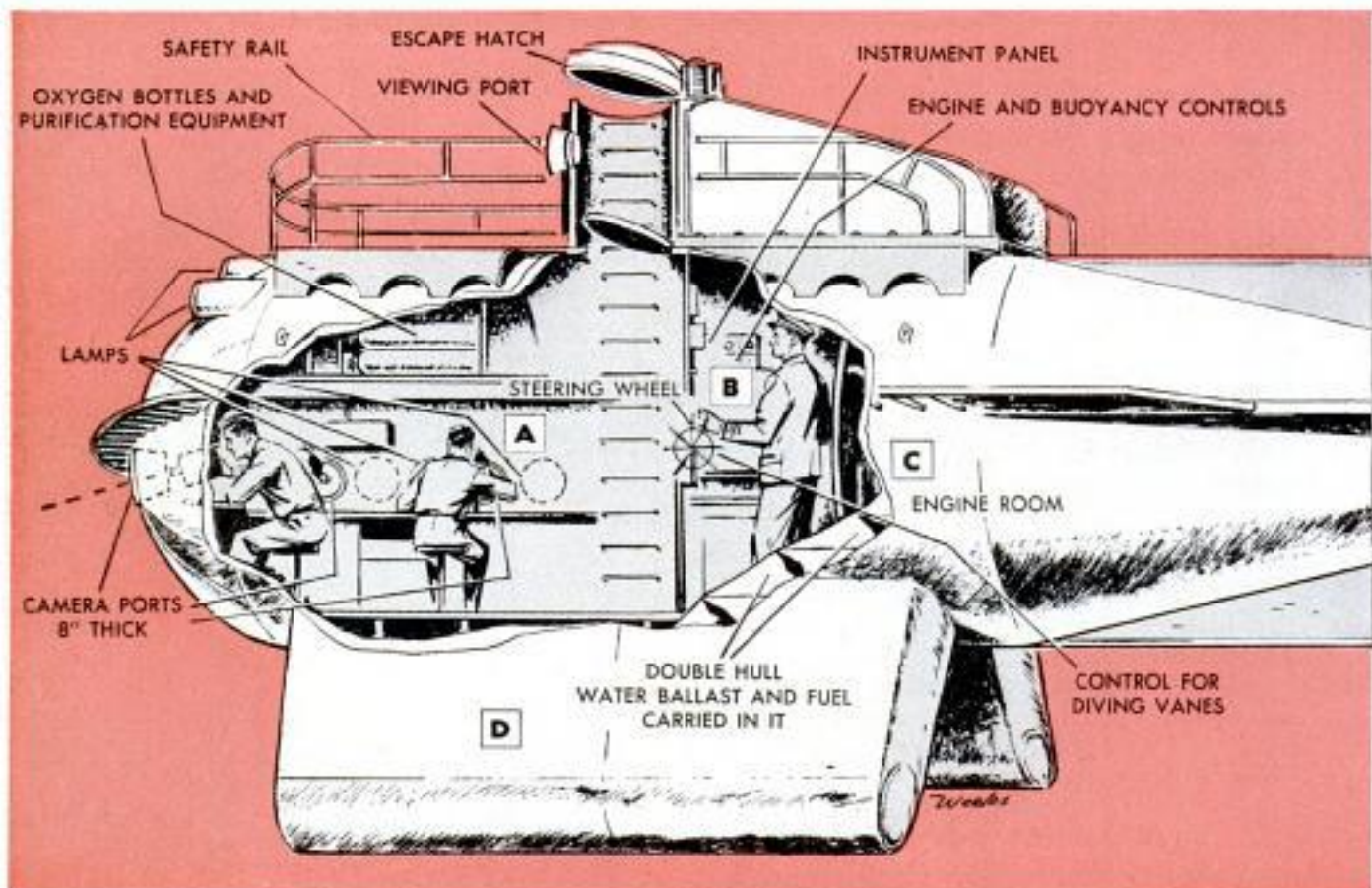


Little submarine carries a crew of five or six, has powerful lights for deep-sea motion-picture photography

Stubby Sub Cruises One Mile Deep

DEEP-SEA MONSTERS not yet seen by man will be sought in the *Cetacean*, a 50-ton submarine that can cruise a mile or more below the surface.

The craft has an underwater range of 35 miles and can lie for days on the ocean bottom, resting on two fat "legs" in which seven tons of storage batteries are carried.





Craft enters water for trim trials. Fat "legs" support it on ocean floor and carry storage batteries

In an emergency the double pressure hull could withstand the squeeze that would be encountered at a depth of five miles. Space between the two hulls is used to carry 2000 gallons of fuel for the 150-horsepower diesel engine which drives the craft on the



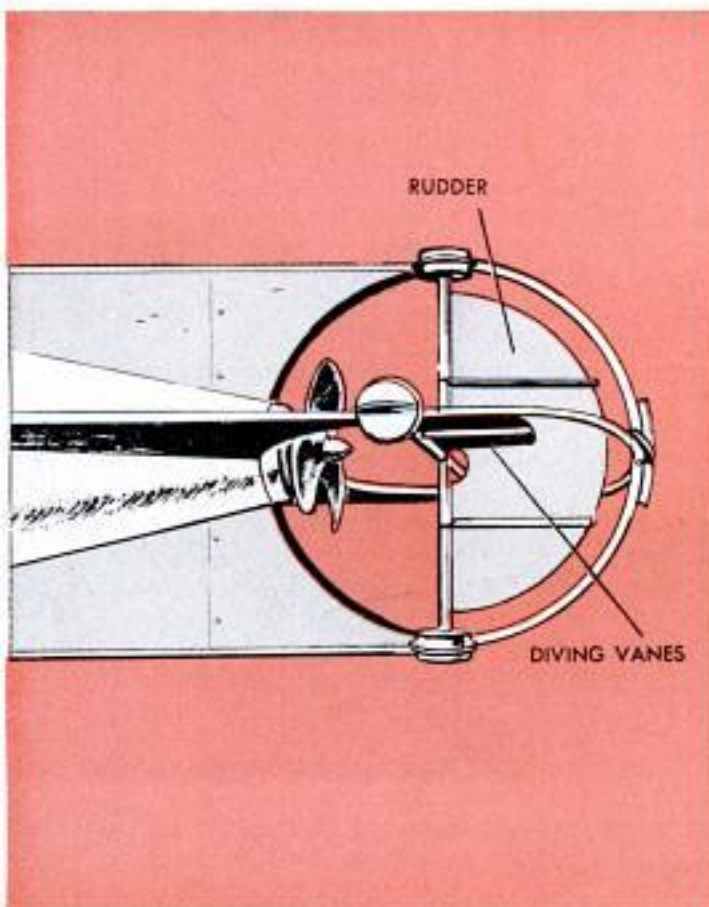
Inventor Martine checks propeller. Behind and above him are diving vanes and rudder that maneuver sub

surface, as well as water ballast for controlling buoyancy during dives and ascents.

As a result of its relatively short length of 41 feet the *Cetacean* can be maneuvered with aircraft-type control surfaces—a rudder and elevators located aft of the propeller. It is designed to make nine knots on the surface, seven knots submerged.

The new submersible is fitted with powerful underwater floodlamps to provide illumination for exploring at great depths and for making wide-screen color motion pictures of interesting objects that are sighted. Edmund Martine, inventor, says that bait in the form of a slaughtered animal may be towed astern to attract deep-zone predators. Counting the photo staff, the crew consists of five or six men. The craft is fitted for other types of deep-sea research in addition to photography.

Martine, inventor and builder of large diving bells that are used on both coasts, made use of his long experience with submersibles in devising watertight fittings and other necessary gear to withstand the pressures that will be encountered at great depths. It is said that his craft is the world's first self-propelled submarine designed from the keel up for underwater research and exploration. Now undergoing diving trials on the West Coast, the *Cetacean* may soon be stationed in the Bahamas. ★ ★ ★



Cutaway shows interior of sub. Compartment A is for cameramen; B shows control compartment; C holds electric and diesel engines; batteries are in "legs" D



Because of its oilless construction, the compressor delivers clean, dry air without need of separator



Normally thought of as part of a paint-spraying outfit, a compressor can do many jobs around the home

Mobile Compressor and Spray Gun Requires No Lubrication

Suitable for the home craftsman, a new compressor is now being marketed which rolls on wheels for ease of handling. Driven by an electric motor, the unit uses graphite or carbon piston rings instead of conventional steel rings, which eliminate the necessity for lubricating cylinder walls. A complete line of accessories enabling the

compressor to do dozens of different jobs, such as paint spraying, insecticide spraying, inflating of tires and beach toys and even the operating of air tools in the home workshop, is available. Because of the oilless feature, no filters are needed to get clean, dry air at the spray nozzle. Spray guns used are the external mixing type.



Magnetic Light Bulbs Leap Into Sockets

Five turns are required to fit an ordinary light bulb into its socket, and five more turns are required to remove it. But now a new bulb with a magnetic base that virtually jumps into place has been developed to eliminate all this twisting. The socket contains a permanent magnet, and the base of the bulb is a metal plate which is attracted to it. No current is needed to energize the magnet. The bulb is expected to be useful in maintenance of large buildings, where a number of bulbs must be changed each day. For example, the Pentagon, the world's largest office building, is illuminated by 68,000 fixtures, and 1200 of these bulbs must be replaced each day. Manpower savings also could be effected in maintaining theater marquees.

☐ Last year American farmers applied 23,000,000 tons of fertilizer to their fields, a tonnage just about equal to the total tonnage of vehicles produced by the automotive industry for the past two years.

THIS IS A STRANGE business. Studebaker brought out its low, "European styled" cars in 1953 with concave, sculptured sides. On its 1956 models the sculpturing is gone, according to rumor, as the car has been "Americanized" again.

Then (and this is more rumor) along comes Chevrolet with its 1956 Corvette (out in January) and it has sculptured sides! Of course, the treatment isn't the same as Studebaker's, but the story does illustrate that this is a strange business.

Incidentally, the 1956 Corvette is to be a hot one, stories say. Dig out an old picture of the Biscayne (Chevrolet's 1955 dream car) and you'll get a clue to its over-all styling. It will have windows that roll up and a removable hardtop.

With it, Chevrolet hopes to deflate some of the Thunderbird's amazing sales: 16,155 sold in 1955. The Ford division plans to sell 20,000 in 1956. Chevrolet plans to get some of that business.

Metal Sculpturing

Any talk of metal sculpturing must include reference to the 1956 Studebaker (shown in this issue on page 93). Look at the way the metal is formed around the wheel openings. Then look at the sculptured treatment of the trunk lid on the Hawk. You will see more of this in the years to come.

The Studebaker idea on the trunk lid opens a whole new area for stylists to work in. Trunk lids of tomorrow's cars may be as distinctive as grilles are today. You'll be able to spot the make from the rear as quickly as from the front—and not by tail-lights alone as you do today.

Tomorrow's cars may also have textured roofs. They will be low enough so you'll be looking down on them. That means the roof must have character—and metal sculpturing is the way to do it cheaply and effectively.

Dealers' Nameplates

At least one company is putting on a campaign to get dealers to stop plastering advertisements on the back end of every car they sell.

Stylists work hours over the precise shape of a trunk latch, or the exact script of the car's trademark. Then the dealer bolts on an entirely different and often clashing chrome sign giving his name and address. Some even apply colored transfers that list everything about the dealer except his credit rating.

Stylists object. And with reason. After all, the most continuously viewed portion of a car is the back end. The front grille whizzes past in a split second. You look

Detroit Listening Post



By Leo Donovan

at the rear end for minutes as you follow another car in traffic.

Station Wagons

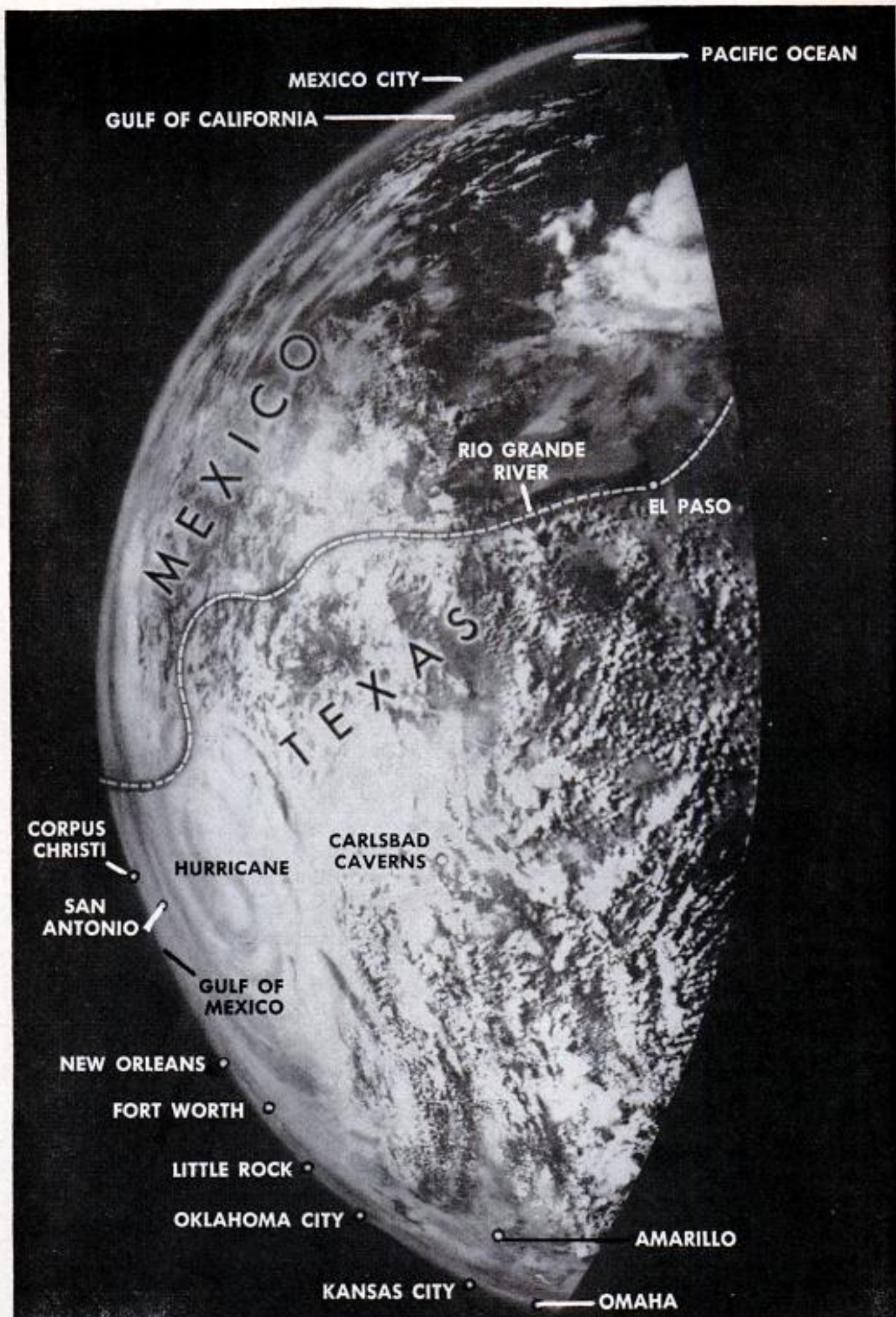
All companies are awakening to the fast-growing station-wagon field. With almost 20 percent of the country living in the suburbs, and most of that 20 percent involved in planting, remodeling and other chores that require hauling things, the market is expected to grow rather than shrink. (Incidentally, there are some engineers in the industry who think that the standard sedan of tomorrow will have four separate bucket seats and the six-passenger car will be a station-wagon type with three rows of two seats each.)

Many companies (especially the lower-price lines) have put station wagons in a separate series, distinct from the sedans.

The station wagon has been the big factor in the sales increase at American Motors. The Rambler Crosscountry wagon accounted for half the Rambler sales in 1955. So American Motors spends lots of time thinking about the wagon market.

For 1956, the Rambler wagon boasts a full six-foot length of interior space behind the front seat (with the rear seat folded into the floor, that is). The new wagon also has a rear window that cranks down into the tailgate, doing away with the upper transomlike half of the rear door.

Rambler announced a new body style in advance of the rest of its line: A four-door hardtop-type station wagon without posts between the doors. It will not be available until January, about a month after the rest of the Rambler line is in the showrooms. The reason for the premature announcement is that President George Romney of American Motors heard that another company was going to bring out the same kind of body style before his "surprise package" could be unveiled. Wanting to be first, Romney authorized the advance release. Nobody would say what the other company was, but it could be Chevrolet or Pontiac—you may know by the time you read this.



MEXICO CITY —
GULF OF CALIFORNIA —

PACIFIC OCEAN

MEXICO

TEXAS

RIO GRANDE RIVER

EL PASO

CORPUS CHRISTI

HURRICANE

CARLSBAD CAVERNS

SAN ANTONIO

GULF OF MEXICO

NEW ORLEANS

FORT WORTH

LITTLE ROCK

OKLAHOMA CITY

KANSAS CITY

AMARILLO

OMAHA

Rocket-Eye View From 100 Miles Up

◊ PEERING DOWN on the earth from 100 miles out in space, a camera in an Aerobee rocket glanced over 1,225,000 square miles of the earth's surface, and brought back a record of what it saw. Then scientists at the Naval Research Laboratory in Washington, D. C., sat down to piece together a giant jigsaw puzzle, consisting of 310 prints from the 16-millimeter colored motion-picture film taken from the rocket. When the puzzle was finished, they had a composite photograph covering the largest area of the earth ever photographed from one spot at one time. The horizon in the photo extends about 2800 miles, from Omaha, Neb., to the lower Gulf of California, in Mexico. The whole state of Texas and parts of nine others appear in the photo. Also in the picture, is a hurricane, the first ever to have its whole picture taken. It was centered over Del Rio, Tex., and measured about 1000 miles in diameter. Strangely enough, on this date, October 5, 1954, the surface winds in this area were easterly and of normal velocity, in spite of the high-powered storm sitting overhead. The Aerobee, a two-stage rocket 22 feet long and 15 inches in diameter, was fired from the White Sands Proving Grounds, Las Cruces, N. Mex. Since 1948, this rocket has been used by the Naval Research Laboratory in its upper-atmosphere research program. ★ ★ ★



Nursery Cars on Swedish Railroads

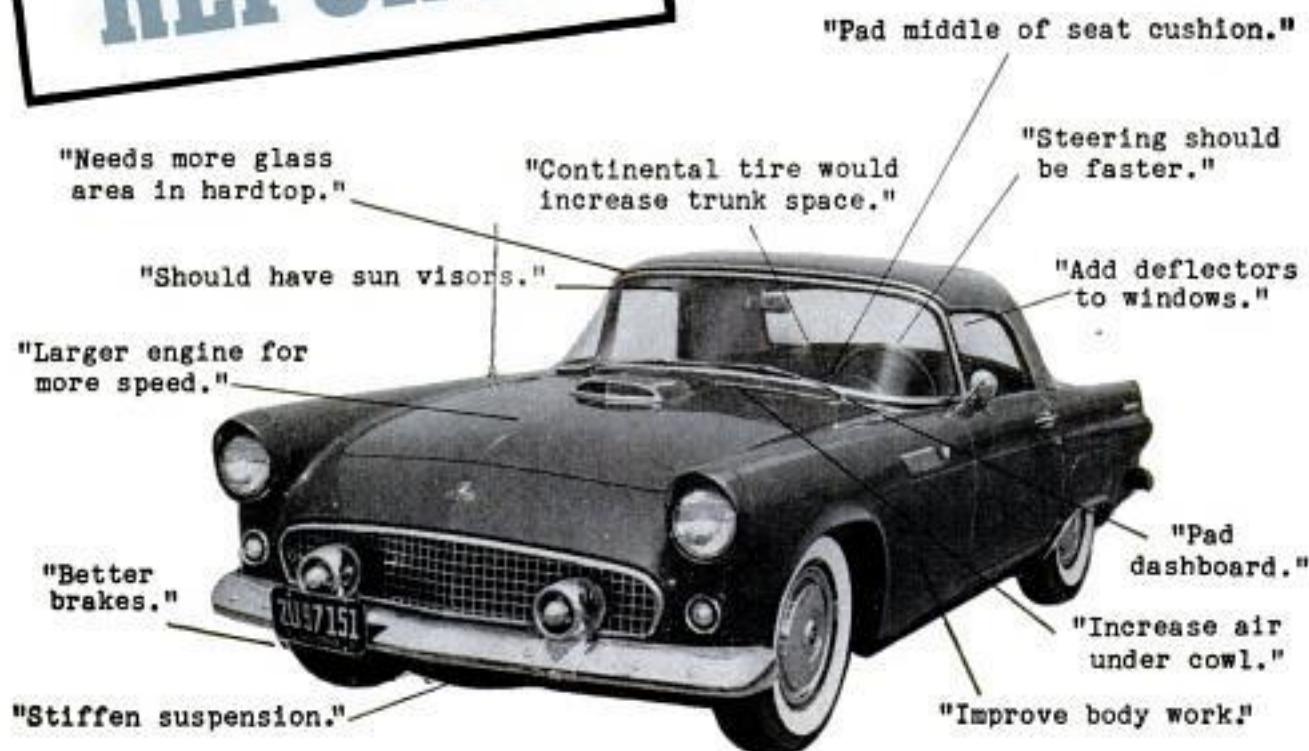
Babies are about the same the world over, but the practical-minded Swedes are apparently the first to try solving the problems of mothers who take their babies on train trips. Swedish railways provide separate cars for mothers traveling with small children. Compartments in the cars are fitted with racks, similar to luggage racks, which are actually beds for babies. The racks can be shut off with curtains if desired. The compartments also contain lavatories and diaper-changing tables. A mother pays her regular fare; there's no charge for any child under two. The mothers are enthusiastic—and so are all the other passengers!

25-Ton French Tractor Carries 100-Ton Payload

Recently tested by the French army at the Camp de Satory proving grounds, the Berliet T-12 semitrailer tractor is a gasoline-powered behemoth with a 12-cylinder 450-horsepower engine. The tractor weighs 25 tons and can carry a useful load of 100 tons on high-speed, long-distance hauls. Power from the engine is transmitted through special differentials to eight of the wheels. It is designed to operate under moderately difficult field conditions.



OWNERS REPORT:



Owners of the 1955 Thunderbird say they want these changes made in their cars

And these are the changes Ford made for 1956:

'55 Thunderbird Owners Like Performance And the '56 T-Bird Will Provide Even More

By Thunderbird Owners

DO AUTOMOBILE companies react to the complaints of owners? If our Thunderbird Owners' Report is any indication, they certainly do. Ford reacted—but quick!

We asked 1000 owners of the 1955 Thunderbird about their cars and tabulated the complaints. We compared this list with the changes made in the 1956 Bird. The similarity is amazing as you will see. This evidence proves the accuracy of the Owners-Report technique of reporting on automobiles.

Here are the complaints of the 1955 owners and the action taken by Ford to eliminate them in 1956:

"Poor visibilty with top on. Blind spot

over left shoulder. Should have more glass area in hardtop."—California manager.

In the 1956 Thunderbird, the plastic hardtop is available with two portholes that eliminate the blind spot the California owner complains about. The soft top also has more rear-window area in the new Bird.

"I have been disappointed in the top speed of 110 miles per hour. Car should have a larger engine for more speed."—Illinois chemist.

Ford has put a 225-horsepower engine in its Fordomatic-equipped 1956 Thunderbird. The displacement is 312 cubic inches compared to 292 cubic inches of the 1955 car.

"Continental tire kit should be standard on car to give more luggage space."—California housewife.

This has been done in 1956. Luggage space has also been increased by changing the position of the dust shield behind the seat. Now the Thunderbird trunk will hold enough suitcases for a long trip plus a set of golf clubs.

"There are three of us in the family and the hard part in the middle of the seat is uncomfortable."—Indiana distillery owner.

By redesigning the cushion, Ford has softened the center portion of the seat that is directly over the driveshaft. The seat has also been made level so it is more comfortable for three persons.

"Would like wind deflectors on doors to keep wind out."—Missouri merchant.

This change has been made in the 1956 Thunderbird. Small wings have been added outside the regular window.

"Increase air intake under the cowl."—Pennsylvania attorney.

On each side of the 1956 Thunderbird

there is a push-out vent that scoops plenty of air into the passenger compartment. Especially on automatic transmission models, the 1955 Thunderbird was very hot inside with the hardtop in position.

"Convertible rear window should have a zipper so it could be opened."—West Virginia sales-promotion man.

The new Thunderbird has a zip-out rear window in its soft top.

"Soft top should be a one-man job. It takes at least two now. It is impossible to get the top behind the seat unless you have 30 minutes to do it. It takes 13 operations to get it down and behind the seat so we just leave it resting on the body."—New York businessman.

Ford has not made the top automatic, despite the pleas of many owners, but the operation has been improved. Ford says one man can operate it without too much trouble now. This has been done by the addition of a link in the main support on each side.

"Develop a practical sun visor for the

ADDED PORTHOLES TO HARDTOP

SUN VISORS ARE INSTALLED

PADDED DASHBOARD IS OPTIONAL

1956 Thunderbird

BACK WINDOW OF CONVERTIBLE ZIPS OPEN CONVERTIBLE TOP CAN BE PUT UP BY ONE MAN

WINDOWS HAVE SMALL VENT PANES

CENTER PORTION OF SEAT IS NOW PADDED

INSTALLED A BIGGER ENGINE

CHANGED TRUNK TO INCREASE LUGGAGE ROOM

SCOOPS ON SIDES COOL PASSENGER COMPARTMENT

CONTINENTAL TIRE IS STANDARD

SPECIFICATIONS—1956 THUNDERBIRD

Wheelbase	102 inches
Over-all length	185 inches
Over-all width	70.2 inches
Over-all height	52 inches
Over-all steering ratio	23.0:1

ENGINE

Fordomatic models	
Bore and stroke	3.80 x 3.44
Displacement	312 cubic inches
Compression	9.0:1
Horsepower	225 at 4600
Torque	324 at 2600

Overdrive models	
Bore and stroke	3.80 x 3.44
Displacement	312 cubic inches
Compression	8.4:1
Horsepower	215 at 4600
Torque	317 at 2600

Handshift models	
Bore and stroke	3.75 x 3.30
Displacement	292 cubic inches
Compression	8.4:1
Horsepower	202 at 4600
Torque	289 at 2600

front windshield."—California engineer.

Interior sun visors have been added to the top of the windshield. In fact, these were added as a running change during the 1955 season.

"Two rear clamps for the hardtop are too hard to operate."—Wisconsin butcher.

The clamps are changed for easier operation but it is still an awkward arrangement at best.

"As long as they made the dashboard appear padded, why didn't they pad it?"—Utah moulder helper.

Buyers can get the padded dashboard as an extra-cost option in 1956. It is part of the safety package.

"Safety belts should be standard."—Indiana technician.

For 1956, the Thunderbird has seat belts as an extra-cost option, also part of the safety package.

Best-Liked Features

But there is more to the Thunderbird story than complaints and changes. The 1955 owners had many wonderful things

to say about their "personal cars." All the following good points are retained on the 1956 models.

The feature mentioned most frequently is the power or performance of the car. Sixty-one percent of the owners listed that characteristic.

"I like the acceleration best. I get a buzz each time I tromp on the gas."—Texas electrician.

"Car runs good. Have never been passed when I didn't want to be and have been tried by everything from a Cadillac on down."—Colorado fireman.

"I have made about 22 round trips between Las Vegas and my home in California averaging about 100 miles per hour. I have never been as comfortable at high speed in any other car. The Thunderbird is a good road car."—California electronics executive.

Second on the best-liked list is handling. There were 46 percent of the owners who mentioned this.

"Ease of handling. So easy to handle in traffic as well as on the road. Easy to park.

Thunderbird for 1956 retains its removable plastic roof. It takes two men to put it on or take it off. Optional this year are windows in the quarter panels. The locking clamps are improved on the 1956 models

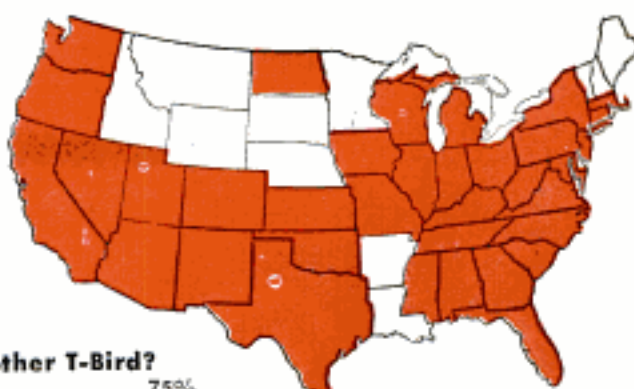


Ford sold 16,155 Thunderbirds for 1955. Owners in the 36 states shown in color took part in our poll

Percentages from PM Poll of Thunderbird Owners

OVER-ALL RATING OF THE THUNDERBIRD

Excellent	70%	Fair	4%
Good	25%	Poor	1%



Dealer service

Excellent	36%
Good	26%
Fair	21%
Poor	17%

Owned other sports car?

Have owned	22%
Have not	78%

What was other car?

Jaguar	10%
MG	9%
Other	3%

Own another car now?

Yes	71%
No	29%

What is the other car?

Ford	22%
Mercury or Lincoln	12%
Other make	37%

Would buy another T-Bird?

Yes	75%
Might	19%
No	6%

What should be changed?

Soft-top design	20%
Brakes	12%
Suspension	9%
Interior ventilation	8%
Seat design	8%
Dash gauges	7%
Trunk space	6%
More horsepower	6%
Needs no changes at all	18%

MOST-FREQUENT COMPLAINTS

Soft-top operation	29%
Door fit	18%
Window operation	15%

Poor body work	15%
Rattles	13%
Interior ventilation	11%
Windshield distortion	9%
Brakes inadequate	8%
Hard-top operation	7%
No complaints at all	15%

BEST-LIKED FEATURES

Power, performance	61%
Handling	46%
Styling	45%
Comfort	20%
Roadability	19%
Compact size	8%
Distinctiveness	3%

I think I will never return to a big car."—California attorney.

"I like the way it handles. No car I have ever had has given me this feeling."—Oregon truck driver.

"A fine personal car for the whole family. Easy to drive for anyone. Especially good for women drivers. But does not compare with the Jaguar or Mercedes 300SL I own for driving at speed with safety."—Massachusetts owner.

Right behind handling came styling in the list of best-liked features with 45 percent praising it.

"The styling sold me. No ugly grille or chrome ornamentation. No juke-box look. Also I'm tired of driving a six-passenger bus when I am usually alone or have only one passenger."—Indiana attorney.

"Beautiful styling. Has sports-car look

with the continental flavor."—Michigan technician.

"Styling has dignity and respectability plus speed and acceleration. Doesn't resemble a crazy teen-ager's dream."—Maryland retired research scientist.

Other Best-Liked Features

After these three best-liked features come comfort, roadability and compact size, in that order.

"Comfortable on long trips. Two tops make it a real all-weather car."—Texas student.

"I have driven it for a straight 30 hours and found it very comfortable."—Florida Air Force pilot.

"I like its roadability—the way it handles on the mountain roads we have here."

(Continued to page 266)

ROAD-TEST DATA

At press time, no production model of the 1956 Thunderbird was available for road-test purposes. *Popular Mechanics* does not road-test engineering prototypes of any car because such prototypes are not necessarily typical of the cars the public is able to buy. Floyd Clymer did road-test the 1955 Thunderbird and here are the results:

¼ mile from zero	- - - - -	14.7 seconds
½ mile from zero	- - - - -	25.9 seconds
0 to 30 miles per hour	- - - - -	4.1 seconds
0 to 60 miles per hour	- - - - -	11.7 seconds
Top speed	- - - - -	112 miles per hour
Over-all gasoline economy	- - - - -	18.2 miles per gallon

Road-test data on a production version of the 1956 Thunderbird will be published as soon as possible.



Completely streamlined, the low, sleek body is designed and built by one of Italy's most famous body shops

Volkswagen Gets a Sport-Coupe Model

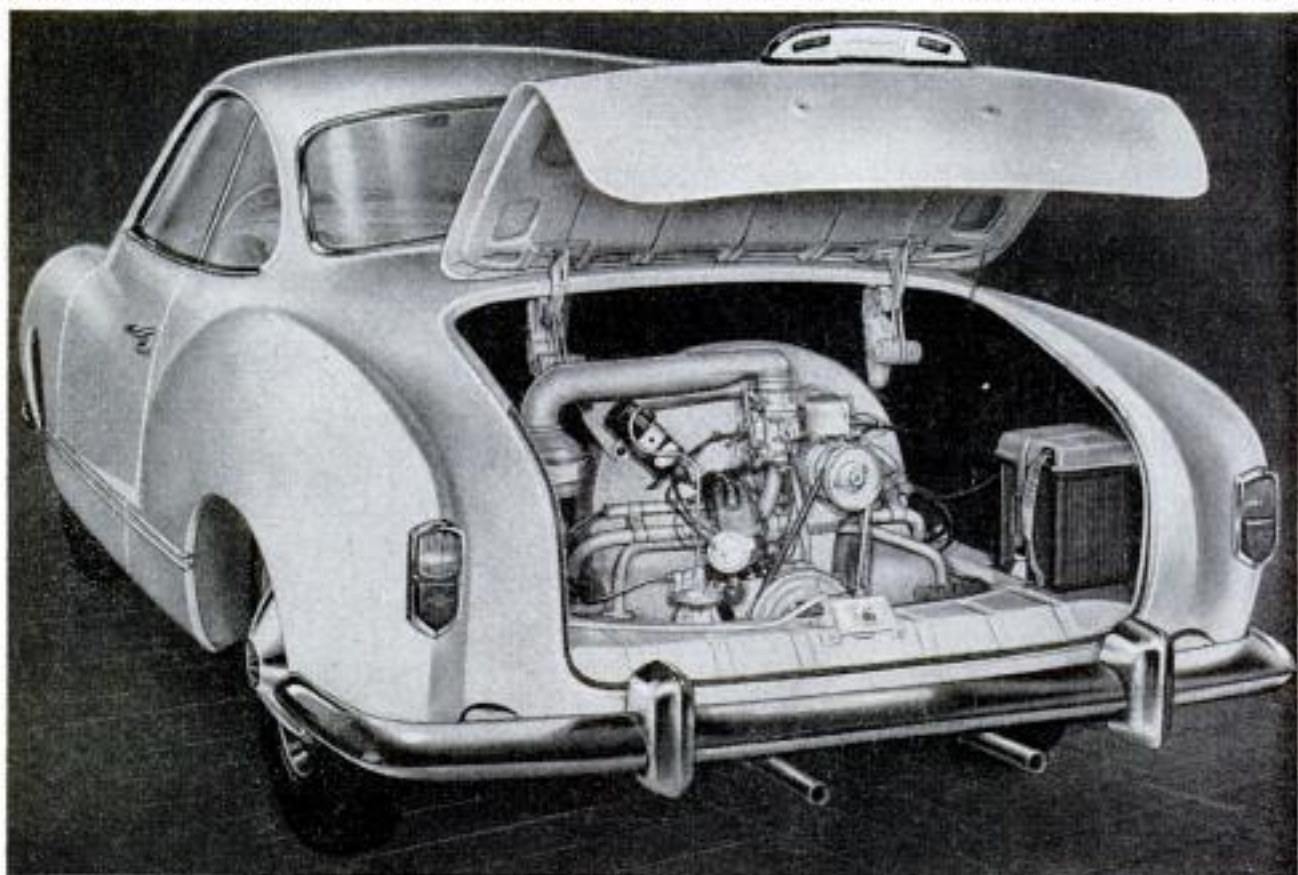
LOW AND STREAMLINED, a two-passenger sport coupe is available on a Volkswagen chassis. The car, called the Karmann-Ghia-Coupe, has standard VW chassis components with only those minor modifications made necessary by the drastic streamlining. Designed to seat two persons comfortably on adjustable bucket seats, the car does have two additional jump seats in the rear suitable for children or for adults on short trips only. Normally the area behind the front seats is used for

luggage. The engine is the standard four-cylinder air-cooled power plant that has made the VW famous for reliability and economy. It is in the rear, of course, and puts out 36 horsepower. Price of the car is about \$2400.

SPECIFICATIONS

Wheelbase	94.5 inches
Over-all length	163 inches
Over-all width	64.2 inches
Over-all height	52.2 inches
Weight	1782 pounds
Top speed	72 miles per hour
Average fuel consumption	32 miles per gallon

In the rear is the VW air-cooled four-cylinder engine. The battery is mounted in the engine compartment





"Auto Raft" Does 12 Miles Per Hour on Water

Using two Army rubber bridge pontoons, Dr. Sverre Quisling of Madison, Wis., has constructed an "autoraft" which he hopes might be useful in time of war. The raft is the result of experiments to find an easy method for military vehicles to cross water bodies. The raft consists of three steel beams between the pontoons, on which

the car is placed. Ordinary tire chains, to which U-shaped irons filled with wood blocks have been welded, give the back wheels of the car the effect of paddle wheels. A rudder, connected by cables to the front-wheels, steers the craft. Doctor Quisling claims a speed of 12 miles per hour and feels it may have civilian uses.

Danes Begin Mining Operations 140 Miles North of Arctic Circle

Lead and zinc will soon be mined at a point 140 miles north of the Arctic Circle in East Greenland, where the average temperature is 16 degrees and snow 15 feet deep is common. A Danish firm has built a town, Mesters Vig, near the mine,

and expects to begin production next spring. Rooms will be blasted out of the side of the mountain to be mined, and separation machinery installed. Water for the separation process will be pumped to the mine through electrically heated pipes.



Plane Swallows Truck

It may look impossible, but an Air Force tank truck laden with jet fuel can actually be driven into the hold of a C-130 cargo plane and be taken aloft. The method speeds loading and unloading of fuel. After landing, the truck finishes its trip by road.



Outline of new dam is shown on picture taken of dam site before work began. Dam will be 2300 feet across top

GIGANTIC DAM IN THE ALPS WILL TAKE 18 YEARS TO BUILD

By G. H. Davis

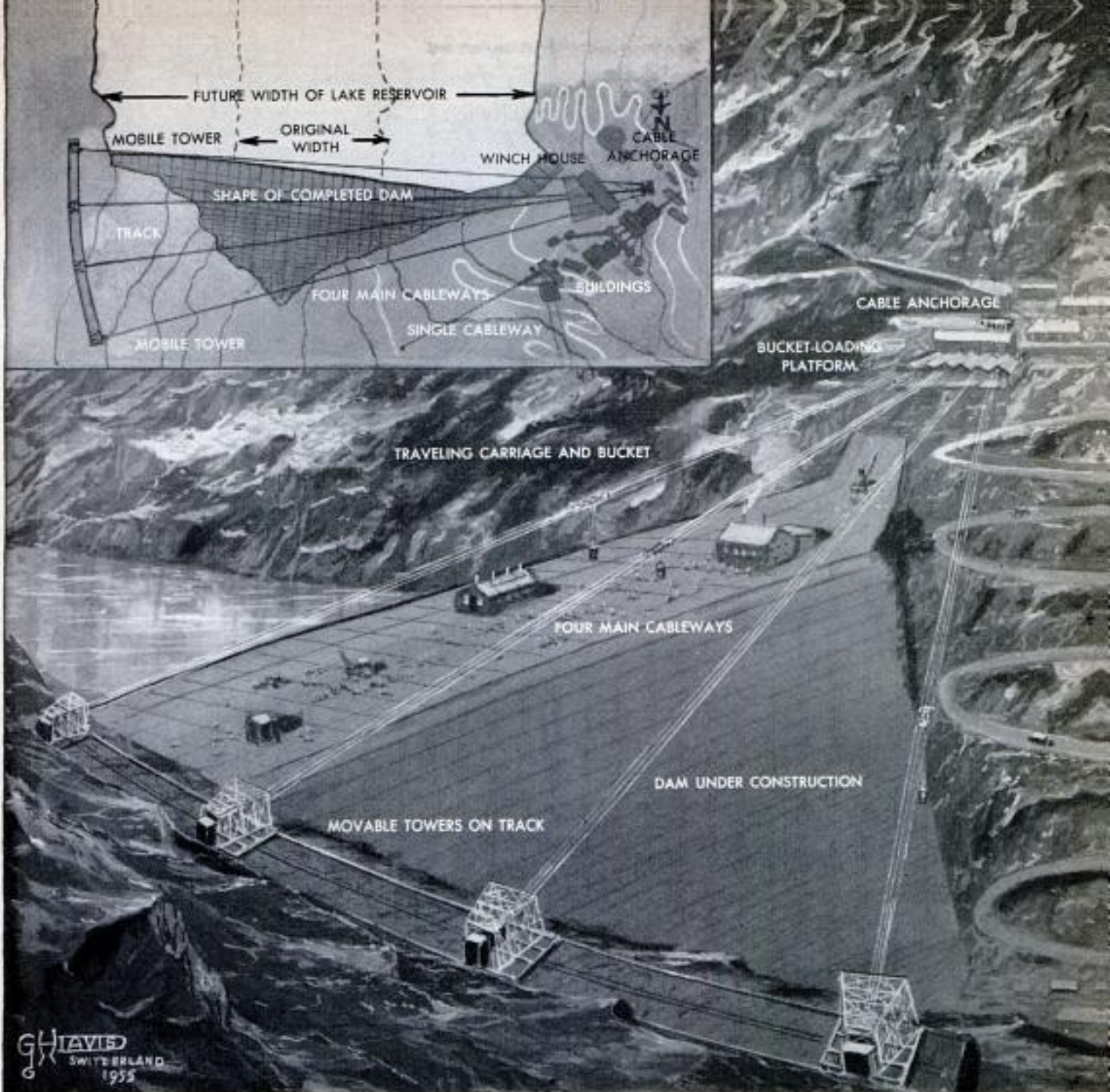
HIGH in the stony mountains of the Swiss Alps, thousands of men toil day and night during the summer months to build a gigantic dam to supply hydroelectric power for Switzerland. Scores of miles of tunnels are being bored through the rock to supply the dam with glacial water.

The 922-foot dam will rise to a point 7750 feet above sea level, which means that it will be at a higher altitude than any large dam in Europe. When finished, it will give Switzerland enough electric power to make her independent of surrounding nations. Surplus electricity will be sold to France, which now must make up Switzerland's power deficiency during droughts.

G. H. Davis, noted English artist, was commissioned by *Popular Mechanics* to visit the site of Switzerland's unique high-altitude dam project and bring back a report. Here is his eyewitness account, in words and pictures.

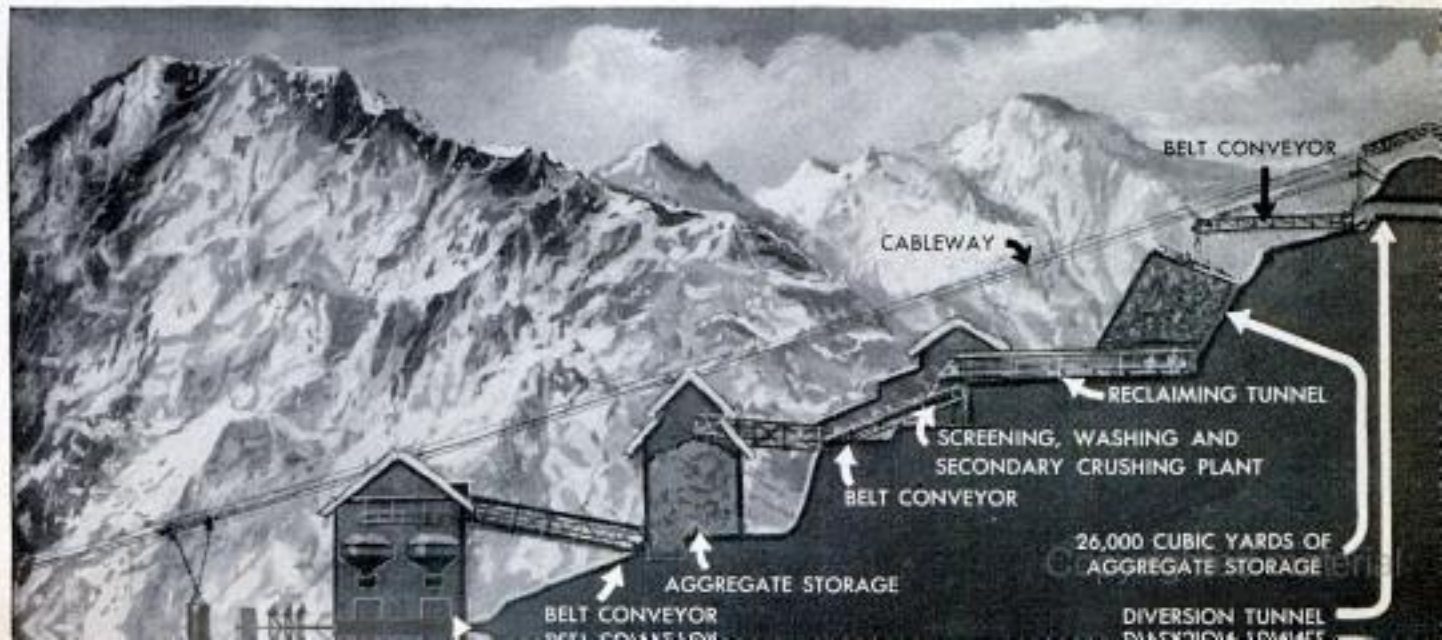
Designed in 1947, the dam was begun in 1950 and is due for completion in 1968, after \$224,000,000 are expended. Over 7,550,000 cubic yards of concrete will have been poured into the completed dam, which will hold back a reservoir of 520,000,000 cubic yards of water.

Three power stations will be supplied with water by the system. The Fionnay station is being constructed beside a compensating basin a short distance from the new dam. An underground tunnel will carry water from the Fionnay reservoir through the mountains to the Rhone-Dixence power station on the River Rhone. Another tunnel will carry water from the dam to the Chandoline power station, which is



Materials and equipment for dam are carried by cableways anchored to mobile towers on a curving track

Concrete plant built on mountainside will furnish a total of 7,550,000 cubic yards of concrete to build dam



also located on the banks of the distant River Rhone.

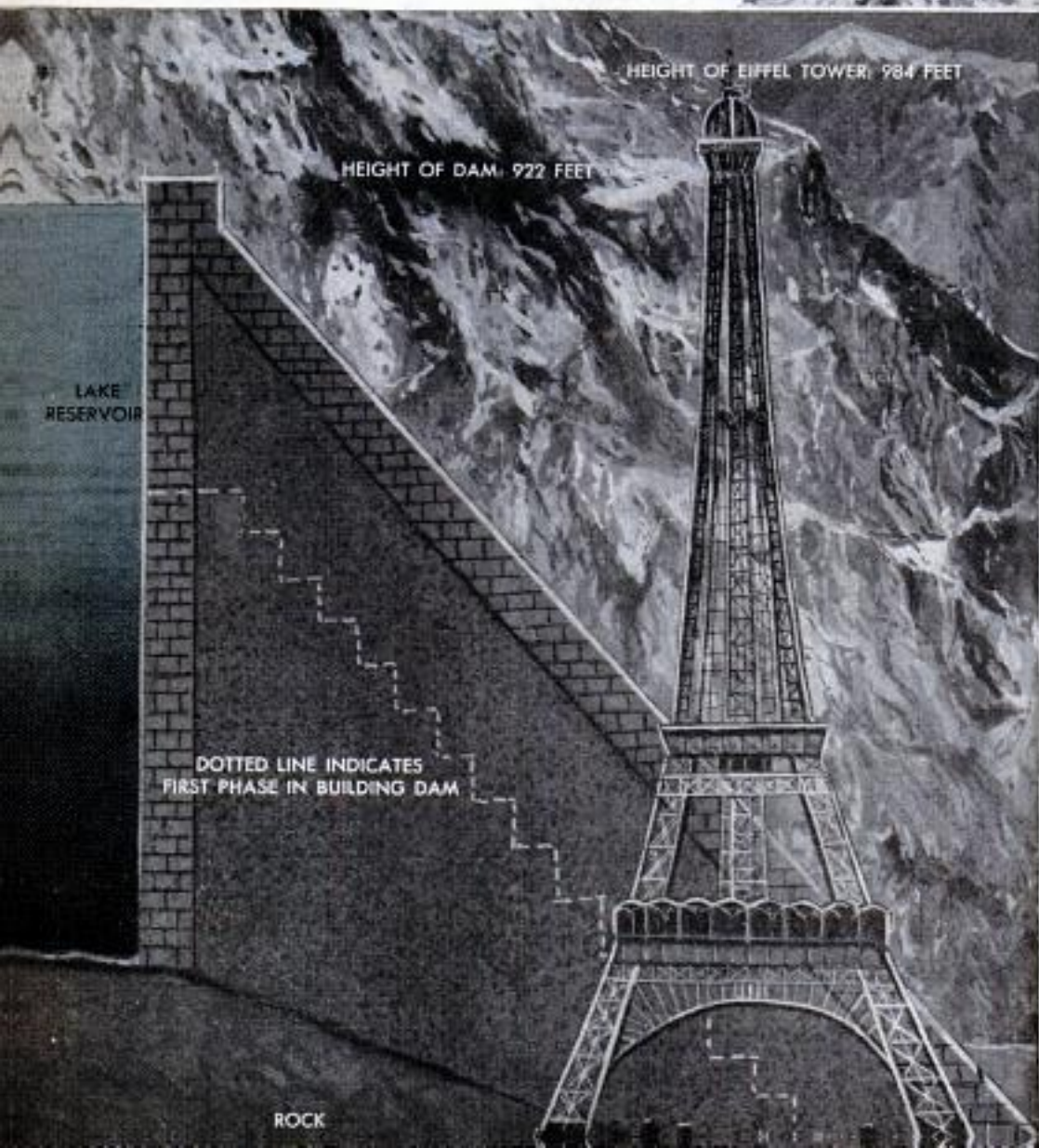
Approximately 20 large and small glaciers will be tapped to supply the dam with water. During spring, summer and autumn, water from the melted surface of the glaciers will spill into the tunnels and rush in torrents through them to the reservoir.

Total length of the water tunnels will be 103 miles. The force of gravity will carry the water most of the way, but at certain points electric pumps will boost it over humps in the subterranean tunnels. The tunnels vary in size, but average 12 feet in diameter.

Last summer, approximately 2000 men working in two shifts (a day shift of 11 hours and a night shift of 10 hours) toiled on the dam. In the winter, six to eight feet of snow covers the area, but work goes on in the tunnels.

Gigantic tools, including much American equipment, have been brought up to the dam site on twisting supply roads cut into the side of the mountain. A small town has

Dam will be almost as tall as the Eiffel Tower. It will be 72 feet thick at top, 721 feet thick at base





With assists from pumping stations, water from melting glaciers will flow through tunnels to dam reservoir

been built on the side of the mountain to house the construction workers.

Concrete for the dam is produced by a special plant constructed for the purpose. All the screen washing and secondary crushing of gravel is performed in the plant. Sheds protect the machinery and the conveyor belts that carry the material on its way. The finished concrete is loaded onto cable cars that swing out over the dam and

dump their loads into the forms below. Huge equipment, including giant bulldozers, can be carried by the cableways and lowered into position on the working area below. Each of the cableways, stretching the width of the chasm, spans a distance of 2900 feet. The carriages that move on the cables have a traveling speed of 17 feet per second.

On the opposite side of the valley from



Thousands of tons of material must be brought up the side of the mountain from valley on this twisting road

the concrete plant and equipment sheds are the unique traveling anchorages of the four main cableways. Four great lattice-steel towers on multiple-wheel trucks support the ends of the cables. The towers rest on a curving track that enables them to move from side to side. With this arrangement, the cables can be moved to cover any point of the dam, and materials and gear can be lowered to desired points in the working area.

The huge power house at Fionnay is being cut out of the solid rock of the mountain so that its front will project slightly over the sheer face of the mountainside.

Its spacious generator room houses six

generators. Controls and transformers are housed in other rooms, and an administration headquarters, auxiliary service installations, living quarters and workshops are housed in adjacent buildings.

The water falls through the outfall tunnels from the dam in three stages. Having passed through the gates in the dam, it passes controlling valves and pressure regulators and surge tanks before reaching the power station. There it drives the water turbines which generate the power. When finished, the gigantic dam will provide power to increase greatly the productive energy of small but extremely industrialized Switzerland. ★ ★ ★

Anticollision Light for Aircraft

Called a "relative-danger light," a new running light for airliners indicates the plane's course to approaching planes. It was developed by an airline pilot. The light actually consists of three lights in one unit. The front light flashes forward three times a second. The middle light flashes to the sides once a second and the

back light flashes astern once every three seconds. The pilot of an approaching plane can determine the position and course by the duration of the flash he sees. Instead of the conventional red light, the new navigational aid uses a blue-white xenon light, known to photographers as a stroboscopic light, which has great fog penetration.



This is southern Chile, in the Region of Lakes. Behind us, Osorno volcano dominates Lake Todos los Santos

Across **FOUR CONTINENTS** *on two cylinders*

*Reprinted "PM
Highlights"*

By Jacques Cornet

As told to Richard F. Dempewolf

SPUTTERING NOISILY, our battle-scarred, heroic beetle of a Citroen wheezed and shuddered over the cobbled square of Notre Dame de Paris and ground to a halt at the curb. A welcoming committee of one excited, gesticulating gendarme promptly greeted us with a ticket for parking in a restricted zone. But who cared? This was home—home after 367 days and 32,292 rugged miles of driving, the likes of which would put a bulldozer to the supreme test.

It was impossible now to believe. Our little 1100-lb., 9-horsepower vehicle, popping along on two cylinders, had teetered on dizzy mountain burro trails that had

Henri Lochon, left, and I smile happily after our return to Paris in May 1954. We had traveled a total of 32,292 miles on four continents in 367 days



DECEMBER 1955

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The roads in Colombia were little better than wide mud beds. We were stuck several times a day, and usually had to dismantle the car before pulling it out

never seen a tire. Stripped to little more than chassis and body frame, it had jounced over rock outcrops to cross a roadless Andean peak 17,000 feet in the Bolivian sky. It had put-putted faithfully across the trackless, desolate wastes of Patagonia to the southernmost tip of the Americas. Tired engine throbbing with heat, it had carried us 1000 miles over the burning Sahara Desert, where a compass showed the route. In fact, thinking back, it seems a remarkable number of those 32,292 miles were roadless. Life was a nightmare of plunging through swamps and creek beds, swishing through sand on beaches at low tide to circumvent impassable mountains, bounding cross-country with only the stars for road signs — and heaven knew what obstacles ahead.

Naturally, all this was something more than just a carefree summer motor tour. For four years, my friend Henri Lochon had nursed a burning desire to drive a car down the Pan American Highway—from





The landscape of the Atacama Desert in Chile makes one think he is driving on the moon. Here we fix a flat

Mexico clear to Tierra del Fuego, last point of land at the foot of South America. He talked about it ceaselessly on the holiday motor trips we took around Europe—to the Austrian Alps for skiing, Cannes for spear fishing, to Italy, Spain and Corsica just for sight-seeing. Motoring was a hobby we enjoyed and shared together at every opportunity. I agreed that South America was a fine idea, but my desire was to tour North America.

"Why not do both?" Henri said one day. "Pool our money, buy a new car and plan a year's expedition across all of the Americas. We could make a tour probably no car has ever covered."

The more we thought about it, the more exciting it seemed. Why not? We were healthy and young (he 29, I 27). We pored over maps. We would go by ship to Quebec, drive down through Canada to New York and Washington, head west across the United States via Chicago and Salt Lake City to San Francisco. From there

it would really begin—down to Los Angeles, then to El Paso to pick up the Pan American and drive effortlessly (we thought) through Central and South America to the bottom of the world. Then, up the east coast to Rio and sail home. What a tour!

The next months were a maelstrom of planning and preparation, much of it undertaken by Henri, since this was his "baby." Because of its small size, light weight, and the fact it can be easily dismantled to go almost anywhere, the Citroën seemed like a good car for our journey. It has a simple two-cylinder air-cooled engine and a rugged four-speed transmission. It holds four passengers. With Henri and me in front, the entire rear could be used for our gear, food, and reserve water and fuel. Another unique feature is that the doors and side panels of this little car are removable simply by slipping them out of slots. For driving through mud, or up precipitous slopes, such a reduction in weight

Left, the only gas station for 1000 miles in Patagonia. Right, sometimes we had to pave our own roads





In Nicaragua we discovered that mulepower was better than horsepower for pulling a car out of heavy mud

can mean the difference between going someplace or turning around in defeat. This feature was to save our expedition many times before we were through. The car was standard except for one modification in the suspension system. The wheels were mounted on movable arms, tied together by a system of spring rods similar to torsion bars. With the rear of the car weighted, rocking motion was thus controlled, resulting in a firm, flat ride and plenty of clearance.

We shopped for lightweight equipment, necessities only—nylon jackets and trousers, canvas shoes, light rubber sleeping bags and air mattresses, a small nylon tent, aluminum utensils, watertight aluminum cases for cameras, aluminum tanks to hold fuel and water. A tiny box held powdered milk, coffee, wheat and chocolate tablets, vitamin pills and some canned foods. With those few things and the two of us, the Citroën was bulging.

At 3 p.m. on May 8, 1953, our compact expedition roared bravely out of the plaza in front of Notre Dame, while dozens of friends cheered and waved us off. It was a year and two days before we saw them again. In no time, we were weaving through jumbled traffic in the waterfront streets of Le Havre. We watched from the pier as a deck crane lifted our car in a sling and lowered her through a yawning hatch into the hold of the British ship *Scythia*. We didn't see it again until the *Scythia* sailed up the St. Lawrence River and deposited us at Quebec. From that ancient walled city, on May 20, 1953, our great adventure on wheels really began.

The first leg, on good Canadian and United States roads, whizzed by without mishap. Our two-cylinder bug "sang" up the St. Lawrence valley, through Montreal, Niagara Falls, New York and Washington. Along the way we began to hear rumors that we might not have clear sailing through Central and South America. And, at Pan American Union headquarters in Washington, the rumors were confirmed. "There is no Pan American highway linking the Americas," the man told us.

Good blacktop highway spears through Mexico, we learned—but at the Guatemalan border the road would peter out to muddy cart ruts, cattle trails and a jagged mountain wilderness for an impassable 25 miles. After that, we might make it along poorly graded one-way paths hanging on mountainsides to Guatemala City, and over fair roads in El Salvador. But in Costa Rica a good highway that soars to a pass 11,000 feet high, from which one would see both oceans, suddenly dead-ends against a mountain and doesn't pick up again until 150 miles later in Panama.

"Worst of all," said our informer, "is a 250-mile gap in the steaming tropical rain forest of Darien, south of Panama, where hostile Indians inhabit jungles and swamps that make the Everglades look like a duck marsh. This part has never even been surveyed for roadway. In southern Ecuador another nonexistent section separates Riobamba and Macara, and your car will have to be carried by plane or train."

What about all those rugged fellows we'd heard about who drove jeeps and "house trucks" from Alaska to Argentina and



The Citroën was not designed to be amphibious but it proved to be just that. This is a river in Ecuador

wrote articles? Our friend grinned. "No one has driven from Alaska to Argentina—or will in our lifetime, probably."

Most car drivers, we discovered, resorted to ships around the Darien jungle—like Leonidas Borges de Oliveira who claimed to have driven a Model-T Ford from Rio to New York. Borges and two friends built 116 bridges and three rafts during their nine-year trip across the Mato Grosso. At each bridge, the Model-T was dismantled, carried across, and rebuilt on the other side!

With this gruesome news, we headed for the West Coast via Detroit, Chicago and Salt Lake City, determined to try our luck anyway.

Through San Francisco, Los Angeles and El Paso we purred along as planned. The sunlit landscapes of Mexico whirled past in a panoramic kaleidoscope of towering mountains and fields, huts and mansions. Colorful Indians and drab peasants trudged the roadside, leading dejected little burros buried under prodigious loads. We ducked and dodged mad-cap Mexico City taxi drivers whose least concern is another car or a pedestrian. Still we zoomed southward with a problem—through Puebla, Mitla and Oaxaca, where we stopped long enough to see the magnificent Zapotec temples that had

been destroyed by the Spanish conquistadores, and to tighten up our steed, check her tires, fuel and engine performance for what lay ahead.

At Tehuantepec we ran out of hard-surface highway, and never saw any again until Oran, 20,000 miles later.

Now the fun began. Guatemalan border mountains loomed ahead. The road narrowed to a rutted, rocky ox path that rapidly dwindled to a foot trail through towering forests. A normal car could never have squeezed between the trunks of virgin jungle giants that crowded our Citroën. The first river was easily forded. Then came another—deeper. We pushed the Citroën across. Then another and another. Jungle closed in until we had to alternate

The date is Christmas Eve, 1953, and we have just disembarked from this landing craft of the Chilean marines after crossing Strait of Magellan





In emergencies, we had to improvise. When the jack broke in the Atacama Desert we replaced it with stones

walking in front of the car with machete to clear a path, signaling the way to the driver. Advancing a few feet at a time we came to the edge of a rushing stream, and drove confidently into it. Almost instantly, the wet motor died. For hours we battled with rope, tackle and jacks, inching our dismantled car to the opposite shore while the glittering eyes of ugly five-foot iguanas peered at us from the foliage. Once across, lianas tangled around us. The car sank in soft earth. No amount of chopping or hauling would free it. Steaming heat descended like a fog, and the mosquitoes went to work on us. We were stuck. This was it. Henri threw up his hands. "Back to the Mexican National Railroad," he announced. "We aren't the first."

That night was spent in the jungle. Without emergency food and equipment it might have been worse. Next day, we stripped the car and pulled it by hand line some 10 miles to the tracks. Then another trip to pack in the rest of our gear. We waved down the first freight and piled aboard for the half-day train ride around the mountains into Guatemala.

Except for incredible 45-degree slopes that worked our little two-cylinder engine to fiery heat, requiring many cooling-off stops, the mountainous road to Guatemala City from the railhead was fairly good. It curled through spectacular canyons, past lush coffee plantations, Mayan ruins and the fabulous palace of Antigua where Spaniards once ruled all of Central America. After ignition and tire repairs at Guate-

mala City, we headed south again, good as new. And for hundreds of miles through El Salvador and Nicaragua, everything was great. We began to scoff at the dark tales we'd heard.

Then we saw the terrifying, jagged peaks that separate Nicaragua from Costa Rica. What's more, the rainy season was in full swing. As we progressed, the road became a sewer of mud—three feet deep in spots. We bogged down a dozen times, finally unloaded, jacked up the Citroen and put on chains while a knot of wet, bedraggled Indians gathered to watch and shake their heads. Not a man, they told us, had been down this road in four months. We must be crazy. For a while the chains helped. Then, thigh-deep in muck, we pushed, hauled and rocked from one mudhole to the next, advancing a few feet at a time. Wheels churned against nothing, the engine overheated, the heat was sickening. Finally, the little car thumped into a huge hole and gave up. It took six mules and as many drivers to pull us out of there—and we decided to take to the sea. We thumped and ground our way to the coast where we boarded a ship for the Panamanian border. From there to Panama City, the road was good. And when we learned on arrival that a French ship was about to depart for Buenaventura, Colombia, we gave up all thought of attempting the Darien jungle and just drove aboard.

Once cleared by customs, we lost no time getting out of Buenaventura. Though pitted and washed out, the road was passable. But



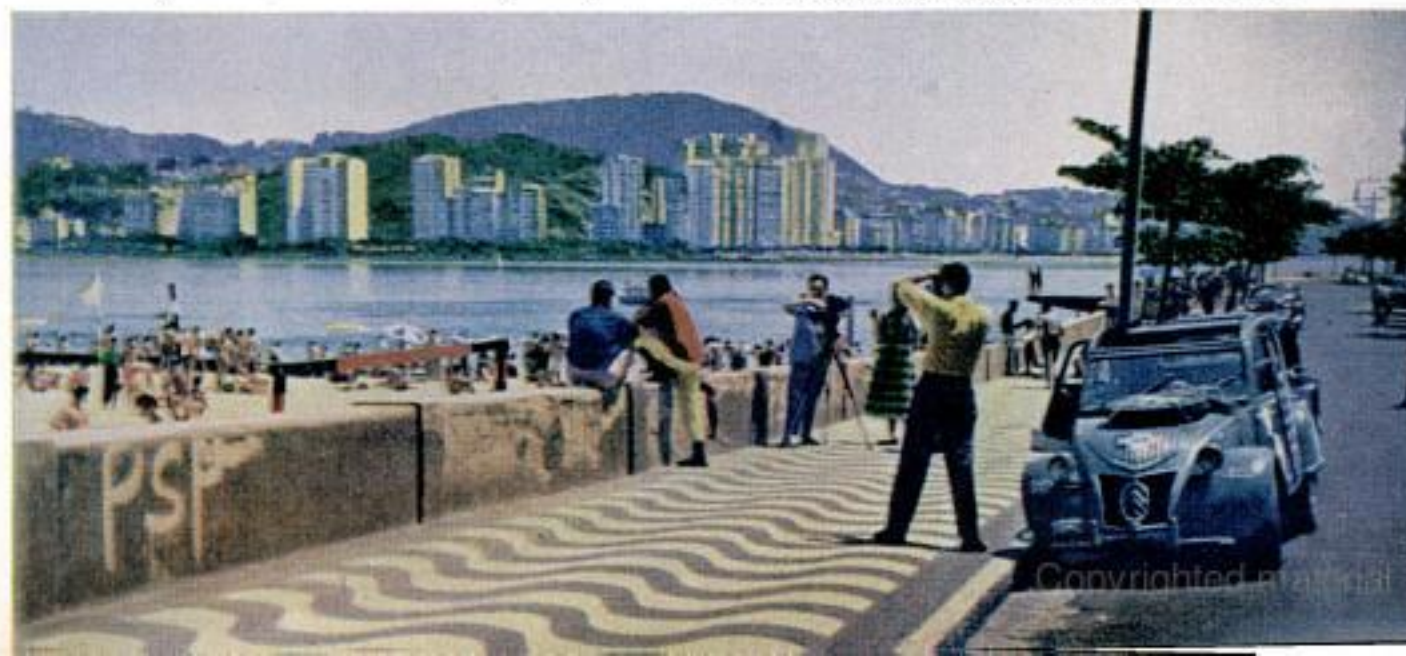
A water and oil break at the northern end of the Atacama Desert. South of here the vegetation disappeared

the creaking, rotten wooden bridges gave us many a qualm. Outside Cali, on the way to Bogota at night, one of these ancient contraptions finally did come apart under us. With a thundering crash the floor gave way and we crashed nose-first into the river bank, exploding both front tires, denting the wheels and snapping the axle. We had barely hauled the car up to the roadside when we heard shots and galloping horses from a nearby hill. Someone had heard us. We'd been warned not to travel at night. Guerillas lurking in these hills shot at anyone. Though famed for their remarkable inaccuracy with guns, stray shots had been known to graze people now and then. We doused the lights and waited. The first horseman shot past us, thundered right



Crossing the Rio Blanco at the equator, we had to disassemble car and reassemble it on the other bank

The mosaic pavements of Rio de Janeiro, Brazil, look wonderful after the thousands of miles of wilderness



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In Bolivia, the little 9-horsepower Citroen was stripped down for an altitude run. After a hazardous ride we reached a record-breaking 17,000 feet (5420 meters), certified by the Automobile Club of Bolivia



Above, Indian women living near Lake Titicaca in Bolivia wear melon hats as they do a festival dance. Below, nothing ever looked as good as Paris, the Champs Elysees and the Arc de Triomphe on our return



through the hole in the bridge, bashed himself against the far embankment and lay groaning. Those following reined in just in time to avoid the same fate, and rushed to his assistance with much chattering. The confusion played into our hands. Henri flipped the ignition, hit the starter and the faithful little car revved up in fine shape. Flat tires, bent wheels, broken axle and all, she went shuddering down the road at a great clip. Those horsemen never knew what took off from there.

We limped into Bogota next morning and cabled a friend in Paris to send new axle, tires and parts by air. They arrived in two days. We waited six more while the damage was repaired by an Indian "mechanic" who could not understand us, nor we him. This may be why he installed the axle upside down—who knows? The error came to light 5000 miles later when, grinding over a pass in the Chilean Andes, the upside-down axle, unable to stand the unusual stress imposed on it, snapped in two and left our front wheels knock-kneed.

Until that happened, there were other things to prevent lethargy. The Citroen bounded unhappily along the poorly graded mountain roads through Ecuador—frequently bottoming out on rocks jutting from the high-crowned, deeply rutted trails. By the time we hit the interminable straightaway to Lima, on the Peruvian coast, seven breaks in the chassis were held together precariously with baling wire. Every place we stopped, curious natives gathered to stare at the muddy, wobbly little car and its haggard occupants. Tropical

(Continued to page 236)

KEEPING UP WITH THE ATOM

LARGEST atomic power plant contracted for in the U. S. is the \$45,000,000 installation General Electric will build for Commonwealth Edison Company of Chicago. A scale model (right) of the dual-cycle boiling reactor plant, which will generate 180,000 kilowatts, was shown at the Geneva atomic conference and later taken to Chicago for public exhibition. Individual earphones connected with the model bring a description of the project to the listener in English, French, Spanish and Russian. The reactor will be built at the junction of the Kankakee and Des Plaines rivers, southwest of Chicago, with completion planned for 1960.



☆ ☆ ☆

To detect the minutest variations in thickness of aluminum, steel, plastic and other materials, Pratt & Whitney has devised a beta-ray gauge (below). Not only does the gauge sense changes in thickness or weight of the material as it comes from the rolling mill, but it makes a record at the same time, accurate within a few micro-inches. Radiation is within safe limits.

☆ ☆ ☆

Because radioactive phosphorus seems to accumulate more in cancerous tissue

than noncancerous, injections of the substance under the skin are proposed by a Japanese scientist for the diagnosis of cancer of the stomach. He reported that his method proved close to 100 percent correct in diagnoses.

☆ ☆ ☆

To produce a light that will burn without fail in storm or battle, independent of electric lines or batteries, the Navy is experimenting with phosphors which glow like luminous watch dials under bombardment of radioactive strontium 90. A lamp has been developed which emits light ten times as strong as bright moonlight.

☆ ☆ ☆

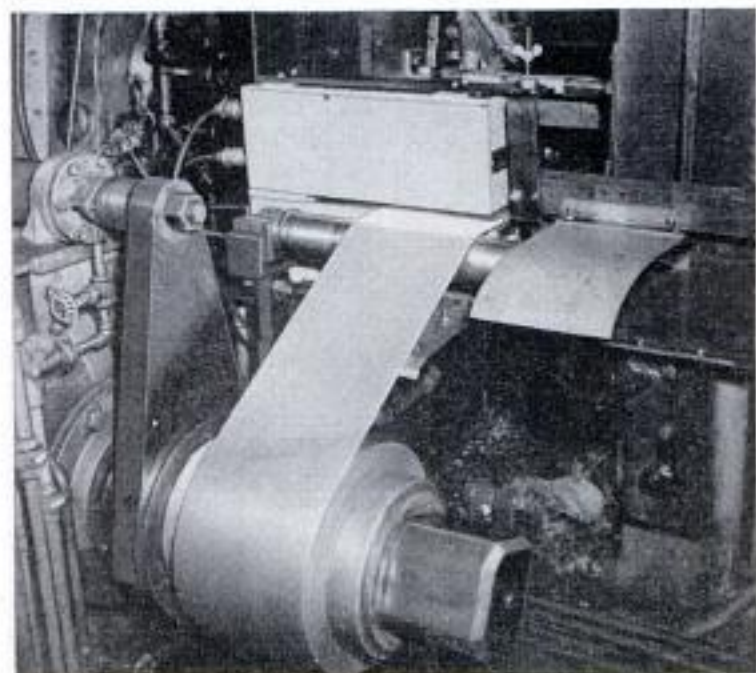
The United States Army is experimenting with radiation to prevent formation of mildew in shoes.

☆ ☆ ☆

Both Russian and American scientists are using carbon 14, the radioactive form of carbon, in botanical experiments seeking to pry loose the secret of photosynthesis.

☆ ☆ ☆

Venezuela plans a nuclear-research center at the Institute of Neurology and Brain Disease Study at the capital, Caracas.



Assembly-Line Operation Speeds Jets Into Air

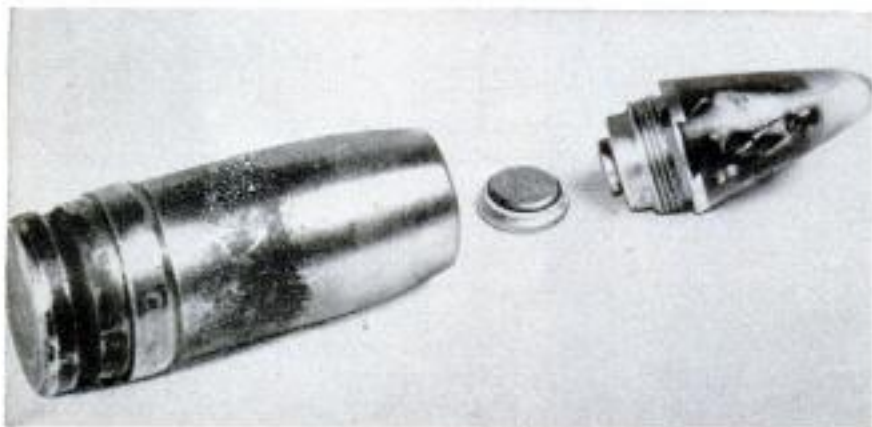


Jet planes are readied for their first flights more quickly by a modification of the automobile assembly line. The planes are placed on dollies that run on rails under open-shed roofs. At specified inter-

vals, a tractor pulls the whole line of dollies ahead one station to move the planes sideways for the next step in their final pre-flight check. When the planes reach the end of the line, they are ready to be flown.

German Trailer Is a Boat, Too

Hook a new German trailer on the back of your car and you have the ingredients for a sportsman's vacation. The multipurpose trailer has a canvas top with plastic windows and screening. It sleeps two persons. After serving as sleeping quarters, the trailer becomes a boat in the morning. It even has an air-cooled outboard motor on the back end (which probably should be called the stern) so you don't have to row. Over-all, it measures four by seven feet.



Shell Radios Data

Equipped with a miniature radio transmitter, a 20-mm. shell broadcasts information during its flight. The transmitter is sealed in the shell's plastic nose. It is powered by a mercury battery about the size of a dime. The transmitter broadcasts information on the shell's spin rate.

"Pogo" Lands In 50-Foot Area

Turboprop powered and capable of more than 500 miles per hour in level flight, the Convair XFY-1 "Pogo" uses only a 50-foot square of the big 8100-foot runway at Lindbergh Field (see arrow), San Diego, Calif., as an operating base. Like an elevator, it takes off straight up and lands straight down, settling gently onto four caster-like wheels set into the wing tips.



Off-Center Radar Picture Tube Gives Added Forward Vision

Ships can "see" 50 miles ahead and 30 miles behind with a special radar cathode-ray tube. General Electric, which developed it, calls it the "far-sighted, near-sighted radar indicator tube." Engineers built the first tube by taking a standard 17-inch TV picture tube and installing a different phosphor screen and electron gun. Then they bent the glass neck of the tube five degrees so that the electron gun would give an off-center indication on the screen. The tube, used on Navy cargo vessels, gives added forward vision without the addition of a larger tube and a more expensive radar set.

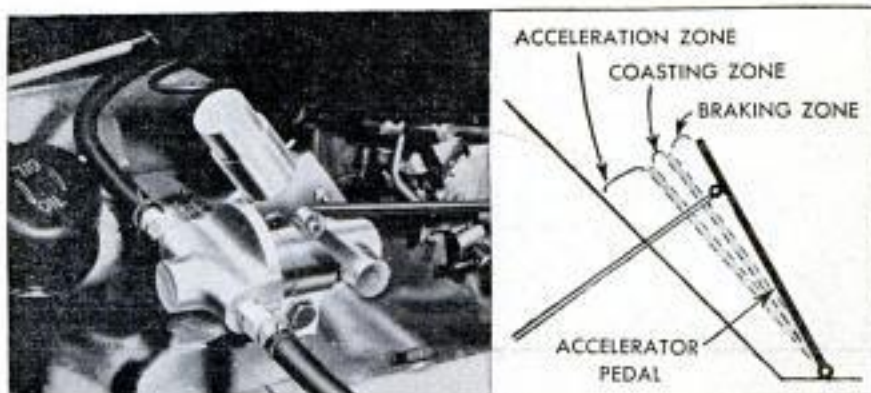
Lopsided radar picture tube was made that way to give 50-mile forward view, only 30-mile rear view. The former range was 40-mile radius

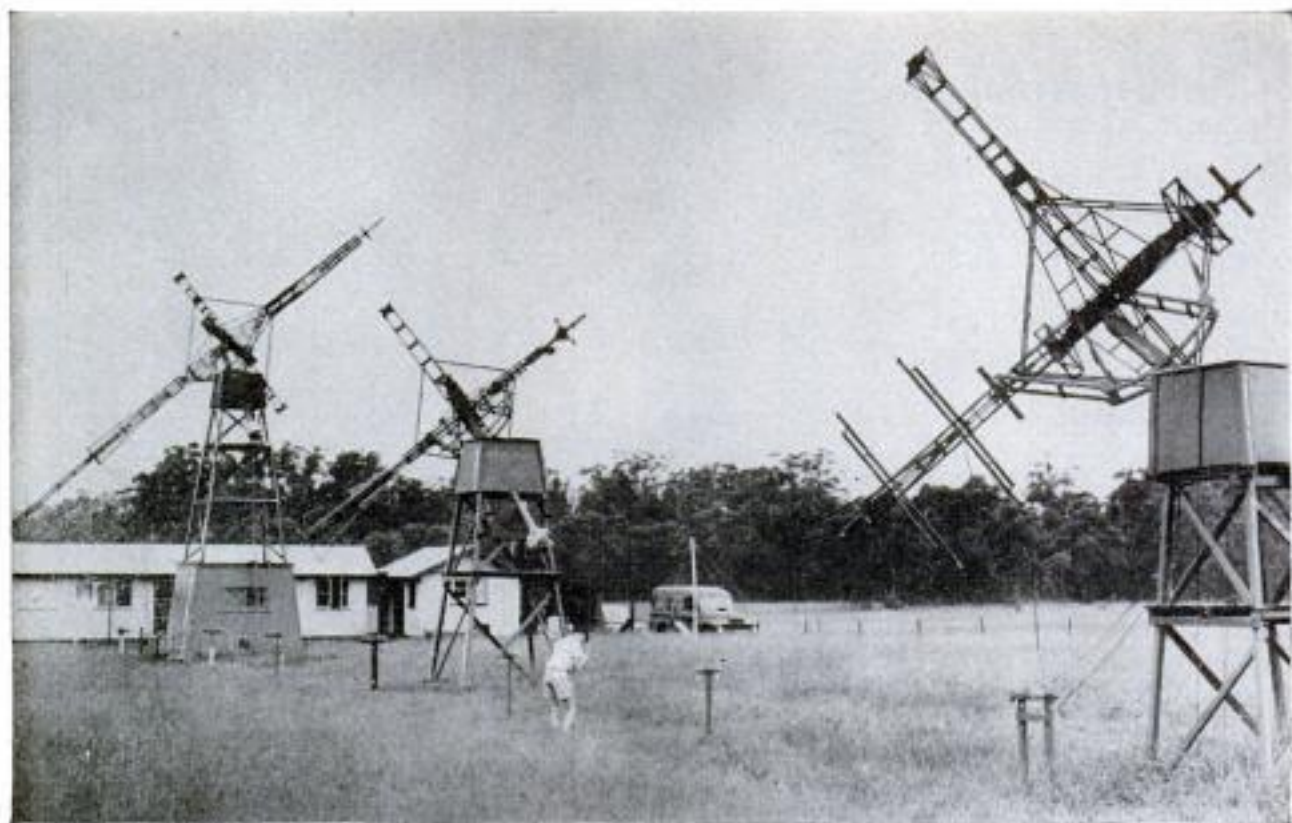
Now That the Clutch Pedal Is Extinct, Is the Brake Pedal Next?

Single-pedal control of the automobile is possible with an automatic braking system that operates from the accelerator pedal.

A metering control valve mounted inside the engine compartment applies the brakes, using manifold vacuum for power. An inch is added to the accelerator travel on the upper end of its movement. This extra inch provides a braking zone (the first three-quarter inch of travel) and a coasting zone (the next one-quarter inch). When the

driver releases the pedal all the way, the brakes are automatically applied. He can release it part way to let the car roll.





Rhombic aerials rotate to follow the sun and pick up bursts of intense radio waves that are emitted by it

RADIO "EYES" PEER INTO SPACE

WITH STRANGE-LOOKING instruments that catch radio waves from the stars, Australian scientists are probing the mysteries of the universe. So far they have identified 100 "radio stars"—highly localized sources of cosmic static.

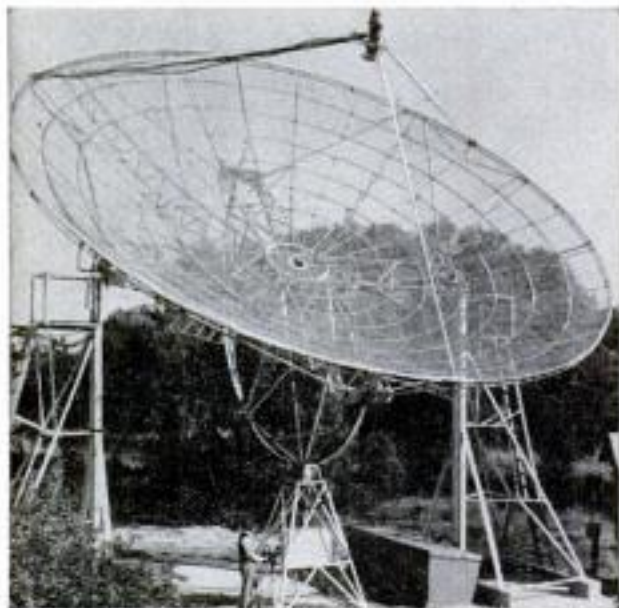
Several of the instruments are used to study the radio waves that originate on the sun's surface. A "quiet" sun emits a

constant radio signal indicative of its temperature. But when great columns of fire shoot from its surface, the radio waves change and the earth experiences radio fadeouts and magnetic storms.

Near Sydney, three separate rhombic aerials rotate to follow the sun from sunrise to sunset. They are connected to radio receivers that tune rapidly from 40 to 240

Radio telescope is designed for studying distribution of neutral hydrogen in space. It is 36 feet across

Antennas arranged in a right angle beside reservoir pinpoint areas on sun where radio waves originate





Radio telescope on cliff near entrance to Sydney Harbor is mounted in bowl hollowed out of the ground

megacycles each second, and record when and on what wavelength any of these transitory disturbances occur.

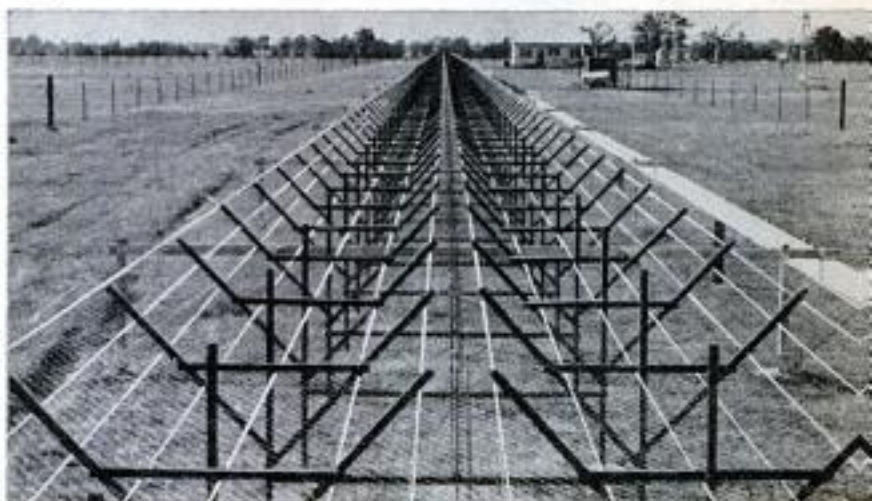
Another installation consists of 48 parabolic "dish" antennas arranged in two rows at right angles to each other. Operating in a very narrow range, the system can pinpoint any existing active radio areas on the sun.

The distribution of neutral hydrogen in space is investigated with a small radio telescope that has a bowl antenna 36 feet in diameter. Hydrogen gas is audible on its receiver as a steady humming note.

A larger radio telescope in use is 80 feet in diameter and is mounted in a bowl hollowed out of the ground on a cliff near the entrance to Sydney Harbor.

Australia's biggest radio telescope, however, is the "Southern Cross," named for its shape. Each of the 1500-foot arms of the cross contains hundreds of receiving elements which pick up the minute static of far-distant radio stars.

Eventually this equipment will be augmented by a giant saucer-shaped aerial 250 feet in diameter that will rotate between two towers 200 feet from the ground. This will allow the telescope to scan any section of sky. ★ ★ ★



Receiving elements of "Southern Cross" radio telescope run parallel to its length. Wire netting is strung beneath them

Arms of Southern Cross, Australia's largest radio telescope, are each 1500 feet long. Operating frequency is 85 megacycles



What Kind of Camera for You?



BOX

The Kodak Duaflex IV, a reflex with a 75-mm fixed-focus lens, uses 620 roll film with 12 2¼ by 2¼ exposures. Flash is synchronized. There is double-exposure prevention. Speeds are instant and bulb

SHOPPING FOR A CAMERA? Even the seasoned amateur may be perplexed by the wide range of types, makes and prices. What are the features of the box type, roll, reflex, miniature, subminiature, press or stereo? Which will best serve your needs? The pages that follow are intended to help you choose. There are many other cameras of the same types available at wide price ranges; those shown here are typical.



Another fixed-focus reflex type is the Anscoflex II. It uses 620 roll film, has built-in flash synchronization and a double-meniscus lens. A sliding front panel protects the lens when not in use. Built in are a yellow filter and a close-up lens which fall into place at turn of dial



Simplest of the Kodak Brownies is the Holiday, a midget box camera that takes eight exposures, 1½ by 2½, on a roll of 127 film. It has Kodet f:15 lens in a shutter with a speed of about 1/50 second. The extra-large view finder is at eye level and of the optical type. It has a body release and neck strap. The flash attachment is optional, uses midget bulbs

BOX CAMERAS are the easiest to operate and the most inexpensive. (These range in price from \$2.95 to \$15.95.) You just aim and click the shutter. If the light is good, or if you have a flash attachment, you'll get an excellent snapshot. But you can't take fast action or close-ups. The simple, fixed-focus lens prohibits big, sharp enlargements. Box cameras have one speed (about 1/25 second) plus time exposure.

Most conventional in appearance, the Zeiss Tenger box camera is the only one which has more than one focusing zone. There are three self-changing supplementary lenses. It takes eight exposures, 2¼ by 3¼, on 120 roll film, has a Goerz Frontar f:9 lens, three apertures, waist-level view finders, built-in synchronization for flash, 1/30 second and time release



The Argus 75 has a reflex-type view finder with a folding metal hood, takes 12 2¼ by 2¼ exposures on 620 roll film, has a fixed-focus f:13 lens with instant and time settings, a body release, built-in synchronization and double-exposure-prevention device





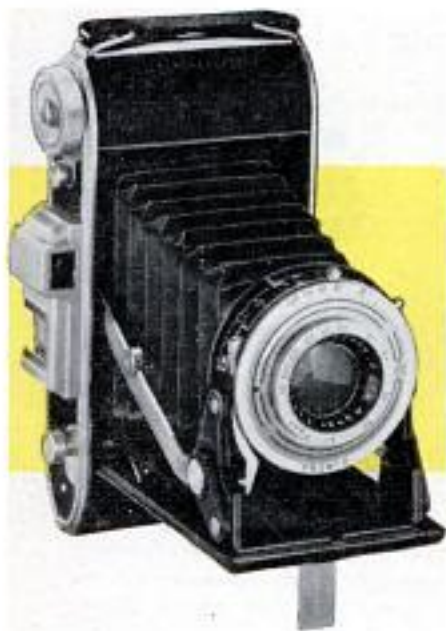
Speeds from 1 to 1/500 are possible with the Super Ikonta A, which takes 16 exposures, $2\frac{1}{4}$ by $2\frac{1}{4}$, on 120 roll film. It has a coated 75-mm Zeiss Tessar f:3.5 lens in shutter, an eye-level finder, coupled range finder, depth-of-field guide, automatic shutter lock, body release



ROLL

The Kodak Chevron shoots at 1 to 1/800 second. It takes 12 exposures, $2\frac{1}{4}$ by $2\frac{1}{4}$, on 620 roll film, has a 78-mm. Kodak Synchro-Rapid 800 shutter, a depth-of-field scale, built-in synchronization for FM and electronic flash, coupled range finder, minimum focusing distance of $3\frac{1}{2}$ feet, lever-operated film stop and counter, parallax correction, eye-level view finder

A coupled range finder and view finder in one window comprise a feature of the Super Ikonta III. The folding camera takes 12 exposures, $2\frac{1}{4}$ by $2\frac{1}{4}$, on 120 roll film. A Synchro Compur shutter (MX) gives speeds of 1 to 1/500 second. You can also set the camera for bulb release. Accessories include close-up lenses, filters, lens shade, camera case



Eight exposures, $2\frac{1}{4}$ by $3\frac{1}{4}$, are shot on a roll of 120 film by the Ansco Viking f:4.5. It has a coated f:4.5 Agfa Agnar lens, Pronto shutter, speeds 1/25 to 1/200 and bulb, eye-level view finder, built-in synchronization, built-in timer, manual focusing and a swing-out film spool



MOST ROLL CAMERAS, nonreflex, nonminiature, are distinguished by a collapsible bellows. A few have a screw-out lens mount instead. A general-duty camera, the roll has plenty of versatility and takes a lot of punishment. The wide price range starts just above the box cameras. The most expensive have the refinements and advantages of the very best cameras. These five range from \$45 to \$199.

Automatic loading and a lens-coupled range finder are features of the Ansco Super Speedex, which takes 12 $2\frac{1}{4}$ by $2\frac{1}{4}$ exposures on a roll of 120 film. Its Synchro-Compur shutter gives speeds of 1 to 1/500 second and bulb release, and it is fitted with an Agfa Solinar f:3.5 four-element lens. The camera has automatic film transport and a rim-set shutter and lens diaphragm





35 MM.

You focus the Graphic 35 by the push of a button. The camera takes up to 36 exposures and has a 50-mm. Graflex f:3.5 lens. Its Prontor SV5 shutter has a speed range from 1 to 1/300 second, in addition to a bulb release. Its minimum focusing distance is three feet, and it has built-in synchronization for electronic flash, F and M-delay lamps. The camera has coupled range finder, eye-level view finder, push-button body release

THE 35-MILLIMETER miniature camera is compact, easy to carry, ideal for casual, candid shots and the favorite for color photography. A color transparency for a viewer or projector costs about 10 cents less than the next larger size. With 20 or

36 shots on a roll, you get more shots per dollar in black-and-white photography, too. Of course, this can be a disadvantage if you take only one or two shots at a time. Another disadvantage of the small film size is that enlarging the small negative emphasizes its faults. Your exposure must be precise. The more expensive 35s have the highest speeds and greatest versatility of any camera, and can be fitted with long-focus and wide-angle lenses. Some have focal-plane shutters. Prices range upward from \$30. These are \$84.50 to \$261.



A rapid-feeding lever with automatic shutter-cocking device and exposure counter is a feature of the Ansco Karamat, which is cartridge loaded and takes up to 36 exposures. It has a coated 50-mm. Schneider Xenar f:2 lens, and also a depth of field scale, Synchro-Compur shutter with speeds from 1 to 1/500, time and bulb release, coupled range finder, helical focusing



A chief feature of the Kodak Retina IIc is the two-section 50-mm. f:2.8 lens, the front half of which can be replaced with telephoto or wide-angle components. The camera has a coupled range finder combined with a projected-frame view finder, a Synchro-Compur shutter, 1 to 1/500, a self timer, rapid film-advance lever and automatic shutter setting

Automatic shutter cocking and a double-exposure and skip-frame prevention device are featured on the Argus C-4. It takes up to 36 exposures on cartridge film, has a 50-mm. coated anastigmatic lens, behind-the-lens shutter, 1/10 to 1/300 second, a combined range-view finder of the superimposed-image type, exposure counter, focusing from three feet

The metal focal-plane shutter of the Contax IIa has speeds from 1 to 1/1250. A self-timer gives 3, 6, 9 and 12-second delay. The camera takes up to 36 exposures on cartridge or spool film, has a bayonet-type lens mount, a film-type indicator, automatic film transport, exposure counter, coupled range finder, depth-of-focus guide, full synchronization





A 35-mm. single-lens reflex, the Automatic Exakta VX takes up to 36 1 by 1½ exposures and has a focal-plane shutter and built-in flash synchronization, fully automatic diaphragm, eye-level view finder, coupled split-image range finder and f:1.9 lens. Many variations of camera and lens are available



Twin-lens reflex Rolleicord V uses 120 roll film, has adjustable back for 2¼ by 2¼ and 35 mm., f:3.5 lens, Synchro Compur shutter, 1 to 1/500, parallax compensation, self timer, sports finder, depth of field scale, light-value scale with coupling device and bayonet mounts

REFLEX

The Rolleiflex Automatic takes 12 exposures, 2¼ by 2¼, on 120 roll film; has an f:3.5 lens; shutter speed from 1 to 1/500; light-value scale; shutter and self timer coupled to rapid film transport; waist, eye-level focusing magnifiers



Automatic shutter cocking is a feature of the Ikoflex IIa, which takes 12 exposures, 2¼ by 2¼, on 120 roll film. The lens is a 75-mm. coated Zeiss Tessar f:3.5. The camera has a Synchro Compur shutter, speeds from 1 to 1/500, an extra-bright reflex finder of combined magnifier and Fresnel grating and a focusing magnifier. Lens shades, slip-on lenses are available



REFLEX CAMERAS are of two distinct types: single lens and twin lens. With both, you see the picture in actual negative size as you focus. In the twin-lens reflex, the top lens provides the image you see in the hooded ground glass at the top of the camera and the bottom lens takes the picture. The single-lens reflex reflects an image from the camera lens itself. Some single-lens reflexes contain an eye-level viewer. With either camera, focusing is easy; the lens is moved back and forth until the image is in focus on the glass. No range finder is needed. The single-lens reflexes are compact and have interchangeable lenses. These five cameras range from \$126 to \$398.70.

Another single-lens reflex is the Contaflex I, which is loaded by 35-mm. cartridge. It has a 45-mm. Zeiss Tessar f:2.8 lens in Synchro Compur shutter, which gives it speeds of 1 to 1/500 second, in addition to a bulb release. The camera has a self timer, built-in MX synchronization, ground-glass and split-field range finder, automatic preset lens diaphragm, shutter cocking and eye-level focusing, picture counter, flash connections, double-exposure prevention





The Linhof Super Technika 4 by 5 press camera features a rising, falling, tilting, swinging, shifting front and a tilting, swinging, revolving back. An adapter handles 2¼ by 2¼ roll film. Extra lenses, like the multifocus view finder shown, are optional. The built-in multifocus range finder can be coupled to as many different lenses as desired. The Universal back with Kodak Ektalite Field lens takes all standard 4 by 5 holders, Polaroid back, enlarging attachments, etc. Track is triple extension. Leather bellows extends 17 inches

PRESS

THE PRESS CAMERA is the choice of most newsmen because it is rugged, dependable, suitable for action shots or portraits, and uses cut film so you can take a picture and develop it immediately. It is also expensive (these range from \$239 with lens to \$330 without lens). Each negative must be loaded separately, unless you use film packs. Although bulky, it is very versatile.

THE ONE-MINUTE CAMERA which develops its own pictures is luring professionals as well as amateurs. New films give sharp, permanent prints; \$70 and \$90.



Interchangeable lens boards are featured in the Pacemaker Crown Graphic. It takes 4 by 5 sheet and film pack. Adapter handles roll film. It has built-in synchronization, and double-extension bellows



Most popular press camera is the Pacemaker Speed Graphic, which has a focal-plane shutter. Other features are same as Crown's: range finder coupled to various lenses, Ektalite lens

POLAROID

In only one minute the Land 95A Polaroid Speedliner develops its own pictures, on a special 3¼ by 4½ eight-exposure roll. It has a coupled lens-shutter setting; a single dial selects the lens and shutter combination. There is built-in synchronization for regular and electronic flash, scale focusing, a combination view finder



Another one-minute camera, the Polaroid Highlander is similar to the Speedliner, but takes 2¼ by 3½ exposures on its eight-exposure roll. It has a self-erecting front, front-element focusing and a coupled lens-shutter setting. An optional flashing unit has a built-in flash guide, exposure counter





The Stereo Realist ST41 takes up to 29 stereo pairs per loading of standard 35-mm. cartridges. It uses f:3.5 David White anastigmatic lenses, has speeds from 1 to 1/150, focusing scale, coupled, split-image range finder and flash

STEREO CAMERAS enable you to capture people and places in three dimensions. You can obtain special projectors for screen showings, but inexpensive viewers are most popular. Most of the twin-unit cameras are simple to operate, do not have expensive lenses, delicate adjustments or many shutter speeds. But the pictures are sharp. One film load produces 20 to 30 color slides. These four cameras range from \$80 to \$160.



STEREO

No focusing is needed with the Graflex Stereo Graphic. One of the f:4 lenses focuses on foreground, the other on background. Viewer sees sharp picture. Camera has one speed, 1/50, automatic shutter cocking and takes 20 slides on a roll of 35-mm. film



Stereo pairs from 335 and 135 film are produced by the Kodak Stereo, which has f:3.5 lenses, four speeds, 1/25 to 1/200, automatic shutter cocking and flash



Stereo Vivid takes up to 29 22 by 24-mm. stereo frames per loading, has f:3.5 lenses, speeds 1/10 to 1/100, flash synchronization, many other features

SUBMINIATURE CAMERAS, small enough to be concealed in your fist, range from Lilliputian box cameras to high-precision instruments that have all the features of normal-size cameras. The Minox, at \$140, is one of these. Quality enlargements to album size are possible with the best cameras, and film cost is very low. A "fun" camera, the subminiature is ideal for candid shots.

Small as a cigarette lighter, 3/8 by 1 by 3 inches, the Minox III S takes sharp 8 by 11-mm. pictures, at speeds of 1/2 to 1/1000, plus time and button-release shots. The camera has built-in flash synchronization, coated 15-mm. f:3.5 lens. Features include automatic simultaneous shutter winding and film transport, exposure counter, two built-in filters, orange and green, direct view finder with automatic parallax correction, focus from eight inches to infinity and a Lammelar shutter in front of the lens. One roll takes 50 exposures



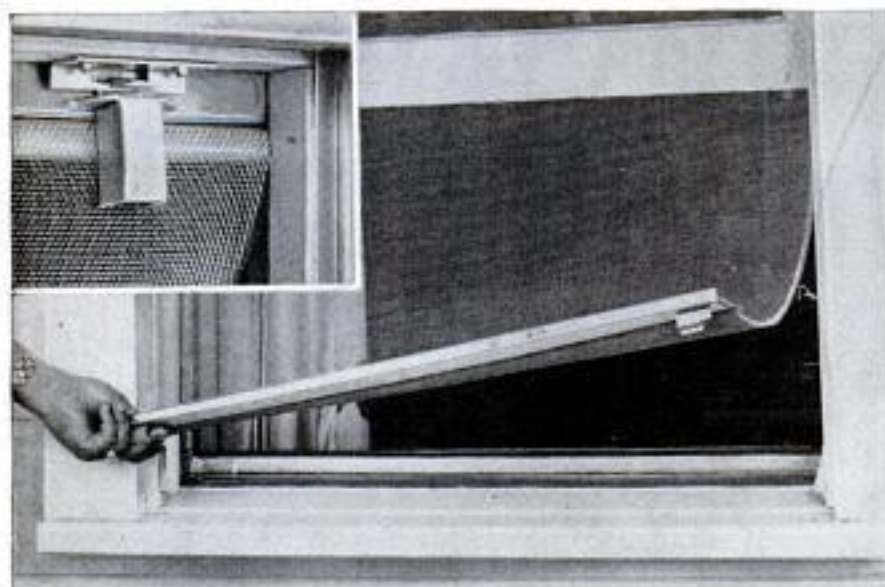
SUBMINIATURE



WHAT'S NEW FOR Your Home

DISPOSABLE BROILER pan of heavy aluminum foil, aimed at eliminating messy chore of cleaning greasy broilers, can accommodate three to four-pound steak without bending. It fits any oven, rotisserie or grill

Manhattan Products Company,
331 Madison Ave., New York City 17



WINDOW SCREENS which are mounted under tension fit windows without sagging or losing shape. They are held tight by two coil springs in the top and are easy to open at the bottom for window cleaning

Springtite Screen Mfg. Co.,
1617 Jonesboro Road, S.W.,
Atlanta, Ga.

FENCE KIT containing pre-cut pieces for an eight-foot length of decorative fence is now sold in lumber yards. Sections can be arranged in many ways around yard or patio. Height of each section is 4½ feet

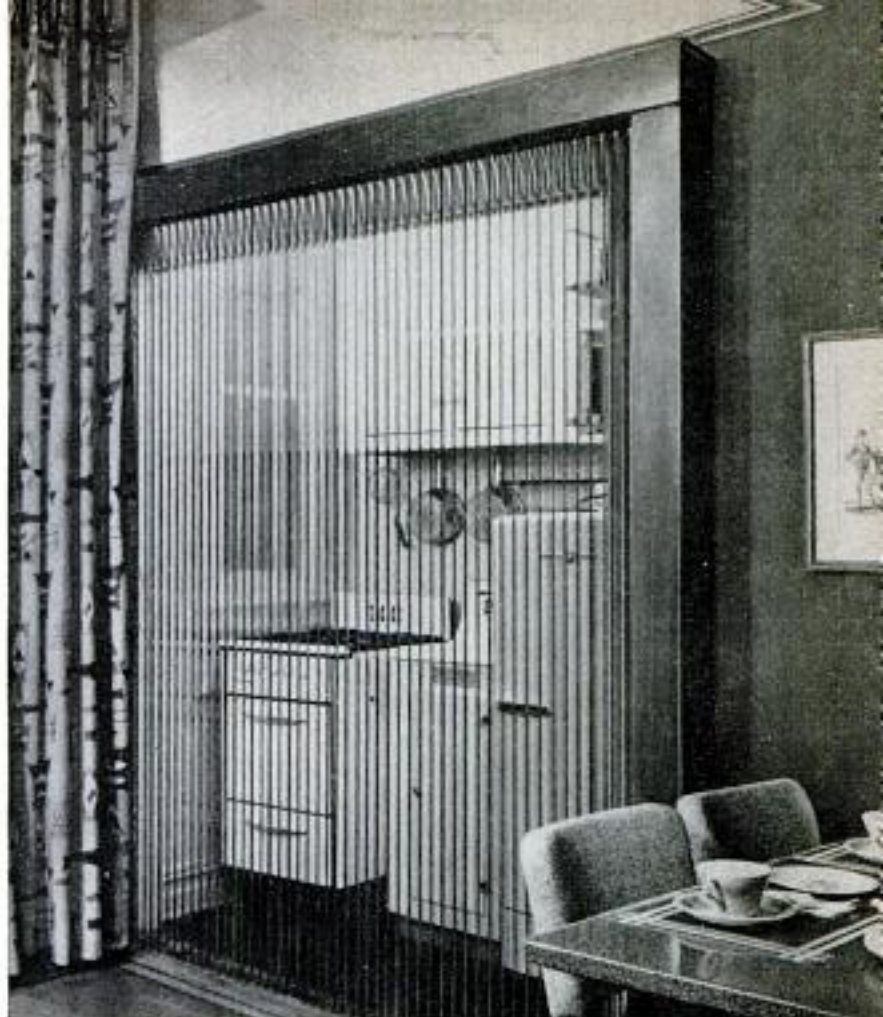
Weyerhaeuser Sales Co., St. Paul, Minn.





AUTOMATIC FIRE EXTINGUISHER for home releases chemical that fights fire in three phases. On first contact, it produces a flash fog; as it heats, a more penetrating fog is sent out; and finally, a small amount of the chemical remains to produce further fog should a reignition of the fire occur. The fog produced is nontoxic carbon dioxide

Red Comet, Inc., Littleton, Colo.



VERTICAL VENETIAN BLINDS can be used as draw draperies or as room dividers. Made of aluminum, they come in 15 colors

Hunter Douglas Corp., 150 Broadway, New York City



TIMER FOR HOME USE has two speeds, showing elapsed time in either minutes or seconds. Handy for timing phone calls, home permanents, baking, cooking

M. H. Rhodes, Inc., 30 Bartholomew Ave., Hartford 6, Conn.



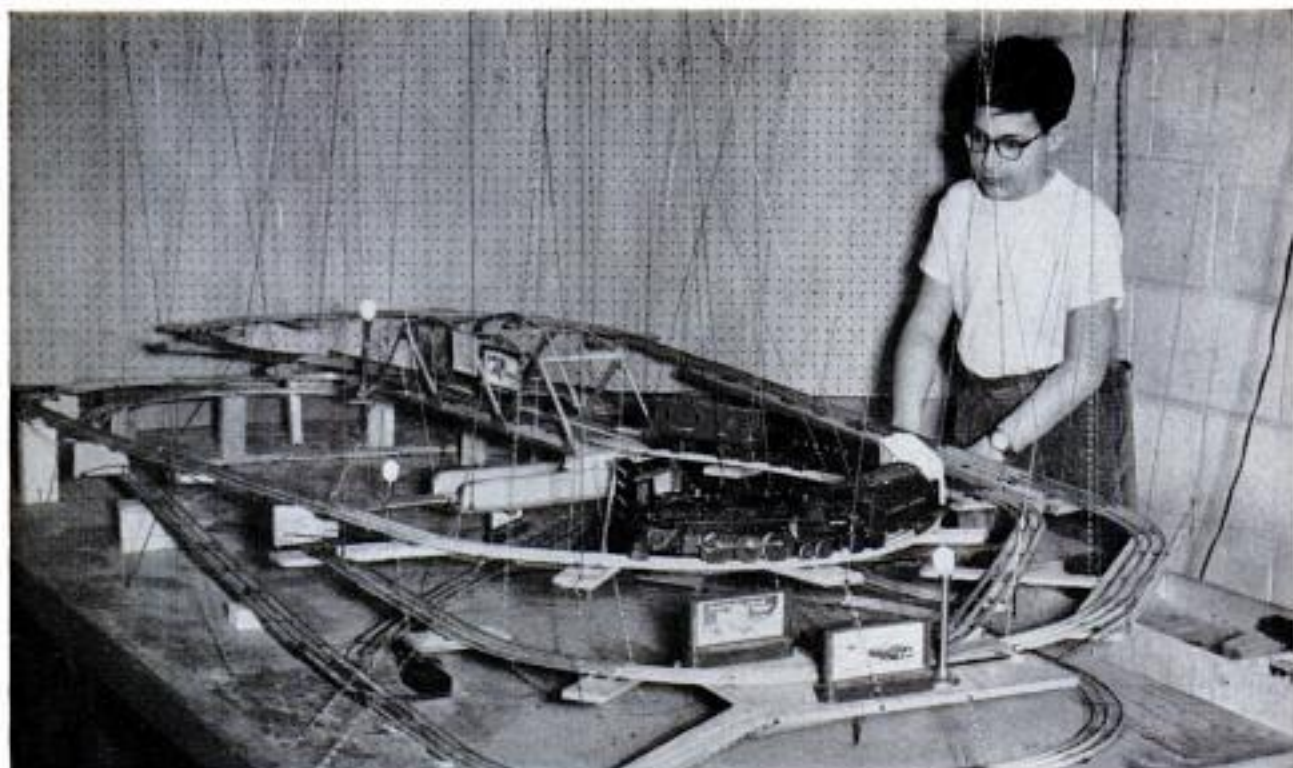
NEW DOORKNOBS to replace old or loose ones can be snapped into place. A built-in spring holds the knob securely

Murphy Machine Products Co., 14320 E. Jefferson Ave., Detroit 15, Mich.

RIPS IN CLOTH, rubber, plastic or leather can be repaired in moments with an easily applied liquid cloth

Downs and Co., 816 University Place, Evanston, Ill.





Train highballs through the maze of wires as it moves from one of the three track levels to another

Train Rolls Through Maze of Wires on Suspended Track

SOMETHING DIFFERENT—that was the goal of Philip Karr and his son David, of Milwaukee, Wis., when they decided to build a model-railroad layout. They achieved it by suspending the rails from the ceiling joists on wires. Now they have a multilevel layout that can easily be

changed by lengthening or shortening the wires. Chains anchored to a table under the layout prevent any side sway of the tracks. The layout contains 84 feet of track, supported by plywood strips at the joints. From a distance the track appears to be floating in mid-air.

All the joints of the track are supported with strips of plywood. Chains anchored to table prevent sway

Wires fastened to the overhead joists support the track sections. Layout contains 84 feet of track





Richly decorated in the style of the old-time river boats, *Lil' Belle* plies her own 125 by 500-foot lake

HERE COMES THE *LIL' BELLE*

By Leland Elam
and Leo Rosenhouse

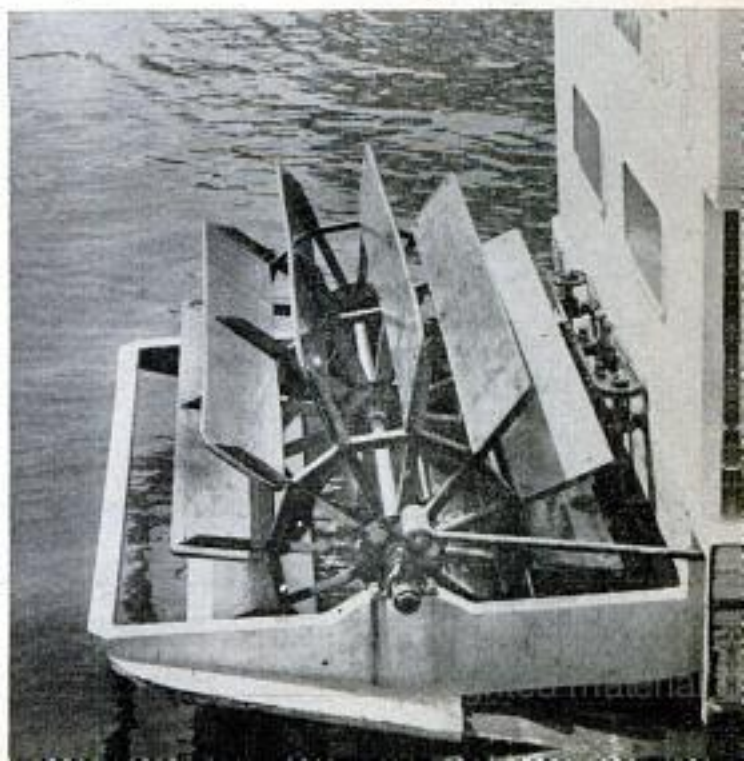
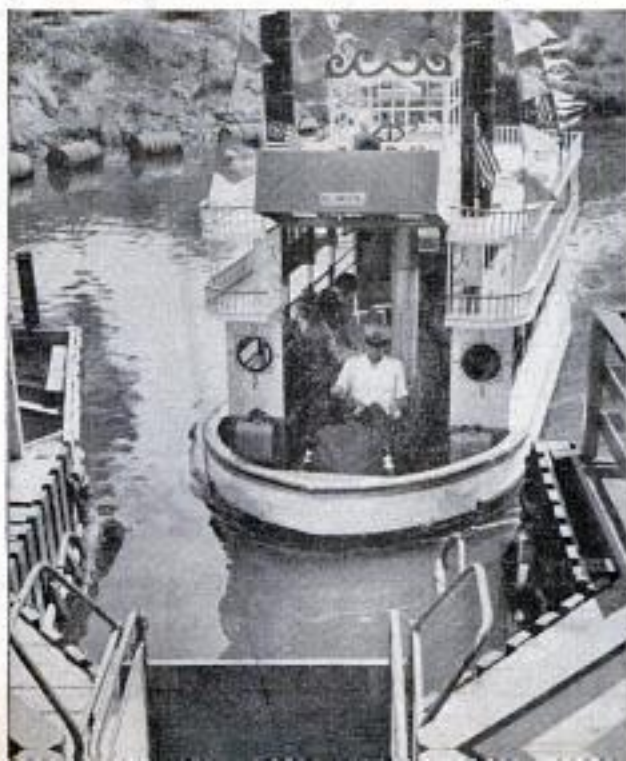
"STEAMBOAT!"

You almost can hear that familiar old river cry out of the Mississippi's past as *Lil' Belle* chugs up to her miniature pier in the Peralta Playground, Oakland, Calif. *Lil' Belle* is a small edition of an old stern-wheeler, carefully constructed to bring back memories of the old-time Southern pleasure boats. She makes numerous daily trips on her own lake, carrying 30 happy small fry comfortably in her cabin. From

The gangplank is a part of the rail above the pilot, hinged for lowering to embark passengers

bow to churning stern wheel, she measures 23 feet, and is eight feet wide at the beam. In order to make the turns in the tiny lake, *Lil' Belle* was equipped with four rudders, and as a safety feature the hull was designed with six watertight compartments. The whole ship is gaily decorated in the ornate style of the old river boats, giving her a picturesque appearance as she splashes along. But the gayest touch of all is the laughter and chatter of her riders.

A 14-horsepower gasoline engine drives the stern wheel, which is 46 inches in diameter, 68 inches wide





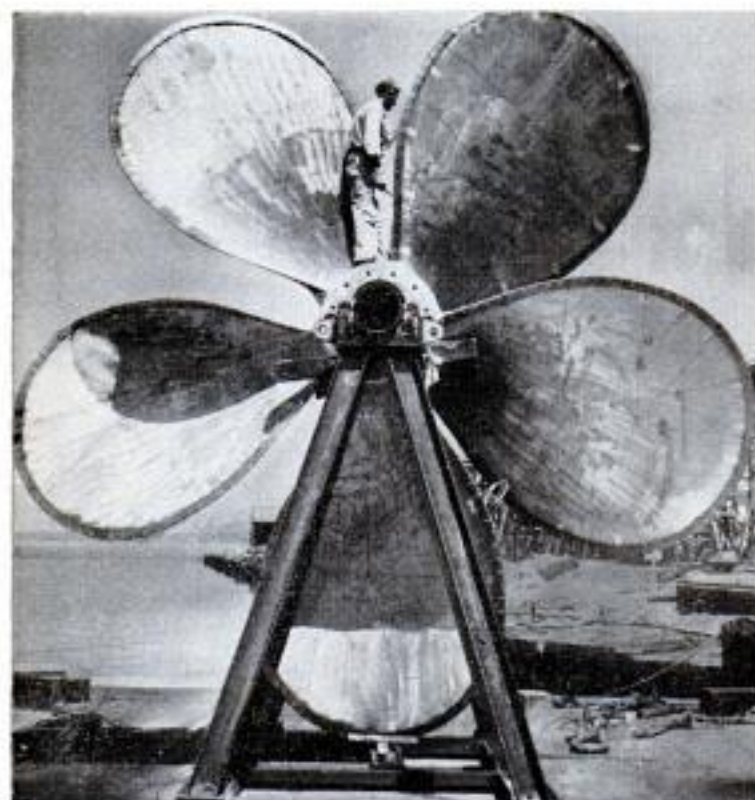
Cabin Scooter Built for Two

Europe continues to come up with new and fresh designs for the small basic car. A fully enclosed three-wheel scooter with a top speed of about 60 miles per hour seats two persons side by side behind a single front door. There's ample room for children or luggage in the rear. A canvas roof is rolled back in good weather. The car is expected to sell for less than \$1000. It has a four-stroke, 175-cycle engine.

Magnifying Machine Lets Near-Blind Read

Persons nearly blind can read a book with the aid of a magnifying machine known as the Megascope. The instrument magnifies print as much as 25 times. One woman with only a tiny fraction of light perception was able to see what print looked like for the first time.

Open book is laid upside down on top of enlarger, which projects two lines of type at a time on screen



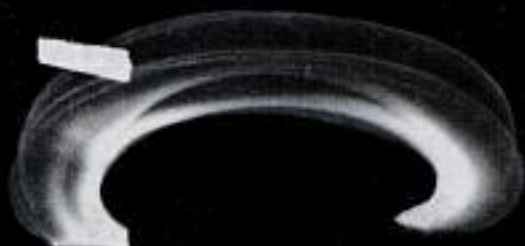
Giant Propeller Shipped by Barge

No truck nor train could carry a giant propeller made for the *USS Forrestal*, so it was shipped by barge. Four of the 35-ton propellers were slowly transported from Philadelphia to Newport News. Each is about 21 feet in diameter and is made of cast manganese bronze. Four more of the variable-pitch, five-bladed propellers have been completed and will serve as spares for the *Forrestal*. Power for driving the propellers is supplied by a 200,000-horsepower electrical propulsion plant, big enough to supply electricity to a city of 1,500,000.

☐ Radiocarbon dating of charcoal found at what is believed to be an early camp site indicates Indians were on the North American continent 22,500 years ago.



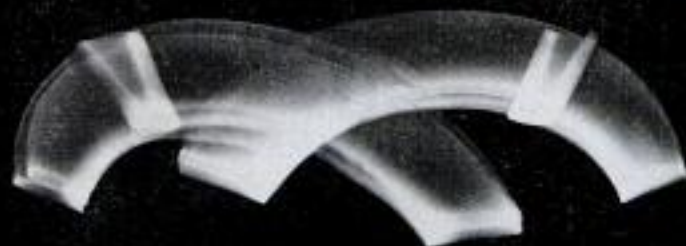
"Straight ahead"



"Turn to your left"



"Slow down"



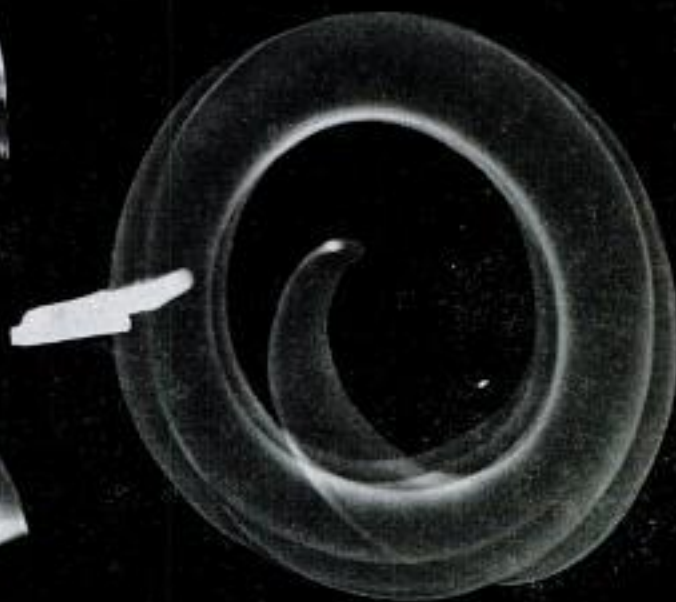
"Stop"

"All clear—marshalling finished"

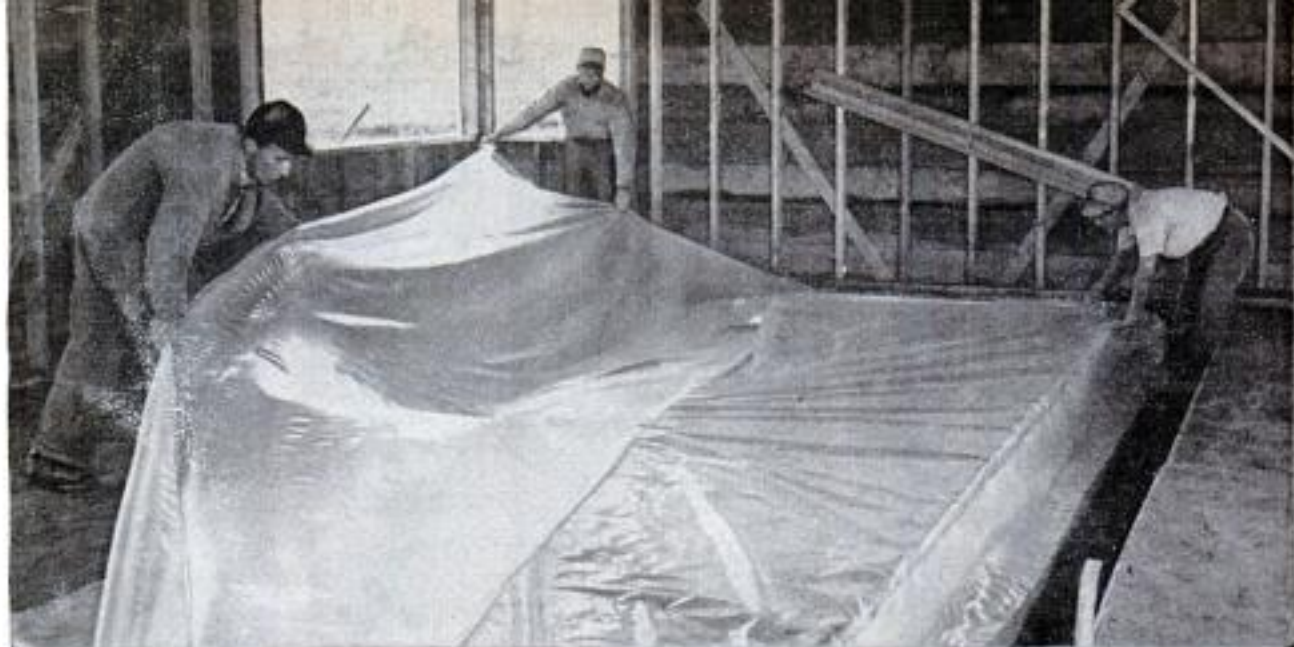


CONDUCTOR'S 'BATON' Guides Airliner Pilots

Bringing a mammoth airliner to rest in the chocks is a delicate job, entrusted at many airports to the "plane marshal." For, though free and maneuverable in the air, airliners are awkward and cumbersome on the ground and require help. These pictures, taken in Amsterdam, Netherlands, show the international signals used by plane marshals as they wield their batons, acting as eyes for the pilots while the big airliners slowly wheel in



"Start engines"



Plastic Film Forms Vapor Barrier for Home Construction

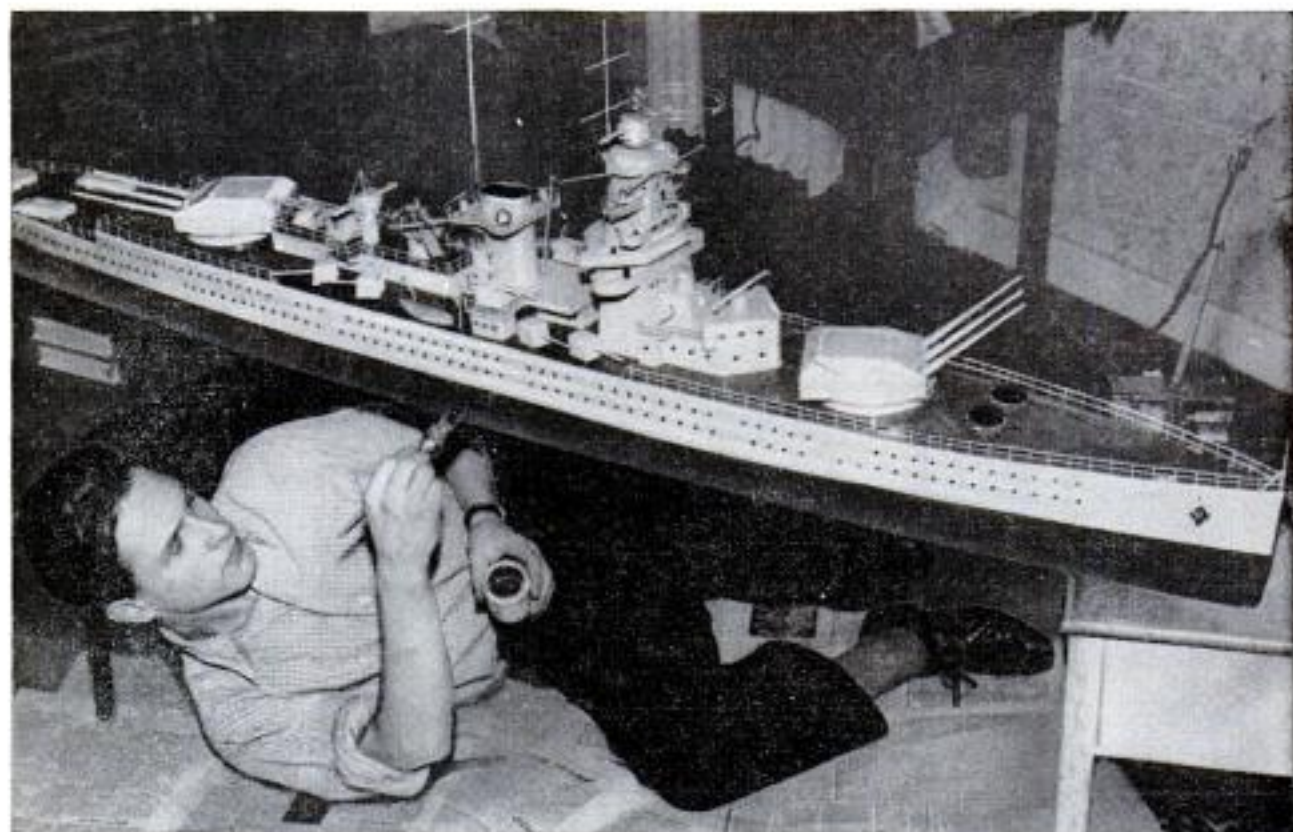
Tough, thin plastic sheeting is now being used in home building to provide an almost impenetrable vapor barrier. The seamless, chemically inert film is expected to last at least as long as the rest of the house. It can be used on the warm side of exterior walls, over subflooring, underneath concrete slabs or laid on the bottom of a crawl space. When used with concrete slabs, it

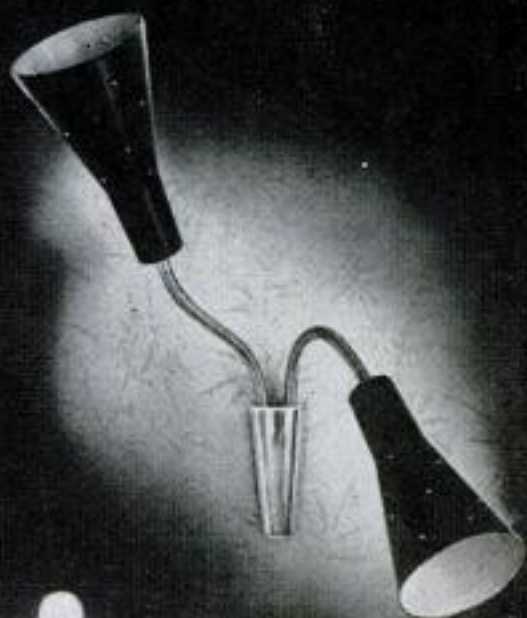
takes the place of gravel or stone. A layer of sand is sufficient. Used over subflooring, it stops the passage of moisture, dust and cold air. The plastic, which is made in thicknesses varying from .002 inch to .020 inch, is easy to handle, extremely lightweight and nonflammable. The thin material remains flexible in either tropic or arctic temperatures.

Pocket Battleship Graf Spee Sails Again—in Model Form

Eight feet long and weighing 30 pounds, a scale model of the *Graf Spee*, famous German pocket battleship, has been constructed by 17-year-old Gunther Lobell of Holstein, Germany. The model has a radio-

control system and is designed for operation on ponds and small lakes. The original *Graf Spee* was sunk off Montevideo, Uruguay, in a battle with British warships, early in World War II.





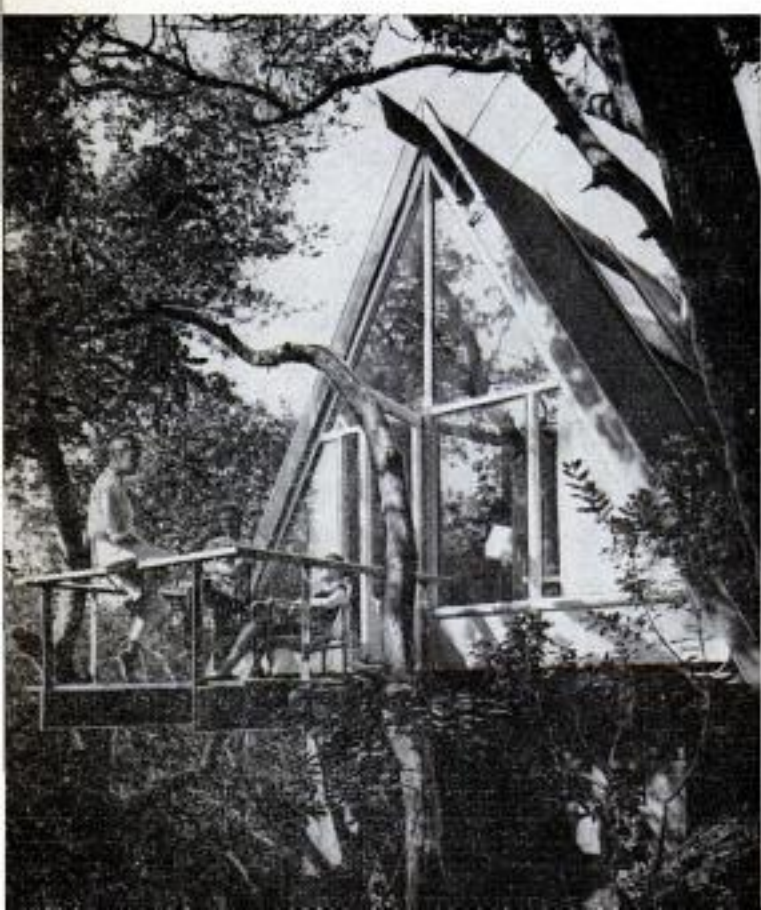
Light Bulbs in Disguise

SINCE THE FIRST electric light bulb shaped like a candle flame, designers have taxed their imaginations for new ways of dressing up or disguising light sources. They're still at it, as is proved by these recent German creations. The lamps range from a classic 617-pound chandelier of 125 candles to a bouquet of glowing tulips branching from a flowerpot.





Week-End Cottage



TWO SAN FRANCISCO architects, John Campbell and Worley Wong, designed a Leisure House that you can build yourself in four or five days. It is precut and is shipped in kit form. The basic unit provides a living-sleeping room, kitchen, bath and sun deck with over-all dimensions 16 feet by 18 feet. This sells for \$1150. Additional four-foot sections are available to increase the size. These sell for \$148 each. The house shown on these pages includes the basic unit and two four-foot sections for the bedroom. Plumbing, glass, paint and wiring for this house cost an additional \$1000. Triangular trusses eliminate cross bracing and simplify construction. Girders are nailed on foundation piers, joists are set over the girders and flooring nailed down. Rafters are bolted to the ridgepole. The house is adaptable for flat or hillside lots. ★ ★ ★

San Francisco owner of this Leisure House added a porch at rear. House was built on a hillside with a foundation of concrete posts for sturdy support



Bedroom was added to rear of basic precut house with two four-foot sections. Dimensions are eight by thirteen feet. Interior walls provide privacy but do not reach peak of roof. House has "tree house" effect

Double beds in living room afford additional sleeping space. This room is 10 by 17 feet with the glass end overlooking the sun deck. Glass panels on sides of the roof have bamboo shades for controlling the light





Mobile animal clinic, which cost \$84,000, tours New York City giving aid to injured and ailing pets of all kinds

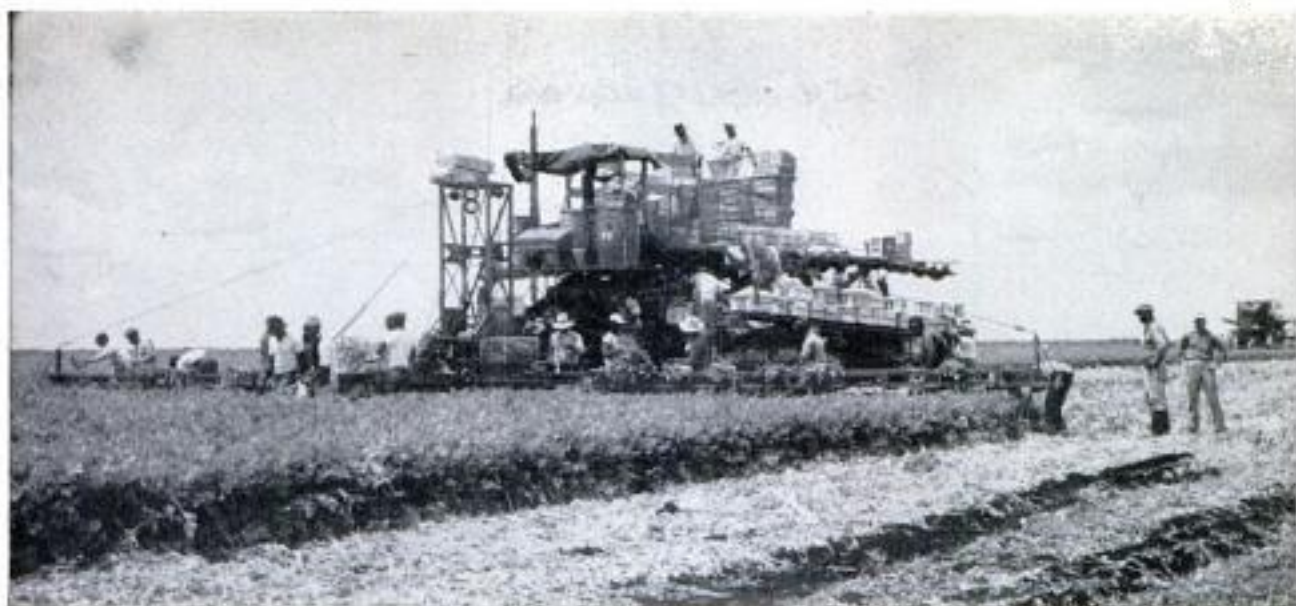
Hospital on Wheels Treats Ailing Pets Throughout City

EMERGENCY CALLS to New York's Speyer Hospital for Animals bring a real ambulance to help ailing pets. The "Petmobile" actually is an animal hospital on wheels. Built at a cost of \$84,000, it is equipped for minor animal surgery. The vehicle contains an X-ray machine, Polar-

oid developer, fluoroscope, sterilizer, refrigerator, medical cabinets, surgical instruments, water tank and sink. A veterinarian who travels with the Petmobile gives instructions to thousands of children each year on the care of their pets. There is no charge for instruction or minor treatment.

Injured dogs, taken aboard the mobile hospital, are X-rayed, given treatment and operated on if necessary





It takes a 60-man crew of cutters and packers to keep up with the harvester as it crawls across the field

Celery Factory

JUST ABOUT EVERYTHING is mechanized on the big Duda Farms, Oviedo, Fla. Eighteen vegetable-harvesting machines manage to harvest and pack 80 freight-car loads of celery each day. The machines, which cost \$18,000 apiece, can travel 40 miles per hour on the highway or crawl along at 1200 feet in 10 hours in the field. Wings unfold to cover the rows of celery. The crew cuts the celery and throws it on moving belts. Carried into the heart of the machine, the celery is automatically washed with water from the machine's 1000-gallon tanks and is crated for shipment. The harvester weighs from 10 to 12 tons.



Celery, carried into the machine by conveyor belts, is automatically washed by water spray from tanks inside the machine

Truck loader lifts a finished crate, ready for the market, from machine's delivery platform. Below, radio keeps the field bosses of big farming operation in touch with headquarters





Converted city bus, which carries own generator, could be Miami communications headquarters in emergency

CAPTAIN Verner Smith pushed the attitude lever and nosed the blimp down closer to the water. Now it was within 50 feet of choppy Biscayne Bay off Miami, Fla., so close that the trailing landing lines of the huge powered balloon almost touched the water. A loudspeaker in the cabin

blared: "This is Miami Communications, Vern. What's happening?"

The sun-browned pilot pulled a control and the blimp nosed up again. "He's still struggling. Trying to hold onto his boat. Get the patrol boat here—fast."

The loudspeaker talked again. "The po-

Miami Has an Electric

Telephones and radios mounted in air-conditioned bus are each on a different circuit. There is also a Teletype





Nervous System

By
Elliott H. McCleary

Radio-equipped blimp serves as link in communications network. It can direct rescues, relay radio messages

lice boat radios that he's coming over. Stay directly overhead. He'll sight on you."

"Check."

Guided by the blimp, a patrol boat of the Miami Police Department scudded to the rescue scene.

Blimps and even horses mount two-way radios in Miami, a city with an electronic nervous system that is as complete as the latest in modern science can make it. The Magic City was first in the nation with a unified system to handle all city communications—fire calls, police intercom, hurricane warnings, Civil Defense and the routine business of running a metropolis.

Miami's head start is largely due to cheerful, energetic Ben Demby, a radio-electronics enthusiast who keeps his Miami Communications Department equipped with the latest advances in technology.

He's been so successful that, as one observer remarked, "Miami offers a preview of what the average city may expect in 10 or 20 years."

At every stop-light intersection in Miami you'll find an emergency telephone that allows you to summon fire trucks or an ambulance in jig time. The system, suggested by Ben Demby to Bell Telephone and installed first in Miami, is duplicated in only 10 other American towns.

Demby's Communications Department, together with Detroit and the FBI, was the first to employ Speedphoto machines to flash pictures, fingerprints and information about dangerous criminals across the country.

Ben Demby, against the advice of FCC experts, was first to employ high-frequency radio in everyday use. Today, the six-foot



Robert Cotter, engineering aide, sights mobile TV camera. It is used for police work, sports coverage

antennas that are the mark of the old 30-megacycle radios are slowly disappearing from squad cars all over the nation. In their place appear thin little wands no longer than a man's hand—the antennas of high-frequency radios that give better, surer reception.

Fire-department communications subcenter has phone switchboard, radio microphones, Teletype, tape recorders

In the nerve center of the Miami Communications Department, a two-story stucco building beside Biscayne Bay, the blare of a police loudspeaker mingles with the sound of Teletypes and card-sorting machines. The crackle of an acetylene torch and the whir of a drill float in from the adjacent electronic shop. An attractive red-haired girl dispatcher in a soundproof glass booth tries to keep calm as excited squad-car police give a running account of a shooting and the chase for the gunman.

Next to her, in a similar booth, a soft-spoken girl dispatcher directs a squad car to a child who has just been hurt.

Banks of files along one wall hold cards with information on the 300,000 cars registered in Dade County. And spotted through all the files are thousands of pink cards—reports on all the stolen cars in the United States.

An electronic card sorter that speeds through cards at the rate of 700 per minute starts a check on used cars newly registered. Moments later a card is flung out of the machine. It's a duplicate of a pink card placed in the sorter—a 1955 blue Cadillac convertible stolen in southern Georgia and sold to a dealer in Miami.

"With this latest equipment," says Demby, "we can often catch a hit-run driver before he's able to remove the blood and dent from his fender—even when we know only the last three digits of his license. In an hour, given those few digits and a description of the car, we can narrow the list down to a handful of suspects."





Each card racked before radio dispatcher of squad cars represents a radio call. Sergeant, right, in police headquarters receives a complaint and writes message for squad car. Message goes via moving belt to radio dispatcher behind window, who contacts car



Just a few steps away from the Speedphoto darkroom is a mobile TV unit. Weighing only a few pounds, the compact camera with its tripod can be carried in one hand, set up anywhere, and linked to a "watching station."

Another valuable crime-fighting tool in the center is the Speedphoto machine—an instrument that links Miami with 25 other major cities and the FBI. In Detroit, a 17-year-old boy ran amuck, killed his mother and sister, then headed south. He landed in Miami and was picked up by Miami police on a minor charge. Although the police had no inkling of his Detroit crime, they put his picture on the wire as a matter of routine. The boy was identified by Detroit police and he was booked on suspicion of murder within the hour. If police had depended upon air mail, the boy would have been released before it became possible to identify him.

Police receive a "hot" telephone tip that a bank robber wanted for murder is headed for Miami. It's believed he'll stay at a certain hotel near the business district. Communications men hide the TV camera behind the hotel desk and string a coaxial cable to a room above where detectives gather around an ordinary television receiver.

Two nights later, the murderer checks in. The detectives alert headquarters by walkie-talkie, a call goes out to a cruising squad car and police nab the criminal as he

Emergency telephone, here used to report bus wreck, was installed as part of a system to report fires

Driver of fire truck checks in with headquarters, using two-way radio that is standard on all trucks





Teletypes line wall of Communications Center. Slave units of these machines are installed in police, fire stations of Miami and suburbs



Portable radio transmitter built by Communications technicians is used at Miami-sponsored golf tournaments, parades and other special events. Speedphoto unit in Communications Center sends and receives photos, information, fingerprints of dangerous wanted criminals



opens the door of his room.

But the mobile TV camera is not just a police tool. Each year it's set up on the grounds of the city golf course to give sports reporters in the clubhouse a stroke-by-stroke account of the Miami Open Tournament. A wide-angle shot of the golfer and the turf ahead turns into a close-up as the Zoomar lens goes into action and catches the almost-spent ball bouncing on the green. The camera is used as effectively for traffic checks and the relay of election returns.

Fire Phones

Of all the features of the Communications Department, Demby is perhaps proudest of the emergency telephones installed at all traffic-light intersections.

The moment you pick up the receiver of one of them a light flashes on the fire-department board and you're talking to the fire dispatcher. If you're reporting a fire, he gets the exact address and nature of the blaze from you, looks up at a chart of the city, and engages a plug that sets one, two or a fleet of trucks rolling to the scene in 30 seconds.

The telephone system, inaugurated by Miami in 1952, replaces the familiar red fire box still used in all but ten American cities. According to Demby, the old system took three minutes longer to alert the nearest fire station—enough time for a minor fire to turn into a major one.

Miami mounts two-way radios on all rolling pieces of fire equipment. Once at the scene of the blaze, fire-department officers direct operations not by shouted commands but by radio. Smoke-eaters rescuing fire victims inside the blazing building carry walkie-talkies to get instructions or summon more help to squelch flames or cut through a wall.

The Network Begins

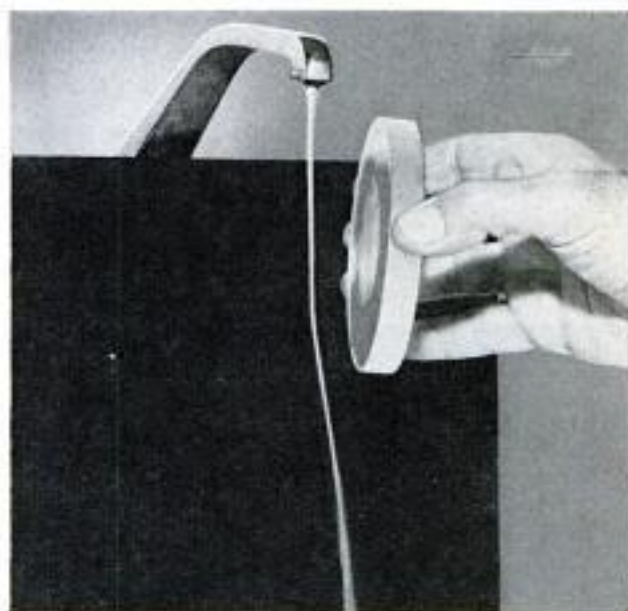
The city's complete communications network began in
(Continued to page 246)

Plastics With a Charge Have 'Magical' Effects

IT MAY BE that in the future your umbrella will consist of nothing more than a small plastic knob on the end of a stick, if the research being done by Jacque Fresco in his small Los Angeles laboratory is successful. Fresco has been doing some odd stunts with electrified plastic disks and high-voltage electricity. To demonstrate, he turns on a small stream of water from a laboratory faucet, then one at a time, holds various plastic disks near the stream. Depending on its electrical charge, the disk may pull the water toward it, or push it away. The electric umbrella would consist of a plastic knob charged to repel water. Held overhead, it would keep you dry.

Fresco believes, too, that he has found new ways of preventing icing on aircraft wings and new ways to maneuver aircraft. Under another stream of water, he places a model of an aircraft wing, and then turns on a high-voltage source that is connected to the wing. The stream of water is immediately pushed away from contact with the wing. This is his de-icer, which prevents ice by keeping all moisture off the wing.

In another experiment, Fresco connects the high-voltage source to electrodes that protrude from the tips of a small wing. When the current is turned on, the wing dips to the left or the right, depending on which way the electrodes are bent. Fresco suggests that a high-voltage control system weighing much less than present mechanical control systems may be developed for aircraft in the future. He thinks, in fact, that after further development, electrical forces will be used not only to maneuver aircraft and keep them free of ice, but also to decrease the density of air on the leading edge. This would reduce drag as well as aerodynamic heating, an important block in the design of supersonic aircraft.



Charged plastic disk, above, attracts or repels water, depending on polarity of the charge. Below, the same principle applied to the leading edge of an airplane wing would keep it dry and prevent icing

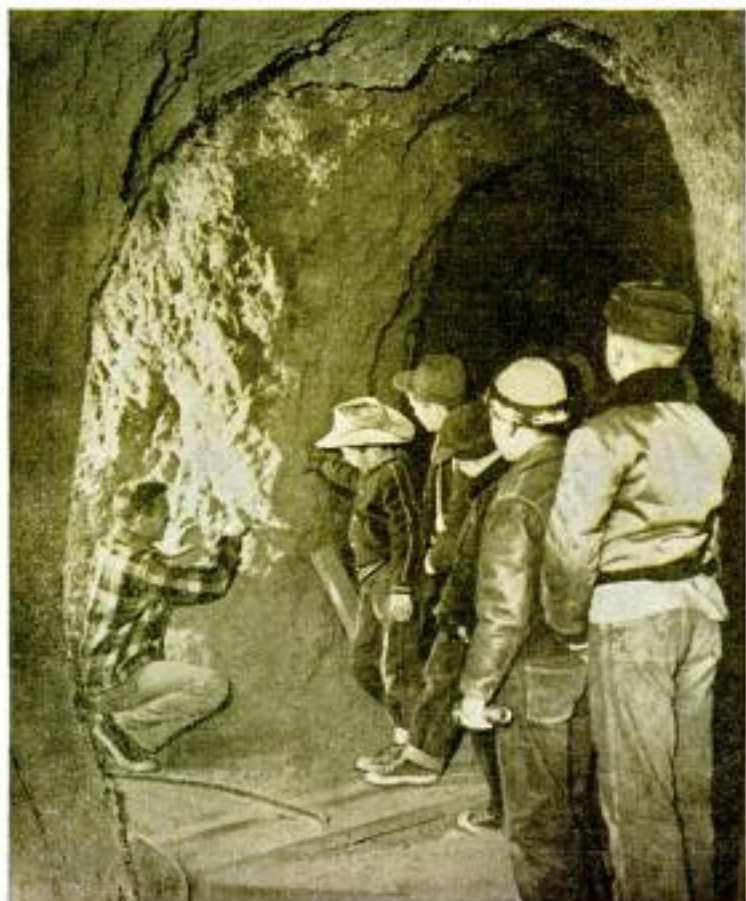




He Made a Business of Camping Out

McOmber, above, loads sleeping bags on trailer before trip. Below, he shows how to mark trail in mine tunnel to aid return

By Hugh Manessier

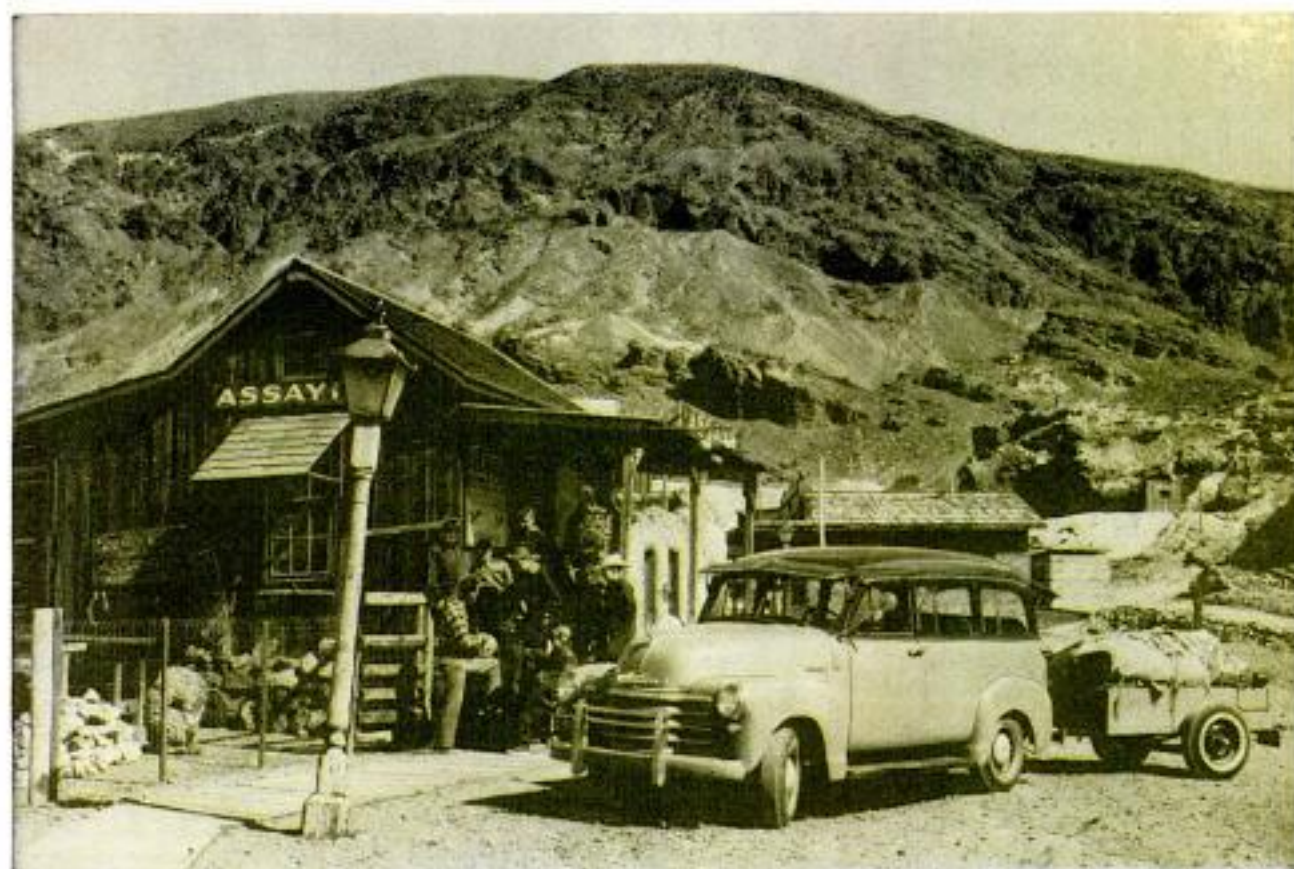


EVENING SHADOWS were deepening at Yosemite National Park as a station wagon loaded with young boys pulled into a camp site. In minutes an even dozen had piled out, picked up their sleeping bags from their camping trailer, and unrolled them in a circle on the ground.

A startled tourist walked over to the young man busily unloading luggage from the trailer. "That's some family you've got there," he said. "I admire the way you keep them under control."

"My name's Darrel McOmber," the newcomer replied, "but that's not my family—it's my business."

During the two years that Journeys for Juniors has been in existence, McOmber has enthusiastically explained his unique business to hundreds of interested parents and travelers. His program involves taking youngsters between the ages of 6 and 11 on exciting, educational trips to a variety of attractions. The trips fill the gap between the time youngsters first display an interest



Stop at assay office in restored ghost town of Calico yields information about ore samples and prospecting

in nature until they are ready for established programs in scouting. His rates are low but, although his business is a spare-time venture, he grossed nearly \$3400 in 1954 and more in 1955.

His initial trips were to nearby deserts, beaches, national parks and monuments. Later he added winter trips to the mountains where some of the youngsters build their first snow men, others ski, and all learn basic survival skills. Trips to various museums and selected factories came later as a result of the children's intense interest in science and industry.

McOmer's current rates are \$5.00 for day trips and about \$8.00 per day for camping trips. His most ambitious trip, added this year, is a 17-day journey exploring half a dozen western national parks. The kids bring their sack lunches for day trips but McOmer provides virtually everything on camping trips. Youngsters furnish only their sleeping bags and personal gear.

The fees are modest when the expenses of gasoline, food and insurance are considered, but a camping trip with 11 youngsters will gross \$88 per day and net up to \$40 per day. Day trips bring in less, but also cost less. Against

this net must be charged the time at home for making phone calls, planning trips, packing and unpacking, and other extra work.

Although recreation and adventure are important ingredients of McOmer's trips,

Boy shows companion a horned toad he has found and learned to identify. Trips increase youngsters' knowledge of nature





In Joshua Tree National Monument, McOmber stops station wagon to explain peculiarities of the desert plant

he never misses an opportunity to stress safety, education and common sense. New youngsters receive their instruction in survival skills at the earliest opportunity. Actual practice in finding directions, food and water in the desert give them life-saving information they'll never forget.

McOmber feels that character development is as important as recreation and education, so he has established minor duties like gathering wood and washing pans that provide training in responsibility. It's

usually more trouble to supervise such work than to do it yourself, but McOmber feels it's worth it.

On most trips McOmber takes a teen-age helper who gets an expense-free vacation in return for his supervisory assistance. Mrs. McOmber frequently accompanies the tours, helps to supervise the all-girl trips and prepares hot meals.

The outings offer many advantages over the conventional summer camp, believes

(Continued to page 234)

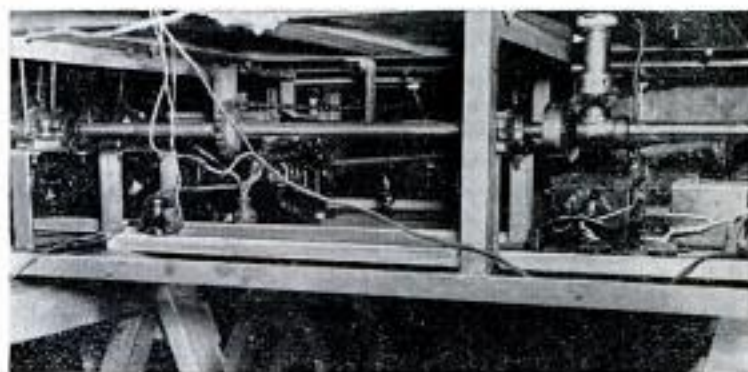
McOmber thumbs book to identify ore sample boys have found. Their interest in such details amazes him





TINY BIG SHOW

OPERATING out of Sherman, Tex., is one of the most complete miniature carnivals in the world. Travis T. Womack, owner, manager and only employee of the show, began building it 28 years ago to entertain his small son. Since then, by renting the show to business firms for advertising purposes, he has put three sons through college. The midway of the show is 10 feet long, and a crowd of 150 spectators (dolls on two moving belts) strolls along it. Offered for their entertainment are all the shows and rides usually found at a carnival, including dancing girls, a freak show and a mirror maze. Miniature hot dogs are sold at the concession stand, and a boy sells cotton candy at another booth. At the weight-guessing booth, the scale jumps every time the customer sits down. Every exhibit in the show is animated and two quarter-horse motors supply power to the shafts, belts, chains and gears which provide this motion.



Fighting the Battle of Yorktown Again



Battle of Yorktown relived on the shores of Lake Matoaka, near Williamsburg, Va. Setting provides realism

By **Walter E. Burton**

THEATERS USUALLY are not called upon to solve problems in navigation or armament, since these most often are matters for admirals and generals to deal with. But the outdoor Matoaka Lake Amphitheater, on the southwest edge of Williamsburg, Va., has had to face problems involving boats and guns, and the theater's technicians have had to use a considerable

Divers clear old tree stumps from lake bottom so that cables drawing ship across lake won't foul up



amount of mechanical ingenuity to solve them.

There, the historical drama, *The Common Glory*, has been playing to audiences totaling over 600,000 persons in eight seasons. The stage is at the water's edge on the sloping eastern shore of the lake. This shore also is the edge of the campus of the College of William and Mary. The theater

Miniature of "French frigate" closes in to bombard British troops. The ship's sails are painted screen wire



was built in 1947 as an educational project and had the backing of the State of Virginia. It is now self-supporting.

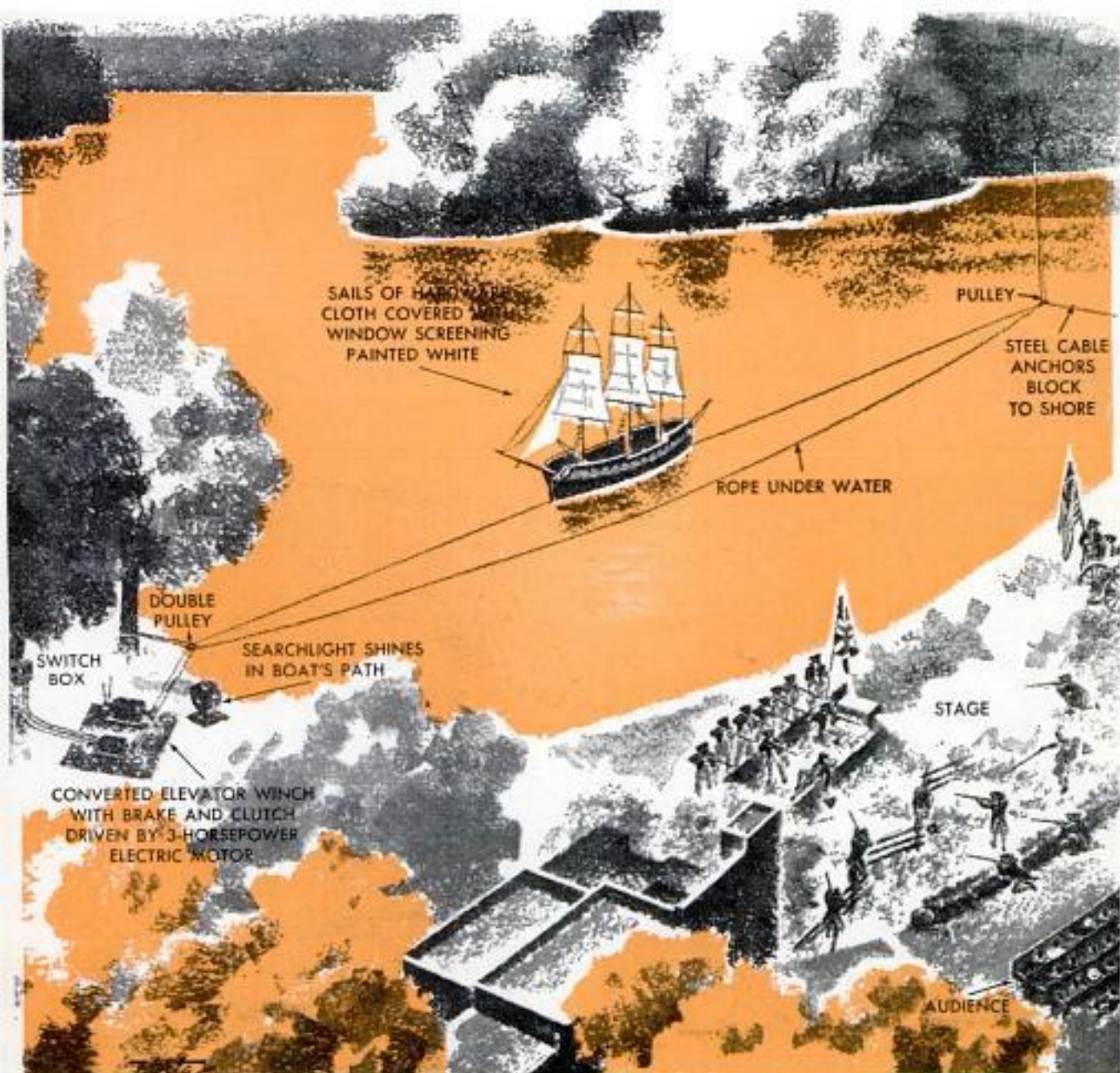
The Common Glory is a historical drama centering largely around the activities of Thomas Jefferson. One of the highlights is a noisy, fire-studded scene depicting the Battle of Yorktown in 1781. The battle opens when a cannon fires toward the audience. Then a French frigate, its guns blazing, moves across the lake which, in the spotlighted darkness and with the night as a backdrop, has become actually a part of the stage. The frigate, though not life-size, looks startlingly real. A tape recording of battle noises — gunfire, ricocheting bullets, and all — is played over the loud-speaker system.

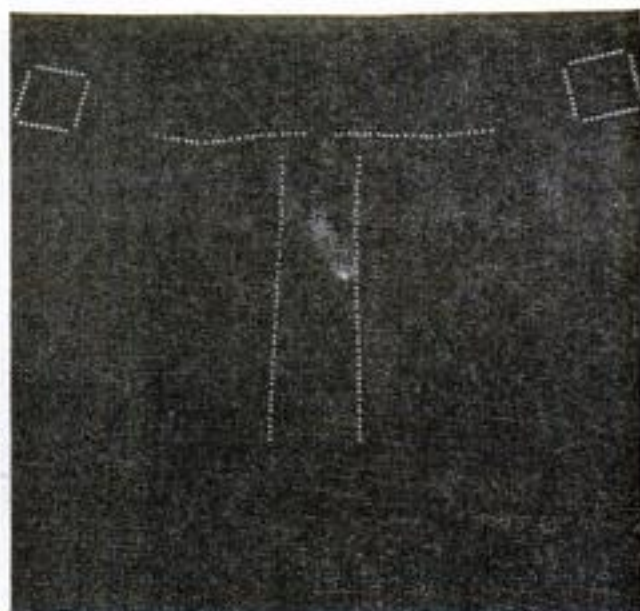
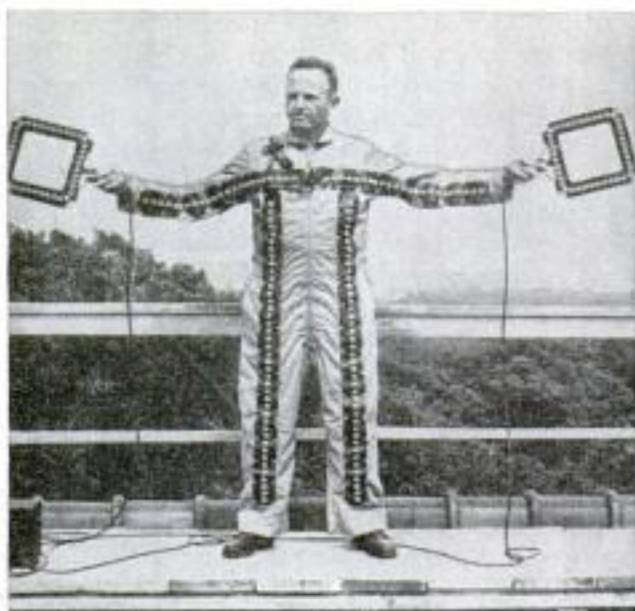
Behind the frigate and the cannon is some additional drama not a part of the main plot. The theater staff constructed the frigate from a retired Navy lifeboat,

adding the necessary scenery and equipment to make it look like a miniature 18th-century man-of-war. The sails were designed to function just the opposite of those on a regular boat. They were made of hardware cloth covered with window screening, so the wind will blow through them without too much resistance.

When the theater first opened, part of the frigate's "crew" included two divers. In the 1¼-minute frigate scene, the boat moves majestically across the lake, firing its 32 guns. The technical staff devised an ingenious plan for propelling the craft. At first, a gasoline-driven winch on shore pulled the boat across the water by means of a cable. The lake, being artificial, contained many old tree stumps and the divers had to be kept on hand to free the cable every time it snagged on a stump. Eventually a system consisting of a submerged

(Continued to page 232)





Signal Suit for Navy Officers Guides Planes to Carrier

Illuminated by dozens of tiny lamps, a suit and paddle set developed by the Navy for landing officers promises new safety in night aircraft-carrier operations. The

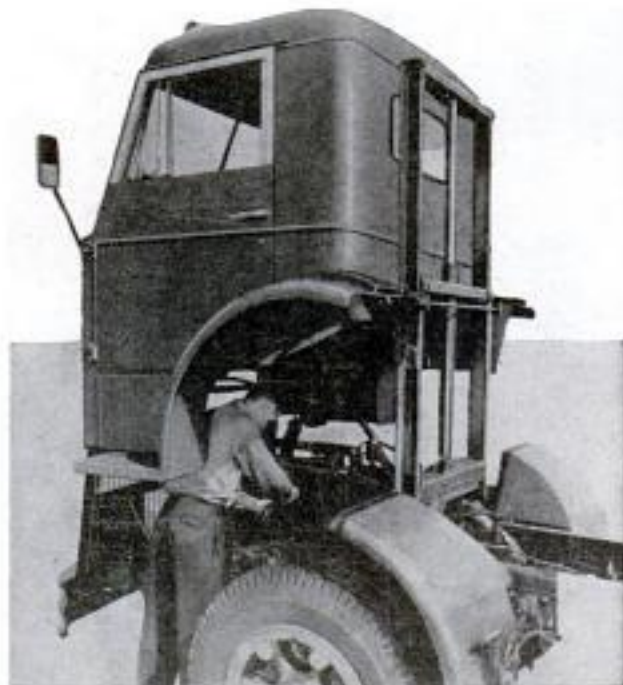
illuminated stripes on the suit and paddles are visible to pilots on the darkest nights. The lights replace fluorescent strips illuminated from the deck.

Meter on Telephone Shows Call Charge

For a small extra charge, telephone subscribers in West Germany may rent a phone with a built-in charge meter. The purpose of the meter is to give the user a running account of the cost of his calls and thereby remind him to cut off his conversation before running up too big a bill. It operates on alternating current. Impulses vary with the distance, so appropriate charges are recorded according to the distance involved. The charge visible to the subscriber is automatically recorded in a central office. The meters are used only with dial phones.

Truck Cab Elevates To Uncover Engine

Without disconnections of any kind, the cab of the 1955 Mack truck is lifted straight up to uncover the engine for maintenance. A hand pump or optional hydraulic power elevates the cab, which locks securely in the top position. With the cab up, the mechanic can reach all parts of the engine without having to move around axle and wheels. Because it does not tilt forward as it lifts, the new design requires no additional floor space.





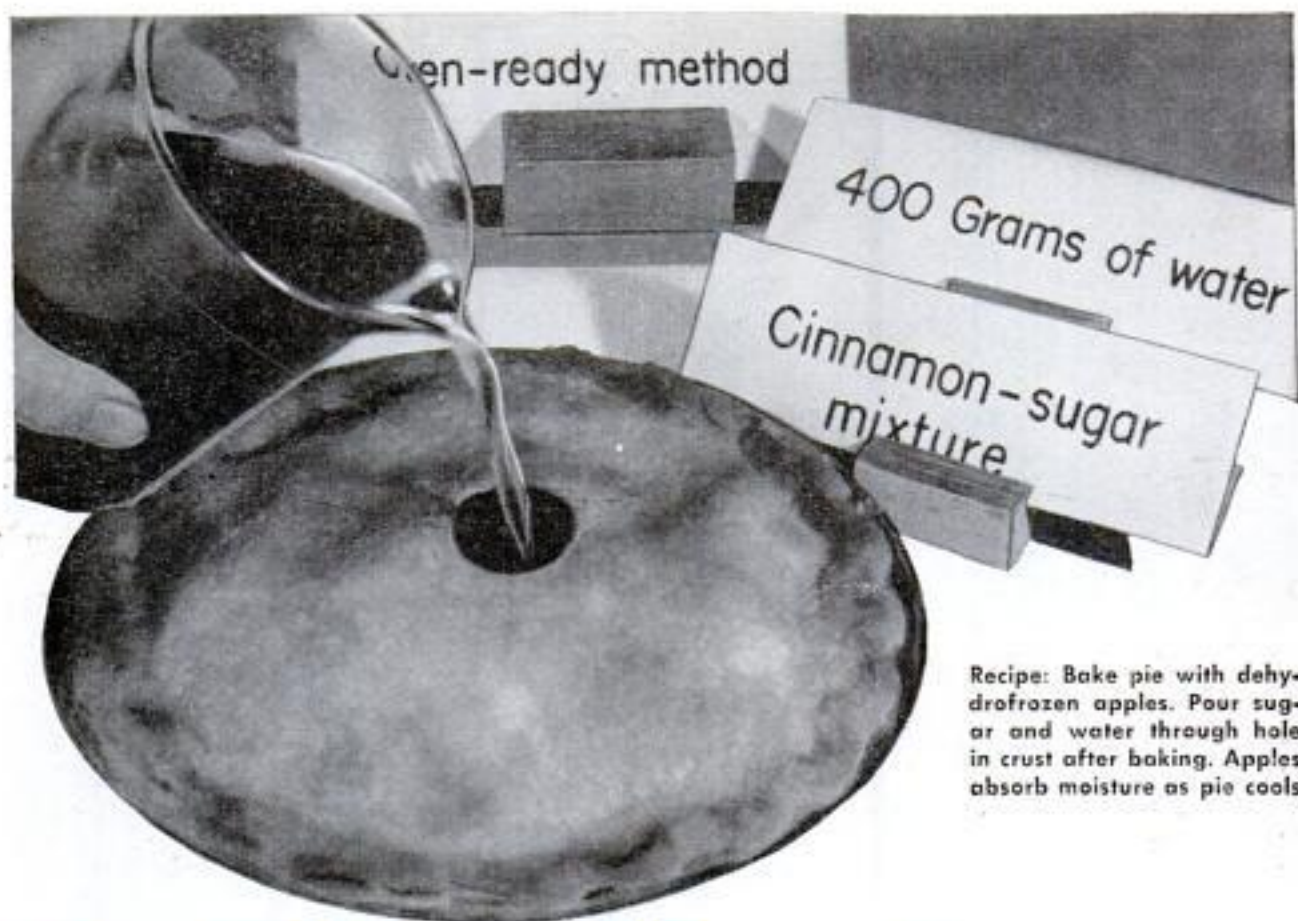
Baby A-Bombs

TROOPS TRAINING at Camp McCoy, Wis., no longer have to imagine atomic explosions during their field problems, for Capt. Loren J. Blazer has devised a simulated A-bomb for them. The bomb explodes with an earth-shaking roar, has a fire ball, the mushroom shape, and even a weird cloud effect that rises 3000 feet in the air. Two 55-gallon drums, with tops and bottoms cut off, are sunk into a pit to form a "cannon." Then three capsules of TNT wrapped in white phosphorus warheads are lowered into the drums. Powdered high explosives are poured over them, and the "brew" is topped off with 50 gallons of gasoline. Eighteen pounds of demolition charges provide the noise and shock wave, while the main charge sends a boiling fire ball up, followed by the rockets which cause the mushroom cloud.



Ordnance experts, below left, wire three capsules of TNT and rocket warheads together. Below right, electric firing device behind protective bunker 300 yards from blast site triggers simulated atom bomb

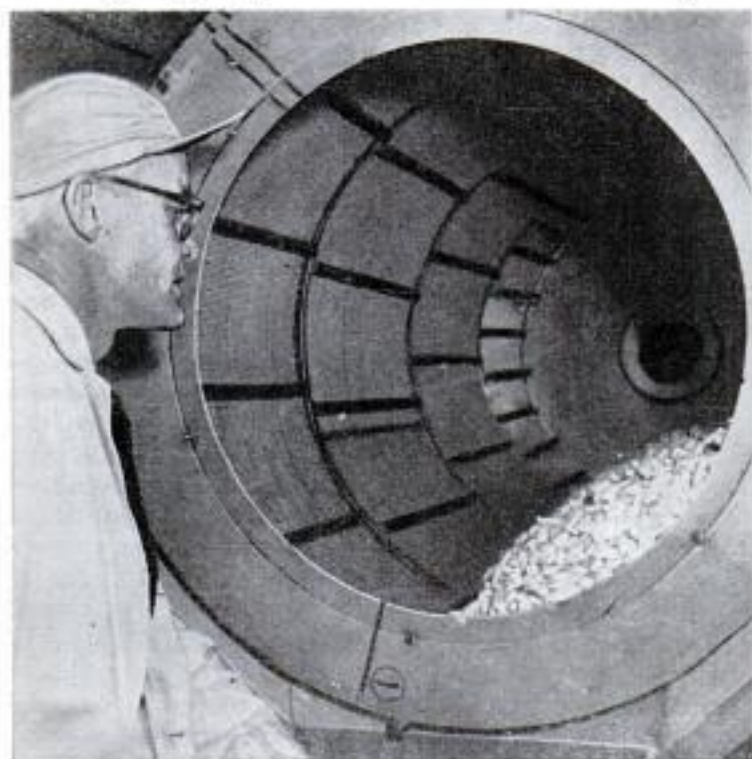




Recipe: Bake pie with dehydrofrozen apples. Pour sugar and water through hole in crust after baking. Apples absorb moisture as pie cools

The Things They Do to Your Dinner!

Rotary drier removes sufficient moisture from apples to reduce their weight by 50 percent. Food then is frozen for shipment



By Ronald M. Deutsch

NOT TOO MANY years ago, Great Aunt Martha scoffed at the notion you could get a palatable vegetable out of a tin can. And when she saw her first freezer, she wouldn't believe her eyes. But the nation's food laboratories are hinting that she hasn't seen anything yet.

Indications are that in a few years, if Great Aunt Martha is still around, she may watch a meal prepared from the following: A two-year-old steak stored on an open shelf in a plastic bag; a tiny packet of powder that turns into a pitcher of fresh-tasting fruit juice; two little boxes about as big as king-size cigarette packages, taken from the freezer to become vegetables for four; and for dessert, "fresh" uncooked fruit out of a can.

Each of these items is a proven reality today, and there are several more such eye openers in the

food scientists' larder right now.

Two of the most important discoveries have come from the Department of Agriculture's huge laboratory at Albany, Calif. Reflecting on the high cost of frozen packing and storage, and on the fact that nearly all fruits and vegetables are at least two thirds water, Dr. Louis B. Howard wondered if there weren't some way to combine the advantages of dehydrating with those of quick freezing.

Out of this thinking grew an important advance in food technology—dehydrofreezing.

DF, as the trade calls it, removes up to 80 percent of the water from a fruit or vegetable. The residue is quick frozen. The result? A package of frozen food a third the size of the original, with a saving of at least two thirds in the costs of packing, shipping and storage. Not enough water is removed to damage flavor or texture (as in dehydration) but enough is taken out so few ice crystals form in freezing. And it's the ice crystals that break down texture and flavor in freezing.

The DF foods thaw dry with no dripping, and pop back into size, shape and flavor when cooked in water. An ordinary refrigerator freezing compartment that holds 25 pounds of frozen food will hold 75 pounds of DF fruits and vegetables.

DF foods, including pimentos for cheese and apples for pie, are already being sold commercially to bakers, institutions and manufacturers. Some time in the future they may hit the retail market and may be a few cents cheaper than quick-frozen products. The grocer can store far more in the same space.

The military services are extremely interested in DF, as they are in any method which enables them to get fresh-tasting foods to fighting men at sea and abroad. For this reason, too, the Army is fostering another of the Albany laboratory's discoveries.

Any man who's ever dined on an

Here's difference in bulk that must be shipped. Same quantity of apples is shown dehydrofrozen (left), canned (center) and before processing on the platter at right



Enough food for four hungry adults! Water will turn this dry food into soup, potatoes, celery, spinach, steak, peaches, milk





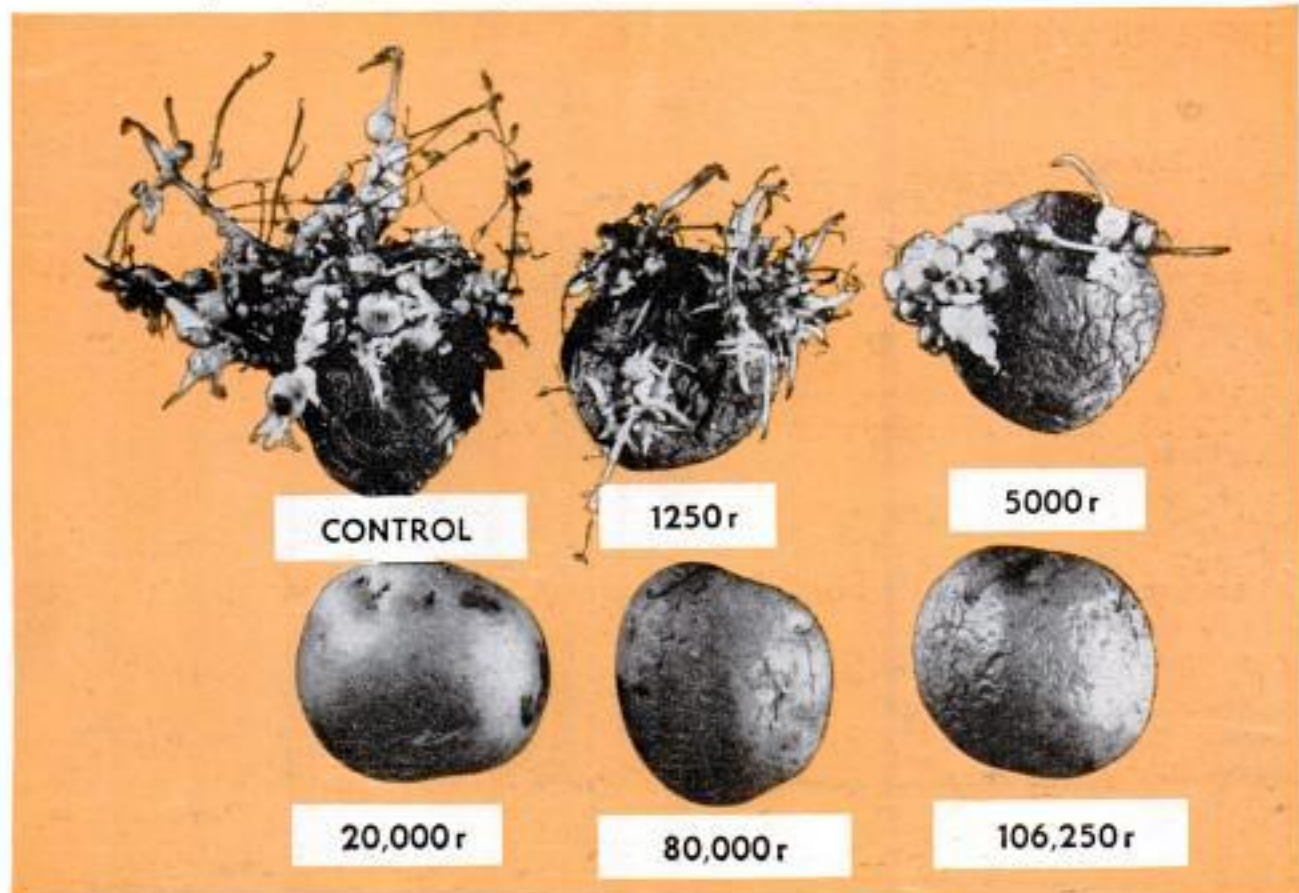
Dehydrated meat gets a try in the laboratory. By adding exactly the right amount of water, technician converts it to juicy steak

Army C ration will tell you what a big morale booster it would be to have a quart of fruit juice in a field pack. This has now been made possible by William F. Talburt and his brother food researchers, who have succeeded in drying several different kinds of fruit and vegetable juices.

Talburt starts with the fresh concentrate that is produced by the frozen-juice packers, but instead of quick freezing this, he places it in a vacuum chamber and dries it quickly in a method called "fluff" drying. The juice concentrate becomes a dry, puffy mass of crystals, easily broken into a coarse powder. When you mix a small envelope of the powder with a quart of cold water, you get a fruit juice as fine as any frozen juice you've tasted.

A pilot plant to produce the powder has been started in Florida, backed by the Army. Experts predict that savings in shipping weight, packing and storage costs may make the powder a formidable competitor to frozen juice. The inventors of the process also see it as a means of getting fresh fruit juice to many parts of Europe and Asia where refrigeration is

Radiation will prevent potatoes from sprouting. Doses of varying intensity produce different effects



rare. The juice powder is being sampled in long-range submarines and went with the party that climbed K2.

It isn't really surprising that the juice powder can be kept on open shelves for years, but visitors to a laboratory at the University of California's Davis campus are startled to see shelves of unrefrigerated steaks, roasts and chops, of veal, lamb, poultry and fish. They are even more startled when they learn that these items have been there for more than two years and are still pleasantly edible.

This is another pet project of the military, known as freeze drying. Aloys Tappel, an assistant professor of food technology at the school, developed the process, in which frozen meats are subjected to a high vacuum which removes almost all the water without damaging the meat. They then are stored at room temperature. When rehydrated (by soaking in water for a few minutes before cooking) the meat is tender and flavorful.

The beauty of freeze drying is that meat can be stored without refrigeration. No bulky cans are needed, the meat needn't be cooked first and shipping weight and space are vastly reduced. The processed food is simply enclosed in a plastic foil-laminated bag. Not only is this a blessing for the serviceman and the sportsman; it may well find its way into the supermarkets in the not-far-distant future.



Powder in can at left becomes orange juice in jar at right. Small container holds drying agent in can

Meanwhile another new development is the shipment of frozen foods without refrigeration. This method, initiated by Libby, McNeill and Libby, uses a "superchill" to bring the temperature of frozen foods down to minus 150 degrees. The food is shipped in a big aluminum container which has insulation six inches thick. The containers are easily loaded aboard ship or boxcar, and the food inside stays at below-zero temperatures for more than a month without additional refrigeration.

The key to much of this food research is the simple fact that all foods deteriorate

Look what's happened to the good old drumstick! Three dehydrofrozen chicken legs weigh less than two ounces

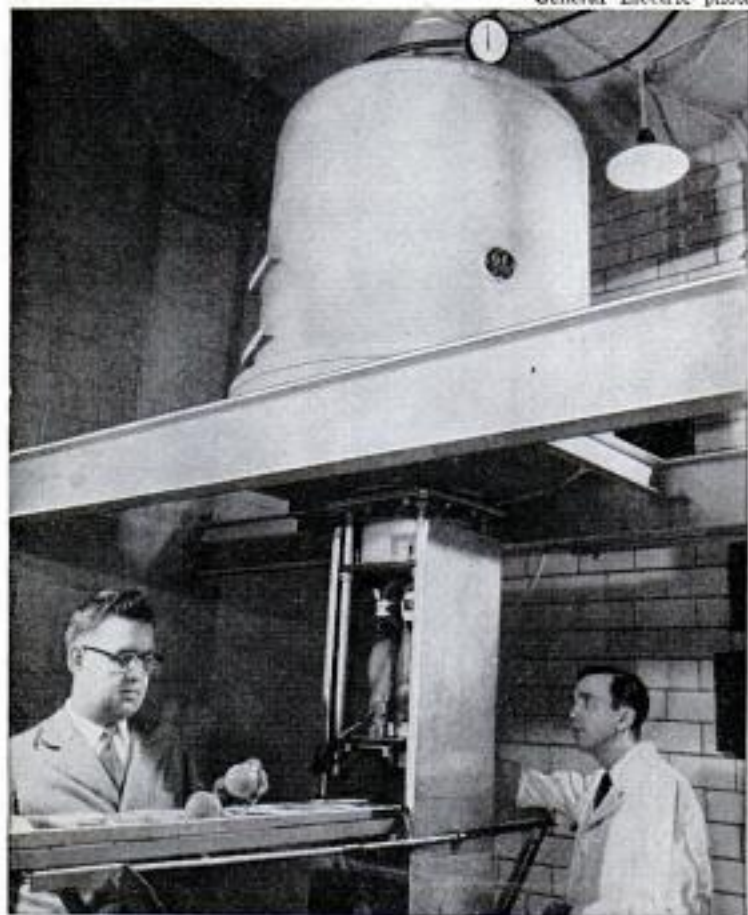




Tomato juice is concentrated into a semisolid inside a vacuum evaporator. Concentrate is spread on trays for further drying

Million-volt electron-beam generator bombards food to kill bacteria. Such research is promising but still experimental

General Electric photo



rapidly because of the bacteria they contain, which tend to make the food unfit or even poisonous to eat. Until recently there have been two prime ways to beat the bacteria: chill them into inactivity, or heat and kill them.

But it isn't always practical to keep food cold, and cooking food (as in canning) can spoil the delicate fresh flavor and texture. Even DF and freeze drying injure these qualities to some extent. So scientists have been intrigued by the possibility of killing the bacteria without affecting the food.

Three important means of doing this job have been tried successfully in the past few years. Food technologists believe that within the next decade at least one will be represented in the markets.

Food Shot With Rays

The best known of these ideas is radiation sterilization, the firing of deadly gamma rays at the food. In this process fresh foods are placed in cans or jars which are irradiated by a kind of atomic gun. The rays pass through the container walls and kill the bacteria. Since the containers are sealed, no new bacteria can get to the food.

Though radiation sterilization is now being studied at several laboratories, three big problems remain. One of these is the high cost of atomic radiation, no mean consideration in the highly competitive food business. The second problem is safety and shielding. And the third is that irradiation sometimes affects flavor.

Another way to do this same job has gained prominence of late, and it may well prevent the radiation process from ever becoming big business. The process is ultrasonic radiation.

These radiations are the extremely high-frequency sound waves, many times higher than those which can be heard, which are being used for everything from dental drills to metal inspection. Used properly, these high-speed sound waves can destroy bacteria just as effectively as gamma rays.

The ultrasonic-wave producers are much cheaper than atomic-radiation equipment and a good deal safer. Just like gamma waves, the ultrasonic vibrations will go

(Continued to page 244)



Sprinkler holds down dust as street-sweeper attachment picks up dirt in bin. Broom is 72 inches long



When the street-sweeper bin, with 1/2-yard capacity, is full, it is emptied into the dump box of truck

Self-Loader Makes Truck Triple-Threat Unit

NOSING UP to a pile of sand or gravel, a dump truck equipped with a new hydraulic self-loader can fill itself in minutes while the driver sits in the cab. Designed to make an ordinary dump truck a triple-threat work unit, the self-loader has a number of attachments to increase its usefulness. Among these are a snowplow that can be raised or lowered hydraulically, a forward-tilting bucket that makes it possible for one truck to load another, and a street sweeper that gathers the dirt into its bin and then empties the bin into the dump box of the truck.

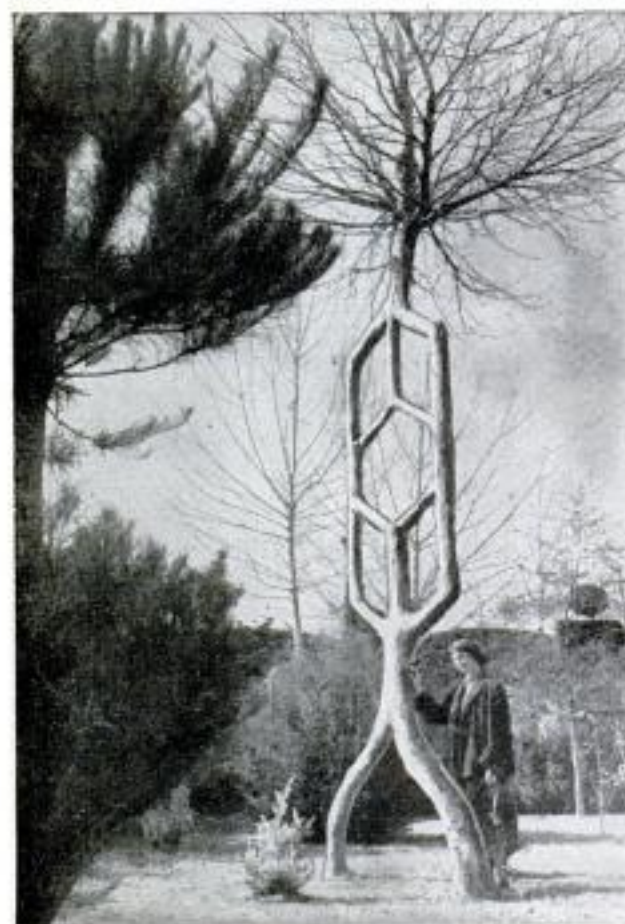


Combination of sideboard assembly and special refuse lip on bucket solves refuse-collection problems





Wooden forms keep two willow saplings growing in a spiral. Below, geometric pattern was formed when two sycamores were grafted together. Living armchair, right, was built by grafting four trees together



As the Twig Is Bent . . .

RETIRED FARMER A. N. Erlandson isn't content to let Nature take her course. In his "tree circus" near Santa Cruz, Calif., are about 50 weird formations of trees that he has produced by grafting and shaping.

One of his masterpieces is a living armchair made from four balm of Gilead trees, a species of poplar. Erlandson planted the trees five years ago and has been shaping them ever since through intricate grafting and interlacing. The chair, which will support the weight of an adult, provides its own shade in summer when the leaves are on the branches.

Another formation consists of two sycamores grafted together to form a geometric pattern. The two trunks were arched together, trained into the pattern, and then allowed to continue their normal growth at the top.

A double spiral of weeping willows was started two years ago. As the willow shoots grew, Erlandson kept them spiraling with wooden forms. These will be removed in two years when the trees, now 10 feet high, are permanently shaped. Wooden, steel and wire guides are used to train the members of the tree circus, which Erlandson started as a hobby 30 years ago. Today the collection is a tourist attraction.



RADIO



ELECTRONICS



Courtesy Allied Radio Corp.

Typical hi-fi demonstration room. Switch panel, right, permits comparison of many component combinations

HOW TO SELECT YOUR HI-FI SYSTEM

ADVANCES IN THE ART of electronics have made it possible to reproduce music with all the splendor and realism of the original presentation. This realism, called high fidelity, is now within the reach of most music lovers.

It is no longer necessary to buy a commercially assembled system with its fancy cabinet and expensive price tag. Today, you can choose from dozens of attractively styled components to assemble a hi-fi system which will meet your own personal requirements.

You need not be an electronic engineer to select the system best suited for your needs. A little advance planning, followed by an actual listening test will enable anyone to get the most enjoyment for every dollar spent.

A basic hi-fi system consists of a record changer, an amplifier and a speaker system. To this can be added, perhaps at a later date, a radio and television tuner and a tape recorder. Each part must be carefully selected because the final quality of reproduction depends not so much on the price of the over-all system as it does on

THE BASIC SYSTEM



AMPLIFIER



PICKUP CARTRIDGE



RECORD CHANGER



SPEAKER AND ENCLOSURE

ADD-ON COMPONENTS



RADIO TUNER



TV TUNER



TAPE RECORDER

a careful balance of components within a given price range.



COST ?

Components for a complete basic hi-fi system can be purchased from less than \$150 to more than \$1000. In spite of this wide price difference, it is comforting to know that even an expert will, under certain conditions, be hard-pressed to differentiate between the most expensive system and a carefully balanced, moderately priced one. As a start, therefore, you should determine how much of your total budget must be allotted to the individual parts. The following chart is designed to guide you in this determination.

TOTAL COST OF BASIC SYSTEM	Select Turntable and Cartridge Priced at About	Select Amplifier Priced at About	Select Speaker and Enclosure Priced at About
\$150	\$35- 50	\$45- 60	\$40- 70
200	45- 60	60- 75	65- 95
300	60- 80	75-125	95-165
500	90-120	100-220	130-310

Once you have an idea of how much you should spend for each item, you can study a catalogue to determine what components are available in your range. Catalogues are available free of charge from a number of reliable radio-parts distributors. These catalogues illustrate and accurately describe the various units. The information to follow will enable you to evaluate the technical data and select the components in your price range which meet the conditions for high fidelity.

Wherever possible, the tentative selection of parts from the catalogue should be followed up by a listening test in one of the high-fidelity showrooms located in many cities. If this is not practical, you can make your final selection directly from the catalogue with complete confidence and order the components by mail.

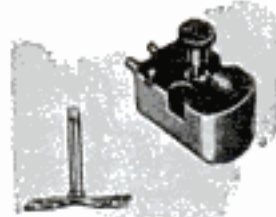


THE RECORD CHANGER

Modern high-fidelity changers are equipped with magnetic or ceramic pick-up cartridges, or have separate plug-in heads for any type of cartridge. The record changer itself should have a heavy duty, four-pole motor which reduces objectionable speed variations and hum to a minimum. For convenience it should be

able to play records at speeds of 33-1/3, 45 and 78 r.p.m. Most high-fidelity changers meet these qualifications.

Until recently, magnetic cartridges have been accepted as the finest available for hi-fi use. Today, however, some manufacturers have produced ceramic units which are claimed to have all the advantages with none of the disadvantages of the magnetic types. Ceramic cartridges have a high-voltage output and require no preamplification or equalization. With magnetic units these features must be included in the amplifier.



THE CARTRIDGE AND STYLUS

Tentative selection of cartridges from the catalogue should be based on the published data regarding their frequency response and inherent distortion. These characteristics will be explained later in some detail. For the present, any cartridge with a flat frequency response from 30 to 15,000 c.p.s. and a distortion figure of less than 3 percent merits hi-fi status.

Styli, or needles, for high-fidelity cartridges are available with sapphire or diamond tips. Either will outlast the osmium stylus generally supplied with ordinary phonographs, as shown by the illustration below.



Comparison of wearing qualities of different styli

While sapphire styli will give excellent performance for a reasonable length of time, the extra investment for diamond tips, particularly for long playing records, is highly worthwhile.



AMPLIFIERS

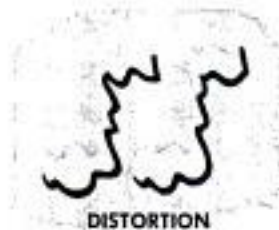
In selecting the amplifier, three important electrical characteristics must be considered. These are power output, frequency response and distortion. Let's consider these requirements individually.



POWER

achieve that illusive phenomenon called "presence," the amplifier must be able to provide considerable power.

The average power required for the normal living room, even when the volume is high, probably does not exceed $\frac{1}{2}$ watt. The amplifier, however, must be capable of furnishing far more than that. If the weakest passages of a record are reproduced with about $\frac{1}{2}$ watt, the loudest passages may well reach 10 or 20 times that proportion. If the amplifier cannot reproduce these faithfully, the results can be very disturbing.



DISTORTION

it is difficult to distinguish between the tones of the various instruments. In addition, distortion can actually introduce new tones which are not related to the original ones, so that the over-all results are unpleasant.

To become audible to the human ear, distortion must reach a certain minimum level. It is generally conceded that even a critical listener cannot detect distortion below three percent of the total output.



FREQUENCY RESPONSE

The frequency response of the human ear is approximately 20 to 17,000 cycles per second. This means that our eardrums are sensitive to pressure variations occurring at any rate within the above limits. In order to meet high fidelity standards, an electronic component must be able to reproduce all of these frequencies with equal intensity. If it does not, we will not hear the various sounds in their true perspective. A wide and flat frequency response, therefore, is a prime requisite of true high fidelity.

In your catalogue you will find amplifiers with distortion figures of less than 1 percent and a flat response from a very few

The output power of the amplifier determines the volume which can be obtained from the speaker. Since hi-fi music must be played loudly in order to

cycles to more than 100,000 c.p.s. Such units, however, are relatively expensive, and the improvement in quality is not commensurate with the increase in cost. In general, an amplifier with a response within 1 db. (a unit of measure of sound intensity) from 20 to 20,000 c.p.s. with less than 3 percent distortion, will provide excellent results.

As to power output, 10 watts is sufficient for average installations with 20 watts being needed for large or heavily draped rooms. For multiple-speaker installations or halls and auditoriums, a power output of 30 or more watts may be required.

In addition to the usual volume control, the amplifier should have separate bass and treble tone controls to permit compensation for personal preference and room acoustics. Furthermore, the unit should incorporate extra input jacks so that other components may be added later. A front panel selector switch is another important requirement.

If a radio tuner is purchased at the same time, all of the above-mentioned controls and inputs may be incorporated in the tuner. In this case, a basic amplifier, one without any controls, may be employed, at considerable saving in cost.

If a magnetic phono cartridge will be used, an equalized preamplifier must be included in the tuner or amplifier. For ceramic cartridges, this feature is not needed.



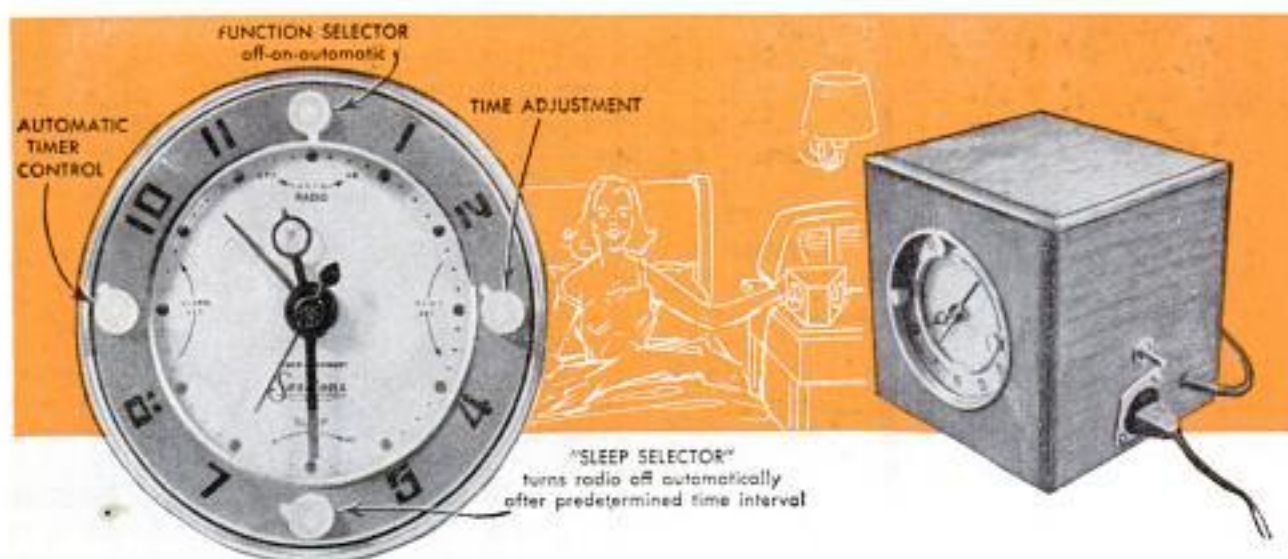
SPEAKERS AND ENCLOSURES

The speaker and its enclosure usually represent the weakest link in any music system. It is here that an increase in cost will bring the greatest improvement in quality. For this reason, several units in varying price ranges should be selected for later auditioning. If you are ordering your system from a catalogue, the following explanations will help you in making your final selection.

Hi-fi speakers are available in sizes ranging from 8 to 15 inches in diameter. The larger the speaker, the larger its enclosure must be in order to obtain best results. This consideration becomes important when the system must be installed in a small room.

The least costly of the hi-fi speakers have large cones and heavy magnets (in

(Continued to page 252)



WAKE UP TO MUSIC

By Dr. Richard C. Hitchcock

THIS EASY-TO-BUILD clock timer, when used in conjunction with your radio, will start your day on a happy note by replacing the jangle of the alarm clock with music from your local radio station. This model, which uses two timer clocks, was especially designed for twin-bed rooms. It permits both parties to see the time simultaneously, and it can be used to turn on the radio at two different times merely by flipping the clock selector switch on the cabinet.

The illustrations below show necessary wiring and the cabinet construction details. Naturally, if a single clock will serve your purpose, the second one can be omitted and the selector switch will not be needed. The width of the cabinet can be reduced accordingly.

Construction should begin with the assembly of parts of the cabinet, except part 6, using a good wood glue and headless brads. After the glue has dried, sand

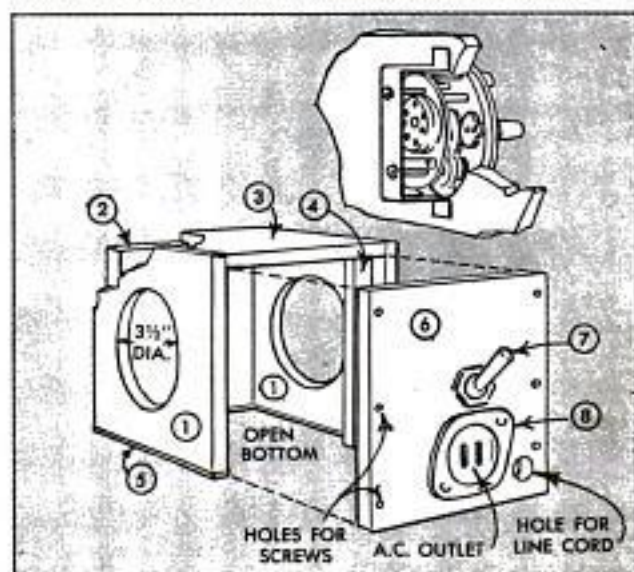
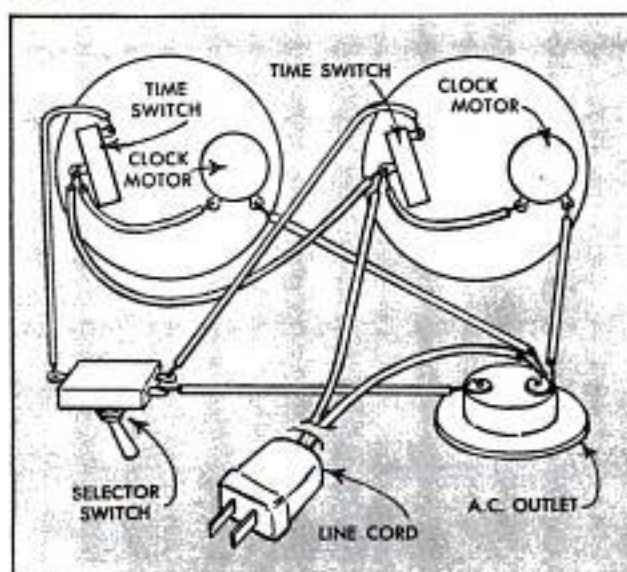
the cabinet smooth and stain or varnish, as desired. Finish side 6 and mount the selector switch and a.c. receptacle as shown. Then, insert the line cord through the panel and wire the circuit as below left. Install the clocks in the cabinet, below right, and attach part 6 to the rest of the cabinet with short wood screws.

To operate, plug timer line cord into wall receptacle and radio cord into timer receptacle. Leave radio switch always in the on position and use the clock controls for the various on-off functions.

LIST OF MATERIALS (See below)

Item	Description	Size
1	Clock mounting face	6"x6"x $\frac{3}{8}$ " 2 reqd.
2	Cabinet front panel	5 $\frac{3}{4}$ "x5 $\frac{1}{4}$ "x $\frac{3}{8}$ "
3	Cabinet top panel	6"x5 $\frac{1}{4}$ "x $\frac{3}{8}$ "
4	Cleats (to hold item 6)	5 $\frac{3}{4}$ "x $\frac{3}{8}$ "x $\frac{3}{8}$ " 2 reqd.
5	Strips of felt material	
6	Cabinet side panel	5 $\frac{3}{4}$ "x5 $\frac{1}{4}$ "x $\frac{3}{8}$ "
7	S.p.d.t. toggle switch, use Hart and Hegeman 21350-BP for radios, and 80618 for appliances drawing more than 3 amperes.	
8	A.c. outlet, Amphenol 61-MIP-61P	
9	Timer clocks, Sessions TF-582, 2 reqd.	

Line cord, wood screws, wood glue, headless brads, etc.



the **POPULAR MECHANICS** CRAFTSMAN

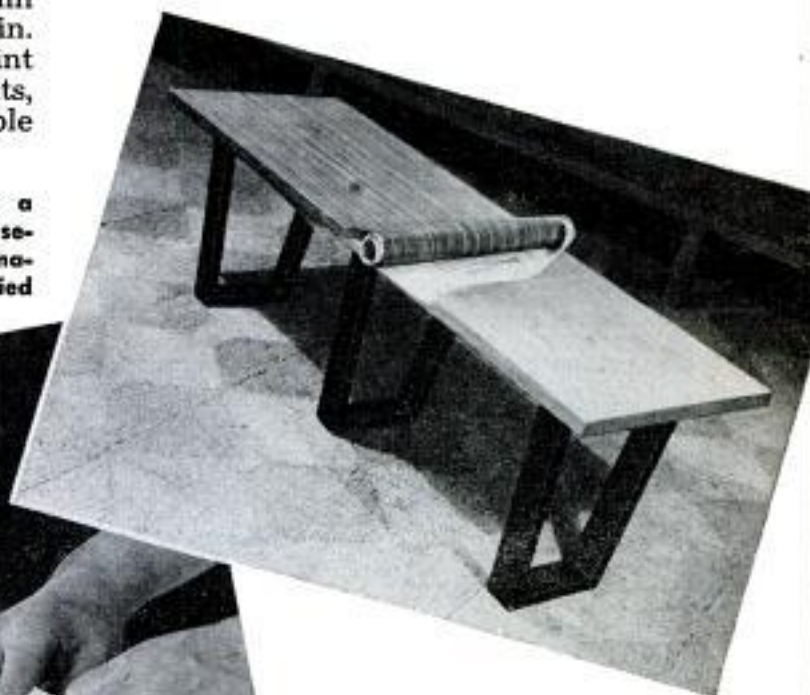
COVER IT WITH **STICK-ON PLASTIC**

By Theodosia Carpenter

Makes many common household items take on a brand-new look. Adhesive backing lets it stick securely yet permits it to be peeled off like masking tape. Wipes clean with cloth

YOU'VE PROBABLY used masking tape and know how easily it can be peeled off. That's the way a waterproof decorative stick-on plastic works, except that a paper backing must be peeled off to expose the adhesive coating. The peeling feature makes the material exceedingly easy to apply—if you make an error in positioning it the first time, simply peel it off and start over. Or, if you wish to change to a new color scheme, just pull it off and begin anew. It can be applied to any smooth surface, adds a durable skin-thin layer of plastic and comes in rolls 18 in. wide. It can be obtained in peppermint stripes, gay kitchen and nursery prints, solid colors, wood grains and marble patterns.

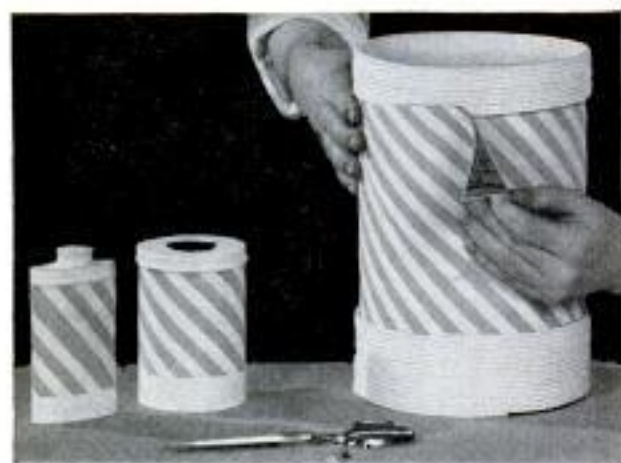
Adhesive characteristic of Con-Tact makes it a suitable finishing material for many craft and household objects because of its ability to bond permanently to any smooth surface to which it is applied



When applying the plastic to a kitchen work area or marred table top, first fill deep scratches and gouges with wood filler and sand smooth



A candy-striped "bib" of stick-on plastic waterproofs and decorates the splash area of this washbowl. Note matching mirror frame in plastic



Plastic covering makes companion pieces of this wastebasket, talcum can and cleanser can. Below, no water, paste or tools are needed. Cut in the desired shape, remove backing and apply



Printed designs are easy to cut from stick-on plastic and used like decals. Cut out before removing backing

One of several brands on the market is Con-Tact which is shown being applied in the photos. In the craft field, stick-on plastic can be used to transform many common articles into attractive pieces. A plain potato-chip can, for example, can be converted to an elegant bathroom wastebasket by covering it in a spiral pattern. The top and bottom are wound with white plastic clothesline glued in place. Matching pieces are a talcum-powder can and a scouring-powder can holder.

Stick-on plastic is excellent for covering books and magazines. In the time normally required to make a paper jacket, a book can be given a sturdy, permanent binding. The spine is covered first with a piece that extends well over the book covers. Matching or harmonizing pieces are cut about

Weathered and damaged sills take on new beauty when covered with wood-grained waterproof plastic





The numerous colors and patterns offered in the material afford a good covering for picture frames

$\frac{1}{2}$ in. larger than the covers and stuck in place. Next the corners are mitered and the edges folded over. An appropriate pattern is used for end papers. If the book is coming apart, the end paper should extend both across the inside of the cover and the facing page.

Magazines are given a hard binding in much the same way. The front cover is cut off and a piece of cardboard of the same size substituted, while another is added on top of the back cover. After the binding has been attached, the magazine cover is pasted on the front.

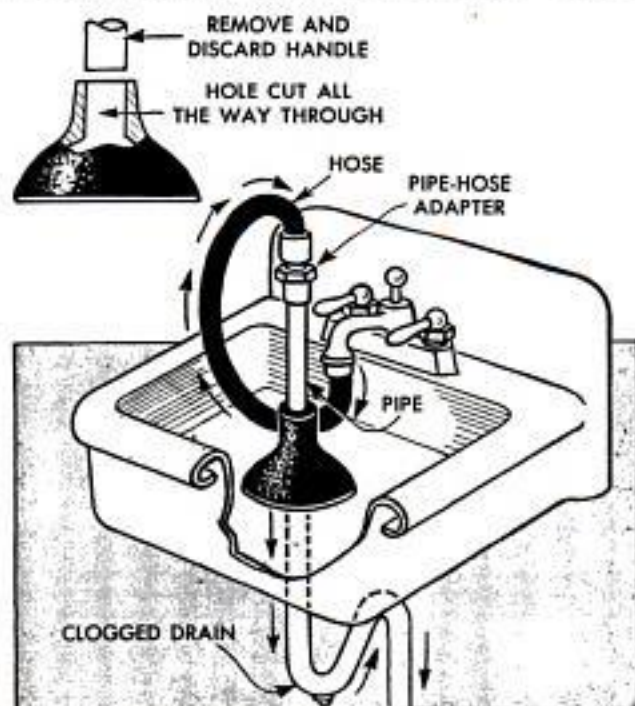
Plastic coverings for kitchen tables are inexpensive and good looking. Working surfaces in the kitchen may be restored to a new appearance with the durable material. Its adhesive characteristic makes it especially useful for covering shelves and window sills.



This marble pattern lends a distinctive note to the dressing table and gives it added serviceability

Because it is waterproof, the product offers a wide variety of uses in the bathroom, as a splash covering around the washbasin or as a colorful frame on the wall around the medicine cabinet. The imitation wood grains are excellent for "paneled" dens or playrooms, while the patterned pieces make lasting washable wall coverings for bathroom and kitchen. ★★★

Pressurized Rubber Force Cup Clears Clogged Drains



A rubber force cup, modified to direct water pressure into a clogged drain, will clear the drain when a regular force cup will not. To modify the cup, first remove the wooden handle and drill through the blind hole from which the handle is removed. Replace the handle with a 24-in. length of $\frac{3}{4}$ -in. pipe threaded at both ends. Hold the cup on the pipe with a hose clamp. Screw a garden-hose adapter to the upper end of the pipe and attach a garden hose connected to a hot-water faucet. Use only a small amount of water pressure and apply it intermittently. Lift the cup to release the pressure after a few moments, then drop it down over the drain again and turn on more pressure. The cup can be used in the regular way by replacing the garden-hose adapter with a pipe cap.

☐ White shellac will serve as a wood filler in the absence of other suitable materials when applied in one or two coats.

Magnifying Glass on Tweezers Aids Splinter Removal



Removing a splinter from your hand is easier if a small magnifying glass is mounted on one leg of the tweezers. Make a sheet-metal clamp as shown for fastening the glass to the tweezers. Either sheet-metal screws or machine screws will hold the clamp in place. Tilt the glass until the tip of the tweezers is in focus before tightening the clamp screws.

Masking-Tape Adhesive Dissolved To Permit Easier Removal



To prevent chipping fresh paint when masking tape is removed after painting, dissolve the tape adhesive with lighter fluid. Apply fluid to the gummed side of the tape as it is slowly pulled from the surface.

Christmas-Tree-Light Sockets Used as Curtain Pulls

Plastic sockets from an old string of Christmas tree lights can be used to make good curtain and Venetian-blind pulls. First cut the wire to remove the socket from the string, then pull both the wire and the metal insert from inside the socket.

Now slip the curtain cord through the hole in the socket and tie a knot in the cord.
R. M. Woodbury, Natick, Mass.

Dyed Pine Cones and Bottle Caps Make Miniature Trees

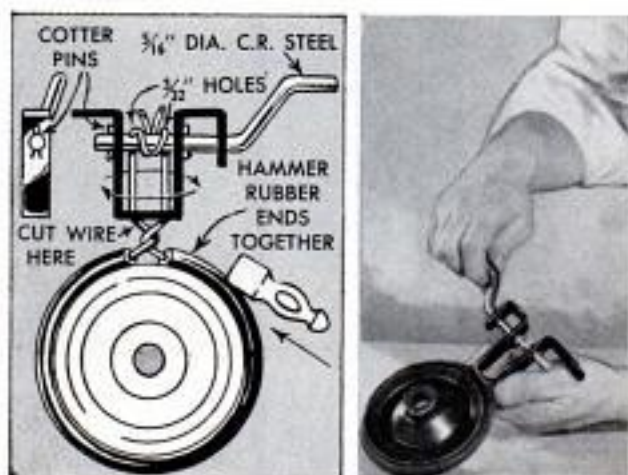
Realistic miniature trees for use in model landscaping can be made quickly by coloring pine cones. The cones are dried, then sprayed with green dye. Bases to hold the "trees" upright are made by driving nails through the bottle caps and forcing the cones onto the nails. Sprinkling boric-acid crystals or other suitable material on the cones will provide a snow effect.



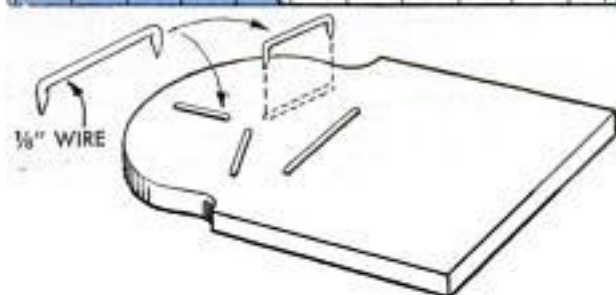
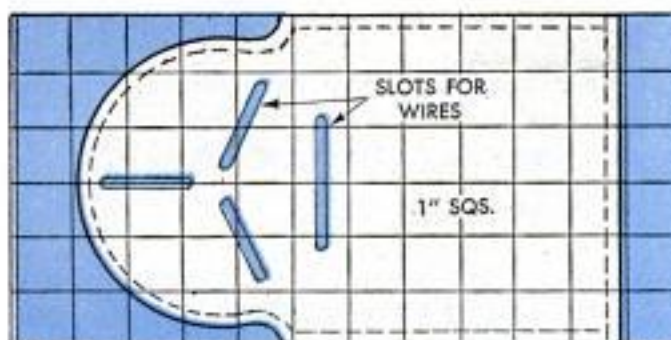
Installing Solid-Rubber Tires

Replacing solid-rubber tires on baby carriages and children's wheeled toys is no problem when this simple wire-stretching tool is used. It consists of a frame bent from flat steel and a crank bent from metal rod. Two holes are drilled through the crank and two through the bottom of the frame so the wire can be threaded as indicated. To operate the tool, strip the tire back until about 6 in. of wire are bared at each end, making sure the remaining length of tire is about $\frac{1}{4}$ to $\frac{3}{8}$ in. longer than the circumference of the wheel. Next, thread the wire ends through the frame and crank holes and turn the crank until the wire is under tension but is not taut. Give the frame one half turn and cut the wires near the twist. Fold the ends down and force them into the tire. Then with a hammer tap the tire on both sides of the joint until the ends are forced together.

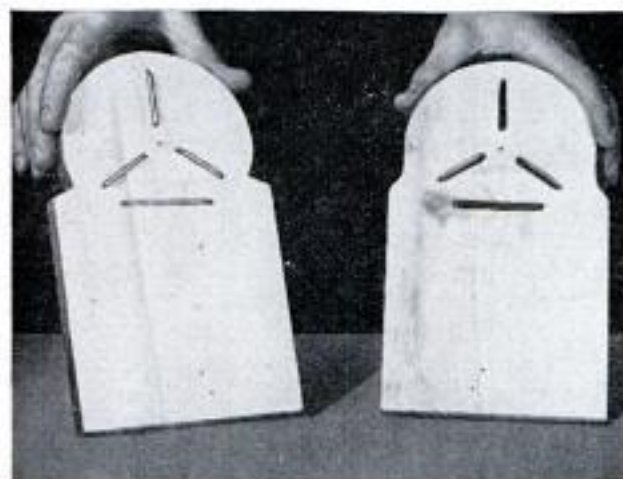
Carl S. Bates, Chicago.



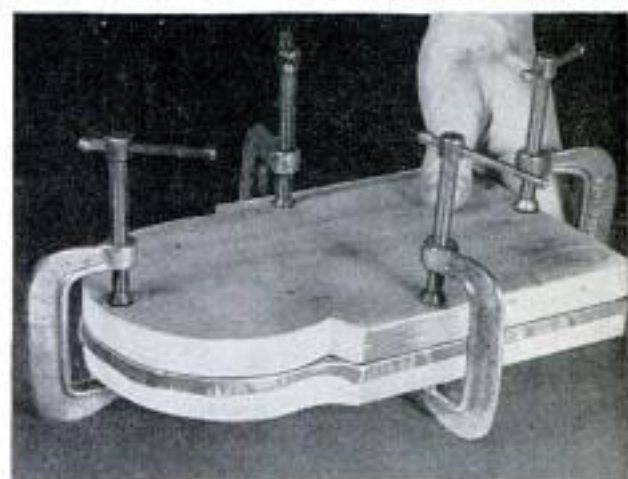
HAMMERED-COPPER SNACK TRAYS



Above, trays are just the right size for holding coffee cup and sandwich when watching special TV program. Ridges pressed into tray provide three-point rest for cup to prevent it from heating tray



Jig for shaping trays consists of two pieces cut from 1-in. stock, one having slots, the other wire staples



Final step in shaping trays is to clamp them between jig halves and bend down projecting edges of metal

THESE HAMMERED-COPPER snack trays are strikingly attractive when buffed to a high polish, and are just the right size for holding a cup of coffee and a sandwich or piece of cake when a special program keeps you at the television set. Best of all, using a simple two-piece wooden jig, the trays can be mass-produced, thus offering an opportunity for Christmas gifts, or salable items for spare-time projects.

Roofing copper is the material used to make the trays. Although this type of sheet copper actually is heavier than necessary, it is generally available in most localities. Also, it comes in a 12-in. width that can be cut economically to make trays which require a 6 x 12-in. sheet. If a lighter-gauge sheet copper is available, it can be used, since peening the metal hardens it so that it will be rigid enough.

To make the jig for shaping the trays, transfer the pattern shown at the upper

left onto 1-in. squares—the dotted lines show the dimensions of the jig, the solid lines show the outline of the sheet-metal pattern—and cut two identical pieces from 1-in. stock. In one piece, cut four slots as indicated on the pattern. In the other piece drive four "staples" to align with the slots in the first piece. The staples are lengths of $\frac{1}{8}$ -in. wire, sharpened on the ends and bent to a U-shape.

Cut a piece of copper according to the pattern, peen it well, then place it between the jig halves and hammer on the slotted end of the jig so the wires force the copper into the slots to form ridges in the tray. Next, clamp the copper sheet between the jig halves and hammer over the $\frac{1}{4}$ in. of metal that projects all around, thus forming the tray edge.

Remove the tray from the jig, smooth the edges, then polish the whole tray with steel wool and coat with clear lacquer.

Hydraulic Wheel-Chair Support

Anyone confined to a wheel chair will find use for this support, whether in the home or in business, as it permits the occupant to raise, lower, or turn the chair to any angle

By Clinton R. Hull

SPECIFICALLY DESIGNED to hold the wheel chair of a handicapped filing clerk who uses a two-shelf, circular desk in his work, this swivel support is mounted on the hydraulically controlled column of an old barber chair. The latter not only permits a swivel action, but its hydraulic mechanism allows the wheel chair to be raised by its occupant to any height within the

Chair occupant controls support height by a few strokes on lever of hydraulic unit in column



limits of the barber-chair column—in this case to permit the occupant to work from either level of the desk. It also positions the chair at a height most convenient for using a typewriter which is fitted on a swivel bracket mounted on the end support of the circular-desk shelf.

Construction of the swivel support starts with the removal of the seat of the barber chair. Usually four bolts are used to hold the chair to the column. The wheel-chair support is designed to be mounted by using the same four bolt holes. A sheet-metal disk is cut to fit over the opening in the upper end of the barber-chair column.

The main frames of the wheel-chair support are lengths of $\frac{1}{4}$ x 2-in. flat steel, bent to inverted U-shapes as indicated in the drawing, so they straddle the top of the barber-chair column. Lengths of the frames are determined by the height of the column when it is at its lowest position. "Tracks" for the wheel chair are $\frac{1}{4}$ x 2 x 2-in. steel angles welded to the lower ends of the frames. These tracks should be positioned so they are about $\frac{1}{4}$ in. above the barber-chair base when the column is at its lowest position.

Track spacing on the original support was $18\frac{3}{4}$ in. between the vertical flanges. However, since wheel chairs vary in size and construction, this dimension should be checked on a particular wheel chair. The vertical flanges help align the wheels of the chair when rolling it onto the tracks and prevent the wheels from slipping off sideways. The vertical flanges of the angles are cut at a point $23\frac{1}{4}$ in. from the back ends, then are heated and bent flat to provide supports for the sheet-steel platform which is bolted across the forward ends of the tracks. The ends of the tracks also are bent down $1\frac{1}{2}$ in. at a point 4 in. from the front ends.

Wedge-shaped wooden blocks are bolted to the lower surfaces of the front ends of the tracks. These blocks should just touch the floor and hold the tracks level when the wheel-chair support is at its lowest position. To determine the latter position, place both wheel chair and its occupant on the completed support and release the hydraulic valve so the column

Hydraulically raised and lowered support positions chair so occupant can work at upper or lower desk level or at typewriter

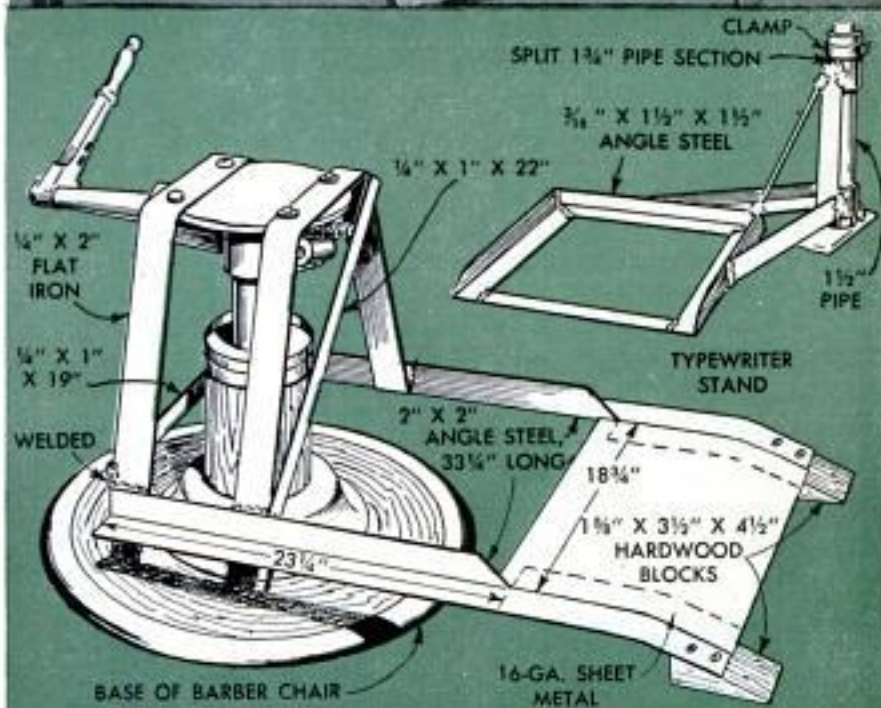
settles to its lowest point. Otherwise, the column, which has been lightened by removal of the barber chair, might not settle to its true low point.

After the tracks have been spaced properly, they are held in place by a $\frac{1}{4}$ x 1-in. flat bar welded horizontally at the rear, and by one or two diagonal braces welded to the upper ends of the U-shaped frames and to the tracks in front of the column as shown in detail at right.

The circular desk for which the wheel-chair support was designed is made of several circular segments cut from $\frac{3}{4}$ -in. plywood. The segments of the lower shelf have an inner radius of 24 in. and an outer radius of 44 in., resulting in a top 20 in. wide. Radii of the upper shelf are 27 and 44 in., resulting in a 16-in. width. The desk is supported on vertical legs spaced along the outer edge of the lower shelf. Angle-steel braces are fitted diagonally between the lower ends of these legs and the inner edge of the lower shelf. This arrangement provides clearance for the wheel chair as it swivels. Sheets of hardboard are fastened to the outer edge of the lower shelf and extend to the floor.

The typewriter support is a welded angle-steel frame, braced and welded to a section of $1\frac{3}{4}$ -in. pipe which is split and rewelded so it will slip over a $1\frac{1}{2}$ -in. pipe, that size being used for the spacers between the upper and lower shelves of the circular desk. ★ ★ ★

Chair support at lowest position permits chair to be rolled onto it, where occupant can adjust it to any height or direction



Convenient Light-Bulb Storage Provided by Hardboard Panel



There is no need to wonder about the light-bulb supply, when a single glance at this storage panel will tell how many unused bulbs remain. The panel is a 12-in. square of hardboard in which 16 equally spaced 1-in. holes are drilled to receive the bulb bases. Cut two empty thread spools in half and use the halves as spacers under the four corners of the panel when it is screwed to the wall. The holder also can be used to hold burned-out bulbs by marking the ends of the bulbs with a grease pencil. Masonite Corp.

Concrete-Filled Flowerpots Hold Driveway Markers



Attractive bases for supporting patio lamps and portable driveway markers consist of large flowerpots filled with concrete. Pour each pot full of a fairly stiff mixture of concrete and invert it on a board. Force the standard of the lamp or

marker through the hole in the bottom of the pot and down into the concrete. Brace the standard in a vertical position and let it stand until the concrete hardens.

Roller Used to Apply Glue Evenly on Large Surfaces

Glue can be applied more quickly and evenly to large areas, such as when cement-

ing counter-top material to plywood, if a roller is used rather than a brush or other type applicator. A print roller of the type used in a photo darkroom would be ideal, or one could be improvised by fitting a length of fairly large-diameter dowel with a Y-shaped handle bent from flat steel.

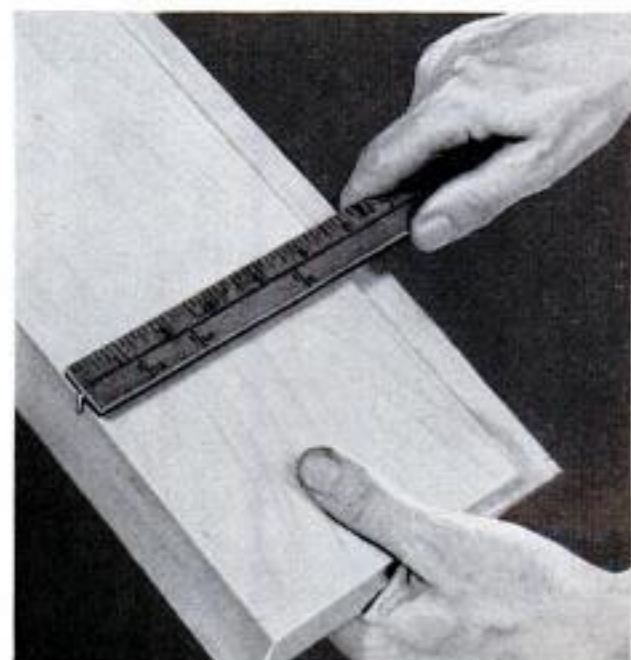
Outdoor Christmas-Tree Stand Made From Implement Wheel

A stand for an outdoor Christmas tree can be made by modifying an implement wheel. The rim of the wheel is cut off and the spokes are heated close to the hub and bent down. The ends of the spokes should be ground to points so the stand can be driven into the ground. If a tree with a small-diameter trunk is to be used, drill and tap two or three holes in the hub to receive bolts that can be tightened against the tree trunk to lock it in place.



L-Hook Driven Into Yardstick Assures Accurate Measuring

A small L-hook can be used on the end of a yardstick to serve the same purpose as a hook on the end of a steel measuring tape. To prevent the wood from splitting when driving the hook, drill a pilot hole. The outer portion of the hole then is counter-bored to receive the nonthreaded body of the hook, thus permitting it to be drawn tightly against the end of the yardstick.





Shallow top section of mailing-tube candle is filled with melted wax a little of which is allowed to trickle down the sides. Then wick is burned just long enough to blacken it. Photo at right shows base, see detail C

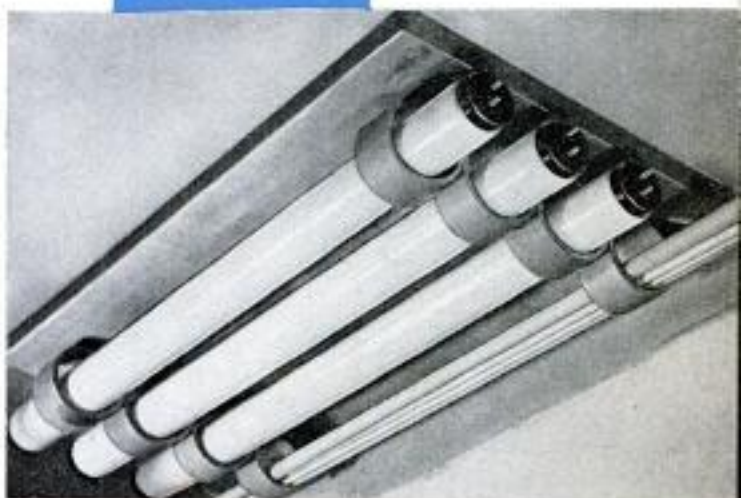
New Uses for MAILING TUBES

By Walter E. Burton

DUE TO THEIR sturdy construction, smooth finish and ease of handling, cardboard mailing tubes find many practical and novel uses around the home. The photos on these pages show several applications of mailing-tube construction—from a Christmas candle to an archery quiver.

There are various ways of cutting mailing tubes so the cut end will be square. The simplest is to draw a line around the tube and cut along the line with a razor blade. For multiple cutting of short sections, the tube may be rotated against a knife which is raised above a table or bench top by means of a wooden block. The knife is clamped in place. The circular saw and

Cylindrical box made from tubing sections holds jewelry or stores camera lens. Tubing may be covered with soft leather or cloth. Cardboard disks form lid



Mailing tubes can be used for storage in several ways. Under-shelf rack, above, is shown in detail E. Below, tubular storage rack holds maps, plans or papers. Tubes are glued to plywood and to each other





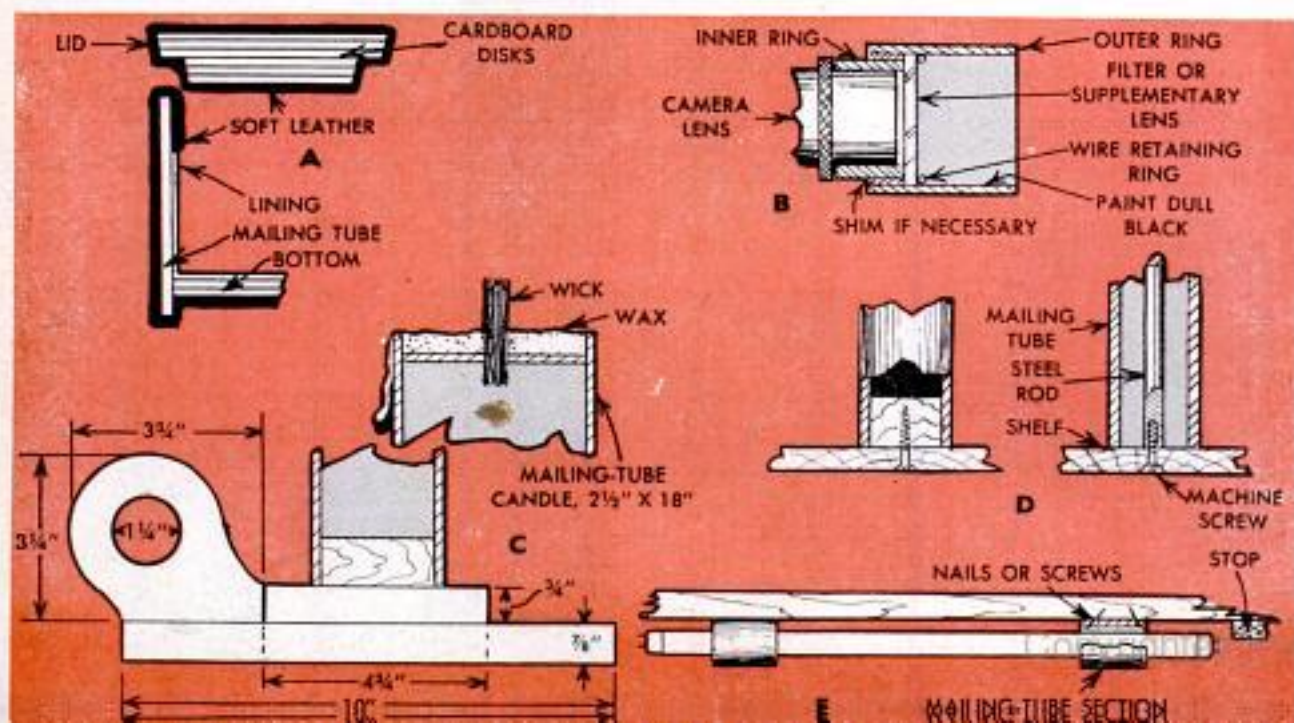
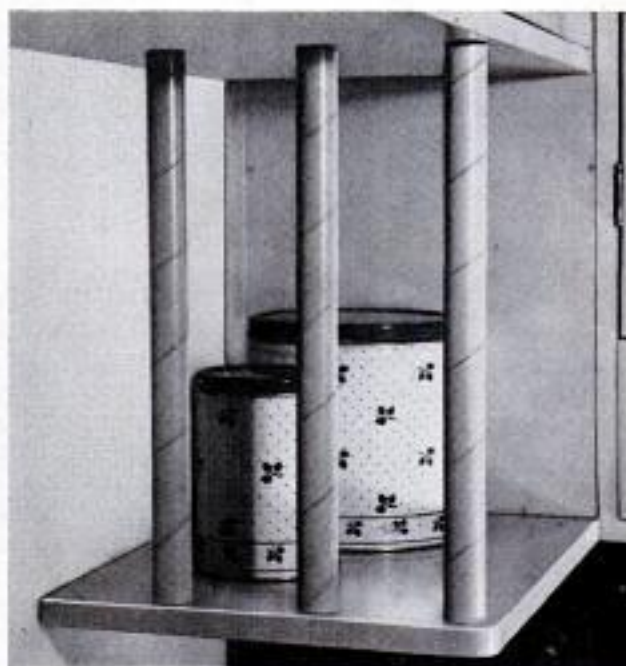
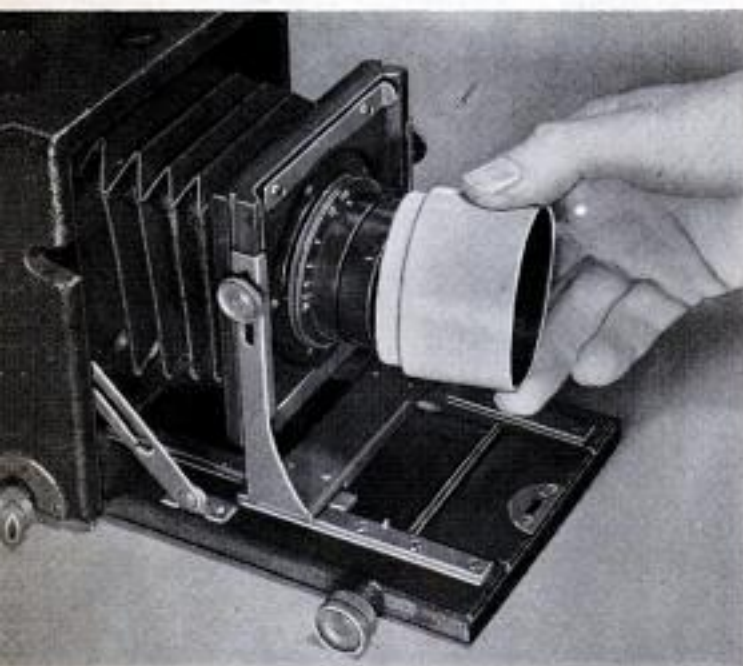
Storage drawer utilizes tube sections which are dipped in shellac or glue size and then glued together



Honeycomb compartments made of tubing are ideal for storing rolls of 35-mm. film, buttons or small parts

Camera-lens shade is made as in detail B, below. If inner ring is too small, pad with felt to fit snugly

Mailing tubes form decorative columns at end of hanging shelf. Corner tube conceals steel rod, detail D



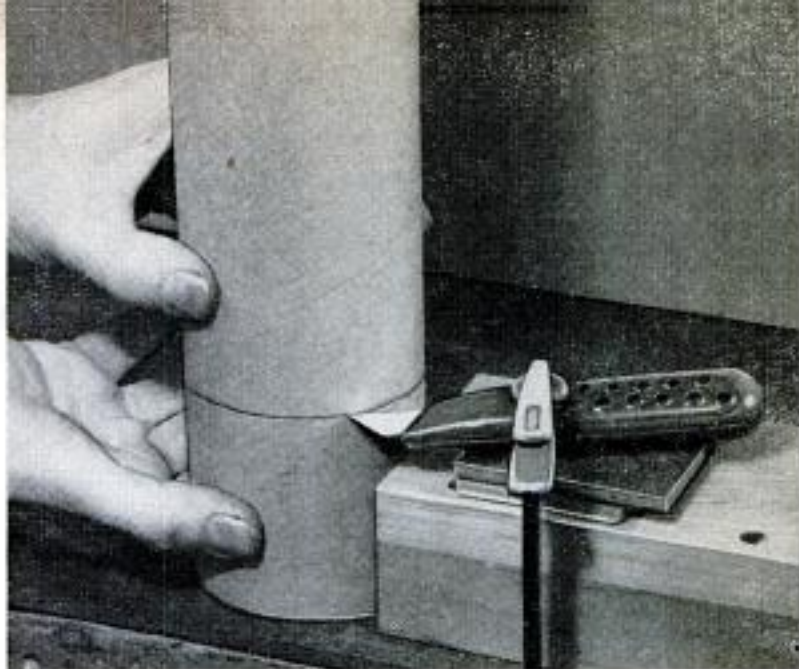
lathe also can be used to cut heavier tubes, the lathe setup being ideal for cutting thin rings.

For appearance, the tubes may be covered with wallpaper, plastic fabric, leather or cloth. Or they may be painted. Before painting, however, seal the cardboard with glue size or shellac and follow sealing with a light sanding.

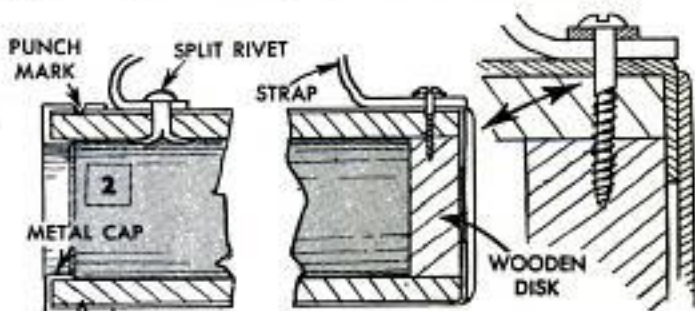
Surprising strength is obtained by nesting together tubes of different diameters. This was done in the case of the jewelry or lens box, detail A. Lid and bottom of the box were made of cardboard disks cemented together. The camera-lens shade, detail B, consists of two mailing-tube rings glued together. The rings may be shimmed with thin cardboard to make them fit snugly.

Both the candle, detail C, and the decorative shelf columns, detail D, show how the tubes can be supported vertically by gluing the ends over dowel plugs. Detail E illustrates how tube sections may be toenailed to shelves or joists to form racks for extra fluorescent bulbs or lengths of molding. ★ ★ ★

Archery quiver, pictured below, is made from mailing tube as detailed at right. Metal cap is improvised from film container or can lid by cutting tabs in center and bending downward

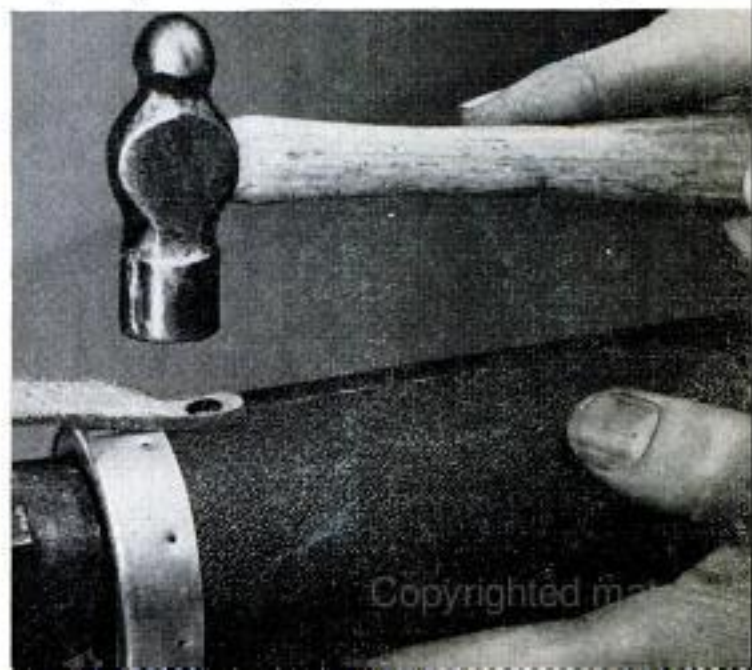


Mailing-tube cutter is made by blocking sharp knife to proper height and clamping to table or bench top



Sides of archery quiver may be covered with cloth-backed plastic fabric which is cemented in place

Vise anvil and hammer are used to rivet carrying strap to quiver. Note punch marks in metal cap



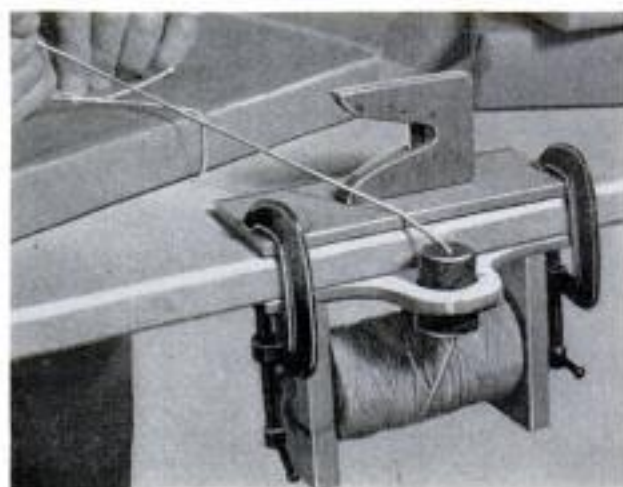
Boot and Mitten Rack Teaches Children Neatness



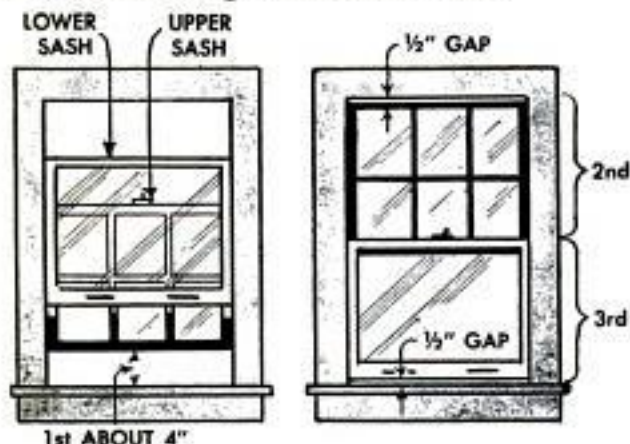
Placed in a convenient spot in the house, this rack will teach children to keep their mittens and overshoes in one location, as well as prevent them from tracking mud and water through the house. Dimensions of the rack will vary with the number and size of the children. Dowels fitted in the cross-piece of the rack upright accommodate wet mittens, the slatted ramp below holding rubbers and overshoes. A metal pan under the rack catches dripping water. With slight modifications the rack could also be used for hanging snow suits and coats.

Two-Piece Portable Unit Holds Cord and Cutter

Whenever he has a number of packages to wrap, one man clamps this portable cord supply and cutter to a worktable or counter top. The cord spool rotates on a dowel slipped through holes in the side-pieces of the lower bracket. Cord from the spool is threaded through a drilled cork forced into a hole in a projection of the bracket crosspiece. The cutter is a razor blade held between two U-shaped pieces of plywood. The assembly is screwed to a plywood base for clamping.



System Simplifies Painting Double-Hung Window Sash



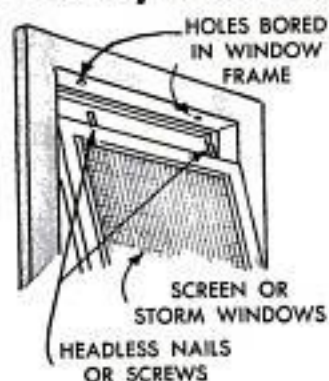
When painting either side of double-hung window sash, position the two sections so that about 4 in. of the top sash can be painted first as shown. Then close the window, leaving a gap of an inch at the top and bottom to keep paint away from

the top of the frame and sill, and finish painting the top sash. To avoid missing any of the crossbars on windows of multiple panes it is best to follow a set pattern of painting all the vertical bars first, following with the horizontal ones. Naturally all loose paint should be removed and loose putty replaced before repainting.

Wood Strips on Exposed Edges Give Plywood Finished Look

Strips of wood glued and nailed to the exposed edges of plywood panels used in cabinets and other projects improve the appearance of the work and conceal blemishes and holes in the core. Screen molding is ideal for this purpose because it approximates the thickness of $\frac{3}{4}$ -in. plywood and can be purchased already sanded.

Storm Sash or Window Screens Held by Concealed Pins



Screens and storm sash can be held securely in window frames without the need of hooks or turn buttons by driving two headless nails or screws into the top edges to fit registering holes in the top of the window frames. Brass

pins or $\frac{3}{16}$ -in. dowels may be used instead, and have the advantage of being rustproof. Ordinary hooks and eyes located near the lower edge of each stile will keep the screens or storm sash closed tightly at the bottom.

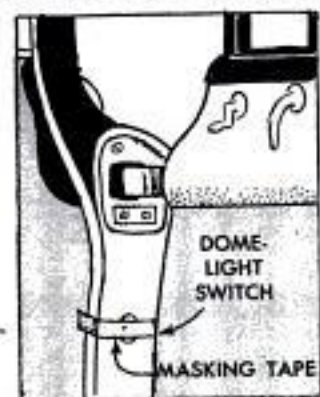
Matches Under Lantern Base Always Ready for Use



There is no need to hunt for matches to light a camping lantern when a book of them is taped under the base of the lantern. In most instances the rim of the lantern base will prevent the matches from contacting the ground and becoming damp. If

the lantern is to be used in an especially damp location, wrap the matches in aluminum foil or plastic sheeting before taping them in place.

Tape on Doorframe Switch Shuts Off Dome Light



When it is necessary to work on the interior of a car for a long period of time, one mechanic keeps the dome light turned off by pressing a strip of masking tape over the automatic switch on the doorframe. The tape keeps the switch depressed,

but does not interfere with the opening and closing of the door, should that be necessary during the repair work.



Simple Christmas-Tree Stand Made From Siding Strips

Four lengths of leftover siding were used by one homeowner to build a simple Christmas-tree stand. The stand is made in an I-shape, the vertical bar consisting of two parallel strips spaced to accommodate the tree trunk. Wood blocks nailed between the strips support the tree in a vertical position.—Frank Zagar, Cleveland, Ohio.

Metallic Letters Printed With Rubber Stamp

You can print names in gold or silver on book covers and luggage with a rubber stamp by using varnish as ink and metallic powder for color. A small amount of varnish is applied to a pad consisting of four sheets of cleansing tissue placed on a piece of glass or hardboard. After lightly inking the rubber stamp from the pad, carefully stamp the name on the object to be identified, then dust the wet varnish with a metallic powder of the type used to color metallic paints. Blow off the excess powder and allow the varnish to dry overnight before the object is handled.



HAMPER- WORK TABLE

By Jack Wall

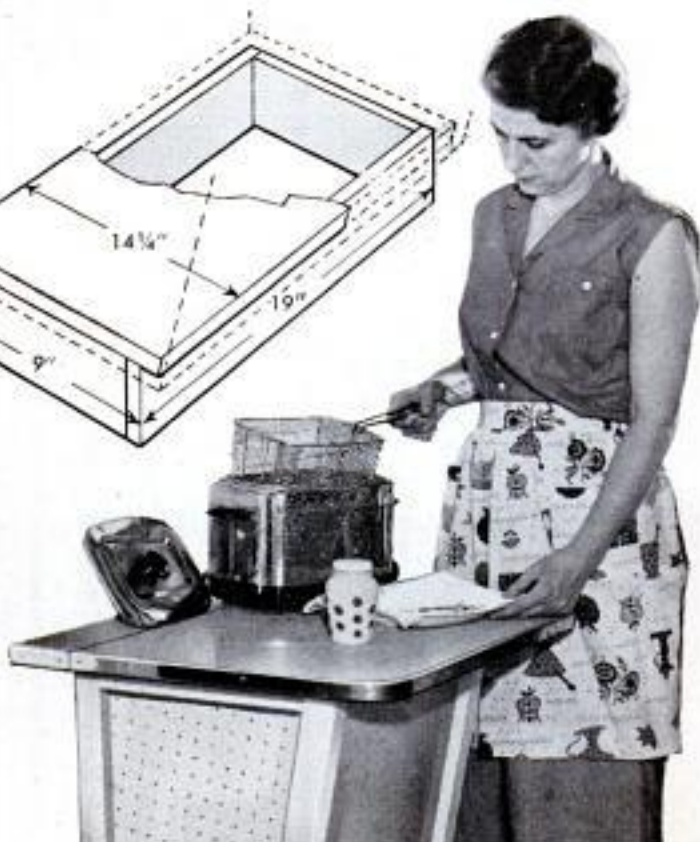
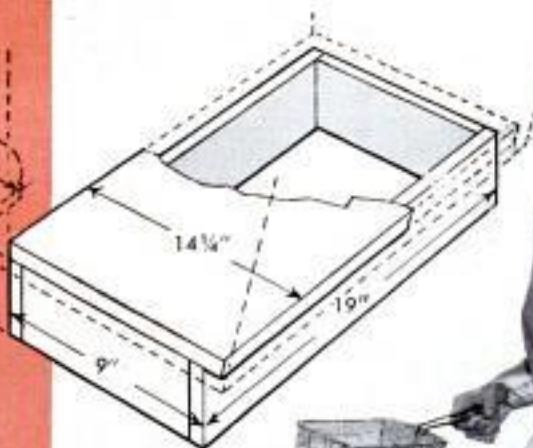
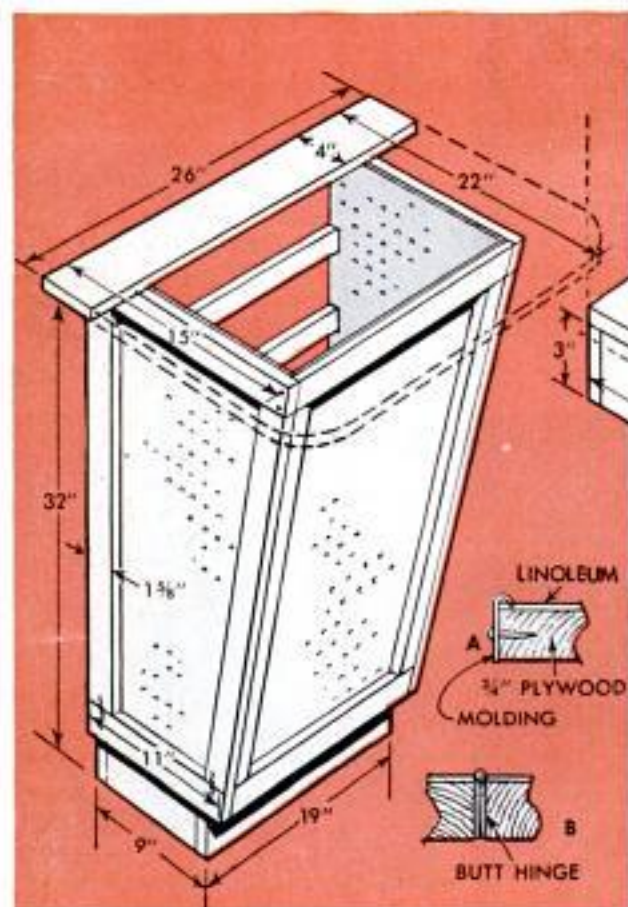


Hamper located in kitchen saves steps and provides extra counter space needed in many small kitchens

COMBINING a counter top with large storage space for soiled clothes, this hamper was designed to utilize scarce floor space to best advantage and provide needed counter space in the kitchen as well as jumbo storage for laundry.

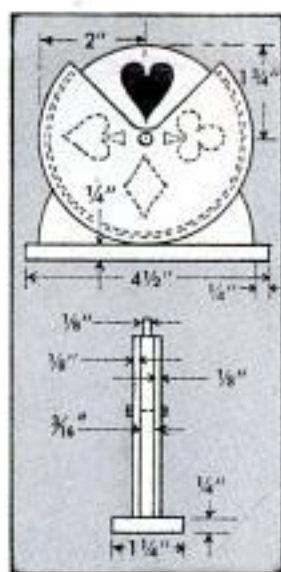
Start construction with the base which is 3 in. high and topped with $\frac{3}{4}$ -in. material. The side frames are 1 x 2s joined with corrugated fasteners and waterproof glue, the spreaders, front and back, being nailed to them. Sides and front of the cabinet are $\frac{1}{8}$ -in. perforated hardboard, and the lid, which is hinged to a 4-in. strip across the top at the rear, is $\frac{3}{4}$ -in. fir plywood. Hinges can be mortised flush with the lid to provide an unobstructed counter. Notice the front is set at an angle to get maximum work area with minimum floor space.

Finish is a matter of choice. Cover the top with a material to match the present counter top in your kitchen. The body of the hamper may be finished to match the base cabinets. Hardboard should be given a coat of primer before painting. Follow the primer coat with at least two coats of paint. If you desire to finish the counter top in natural wood, hardwood-faced plywood should be used.



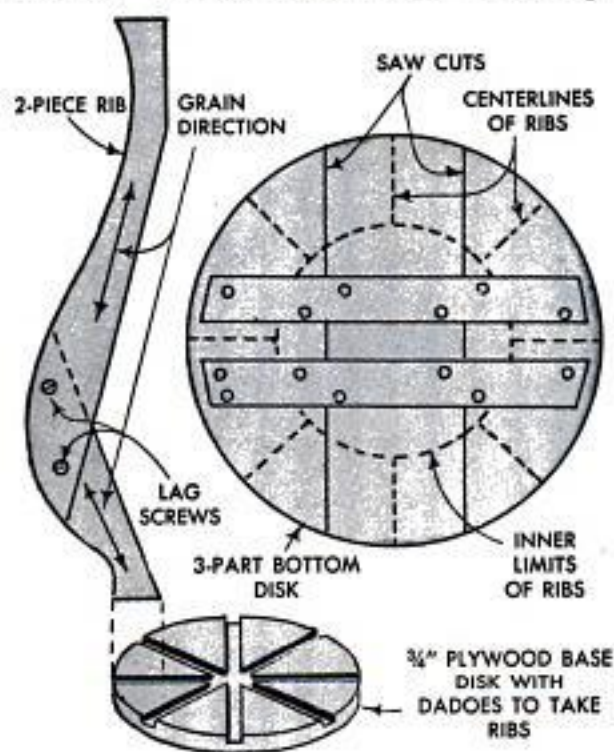
Indicator Shows Trump Suit in Card Game

There will be fewer arguments about which is the trump suit in a card game when this attractive trump indicator is used. Material for making it can be plastic or hardboard. The four card suits are painted on both sides of a 3½-in. disk cut from ½-in. stock. It rotates inside a housing consisting of two 4-in. disks of ½-in. material fitted over a ¾-in. circular spacer block. Viewing windows are provided by cutting V-notches in the housing disks. The three center-drilled disks are assembled with a small nut and bolt so there is a slight drag on the rotating disk to assure that it remains in



position when set. Dimensions of the block used for the indicator base are ¼ x 1¼ x 4½ in.—E. M. Blackman, Lancashire, England.

Forms Inside Concrete Pottery Disassembled for Removal



When casting large concrete vases and urns, it is advantageous to use collapsible forms that can be removed through small-diameter necks. Cut the form ribs from 1-in. stock, keeping the grain lengthwise to the ribs. The rib ends fit into dados cut diametrically across disks of ¾-in. exterior-type plywood. Blocks nailed in the dados keep the ribs from being pressed inward by the concrete. When the bottom disk of the form is larger in diameter than the neck clearance, the disk is sawed

into halves or thirds. Cleats, screwed or doweled to the sections for easy removal, hold the disk sections together. The upper disk of the form is the same diameter as the neck. Two-piece ribs are required for some forms, being held together with two lag screws at each joint. Wire mesh or metal lath is wired over the form to anchor the concrete to it.

Wire Solder Binds Tape Measure

A tape measure will not become tangled and knotted when stored in a drawer if a length of wire solder is permanently attached to one end and used to bind the tape when it is put away. The solder will also serve to weight the end of the tape when vertical measurements are made with it, stretching the tape to its full length to make the measurements more accurate.



Oil Prepares New Paintbrush

The bristles of a paintbrush will remain flexible and easy to clean after each use if the brush is soaked in linseed oil briefly when it is new. The oil prevents hardening of paint on the bristles.

Solving HOME PROBLEMS



INSTEAD OF PULLING NAILS when removing plasterboard, drive nails through with a flat-ended punch. Board is only slightly damaged and can be reused. Patch holes after reinstalling

REMOVING THAT FIRST PICKLE from tightly packed jar is easy when a tool made from an ice pick is used. Tool is made by heating pick about 1 in. from point and bending it at right angles

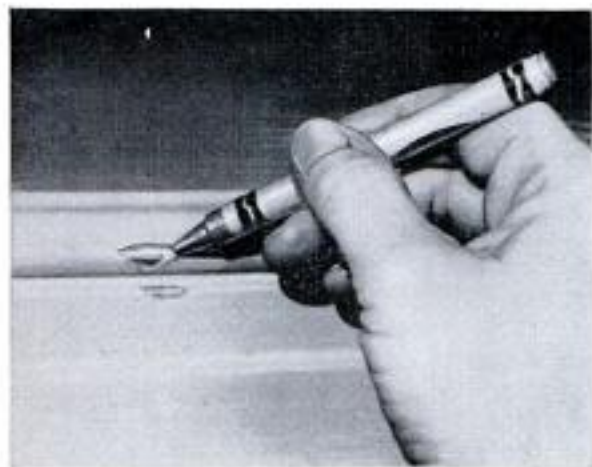


EMPTY FOOD TINS can be adapted to a number of uses more readily if they are fitted with a handle for easier holding. Simply screw a drawer pull or cabinet handle to the tin



MAKE A NOVEL CANDLEHOLDER by punching hole in the bottom of a gelatin mold, inserting a candle stub and weighting mold with plaster. When plaster is set, remove candle and shellac mold for easy cleaning

SMALL CHIPS AND NICKS in painted surface can be hidden by using wax crayons. The crayons, which come in an almost endless variety of colors, can be selected to match any paint color. Rub a crayon lightly over the marred area, both to fill and color the damaged spots in the paint

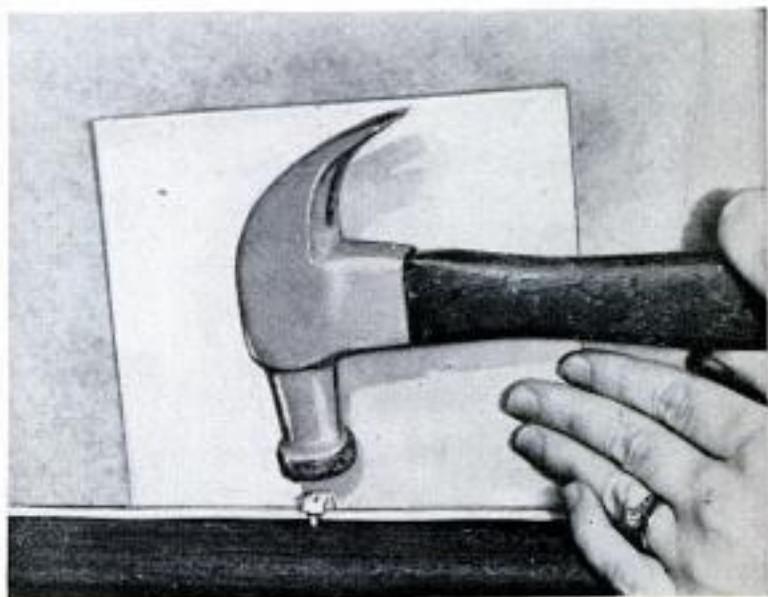


SAVE ON SOAP POWDER or detergent by dispensing from a sliding-lid syrup container. Glass sides of container permit keeping an accurate check of the amount of powder used, while sliding lid seals out dust and dirt



STAINS AND RINGS left on finish of a table top by drinking glasses can be removed by using a fine abrasive consisting of oil mixed with cigarette or cigar ashes. Dip an oil-moistened cloth in the ashes and gently rub away the stains

WHEN USING A HAMMER close to a wall, as when driving staples into woodwork to hold a lamp cord, avoid marring the paint or wallpaper by using a cardboard shield. The shield also prevents damage to the plaster, should the hammer slip



Sash Weight Hung on Tripod Stabilizes Camera



Blurred pictures, resulting when the tripod of a small movie camera vibrated in the wind, were eliminated by one amateur movie maker who suspended a window-sash weight under the tripod to act as a vibration dampener. The weight is hung on a cord looped around the tripod thumb-screw so it can be removed quickly.

Wire Bail Added to Paint Pail



It is a lot easier to carry a paint can if you fit it with a wire bail, which now seldom is furnished on gallon cans and never on smaller-sized containers. Bend the bail from a length of coat-hanger wire, twist a loop in each end

and attach it to the can with sheet-metal screws. To start the screws, simply punch small holes in the can with an awl.

Moist Sponge Prepares Wood For Smoother Staining Job

One method of preventing a wood surface from becoming "fuzzy" after the application of a water-type stain is to pre-moisten the sanded wood surface with a damp sponge. Allow the surface to dry

thoroughly, then sand lightly to remove any wood fibers raised by the water. When the water stain now is applied there will be few, if any, raised fibers.

"Rubber Mallet" Improvised From Shop Hammer

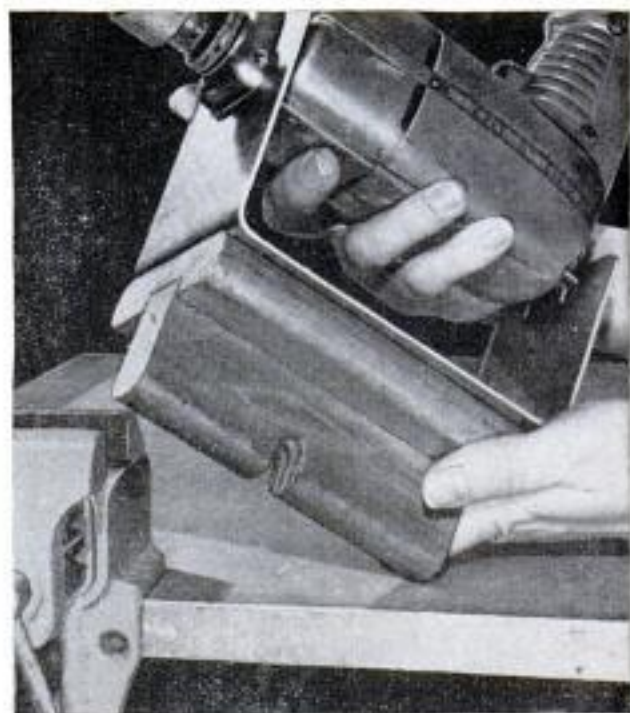
A serviceable "rubber mallet" can be improvised from any shop hammer by wrapping the head with rubber tape. Fold several layers across the face of the head, then tape them firmly in place. If a tool with a larger face is required, a wooden mallet can be modified in the same manner.

Frank A. Javor, North Bergen, N. J.



Drill Stand Screwed to T-Block Can Be Clamped in Vise

The problem of where to clamp the U-shaped metal stand, into which a 1/4-in. drill motor is snapped when it is used as a stationary tool, is solved by first screwing the stand to a T-shaped wooden block. The vertical bar of the T-block then can be clamped in any vise. It may be necessary to notch the block to clear the vise screw.



After painting walls or woodwork, fill an old nail-polish bottle with some of the leftover paint. Later this can be used to touch up nicks and scratches.

UTENSIL CABINET Has Roll-Top Door

FITTED WITH A DOOR that works like a roll-top desk, this little utensil cabinet will add a novel touch to a wall of your kitchen and provide a handy place to keep kitchen cutlery at your finger tips. A study of the drawing below will show you how the cabinet is put together and how a track is formed for the roll-up door.

Temporarily nail the sidepieces together for sawing. In this way they can be cut out simultaneously so that they will match. Note that the upper ends are cut down from $\frac{3}{4}$ in. thick to $\frac{1}{2}$ in. thick. A piece of $\frac{1}{8}$ -in. hardboard provides the back panel which fits in grooves cut in the sidepieces and upper spreader. To assure smooth operation of the door, it is important that both sidepieces be grooved identically and assembled squarely with the spreaders.

The curved sections at both top and bottom of the cabinet are covered with strips of screen molding. The same type of molding is used to make the sliding door. It is best to check the grooves in the cabinet side panels before assembly to be sure that they are wide enough to permit free movement of the door. The latter should be long enough to extend around the curved portion of the guide when in the closed position.

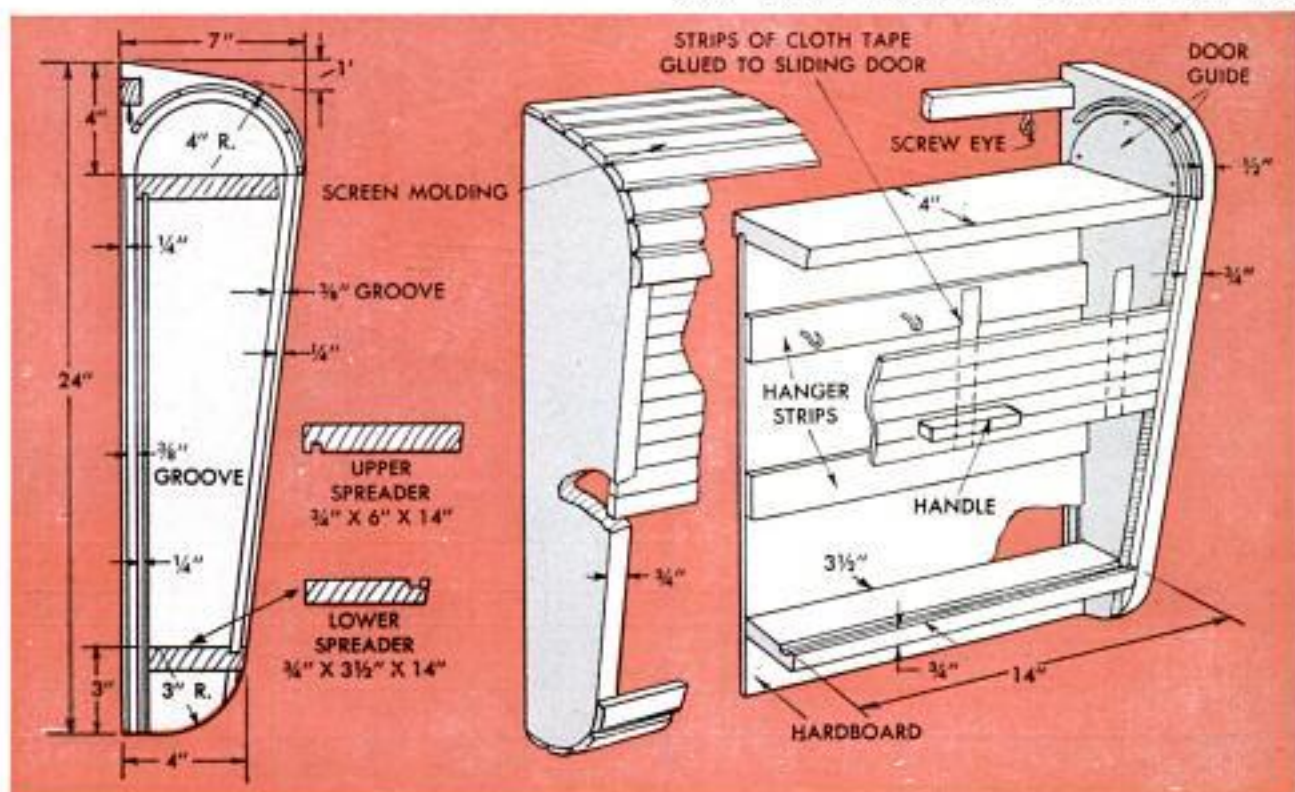
The handle which is fastened near the lower edge of the door keeps the door from sliding too far into the guide when opened. A coat of paint and, finally, an application of wax to the guides complete the cabinet.



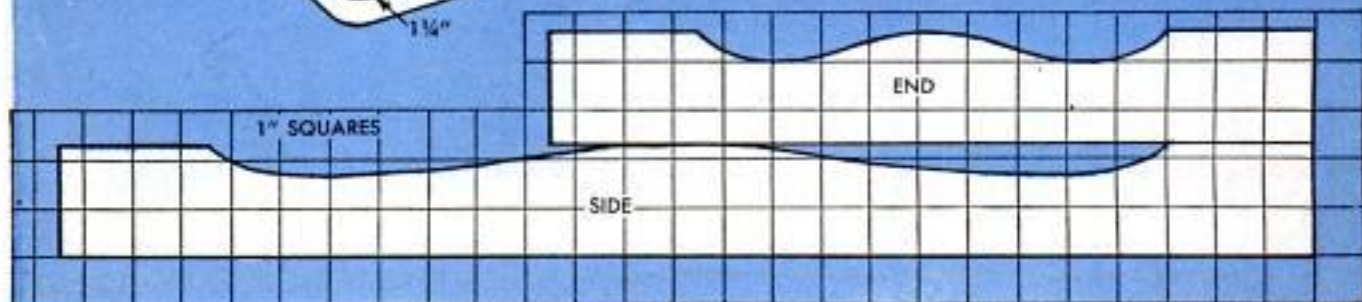
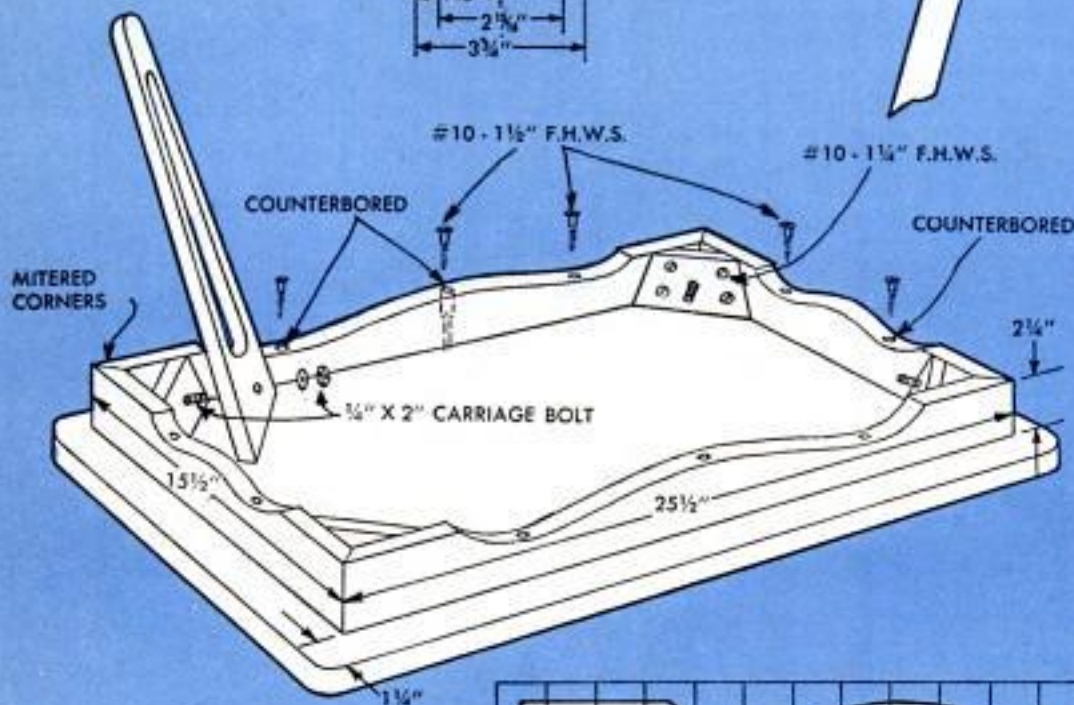
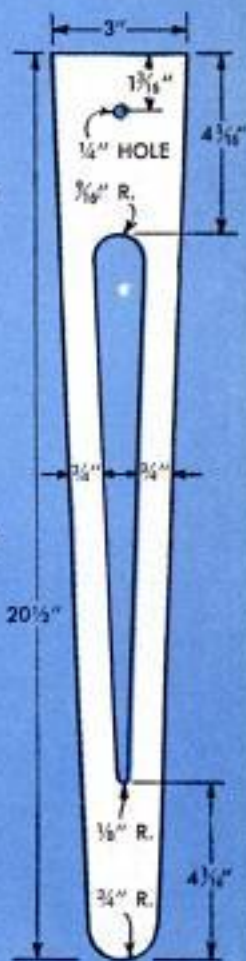
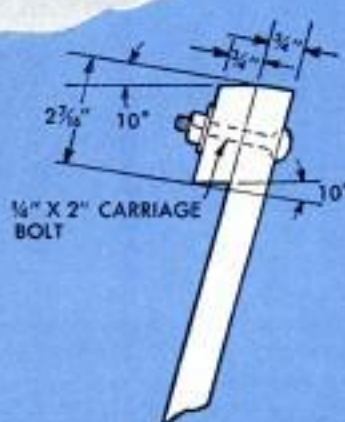
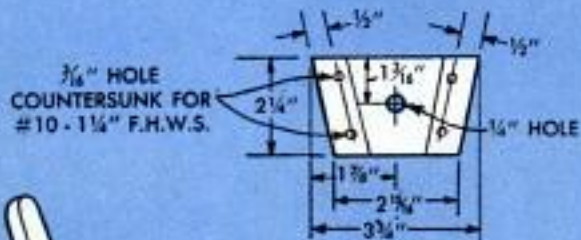
By J. W. Rocke



Butt the door slats against a straightedge and square them before joining with strips of cloth tape



PATTERNCRAFT

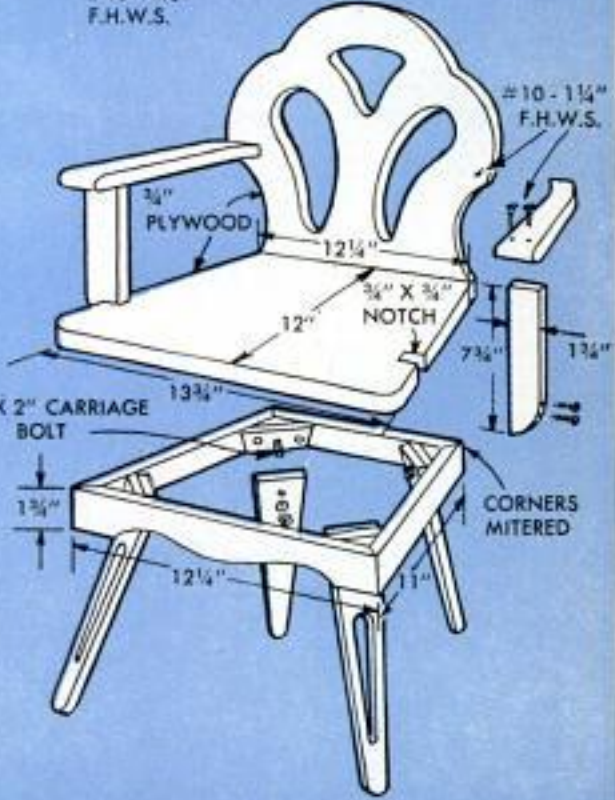
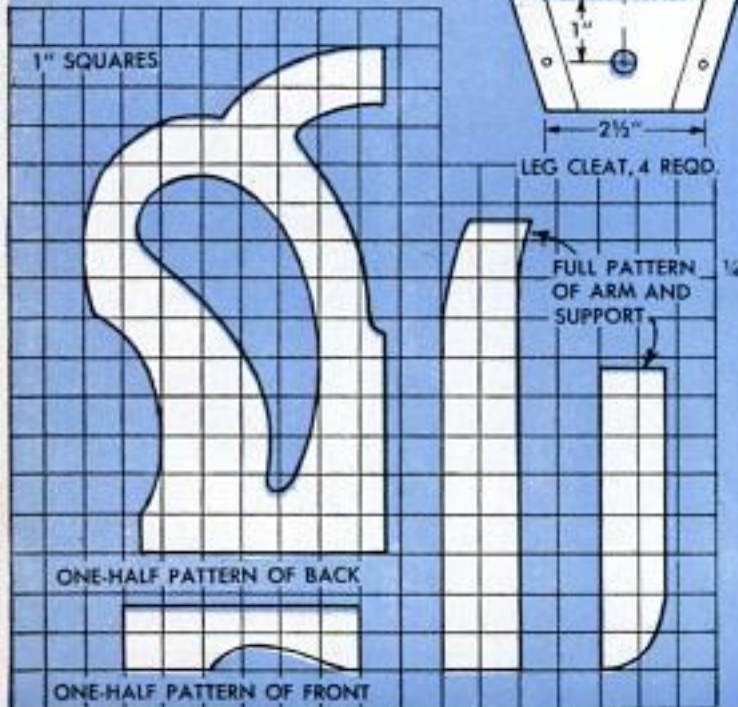
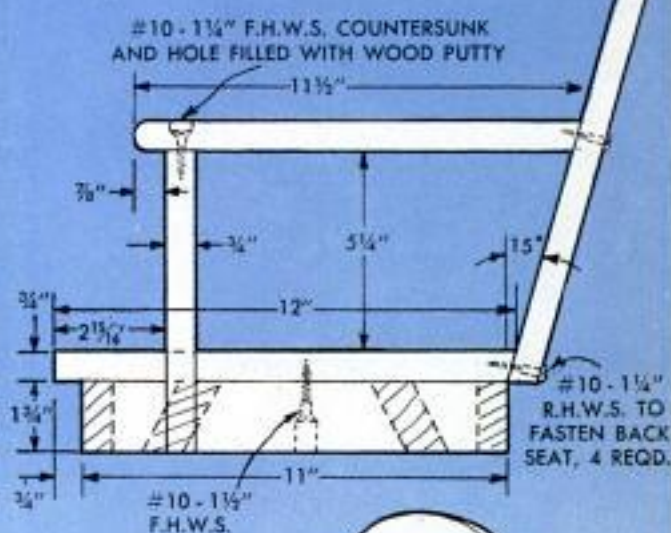
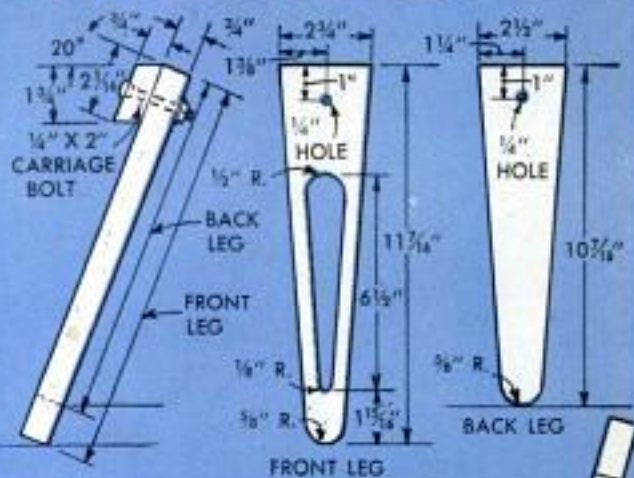


Children's Dinette Set

Always appealing to little girls and boys, a pint-sized dinette set means tea parties in style as well as a fine place for drawing and playing games. The table top may be a 20 x 28-in. piece of $\frac{3}{4}$ -in. plywood or the sink-cutout blank from a plastic-laminated counter top. Rails and legs are made of $\frac{3}{4}$ -in. lumber and assembled as in the details. If ordinary $\frac{3}{4}$ -in. plywood is used for the table top, it may be covered easily with plastic laminate. Make as many chairs as you like, using the patterns shown below. The back and seat are of $\frac{3}{4}$ -in. plywood, with legs, rails and arms of $\frac{3}{4}$ -in. lumber. When assembling both chairs and table, apply glue to all joints before fastening them together with wood screws. Then simply bolt the legs to the corner blocks. The exposed surfaces of the wood can be enameled or stained and varnished.

FULL-SIZE PATTERNS

Laying out, or drawing to size, the parts for a project, like this, where you have a number of scrolled edges, is greatly simplified by using a full-size pattern. To obtain your pattern of the children's dinette set, send 50 cents to Popular Mechanics Press, 200 E. Ontario St., Chicago 11. Be sure to ask for plan No. 123



Bowl Cover on Bicycle Seat Protects it Against Rain



Where a bicycle is kept outdoors and unprotected against rain, it is a simple matter to keep the seat dry by covering it with a plastic bowl cover. When not in use, the cover can be carried in a pocket.

Warped Records Straightened



Place a 1-lb. weight on the plate and leave the record under pressure until the water has cooled to room temperature.

Stanley Clark, East Bradenton, Fla.

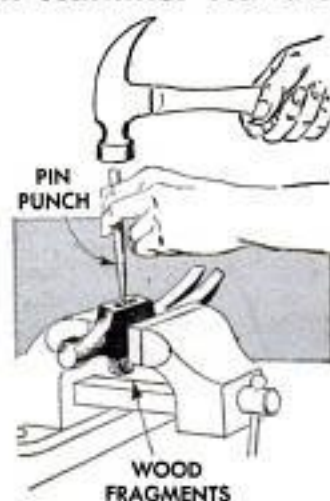
Paint Kept Thoroughly Stirred By Using Two Containers

Using two containers will solve the problem of keeping paint well mixed when its pigment is a metallic powder such as aluminum, which has a tendency to settle rapidly. Mix the paint thoroughly in a large container, then pour a small portion into a smaller container into which the

brush will be dipped for applying the paint. The action of dipping the brush and touching the bottom will keep the metallic pigment well agitated. Stir the paint each time in the large container before refilling the smaller one.

Removing Broken Hammer Handle

The next time it is necessary to replace the handle of a hammer, hatchet or ax, cut off the old handle just behind the head and drive out the remaining piece of wood with a pin punch. Clamp the head in a vise as shown and drive the punch into the wood at the cutoff end. Locate the punch so that the steel wedges will be driven out first, after which the wood will be loosened and can be driven out in fragments. This method of removing the wood is much easier than attempting to remove the entire piece with a large punch or burning out the wood which will ruin a carefully tempered hammer head.



Gaskets for Automobile Lamps

Effective gaskets for automobile lamps other than headlights are made easily from light cord, such as window-sash cord. Fit the cord in the rim of the lamp and cut it slightly long so the ends must be forced together. Remove the cord and staple the ends together in the manner shown. A light coating of rubber cement on the cord will assure an even more watertight gasket.



To remove a bulge in wallpaper, slit the bulge and insert paste under it, then press the paper until the paste holds.

WTM 57

Homemade Organs

PART I

Cost and space are the factors that keep many individuals as well as small churches and Sunday schools from enjoying the ownership of an organ. Here are two fine instruments—one made from an accordion and the other from a reed-organ kit



By Allan Carpenter

Cabinet designs by John Bergen

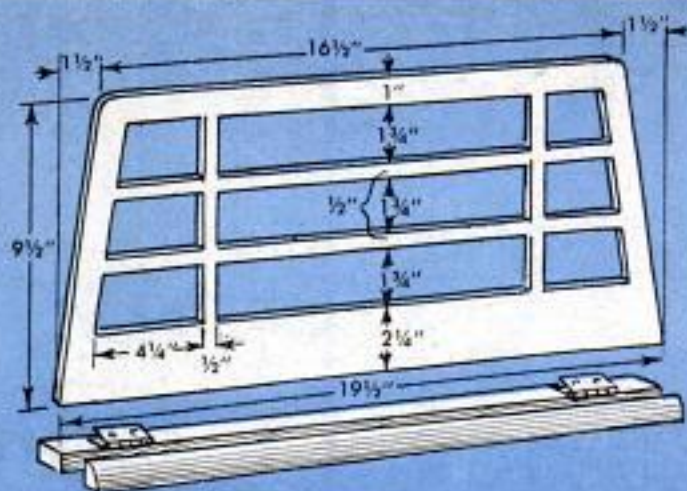
THE SMALLER of the two organs, pictured below, consists of an accordion and blower installed in a specially designed cabinet. Construction of this organ is detailed on these pages. The larger organ, shown above, is made from a do-it-yourself kit which includes everything necessary for a 61-note reed organ except the cabinet. Cabinet and kit installation will be detailed next month in Part II.

Musical quality of the accordion organ depends entirely on the quality of the accordion. However, a mere \$35 purchased a fine used instrument for the original organ. Condition of the bellows is not important, as it will not be used.

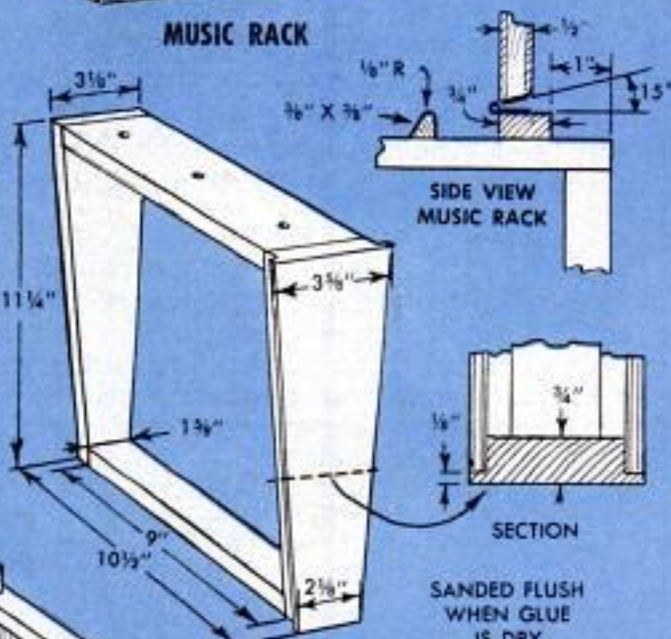
Photo at right shows small size and pleasing design of accordion organ. Note how both keyboard and chord buttons are within easy reach. Bench will be detailed in Part II next month



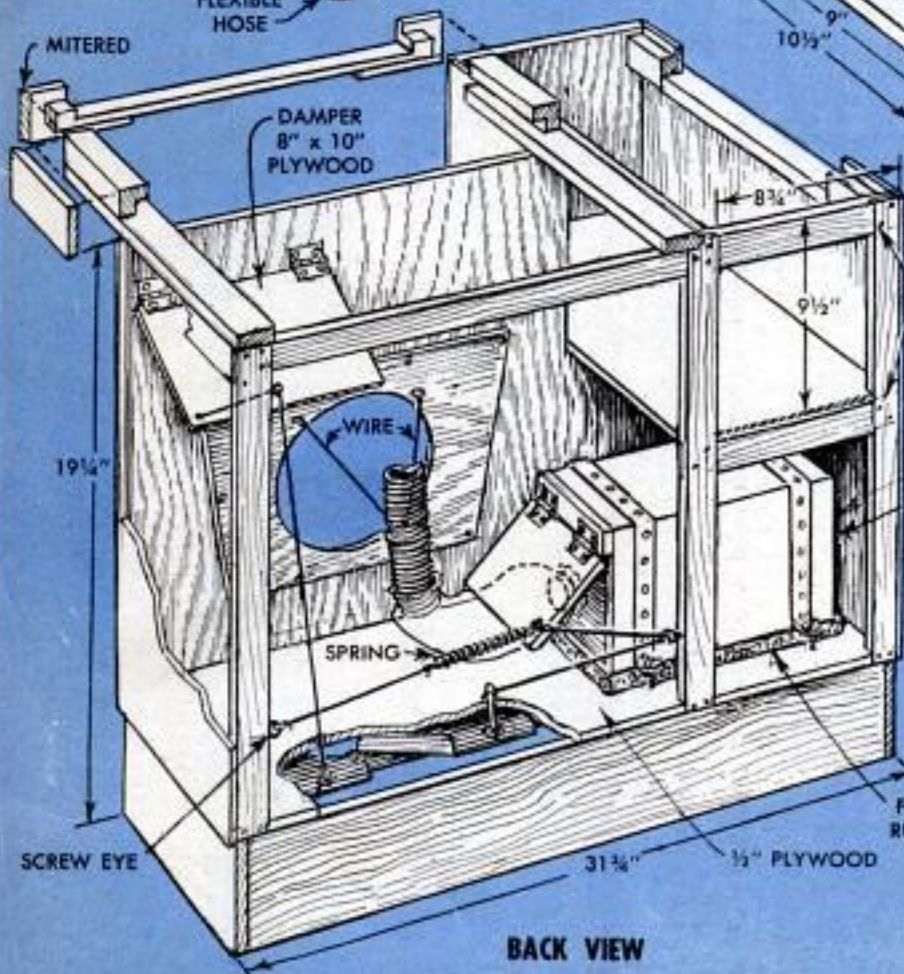
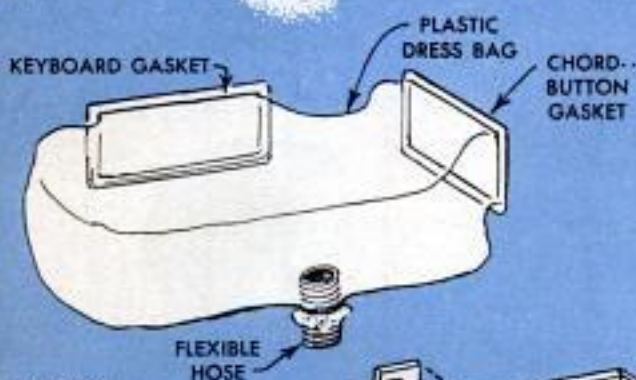
Copyrighted material



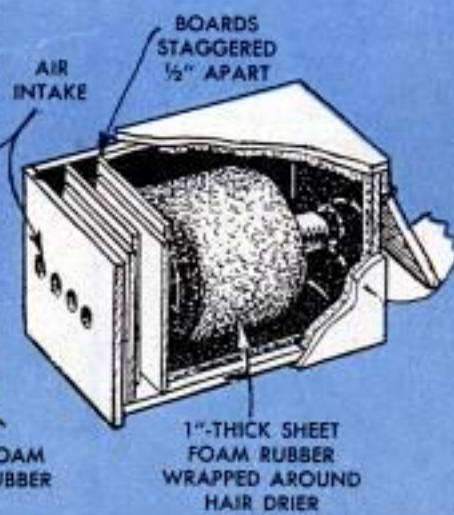
MUSIC RACK



PEDESTAL FRAME



BACK VIEW





Rear view of accordion organ with back panel removed shows air bag and hose connection to blower

The cabinet is built from $\frac{1}{2}$ -in. hard-wood-faced plywood according to the details shown on the preceding pages. Fir plywood may be used for the unexposed shelves and the baffle board. Note that the 7 x 10 x 23-in. top section is made separately and then fastened to the main cabinet and over the keyboard mechanism. The keyboard of the accordion slips in a groove on each side of the cabinet as in detail A. The base is of cabinet wood as detailed and the frames are of 1 x 2 lumber. Certain slight

changes may be necessary, depending on the type of accordion used, such as cutting out portions of the upper cabinet of the front keyboard rail to accommodate the accordion switches.

The opening on the left-hand side of the cabinet is made just large enough to expose the chord-button portion, allowing it to be played without restriction.

An inexpensive hair drier which can be operated on "cold" provides adequate air supply for the organ. This is enclosed in a soundproof housing, as shown just to the right of the back-view detail. The air reservoir is a plastic dress-storage bag which is cut out for the keyboard and chord-button gaskets and to permit attaching a flexible hose. The latter, a car-radiator hose, is taped to the bag and held in place with stiff wire. A plastic tube, made from a small refrigerator bag, connects the radiator hose to the drier, and a piece of hardboard hinged to the drier housing can be closed to stop the flow of air through the connecting tube. This controls sound volume. Note in the details how this is connected to the left-foot pedal.

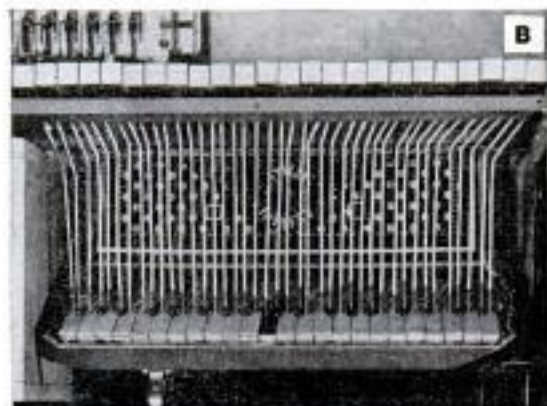
Another hardboard panel is hinged to the inside of the cabinet front so it can be raised by the right-foot pedal to press against the full air bag. This provides the sudden loud sound which is called a *sforzando*, or accent. An electronic amplifying system will be described in Part II, which also will detail the kit organ.

(Continued next month)

Accordion organ pictured below differs from instrument detailed in the respect that a small organ keyboard is used and the keys linked to the chord buttons, photo A, and accordion keyboard, photo B, with stiff wire

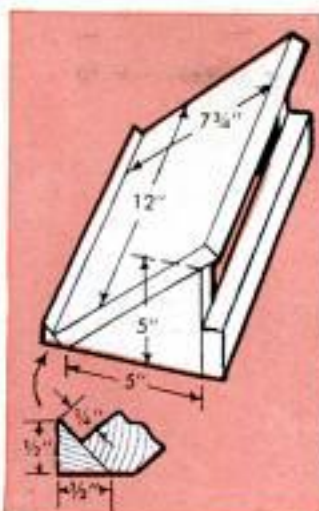


Designed and built by A. J. Schneider, Chicago



Handy Jig for Power Sanding a Uniform Bevel

This handy jig clamped to the fence of a sander equipped with a suitable table makes it easy to sand a uniform bevel on a wooden part parallel with a finished straight or convex surface. Made of wood, the parts of the jig are easily cut and assembled in an hour. The triangular piece at the lower left of the jig serves as a guide and stop for the work. The fence, with the jig and work attached, is moved at intervals to feed the work gradually toward the sanding surface. Depth of cut and width of the bevel are determined by the position of the



jig in relation to the face of the sanding disk or the sanding belt.

Howard E. Good, Waterville, Ohio.

Painting to Simulate Flagstones Renews Worn Linoleum

A badly worn linoleum floor can be given new life by painting it to simulate flagstones. Clean the linoleum thoroughly to remove any grease or oil, then paint it a



solid color. After the paint is dry, sketch in the flagstones with pencil and paint over the pencil lines with a narrow brush to simulate earth or mortar. An alternate method, which helps utilize paint leftovers, is to paint the various "stones" different colors, leaving about $\frac{1}{4}$ in. between them. Outline the stones with a $\frac{1}{2}$ -in. strip of white paint.

Rubber Ball Anchors Cushion On Car Seat

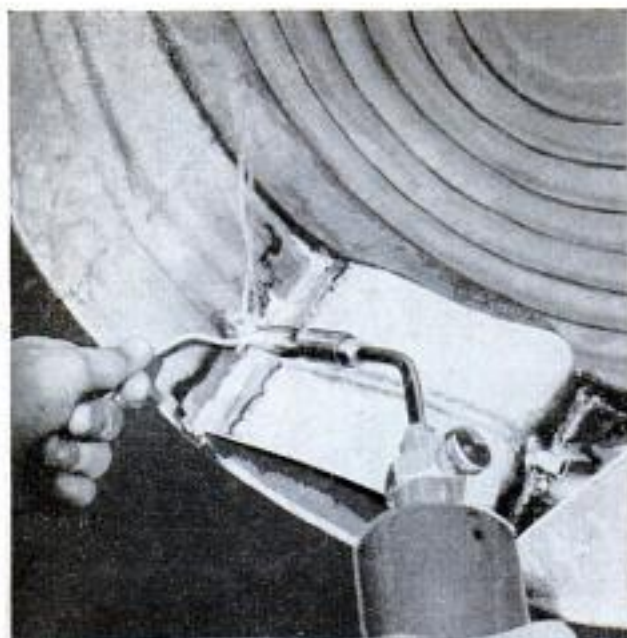
When an extra cushion is used in the driver's seat of an automobile, it may be held in place by an anchor made from a sponge-rubber ball. The ball is attached to one edge of the cushion with heavy twine and then forced down between the back and the seat cushions as shown. It will wedge into place sufficiently to hold the cushion and yet will not be difficult to remove when desired. The easiest way to attach the twine to the ball is to cut a hole through the ball, putting the twine through it and tying a large knot in the end.



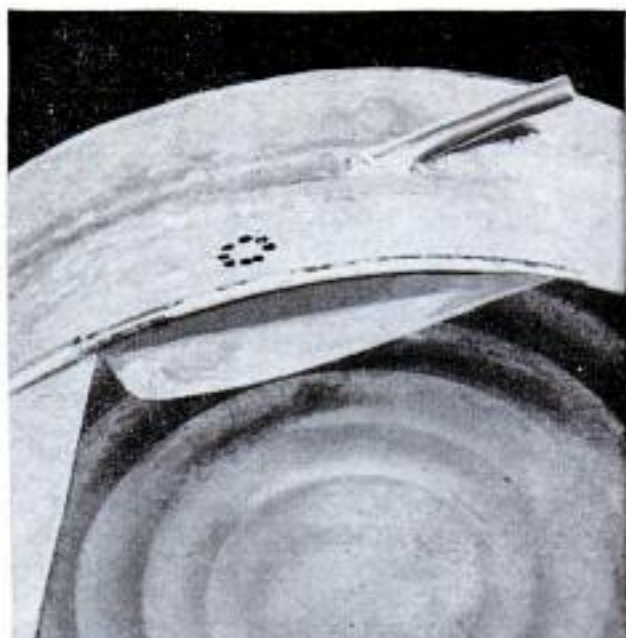
The Portable Router . . .

is one of the most versatile power tools available to the home craftsman. It is excellent for everything from shaping and grooving to grinding and drilling. Learn just what this amazing little tool can do and how to use it by reading the story on routers next month

When light bulbs are removed from outdoor sockets, replace the bulbs with burned-out fuse plugs to protect the sockets against rain and weather.



Start with a galvanized pan—a service-station drain pan is just right—and drill holes in side for outlet fitting and inlet tube. Cut and bend sheet-metal outlet baffle and solder to pan as above



Insert copper inlet tube through holes in side of pan and baffle and remove zinc from galvanized surfaces with muriatic acid before soldering. Drill and punch out hole near pan rim for outlet fitting



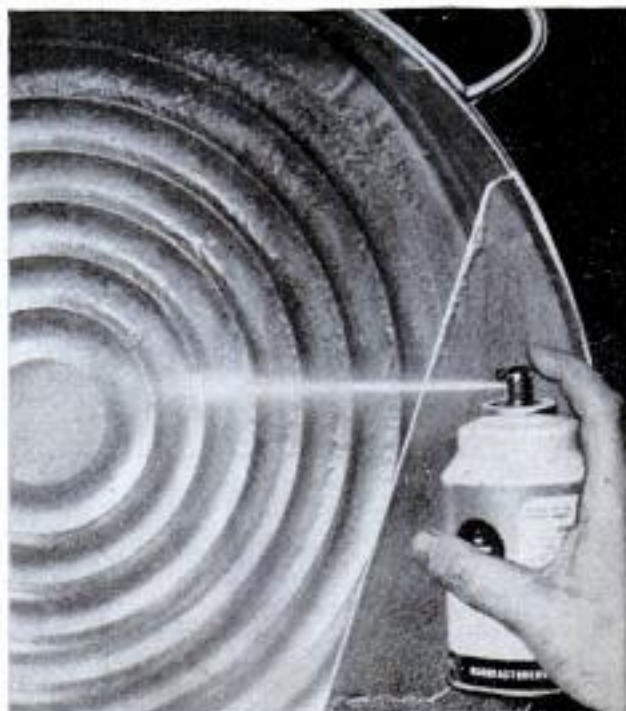
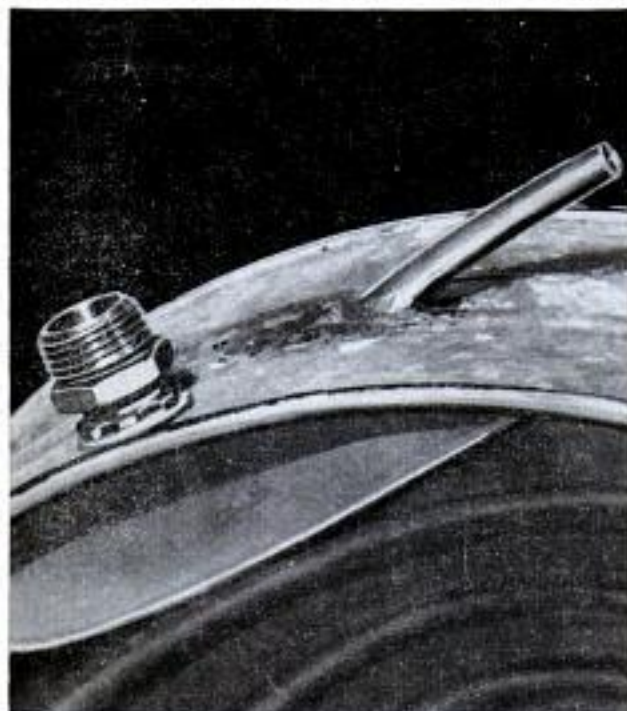
Outlet fitting is standard garden-hose connection having pipe threads on opposite end. This permits fastening fitting to pan side with double nuts, using rubber washers to prevent leakage around fitting

YOU CAN MAKE THIS PRINT WASHER

FOR \$3

By Jack Wall

After soldering, clean pan thoroughly and spray with "industrial chrome" finish or aluminum paint. Then waterproof with plastic spray. Print washer may be connected to faucet with portable shower-spray hose



WTM '57

TRUNDLE BEDS

FEATURE STORAGE HEADBOARDS

Designed by John Bergen

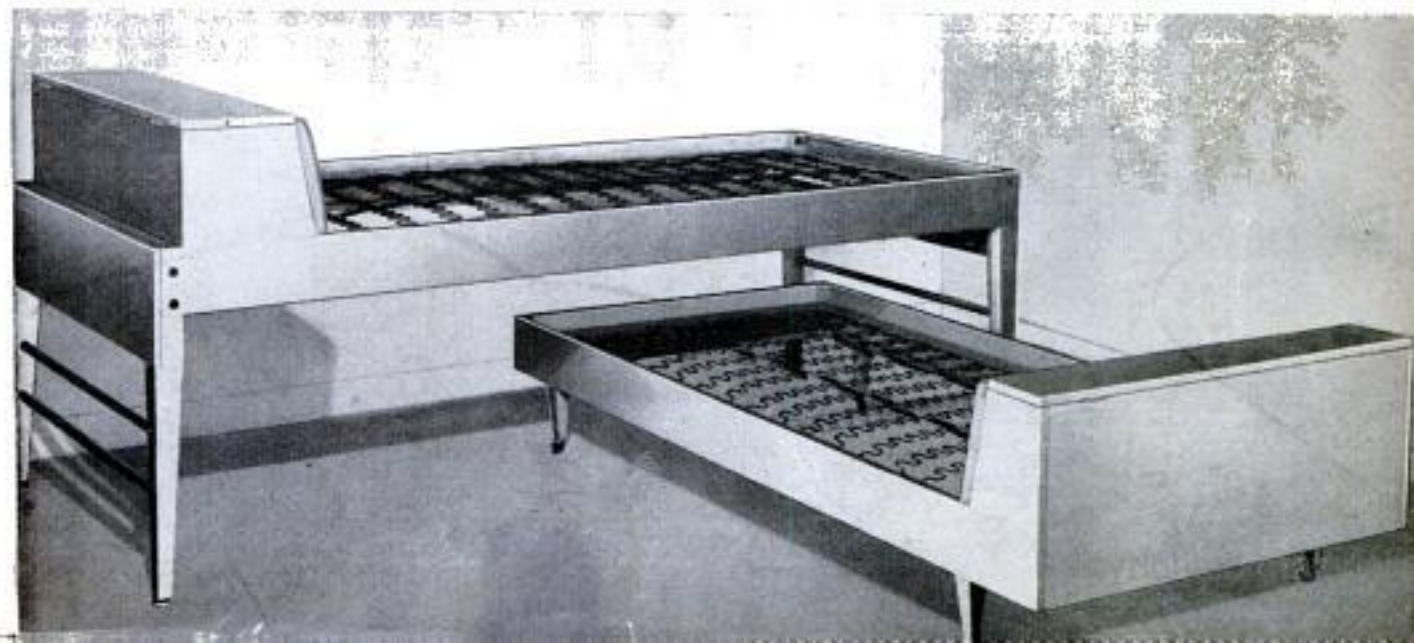


IDEAL FOR A SMALL ROOM in a home cramped for space, these trundle beds stack one above the other when not in use. Storage headboards take extra blankets and bed linens as well as provide a hiding place for the "valuables."

Start construction with the frames, the parts of which can be stock thicknesses and widths. The legs for the upper bed are $2\frac{1}{2}$ -in. squares and those for the lower bed are $1\frac{3}{4}$ -in. squares. All legs can be tapered

with a hand plane. Note that the legs on the high bed are set in the corners of the frame and bolted to the side rails and screwed to the headboards and footboards, while those on the lower bed are set in from the headboards and footboards and screwed to the side rails only. Note, also, that the latter boards on the low bed are tenoned into the rails and fitted with glue blocks, the headboard on this bed being built up as the storage unit. The unit on

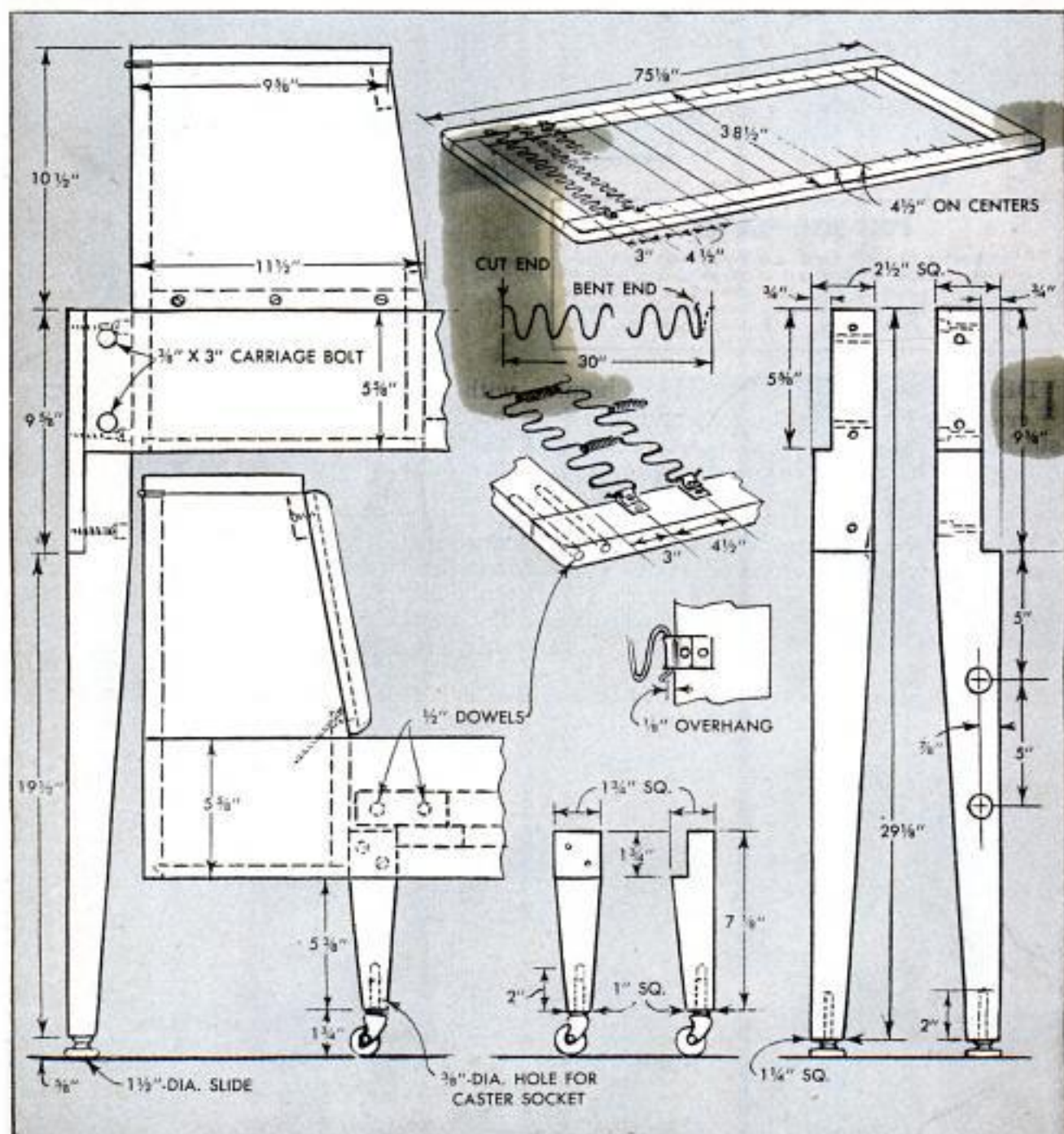
Lower bed is on casters so it can be moved out into room at night, and back under upper bed during day

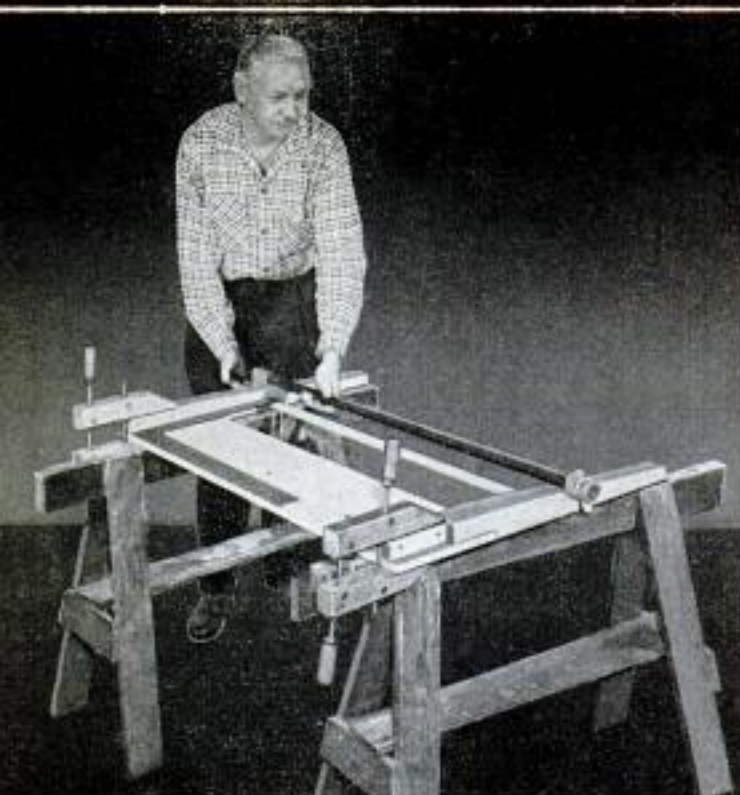




Sagless-type springs are fastened to frame of yellow pine 2 x 4s butt-joined and doweled together

the high bed is assembled separately to fit between the side rails. If power tools are not available for cutting the tenons on the headboard pieces, they may be made with a special plane, or by sawing across the width of the board at a distance from the end equal to the desired length of the tenon. Make the cut halfway through the board and remove the waste stock with a wood chisel to form the tenon. Grooves are made with two saw cuts on the same side of the board, removing the waste stock between them with a chisel. Solid stock is used for all parts except the storage units which may be made of hardwood-faced plywood, preferably the cored type. Fronts of the storage units are framed to take an upholstered panel of $\frac{1}{2}$ -in. plywood, which is screwed in place. Upholstering material,





Head and foot boards of upper bed are glued and screwed to legs. Dowel stretchers are glued in holes in the legs and side rails are bolted to legs. Note legs are cut away to take boards flush with surface

placed over foam-rubber padding, may be any material desired.

Since the spring unit is a frame of 2 x 4s butt-joined and doweled, only three slats are necessary. These are screwed to cleats to keep them in place and also to prevent spreading of the rails. Springs are of the sagless type spaced 4½ in. on centers, starting 3 in. from one end. Spring stock is available in most department stores and from some mail-order houses. Special clips for attaching the springs are required. Be sure all spring pieces are the same length and install them as indicated in the photo on page 198. Notice that they bow upward about 3 in. at the center of the frame.

Large casters are used on the low bed as it stores under the upper one, but pads may be used on the latter as indicated to assure it staying in place.

Finishing depends on the type of wood used. If a light finish is desired, oak, maple or birch should be used. Walnut or mahogany is best for a dark finish. ★ ★ ★



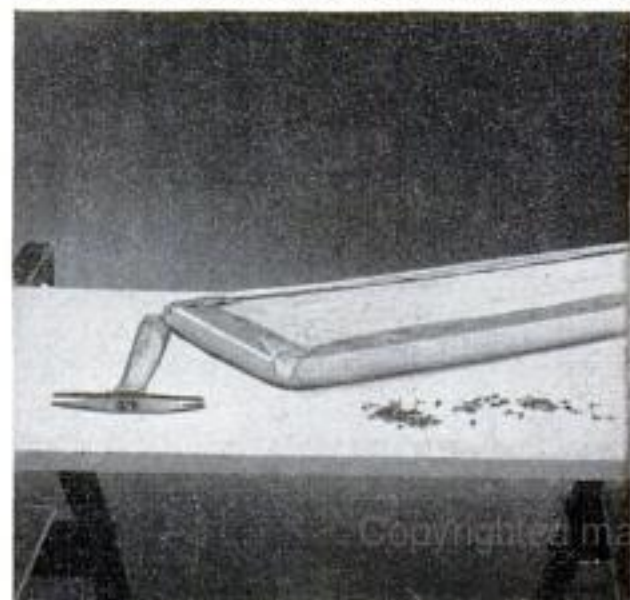
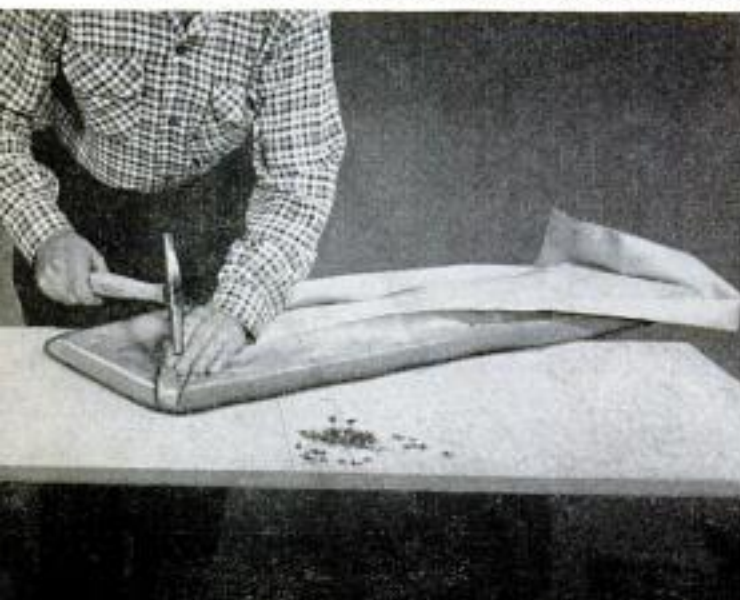
Storage units are faced with upholstered panel of ½-in. plywood which is screwed in place on the unit



Foam rubber 1 in. thick is ideal for padding under the covering material, which may be any type desired

Note in these four photos how the upholstering material is folded over all edges of the panel . . .

then tacked to the back side of the panel. Corners are folded over and tacked also to produce neat job



"Convertible" Camera Tripod Provides Outdoor Typewriter Stand

A few modifications on a wooden camera tripod permit it to be used as an outdoor stand for a portable typewriter or quickly reconverted for use with a camera. To assure rigidity when it is used with a typewriter, hooks screwed into two of the legs are fitted into a screw eye driven into the third leg as shown in the upper detail. Stability on uneven ground is assured by replacing the rubber-tipped leg extensions with sharpened wooden stakes. A flatheaded machine screw is countersunk in each stake and allowed to project far enough to fit through the slots in the tripod legs. A washer and thumb nut are used to hold the stakes to the legs.



The lower half of the portable-typewriter case also must be modified by drilling a hole in the center of the bottom and reinforcing it with a steel washer screwed to the inside surface. The typewriter is

mounted by removing the tripod screw and replacing it with a bolt passed through the hole in the typewriter case. A wing nut also is used on the bolt to permit quick attachment and removal of the typewriter.

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SN 58



Check the Battery Regularly and Avoid Scenes Like This One

GIVE YOUR BATTERY A BREAK

By Ed. Packer

FEW PARTS OF A CAR give so much for so little as does the storage battery. Just give it a "drink" at regular intervals, "feed" it the required current and it will perform for years. Unlike some other parts of a car, it is not a loud-mouth. If neglected, it never howls, growls, grinds or squeaks for attention. It just slowly weakens and

Hammering the cable terminal on the battery post may break it from the plates inside the battery

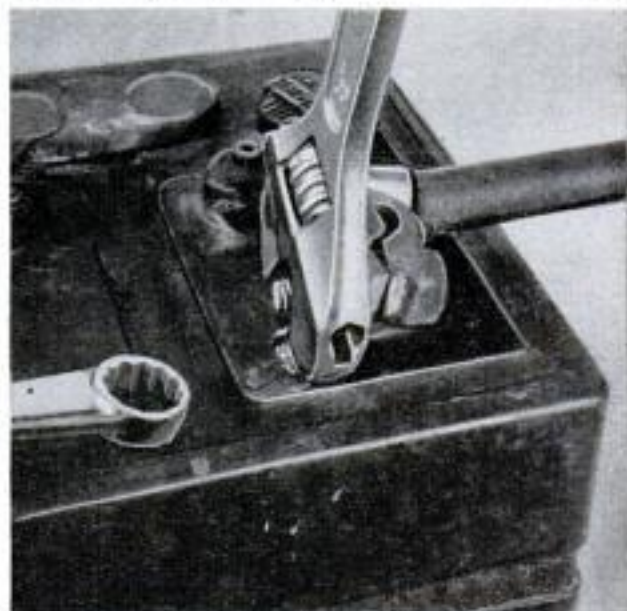


dies. Thirst has sulphated its plates, or an overly enthusiastic generator has warped them, or its life blood has spilled through a crack in the case.

Adding Water

The liquid in a battery called electrolyte consists of water and sulphuric acid. Water

Tightening the terminal bolts with the wrong type wrench may crack sealing material and cause leak



is lost by evaporation and must be replaced at intervals. Frequency of water addition depends on evaporation, charging rate and reserve space above the plates. Some batteries have so much reserve space they require addition of water only at long intervals, possibly three times a year.

Use distilled water or water that is demineralized, and add it carefully with a special syringe to avoid spilling. Water spilled on top of the battery may combine with dirt and acid spray to produce a current-conducting material that can slowly discharge the battery.

One post is grounded and all other posts are "hot" relative to the ground. Consequently, electricity will flow from the hot posts or terminals to the ground if there is dirt, acid and water on top of the battery case. If the car is out of use for a few days or weeks, the cells will discharge in proportion to the shorting effect of the dirt.

After adding water, wipe off the top of the battery with a cloth moistened with soda water. It is important, too, to avoid overfilling a battery. When it warms up under charging, the liquid expands and may overflow the battery if it is filled above the mark indicated by the manufacturer. If acid gets on electrical parts, such as the coil or spark plugs, it may make starting difficult or impossible.

Clean Terminals Let Current Flow

The same cleaning care given to the top of the battery should be extended to the terminals. If corroded, they should be dipped into strong soda water to neutralize the acid, after which any corrosion should be scraped off and the terminals again

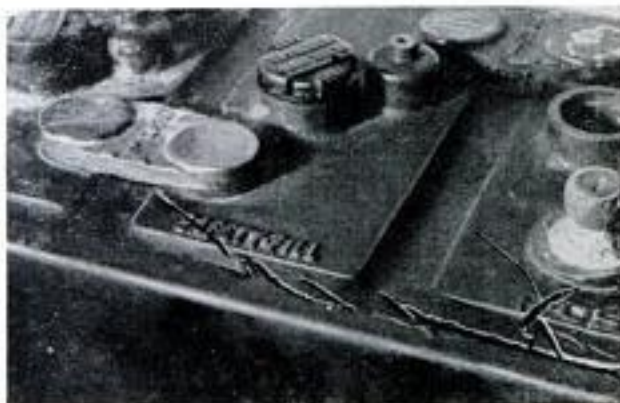
This happens when battery is used with electrolyte too low. Plates slowly disintegrate and warp and separators dry out. Regular checking of electrolyte level will help avoid this type of trouble



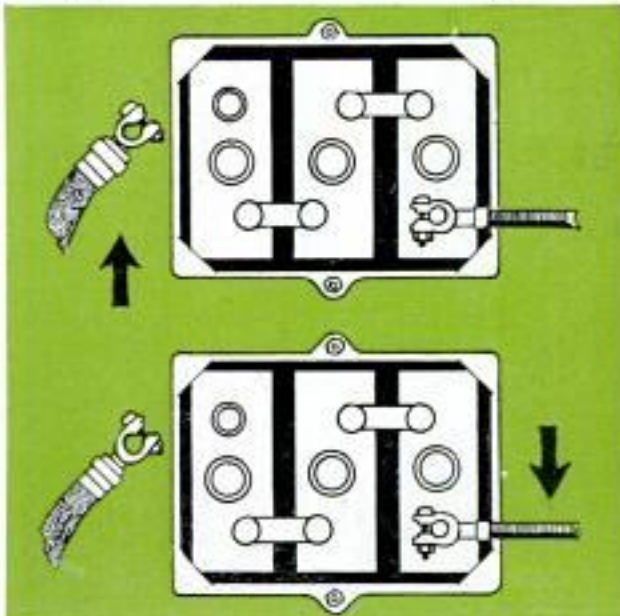
DECEMBER 1955



You can use any type of container to add water, but don't. Use a syringe and keep battery clean



Above, pulling hold-down nuts too tight cracked top of battery which will let electrolyte leak out. Below, disconnect grounded terminal first to remove battery; connect it last when installing battery



GRAVITY TABLE

Percent of Charge	Type of Battery		
	Regular	High-level	Tropical
100	1.280	1.260	1.225
75	1.230	1.220	1.180
50	1.180	1.170	1.135
25	1.130	1.120	1.090
0	1.080	1.070	1.045

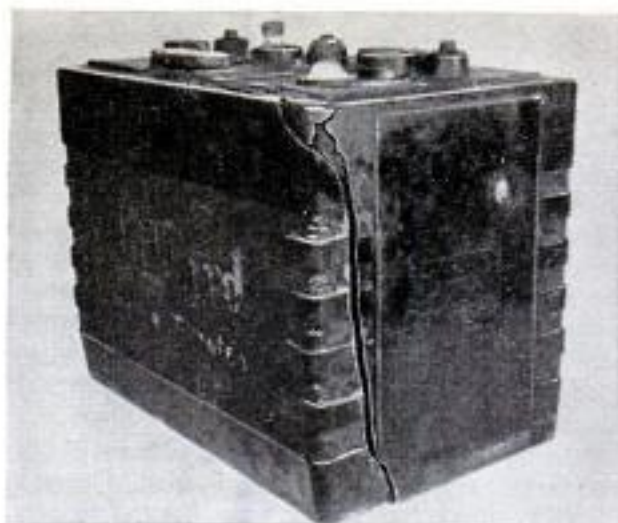
soaked in soda water. Follow cleaning with a coating of nonmetallic grease or corrosion-preventing compound. Never hammer terminals on their posts since this might break the post off the plates inside the battery.

If the battery cable is corroded, it should be replaced. Corrosion frequently weakens the cable wires or even severs them, which reduces the current-carrying capacity of the cable with the result that starter action may be sluggish.

If it is necessary to remove the battery from the car, note whether the positive or negative post is grounded and then remove the grounded cable first. This will avoid accidental short circuits which are especially serious with 12-volt batteries. When installing a battery, reverse this procedure. The hold-down nuts that keep the battery in its cradle should be pulled up snugly but not extremely tight as this might crack the case.

After installing the battery, check it to see that the connections are made cor-

Active material from plates accumulates in bottom of case and will "short" plates if it touches them



A low charge and a cold snap teamed up to ruin this battery by freezing it and cracking the case

rectly. Turning on the lights should show a discharge reading on the ammeter. If the reading shows charge, reverse the connections by turning the battery around.

Charging Rate

If the regulator is adjusted correctly and the generator is in good condition, a fully charged battery will receive a low rate of charge. Immediately after using the starter, the rate may go fairly high, but within minutes it should drop to a lower reading, possibly 3 to 5 amps.

A discharged battery or one that is used in a partially discharged condition may freeze in cold weather. A battery that tests around 1.150 will freeze at 5 deg. F. A half-charged battery, specific gravity of 1.210, is safe to 19 deg. below zero, while a fully charged one will be safe to 65 deg. below zero.

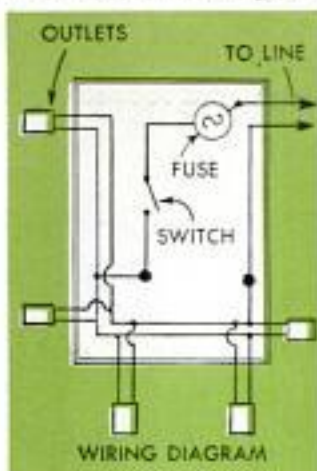
Testing Specific Gravity

Since the electrolyte in a battery consists of water and acid, the specific-gravity test with a hydrometer is a good way of determining the battery condition provided acid has not been lost. Acid weighs 1.835 times as much as water, which has a specific gravity of 1.000. In a fully charged battery, the gravity reading should be 1.280 to 1.300. Some manufacturers, however, have reduced the gravity of a fully charged battery to 1.260 or even less. Therefore, it is well to know the desired gravity of your battery in order to get an accurate check.

All cells should test within 25 points in specific gravity. A greater variation may indicate trouble. It is possible that active material has been shaken from the plates while in a partially discharged condition. If active material is lost from the plates, the gravity of the battery cannot be brought up fully. ★ ★ ★

Fused Switch Box Wired as Multiple Outlet for Photo Floodlamps

A handy device used by commercial and industrial photographers is a multiple-plug-in unit which supplies electric current simultaneously to a number of photo floodlights. A comparable unit, adequate for the average home photographer, can be made from a regular fused switch box. Six knockout blanks are removed from the box and the holes fitted with insulating grommets. Five heavy-duty shockproof sockets are wired to the box as indicated. The sixth hole is used for the line cord. As a safety precaution, check the size of the fuse used in the



circuit into which the line cord is plugged, then use a fuse of the same, or lesser, capacity in the switch box. The switch-box fuse then will blow before the circuit fuse.

Improvised Extension Tube Permits Camera Close-Ups

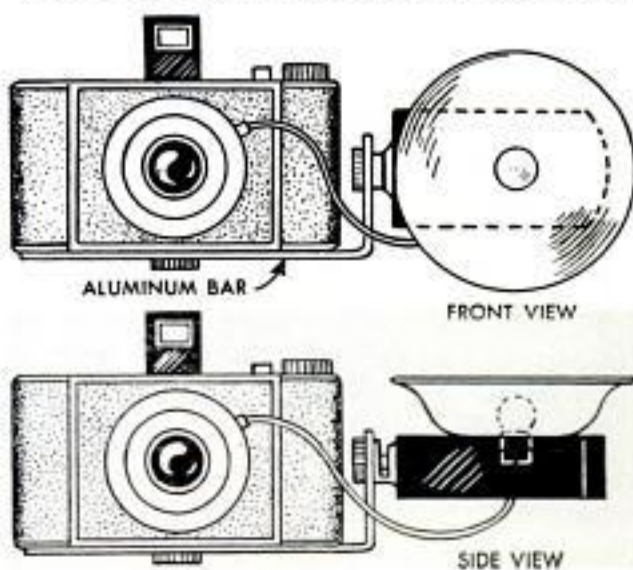


Discovering he had forgotten an extension tube for his 35-mm. camera, one photographer on a field trip improvised an extension from a cardboard mailing tube and two scraps of wood. First, the original lens was removed and the supplementary lens held in front of the camera so it was roughly in focus when sighting through the ground glass of the camera. The distance from camera to lens was measured, the mailing tube cut to match and the tube taped to the camera. A hole was bored in a piece of lumber to match the mailing-tube diameter and the wood then was cut in half lengthwise. Two bolts through the

edges of the halves clamp them around the mailing tube. A piece of plywood next was fitted across the back of the camera. Two long bolts hold plywood and lumber piece together, clamping camera, lens and extension tube as a unit. A piece of felt protects the camera back, and black plastic tape is used to make all joints light-tight.

L-Shaped Bracket on Camera Permits Using Bounce Flash

Replacing the straight flash-gun bracket on his camera with an L-shaped aluminum bar permits one camera enthusiast to use the gun for bounce flash. Holes are drilled near each end of the bar to accommodate gun and camera, then a portion of the bar at one end is bent at right angles. The flash reflector now can be used facing straight ahead or in any position in a vertical plane.



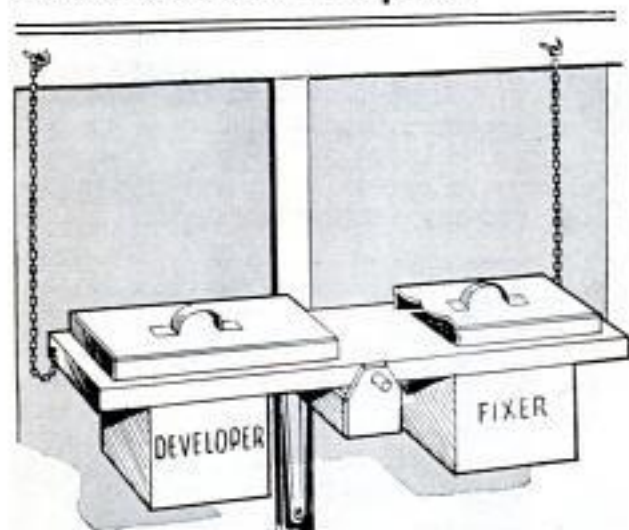
Sponge-Rubber Padding in Case Minimizes Camera Damage



A camera that is carried in the trunk of an automobile will suffer less vibration damage if it is kept in a carrying case fitted with a padded bottom. The padding consists of several pieces of thick sponge rubber. For further insurance against camera damage, fit straps or brackets in the car trunk to hold the bag securely, yet permit its easy removal.

Virginia Hanson, Los Angeles, Calif.

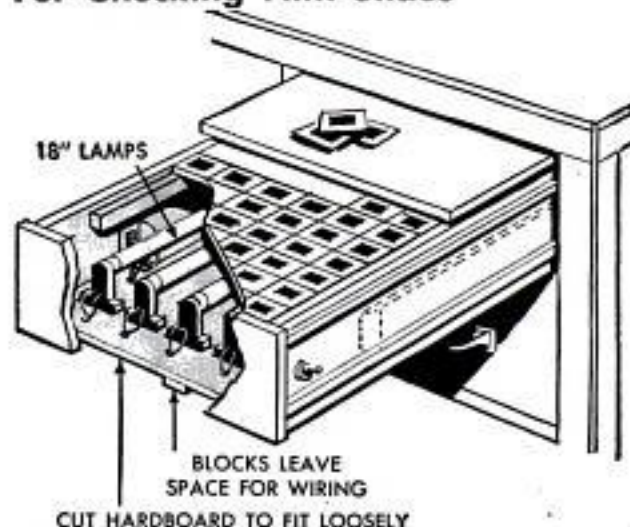
"Teeter Totter" Darkroom Shelf Conserves Counter Space



If counter space is at a premium in a darkroom, suspend the film-developing tanks in openings cut in a shelf pivoted above the sink as shown. The shelf is a piece of $\frac{3}{4}$ -in. plywood with a length of steel rod screwed to the lower surface at the center to provide a pivot rod. The latter pivots in two flat-steel brackets located at the ends of a wooden block which is

screwed to a metal shelf bracket. Agitating the developing solutions is accomplished by rocking the shelf. Lengths of light chain screwed to the ends of the shelf and looped over hooks driven into the wall prevent the shelf from being tipped down too far.

Drawer Converted to "Light Box" For Checking Film Slides

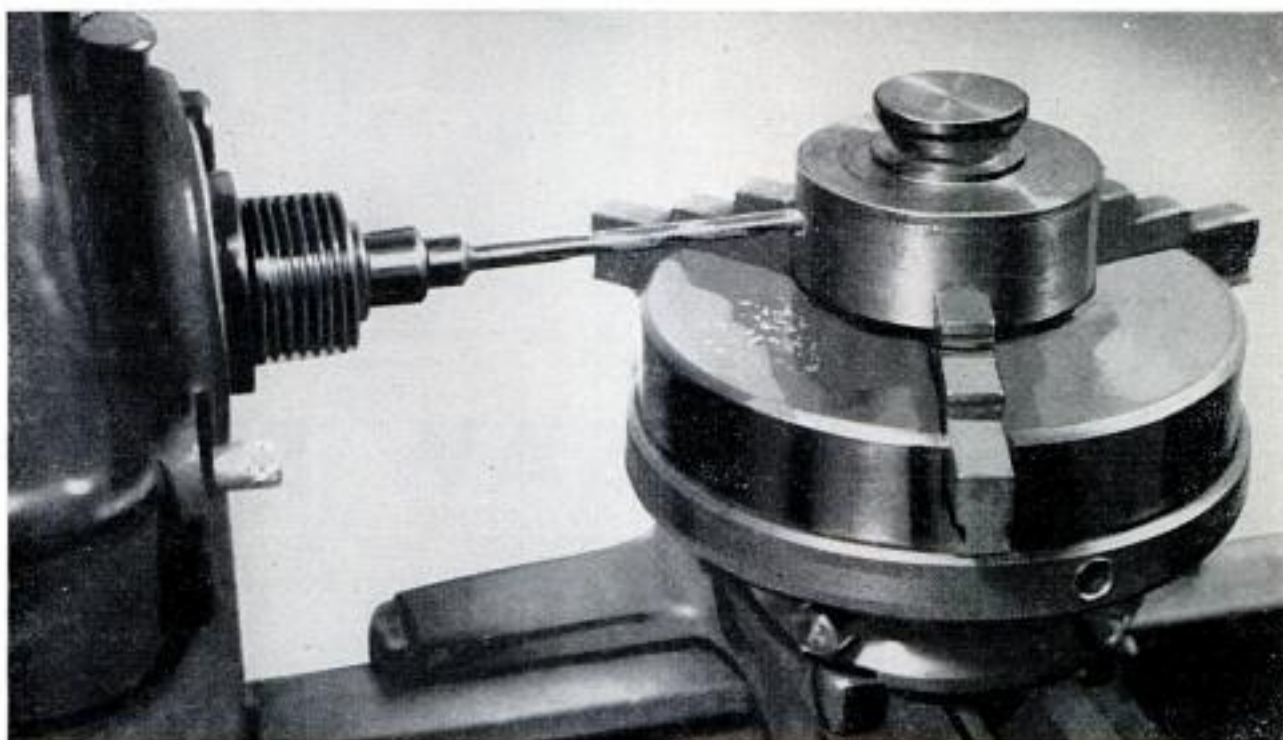


When the task of examining negatives and arranging slides for proper sequence of showing are combined with other duties in a desk job, converting a desk drawer to a "light box" will simplify the film work. Fluorescent lamps are used in the drawer to minimize the heat problem. Starters and transformers for the lamps also are installed inside the drawer. The "opal" or translucent glass cover of the drawer rests on wooden cleats screwed to the inside. A toggle switch fitted on the front or side of the drawer controls the lights.

Tape Marks Photo Thermometer At Solution Temperature

Since the temperature of photographic solutions is critical for good developing, it is important that a thermometer be marked for quick and accurate reading. A bit of colored cellulose tape stuck to the thermometer to serve as a pointer provides a legible, waterproof marker. Do not cover the graduation marks with the tape.





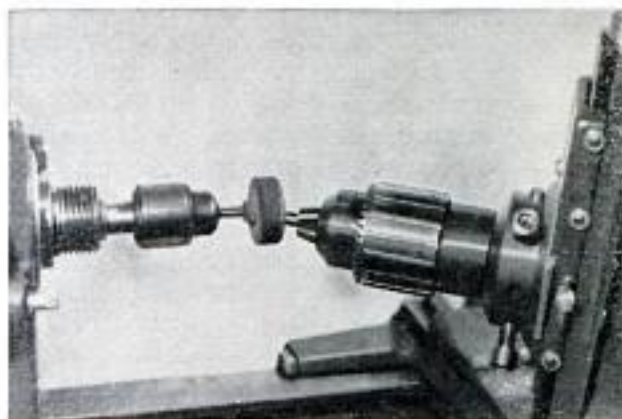
Chuck mount used to hold universal three-jaw chuck on lathe cross slide for precision drilling operation

DUAL-PURPOSE CHUCK MOUNT

By R. Glen Nye

ONE OF THE MOST USEFUL milling accessories for a metal-cutting lathe is a chuck mount, which not only greatly increases the utility of the lathe but can even replace the milling attachment in a number of machining operations. The chuck mount's primary use is in holding round stock which is otherwise difficult to clamp. It also provides for exact angular positioning of the work about an exactly known center, permitting milling and jig-boring in circular as well as rectangular coordinates. When mounted on the cross slide as shown above, the same types of work are accomplished about a different axis. Between the two positions almost any conceivable setup can be made.

Gray iron or cold rolled or mild steel are satisfactory materials for the chuck mount. If the largest stock available is undersized in diameter, studs may be added to bring the angle indicator marks flush with the protractor scale. Socket-head setscrews are preferable for position locking.



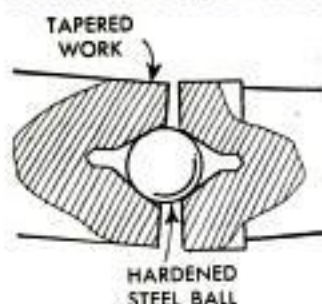
Chuck-mount setup on milling attachment. Spindle on chuck mount takes threaded sleeve on geared drill chuck. Pictured is angular grinding small part

Holes located between the setscrews permit insertion of a positioning lever made from a length of drill rod.

On the lathes shown in the illustrations on this page, the vise, which is part of the milling attachment, also fits the post on the lathe cross slide that mounts the compound rest. Therefore a single chuck mount will accommodate any of the lathe chucks on either the milling attachment or the lathe cross slide. Owners of milling heads often overlook the fact that the milling-head vise also fits the cross-feed and that a drill-press vise clamped in it can do many difficult jobs.

SN 57

Taper Turning Lathe Center Made From Drill Shank



Turning tapers between centers, using the set-over tailstock method, can be readily accomplished with the simple tailstock center shown in the detail. It is made

from the tapered shank of a discarded twist drill with a large center hole drilled in the big end and a hardened steel ball inserted for the work to rest on. This will support the off-center work evenly and allow it to rotate true, without danger of burning or scoring the regular lathe center point when steep tapers are turned, which would throw the ordinary center point badly out of alignment.

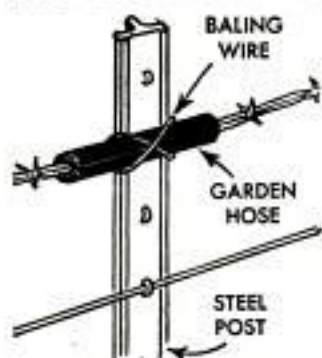
Clothespin Holds Drill Chuck Key



Loss of an electric-drill chuck key can be prevented and the key kept within easy reach if it is attached to the cord with a

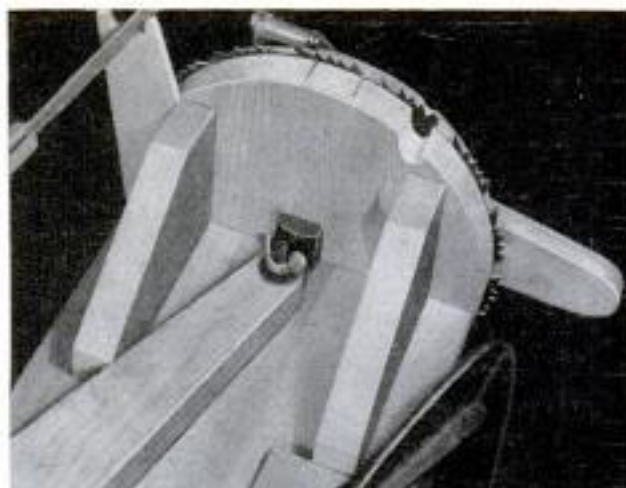
spring-type clothespin. The clothespin can be taped to the cord at a point close to the handle, or it may be fastened to the drill housing with a short length of wire. The clothespin will be held firmly in place if the fastening material is applied at both ends of the lower member. The jaws of the clothespin hold the key securely until it is needed.

Short Lengths of Garden Hose Are Electric-Fence Insulators



When steel posts are used for electric-fence installations, 6-in. lengths of discarded garden hose can be used for insulators as substitutes for the conventional porcelain ones. The lengths of hose

should be split along one side, slipped over the barbed wire and fastened with baling wire which is wrapped around the post and the hose. These insulators are easily removed and reused when it becomes necessary to move the fence.

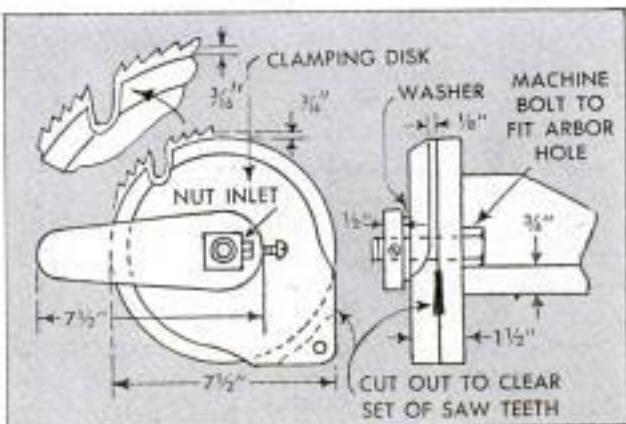
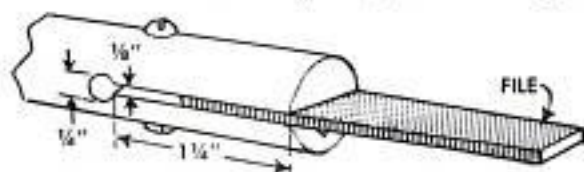


Rear view shows purpose of file rest, index marks and notch in vise for filing gullet of raker teeth

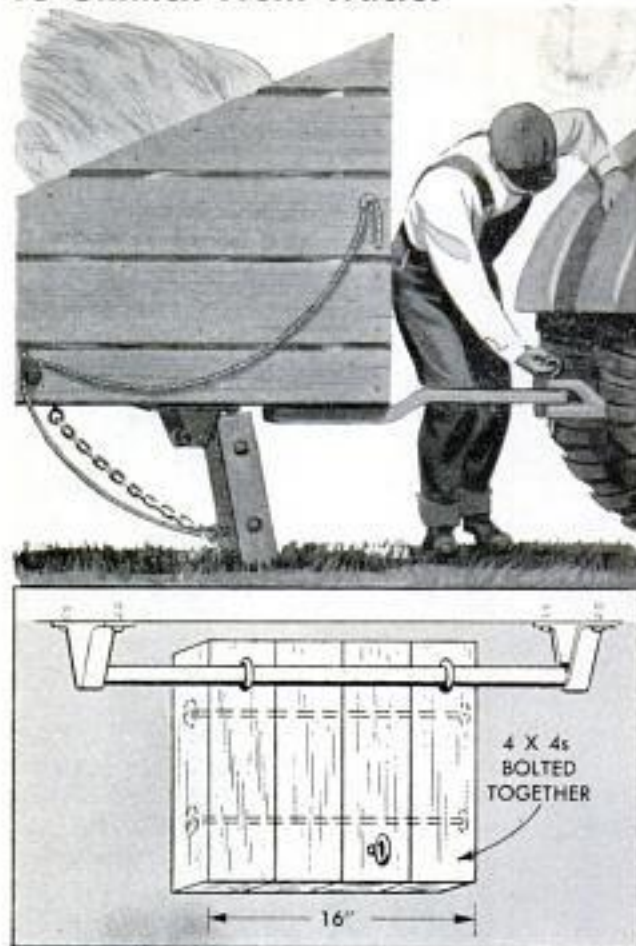
SAW FILER

HOLDING THE FILE at the proper angle is no problem with this circular-saw filing jig for it guides the file for you. Once the file guide is adjusted to suit the teeth of the blade at hand, you simply push the file forward, lifting it on the back stroke. The jig will accommodate 8-in. rip and crosscut blades as well as the combination type. A roller guide is provided for filing the raker teeth of the latter. The details below and on the opposite page show how the jig is made, and the photo above shows how the swinging arm of the file guide is locked in position with a wing nut. In use, the file is held in the slotted end of a dowel and the blade is clamped between the disks of the vise. As each tooth is filed, the locking handle is loosened and the blade is advanced to bring the third tooth in line with an index mark on the top of the vise. ★ ★ ★

H. R. Heydorf, Beaverton, Ore.



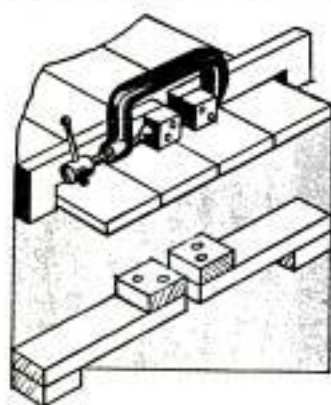
Jack-Equipped Trailer Backed To Unhitch From Tractor



Equipped with a simple jack, consisting of four 4 x 4s bolted together, a 2-wheeled trailer on one farm can be quickly hitched or unhitched from the tractor. The 4 x 4s are suspended on a shaft which passes through two eyebolts in the jack assembly. The shaft is attached solidly to the underframe of the trailer. Backing the trailer lifts it up on the jack, the forward motion of which is limited by a length of chain. Towing the trailer forward releases the jack, which then is pulled up by means of a rope passed through a pulley.

L. D. Johnson, Leslieville, Alberta, Can.

Improved C-Clamp Extensions Increase Useful Capacity

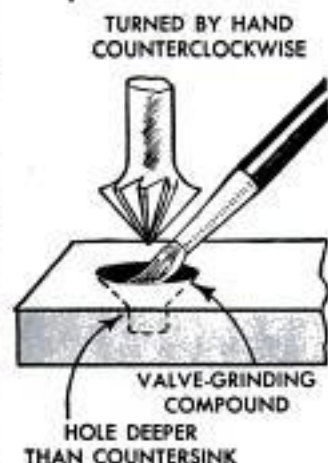


When bar clamps are not available for a particular job, improvised wooden extensions often will permit using C-clamps as substitutes. The extensions, which require only a few minutes to assemble, can be made in either of the two

ways detailed. The upper detail shows one type which consists of L-shaped wooden hooks. Blocks are nailed to the sides of the straight ends to provide pads for the C-clamps. The second type of extension, shown in the lower detail, is made from straight pieces of stock with blocks nailed on the opposite sides at the ends.

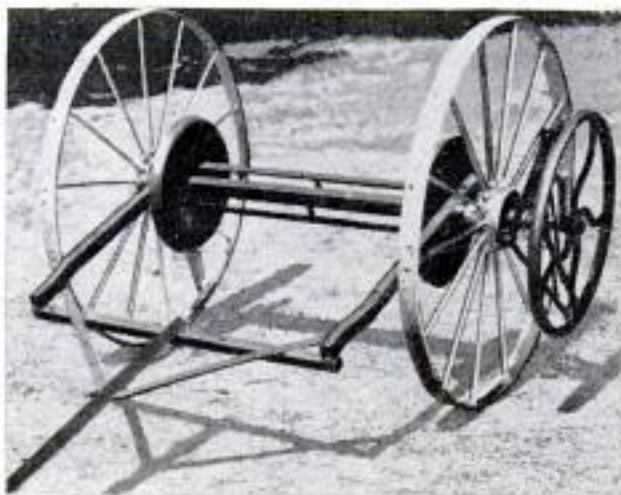
Dull Countersink Sharpened With Grinding Compound

Sharpening the dulled edges of a countersink can be done with a "hone" improvised from a block of mild steel and valve-grinding compound. A hole is drilled in the steel with the countersink, after which valve-grinding compound is applied to the sides of the hole. Then the countersink, which is chucked in a drill press, is brought down into the hole and turned by hand in a counter-clockwise direction. It is raised from time to time and the grinding compound redistributed.



Reel for Barbed-Wire Fencing

Any barbed-wire fence which must be moved frequently can be relocated quickly by using this two-wheeled reel. It is made by cutting the axle of a hayrake to a convenient length and fitting it with a welded-steel angle spool, frame and drawbar. The reel is pushed to pick up the wire; the handwheel welded to the end of the axle permits backing the axle against the ratchets to take up slack. When the wire is unrolled the reel is pulled and the ratchets provide a light tension.



MIDGET TELESCOPES



STANDARD 6 X 30



No. 1-5X



No. 2-4X



No. 3-5X



No. 4-5 1/2 X

1

By Sam Brown

YACHTSMEN, football fans, birders and hunters used to conventional binoculars can well appreciate the lightness in weight, the optical brilliance and resolving power of a workshop-made instrument no larger than a pack of cigarettes. The midget monoculars, or "telescopes," pictured in Fig. 1, illustrations 1 to 4 inclusive, are prismatics of top optical quality assembled from eyepieces, objective lenses and prisms obtainable from dealers in military surplus. Note the comparison in size with the standard monocular in Fig. 1, also the comparison with standard 7 x 50 binoculars in Fig. 5. The eyepiece mounts, prism cells, cover plates and certain other parts can be made of wood, aluminum and black or colored plastic.

The 5X (5-power) midget, No. 1 in Fig. 1, has the greatest light-gathering power, which makes it especially useful when good illumination is required under poor lighting conditions. The unit is fitted with standard 6x30 binocular prisms and has an eyepiece giving sufficient relief to be used without removing eyeglasses. The prism cell is bandsawed from hardwood, the various steps in the construction being shown in Figs. 2 to 8 inclusive. Use the full-size centering pattern in laying out all the parts shown in the exploded view, Fig. 7. The seat for the objective lens is cut in the lathe, the setup being made as in the detail, Fig. 3, after boring the block according to the pattern layout, Fig. 2. Then the block is bandsawed to outside contour as in Fig. 4. In the initial operation both the front and back cell blocks must be squared on two adjacent sides so that the center lines can be transferred accurately. The hole for the eyepiece should be bored in the lathe as in Fig. 10. It's a good idea to check the layout, Fig. 14, on all pieces by setting up the parts

In the photo above the four midget scopes are compared in size with a standard 6 x 30 monocular. All four are pocket scopes of high optical quality



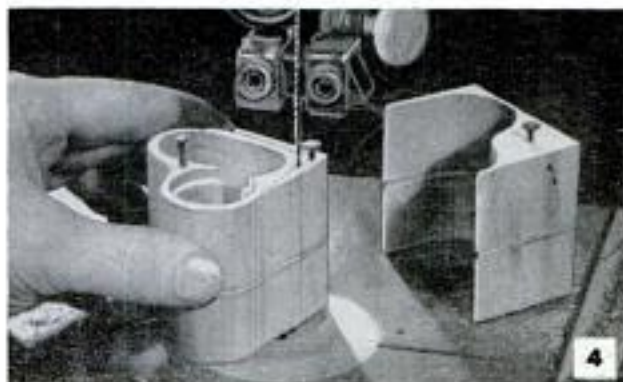
2

First operation on the prism cell after layout. Layout is made carefully to assure correct hole register



3

Above, turning the objective-lens seat in the prism cell. Note that work is mounted on a plug chuck for boring. Below, after boring operations are completed, cell block is bandsawed to outside contour

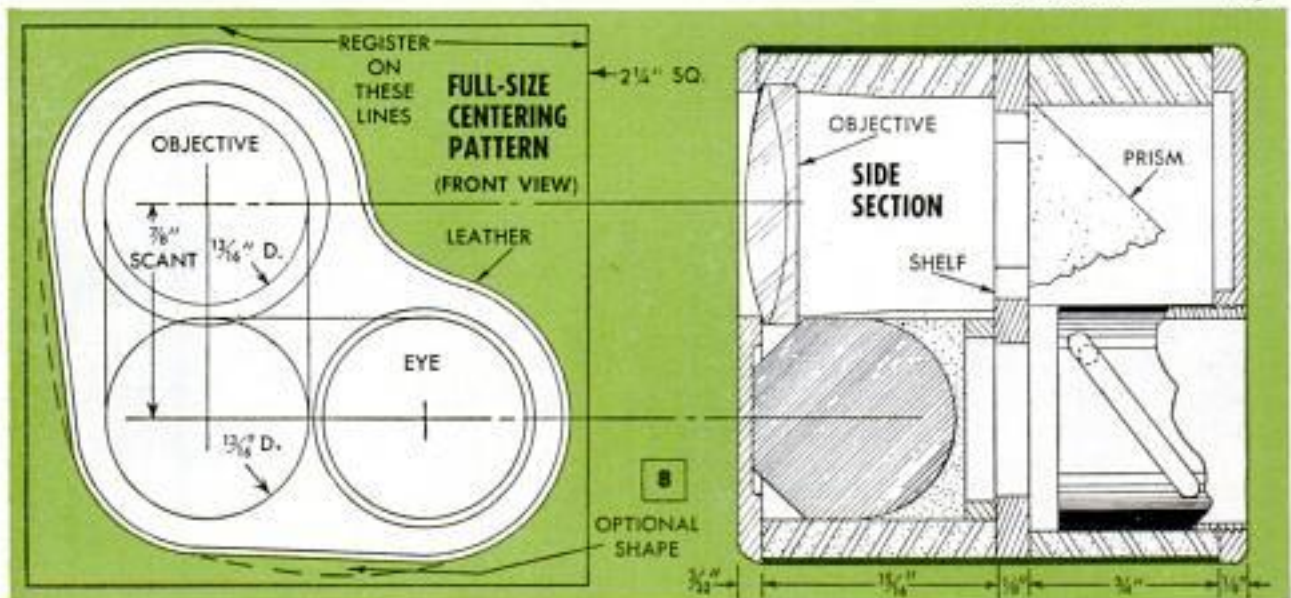
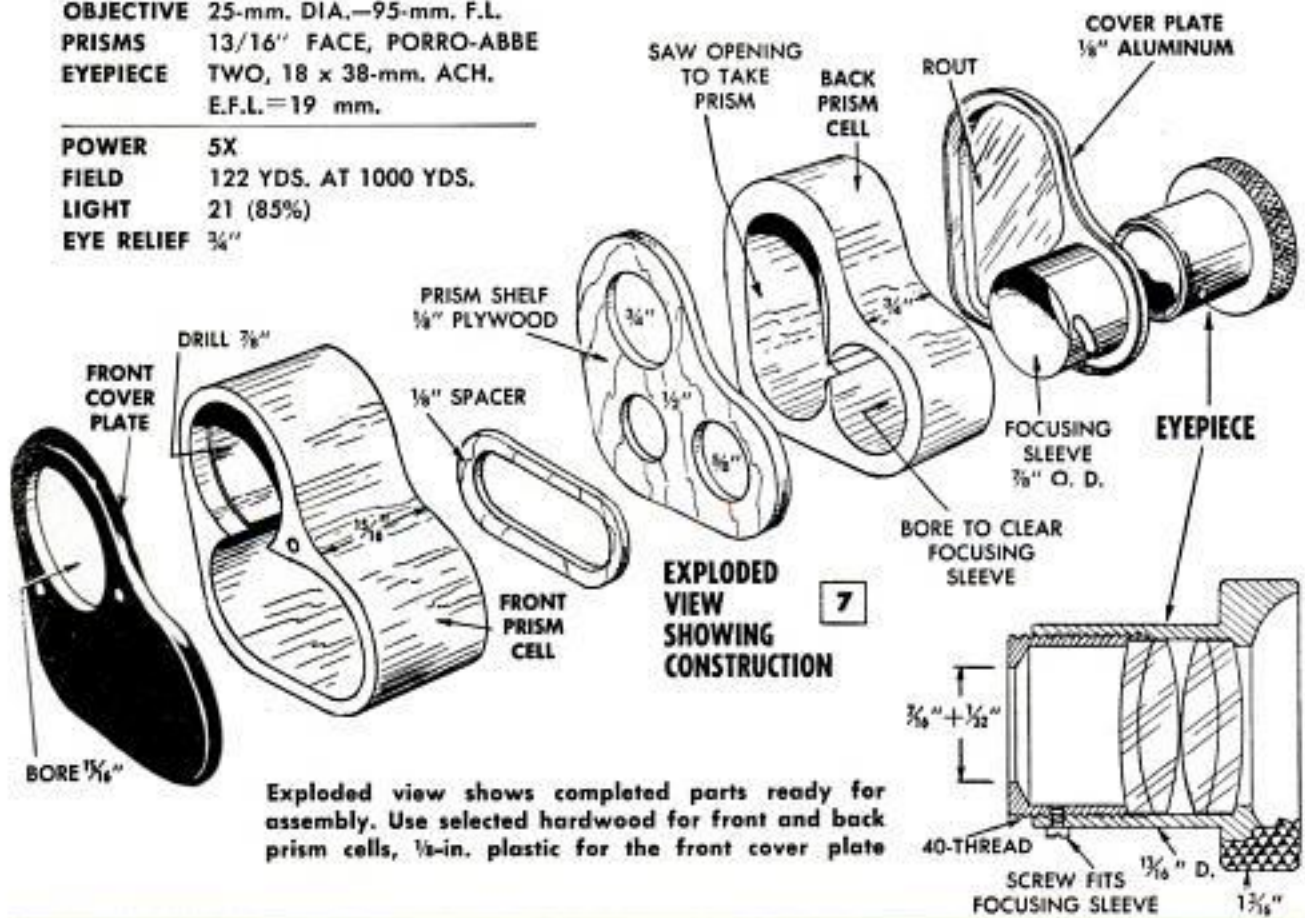


4



OBJECTIVE 25-mm. DIA.—95-mm. F.L.
PRISMS 13/16" FACE, PORRO-ABBE
EYEPIECE TWO, 18 x 38-mm. ACH.
 E.F.L.=19 mm.

POWER 5X
FIELD 122 YDS. AT 1000 YDS.
LIGHT 21 (85%)
EYE RELIEF 3/4"



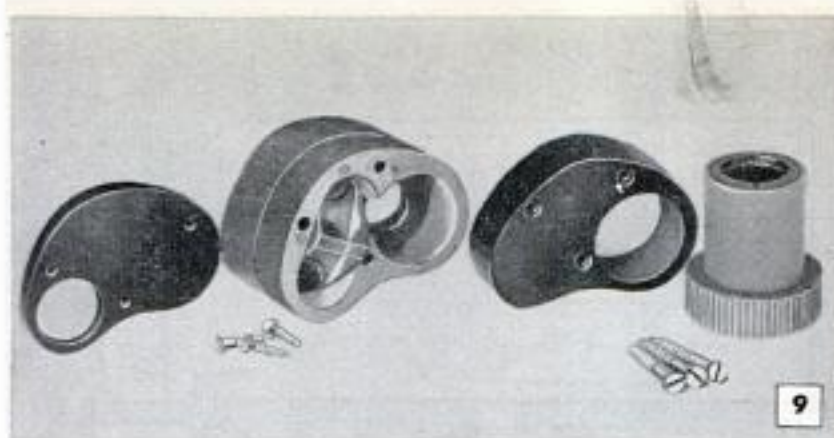
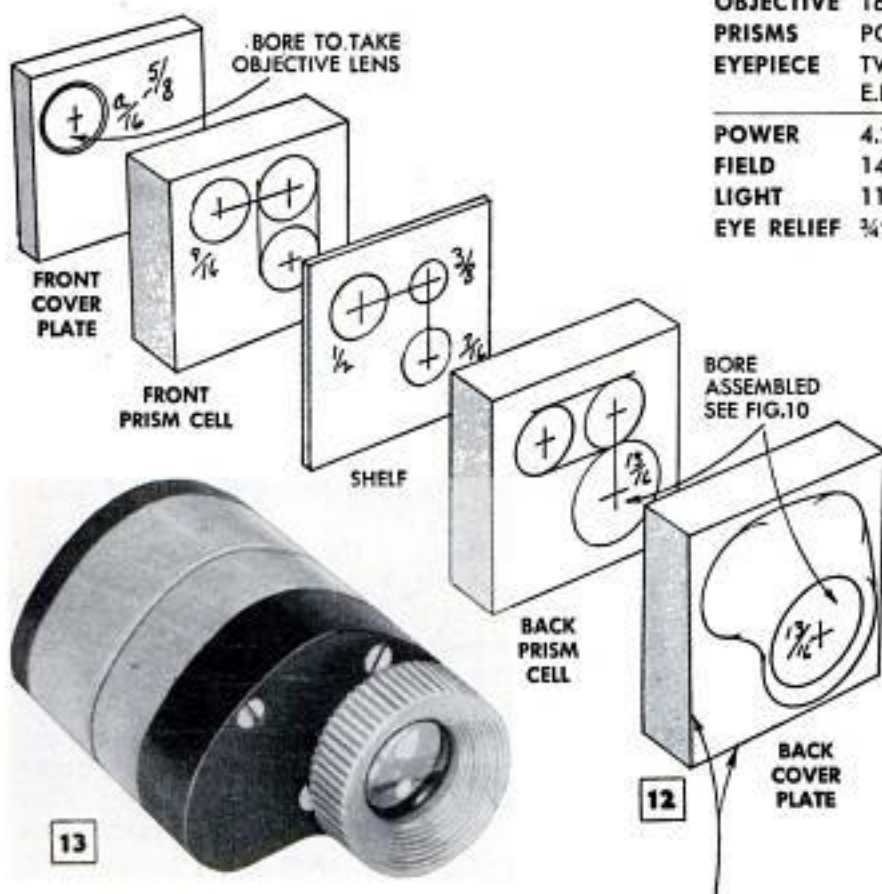


Photo at left pictures partially assembled parts of the No. 2 scope, Fig. 1. Right, boring cover plate

OBJECTIVE 16-mm. DIA. BY 80-mm. F.L.
 PRISMS PORRO-ABBE, $\frac{1}{2}$ " FACE
 EYEPIECE TWO, 18 x 38-mm. ACH.
 E.F.L.=19 mm.

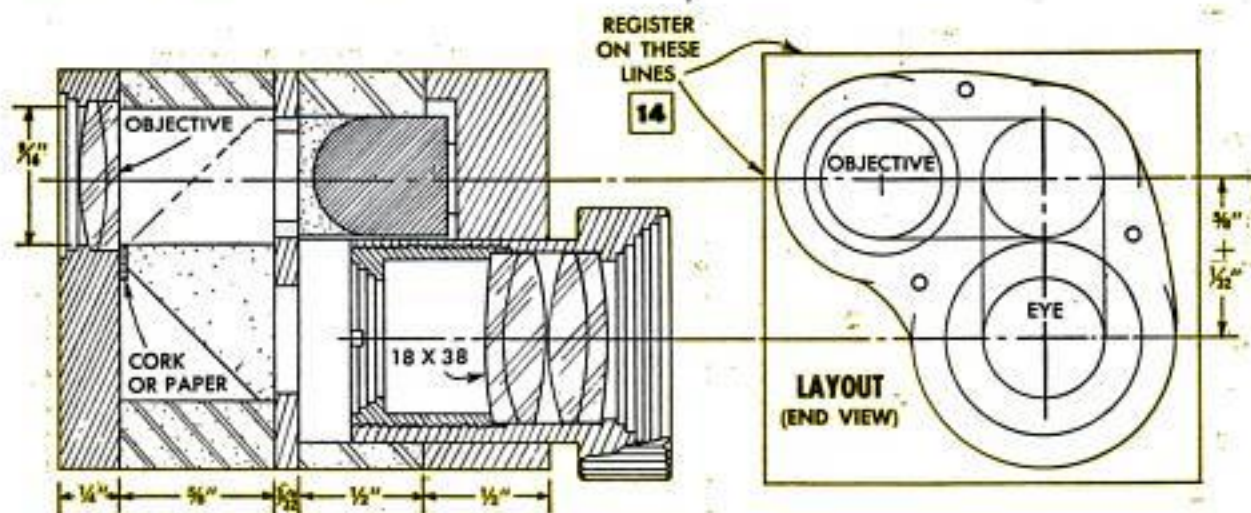
POWER 4.2 X
 FIELD 140 YDS. AT 1000 YDS.
 LIGHT 11 (45%)
 EYE RELIEF $\frac{3}{4}$ "



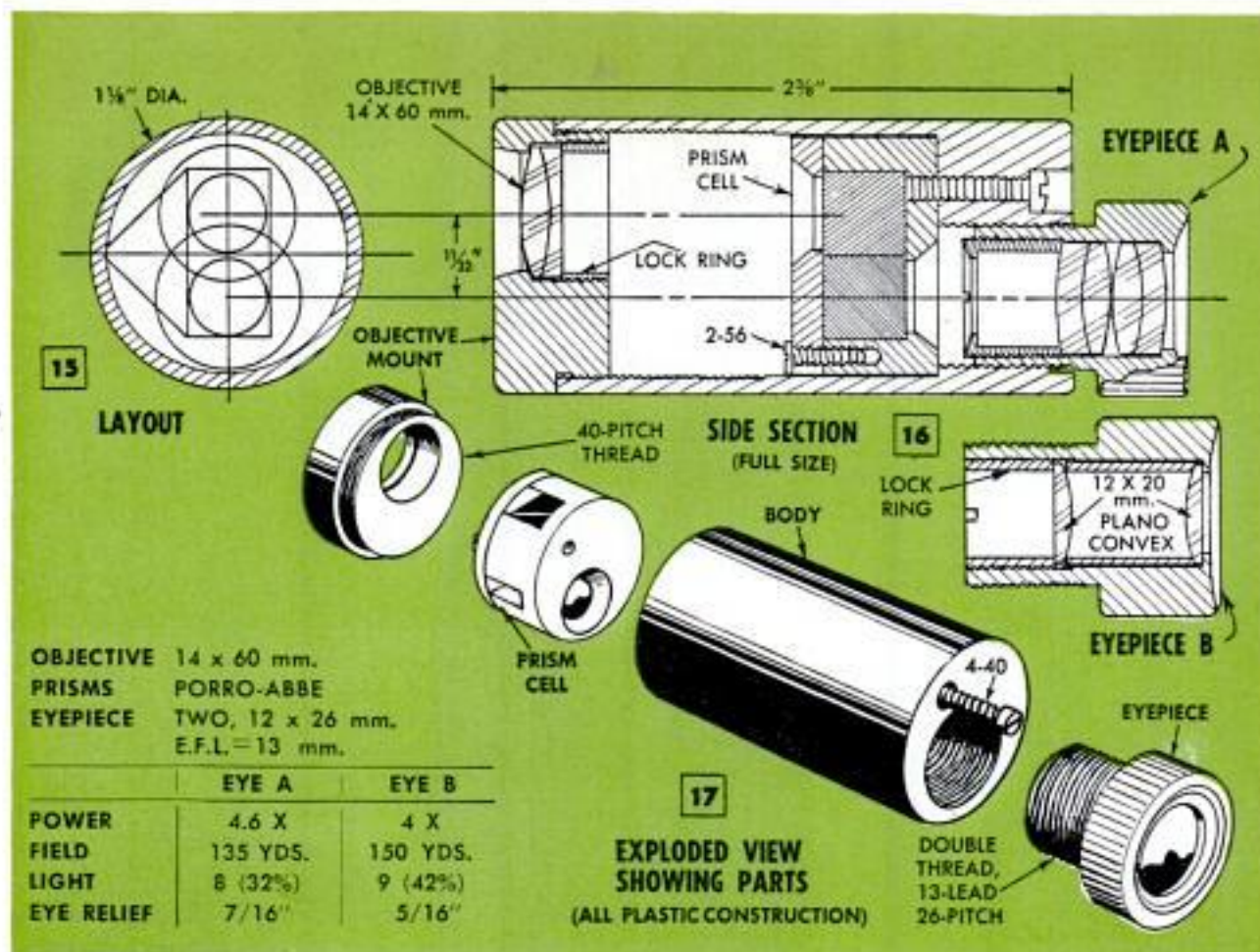
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12

11



14



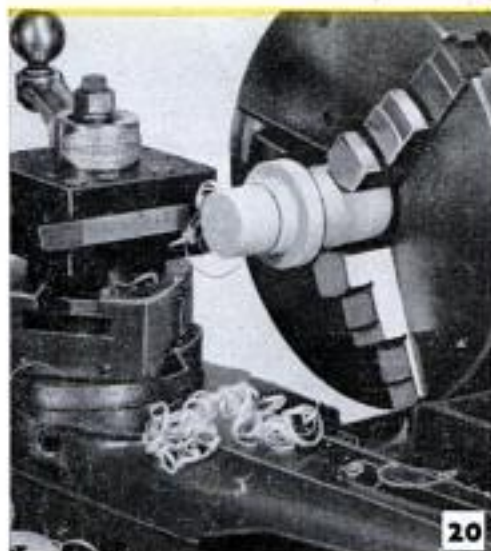
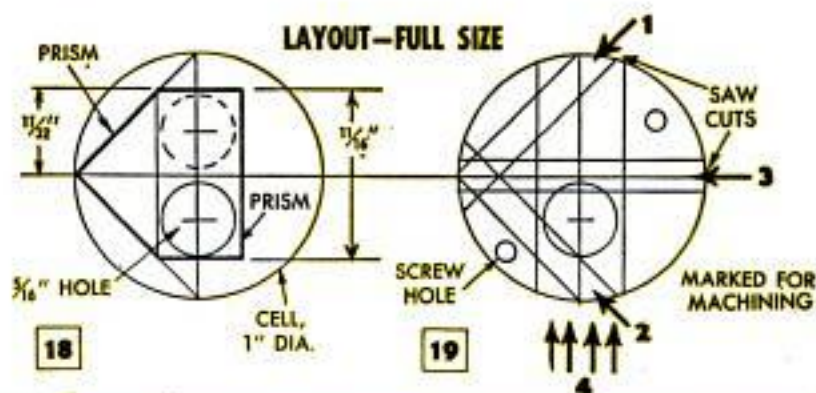
as in Figs. 11 and 12. It's especially important to make sure that the holes register. Then the two prism cells and the shelf are glued together, Fig. 9. The cover plates are held in place with wood screws. Figs. 9 and 13 picture a partial and complete assembly of the No. 2, 4X scope shown in Fig. 1. The body (prism cells) of this unit is not leather-covered as is the No. 1 scope in Fig. 1. The eyepiece in both is a plain draw-tube type and should be a snug fit. If desired it can be fitted in place with a slot-and-pin adjustment by slotting the eyepiece tube and driving a pin (small screw) from the outside of the back cover plate, Fig. 7.

The No. 3 scope in Fig. 1 is the smallest and in some respects the handiest of the four midgets shown. It is of all-plastic (black Tenite) construction. The prisms are the Porro-Abbe type and while a bit small are inexpensive. The scope is fitted with a symmetrical eyepiece composed of two 12-mm.-diameter by 26-mm.-focal-length achromats, the equivalent focal length being 13 mm. You may have some difficulty in locating these lenses, A in Fig. 16, since surplus stocks are not large. For this reason an alternate Ramsden eyepiece is shown, Fig. 16, B. The Ramsden eyepiece is less expensive than the symmetrical type, is equally good optically, but has a shorter eye relief, making it un-

suitable for use by those who must wear glasses.

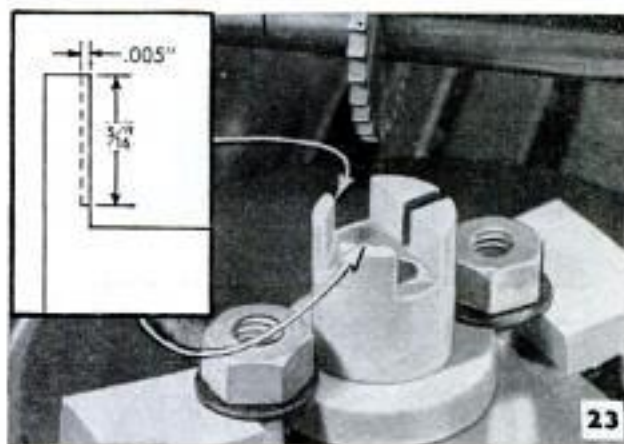
Construction of the No. 3 scope begins with the layout, Fig. 15, and is detailed in Figs. 16 to 24 inclusive. The full size layout of the prisms and cell, Fig. 18, shows how the two prisms are fitted in contact, one over the other. Fig. 19 is the same layout with the paths of the various machining cuts marked. This layout is carefully marked on the end of the plug after turning, Fig. 21. Machining is best done on the milling machine with $\frac{1}{8}$ in. saw, Fig. 22, but also can be worked on the drill press with a milling vise or the lathe with a milling attachment, using a $\frac{1}{8}$ -in. end mill in both instances as the cutting tool. In a pinch you could even work this on the circular saw with a suitable holding jig. As worked on the miller, the piece finally shapes up as in Fig. 23. The two small triangular pieces, Fig. 19, will break out and should be dressed smooth with a hand grinder. Fig. 24 shows how the prisms fit in place. A little shimming with gummed paper may be needed if both prisms are not exactly the same size. The cell is cut from the plug with a parting tool, leaving a $\frac{1}{8}$ -in. thick base. A cover plate for the cell is cut from the same plug, turning this piece over to put the $\frac{5}{16}$ -in. hole on the opposite side of center. The plate is fastened with two screws.

HOW TO MAKE THE CELL FOR SMALL PORRO-ABBE PRISMS

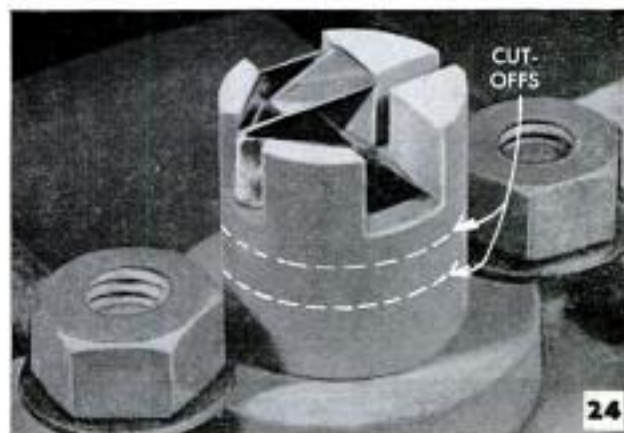


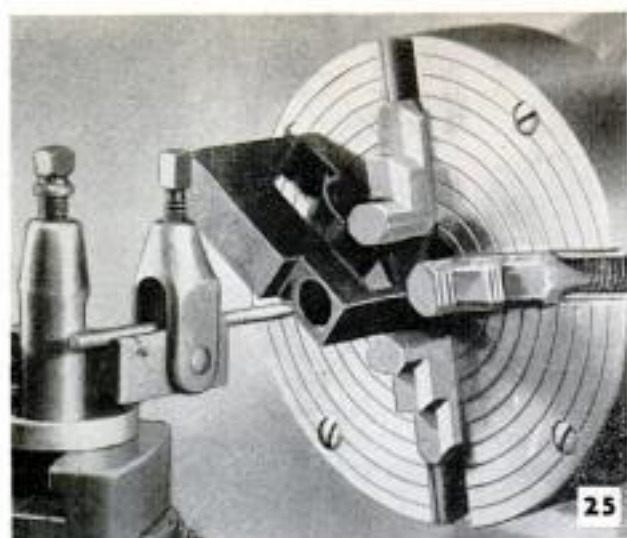
After the prism cell is made, the rest of the scope can be worked, Fig. 16. The body is made first, turning the inside to take the prism cell but leaving the outside in the original thickness for rechucking. The objective mount is worked on-center and is then off-centered to bore the objective hole. With the objective mount fitted in place, the center line for offsetting the eyepiece hole can be located by measuring or sighting. From the layout plan, Fig. 15, it can be seen that all holes, objective, prism cell and eyepiece, are worked on the same center line, and offset the same distance on either side of center.

The No. 4 scope is a departure from conventional monocular design, excellent as a pocket scope. A Leman prism is used and it is easy to mount because it comes in one piece. The simple construction involved is shown in Figs. 25 to 28 inclusive. The plastic body block should be machined flat and square to permit accurate chucking, Fig. 26, when boring the objective and eyepiece holes. The cutout to take the prism should not contact the reflecting surfaces. Allow clearance as shown in Fig. 28 for maximum light transmission. When making the plastic body, Fig. 27, it's a good idea to run the cutout slightly undersize, then hand-fit the prism by removing material from the cutout with a fine file. The eyepiece is almost identical with No. 3

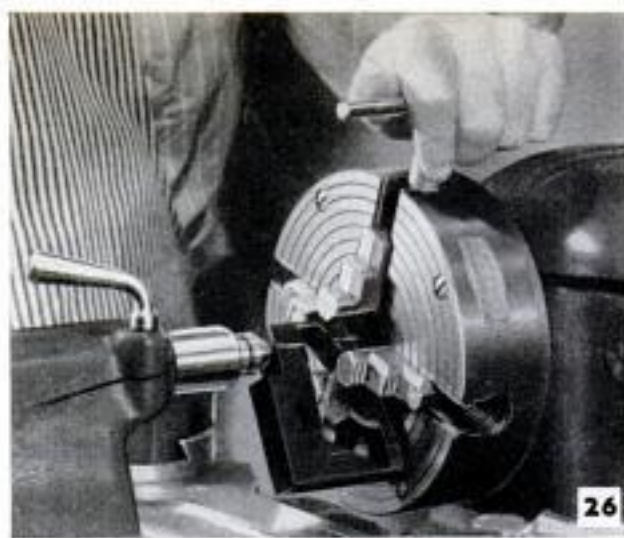


Above, prism cell for the No. 3 scope, Fig. 1, after milling to layout, Fig. 19. Note dimensions in detail. Below, cell completed with prism in place. It may be necessary to shim prism to proper alignment

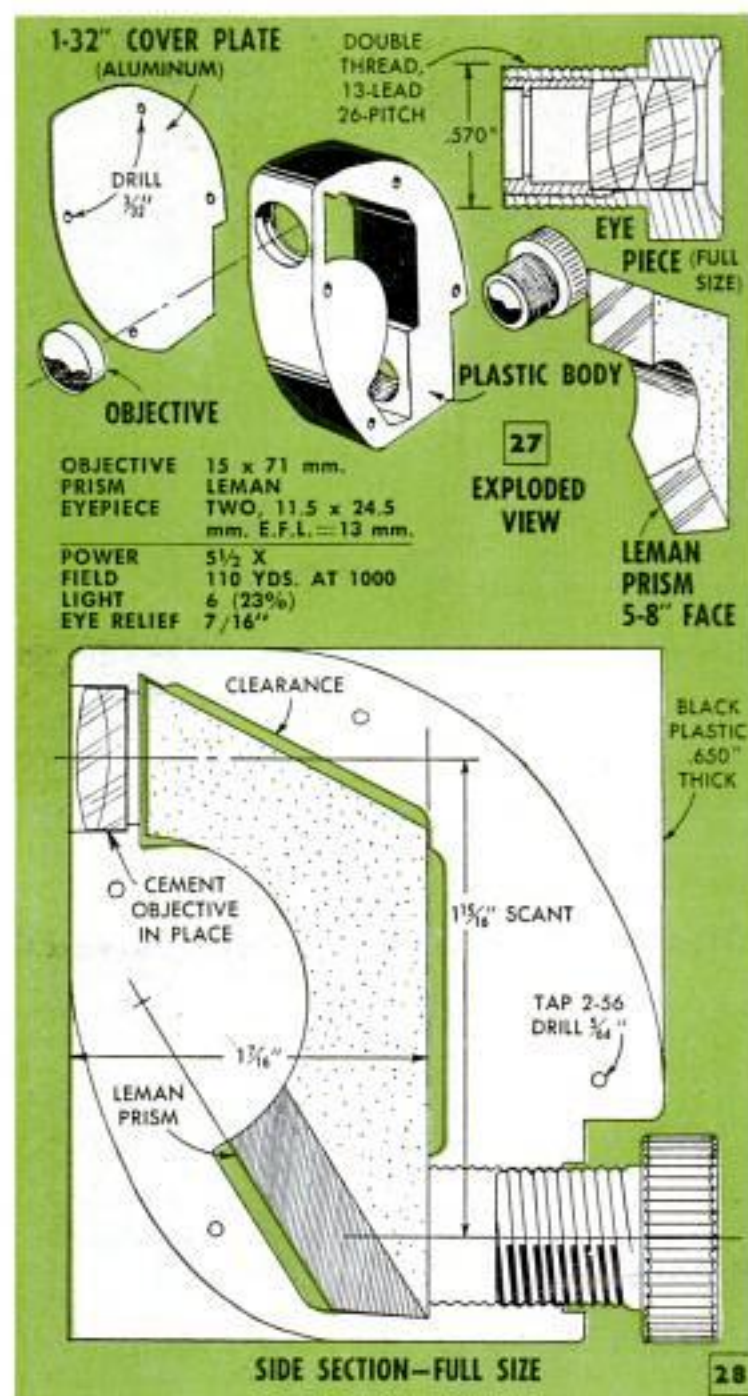




Setup in lathe for boring hole for objective, Fig. 27. Hole is shouldered, Fig. 28. Take very light cuts



Setup in 4-jaw chuck for boring operation pictured at left. Note use of tailstock in centering work



design and focuses by means of a 13-lead double thread. This is fast enough for quick focusing. However, if desired, focusing can be held to one turn with a thread of 7-lead, 28-pitch.

All four designs can be varied considerably in magnification. Generally it is not practical to go below 3X (3-power) since this power usually gives the best definition with a comparatively wide field of view. The 3-power units are the most compact of all scopes. They can be worked up about $\frac{3}{4}$ in. in diameter by $1\frac{1}{2}$ in. long. None of the midgets shown should be raised above 7X because of light loss due to the small objectives.

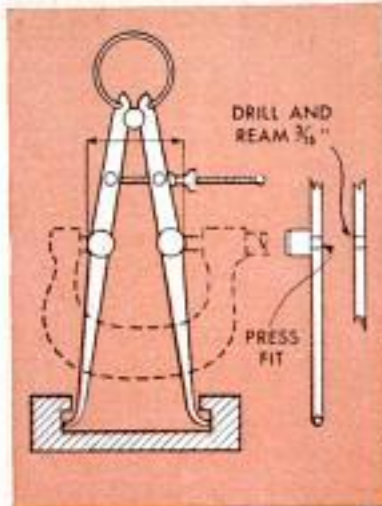
Higher power is obtained by using a stronger eyepiece (shorter focal length) or a longer focal length objective. The latter will increase the length of the scope by an amount equal to the extra focal length over that specified. A change in the eyepiece will not affect the size of the scope. It is a simple matter to make up two or three eyepieces to fit any scope and in this way obtain variable power. A $\frac{1}{2}$ -in. eyepiece, such as used for designs No. 3 and 4, will give 7X with design No. 1 and 6X with design No. 2 scope. ★ ★ ★

Grinding a Round Punch

Sharpening a round punch on a grinder is much simpler if the punch is chucked in a hand drill. Not only is it easier to hold the punch, but the hand drill can be used to slowly rotate it against the grinding wheel.

Micrometer and Calipers Measure Blind Recess

Measurements in blind recesses can be made with a pair of spring calipers fitted with steel buttons so that measurements can be transferred with an outside micrometer. Steel buttons are turned $\frac{1}{2}$ in. in diameter and shouldered to $\frac{3}{16}$ in., as shown in the detail. They are press-fitted into holes drilled in the caliper legs. To use the calipers, their points first are set to a known measurement between the anvils of the micrometer. Next, a measurement is made across the buttons with the micrometer. Now, slip the calipers into the blind recess and set them to measure it. Finally, measure across the buttons again. The differ-

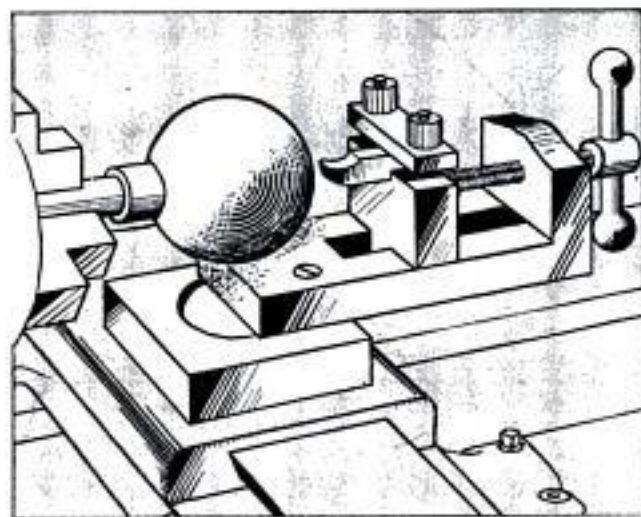


ence between the two measurements across the buttons added to the first measurement across the caliper points will determine the measurement of the blind recess.

H. J. Berber, Stillwater, Okla.

Ball-Turning Attachment for Lathe Utilizes Drill-Press Vise

Spheres can be turned quickly and accurately on a lathe with this attachment,

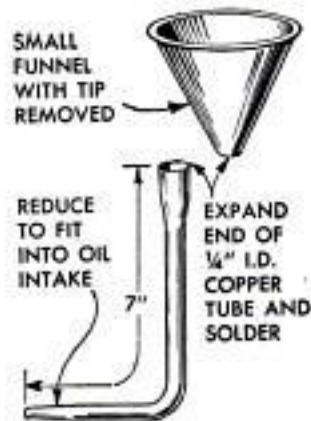


which consists of an old drill-press vise fitted on a swivel base and modified to hold a tool bit. The base will vary with each make of lathe, but primarily it bolts to the cross slide in place of the compound rest and permits the vise to rotate around the lathe center. After the stationary jaw of the vise is removed or cut away, a groove is milled in the top of the movable jaw to receive the tool bit. Two cap screws turned into tapped holes in the jaw hold a small bar which clamps the tool bit in place. Diameters of turned spheres are varied by moving the tool bit closer to the swivel center for smaller diameters and backing it away for larger. In some cases it may be necessary to shim the base to raise the tool bit to exact center. The cutting edge of the tool should be rounded so it will cut in either direction.—C. W. Woodson, Chicago.

Machinery Crankcase Filled Through Extension Funnel

Filling the crankcase of workshop equipment, such as a jigsaw, where the oil intake is difficult to get at, can be done easily and without tipping or dismantling the machine through the use of an extension funnel. The funnel is made as shown in the detail. One end of a 7-in. length of $\frac{1}{4}$ -in.-i.d. copper tubing is flared and then soldered to the bottom of a funnel from which the spout has been removed. The other end of the tubing is reduced by hammering until it fits into the oil intake. When using this funnel it is best to pour the oil slowly.

Dick Hutchinson, San Gabriel, Calif.



Horse-Drawn Planter Modified For Use With Tractor



This horse-drawn corn planter was modified for use with a tractor by bolting on a short length of 3-in. steel channel for a drawbar, and adding brackets to permit the entire planter to be lifted by the tractor's hydraulic system. Cables running from the marker shoes, through pulleys and down to the drawbar automatically raise the markers when the planter is lifted at the end of a row. The markers are dropped manually.

Guide Clamped to Tubing Assures Square Saw Cuts

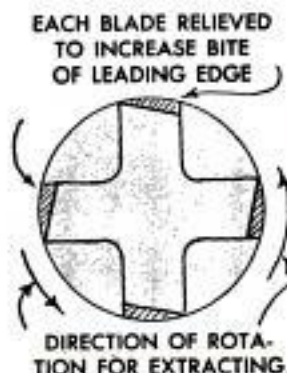


Square hacksaw cuts on tubing and pipe are assured by using a clamp-on-type saw guide. The simplest method of doing this is to use a regular automobile-radiator-

hose clamp. If a clamp of the correct size is not available, the saw guide can be improvised from a strip of thin sheet metal bent to form a clamp and held with a nut and bolt as shown in the illustration.

Screwdriver Removes Bolts

A Phillips-type screwdriver can be used to remove a broken bolt if a regular bolt extractor is not handy. Grind a relief on each of the "blades" of the driver to increase the bite of what will be the leading edges when the driver is used as an extractor. Force the screwdriver into a hole drilled in the broken stud and turn it with clamp-type pliers to obtain greater leverage. To aid in removing a broken bolt, strike it several sharp blows to loosen rust and corrosion before drilling it.

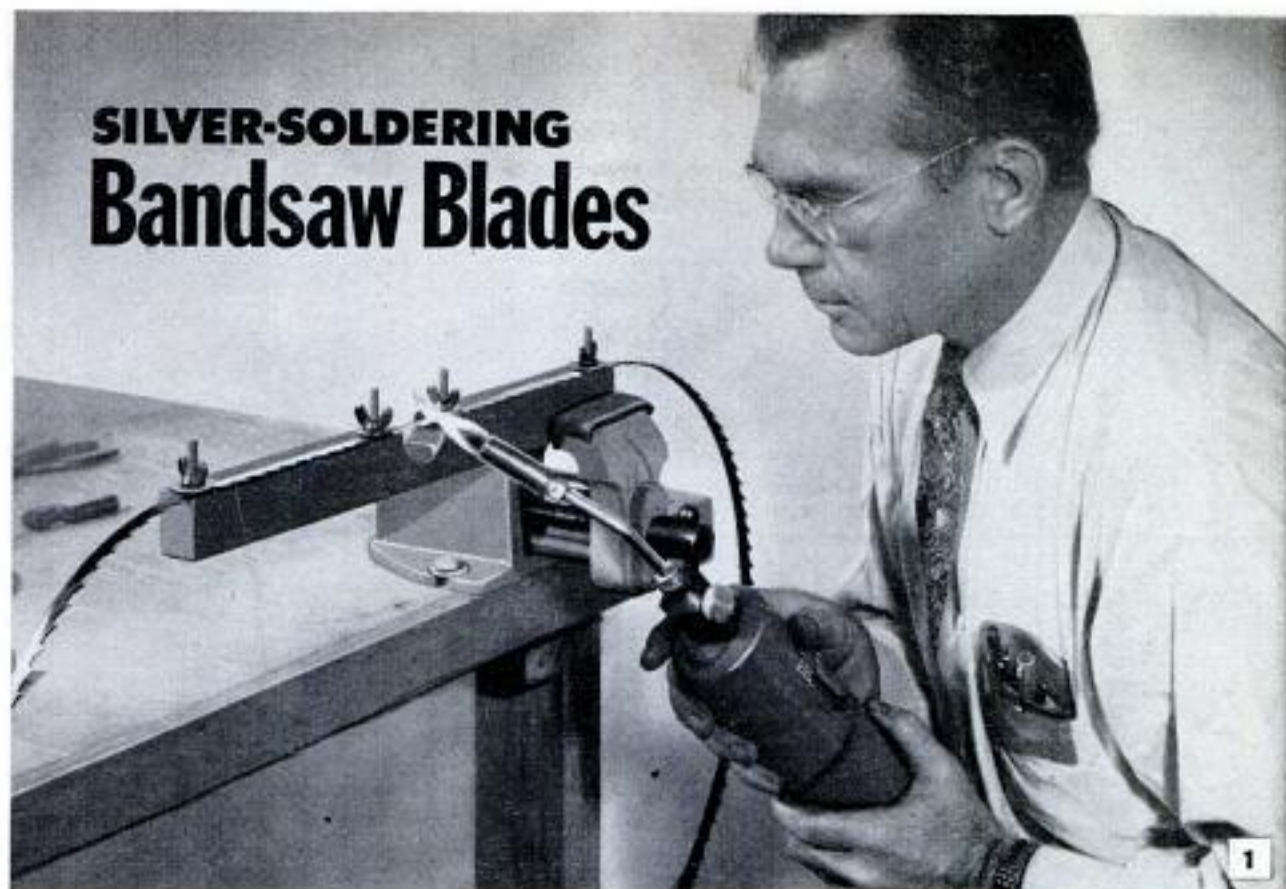


Generator Efficiency Restored By Washing Out Excess Oil

An automobile generator that is not operating properly because it has been over-oiled, can be "repaired" by cleaning oil from brushes and commutator with carbon tetrachloride. Use a pump-type oil can to force the carbon tet into the generator while it is running. The carbon tet will loosen the oil and dirt and the spinning commutator will throw off the loosened matter. Do not use gasoline or other flammable solvents for the job. Carbon tetrachloride, although nonflammable, gives off toxic fumes, so it must be used only in a well-ventilated area.



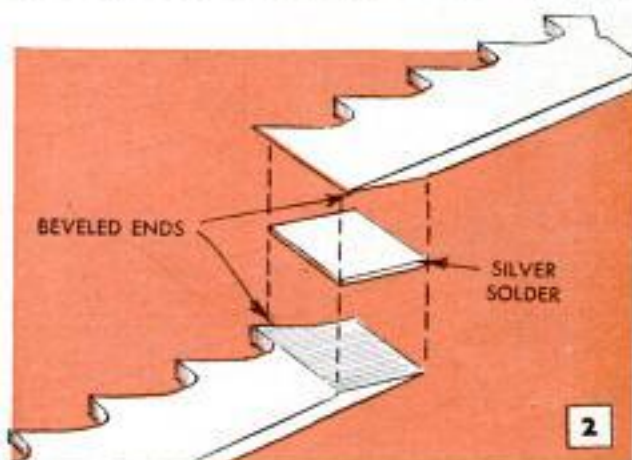
SILVER-SOLDERING Bandsaw Blades



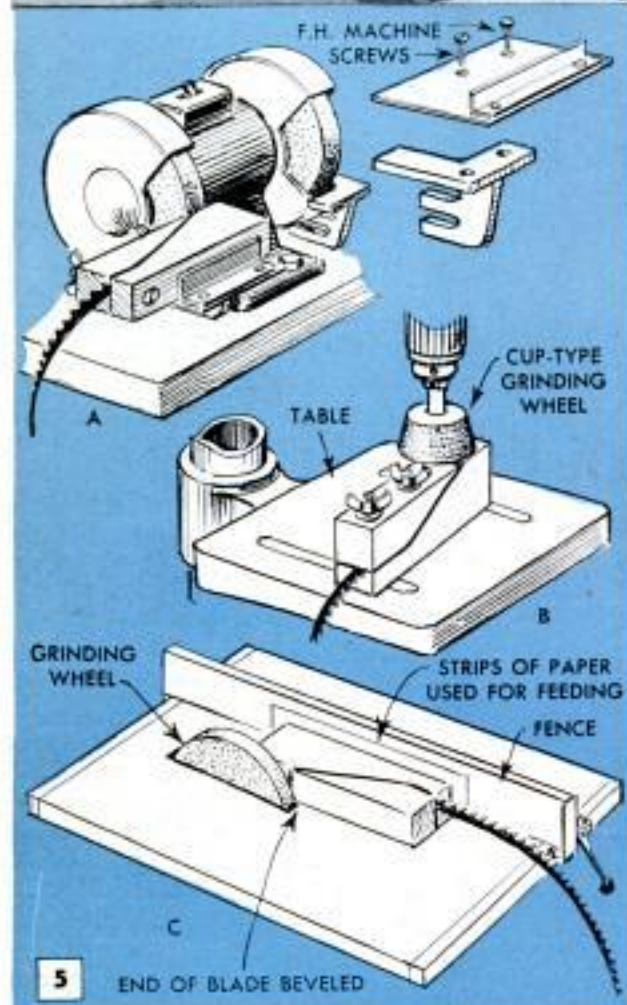
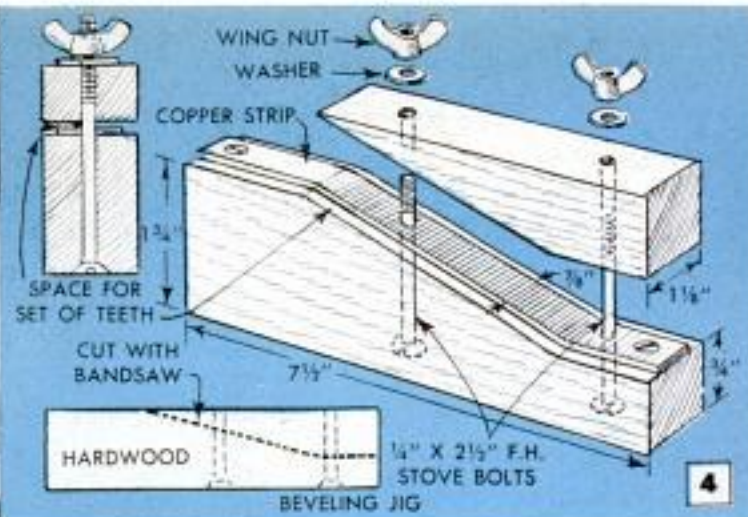
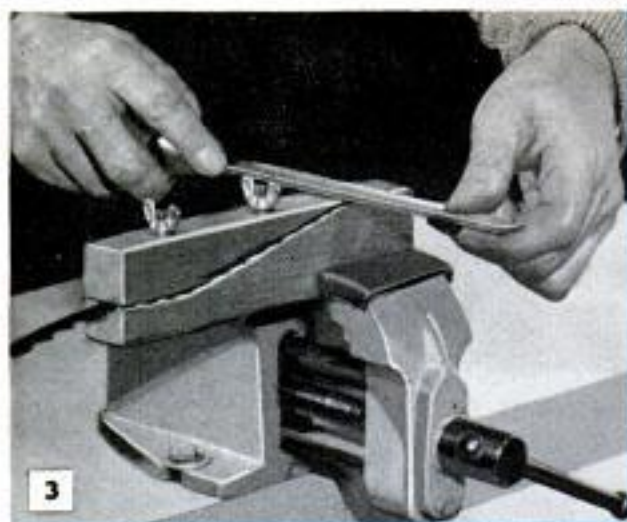
By E. R. Haan

IN SOME CASES it's an advantage to make internal cuts with a bandsaw without running in from the edge of the stock. This is easily done by drilling a hole at some convenient point within the pattern to admit the blade end as in jigsaw work. Then you cut the bandsaw blade, insert one end through the hole in the stock and bevel and silver-solder the ends as in Figs. 1 and 2. Replace the blade on the band wheels and you're ready for work. When the cutout is finished, cut the blade again, remove it from the work and bevel and re-solder the ends. The advantage of the bandsaw for this type of scrollwork is that it cuts much faster and smoother than the jigsaw, especially with narrow, skip-tooth blades. The same procedure can be used when making internal cuts in metal.

Jigs for silver-soldering: Two simple wooden jigs are made for beveling and joining the blade ends. The first one, used for beveling the ends, is pictured and detailed in Figs. 3 and 4. Methods of beveling are shown in Figs. 3 and 5, A, B and C. The method used depends on the type of blade. Bandsaw blades for cutting wood can be beveled with a file as in Fig. 3, while those used for metal cutting are harder and must be beveled by grinding, Fig. 5. The purpose of beveling the ends before joining is to obtain relatively large contacting surfaces. These form a strong joint when united with



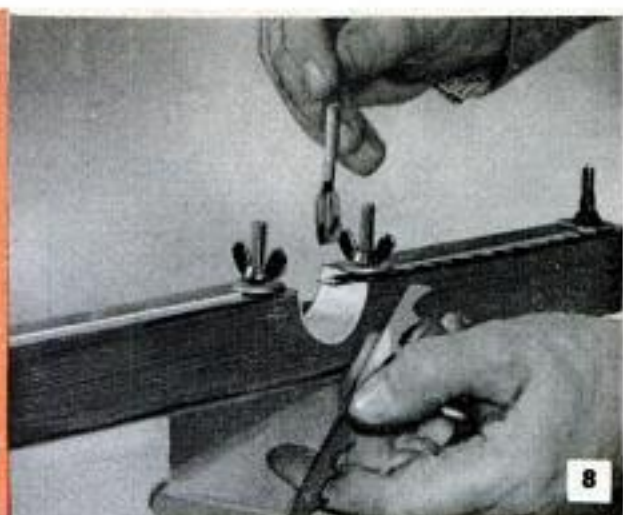
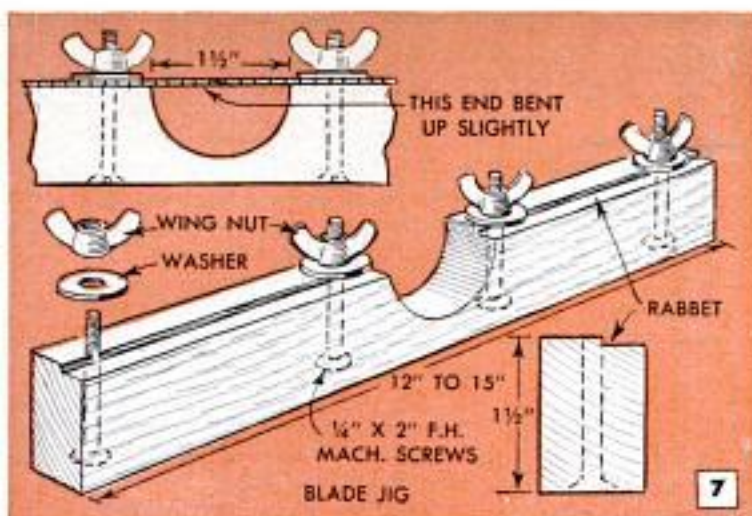
a thin film of molten silver solder, Fig. 2. The jig in Fig. 4 is especially designed for hand-filing with the unit held in a vise as in Fig. 3. However, this same type of jig also can be used for grinding as in Fig. 5. The copper strip, Fig. 4, serves a twofold purpose. It holds the blade rigidly in position when filing or grinding, and also serves to dissipate heat rapidly when grinding, preventing damage to blades which have been hardened for metal cutting. When grinding on the circular saw, detail C in Fig. 5, set the ripping fence so that the jig clears the grinding wheel and then use strips of paper between the jig and the fence to provide a means of slow-feeding to the grinding wheel, inserting a sheet of paper each time the end of the blade is moved past the wheel. When mounting the jig on the grinder, detail A in Fig. 5, be



sure that the blade is located on the horizontal center line of the wheel. If it is only slightly above or below center, the end will be ground at an angle. When ends ground in this manner are joined by silver-soldering there may be a slight twist in the blade at the joint. This can cause undue wear as well as possible pounding in the blade guides on the machine. One thing to remember in this connection, always check the blade after soldering to see that it passes freely through the guides.

Clean blade ends before soldering: After cutting the blade and beveling the ends, clean with benzine or carbon tetrachloride, Fig. 6, to remove fingermarks and all traces of oil and sawdust from between the teeth. After cleaning do not touch the blade ends with the fingers.

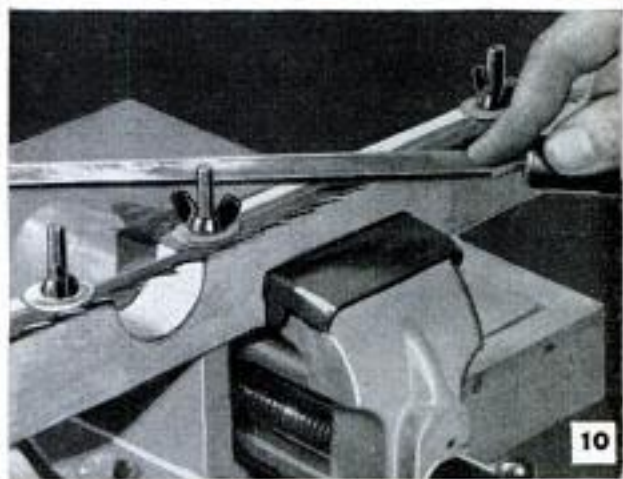
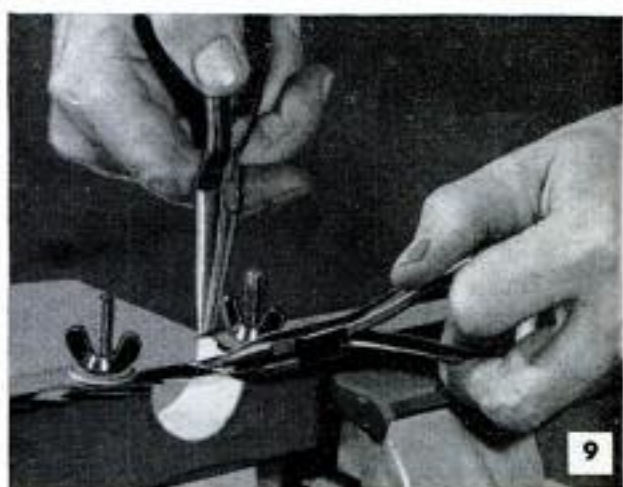
Soldering jig: Fig. 7 details the soldering jig which is made of hardwood $1\frac{1}{4}$ in. in thickness and 12 or 15 in. long. A $\frac{3}{16} \times \frac{1}{4}$ -in. rabbet is cut on one edge. Four holes for $\frac{1}{4}$ -in. bolts are equally spaced along the length as shown. The bolts are fitted with washers and wing nuts. The semicircular cut at the center is made on a $\frac{3}{4}$ -in. radius, but can be made slightly larger if desired. The purpose of the jig is to hold the beveled blade ends tightly together with the flux and silver solder between while heat is applied with a torch of the type pictured in Fig. 1. As the blade ends are placed in position in the jig, it may be necessary to bend one or the other or both slightly upward to assure full contact of the beveled ends. Coat the ends with a paste made by mixing ordinary borax with water. The borax paste serves as a flux and should be thick enough so that when applied with a small brush as in Fig. 8, it will stay in place in the joint. Silver solder comes in sheet, roll and wire form. You can use any form but, of course, the wire solder must be hammered thin so that a small square can be cut to a size slightly larger than the bevels at the ends of the blade. Place the



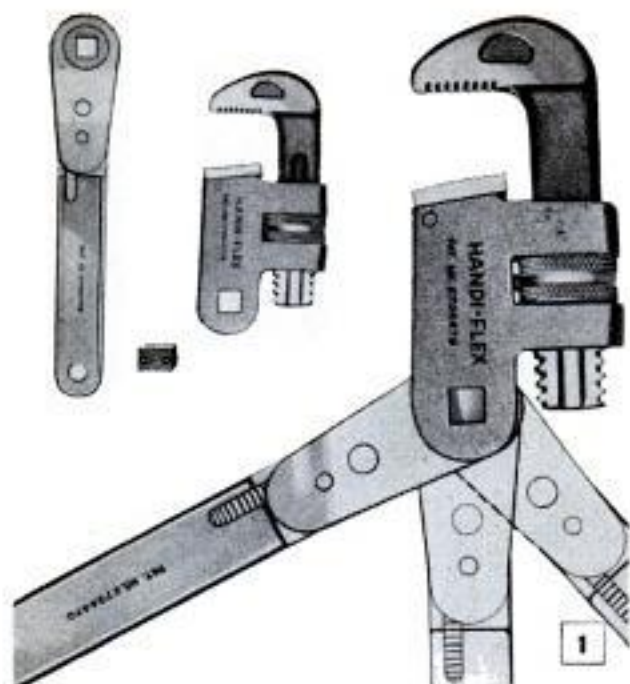
square between the bevels after fluxing and then clamp tightly in position as in Fig. 9. Be sure that the blade is correctly aligned in the jig before applying heat.

Flame-soldering: A small torch having a tip of the type that will concentrate the flame is used for soldering the blade ends. This can be one of the newer-type torches having a pressurized container, or you can use an alcohol torch with a blowpipe to concentrate the flame and produce intense heat at the tip. A spreading flame, such as that produced by an ordinary blowtorch, is not suitable for this type of soldering as it is essential to heat only that portion of the blade necessary to melt and flow the solder. After lighting the torch, adjust the tip to give a narrow flame with the point fairly well out from the torch tip. On the smaller blades, which are thin gauge, such a flame will bring the blade ends to a medium red in a few seconds. Play the flame at a slight angle both from the top and bottom of the blade ends. As soon as the solder melts and flows, withdraw the flame. On wider and heavier-gauge blades heating to the proper temperature will take a few seconds longer and the joint must be carefully watched while the flame is played from above and below at a slightly greater angle in order to heat the joint uniformly. It should come to a uniform red across the full width of the blade at the same instant to assure a joint of maximum strength.

Finishing the joint: When the work has cooled, check the thickness of the joint with a micrometer as in Fig. 11. Usually it will be somewhat thicker at the joint than the regular gauge of the blade. The joint must be reduced to the same thickness, or gauge, by filing as in Fig. 10. Move the blade in the jig as pictured so that the joint is supported. Use a fine double-cut file and remove an equal amount from each side of the blade. Reset the teeth if necessary and then test the blade on the machine to make sure the joint clears the guides. ★ ★ ★



SHOPPING FOR TOOLS



1. PIPE WRENCH has ratchet handle that can be locked in any position for working in close quarters. Handle can be detached from wrench head and used as socket driver, using a 1/2-in. square adapter. The ratchet handle provides for maximum torque in tight places, as it can be swiveled to any required position to obtain a "bite" for tightening or loosening

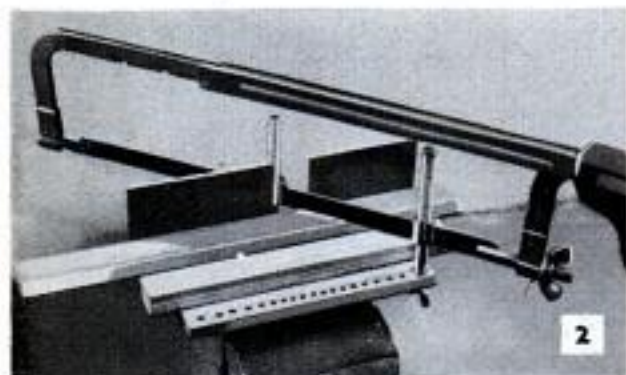
Todd Products Co., P.O. Box 1621, Rockford, Ill.

2. MITER BOX takes standard hacksaw, cuts metals at any angle from 90 to 45 deg. Unit can be clamped in a vise as pictured, or attached directly to the work bench. Handles stock up to 2 in. wide and 1 1/4 in. thick. Accurate angle guides hold exact adjustments when set. Bed of unit is wood that is replaced when badly cut, other parts are steel and aluminum

Riverside Enterprises, 116 Riverside, Corning, N. Y.

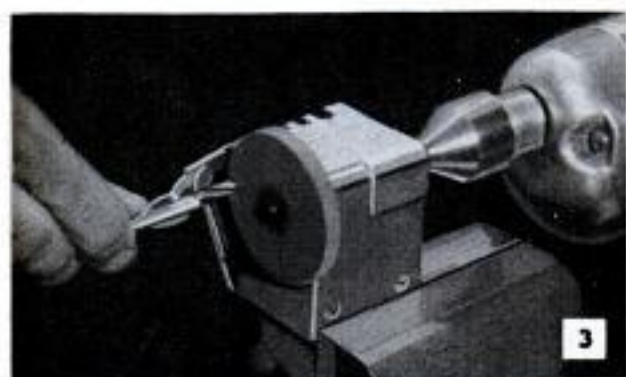
3. DRILL SHARPENER for bits up to 1/4 in. has 1/4 x 2 in., 120-grit wheel, which is powered by chucking its spindle in any 1/4-in. drill motor. Fixture on sharpener holds drill bits at correct angle for sharpening and gauge slots in sharpener body permit checking angle and symmetry of sharpened drill points. Unit is compact enough to be carried in small toolbox

Popular Manufacturing Co., Minneapolis, Minn.



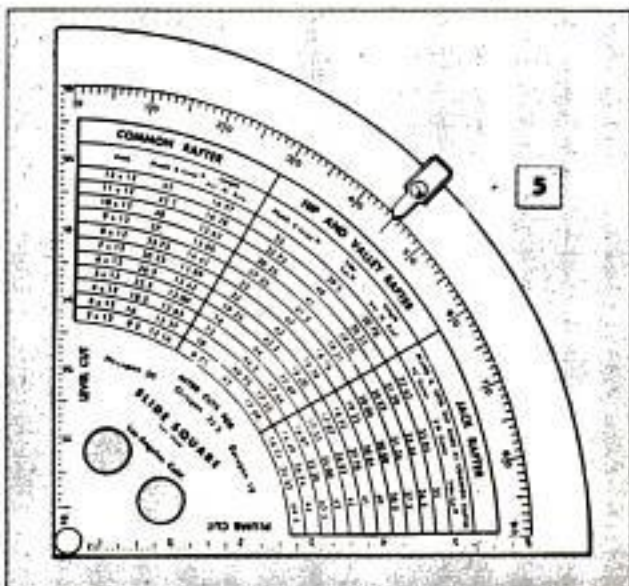
4. GRADIENT-LEVEL ATTACHMENT can be fitted on any level in a few seconds, converting it to an accurate inclinometer for establishing and checking pitch, slope or fall. Device is made of 16-ga. steel, plated for durability. Two scales on calibrated end of attachment are for 3-ft. and 4-ft. levels. From these scales measurements can be determined for any level

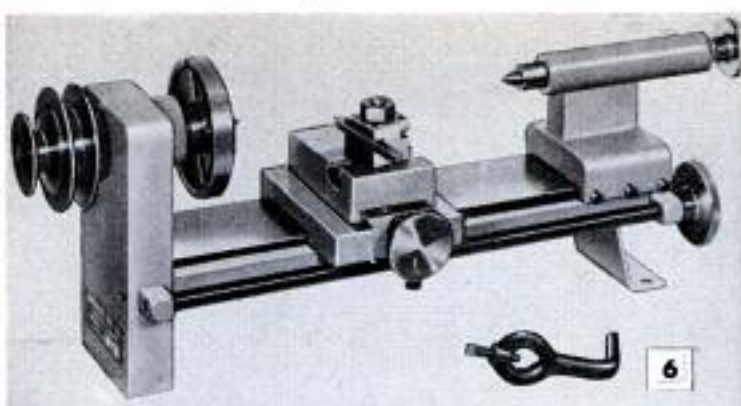
Carr Manufacturing Co., Tonia, Mich.



5. SLIDE SQUARE is made of dural for lifetime use. Can be used as a protractor, angle-degree finder and divider. Ideal for checking and laying out bevels and miters. A complete rafter table on the square makes roof framing a much simpler job. Complete illustrated instructions furnished with square clearly explain and picture various operations possible

Research Specialties Co., P.O. Box 8723, Los Angeles 8, Calif.



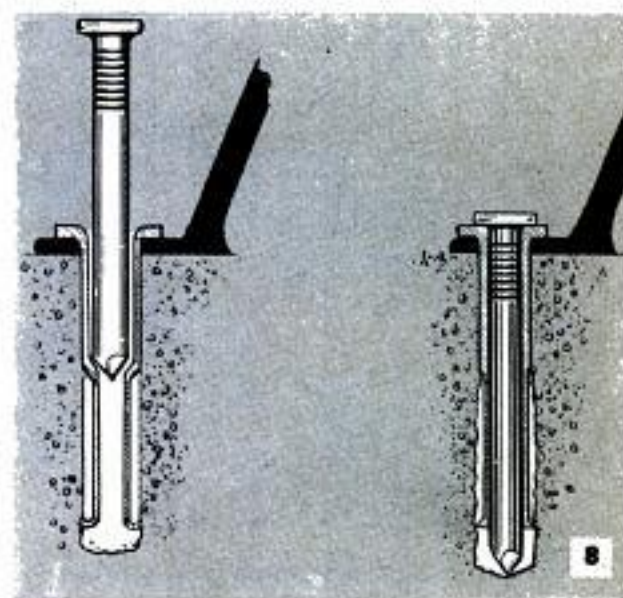


6. LOW-COST METAL-TURNING LATHE is all steel, comes complete with faceplate, driving dog and mounting bolts. Has ball-bearing headstock spindle. Lathe has a swing of 4½ in., bed is 12 in. long. Distance between centers is 7 in., tailstock travel is 1¼ in.
Rosemoor Manufacturing Co., Lansing, Ill.



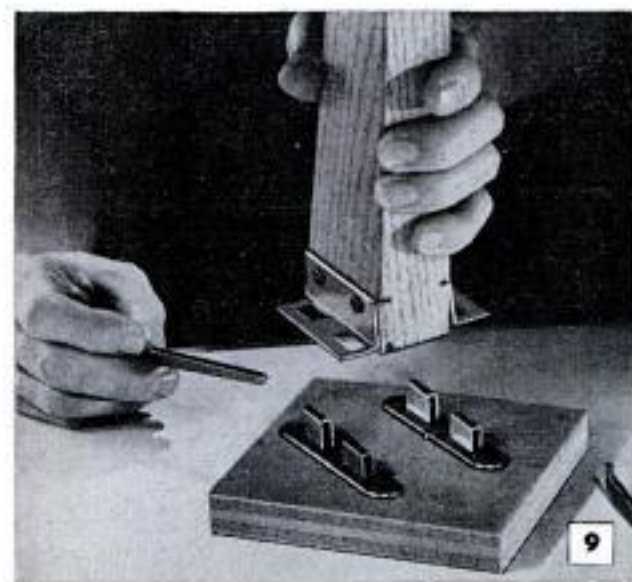
7. JIGSAW ATTACHMENT for portable electric drills has circle-cutting fixture which doubles as rip gauge. Permits making straight cuts up to 10 in. wide and perfect circles up to 20 in. in diameter. Attachment clamps securely to any portable electric drill
Arrow Metal Products Co., 140 W. Broadway, New York City 13

8. EXPANSION SLEEVES permit using nails to fasten objects to masonry. Shields are flanged sleeves, the upper portions being steel, the lower portions lead. Shields are slipped into holes drilled in masonry and nails driven down into lead which expands in hole
Star Expansion Bolt Co., 147 Cedar St., New York City 6

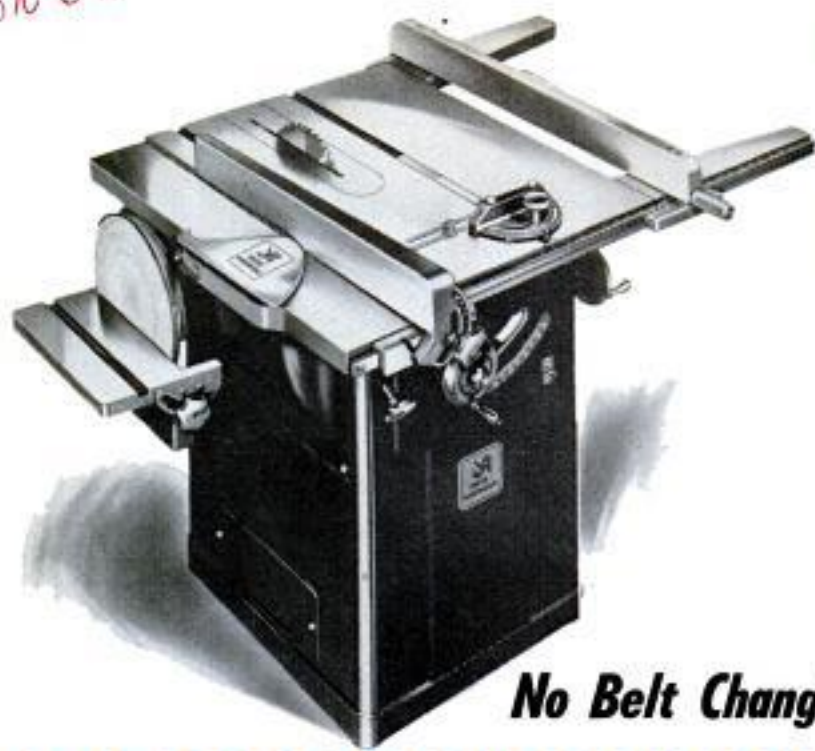


9. INTERLOCKING CONNECTORS use wedges forced into wedge receivers to assure rigid connections in furniture construction. Various types available to join components of different shapes together, and at various angles. Removing wedges permits disassembly
Interlocking Connectors, 4115 W. Belvedere Ave., Baltimore 15, Md.

10. LIGHTWEIGHT PORTABLE ROUTER for home workshop is inexpensive, yet has versatility of more costly machines. Router can be used for grooving, fluting, dovetailing and making mortises and tenons. Adapters permit using router bits with 3/8-in. shank
Mall Tool Co., 7725 South Chicago Ave., Chicago 19



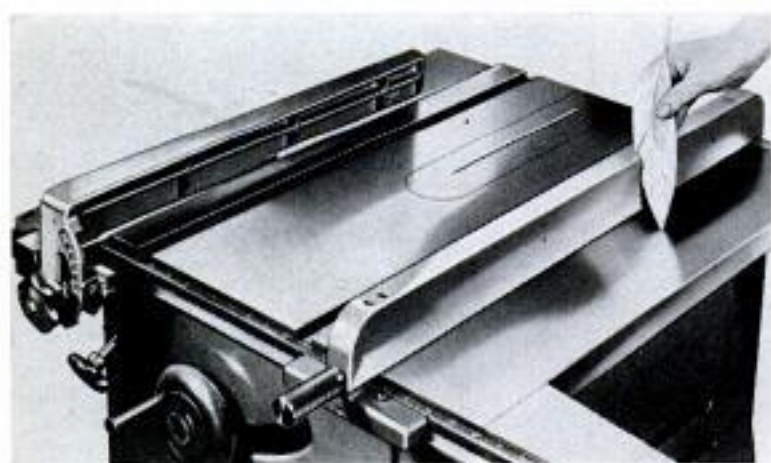
SN 58



Sander is easily removed to expose power take-off for quick attachment of accessories. Powered by friction drive

No Belt Changing Is Feature of New

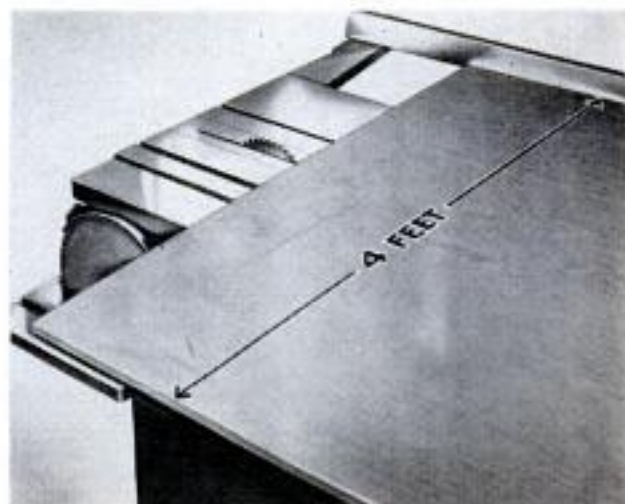
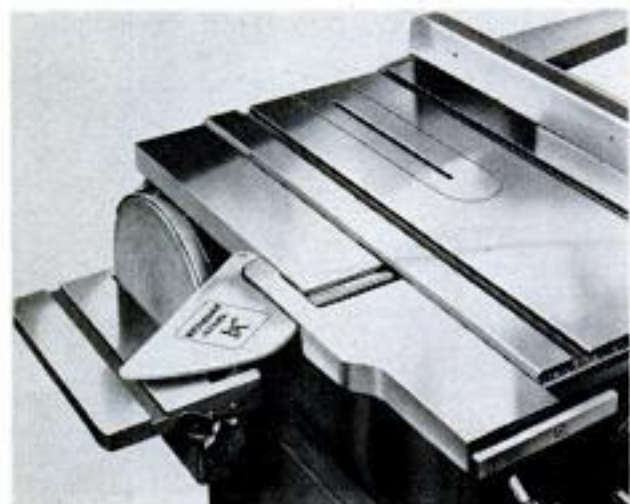
COMBINATION SAW-JOINTER-SANDER



A NEWCOMER to the home-workshop market, this three-in-one machine features a saw, a jointer and a disk sander in one complete unit, and can be changed from one tool to another by merely turning a crank—no need to touch a belt. Work heads retract automatically to promote maximum safety. When saw is "up" and in use, jointer is "down" and out of the way. Cuts to center of 4-ft. panel with table extensions. Features ball-bearing rip fence, guard and power take-off.

Above, patented ball-bearing rip fence can be moved very easily and eliminates need for cumbersome micrometer adjustment. Below, change-over from an 8-in. saw to a 4-in. jointer to a 10-in. sander is done instantly by turn of wheel, no belts to shift

Below, a table surface 100 percent larger than most enables the 8-in. saw of this multipurpose machine to do the work of most 10-in. saws and rip to the center of 4-ft. material. Distance in front of saw blade is 14 in. Jointer retracts when saw is in use



The hot one's even hotter!

'56 Chevrolet



THE BEL AIR SPORT SEDAN — one of two new 4-door hardtops.

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They're here—and even *hotter!* That's the word on the new '56 Chevrolets.

They offer new higher horsepower—ranging up to a top of 205! This is the car, you know, that smashed the Pikes Peak record! That's *proof* of the kind of performance that puts more safety and fun in your driving.

And look at that sassy new Motoramic styling—the lower, longer hood, the bold new front-end and sweeping chrome. See the new flaired fender openings and high-fashion taillights. (The left-side taillight hides the gas cap!)

The fun's at your Chevrolet dealer's. So, why wait? . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



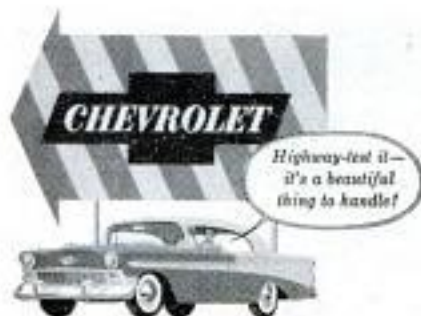
The new "Two-Ten" 2-door Sedan



The new 9-passenger Bel Air Beauville



The new Bel Air Convertible



There's a just-right

Start your shopping on these pages...



Ideal "first" outfit. Brownie Holiday Camera, flashholder, flashguard, batteries, bulbs, and film. Brownie Holiday Flash Outfit complete, **\$9.75**. Camera alone, **\$4.95**

Complete ready-to-use photo-flash gift outfits . . .



Brownie Hawkeye has no "settings" to adjust. Makes 12 snapshots per roll of color or black-and-white film indoors or out. Brownie Hawkeye Flash Outfit complete, **\$14.35**. The camera alone, only **\$7.45**



Brownie Bull's-Eye lens focuses to 4 feet for close-ups, adjusts by dial for snapping "groups" or "scenes." Other deluxe features. Brownie Bull's-Eye Flash Outfit complete, **\$18.60**. The camera alone, only **\$13.50**



Kodak Duaflex—"Preview-Finder" lets you see pictures before you shoot. Kodak Duaflex Flash Outfit complete, only **\$21.75**. Duaflex Kodet Camera alone, **\$14.95** (brown-finish camera slightly higher). A Deluxe Duaflex *f/8* Camera and Flash Outfit are also available.

Deluxe Kodak Gift Kits for Color-Slide Fans . . .



An all-time color-slide favorite, the versatile Kodak Pony 135, Model C, features a fast *f/3.5* lens, 1/300 shutter. Kodak Pony 135 Outfit (camera, flashholder, case) **\$49.65**. The camera alone, **\$33.75**

Kodak Bantam RF takes Kodacolor snaps as well as full-color slides. Fine rangefinder, *f/3.9* lens, 1/300 shutter. Kodak Town-and-Country Outfit (camera, flashholder, case) **\$65.45**. Kodak Bantam RF Camera alone, only **\$49.75**



Kodak's Signet 35 features a matchless Ektar *f/3.5* Lens, coupled rangefinder, 1/300 shutter, precision controls. Kodak Signet 35 Outfit (camera, flashholder, case) **\$91.45**. The camera alone, only **\$75**

Kodak Stereo Camera for 3-D color-slides. Twin *f/3.5* lenses, 1/200 shutter. Kodak Stereo Outfit (camera, Stereo Viewer I) **\$97.25**. Camera alone, **\$84.50**. Stereo Viewer I, **\$12.75**; Viewer II, **\$23.75**



Kodak gift for everyone

finish happily at your Kodak dealer's

(Ask him about small down payments, easy terms)

New Do-It-Yourself Photo-Hobby Outfits



It's easy to develop negatives and print snapshots at home with a Kodak Photo-Hobby Outfit. There are two complete "do-it-yourself" Outfits to choose from—alike except for the snapshot printer they feature and the amount of chemicals and printing



paper they contain. Each comes with an 11 x 14-inch card (above) which explains the simple steps for developing and printing. Kodak Deluxe Photo-Hobby Outfit, \$16.95. Regular Photo-Hobby Outfit, \$9.95. The Kodak Deluxe Photo-Hobby Printer alone, only \$7.95

Home Movies—the finest family gift of them all . . .



Brownie Movie Kit with a 4-Lamp Movie Light (lamps extra) to provide plenty of light for indoor color movies. Brownie Movie Kit with $f/2.7$ lens, \$49.95. Brownie Movie Kit with fast $f/1.9$ lens, \$59.20



Complete movie-making outfit. To make color movies, a Brownie Movie Camera, $f/2.7$ lens. To show them, a Brownie Movie Projector with an $f/1.6$ lens, plus a preview screen. Brownie Movie Outfit complete, \$99.50



Welcome gifts for movie-makers. Brownie 4-Lamp Movie Light, \$8.45. Kodak Converters for 8mm Brownie Movie Cameras, Wide angle, Telephoto, \$18.50 ea. Kodachrome Movie Film, from \$3.75

Kodak Photo "Stocking Gifts" for Everybody

Film—buy it in thrifty Kodak Duo-Paks, one roll for the camera, another for a spare. Popular sizes of black-and-white, from 75¢. Kodacolor, from \$1.70. For color-slide fans—Kodaslide Dial-Lite Viewer, \$12.95; Kodaslide Pocket Viewer, \$1.95. Books for fact hunters—"How To Make Good Pictures," \$1; "How To Make Good Movies," \$2; Kodak Photoguides, \$1.75 ea. Many other gifts to choose from.

Prices are list, include Federal tax where applicable, and are subject to change without notice



Kodak
TRADE-MARK

Eastman Kodak Company, Rochester 4, N.Y.

Care and Feeding of Engines



BY
S. P. CORP

VALVE FAILURES

Valve burning, a common cause of valve failure, is often due to incorrect valve lash—or clearance between stem and rocker arm. If this is below manufacturer's specifications, valve will be held off its seat when engine warms up. If above specifications, valve head will be distorted when valve is hot. Be sure to check valve lash when tuning engine.

Valve sticking can cause burning. If stem shows a hard shiny deposit, the valve is sticking. Valve seats may not be concentric with valve guide, valve guides may be improperly installed, or your cooling system may be faulty, with poor water circulation around valve guide. If you reface valves and seats, check angles against specifications, as well as valve seat run-out (.002").



BURNED FACE

Lean fuel mixture can cause valve failure. Look for an air leak in intake manifold, checking gaskets and replacing if doubtful.



BRIGHT SPOT

BALL JOINT SUSPENSION

If your car has ball joint suspension, and steering becomes erratic, check ball joints for wear. Put upper ball joint in a vise. Put a nut on end of thread and use a torque wrench to check effort required to turn stud in assembly, which should be 25 to 40 inch-pounds. If not up to low limit, replace ball joint.

Put lower ball joint in vise, tie a cord over end of stud, and attach cord to a spring scale, with pull over end of stud. If less than 8 lbs. pull moves stud, install a new ball joint assembly.

THIS NEW MANUAL CAN BE YOURS



A postal card request will bring you this new 36-page manual of car care, profusely illustrated, with helpful hints on 52 subjects. Write for your free copy today, and when you rearing, be sure to use Sealed Power KromeX Ring Sets—the quick-seating long-wearing, oil-saving rings which fight heat, friction, abrasion and corrosion!

Your dealer has them or can get them for you! Sealed Power, Dept. G-12, Muskegon, Mich.

Sealed Power

PISTON RINGS

Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.



Refinishing Old Floor

Q—I have recently purchased an old country home in which the floors apparently never have been finished with shellac or varnish. Although there isn't much evidence of it now, I would guess that at some time they were oiled. All floors appear to be hardwood. What is the best procedure in refinishing?

—E. O., Conn.

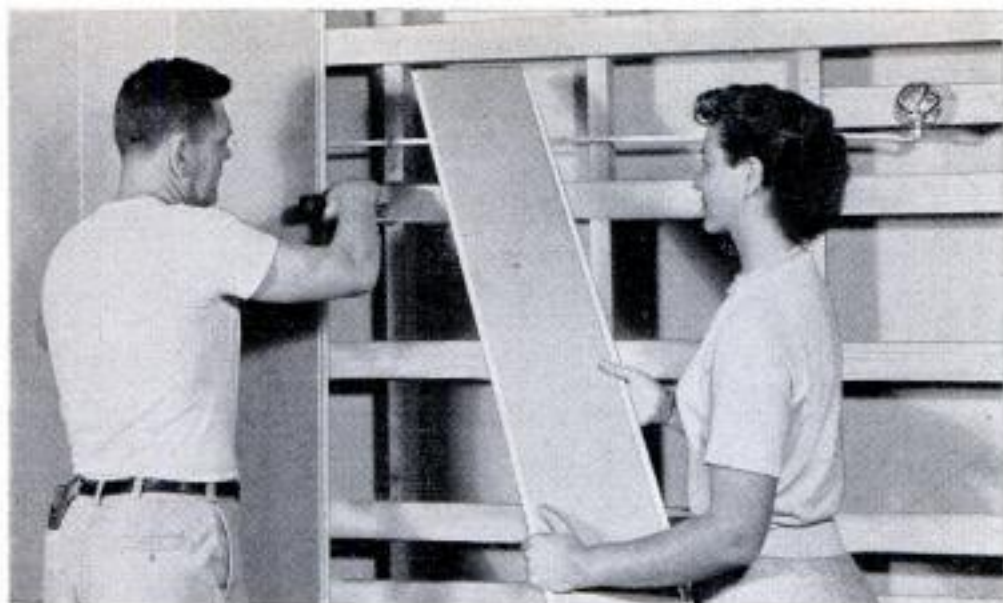
A—If, as you say, the floors appear to have been oiled at some time, then it will be necessary to proceed with caution. If a pure linseed oil originally was used, then it probably is safe to assume that the oil is so thoroughly oxidized that it will cause no trouble with the new finish drying. However, there is always the danger that cooking fats have been spilled on the floor at some time (especially in the kitchen) and that the oil used to finish the floor originally was not of the best quality. Also there is the possibility that the floors may have been waxed over a period of time. The first step is to rent a sanding machine and sand the floors to remove embedded grime and possible discolorations and expose the bare wood. Then apply an oxalic-acid bleach, or a ready-to-use bleach, to a small area in some inconspicuous place. When the floor boards are thoroughly dry after using the bleach, apply a sealer made especially for use on hardwood floors. Allow the normal drying time and check the results. If the sealer dries properly in the allotted time, then it probably is safe to proceed with the refinishing over the whole area involved. Generally it's necessary to bleach an old floor all over in order to obtain a uniform color. Spot-bleaching is seldom satisfactory. After bleaching it also is a good idea to go over the surface lightly with fine sandpaper to cut off any wood fibers raised by the bleach. Then apply the sealer and finish with one or two coats of floor varnish. Or use one of the new floor finishes in which sealer and finishing material are combined. Old floors of maple or beech usually do not require a filler as the wood is close-grained.



Efflorescence

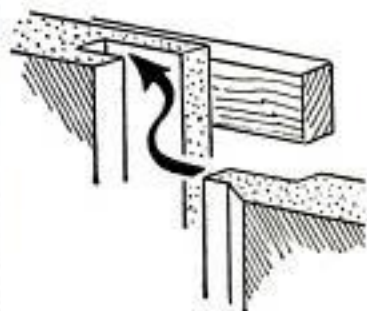
Q—Within the past four months or so, a white powdery substance has appeared on the outside surfaces of the brick walls of my one-year-old house. What is this coating, and how do I prevent it from spreading? —C. T., W. Va.

(Continued to page 230)



Easy-to-handle Temlok Plank goes up fast by stapling or nailing. Once pre-finished Temlok is installed the job is done—no painting or further finishing is necessary.

Lok-Bevel joint hides staples or nail heads, speeds installation, and provides neat, even joint lines.



How to Build a Basement Game Room with Temlok Tile and Plank

You can do the job yourself, easily and economically, by installing Armstrong Temlok® Tile on the ceiling and Armstrong Temlok Plank on the walls. These attractive interior finishes rapidly turn an unused basement into extra living space because they build, decorate, and insulate in one application.

Start by framing the foundation walls with 2" x 4" studs on 24" centers. Then apply 1" x 3" furring strips, one foot apart.

Next, nail or staple Temlok to the furring

strips. The exclusive Lok-Bevel® joint on both Temlok Tile and Plank has an extra wide nailing flange for quick, easy installation. For sturdy lower walls, use Armstrong Temwood® backed up with Temlok Wall-board.

Armstrong Temlok interior finishes are handsomely pre-finished. Temlok Tile is available in Snow White or Light Ivory; sizes, 12" x 12", 12" x 24", 16" x 16", 16" x 32". Temlok Plank comes in a random Suntan Blend; sizes, 8", 12", and 16" wide—8' long.

For complete details, see your local lumber dealer. He'll be glad to give you help with your remodeling plans.



Basement game room is attractively finished with Temlok Tile and Plank. They offer a fast and economical way to turn wasted cellar space into comfortable living areas.

Send for free booklet, "New Ways to Remodel Your Home." Just write Armstrong Cork Company, 3512 Watch Avenue, Lancaster, Pennsylvania.



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TEMLOK

Cushiontone® • M-67® Monowall® • Insulating Wool
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Christmas
decorations
you make
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Ask for Plans Nos.
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MAKING SHINING ALUMINUM DECORATIONS is great family fun. Amazingly easy to cut with ordinary household scissors. Use them outside or in—they can't rust or lose their luster. There's special fun for grown-ups in making strong, rustproof toys as wonderful Christmas morning surprises.

Your hardware or building supply dealer has Reynolds Do-It-Yourself Aluminum plus plans for these handsome Christmas projects.

Don't forget a good supply of Reynolds Do-It-Yourself Aluminum with power tool gifts



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See "Frontier" Sundays on NBC-TV

REYNOLDS
DO-IT-YOURSELF
ALUMINUM

Reynolds Metals Co., Louisville 1, Ky.

Also available in Canada

(Continued from page 228)

A—According to your description the coating on the brick walls is what is called efflorescence and it is caused by soluble salts in the brick which are activated in the presence of moisture. The powdery coating appears as the water evaporates at the surface. It is an indication that moisture is present within the wall and is generally regarded as evidence of faulty workmanship which should be corrected, as it can cause serious deterioration of masonry over a period of time. Usually, patches of the coating on a masonry wall indicate leaks at the mortar joints which admit driven rainwater to some point inside the wall. It should be kept in mind that water that enters the wall in this manner may not leave it at the same spot by evaporation. Because of this, efflorescence on the surface at a given spot does not always mean that water is entering the wall at that point through a faulty mortar joint or possibly a defective flashing. There are other causes, of course, but these are less common. Also, efflorescence sometimes appears on masonry walls which are properly constructed according to good practice. Usually it will disappear if the walls are thoroughly scrubbed with water and a stiff-bristle brush. If the first washing does not remove it entirely, add muriatic (hydrochloric) acid to the water in the proportion of 1 part acid to 10 parts water. Wear rubber gloves and protect the face from spatters when applying the acid solution. If the wall is dry, dampen with a sponge, then brush on the solution. After a minute or so, rinse off with plain water. When working near window or doorframes, protect painted surfaces. Destroy any unused portion of the acid solution.

Damp Wall Spots

Q—Some months ago we moved into our new home, planning to decorate the interior later. When we moved in there were damp spots on one living-room wall, which later seemed to dry out. Now the same areas are again damp. I've searched for roof leaks, but found none. Walls are plaster over plaster base. What could cause this?—S.E., Ill.



A—It is rather difficult to say with certainty at long range, but one of two possibilities is perhaps the most likely. Cold-water pipes running from the basement to the second floor through the walls may possibly touch the plaster base. Under certain conditions moisture may condense on the pipe and run down to the point where the pipe touches the inner surface of the plaster base. A slow, drop-by-drop leak at one of the pipe joints could also be a cause. However, moisture would normally condense on the pipe only under certain conditions. With temperatures equalized, condensation would stop and the wall would dry out in a comparatively short time. Another possibility, perhaps more logical, is what masons sometimes refer to as "hot plaster" or "soft plaster," the terms generally inferring application of a faulty mixture which does not set to the same degree of hardness, resulting in spots, which absorb moisture from the air when humidity in the rooms is especially high. If you can eliminate the possibility of a water pipe as a cause of the trouble, then faulty plaster spots are perhaps the possible cause. If this is so, then the surest remedy is to remove the faulty plaster and replace it. The new patches should be allowed to dry thoroughly before decorating with paper or paint.

Concrete Expansion Joints

Q—I notice that on extremely cold days the expansion joints in my concrete sidewalk open up so far that the felt expansion strips are loose. Should I attempt to calk these joints?—H. H., Chicago.

A—We do not suggest that you calk the joints. In the case of concrete-expansion joints, the calking would simply be forced out when warm weather expanded the concrete. Using any type of calking compound outdoors in winter is difficult because the calking tends to become unworkable when cold.

**—great engineering triumph
and important extra protection
for engine parts!**

more than **90**
**SLUDGE-TRAPPING
POCKETS**

**AC OIL FILTERS top all makes
as New Car Equipment**

The unusual "inside story" of AC Oil Filter construction pictured at the left is one reason why *AC OIL FILTERS* today are standard or optional factory equipment on more new cars than any other brand.

**New paper engineering pioneered by AC
makes density-type filter obsolete!**

Oil filters came into their own when engineers found a way to filter oil through paper. How AC treats its own custom-engineered paper is a carefully guarded trade secret. But, this specially processed paper filters out damaging dust, dirt, grit or specks of metal as small as 1/100,000th of an inch . . . traps as much as 1¼ pounds of harmful material in 5,000 miles of driving. *Will not remove detergents from heavy-duty oils!*

**Exclusive AC "accordion fold" increases filter area—
prolongs filter life!**

Ten times the filtering area! More than 90 sludge-trapping pockets! Those are two of the benefits of AC's "accordion fold." This exclusive AC feature provides better filtering action through the full 5,000 miles of driving between filter changes.

**... another AC
feature story that can't
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AC SPARK PLUG DIVISION
GENERAL MOTORS CORPORATION
FLINT, MICHIGAN



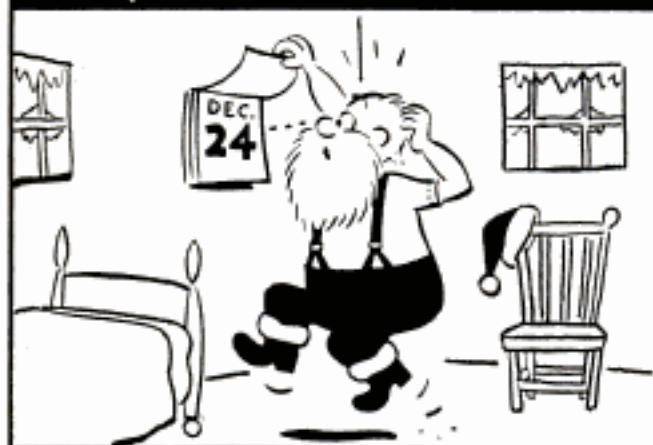
AC ENGINEERING WITH GM RESOURCES CAN ALWAYS BE LOOKED TO FOR LEADERSHIP

DECEMBER 1955

231

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Looking for Something?



**FROM TRAVEL TO TOYS
WHATEVER YOU NEED**

Find It Fast
In The
'Yellow Pages'



Fighting the Battle of Yorktown Again

(Continued from page 155)

anchor cable and an endless rope was devised. The one-half-inch manila rope, to which the frigate is attached, is operated by a converted elevator winch mounted on shore and driven by a three-horsepower, three-phase reversible electric motor. This arrangement, plus the activities of the divers, has largely eliminated the stumps as a source of trouble. So the ship's crew has been reduced to two, one man on shore to operate the winch, and one in the boat to fire the guns.

The frigate's artillery was built by the theater's technicians. The guns are eight-inch lengths of iron pipe mounted on boards extending along the decks of the ship and fired through ports in the side of the boat facing the audience, two guns to each port. Various firing methods have been tried, including the use of priming caps and coils of resistance wire electrically heated. The cannon now have their breeches closed by a cap in the center of which a small hole has been drilled. A spoonful of a mixture of black powder and flash powder is placed in the breech-end of each gun. At the proper time, the boat's gunner sets off each charge by directing the flame of a small gas torch into the hole in the cap. This produces a large, impressive flash and considerable white smoke. Backfire is said to be negligible. When the cannon are going, the ship seems to be spouting fire all over. One night there actually was too much reality: The boat caught fire and the cannon did a machine-gun act. The bombardment was more spectacular than usual, but did not last as long.

The firing mechanism used on the prop stage cannon which provides the land-based artillery action was devised from available odds and ends. The theater staff acquired a supply of surplus Very signal pistol flares, and these proved effective as igniters for a quantity of powder placed in a length of three-inch pipe installed in each cannon barrel. At the breech is a plunger that fires the Very cartridge.

The Common Glory runs each year from about the first of July to Labor Day. The more than 50 performances per season play to a nightly audience averaging 1600 persons. The theater area is sprayed and fogged to eliminate insect pests. The cast of the show, composed of paid performers, is recruited through auditions held throughout Virginia and in New York. To clothe this cast, an extensive wardrobe of elaborate costumes is maintained. ★ ★ ★



COMPLETELY FURNISHED
Mobile Homes

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Decorator styled! Famous-name Appliances!



HERE'S THE ideal home for industrial or construction workers. It offers the beauty and comfort of the finest decor and facilities in every room. Yet you can *move it* and your family—wherever your work takes you.

Living rooms offer large picture windows, draw drapes, comfortable upholstered furniture, automatic heat. Dream kitchens come equipped with electric

refrigerator, gas range, twin sinks and cozy dinette. Tiled baths provide *tub and shower!*

Look for the MHMA Seal—be sure you buy a mobile home made by a member of the Mobile Homes Manufacturers Association. These are the manufacturers you can count on for the most efficient designs, advanced styling, good service and dependable construction.

Watch Dave Garroway and Steve Allen show MHMA mobile homes on "TODAY" and "TONIGHT"



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Free book on newest models!

Pictures and full specifications. Write Dept. PM-125, Mobile Homes Manufacturers Assn., 20 N. Wacker Drive, Chicago 6, Illinois.

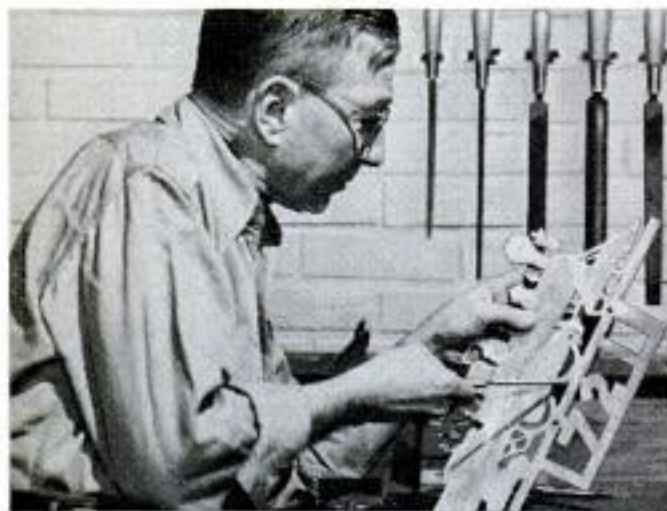


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HOW TO GET THE MOST OUT OF FILES



You do better work and your files last longer when you follow these few simple rules

1. CHOOSE THE RIGHT FILE FOR THE JOB.

Nicholson triangular Slim Taper, and Mill, Flat, Half Round, Round and Square Bastard files fill basic workshop needs. For coarser or finer filing, or work on special materials, there are Nicholson files especially for the job.

2. USE FILES CORRECTLY. Each kind of filing—straight, draw or lathe—has its own file grip and motion. Holding the file at exactly the desired angle is important. Work height is important, too: elbow height normally, lower for heavy filing, near eye level for precise work.

3. TAKE CARE OF FILES. Protect precisely-formed teeth by standing your Nicholson files in a rack or hanging them by their handles. *Never* throw them in with other tools or stack them. Clean often with a Nicholson File Card or Brush. A soft iron "scorer" helps remove stubborn pinnings. Chalk removes oils or grease.

At good hardware stores everywhere

Experienced craftsmen choose Nicholson files for uniform high quality and long work life.

Write for free 50-page file "textbook," "File Philosophy" tells you more about how to choose, use and care for files.

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(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON FILES

FOR EVERY PURPOSE

He Made a Business Of Camping Out

(Continued from page 152)

McOmber. His groups are small enough to permit personal attention to the questions, interests and education of each child. Instead of the single location a summer camp provides, McOmber's territory is the entire West.

A science teacher in the Claremont, Calif., schools, McOmber has found his background especially helpful in his business. But he believes many nonteachers with a genuine interest in youngsters could duplicate his programs. Although a year or more of part-time work is necessary to start such an endeavor, it could be made a full-time business, he believes.

His biggest investment was the station wagon. He soon found that its tires were not sturdy enough for the job, and replaced them with 15-inch truck tires and wheels at a cost of \$200.

Other equipment includes a utility trailer, an icebox, gasoline stove and lantern, tent, vacuum bottles, packsacks and pack boards, geology hammers and the like.

McOmber recently removed the rear seats of his station wagon and substituted long benches extending along each wall from the front seat to the rear door. These are padded with foam rubber for maximum riding comfort, and have increased the vehicle's capacity from 11 to 13 youngsters.

"I've found that it's important to remember that I'm working for these youngsters," McOmber says. "If they want to inspect a wrecked car or climb an uninteresting hill I never say no unless safety demands it. Many of the kids earn their own money for these trips and I like to see them have the time of their lives."

This liberal point of view backfired only once, during a 1954 trip to Yosemite National Park. The boys asked permission to fish in a nearby stream while lunch was being prepared. Soon some of the youngsters came running back carrying a dozen trout so big that McOmber knew they must have come from the breeding stock at the Yosemite fish hatchery. But by the time the boys could lead McOmber back to the scene, the fish were dead.

The ranger in charge prescribed that the boys should work around the hatchery the rest of the afternoon in payment for their mistake. When they had finished, he surprised the boys by giving them the fish for dinner, so the meat wouldn't be wasted.

"That experience taught those youngsters to think before they act," McOmber says with a grin. "And those trout were the most delicious fish I've ever tasted." ★ ★ ★

don't be "sold" . . . get the facts

Make up your own mind

about the scroll saw that's best for you!



here are the facts about the

Rockwell-built **DELTA 24" Scroll Saw**

Professional woodworkers regard this saw as the finest—at any price! It's a precision machine that makes smooth, accurate cuts, yet has proved tough through years of punishing industrial operation. This precision, this ruggedness—plus the built-in safety and ease of operation—make it ideal for your workshop. Compare these quality features:

- Only scroll saw with variable-speed drive—the right speed to cut all materials.
- Built-in blade guard protects fingers.
- Cuts stock 2" thick, rips to center of 48" panel—converts to saber saw of unlimited capacity.
- Table tilts 45° front and right, 15° left.

- Universal lower chuck holds all types of blades, sanding, filing accessories.

Get All the Facts—then Compare

You must see this saw demonstrated—try it yourself—compare it with any scroll (or jig) saw made! Then MAKE UP YOUR OWN MIND! Your Delta Dealer is listed under "TOOLS" in the classified pages of your phone book. Or send the coupon for catalog.



DELTA

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DELTA QUALITY COSTS NO MORE

Delta Power Tool Division, Rockwell Manufacturing Co.
502M N. Lexington Avenue, Pittsburgh 8, Pa.

- Please send Delta AB Catalog showing 24" scroll saw.
- Name of my nearest Delta Dealer.
- Delta Homecraft Catalog.

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City _____ County _____ State _____

Across Four Continents On Two Cylinders

(Continued from page 120)

showers drowned us one moment, and white-hot sun baked us dry the next as we chugged through endless banana groves and oil fields.

At Lima, we welded broken parts, rebuilt our car and enjoyed the sights. By the time we finished, the Citroen was in such good shape we decided to alter course, head inland to the Bolivian Andes, and try for an altitude record. The grueling ascent through Nazca, Cuzo and Puno to the 14,000-foot heights of La Paz and Lake Titicaca, was only a beginning. Here, llamas grazed and people moved slowly in the rarefied air. Strength left our legs, temples throbbed, and breath came in quick gasps with the least exertion. Even the Citroen throbbed. At La Paz we removed the car's side panels and doors, stripped her to nothing but engine and frame and chugged up the barren, roadless slopes of a 17,777-foot peak—an all-time high for Citroen.

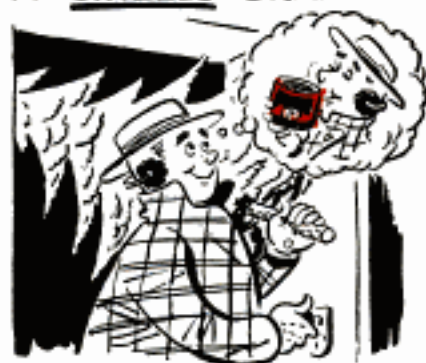
From there, it was all downhill. For ten days we clattered around hairpin curves and down hair-raising mountain trails to the Chilean coast. At Iquique, we stocked supplies of food and water for the 1750 miles of desert between us and Santiago.

Stopping only to eat, we drove day and night across the wind-whipped sands in an immensity of space. By now, our tires that had been new in Colombia, were going flat at a rate of four times a day. After recuperating at Santiago for two weeks, we pressed southward to Puerto Montt, where roads and beaches gave way to precipitous mountain slopes plunging vertically into the sea.

Henri, myself and the Citroen went aboard one Captain Francisco's little 100-ton schooner plying among the islands. We were put ashore several hundred miles down the coast at Puerto Aysen, a fishing town of white houses, board sidewalks and sailors, reminiscent of a hundred Scandinavian ports. From here, the rock-bound coasts rose to the barren steppes of Patagonia. We'd heard about the terrible winds, sweeping up from the South Polar seas, that constantly batter this roadless land of rocky desolation. But we had no idea, as we set out toward our goal of Tierra del Fuego, how badly it would buffet us. Gales of 60 to 90 miles per hour lashed us in fury the entire distance. Our hands and faces stung from pebbles—up to the size of marbles—whipped into the air and driven before the blast. We drove largely by compass, since the lashing wind erased all but the faintest trace of trails. Except for an

(Continued to page 238)

IT SMELLS GRAND



HERE'S THE SEASON'S FRAGRANCE HIT!

IT PACKS RIGHT



THERE'S LOTS OF FUN IN LOADING IT!

IT SMOKES SWEET

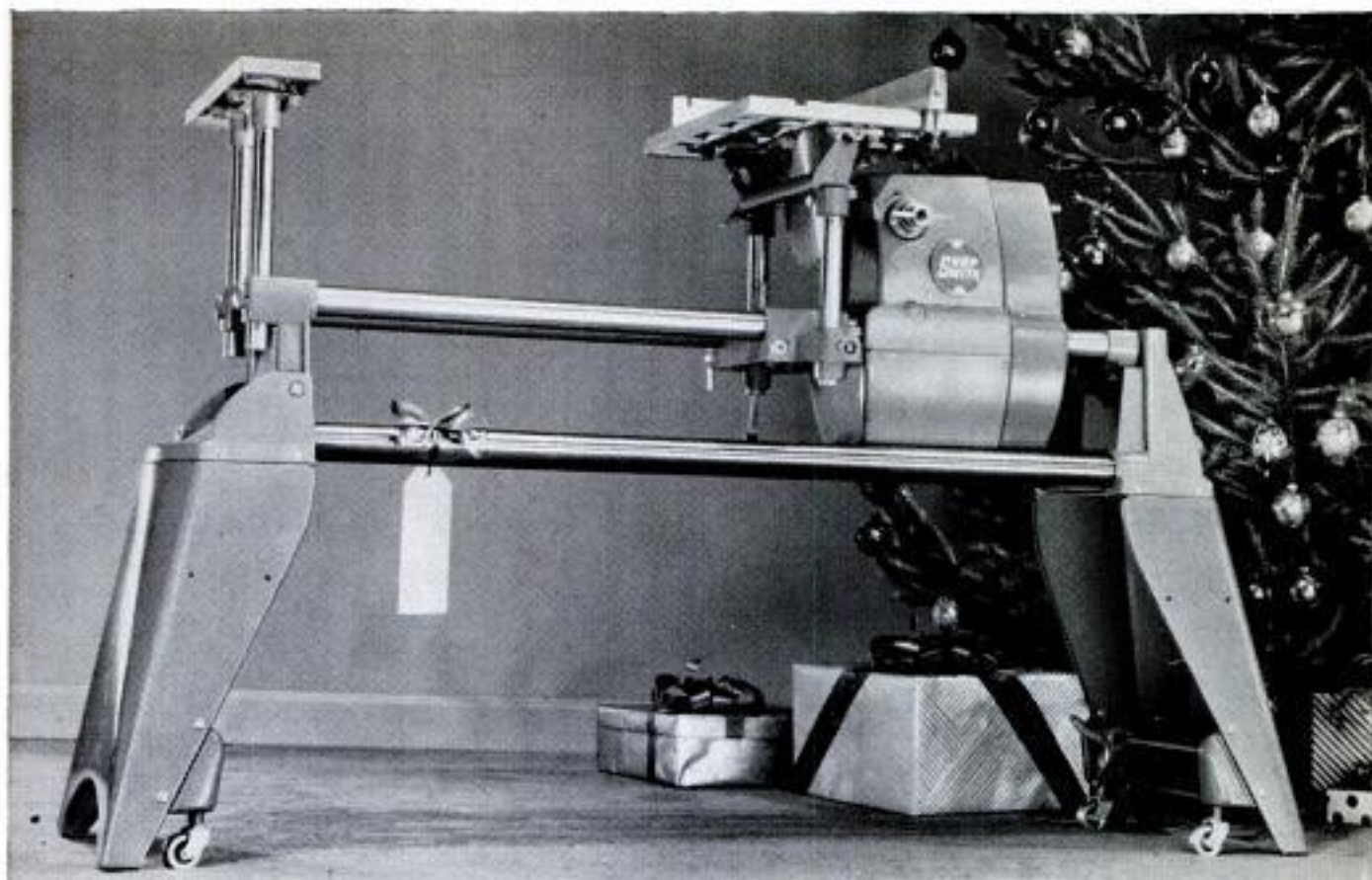


AND MAN—WHAT PLEASURE
WHEN IT'S LIT!

IT CAN'T BITE!



SIR WALTER RALEIGH'S BLEND OF CHOICE KENTUCKY BURLEYS IS EXTRA-AGED TO GUARD AGAINST TONGUE BITE. XMAS WRAPPED... IT MAKES A PERFECT GIFT.



The Merry Christmas present that gets you off to a Happy New Year—

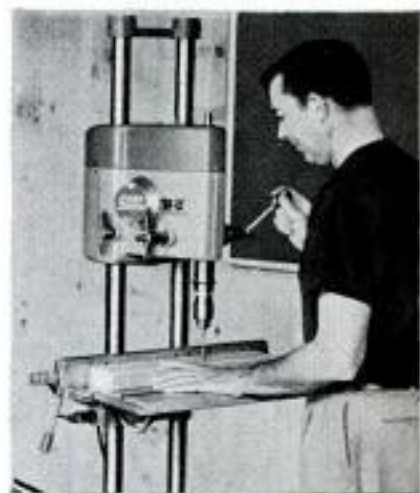
SHOPSMITH

This present has a future! SHOPSMITH® will give years of fun and work-saving service in your home.

In one magnificent machine you get a saw, disc sander, vertical and horizontal drill, lathe. Motor is $\frac{3}{4}$ hp. and built in. Speed-Dial lets you choose any speed from 700 to 5200 rpm. SHOPSMITH'S twin-tube,

fast-coupling Power-Mount lets you add jointer, jigsaw, and sprayer.

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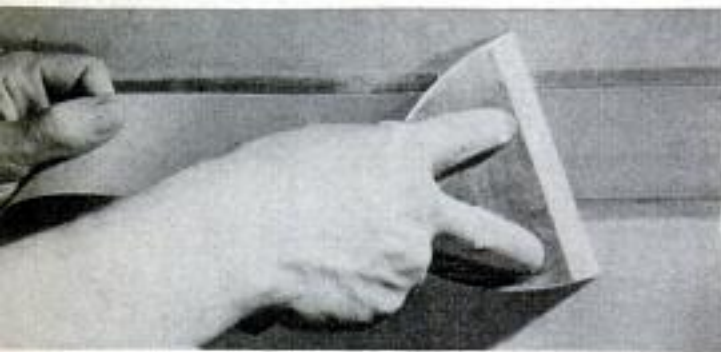
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UNITED STATES GYPSUM

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occasional refugee rancher, the only signs of life were a few ostriches, guanacos and scuttling rabbits. Life was a succession of flat tires.

By Christmas, we had made the rugged 1000 miles to Punta Arenas on the Strait of Magellan. We were bedraggled and hungry. Here, where sunlight lasted 20 hours a day, we used the meager facilities of the isolated village to repair the Citroen and ready ourselves for the dash to the southernmost civilized town on the western continents—Ushuaia, on the southern coast of Tierra del Fuego. We were warned we'd never make it. There was no road. Steep rocky cliffs plunged to beaches completely inundated at high tide, and a mountain range blocked the last 10 miles. But it was worth a try.

Chilean marines agreed to sail us across the strait in a landing barge. So, at three o'clock one morning, to more head-shaking and dire predictions, we sailed south. Six hours later, our marine friends wished us well and left us on the beach at Marantiales. Following advice, we banged and bumped along the shore of a small river named Rio Grande and found shelter that night in an isolated ranch owned by a refugee Belgian who informed us there was no road at all from here. We would have to take the beach at low tide. Leaving at 8 a.m. would give us four hours to go 30 miles—plenty of time if the tires held up. If not? We might have to climb the cliffs and walk home.

Luck was with us. The tires held and by noon we were back on a so-called road, off the beach. But after 50 miles the road dwindled away to nothing but limitless waste—a land of birds, millions of them, so fearless they had to be shooed from the path with sticks. Then, a rushing river blocked the way and, halfway across, the car stuck. Baggage floated down the current as we struggled for four hours, dismantling the car panels and doors so we could pull it out. More hours were lost starting it again. Rain and snow began to pelt us, and the trail became a mire that soon froze. A dozen times we pried the car out of holes and ditches into which it skidded. Chains were little help. Our feet and hands were blue with cold, but still we inched ahead through country no car had ever traveled. In three hours we made two miles on a donkey trail leading up through the last mountain range. Suddenly, we found ourselves wedged between the cliff wall and a 500-foot precipice. We could go no further. The ledge ahead was narrower than the car. In that precarious place we had to turn the car around and find refuge

(Continued to page 240)



Finest drill of its type. Drills 1" holes in wood, 3/4" in metal—and sands, polishes, removes paint. **No. 1814 Drill with Jacobs Geared Key Chuck . . . \$25.70**

New self-powered Orbital Sander will sand in any direction without tracking, scoring or burning. **No. 580 Orbital Sander, regular \$44.95 value. Special for Christmas . . . \$39.95**

Fastest-cutting jig saw made

Actually 6 saws in one. Cuts wood, plastic, metal; cuts own starting hole in wood. **No. 480 Jig Saw with 4 assorted blades, regular \$44.95 value, Special for Christmas . . . \$39.95**

There's something Wonderful here FOR EVERY MAN ON YOUR LIST!

START A COMPLETE POWER WORKSHOP WITH THIS 4.0 amp. 1/2 h.p. 888 POWER UNIT

The Gift that keeps growing! This husky Power Unit comes completely equipped as a 3/8" drill, 6" sander and polisher. The inexpensive but beautifully engineered attachments listed below can be added any time to make a complete Power Workshop.

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Add these for a fraction of the cost of individually powered tools

"Dyno-Mite" Power Workshop
You — or the lucky recipient — can convert the sensational **888 Power Unit** to a whole workshop of power tools by adding these specially designed inexpensive attachments —

Including a 6" Portable Circular Saw, an Orbital Sander, a Portable or Bench Jig Saw, a Bench Sander, Bench Grinder, 6 1/4" Circular Bench Saw, and a Drill Press. Ask your dealer to show them to you.



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Your dealer now has a special group of Miller's Falls Tools in Xmas packages. And ask him for the special Miller's Falls Xmas folders. Or write us direct.

For power and performance



MILLERS FALLS CO., Dept. PM-11, Greenfield, Mass.

FINEST POWER TOOLS MADE

before nightfall at 11 p.m.—three hours off. It was too dangerous to back down. Lifting, heaving and coaxing, we almost made it—then a back wheel slipped over the edge and hung, spinning, in space. Digging one foot in a crevice of the cliff wall, and using a stout sapling for a lever, Henri pried mightily against the dangling wheel while I heaved and tugged at the car. A slight gust now would have sent the teetering vehicle plunging over the edge. Inch by inch it came around. At last, numb and weary, we climbed aboard and banged down the trail to a settler's hut we had passed on the way up.

The slow return back across the strait in the landing barge, up across wind-swept Patagonia, then off to the east coast for Buenos Aires, Sao Paulo and Rio, was anticlimactic. Our second set of tires peeled off in ribbons on the desolate steppes, and we drove 2000 miles into Buenos Aires on the rims, clanking along over rocks like a rolling garbage can full of loose rivets.

The banquets, parties and hospitality of the people who welcomed us in the glamour cities of Argentina and Brazil quickly erased the grim memories of our ordeal. And, with the Citroen once more welded back in one piece, equipped with a new set of wheels and washed, things looked brighter. So bright that in Rio we made

the foolhardy decision to sail for Dakar, instead of France as originally planned, and travel back across the Sahara Desert to set another record. We would coast home via the Senegal, Sudan, Bamako on the Niger River, around the mountains to Oran, down to Casablanca, up to Rabat and Tangiers. Then, across Gibraltar, up through Spain—and Paris!

The wonder is we ever made it. We had overestimated the ability of our stout little vehicle—and ourselves. Had the car been new, we might have had no trouble—but with 25,000 miles of hideous punishment under its hood, we were asking too much. The Sahara is a cruel desert.

A few hundred miles out of Dakar, on the burning sands, our troubles began. The new tires overheated and exploded continually. The battery went dead, and we stuck pitifully time and time again in the endless horizons of loose, drifted sand. Our meager stock of drinking water was quickly consumed, as we worked, perspiring in the 120-degree heat to push the car out of sand traps. Two hundred miles from anywhere, our water was gone. For two days we went without any as we struggled to move the car a few miserable miles over the wastes. Not a living soul did we pass. Our lips blistered and tongues began to

(Continued to page 242)



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Every power and performance record in the book smashed by new '56 Dodge at Bonneville Salt Flats!



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Day and night, for 14 gruelling non-stop days, this new 1956 Dodge Custom Royal 4-Door Sedan shattered all American stock car records in the unlimited closed car division for every distance up to 31,224 miles. A. C. Pillsbury, AAA official in charge, wired, "This amazing performance demon-

strates the great power and rugged endurance of your fine new product." No specially equipped or "souped-up" car, this new champion was *selected at random* from the Dodge production line by AAA officials. It's the *same* car you yourself can buy today, powered by our new 230 horsepower V-8 engine.

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- All-time AAA record of 92.86 mph for 14 days.
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swell. That night as we lay down to sleep in the cool side of a dune, neither of us spoke. We knew another day would spell the end.

Morning brought no cheer until, suddenly, Henri gave a hoarse croak and pointed toward the horizon. There, creeping across the dunes against the sky was a camel caravan, headed our way! They were Taureg traders. No sight in the world could have been more beautiful. The brackish water from their sour goatskin sacks tasted like a cool, crystal mountain spring to our parched mouths. These Samaritans of the desert fed us, rested us and then, with one young camel hitched to the front of the Citroen, we were towed ingloriously for 20 miles to an oasis. Making emergency repairs, we managed to limp into Bamako where the car was serviced and refitted with new tires. The remainder of the journey to Oran was a nightmare of digging ourselves out of sand pits, minor breakdowns, and waiting in the scorching sun for trucks to come and tow us out of trouble. Then came Oran and the nightmares were gone. Once again we drove on flat, hardtop roads, purring along as though nothing in the world had ever stopped us.

And so we proceeded back to Paris at a tourist's amble, to the Plaza in front of Notre Dame. Under our belts was a great adventure and an assortment of outstanding records. Would we do it again? I can't speak for Henri, but I know that, for myself, I am going to be content to settle down to the pursuit of my new profession—photography. Whether or not it will take me to the corners of the world again, who knows? ★ ★ ★

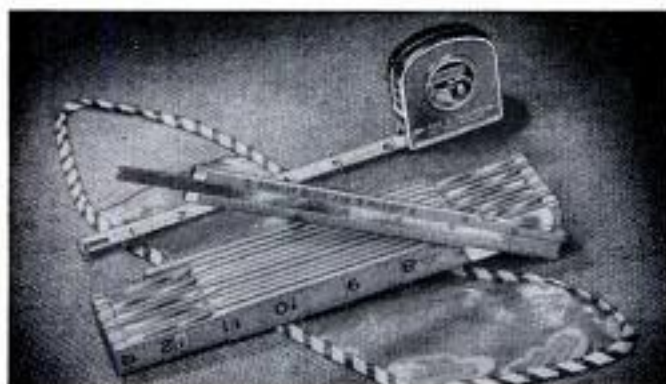
**Birth of New Stars
Seen by Scientists**

Two photographs taken by Dr. George H. Herbig, astronomer at the University of California's Lick Observatory, show what scientists believe may be the birth of new stars. In the first photo, taken in 1947, there are three stars embedded in a dark cloud of dust and gas. In the second picture, taken in 1954, five stars appear, implying that the two new stars may have been born by condensation of material from the cloud. If true, the actual birth of the stars would have taken place 1600 years ago, since that is the time required for light from the Orion Nebula where the baby stars were discovered to reach earth.

☐ About 2000 languages are spoken in the world, and nearly half of this number are native to North and South America.



A STANLEY CHRISTMAS means A Happy New Year



GIVE ACCURACY. It pays to be precise and say Stanley — it's a *good* rule. Here's why: a 6 ft. folding wood rule with extension slide, No. X227 — \$2.49; and an 8 ft. Pull-Push steel tape rule in free magnifying lens box, No. 1208W — \$1.19.



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GIVE POWER FOR DRILLING AND DRIVING. Here's a work-saving combination. The 1/4" electric drill is still the most popular power tool. Stanley H41 Electric Drill — \$27.95. And the power screw driver with snap-in bits, Stanley H180 Screw Driver Attachment — \$6.95.



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THE HALLMARK OF QUALITY
UTICA DROP FORGE & TOOL CORP.
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The Things They Do to Your Dinner!

(Continued from page 162)

right through food containers to get at the unwanted bacteria.

So there's a mighty good chance that by 1965 you'll be buying irradiated food of one sort or another. The processes are being thoroughly tested in the laboratory.

A few food technologists, however, are putting their money on another no-cooking packaging process, but this one is something of a dark horse.

"If it's bacteria we want to get rid of," reason these scientists, "what's one of the most common modern ways to do it?"

A Hypo for Your Food?

The answer is antibiotics. If they kill bacteria in people, why not in food?

The search for a cheap antibiotic to turn the trick began several years ago. The Agriculture Department's Western Regional Research Laboratory at Albany, Calif., was one of many researchers. But though the searchers have come close, they haven't quite found the right antibiotic. For the most part, the good ones are too expensive.

But many food technologists concede it is only a matter of time before foods are preserved by being given an antibiotic "shot." For a while they thought they had the answer in a drug called subtilin, but this only arrested the growth of the bacteria.

Skeptics about the new food processes are inclined to say that these ideas may be clever, but they will never replace fresh foods. This is true, up to a point.

Fresh Vegetables Are Vanishing

But most vegetables consumed in the United States today are processed. And another item to consider is the fact that food production in this country is becoming centralized in special areas hundreds and even thousands of miles from the population centers where the food is consumed. Eight states, and primarily California, now produce from 52 to 86 percent of all our frozen lima beans, peas, corn and carrots. The shipping of this produce is expensive. The new methods all offer ways to cut packing, shipping and storage costs.

Still another factor is that the average American is becoming impatient of seasons. He demands top quality and he doesn't want to pay high prices for out-of-season food. The new processes may solve these problems.

So Great Aunt Martha may scoff, but it's a good bet that before long her granddaughter will be serving dehydrofrozen peas and irradiated spinach. ★ ★ ★

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MODEL 2500
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along with new 24-page picture-packed booklet, "Friendly Home Ideas in Western Pine." Write to Western Pine Association, Dept. 416-N, Yeon Bldg., Portland 4, Ore.

Transform idle attics and extra basement space into bright, cheerful living areas—with handsome, economical Western Pines®!

The pictured top-story hideaway is a den, study, playroom and extra guestroom. Its handsome, durable Western Pine-paneled walls and

ceilings require a minimum of care, take to modern or traditional furnishings.

It costs little to build or remodel with these easy-to-work woods. They're carefully selected and seasoned, take all finishes without grain-raising. Ask your lumber dealer for an estimate.

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TODAY'S WESTERN PINE TREE FARMING GUARANTEES LUMBER TOMORROW

DECEMBER 1955

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The grip, accuracy and durability of the Jacobs Plain Bearing Chuck have made it standard equipment all over the world. This model, especially designed for drill presses, features a Jacobs-engineered PLUS—the threaded locking collar for extra safety and more versatile use of the tool.



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The Jacobs Plain Bearing Chuck equipped with threaded locking collar makes any drill press a safer, surer, more versatile tool.

Safer because the threaded collar keeps chuck locked on tapered spindle regardless of speeds or type of thrust.

Surer because it's a Jacobs, the most accurate, holdingest, longest lasting chuck of its kind—anywhere.

More versatile because it eliminates the necessity of using special collet chucks or similar adapters for holding routing, carving or dovetailing bits.

When you work with a drill press or portable electric tool you'll hold your drill or bit best when you use a Jacobs Chuck. There is none better for accuracy, grip and durability. The Jacobs Manufacturing Company, West Hartford 10, Connecticut.



Jacobs
CHUCKS

If it's a Jacobs—it holds

Miami Has an Electric Nervous System

(Continued from page 148)

1934 when Ben Demby was placed in charge of the newly formed police communications system.

But the first radios he purchased and installed in the police cars crackled, buzzed and were undependable. During the month of August, especially, the ionosphere played strange tricks on policemen operating the 30-megacycle radios. A call would go out to a cruising squad car, but the sheriff's office in Hartford, Conn., would answer. The message would then be relayed to Hartford, which would contact the Miami patrolman who couldn't hear his own dispatcher.

Demby was convinced that a frequency of 155 megacycles would solve his problems. No one was using over 100 megacycles at the time, and the FCC assured him his dream was impractical.

He proceeded to rip out the old radios and install 155-megacycle sets built to his design by Communications technicians. They worked fine. Later, the same opposition and the same success were repeated when Demby's department, now expanded to cover all city communications, went to 460 megacycles.

Teletypes and Radio

Nine Teletype machines, some of them operating on circuits to municipal "clients" as well as to local police and fire stations,

(Continued to page 248)

Demby, Communications Department head, inspects experimental radio he is testing for electronics firm



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Self Adhesive! Just Wrap It On and Plug It In—It Sticks!

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The simple sensible Red-i-Kut way as thousands have—SAVE HALF SHOP TESTED PLANS "SPIRIT OF THE CENTURY" Narrow waist 83" tall or stately straight side "SPIRIT OF AMERICA." EASY-TO-FOLLOW photographs PLANS tell all—plus BROCHURE of heavy brass weight Westminster, tube chime, movements, gorgeous dials, 3 1/2" solid mahogany case kits. Send \$1.00 today—Both plans \$1.50 NOW.

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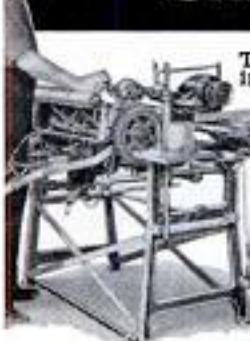
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New Easy Way! Dry clean rugs on location in homes, stores—fast and easy—machine does hard work for you! Amazing ALM-13 machine with Float-Action Brush whirls cleaning material into rug fibers—gets out grime, dirt like magic! Use rug at once. Also, use same machine with no-tool attachments to clean, wax, polish any floor—make extra profits! Write for details.

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THE **DOT** LINE

are located in the headquarters of the Communications Department.

Two radio dispatchers in Communications headquarters operate the county and suburban radio systems. These operators are in addition to the regular Miami operations: A telephone switchboard and a radio dispatcher in the fire department, a radio-dispatching system at police headquarters and a switchboard in City Hall that links all phones in the city government.

In touch with surrounding communities, the center also has direct contact with several agencies.

Pick up a telephone marked "Coast Guard" and an officer at the local Coast Guard headquarters answers immediately. Lift another receiver and a phone rings at the Strategic Air Command post in Marietta, Ga., 550 miles away. A phone call reporting bombers approaching Miami would alert the nation in 12 seconds. Meanwhile, switches in the Miami Communications Center would be pulled to set air-raid sirens sounding all over the city. Miami would start broadcasting messages over an emergency radio-communications frequency that reaches out over a 500-mile radius.

The emergency communications network, invaluable in air raids, was set up to counter havoc that Miami is familiar with—hurricanes. In touch by Teletype and radio with the United States Weather Bureau, Demby's department must alert the city when a hurricane veers too close.

(Continued to page 250)

Even the police horses in Miami are equipped with two-way radio for parade duty. Unit is walkie-talkie





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When the alert is sounded, it's also time for the Communications Center to secure itself against wind and flood. It does this by packing bag and baggage, IBM machine and Teletype, and transferring its entire operation to a stand-by center on the third floor of the Dade County Courthouse. The job takes 30 minutes and is accomplished without a break in communications.

Meanwhile, a bus converted into a rolling communications headquarters is heading for a flooded area on the outskirts of the city, ready to direct evacuation operations. Equipped with all ten radio circuits, telephones and a Teletype, it is the third line of defense in case of emergency. For it alone could function as a complete communications center for the Miami area.

In certain emergencies, other than hurricanes, the radio-equipped Goodyear blimp that winters for six months in Miami could serve as a radio relay and connect Miami patrol cars with cities as far away as Daytona Beach, 250 miles up the peninsula.

Last Resort

The last communications center—the fourth line of defense—is Ben Demby's personal automobile. Its instrument panel would make a Detroit designer turn handsprings of delight. Demby's array of instruments, however, has a practical purpose. By lifting various receivers and turning certain dials, he can communicate by radio with all branches of his department—wherever he may be around Miami. All the radios in the department can also contact others on the same band. So radio communications do not depend solely on one or two transmitting towers.

Demby, who has been building up the city's nervous system for over 20 years, is still convinced that improvements can be made. Once again he may raise the frequencies of city radios. Soon microwave television circuits will be set up. The projected city jail and city hall will naturally be equipped with the latest closed-circuit TV. In 1956 a location detector for mobile units will be installed. After that? "If it's invented and we need it, we'll get it," says Demby. "A modern city needs all the help that electronics can give." ★ ★ ★

Peanut Husks Pave Roads

Scientists in India are using a dark liquid obtained from peanut husks to pave dirt roads. The soil is first treated with the liquid and then dried. Calcium chloride is then applied to form a gelatinous mass in the soil and hold the tiny earth particles together. The treatment increases the soil's resistance to friction.

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(Please print or typewrite)

How to Select Your Hi-Fi System

(continued from page 167)

excess of 10 oz.) for good low frequency response and low distortion. Improved performance can be obtained with coaxial speakers which have a large cone for the low frequencies and a separate small one for the highs.

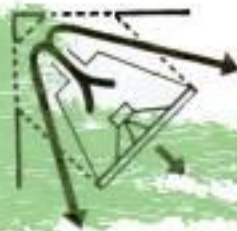
The most elaborate speakers consist of three separate units: The low-frequency cone, the midrange and the high-frequency units. These parts may be assembled on one frame, as with triaxial speakers, or may be purchased separately.

When selecting speakers from the catalogue, plan to listen to those meeting your requirements: 8-12 inch units for small rooms, and 12-15 inch units for large rooms. Make certain that each unit selected will handle the full rated output power of the proposed amplifier.

ENCLOSURES



BASS REFLEX



FOLDED HORN

The enclosure is almost as important to high fidelity as the speaker itself. Without it, even the finest speaker will sound flat and lifeless. Commercially, such enclosures are available in a tremendous price range, but even the least expensive of these is likely to cost more than the speaker itself. You can save some money by purchasing a speaker enclosure kit which can be assembled with only a screwdriver and a minimum of skill. Or you can construct the enclosure from plans that are available at a very low cost.

Having compiled a tentative list of components, you can walk with confidence into a showroom and request a demonstration. When doing this, it is advisable to take along your favorite high-fidelity record to be used in the listening tests.

Here, a definite pattern should be followed in making your selections. Have your



(Continued to page 254)

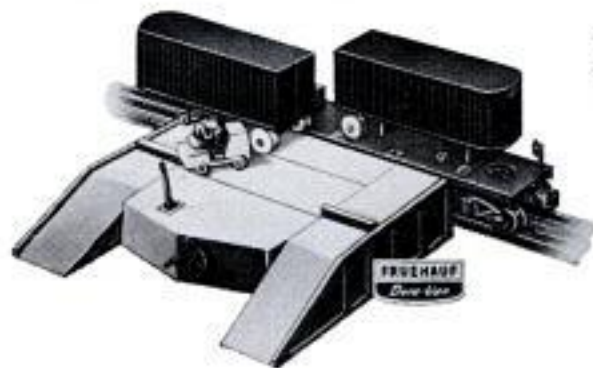
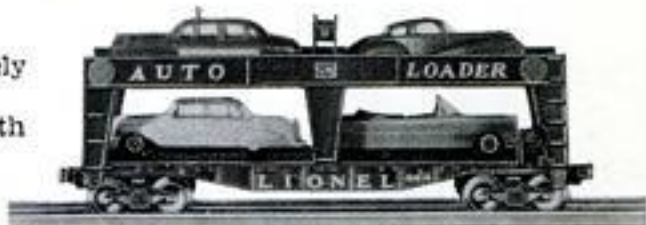
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New! Gas Turbine Switcher! No. 41. Snappy looks! Snappy action for your yards! Exact model of gas switcher just built for U.S. Army! Amazing detail... doors, stacks, air scoops, front and back simulated headlights. Regular Lionel 3-position control. Remote control couplers at both ends. For "0" and "027" gauges. Switcher measures 7½" long.

New! Piggy Back Transportation Set! No. 460. Action! Action! MORE ACTION with this latest real-life R.R. innovation... "piggy back" transportation! Scale-detailed truck vans can be cranked right on and off flat car! Flat car couples to any Lionel Train. Set includes platform, flat car and vans! Platform and ramps are 14" long; platform is 5" wide and 2" high.



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record played through the finest hi-fi system available in order to become familiar with the true timbre of high fidelity. Then, play the record again, this time switching in the various speakers on your list, one at a time. It may require several playings before you can decide which of the speakers is most pleasing.

Once the speaker has been decided upon you are ready to select the cartridge. Again, using the very best amplifier available, but with the speaker which you have already picked out, play the same record with the various cartridges on your list. At this time you should not try to determine which of the cartridges you are listening to, but you should make notations as to which ones sound best, and the degree of difference between them. In this way you can quickly eliminate all but two or three of them, and your final selection can be based on a cost-versus-improvement basis.

You are now ready to select the record changer. Using the cartridge and speaker previously chosen, listen to the record at moderate volume with the bass control of the amplifier turned to maximum. Pay particular attention to hum during the relatively soft musical passages. This is especially important if a magnetic cartridge is used. Next, listen carefully for a very annoying "waawaawaa" sound and an equally distracting "whirrrr" which indicate the presence of wow and flutter. A trace of any of these is sufficient cause to reject any particular changer.

The final piece of equipment to be selected is the amplifier. To select the best amplifier for you, proceed as follows:

1. With all components interconnected but the changer shut off, turn the volume of the amplifier under test to maximum. With the base control also at maximum, listen for hum through the speaker. With a good amplifier, hum will be noticeable only if you stand very close to the speaker.

2. Turn all tone controls to the flat position and listen to your record at a relatively loud average volume. Compare the cleanliness of the tones with the results obtained with the best amplifier in the house *playing at the same volume level*. The highest peaks should be clear and undistorted. Tone controls should be effective in both the bass and treble registers, with little or no interaction between them. The amplifier which best meets these qualifications is the one for you.

A list of some reliable radio parts distributors as well as specifications for the construction of bass-reflex speaker enclosures can be obtained from the Popular Mechanics Radio and TV Dept. upon receipt of ordinary letter postage. ★ ★ ★

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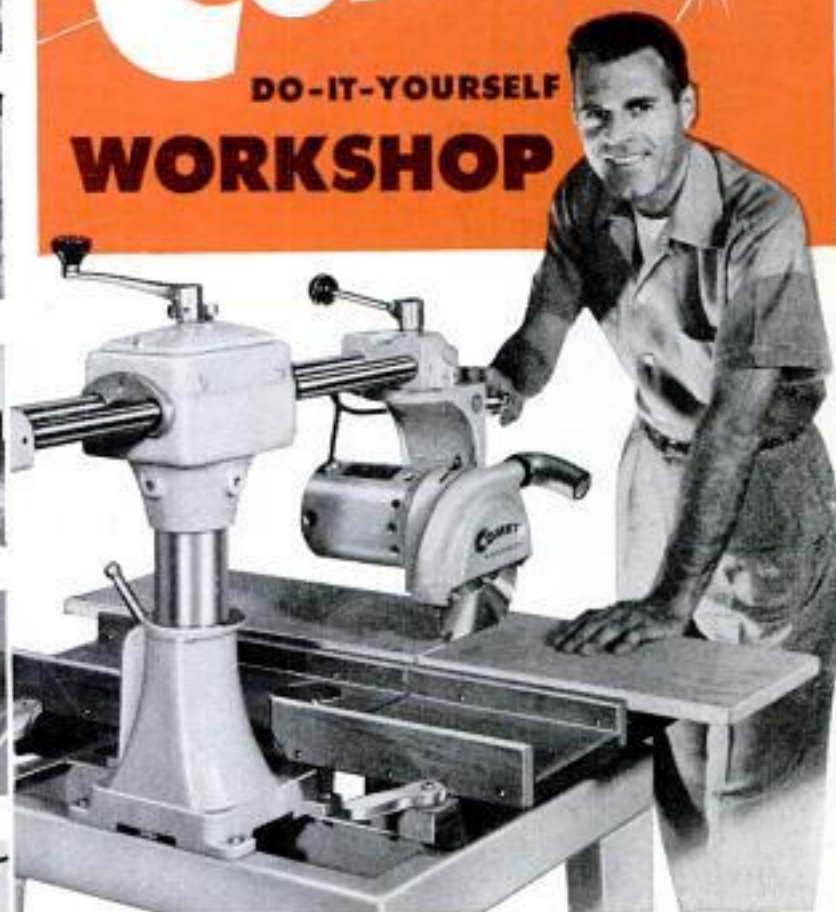
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Jetography

(Continued from page 86)

there's canopy glare, the reflection of sun against Plexiglas. There's no escaping it. Best a jetographer can hope for is to minimize glare, shoot "around" when he can.

G-Force Is Tough "Boss"

But G-force—the multiplication of gravitational pull—is a jetographer's most unrelenting taskmaster. A sudden, heavy G-force can prematurely trigger a still camera's solenoid, jam a movie camera and warp its film, distorting the image. As if this wasn't enough, the jetographer is burdened by his crash helmet which makes view-finding tough. It's all but impossible to bring a camera close enough to the eye to align the "subject" plane in the finder.

Douglas' Walt Tufts is one jetographer who solved his "finder" problem. As always, it began with an assignment: to photograph Douglas' "Skyrocket" leaving its B-29 mother plane at 37,000 feet.

Tufts was worried. "Can't bring the view finder close enough to make sure of that shot," he fretted.

His pilot, veteran speed-jockey Lt. Col. "Pete" Everest, Jr. commiserated. "But you gotta wear that oxygen mask. There's no living without it at that altitude."

"Suppose I hold my breath?" Tufts retorted. "Nothing in the rulebook against that!"

Tufts conferred with the B-29's pilot. He agreed to signal just before the Skyrocket dropped from the bomber's belly. Close by, Tufts would be riding a T-33 camera jet, his Speed Graphic set and loaded. As the rocket plane streaked clear, he'd yank off his oxygen mask, hold his breath, bring the finder up close—and shoot.

New Breath-Holding Record

It worked. And to Walt Tufts went a new high-altitude record—for holding his breath. Walt's breath-taking photo has since splashed across scores of magazine and newspaper pages.

For all the risks, there are also the rewards—like the once-in-a-lifetimer which Northrop's Sam Orr recently brought back from a "routine" mission.

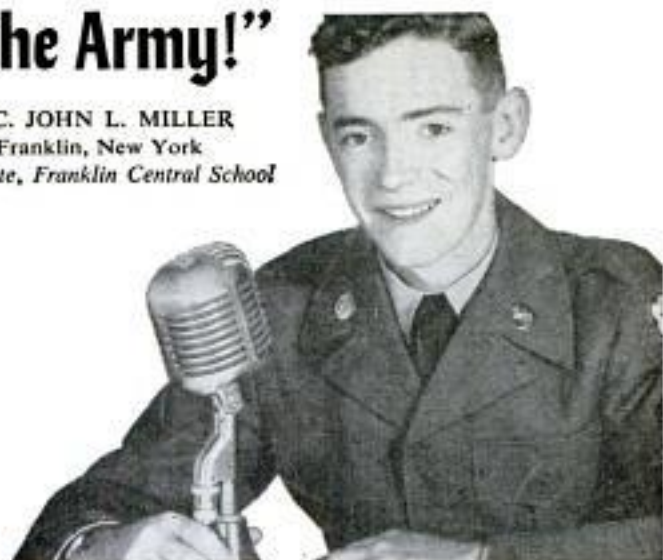
"Everything was routine," recalls Orr, "except the results . . . I was to snap the Scorpion F-89's rocket-firing sequence, get a color close-up of those 104 air-to-air rockets leaving their launchers, the whole thing shot at 30,000 feet. Northrop's flight-test engineers needed to see how the rockets lined up as they left the wing pods."

Orr climbed into an F-89's rear cockpit

(Continued to page 258)

"I picked my own spot in the Army!"

PFC. JOHN L. MILLER
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with \$4000 worth of photo gear. His mainstay was to be a 4 x 5 Speed Graphic (with special finder), though he also took along a Fairchild K-20 aerial camera, a Bell and Howell 70 DH and 35-millimeter Leica. In addition, he wore a pressure suit, two parachutes, specially molded crash helmet and visor, bail-out bottle, survival kit and oxygen mask. Had he been working over water, he'd also have worn a "Mae West."

Pilots Carry Flight-Plan Cards

The mission had been carefully briefed. Both pilots had been handed a 5 x 8-inch "plan card." The cards' simple sketches (each numbered) illustrated a jetcraft's 16 most common in-flight positions. When the jetographer ordered "Plan 8," the rocket-firing pilot had merely to glance at his plan card. Plan 8 called for a three-quarters rear shot, the photo jet slightly below and behind its rocket-firing subject. Plan cards eliminate guesswork, save time and fuel and lessen the chance of a collision.

Upstairs, Orr huddled in the camera ship's rear cockpit, readied the Speed Graphic, metered his exposure and speed. Any one of a dozen miscalculations could rhubarb the mission, waste a couple thousand dollars worth of rockets—or worse.

At 30,000 feet and near the speed of sound, Orr called for Plan 8. He watched, straining at the view finder, as the subject jet jockeyed into position, slightly above the camera ship and to starboard.

Planes Draw Close

At screeching speeds, the two planes closed. Now they were 200 feet apart . . . now but 150 feet . . . now drawing even closer. . . .

Carefully, Orr drew focus, quickly rechecked his settings. Everything seemed aligned . . . both rocket pods were clearly focused . . . the sun just right . . . canopy glare at minimum. . . .

"Begin count-off," Orr rasped.

Loud in his helmet sounded the cadenced count-off . . . "10 . . . 9 . . . 8 . . ." At zero the F-89 would fire its rockets. After that, it'd be up to Orr.

"2 . . . 1 . . . zero!"

Smoke whiffed from the twin rocket pods. For a fraction of a second—just as he'd briefed it—Orr held his fire. Then he triggered the shot home. Ahead, flame balled from the Scorpion's wing tips. Like fiery javelins, 104 deadly rockets shuttled airborne.

Not for another four hours did jetographer Orr know the results. Then he learned that with one pass, he had snapped one of the sonic age's most remarkable aerial

(Continued to page 260)

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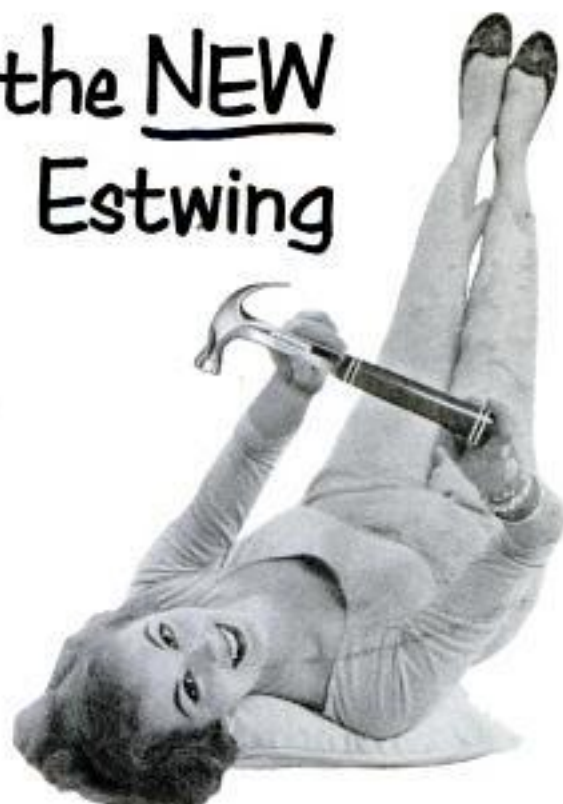
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stills. Black and white prints from the color transparency have found their way into photo galleries. But more important was the insight it gave Northrop's engineers. Caught on film was the Scorpion's mid-air reaction to rocket firing. Clearly shown was the flame pattern, the synchronization between rocket pods, the in-flight behavior of those folded-fin missiles.

No camera mounted on the ship's tail or wing tips could have equaled the results. Nothing else could have told the engineers so precisely what they needed to know. Sam Orr had once again proved jetography the sonic age's indispensable researcher.

No Place for Milquetoasts

Lockheed's Erik Miller shepherded a newsreeler, a gent with a reputation for iron nerves, to Williams AFB to film a spectacular quartet of aerial acrobats—the Acrojets. They caught first glimpse of their subjects as the four F-80s interlocked wing tips and looped, just for the fun of it.

"And you'll be riding right on their tails," a young Air Force lieutenant gestured, briefing, the goggle-eyed newsman. "Not me," he snorted.

So Miller climbed into the forward cockpit of a T-33 jet, borrowed the newsman's 35-millimeter Bell and Howell, and bolted it to the forward gunsight.

"We rode their tails all the way—never more than 15 feet from their rudders," Miller wheezes, remembering. "My pilot had trained with the Acrojets—he was their relief man. He knew all the tricks. I kept to the view finder, directing him, keeping all four jets in the finder. We rolled, looped, dived and climbed straight up to 20,000 feet. Me? I just hung on—too scared to pray."

Back to Earth

Down on the ground Miller handed the unnerved newsreeler his camera and film—and staggered off.

Recently Earl Janda, who shoots high-altitude stuff for North American, was assigned to record a Sabre Jet's instrument panel as the ship broke through the sonic barrier. The close-up was for a Hollywood picture. Janda became first jetographer to trigger a camera at better than 750 miles per hour. He also got considerably more than he'd bargained for.

"Trouble was," he explains, "I hadn't reckoned with negative G-force."

Negative Gs—unlike the positive which multiply a camera's weight—create weightlessness. It's an eerie effect, encountered as a sonic plane arcs into its super-sonic dive.

(Continued to page 262)

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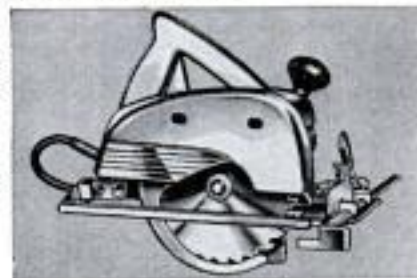
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Camera focused, Janda was readying to open fire when "weightlessness" set in. Janda stared incredulously as a pack of cigarettes floated above the dashboard. His meter, slung around his neck, rose phantom-like, jabbing his jaw. Around the cockpit floated his battery case, auxiliary camera, a half dozen film magazines. With one hand he slapped at the meter. With the other he lunged for his gear. Seconds later things settled down—as a walloping positive G-force set in.

"We busted through Mach 1.0," Janda's pilot chirped.

Too Busy to Shoot

"Mach 1.0!" the jetographer groaned. "I was so busy beating off all that floating stuff I didn't even trigger the shutter!"

Northrop's flight-status photos have pioneered special gadgets and techniques to make their job easier. View finders, designed to get close to the crash helmet, aid focusing. Jetographer Paul Wheeler, an eight-year veteran to sonic photography, has installed his Speed Graphic with a stronger trip-spring, a more powerful solenoid—to prevent G-forces from prematurely triggering the shutter. Cameraman J. L. Wilkinson, a motion-picture specialist, shoots movies at 32, 48, even 64 frames per second (instead of the usual 24) to slow the action, smooth out high-altitude turbulences. Wilkinson simulates "night" shots by shooting in daylight, using Kodachrome type A without a filter, his lens closed-down about 2 1/2 stops from the daylight meter-reading. That way, the sky comes out under-exposed, prints black and "nightish."

If there's any "secret" to sonic photography, it's that it takes a jet to catch—and pace—a jet. With subject and camera planes holding the same relative speed and position, jetographers can often shoot slow—1/100 second at f 4.7 for color stills: 1/100 to 1/400 for black and white. Dives and spins take a bit more doing, and considerably faster shutter speeds.

"Gadgets and techniques help, of course," explains a Lockheed jetographer, "but Lady Luck still accounts for many of the best shots." ★ ★ ★

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Wall tile of porcelain fused to aluminum can be used when a lightweight wall covering is required. Its glass-hard finish cleans fast, resists chemicals, fire and scratches. The tile and mastic together weigh less than 18 ounces per square foot. It is easy to install, can be cut and bent to fit, and is said not to chip or craze.

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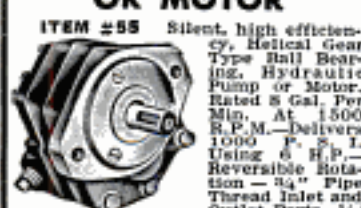
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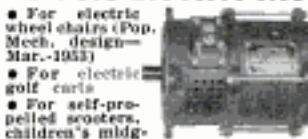
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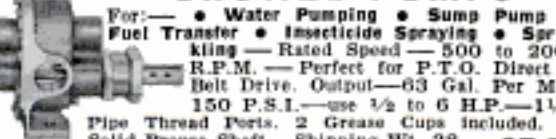
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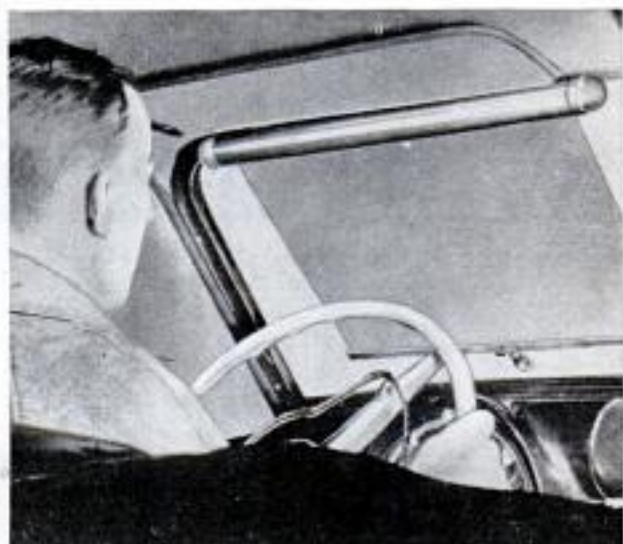


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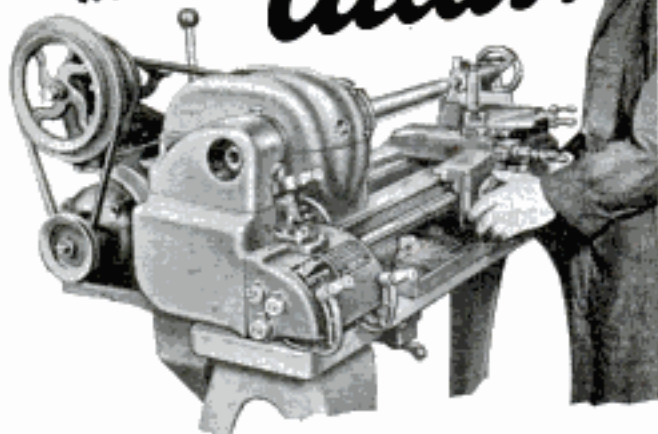
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'55 Thunderbird Owners Like Performance And the '56 T-Bird Will Provide Even More

(Continued from page 105)

—New Mexico civil-service worker.
 "I like its smallness. I drove big cars for 14 years. Don't expect to go back to a big car ever."—Arizona editor.

"Its compactness and privacy without a back seat. No more back-seat passengers to burn upholstery and abuse car."—Wisconsin executive.

"I no longer enjoy driving any large car."—California lawyer.

And the Complaints

Although Ford has changed the Thunderbird for 1956 in some respects, it has not corrected everything the owners complained about as you will see by reading the following quotations (listed in order of frequency of mention by the 1955 owners):

"In soft-top frame, there's a bolt that cuts into the fabric when it is folded back. It happened to mine and later I saw the same one-inch cut on two others."—New York owner.

"I don't think the factory should charge for a top. One or the other should be standard equipment."—Colorado cashier.

"Soft top is not good enough for \$290 more."—Massachusetts truck driver.

"Doors rattle when hardtop is removed."—California retired owner.

"Everything under the hood is great. The body is something else. Lots of minor things that should not go wrong on a \$4200 car."—California advertising man.

"Window handles actually bend. Dealer strengthened handles by brazing a bead to them. Biggest complaint is poor assembly."—Arizona sales manager.

"Too much heat comes up through floor board."—Ohio student.

"Extreme distortion in bends of windshield can induce eye strain and dizziness."—Colorado jobber.

"Original power brakes were very difficult to operate. My dealer changed to another type at no cost to me."—Missouri doctor.

"Have replaced brake linings, brake drums, and have had many adjustments, but brakes still cause pull or swerving when applied."—New York mechanic.

"I have to drive with the seat all the way back and it tends to lock there."—Maryland naval officer.

"Seat sticks in far-back position."—California employment consultant.

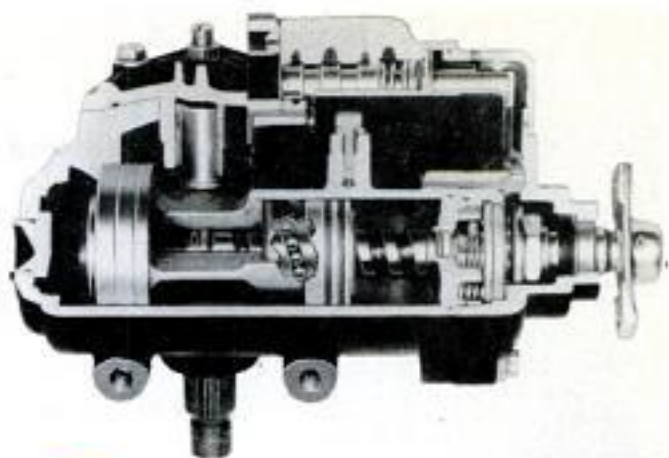
"Service is miserable. Since it has the

(Continued to page 268)



ANNOUNCES

**THE WORLD'S FINEST
STEERING SYSTEM**



new

Safety POWER STEERING

by **Saginaw**

WITH **3** MAJOR IMPROVEMENTS FOR 1956 !



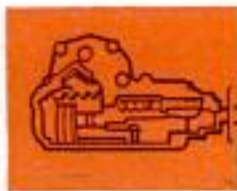
1 TWICE-AS-EASY PARKING. Revolutionary new valve design cuts maximum manual effort in half. It never exceeds 5 lbs.

2 GREATER ROAD STABILITY. New system helps hold car "on course"—assures even more secure "road feel" than ever.

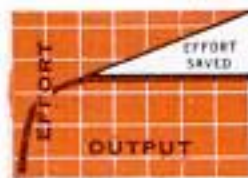
3 RELAXING NEW RESPONSE. Lower-ratio wheel responds more effortlessly—reduces mental and physical fatigue.

NEW "FROM THE GROUND UP"

A completely redesigned, simplified In-Line system with only 49 parts and basic improvements in steering geometry beginning right at the front wheels. Every part has been specifically engineered for *power steering*.



AUTOMATICALLY HELPS HOLD CAR "ON COURSE"—Precision pre-load built into ball-nut-and-worm assembly helps keep wheels centered straight ahead.



AUTOMATICALLY LIMITS MANUAL EFFORT WHILE PARKING. New reaction-limiting valve cuts in whenever turning resistance reaches predetermined point; increases power assistance to lower manual effort.

**MAIL COUPON TODAY
FOR FREE BOOKLET!**



Saginaw Steering Gear Div.
General Motors Corporation
Saginaw, Michigan (Dept. 368)

Please send free facts booklet on your NEW Safety Power Steering System

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preservative keeps homes
sound, saves costly repairs



in insulating—building board

When you build your home be sure you're getting the added protection of insulation and building board that's fully protected against rot, mold, mildew and termites. Leading manufacturers ensure longer board life by treating with *PENTACHLOROPHENOL preservative. Clean, odorless PENTA keeps board sturdy longer, helps it in such applications as sheathing, siding, roof decking, lath. Make sure the board you buy is PENTA-treated; ask your building supply dealer. You'll be glad you insisted. For FREE BOOKLET, write to THE DOW CHEMICAL COMPANY, Dept. PE 873QA, Midland, Michigan.

you can depend on
DOW CHEMICALS



Mercury engine, it should be serviced by Mercury dealers."—New York artist.

"Ford dealer doesn't know the first thing about repairs or maintenance of the Thunderbird."—New York sales manager.

"On rough roads there is considerable wobble in the windshield, dash and doors, with the top off. During a hard rain, water runs into the car from under the doors."—Ohio supervisor.

"Hard top does not fit. Takes five men to get it back on after removing it. One has to sit on the top to hold it down."—Kansas advertising man.

"Carburetor is a mess to keep in tune."—Utah salesman.

"Speedometer hard to read and not accurate."—California mechanic.

"Would rather have gauges than lights for ammeter and oil pressure."—Florida musician.

"Glove-box latch is difficult to use. When door opens, contents are dumped. Performance could be increased by using a four-speed gearbox and proper rear-end ratio."—Wisconsin engineer.

"Needs a more radical cam to make more use of the big displacement. I have been beaten by smaller-displacement stock sedans equipped with power packs."—Alabama television engineer.

"I have left-leg trouble due to the angle of the floor and seat. My heel rests on the floor, but the toe has no support."—California technician.

"The only thing that I don't like are the extra-big taillights. They are too large for the size of the body."—North Dakota farmer. (For 1956, they are even larger!)

More Best-Liked Features

"Distinctive. Hottest conversational piece since the original Continental. Even the burble of the exhausts is artfully conceived. Car will become a collector's item."—Connecticut author.

"It has an air about it that no sports car can match. Every extrovert should have one! I just don't mind those monthly payments, for every time I step into my Thunderbird I feel it's so worth it."—California fashion artist.

"Getting better than 20 miles per gallon on long trips."—Ohio supervisor.

"Large displacement engine eliminates the peak tuning required on foreign jobs."—Florida loan adjuster.

"A fine answer for those who want a high-performance car but do not wish to race."—Virginia art director.

"My wife and I both have a great deal of pride in this machine. Each trip has been a pleasing experience. With it, more people

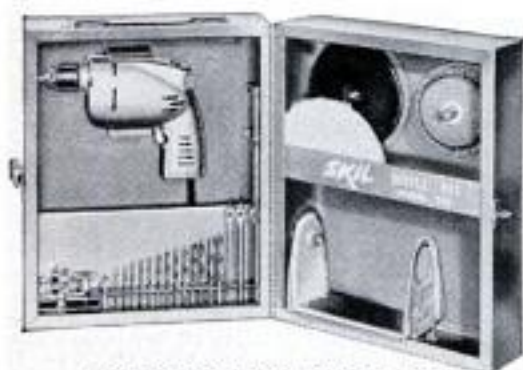
(Continued to page 270)



Gifts from SKIL...for You Mean Christmas all year long for the family!



Famous SKIL Tools help you build for your family. Power-plus and professional features let you handle big jobs in the home. Build a rumpus room! Fix the stairs! Make a cabinet! Finish the basement! SKIL Tools let you give your family *more!* Here are Christmas gifts for you that mean *family fun all year long.*



32-PIECE SKIL DRILL KIT Model 515 . . . Only \$39.95.

A whole workshop in one handy kit! 32 great tools including a powerful $\frac{1}{4}$ " SKIL Drill with geared chuck. Sand, polish, drill, buff, mix paint . . . all with the same SKIL Tool. You get all this:

Model 549 SKIL Drill with geared chuck . . . Drill Stand . . . Rubber Disc Pad . . . Polishing Bonnet . . . 5 Sanding Discs . . . 2 Arbor Adapters . . . Paint Mixer . . . Grinding Wheel . . . Wire Brush . . . Counter Sink . . . 3 Wood Augers . . . 13 Drill Bits . . . Wall Type Carrying Case.

LEARN ABOUT THE FUN SKIL TOOLS OFFER. SEE THEM AT YOUR HARDWARE, DEPARTMENT OR APPLIANCE STORE.

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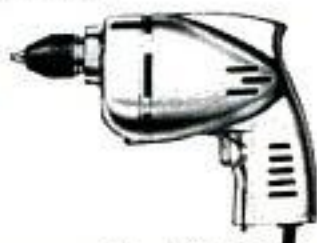


6" SKIL SAW Model 526 . . . Only \$49.50.

All the exclusive SKIL features and the power of many professional saws. Sawing jobs become simple for you. Make kitchen cabinets, build a fence or finish the basement. Just look at these professional features SKIL offers:

- 6,100 r.p.m. powerful 8 ampere motor
 - Trigger switch for right or left hand control
 - Automatic safety guard
 - Tilts to 45 degrees for bevel cuts
 - Quickly converts to a bench saw
 - Extra powerful A.C.-D.C. Universal Motor
 - Rugged die cast aluminum housing
- Other models as low as \$29.95

NEW $\frac{1}{4}$ " SKIL DRILL Model 535 . . . Only \$19.95.



Lowest price ever for a famous quality drill. Here is the greatest tool investment you could make. Power to drill through $\frac{1}{4}$ " steel or $\frac{1}{2}$ " hard wood. Use it for hundreds of jobs, in the home, the garage or the basement. Look at these features:

- Famous Keyless Chuck
 - Self-Lubricated Bearings
 - Hardened Steel Gears
 - Pistol-Grip Handle
 - Powerful Motor
 - 2500 r.p.m. Speed
 - Trigger-Type Switch
 - Only 3 $\frac{1}{2}$ Lbs.
- Other models up to $\frac{1}{2}$ "

PENTA^{*} preservative

saves costly home repairs



in sash and exterior millwork

Your windows and doors and exterior millwork, too, will last years longer when *PENTACHlorophenol-protected against rot and termites. Your lumber dealer has or can get PENTA-treated sash and millwork right away; tell him that's what you want. Get helpful FREE BOOKLET by writing to THE DOW CHEMICAL COMPANY, Dept. PE 873QB, Midland, Michigan.

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NEW *Lynx* THREAD KIT SAVES DOLLARS IN REPAIRS AND REPLACEMENTS

Loose, worn or damaged threads are costly—cause scrap, downtime, and poor performance. Now for the first time, it's easy as A-B-C to replace these threads quickly and economically. Use Lynx* Thread Kit! All you do is (A) drill out the hole; (B) tap new threads with tap provided; and (C) wind in Lynx stainless steel inserts, using inserting tool provided. You get a permanent, back-to-original size, stronger-than-ever repair made in minutes! Wonderful for screen doors, storm doors, furniture, lawn mowers, engines, door hardware, wood joints, boats—hundreds of uses!

Each Lynx Thread Kit contains two drills, two taps, two inserting tools and supply of stainless steel wire thread inserts for most household uses—and complete instructions!

Send check or money order—no C.O.D.'s. Money back if not completely satisfied. *Reg. U.S. Pat. Off.



HELI-COIL CORPORATION
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Please send me a Lynx Combination Thread Kit postpaid: \$6 value for \$4. (Sizes 10-24 and 1/4-20). Covers 90% of household uses. I am enclosing \$4.

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can enjoy, once again, a pure touring thrill."
—California architect.

"Adjustable steering wheel and seat height are good for me since I am short."
—Michigan artist.

"Everybody stares at the Bird, including the young ladies."
—California researcher.

"Was unable to find a suitable sports car because I have two small children. Seat is wide enough for the whole family."
—Texas cabinetmaker.

"On ice and snow the T-Bird is safer than the stock cars. I certainly feel safer."
—Ohio boltmaker.

Is It a Sports Car?

Many of the Thunderbird owners have owned foreign sports cars. To find out what they, as experienced sports-car owners, think of the American version of the sports car, we asked them to make a comparison. Here are some typical answers:

"I don't consider the T-Bird a sports car, but having had a Jag, I don't want one. The Bird is a great compromise and could be better with a little modification."
—New Mexico student.

"I have owned an MG. It is a true classic sports car. Enjoyed it every second. But the Bird is a very good family man's compromise."
—Florida naval aviator.

"I consider this a luxury passenger car of sports-car appearance—not to be confused with sports cars modified for competition. For competition, the Thunderbird should be stripped of 500 or more pounds of luxury appointments."
—California engineer.

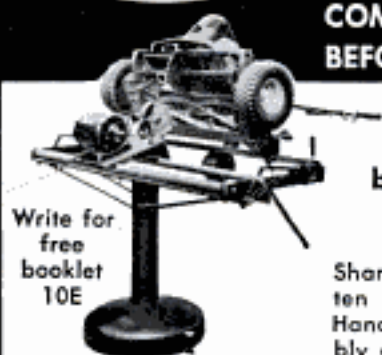
"To sum up, the T-Bird is neither an outstanding sports car nor is it an excellent passenger car. It falls in between. I cannot see why Detroit builds compromises all the time."
—Ohio mechanical engineer.

"I have owned a Jag and an Austin-Healey. There is no comparison with the Thunderbird, which is a cut-down convertible."
—Wisconsin designer.

"One must realize that the Thunderbird is a compromise between the road racer and the family convertible. The compromise was extremely well done. The transmissions available are such that you must choose the least objectionable. The overdrive ratio is extremely bad—so low that the engine cannot develop full horsepower at high speed. However, by learning new techniques, the owner can handle the automatic transmission fairly well in cornering."
—California engineer.

"Thunderbird not finished as nice, nor is it as rigid, but will accelerate with the Jag and it's not so temperamental."
—Oklahoma store owner.

(Continued to page 272)

MODERN**LAWN MOWER SHARPENER****COMPARE
BEFORE YOU BUY**

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Boat included
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No. M-625 (Weights 70 oz.) Has pull of 125 lbs. on steel block. \$ 8.50
No. M-575 (Weights 18 oz.) Has pull of 75 lbs. on steel block. \$ 6.00
No. M-500 (Weights 13 oz.) Has pull of 50 lbs. on steel block. \$ 4.00
No. M-101 U-shaped Magnet (Wt. 2 1/4 oz.) Pull of 6 1/2 lbs. 2 for \$ 1.50
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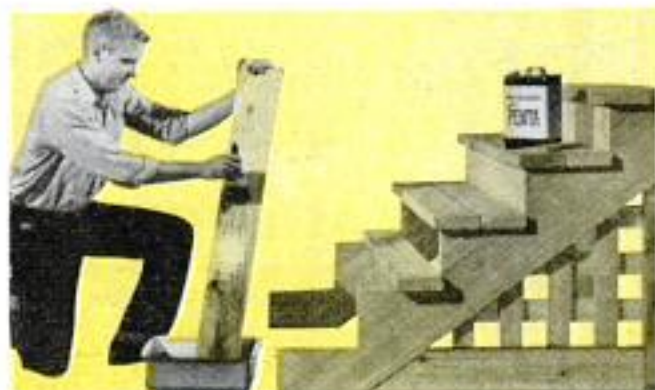
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Deluxe with blower
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Hand-feed Deluxe
Bench Model (as
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Heavy cast, precision
ground. Shipping wt.
95 lb.

Here is the low-cost, hand-feed bench model Moulder-Planer you have been waiting for! Especially designed for the home workshop, hobbyist or specialty woodworking shop, this rugged machine produces fine finishes in equal stock capacities as larger, more expensive models. Selected moulding patterns can be produced in widths up to 5 3/4" Planing capacity 4" x 6" or 11" wide on second pass. Dealer franchises available. Territories open for factory reps.

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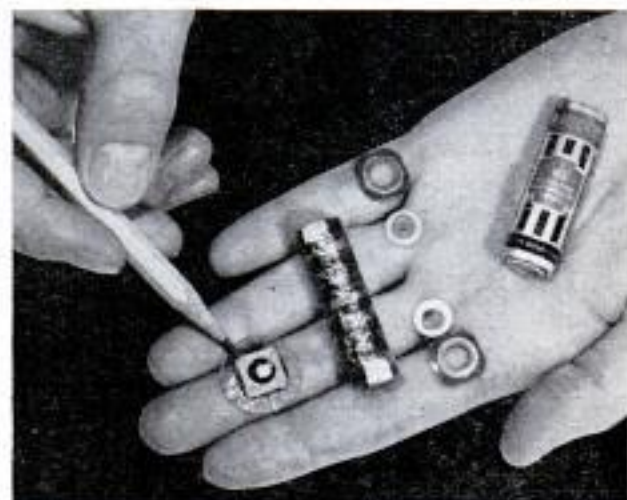


"Doesn't corner as well as a sports car, but rides better."—Illinois broker.

"Our Thunderbird has given us a great deal of pleasure and pride. We have always been foreign-car bugs, but could never get used to the inconveniences of side curtains. The Bird has given us the pleasure of a sports car with domestic service and parts."—Pennsylvania contractor.

"From my experience with foreign sports cars, the Thunderbird will run circles around them in the mountains, but would lose on a closed course or on the open road."—Illinois professional soldier.

"I have owned French, Italian and English sports cars and, compared with the Thunderbird, they all belong in Europe."—Connecticut club manager. ★ ★ ★



Miniature Dry Battery

"Wafer cells" stacked in a column make up a miniature dry battery with 30 percent more power and life than conventional batteries, according to the manufacturer. The midget power unit will go into transistorized hearing aids, portable radios and even heavy-duty electronic systems. Each cell is a sandwich of artificial manganese-dioxide mix between tiny disks of flat zinc and carbon electrodes. A dab of silver wax on each side of the cell conducts electricity to join the wafer cells in a series, permitting a two-inch battery to develop 22 1/2 volts, a 20-cubic inch battery to produce 300 volts. A bit of carbon replaces the old carbon rod. An airtight plastic wrapper encloses the wafer battery, which is compressed into a metal tube. The cells are produced entirely by machine in a speedy automated process.

□ World population has reached a high of over 2,500,000,000, but birth rates in Europe (except for France and Norway), Japan and the Philippines have fallen to or below pre-World War II levels.

Now!
Porter-Cable quality
in this all new
finishing sander

only \$39⁵⁰

Here's the great new finishing sander that's got *everyone* talking—with a price tag *anyone* can afford!

It's Porter-Cable's Model 145—and it's a honey! Use it for coarse, medium, and fine finishing on wood, metal, plastics, glass, and many other materials—do hundreds of sanding jobs faster and easier! Orbital motion lets you sand with, against, or across the grain, with never a gouge or ripple. Husky Universal motor has all the speed and power you'll ever need—lightweight, *balanced* design prevents fatigue.

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MODEL 145—ONLY \$39.50 COMPLETE
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Please send.....Flexible Power Shaft(s) with handpiece and coupling for only \$8.95 ea. Check or money order enclosed. Shipping charges C.O.D.

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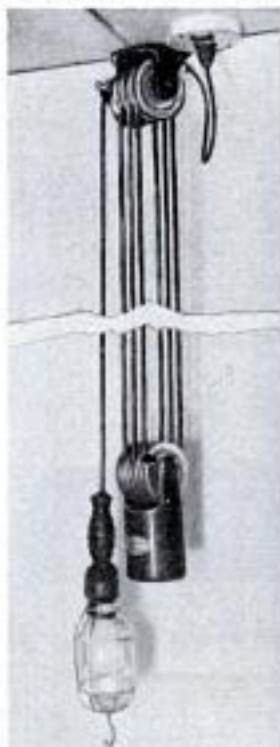
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Papoose Carrier

Modern kids can now enjoy the parent-back rides of an Indian papoose. A 39-ounce aluminum, steel and fabric chair for the youngster straps to the back of Mother or Father, leaving both hands free. Properly balanced, the carrier distributes the load evenly to prevent injury to the back. It folds into a flat package measuring 22 by 15 by 4 1/2 inches. When not in use for infant carrying, the unit can be employed by the sportsman to tote heavy fishing and hunting gear or as a seat for a baby in an automobile.

Extension-Cord Holder



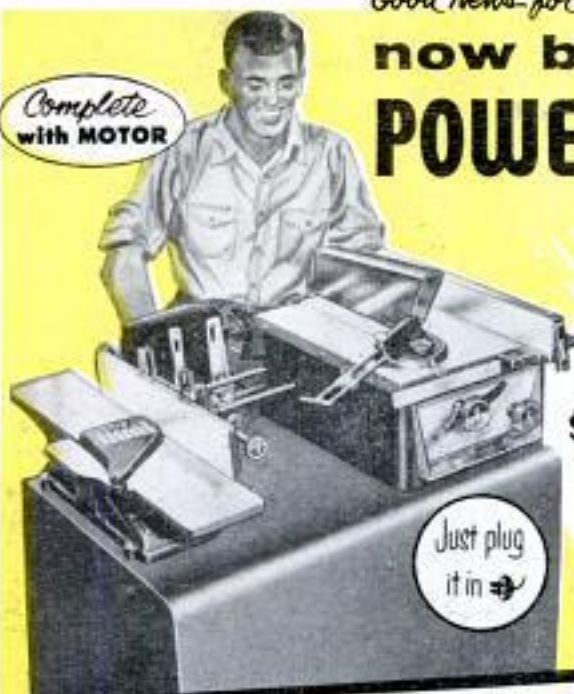
Weighted pulleys in a compact holder keep 50 feet of extension cord tangle-free and ready for use. The single cord is strung between three pulleys mounted on a ceiling bracket and three suspended pulleys mounted on a weight. The weight holds the suspended pulleys at any point where they come to rest after a length of the cord has been pulled out. Mounted on a garage or shop ceiling beside an electrical outlet, the holder supplies plenty of cord for a light or a drill.

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The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt, for only \$29.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

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SUPER SAW FILER NO. 6
IT'S NEW! With Automatic DEPTH CONTROL ROLLERS

Automatically controls **DEPTH—ANGLE—PITCH**

Perfect bevel and angle maintained, and fool-proof depth control for all Rip, Cross-cut, and Handsaws. Precision made and calibrated for instant setting at desired angle. Can be used in any vise or clamp. Complete with file, only... **\$6.50 ppd.**

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Sensational new Super Filer No. 11 joints and sharpens both hand and circular saws 6" to 10" with all teeth the correct height, depth, pitch and bevel. Easy to use—when file hits hardened steel roller, teeth are finished. Saw runs true and smooth with no side pull. Complete with special 8" file \$9.95 ppd.

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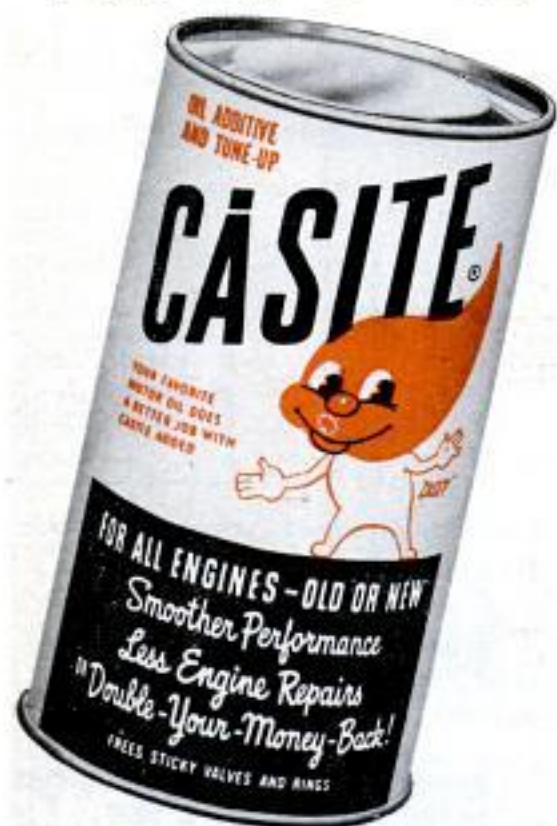
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Motor Scooter Burns LPG

Already noted for its gas economy, the motor scooter now has been adapted to burn LPG. Ralph Carlton of Wauchula, Fla., converted his standard scooter into an LPG-burner with a few minor engine changes. Now he carries a bottle of propane lashed to the scooter's front end.



This year give more than a gift... GIVE A HOBBY!

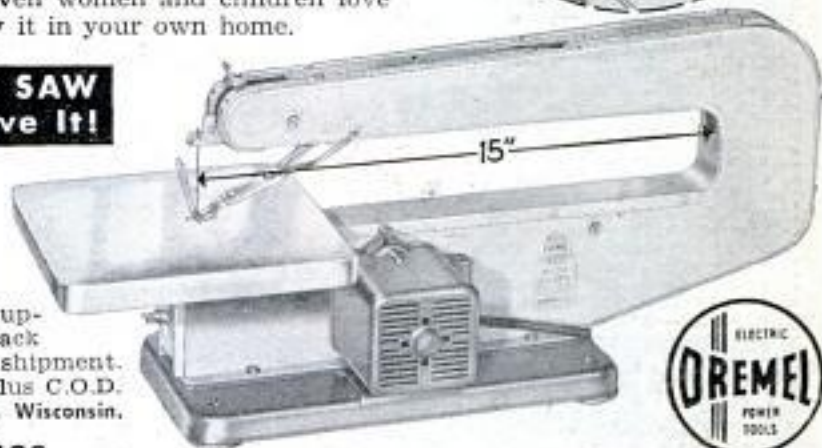
This year, make your Christmas gift an investment in productive family fun! The new DREMEL Moto-Jig Saw is the most pleasurable power tool ever marketed—out-performs cumbersome jig saws costing many dollars more, yet is so easy to use even a novice becomes an expert in no time. Weighs only 12 lbs., sets up anywhere to make any corner a hobby shop! You'll make furniture, cabinets, toys, 1001 useful projects. You'll save by doing your own home repairs. Best of all, you'll unite the whole family around an exciting woodworking hobby. The DREMEL is super-safe—even women and children love it. For an eye-popping experience, try it in your own home.



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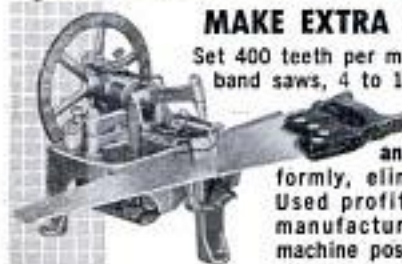


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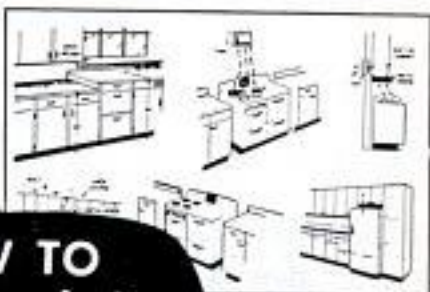


759 PICTURES

Above: How to lay a new roof over the old.

Right: New walls over the tired old walls. A few of the 83 modern kitchen ideas.

Below: Modern ceilings for old basements.



HOW TO Remodel Your Home

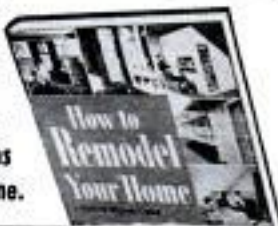
With Data on New Materials and Products Available to Home Owners

Here are hundreds of ways you can make a modern home out of an old house, make the house worth more and save money while doing it. If you own an old house or intend to buy one, get "How to Remodel Your Home" by E. R. Haas, formerly technical editor for Popular Mechanics. You can do the modernizing yourself or have it done for this vital book contains 547 methods and 759 illustrations covering complete modernization, adding rooms and living space, installing new kitchens and baths, adding closets, wardrobes, rumpus rooms. Complete face-lifting jobs for the outside and morale building jobs for the inside. Learn the joys and conveniences of modern living with this vital book prepared especially for the home owner. Mail coupon for your copy today.

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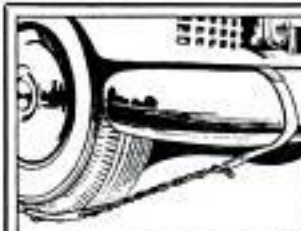


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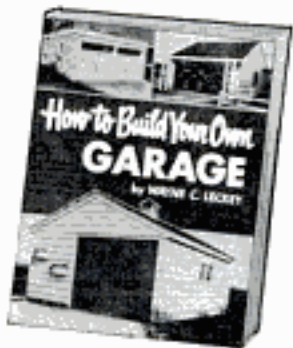
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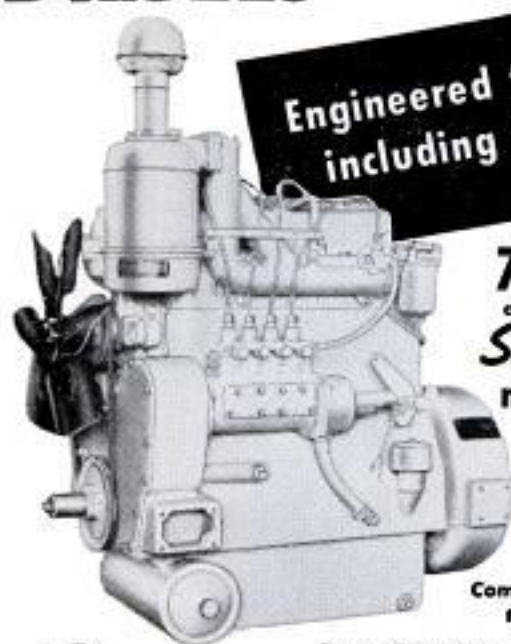
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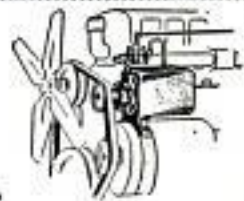


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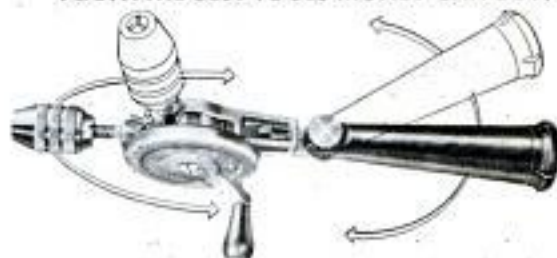
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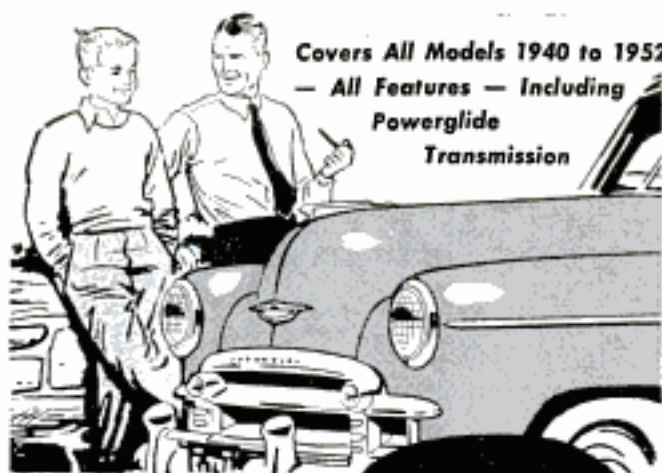
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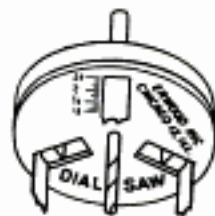
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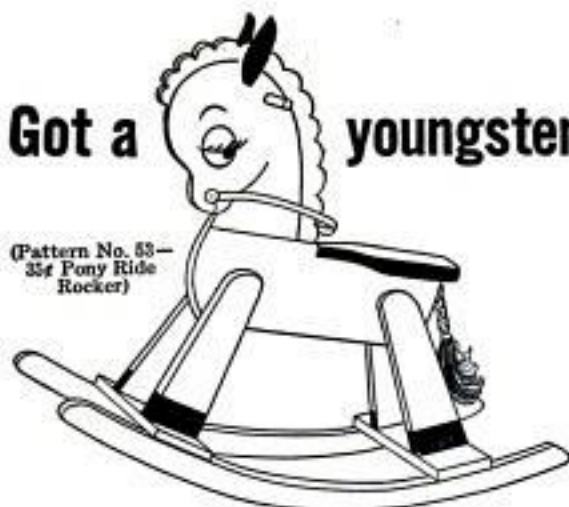
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New—Perfect, Select Grade **Grade 1, Unused, like new**

1/2 mile reels . . . **\$15.00** 1/2 mile reels . . . **\$10.00**

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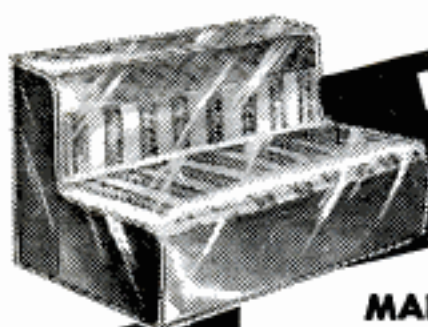
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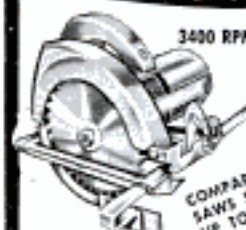
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SAVE 50% on Genuine Select PHILIPPINE MAHOGANY PLYWOOD

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Our prices are LESS THAN DOMESTIC PLYWOOD at WHOLESALE. This selected LUAN MAHOGANY meets the most rigid specifications. It is WEATHER and WATER RESISTANT. You'll be amazed at the beauty of this fine wood. Its rich golden elegance will thrill you. Rotary cut for beauty of grain. Both sides sanded and ready to use. Bonded with finest resin adhesive. Face side unjointed.

See for YOURSELF FREE SAMPLE on request!

Available in three thicknesses - 3mm (approx. 1/8"), 4mm and 1/4". ALL orders shipped by special Truck for lowest rates. No order accepted for less than 100 lbs. - equal to (6) 1/4" sheets, (5) 4mm sheets or (3) 3mm.

3mm (1/8") x 3ft. x 6ft. - \$5.00 value. **179 PER SHEET** (Min. order 8 sheets)

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1/4" x 4ft. x 8ft. - \$9.50 value. **499 PER SHEET** (Min. order 4 sheets)

NEW! 34 Pc. HOME WORKSHOP DRILL • SAND • BUFF GRIND POLISH • MIX PAINT

Famous Make **1/4" ELECT. DRILL WITH JACOBS CHUCK**

Another Palley exclusive. A sturdy, all-purpose drill for all home work shop and "DO-IT-YOURSELF JOBS." 1800 RPM AC-DC motor. Automatic trigger with lock action.

Kit contains: 1/4" Drill with Jacobs chuck, 7 carbon steel drills, 8-piece spindle adapter, polishing bonnet, sanding disc, grinding & buffing discs, drill stand, etc. Complete in metal case.



COMPLETE KIT **\$16.88** 24.95 VALUE

HARDWOOD LEGS WITH BRASS TIPS BUILD OR RESTYLE YOUR OWN FURNITURE

Beautifully turned, fully seasoned hardwood legs. Smoothly sanded and complete with brushed Brass tip and sturdy steel mounting plate. Available Finished or Unfinished - Finished units come in Blonde, Silver Fox, Mahogany or Charcoal Black. Please Specify type. Price per set of 4 with Brass tip.

SIZE	FINISHED	UNFINISHED	SIZE	FINISHED	UNFINISHED
4"	\$2.65	\$2.15	14"	\$4.40	\$3.95
6"	3.00	2.65	16"	4.75	4.40
8"	3.55	3.00	18"	5.35	4.75
12"	3.95	3.55	26"	6.25	5.35

NEW 4-SPEED HOBBY MOTOR

A rugged, precision built electric motor - operates on 110 volt, 60 cycle current. Originally built for the Navy - NOW converted for YOU! Has four take-off shafts turning at 5, 25, 150 and 4000 RPM. Cost Government approximately \$35.00 NOW . . .

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Made of top quality Vanadium steel. 15" long. Ideal for clearing brush. With sturdy belt sheath.



198



ARMY MACHETTE

Has 22" Vanadium steel blade. A hardwood handle. Sturdy belt sheath. 27" overall. . . . **ONLY 198**

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AAF SURVIVAL PONCHO Complete Rain Protection with this roomy Poncho. Has built-in hood with throat lacing for tight fit. Can be used as an emergency tent or tarpaulin - when it is stretched out makes a fine ground cover. (see view at right)



395

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Thick	Per Sq. Ft.	Thick	Per Sq. Ft.
1/4"	25¢	3/4"	75¢
3/8"	38¢	1"	\$1.00
1/2"	50¢	1-1/4"	1.35

CORED STOCK

Thick	Per Sq. Ft.	Thick	Per Sq. Ft.
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Now Anyone Can Smooth Rough Stuff!

Save yourself a lot of scraping and sandpapering with the new SMOOTHY. Easy to use as a black-board eraser! Has four scientifically designed star blades imbedded in tensioned plastic that will last indefinitely. Works quickly on rough plaster, wood, floors. Removes paint and varnish without messy liquids.

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Send 10c for New 120 Page Catalog (about 1000 illustrations) of UNUSUAL HOME ACCESSORIES.

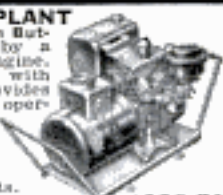
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PORTABLE LIGHT PLANTS

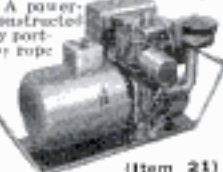
1300-1500 WATT PLANT
115v. 60 cyc. AC Push Button Start. Powered by a 3 1/2 HP. Clinton engine. Combines big output with easy portability. Provides emergency power for operating any oil burner, sump pump, freezer, television, lights, communications systems, etc. which require up to 1500 watts. (Item 22) Wt. 110 lbs. Reg. \$475 value. Factory price... **\$239.50**



1750 Watt Plant Powered by 4.5 HP Briggs engine. Electric starting & battery charging built-in! Factory price... **\$279.50**

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 10 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacle. An ideal plant for permanent or stand-by service. Wt. 225 lbs. Reg. price \$645.00 (Item 21) Factory Price... **\$329.50**

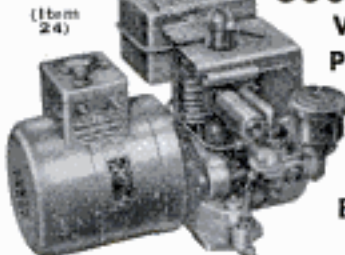


3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 50% more capacity. Wt. 270 lbs. Reg. \$740. Factory Price... **\$370.50**

DUAL VOLTAGE 110/220 for any of above plants—\$30 additional

get MASTER MECHANIC'S BEDROCK FACTORY PRICES

600-700 WATT PLANT



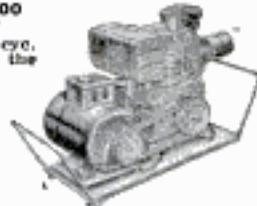
115 v. 60 cyc. AC Powered by a rugged 2 HP, easy starting Briggs engine. No wiring necessary! just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 4 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm knocks out power lines... **\$143.50**
Regular \$275.00 value... **\$199.50**

PUSH BUTTON START

LESS THAN WHOLESALE

GIANT 2000-2500 WATT PLANT

110-120 v. 60 cyc. AC. Absolutely the best made — exclusive dynamically balanced armature; heavy windings develop up to 2000 watt output for motor starting. Skid mounted — portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price \$585. Special at... **\$299.50**
Same plant with electric self starter (Item 31a)... **\$359.50**
Generator only and control box... **\$169.50**
DUAL VOLTAGE 110-220 available on any of above models for \$28.00 additional.



HI-LINE 6000 WATT PLANT

115/230 v. 60 cyc. AC. A brute of a power plant with a rugged 14.6 hp Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. (Item 162)



52 pc. SOCKET SET



Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome trim will alloy absolutely the best. Contains a complete set of 28 sockets in 1/2" drive, 3/4" drive and 1 1/2" drive, plus all necessary extensions, handles, spacers, reversible ratchets, etc.; all unroad, guaranteed against breakage. A beautiful set of tools that will handle any job in a big doghouse steel box. Wt. 37 lbs. (Item 205) List price \$62.90. Factory Special... **\$27.95**

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100 ft. extra heavy duty, made of specially insulated No. 14-2 conductor wire, non-prone to break. (50) **\$8.95**
No. 10-2 POWER CABLE. Heavy duty. Very flexible, rubber covered, 50 ft. with male and female fittings. Wt. 9 lbs. (Item 592a) **\$10.45**
50 ft. without fittings (Item 592) **\$9.45**
No. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 199) Wt. 8 lbs. **\$12.95**

JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements and road machinery. Pays for itself in a few weeks, sterilizes soil. 50 lbs. 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 1 1/2 ft. of high pressure steam hose and new triple-efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. **\$329.50**



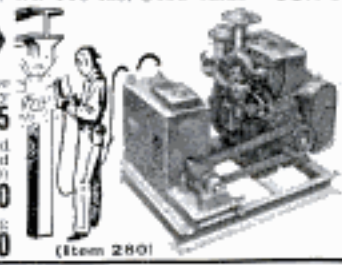
MASTER MECHANIC'S DC ARC WELDERS



Built in our own factory, these big, industrial capacity, portable welders provide terrific performance, yet are sold direct-to-you at bedrock factory prices—hundreds of dollars less than you'd expect! Senior model (shown in illustration, left) has high capacity DC welding unit—easily welds any thing up to 2 1/2" plate using 1/4" to 1/2" 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. Comes 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—drive with your tractor, jeep or gas engine of 14 HP or more. (Item 38a) Wt. 110 lbs. \$450 value **\$99.75**

THE POWER MASTER



WELDER ONLY—STANDARD MODEL. Same as above but with single rheostat for heavy metal welding only. (Item 38b) Wt. 110 lbs. \$400 value. Special! **\$99.75**

COMPLETE POWER MASTER. (Illustrated at right) powered by a 14.6 hp., air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compares with welder costing \$1200. Factory Special... **\$449.50**

WELDING KIT. Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at **\$10.50**

JET FLOW BLOWER



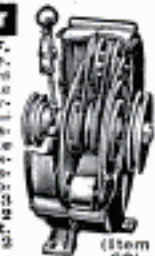
Tremendous air movement (1800 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating to forced air; spray booth exhausts, etc. Operates with any 1/4, 1/2 or 1/2 HP motor. Oversized, long life bearings. Includes variable speed motor pulley and belt. Dimensions 10" h x 18" x 16 1/2". Outlet opening 11" x 11 3/4". Wt. 45 lbs. Item 245. Reg. \$54.50. **\$29.50** Factory Special...

HEAVY DUTY 1/2 HP motor for above blower... **\$17.95**

12" TURBINE BLOWER Similar to above, but larger with 2400 CFM capacity. Wt. 65 lbs. (Item 245a) Reg. \$70.00. Factory Spec. **\$34.75**

Variable Speed Selector

Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drives. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation, easy installation. 3 sizes: 1/2-1 hp. 36 lbs.; 1-2 hp. Wt. 55 lbs.; 2-3 hp. Wt. 105 lbs. Reg. list \$228, \$252 and \$352. Our prices **\$79.50, \$89.50 and \$114.50**



10" Fan, wt. 8 lbs. (Item 10K)... **\$11.95**
12" Fan, wt. 10 lbs. (Item 10D)... **\$12.95**

CONDITIONAIRE VENTILATING FANS

Save big money installing your own exhaust fan. Efficient propeller type blade moves huge volume of air quietly and effortlessly. Heavy welded frame — pre-drilled for easy installation. Just cut opening and bolt in place. Continuous duty motors. Ideal for attics, restaurants, garages, barns, chicken houses, etc. Control manually or with thermostat.



Blade Opening CFM	Wt.	Item	Price
16"	18 1/4"	2025 19 lb.	365a \$27.95
18"	19 1/4"	3600 27 lb.	365b \$31.95
20"	21 1/4"	4100 30 lb.	365c \$39.95

THERMOSTATS: BARN type (range 40°-60°), Wt. 2 lbs. \$6.95.

9 TON HYDRAULIC PRESS

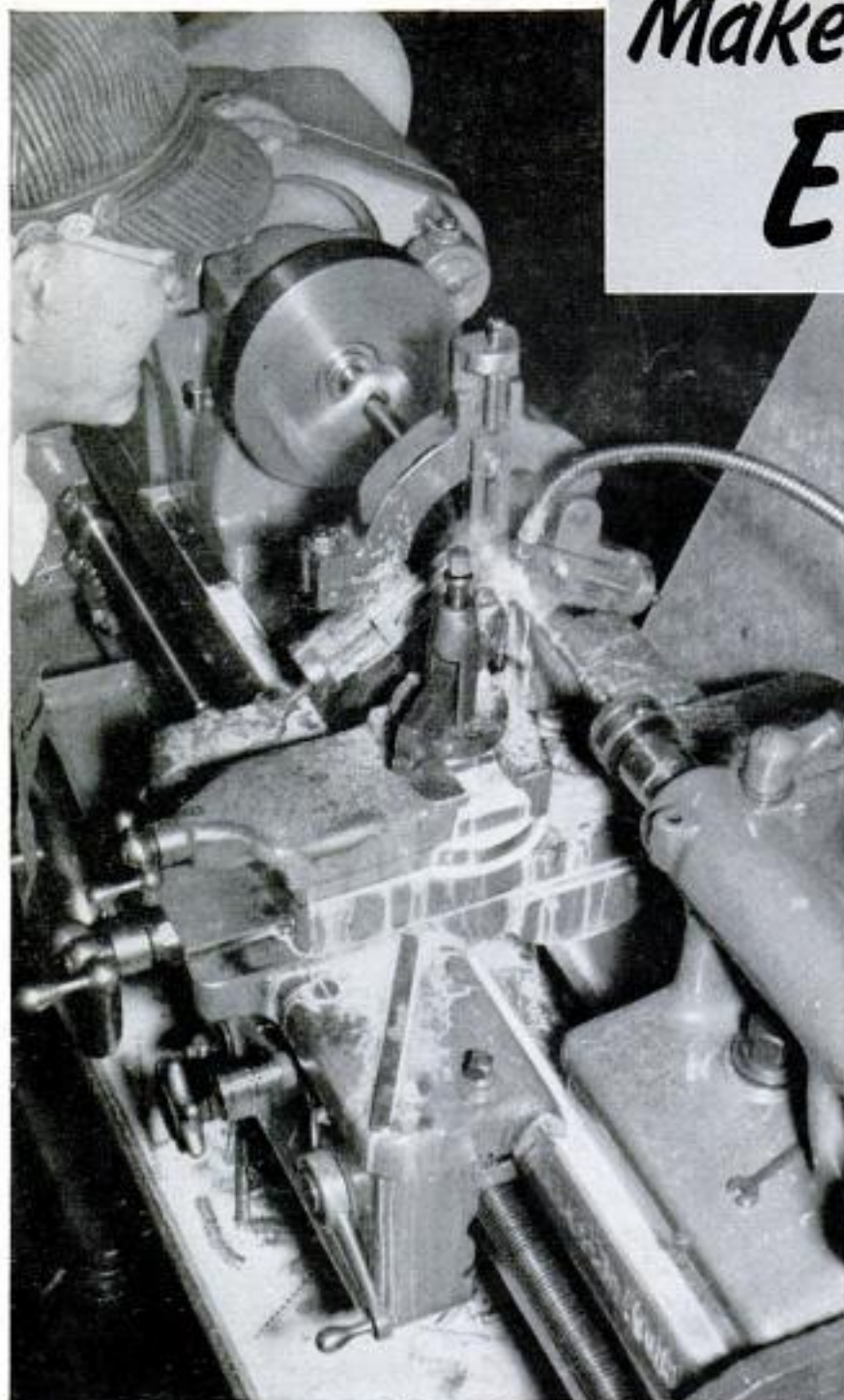
A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crankshafts, axles, link pins and bars — or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and jigs to straighten any kind of curve or bend. (Item 464) Wt. 110 lbs. Actual list price \$365. Our special close-out price.



Send check or M.O. Prices f.o.b. Factory. 10 Day Money back guarantee. SEND 10c for... **MASTER MECHANIC MFG. CO.,** DEPT. 1004 **Burlington, Wis.** **BIG 1956 Catalog**

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Make Tough Jobs
EASY



When tolerances start slowing up output, then is the time you need South Bend 14½" Lathes. Many plants have found they can save manhours and material by running the tough operations on these precision lathes — this is the type of work they do best. Their versatility enables you to keep them busy on a wide variety of work with a minimum of set-up time. Many attachments are available for special classes of work. Find out now how these lathes can give you efficient machining — *mail the coupon below today.*

BASE PRICE \$1809

SPECIFICATIONS

SWING: 14½" over bed and saddle wings; 10¼" over saddle with chip guard removed.

BED LENGTHS: 5, 6, 7 and 8 feet.

DISTANCE BETWEEN CENTERS: 24½ to 60½ inches.

COLLET CAPACITY: 1 inch.

SPINDLE BORE: 1½ inches.

SPINDLE SPEEDS: Eight . . . 30 to 875 r.p.m.

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.

CROSS SLIDE TRAVEL: 10 inches.

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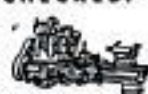
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