

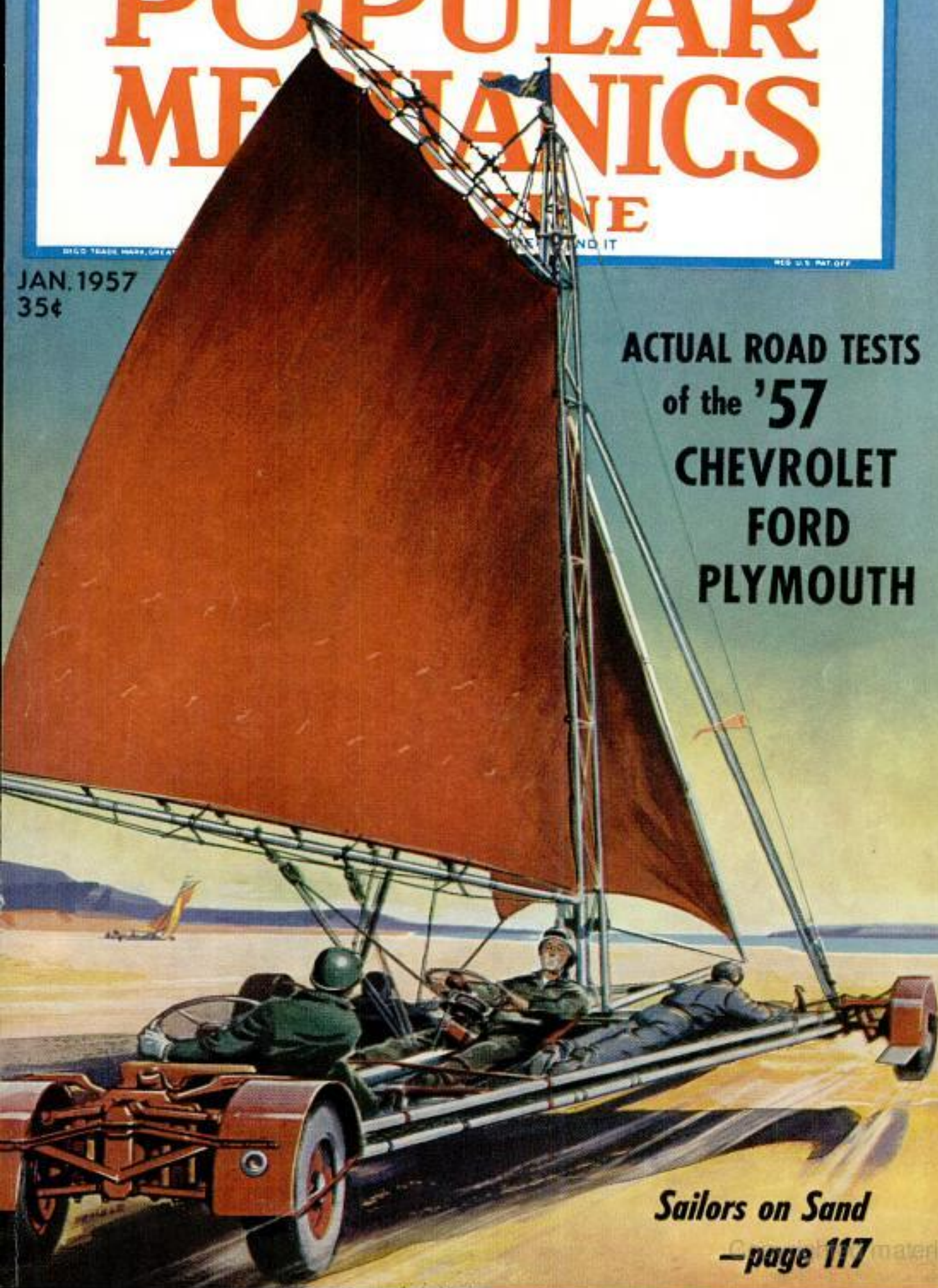
HOW TO PLAN THAT VACATION CABIN

# POPULAR MECHANICS

JAN. 1957  
35¢








ACTUAL ROAD TESTS  
of the '57  
CHEVROLET  
FORD  
PLYMOUTH

*Sailors on Sand*  
—page 117



# Champion spark plugs power 130 out of 134 stock car winners !

## BOX SCORE OF 1956\* NASCAR WINNERS

		Short track	Convertible	Grand National	Total
Ford		10	26	13	49
Chevrolet		18	10	3	31
Dodge		1	10	10	21
Chrysler		0	0	19	19
Mercury		2	0	5	7
Oldsmobile		1	0	1	2
Buick		0	1	0	1

\*through Oct. 14

**Tremendous record compiled by seven different makes of cars proves Champions are best for your car, too! If you've gone about 10,000 miles without a spark plug change, they can boost your road horsepower by 24%!**

What could be more dramatic proof of Champions' amazing performance? Out of 134 winning stock cars in 1956 NASCAR† races, 130 were powered by Champion Spark Plugs!

This kind of performance shows that Champions are best for *your* car, too. In fact, independent engineers have proved that if you've gone about 10,000 miles without a spark plug change, new Champions can give your car an *immedi-*

*ate* gain in road horsepower—a gain that averaged 24% in tests with all major makes of cars!

If you haven't had your spark plugs checked recently, chances are you're losing power! For spark plugs should be checked every 5,000 miles—and changed every 10,000 miles—to assure maximum performance. Replace *your* old plugs with new Champions—and get more road horsepower *instantly!*

†National Association of Stock Car Auto Racing, Inc.



**Cars that win stock car races** are no different from the cars you drive. But the men who race them know how to get every last ounce of horsepower. That's why the overwhelming majority of winners—better than 96%—are equipped with Champion Spark Plugs.



# AT LAST, AN AIR FILTER THAT REALLY PROTECTS YOUR ENGINE!

New FRAM  
**FILTRONIC**  
CARBURETOR  
AIR FILTER  
obsoletes all  
other air  
filter types



Here's  
the **SECRET**

Exclusive FRAM patented, built-in gasket  
absolutely prevents by-passing.

**TIME WAS** when your new-car manual warned: *Service your air filter every 1,000 miles.* It had to be! If you let it slide, engine wear jumped alarmingly as a result of abrasive dust and dirt passed by the already loaded filter. Cleaning efficiency dropped sharply and it was costly to keep your filter serviced.

**THE AMAZING NEW FRAM "FILTRONIC" CARBURETOR AIR FILTER** ends all that! Here's the air filter that performs mile after mile with a bare minimum of attention. It *keeps* its high efficiency—99. + % through all its life! No abrasive dirt or dust can by-pass it. Engine wear is cut up to 90%! And, it's a cinch to service! Takes but a minute or two to remove the specially-developed dry-type cartridge, clean it and re-install.

**WHY IS THIS NEW FRAM "FILTRONIC" AIR FILTER** so efficient? Because the exclusive FRAM-patented built-in gasket absolutely prevents by-passing and is a FRAM feature not found in any other filter! Dirt and dust *absolutely* cannot by-pass to damage vital engine parts. Your engine breathes clean air only; you save your engine's power; you lengthen your engine's life!

**Revolutionary New  
FRAM "FILTRONIC"  
AIR FILTER Now  
Standard Equipment  
on these Great Engines!**

Continental • Ford  
Lincoln • Mercury  
Studebaker • Thunderbird  
Turnpike Cruiser  
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Autocar • Clark • Cummins  
Diamond T • Divco  
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**GRAFLEX®**  
A SUBSIDIARY OF 



**Building Blocks for Fence  
Lock Without Mortar**

Fences or attractive garden walls can be made with a building block which requires no mortar. The block was developed by a student, Paul G. Priestley, at the Institute of Design, Illinois Institute of Technology. The block appears as a flat rectangle from the front and forms an H when viewed from a side. After the first row of blocks is laid, subsequent rows fit into grooves of the blocks below. The blocks can be laid in many designs and the inventor sees possibilities in them for room dividers that can be moved with ease.

**Satellites Would Extend  
Range of Television**

Manmade space-satellites, traveling 4000 miles high at four locations over the earth's equator, will serve as relay stations in a worldwide-TV system, a General Electric rocket expert has predicted. TV signals could be transmitted to the nearest satellite from a ground site on the equator. Relayed from satellite to satellite, these signals could be retransmitted to a selected TV-receiving station on earth. Need for high-altitude satellites is caused by the high radio frequency of TV signals, which are limited in range due to straight-line transmission over the earth's curved surface. At a 4000-mile altitude the effect of the earth's curvature on TV transmission and reception would be lessened.

# Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

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



## Next Month

DR. KARL SAX, the guiding genius of an arboretum famed as "America's Greatest Garden," can change an ordinary tree into a dwarf. He tells how you can do the same in a feature next month in which he reveals "The Tricks He Plays on Trees"

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Sources of further information not listed in the index, starting on page 90, about articles in this issue, frequently are shown in the Where-to-Find-It List prepared for each issue. A copy may be obtained by readers, without charge, from Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11, Ill.

Published monthly by Popular Mechanics Company, 200 E. Ontario St., Chicago 11, Ill. H. H. Windsor, Jr., president; Wm. Harrison Petridge, exec. vice-pres.; Franklin S. Forsberg, operations vice-pres.; D. F. Windsor, vice-president and secretary-treasurer; H. H. Windsor III, vice-president; W. T. Windsor, vice-president; Joseph R. Busell, Jr., advertising manager; Alan M. Deyoe, circulation manager. Single copy in the United States and Canada, 35 cents; subscription rates in the United States and possessions, Canada and countries of the Pan-American Postal Union, 1 year \$3.50; 2 years, \$6.00; 3 years, \$8.00. To all other countries add \$1.00 a year over United States prices for overseas postage. If you plan to move, notify us at least 30 days in advance so you will not miss an issue. Give both your old and new addresses. Entered as Second Class Matter, September 15, 1903, at the Post Office at Chicago, Illinois, under Act of March 3, 1879. Entered as Second Class Matter at Post Office Dept., Canada. Registered as Second Class Matter at the Post Office at Mexico, D. F., Mexico, June 20, 1950. Copyright 1956 by Popular Mechanics Company. Copyright under International Copyright Union. Copyright in France. All rights reserved under Pan-American Copyright Union. Printed in the United States of America.

Volume 107 JANUARY 1957 Number 1

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Chicago: 200 E. Ontario St., Whitehall 4-0100; New York: Empire State Bldg., 350 Fifth Ave., Longacre 5-7580; Detroit: General Motors Bldg., TRinity 5-8711; Cleveland: Hanna Bldg., 1422 Euclid Ave., PRospect 1-0456; Los Angeles: 3460 Wilshire, DUNKirk 2-8458; San Francisco: Russ Bldg., 235 Montgomery St., YUKon 2-0823.

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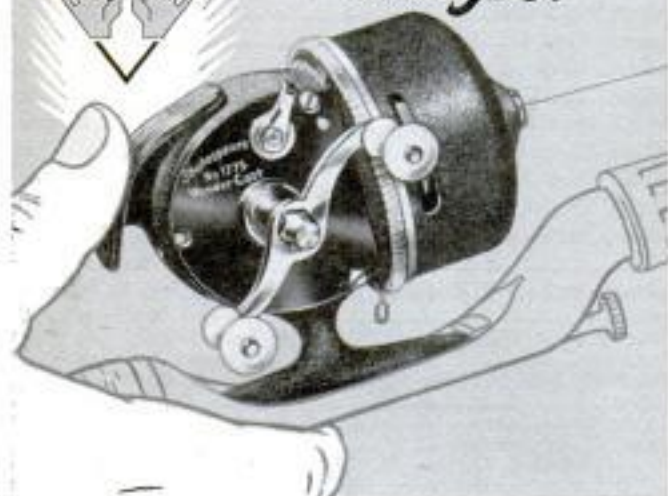
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## Portable Trap

O. F. Mossberg & Sons, Inc., New Haven 5, Conn.



Coveys of clay birds, hurled up to 60 yards from a 1½-pound aluminum hand trap, bring actual field conditions close to the practicing hunter. Swung like a baseball bat, the nonmechanical trap has no moving parts and releases from one to three spinning targets at a time. The unit is 37 inches long, has a removable handle which locks inside the trap frame for carrying or storage, and is operated right or left-handed. A retaining spring along the rubber-lined track holds clay targets in place prior to throwing. Speed and angle of release can be varied.



Ithaca Gun Co., Inc., Ithaca, N. Y.

## Glowing Gun Sight

Picking up light rays to glow a bright red-orange against the target, a plastic-pellet gun sight increases accuracy and speeds sighting in weather involving poor lighting conditions. The pellet is mounted in steel.

Chemical "stop drop" sprays that prevent fruit from falling off trees are cutting pre-harvest losses of apples and pears from 20 percent to less than 6 percent.

POPULAR MECHANICS

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New versatile

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

It's a 1/4" drill...a screw setter...a power screwdriver!



Porter-Cable's amazing new Screwdriver Kit gives you *three* of the world's handiest tools—at a real bargain price, if you act now.

The matchless Porter-Cable drill has all the speed and power you will ever need for any kind of drilling up to 1/4" in steel and 1/2" in hard wood.

The unique screw setter attachment drills precision pilot holes for the threaded portion of the screw, and a larger hole for the shank, countersinks for the screw head and counterbores for putty and wood plugs—all in one easy operation.

And simply by inserting the screwdriver attachment into the chuck, this Porter-Cable drill becomes a power screwdriver. It performs all your screwdriving needs easier, faster than ever.

This amazing screwdriver kit helps you get professional results in furniture-making, home improvements, fine cabinet work and shop work of every kind. Save \$5.00 if you buy *now*.

**Porter-Cable**

*Quality Electric Tools*

## SPECIAL INTRODUCTORY OFFER!

Model 161 Screwdriver Kit, complete with adjustable Screw Setter (for No. 8 screws) and Screw Driver attachments with slotted screw bit and Phillips bit, and Carrying Case constructed of strong, welded steel.

\$41.95 value... **\$36<sup>95</sup>**  
now only

Offer expires Jan. 31, 1957



SEE YOUR DEALER—OR MAIL COUPON TODAY!

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- 7141 N. Salina St., Syracuse 8, N. Y.
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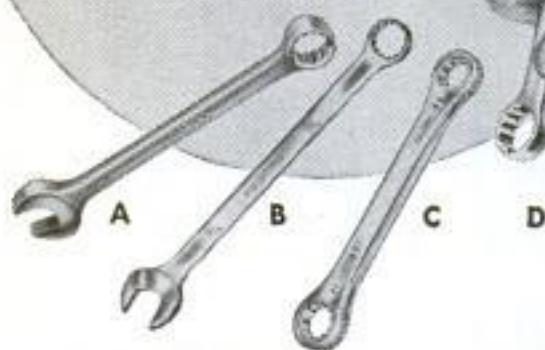
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In Canada: write Porter-Cable, Ltd., Box 5019, Ont., Canadian prices slightly higher.

# Do Your Work Easily with PROTO's New, Improved Flat Wrenches



## CHECK THESE FEATURES!

**Balance . . . Proportion . . . Design •  
PROTOLLOY Steels • Good Obstruction  
Clearance • Tough, Non-Slip Finish •  
Plainly Marked Openings.**

PROTO Flat Wrenches are truly "professional quality" tools, made of specially forged alloy steel, carefully heat treated. Designs are based on scientific study to make them as slim as possible for convenience in tight places, yet reinforced properly where it counts to eliminate breakage. See your nearby PROTO dealer today. Send 10¢ for catalog of entire line to

### PROTO TOOLS

2217 Santa Fe Ave., Los Angeles 54, Calif.  
Eastern Factory, Jamestown, N.Y. • Canadian Factory, London, Ont.

**A. NEW!** Whitworth Combination Box & Open End Wrenches. Four sizes commonly used on foreign automobiles and motorcycles. Whitworth openings,  $\frac{3}{16}$ " to  $\frac{3}{8}$ ". Lengths,  $5\frac{1}{4}$ " to  $8\frac{1}{4}$ ". Satin chrome plated.

**B. NEW!** Long 6-Point Box & Open End Wrenches. Provide greater gripping area for heavier torque loads.  $\frac{3}{16}$ " to  $\frac{3}{8}$ " openings.  $5\frac{3}{4}$ " to  $9\frac{1}{8}$ " lengths. Satin chrome plated.

**C. NEW!** Ratcheting 12-point Box Wrench. For oil filter work on new cars.  $\frac{5}{8}$ " x  $\frac{3}{4}$ " openings.  $8\frac{1}{8}$ " long. PROTO line now includes 6 tools in this series.

**D. NEW!** Double Head 12-Point 15° Box Wrench. Meets Mil. Spec. Designed for use on elastic stop nuts. Openings,  $\frac{3}{16}$ " x  $\frac{17}{32}$ ". Length,  $5\frac{1}{4}$ ". Satin chrome plated.



AS688

## ACROSS THE DESK



Like to compare the performance of Chevrolet, Ford and Plymouth as reported by experts? Turn to page 106 for analyses of the Big Three by Dale Kelly, engineer, and Floyd Clymer, who has taken all three '57 models into the country for test runs.

### To the Editor:

The annual house section of your magazine (PM, Oct. 1956) is a wonderful idea and I would like to add my opinion on "What is wrong with today's houses."

First, I think there is not enough thought given to eating areas. That is the only time you can get the family together, but not sitting in front of a wall in a little dark corner or on a stool. The eating area, rather than the sink, should be in front of windows to inspire chumminess, friendliness and relaxation. A dining area in the living room is only used on state occasions; therefore, the kitchen is very important.

Second, the garage should always be next to the kitchen; parcels and groceries should not be carried through bedrooms or living room.

Our interest is running high at the moment because we wish to dispose of our spacious 12-room house for a five-room house. We have an adorable location with all the land we wish; the living room shall have to be at the rear of the house because the view is of the most beautiful sunsets in New England.

I may as well tell you what we want in a house: Living room about 400 square feet, two bedrooms about 180 square feet and kitchen about 180 square feet (no stool and no breakfast nook). Many cabinets and many closets and a screened porch, not a breezeway. Full basement. You see this is not to be pretentious but just perfect for a retiring couple. Many of our friends are also looking for this type home.

Hoping my ideas may be of some value. We find *Popular Mechanics* the most interesting literature that comes into our home.

Mrs. Fred Kingdon,  
56 Pakachoag St.,  
Auburn, Mass.



We were in error in stating that the nail-on bricks described on page 140, November 1956, are  $2\frac{1}{2}$  inches thick. The face of the brick is  $2\frac{1}{2}$  by  $11\frac{1}{2}$ , but its thickness is only one inch, making the brick only one fourth the weight of ordinary brick.

(Continued to page 8)

POPULAR MECHANICS





To the man who wants to enjoy  
**an ACCOUNTANT'S CAREER**



**IF** you're that man, here's something that will interest you.

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

Of course, you need something more than just the desire to be an accountant. You've got to pay the price — be willing to study earnestly, thoroughly.

Still, wouldn't it be worth your while to sacrifice some of your leisure in favor of interesting home study — over a comparatively brief period? Always provided that the rewards were good — a salary of \$4,000 to \$10,000 and up?

An accountant's duties are interesting, varied and of real worth to his employers. He has *standing!*

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### Get Individual Guidance

Our famous school trains you step-by-step, right at home in your spare time, with clear A-B-C explanations and how-to-do-it pictures. Each of your lessons is personally reviewed by a gifted art instructor who writes and sketches suggestions and hints right on your own lesson sheet. Reasonable tuition fees. Earn while you learn. **TWO Complete Art Outfits** included at no extra cost.

### They Traded Dull Jobs For Glamorous Careers



L. E. SIKES, Jr., Lake Wales, Fla.

"I now own my own business. Without the training I received from the WSA I'd still be a clerk." — MRS. TAVI TEICHMAN, Northfield, N. J.



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Address \_\_\_\_\_

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### To the Editor:

Enclosed is a snapshot of a three-wheel car I built. The body is from a cracked-up airplane (cut the tail and front seat off), Model-T steering wheel, one-wheel trailer



wheels and tires, motorcycle sprocket and chain, scooter brake and Briggs & Stratton motor. Top speed, 22 miles per hour.

Gail D. Wilson,  
5100 Colonial Dr.,  
Minneapolis, Minn.

### To the Editor:

As a vocational teacher I have always found *Popular Mechanics Magazine* an abundant source of teaching materials. Its pages are packed full of ideas which with a little enthusiasm and sweat often can prove profitable. In the present emphasis on vocational education and the development of home industries sponsored by our



government, your magazine has proved one of the best means toward that end. It's no wonder, therefore, that it has been very popular with students anywhere and everywhere here.

Enclosed picture shows you what some of my vocational students produced from ideas found in *Popular Mechanics* (August 1953, Craftsman Section). Some have sold

(Continued to page 10)

*if you're in your twenties or early thirties, here's a solid-gold opportunity to make*

# BIG MONEY BY 35



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Another is a handbook outlining opportunities in your particular field of interest (see list in coupon below).

The third is a sample lesson in Basic Mathe-

matics which demonstrates how easily yet how thoroughly I.C.S. helps you master a subject.

These books will be especially useful to you if you are between 20 and 35—provided you want to enjoy the rewards of success before you reach middle age. Actually, the famous I.C.S. method of "Success Conditioning" knows no age limit. It's never too late to learn.

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YEAR**

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- Building Maintenance
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- Painting Contractor
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- Chemical Engineering
- Chem. Lab. Technician
- General Chemistry
- Natural Gas Prod. & Trans.
- Petroleum Engineering
- Plastics
- Pulp and Paper Making

- CIVIL, STRUCTURAL ENGINEERING**
- Civil Engineering
- Construction Engineering
- Highway Engineering
- Reading Struct. Blueprints
- Sanitary Engineering
- Structural Engineering
- Surveying and Mapping
- DRAFTING**
- Aircraft Drafting
- Architectural Drafting
- Electrical Drafting
- Mechanical Drafting
- Mine Surveying and Mapping
- Plumbing Drawing and Estimating
- Structural Drafting
- ELECTRICAL**
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- Electrical Maintenance
- Electrician  Contracting
- Lineman
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- Commercial  Good English
- High School Subjects
- Mathematics

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- Industrial Supervision
- Leadership and Organization
- Personnel-Labor Relations
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- Heat Treatment  Metallurgy
- Industrial Engineering
- Industrial Instrumentation
- Industrial Supervision
- Internal Combustion Engines
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- Machine Shop Inspection
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 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to P.M. \_\_\_\_\_  
 Occupation \_\_\_\_\_

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(Continued from page 8)

their products for 20 pesos (\$10, U.S.) Most brought their luggage home as presents to their parents. You bet admiring eyes popped!

R. B. Castro,  
Vocational Dept.,  
West Visayan Academy,  
Box 502, Iloilo City,  
Philippines

☆☆☆

Several readers have called our attention to similarities between the airplane built by Bob Nesmith of Houston, Tex. ("The Plane for the Do-It-Yourselfer," October 1956) and the airplane designed by Steve Wittman of the Wittman Flying Service, Oshkosh, Wis.

Mr. Wittman, designer of a light plane called "The Tail Wind," writes us that he sold a set of plans to Mr. Nesmith and adds: "At present there are 64 Tail Winds being built in the United States, one in Sweden and Belgium. The plans are copyrighted and the landing gear is patented."

Mr. Nesmith writes us that he did not build his Cougar from Mr. Wittman's plans; that he does "have a set of his [Wittman's] plans along with over 100 sets of plans of other airplanes," and lists a number of

differences in materials, controls and dimensions between his Cougar and the Tail Wind.

Since there are differences in opinion involving both copyrights and patent rights *Popular Mechanics* regrets that it cannot refer readers interested in these airplane plans to the owners of the plans at this time.

#### To the Editor:

I read your magazine whenever I can get one, which is not very often, and I find it one of the most interesting of its kind. I wonder if you can put me in touch with some fellows who would be interested in exchanging general mechanical information? I would prefer a hobbyist, as I am one myself.

Alfred Sing,  
114 Duke St.,  
Kingston,  
Georgetown, British Guiana

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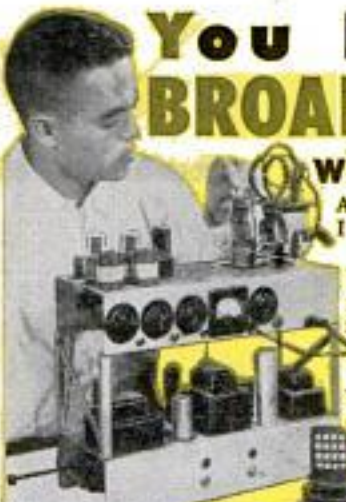
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"I have progressed very rapidly. My present position is Studio Supervisor with KEDD Television, Wichita."—Elmer Frowaldt, 9026 Stadium, Wichita, Kans.

"Fix sets part time in my shop. Made about \$600 first three months of the year. Could have more but this is about all I can handle."—Frank Beer, 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 Delzell, 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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A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled "Patent Guide for the Inventor", containing detailed information with respect to patent protection and procedure, together with a "Record of Invention" form will be promptly forwarded to you without obligation upon request.

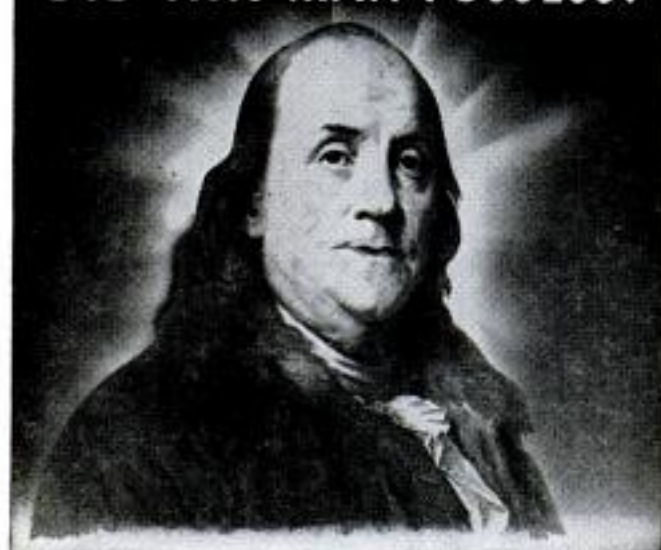
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The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

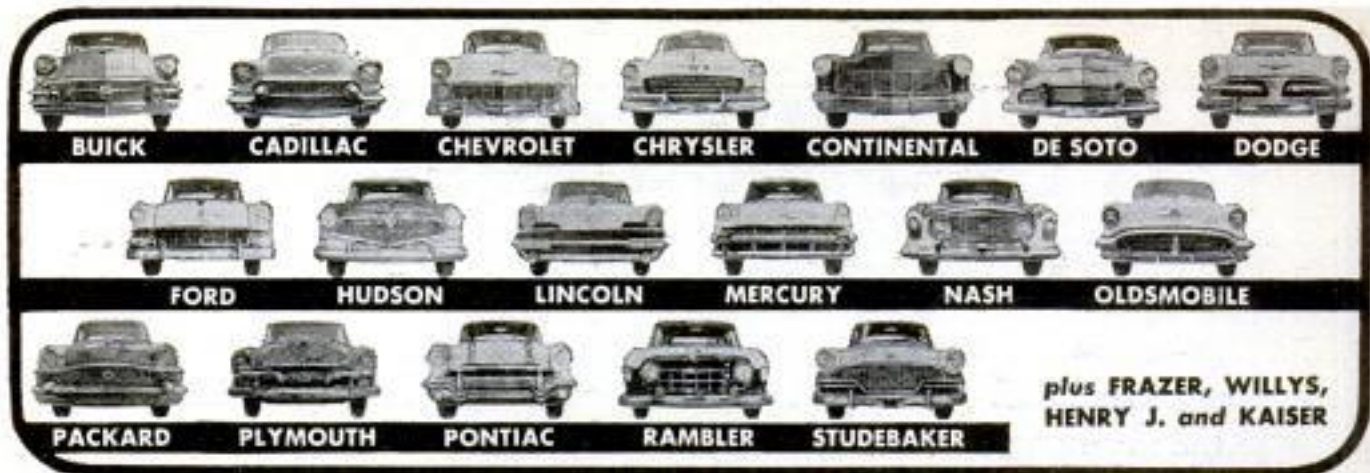
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**FROM FARM TO FAME.** Above are Lawrence Welk and his famous "Champagne Music" orchestra of TV fame. When Welk was a farm lad, a U. S. School of Music Course taught him to read and play music in his spare time.

### And Here's What Other Students Say

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—Bobby Smith, Grove Hill, Ala.

#### "How Happy I Am"

"How happy I am. I play for parties, entertainments. Never once thought I would be able to play the piano. Thanks a million!"

—Cora Franklin Duke, Bumpass, Va.

#### "Friends Were Amazed"

"Didn't know a note on piano. In a short time I could play simple hymns. Friends were amazed. Now entertain at parties, play at church."

—Samuel Moses, Mt. Vernon, Tenn.

Over 900,000 people have found a simple answer to these difficulties. One of them was a farm boy named Lawrence Welk. Early in life he showed a love of music, and by 13 had learned to play his father's old "squeeze box" by ear. After years of farm labor, came the day when he was rewarded with a modern accordion. He enrolled in the home study Course of the U. S. School of Music and was soon playing real music by note. Thus he started on the road that led to the present triumph of Lawrence Welk and his "Champagne Music" on ABC-TV.

### What Music Can Do for YOU

You may simply want to learn to play for the sheer joy of it. The fun of entertaining your friends—of being invited to play at parties, where you meet interesting



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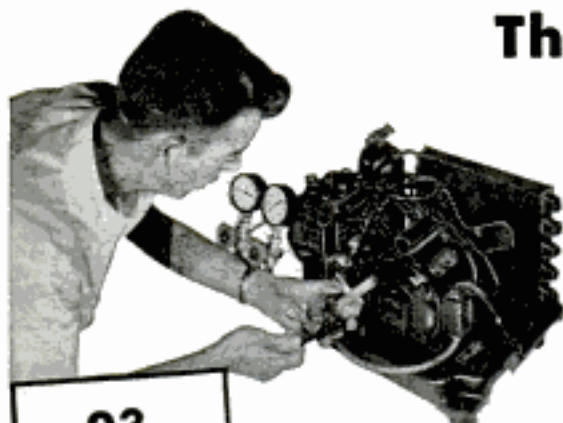
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"Without the practical and theoretical training I received through CTI, I never could have started a business of my own. I have a small shop. Am financially independent."—*K. Sellman, Guthrie Center, Ia.*

"Am very glad I learned through CTI. I am now an able refrigeration technician. Am earning good wages, find my work interesting. I recommend CTI to any ambitious man."—*A. W. Heindrich, Kewanee, Ill.*



"I find the lessons very interesting and easy. Since my fifth lesson I have been working on refrigerators. I rebuild old ones and sell at a nice profit. Am planning a full time shop."—*W. O. Ward, Mich.*

"Your course proved to be very valuable to me. As a result of your training, my partner and I run our own repair shop. He is also a CTI graduate. We also employ a former CTI student as our outside repair technician."—*J. J. Giertuga, Chicago.*

"My training thru CTI has changed my life. It has changed it from working for bare necessities to my owning a business."—*J. J. Kish, E. Chicago, Ind.*

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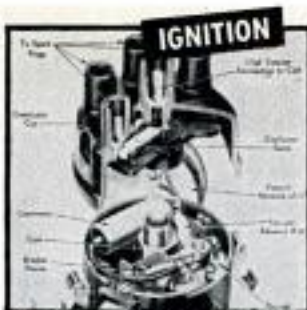


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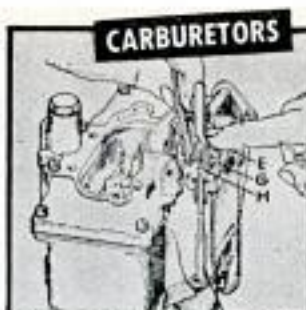




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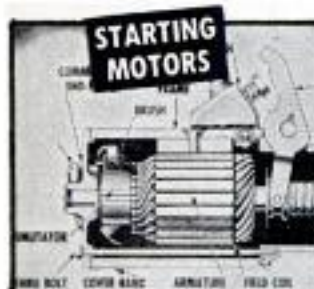


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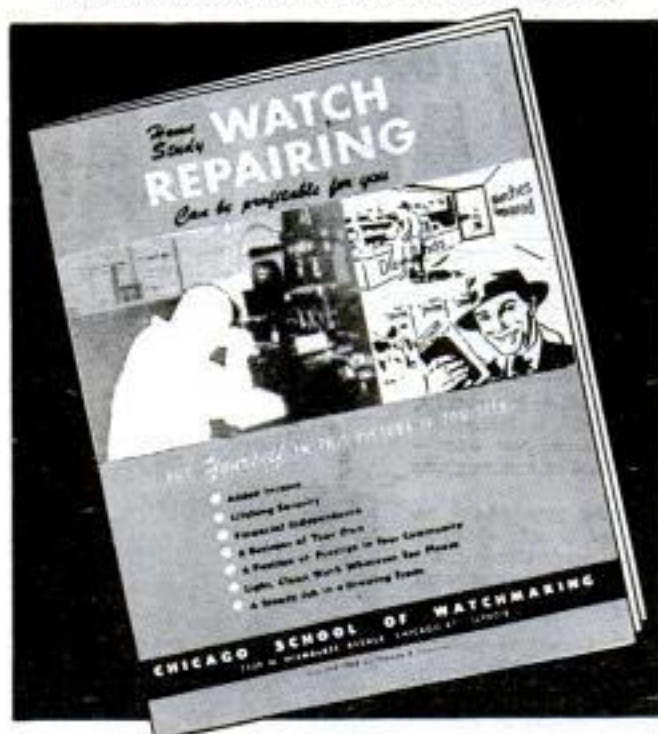
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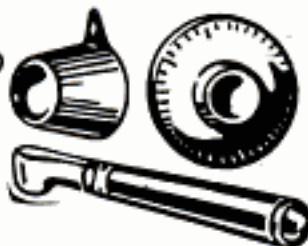
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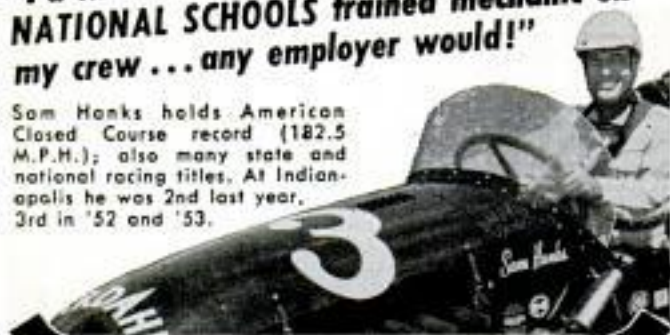
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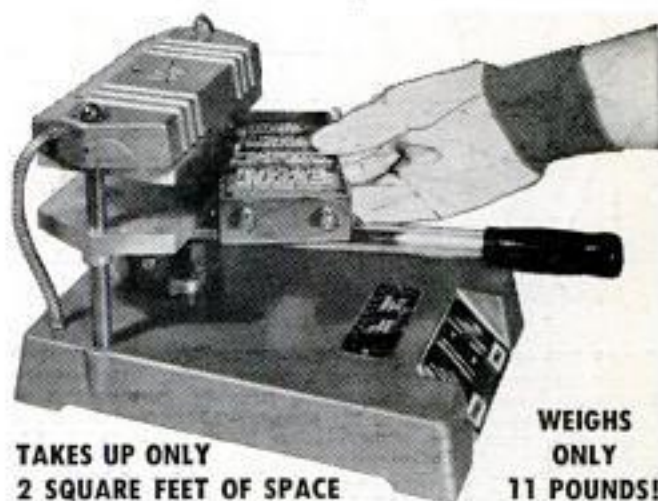
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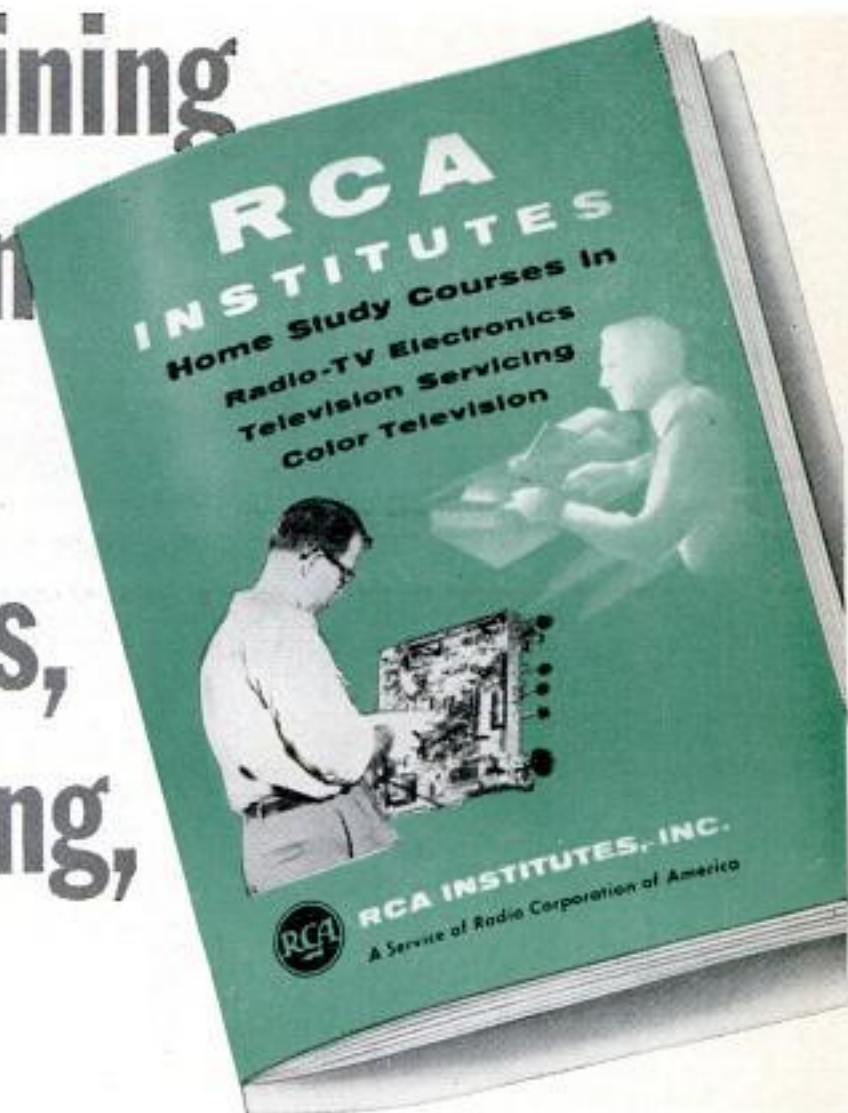
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By ED MITCHELL

Let me say this at the start. What I'm offering you on this page is a very simple investment. I want you to try the most fantastic spark plug in the world, entirely at my risk! A spark plug that costs only a few pennies more than the old-fashioned model that's on your car today. A spark plug that lasts up to 10 times as long as that old-fashioned model . . . that gives you the full blazing horsepower that that old plug is robbing you of today . . . and that actually saves you enough gas to drive half way across America, every single year that you use it!

Does this sound impossible? It's been proven a thousand times this year! Here is a small sample of that proof.

## This is Why Your Car Wastes Gas, Loses Power

Some day, if you ever have a spare moment, lift one of the spark plugs out of your car. Look at the bottom of that plug. In 10 seconds, you'll learn more about gas waste than any book could teach you in a year.

If that plug has been in your car a thousand miles or more, then what you'll see on the bottom of that plug is FILTH! The Firing Point of that plug—the most important single point in your car—will be choked to death with BLACK, FILTHY CARBON! Carbon that robs your car of as much as 20 vital horsepower every time your engine fires!

Now, wipe that filth away. And look at the Firing Point itself. This is the POWER POINT of your car . . . the pin-head of electricity that turns raw gas into 200 horsepower of driving energy! And what is the condi-

tion of that Point? CORRODED . . . PITTED . . . SCARRED . . . AND WORN! Hardly able to deliver half the spark it should! Wasting gas . . . wasting money, every time you put your foot down on the pedal!

Yes! You pay \$2000 . . . \$3000 . . . \$4000 for your car. And a single 58c part robs you of the real power and enjoyment of that car.

## At Last A Plug So Smart That It "Thinks"

Now look at the new plug—the jet-finish "POWER-FLASH" plug that I send you—for only a few pennies more than you're paying today!

Here is a plug that has not only ONE firing point—but hundreds of firing points! That fires so fast, so effectively, an alien that is actually ELIMINATES THAT DEADLY CARBON BURNS IT UP . . . THROWS IT AWAY . . . KEEPS ITSELF SPARKLING CLEAN, ON EVERY SINGLE STROKE! The full, blazing horsepower that was there when your car was brand-new, is still there 30,000 miles later.

But that's just the beginning! This plug actually gives you the different firing power you need for every driving condition—smooth, dependable power for city stop-and-go driving . . . effortless horsepower for the parkway . . . blazing reserve power for super speeds! No more missing, sputtering, knocking when you want to pull ahead of other cars at high speeds! No more greasy take-offs at the lights! FULL POWER 24 HOURS A DAY . . . or we send you a new set FREE!

And that's still just the beginning! Best of all—this is the toughest, strongest, longest-lasting plug ever made! YOU COULD ACTUALLY POUND IT AGAINST A CONCRETE WALL WITH A HAMMER, WITHOUT EVEN DENTING IT—AND THIS AMAZING PLUG WOULD STILL FIRE CLEAN AND HOT FOR 30,000 MILES! Yes! These fantastic plugs give you such terrific, consistent, long-lasting service that



## See The Amazing Difference Yourself!



- This new "Power-Flash" Jet-Compression Power Plug (on the left) is guaranteed to be the most powerful longest lasting Spark Plug ever made! Here's why:
1. Only "Power-Flash" gives you an unlimited number of firing points—plus a guaranteed minimum of 2000 more spark actions than ordinary plugs! Highest compression, longest engine life, more mileage, more hot spots!
  2. Only "Power-Flash" gives you automatic heat and gap control! Absolutely thinks for itself! Gives you instant, wider spark for smoother performance, instant starting, faster pick-up even in freezing weather!
  3. Only "Power-Flash" gives you automatic self-cleaning action! Actively forces dirt to clean itself. Keeps the crown, center, longer life, more lasting "plug" or power loss!
  4. Only "Power-Flash" gives you longest insulation! Made! Lifetime guaranteed—diamond-like hardness! Gets rid of deadly heat up to 20 times faster than ordinary insulators!

This set starting guarantee: Satisfaction guaranteed for the full price of \$1.00. Refund . . . or a new set FREE! Act TODAY!

we can afford to make one of the most amazing guarantees you ever heard!

## Try It at My Risk, Today!

What have you got to lose? These amazing jet-finish "POWER-FLASH" plugs cost only \$1.45 each—or \$8.70 for a complete set for six-cylinder cars, and \$11.95 for a complete set for

eight-cylinder cars. They cost only a few pennies more than ordinary old-fashioned plugs—and they can save you up to \$100 this year!

Here is my guarantee to you. Put these plugs in your car yourself. No mechanic needed. Nothing to adjust. From the very first moment that you get back in that car and drive, you must notice amazing new power and pick-up—or I'll send you a new set free!

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Here are simple tips that show you how to add amazing mileage to your car—without touching a tool—without even lifting the hood of your car! Here's a fantastic 30-second trick that gives you up to 2-3 extra miles per gallon! Another secret shows you how to switch one single wire and save up to 50 gallons of gas in your water driving . . . how you can add up to 10,000 more miles to your tires—how to get your "dead" battery started in just one minute—without a pump or a key!

Yes, professional tips that can save you hundreds of dollars a year! And it's all yours—FREE! How would you like to get power to move away from other cars at the lights . . . to drive up to 5,000 miles—without changing your oil! Other important tips show you how to remove rust from your chassis . . . make dents and scratches disappear for good . . . to stop steering wheel "play" . . . how to adjust your own brakes and save \$5 . . . to repair your chipped windshield and save \$25 . . . to fix a leaky radiator and save \$20!

Yes, all this and more is yours—absolutely FREE—our BONUS GIFT to you with your purchase of the amazing new "POWER-FLASH" PLUGS which are absolutely guaranteed for two years or 30,000 miles of the most fabulous spark plug service you've ever enjoyed! And if you want this special FREE BONUS—the sensational book "How To Double The Performance of Your Car"—you must order your "POWER-FLASH" PLUGS today! Our supply of this free, Pearl Edition of the Car-Book is limited! So act NOW!

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E. O., Detroit, Mich.

"I bought your plugs for my '34 Ford some time ago . . . so far as I can tell I am getting at least 8 miles per gallon better mileage. Also my Ford has far better pickup and horsepower. I have driven about 12,000 miles since purchasing the plugs and they are in as good condition as ever."

C. C., Avila, Indiana

"I replaced the expensive-type spark plugs in my Lincoln Continental with yours. With the old style plugs, I was getting approximately 15 miles in the gallon. During the first thousand miles of operation with Power Plugs, my mileage increased to 22 miles per gallon. This was an increase of 7 miles per gallon. In addition to the increased mileage, it was happy to notice much better filling and absolutely no stalling. Mile which I formerly had to second gear now presents no problem in climbing with high gear. My heavy Continental used to lug away from signals; now it dashes away."

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"Your plugs have been in my car now for three or four months, and I must say it's running better than it ever did before, and I am getting a lot better mileage out of it. At least as much as the D.C. you claim."

"I'd say your plugs are well worth the price you ask, especially as I do not expect to have to buy a new set so long as I have my power—\$1.00 money."

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"I have just disposed of the car in which your spark plugs were installed. The mileage facts may be of interest to you."

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2) These plugs MUST give you up to 20 MORE horsepower—INSTANTLY—or every cent of your money back!

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Blueprints</li> <li><input type="checkbox"/> Sanitary Engineering</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Mine Surveying and Mapping</li> <li><input type="checkbox"/> Plumbing Drawing and Estimating</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Electrical Maintenance</li> <li><input type="checkbox"/> Electrician <input type="checkbox"/> Contracting</li> <li><input type="checkbox"/> Lineman</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial <input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Subjects</li> <li><input type="checkbox"/> Mathematics</li> </ul> | <p>(Partial list of 256 courses)</p> <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Leadership and Organization</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> </ul> <p><b>MECHANICAL AND SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gas—Electric Welding</li> <li><input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Internal Combustion Engines</li> <li><input type="checkbox"/> Machine Design-Drafting</li> <li><input type="checkbox"/> Machine Shop Inspection</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration</li> <li><input type="checkbox"/> Sheet Metal Worker</li> <li><input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio TV Eng'ing</li> <li><input type="checkbox"/> Radio and TV Servicing</li> <li><input type="checkbox"/> Radio Operating</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Television Technician</li> </ul> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Brake Equipment</li> <li><input type="checkbox"/> Car Inspector</li> <li><input type="checkbox"/> Diesel Engineer &amp; Fireman</li> <li><input type="checkbox"/> Section Foreman</li> </ul> <p><b>STEAM AND DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Diesel—Elec. <input type="checkbox"/> Diesel Eng's</li> <li><input type="checkbox"/> Electric Light and Power</li> <li><input type="checkbox"/> Stationary Fireman</li> <li><input type="checkbox"/> Stationary Steam Engineering</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton, Rayon, Woolen Mfg.</li> <li><input type="checkbox"/> Finishing and Dyeing</li> <li><input type="checkbox"/> Loom Fix'g <input type="checkbox"/> Textile Des'ing</li> <li><input type="checkbox"/> Textile Eng'g <input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warping and Weaving</li> </ul> <p><b>MISCELLANEOUS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Domestic Refrigeration</li> <li><input type="checkbox"/> Marine Engineering</li> <li><input type="checkbox"/> Ocean Navigation</li> <li><input type="checkbox"/> Professional Engineering</li> <li><input type="checkbox"/> Short Story Writing</li> <li><input type="checkbox"/> Telephony</li> </ul> |
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Borg then told me that his power of memory would probably amaze me — and I had known him, while we were studying law together in Paris to have the most deplorable memory!

So he went to the end of the dining room and asked me to write down a hundred three-figure numbers, calling each one out in a clear voice. When I had filled the edge of an old newspaper with figures, Borg repeated them to me in the order in which I had written them down and then in reverse order, that is beginning with the last number. He also allowed me to ask him the relative position of different numbers: for example, which was the 24th, the 72nd, and the 38th, and I noticed that he replied to all my questions at once and without effort, as if the figures which I had written on the paper had been also written in his brain.

I was dumbfounded by such a feat and sought in vain for the trick which enabled him to achieve it. My friend then said: "The thing you have just seen and which seems so remarkable is, in fact, quite simple; everybody has a memory good enough to do the same, but few indeed can use this wonderful faculty."

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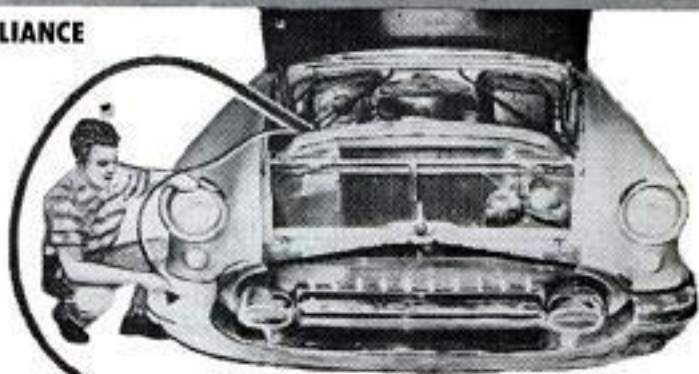
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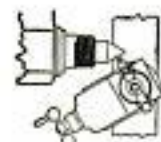


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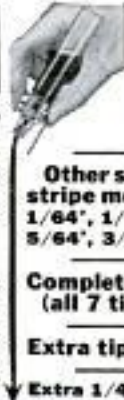
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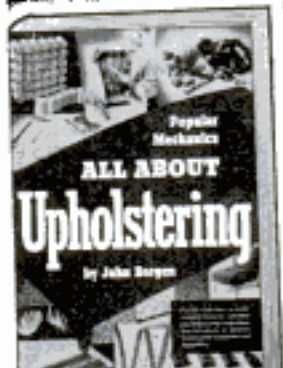
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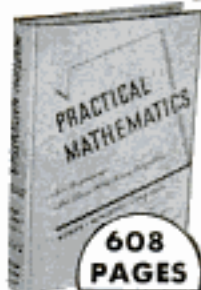
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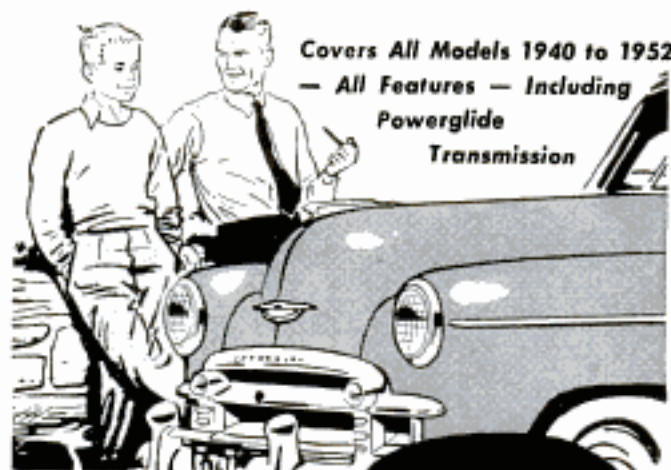
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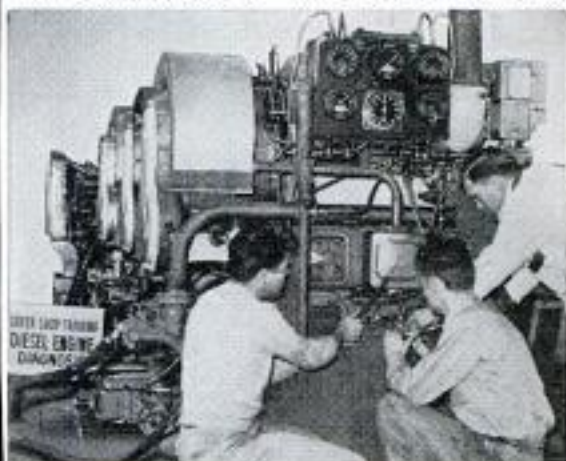
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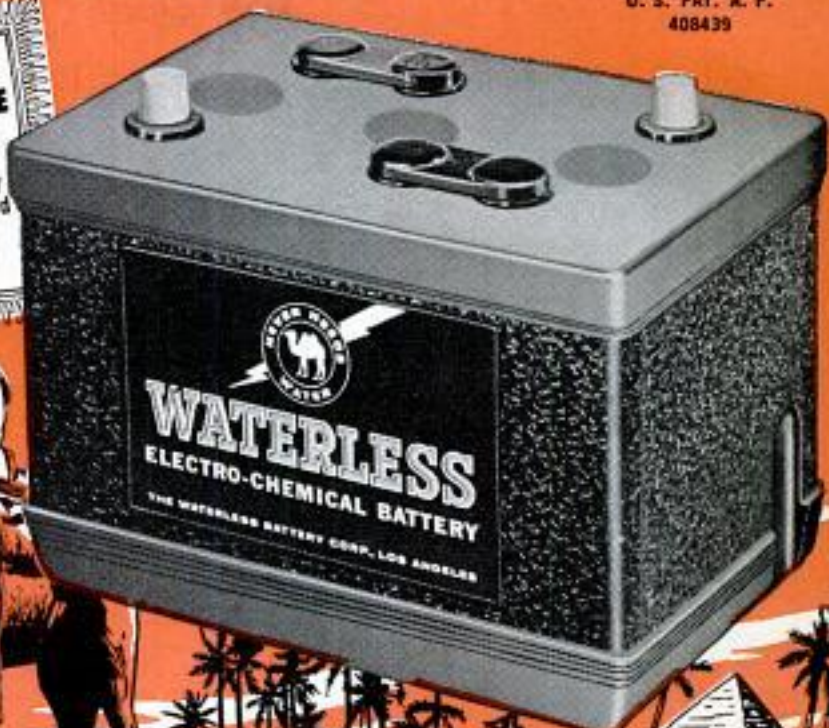
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**FREE!** Monaco Roosevelt set! Inexpensive approvals. Atomic, Box 295-A, Silver Spring, Maryland.

**GERMANY** Below wholesale. Request price list. Kaperi, P.O.B. 35175, Los Angeles, Calif.

**QUALITY Approvals, 500 at 2¢ each.** Hadrian, 12 East 31st, New York City 16.

**LIBERIA Birds complete, 25¢ to approval applicants.** BKJ, Astor Station, Boston 23, Mass.

**ITALY—100 Different 10¢ with approvals.** DeRespinis, G.P.O. Box 771A, New York 1, N. Y.

**90,000 STAMPS Sale!** Big lot including beautiful Mona Lisa, Greece, Egypt, Malta, Turkey, \$1. Extra special better stamps \$2. Giant assortment \$5. Literature free. Persil, 436 N. Y. Ave., Brooklyn 25, N. Y.

**FREE!** U.S. price list (1957) to all our approval customers. Write for a selection today. New-Way Stamp Co., Lawrence, Massachusetts.

#### **ANTIQUES, RELICS, INDIAN GOODS, CURIOS**

**10 ANCIENT Arrowheads \$2.00.** Grooved tomahawk \$3.00. List free. Lear's, Glenwood, Arkansas.

**SELECTED War arrowhead \$1.00.** List 5¢. H. Talburt, Calico Rock, Ark.

**ILLINOIS "Gesundheit" — Disposing of \$300,000.00 collection of 500 historical firearms; revolutionary, civil, Indian war, flintlocks, muskatoons, swords, bayonets, bullet molds, powder flasks, Kentucky rifles, pepperboxes, dueling pistols, 50,000 Indian relics, collectors cartridges, coins, Confederate money, Agates, minerals, fossils, mounted birds, animals, deerheads, gold dollars, bo-wood, violin wood, blorbons, daguerrotypes, a 400 page catalog would not list everything. Send 35¢ for profusely illustrated catalog. Heike's, Dadeville, Wenona, Illinois.**

**SCALPING Knife, spearhead, thunderbird \$4.00.** Catalog free. Arrowhead, Glenwood, Arkansas.

**4 PERFECT Arrowheads \$1.00.** Smith, 841 N. Tacoma, Indianapolis, Indiana.

#### **PRECIOUS STONES, MINERALS**

**EARTH Science, the Rockhounds' national magazine.** Subscription \$2.00, sample 25¢. Box 1357, Chicago 90.

**OPALS, Sapphires airmailed direct from Australia.** Collection 12 rough Australian gems \$5 and \$10. Send cheque or international money-order. Free catalogue. Australian Gem Trading Co., 49 Elizabeth Street, Melbourne, Australia.

**CUT Gems, make jewelry—For profit or fun.** 100 page magazine tells how: where to get supplies. Sample 25¢ or request free literature. Lapidary Journal, Del Mar 2, Calif.

**AGATES, Gems, machines.** Free list. Northwest Gems, 2819 North Warner, Tacoma 7, Washington.

**SAPPHIRE, Topaz, tourmaline, garnet, peridot.** Five uncut gem specimens, \$1.00. Ten polished gems, baroque shaped, \$1.00. Free bargain list jewelry, gems. Profitable, easy "do-it-yourself" projects. O'Brien's, 1116M Wilcox, Hollywood 38, Calif.

#### **HOBBIES AND COLLECTIONS**

**COLLECTORS Matchbook covers, 100 different unused, \$1.00.** Catalog 25¢. Album \$3.00. Charles Edelman, 1311-C East 84, Cleveland 3, Ohio.

**MILITARY Miniatures.** Civil War. Custer's Cavalry, American Revolution and U. S. Marines. Illustrated catalog 25¢. Bussler Miniatures, Dept. Z, 40 Howe St., Quincy 69, Mass.

**INVENTING Can be an interesting and profitable hobby.** Write for complete particulars. Institute of American Inventors, Dept. 40-E, 635-F St., N.W., Washington 4, D. C.

**NAZI Insignia, 12 different \$1.00.** Medals, patches, armbands, flags, daggers. Illustrated lists, 10 cents. Medcrafts, Box 532, Victoria, B.C. 2, Canada.

**DISPLAY Cases!** Details for stamp. Poster, 852 Lake Rushville, New York.

#### **CAMERAS, PHOTO SUPPLIES**

**FREE! Free! Free! Bargain book.** Big savings—Still, movie camera, equipment and supplies. Photographic headquarters since 1899. Central Camera Company, Dept. 1-11, 230 S. Wabash Ave., Chicago 4, Illinois.

**3-D Stereo camera, flashgun and viewer.** English import. Complete outfit only \$12.95. Literature, photo 25¢. Navair, 4224 Adams, San Diego 16, Calif.

**PHOTOGRAPHY For pleasure or profit.** Learn at home. Practical basic training. Long established school. Free booklet. American School of Photography, 835 Diversey Parkway, Dept. 3442, Chicago 14.

**BUY Wholesale nationally advertised cameras, photo supplies, thousands other products at big discount.** Free "Wholesale Plan." American Buyers, Hertel Station, Buffalo 16-E, N. Y.

**ARGUS C-3 outfit \$49.50.** Discounts to 60%. Photo equipment, appliances. Free catalog. Mellers Mart, Box 135-MP, Peabham, New York.

**BASS Says: Quality cameras since 1910.** When in Chicago visit the camera cross roads of the world, or write us for your favorite equipment, new or used. Satisfaction guaranteed. Bass Camera Co., Dept. AG, 179 W. Madison St., Chicago 2, Ill.

**20 TO 75% Discount everything photographic, gift-ware.** Free catalogue. Dart, 3812E Atlantic Avenue, Brooklyn 24, New York.

#### **PHOTO FINISHING**

**5x7's—10¢ EACH.** Send negatives. Huffman, 309 Water, Whitesboro, Texas.

**FROM Rolls or negatives, Jumbos 4¢ each.** Contacts 3¢. 30 jumbos \$1.00. Highest quality. Sharp, fadeproof guaranteed prints. Quantity orders special rates. Square Deal Photos, Hutchinson, Kansas.

**STAROTYPE Enlargements; Amazingly different.** Eight 5x7's or five 8x10's—\$1.00. Hargraves, Box 373, Hollywood 28, California.

**8-HOUR Service on deluxe jumbo prints.** 8-exposure roll developed and 8 jumbo prints 40¢, 12 exposure 55¢, 16 exposure 70¢; 35mm. 20 exposure 75¢, 36 exposure \$1.25. Jumbo deckledge reprints 4¢ each. Contact prints made if specified. Bay Photo Service, P.O. Box 210, Oakland, California.

**QUALITY Kodak finishing, 8 exposure roll 35¢; 12 exposure 50¢; 16 exposure 60¢.** Reprints 4¢. Fast service. Guaranteed quality. 40 years continuous operation. Be a satisfied customer. We do color. Send for mailers. Mail Order Photo Service, Box 297, Watertown, Wisconsin.

**EKTACHROME Processing — \$1.00.** Transparencies printed, 2X 45¢; 3X 65¢. Photocolor Laboratory, P.O. Box 617, Toledo 1, Ohio.

**ENLARGEMENTS, Heavyweight eight 5x7's or five 8x10's, \$1.00.** Jack Koons, Huntington Mills, Luzerne County, Pennsylvania.

**SUPERIOR Quality.** Prompt service, 8 jumbos in album 40¢, 16 contacts 50¢. Jumbo reprints 5¢. Satisfaction guaranteed. Also complete color film finishing service. Write for free circulars and mailers. Fast-X-Photo, Box A, Jersey City, N. J.

**ONE-Day quality photo finishing service at no extra cost.** Prints, reprints, enlargements in giant and negative sizes. Mailed coast to coast. 8 exposure roll developed for 42¢ complete. Send for free mailing kit. Royal Snapshot, P.O. Box 543, Milwaukee 1, Wisconsin.

**EKTACHROME—Anscochrome processed.** Mounted \$1.00. National Color Corporation, Box 55, Northside, Atlanta 5, Georgia.

**LIFETONE (Copyright) ultra fine grain prints.** Custom developing plus oversize prints on heavy portrait weight paper. Salon quality. 8 exposure 70¢, 12 exposure \$1.00; 35mm—20 exposure \$1.75, 36 exposure \$2.75. Free mailers and circulars. Send to Lifetone Photo, Post Office Box 96, Chicago 17, Illinois.

**8-12 EXPOSURE Rolls 39 cents jumbo prints.** Free 5x7 enlargement with each roll developed. Guaranteed work, one day service. Lincoln Studios, Dept. K, Box 13, Lincoln, Nebraska.

#### **MOTION PICTURES AND SOUND EQUIPMENT**

**5,000 8-16MM. Movie films.** Free catalogues. International, Greenvale, N. Y.

**TAPE Recorders, tape.** Unusual values. Free catalog. Dressner, 69-02M 174 St., Flushing 65, N. Y.

**MOVIE Camera film; 8mm. roll \$1.50, 16mm. 100' \$3.00.** Free processing. Better Films, 742 New Lots, Brooklyn, N. Y.

**RECORDERS, Tapes; wholesale.** Free catalogue. Carstan, 215 E. 88, New York City 28.

**FREE Catalog.** Save dollars. Fresh 8mm., 16mm. b&w and color film. Home processing equipment. Superior Bulk Film Company, 448 No. Wells, Chicago 10.

**FREE! Blackhawk's big sale catalog new and used 16mm., 8mm. films; 3"x3" color slides; used 16mm. sound projectors.** Biggest stock in U.S.A. Blackhawk Films, 1700 Eastin, Davenport, Iowa.

**SAVE 50%! Guaranteed-fresh color, b&w. movie film! 8mm., 16mm.** Free catalog! Eso-R, 47th Holly, Kansas City 12, Missouri.

**16 MM. Sound films.** Bargain prices. Bedner, 5300 So. Talman, Chicago.

**SPECIAL For Lent "Entire Life of Christ." 8mm. silent, 16mm. narrated with sacred music.** Hemenway Film, 424 Little Bldg., Boston 16, Mass.

**16 MM. Sound movies.** Rented, sold. Hutton Rental Service, Bellows Falls, Vt.

## MUSIC AND MUSICAL INSTRUMENTS

**SONG** Request forms made for two dollars. Howard Olenik, Mount Morris, Mich.

**POEMS**, Songs wanted! Recording, promotion. Bengol, 93 Jefferson, Chelsea 50, Massachusetts.

**PLAY** Piano the first day! Copyrighted secret. Details free. Miracle Method, Box 5203P, Phoenix, Arizona.

**ACCORDIONS**, Wholesale to everyone. Save up to 60%. All national known brands. Free catalogue. Del Principe, 29 South Cicero, Chicago 44.

**WRITE** Songs. Big money and reputation. Write for information. J. Gordon Pub. Co., 4700 South California Avenue, Chicago.

**SONGPOEMS** And lyrics wanted. Mail to: TinPan Alley, Inc., 1650 Broadway, New York 19, N. Y.

**SWISS** Musical movements, \$1.90. Helax, 218 West 72nd Street, New York 23.

**DISCOUNTS**, Instruments, accessories, national brands. Tempo Music, 37 Cutler, New London, Connecticut.

**SONGS** Into dollars. Share \$29 million dollars yearly for new songwriters, song-poets. Songs composed, published, promoted by famous firm. Information, appraisal free. Send to Nordyke Publishing, 6000 Sunset, Hollywood 28PM, California.

**FREE** Records of your song. Your words, my melody. Free information. Johnny Mack's Melody Mart, 1094 West 39th Street, Dept. A, Los Angeles 37.

**POEMS** Wanted for new songs. Send poems. Free examination. Immediate consideration. Songcrafters, 2724 Arcade Station, Nashville, Tenn.

**WANTED** Used guitars and banjos. Write description and price wanted. Eddie Bell, 101 West 46 Street, New York 36, N. Y.

**ACCORDIONS**—Direct from importer. Save 50% and more! Free trial. Lifetime guarantee. Trades accepted. Free catalog. Write Accordion Manufacturers, Dept. 17R, 2063 Chicago, Chicago 22, Illinois.

**SONG** Poems wanted. Five Star Music Masters, 630 Beacon Building, Boston.

**ACCORDIONS** Wholesale—10 day trial. Free catalog. American Accordion Center, 5329-PM-1 Belmont, Chicago.

**SONGWRITERS**: Recording company wants new songs. Royalty basis. National sales, promotion if selected. Send material. Music Makers, Dept. E-29, Box 2507, Hollywood, Calif.

**POEMS** Wanted for new songs. Send poems. Immediate consideration. Crown Music Company, 49-C West 32 Street, New York City.

**SONGWRITER'S** Magazine 25¢. Songsmith, Dept. 2P, 511 Thurston, Rochester, N. Y.

**SACRED** Music composed to religious words. Reginald Belcher, Box 334, Morristown, New Jersey.

**ELECTRIC** Guitars, amplifiers, wholesale. Free catalog. Carvin PMM, Covina, California.

## RADIO, TELEVISION AND ELECTRONICS

**CRYSTAL** Radio kit \$1.00, preassembled \$1.25, phone \$1.75; catalogue. Clearco Crystal Company, 2966 North 4th, Milwaukee 12, Wisconsin.

**TWO-Way** radio. Portable. 10 mile range. Operator's license unnecessary. \$69.75, prepaid. Hart, 467 Park, Birmingham, Michigan.

**CRYSTAL** Radio experimenters, write Hulet, 305 Hope, Lakewood, New Jersey.

**WALKIE-Talkie**. Build wireless two-way portable radiophone for less than \$10.00. Plans 50¢. Springfield Enterprises, Box 54-B1, Springfield Gardens 13, New York.

**KNOW** Your television! Circuit diagram with detailed tube and parts data. Send make and model number, \$1.00. Telpix, P.O. Box 1283, Oakland 4, Calif.

**EXPERIMENTERS**: Make hi-fidelity, self-powered loudspeaker radio. Plays forever. Operating expense zero. Rush \$1.00 for fully diagrammed instructions. Satisfaction guaranteed. Act now! Janecck Development Company, Dept. BA, 373 East 155th St., New York 55, N. Y.

**WHOLESALE**: Phonographs. Radios. Tape recorders. Catalogue 25¢ (refundable). Towers, 155, Philadelphia 5.

**FREE!** Newark's new 1957 catalog. A postcard will bring you 306 pages full of the latest releases and largest selections of the world's finest radio, TV, amateur, electronics and high fidelity equipment. Write today to: Newark Electric Company, 223 W. Madison St., Dept. PM-1, Chicago 6, Ill.

**ELECTRIC** Guitars, amplifiers, wholesale. Free catalog. Carvin PMR, Covina, California.

**POCKET-Vac** cleaner \$5.95. TV tube booster \$3. World-Export, Box 929, Indio, California.

**ENJOY** 3-Color television now! Screens for every black-white set. Complete details free. Zingo Products, Johnstown, New York.

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**PORTABLE** Garbage disposal sells itself! Earn \$2135 monthly. 100% profit. No installation, UL approved. Retail \$89.50. Choice territories. Free demonstrator offer, kit. Write today. New-Home Co., 41, P.O. Box 840, Beverly Hills, Calif.

**MAKE** Money growing miniature trees on your window sill. Free seed and plan. National Nursery, Dept. M-JY, Inglewood 4, Calif.

**BUY** Wholesale! Resell at big profits. Brand name merchandise—Appliances, cookware, housewares, watches, jewelry, dry goods, clothing, sporting goods, toys, gifts, etc. Free 1957 color catalog with confidential cost sheet. Merit Home Products, Dept. PM-1, 107 Manhattan Ave., Brooklyn 6, New York.

**TREMENDOUS** Profit in your own home mail-order fish bait business. Terrific potential. Buchholz, Realtor's, Edgerton, Wisconsin.

**MADE** \$10,000.00 Typing at home. Guaranteed profit. Amazing information 10¢. Lenore Felgen, Box 1125-PM, Oak Park, Ill.

**STRANGE** Dry window cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee 106, Akron, Ohio.

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

**A Big-paying** business for a man in his 50's. One of our men makes \$11,000 in a year. Other top men in their 50's earn up to \$5,000 to \$8,000 right from the start. We pay earnings in advance. Require no investment. Write confidential letter to President, Dept. PM, Box 676, Dayton 1, Ohio.

**MAKE** Extra money. Cash commissions. Everybody buys easy-to-sell advertising book matches. Union label. All sizes—Cuts for all businesses. Powerhouse selling kit free. Steady repeat business. No experience necessary. Superior Match Co., Dept. MX-157, 7328 S. Greenwood, Chicago 19.

**\$5000.00 YEARLY**, Part time, in one of these businesses: Mail order; real estate; photography; insurance; bookkeeping; collection. Write today. Nationwide, 618 Savannah, Columbus 4, Ohio.

**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-C, New York.

**IMPORT-Export** opportunity, profitable, world-wide, mail-order business from home, without capital; or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger G701, Los Angeles 24.

**MAKE** Attractive, durable, building plastic, easily. 800% profit. Exclusive district. Bays Laboratory, Oklahoma City 9.

**FREE** Book. Grow mushrooms. Guaranteed market. Mushrooms, Dept. 172, 2954 Admiral Way, Seattle, Wash.

**PRINTING**, Office supplies wholesale. Save 50%. Royal, Box 388-A, Cleveland 27, Ohio.

**BECOME** Tax consultant. Graduates earn \$3,000 every tax season preparing returns evenings. State approved. Union Institute, 68 Hudson, Hoboken, 28, N. J.

**YOU** For president of collection agency. We have helped hundreds get their names on office doors. Franklin Credit, Roanoke 7, Virginia.

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

**MAIL** Order advertising agency executive reveals sensational no-risk advertising and merchandise methods. Start in office or home; minimum capital; positive profits. Free details: Impact! 2108 Payne, Dept. 11-1, Cleveland 14, Ohio.

**WANT** To make big money at home? \$10.00 profit in an hour possible with invisible reweaving. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 8334-S Prairie, Chicago 19, Illinois.

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

**MAKE** Perfumes, cleaners, polishes, cosmetics, home. Sell mailorder. International, 6347 Parnell PM-17, Chicago 21, Illinois.

**DEALERS** Wanted. Exclusive franchise to people who qualify on terrific new product. \$10,000 cash required plus good background. Excellent opportunity to net \$50,000 a year and up. Immediate response necessary. Write P. O. Box 1076, Jacksonville, Florida.

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

**SHAVING** Revolution. No electricity, soap, blades required. Amazing. 2323 Bon Air, Montreal, Canada.

**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 1038-RJY, Los Angeles 19, California.

**TAPE** Recording! Exceptionally profitable opportunity in your area. Free information. Baron's, Lynden, Washington.

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

**INTERNATIONAL** Mailorder business. Complete setup service—Not just instructions. Hermes, 152 West 42, New York City 26.

**\$100 WEEKLY** Raising earthworms! Free plan reveals how! Oakhaven-P, Cedar Hill, Texas.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**HOW To make up to \$100.00 a week in spare time**—by mail. Tested, money-making plan. Free details. Personal Press, 1412-PM Great Northern Bldg., Chicago 4, Illinois.

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

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

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

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

**LIQUID Rubber,** make flexible molds. Free sample. Chaney, 1130 E. 18th St., Jacksonville 6, Fla.

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

**FREE Folio** "85,000-\$45,000, Unlimited Vacations." No merchandise, equipment. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

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

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

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

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

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

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

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**FREE Book** "305 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

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

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

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

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

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

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

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

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

**FREE Success plan** folio. "Secret Journal," 919 secrets! Work home—Successfully! Publico, Oceanside, Calif.

**IMPORT** Your own products in small lots. Also, start profitable mail-order business using international drop shipment method. Capital unnecessary. Free details. Georgia Overseas Trading Company, Dept. W, 715 Persons Bldg., Macon, Ga.

**SPECIALIZED Magazines.** Current copies, 5,186 publications. Also 1148 self-help books. All trades, professions, sports, hobbies, etc. Free list. Publications, 34C North Ritter, Indianapolis 19, Indiana.

**INCREASE** Your income. Free literature. Bercher, Box 500, Shreveport, La.

**WANTED:** Home producers, to be subcontractors. Cast plastic products for manufacturers in our clearing house service. Thousands of easily made items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 1-PM, East Boston 28, Massachusetts.

**MAKE Money** in landscaping. Start your own business, part or full time. Many good paying positions open. Earn while learning. Send for free book. National Landscape Institute, Dept. M-17-C, 310 S. Robertson Blvd., Los Angeles 48, Calif.

**POPCORN** And potato chip equipment. Eakins, Box 933 A7, Springfield, Ohio.

**123 WAYS** To make money. Kent Co., 1060 N.E. 127 St., N. Miami, Fla.

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

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

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

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**DO Drain** cleaning by electric machine. Highly profitable, non-competitive business. Full details and prices. Electric Sewer Cleaning Co., Allston 34, Mass.

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**EARTHWORM** Growers needed! Good paying home business. Profits to \$1,000.00 a month! We teach you how to raise, and where to sell. Start now! Send \$5.00 for special beginner's unit—You get 1,000 big red Egyptian breeder earthworms, plus our terrific 1957 raising, marketing manual, postpaid! National Earthworm Growers' Co-Op, 4163 Pedley Avenue, Norco, Calif.

**PROFITABLE** Mail order methods, ideas, opportunities. Clearly, authentically revealed in amazing new publications now available. Free details. Write: Wellington Publishing, Box 4157, Austin 51, Texas.

**VENDING Machines**—Every description. New or used. Lowest prices. Start a route or sell outright. Mack Postal, 2952 Milwaukee, Chicago 18.

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

**BUSINESS** Of your own. In the multi-million dollar automotive business. Five products you can make and sell. Complete with formulas, \$10.00 value, only \$1.00. Professional Men's Service Div., Box 4194, Tulsa 9, Okla.

**SPARE** Time vending machine route for ball pens. Bonomo, 54 Jefferson St., Brooklyn 6, N. Y.

**WOULD** You spin Angora wool at home? Fascinating, profitable. Angora House, PM, Springfield, Ill.

**BUSINESS** And real estate ads mailed \$2. Greenway, 3549 W. 135, Hawthorne, California.

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

**GUARANTEED**—Profitable. Sparetime. Home. Mailorder business. \$1.00. AAA, 100 Airport, San Antonio 12, Texas.

**3 BIG** Opportunity-laden issues. 25¢. Profitable selling, 2007 Wyoming, Washington 9, D.C.

**MAKE** Money. Work home. Enjoy life. Opportunities galore. Free details. H. & L. Products, 756 So. Normandie, 308 Pop., Los Angeles 5, Calif.

**BIG** Package of mailorder magazines, \$2.00. Sample magazine, 25¢. Pickett, Mt. Airy, Md.

**\$5,000 YEARLY.** Spare time at home. Nothing to buy. No local selling. Dignified. Guaranteed. Home Harvest, Rt. 3, Box 3491-A, Albuquerque, New Mexico.

**MAIL** Order business. Make money in a "collective mail order business" with repeat income. Orders come direct to you with a big profit on every sale. Only \$1.00. Include this ad for 100 free circulars. Collective Enterprises, P.O.B. 179, Murray Hill Station, New York 16, N.Y.

**BUY Wholesale!** Discounts to 80%! Appliances, cameras, sporting goods, housewares, watches, tools, clothing, etc. Buy-Rite 73-01, Wagaraw, Hawthorne 2, New Jersey.

**BRICKLAYERS** Literature, opportunities, layoff plans, retirement. Information 25¢. Pretlo Services, Box 114, Durham, N.C.

**OPERATE** Money-making mail order business. Write Adams, Box 5415, Chicago 80, Illinois.

**HOW** And where to sell mailing lists. New instructions gives low-down about this fascinating home business venture. Further details. Write now. Megargel, 32 Fairway, Ludlow, Mass.

**PROMOTE** Capital for your new product, proposition. Write, Knott, 109 St. Stephen, Boston 15.



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

**TYPE** For pay. 25-ways. Instructions 50¢, refundable. Empire, 1513-PM1, New York City 80.

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

**START** Mail order discount business at home. Offer gifts, appliances, cookware, housewares, cutlery, dinnerware, silverware, jewelry, watches, etc., at discounts up to 75%. No stock needed. We ship your orders under your label. Catalogs printed with your name can cost you nothing. Postcard brings sample catalog, complete details. Topval Corp., Lindenhurst 118, N.Y.

**MAILORDER**—Make it pay. I did, so can you. Being in close touch with the Patent Office, Washington D.C., I can give you from five to twelve novelties, gadgets, etc., relatively new to mailorder, including name and address of manufacturer or supplier who will drop-ship on your label. Some are good. Write for this month's articles. McClain's, Box 471, Detroit 4, Mich.

"I Earn \$400.00 a week." I've learned an amazing new method of printing colorful signs, banners, cards, posters, glassware—anything. No printing press or other expensive equipment is necessary! Big money-making opportunity for anyone. Write for my secret and revealing home-business plan, you'll be amazed! Mr. Anderson, Screen Print Company, Dept. JY, Los Angeles 61, California.

#### MONEYMAKING OPPORTUNITIES

**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.

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

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

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

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

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

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

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

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

**FREE** Book "505 Odd, Successful Businesses." Work home. Pacific, Oceanside, Calif.

**PRIZE** Contests provide fabulous and confidential home income opportunities! Here's how and where to win your share! Send stamp! National Contest Bulletin, Box 2635-P, Miami 16, Florida.

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

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

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

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

**ATTENTION** Typewriter owners. Make handsome profits. Write today. Groves Company, 682, Hastings 8, Nebraska.

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

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

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

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

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

**RAISE** Money for church, club, school. New plans. Free details. Theron Fox, 1296 1/2 Yosemite, San Jose, Calif.

**MEN** And women wanted to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$9.80 an hour without previous experience. Full particulars free by mail. Send postcard to Roberts, 1512 Jarvis, Room 7-A, Chicago 26, Ill.

**NEW** Sandwich! Outsell barbecue or hamburger. Make it yourself from ingredients obtainable in your own town. No special equipment needed, no franchise. Copyrighted manual containing recipe sent postpaid \$5.00. Haskell D. Boyer, P.O. Box 1486, Fort Worth 1, Texas.

**MAKE** \$5,000 Yearly sparetime raising mink, chinchillas, nutria, etc. Free booklet reveals proved plans. Write Purs, 588 Mt. Pleasant Road, Toronto 1, Canada.

**FREE** Book. Grow mushrooms. Guaranteed market. Mushrooms, Dept. 173, 2954 Admiral Way, Seattle, Wash.

**IMPORTED** Rosaries. 300% profit. Sample \$1.00. Malik Sales, 1617 Scoville, Berwyn, Ill.

**START** Big-pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room 7-A, Chicago 26, Ill.

**FREE** Success plan folio. "Secret Journal!" 919 secrets! Work home—Successfully! Publico, OceanSide, Calif.

"**HOW** To Win Prize Contests." Free information. National, 9128-P E.W. 26th, Portland 19, Oregon.

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

**MAKE** Money writing short paragraphs! No tedious study, I tell you what to write, where and how to sell; and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell, right away. Send for free facts. Benson Barrett, Dept. C-27-A, 7464 Clark, Chicago 28.

**TREMENDOUS** Opportunities. Buy government surplus now direct from Uncle Sam. Buy and sell—Jeeps; trucks; tractors; farm machinery; boats; airplanes; hunting, fishing, sporting equipment; shop equipment; electronics; cameras; building, plumbing equipment. Direct from U. S. govt. depots. List and procedure \$1.00. Brody, Box 8-PMG, Sunnyside 4, N. Y.

**FASCINATING** 12 Tool stainless steel sportsman's knives. 200% profit. Sample \$3.00. Malik Sales, 1617 Scoville, Berwyn, Ill.

**MEN**—Women! Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room 7-A, 1512 Jarvis, Chicago 26, Ill.

**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-D, New York.

**MONEY** Making opportunities. Copper Hill Sales Service, Copper Hill, Va.

**NEW** Low cost duplicator. Prints like high priced machines. Guaranteed. Postcard size only \$1 postpaid. Duplicator, 4313 6th Ave., Tacoma 6, Washington.

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

**\$45.00 PROFIT** From one bag of cement. Complete instructions and formula \$1.00. McComb & Son, Hometown, Indiana.

#### EXPORT — IMPORT

**FREE**, Free, free! Foreign import's catalogue. Hershey Mail Mart, Box 543, Hermosa Beach, Calif.

**DIRECTLY** Imported cigarette lighters 37¢, your door. \$2 seller. Drop-shipped 50¢. Two different models \$1. U.S.S. Importers, 565 North Coles, Maple Shade, New Jersey.

#### FORMULAS, PLANS, ETC.

**MAKE** 30 Products. Complete manufacturing details, 25¢. Herman Reynolds, Jefferson, Georgia.

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

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

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

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

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

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

**FREE** Information, lists, 10,000 authentic formulas. Brockway, Gage Building, Topeka, Kansas.

#### PLASTICS

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

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

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

**PLASTIC**, Sheet, rod, tubing. Catalog 10¢. Coleman Sales, 5926 Cornell, Dearborn, Michigan.

**PLEXIGLAS**, Lucite. Square foot cost: 1/16", \$1.18; 1/8", \$1.52; 3/16", \$1.86; 1/4", \$2.21; 3/8", \$3.23; 1/2", \$4.36. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, 23-25 Sussex Avenue, Newark, N. J.

**CARDS**, Photos, plastic sealed by machine. Wallet size 50¢, 3 for \$1.00. Box 516, Davenport, Oklahoma.

**PLEXIGLAS**, Fiberglass, polyester, acetate. Instructive wholesale-retail catalog free! Gem-O-Lite, 5529 Cahuenga, North Hollywood, California.

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

#### CHEMISTRY

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

**CHEMICALS** And apparatus for industrial, analytical, and private laboratories. Catalog 25¢. Dept. M-50, Biological Supply Co., 1178 Mt. Hope Ave., Rochester 20, N. Y.

**ANALYZE** Like professionals do. Kit \$3.00. Steiner, Suite 940, 127 N. Dearborn St., Chicago 2, Ill.

**FREE!** 5 Unusual dazzling experiments. Send 3¢ stamp. Chem-Tron, 114 East 28th St., New York 16, New York.

**60 PAGE Booklets!** "Beginners Chemistry," "Chemistry," "Physics," "Relativity," "Light," "Astronomy," "Electricity," "Radio," "Useful Tables," "Scientific Oddities." 10¢ each. Franks, 3121 South Racine, Chicago 8.

**BEGINNER'S Modern chemistry.** All ages. Plus sample uranium ore. \$1.00. Future Chemists of America, Oakdale, Penna.

**CHEMICALS, Supplies catalog, 25¢.** Laboratory Sales, Box 161-E, Brighton, Mass.

**AMAZING New book of science.** Experiments, formulas and catalogue of laboratory supplies. Only 25¢. National Scientific Co., Dept. PM-1, 500 W. Road, Lombard, Illinois.

#### AGENTS WANTED

**\$1,000.00 A Month** for making dramatic 3-second demonstration of amazing lightweight Presto fire extinguisher. New chemical used by airforce snuffs out fire instantly. Only \$4.95. Terrific commissions. Millions want it. Free kit. Merlite, 114 E. 32nd, Dept. P-66R, New York City 16.

**MEN-Women agents:** Sensational new money-makers — Beautifully hand-painted, plastic personalized photo enlargements, compacts, rings, bracelets, lockets, etc. Simply take orders, pocket 40% commission. We deliver and collect. Sales outfit free. Novelco, 3343 North Avenue, Chicago 47.

**DISTRIBUTORSHIPS Open.** Low cost unbeatable English chamoms. Chamtana Tannery, Hudson Falls, N. Y.

**60% PROFIT** On cosmetics — Famous nationally advertised Hollywood cosmetics pay 60%! Make \$25-day up! Hire others. For free samples, details, write Studio Girl, Glendale, Calif., Dept. 1271-G.

**YOU Can make money at home** in spare time taking magazine renewal subscriptions. No capital or experience necessary. All supplies furnished. Write today! McGregor Magazine Agency, Dept. 560A, Mount Morris, Illinois.

**IF You want to earn money fast,** I'll send you free sample stocking of newest stretch DuPont Nylons to sell at only \$1 a pair. American Mills, Dept. 603, Indianapolis 7, Ind.

**RUN Spare-time greeting card and gift shop at home.** Show friends samples of our wonderful new 1957 all-occasion greeting cards and gifts. Take their orders and earn up to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. Regal Greetings, Dept. 33, Ferndale, Michigan.

**"FOG-Stop" windshield cloth.** Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee 59, Akron, Ohio.

**MAKE Extra cash—Quickly!** Show newest big value \$1, \$1.25, \$1.50 assortments of birthday, get well, Valentine, Easter greeting cards, gift wrappings, stationery, gifts in spare time. Big profits, bonus. Friends, others buy on sight. Write for samples on approval, free gift offer, details. Hedenkamp, 361 Broadway, Dept. PM-45, New York City.

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

**SELL New automatic floor waxer.** Trigger on handle. Retail \$2.95. Your profit 125%. Write Smith, Inc., Greenfield 15, Mass.

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

**BEAUTIFUL Feather pictures.** 200% profit! Free sample. Apartado 9036, Mexico 1, D. F.

**SEEKING New products?** Get my outfit 47 money-making specialties. Latest conveniences for home, car. Send no money. Just your name. Kristee 60, Akron, Ohio.

**WHOLESALE Comedy cards!** Samples, \$1.00. Sebastian, 10934-B Hamlin, North Hollywood, California.

**IF You're interested in making money** in selling, see the hundreds of exceptional opportunities in Salesmen's Opportunity Magazine. Send name for your copy, absolutely free. Tell us what you're selling now. Opportunity, 848 N. Dearborn, Dept. 39, Chicago 10, Illinois.

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

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

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

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

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

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

**YOUR Own business—Used suits \$1.50,** overcoats 65c, mackinaws 35c, shoes 12 1/2c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Nathan Portnoy Associates, 805-AA West 12th Place, Chicago 7.

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

**CALIFORNIA Sweet smelling beads.** Sensational sellers. Particulars free. Mission, 2328-PM W. Pico, Los Angeles 6, California.

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

**"BOY Electrician."** Build motors, etc. Booklet 25¢. Popular Mechanics Press, 631 N. St. Clair St., Chicago 11.

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

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

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

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

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

**COUNTRY Salesmen.** Automatic fire extinguisher. Huge profits. Out-O-Matic Co., 1737 E. 31st, Dept. 27, Denver, Colo.

**GREETING Cards—\$50.00 cash** from 40 boxes sensational all-purpose assortment. Big money all year from special occasion cards—Mother's, Father's Day, birthdays, Eastern Star. Best all-occasion assortments, stationery, gifts. Bargain specials. Color catalog. Samples on approval. Midwest, 1113 Washington, Dept. 707-A, St. Louis 1, Mo.

**AMAZING "Cut flowers" greeting cards** sell fast! So real even stems are cut. Keep 85¢ on each \$1.25 everyday assortment. \$85.00 easy! 140 finest card, novelty, stationery money-makers. Gift bonuses. Assortments on approval. Act fast—Get "hot plate" salt-pepper free! Creative, 4401 Cermak, Dept. 517-F, Chicago 23.

**EASIEST Extra money year round** from greeting cards, personal stationery, unusual gifts. Everything that's new, fastest selling, most profitable for you. No experience needed. Samples on approval. \$1.25 gift for prompt action. Cardinal, 1410 State, Cincinnati 14.

**BIG Money-making opportunity.** Exclusive line work uniforms. Jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit free. Master Co., 425 Water, Ligonier, Ind.

**VITA-Zest.** Health producing vitamins and minerals. Whirlwind seller. Great repeater. Amazing profits. Free details. Vita-Zest Co., 210R East South St., Orlando, Florida.

**SENSATIONAL Seller.** Push button needle threader. A gold mine. \$1.00. Sample refundable. J. Veitri, 1463 Newkirk St., Philadelphia 21, Penna.

**AGENTS 90% Profit** selling name brand merchandise. Koser, 1400 East 2 St., Brooklyn, N.Y.

#### BUY IT WHOLESALE

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

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

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

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

**"MAGIC For everybody."** 25¢. Free catalog. Popular Mechanics Press, 631 N. St. Clair St., Chicago 11.

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

**SEND \$3.00.** New catalog with \$3.00 saving certificate. Appliances, etc. Time payments. Ivan Wagner, 1015 Larkin, San Francisco.

**VITAMINS—Buy direct.** Save 40%. State formula now using for free sample. Vitamin Specialties Co., Philadelphia 40, Penna.

**BIG Multicolor wholesale catalog!** Housewares, appliances, clothing, tools, cameras, luggage, radios, phonographs, recorders, watches, jewelry. Name brands. Huge discounts. Postcard: Selbyco, Decatur 152, Illinois.

**ELECTRIC Guitars, amplifiers,** wholesale. Free catalog. Carvin PMW, Covina, Calif.

**BUY Wholesale! Discounts to 80%!** Appliances, cameras, sporting goods, housewares, watches, tools, clothing, etc. Buy-Rite, 73-04 Wagaraw, Hawthorne 2, New Jersey.

#### SALESMEN—DISTRIBUTORS

**STOCK Signs—Attractive, fast selling,** various colored backgrounds, large profits. Fifteen samples one dollar. Details free. F. I. Adams, 158 Roberta Road, Ormond Beach, Fla.

**SALESMEN Add extra profits** to your income. Sell trading stamps and stamp saver books, printed with merchant's name, to your present retail store accounts, supermarkets, gas stations, etc. Boosts business up to 40%. Worthmore, Dept. D, 1625 South Michigan Avenue, Chicago 16, Illinois.

**WILL You wear new suits and top-**coats without one penny cost and agree to show them to friends? You can make up to \$30.00 in a day even in spare time, without canvassing. Stone-Field, 532 South Throop Street, Dept. C-926, Chicago 7, Illinois.

**MONEY-Making opportunity!** Take big profit orders for world famous patented varieties fruit trees. Also flowering shrubs, roses, vines. Big sales outfit free. Stark Bro's, Desk 30117, Louisiana, Missouri.

**AD Matches! Sell amazing designs—10,** 20, 30, 40 and 240-light book matches. Bigger spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-85, Chicago 32, Illinois.

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

\$1,000.00 A Month for making dramatic 3-second demonstration of amazing light-weight Presto fire extinguisher. New chemical used by airforce snuffs out fire instantly. Only \$4.95. Terrific commissions. Millions want it. Free kit. Merlite, 114 E. 32nd, Dept. P-66R, New York 16.

ANYONE Can sell famous Hoover uniforms for beauty shops, waitresses, nurses, doctors, others. All popular miracle fabrics—Nylon, dacron, orlon. Exclusive styles, top quality. Big cash income now, real future. Equipment free. Hoover, Dept. A-160, New York 11, N.Y.

BOOK Repair kit. Schools. High profit. Martine, Colgate, N. Dak.

MAKE Extra money. Cash commissions. Everybody buys easy-to-sell advertising book matches. Union label. All sizes—Cuts for all businesses. Powerhouse selling kit free. Steady repeat business. No experience necessary. Superior Match Co., Dept. M-157, 7528 S. Greenwood, Chicago 19.

SELL "Grease that won't melt," including moly products in a complete line of heavy duty lubricants. Our leading salesmen now earning over \$12,000 in a year. Write immediately to E. J. Baker, Dept. P-7, P.O. Box 676, Dayton, Ohio.

INCREASE Present income \$75-up weekly. Dealers, farmers, agents—demonstrate nationally known Gro-Green liquid fertilizer nutrients. Results guaranteed. Full-part time. Samples free. Campbell Co., Rochelle 209, Illinois.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 850 N. Dearborn, Dept. 17, Chicago 10, Ill.

ONE Monument sale weekly earns \$200 or more. Jones Monumental Works, St. Cloud, Minn.

CASH In on Chestlite, successor to flashlight. Profit over 100%. Protected territories still open for this patented money-maker. Write for details right now. Chestlite, 620 W. Anaheim, Long Beach 13, Calif.

GET New shirt outfit free. Make \$90.00 weekly on 5 average orders a day. Famous quality made-to-measure dress and sport shirts at \$3.95 up sell fast to all men. No experience needed. Full or part time. Write: Packard Shirt Co., Dept. 450, Terre Haute, Ind.

WE Are the world's largest manufacturer of portable adding machines. Highest grade. Best service, highest profit. You are sure to win. Lightning Adding Machine Sales Co., 2306-C W. Slauson Ave., Los Angeles 43, Calif.

100% PROFITS Vitamins! Direct and mail sales, homes, offices, stores, and get your own needs wholesale. Details free. Sample \$2. Roberts, 432 Fremont, Springfield, Ohio.

BUILD Sales by recruiting productive distributors selling direct or to retail outlets. Secure most concentrated circulation through classified columns of Salesman's Opportunity. Write for facts. Gilbert, Salesman's Opportunity, Room 1700, 850 N. Dearborn, Chicago 10.

## EMPLOYMENT INFORMATION

JOB Information. High pay. South America, the Islands, U.S.A., foreign countries. All trades. Clerical, labor, engineers, drivers, others. Women also. Companies pay overseas fare if hired. Write Section 92P, National Employment Information, 1020 Broad, Newark, N. J.

HIGHEST Pay available in greater Chicago classified listings airmailed \$1. Jobs, 5345 South Halsted, Chicago 8, Illinois.

COPYRIGHTED Reports on best paying jobs with travel, adventure, promotions. Construction, aviation, shipping, laborers, clerical, trades, supervisory, factory, unusual opportunities. Many types of work. Skilled and unskilled. Foreign and state-side openings for men and women. Only \$2.00 (\$2.25 airmail), including registration-advisory service. Satisfaction guaranteed. Included absolutely free! Special reports on Alaska, Spanish airbase construction, South American opportunities and husband-wife foreign jobs. Research Services, Suite 207-PML Brown Building, St. Louis 5, Missouri.

SUNSHINE City—Classified list business opportunities, help wanted, apartments, houses. All \$1.00 check. Herco Industries, P.O. Box 382, St. Petersburg, Florida.

FOREIGN, Alaskan, U.S.A., jobs! To \$15,000 monthly! Million Americans employed overseas. Copyrighted reports. Who to contact for highest paying jobs. Laborers, trades, truck drivers, office, engineers, many others. 52 countries—St. Lawrence project, Spain, Latin America, Northern project, Europe. Year registration-advisory service. Application forms. Unconditional money-back guarantee! \$2.00 (airmailed \$2.25). C.O.D.'s accepted. International Reporter, St. Louis 1-PO, Missouri.

## EDUCATIONAL AND INSTRUCTION

MEMORY Education. Additional mental power. Science of memory. Memorology, volume one free, without obligation. Memorology Studio, 2016-M Sunnyside, Chicago 25, Ill.

BLUEPRINT Reading—Train at home. Learn to read blueprints with confidence in 10 easy lessons. Write today Belton School, 1059-G North Lawndale, Chicago 51.

LEARN By ear with Dormiphone. While you sleep, amazing new scientific invention works for you. Revolutionary Dormiphonic tools give you a shortcut to learning languages, correct speech; memorizing facts, figures; ideal for self-improvement, relaxation, habit training. Saves time, effort. So simple children benefit. Used by educators, psychologists. Write today for fascinating free book. No obligation. Modernophone, Inc., 320-017 Mezz., Radio City, New York 20.

WHY Struggle with multiplication when this simple device will do the job quickly and accurately? Invaluable for merchants, produce dealers, farmers, students, and anyone who is required to do great deal of multiplying. Multiplies any number from 1 through 100 by any number from 1 through 100 by the very simple process of adding two numbers. Send for free descriptive literature, or send only \$2.00 for a postpaid calculator. If not satisfied, money will be refunded if calculator returned within ten days. Storbakken, Box 26, Viroqua, Wis.

LEARN Another language at home with Linguaphone, the world's standard conversational method on fine, life-like recordings. You learn to speak French, Spanish, German, Japanese, Modern Greek—any of 34 modern languages easily, quickly, naturally. It's like living in another country. Complete language courses available for free trial. Send for free book and details of free trial. No obligation. Linguaphone Institute, T-83-017 Radio City, New York 20.

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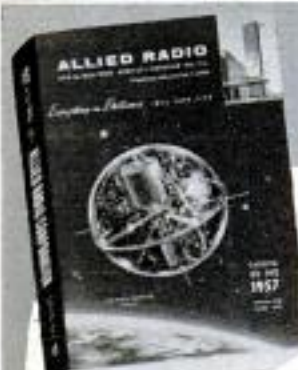
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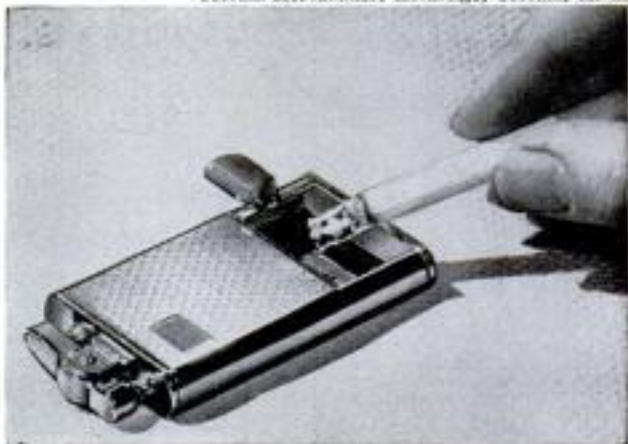
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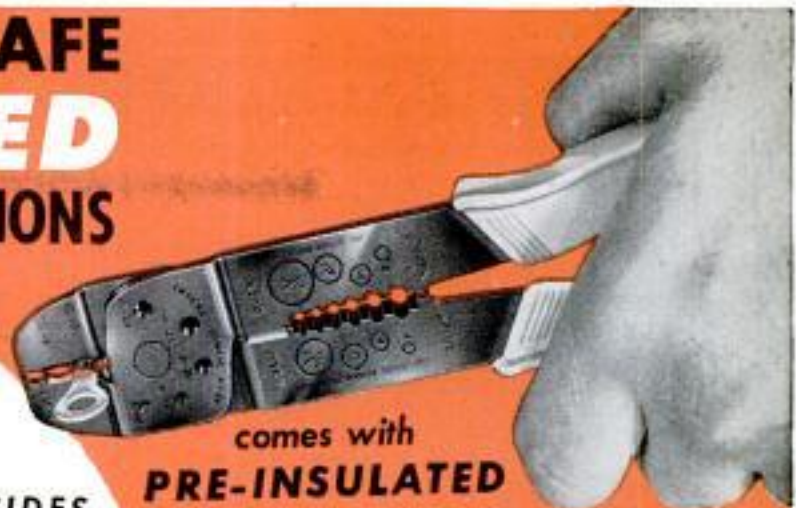
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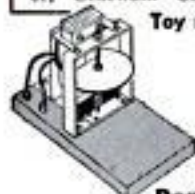
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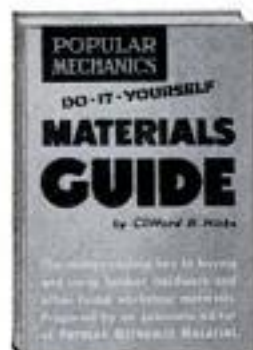
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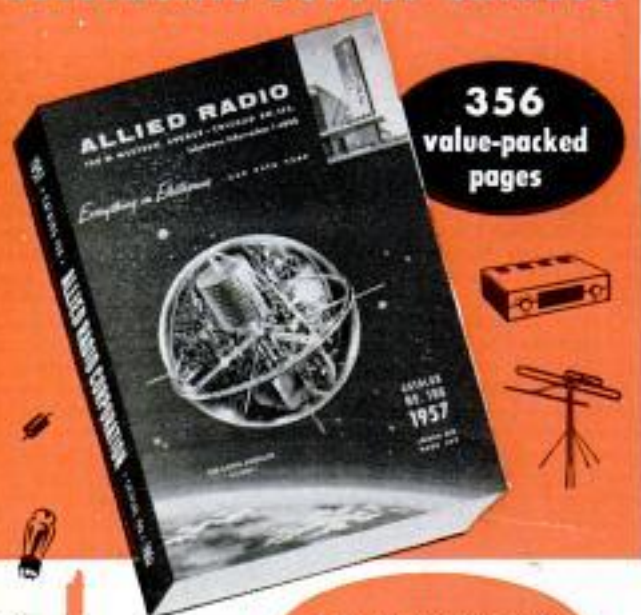
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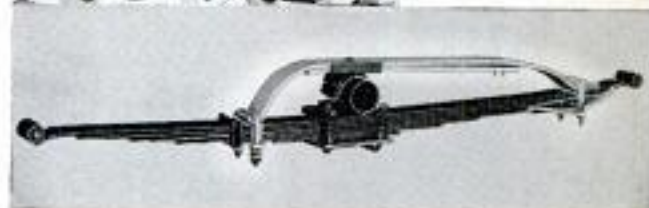
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**NOTICE**—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that commercial use is to be made of any of the developments reported herein, it is suggested that legal counsel be consulted to avoid liability for patent infringement. It is not the purpose of this magazine to encourage patent infringement but, as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.

# 23 BOATS YOU CAN BUILD



## You Can Build These Boats Without Experience With Few Tools, and Little Time to Spare!

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### Special Chapter on Boats for Sportsmen

If you are a sportsman, hunter, fisherman, trapper, or just plan to use your boat for pleasure, this chapter contains ideal craft for your use. Perhaps you have a canoe in mind, or a rowboat that can be carried on your auto. Maybe you have always wanted a duckboat but have been reluctant to purchase one because of the expense. All these boats plus a 3-second

tion rowboat, and 12-foot plywood outboard, are available in this one chapter alone. All are easy to construct, and beautiful to own. Step-by-step instructions, photographs and illustrations, plus important material lists carry you right through from the forming of the keel to the last coat of paint and varnish.

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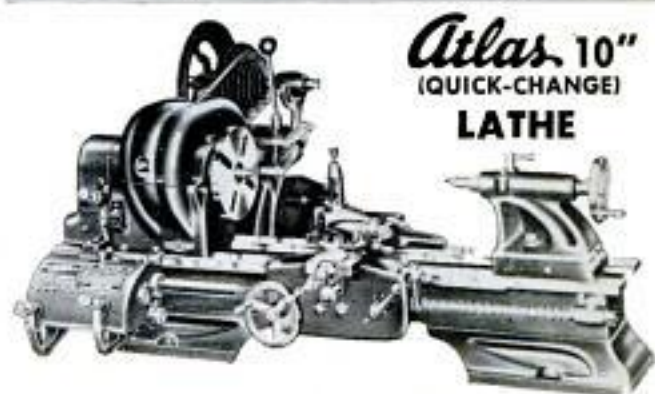
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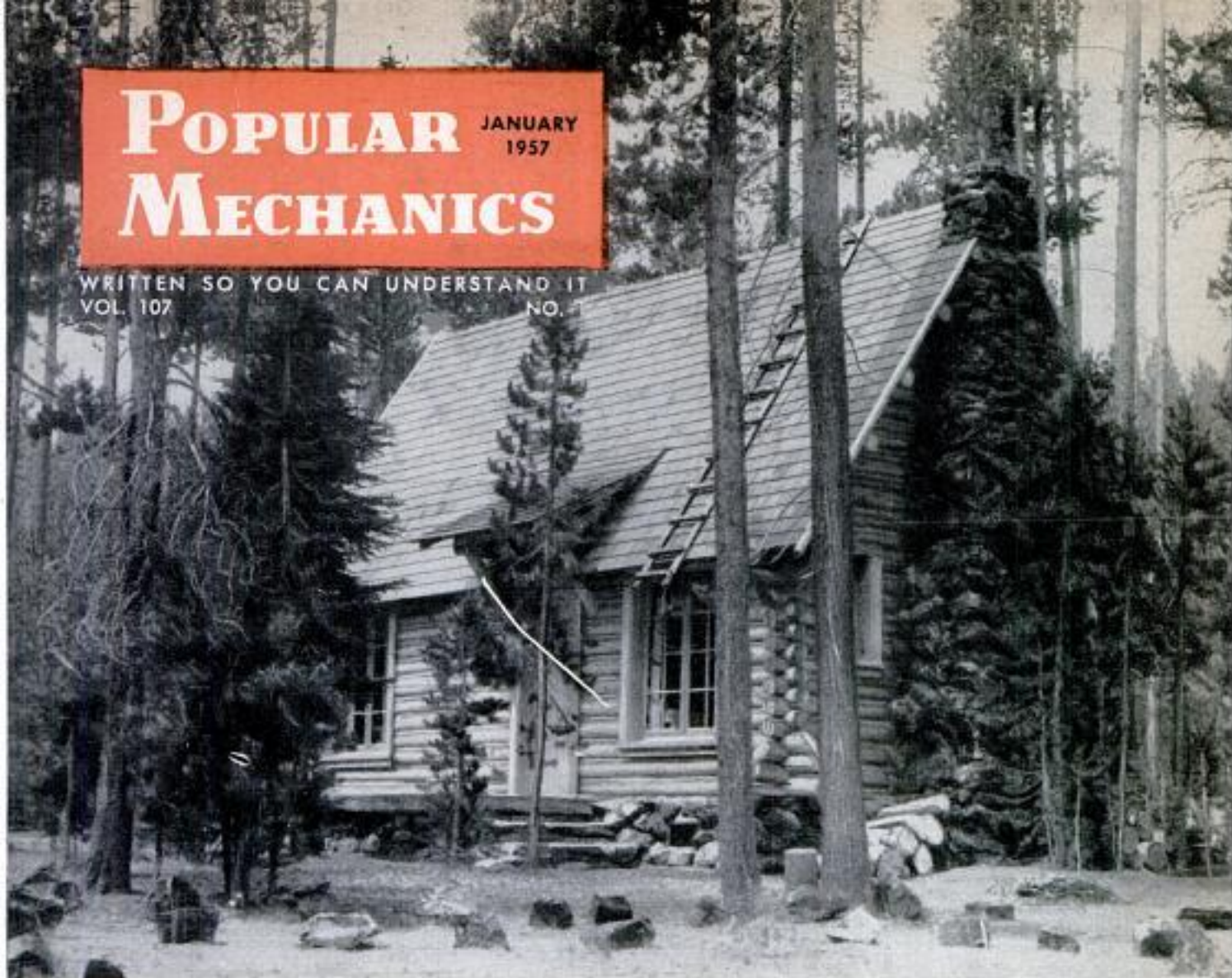
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# POPULAR JANUARY 1957 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 107 NO. 1



U.S. Forest Service photo

This attractive vacation cabin in Oregon is one of 16,000 that have been built on national-forest land



## How to Plan That Vacation Cabin

By Marion H. Kemp

**W**HETHER YOUR FAMILY'S preference for a vacation spot is a mountain cabin lulled by the whisper of tall pines, a beach house open to the tang of salt air and roar of surf, or just a quiet week-end retreat without anything dramatic in the way of scenery, it should be an investment in carefree living with a minimum of expense, upkeep and responsibility.

Looking for a suitable site can be almost as enjoyable as the final result, when your "getting away from it all" haven has become a reality. Searching jaunts are fun—planning where to look, exploring out-of-the-way places. Lively family discussions over the merits and disadvantages of a proposed location can be fun, too, and

can be worthwhile in a monetary sense.

But don't let the beauty of a view, or the contrast of nature-in-the-rough to your city dwelling, sway judgment and consideration. Before investing in a vacation site—investigate!

There are many things to consider that are never a problem in urban areas. Americans take for granted the protection of community guardians. Ascertain if, in case of an emergency, there are fire-fighting facilities, police and a hospital within a reasonable distance. As a matter of course we accept the electricity, heating, shopping, transportation and communication conveniences of a modern civilization. Ask yourself which of these conveniences



PM's precast house can be built as a roughly finished simple cottage or year-round home. Floor plan is below

your family can do without in a cabin in the back country.

What about electricity for lighting and refrigeration? Can you do without it or can it be brought in, and at what cost? Are the terrain and soil such that drainage and sewage disposal will not be a headache? Must you keep in touch with your office while away? If so, will you be able to do so from your chosen location?

An adequate, pure and convenient water supply is of the utmost importance. The cartoons of a harried vacationette hauling

buckets up a hill may be humorous to the modern housewife in her home, but put her in the same situation under the guise of roughing it and the little woman will soon take a dim view of her family's vacations! If a well must be drilled, or water piped any distance, estimate before you buy—the cost of drilling and water pipes can scuttle any budget.

A matter for serious consideration is the road into your property. Is it accessible at all times of year, and under any weather condition? Will it become a deeply rutted,



Here is the most popular floor plan of this house which was introduced by *Popular Mechanics* in 1955. None of interior partitions is load-bearing so they can be shifted for a variety of plans. Unique window panel at rear of house provides for "switchable" windows to suit owner's desires. Features of the home are a big living room, fireplace, many built-ins, lots of storage space and a roomy porch. Foundation is concrete slab, exterior siding is weatherproof composition board

muddy trail during heavy rains? Will the babbling brooks you so admire flood and make travel impossible? What about snow in winter? If on the desert or by the ocean, will you be constantly digging out of drifting sand? The most beautiful hillside view in the world loses much of its charm if all supplies must be lugged up or down a dangerous, precipitous path. Before any final decision on a secluded vacation spot, especially if you plan to build and must have materials and supplies hauled in, determine the expense and work necessary to keep your road passable in all kinds of weather.

For week-end convenience, as well as longer stays, the distance from home should not be so great that the trip becomes a chore. Locate your vacation spot within reasonable reach and you will use and enjoy it more often.

If hunting and fishing are family hobbies, their possibilities should be thoroughly investigated. All counties do not permit every type of hunting. If it is your dream to stock a pond or stream on your property for fishing purposes, cooperation and expert advice are yours for the asking from state fish-and-game officials. There are many excellent pamphlets obtainable through state and federal departments. Take advantage of their know-how before such a project is started, unless you are an expert yourself.

A clear title, which is more or less taken for granted these days in the purchase of urban property, is not always the case when you are dealing with an undeveloped locality. Title and possible legal entanglements, especially if you are contemplating buying a property up for sale for back taxes, should be carefully investigated. By all means check local ordinances. They may prevent your particular purpose for acquiring a vacation site, such as installing an outdoor shooting range or indulging in speedboating on a nearby river.

You might also want to consider one of our national forests as a site for your summer home. Did you know that 16,000 homes have already been built on national-forest land? Suitable areas are selected by experienced forest officers and are surveyed into lots of about one acre each. In each case the forest environment is preserved and each site is isolated from its neighbors. If you want such a site get in touch with the supervisor of the particular national forest in which you are interested. He issues "special-use permits" for \$20 to \$50 a year, depending on location, facilities, size and other factors. Although the builder never gets title to the land, renewal of the permit from year to year at a modest



Photos by Dan Bauer

Unhappy owner of this cabin on a California river found out it was below flood-level stage of stream



Cabin owner with lack of foresight finds road to his summer home is impassable during the rainy season

Heavy rains and melting snow caused the hillside to slide down and almost engulf poorly located cabin





Courtesy Masonite Corp.

Summer cottage designed for do-it-yourself builders is made of hardboard panels prefabricated in workshop

Plan # AE-203

Floor plan for cottage above provides four rooms in 20 by 20-foot structure. Porch or carport is optional



fee is assured if reasonable rules are observed. Design and construction of the buildings must be approved by the forest officer in charge. Such homes, of course, are not to be used for commercial purposes but must be occupied as private residences. The homes may not be sold without approval of the forest supervisor.

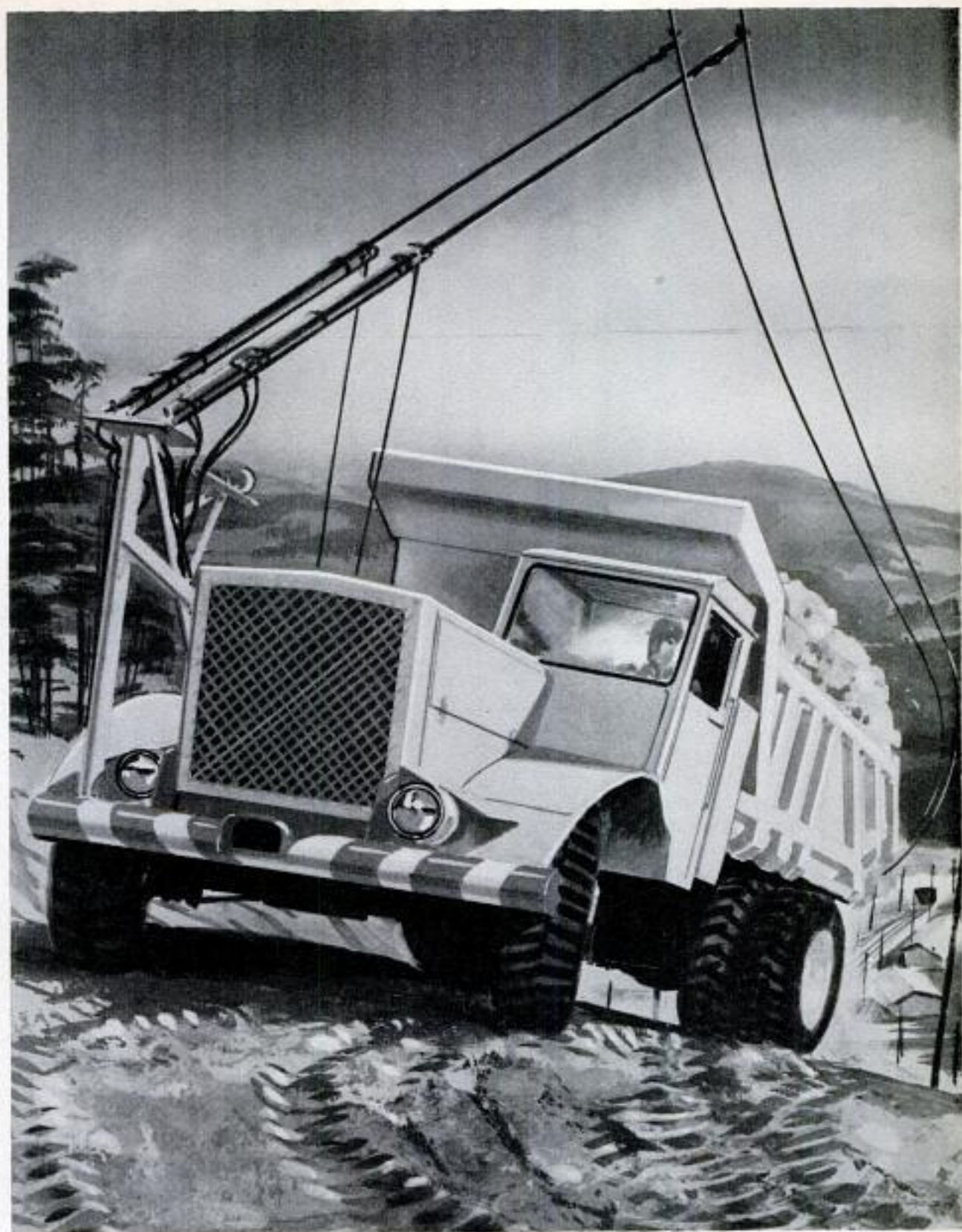
Naturally you have your own ideas for a vacation home suitable to the particular terrain and climate of its location. Whatever you do—whether it is remodeling and repairing, building yourself, using a contractor, local labor or a combination of any of these methods—have your place

built to a definite plan. Know what you can afford, and adhere to the principle that anything jerry-built or haphazardly done will, in the long run, prove more expensive to maintain and repair. Consider carefully the pleasure and convenience of built-ins. Install more than what you consider adequate-storage facilities. One insect and rodent-proof cupboard is worth all the shelves that can be built. Doors and windows should be stoutly constructed and as prowler-protected as possible. Strong, well-fitting shutters are a small initial expense that can pay long-term dividends in protection against weather and pilfering.

There is nothing more delightful than the open hearth, the crackling logs, the rugged beauty of a rustic fireplace. Know that it is as safe as it is soul-satisfying. You don't want your dreams and carefree vacations to go up in smoke. The mortality rate of cabins, due to inadequate fire protection, is very high.

Since a vacation cottage should be equally enjoyed by all members of a family, their individual needs and wishes merit consideration. Please allow me, as an eyebrow-singed, smoke-eating camp cook to become very forceful about a little matter too often disregarded. Very few women enjoy, much less are able to prepare a satisfactory, well-balanced meal over a smoky campfire or a fractious wood stove. Why should they, when the soot-blackened pots, the unregulated heat, the extra time and work are unnecessary? A Coleman camp stove, or the efficiency of a modern butane or kerosene range is within the

(Continued to page 268)



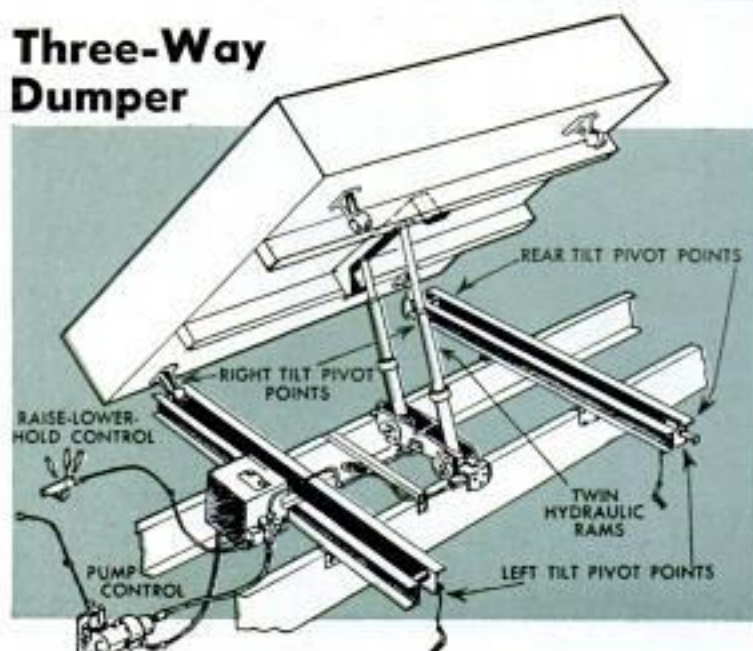
## Truck Gets Power From Overhead Wires

ELECTRIC TRACTION MOTORS power a dump truck that gets current from overhead wires through a trolley. Four of the trucks will be used at Crestmore, Calif., to move limestone rock from an underground mine to a crusher on the surface. Two thou-

sand feet of the mile-long haul are underground and on a 10-percent grade. Down at the loading zone, the trolleys are disconnected and cable reels plugged in to give the trucks more mobility. The truck solves problems of safety and ventilation.



### Three-Way Dumper



Capable of dumping in any of three directions, a British truck simplifies unloading in tight places. Two hydraulic rams are used to raise the body. Both sides are hinged and can be lowered in the same manner as the tailgate. The body comes in various sizes, with the largest having over-all length of 17 feet. The truck can be driven with the body in any intermediate position, making it ideal for spreading gravel along the shoulder of a roadway, either to right or left.

### Portable Electric Concrete Mixer Has Five-Bag Capacity

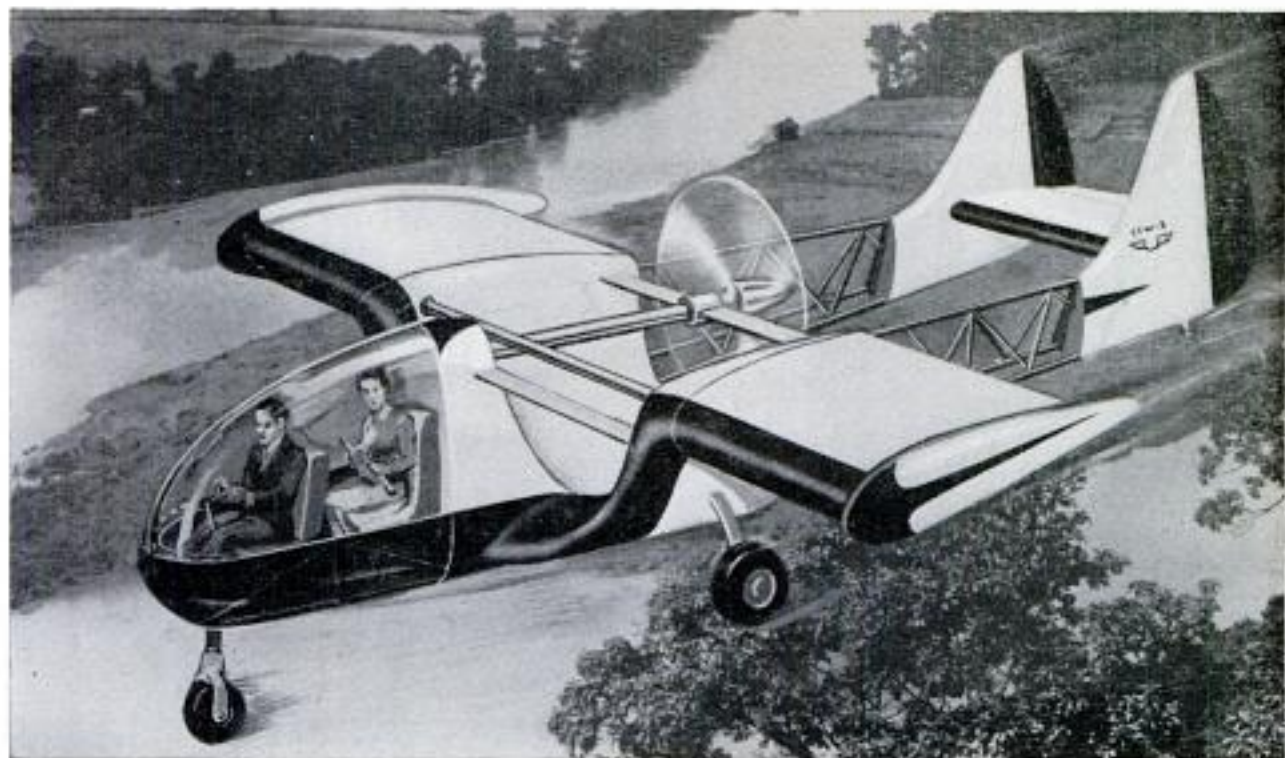


Featuring one-man portability, an electric mixer for concrete, plaster and terrazzo can be used on the job site. It can be assembled in less than a minute by inserting an electric mixing unit in a tub. The tub has a capacity of five bags of premixed aggregate and the entire unit can be transported easily in a car trunk, station wagon or small truck. The mixer operates from any 115-volt outlet. If desired, extra tubs can be used to mix different colors.

### Copter De-Ices Wires

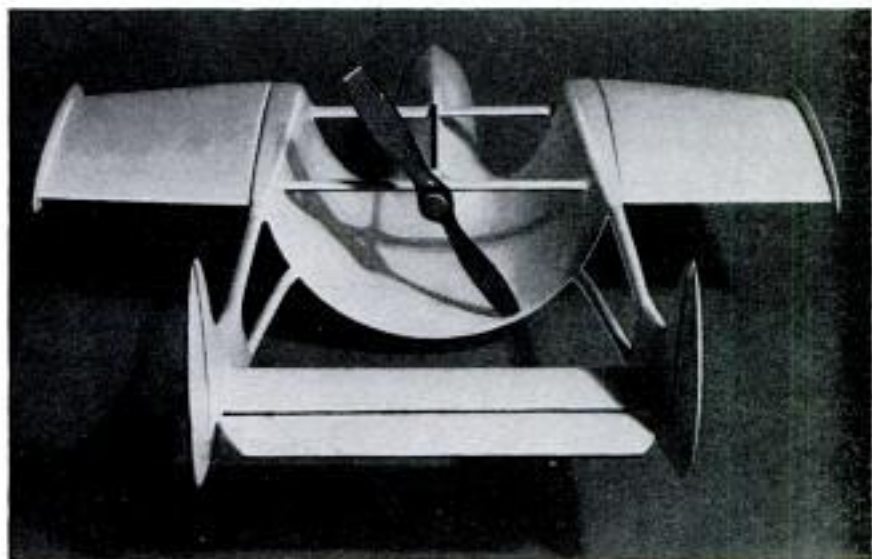
Flying above a power line, a helicopter trailing a bamboo pole has knocked ice off the wires with the dragging action of the pole and the downdraft of its rotors.





## Channel-Wing Plane

Blending of auto and aircraft are merely a step away, if tests succeed on a plane with a single-channel wing that has outboard panels working like ailerons. By mid-1957 experiments will have pin-pointed whether this prototype can take off and land at five miles per hour inside its own length of 18 feet. One trial involves the clearing of a 50-foot obstacle within 300 feet of a standing start and at a climb rate of 4000 feet per minute. Carrying two passengers and powered by a 240-horsepower engine, the craft is expected to fly 200 miles per hour at a range of 1200 miles. The plane operates on a principle developed by Willard R. Custer (See *PM*, May 1947): Lift



and thrust are produced by drawing air at tremendous speeds through the channel wing. Pending test outcome, designers plan a craft that will land on a road, folding its wings to a width of less than eight feet and disengaging the propeller shaft to become an automobile, all without halting.

## Synthetic Rubber Resists Heat

Synthetic rubber has a new candidate for honors in resisting heat of supersonic jets, frigid temperatures of the upper air and attack of fuels, lubricants and hydraulic fluids. Strong and elastic after long exposure to air heated to 400 degrees F., the material is flexible to 98 degrees below zero. This rubber resists aromatic and paraffinic-type fuels and certain hydraulic fluids used in current aircraft.

JANUARY 1957

## Electric Clock Keeps Going When Power Fails

You can now buy an electric clock that keeps going when power fails. Whenever electricity is shut off, a spring built into the clock automatically takes over and accurate time is kept until the electric motor is back in operation. The spring will operate the clock for 30 hours without rewinding. A red flag on the face of the clock shows when rewinding is necessary.

103

# SUBMARINE ESCAPE

**C**REW MEN of the undersea fleets using a new escape system can leave sunken submarines at the rate of one man every five seconds. In the past it has taken five minutes for each man. Recent lifesaving techniques are replacing permanent, bulky escape locks built into sub hulls. The long-used "breathing bags" for repurifying air during an escapee's rise to the surface will soon be obsolete.

British and American sub services are rapidly installing escape methods and gear involving three radical revisions of old-time procedures. First, a twill tunnel stored in the ceiling of the sub's pressure hull under the escape hatch is unfolded to provide access to crewmen seeking outside waters. Also, individual air-and-gas mixtures are available to those waiting to use the escape tunnel. Storage cylinders, piping and valves make breathing possible. Finally, on the principle that pressure inside a man's lungs at certain depths is greater than the pressure of surrounding water, present escapees are instructed not to hold their breath during ascent but to let water pressure force air from their lungs. Air will rush from a man's mouth (his nose being clipped shut) in such a way that water cannot enter to suffocate him.

If a sub sinks in 200 feet of water, the crewmen will move into escape compartments, one at either end of the stricken vessel. While dressing in cold-resistant rubber immersion suits, they assemble the twill tunnel and slowly flood the compartment, leaving a large bubble of air at the ceiling. When the compartment is sufficiently flooded to equalize inside and outside water pressures, the escape-hatch cover is opened to admit water over the escape hatch above the compartment. One by one, crewmen crawl into the bottom of the tunnel, up through the escape hatch, and into cold, dark water around the hull's exterior.

Meanwhile, individuals lined up for entry into the tunnel "tap" air-and-gas reserves by working valves in head-level piping. Each man inflates the rubber collar of his suit to help his ascent which is made at the rate of four feet per second. Faster ascent would produce agonizing "bends." He allows lessening water pressure to expel air from his lungs, as he moves upward. Surfacing, he inflates the entire suit and floats until rescuers see a red electric light on his collar.

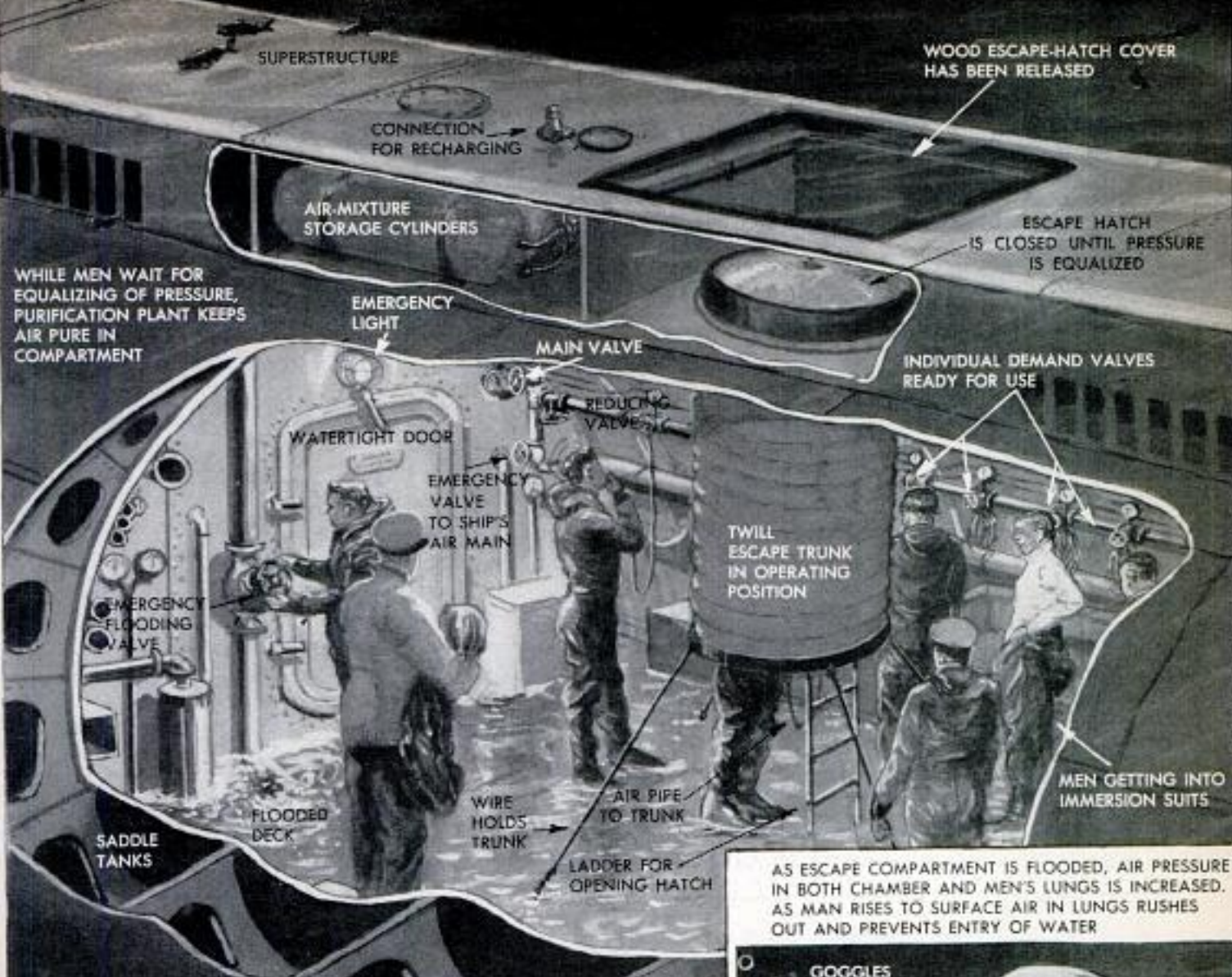
Britain has lost 140 men and two subs during the last six years. ★ ★ ★



## *U. S. Tests B-58 Hustler— America's First Supersonic Bomber*

Capable of flying more than 1000 miles per hour, the new Convair B-58 Hustler is the first U.S.-made supersonic bomber. It is powered by four turbojet engines slung under the wing in separate nacelles and has a delta-wing span of 55 feet, a length of 95 feet and a swept-back vertical stabilizer 30 feet high. Elevons in the wing's trailing edges combine functions of conventional ailerons and elevators. A pilot, navigator-

bombardier, and defensive-systems operator will crew the aircraft at altitudes above 50,000 feet. This bomber is said to be the first production plane to use brazed stainless-steel sandwich panel as primary structure. Included in the B-58's 16 major near-automatic subsystems is equipment for launching guided missiles from points outside the reach of the enemy. It will be in squadron service in two or three years.



AS ESCAPE COMPARTMENT IS FLOODED, AIR PRESSURE IN BOTH CHAMBER AND MEN'S LUNGS IS INCREASED. AS MAN RISES TO SURFACE AIR IN LUNGS RUSHES OUT AND PREVENTS ENTRY OF WATER



# An Engineer Analyzes 1957 Chevrolet V8

By Dale Kelly, SAE

**MODEL TESTED:** Two-Ten four-door sedan with 283-cubic-inch V8 engine, four-barrel carburetor, dual exhausts and Powerglide transmission.

Rear-axle ratio: 3.36 to 1. Wheelbase: 115 inches. Tires: 7.50 by 14. Weight: 3474 pounds with gas

tank half full (54 percent on the front wheels, 46 percent on rear).

Barometer: 29.06 inches, temperature 81 degrees F., payload 400 pounds for acceleration tests, 200 pounds for economy tests.

## ACCELERATION TIME FROM STANDING START IN SECONDS



	0 to 20	0 to 40	0 to 60	0 to 80	¼ mile
Ignition timed for regular gasoline	2.5	5.6	11.5	19.2	18.5
Ignition timed for premium gasoline	2.5	5.4	11.3	19.1	18.4

Ignition timed for super-fuel (90 to 105 octane)

No improvement

The watch was started the instant the accelerator was floored. The engine was not run up against the brakes. All tests in Drive range.

## FUEL ECONOMY IN MILES PER GALLON



	Steady 30 m.p.h.	Steady 50 m.p.h.	Steady 70 m.p.h.	Traffic Route
Ignition timed for regular gasoline	21.8	18.9	15.5	10.2
Ignition timed for premium gasoline	22.0	19.6	16.0	10.2

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

**ESTIMATED AVERAGE ANNUAL GASOLINE BILL: \$166 for 10,000 miles.**

## SPEEDOMETER ERROR (MILES PER HOUR)



Speedometer speed	20	30	40	50	60	70	80
True speed	20	29	39	50	60	70	80

## ODOMETER ERROR

Distance registered for covering an actual 100 miles: 99 miles. Odometer error: 1 percent low.

## DRIVER'S VISION



Distance at which part of road in front of car could be seen (A in sketch).....17 feet  
 Distance at which full width of road could be seen (B in sketch).....20 feet

## GROUND CLEARANCE (unloaded car)



Radius of sharpest dip that could be crossed without "hanging up" (solid line).....22 feet  
 Radius of sharpest hump that could be crossed without "hanging up" (dotted line).....17 feet  
 Deepest rut that could be driven in.....7 inches  
 Curb clearance for door opening.....12 inches

## MISCELLANEOUS

### STEERING

Steering-wheel turns from straight ahead to steer outer front wheel in a 100-foot circle: 0.9 turn.

Diameter of smallest circle inside which the wheels could turn (curb-to-curb): 42 feet.

Diameter of smallest walled circle inside which entire car could turn (wall-to-wall): 44 feet.

Steering-wheel turns, lock-to-lock: 4.6 turns.

Steering-wheel diameter: 18 inches.

### TRUNK CAPACITY

Number of standard cartons (1 cubic-foot each) that could be packed into trunk: 9 cartons.

### CENTER OF GRAVITY

Height of center of gravity of unloaded car: 23 inches.

**WATER RESISTANCE:** Good.

### MEASURED DIMENSIONS

Length: 200.5 in. Width: 74.0 in. Height: 62.25 in.

Dale Kelly, Registered Professional Engineer



## CLYMER DRIVES 1957 CHEVROLET V8

By Floyd Clymer

**T**HE TEST was from Los Angeles via Lake Arrowhead, the Rim of the World Highway and the edge of the Mojave Desert to Bakersfield, returning via San Luis Obispo and Santa Barbara. Total distance was 635 miles, including several miles of off-road desert and mountain driving.

The car was the Bel Air four-door sedan powered by the extra-cost 283-cubic-inch V8 engine and power pack, including a four-barrel carburetor.

The power-pack V8 has a 9.5-to-1 compression ratio. The standard Chevrolet V8 has a 265-cubic-inch displacement and an 8.0-to-1 compression ratio.

We had hoped to test a Chevrolet with the new fuel injection and Turboglide automatic transmission, but neither of these was available in production models at the time of the test.

The 115-inch wheelbase car has all the fine characteristics of the 1956 Chevrolet insofar as roadability, maneuverability and handling are concerned. There is some front-end bounce when driving fast over dips as the front end has rather soft springing. There also is some roll on the corners.

The extra-long rear springs are widely spaced for better rear-end stability. The new 14-inch tires require but 22 pounds of air pressure and give a softer ride than previous tires.

There is a feeling of safety in the way the car handles at high speed. Ball joints are used in the front-end suspension.

Top speed is 112 miles per hour by the speedometer, which checked out fast on this particular car although only 2 percent at the high end—not nearly as much error as other makes tested.

I found some fade when braking constantly in descending sharp grades near San Bernardino and over the Rim of the World Highway. There was some tire squeal on corners and some brake-lining squeaks at times.

A slight drag of three pounds on the power steering unit gives an artificial "feel" of the road.

The Powerglide transmission is very dependable and will take an awful beating—as will the car itself. With normal throttle opening, upshift is smooth. If the throttle is held on the floor, final upshift takes place at 55 miles per hour, which is too early. It is a little on the rough side as well. Downshift can be used below 55 miles per hour. It would be better if you could downshift at speeds up to 70. Between 45 and 50, the powerful engine unleashes a terrific surge to make the downshift a little rough when the throttle is floored.

(Continued to page 270)

On these six pages, PM presents two expert reports on the 1957 Chevrolet, Ford and Plymouth. Our two experts, Kelly and Clymer, tested actual assembly-line cars, not engineering test models. The tests were made on public highways, not on company proving grounds. PM Owners Reports on these three cars will appear in early issues.

# An Engineer Analyzes the 1957 Ford V8

By Dale Kelly, SAE

**MODEL TESTED:** Fairlane 500 V8 four-door sedan with a two-barrel carburetor, the 292-cubic-inch engine and Fordomatic transmission. (Additional tests were run, as noted below, on Car No. 2 which had a four-barrel carburetor and the 312-cubic-inch V8 engine.)

Rear-axle ratio: 3.10 to 1. Wheelbase: 118 inches. Tires: 8.00 by 14. Weight: 3731 pounds with gas tank half full (56.5 percent on the front wheels, 43.5 percent on the rear wheels).

Barometer 29.2 inches, temperature 86 degrees F., payload 400 pounds for acceleration tests, 200 pounds for economy tests.

## ACCELERATION TIME FROM STANDING START IN SECONDS



	0 to 20	0 to 40	0 to 60	0 to 80	1/4 mile
Ignition timed for regular gasoline	3.0	7.2	14.2	28.0	20.1
Car No. 2		6.2	11.9		
Ignition timed for premium gasoline	3.0	6.9	13.8	27.0	19.8

Ignition timed for super-fuel (90 to 105 octane)

No improvement

The watch was started the instant the accelerator was floored. The engine was not run up against the brakes. All tests in Drive range.

## FUEL ECONOMY IN MILES PER GALLON



	Steady 30 m.p.h.	Steady 50 m.p.h.	Steady 70 m.p.h.	Traffic Route
Ignition timed for regular gasoline	18.3	17.3	14.9	10.2
Ignition timed for premium gasoline	18.4	17.3	14.1	10.2

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

**ESTIMATED AVERAGE ANNUAL GASOLINE BILL: \$185 for 10,000 miles.**

## SPEEDOMETER ERROR (MILES PER HOUR)



Speedometer speed	20	30	40	50	60	70	80
True speed	22	32	44	56	67	77	86
True speed car No. 2		26	35	43	52	60.5	

## ODOMETER ERROR

Distance registered for covering an actual 100 miles: 84 miles. Odometer error: 16 percent low (These errors in speedometer and odometer performance were obviously not typical of all Fords and must have been due to an assembly-line blunder in selection of the wrong speedometer drive gear. Car No. 2 is probably more typical of Ford.)

## DRIVER'S VISION



Distance at which part of road in front of car could be seen (A in sketch).....16 feet  
Distance at which full width of road could be seen (B in sketch).....22 feet

## GROUND CLEARANCE (unloaded car)



Radius of sharpest dip that could be crossed without "hanging up" (solid line).....24 feet  
Radius of sharpest hump that could be crossed without "hanging up" (dotted line).....17 feet  
Deepest rut that could be driven in.....7 inches  
Curb clearance for door opening.....12 inches

## MISCELLANEOUS

### STEERING

Steering-wheel turns from straight ahead to steer outer front wheel in a 100-foot circle: 0.9 turns.

Diameter of smallest circle inside which the wheels could turn (curb-to-curb): 41.5 feet.

Diameter of smallest walled circle inside which entire car could turn (wall-to-wall): 44 feet.

Steering-wheel turns, lock-to-lock: 4.4 turns. (This differs from manufacturer's claims but is an actual measurement.)

Steering-wheel diameter: 17.5 inches.

### TRUNK CAPACITY

Number of standard cartons (1 cubic-foot each) that could be packed into trunk: 14 cartons.

### CENTER OF GRAVITY

Height of center of gravity of unloaded car: 23.3 inches.

**WATER RESISTANCE:** Fair. (In high-pressure car wash some water leaked in around right-front ventilator pane.)

### MEASURED DIMENSIONS

Length: 208.0 in. Width: 77.5 in. Height: 58.25 in.

Dale Kelly, Registered Professional Engineer



## CLYMER DRIVES THE 1957 FORD V8

By Floyd Clymer

**T**HE 1957 FORD tested was the 118-inch wheelbase Fairlane. The route was from Washington, D. C., over winding roads and hills near Gettysburg and through Harrisburg, Pa. Then I drove to New York City on turnpikes, returning through Delaware and Maryland. Total mileage was 605 miles.

Later in California, I topped off the Ford tests with a Fairlane 500 four-door sedan with power pack V8, driving it on some high-speed tests for an additional 356 miles.

I found the bodies of both cars to be tight and dustfree and the Western car covered many miles on the dusty Mojave Desert.

Driving against strong side winds in Pennsylvania, I found the car extremely stable. In a heavy rain, there were no water leaks. The body is well insulated and has a minimum of wind noise and rumble.

There is little body roll. Due to the lowness of the car, there is a feeling of safety when cornering and driving at speed on rough roads. Weighing about 400 pounds more than the 1956 Ford, this car has the feel of the larger car that it is.

The 14-inch wheels, with a 22-pound air pressure, cushion the bumps and yet have less tire squeal than previously.

Both Fords I tested gave very good performance. The Fairlane 500 had terrific acceleration. On long stretches out West, the speedometer needle would hit 120 miles per hour. Like most speedometers, this one was fast—the amount was about eight

percent, average for a production model.

The engine is extremely smooth with very little vibration. The car did not overheat, even in the desert.

Fordomatic shift is smooth, except that with fully depressed throttle the final upshift at 65 is a little rough. Downshift can be made at speeds below 62 miles per hour.

Rigidity is noticeable. No squeaks or rattles developed. Doors open and close very easily. Push-down knobs lock front as well as rear doors from inside.

Suspension is improved and the ball-joint front suspension is retained. Even though over-all height is only 57.2 inches (3.2 inches lower than last year), road clearance is reduced only a half inch.

Ford power steering is good, although there is considerable pressure or drag apparent when turning the wheel. It is intended to give a "feel" of the road. Five and one-half turns are required from lock to lock. This is too many for a power-steering car. Faster steering would be desirable.

Ford has increased gas-tank capacity to 20 gallons—I am happy to see that.

Vision is improved. There is some front-fender vibration on rough roads, especially at high speeds.

The new inside-operating hood lock is desirable and it may help reduce theft of underhood parts. The hood is now hinged from the front and opens from the rear. This is a safety feature as there is no longer

(Continued to page 272)

# An Engineer Analyzes 1957 Plymouth V8

By Dale Kelly, SAE

**MODEL TESTED:** Belvedere four-door sedan with 301-cubic-inch V8, two-barrel carburetor and TorqueFlite transmission.

Rear-axle ratio: 3.36 to 1. Wheelbase: 118 inches. Tires: 7.50 by 14. Weight: 3820 pounds with gas

tank half full (54 percent on the front wheels, 46 percent on the rear wheels).

Barometer: 28.89 inches, temperature 82 degrees F., payload 400 pounds for acceleration tests, 200 pounds for fuel economy.



## ACCELERATION TIME FROM STANDING START IN SECONDS

	0 to 20	0 to 40	0 to 60	0 to 80	1/4 mile
Ignition timed for regular gasoline	2.5	6.8	14.5	27.1	19.9
Ignition timed for premium gasoline	No improvement possible with either premium or super-fuel				

The watch was started the instant the accelerator was floored. The engine was not run up against the brakes. All tests in Drive range.



## FUEL ECONOMY IN MILES PER GALLON

	Steady 30 m.p.h.	Steady 50 m.p.h.	Steady 70 m.p.h.	Traffic Route
Ignition timed for regular gasoline	18.9	15.8	12.8	11.1
<i>In the traffic test the car makes 10 full stops per mile and is driven fast enough to average 15 miles per hour.</i>				

**ESTIMATED AVERAGE ANNUAL GASOLINE BILL: \$182 for 10,000 miles.**

(Based on the use of regular gasoline entirely as there is no advantage in using premium fuel in this engine.)



## SPEEDOMETER ERROR (MILES PER HOUR)

Speedometer speed	20	30	40	50	60	70	80
True speed	19	29	38	46	55	64	72

## ODOMETER ERROR

Distance registered for covering an actual 100 miles: 104 miles.  
Odometer error: 4 percent high.



## DRIVER'S VISION

Distance at which part of road in front of car could be seen (A in sketch).....19 feet  
Distance at which full width of road could be seen (B in sketch).....24 feet



## GROUND CLEARANCE (unloaded car)

Radius of sharpest dip that could be crossed without "hanging up" (solid line).....27.5 feet  
Radius of sharpest hump that could be crossed without "hanging up" (dotted line).....20 feet  
Deepest rut that could be driven in.....6.5 inches  
Curb clearance for door opening.....13 inches

## MISCELLANEOUS

### STEERING

Steering-wheel turns from straight ahead to steer outer front wheel in a 100-foot circle: 0.65 turn.

Diameter of smallest circle inside which the wheels could turn (curb-to-curb): 41 feet.

Diameter of smallest walled circle inside which entire car could turn (wall-to-wall): 45 feet.

Steering-wheel turns, lock-to-lock: 3.4 turns.

Steering-wheel diameter: 17 inches.

### TRUNK CAPACITY

Number of standard cartons (1 cubic-foot each) that could be packed into trunk: 18 cartons.

### CENTER OF GRAVITY

Height of center of gravity of unloaded car: 22.6 inches.

**WATER RESISTANCE:** Good.

### MEASURED DIMENSIONS

Length: 204.0 in. Width: 76.5 in. Height: 58.38 in.

Dale Kelly, Registered Professional Engineer





## CLYMER DRIVES 1957 PLYMOUTH V8

By Floyd Clymer

**T**HE TEST totaled 2760 miles from Detroit to Los Angeles, including some off-highway runs. The car was a Belvedere four-door sedan with power pack. The 301-cubic-inch Fury V8 engine is fast and powerful. It is also quiet and vibrationfree. The more miles I drove the 1957 Plymouth the more convinced I became that it was one of the finest cars I have driven.

Weighing 3900 pounds, the test car had a 118-inch wheelbase, three inches longer than 1956. It has the roadability and handling characteristics of a large, heavy car which, actually, it is. However, it is a fraction of an inch shorter over-all than last year. It is 3.6 inches wider.

I rate roadability and handling of the Plymouth as its outstanding features. Chassis and suspension are new. Conventional front coil springs have been replaced with 44.6-inch-long torsion bars. Springing results from the twisting of these one-inch rods. This system is, of course, not new, having been used in some European cars for years.

The Plymouth is only 56.6 inches high, several inches lower than previously. The floor has a slight stepdown design, further contributing to its low center of weight. Ball-joint front suspension is used. The new front end greatly reduces roll on corners, a roll which was above average on previous Plymouths. Front-end dip as brakes are applied has been minimized. The hood is rather flat and wide as are the front fenders. There is slight vibration of

front-fender ends on rough roads, however it is less than in previous Plymouths.

The rear suspension is redesigned to allow for the lower frame. Due to the off-center mounting of the rear axle on the springs, there is less windup when power or brakes are applied. The axle is attached to the spring about one third of the way back from the front shackle, allowing a stiffer action between the axle and the front spring hangers.

The lower center of gravity makes the car a safer car under all driving conditions. Fourteen-inch wheels contribute to the lowered position. Ground clearance has been reduced about a half inch. There is less tire squeal on corners this year.

TorqueFlite transmission, new in the Belvedere this year, has five push buttons and is a three-speed unit. It provides increased acceleration, economy and better downhill braking. In models other than the Belvedere, the two-speed PowerFlite (with four buttons) is used.

You can downshift below 62 miles per hour by flooring the throttle.

The car does have extreme high speed. The speedometer needle would hit 115 on long stretches (it was fast by six percent on this particular car). It hit 100 with what seemed to be little effort. Handling at this speed was outstanding. I covered 1004 miles in one day from Kansas City to Albuquerque, N. Mex., and 841 miles the next day from Albuquerque to Los

(Continued to page 274)



## Ocean-Going Raft

Drifting on a bamboo raft named Tahiti Nui, a French scientist and four countrymen plan a round-trip voyage between Papeete, Tahiti, and South America. The raft is built like ancient Polynesian craft:

No nails or bolts, sails woven of leaves, and with centerboards rather than rudders. Electronic gear aboard will be used to record weather and oceanic data. The group has scheduled a landing in Chile by late January, with a similar waterborne return to Tahiti from Peru. Leader of the party is Eric de Bisschop.

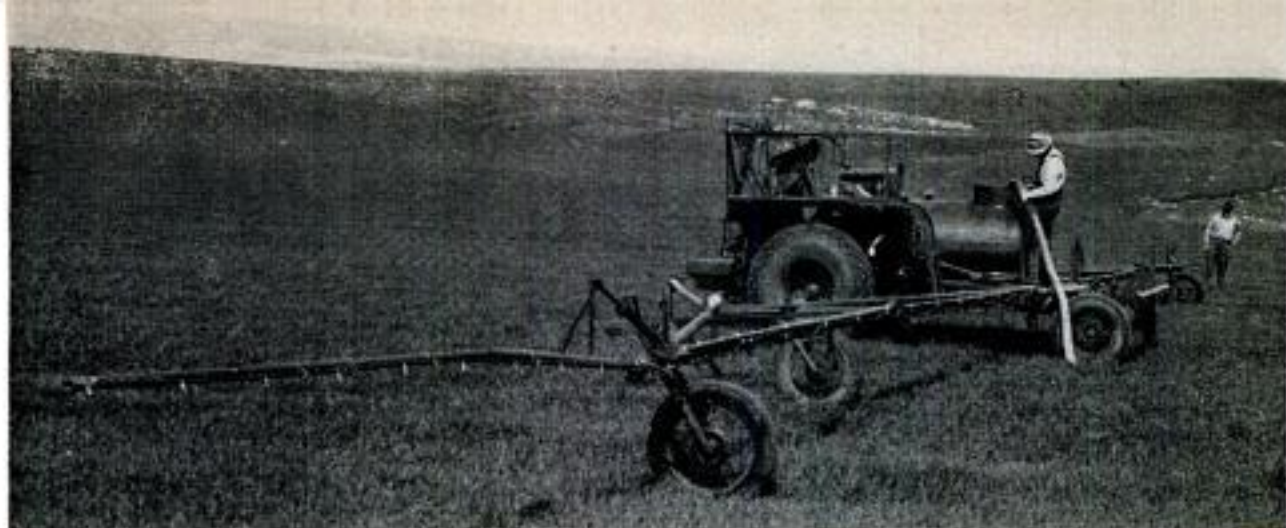


## Vibrator Helps Locate Rattles on Auto

Hooked to the bumper of a car, a vibrating device enables the mechanic to hear and locate body rattles without taking the car out on a road test. A control box permits him to vary the frequency of the vibration as he walks around the car listening for rattles. The device, working on an electro-mechanical principle, weighs 34 pounds, plugs into 110-volt outlet.

## Crayons Detect War Gases

Marks with chemical crayons on paper, wood, stone or painted surfaces help detect war gases. The Army Chemical Corps has developed the crayons which turn red, green or blue in the presence of such gases as phosgene, hydrogen cyanide, lewisite and cyanogen chloride. Peacetime applications of these crayons include use in fumigating, chemical manufacturing, air pollution and smog control.



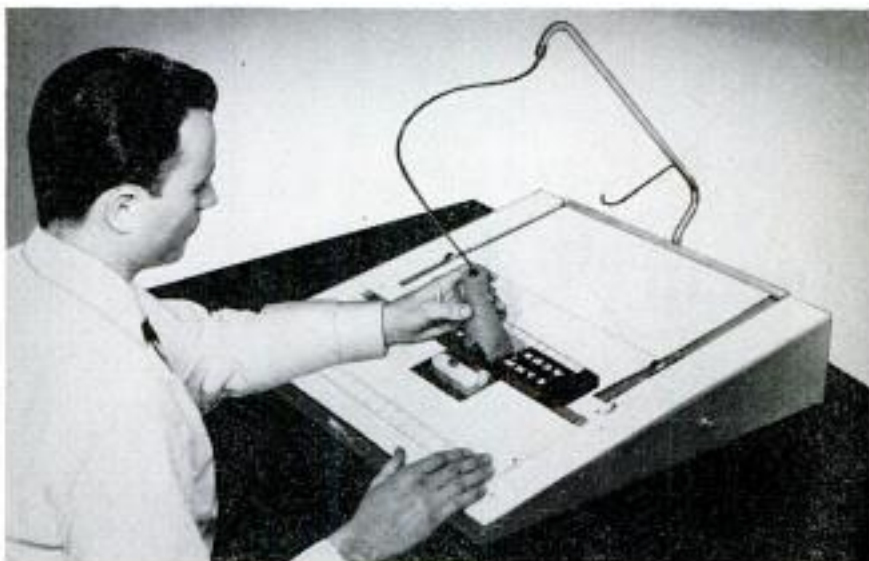
## "Inexpensive" Homemade Crop Sprayer Covers 500 Acres Daily

Five hundred acres a day are covered by a 130-foot-wide crop sprayer powered by a stripped-down, self-propelled grain binder that mounts a spray tank. Pipes and supporting frame ride on four motorcycle wheels. The builders, Paff brothers of Gar-

field, Wash., claim lower costs when compared with aerial spraying, and greater benefits, because of more direct application. A motorcycle is driven along the edge of the previously sprayed strip to guide the driver of the sprayer.

## Photographic Typesetter

Over 10,000 type styles and sizes can be set on an easily operated desk-top machine for setting display type and headlines photographically. Setting type for 6 to 90-point size, the machine uses negative templates to provide upper and lower-case letters. All work, including the developing of the photographic copy, can be carried out in a lighted room. Type can be set in a straight line, curved to fit a layout or staggered, as desired.



Setting type for 6 to 90-point size, this photographic-typesetting machine uses negative templates to provide upper and lower-case lettering

## Weed-Spraying Railroad Engine Has Five-Car Killing Fluid Supply



Weeds between the tracks of the German Federal Railway are killed by a spraying engine that pulls five tank cars behind it. The cars, filled with weed-killing fluid, supply the sprayer through a large hose that runs the length of the train. Ten of these trains have been ordered.

Even after two years of scrubbing and washing, a new paint with a special additive will kill germs that contact it.



Arrows point to the air-intake pods atop compound-wrap windshield. Dual headlights are optional on Cruiser

## Mercury's Lushest: Turnpike Cruiser

MERCURY SAVED ITS ACE for the final round: It introduced the Turnpike Cruiser at the New York Auto Show. Other Mercurys came out a month earlier.

The Cruiser has several new ideas that are exclusive. It also has, of course, such

Mercury innovations as the air-isolated rear-spring hangers (see *PM*, Nov. 1956).

Exclusive on the Turnpike Cruiser is a ventilation system that takes fresh air in at roof level through louvered pods at each end of the windshield and exhausts it through a rear window that lowers into the trunk.

Rear window is in three sections. Center portion lowers into the trunk



Four headlights are available on the Cruiser as an option. The new compound-curve windshield wraps upward as well as sideways. The V8 engine has 368-cubic-inch displacement and develops 290 horsepower (this same engine is available on other Mercurys at extra cost). With a four-barrel carburetor and a 9.75 to 1 compression ratio, this big engine gives the Turnpike Cruiser a performance of 0 to 60 miles per hour in 10.5 seconds (based on manufacturer's claims, not on *PM* test) for a fully equipped car with four persons aboard.

# It's Here—A Hardtop That Converts

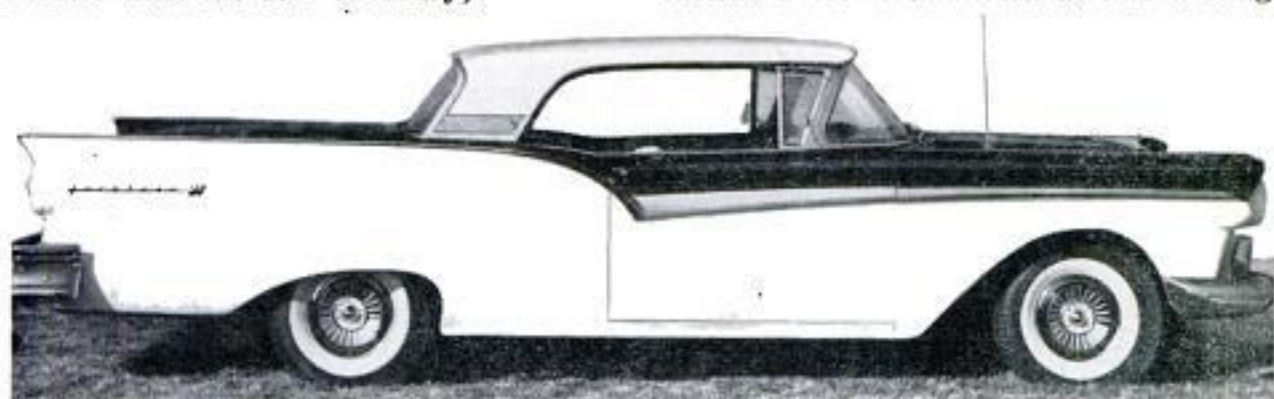
IF YOU LIKE TO DRIVE with the top down, but don't like flapping canvas, the Ford retractable hardtop is your car.

It's a genuine two-door steel hardtop. At the touch of a button, the top folds itself slightly and disappears into the trunk, making the car an open convertible.

To make the top disappear, Ford had to add three inches to the trunk (the car is 210.7 inches long, a fraction of an inch shorter than the 1957 Mercury).

The forward portion of the roof is hinged to fold under as it goes down. The trunk lid pivots from the rear, opening at the front end. Luggage space is restricted and difficult to get at.

Removing the spare tire (recessed in a floor well) is virtually impossible unless you climb inside the trunk. But for those who like their cars sporty such handicaps are minor indeed. Ford begins delivery this month. Price is unknown at this writing.



Longer than any other Ford, the retractable hardtop has a distinctive look with its squared-off top. The trunk has been extended three inches. The roof had to be made flatter and shallower in order for it to fit inside the trunk



Above, as the top lowers, its forward edge folds under to shorten its overall length. The whole operation is automatic once the button is pushed. It takes 40 seconds for the cycle and it can't be started until the engine is stopped and transmission in neutral. If you just want to load the trunk, you stop the cycle when the trunk lid has opened, but before the top has moved



# Detroit Listening Post



By Art Railton

**CHEVROLET CAUGHT** the industry (and those who write about the industry) by surprise when it announced it was offering fuel injection for 1957 models.

No wonder. It turns out that the secret was well kept because there had been no production of the fuel-injection system prior to announcement. The only units they had were engineering prototypes, so naturally nobody knew about them!

Now, they say, production is under way and you will be able to get fuel injection in your Chevrolet for an extra \$450.

At that price it won't eliminate carburetors, but it is hoped that as production builds up the price will drop. All the first units are going into Corvettes anyway, so don't expect to find one under the hood of your neighbor's new Chevy.

This fuel-injection business is mixed-up, to say it politely. Cadillac's Eldorado Brougham (the \$10,000 plus car that will go on sale sometime in February) was all set to have it, then it was dropped, then it was uncertain as it is at this writing.

## Must Be Bug-Free

Why the uncertainty? Simply that Cadillac wants to be sure the system is bug-free. Four test cars have been wearing themselves out covering every part of the country to make sure. After all, when you buy the most expensive car in the country, you don't want it to break down some evening on your way to the club. The fact that it has the latest fuel injection won't help your morale at the moment!

By the time you read this you'll know if the bugs are out. This column's guess is that it won't have fuel injection—Cadillac will play it safe.

Don't expect to see many of the Broughams on the road. Not that the country can't afford them. It's Cadillac that can't afford to put too many out. There's no doubt that even with a \$10,000-plus price tag, Cadillac loses money on every one it delivers. The loss is chalked up to advertising.

Guesses are that between 1500 and 1700 Broughams will be built per year. That's about six a day. Its only competition (Continental) built six cars in one recent week against over 50 for the same week last year. Continental insists the drop is not due to a drop in demand, but that Lincoln needs its line to build hardtops.

## It's the Edsel

They finally admitted it. The new E-car at Ford is named the Edsel, honoring the late Edsel Ford, son of the founder and father of Henry II, Benson and William Clay. The name was picked from 18,000 submitted.

Ford won't say it officially, but the Edsel is apparently going to fit pricewise between Ford and Mercury, not between Mercury and Lincoln as so long rumored by just about everybody. Covering the lower-medium field with the Edsel would explain why Mercury moved up this year with its Turnpike Cruiser and, at the same time, dropped its Medalist price leader introduced only last year.

But Mercury's in step with the trend. Everything's moving up, including prices. For 1957 cars, you will pay 7.17 percent more than you did for 1956 cars. On a \$3000 car, that amounts to over \$200.

You get more for your money, though. The average 1957 car is 1.1 inches longer and 0.7 inch wider than the average 1956 car. It's 2.1 inches lower—whether that's a plus or a minus is hard to say.

From 1941 to 1955, average car length increased only 2.7 inches. Now in one year, the figure increases 1.1 inches—that's a big stretch for one model year.

Of course, average lengths are misleading. After all, there always have been big cars. But at one time there were small cars also. Now we still have the big car (although strangely enough they are getting smaller—in 1933 the smallest Cadillac weighed 5000 pounds, in 1957 the smallest Cadillac weighs 4595 pounds), but the small car seems to have gone.

The Plymouth four-door sedan in 1933 weighed 2645 pounds. The lowest-price four-door Plymouth V8 this year weighs 3405 pounds.

Yet cars don't get much roomier. Compared with the 1956 Plymouth, the 1957 Plymouth interior is larger in only 5 of 11 dimensions, it is smaller in 6 of 11. The 1957 Ford interior is smaller than the 1956 interior in 5 dimensions, larger in 3 dimensions and unchanged in 3 more. And if you want to be really confused, the "big" Ford Fairlane is smaller inside than the "small" Ford Custom. Yet outside it is six inches longer! If you want more room, buy the small Ford. Confused?

*Gale winds are welcome to these yachtsmen as they seek to top the 100-mile-per-hour mark in strange craft that are part sailboat and part automobile, with aerodynamics thrown in.*

# THEY SAIL ON SAND

By Robert E. Dorsett

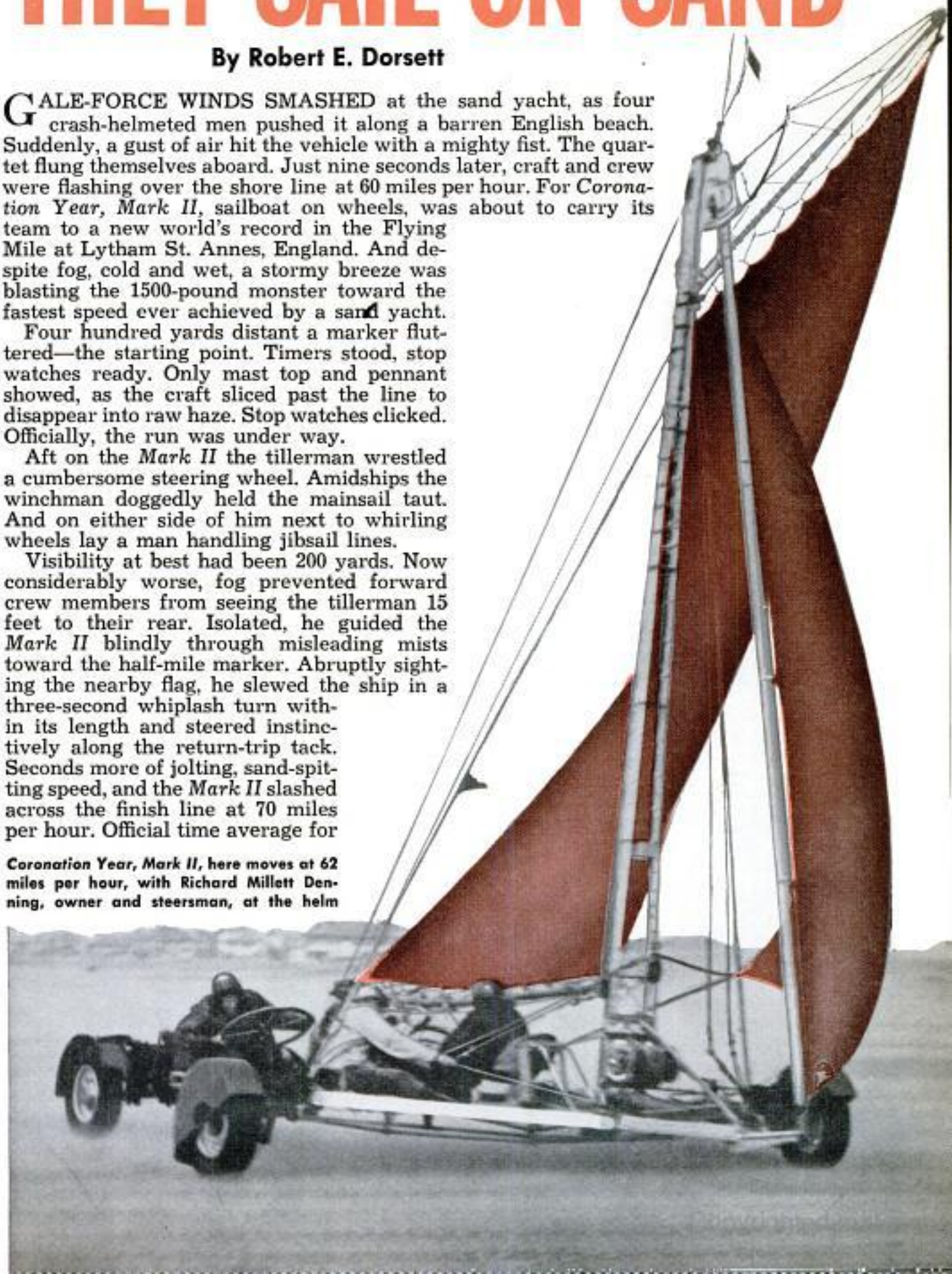
**G**ALE-FORCE WINDS SMASHED at the sand yacht, as four crash-helmeted men pushed it along a barren English beach. Suddenly, a gust of air hit the vehicle with a mighty fist. The quartet flung themselves aboard. Just nine seconds later, craft and crew were flashing over the shore line at 60 miles per hour. For *Coronation Year, Mark II*, sailboat on wheels, was about to carry its team to a new world's record in the Flying Mile at Lytham St. Annes, England. And despite fog, cold and wet, a stormy breeze was blasting the 1500-pound monster toward the fastest speed ever achieved by a sand yacht.

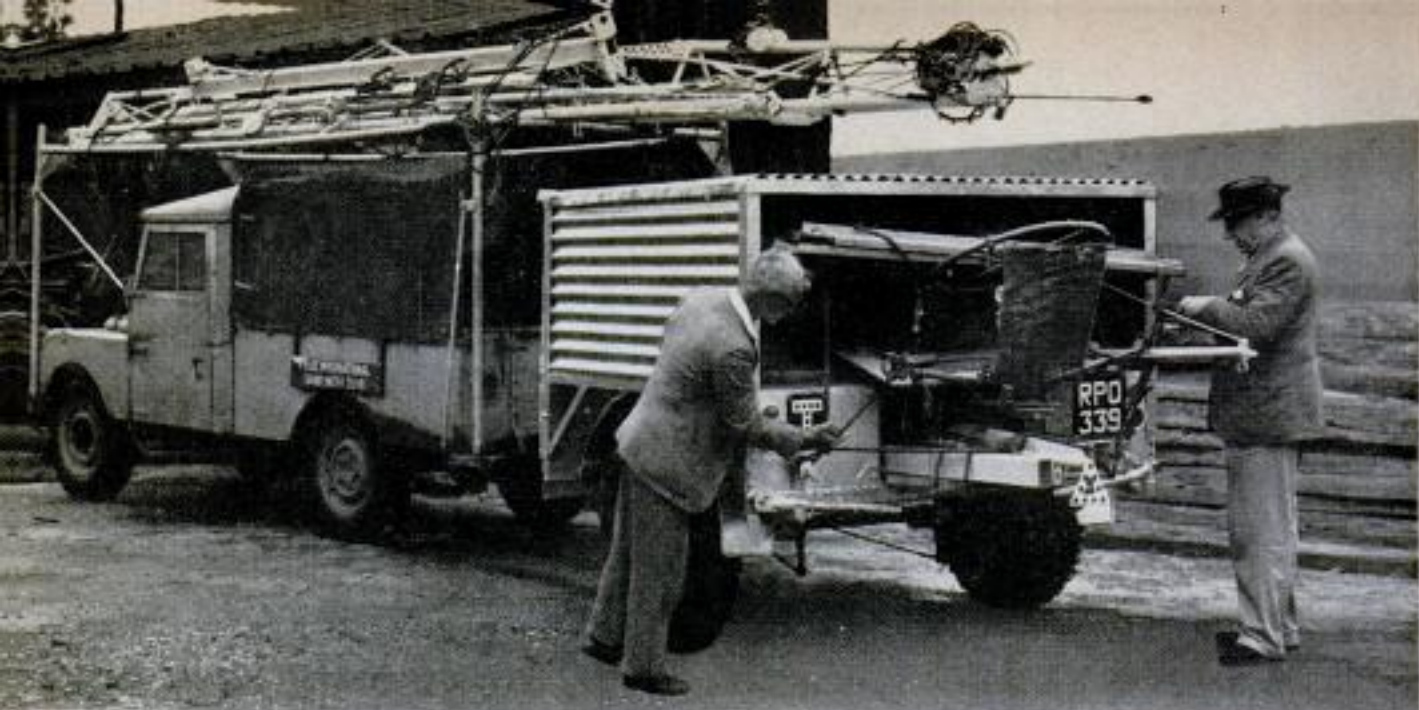
Four hundred yards distant a marker fluttered—the starting point. Timers stood, stop watches ready. Only mast top and pennant showed, as the craft sliced past the line to disappear into raw haze. Stop watches clicked. Officially, the run was under way.

Aft on the *Mark II* the tillerman wrestled a cumbersome steering wheel. Amidships the winchman doggedly held the mainsail taut. And on either side of him next to whirling wheels lay a man handling jibsail lines.

Visibility at best had been 200 yards. Now considerably worse, fog prevented forward crew members from seeing the tillerman 15 feet to their rear. Isolated, he guided the *Mark II* blindly through misleading mists toward the half-mile marker. Abruptly sighting the nearby flag, he slewed the ship in a three-second whiplash turn within its length and steered instinctively along the return-trip tack. Seconds more of jolting, sand-spitting speed, and the *Mark II* slashed across the finish line at 70 miles per hour. Official time average for

*Coronation Year, Mark II*, here moves at 62 miles per hour, with Richard Millett Denning, owner and steersman, at the helm





Parts of the *Mark II* are packed atop a small truck and inside a trailer for transportation to another race

the mile: 57.7 miles per hour—a new world's record.

Later that day the American yacht *Flying Slipper*, netting 46.2 miles per hour average on the same course, was unable to better the *Mark II*'s time. None of the 18 other competitors of the day did as well. Thus, Richard Millett Denning, owner and pilot of the *Mark II*, and his crew became leading contenders for the sand-yachtsman's goal—a speed of 100 miles per hour.

*Mark II* is the culmination of the biggest

and best in sand yachting—and the most expensive. Costing \$6000 (average homemade yachts are worth \$200), the *Mark II* has been two years in design and three years in construction. Able to withstand full-gale winds without crumpling, the big land boat looks like a large equilateral triangle made of aluminum alloy, with steel tubing as ribs extending from a "strong-back" brace along the craft's center axis. Four wheels are used in straight-line travel; in turning, the yacht utilizes only three

Aboard the *Mark II* are the tillerman, left foreground, the mainsail winchman and jibmen on each side





wheels: The two back wheels pivot as one on a horizontal sleeve independent of steering.

The yacht's 26-foot length includes a bowsprit at the front of a 16-foot-wide frame. *Mark II*'s main and jib sails are supported by a 20-foot high-tensile steel mast. Leading edge of the jib is kept straight by a Duralumin stay pole to the bowsprit from the top of this mast. Main and jib sail have a total area of 372 square feet. The jibsail, overlapping the mainsail, is worked on an endless-rope system. The mainsail is handled by a sun-and-planetary internal-gearred winch.

Hydraulic brakes are fitted on the yacht's rear wheels which are independently suspended and have pneumatic tires. For transportation purposes, the *Mark II* breaks into compact subassemblies which can be packed into a trailer.

Normal crew for cruising is four, but three are used for point-to-point racing, and two men team up for usual Flying Mile conditions.

#### Sand-Yachting History

Historically, sand yachting originated sometime between 1895 and the turn of the century. Make-shift iron wheels, old wood parts and bedsheet sails were successfully combined to produce 15 to 20-mile-per-hour speeds. Primitive land yachts sped along Southport, England, shores. Equally antique models were operated by Francois Dumont and eight brothers on Belgian beaches. Louis Bleriot, the first aviator to fly across the English Channel, lured the Belgians to France for sand-yacht races by offering a flight in his aircraft as a prize. Now the sport also is enjoyed at Daytona Beach, Fla., on California's dry lakes, and on sandy wastes in New Zealand, Australia, Holland and Africa. Sand-yachting season extends from late fall to early spring, when beaches are relatively bare. Wearing apparel for this sport is catch-as-catch-can; one enthusiast even participates barefooted.

Sand yachts are divided into two categories: the ships copied after nautical craft stressing fore-and-aft rigging and cockpit; and those designed as land craft or "motor" types (though they do not have motors), with one large



Above, with a crew of four aboard, the *Mark II* dwarfs one of the homemade sand yachts built by a young enthusiast. Below, perched high on the mast, one of the crew helps hoist the large mainsail of the *Mark II*. The boom rest, right, will be removed

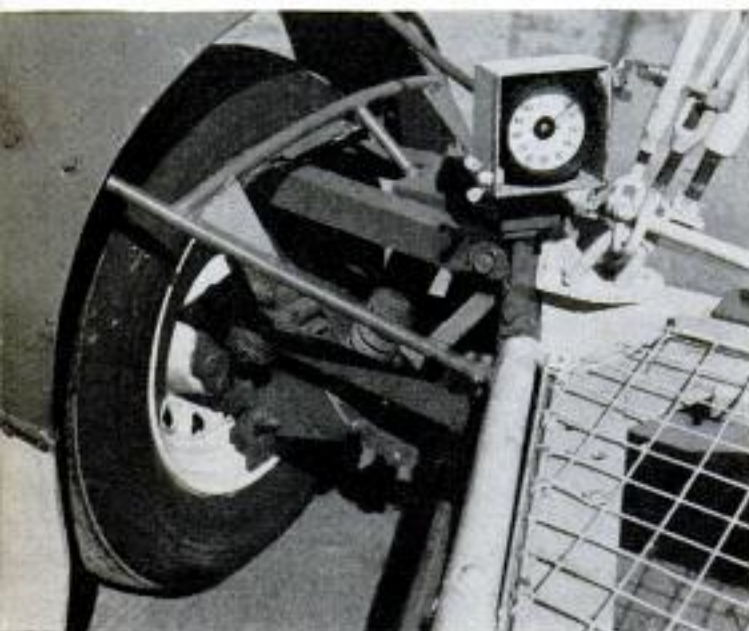




Above, located at the forward end of the yacht, this winch wheel and cable keep the mainsail taut

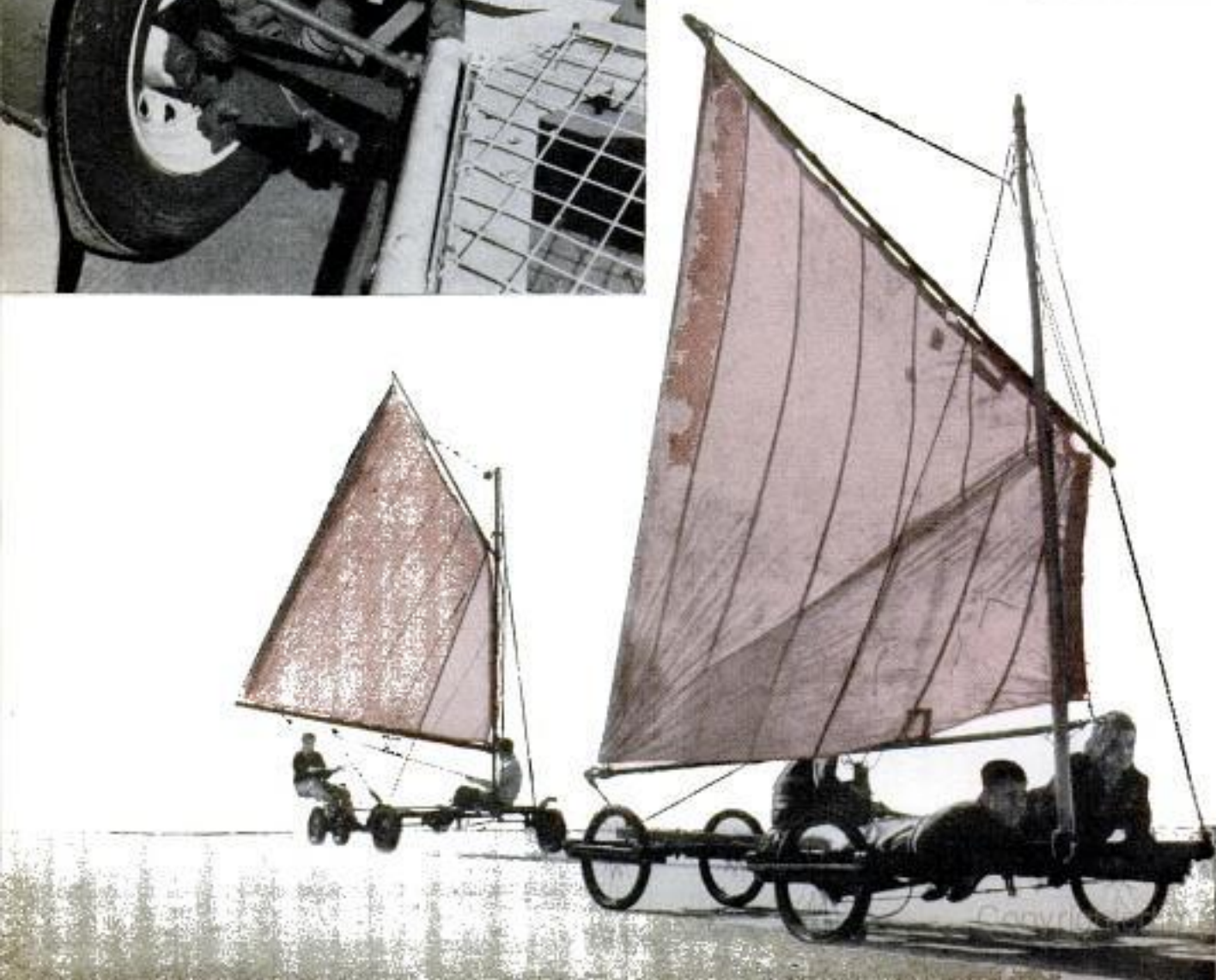


Above, R. M. Denning is at the steering wheel of the *Mark II*, which was five years in design and building



Left, this closeup of front-wheel hydraulic dampers and coil springing on the *Mark II* shows how the big yacht is able to ride out jarring record runs

Below, where races for the larger craft extend to 20 miles, smaller makeshift land boats usually are limited to one-half-mile heats for younger yachtsmen





On a windy day at the beach, sand yachtsmen ready their sand craft for a race. Note structural variations

mainsail and an open chassis. The latter type is most popular. The most maneuverable ones have a triangular chassis, in contrast to rectangular, four-wheel models. Sea-type sand yachts usually run on unsprung wheels, while motor types use springing for at least the front wheels.

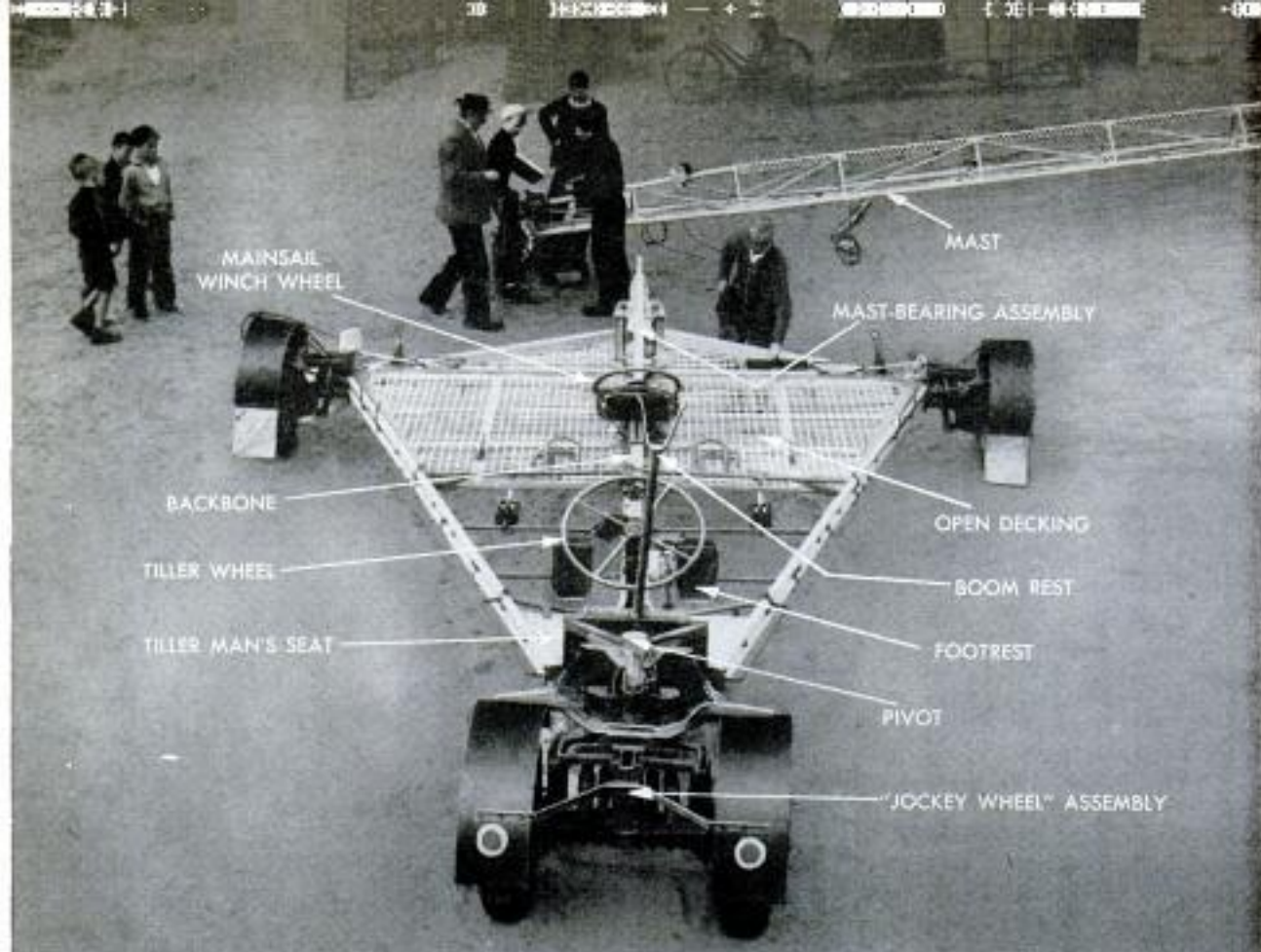
Structurally, masts are the chief problem, especially since guy-wiring sometimes is a hindrance. High-tensile aluminum tubing provides structural strength. Mechanically, steering is the paramount difficulty, and steering wheels and tiller bars are subjects of heated arguments.

#### Sand, Ice, Water Yachts

Although similar in shape to their first cousins on ice and water, these specialized land boats are strangely different. For example, rigidity is all-important to the sand yacht. Frame, mast and other assemblies must withstand hammer blows not often delivered to ice and water boats. Mild gusts will maintain movement for these latter craft, but for the average 400-pound sand yacht (measuring 12 feet wide by 15 feet long with a mast 24 feet high) an initial blast of 15 miles per hour is needed. And the sail must use every ounce of wind it can beg, borrow or steal to keep up the yacht's momentum. Not only this, but the sand boat must make hairpin, lightning-like reverses at 30 to 50 miles per hour to begin another tack; and having made the turn,

Below, holding the rear wheel assembly, two young men are aided by a boy in pulling their triangular craft to the beach





After seating the aluminum mast in the mast-bearing assembly, these men will install the sail boom rig

the craft's momentum must be regained by another smashing blow from the wind. Any lack of rigidity under these conditions results in loss of speed and maneuverability. Yet, ice and water boats can bend easily and sail reasonably fast without 100 percent economy of wind.

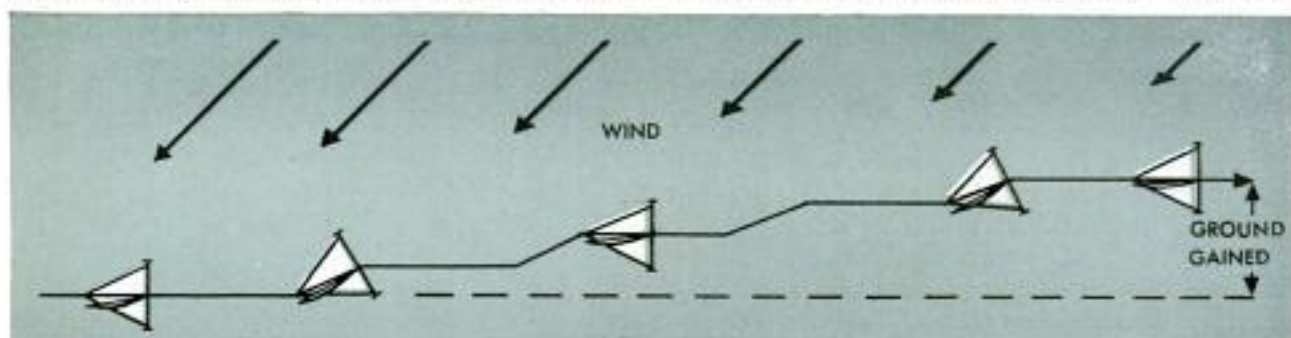
A wind-driven water boat tends to heel over in healthy breezes—a luxury permitted by its stabilizing keel or centerboard. The sand yacht must rely on wide base and axle support for uprightness in a wind. In addition, flat surfaces on a sand yacht are deadly because they tend to resist the wind. Therefore, a good sand yacht has a specialized chassis and mast with extra-light sails. This "open" type structure allows minimum weight and wind resistance and steals little wind from the sails.

Even sailing techniques produce variations in these three cousins. Ice and water

craft are subject to currents, drift and side-slipping, while the sand yacht moves in unerring straight lines. In tacking, the land boat gains ground in frequent jogging jumps along a path determined in most cases by the shape of the beach. Ice and water yachts usually have larger areas in which to maneuver.

By the way, don't get the impression that sand yachting is restricted to adults. The Fylde International Sand Yacht Club at Lytham St. Annes, with more than 100 members and 15 competing yachts, holds periodic races of 16 to 20 miles' distance for its voting-age members. But with these longer races, there are half-mile heats for youngsters 14 years and under who have built homemade yachts. In each category the spirit and fun are equal, based on the philosophy that today's sand yachtsmen are tomorrow's *Mark II* teams. ★ ★ ★

Tacking in a sand-yacht race is restricted by the shape of the beach. Offshore winds are ideal for best racing





# KEEPING UP WITH THE ATOM

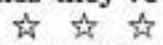


**H**IGH-ENERGY atomic particles soon will produce plastics so tough they can be used as the structural members of buildings, predicts an oil company scientist.

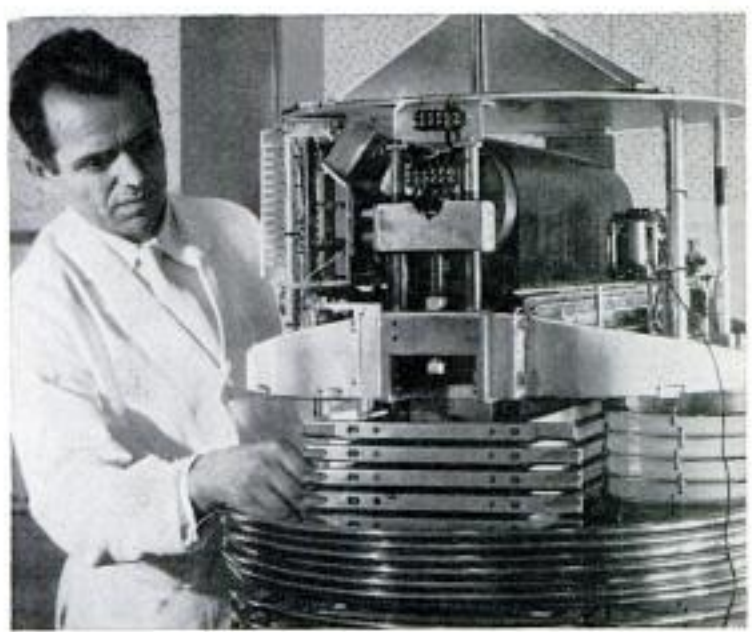
Dr. Harold Gershinowitz, president of Shell Development Company, recently stated that "high-energy bombardment will do for plastics what forging did for iron and vulcanizing did for rubber." Already, ordinary liquid plastics can be changed into unique new solids with extremely high resistance to heat, chemical change and shock.

For basic research in this field, the company has a brand-new 3,000,000-volt electron accelerator, most powerful radiation source in industry. It accelerates atomic particles to nearly the speed of light and then fires them into the material being processed.

The photo at right shows the continuous-belt "escalator" which carries electrons to the top of the accelerator. The electrons are stored there until the required voltage is built up, then fired down through a vacuum tube at the target. Such high-energy particles produce strange effects. They can vulcanize rubber, change the color of many standard chemicals and give oils and greases properties they've never had.



One of the interesting paradoxes in the search for new materials for nuclear reactors was pointed out by AEC Commissioner Willard F. Libby recently. A group of metallurgists is searching for a completely noncorrosible fuel element, a metal that will not dissolve in the highly cor-

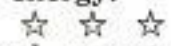


rosive reactor. At the same time, a group of chemists is asked to find ways to dissolve this noncorrosible metal so a spent fuel element can be processed for radioactivity at moderate cost!



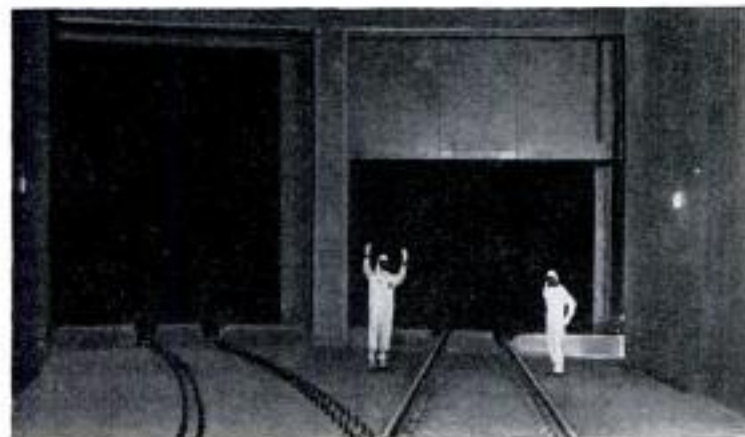
Recently a Naval scientist challenged some basic physical concepts. For many years physicists have thought that minus 459.6 degrees F. is absolute zero, and that the speed of light is the fastest theoretical speed possible. These concepts aren't necessarily true, says L. Carroll.

He theorizes that if atoms could be made extremely cold instead of hot, a "new type of superatomic energy" could be released. In his concept, as the atom got colder and colder its electrons would gravitate toward the nucleus faster and faster, at last plunging into the nucleus, disintegrating it and releasing its entire energy.



Mechanical monsters of the atomic age will be entombed in the desolate tunnel shown in the photo at left.

Recently this tunnel was built at the Hanford plant, reaching 500 feet out beneath the desert. A giant piece of apparatus too "hot" to be repaired now will be loaded aboard a railway flatcar and rolled into the tunnel. There both the car and its contaminated cargo will be entombed forever behind massive water-filled concrete doors.





## Radar Unit Selects Speed Violators Only

Cars traveling within the speed limit are ignored by a new radar unit, while those exceeding the limit are instantly spotted. The radar meter, built by Admiral, can be preset for the prevailing speed limit. It then registers only the cars that break the law. An optional attachment will take a

picture of the license number of the violator's car along with the speed reading. Floodlights can be synchronized to operate automatically with the meter at night. Another optional attachment is a tape recorder which permits a traffic officer to record a car's speed and license number.

## Germ Killers Are Discovered in Soft Coal

Coal produces organisms that slow down or kill infectious diseases. In soft coal, Martin Rogoff of the Bureau of Mines has found 35 bacterial cultures, three molds and four actinomycetes, related to wonder-drug-producing soil bacteria. Study of

lignites, peat moss, and soft coal indicates that germ-killing potency of organisms increase with successive stages of coal formation. Hard coal, as yet untested for these properties, may prove to make possible even more potent wonder drugs.



## *Aerial Fire Engine*

HELICOPTERS soon will serve as aerial fire-and-rescue engines at military and civilian air bases in this country. After landing a three-man fire-fighting team and extinguishing gear at the crash scene the pilot maneuvers the "whirly-bird" to help control the blaze by beating on flames with powerful rotor downwash. Afterwards, these airborne ambulances fly the injured to distant hospitals. Effectiveness of helicopters for such rescue work has been tested by simulated emergencies. A number of dummy pilots have been "saved" from burning planes in less than 45 seconds after arrival of copter and crew at the site. Similar Marine HOK-1 models could assist fire-and-rescue projects in areas inaccessible to ground-operated fire engines and rescue trucks. With a gas-turbine power plant installed, and equipped with a Lycoming XT-53 free-shaft turbine engine, this helicopter is said to be the first U. S. aircraft of its kind airborne with a turbine developed to helicopter turbine specifications. Usable cabin volume has been doubled by mounting the turbine above the fuselage between the twin tail booms. The Kaman Aircraft Corporation of Bloomfield, Conn., builds these helicopters.

Above, flying to the scene of the crash, the helicopter hovers and quickly sets the fire-fighting equipment on the ground



Above, as the helicopter overhead uses powerful rotor downwash to beat on the flames, two firemen operate dry-chemical extinguishers and open a path for the third fireman to rescue the dummy pilot. Below, third fireman carries the dummy from plane





Now it's the frame and not the picture that gets the attention of Leo Thompson in his Miami, Fla., plant

*A Coast Guard veteran wanted a better way to frame his own paintings. Now he has a new career making*

## Aluminum Picture Frames

*By Edward G. Dickson and Max Hunn*

**L**EO G. THOMPSON is in business in Miami, Fla., today because he was a frustrated artist during his years in the U. S. Coast Guard. This frustration was caused by the cheap wooden picture frames in which he had to display his oil paintings. The frames warped, would come apart at the corners and frequently had to be refinished.

Thompson says he used to dream about sturdy metal frames to hold his pictures and finally decided to do something about it. As a machinist's mate, metalsmith and a chief in the aviation branch of the Coast Guard, he had the shop facilities for experimentation in his spare time. By the time he retired in 1953, he had worked out the details for his colored-aluminum pic-

Cross sections show some of the designs available in Thompson's picture moldings made in many colors





ture frames and was ready to become a manufacturer. He has a patent pending on the frames.

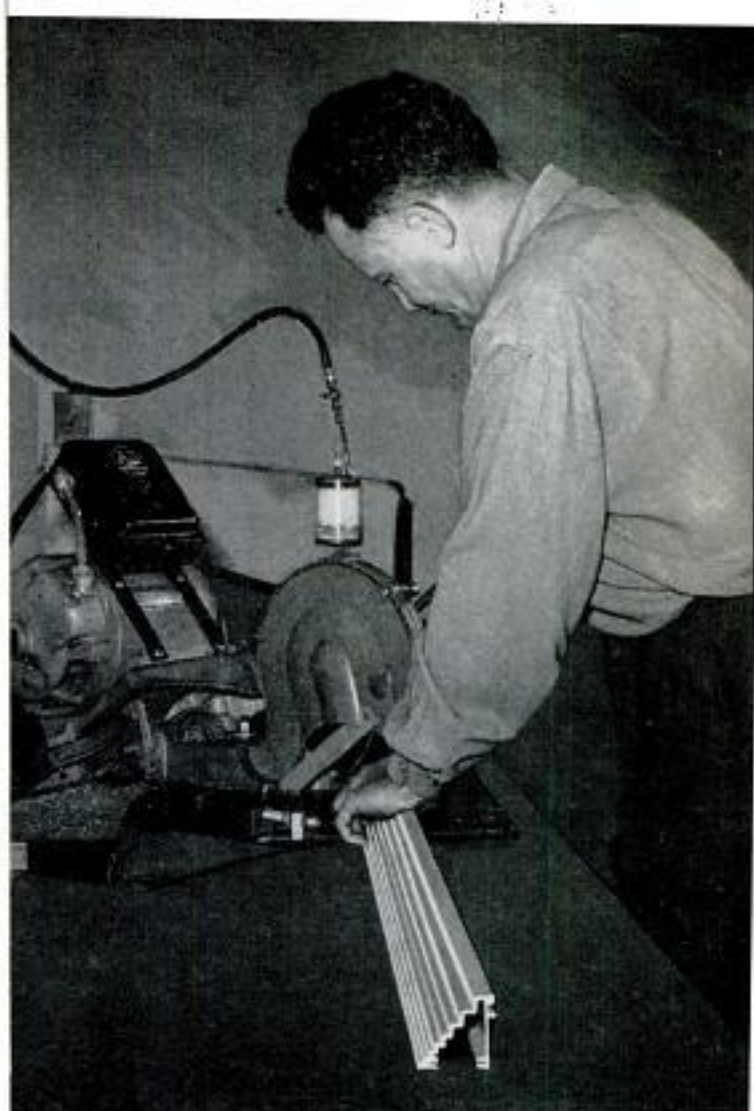
Now, in his small plant, he is turning out picture and mirror frames in eight different styles of aluminum, color-anodized in a variety of hues—gold, silver, red, blue, green and others—in demand by department stores and interior decorators.

With the increasing popularity of colors in home decorating, Thompson's frames are put to a variety of uses. Some buy the frames to harmonize with or accentuate the color of the pictures to be framed; others incorporate the colors of the frames into decorating schemes; some take a large frame and make it a central decorating item in a room, harmonizing other colors with it. A display man in one department store used one of the mirror frames in a window display as a table top. This led to so many inquiries for tables of this type that Thompson had to start manufacturing them. First, he had to design legs which could be attached to the mirror frames.

The aluminum which Thompson uses is extruded from dies he designed for the frames. All extrusions are of the same thickness. Each of the four basic designs is "reversible," so he actually has eight designs. He cuts the extrusions on an electric bench saw in his shop, checks the miter cuts for accuracy, ships the pieces in special boxes to Indianapolis for the anodizing process. This step comes after the cutting because he wants the color to be worked into the corner joints as well as the rest of the frame. When they return from the color processing, the pieces are ready to be assembled.

This step, too, is a simple one, but the key to Thompson's invention. The corners of the frames are locked tightly together by corner brackets. Bolts set in the brackets are self-locked into corresponding holes in other plates. Each corner is held securely by two plates set in grooves in the molding.

The former coastguardsman and artist devised another feature to enhance his in-

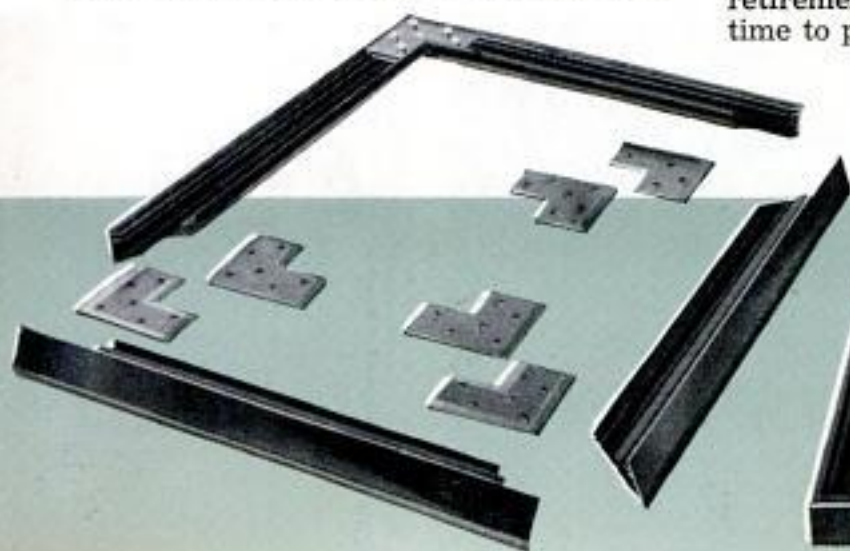


Thompson uses power cutoff saw to miter corners of aluminum molding before frames get color treatment

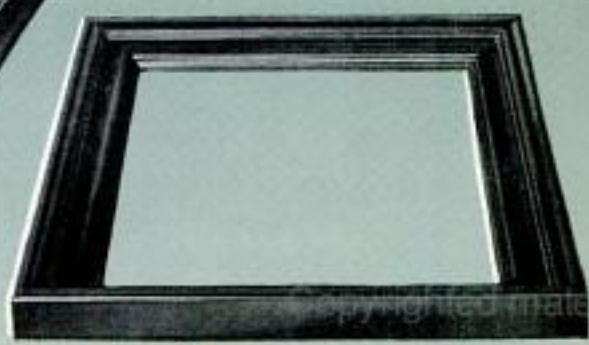
vention—a steel spring clip which holds the picture or mirror in place and does away with brads or nails. Frames are made in sizes ranging from 9 by 12 inches to 36 by 60 inches.

Thompson's roughest obstacles in the growth of his venture have come not from the technical end but from the business side. Many years in service had divorced him from methods in the commercial world and he discovered he had a lot to learn. His thriving company, Alumin Art, is evidence that he learned quickly.

In the Coast Guard, Thompson had time to practice his hobby of painting. Now—in retirement—he is so busy he rarely has time to pick up a brush. ★ ★ ★



Left, one corner bracket is ready for fastening. Below, completely assembled metal frame is shown from front view



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Reese's favorite is this fighting sailfish mounted against a painting. Even the sail bones are the originals

## Where an Angler's Thrill Becomes a Masterpiece

By George X. Sand

OPEN THE DOOR of a typical pink-stucco building in Ft. Lauderdale, Fla., and you step into another world—a Jules Verne submarine world. Muted light shimmers from aquamarine walls. Rainbow-hued marine denizens surround you. Overhead the shadowy hulk of a sleek

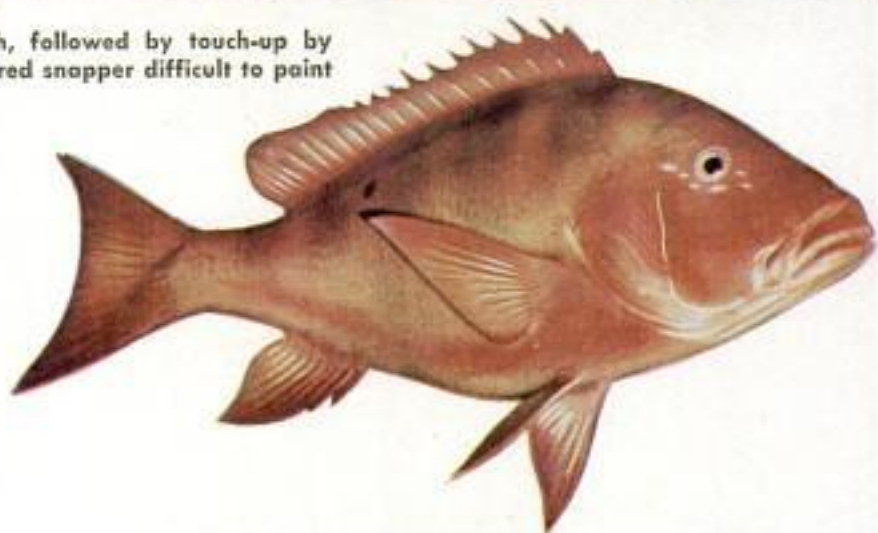
eight-foot hammerhead shark curves sinuously. A barracuda lunges with open mouth, razor teeth glinting. The brilliance of a big red snapper stands in sharp contrast to the sea-green background. So do the mottled colors of an ugly spined scorpion fish, a dazzling triggerfish, a



Painting is done with an airbrush, followed by touch-up by hand. Right, varying shades make red snapper difficult to paint

monstrous blowfish. The wet tentacles of a young octopus almost seem to move. On all sides sailfish leap, and flying fish skim across the walls, wings extended. Each creature has been trapped forever in a lifelike attitude by a master craftsman.

There are about 3500 species of fish that swim in Florida waters, and Joseph T. Reese—a specialist who is himself an ardent fisherman—has cured and mounted most of them at one time or another. From the biggest (a 1320-pound, 14-foot Peruvian marlin) to the smallest (a half-inch butterfly fish that required work under magnification with tweezers

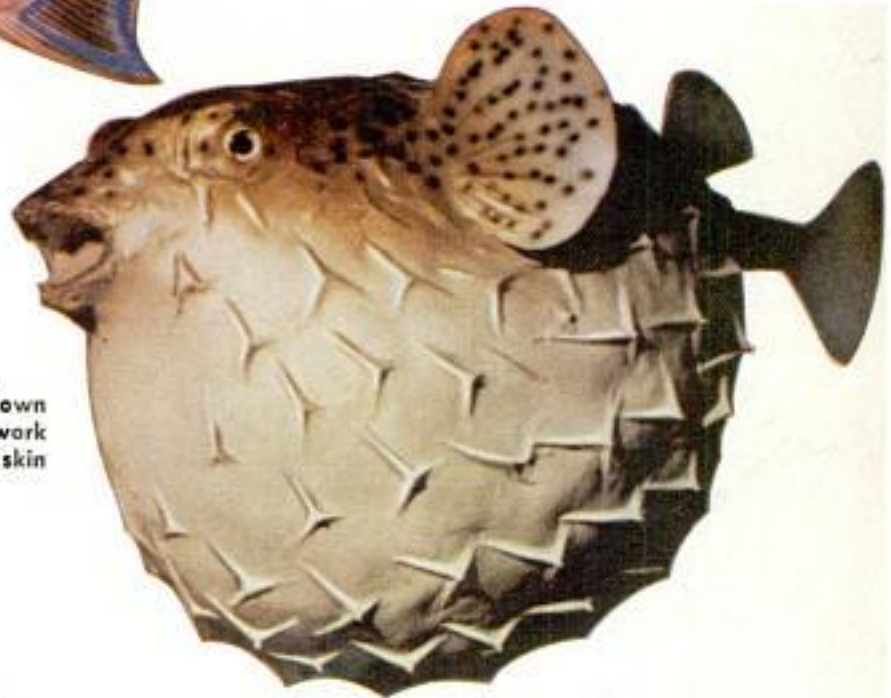


and scalpel) every specimen undergoes the same painstaking process.

"The uninformed fellow," says Reese, "thinks of a fish taxidermist as a man who works in a place that smells like a fish market, a man who cleans the innards



Rainbow hues of the triggerfish call for the touch of a real artist. Some fish change color as they change their activities from cruising to fighting



Reese mounted this blowfish in full-blown condition. Balloonlike stomach has a network of bones that had to be cured with the skin



This ugly character, a scorpion fish, has such intricate spots it required days of painting with a hand brush

from a trophy and stuffs the remains with fistfuls of straw. Nothing could be further from the truth."

In the shops behind Joe Reese's display room you can watch him and his crew of 25 experts processing 1300 to 1400 trophy fish at any given time. Through schools of game fish, big and small, mounted on work palettes that hang from the rafters, the men move from job to job. In spite of the volume of fish moving through the shop, the only smell is a faint suggestion of formaldehyde and lacquer. White-coated specialists work with surgical tools, plaster molds, vernier scales and modern tanning equipment. No fish is ever "stuffed" with

anything. There are 70 operations that go into the production of a single mounted sailfish. Curing takes two months; making the finished mount requires another month. Send him your prize catch in March and you'll probably hang it on the wall about July.

#### Childhood Interest

Reese's interest in preserving wildlife for posterity began in Oklahoma when he was nine. "I wanted to keep the owls, hawks, herons and snakes that I caught or shot," he recalls, "but the folks didn't like what my specimens did to the atmosphere." From the family encyclopedia he learned to remove skins, cure them in a mixture of alum and arsenic, and stuff them with excelsior, using a wire skeleton for rigidity. "I saved a lot of trophies that way," he recalls. "But I wasn't satisfied."



Baby octopus was skinned from the underside so incisions would not show. In this case Reese used rubber mold instead of plaster so he could save delicate suction cups

Rare butterfly fish has intricate ribs in its sails. This fish can soar out of water, occasionally climbs trees to breathe fresh air



Back to the books he went to study the clay-and-plaster techniques (in which skins are stretched over sculptures) used by such masters as Carl Akeley, whose realistic jungle cats and other beasts stalk the dioramas of the American Museum of Natural History. Under taxidermist Guy Rush, Joe served as apprentice in museum work. In college, where courses in comparative anatomy, biology and chemistry made him familiar with dissecting tools and techniques, he turned out his first professional mounts. He put in a stretch of time at an art school, studying sculpture and color.

So far it was all land animals. Then Joe took a fishing vacation in Florida. "I was appalled by the crudeness of mounts turned out by most marine taxidermists," he says. "They worked from stock models of paper, burlap and glue in different sizes, cast from stock molds. The skin of the fish was stretched over these prefabricated stuffings. The result no more resembled the original fish than a rat resembles a mouse."

### Museum Specimens

That was 20 years ago. Today his work hangs on the walls of a marine museum he created for Cornell University, and you'll find his specimens in Waikiki Aquarium at the University of Hawaii. From all over the world men with salt in their hair ship their prize catches to Ft. Lauderdale.

Reese's method is known as "hollow

sculpture mounting," and it involves making a plaster mold of every specimen the moment it arrives.

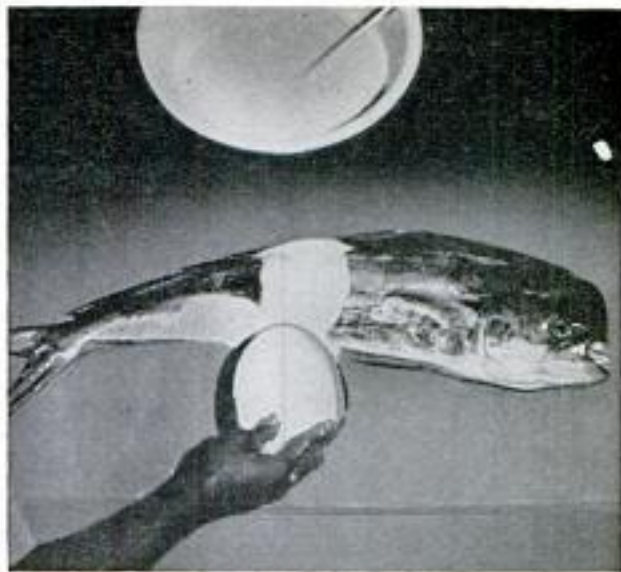
First the fish (which must arrive in perfect condition) is carefully tagged and measured. "The finished mount," says Joe, "should come within  $\frac{1}{32}$  inch of the original fish or it's a poor job."

Once sized and tagged, the specimen is posed on wooden blocks in a lifelike attitude (curved as though swimming or contorted in a splendid leap). Plaster is poured over it to form a split mold. Then the mold is removed and put aside for weeks while the skin is prepared in an operation requiring skill and ingenuity. "It takes two years to train a good skinner," says Reese.

Through a small slit in the side of the fish that will be fastened against the mounting, every vestige of flesh and nearly all bone are removed with surgical in-



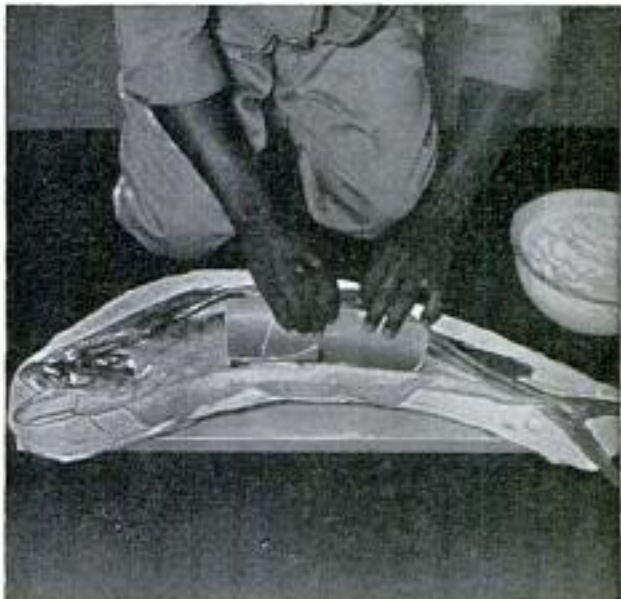
First step in mounting a dolphin is to measure it precisely, then lay it out in a lifelike position



After the fish is blocked up in the proper curved pose, plaster is poured over it to form a direct cast



Cast then is split lengthwise and the fish removed. The cast is stored, as it won't be needed for weeks



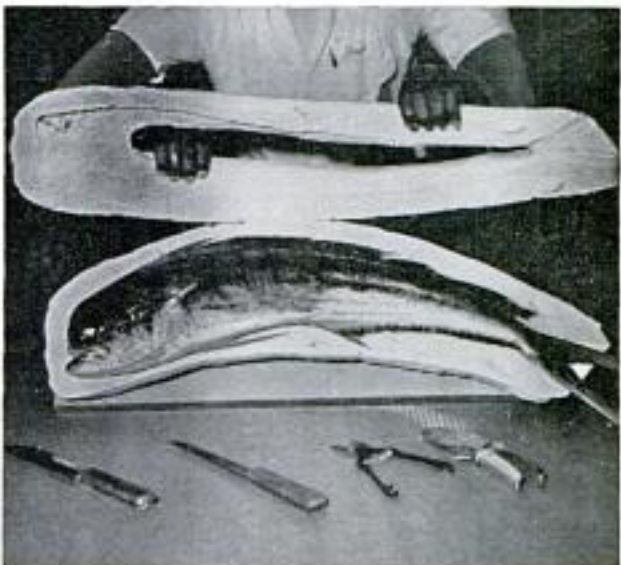
After hide is tanned, it goes back into mold. Asbestos paper mixed with paste is pressed against inside of skin. Below, opposite side is filled through slit in mold. After drying, dolphin is ready for paint

struments. In some cases, such as the kingfish and bonito, this means handling a skin so thin you can read a newspaper through it. "Sometimes," explains the taxidermist, "a skin as delicate as cigarette paper must support a heavy tail structure, and we have to strengthen it by spraying it with gelatin before it's removed."

Oddly, a shark's hide, which you'd think would be tough as leather, comes apart like paper under a knife. "We toughen it with formaldehyde," says Reese, "the way we do for rays and octopuses. It stiffens the skin and the specimen."

#### Mounting a Baby Sailfish

According to the taxidermist, few creatures can't be skinned if you know how. "Not long ago," he reveals, "a captain named Seeman saw a three-weeks-old





Here's one of the biggest molds ever built. The skin of a record 631-pound blue marlin is replaced in its plaster cast



Skinner has touch of a surgeon. Some skins are so thin you can read print through them



Sail of a sailfish sometimes is torn beyond repair. Here a prefabricated sail made of hardboard is mounted on a fish. Below, in spray-painting process fish is first painted white, then its own authentic colors are reproduced over base coat



baby sailfish, 7½ inches long, drifting past his boat. He dipped up the little fellow in his hat and sent it to me as a present. At first, mounting it seemed impossible because of its size, and its ridiculous, out-of-proportion sail of delicate membrane." By using glue over the skin to keep it from shredding, however, Joe skinned the oddity and mounted it in a majestic leaping pose. Today, the miniature fish sits in a plastic case on his desk, leaping from a miniature ocean in a diorama.

Fish skins go through a series of chemical baths to remove natural oils and organic matter and to preserve them for a lifetime. After weeks of curing, the hide is fitted back in the original mold. Through a slot in the back, expert craftsmen model paste-soaked asbestos paper against the inner lining of the skin, pressing it firmly against the inside walls of the mold. Thus a firm core is built up inside the fish.

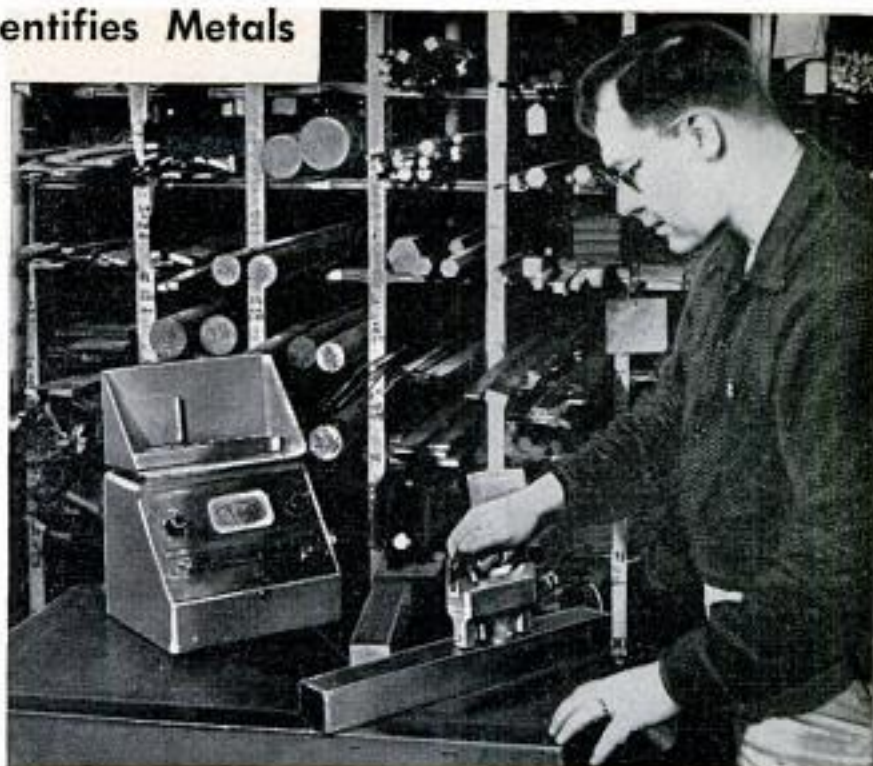
After removing chalky plaster residue, checking against original measurements and pointing up any tears or flaws, a worker moves the trophy to the paint room. Reese's crew is broken down so that each man performs a specific part of the job, but the painting is usually reserved for himself and one other expert. Perhaps it brings out the artist in him. The delicate shadings that make a mounted fish look real or phony are something he knows almost by instinct.

(Continued to page 244)



## Electronic Device Identifies Metals

Identification of unknown metals can now be done without laboratory analysis with an electronic device based on the principle of the thermocouple effect. This effect is an electromotive force produced when two dissimilar metals are joined. To use the new instrument, the operator places an electrode in contact with the metal to be tested. The voltage generated by this contact is amplified and transmitted to a meter, where the reading is compared with readings obtained from samples whose metallurgical characteristics are known.



## Automatic Anesthetizer Becomes Surgical Tool

Machine-dispensed artificial respiration and automatically administered anesthetics are surgical stand-bys today. Control of rate and depth of a patient's breathing is monitored by a device which mechanically changes the pressure of the oxygen-nitrous oxide mixture given. The changes depend on the breath's concentration of carbon dioxide. Doctors will use this machine with polio victims and others unable to breath spontaneously.

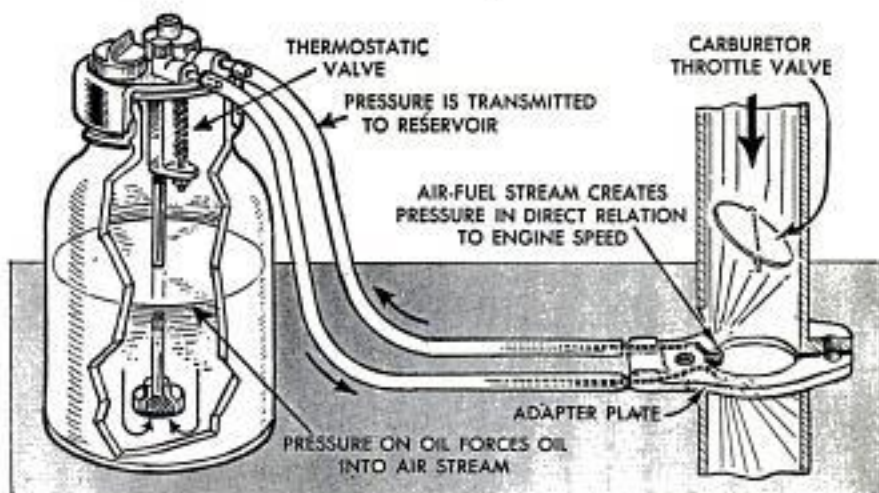
## Silicone Rubber Guards Airborne Electronics

Silicone rubber is the latest link in the chain of electrical insulating materials developed for high-speed jet aircraft and guided-missile flight. Designed for airborne electronic equipment, the new substance can survive minus 85 degrees F. to plus 500 degrees F. Lab tests show this compound to be effective insulation for power transformers in service for 500 hours at internal temperatures as high as 482 degrees F.

## Pressure-Controlled Top-Cylinder Oiler Meters Engine Lubricant

Fed into the top of the cylinder by the pressure of air flowing into the carburetor, lubricant is metered into the engine as it is needed regardless of vacuum variations. Most top-cylinder oilers depend upon engine vacuum to meter lubricant and this creates problems when the car is running uphill with less vacuum and downhill with more vacuum. In the new oiler, engine speed and throttle-valve opening control the oil flow. The impact of the air rushing through the carburetor is transmitted to the oil in the reservoir, forcing the oil in metered amounts back into the air stream. Additional protection during cold-start

periods is built into the device in the form of a thermostatic control which opens the valve wider when the oil is at a low temperature and closes the valve as the engine compartment warms.



## Electronic Skin Thermometer Records Patient's Temperature



Touched to a patient's skin, an electronic skin thermometer takes the body temperature immediately and can also be used to make a permanent record of it. All the work is done by a tiny heat-sensitive element, called a thermister, and a precision electric meter which measures the temperature accurately to two tenths of a degree. Aside from saving time, the electronic thermometer will simplify temperature taking in children and persons too ill to hold a mercury thermometer in their mouths.

## Tiny Mercedes Zips 22 Miles Per Hour

Not much over a foot high is a midget Mercedes Benz Grand Prix racer built by Josef Janschuetz of Baden-Baden, Germany. Top speed is 22 miles per hour. The one-horsepower water-cooled motor hits 7000 revolutions per minute. The car has a magneto ignition, four speeds, is fueled with gasoline and has a steel-tube chassis with individual spring suspension.



Janschuetz rides a trailer as he operates the controls in the cockpit. His feet rest on metal supports on each side of the car.



## Boxcars Unloaded By Rocking Action

Boxcars are emptied of grain by the gentle rocking action of an unloading platform. The car rests on standard rails. One rail is higher than the other to give the car an eight-degree side tilt. The entire platform on which the car rests is gently rocked endwise by a 25-horsepower motor, raising and lowering each end of the car a distance of three inches. Grain in the car is shifted slowly to the middle and spills out the open side door into a hopper.

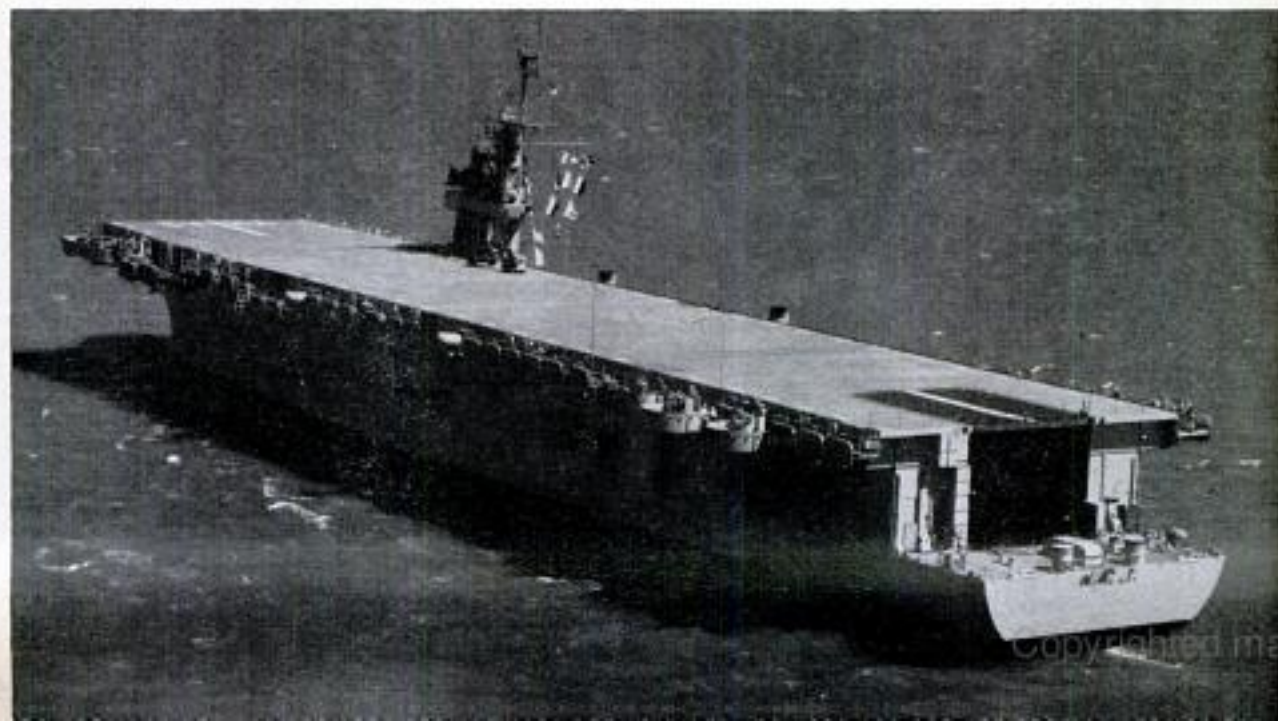
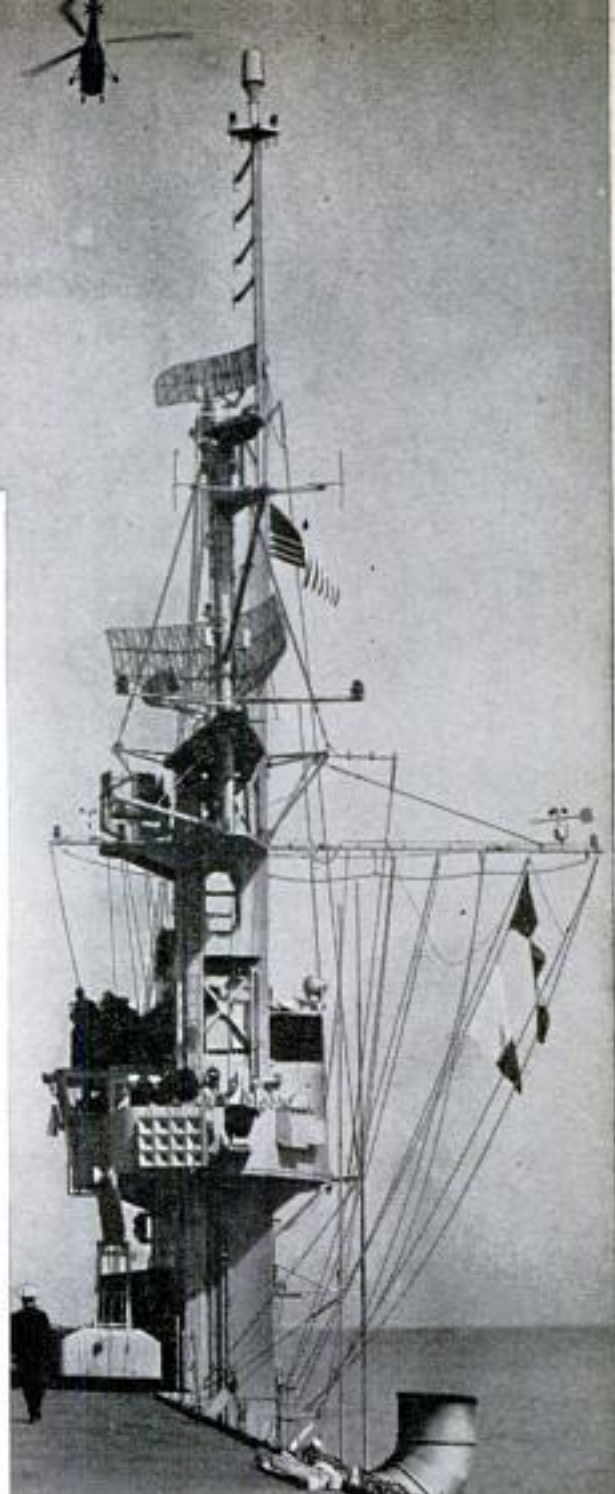


## First Helicopter Carrier Airlifts Teams of Marines

Marines are whirling aloft in helicopters from the deck of the USS *Thetis Bay*, the first carrier designed for helicopters. A rebuilt baby flattop, the ship can carry 1000 Marines and more than 20 helicopters for putting them ashore. Each 'copter carries a team of four men to the landing area, then returns for another team. Depending upon what is learned with the *Thetis Bay*, new helicopter carriers may have a cloverleaf of four or more round landing platforms instead of an ordinary flight deck.



Top, flight of four helicopters departs for shore. Above, helicopter can land, load and take off in 14 seconds. Below, 20-knot *Thetis Bay* is 517 feet long





Up on the catwalk, bridgemen pull the dead wire down into cable after spinning wheel passes them

## **BIG MACK, THE WORLD'S**

**By Leonard F. Hilts**

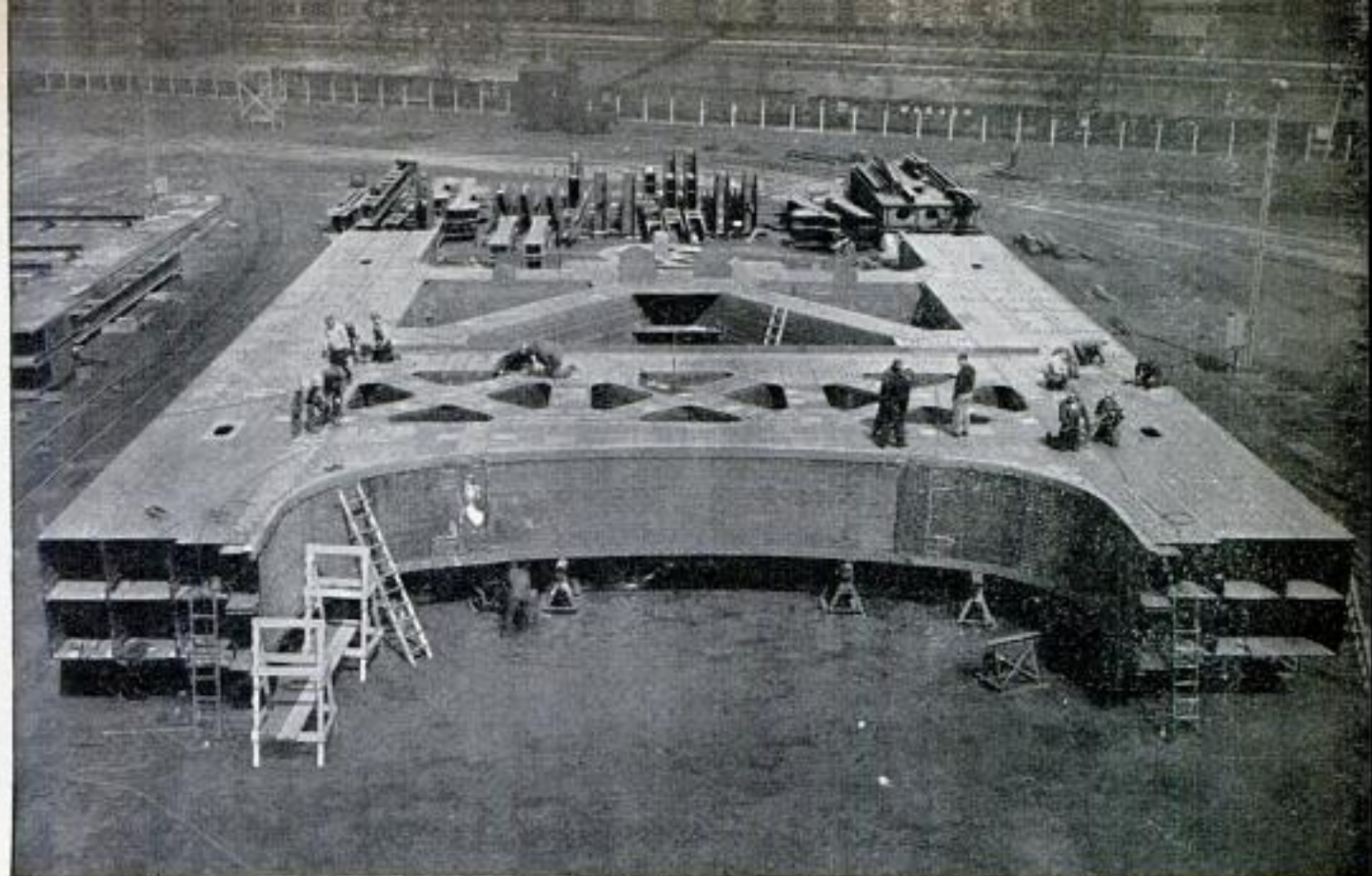
*PM* Photos by Joe Fletcher

**S**TANDING LIKE legendary giants wading in a stream, two huge but graceful towers of red steel loom up in the middle of the Straits of Mackinac, the narrow neck of water which separates Lake Michigan and Lake Huron. Right at home in this land which was once the preserve of Paul Bunyan, these giants are at present unemployed, but by November 1957 they'll be hard at work carrying the cables of the world's largest suspension bridge on their broad shoulders.

A dream for the past 50 years, this bridge will link the mainland of Michigan with the state's Upper Peninsula and will replace the five busy ferry boats which now move traffic across this strip of water. But, as any vacationist knows who has driven that way, the boats simply can't do the job. Carrying over 100 cars each, the ferries make the trip in 53 minutes—and they pause only long enough at each dock to unload and reload. Yet during the busy summer season waiting cars line up, and

Artist's conception of completed bridge. Total length of the bridge, including approaches, will be five miles





Sections of the two towers were fabricated on land, floated out to bridge site and hoisted into position

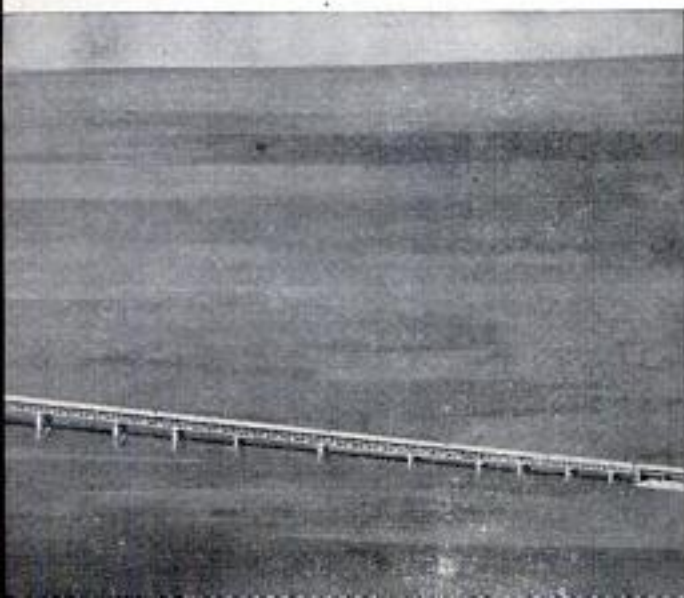
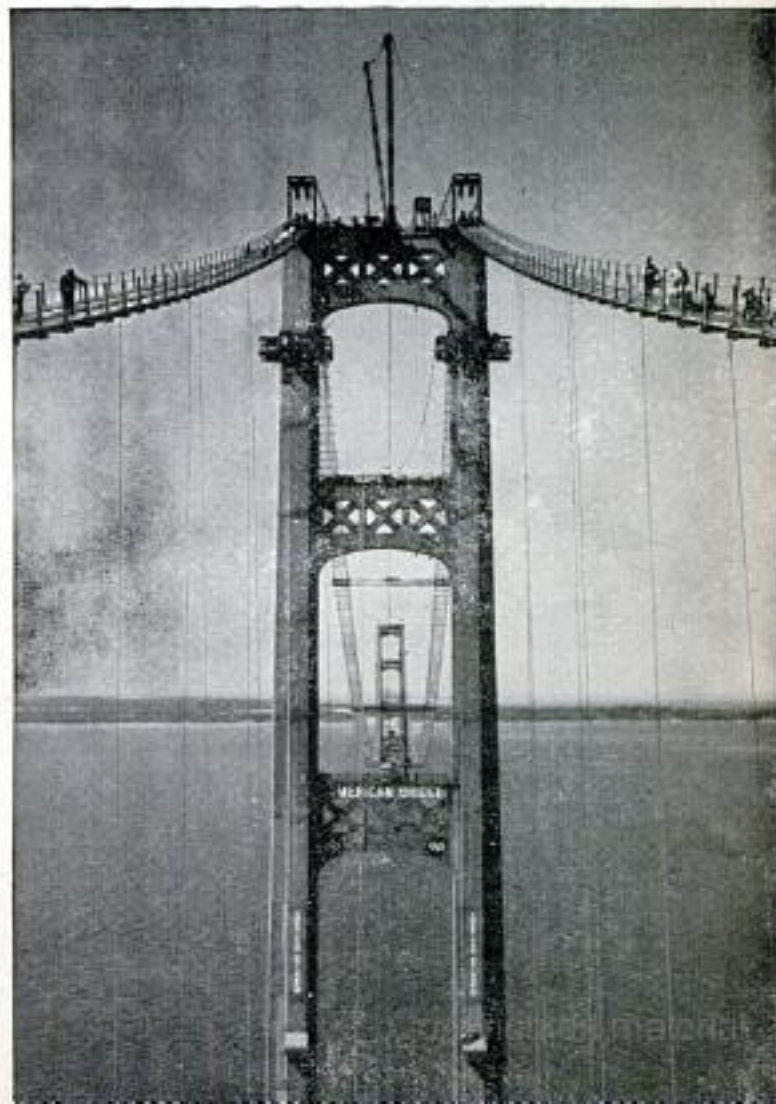
## LONGEST SUSPENSION BRIDGE

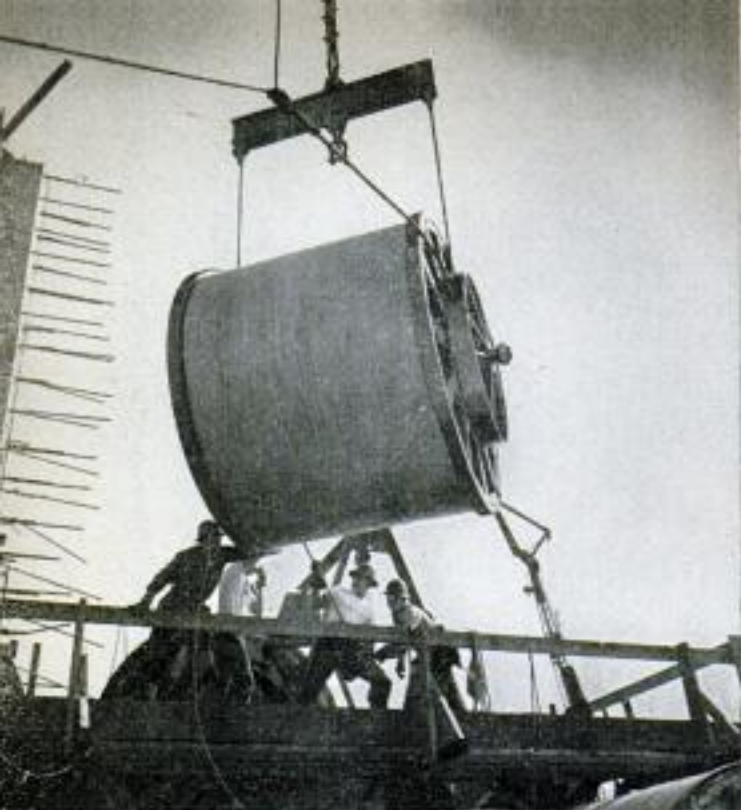
delays of four to ten hours are common. And on the big holiday week ends, the line of cars stretching from the ferry docks may reach 20 miles in length.

Big Mack, as the bridge is nicknamed, will accommodate 600 cars per hour, with the trip across the straits taking 10 minutes. The total length of the bridge, from the beginning of its approach in Mackinaw City on the mainland, to its junction with Route 2 just outside St. Ignace on the peninsula, will be just over five miles.

The Oakland Bay Bridge is longer. The distance between towers on the Golden Gate Bridge is greater by 400 feet. Big Mack's biggest claim to fame is that it is the longest suspension bridge, from cable anchorage to cable anchorage, in the

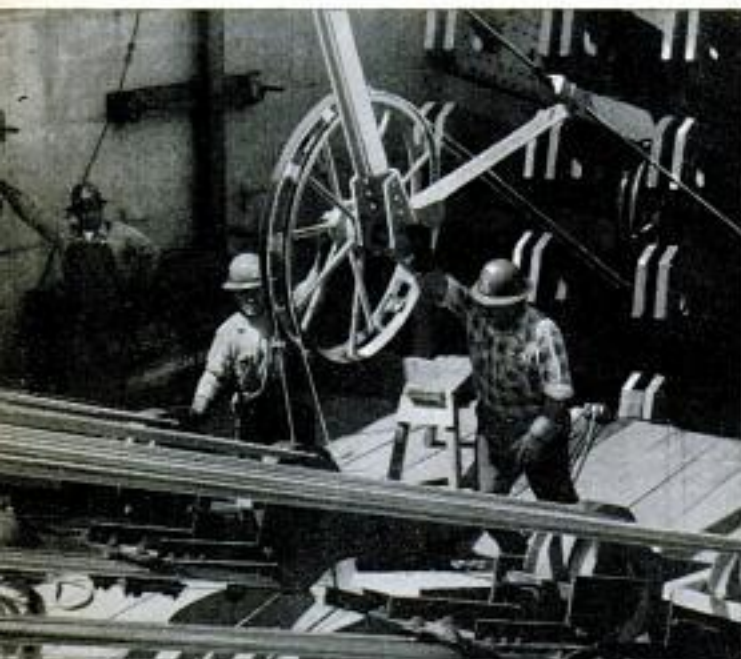
The bridge towers are 552 feet high and support the giant cables from which the suspension span is hung





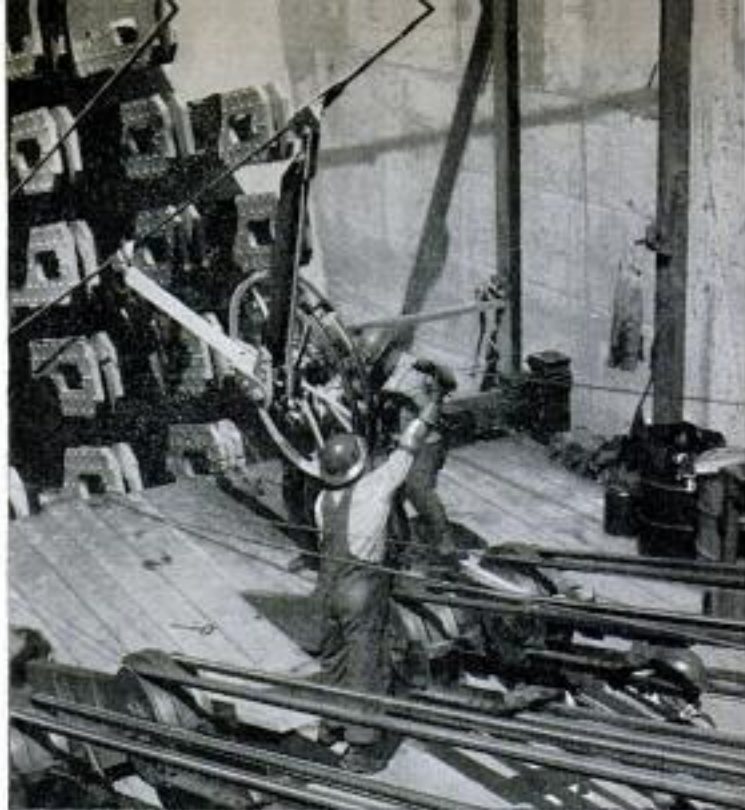
Reel of wire is swung into position on rack high on anchorage pier. This wire is spun to form a cable

After being placed on strand shoe, wire is looped around spinning wheel, which is started on new trip



world. More roadway—7400 feet of it—will hang from its cables than from any other bridge.

The tremendous concrete piers which support the bridge go down 206 feet under the two towers to bedrock to hold up the nearly 7000 tons of steel in each tower. The approaches are long spans made of steel members which rest on piers. The towers, 552 feet high and tall as the Washington Monument, have the task of holding up the big cables from which the suspension span will be hung. And the suspension span contains the roadway itself—four lanes

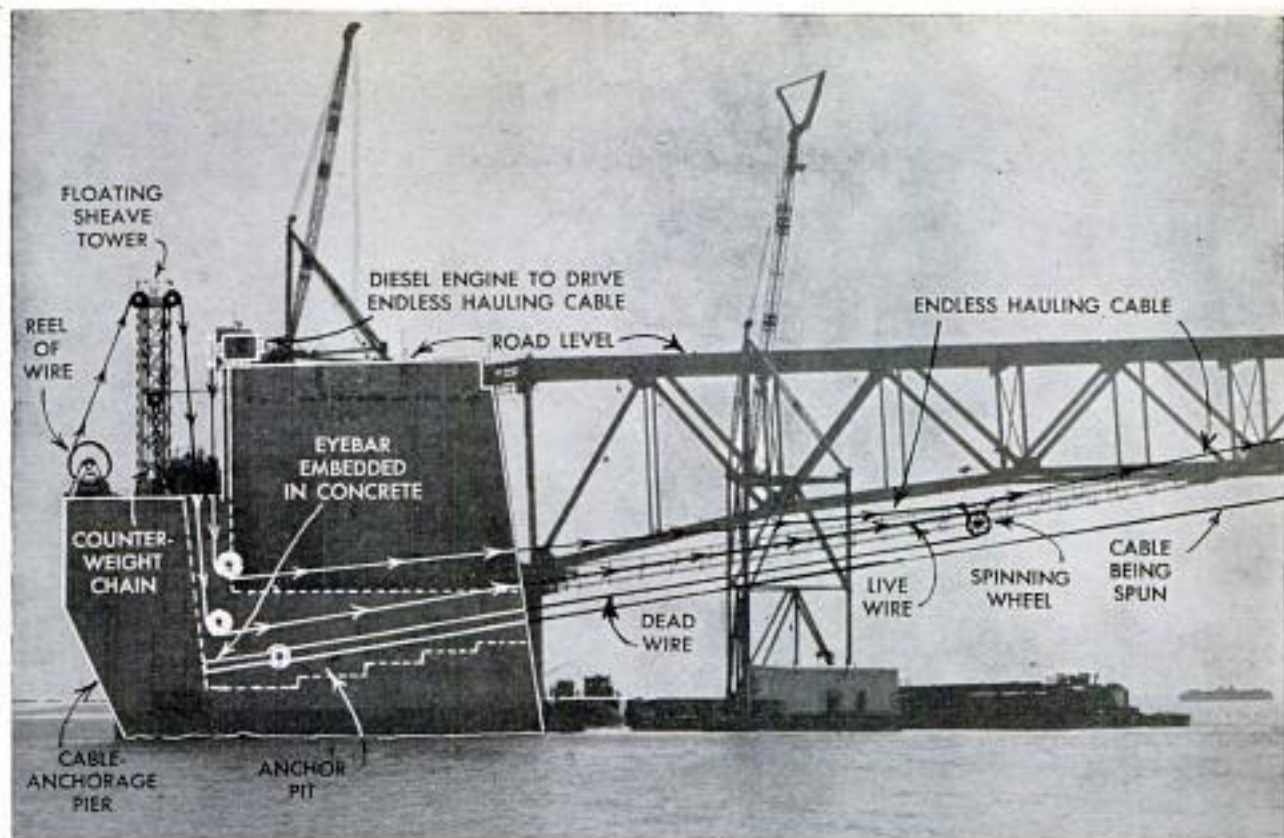


As wheel arrives in pit, wire is removed, reversed and put on strand shoe. It is then part of cable

As wheel travels along, wire is payed out. Bottom wire is dead and is pulled down to be part of cable



and 48 feet wide. If the motorist who drives across this engineering marvel will take time to look up, he will see the giant cables which make such a structure possible. Two of them, each  $24\frac{1}{2}$  inches in diameter, rise out of anchorages at each end of the suspension span, cross the tops of the towers, and sag down between them in graceful arcs. Every 39 feet along the cable a steel-cable band is clamped, around which is looped a  $2\frac{1}{4}$ -inch wire rope. These wire ropes are actually the suspenders which hold up the roadway. Coming down from the cable, they are attached to the stiffen-



**Simplified diagram superimposed on photo of cable anchorage shows basic principle of cable spinning. Wire feeds from reel through floating sheaves tower and on to spinning wheel which carries it across bridge**

ing trusses of the suspension span and bear its weight.

Before 1854, suspension bridges were hung from giant chains and were sharply limited as to size. But in that year, John Roebling announced that he intended to build a new type of suspension bridge across Niagara Falls. The bridge, he said, would be hung from cables. The cables would be too big to drag or hoist into position, and therefore he would make or "spin" them right on the structure of the bridge.

Many of the ideas he incorporated in the bridge—and especially the trick of spinning the cables on the structure—were so novel that engineers scoffed and predicted the bridge would collapse in the first good wind that came along.

It didn't. In fact, it proved to be the forefather of a long line of big suspension bridges, including the Brooklyn Bridge, built in 1883. Improvements have been made in Roebling's method of spinning the cables, but the principle remains basically the same.

The phrase "cable spinning" commonly used by engineers is a misnomer, for the wire is not twisted or spun as the cable is made, but is strung in place a strand at a time and bound into the final product.

The cables on Big Mack are of high-tensile galvanized wire about the diameter of a pencil. Each of the cables consists of

12,580 wires, divided into 37 strands of 340 wires each. Forty-one thousand miles of wire, spliced to make two continuous wires for each cable, are used, and the cables plus their fittings weigh a staggering total of 25,000,000 pounds.

Each cable-anchorage pier is a manmade island of 170,000 tons of concrete and steel, 115 feet wide and 135 feet long. These piers must resist the tremendous pull of the cables and the weight they support, and transmit this reaction to the bedrock on which the pier is founded. Each cable has its own anchorage pit in each pier.

(Continued to page 260)

**Approach spans were also prefabricated and floated into position. Here span is carried by barges**





## Protective Slip Covers Keep Wagons Clean

They were bound to come—slip covers for station wagons. Originally a utility vehicle designed to take rough treatment, the wagon has become a handsome, comfortable automobile just as vulnerable to abuse as any car. To protect upholstery and trim of the station wagon a plastic-coated liner is available that snaps into place from the front seat to the top of the tailgate, covering the sides at the same time. No drilling is required to install the liner, its snap fasteners being held in place by the body screws on the floor and side panels.

## Synthetic Passenger-Car Tires Derived From Oil-Refinery Gases

Passenger cars soon may have synthetic-rubber tires made of butyl, derived from oil-refinery gases. Present auto tires consist of synthetic rubber known as "GR-S" plus lesser amounts of natural rubber. Lab and road-tested all-butyl tires show immunity to atmospheric or chemical attacks, smoother riding comfort and low noise

level. Recent safety checks demonstrate that butyl-tired cars traveling 60 miles per hour on wet pavement stop in 30 percent less distance than vehicles having GR-S and natural-rubber tires. On dry roads butyl tires halt cars in 20 percent less distance. Also, the new tires do not "squeal" when rounding corners.

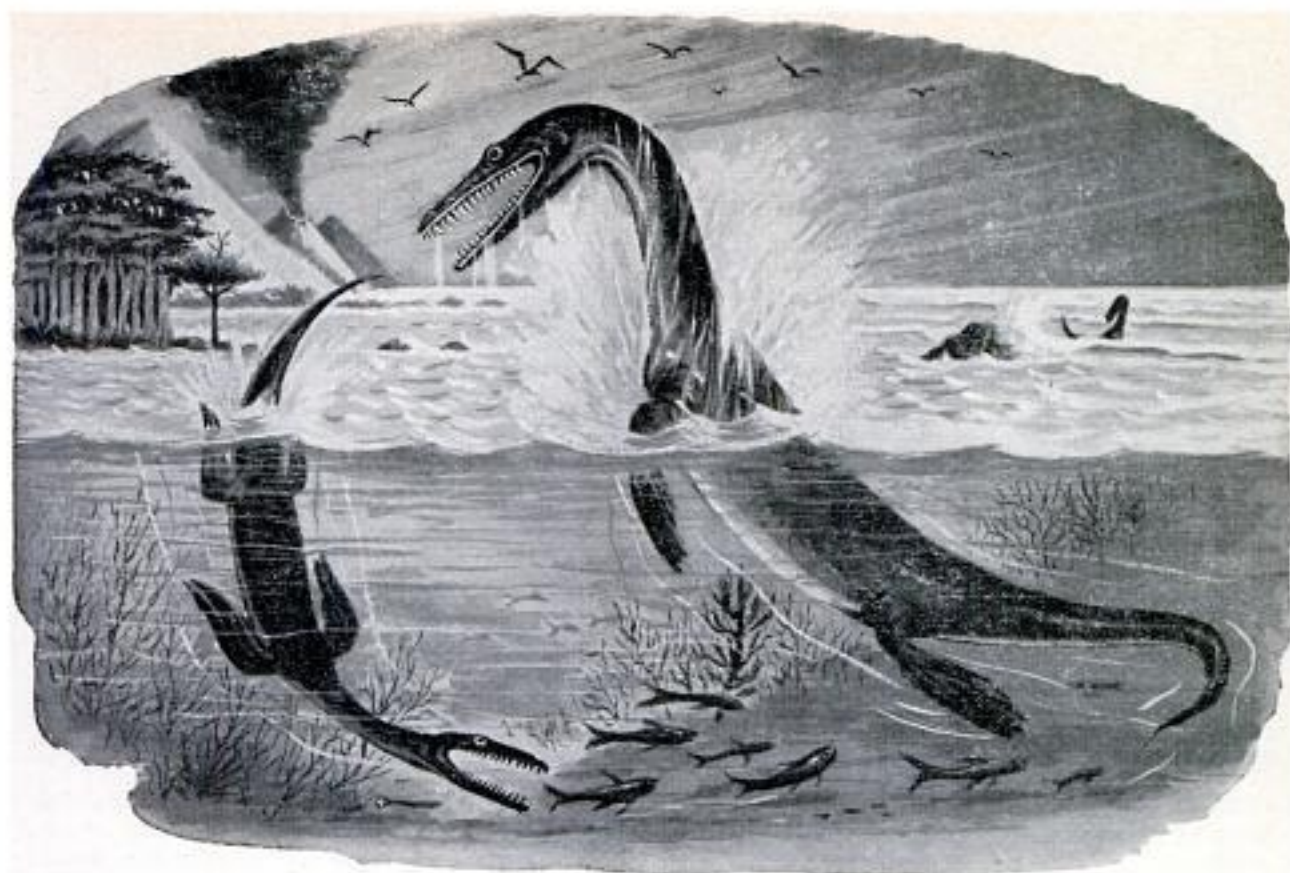


## Trailer Trucks Travel On Ocean-Going Ships

Piggyback transport of truck-trailer bodies has spread from the railroad industry to shipping. Three specially adapted tankers now offer a weekly service from the New York area to Houston, Tex. Freight is picked up by truck within a 200-mile radius of New York and delivered within a 200-mile radius of Houston. At Port Newark, N. J., a huge crane lifts each trailer body from its chassis and swings it onto the ship where it is clamped to the deck. One vessel can carry 58 of the 33-foot aluminum trailer bodies with 2,320,000 pounds of freight. At Houston, vans are refastened to tractor-trailer chassis and delivered by highway to the consignees. The ship can also carry a top deck load in sealed containers.

British scientists are endeavoring to make invisible the vapor trails formed by jet planes at high altitudes by converting the hot exhaust gases into cool, noncondensing gas streams.





## Harvard Restores 49-Foot Skeleton of Biggest Marine Reptile

Kronosaurus, believed to be the biggest marine reptile that ever lived, is being restored for public display at Harvard's Museum of Comparative Zoology. The 49-foot-long creature lived 120 million years ago, long before dinosaurs, and preyed upon other great reptiles and large fish. It propelled itself with four massive flippers, each 6 feet long, that jutted from a body 6 feet thick and 20 feet in length. The

head was 9 feet long, the neck 10, the tail 10. The Harvard specimen is the only complete skeleton ever found. It was discovered in Australia encased in hard dolomite rock. The dolomite is being separated from the mineralized bone by chipping and with acetic acid. The few missing bones and bone parts from the ancient reptile are being filled in with glue, asbestos fiber and plaster of paris.



Named "Kronosaurus," the larger monster above lived 120 million years ago and ate reptiles and fish



## Polyester Resins Made With Citric Acid for Structural Purposes

Citric acid seems destined to replace the soybean and peanut, when it comes to versatility. Essential in products ranging from foods to hair rinses and rejuvenating

oil wells, this acid helps prepare certain polyester synthetic resins. The latter have seen structural use in automobile bodies, radomes and for boat hulls.



**OUTBOARD MOTOR** in kit form has now been added to the do-it-yourself field. Kit comes complete with all parts and only a screwdriver and adjustable wrench are needed for assembly. The motor is an air-cooled type developing 2½ horsepower and will give

about 2½ hours of cruising per filling of fuel. It is ideal for small boats and for trolling. A book of simplified instructions is included in each kit and all parts are guaranteed. By assembling his own motor, the do-it-yourselfer can save 25 percent of the cost

Continental Mfg. Corp., Washington Blvd. at Motor Ave., Culver City, Calif.

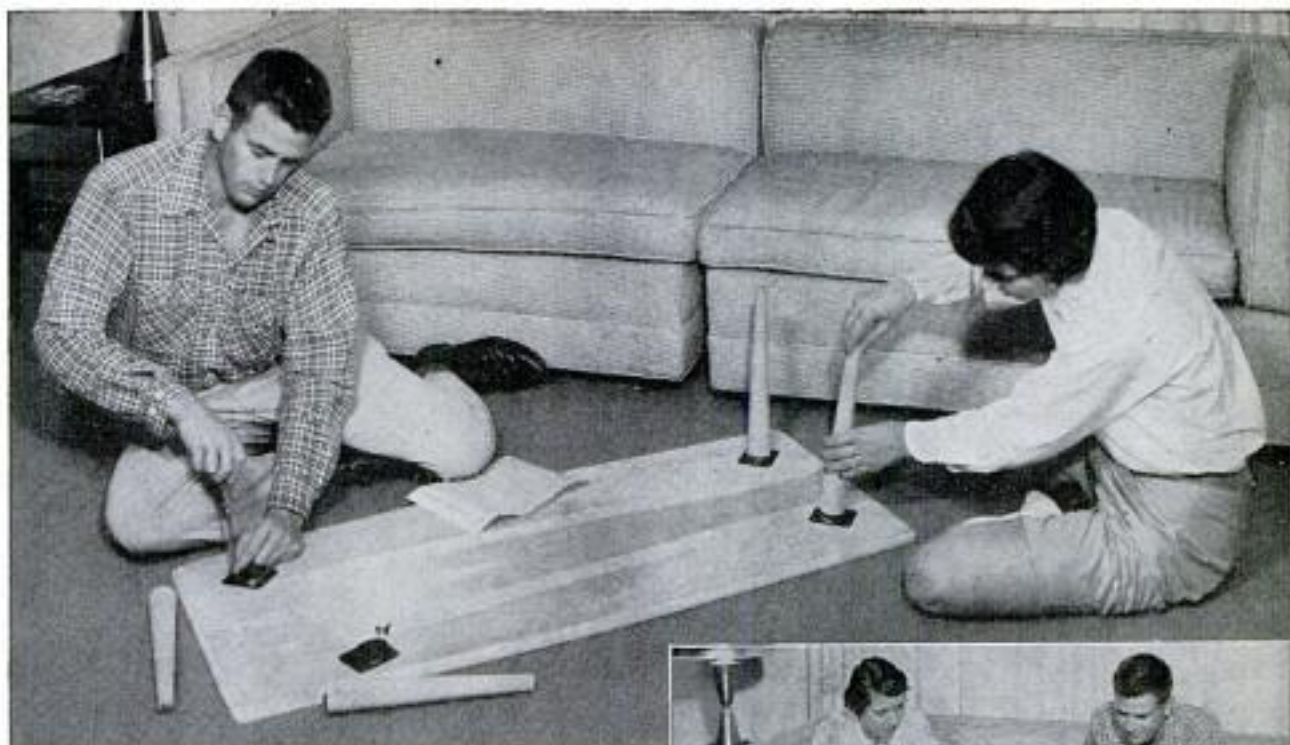
# DO IT YOURSELF

## *With Kits*



**ALUMINUM CARPORT** comes as a kit you can assemble yourself. Two sizes are available, for one or two cars, and both can be erected quickly without special tools. The legs are adjustable to any required height up to eight feet six inches, and may be bolted into cement or mounted on casters for portability. The port can also be used as a cover for a boat moorage, a breezeway or as an attractive outdoor living room if screened sides are attached to the frame

H. C. Mun Co., 162 7th St., Oakland, Calif.



**COFFEE-TABLE KIT** is one of a series of do-it-yourself furniture kits. Each kit contains maple legs, and a premachined table top. Called Peg-Legs, the legs are available in many sizes for those who want to design their own furniture. They are equipped with a unique metal-to-metal fastener which assures solid construction. The complete kits are available in a wide variety of table-top patterns and leg sizes

Perry Furniture Co., Grand Rapids, Mich.



**AUTHENTIC POST LANTERN**, an elegant reminder of the gaslight era, now comes as a kit which can be put together in an hour. The lantern is made of copper and everything is included in the kit, even the glass

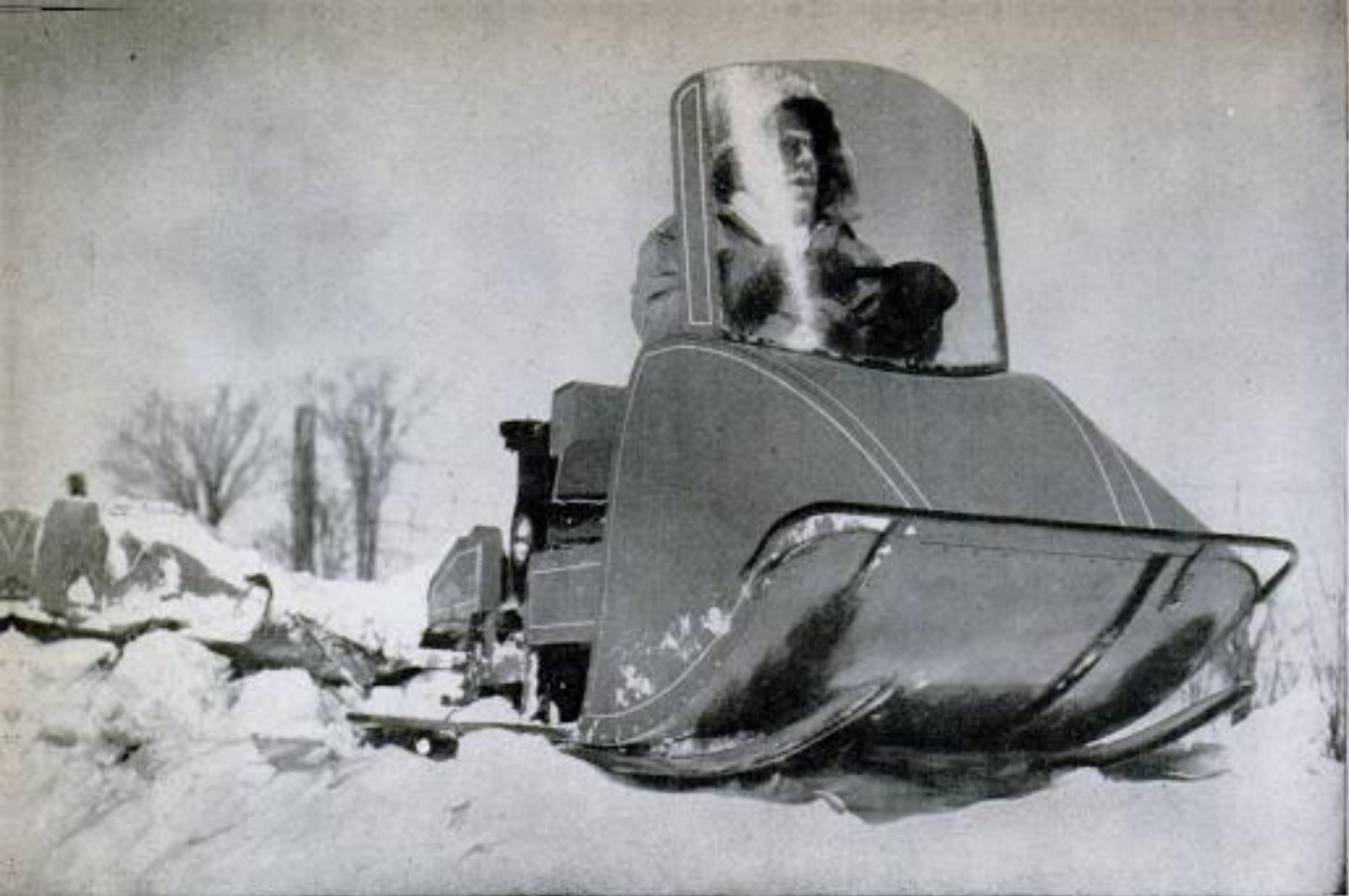
The St. George's, Dept. A, East Hartford, Conn.



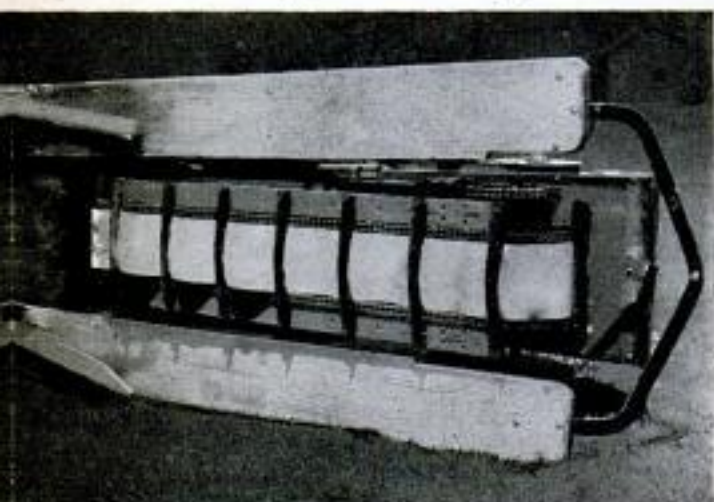
**ASTRONOMICAL TELESCOPE** of the reflecting type, with a 3-inch mirror and 100-power lens, comes as a kit with all necessary parts, including a 40-inch tripod, in one package. Manufacturer says a nine-year-old child can assemble the telescope. The finished scope can also be used terrestrially

Edmund Scientific Corp.,  
Barrington 195, N.J.





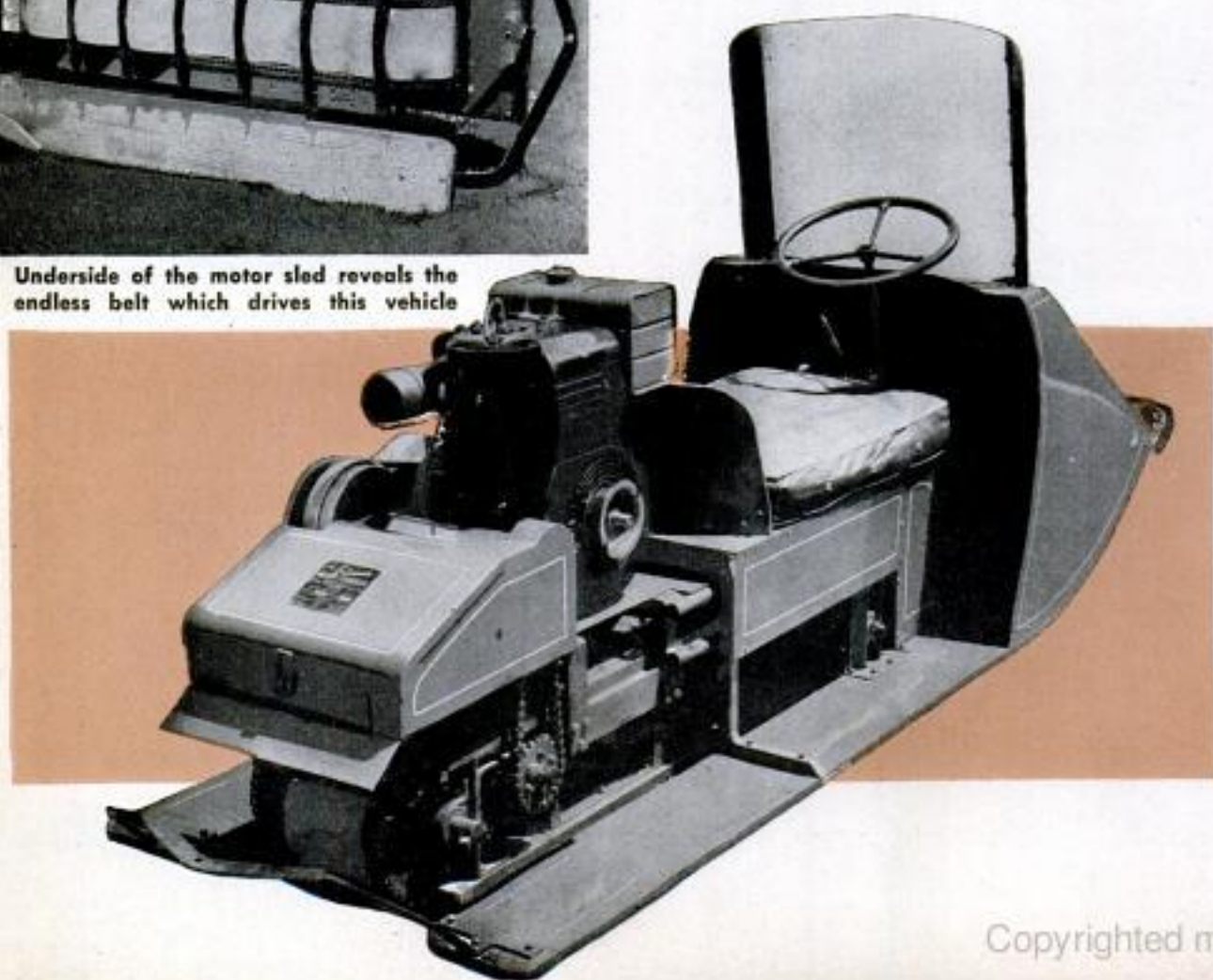
Motorized toboggans have steering runners that steer like car wheels. The windshield here is an accessory



Underside of the motor sled reveals the endless belt which drives this vehicle

# MOTOR SLED

By Neil Duncan



Copyrighted material



Pulling a load of 800 pounds with an eight-horsepower engine adds up to 10 to 15 miles per hour on the trail

## DOES A DOG TEAM'S WORK

CANADA'S arctic-winter wilderness today finds the noisy yammer of gasoline engines replacing the bark of Husky dog teams, and a miniature tractor—the motorized toboggan—is gaining favor. Big oil and mineral-exploration teams long have depended on large tractor trains to haul heavy equipment over ice and muskeg. But for small parties, such as surveying crews, dog teams have been the only means of transport. Experimental comparison has decided the issue.

Powered toboggans are almost 8 feet long, 33 inches wide and 3 feet high, including laminated-wood runners, steered like car wheels. Using an endless-belt system, a single-cylinder, eight-horsepower motor drives the 425-pound toboggan 5 to 25 miles per hour.

Snarling dog teams, food, sleighs and

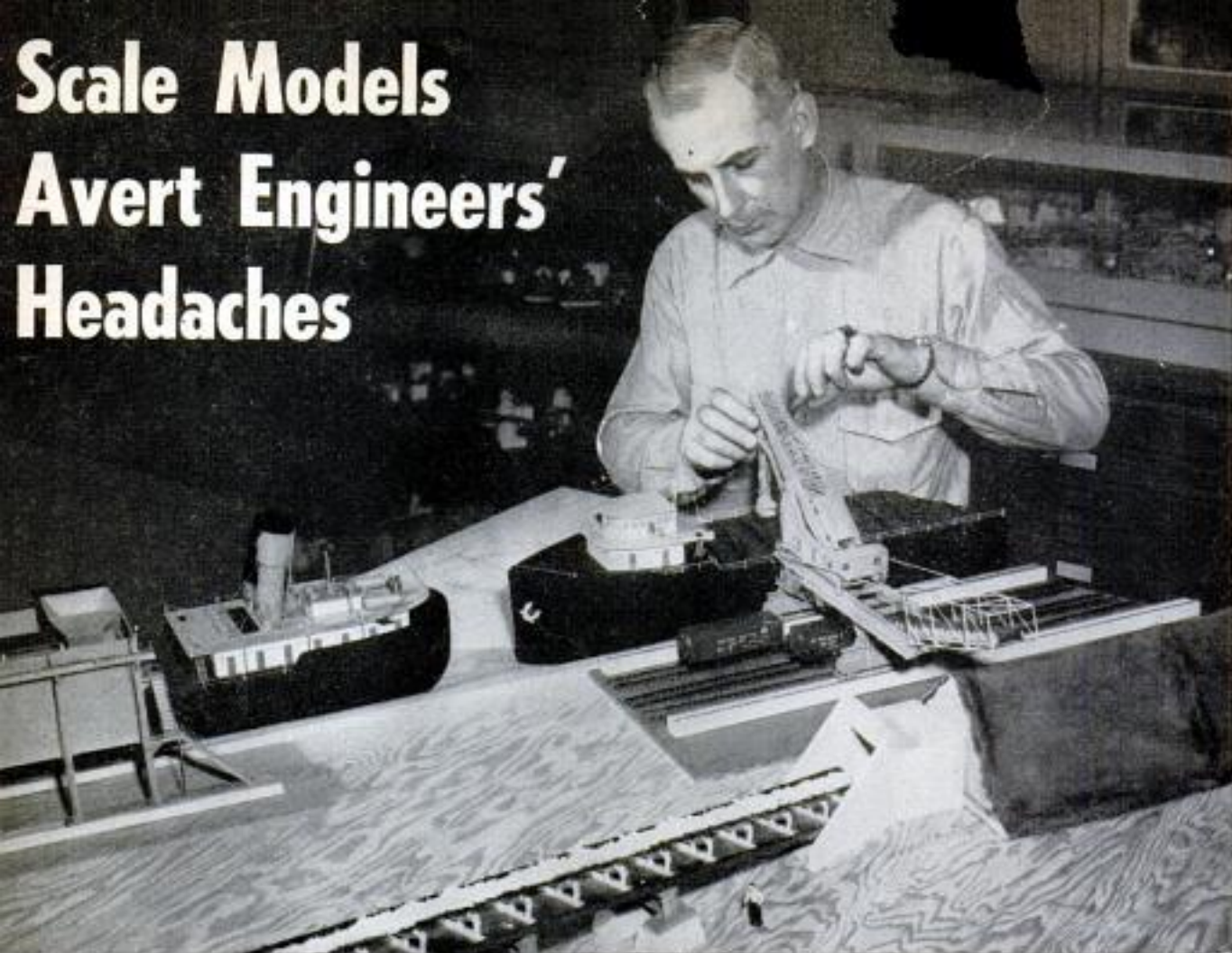
drivers size up unfavorably with machines and gasoline, which are easier to maneuver, lighter, and less costly to operate or transfer. Also, dogs need handlers, while one mechanic can service many items of machinery with little difficulty.

A maximum load of 16 men (2500 pounds) has been carried by motorized toboggan. However, a mechanized unit and two nine-foot tow toboggans normally carry 600 to 800 pounds. This toboggan train moves faster than a dog team could travel with half the load. Yet, survey parties still insist on dog teams for breaking trail and emergencies. ★ ★ ★

Hooking up motor of toboggan to a circular saw, these men can make short work of cutting wood for cooking or heating. Dogs can't compete here



# Scale Models Avert Engineers' Headaches



Tisen adjusts a scale model of an ore unloader, part of an 18-foot working model of trans-Ohio conveyor belt

By **Walter E. Burton**

**I**N A SORT of factory within a factory, W. C. Tisen constructs, on a reduced scale such as one fourth inch to one foot, branch plants, factory installations and machines—often before they are built full-size. His workroom, buried deep in the main plant of the Goodyear Tire and Rubber Company at Akron, Ohio, contains a carefully kept collection of scale models of Goodyear factories located in various parts of the world.

The models Bill Tisen builds earn their keep by enabling engineers and officials to work out arrangements of buildings, locations of machines and other details before a proposed branch factory is started or a projected change in existing equipment is tried.

Many a home shop boasts more extensive power equipment than Tisen uses. A wood-turning lathe with a three-jaw universal chuck, a drill press and a 10-inch circular saw equipped with molding cutter are the main items. Compressed air is available for spray-painting. Tisen assigns a lot of importance to hand tools, particularly the special ones he makes from old files and other pieces of tool steel.

The model builder believes that his methods can be adopted by almost any amateur

craftsman who wants to make miniature copies of railway equipment, parts of ships, military equipment such as big guns, aircraft of all sorts, buildings or almost anything else.

Briefly, here is how Tisen creates a model of a piece of machinery: He first prepares pencil drawings, usually on a scale of one fourth inch to the foot, and exact as to shape. Using them as a guide, he makes parts from transparent plastic, then cements the parts together to form the complete machine. If only one model is required, he paints and uses the plastic model itself. If duplicates are wanted, he places it in a wooden box and pours around it a self-curing rubber molding compound; and from the resulting mold he makes as many plaster castings as are needed. These plaster machines require almost no touching-up. He gives them a spray-lacquer finish, using plenty of air in order to produce a satiny surface that will photograph readily.

Tisen constructs miniature buildings largely of patternmaker's pine. For an older type of building, he may make the windows by drawing them or having them printed on cardboard, which he then glues to the building exterior. For modern one-story



Set up as an exhibit, model of the Riverlake Belt Conveyor Line gets a final check before going on tour

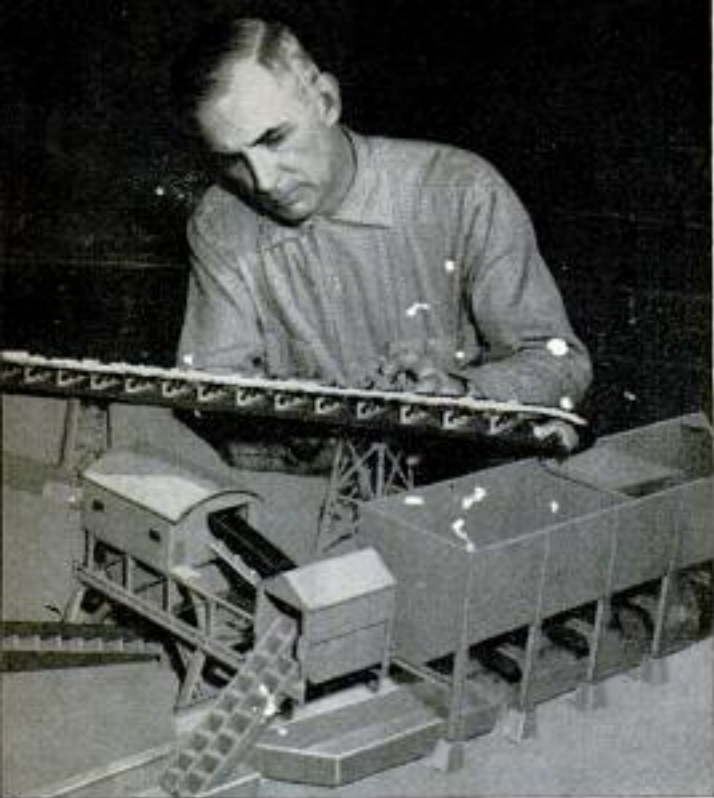
factory buildings, strips of graph paper make excellent representations of windows. Lacquer undercoater sprayed on the buildings produces a realistic finish, using a red color for brick walls, and a gray color for painted steel.

The model builder prefers asbestos fiber, mixed with water to form a paste, for reproducing earth and rocks. It is easily painted with show-card water colors. For trees he uses natural sponge or foamed latex rubber. The rubber is easily trimmed to shape with scissors and joined with rubber cement, and it takes show-card paint readily. For fastening plastic and plaster models, trees and other items permanently in position he employs model-airplane or similar cement. When there is a possibility that the item will be shifted at a later time, he uses rubber cement.

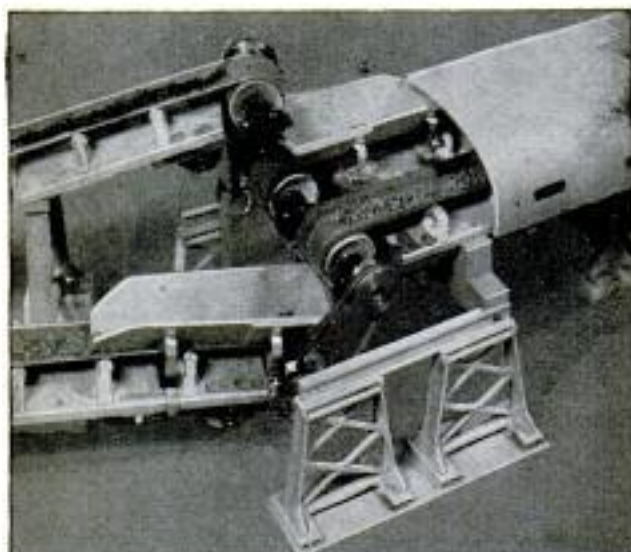
Goodyear technical men use one of Tisen's models to visualize and discuss proposed improvements to be made at one of Goodyear's branch factories

When seeking the countless little odds and ends that a model may require, Tisen often visits local ten-cent stores—especially their jewelry counters. One time he needed some tiny disks to use on a model, and found that sequins filled the bill perfectly. At home he keeps a sizable "junk box" collection of bits and pieces. And when ten-cent stores and junk boxes fail to yield the little wheel or rod or button desired, he proceeds to make it. For example, he





Model of trans-Ohio conveyor system was set up to show how proposed system would look and operate



produces miniature models of steel I-beams by cutting grooves in rectangular strips of transparent plastic with a circular-saw molding-cutter attachment. Painted gray or red, they look remarkably like the real thing. Sometimes he casts metal parts in rubber molds, using an alloy that melts at a temperature low enough to prevent damage to the rubber. The casting can be filed, drilled, or otherwise worked, and painted or lacquered any color.

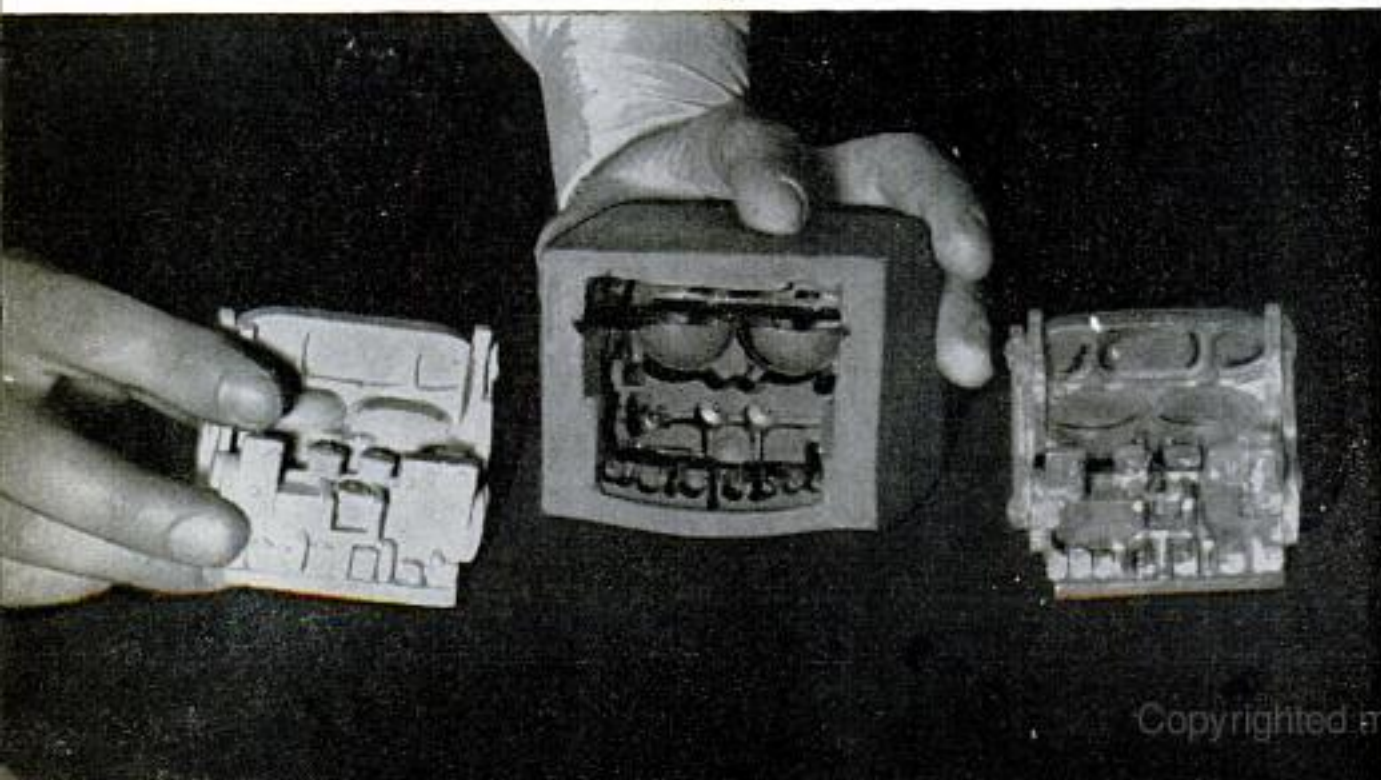
#### Most Difficult Project

The project that gave Tisen the hardest time was a working model of the proposed Riverlake Belt Conveyor Line. Plans have been made for building, across the state of Ohio, a rubber-belt conveyor system for hauling iron ore and coal. Tisen had no blueprints; in fact, many of the details were in a rather hazy stage. He made the model, which had to be portable for trailer travel, in three sections totaling 18 feet in length. Unlike the real thing, the \$25,000 model conveyor had to have facilities for returning the "iron ore" and "coal" to the starting point automatically and continuously. So the model builder created an elaborate "underground" network of machinery, virtually a second complete conveyor system.

Modelmaking such as Tisen does at Goodyear saves money and time and prevents a lot of headaches. Someone has calculated that, in a single project involving a branch plant, enough was saved by means of a model to pay the model-maker's salary and his model-shop expenses for a number of years. ★ ★ ★

Tisen builds intricate detail into models, left. This is part of a transfer point between strands of belt

When duplicates of a model must be made, below, Tisen makes mold of original, then plaster castings







Aerial view of the blasted Ponte Della Pietra, showing temporary steel bridge for use during restoration

## Italians Restore Old Bridge Stone by Stone

When the German occupation forces pulled out of Verona, Italy, in World War II, they blew up the Ponte Della Pietra behind them. Now the townspeople have decided to restore the 1500-year-old bridge to its original condition. All stones from the original bridge have been dredged from

Architects made faithful models of each stone salvaged from river, assembled them on small bridge

the river bottom, and architects, using enlarged photographs, are carefully locating the position of each stone in the structure. Eventually each stone will be placed in its original position. The bridge, with each stone accurately reproduced, was first made in miniature to guide the builders.

Using enlarged photograph of bridge taken before the war, architects try to identify position of each stone





Dirt road at left is raised above high-tide mark. The steam electrical generating plant has sunk 22 feet

## CITY WITH A **SINKING** FEELING **SINKING**

*We're talking about Long Beach, Calif., whose harbor land has sunk 22 feet in recent years. Some folks who used to see the ocean from their office windows now look up at it.*

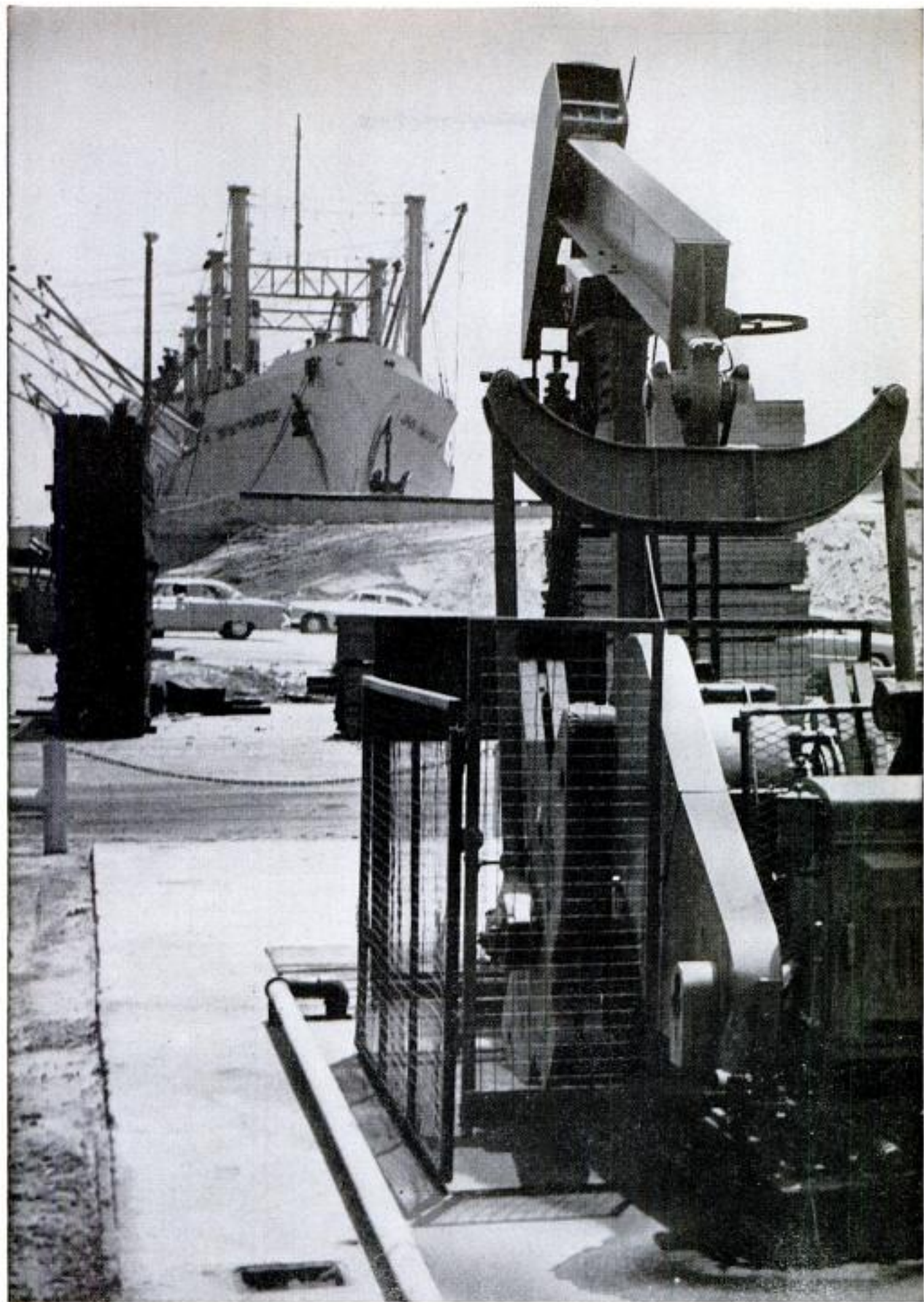
**By Claude M. Kreider**

**W**HEN 2000 ACRES of valuable harbor land sink below high-tide level and Pacific waves threaten to flood the area, it's time to consult the experts. And when this slowly subsiding, oval-shaped bowl contains \$500,000,000 worth of docks, warehouses, industrial plants, a Navy shipyard and 2500 producing oil wells, the problem becomes even more complex. Today, such a difficulty faces officials of Long Beach, Calif., Naval authorities and private owners of industrial installations in the vicinity.

Signs of sinking were first noticed at the site of a large steam electrical generating plant. The heavy structure obviously was settling into the sandy soil. But geologists and engineers sought a more fundamental solution, since receding land ex-

tended far beyond the plant in a gradual, shallow slope in every direction. Scientists finally credited the strange depression to reduction of gas pressure in underlying earth structure due to extensive withdrawals of oil and gas from local fields.

The problem is not new. A report in 1940 by engineers to the Navy Bureau of Yards and Docks predicted total future settling of seven feet. This announcement was succeeded by later statements jumping the figure to nine feet. By 1948 estimates placed maximum sinking at 16 to 18 feet, and in 1951 competent authorities agreed that subsidence might total 22 feet—the point of today's lowest ebb. Recent long-range appraisals made for the Long Beach Harbor Department fix final settling at 30



The oil-well pumping unit in the foreground is at a much lower elevation than the ship floating in the ocean in the background. A concrete seawall has been installed around the ship channel at Long Beach



Long Beach Harbor Department Headquarters, once overlooking ship channels, now sits below a 20-foot dike

feet, with computations indicating the sinking will end around 1972.

Paradoxically, withdrawals of gas and oil from these fields are still continuing side by side with remedial measures. Oil and gas removal has become a calculated risk, based on realization that it is more profitable to rehabilitate the subsided area at a known cost than to hamper various lucrative projects now in full-time operation. For example, in 1955 annual production of this entire oil field was 39,000,000 barrels of crude oil and 34,200,000 thousand feet of natural gas, the whole of which was valued at \$100,000,000.

Also, in Long Beach Harbor there are

30 miles of ship channels, wharves and docks, which handled 8,415,000 tons of shipping in 1955. Through this largest of the West Coast cotton-shipping ports passed 452,000 bales of cotton last year. Potential long-range expansion of port facilities and oil production will add 8 to 12 miles of waterfront to the receding area. Rather than retreat from such a financially optimistic future, Long Beach workers have elected to stay and fight. The outcome will affect the economy of southern California and distant areas served.

In counterattacking, Long Beach Harbor Department, assisted by private ownership and Naval authorities, has definite

Well head, center rear, will be at ground level when earth-fill operations upgrading the area are finished



plans to meet the situation's needs. These remedies, however, do not include one all-encompassing solution, as obstacles are many and varied. For instance, seen as an inadequate answer is one simple fill, which would require 50,000,000 cubic yards of material to raise the area back to normal level. And this would compensate only for the sinking to the two-foot contour line of the bowl, in addition to curtailing industrial activities during the project.

Then, too, diking of the entire area is seen as impracticable due to a strange horizontal movement accompanying subsidence. This movement has been measured at  $4\frac{1}{2}$  inches per 100 feet. Indicating the effect of such sliding, repair and realignment of many oil wells with broken or crushed casings have been necessary. A barge bridge crossing the main harbor entrance channel has required raising of its fixed portions to overcome this side-slipping action. Differential settling of towers of a huge vertical-lift bridge has necessitated expensive readjustments, with more foreseen. Harbor sheds, built with contraction joints for normal conditions, have been set "out of plumb." One 120 by 832-foot steel-and-concrete structure was shortened by  $12\frac{3}{4}$  inches on one side, resulting in the cutting out of a strip the full width through the building to permit "replumbing" and rejoining of the structure's halves. Other such properties will have to be raised, additionally entailing elevation of railroad and highway approaches to a grade still practicable for traffic. Coupled with destructive horizontal movement is prohibitive size needed for a dike, if a large-scale plan using this device were adopted.



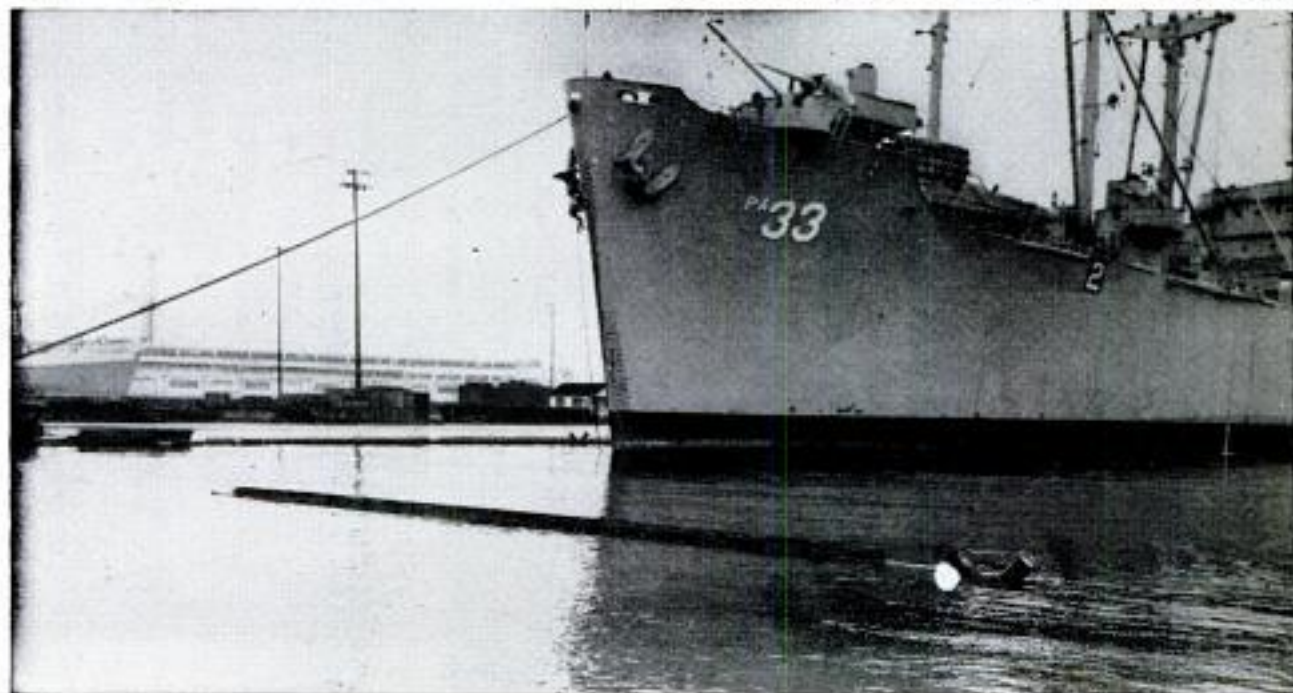
Discharge tube, pumped to keep rain and floodwaters from area, runs through one of the protecting dikes

Enclosure of 15 square miles with a broad dike 30 feet high and impervious to seepage would be necessary, and tremendous locks and gates would have to front harbor entrances.

Even drainage problems now cannot be faced in this area in the usual way. Flow of storm drains has been reversed, complicating this common remedy for handling surface-water floods. Where once these mains carried water to the sea, salt water now flows back to inundate streets and buildings. Sewers have been crushed at their joints. A 48-inch line, leading to a treatment plant, now carries ground water

(Continued to page 250)

Water in foreground covers the floor of a wharf that was once many feet above high tide at Long Beach





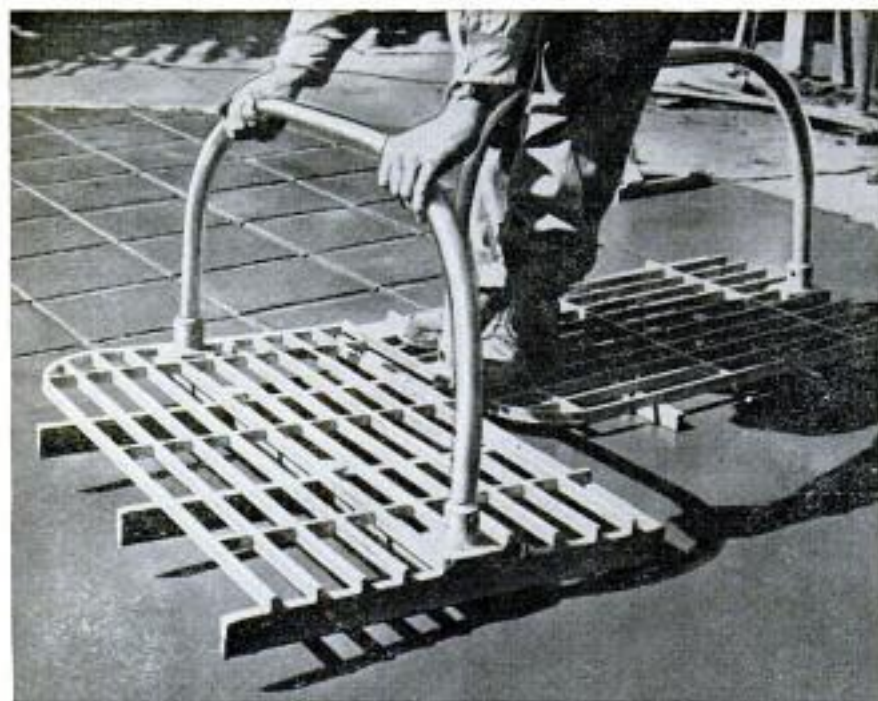
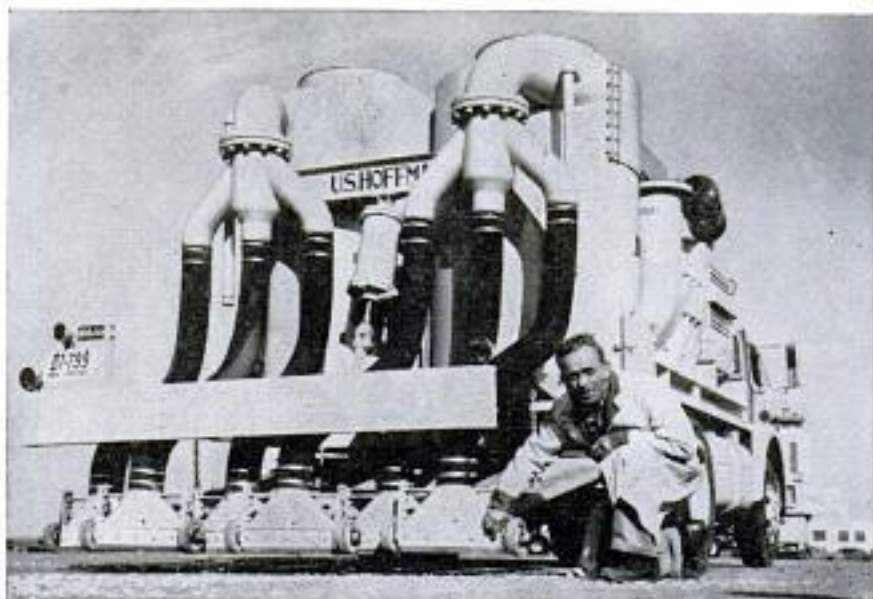
## Viewer Enlarges Image Five Times

People with poor vision can read easily with a viewer that projects a three or five-times-enlarged image of text on a foot-wide screen. The unit is illuminated by a 40-watt bulb, is small, light and rugged enough to be portable. The counter-balanced top housing is pushed down to rest on the book or magazine page, and is easily raised to allow for turning of pages. No focusing adjustments are necessary.

## Vacuum Cleaner Sweeps Airport

Landing strips at Baltimore's Friendship International Airport are swept with a 30,000-pound vacuum cleaner that has the power of 1200 living-room units. It can clean 2,000,000 square feet of runway an hour. The unit picks up loose bolts, nuts, gravel and other litter harmful to jet engines.

This 30,000-pound vacuum cleaner has power of 1200 living-room vacuum units



## Tool Stamps Design In Concrete

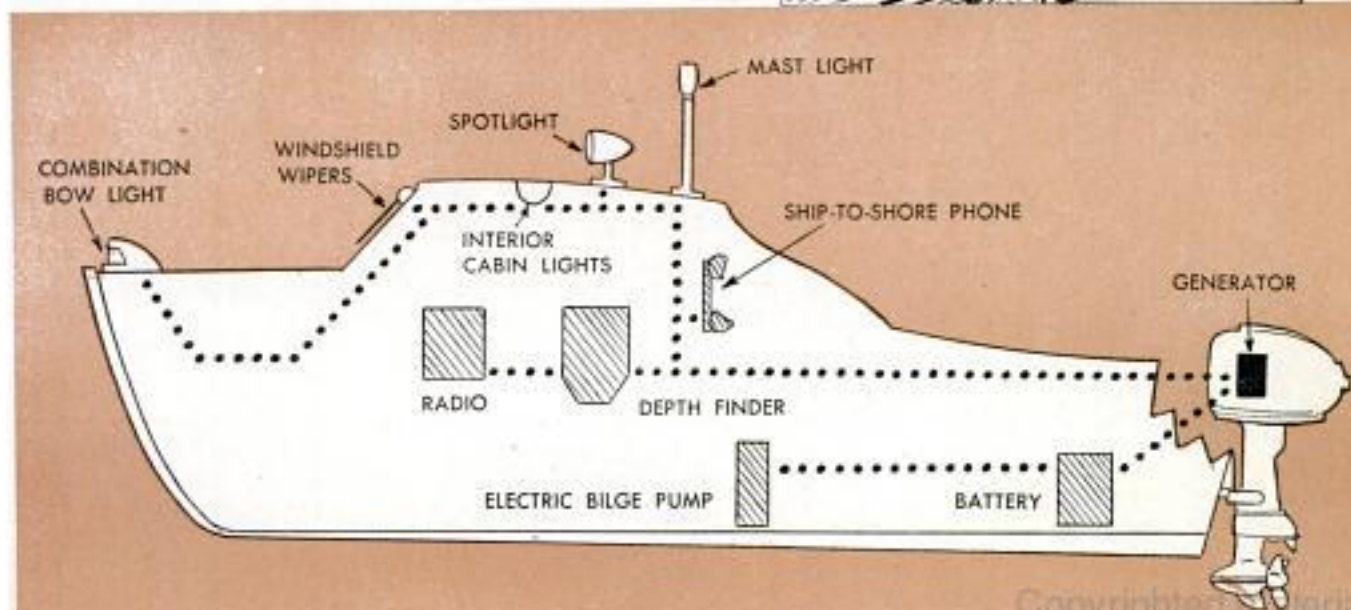
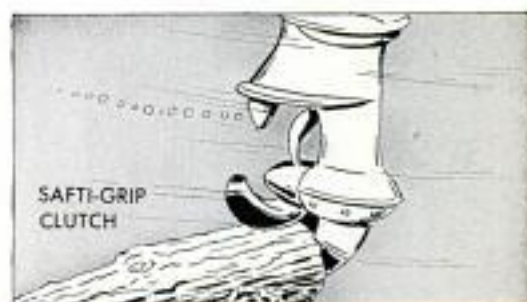
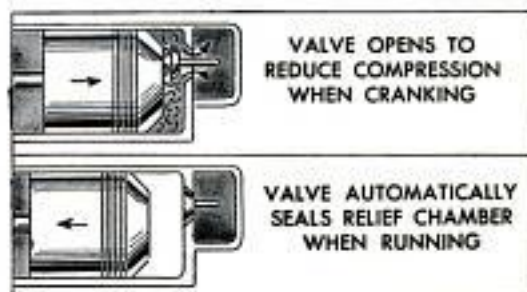
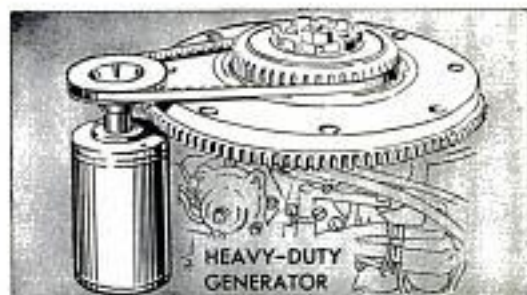
Poured concrete slabs can be given the appearance of hand-laid brick and tile with a new tool that stamps a pattern into the surface. The concrete surface first is topped with color. After the surface is troweled to the desired texture, the tool with its projecting metal flanges is used to impress the surface with the pattern. After the concrete is cured, the joints are filled with mortar. The method, says the manufacturer, is less expensive than brick or tile.



## Outboard-Motor Generator Powers Boat Accessories

AN AUTOMOBILE-TYPE GENERATOR is one of the features of Evinrude's '57 outboard-motor line. Also, some of the new motors have higher horsepower, a slip-clutch propeller for underwater obstacles, a reduced-compression system for easier starting and an improved air silencer. The new generator, optional equipment, is a d.c. system for two of the company's 35-horsepower motors. It provides power for a boat's electrical accessories, such as lights, phone, pumps and radio. The generator is rated 12 volts with continuous output of 10 amperes. The system is equipped with a current and voltage regulator to prevent overcharging of the battery. Powerwise, the firm's 15-horsepower models have jumped three horsepower, while the 30-horsepower motors are up to 35 horsepower. The new slip-clutch propeller disengages on contact with a subsurface obstruction and engages shortly after passing the rock or log.

Heavy-duty generator, reduced-compression system and slip-clutch propeller are at right. Below is boat electric circuit

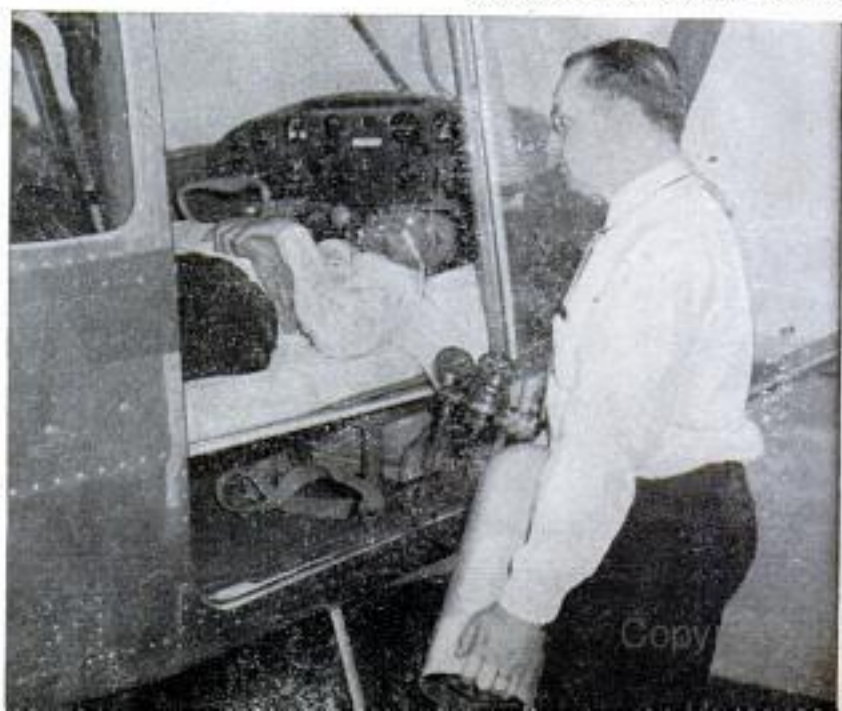




By Harry F. Unger

# Family Airport

Left, "Alabam" and his boys change the wind sock at Airhaven once each year. Below, an ambulance service uses the airport as an emergency terminal







This is a bird's-eye view of Airhaven Airport, with its 3200-foot-long strip and 130 acres of facilities

**S**TRETCHING OUT before a mobile home near Glendale, Ariz., is a 3200-foot-long "welcome mat" named Airhaven Airport. This strip forms the nucleus for a one-family business operated by five human dynamos—the Powers quintet.

Each member of this clan has specialized duties. Garrett "Alabam" Powers, the father, inspects and rebuilds small aircraft. Elizabeth, his wife, replaces fabric on several plane wings weekly and reupholsters cockpits. Melvin, 14, and Carl, 10, refuel, wash customers' ships, and clean up the airport in out-of-school hours. And a 65-year-old grandfather, R. C. Powers, rides herd on the bookkeeping.

From the status of stockholder and head of the firm's maintenance shop since 1946,

Alabam took over responsibility for the failing field after the organization had burst its post-World War II financial corset. Today, from 75 to 100 planes use this successful airport's facilities on week ends, and about 50 to 75 aircraft are based permanently on the strip. Flying groups, such as the Crowl Dusters; Luke Aero Club, composed of nonflying Air Force personnel; Westside Flying Club, and the Grimshaw Air Ambulance operate from Airhaven. Incidentally, numerous air searches for missing persons and escaped convicts have originated from this field, with Alabam assisting the flying deputy sheriffs of Maricopa County on a neighborly no-charge basis.

For the average plane owner no radio

Rolling the small planes around the airport is one of the tasks in which three of the Powers' clan "turn to"





Mrs. Powers checks the upholstery, while Alabam looks over a faulty engine in the airport's repair pit



"Mrs. Alabam" and son put fresh fabric on a plane wing. This and upholstery are her specialties

Below, the Powerses pack for a picnic flight. Right, below, Alabam hand signals to an incoming plane

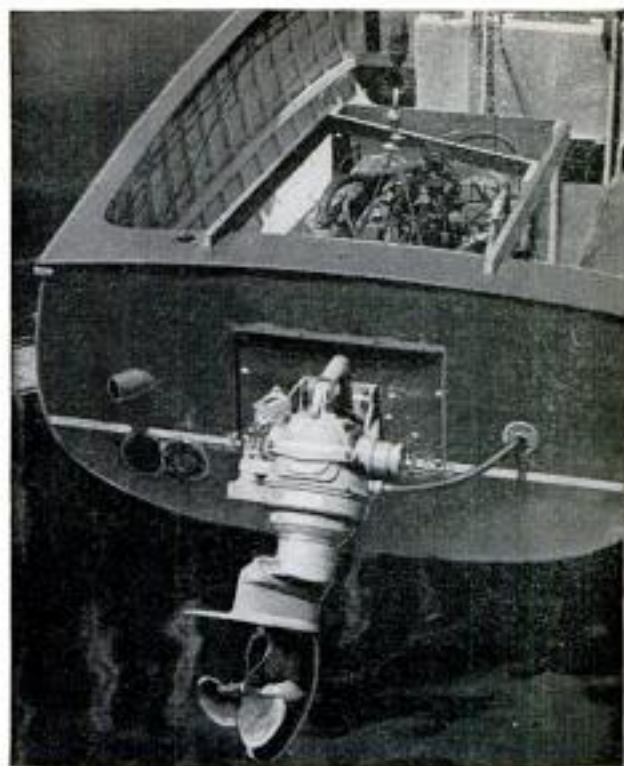
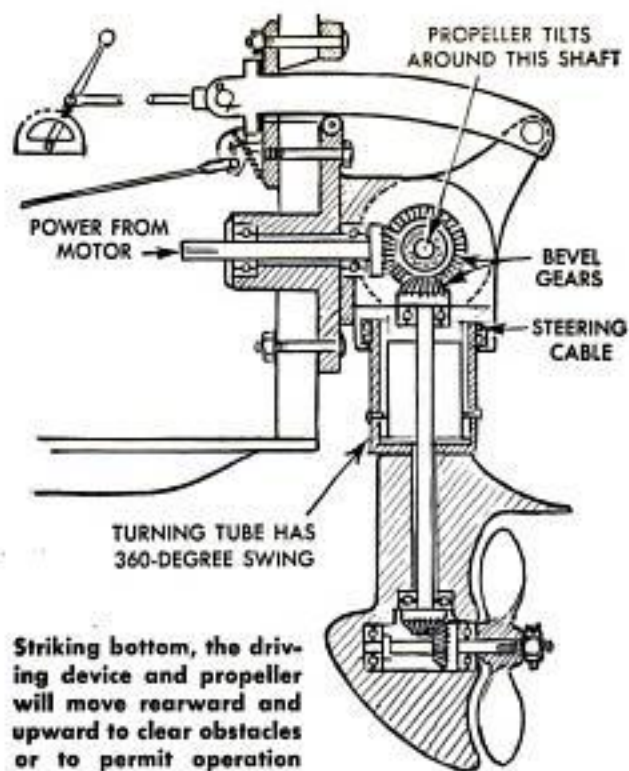


equipment is required to land at Airhaven. Although the intercom is in service from 8 a.m. to 10 p.m. daily, many are the times Alabam is routed from sleep to direct a transient pilot and his plane to the next airport on a flight plan. Alabam also has installed an underground refueling island of his own design and gradually is oiling the runways and ramp for dust control.

A World War II CAA inspector of B-24s and B-29s, Alabam has loved aircraft since his first contact with barnstorming pilots in 1927 at Waycross, Ga. In fact, the family now owns a Piper Tri-Pacer Model 150, a Cessna Air Master, C-165 and a Piper P-11 trainer. The Powerses occasionally use the ships in joining a breakfast flying club.

But the quintet is engrossed chiefly in running noisy Airhaven, which is their front yard. For the Powerses, the roaring planes on the strip make a lulling sound. Alabam says: "When that noise stops, something's wrong." And he's right. ★★





## INBOARD-OUTBOARD BOAT

BY AN INGENUOUS propulsion system, Robert W. Hills of Miami, Fla., has made his inboard-powered boat as maneuverable as a smaller craft fitted with an outboard motor. Hills worked two years to combine advantages of inboard and outboard motors. His 19-foot boat has a 75-horsepower

inboard. The drive shaft goes through the boat's transom to bevel gears which transmit power to the propeller. Gears permit the propeller to be turned to face in any direction and to be moved upward in an arc from vertical to horizontal, allowing use in water as shallow as the boat's draft.

Builder of this inboard-outboard combination is able to whip the craft around safely within its own length





Driven off the road into a pile of sand at 40 miles per hour, the test car shows no signs of loss of control

## CENTER-LINE STEERING—Better Than POWER?

**T**HERE'S A 1951 Cadillac in Benton Harbor, Mich., that has been driven off the road more times than anyone cares to recall. It's a test car for a steering system that some experts say is better than power steering—and it has no power assist at all.

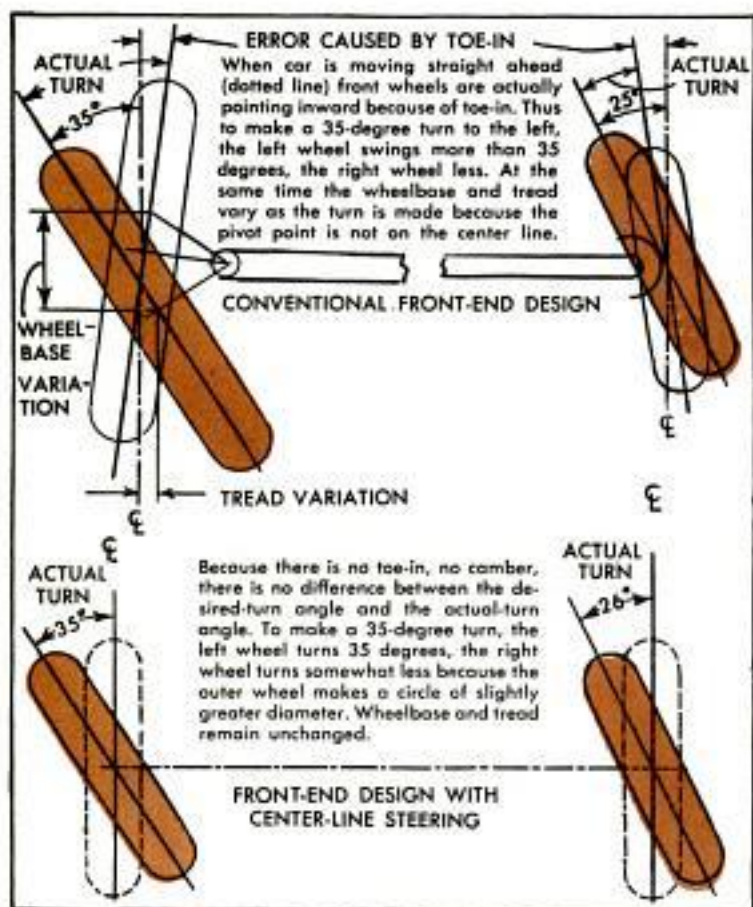
It's called center-line steering and what it does you'll probably refuse to believe. That 1951 test car can do things that would put other cars into a ditch and the drivers into a hospital—and it does it without a moment's loss of control or, for that matter, without any sensation of danger.

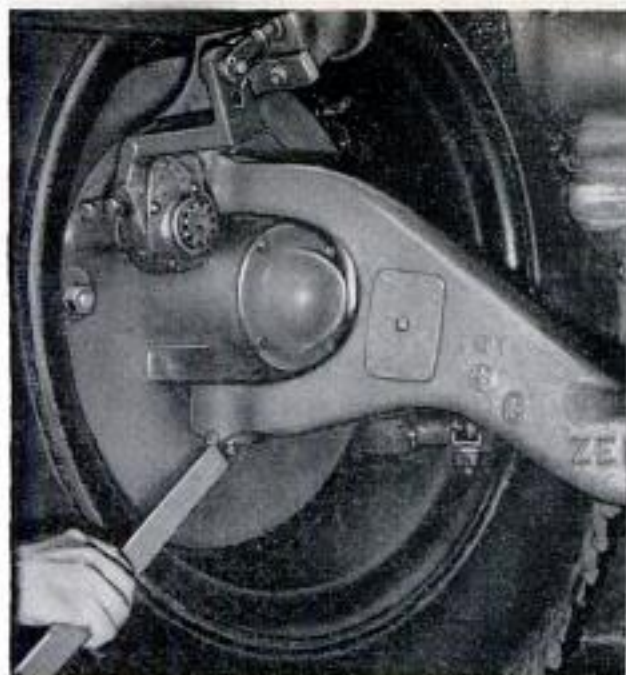
You can aim the center-line-equipped car off the road into a deep and soft shoulder, take your hands off the steering wheel and just sit there! What happens? Nothing! The car plows right through the soft dirt.

At 40 miles per hour you can aim the car so one front wheel will hit a big pile of sand. Take your hands off the wheel. Again, nothing happens. The car plows ahead without a twist or a jerk.

What's behind all this magic? Simply an application of the laws of leverage.

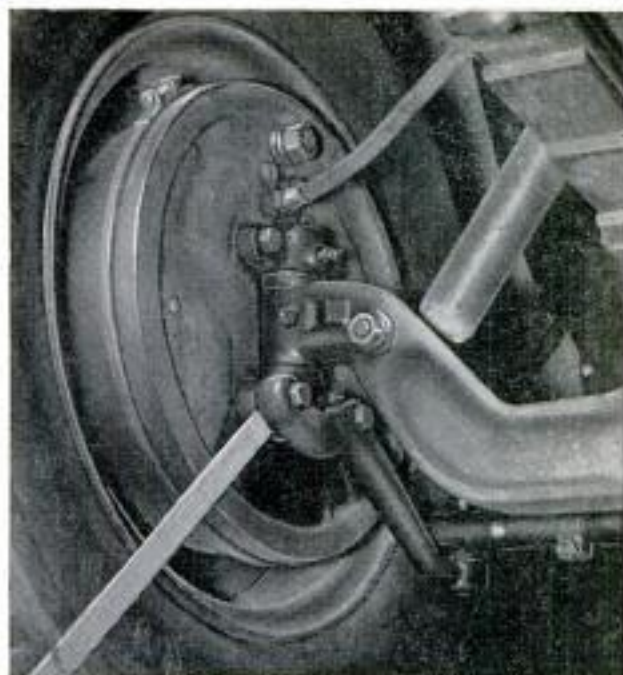
The conventional front end has its wheels mounted on spindles that extend outward six inches or so from the pivot on which the weight of the car rests. Every time one front wheel hits a bump, a soft pile of sand or snow, or drops off into the shoulder, the thrust rearward is multiplied by the leverage of the spindle. The force jerks the steering wheel around, twists the other front wheel and may cause a complete loss of control.





**CENTER-LINE steering on truck.** Stick shows where load is carried. Bearings are on center line of wheel

With center-line steering that's eliminated. There is no leverage effect. Forces pushing against the front wheel are thrust directly along the center line of the wheel and there is no twisting to turn the wheels and cause loss of control. That's why you can take your hands off the steering wheel while a front tire is blown out from under you without so much as a moment's fright.



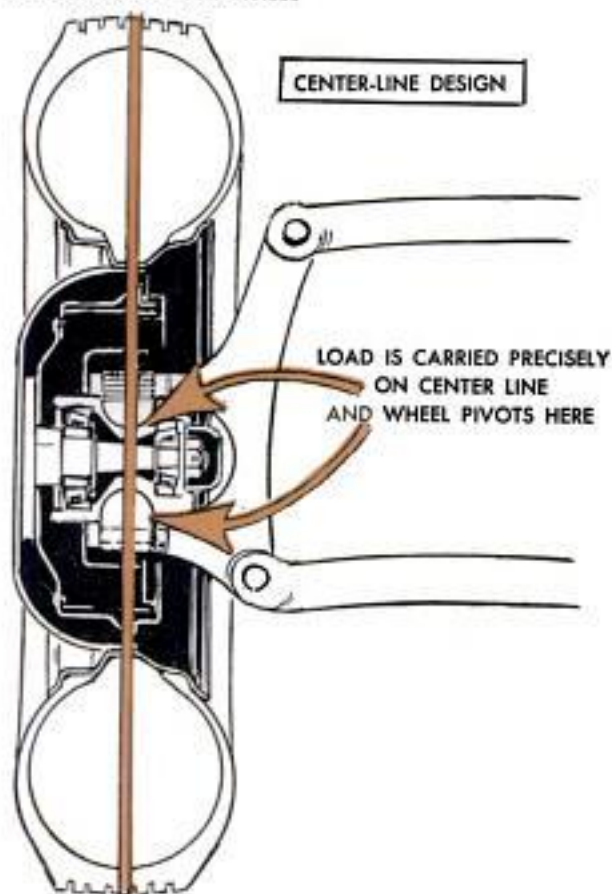
**CONVENTIONAL design.** Stick points to kingpin. It carries the load far inboard of wheel center line

The car goes straight ahead bumping along on a flat tire.

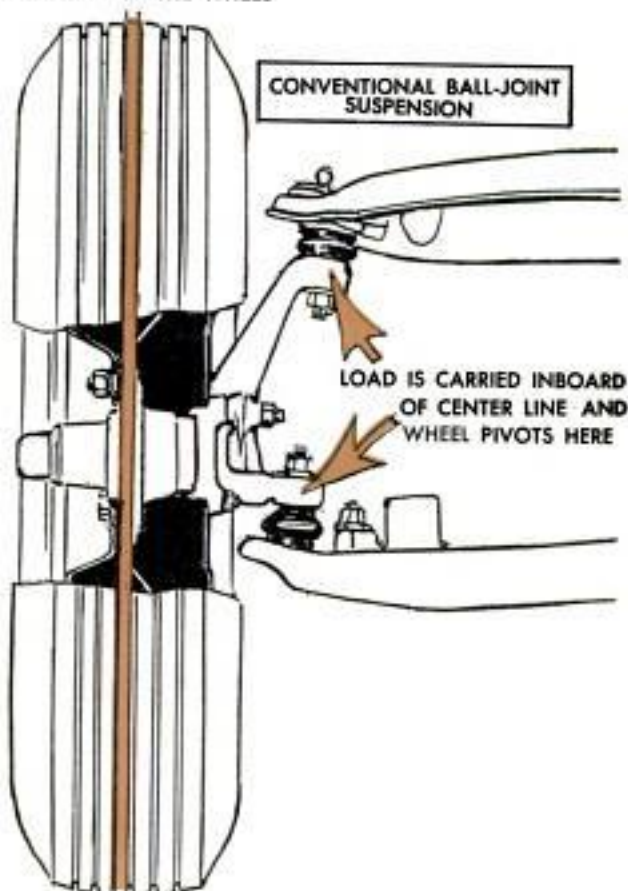
What other advantages are there? Well, steering is effortless just as long as the car is moving. When it's absolutely stationary, steering is no easier than that of any car without power steering. But just edge the car ahead, even the slightest bit, and

(Continued to page 248)

CENTER LINE OF THE WHEEL



CENTER LINE OF THE WHEEL



## Gasoline Engines Power Small-Fry Tractors

Left, crawler-type tractor and below, wheel-type for miniature farmer

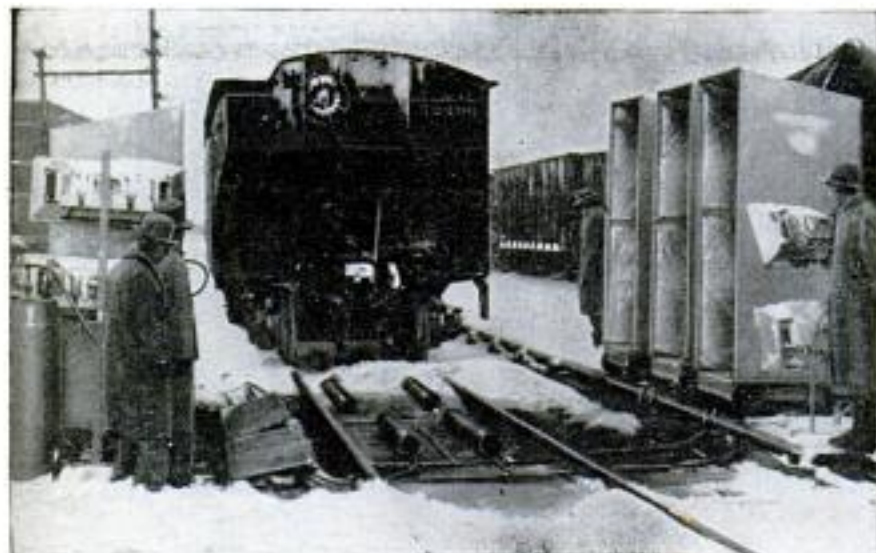
Two miniature tractors are the pride of an Iowa farm boy. Marvin Green, a Boyden, Iowa, farmer, built the two tractors for his seven-year-old son. Both are powered by air-cooled gasoline engines. One is a row-crop wheel tractor with a 1929 Ford transmission and differential and a 1923 Chevrolet steering gear. It even has a hand clutch in keeping with its full-size counterpart. The other is a crawler type, with tracks made of plates welded to heavy roller chain. Model-T clutches steer the tractor.



## Straps Clamped to Car Permit Motorists to Carry Extra Clothes

You can carry extra clothes on your next automobile trip with hooked straps that are clamped in the top of the rear door and fastened to rain gutter. Each strap holds up to five garment hangers. When not in use, the folded straps are kept in the glove compartment.

ⓂJupiter once had 20 times its present mass, members of the American Astronomical Society have speculated, but lost the excess through gradual evaporation.



## Infrared Rays Thaw Frozen Coal Train

Coal frozen in rail cars is thawed for unloading by gas-fired infrared heaters on each side of the tracks. The method halves usual thawing time. If tests are successful, similar units may be installed in 400-foot-long corridors along the tracks to thaw cars as they move toward unloading points. The process may supplant methods using oil burners and torches.



Hybrid varieties of corn resist disease, are multiplying the farmer's yield

*Plant diseases cost each person in the United States \$20 per year. In this article, the last of a series on the farmer's greatest enemies, science sets its sights on*



Doctor Stakman, one of authors, studies wheat in test plot. Specially bred varieties resist rust

## GOAL No. 3

# DISEASE-FREE CROPS

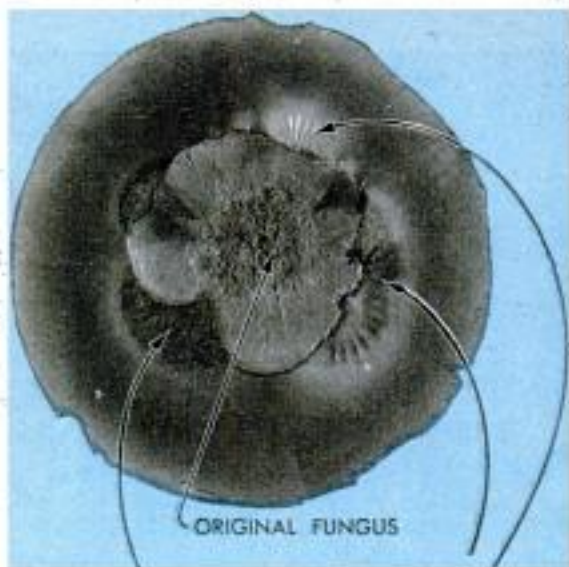
**By Dr. E. C. Stakman,**  
*Professor Emeritus of Plant Pathology and former Head of the Department,  
University of Minnesota;*  
and

**Dr. Carl J. Eide,**  
*Professor of Plant Pathology, University of Minnesota*

**N**OT LONG AGO a truck gardener in Minnesota discovered that his land had become infested with a particularly destructive fungus. The fungus causes a disease known as club root in cabbage, cauliflower, turnips and similar crops. Today the fungus still is in the truck-gardener's soil and will stay there indefinitely,

for no one knows a practical way of eliminating it. The man's land is worth more than \$1500 an acre, yet he faces the necessity of growing a less profitable crop than those he formerly raised. To him, the fungus invasion is a tragedy.

The Minnesotan is just one of thousands of farmers whose profits are being ravaged



**MUTANT TYPES THAT MAY PRODUCE DIFFERENT EFFECTS ON CORN**

*University of Minnesota photo*

Ordinary corn-smut fungus naturally produces several mutant types with different effects than parent type

Late blight fungus killed potatoes in foreground; plot in background was sprayed with modern fungicide



Experiment shows yield of potatoes from rows of equal length, sprayed with different fungicides. The old standby, Bordeaux mixture, had little effect. Note big yield with Manzate, one of the newer fungicides

*Ministry of Agriculture of Colombia photos*



by plant diseases. But farmers are not the only losers. Plant diseases cost the United States at least \$3,000,000,000 a year. You, the consumer, pay this high bill at the rate of almost \$20 for every person in your family. Obviously we need better disease-control methods.

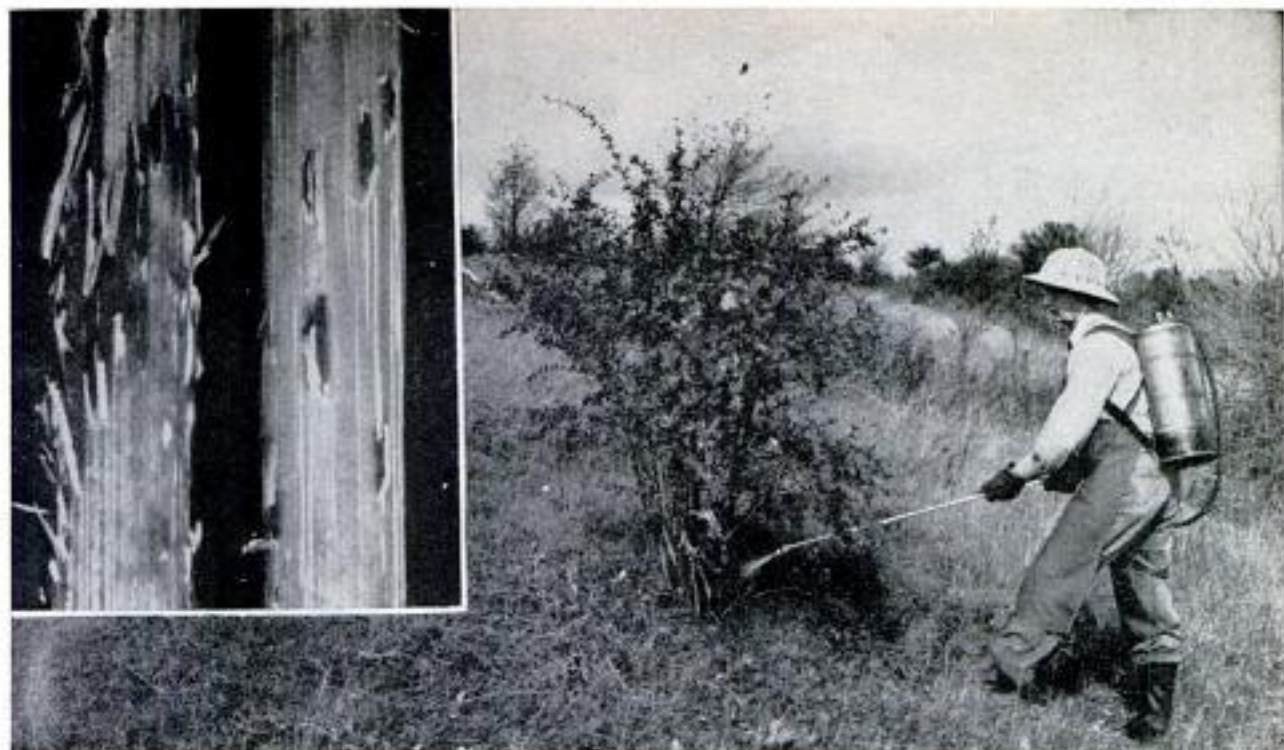
The farmer has only one interest in plant-disease control. It enables him to produce greater yields of higher-quality crops at lower cost. If a control method does not pay, he does not use it.

### Important Advances

Progress in the field of plant-disease control is not spectacular. Yet important advances in plant pathology, the science of plant diseases, are being made constantly.

Compare the problem with that of human or veterinary medicine. At present, diseased plants can't be cured like most sick animals and humans can be cured. Therefore we must prevent the diseases. Of course, if blighted leaves or rotted limbs of trees are removed, the rest of the plant





U. S. Department of Agriculture photo

**Inset, wheat ruined by stem rust. This can be prevented by spraying nearby rust-spreading barberry bushes**

may survive without apparent harm. The lost parts may be replaced by new growth, but the part of the plant that is infected does not recover in the sense that a person recovers from measles.

And there's another difference. Only rarely is an individual plant valuable enough to receive care as an individual patient. A farmer would have 300,000 corn-plant patients on 20 acres of corn if he gave each one individual care. Therefore we must try to prevent disease in entire fields or even more extensive areas. This means it is largely a matter of "plant public health," and in many cases must be managed by public servants rather than individual farmers.

The problem is fantastically complex. There are hundreds of kinds of crops, and each may be attacked by many diseases in its life from the seed bed to the seed bin. Malnutrition—a deficiency of nitrogen, phosphorus, potassium, boron or other mineral elements—causes some diseases. Bad weather can touch off others. Most diseases, however, are caused by microscopic organisms—parasitic fungi, bacteria, nematodes (microscopic worms) or viruses. They live on or in the tissues of the plant and are called plant pathogens. Plant pathology tries to enable man to eat plant products before the pathogens eat them or spoil them.

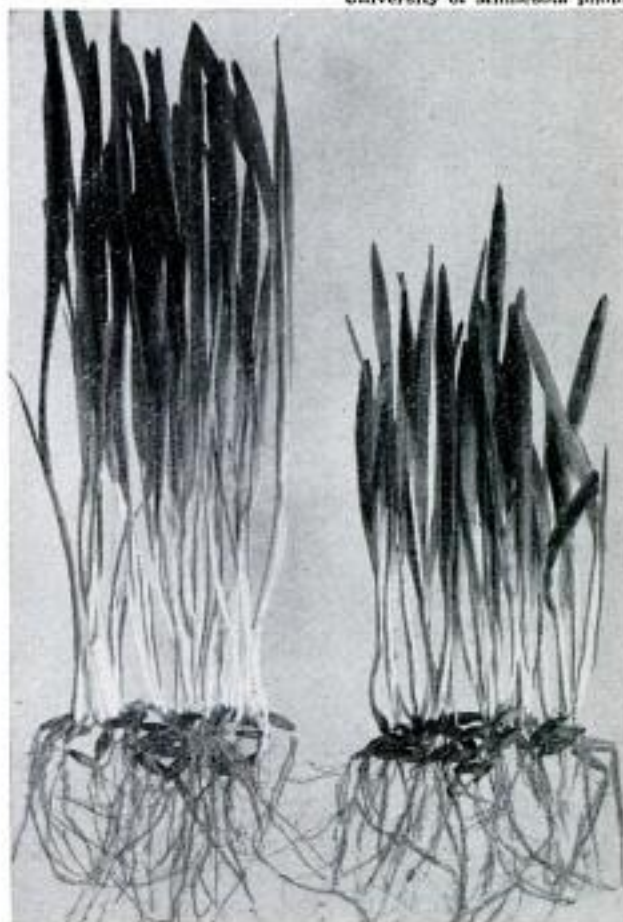
#### **Diverse Weapons**

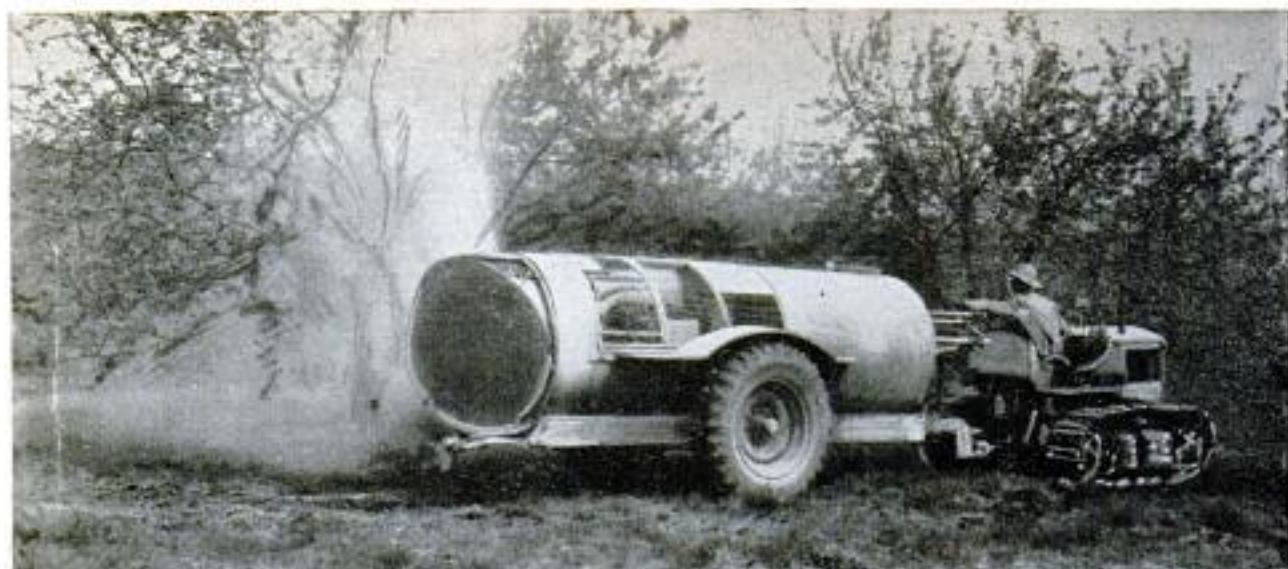
There is such a wide variety of plant diseases that we must have diverse weapons to fight them off. The successful farmer or

florist knows what diseases are likely to attack his crops and takes steps to prevent them. Here is a list of his possible steps in the order they might be employed during the season:

**Barley seedlings at left were grown from disinfected seed. Those at right were untreated, probably will die**

University of Minnesota photo





University of Minnesota photo

Huge modern sprayers can blanket entire orchards with fungicides, assuring higher yields from healthy trees

1. He selects crops suited to soil and climate, fertilizes the soil properly and uses the right methods of cultivation.

2. He avoids land infested with disease organisms, or rotates crops so the organisms will die out, or kills them with steam or chemicals.

3. He selects disease-resistant varieties if possible.

4. He uses seed or other planting stock that is free from pathogens.

5. He disinfects the seed or planting stock with chemicals or heat if diseases can be prevented in that way.

6. He sprays or dusts growing plants with fungicides if it is possible and profitable to do so.

Other measures, such as quarantining or destroying diseased plants on a large scale, cannot be done by the individual and therefore must be done by government agencies. The important point to remember is that there is no panacea for plant diseases.

#### No "Miracle Drugs"

To most of us, the phrase "plant-disease control" conjures up a picture of a farmer spraying his crop with some kind of disinfectant or medicine, the plant equivalent of a bottle of pills or shot of penicillin. Although millions of dollars are spent each year on such "medicines," called fungicides, they will control only a small

(Continued to page 252)

Flax production would be impossible without resistant types, as shown in differing yields of these test plots

University of Minnesota photo



## Magic Whistle Stop Shuts Off Radio

Simply by squeezing a "magic" whistle, you can turn a new German radio on or off from across the room. A specially tuned relay system responds to the frequency of the whistle. It makes it unnecessary to walk across the room to quiet the radio when you want to talk on the telephone.

## DC-3 Still Popular

Most commonly used plane by United States' domestic airlines is still the pre-war DC-3, with 302 of them flying out of a total of 1118 airliners in operation.



## Automobile Desk Folds for Storing

Resting on the dashboard and seat cushion, an automobile desk provides a firm, smooth writing surface for salesmen, route men or anyone who must take notes in a car. The writing surface is a firm sheet of steel and has a spring clip on it that keeps papers in position. The desk can be closed to a length of 26 inches for storing when not in use.

☐ An Arizona inventor has been granted a patent on a mixture of cotton-gin waste and molasses in pellet form for livestock feed.

## Automatic Enlarging Timer Eliminates Need for Test Strips

Projection prints are exposed correctly every time without test strips by a fully automatic photoelectric enlarging timer. The photosensitive head measures the light as it falls on the enlarging paper and shuts the enlarger off when properly exposed. It can be used with any enlarger. All you do is place the negative in the enlarger, set a paper-selector dial to the proper sensitivity and aim the photosensitive head at the projected image. Then with the paper in the easel, turn on the enlarger and the timing control does the rest, turning off the enlarger when exposure is complete. The device is designed for use by professional photographers.

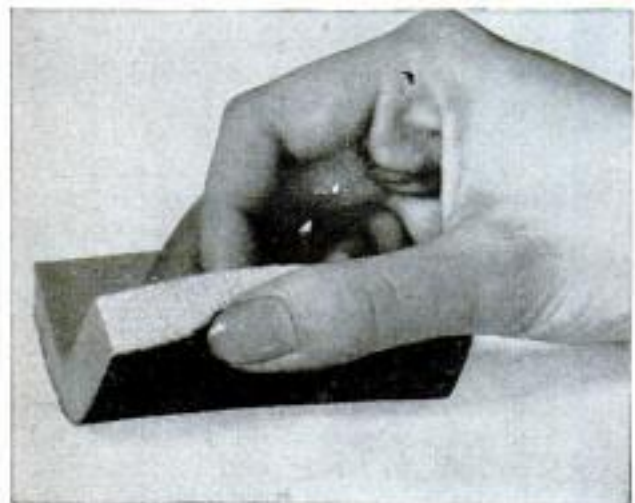




## WHAT'S NEW FOR Home

**BABY HIGH CHAIR** fastens to and folds under the kitchen table. Four screws secure a bracket, which holds the chair at the correct distance from the table edge. Folded, the chair is 4 inches deep, 13 inches wide, and extends 22 inches under the table top. A child cannot stand in this chair, which has an anodized-aluminum frame of etched aluminum finish or varied colors. A special table converts for adult use

Plymouth Mfg. Co., 5825 Tingle Ave., S.  
Minneapolis 10, Minn.



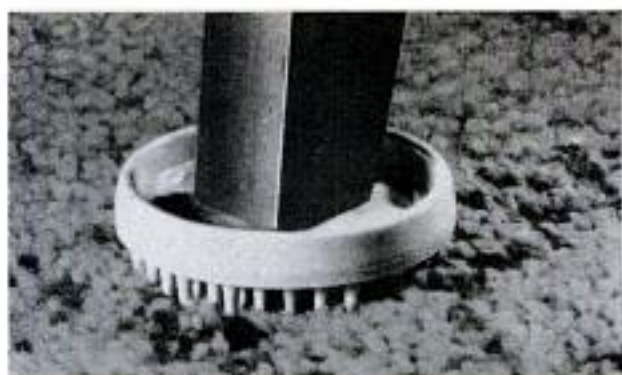
**FOAM-RUBBER PAD** coated with abrasive particles will scour and polish without scratching. Flexible and compressible, this pad rinses clean prior to squeezing and drying. There is no danger, as in metal pads, of slivers harming the skin. Measuring three by three inches, the pad is one half inch thick. After use in the kitchen, the pad becomes less abrasive and can be used to clean bathtubs, sinks and enamelware

Rubber Scrubber Corp., P.O. Box 122, Watertown, N. Y.

**CONVERTIBLE SOFA** automatically becomes a bed nine seconds after you have set the controls and turned a key in a lock on the sofa. The mechanism operating these controls is inside the upholstery. Power comes from a one-third-horsepower electric motor. To prevent accidents a fuse in the mechanism blows when more than 15 pounds' pressure has been exerted against the sofa while it is converting into a bed

Castro Convertibles, Nassau Terminal Bld.,  
New Hyde Park, N. Y.





**FURNITURE SUPPORTS** will not mar or dent your carpet. Many molded legs give multiple support, permitting the pile of the carpet to remain vertical under the heaviest of loads. Made of plastic, these supports keep furniture from shifting and are available in blonde, clear or walnut-mahogany-type finishes

Childlore Co., 331 Southwest Blvd., Kansas City, Mo.

**AUTOMATIC TOASTER-OVEN** features a vertical toasting section and an oven drawer. A selector dial indicates toaster or oven. Another dial sets the degree of brownness in the toasting section or oven. A chrome-plated steel shell covers the unit, which has heat-resistant plastic handles, feet and controls

General Electric Co., 1285 Boston Ave., Bridgeport, Conn.

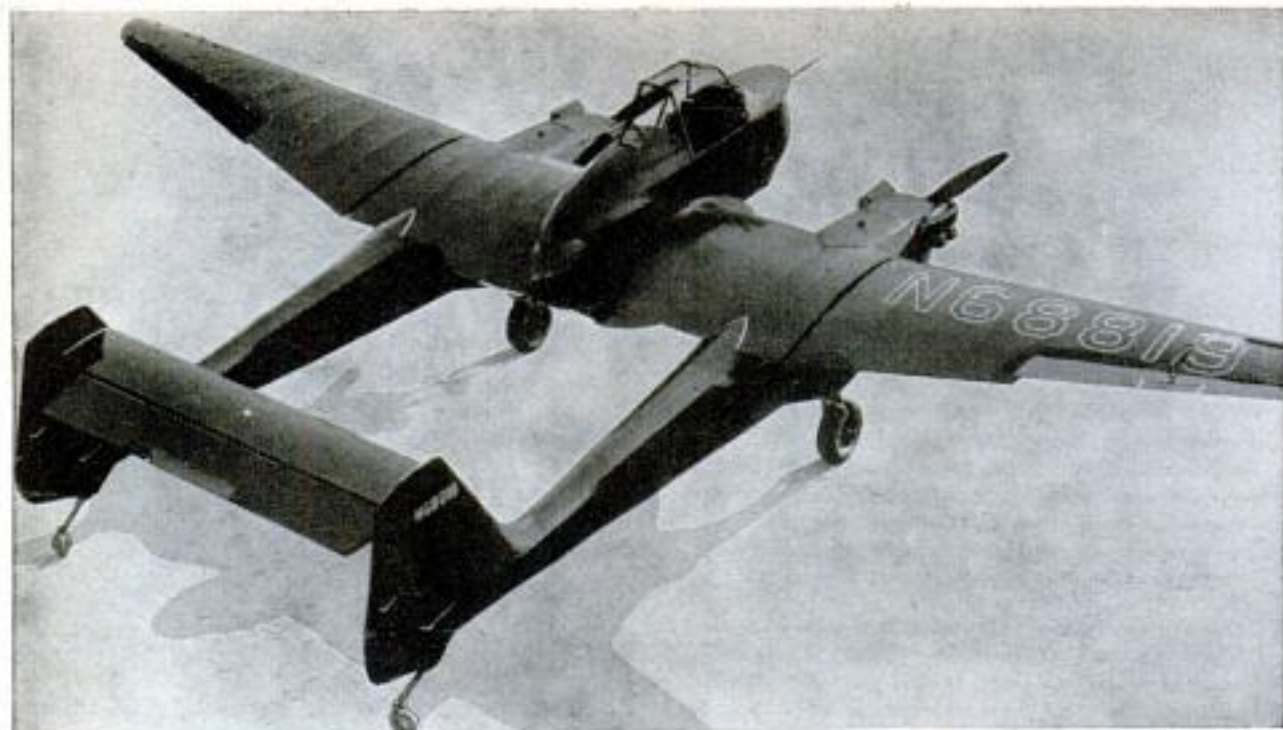
**BURGLARPROOF LOCK** has no keyhole on the outside of the door for prowlers to "pick." No knob turns or moves without a specially fitted key. This lock fits any door and is of all-metal construction. Using one-way slotted screws, the lock can be installed without removing the present lock. Lock resists forced entry

Loxem Mfg. Co., 481 Main St., New Rochelle, N. Y.

**CENTRALIZED VACUUM CLEANING** operates from a motor, suction fan and dust collector installed in the basement, garage or utility room. Steel pipes in the walls run from the basement unit to various rooms in the house, emerging at floor or wall outlets. A 25-foot, lightweight tube plugs into outlets for cleaning

Central Vacuum Corp., 3667 W. Sixth St., Los Angeles 5, Calif.





## POD PLANE

POD-CARRYING PLANES that can land, detach their cargo, hook on another pod and take off in a fraction of the time conventional aircraft transfer their cargo are the proposal of E. W. "Speed" Gardenhire.

The prototype "AirUtility" has already been built by the North Sacramento, Calif., pilot, mechanic and aeronautical engineer. He would like to produce a fleet of these versatile planes which could carry passengers, freight, military supplies and a variety of special loads in specialized pods fastened between the wheels, beneath the cockpit. Loading and unloading would be reduced to the simple operation of attaching or detaching a convenient prepacked unit. There would be no waste time for the power plant.

Speed, his wife and daughter, have adopted the twin-tailed bimotor as a family project. AirUtility first flew in 1949. Modified, it is now undergoing certification tests. Three freight lines and agricultural dust sprayers are interested in the plane.

PASSENGER POD



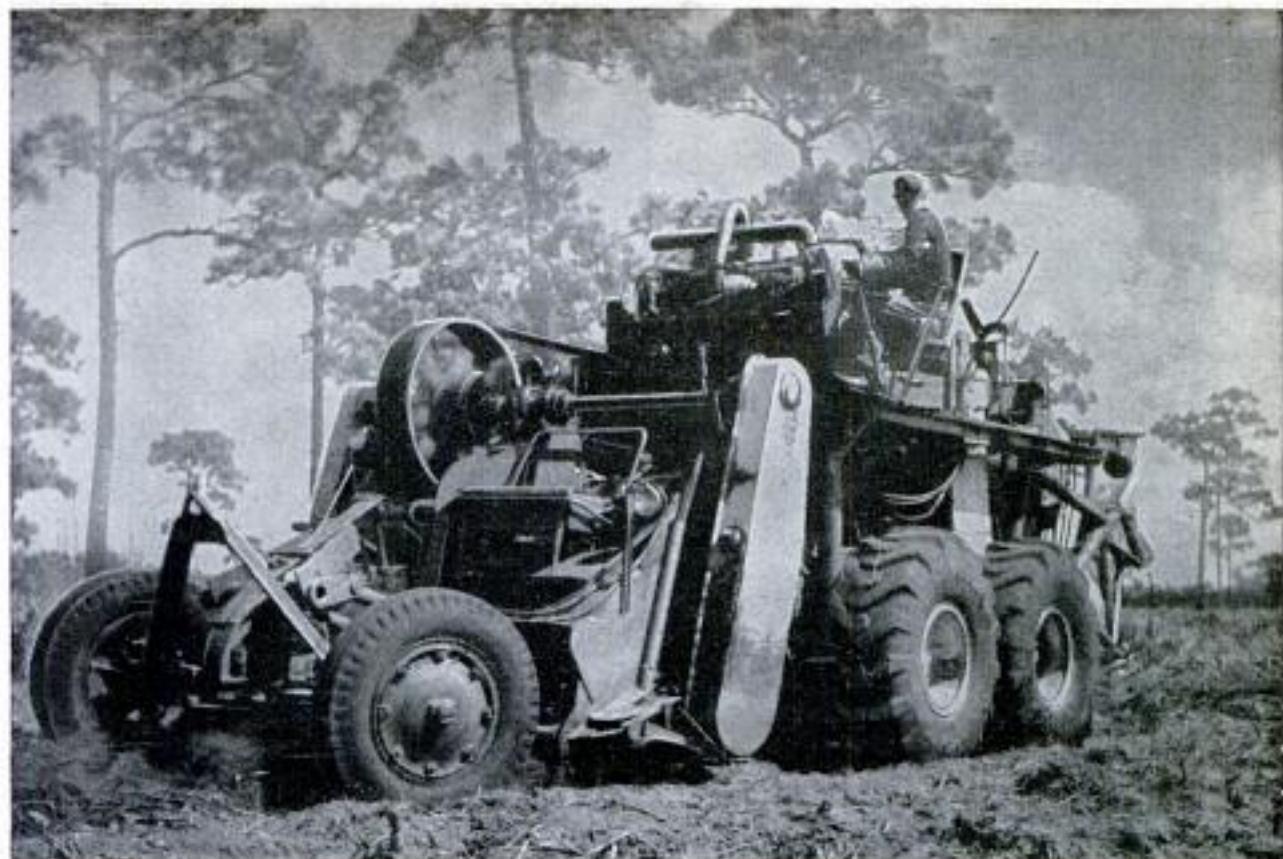
AMBULANCE POD

CARGO POD



CARGO LASHED





Rotary plow beneath the huge machine digs up palmetto roots and other brush to clear Florida farmland

## Plow Clears Palmetto From Florida Farmland

Clearing farmland in Florida consists largely of rooting out palmetto, a low growth with fan-shaped leaves. A huge new machine not only clears the palmetto but stacks it for burning. A rotary plow digs up the palmetto and other roots. The brush is deposited on a conveyor and carried to a big basket on the rear of the machine. When the basket is full, the brush is dumped in a pile. The machine will clear up to 20 acres in 24 hours.

Roots are deposited in a big basket at rear of the machine. Later the basket is dumped. Pile of roots can then be burned



## Water Jet Scales Fish

Fitted to an ordinary garden hose, a special nozzle produces a powerful jet of water which lifts the scales from fish. Bass, bluegills, crappies and most game fish can be scaled with the water jet. The fish is held by the tail in a clamp, and is flopped over when the scales have been cleaned from one side.

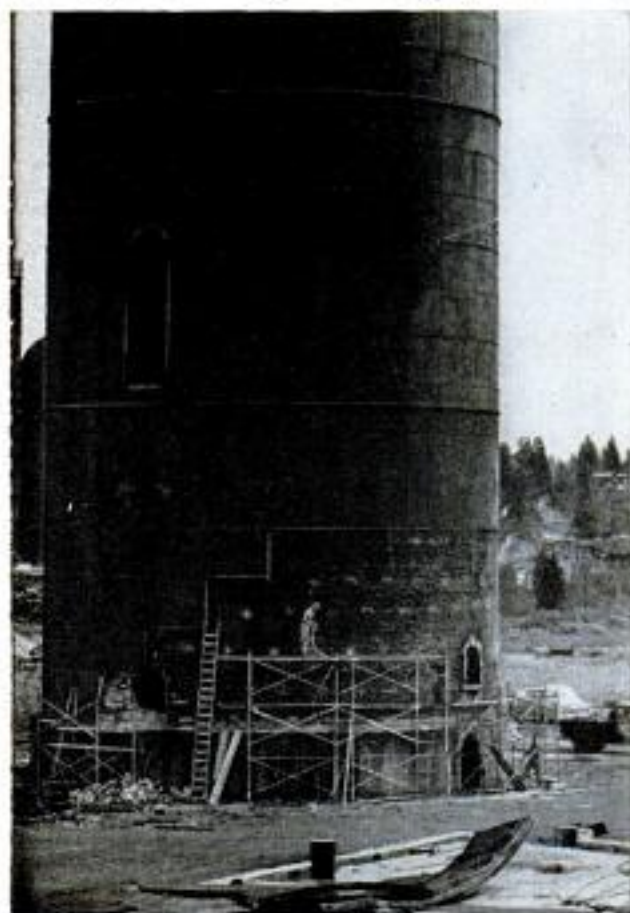


Model showed engineer that small triangular segments at opposite balance points held up structure

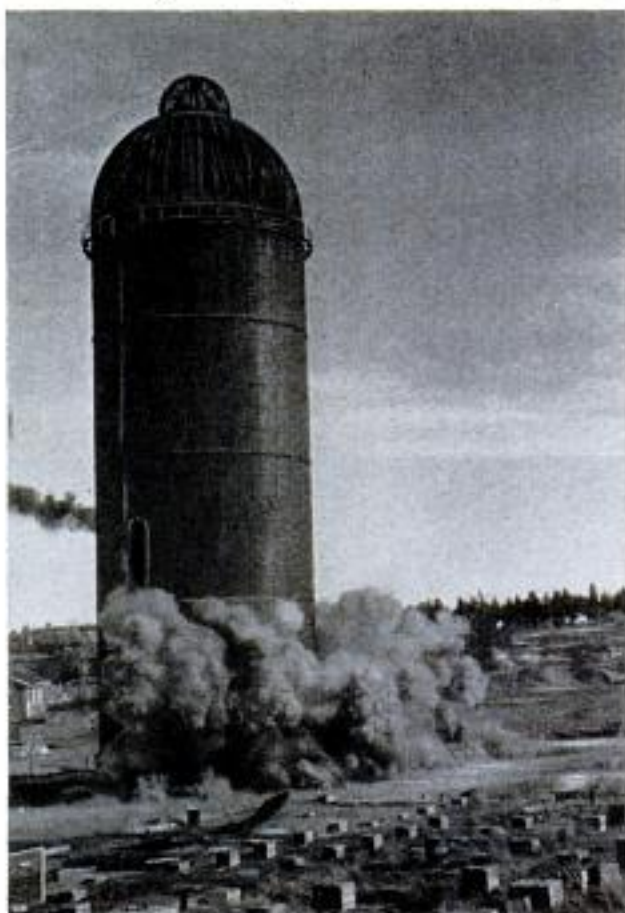


When triangular segments were removed simultaneously with jerk on a string, model fell straight and true

Holes were drilled in the wall at predetermined balance points and dynamite charges packed inside



Engineer marked out the predicted line of fall as determined by the model, then touched off dynamite





**I**N THE LUMBERING TOWN of Bend, Ore., a huge structure recently was felled with all the accuracy of an old-time lumberjack felling a big tree.

The structure was a sawmill scrap burner 160 feet high and 50 feet in diameter, built from 90 tons of steel and 835 tons of masonry. When a lumber company decided to abandon the structure, the contract for razing it was given to young civil engineer, H. A. Pyzdrowski.

Pyzdrowski believed there was an easier and better way to do the job than to take the huge structure apart piece by piece. He suggested that dynamite be used to fell the old scrap burner. It was considered a risky step to take because the only time dynamite had been used to raze a somewhat similar building, the structure had fallen in a different direction than anticipated with disastrous results to surrounding buildings.

To convince the owners that the operation would be successful, Pyzdrowski built a scale model of the burner. Next he made a cut in the model similar to the cut a

woodsman makes in felling a large tree. He made the cut in segments so he could determine precisely which segments controlled the fall. With the aid of the model, he discovered that small sections at the balance points on opposite sides were the elements which accurately determined direction of fall. Rather than risk failure due to a miscalculation at these points, he had them drilled out with an air drill.

When the time came to fell the burner, the overlay of  $\frac{3}{16}$ -inch steel plate was removed from a section of the wall in an approximation of a woodsman's cut. In the three-foot-thick brick wall, 156 sticks of dynamite were placed with the greatest load at the bottom. The dynamite was fused so the bottom charges would explode first, leaving room for the rubble from the higher sections.

Prior to dropping the burner, Pyzdrowski calculated the line of fall. He drove a flag into the ground to mark this line from the base of the burner. When the structure came crashing down like a giant tree, the top was in direct line with the flag. ★ ★ ★

Ancient scrap burner weighing 835 tons came thundering down, much as a tree falls in the direction controlled by woodsman's ax. When dust cleared, demolished burner was lying exactly along predicted line





Milwaukee Journal photos

The TV above, monitored from the principal's office, keeps students at right on job

### TV Watches Study Hall And Relays Criticism

TV is fighting spitball throwers and pigtail yankers. At New London (Wis.) High School, the glassy eye of a TV camera peers at pupils in the study hall. There are no teachers in the hall. Instead, secretaries in the principal's and superintendent's offices watch a monitor screen in between regular duties. A public-address system picks up sounds in the study hall and relays admonitions



to students. Paul Loofboro, superintendent, estimates the TV monitor saves the school one half a teacher's annual salary.

### Whirlybird's Newest Job: Flying TV Station for the Navy

Helicopters now may become self-contained flying television stations, as the result of tests made by the Navy's Bureau of Ships. A television system developed by Philco for the Navy to control amphibious

landings has proved so successful in transmitting clear pictures to a receiving location 50 miles from the plane, that the Navy is considering further use of it. Tests were made at altitudes of 500 to 2500 feet.





## New Products of Interest



Performance, convenience and styling are featured in this new type of indoor TV antenna which is said to filter out electrical interference and reduce picture "ghosts" to a minimum. A control knob permits the antenna to be tuned to the same channel as the set itself, in order to provide proper matching for optimum performance. Swivel base mounting allows antenna rotation without marring furniture

High-fidelity-radio reception is available for automobiles with this imported FM-AM receiver. Designed to fit most cars, the radio operates from 6 or 12-volt batteries. Features include 4-gang permeability tuner, 11 tuned circuits, coaxial speaker, rear-speaker plug and tone controls. Audio response is said to be essentially flat from 40 to 16,000 c.p.s. FM sensitivity: 3 microvolts for 20-db quieting



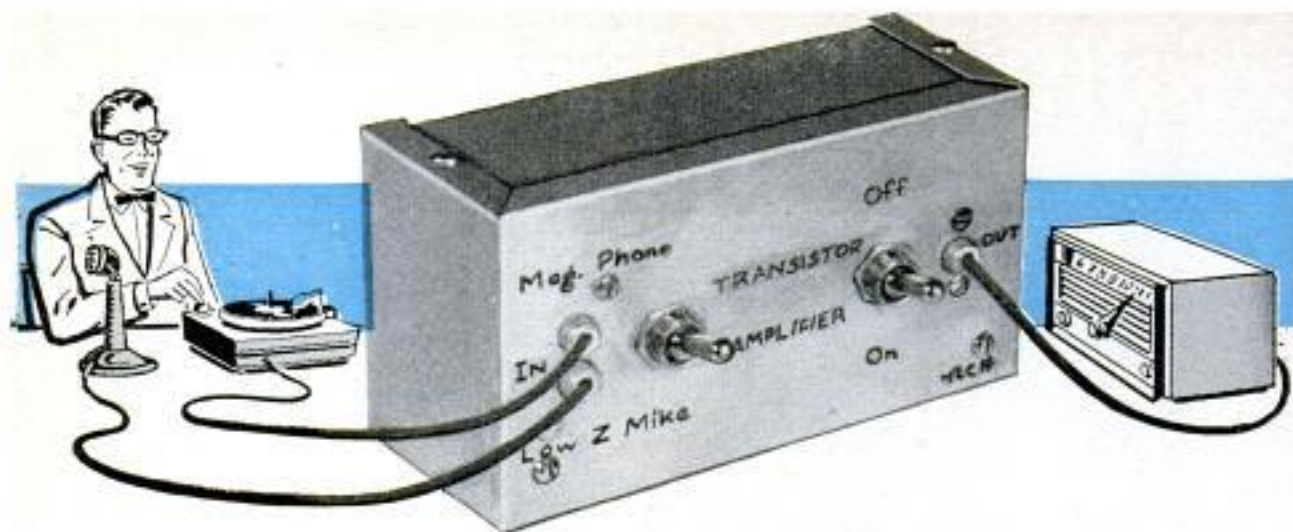
This new tape recorder starts automatically, at predetermined times, to record radio programs or microphone pickups. Model has a built-in eight-tube receiver and Telechron clock with automatic time-switching facilities. Seven speakers, including a 12-in. public-address type, provide panoramic sound reproduction. Other features are: Two recording speeds, 8-watt amplifier, dual-level indicator, and tone controls. Unit can be used as a public-address system to cover an area containing several thousand persons. Ideal for schools, clubs or industrial applications



Automatic voice control eliminates the use of a manual press-to-talk switch, yet permits private and selective communication in this newly designed intercom system. The voice automatically activates talk-listen switch even when conversing with conventional touch-controlled units. Also contains auto-

matic traffic control which tells user by means of multicolored lights whether a line is clear, busy or being called. Shown below is 10-station master and accompanying substation. Arrows point to two control buttons. One permits setup for private listening; the other clears line at end of conversation





## DUAL INPUT TRANSISTORIZED PREAMPLIFIER

By Dr. Richard C. Hitchcock

**M**ANY A GOOD audio amplifier or radio of earlier vintage was designed for use in conjunction with a record player employing a crystal phono cartridge. Such cartridges have a high signal output, but provide far more distortion than can be tolerated in a high-fidelity sound system. But, while the amplifier itself may be capable of much better performance, it can not be used with the more modern magnetic cartridges without additional amplification and equalization to compensate for the characteristics of these units.

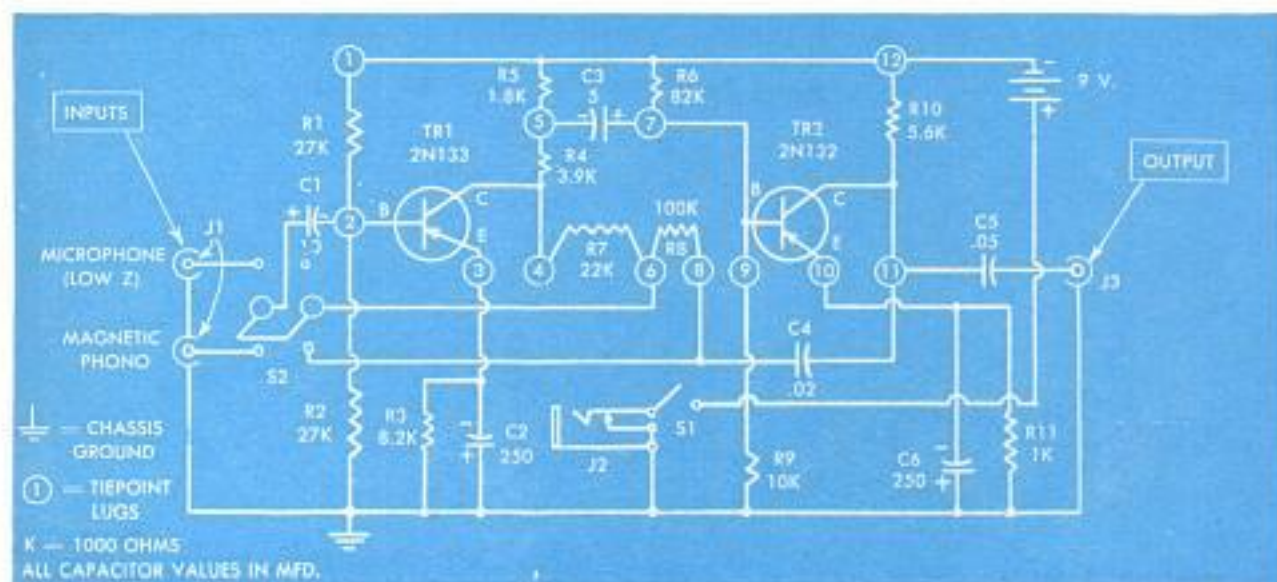
If you plan to improve your phono system by changing to a record player using a magnetic cartridge, you can still retain your present amplifier by adding this simple but effective transistorized preamplifier. This addition will also permit you to use the amplifier as a public-address

system in conjunction with a suitable microphone.

### Why Transistors?

In high-gain, low-level amplifiers transistors have a number of important advantages over vacuum tubes. The extremely low power requirements of these units makes battery operation practical. The six inexpensive pen-light cells used in this unit, for example, have an estimated life of six months when used at a rate of about three hours per day. The operating costs, therefore, are negligible, and the hum problem often associated with vacuum-tube circuits is entirely eliminated. Microphonics, those "ringing" sounds caused by vibration of vacuum-tube elements, are nonexistent, and the completed preamplifier is practically noise-free in operation.

Fig. 1. Schematic wiring diagram of transistor preamplifier for magnetic phono cartridges and microphones



## The Circuit

The schematic diagram of the transistor preamplifier is illustrated in Fig. 1. The circuit consists of two transistors, one of which, the 2N133, is a special, low-noise unit. Resistance-capacitance coupling is used between the two stages. With the switch, S2, in the Mike position there is a small amount of negative feedback, through C4, R8 and R7, from the collector of the output to the collector of the input stage. This feedback is approximately the same at all frequencies so that the amplifier response is essentially flat over the entire audio-frequency range.

### LIST OF MATERIALS

**RESISTORS:** (All resistors  $\frac{1}{2}$  w. 10 percent. K=1000 ohms) R1, R2=27K; R3=8.2K; R4=3.9K; R5=1.8K; R6=82K; R7=22K; R8=100K; R9=10K; R10=5.6K; R11=1K.

**CAPACITORS:** C1=10-mfd. 50-v. electrolytic; C2=250-mfd. 6-v. electrolytic; C3=5-mfd. 50-v. electrolytic; C4=.02-mfd. 200-v. paper; C6=250-mfd. 6-v. electrolytic; C5=.05-mfd. 200-v. paper.

**MISCELLANEOUS:** TR1=Raytheon 2N133; TR2=Raytheon 2N132; S1=s.p.s.t. toggle switch; S2=d.p.d.t. toggle switch; J1=dual phone input jack; J2=closed-circuit jack, Mallory A-2A; J3=single phone jack.

**HARDWARE:** Aluminum case,  $5\frac{1}{4} \times 3 \times 2\frac{3}{8}$ ; ICA 29341; 12-point terminal strip; battery holders for 3 type Z pen-light cells, Lafayette MS-171 or equiv. (2 read.); type Z pen-light cells (6 read.); hookup wire; rosin-core solder.

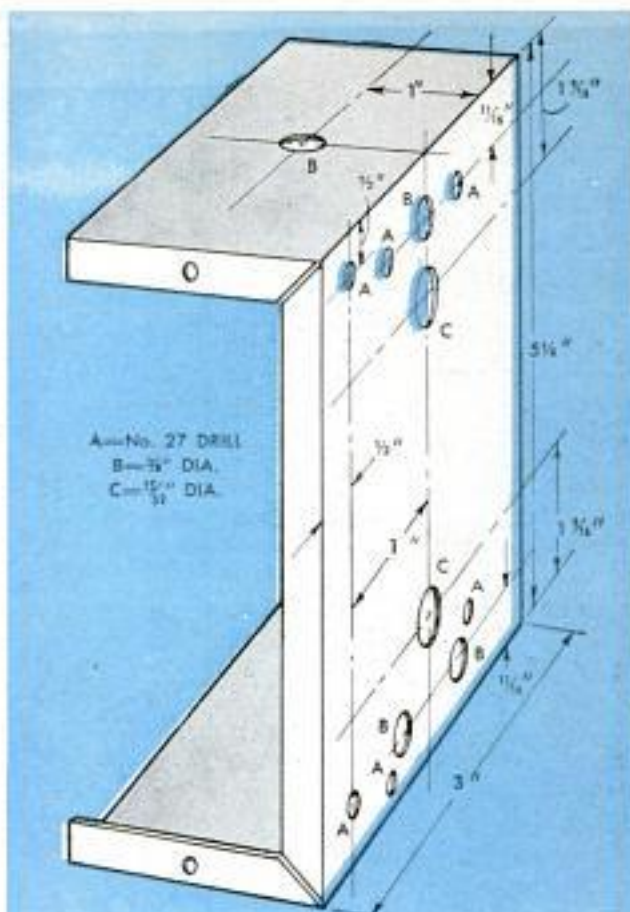


Fig. 2. Chassis layout for preamplifier

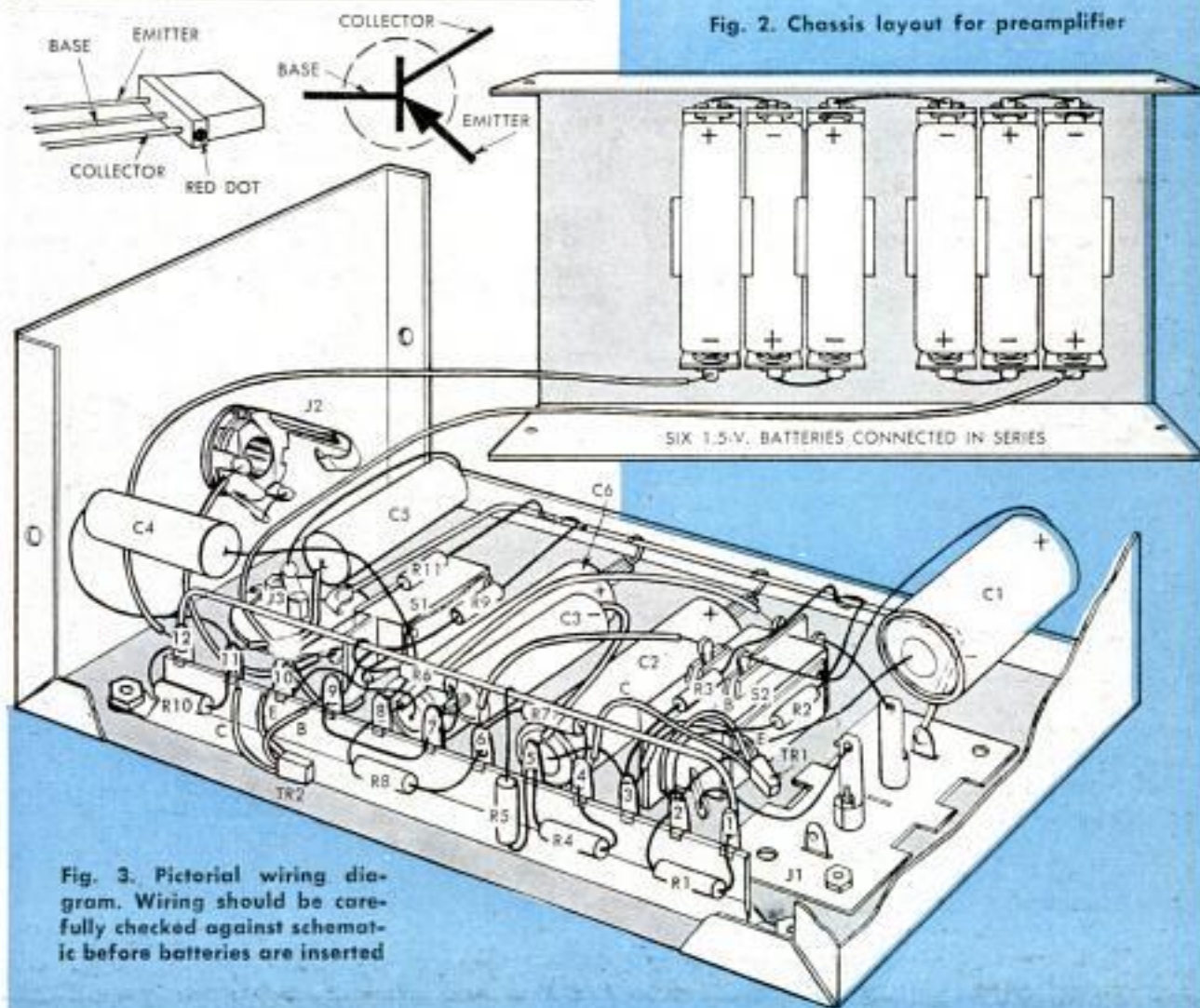


Fig. 3. Pictorial wiring diagram. Wiring should be carefully checked against schematic before batteries are inserted

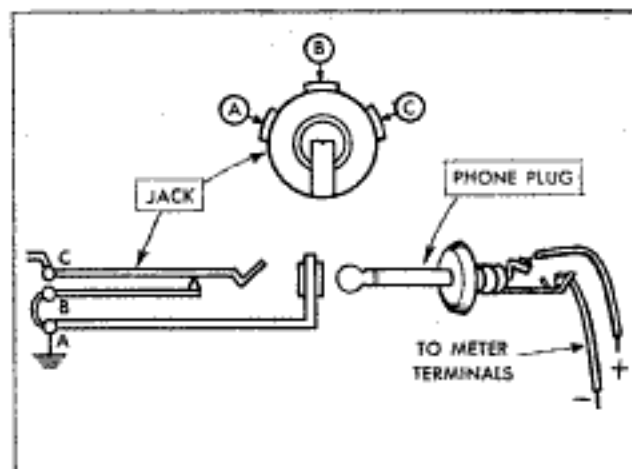


Fig. 4. Test jack terminal identification. Polarity must be observed when connecting meter leads to plug

When S2 is set to the Mag Phono position, R8 is shorted out and only the smaller resistor R7 remains in series with C4 to limit the feedback current. At high audio frequencies, the reactance of C4 is negligible, and the amplification is considerably reduced by the relatively large amount of negative feedback. As the signal decreases in frequency, the reactance of C4 increases. As a result, the feedback current becomes smaller and the amplification goes up. This rise of amplification at low frequencies compensates for the characteristics of magnetic cartridges. The other resistors and capacitors in the circuit are used primarily to apply the proper operating currents to the transistor elements and to provide bias, stabilization and coupling.

The test jack, J2, is so connected that all battery current flows through its normally closed contacts. A milliammeter plugged into this jack can be used to check for the proper operation of the preamplifier and to determine the condition of the batteries after prolonged use.

The preamplifier has no tone or volume controls since these are usually present in the main amplifier. Their use here would represent an unnecessary and often confusing duplication of functions.

### Construction

All parts used in this project are available from most radio-parts distributors and construction is not difficult. The parts are mounted in a standard aluminum case which is first drilled and punched as shown in Fig. 2. Then, the switches, jacks and the 12-point terminal strip are mounted in accordance with the pictorial diagram of Fig. 3. Connect a U-shaped length of No. 16 tinned copper wire between tie points 1 and 12 so that the horizontal portion of the wire is about  $1\frac{1}{8}$  in. above the base. A similar bus wire, raised about  $\frac{1}{4}$  in. above the base, connects the ground lugs of the

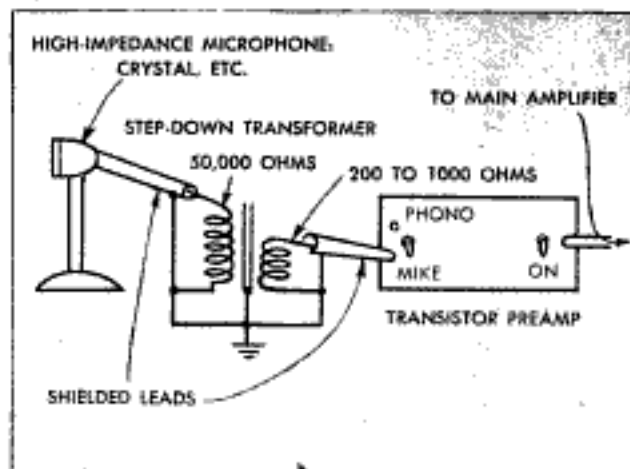


Fig. 5. Method of connecting high-impedance microphone to preamplifier through step-down transformer

input and output jacks and serves as a common ground for other connections.

The various capacitors, resistors and wires can now be soldered in place, as illustrated. Be sure, however, to leave a small opening in those terminal-strip lugs to which the transistor leads will be connected later. Polarity (plus and minus) of electrolytic capacitors must be observed as these units are wired into the chassis. Finally, the transistors are soldered into place after their leads have been covered with "spaghetti."

The two greatest enemies of transistors are heat and reversed voltage polarity on the transistor elements. These units, therefore, should be installed with special care. Before soldering, make sure that the transistor elements are connected to the correct tie points, and then apply the soldering iron to the junction for only a very short instant, just long enough to make a good connection. (Rosin-core solder with a low melting point should be used for a quick connection without excessive heat.)

Fig. 3 shows the proper method of mounting and wiring the battery clips in the back cover of the case. Be sure to mount these so that there will be no interference between them and the components mounted in the main chassis when the two pieces are fastened together. Use flexible stranded wire between battery clips and chassis.

### Testing

The wiring should be carefully checked against both pictorial and schematic diagrams before the batteries are inserted in the clips. It is a good idea to check the voltage of each cell before insertion. Each should measure about 1.5 volts. Again, polarity must be carefully observed as the cells are clipped in.

A d.c. milliammeter with a full-scale deflection of 5 or 10 ma. can be used to

(Continued to page 264)

X162

X162  
TME

WTM 58

POPULAR  
MECHANICS

## CRAFTSMAN



Those Christmas coloring books will go well with this

## Desk-Chair

By Harold Jackson

WITH ONE SIMPLE MOTION, this novel youth-size chair can be converted into a neat little desk that is just right for play or school homework. When used as a chair, the back locks firmly in place. By sitting astraddle the chair backwards and pushing the back up and outward, the chair is changed into a desk. A small metal clip locks the desk top securely in place. Releasing this clip permits the desk top to be returned to its original position as a chair back. A small drawer that opens at one side is handy for pencils, crayons and paper.

### Any Wood Will Do

The drawings show how the parts are made and fitted together. Dowels, screws and glue are used in assembling the parts. Hardwood is best for this project but any clear, straight-grained wood can be used. All screwheads are deeply sunk and the holes plugged wherever they show.

A spring clip on the underside holds the desk top in place. It is placed so that it locks over the upper dowel rung at the

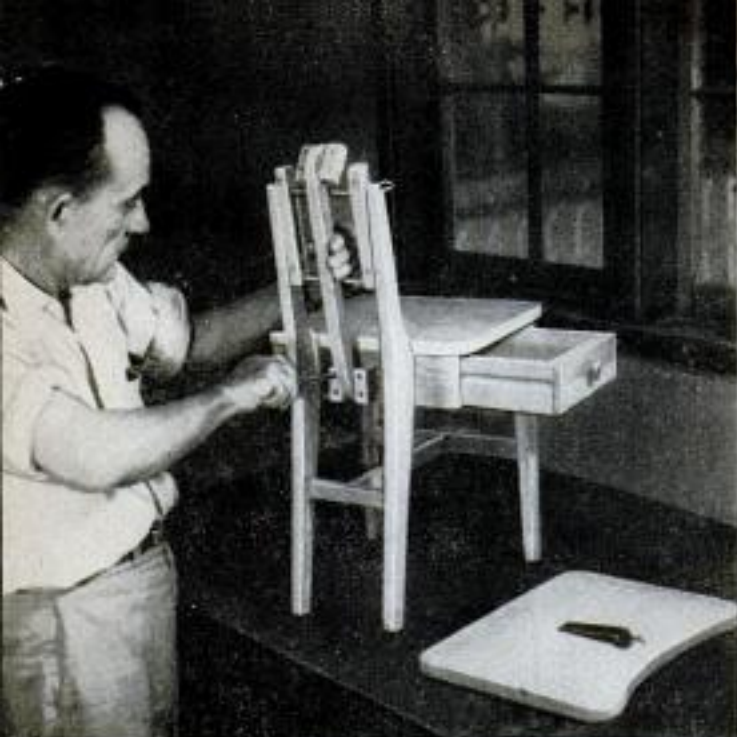


top of the legs. The recess at this point is to allow space for the clip to operate freely. The clip is released by pressing upward on it if you want to change from desk to chair.

### Drawer Under the Seat

Standard drawer construction is used in making the drawer. It is mounted on guide strips fastened to the inside face of the seat rails and the drawer sides are grooved to fit the guides. Glue and nails are used in assembling the drawer, and a small knob is attached to the front.

Each back leg is cut from a piece 4 x 25 in. Follow the side-view drawing in laying them out. Where possible it is best to band-saw or jigsaw them as a pair to assure identical shape and also sand and bore the holes for the dowel rungs while the two



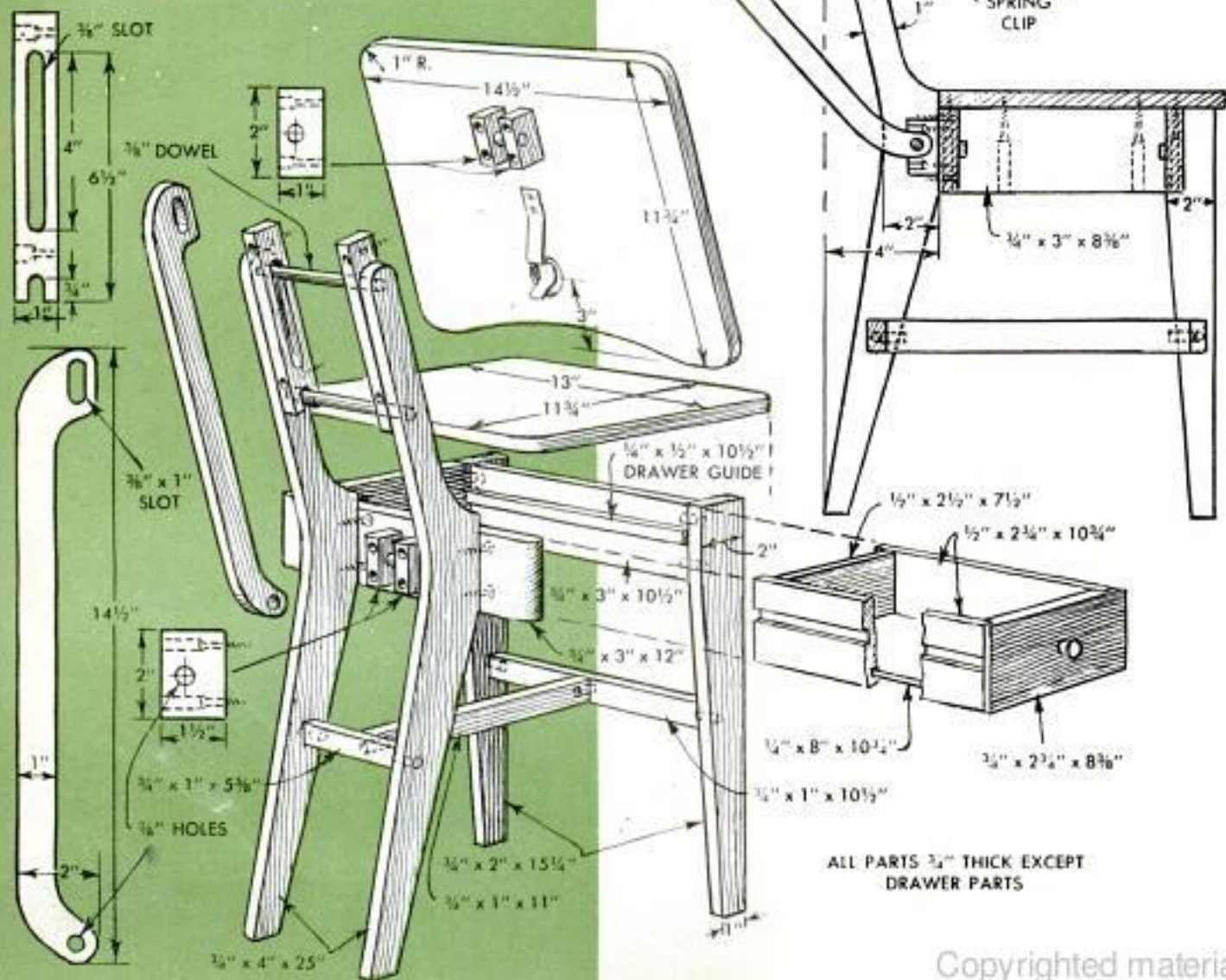
Pivot blocks for the lower end of the desk-top brace are attached securely with screws to side of chair seat rail. Brace must work freely to fold properly

The combination desk-top-and-chair-back is attached with screws to slotted cleats that ride on dowel rungs. Notice how notched ends of cleats hook over lower rung to lock desk top in chair-back position

back-leg pieces are still tacked together.

Dowel pins and screws are used in assembling the chair frame. Glue is applied to all joints at the time of final assembly. Three rails are all that are used in the chair, one side being left open for the drawer. Screws for attaching the seat board are placed in counterbored holes in the rails. Corners of both the seat board and back board are rounded as shown. The arm should be made of  $\frac{3}{4}$ -in. plywood for strength and to prevent splitting at the ends.

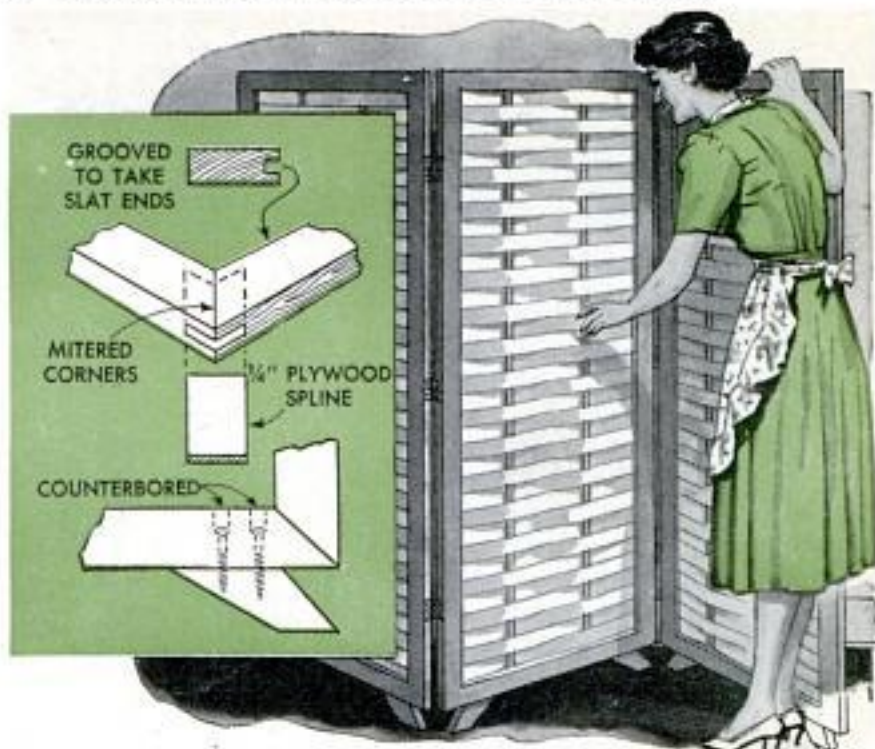
The desk action of the chair back is easy to see in the side view. The holes for the countersunk screws are plugged with plugs made of  $\frac{3}{8}$ -in. dowel. These are glued and sanded down smooth. Holes and moving parts may have to be filed or sanded a little to make the parts work freely. The completed project can be finished with wood stain and varnished or painted. ★★★





## Folding Basket-Weave Screen From Venetian-Blind Slats

Slats from discarded Venetian blinds can be used to make an attractive folding screen as shown in the illustration. The screen can be made with two or more sections depending upon the number of slats available. Width of the sections is determined by the length of the slats which are cut down to exclude the cord holes. The frames are assembled first using either 1 or 2-in. stock. Strong corners are produced by grooving the mitered frame for  $\frac{1}{4}$ -in. splines of plywood, which are glued in place. After the glue dries cut the splines off flush with the edges of the framing. Side members of the frames are grooved on the inside edges to take the ends of the slats. Diameter of the vertical rods around which the slats are bent



should be approximately half the thickness of the framing. Small tapered feet are fastened to the bottom of each section.

## Marred Chromium Coatings Easily Renewed

Chromium-plated fittings such as headlight rings, hood ornaments and miscellaneous trim are coated with a thin layer of clear plastic lacquer. With age, this coating sometimes discolors, chips off or checks, leaving the once bright and smooth finish dull and irregular.

In order to remove this coating, manufacturers of chrome protectives recommend the use of strong solvents such as acetone, lacquer thinner or abrasives. Unfortunately, these agents are laborious, time consuming and require some skill in their application.

A better way to do the job is to immerse the fitting in very hot, but not boiling water. After the metal has heated thoroughly, the old coating will loosen so that it can be peeled off in strips. If an occasional speck is stubborn, it can be removed with a soap-saturated steel-wool pad.

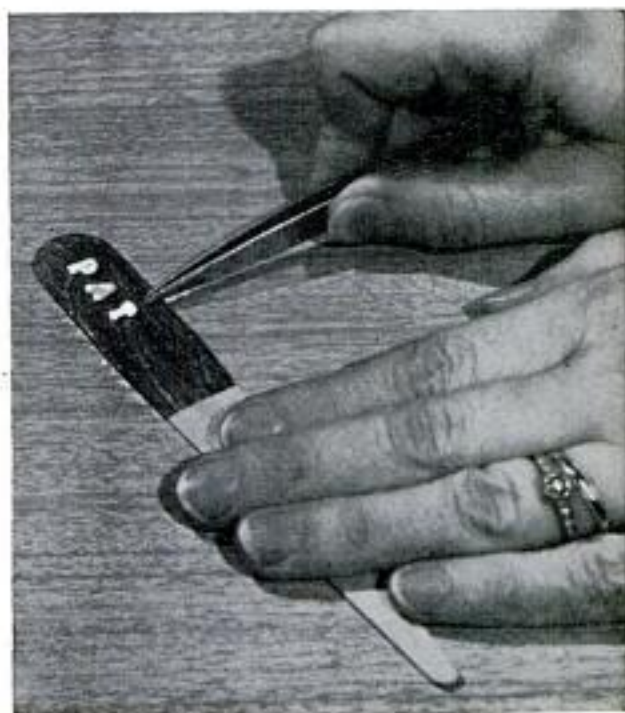
Once the old coating is completely removed, simply dry and buff the part with a clean, soft cloth. After that, a new coat can be sprayed or brushed on.

Charles Younger, River Edge, N. J.

☞ A cake may be cut into three layers by wrapping a heavy thread around it, crossing the thread ends and pulling on them.

## Alphabet-Noodle Monograms

If you want a personalized jewelry box, letter opener, or other item, here is an easy way of applying your monogram. Take the required letters from a package of alphabet noodles and glue them on the handle or other flat surface. After the glue has dried, cover the letters with one or two coats of clear shellac.



W.T.M. 58

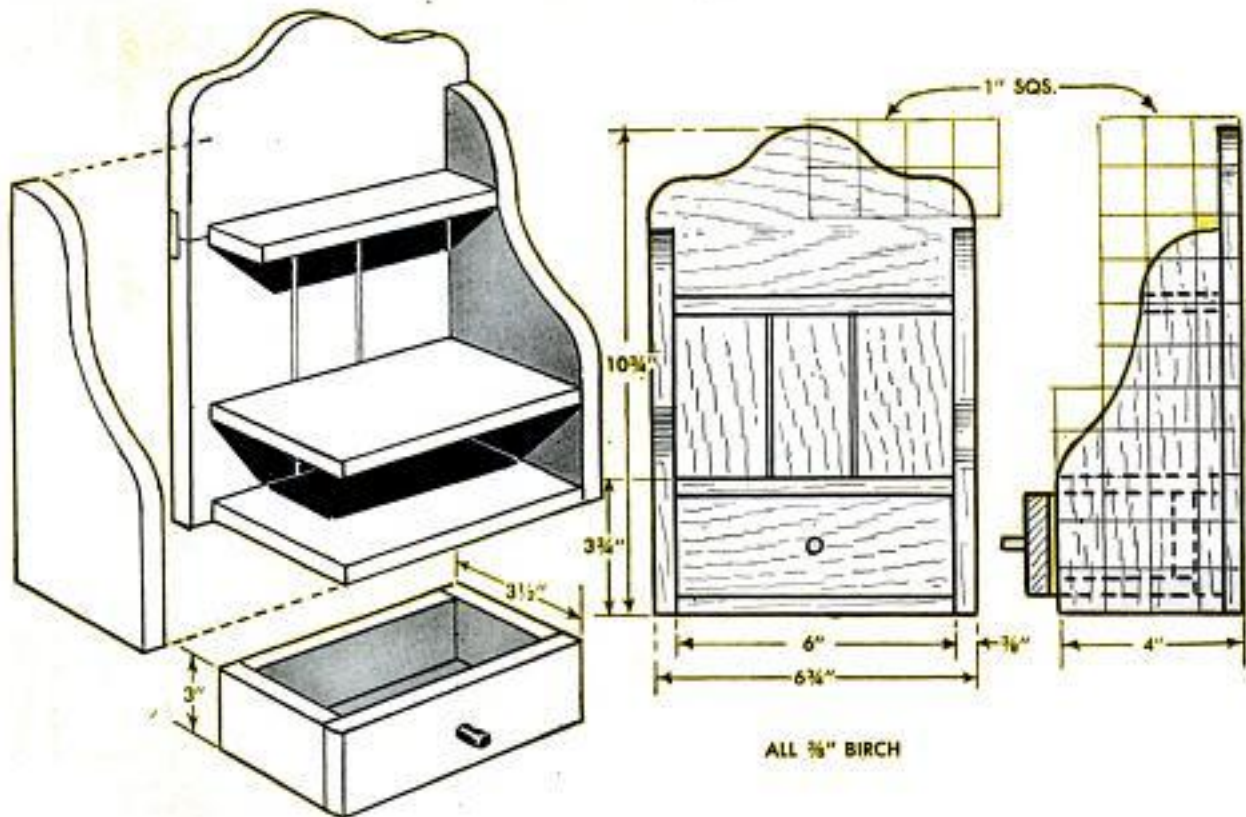


# Midget Spice Cabinet

This little one-drawer spice cabinet, made entirely with hand tools and assembled with brads and glue, is a good place to keep frequently used seasoning within easy reach. All members are  $\frac{3}{8}$ -in. birch, and were sanded with a fine grade of sandpaper before assembly and finished in natural grain. The knob on the drawer is simply a  $\frac{3}{8}$ -in. dowel tapered slightly and rounded on the end.

The drawer of the cabinet should be made slightly smaller than the dimensions given for proper clearance. A hole can be drilled in the back of the cabinet for hanging on a wall as shown in the photo, or it may be screwed to one end of a kitchen cabinet near the range.

Hi Sibley, Nuevo, Calif.



## Two Nuts and Washer Used To Tighten Studs

If you use a single nut when tightening a stud bolt you will undoubtedly run into trouble when the nut is backed off. The bolt is usually loosened also, and you're right back where you started. To successfully tighten a stud, use two nuts and a washer in between. Turn the bottom nut on with the flat side up. Tighten the stud by using the wrench on the top nut. You can loosen the nuts without disturbing the

stud by first turning down the bottom nut. This will release pressure on the upper one and allow them both to be removed easily.

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

☛ Texture paints are best for hiding plaster cracks or dry-wall seams, and are also good for covering patched or rough plaster as they are thicker in consistency and can be easily stippled to conceal defects.

WTM 58  
+  
SN 58



EARRING



LAPEL PINS



# SOLDERING CERAMICS

By Byron G. Wels

**S**OLDERING METAL to ceramics is a new technique that promises to eliminate completely the many problems resulting from the present method of attaching clips, pins and earpieces to ceramic jewelry with cement. Where jewelers' cement is difficult to control and often runs over the article, ruining its appearance, solder will run only where the heat is applied. Although clamps must be used to hold a metal fastener to a ceramic article while the cement sets, often marring the glaze, the weight of the soldering iron is sufficient to hold the fastener while it is soldered, and the metal cools in a matter of moments to provide a positive bond.

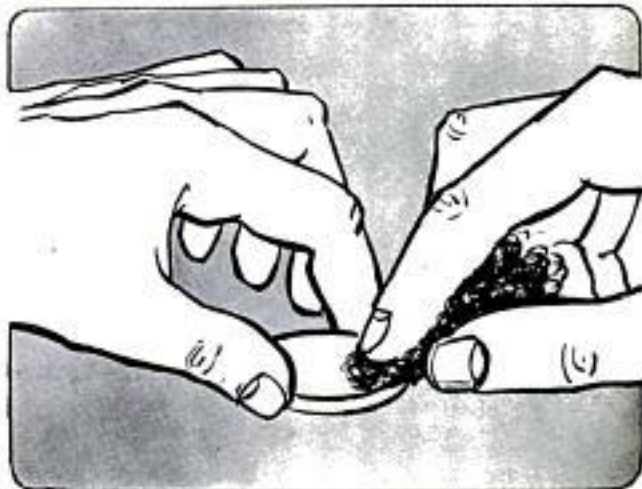
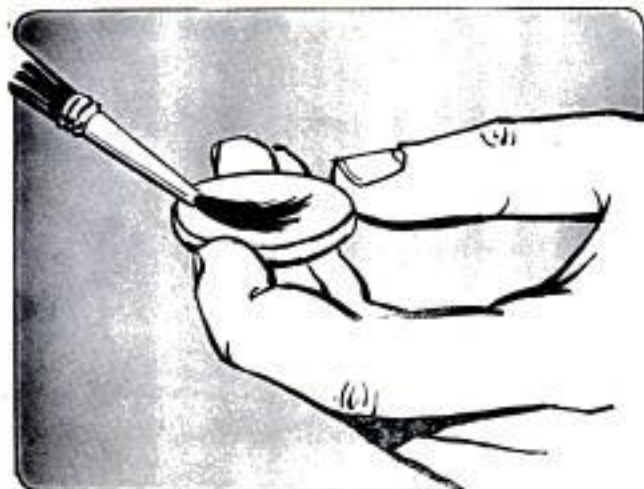
When making a piece of ceramic jewelry onto which a metal fastener is to be soldered, proceed in the usual manner. Pre-fire the article, then when cooled apply the glaze to the front but not the back of the article. Fire it to set the glaze, then allow

After the ceramic has been pre-fired, then glazed and fired again, paint silver on the unglazed back



it to cool and paint the unglazed back with a silver solution (DuPont Silver No. 4756). Be sure to shake the bottle of solution vigorously so that it is thoroughly mixed. Apply two coats of the silver, allowing the first to dry completely before applying the

Fire the silver-painted ceramic for 30 min. at 500 deg. C., then cool and buff shiny with steel wool

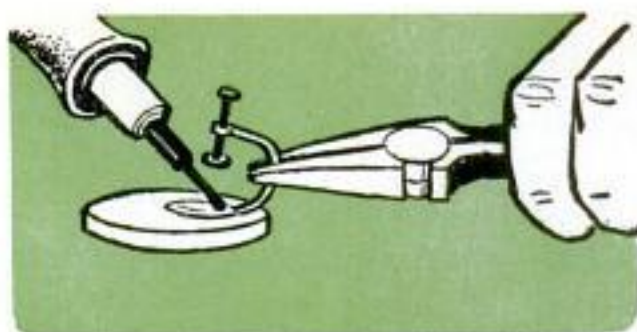




Tin both the silvered portion of the ceramic and the metal attachment with solder, using rosin flux

second. When dry, fire the ceramic in the kiln at a temperature of 500 deg. C. (1250 deg. F.) for 30 min. Remove the article from the kiln when it has cooled to room temperature. The silver now is mixed with the structure of the ceramic base and actually is fired into it.

Now buff the silver carefully with steel wool until it shines. Use rosin-type paste flux and tin the silver with solder. Do the

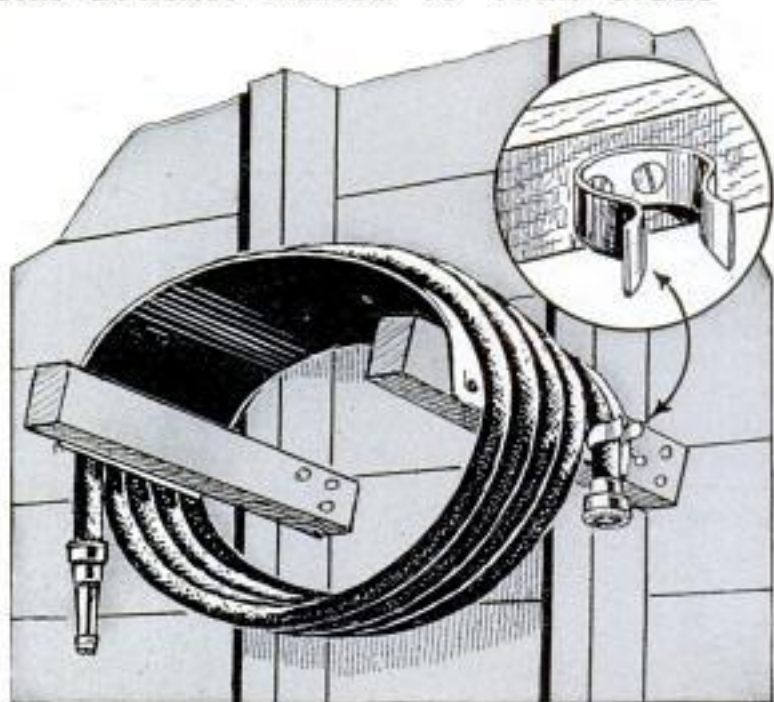


Hold the attachment on the ceramic with pliers, apply the iron and "sweat solder" them together

same with the metal fastener that is to be attached to the ceramic. With a pair of pointed-nose pliers, hold the fastener in place on the back of the ceramic item and "sweat solder" it in position. As soon as the solder has cooled enough to set, the job is done. When the assembly has cooled, wipe over the soldered joint with a piece of absorbent cotton dipped in alcohol to remove the excess flux. ★ ★ ★

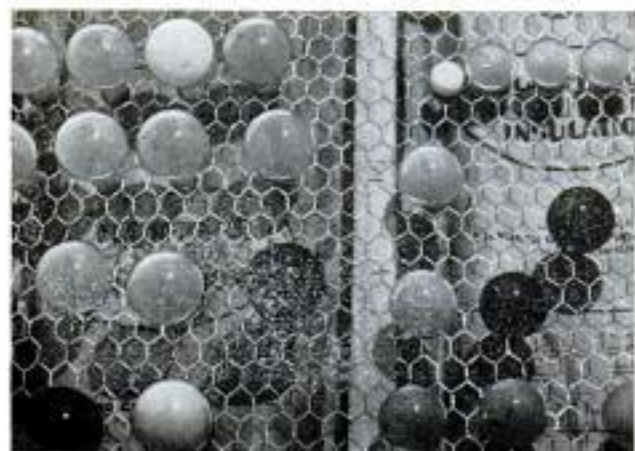
## Hose Stored on Semicircular Bracket Nailed to Wall Studs

Two short lengths of 2 x 2 or 2 x 4 nailed to wall studs in a garage provide a handy wall bracket for storing a garden hose. A piece of sheet metal curved and nailed to the two members as shown supports the hose properly in its natural coil. A broom clip attached to one of the pieces will hold either end of the hose while it is being wound around the supports.—Sam Fenn, Chicago.



## Safe Combination Hidden

An extra copy of the combination to the office safe may be hidden behind the label of a file drawer for emergency use. Location of the combination should be changed at regular intervals to the fronts of other file drawers.



## Neat Storage for Lamp Bulbs

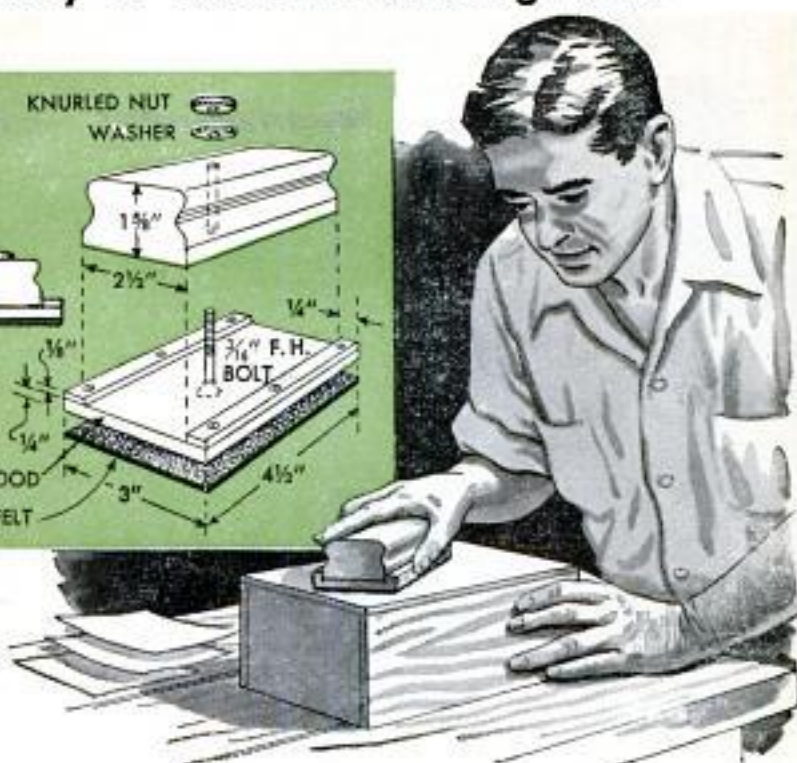
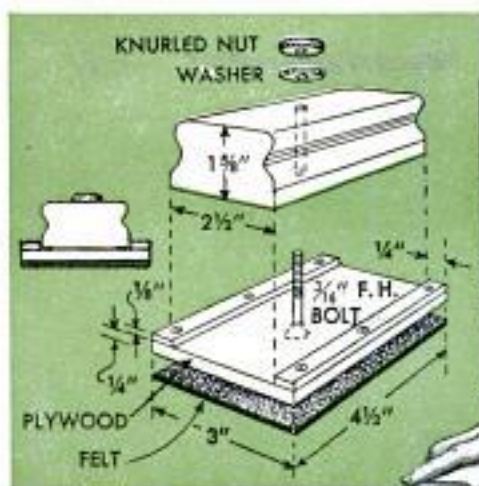
Running out of lamp bulbs of a particular size will no longer be a problem when they are stored in a piece of chicken-wire fencing nailed to the studs of a garage or basement entryway. The bases of standard light bulbs fit snugly in the openings of 1-in.-mesh wire.

Earl V. Wilhelm, Chillicothe, Ohio.

Ⓢ Carpeting tacked on the bottom step of the basement stairs will identify it as the last step even when it cannot be seen over an object being carried.

## Sandpaper Gripp'd Securely in Two-Piece Sanding Block

Made to take 4½ x 5-in. sheets of sandpaper, this sanding block is comfortable to use and permits rapid changing of the sandpaper. The sheets are wrapped around the lower block and sandwiched between it and the upper one. The top block is cut from 2-in. stock and fits between edge strips screwed to the lower block. A piece of felt is glued to the underside of the lower block to cushion the sandpaper. A flat-headed bolt running up through both blocks barely projects above the top one to allow for washer and knurled nut which hold the two blocks together.



## Cuts on Friction-Tape Roll Release Threads From Edge



When friction tape is pulled from a roll there often are two or three threads that stick to the edge and which must be removed after unwrapping several turns. To avoid

this, make four shallow knife cuts in each side of the roll as indicated. The cuts separate the threads into short lengths that readily pull off the roll with the tape.

Robert V. Thompson, Clinton, Iowa.

## Plug Helps Remove Pipe Nipple From Steam Radiator



When removing a corroded nipple from a steam radiator, drive a wooden plug into it before applying the wrench. If the plug is trimmed to fit snugly, there will be little danger of crushing the nipple. Also, the

plug may be hammered lightly to aid in loosening the nipple before a wrench pressure is applied.

## Direct-Bounce Flash Lighting

By adding an angled reflector under the flash unit on your camera you can have the benefit of simultaneous direct and bounce lighting. Cut from aluminum sheet insulation or light-grade reflective metal, the reflector is shaped around the lamp base and taped or soldered to the back of the regular reflector. Light which normally is cast down at the floor and lost is diverted upward by the additional reflector and the combined lighting helps to soften shadow effects.



## "Roll Up" Storage for Brushes Made From Bamboo Place Mat



Lightweight and easy to carry, a bamboo place mat provides an ideal method of carrying artists' paintbrushes. Two strips of narrow elastic stitched across the mat provide loops to hold the brushes and prevent them from rubbing against each other. When spread flat, the mat displays the brushes ready for quick selection. When rolled, for easier carrying, the mat prevents damage to the bristles, and air can pass through the slats to dry cleaned brushes.

Mrs. Michael Fey, New York City.

## Preventing Paint Accumulation In Heel of Brush

It is much simpler to prevent paint from accumulating in the bristles at the heel of a brush than it is to remove the paint after it has hardened. A simple preventive measure is occasionally to squirt solvent from an oil can directly into the bristles next to the ferrule while the brush is being used.

Ken Murray, Colon, Mich.



## Floating Short-Stemmed Flowers

To float a bouquet of short-stemmed flowers in a shallow bowl and hold them in neat arrangement use a disk of paraffin, such as is removed from a glass of jelly. Cut a hole in the disk and insert the stems in the hole. The paraffin will float sufficiently to support the flowers. Paraffin disks of various sizes may be molded by pouring the melted wax into a pan or saucer.

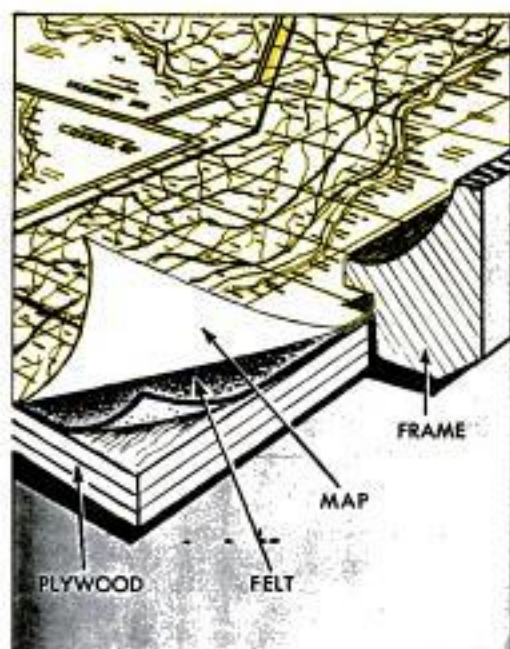


## Incinerator Built From Oil Drum Has Removable Grate



For an incinerator that is inexpensive and easy to build, use an oil drum. Make several slits or holes in the top of the drum, cut the top free and drop it on V-shaped tabs cut from the sides of the barrel. An opening is cut in the bottom and the barrel is placed on blocks as shown. This prevents excessive corrosion and provides for easy removal of ashes. The holes in the grate and the four openings left by the tabs provide ample draft. A piece of hardware cloth fastened to a wire frame will serve as a spark shield.—

S. S. Miner, Niles, Mich.



## HOW TO MOUNT A WALL MAP

A road map of your own state or a map of the United States or the world mounted on a sheet of plywood and hung in a convenient spot is a handy reference for planning week-end trips and vacations or following current events. Also, it is a colorful wall decoration for the living room or den. When mounting a map, be sure to cut the plywood large enough to accommodate a frame around the border. Lining felt, such as is used under linoleum-floor coverings, is glued to the plywood with linoleum paste to prevent the map from becoming wrinkled or cracked when there are extreme changes in humidity. Next, the map is pasted on the felt and any air pockets that appear are rolled out with a rolling pin. Any style trim can be used for a frame and finished as desired.—Hal Roth, Berkeley, Calif.



Below, frame is attached to mounted map with finishing nails. Heads of the nails are set below the surface and holes filled



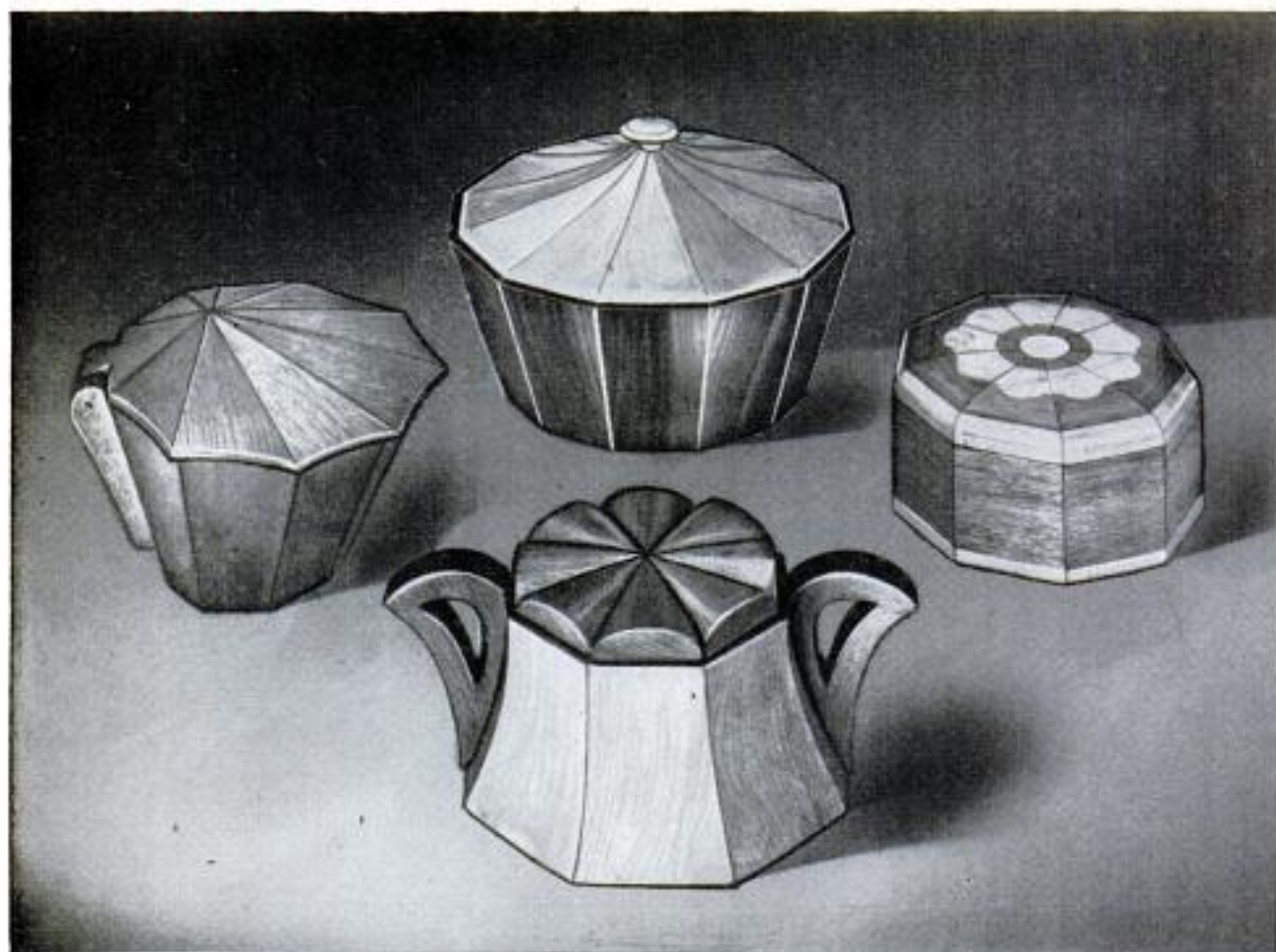
## Buzzing Heard When Playing Piano Caused by Vibrating Object

When a buzzing sound is heard while a piano is being played it often can be traced to an object somewhere in the room which tends to vibrate at a given frequency. To locate the offending object, first find the note which seems to cause the buzzing and then have someone strike the key while you try to locate the origin of the noise. It may be a lamp, vase or the glass in a picture frame. In one particular instance the

vibrating object was found to be a loose pane of glass in a leaded window hidden behind a heavy drapery. If the origin of the sound cannot be located, call a piano tuner.

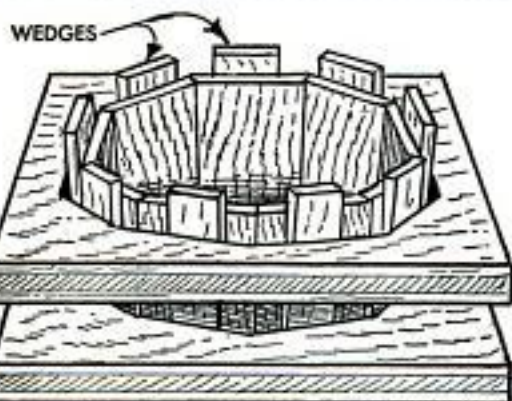
C. S. Onderdonk, Jr., Margate City, N. J.

Regular eyeglasses can be modified to protect eyes against snow blindness by fitting two strips of tape across each lens to provide a horizontal slot about  $\frac{1}{4}$  in. wide.

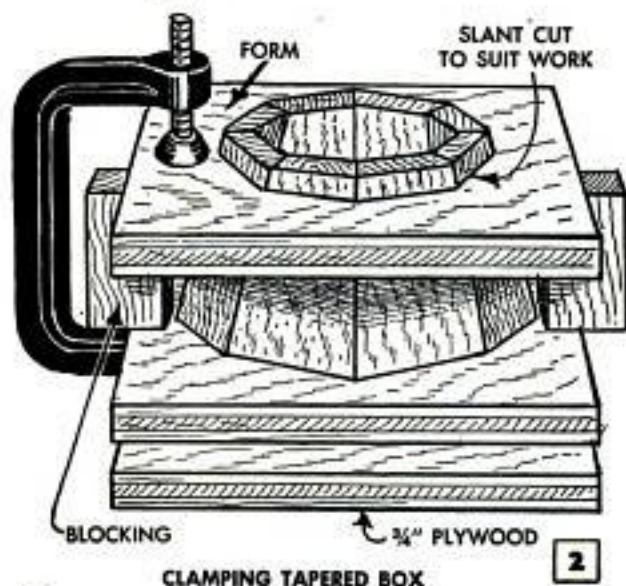


# STAVED

By Edwin M. Love



1 CLAMPING INLAID BOX



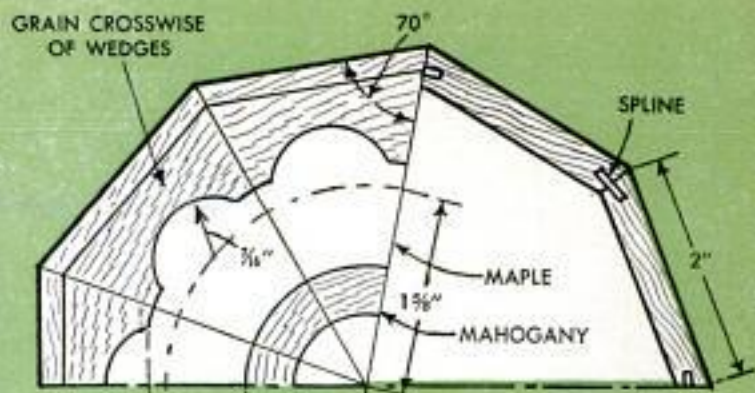
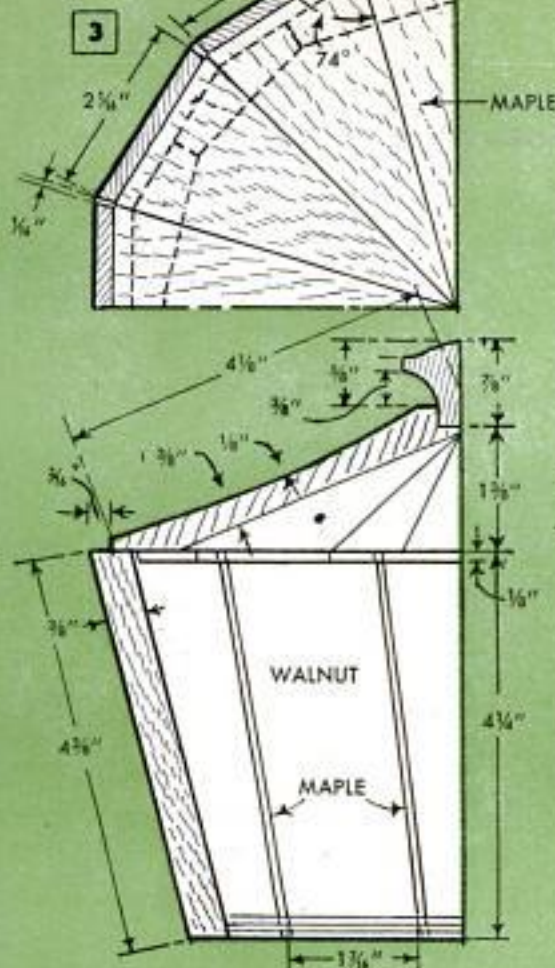
2 CLAMPING TAPERED BOX

**STAVED SIDES** and lids give ornamental boxes an individuality that can be attained by no other construction. The four boxes shown above are typical of staved work, with similar methods used in all. To cut the sides of tapered boxes, swivel the miter gauge and tilt the blade the degrees indicated in the drawings. Clamp the pieces dry to check the joints and, if splines are used, run the grooves afterward. A band clamp is excellent for the box with vertical sides, but if not available, use form clamps made by sawing openings in  $\frac{3}{4}$ -in. plywood. Slip them over the assembled staves and drive in wedges as shown in Fig. 1.

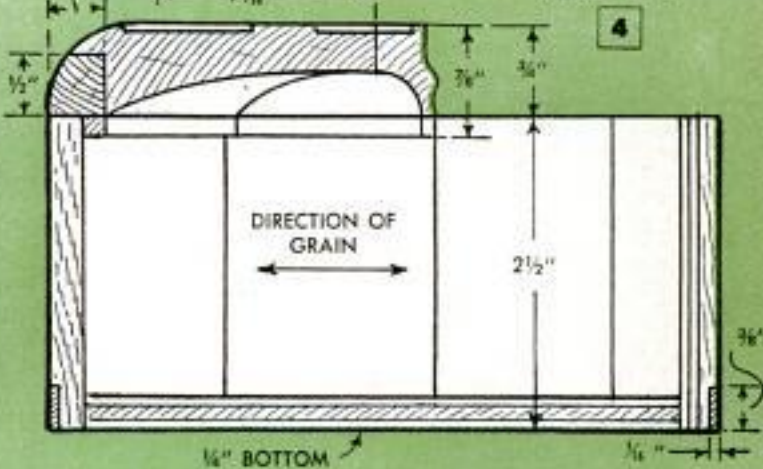
Two sizes of forms are forced down over tapered boxes and clamped to the base board as shown in Fig. 2. The inlays of the 12-sided box, Fig. 3, are  $\frac{1}{16}$ -in. strips of maple inserted in the joints. Apply glue freely to joining surfaces and press lightly together, going around the box in rotation. By the time the clamps are arranged, the glue has soaked in enough and become tacky. Pressure forces out the excess,



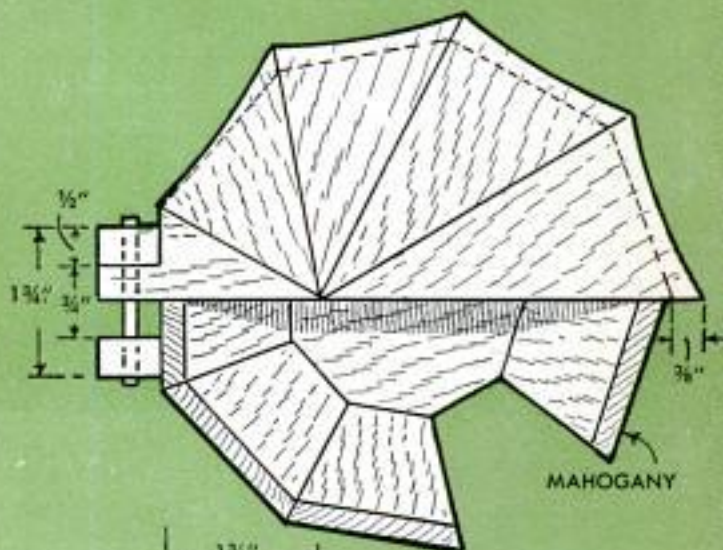
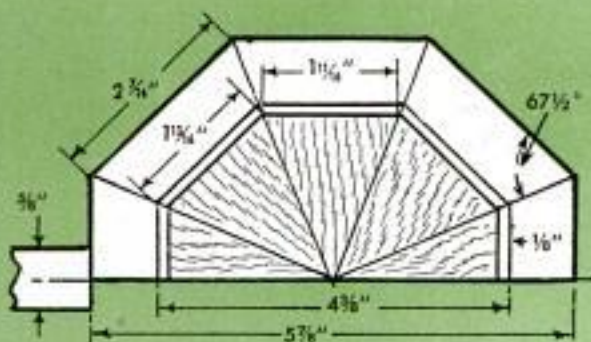
**TWELVE-SIDED BOX**



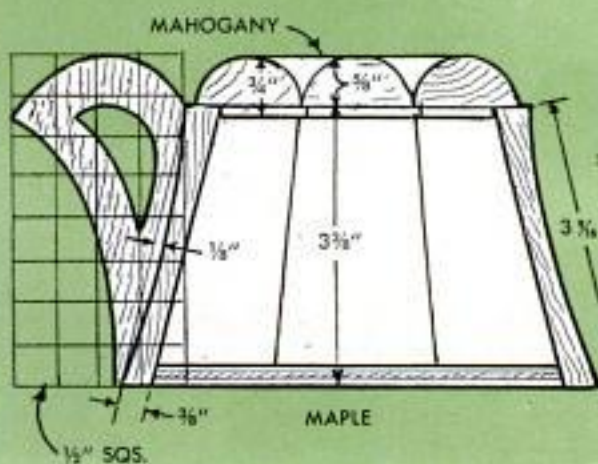
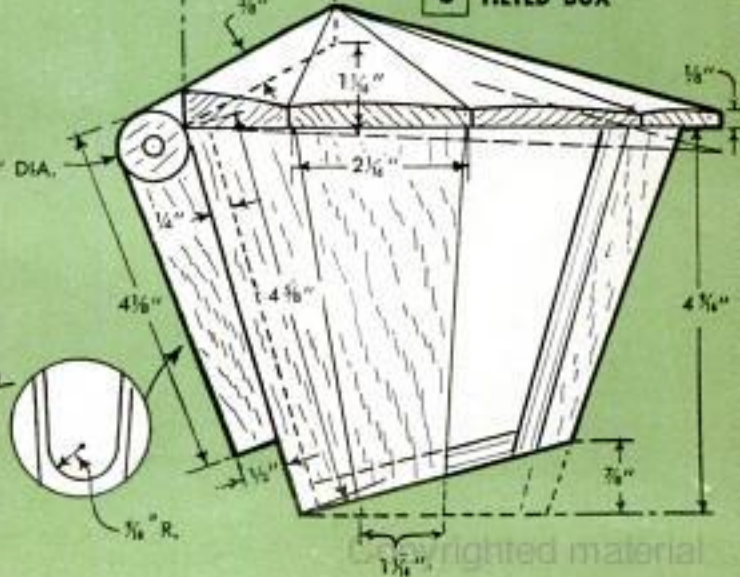
**INLAID BOX**



# BOXES



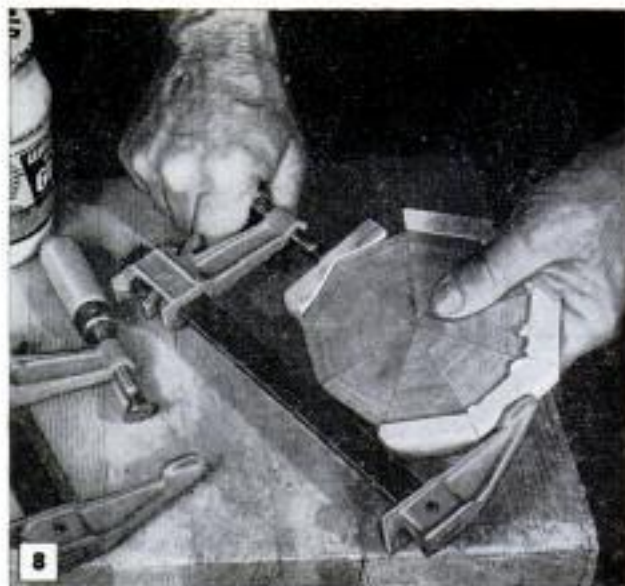
**6 TILTED BOX**



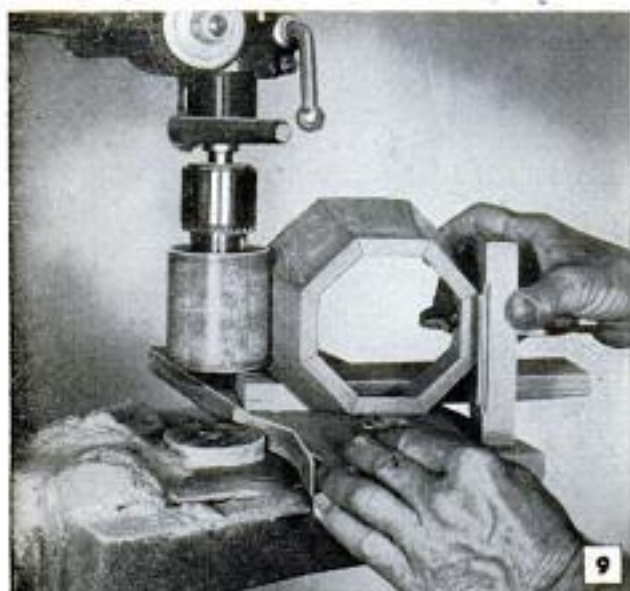
**5 BOX WITH HANDLES**



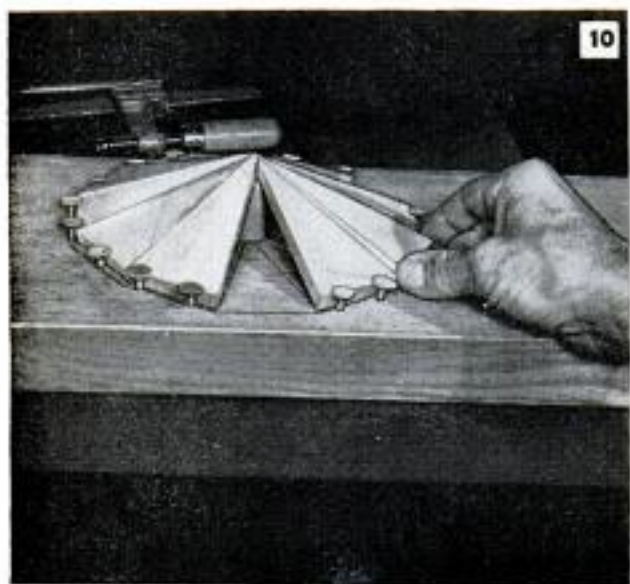
7 Sanding disk chucked in drill press is used to sand uneven ends of staves. Lock quill for final sanding



8 Saddle blocks of scrap wood seat the clamp jaws when gluing inlay blocks to the edges of pyramidal lid



9 Above, special fixture holds box for scalloping faces of staves. Note disk attached to drill-press table against which fixture rides. Below, pyramidal lid is assembled over full-size pattern drawn on board



10 When dishing sections of pyramidal lid, each stave must be held on a level axis to assure uniformity



fingers. Fit the remaining wedges, glue and clamp. Smooth both sides of the lid on a sander, rabbet for the edge blocks and glue on the edge blocks, using a notched block to shield the corners and seat the clamp jaw as in Fig. 8. Assemble the lid for the handled box, Fig. 5, in the same way after roughing out the tops with a sanding disk.

Cut the wedges for a pyramidal lid with the saw blade tilted according to the drawing, Fig. 3. To assemble, lay out the plan on a board, nail in a center post made of  $\frac{3}{4}$ -in. dowel chamfered at the top, and locate every other wedge as in Fig. 10. Glue the tips and hold the bases with large-headed nails. Glue in the remaining wedges, allowing the points to rise slightly above the first. Apply pressure with a hollowed block laid on top and held with a clamp. A similar method works for the off-center lid of the tilted box, Fig. 6. A base block traced from the top of the finished box allows projection of the lid overhang. Glue the wide ends of the wedges to the base. As the edge angles of the wedges are variable, they can be determined by holding the first wedges in position, marking the edges by comparison with the layout.

Side and lid staves are hollowed by use of simple jigs in combination with a sanding drum. Center a plywood disk of the same diameter beneath the drum, holding it with a bolt through the drill-press table, Fig. 11. If necessary, face the disk with a strip or two of cardboard to get correct sanding depth, see Fig. 9. When a sanded side comes around to the upright it must be shimmed out to make up for material sanded away. For this reason it is best to rough out the box and then go over it again with a finishing cut.

A lid is clamped against the upright of the jig with the wedge to be sanded in a horizontal position, Fig. 11. After sanding, any slight offset of the corners with the joints is corrected by hand with a scraper and sandpaper. Jigsaw the three inlays for the inlay box, Fig. 4, with edges slightly undercut, and file smooth. Trace around them on the lid, chisel the mortises close to the lines and take an impression by clamping the inlays in place. Remove, and trim the mortises accordingly.

Lids that are not rabbeted have ledges built up with small pieces glued in place. Try the lids in place, rotating them to find the best fit, and glue a small boss inside the box, notching the ledge to clear it. This will position the lid correctly each time.

One leaf of the hinged lid, Fig. 6, is solid with its wedge. Make the other leaf and glue it to the longest box stave. To scallop the edges, hold the lid firmly against the box and dress the edges on a drum. ★ ★ ★

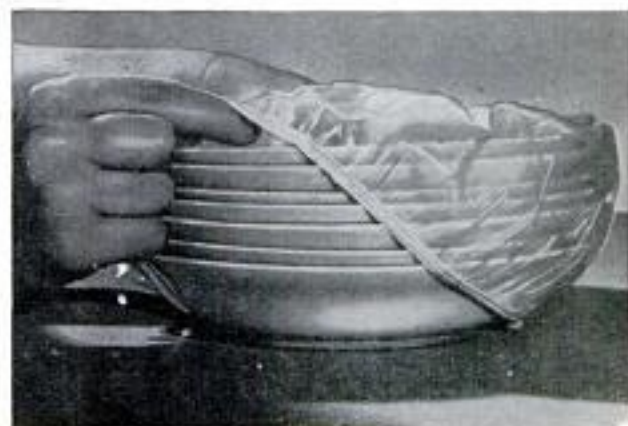


### Crossbars on Stepladders Support Scaffold Plank

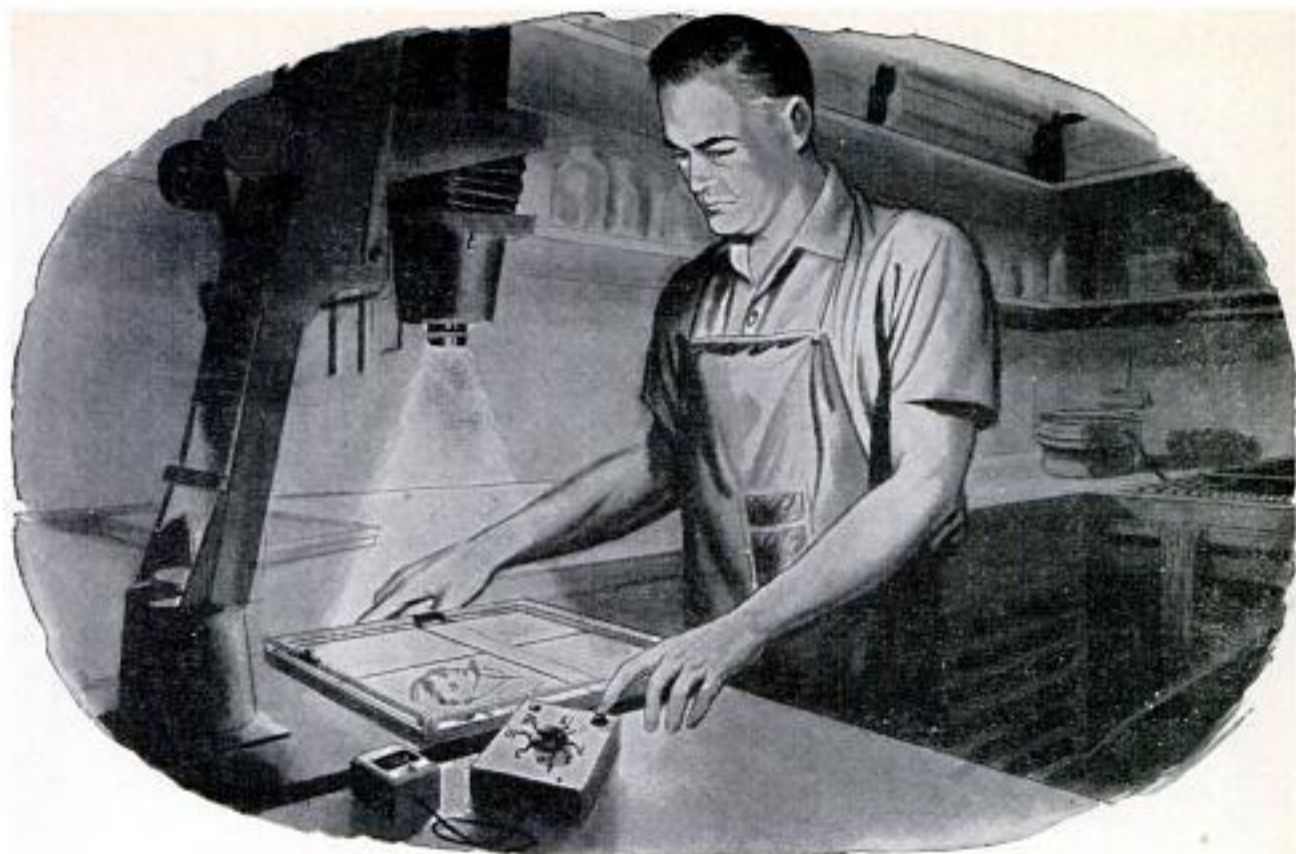
A pipe crossbar on each ladder will assure steadier and safer footing when a pair of stepladders is used to support a scaffold plank for painting and other similar jobs. The crossbars eliminate the chance of breaking a ladder step, and at the same time strengthen the ladders. Each crossbar is a length of pipe with floor flanges on each end that are screwed to the inside surfaces of the ladder rails as shown. If several working heights are normally used, more than one crossbar may be installed on each ladder.

### Bowl Cover Keeps Plates Clean

Plastic bowl covers slipped over seldom used, stacked plates will keep them dust-free for immediate use when company drops in. No longer do you have to rinse off plates to avoid embarrassment. It's a fine idea for everyday use as well if plates must be kept on open shelves.





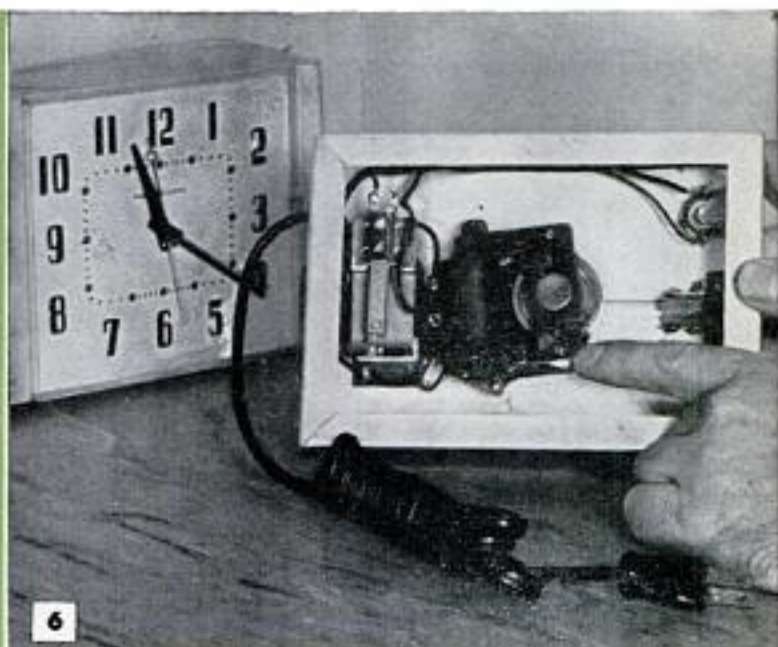
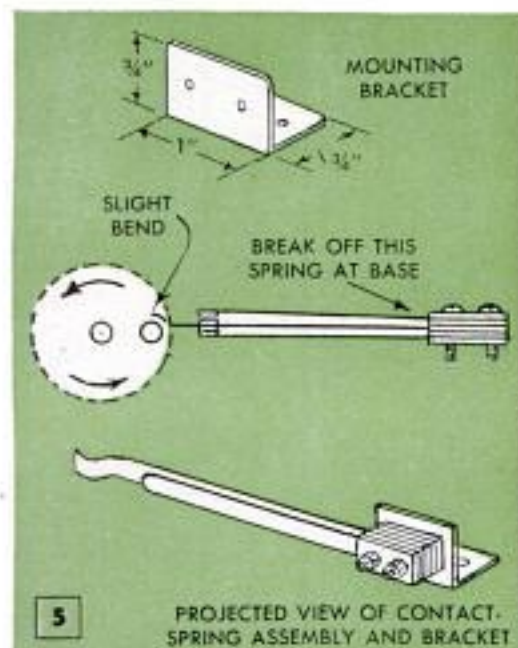


When installing the contact-spring assembly, Fig. 5, mount it on the chassis so that the longer contact spring does not extend beyond the center of the cam pin. After wiring the timer as shown in Fig. 2, it is ready to calibrate.

#### Calibrating the Timer

To calibrate the timer, plug an electric clock into the timed outlet of the timer and note the interval involved at the various positions you select by turning the knob. Mark and number these positions on the chassis as shown in Fig. 1. Cam con-

tacts are open when the pointer is at zero. When the cam is rotated (for selection of a time interval) the contacts close, preparing the circuit for operation. Depressing the push button activates the relay which then "locks" through its own contacts and the cam-spring contacts. When the motor returns the cam to normal position and reopens the cam springs, the time interval ends and the unit is ready to start a new cycle. After calibrating the timer, recheck all the wiring, making sure that there are no bare wires in contact with the chassis.



## Concrete-Filled Tires Anchor Volley-Ball-Net Uprights



Pipe uprights for a volley-ball or badminton net that are anchored in concrete-filled tires as shown are easy to move to a new location to prevent damage to the lawn by constant playing in one area. When casting an anchor of this type, center the post in the tire and hold it vertical with three guy wires staked 120 deg. apart. Leave the wires in place until the concrete hardens. Holes for fastening the net should be drilled in the pipes before anchoring them in the concrete-filled tires.

Mrs. Dale Pease, Ft. Wayne, Ind.

## Masking Tape Used as Handle When Fitting Cabinet Door

A strip of masking tape attached to a cabinet door that is being flush mounted serves as a convenient handle for opening the door as often as necessary until the hardware is installed properly. One end of the tape is stuck to the inside face of the door and brought around to the front where it can be grasped to pull the door open. Having to pry the door open with a knife is apt to mar the wood.

G. E. Hendrickson, Argyle, Wis.

## Dry Ice Aids Tile Removal

When plastic tile must be removed to gain access to pipes or wiring, try wrapping a flat piece of dry ice that is large enough to cover one tile in a cloth and hold it against the tile to be removed. In a few seconds contraction of the plastic will cause the tile to pop off the wall without breaking. This method of removing small areas of tile usually will work in all cases except newly installed tile.

Stuart Knepp, Columbus, Ohio.

## Handle of Discarded Toothbrush Is Ideal Tab for House Keys

The handle of a discarded toothbrush can be made into a tab for house keys. An additional hole is drilled so that it can be hung on a nail and the color distinguishes various keys.



## Hand Liquid Dispensers Made From Lighter-Fluid Cans



Lighter-fluid cans with plastic self-sealing spouts can be used as handy dispensers for small quantities of liquids. Filled with water, one of the cans becomes a leakproof car-window washer. Enlarging the hole in the spout will permit the can to be used for dispensing thick liquids. If a cap is slightly damaged when pried off a can, drop a little plastic cement inside its sealing ring before replacing it. —Richard S. Downie, Falls Church, Va.



### Storage Space Utilized Over Dropped Ceiling

Wasted space over a ceiling dropped during remodeling was converted by one homeowner into a much needed storage enclosure for suitcases and little-used boxes of material as shown in the illustration above. Working from inside the closet, which was added when the ceiling was dropped, the false joists were covered with hardboard, and sliding doors, also hardboard, were installed at the point of entry.

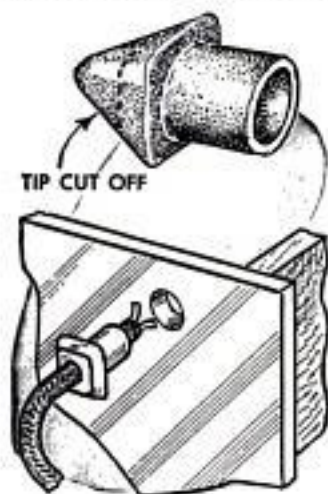
Presence of a closet is essential for access to the dead space. When a ceiling is lowered in a room that has a closet, it is only necessary to remove the part of the wall separating the dead space from the inside of the closet before installing hardboard flooring and sliding doors. The interior of the enclosure is painted white to assure adequate illumination.

Courtesy Masonite Corp.

### Work Shield for Driving Screws

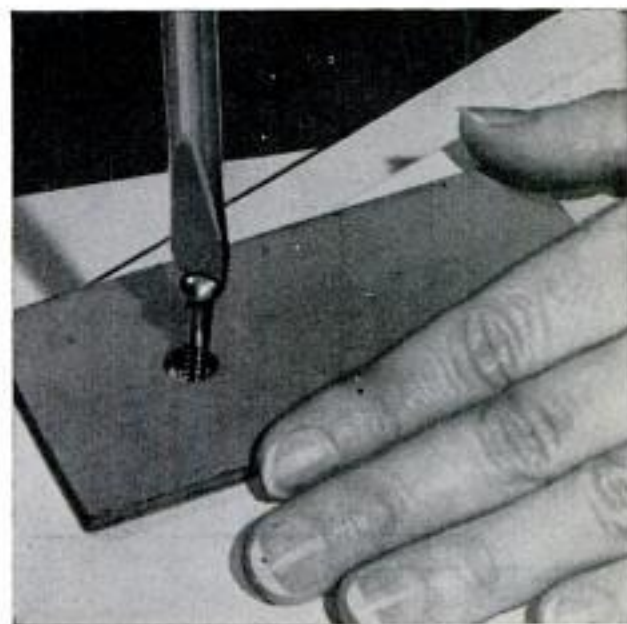
Nicks and gouges in a finished surface, caused by a screwdriver slipping off a screwhead, can be prevented by using a hardboard shield. Drill a hole slightly larger than the screwhead in a scrap of hardboard and drop the shield over the screw being turned.

### Grommets From Pencil Erasers

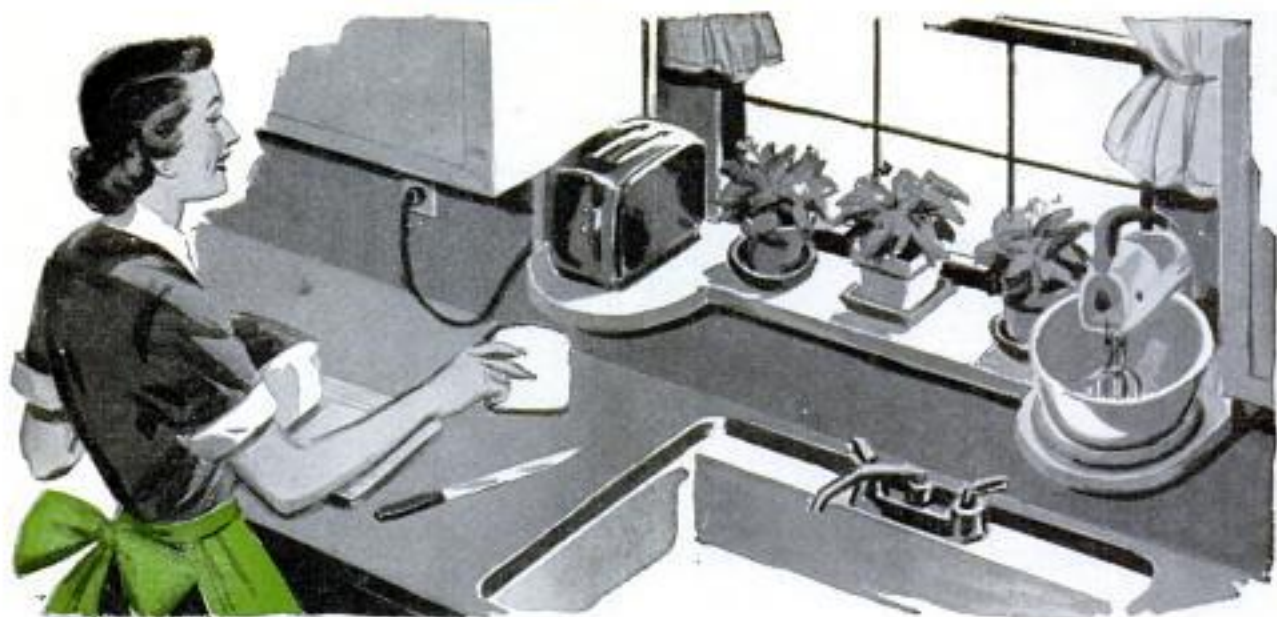


Rubber grommets can be made from slip-on pencil erasers. Simply cut off the point as shown and extend the hole on through the eraser. Stiff bare wire wound on the opposite end when grommets have been installed will hold them in place under any normal conditions.

One finger cut from an old glove and pinned to the inside of a purse serves as a convenient holder for an inhaler tube.



# SOLVING Home Problems



**THIS WINDOW SHELF** solves three kitchen problems—provides parking space for toaster, food mixer and potted plants. Cut shelf from  $\frac{3}{4}$ -in. plywood and surface with colorful Marlite and contact adhesive



**EVER THINK OF USING** a gum eraser to clean piano keys? It does the trick neatly, takes off finger marks and other surface stains without danger of dulling or otherwise damaging the surface of the keys

**IF THAT RECIPE** turned out badly, it may be that you misread the amount of some ingredient on the measuring-cup scale. Next time stick a length of tape around the cup at the required level and you'll be sure

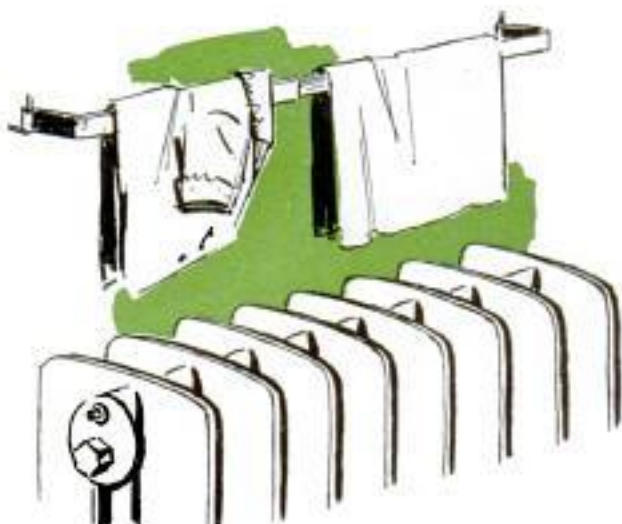


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**SAVE TWO PLASTIC BASKETS** in which small fruits and berries are sold and you can make an ideal container for a ball of twine or wool yarn. Lace edges of baskets together to form a hinge. Tie with cord

**THOROUGHLY WET MITTENS,** stockings and other child's garments can result from a snowball fight or building a snow man. Dry quickly on a curtain rod supported on L-hooks driven into wall above radiator



POPULAR MECHANICS

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**A STUBBORN SASH** will yield to this lifter. Tap the block lightly to loosen one side, then shift slanting upright. Repeat procedure on opposite corner of sash



**IF THE JOB OF CLEANING** a pastry board is something you don't like to think about, try using a plastic windshield scraper. It turns the trick in half the time and with less exertion than is required by other methods. Scraper won't scuff board or raise grain

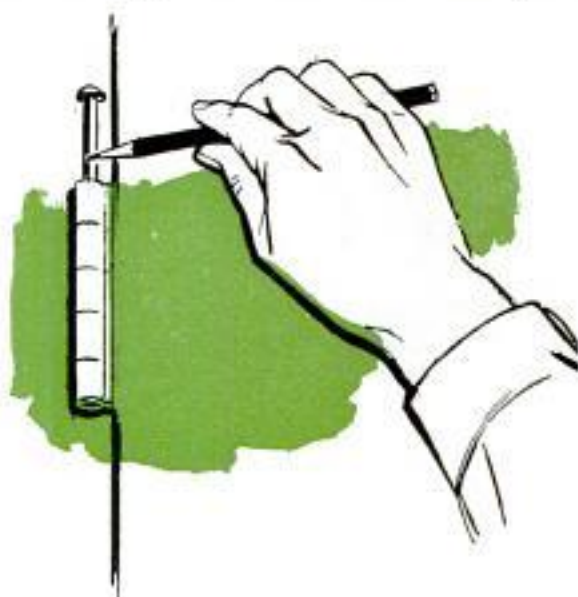


**SMALL-FRY TAMPERERS** can't turn on the water if you lock the sill cock in the manner pictured. The padlock and an S-hook (or a flat chain link) are all you need

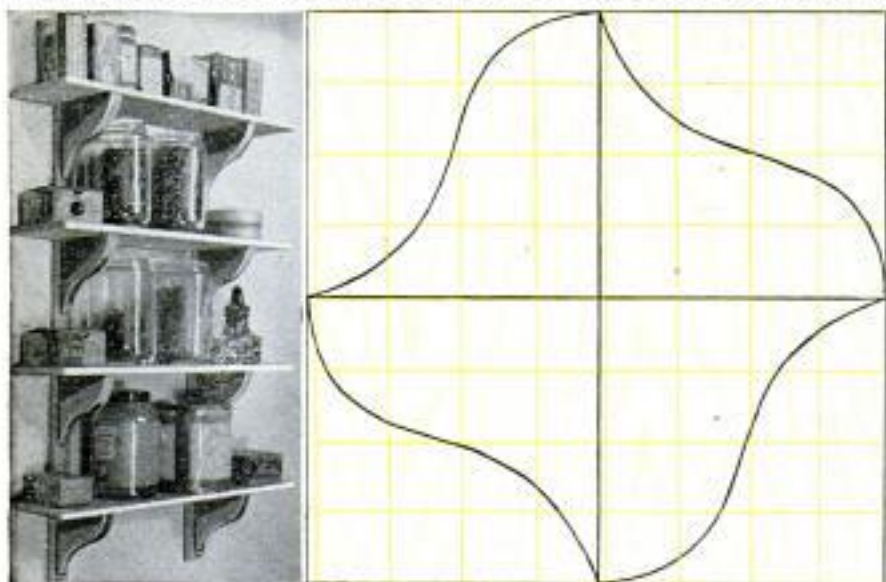
**KEEP THAT ROLL** of wallpaper, below left, under control at all times by placing it in a short section of steel Venetian-blind slat tacked to the bench top

**CELLULOSE TAPE** pressed onto your finger, below right, will aid in removing a stubborn finger ring. In some instances two pieces of tape may be required

**THAT ANNOYING SQUEAK** in interior door hinges can be silenced for a long time simply by lifting pin and rubbing its surface with a soft lead pencil

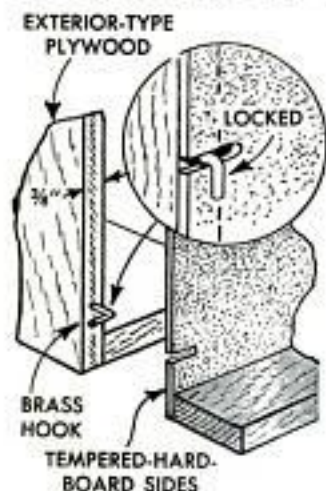


## Wooden Shelf Brackets Cut Without Wasted Stock



Any even number of wooden shelf brackets can be cut with absolutely no wasted stock if the pattern shown in the squared diagram at left is used. Both height and width of the brackets are the same, since a square piece of stock must be used. When solid stock is used, direction of grain must be watched. Plywood, either  $\frac{3}{8}$  or  $\frac{1}{2}$  in., is best, since the grain problem is eliminated. Bertram Brownold, Cedarhurst, N. Y.

## L-Hooks Permit Quick Removal Of Martin-House Sides



You will find that all the nests of a colony martin house can be made quickly accessible for cleaning if the sides are attached with L-hooks, one near each corner. Short saw cuts in the sides line up with the hooks, which are driven into the ends of the house. When the heads of the L-hooks are parallel to the cuts, a side comes off easily, but is locked in place when the heads of the hooks are turned at right angles.

When the heads of the L-hooks are parallel to the cuts, a side comes off easily, but is locked in place when the heads of the hooks are turned at right angles.

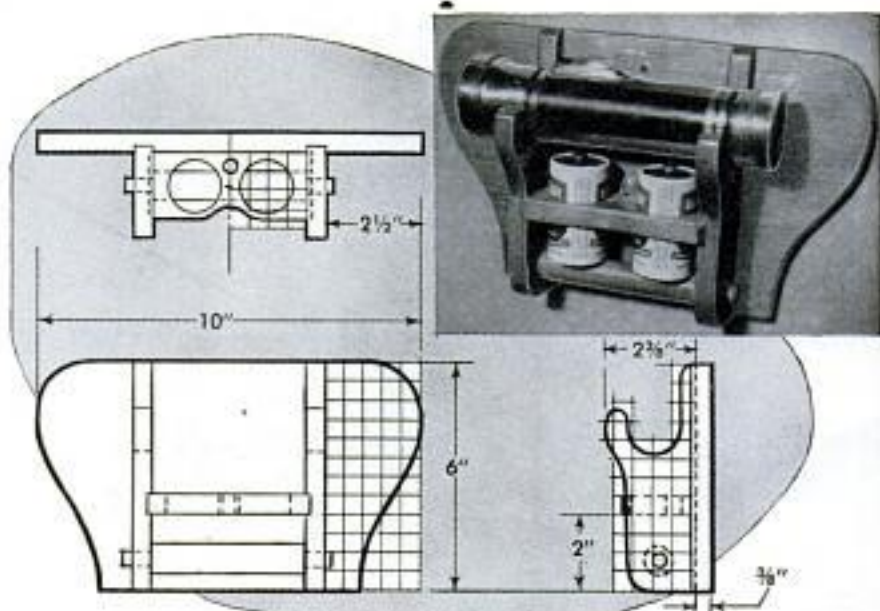
## Quick Refinish for Furniture

Checked and scratched varnish finishes can be smoothed quickly and easily by applying what is known to professional refinishers as an amalgamate. Commercial amalgamates are available, but ordinary alcohol can be used. First clean the surfaces thoroughly with turpentine and allow to dry. Then apply the amalgamate, or the alcohol, wiping it on with a piece of cheesecloth. When the surface is dry rub lightly with a wool pad dusted with fine pumice. After rubbing, wash the surface with clean, soft water to remove all traces of pumice and finish with a coat of flat or semiflat varnish. Finally, rub down with fine steel wool to obtain a smooth finish. Dust carefully with a soft cloth, then apply wax.

To give longer life to perforated folio sheets, reinforce the holes by using staples at opposite sides of each hole.

## Flashlight Rack Holds Spare Cells

Your household flashlight will always be within easy reach, and a spare bulb and dry cells will be with it, when this rack is attached to the wall at a handy location. Use  $\frac{3}{8}$ -in. stock and lay out the back and brackets on  $\frac{1}{2}$ -in. squares. Bracket spacing and length of shelf and dowel are determined by the flashlight. Ends of the  $\frac{3}{4}$ -in. dowel are reduced to  $\frac{3}{8}$  in.—John M. Avery, Dexter, N. Y.



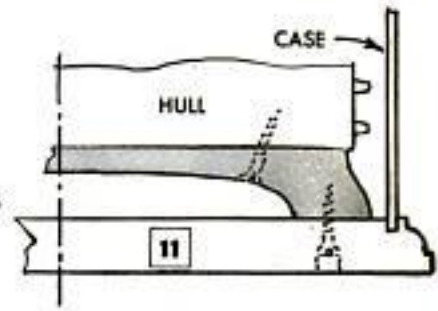
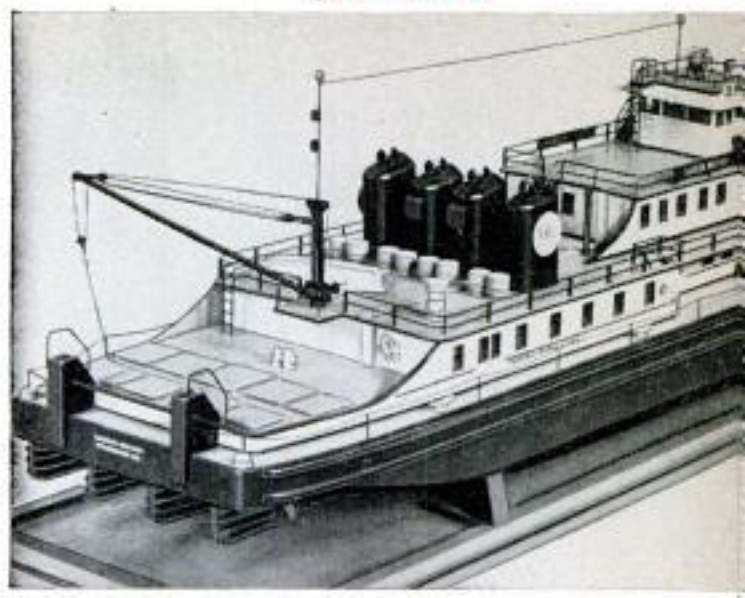
WTM 58

# MODELING THE LACHLAN MACLEAY

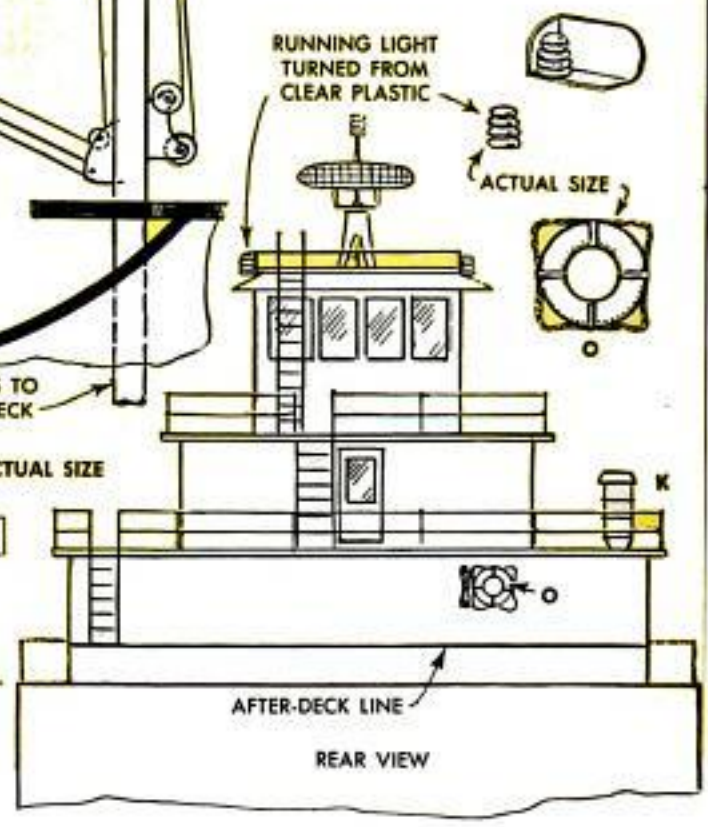
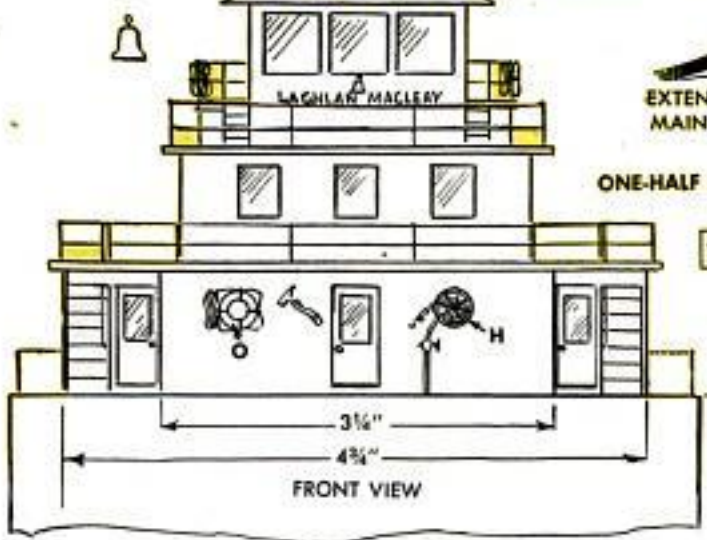
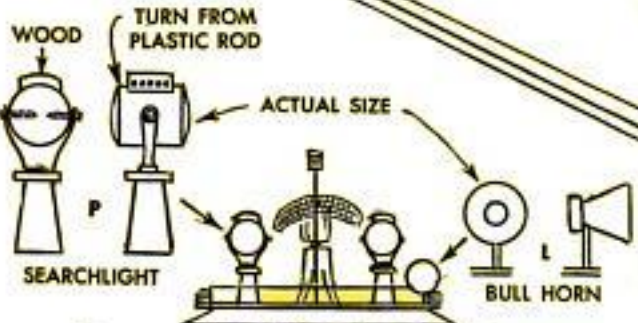
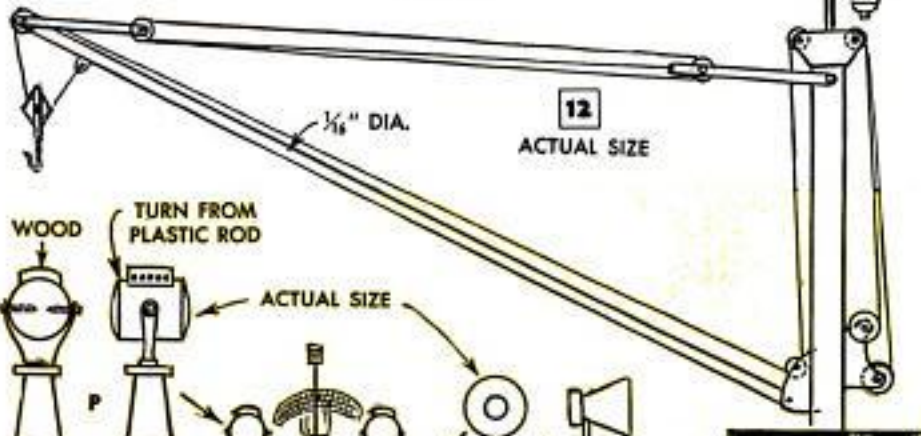
By Louis Martin Reitz

## PART II—Superstructure

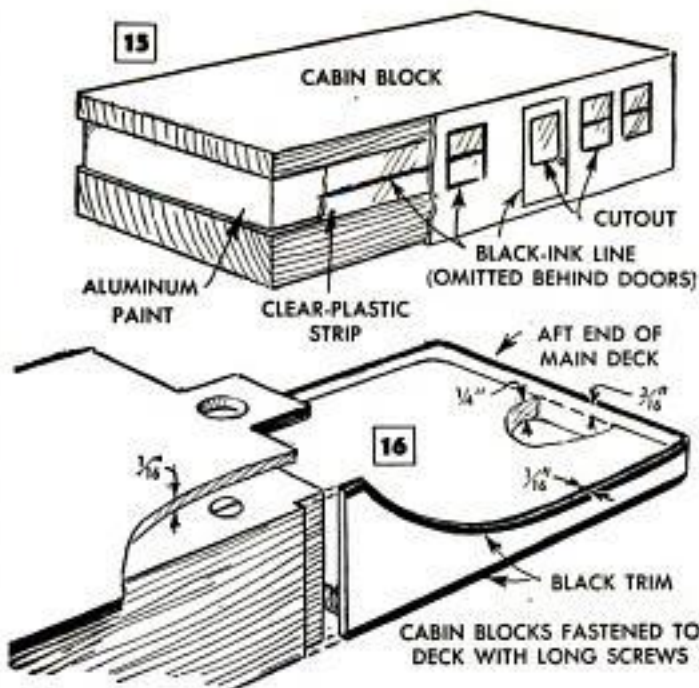
WITH THE HULL completed to the point described last month, you are ready to add the superstructure to your 18-in. model of the towboat *Lachlan Macleay*. First of all, take the time to make a stand to support the hull and protect the props and rudders at the stern. This can be a temporary stand at this time or the finished one, and may consist of two cradle-like pieces, as shown in Fig. 11, or two spool-shaped brass turnings. In either case, they are screwed to the flat portion of the hull and to a baseboard of walnut, molded around the edge and given a rich hand-rubbed finish. If later you wish to make a protective display case for your model, a groove can be run around the baseboard edges to receive a glass or plastic case.



Front and rear patterns of deckhouses given below are half size. Profile view, also half size, is given on the following page. This means all sizes must be doubled







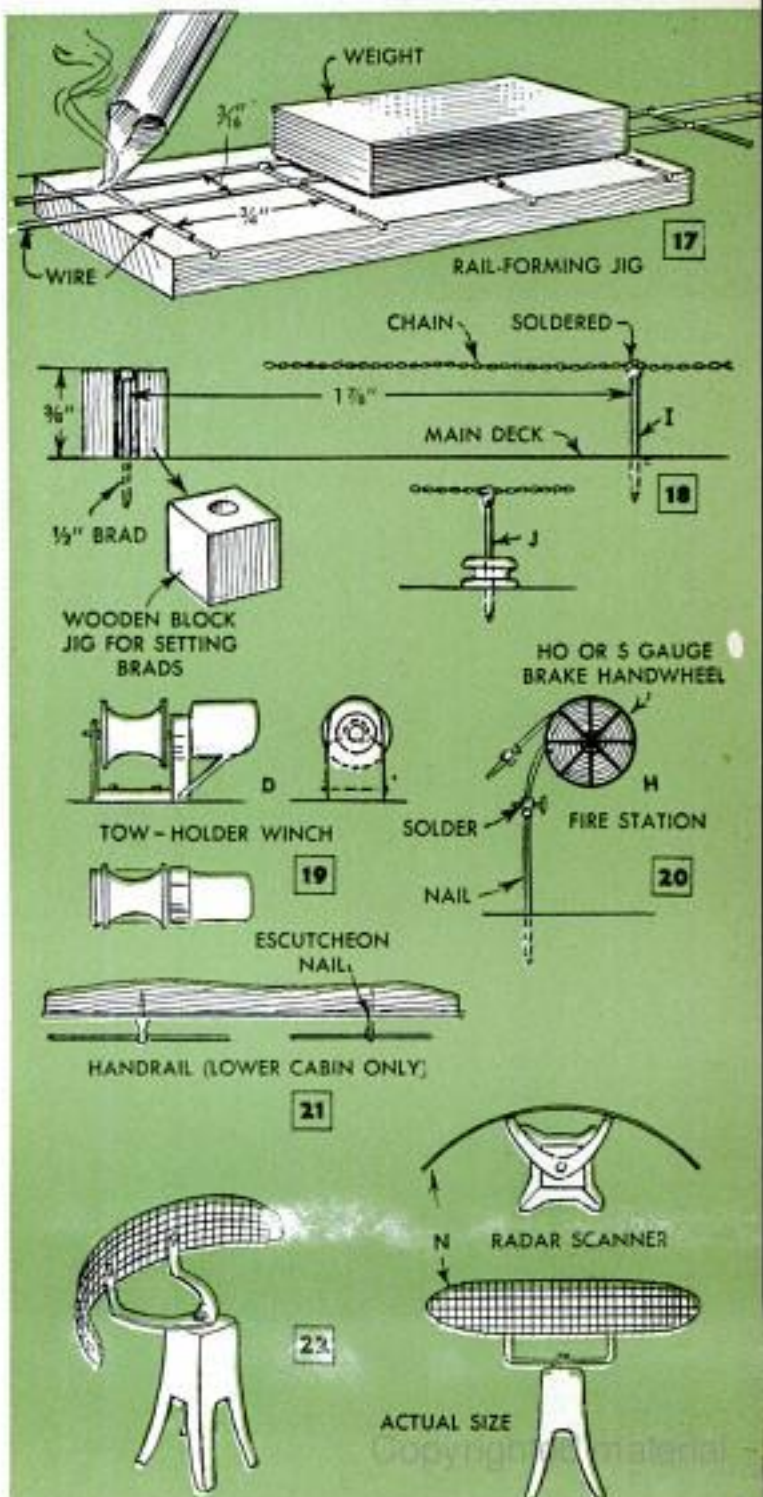
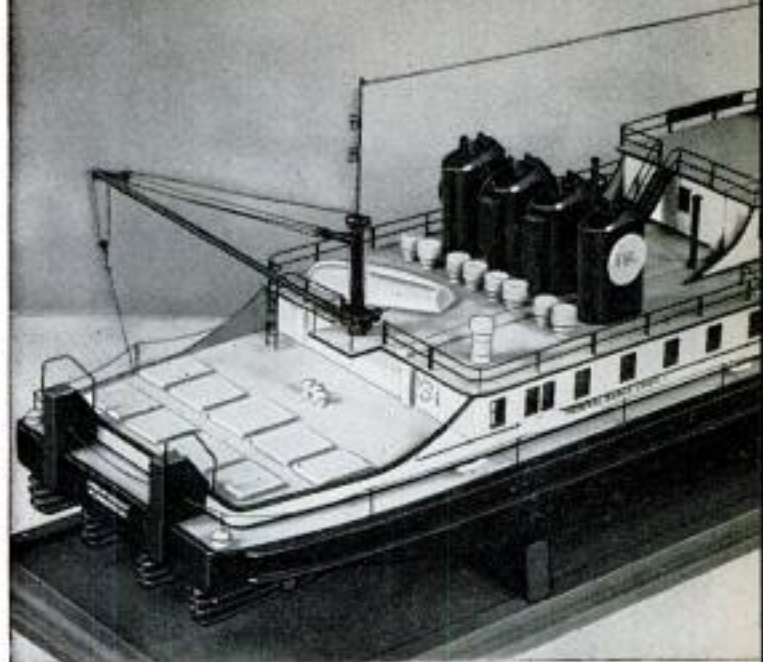
### The Deckhouses

On a model of this size, it is best to make the deckhouses of solid blocks. Figs. 13 and 14 show these houses one half actual size, which means you will have to double their sizes in laying them out on your wood. For the most part, the houses are merely rectangular blocks of wood. Perhaps the neatest way of simulating the various doors and windows on the houses is to cut shallow recesses in the edges completely around the blocks to receive a strip of clear plastic as detailed in Fig. 15. The recesses are first painted aluminum and then a black ink line is ruled in the center of the recesses to represent the sash. The ink lines are stopped where they cross door openings. After the plastic strips are pressed in place, the windows and doors of each particular deckhouse are laid out on a strip of thin cardboard and the window openings are cut out neatly with a razor blade. Cut out just the "glass" portion, and then outline window frames with black drawing ink. The doors can be treated the same way or glued on separately.

A baseboard is inked  $\frac{3}{32}$  in. wide all around each deckhouse. Actually, all this should be done after the cardboard is glued to the houses and painted jonquil yellow. Notice in Fig. 16 how the curved aprons aft of the deckhouses fit flush in shallow rabbets at the corners. The deckhouses are fastened to the hull with long wood screws, which are later covered by the decks. It will help a lot in attaching the railings if the decks are of metal, as the railing stanchions can then be spot-soldered to them.

### Making the Railing

Fig. 17 details a simple jig for forming the deck railing. It consists of a hardwood block grooved across the face. These grooves position  $\frac{1}{2}$ -in. brads which are

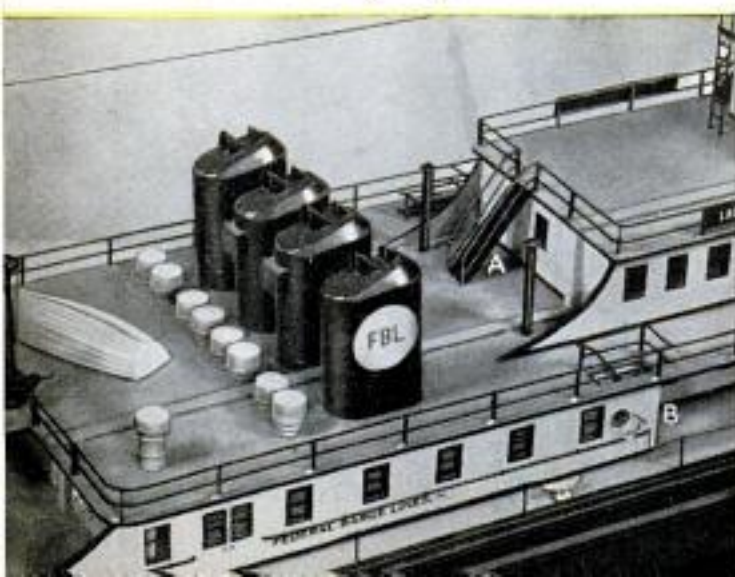
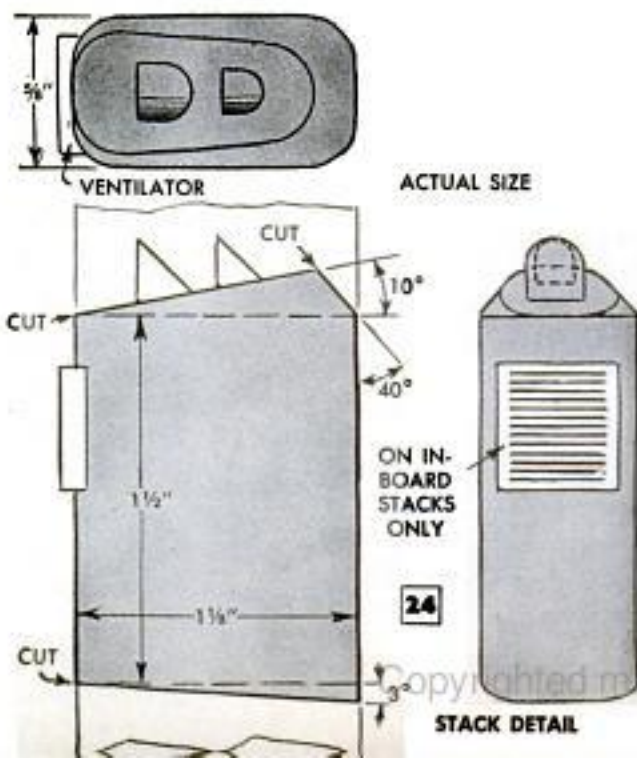
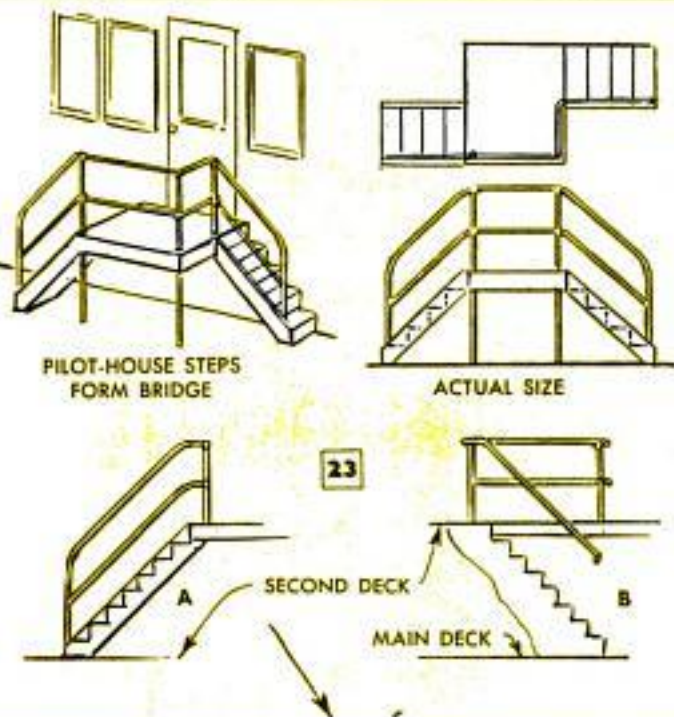




placed in them to provide stanchions for the two-strand wire railing which is spot-soldered to the brads  $\frac{3}{16}$  in. apart. A weight holds the wires in place as they are soldered. Use a tiny soldering iron for this and avoid over-soldering. It is best to add the railings to decks before fastening them to the deckhouses. Before the railing is applied to the second deck, sometimes called the boiler deck, the two openings should be cut for stairways. These are located on both port and starboard. See deck view, Fig. 14. Add the handrails on the lower cabin, Fig. 21; also the vent and filler pipes for the fuel-oil bunkers and the fire-hose assemblies, Fig. 20. The latter fittings can be simulated with fishline dipped in cement, coiled and then painted gold. There are three of these fire stations, one on the forward bulkhead and one on each side aft. In mounting the railings, leave enough stock to join onto the stairs, or ladders, on the upper deck and the ladder aft on the second deck. The ladders can be purchased ready-made. You will need five of them, two being placed on the main deck, one leading from the second deck to the upper deck and one on each side to the pilothouse. One ladder can be cut in half to make the two on each side of the bridge, Fig. 23.

#### Adding Rest of Fittings

Most of the fittings required can be purchased, although you may have to make some from bits of wood and plastic. All fittings are keyed with the deck plan, Fig. 14, to show where they all go on the model. Fig. 18 shows how to set the stanchions for the chain railing that skirts the main deck. These are  $\frac{1}{2}$ -in. brads spaced  $1\frac{1}{8}$  in. apart and driven to project  $\frac{3}{8}$  in. above the deck. A small block of wood with a hole through it and slipped over the brads when driving



them will assure all being the same height. Oxidized model chain having 32 links to the inch is soldered to the head of each brad. As you will see, the chain railing begins at the forward knees and continues aft to corner stanchions which are mounted on buttons, or roller chocks. From here the chain goes through holes in the aft knees.

The stacks, which actually are shrouds for the exhaust pipes and mufflers, are detailed in Fig. 24. Four are required, all being the same size and shape and differing only in the placement of the fan ventilators. The outboard stacks have the vents mounted on the outer faces, under the FBL lettering, while the vents on the inboard stacks are placed on the aft sides. The detail shows the stacks actual size ready for tracing. The two small vents on top of each stack are short pieces of dowel. The circular letter boards are cut from light cardboard, painted yellow and lettered in red.

Details of the crane are given in Fig. 12. Most of it is made of dowels, the pulleys being formed from plastic rod and the sheaves and rest from thin sheet brass. Running lights atop the crane mast and the pilothouse mast, as well as the lights on each side of the pilothouse, are fashioned from bits of plastic. The topmost lights are white, while the two lower lights on the crane mast are red. The port light on the pilothouse is red and starboard one is green. Fine black thread is used for the antenna and glass beads for the insulators. Figs. 19 and 22 detail the remaining fittings, the towholder winches and the radar scanner. You'll notice in the photos that there are nine hatch covers on the aft deck. These are represented by small squares of cardboard. A tiny lifeboat is placed upside down on the second deck aft of the stacks. All fittings, including the railings, are painted black and the decks are medium gray. ★ ★ ★

### Leather Loop on Wire Brush Reduces Hand Strain



brush so it extends at one side for insertion of the thumb. The loop should fit your thumb snugly, but not so tightly that it is uncomfortable.

Hand strain suffered in gripping a wire brush to hold it safely, especially when working on a ladder, may be reduced by tacking a loop of leather or rubber to the top of the

### Legs of Sawhorse Are Adjustable To Various Heights



Support scaffold planks on uneven surfaces with sawhorses having adjustable legs. The legs utilize two sections of pipe with the lower piece sliding inside the other. Equidistant holes are drilled in a line along the lower section of pipe. A bolt slipped through a hole at the bottom of the outside pipe and into any one of the holes permits adjusting the leg to the desired height.

Hugh Lineback, Stillwater, Okla.

### "Self Closing" Turn Button

Wooden turn buttons used to hold doors, gates and shutters sometimes accidentally rotate to an open position due to vibration or other causes. To prevent this, locate the pivot of the turn button off center as indicated. Its own weight then will cause the turn button to assume a horizontal position when it is free to turn.



WTM 58.

# Vegetable Puppets



Let the youngsters paint puppet faces with water color, assuring easy cleaning of hands and clothes



Above, fruit, vegetables and egg provide a variety of shapes for different character's heads. Below, first step in preparing vegetable for making puppet head is to cut finger hole with coring tool



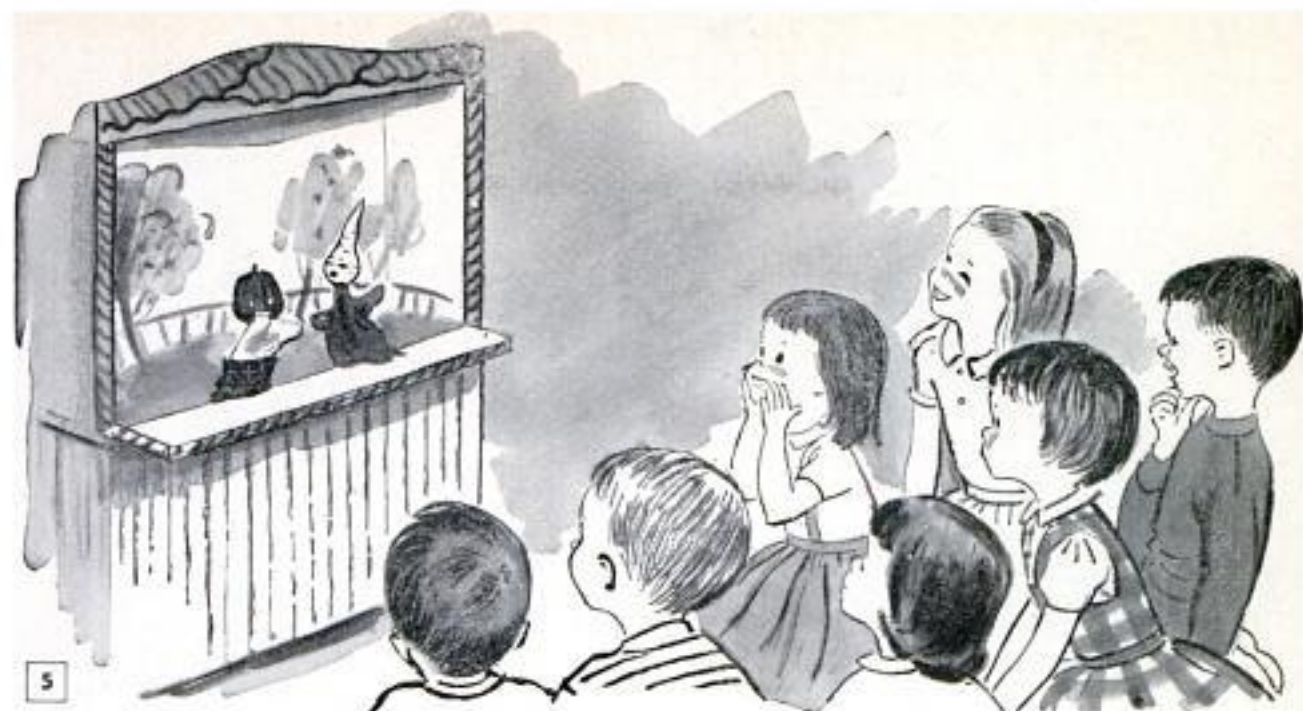
WHEN IT COMES to rainy-day entertainment, nothing pleases youngsters more than watching the intriguing antics of puppets, except actually working the puppets themselves. What's more, materials for making the whimsical creatures are as close as the vegetable bin and sewing basket. As shown on these pages, almost any vegetable of moderate size, many fruits and even empty, whole eggshells can be used for puppet heads.

The first step in making the head is to cut a finger hole in the fruit or vegetable with a paring knife or coring tool, Fig. 3. Next, paint on the features of the faces with tempera or water colors. The children can help in this operation, Fig. 1, and water paints are more easily washed from clothes and hands than oil-base types. Hair for the figures can be absorbent cotton or yarn cemented in place. Hair also can simply be painted on, with a bandanna providing an added touch, Fig. 2. Dresses for the puppets are simple to cut out and sew, Fig. 7. Sew them inside out, then turn right-side out to assure smooth seams. Include

Next step in making puppet head after cutting finger hole is to paint on face with tempera or water colors







three "arms," the center one being used to cover the finger that is inserted in the head of the puppet, as in Fig. 8. Measure hand span of the child who will work the puppet to determine the correct dress size. Hands or fingers can be painted or embroidered on the ends of the arms, or hands from discarded dolls may be attached. Odds and ends of ribbons, feathers and costume jewelry can be used as dress accessories.

A stage for a puppet show can be a large cardboard box cut to form the stage and painted as desired, Fig. 6, or can be a more elaborate structure of hardboard or plywood, Fig. 5. Lights and curtains that open and close will add an authentic touch. With lights above the stage and a translucent backdrop, the puppeteers can sit or stand behind the backdrop while working the puppets without being visible to the audience.

★ ★ ★

Puppet dress is sewn with inside out, then turned right-side out, so finished dress has smooth seams

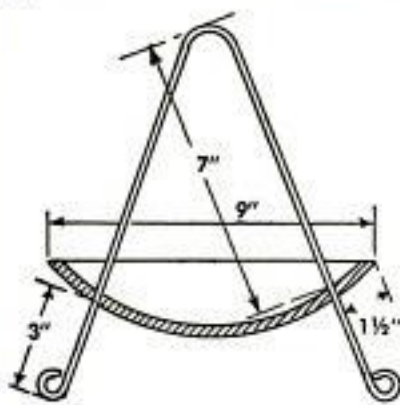
Above, "Carrot Top" and "Green-Pepper Head" entertain the youngsters with their antics on stage



Above, puppet stage can be large cardboard box cut to shape and painted to provide backdrop. Below, center "arm" of puppet's dress actually covers index finger that is inserted in hole cut in head



## Wooden Fruit Bowl Supported on Wire-Coat-Hanger Legs



SPACE HOLES BY LAYING  
5 1/4" SQUARE PAPER ON  
BOWL BOTTOM AND MARK-  
ING CORNERS

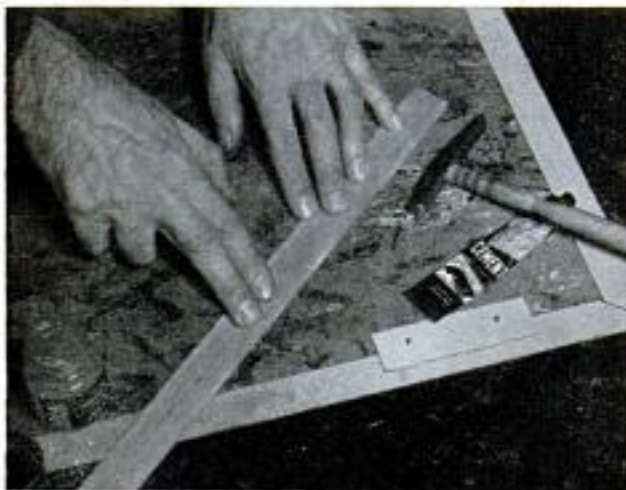
With the addition of "wrought iron" legs formed from two wire coat hangers, a 9-in. wooden bowl can be made into a modern fruit tray. Both pieces of coat-hanger wire are cut to a length of 23 in., and bent to the shape of a hairpin. Location of the four angular holes drilled through the bowl is determined by centering a 5 1/4-in. square of paper on the bottom of the bowl and marking the wood at each corner. Proper angle for the holes

is estimated when drilling; then the "hairpins" are pushed through. Eyelets are formed at the bottom of each leg and the top arcs joined together with soft copper wire to form a handle. Friction should hold the bowl in place, but as a precaution, cellulose cement should be forced into the holes around the wires.

Walter E. Burton, Akron, Ohio.

## Lath Holds Linoleum Edge While Cement Sets

To assure a good bond along the edges of newly laid linoleum, one homeowner tacked a border of wooden lath around it as shown. The lath strips, coated with grease on the underside to prevent cement from adhering to them, are removed after the cement has set. Small box nails are used to fasten the strips to avoid noticeable holes in the floor around the linoleum and ease removal of the lath.



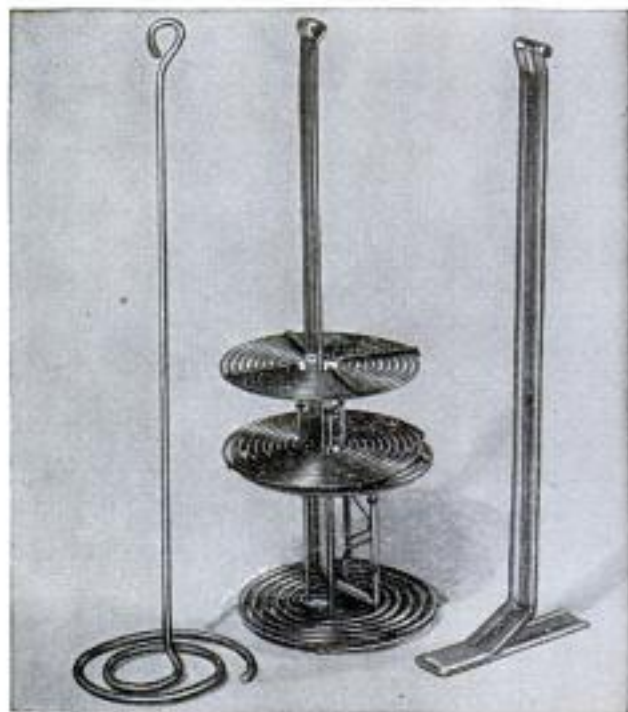
## How to Start a Siphon

Starting a siphon hose is relatively easy if it is done as follows: Insert the hose in the liquid to within an inch or so of the upper end. Then place a finger tightly over the upper end, draw the hose rapidly up (but not completely out of the liquid) and down below the level of the liquid, removing your finger during the downward motion. This rapid motion will cause the liquid to push the remaining air ahead of it as it flows out.

W. Shupenia, Smoky Lake, Alta.

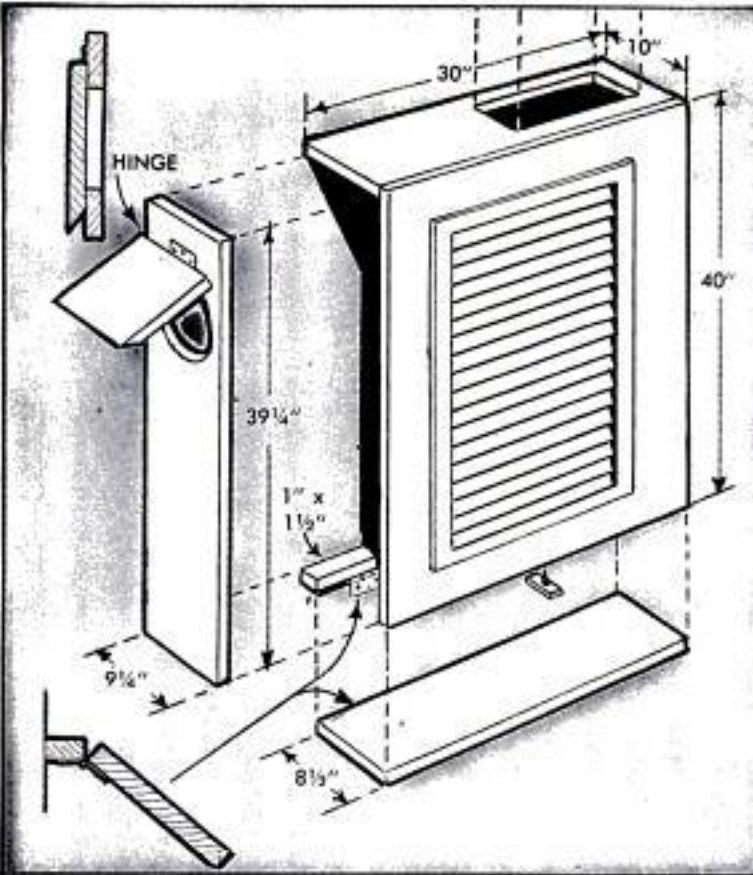
## Multiple-Reel Holders Speed Film Developing

Aluminum molding strips or 1/8-in. aluminum wire bent into the shapes shown provide holders upon which as many as nine reels of film (three reels per holder) can be developed simultaneously in one tank. Aluminum holders must be removed when reels are placed in hypo solution to prevent its contamination.



POPULAR MECHANICS

## A Third Member for Your Automatic Laundry



By M. C. Anderson

Even with an automatic clothes washer and drier, collecting and sorting soiled clothing must be done by hand. You can bring "automation" closer to the home laundry by building and installing this storage hamper which permits the clothes to be dropped directly to the tops of the washer and drier for convenient sorting. If the laundry room is in the basement, extend a chute from the hamper up between the floor joists so that clothing can be dropped into it without the need for entering the basement. In a two-story house with the laundry on the first floor, or basement, a similar arrangement can be made. When the laundry equipment is in a utility room of a one-story ranch-type home, build the hamper with a door near the top of one side. Soiled clothing left on the washer or drier by the children can easily be dropped into the hamper by taller members of the family.

Dimensions of the hamper can be changed to suit the size of the family wash, but the hamper should not project more than 10 in. from the wall to avoid interfering with the opening of the lids on some types of washers, and to allow circulation of air around both units to aid in carrying away excess heat. To simplify construction, the louvered panel in the



front of the hamper can be replaced by a sheet of attractive perforated hardboard. The 1 x 1 1/2-in. strip on the bottom of the hamper is screwed securely to the wall and the bottom is hinged to it. A simple wooden turn button is used to keep the bottom shut. Be sure that any nails or screws that project into the hamper are cut off and filed flush, and that all wood surfaces are smooth, so clothing will not be snagged or torn. A coat of waterproof varnish will aid in keeping the inside of the hamper smooth and dry.

### Match Lengthens Pen Refill

When the correct-length refill for a ball-point pen cannot be had, a shorter one may be used by extending its length with a matchstick. Remove the head and shape one end of the stick to fit tightly in the top of the refill. Then cut the stick to the proper length and place the assembly in the pen.—Harry Radzinsky, New York City.



### Caster Cups on Hairpin Legs Prevent Damage to Floors

Hardwood caster cups permanently attached to hairpin legs of modern furniture with brass cup hooks or screweyes prevent damage to floors. Press the eye around the leg but leave it loose enough to slide and turn in all directions, so it can adjust to uneven floors.

William C. Eymann, Palo Alto, Calif.

### Replacement Pad for Floor Mop Cut From Cellulose Sponge

Cut to fit and fastened with waterproof cement, a cellulose sponge may be used as a replacement pad for a sponge-type floor mop. A saving of about two thirds the cost of a regular replacement pad is realized and, since synthetic sponges are commonly used around the home, one may be at hand.

Kate L. Onderdonk, Margate City, N. J.

### Bit Prevented From Slipping Into Previously Drilled Hole



To drill a series of holes close together without the bit slipping back into a previously drilled hole, clamp the work in a vise as shown. Holes already drilled are concealed between the jaws of the vise which can be used as a guide. —Arthur Shults, South Bend, Ind.

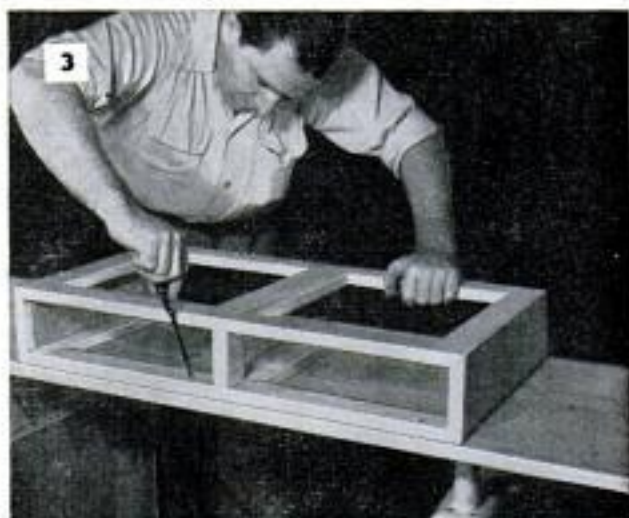
# VANITY TABLE Doubles As Desk

By Ralph Treves

USED EITHER as a vanity or as a practical desk for the home or business office, this unit has the proportion and design detail that belong with modern furnishings. You purchase the pedestals ready-made and then make the top and frame for the two center drawers in your own shop. Fig. 1 pictures the unit in use as a vanity, the over-all dimensions having been worked out so that the unit fits neatly into the wall recess. When used as an office desk the over-all width can be reduced somewhat if desired.

The top is  $\frac{3}{4}$ -in. hardwood-faced plywood surfaced with wood-grained plastic applied with contact adhesive. The plastic sheet should be of a color and grain to match the wood in the pedestals. Apply the plastic facing to both sides of the plywood and finish edges with wood-grained "tape" made especially for the purpose. After making the top the next step is to remove the tops from the pedestals (so that the new top will be at the correct height), Fig. 2. Then make the drawer frame and the drawer, or drawers, as required, following the general construction detailed on the opposite page. The detail shows the simplest type of drawer construction but, of course, you can use conventional construction if you have the necessary equipment at hand. Screw the drawer frame to the underside of the top, Fig. 3, then screw the pedestals to the top and also to the edges of the added drawer frame as in Fig. 4. Then finish the wood to match the room furnishings. ★ ★ ★

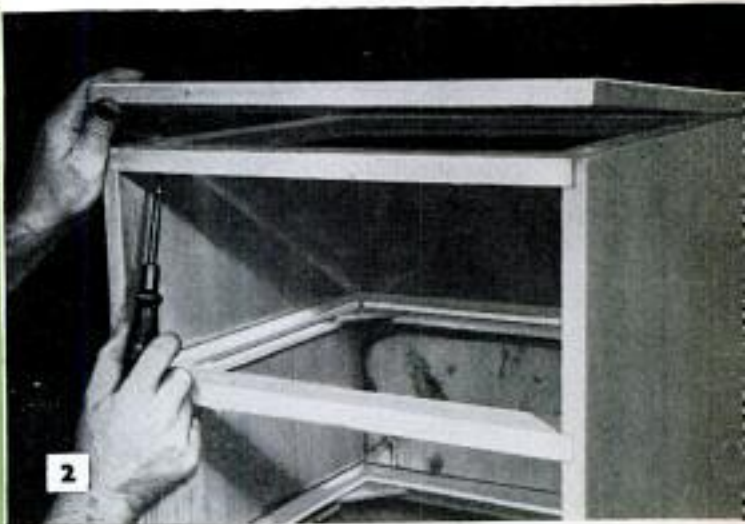
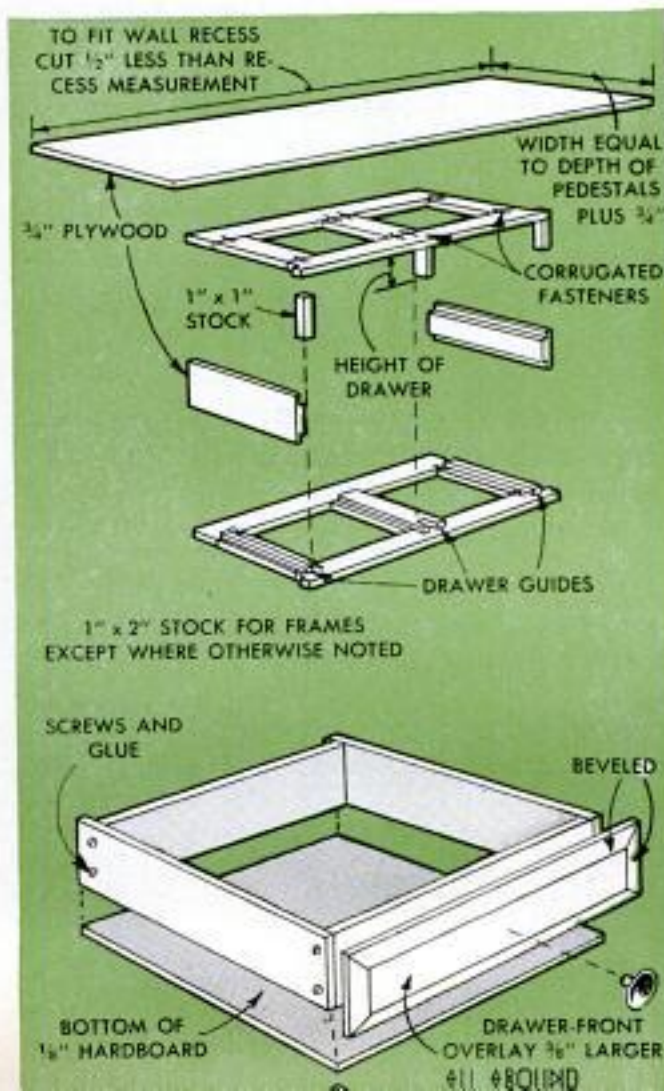
After "veneering" plywood top with a plastic wood-grained facing, drawer frame is screwed in place





1

Here the vanity-desk unit is sized to fit neatly in a wall recess. When used as a desk the top can be made in the same general proportions, or made somewhat shorter and the center frame designed for one drawer



2

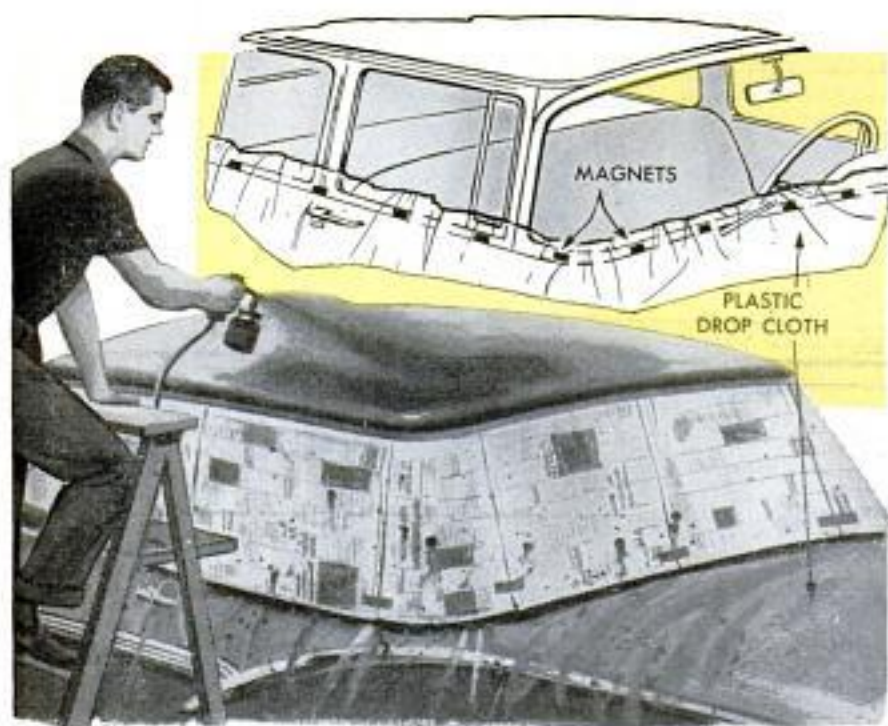
Above, standard tops with which pedestals are supplied are removed to give new top proper height. Below, pedestals are screwed to frame



4

DRAWER FRAMING IS ATTACHED  
TO SIDE OF PEDESTAL WITH  
FLATHEADED SCREWS

## Plastic Dropcloth Speeds Masking Auto for Painting



You can save both time and masking tape when repainting a car, especially two-toning, by covering the bottom color with a plastic dropcloth held in position by small magnets as shown. The windows are covered with strips of newspapers taped to the drip molding. With this method, a car can be completely masked in a few minutes. Apply the bottom color first, and allow it to become dry before masking for the second color. — Stanley Clark, East Bradenton, Fla.

☞ To provide luster and added toughness to exterior oil paint, add a little spar varnish.

## Butt Joint Fitted Accurately By Using Doubled Sandpaper

To assure a tight-fitting butt joint between two wooden panels, simultaneously sand the edges to be joined. Double a piece of sandpaper so the abrasive is on the outside, then slide it back and forth between the panels that have been clamped together so there is just enough clearance for the sandpaper. Place the panels on blocks so the sandpaper does not catch on the workbench top.



## Make Your Own Sports Car

by utilizing parts from any junked or used car. If you have ever wanted to build a car of your own, completely original in design and styling, don't miss the article in the February issue which shows in detail how to build a modern, low-slung sports car with a competition-type frame

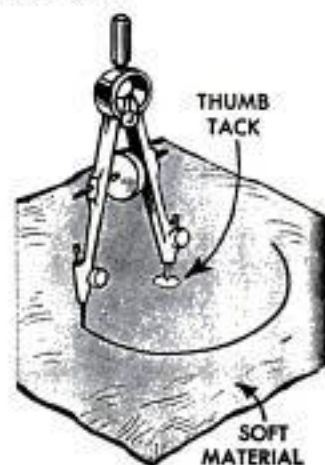
## Rack for Sanding Belts

To keep sanding belts close at hand and in order, provide a rack for them as shown. Wooden clothespins set in holes drilled in a board and the latter mounted on the shop wall near the sander make a convenient rack. The belts are squeezed together and inserted in the clothespins.



## Center Point for Compass Provided by Thumbtack

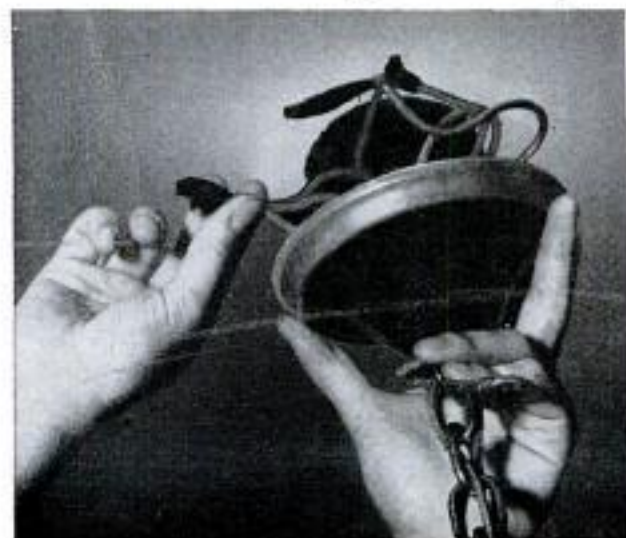
When using a compass on soft materials such as cork, rubber, or cloth, place a thumbtack at the center point and mark it with a center punch. The compass point will have a true center and the circle drawn by the compass will be accurate.



# REDECORATING WITH LIGHT

REPLACING an old-fashioned ceiling light fixture with a smart, modern unit is an extremely effective way of improving the appearance of a room, and requires very little time, effort and expense when compared to the increased beauty and better lighting it adds to the room. The first step in removing the old fixture—after unscrewing the fuse that supplies current to this particular circuit to eliminate any chance of getting shocked—is to take off the small locking collar that holds the canopy which covers the fixture mounting and wires. In some cases the collar can simply be unscrewed, in others it may be held with a setscrew that must be removed. Generally both collar and setscrew are brass, so care must be used not to break off the screw. With the collar removed, pull down the canopy to expose the wires. Cut the two wires coming from the fixture at a point an inch or two below the taped splices. This is to aid in identifying the wires when installing the new fixtures, and to avoid disturbing other wires in the ceiling junction box that may lead to wall receptacles and switches. Remove the old fixture which may be fastened in one of two ways, either by a single locknut on the mounting stud, or by screws and nuts to a strap. If a strap was used for the old fixture, check to see if the new fixture can be attached to it. If not, discard it and replace it with a new one. The strap is held on the mounting stud by a locknut. Now, attach the new fixture to the strap with screws and nuts. Next, take one of the ceiling wires and remove the tape and unwind the splice. If the wires have been

Drop the canopy on the old fixture, then pull down the wires and cut them at a point below the splices



JANUARY 1957



Better quality of lighting and greater beauty are double advantages provided by modern light fixture

soldered, cut the splice and file off the solder. Twist this wire onto a wire of the same color on the new fixture. A black or colored wire is the "hot" wire, and a white wire is the neutral or ground wire. Twist the wires together so the twisted portion is at right angles to the wires, making an "underwriters" splice. Do not make an "in-line" splice for the sake of neatness. After splicing both wires, wrap them with electrician's tape and tuck them up around the fixture mounting. Slip on the new canopy and hold it in place with the locking collar.

Courtesy American Home Lighting Institute.

Canopy on new fixture is held in place by locking collar. This is turned against it as shown below



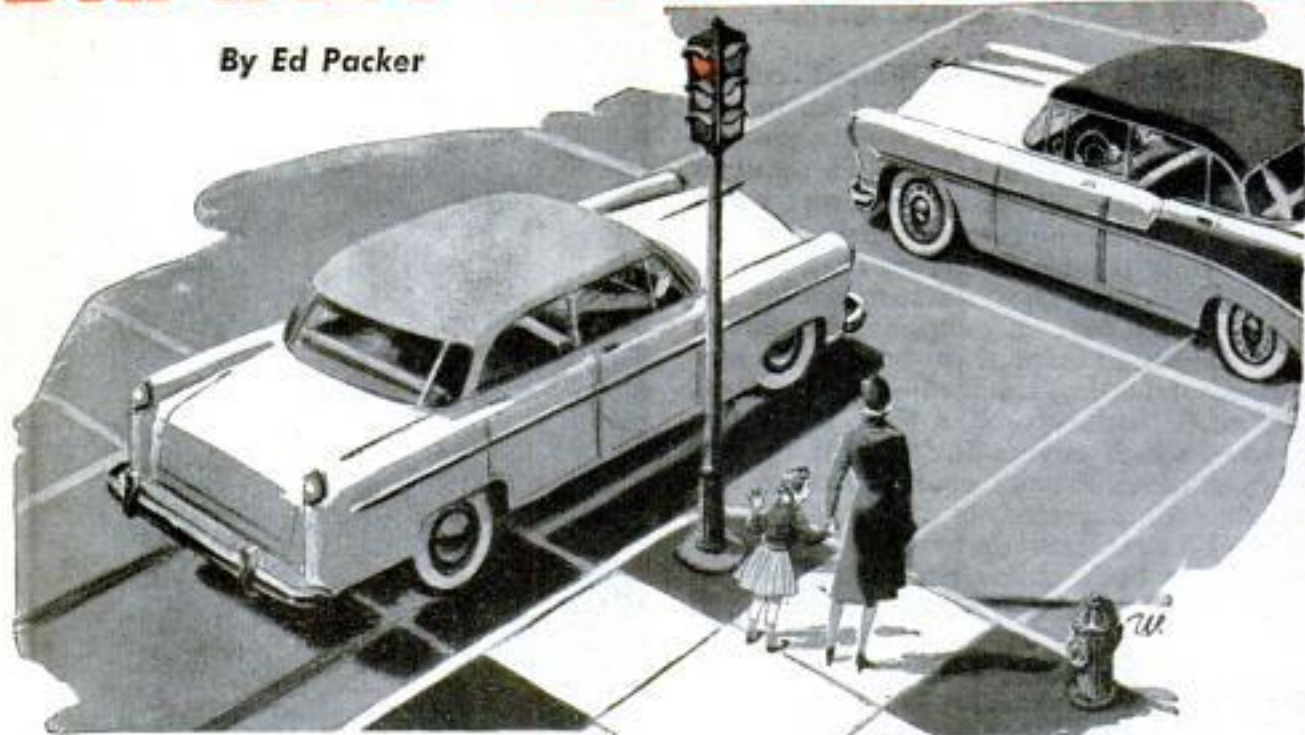
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SN 51

# BRAKES FOR TODAY'S

By Ed Packer



After wheels are removed, boots on wheel cylinders are pulled back and cylinders checked for leakage. Below, new brake lining is buffed to a true radius



**GOOD BRAKES** can save your life, and the best way to make sure the braking system of your car is always in top condition is, first, to recognize the symptoms that indicate trouble. Second, have the trouble corrected immediately. Third, use only material recommended by the manufacturer of your car, or materials of comparable quality and dependability.

## Symptoms and Causes

One symptom of brake trouble that often is ignored is a "spongy" pedal. Generally it is caused by air in the hydraulic lines, and simply "bleeding" the brakes will eliminate it. However, air does not enter the system normally and a spongy pedal indicates that somewhere in the system there is a leak that is allowing fluid to escape and be replaced by air. It could be a leaking connection, wheel cylinder or master cylinder or a break in either the tubing or a flexible hose. All components should be checked to find the leak, and it should be repaired immediately. If, when you hold the brake pedal down firmly, it slowly moves down under the pressure, the master cylinder should be overhauled or replaced. The compensation valve in the cylinder is leaking and sooner or later will fail completely. Any time that the brake pedal goes lower than about 3 in. from the floor—power brakes being excepted since they have an extremely short travel—the brakes should be adjusted, and one front wheel pulled to check the condition of the lining. Should a car pull to



# TRAFFIC

either right or left when the brakes are applied, it generally indicates that grease or brake fluid is running onto the lining and causing the brake to "seize." Pull the wheel that is giving the trouble and check the grease seal. If it is all right, and brake fluid is leaking from the cylinder, it should be repaired or replaced. Brake fluid usually can be washed from the linings with alcohol, after which the lining should be sanded lightly to remove the glaze. Grease cannot be removed from lining and requires that the lining be replaced. Never replace lining on a single wheel without replacing the lining on the opposite wheel, to assure equal braking characteristics of each wheel.

## Complete Brake Relining

If you check your brakes and find they need relining, here's what a mechanic will do. He first removes all wheels and checks for leaking wheel cylinders, Fig. 1. They must be repaired or replaced. Scored drums will require turning on a drum lathe, unless gauging, Fig. 3, shows that they have already been turned oversize to the maximum limits, which means they must be replaced. Out-of-round drums will be trued. After new lining has been installed, it may be necessary to buff it to a true radius if the shoes are distorted, Fig. 2. After reassembly of the brakes on the backing plates, the drums are reinstalled, Fig. 5—front-wheel bearings are repacked with grease first—and the brakes are adjusted, Fig. 4. ★ ★ ★



Above, drums are checked for true radius and to see if they have been turned oversize beyond limits

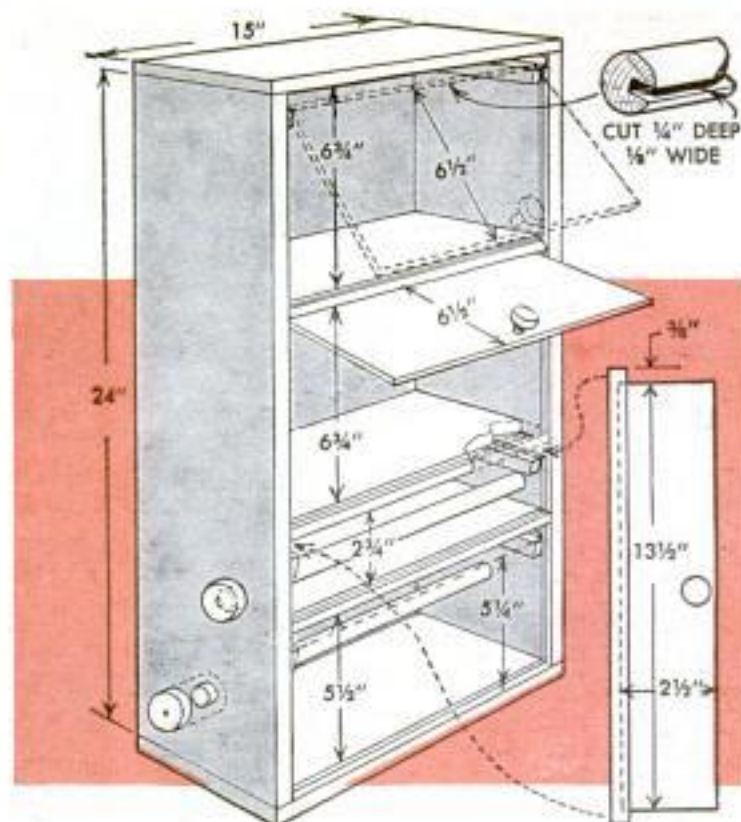


With drums reinstalled, brakes are bled and adjusted so there is no drag, good pedal. Below, front-wheel bearings are repacked before drums are reinstalled. In latter operation, care is taken not to use an excess of grease which may run onto brake drums



167A 58

# Kitchen Cabinet for Condiments and Towels



A useful cabinet to have in your kitchen is this combination wall-mounted unit. It has plenty of room for condiments on the two top shelves and ample space for a roll of waxed paper and a roll of paper towels mounted on dowels in the bottom section. Sliding doors provide easy access, keep dust out and give the cabinet a smart appearance. The sides are 3/4-in. plywood while the top, bottom and back members are cut from 1/2-in. material.

The doors of the cabinet are made of 1/8-in. wood or hardboard, each glued into a 1/2-in. dowel that is grooved as shown in the detail. The dowel extends 1/2 in. beyond the sides of the door so that it will slide in 1/2-in. grooves cut in the sides of the cabinet. Cleats, nailed at the bottom edge of the grooves, support the doors when they are open. The 1/4-in. plywood shelves are glued and nailed into position directly above the slots. Facing strips nailed over the front edges of the cabinet provide stops for the sliding dowels, while 1/4-in. wooden strips tacked to the top of each shelf 1/8 in. from the front edge serve as doorstops when the doors are closed.

T. K. Hastings, Los Angeles, Calif.

## Strong Hypo Substitutes for Rapid Fixing Solution

With the new single powder acid fix on the market it is possible for photographers to mix a double-strength hypo and get the same effect as a rapid fixing solution, and at less cost. The hypo mixture has none of the caustic properties of the ammonium-chloride rapid fix and has none of the corrosive effect of the latter. By using this double-strength hypo, films will clear equally as fast as when treated with a rapid

fix, and the hypo will actually last three to four times longer than a mixture of normal strength. When used on prints, the bleaching characteristics of a rapid fix are not present and the time allowance for immersion of the prints is not a controlling factor. A mixing ratio of acid fix, two parts to water, one part, is suitable for most general requirements.

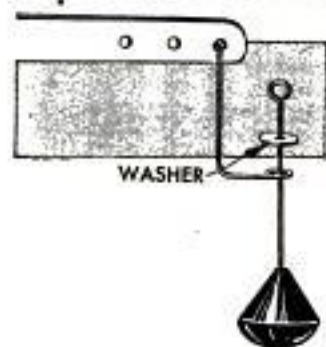
Robert C. Florian, Cicero, Ill.

## Wire-Mesh Debris Catchers for Basement-Window Wells

To facilitate the removal of leaves and other debris from air wells around basement windows place a  $\frac{1}{4}$  or  $\frac{1}{2}$ -in. mesh screen, cut to size, in the bottom of the well. It can be held flat by first welding a rim of  $\frac{1}{4}$ -in. rod around the edge of the screen. Upright handles, also of  $\frac{1}{4}$ -in. metal rods, are bent to shape and welded to the rim on opposite sides.

A. L. Kaser, Niles, Mich.

## Metal Washer on Ball-Lift Rod Improves Flush-Tank Action



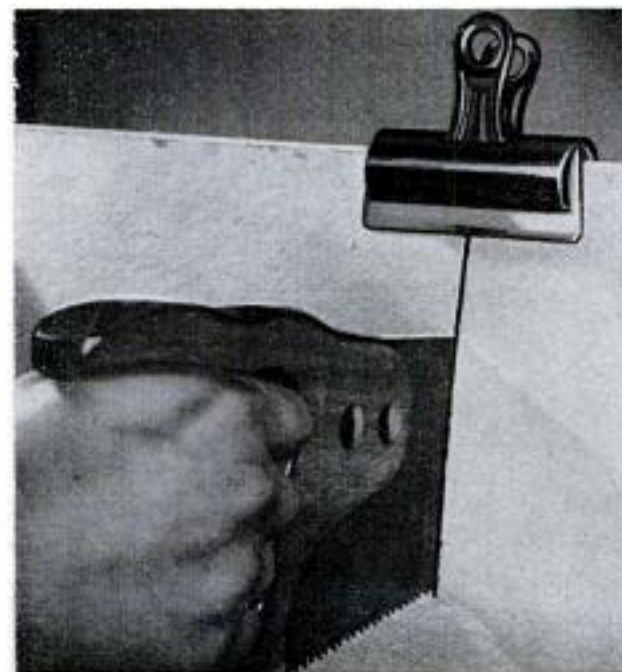
A small metal washer slipped over the lift rod on a flush-tank ball will keep the rod from catching on the lift wire, a common problem which prevents the ball from seating. Unscrew the lift rod from the

ball, remove it from the lift-wire loop, slip the washer over the rod and replace the rod so the washer is between the loops of the lift rod and wire as shown.

Bob Hewitt, Colorado Springs, Colo.

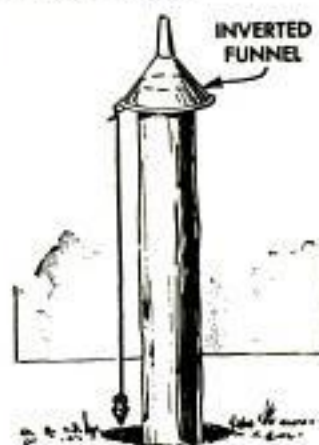
## Paper Clamp "Pinchproofs" Saw

It is easy to prevent a saw from binding when the severed pieces twist against each other, by slipping a sturdy paper clamp over the cut as shown. The clamp keeps the pieces in line, allowing the saw to ride smoothly through the entire cut.



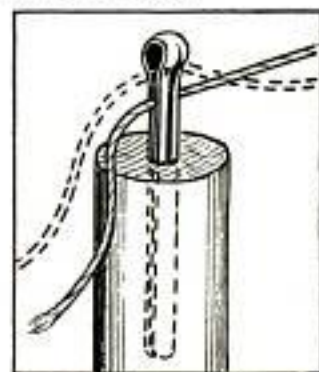
## Inverted Funnel Holds Plumb Bob When Aligning Fence Posts

The difficulty of suspending a plumb bob to swing freely when attempting perpendicular alignment of a newly set fence post can be overcome by attaching the plumb line to the edge of a funnel set in an inverted position on top of the post. For a better job, the earth should be tamped loosely around the post before beginning the aligning operation.



## Cotter Key Driven Into Stake Is Quick-Release Line Holder

To simplify the job of tightening and releasing a mason's line on an anchor stake, drive a large cotter key into the end of the stake and insert the line through the eye of the key. The stretched line is held tightly by being pulled down between the legs of the key as indicated. Pulling the line upward from any point along it into the eye of the cotter key will release it.



## Guide Lines Made on Linoleum With China-Marking Pencil



When marking linoleum for cutting, use a china-marking pencil, the type which often is used to write on frozen-food packages. The soft lead makes a clearly visible line on the hard-surfaced floor covering and is removed easily with a damp cloth.

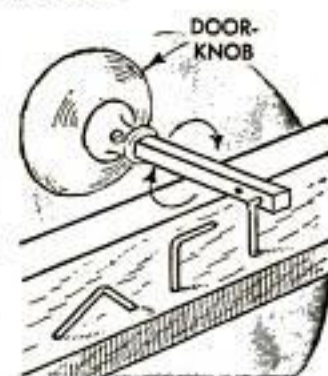
## Flattened End of Paper Clip Provides Midget Screwdriver

If a small screwdriver is needed to tighten a compass or other instrument, make an emergency one by flattening the end of a paper clip. A file will quickly square the flattened end of the wire to fit the tiny screw slots.



## Tool for Clinching Nails

A doorknob with its square shaft is used as a nail-clinching tool by a crating and furniture-moving contractor. The tool is used to bend the nails as indicated, after which they may be driven into the wood.

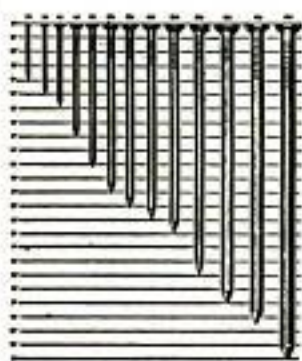


# Do-It-Yourself MATERIALS GUIDE

## for the Homeowner and Handyman

### Cross Indexed for Easy Use

If you've ever walked into a hardware store without knowing exactly what you need (and walked out without being sure of what you'd bought), you'll want a copy of this new guide that lists *all* the specifications for *all* Do-It-Yourself materials. With this book, you'll know exactly what to look for, and how to save money when you buy.



Need to know how long a 50d (penny) nail is? In the Do-It-Yourself Materials Guide, charts like the one at the left (4½ times larger in the book) will show you it's 5½ inches.

The chart at the right, of common wood-screw sizes and gauges, is typical of the dozens of illustrations (all much larger) in the book. Now you'll know how to choose and where to use building and hobby materials.



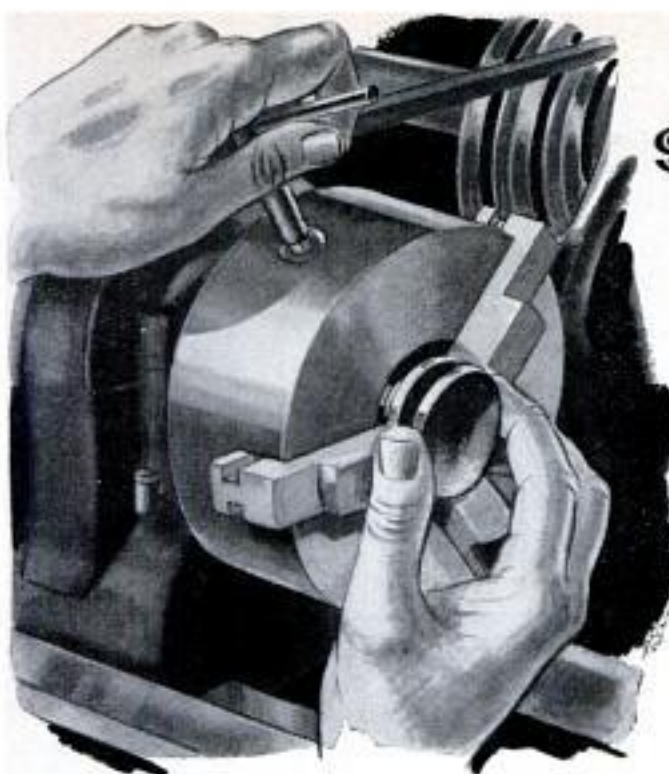
### A Key to Buying and Using:

Adhesives	Fuses	Plumbing
Bolts	Glass	Plywood
Bricks	Hinges	Roofing
Conduit	Locks	Siding
Doors	Millwork	Tile
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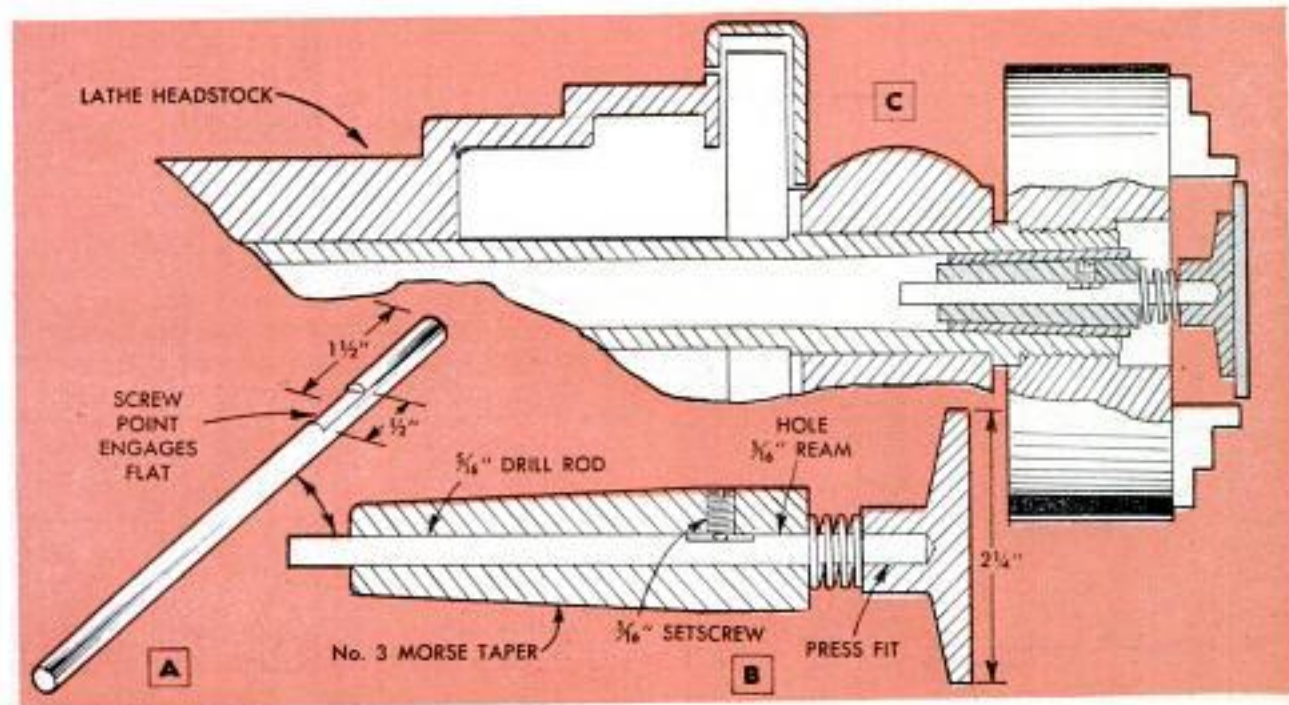


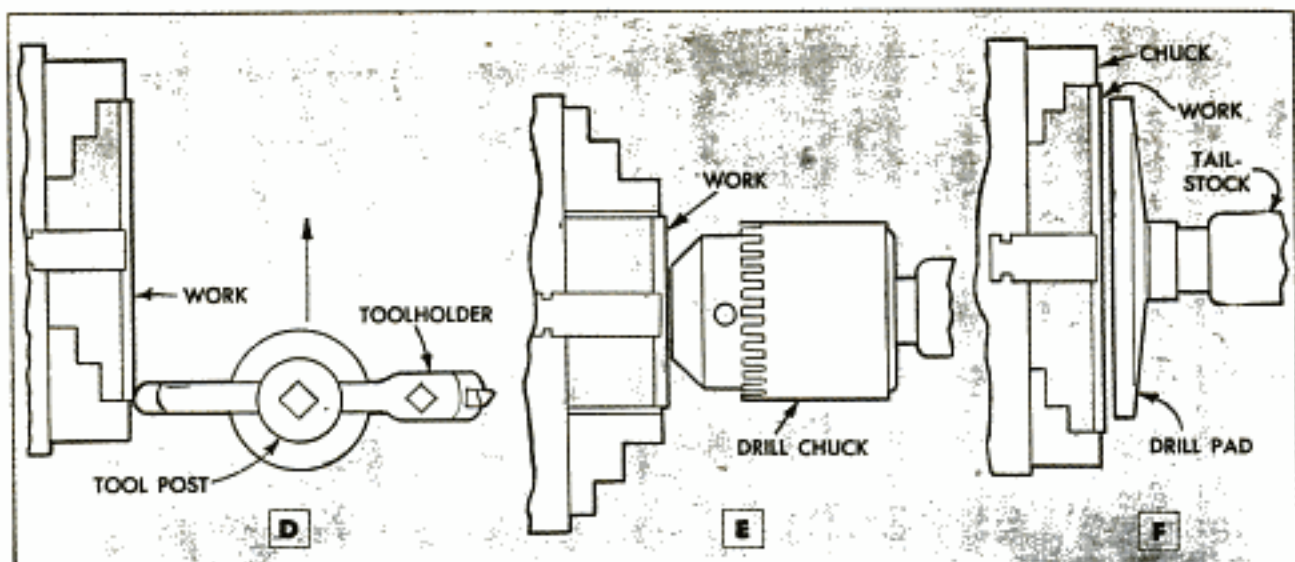
# CHUCKING THIN BLANKS For Face Machining

By C. W. Woodson

WHEN STEP-CHUCK equipment is not available, or when the amount of work to be done does not warrant the cost of such equipment, facing of thin metal blanks (disks) may be done accurately with any one of several simple lathe setups. For repetitive work, the stop

shown in details A, B and C below is perhaps the best. It positions the work accurately to any desired projection beyond the chuck jaws. The latter automatically position the work concentrically when tightened. The stop consists of the spindle A, the taper sleeve and a machined pad





assembled with a spring loading as in detail B. Note that a setscrew engages a flat filed on the spindle and limits the travel of the pad in two directions. The setup is shown in detail C. In use, the work is placed against the pad, pressed into the desired position and the chuck jaws tightened. Although the sleeve is given as No. 3 Morse taper and the diameter of the pad as  $2\frac{1}{4}$  in., these parts can be made in various sizes to suit both the lathe size and the nature of the work.

Another method, especially useful where speed is not important, employs a lathe drill pad to position the work as in detail F. As detailed, the pad is mounted in the tailstock, which is brought up close to the chuck. Then the work is centered, using any one of the several methods of centering in a 4-jaw chuck. When using the 3-jaw chuck this step is, of course, eliminated. Next, the blank is held against the pad and the tailstock sleeve is run up to bring the blank into position in the chuck jaws.

Care must be taken to hold the blank tightly against the pad as the jaws are tightened.

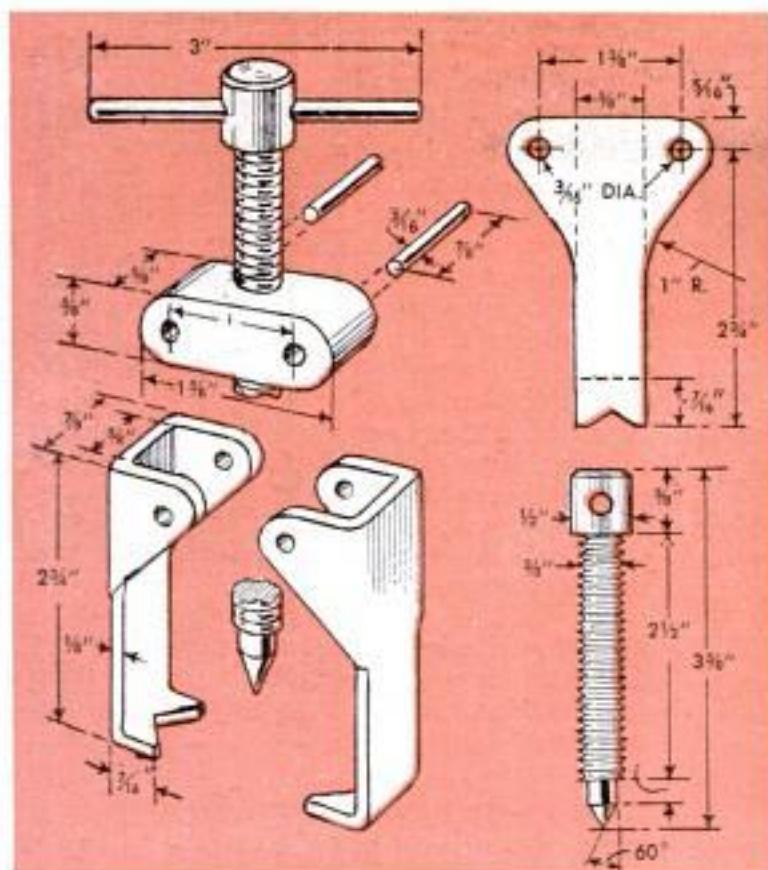
Details D and E outline two other methods of chucking a thin metal blank. In the first, detail D, the toolholder is swung parallel with the lathe axis and positioned in relation to the work as indicated. The blank is chucked with the chuck jaws drawn to just sufficient tension to hold it in position, the end, or heel, of the toolholder touching the face of the blank lightly. Then run the tool in the direction of the arrow, using the carriage cross-feed screw. Turn the chuck by hand 90 deg. and repeat. This procedure will bring the blank into position for a facing cut. The other method employs the geared drill chuck as in detail E. The chuck is placed in the tailstock sleeve and the jaws fully retracted. Then the blank is held squarely against the end of the chuck body as indicated while the jaws of the lathe chuck are tightened. Small-diameter blanks can be centered accurately in this way. ★ ★ ★

## Overflow From Drain Tile Inlet Passes Through Floodgate



Under normal conditions water flows into this field-tile inlet and is discharged at a point 800 ft. away. Trash is kept out by a welded-steel grate. When there is an abnormally heavy flow of water the concrete spillway leads water into the field on the other side of the fence where it spreads out over a grassed waterway. Any heavy flow of water will open the floodgate which is suspended on a pipe frame. The inlet tile is 7 in. below ground level, and the retaining walls on each side of the spillway are 10 in. high.

☞ When polishing brass, use the same cloth for both buffing and applying the polish. The residue left on the cloth after the liquid evaporates acts as a fine abrasive.



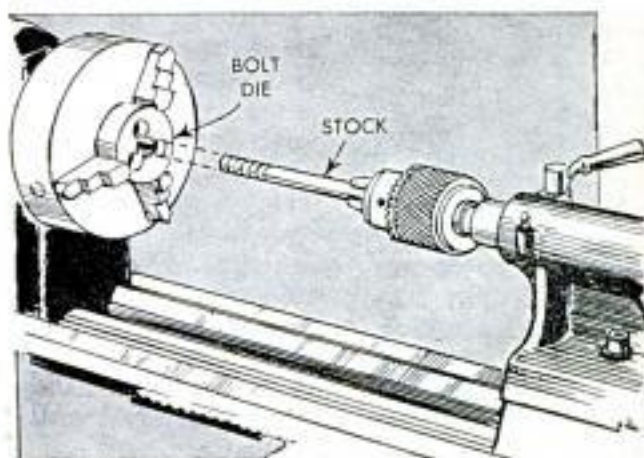
## Modelmaker's Gear Puller

Designed for model work, the capacity of this gear puller ranges from very small pinions to gears or wheels slightly over 2 in. in diameter, and it will exert sufficient pressure to remove the most stubborn pulley, collar or other shape that has been driven onto a shaft. Sheet steel  $\frac{1}{8}$  in. thick is used for the two arms. Rough-cut them to shape with a hacksaw, then finish to correct size by hand filing. The upper ends of the arms are bent in a vise around a  $\frac{5}{8}$ -in.-sq. steel bar. The lower end of each arm is bent at a right angle to form a hook and a V-notch is filed in it to provide clearance around a shaft when pulling small-diameter gears. Steel bar stock  $\frac{5}{8}$  in. sq. is

used to make the crossbar which has both ends ground to a radius, then is drilled for the two  $\frac{3}{16}$ -in. hinge pins. Cross-drill and tap the bar to receive the  $\frac{3}{8}$ -in. portion of the hand screw. The screw is made from a piece of  $\frac{1}{2}$ -in.-dia. round stock shouldered to  $\frac{3}{8}$  in. for all but  $\frac{5}{8}$  in. of its length. After the thread is cut on the screw with a die, the lower end is reduced to  $\frac{1}{4}$ -in. dia. by cutting away the threads. The end then is turned to a 60-deg. point as indicated. Cross-drill a  $\frac{3}{16}$ -in. hole through the upper end of the screw to accommodate the handle which is a 3-in. length of drill rod. Peen over the ends of the hinge pins to prevent them from working loose.

### Threading Small Rods Accurately

Accurately threading the ends of small-diameter rods is difficult with an ordinary die holder, but when the die is mounted in a three-jaw chuck of a lathe and the rod aligned in a tailstock drill chuck, threads can be cut accurately by merely feeding the work to the die. Turn the three-jaw chuck slowly back and forth by hand, advancing the die slightly with each forward turn. A light, steady pressure should be kept on the tailstock handwheel to slowly advance the work to the die. Use oil or cutting compound to lubricate the die.



## Heavy-Duty Extension Cord Kept on Handy Reel



When electrically powered tools and equipment are used at some distance from farm buildings, this reel provides any length of heavy-duty extension cord needed. Two plywood disks nailed to the ends of a length of 2 x 2 form the drum, and a long bolt passed through a hole drilled lengthwise in the 2 x 2 provides an axle. A socket is wired to one end of the cord and the other end is wired to a receptacle fastened to the reel. A second cord connects the receptacle to the power source.

## Squeeze-Type Plastic Bottle Doubles As Grease Gun



ically in measured quantities. Nozzle of the bottle fits tightly into the lube holes in housings which are normally plugged.

☐ A nail dipped in hot water or melted paraffin can be driven into a plastered wall without crumbling the plaster.

## Double-Duty Mailbox Standard Also Supports Sign

Hanging a sign advertising his business on an arm above the mailbox support is the method used by one farmer to avoid having several standards along the highway.



Pipe and fittings are used to assemble the support. The pipe on which the mailbox rests is screwed into a pipe tee that has been reamed out to turn freely on the standard. A steel pin fitted through the standard supports the tee.

☐ Weak cells in a three-cell flashlight can be used to produce sufficient light if a bulb from a two-cell unit is substituted for the three-cell bulb.

## Carbon Removed From Pistons With Modified Ring Section

Costfree and effective, a section of piston ring is a handy tool for removing carbon from the ring lands of a piston. Its one drawback is that the sharp edges of the ring tend to widen the lands. To avoid this, grind off the sharp edges of the ring to within a point about  $\frac{1}{16}$  in. from the end. For more comfortable operation, fit the ring section in a file handle as indicated. When removing carbon with this improvised tool be careful not to score the grooves.—Ed Packer, Oak Park, Ill.





SN 58

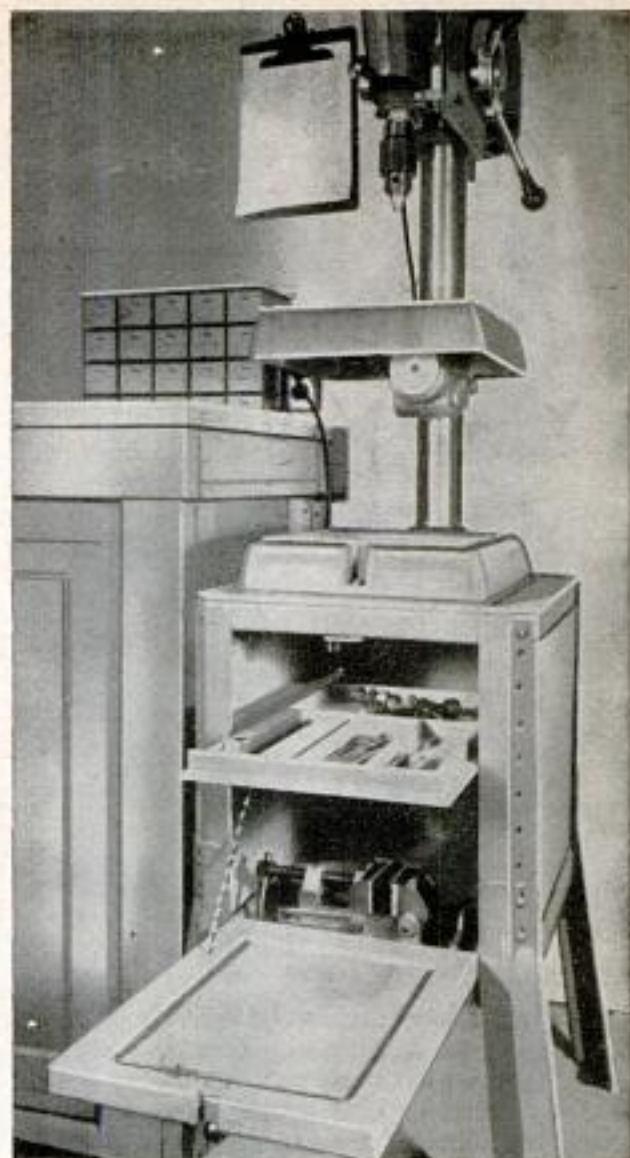
# Accessory Cabinets For Power Tools

A SMALL CABINET built into or attached to the stand or bench that supports a stationary power tool is a convenient place to store the accessory items and special wrenches used with the machine. Also, machined surfaces of accessories are protected from dust and rust and the appearance of the stand is improved.

The shallow cabinet on the table saw, shown in the two photos below, has ample room for a dado head and inset, extra blades, etc., and is an example of a cabinet that is attached to a stand where the motor occupies the lower part of it. Accessories are hung on dowels, clips and small blocks on the inside and outside of the cabinet.

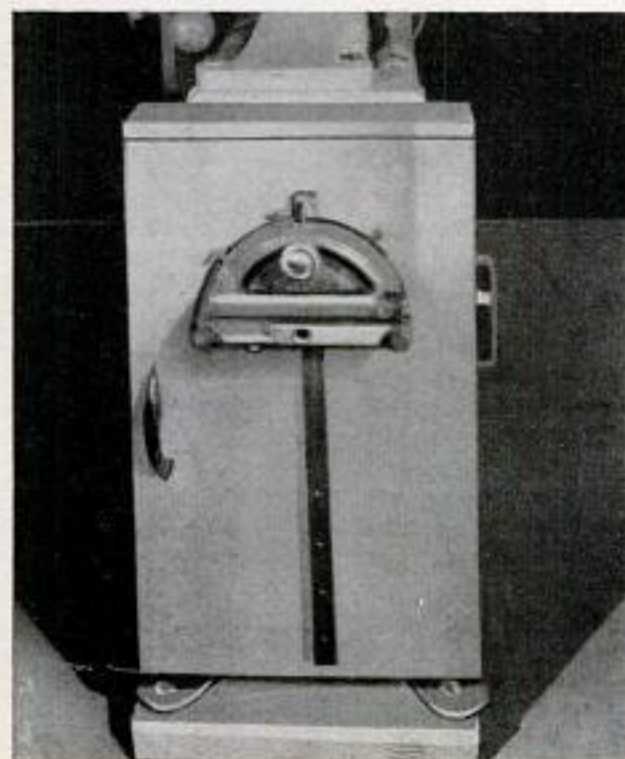
When the lower part of a stand is not occupied by a motor, it can be enclosed to form a cabinet as shown in the photo on right. A sliding tray holds small items, such as router bits, mortising drills, circle cutters, etc., while larger accessories, such as the drill-press vise, hold-downs, etc., are stored at the bottom. Similar cabinets can be constructed for lathe benches, shaper stands and other power tools. Doors and latches for built-in cabinets are bolted directly to the frame of the stand or bench. The wooden members of a cabinet can be varnished or painted to match the stand.

W. F. Gephart, Dallas, Tex.



Shallow cabinet attached to table saw, photos below, provides handy storage for blades and accessories

Stands containing no motor or machinery are suitable for built-in type of cabinet as shown above



## Tubing on Microscope Protects Worker's Glasses



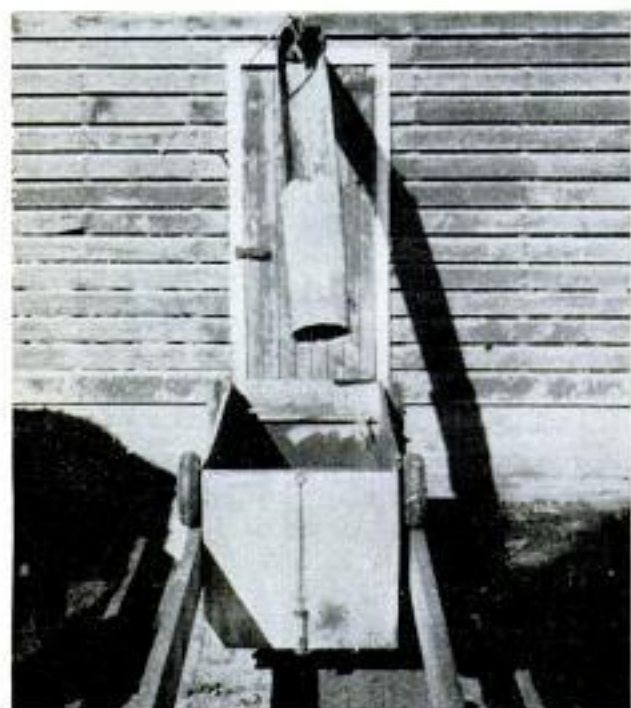
Eyeglasses of workers who use microscopes need not become scratched from frequent contact with the eyepiece of the instrument. A simple way to avoid this trouble is to stretch a short section of rubber tubing over the eyepiece so it extends above it slightly. If rubber tubing of the correct size is not available, a single wrapping of  $\frac{1}{2}$ -in.-wide adhesive tape provides a good substitute.

## Milk-Can Cart "Climbs" Stairs

Take the lifting and carrying out of handling milk cans with this cart that even rolls up or down stairs. The wheels are 8 in. in diameter, the axle  $\frac{1}{2}$  x 24 in., and the handle a  $5\frac{1}{2}$ -ft. length of pipe shaped as shown. The handle is welded to the axle and braced with two steel rods. Wheels are retained with cotter pins so they can roll free. A hook welded to the handle at the right height permits support of the can by one of its handles. A metal loop, also welded to the handle, provides a handgrip by which the cart is guided up or down steps.

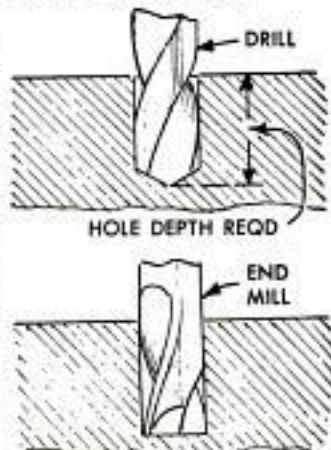
## Track-Mounted Grain Cart Saves Feeding Time

For quick and effortless feeding of grain to cattle, one Midwestern farmer uses this small cart which runs on rails above a row of feed bunks. The grain flows from an overhead bin in the granary into a spout that can be lowered into the cart. One end of the cart is hinged so that the grain can be poured in each bunk as the cart is moved along.—A. M. Wettach, Mt. Pleasant, Iowa.



## Squaring Bottom of Blind Hole

When it is necessary to square the bottom of a blind hole, as in making a pivot bearing, use an end mill of the same diameter as the drill. Run the drill to required depth, and then square the bottom of the hole with the end mill.



SN 58

# INDEXING HEAD For Gear Cutting

By R. D. Shriner



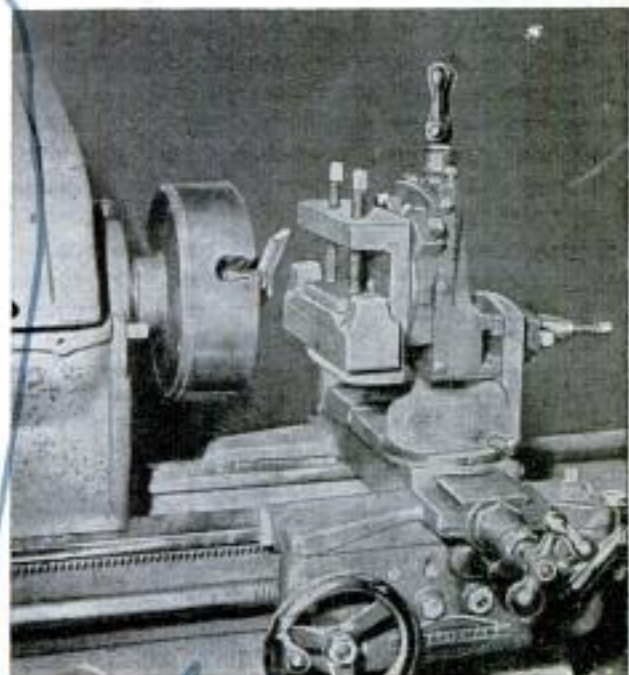
**U**SING A CHANGE GEAR from your lathe for indexing the cuts accurately, you can cut almost any required number of teeth on gear blanks up to approximately 4 in. in diameter with this simple indexing head. It is designed to be used in a lathe milling attachment and, of course, the maximum diameter of the blank that can be machined will depend on the swing of the lathe over the bed. Rough castings for the main body of the indexing head and also the indexing bracket are available complete with all necessary steel parts. Machining is done by the purchaser to suit his own requirements. Nearly all necessary machining can be done on the lathe on which the unit is to be used.

Detail drawings on the following page show how the parts are machined and assembled. Only general over-all dimensions are given, as the shouldered ends of the shaft and the bushings must be dimensioned to fit the lathe change gears and the gear blanks. Also, the indexing rod, or plunger, must be machined to fit the change gear which is used as an indexing disk. The photo at the right shows the lathe setup for machining the side of the body casting with a fly cutter held in the lathe chuck. Both sides and the bosses for the shaft lock screws can be machined with this setup. The ends of the casting are

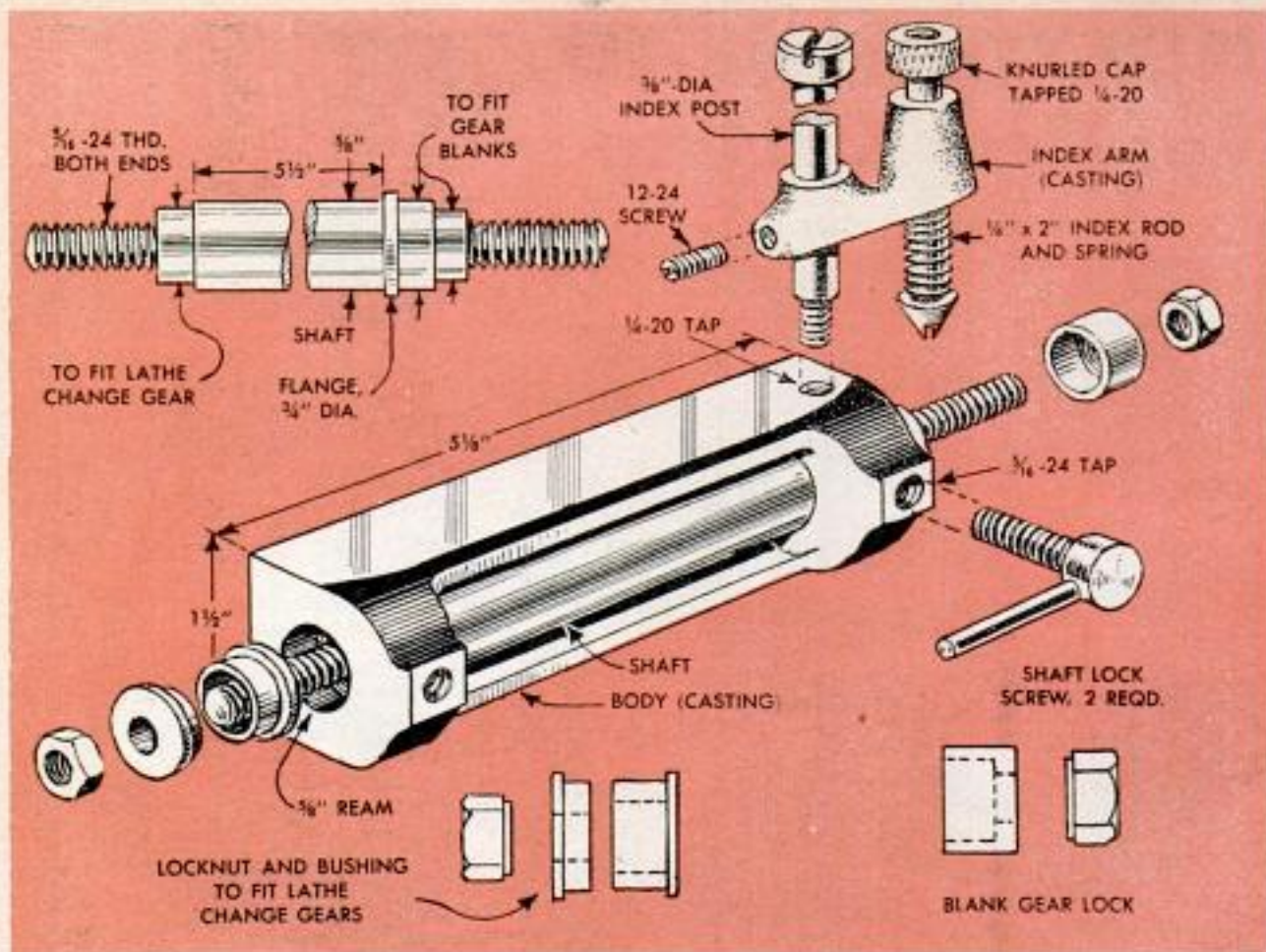
machined by mounting the casting on the compound. Line boring is done with the casting mounted on the compound and using a boring bar mounted between centers. Bores can be finished by grinding or reaming to  $\frac{5}{8}$  in.

The index bracket, or arm, is bolted or

Body casting is trued on both sides, and tops of locking-screw bosses are faced with setup pictured



see front



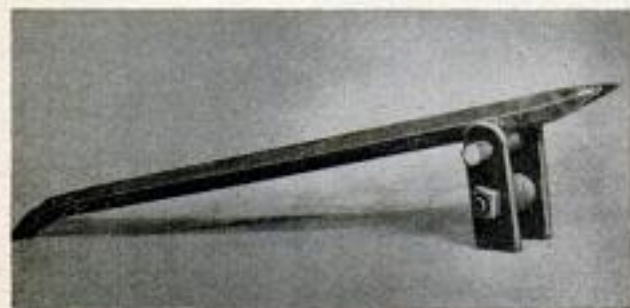
Only general over-all dimensions can be given as certain parts must be machined to suit requirements

clamped to the faceplate and the top ends of the bosses are machined flat before spotting and drilling the holes. Spacing of the holes must be determined from the shoulders run on the shaft. Machine the index post to body diameter, shoulder and thread one end and slot the head as indicated. Machine the index rod, or plunger, turn one end to a taper and slot to fit the indexing-gear tooth. Thread the other end and turn, knurl, drill and tap the cap. Finally, drill and tap the horizontal boss on the casting for a 12-24 headless setscrew. Locking screws are made by turning the hex head of a capscrew round, drilling a 1/8-in. hole transversely and driving a length of 1/8-in. rod into the hole to form a handle.

Dimensions are not given for the bushings which carry the indexing change gear or the gear blank. These must be turned

and bored to suit the work. Note that the length of the shaft from the left-hand shoulder cut to the inner edge of the flange is given as 5 1/2 in. This dimension is arbitrary and depends on whether or not the change gear used as an indexing disk has a flush or extended hub. If the hub is flush, it may be necessary to machine the shaft to 5 1/2 in. and use a 3/8-in. collar between the end of the body casting and the inner surface of the hub in order to gain sufficient clearance for the gear teeth and also to align them with the indexing rod.

Teeth in the gear blanks are cut with a round bar and fly cutter, the assembly being held in a drill chuck attached to the live spindle of the lathe as in the upper illustration on the preceding page. The cutter must be carefully ground to give the gear teeth the correct size and shape. ★★



### Pivoting Pinch Bar Removes Electric-Fence Insulators

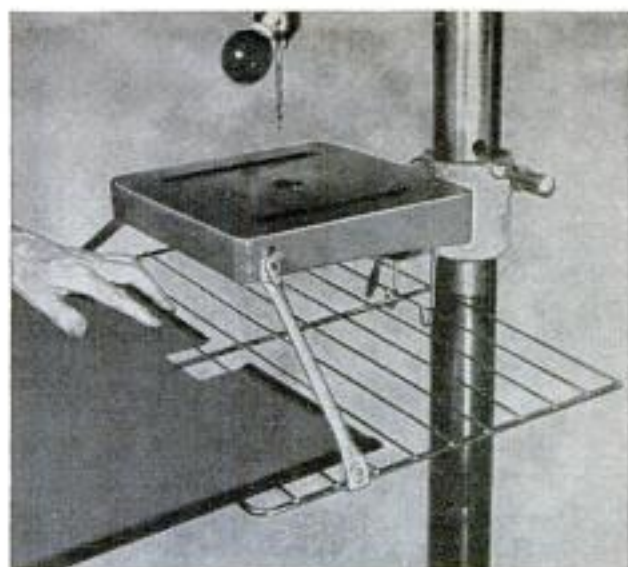
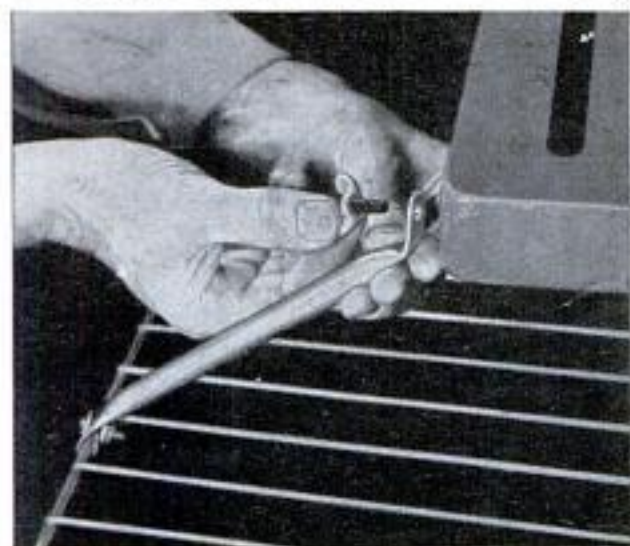
This small pinch bar fitted with a welded pivot and bracket was designed to remove electric-fence insulators without cracking the porcelain. The short end is indented like a claw and sharpened to slip under the head of the insulator nail.

A. M. Wettach, Mt. Pleasant, Iowa.

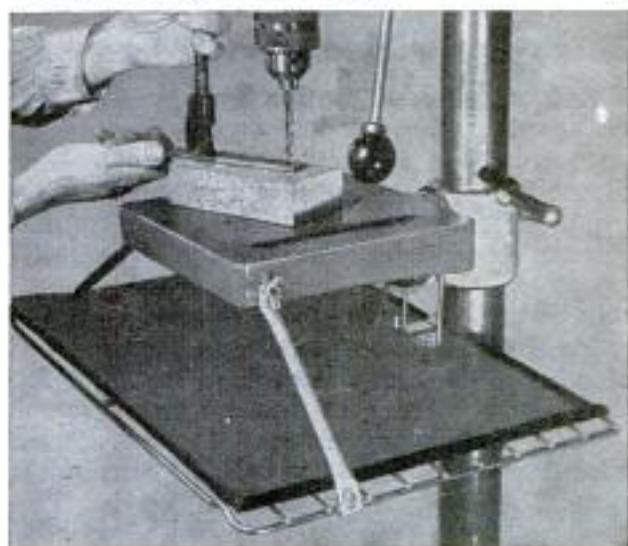
## CHIP TRAY for Drill Press

This chip tray was made from a discarded refrigerator shelf and a photographer's ferrotype tin and is supported beneath the drill-press table in the position pictured, using two S-shaped brackets and a U-shaped hanger bent from a piece of heavy wire. The edges of the ferrotype tin are bent up to form sides and ends about  $\frac{1}{2}$  in. high. The welded-wire refrigerator shelf is cut down to suitable size and the front brackets are made by flattening and drilling the ends of lengths of thin-wall conduit. The top ends of the brackets are attached with thumbscrews, the latter turned into holes drilled and tapped in the drill-press table.

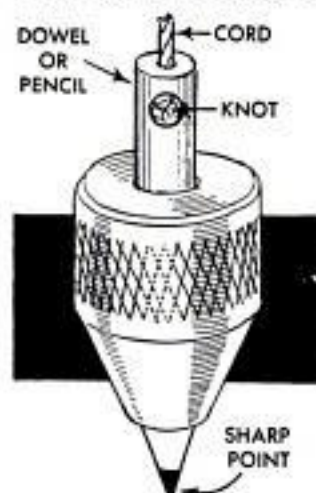
Refrigerator shelf is attached to drill-press table with S-shaped brackets made from thin-wall tubing



Above, ferrotype tin slides into position on shelf. Below, ferrotype tin catches, retains oil and chips



## Plumb Bob Made From Chuck Shell

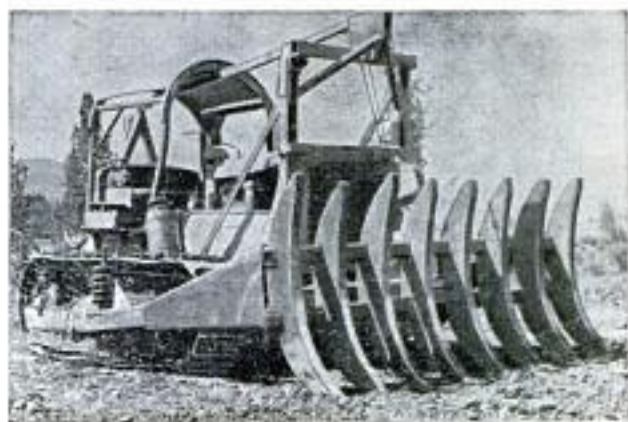


A practical plumb bob is easily made from a small drill-chuck shell by using an ordinary lead pencil as the pointer. Drill a small hole transversely through the pencil about  $\frac{3}{4}$  in. from the end. Remove the lead above the hole, insert the cord and tie a knot in the end. Then sharpen the pencil to a point, insert in the top end of the chuck shell. When the threads have engaged the pencil, turn latter until the point projects from the lower end of the chuck. A small dowel also can be made to serve the same purpose as the pencil.—Frank Shore, New York City.

## Light Low-Cost Brush Hook

This brush hook was built along box-framing principles to cut down on weight and cost. Upright teeth and square-shaped crossbeams are hollow, being constructed from  $\frac{3}{4}$ -in. steel plate welded together at the corners. Strength and serviceability are proving comparable to conventional units constructed of solid steel.

Roscoe LeGresley, Kooskia, Idaho.



## Oil-Can Dispenser Saves Time and Space in Service Station



Located adjacent to the grease rack where it occupies a minimum of space, yet is handy, this vertical rack holds a generous supply of 1-qt. cans of motor oil. Partitions are spaced so the cans slide easily, and a triangular-shaped block on each side of the front edge at the bottom of each partition prevents the cans from rolling out. Sheets of hardboard are used to cover the front of the rack.

George R. Harrison, Valparaiso, Ind.

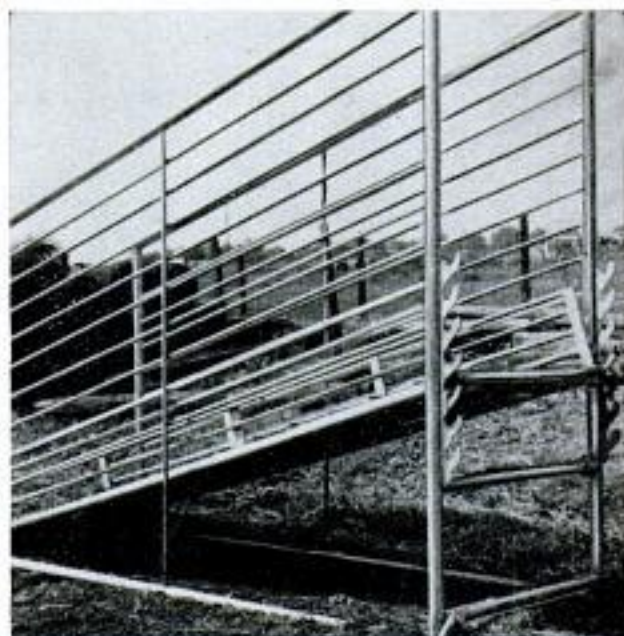
ⓘ Before filling holes and cracks with putty it is best to seal the wood with a coat of paint. This will prevent the oil in the putty from being absorbed into the wood, causing the putty to dry and fall out.

## Checking Carburetor Float Level

Although lowering the float level in the carburetor of an older engine sometimes will improve performance, a number of factors first should be checked before making any adjustments. A leaking float, which has become partly filled with gasoline, will produce the same effect as a too-high setting of the float. The filled float loses some of its buoyancy and requires a higher level of gasoline to raise it so that it will close the needle valve and shut off the gasoline supply from the pump. To determine whether or not a float is leaking, remove it from the carburetor and shake it. The sloshing sound of liquid inside it will be apparent. A second condition that will produce the symptoms of a high float level is a leaking needle and seat in the gasoline-supply line. Carburetor repairmen check these for tightness by removing the needle-and-seat assembly from the carburetor and sucking through it. If the assembly leaks under vacuum, it should be replaced. Reassemble the carburetor and install a shut-off valve between the carburetor and the gasoline-supply line from the fuel pump. Start the engine and run it until it is at normal operating temperature, then allow it to idle and shut off the valve. If the engine gradually speeds up as the gasoline in the float bowl is used, the float should be set lower. Bend the float arm only about  $\frac{1}{16}$  in. at a time, then retest the setting by using the valve as before. When the engine no longer speeds up, the setting will be fairly accurate. As a rule of the thumb, when no gauge or specifications are available, invert the carburetor fuel-bowl cover and align the float so it is approximately parallel with the cover.

Ed Packer, Oak Park, Ill.

## Adjustable Metal Stock Chute

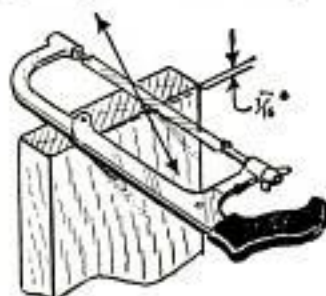


One Midwestern university has equipped its dairy farms with stock chutes similar to the one pictured above. Constructed primarily of metal rods and pipes, chute ramp adjusts to the height of any truck bed

## Hacksaw Is Emergency Wood Rasp

When no wood rasp is available, and the amount of stock to be removed is only about  $\frac{1}{16}$  in., a hacksaw can be used for the job. Hold both the saw frame and blade flat against the wood and saw back and forth. The offset teeth of the blade will provide an easily controlled rasping effect.

Frank Shore, New York City.



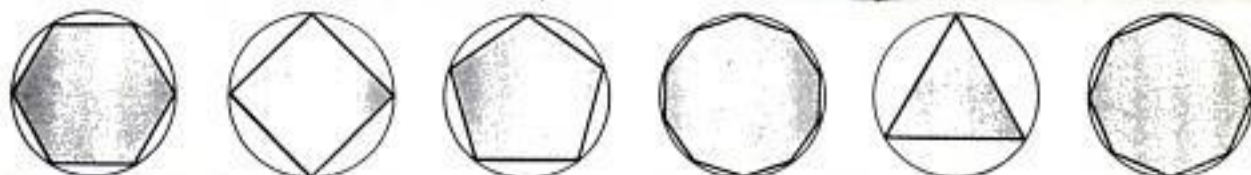
# SHOP GEOMETRY

MAKING A WORKING DRAWING to scale usually is the first step when planning a shop project from scratch. In this preliminary step you may find it necessary to divide circles accurately into five or more equal segments, or perhaps bisect a line or an angle. It's simple, quickly done, when you know how. The details below show how to solve several common shop-layout problems, using a pencil compass and making the layouts on drawing paper, or directly on the stock, when it is possible to make a layout full-size. When working to scale, keep the pencil point very sharp to minimize as far as possible any error due to the thickness of the line.

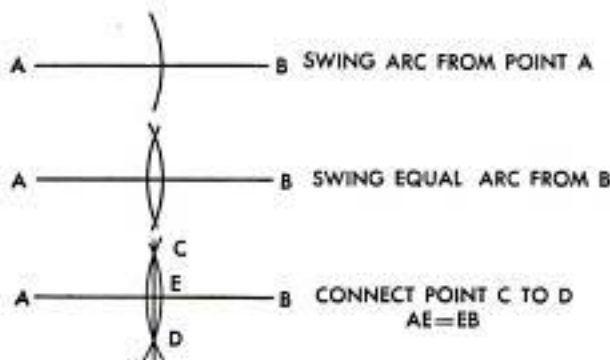
Ernest R. Ranucci, Fanwood, N. J.



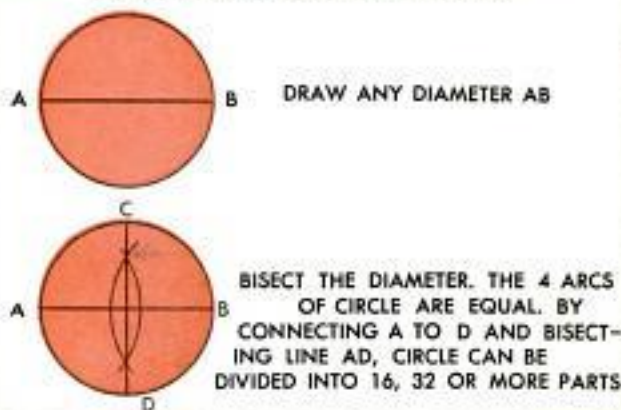
SN 58



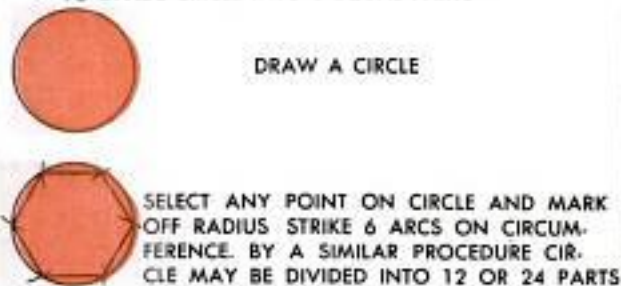
## TO BISECT A LINE



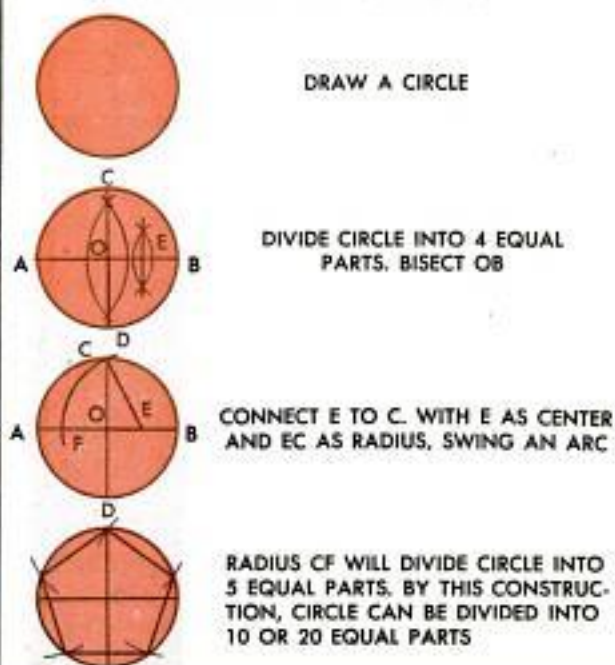
## TO DIVIDE CIRCLE INTO 4 EQUAL PARTS



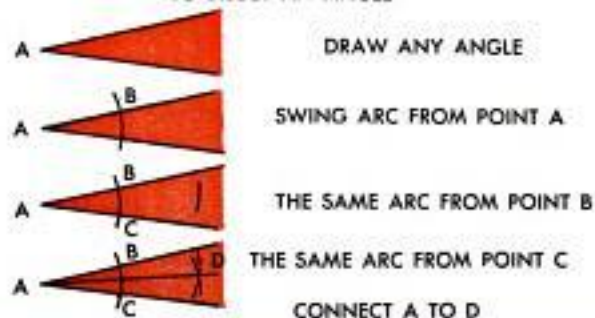
## TO DIVIDE CIRCLE INTO 6 EQUAL PARTS



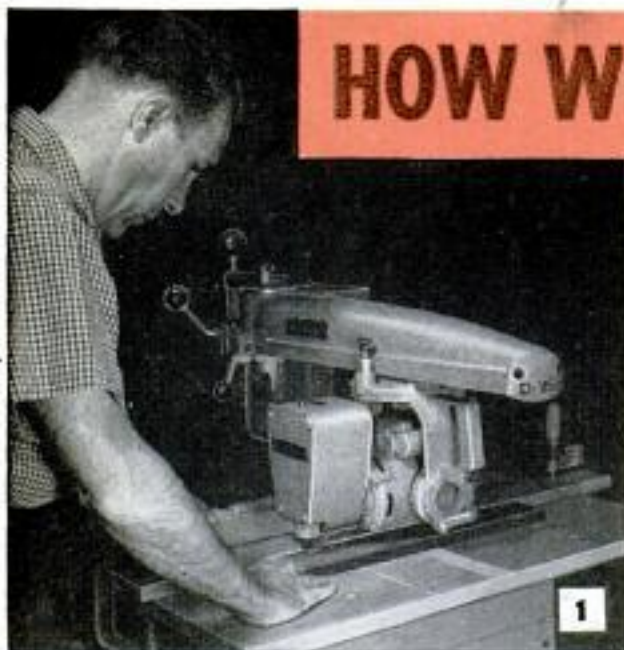
## TO DIVIDE CIRCLE INTO 5 EQUAL PARTS



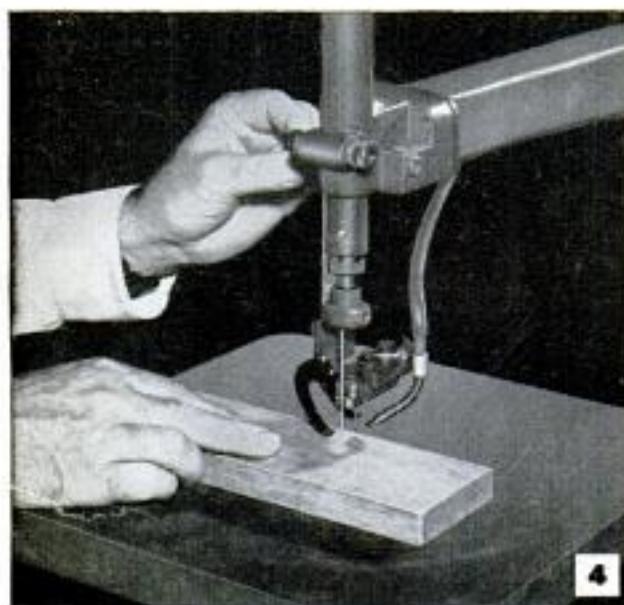
## TO BISECT AN ANGLE



# HOW WOULD YOU DO IT?



By Chris Nelson



**1. Q—What piece of auxiliary equipment can be rigged up in a minute for making straight-line cuts on a jigsaw?**

**A—**A fence will speed up and improve your straight cutting. You can make one from a straight board and a pair of C-clamps. It works well on any jigsaw or with a saber attachment for a radial-arm saw

**2. Q—How should one stand and place the hands for easy, comfortable jigsawing?**

**A—**Stand in front of the table. Use the left hand to guide the work and keep the blade on the cutting line and the right hand to feed the stock

**3. Q—What should be done to avoid blade breakage when changing from cutting thin stock to heavy lumber that is as much as 2 in. thick?**

**A—**Use a heavy blade, usually a coarse one. For stock from  $\frac{1}{2}$  to 2 in. thick, a good choice is a  $\frac{3}{4}$ -in. blade having about seven teeth to the inch

**4. Q—How should the spring hold-down be adjusted for easy and accurate jigsawing?**

**A—**Let the hold-down drop onto the surface of the stock. Then press down lightly and fasten it. Pressure must be sufficient to keep the stock from bouncing up and down, but light enough to permit moving the material easily and without being marred by the hold-down

**5. Q—What's the quickest, neatest way to cut uniform round-end slots within a board?**

**A—**First drill holes of the desired diameter at each end of each slot. Then simply cut away the material between the holes as shown top left, opposite page





**6. Q—How can a drum sander be used to sand curved work on a jigsaw?**

A—The sander is chucked in the lower blade jaw and to raise the work above the lower edge of the sander an auxiliary table is clamped to the jigsaw table. This can be merely a flat board clamped close to the drum or a hole can be provided to slip over the drum

**7. Q—How are internal cutouts made on a jigsaw?**

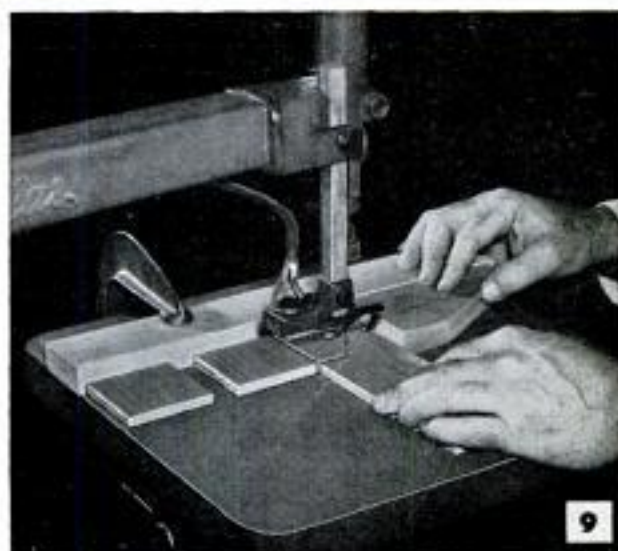
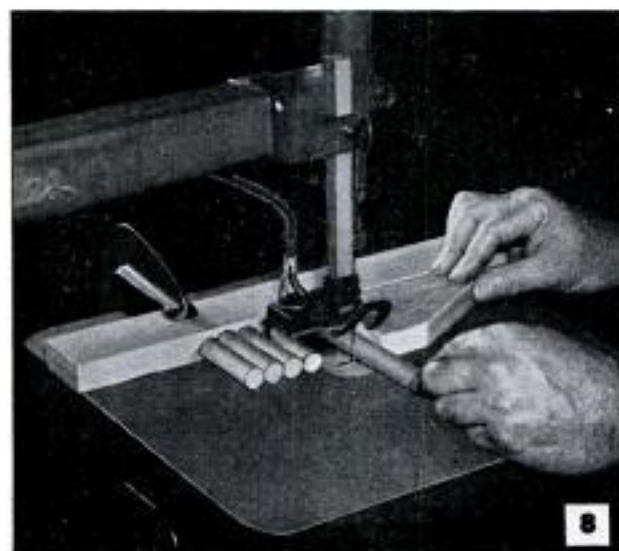
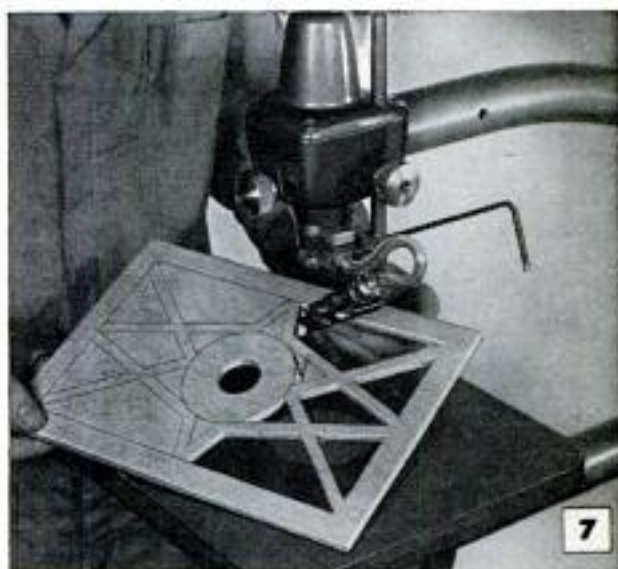
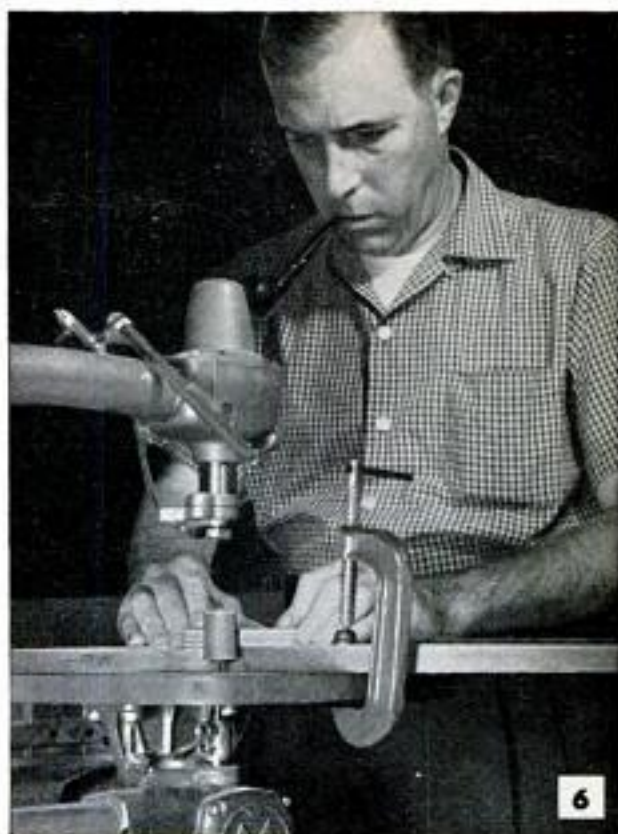
A—First drill a blade-insertion hole in waste area for each cutout. Loosen the blade from the upper chuck, slip it through the hole and then retighten the upper chuck. It's often satisfactory and much faster to use the jigsaw as a saber saw for this kind of work

**8. Q—How is a jigsaw used for cutting dowels to length for pegs, handles, glue joints and so on?**

A—It's difficult to cut off dowels quickly and neatly on a circular saw, but a jigsaw does it nicely. Use a fence as a stop and a backup block to guide the dowel squarely as it is pushed

**9. Q—What fixed rule about circular-saw work can be violated when cutting off duplicate pieces with a jigsaw?**

A—Use a fence as a stop so all pieces will be the same length. Never do this on a circular saw. As picture shows, use a square push block behind work



## Spring-Leaf "Tines" on Back of Hoe Speed Mixing of Concrete



To speed the hand mixing of dry ingredients for mortar and concrete, one contractor welded 6-in. lengths of automobile spring to the backs of the hoes used for the job. The ends of the spring sections are ground to a radius. Lumps in the ingredients are easily broken by the spring "tines" and material which settles in the corners of the mortar box is easily dislodged and mixed thoroughly into the bulk of the concrete or mortar.

Bob Poulson, Los Angeles, Calif.

## Scored Lines on Saw Table Assure Accurate Miter-Gauge Setting

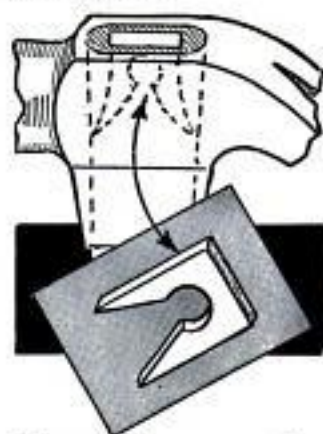
Scribing precise angular lines on a new saw table will assure future accuracy in setting the miter gauge, since the pointer on the gauge can be accidentally bent so that its accuracy cannot be depended upon.



To scribe the lines, set the gauge at the exact angle and run a sharp steel awl along the faceplate, marking for both right and left hand cuts. For future work, set the miter gauge flush with the line.

## Pronged Wedges Lock Handles In Ax and Hammer Heads

Hammer and ax heads are held firmly on their handles when steel wedges like this one are used. Each wedge consists of a piece of flat steel with a hole drilled in its center. Two hacksaw cuts into the hole form the two prongs, which are filed to a wedge shape. When driven into a wooden handle, the prongs spread, locking the wedge in place.



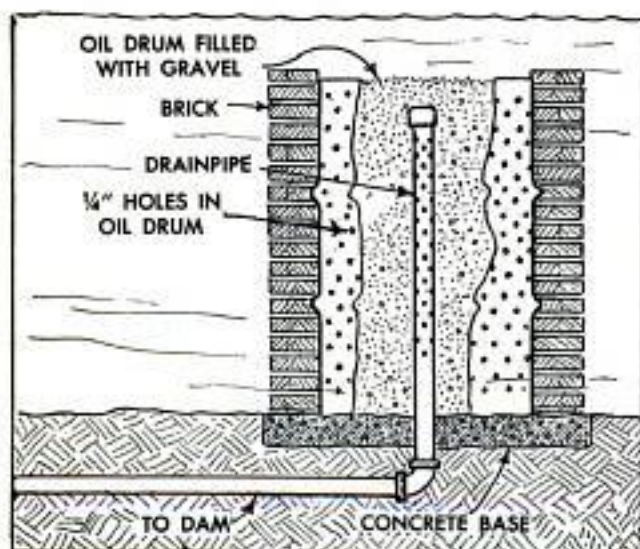
Stanley Clark, East Bradenton, Fla.

Paint accidentally dropped on the enameled surfaces of heavy appliances such as refrigerators can be removed with a cloth dipped in turpentine. Wash off the resulting film with hot soapy water, but do not rub.

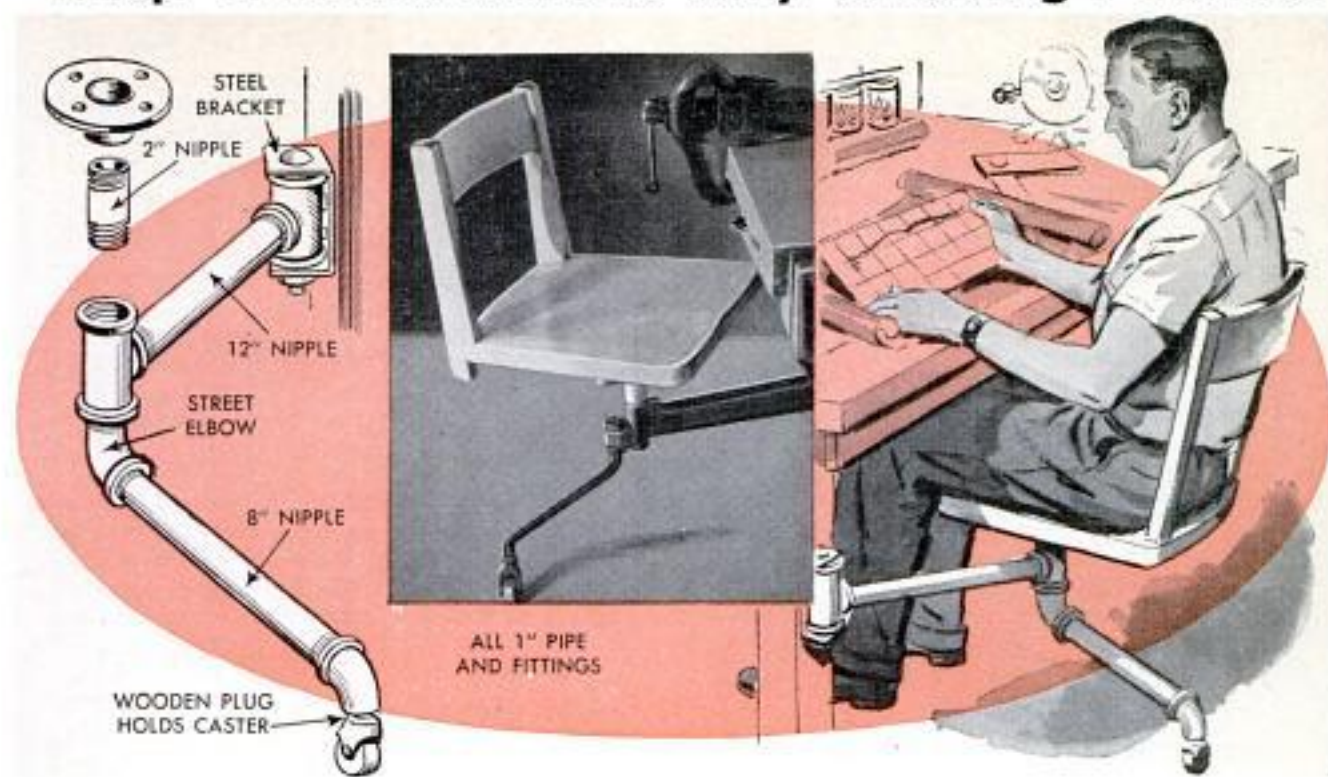
## Permanent Stock-Pond Filter

Farmers can equip their stock ponds with permanent filters by encasing gravel-filled oil drums in brick or stone as shown. Even after the drums have rusted away, the filter continues to operate. Erect a concrete base a few inches larger than the diameter of the drum with the outer edge serving as a foundation for the masonry. Remove both ends from an empty oil drum and perforate the side with numerous holes about  $\frac{1}{4}$  in. in diameter. Place it on the foundation and fill with a mixture of sand and gravel. Then wall up around it with bricks or small rocks, leaving the vertical joints free of mortar to permit seepage. The barrel serves as a form, and after it rusts away, the installation still remains intact and in effective operation.

Louis M. Reitz, Bourbon, Mo.



# Shop Chair Swivels to Any Working Position



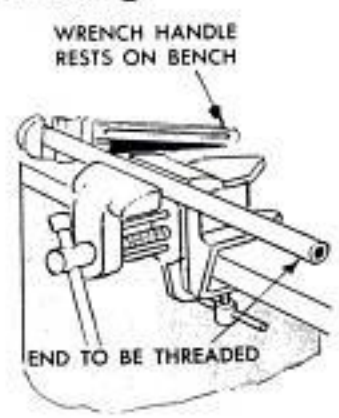
The original chair pictured was made by using a swiveling frame salvaged from a discarded typist's chair of the type having a pivot bracket that bolted to a corner of the desk. Although such swiveling fixtures are not now readily available, the same type of bracket, or frame, can be assembled from pipe nipples and fittings in the manner detailed. When finished you have a comfortable shop chair that swivels around the end of the bench. Make the pivot bracket from a short length of heavy steel channel. Drill and countersink holes in the

body of the channel for heavy screws. Drill the webs for a  $\frac{1}{16}$ -in. pivot bolt and screw to the bench leg. Next center-drill two pipe plugs (plugs must fit the pipe tee) to take the  $\frac{1}{16}$ -in. pivot bolt and turn these into the tee to serve as bearings. This assembly forms the swiveling head. From this point on the assembly is clearly shown in the detail. After assembly, the pipe tees are welded to the connecting 12-in. nipple. The chair seat and back can be made from hardwood in the simple design pictured.

D. C. Marshall, Manhattan, Kans.

## Pipe Wrench and Flat-Jaw Vise Hold Pipe for Threading

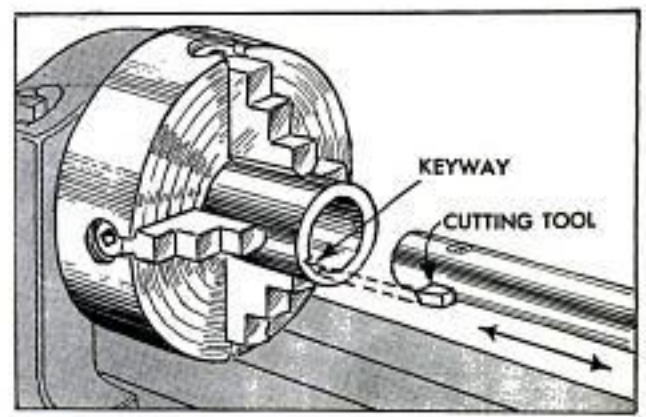
For small plumbing jobs where pipe has to be threaded without the aid of a pipe vise, holding the length of pipe with a pipe wrench and flat-jaw vise will prove satisfactory. Clamp the wrench firmly to the pipe and place the pipe in the vise. The wrench should rest against the top of the bench, so the cutting pressure of the die results in a tighter grip by the wrench, preventing the pipe from turning.



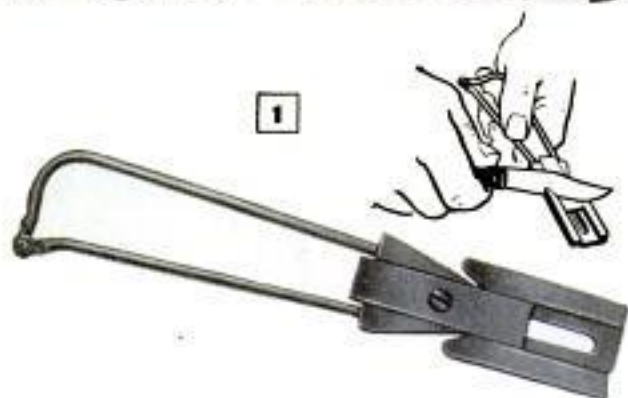
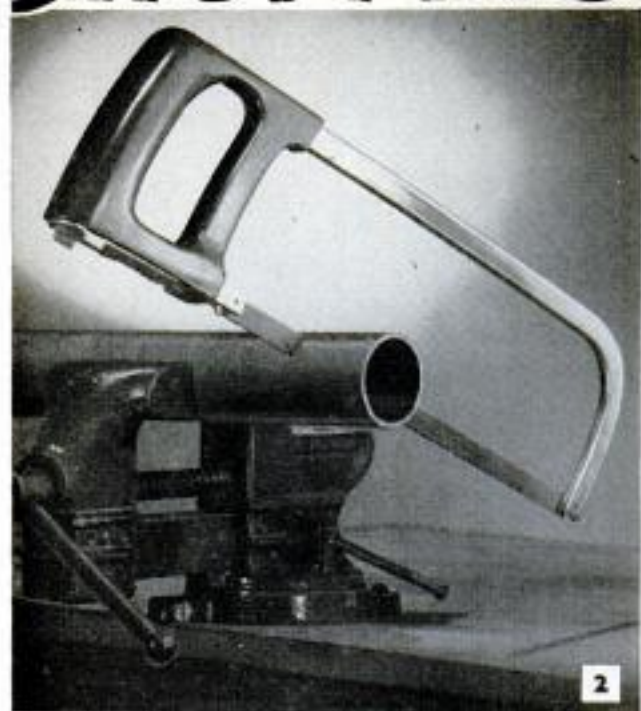
Howard E. Moody, Upper Jay, N. Y.

## Internal Keyway Cut in Bushing

A keyway may be cut on the inside of a bushing or pulley, mounted on a lathe, by means of a cutting tool attached to a boring bar as shown. The bar is moved back and forth by the carriage handwheel, and is adjusted by the cross-feed to take a thin shaving on each forward stroke.



# SHOPPING FOR TOOLS

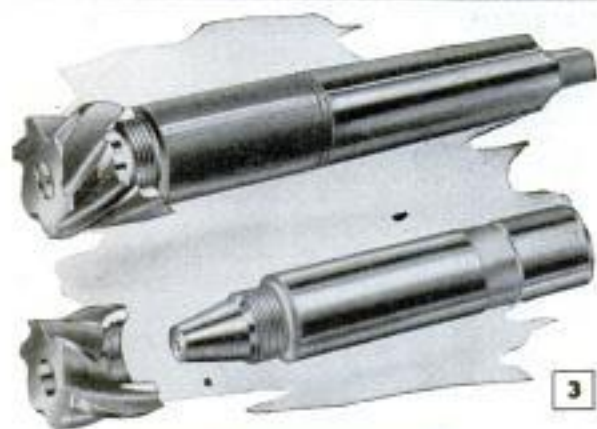


**1. HANDY HOUSEHOLD TOOL** combines a sharpener and useful glass cutter in one unit. Nearly all types of common edge tools can be sharpened with a few strokes by placing the blades, edge down, against the guides and drawing across the hardened cutter

Cash Co., Box 333, Beverly Hills, Calif.

**2. HACKSAW FRAME** adjusts to take 10 or 12-in. blades which are held at the proper tension by a cam-action locking device, the operating lever being located below the handle. Frame is of single-member construction, permitting work in close quarters

Clemson Bros., Inc., Middletown, N. Y.

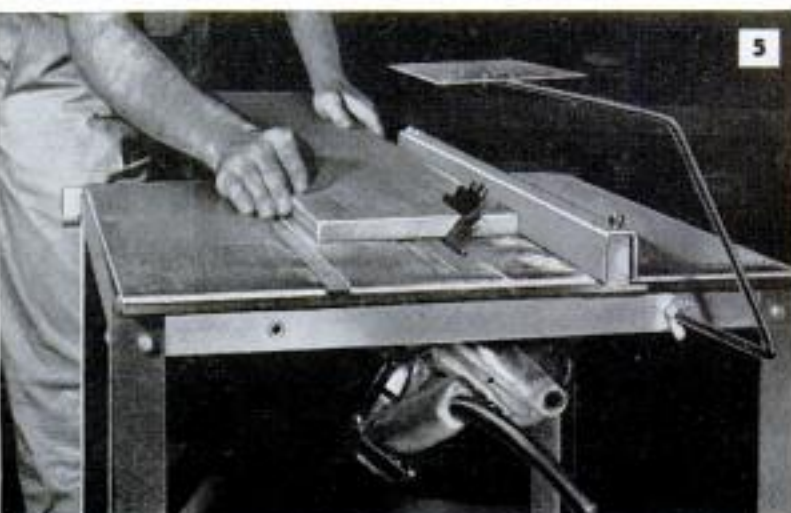
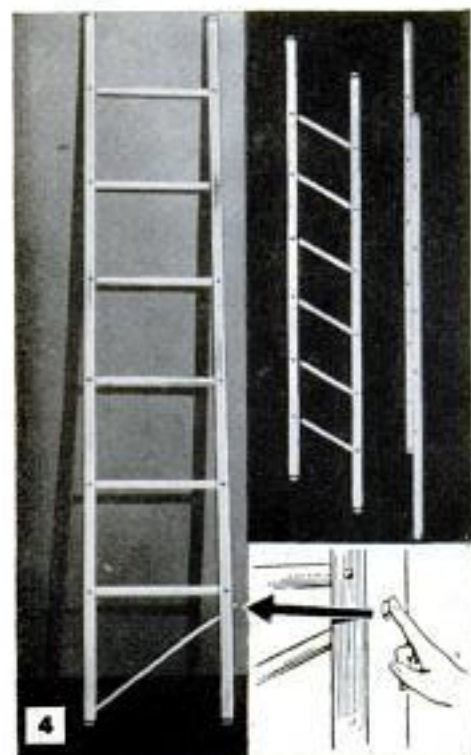


**3. REAMERS** with replaceable and interchangeable heads cut replacement costs in both small and large shops. Heads are automatically aligned when screwed onto the tapered shank. Straight and tapered shanks are furnished for heads  $\frac{1}{2}$  to  $2\frac{3}{4}$  in. in dia.

Tomkins-Johnson Co., Jackson, Mich.

**4. ALUMINUM LADDER** folds for storage in small space, making it especially suited to needs of homeowners. Angle brace locks in position when ladder is opened. Finger-tip pressure releases brace, permits ladder to fold. Available in 6 to 14-ft. lengths

Dalton Mfg. Co., 20 S. Central Ave., St. Louis 8, Mo.



**5. STATIONARY TABLE** converts portable electric saws into a tilting-arbor bench saw for making bevel cuts up to 45 deg. Equipment regularly furnished includes adjustable miter gauge, ripping fence and adjustable guard. Table top is aluminum. Legs are of steel

Black & Decker Mfg. Co., Towson, Md.

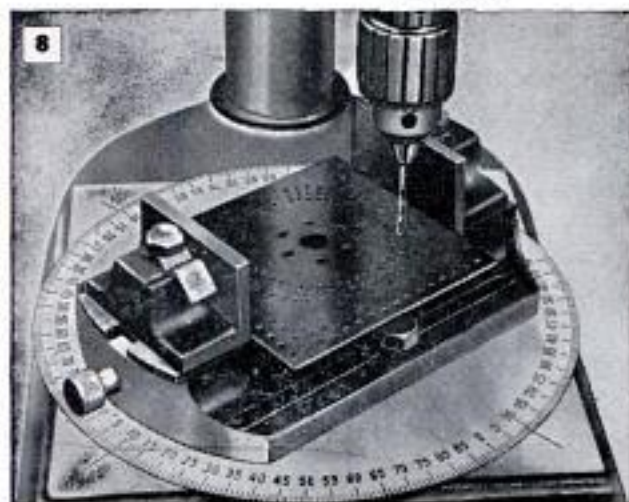


**6. TABLE-TOP MACHINE SHOP** for jewelers, instrument builders and modelmakers consists of a basic unit and accessories that make it possible to perform 10 machining operations on metals, plastics and wood, with accuracy to .0004 on metals. Attachments are available for metal sawing, threading, indexing and milling. Set up as a lathe, machine swings work up to 2 3/4-in. dia. Distance between centers is 7 in.

American Edelstaal (Amsterdam) Inc.,  
350 Broadway, New York City 13

**8. DRILL-PRESS VISE** has protractor for setup and indexing work, also quick-acting jaws that slide into position and lock by turning a single screw. Jaws can be swiveled to grip work of irregular shape. Protractor aids in layout and development of hole patterns, angular milling cuts and in routing relief work in wood. Work can be locked in vise and then shifted and positioned without swinging drill-press head

The K-Vise Co., Inc., 115 Farrand Ave.,  
LaPorte, Ind.



**7. SELF-CENTERING DRILLS** are especially designed and heat treated for applications requiring a shorter, stiffer drill bit which will withstand severe stress without breakage. Drills are self-centering due to specially ground split point (see enlarged view). This feature adapts the drill bits to sheet-metal drilling, and also contributes to more accurate work when bits are used in portable electric drills for drilling wood or metal. Available in the fractional sizes from 3/64 to 17/64 in., in all letter sizes and in wire-gauge sizes from 1 to 30

Chicago-Latrobe, 411 W. Ontario St., Chicago 10



7



**9. PENCIL-SIZE TORCH** uses gas cartridge similar to the type used in charging cigarette lighters. Each cartridge supplies fuel for approximately 30 min. of operation at full heat. Specially designed tip gives 3500-deg. pinpoint flame for soldering or brazing in hard-to-reach places. Flame is controlled or shut off entirely by turning cartridge

Kibbe Mfg. Co., Inc., Bloomfield, N. J.



9



## On the MARKET

for Do-It-Yourselfers

**SELF-ADHESIVE FLOOR FELT** makes do-it-yourself floor tiling nearly as easy as painting the walls. Felt is coated with a pressure-sensitive adhesive on both sides. You simply unroll it on the floor. Then strip off the protective backing from a small area and begin laying the tile, continuing to strip off the backing as you go

Spring Packing Corp., 332 S. Michigan, Chicago

**SLIDING DRAWERS** molded from phenolic plastic greatly simplify the construction of projects involving the making and fitting of conventional drawers. Molded drawers come with special lips and guides as in sectional detail at the left, and are easily fitted into any cabinet frame. The drawers will not warp, shrink, swell

The Richardson Co., Melrose Park, Ill.



**DRIVEWAY TOPPING**, lower left, not only is an attractive repair for old driveways of asphalt or concrete, it also acts as a sealer. Dries hard in 2 to 3 hr., ready for use. Won't soften from exposure to extreme heat or crack due to severe cold. Covers 50 to 60 sq. ft. per gal., depending on condition of surface over which it is applied

Sylvania Chemical Co., 8444 Broadway, Cleveland

**EXPANSION ANCHORS**, below, fasten shelf brackets, signs, conduit and downspouts to masonry quickly and securely. Just drill a 1/4-in. hole in the masonry, insert expansion sleeve, or rivet, and drive home the pin. Anchor consists of two parts assembled in a friction fit so that neither of the parts can be lost in handling

Southco Div., South Chester Corp., Lester, Pa.



# New! MAGNA offers America's finest tilt arbor saw!



## MAGNA 9-in. Saw with "The Helping Hand"

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knob • Externally adjustable Tilt Stops, easy to reach • Colored Safety Zone Table Insert cannot catch work piece • Exclusive pressure-cast tub front bolted rigidly to table, coordinates all controls • 3 Auto-stops on Miter Gauge • Inter-change Arbor for quick change of blades • Constant belt tension at any degree of tilt • Easily converted to largest capacity saw-jointer (operates at any height of blade) with Magna 4-in. Jointer and the inexpensive Magna Saw-Jointer Adaptor Kit!

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Pvt. Henry W. Luetkemeyer, Jr.  
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# Care and Feeding of Engines

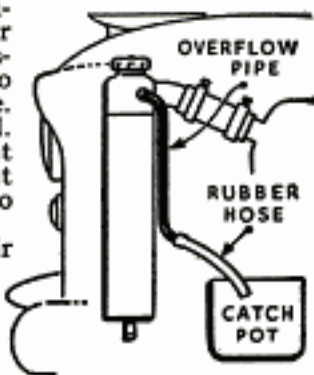


BY  
S. P. CORP

## AIRLEAKS CAUSE LOSS OF COOLANT

Air drawn into the cooling system may raise the level in the radiator causing loss of coolant through the overflow pipe. To check for air leaks on the suction side of the pump:

1. With water level in radiator at line stamped on its rear block, open radiator cap pressure valve and attach hose to lower end of overflow pipe.
2. Run engine in neutral. When gauge reaches constant operating temperature put free end of rubber hose into bottle, or catchpot.
3. A continuous flow of air bubbles out of the end of the hose is an indication that air is being sucked into the system through waterproof seal, lower radiator hose or cylinder head gasket.

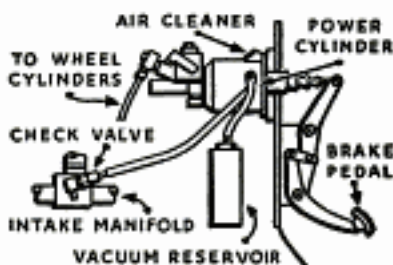


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## FORGOTTEN AIR-CLEANERS

Engine bearings, pistons, rings and cylinder walls wear rapidly when dirty air enters the engine. Even when the carburetor air-cleaner is kept clean the air-cleaner at the oil filler tube may be neglected, resulting in high oil-consumption.

If your car has power brakes, there is a third air-cleaner which must be serviced twice a year. Air is taken into the engine through the intake manifold when power brakes are released. If this air is dirty, it may be the cause of excessive engine wear. To prevent this, remove the air-cleaner hair filter, wash in a cleaning solvent, dry and re-install.



VACUUM BOOSTER BRAKE SYSTEM

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Write for your free copy of "Care & Feeding of Engines," a 24-page illustrated handbook of engine care which may save you a lot of time and money. When you re-ring, be sure to use SEALED POWER KromeX Ring Sets. Their chrome faces fight heat and friction, and they seat fast, control oil immediately, and give you double ring life. Sealed Power, Dept. G-1, 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.

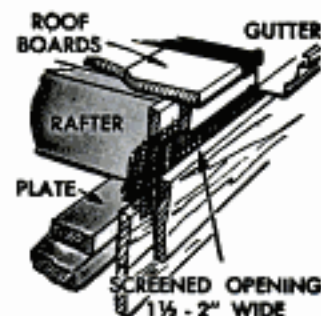


## Basket-Weave Fence

Q—I want to build a basket-weave fence but don't know how to determine the size of posts and boards to use. The fence will be about 5 ft. high and about 60 ft. in length. Should the boards be spaced or should they be placed edge to edge? What length boards should I use? Should the posts be set in concrete?

I. S., Fla.

Q—Ordinarily, for a fence of this height and length you would use 1 x 4 or 1 x 6-in. boards and posts about 4 in. in diameter. Redwood is an excellent choice, both for posts and boards, or slats, with western red cedar and cypress being about equally good as second choice. Some basket-weave fences now are being built using mill slabs, or bark cuttings, as the slats. This makes an attractive fence when the wood is finished with a creosote stain, or other outdoor stains such as are used on shingles. You did not say how you intend to finish the material. Ordinarily, 1-in. stock (3/4 in. actual thickness) is used for slats, the latter being about 12 ft. long. In this case the posts should be set about 6 ft. apart. However, if a tighter weave is desirable, then it's best to use 3/8 or 1/2-in. stock for slats, the length of each slat ranging from 6 to 10 ft. For permanence, the posts should be set in concrete.



## Venting Flat Roof

Q—I'm planning to build a home with a flat roof having no overhang. The roof will slope only slightly in two directions, with gravel and asphalt on top and an insulating board attached to the underside of the joists, or rafters. How can I vent the space between the rafters?

F. S., Ariz.

A—You can plan the structure in such a way as to provide a continuous screened opening, or spaced openings just below the gutter. Perhaps the continuous screened opening would be the simplest as the opening can be provided by using two narrow frieze boards, one nailed above the other to the ends of the rafters, with a space of about 1 1/2 in. between. In this we are assuming that the house is of frame construction similar to that shown in the sketch, which is not complete in all

(Continued to page 242)



### Automatic Checkout Counter

Automatic checkout counters will eliminate waiting time and jangled nerves for supermarket shoppers. Three-section speed-up units will be available this year. In operation, a conveyor belt brings packages within reach of a cashier who places them in a movable bin and presses a button. The groceries are fed into one of three bag sizes, tilted for pickup by the customer.

### Exhaust System Traps Lead

Lead particles, added to gasoline to increase antiknock qualities, are not a significant factor in city smog, says an engineer of the Ethyl Corporation, manufacturers of the lead additive. These particles are trapped by the car's exhaust system during partial-throttle operation, as in city driving. During subsequent high-speed driving, the lead is expelled on the open road, cleaning the system so it is able to trap more particles once city driving is resumed. Tests show, say the chemists, that only about 25 percent of the lead in the gasoline is exhausted in city-type driving. At full-throttle acceleration, the exhausted lead runs up as high as 1990 percent of the amount in the gasoline actually being consumed by the engine.

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**a cinch  
to handle**



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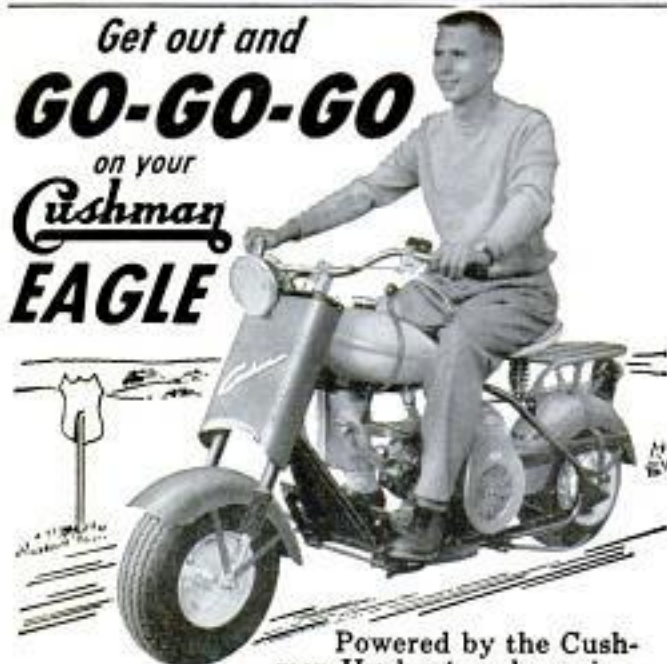
- regular soldering, sweat fittings,
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(Continued from page 240)

details. It is intended only to suggest the procedure which might be carried out. Use 14-mesh galvanized-steel screen or bronze screen and be sure it is drawn to a uniform tension before tacking in place. Galvanized screening can be painted for additional protection after it is tacked in place.

### Yard Fill

**Q**—My home is at the lower side of a slight slope and my neighbor's yards are graded somewhat higher than mine. During heavy rains my yard is flooded and some water seeps into my basement through the concrete-block wall. I had thought of having a concrete curb, or dam, built along the lot line. Would this help?  
C. E., Kans.



**A**—Perhaps, but a curb, or dam, as you describe it, may not be permissible under your local building code. You do not give the length of the lot, but in any case the construction of such a dam, or curb, would be quite expensive, as you would have to carry the concrete below the normal frost line for your locality. This procedure would require trenching to the necessary depth and the construction of a suitable form above grade. We think you will find it more satisfactory in the long run, also perhaps less expensive, to consider filling and grading your lot to prevent floodwaters from reaching the foundation walls.

### Concealing Metal Posts

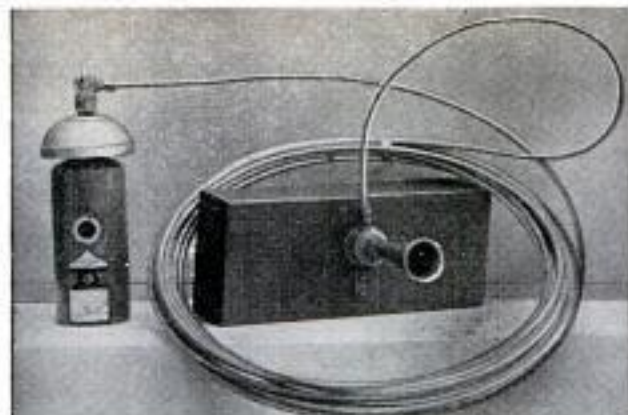
**Q**—The center beam in my basement is supported on round metal posts, or columns. I want to divide the basement into rooms and one wall is at the center directly under the center beam. I had thought of replacing the metal posts with wooden ones. Would this be practical?—C. S., N.J.

**A**—Why not consider boxing in the posts? Judging from your description, this would be the recommended procedure. Replacing the metal posts supporting the center beam would be a rather extensive undertaking, as the structure would have to be supported on jacks while the change was being made. Then, of course, there is the additional problem of adequate concrete piers. By boxing in the existing supporting posts you would avoid the extra labor involved, and by selecting the wood used in the square columns you would finish with an attractive job. A nailing base at the lower ends of the metal supporting posts is easily made by using two short lengths of 2 x 4 stock, each piece cut to the same length as the inside measurement of the proposed wooden column. Make a semi-circular cut in from the edge of each piece, the depth of the cut equal to half the diameter of the metal post. Then drill holes in each piece for bolts and clamp the two members to the column.

### Chimney Cover Prevents Leaks

**Q**—My fireplace chimney has a very large flue, about 8 x 16 in. During prolonged rainstorms water apparently comes down the chimney and seeps through to the plaster above the fireplace mantel. The plaster will have to be patched over a considerable area. But what can I do to prevent water entering the chimney flue?—I. N., Okla.

**A**—Probably the best procedure is to cast a concrete cover in a wooden or sheet-metal form, the outside dimensions being the same as the outside measurements of the chimney and the thickness about 3 in. The concrete cover should be reinforced with welded wire fabric. Cut the latter about 1 1/2 in. smaller each way than the inside measurements of the form. Pour about half the concrete, level it and place the fabric. Then finish the pouring. The cover thus made should be supported on bricks laid in mortar at the four corners of the chimney. These corners should be laid up two to three bricks high and the cover placed on top. Mortar the top faces of the brick columns before placing the cover.

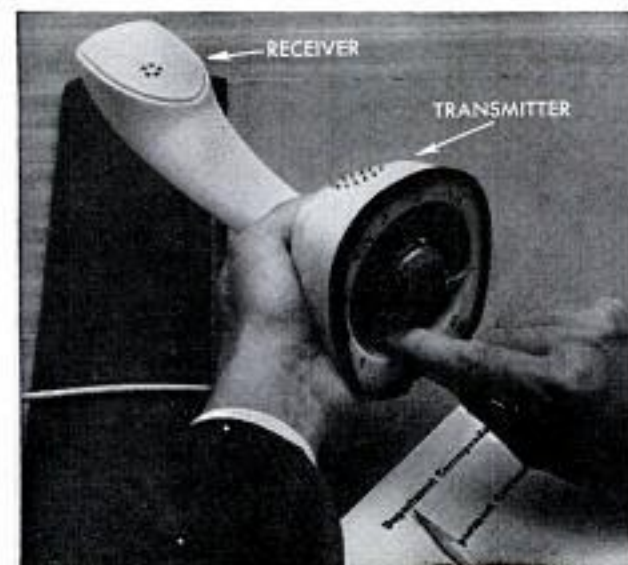


### Glass-Eye Monitor Checks Fire Alarm

Glancing into a nonmechanical, glass-eye monitor, a homeowner can verify that the fire detection system in his house is in good working order. The monitor is part of an automatic, nonelectric, self-contained fire-alarm network that depends on heat-expanded gas to set off a warning horn. The system can be installed by the average person. Containers, placed in the basement, attic and at the head of the stairs on the second floor, are interconnected by aluminum tubing. When heat from a fire raises the temperature of gas in a container, the gas expands and forces a lead plug, located behind the warning horn, out of its seat. Gas flows through the horn and sounds it for 18 minutes at a noise range of one half to three quarters of a mile.

### One-Piece Dial Telephone

Telephone numbers are dialed in the underside of a new one-piece dial-transmitting-receiving unit. When this device is lifted, a switch in its base begins line-connecting operations. Reseating the unit will disconnect the line.



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## Where an Angler's Thrill Becomes a Masterpiece

(Continued from page 134)

Working from thousands of notes made by personal observation, and from color photographs by the hundreds, the master goes to work with airbrush. "A lot depends on the pose," he explains. "Many fish change color for different activities. The deep bronze of a cruising dolphin flares into vivid blue and gold when he strikes at a morsel or fights a line. Pull him aboard and before you get home he'll be a leaden gray. The sail's famous royal-blue, black-spotted dorsal fin is actually dull brown when he's coasting along."

Reese starts by spraying a specimen white. Then successive layers of darker colors are superimposed until all the actual hues are achieved in the right places. On small specimens he may work with a tiny hand brush, accurately shading hundreds of minute scales.

After a week of drying, finished mounts are given a final coat of lacquer and shipped to their destinations at a rate of nearly 500 a month.

### Hardboard "Sails"

Save for the eyes, every exterior bit of a fish is usually the fish's original equipment. An exception is the majestic dorsal fin on a sailfish. The delicate membrane webbed between strawlike ribs is often tattered beyond repair during the battle to land him. Even if it weren't, the tissue would dry and crumble after a few years, and shipping it would be hazardous. So in Reese's shop you can watch men cutting and gluing paper ribs to hardboard "sails" which are substituted for the real sails.

The trouble with hardboard sails is that they limit the sinuous action you can put into the lithe body of a sailfish, and Reese doesn't like to be limited when he's striving for accuracy. So when he got a beautiful seven-footer one day, he put his ingenuity to work.

"I wanted it to be the most accurate mount ever made," he says. "I'd watched those beauties break out of the water too many times to kid myself into thinking that a simple arch was all they threw. They are a mass of fighting curves that I'd never seen reproduced."

Studying photographs and relying on memory, he worked three months on elaborate molds and preparations. Using the original bone ribs, split down the middle, he stretched a sheet of  $\frac{1}{32}$ -inch aluminum between them, curving it to conform to the fish's sinuous spine. The result is a

museum piece of perfect marine mounting.

The baby octopus that hangs in his reception room is a tribute to his ingenuity. To hide any trace of the incisions he skinned it from the underside, and saved the suction cups by using a rubber mold instead of a plaster mold. He reinforced the delicate tentacle tips and coated the entire creature with clear liquid plastic to give it a wet, slippery look. "On occasion, I've reconstructed damaged skins with glass cloth and polystyrene," he admits. "Actually, an entire fish could be made up of these materials and no one could tell it from the real thing if it were carefully executed."

### Young Taxidermists

Although he no longer mounts land creatures, Reese occasionally is jolted from bed by a ringing doorbell to identify or "stuff" a bird or animal some youngster has shot. One boy showed up at three a.m. with a dead rattlesnake and wanted to know how to tan the skin and whether the meat was good eating. "I've put together a set of basic do-it-yourself skinning and tanning instructions that I give those boys," he says. "If the kid comes back with a good skin, I criticize the job he's done, provide him with a set of eyes and start him off mounting his specimen. The country needs good taxidermists, and maybe some of those boys will help fill the vacancies."

Though he refuses to create freak mounts, the taxidermist on one occasion agreed under pressure to make up a composite fish from separate species for a famous sportsman who obviously wanted to perpetrate a deception. Annoyed, Reese carried out the assignment in such a way no one could be deceived by it. The marine "whatsis" stood 18 inches high, with dolphin's head flawlessly hitched to a tarpon's body and ending in a barracuda's tail. Besides giving it a buxom torso, he painted its lips carmine, put a come-hither look in the eyes and draped them with dreamy inch-long lashes!

Once a couple drove up to the studio in an ancient car. In the rear lay an eight-foot sailfish, brought in for mounting with the mistaken belief the charge would be but \$10 or \$15. (For an average sailfish, about six feet in length, the cost is \$100.)

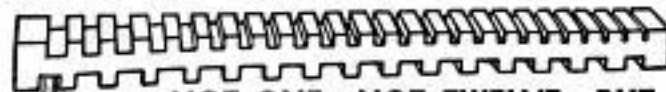
"They were so disappointed they almost had tears in their eyes," the taxidermist recalls. "When they asked if they couldn't pay for their fish at the rate of 50 cents a week, I hadn't the heart to refuse them."

"Most of the fish brought to me for mounting are far from record breakers," he continues. "They are preserved purely for the sake of recalling some particular thrill to a happy sportsman." ★ ★ ★

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## German Coal Ceramics Make Nonsoiling Ornaments

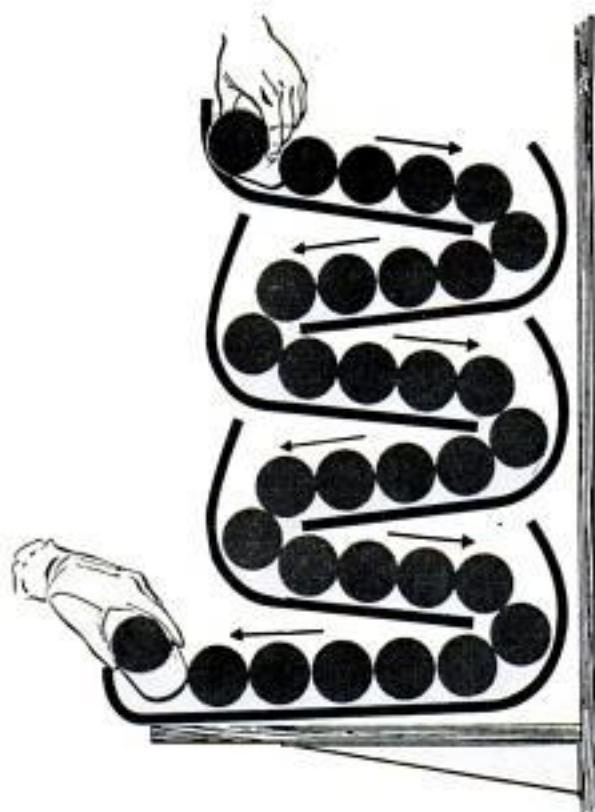
Handsome ornaments, such as wall plaques, clock faces and paperweights, are made of a ceramic material that is nothing more than clean pit coal molded under high pressure and baked. The finished product

is black in color, solid and nonsoiling. Its dark surface takes on a rich beauty when artistically lighted. A firm in Germany is using the coal ceramics to make many articles, both decorative and useful.

## Baby-Food Rack Uses Gravity to Dispense Stock

Gravity and inclined planes are the basis of a new plastic dispensing rack for baby foods. Canned stock is fed into the top of the rack and moves by gravity down angled planes to the front of the display unit for

selection by a customer. This apparatus saves time and space, provides continuous rotation of fresh canned stock, and eliminates breakage for the retailer. Uniformity of arrangement benefits the consumer.





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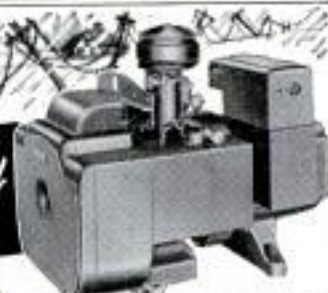
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## Goose Decoy Is Inflatable

Geese, failing to fall prey to hunters with a new, inflatable, extra-thick rubber decoy, just don't know enough to surrender. Sixteen different styles of 22 by 10-inch decoys with detachable feet and legs are available. Hand-painted and hand-molded, these false geese are made rigid by blowing or pumping air through a valve in the decoy's tail.



## Center-Line Steering—Better Than Power?

(Continued from page 163)

the wheels turn as easily as with power steering. All that is required is that the wheels are moving and steering effort is reduced drastically.

And there is also a drastic reduction in tire wear. Conventional front-end geometry has to have toe-in and camber. Center-line steering has neither—no toe-in, no camber. Therefore the tire is running straight down the road without scuffing.

With conventional steering (power-assisted or not) the tire is scuffed sideways about 50 feet for every mile of driving. Side scuffing is important in tire wear.

The 1951 Cadillac test car already has 65,000 test miles on its front tires. The tread has been inspected by tire-company officials who estimate the tires still have enough rubber to go a total of from 80,000 to 100,000 miles. And remember that those 65,000 miles were under test conditions for the most part.

Actually power steering can cover up a great many faults in a conventional spindle-steering system. Center-line steering eliminates many of these faults, but its designers do not claim it will make power steering unnecessary. They say it will more likely augment power steering. They visualize a future combination of the two.

Power steering is fine for parking and maneuvering at very low speeds. It is unnecessary (and, some say, undesirable) on the highway. These engineers visualize a low-cost, on-off power-steering unit that will operate only when the car is standing still or moving very slowly. On the highway, center-line steering will provide the safety advantages of power steering without its disadvantages and costs.

Developers of the center-line system, Transportation Engineering Components, Inc., of Benton Harbor, already are making these units for trucks. On trucks, where a front-wheel blowout can mean disaster, the stability of center-line steering is a sure-fire hit. And steering is easy. Big trucks steer as easily as passenger cars through city streets—all that is necessary is that the vehicle be moving. There is no jerking of the steering wheel when the truck goes over bumps.

The developers see a big future for the design in passenger cars and have been demonstrating the design to manufacturers. It is still uncertain, but if the acceptance by the truckers is any indication, you may be getting center-line steering in your new car within a few years. ★ ★ ★

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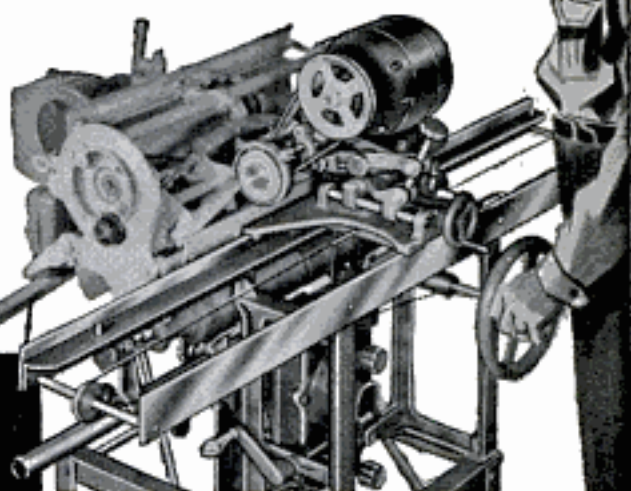
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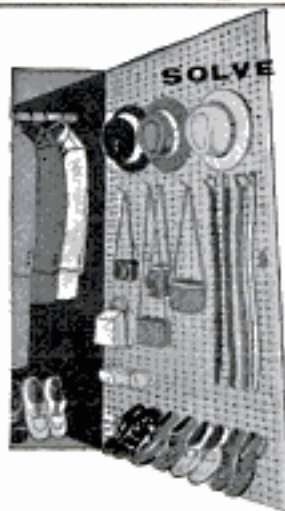
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## City With a Sinking Feeling

(Continued from page 155)

to the plant which has been converted into a pumping station to dispose of this water.

Combining and adding to possible solutions, Harbor Manager E. J. Amar and Chief Engineer Robert Shoemaker plus consultants have developed interlocking correctional measures. These include: Earth-filled dikes spotted strategically; consolidated earth levees with cores of impermeable muds and clays in locations used exclusively for oil production; elevation of low spots to positions above high tide and ground-water drainage; the raising of large, valuable structures to higher elevations, and bulkheads of steel and concrete to hold back the ocean at inside ends of ship channels.

Remedial work to date by all parties has cost more than \$50,000,000 with the Long Beach Harbor Department spending an estimated \$24,500,000. Another \$53,000,000 and possibly more money is believed mandatory for completion of future counteractive projects. Fortunately, tremendous oil and gas production on city-owned land administered by the Harbor Department provides funds for these activities. From 1000 wells pours a stream of oil and natural gas totaling \$24,000,000 annually. These wells are located on "made" land, consisting of sand and silt pumped from the harbor floor during the dredging of shipping channels.

Ironically, there are two compensations that please engineers battling the weird land recession. Since the floor beneath shipping channels is sinking also, dredging to deepen these channels is no longer necessary, and all efforts can be directed to correction of the complex problems ashore. The second compensation is that subsidence actually causes the oil field to yield more gas and oil than it would otherwise. In pressing down on the field, the sinking soil forces older wells to produce longer than expected. This "milking dry" process usually is accomplished by water-flooding or gas-repressuring techniques.

Long Beach has chosen to challenge its destiny, and by so doing to enrich itself from the earth shrinking beneath the city's foundations. Perhaps, 1972 will be the year of decision. ★ ★ ★

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## Goal No. 3—Disease-Free Crops

(Continued from page 168)



New spray gun for home use holds fungicide in plastic bag. Such sprays help prevent plant diseases

percentage of plant diseases. So far there are no "miracle drugs" in this field.

Plant-disease control, though, has emerged from its patent-medicine stage. In the past 25 years hundreds of chemicals have been tested and a few dozen improved fungicides and seed disinfectants are now on the market.

On small-grain seed, organic mercury compounds are effective against many diseases, are not likely to harm the seed and are easy to apply. Several other organic compounds such as thiram, captan and dichlone are widely used on corn, vegetable and flower seeds. Some of these compounds, along with such well-known antibiotics as streptomycin, can be used safely on cut-potato seed pieces, protecting them against decay organisms.

Of the new foliage sprays and dusts, the group known as dithiocarbamates probably is the most successful. These include such unfamiliar names as ferbam, zineb and maneb. The old stand-bys, of course, were Bordeaux mixture and sulphur. The new ones are a little more effective against a greater number of disease fungi; they stick

to the plant better and injure it less; they are a little easier to use, but generally no cheaper.

These foliage sprays and dusts are poisons that kill disease fungi before they can penetrate the plants. All susceptible surfaces of the plant must be covered, so their application requires good spraying and dusting machinery. Airplanes sometimes do the job on larger acreages. Repeated applications must be made, both to cover new growth and to replace the fungicide washed off by rain.

Spraying or dusting with fungicides is a tedious and expensive job, but so far we have no better answer to the problem. Fungicides effectively control such diseases as apple scab, potato late blight and the mildews and blights of other plants. We've usually considered them too expensive for use in controlling the rusts of cereals, but recent improvements in machinery have touched off new experiments to learn whether such applications might now be profitable.

### Chemicals That Penetrate Plants

Plant pathologists have always hoped that someday they would find chemicals which would actually penetrate the plant, diffuse to all parts of it and protect it from disease. Such chemicals could be applied to the soil and taken up through the roots, applied to the seed or sprayed on the leaves and absorbed through them. They would protect the plant against infection or even cure it of disease.

We've edged closer to this goal in the past five years. We've borrowed medicines from the family doctor. Certain antibiotics, notably streptomycin, will penetrate the plant, move through it and protect it against infection. Some synthetic chemicals move through the plant in the same way and show promise of controlling virus diseases as well as those caused by fungi and bacteria. If such toxic chemicals prove practical, they may revolutionize plant-disease control. At that time plant pathologists will have a truly spectacular announcement to make to the world.

Meanwhile, streptomycin is preventing some bacterial diseases that have never been controlled with chemical sprays. Apple fire blight, bacterial blight of beans and other diseases have been prevented with low-concentration sprays of streptomycin, applied several times during the season.

Streptomycin and another antibiotic, actidione, also will control certain fungus diseases. Actidione wipes out powdery mildew and rust on apple leaves.

(Continued to page 254)



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Actually, antibiotics probably control a great deal of disease without any help from man. Many microbes in the soil fight each other. The bacterium that causes ring rot of potatoes is a good example of a pathogen that is quickly killed by other microbes in the soil.

Can we find organisms which will fight plant pathogens, and add them to the soil artificially? This usually is ineffective because the nature of the soil determines which organisms will survive in this microscopic world. A fungus that kills a second one in the laboratory may itself be destroyed by a third one in the soil.

Our well-known medical antibiotics came from the soil originally, and sometimes through cultivation we can help the natural antibiotics in the earth. For example, in some areas, green rye plowed into the soil stimulates the growth of bacteria that fight off the pathogen causing potato scab.

Florists long have known that steam or chemicals will wipe out plant pathogens in the soil. Such methods have been used only in greenhouses, seed beds or on high-value crops because they are so expensive. Usually the soil must be sealed so the chemicals will not escape too fast.

Improved machinery for applying the chemicals, and plastic films for covering the soil have cut the cost of using these chemicals. The most important of the chemicals are chloropicrin and methyl bromide, but two new materials with tongue-twisting names, dichloropropene and dichloropropane, have been found especially effective against nematodes. Furthermore, they can be applied with field machinery and require no soil cover. They are a great advance in soil treatment, controlling nematodes of tobacco, pineapple, cotton and vegetables. Still other chemicals, such as (hold your breath) pentachloronitrobenzene, can be applied as solids and hold promise of controlling cabbage club root and potato scab.

### Disease-Resistant Plants

We should not discount the possibility of curing plants or making them immune to disease by chemical treatment. However, striking progress is also being made in the use of disease-resistant varieties of plants.

Many such varieties are available today: Peas, watermelons and flax resistant to soil-borne wilts; wheat and oats resistant to certain rusts and smuts; potatoes immune from certain viruses. Indeed, were it not for such resistant varieties, some crops such as flax could not be grown at all economically. It often is less work for

the farmer to raise disease-resistant varieties than disease-susceptible ones. Many farmers using such varieties are unaware that they are resistant, or even of the disease they are resisting!

But even these special varieties are not the complete answer. Change is the law of life. Fungi and bacteria are living plants, mostly microscopic in size, but living nonetheless, and even the viruses behave in many ways like living things. They keep changing. While man breeds new varieties of wheat, oats, corn, rice and potatoes, nature breeds virulent new races of plant pathogens. Varieties may be resistant for a number of years, then succumb to new races of fungi which nature spawns. It is the age-old battle of man against nature.

### Two-Front Attack

Plant pathologists are attacking this problem on two fronts. First, they are learning much more about present and possible future races of parasites, so they can predict what they will be up against. Second, they are finding out more about *what* protects some varieties against disease. Through such basic, painstaking research, man is gaining on nature.

Farmers, for the most part, would be amazed to know how much more disease resistance is "built into" our principal crops than there was 25 years ago, and more is being added continually. Listen to the roll call. Flax wilt and flax rust have been kept under reasonably good control. The damage from smuts of corn and some small grains has been greatly reduced. Because of semiresistant varieties, seed treatments are now effective in controlling the stinking smut of wheat that destroyed or befouled huge quantities of that grain in the Pacific Northwest a few decades ago. In some areas, blight-susceptible potatoes must be sprayed at least eight times, but new varieties have enough built-in resistance to require only four sprayings—a considerable saving to the farmer. Improved varieties of bread wheat in the spring-wheat region of the United States and Canada will yield half a crop in a bad rust year, while susceptible varieties yield almost nothing.

But most encouraging of all is the fact that the intelligent farmer now realizes the complexity of plant-disease problems and what he can do to help solve them. He continues to hope that miracle drugs or completely disease-resistant varieties will relieve him of his plant-disease worries, but he is realistic enough to learn what he now has to do to control diseases. Not only is he supporting research, but he is applying the results more intelligently. ★ ★ ★



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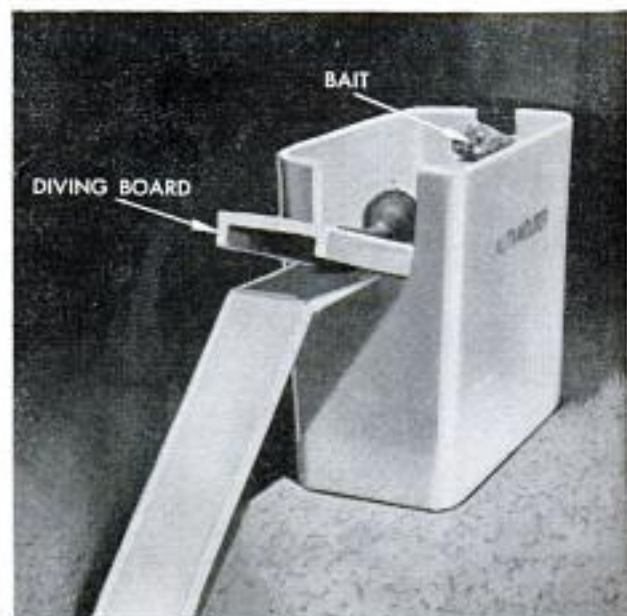


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## Big Mack, the World's Longest Suspension Bridge

(Continued from page 141)

The spinning of these big cables is a fascinating operation to watch, and begins as soon as the anchorages and towers are ready. The cable-spinning crew, highly trained engineers and bridgemen of the American Bridge Division of United States Steel Corp., finished the cables on the Walt Whitman Bridge, crossing the Delaware River at Philadelphia, just in time to begin spinning the cables on Big Mack.

Their first job was to swing the two long footbridges from anchorage to anchorage, across the tops of the towers in the same arcs that the cable was to travel. A walk along this footbridge is perfectly safe, but it is not a stroll for the weak of heart. The floor of the footbridge is made of chain-link fencing, so that any time the stroller glances down, he can see the blue water of the straits between his feet and it's a long way down. As he approaches either tower, he is well over 40 stories up.

After the footbridges were strung, master wires were stretched across—one for each cable—and then carefully surveyed. Once adjusted to the proper sag, these wires served as patterns to which succeeding wires were spun.

The basic spinning rig consists of a wheel, four feet in diameter, which is pulled back and forth across the bridge on a tramway by an endless hauling rope. This rig is held over the footbridge by sheaves on pipe frames supported by the tramway cables, which are located on top of the towers and periodically along the footbridge.

To begin the spinning, a reel of bridge wire weighing 32,000 pounds is hoisted in a rack on the anchorage, and wire from it is fed through a floating-sheave tower. The purpose of this tower is to maintain a constant tension on the wire as it is fed into the cable, which it does by means of a heavy chain hung from its floating wheel. After leaving this tower, the wire is routed to the cable-anchorage pit.

The first wire is anchored—it will later be spliced to the last wire so that one half of each strand will be one continuous wire—and then it is looped over the grooved rim of the spinning wheel. Then the wheel moves out of the anchorage pit and starts the long climb to the top of the first tower. As it moves, it pulls wire from the reel which pays out around the wheel and into its place in the cable.

The wire paying out of the reel is called the live wire, because it is moving; once

(Continued to page 262)

POPULAR MECHANICS



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"I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back with repeat orders." —Len Crego.



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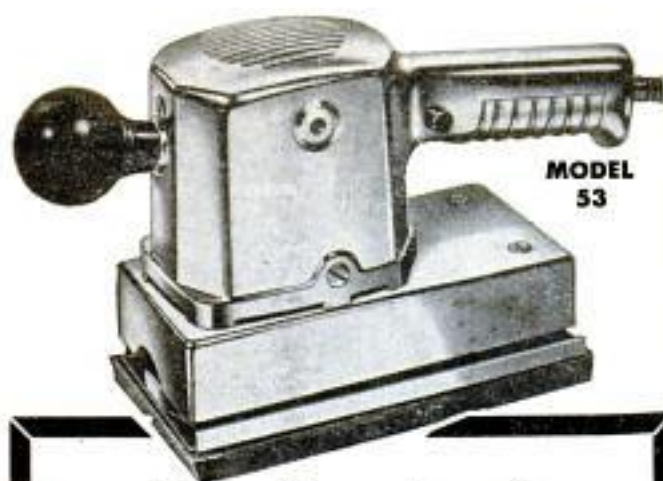
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JANUARY 1957

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ARKANSAS TRAVELER BOATS, 2006 E. 14th St., Little Rock, Ark.

the wire circles the wheel, it no longer moves, and becomes the dead wire. As the wheel passes stations along the footbridge, bridgemen reach up and pull the dead wire temporarily down into hooks in the floor of the footbridge.

When the wheel reaches the other anchorage after an 18-minute trip, it is stopped. The crew pulls the loop of wire from the wheel, and places the loop over its permanent anchor—called a strand shoe. The wires are removed from their temporary positions along the footbridge and tensioned to their correct locations in the strand. Then the live wire is picked up once more and looped around the wheel again. This leaves the dead wire anchored to the strand shoe and the live wire free to pay out.

In this manner, the spinning continues until all the strands are finished. One half of each strand is actually spun from one continuous length of wire, looped around the strand shoes on each side—much in the same manner as a housewife wraps her knitting yarn around her husband's extended hands before balling it. When the wire from one reel is exhausted, the wire from the next reel is spliced in.

In actual operation, the spinning wheel carries two loops of wire at a time, and two wheels operate simultaneously, one leaving each anchorage at the same moment and passing in the middle of the bridge. Thus it is possible to spin four strands at the same time, if the wheels are alternated every other trip.

When all of the wires for a strand have been spun, the strand is bound with narrow metal bands. When all of the strands have been completed, a compacter is placed on the cable which compresses it into its final circular shape.

After the suspension span is completed and is hanging from the big cable, it is wrapped over its entire length with galvanized wire as a protective measure.

Big Mack was begun in 1953, and will cost \$99,800,000. Traffic surveys indicate that enough cars will use the bridge to pay for it by 1975. Dr. D. B. Steinman, the bridge's designer, planned it so that high winds would have little effect on it. Aerodynamically, the suspension span serves virtually as an airplane wing when the wind blows across it. To prevent lift from developing at such times, the outer traffic lanes on the roadway will be concrete topped with a bituminous material, while inner lanes will be open iron grillwork.

The cable spinning was completed before the end of the 1956 construction season and the bridge is scheduled to be opened for service next November. ★ ★ ★



### MASTER & SLAVE HYDRAULIC REMOTE CONTROL SET

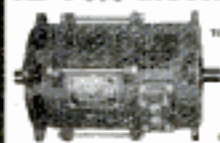


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When master control lever is moved, slave lever follows exactly. Light, compact, aluminum alloy construction.

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• For electric wheel chairs (Pop. Mech. design—Mar.-1953)  
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Rated 1 H.P., 100 amps., 6000 R.P.M., 12 volts, D.C.—This double shaft motor of ball-bearing construction may be run on 6 volts for lower horsepower requirements—Standard 1/2" shafts, flange mounting. Dimensions: 2 1/2" x 4 1/2" x 2 1/2", wt. 19 lbs. A real **12.50** F.O.B. Chicago value at.....

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75 gallons per minute **ITEM #414**  
@ 2400 R. P. M. Higgins Type PNB, Model R, marine bilge pump. Open Impeller design for handling muddy water. Delivers 75 gallons per minute, 30 foot head with 3/4 H.P. motor. Pump body and impeller are made of solid bronze, with alloy steel 1 1/2" diameter shaft, 1 3/4" long. Rotation of the pump is clockwise. Inlet has 1 1/2" pipe thread. Plain 1 1/2" outlet for hose connection. Dimensions 12" x 7" x 8". Shipping weight 23 lbs. F.O.B. Chicago. **23.50**

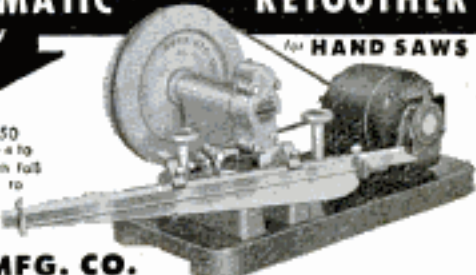


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## Dual Input Transistorized Preamplifier

(Continued from page 180)

determine if the preamplifier is operating properly. A phone plug is connected to the meter leads as shown in Fig. 4 and is plugged into the test jack, J2. When the switch of the preamplifier is turned on, there will be an instantaneous current flow of about 5 ma. through the meter. After a few seconds, as the electrolytic capacitors become charged, the current will taper off to about 1.5 ma. and remain at that value. After the test, the meter may be removed from the circuit.

The meter can also be used to check the condition of the batteries after prolonged use. If the normal operating current should drop to less than 1 ma. the batteries are getting old (and possibly noisy) and should be replaced.

### Operation

For proper performance, the load impedance for the amplifier should be high (250,000 ohms or more). This condition is satisfied by most audio amplifiers and radios designed for phono operation. It is merely necessary, therefore, to connect a shielded lead between the output jack of the preamplifier and the phono input jack of the main amplifier or radio.

Shielded cable should also be used between the magnetic phono cartridge and microphone and their corresponding preamplifier input jacks. These cables, if left unshielded, could pick up hum which is not inherently present in the preamplifier.

Shielded cable consists of an insulated center conductor, surrounded with a copper-shield braid. To attach a phono plug to the end of such a cable (phono plugs are needed to match the input jacks of the preamplifier and also the phono jacks of most amplifiers and radios), unravel the shield braid to about one inch from the end of the cable. Strip the insulation from the center conductor for a distance of about ½ in. and insert this conductor in the center hole of a phono plug. Solder this conductor to the plug at the point where it protrudes through the front tip, and cut off any excess length. Then, solder the previously unraveled shield braid to the shell of the plug. Secure solder connections must be made if hum or intermittent operation is to be avoided.

Preassembled cables with almost any type of plug that might be required are commercially available.

The mike input of the preamplifier is

(Continued to page 266)

POPULAR MECHANICS

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designed for a low-impedance (dynamic) type microphone. When used with high-impedance (crystal or ceramic) phones, a step-down microphone transformer is required. Proper connection of such a unit is shown in Fig. 5.

The magnetic phono input is low impedance to match the output of magnetic (variable reluctance) phono cartridges, such as G-E, Pickering, etc. A crystal cartridge should never be connected to either of the preamplifier input jacks since the high output voltage of such units will overdrive the preamplifier and cause severe distortion.

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## Inflated Safety Shoes Aid Search for Mines

British sappers working in fields which have been sown with antipersonnel mines will be wearing weird safety shoes. The shoes, looking something like a novel type of snowshoe, are inflated and attached to the regulation shoe. Presumably the shoe distributes the weight of the sapper widely enough to avoid setting off mines under the surface, though precise information is not available. The shoes are still on the secret list in England, though they were displayed at a recent exhibition of war techniques.



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Can be used for pumping fuel, oil or where-ever hydraulic pressure is required. Pump has 1" connections, built-in relief valve, adjustable up to 1500 lbs. Max. capacity 6 GPM. 1 1/2 H.P., 24 volt motor, 4000 RPM. Can be used on 12 to 36 volts. Approx. GOVT. COST \$350. NEW — \$10.95.

**SPECIAL HYDRAULIC MAKE-UP KIT**  
KIT No. 25—1 ea. Bendix Hydraulic Pump & Motor, 2 ea. Hydraulic Cylinders—7/8" stroke, 1 1/4" bore, 3/4" shaft, 13" overall. 1 ea. 4-way valve, 1 ea. hydraulic pressure gauge, 2000 lb. pressure dial, 1 ea. purifier oil filter. Approx. GOVT. COST \$500. Shng. Wt. 38 lbs. New—\$30.50.  
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## How to Plan That Vacation Cabin

(Continued from page 100)

means of anyone. Returning to the subject of fire hazards, a dependable well-operating cookstove is an important safety factor in an isolated place.

A vacation house, whether it is a floored Army-surplus tent, a log cabin or a luxurious chalet can be a heaven-on-earth place. Fortunate indeed is the family who can spend peaceful, pleasant hours in an atmosphere far different from their workaday world. Small Davy Crocketts discover the "wild frontier." Dad comes into his own as an expert on the ways of a man with a fish. The starry firmament and beautiful simplicity of nature are rediscovered. Birds and their calls are known. The tissue of life is woven from memories—plan the site of yours carefully! ★ ★ ★

### CHECK LIST OF THINGS TO CONSIDER IN PLANNING A VACATION CABIN

- 1—Is the distance too great from your home for quick week-end trips?
- 2—If a site is decided upon, can you get clear title? Is the zoning, if any, compatible to your plans—what restrictions must you abide by?
- 3—Is the road leading into the cabin site passable at all times and under all conditions? How much will it cost for maintenance?
- 4—Are the facilities such that all members of the family can equally enjoy vacation pursuits?
- 5—Will local regulations of the proposed area prevent specific family hobbies such as a shooting range or motorboating?
- 6—Is the water supply pure, adequate, inexpensive to install?
- 7—Can the conveniences of electricity, plumbing and telephone be installed at a price you can afford—either now or in the future?
- 8—How close is a fire station, the police, a hospital?
- 9—Do your plans call for adequate built-ins?
- 10—Are you incorporating as many prowler-proof and weatherproof precautions into your vacation cabin as possible?
- 11—Do you have an over-all, methodical plan of construction?

### Hogs Eat Feathers

Hogs are eating feathers in a research project at the University of Tennessee. Feather meal, much cheaper than soybean-oil meal, is a rich source of crude protein. The feathers are steamed or mixed with lime and cooked to make them digestible. The feather-fed hogs are eating less to gain the same amount of weight and apparently are thriving.

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Model A—Rugged professional type adjustable saw. Will cut any angle from 0 to 45°. Has adjustable 0 to 6" rip fence. Safety trigger with switch on handle. Full 1/2 HP universal AC-DC 110-120 volt 60 cycle motor. Weighs only 6 1/2 lbs. Extra saw blade available in rip, crosscut or combination... \$2.25 each

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Cuts a Full 2 1/4" at 90° and Will Cut a 2 x 4 at 45°  
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Tremendously rugged ball bearing saw, ideal for continuous rough use. Full 1 HP universal 115 volt AC-DC 60 cycle motor. Power, long service and ease of handling are derived from streamlined design which incorporates a precision dynamically balanced fan-cooled high speed motor—equipped with adjustable riving guide from 1/4" to 8" graduation. Net weight 11 1/2 lbs. Extra combination blades available at \$2.25 each.

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NOW! Sale Price Chuck and Key  
For heavy duty industrial use. Built for years of rough, tough use. Powerful motor gives 1 1/2" capacity in wood and 1/2" capacity in steel. 2000 RPM universal wound AC-DC motor. Voltage features adjustable 115v. AC-DC 2 amperes. Weigh 3 1/2 lbs. 9 in. overall. Lightweight aluminum housing takes effort out of long drilling jobs and perfectly designed pistol grip assures steady one hand operation.

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SAVE \$16.00 Equipped With  
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Powerful 1/2" drill features a 450 RPM 4.5 amp. universal AC-DC 115 volt 60 cycle motor. Aluminum die casting combines strength and light weight durability. Weigh 9 lbs. The low weight to power ratio provides comfortable handling without fatigue. Instant release lock type trigger switch. Precision 3 saw chuck. 7 foot rubber covered 3 wire cord with adapter and plugs.

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12 ft. ....	\$3.25	40 ft. ....	\$6.85
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Protects WATER PIPES Against Freezeups!

Keeps water pipes above, below ground warm, safe from freezing! Pipes stay warm all over. Heat's distributed evenly along entire length of tape. Twin insulated heat cables run entire length of tape, end in lead wire, plug. Wrap tape around pipe, cover with heavy-duty outer covering, fasten with gummed vinyl tape. Plug in on cold days. Unplug on warmer days! Also protects house trailer plumbing, water pumps, etc. You get: heat tape with twin attached cables, insulating wrap, vinyl tape, instructions.

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6 ft. ....	\$2.95	24 ft. ....	\$5.75
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Also Available—Easy Heat Thermostat. Saves you money! Attach directly to surface protected by Easy Heat Cable or Tape. It turns heat on when temp. approaches freezing, turns heat off when temp. rises. **\$5.95** ppd.

keeps water pipes above, below ground warm, safe from freezing! Pipes stay warm all over. Heat's distributed evenly along entire length of tape. Twin insulated heat cables run entire length of tape, end in lead wire, plug. Wrap tape around pipe, cover with heavy-duty outer covering, fasten with gummed vinyl tape. Plug in on cold days. Unplug on warmer days! Also protects house trailer plumbing, water pumps, etc. You get: heat tape with twin attached cables, insulating wrap, vinyl tape, instructions.

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 200 HOLLAND AVE., BRIDGEPORT 9, CONN.

## Clymer Drives the 1957 Chevrolet V8

(Continued from page 107)

The rear-axle ratio is 3.36 to 1, but the engine has ample power to handle this rather high choice. Economy is average for such a fast and powerful engine. Premium gas should be used, in my judgment. The gasoline tank holds 16 gallons, which is not enough.

The bumpers offer good protection, front, rear and around the sides. The front bumper and grille are a unit made up of eight sections to make it more economical to repair in event of damage. There is a 16-inch open space between the radiator and the grille. Wheel openings extend high into the fenders, fine for checking air pressure and changing tires.

All-around visibility is good. Instruments are grouped conveniently. Instrument visibility is excellent except that the full-circle horn ring annoys me as it is directly in the line of view of the speedometer dial. Warning gauges are used for oil and generator. I prefer needles.

The two-spoke steering wheel is very flexible, probably a good feature in the event of an accident. The hub is recessed.

The ignition key, as in other GM cars, can be removed with the engine still running. This feature can be a disadvantage.

The new ventilating system brings the fresh air into the body from intake scoops directly above the headlights. The scoops are hidden by the fender tips. Ducts carry the air into the passenger compartment.

The throttle and brake pedals are well located in height, being about the same level in the off position. The parking brake requires more pull than most and the handle is too far away from the driver.

There is adequate space in the glove compartment, well located in the center of the dash. For improved sound distribution, the radio speaker is now aimed upward at the windshield from the center of the instrument panel.

The body is solid and no dust leaked in, nor did any water enter under a high-pressure hose test. It is well insulated and has a minimum of wind noise or body rumble.

Chevrolet has, in my opinion, the best operating door handles, inside and out, in the business. Three and a half turns of the cranks lower or raise the windows, a satisfactory ratio.

The interior is well finished. Seats are comfortably padded. Armrests on the front doors are long and conveniently placed. There is excellent headroom, this being one of the few 1957 cars in which the tall driver can wear a hat. ★★★



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1/2" DRILL PRESS



8" SANDER



30" LATHE



8" GRINDER

## Clymer Drives the 1957 Ford V8

(Continued from page 109)

any danger of it flying open, even if not properly latched.

The interior is nicely finished. Instruments are well located. The three-spoke steering wheel has a recessed hub for safety. Speedometer visibility is excellent as there is no upper horn ring to get in the way. There is little glare from the sun by day or from reflections by night. The rear-view mirror is well positioned near the windshield top, but it is too small.

The driving position is comfortable and the car reminds me somewhat of the Thunderbird. To the left of the driver is the left-hand-operated ignition switch which I don't like as I am right-handed. The shift lever is easy to operate and has a parking-lock position.

Window cranks operate easily and only 2½ turns are required for raising or lowering the windows.

The floor hump over the transmission seems more pronounced this year. At the center it is eight inches above the floor.

Warning signals are used instead of the oil and generator needle gauges I prefer. The ventilating and heating system is easily controlled and outside air now enters through an intake just below the windshield. There is a roomy glove compartment. The brake and throttle levers are well located except it is necessary to raise the foot three inches from the accelerator to the brake—this is too much.

There is a large trunk and the lid is self-locking. Bumpers, front and rear, are massive and practical. There are no sharp extensions either front or rear, which is good. I am glad to see Ford has eliminated the sooty, exhaust-pipe extensions that came through the rear bumper on previous models.

The gas-filler cap is behind the license plate as before—an excellent feature. ★★★

## Modern Planes Are Complex

Increased complexity during the past decade is shown by the modern fighter aircraft, which now require 23,000 feet of electric wiring compared to 1500 feet of wiring in the average World War II fighter, according to Lt. Gen. Thomas S. Power, Commander of the U.S. Air Research and Development Command. F-51 Mustangs of World War II needed 2000 engineering man-hours for development. F-86 Sabre Jets of the Korean War required 70,000 man-hours, and today's most recent fighter, the F-100, needed 170,000 man-hours of engineering skill, General Power said.



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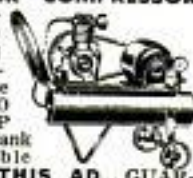
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## Clymer Drives the 1957 Plymouth V8

(Continued from page 111)

Angeles. I can truly say that these long drives were made with less fatigue than I have noticed over such distances on test runs with any car, regardless of price.

Instruments are well located and there is no upper horn ring to obstruct visibility. Needle indicators are used for fuel and temperature, warning lights for oil and generator (a standard arrangement in the industry these days, it seems). There is some reflection at night in the upper portion of the windshield, not so much from the dash itself as from the steering column. The cowl of the test car was padded as were the sun visors. The wide rear-view mirror is mounted atop the dash. I like this location, although there was considerable vibration which blurred the rear view.

New this year are circular, swiveling defroster outlets on top of the dash that permit the driver to aim the hot air to any part of the windshield. Gone, at last, is Plymouth's pushup outside air scoop. It is replaced by a flat opening across the cowl.

There is an average-size glove compartment. Its door drops down to open and is likely to hit the legs of the passenger unless care is used. Headroom is reduced this year, more so in the rear than in the front.

The test car had power brakes and the wide foot pedal is well located in relation to the throttle. Plymouth has always had first-rate brakes and I found them to be better than ever this year. There was little tendency to fade, regardless of frequent use in hilly country.

Driving position is comfortable and the wheel position is similar to that of a sports car. Interiors are better than previously and seats are well padded, although the back padding is not thick.

I am sold on the full-time power steering. However, there is a tendency to oversteer until you become accustomed to it.

Front-window vents are smaller than before, but I see no disadvantage here. Doors have a solid feel. Handles are the pull-out design, heavy and strong, but the kind you'd expect on a truck rather than a passenger car. They could be improved as could the key lock. The large trunk requires a key to lock the lid, a feature I do not like.

Rear tailfins are high. Plymouth says these give greater stability. I don't know whether they do or not, but the car is a fascinating one to drive with a feeling of safety and control at any speed.

Economy was satisfactory at normal speeds, but very poor at high speeds. ★★★

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**Made \$2,600**

**LAST SEASON**

**with FOLEY LAWN MOWER SHARPENER**

### 99c Profit On Each Dollar!

It costs less than 1c per mower for electricity and material. The Foley sharpens all blades and cutter bar together just like lawn mower manufacturers do it. Start in spare time in basement or garage. The Foley handles up to 3 or 4 mowers per hour—prices run \$1.50 to \$3.00 for hand mowers—\$5.00 to \$8.00 for power mowers.

**FREE — VALUABLE ILLUSTRATED BOOK** shows how to sharpen all leading makes of power mowers. Foley prices are low—easy payment plan lets you pay for machine with profits. **FREE PLAN** tells how to start. Send coupon today—no salesman will call.

"Last year we sharpened and repaired about 1000 lawn mowers for a net profit of \$2,600," says E. G. "Years ago, . . . I bought a Foley Lawn Mower Sharpener," writes W.T.J., "the best investment I ever made. I have made a good living for my wife and myself and have put money in the bank besides."



SEND FOR FREE

BOOK

**FOLEY MFG. CO., 107-7 Foley Bldg., Minneapolis 18, Minn.**  
Send **FREE BOOK** and **FREE PLAN** on Foley Lawn Mower Sharpening business.

Name \_\_\_\_\_

Address \_\_\_\_\_

## PORTABLE LIGHT PLANTS

**MASTER-LITE 2500 Watt Plant**  
110/120 v. 60 cyc. AC. A power-  
ful plant, ruggedly constructed  
and yet designed for easy port-  
ability. Can be started by rope  
or built-in 12 v. elec-  
tric push button start-  
er. Built-in winding  
to charge battery.  
Powered by a big 5.10  
HP Briggs engine—  
complete with all  
accessories, incl. a  
control box, voltmeter,  
and handy plug-in power receptacle. An ideal  
plant for permanent or stand-by service. Wt. 205  
lb. Reg. price \$645.00  
(Item 21) Factory Price ..... **\$329.50**  
**DUAL VOLTAGE 110/220** for Item 21—  
\$30 additional.



(Item 21)

## BATTERY CHARGING GENERATOR

### Push Button Start

A husky, 750 watt plant de-  
signed for charging 6 or  
12 volt batteries in just min-  
utes! When mounted with  
two 6 volt batteries it pro-  
vides a terrific cold weather  
motor starting unit, also perfect  
as a 12 volt light plant on  
boat! Charges all bat-  
teries anywhere—no hi-line  
current needed. Ideal for  
service stations, contractors,  
fleets, boats and farms. Comes complete  
with ammeter and cutout. (Item 821) Wt.  
120 lbs. Regularly \$295.  
Our special, only ..... **\$119.50**



Comes complete

with ammeter and cutout. (Item 821) Wt.

120 lbs. Regularly \$295.

Our special, only ..... \$119.50

## 52 pc. SOCKET SET



Highest quality, guaranteed non-  
breakable sockets made by Husky.  
Beautifully matched chrome thin  
wall alloy absolutely the best.  
Contains a complete set of 38 sockets  
etc. in 1/2" drive, 3/4" drive and 1 1/4"  
drive, plus all necessary exten-  
sions, handles, speeders, reversible  
ratchets, etc.; all uncond. guaran-  
teed against breakage. A beautiful  
set of tools that will handle any  
job in a big doughnut steel box.  
Wt. 17 lbs. (Item 205) List  
price \$62.90.  
Factory Special ..... **\$27.95**

## EXTENSION CORD

Heavy duty  
and very  
flexible.  
Neoprene  
14-2 cable.  
20 year  
quality. So  
tough you  
can drive  
a truck  
over it. Wt. 12 lbs. (Item 185)  
100 ft. Complete with rubber  
plug and outlet. **\$8.95**  
A terrific buy at only .....

No. 10-2 Power Cable. Heavy  
duty, very flexible 20 ft. with  
male and female fittings. Wt. 4  
lbs. (Item 818b) ..... **\$5.15**

20 ft. (Item 592) with fittings ..... **\$4.25**

100 ft. (Item 135) with fittings ..... **\$25.95**

No. 12-2 Power Cable. Very flexible rubber  
covered, special outside shield for grounding  
power tools, etc. 50 ft. (Item 109) Wt. 8 lbs.  
**\$6.95**. 100 ft. (Item 200) ..... **\$12.95**

No. 8-2 Conductor Power Cable. 50 ft. heavy  
duty, very flexible rubber covered with male  
& female plug (Item 817) ..... **\$12.95**

## JET STEAM MASTER

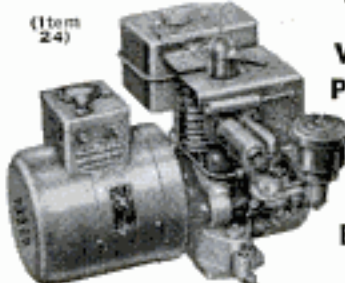
Now, a super effi-  
cient portable steam  
generator that pro-  
duces live steam at  
100 lbs. pressure in  
a cold start! Produces  
large volume of high  
pressure steam on 2  
pints of fuel oil. In-  
stantly cleans sticky  
grease, dirt, rust,  
old paint, etc. off  
implements and road  
machinery. Pays for  
itself in a few weeks.  
Sterilizes soil. Steri-  
lizes as it cleans—  
milk equipment, etc.  
Fully automatic—oil  
lifetime bronze water circulating pump. Draws  
water from faucet or bucket. Simple and safe  
—anyone can use it! Built-in safety valve.  
Complete with 12 ft. of hi-pressure steam  
hose and new triple efficiency steam gun that  
automatically mixes in soap solution if de-  
sired. Wt. 250 lbs. Item 463.  
Special factory price ..... **\$349.50**



Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for .....

**MASTER MECHANIC MFG. CO.,** DEPT. 75-P

**SAVE middleman profits**  
**BUY DIRECT from**  
**MASTER MECHANIC factory**



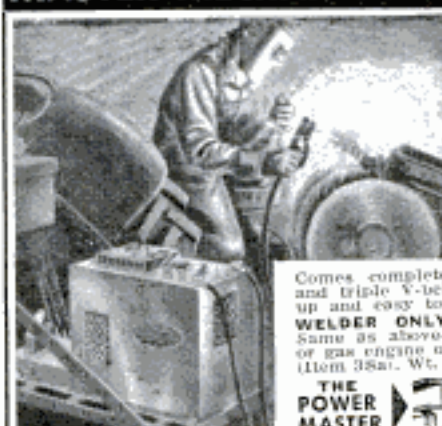
(Item 24)

## 700 WATT PLANT

115 v. 60 cyc. AC Powered by a rugged 2.2 HP,  
easy starting Briggs engine. No wiring ne-  
cessary; 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. Com-  
plete with voltmeter and built-in winding to  
charge 6 v. auto batteries. (Item 24) Wt. 75  
lbs. Easily fits in car trunk. Be prepared if  
storm knocks out power lines. **\$143.50**  
Regular \$275.00 value .....  
**1200 Watt Plant** (Item 45) same as Item  
24 but larger generator and engine **\$199.50**  
with 50% greater output .....

## PUSH BUTTON START

## MASTER MECHANIC'S DC ARC WELDERS



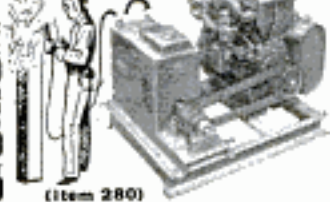
Built in our own factory,  
these big, industrial capacity,  
portable welders provide ter-  
rific performance, yet are sold  
direct-to-you at bedrock fac-  
tory prices—hundreds of dol-  
lars less than you'd expect!  
Senior model (shown in illus-  
tration, left) has high ca-  
pacity DC welding unit—easily  
welds any thing up to 2"  
plate using 1/4" to 3/4"  
rods. Built in stabilizer and  
cooling system makes are easy  
to strike and hold. Dual con-  
trol rheostat provides low  
heat soldering, brazing, and  
welding from 10 to 300 amps.  
with instructions, guarantee  
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 **\$119.50**

## THE POWER MASTER

(Item 38a)

**WELDER ONLY — INDUSTRIAL MODEL**  
same as above but with ceramic rotary  
type rheostat providing 74 different heat  
settings for all types of welding  
(Item 38b) \$500.00 value. **\$139.50**  
**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**



(Item 280)

## GIANT METAL SHEARS



"PEXTO"  
Nine inch cutting blade made of special  
high carbon alloy steel, perfectly aligned  
and ground. Easily cuts steel plate up to 12  
gauge or 1/2" thick. Overall length 40". Wt.  
23 lbs. (Item 156) Regular **\$14.95**  
\$49.50, while they last .....

## Rugged, ball bearing WINCH

Sturdy ball bearing  
winch—super tough  
aluminum alloy con-  
struction. Powered  
by an easy starting  
2 1/2 HP Briggs gas  
engine thru gear  
reduction drive — it  
exerts up to 3000  
lbs. of terrific force  
for hoisting mate-  
rials or pulling.  
Combination gear and pulley reduction re-  
sults in tremendous multiplication of engine  
power. Eater pulley clutch arrangement and  
built-in drum brake (with ratchet hand lever)  
enables operator to ease loads down gently  
and lock at any point desired. Drum handles  
400 ft. of 3/4" cable or 800 ft. of 1/2" cable.  
Ideal for contractors, farm implement trail-  
ers and unlimited other uses!  
(Item 795) Wt. 125 lbs. Only ..... **\$149.50**  
**HAND WINCH**—Same winch with large crank  
handle for extra leverage and 2  
speed drive. (Item 794) Wt. 60 lbs. **\$59.50**



(Item 795)

## LESS THAN WHOLESALE

### GIANT 2500 WATT PLANT

110-120 v. 60 cyc. AC. Absolutely the  
best made — ex-  
clusive dynam-  
ically balanced  
armature; heavy  
windings develop  
up to 5000 watt  
overload for mo-  
tor starting. Skid  
mounted — port-  
able. 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 lbs. Reg. price \$585. Special at ..... **\$299.50**  
Same plant with electric  
self starter (Item 31a) ..... **\$359.50**  
Generator only and control box ..... **\$169.50**



### POWER-FLO 3500 WATT

115-230 v. 60 cyc. AC. A  
rugged power plant for heavy  
duty use. Duplex  
power distribution  
provides both 115  
v. and 230 v. out-  
put at the same time  
if desired. Powered  
by a big 8 HP Wis-  
consin engine with  
triple V belt drive.  
Has built-in over-  
load protection. A  
dependable plant for  
either standby or regular service.  
Equipped with electric self  
starter. (Can also be started by  
rope) and plug in outlet box.  
(Item 198) Wt. 310 lbs. **\$439.50**  
Factory price .....  
**GENERATOR ONLY** belt driv-  
en ..... **\$239.50**



(Item 198)

## HEATING & VENTILATING FAN

(Item 10) Easily  
installed in fur-  
nace pipes. Forces  
even heat to all  
rooms. Over range  
removes kitchen  
smoke and odors.  
Powerful contin-  
uous duty motor,  
110-120 v. AC.  
Mount in wall or  
ceiling to venti-  
late any area. Quiet, super ef-  
ficient fan moves huge volume  
of air. (400 to 600 c.f.m.)

8" Pipe, wt. 5 lbs. .... **\$6.85**  
9" Pipe, wt. 6 lbs. .... **\$7.85**  
10" Pipe, wt. 7 lbs. .... **\$8.85**  
12" Pipe, wt. 8 lbs. .... **\$9.85**

**HEAVY DUTY FAN.** Semi-en-  
closed motor, suitable for spray  
booths, restaurant exhausts,  
poultry houses, etc. 10" Fan.  
Wt. 8 lbs. (Item 10E) **\$11.95**.  
12" Fan, Wt. 10 lbs. (Item  
10D) **\$12.95**

**HIGH SPEED BARN FAN** similar  
to above, but larger, high speed  
motor moves huge volume of air.  
12" Fan (Item 10F) ..... **\$14.95**  
14" Fan (Item 10G) ..... **\$17.95**

late any area. Quiet, super ef-  
ficient fan moves huge volume  
of air. (400 to 600 c.f.m.)

8" Pipe, wt. 5 lbs. .... **\$6.85**

9" Pipe, wt. 6 lbs. .... **\$7.85**

10" Pipe, wt. 7 lbs. .... **\$8.85**

12" Pipe, wt. 8 lbs. .... **\$9.85**

## Double Acting Hydraulic Cylinder



A powerful cylinder mfr'd. by Massey Harris  
which develops both a pushing and a pulling  
action. Will push 8,100 lbs. with a 1000 P.S.I.  
pump pressure. Cylinder is 3 3/4" O.D. with  
6 1/2" stroke—standard heavy duty clevises on  
both ends. Has standard 1/2" pipe thread open-  
ings. Can be used for tilting buckets or  
blades, raising or lowering implements, hy-  
draulic presses, etc. Can also be used as an  
air cylinder. (Item 802) Wt. 17  
lbs. Reg. \$68 value. Special ..... **\$14.95**

**HYDRAULIC HOSE COUPLERS** Connect or dis-  
connect hydraulic lines without loss of oil.  
1/2" pipe threads. (Item 819) per set. **\$4.95**

## SCREW-TYPE PRESS

A tremendously powerful press  
capable of exerting nine tons  
of pressure. Pays for itself  
straightening bent parts, or  
pushing out bearings and bush-  
ings. Ideal for manufacturing  
and assembly operations. Be-  
cause of precast control Mas-  
sey 1 1/2" screws permits pre-  
cise control over vertical  
travel. Extra heavy ribbed  
yoke has a throat 2 1/2" high;  
depth capacity for working to  
the center of an 11" ob-  
ject. Includes 8" x 15 1/2"  
vise-type table and two  
pushing arbors. Wt. 150 lbs.  
(Item 797). Reg. **\$149.50**. Special. **\$49.50**



**HYDRAULIC PRESS.** Nine ton  
capacity. See Dec. Pop. Mech's  
ad for details—or write. Com-  
plete Wt. 110 lbs. (Item 404) ..... **\$69.50**

Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for .....

**MASTER MECHANIC MFG. CO.,** DEPT. 75-P **Burlington, Wis.** **BIG 1957 Catalog**



THE  
**BASIC**  
SHOP TOOL

9" x 3' Model C Bench Lathe \$276.00 f.o.b. factory. Time payment terms available.

## 9" SOUTH BEND LATHE

This South Bend 9" Precision Lathe is the basic tool for your shop. It enables you to perform accurately the same full range of operations done on South Bend Lathes in industry. Also, operations ordinarily performed on other machine tools are made possible through the use of efficient attachments. You get more for your money in a South Bend 9" Lathe.

Write for catalog — see local distributor — look under "Machine Tools" in your classified telephone directory.

**NEW 14" DRILL PRESS**—a ruggedly built tool unsurpassed for accuracy and dependability.

*Write for catalog.*



**SOUTH BEND LATHE WORKS**

*Building Better Tools Since 1906*

455 EAST MADISON STREET, SOUTH BEND 22, INDIANA

A Few of the Many  
Operations You Can Perform



TURNING



BORING



THREADING



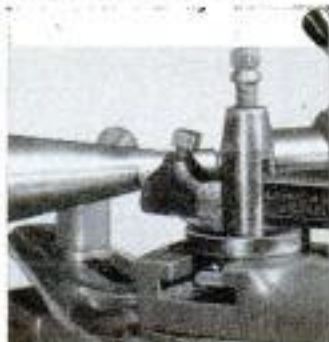
FACING



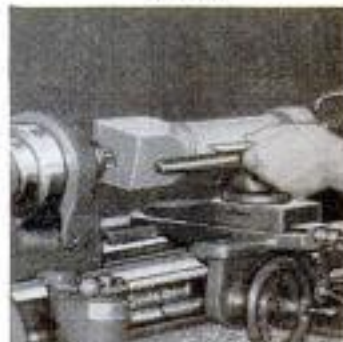
MILLING



GRINDING



TAPER TURNING



WOOD TURNING

# Even Men with No Experience are Making as High as \$1,000 A Month

A message to all men who are looking for a way to make more money faster, with one of America's greatest inventions wanted by millions

Folks Are Amazed when you Tell Them This New Kind of Protection Costs Only

**\$4.95**



**Here's Your Opportunity to Get into the BIG MONEY CLASS FAST with Sensational PRESTO FIRE EXTINGUISHER. Over 2,000,000 sold for Homes, Offices, Autos, Service Stations, Stores, Farms, Boats!**

Wouldn't you like to be making as much as \$1,000 in a month? Of course not everybody makes such profits starting out, but look at these profit reports: A Florida salesman earned \$600 in 1 month. An Ohio man earned \$2100 in 2 months. A New

York salesman earned \$1500 in one month. A New Hampshire man added the Presto as a sideline and picked up an extra \$1800 in 20 months. Men everywhere, even in off hours, are rolling up amazing profits. How about you?

## WHAT'S THE SECRET?

PRESTO contains an amazing new chemical—"Chlorobromomethane" or "C.B." The Germans developed "C.B." as a secret defense against fire during the war. After the war, a famous American firm, The Dow Chemical Company, acquired the formula from the U. S. Government and began manufacturing it here. Then we (Merlite Industries) designed a handy, yet amazingly effective, fire extinguisher to contain and release this new wonder-chemical. In comparing the effectiveness of "C.B." in fighting fires, The Dow Chemical Company's report states, "It has been proved that 'C.B.' is about 1.5 to 6 times as effective as other common extinguishing agents on an equal weight basis." This means that Presto can be made light and handy so even a woman or child can use. No pumping, no heavy tank. Just twist the knob, and flames disappear!

## WHY LARGE PROFITS ARE EASY

Everyone is terrified by FIRE! Every year fires kill more than 11,000 persons, destroys over SEVEN BILLION DOLLARS of property. Millions of people have been waiting for this sure, simple, inexpensive safeguard. Most people who see the dramatic, five-second demonstration want one or more, at the low price of \$4.95. You make as much as \$2.70 on every one. Get started in this rich new field now. Don't put it off. Every day you hesitate may cost you \$10, \$15, or even \$50 you could otherwise be making. Get the facts FREE. Simply mail postcard in this ad—no stamp needed. But do it now!

## Only Presto Has ALL These Features

-  Ends Fire as Fast as 2 Seconds
-  Chemical Contents 1.5 to 6 times More Effective than Others
-  Weighs Less Than 1 Lb.
-  Easily Held in One Hand—Even by a Child
-  Needs No Inspection or Re-Charging—Does Not Corrode or Deteriorate
-  Costs Only \$4.95—Yet Outperforms Bulky Extinguishers Costing Several Times as Much
-  Automatic Pressure—No Pumping
-  Guaranteed for 20 Years—Certificate is Packed With Every Presto

## Big Money Like This Even in Spare Time



**Charles Kama Reports \$1,000 in One Month**  
"I think I've succeeded pretty well. I'm making more than \$1,000 a month, and I haven't touched bottom yet."  
Charles Kama, Texas



**William F. Wydallis Reports \$15.20 an Hour**  
"For every hour I devoted to the Presto, I find I have earned an average of \$15.20 an hour."  
William F. Wydallis, Ohio



**Walter Gable Reports \$75 to \$80 a Week**  
"My selling time has averaged less than a day or two a week. These part time sales have brought me as much as \$75 to \$80 a week."  
Walter Gable, Md.

**FREE** Full Details of this Truly Amazing Money-Making Opportunity  
**JUST MAIL CARD BELOW**

**IMPORTANT!** Be sure to print your name and address in space on card below. Then simply cut out this card along dotted lines and drop in the mail box. No stamp necessary. We'll rush all facts to you at once, free and without obligation.

**PRINT YOUR NAME and ADDRESS HERE**

**BE SURE TO PRINT YOUR NAME AND ADDRESS ON SPACES BELOW**

FROM  
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_

**BUSINESS REPLY CARD**  
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

3c — POSTAGE WILL BE PAID BY —

**MERLITE INDUSTRIES, INC.**

**114 EAST 32ND STREET**

**NEW YORK 16, N. Y.**

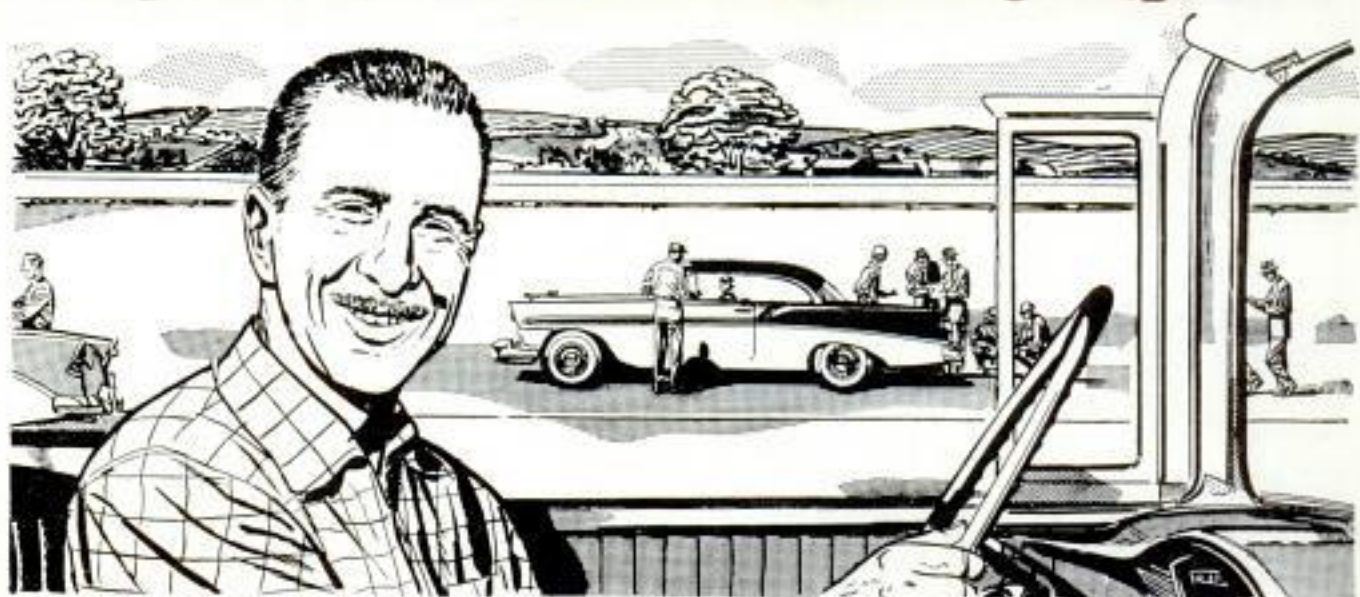
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NEW YORK, N.Y.

**MERLITE INDUSTRIES, INC. DEPT. X-15R**  
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# "How to Think Ahead of Your Car and Save Gas Dollars!"



"Professional drivers think ahead of their cars... avoid needless stops and starts... save fuel that many drivers waste..."

*Mauri Rose*

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



"Most drivers waste gas at stop lights. The smart driver goes at a steady pace, slowing down well back of a red light... avoiding the stop if possible."



"A professional driver always keeps well back of the car ahead. This way, he avoids gas-consuming 'panic' stops... possible rear-end collisions."



"A pro never speeds over a hill or into any 'blind' situation. It's dangerous... and even if you can stop in time, it's a stop and start that consumes extra gas."

You can think ahead of your car in more ways than one. Make sure you're getting all the performance you paid for... see your Rochester Carburetor specialist. He'll give your car the kind of care that only a factory-trained mechanic can. And he knows that Rochester Carburetors are precision-built for top performance on today's high-compression engines... they're rugged and reliable! They'll help you save on gas by delivering just the right mixture, at just the right time, to squeeze extra mileage out of every gallon.

Standard equipment on Cadillac, Buick, Oldsmobile, Pontiac and Chevrolet

**R** ROCHESTER  
CARBURETORS

ROCHESTER PRODUCTS DIVISION  
GENERAL MOTORS CORP., ROCHESTER, N. Y.



"A stop every good driver considers necessary is at his factory-trained mechanic's for regular checks on the carburetor and vital engine parts whose condition affects performance and economy."