

JUNE 1955

35 CENTS

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

U.S. TRADE MARK GREAT BRITAIN No. 40428

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**HOMEMADE FLYCYCLE**  
—Page 115

Owners Report on the  
**'55 DODGE V8**

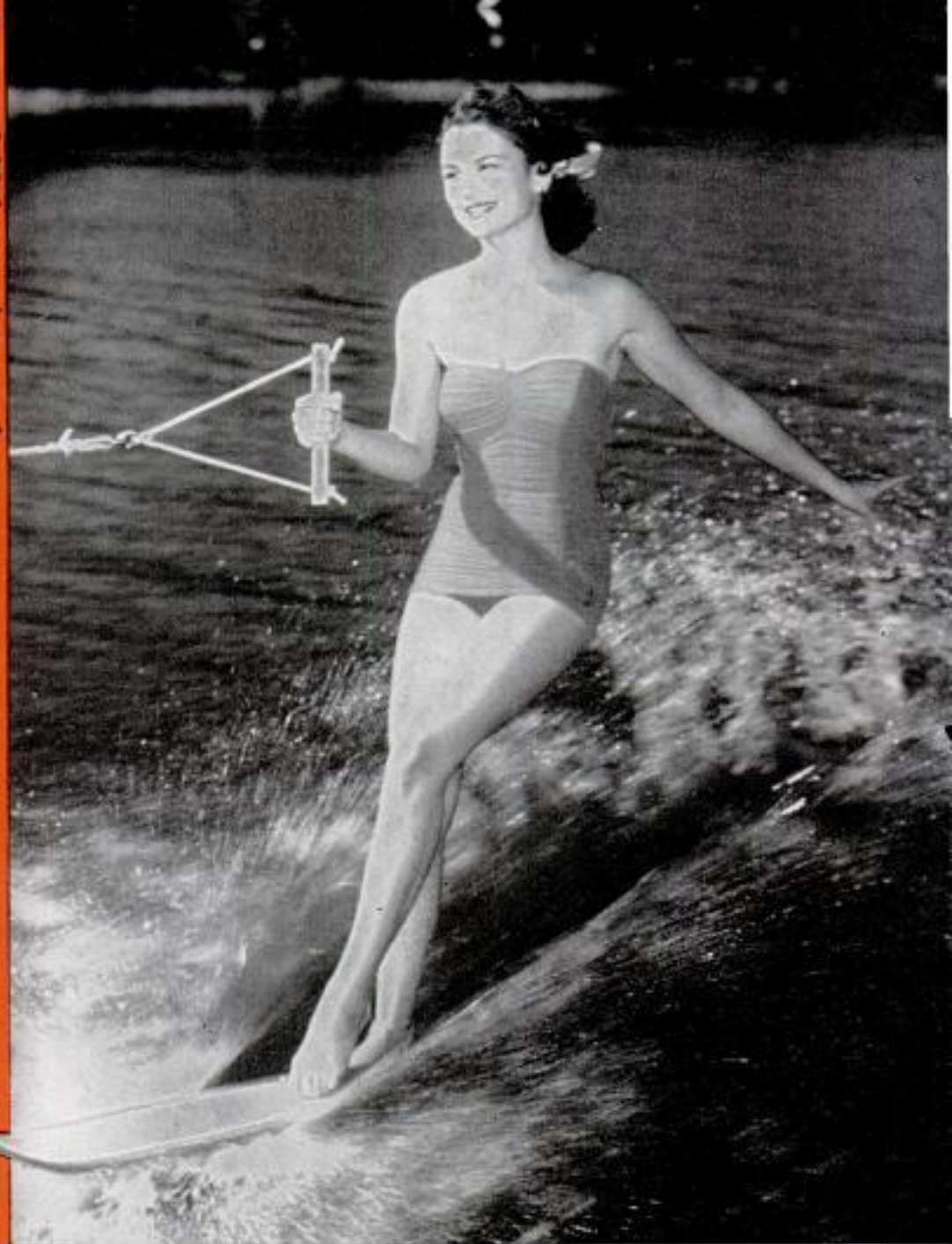
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1954



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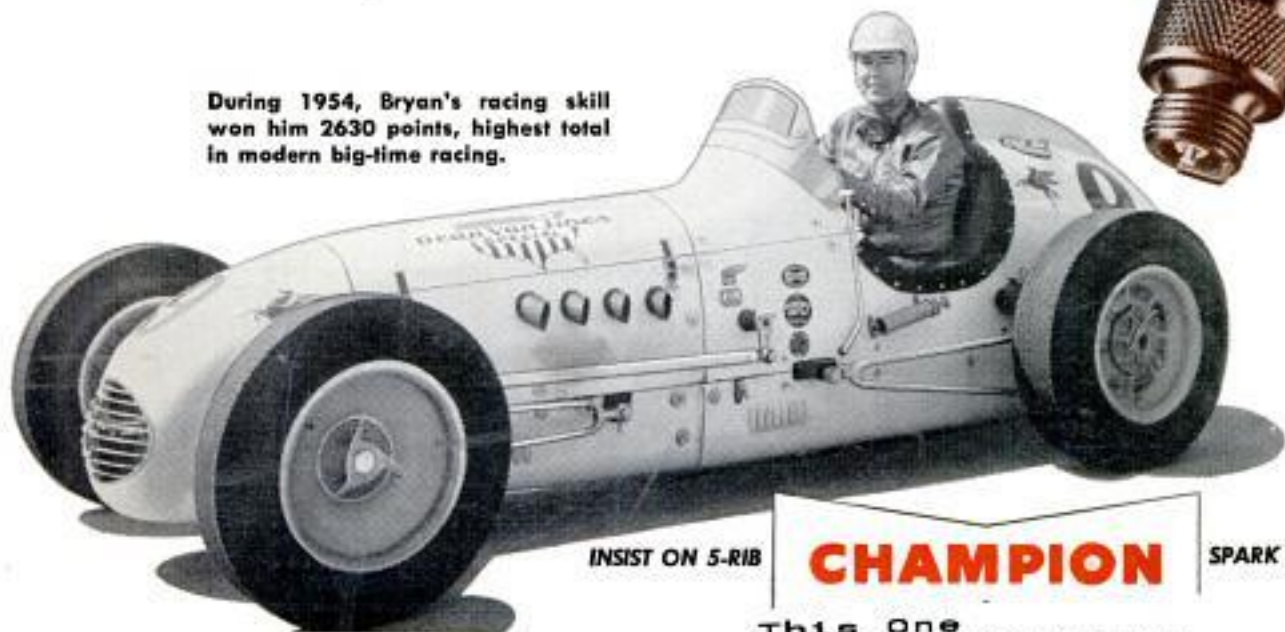
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# Popular Mechanics Magazine

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## Next Month

TRAPPED IN those bottles is smog—the ghostly stuff that smothers Los Angeles and plagues half a dozen other cities. Actually the bottles hold metals, tars and acids that can touch off more sneezes than a flu epidemic. When weather conditions clamp a lid on Los Angeles, residents breathe and rebreathe the same air while they gasp out curses at their enviable mountains and climate. Science has been called into the battle and the research may have some startling sideline results. For example, tests show that one gallon in every tankful of gas flows unused through your car. A feature next month shows smog sleuths at work, and tells how their research may benefit you, wherever you live

Information not listed on articles in the index, starting on page 58, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by writing to the Bureau of Information, *Popular Mechanics*, 200 E. Ontario, Chicago 11, Ill.

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Other items, and manufacturers of available products described, are listed on pages 58, 60 and 62

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# ACROSS THE DESK



## To the Editor:

When a man does a particularly good piece of work his effort deserves to be appreciated and commended. Your article "What Does It Cost to Own a Car" is the best I've read on the subject. The illustrations and graphs summarize the subject in a manner easily remembered.

I was especially interested in what car owners are willing to forego to lower costs—top speed, style changes, deluxe trim, etc. I agree with that 100 percent, but every time I mention it to a car dealer he insists emphatically that these things are continually boosted because the buyer demands them and is willing to pay the extra costs. That certainly is not true of the car owners I have questioned. They would jump at the chance to trade in their cars for more functional vehicles unencumbered by excessive top speed, annual style changes, deluxe trim, etc., but at a lower price. Give us an article on "What Does the Car Owner Really Want" and we'll be your friends for life.

Joseph Wiznuk,  
Stonewall, Manitoba, Can.

## To the Editor:

On page 106 of the March issue there is a picture with this description: "Chevrolet's instruments are easy to read, but horn ring interferes with driver's view of speedometer."

Cut off the upper part of the horn ring. I did.

It is easy to do and it makes the instruments readily visible.

Joseph R. Younglove,  
Johnstown, N. Y.

☆☆☆

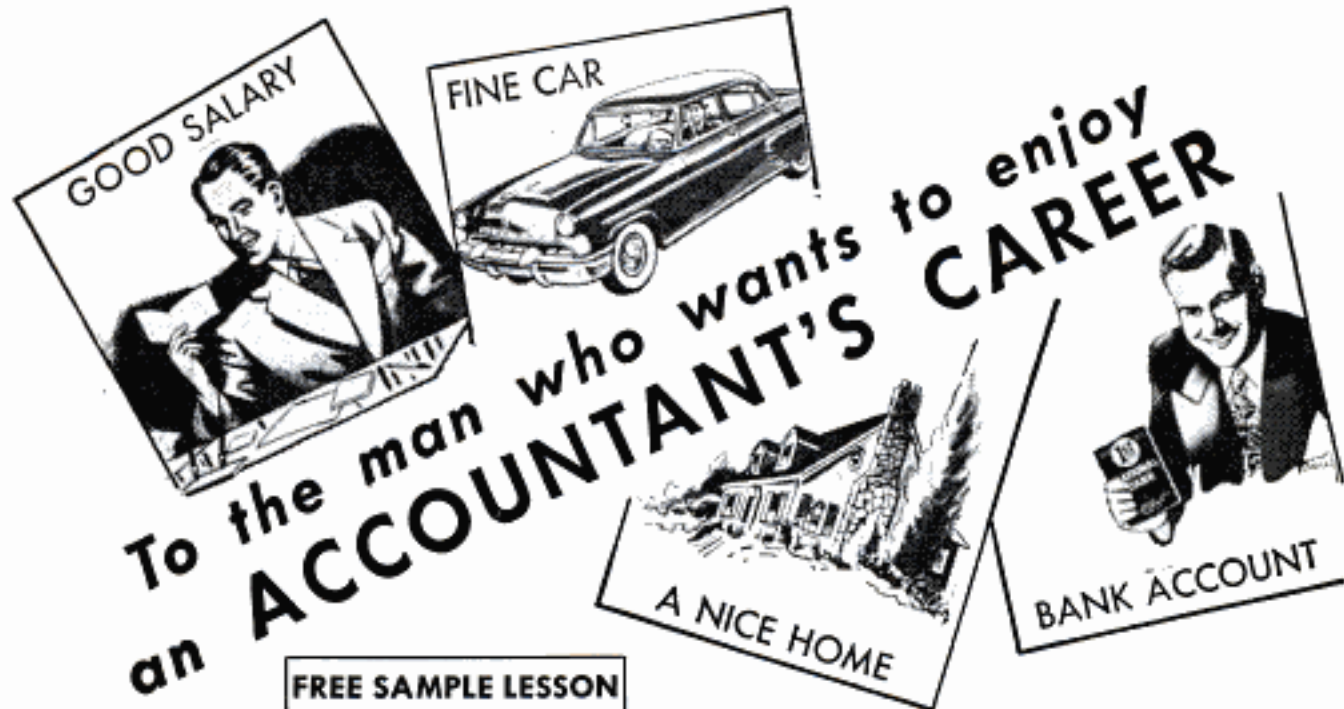
The K.L.M. Royal Dutch Airlines' Freight Manual states that during an air trip monkeys aboard the plane must be spoken to from time to time to keep them from quarreling with one another.

## To the Editor:

Strangest of the winds of the world occurs in the northwestern United States. During the coldest days of winter it originates in the Pacific Ocean off the coast of Washington, blows eastward, inland, over Washington, Idaho and western Montana,

(Continued to page 8)





**FREE SAMPLE LESSON**

**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?

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Do you feel that such things aren't for you? Well, don't be too sure. Very possibly they *can* be!

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Your progress is as speedy as you care to make it—depending on your own eagerness to learn and the time you spend in study.

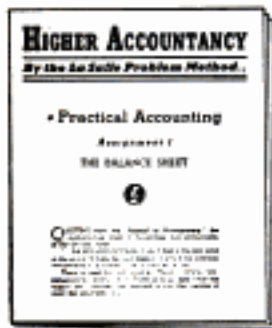
Will recognition come? The only answer, as you know, is that success *does* come to the man who is really *trained*. It's possible your employers will notice your improvement in a very few weeks or months. Indeed, many LaSalle graduates have paid for their training—with increased earnings—before they have completed it! For accountants, who are trained in organization and management, are the executives of the future.

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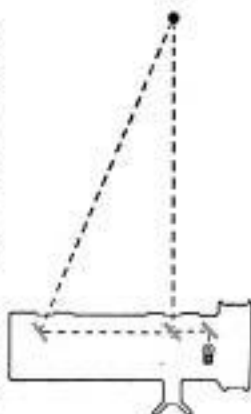


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When camera is exactly focused, both beams of light are superimposed. Simultaneously, parallax is automatically corrected on the optical viewfinder (8) through linkage (9).



For further information regarding the Pacemaker Graphic 45 and the features which make it the press photographers choice, write Dept. PM-65, Graflex, Inc., Rochester 8, N. Y.



# GRAFLEX®

(Continued from page 6)

and blows out on the great plains of eastern Montana.

Called the "Chinook," it develops intense heat in eastern Washington, Idaho and western Montana. The country may lie frozen during January in 40 degrees below



Picture taken at start of the Chinook — 12 noon



The Chinook almost blown out—4 p.m. same day

zero; the Chinook stirs, and in the space of an hour the temperature may jump to 40 above zero and water begins to run. The name comes from a tribe of Indians at one time inhabiting the coast of Washington. At no other place upon earth does this type of wind occur except in a very limited manner in Greenland and Switzerland.

In pioneer times, people waited for the Chinook, and even today the cattlemen and lumbermen watch anxiously, during spells of intensely frigid weather, for the Chinook. It develops and blows during the

(Continued to page 10)

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Technician</li> <li><input type="checkbox"/> Auto-Engine Tune Up</li> <li><input type="checkbox"/> Automobile</li> </ul> | <p><b>AVIATION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aeronautical Engineering Jr.</li> <li><input type="checkbox"/> Aircraft &amp; Engine Mechanic</li> </ul> <p><b>BUSINESS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Advertising</li> <li><input type="checkbox"/> Bookkeeping and Accounting</li> <li><input type="checkbox"/> Business Administration</li> <li><input type="checkbox"/> Business Correspondence</li> <li><input type="checkbox"/> Public Accounting</li> <li><input type="checkbox"/> Creative Salesmanship</li> <li><input type="checkbox"/> Federal Tax</li> <li><input type="checkbox"/> Letter-writing Improvement</li> <li><input type="checkbox"/> Office Management</li> <li><input type="checkbox"/> Professional Secretary</li> <li><input type="checkbox"/> Retail Business Management</li> <li><input type="checkbox"/> Sales Management</li> <li><input type="checkbox"/> Stenographic-Secretarial</li> <li><input type="checkbox"/> Traffic Management</li> </ul> <p><b>CHEMISTRY</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Analytical Chemistry</li> <li><input type="checkbox"/> Chemical Engineering</li> <li><input type="checkbox"/> Chem. Lab. Technician</li> <li><input type="checkbox"/> General Chemistry</li> <li><input type="checkbox"/> Natural Gas Prod. &amp; Trans.</li> <li><input type="checkbox"/> Petroleum Engineering</li> <li><input type="checkbox"/> Plastics</li> <li><input type="checkbox"/> Pulp and Paper Making</li> </ul> | <p><b>CIVIL, STRUCTURAL ENGINEERING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Civil Engineering</li> <li><input type="checkbox"/> Construction Engineering</li> <li><input type="checkbox"/> Highway Engineering</li> <li><input type="checkbox"/> Reading Struct. Blueprints</li> <li><input type="checkbox"/> Sanitary Engineering</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Mine Surveying and Mapping</li> <li><input type="checkbox"/> Plumbing Drawing and Estimating</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Electrical Maintenance</li> <li><input type="checkbox"/> Electrician <input type="checkbox"/> Contracting</li> <li><input type="checkbox"/> Lineman</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial <input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Subjects</li> <li><input type="checkbox"/> Mathematics</li> </ul> | <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Leadership and Organization</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> </ul> <p><b>MECHANICAL AND SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gas—Electric Welding</li> <li><input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Internal Combustion Engines</li> <li><input type="checkbox"/> Machine Design-Drafting</li> <li><input type="checkbox"/> Machine Shop Inspection</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration</li> <li><input type="checkbox"/> Sheet Metal Worker</li> <li><input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio TV Eng'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 Brakes <input type="checkbox"/> Car Inspector</li> <li><input type="checkbox"/> Diesel Locomotive</li> <li><input type="checkbox"/> Locomotive Engineer</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> |
|--|---|--|--|--|

Name \_\_\_\_\_ Age \_\_\_\_\_ Home Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to P.M. \_\_\_\_\_

Occupation \_\_\_\_\_

Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. . . . Special tuition rates to members of the U. S. Armed Forces.

## USING TOO MUCH GAS



Clean your  
carburetor with  
**GUMOUT**

One big cause of high gas consumption is a dirty, gummed-up carburetor. When tiny gas and air passages become clogged, the fuel-air ratio is upset. The carburetor can't function right. And there is no adjustment you can make to compensate for dirt and gum! The carburetor must be cleaned!

**But—the carburetor doesn't have to be taken apart to clean it!**

GUMOUT does the job for you—while you drive. Just add GUMOUT to your gas tank every two or three months, and you'll keep your carburetor sparkling clean. There's nothing like GUMOUT.

Send for FREE 46-page Carburetor Handbook. Gives you all the answers. Good to have.



POWER MOWERS and OUTBOARDS need GUMOUT, too. Winter storage and infrequent use are sure to cause gum formation in the carburetor and fuel system. Hard starting, stalling, and rough idling results. GUMOUT dissolves the gum, cleans out the fuel system . . . fast.

GUMOUT is sold by service stations, garages, auto supply dealers, and hardware stores everywhere.



GUMOUT DIVISION

Pennsylvania Refining Company  
2671 Lisbon Road, Cleveland 4, Ohio

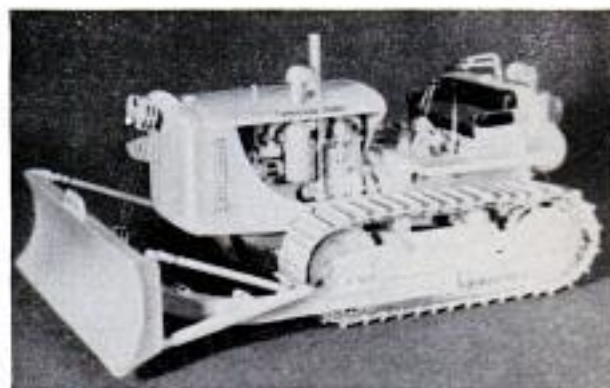
(Continued from page 8)

months of January and February and sometimes early March.

Eric Thane,  
Helena, Mont.

### To the Editor:

Enclosed is a picture of my model D8 Caterpillar. The approximate size is 14 inches long, 9½ inches wide and 8 inches high. It is built entirely out of balsa wood. It is powered by two six-volt motors. The



blade works off two more six-volt motors.

There are two separate electrical systems to run and operate my Cat. I used no plans or blueprints, only photographs of a full-size Caterpillar. Batteries used are six-volt electric-fence type.

Robert N. Jensen,  
Las Vegas, Nev.

### To the Editor:

We were not too surprised at the criticism of windshield reflections from instruments during night driving by owners of early models of the 1955 Plymouth ["Owners Report on the Plymouth", *PM*, April 1955]. We have, however, developed a very satisfactory solution for this problem which has now been in production for a considerable length of time. It involves the use of dull-black paint on the portion of the bezels which face the instrument dials plus a stripe of dull-black paint properly located in the lower half of the instrument housings. The maximum light intensity in the speedometer was further reduced by omitting one of the two bulbs originally used. We thought your article on the Plymouth car gave a rather complete coverage.

R. W. Steere,  
Assistant Chief Engineer,  
Plymouth Division,  
Detroit, Mich.

☆☆☆

☐ Meteorologists of the U.S. Weather Bureau believe that the highest wind ever measured reliably—close to 300 miles an hour—swept over Philadelphia at 20,000 feet last Jan. 23.



**J. E. SMITH**  
President, National Radio Institute. 40 years' experience training men at home for Radio-TV

I Will Send You A  
**SAMPLE LESSON FREE**  
to show you how easy, practical it is to  
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TRAINING plus OPPORTUNITY is the PERFECT combination for ambitious men. Let me send you a sample lesson from my course to prove you can keep your job while TRAINING at home in your spare time for better pay and a brighter future. I will also send my 64-page book to show you that Radio-Television is today's field of OPPORTUNITY for properly trained men.

**Make \$10, \$15 a Week Extra**  
Many men I train fix neighbors' Radios, make extra money, soon after they enroll. Actual equipment you build gives you practical experience.



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Radio is bigger than ever and television is growing fast. Government, Aviation, Police, Ship, Micro-wave Relay, Two Way Communications for buses, taxis, railroads are other growing fields for Radio-Television trained men.

**Mail Coupon—Find Out About This Tested Way to Better Pay**

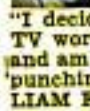
Take NRI training for as little as \$5 a month. Many NRI graduates make more in two weeks than the total cost of my training. Mail coupon today for Actual Lesson and 64-page Book—Both FREE. J. E. SMITH, National Radio Institute, Dept. 5FA, Washington 9, D.C. Our 40th Year.



**I Trained These Men**



"I am a police captain and also have a good spare time Radio and Television service business. Just opened my new showrooms and shop."  
C. W. LEWIS, Pensacola, Florida.



"I decided to quit my job and do TV work full time. I love my work and am doing all right. I'm not just 'punching a time clock.'"  
—WILLIAM P. KLINE, Cincinnati, Ohio.



"Thanks to NRI, I operated a successful Radio repair shop. Then I got a job with WPAQ, later WBOB and now am an engineer for WHPE."  
—VAN W. WORKMAN, High Point, N. Carolina.

**You Learn by Practicing with Equipment I Send**



Nothing takes the place of practical experience. That's why NRI training is based on LEARNING BY DOING. My training includes kits of parts which you use to build equipment and get practical experience on circuits common to both Radio and Television. Shown at left is the low-power Broadcasting Transmitter you build as part of my Communications Course.



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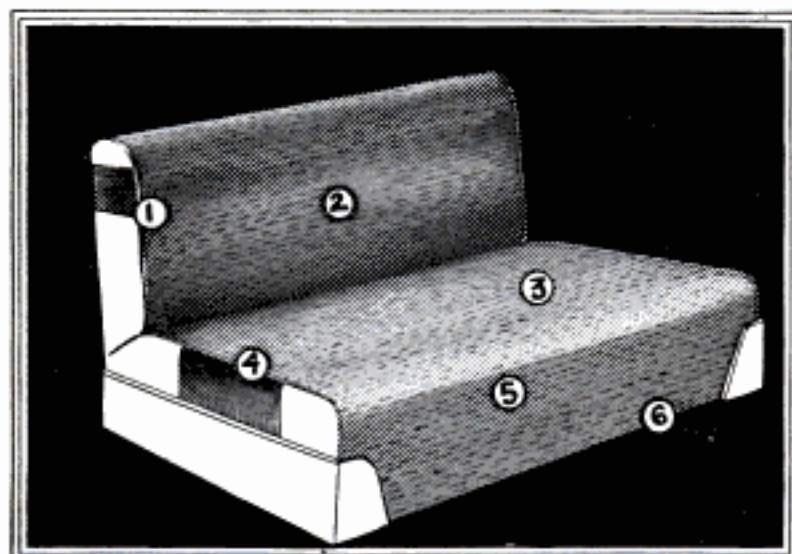
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Mr. J. E. Smith, President, Dept. 5FA  
National Radio Institute, Washington 9, D.C.  
Mail me Sample Lesson and 64-page Book, FREE. (No salesman will call. Please write plainly.)

Name \_\_\_\_\_ Age \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

**VETS** write in date of discharge \_\_\_\_\_  
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4. Your Choice of 3 Colors
5. Lockstitch Nylon Thread
6. Snap-Flex Feature

Because we purchased thousands of yards of genuine upholstery fabrics far below wholesale cost . . . because we produce our own seat covers in our own factory . . . because we use no middlemen but sell direct from factory to you . . . that is why this amazing value is possible. Yes! Only 3.99 each for these smart, durable covers!

### Generous Tailoring!

We use 3 full yards for each seat!

There's nothing skimpy about these superb auto seat covers! We use 3 full yards of heavy duty upholstery fabric—the kind you'd expect to pay up to 4.00 a yard! The cloth is durably tailored for good fit plus long life! MOTO-MATIC Seat Covers can really take lots of punishment day after day. You'll love the rich looking upholstery fabric that gives old worn interiors that new, neat look. Wonderful, too, for protecting new upholstery against wear, dust, stains, etc.

### Snap on . . . Snap off. Quick and Easy With Snap-Flex Feature

Install in a jiffy—remove in a jiffy! Ingenious design—one style fits All cars from Chevrolet to Cadillac—1936 to 1955. Special "SNAP-FLEX" feature adapts to any type seat, front or back. Result: You get a smooth contour-shaped cover that will not ride up or lose shape. The tough, durably tailored upholstery material won't tear or crack like certain thin plastics. Won't stretch out of shape and—most important of all—they're SANFORIZED and will not shrink more than 1/2 of 1% after washing or dry-cleaning.

### Your Choice! 3 Distinctive Colors

Choose any of these 3 smart colors: Dappled Blue, Forest Green or Duotone Grey. You'll love any one of these luxurious shades, with that rich tweedy feel. No matter which color you choose you'll add new distinction and greater resale value to your car. NOTE: Front seats come in 2 styles: A—for SOLID back seats in 4-door models, B—for SPLIT back seats in 2-door cars. Either type front seat, one price—3.99 each. Mark your choice in coupon.

You'd expect to pay  
up to \$12.00  
for the luxury  
fabric alone!

Now **3.99**

(2 for 6.98)

**DIRECT FROM  
FACTORY TO YOU**

### Try a Set in Your Car Without Obligation

We want to send you a set of these LONG-LIFE covers on approval. Then you can see and feel the attractive, durable cloth. Install them in your car. Enjoy them for 5 days—without risking any money! Send only 3.99 each—or \$6.98 for front AND rear, and they will be sent postage prepaid. Or you can order C.O.D. plus postage. But in either case, remember: You're TRYING—not BUYING! You must be delighted in every way or your money back at once!

### Rush Order Now to avoid disappointment

We made a lucky buy on the material—because we purchased in huge quantities! WE'RE PASSING THE SAVINGS ON TO YOU—but there's a catch: this big bargain can't last forever. You'll have to act fast to avoid disappointment! Orders received after supplies are ended will be promptly returned. Try a set now on FREE trial! Mail coupon today to famous:

## MOTO-MATIC COMPANY

Dept. 6-F-151

352 Fourth Avenue, New York 10, N. Y.

### CHECK TYPE BELOW

(For Front Seat Only)



STYLE "A"  
(Solid Back)



STYLE "B"  
(Split Back)

### RUSH TODAY FOR FREE TRIAL!

MOTO-MATIC COMPANY, Dept. 6-F-151  
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RUSH your "Long Life" Seat Covers made with sturdy upholstery cloth on approval for 5 days. If I am not delighted in every way, you will return 3.00 each at once—no questions asked.

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- Send Front & Back Seats at 6.98 for BOTH, plus FREE offer.
- Payment enclosed, RUSH prepaid.
- Send C.O.D. plus 49c postage each.

Check color desired.  BLUE  GRAY  GREEN

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

## FREE!

To those ordering more than one seat cover (i.e., a front and a back), we are GIVING a brand-new POLY-SHEEN auto cleaning cloth. POLY-SHEEN adds a magic-like lustre and polish to your car—enables you to DRY WASH it in less than 10 minutes! Makes your home sparkle, too, when you use it on furniture, glassware, woodwork, mirrors, windows and walls. New and used car dealers swear by it! POLY-SHEEN retails for \$1.98, but it's yours—FREE of EXTRA CHARGE—when you order TWO seat covers at the special price of \$6.98.



# INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

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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51-F DISTRICT NATIONAL BUILDING

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# 17 pt. Self-Cleaning Plug Alone Shows 8 hp Gain and 7 mph Greater Speed!

**Eddie Edmunds**  
CHASSIS DYNAMOMETER CHART

Model No. \_\_\_\_\_  
Year \_\_\_\_\_  
Make \_\_\_\_\_  
Model \_\_\_\_\_  
Year \_\_\_\_\_

**Power Test**

PLUG TYPE	HP	MPH	0-30 SEC.	0-50 SEC.
17 pt. LIFE-TIME	12.5	72	11.5	18.5
16 pt. Standard	10.0	65	13.5	21.5

**Recommendations**

Special plug for this car is recommended for best performance.



**Tustin Auto Parts**  
110 West Main Street, Tustin, California, Phone BR 6-6321

Dear Sir:

We have just received your order for 17-point LIFE-TIME Spark Plugs. We are pleased to serve you and will ship your order as soon as possible. We will also include a coupon for your next order.

PLUG TYPE	QUANTITY	PRICE
17 pt. LIFE-TIME	12	\$12.00
16 pt. Standard	12	\$12.00

Yours truly,  
E. Edmunds

## HOW 17 PT. FIRING WORKS

Note electrodes closely. A circular arcing area (four concave segments). Gap being the same from all points. Electricity has property of arcing from coldest point. Current also arcs more readily from apex of two planes than from the face of a flat, metallic surface. Note that there are 16 apexes (where two planes meet) — all the same distance from the center electrode. Normal heat and spark erosion are spread around the entire 360 degrees and around the whole circumference of the center electrode.



## FULL ROTATING SPARK

allows overall cooler electrode temperature for greatly increased life. Hotter spark prevents fouling, yet the rotating and cooling effects minimize the common faults of burning, erosion, blistering and insulator failure. Compare this principle with the conventional 2-point spark plug design.

- **PLATINUM-NICKEL ALLOY ELECTRODES**— Metallurgists' first major step beyond platinum aircraft plug electrodes. Arcing points of this material have continued to function after the equivalent of 120,000 car-miles.
- **SPECIAL SINTERED CORUNDUM INSULATOR**— Made of gem-like mineral which conducts heat 20 times better than ordinary porcelain. Special shape is designed to vaporize and exhaust wet carbon and oil.

- **INDIVIDUAL INSPECTION**— Each LIFE-TIME Spark Plug is tested for firing in oil and for resistance to 30,000 volts C.M.
- **PERMANENT GAP**— After months of use LIFE-TIME Spark Plugs make at exact factory pre-gap.
- **SELF CLEANING FOR LIFE**— Confined gases exploding in chamber formed by multiple electrodes reclean arcing surfaces with each firing stroke.



**NOW...  
ORDER REGISTERED SET  
FOR YOUR CAR AT POPULAR PRICE!**

Dealers and Distributors: The LIFE-TIME Spark Plug is now in full production. Write for full details. Distributors: Please inquire as to status of your territory.

## 50,000 CAR MILES!

Before LIFE-TIME development, the spark plug was the most often replaced part of your car. Engineers agreed that "creeping paralysis," gradual electrode disintegration, carbon buildup, widening gap, could waste one gallon in ten. The LIFE-TIME Plug has now gone far beyond the life of the average set of tires, the average battery. This plug still fired clean, hot and steady at 50,000 car miles!

Most spectacular spark plug research breakthrough in 50 years allows us to include this unique and unprecedented warranty with every set of LIFE-TIME Spark Plugs. We GUARANTEE GREATER GAS MILEAGE — GREATER ACCELERATION — A MAJOR POWER INCREASE — OR YOUR MONEY BACK.

## YOU RECEIVE BY MAIL

this registered set of LIFE-TIME Spark Plugs in proper series (heat range and gap) for the car you indicate in coupon. Now AVAILABLE FOR AMERICAN & EUROPEAN PASSENGER CARS, TRUCKS, BOATS, FARM EQUIPMENT, INDUSTRIAL ENGINES.

LIFE-TIME Spark Plug Division,  
CONTINENTAL MANUFACTURING CORP.  
Washington Blvd., at Motor Ave.  
Culver City 47, California

Gentlemen: Please mail postpaid. . . . . 50001 Registered set of LIFE-TIME Spark Plugs in proper heat range and gap for my car at introductory price of 50¢ per plug (set of six, \$2.50, set of eight, \$7.00) 10¢ each \$1 per set, balance C.O.D.)

Make of my car is \_\_\_\_\_ Year \_\_\_\_\_  
Model \_\_\_\_\_ No. Cyl. \_\_\_\_\_  
I enclose \$ \_\_\_\_\_ (check, cash or money order)  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## 8 HORSEPOWER GAIN!

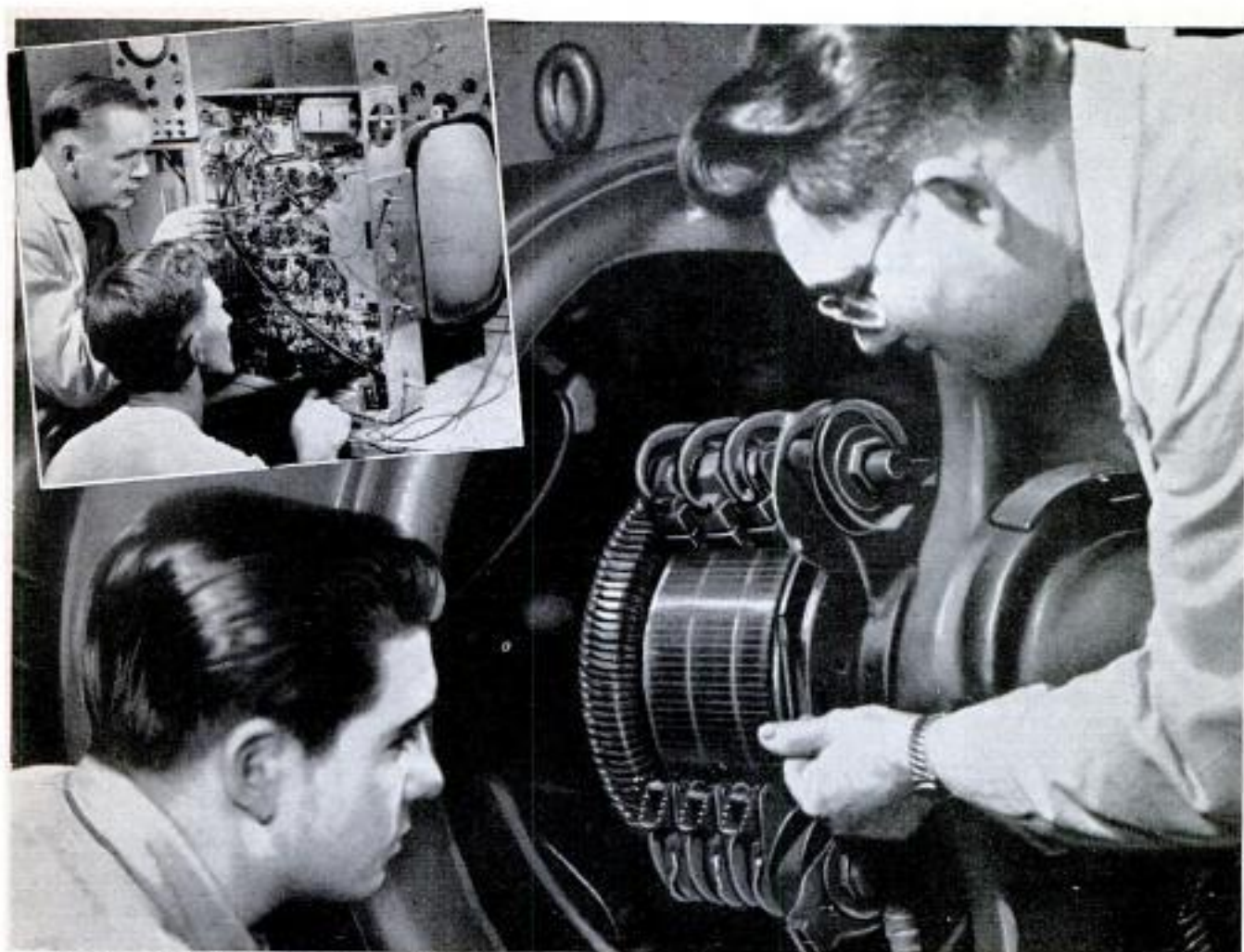
Dear Car Owner:

The real test of a spark plug is "What will it do in my own car?" Take the above dynamometer test on a 1951 Buick Super. It shows an 8 horsepower gain with Life-Time 17-point plugs. This was a 12 1/2% hp gain at 2000 RPM. You don't need a dynamometer with Life-Time plugs. You can feel the difference both in your ride and your pocketbook. Try a set and let me hear from you about them. Many thanks!

*Frank Williams*  
Inventor of the LIFE-TIME Spark Plug







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**FINANCE PLAN** Enroll now. You may pay most of tuition later. We have a special plan for men of draft age.

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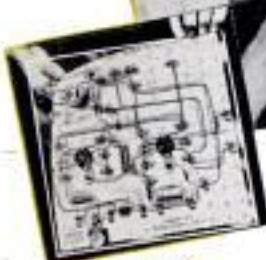
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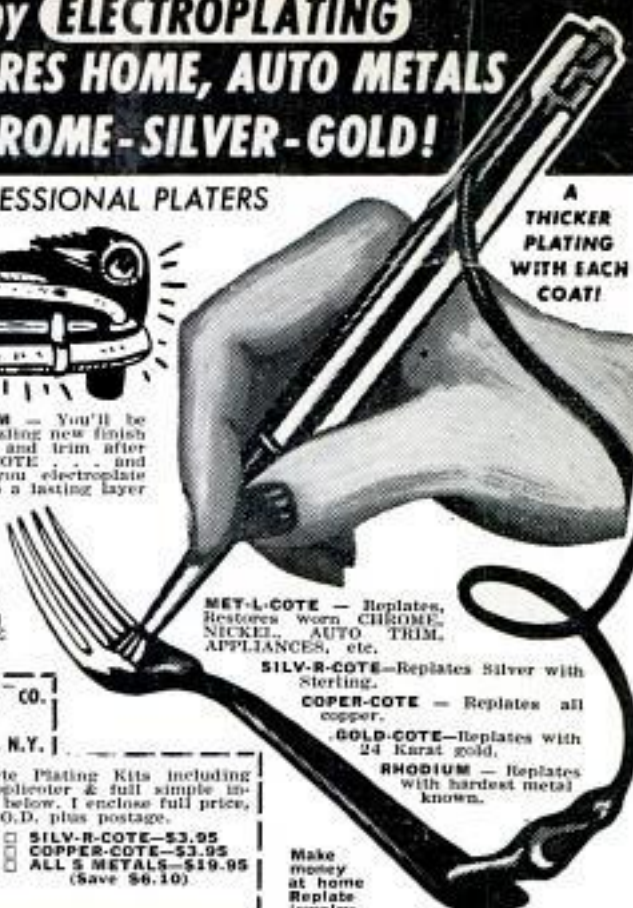


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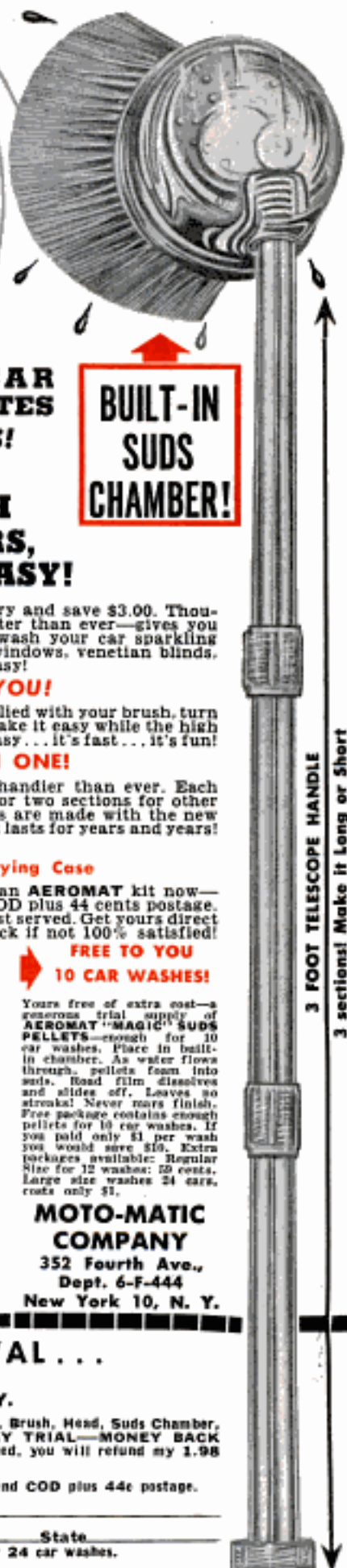
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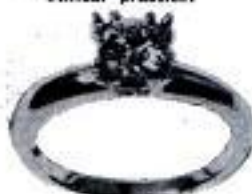
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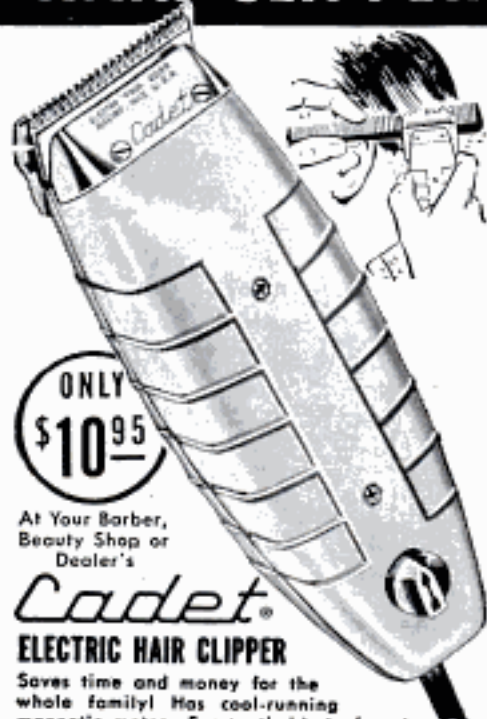
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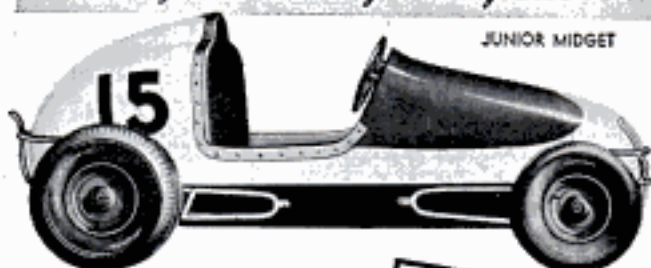
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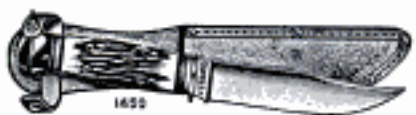
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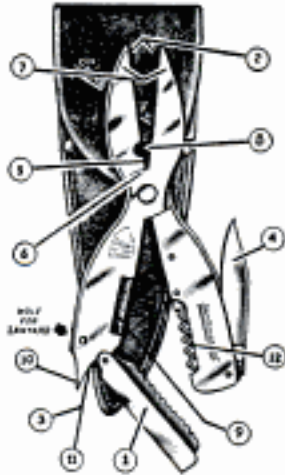


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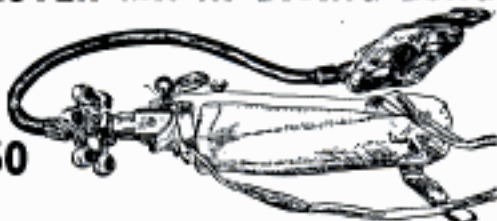
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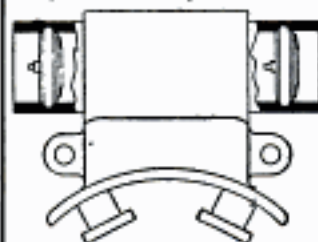
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This amazing method was developed by a little group of professional fishermen. Though they are public guides, they rarely divulge their method to their patrons. They use it only when fishing for their own tables. It is probable that no man on your waters has ever seen it, ever heard of it, or ever used it. And when you have given it the first trial, you will be as closed-mouthed as a man who has suddenly discovered

a gold mine. Because with this method you can fish within a hundred feet of the best fishermen in the county and pull in ferocious big ones while they come home empty handed. No special skill is required. The method is just as deadly in the hands of a novice as in the hands of an old timer. My method will be disclosed only to those few men in each area who will give me their word of honor not to give the method to anyone else.

Send me your name. Let me tell you how you can try out this deadly method of bringing in big bass from your "fished out" waters. Let me tell you why I let you try out my unusual method without risking a penny of your money on instructions or lures. There is no charge for this information, now or at any other time. Just your name is all I need. But I guarantee that the information I send you will make you a complete skeptic—until once you try it! And then, your own catches will fill you with disbelief. Send your name, today. This will be fun.

**ERIK T. FARE, Libertyville 24, Illinois**

**Erik T. Fare, Libertyville 24, Illinois**

Dear Mr. Fare: Send me complete information without any charge and without the slightest obligation. Tell me how I can learn your method of catching big bass from "fished out" waters, even when the old timers are reporting "No Luck."

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# DON'T READ THIS!

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**ABSOLUTELY EVERYONE**

Now that you have taken the safety precautions, read every word in this ad, as we have said above, this item is **HOT**, so hot that to be extra safe we have ordered the publishers not to use any **RED** ink. Now, getting serious, fellows, here's the scoop. We are going to do **EVERYTHING** to make you the most welcomed salesman to ever approach a customer. We will give you **GLOSSIES, MATS, IMPRINTS**, all the material needed for an immediate mail order set up, also documented test reports of how prominent colleges and testing labs, **RATE** our product, also at your disposal is a powerful pulling pitchman sound T.V. movie on Bug Weapon. The production value of this film cost us more than \$2000.00, **PLUS BELIEVE IT OR NOT** an advertising allowance. We will **PRE-SELL** this Bug Weapon for you, by launching a tremendous advertising barrage, including almost all national magazines, radio, and T.V. The entire population of the U.S. will be put in a buying mood. Especially so since hundreds of insects will help you make every sale. They will dive bomb about him, molest his comfort, interrupt his sleep, destroy his property, and spread contagious diseases about his home, and food. Business establishments suffer enormously combating the ugly insect problem. They will greet you with arms wide open. It's a tested natural with **STAGGERING** public acceptance and mountainous profits. Yes, you will be **WELCOMED**, you will be **THANKED**, most important you will make **MONEY**.

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F. W. Johnson, Manager, Classified Advertising

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EARN Up to \$15.00 daily with your movie projector! Metcalf, 16806 Glenroy, Chicago.

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**UNUSUAL Opportunity.** Spinning at home. Supplies, market, furnished. Angora House, PM, Springfield, Illinois.

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#### MONEYMAKING OPPORTUNITIES

**COST** Of things going up faster than your income? You can make more full or part time as a Rawleigh dealer. Write for full particulars. Rawleigh's, Dept. P-RR-PPM, Freeport, Ill.

**FREE!** "301 Profitable Small Businesses!" Amazing shoeing plans! Work home! Start sparetime. Deumant Surveys, Kenmore 23-R, N. Y.

**LEARN Mailorder fundamentals.** Plans, Opportunities. Will Kell Company, 5255 Wilshire, Beaumont, Texas.

**WHOLESALE!** 12,000 Nationally famous products! 30-80% discounts! Sensational plans, small catalog free. Derron Company, 21-13 White, Paterson 23, N. J.

**GROW Earthworms.** Sell breeding stock. Soil culture, fishbait. Home business opportunity. Write Earthworms, 597, Corona, California.

**EXTRA Income** serrating and sharpening knives. Service welcomed. Free details. Serr-Edg, 9731 Lorain, Cleveland 2, Ohio.

**SCHEMER Magazine,** Canfield 1, Ohio. monthly mailorder ideas, plans. Year \$2.00. Sample 25c.

**LEARN Swimming** the easy way. Teach children, others. Complete easy to understand lessons. Four lessons, practiced without pool, \$1.00. Swimming, Del Mar 1, Calif.

**DO You want your own business?** For moneymaking opportunities. Write: Central Sales Outlet, Robbins, N. C.

**IF You need more income.** Start a home business in spare time. Make extra money. Experience not necessary. Literature free. World Sales Co., P.O. Box 179 PM, Ripley, Miss.

**START A buying service,** buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 830-R Linden, Buffalo, N. Y.

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

**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, B. C., Canada.

**100 TESTED Ways to make money, \$1.00.** Roger Frink, Whittemore, Iowa.

**MAKE Extra money at home, sparetime!** Exciting new booklet shows "how!" Dozens of proven money-making plans, ideas for entire family! Rush 25c for yours! Mail Products, 62-46-247th Street, Bellerose 26, N. Y.

**WHOLESALE Brand named products** catalog \$1.00. D. Kabel, 870 Lafayette, Buffalo, N. Y.

**SAVE To 80% on famous brand products!** Appliances, tools, jewelry, etc. Receive large fully illustrated catalog every year! Costs you nothing! \$1.00 deposit (refundable) brings 1955 catalog. Satisfaction guaranteed! R. Broderick, 383 Park, Glencoe, Illinois.

**RAISE, Sell earthworms.** Instructions free. Johnny K's Hatcheries, 965 Selby, St. Paul 4, Minn.

**WINNING Prize contests** is fabulous, confidential, home opportunity! Send stamp! National Contest Bulletin, Box 2685-P, Miami 16, Florida.

**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.

**"MONEY Getter's Bulletin"** This exciting magazine prints money-making plans, ideas, spare-time tips; hobby ideas; many other types of money-making facts for men, women; young or old. Sample copy 25c. Distributors, Box 831-B, Monessen, Penna.

**ALUMINUM Awnings.** Sell yourself. Sell neighbors. Factory prices. Write Groff Awnings, Box 10254, Tampa, Florida.

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

**\$9.00 RETURNS \$160.00.** Repeats. Make us prove it. Ezee, Bayport 7, Mich.

**NEW 7"x11" Ultra-blue signs.** To retail 50c. Sample free! Lowy, 812 Broadway, Dept. 872, New York City 3.

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**MAKE Jewelry!** Pleasure, profit. Tremendous demand. Complete instructions. Material sources. Send \$1.00. Haase, 2719 East Washington, Madison 4, Wisconsin. Priceless or refund.

**BINGO Markers,** greeting cards, books. 300% profit. Freemans, Cornwall, Ontario.

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**WANT To go in business for yourself** without capital? We show you how. Postcard brings details absolutely free. Topval, Lindenhurst 320, New York.

**BUY Wholesale 100,000 advertised products!** Profit selling others! Free details! National Buyers Service, Box 426EF, Oakland, California.

**SELL Religious mottoes.** Send no money. We trust you. Crystalglo, Sidney, Ohio.

\$5 TO \$10 An hour. I've did it, I'm disabled now. Real genuine offer. Complete information only \$1. Lucas, 2200 Carson St., Pittsburgh 3, Penna.

GROW Into the mail-order business. Experienced operator tells how. Send \$1 today! Premier, Box 8177, Chattanooga, Tenn.

CASH Profits. Supply prospects for stupendous silverware deal. We do selling. Raymond Lindblom, 216 West Jackson, Chicago 6.

MAKE To \$300 extra. New! Different! No selling! No mailorder! Details free. J-M Enterprises, 801 1/2-A North Marsalis, Dallas 3, Texas.

BUY, Sell and swap for profit. Amazing new method. Inquire Box 621G, Culver City, Calif.

DOLLARS In baby record books, baby shoe kits. Liebig Industries, Beaver Dam 2, Wisconsin.

PROFIT! Prestige! Publish a magazine under your own name! Only \$3 per month! Sample, details 5c! Filmer, 910 Marion, Pharr 22, Texas.

PRINTING And office supplies wholesale, 20,000 items. Literature free. Royal, Box 248-A, Cleveland 27, Ohio.

FREE Literature describing moneymaking mailorder plans. Lewis Bartlett, Richmond, Georgia.

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 1709, 850 N. Dearborn, Chicago 49.

FREE Booklet "Money Making Facts" tells mechanically inclined men how to start sparetime business at home. V. Foley Company, Columbia Heights, Minnesota.

ACME Saw sharpeners are the finest you can own. Don't be satisfied with less. Send for free literature. Max Mig. Co., 138 Stockton Ave., San Jose 26, California.

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MAKE To \$4.50 hour doing common pen lettering. National Artists, 801 1/2-A North Marsalis, Dallas 3, Texas.

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

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

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free book. Washington Mushroom Ind., Dept. 173, 2934 Admiral Way, Seattle, Washington.

50,000 ARTICLES Wholesale. Source directory, dime. Nelko, Box 3462-DR, Chicago 34.

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.

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

SELL—Buy Titania gems. More brilliant than diamonds. 89.75 carat wholesale. Free catalogue. Diamonite, 1404-M Mitchell, Oakland 1, California.

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FORMULAS 10c. A. Millic, Chemist, 430 South Western Ave., Los Angeles 5, Calif.

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53 MONEY Making formulas 25c. Ralph Bastiens, LaMolle, Nevada.

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

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

FREE Formula list. Anything analyzed. Northwestern Laboratories, 2316 Brown, Evanston, Illinois.

THE Best mfg. formulas at any price. A. F. Hanlon, Malvern, Penna.

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PLASTICS Home-craft course for men and women. Tells and shows how to make hundreds of fast selling plastics products. All plastics and materials for 23 projects included in course. No special tools needed. Course pays for itself. Write for free booklet. Interstate Training Service, Dept. D-3-P, Portland 13, Oregon.

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PLEXIGLAS, Lucite. Square foot cost 1/16", \$1.10; 1/8", \$1.45; 3/16", \$1.80; 1/4", \$2.15; 5/16", \$3.28; 3/8", \$4.38. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, Inc., 35 Clarkson Street, New York City.

PLEXIGLAS, Fiberglass, polyester, acetate, vinylite. Fast service. Wholesale-retail. Catalog 15c. Gem-O-Lite, Box 686P, North Hollywood, California.

PLEXIGLAS Sheets—Cut to size. Clear. All thicknesses. Standard outdoor translucent colors. McClarin Plastics, P.O. Box 168H, Hanover, Penna.

LAMINATING Supplies. Free price list. Solomson, 48 Cornhill, Boston 8, Mass.

PLASTIC. Sheets, rods, tubes, etc. Free list. Plastic Supply Co., 2111 Olive Street, St. Louis 3, Mo.

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"CHEMISTRY For Beginners" and "Chemistry of Familiar Things." Both books 30c. Franks Book Service, 3121 So. Racine, Chicago 8, Illinois.

CHEMISTRY, Biology, microscopy. Catalog 25c. Laboratory Sales, Box 161-A, Brighton, Mass.

NEW Idea chemical and apparatus outfits for home experimenting, photo-scales, microscopes, chemicals, biologicals and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 1244 West 23rd St., New York, N. Y.

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 25c. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 26, N. Y.

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

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MEN, Women, make money spare time plus new car as bonus for encouragement. Amazing hosiery guaranteed to wear without holes, snags, and runs, or replaced free. For example, lovely 60 gauge nylons guaranteed for as long as 1 1/4 years, or replaced free. Write Wilkint, 1756 Washington, Greenfield, Ohio.

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LOWEST Wholesale prices. Thousands of name brand items. Free literature. Parker Distributors, Box 55, (Dept. C) Williamsbridge Sta., New York City 67.

NEED More money to live on? Increase your weekly income \$20 to \$25 or more in spare time. Supply Rawleigh Products to consumers. Also openings for full time dealers. Write Rawleigh's, Dept. P-DD-PPM, Freeport, Ill.

BEAUTIFUL Feather pictures, 200% profit! Free sample, Apartado 9636, Mexico 1, D. F.

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BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, 629-R Linden, Buffalo, N. Y.

FAR East and European firms seeking agents for exclusive and general lines. International survey \$1.00. Rachalske, 1902 South 93rd, West Allis 14, Wisconsin.

SELL 8x10 Enlargements \$2.95. \$1.00 commission plus bonus. Acme Enlargers, Levy Sta., No. Little Rock, Ark.

WHOLESALE. Only name brand catalog with S&H green stamps. Send \$1, refunded. Pollack, 12 Cedar, Akron, N. Y.

POWER Mowers. Free demonstrator. Prepaid. Home agents. Dealers. Cut rate deal. Farmco-PM, Excelsior Springs, Mo.

WHOLESALE! 12,000 Nationally famous products! 30-80% discounts! Sensational plans, small catalog free. Derrom Company, 21-10 White, Paterson 20, N. J.

EARN \$200 Weekly! "Seal-Tite," sensational \$1.98 puncture-proofer guaranteed to stop flats. Big sales, profits. Free sales kit. M & M, Dept. M-2, 842 Third Ave., New York City 22.

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EARN \$30.00 Daily with "Dab-it," sensational spot-remover stick. Like magic! Buyers everywhere! Big sales, profits. Free details. M & M, Dept. M-1, 842 Third Ave., New York City 22.

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HIGHLY Profitable magnetic pencils for everyone! Samples \$1.00. Nicholson Products, 3401 Cahuzanga, Los Angeles 28, Calif.

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**ONCE** in a lifetime deal never before offered. Want representatives each city, town, village also foreign countries. Nothing to sell. Tremendous opportunity. Kleckner, Box 2, Far Hills Branch, Dayton, Ohio.

**EASILY** Make \$30 daily. Automatic toilet bowl cleaner sells itself. Write Box 61, Belleville, N. J. Sample, only \$2.35.

**BIG** Profits yours—Sell revolutionary room climatizers also fire alarm and extinguisher kits. Write for literature and sample prices. Micro-Moisture Controls, Inc., Mineola 60, N. Y.

**FREE!** Wholesale catalogs appliances, homewares, sporting goods, furniture. United Distributors, 23A Grant, San Francisco.

**EARN \$45.80 Daily!** One application Silicone, wax-treated "Car-Glo" cloth cleans car beautifully. Big sales, profits. Free details. M & M, Dept. M-3, 842 Third Ave., New York City 22.

**\$5 TO \$10 An hour.** I've did it. I'm disabled now. Real genuine offer. Complete information only \$1. Lucas, 2200 Carson St., Pittsburgh 3, Penna.

**"MIRACLE Mitt."** Simonizes, polishes autos like magic. No messy rags, no dirty hands. Works on furniture. Big profits. Whirlwind seller. Miracle Mitt, Box 276-P, New York City 18.

**30,000,000 WOMEN** Want amazing new automatic refrigerator defroster. You sell 8 out of 10 on sure-fire free trial. \$250.00 weekly profit not uncommon. Rush postcard for guaranteed plan. D-Frost-O-Matic, Dept. H-102, 173 W. Madison St., Chicago 2, Ill.

**YOUR Own business—Used suits \$1.50, overcoats 85c, mackinaws 35c, shoes 12½c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Moro, 1213AA South Jefferson, Chicago 7.**

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**WEDDING** Invitations, personalized napkins. Wholesale prices. Sperry-Print, Williamsport 45, Penna.

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**GOLD** Or silver letters, numbers. Windows, doors, trucks. 1" to 8". 500% profits. Free samples. Atlas-T, 544 West 79th, Chicago 20.

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

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

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**CASH** in on toilet trouble—Sell plastic flush valve guide. Write for sales plan. Guide-O-Valve Co., 1616 Broadway, Redwood City, Calif.

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

**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, 300 E. Ontario St., Chicago 11, Ill.

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**PROVEN** Profits. Specialty salesman. Part or full time. Selling dazzling diamond and square reflectorized road signs to motels, auto repairmen, truck stops, every line business. Make \$50 up daily. Write for dealer application form. Hi-Way National Sign Co., 1944 Park Ave., New York 37, N. Y.

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**MAKE \$75-\$200 Weekly.** Dealers, farmers, agents demonstrate, take orders, new proven nationally advertised Gro-Green Liquid Fertilizer and Nitrogen Nutrients. Full, part time. Prospects everywhere. Campbell Co., Rochelle 51, Illinois.

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**UNUSUAL** Mail order plan pays \$100.00 per car commission. No investment required. Take orders only. Brand new 1955 automobiles equipped with windshield washers, outside Rearr mirror, turn indicators, tutone paint, oil filter, undercoating, federal taxes, Michigan sales tax, license and title. Prices start at Nash \$1673.00, Ford \$1733.00, Plymouth \$1730.25, Chevrolet \$1795.65, Studebaker \$1858.96, Dodge \$2085.00, Pontiac \$2107.74, Mercury \$2233.60, Buick \$2341.15, Oldsmobile \$2415.17. Other equipment additional. Also Lincoln, DeSoto, Chrysler, Packard, Hudson, etc. Send \$1.00 for complete details. Harry Harwoods, 20058 Renfrew Rd., Detroit 21, Michigan.

**\$5 TO \$10 An hour.** I've did it. I'm disabled now. Real genuine offer. Complete information only \$1. Lucas, 2200 Carson St., Pittsburgh 3, Penna.

**AGENTS,** Salesmen, buy standard brand merchandise at rockbottom wholesale prices: \$49.50 watches at \$22.95. \$49.50 dinner sets at \$15.60. \$1.00 ladies' first quality nylon hose at \$6.50 per dozen. Ladies closeout \$8-\$10 fall and winter dresses at \$1.50. Other sensational values in clothing, silverware, jewelry and appliances. Minimum order \$10.00. Send \$1.00 for catalog with confidential price list. Refundable first order. Merchandise Dept. P-6, P.O. Box 66, Bronx 59, New York.

**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. R-100, New York 11, N. Y.

**START** Your own business on credit. Your own boss. 1135 of our dealers sold \$5000 to \$30,000 in 1954. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary, pleasant profitable business backed by world-wide industry. Write Rawleigh's, Dept. F-U1-PPM, Freeport, Ill.

**ADVERTISING** Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M-855, 7530 Greenwood, Chicago.

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**35 MILLION** TV owners welcome new, exclusive, remote volume control. Eliminate undesired commercials, converse, phone, adjust volume up or down from easy chair. Editorially featured leading magazines. Portable radio demonstration or free trial practically assures sale. Retail \$6.95. Money-back guarantee. Send \$3.50 for sample and deal. Control-Tone Company, 111 No. Tacoma Ave., Tacoma, Wash.

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**MAKE \$75-\$200 Weekly.** Dealers, farmers, agents demonstrate, take orders, new proven nationally advertised Gro-Green Liquid Fertilizer and nitrogen nutrients. Full, part-time. Prospects everywhere. Campbell Co., Rochelle 51, Illinois.

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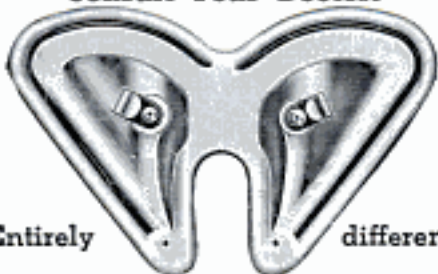
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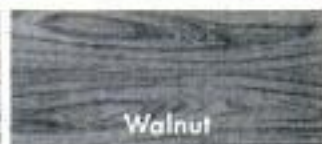
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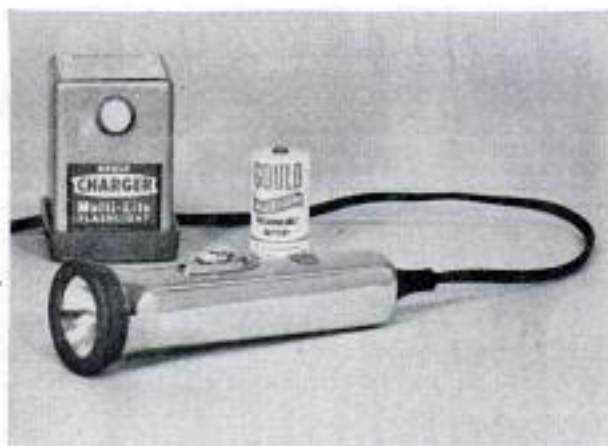
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...and I Discovered it by Accident!

by Albert Wells

IT ALL STARTED the day I got the bill: \$214.36 for an engine overhaul—and I had only 28,000 miles on the car!

I told my troubles to a neighbor—a lubrication engineer—told him how I'd always changed oil every 1500 miles, changed filters every 5,000 miles. His answer floored me.

"You've been wasting your money," he said. "We've spent millions developing oil additives that keep carbon, gum and abrasives from damaging your engine. Your oil costs about 15c more a quart because of those additives. Yet, some of the filter packs you've been buying actually remove oil additives. And the more often you change filter packs, the more money it costs you."

"But don't I need a filter to take the impurities out of the oil?" I asked.

He took a deep breath. "This will really shock you. Engine damage is done by abrasives 10 to 40 microns in size (a micron is .000039"). Your oil filter can't take them all out because cloth or paper can't be packed tight enough without stopping oil flow when the fibers soak up oil and expand."

"What kind of oil filter do you recommend, then?"

He laughed. "Well, there's a porous bronze filter they're using in supersonic aircraft that does a perfect job. But you can't get one like that for your car."

I asked myself: "Why not?" Next day, I tracked down the outfit that was making the filters for aircraft, and got the answer. These porous bronze filters were made by fusing together millions of tiny bronze balls. Non-absorbent, they didn't remove additives, yet they removed abrasives in the 10-to-40 micron danger zone. Could they be made for automobiles? Again, the answer floored me.

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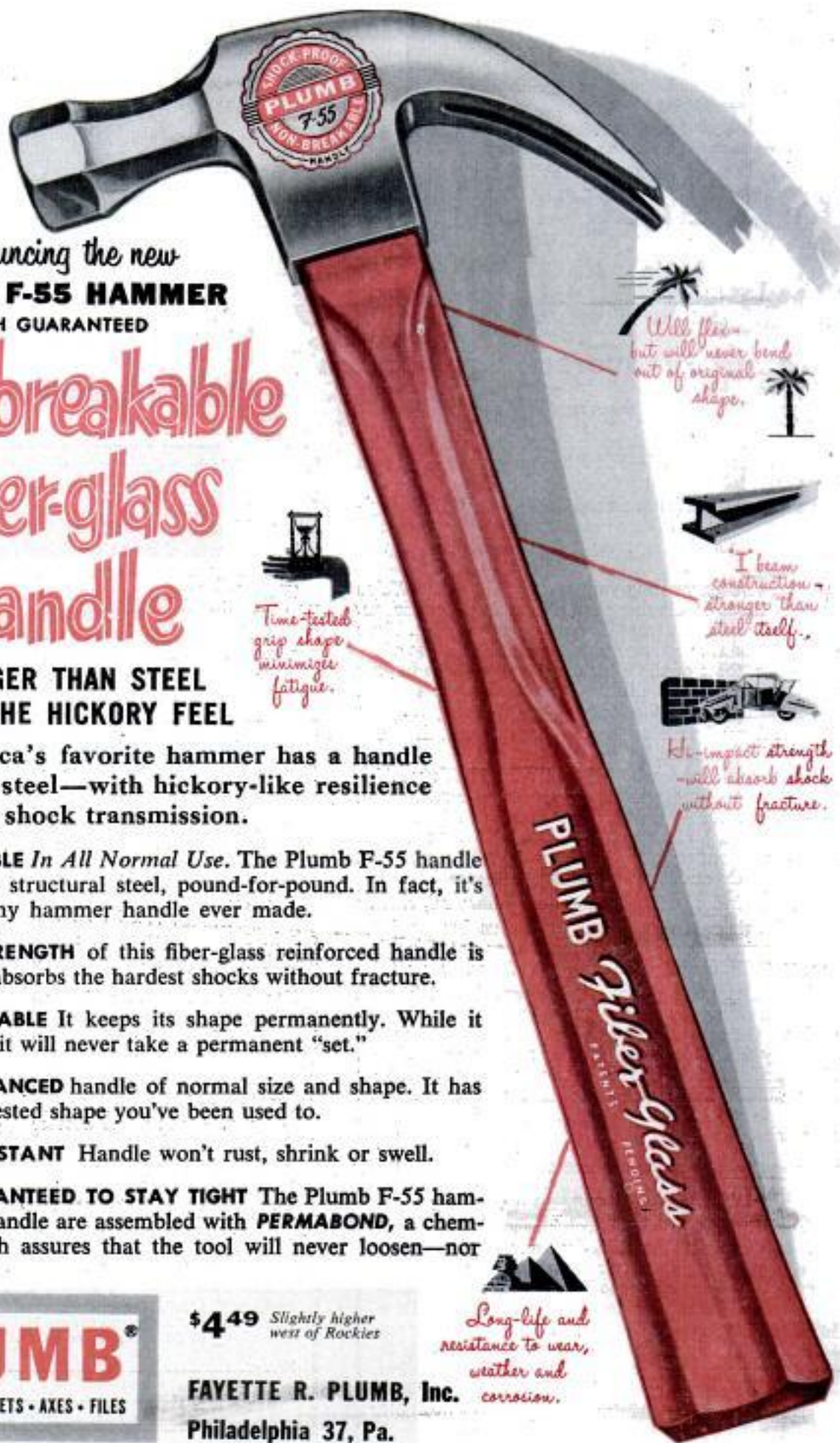
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# Can We Blame the Sun for Stormy Weather?

By Dr. Walter Orr Roberts

*(Doctor Roberts, an internationally known solar scientist, is director of the High Altitude Observatory at Boulder, Colo.)*



**E**ACH MORNING, winter and summer, a young man arises before dawn and shuffles sleepily out into the thin air of a high mountain pass near Climax, Colo. He walks a few hundred yards to a small building, rolls back a section of the roof and aims a relatively small telescope at the sun as it climbs over the surrounding peaks. With a camera attached to the

Author examines occulting disk of new coronagraph. Disk will blot out sun to its rim, producing artificial eclipse

Observer uses a photometer for a quick measurement of the brightness of the atmospheric halo of the sun. The small circle on the end of the spar serves as artificial moon for eclipsing sun

High Altitude Observatory photos





U. S. Navy photo

Coronagraph photo shows sun's halo. Streamers may flow all the way to earth (exaggerated size in drawing)



telescope he takes half a dozen pictures.

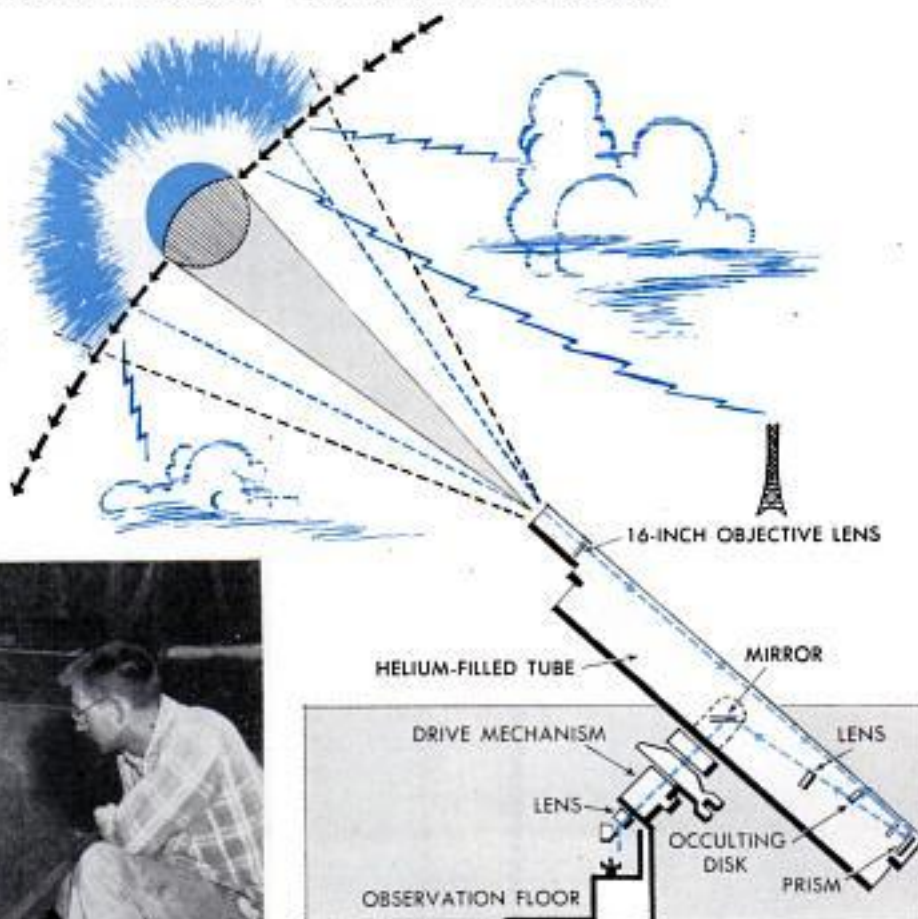
It seems quite possible that research based on these pictures, and others taken at a few places scattered across the face of the earth, will have as far-reaching effects as any scientific program ever undertaken in the history of astronomy. It is a program that may well touch the life of every person on earth.

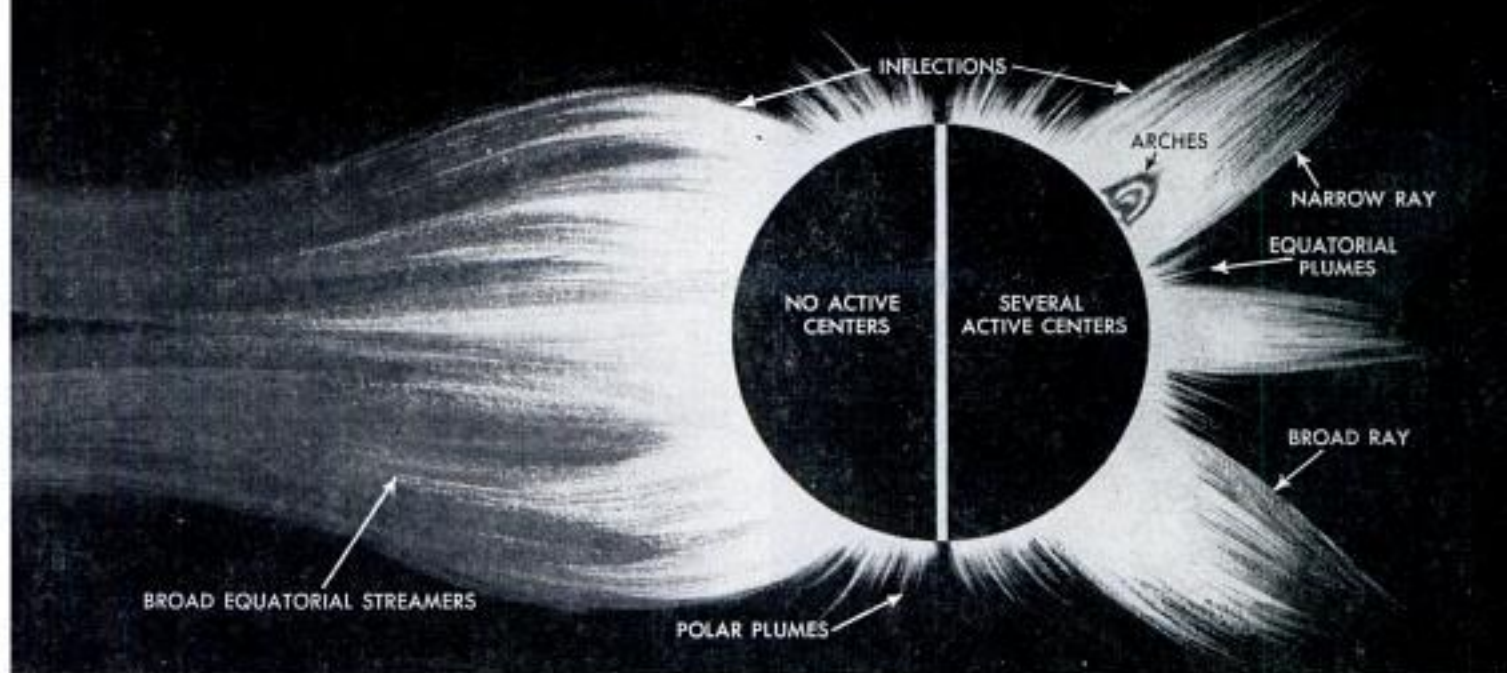
Through these pictures, scientists are discovering that storms raging on the sun's surface may have a profound effect on the earth's climate; that long-sustained cycles of these storms may explain the droughts and deluges of history; that streams of energy from the sun play havoc with radio broadcasts, intensify the beams of cosmic rays playing on the earth, and may even affect the weather from Kansas City to Kyoto.

Mounting system of new coronagraph will keep spar aimed at sun. It is so delicately mounted that a teacup-size motor will move the 26-foot tube. Diagram shows optics of new coronagraph

It even seems possible that some day we will be able to make long-range weather forecasts here on earth by studying the storms that rage across the sun's surface.

Few people outside the field of astronomy know of the daily sun-watch of Richard T. Hansen and his assistant, David Dodgen, in the thin air of the mountain pass. They send their photos of the sun 120 miles northeast to the research laboratories of the High Altitude Observatory at the University of Colorado in Boulder. There Dr. Donald E. Billings and the rest of our staff analyze the photos.





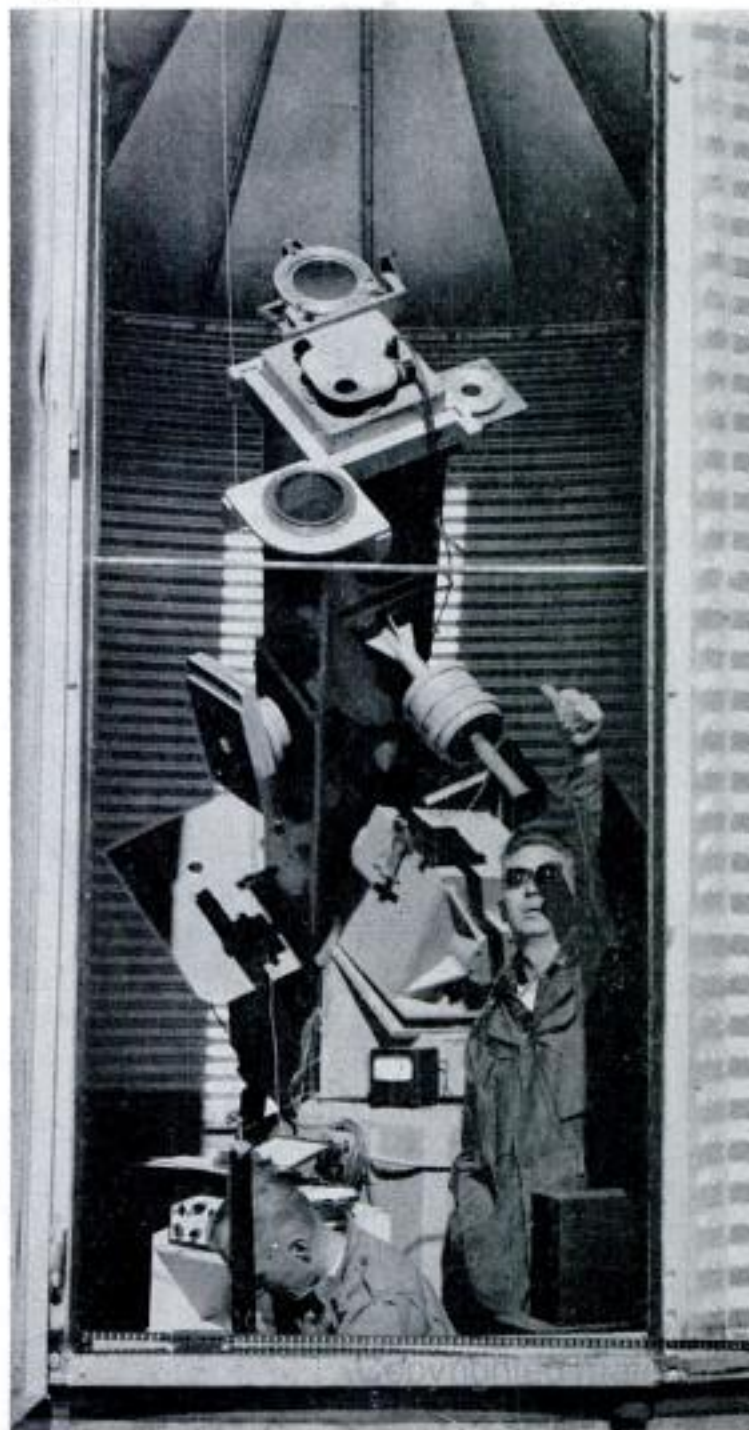
Sun's magnetic field focuses rays into streamers. Earth's magnetic field causes them to shower down near poles

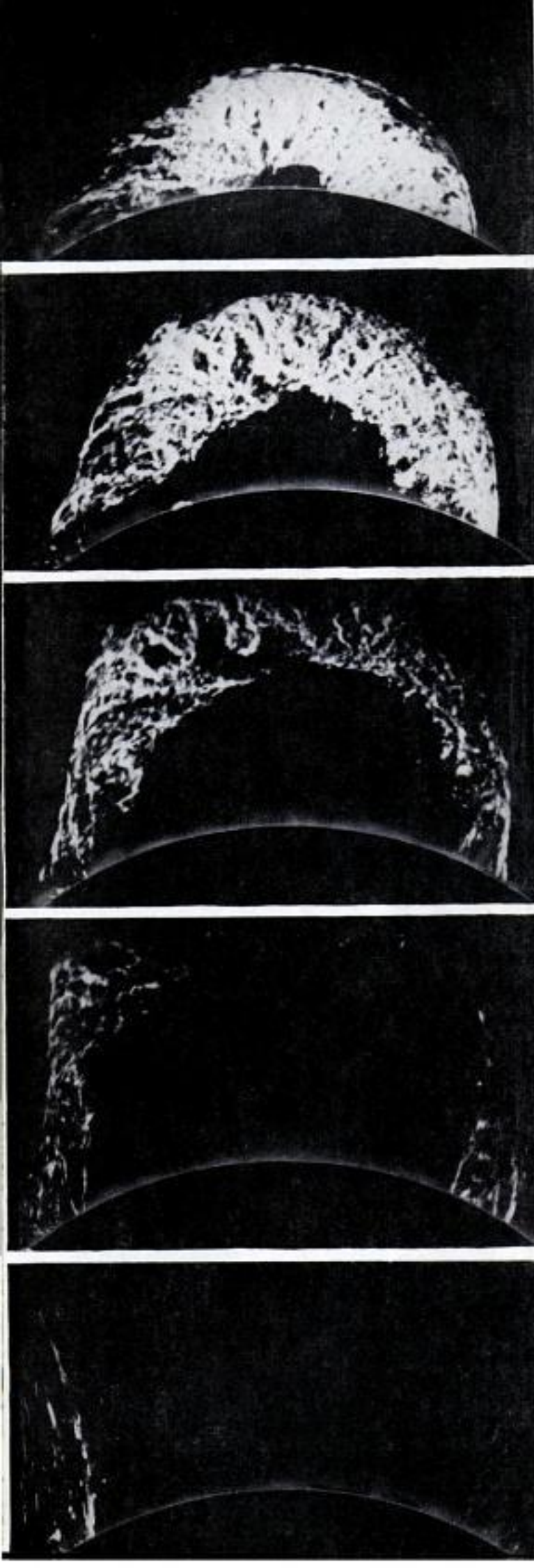
Much of our information about solar storms has been obtained through the single eye of that mountain telescope—a special kind of telescope designed not for looking at the sun's face but into the tenuous atmosphere that lies beyond. In this atmosphere are hidden the clues to many of the important secrets of the sun's effects on earth—secrets that centuries of looking at the sun's face through telescopes have failed to reveal.

Scientists long have tried to peer into the swirling atmosphere of the sun. That is why, for many decades, scientific expeditions have carried solar telescopes to remote corners of the earth for observations during eclipses. At the moment of eclipse, the shadow of the moon falls upon a narrow strip of the earth's surface, and for a selected few of the earth's inhabitants, blocks out the brilliant rays of the sun. At such moments, even an untrained observer without a telescope can see the gleaming, pearly white halo around our parent star. This halo, called the corona, was recognized as far back as 2000 B.C. Recently it has cast light on many of the age-old mysteries of the sun. During the less than eight minutes of total eclipse, scientists work with practiced speed to photograph the corona and the vast clouds of incandescent gas that surge out from the rim of the sun.

But eclipses are infrequent. As early as 1868 scientists asked: Why not build an eclipse into a telescope by blotting out the brilliant circle of the sun with a disk? The corona then could be observed at any time. Many famous astronomers wrestled with the problem of building such an eclipse into a telescope, and failed. Reflected and scattered light always penetrated their telescopes to overpower the dim light of the corona.

Flare patrol is an instrument used to detect sudden, bright prominences that interfere with radio reception





By 1929 the problem looked quite hopeless. That year two distinguished astronomers concluded that it was impossible to build a coronagraph. Just one year later, B. Lyot, a young French astronomer, hauled a small instrument on skis to the top of a mountain in the Pyrenees. There for the first time, on July 25, 1930, he cast a manmade "moon shadow" on the earth. He used a simple but ingenious optical system to mask out unwanted light from the sun's face.

Other coronagraphs soon appeared. But even today there are only an estimated 15 such instruments throughout the world. In 1939, Dr. Donald H. Menzel of Harvard University was well on the way to building the first coronagraph in the Western Hemisphere. In that year, as a graduate student working under Doctor Menzel's supervision, I took over the completion and installation of the coronagraph as a thesis project for my doctorate in astronomy. In 1940 we moved the new telescope to its permanent home on Fremont Pass in Colorado. I remained at Climax operating the coronagraph for seven years and then moved to Boulder to take over the development of the High Altitude Observatory research station on the campus of the University of Colorado, where we now guide the operation of the Climax coronagraph.

A few months ago, our observatory passed a great milestone in its history. We dedicated a large new solar laboratory and coronagraph at Climax. Sometime this year we hope to start spying on the sun with this new telescope. It will be the largest coronagraph ever built. The new instrument will have a 16-inch objective lens, contrasting to the five-inch lens of the present coronagraph, and will produce much larger and clearer images of the sun's rim and corona. Instead of a tube, the new coronagraph is simply a rectangular metal box 26 feet long. The optical system will be fastened to the outside of the box. At the lower end of the box we will bounce the sun's rays inside the box and down to a special light-tight camera room directly below the main mounting of the telescope. Photoelectric cells will keep the huge spar unerringly aimed at the sun as the earth whirls on its axis and swoops through space. Though the spar weighs over nine tons, it is so delicately balanced that it is driven by a  $\frac{1}{4000}$ -horsepower motor small enough to fit into a teacup. The basic telescope was provided for us by the Office of Naval Research, and the funds for the

Successive photos taken through coronagraph show, top to bottom, stages in development and disappearance of solar prominence. This immense cloud of hydrogen rose to height of over 1,000,000 miles

High Altitude Observatory photos



Old observatory, foreground, and new building are located in the thin, clean air of a Colorado mountain pass

associated laboratory were provided by private donors. We are now raising funds to complete the expensive and precise optical systems that will take full advantage of the powers of the new instrument. A twin of this big coronagraph is under construction at Sacramento Peak, N. Mex. It will be used for basic research on the sun at the Upper Air Research Observatory of the United States Air Force.

We believe that these two new coronagraphs will help solve some of the riddles of the sun's atmosphere. The sun is a revolving ball of gas some 864,000 miles in diameter. At the center the temperature is probably around 25,000,000 degrees C. and the pressures are so great that the gas is compressed until it is 10 times the density of a bar of iron. It is here in the center that nuclear fusion gives the sun its heat.

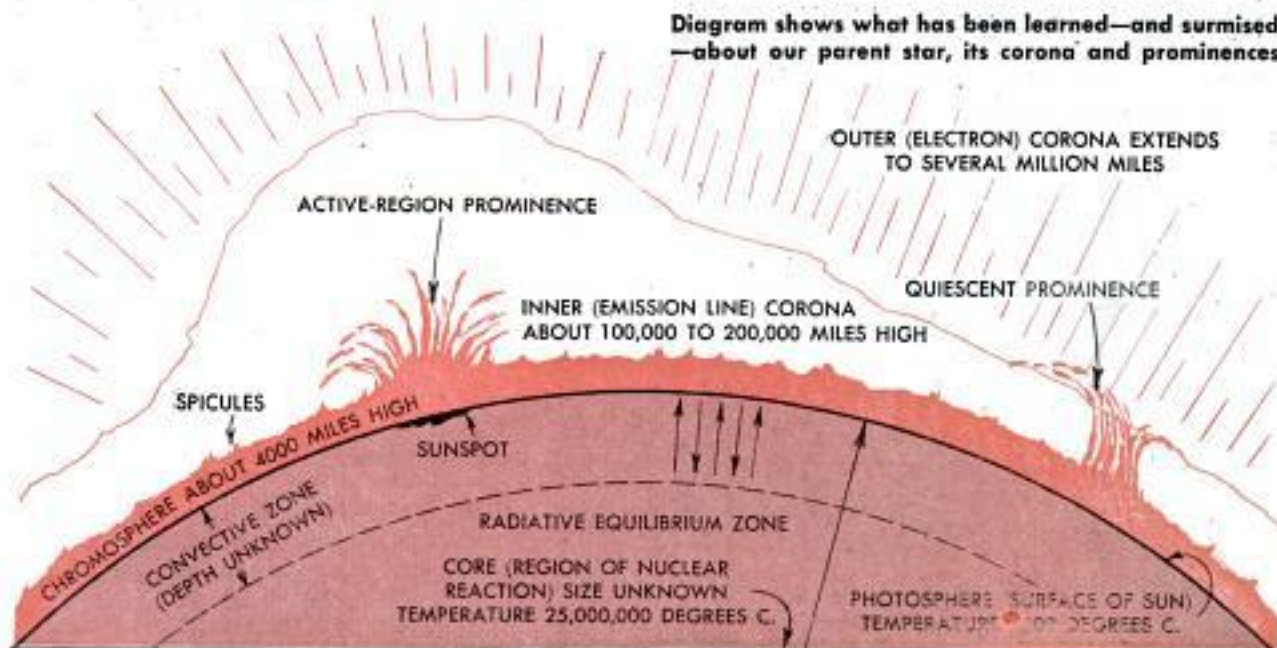
Near the surface is an unstable layer of unknown depth called the convective zone. It has been variously estimated to be from

a few thousand to over 100,000 miles in thickness. Above this layer is the photosphere, which you might call the real surface of the sun for it is here that the gas changes from opaque to transparent, giving the sun a sharp rim when viewed from the earth. The temperature here is about 6000 degrees C. Just above lies the chromosphere, a radiant layer of gas. Near the bottom of it lies the coolest region generally found anywhere near the sun—called the reversing layer and possessing a temperature of a mere 4500 degrees. Above this point the temperature rises, reaching millions of degrees in the corona. The sun, paradoxically, is much hotter at some distance above its surface than it is right at the surface.

One complete rotation of the sun on its own axis, as viewed from the earth, takes about 27.3 earth-days. One of the surprising mysteries concerning the sun is that its

(Continued to page 234)

Diagram shows what has been learned—and surmised—about our parent star, its corona and prominences

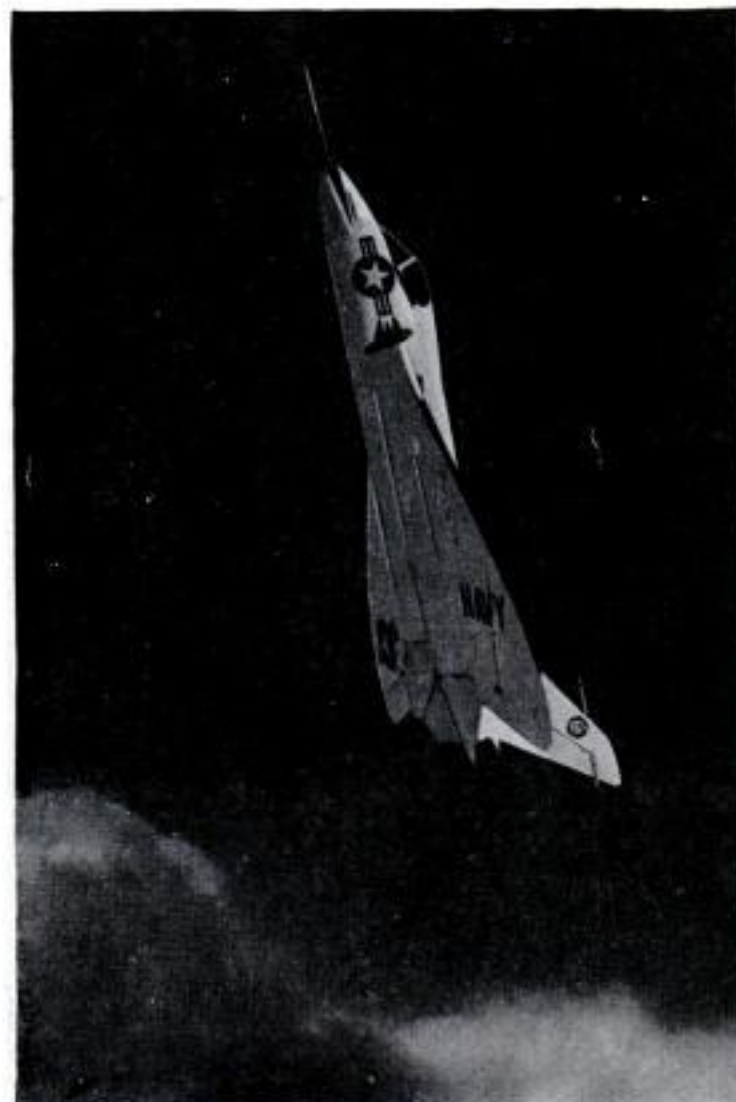




## Submarines Refuel Navy's Big Long-Range Seaplanes on Open Sea

Refueling of long-range seaplanes by submarines surfacing on the open sea has greatly increased the striking power of the Navy's giant seaplanes. The refueling system was worked out in the Caribbean in a two-week operation involving the submarine-oiler *Guavina* and a twin-engine

P5M Martin Marlin patrol seaplane. A long-range striking force of high-speed, submarine-refueled seaplanes is important in the Navy's plans to retain mobility of action in the event of war. The Navy expects to use submarine tankers to refuel its new 600-mile-per-hour jet flying boats.



## 10,000 Feet in 56 Seconds Sets Fighter Climb Record

A United States Navy F4D Douglas Skyray has climbed to a height of 10,000 feet in 56 seconds for a new unofficial climb record. The production-model Skyray is powered by a Pratt & Whitney J57 jet engine, equipped with afterburner. Earlier models, with less powerful engines, were supersonic and hung up two new world speed records. The F4D is a carrier-based fighter. Today's rate of climb appears even more amazing when compared with that of World War I fighter aircraft, which required an hour to reach an altitude of only 6000 feet.

## Glaciers Are Growing

Glaciers in western United States are growing, not receding, according to Dr. A. E. Harrison of the University of Washington. Data secured with photogrammetry, a precise form of three-dimensional photography applied to surveying, shows that the trend is evident throughout the western states. The "most spectacular growth," Harrison says, has occurred in the Cascade Range of Washington.



## Ford's 1955 Tractors Offer Tricycle Design

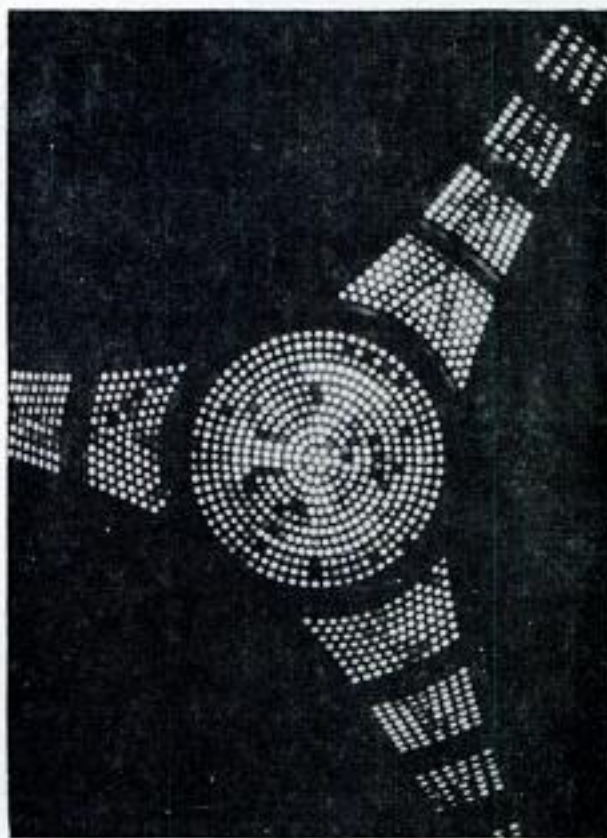
Ford tractors have always been identified with the four-wheel design. Now for 1955, Ford is introducing three new lines of tricycle tractors to increase its tractor line to eight models. The tricycle tractors have two small front wheels mounted on a slight angle directly under the radiator, giving the effect of a single wheel, hence the name tricycle. Directly above the double wheel is a rack in which as much as 450 pounds of additional weight can be placed in easily handled segments to help balance when necessary. The rear wheels can be spread apart by a power unit and adjust in one-inch increments from 56 to 76 inches, or from 64 to 84 inches with disks reversed. Front-mounted equipment designed for use with the new tractors includes two and four-row cultivators with planter, fertilizer and side-dresser attachments.

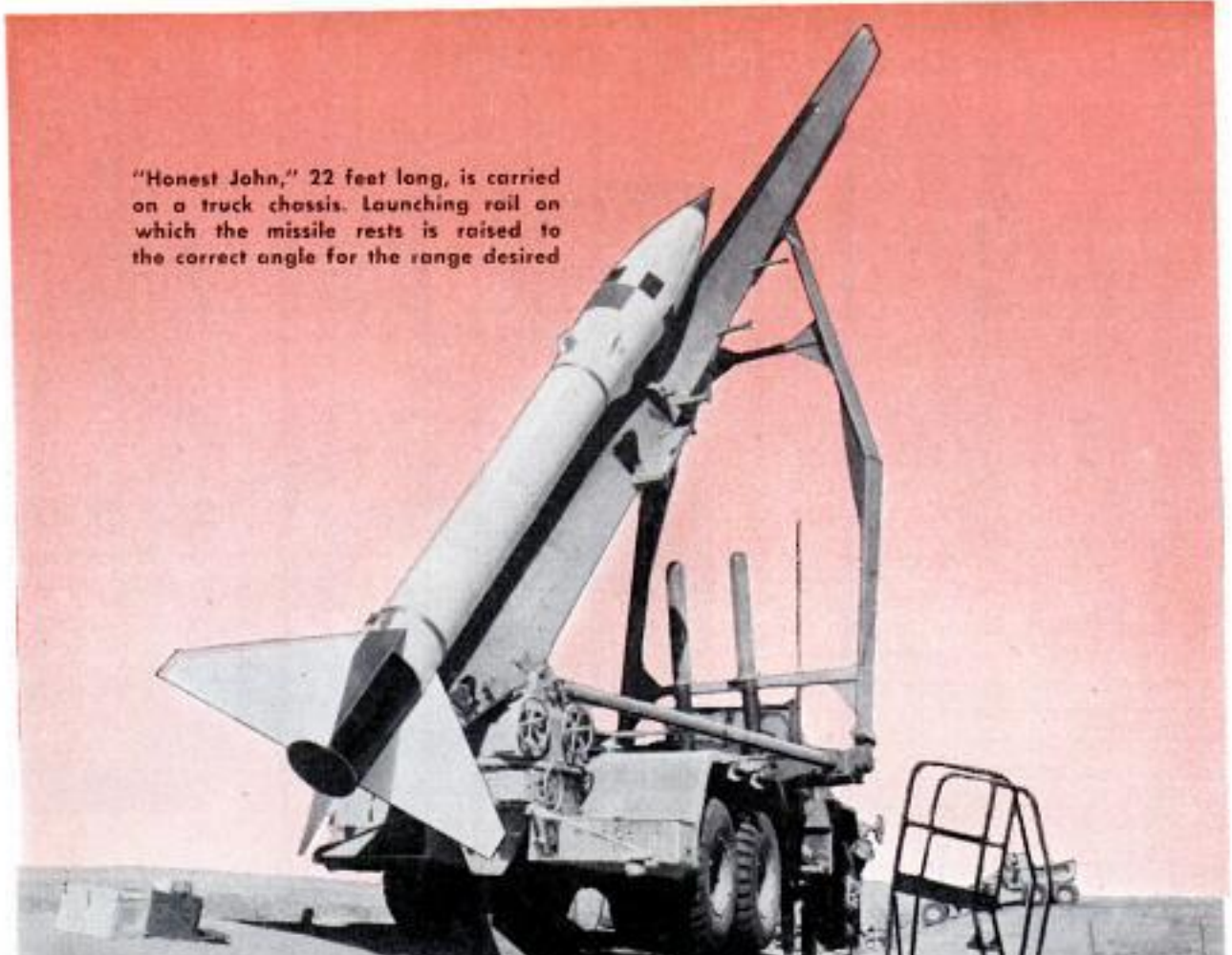


## Egg-Shaped Dome on Church Has Unique Panels of Light

In Düsseldorf, Germany, the new St. Rochus Church is dominated by a dome shaped like an egg. The dome is 84 feet high. Covered with copper plates, it has no conventional windows. Running up

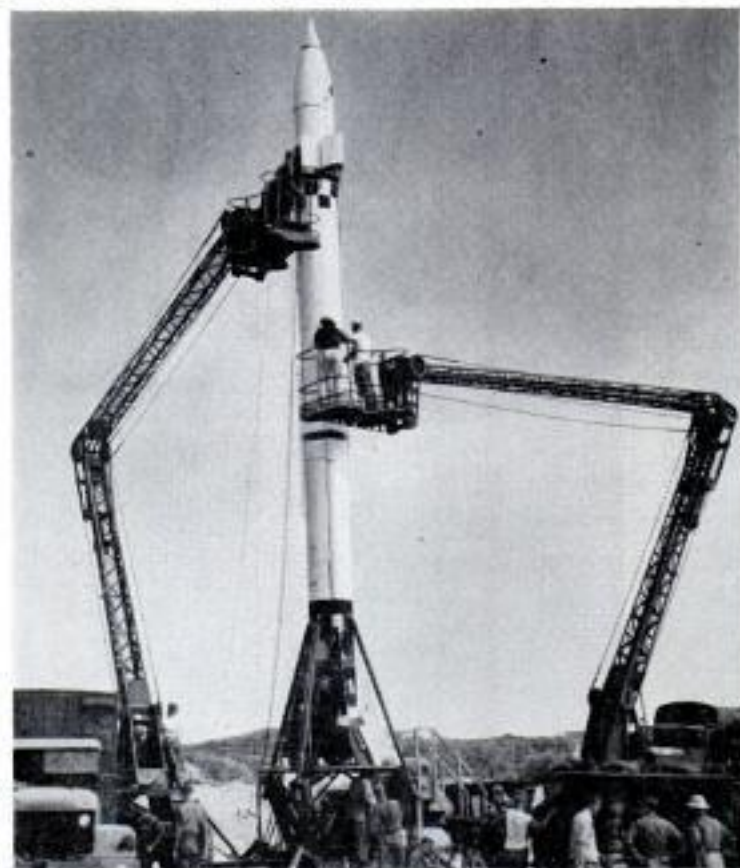
three sides of the dome are panels of glassed-in openings. The panels meet in a circle at the top, and form a unique pattern of light when viewed from inside the church, replacing stained-glass windows.





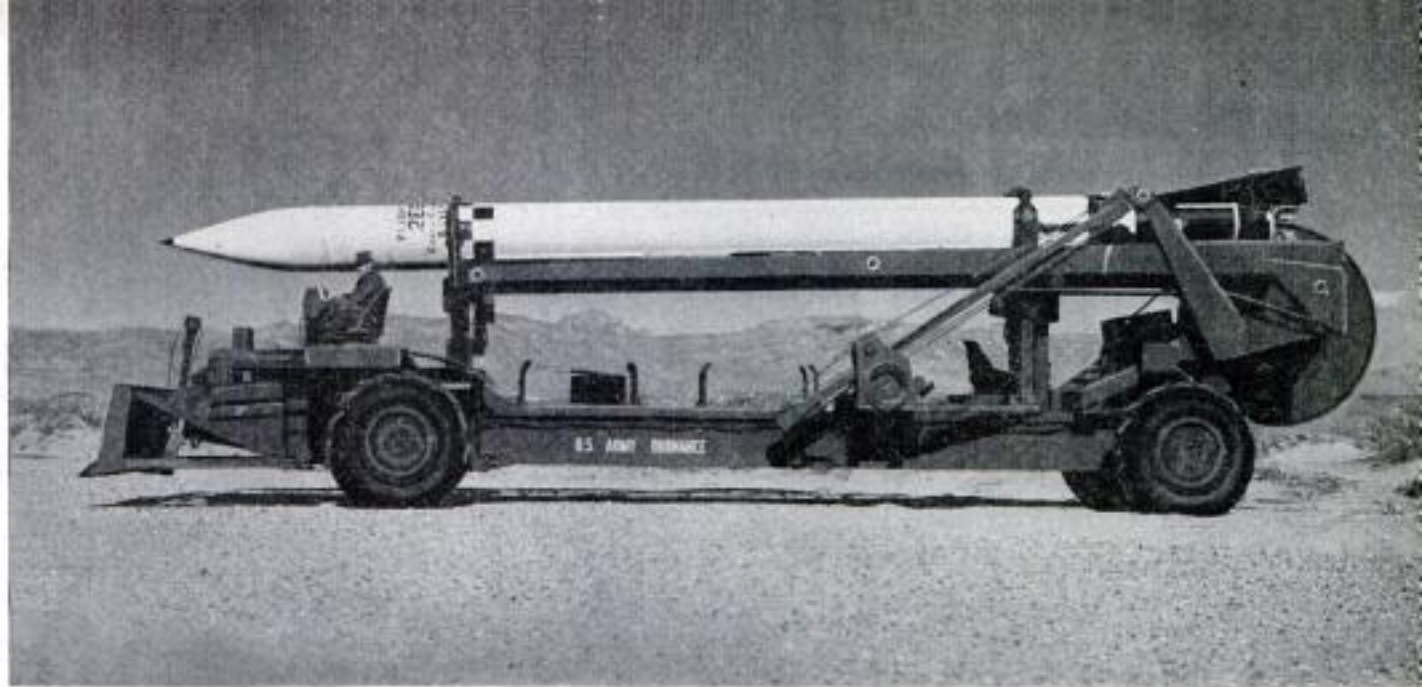
"Honest John," 22 feet long, is carried on a truck chassis. Launching rail on which the missile rests is raised to the correct angle for the range desired

## Hit-Run Rocket Launchers



UNDER TEST by the Army are "hit and run" transporters which serve as launchers for huge rockets. The purpose of the transporters is to avoid launching missiles from fixed positions that could be located and destroyed by an enemy. One type of transporter carries a 22-foot "Honest John" artillery rocket designed for close support of front-line troops. Built on the chassis of a standard Army truck, it is equipped with leveling pads and launching rail. A free-flight rocket, Honest John is aimed by elevating one end of the launching rail to the desired angle. For the longer range, liquid-fueled "Corporal" guided missile, the Army is testing a truck convoy. It includes the transporter, fuel trucks and maintenance trucks fitted with aerial platforms for servicing the 45-foot rocket. ★ ★ ★

After "Corporal" is placed on its launching platform, aerial platforms are raised from service trucks and men adjust the big rocket



Corporal rides on a long transporter that has its own bulldozer blade for leveling an uneven firing site

An Honest John roars up from its launching truck. In this test, balloons spaced along line of flight were used to compile research data



Truck has an erecting mechanism which pivots the 45-foot Corporal into position and then lowers it to the launching platform





When the unit is used as a swimming and diving raft, cots unfold to provide a comfortable canvas sun deck



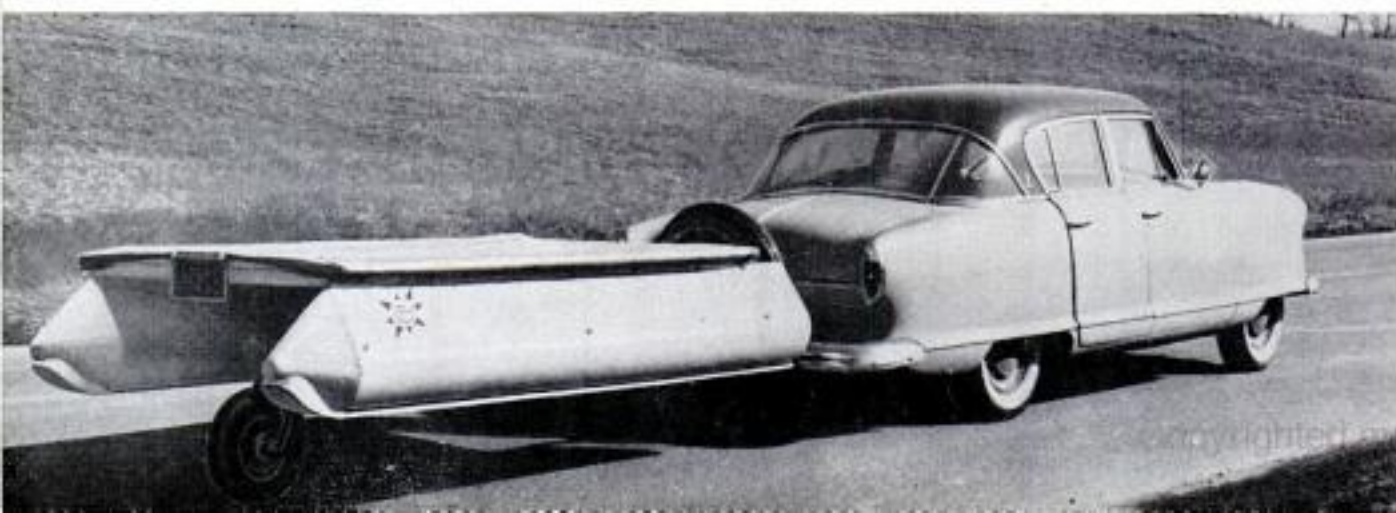
Motor mounted astern, craft becomes fishing boat

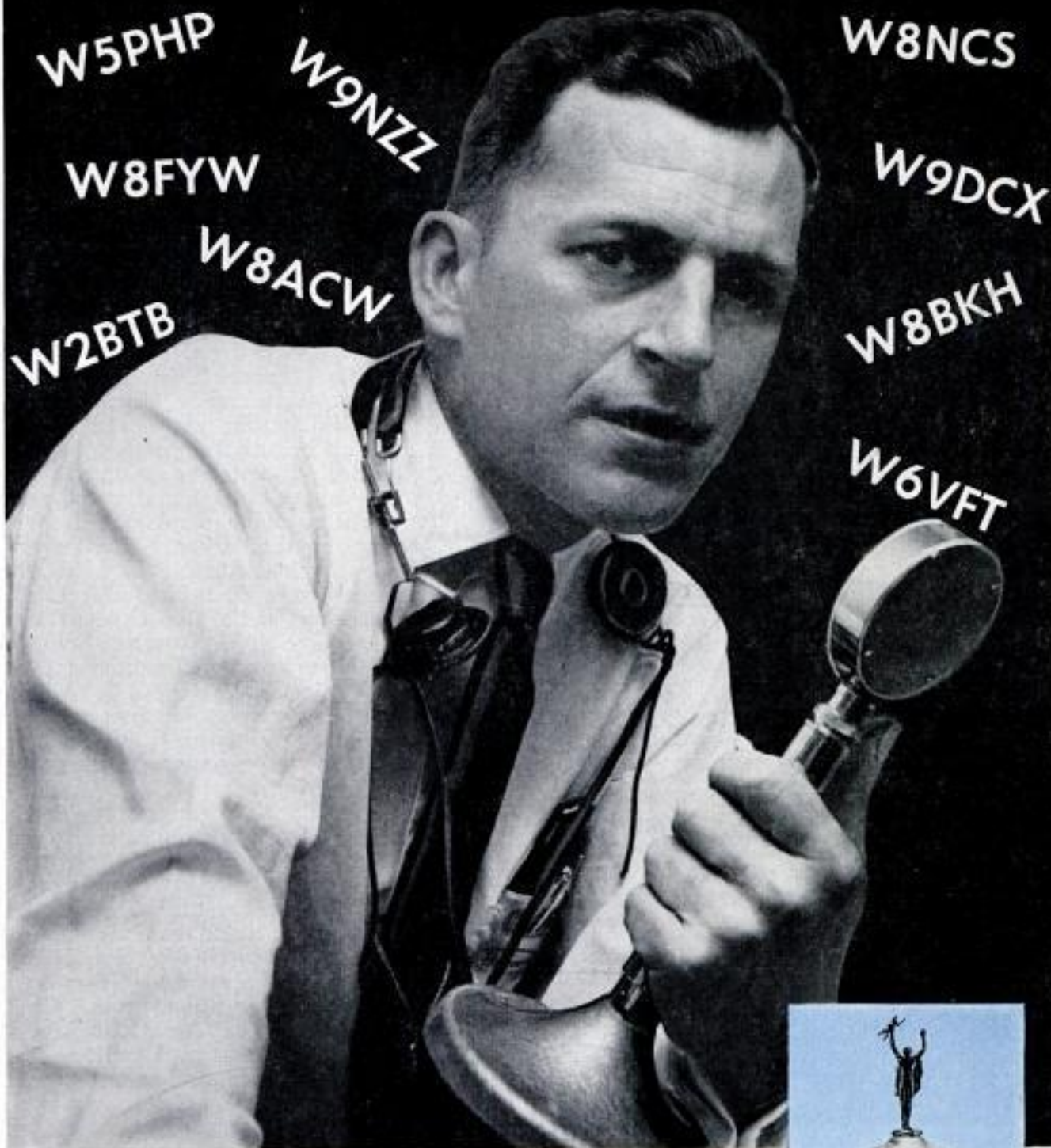


At end of day, unit is beached. Tent converts it into a camp. Below, the trailer has capacity of 750 pounds

## Four-In-One Trailer Becomes Boat, Raft and Camp

SPORTSMEN CAN HITCH a new trailer unit to the car and head for their favorite camping or fishing spot. There they push the trailer right into the water and retract its single wheel. The trailer then is afloat, converted into a boat. Actually it is a catamaran-type craft, with a hull supported by two steel pontoons. Each pontoon is divided into three watertight sections, making the unit virtually unsinkable. Even when the hull is full of water the craft won't sink. Turn it upside down and there's as much of the boat out of the water as when it is right side up. If rough weather brings water into the hull, the craft can be drained by removing a plug. The boat can be fitted with an outboard motor up to 15 horsepower or with a sail. When the day is over, the sportsman pulls the unit up on the beach and mounts a tent over it. The unit then becomes a camp with four built-in cots more than seven feet long. No tent pegs are required, and no drainage ditches need to be dug, as the cots are more than two feet off the ground. In the water, the unit can also be used as a swimming and diving raft. The canvas deck measures seven feet by eight feet. On the road the trailer has a load capacity of 750 pounds.





Benjamin S. Hamilton, winner of award as outstanding "ham" of the year, organized a Civil Defense radio network of 35 stations for San Diego County

## **The "Hams" Have a Man of the Year**

**By Wayne Whittaker**

**I**N WASHINGTON, D. C., the other day a group of distinguished men gathered to pay tribute to a radio "ham," a young man with a look on his face that said: "This must be happening to somebody else."

Those who came to honor him included Congressmen, a former governor and director of Federal Civil Defense, high brass

of the Army, Navy and National Guard, American Red Cross executives, directors of MARS (Military Affiliate Radio Systems), a vice-president of a large business concern, representatives of the press, television and radio.

The man singled out from the nation's 100,000 amateur radio operators, better known as hams, to receive the Edison Amateur Radio Award is Benjamin S.





Hamilton instructs a class of radio students at Civil Defense headquarters in San Diego. He has trained over 200 amateurs



Hamilton's radio network embraces an area the size of Connecticut and could serve 750,000 persons in time of disaster. Below, Hamilton directs drill at Civil Defense headquarters



Hamilton (W6VFT), a school-teacher of La Mesa, Calif., who has been working 20 hours a week to organize and equip an outstanding 200-man radio-communication system to care for his 750,000 neighbors in San Diego County. This county is about the size of Connecticut. To serve it he has organized a 10-transmitter control station and 35 subsidiary stations.

Each year the award, sponsored by the General Electric Tube Department, is made "for the outstanding public service of the year which brings the greatest benefit to an individual or group and for the amount of ingenuity and personal sacrifice displayed in performing the service." The judges who picked 1955's "ham of the year" were E. Roland Harriman, president of the Red Cross; Commissioner E. M. Webster, Federal Communications Commission; G. L. Dosland, president of the American Radio Relay League; and Val Peterson, Federal Civil Defense administrator and former governor of Nebraska.

Hamilton, a veteran of both World War II and the Korean War, found one of his biggest jobs was training operators. He was well equipped for this because he makes his living teaching industrial electronics at San Diego Junior College and Vocational School. In addition to the Civil Defense system for which he received the award, Hamilton has set up a communication system for his local Red Cross chapter.

The Edison awards were started by GE three years ago and have done more to raise the morale and prestige of hams than anything since the beginning of "time." Time for the hams goes back to 1914 when the group that was to become the American Radio Relay League, to which nearly all hams belong, boasted 23 members. Before GE got busy, all that the hams received for their valiant efforts to keep communication lines open in times of flood, tornado, fire and other disasters was a big "thank you" from government officials and neighbors. The hams, who are licensed as amateurs by the Federal Communications Commission, are prevented by law from receiving payment of any kind for their services.



**J. Stan Surber, last year's top ham, sends 1000 messages a month to men at Arctic weather stations**



**Spread before Surber are some of the hundreds of letters he receives with messages for the Arctic**

Every year hundreds of letters are received by GE nominating hams for the coveted Edison award. The job of selecting a winner, however, isn't quite as Herculean as you might imagine because each year a half dozen hams stand out far above the others. Some of these finalists are given special citations.

Last year, so many nominations were received for hams along the East Coast who

performed communication miracles during the hurricanes (remember Carol, Edna and Hazel?) that the judges gave a special citation to 1245 hams in that area. Operators of mobiles as well as fixed stations received high praise for maintaining emergency communication. Their work included routing traffic to guard against fallen trees and live wires, conducting fire patrols in cities where telephone and fire-alarm circuits

**Ben Hamilton, left, instructs a Civil Defense field worker on hill overlooking valley near La Mesa, Calif.**





Boy at Columbus (Ohio) State School for the Blind was one of class trained by ham operator Bill Jenney

were out, cooperating with the Red Cross and Civil Defense and in one case (Norfolk, Mass.) helping the police set up road blocks to capture escaped convicts. When Hurricane Edna was lashing her way up the coast, a special hurricane network was organized. At one time 131 hams were reporting to the network.

The year before, an amateur radio club in Genesee County, Mich., W8ACW re-

At Red Cross headquarters in San Diego, Hamilton showed workers how to make use of the ham network should need arise



Don Mullican, first Edison award winner, used makeshift telephone to contact station during tornado

ceived a citation for the members' work during the tornado that struck Flint.

Civil Defense leaders, such as Val Peterson, consider ham radio the most important hobby in the United States. Peterson says that if an all-out war comes to our shores the hams will be called upon to perform a supreme task in keeping communications flowing and preventing panic. When power plants and lines are destroyed, the ham can get his CQ (seek you) or QRRR (the SOS of ham radio) out on the short waves with batteries or generators.

During the 40 years of amateur radio's development, hundreds of articles have been written depicting the valor of the ham operators. The Edison award citations for this year prove that the hams are still running true to form. Carter Rogers (W8NCS) of Richwood, W. Va., operated a mobile transmitter for 16 hours continuously when a flash flood severed his town's communications with the rest of the world. Carl J. Theis (W8BKH) of Cleveland, Ohio, was credited with saving three lives. Theis was cited for his work in designing, converting and constructing radio equipment for missionaries overseas.

The top award winner before Hamilton was J. Stan Surber





Hamilton calls the roll for his class of mobile-equipped hams who are part of the Civil Defense network

(W9NZZ) of Peru, Ind. The judges were almost bowled over with nominations for Surber—112 letters from 28 states and 5 foreign countries.

Surber is known as the "Arctic mailman" and for the last five years has served as the link between government weathermen stationed at lonely outposts near the North Pole and their homes. His work has been called the greatest morale builder in the Arctic. "Send a message through Stan" is a byword in the icy regions where mail is received only once or twice a year.

Surber's regular job is that of railroad dispatcher and his hours are from four p.m. to midnight. This leaves his days free to contact such stations as Mould Bay, Eureka, Alert, Resolute Bay, Fletcher's Ice Island (known as T-3) and other places where even the Eskimos refuse to live. Surber works seven hours a day contacting the various stations on a regular schedule and averages 1000 messages a month. He handles all the work in Morse code, which is much harder than phone.

Surber's messages cover the entire gamut of human relations including birth, death, sickness, love, despair and all the trivia that bind men to their homes and families. There was the case of a young man who lay near death on Ellef Ringnes Island and no plane available to fly him out for medical attention. His buddies sent a QRRR to Surber who immediately wired the sick man's father. The father made arrangements to

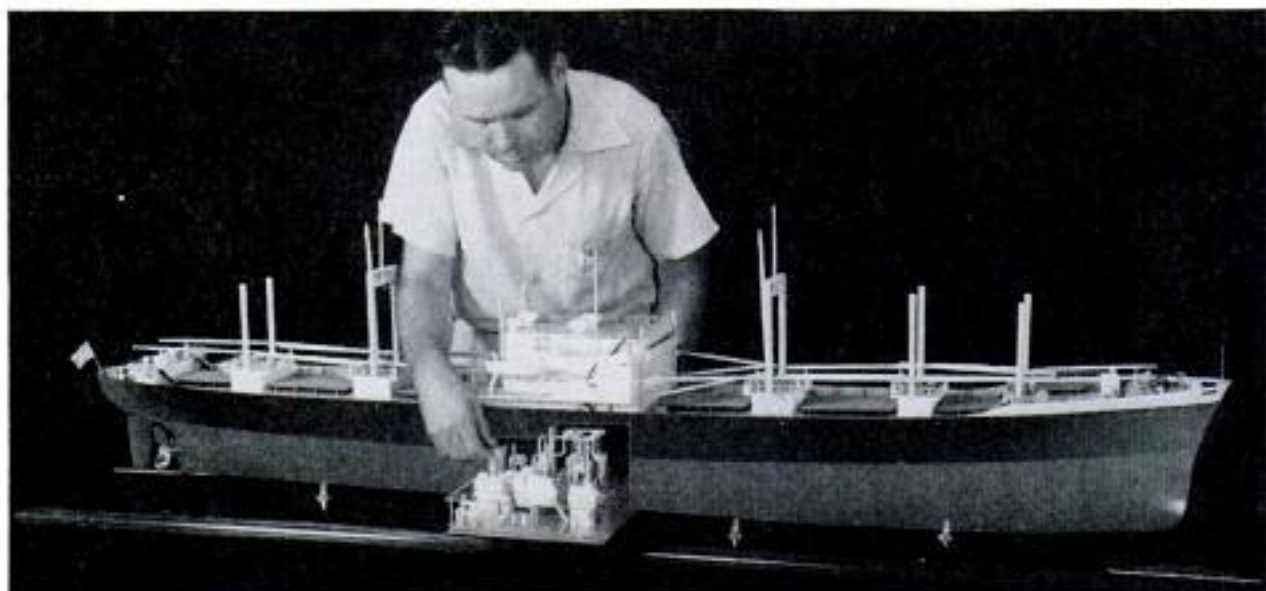
(Continued to page 232)

## "Q" SIGNALS

### LANGUAGE OF THE HAMS

- CQ—Seek you, general call
- QRG—Will you tell me my exact frequency?
- QRK—What is the readability of my signals?
- QRL—Are you busy?
- QRN—Are you troubled by static?
- QRQ—Shall I send faster?
- QRS—Shall I send more slowly?
- QRX—When will you call again?
- QRZ—Who is calling?
- QSB—Are my signals fading?
- QSL—Can you acknowledge receipt?
- QSY—Shall I change to transmission on another frequency?
- QTH—What is my location?
- QTR—What is the exact time?
- QST—General call preceding a message
- QRRR—the "land SOS," distress call for emergencies only

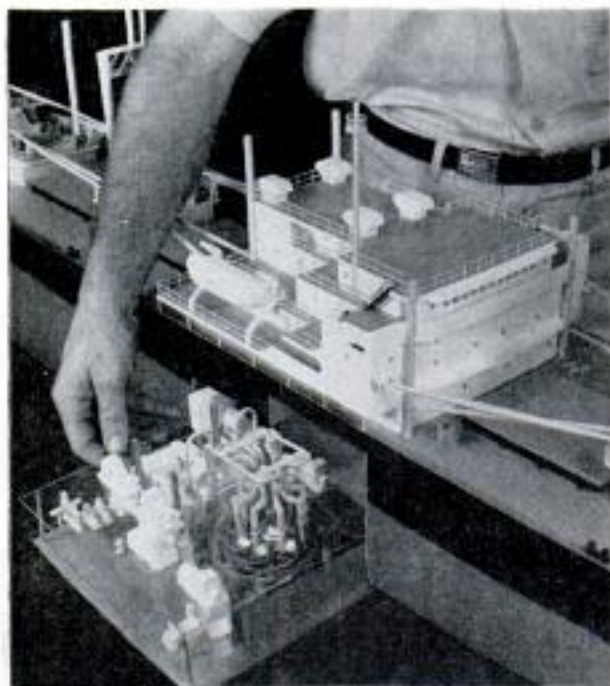
*(Q abbreviations take the form of questions only when each is followed by a question mark)*



## The President Announces an Atomic Freighter

WHEN President Eisenhower, late in April, announced his plan for the construction of a nuclear-powered cargo ship, engineering studies of such a ship had already been made. A model of an atomic-powered ship has been built by the Newport News Shipbuilding and Dry Dock Co. The company, along with Bethlehem Steel Corp., is under contract to the Atomic Energy Commission to study the application of nuclear power to cargo vessels. The ship, according to Mr. Eisenhower, would be able to sail "scores of thousands of miles" without refueling and will "demonstrate to people everywhere this peacetime use of atomic energy, harnessed for the improvement of human living." The President gave no estimate of the cost, but one spokesman for the Maritime Administration said it would

be "terrifically high." He said it would be built and owned by the government, even though it might be leased to a private operator. The model which had been built at the time of the President's announcement represents a 650-foot 20-knot cargo vessel of the Mariner class. The power plant is a pressurized-water reactor which will use uranium as a fuel. Experts have estimated that the propulsion plant on an atomic ship developing 10,000 shaft horsepower would require only 30 pounds of uranium a year. A two-pound lump of uranium, about the size of a golf ball, is the equivalent of about 460,000 gallons of fuel oil or 3000 tons of coal. Engine and boiler rooms on the atomic-powered ship would occupy about the same space as those of a conventional vessel, but additional cargo space would be created by the elimination of fuel-oil tanks. Two great problems confront designers of atomic-powered ships: Economy and speed. Costly reactors can be built today to achieve the comparatively low speeds satisfactory for a submarine, but a plant is yet to be built that can provide the speeds required for passenger liners, destroyers and carriers. The cargo-ship power plant would achieve a speed greater than that of the submarine but lower than that required for other naval vessels. Some marine designers anticipate that it will be easier to sail a nuclear-powered ship because there will be no great changes in the weight of the fuel. A conventional ship must frequently take on sea-water ballast as the fuel is drained from the tanks. The atomic-powered vessel would also eliminate some of the maintenance problems which normally result from the use of both sea water and fuel in the same tanks.





Plastic body panels carry out the front-fender line to make Chevrolet's Cameo Carrier appear low and long

## Chevrolet Pickup Truck Has Plastic Body Panels

It may be just a truck, but the 1955 Chevrolet Cameo Carrier is as stylish as a new car. It has plastic body panels that bulge out flush with the cab and wrap-around glass front and rear. Spring-loaded cables replace clumsy chains in the end-gate, the handles of which are recessed. The interior of the cab is red and beige.

Also new in Chevrolet trucks is a pump-up cushion. Driver and passenger inflate sections individually



## Navy Sub Hunter

Submarines have a tough time avoiding detection by the Navy's Grumman S2F, a two-engine plane that spots the underwater craft whether afloat or submerged. A plastic radar dome extends from the belly of the plane to detect and track surfaced subs. Extending from the tail is a long boom which houses the magnetic detection device that spots submerged subs.

## Automatic Distress Machine

Firing a signal flare every eight minutes for about 12 hours, an automatic distress machine requires no attention once it has been set in operation. Demonstrated on a Dutch vessel, the machine is a turntable containing 96 flare shells. It is powered by the movement of the ship.

Customers in a Long Island shopping center can watch their children at play in a supervised kiddie park by glancing at large-screen television receivers, a TV camera in the park bringing the picture over a closed circuit.





### Hose Unit Mixes Fertilizer

You can fertilize and water your lawn or garden at the same time with a mixing unit that connects to a garden hose. Weed killers, insecticides and even grass seed can also be applied with the unit. Up to 10 pounds of dry material or 2¼ gallons of liquid are placed in the aluminum mixing chamber. Water rushing through the chamber picks up the mix and deposits it uniformly on the area to be covered. The mixer, which has no moving parts, can be used with a hose and nozzle, with an automatic lawn sprinkler or with soaking hose. Hydrated lime, wettable sulphur and gypsum are among the materials the unit distributes.

### Glassless Sunglasses



Protection for the eyes from both direct and reflected sun glare is offered by double visors, called "See Shells," designed to replace sunglasses. An upper visor guards against overhead rays, and translucent lower visors filter any reflected sunlight.

# Flying Platform

**S**OMEDAY SOON you may be able to ride a column of air to work. You would step out of the house after a leisurely breakfast, jump into the family "flying saucer" parked on the lawn and be wafted away to your plant or office in a few minutes.

Glimpses of this dream flashed through the minds of observers watching test flights of the Navy's revolutionary "flying platform." Not a plane or a helicopter, but a new type of flying machine that looks like nothing else on earth, the circular craft literally rests on a column of air when in flight.

Two contrarotating ducted propellers, or fans, are located beneath the platform on which the pilot stands. Enclosed in a circular casing, they pull air from the top of the open platform and thrust it out the bottom with great force. This accomplishes two things: Air pressure on top of the curved lip, or "wing," is lowered, and a lifting force is created; air rushes up around the outside of the platform to exert an upward thrust on bottom of lip.

Two small engines, one for each propeller, spin the fans in opposite directions to eliminate torque. If a V-belt should snap, or one of the four-cylinder air-cooled engines should fail, the craft would careen to earth. This is one of the many safety

Pilot of the simple craft operates only two controls. The two engines develop less than 100 horsepower



POPULAR MECHANICS

# Rides Air Column

problems that still bother the designers. But the craft may be designed to fly on one motor alone if necessary, and a quick-opening parachute could conceivably save the pilot in case of total power failure.

Flying the platform is so simple that, as one spokesman suggested, "a trained bear could do it." To go forward, backward or sidewise, you simply lean in the desired direction. The shift of weight tilts the platform, changes the direction of the air stream and the machine moves horizontally. A built-in safety feature prevents the machine from tipping over should you lean too far. There are only two controls—one for the throttle, one for an undisclosed purpose.

The circular platform is about six feet across and lands on four metal legs that give it a height of 30 inches. The unit is so lightweight that two men can carry it, so simple in design that production-line models for civilian use could be turned out for well under \$1000.

But Hiller Helicopters, which developed the craft with the aid of studies made by the National Advisory Committee for Aeronautics, emphasizes that the first model is only a crude prototype. It has flown only a few hours, and in most of these flights the craft has been tethered to an overhead line for safety. Future models big enough to hold several people and lift huge weights would probably incorporate several fan units. In any case, according to Hiller, the dream of a "flying saucer in every garage" will depend upon the military success of the flying platform. Granted that, safe, dependable, low-cost family saucers may come within a decade. ★ ★ ★



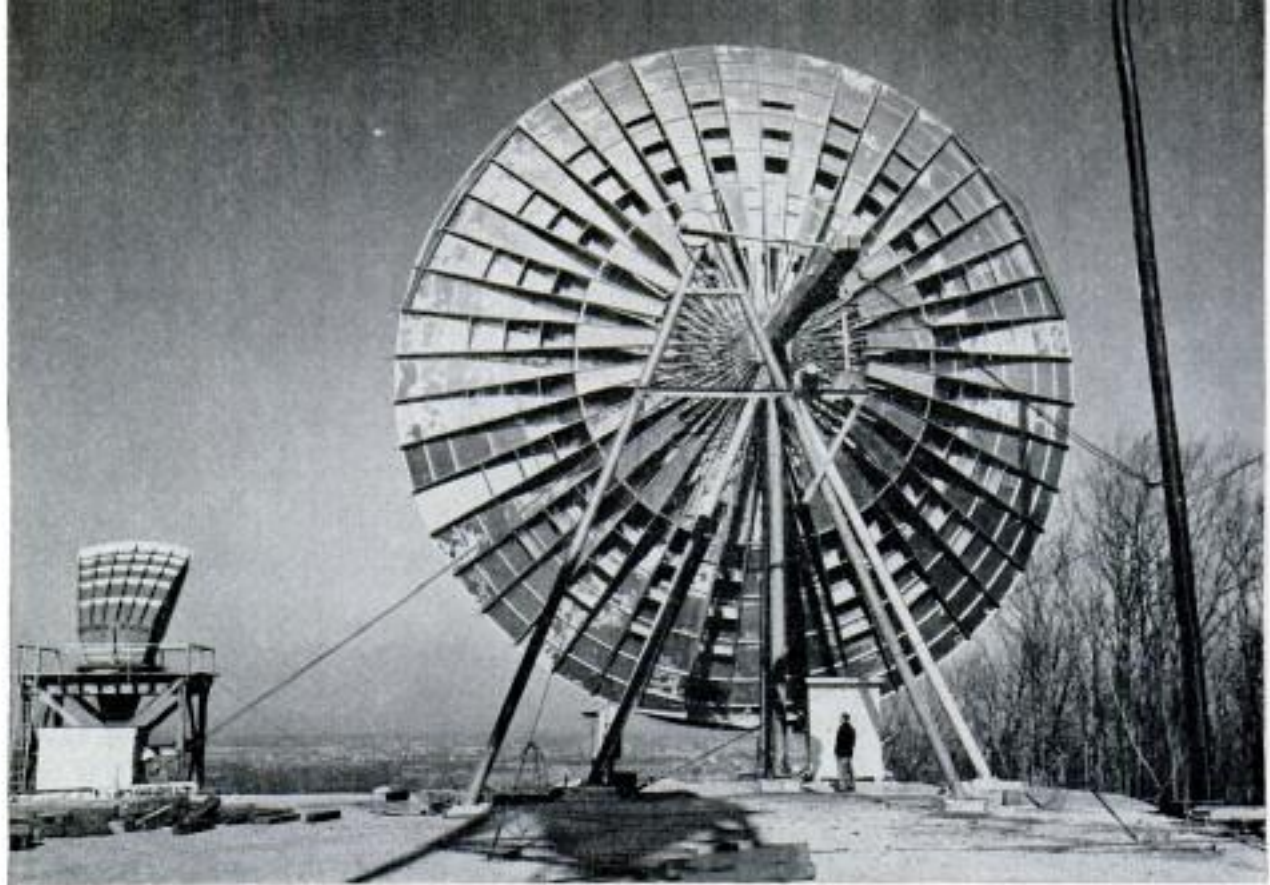
JUNE 1955



The platform goes straight up, down or sidewise. Pilot changes direction just by shifting his weight. Below, safety tether used in test flight saves pilot and craft from sudden letdown if trouble develops



83



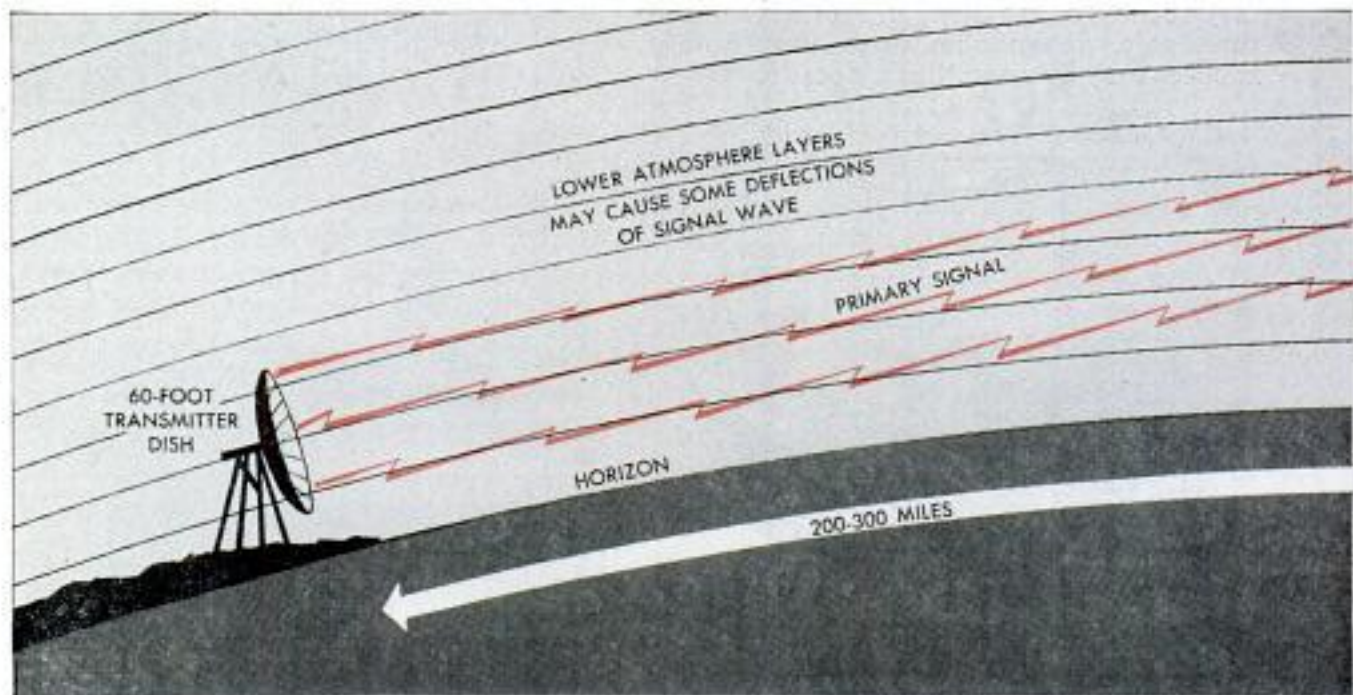
Dish-shaped antenna 60 feet in diameter is the type that will beam TV over the horizon from Florida to Cuba

# TV CROSSES THE HORIZON

By Richard F. Dempewolf

**I**N A TAR-PAPER SHACK squatting on a coral pile in Florida's endless Everglades, a peculiar clock with a circle of pegs under its face hangs on a bare stud. It announces the arrival of each quarter hour with a honk as nerve-shattering as the cry of a wounded swamp bird. The racket doesn't subside until Gene Womble unfolds

his lanky frame, reaches across the crude counter and punches the peg for that particular 15-minute period. Then Womble turns to an electronic nightmare of wavering dials, humming tubes and gleaming red-button lights. He lifts a telephone from a hook, mumbles a cryptic message into the mouthpiece and hangs up.



Womble and two other electronics experts for the Long Lines Department of American Telephone and Telegraph Company have been following the same dreary routine for the past several months. Every 15 minutes, 24 hours a day, they have been spelling each other off in 8-hour shifts.

There's little about their hermitlike existence and the monotonous round of chores out there in the snake and 'gator-ridden swamp to indicate that anything unusual is going on. And, except for the 10-foot dish antenna atop a 50-foot aluminum tower on the highest point of the coral pile, few people roaring down the nearby highway to Key West would guess that the shack out in the morass was anything but a fisherman's hut.

No other Everglades hut ever held a secret like this one, however. The \$20,000 worth of gleaming equipment under its tarpaper siding is providing the test run on a radically new radio-relay system. It can blast TV or multichannel radiotelephone signals 200 miles across wilderness and water in a single mighty leap to Cuba. In the hills behind Havana, a similar antenna, manned by a crew of Cuban-American Tel and Tel technicians, is snatching Gene Womble's signals out of the ether and measuring them for strength and stability. Cuban-American is owned jointly by A.T. & T. and the International Telephone and Telegraph Corporation.

But all this is just a forerunner of more fantastic things to come. Right now, tough engineering crews are splashing through the Florida Everglades and the jungles on Cuba's coast. They are exploring permanent sites for the king-size dish antennas (60 feet in diameter) and the big transmit-

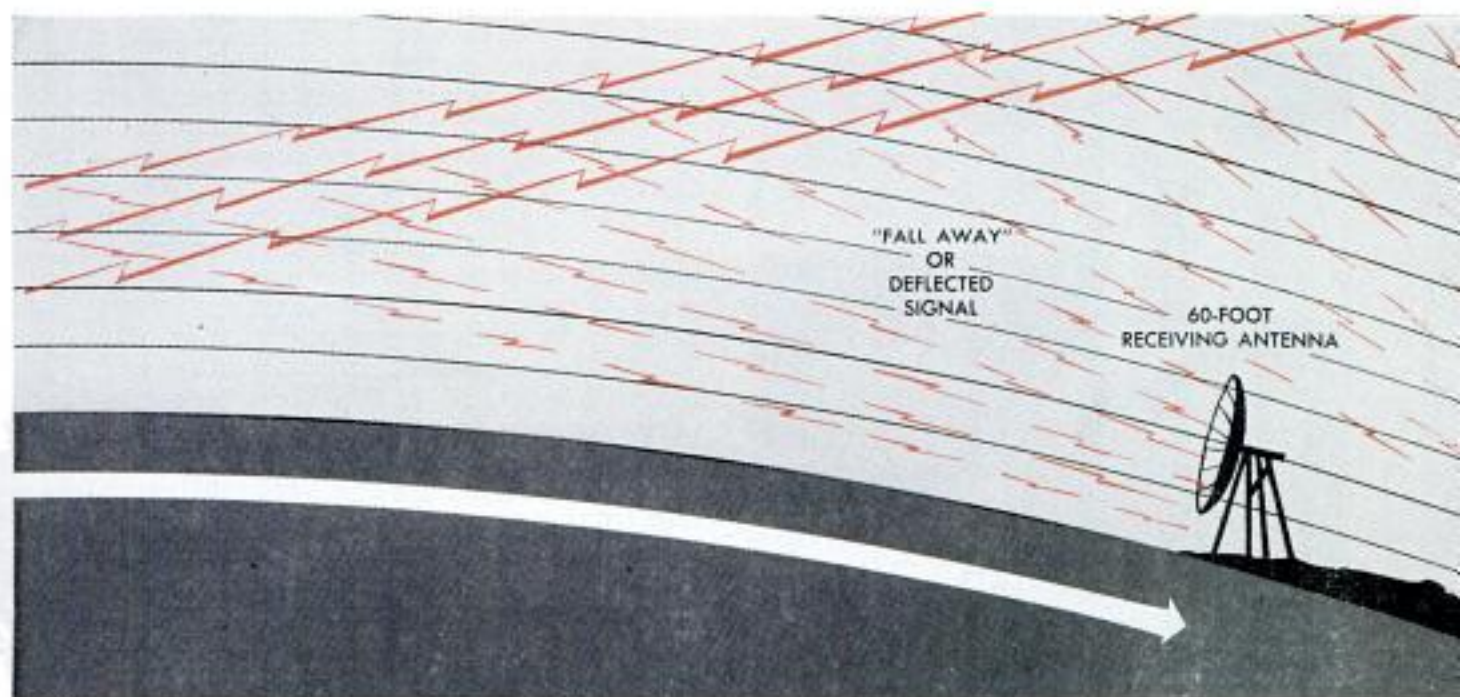
ters which, sometime early in 1956, will start blasting 40 or 50 telephone circuits over the ocean. If these work, hundreds more circuits will be added. Then TV shows may break their tight relay leashes and leap the chasms of water that have hemmed them in until now.

Since it first went to work transmitting TV and multichannel telephone circuits, the handy microwave has had one bad characteristic: It refuses to follow the curvature of the earth. When a microwave passes the horizon, it continues dead ahead and spears off into space. "Most radio waves do the same thing," Womble will tell you, "but those in the lower frequencies can be bounced off the ionosphere and, by this means, can be used for communications over hundreds and thousands of miles. Not the microwave, though. It goes right on through and keeps going forever, for all we know."

That's why microwaves must be relayed from stations spaced about 30 miles apart—even on 300 to 400-foot towers across mid-western prairies. These towers have square or dish-shaped antennas at the pinnacle. Each catches the signal from the previous tower, boosts it, focuses it in its own reflector and shoots it along to the next.

It is because of this microwave behavior that large bodies of water have provided a barrier against transmission. Relay stations would have to be hung from skyhooks or planted on manmade islands—and that gets expensive.

The new system, based on nearly 10 years of research at Bell Laboratories, Massachusetts Institute of Technology, A.T. & T. and other electronics centers, lets the stubborn signals go ahead and shoot





A.T. & T. photo

Small antenna is raised to the top of its tower for the first test broadcasts between Florida and Cuba. Huge antennas for commercial broadcasts may follow

Tar-paper shack in the Everglades contains more than \$20,000 worth of electronics gear. Every 15 minutes a technician broadcasts a message picked up in Cuba



themselves out of this world with a tremendous blast of power, then picks up a few of the leavings at the other end with an equally powerful receiving setup.

Oddly enough, none of the experts will tell just what makes it work. Reason: They don't know. "Back in 1946," says G. W. Gilman of Bell Laboratories, "our engineers observed some unusual behavior of FM radio waves and did some measuring. Waves didn't always do what mathematics said they should. Sometimes they propagated themselves to great distances across the earth when they should have been gone forever. One cause was what we call 'ducting,' due to unusual weather effects. The other was something else—nobody knows what."

Whatever it was, Bell engineers set up equipment in Whippany, N. J., and tried something. During 1950 and 1951 they blasted the ether with something which the men have dubbed super-high frequency, or "SHF." Broadcast from two transmitters—500 megacycles and 3700 megacycles at a peak power about 300,000 watts (the usual microwave signals for TV go out at  $\frac{1}{2}$  watt), the Whippany signals got quite a send-off. A mobile unit with a 57-inch antenna on top roared away to see how far it could still pick up signals. It was out several months, roving at great distances, and never lost the beam. Actually, the racket was picked up on Mount Washington, N. H.—285 miles away, where optical line of sight from the transmitter would have been eight miles in the sky above the receiving antenna!

Were the waves bounced off layers in the lower atmosphere? Some electronics men think so. Others think the signals picked up may be stray emanations from the main beam, like the trailing sparks from a July 4th rocket. This idea has given the phenomenon the name "fall away," now used by some engineers to describe it.

Probably the most graphic description is Gilman's: "If you've ever driven down a highway at night toward a big city, you've noticed the glow in the sky from the city's lights long before you ever saw an actual light. That's propagation of light. It's quite possible that these radio waves are propagated in a similar way, and that it's the 'glow' that our receivers are picking up."

Jim Rae of A.T. & T.'s Long Lines Department, who supervised logistics for the test equipment in Florida and Cuba, listened to all the stories of snakes and 'gators told by the men, and worried about what to do when the crew in Havana discovered they'd forgotten the "feed horns" for their antennas, is pretty realistic about the whole thing. "We're simply shooting out tons of signals at the transmitter and pick-



ing up an ounce or two at the other end," he says.

For this reason the long-leaping super-high-frequency waves are not likely to replace the microwave-relay networks already in existence. The vast power and tremendous nine-story dish antennas needed to do the job cost considerably more than standard 30-mile relay stations set up over a 200-mile route. But across gaps of water separating us from many neighbors, and where cable or short-range relay is impractical, the new system may soon carry telephone and TV service to places it never went before.

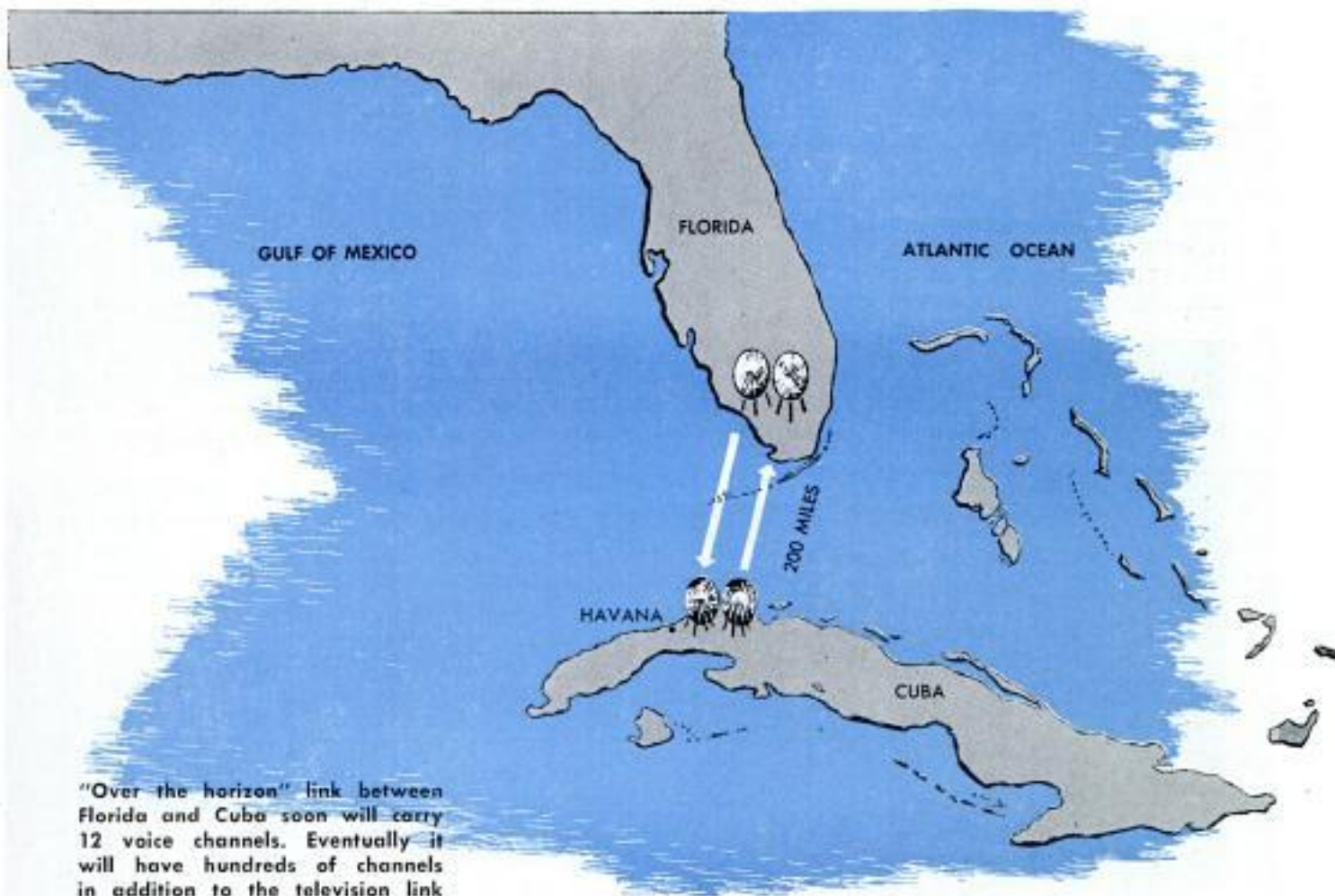
It will find many other uses. Guided missiles are governed in their flight by microwaves that follow them out into space, move their control surfaces to steer and stabilize them and fire their warheads. Microwaves from the missile to men stationed in blockhouses back on earth, relay all kinds of information about what's going on up there in space. It works nicely on vertical or near-vertical flights, where the missile always remains in a theoretical line of sight from the launching point. But until now, low-level horizontal flights have been tough to handle. On horizontal paths, the missile soon is out of "sight" over the earth's horizon, and contact with "home

base" is lost. Using ultra-high-frequency (super-high-frequency) signals with the new powerful equipment may give missile men control over their charges at much greater distances than they have had before.

The galloping waves may also come in handy to flash scope pictures from the outposts of our Arctic radar network back across the inaccessible lakes and wilds of the Canadian North to headquarter filter stations nearer civilization. In fact, rumor has it that this system of mighty "forward pass" relays already is under construction.

Meantime, down in the Everglades, Gene Womble and his companions continue to punch that noisy clock every 15 minutes. And from their "baby" 10-foot dish, a faithful message beams across waste and water to Cuba on a single narrow band, kicked off by their 800-megacycle transmitter, blasting at 500 watts' output. That's just a trickle compared with the job the permanent equipment will do. Signals from the huge 60-foot antennas will get a 10,000-watt boost. There won't be just one of the giant dishes at each end, but two—to offset rapid fading. Both can be used to receive signals. "If the signal fades on one, the other will tap in," explains Jim Rae.

(Continued to page 244)





# KEEPING UP WITH THE ATOM



HOW GOES OUR uranium supply for weapons and power? Three or four years ago there were fears that our military program might be restricted by a shortage of the strategic mineral, but not today. In a recent address, Jesse C. Johnson, Director of the Division of Raw Materials of the Atomic Energy Commission, gave assurance that "uranium rapidly is becoming just another strategic material and we can look forward to adequate supplies to meet foreseeable military and industrial requirements." Prior to 1942, when uranium suddenly became a vital war material, there was little interest in it, and up to 1948 no new source had been discovered. The Belgian Congo was then almost our sole supplier. "Today," said Mr. Johnson, "private uranium activities in the United States have a value of about \$100,000,000 per year. In the past two years, private financing totaling \$70,000,000 has been arranged for three Canadian uranium projects alone. In addition, there are the extensive Canadian government operations and many private projects. The investment in South African uranium mills is approaching \$150,000,000," besides other projects in the Congo, Australia and Portugal. Most domestic uranium comes from the Colorado plateau, with other production being developed in Texas, Wyoming and the Dakotas. While most of the presently worked deposits may be mined out within 10 years, Mr. Johnson said continued exploration may discover even greater ore reserves than known to-

day. Phosphate and shale also provide a large low-grade uranium reserve.

☆☆☆

X-ray photographs can be taken anywhere with a portable atomic X-ray machine that weighs less than 20 pounds (see photo below). The X-ray source is a radioactive isotope shielded so that the machine requires no special precautions. The little unit, which is small enough to fit into a woman's hatbox, requires no electricity, and can be used in ambulances, at accident scenes, in industry or combat zones.

☆☆☆

The rate of wear of machine-tool bits has been measured accurately by another new application of radioisotopes. The bits were first irradiated at Oak Ridge laboratory, and the amount of radioactivity transferred to the chips was used as the basis for determining relative tool life.

☆☆☆

Atomic scientists can see and photograph radioactive specimens in three dimensions with a specially designed periscopic, stereoscopic telescope already in use in Knolls Atomic Power Laboratory.

☆☆☆

The site for Australia's first research reactor has been chosen a few miles south of Sydney where its coastal location will permit dumping radioactive wastes into the sea.

☆☆☆

Doctors at the University of Michigan have found a way to sterilize bone tissue by exposing it to radioactive cobalt; the irradiated bone afterward was transplanted into dogs without harmful effect.

☆☆☆

Radioactive gold has been used to treat more than 200 cancer patients at the Ohio State University Medical Center. In some, all evidence of cancer has been eliminated, but the evidence is not yet conclusive since the cancer may already have spread to other parts of the body; some of the patients have since died of the malignant disease. The method used in the center's experiments is to embed the radioactive gold in nylon thread which is then sewn throughout cancers that cannot be removed by surgery.



The USS Haverfield, first of a new class of radar picket ships, is crammed with electronic gear from the topmast to keel

U.S. Navy photo



# "Paul Revere" Ships Join the Lookout

By Comdr. W. D. Brinckloe, USN

(Head of Battleship-Cruiser-Destroyer Branch, Bureau of Ships)

ON THE SLEEK AIRLINER speeding across the Atlantic from England, scarcely anyone noticed that the pilot, departing from his straight flight path, was gently turning the big plane in a wide circle. This maneuver completed, he returned to course and continued on toward New York. One passenger asked the pretty hostess to explain the odd evolution.

"A Navy picket ship has challenged us," she explained. "That's our recognition signal for this flight."

The passenger pondered her reply. "And what would happen if we didn't give the right signal?"

The pretty hostess' smile faded a bit. "I've often wondered," she said.

Down below, across the horizon from the big plane, the men aboard the little picket ship tossing in the oily swells didn't wonder what would happen. They knew. That's why they were out there. One word from them, and jet interceptors poised at coastal

airfields hundreds of miles away would streak seaward to strike down the suspicious plane that hadn't known the password.

Day and night these rugged radar picket ships keep their lonely vigil, in the hardy tradition of Paul Revere, ready to spread the alarm of an approaching enemy.

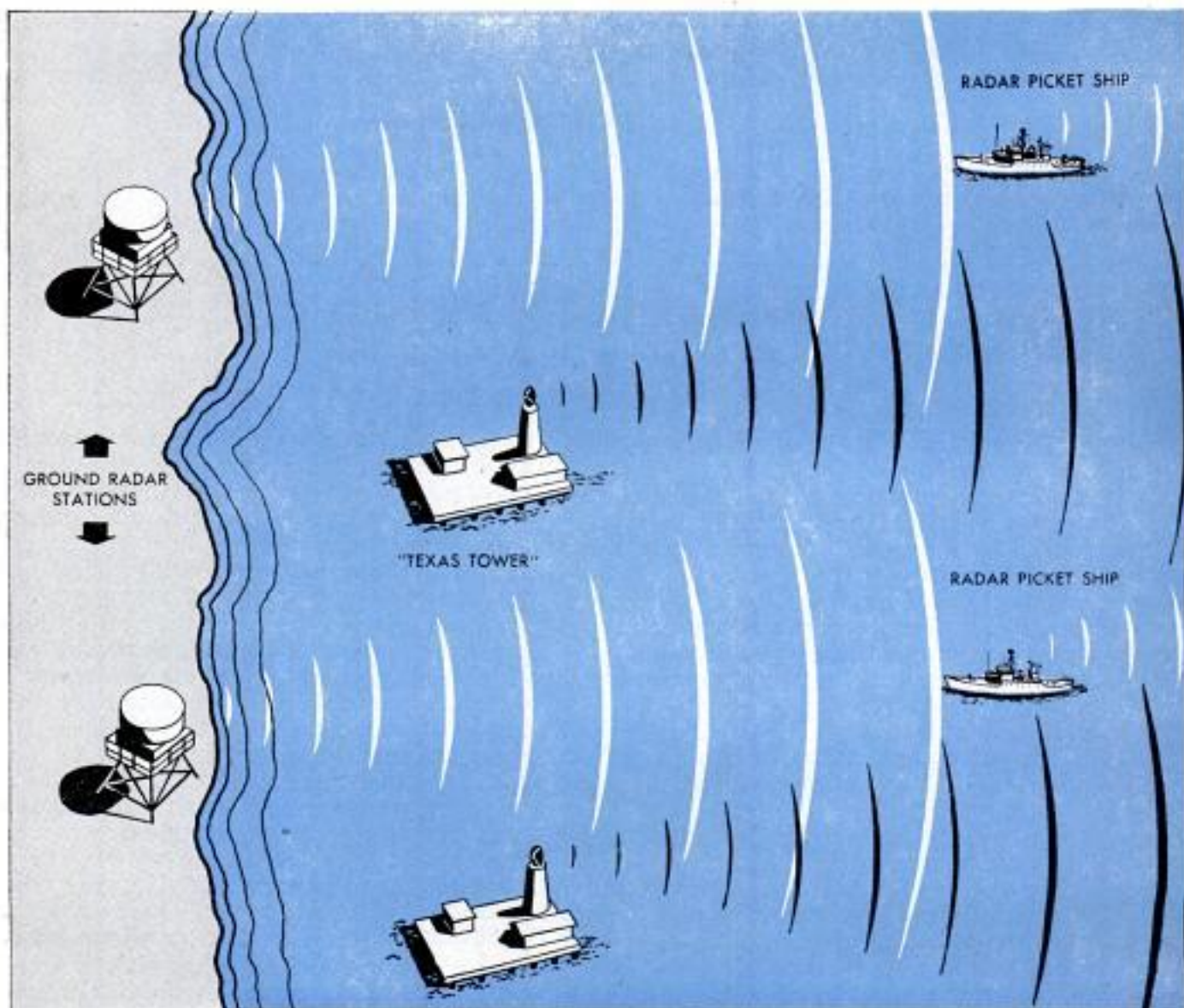
Like her human counterpart on an isolated sentry post, the picket ship's lot is a lonely one. Consigned to a desolate stretch of sea, separated from her sisters by the very nature of her vigil, she lives in the constant realization that she stands her watch at the enemy's border. In today's uneasy peace, her station is no man's land—hers the outpost that would be overrun in the first strike. In an age where every stranger must be considered hostile, she lives by the border guard's stern rule of shooting first and asking questions later.

The first improvised radar pickets were born of necessity in the Pacific fighting, to guard the outlying flanks of World War II's



Incoming raids are plotted and evaluated in the busy Combat Information Center, heart of the picket ship's watch system

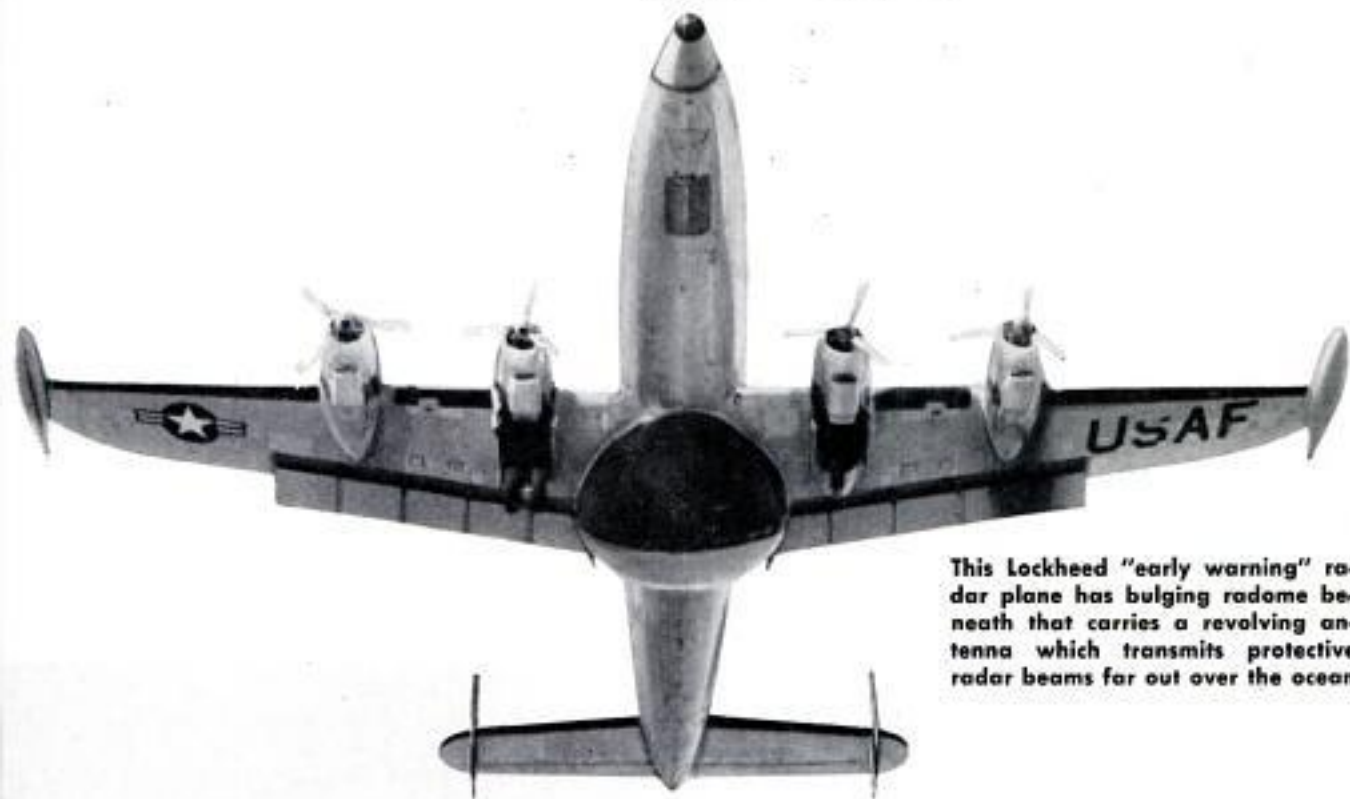
Diagram below shows the radar picket ships' position in the four bands of defense of the Continental Air Defense System. Planes, ships, towers and ground stations are on constant alert



mighty task forces. Patrolling just over the horizon from the main body, they caught the first warning of attacking planes and vectored carrier fighters to intercept them. Later, with the increasing need for air defense, radar picket groups took station off Okinawa during the 1945 campaign.

Okinawa's most remote picket stations were 40 to 70 miles out from the transport area. But the speed of modern planes has so shrunk the oceans that today's pickets must roam hundreds of miles out at sea, keeping watch over an entire nation.

When war ended, the bulk of our Navy was moth-balled against the day of need. Among these hibernating ships was the destroyer escort *Haverfield*, winner of the Presidential Unit Citation for extraordinary heroism in action against the Nazis. While she slept,



This Lockheed "early warning" radar plane has bulging radome beneath that carries a revolving antenna which transmits protective radar beams far out over the ocean

six destroyer escorts—merely a token force—were given a trial conversion to radar pickets to provide a nucleus force and keep the techniques alive. There the matter stood until the international cauldron began to seethe again.

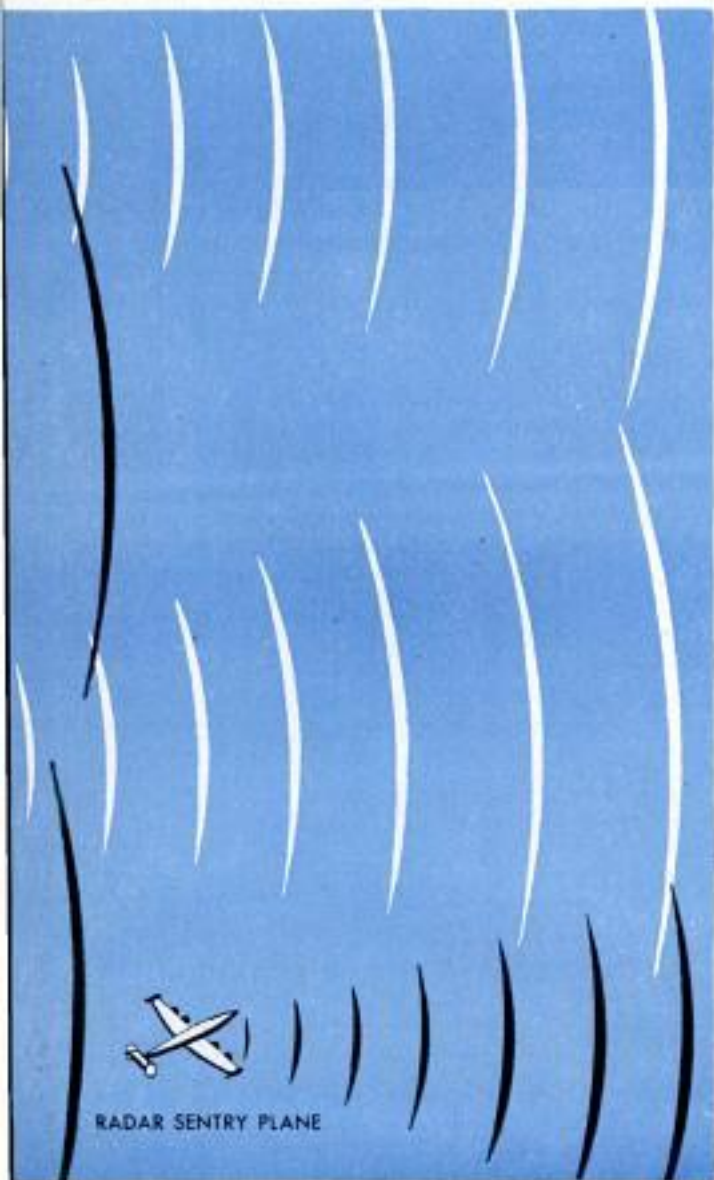
The nation manned its ramparts swiftly. SAC was formed—the massive retaliatory weapon that stands poised to strike at a moment's notice. The Continental Air Defense System was set up—a vast network of defense lookouts, laced with hornets' nests of ready interceptors. And *Haverfield* and her sisters, roused from their slumber, were ripped open in a multimillion-dollar conversion into modern radar picket ships for the Barrier Patrol.

Lead ship of this crash program, *Haverfield* is just now taking her place in the line, with her sister pickets coming close behind. A maze of electronics gear, probably pound for pound more than in any other ship afloat, *Haverfield* is a virtual floating radar set tuned to spot aircraft, submarines and surface vessels headed for our coastline.

"Most of the electronic gear is highly classified," says Lt. Comdr. B. G. Westfield, USN, *Haverfield's* skipper. "But I can tell you that the heart of our detecting system—where all contacts are first spotted, evaluated and tracked—contains more equipment than the average cruiser or battleship!"

*Haverfield* is comfortable. She has to be, to make those lonely patrols tolerable. She's completely air-conditioned—the smallest ship in the fleet to rate this luxury. She is fluorescent-lighted throughout, and her mess hall's aluminum tables are small

(Continued to page 242)



# Detroit Listening Post



By Leo Donovan

**T**TALK ABOUT THE TAIL wagging the dog! It may come to that at American Motors if the Rambler continues to grow. One out of every two cars built by the Nash-Hudson combine is a Rambler—an impressive success story for a car that started out as a mere sideline.

When the Rambler debuted, it was a deluxe, compact convertible on a 100-inch wheelbase. Today it comes in a full line except there is no convertible—the model that started it all. Half of all Ramblers sold are four-door station wagons on a 108-inch wheelbase. Another 25 percent or so are four-door sedans on the same wheelbase. The original 100-inch wheelbase seems destined to be dropped. Those extra eight inches are the difference between smallness and spaciousness, say designers.

And the 1956 Rambler will be even more spacious, rumor reports. It will be wider and longer. This just proves once again that you can't sell America on a small car. The rule seems to be that at any given price level, the bigger the car the more you'll sell.

You'll be able to buy a V8 Rambler in 1956 and perhaps even in 1955, reports our underground. It will be an American Motors V8, not one bought from some other manufacturer, and it will be sold through the A/M line in varying horsepowers.

## Can You Sell Safety?

You're likely to hear more talk about safety in 1956. Chrysler now offers optional seat belts for \$80. Nash offered seat belts a few years ago and the dealers were kept busy tearing them out of the cars that came through with belts installed. It will be interesting to see what Chrysler's experience is. Most of the industry still seems to feel that you can't sell safety—it's a negative approach.

John O. Moore of the Cornell University College of Medicine told the Society of Mechanical Engineers that in any serious accident the occupants of the newer cars (1950 to 1954) are more likely to be killed

than those in older cars (1940 to 1949). Why? The newer cars are usually traveling faster. And speed plus impact means death. In 15 years, Moore said, there have been no advances in "crash worthiness" of automobiles.

Any increase in safety emphasis, however, is not expected to retard the trend toward higher horsepower. Compressions on 1956 models will be up, with 10.1:1 being a definite possibility. There will be more than just Chrysler bragging about 300 horsepower!

## Rocket-Ship Tail Fins

It's beginning to look as though 1956 will bring the rocket-ship motif to automobiles—especially in the tail-fin department. The 1956 Chrysler is said to have huge fins that run straight back, rising at a slight angle in the style of a space ship. The Cadillac Eldorado Brougham, the car that GM plans to compete with the forthcoming Lincoln Continental, also has an exaggerated tail structure. The 1955 Cadillac Eldorado started the whole business. Whether Cadillac itself will abandon its turned-up tail is still a secret. That design has been worked and reworked so many times that a change seems likely. After all, you can't just keep making the same thing bigger and bigger—or can you?

The top three of GM—Cadillac, Buick and Oldsmobile—are expected to make more than minor styling changes in 1956, but Chevrolet and Pontiac will get only face lifts.

Ford Motor Company's reorganization leaves the way open for a new line of cars priced between Mercury and Lincoln. This would compete with upper-middle-price cars like Buick, DeSoto and the Clipper.

The Continental, incidentally, will probably offer a removable hardtop for use with convertible models—a la Thunderbird.

Lincoln, at this writing the only make that has built fewer cars in 1955 than in 1954, will be completely restyled for 1956. Longer, lower and more lush in appointments, it will be aimed less at the performance market, more at the elegance market—the one so successfully dominated by Cadillac. The 1956 Lincoln may be out sooner than you think.

In fact, as the season approaches, more and more rumors are heard that all cars will be out in the late fall.

By the way, we have been getting letters from readers asking if our crystal ball was clouded when we predicted power windows, top and other comfort features on the new Corvettes. No, the ball wasn't clouded. It saw very clearly. It was just that we didn't realize how far ahead it sees. Watch the 1956 Corvette for further details.



## Air-to-Air Rocket Searches Out Enemy Plane

Capable of knocking down any bomber in the world is a new air-to-air rocket designed to be fired from United States interceptor aircraft. Trevor Gardner, assistant Air Force secretary, said the rocket, called the Falcon, can destroy enemy bombers carrying hydrogen bombs long before they reach their targets. The Falcon carries its own power plant and automati-

cally "locks on" its target bomber, no matter what its speed or evasive action. Two other new weapons are the Atlas, an intercontinental ballistic missile capable of flying several thousand miles per hour, and the Rascal, an air-to-ground weapon with a nuclear warhead capable of hitting targets far removed from the United States bomber that launches it.

## Light Submachine Gun

London Sea Scout, Barrie Spraggon, recently demonstrated the new lightweight Sterling submachine gun, a replacement for Britain's famed wartime Sten gun. The new weapon weighs but 6½ pounds, and can fire 575 rounds per minute. It is said to be accurate at 200 yards and lethal at 500.

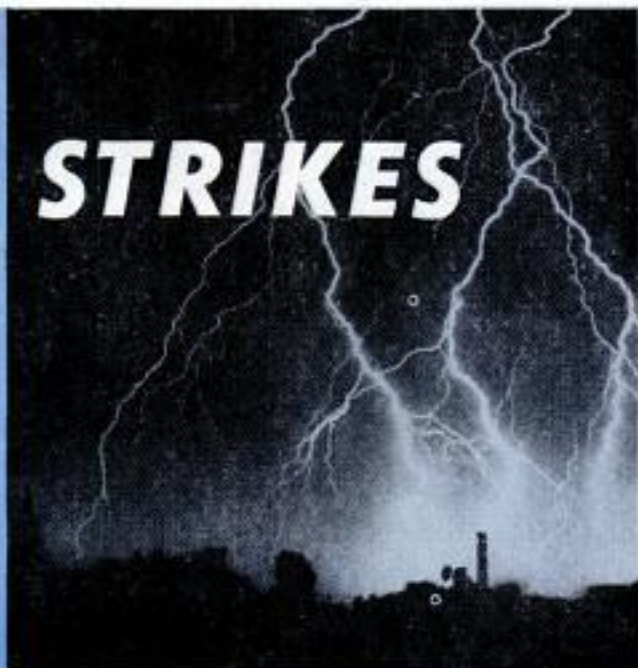
## Golf Bag Becomes Chair For Player's Relaxation

Golfers who have waited long periods for slow foursomes will appreciate a combination golf-bag seat that weighs little more than an ordinary bag. The bag is actually a lightweight folding chair with a hollow back that holds clubs. When there is a delay in the game, the golfer unfolds it and sits down. With wheels attached it becomes a golf cart.



# What to Do When **LIGHTNING STRIKES**

A FEW PRECAUTIONS can save you from possible injury or death the next time you're out in an electrical storm. The suggestions on these pages, advanced by the National Safety Council, point up the importance of seeking shelter in low spots, avoiding electrical conductors and seeking shelter only in protected enclosures. Even an open window or a fireplace can be dangerous when lightning follows air currents. ★ ★ ★



## **AVOID . . .**



**. . . exposed shelters**



**. . . boats**



**. . . swimming**



**. . . beaches**



**. . . hills**



**. . . lone trees**

## **YOU'RE SAFER . . .**



**. . . in a ravine**



**. . . in thick timber**



**. . . flat on the ground**



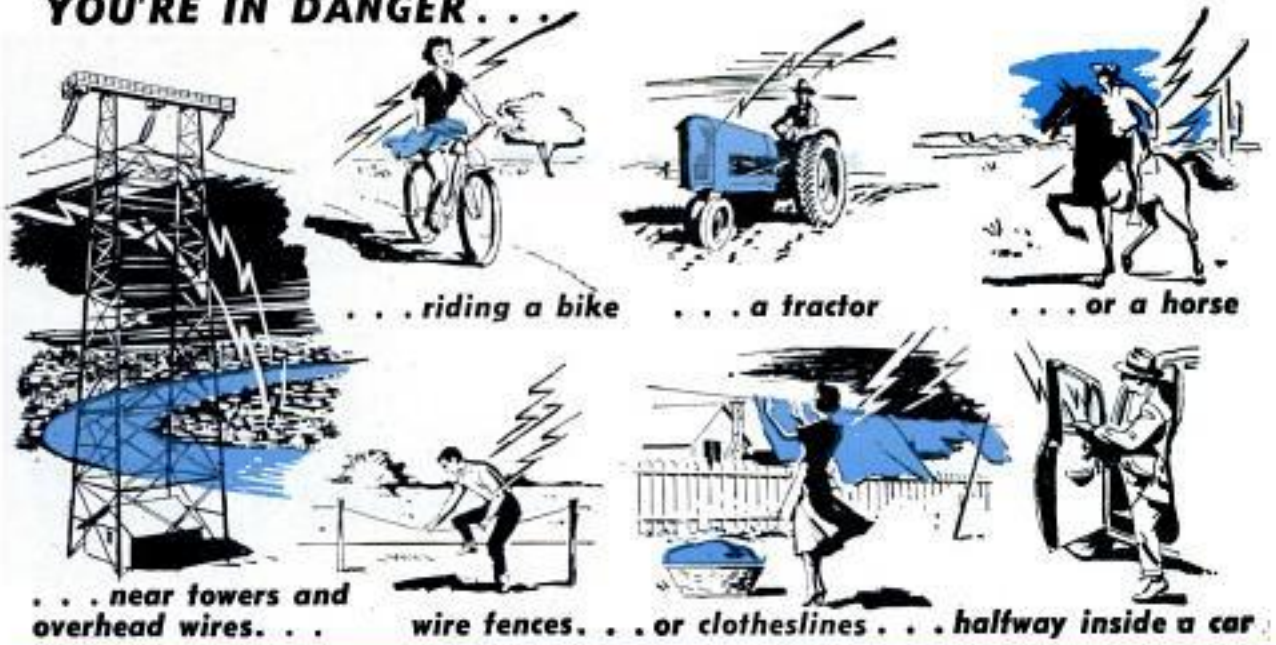
**. . . in a ditch**



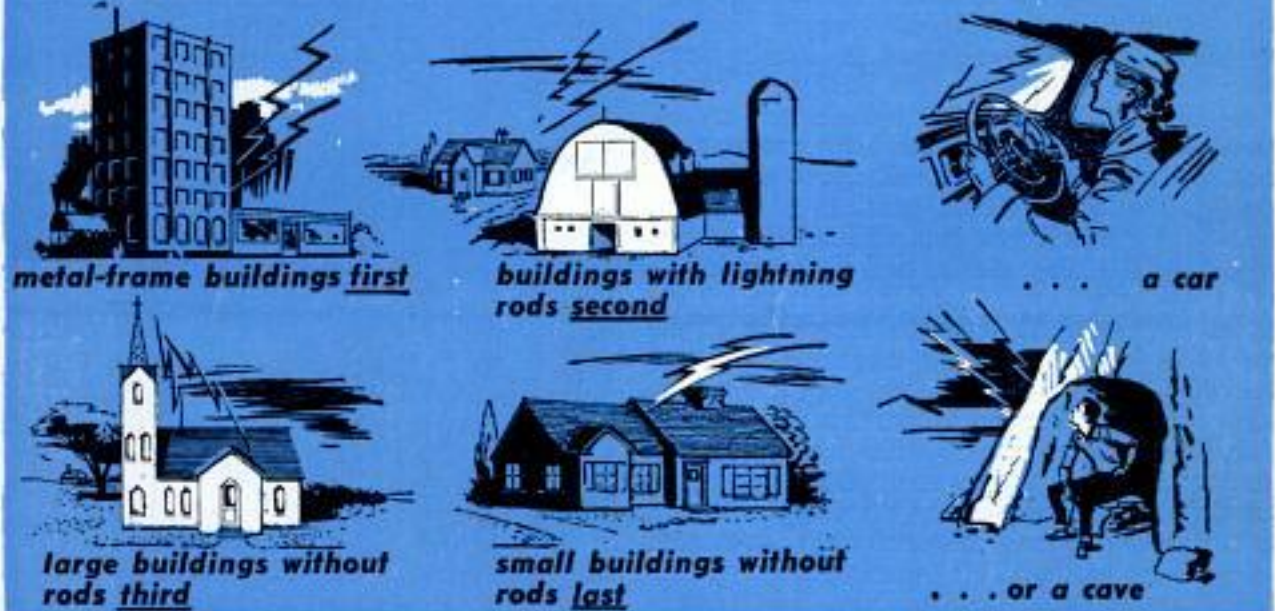
**. . . under a cliff**



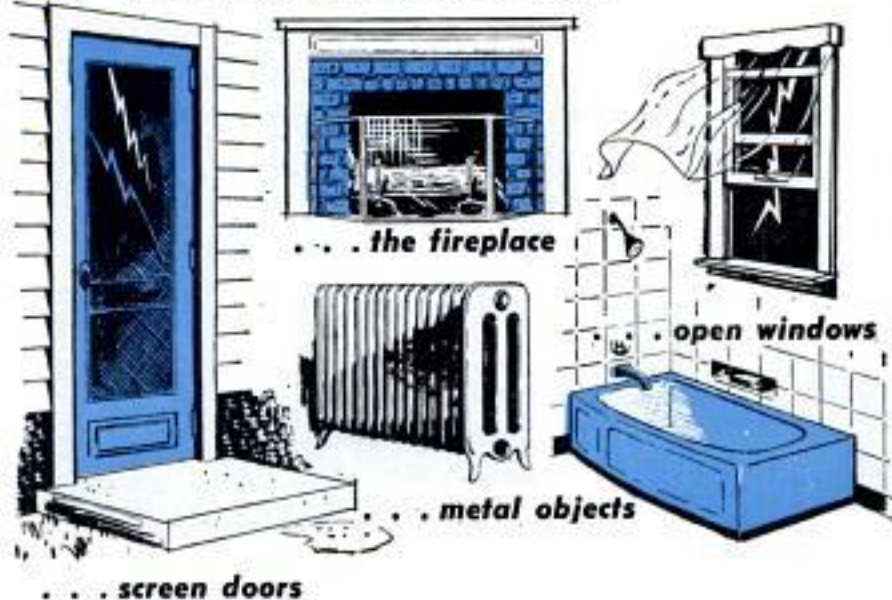
**YOU'RE IN DANGER . . .**



**CHOOSE SHELTER IN . . .**



**AT HOME . . . Keep Away From:**



**Safest Spot:**



## Italy's Answer to the VW

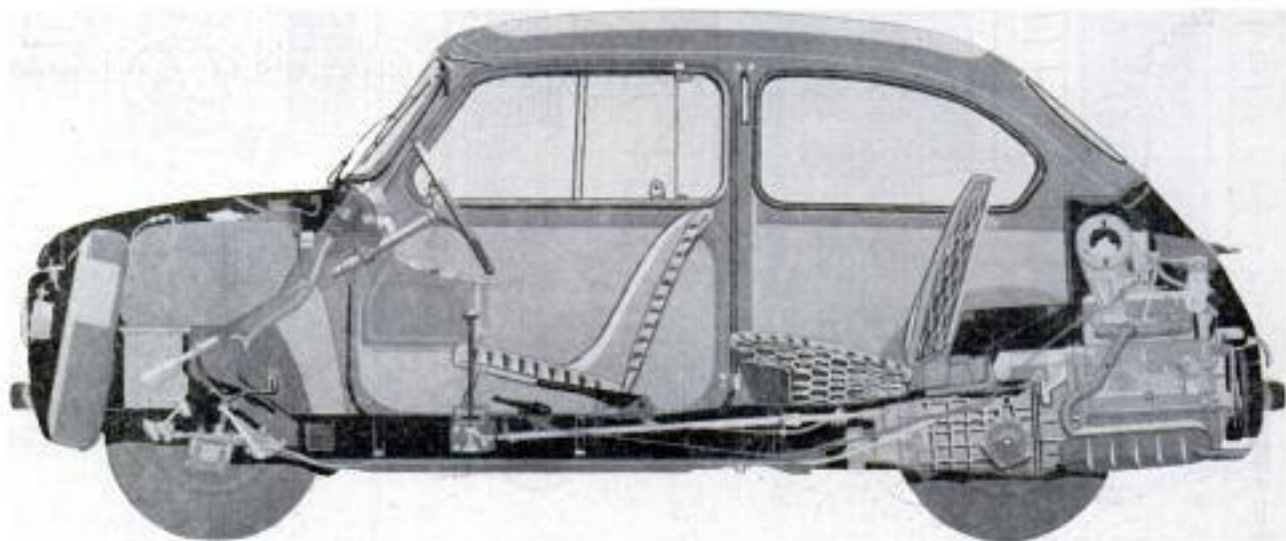


**POWERED** by a four-cylinder, water-cooled rear engine, the Fiat 600 has a striking resemblance to a snub-nosed Volkswagen. The four-seater is Fiat's first excursion into rear-engine design. Wheelbase is 78 $\frac{3}{4}$  inches. All wheels are independently sprung, the front by transverse leaf spring, the rear by coil springs. Compact power unit in rear consists of engine, clutch, transmission and differential. Top speed of the tiny car is said to be around 60 miles per hour. Gasoline consumption is an estimated 50 miles to the gallon. The radiator for the engine's cooling system is mounted on the side of the engine and is supplied by a shrouded fan that draws air through louvers on the rear deck. In winter, air that has passed through the radiator is piped into the passenger compartment for heating. Spare tire and fuel tank are located under the hood, leaving some space for luggage and small parcels. Additional luggage room is available behind the rear seat. The car sells for \$980 in Italy. It is not available in the United States.

Described as a four-passenger car, the Fiat 600 is large enough for a family with three young children



Above, with its four-cylinder engine in the rear, the 600 has spare tire, fuel tank and some luggage space under the hood. Below, cross-section shows the efficient use of space inside the integral body





GUNNER AND HARPOON GUN ON THE FORECASTLE OF A CATCHER



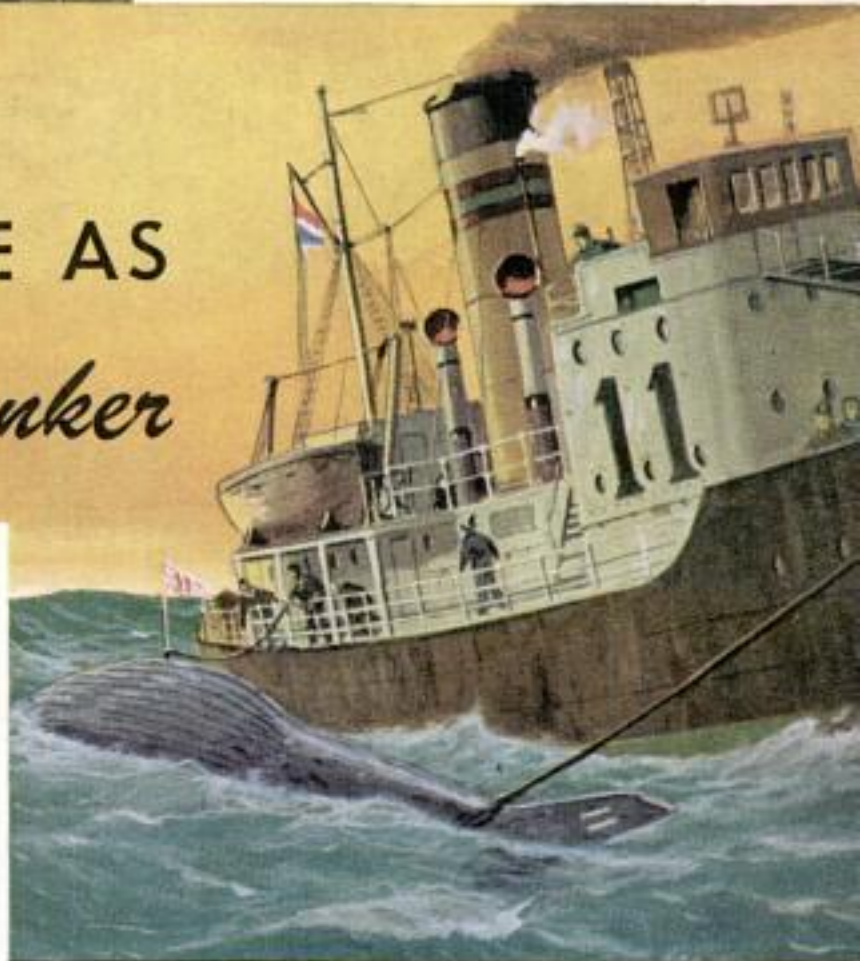
A Dutch "corvette" catcher approaches its target, a spouting blue whale. Gun on forecastle fires a harpoon that explodes and snaps open in whale

## Whaler TO DOUBLE AS Supertanker

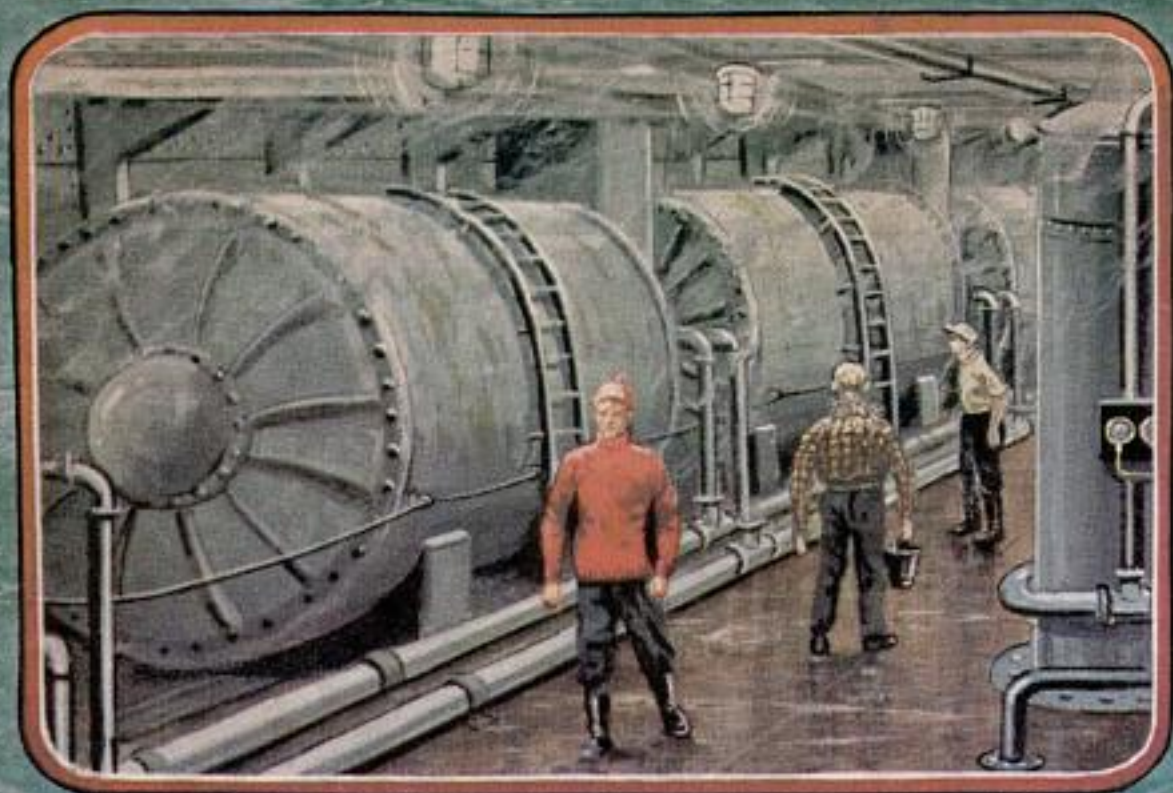
**I**CEBERGS and Antarctic gales hold little terror for the whaling fleets that yearly hunt their prey at the bottom of the world. Modern, radar-equipped "floating factories," each accompanied by a brood of smaller vessels, harvest the seas with systematic and determined thoroughness.

Most modern and biggest of the floating factories will soon be the Dutch vessel, *Willem Barendsz II*, scheduled for action in 1956. Carrying a crew of 500 officers and men, the 635-foot vessel will have

(Continued to page 101)



Dutch trawler-type catcher prepares to cast loose whale it has killed. Inflated to keep it afloat, marked with a flag and a number cut into flukes, whale will be retrieved by another boat



A CORNER OF THE FACTORY DECK

**"WILLEM BARENDZ II"**

Dead weight — 26,400 tons  
Over-all length — 635 feet  
Beam — 86 feet  
Depth — 58 feet  
Crew — 500 officers and men  
Speed — 14 knots



G. HAVIS  
1954

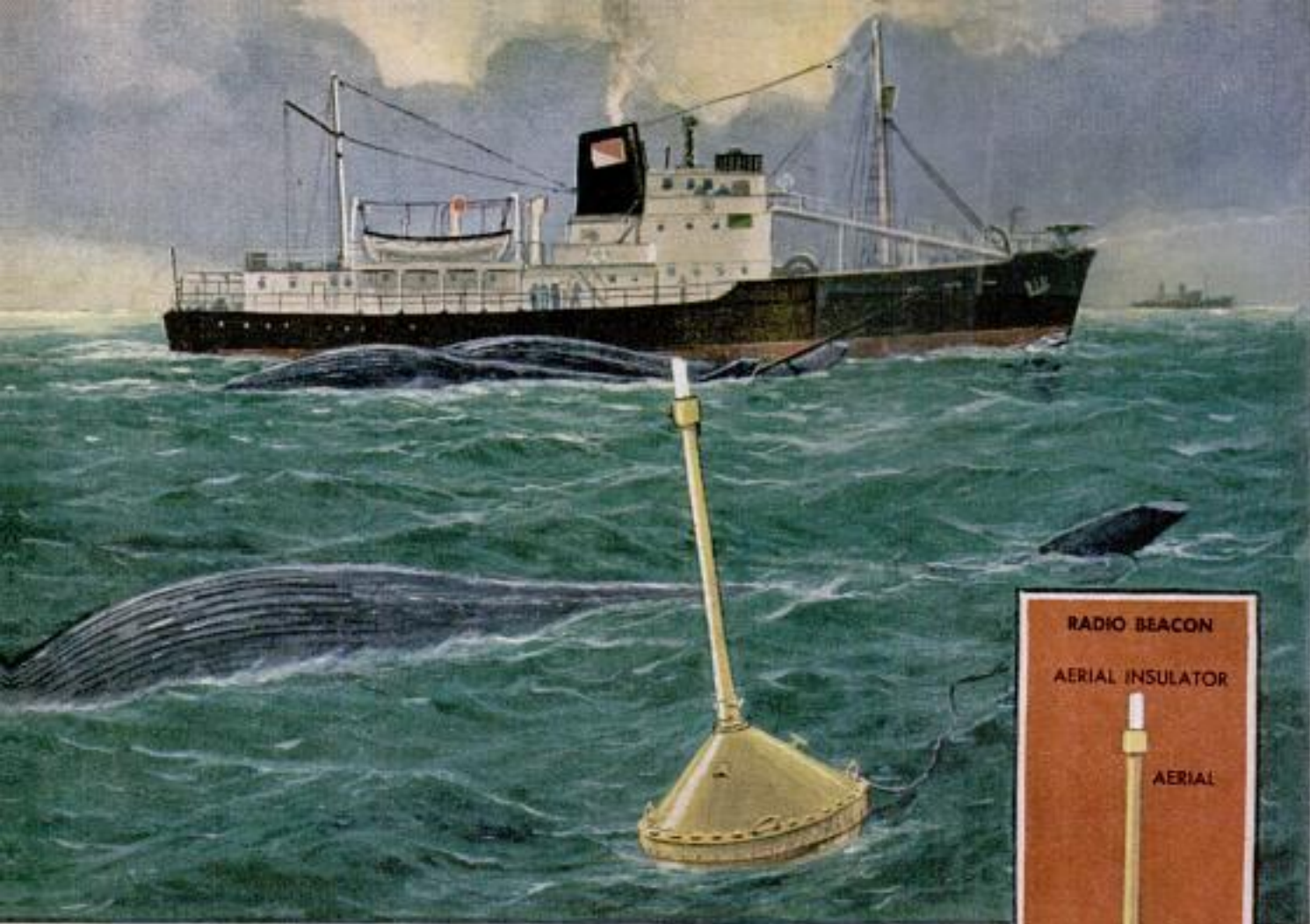
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- |   |                                       |
|---|---------------------------------------|
| 1. Whale skidway                                      | 15. Meat-and-bone boilers             |
| 2. Whale-towing bollards                              | 16. Final-separation plant            |
| 3. Capstans   | 17. Whale-oil tanks                   |
| 4. Spare propellers                                   | 18. Whale-hauling winches             |
| 5. Sleeping quarters                                  | 19. Derrick post                      |
| 6. Factory steam boilers                              | 20. Mixture tank                      |
| 7. Diesel propulsion engines                          | 21. "Coast guard" tank                |
| 8. Fuel bunkers                                       | 22. Drier of meat-treatment plant     |
| 9. Blue whale on flensing deck                        | 23. Bone-meal plant                   |
| 10. Factory control room                              | 24. Radar scanners, direction finders |
| 11. Separator tanks                                   | 25. Crow's nest                       |
| 12. Settling tanks                                    | 26. Radio cabins and wheelhouse       |
| 13. Chute hole  | 27. Bridge                            |
| 14. Blubber boilers                                   | 28. Anchor winch                      |
| 30. Officers quarters, administrative offices, galley | 29. Bow lookout                       |

THE "WILLEM BARENDZ II" AS SHE WILL APPEAR WHEN COMPLETED





Radio beacon in buoy transmits a distinctive signal that helps a retrieving vessel locate a floating whale carcass. Dead whales may drift for miles after killer vessels cast them loose. In background is one of the latest Norwegian catcher ships. Below, a blue whale just after it has been pulled from sea up slanting skidway to ship's deck



RADIO BEACON  
 AERIAL INSULATOR  
 AERIAL  
 FLOAT  
 COUNTERWEIGHT

a speed of 14 knots and a dead weight of 26,400 tons. The latest processing equipment will enable it to slice up a whale in an hour, and advanced navigational equipment will insure its safety.

Its huge whale-oil tanks, stretching almost the length of the vessel, have a capacity of 30,000 cubic meters. Its owners plan to use these huge tanks for carrying mineral oil during the six months of the year when the vessel would normally be idle.

The golden days of Nantucket and New Bedford are gone, when America alone sent forth a thousand wooden sailing ships to do battle with the largest creature ever to appear on earth. But today, during a hunting season that may last only 10 weeks, the world's whaling fleets gather five times the yield of a record year in the 19th century.

Each year, an international commission sets a quota that may reach 16,000 units, with the large blue whale equaling one unit. Two fin whales, 2½ humpback whales or six sei whales equal one blue. Once the season opens, in January, a furious race begins between the 16 or more expeditions from various countries. Each tries to capture as many whales as it can, before the quota is filled, for the only limitation is upon the total catch of all the fleets.

At the core of each expedition is the factory ship, a great departure from the old wooden whaler whose only equipment was a primitive tryworks on deck for boiling oil out of the blubber, a hold full of wooden casks for oil and small harpooning boats.

The factory ship, which carries several hundred men, contains a maze of specialized equipment for reducing a 125-ton whale to oil and valuable by-products like vitamins, adrenal extracts and animal feed.

Operating with the factory ship are a dozen or more catchers, ships from 130 to 180 feet long, that do the actual hunting and shooting. Fueled and provisioned by the main ship, they cover vast areas and may search several hundred miles from the factory ship. The catcher ships carry a crew of 16 to 21 men.

Supporting the main ship are tankers and buoy boats—catcher ships with their harpoons removed that collect the buoyed carcasses of the whales and take them to the mother ship.

The sighting of a whale marks the beginning of furious activity on board a tossing catcher ship. First to sight the animal is the lookout, stationed on a cold, gyrating crow's nest high on the foremast. From the ice-laden bridge the skipper (who usually doubles as gunner) scrambles across the gangway to the bow and mans his swivel-mounted harpoon gun.

The catcher surges forward, rolling and

pitching with the waves, until the whale looms close. The gunner fires his harpoon, which arcs a trailing rope across the 150 to 180 feet separating whale and ship, and buries itself deep within the huge body. An instant later, a charge in the harpoon's nose explodes and heavy barbs snap open to anchor the hook.

The dying whale may plunge and thrash, but the killer ship has it well under control. Maneuvering with rudder and engines to maintain constant pressure on the whale, the catcher slowly reels in the six-inch Manila line until the inert whale floats alongside the vessel.

Spikes attached to compressed-air lines are driven into the carcass, and the whale is inflated until it floats like a balloon. Otherwise, if it is a baleen whale, it would soon sink. The catcher marks the whale with a distinctive flag, casts the dead monster loose and resumes its hunt.

The floating whale may drift for miles before a buoy boat, alerted by radio from the catcher ship, is able to reach it. To hasten the discovery of the carcass, a buoy containing a radio transmitter may be attached to the dead whale. For 22 hours, every 10 minutes, the buoy transmits a radio signal of 2 minutes' duration. The buoy boats track down the signals and secure the catch despite fog or darkness.

The buoy boat lashes onto the floating whale and heads for the factory ship. Sometimes, as many as five whales will be towed at one time by a retriever boat. The tow lines are secured to bollards on the stern of the factory ship and the whales are towed behind the vessel until they are one by one drawn up into the ship for processing. As each whale's turn comes, it is grasped around the flukes and pulled by winches up a slanting skidway that starts at the water line and terminates on the flensing deck.

The flensing crew, armed with knives on long poles, attacks the thick hide of the whale, cutting through the flesh, and tying winch ropes through holes in the blubber. The winches strain, and peel huge slabs of blubber from the carcass. These are cut up and thrown into holes that lead to the boilers below. When the blubber is removed, and the tons of bone plate from the whale's mouth thrown overboard, the remainder of the whale is pulled forward to another deck, where the bones and flesh are cut up and chuted to the processing plant below.

Cookers below decks extract from the flesh the oil, which is piped to huge storage tanks and later sold for use in margarine. The residue is dried and ground into meal for use as animal feed. Oil from the liver has a high vitamin content, and glands yield other therapeutic products. ★ ★ ★



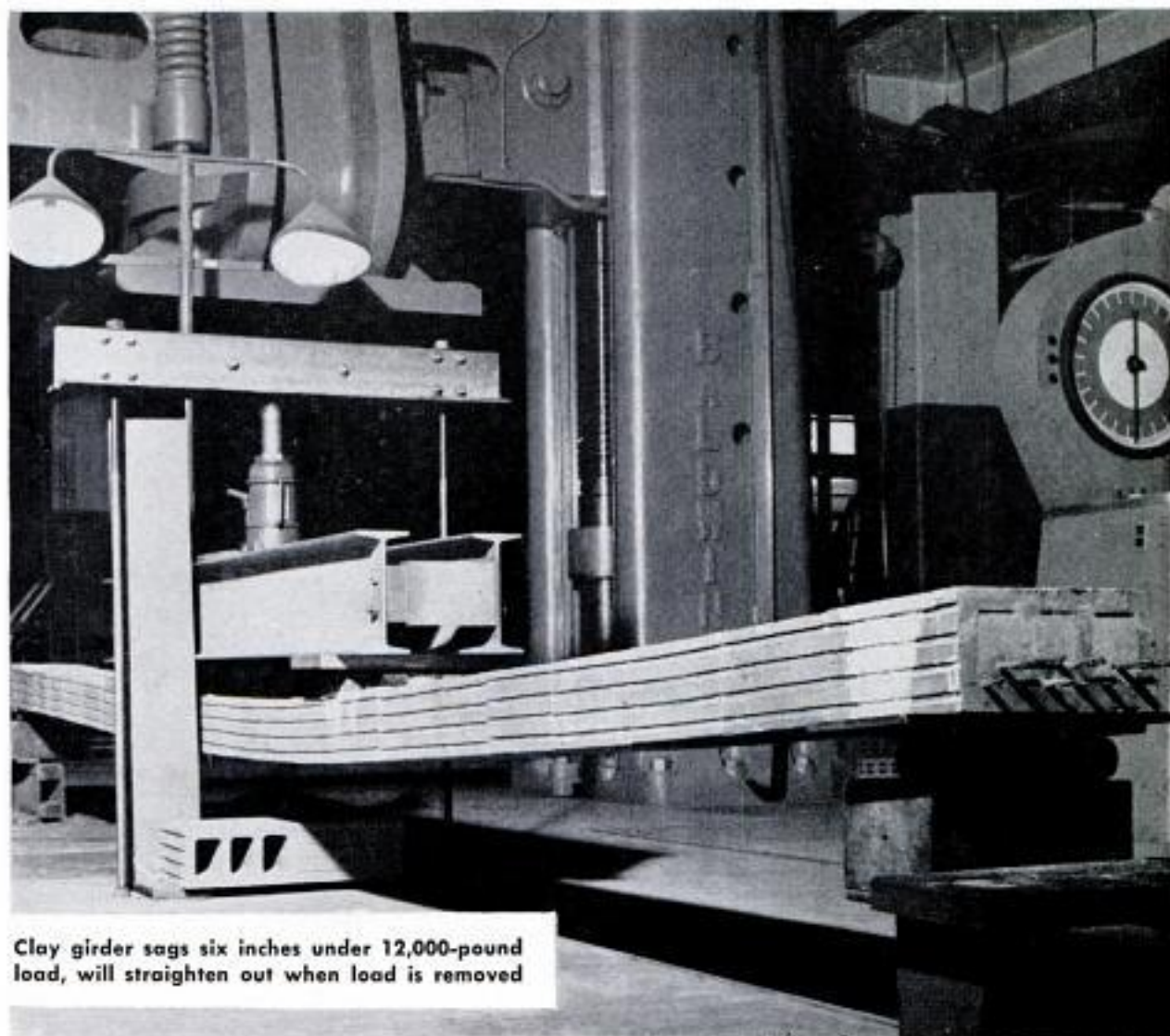
Tile roof slab is eased into position. Made of ordinary clay, it has resiliency of spring steel

## ***Prestressed Tile***



Strands of strong wire protrude at left. Under high tension, they give slab its amazing strength





Clay girder sags six inches under 12,000-pound load, will straighten out when load is removed

## ***Bends Without Breaking***

**H**AVE YOU ever heard of clay that behaves like steel?

Clay-tile beams that bend instead of shattering under tremendous loads have been developed in the Pacific Northwest.

The secret of making brittle, baked clay behave like spring steel lies in the use of a special kind of "high compression." These girders, fabricated out of ordinary hollow tile, are subjected to a continuous end-to-end squeeze by tension bars which run through cells in the tile.

This steady squeeze is anything but gentle. In 50-foot beams the total longitudinal compression is maintained at a whopping 99,000 pounds. Compression makes the beams capable of supporting great weight and imparts elastic ruggedness to the clay.

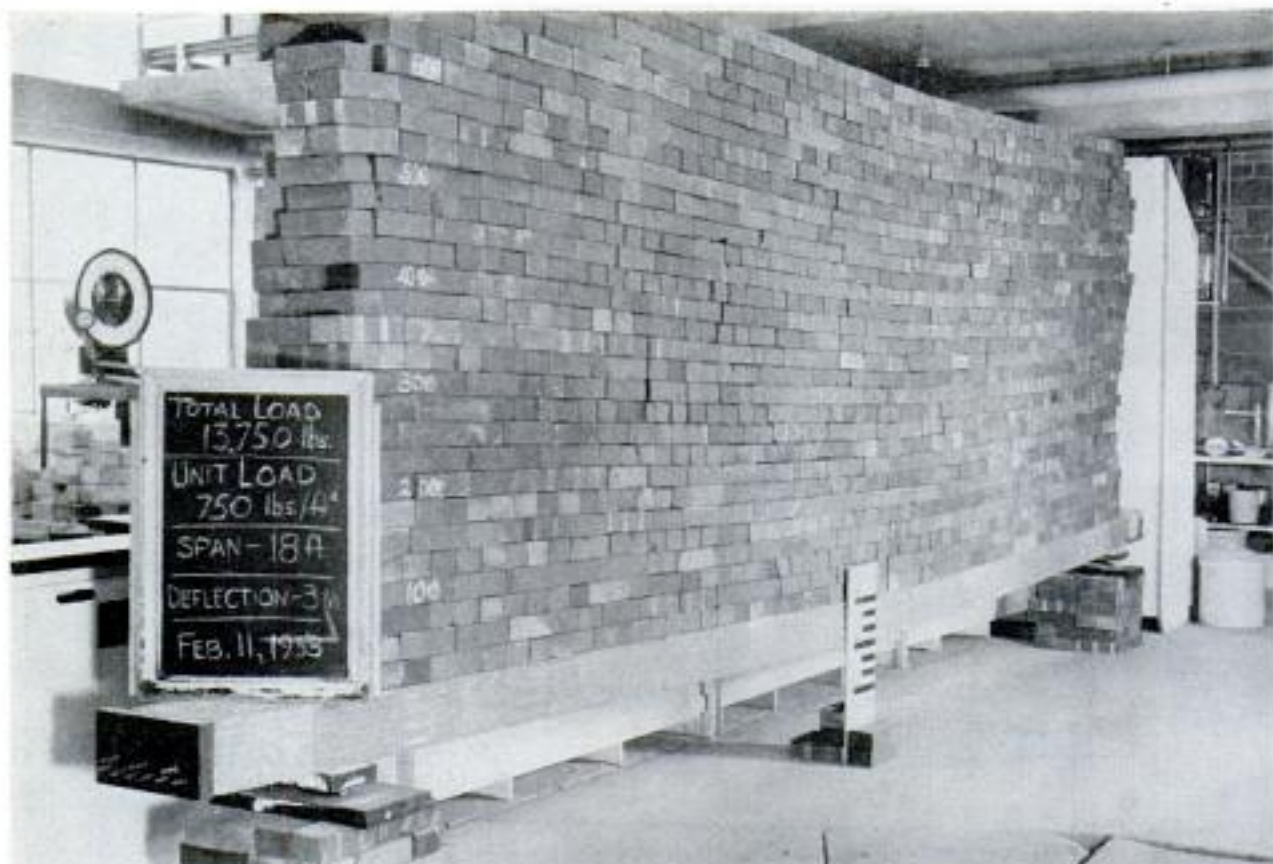
Harry R. Powell, a Seattle consulting engineer who introduced prestressed concrete to the Pacific Northwest construction industry in the immediate postwar period, began experiments with prestressed tile

By Robert Hertzler in 1953. His aim was to create a structural material which would be more fire resistant than wood or steel and lighter than concrete.

He has succeeded in developing not only practical fireproof-tile girders, but roof and wall slabs as well. To prove these new materials, he designed a unique all-ceramic structure. The building has four 50-foot prestressed-tile beams supporting a roof made up of 30 prestressed-tile slabs, each of which is 20 feet long and 5 feet wide.

The 50-foot girders are formed from seven courses of common 12 by 12 by 6-inch load-bearing tile. When the units were fabricated, the tremendous squeeze exerted by the tension bars was sufficient to bow each girder  $\frac{3}{8}$  inch. This bow disappeared when the slabs were laid.

An interesting characteristic of prestressed-tile beams is that their exposed surfaces are tough and highly resistant to chipping and cracking under impact. When



Stack of bricks weighing almost 14,000 pounds gives a stressed-tile beam the bends but fails to break it

Tile beam drops into place atop a reinforced tile column. The stress exerted by the tension bars is distributed evenly throughout the beam



a heavily loaded tile beam is struck with a hammer, it gives back a metallic, bell-like tone.

The most amazing characteristic of stressed-tile beams is their ability to bend under great weight and then spring back when the load is removed.

The 3000-square-foot demonstration structure, sections of which were assembled beforehand, was erected in half a day by six men using a crane.

In addition to reducing on-the-job labor costs, Powell maintains that tile can be fabricated into girders for about one-third the cost of prestressed-concrete beams.

Powell believes the day is not far distant when stressed ceramic beams capable of spanning 100 feet under load will be designed. In the meantime, he predicts increasing interest in squeezed-tile beams and slabs for roof girders, tilt-up walls and "lift on" roofs. ★ ★ ★

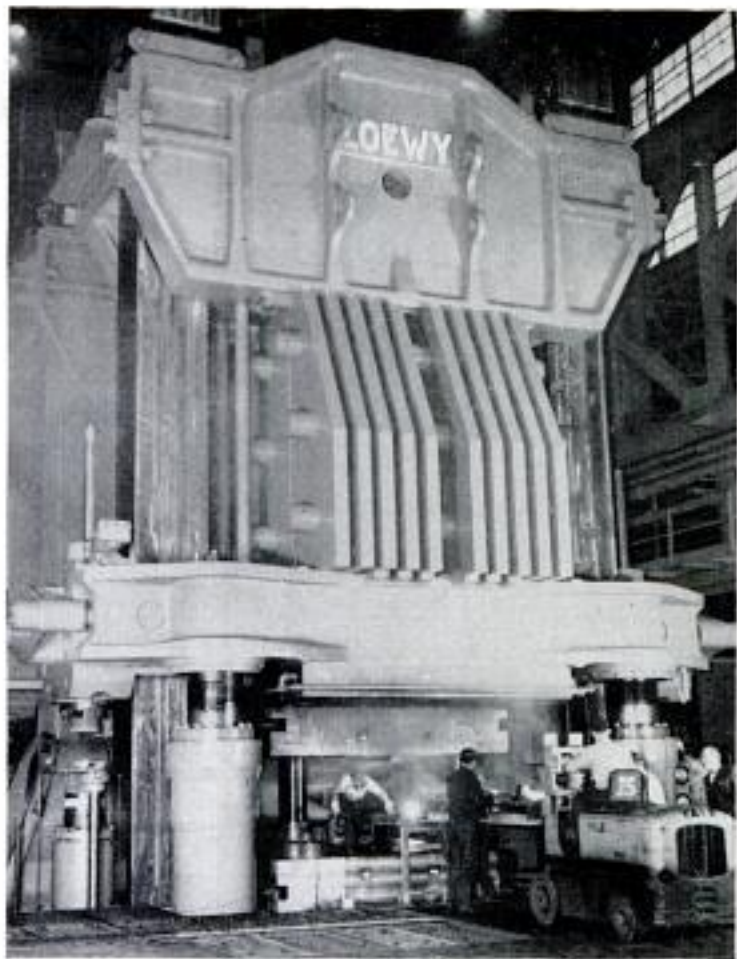
## PRESS EXERTS BIG SQUEEZE TO TURN OUT PLANE PARTS

WHEN THIS new forging press goes into action, it puts a 35,000-ton squeeze on metals to produce aircraft parts. The press is said to be the largest of its type now in production, although another rated at 50,000 tons is being assembled in the same plant. The existing press stands 45 feet above the operating floor of the shop and extends 62 feet below it. The press weighs 7180 tons and the accessories for it weigh at least that much. It is turning out aluminum-alloy wing spars for the F102, a delta-wing, supersonic, all-weather interceptor for the U. S. Air Force. Each spar is 12 feet long, 18 inches wide at its widest point, and only  $\frac{3}{16}$  inch thick in some areas. It takes only three squeezes of the mighty press with three different sets of dies to produce one of the spars. The metal for each spar is heated to a temperature of 800 degrees F. for each pressing. In the aircraft, four of the spars will replace 272 parts and save 3200 rivets. Three 1500-horsepower pumps develop the pressure for the hydraulic press. The press will be used for civilian and armed forces' work.

Top, press dwarfs men working around it. The machine weighs 7180 tons, extends 45 feet above the floor and 62 feet below

Right, operation of press is directed from panel of instruments. One man can control the press, contact rest of crew by phone

Below, 12-foot plane spar made of light-weight alloy was turned out by press in three squeezes. It requires little machining



# Dodge Owners Rate Handling As The Best-Liked Feature

**By Dodge Owners**

**T**HERE'S VERY LITTLE disagreement among owners of the 1955 Dodge V8 about its good points. Nearly half (47 percent) of them list Dodge's fine handling as the best-liked feature. This big chunk of agreement is especially surprising in view of Dodge's emphasis on its new styling this year.

"Handling is excellent. Power steering is very precise. I like it this way."—New Jersey manufacturer.

"The day after I bought my new Dodge with power steering I drove 874 miles (from 8 p.m. until 4 p.m. the following day). Prior to that I was not interested in power steering. Now I would not own a car without it—Dodge power steering, that is."—New Jersey fire chief.

"A good woman's car. Easy to handle and easily parked."—Virginia housewife.

Topping the list of complaints by a wide margin was poor gas economy (22 percent of the owners listed it).



## CLYMER ROAD TEST

**By Floyd Clymer**

**T**HE TEST WAS MADE over the route from Los Angeles to Phoenix, Ariz., returning via San Diego, a distance of 849 miles which included some tests on back trails of the desert.

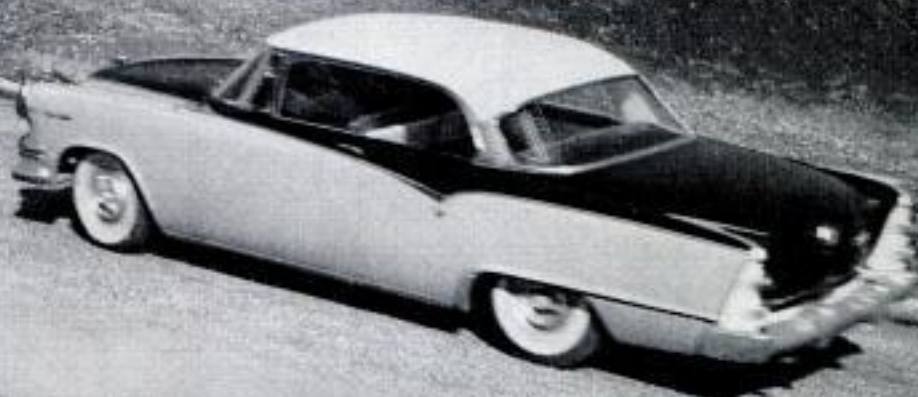
The test car was the Royal Custom four-door sedan, powered by the Super Red Ram V8 engine of 7.6:1 compression ratio. This over-square engine has hemispheric combustion chambers. Displacement is 270

cubic inches as against 241 for 1954 and horsepower has been increased to 183 from last year's 140.

Dodge for 1955 offers two V8 engines. The more expensive is the Super Red Ram described above. It features the double-rocker-arm-shaft design with hemispheric combustion chambers. The second Dodge V8 is the 175-horsepower Red Ram. It has a

(Continued to page 226)

# OWNERS REPORT: 1955 DODGE V8



"So far my gasoline mileage is not what I was led to expect. It is 12.8 miles per gallon for over-all average for 1000 miles. Hope to have this situation improved by the 3000-mile check."—Texas guard.

### Other Best-Liked Features

Dodge owners rate power and performance second on the list of best-liked features and the much-publicized "flair fashioned" styling is third.

"I like its ready response when I want to go. All trips seem too short. It is indeed a pleasure to drive."—Nebraska farmer.

"The 193-horsepower engine has plenty of get-up-and-go. It takes hills like a charm. I make an average of 35 stops a day calling on customers, and I am amazed at the mileage I get with such a big car."—New Jersey salesman.

"Even after I have owned the car for three months, people still stop, stare and admire it and ask questions about it."—Pennsylvania store owner.

"I like the styling best. Chrysler Corporation has finally caught up with the rest of the industry in this aspect."—Pennsylvania insurance man.

Most attractive model in the Dodge line is the three-tone Royal Lancer hardtop shown above in a fast corner.

### Best-Liked Features:

"Holds curves nicely. Handles just as well at 100 miles per hour as at 40 miles per hour." *Oregon minister*

"Has smooth flow of power when needed. I have gone 95 miles per hour with no motor labor. That's fast enough for any emergency."

*Texas guard*

### Most-Wanted Changes:

"Disappointed with gas mileage. Had trouble with automatic choke. Car has never done better than 14 miles per gallon."

*Mississippi mill operator*

"Would like glove compartment to be larger and in center of dash."

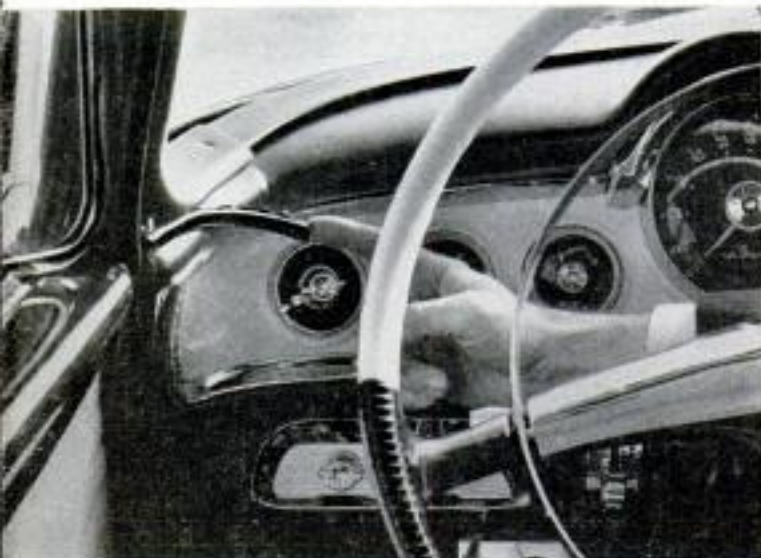
*Papa Clark*

Dodge's glove compartment is too small, owners say, and too far from driver. It is less than six inches deep





Dodge's unusual two-toning lets you put a dark color on top of the hood of a light-colored car to reduce glare



Owners say body assembly is careless, especially on details like this improperly fitted plastic piping

Driver's position and dash are fine, says Clymer, but he still objects to horn ring blocking view of panel



"Over-all beauty gives the car snob appeal. Colors harmonize beautifully. Incidentally, in a demonstration drive with PowerFlite, I was told by the salesman it was safe to reverse the car at speeds under 40. I tried it at 30 miles per hour repeatedly. No damage done. It's a nice feeling, while driving with children in front, to know they will not cause harm to the transmission by an accidental bump of the shift."  
—Pennsylvania printer.

#### And Other Complaints

Second and third on the list of most-frequent complaints are body noises (squeaks and rattles) and the operation of PowerFlite transmission.

"There are too many rattles in doors and instrument panel."—Virginia factory superintendent.

"PowerFlite is not smooth operating. It is noisy and jerks when dropping into low gear at stops. Has not had final adjustment, however."—Nebraska Army employee.

"PowerFlite thumps when car is put into motion."—Florida nurseryman.

Owners of the Dodge V8 are unbothered by engine trouble, the survey shows. Three out of four say they had no engine trouble at all (77 percent). Another 20 percent say they had some trouble and only a tiny 3 percent report considerable trouble.

Although Dodge offers a brand-new V8 this year (the 175-horsepower Red Ram with a single rocker-arm shaft), in addition to the double-rocker-arm-shaft Super Red Ram (183 horsepower), there apparently is no oil-consumption problem among the engines. Only 7 percent of the owners report using some oil and none reports that the engines use considerable amounts of oil.

Most of the owners who report some engine trouble list the automatic choke as the



Dodge owners in 30 states took part in this Owners Report. Tabulation of their opinions is given below

## Percentages from PM Poll of Dodge V8 Owners

**Miles per gallon**  
 City driving.....13.4 m.p.g.  
 On trips.....17.3 m.p.g.

**Oil consumption**  
 None .....93%  
 Some ..... 7%  
 Considerable ..... 0%

**Acceleration from zero**  
 Excellent .....78%  
 Good .....21%  
 Poor ..... 1%

**Acceleration from 50 m.p.h.**  
 Excellent .....75%  
 Good .....24%  
 Poor ..... 1%

**Had trouble with V8 engine?**  
 None .....77%  
 Some .....20%  
 Considerable ..... 3%

**What was engine trouble?**  
 Automatic choke.....11%  
 Hard starting in cold..... 3%  
 Rough idle.....2%  
 Ignition .....2%  
 Trouble not described..... 3%

**Dashboard shift-lever location**  
 Like .....84%  
 Dislike ..... 6%  
 No difference.....10%

OVER-ALL RATING OF DODGE V8	
Excellent .....	76%
Average .....	22%
Poor .....	2%

**Exterior styling**  
 Like bright colors.....94%  
 Dislike ..... 4%  
 No opinion ..... 2%

Like chrome treatment.....88%  
 Dislike ..... 4%  
 No opinion ..... 8%

Like longer body.....92%  
 Dislike ..... 5%  
 No opinion ..... 3%

Like windshield.....85%  
 Dislike ..... 5%  
 No difference.....10%

**What did you trade in?**  
 Dodge .....61%  
 Other Chrysler make.....14%  
 Non-Chrysler make.....19%  
 No trade ..... 6%

**Trade-in allowance**  
**Dodge traders**  
 Excellent .....42%  
 Average .....52%  
 Poor ..... 6%  
**Other Big Three traders**  
 Excellent .....43%  
 Average .....51%  
 Poor ..... 6%  
**Independent traders**  
 Excellent .....40%  
 Average .....50%  
 Poor .....10%

**What Should Be Changed?**  
 Needs no changes.....43%  
 Glove compartment..... 5%  
 Better gas economy..... 5%  
 Tighter body..... 5%  
 Better assembly..... 4%  
 Add Park to PowerFlite... 3%

**Most-Frequent Complaints**  
 Poor gas economy.....22%  
 Squeaks, rattles.....14%  
 PowerFlite ..... 7%  
 Water leaks..... 5%  
 Tubeless tires..... 5%  
 Road noises..... 5%  
 Poor assembly..... 5%  
 27% of the owners made no complaints at all

**Best-Liked Features**  
 Handling ease.....47%  
 Power, performance.....35%  
 Styling .....32%  
 Riding comfort.....29%  
 Visibility.....16%  
 Roadability ..... 8%  
 Interior styling..... 8%

offender. A few more say the engine is hard to start in cold weather.

"Automatic choke flooded frequently until it was adjusted properly."—Kansas executive.

"Carburetor kept flooding. Dealer installed a new one. It's okay now."—Florida dragline operator.

"On cold mornings the car has been very hard to start due to the choke."—Mississippi mill operator.

Another complaint is that the engine has a rough idle.

"Engine should idle more smoothly. It rocks all the time."—Pennsylvania laborer.

### What Should Be Changed?

Asked to name one change they would make in their Dodge, 43 percent of the owners say no change is needed. The other 57 percent offer various suggestions, but no more than 5 percent agree on any specific change. Five percent want the glove compartment larger or moved closer to the driver. The same percentage (5 percent)

want gasoline economy improved. Another 5 percent say the body should be tighter. Here are some typical quotations by owners asking for specific changes (in order of frequency of mention):

"I would like the glove compartment to be larger and in center of dash. Also two ash trays in front."—Texas clerk.

(Quotations about better fuel economy have already been given.)

"Factory or dealer should take more care to tighten body. I found I had to replace several bolts and tighten others under the car and inside."—Arizona contractor.

"Add parking dog to PowerFlite."—Ohio insurance agent.

"Make the steering wheel clear the lap more."—Kansas fireman.

"Get rid of push-button door latches. Hard to open with groceries in hands."—Oregon minister.

"Eliminate cowl ventilator."—Texas clerk.

"Put ram's head back on hood."—Tennessee machine operator.

## TEST DATA

1955 DODGE V8  
Four-Door Sedan with PowerFlite

### Driver's Blind Spot

Farthest point 19½ feet

Nearest point 12½ feet



The combination of a high seat and a low hood gives Dodge drivers excellent forward vision

### Acceleration Test

¼ mile from zero	20.3 seconds
½ mile from zero	32.4 seconds
0 to 30 miles per hour	5.3 seconds
0 to 60 miles per hour	15.6 seconds
Top speed by speedometer	108 miles per hour
True top speed about	103 miles per hour

### Economy Test

#### Constant-Speed Mileage

At constant 30 miles per hour	21.7 miles per gallon
At constant 50 miles per hour	19.8 miles per gallon
At constant 60 miles per hour	16.7 miles per gallon
At constant 75 miles per hour	13.9 miles per gallon

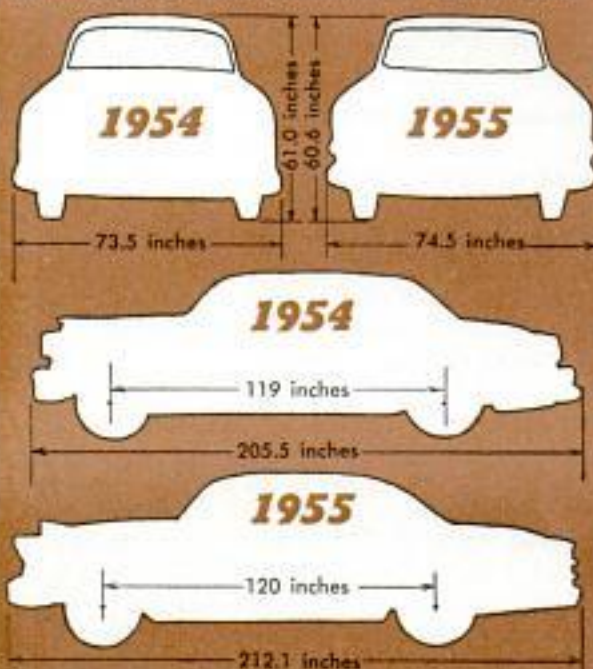
#### Cross-Country Mileage

Los Angeles, Calif., to Phoenix, Ariz.	16.7 miles per gallon
Phoenix to San Diego, Calif.	17.2 miles per gallon
San Diego to Los Angeles	14.5 miles per gallon

(Both premium and regular gasoline used)

### Comparison with 1954 DODGE

Dodge for 1955 is a longer, lower and wider automobile as these comparative figures show



To bring its readers a full report on new cars, *Popular Mechanics* combines two tests: 1. A road test by Floyd Clymer (the results of which are given above); and 2. An actual use test by owners themselves. Opinions of owners all over the country are studied and summarized in the monthly *PM Owners Report*

### Other Best-Liked Features

The following typical quotations were made by owners in stating what they like best about their 1955 Dodges:

"Excellent riding comfort. Do not get jarred on bad roads."—Pennsylvania sales manager.

"It has the best visibility of any car on the market."—North Carolina farmer.

"Sloping hood and raised fenders offer good vision."—Iowa railroad fireman.

"Windshield design makes it easy to get in and out plus giving a nice view to front and right side."—Washington service-station attendant.

"Roadability excellent. You feel safe at all times."—Iowa auto mechanic.

"Interior styling is excellent, especially the plastic upholstery that eliminates the previous dissatisfaction of buying good-looking upholstery and then having to cover it for protection."—Florida owner.

"Doesn't use any oil to speak of and is so easy on gas. Always ready to go when others won't even start."—Missouri owner.

"I drive to work every day. With six in the car we are not crowded."—Pennsylvania crane operator.

"I like the way I get traction on ice and snow with PowerFlite."—Washington petroleum wholesaler.

"I like the new bright colors. They are cheerful and can be seen quicker on the highway."—Arizona shovel operator.

"Large trunk area and convenient map light on instrument panel."—Oklahoma housewife.

### Additional Complaints

"Water leaked in around top of the windshield."—Washington foreman.

"Body leaks. Floor mats are always wet on underside."—Pennsylvania engineer.

"Tubeless tires are not satisfactory. Ride very hard, out of round, give the car vibrations. I removed all four tires and substituted tires and wheels from a 1949 Chrysler which I own and the difference was amazing. Vibration was cut down at least 40 percent."—New York machine operator.

"Had trouble with tires being out of round. Three were replaced in 1300 miles and I still get vibration."—Illinois machinist.

"Steering post is very noisy over rough roads."—New Jersey mason.

"Had several bad chrome sections when delivered, but were taken care of to my satisfaction by my Dodge dealer."—Pennsylvania businessman.

"Defroster clears windshield unevenly."—Washington farmer.

"Defroster very poor on driver's side."—Connecticut rubber worker.

(Continued to page 222)





### Assembly-Line Crane Lifts Constellation in Its "First Flight"

Ten-ton, 110-foot fuselages for Super Constellations become "airborne" for the first time when a specially designed crane balances them carefully and then lifts them at the Lockheed Aircraft Corporation's

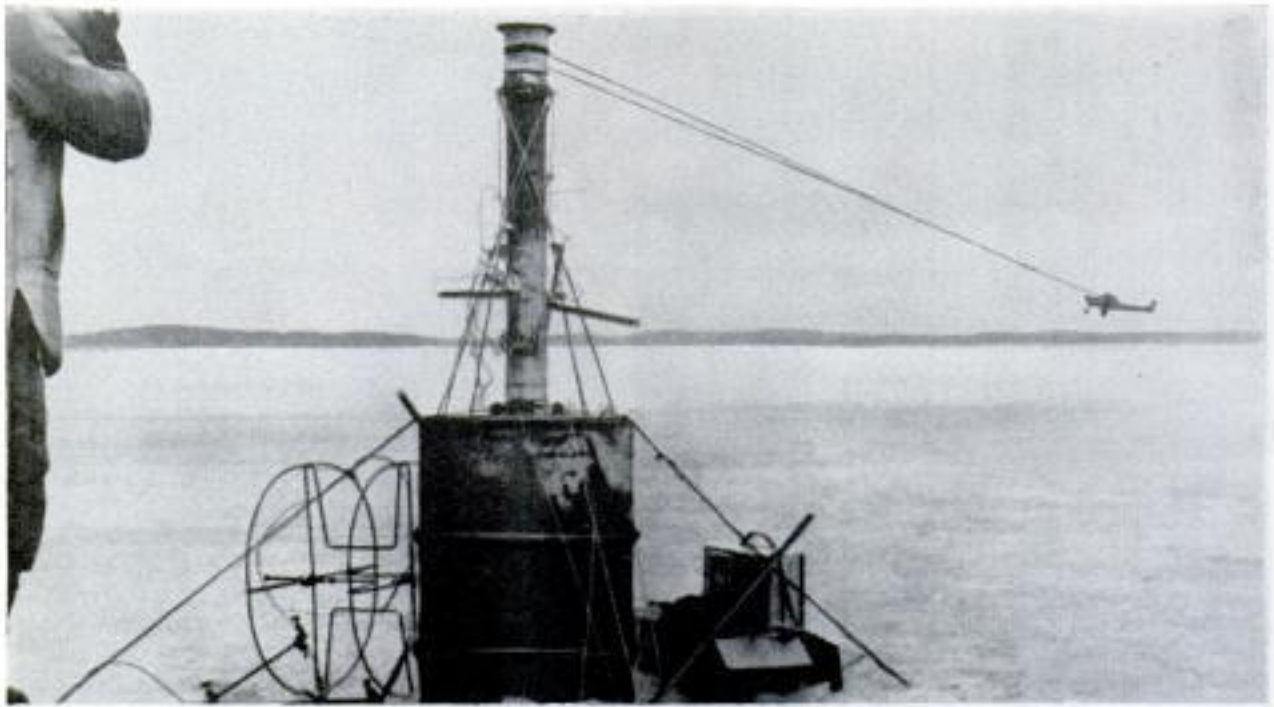
final assembly line, Burbank, Calif. The crane moves the immense fuselages from one point on the final line to the next. Small wheels are attached temporarily to the fuselage for ground movement.

### Tongue Hitch for Jeep Converts It to Trailer

Often used as a tractor, a Jeep becomes a trailer when equipped with the tongue hitch made by an Indiana farmer. With the hitch, the Jeep can be towed behind self-powered equipment to the job, and then driven home, leaving the equipment at the job site. The tongue folds up out of the way when not in use. It is attached by steel pins to brackets welded to the Jeep bumper.



Information not listed on articles in the index frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11



### Plane Tethered to Post Takes Off in Circle

Comparatively small circular landing fields could replace excessively long runways with a tethered take-off system for aircraft devised by Prof. J. G. Winans of the University of Wisconsin. A plane using the system would be attached by a cable to a central pivot while it gained flying speed traveling in a circle whose radius is

determined by the length of the tether. When flying speed is reached, the cable is dropped. Winans himself made several successful take-offs with a light plane tied to a central post on a frozen Wisconsin lake. In his experiments he used a 400-foot nylon cord. The central post pivoted in an oil drum fastened to the ice.



### Balloons Inflated Under Water To Raise Sunken Ships

Nylon balloons designed to aid in raising sunken ships were tested in the Baltic Sea off Kiel recently when they brought a one-man submarine to the surface. The balloons were attached to the submarine, which had been submerged for the test, and then inflated. Greater numbers of balloons would be used for larger vessels.

### Electric-Heating Thermostat Measures Radiant Effects

Both radiant heat and air temperature are measured by a room thermostat designed for use with electric heating systems. It contains a new type of sensitive element directly exposed to air and radiant effects. The result is said to be constant comfort combined with economical operation. The unit, which fits into a standard outlet box, contains the complete switching system and operates silently without clicks, chatter or arc flash. It can be set for any temperature in the normal heating range, and is made for such systems as radiant-cable heat, radiant-glass panels, radiant electric baseboards and rubber panels.



Six-pronged pick artistically smooths out the fins of a fish. These two ice statues will become banquet centerpieces. Right, mouth of fish gets last-minute touches. Slip of hand would ruin an evening's work



## Here's a Chilly Hobby: ICE CARVING

FOR 22 YEARS John F. Krich has chosen to spend his evenings and week ends seated in front of 350-pound chunks of ice in a warehouse kept at a chilly 22 degrees above zero. While others seek the warmth of the fireplace in winter, Krich pursues his hobby—carving detailed figures from commercial ice blocks—in an atmosphere that only a polar bear could appreciate. Come summer, he likes his hobby even better.

Krich, of Cleveland, Ohio, carves a variety of subjects ranging from simple alphabet letters to his masterpiece, a 20-foot frozen miniature of a locomotive,

Chips fly as Krich forms a basket from a 350-pound chunk of ice. Smaller basket is ready for the table

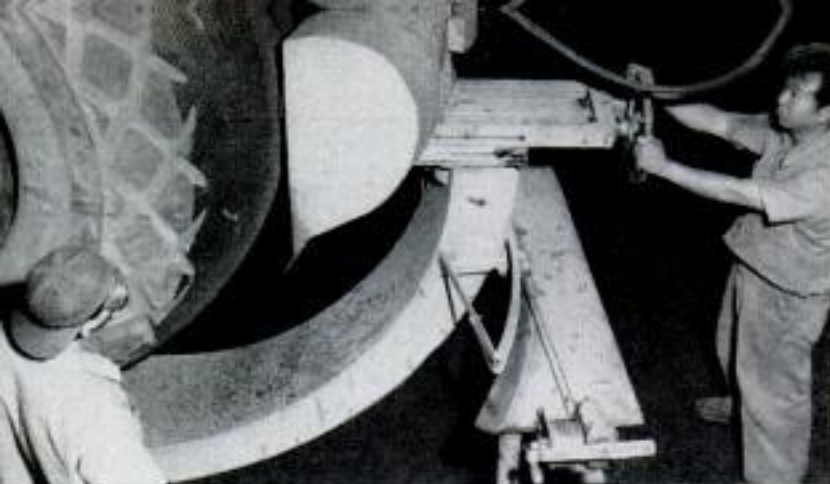
tender, oil car, freight car and a caboose.

Tools of the ice carver's trade are pronged ice picks. His "uniform" is a pair of arctic boots, two woolen shirts, a hat or a cap with earflaps, a canvas glove for his "carving" hand and a rubber glove for his "chip-brushing" hand.

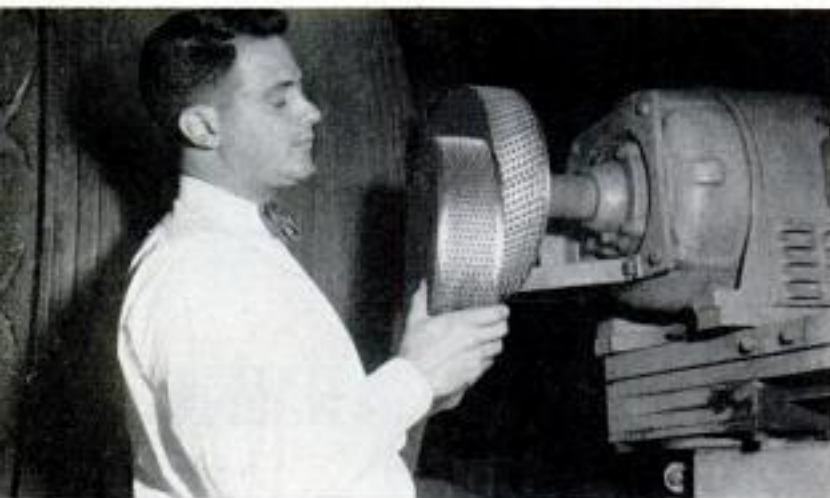
One of his toughest projects was carving an ice ball, hollowing it out and placing a plastic dollhouse, trees and fence inside. He added snowflakes to the scene and then drilled a hole in the back of the globe and inserted a thin hose. The hose piped in compressed air, which blew the snow about to create a novel winter scene.

Sculptor works winter and summer surrounded by big blocks of ice in the freezing climate of a warehouse





Major problem was getting a buffer big enough to handle the huge tires. Parts of this one are from an old B-29 bomb bay



Two grades of buffing wheels are needed to chew off the old tread—one coarse, one fine. Note the tremendous tread size



New tread is formed in a big mold, shown under man's right foot. Below, the mold is pulled upward, exposing "new" tire



## \$3000 Tire Gets Recap

WHEN A NEW TIRE has a price tag of \$3000, you don't throw the old one away just because the tread is bald. You don't, that is, if you can get the giant doughnut recapped at half the price.

Cliff Melim, head of a tire servicing company in Hawaii, was confronted with the big recapping problem when his customers began using mammoth LeTourneau haulers instead of steam locomotives on their plantations. The customers couldn't see shelling out \$3000 when a recap job would do.

So Melim and Walter Woodside, a local welding expert, put together some electric motors, a 1942 Dodge transmission, parts of a B-29 bomber, plus a set of commercial cutters and buffers, to make one of the largest tire-preparing machines in use today.

Once the worn tread has been peeled and buffed off, recapping is done in a standard mold, differing only in size from the usual mold used by recap companies.

As a result, Melim's customers save about \$1500 a tire and he has a new branch to his business.

Ready to go back to work on the Hawaiian plantation, the tire wears a \$1500 recap





Lawrence Farnham wanted to combine the best points of a plane, horse and motorcycle. The Flycycle resulted

## THEY BUILD THEIR OWN PLANES

**I**F A THREE-WHEELED motorcycle whizzes by you 50 feet off the ground, and adds insult to injury by blowing dust in your face, it is not a nightmare and you are not going crazy—it is just Lawrence Farnham's Flycycle.

Farnham, of Fort Collins, Colo., designed and built the Flycycle for his own special purposes. He wanted a short-hop aircraft that combined the best qualities of a crop-dusting plane, a motorcycle and a saddle horse. No manufacturer built such an aircraft, so Farnham, a member of the Experimental Aircraft Association and an experienced builder of light planes, made the craft for himself.

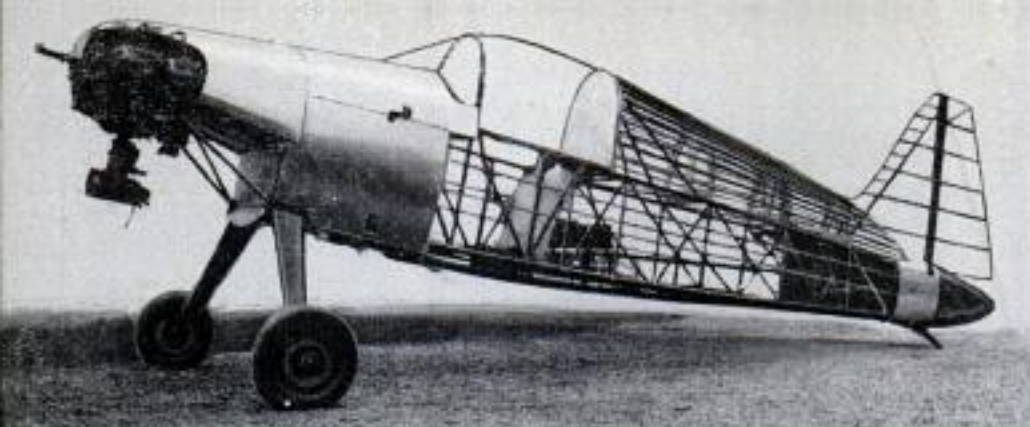
The Flycycle is a one-man light plane, powered by a 75-horsepower Continental engine, that the pilot rides like a motorcycle. He sits astride the fuselage and controls it with handlebars, rather than a conventional stick or wheel. The motorcycle likeness is also in the throttle control which is a twisting handlebar grip.

Farnham is one of several thousand Americans who have built or rebuilt their own airplanes. He built his aircraft to fit a special purpose. Other back-yard plane makers, who prefer to call themselves "homebuilders," have other reasons.

Typical of these is Howard Myers of Chicago, flying counterpart of the postman who goes for a walk on his day off. Myers

Although protection from the weather is at a minimum, visibility could not be improved in the Flycycle. Handlebar replaces normal control stick





Without wings, propeller or fabric covering, steel-tube construction of single place *Little Audrey* is evident. Ready to fly (below, left) Paul Poberezny's homebuilt looks trimmer and smaller



Many homebuilders seek more speed than that built into ordinary light planes and turn out slick racing jobs like the 180-mile-per-hour *Pitts Special*, below. Engine turns up only 85 horsepower



flies TWA Super Constellations and Martin 404s for a living and, for relaxation, he flies his own high-performance clipped-wing Cub.

"I wanted something pretty good," Myers said, "something better than I could afford as a complete plane."

He has it. By completely rebuilding and repowering a 1946 Cub, he has a light plane that cruises at 110 miles per hour, as compared to the original 75, and will climb 1500 feet per minute, pretty good for any light aircraft.

Farnham and Myers are good examples of aircraft homebuilders. They had different reasons for their projects and they went at them in different ways, but each now has a homebuilt plane that suits his purposes. One is a completely new design

and the other is a modification of an existing airplane.

Although some pilot-built aircraft are radically different, most follow conventional lines but incorporate the ideas of the builder, ideas that differ from those of the designers in the large airplane plants.

Each homebuilder believes, of course, that his design changes are improvements, and the belief is encouraged by the Experimental Aircraft Association, the pilot-builders' own organization.

"In encouraging homebuilding," says Paul Poberezny of Milwaukee, president of EAA, "we hope that perhaps some of our members will have an idea that can be incorporated into a design that may revolutionize private flying."

That would be a big, and profitable, or-



J. H. C. Palen, Jr., of Poughkeepsie, N. Y., built this flying replica of the famous 1909 Bleriot monoplane

der. Latest Aircraft Owners and Pilots Association figures show almost 65,000 privately owned aircraft in the United States.

Poberenzy himself has built at least three airplanes, and is working right now on an adaptation of a prewar light plane he hopes can be made available to EAA members in kit form.

As maintenance officer for a Wisconsin National Guard outfit, Poberenzy finds it

necessary to make official trips to various parts of the country. And there are few airports at which he stops that are not within easy telephone distance of at least one enthusiastic homebuilder who wants to know the latest experimental-aircraft news.

The EAA has about 1000 members in chapters scattered from coast to coast. Those who can, attend the annual "fly in," or meeting, to talk shop, exchange views and

Some homebuilts are so small pilots must lie prone. In others, odd wings combine with normal fuselages





Builder Ray Stits claims 200-mile speed for this tiny biplane, one of several midgets he has designed

examine other members' ideas as incorporated in their planes.

Some members experiment in fields far removed from the conventional. Queries in the *Experimenter*, official EAA publication, indicate that ambitious amateur builders are working on or planning such widely diverse projects as a ramjet helicopter and a water-ski seaplane.

Others, like Ray Stits of Riverside, Calif., build more or less conventional airplanes to make available in kit form, and then let their imaginations roam on truly experimental aircraft. Stits has produced two flyable airplanes with wings so short they look incapable of lifting good-sized models.

The homebuilders are lineal descendants of the thousands who, a couple of generations back, built their own improvements into Model-T Fords. But they have more material to draw from. Instead of one automobile, they have any number of light aircraft with which to start. Sometimes they wind up with interesting hybrids.

Poberenzy, for instance, built a one-place sport plane, the *Little Audrey*, using the basic fuselage of Benny Howard's famous prewar racer, *Pete*. Before the aircraft flew it included wings from a Luscombe, wing struts from a Cessna and the Continental A-75 engine from a Rearwin.

Typical of pilot-builders who use few salvaged parts is Tom Cassutt of Deer Park, N. Y., another TWA pilot. He flies Super Constellations between New York and Paris. Cassutt started with little more than his own design for a miniature racing plane, a supply of steel tubing and the ability to weld.

The *Cassutt Special* cruises at about 185 miles per hour, which is pretty fast for a light plane, but it also takes more runway to get off the ground than its slower cousins. Low stalling speed and high top speed seldom go together, and Myers, Cassutt's fellow transport pilot-homebuilder, declares:

(Continued to page 218)

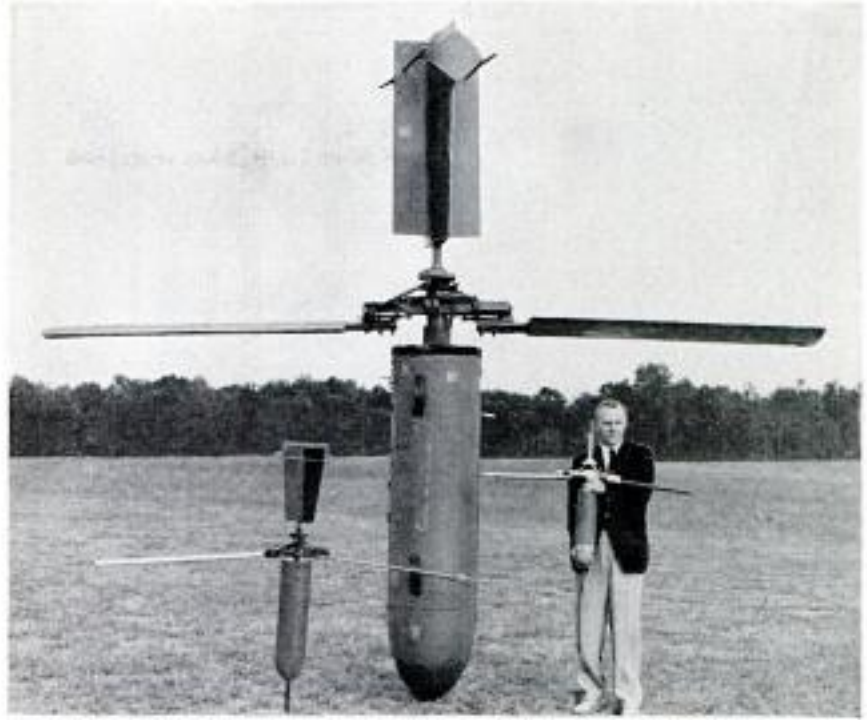
Even with its modern, in-line, air-cooled engine, this aircraft is recognized easily as a World War I Jenny



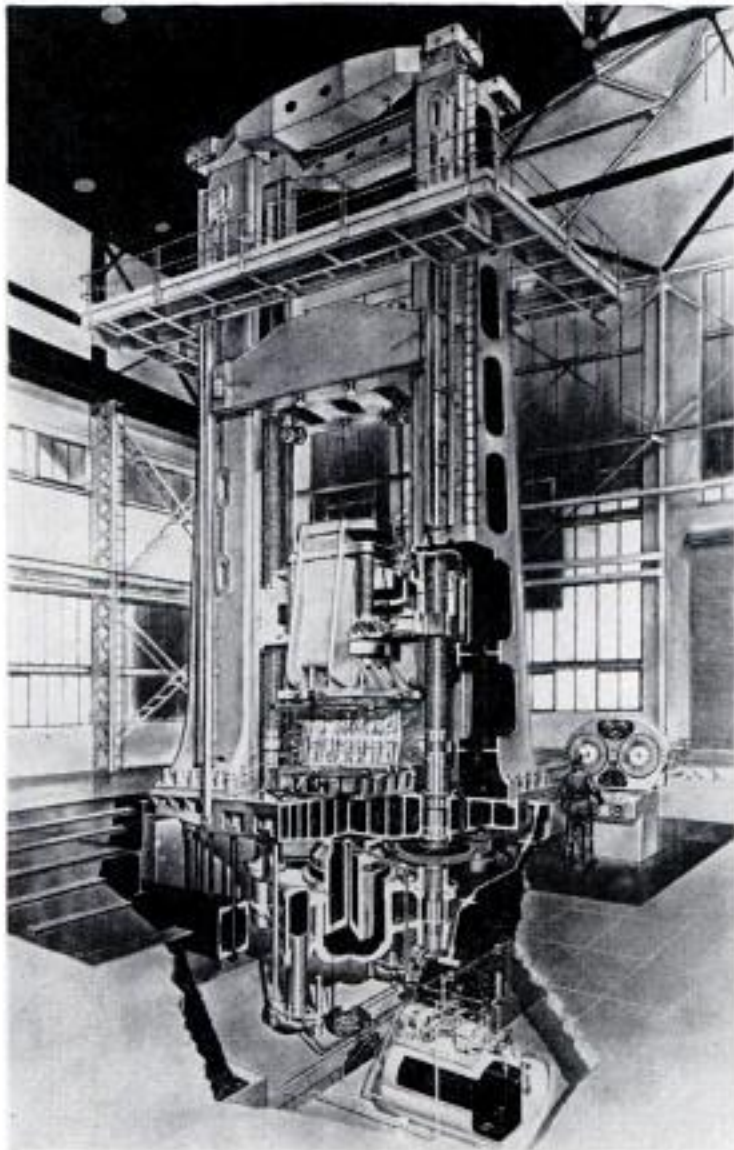


## Accurate Airdrops With Rotor Chute

Pinpoint accuracy in airdrops to confined combat areas is claimed for the rotochute, a device using a rotor rather than a parachute to slow descent of falling bodies. The rotochute, developed by the Kaman Aircraft Corp., consists of two rotor blades mounted on a hub attached to a standard airborne supply container. The blades fold 90 degrees to form the tail of the container when it is carried on bomb racks. Released, the blades automatically spread to rotor position.



## Giant Testing Machine Will Measure Strength of Full-Size Girders



Steel girders will crumple like soda straws in a giant universal testing machine nearing completion at Lehigh University in Bethlehem, Pa. Its designers believe it to be the largest in the world. Able to exert forces up to 5,000,000 pounds, the machine will make it possible to test full-size structural members in designing the skyscrapers and bridges of tomorrow. Previously, effects of actual tension and compression could only be figured on paper. A 30 by 100-foot working platform will make possible the testing of plate girders with a span of 100 feet, and the machine's 53-foot height will permit the testing of building columns and cross sections up to 36 feet high.

## Radar Reveals Locust Hordes

Radar, long established as an early warning system for detecting approaching hostile aircraft, is now employed to warn of a different kind of airborne enemy—hordes of locusts. British scientists report that radar has successfully spotted locust swarms in the Persian Gulf area. Advance warning will enable aircraft to take off and intercept them with clouds of insecticide. One application of 300 gallons of aerial spray can kill 3,000,000 locusts.

# WHAT'S NEW FOR Your Home



1

**1. VACUUM CLEANER-POLISHER** combines two appliances into one. As a vacuum cleaner it adjusts to three positions depending upon depth of pile. Flip of a switch brings polishing brushes down against floor. Sponge can be attached to brushes to apply detergent  
Fillery Home Appliances, Inc., 38 Pearl St., New York City 4

**2. GRATER** has a rotating handle that prevents skinned knuckles and permits cheese to be grated directly onto the food. Pressure on the movable handle feeds cheese into the hopper. The grater can also be used on chocolate, nuts, bread, other foods  
Hoffritz for Cutlery, 49 East 34th St., New York City 16



2

**3. SHOWER HEAD** molded from plastic can't corrode and will not attract lime deposits. Shower stream can be shut off at the head itself if desired. The head is milky-white in color but can be dyed to match bathroom color scheme with household dyes  
Warren-Magnuson Co., 612 E. Alhambra Ave., Glendora, Calif.

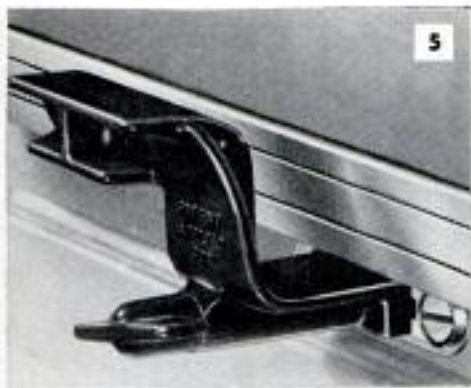
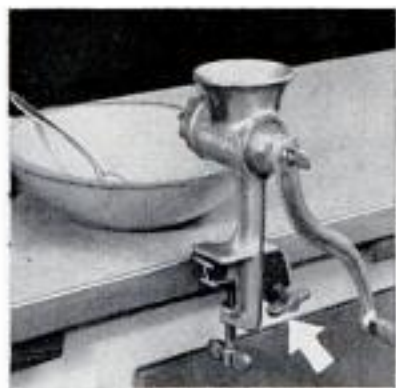
**4. STEP AND HANDLE** can be screwed onto a closet doorframe, permitting easy access to upper shelves or to second clothes pole. Unit is available in two models, one with a permanent step and the other with a step that flips out of way when not in use  
Narva Products, Inc., 70 E. 45th St., New York City 17



3



4



**5. BRACKET** for food grinder prevents damage to kitchen counter tops and edges. Slotted plate is attached permanently just beneath edging at point where grinder will be used. The bracket itself slides into the plate and the grinder is clamped to it. After use, bracket can be stored

Robert B. Haynes, 2005 Laskey Rd., Toledo 13, Ohio

**6. HOSE CADDY**, similar to golf cart, eliminates dragging of heavy hose across a lawn. It holds up to 200 feet of garden hose. Flat-tread rubber wheels prevent damage to a wet lawn. A clamp on caddy, adjustable with a wing nut, holds hose nozzle in any desired position for sprinkling lawn

H & W Products Co., P.O. Box 792, Peoria, Ill.

**7. CLOTHES CATCHER** fastens to the bottom of the laundry chute. An aluminum zipper across the bottom permits easy unloading. Made in a variety of fabrics, the clothes catcher is easily installed with four hooks attached to the basement ceiling. It holds up to four bushels of laundry

Fornell Manufacturing Co., Minneapolis 19, Minn.

**8. TOASTER** turns out hot buttered toast at the table. In most toasters, butter can't be applied to bread before toasting. New appliance is an aluminum box with a heating element in the top. In upper position, drawer turns out buttered toast; in lower, it heats rolls or coffee cake

Munsey Products, Inc., Little Rock, Ark.





## TV Finds Parking Spots To Speed Lot Operation

Mounted atop a light standard in an Oakland, Calif., parking lot, a closed-circuit TV camera serves as an extra attendant, spotting open spaces. The camera constantly scans the lot, and its picture is reproduced on a 21-inch screen in the entrance booth. The attendant merely sends incoming cars to the vacant parking spaces he sees on his screen.

## 550-Mile "Dingo" Fence

All Australian wildlife except the dingo, a medium-sized wild dog, has been brought under control, but dingoes are still a serious menace to sheep. To protect the continent's 17,000,000 sheep, a 550-mile dingo-proof fence is being erected. It will stretch north through Queensland from the New South Wales border.

## Army Can Take Complete Theater to Forward Areas in Showmobile

First Army vehicle built specifically for entertainment purposes, the Showmobile, an \$18,000 theater on wheels, has been delivered to Fifth Army headquarters in Chicago. The Showmobile, mounted on a truck chassis powered with a V8 engine,

includes a 14-foot roll-out stage, two fully equipped dressing rooms, storage space and a 10,000-watt generator for extensive theatrical lighting. It will be used to take stage shows to maneuver or combat areas in which auditorium space is nonexistent.



## Radar Traces Projectiles, Locates Mortar

Infantrymen who have exhausted their vocabularies on mortar fire that pinned them down will welcome a new Army radar that spots enemy mortars by tracing the trajectory of projectiles. In Army terminology, the device is known as counter-mortar radar AN/MPQ-10. Developed by the Signal Corps and Sperry Gyroscope Co., the mortar spotter was first used in the late stages of the Korean war. It consists of a dish-shaped radar antenna, automatic tracker, remote-control console with radarscopes, a gasoline-powered motor-generator and a trailer mount. Backtracking projectiles, the radar pinpoints the enemy mortar.



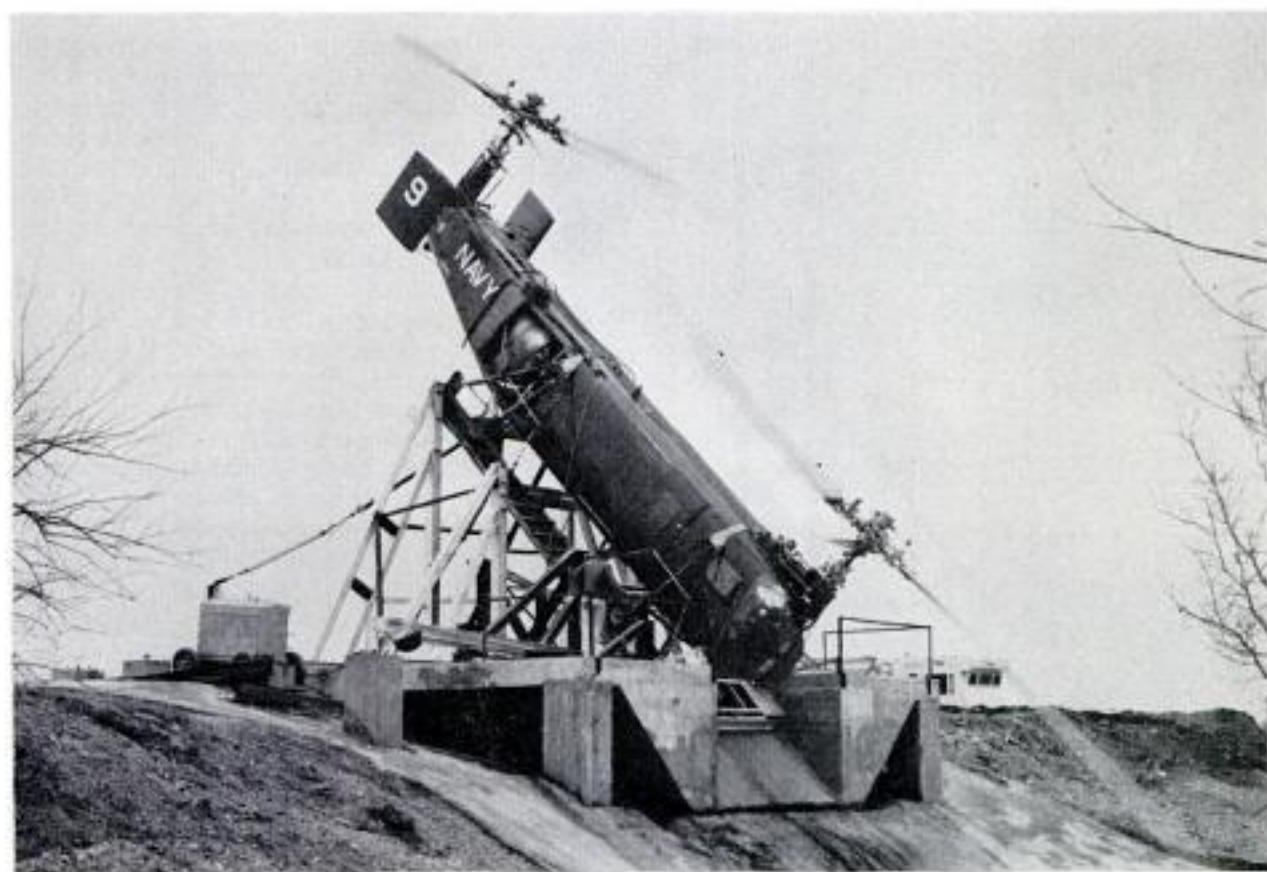
## Tiny Radio Transmitter

Housed in the war head of a speeding 20-millimeter projectile, a thimble-size Navy radio transmitter broadcasts signals that are recorded by an oscilloscope on the ground. The transistor-equipped unit is used to trace the rotation of projectiles.

## Helicopter Tilted on Special Ramp for Testing at Various Angles

Looking as if it were about to nose over, a Bell HSL-1 antisubmarine helicopter is tilted to a 45-degree angle for testing. The tests are conducted on a specially built

ramp at Bell's Fort Worth, Tex., plant. It was necessary to build the ramp on a downhill slope so that the forward rotor would not strike the ground.





## Electric Reel Brings in Odd Fish Caught at Great Depths

Odd species of ocean fish that live half a mile or so below the surface can be caught with a new electric fishing reel that takes the hard work out of angling at great depths. As much as 3500 feet of thin Ni-chrome wire with a breaking point of 70 pounds can be carried on the reel. Tested in the Pacific off San Diego, the reel has brought up rare sable fish from 3200 feet,

rock cod and halibut from 1200 feet, 10-foot sharks and a 115-pound black sea bass. The reel has a drag to regulate speed and is used with a short, stiff boat rod having a roller tip. A 12-volt automobile storage battery will power two reels for a full day's fishing at depths not practical for angling with ordinary equipment. Nibbles a half mile down are detected immediately.



## Homemade Pile Driver Pounds Stumps Into Soil

Instead of dynamiting the stumps on their land, two Arkansas farmers have built a machine like a pile driver to pound them into the ground. A 2000-pound weight is hoisted to the top of an 18-foot frame and dropped on the stump. Repeated blows are necessary to bury the stump the required depth of 16 inches in the soft earth, well below the reach of a plow. Between 15 and 25 blows are required to sink the toughest oak stumps, which were cut flush with the ground many years ago when the land was first cleared. The homemade machine, built at a cost of \$1500 by Ebb and Leo Sellmeyer of Knobel, Ark., is powered by a V8 automobile engine, rides on three huge wheels from junked B-17 bombers, and has a chassis made from scrap.

☞ Texas Longhorn cattle, almost extinct 25 years ago, now number over 500 because of federal efforts to preserve the breed.



Can you spot errors of these divers? They're careless with weapons, diving near boats, seaweed, swimmers.

## *Skin Divers . . . Play it Safe*

By Richard W. Emery



**S**KIN DIVING — the fascinating pastime that takes you into a new world beneath the surface of lake or ocean—is fast becoming one of the most popular water sports. It's loaded with excitement and fun. It's also loaded with danger.

Each year several skin divers go down but fail to come up because they didn't follow simple rules of underwater safety. The skin diver who is reckless with his own life may also endanger the lives of others. On the other hand, skin diving can be safe if the diver obeys the rules.

Off the California coast, five teen-age boys equipped with aqualungs were diving and surfacing near beds of seaweed. It was a lot of fun—until one of the older boys

suddenly noticed that a 15-year-old was entangled beneath the surface in heavy kelp. He dived immediately, cut loose the kelp and the aqualung equipment and brought the drowning lad to the surface. Lifeguards worked four hours in an unsuccessful attempt to revive the boy.

Only five days before, kelp beds nearby had claimed the life of an 18-year-old who was skin diving from a boat.

Even shallow water claims its victims. In Fort Worth, Tex., a 14-year-old boy suffocated in his rubber-and-glass swimming mask. Vacuum, created as he tried



**DON'T** dive in areas that are known to be dangerous. **DON'T** take chances with strange, untested equipment

to breathe, sucked the mask so tight over his nose and mouth it had to be cut from his face. The lad had drowned in only three feet of water in a swimming pool.

Attempts to set underwater records can lead to tragedy. In Elkhart, Ind., a teenager was experimenting with a "rebreathing" mask, designed for use in aircraft at high altitudes. The mask filters air so it can be breathed again. The lad weighted

**DO** use only basic equipment if you're a novice. Beginner has only face plate, fins, float, bag, spear



**DON'T** enter deep water if you can't swim. Inflated rubber floats can be punctured and let you down

his body and went down to a depth of 30 feet. He managed to stay down a full hour before he resurfaced. The following day he returned to the lake, determined to break his own record. His body was recovered an hour and 15 minutes later.

There may be even more such accidents this summer because there'll be more skin divers. And these tragedies need never happen if divers use their heads and obey

**DON'T** overburden yourself. This diver carries pack full of fishing gear, hand fins, knives and weights







**DON'T** carry a cocked weapon until you're ready to fire it. It may go off accidentally, injuring someone

a few common-sense rules of water safety.

The rash of preventable accidents along the coast of California prompted a recent demonstration of right and wrong diving practices. In the demonstration, members of the Council of Southern California Diving Clubs and the American Red Cross illustrated the rules for skin-diving safety.

The most important rule of all, of course, is to learn to swim well before you ever

**DON'T** venture into kelp beds. Kelp may tie itself in knots around equipment you carry on your back



**DO** try artificial respiration on a float in an emergency. Alternately compress and release diaphragm

try skin diving. The good swimmer is less likely to panic and better able to take care of himself if he ever does get in any trouble. Inflated inner tubes, for example, can be punctured and let the novice swimmer down in deep water.

Experienced divers agree that too many beginners weight themselves down with too much equipment. Gear that loads down a diver may also foul him up under water.

**DO** swim on your back if you get tired. Tank-type breathing equipment will help support you in water





**DO** use this type of fastening if you hang weights on your body. One pull will release the entire belt



**DON'T** show off by inviting nonswimmers into deep water to watch you dive. Their floats may fail them



**DO** save your strength by resting part of your weight on float while looking around for underwater game

Try the recommended minimum—face plate, fins, float, bag and spear—before you try any other equipment. And use only tested and approved breathing devices. Don't take chances with poor equipment.

Converted aluminum breathing devices designed for high-altitude flying may corrode in salt water and become dangerous.

Weights that are hung on the body, of course, should never be secured in such a way that you can't get rid of them instantly.

**DO** learn to swim well before using equipment in deep water. This is the most important rule of all



**DO** team up for artificial respiration. One man applies pressure while another tows two men ashore

Weapons are dangerous. Anything that can kill a fish can also kill a human. Treat underwater weapons with the same respect you treat their surface counterparts.

Skin divers never should swim alone.

And one of the most important rules of all is to swim only in water that has no hazards. Seaweed, jagged stones and boats are all dangerous to the skin diver.

The underwater world can be oceans of fun—if you keep it safe. ★ ★ ★

**DO** use the buddy system. Never swim alone. Here a buddy comes to the rescue of a diver fouled in kelp



## Air Force's Matador Missile Launched From Special Semitrailer

No runway is needed by the U. S. Air Force's B-61 Matador missile, which is launched from a specially constructed semitrailer, 39 feet long and weighing 35,000 pounds. Complete launching equipment, in addition to the tandem-axle semitrailer, consists of a launcher tractor, a 15,000-pound transport semitrailer and a 20-ton truck-mounted crane. Before launching, the missile is mounted on the launcher at three points. When power is applied, a bolt in the rear support shears and the two forward supports pivot away.

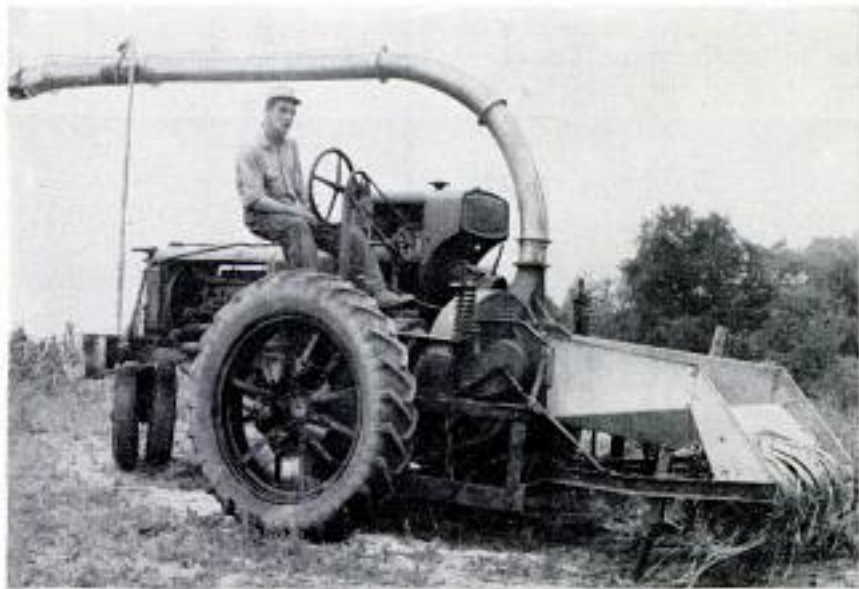


### Pencil With Liquid Graphite Writes Like Ball-Point Pen

Pencils using liquid rather than solid graphite have been developed separately and simultaneously by two companies, one a major maker of fountain pens and the other a mechanical-pencil producer. The liquid-graphite writing instruments are designed to multiply many times the life of ordinary pencils, and it is claimed that one could write a straight line three miles long. Liquid graphite flows around a ball, as in a ball-point pen. Marks made by the liquid graphite can be erased just as easily as those of ordinary pencils.

### Forage Cutter Tractor-Mounted

By mounting an ensilage cutter on a 25-year-old tractor, Chan Smith of Cuttingsville, Vt., has created a self-propelled forage harvester that speeds work by going backward. Smith reversed the gears of his tractor, mounted a 30-horsepower engine on the tractor to drive the cutter and offset the new seat and steering wheel. A belt-and-pulley rigging connects the steering wheel to the main steering shaft. A pickup was added to the cutter, which was hinged to the tractor's drawbar and suspended from springs. The entire operation is with-



in view of the operator and maneuvering is easy. Chopped corn or hay is blown into a towed trailer.



Navy photos

Above left, in tests of the target, men count each hit to make sure the instrument is tallying pilot's score correctly

Above, officer on tower observes pilot's run while instrument records hits. Cable runs between the recorder and the target



Left, pilot aims at 12-foot-square target made of rubber panels. Hit is registered whenever electric circuit is disrupted

## Electronic Target Tests Aim of Strafing Pilot

Pilots who make strafing attacks on a new electronic target can't boast of hits they never made. On the other hand, the practice target gives them credit for every hit. The new target is made of six sheets of rubber, each measuring four by six feet, mounted on a wooden framework. The rubber sheets are impregnated with minute particles of carbon. The sheets then are en-

ergized with an electric current. A cable carries the current to a recording instrument on an observation tower. The instrument gives a steady reading until the circuit is disrupted by the impact of a bullet registering a hit. As many as 300 hits per second have been accurately recorded by the instrument. A unique feature of the target is that it is self-sealing.



## Floating Inspectors Check Tank Wall

"Routine inspection" of an oil tank in the Saudi Arabian desert calls for two engineers and one rubber life raft. Before inspection of the Arabian American tank, the oil is removed, the gases purged by steam and water admitted. Water level is raised in eight-foot steps until the inspection is finished. During the check, the men paddle along the steel wall of the bubble-shaped tank, looking for signs of corrosion.



### **Twin-Rotor Convertiplane Successfully Test Flown at 3000 Feet**

Test flights to altitudes of 3000 feet have been made with a convertiplane designed and built by Transcendental Aircraft Corp. (*PM*, June 1954, page 119). The aircraft is lifted by twin rotors, one at each wing tip,

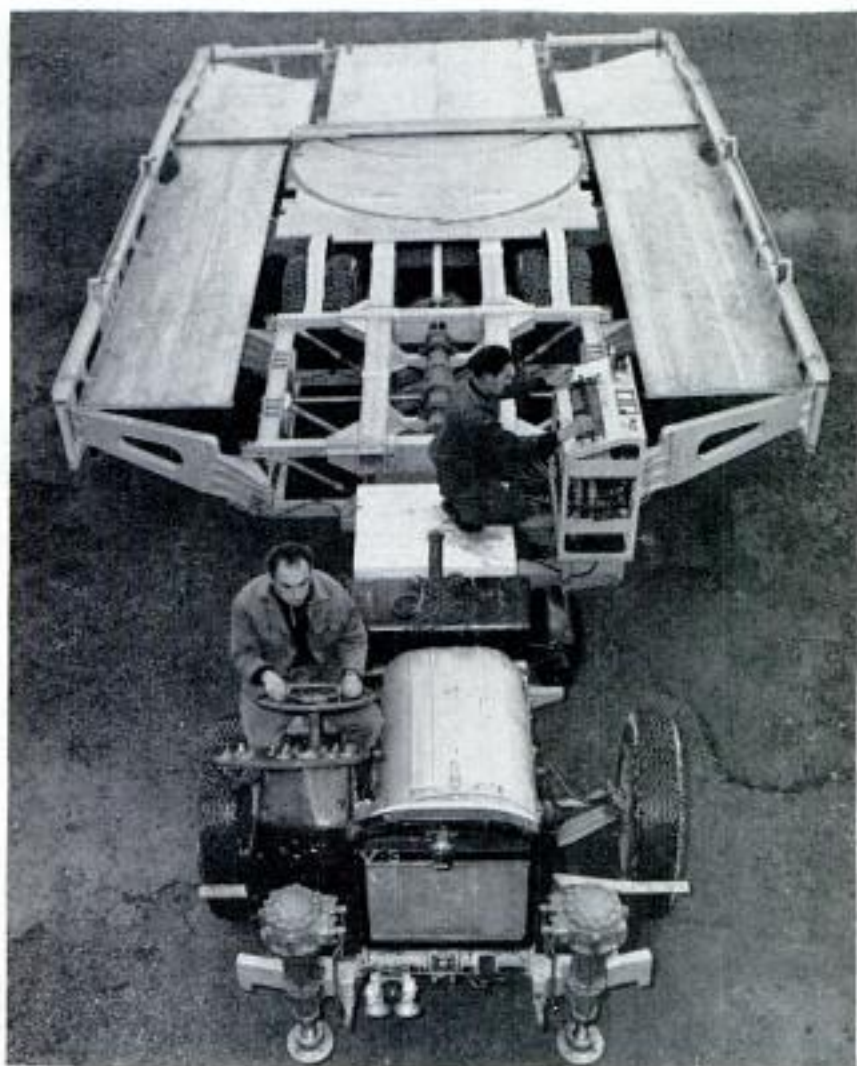
and is expected to attain full forward speed when the rotors are turned forward 90 degrees to act as propellers. In tests so far, the rotors have been turned forward about 30 degrees.

### **Side Wings on Bus Unfold for Crowds**

Not many people can travel aboard a new Italian bus, but when it reaches its destination it unfolds to accommodate 100. The bus is designed for agricultural agencies, manufacturers and others who want to hold traveling schools or demonstrations. Wings unfold from the sides of the chassis, converting the bus into a large room.

### **Air Saves Fish**

Winter ice kills fish by preventing sunlight from reaching green plants, which produce oxygen. Jack Hemphill of the Arizona Game and Fish Commission keeps fish alive by laying a perforated plastic pipe on the lake bottom. Compressed air escaping through the holes forces the warm water at the bottom of the lake up to the surface, where it melts the ice.





## Detachable Truck-Trailer Body Speeds Freight Delivery

Freight carried in a shipping container that is 17 feet long, 8 feet wide and 8 feet high can be shifted quickly from truck to rail transport. The 3000-pound box, which holds 20,000 pounds of freight, is handled by fork-lift or straddle carriers and is fastened with automatic locking devices to

the bed of a freight car or a truck. One can be carried on a city delivery truck, two on the conventional 35-foot highway truck trailer, or three on a standard railroad flatcar. After the box reaches its destination, it can serve as a temporary warehouse for the freight.

## Sleeping Bags Made of Paper

Disposable paper sleeping bags are proving their worth in tests by the U. S. Forest Service. Because they are lightweight, pack into a small space, and cost so little they can be thrown away after use, the paper bags are being used by forest-fire fighters, especially those who parachute into isolated areas. The bags are water-repellent, roomy and sturdy. They are made of quarter-inch cellulose paper with two layers of crinkled paper and one layer of dry, waxed, kraft paper on top. A draft curtain of flannel which is wrapped around the



U. S. Forest Service

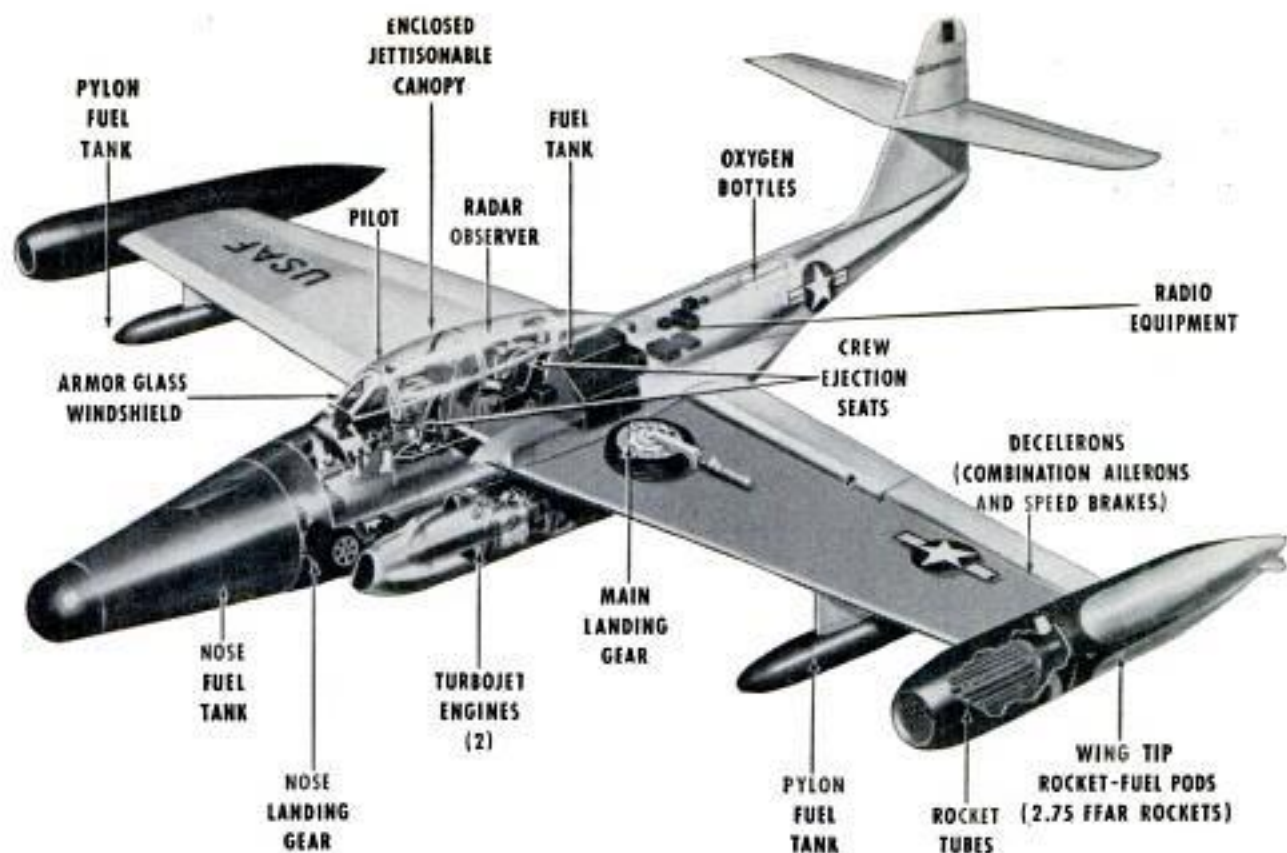
shoulders is sewed into the mouth of the sleeping bag. If more warmth is needed, a regular woolen blanket or a disposable paper blanket can be used.



## Lubricant Loosens Locks

Designed to clear frozen or rusted locks, hinges and other gummed moving parts is a new lubricant whose principal ingredient is graphite. The lubricant is supplied in a convenient applicator bottle. Special grease-cutting fluid in the lubricant gives it penetrating power.

Use of a nylon tube as a permanent replacement for a damaged or diseased artery has proved successful in a human being.



## Scorpion Twin-Jet Interceptor Carries 104 Rockets

Internal details of the Air Force's Scorpion F-89D, twin-jet all-weather interceptor, are revealed in a phantom view released by its builder, Northrop Aircraft. The plane, now guarding approaches to vital industrial areas, is said to be America's most heavily armed fighter. It carries 104 big folding-fin rockets, each capable of downing the largest enemy bomber, in the forward part of the wing-tip pods. Fuel

is carried in the aft portion. Additional fuel tanks slung beneath the wing supplement a fuel tank in the nose to give extended range. The 600-mile-per-hour F-89D is powered by two turbojets with afterburners, flies at altitudes in excess of 45,000 feet, and mounts electronic aiming and triggering equipment that enables its two-man crew to seek out aircraft despite darkness or fog.



## Mower Has Overlapping Blades

On a new power mower, dozens of short, overlapping blades cut the grass by high-speed impact. The blades, mounted on a shaft between rubber spacers, revolve away from the operator. A safety hood over the shaft traps flying objects and expels them without damage. The mower mulches as it cuts, and mows high grass and weeds, wet or dry. It is available in two sizes, 16 and 20-inch.

☐ In 1954 the nation's home handymen invested about \$6,000,000,000 in workshop tools and do-it-yourself materials.



600 15th St.  
Miami Beach, Fla.

# SCULPTURE **IN COPPER**

By Ed Dickson and Max Hunn

THE 33 YEARS which Alexander Lapkoff spent in the prosaic work of an expert auto-body repairman gave no hint of his artistic talents. But in the three years since a heart attack forced him to give up regular work he has developed the hobby of sculpture in copper to the point where it may rate recognition as a new art medium.

When the doctors gave him orders to slow down, the Russian-born metalworker decided to occupy himself by working with copper. It is a craft often taught in hobby courses, but he made it an outlet for his heretofore hidden artistic talents. With characteristic intensity, he copied and created all sorts of pictures in the medium he was developing—portraits, maritime scenes, Western sketches, animal life, Oriental characters and abstractions.

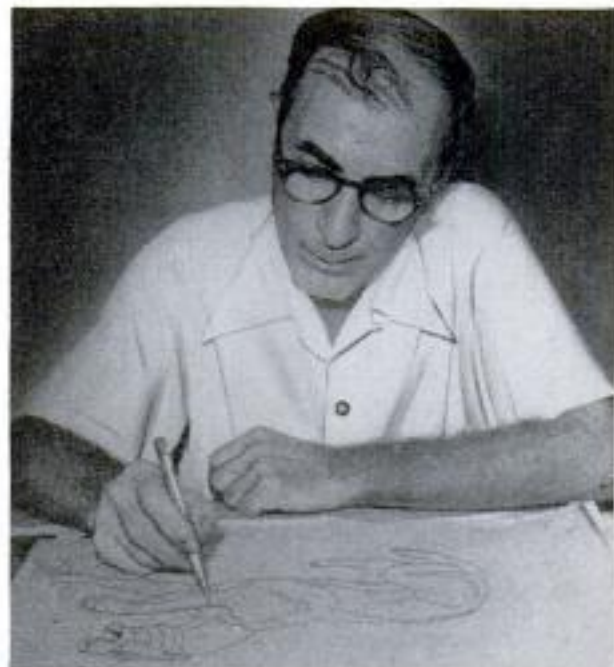
The work in copper is given its dramatic effect by "stretching" the metal to project figures and lines from the background. This elevation creates perspective.

Lapkoff started his hobby in Washington, D. C., where he had operated his automobile-body shop. To take things easy, he moved to Miami Beach, Fla., where he

hopes to interest art circles in his work.

Most of Lapkoff's works are left in the natural copper color. This can be varied in shading by steel-wool polishing and by use of acids. On some pictures he uses

Tracing of design to be sculptured on back of soft-copper sheet is necessary before shaping can start







**Strong, vigorous line lends itself effectively to copper sculpture. This scene is one of Lapkoff's largest**

vivid colors. These are of fingernail polish, made especially for him in a dozen colors by a nail-polish manufacturer. Nail polish was selected because it leaves no brush marks. He covers the finished pictures with linoleum lacquer as a protective coat.

Lapkoff has spent hour after hour sketching the pictures he wants to work in relief in copper. He has learned that detail some-

times cannot be followed minutely—a single line may be more telling than several lines. On the other hand, he will spend tedious hours working an intricate pattern when detail is impressive.

Lapkoff does most of his work in 36-gauge copper. It can be obtained in rolls of 12, 14 or 18-inch widths. For larger pictures he uses the heavier 32-gauge.

**Impressions are worked into copper from back (left). Final finishing and smoothing are done on front (right)**





Lapkoff made impression of his heart attack (above) and worked intricate detail into mandarin (below)



Sculptor works in copper on wide range of subjects. This bulldogging scene shows variety of interest



To prepare the sheet of copper for working, Lapkoff lays it on about eight thicknesses of newspaper and attaches the sketch of the drawing to be transferred. Masking tape is used to hold the sketch firmly to the copper. Then, he traces the lines of the drawing, the copper easily taking the impression from the overlay.

From now on Lapkoff works with the sheet of copper lying on a pane of glass to provide a smooth surface. He slides a section of the copper off the edge of the working surface so he can reach the back with his sculpturing tools.

The tools are adapted leatherworking and clay-working tools, all with blunt or ball-shaped ends. With the proper tool, he gently massages, thus stretching, the metal from the back of the sheet of copper. This produces the elevation in the picture to give perspective. As he gently works the elevations into the picture, he watches from the front side of the picture to get the effect he wants.

When all the various elevations are achieved, Lapkoff works on the front side of the picture, smoothing out any irregularities in the background and in sections which are not elevated.

One of the lessons Lapkoff learned was to protect the finished picture by pouring melted paraffin in the larger depressions on the back side of the sheet of copper. This prevents the depressions—which are elevations when viewed from the front—from collapsing. ★ ★ ★

## Pavement Pounder Records Road Test

Capable not only of simulating the pounding roads take from traffic, but also of recording the effects of the pounding, is a new road tester perfected by the Shell Oil Company. The testing equipment, mounted on a two-wheel trailer, uses a base plate and vertical shaft to impart to the pavement simulated traffic impact. Recording equipment mounted on trailer electronically measures pavement movements as small as  $\frac{1}{10,000}$  in.



## Radar Guides Swiss Rocket

Guided by radar is a Swiss ground-to-air rocket designed for vertical take-off. Twenty-five of the experimental anti-aircraft missiles have been sold to the United States by the Oerlikon Machine Tool Works. The rocket is undergoing tests in the Alps.

## Paint Roller Ends Splatter

You don't need to cover rugs and furniture when you paint a room with a roller designed not to drip or splatter. The foam-rubber roller can be used only with water-soluble paints because it would be damaged if cleaned with turpentine. It is said to hold more paint than most rollers.

## Fisherman's Truck Mounts Boat

Like a snail carrying its shell, a bantam-size two-cylinder Italian truck chugs along with a boat on its back. It's owned by an Italian fisherman who takes his boat and his family with him as he transfers from the Adriatic Sea to the Mediterranean.

Sources of available products described in this issue are listed on pages 58, 60 and 62. Sources of further information on other articles are given in the WHERE-TO-FIND-IT LIST, available from Bureau of Information, Popular Mechanics, 200 East Ontario Street, Chicago 11



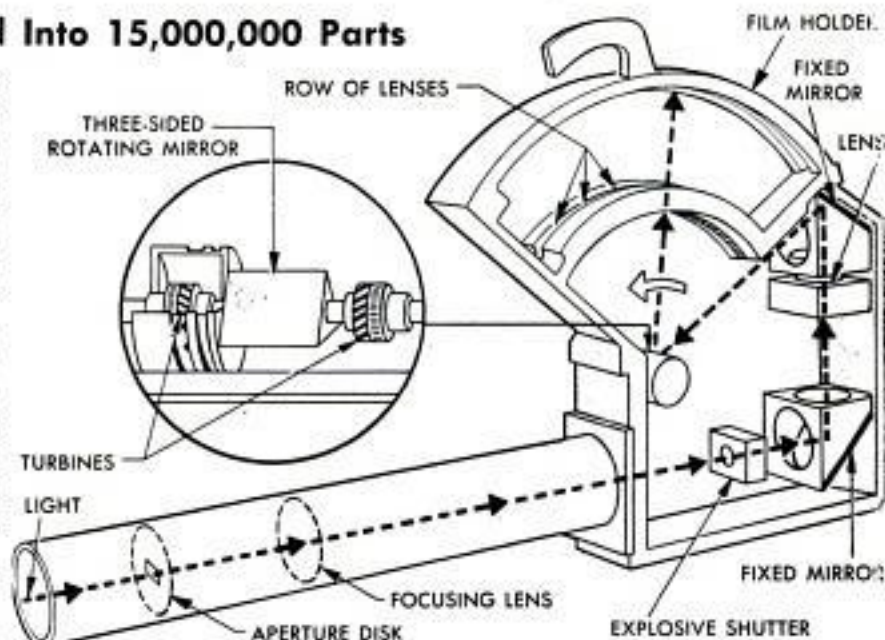


## Saxophone Keyboard Simplified by Inventor

It takes only 15 minutes for a musician to replace the felt pads and clean his saxophone when it is equipped with a simplified keyboard invented by a California man. There are 27 fewer key-holding posts on the new keyboard than on a conventional model which is so complicated that the instruments have to be turned over to a repairman for cleaning. Another advantage is claimed in addition to the ease of maintenance: The saxophone has a deeper tone with more volume because of the absence of the 27 key-holding posts.

## Camera Splits Second Into 15,000,000 Parts

Motion pictures at the rate of 15,000,000 frames per second are taken by a camera that shoots up to 96 consecutive pictures of a single event. Developed at Los Alamos, the camera is used to record explosive phenomena and other high-speed actions. Light enters the camera through a long tube and is reflected to one face of a three-sided mirror that revolves 23,000 times per second. As the mirror turns, it flashes the image through a series of lenses that are arranged in an arc. Behind the lens is the film, on which separate pictures are recorded. Before the mirror makes another turn, an electric detonator shatters a glass block in the light path, the shattered block



being opaque enough to bar the light until a mechanical shutter can close. The revolving mirror is made of high-strength, highly polished steel.



## \$850 Sports Car

If you can't afford to buy a speedy competition car, you can always build one. At least, that's what Don James found out. This San Mateo car enthusiast built a 155-mile-per-hour speedster for only \$850—plus, of course, 18 months of spare-time activity on his part. The body is glass fiber. The power plant is a 1949 Ford V8 engine.

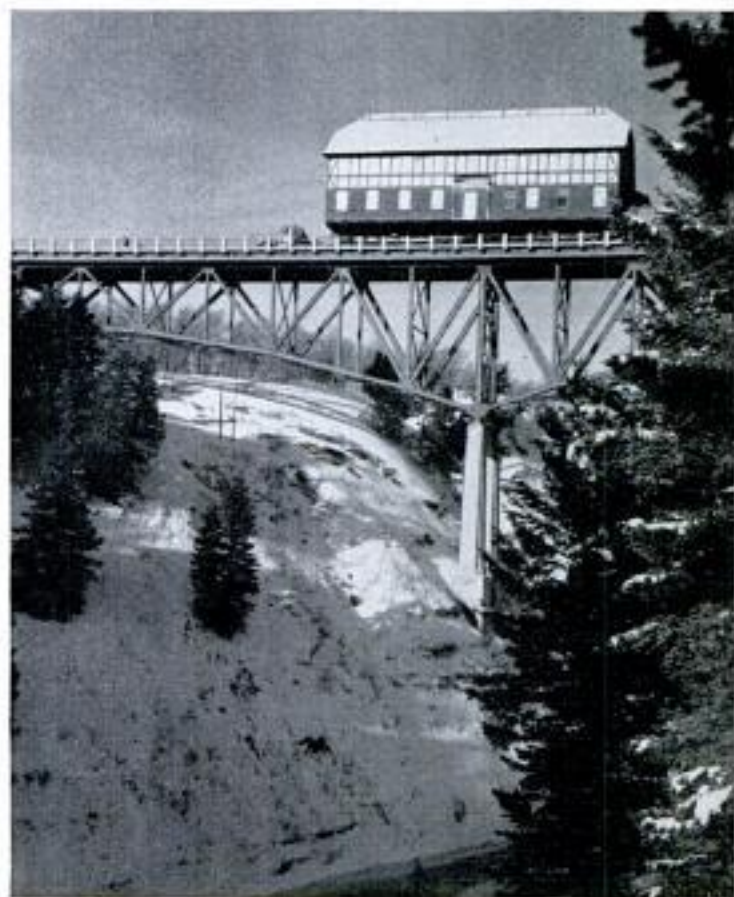


"Restless" dormitory starts across bridge. Two tractors in photo push in reverse while two others pull

## Hotel Takes a Ride

RANCHERS near Glacier National Park rubbed their eyes in amazement one morning when they sighted a two-story frame building moving down U.S. 2 toward the tall steel-and-concrete bridge spanning the Two Medicine River Gorge. For weeks the 179-ton building had been moving across the rugged country, in easy stages, on a 25-mile trip to its new location in Glacier Park. Half of a former dormitory for railroad men at Blackfoot, Mont., it will serve as housing for park employees. Most of the time the structure was carried on trailers pulled by two crawler tractors and a truck tractor. But at Two Medicine bridge, it was necessary to reload the hotel on other trailers. Two truck tractors pulled at the front while two at the rear followed in reverse gear. The cost of moving the 32-by-80-foot structure was around \$15,000. Difficulties included the crossing of 10 rural electric lines and five telephone lines.

Too wide for the bridge, the big building had to be raised six feet to clear the guard rails. Dormitory weighs 179 tons



# MR. LADYBUG

He'll probably sell over a billion this year to garden lovers—a man-sized mail-order business

By James Joseph

About 500,000 "ladies" — killers of garden pests — crawl in this bucket



Gatherer harvests a crop of ladybugs by scooping them into a container while they hibernate in mountains

**I**N ATLANTA, neighbors were astonished to see a young man sowing ladybugs by the handful over a small garden.

His explanation left them even more incredulous.

"Sure," he said, "we've got 20,000 of the critters stashed in our refrigerator. Every week we scatter a few thousand ladybugs among our roses and petunias. Within 24

hours they've devoured every aphid, red spider and mealy bug—all the soft-bellied, sapsucking insects that were ravishing our plants."

He neglected to mention that he'd latched onto his 20,000 unladylike ladybugs for just \$3.50. Moreover, his "garden packet"—a screened, fiberboard box—had arrived via the postman.



Bugs, dazed in the cool mountain temperatures, cling to a sheet of burlap which is shaken into a tub. They are sold to gardeners for release during summer

Colonies are scooped into plastic mesh bags by the gatherers. They are dumped into a container through a sieve, which separates the ladybugs from the trash

And where had it come from? Greenbug Control Company, Oroville, Calif.

Greenbug's originator is lanky Paul Harris, a former woodcutter and truck driver who has made a big thing of nature's own little ladybug. In 1954—his fourth year as a full-time "lady's" man—Harris grossed about \$80,000 selling ladybugs mail-order to thousands of homeowners. How many of the critters did he ship during the year? About 10,000 gallons—1,350,000,000 insect-hungry little ladies.

Coast to coast, back-yard gardeners are taking a tip from their greener-thumbed cousin, the farmer. Agriculturists have long employed ladybugs to rid crops of leaf worm, onion thrip, apple mite, red spider, lygusbug, aphid and a score of other pests, their eggs and larvae.

If Harris guesses correctly, more and more gardeners will be reaching for ladybugs instead of insecticides. Some chemicals indiscriminately slaughter good insects and bad. Ladybugs have appetite for harmful insects only.

Harris, plunging into the mail-order bug business without capital, customers or formal education, has proved that big-money ideas can lurk anywhere. He found his jackpot between 2000 and 5000 feet on the western slope of the Sierra Nevada.

One day in the mid-'30s he laid aside his woodcutter's ax and stooped to examine a huge colony of swarming red insects. Ladybugs.

But what were they doing at 3000 feet, especially since it was February and the



mountains were blanketed with snow? Curiosity led him to other ladybug clusters. Millions of the insects, he discovered, were congregated across the Sierra Nevada's snow belt.

Harris scribbled postcards to a half-dozen county farm agents.

"Is there," he asked, "any commercial use for ladybugs in quantity?"

Sacked ladybugs are temporarily stored in a walk-in refrigerator to keep them from getting too lively





Bugs are measured into boxes for shipment to gardeners. There are about 135,000 ladybugs to a gallon

His own county agent replied yes, emphatically. Enough ladybugs scattered around prune orchards could rid them of the fruit-destroying aphid.

The agent's appraisal neither surprised nor elated Harris. Having been reared on a California citrus ranch, he remembered his father's praise for ladybugs and the work they did. Though he now had prospects of a market, Harris knew nothing about gathering ladybugs and even less about shipping and handling them. Nor had he any capital.

During the next few years he swung his

Harris, left, and assistant load screened boxes of insects for shipment



ax by day and thought about ladybugs in his spare time. Whenever he came across a cluster in the mountains he hawked them to prune growers for 25 cents a pound. That way he managed to pick up an additional \$500 to \$700 a year.

Meantime he did some research. Ladybugs, he learned, were creatures of habit, especially the *Hippodamia convergens*. These bugs, true to their name, congregate during hibernation. It's this penchant for colonizing which makes the species commercially harvestable.

From mid-May through September, millions of ladybugs swarm up from the cultivated valleys. Often they fly 100 miles to reach their annual hibernation area. Clustering, they sleep out the winter, dazed to inactivity by the cold. A dozing colony can be brushed, scooped or shaken into containers with little difficulty. About February, revitalized by a week or two of sunshine, they fly back to the valleys. Now hungry, they gobble up every soft-bellied, leaf-eating insect in sight.

Eventually the females (ladybugs are ladies in name only) lay about 700 eggs. The eggs hatch in about seven days, producing ugly, six-legged larvae which look like miniature alligators. Larvae have even greater appetites than their parents for leaf-eating insects.

In another 10 to 20 days the larva spins a cocoon and emerges in a week or so as a ladybug. That's when the Sierra migrations begin. Last year's ladybugs—loath to compete with their offspring for food—head for the highlands, often to die. Before many weeks, the youngsters have gone through the cycle. Then they migrate.

Figuring an average of 135,000 ladies to a gallon and 200 gallons to a colony, Harris often stumbled upon 27,000,000 ladybugs all ready for gathering.

First, however, Harris had to overcome a formidable problem. Summertime was the most profitable season for gathering. Yet customers—cotton growers in Texas, milo raisers in Louisiana and Arkansas, Midwestern gardeners—needed ladybugs in the spring as the first green shoots poked through the soil. For it was then that leaf-eaters—especially aphids—swarmed to the kill. How could

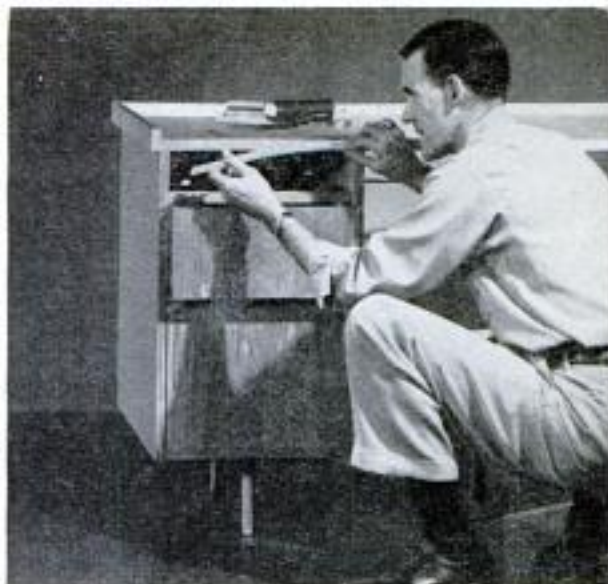
(Continued to page 212)





Paper backing is peeled off wood strip to expose the adhesive. Tape then is applied to the plywood edges

Household iron, set at medium heat, permanently bonds edging. The tape is available in various woods



### Adhesive-Coated Wood Strip Covers Edges of Plywood

Finishing the edges of plywood is easy with a new tape. The tape is a thin strip of wood which can be stained or painted to match the plywood. One side is coated with an adhesive which is covered with a strip of paper. The home craftsman peels off the paper and applies the wood tape to the edge of the plywood. He then runs an ordinary household iron, set at medium heat, along the tape to bond it to the edge permanently. A special tool is also available for this purpose. The tape comes in  $\frac{3}{4}$ -inch strips four feet long, two strips to a package. It is available in six different woods, red mahogany, white mahogany, birch, fir, walnut and oak.



### Electric-Powered Caddy Hauls Clubs for Golfers

Newest step in removing the drudgery from sport is found in a powered golf-bag cart. The cart, called a Power Caddy, will propel two golf bags for 18 holes or one bag for 36 holes on one charge of its two 12-volt storage batteries. A speed selector paces the unit to the player's walking speed.

### Synthetic Paper

Paper three to ten times stronger than average has been produced from synthetic fibers. Instead of pulp or rags, the product is made of nylon, Dacron and Orlon. Highly resistant to chemicals, it also resists the action of molds, bacteria, light and moisture.





## Helicopter Trawl Fishes Up Humans

Helicopter pilots can literally scoop up human beings as a fisherman hauls in fish with a rescue device perfected by Britain's Royal Navy. The apparatus consists of a scoop made of netting and held open by a light tubular-steel frame. It is lowered from the helicopter winch on a single cable and trawled through the water just under the surface so that it can pick up the person to be rescued. The net is designed primarily for the aid of injured or unconscious persons, unable to strap themselves to the harness already widely used in helicopter rescue service.

## Two-Cylinder Car

Two cylinders and 14 horsepower give a small German automobile a top speed of 50 miles per hour and a fuel economy of about 70 miles per gallon. Inside, there is room for four persons plus luggage. The rear engine is air-cooled. The car weighs 1320 pounds and costs \$690 in Germany. Its four-speed gearbox and differential are combined with the engine in a unit at the rear.



## Jets Push Boat

There's no propeller or rudder on a Russian hydrojet cutter that sucks in water at the bow and pumps it out the stern. Two forward-facing side jets amidships permit reversing. A control valve directs the flow to stern or central pipes, and to port or starboard for steering. Elimination of the propeller and rudder allows navigation with high maneuverability in shallow water.



## ELECTRONICS TODAY

EIGHT tiny Raytheon transistors, on the card held by the young lady in photo A, replace the usual vacuum radio tubes in the "8 Transistor" portable radio that she is demonstrating. Now available for \$79.95, it comes in a choice of four bright colored leather coverings with a short carrying handle. A long leather shoulder strap is available as an accessory. This small portable receiver is only  $2\frac{5}{8}$  in. thick,  $6\frac{3}{16}$  in. high, and  $9\frac{3}{16}$  in. wide at the bottom. It is claimed to operate for 500 hours solely on the power from four standard flashlight batteries. With batteries, it weighs only 5 pounds. Volume, sensitivity and selectivity are claimed to be equivalent to that obtained from present-day radios using vacuum tubes.

The parts used in fabricating the "rate grown" transistors made by General Electric are so small that the 40-power microscope shown in photo B must be used to attach the base-lead wire to the transistor bar. GE engineers are designing special automatic tools to perform the operation.

One of the smallest magnetic-tape recorders is illustrated in photos C and D. This tiny tape recorder is small enough to fit into a pocket and operates anywhere. It measures  $8\frac{1}{2}$  by  $3\frac{7}{8}$  by  $1\frac{7}{8}$  inches, weighs  $3\frac{1}{4}$  pounds. The tape, good for one hour's recording on its double track, is continuous and comes in an easy-loading cartridge. It is designed to operate for 45 hours on a set of batteries.



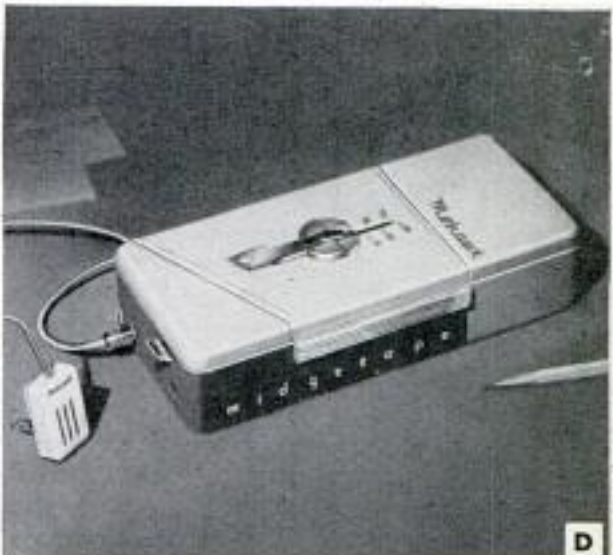
A



B



C



D

## ★ ★ ★ Television Operating Hints

By Frank L. Brittin

**B**UILT-IN television arrangements where the unit must be custom installed in a specially built wall are usually expensive and require an inflexible furniture arrangement. However, many of today's homemakers would like to fit TV receivers into some sort of inexpensive, good-looking, space-saving wall unit. This idea has been made possible with the introduction of stock cabinet units; they come in all price ranges, finishes and even in unfinished versions.

Many TV viewers prefer the operating convenience and flexibility of the table-top or portable TV set as they can take advantage of an available or easily constructed wall-alcove cabinet located in a good viewing position such as the one in photo A. Efficient ventilation is a must in all TV and radio installations. For this reason, the wall alcove with sliding door in photo C must be provided with several large vent-holes cut in the sides and rear. The sliding-door idea was prompted by the desire to prevent children from tuning the sets without supervision. One of the new "pick up and carry" lightweight portables is the 17-in. Zenith model T1816L illustrated in photo B. Balanced handholds on the sides of the set make it convenient for moving whenever and wherever the family prefers; this type of TV set solves a lot of temporary present-day home installation problems.

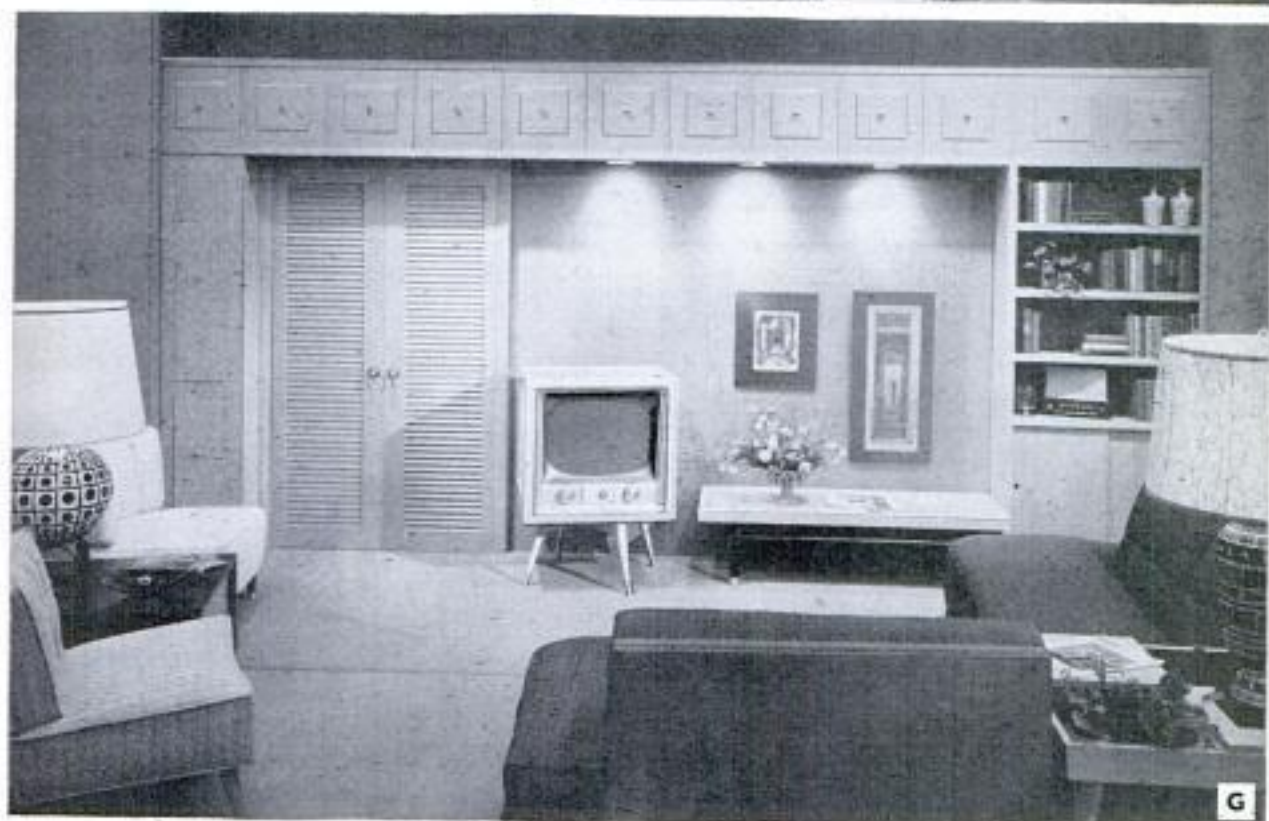
The homemade plywood stop shown in photo D is a simple installation hint for protecting the picture-tube neck that usually



## and Planned Home Installations

projects from the back of the console set under a rather fragile fiber cover. The stop should extend about 1 in. beyond the tube cover.

Helpful demonstrations of modern planned TV installations for the homemaker have been worked out by the Motorola, Inc., research stylists and several interior decorators and furniture manufacturers. These are shown in photos, A, E, F and G. The room divider, photo E, is used in this recreation room to separate the bar from the entertainment area. An interesting installation is illustrated in photo F. This is a wall assembly made from readily available units called "Space-Span." This series can be assembled along any wall, even in a tiny room, to incorporate storage, a desk, TV set and shelf space. If your TV set does not line up exactly as this Motorola console 21K26 does, you can use furniture glides under the cabinets to raise them. Photo G shows how you can achieve a built-in look with standard equipment. Shelves of bleached oak extend across the room and over the louvered closet door. The recessed lighting is ideally suited for TV viewing. ★ ★ ★

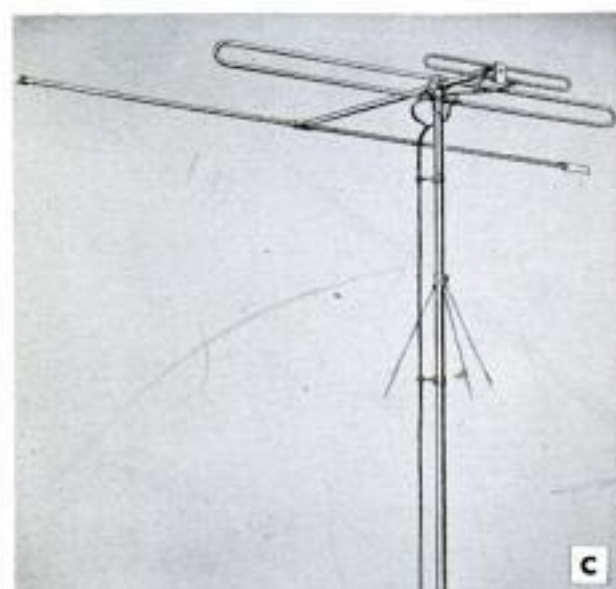
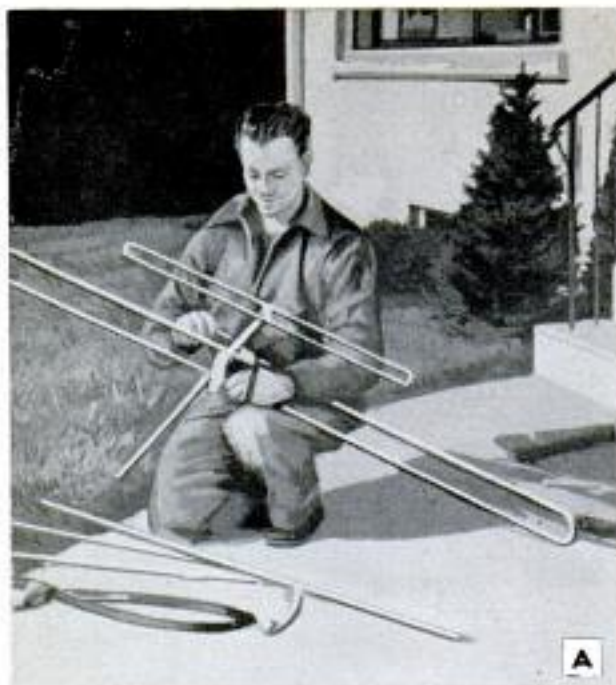


## BROAD-BAND FLAT-GAIN TV ANTENNA FOR COLOR

OUTDOOR TV antennas will invariably give a better over-all color picture on all channels than an indoor type, although some of the portable indoor types do perform fairly well in strong-signal areas. A color signal, as received from the transmitter, contains a number of additional signals which must reach the receiver for good color reproduction.

For fidelity color reception the antenna must have these characteristics: It must be an all-channel VHF type, unless you are located in a UHF area. In that case, all of the following specifications apply, with extra care required for the more critical special UHF-antenna setup. The color-TV antenna gain must be flat; no gain or loss greater than 1.50 db within 1.5 megacycles below, and 0.6 megacycles above the color sub-carrier. The antenna gain must be held down across the FM frequencies, 88 mc. to 108 mc. These specifications also hold good for the regular black-and-white TV broadcasts, and some of the VHF-TV-antenna systems that have been in use for several years are able to meet these color specifications perfectly. One of these commonly used types is the Amphenol "Inline" illustrated in the photos. The color advantages of this system are also good in fringe areas with 2 or 4-bay stacked arrays.

Available in knockdown kit form for assembly on the job as shown in photo A, it is installed on the roof and oriented for maximum-signal pickup before the clamp brackets are tightened, as illustrated in photos B and D. Extension mast sections are used where greater height is necessary, and these are guyed below the array as indicated in photo C.



X810

Modern Furniture

the

POPULAR  
MECHANICS

## CRAFTSMAN

*Wrought iron legs + backs for this set were suggested by:*

*Rosemary Design Co.  
1904 Sullivan St.  
Greensboro, N. C.*



## WROUGHT-IRON DINETTE SET

FURNITURE IN WROUGHT iron is high fashion and dinette sets are no exception. Most popular are the sets featuring chairs upholstered with a plastic fabric and tables finished in a plastic laminate. Such sets are not only decorative, but will wear well and are wonderfully easy to keep clean. But even more important, a wrought-iron dinette set is so simple to build that any handyman can do it. It makes a pleasant week-end project and, with a little care, the average craftsman can produce at a considerable saving a set equal in quality

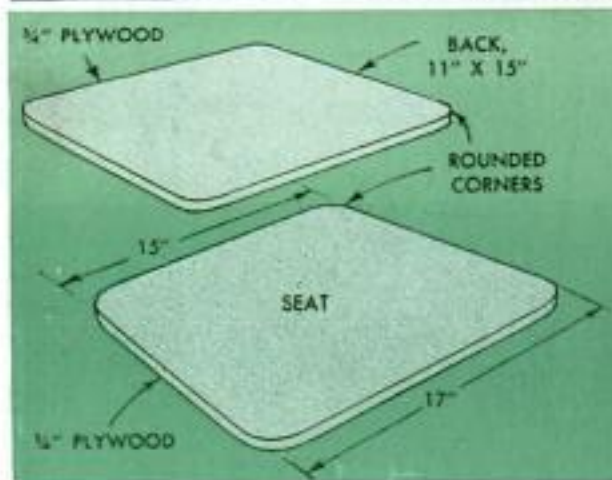
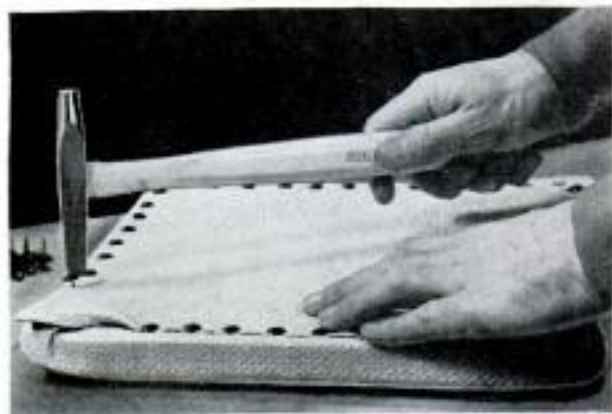
and appearance to one that he could buy.

The wrought-iron table legs and chair frames are available in individual units. The dimensions of the table can be varied to suit your family needs. On page 151, the detail shows how a 31 x 42-in. table and four chairs can be cut from a 4 x 6-ft. sheet of  $\frac{3}{4}$ -in. plywood with very little waste.

Both seats and backs are padded with three layers of roll cotton, or equivalent of foam rubber, cut to the same size as the plywood. The covering material is cut 2 in. larger all around than the plywood, which



Above, three layers of roll cotton, or the equivalent in foam rubber, are used as padding. Below, the material covering the backs of the chairs is held in place by large-headed, decorative furniture nails



Below, the right amount of mastic is applied to the laminate and plywood with a notched applicator



Final assembly is completed by attaching the seat and back of the chair to the metal frame with screws

leaves plenty of material for tacking. Tack one side first, spacing  $\frac{1}{2}$ -in. carpet tacks about 2 in. apart. Then tack the opposite side, pulling the material as tight as possible. At the corners make two neat folds to follow the radius. The backs are done in the same manner, except that an additional piece of material covers the back side.

The plastic laminate is applied to the table top according to the directions given with the type of mastic you are using. Normally, the mastic is spread on both the plywood and the laminate, and allowed to dry 30 to 40 min. The laminate then must be positioned on the wood carefully, since as soon as the coated surfaces make contact, they cannot be separated. ★ ★ ★

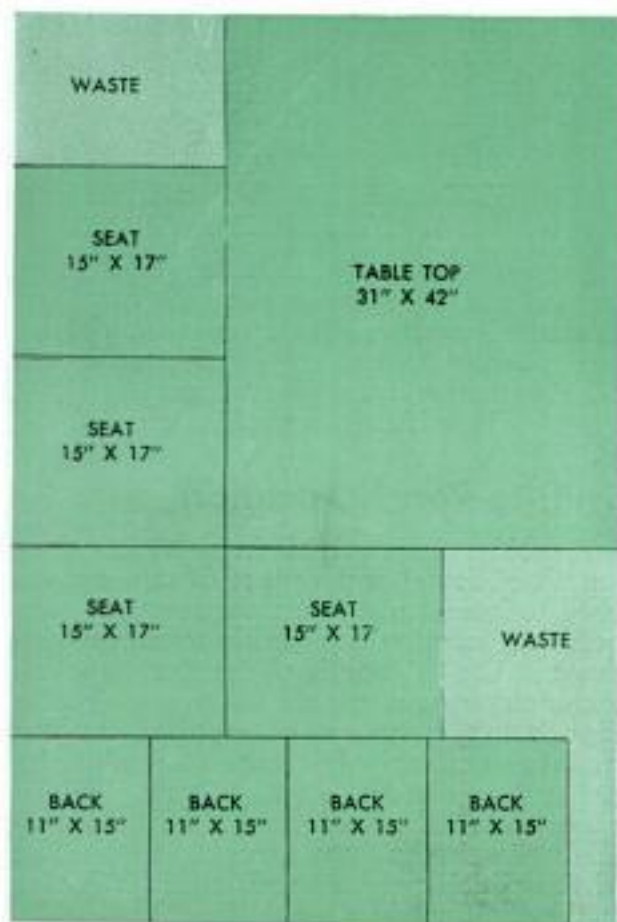
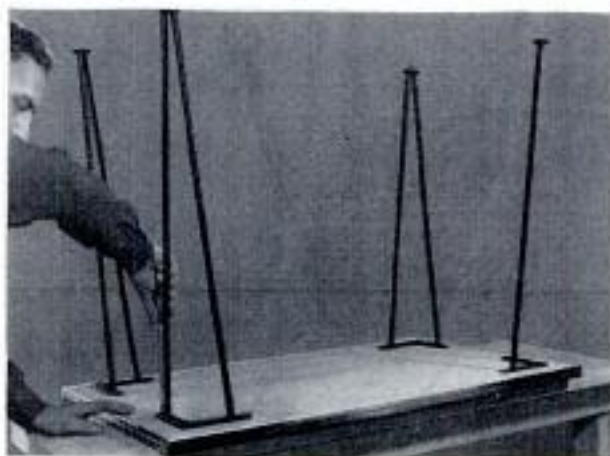
Firm pressure should be applied to the entire surface of the plastic-laminate top with a rolling pin







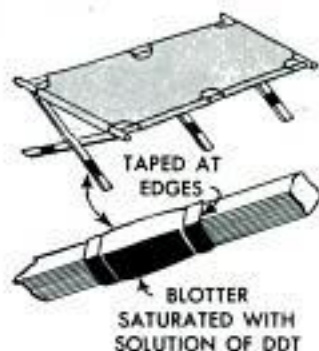
It is best to cut the laminate slightly larger than the table top and then file it back flush before attaching the metal molding. Below, table legs are screwed to top, setting them in 1 in. from corners. Several types of wrought-iron legs are available



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## Blotter Strips Around Cot Legs Bar Crawling Insects

When it is necessary to keep crawling insects from getting onto camp cots and bedding, one preventive measure consists of putting an insecticide barrier on each leg. Pieces of blotting paper are taped around each leg, saturated with DDT or other insecticide solution.



Keep the cot and bedding from touching a tent or cabin wall which would nullify the effectiveness of the barriers. Tables used for food can be protected in the same manner.

## Comfortable Kneeling Assured With Pad Pockets on Overalls

Comfortable sponge-rubber kneepads are always in place when and where needed if they are kept in pockets sewed to the outside of the knees of overalls. The "pocketed pads" are regular kneepads cut in half with all corners trimmed round.



When the overalls are to be washed, the pads are simply removed. The pockets can be made of overall material, but for longer wear light canvas should be used.

## Outdoor Window Boxes Supported By Storm-Sash Hangers

Storm-sash hangers can be used to provide inconspicuous supports for small outdoor window boxes that are stored for the winter. The hooks of the hangers are screwed to the siding of the house or screw-anchored to concrete or masonry and the eyes are screwed to the backs of the window boxes.

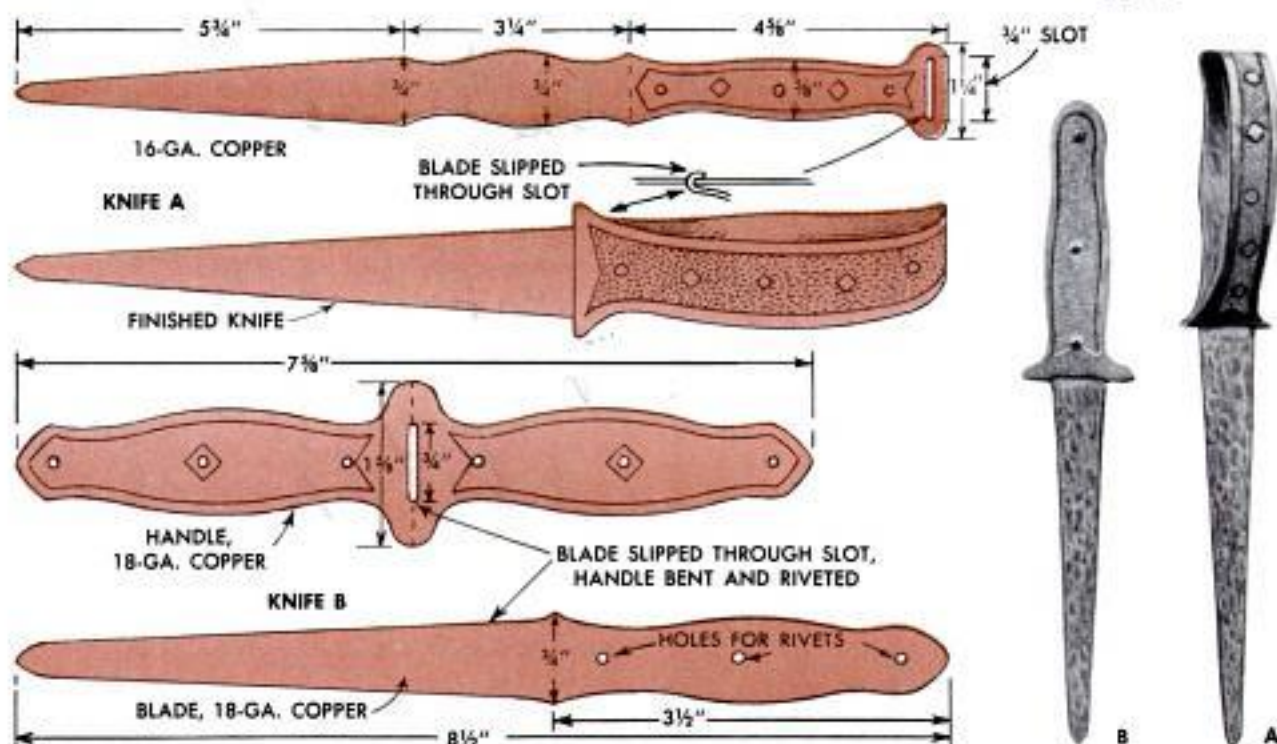


When it is time to store the boxes, they are lifted off the hooks.

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# Letter Knives of Hammered Copper



Either of these two copper letter knives makes an interesting addition to your desk or an attractive gift. Knife A is made from 16-ga. copper, the blade and handle being formed from one piece. The blank is cut out first, as in the upper detail, and then the handle portion is hammered with a ball-peen hammer. The center pattern of the handle is outlined and the diamond-shaped reliefs made with a blunt cold chisel. The small round reliefs are formed with a rivet set, and the decorative background is completed with a paneling tool, or with a nail set, center punch or any other tool that will make small indentations. Then the blank is bent and the blade slipped through the slot cut in the end of the handle portion. To hammer the blade to a knife edge, place the blade on an anvil or steel block and hammer one edge and then the opposite edge on the same face of the blade. Although the blade

will curve somewhat when the first edge is hammered, it will straighten when the second edge is hammered, provided the work is done carefully. Finally, file down both edges evenly. Knife B is made from 18-ga. copper in much the same way, except that the handle is cut out separately and riveted to the knife blank. After both blade and handle blanks are hammered and decorated, the blade is slipped through the slot in the handle blank and the handle is bent double. Then the handle section of the knife is drilled, as indicated, and the handle is riveted to the blade. To finish the knives, coat them with copper-nitrate solution, applying it with a cotton swab and being careful not to get the acid on the hands or clothing. Next, heat the knives with a blowtorch to a dark-brown color. Then brush off the residue, burnish and wax.

Dick Hutchinson, Alhambra, Calif.

## Pencil and Tape Hold Nut in Difficult-to-Reach Location



A holder improvised from a pencil or length of dowel and a piece of tape can be used to hold a nut when threading it on a bolt in a location impossible to reach with fingers. Cut a length of friction tape no wider than the nut is thick—to prevent the tape being caught between the nut and surface—and tape the nut to the end of the holder, as shown in the illustration. In cases where the holder must be held parallel with the bolt, tape the nut to the side of the pencil near its end, at right angles to the position shown.

## Adjustable Cardboard Pointers Assure Uniform Line Spacing

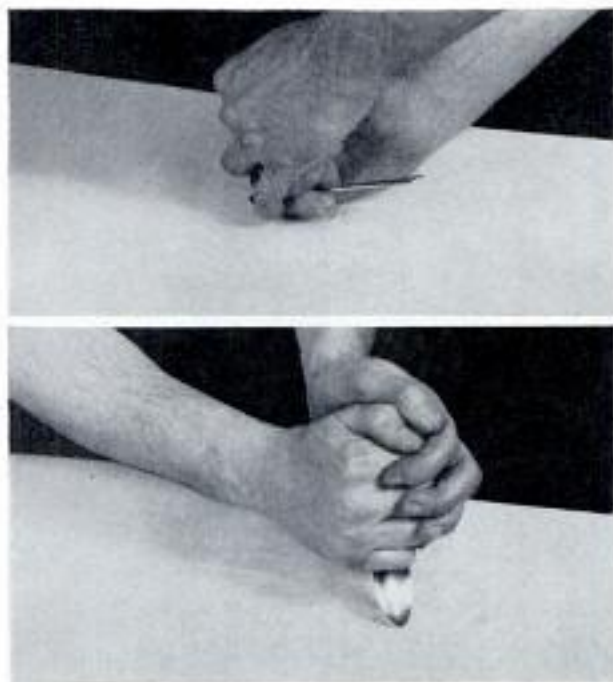


Held securely on a T-square or ruler by means of masking tape, the cardboard spacing guides shown in the illustration will enable you to rule equally spaced lines rapidly. In use, the guide points are aligned with the last line drawn in

order to position the ruler for the next line. Guides can be made in a number of lengths and kept handy on the drawing board, for use when different spacing is required.

## Dinner-Table Stunt With Spoon

A dinner-table diversion—of which your hostess should be informed beforehand—is apparently to bend the handle of a teaspoon in your hands. The secret of the stunt lies in the fact that the spoon handle actually pivots between the small fingers of your hands, the top end of the handle sliding down between the palms. When doing the trick, place the bowl of the spoon on a napkin, then hold the hands cupped as shown. Do not clasp the fingers, merely cup one hand over the other. Avoid altering the position of the hands and tense hand and arm muscles as though using considerable force. Realistic presentation of the spoon trick, as with any illusion, requires practice beforehand.



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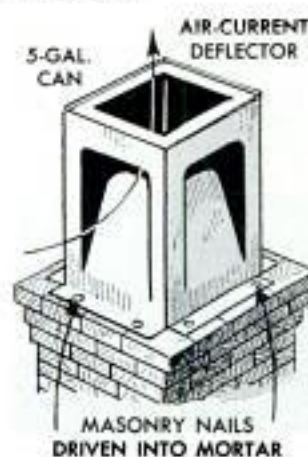


## Tumblers and Embroidery Hoops Provide Party Game

An interesting party game for youngsters, in which the prizes are visible to the contestants, requires only a few water tumblers and a couple of embroidery hoops. The prizes are placed under the tumblers which are inverted on the floor in a geometric design, such as the triangle shown. Each child then is given two or more embroidery hoops which he attempts to toss over the tumbler containing his choice of prize.

## Chimney Efficiency Improved By Metal Draft Deflector

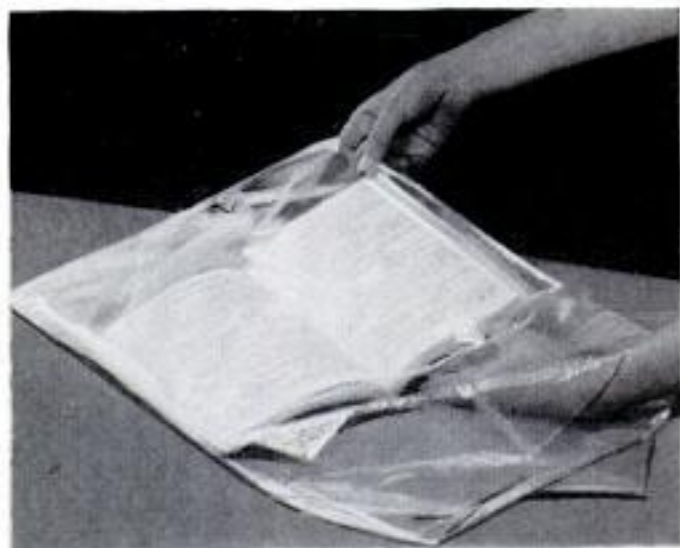
A chimney which is adversely affected by horizontal air currents from any direction can be improved by installing a draft deflector made from a 5-gal. can. A hole is cut in the bottom of the can and the top is completely removed. The top edge of the can then is slit at each



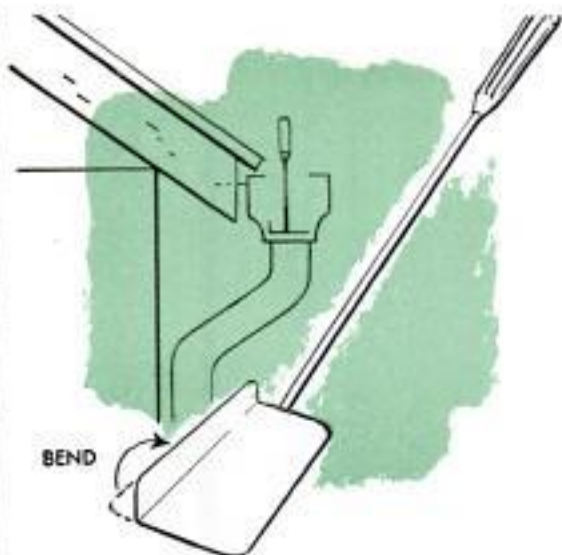
corner and the edges bent down at right angles to form flanges for fastening the inverted can on the chimney top. All four sides of the can are cut and bent in, as shown in the illustration. Masonry nails are driven through the flanges on the can and into the mortar of the chimney. The draft deflector also could be fabricated.

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Copyrighted material



**RECIPE BOOKS** are kept clean and free of grease spots when used on the kitchen counter if the open book is slipped into a transparent plastic bag. The print is visible through the plastic, the bag will keep the book open at the right page, and the bag is easily washed

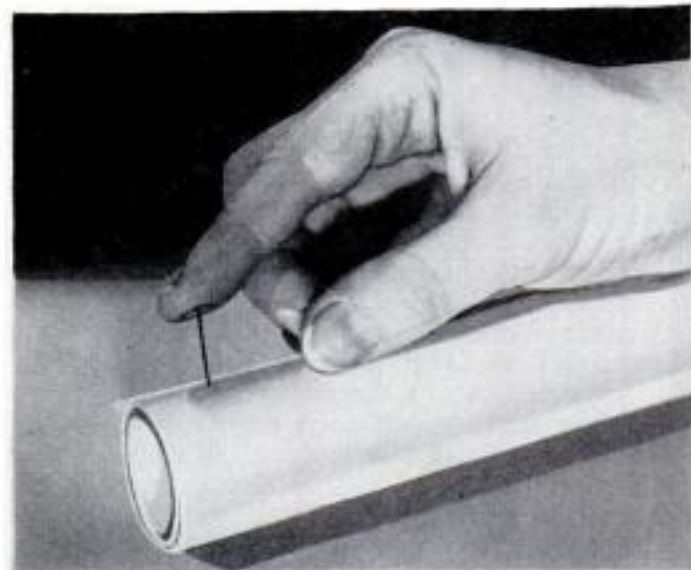


**LEAVES AND OTHER DEBRIS** which accumulate in eaves trough can be removed easily with the help of a pancake turner that has been altered as shown. The blade is bent in a vise so that it fits into the bottom of the trough

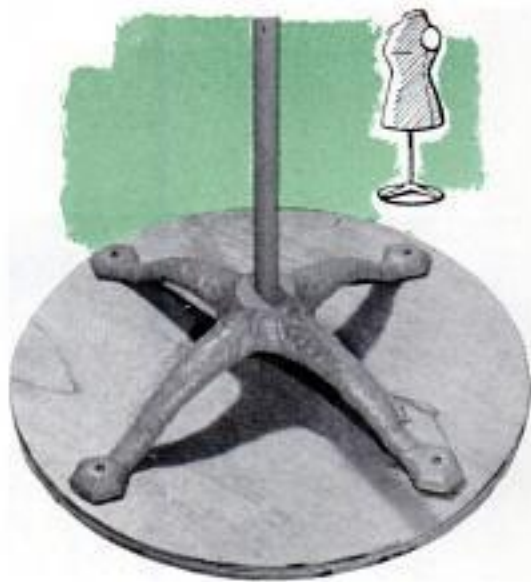
Solving

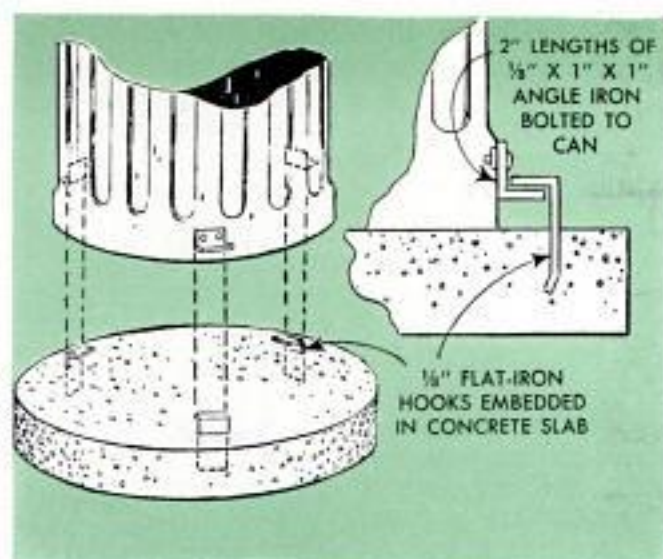
# HOME PROBLEMS

**WHEN CUTTING WINDOW SHADE** to fit narrower roller, the edge to be cut can be kept straight if it is marked by inserting a pin through the material. Roll the shade evenly, then pass the pin through all layers. With the shade unrolled, pin holes will mark line to be cut. For greater accuracy, draw line along holes before cutting.

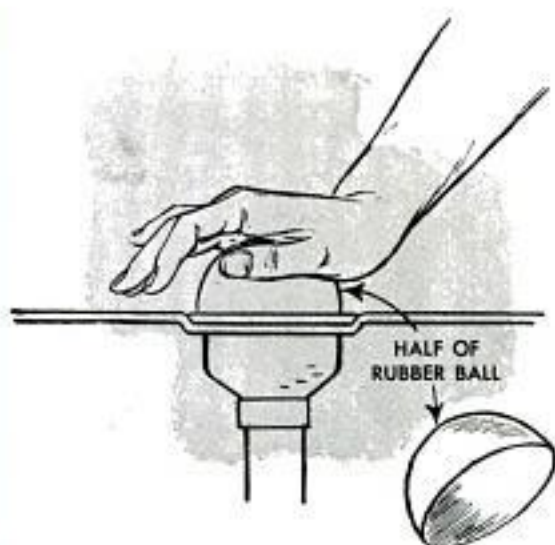


**A DRESSMAKER'S DUMMY** is less likely to tip if a plywood disk is attached to the feet as shown. The disk should be cut from  $\frac{3}{4}$ -in. plywood and the diameter should be slightly larger than the spread of the feet. Drill each leg for wood screws for attaching the disk



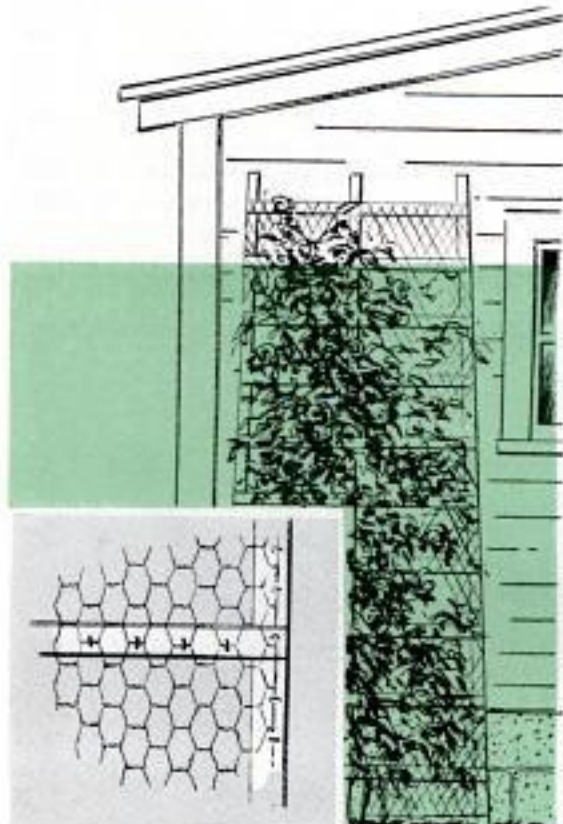


**DOGS WON'T BE ABLE TO TIP** over a garbage can if the can is locked on a concrete base. A 4-in.-thick concrete base is poured for the can and three brackets are set equidistantly in the wet concrete. Then three similar brackets are bolted to the can. To lock in position, set can on base and turn until the brackets engage as shown



**IF SINK DRAIN IS STOPPED UP** and no plumber's force cup is available, half of a child's hollow-rubber ball can be used as a substitute. Rapid pressing on the ball with the hand produces suction. The rubber walls of the ball must be thick enough to provide good spring action

**YOUNGSTERS WON'T BE** tempted to climb a trellis to which a length of poultry wire has been stapled. The wire will prevent them from getting a foothold on the trellis but is not dangerous to them, nor will it prevent vines or rosebushes from climbing. Use the wire to a height of at least 5 ft. or more



**GROUND COFFEE CAN BE POURED** from an opened can into a storage container without spilling if a two-piece photographic funnel, which can be purchased at any photo-supply store, is used. The larger section of the funnel will just fit over the top of the can snugly. Smaller half of funnel, pictured at the left in the photo below, can be used if the coffee is to be poured into a narrow-mouthed container



## Loose Woodpile Ends Fastened With Old Auto Chains



Since they are dangerous to children who might be tempted to play on them, loose woodpiles should be fastened securely in place when first stacked. One way of doing this is to set straight saplings vertically against the end of the pile as it is stacked, as shown, and then secure them with chains which extend into the woodpile and are held by the weight of the wood.

## Emergency Methods of Boring Holes In Confined Places



The next time it is necessary to bore a small-diameter hole with a wood bit in such small quarters that a brace cannot be used, use a door-knob as shown. Slip the knob on the shank of the bit and tighten the setscrew so that the bit can be turned by hand.

Another emergency method of turning a bit is to use a ratchet wrench that has a square hole of the proper size to receive the shank of the bit.

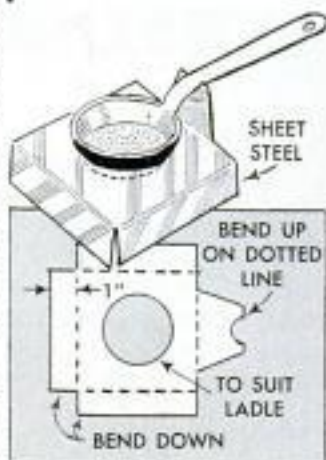
## Rusted Bolt Loosened Quickly

When it becomes necessary to loosen a rusted nut or bolt, form a dam of putty around it, and then pour in a small quantity of any carbonated beverage. This will

loosen the rusted part quicker than most penetrating oils commonly used for the same purpose. If the nut is in a position where the putty dam is impossible, good results can be obtained by applying the fluid with a saturated cloth or sponge.

## Sheet-Metal Support for Ladle

A supporting stand for holding a lead-melting ladle over a gas-stove burner can be cut in one piece from heavy sheet metal. The pattern for the stand is shown in the detail. The cutout for the ladle must permit it to sit deeply enough so it is held firmly against tipping. Three



sides are bent down to serve as legs and the extending tab on the fourth side is bent up as a support for the ladle handle. Adjust it to support the ladle in a level position over the burner. If the stand becomes overheated, it may be necessary to drill a number of holes in the bent-down sides to permit a circulation of cooling air.

## Finger Grip on Case Aids Winding Long Measuring Tape

A small, wooden finger grip cemented to the case of a long measuring tape will make it easier to hold when winding the tape. The grip, which can be a portion of a thread spool or a special turning, is located on the side of the case opposite the crank. If the case is disassembled easily, small nails or screws can be driven from inside the case into the grip.

H. Hanscom, Elmhurst, Ill.



# How to Select a Used Outboard

Even though the cost of a new outboard motor is more than the budget can stand, you still may be able to join in the outboard-boating fun this summer by buying a used motor. As, in most cases, a good used outboard can be purchased for only a fraction of the cost of a similar new model, you probably can buy one that is well within your price range. When you have found a motor you want, a good idea of its condition can be had by checking the following points.

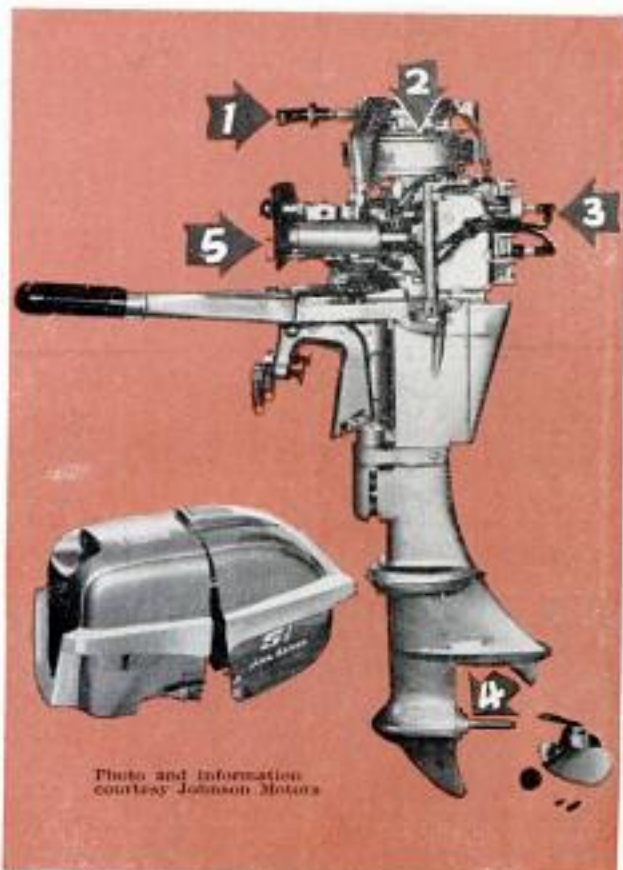
**1. Compression:** Pull the starter rope and note the "pull" and "bounce" as the motor turns over. Before you do this, be sure it is not possible for the motor to start.

**2. Crankcase bushing:** Check for excessive accumulation of dirty oil on the armature plate. Its presence indicates a faulty upper-bearing assembly.

**3. Condition of cylinders:** Remove the spark plugs and check the inside of the cylinder head with the aid of a pencil flashlight. Excessive carbon deposits here mean poor motor performance immediately.

**4. Propeller bushing:** Exert up-and-down pressure on the propeller shaft and look for seepage around the propeller-shaft bushing. Excessive up-and-down play or seepage indicates a worn bushing.

**5. Needle-valve response:** Insist that the motor be run in a test tank and check both slow-speed and high-speed carburetor adjustments. In this way you can tell whether



or not the needle valves respond readily. While the motor is running, note particularly if it idles smoothly. At this time, you also can check the condition of the wiring, fuel connections and fuel line.

## Display Holder for Collector's Miniature-Cup-and-Saucer Set



Cup-and-saucer collectors who have difficulty finding display holders for miniature-size sets can build their own inexpensively from  $\frac{1}{4}$ -in. hardwood stock. The stock is cut and shaped to the dimensions shown in the detail. A slot for the saucer and well for the cup are routed to a depth of  $\frac{1}{8}$  in. The diameter of the well is determined by the size of the base of the cup for which the holder is designed. The holder detailed is for a cup of approximately 1-in. top diameter. The holder could be made to accommodate various sizes.

Jane Whitman, Chicago.

## Small Insecticide Sprayer

An insecticide sprayer for use in an automobile can be made by utilizing a plastic spray bottle in which cosmetics are packaged. Small and leakproof, the emptied bottle, when filled with insecticide, is carried easily in the glove compartment. The sprayer also is handy on picnics.

Gene L. Henderson, Philadelphia, Pa.

# COMPLETING THE PM PRECUT HOUSE

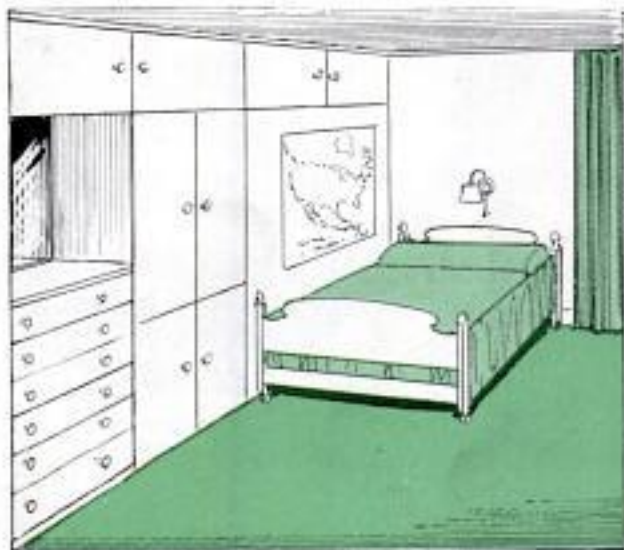
By Richard F. Dempewolff

**H**OW WOULD YOU LIKE your new PM House? With two or three bedrooms? Take your choice. The difference in cost of materials wouldn't buy the week's groceries. If you want four bedrooms and two baths, with attached two-car garage, that can be arranged too. There are plans for an added wing that will cost about \$1500 more for materials.

Once the precut shell is erected, there is almost no limit to what you can do with it. Maybe you prefer wood siding. If so, put it on. The Homasote in the kit makes an ideal sheathing with high insulation value. Is a hardwood floor important to you? Put it right on top of the flooring that came in the kit. This single floor was designed to serve as a finished floor as long as needed, but makes a good subfloor for any surface.

In the test house, we allowed ourselves \$1000 to develop the shell first into a summer cabin, with partitions finished on one side, and with plumbing, wiring and fireplace chimney complete. A final \$1000 was budgeted to produce the fully winterized "stage 3," including insulation, finished ceilings, walls and trim, heating system and built-ins. To achieve this, we had to be careful of our "extras." The siding looked perfect the way it was, and we knew it would last as long as we would. So, it is

Finished storage wall on bedroom side has a built-in chest, luggage bin, cedar wardrobe and cabinets



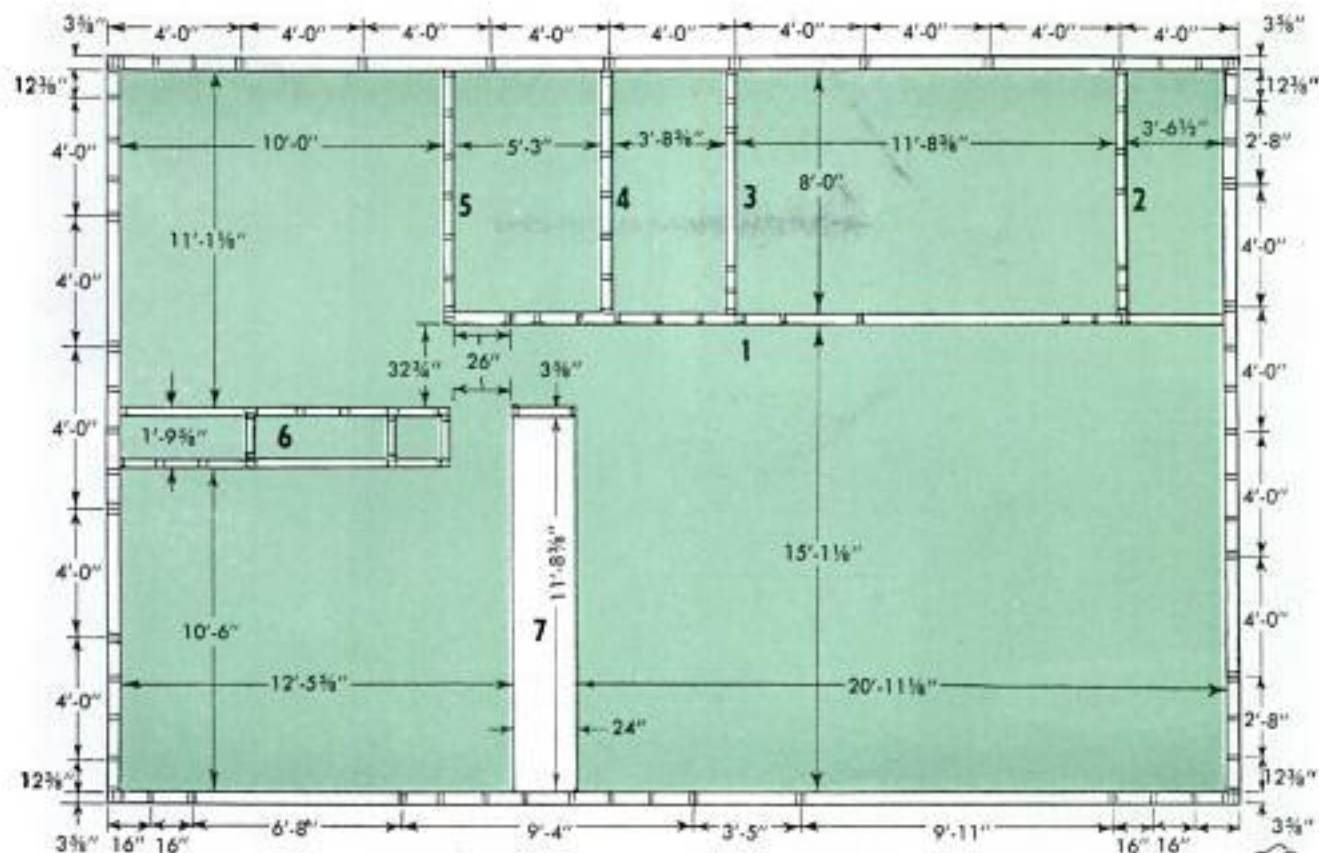
Partition walls with single top and bottom plates are assembled on deck, then tipped up into place



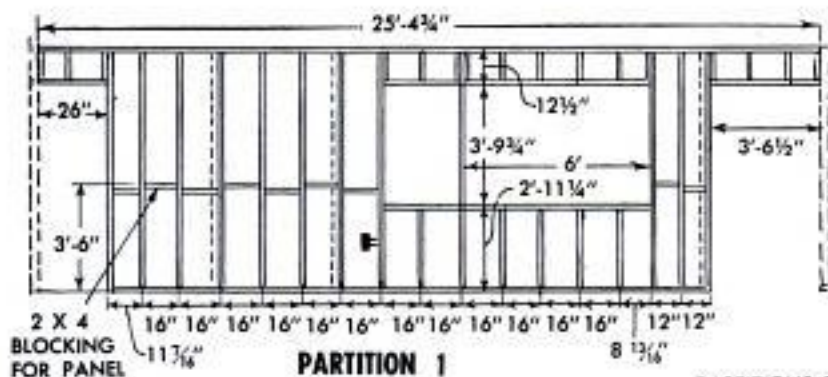
Short blocking between partition studs provides nailers for wooden wall panels. Insulation is reflective type, applied with a rented stapler, below



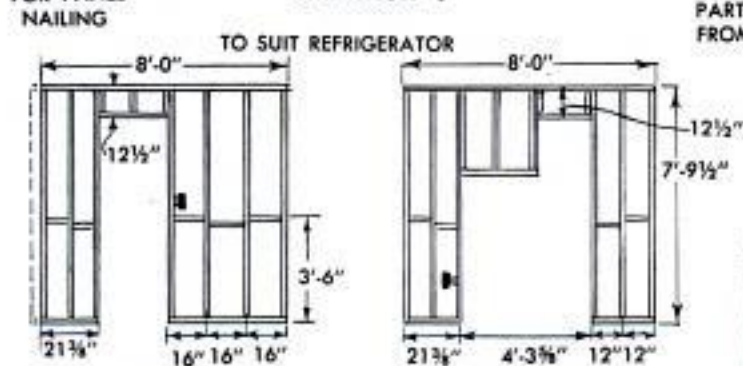
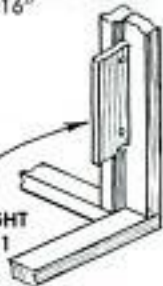




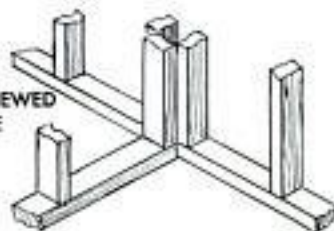
**WALL FRAMING AND PARTITION PLAN**



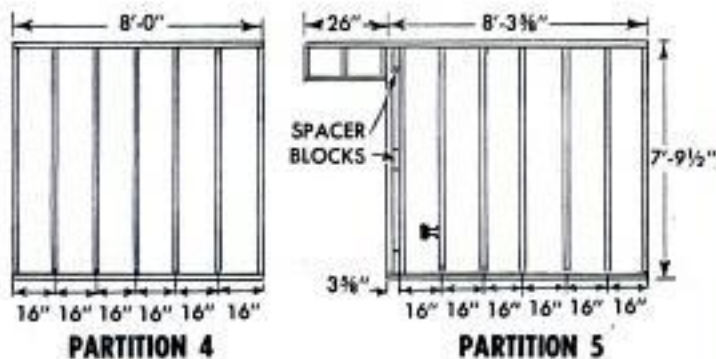
STRIP OF WASTE FLOORING NAILED TO BACK OF END STUD ON ANY WALL AT RIGHT ANGLES TO PARTITION NO. 1 PROVIDES CORNER NAILER FOR SIDING

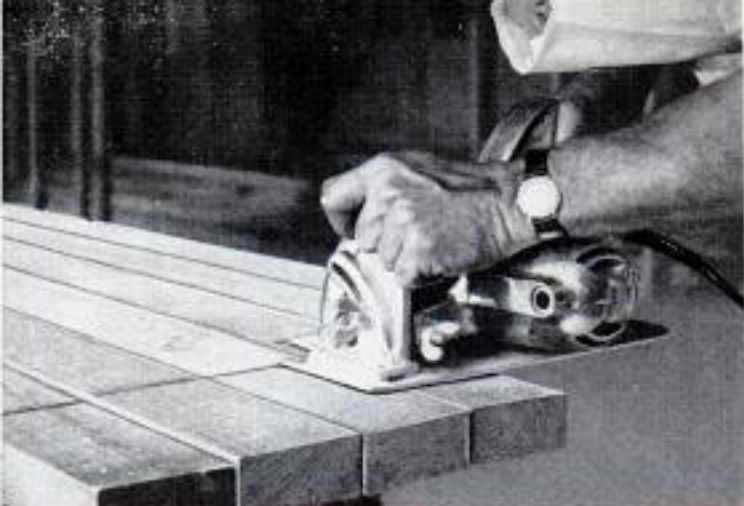


PARTITIONS 2, 3, 4 AND 5 VIEWED FROM PORCH END OF HOUSE



Partition framing is designed for simple assembly. Plates are laid out first, as below

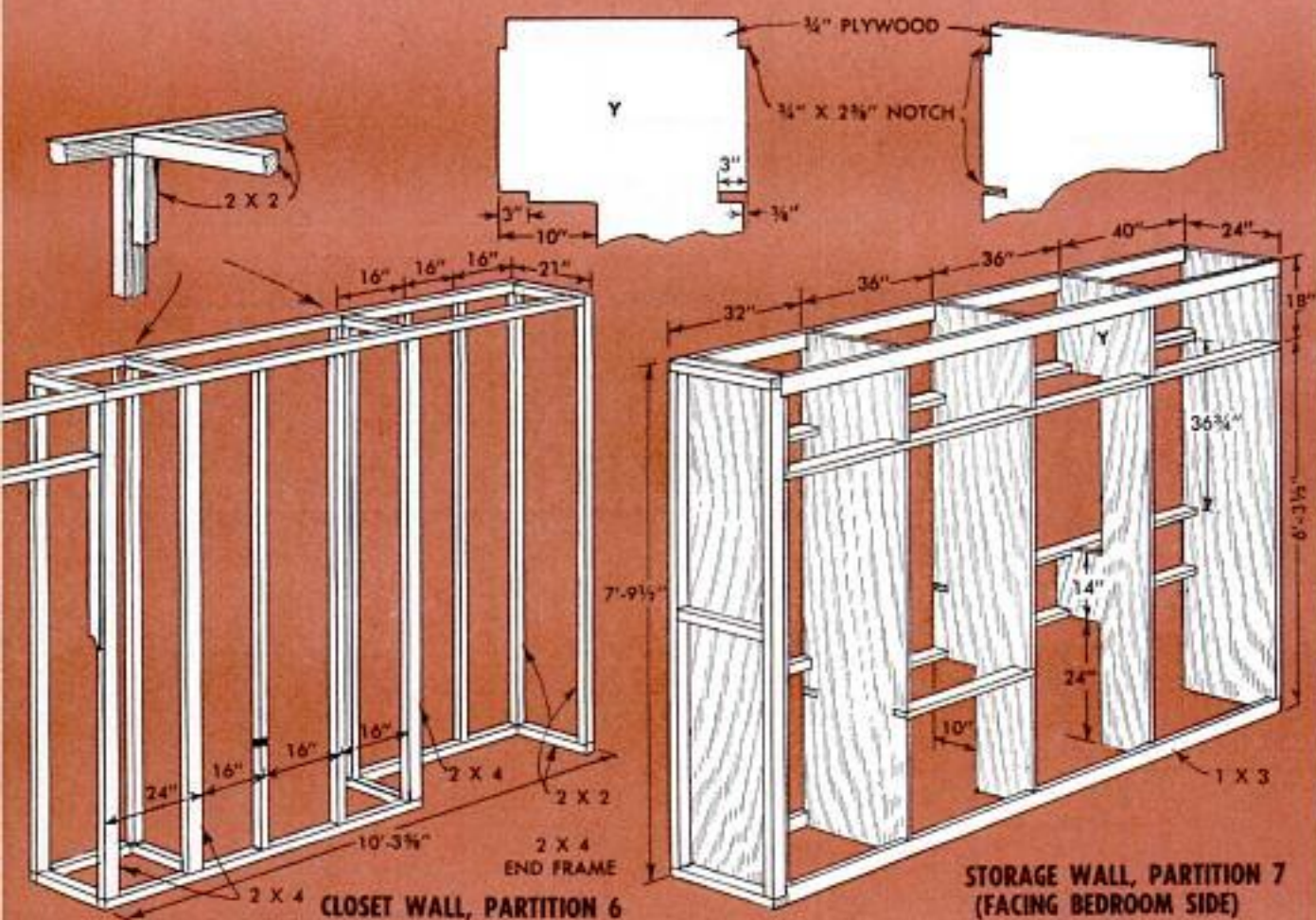




Partition studs are clipped off up to 12 at a time by using a simple jig and a portable electric saw

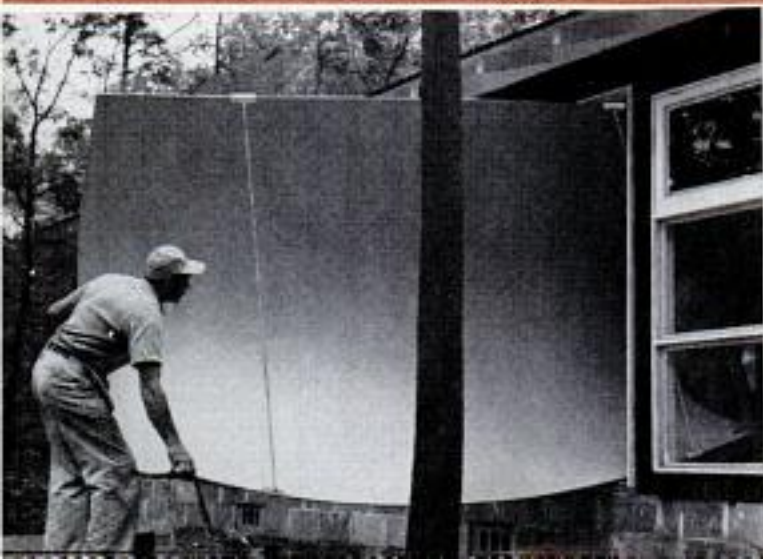


Furring strips nailed to roof trusses support fasteners that clinch big ceiling panels from behind



Huge Upson wallboard panels, up to 8 x 20 ft., pass through any standard door if bowed with black slings

Ceiling fasteners are clinched in rear side of wallboard panels with hammer and padded block





King-size panel covers entire wall with no nails showing. Secret is a claw that grips panel from behind. Studs are marked, and fasteners nailed to them, above. Same interval-marked stick used on studs now locates fasteners. Each is clinched, right

our permanent exterior. The single fir flooring is our finished floor, except for kitchen and bath which are tiled in linoleum and vinyl asbestos respectively. Actually, we like it as is and it may stay that way.

The fact is that completion of this house is entirely up to you. The pictures and sketches on these pages merely show one way in which the shell may be completed under cost limits mentioned.

Our two-bedroom floor plan cost about \$20 less than the three-bedroom plan described in the book and blueprints on this house. But two bedrooms or three, partitions are constructed in the manner shown on page 159. Because the trusses make a self-supporting roof, partition walls bear no weight. Single top and bottom plates do the job that requires double plates in conventional houses. All studs are 16 in. on centers, as shown, except where walls are too long or short to take this "module." Then, spacer studs are set closer, to make the others come out even—as was done on the right end of partition 1.

Closet wall, partition 6, designed to go between two adjacent bedrooms, is framed largely of 2 x 2 material to save lumber and space. And the storage wall—which



is designed to go between living room and bedroom—is a simple frame of plywood and 1 x 3s. By using plywood dividers instead of vertical framing members you kill two birds with one stone. The dividers become the interior walls of the cabinets.

Closet and storage walls are best framed in place. Flat partitions can be assembled on the floor and raised in place as shown.

Before insulating the house or covering

Combination tool, such as this Shopsmith, earns its way in cutting, shaping and jointing finish trim



### *Detailed Book Shows How*

In addition to a 128-page instruction book which shows you step by step how to build the precut house, there is a complete set of blueprints available. Write: Blueprint Department, Popular Mechanics Magazine, 200 East Ontario St., Chicago 11



Fuse box to handle all circuits is a four-fuse service located in entry closet right behind meter



Counters are designed to make standard-size plastic top easy for amateurs to apply, like this Formica



Fixtures in plumbing kit for this house are designed for amateur assembly. Kitchen sink, above, is fastened to the counter top with simple ring and clamps. Lavatory legs, below, are adjustable



Water for the test house is pumped from private well by a Myers jet pump that is easily primed and drained for seasonal use. Below, closet and pass-through closures are Novafold sliding bamboo doors



any walls, wiring and plumbing are installed. Electrical circuits for this house are the simplest possible, so that an amateur can install them himself where codes permit. The entire plumbing—including all units and fixtures for complete bath and kitchen, plus rigid copper tubing, and all necessary drainpipe cut to size and threaded—is available in a do-it-yourself kit made up especially for this house. The copper tubing is sleeve-jointed and soldered. Other units are designed for rapid assembly by an amateur craftsman as illustrated on page 162.

Though the *PM Precut House* shell is designed to take any type interior finish, including plaster, "dry wall" construction was used in the test house due to its ease and speed of application.

Floating fasteners nailed to the studs, as shown in the photos on page 161, grab the Upson panels from behind, so no nailheads show on any wall or ceiling. The huge 8 x 20-ft. panels cover entire wall and ceiling areas without a seam in evidence. Genuine 3/4-in. redwood used in living areas (and to make the beams for all ceiling seams) is easy to work and remarkably cheap. Cabinet, interior doors and trim are all made of this material.

Installation of a heating system is a mat-

**Prefab Van-Packer chimney hangs on ceiling joists, will flue any furnace, can be erected in 3 hours**



JUNE 1955



**Open-face modular closets in kitchen frame pass-through opening. Cabinet doors are cleated redwood panels hung with wrought-iron strap hinges**

ter of choice. In the test house, the LP gas space heater required three hours to install. It keeps the house at 70° in zero weather. The packaged utility chimney (below, left) went up in one morning. Its three sections of cement asbestos with tile lining, sit in brackets between ceiling joists and will flue any furnace you care to put in the house.

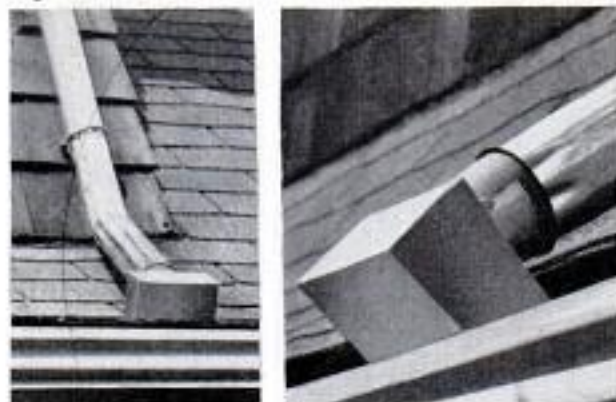
If you do the important things first, you can satisfy a lot of whims with what's left of your budget. Plans and directions for some of those whims—such as a bed with gliding drawers for Junior's treasures, and a roll-away closet for sports and recreation gear—are fully detailed in the blueprints and book. ★ ★ ★

**Luxury items left until last include cedar lining for storage-wall wardrobe and blanket cabinets**



163

## Antisplash Box Prevents Damage By Water From Dormer Downspout

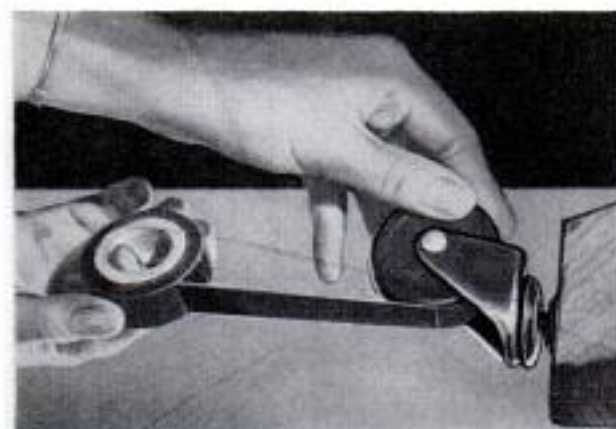


Running the downspout from a dormer roof into an antisplash box fitted over the eaves trough on the main roof was the method used by one homeowner to eliminate two problems caused by rainwater draining from the dormer. The first problem was damage to the roofing resulting from the rush of water across it as water drained from the dormer downspout. The second problem was damage to the side of the house and dampness in the basement, caused by water running across the roof so rapidly it overshot the eaves trough and ran down the wall. The antisplash box is made from 26-ga. sheet metal. It is 5 $\frac{3}{8}$  in. long, 3 $\frac{1}{4}$  in. high, and the cross section tapers from 2 $\frac{3}{4}$  in. at the top to 2 $\frac{3}{8}$  in. at the bottom where it fits between the top edges of the eaves trough. The upper side of the box is fitted with a standard slip fitting into which the downspout is pressed.

L. H. Georger, Buffalo, N. Y.

## Plastic Tape on Casters Prevents Black Streaks

Black streaks on hardwood and tile floors caused by rubber furniture casters can be prevented by covering the casters with a strip of electrician's plastic tape. The durable plastic tape will last from 6 months to a year under steady usage. It then can be replaced easily.



# AUTOMATIC

**R**ELYING ON MEMORY to turn a dehumidifier off when not needed usually results in unnecessary operation. But with this humidity-sensitive control you can practically forget about your dehumidifier so far as watchful operation is concerned, for it will turn it on and off automatically with rise and fall of humidity in the room.

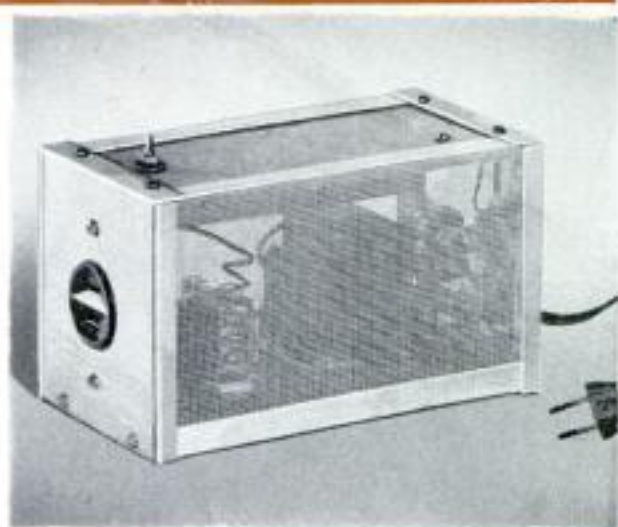
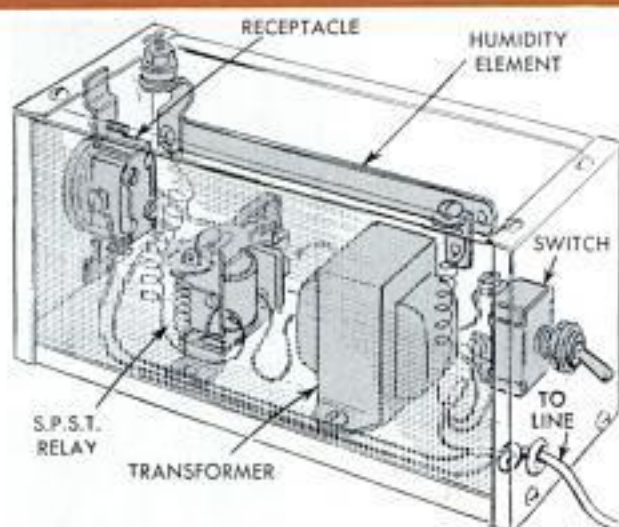
The heart of the control is a humidity-sensitive element which is made by cementing a strip of blotting paper to a strip of very thin copper. In use, the blotting paper absorbs moisture in proportion to the atmospheric humidity and in so doing, expands, causing the copper element to curl as the humidity increases and make electrical contact. The element is made from a strip of .003-in. sheet copper,  $\frac{1}{2}$  in. wide and 5 $\frac{3}{8}$  in. long. It is important that the blotting paper be dried in an oven at 225°F. for 15 min. just before it is cemented to the copper strip.

A small silver or tungsten contact is soldered to the copper side of the element  $\frac{3}{16}$  in. from one end, and a  $\frac{5}{16}$ -in. hole is drilled at the other end for mounting the element. The support bracket for the element is cut and bent from thin brass,  $\frac{3}{8}$  in. wide. Then a 6-32 brass machine screw is soldered to the bracket as shown and flats are filed on the end of the screw so it can be turned with pliers to adjust the element. A  $\frac{1}{2}$ -in. 6-32 brass machine screw is used to mount the element on the bracket, placing the copper side of the element against the bracket and a  $\frac{1}{2}$  x  $\frac{3}{8}$ -in. brass "washer" between the blotter side and the nut. A fixed bracket, fitted with a silver or tungsten contact, also is cut from thin brass.

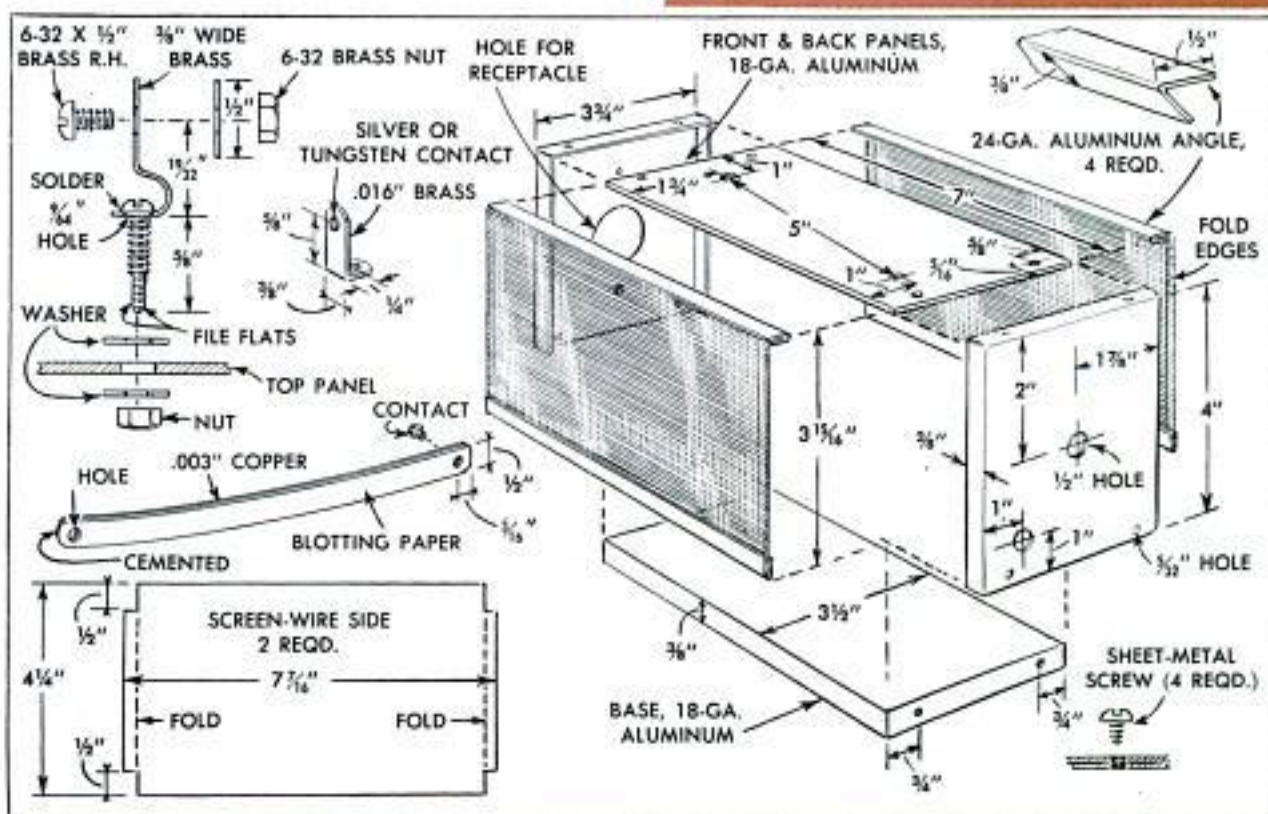
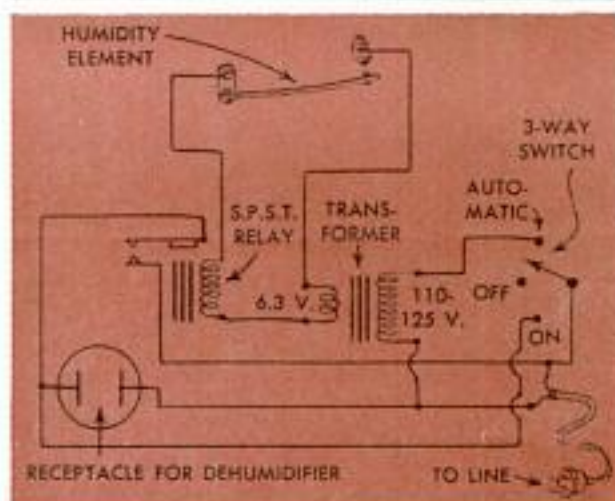
The case for the control is made of 18-ga. sheet aluminum and fitted with screen-wire sides to allow air to pass through to the element. Both the element and the fixed contact are fastened to the top of the case which is a piece of  $\frac{1}{8}$ -in. hardboard or Bakelite. A receptacle is mounted in the back panel of the case, and a single-pole, double-throw, center-off toggle switch (equivalent to a 3-position rotary switch) is mounted in the front panel. A 6.3-volt, 3-amp. transformer, such as a filament radio transformer, and a 6-volt, single-pole, single throw, normally open relay are mounted on the base of the case. The various parts are wired according to the diagram given.

The element will move approximately  $\frac{1}{8}$  in. during a 10-percent change in humidity. Position the element so it will be

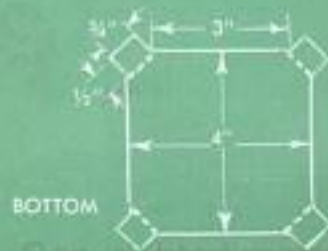
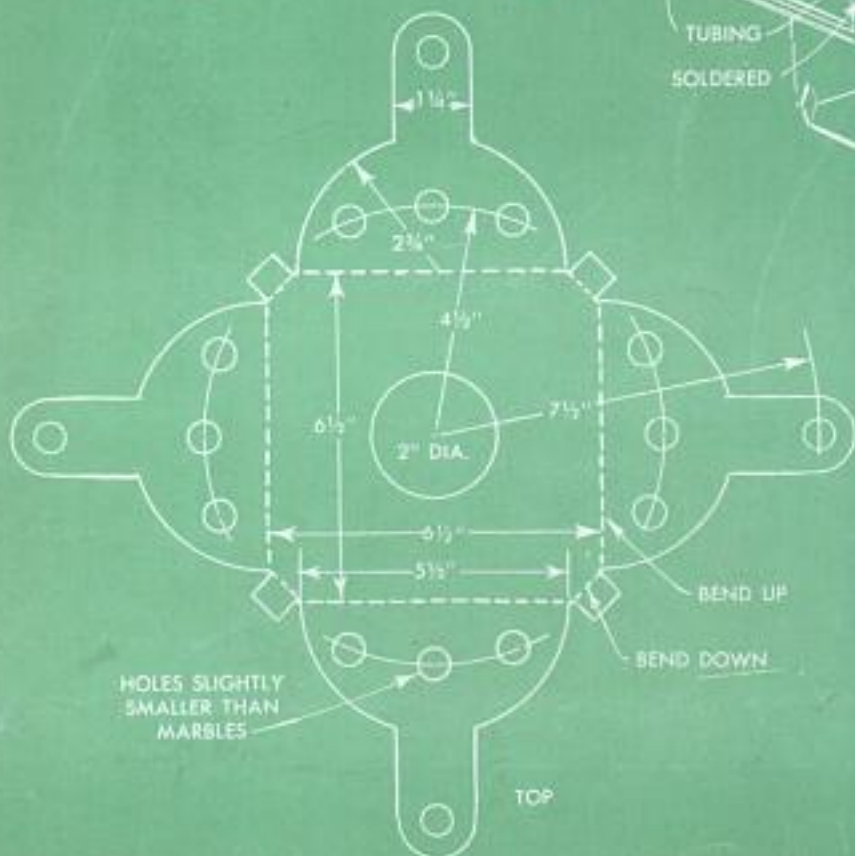
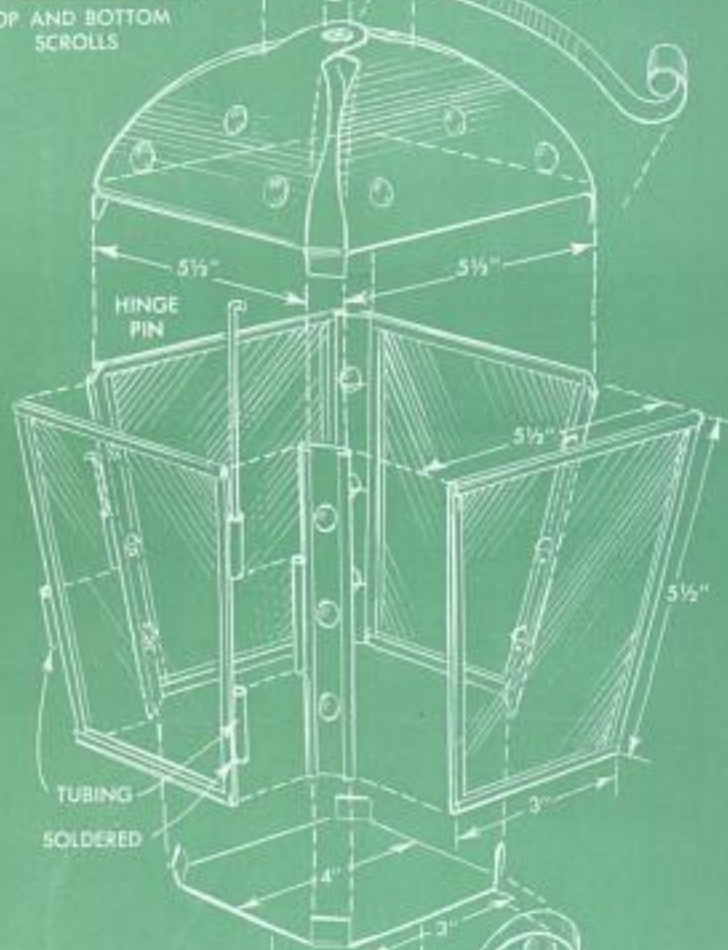
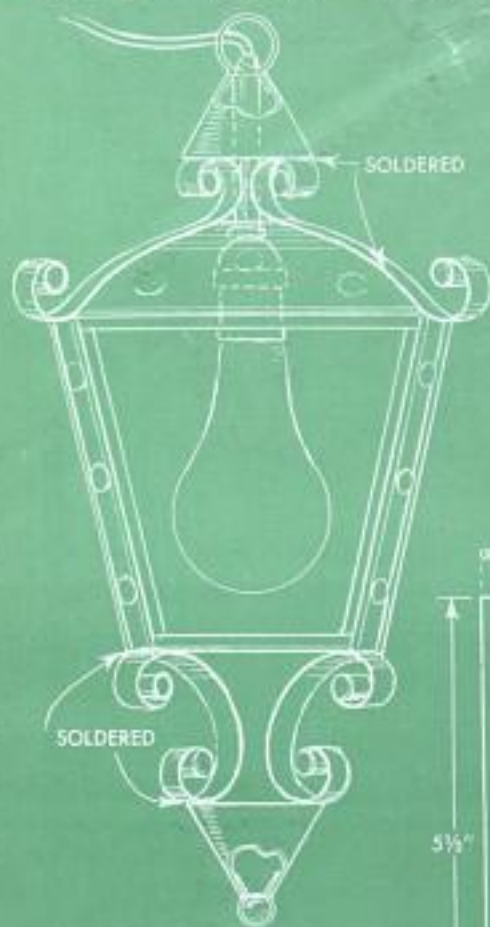
# DEHUMIDIFIER CONTROL



parallel with the side of the case. With the element in this position, the control will usually operate at about 50-percent relative humidity, which is a satisfactory level for most purposes. By turning the flat-sided adjusting screw with pliers, the humidity turn-off point can be regulated (raised or lowered) as desired. The dehumidifier switch should be left in the "on" position and the control switch in the "automatic" position. The dehumidifier will operate as long as the humidity element contacts are closed and will shut off when the humidity drops sufficiently to open the contacts. ★★★

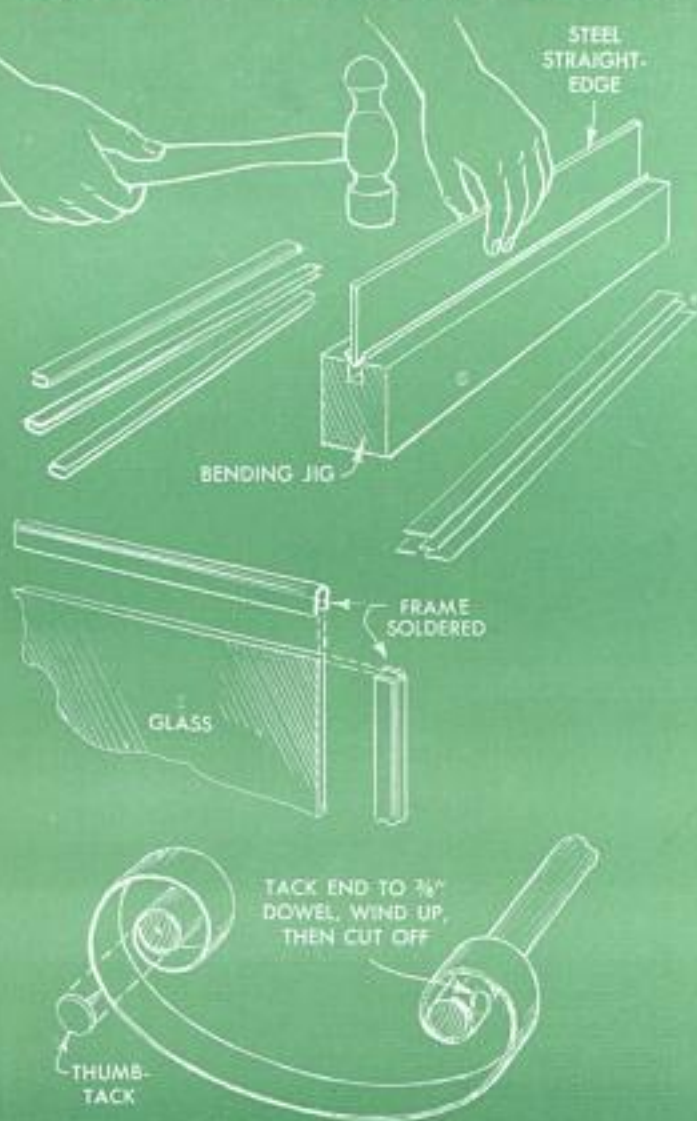


# PATTERN CRAFT LAMPS





# and PLANTER



## FULL-SIZE PATTERNS

Actual-size patterns which can be traced directly on your metal save you the trouble of making a full-size pattern from the magazine plan. If you prefer to make the jewel lamp detailed here from a pattern already drawn full size, you can purchase this pattern by writing to ~~Pottercraft, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, and asking for plan No. 118.~~ This plan also includes full-size trace-and-cut patterns, plus instructions, for making the hanging planter and the coach lamp pictured at the right. All three items are basically tin-snip-and-solder projects. The fairylike jewel lamp from Old Mexico makes use of colored glass marbles for the jewels. Holes for the marbles are stamped out with a homemade punch which is made by grinding one end of a piece of pipe to provide a cutting edge. The holes are punched with the metal placed on a hardwood block. Wire bands hold the marbles in the holes

WTM '57



*Jewel Lamp*



*Hanging Planter*



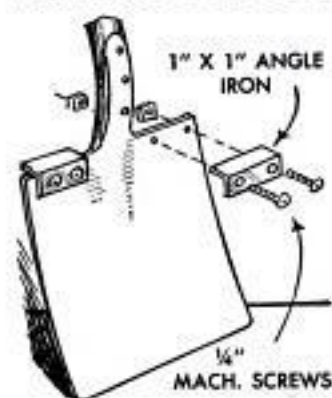
*Coach Lamp*

## Telescoping Camera Tripod Used as Sketching Easel



A small telescoping camera tripod does an excellent job as a sketching easel when light weight and compactness are required. Some tripods can be folded and telescoped down to a 10-in. length. The telescoping feature also is useful for adjusting the height of the easel. A sketch pad or drawing board is placed against two of the tripod legs and supported on spring clips. The clips can be the flat-spring type or clipboard clamps which have a circular cross section that fits the tubular legs of the tripod can be used.

## Wide Footrest on Shovel Prevents Foot Soreness



When it is necessary to use a spade or a shovel for any length of time, sore arches can be avoided if a wide footrest is attached to it as shown. The rest is made by bolting lengths of 1-in. angle iron to the shovel with  $\frac{1}{4}$ -in. machine screws.

The wider contact area that is provided distributes strain over the foot and prevents soreness.

## Suet "Cupcake" Is Bird Treat

A real treat can be provided for the birds at your feeding station by serving them bird "cupcakes." The cakes are made

by mixing a handful of sunflower seeds, grain or commercial birdseed into some melted suet and pouring the mixture into paper drinking or baking cups. After the suet has cooled and hardened, place the cups on the feeding stations.

R. M. Woodbury, Natick, Mass.

## Preserving Natural-Wood Color

To preserve the natural color of white birch, bird's-eye maple, hickory or any smooth-grained, light-colored wood without darkening, brush on two coats of clear lacquer. If the lacquer is sprayed, use three coats instead of two. Sand lightly between the coats and, finally, apply one or more coats of white wax.

Thomas Bishop, Sr., Seattle, Wash.

## Trellis for Potted Plants

This attractive trellis for climbing house plants requires only a few lengths of small-diameter wooden dowel and some stiff wire for its construction. Cut the dowels into 6-in. lengths and drill holes about 1 in. from the ends. The holes should be a fairly snug fit for the wire. Bend the wire in the desired arch to determine the length, then straighten out both lengths and place on a flat surface. String the dowels on the wires, using household cement if they are loose. When the cement is thoroughly dry, rebend into an arch and force the ends of the wire into the earth in the plant holder. If the trellis is painted, be sure to use paint that does not contain lead or other materials toxic to plants.

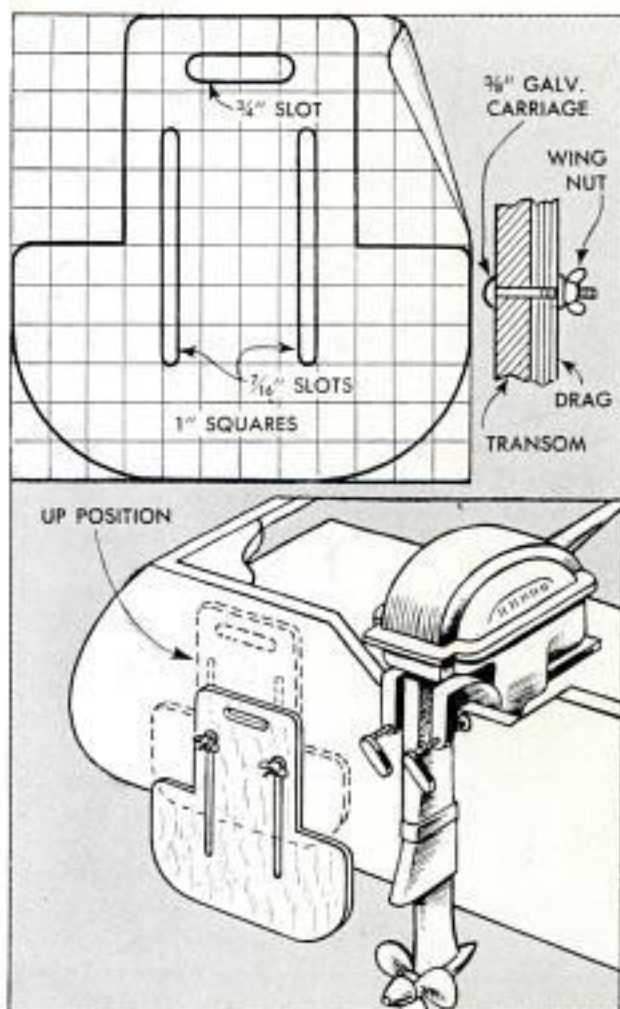
A. O. Aldrich, Oakland, Calif.



# Transom Drag Brakes Boat to Trolling Speed



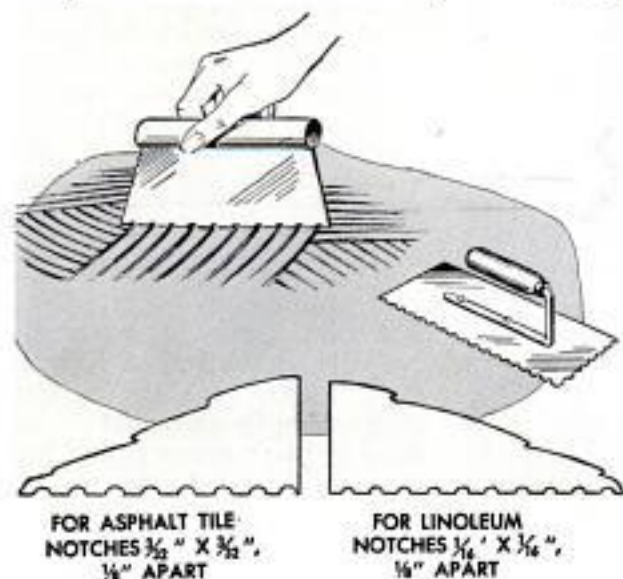
In the raised position, this transom drag has no effect on the speed or performance of an outboard motorboat. However, when lowered, it greatly reduces the idling speed of the boat, making it an ideal accessory for slow trolling and leisurely plug casting along the shore line. From the standpoint of convenience, the drag can be raised or lowered from inside the boat in a matter of seconds. It is cut from  $\frac{1}{2}$ -in. exterior-grade plywood, as in the upper right-hand detail, and held in position on the transom with a pair of  $\frac{3}{8}$ -in. carriage bolts and wing nuts. Before drilling the bolt holes through the transom, it is important to locate the drag so it will clear the propeller regardless of the direction in which the motor is turned. To do this, hold or clamp the drag in the lowered position and check for clearance by swinging the motor. Then move the drag to the raised position so that its lower edge is  $\frac{1}{2}$  in. above the bottom of the boat and locate the bolt holes at the bottoms of the two slots. Use galvanized bolts and wing nuts and give the drag



several coats of marine paint or varnish before installing. If you use a large outboard motor, it may be necessary to install a second drag on the opposite side of the transom for satisfactory braking action.

Tom Riley, Portland, Ore.

## Important to Use Proper Adhesive Spreader When Applying Tile



JUNE 1955

When applying wall or floor tile, countertop coverings or linoleum, it is important to use the correct cement-spreading tool since there is a definite difference in the amount of cement each type will apply. First, check the manufacturer's recommendations as to the type of cement to use. Then, use either the larger-notched tool for asphalt-tile cement or the finer-toothed spreader for linoleum cement.

## Hook Rings for Clothesline

Single side links taken from a tire chain make excellent hook rings for clotheslines. Tied onto the end of the line, the links are dropped over the hooks between which the clothesline usually is strung, thus eliminating the need for tying and untying.

169

# Tow-Tow-Tow-



By Edward S. Spanke and Frank N. Stephany

**Y**OU WILL SEE more boats and trailers than ever before at resorts and fishing areas this summer, and a closer look likely will disclose that the cars have out-of-state license plates and big-city windshield stickers.

Yes, you've guessed it. Folks are bringing their boats hundreds of miles to the waters they want to fish, explore and enjoy. And they're not all country people or suburbanites who might be expected to have a boat-trailer rig and plenty of room to store it during the off season. Many of these boat owners live right in the hearts of the large cities.

The boat trailer did it. Now, no matter where you live, or how far it might be from the water, you can own an outboard boat. All you need is garage or yard space in which to store the outfit. As far as size is concerned, you can go from a small utility boat all the way up to a cabin cruiser that will sleep four to six people.

Everything is set for this family to enjoy a pleasant day of boating



When buying a boat trailer, size and weight capacity are the first things to consider. There is no hard-and-fast rule. The trailer should handle your present boat and even be able to carry a somewhat larger one that you may purchase in the future. Several factors determine the weight-carrying capacity required—weight of the outboard motor if it remains on the transom while towing, and weight of extra fuel, luggage and camping gear that may be stowed in the boat. So estimate the total weight of everything to be carried in the boat and select a trailer accordingly. If the weight comes within 100 lb. of the rated capacity, better get a trailer of the next largest size. If you intend to carry the motor on the boat, the trailer should be designed to support the boat transom.

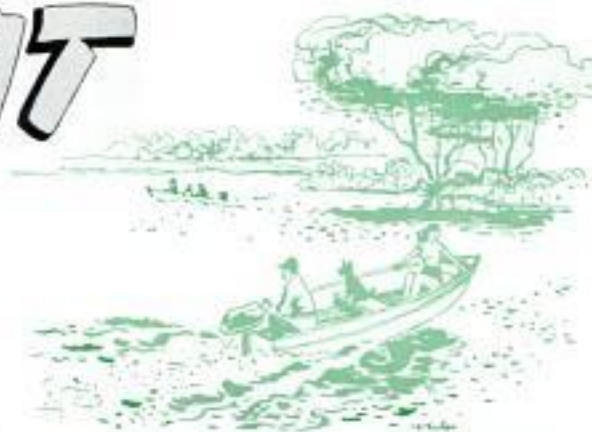
As the hitch is the most important trailer accessory, don't attempt to improvise at this point. Use a standard ball-and-socket car hitch, preferably one with a latch that keeps the coupling from working loose. Safety chains are required in some states, but they are well worth their small cost regardless of where you live.

A taillight is necessary for night-time driving, and can be anything from a flashlight clamped to the boat transom to a combination stop light and taillight. The latter operates on the car battery and plugs into an extension cord kept in the trunk.

Before driving off with the boat and trailer, be sure that the boat is tied down securely, that the hitch is locked tightly and that the safety chains are in place. It's also wise to stick some reflective tape on the boat transom or the rear of the trailer in case the taillight should burn out.

Hauling the trailer over

# YOUR BOAT



For night trailering, a combination stop light and taillight either on boat or trailer is ideal. Light is plugged into extension cord kept in trunk of the car



Treat your trailer tires just as you would those of the car. Check air pressure before traveling, especially if you haven't used trailer for a while

Being sure that hitch is clamped tightly is tops in importance. Most couplers have a safety latch to keep the socket from working loose while under way

Safety chains are as inexpensive a form of insurance as you can get. Should the trailer hitch fail, chains keep boat and trailer from taking off cross-country





To start trailer into its turn, cut steering wheel hard left. All procedures shown are reversed for backing into the turn from opposite direction

With trailer well into turn, watch your "target"—driveway in this case. Proceed slowly and steadily, making slight corrections with steering wheel



As trailer enters turn, bring steering wheel from left to right, but not too hard—just enough to even out turn. Now, you begin to get "feel" of turn

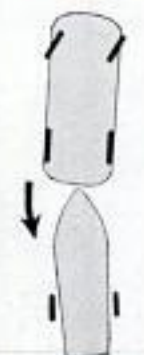
Turn begins to straighten out here. This is done by bringing steering wheel a little harder to right. To sharpen turn, bring the wheel to left



As boat starts to line up with driveway, bring steering wheel to the left to come out of turn



If boat bow points either right or left, cut steering wheel in the opposite direction to straighten it



the road is no problem as long as you remember that it's there when driving in traffic or passing. In fact, it's a good idea to have something in the boat that will rattle and serve as a reminder. The only troublesome maneuver in trailering is backing up, and this is explained by the photos and diagrams on the opposite page. You will find that all trailers built by reputable manufacturers are designed to be towed at high speeds—but it's wise to stay somewhat under the posted speed limits. With a trailer in tow, it is going to take more distance to brake the car.

Trailer maintenance is simplicity itself. Your trailer wheels most likely will have high-speed bearings, so be sure they are lubricated with wheel-bearing grease and nothing else. Keep the tires at recommended air pressure and occasionally oil the moving parts, such as rollers and winch. If rust appears, remove it and repaint. ★ ★ ★



Launching boat is easy. Back trailer so end of boom is at water, release winch lock and push boat into water



To bring boat out of water, fasten winch rope to bow, line up boat with the trailer boom and reel in the boat

Transom support is shown on trailer at left. Rollers under transom prevent its being weakened by motor weight

Modern trailers are truly one-man, or one-woman, operated. Hefty boat, below, is handled easily by one person





### Bar Between Clothesline Posts To Air Garments on Hangers

When installing pipe standards for clotheslines, the standards being two uprights with a crossbar between, one homeowner included an auxiliary crossbar for airing clothes that must remain on hangers. The auxiliary crossbar is a length of  $\frac{3}{4}$ -in. pipe suspended below the main crossbar and spaced with short lengths of  $\frac{3}{4}$ -in. pipe. Long bolts run through both crossbars and spacer pipes.

Roman Smits, Green Bay, Wis.

### Quick-Starting a Barbecue Fire

For efficient cooking, a barbecue fire made of wood should start quickly and burn down to a bed of glowing charcoal; or when starting with charcoal, the fire should ignite rapidly to furnish cooking heat. Here are a number of ways of hastening the process:

A stub of a candle can be used as an igniter, with a teepee of twigs built against it. As the fire grows, the candle will melt and the wax burn away.

Wood alcohol or kerosene poured directly on wood or charcoal will provide a quick blaze, but kerosene has the disadvantage of producing black smoke and an objectionable odor. Do not, of course, pour flammable liquids onto a fire that is already burning.

Wax fire starters can be purchased, or you can make them yourself by dipping lengths of tightly rolled newspaper in melted wax.

Homemade tapers, slivers of wood dipped

in melted wax, work in much the same way as the wax-and-paper starters, but provide a wood fire immediately.

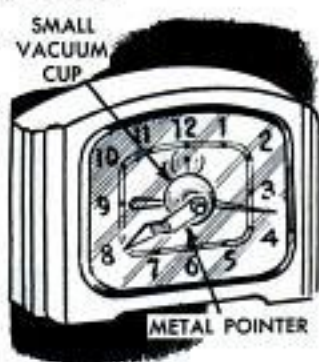
A fire brick soaked in kerosene or alcohol will provide a giant lighter; use a shovel to move it around after it is ignited.

Finally, if a fire is made on a flat surface, such as a pan filled with sand, or in a shallow, portable barbecue pit, fit a 5-gal. can, its top and bottom removed, over the fire to provide a chimney for draft. When the fire is well started, the chimney is removed.

Max Alth, Port Chester, N. Y.

### Improvised Photo Timer

A timer for use when developing photographs can be improvised from an alarm clock, a small vacuum cup and a sheet-metal pointer. The pointer is attached to the vacuum cup with a small nut and bolt, and the cup is then pressed against the face of the alarm clock over the hub of the hands. In use, the pointer is turned ahead of the clock's minute hand the number of minutes the developing operation will require. When the minute hand appears under the pointer, the time is up and the operation can be stopped.



### Wires Locked in Electric Plug

Loosening of terminal screws or shorting of bare wires inside a male electric plug can be avoided by filling the plug with sealing wax. The wax will insulate the wires from each other and absorb the strain if the cord instead of the plug is pulled when it is removed from a wall receptacle.





Part III—  
Conclusion



## *Keep Warm in Winter and Cool in Summer*

**I**N THIS ARTICLE, the final one of three articles on installing a heating and air-conditioning plant in your home, you are ready to wire the units, adjust them correctly and then relax and enjoy with your family the comforts of modern living.

For an installation of this type, two electrical circuits are required, a 220-volt circuit for the air conditioner and a 110-volt circuit for the furnace. Since electrical consumption varies in different homes, check with your local utility company as to the size of service necessary for your particular requirements. In this installation, electrical consumption in the home made it necessary to install 100-amp. service at 220 volts.

Since certain electrical codes must be met in wiring, this work should be done by a licensed electrician. However, if you have an experienced person available to guide you, you may do the work yourself. In this case, the entire wiring job should be inspected by your utility company.

The furnace-blower motor and oil burner, if the furnace is oil fired, require 110-volt current. This should be fed to a fused switch box located near the furnace. Since wiring diagrams will vary from the one

used for this installation, which was a warm-air furnace and air conditioner made by the Lennox Furnace Company of Marshalltown, Iowa, no diagrams are given. Just follow the wiring diagram provided by the manufacturer of your equipment for wiring from the switch box to the furnace. On an oil-fired furnace there is a control in the smoke pipe and one in the warm-air plenum. The former controls the oil burner and the latter the blower.

After the furnace has been wired, connect the oil line to the oil burner, lower right photo, page 176. Be sure to install a filter in the oil line, preferably near the oil tank. Follow the manufacturer's instructions for putting the furnace into operation. When the furnace is operating satisfactorily you are ready to wire the air conditioner. Again, follow manufacturer's instructions.

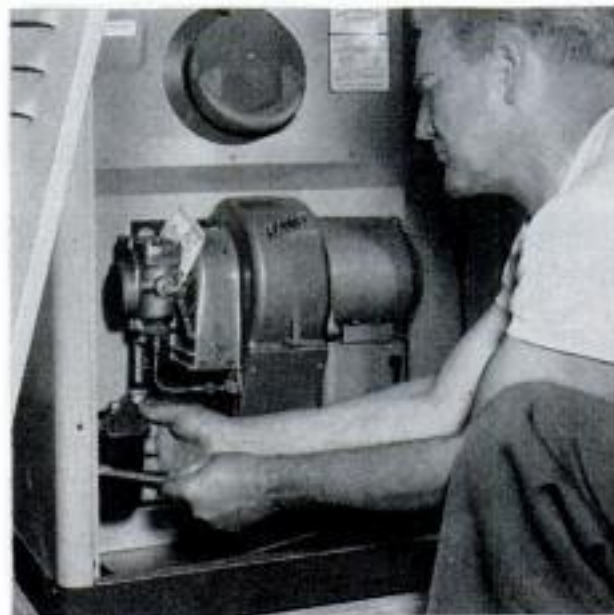
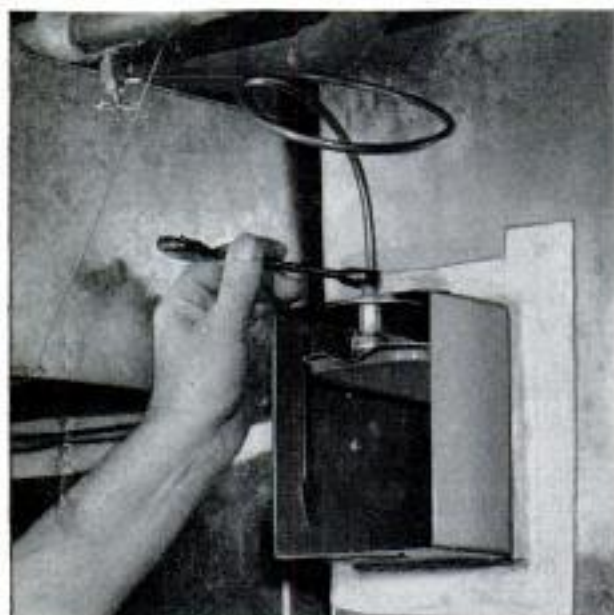
Wire size for the 220-volt circuit will be determined by the load it must carry. For this installation, which was a 2-ton air conditioner having a 2-hp. motor, a 3-wire conduit was run from the electrical service box to a Square-D switch box near the conditioner as shown in upper-left photo on page 177. Notice that the control panel for the conditioner is mounted directly



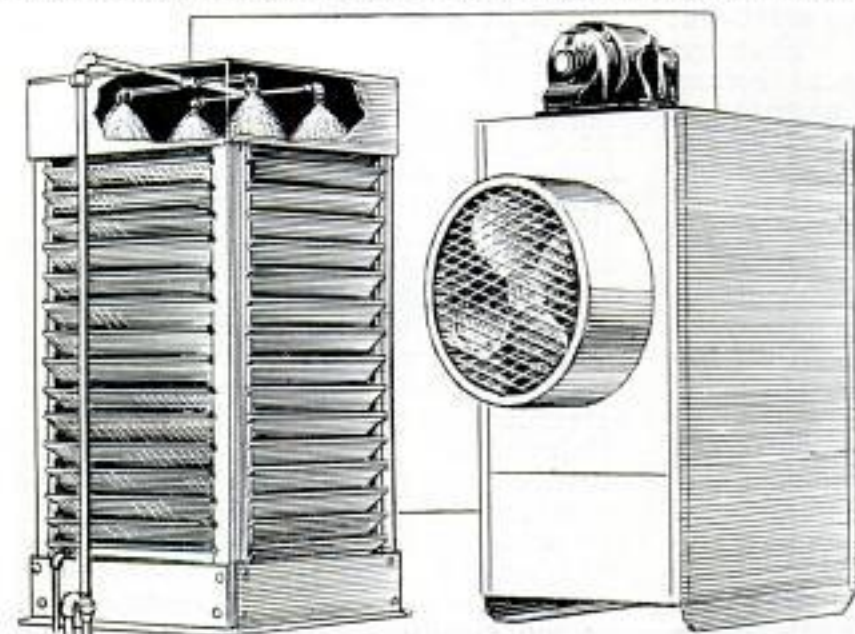
Combination limit control and blower control is located in warm-air plenum as shown in photo above. Below, an automatic humidifier installed in the plenum maintains the correct humidity in your home



Above, use flexible conduit to the blower motor as it rests on flexible mountings which would fracture rigid conduit. Below, if the furnace is oil fired, an oil filter should be installed in the oil line

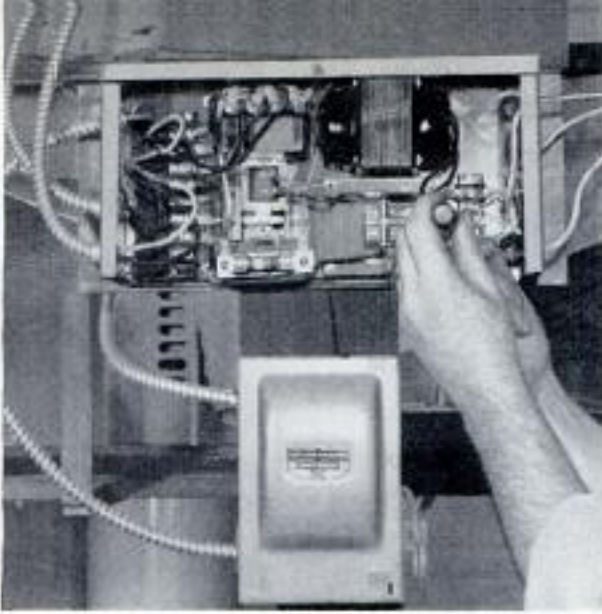


Water towers are of two general types. The natural-draft type shown at left below, and the forced-draft type shown at the right below



above the switch. From this panel a 2-wire conduit goes to the air-conditioner junction box, the conditioner having been shipped already wired to this point.

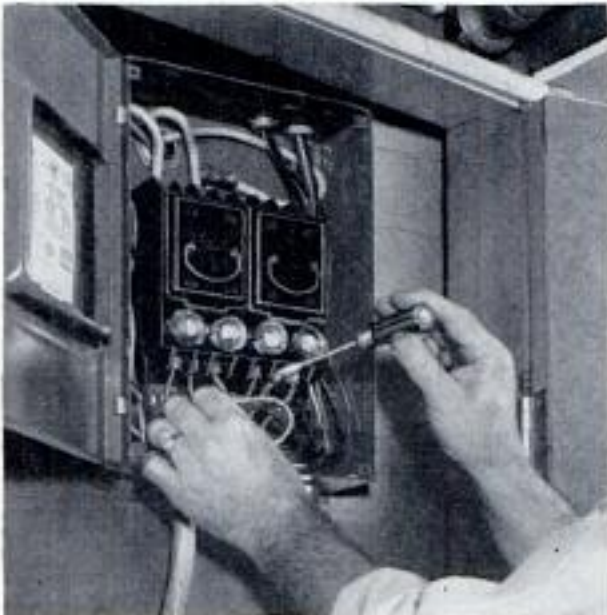
The control panel contains starting relays for the air-conditioner motor, the furnace blower, which is used in conjunction with the air conditioner, and for the motors on a water tower if used. It will be necessary to run a 2-wire conduit from the control panel to the furnace-blower control in the plenum. This provides current for the blower independent of the furnace when the air conditioner is in use. The



A fused switch box should be installed in the air-conditioner electrical circuit as pictured above. Below, connecting the 220-volt circuit into the service box. This should be done by a licensed electrician



Above, a 2-wire conduit from the control panel is connected to the air conditioner at a junction box. Below, delivery water line to conditioner should have a valve to control the flow of water as desired



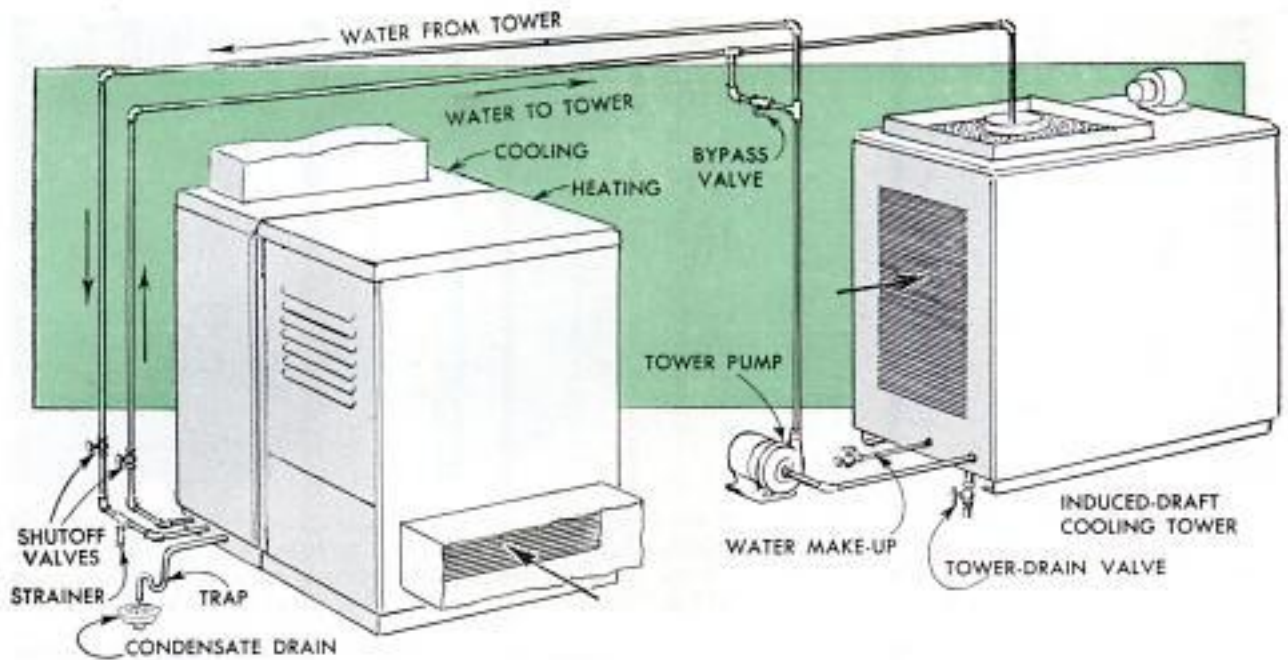
control panel also contains a 24-volt transformer which provides current for the low-voltage circuit to the room thermostat.

In locating the room thermostat, place it where cool or warm drafts cannot affect it. On some installations, two separate room thermostats are used—one for heating and one for cooling—while other installations use a combination thermostat for both of these operations.

After the air conditioner has been wired, the circuit is connected into the electrical service box, lower-left photo, this page. Since many air conditioners of this size or larger are water cooled, the water supply and its cost will determine whether or not a water tower is to be used. If the water supply and its cost permit, the discharged cooling water is run into a sewer or through a hose to a lawn sprinkler. No definite figure for the amount of water required can be given as several factors determine this, some of which are outside temperature,

temperature of water entering the air conditioner, etc. An average, however, would likely be between 2 and 3 gal. per min. when the conditioner is in operation. A water-cooling tower would save most of the water as it receives discharge water from the conditioner, cools it and then recirculates it through the conditioner. Water towers are of two general types. One depends on natural air circulation over the water baffles for cooling, left detail of diagram, page 176. The other uses a fan to move the air over the baffles, right detail. The detail at the top of page 178 is representative of an air conditioner-water tower hookup.

Flow of water through the conditioner should be adjusted so that the temperature of the discharge water does not exceed 95° F. A thermometer connected to the discharge pipe as in the lower-right detail on page 178 will enable you to correctly adjust the flow of water.

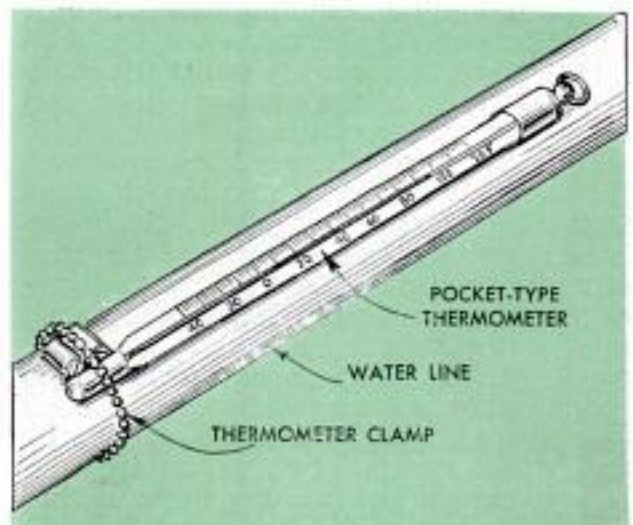
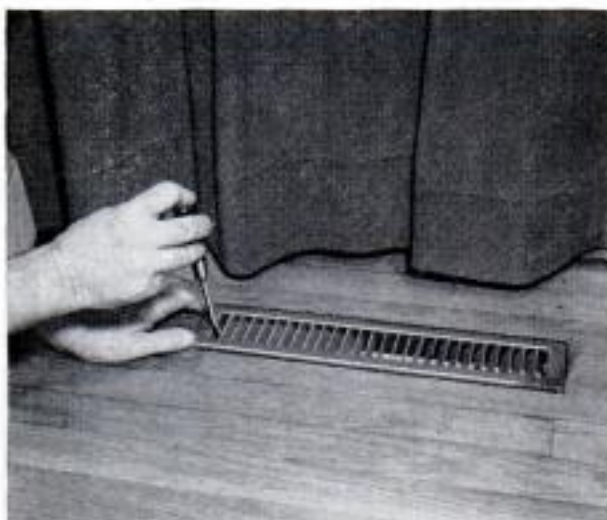


Once the furnace and air conditioner are operating, the final step is to balance the air flow into the rooms to get uniform heating and cooling. For heating, a temperature rise of 100 deg. as the air flows through the furnace is desirable. To check this, install a thermometer in the return-air plenum and another in the warm-air delivery duct adjacent to the furnace. If a ceiling-mounted air conditioner is used, the thermometer should be installed in the duct on the delivery side of the conditioner. Allow the furnace to operate continuously until all parts of the system are thoroughly heated. Then reduce or increase the blower speed to get a difference of 100 deg. reading between the two thermometers. Reduce the blower speed to increase the temperature and increase the blower speed to lower the temperature of the air.

For cooling, one method is to use the same thermometer setup and adjust the blower so the temperature of the air is lowered 18 to 20 deg. as it passes through

the conditioner. A more accurate method is the use of a draft gauge with which you can determine the air-pressure drop through the coil and then adjust the blower speed to maintain the drop recommended by the manufacturer. Depending on the house, cooling and heating requirements may not be the same. Cooling coils are designed for a certain air volume for maximum efficiency. This sometimes requires changing blower speeds twice each year. The Lennox Furnace Co., as well as other manufacturers, also make equipment with self-contained blowers which make changing unnecessary.

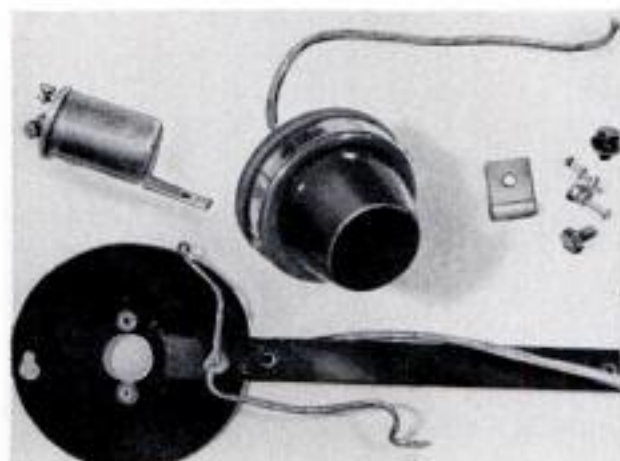
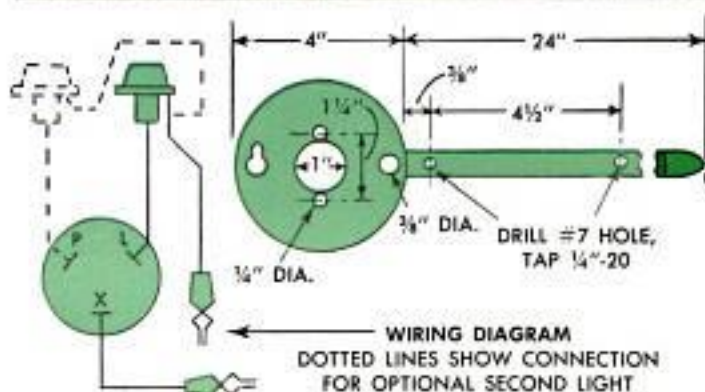
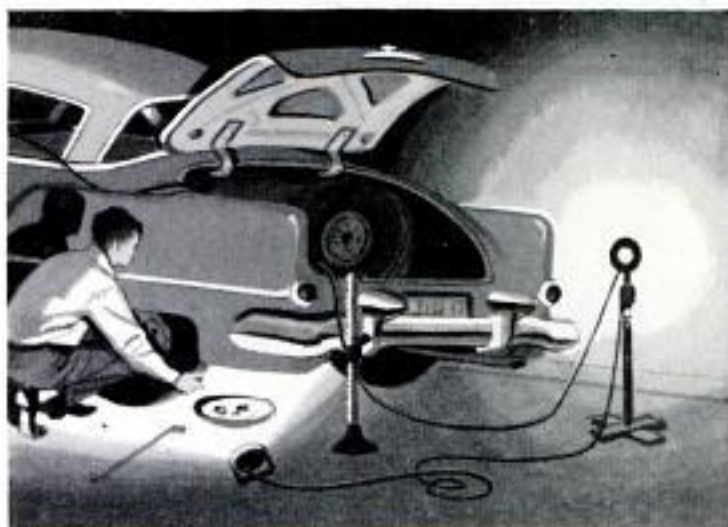
This completes the installation except for adjusting the air valves in the diffusers, lower-left photo this page to get uniform heating or cooling in each room. If you desire some rooms cooler than others, just reduce the flow of air through the diffuser in these rooms. Or in cooling, increase the flow of air. Use thermometers in the rooms while making the adjustments. ★ ★ ★



## Flashing Electric Flare Protects Stalled Car

When a flat tire forces a stop on a highway at night, this flashing electric flare will warn oncoming cars. The flare consists of a truck-type, directional-signal lamp and a flasher of the type used on emergency vehicles. On the original flare the flasher is a Tungsol 129D. The flare support is a junction-box cover welded to a flat-steel upright. Two holes are drilled and tapped in the upright, the lower hole used to attach the flasher and the upper for clamping the wires. The lead-in wire is a length of two-wire lamp cord fitted with two battery clips or a cigarette-lighter plug at one end. One wire of the opposite end is connected to terminal "X" on the flasher and the other to the lamp. The lamp is wired to "L" terminal on the flasher. The terminal "P" may be used to connect a second flashing lamp. A removable base supports the flare upright. A trouble light can be wired directly from the lead-in wire, by-passing the flasher unit, as shown in the illustration.

John M. Avery, Dexter, N. Y.



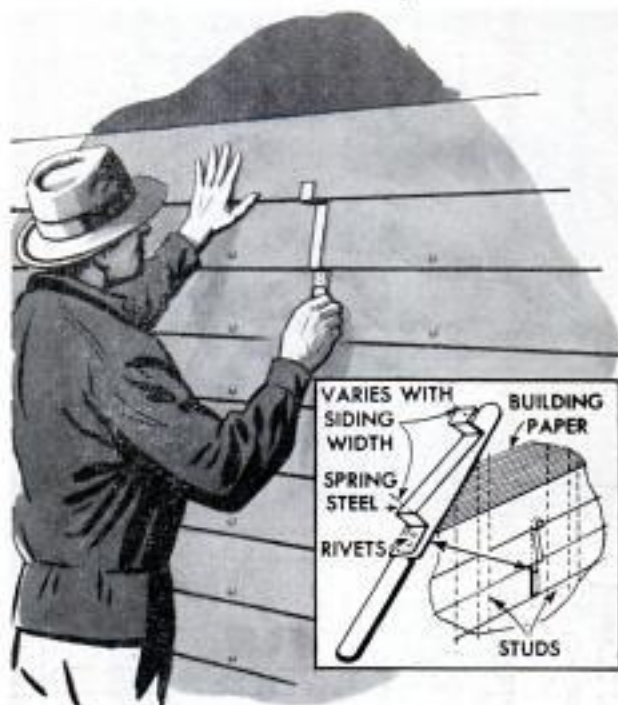
## Inexpensive Basement Shower Utilizes Laundry Tubs

A simple and inexpensive shower can be installed in any basement equipped with laundry tubs and a floor drain. Locate the shower head—it can be purchased at most hardware stores—over the floor drain and couple it to a length of  $\frac{1}{2}$ -in. pipe clamped to the floor joists. The pipe is run to a point over the laundry tubs and fitted with a pipe-to-garden-hose adapter. A length of hose with a female coupling at each end is used to connect the pipe to the faucet of the laundry tub. In use, the water temperature is controlled by adjusting the mix-

ing faucet in the tubs. The hose is simply unscrewed from the faucet when the laundry tubs are to be used for washing. For greater comfort and safety, a wooden-slat floor grating can be made for the shower.

☐ To provide a smooth surface on woodwork before it is repainted or refinished, fill all cracks, gouges, nail holes, etc., with wood putty. Apply the putty so it is slightly higher than the surface, permit it to dry completely, then sand flush.

## Gauge-Tool Holds Bevel Siding To Permit One-Man Operation

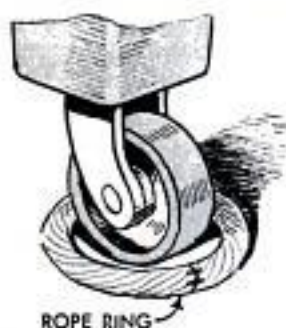


A handy gauge-tool that will both space bevel siding and hold it in place for nailing can be made from a kitchen knife to which is riveted a length of flat spring steel. The knife blade slips under the last strip of siding installed. The end of the strip to be installed then is set on the hook end of the steel spring. Cutting and nailing are done at the opposite end, making a one-man job of an operation ordinarily requiring two men. Dimensions of the tool will vary according to the width of the siding used.

## Glass-Cutting Pattern

One method of overcoming the difficulty of cutting glass to exact size is to draw a pattern on a large piece of paper, cardboard or plywood and lay the sheet of glass directly over the pattern. The pencil lines will show through the glass for perfectly aligning a straightedge.—J. R. E. Cameron, Buccaneer Bay, B.C., Can.

## Rope Rings Stop Rolling Of Washing Machine



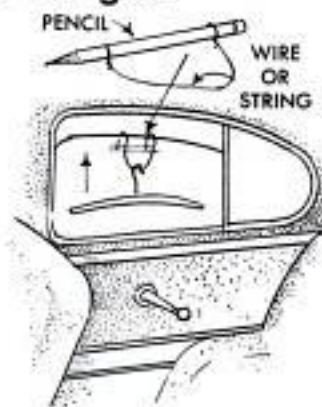
A washing machine that rolls around the basement during operation can be kept in one place by means of rope rings laid on the floor around the casters. The rings can be made by joining the ends of 1-ft. lengths of clothesline. When

these rings are placed around the casters, as shown, the wheels wedge against the rope and further rolling is prevented. Two rings usually are enough to keep the machine stationary, though more can be used if necessary.

Bruce W. Porter, Clarendon Hills, Ill.

## Window Attachment in Auto Supports Clothes Hangers

A simple window attachment to support clothes hangers when traveling by car can be made with only a short length of string or wire and a pencil, as shown in the illustration. Then, with a rear window rolled partially down, the pencil is



placed outside the window and the loop of the wire kept on the inside. The window is then closed and a clothes hanger suspended from the loop of wire. Several of these hangers can be used on each window.

Robert B. Forbes, Fort Custer, Mich.

## Worn Brass Fitting Turned By "Shim Grip" Wrench

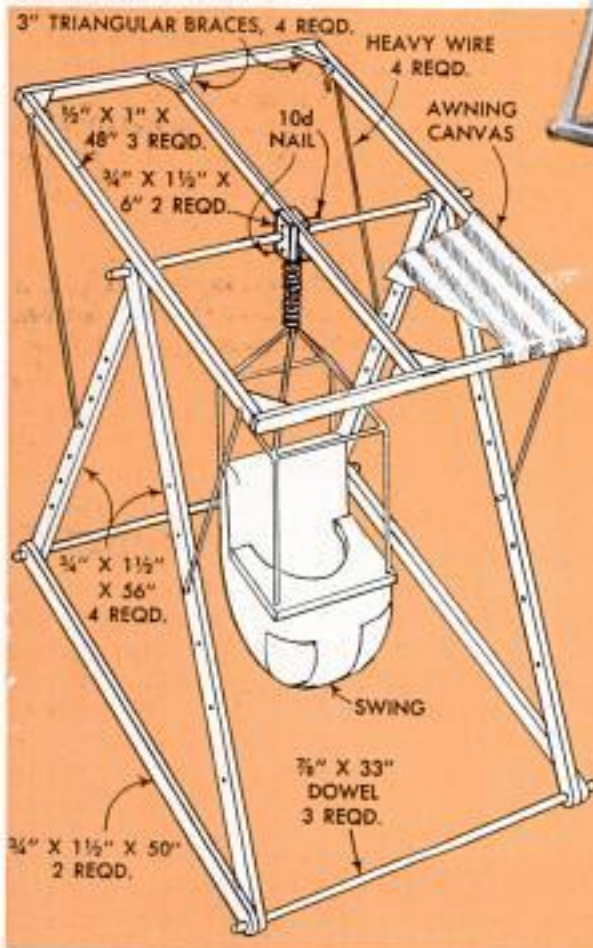
When a brass fitting, such as a tubing connector on an automobile oil filter, has become so rounded that a wrench merely slips around it, an L-shaped shim bent from sheet metal will restore a positive grip for the wrench. First, choose a box-end wrench that most nearly fits the brass shape, then drive the shim between the wrench and an angle of the brass fitting. If possible, screw another fitting inside the first to prevent it from collapsing. When the wrench is firmly locked on, simply turn out the fitting.—C. E. Packer, Oak Park, Ill.



## Play Yard Has Adjustable All-Day Awning



Photo above and the detail below show attachment of swing. Awning frame pivots at center. Right, standard playpen fits inside uprights



This novel play yard will keep a toddler happy and safe out of doors for hours at a time. The adjustable awning provides an all-day shade from the sun and there's room within the span of the supports for a standard playpen as in the photo above. When desired, the playpen can be removed and a swing substituted as in the upper left-hand photo and the detail. Note in the detail that the awning frame is held in place at the center by a 10d nail, which makes it easily removable. Adjustment is provided by four lengths of heavy wire, the upper ends being bent in a U-shape after insertion in holes drilled in the awning frame. The lower ends are bent at a right angle and inserted in spaced holes drilled in the slanting uprights. The length of the wires must be determined after assembly of the framing. Use hardwood and finish in the natural color with spar varnish.

M. L. Foster, Barrie, Ont., Can.

## Turns Computed Easily When Coils Are Wound on Metal Lathe

One craftsman has found that a handy method of counting turns when winding several coils is to use the thread gears on a lathe and to measure off the distance on the bed for carriage travel. For example, when several coils with 1760 turns each are required, he sets the thread gears for 176 threads per in., and then moves the

carriage to the end of the lathe bed and marks off 10 in. A toggle switch is clamped on so it will ring a bell when the carriage has traveled about 9 7/8 in. When winding is started, the coil is set at the first mark. When the bell rings, the carriage is stopped and turned by hand until it reaches the second mark. This will give 1760 turns.

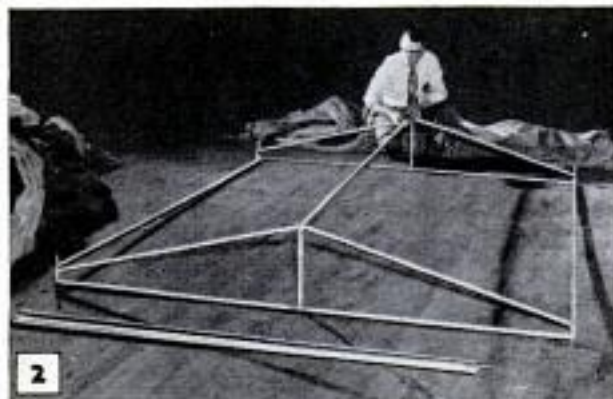
# ALL-WEATHER TENT

## Has Tubular-Steel Frame

By Jim Kendall



1 The tent folds into small units ready for transport. The screened sides and canvas top are intact



2 Tubular-steel frame is quickly assembled. Gable ends are single units of all-welded construction



3 Above, second step in setting up is placing canvas roof and screen sides over frame. Below, setting corner posts after roof and sides are in place



4

**S**PECIAL FEATURES of this tent will appeal to hunters, fishermen and campers on trips where protection from insects and inclement weather is the first requirement of camping equipment. It is just as good on week-end trips, too, as it's a screened breezeway and a storm tent in one. The basic unit consists of a tubular-steel frame and a canvas roof having walls of 16-mesh plastic screen sewed to the eaves all the way around. The ends of the screen are closed insect-tight at the front when the unit is set up and staked. Setting up the tent is accomplished in three steps as in Figs. 2 to 4 inclusive. Fig. 5 shows the unit set up as a screened enclosure, and in Fig. 6 the storm sides have been attached to serve as protection against wind, rain or snow.

For transporting, the canvas top and screen and the storm sides are placed in a sack, or duffel bag, and the roof frame dismantled as in Fig. 1. To set up the unit, the tubular frame is assembled as in Fig. 2. This is easily and quickly accomplished as the gable ends are welded units. The ridgepole and side members, or "plates," slip over pins welded to the gable ends. Next, the roof with its plastic-screen walls is stretched over the tubular frame as in Fig. 3. One end is then raised and the corner posts placed in position. Then the other end is raised for placement of the two remaining corner posts as in Fig. 4. This three-step procedure ends with the structure set up as in Fig. 5. Double ropes staked at all four corners hold the unit securely.

Build the tubular frame first, as all measurements to determine the size of the canvas and screen covering must be made with the tubular frame assembled. Note in Fig. 8 that all principal parts of the frame are keyed to the material list, which gives the sizes and kinds of materials used. The ridgepole and the two side members, part F, Fig. 8, each consist of two sections, one 72 in. long, the other 30 in. long. These join by means of a  $\frac{5}{8}$ -in. threaded rod 7 in. long, center detail, Fig. 8. The rod is pinned to the longer tube as in the cutaway view. The other end of the threaded rod is inserted in the open end of the short tube, forming an expansion joint adjustable by means of a nut. The nut on each assembled member provides a means of stretching the canvas roof after setting up the tent and also of slackening the tension on the canvas





when disassembling the tent. The gable ends, which consist of the parts A, B, C, D, E and H, are assembled by welding into a rigid unit. The ends of the tubes (the term "tubes" refers to both pipe and tubing used in the assembly) are shaped by filing to fit the rounded contours of the parts to which they are joined. Care must be taken when cutting to make allowance for filing the ends to fit before welding. All dimensions given are only close approximations. Note that the pins, parts H in Fig. 8, are shown in two locations on the frame. Six pins in all are required. They are cut approximately 2 in. long; one end is rounded and the other filed convex to fit the contour of the tubing. They are surface welded in the positions indicated. Some filing likely will be necessary on both the pins and open ends of the tubes in order to obtain an easy, sliding fit. The same is true of the expansion joints in the ridgepole and the two side

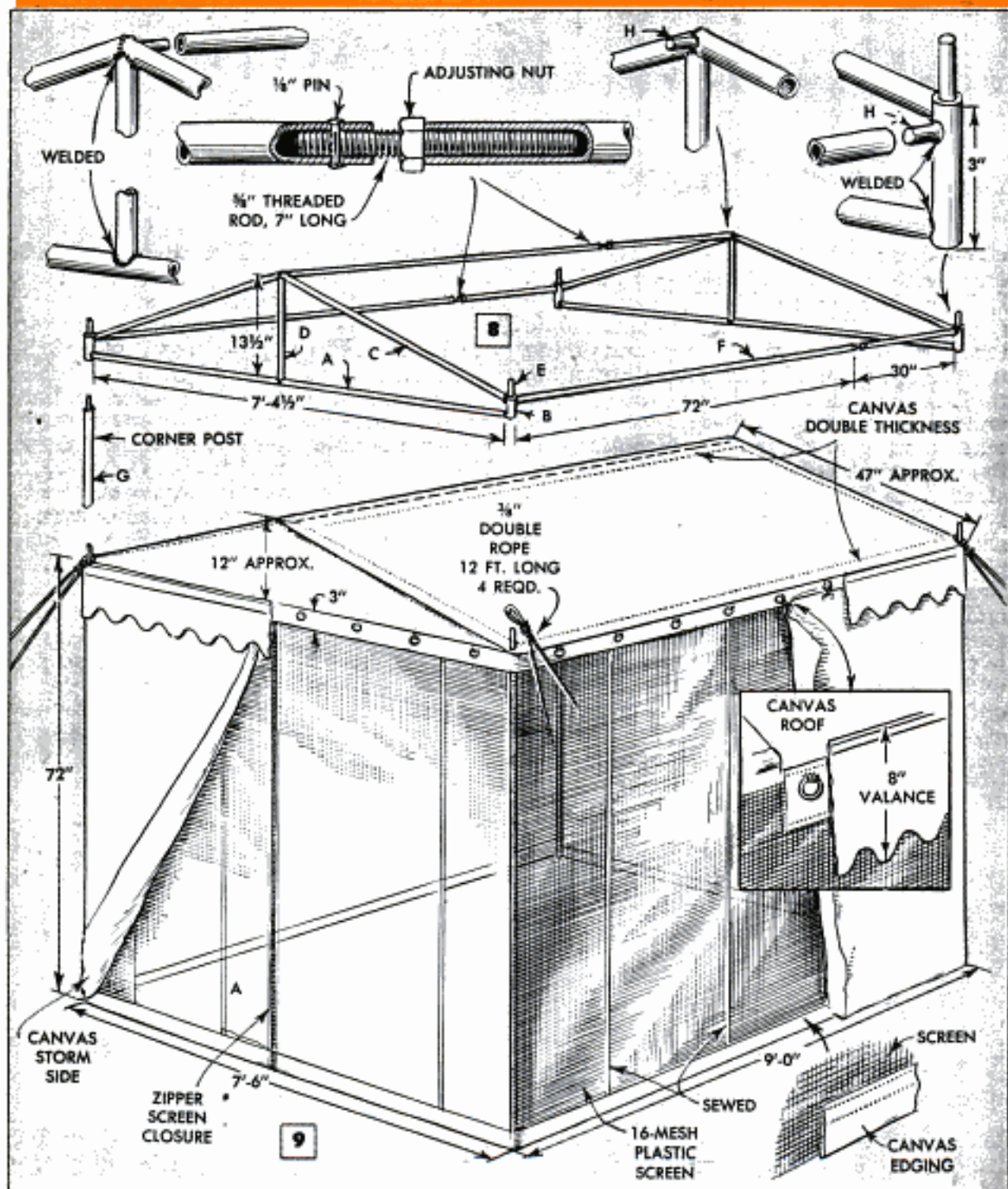
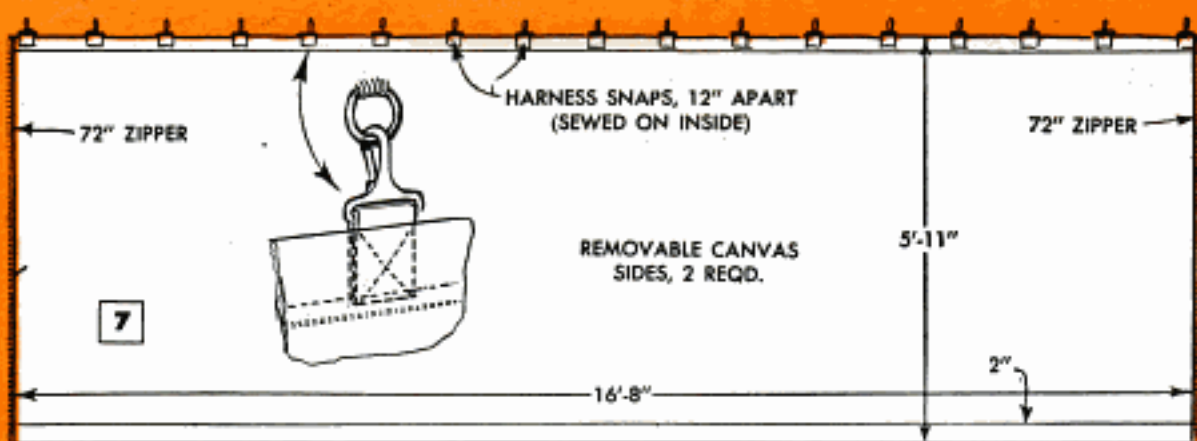
members, F in Fig. 8. Care must be taken to form sound welds on all joints in the frame assembly as the parts are subjected to considerable stress in normal use. The vertical pins, E in Fig. 8, may have to be shimmed into the ends of the short tubes, B, in order to obtain a tight fit as there are allowable variations in the inside diameter of the pipe from which these are cut. The projecting ends of the rods pinned into the upper ends of the corner posts, part G, Fig. 8, may also have to be filed or turned down to an easy fit in the lower ends of the corner tubes, B. The projecting rods, or tenons, are pinned into the ends of the posts in the same manner as are the threaded rods which form the expansion joints in the parts F, Fig. 8. Ends of the pins are peened over so that they hold securely.

The 16-mesh screen which encloses the area under the roof consists of strips of screening of standard width sewed together

**All set for use as a comfortable screened enclosure. Zipper at front closes screen, keeps out insects**

**Attachment of storm sides protects interior against wind and rain. Storm sides are closed from interior**





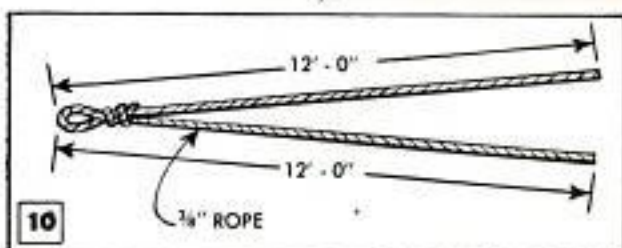
## MATERIAL LIST—TENT FRAME

- \*(A) 2 pcs.  $\frac{1}{2}$ " Thin-wall conduit, 7'-4" long
- (B) 4 pcs.  $\frac{1}{2}$ " Steel pipe, each 3" long
- (C) 4 pcs.  $\frac{1}{2}$ " Steel pipe, each 46 $\frac{1}{4}$ " long
- (D) 2 pcs.  $\frac{1}{2}$ " Thin-wall conduit, each 13 $\frac{1}{2}$ " long
- (E) 4 pcs.  $\frac{3}{8}$ " Steel rod, each approximately 4 in. long
- (F) 3 pcs.  $\frac{1}{2}$ " Steel pipe, each 72" long  
3 pcs.  $\frac{1}{2}$ " Steel pipe, each 30" long
- (G) 4 pcs.  $\frac{1}{2}$ " Thin-wall conduit, each 72" long
- (H) 6 pcs.  $\frac{3}{8}$ " Steel rod, each 2" long  
1 pc.  $\frac{5}{8}$ " Threaded steel rod (for expansion joints)

\*Parts are shown letter-keyed in Fig. 8

to form a continuous strip with a single zipper closure at the front. A screen flap, extends 12 in. beyond the zipper, part A in Fig. 9, the edge being clothbound. The canvas roof is made first, the measurements being taken over the tubular frame assembled on a flat surface. Expand the joints in the ridgepole and side members about 1 $\frac{1}{2}$  in., this allowance being necessary for possible shrinkage of the canvas. Be sure when measuring to make allowance for seams and the 3-in. drop at the eaves, Fig. 9. After the parts of the roof have been stitched together the screen is sewed into the 3-in. drop. The unit is completed with a scalloped flap, or valance, fastened to the eaves as in the detail, Fig. 9. Steel rings are sewed under the valance all the way around as in Fig. 9. The rings are spaced 12 in. apart.

The canvas storm sides, Fig. 7, consist of two identical units, each 16 ft. 8 in. long and having a zipper closure at the front and back of the tent when in position. Each unit is attached to the tent over the screen by means of harness snaps which are spaced 12 in. apart as in Fig. 7. These snap



into the rings sewed to the roof under the valance, forming a watertight closure. In use, the zipper at the front of the tent is closed from the inside. Where possible, all canvas parts should be made up by a dealer in awnings having the necessary equipment for the heavy seam work required. Use a heavy grade of waterproof canvas of the type used in making tents. Provide four tie ropes made as in Fig. 10, also suitable stakes. ★★★

## Photo Chemicals Filtered Through Medical Cotton

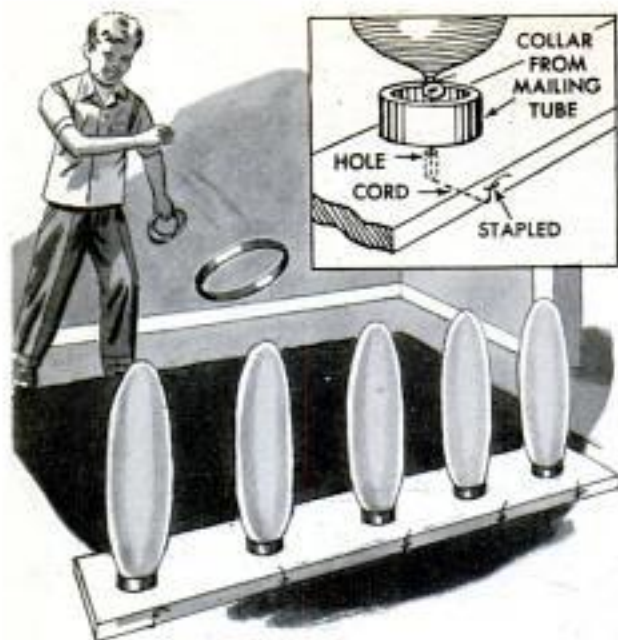
Medical cotton of the type packaged in the form of balls, provides efficient, disposable filters for photographic chemicals and other solutions. A ball of cotton is dropped into a funnel, as shown, so that liquid poured into the funnel must pass through the cotton. Packages of cotton balls are available at drugstores and drug counters of department stores.

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

## Dowel Ends Vented in Vise

Instead of shaving one side of dowel ends to vent them for driving and gluing, the same purpose can be accomplished by crushing the ends slightly in a bench vise. Moisture from the glue will cause the ends to expand again after they have been inserted in the holes, thus providing firmer anchoring than ordinarily possible.

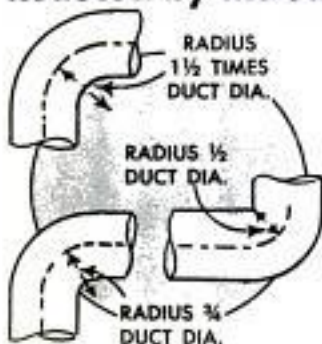




### "Stakes" for Ring-Toss Game Are Inflated Balloons

Novel "stakes" for a ring-toss game can be made by using a few balloons fitted in cardboard collars on a strip of smooth wood. The balloons, which should be the elongated sausage type rather than spherical, are inflated to a diameter of about  $3\frac{1}{2}$  or 4 in. and tied shut with lengths of string. They then are placed over collars cut from a cardboard mailing tube and the strings passed through holes drilled 6 in. apart on the wooden strip. The ends of the strings are stapled to the edge of the strip after the balloons are pulled to a vertical position. Embroidery hoops about 6 in. in diameter are used as rings for the game.

### Resistance in Air-Duct Turns Reduced by Increasing Radius



Right-angle turns in air ducts used for warm-air heating and air conditioning should, if possible, have a radius equal to  $1\frac{1}{2}$  times the duct diameter, upper detail. A turn in which

### *A playtime cottage . . .*

is something that children will never tire of, especially when it boasts such features as its own table and chairs, bunks for overnight sleeping, electric lights and even a puppet stage. It looks like a real house in miniature, complete even to the front porch. Completely detailed plans for it will be featured in next month's issue

radius is equal to three fourths the pipe diameter presents twice as much resistance, while a turn equal to one half the radius of a duct offers four times as much resistance. Lines which conduct fluids are similarly influenced by the radii of the turns.

### Sanding Disks Will Not Tear If Reinforced With Tape

Sanding disks won't tear out at the center washer if the slots around the center hole are reinforced with masking tape. The tape is applied to the back of the disk before it is mounted on the rubber plate. Thus reinforced, the disk will stay on until it is worn out and needs to be replaced.



L. D. McNamara, Columbus, Ohio.

### Modified Cords on Floodlamps Permit Easier Storage

Replacing the extension cords of photo floodlamps with short leads and male plugs will permit easier storage and portability of the lamps. Also, the nuisance of cords dangling from the lamps when they are being located is eliminated. The removed extension cords are fitted with female plugs and, when the lamps have been approximately located for the picture, the cords are run to the lamps and connected. Another method is to use a single, rather long, extension cord to which a number of sockets have been wired. The single extension then is run from lamp to lamp and each one plugged in.

Hugh Lineback, Stillwater, Okla.



# REBUILDING OLD AUTO ENGINES

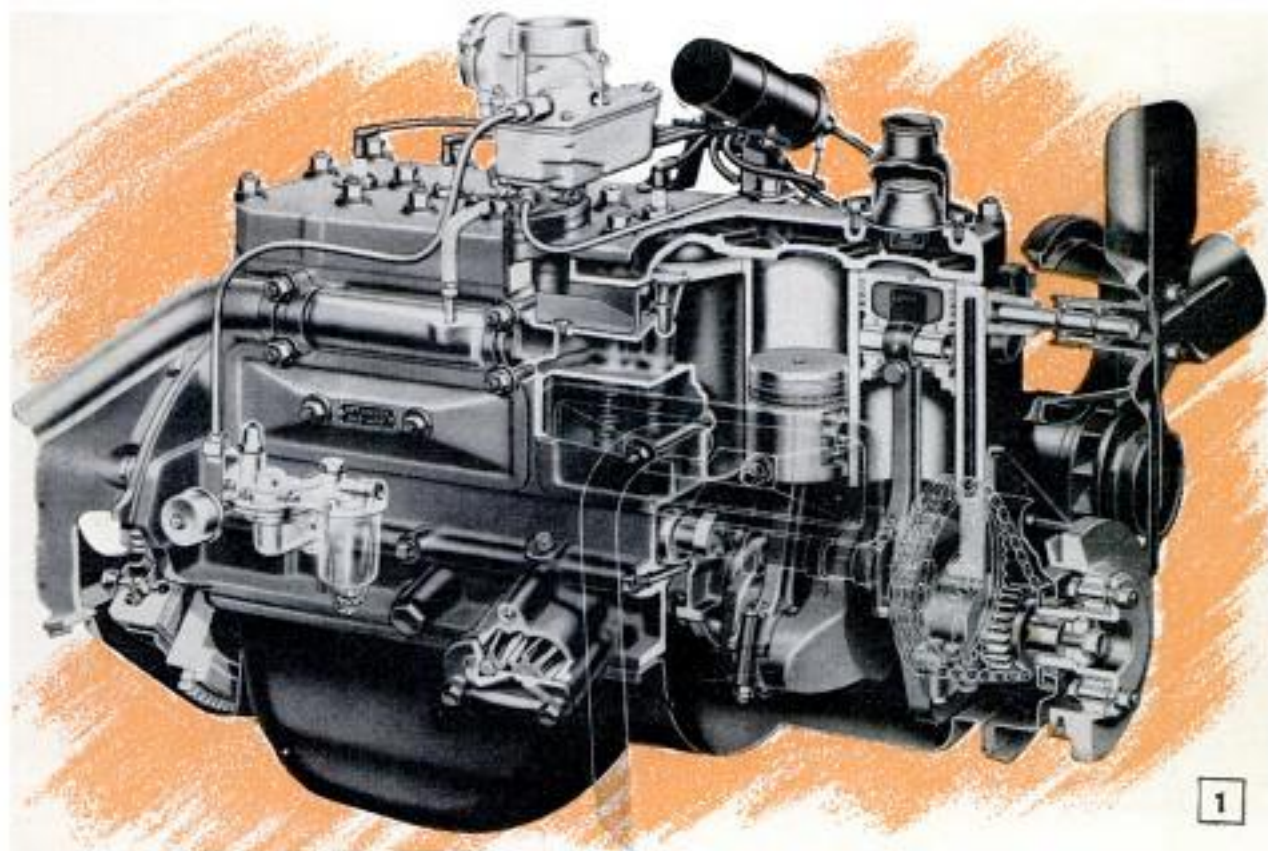
By Ed Packer

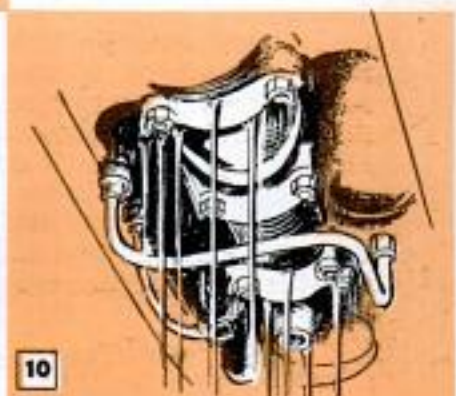
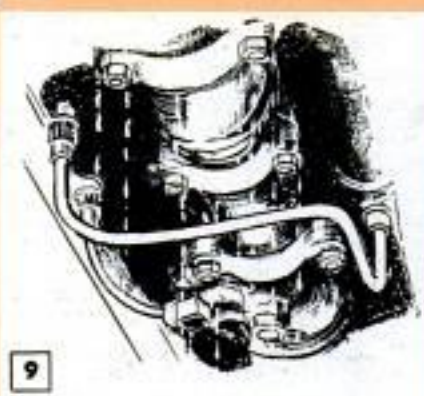
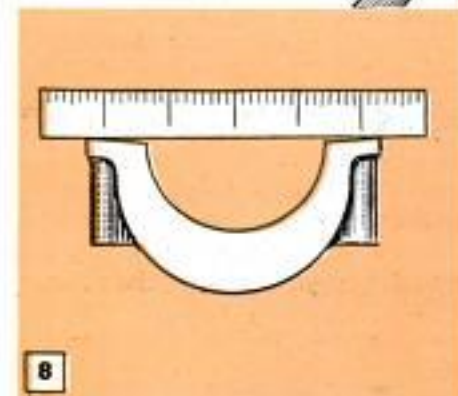
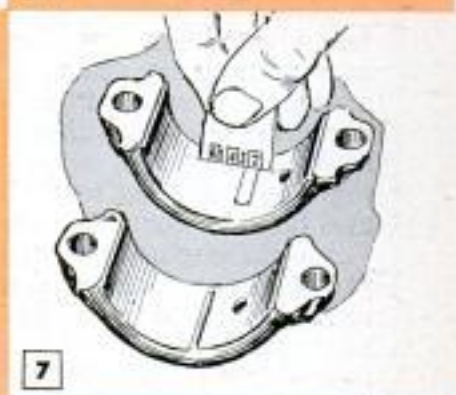
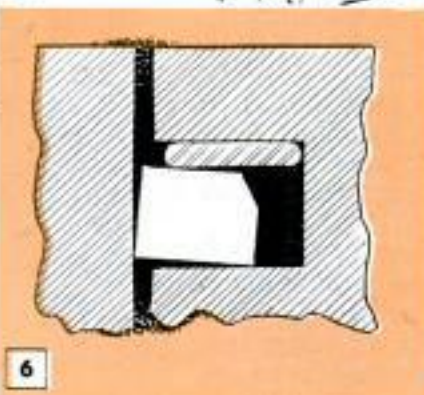
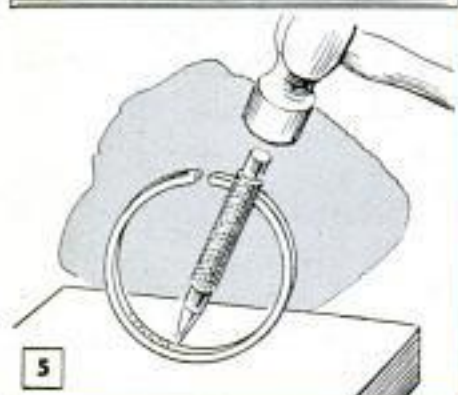
**F**OR STATIONARY POWER applications beyond convenient reach of electric power lines, an old auto engine is hard to beat. On heavy beltwork and as a power source for certain types of portable farm equipment, such as shellers, grinders, sawmills and pumps, a reconditioned six or eight-cylinder engine can turn up the speed and horsepower required.

An old engine, long neglected, can look pretty hopeless either in or out of the chassis. But it's the useful life left in the wear parts that counts. Old engines often are in better condition than they appear to be. Usually the first step in reconditioning is to clean and space plugs and breaker points, replace damaged wiring, add oil, water, fuel and a battery to turn the engine over. At the time the plugs are removed for cleaning, pour a small quantity of crankcase oil in each cylinder, about two tablespoonfuls. Turn the engine over several times with the ignition off. This will distribute the oil over the cylinder walls. Start



the engine and adjust the carburetor to give a slow idle. Let the engine run for 10 min., then shut off the ignition without acceleration. Remove the cylinder head and drop the oil pan, or sump. At slow idle the high vacuum will pull oil past the pistons if the rings are stuck or the cylinder walls in poor condition. This will show as a wetness on the tops of the pistons, also on the valves and spark plugs. On the other hand,



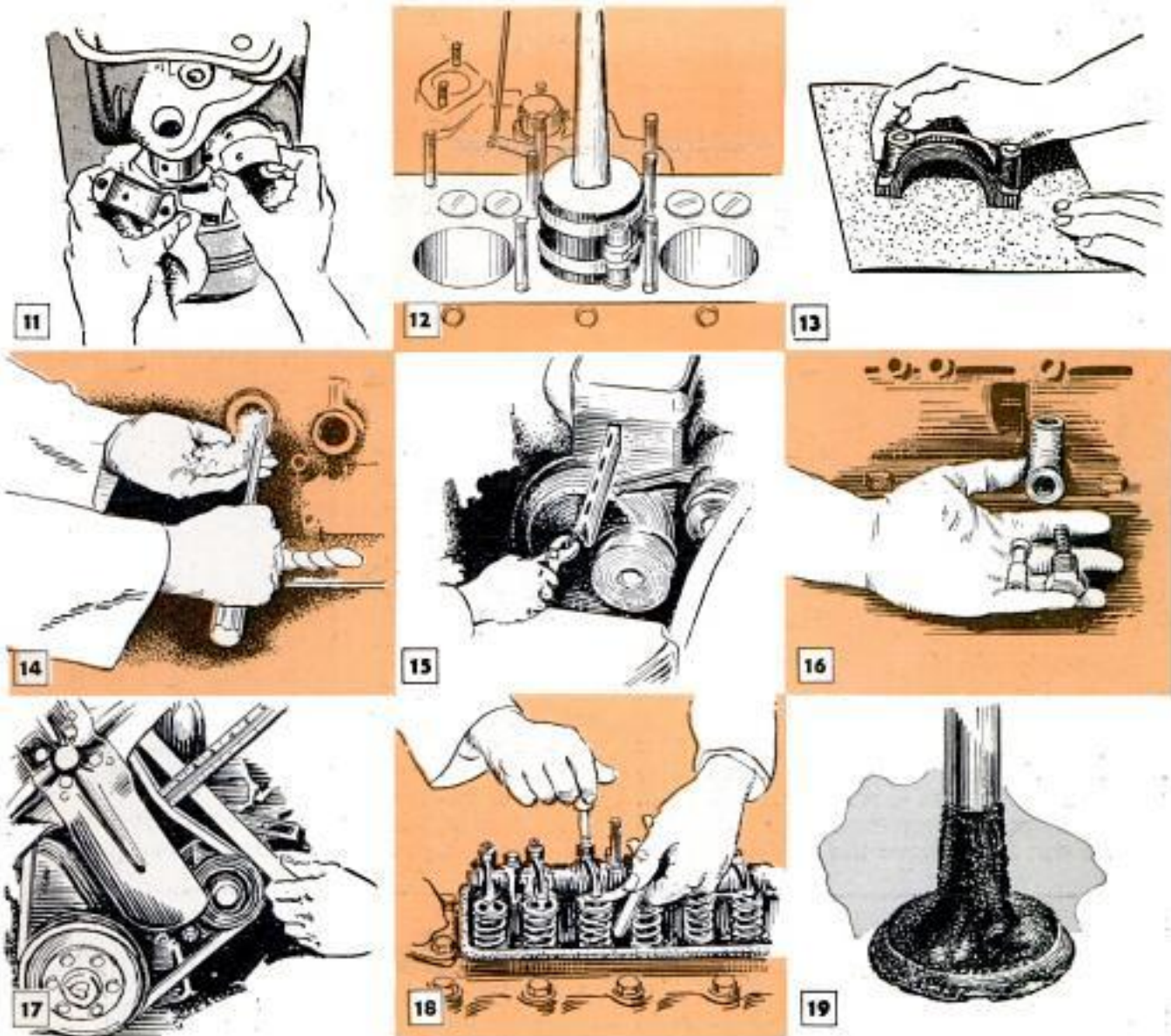


if these parts are still in good condition, the surfaces will be dry. In this case, removing carbon deposits and grinding the valves generally will be sufficient to put internal parts in good operating order. However, nearly all old engines of four, six and eight-cylinder types, Fig. 1, will have cylinders worn out-of-round, ridges at the top ends and possibly light scoring of the cylinder walls. These will require either reboring and the installation of oversize pistons, or removing the ridges at the top ends of the cylinders, honing and the installation of special rings and piston expanders. Methods of removing the ridges and honing the cylinder walls are shown in Figs. 2 and 3. However, before removing the pistons for reconditioning, test the condition of the main and connecting-rod bearings, also camshaft bearings, using a pressurized tank containing No. 20 lubricating oil. This is connected to the engine oil line and the pressure raised to about 30 lb. Drops of oil forced out of the bearings, Fig. 9, indicate that they still are in reasonably good con-

dition. Streams of oil, Fig. 10, usually indicate the need for bearing replacement.

When removing connecting-rod bearing caps always check each one with a straightedge, Fig. 8. When necessary, true the cap as in Fig. 13. Bearing clearances are easily checked by using a precision plastic strip especially made for the purpose, Fig. 7. This is placed in the cap, which is tightened. The strip flattens and its width is measured with a special scale as in the upper detail, Fig. 7. This gives the bearing clearance sufficiently accurate for all practical purposes. Another thing to be sure about when reassembling the bearing caps after reconditioning is the location of the oil holes, or "squirt" holes, as they are often called. Make certain that the caps are replaced with these holes in register with those in the crankpin, Fig. 11.

Older-type piston rings in serviceable condition can be expanded, or tensioned, with a row of punch marks as in Fig. 5. Usually, however, it is advisable to install new rings in accordance with the manufacturer's in-



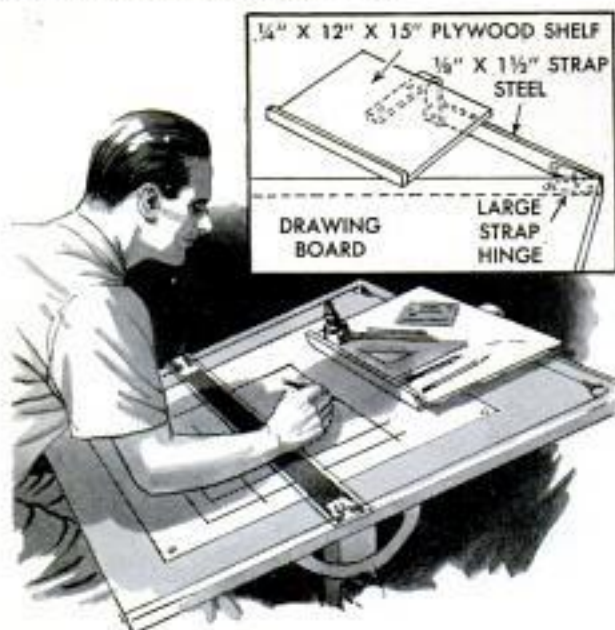
structions. In some cases, ring fillers will serve the purpose, Fig. 6. After installing a filler be sure that the ring is free as in the exaggerated view, Fig. 6. When installing pistons, use a ring guide as in Fig. 12.

While the engine is dismantled give the valves a thorough going over. Valves badly pitted and carboned like that in Fig. 19 are seldom worth the attempt at reconditioning. If the valves are in generally poor condition, it's good economy to replace them all. New guides also may be needed, as they are likely to be badly worn. Check for correct valve clearance and adjust as in Fig. 18. Refer to the manufacturer's instructions for the correct clearance. When reassembling the engine be sure to use all new gaskets, cotter pins, lock washers and nuts if the latter have been damaged in any way. It will pay to borrow or rent a tension wrench so that nuts and cap screws can be drawn to a uniform tension, especially on the oil pan, cylinder head, water-pump and timing-gear housings.

A lot of sediment collects in the water

jackets of an older engine. This will not ordinarily be removed by regular cleaning procedure. The only sure way to get at it effectively is to remove the expansion plugs in the sides of the block, Fig. 14, and loosen the deposits with a screwdriver, or similar tool. Some engines are fitted with a water-distributing tube which should be replaced as a rule, Fig. 15. With the expansion plugs and the water tube removed, hose out the block with water under pressure. Then replace the plugs (new ones generally are required) and the water tube. Replace the thermostat while the cooling system is open. Final checks on the engine itself include the oil-pressure-regulator spring, Fig. 16, and the slack in the fan belt, Fig. 17. In most cases, it will be advisable to replace the regulator spring and readjust or replace the fan belt. When auto engines are used for stationary work it usually is necessary to increase the capacity of the cooling system. This usually is done by substituting a radiator of greater capacity than that originally supplied. ★ ★ ★

## Shelf Above Drawing Board Swings on Strap Hinge



Especially useful where a parallel straightedge is used on a drawing board, a swinging shelf keeps tools and supplies handy yet off the board. The shelf is a 12 x 15-in. sheet of  $\frac{1}{4}$ -in. plywood screwed to an L-shaped piece of  $\frac{1}{8}$  x  $1\frac{1}{4}$ -in. steel strap. The L-shape is long enough to hold the shelf about 2 in. above the drawing board

when it is bolted to another length of strap steel. The latter strap is bolted to a strap hinge screwed to the back edge of the drawing board at the right side. The hinge pin is upset so the hinge will stay in whatever position it is placed when the shelf is swung back.

Leonard W. Mitchell, Carrsville, Ky.

## Litmus Paper Held With Tweezers

To prevent false or confusing reactions on litmus paper, which might be caused by perspiration stains from his fingers, one chemist handles the sensitive paper with small tweezers. Less paper is wasted when the tweezers are used, because there is no stained portion that must be cut off before the paper is used.



A pair of tweezers is kept in the litmus-paper containers so they are always at hand when needed.

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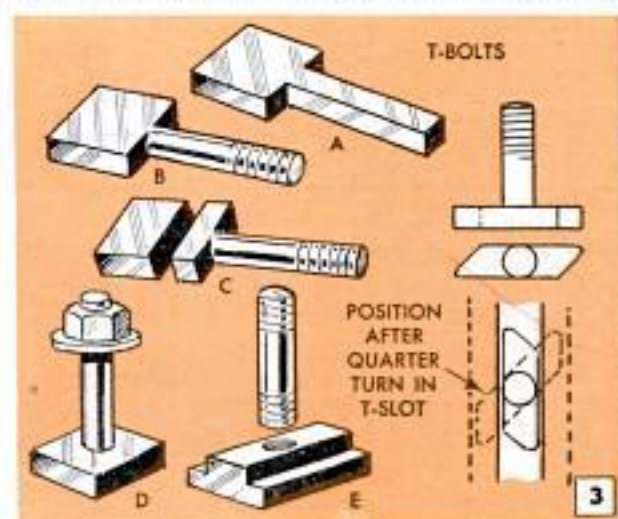
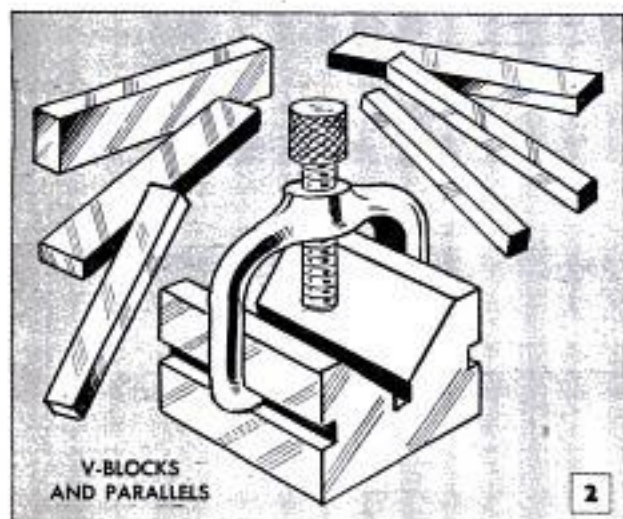
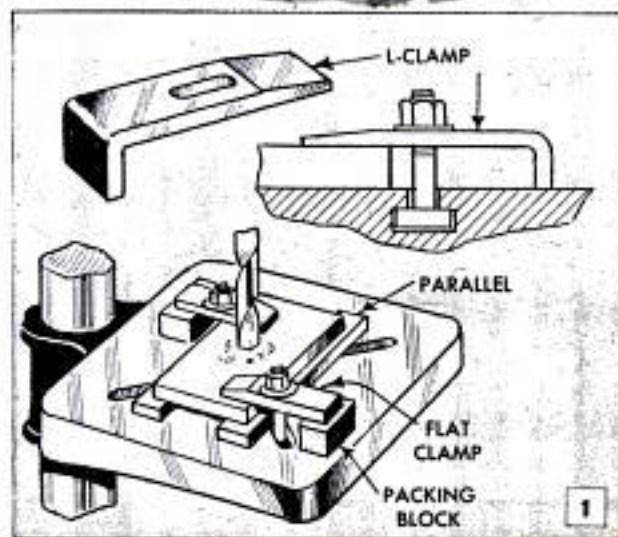
# SHOP NOTES

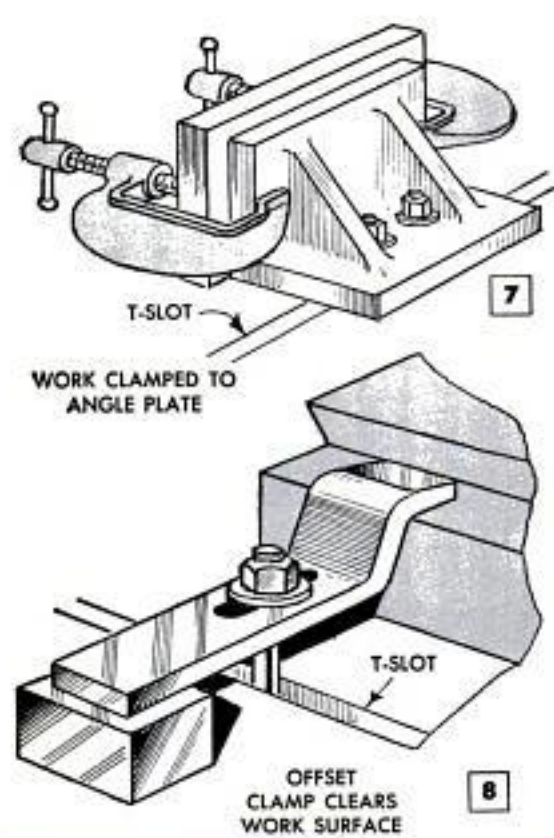
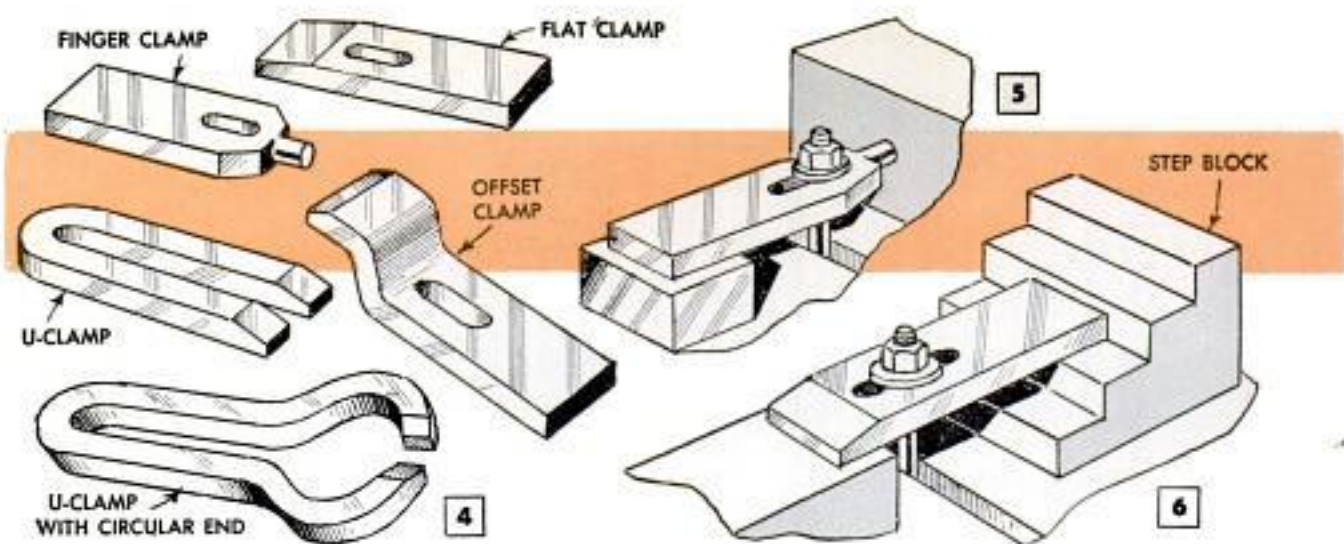
## Make Your Own T-BOLTS AND CLAMPS

By C. W. Woodson

ACCURATE MACHINING of work mounted on the drill press, milling machine or metal shaper requires that the work piece be securely clamped to the machine table so that it cannot shift under cutting stresses. Ordinary C-clamps and machine vises do not always meet this exacting requirement. Machinists use T-bolts and clamp bars, or hold-downs of various types and sizes, many of which are made in the shop. Most of the smaller sizes are easily made from stock materials.

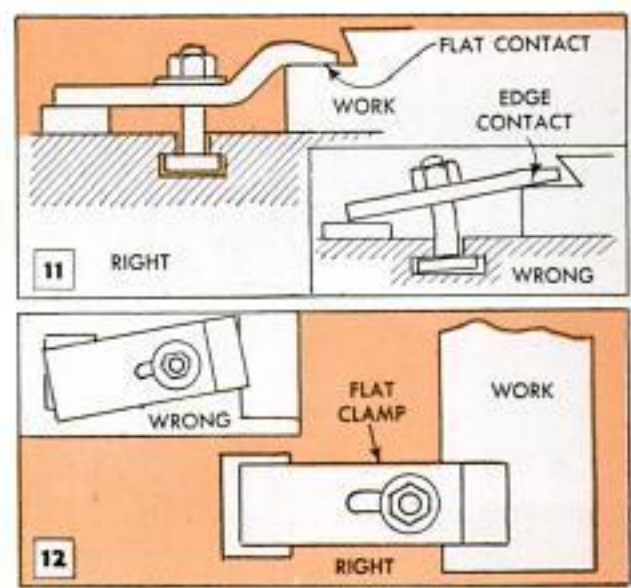
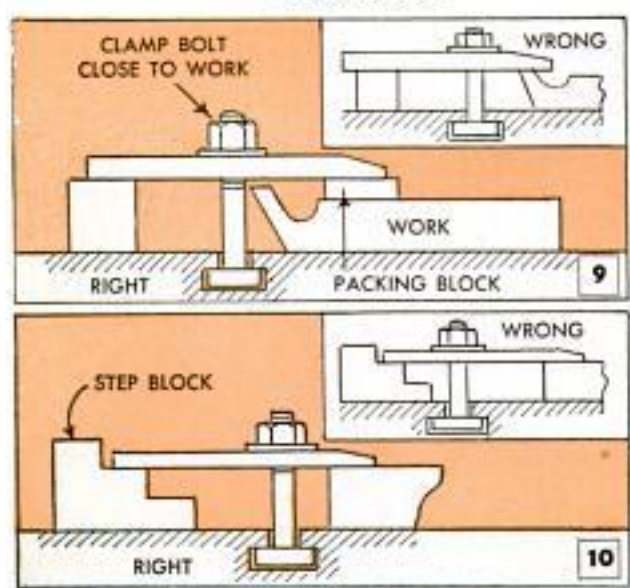
Fig. 1 shows a typical setup on a drill-press table using two flat clamps, two T-bolts, two parallels and two packing blocks. On some types of light work the L-clamp, Fig. 1, can be substituted in the setup. The L-clamp eliminates the need for packing blocks, thus speeding up setups on repetitive work. Parallels (not to be confused with machinist's precision parallels), or shims, are cut from mild-steel bar stock of various widths and thicknesses to suit the purpose, Fig. 2. A conventional V-block with clamp, Fig. 2, usually is included in the kit of clamping accessories. T-bolts, so-called because of the special shape of the head, usually are made in the shop. They also may be purchased in conventional types. Details A, B, C, D and E in Fig. 3

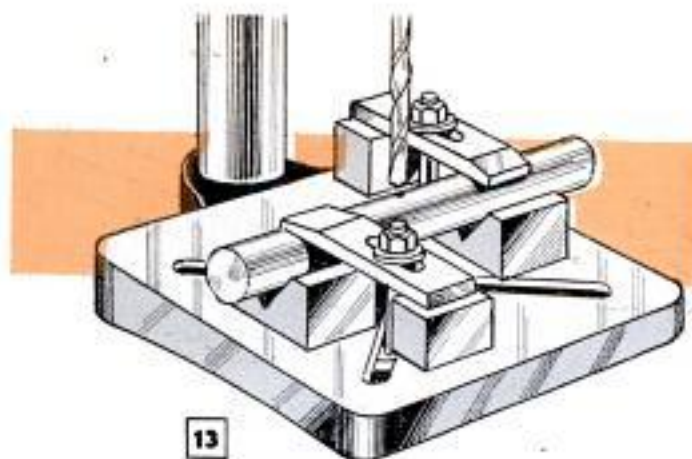




show several types commonly used. Details A, B and C show the development of the quarter-turn bolt which is especially designed to be dropped into the T-slots in machine tables and locked by a quarter turn as in the details at the right in Fig. 3. This bolt is easily turned in a lathe from flat stock. The square-head bolt, detail D, will withstand the greatest clamping pressure, but the shape of the head makes it necessary to insert it in the end of the slot in the machine table. Machinists generally use the squarehead bolt and the quarter-turn bolt in combination, as the latter can be inserted in the slots in the table at any point and tightened on the clamp bar. The T-head slide, detail E, Fig. 3, is tapped for a stud as shown and is designed for use where the clamp must be assembled after the work is placed in position on the machine table. The accessory kit generally includes assorted sizes of all the common types of bolts.

Four different shapes of clamps, or clamping bars, are shown in Fig. 4. Unusual setups using the finger clamp and the straight, or flat, clamp are detailed in Figs. 5 and 6. The finger clamp, Fig. 4, is especially useful where the nature of the work makes it necessary to

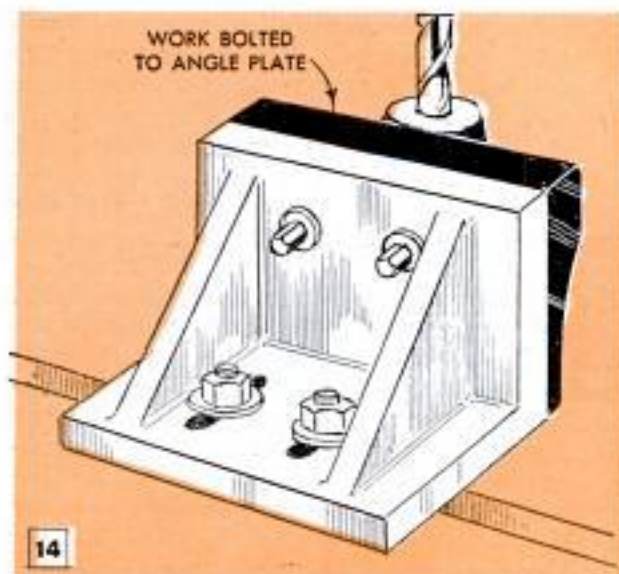




13

V-BLOCKS AND FLAT CLAMPS  
HOLD ROUND WORK

place the clamp so as to leave a clearance for machining the surface of the work. In this case the finger of the clamp is inserted in a hole or slot in the side of the work piece in such a manner that the clamp, packing block and clamp nut are below the surface to be machined. In the setup in Fig. 6 the unusual feature is the use of a step-type packing block. A similar step-block setup is illustrated in Fig. 10. Special short T-bolts are handy for angle-plate setups as in Figs. 7 and 14. In Fig. 7 the work piece is clamped to the vertical face of the angle plate with machinist's C-clamps, while in Fig. 14 the work is attached to the vertical face with bolts. In some cases the offset clamp can be used as in Fig. 8 where it is necessary to provide machining clearance. Right and wrong methods of making setups with clamps and T-bolts are detailed in Figs. 9 to 12 inclusive. Note especially the correct placement of the T-bolts in relation to the edge of the work. Flat clamps, V-blocks and packing blocks also can be combined in an accurate setup for drilling round work in the manner shown in Fig. 13. ★ ★ ★



14

## Blade of Rotary-Type Lawn Mower Turns on Auto-Wheel Spindle



Parts from an automobile front-axle assembly are combined with metal scraps from a farm machine shop to build this rotary-type lawn mower, which is powered by a ½-hp. electric motor. An 18-in. blade is mounted on a cut-down front-wheel spindle from a car. Bevel gears on the spindle and motor shaft provide direct drive to the mower blade. The wheel hub, with bearings and spindle stub, was removed from the brake drum and bolted directly to a semicircular steel plate that forms the top of the mower. Two rubber-tired wheels are fitted at the back of the mower, while a single wheel at the front is pivoted to permit easier steering.

A. M. Wettach, Mt. Pleasant, Iowa.

## Portable Chicken Feeder

A large, portable chicken feeder can be made easily by supporting a 5-gal. paint or grease pail above the bottom of a wide, shallow pan. Remove the bottom of the pail and punch four holes, equally spaced, near its lower edge. Two ¼-in. steel rods span the pan, passing through the holes in the pail and corresponding holes in the pan. The rods support the pail above the bottom of the pan and also permit picking up the feeder as a unit by the bail.





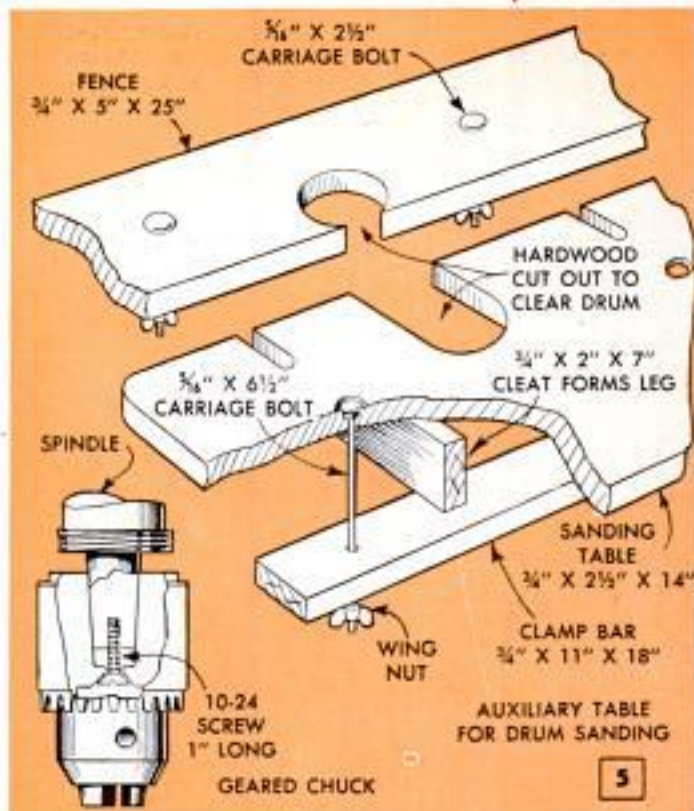
1 For best results, drum-sanding should be done with an auxiliary table bolted to the drill-press table



2 In some cases where work is small size, drum can be worked off edge of machine table in manner pictured. Lower end of drum should be below surface of table



3 Above, purpose of auxiliary table is to permit running drum with its lower end below surface. Below, table with raising cleats allows drum to be adjusted up or down to equalize wear on the abrasive sleeve



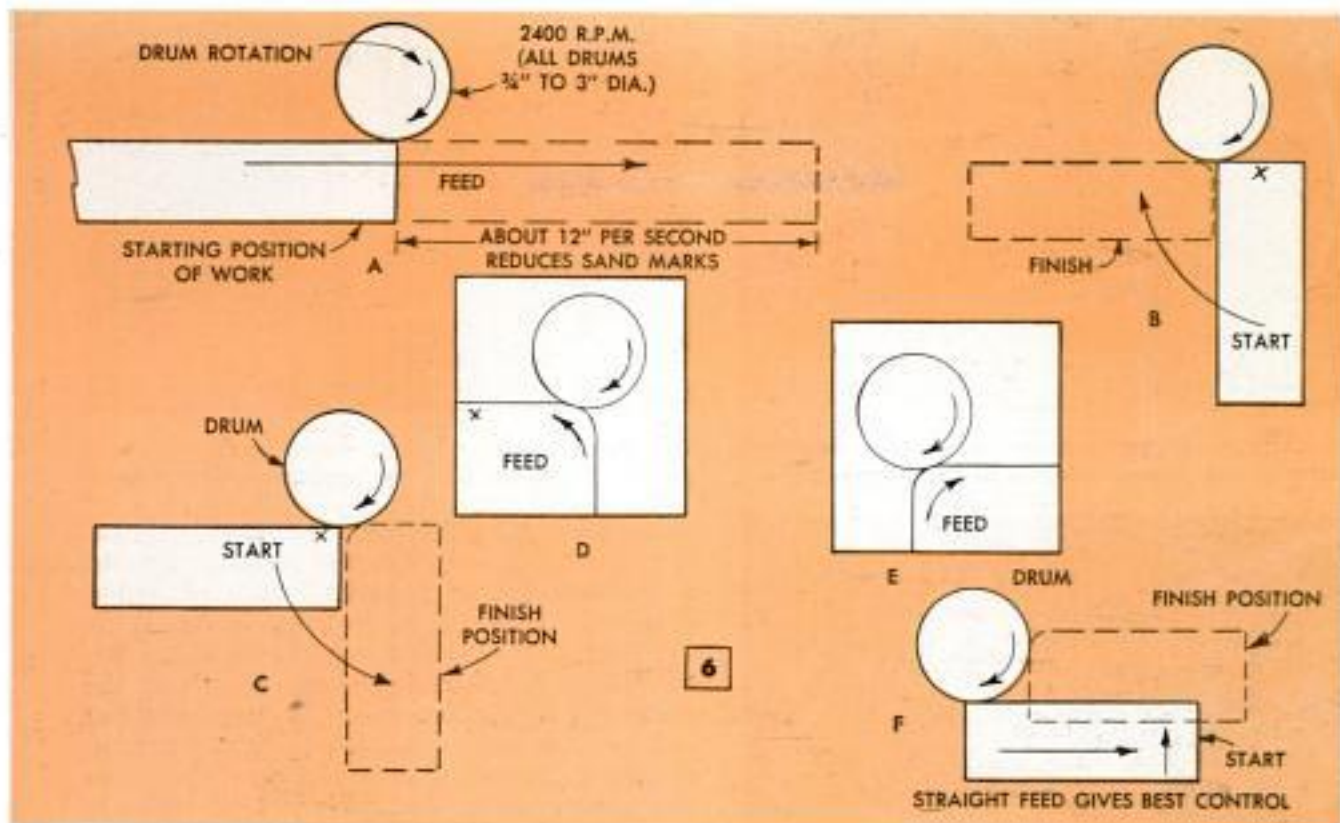
# High-Speed

By Sam Brown

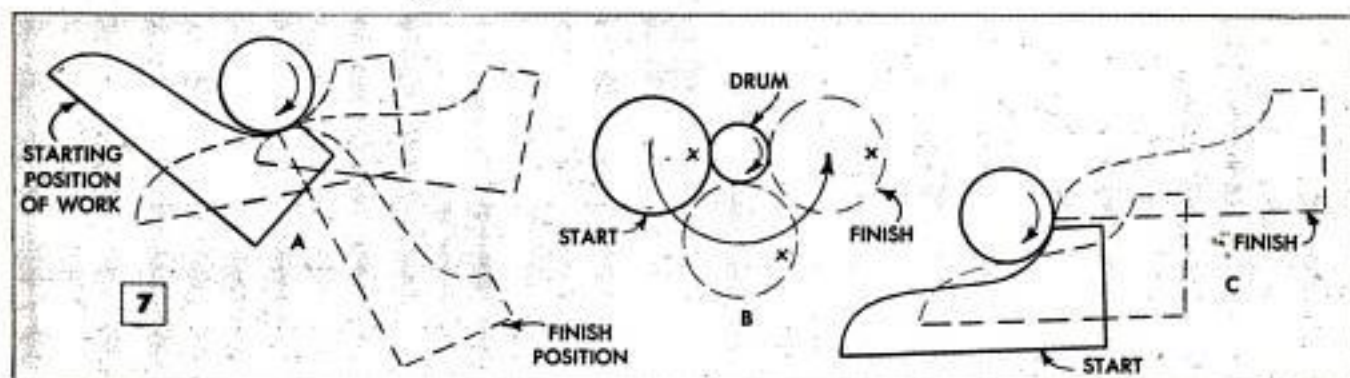
**Y**OUR DRILL PRESS can take the hard work out of sanding both edges and flat surfaces. Edge-sanding by hand is a tedious, unsatisfactory job at best, especially if the nature of the work demands that you produce a perfectly square edge without rounded corners. Due to the slow speed of the abrasive in hand-sanding it is difficult to eliminate scratches, even though different grades of sandpaper are used. Also the abrasive grains in the coarser grades tend to "track" on the surface, leaving comparatively deep scratches due to the tendency of each individual grain to load with wood fibers.

In machine-sanding the relatively high surface speed of the abrasive produces remarkably smooth work even with the coarser grades of abrasive. Due to the movement of the work and the abrasive, the individual abrasive grains do not track. Smooth work and faster cutting result on both hardwoods and softwoods, on both surface sanding with a disk and edge sanding with a drum. Abrasives of different grades cut fast and clean with only moderate pressure.

**Drum-sanding setups:** Small sanding drums suitable for use with a home-shop drill press come in a wide range of sizes,



# Sanding on Your Drill Press



from about  $1\frac{1}{16}$  to 3 in. dia. Both the drums and the abrasive sleeves are inexpensive and very efficient for edge-sanding curved work. Figs. 1 to 5 inclusive show typical drum-sanding setups on a drill press. On curved work of the type pictured it is necessary to provide an auxiliary table of plywood with a hole at the center through which the drum can be worked as in Figs. 1, 3 and 4. In some cases the drum can be worked off the edge of the drill-press table as in Fig. 2. However, only short pieces of work can be adequately supported in this setup. The method of mounting the sanding drum varies. For light work where only light side pressure is required, the spindle of the drum can be held in the geared chuck which is regularly supplied with the machine, Fig. 2. On drums having

sleeves, a  $\frac{1}{2}$ -in. adapter spindle is used. Accessory adapters or interchangeable spindles are supplied for nearly all small drill presses. The mounting point on these accessories is closer to the spindle bearing, thus reducing the overhang as in Figs. 1, 3 and 4. On some drill presses the geared chuck is mounted on a tapered spindle. Side pressure sometimes loosens the chuck. This can be prevented by drilling and tapping the end of the spindle for a machine screw as in Fig. 5, the lower left-hand detail. Drill the spindle as in Fig. 12. Although manufacturers do not ordinarily recommend this procedure it is permissible where possible slight impairment of chuck accuracy is not important.

**Drum-sanding procedures:** Fig. 5, the upper detail, shows a convenient sanding



8 Coating the soft-rubber drum with commercial talcum powder will prevent sticking of the abrasive sleeve



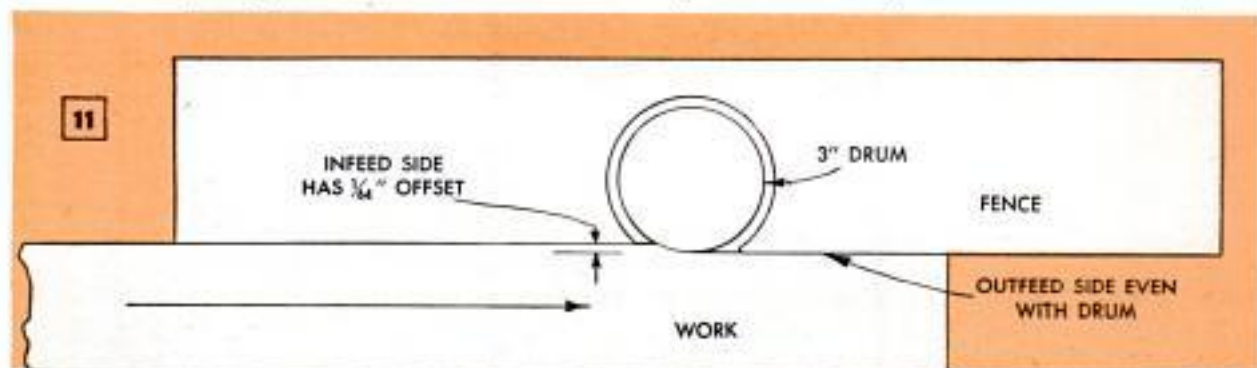
9 Wire-brushing the abrasive sleeve occasionally will prolong its useful life and produce smoother work



table which is designed to clamp onto the drill-press table. A similar auxiliary table is pictured in Fig. 4. When sanding the edges of straight work where the width dimension is not extremely important, the work is moved past the drum from left to right as in Fig. 6, detail A. When a certain amount of stock must be removed by sanding and the width must be uniformly close, use a guide fence as in Fig. 11. When sanding uniform curves and especially when rounding corners with a drum, details B and F show what is generally considered the best procedure when very smooth sanding is required. Other methods, details C, D and E, produce fairly good results where finish is not so important. Although 2400 r.p.m. is a recommended speed, any speed between 2000 and 3000 r.p.m. will give good results, provided feeding of the stock is properly handled. When drum-sanding curved work, the procedures A and C de-

tailed in Fig. 7 often are used, that in detail C giving uniformly the best results. Truing a bandsawed or jigsawed disk of wood generally is done as in Fig. 7, detail B. Ordinarily this is done freehand when the accuracy of a turning is not required. In some cases it is necessary to spot-sand the high areas before finish-sanding for true contour. Before applying a new sleeve to the drum, dust the surface with talcum powder as in Fig. 8. This will prevent the sleeve from sticking. Wire-brushing the sleeve occasionally, Fig. 9, will prolong its useful life. Ordinarily, this is most effective if done while the machine is running.

**Guided sanding:** Although nearly all drum-sanding on a small drill press is done freehand, straight work usually requires a guide fence made to suit the purpose. Examples are shown in Figs. 13, 14 and 15. In order to produce a true edge on the work and at the same time prevent undue wear on the lower edge of the sanding sleeve, it is necessary to lower the drum below the surface of the sanding table. This requires an auxiliary table of plywood and a separate guide, or fence, set up as in Fig. 13. A hole is drilled or sawed through the guide, the diameter slightly greater than that of the drum, Fig. 11. Then the edge of the guide is planed with a  $\frac{1}{16}$ -in. offset between the infeed and outfeed edges as in Fig. 11. The fence and auxiliary table are then bolted to the machine table. Adjust to the correct position before tightening the bolts. If you're working to close dimensions, test

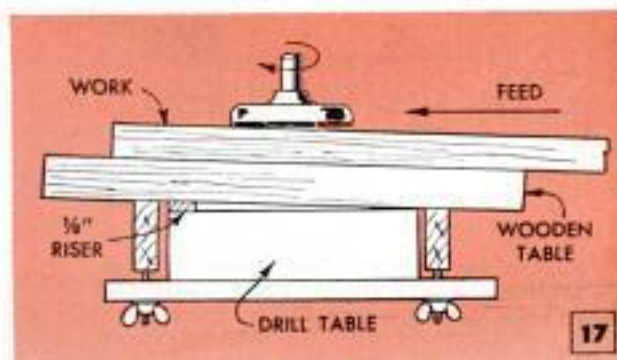




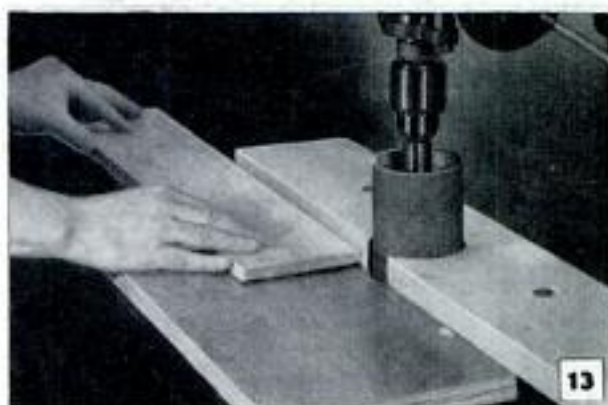
When drilling spindle, place drill bit in vise and lower spindle onto it slowly. Use very light feed

the setup on a piece of waste stock and readjust if necessary to give the desired results. In sanding straight work the rate of feed is not so important as uniformity. The work must be kept moving at a uniform rate past the drum. If the work is stopped at any point along its length while in contact with the rotating drum, it may be scored or burned at the stop point. An uneven feed can produce scoring at intervals along the length of the stock. On short work, such as that pictured in Fig. 13, it is possible to make the sanding stroke with one sweep of the arms without removing either hand from the work. On longer stock it will be necessary to shift the hands alternately. Here the trick is to maintain uniform pressure and rate of feed with the one hand while the other is being shifted. In some cases an overhand movement gives satisfactory results.

**Disk sanding:** When you do not have a belt sander available, the disk sander, power-driven in the drill press, is the next best thing. The rubber-cushioned disk, supplied for use in the drill press, does a good job of surfacing when driven at speeds above 2000 r.p.m. Ordinarily, the depth of cut is set by chucking the disk and bringing it down lightly on the work. Then lock the drill-press spindle. As a rule it's best to use a fairly coarse abrasive on a disk, especially when the disk is run flat on the work surface. Only minor swirl marks will be left on the work if the feed is uniform. These are easily sanded out by hand if



JUNE 1955



Straight sanding requires a fence with infeed and outfeed edges offset 1/64 in. as shown in Fig. 11

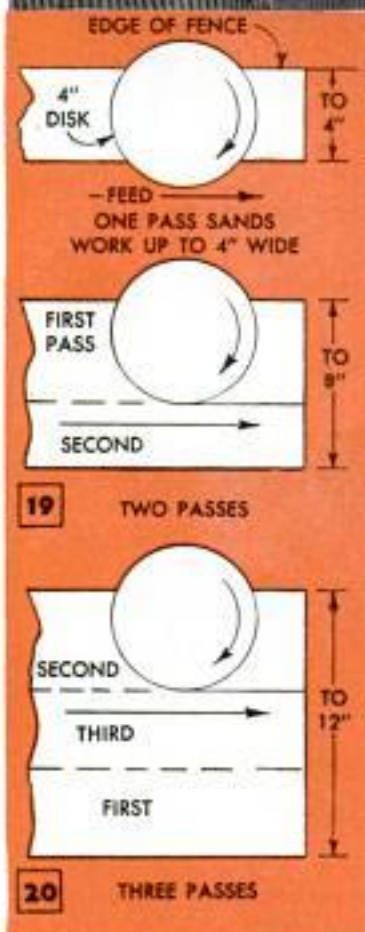
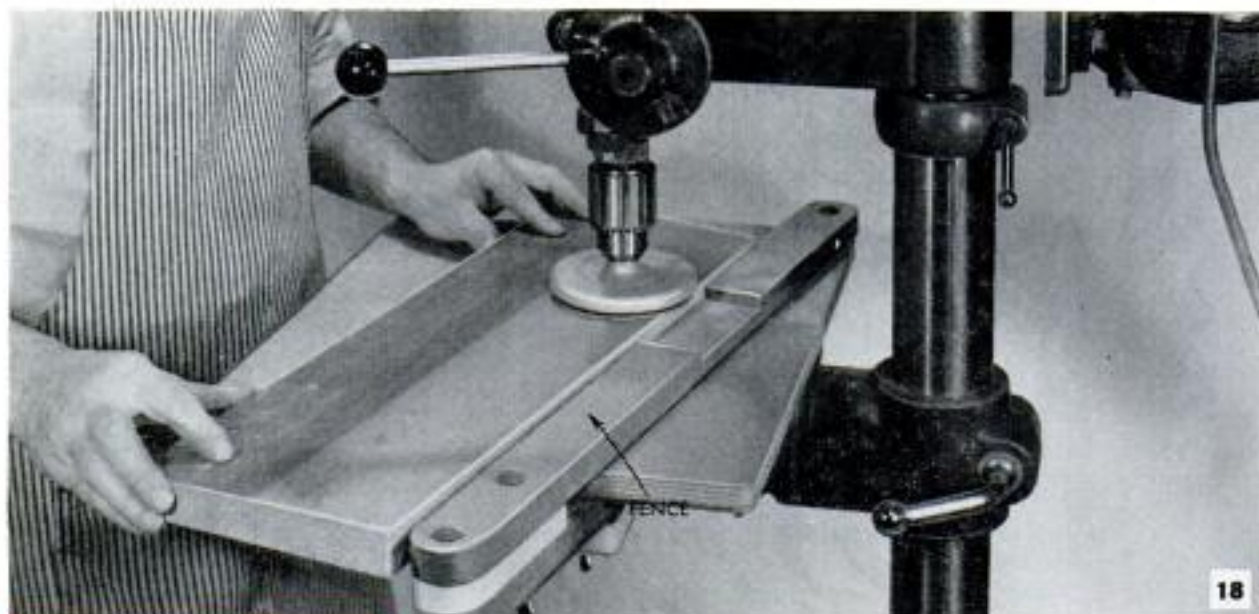


When squaring the end of a narrow strip use a follow block to guide end of strip past fence opening. This precaution assures a square end on the stock



Above, a shaper fence can be used with drums 2 in. or less in dia. Fence is adjustable to proper offset. Below, disk sander is efficient unit for surfacing either hardwood or softwood to a uniform thickness

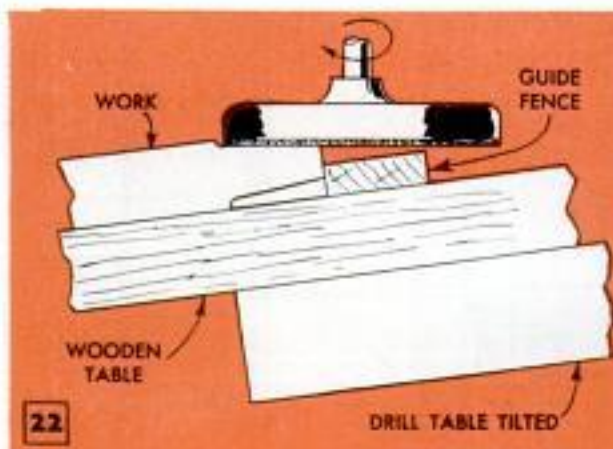




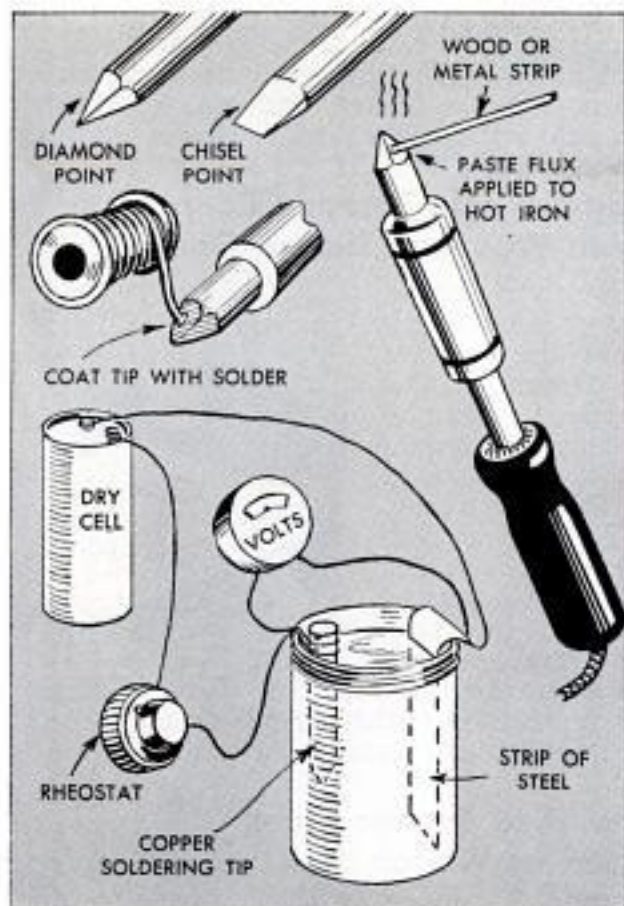
necessary for a fine finish. The work will require a guide as in Figs. 10, 16, 18 and 21. In some cases a hold-down is an advantage, Fig. 16. When it is necessary to remove considerable waste as quickly as possible by sanding, the work table can be tilted slightly by means of a riser as in Fig. 17. The slight angle of the work causes the disk to cut much faster. This position of the work produces some swirl marks and a slight concavity of the surface, but these imperfections are easily removed by hand-sanding or by flat-sanding with the disk.

Boards up to 12 in. wide can be flat-sanded with a 4-in. disk by using overlapping passes as in Figs. 18, 19 and 20. If care is used in feeding the stock at a uniform rate, very smooth sanding can be done by using this procedure. For best results all three passes should be made without shifting the stock end for end. A pivoted fence like that in Fig. 18 makes it easy to pass the stock under the disk in one direction from left to right.

Another job on which the disk sander is especially effective is finishing the beveled edges of a raised panel. This is difficult to do by any hand-sanding method, but the setup shown in Figs. 21 and 22 does the trick in a professional manner. Care must be taken in locating the disk in relation to the bevel. The fence, Fig. 22, must clear the disk and must be so placed that the abrasive covers the entire face of the bevel in one pass. Be sure that the abrasive is correctly centered on the disk. If it overhangs it may damage the smooth contour of the work. ★★★







## New Life for Soldering-Iron Tips

Worn and pitted soldering-iron tips can be restored to new and greater efficiency by first filing the point to the preferred shape, either diamond or chisel point, and then electroplating with an iron-plating solution. The iron plating prevents burning and pitting of the tip and at the same time does not impair the high-heat conductivity of the copper.

The iron-plating solution is prepared by dissolving ferrous (iron) chloride, 8 oz., and potassium chloride, 6 oz., in 1 qt. of water in a glass container. To this solution add  $\frac{1}{2}$  fl. oz. of hydrochloric acid and stir in clean iron filings. Continue stirring until the solution is a bright-green color. Then make the electroplating hookup shown in the details above, using a large dry cell, a rheostat and a voltmeter. Although the latter is not essential, its use gives a somewhat more positive control of plating conditions. Wire-brush the copper soldering tip to remove any loose particles, then dip for a few seconds in nitric acid which has been diluted with an equal volume of water. Rinse the tip in hot water and place in the plating bath without drying. Hang a strip of sheet steel in the plating bath as shown and connect to the positive terminal of the battery. Connect the soldering tip to the negative terminal. Adjust the rheostat

to give a smooth, uniform deposit on the tip, between  $\frac{1}{2}$  and 1 volt on the voltmeter. Turn the tip once or twice during the plating period, which should be about 45 min. When the time is up, remove the tip from the solution and wash thoroughly in clean, hot water.

Replace the tip in the heating head, heat to working temperature and coat with paste flux. Then tin with solder as in the details above, using care to assure a uniform coating. The iron-plated tip will last indefinitely. Do not remove the plating by filing the tip. Simply brush lightly to clean.

*Caution:* Handle concentrated acids with extreme care. Wear rubber gloves and take every precaution to protect the eyes from spatters.

J. B. Mullen, Barrington, Ill.

### Improved Fence-Post Puller

An automobile bumper jack can be used as an effective fence-post puller. Attach a chain to the post at ground level and to the lifting pad of the jack. On large posts use two jacks, one on either side of the post. The latter method provides greater pulling force, and if both jacks are raised at the same time, will lift a steel post without bending it.

## Shaper-Mounted Grinder Smooths Flat Work



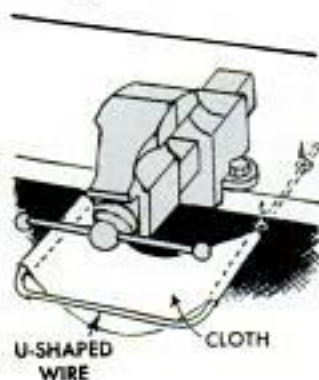
Mounted on a shaper ram, a tool-post grinder can be used to accurately grind small flat work. Run the shaper at slow speed and fine feed for best results. The shaper cross rails and vertical slides of the table must be protected against grinding-wheel dust and grit. Heavy paper or light canvas can be used for the latter purpose. For purposes of illustration, the protective covering is not shown in the drawing but should always be used to prevent accidents.

C. W. Woodson, Chicago.

## Weather Shield on Hoist Pulley

A section of auto tire will provide a convenient weather shield that can be fitted easily over a hay-hoist pulley that must be left outdoors. Punch a hole in the casing and slip it over the hoist before it is mounted in place.

## Small Parts Dropped From Vise Caught in Cloth "Net"

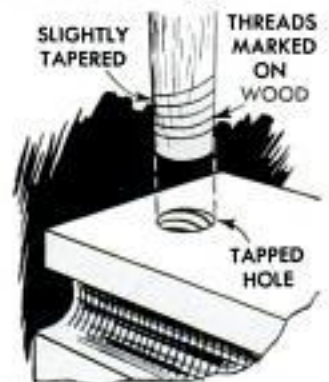


Supported on a wire frame from the underside of the bench top, this simple cloth "net" catches small parts dropped while working in a vise. The supporting frame is heavy wire bent into a U-shape. The ends of this frame slide

in screw eyes so the net can be removed and stored under the bench top when it is not needed. The edges of the cloth may be hemmed to fit over the wire, or it can be held with safety pins.

## Tapped-Hole Threads Counted With Wooden "Thread Gauge"

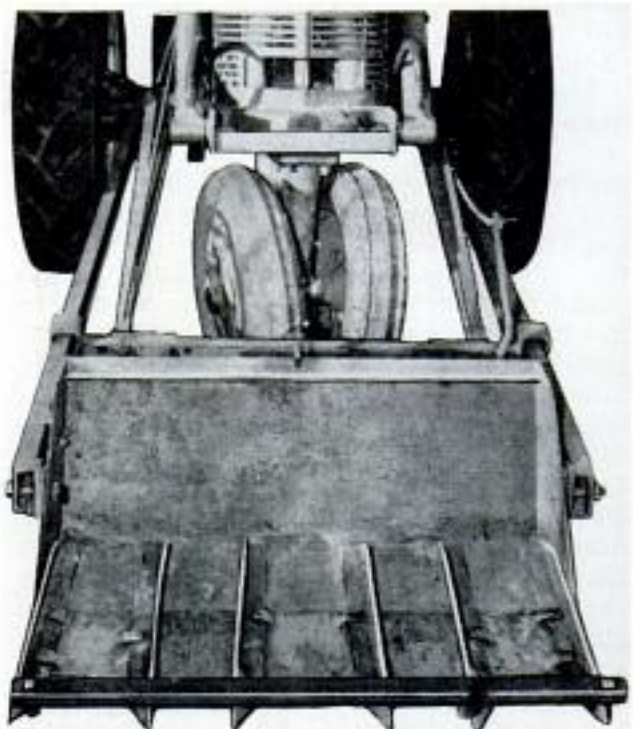
When a thread gauge is not available, the number of threads in a tapped hole can be determined quickly by using a wooden plug. Whittle the plug so that one end is slightly larger than the hole size, yet small enough to be turned into the hole. This produces an impression of the threads on the wood, where they are counted easily.

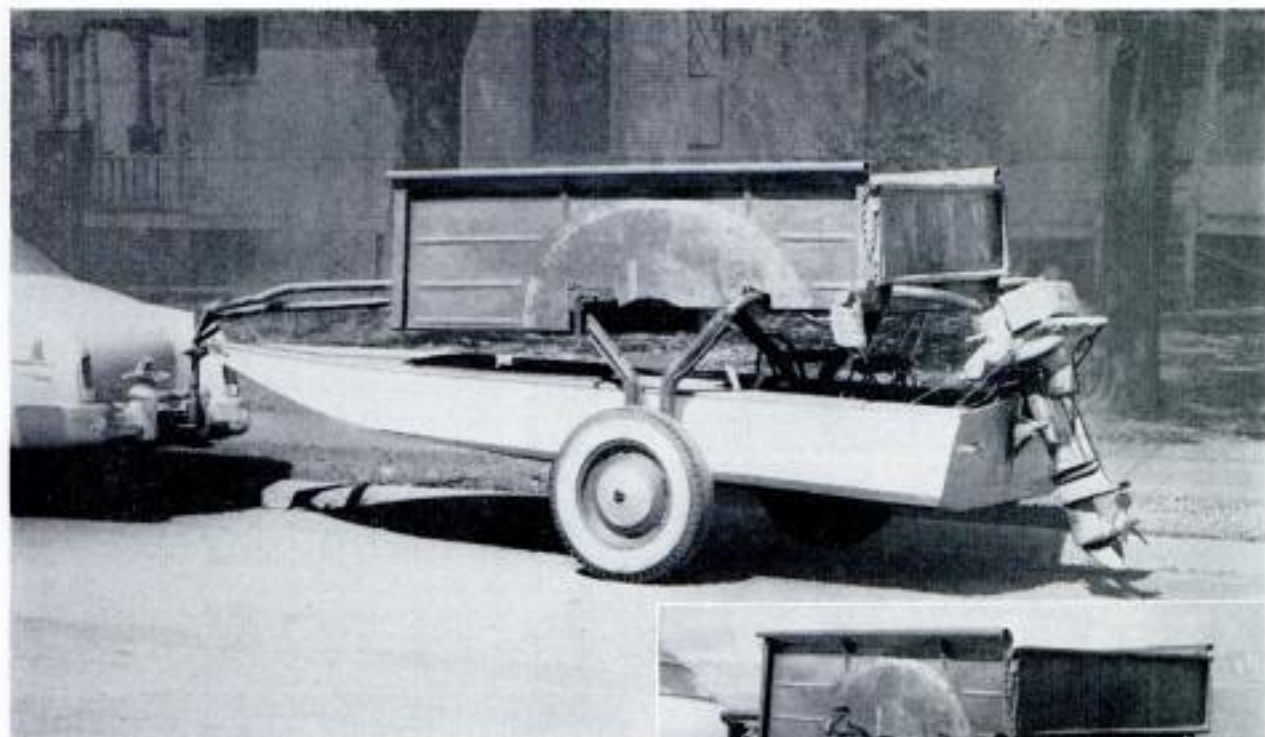


## Modified Tractor Scoop Used as Wagon Jack

When a wagon jack was unavailable, one farmer modified his tractor scoop to permit dumping wagon loads of ear corn at the elevator. A heavy steel bar is bolted across the teeth at the front of the scoop. When it is being used to raise the front of a wagon, the scoop is positioned so the bar fits behind the front cleat on the bottom of the wagon box. This prevents the box from slipping off the scoop.

A. M. Wettach, Mt. Pleasant, Iowa.





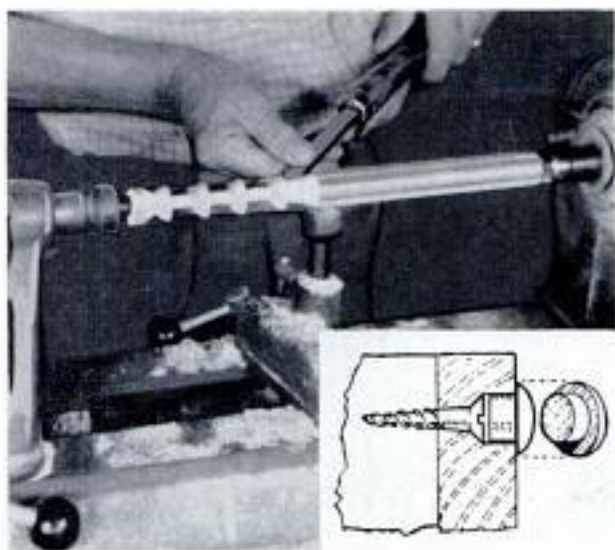
## PIGGYBACK BOAT TRAILER

This dual-purpose trailer carries the boat and sufficient camping gear for a full week end of fun. The unit consists of a standard boat trailer of the underslung type with a pickup-truck bed mounted on the axle arch as pictured. The fenders were removed from the pickup bed and U-shaped cuts were made in the sheet-metal skirt on both sides to permit the bed to fit down snugly on the axle arch. U-bolts passing around the arches and through holes drilled in the bottom of the bed hold it securely in place. This placement of the pickup bed does not in any way interfere



with operation of the winch which raises and lowers the boat. In some cases it may be necessary to use wooden cleats between the arches and the bottom of the bed in order to raise it to the correct height to clear the winch drums. In some states fenders are required on trailers used on the highways. Attach fenders to the axle arches, either by welding or by means of U-bolts.—Grover Brinkman, Okawville, Ill.

## Countersunk Screws Covered With Turned Wooden Buttons



When assembling furniture, the use of turned wooden buttons will simplify the job of covering the heads of countersunk screws. The buttons are turned with stems the same diameter as the screwheads and glued in counterbored holes into which the screws are driven. As shown in the detail, the heads of the buttons are slightly larger in diameter than the stems. Turning all the buttons from a single length of stock will assure that all will be of the same grain and color. All screw holes should be aligned, spaced evenly or located to form a pattern. The wood used for the buttons can be the same as is used in the furniture, or of a grain and color to present a pleasing contrast.

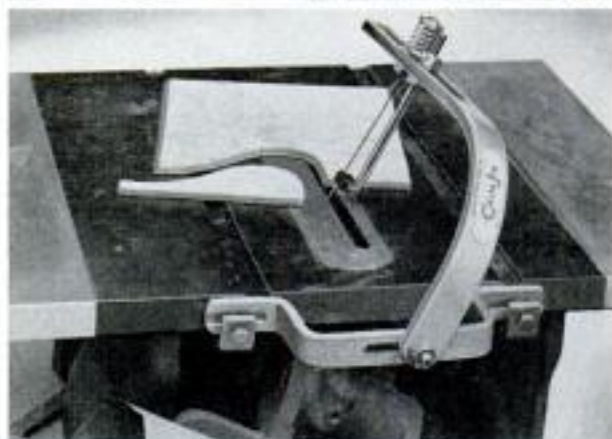
Dick Hutchinson, San Gabriel, Calif.



# SHOPPING FOR TOOLS

**PROTRACTOR GUIDE** for portable electric handsaws permits cuts to be made with the accuracy and speed of a table saw. Works like a draftsman's T-square, except that the blade is adjustable either right or left to any common angle from 90 deg. This permits angle cuts to be made in either direction. Guide is placed on top of the work, the arm being adjusted to the angle desired. Then saw is placed with the edge of the shoe against the edge of the guide arm. Protractor is calibrated in deg. for accurate setting

Boden Sales, 274 Busher Ave., Valley Stream, N. Y.



**JIGSAW ATTACHMENT** for circular saw uses standard jigsaw blades, cuts work up to 2 3/4-in. thickness and works to the center of a 16-in. circle. Jigsaw arm can be tilted for angle cuts as pictured in lower photo above. Unit comes complete, ready for attachment to any small circular saw. Jigsaw blade is driven from circular-saw arbor at arbor speeds. Tension of the blade is adjustable to prevent breakage

Verso-Tool Co., Lake Ave., at 4th St., Racine, Wis.



**ELECTRIC BRAKE** for small radial saws brings saw blade to a dead stop within a few seconds after motor switch is opened. Normally, saw blade spins from 2 to 4 min. after shutting off motor. From this the saving in time when making certain repetitive cuts or changing cutting tools will be apparent. Unit is supplied as a kit which can be installed easily. Brake is fitted with switch and is entirely automatic

DeWalt, Inc., Lancaster, Pa.

**CHAIN-SAW SHARPENER** will precision-sharpen any saw chain that normally is sharpened with a round file. Adjustments are easily made for any horizontal and vertical angles ordinarily required and also for all common sizes and lengths of teeth. Sharpening is done by a carbide burr driven at 20,000 r.p.m. High speed of burr prevents any tendency to overheating and produces smooth, sharp edge. Bolts to bench top

Forester Mfg. Co., 10 McCue Ave., Lockport, N. Y.





**LABORATORY "JACK"** provides a working platform on which experimental apparatus or work projects can be mounted and raised and lowered as desired while assembly or tests are carried out. Elevation range is 7 in. Lowers to 3 in. in height

Central Scientific Co.,  
1700 Irving Park Rd., Chicago 13



**100-AMP. WELDER** works on 115-230-volt current and is designed for conventional welding processes, also revolutionary new "Self-weld" process. Selfweld simplifies ordinary arc welding by means of a special matchhead electrode which is placed on the work to be welded. Starting switch is then pressed and arc forms automatically. Adjustable leg holds rod at correct angle

Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio

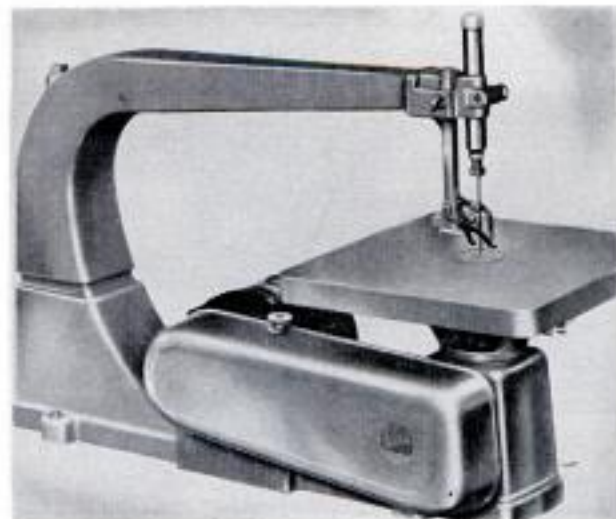
**PANEL SAW** cuts mild steel up to 16-ga., aluminum, hardboard, metal and plastic laminates. Circular saw blade is 2 in. in dia., cuts  $\frac{3}{8}$  in. deep. A "gun sight" guide, similar to that on electric hand-saws, makes it easy to follow a line scribed on the stock. Will cut straight and also in long, sweeping contours without binding

Kett Tool Co.,  
5 E. Third St., Cincinnati 2, Ohio



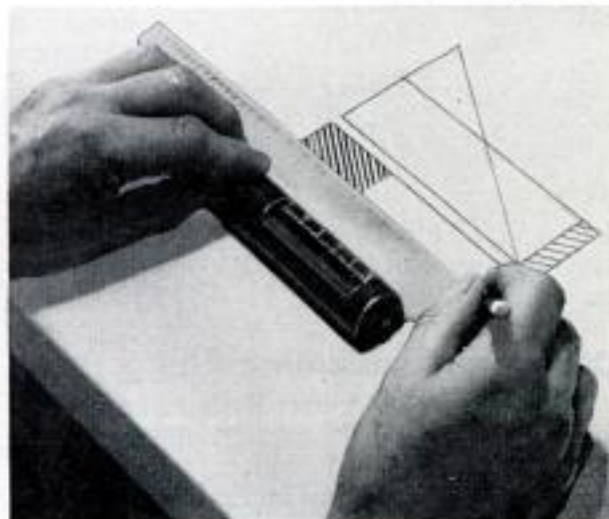
**PRECISION-BALANCED JIGSAW** provides unmatched smoothness of operation due to an entirely new blade-driving mechanism in which each part is individually balanced. Table is 14 x 14 in., tilts 45 deg. to right, 15 deg. to left and swivels 90 deg. to handle angular cutting of long stock. Full 24-in. capacity

Atlas Press Co.,  
2643 N. Pitcher St., Kalamazoo, Mich.



**ROLLING RULE** enables the draftsman to rule lines either vertically or horizontally without using a T-square. Spiral index measures distance between horizontal parallel lines. To draw vertical lines, insert pencil in hole in straightedge and move the unit up or down. Spiral index gives length of line

Stationer's Guild of America,  
1421 Chestnut St., Philadelphia 2, Pa.



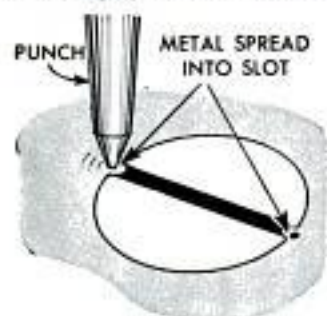
## Sandpaper-Wrapped Cotter Pin Provides Small Sanding Drum



A variable-diameter sanding drum for finish-honing small-diameter holes can be improvised from an ordinary cotter pin. Slip the end of a sandpaper strip through the legs of the cotter pin and twist the pin clockwise, wrapping the paper until the desired diameter is reached. Additional strips can be added by slipping about 2 in. of the new strip under the free end of the strip already on the key and winding it on in the same manner as the first. To prevent slipping the sandpaper can be glued to itself. The finished hone can be chucked in either a drill press or hand drill.

Sidney V. Worth, Philadelphia, Pa.

## "Locking" Flatheaded Screws In Metal With Centerpunch



Centerpunching a mark at each end of the screwdriver slot will more effectively anchor a flatheaded screw in metal than will centerpunching of the screwhead perimeter. The former method

forces a small amount of metal into the slot, thus providing a "key" to prevent the screw from turning.

## Detecting, Eliminating Chiggers

In areas of the United States where chiggers are prevalent, the entomologists of the U. S. Department of Agriculture suggest a simple method of detecting an infested

location. Place a square of black cardboard edgewise in the ground at the suspected spot and carefully observe it for a few minutes. If small yellowish or pinkish mites are seen moving rapidly across the cardboard and collecting on the top edge, a chigger-infested spot has been located. The area should be dusted or sprayed with a suitable insecticide. The Department of Agriculture suggests chlordane, toxaphene or lindane. The suggested amounts to be applied per acre are: Chlordane, 1 to 2 lb.; toxaphene, 1 to 2 lb.; lindane,  $\frac{1}{4}$  to  $\frac{1}{2}$  lb. As with any toxic material, the operator should be careful when applying. Keep clear of gardens and fish ponds.

## Extend Life of Electrode By Filing to Chisel Edge

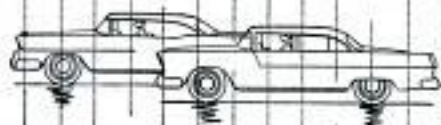
When doing delicate jobs of arc-soldering on small work, file the carbon electrode to a chisel shape, rather than a point. The chisel shape has most of the advantages of a point, yet will last much longer.



## Transmission on Manure Spreader Increases Speed Variations

Desiring greater variation of apron speeds than is possible with the regular controls on a manure spreader, one farmer mounted an automobile transmission on the side of the spreader frame and belt-drives the apron from it. The transmission, in turn, is driven from the power take-off shaft through a system of belts and pulleys. A pulley on the side of the frame opposite the transmission is coupled to a sprocket and chain that drive the beater. Shifting gears in the auto transmission provides lower or higher speeds as required.





**Just in passing...**

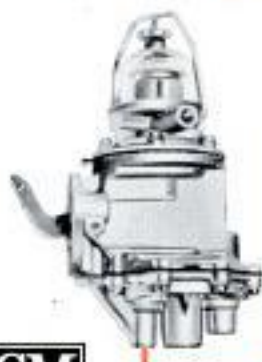
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# How to choose a camera

The best camera for you is the one that gets the pictures *you* want. So, start off by analyzing your needs. Do you want to take snapshots (black-and-white or color), color slides, or stereo pictures? Are you interested in slow-moving or fast-action subjects? Do you want to be able to take close-ups? Are the pictures for album use or for enlarge-

ment? And what about flash shots?

Deciding upon points such as these will help provide the basis for an intelligent, satisfying choice. Then from the comments below, plus the additional details your Kodak dealer will supply, you will be able to select a camera whose type, features, and capabilities are fitted precisely to your needs.

## Box and simple Reflex-type Cameras

These cameras are inexpensive, easy to use, need little, if any, adjusting. They have simple lenses, capable of taking sharp, clear snapshots. All shown here take black-and-white or color pictures. They're suitable for snapshots, in good daylight, of non-moving or slow-moving subjects, and for flood and

flash shots. The reflex camera is similar to the box type except for a large hooded viewfinder at the top, which shows the subject big and clear just as it looks in the finished snapshot.



### MOST POPULAR CAMERA . . .

Over 5,000,000 Brownie Hawkeye Cameras now in use. The ultimate in simplicity. Large viewfinder. Fixed-focus lens—no adjustments to make. 12 pictures on #620 films. Standard enlarged prints,  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ ".

**Brownie Hawkeye Camera, \$6<sup>95</sup>**  
Flashholder, \$4.



### UNIQUE DISTANCE-DIAL

on Brownie Bull's-Eye Camera focuses quickly for "Scenes," "Groups," or "Close-ups" down to 4 feet. *Lumenized* lens for sharp detail, color purity. Double-exposure preventer. 8 pictures on #620 films. Standard enlarged prints,  $3\frac{1}{2}$ " x 5". Flashholder takes new, low-cost M-2 bulbs.

**Brownie Bull's-Eye Camera, \$12<sup>85</sup>**  
Midget Flashholder, \$3.20



### ADVANCED SNAPSHOT CAMERA

The Kodak Duaflex III, Kodar model, is reflex-type camera with 3-element, coated lens for sharp detail, color purity. "Faster"  $f/8$  lens lets in more light for snaps on dull days. Focuses to  $3\frac{1}{2}$  feet for close-ups. Extra-large hooded viewfinder; handy exposure selector; double-exposure prevention. Standard enlarged prints,  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ ".

**Kodak Duaflex III Camera, \$22<sup>50</sup>**  
Kodar  $f/8$  lens  
Flashholder, \$4.



## Miniature Cameras

Small and compact, these cameras feature fast lenses ( $f/4.5$  and faster), fast shutters, and often other picture-taking refinements such as rangefinder, automatic film stop, exposure counter, etc.

They make crisp color slides (black-and-white or color snapshots, too), using economical 35mm or Bantam-sized films. Their picture-taking scope extends beyond that of snapshot cameras to cover fast-action subjects and subjects under poor lighting con-

ditions. Added controls make picture-taking more precise and thus more satisfying.

Lifelike, 3-dimension color slides are also made with a special type of miniature camera. Known as a stereo camera, it has two lenses spaced about the same distance as your eyes and takes two pictures at the same time. The resulting pictures, when seen in a viewer, appear as a single picture with depth. This added dimension gives them a realistic, true-to-life appearance.



### BUDGET-PRICED MINIATURE

The Kodak Pony Camera has Anaston  $f/4.5$  Lumenized lens,  $1/200$  shutter, automatic film stop and counter, no-thread loading. Takes 20- or 36-exposure #135 films.

**Kodak Pony 135 Camera, \$29<sup>75</sup>**  
Model B  
Flashholder, \$7.95

### RANGEFINDER MINIATURE

The Kodak Bantam Camera has an Ektanon  $f/3.9$  Lumenized lens, super-imposed image rangefinder, automatic film stop, double-exposure prevention. Takes 8 pictures on #828 film.

**Kodak Bantam RF Camera, \$56<sup>75</sup>**  
Flashholder, \$7.95

### KODAK'S FINEST LENS

The Kodak Signet Camera features Kodak's famous  $f/3.5$  Ektar lens, unsurpassed for quality.  $1/300$  shutter. Coupled rangefinder combined with viewfinder. Automatic film stop and counter.

**Kodak Signet 35 Camera, \$75**  
Flashholder, \$7.95



**SIMPLIFIED STEREO** — Kodak Stereo Camera offers top-quality, precision stereo photography at low cost. New easy distance-selector dials for "Scenes," "Groups," "Close-ups." New easy exposure selector adjusts for "Bright," "Hazy," or "Cloudy Bright" conditions. Matched Anaston  $f/3.5$  Lumenized lenses,  $1/200$  shutter. Scopesight viewfinder, automatic film stop and counter, double-exposure prevention.

**Kodak Stereo Camera, \$84<sup>50</sup>**  
Flashholder, \$7.95

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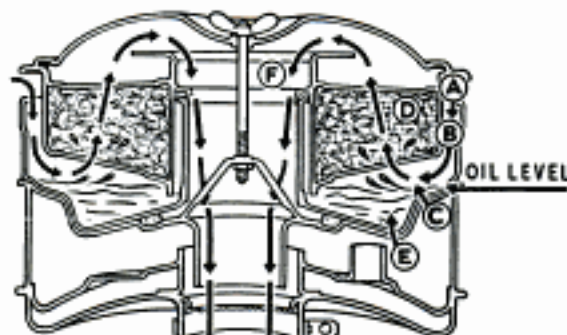
# Care and Feeding of Engines



BY  
S. P. CORP

## AIR CLEANER CARE

Servicing the air cleaner is as important as chassis lubrication or changing engine oil. In the oil bath type of air cleaner, air enters through opening A, passing down through B to the oil at C, which picks up dust and dirt. Air carries some oil into the filter element, where the air gets more cleaning. The oil drips back into the sump, E, as clean air is drawn into the carburetor at F.



OIL BATH AIR CLEANER

Clean the filter often to reduce engine wear. (1) Remove wing nut and cover and lift out filter. (2) Plunge filter up and down in a pail of kerosene; then drain and blow out with air until dry. (3) Clean out oil sump and fill to correct level with same grade of oil used in engine. **CAUTION: DON'T OIL THE FELT IN THE COVER. KEEP THIS DRY.** (4) Re-assemble and install on carburetor, but don't over-tighten the clamp, as this would affect the operation of the automatic choke valve.

## ENGINE VENTILATION

Air which circulates through the crankcase is drawn in through the oil filler cap, where a copper mesh air filter screens out dust. Always keep the oil filler cap clean, as a dirty cap will allow dust and grit to get into the crankcase, circulate through the oil, and cause premature wear on bearings and thrust surfaces.

## FREE ILLUSTRATED HANDBOOK

Be sure to write for your free copy of Sealed Power's new illustrated booklet, "Care and Feeding of Engines." You'll find a world of carefully indexed hints about car care, which may save you a lot of money. And be sure to use Sealed Power KromeX Ring Sets when you re-ring. These sets have chrome where it counts, to fight heat, friction, abrasion, and corrosion in modern engines. Sealed Power, Dept. G-6, Muskegon, Michigan.



# 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.

## Painting Screens



**Q**—A year ago I installed aluminum screens. I was told at the time not to finish them. They remained bright for only a short time, then the fly screen became coated with a powdery white substance, the aluminum frames turned a grayish color. Is there a remedy for this?

H. L., Me.

**A**—The grayish-white coating on the metal frames and wire screening results from a slow oxidation of the metal on exposure to the air. The condition is merely unsightly, however, as it does not impair the screens in any way. In time the metal will appear to darken, the discoloration shading almost to black in some instances. The discoloration is not inherent in the coating, but is due to the accumulation of dust which finds lodgment in the tiny pits which indent the surface of the metal. After several seasons of exposure this coating is difficult to remove by any ordinary means. In your case, however, it may still be practicable to smooth the screen and frames with fine steel wool and in the process remove most of the discoloration. A clear metal lacquer sprayed on the metal forms a coating that will prevent oxidation for a season or two, after which it must be renewed. The next best thing is the clear-plastic spray material supplied in pressurized containers. When spraying be careful to apply a uniform coating to both the screen and frames.

## Attic Louvers



**Q**—How does one calculate the required size of attic louvers? Must they be installed in the gables, or can they be installed along the ridge?—L. S., Ill.

**A**—The recommended practice is to allow 1 sq. ft. of free louver area for each 100 sq. ft. of attic floor space. This specification is intended to serve as a guide when installing louvers in the gable ends or in the roof. On a long, low-pitched roof there probably is some advantage in installing louvers, or ventilators, in the roof rather than in the gable ends. Roof ventilators are quite easy to install on a roof where the shingles are already laid. Simply remove shingles to expose the roof boards at the points where the ventilators are to be located. If care is used, the shingles can be removed and replaced without damage. Bore a hole through the roof boards large enough to admit the

(Continued to page 210)



Some brands give you shorts and bits which burn like tinder—fast and hot.



Others give you fine-cut shreds—good for cigarettes, but not so good for pipes.



Only Edgeworth gives you slow-burning "chunks" made for pipes and pipes alone.

PIPE SMOKERS: COMPARE THE CUTS OF TOBACCO AND SEE

# Why Edgeworth Smokes Coolest



## Edgeworth's Way with White Burley Has Never Been Equalled

Your true tobacco expert will tell you that white burleys are the world's coolest smoking tobaccos. Edgeworth is a blend of white burleys only—aged like fine wine, for years. Of course, other tobaccos use white burley, too—but nobody else has yet found out just how to blend and process tobacco to give it the even-burning, cool-smoking character that Edgeworth "Ready-Rubbed" has maintained.

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One friend of ours left an unopened Edgeworth pouch on a hot radiator. When discovered two weeks later, the tobacco was still moist and cool smoking.

co until it crumbled into chunks of just the right size. Now Edgeworth does all this for you *before* the tobacco is packaged. An ingenious, exclusive process "ready-rubs" Edgeworth into chunks that pack *right* in your pipe, giving you a cool, leisurely smoke with never a touch of tongue bite.

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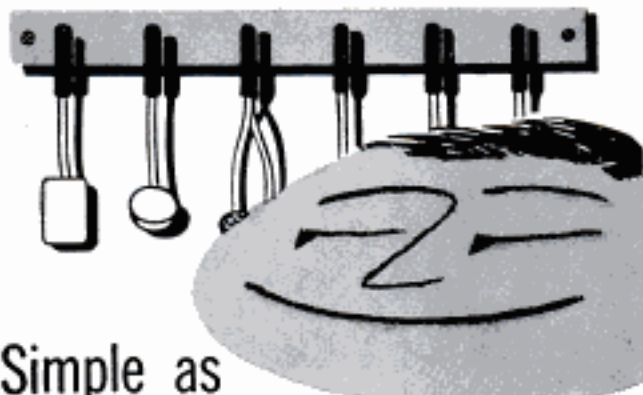
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Mail with \$1.50 to Park Lane, Larus & Brother Company, Inc., Richmond, Virginia. Offer good only in the U.S.A. **PM-6**

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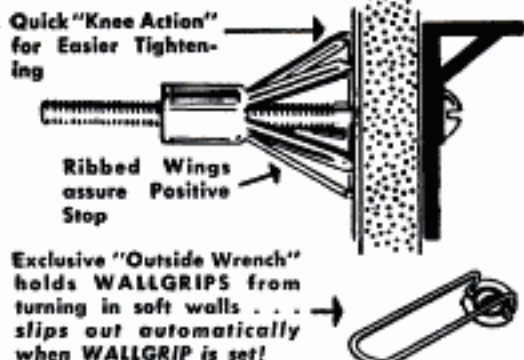


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HOLLOW WALL SCREW ANCHORS



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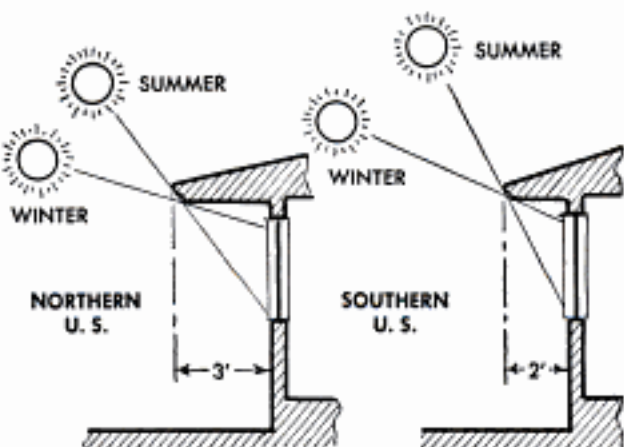
(Continued from page 208)

blade of a keyhole saw. Then mark off and saw an opening into which the ventilator will fit snugly. Then replace the shingles, cutting them so that the edges cover the flange of the ventilator. Usually, instructions are furnished with the units covering the recommended method of installation. Ready-made louvers are just as easily installed in the gable ends by cutting an opening of a size to take the unit in a snug fit. In some cases, when installing large louvers it may be necessary to cut one of the studs when sawing the opening. In this case it is advisable to install headers.

**Air Conditioning**

**Q**—I am going to build a home in which an air-conditioning unit will be installed. I'm told that in planning the design something can be gained by extending the cornices to fully shade the windows in the summer from the direct rays of the sun, and still get full exposure of the windows during the winter months. How is this done?—N. H., Tex.

**A**—You did not say which way the house faces. Neither did you describe the window arrangement on the southern exposure. However, assuming as an example that the admission of solar heat in winter and the exclusion of the direct rays of the sun in summer is a consideration in planning window size and placement, it's the usual practice to shield windows on the southern exposure with a cornice overhang of 2 ft. This applies only to windows with stools 3 ft. from the floor, in homes



built in the southern United States. In northern United States, the cornice overhang must be at least 3 ft. as will be seen from the sketches. If the window extends to the floor, the overhang must be at least 1½ to 2 ft. wider. Whether or not these overhangs are practical must be determined by the builder. In some cases it may be more practical to consider the construction of a louvered structure with adjustable slats or a trellis with climbing vines. Louvers, of course, can be adjusted to admit direct sunlight in winter and shade the windows in summer. In general, the same installations should be considered for the east and west exposures also, unless, of course, trees or shrubs provide shade.

**Repairing Field-Stone Masonry**

**Q**—The walls of my home are of field stone and the mortar is beginning to loosen in some of the joints near the top of the walls on the north side of the house. Small pieces of mortar have fallen out, leaving unsightly openings. How do I go about repairing the wall?—A. T., Pa.

**A**—Ordinarily this job is for an experienced stonemason. The cost should be quite nominal, unless, of course, a major repair job is necessary. However, if you wish to attempt the work yourself, then the first step is to remove all loose mortar from the defective joints, brushing away dust and fine particles. Large openings should be undercut slightly with a chisel where possible. Prepare a fairly stiff mortar. Dampen the wall and sides of the openings where new mortar is to be applied. Then trowel the fresh mortar into the openings, pressing it in with some force to assure that the depressions are completely filled. Then, finish the surface of the mortar by brushing lightly with a whisk broom.

# Add an extra room to your home —easily, economically



- 1. Do it yourself** with Armstrong Temlok® Tile and Plank. Finish off unused space in the attic, basement, garage, or enclosed porch quickly with these attractive wood fiber building materials. Start by nailing up 1" x 3" wood furring strips at right angles to all framing members.



- 2. The Lok-Bevel® joint** on both Tile and Plank has an extra wide nailing flange for quick installation. This special joint hides all nails or staples, assures neat joint lines, helps you do a really professional looking job. With Temlok Tile, you can choose a smooth or a noise-absorbing perforated surface.



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- 4. No painting needed.** Temlok is handsomely finished at the factory. There's practically no mess or waste—once Temlok is installed, the job is done. Add a few decorative touches and you've got that extra living space in the form of a game room, workshop, or bedroom . . . and at low cost.

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FROM CEMENT TO LINOLEUM  
WHATEVER YOU NEED

Find It Fast  
In The  
'Yellow Pages'



## Mr. Ladybug

(Continued from page 142)

he keep ladybugs alive and healthy through the winter and have them ready in the spring?

Harris found the answer in his own refrigerator. Ladybugs sleep just as soundly in cold storage as on some frigid slope.

Currently Greenbug Control Company employs 10 gatherers, three of them the year-round. Armed with meshed sacks (capacity, 1½ gallons), they trek the highlands, each collecting an average 45 gallons a day — about 6,000,000 ladybugs. Gatherers are paid \$2.00 a gallon for bugs retailing at \$10. Ladies are also sold by the pound. Four pounds usually, but not always, equal one gallon. As ladybugs age they lose weight. Typically, nine-month-old bugs, nearing the end of their life span, weigh but 2½ pounds to a gallon.

Although gathering depletes colonies, at least half are left to hibernate and return to the valleys. This conservation is motivated more by economics than altruism. Though a colony's top layers are composed almost entirely of insects, lower levels contain a high percentage of trash—sticks, stones and humus. Customers want ladybugs, not forest litter, so only the upper or "clean" insects are taken.

Once, hoping to mechanize the gathering, Harris rigged a modified tank-type vacuum cleaner to a 1½-horsepower gasoline generator mounted on one of his pickups.

"The vacuum did a roaring good job," Harris concedes, "but the impact killed a million ladies in five minutes. We tried using every kind of nozzle imaginable—but it was mass murder from start to finish."

If Greenbug Control Company has a secret, it's constant chilling, which keeps ladies dazed and inactive. Let a colony warm up and you have a flying, crawling horde on your hands.

"Like handling mercury," Harris says, recalling the unsealed container a gatherer once left in his kitchen. The Harris family moved outdoors as a million ladybugs commandeered the house.

Ladybugs, gathered between sunup and 10 a.m. (during the heat of the day they're too active), are trucked to a refrigerator in Oroville. It's a walk-in box, thermostatically monitored to 36 degrees Fahrenheit. Colder, the bugs freeze to death. Much warmer (say 24 hours at 50 degrees), they revive.

Harris shudders at the thought of a prolonged power failure.

"I'd hate to be around when maybe

(Continued to page 214)

# 9

## DO-IT-YOURSELF IDEAS for home, garden and vacation!

### REYNOLDS *DO-IT-YOURSELF*\* ALUMINUM You work it with woodworking tools

the  
home..



Junior can't ram holes through the screen door when you make a good looking screen guard with Reynolds Do-It-Yourself Aluminum perforated sheet. Make a kickplate, too.



Children "might" actually hang clothes up if you provide a handy rod arrangement like this—of Reynolds Do-It-Yourself Aluminum tube—of course. Easy to put up.



Summer rains and messy summer mud go together. Keep the mud outdoors with an aluminum scraper. Ask the hardware man for Reynolds Do-It-Yourself Aluminum bar.

the  
garden..



Don't have miniature canyons under your downspouts. A trough of Do-It-Yourself Aluminum sheet will carry the water away. Easy to remove.



Make pruning and trimming faster—easier. Equip your pruning saw with a lightweight extension handle of Do-It-Yourself Aluminum tube.



This trellis of Do-It-Yourself Aluminum tube and rod can't rust or rot—never needs painting. You keep the beauty of aluminum's soft sheen.

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vacation..



It's a lucky fisherman who has a minnow and fish box of Do-It-Yourself Aluminum sheet—sturdy, rust-proof, lightweight—and easy to make.



The most prized rod can be carried in perfect safety in this rod case of Do-It-Yourself Aluminum tube. Non-rusting and light, good looking.



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This Reynolds Do-It-Yourself Aluminum rack in your hardware or building supply dealer's contains:

tube • rod • bar • a wide variety of sheet designs • angles • fasteners  
screen and storm sash sections • window hardware • trim strip  
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Member Pennsylvania Grade Crude Oil Association

10,000,000 ladies thawed out. They'd overrun a couple of counties.

When gatherers accumulate a truckload (about 1000 gallons), Harris hauls the critters 26 miles to the big cold-storage room he rents in Yuba City. The room doubles as a packaging and mailing plant. Ladybugs are held at 36 degrees right up to shipping time. Air-expressed or hauled in refrigerated trucks, they usually arrive in peaceful bug-slumber.

Customers—back-yard gardeners, park superintendents, farmers and flower growers—stash cartoned ladies in their refrigerators or cold rooms until ready to sow. Scattered before sunup or after dark, they slowly revive and within 24 hours start hunting down crop destroyers.

How many ladies does it take to do the job? That depends on their assignment.

"On the average," says Harris, "an ordinary-size yard or garden needs 20,000 to 30,000 ladybugs during the summer. A few thousand—a couple of handfuls—sowed every other week seems satisfactory."

Harris advises farmers to use 2000 ladies per acre on small plants, lightly infested. Where trees or large plants are heavily infested, as many as 120,000 ladies may be required per acre.

When ladybugs are packaged, they're weighed directly from cold storage into fiberboard cartons. The ends of the cartons are ventilated with fly screen. Greenbug markets 1 and 1½-gallon batches (135,000 and 200,000 bugs, respectively) for agriculture. The gallon size retails for \$12; the larger for \$18. Both prices include shipping charges.

The garden pack, retailing for \$3.50, contains about 15,000 to 30,000 ladies. The carton is designed to fit beneath the bottom shelf of a standard refrigerator. Kept chilled, bugs destined for periodic back-yard sowing should live three months—through the summer.

"I discovered right off," admits Harris, "that simply scooping a quarter-million ladies into a carton and air-expressing them invites disaster. Once I lost 300,000 bugs and two customers. Ladies can't be crowded. They 'pack' during shipment and smother to death."

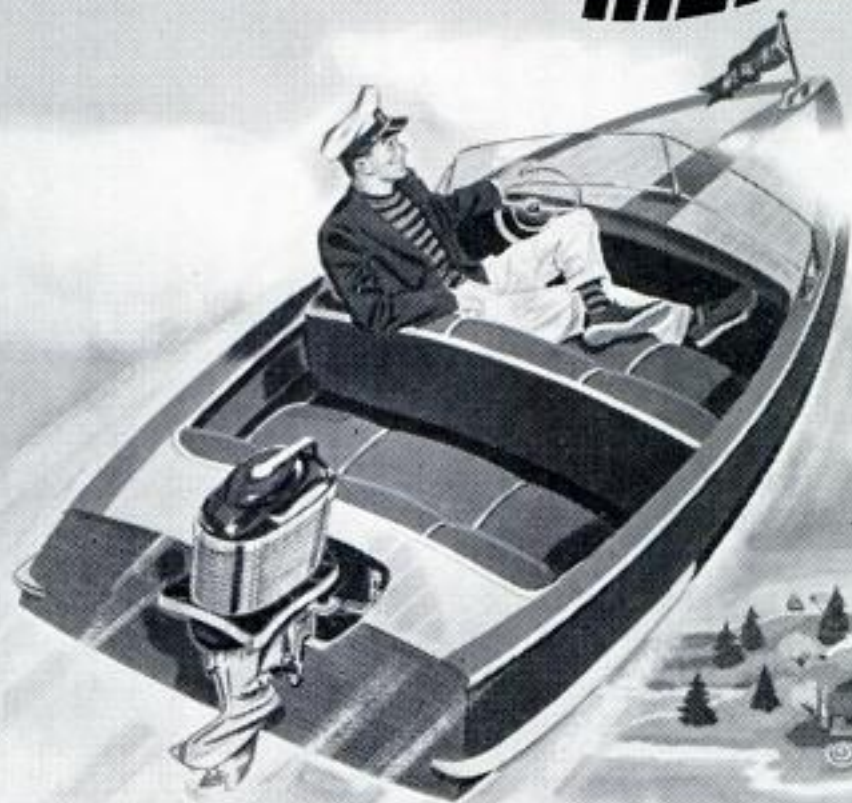
Thus, into each carton goes excelsior, some pine cones or perhaps bits of shredded cardboard—anything to give the ladies a footing.

Potential bug merchants must square their operations with the U. S. Department of Agriculture and often with state agriculture agencies. Even though ladies are beneficial and welcomed across state lines, permits are required.

(Continued to page 216)



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to take off with a Super Silent*  
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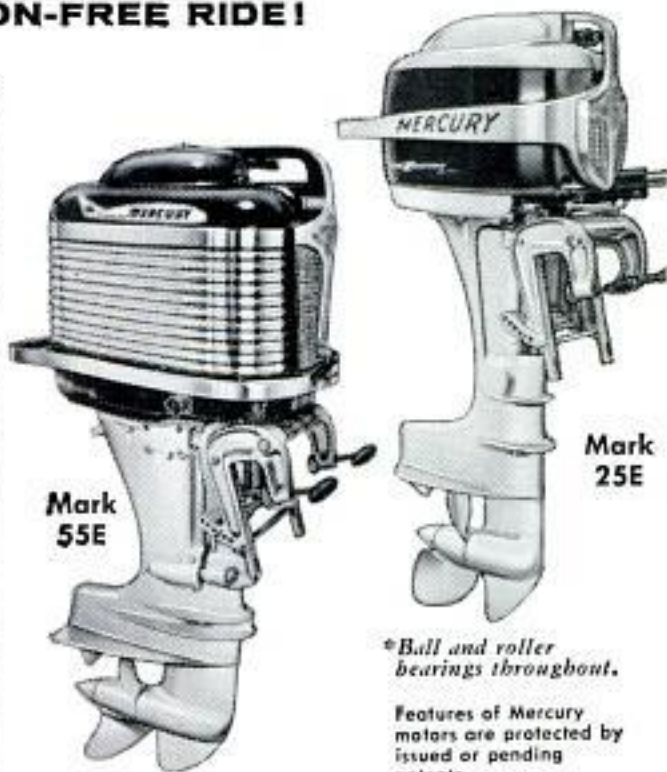
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**Mark  
55E**

**Mark  
25E**

\*Ball and roller bearings throughout.

Features of Mercury motors are protected by issued or pending patents.

Harris chuckles when he thinks of mink ranchers and chinchilla breeders who spend hundreds of dollars for feed.

"My ladies eat nothing at all during hibernation. My feed bill last year? Zero dollars and no cents."

Repeat business—thanks to ladybugs' foraging habits—is Greenbug's sustainer. Once ladies are sowed, they're on their way. When near-at-hand food has been devoured, they turn to neighboring fields. They circle the sower's own crops or flowers with a wide, bug-free isolation belt. But having left your field or yard, they seldom return.

Some ladybird eggs hatch, of course, and their larvae keep up the good work. But they'll need reinforcements.

Greenbug's four or five competitors operate in a half-dozen western states, although the congregating species of ladybug has been found as far east as Connecticut. All this indicates that the market has hardly been sampled yet. It's estimated that not more than 30,000 gallons are marketed annually by all dealers, big and small.

Most-frequent complaint comes from back-yard farmers who hanker to sow ladies—but don't want to pass their benefits on to the neighbors. Typical query: "How can I keep the ladybugs in my yard? Can I train them to stay at home?"

Harris remains strictly aloof from such urban squabbles. ★ ★ ★

### Fish Preserved Alive in Ice

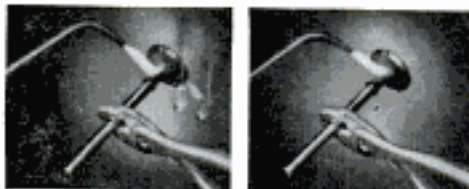
Fish can be preserved alive in blocks of ice. The method, developed by Arne Joker of Esbjerg, Denmark, may result in the shipment of live fish to market. In his experiments, Joker anesthetizes live fish and then freezes water around them. Fish that are frozen solid cannot be revived, but they remain unfrozen and alive at temperatures slightly below the freezing point of water. The fish have been left in a torpid state in a block of ice for 29 days and then revived. Joker now is attempting to cut down the loss, which in experiments has run 38 percent. If he is successful, living fish will be exported in Danish refrigerator ships.

### Supersonic Paint for Jets

Aircraft paint that won't peel off at supersonic speeds and resists temperatures up to 400 degrees Fahrenheit is being tested by the British Royal Air Force. The finish sticks to the fuselage despite air friction, rain or hail. Friction generated by air rushing past the fuselage heats the metal, softening conventional paints.

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An acetylene torch instantly burns motor oil (left). But engine heat is often greater than that of the torch! Use Miracle Power—it always lubricates, never burns off.

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Miracle Power is a pure petroleum product containing colloidal synthetic graphite in suspension. The graphite forms a lubricating film that impregnates metal as butter does bread. This coating won't burn off and it doesn't build up. It provides lubrication under *all* circumstances—keeps your engine tuned and free from sluggishness, lubricates in the top cylinder area, prevents dry starting damage, frees sticky valves, quiets hydraulic lifters, cuts oil consumption.

Miracle Power is not a chemical. It's *all* lubricant. Follow the lead of auto engineers

and try it yourself. Add an 85c can to your oil and gas every 1000 miles; use the 39c size in gas between treatments.

Get Miracle Power at car dealers, garages, service stations. It is available at Ford, Studebaker, International Harvester, Kaiser and Willys dealers in their own Miracle Power containers. Miracle Power treats the *engine*, not the oil.



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TOOLS FOR CRAFTSMEN

# GREENLEE

The GREENLEE line of fine tools includes auger bits, electric drill bits, chisels, gouges, spiral screw drivers, drawknives, and many more. At leading hardware and building supply dealers.

**GREENLEE TOOL CO.,**  
2106 Columbia Ave., Rockford, Ill.

## They Build Their Own Planes

(Continued from page 118)

"The only fellow who gets them both is Steve Wittman."

He is almost right. S. J. "Steve" Wittman of Oshkosh, Wis., is practically a living legend in the homebuilt and racing field. An active member of EAA and of the Professional Race Pilots' Association, Steve has been designing, building and racing his own aircraft since many of today's pilots were in knee pants.

As far back as two decades ago Wittman's low-cost racing ships in both limited and open classifications were the despair of pilots and owners who spent several times Steve's investment, only to "eat" his exhaust around the pylons.

One of Wittman's latest accomplishments inspires every homebuilder. His two-place *Tailwind* is the first pilot-designed-and-built aircraft to receive a Civil Aeronautics Administration certificate permitting transportation of nonrevenue passengers.

In an effort to assist and encourage pilot-builders, the CAA has worked out regulations (CAR 174-3) providing for inspection and licensing of individually made aircraft. All ships are made under CAA regulations and have experimental licenses but, until the *Tailwind* came along, none was certificated to carry passengers.

The *Tailwind* is truly an outstanding example of what can be done in the field, and its performance and economy set a mark the commercial builders can shoot at.

Powered by an 85-horsepower Continental, the *Tailwind* will carry two persons and their luggage comfortably at a cruising speed of 150 and a top of 175. Even with this top speed it will land at 50 miles per hour with flaps and at 60 without them. And it has the Wittman landing gear, another inspiration to homebuilders. Wittman worked out his gear for racing aircraft before World War II. It is extremely simple and light—basically nothing more than a strip of high-quality spring steel upon which the wheels and brakes are mounted.

One piece of spring steel has little surface to streamline and no hydraulic mechanism to maintain. The gear is so efficient that it has been adopted by one of the largest light-plane makers for all fixed-gear aircraft.

This commercial use of a pilot-built gear inspires other garage aircraft builders. If they can work out something like Wittman's gear and sell it to a commercial builder, they will have funds to make a lot of homebuilt aircraft.

(Continued to page 220)



## \$35,000 REWARD FOR URANIUM

Here's your chance to "cash in!" Over \$2,500,000 in Government Bonuses have been paid for URANIUM discoveries in the past 2 years. Currently \$150,000 a month is paid to people just like you.

Precision Geiger Counters and Scintillators are the finest instruments made for URANIUM prospecting. These highly sensitive instruments are compact, lightweight and ruggedly built for field use. Prices start at \$29.95.

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2235PM S. La Brea, Los Angeles 16, California

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### BUILD FINE GRANDFATHER CLOCK NOW

The simple, reliable Red-I-Kut way as thousands have — SAVE HALF. SHOP TESTED PLANS "SPIRIT OF THE CENTURY" Narrow waist 80" tall or stately straight side "SPIRIT OF AMERICA." EASY-TO-FOLLOW photograph PLANS tell all—plus BROCHURE of heavy brass weight Westminster, tube chime, movements, gorgeous dials, 3/4" solid mahogany case kits. Send \$1.00 today — Both plans \$1.50 NOW.

KUENZEL CHIME CLOCK CO., 27 Kuempel Bldg., Minneapolis 16, Minn.

### WORLD'S BEST SMALL TRENCHERS



Portable DITCH-WITCH digs 2" to 6" clean, even ditches to 36" depth in all types of soil. Complete unit—self propelled—outdigs 8 men. Four rugged models.

Write for illustrated literature.  
THE CHARLES MACHINE WORKS  
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SPEED COP SAW DRILL BIT

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Only  
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Surveys prove it . . . and in many cases the preference for FRAM Oil Filters more than equals the preference for the next two most popular brands combined!

Here's why: FRAM is engineered for extra-high filter efficiency . . . keeps oil clean, cuts wear, saves power and reduces repair bills.

There's a FRAM Cartridge engineered for your car. See your FRAM Dealer today!

Send FRAM boxtop or 25c for big, colorful, 68 page Vacationland America Book describing motor trips throughout America!



FRAM CORPORATION, Providence 16, R. I.  
Fram Canada Ltd., Stratford, Ont.

You need fewer tools  
when you use ...



**CHAN NEL LOCK** pliers  
TRADE MARK REG. U. S. PATENT OFFICE



here's why

Look for the Channellock line when you're shopping for hand tools. Channellock pliers offer features that you can't get with other makes. And when you buy a Channellock plier, ask to see the full line—you'll find a style and model to do any job better.



THE PLIER DESIGN THAT OBSOLETE ALL OTHERS

CHAMPION D•ARMENT TOOL CO. • MEADVILLE, PA.

Not all homebuilders attempt racing or sport craft. Some reconstruct or duplicate antique airplanes, much as antique automobile fans labor long hours over their Stutzes and Pierce-Arrows. One antique builder has reconstructed a 1909 Bleriot monoplane, and there is more than one rebuilt Jenny—famed World War I training plane—still flying.

William Chana and Ken Coward, who worked in the Convair plant at San Diego, set out to see how small a plane they could build that would carry a man. They developed the *Wee-Bee*, powered by a 20-horsepower two-cycle engine designed for a drone target plane. So small the pilot must lie on his stomach and fly from the prone position, the *Wee-Bee* weighs in at 210 pounds and is said to be the only heavier-than-air craft that can carry or be carried by the pilot.

Homebuilding of aircraft is in the American tradition of "do it yourself," and brings aviation and its fascination to many a man who could not afford to buy a new airplane and would rather rebuild an old one than let someone else do it.

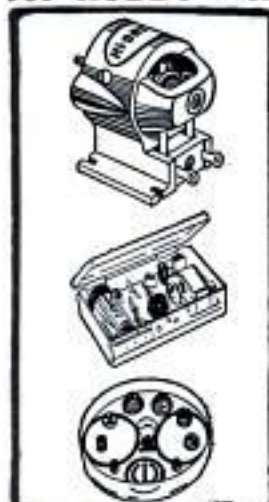
The homebuilder must be careful, however, and he must know what he is doing. The CAA asks that plans be submitted before construction is started and that inspectors be allowed periodic checks. The Experimental Aircraft Association heartily endorses this practice. It insists that its members exceed commercial builders' safety standards, and also makes every effort to lend a hand to the novice.

EAA members have no desire to see unsafe, unflyable aircraft built by amateurs. They urge would-be homebuilders to come to them for aid and advice. They feel that the potential airplane builder should know such basic facts as the necessity for high-strength steel tubing in fuselage construction. Gas pipe is not a suitable substitute, as one aspiring builder found after he had completed his airframe. ★ ★ ★

## Echo From World War II

Remember the supersecret Norden bombsight, considered the nation's biggest military secret early in World War II? Downed pilots were ordered to destroy the bombsight at all costs. A patent finally has been issued for the sight, 32 years after it was conceived. Carl L. Norden invented the sight in 1923, but military security kept it under wraps until 1945, when application was made for a patent. Now, 10 years later, it has been issued. For just 25 cents you now can purchase plans for the once top-secret sight from the United States Patent Office!

## NEW POWERFUL ELECTRIC MOTOR for HOBBY • RESEARCH • INDUSTRY



Meet Wilson's NEW Hi-Drive motors—tiny yet powerful enough to motorize hobby items, toys, recording equipment, research devices, industrial models. Long motor and battery life. Other high-quality, low-cost items listed may help solve your motorizing problems.

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- No. 1300—Small accessories kit \$1.00
- No. 3700—Large accessories kit \$3.00
- No. 4000—DeLuxe acc. kit with motor \$5.00
- No. 700—Super-Power kit with motor, speed reducer, all accessories \$10.00
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\* Item illustrated. Ask for FREE Cat.

All Wilson's motors have Permanent Alnico V Magnets.

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Up to 7,500 GPH, 3,000 GPH from 25' well. Use 1/2 to 1 HP motor. 1 1/2" inlet; 1" outlet. Stainless shaft. TYPE X—2 oilless bronze bearings. \$10.95

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"ESHELMAN"  
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70 Miles per Gal.  
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These famous AQUA-JET propellers won twice as many times in the "National Stock Outboard Championship" as all other wheels, custom built included. Inexpensive stock propellers, requiring no alteration of lower unit, each specifically engineered for motor used 5HP to 50 HP. Write for FREE 1955 catalog—the Outboarder's Bible. Shows how to get better performance from any boat and motor combination—for pleasure or racing—also fine line of boat trim. Michigan Wheel Company, Dept. P-76, Grand Rapids 3, Mich.

## NEW! BEAUTIFUL PRE-FINISHED HARDWOOD PANELING YOU PUT UP WITHOUT NAILS!



New pre-finished Weldwood paneling comes in figured walnut or light oak, 32" x 96" or 48" x 96", both 1/4" thick.



Brush Weldwood Contact Cement on studs and panel backs at points of contact. Let dry 1/2 hour and repeat. When dry, position panel, tap with hammer and wood block—job's done!

Here's real wood paneling that needs no staining or waxing—and you install it with a brush! New Weldwood panels come already pre-finished and waxed by expert wood craftsmen. You can put them up with new Weldwood Contact Cement—no nails, no hard-to-cover-up nail holes.

Panel a wall in your living room, dinette or den—Weldwood gives a lift and sparkle to the whole room. An 8' x 12' wall in pre-finished walnut costs about

\$78—other unfinished decorative paneling from \$23 for 8' x 12' area. See your lumber dealer for pre-finished and regular Weldwood paneling and superior Douglas Fir Weldwood, or visit any of the 82 United States Plywood showrooms in principal cities.

Ask your lumber dealer for



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Pre-finished Hardwood Paneling  
UNITED STATES PLYWOOD CORPORATION  
World's Largest Plywood Organization  
55 West 44th Street, New York 36, New York

"Handy" SANDY offers



more work-saving  
**GOOD  
SHORT-CUTS**  
you can use

Sharpen the cutting wheel on your wife's wall-type can opener quickly and easily by running a strip of CARBORUNDUM® Brand Fine Emery Cloth through it a few times. Saves taking the wheel out . . . puts a keen new edge on it.

Ever take a clock apart and lose a few small parts? Next time you're working with a number of tiny screws, springs, bolts and other elusive parts, lay a long strip of FLEXBAC® Masking Tape by CARBORUNDUM on your bench or table, sticky side up. Simply place your parts on the tape as you remove them, and they can't fall or roll away. Keeps them in order, too!

Safe way to clean your No. 109 Combination Stone or other sharpening stones by CARBORUNDUM: dissolve any household detergent in lukewarm water and scrub into the pores of the stone with a stiff brush. Lifts out the dirt, grit and grease—doesn't leave a residue.

Here's a brand new sanding block developed by the folks at CARBORUNDUM—now on sale by your hardware or building supply dealer. It's called RED-I-RUB, and it's the handiest little block you can use for sanding wood, metal, paint. It's made from two layers of thick, flexible rubber . . . sandpaper wraps around and is held tight between them. Because it's so flexible,

it's perfect for sanding irregular surfaces like moldings and such. Get two or three RED-I-RUB blocks (they're very moderate in cost) so you'll have one handy in the house, garage and workshop. I think they're terrific . . . once you've tried one you'll think so too!



Send me your ideas on how my line of CARBORUNDUM® Brand products can save time or work around the house or workshop. Put each Short-Cut idea on a separate postcard, and for each one I can use in later columns, I'll pay you \$5.00 right away. If I can't use 'em (because of duplicates, etc.), I'll send you a worth-while little gift anyway.

A free folder called "How to Sand", giving lots of useful information, is yours for the asking, too. Address all your postcards to me . . .



"Handy" SANDY  
**CARBORUNDUM**

REGISTERED TRADE MARK

Niagara Falls, New York

90-124

## Dodge Owners Rate Handling As the Best-Liked Feature

(Continued from page 110)

"Steering wheel too low. When I get in and out my legs hit it."—Kansas farmer.

"Ash tray hard for front-seat passenger to reach."—Texas refinery worker.

"I am still waiting for the heater that I paid for when I bought the car."—Florida electrician.

"Trunk lid closes too hard for women."—Wisconsin mechanic.

"Slight distortion where windshield curves."—Texas cafe owner.

### SPECIFICATIONS 1955 DODGE

#### ENGINE

	SIX	V8
Type	In-line, L-head 6	OHV V8
Bore and stroke	3.25 x 4.63 in.	3.63 x 3.256 in.
Displacement	230 cu. in.	270 cu. in.
Horsepower	123 at 3600	175 at 4400 (Red Ram) 183 at 4400 (Super Red Ram) 193 at 4400 (Super Red Ram with Power Pack)
Compression ratio	7.4	7.6
Transmissions	Three-speed; overdrive; PowerFlite (torque converter with gears)	

#### GENERAL

Steering wheel, lock-to-lock	4 turns (3.5 turns with power steering)	5 turns 42 ft., 3 in.
Turn circle	42 ft., 3 in.	3395 lb. (Coronet) 3425 lb. (Royal) 3485 lb. (Custom Royal)
Shipping weight	3295 lb.	
Wheelbase	120 in.	120 in.
Tread, front	58.9 in.	58.9 in.
Tread, rear	59.1 in.	59.1 in.
Height over-all	60.3 in.	60.6 in.
Width over-all	74.5 in.	74.5 in.
Length over-all	212.1 in.	212.1 in.
Road clearance	5.0 in.	5.0 in.

#### INTERIOR DIMENSIONS

Front (four-door sedan)	62.5 in.	62.5 in.
Rear hiproom	62.8 in.	62.8 in.
Front headroom	35.5 in.	35.5 in.
Rear headroom	34.9 in.	34.9 in.
Front legroom	44.5 in.	44.5 in.
Rear legroom	45.0 in.	45.0 in.

#### CAPACITIES

Oil	5 qt.	5 qt.
Water	13 qt. (without heater)	19 qt. (without heater)
Gasoline	17 gal.	17 gal.

"Horn ring positively dangerous. Answers to pressure on bottom third of wheel only. In a curve, driver has to hunt for pressure spot to sound horn."—Missouri lawyer.

"Chrome inside and out is not put on the right way. It works loose and causes squeaks and noises."—New Jersey baker.

"Driver cannot see right front fender clearly."—Pennsylvania salesman.

(Continued to page 224)



What home job do YOU want to do?



**NEW!**

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1/4 inch Drill  
does 'em ALL better!**

The Black & Decker 1/4-inch Utility Drill made even better! It's 44% more powerful ... smoother and quieter in operation ... and easier than ever to handle! Does hundreds of home jobs! See it at your dealer's. For "Handy Tips" booklet, send 25c to: THE BLACK & DECKER MFG. Co., Dept. M065, Towson 4, Maryland.

See "Tools-Electric" in phone directory for



**Black & Decker®**  
PORTABLE ELECTRIC TOOLS



44% MORE POWER!  
TWICE THE TORQUE!  
CONTOURED HANDLE!  
HELICAL GEARS!  
SMOOTHER OPERATION!

Still only  
**\$24.95**  
with geared  
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**STOP WATER WASTE AUTOMATICALLY**

Use HECO Flex-tip, the nozzle that shuts off the water FOR YOU. FLEX to use—RELEASE, it's off. No running back and forth to faucet. Stop puddles, save water and mess when washing cars, mixing cement, transplanting flowers and shrubs, etc. Made from solid brass bar stock and grease resistant Neoprene. Nothing to clog or break. Thousands in daily use. Get yours! \$1.75 each, 2 for \$3.00 postpaid. Satisfaction guaranteed. If dealer can't supply, send check or money order to: Customer Service, Dept. M, HECO, Littleton, Colorado. Colorado residents add 2% sales tax.



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NEW U-238 geiger counter—world's smallest, most sensitive uranium locator. Ideal for prospecting even on hunting, fishing trips! (Full line of mineral and metal locators, too.)



FREE booklets on request. (Dealer inquiries welcome.)

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Protect your home against power interruptions with an ...

**ONAN Emergency ELECTRIC PLANT**



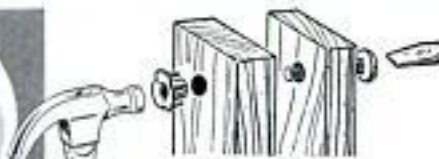
Provides dependable stand-by electricity for heating system, pumps, freezer, lights, appliances. Keeps home safe, livable. Automatic start and stop. Find out how little it costs!

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JUNE 1955

A SIZE FOR EVERY NEED  
400 to 75,000 watts.  
Compact, quiet-running,  
easy to install. Gasoline engine powered.



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steel threads in wood

TEENUTS mount flush without counter-boring. Excellent for new work or repairs ... wood to wood, wood to metal ... and where old screw holes have worn out. Simply drill hole for TEENUT barrel, hammer home TEENUT and its steel prongs provide rigid, permanent anchorage. Same size hole for bolt. Sizes to fit standard bolts: 6-32, 8-32, 10-24, 10-32 (4 per card), 1/4-20 (3 per card), 5/16-18, 3/8-16 (2 per card).

AT HARDWARE COUNTERS EVERYWHERE 15¢ per card



3229 South Ashland Ave., Chicago 8, Illinois

THE DOT LINE



### Dash-Mounted Shift Lever

One of the most talked-about features of the entire Chrysler Corporation line is the location of the PowerFlite selector lever on the dashboard. Only 6 percent of the owners polled dislike the new location. Another 10 percent say it makes no difference to them and 84 percent like the idea. Here are some opinions:

"Selector lever on dashboard is the hardest thing to get used to. It is handier under the steering wheel, but must admit it is out of the way of coat sleeves on the dash and you don't use it much anymore."—Washington prison officer.

"Dash-mounted lever is just as convenient (but no more so) as when on steering column."—New Jersey salesman.

"Dashboard location is wonderful. Seems the natural place for it."—West Virginia salesman.

"New position is very good. I cut the lever off flush with the dash."—California electronics engineer.

Well, there you have it—the good and the bad about the 1955 Dodge V8. A brief summary of the owners' opinions would state that the Dodge is excellent in handling, power and performance. Its two V8 engines are reliable and very miserly with oil. The major complaint is that the car

uses too much gasoline, especially with PowerFlite. For a more detailed summary of the survey, study the percentages listed on page 109. ★ ★ ★

Turn back to page 106 to begin Floyd Clymer's road test of the Dodge V8.

### Separator for Viruses Uses Electrical Process

Low-cost separation of proteins, viruses, bacteria and similar compounds can be achieved with a new electrical process developed by Alexander Kolin of the University of Chicago. Hitherto, separation of viruses of different kinds and the separation of them from their host cells was difficult and expensive. The Kolin apparatus, most efficient yet developed, can be set up for less than \$20. The process is based on placing a solution containing the mixtures to be separated in a vessel containing fluids that are different from each other by reason of weight or other qualities. When an electric current is passed through the fluids, the particles in solution move toward a point at which their electrical charge is zero—their isoelectric point. Different particles have different points, and tend to collect in the container with the fluid having their same isoelectric point.

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**Leather for comfort!**

You'll like the skillful way that Estwing craftsmen combine leather and steel in making the world's only one piece hammers and hatchets.

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## Fold-over edges continue grain design on this coffee table



get complete detail drawings and easy-to-follow directions in

### FREE PATTERN KIT 407

along with the picture-packed booklet, "Friendly Home Ideas in Western Pine." Write for it to Western Pine Association, Dept. 407-N, Yeon Bldg., Portland 4, Ore.

You'll enjoy making this coffee table with the handsomely grained woods of the Western Pines\*. Mitered fold-over edges on sides and ends continue grain design all around—give you a table without end grain. Tapered legs complete this unusual contemporary design.

Smooth-surfaced, even-textured Western Pine woods are easy to work and economical for all do-it-yourself projects. They cut clean and accurately without grain raising. See these carefully selected, well-seasoned woods at your local lumber dealer—ask him to give you an estimate!

## the Western Pines

- \* IDAHO WHITE PINE
- \* PONDEROSA PINE
- \* SUGAR PINE

TODAY'S WESTERN PINE TREE FARMING GUARANTEES LUMBER TOMORROW

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### 12 ft. SPORTBOAT KIT



Includes ready-cut parts and hardware. Models low as \$39.00 freight incl.

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### 2 GREAT AUTO BARGAINS



**NEW KING MIDGET** for 1955. lower priced, improved performance. Drive it for 75¢ per week. Rider agents wanted. earn your own car. Also just out **KING MIDGET JUNIOR** chassis, finely engineered.



ready to run, and priced at less than the retail cost of parts. Agents wanted. Get all the facts—send 25¢ for literature, special prices and proposition on both cars, or \$1 (refunded first order) for this plus actual assembly book and service manual.

**MIDGET MOTORS MFG. CO.**  
ATHENS 1, OHIO

## How to PROTECT hobby equipment from MOISTURE DAMAGE





**Just plug in the amazing FRIGIDAIRE electric DEHUMIDIFIER**

Positively controls moisture in workshops, basements, or any closed area up to 10,000 cu. ft. where moisture is a problem.

18 1/4" high; 20 1/2" long; 11 3/4" wide.

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**No Wash**  
**Non-inflammable**

**Peels Off Paint**

**How you can get perfect paint jobs every time!**

Klean-Strip is totally unlike ordinary paint removers that dissolve the finish and are so messy to use. Klean-Strip actually breaks the bond between finish and surface . . . removes many coats with one application. It's clean, fast-acting and easy to use . . . leaves the surface smooth and dry, ready to paint without neutralizing or afterwash.

Use Klean-Strip on furniture, woodwork, walls, metal. Klean-Strip peels off any finish. Buy it when and where you buy paint.

**KLEAN-STRIP**  
**Paint Remover**

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1963

## Clymer Road Test

(Continued from page 106)

single-rocker-arm shaft with modified hemispheric chambers. All specifications except horsepower are the same on both engines. The single-rocker-arm-shaft design is also used in the Plymouth and Chrysler Windsor V8 engines.

Dodge has terrific performance. It eats up average hills as if they were level ground and loafs along at 95 miles per hour. The speedometer showed 108 top speed, but it is fast by about 5 percent.

At high speeds there is more road noise than I believe is necessary. It is magnified some, perhaps, because there is no sound-deadening material on the underside of the hood.

The ride is comfortable and well controlled. Weight distribution is good with 56 percent on the front and 44 percent on the rear. There is considerable roll when sharp corners are taken at high speed. However, there is a feeling of safety in operating the car and fast road speeds can be maintained mile after mile. It was hard to make the frame hit bottom on the worst bumps, even at high speed with two persons in the car.

Chrysler's full-time power steering requires 3½ turns from lock to lock; without power it is five turns. This is an excellent ratio, but because of the very easy steering, one is inclined to over-steer until he has driven a few miles. After rounding a corner the wheel returns without assistance to normal straight position—an improvement over the first full-time power steering on Chrysler-built cars.

The hydraulic brakes are excellent. The power brakes on the test car are the best I have ever found on a stock production car. There was no fading and the pedal seemed less sensitive than on most power units.

PowerFlite transmission is not as smooth in the changing of speeds as some automatic transmissions. However, the operation of the foot throttle has much to do with the smoothness of PowerFlite operation. With some practice, the changes can be as smooth as silk, but they can also be jerky if the throttle is manipulated carelessly. If the throttle is held wide open, top speed engages at about 58 miles per hour. By depressing the throttle pedal, step-down below 58 miles per hour is quick and increased speed takes place instantly with a surge. It is a positive-operating transmission with no evidence of slippage.

The gas economy was not good and not bad—just average for a car with Dodge's

(Continued to page 228)

they keep your tools handy  
... and cost nothing extra

## UTILITY HOLDERS

included with Indestro Socket and Wrench Sets

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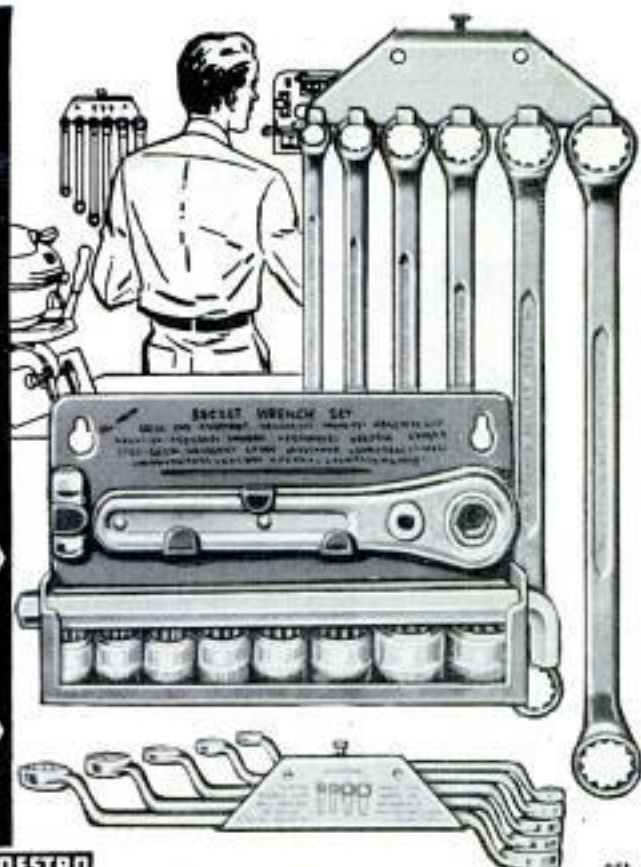
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Jiffy Brackets and 2x4s are all you need. Set-up and knocked down in a jiffy—no nails, screws, or bolts required. Easy to move or store. Sold by hardware and building supply stores everywhere, or order direct.

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Weldwood Contact Cement works like magic! No need for clamps or presses. Just apply...let dry...then bring laminate and surface together! Instantly you get a permanent bond!

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horsepower and weight. (See Economy Test, page 110.)

I found no squeaks or rattles and the body, which is extremely roomy, developed no water or dust leaks. The body has a tight feeling; the doors open and close easily. I like the short  $2\frac{1}{2}$  turns of the crank to lower or raise the windows.

Interiors are very attractive. The seat springs, front and rear, are excellent. Adjustment of the front seat is controlled by pulling up on a lever operated by the driver's left hand and this arrangement is awkward. Movement of the seat could be easier if this seat adjustment were redesigned.

The instrument panel is very attractive. I like the indicator needles that are used on all instruments, instead of red warning lights used by many other makes.

The heating system, although somewhat slow to warm up, is efficient and controlled by one lever. The ventilating system is good and the cowl ventilator, of which I approve, is now operated by a slide-movement lever below the center of the instrument panel.

The speedometer, directly in front of the driver, has an easy-to-read dial, but the top of the horn ring is annoying in that it is directly between the driver's eyes and the speedometer dial.

Dodge's brake pedal (now suspended from the firewall) is seven inches wide, easily operated by either foot. Incidentally, more and more drivers operating cars with automatic transmissions are learning to use the left foot for braking. This is as it should be; it makes for faster and safer braking. The brake-pedal location, in relation to the throttle, is good. As on all Chrysler models, the parking brake operates on the propeller shaft, a design I have never liked.

The starter is operated by the ignition key. The more accustomed I become to Chrysler's new shift-lever position on the dash, the better I like it. Windshield wipers are electric with slow, fast or varying speeds of operation.

There is some slight distortion at the extreme sides of the windshield, such as I have noticed on all cars using the wrap-around design. The vision directly in front of the hood is above average, due to the slope of the hood toward the front. Rear vision is also good.

The bumpers are massive, with good front and side protection. There is an exceptional amount of trunk space, the 1955 Dodge being almost seven inches longer than the equivalent model was in 1954 (see chart on page 110). ★ ★ ★

Now that you've read what Floyd Clymer thinks about the Dodge, turn to page 106 for the Owners Report.



Launch a day of fun...most anywhere!

—quiet fun, with an Evinrude



Outdoor America's most exciting discovery . . . TRAILER BOATING! Thousands will tell you there's nothing like it! You can explore famed vacation waters, or whisk your boat to lovely shores in easy reach. From highway driving to waterway cruising is a matter of *minutes*. Each launching starts a holiday of fresh adventure, new family fun.

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Build a Summer Home With All Conveniences for Only \$2800

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Designed by  
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New Popular Mechanics Book and Plans—New Precut Materials Kit—Packaged Plumbing, Heating, Chimney, Etc.—Make Amateur Carpenter's Job Easy

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Simplified How-To-Do-It Instructions—Hundreds of Pictures—Working Blueprint Plans!

You can build the house with the book alone. The plans make it easier. The book gives lists of materials required, all measurements and dimensions, suggestions for financing, and tells in words and shows in pictures every detail of construction. Like thousands of others who have built their homes themselves, you can do it too and save up to 70% of the cost. The dream home that seemed impossible is here. This fabulous, economical house, designed by famous architects, especially for amateur builders, is your answer to the home you always wanted.

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The coupon will bring you the "Precut House" book and plans. Mail it Today. If you do not like what you get or decide not to build this fine house, return either or both within 10 days for full refund of purchase price. Mail coupon today.

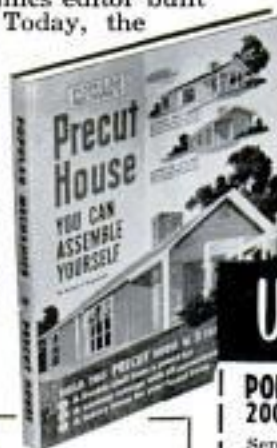
### Building the Test House

The test house pictured above was built in eastern Pennsylvania by the author and his wife, neither of whom had any previous building experience. It is a year 'round home, insulated, modern heating and plumbing, fireplace, redwood interior finish, dozens of built-in features and floor-to-ceiling, 9-foot wide picture window. Total man hours required to build—1650. Total cost not including ground and inexpensive foundation—\$3731.23



Build It to Your Own Plan in The Same Shell—2 Bedrooms or 3 With or Without Fireplace—Install Windows Where You Want Them!

Overall size 24 x 46 feet. Note the two typical floor plans shown. Above: Two bedrooms, bath, kitchen, dining room, living room, car port or porch. Below: Three bedrooms, bath, utility room, kitchen, dining area, living room, porch. The "Precut House" book shows many other variations.



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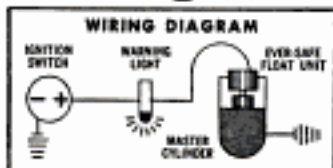
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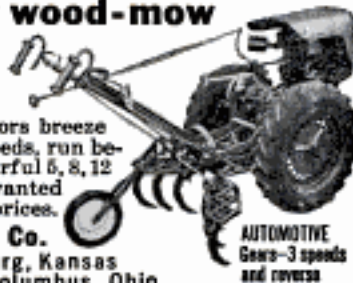
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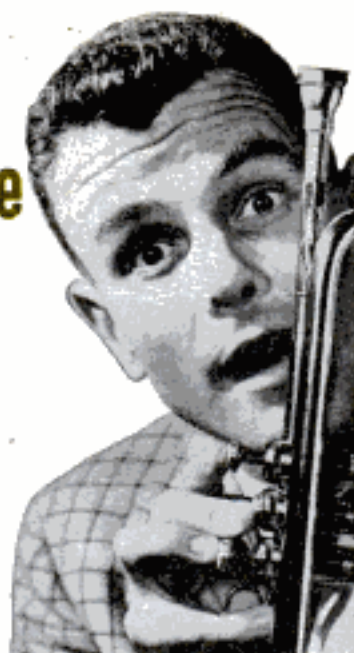
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There are thousands of lawnmowers in your locality: Average \$1,000 profit per 250 mowers with customer satisfaction and repeat business assured. Provide this essential service with an Ideal Lawnmower Sharpener, the only machine that grinds the reel to "fit" the bed knife. Compare by any standard. The Ideal, backed by 53 years of experience, costs no more. Write today for complete, free catalog.

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sticking  
trumpet  
valves!



**Free your car's engine from harmful deposits to UNLOCK HORSEPOWER**

Trumpet or engine, deposits can cause valves and other vital parts to stick. Then rhythm is gone and the *tune* goes sour. In your engine it means lost power, wasted gasoline, excessive wear.

Pennzoil with Z-7 disperses all harmful contaminants, lets the *Tough-Film*® lubricate completely—*unlocking* engine horsepower for instant response, better gasoline economy.

Next time, change to Pennzoil with Z-7 and *feel* the difference!

Sound your  for the  
**LONG QUART**

NOW with  
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Switch now at this sign

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**The "Hams" Have a Man of the Year**

(Continued from page 79)

have his son flown to a hospital at Thule, Greenland, where his life was saved.

Another case was that of a young radio operator on T-3, which is only 270 miles from the North Pole. He was stricken with appendicitis. There was no doctor available and the man had to be flown out under near-impossible weather conditions at 40 below zero. En route to Thule, the rescue plane was forced down at Alert, in Northwest Territory, Canada. The newspapers were playing the story for all it was worth and the stricken operator's parents were almost frantic until they heard from Surber. He contacted an operator at Alert who checked on the youth's condition. Through this cooperating ham, Surber kept the parents in constant touch with their son, reporting his condition through attempted and finally successful take-off for Thule, arrival at the hospital and successful operation.

Comedy, too, has a part in the hams' communication with the Arctic stations. Once an operator, also at T-3, reported that the station cook was getting "mighty tired of using a flattened tin can as a pancake turner." This message was picked by a ham in Pennsylvania. When the next package of mail was dropped, the cook was surprised with a brand-new pancake turner.

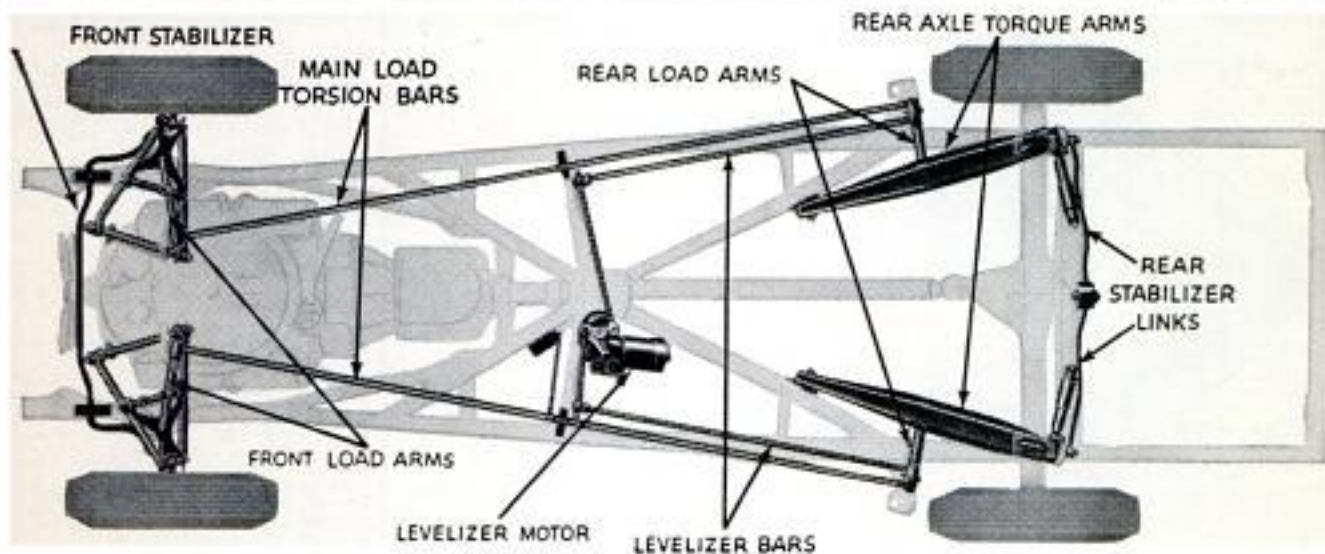
The first Edison award winner was Don L. Mullican (W5PHP), a college student of Searcy, Ark. He stuck to his radio for five days and nights to direct emergency aid to tornado victims in two nearby towns.

Among those who have won citations in the past is William C. Jenney (W8FYW) of Columbus, Ohio. Jenney was cited for spending many of his evenings teaching the boys at the Columbus State School for the Blind how to become hams. He helped them beg, borrow and buy equipment and taught them how to take down communications in Braille. The reports of his work have inspired blind boys all over the world.

Another special citation winner, Philip S. Rand (W1DBM) of Redding Ridge, Conn., has penetrated the Iron Curtain with his broadcasts. In recent months other hams have reported contacts with operators in Russia and satellite countries.

The big thrill to the hams as they eye the Edison awards is the fact that every man knows he has as good a chance as the next guy to become the ham of the year. National leaders in many fields salute the awards as an important incentive to a group of people who work without pay and are an important factor in civil-defense plans. ★ ★ ★

# GREATEST RIDE DEVELOPMENT IN AUTOMOTIVE HISTORY



**Torsion Suspension** has two long, torsionally flexible bars, four pivoting arms (called "load arms"), and four links. These support the frame and body.

**The Levelizer (Compensator)** has two short "levelizer" bars connected at one end by links and levers to a two-way motor with reduction gearing and at the

other end to the rear of the main torsion bar load arms.

**Rear Axle Mounting**—Driving torque arms connect the rear axle housing to the frame. Side movement of the rear axle is controlled with two transverse stabilizer bars, allowing only true vertical axle movement.

## NEW PACKARD TORSION-LEVEL RIDE A Sensational New System of Suspension Eliminates Conventional Coil and Leaf Springs

### Smooths the Road . . . Levels the Load Automatically

**H**ERE'S WHY the new Packard Torsion-Level suspension gives you comfort unequalled by any car on any road . . . whether super-smooth or rugged and rutted.

In other cars, twisting forces due to wheel shock are transmitted to the frame. You submit to resulting pitch and bounce, the car is subjected to wracking of frame and body. In the new Packard, these same twisting forces are transmitted along the new torsion bar system and absorbed *before* they can reach either frame or passengers.

Torsion suspension has two "main load" torsion bars running the full length of the frame on each side connecting a front and rear wheel and making them work as a team. Each "team"

acts as a longitudinal stabilizer, reducing "pitch" and "dip" much as a transverse sway bar stops side roll. As the wheels move up or down, four pivoting arms (called "load arms") transmit twisting force to the main torsion bars, which, in turn, tell the wheels how to react to bumps and ruts.

A new type of front and rear stabilizer control helps give better handling on sweeping curves and tight corners. And an ingenious power-controlled levelizer compensates for changes in passenger and luggage load, and automatically keeps the car always at "flight-level."

But to fully appreciate this new kind of ride, visit your Packard dealer . . . take the key and see . . . let the ride decide.

"Ask the Man Who Owns One."

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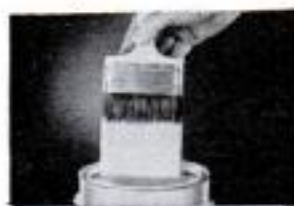
# How to choose a paintbrush that does faster, streak-free work



Here's why it pays you to use a brush with Du Pont TYNEX nylon bristles



**1. No break-in!** You don't have to soak or flex a new brush . . . if it has "Tynex" nylon bristles.



**2. Full paint pickup!** Specially tipped and flagged "Tynex" bristles hold a full load of paint.



**3. Smooth, even flow!** Anyone can do streak-free work, because each tapered "Tynex" bristle provides better, more even flow.



**4. Easier to clean!** They're the easiest-to-clean bristles there are! Paint loosens quickly in any commercial cleaner, rinses out thoroughly.

FREE! 8-page booklet full of helpful painting tips. Write Du Pont Company, Polychemicals Dept. PM-6, Wilmington 98, Del.



"Tynex" is the registered trade-mark for Du Pont nylon bristles.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

## Can We Blame the Sun for Stormy Weather?

(Continued from page 69)

equatorial regions revolve considerably faster than its higher latitudes.

Inside the coronagraph, an artificial eclipse produced by the "occluding disk" blots out the sun to its rim, so that the observatory staff sees only the portions of the sun that extend beyond the luminous surface—a sort of cross section from the rim out through the sun's atmosphere. The two extremities of the rim are called limbs. Because the sun takes roughly 28 days to make one revolution, anything observed on the east limb will directly face the earth about seven days later, and the west limb shows the area which passed by the earth some seven days before. By recording our observation on the east limb and then studying the west limb some 14 days later, Miss Dorothy Trotter, who maps the solar activity daily at our Boulder research center, is able to interpret what was happening in a particular area on the sun at the moment it faced the earth.

These studies are important because the sun releases a great deal of energy in addition to sunlight. It emits this energy in two ways:

1. If you looked at the surface of the sun through a high-quality telescope of substantial size, equipped with filters to protect your eyes, you'd see that it has a mottled or granular appearance. Astronomers now believe that the tremendous energy born in the center of the sun greatly disturbs the layers just below the sun's surface as it seethes outward, producing violent agitation. This agitation shows up as bubblelike bright granules all over the solar surface. A typical granule lasts about three minutes. We believe that these granules are actually jets which shoot incandescent gas through the solar surface. Some of the largest of these show up as tiny spikes projecting from the rim of the sun. We have given the name "spicules" to these, and in the coronagraph they are fascinating objects for study. A spicule shows first as a tiny bump on the solar limb, which then thrusts upwards perhaps 10,000 miles at a speed of about 20 miles per second, releasing an accelerating jet of protons and electrons out into space. These protons and electrons form a part of the sun's corona and also, we believe, have effects on the earth.

2. Huge clouds of rosy-lavender, gaseous material lash out from the sun to tremendous heights. For example, one of these fiery clouds, photographed on June 4, 1946,

(Continued to page 236)



# B.F. Goodrich ASPHALT FLOOR TILE



**EASY** TO INSTALL  
TO CLEAN



Save by installing this low-cost tile yourself! The precision-cut edges and true corners help you do a fast, neat job.

A new electronically controlled process now gives B. F. Goodrich Asphalt Floor Tile a superior finish . . . extra smooth . . . easier to clean. It also provides uniform marbleization . . . brilliant colors . . . that make any room look new!

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Name.....  
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City..... Zone..... State.....

surged out to a height of 1,000,000 miles, more than one percent of the distance from the sun to the earth. Such "prominences" grow and fade in irregular fashion on the surface of the sun. Usually they arch and fall back into the solar surface. Many more are seen dropping towards the sun than can be seen shooting upwards. Some astronomers believe that at least a substantial number of prominences come to the sun from elsewhere in space, and fall into it. Prominences may last from a few minutes to several months. One extremely bright and abrupt type of prominence is called a "solar flare." Flares release powerful ultraviolet and X-ray radiations that find their way to earth.

Certain areas of the sun often become cooler than the rest of the solar surface, though no one yet knows exactly why. These are the famous sunspots, huge irregular areas that fluctuate in number and size in an 11-year cycle. They have been blamed for everything from depressions in our economic system to cycles in the frequency of twins. It seems likely that they have many profound though indirect effects on the earth. Flares are most likely to occur close to sunspots, and there are indications that the energy they release can very well alter the earth's climate and weather.

Astronomers have recently concluded that the sun has a gigantic magnetic field surrounding it, and speculate that this field can focus the proton-electron beams that shoot into the solar atmosphere. The sun's magnetism, most likely, focuses these beams into a broad band around the sun's equator. In addition, areas of intense solar activity where there are flares and sunspots create localized magnetic fields which can bend and distort the beams.

These electron-proton beams presumably flow the 93,000,000 miles through space from sun to earth in something between 6 and 80 hours. When they enter the earth's magnetic field they swerve to one side or the other, veer through space in a gigantic S-curve and shower down upon our planet in areas near both poles. What we see as the northern and southern lights are concentrations of these corpuscles. We are viewing the spectacular halo of the sun as it strikes the earth.

A violent outburst of flare activity on the sun sometimes produces a sudden surge in this shower of corpuscles. Impinging on the earth, this causes sudden and violent changes in the earth's magnetic field. Delicate compass needles, particularly in polar areas, develop irregular tremors. Brilliant auroral lights show up in the night. The


(Continued to page 238)

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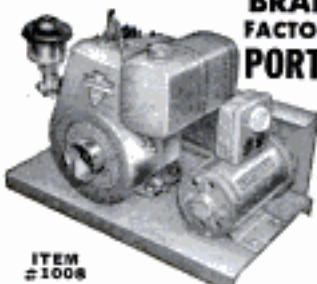


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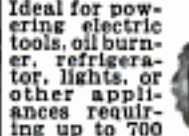
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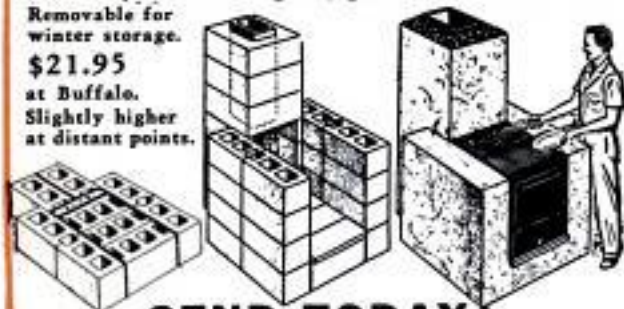
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corpuseular energy also affects the ionosphere, upon which we depend for long-distance radio broadcasts; stormy weather on the sun can completely black out radio reception on the earth. Some years ago, at a time when Easter messages were being sent by telegraph, Western Union instruments in many parts of the country suddenly started clicking gibberish. A great flare on the sun had sent out a tremendous surge of energy which induced currents in the telegraph lines.

Radiation from spicules, prominences and the corona can be analyzed by spectroscope. The presence of certain elements produces lines of particular colors. Two isotopes of iron give the two strongest spectrum lines of the sun's corona, one representing red radiation and the other line green. There is also a yellow line, rarely seen, which indicates violent activity and high temperatures on the sun.

In recent years, many astronomers and meteorologists have sought a relationship between the mysterious red and green lines and weather on the earth. It is too soon to be at all certain that real effects exist, but there are some clues that suggest to us that periods of very weak solar activity correspond to the development of dust-bowl conditions in this country.

Our measurements of the corona, in the hands of E. D. Farthing, a meteorologist with Trans World Airlines, have yielded even more specific results. Farthing has made an intensive three-year study of weather records in the Kansas City area, and the spectrum lines of the corona. This showed a definite relationship between the coronal lines and the rainfall at Kansas City. The greatest rainfall for the period 1951 through 1954 came when strong regions of green coronal emission covered areas of the sun facing the earth. Farthing also found that as the minimum of solar activity approached in mid-1954, the red emission line grew stronger compared to the green, and drought conditions prevailed at Kansas City. Then in August and in October, solar activity increased with strong green coronal emission. With this, heavy rains came again.

In some yet-unexplained way, it seems that the behavior of cold fronts in the Kansas City area also is controlled, at least partially, by these mysterious solar radiations. The position and timing of cold fronts, with attendant rainfall and temperature effects, appears to be synchronized with the green line of the corona. The TWA meteorologist found that on 81 percent of the days in the three-year period, the day following green coronal activity was colder

(Continued to page 240)



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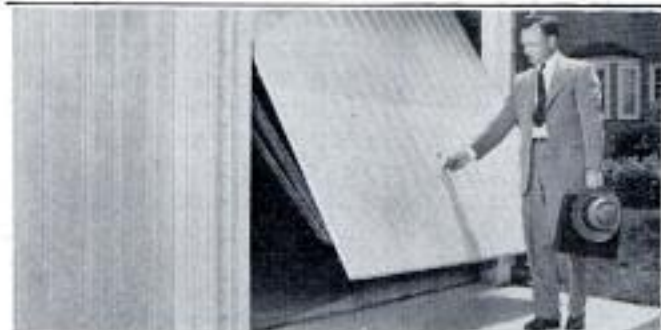


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than its predecessor. These cold temperatures tended to continue for about five days as the front passed beyond Kansas City. These effects are of great importance to the airlines, as these fronts produce low ceilings and poor visibility.

The emissions also appear to have an effect on the jet stream and the large-scale circulation of the earth's wind systems. For example, during the test period examined by Farthing, TWA's San Francisco to New York flights averaged over 14 minutes faster during periods of strong green coronal emission than at other times. A word of caution, however, is in order, as Farthing is careful to point out. All of these sun-weather effects are difficult to isolate and even more difficult to explain. In a new field of research it is very easy to be fooled. The only answer will be more years of painstaking scientific study.

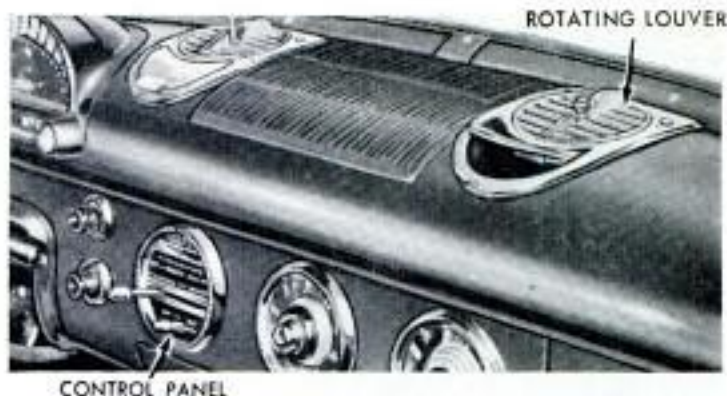
Nobody should pretend, at this stage, that accurate local weather forecasts are possible by studying the sun's activity. We don't even know the answers to the basic questions about how the sun's variable energy is generated. We have no even remotely satisfactory explanation of how the green coronal emission can affect frontal activity at Kansas City. We don't know what causes sunspots. The sun's corpuscular streams appear to have insignificantly small energy to modify the course of the jet streams. Nor do we fully understand what the high temperatures and violent activity of the rare yellow line indicate.

But there are many fascinating questions for the future. When we know more, will we be able to predict the drought years and seasons with accuracy? Will we be able to forecast the flow of the mysterious storm-generated jet stream? Can we use the new knowledge that we will most surely gain about sun-weather effects to produce significant modifications of the distribution of the earth's rainfall?

The answers to these and to many other questions lie hidden in the swirling atmosphere of our mother star. ★ ★ ★

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Launched at Vernalis, Calif., a research balloon traveled 6250 miles to Spain in 52½ hours to set a new distance record in the high-altitude program being sponsored by the U. S. Air Force. Unusually strong winds at high altitudes carried the big balloon across the United States, the Atlantic Ocean and to a landing near the town of Badajaz, Spain, near the Portuguese border. Data from the flights gives scientists added information on winds at high altitudes.

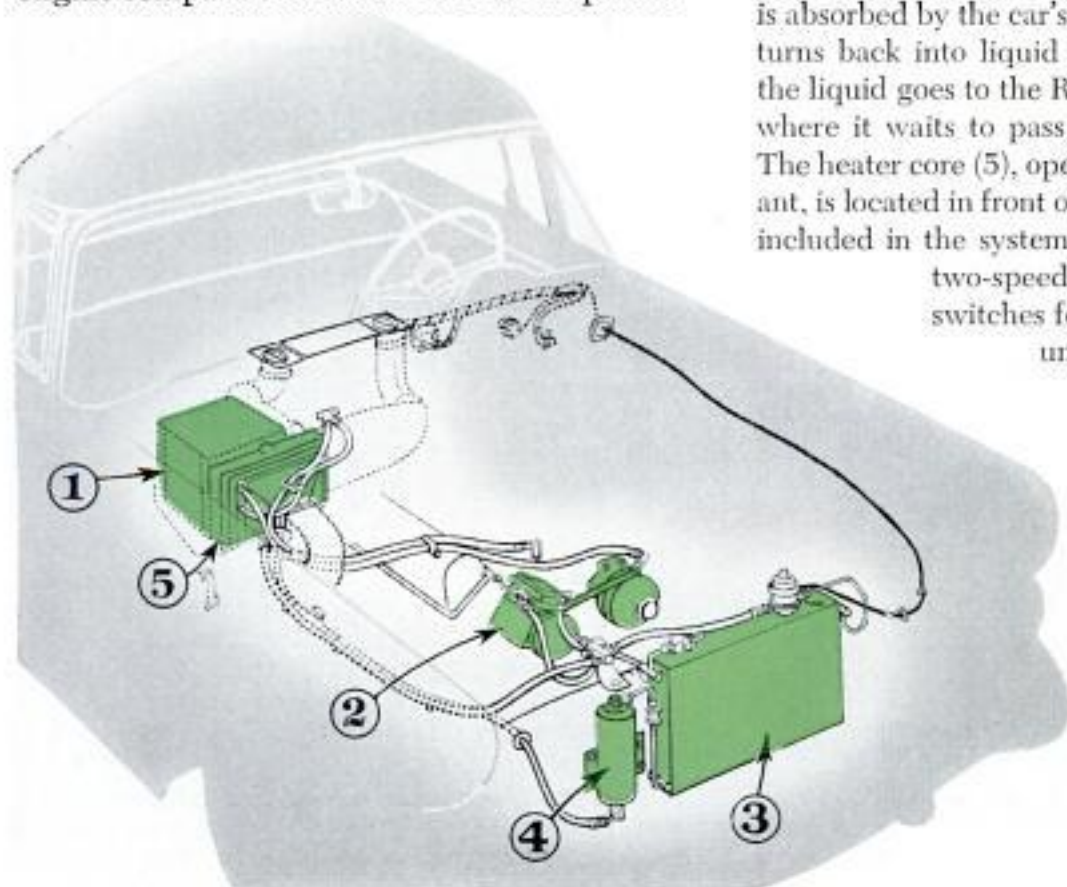


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(Continued from page 91)

individual units, topped with decorative laminate and laid out breakfast-nook fashion. When not in use, they fold back and the seats reverse to make a compact theater.

The officers' wardroom suggests a club-room with its blue carpeting and smart leather-covered furniture. But the mailed fist can be felt beneath the velvet glove, for the glossy dining table doubles as operating table and the trim lampstand opens to disclose sterilizer, anesthesia equipment, retractors and suture trays.

What's it like out there on the picket line?

"The toughest thing to combat is monotony," says one executive officer. "The crew try all sorts of things to beat it, but probably the most successful is our disk-jockey program—Station DER, broadcast over an internal circuit."

On a picket ship, rolling lazily out there on the ocean, the sea seems very close. Shark fishing is commonplace, and stranger specimens have been reeled in from the depths. The sea seems close, too, when typhoons rage. The Air Force liaison officers who go along on occasional patrols are overwhelmed by the relative sizes of the waves and the small ship.

But on the whole, Air and Navy have a mutual respect for each other's roles on the integrated team. The airmen are impressed by the compact machinery and the intricate air-control setup, while the seamen are awed by the vast communication and command network that can spew forth coastal fighters on an instant's notice.

The present picket line is a little like a patchwork quilt. It includes big shore-based radars at promontories along the coast, "Texas Towers" in shallow ocean areas offshore, converted Liberty ships with radar installed and the rapidly multiplying DERs. But the time isn't far off when the nation's outer defense perimeter will be a uniform radar net, as nearly airtight as modern science can make it.

The picketeers are a hardy breed and few hardships or dangers disturb them. But ask them if there's any phase of their lonely work that's really tough to take—and they answer soberly that, yes, there is one thing that nearly stops them.

It's those blasted mile-long patrol reports they have to write up when they come in!

★ ★ ★

*The opinions and assertions expressed herein are those of the author, and do not necessarily represent the views of the Navy Department or the naval service at large.*

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## TV Crosses the Horizon

(Continued from page 87)

You get a pretty good idea of what those dishes will look like when you see the experimental 60-footer announced recently by Bell Laboratory engineers at Holmdel, N. J. The 13,000-pound reflector, which A.T. & T. engineers say their production models will resemble, was so vast that new techniques were used to erect it.

"First we set up the tripod, with a vertical bearing post in the center," says one of the Bell engineers who helped construct it. "Then we installed the hub of the dish—horizontally—and fastened it with pivot pins to the top of the bearing post. Then we stuck the 'inpole' or feed horn, on top of that."

Usually, a feed horn, which actually puts out the signal, is a rod about the diameter of your finger sticking out of the center of a dish antenna. On this monster, however, the feed horn was stout enough to become the mast of an improvised derrick, which was used to raise prefabricated dish sections, shaped like orange-peel sectors, into place. When the entire assembly was completed, the 60-foot reflector sat atop its tripod with bowl pointing skyward. Then it was swung into vertical position on its pivot pins and rotated to proper direction on the hub bearing.

What happens if a hurricane should blow into the center of that massive cup? "She's built to stand a 100-mile-per-hour wind head-on," explains a Bell engineer, "which is about the most we ever get up this way. But the ones for that hurricane country in Florida and Cuba will have to take 150-mile-per-hour winds. Guys and other supports will probably have to be used. They can do it for billboards, so why not for big dishes, too?"

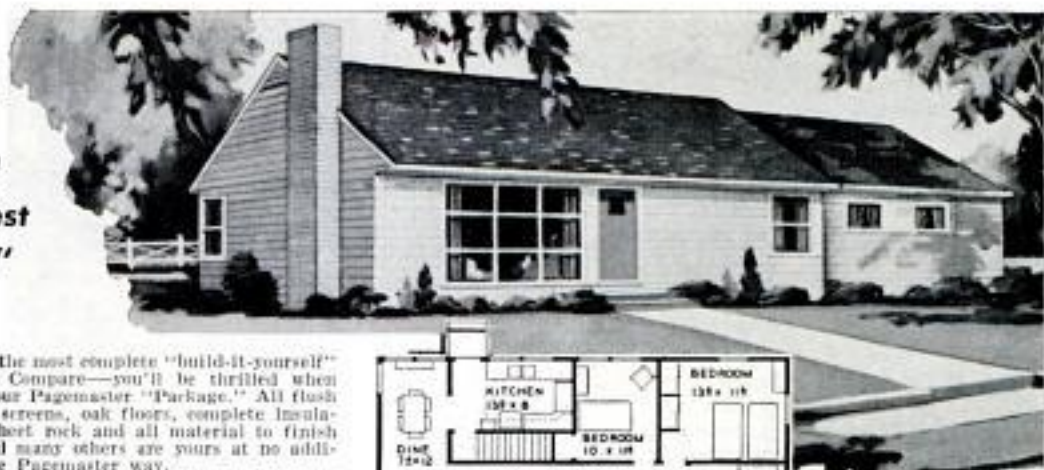
And for all anyone knows, the big antennas may one day be relaying radar warning pictures across the Caribbean of hurricanes they will have to buck. ★ ★ ★

## Nylon Balls Travel 15,000 Miles Per Hour

Rifles are firing nylon balls at a speed equivalent to 15,000 miles per hour at the Naval Ordnance Laboratory, White Oak, Md. The balls travel so fast they get hotter than the surface of the sun and light up the room in which they are fired. The purpose of the experiments is to study what happens to gases around a high-speed missile. The nylon balls, fired from a rifle with a 30-caliber cartridge, reach speeds far greater than the largest artillery shells.

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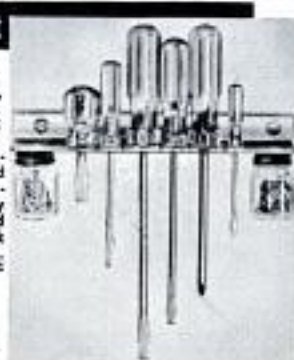
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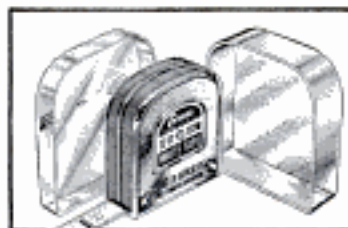
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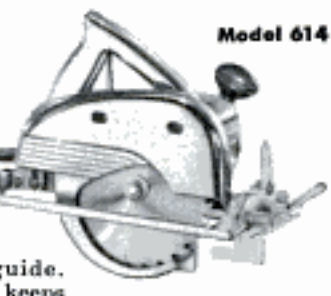
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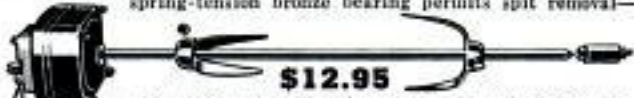


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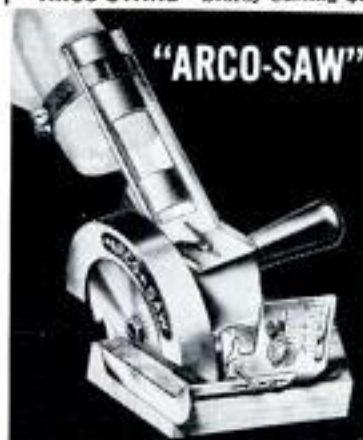
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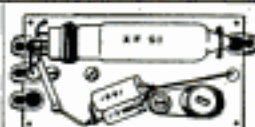
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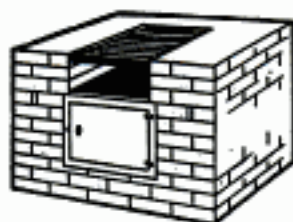
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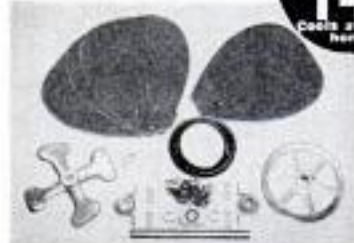
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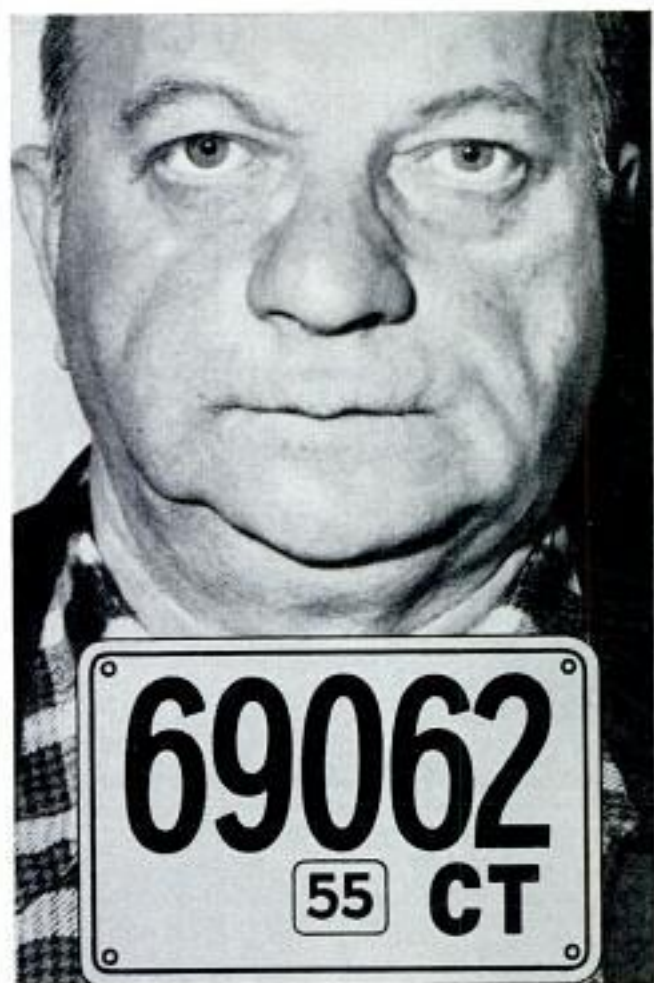
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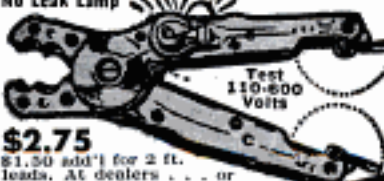
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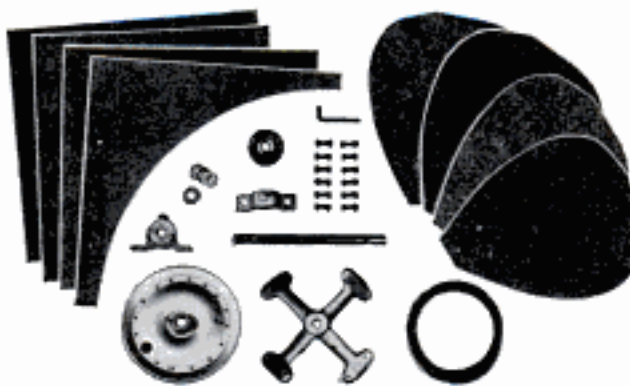


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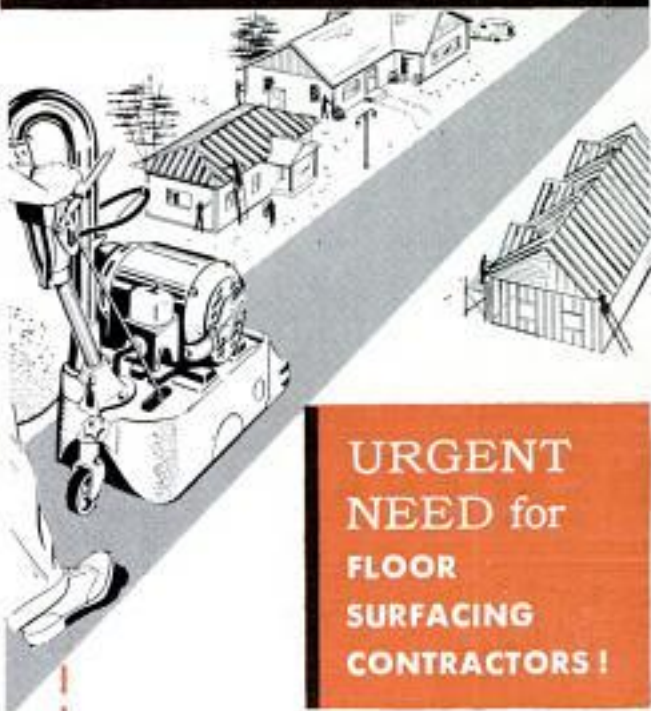


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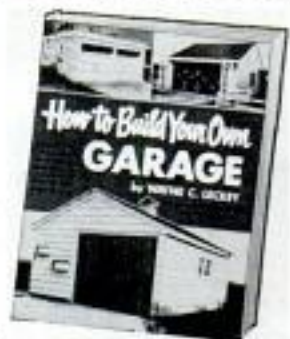
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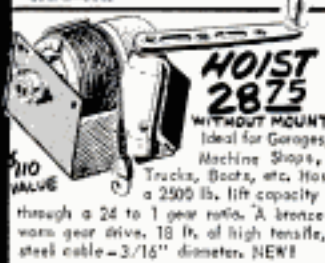
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Scope and Mount, BOTH **24.50**



**180° OFFSET DRIVE**  
For use where  
tremendous power at  
low take-off RPM is desired.  
6 gears rotate on self-lubri-  
cating, hi-speed roller bearings.  
85 to 1 gear ratio. Shafts are  
1 1/2" & 3/8" dia. All NEW **12.95**  
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ball-contained, con-  
stant torque at all  
speeds with variable  
volume, reversible piston pump which  
supplies piston hydraulic motor. Has  
2 H.P. Automatic pressure dash pot  
for smooth control. Power output RPM  
= 0 to 1/3 input RPM in both directions.  
Input RPM 1500 continuous, 4000 inter-  
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**4" SPLINE SHAFTS** for input and  
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**INPUT & TAKE-OFF PLATE ASSEM.**  
To adapt Trans. to pulley drive. Has  
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High speed bearings.

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CYLINDERS. Designed to meet the most rigid  
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1500 and 3000 PSI. Full stock of replacement  
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BORE	STROKE	SHAFT	PSI	PRICE
3"	4"	1-1/8"	1500	\$32.50
4"	5"	1-1/8"	1500	\$37.50
4"	5"	1-1/2"	3000	\$52.50
5"	18"	2"	3000	\$85.00
5"	30"	2"	3000	\$130.00



**4-WAY OPEN CENTER CONTROL VALVE \$21.50**  
Has built-in adjustable relief valve, set at  
1000 PSI. Spring loaded neutral position.  
For use with one double action cylinder as  
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3/4" pipe, inlet & outlet, 1/2" pipe threaded  
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No. 29 HYDRAULIC CYLINDER - will  
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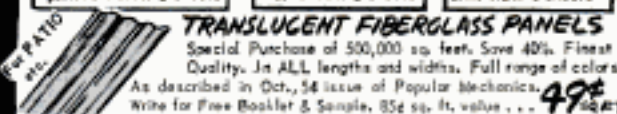
Ideal For Fine CABINET WORK, FURNITURE,  
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specifications. It is WEATHER and WATER RESISTANT. You'll

be amazed at the beauty of this fine wood. Its rich golden elegance will thrill  
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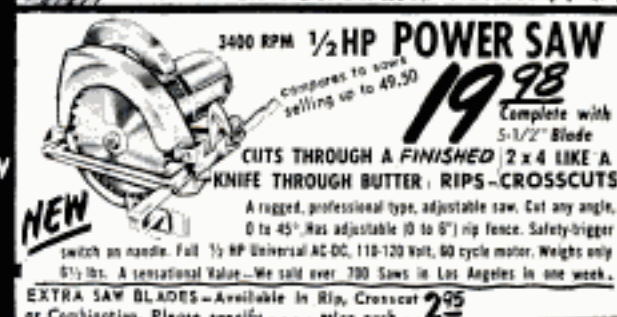
Available in three thicknesses - 3mm (approx. 1/8"),  
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3mm (1/8") x 3 ft. x 8 ft. <b>\$5.90 VALUE</b> <b>1.79 PER SHEET</b> Minimum order 8 sheets	4mm x 4 ft. x 8 ft. <b>\$7.50 VALUE</b> <b>3.89 PER SHEET</b> Min. order 6 sheets	1/4" x 4 ft. x 8 ft. <b>\$9.50 VALUE</b> <b>4.99 PER SHEET</b> Min. order 4 sheets
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Special Purchase of 500,000 sq. feet. Save 40%. Finest  
Quality. In ALL lengths and widths. Full range of colors.  
As described in Oct., 54 issue of Popular Mechanics. **49¢**  
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## 3400 RPM 1/2 HP POWER SAW

Compares to saws  
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**19.98**  
Complete with  
5-1/2" Blade

**CUTS THROUGH A FINISHED 2 x 4 LIKE A  
KNIFE THROUGH BUTTER; RIPS - CROSS CUTS**

A rugged, professional type, adjustable saw. Cut any angle,  
0 to 45°. Has adjustable (0 to 6") rip fence. Safety-trigger  
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8 1/2 lbs. A sensational Value. We sold over 700 Saws in Los Angeles in one week.

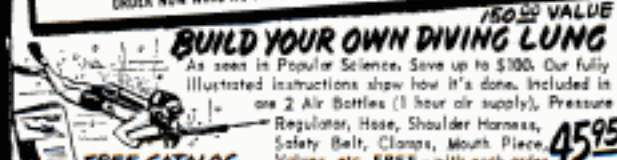
**EXTRA SAW BLADES** - Available in Rip, Crosscut or Combination. Please specify . . . price each . . . **2.95**



## SPORTSMAN'S 12 Pc. IMPORTED COMBINATION KNIFE

Eliminates 12 individual items from  
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(A \$12.95 VALUE) **4.95**  
**COMPLETE CAMPKIT**

Here is the Perfect, Combination Knife-Tool for  
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unit you have (1) a regular knife, (2) a fork, (3) a spoon,  
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(6) a screwdriver and (11) a metal file. All this PLUS a  
genuine leather, belt holster.  
ORDER NOW While We Can Guarantee Delivery at this Special Low Price



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As seen in Popular Science. Save up to \$100. Our fully  
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Regulator, Hose, Shoulder Harness,  
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Has two built-in, snorkle  
type breathing tubes. Fully  
covers both the mouth and the nose.  
Made of finest quality rubber with  
quality safety glass eye  
lens. Formerly \$10.95 . . . **8.95**



## NEW GRESSI PINOCCHIO DIVING MASK

Specially designed to bring the lens  
close to eyes. The mask's Pinocchio  
nose allows you to grasp it between  
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Install a complete underground system for less than the ordinary cost of pipe and fittings alone. Kit contains 2 Rain Jet heads, 60' flexible polyethylene tubing, gate valve and metal fittings, wrench, instructions. No cementing, no clamps, no threading—uses patented slip-on couplers. Great for slopes, hill-sides, old lawns, newly seeded areas. So fast and easy you can make system-installing a profitable part-time business!

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Uniformly covers area 34-ft. in diameter. Rain-size drops and low angle of discharge give deep penetration. No puddling or runoff. No water-wasting mist. Top performance even at low pressures (5-30 lbs.). Solid brass... made to last. Fits 1/2" metal, plastic or rubber pipe.

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KIT FOR 50' x 24'  
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Forged from special alloy steel, extra hard P&C bits are precision ground and oil tempered. Fluted, plastic amber handles take the toughest twists, are kinder to your hands. Shock, hammer, acid and grease-proof. Knurled tips for fast finger twirling.

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**beware of imitations**  
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## Swanky New Lounge Chair

**SAVE 50%—NOTHING LIKE IT**

Big do-it-yourself kit only \$11.95. Ultra-modern design. For your lawn, den, TV room. Unique, no other like it. 3 position, full reclining with footrest. Ventilated seat and back curved to fit. Rubber tired wheels. Folds! Extra strong solid oak bent to shape. Easily assembled and painted. Strength and comfort guaranteed. Save half—order yours now! \$11.95 ready to assemble. (Assembled, ready to use, costed green, \$24.95 each). Send check or money order to:

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## NEW! MASTER Tiller-Mower

It's a rotary mower! It's a rotary tiller. Amazing new gardener combination that works for you the year around. Switches in seconds without tools from gear driven tiller to big 90° rotary lawn mower. Powered by an easy starting 2 HP Briggs & Stratton engine. Has exclusive built-in automatic clutch which smoothly engages power as throttle is opened. Tiller transmission sealed in grease for years of smooth operation. Non clogging steel tines till or cultivate soil down to 8" depth. Perfect for cultivating—ends backbreaking hoeing and weeding. Tiller propels itself forward—no pushing necessary. 20" mower attaches in less than 1 minute. Does a perfect job on any grass, short or tall, velvet smooth! Matches as it cuts—eliminates raking. Years ahead of other mowers and tillers. Basic power unit, factory price... **\$69.50**



Gardener shown with tiller attachment

### ROTARY MOWER ATTACHMENT



Attaches in less than 1 minute. Does a perfect job on any grass, short or tall, velvet smooth! Matches as it cuts—eliminates raking. Years ahead of other mowers and tillers. Basic power unit, factory price... **\$69.50**

### TILLER ATTACHMENT COMPLETE... \$40.00

### 30" ROTARY MOWER ATTACHMENT (Item 737a) ... \$49.50

Easy payment plan available. Freight paid east of Rockies—half paid elsewhere.

### FLASH-WELD SOLDER GUN

High powered double transformer soldering gun that converts ordinary 115 v. current to instant heat for big soldering jobs. Install or remove copper pipe fittings in two seconds! Applies solder bugs, heats tools for hardening, provides heat for continuous sheet metal soldering. Saves at least 50% labor time. Includes complete heating unit transformer, heavy cables and grip type soldering pliers. Wt. 38 lbs. (Item 777) Reg. \$79.50, Close-out **\$39.50**



### EXTENSION CORD

Heavy duty and very flexible. Neoprene 14-2 cable, 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only **\$8.95**

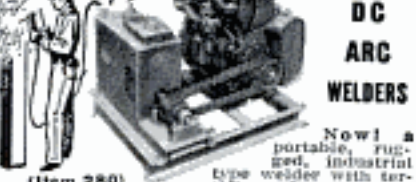
NO. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 109) wt. 8 lbs. **\$6.95**. 100 ft. (Item 200) wt. **\$12.95**

### 9 TON HYDRAULIC PRESS

A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself in many ways overstraining bent connecting rods, king pins, crankshafts, axles, link pins and nuts—or pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauges. Complete with both large and small anvils and jigs to straighten any kind of curve or bend. (Item 464) Wt. 110 lb. Actual list price \$365. Our special close-out price... **\$69.50**



### MASTER DC ARC WELDERS



Now! a portable, rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to 1/4" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions—guarantee and triple V-belt of flat pulley. You can pay more, but you can't buy a better welder. **WELDER ONLY—DUAL CONTROL MODEL.** Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item **\$119.50**) Wt. 110 lbs. \$450 value. **WELDER ONLY—STANDARD MODEL.** Same as above but with single rheostat for heavy metal welding only. (Item 38.) Wt. 110 lbs. \$400 value. Special... **\$99.75** **COMPLETE POWER MASTER** (Illustrated above) powered by a 14.6 hp., air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compare with welder costing \$1200. Factory Special... **\$449.50** **WELDING KIT** Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **\$10.50**

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### 600-700 WATTS PUSH BUTTON START

115 v. 60 cyc. AC Powered by a rugged 2 HP easy starting Briggs engine. No wiring necessary! Just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24.) Wt. 75 lbs. Easily fits in car trunk. He prepared if storm knocks out power lines. Reg. \$275 value... **\$143.50** **1000-1200 Watt Plant (Item 45)** same as Item 24 but larger generator and engine... **\$199.50**



### 1300-1500 WATT PLANT

115v. 60 cyc. AC Push Button Start. Powered by a 3 1/2 HP. Clinton engine. Combines big output with easy portability. Provides emergency power for operating any oil burner, sump pump, freezer, television, lights, communications systems, etc. which require up to 1500 watts. (Item 22.) Wt. 110 lbs. Reg. \$475 value. Factory price... **\$239.50** **2500 WATT PLANT—Push Button Start (Item 21)** 110/120 60 cyc. A.C. A rugged powerful plant. Reg. \$645. Spec... **\$329.50** **3500 Watt Plant Push Button Start (Item 23)** 115 v. 60 cyc. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. \$760. Factory Price... **\$379.50** **Dual Voltage 110/220** available for above plants for \$30.00 additional.



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### HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful, continuous duty motor 110-120v. AC. Mount in wall or ceiling to ventilate any area. Quiet, super-efficient fan moves huge volume of air. (400 to 600 CFM). 8" Pipe, wt. 5 lb. .... **\$6.95** 9" Pipe, wt. 6 lb. .... **\$7.85** 10" Pipe, wt. 7 lb. .... **\$8.85** 12" Pipe, wt. 8 lb. .... **\$9.85** **HEAVY DUTY FAN.** Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 102) .... **\$11.95** 12" Fan, wt. 10 lbs. (Item 103) .... **\$12.95**



### JET FLOW BLOWER

Tremendous air movement (1800 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating to forced air; spray booth exhausts, etc. Operates with any 1/4, 1/2 or 1/2 HP motor. Oversized, long life bearings. Includes variable speed motor pulley and belt. Dimensions 19" hi x 18" x 16 1/2". Outlet opening 13" x 11 1/4". Wt. 45 lbs. (Item 245). Reg. \$54.50. Factory Special... **\$27.50** **HEAVY DUTY 1/2 HP motor** for above **\$16.95** **12" TURBINE BLOWER** Similar to above, but larger with 2400 CFM capacity. Wt. 65 lbs. (Item 245a) Reg. \$70.00. Factory Spec. **\$34.50**

### JET STEAM MASTER

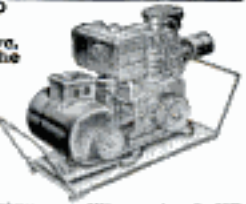
Now, a super efficient portable steam generator that produces live steam at 150 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. off implements, tools, machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it! Built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. Item 463. Special factory price... **\$329.50**



### PORTABLE LIGHT PLANTS

#### GIANT 2000-2500 WATT PLANT

110-120 v. 60 cyc. AC. Absolutely the best made exclusive dynamically balanced armature; heavy windings develop up to 5000 watt overload for motor starting. Skid mounted—portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Oil outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price \$585. Special at... **\$299.50** Same plant with electric self starter (Item 31a) ... **\$359.50** Generator only and control box... **\$109.50** **DUAL VOLTAGE 110-220** available on any of above models for \$28.00 additional.



### CONDITIONAIRE VENTILATING FANS

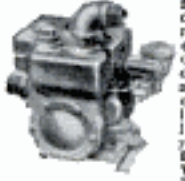
Save big money installing your own exhaust fan. Efficient propeller type blade. Moves huge volume of air quietly and effortlessly. Heavy welded frame—pre-drilled for easy installation. Just cut opening and bolt in place. Continuous duty motors. Ideal for attics, restaurants, garages, barns, chicken houses, etc. Control manually or with thermostat.



Blade Opening CFM	Wt.	Item	Price
14" 18 1/4"	2025	19 lb.	\$65a \$27.95
18" 18 1/4"	3600	27 lb.	\$65b \$31.95
20" 21 1/4"	4100	30 lb.	\$65c \$39.95

### HI-FLO Centrifugal PUMP

Completely self-priming! No foot valve required. Tremendous capacity—100 gal. per min. Special impeller enables pump to handle muddy or sandy water. Simple to operate—simply start engine and watch the water go. Powered by a rugged, easy-starting 2 HP Briggs engine. Pre-lubricated sealed bearings for years of heavy low-cost service. Big 1 1/2" Model. Item 507. Wt. 70 lbs. Factory price... **\$134.50** 2" Model (150 gal. per min.) with 2 1/2 HP engine. Item 502a. 90 lbs. Fact. Spec. **\$154.50**



### BIG JOE Portable Pump

A powerful pump that handles up to 15,000 gal. per hour. Easy to operate. Self-priming (after initial prime), no foot valve needed—resulting in 2 1/2" surge capacity. Exclusive impeller design provides maximum rate of water per horsepower, yet handles water containing mud, 2 1/2" suction and discharge. Powered by an easy starting 6 hp. Wisconsin engine and mounted on big rubber tired wheels. Wt. 280 lbs. (Item 280). Special factory price... **\$299.50** Same pump mounted on steel skids. Wt. 270 lbs. (Item 503). Factory price... **\$275.00**



### 52 pc. SOCKET SET

Highest quality, guaranteed non-breakable sockets made by Husky. Beautifully matched chrome trim wall alloy absolutely the best. Contains a complete set of 28 sockets in 1/2" drive, 3/4" drive and 1 1/2" drive, plus all necessary extensions, handles, speeders, reversible ratchets, etc.; all uncond. guaranteed against breakage. A beautiful set of tools that will handle any job on a big doghouse steel box. Wt. 17 lbs. (Item 205). List price \$62.90. Factory special... **\$27.95**



### Variable Speed Selector

Heavy duty, made by B. F. GOODRICH for industrial use. Provides instant speed changes for any drive. For machine tools, dryers, printing, conveyors, production lines, hoists—any operation requiring variable speed. Employs reliable "trouble free" planetary system. No hydraulic power losses. Infinite range, smooth operation. Easy installation. 3 sizes: 1 1/2 hp. 30 lbs.; 1-2 hp. wt. 55 lbs.; 2-3 hp. wt. 105 lbs.; Reg. list \$228, \$252 and \$352. Our prices **\$79.50, \$89.50 and \$114.50**

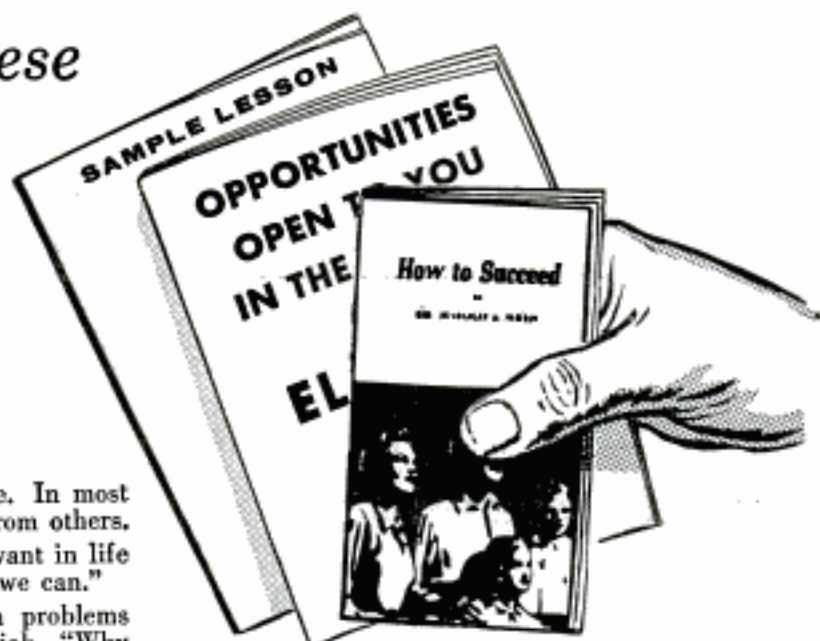


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|--|---|--|--|--|
| <p><b>ARCHITECTURE and BUILDING CONSTRUCTION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Conditioning—Refrig.</li> <li><input type="checkbox"/> Architecture</li> <li><input type="checkbox"/> Architectural Interior</li> <li><input type="checkbox"/> Building Contractor</li> <li><input type="checkbox"/> Building Maintenance</li> <li><input type="checkbox"/> Carpenter and Mill Work</li> <li><input type="checkbox"/> Estimating</li> <li><input type="checkbox"/> Heating</li> <li><input type="checkbox"/> Painting Contractor</li> <li><input type="checkbox"/> Plumbing</li> <li><input type="checkbox"/> Reading Arch. Blueprints</li> </ul> <p><b>ART</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cartooning</li> <li><input type="checkbox"/> Commercial Art</li> <li><input type="checkbox"/> Fashion Illustrating</li> <li><input type="checkbox"/> Magazine Illustrating</li> <li><input type="checkbox"/> Show Card and Sign Lettering</li> <li><input type="checkbox"/> Sketching and Painting</li> </ul> <p><b>AUTOMOTIVE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Auto Body Rebuilding</li> <li><input type="checkbox"/> Auto Elec. Technician</li> <li><input type="checkbox"/> Auto-Engine Tune Up</li> <li><input type="checkbox"/> Automobile</li> </ul> | <p><b>AVIATION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aeronautical Engineering Jr.</li> <li><input type="checkbox"/> Aircraft &amp; Engine Mechanic</li> </ul> <p><b>BUSINESS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Advertising</li> <li><input type="checkbox"/> Bookkeeping and Accounting</li> <li><input type="checkbox"/> Business Administration</li> <li><input type="checkbox"/> Business Correspondence</li> <li><input type="checkbox"/> Public Accounting</li> <li><input type="checkbox"/> Creative Salesmanship</li> <li><input type="checkbox"/> Federal Tax</li> <li><input type="checkbox"/> Letter-writing Improvement</li> <li><input type="checkbox"/> Office Management</li> <li><input type="checkbox"/> Professional Secretary</li> <li><input type="checkbox"/> Retail Business Management</li> <li><input type="checkbox"/> Sales Management</li> <li><input type="checkbox"/> Stenographic-Secretarial</li> <li><input type="checkbox"/> Traffic Management</li> </ul> <p><b>CHEMISTRY</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Analytical Chemistry</li> <li><input type="checkbox"/> Chemical Engineering</li> <li><input type="checkbox"/> Chem. Lab. Technician</li> <li><input type="checkbox"/> General Chemistry</li> <li><input type="checkbox"/> Natural Gas Prod. &amp; Trans.</li> <li><input type="checkbox"/> Petroleum Engineering</li> <li><input type="checkbox"/> Plastics</li> <li><input type="checkbox"/> Pulp and Paper Making</li> </ul> | <p><b>CIVIL, STRUCTURAL ENGINEERING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Civil Engineering</li> <li><input type="checkbox"/> Construction Engineering</li> <li><input type="checkbox"/> Highway Engineering</li> <li><input type="checkbox"/> Reading Struct. Blueprints</li> <li><input type="checkbox"/> Sanitary Engineering</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Mine Surveying and Mapping</li> <li><input type="checkbox"/> Plumbing Drawing and Estimating</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Electrical Maintenance</li> <li><input type="checkbox"/> Electrician <input type="checkbox"/> Contracting</li> <li><input type="checkbox"/> Lineman</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial <input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Subjects</li> <li><input type="checkbox"/> Mathematics</li> </ul> | <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Leadership and Organization</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> </ul> <p><b>MECHANICAL AND SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gas—Electric Welding</li> <li><input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Internal Combustion Engines</li> <li><input type="checkbox"/> Machine Design-Drafting</li> <li><input type="checkbox"/> Machine Shop Inspection</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration</li> <li><input type="checkbox"/> Sheet Metal Worker</li> <li><input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio TV Eng'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 Brakes <input type="checkbox"/> Car Inspector</li> <li><input type="checkbox"/> Diesel Locomotive</li> <li><input type="checkbox"/> Locomotive Engineer</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> |
|--|---|--|--|--|

Name \_\_\_\_\_ Age \_\_\_\_\_ Home Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to P.M. \_\_\_\_\_

Occupation \_\_\_\_\_

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