

# POPULAR MECHANIC MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REGD TRADE MARK GREAT BRITAIN No. 410426

OFF

*Skyhook for a Rocket*  
page 103

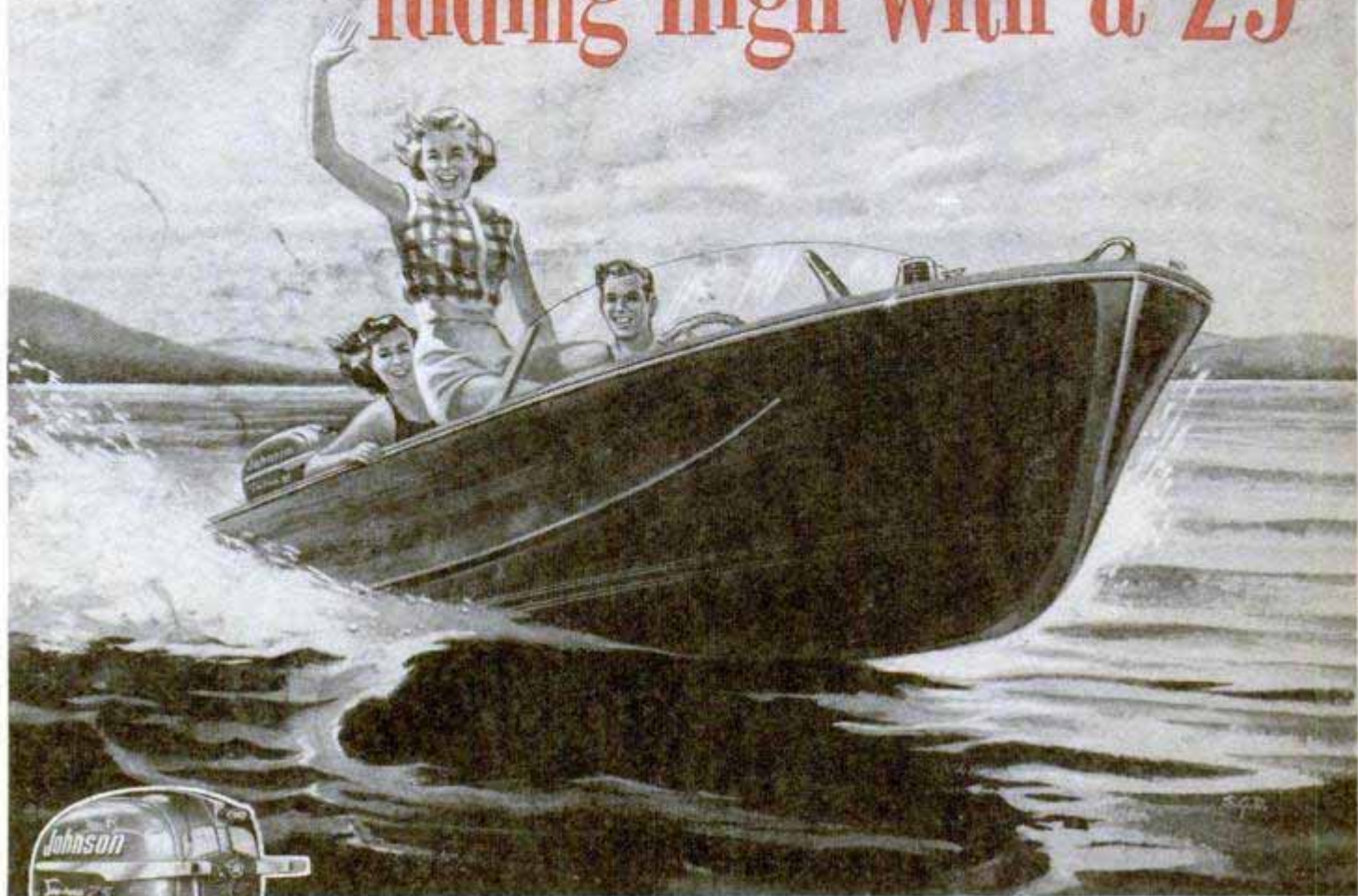
**WHAT'S AHEAD IN TV--**

an exclusive interview with ALLEN DU MONT

**THE OWNERS REPORT ON THE  
DODGE** *By Floyd Clymer*

**How to Motorize a Wheel Chair**

# Riding High with a "25"



Sea-Horse 25

Once in a lifetime there's a motor like this—an engineering triumph! *Big* power, with *little* weight. Speeds over 30 mph—dazzling acceleration—yet *it trolls!* It's a powerhouse that sends your big boats streaking at express speeds. It gives wings to water skiers, drive to work boat operators, range to "big-water" fishermen—and reality to your dream of low cost **DEPENDABLE** outboard cruising! See your Johnson Dealer. Look for his name under "Outboard Motors" in your classified telephone book.

**FREE!** Write for the new Sea-Horse catalog which describes, in detail, the 4 great Johnsons for 1953. A motor for every outboard need.

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*In Canada: Mfd. by Johnson Motors, Peterborough*

#### FOR 1953 — FOUR GREAT ALTERNATE FIRING TWINS

- SEA-HORSE 3** — 3 hp. 32-lb. twin. Angle-matic Drive. . . . . \$145.00\*
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\*Prices are f.o.b. factory, subject to change.  
 OBC certified brake hp at 4000 rpm.  
 Weights are approximate.

**Johnson**  
**SEA-HORSES**  
**FOR DEPENDABILITY**

THE ONLY MANUFACTURER WHO HAS BUILT A MILLION OUTBOARD MOTORS





## A Handsomer Home for the Handyman (and his lucky wife!)

This new pre-polished flooring is easy to install, practically indestructible — and never needs waxing!

A Goodyear VINYL-TILE Flor-Master kit and a few hours are all you need to install a new floor of carefree, lasting beauty in practically any room in your home.

That's the story on new Goodyear VINYL-TILE — the colorful, all-vinyl flooring material that is factory pre-polished to a lifetime luster.

It's smooth but not "slick," readily takes on room temperatures for underfoot warmth — and presents a beautiful lustrous surface that never needs waxing. An occasional swish with a sudsy mop keeps it as beautiful as it was the day you installed it.

**FREE VINYL-TILE "SELF-INSTALLATION BOOKLET"** — complete step by step illustrated instructions for installing your own "Pre-Polished" Goodyear VINYL-TILE floor. Send a postal card today to Goodyear, Flooring Dept. 5-M, Akron 16, Ohio.



**A HANDY GOODYEAR VINYL-TILE FLOR-MASTER INSTALLATION KIT** provides the simple tools required to do a professional job in jig time — available at all better flooring dealers', furniture and department stores where Goodyear VINYL-TILE is displayed in a range of 24 sun-drenched colors, in tile or by the yard.

FLOR-MASTER—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

**GOODYEAR Vinyl-Tile**  
for FLOORS • WALLS • COUNTER TOPS

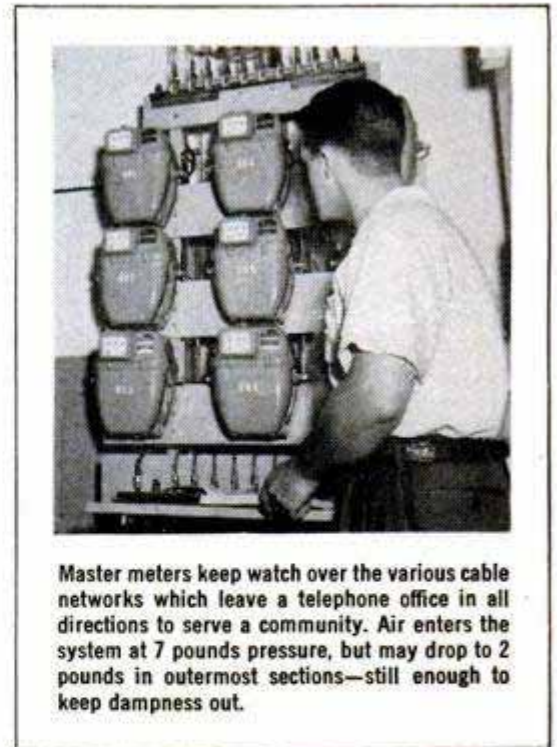


# “Check your air, Sir?”



Air compressor and tank are at right. Long cylinders on rack dry air before it enters cables.

He's checking the air pressure in a branch cable, one of scores serving a town. The readings along the cable are plotted as a graph to find low-pressure points which indicate a break in the protecting sheath.



Master meters keep watch over the various cable networks which leave a telephone office in all directions to serve a community. Air enters the system at 7 pounds pressure, but may drop to 2 pounds in outermost sections—still enough to keep dampness out.

To keep voices traveling strongly through telephone cables, you have to keep water *out*. This calls for speed in locating and repairing cable sheath leaks — a hard job where cable networks fork and branch to serve every neighborhood and street.

At Bell Telephone Laboratories, a team of mechanical and electrical engineers devised a way to fill a complex cable system with dry air under continuous pressure. Pressure readings at selected points detect cracks or holes, however small. Repairman can reach the spot before service is impaired.

It's another example of how Bell Laboratories works out ways to keep your telephone service reliable — and to keep down the cost to you.



## BELL TELEPHONE LABORATORIES

*Improving telephone service for America provides careers for creative men in mechanical engineering*

# Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

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



## this month's cover

NO MAN has ever watched the scene depicted on our cover, but it occurred more than once last fall. Artist John Howard painted it exactly as it must have happened, after checking through batches of material from the Navy. A few months ago a team of physicists and rocket experts set sail aboard a rugged little icebreaker on a cosmic-ray hunt to the cold waters of the Arctic. Only a few hundred miles from the North Pole they dropped anchor and went to work. Gas hissed into a huge plastic balloon. Trailing from the balloon was a cable, and to the cable they hooked a 10-foot rocket. When the balloon was released it moved slowly upward until it disappeared into the cold depths of the sky. High above most of the earth's atmosphere, a timer touched off the rocket and it slipped its cable to zoom on up 50 miles above the earth, sending back data by radio. You can join this fascinating and important hunt by turning to the story on page 103

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Other items, and manufacturers of available products described,  
are listed on pages 12, 14 and 16

Turn your attic  
into a  
*Colorful*  
new room—

Install a  
long-lasting  
**KENTILE**  
**FLOOR**

like this  
for only **\$17<sup>50</sup>\***



Handy Ken-Kit has complete easy-to-follow instructions—all the tools you need. After floor has been measured, chalk line is snapped. Next, Kentile Adhesive is spread.



Tiles go down one at a time. After first half is done, Kentile Adhesive is spread and tiles set in remaining area. And, once in place, your Kentile Floor is ready to walk on.



**A Kentile Floor like this costs \$8 to \$20 less than tile floors of many other materials... yet Kentile is guaranteed!**

Kentile's 25 modern colors give endless design opportunities to make your new room the show spot of your home. Kentile is easy to clean with mild soap and water washings...glows like new with occasional no-rub waxings. Colors never wear off...because they go clear through to the back of each rugged, dirt and stain-resistant tile. Remember, only your Kentile Dealer carries guaranteed Kentile.

\*Price quoted is for a Kentile Floor approximately 6' x 10' 6" installed by you. Your floor may cost less or slightly more, depending on size, colors and freight rates to your city. See your local Kentile Dealer...He's listed in the classified phone directory under FLOORS...In Canada, T. Eaton Co., Ltd.

KENTILE, INC.

58 2nd Avenue, Brooklyn 15, N. Y.



**KENTILE** 

*The Asphalt Tile of Enduring Beauty*

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POPULAR MECHANICS

"Has your tongue been **STUNG** lately?"



## NO TONGUE-STING IN YELLO-BOLE PIPES

Let the Honey Girl show you why



Look! It's lined with  
**PURE HONEY!**



Don't smoke a pipe that tortures your tongue! Light up a Yellow-Bole... and *feel* the difference. Thanks to that pure honey lining...you can smoke your Yello-Bole to your tongue's content. No "Break-In Blues!" No stung tongue or irritated throat. Switch to a sweet-smoking Yello-Bole...today!

**\$1.00 to \$2.50**

# YELLO-BOLE PIPES

WIDE VARIETY OF SHAPES...IMPORTED BRIAR

# WANT MORE MILEAGE? ADD PYROIL

● You may ask, "How can Pyroil give me more mileage?". Here's the answer. Pyroil contains the special property of causing oil to cling to those all-important engine parts. This prevents metal-to-metal wear between piston rings and cylinder walls. Pyroil prevents clogging due to sludge and carbon deposits—and rust from condensation. The protective film of oil provided by Pyroil in your motor, eliminates battery drain. It flushes dirt from the motor and keeps it clean. A clean, friction-free motor protected by lubrication at all times means less motor trouble, less wear-and-tear, less repair expense and more miles for you.

Pyroil costs so little and does so much. If you want more mileage—add Pyroil—add miles to your car.

## PYROIL FOR AIRCRAFT ENGINES

Use Aircraft Pyroil B for lubricating oil, Aircraft Pyroil A for gasoline.

**GIVEN!** An attractive Pyroil metal savings bank—takes coins up to 50¢ pieces. **MOTORISTS**, it's yours for the asking—sent postage paid.

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I want my car to last and run properly. Please tell me more about Pyroil and how it can accomplish this for me.

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## in this corner..... **THE EDITORS**



### Letter to the Editor:

I was greatly interested in the model Mercedes car (*PM*, Nov. 1952, page 138) that won the 1903 Gordon Bennett race in Europe. . . . I also built a scale model 1/4



full size for my young son in 1904 . . . (of) the 28/32 horsepower car. The driver of the car pictured is present chief engineer of the Royal Automobile Club, London.

In the interest of accuracy, the Mercedes-Benz car never won the Gordon Bennett race. The car was a 60-horsepower Mercedes. It was the intention of the Mercedes Company to enter their new 90-horsepower model, but the car was burned out in a disastrous fire in the works just before the race. The two companies did not amalgamate before June 28, 1926.

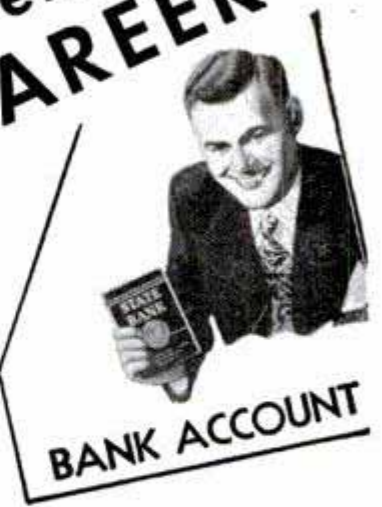
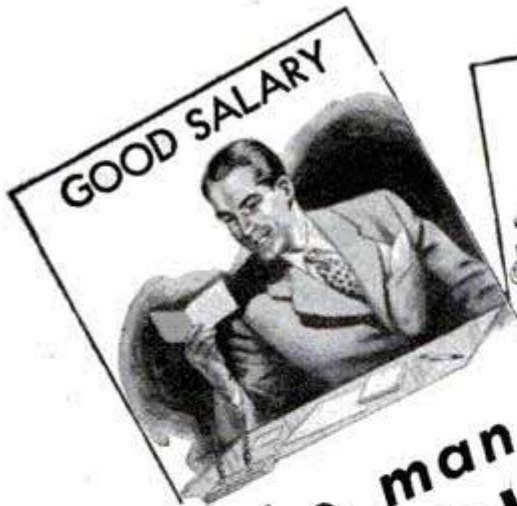
Felix W. Hudlass,  
Richmond, Surrey, England.

### The Eyes Have It

These tidings of the artificial-eye industry come from our operative on the Pacific Coast. Thomas E. Stimson, Jr., our editor at Los Angeles, reports a telephone call from a Mr. Ralph Perkins of La Crescenta, Calif., a gentleman who has lost one eye but not his sense of humor. Mr. Perkins has had a special plastic eye custom-made by a manufacturing optician, and what distinguishes his new eye from the usual glass product is a tiny "wheat grain" lamp bulb behind it, connected by thin wires to his spectacles and thence to a concealed hand switch and battery. By this means Mr.

(Continued to page 8)





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

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

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

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

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

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

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

Why not, like so many before you, investigate LaSalle's modern Problem Method of training for an accountancy position?

Just suppose you were permitted to work in a large accounting house under the personal supervision of an expert accountant. Suppose, with his aid, you studied accounting principles and solved problems day by day—easy ones at first—then more difficult ones. If you could do this—and could turn to him for advice as the problems became complex—soon you'd master them all.

That's the training you follow in principle under the LaSalle Problem Method.

You cover accountancy from the basic Principles right up through Accountancy Systems and Income Tax Procedure. Then you add C. P. A. Training and prepare for the C. P. A. examinations.

As you go along, you absorb the principles of Auditing, Cost Accounting, Business Law, Statistical Control, Organization, Management and Finance.

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.

### Write For This Free Book

For your own good, don't put off investigation of *all* the facts. Write for our free 48-page book, "Accountancy, The Profession That Pays." It'll prove that accountancy offers brilliant futures to those who aren't afraid of serious home study. We'll also include "Ten Years' Promotion in One"—a book which has helped many men. Send us the coupon *now*.

**LASALLE EXTENSION  
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Over 3500 Certified  
Public Accountants among  
LaSalle alumni

- Other LaSalle Opportunities**
- Higher Accountancy
  - C.P.A. Coaching
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## LASALLE EXTENSION UNIVERSITY A CORRESPONDENCE INSTITUTION

417 S. Dearborn St. Dept. 364-HR Chicago 5, Ill.

I want to be an accountant. Send me without obligation, "Accountancy, the Profession that Pays"—also "Ten Years' Promotion in One."

Name.....

Address.....

City, Zone & State.....



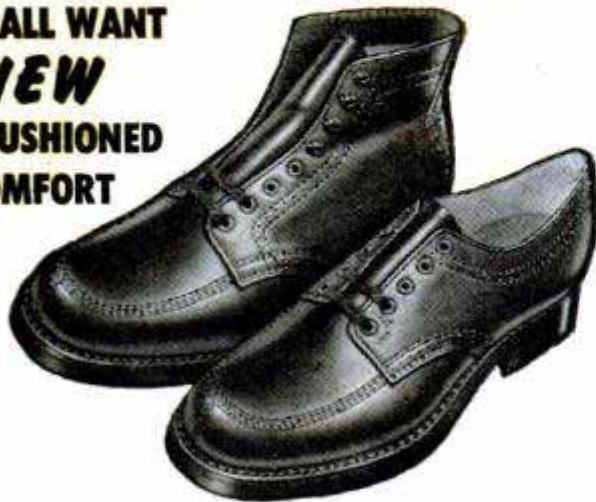
This One



CAYZ-7U7-X1TQ

# Make Money Selling SERVICE SHOES Direct to Fellow Workers!

THEY ALL WANT  
**NEW**  
AIR-CUSHIONED  
COMFORT



Would you like to earn from \$15.00 to \$60.00 a week EXTRA in spare time? Take orders for Consolidated's sensational service shoes—wanted *everywhere!* Sell to people where you work—to service station attendants, factory workers, barbers, waiters, to friends and neighbors.

## 17 SPECIAL TYPES

Now, a wonderful selection to choose from! Rugged Horsehide Shoes, Steel-Toe Safety Shoes, Gro-Cork Slip-Resistant soles, and the long-wearing Service Shoes, pictured above, with Du Pont Neoprene Oil-Resistant soles and heels, and famous Velvet-Eez comfort features. Notice the special air-cushion insole and instep arch support. Marvelously restful for people who are on their feet a lot. Also, all kinds of Dress Shoes for men and women—sizes 4 to 16, Widths AAA to EEEE. See how easy it is to make extra cash for yourself while helping fellow workers save money—everyone can afford to buy at our low direct-from-factory prices!

## WE SHOW YOU HOW!

You don't need experience; we show you how to become successful! You get a Free Selling Outfit, and our famous Automatic Selling Plan that helps you make **BIG MONEY** from the first hour you start. Don't delay a minute—rush coupon now!



## RUSH COUPON NOW



**CONSOLIDATED SHOE SYSTEM**  
Dept. CD-150, Chippewa Falls, Wisc.

I want to make **BIG MONEY** taking orders for popular Consolidated Shoes. Please rush your great Sales Outfit, including Special Service Shoes and Demonstrator, with everything else I need to get started **RIGHT AWAY!**

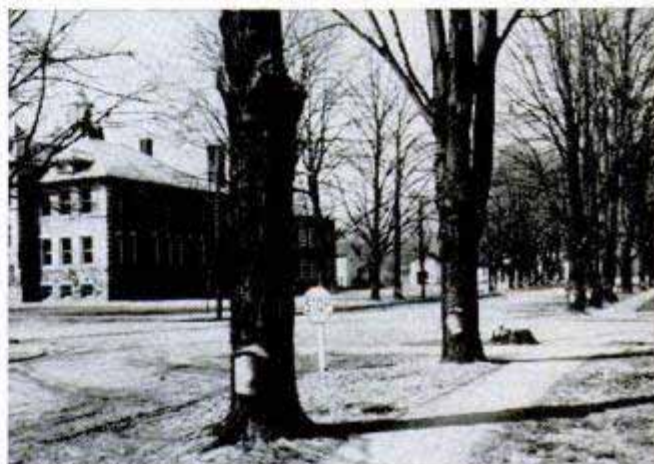
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TOWN \_\_\_\_\_ STATE \_\_\_\_\_

(Continued from page 6)

Perkins is able to flash a greeting to his friends and, on occasion, startle a passer-by with a sly illuminated wink. He adds that it is a very handy thing for finding keyholes in the dark. This intelligence led to Editor Stimson's further research into the custom-eye field. The technician who created the orb with the built-in lamp, it seems, made for one customer an artificial eye with a tiny American flag as the pupil, and for another a miniature portrait of the owner's girl friend. Now there are plans afoot to imbed in an artificial optic a minuscule apple so that the wearer may always have with him literally the "apple of his eye."

## Letter to the Editor:

In the little maple-shaded town of Nashville in the hills of Barry County, Mich., the high-school students have a unique way to raise money for athletic equipment.



Above, sap-gathering buckets on maples near school



Crew of students uses tractor trailer to gather sap

Each spring they tap the maple trees along the streets and the sap is boiled down into syrup, which sells at present for \$5.50 per gallon; this all adds up to a nice little sum for the school.

A. O. Aldrich,  
Lansing, Mich.

(Continued to page 10)

# They claim

# this coupon

# brings you "good luck"



"Six months after mailing the coupon, I had a promotion and a big raise in pay!"



"From the moment I marked the coupon, my luck changed!"



"My break came when I sent the coupon!"

**These statements are typical!** I. C. S. gets letters like these regularly. Coupon senders report pay raises. Others win important promotions or new, interesting assignments. Still others find happiness, job security, opportunities never dreamed possible.



**Is it LUCK?** The results are so impressive, so quick in coming, that some say the I.C.S. coupon is "lucky." Of course, that's not true. The real reason for these amazing results is what happens to the person when he or she mails the coupon.

**Coupon is first step!** Naturally, you want to make good. But you've put off doing something about it. Mailing this coupon is *definite action!* It shows you're fed up with waiting for the breaks. You're determined to make your own breaks! And this determination alone accounts for much of the "luck" you'll start to experience.



**You get free guidance!** Within a few days you get the helpful and inspiring 36-page book, "How to Succeed." It's crammed with information. For example, it tells you in detail how to plan your career. Also how to prepare for advancement. In addition, you get a free catalog on the I.C.S. course that interests you. With your new-found determination and these two books as your guides, you're ready to cash in on your hidden abilities!

**391 I.C.S. courses!** You'll find a partial list of courses in the coupon below. Each course is up-to-date, extremely practical, completely success-tested. You study in your spare time. Set your own pace. Correspond directly with instructors. Cost is low. Diplomas are awarded to graduates. I. C. S. training rates high in all fields of business and industry. You won't find another school like it.

**Call it being "lucky" or being "smart." Whatever it is, you're one step closer to your goal when you mail this famous coupon!**

## INTERNATIONAL CORRESPONDENCE SCHOOLS



BOX 5571-L, SCRANTON 9, PENNA.

Without cost or obligation, send me "HOW to SUCCEED" and the booklet about the course BEFORE which I have marked X:

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**Letter to the Editor:**

Our January article, "Wanted: 50,000 Engineers," by Carey H. Brown, chairman of the Engineering Manpower Commission, brought these comments from readers:

I have been very much interested in the efforts of the Engineering Manpower Commission, under the chairmanship of Mr. Brown, to solve the problem of current shortage of engineers in this country. One of the most important steps in relieving this situation is to encourage our young people to pursue an engineering course. Mr. Brown's article should go a long way toward accomplishing this objective. Speaking with more than 42 years in the profession I can say that the satisfaction of being an engineer has not been overstated.

C. H. Mottier,  
Vice-President and Chief Engineer,  
Illinois Central Railroad.

\* \* \*

Popular Mechanics reaches so many young men with "practical" interests that this article will produce its maximum benefit. The inclusion of the self-test section will center attention on the article. Missed some of the questions myself!

Malcolm Pirnie,  
Malcolm Pirnie Engineers,  
25 W. 43rd St.,  
New York City

\* \* \*

I wish sincerely that a copy of this article could be placed in the hands of every high-school student in the senior class, because in the next four or five years we will definitely see the adverse effect of the draft-board attitude in not allowing boys to finish their engineering education. . . . I congratulate you on your efforts.

James M. Todd,  
James M. Todd & Associates,  
Consulting Mechanical and  
Electrical Engineers,  
New Orleans, La.

\* \* \*

Perhaps you can tell me why the government has ceased paying tuition for veterans who were studying mechanical engineering. I refer to those enrolled at International Correspondence Schools under the GI Bill of Rights.

B. Golubinski,  
Brooklyn, N. Y.

\* \* \*

Major Brown, in his capacity with the Eastman Kodak Company, is in a singular position to handle the chairmanship of the Engineering Manpower Commission and

(Continued to page 20)

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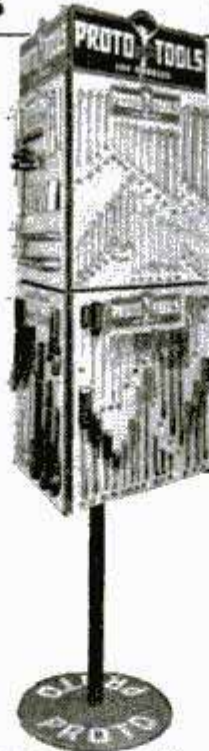
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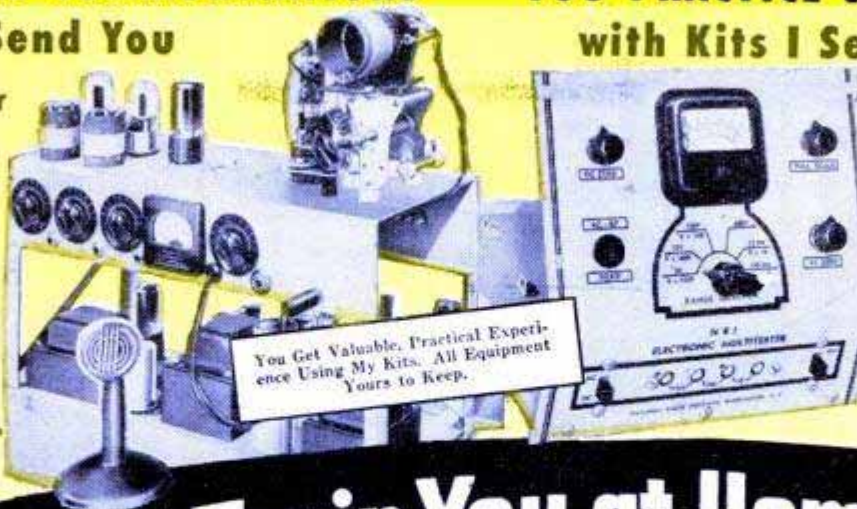
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BY WEEGEE

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This month I'll tell you how to focus in 1/200th of a second. How? Simply keep your camera set for 10 feet at f16 indoors. It's perfect for most pictures. Change to 6 feet at f22 for close-ups. When outdoors, I shoot 10 feet at f11 and 6 feet at f16.

I practice judging distances with two objects, one exactly 6 and the other 10 feet from my favorite chair. While relaxing or reading, I glance up and concentrate on these distances. Try it. With a little practice you can guess these lengths to the inch. But don't try to guess the entire scale on your camera. After 20 years I still can't.

Here's another tip. Cameras are a matter of choice. Flash bulbs are not. I and most of my friends who earn our living with a camera, insist on Westinghouse flash bulbs. Westinghouse bulbs give all the flash you need to freeze the fastest action. I even use them in my daytime shots. And I can honestly say my new book, "Naked Hollywood," could never have been done without dependable Westinghouse flash bulbs.

Fast focusing, plus other secrets I've picked up in 20 years of photography, are described in a new booklet, WEEGEE'S SECRETS OF SHOOTING WITH PHOTOFLASH. This booklet is not for sale. You can't buy it at any store. But you can get a copy with the wrapper from a carton of Westinghouse flash bulbs. Mail the wrapper and coupon below with 25¢ to cover postage and handling.

Next month I'll tell you how I get "naturalness" even in posed flash pictures.



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### Big Jolt

In 1952 the United States produced almost 45 percent of the electricity generated throughout the world. Last year the nation generated more than 400,000,000,000 kilowatt-hours with an estimated installed capacity of 90,000,000 kilowatts. This is an increase in kilowatt-hour output of 66 percent over 1946. By way of contrast, the United States generated more than four times as much electric power as Russia during 1952.

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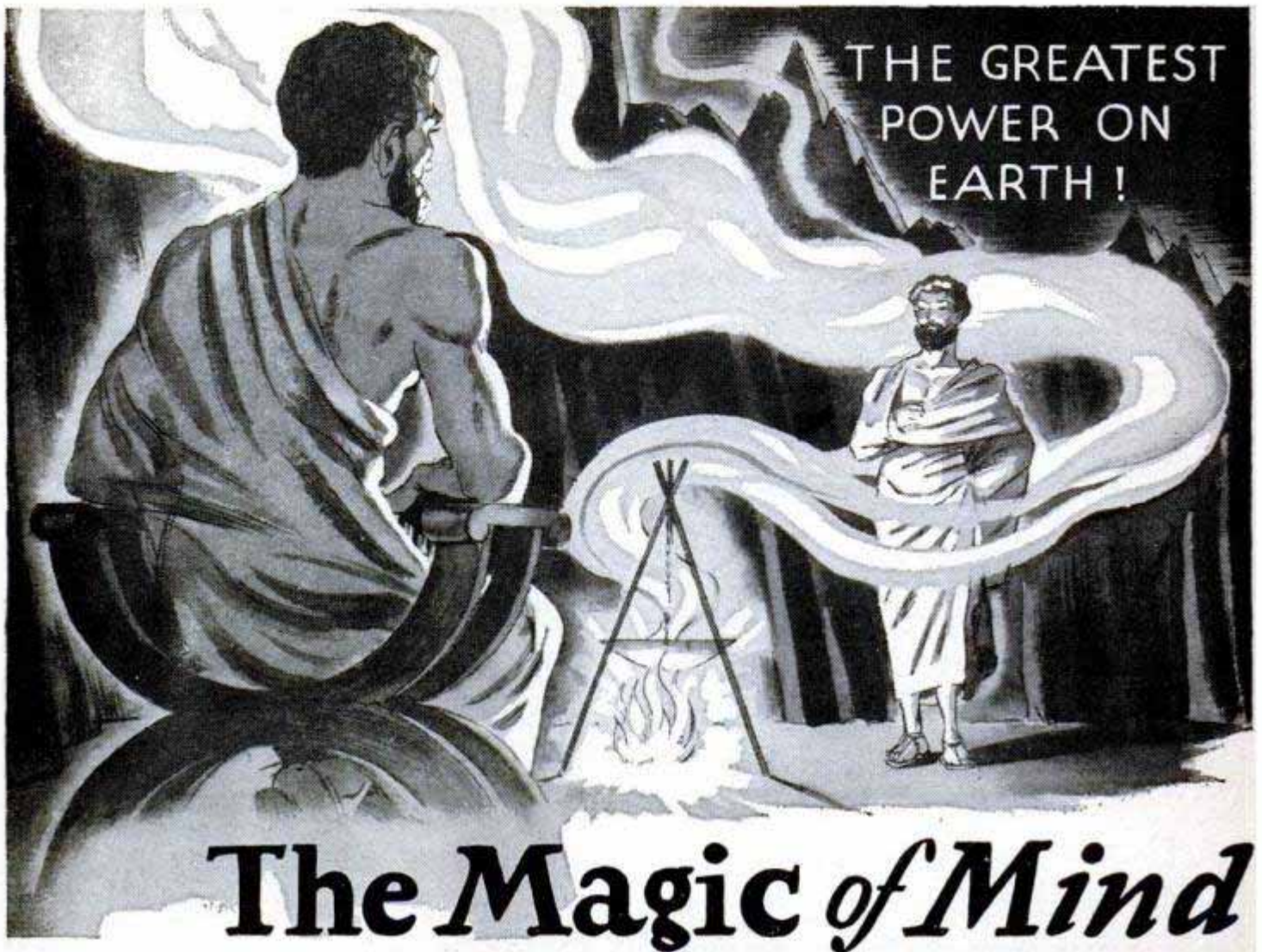
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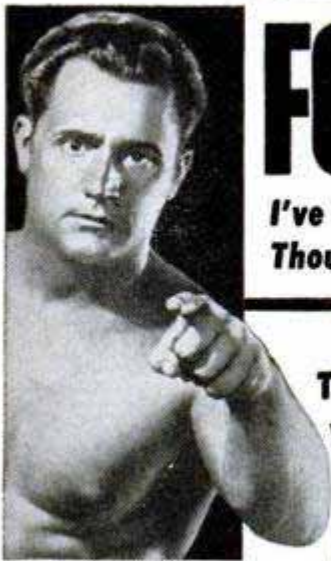
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(Continued from page 10)

undoubtedly knows better than anyone else of the shortage of trained engineers.

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Charles H. Tompkins,  
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### Letter to the Editor:

That was a beautiful article on machine tools (PM, Sept. 1952, page 96).

I have watched the passing of the old machine shops with their drive shafts and overhead belts. When I was an electrician's



JOE HOLUB

helper in Cleveland 40 years ago we watched engineers check up a line shaft perhaps 100 feet long. The thing which surprised us was that you could turn this long shaft by pulling with your hand on the drive wheel. Then I remember when I was going to trade school and Professor

(Continued to page 24)

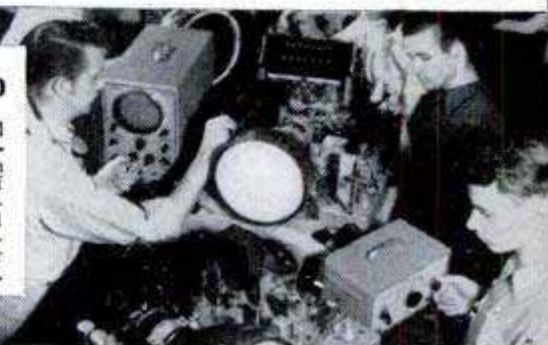
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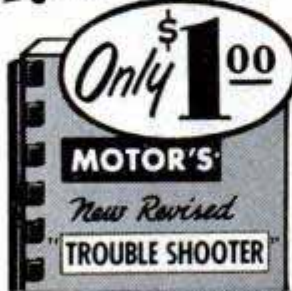


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(Continued from page 20)

Thurston conducted us through Warner and Swasey's. He said that in each operation there was a certain tolerance allowed to the operator. We came to a man who was grinding the shaft for a telescope. "They don't allow him anything," the professor told us.

Then one day I met Joe Holub. He was 70 years old. He had closed his shop in the North and retired here. Then he and his two sons opened up again . . . they would rather do that kind of work than eat. Mr. Holub's lathe has been used by him for 40 years, and to use his words: "It was second-hand when I bought it."

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One of our articles, "I Rode the First Jet Liner," has been voted the best aviation-development story of 1952 by the judges of Trans World Airline's Annual Aviation Writing and Picture Competition. Appearing in July, it described the impressions of Associate Editor Aubrey O. Cookman, Jr., as he flew eight miles a minute through the

(Continued to page 26)

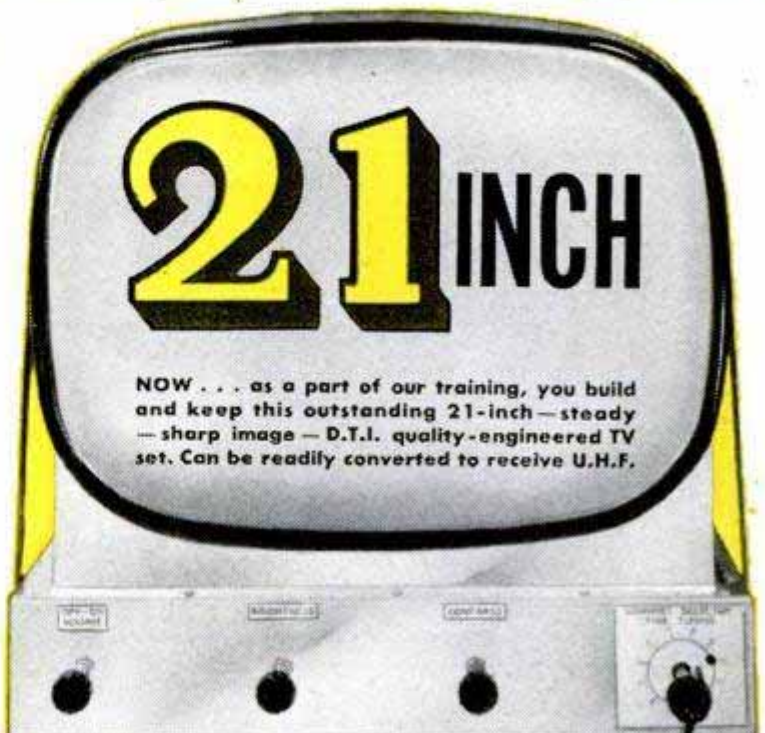


Cookman, left, and TWA official Gordon Gilmore

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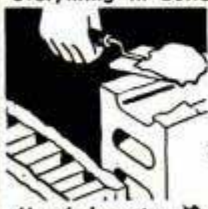
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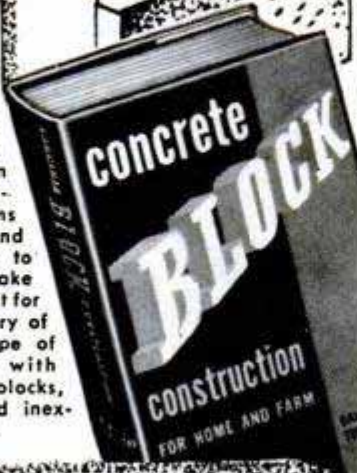
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(Continued from page 24)

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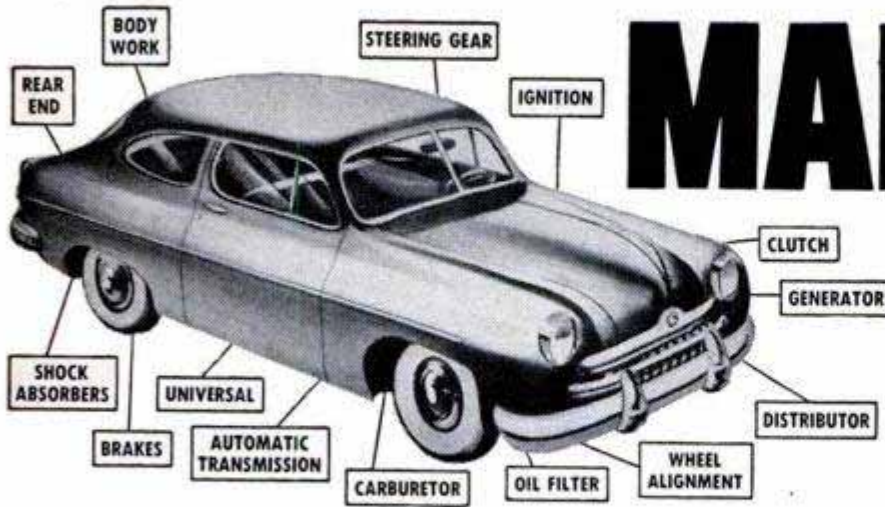


tunnel and although the intense heat shook the reason of some of the men, Pulaski stood at the entrance to the tunnel and kept them from rushing out into sure death. Although he suffered blindness temporarily and a long illness and burns, he was credited with saving the life of every one of the 40 men in his crew. During the night, the forest burned out sufficiently for Pulaski to lead the crew from the tunnel to safety.

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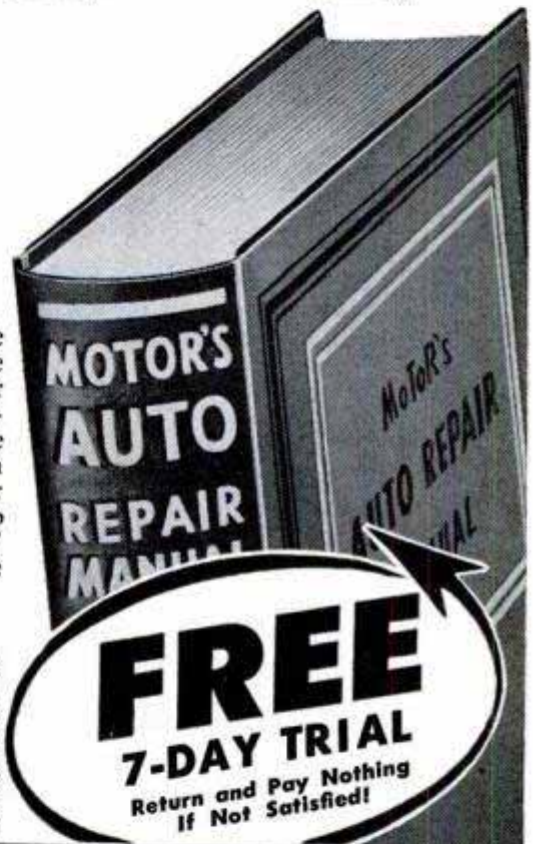
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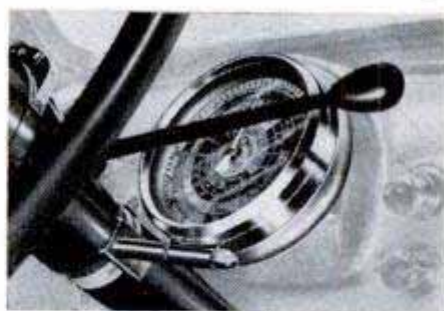
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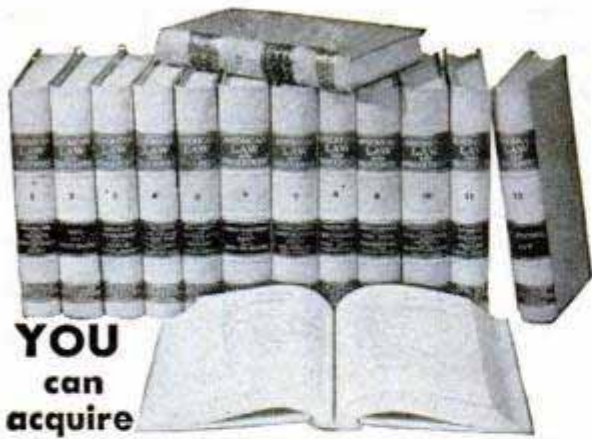
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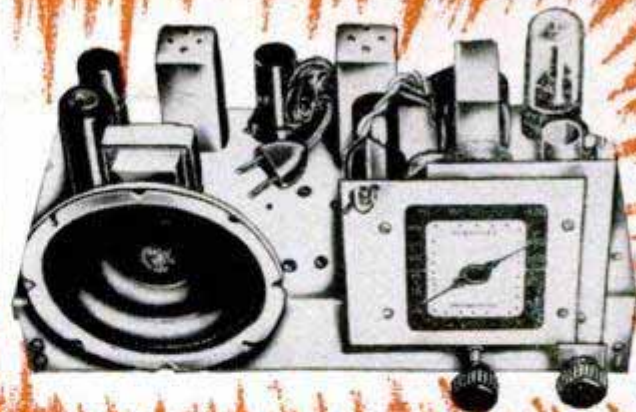
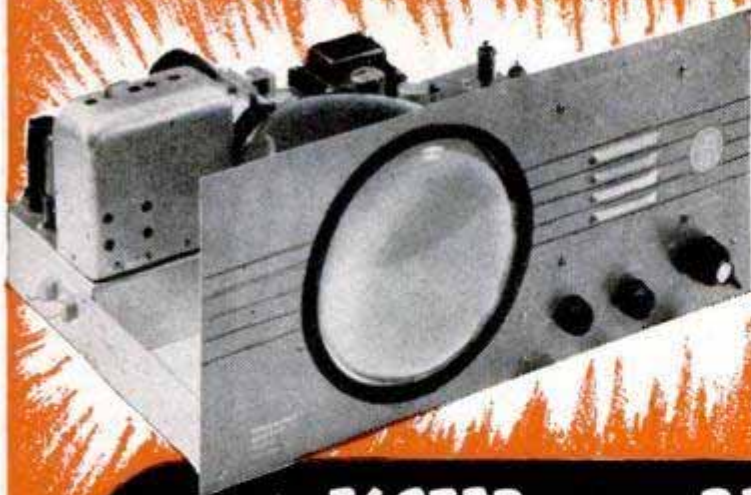
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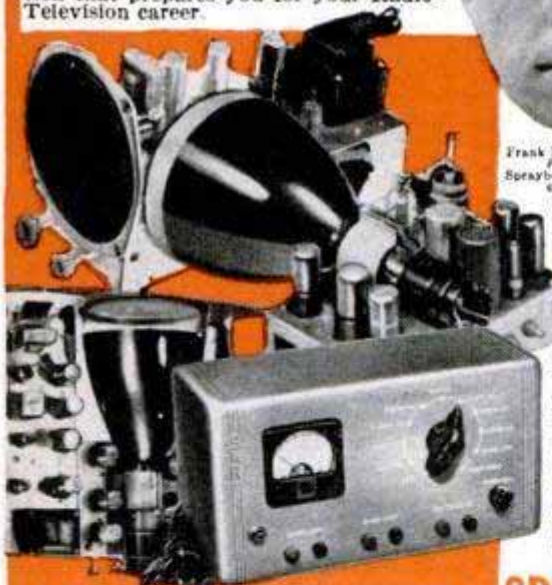
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As you can see from my picture, I'm an ordinary man. Always worked for a salary — and it was never enough. I studied and studied to see if I could find out how to make extra money on the side. I didn't like selling house to house. I didn't have any big capital to invest. So I had to substitute thinking for money.

Every place I went I saw one thing: Venetian Blinds were replacing old fashioned shades all over. Office buildings, homes, factories, and institutions were converting over in droves. And everyone said the same thing: "Venetian Blinds are wonderful, but they are

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I worked for months in my basement trying different methods. Finally my work paid off. I discovered how to clean blinds—really clean—without ever touching them with my hands and without taking them apart. Just hang up a complete blind, point the nozzle of my machine at it, and right before your eyes the dirt and scum runs off—leaving both the slats and tapes sparkling clean. This is done so fast that I can completely launder 15 to 20 blinds an hour. The cost of the special detergent is only 3c average per blind. This means that you can do the work at such a low price that everyone would rather send their blinds out than bother with trying to wash them in the windows. And that means your business is simply enormous.

Why I had a telegram from a man who ordered one of my machines in which he said, "Trace shipment of my Torpedo. I have \$8,000 in washing contracts signed up in last five days and machine has not arrived." He was a full time operator and he had contracts with hotels, hospitals, and office buildings. But just think of the big money that can be made.

In my own business—right now, as you read these figures—I'm laun-



dering hundreds of blinds a month and making a net profit of over \$1,000.00 per month for myself. I don't have to sell machines to make a living. I can make all the money I need just operating my own invention. But the business is growing so fast that I must supply machines for others. After all, I can only work in one town, and why should I deny other men the opportunity that has meant so much to me.

I'll tell you all about my business, when you write. Send me your name. I can't come to see you, but I will mail complete information free and a picture of my machine. I'll also show you how to start with a small down payment in spare time without giving up your job—like I started—and then how to expand out of profits to as big as you want to get.

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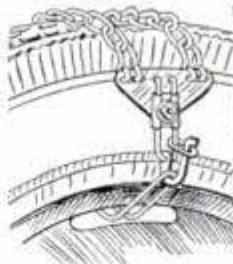


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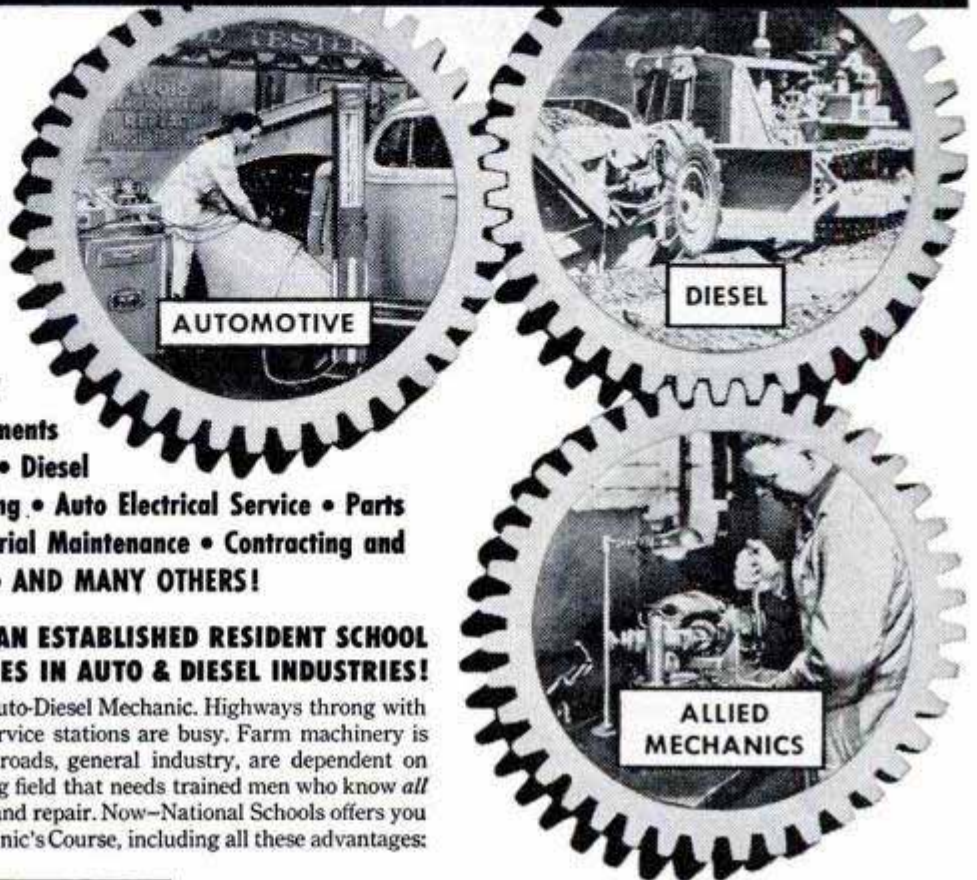
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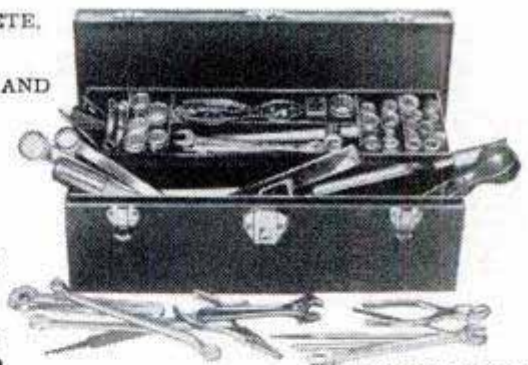
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and when your trouble can be corrected with a minor, simple, safe adjustment you can make yourself . . .

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You don't have to be a mechanical genius to be able to make many of these same adjustments on your set yourself. If you have ever put a new washer on your water faucet, or changed a tire on your automobile, or attached a new plug to an electric cord—you have enough "mechanical background" to be able to take care of all "nuisance repairs" yourself, and probably of most other things that go wrong with a set.

## Amazing New TV Owner's Self Repair Book Takes the Mystery Out of TV Repairs

With the amazing new TV Owner's Self Repair Book, you can have a television expert at your side whenever you need it. Now, every time your set begins to flicker or jump, or becomes distorted or dissolved into lines or zags—a flick of the finger to the right page **SHOWS YOU EXACTLY WHAT CONTROL** knob to turn to correct the trouble in less than one minute! From now on, every time you're annoyed by "ghosts," snow or weak channel reception—the TV Owner's Self Repair Book shows you how to effect a quick 15-minute repair job that eliminates these faults and restores the set to perfect, movie-clear reception.

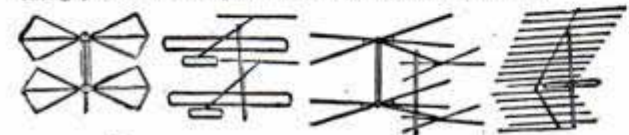
**IT HAS BEEN PROVEN THAT 1 OUT OF EVERY 3 TV FAULTS IS CAUSED BY A WEAK OR BURNT OUT TUBE.** Just by replacing a tube you can correct fully 33 1/3% of the troubles that may develop in a set. The TV Owner's Self Repair Book shows you how to safely locate and change the bad tube in less than 5 minutes.

**Contains special tube diagrams that spot faulty tubes immediately . . . a complete section on antennas . . . interference . . . covers T.V. set models from 1947-1952 . . . all makes . . . all sizes.**

When you check your trouble and find that it is due to a faulty tube, you are led right to it. You simply find the diagram for your set and the one (or more) tubes you are to check—and **THE ONE TO REPLACE** are pinpointed for you! You are directed right to it. No blind guessing or hunting for the bad tube. **ONLY IN THIS BOOK**, has there been developed a special identification method to make it a cinch to locate the bad tube. Each tube in each diagram not only carries its usual trade identification number, but also a special letter to identify its function and location as well. It's (1) find the trouble, (2) find the tube, bingo, (3) replace the tube—and that's all there is to it!

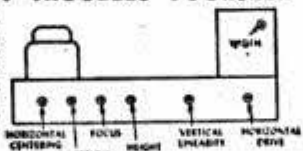
### Which Type of Antenna Is Best for Your Set

The special chapter on antennas explains what an antenna is supposed to do; the reason for the different shapes and arrangements; the reason for "stacking" and multiple antennas; how to "orient" an antenna for best reception; the need and use of a "rotator"; the special antennas for "fringe" areas; how to install, change or add antennas and parts; information on complete antenna installation kits which are available. Just about everything practical that you need to know about antennas.



## Do This Right Now and Prove You Can FIX TV TROUBLES YOURSELF

Turn your set around. You will find in the back of it an arrangement of "rear controls" looking like this:



Zags on Your Screen

Now, if you are troubled with these zags on your screen, locate Hor. Syn. on the above rear panel. Turn control slowly to right. Zags will appear even stronger. Turn control slowly back to left. Zags will disappear and you will have a perfect picture on your screen. That's all there is to it. You have made a \$5 repair in less than 5 minutes. A few other repairs that you can make yourself without tools, without any special knowledge, just with the help of this new TV Owner's Self Repair Book.



Picture Not High Enough to Fill Screen Top to Bottom.



Sound and Picture Not in Step, Sound Not Good When Picture Is Best.



Picture Weak, Gray, Lacking in Contrast.



Jumpy Picture



Dark Fuzzy Picture



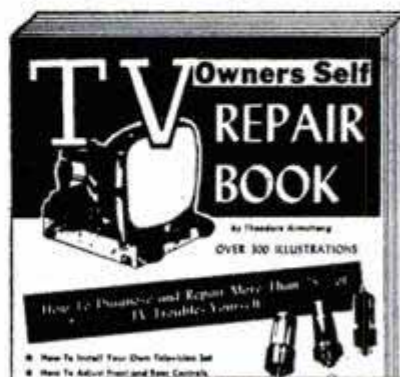
No Picture, Sound Okay

## 6 Easy Ways to Eliminate Interference

In the TV Owner's Self Repair Book there is a unique chapter devoted just to elimination of interference. This chapter tells you just what "interference" actually is. It describes and illustrates the interference symptoms or patterns which appear on your screen in the form of diagonal lines, vertical lines, herringbone or hyphens, all over the screen, etc. This chapter gives you the easy ways to eliminate interference, doing it yourself in a few minutes.

## Complete Price Lists of All Tubes

The TV Owner's Self Repair Book contains a full listing of every tube used in TV sets, fully identified with number, and also listing of picture tubes and with the fair retail prices (by the way, prices range from \$1.10 for a 5YEGT tube to \$6.60 for a 6CDG tube and up to \$101.00 for a 24 inch picture tube, 24BF4). A full listing, also, of standard and reasonable charges for every type of television service and repair job. No longer need you be in the dark when it comes to knowing what a job should cost. Now you can make your own minor repairs and in addition know just how expensive "Expensive" repairs should really be.



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## Never Before Such a Complete, Authoritative Book for So Little Money!

It contains chapters devoted to GETTING ACQUAINTED WITH YOUR TV SET, telling you how the set is put together, how to understand the controls, how to operate the set, why a "test" pattern is needed—and HOW A TV SET WORKS, telling you how pictures and sound are broadcast and received. Included in the broad scope of this book, is complete information on HOW TO DIAGNOSE TROUBLES IN YOUR TV SET, telling you how to spot faults due to poor adjustment, faults due to wear and breakdown of tubes and parts, faults due to outside causes including extreme distance from telecasting center; also HOW TO CURE YOUR TROUBLES IN THE SET, telling you with pictures and descriptions just how to go about replacing tubes, parts. HOW TO MAKE VARIOUS ADJUSTMENTS and how to do all this without the slightest danger to yourself or to your set! There is also a special chapter devoted to television accessories, such as boosters, what they do, Interference, Traps, Glare Filters, Antenna Couplers, which means a master antenna system which permits the operation of two sets from a single antenna, and much, much more.

## Unconditional Money Back Guarantee!

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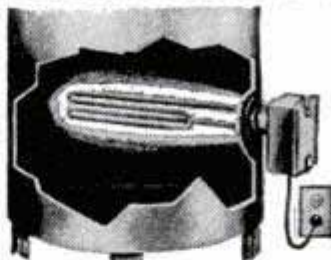
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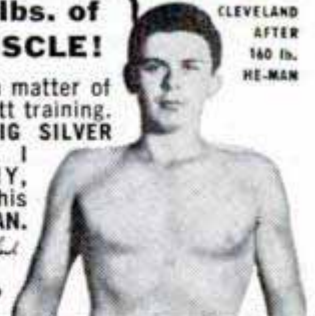
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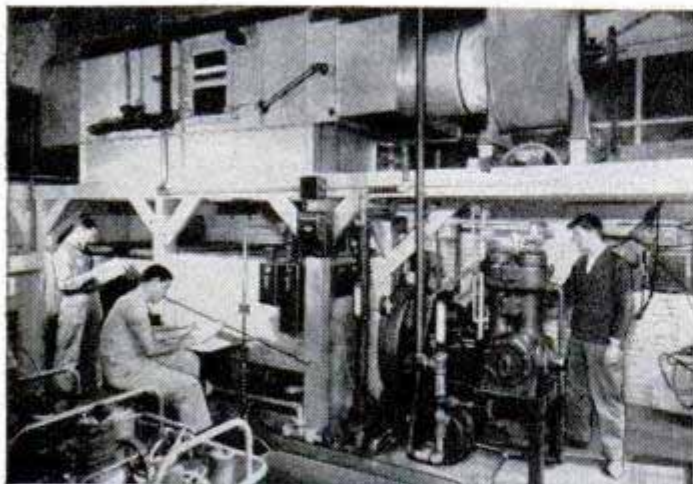
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650x16 (G)	6.72	710x15	5.62	750x17	10.42	825x20	18.12
700x16	6.42	760x15	5.82	750x15	10.52	900x20	17.12
750x16	6.92	800x15	6.72	825x15	11.52	1000x20	18.32
525x18	4.82	820x15	6.82	600x20	8.62	1100x20	18.32
550x17	4.42	670x16	6.12	650x20	10.42	1000x22	17.32
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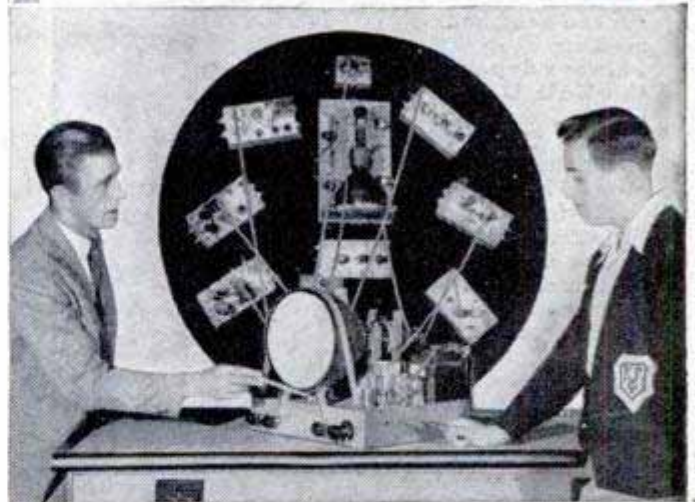
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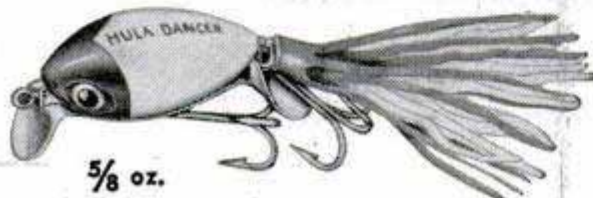
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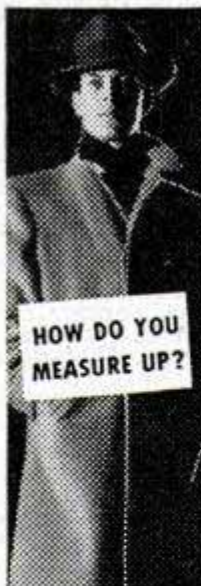


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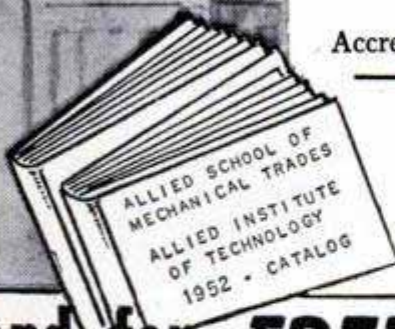
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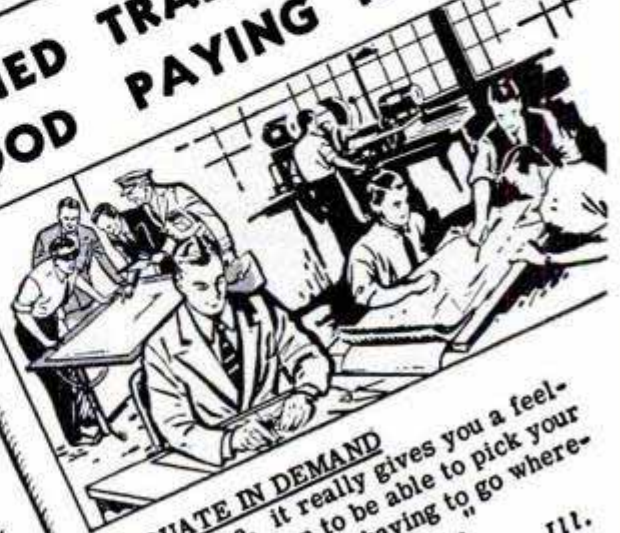


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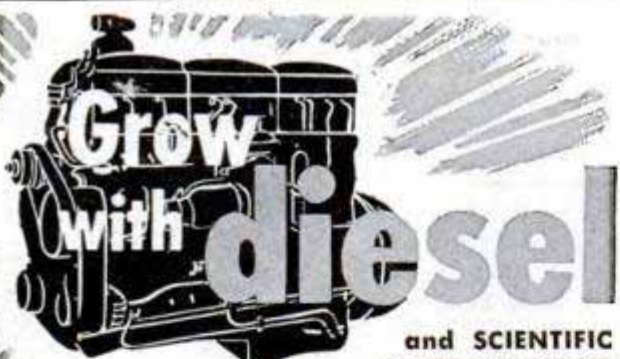


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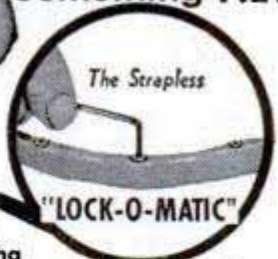
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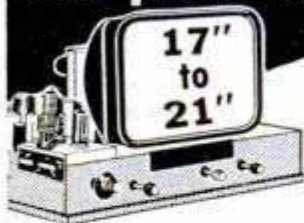
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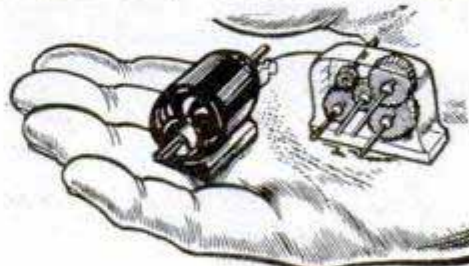
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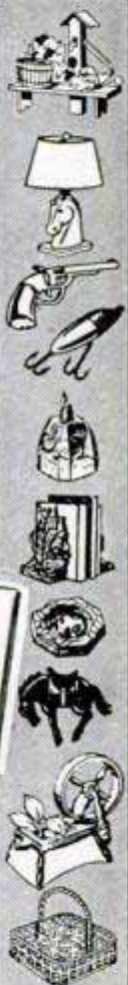
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1953 ACCORDIONS — Wholesale. Free catalog. American Accordion Center, 5329 Belmont, Chicago.

**POEMS** Wanted for musical setting on percentage basis. Free broadcasts. Sooner Song Co., Box 8336, Dept. PM, Oklahoma City 14.

**YOUR Words**—Our music. Song Promotion Guild, 350-M Broadway, New York 13.

**ELECTRIC** Guitars, accordions, amplifiers. Wholesale. Free catalog. Carvin, Baldwin Park, Calif.

**COLLABORATION** Offer. Newart Publications, GPO Box 1226, Syracuse, N. Y.

**ACCORDIONS**—Save 50% and up. Cash or terms. New and used. All brands. Wholesale to everyone. Free catalogue. Del Principe, 29 South Cicero, Chicago 44, Ill.

**POPULAR Songs.** How to write and sell them. Write for free booklet Successful Songwriting. Gateway Songs, Box 2470, Hollywood 28, Calif.

**SONGWRITERS!** Protect your ideas! Hold all songs; poems! Write for Safe Correct Procedure first! Song Service, Dept. P, 333 W. 56th St., New York 19, N. Y.

**SONGWRITERS!** Send poems, songs. Music Service, 243 West 72nd St., PM, New York 23.

**POEMS** Wanted to be set to music. Free examination. Send poems. McNeil, Master of Music, 510-PM S. Alexandria, Los Angeles, California.

**WANTED!** Poems for musical settings. Write Songwriters' Service, Clifton, N. J.

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

**POEMS** Wanted for musical setting. Send poems for free examination. Five Star Music Masters, 630 Beacon Bldg., Boston, Mass.

**SONGPOEMS** Wanted. Mail to: Tin Pan Alley, Inc., 1650 Broadway, New York 19, N. Y.

**SENSATIONAL Free** booklet, "How To Write And Sell Songs." Get the facts first. Poems examined free. Reliable Music Service, Box 430-P, Hollywood 28, Calif.

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**TV Picture aligner.** Get center of picture screen, vertical center line, horizontal center line, perfect circles. Send \$1.50. Tele-Tru-TV-Pattern, Dept. M, P.O. Box 476, St. Louis 12, Mo.

**BUILD 15 Radios**—Only \$1.30 each. Experience unnecessary. Home radio and TV course includes trouble shooting and servicing lessons, radio principles, code instructions, practical radio building and repairs. You build and keep receivers, transmitters, amplifiers, test equipment and code oscillator. All parts, tools, instructions supplied, including radio tester and electric soldering iron. Send for big, new time and money saving catalog and radio TV repair guides. Enclose 25c. Progressive Electronics, 497 Union Ave., Dept. PM-28, Brooklyn 11, N. Y.

**YOUR** Tape or wire recordings reproduced onto disc. 78r.p.m. \$2.85, seven minutes; 33 $\frac{1}{2}$  microgroove \$3.50, fifteen minutes. Conn. Recording, 16 Parklane, Wallingford, Conn.

**COMPLETE** Instructions, how to check and repair radios. Only \$1.00. Slate's Radio Service, Corsicana, Texas.

**ATTIC** Or minimum roof antenna installation! Join delighted owners. Install yourself! Equals 20' roof mast. Feeds one or more sets. Lifetime storm savings. Stop disfiguring your home. Guaranteed copyrighted instructions, \$1. Cywar Television, West Point Pleasant, New Jersey.

**AMAZING** Television antenna eliminator. Small device attached to rear of set where it's out of sight. Outperforms outdoor aerials. No snow, no ghosts. Send only \$2.95 or write for free details. Arrow Sales, 2306 S. Howell, Milwaukee 7, Wis.

**GENUINE** Western Electric fixed crystal detector. No adjusting. Excellent for crystal set. 99c. List 2. Radio City Labs, 30 Church St., New York.

**RADIO** Controls. Attractive prices. 207 Lyon Block Building, Albany, New York.

**CRYSTAL**—Radio experimenters. Write to Leslie Hulet, R4, Lakewood, N. J.

**SIMPLE** Tubeless razor blade radio. Plans 25c. Love, Box 1613, Charlotte, N.C.

**CLEARCO** Crystal radio kit \$1.50; preassembled \$1.75. Free catalogue. Clearco Crystal Co., Box 1857, Milwaukee, Wis.

**TELEVISION** Owners, agents, dealers wanted. Sell television wavetraps \$2.75. Sample \$2.00. Steils, Box 1104, Sioux City, Iowa.

**FREE** 236 Page 1953 television-radio-electronic catalog! World's largest stocks, lowest prices. Complete supplies for builders, experimenters, amateurs, servicemen. Latest television, radios, phonos, recorders, sound equipment. Thousands of parts, tubes, test instruments, books, diagrams. Top quality money saving values. Get yours now! Allied Radio Corp., 833 W. Jackson Blvd., Dept. 34-C-3, Chicago 7, Ill.

**BUILDER'S** "Pictorial Construction Plans." Free list. Alena, Box 24, Astoria 6, New York.

**MAKE** Simple, tubeless, batteryless distance-getting crystal radios. Crystal and illustrated instructions 25c postpaid. Allen, 427-P, Clinton, Missouri.

**RADIO** Control model booklet with illustrated diagrams and list 18 builder's plans, 25c coin. Dittofax, 5208-A Onacrest, Los Angeles 43.

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**LEARN** Sewing machine "big money" business. Repair, electrify, rent, trade, sell, spare time. New machines, motors, small parts, wholesale. Facts free. Taylor Service, Hamilton PM3, Ohio.

**NEWEST** Spare, full-time home business. \$5 to \$10 hour possible. Paint with suede—The finish with touch and eye-appeal. Beautify auto dashboards, signs, radios, toys, figurines, lamps—1001 others. Complete, step-by-step instructions sent for no-risk examination. Free details. Coast, 1004-AZ So. Los Angeles St., Los Angeles 15.

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**FABULOUS** Florida. Cool in summer—warm in winter. Fast-growing Florida offers many opportunities. If you are interested in going into business in fast-growing Florida, write State of Florida, indicating type of business you are interested in and stating your specific requirements. You will be put in touch with communities where opportunities exist. Get complete information, without cost or obligation. Write today. State of Florida, 4217G Commission Building, Tallahassee, Florida.

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**MAKE** \$6.73 Every time you sell one—And they're amazingly easy to sell! We have new adding machines in original factory cartons you can sell for only \$14.95 and you make 45%. They're executive model portables, precision built with automatic clearance, direct subtraction, fully guaranteed. Send for life size color photo with full details. Write today to Lightning Adding Machine Co., Inc., Dept. P-27, 1260 West Second Street, Los Angeles 26, Calif.

**SPECIALIZED** Magazines covering your field of interest help you to greater success. Get latest copies through our easy-to-get-acquainted service. Hundreds of business, trade, professional, educational, sport, hobby, cartooning, chemical, chiropractic, clothing, coal, coin collector, industrial, confectionery, construction and others covering all interests. Send for list today. It's free. Commercial Engraving Publishing Company, 34C North Ritter, Indianapolis 19, Indiana.

**RAISE** Orchids at home. Big profits—Fascinating. Year 'round any climate. No greenhouse. Instructions, including 3 orchid plants, sent for non-risk examination. Free details. Flowerland, 601-BL S. Vermont, Los Angeles 5.

**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. MX-353, 7530 Greenwood, Chicago.

**START** Your own business on credit. Your own boss. 1586 of our dealers sold \$5000 to \$27,500 in 1951. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. C-U-PPM, Freeport, Ill.

**25%-50% COMMISSIONS** Taking magazine subscriptions. Details: Courier, 40-69G 97th Street, Corona 68, New York.

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**NEW** Kind mail order home work! Carry no merchandise. No selling, manufacturing, experience, advertising investment, capital necessary. Eye-opening proof free! Mann, 17-P William, Hillsdale, New Jersey.

**OPERATE** "Escalator" mailorder system, selling our products or any products. Fastest, most revolutionary mailorder system known. Write: Selbyco, Decatur 154, Ill.

**OPERATE** Profitable mailorder business! Details free: Instructive booklet 25c. Shumaker, 2623-M Columbus, New Orleans 19, Louisiana.

**LEARN** Professional candy making, profitable home business. Details free. Pate, Kissimmee, Florida.

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**HOTTEST Seller ever!** Get in on the ground floor! Huge profits await you as our agent selling full or part time new nationally advertised top quality Pennsylvania saw sets. Tempered steel saws for every use, all on one handle. Hacksaw, crosscut, frozen meat and bone saw, pruning saw, keyhole saw, dovetail saw. Tremendous value everyone can use, everyone wants! Sells on sight! Send for free illustrated catalogue. James R. Barnett Co., Dept. C, Box 188, Wellesley Hills, Mass.

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**START A buying service,** buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 627-PM Linden, Buffalo, N. Y.

**MAKE Perfumes at home.** Write, "Carey Laboratories," 1914 Chouteau PM-3, St. Louis 3, Missouri.

**EXTRA Dollars.** Spinning angora wool for us. Angora House, PM, Springfield, Illinois.

**MAKE Money mailing cards, circulars.** Peaceful, profitable. Paton, Box 55-E, New York 23, N. Y.

**MAILORDER Instructions.** Get, "Dollars in the Mail." Eliminate expensive mistakes. Ransie, Box 1719, Richmond 14, Virginia.

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**MONEY Getter—Tips, plans, information.** Free copy "Inside Secrets." Edikar, Johnstown, Penna.

**"DOLLAR Maker Tips."** Stamp brings details and free gift. Flatwoods, Leesburg, Fla.

**MAKE Products—Sell mailorder.** Formula catalogue free. Imasco, 6347 Parnell PM-3, Chicago 21, Illinois.

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**FOR New 1953 mail order plans** write, Millheiser Service, Fayetteville, Ark.

**START Mail order business at home.** Expert will show you how. Now owns \$100,000 business built in 4 years. Dime brings amazing proof and valuable information. No postals. Northmore, Highland Park, Illinois.

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**MAIL Order business** using profitable free advertising method reaching 66½ million. Revealing information free. H. P. Seidel, 7070 Hollywood Blvd., Hollywood 28, California.

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**COMPLETE Invisible reweaving course.** Harris, P.O. Box 7112, New Orleans 19, Louisiana.

**OPERATE Profitable mailorder business.** Particulars free. George Lenhoff, Lincoln 8, Nebraska.

**EXCLUSIVE Franchise** available to city residents. New national phone service for advertisers. Supplies and instructions furnished. Modest investment. "P.M.," Box 434, Buffalo 5, New York.

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**WANTED! Home producers,** by manufacturers in our clearing house service. Become a sub-contractor, casting plastic products for these companies. Thousands of easy-to-make items required for consumer and industrial use. Cash in at home, without previous experience. Write Plastic Service Associates, Dept. PM3, East Boston 28, Mass.

**DIRECT** From factory. Fine oak precut coffee and step tables. Assemble in minutes. Retail prices \$16 to \$20 finished. Factory price \$5. E. L. Overstreet, RD 3, Box 243-A, Lufkin, Texas.

**BOOKKEEPERS,** Keep books, small firms spare time. Manual latest technique by C.P.A., \$3.00. Modern Business, Box 406, Youngstown 1, Ohio.

**EARN Money** with typewriter—Sewing machine! Details free. Edwards, 3915-PM, 12th, Des Moines 13, Iowa.

**MADE \$24,500** Using money making plans from Schemer Magazine, world's oldest mailorder publication. Box 275M, Canfield, Ohio. Year \$1.00. Sample 20c.

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**50% PROFIT.** Power mowers. Home-store assembly. Franchise deal. Rotacut-PM, Excelsior Springs, Mo.

**START Business** without capital! Reliance, 15-A Park Row, New York 38, N. Y.

**START Your own profitable home mail-order business!** We supply everything! Write today! Studio Products, Box 564-AD, Glendale 5, Calif.

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**FREE Electroplating information.** Money making plans. Send postcard for your copy. Highly paid, interesting, uncrowded field. Plater M. Hyde, 327 West 120th Street, Los Angeles 61, California.

**FREE Booklet** reveals amazing secrets behind 301 new, profitable enterprises! Many mailorder! Includes confidential instructions for starting wholesale buying service. Deumant Publications, 79PM Deumant, Kenmore 23, N. Y.

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**OWN, Operate route—"Wishing Wells."** Place these new \$7.50 skill games on counters in cafes, luncheonettes, clubs, etc., collect coins weekly. "Legalcharr," Box 929, Long Beach 1, California.

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**QUICK Sign painting.** Use letter patterns, avoid sloppy work, wasted time. Write for sample. John Rahn, A1330 Central, Chicago 51.

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**MAKE Money** from old coat hangers. \$1.00. Baxter, 4972 San Rafael, Compton, Calif.

**CASH In on your skills!** Can you handle tools—read accurately—follow an idea through? Complete plans (including marketing information) for making many sought after articles. 25c. Profit from spare time. Send today! Master Skills, 118 Ashland Ave., River Forest, Illinois.

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**START Your own business** with a route of nut, candy or gum vendors. No experience necessary. Full or part time. For full information write for Catalog 100 to Rake, 609-P Spring Garden St., Philadelphia 23, Penna.

**MAKE Perfume.** Catalogue free. International, 6347 Parnell, PM-3, Chicago 21, Illinois.

**GET Dollars** in your mail. Keep every cent. Orders filled free. Genmerco, Box 142, Boston 24B, Mass.

**LIVE Better.** Live happier. Find security, profit in the country. Interesting facts free. Hermes Publishers, 152-E West 42nd St., New York.

**PRINT** Without printing press—Posters, banners, greeting cards, toys, glassware, neckties—anything! New "easy" revolutionary method. No special equipment or experience needed. Work full or spare time at home. No selling. We set up "your own local business." Wonderful moneymaking opportunity. Free sample. Profitable ideas, beautifully illustrated plan free. Write Screen-Print, 1010 South Los Angeles Street, Los Angeles 15.

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**EXCITING, Profitable hobby!** Collect old and rare books. Where and how to find, city or country. Pay few cents each. Where to sell, plus list 200 books that have sold for \$50 to \$5000. Send \$1. Barcl'e, Box 481, Peoria, Ill.

**STONES—Turn them into fun and profit.** Make original, attractive pottery, garden ornaments, lamp bases, etc., from stones without costly molds, equipment or investment. Easy instructions: \$1.00. Darcy, 38-01 Vernon Blvd., Long Island City 1, N. Y.

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**HAVE Home mail business—Everything furnished.** Complete idea-mailbox service. Start low as \$150.00. Booklet 25c. Details free. Nmd Agency, Box 88, Boston 22A, Mass.

**FREE Information—Home business opportunity** mailing to automobile owners. Everything furnished. Big earnings. Wood, 2-B Intervale Road, Worcester 2, Mass.

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**WE Love our mailman—He leaves over \$1000 monthly** in our rural mailbox. My college professor husband drafted a scientific plan for a home mail-order business. It pays. We bought a Texas ranch, live as we always wanted to. Now we sell the "Ranch Mail Order Plan." Write: Eveningshade Ranch, Helotes, Texas.

**FREE Vending machines;** if used to sell our profitable nuts. Continental, Box 1361-A, Milwaukee 1, Wisconsin.

**MAIL Order opportunities.** Write F. Tyler, 528 Piqua Place, Dayton 7, Ohio.

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**WHOLESALE** Of sensational nationally advertised appliances, silverware, watches, cameras, etc. Start your own business. Full details. Send 25c for catalogue. International Sales Co., 175 Fifth Ave., New York 10, N. Y.

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**FREE Formula literature** for newest 1953 big profit products now ready. Miller, Chemist, Tampa 6, Florida.

**EXCELLENT Earnings,** repairing sewing machines as a business. Details free. Joseph Alexander, 313-8th Ave., New York 1.

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**START Own business—Local mail order.** Folder describes collection of 137 plans free. A Sales, 16P City Terrace, Newburgh, N. Y.

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**TO \$35.00 Weekly. Spare time, home operated, mailorder business. Successful "beginner's" plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34, Calif.**

**RAISE Fishworms. Easy, profitable. Complete instructions 25c. Huffmans Worm Ranch, Rives Junction, Mich.**

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**MAKE Money spare or full time, casting metal toys and novelties. Big wholesale and chain store demand for autos, soldiers, ashtrays, banks, etc., keeps manufacturers busy. Production moulds furnished for up to 100 and more castings per hour. No experience or special place necessary. Write for information and illustrations of patterns needed. Metal Cast Products Co., Dept. A, 1696 Boston Road, New York 60, N. Y.**

**NEW Exceptionally profitable plans, ideas for home operated mail business. Rush name. Miller, 1772-P Carlyon Road, East Cleveland 12, Ohio.**

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**READ "Advance"—The voice of mail order. Offers money-making opportunities, sources of supply, personal guidance, etc. Issued monthly. Sample copy 35c. Yearly subscription \$2.00. Advance Publishing Company, 313 East 21st Street, Suite 450, New York 10, N. Y.**

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**COPUBLISH Leading m.o. paper. Latest copy. Mail Sale Advertiser, details, dime. Vanroy Shirk, Lebanon, Penna.**

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

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

**CHINESE Raised art. Fantastic profits. Easy enjoyable hobby. Details free. Modern Aids, 248 South Main, Jamestown, N. Y.**

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**1001 OPPORTUNITIES, Dept. P, Box 209, New York 28, offers real business-building aids and ideas. Free information.**

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**SELL Books by mail! Wholesale catalog, 25c. Monarch, Auburn, New York.**

**MAKE Money from newspaper clippings. Siegel, Box 183 PM, New York 2.**

**137 PLANS For starting home business. Details: Elite Co., 220 Grand St., New York 13.**

**METALIZE, Permalize, ceramize, porcelainize, baby shoes, dolls, pottery, hundreds of items. No firing, no baking. Tremendous profits without costly equipment! Send 25 cents for complete business plan and illustrated instruction book. Professional Art Products, Dept. P.M.25, 845 S. Wabash, Chicago 5, Ill.**

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**BE The Popular Mechanics representative in your neighborhood and earn big profits in your spare time. Write Popular Mechanics Magazine, Room 408M, 200 E. Ontario St., Chicago, Ill.**

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**\$10,800 PROFITS! Your own mailorder business! No capital risk! "Success plan" (worth \$2) free! Write today! Treasury, 149 Storer, New Rochelle PM-9, New York.**

**START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, 631-PM Linden, Buffalo, N. Y.**

**BIG Money, spare time. Unusual services. Virillo, Box 507-Z, North Hollywood, Calif.**

**FREE Booklet reveals amazing secrets behind 301 new, profitable enterprises! Many mailorder! Includes confidential instructions for starting wholesale buying service. Deumant Publications, 83-PM Deumant, Kenmore 23, N. Y.**

**WE Pay cash for boxtops, labels, wrappers, coupons, etc.! Particulars free. Box-tops, 1211-PM Bryden, Columbus 5, Ohio.**

**BIG Profits decorating candy mints, no special equipment necessary. We supply ingredients and decorations. Send \$2.00 for complete instructions, materials for trial batch. M. Dohring, 1917½ 8th Ave., Scottsbluff, Nebraska.**

**MONEYMAKING Formulas: Two-way mirrors, resilvering mirrors, septic tank cleaner, battery charger. All \$1.00. Ideal Service, Park Ridge 3, Illinois.**

**CHURCHES, Organizations — Receive \$130.00, 12 card tables free. Unique gift plan. 28 East Second Ave., Pine Hill, New Jersey.**

**SELL Books, merchandise, by mail. Everything furnished! Free details. Paragon, Box 5, Providence 8, R. I.**

**1000 DOLLAR-Making "Tips"! Write, free books! Box 91, New York 60.**

**\$15 HOURLY, Home, spare-time, investment-free! Mailway, Box 198-C1, State College, Penna.**

**BUY Thousands articles wholesale. Best, lowest-priced book tells how and where. \$1.00 postpaid. Guaranteed. United, Box 87-M, Detroit 2.**

**TYPEWRITERS, Adding machines 30% discount. Television, refrigerators, motors, garden tractors, clothing, thousands world famous brands merchandise. \$1.00 guide reveals biggest discounts. Money back guarantee. More details free. Mayfair Discount Club, Wixom, Mich.**

**11x17 PICTURE America's new peace flag 25c. Box 230, Chicago 90.**

**SELL By mail, make real money. 25c (coin) brings required information, how to get started. Act now! Willis Book Shop, 1401 Whitelock St.-A, Baltimore 17, Md.**

**EXTRA Cash daily. Big-profit home-work opportunity. Fallo Research, Box 504B, Yonkers 1, N. Y.**

**PLEASANT Spare time work. Write RTK Sales, P.O. Box 6693-A, Cleveland 1, Ohio.**

**AMATEUR Photographers—Easy plan to turn your spare time into cash. \$100 a week or more! Send for illustrated brochure and full information, enclose 25c to cover postage and handling charges. Harrison Studios, 13561-A Ventura Blvd., Sherman Oaks, Calif.**

**DIME Brings our nationally advertised "opportunity packet." Rinehart, 235 Baltimore. Hanover, Penna.**

**MAKE To \$4.50 hour doing common pen lettering. National Artists, 801½ North Marsalis, A-5, Dallas 3, Texas.**

**FREE! Your own mailorder business! Everything furnished! No investment! Terrific profits! Write today. California Vitamins, 2910PM Beverly Boulevard, Los Angeles 4, California.**

**NEW Inexpensive key duplicating machine. Starrett Manufacturing Co., 3038 Adams Avenue, San Diego 16, Calif.**

ADDED Income selling by mail. Roblin Sales, 1001 Curtiss, Downers Grove, Ill.

DON'T Envy the successful mail order dealer—Be one. Write now. Payne's, 162-P McKittrick, Kentville, N. S., Canada.

MARKET Items you make, or sell, for cash. I'll help you. Particulars 25c. Weigand, 984 Brookwood Drive, Saint Petersburg 7, Florida.

MAKE \$2.00 An hour or more operating home typing service. My folio tells how. Send \$2.00. Howtoedit Publications, 3101 Tom Green, Austin, Texas.

EXPERIENCED Roof repairer. Franchise Protection. Luster-Kote, 19417 Derby, Detroit, Mich.

WIN Contest money. General Contest Bulletin gives hundreds of tips. Lists current contests and rules. Sample 25c. General Contests, 1609½ East 5th, Duluth, Minnesota.

GROCERIES Without cost! Few hours weekly can supply your family. Free information! Send postcard now to Jaydee, P.O. Box 664, Woodland 1, Calif.

SELL Titania gems; \$9.75 carat wholesale. More brilliant than diamonds. Free catalogue. Diamonite, 1404-M Mitchell, Oakland 1, California.

TIE-Breaker picture puzzles exposed, \$2.00. Wenograd, Box 1495, Philadelphia 5, Penna.

SCHUHMACHER Matmakers. Convert old tires into dollars. Devote full or spare time. S and S Patents, Inc., 1307 North Clark St., Chicago 10, Ill.

MAKE Money—Sewing and assembling at home. Liebig Industries, Beaver Dam 10, Wisconsin.

50,000 ARTICLES Wholesale. Source directory, dime. Nelko, Box 3462-DR, Chicago 64.

PUBLISH Your own magazine. Hand-some 52 page format, well edited, illustrated. Cost low as \$1.00 month. Brings you prestige, profits. 25c brings sample. details. National, Ord, Nebr.

137 PLANS To make money, local mail-order. Details: Elite Co., 220 Grand St., New York 13.

BE Appointed State Notary Public now! Details: Stationers. Helotes, Texas.

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.

SPARETIME Profits taking subscriptions, all magazines. Wholesale catalog free. Cassell Agency, Westfield 2, New Jersey.

## FORMULAS, PLANS, ETC.

CHEMICAL Formulary — 9 volume authority! \$7.50 any volume, \$63.00 complete. Guaranteed. Paullin, 109PC, Loudonville, Ohio.

NEW Formulas. Free literature. Dr. Herstein, 511 Thomas, Grand Rapids, Mich.

RESEARCH Chemist will answer your chemical questions \$1 each. Any formula \$3.00. Chemical Service Co., P.O. Box 731, Seattle 11, Washington.

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

FREE Formula literature for newest 1953 big profit products now ready. Miller, Chemist, Tampa 1, Florida.

COYOTE Repellent formula \$1.00. American bill accepted. B. O. Stenseth, Box 231, Regina, Sask., Canada.

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

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

TESTED Formulas. Interesting descriptive booklet free. Pont, Box 635-PM, Terre Haute, Indiana.

ANY Formula. Jack, Consulting Chemist, 5138 Gainor Road, Philadelphia 31, Penna.

GENUINE Manufacturing formulas. Latest. Literature free. Nelko, 3462-P Merchandise Mart, Chicago 54.

LUMINOUS Paint. Formula, selling plans \$1.00. Krysto Products, Felton, Calif.

## PLASTICS

PLASTIC Boxes for visible packaging. Request list of sizes, prices, colors. Otto Products, Lapeer, Michigan.

MANUFACTURERS of a complete line of internal carvings. Special introductory offer; \$1.00, jewelry set and keychain. Crystal Floral Company, Bound Brook, New Jersey.

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. 3C, Portland 13, Oregon.

NEW Liquid casting plastic. Clear, colors. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for Castolite Creations Manual and proved success plan showing how to make money at home—Or ask for free folder. Castolite, Dept. C-101, Woodstock, Illinois.

PLASTICS, Lucite, Plexiglas, acetates, Polyester-Fiberglas. Compare our retail-wholesale prices. Be sure you get our new value-packed, bargain-filled catalog 10c. Airmailed 25c. Gem-O'-Lite, Box 6862E, North Hollywood, California.

LUCITE, Plexiglas. Any size sheets, masked. Square foot (12 x 12) cost, 1/16", \$1.20; 1/8", \$1.40; 3/16", \$1.75; 1/4", \$2.08. Include 10% postage. Almac Plastics, 600 Broadway, New York City.

LEARN Plastics at home. Small cost—Spare time. Dime brings sample plastic, three experiments, full details. Plastic Projects, Box 5151, Detroit 35, Mich.

INTERNAL Carvers increase profits, make television or night lights. Now available, plastic lamp base completely wired, with slot in top to illuminate your carved plaque. Available in opaque black, translucent ivory or pink. Send for sample and prices, \$1.25 postpaid. Arata, Roberts and Browse, Inc., Towaco, N. J.

PLASTIC, Sheets, rods, tubes, etc. Free list. Plastic Supply Co., 2901 N. Grand Blvd., St. Louis 7, Mo.

## CHEMISTRY

NEW Chemical supply catalog, 15c, refundable. Laboratory Sales, Box 161-A, Brighton, Mass.

PERMANENT Alnico magnets, never loses magnetism. Many uses. 12 for \$1.00. Pritt Co., Dept. MM-3, 12 W. 27, New York City.

SECOND Printing, improved version, spectacular chemical fireworks experiments manual. Contains complete setups, formulas, instructions on thermites, fulminates, explosive powders, etc. Still \$1.00 postpaid. Chemi-Technix Laboratories, 568T Riley, Buffalo 8, New York.

LABORATORY Apparatus, chemicals, microscopes, complete chemistry sets, minerals, uranium ore. 10c brings catalog. Porter Chemical Company, Hagerstown 1, Maryland.

NEW Idea chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biological and laboratory supplies in small quantities. Catalog 25c. Established 1931. John H. Winn, 124A West 23rd Street, New York, N. Y.

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

ILLUSTRATED Catalog: Chemistry, mineralogy, biology. 10c. Tracey Laboratories, Evanston, Illinois.

SPECTROSCOPE For quick chemical analysis \$3.00. Kutting Sons, Los Altos, Calif.

## AGENTS WANTED

PHOTO-Salesmen, agents. Sell beautiful hand colored plastic enlargements and sensational new photo compacts, rings, bracelets, lockets, etc. Collect deposit, we deliver. Profitable sideline. Send card for free sample kit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

AT Last! Something new and sensational in everyday cards, 21 for \$1. Make extra money fast! Show satin, velour, metallic cards. Get orders easy. Big line \$1 assortments, scented stationery, personal matches, kiddie books. Imprints free. Three \$1 boxes on approval. Puro Co., 2801 Locust, Dept. 340-C, St. Louis 3, Mo.

EXTRA Money! Make up to 100% profit selling amazing value all occasion greeting cards, gift wrappings, gifts. Bonus. Surprise offers. Experience unnecessary. Write for feature samples on approval, free samples exclusive name imprinted stationery, napkins, free catalog and selling guide. New England Art Publishers, North Abington 811-B, Mass.

STRANGE "Dry" window cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee 156, Akron, Ohio.

CAN You use \$60.00 extra per week? Show amazing cushion comfort shoes. Commissions to \$4.00 pair plus cash bonus. Experience unnecessary. Write for free catalog, full information. Tanners Shoes, 270 Boston, Mass.

EXTRA Money every week. I'll send you full-size Blair household products. Show them to friends and neighbors. You can make big extra profits. Write Blair, Dept. 31LC, Lynchburg, Va.

NEED Extra money? Show your friends wonderful Regal line of all-occasion greeting cards. Over 100 beautiful assortments to choose from. Also exclusive stationery unobtainable elsewhere. No experience necessary. Your profit up to 100% plus bonus. Write for free samples. Sales kit on approval. Regal Greeting Card Co., Dept. 127, Ferndale, Michigan.

MAKE Money introducing world's cutest children's dresses. Big selection adorable styles. Low prices. Complete display free. Rush name. Harford, Dept. J-4341, Cincinnati 25, Ohio.

BIG Money making opportunity. Exclusive line work uniforms. Jackets, pants, shirts, coveralls, advertising embroidered. Every business prospect. Outfit free. Master Div., Dept. 491, Ligonier, Ind.

BUY Wholesale thousands nationally advertised products at big discount. Free wholesale plan. American Buyers, 629-PM Linden, Buffalo, N. Y.

BRAND New! Amazingly different and smart everyday cards, 21 for \$1. Magic window designs. Take easy orders. Make up to 100% cash profit. Big line \$1 assortments, personal stationery, imprinted matches. Free imprint samples. Assortments on approval. North Star, 31 Glenwood, Dept. 18-J, Minneapolis, Minn.

BUY Wholesale—Thousands nationally advertised items. Save, make money! Free details. Durex Co., Box 672-L, Chicago, Ill.

BIG Profits on brand names! Appliances, giftwares, etc., like Wearever, Bulova, Eversharp, Hickok, Silex. Detecto, sell themselves. New! Illustrated catalog free! Over 280 items. Winderman (Dept. A-33), 527 Hendrix Street, Brooklyn 7, New York.

NEW Car given as bonus. Make money spare time. Unusual nyons guaranteed to wear definite time or replaced free! Rush name and hose size. Lowell Wilkin, 1733 Wash., Greenfield, Ohio.

SELL Popular Mechanics and all other magazine subscriptions. Free catalogue, supplies. Subscription Service Company, Dept. C, P.O. Box 2070, Birmingham, Ala.

SELL Harmar's French fried popcorn to stores and taverns. Fast repeater. Harmar Products Co., Hammondsport, N. Y.

3 CHANCES To make money—Three repeat-profit items needed by every housewife. Write for money-making details. R. G. Dispenza Manufacturing Company, 2020 Harbor Ave., Ashtabula 3, Ohio.

ABSOLUTELY Free—Sales kit. Yours for the asking. Send postcard today requesting kit showing new line, belt buckles with your name or personal initials, cap badges, choice 3000 different emblems. Write Hook-Past, Box 1425PM, Providence, R. I.

FREE Samples. Big profits showing amazing "Glow-in-the-dark" specialties. House numbers, pictures, plastic novelties, ashtrays, keyholders, religious and nursery objects, etc. Madison Plastics, 303 Fourth Ave., New York 10, N. Y.

BUY Wholesale. 25,000 items. Catalogue 25c. Matthews, 1472-B-5 Broadway, New York City 36.

PROFITABLE Plastic items—Woody toothpick dispenser, Tidee thread box, bird cage plaque, sue server, grease-in-brush. Many other fast sellers. Write Sunshine Sales, Dept. PM-3, Loudonville, Ohio.

**MAKE** Your dreams of success come true! We can show you how. Sell direct exclusive Spring-Step cushion shoes—A new idea in foot comfort. Earn up to \$25 daily! Full or part time. Free sales equipment. Write today! Dept. PM33, Ortho-Vent Shoe Co., Salem, Va.

**HIGHEST Profits, prestige:** Sell outstanding food line on exclusive franchise. The steady repeat business you dreamed of! Free details. New Amsterdam Herb Company, 220 Broadway, New York City.

'53 **WHOLESALE Dealer** kit on appliances, typewriters, recorders, cameras, giftware, etc. Free. Write Arrow Distributing, 154-B Nassau Street, New York.

**MEN, Women—Wonderful opportunity.** Every home a prospect. Our representatives earning \$100.00 weekly and more. Sell complete line of lighting fixtures. No samples to carry. Send for beautifully illustrated catalog and particulars. Jem Home Products, Maywood, Ill.

**HERE'S Big money fast!** More people buy it! They have for hundreds of years and always will! Religious merchandise sells faster now than ever before! Our exclusive line sells on sight! Offers you big profits! Tablecloths, pictures, wall mottoes, scarfs, etc. Send \$1.75 for sample of newest 2-in-1 plastic tablecloth. Free catalog and price list. Diamond Motto Associates, Lexington 5, Kentucky.

**BALL Point pens.** \$7.50 gross, novelty flashlight \$2.25 dozen. Samples. Lutzker, 871PM East 170th, New York City 59.

**500% PROFIT** Selling multicolor, ready-made cardboard signs for every business. Dynamic samples and catalog, 25c. M. Velvetex, 200 W. 34 St., New York 1.

**BIG Profits** selling sensational engine oil-vuer. Every motorist hot prospect. Details free. Rogers Automotive, Box 23, Station C., Pasadena, California.

**AGENTS—Show America's** leading nationally advertised line. Novelties, gifts, utility items. 100% profits. Prospects everywhere. Steady repeats. Write today for sensational low prices. Free literature. Charms & Cain, 407-PM33 South Dearborn, Chicago, Ill.

**MEXICAN Feather pictures.** High profit! Fast sellers! Adelphi, Box 57-B, Bellerose 26, N. Y.

**SELL Fast—79c Baby** necessity. Big repeater. Baby Gay, Beaver Dam 8, Wis.

**GET Into toys!** Big money. Show free toy-gift line full or spare time. Take orders. Pocket juicy profits. Styleco, Dept. E354, Cincinnati 10, Ohio.

**EXTRA Money.** Easy-selling repeat attractive items; imprinted napkins, guest towels, new soap and towel sets. Also unusual fast-selling gift creations. For quick profits write for free samples. Nancy Lee Novelties, 22 Wooster Street, New York City.

**BUY Wholesale!** Big profits! Name brand—Appliances, watches, gifts, silverware, etc. Free catalog. Bergen Novelty Sales Co., 59 S. Dean St., Englewood, New Jersey.

**COSTUME Jewelry** will bring you fabulous profits, easy sales! Our terrific line includes popular-priced Coronation jewelry! Send for catalog and wholesale prices—for re-sale only! Penn Jewelry Co., 826 W. Lacka. Ave., Scranton, Penna.

**BIG Money** selling Walker's famous tooth powder. James Walker, Jr., 633 So. Plymouth Court, Dept. 11, Chicago 5, Illinois.

**MEXICAN Feather pictures.** Sell on sight; 200% profit! Free details. Sample 20c stamps. (No coins.) Sylvia P. Apar-tado 9036, Mexico City.

**BIG Money** for you selling our complete line of beautiful greeting cards. Big value box assortments for all occasions, birthday, Easter, Scripture, baby, sympathy; stationery, gift wraps. Also wonderful gifts, jewel box, purse-lites, coaster set, whisk-broom, tissue holder, bath brush, sewing kit, plastic tablecloth, food saver bag. Over 75 items. Write today for free selling plan and samples on approval. Card Mart, Inc., P.O. Box 790, Holyoke, Mass.

**NEW "Sponge"** wall cleaner. Erases dirt like magic. Wallpaper, painted walls, ceilings. Saves redecorating. Lightning seller. Samples sent on trial. Kristee 158, Akron, Ohio.

**CALIFORNIA** Sweet smelling beads. Sensational sellers. Free particulars. Mission, 2328PM West Pico, Los Angeles 6, Calif.

**SPARE-Time** representative, pleasant interviews, lucrative. C. Knight, 19217 Schoolcraft, Detroit 23, Mich.

**BARGAINS—Terrific savings.** Job lots. Close-outs! Also save up to 50% on dry-goods, clothing, hosiery, notions, drugs, toiletries, gifts, jewelry, television, etc. 2000 items. Send 25c for wholesale bargain catalog with special "get acquainted" offer which includes free \$1.00 merchandise certificate. Reliable Jobbers, 311-B North Desplaines, Chicago 6.

**SELL Big money** maker to men and women. Easy handwork makes fast-selling useful articles. Sample free. Sun-made Company, Brockton 64, Mass.

**PAINTS—All kinds.** 65c gallon up. Private label. Big profits. Certified Products, Louisville, Ky.

**WHOLESALE Catalog!** Nationally advertised appliances, cameras, watches, etc. Cam Company, 1717—58th St., Brooklyn 4, N. Y.

**YOUR Own business—Used suits** \$1.50, overcoats 65c, mackinaws 35c, shoes 12½c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Moro, 558-AA Roosevelt, Chicago 7.

**SCHOOL Seniors—Earn** sensational profits selling classmates America's most beautiful graduation name cards. Largest selection. Outsells all others. Free sample kit. Printercraft, Dept. M, 1509 Maple St., Scranton 5, Penna.

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

**GOLD Lacquered** and silver sign letters. Windows, doors, trucks. Standard sizes. Penny and up samples. Atlas-P, 544 West 79th, Chicago 20.

**50 WEEKLY** Selling finest razor blades, other items. Free details. Edisans, Box 274, Far Rockaway, N. Y.

**EXCELLENT** Sideline for printing and advertising salesmen. Decalomania name plates in small quantities. Great demand. Also, make money with our line of automobile initials and sign letters. Free samples. "Ralco" XL-Roxbury, Boston 19, Mass.

**AGENTS:** Stamping names on key protectors. Sample 25c. Stamping outfits, checks, social security and name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

**SALESMEN, Distributors,** fast selling costume jewelry direct from factory. Big picture catalog, free. Pickcraft, M19 Bank, Attleboro, Massachusetts.

**PRINTING, Salesbooks,** envelopes. Free illustrated catalog. Ersco, Dept. PM, Bronx 72, New York.

**BE A money** make. Use your home as magazine headquarters. Liberal commissions. No experience. No capital needed. Everything furnished. Write for free catalog. McGregor Magazine Agency, Dept. 500A, Mount Morris, Ill.

**ABSOLUTELY Free,** yours for the asking. Send postcard today requesting free sales kit showing complete new line, belt buckles with your name or personal initials, cap badges, 3000 different emblems also uniforms, caps, shirts, ties, wallets, etc. Write Hook-Fast Company, Box 480PM, Roanoke, Virginia.

**BIG Profits** selling ties (\$2.00 values), \$6.50 dozen. Free catalog. Empire Cravats, 648 Broadway, New York 12.

#### HELP WANTED

**WANT To make** more money? Have a real career with a lifetime of high salaries? I'll show you how to succeed in the growing automotive-diesel field. Write Ed Howes, Chief, Dept. 233, 4000 S. Figueroa St., Los Angeles 37. No obligation.

**NYLONS At** wholesale prices. Fields Hosiery, 99-G Chauncy, Boston, Mass.

#### SALESMEN—DISTRIBUTORS

**NEWLY Patented,** self-filling brush and ink combination. Storekeepers can't resist. Sign-Riter, Inc., 261 Great Arrow, Buffalo 7, New York.

**SCIENCE** Believed to have discovered secret of rust prevention hidden in ancient Egyptian soils. Rus-Tov, amazing tool and metal protector—Keeps rust off. Distributors, salesmen, demonstrators, factory workers, mechanics, dealers, agents, routemen, send for free details. Don't miss this. Goodwin Manufacturing Company, Inc., Chemical Specialties, 126 W. Fifth St., Dept. PM-1, Kansas City, Missouri.

**RUN Your own** repeat-order shoe business! 3 sales a day brings up to \$63 or more a week extra with fast-selling Consolidated shoes! No experience or investment needed. Fit customers stores are unable to take care of. Special kinds of shoes for different occupations. Send postcard now for free selling outfit! Consolidated Shoe System, Dept. CC-19, Chippewa Falls, Wis.

**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-353, 7530 Greenwood, Chicago.

**AMAZING Discovery,** Master Glaze, puts brilliant glass-like surface on cars. Free sample, information. Big commissions. Master Glaze, Dept. 755, 7720 Harwood, Milwaukee, Wis.

**ANYONE Can** sell Hoover, DuPont nylon uniforms for beauty shops, waitresses, doctors, nurses, others. In white and colors. Exclusive styles. Top quality. Low priced. Exceptional income. Real future. Equipment free. Write fully. Hoover, Dept. K-100, New York 11, N. Y.

**SEE Miracle** orion embroidered work uniforms! Looks, feels, tailors like wool; wears 3 times longer. Outwears cotton 5 to 1. Acid-proof, grease-resistant. Washes perfectly pressed. Amazing profits! Outfit free. Topps, Dept. 533, Rochester, Ind.

**AUTOMATIC** Insect control. Big demand. Generous profits. Dealers wanted. Vapor Chemical Co., Rives Junction, Michigan.

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

**AD Matches!** Sell amazing designs—20, 30, 40 and 240-light book matches. Bigger spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. Match Corp., Dept. PM-39, Chicago 22, Illinois.

**SALESMEN:** Make big money with the magic trick Hypnotizer. Millions wanted. 100% profit for you. Card brings sample. Hypnotizer, 208-C Iiniway, Aiea, Oahu, Hawaii.

**FIRST Time** offered, sell stores, \$3.00 sale \$1.00 profit. Howe, 2975 S. W. First Street, Miami, Fla.

**IS \$210 A** week worth a postcard to you? Then rush card with name and address for special free trial plan that sells amazing new automatic refrigerator defroster "like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. W-102, 173 W. Madison, Chicago 2, Illinois.

**FAST Selling** big profit item direct from factory. Box 473, Waterloo, Indiana.

**SELL New** automatic floor waxer. Trigger on handle. Retail \$2.95. Your profit 125%. Write Smith, Inc., Greenfield 41, Mass.

**POSITIVELY** Make \$50.00 a day and up selling brand new item going to every type of food and beverage store, factories, laboratories, hospitals, etc. Samples furnished. Utility Durawear, 53 West Jackson Blvd., Dept. PM-3, Chicago, Illinois.

**SENSATIONALLY** New—100 year calendar, vest pocket size. 1½c each. Sells on sight to all business houses. Big commission. 25c for samples will reserve your territory. Specialties Mfg. Co., 339 W. Schiller St., Chicago, Ill.

**SLENDERIZING,** Massaging home unit for men—women. Tremendous market. Free details. Gyro-Belt, 6920 Market, Upper Darby 7, Pennsylvania.

**NYLON** Stockings all over the world. Rich Supply, 215a W. 98th, New York 25.

**DISTRICT** Mgr. calendars, specialties. Klingstedt's, 425-509 Schroyer, Canton, O.

**NEW Jobs** open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide. Listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 28 E. Jackson, Dept. 17, Chicago 4, Ill.

**MAKE Money** with fast-selling Bostonian shirts. Blouses too. Spare time, full time. Sales kit free. Bostonian, 89 Bickford, Dept. U-10, Boston 30, Mass.

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**IT'S Fun** learning a language by Linguaphone. At home, in leisure time, quickly, easily master Spanish, French, German, Russian, Japanese—29 languages available by Linguaphone World's-standard conversational method. You listen—you hear men and women speak—you understand—you speak. Save time, work, money. Gain job, school, travel, cultural opportunities. Write for free book. Linguaphone Institute, 8303 Mezz., Rockefeller Plaza, New York 20.

**WANT A diesel job?** New opportunities to increase income. Higher pay. More money. We can help you qualify. Tools. Shop method home training. Write today! Diesel, Tractor, Heavy Equipment Division, Interstate Training Service, Dept. 3C, Portland 13, Oregon.

**MAKE Up to \$45-\$55 week** as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-3, Chicago.

**COMPLETE** Your high school at home in spare time with 55-year-old school. Texts furnished. No classes. Diploma. Information booklet free. American School, Dept. X345, Drexel at 58th, Chicago 37, Ill.

**"HOW To Break and Train Horses"**—A book every farmer and horseman should have. It is free; no obligation. Simply address Beery School of Horsemanship, Dept. 1103, Pleasant Hill, Ohio.

**WELDING** Training pays at Hobart Welding School, Box M-331, Troy, Ohio. VA contract. Best equipment. Catalog free.

**FOR** An extremely profitable lifetime business, operate a collection agency. Quickly learned. Write Cole Associates, Syracuse 2, N. Y.

**HIGH School**—No classes. Study at home. Spare time. Diploma awarded. Write for free catalog HF-30, Wayne School, 2527 N. Sheffield, Chicago 14, Ill.

**PRACTICAL Nursing**—Learn easily at home, spare time. Big demand, good earnings. High school not necessary. Write for free facts. Wayne School, Dept. FG-15, 2525 Sheffield, Chicago 14, Ill.

**WANT To make more money?** Have a real career with a lifetime of high salaries? I'll show you how to succeed in the growing radio-television field that needs men. Write Ed Howes, Chief, Dept. 433, 4000 S. Figueroa St., Los Angeles 37. No obligation.

**BECOME** A doctor of psychology or metaphysics. Learn secret of contentment, happiness. Win degree of PsD. or MsD. Solve mental worries. Free book. College of Universal Truth, 5038-C Broadway, Chicago.

**FREE "Career Chart."** Mention occupation. Details. Professor Martin, Sunfield, Mich.

**TELEGRAPHERS** In big demand. Full information. Chicago Telegraph Institute, 7626 Normal, Chicago 20, Ill.

**OPEN** Your own profitable spare-time business. Claim adjusters urgently needed. Men-women earning over \$100 week during spare hours. Free book—Today! Universal Schools, Dept. D-105, Box 8202, Dallas 5, Texas.

**STUDY** Traffic management for top executive jobs. Details free. Union Institute, Lakewood 21, New Jersey.

**"X-RAY Mind."** Stupendous mental science. Completely describes and analyzes the 38 different types of men and women. Reveals the swift, sure-fire methods of influencing them. Being profitably applied throughout North America in the 23 leading professions, businesses, jobs. Entire course, \$2.98. Krishnar Institute, 1912 Lincoln-Park-West, 114-P3, Chicago 14.

**RADIO** Announcer-engineers urgently needed. 6 weeks training. Free placement. Grantham School, 6064 Hollywood Blvd., Hollywood 28, California.

**RELIGIOUS** Homestudy degree courses! Free bulletin! Midwestern Bible School, 517 Merchants Bank Building, Indianapolis, Indiana.

**"PHOTO-Offset** Production of School Publications." Valuable book for printing buyers. \$1.00. Graphic, 453 Colt Street, Irvington 11, N. J.

**GET** Into politics. Brand new course tells how. Get into the big money class. Details free. Realfact Publishers, Post-office Box 137-A, New York 51, N. Y.

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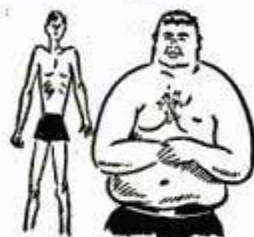
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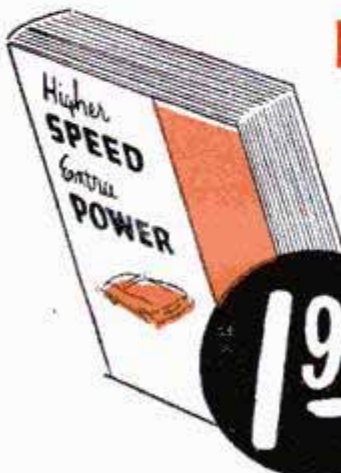
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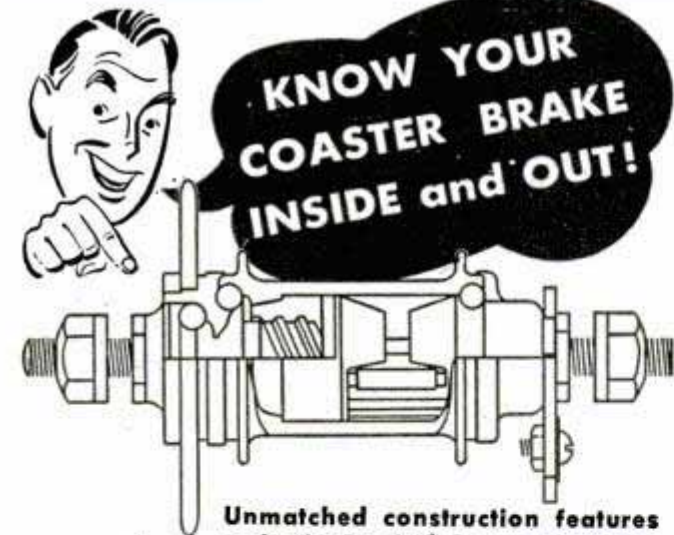
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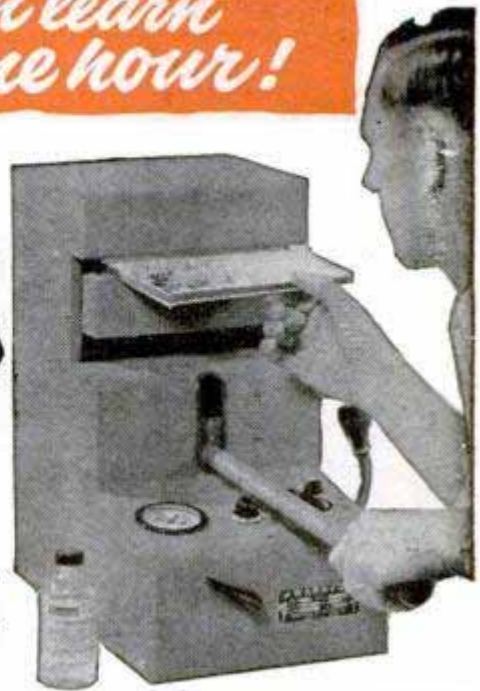
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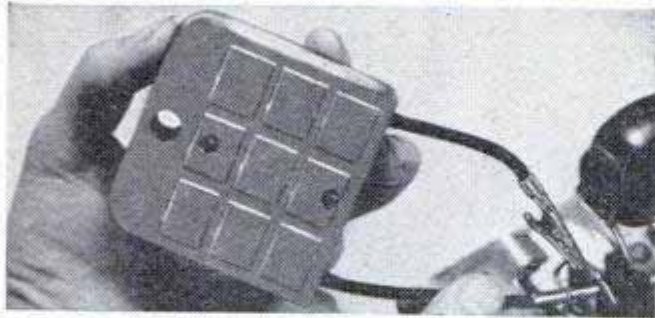
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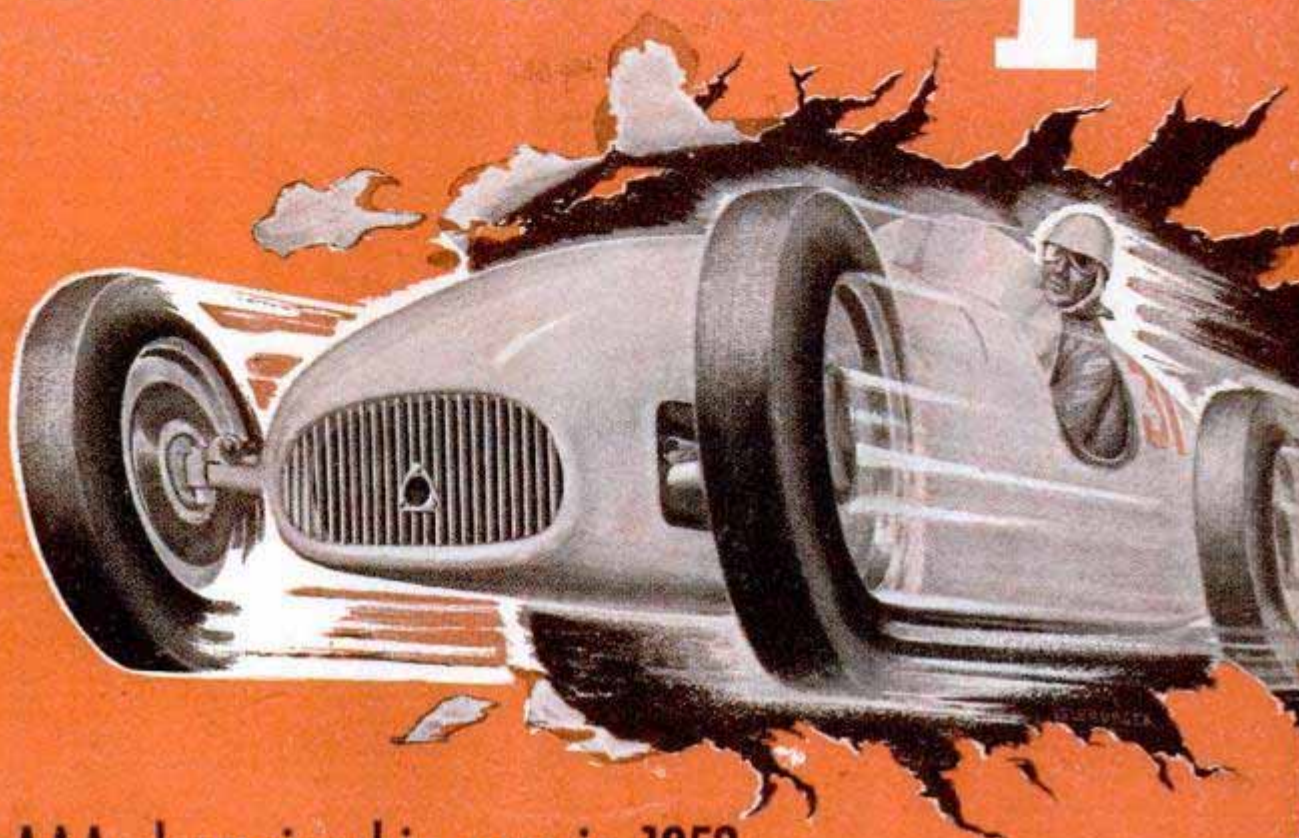
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Aug. 30	Detroit, Mich.	100 Miles	Bill Vukovich
Sept. 1	DuQuoin, Ill.	100 Miles	Chuck Stevenson
Sept. 1	Pikes Peak, Colo.		George Hammond
Sept. 6	Syracuse, N. Y.	100 Miles	Jack McGrath
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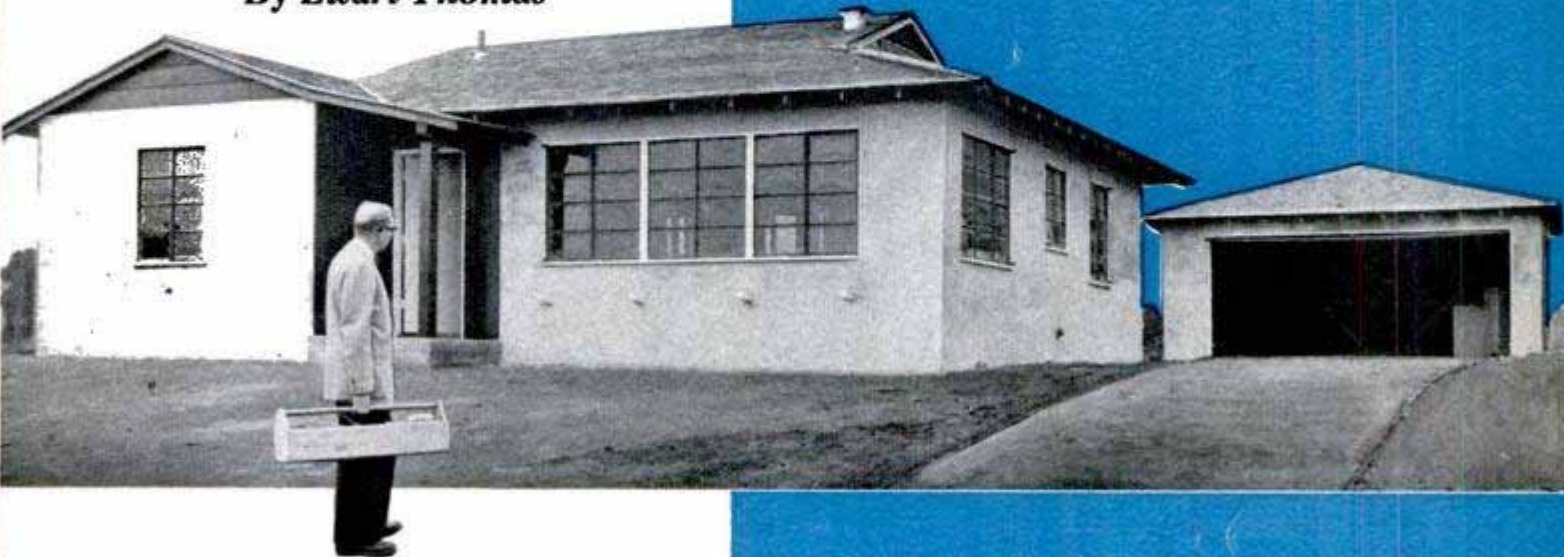


# Partly Built Homes for Sale

By Ewart Thomas

**POPULAR** MARCH 1953  
**MECHANICS**

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 99 NO. 3



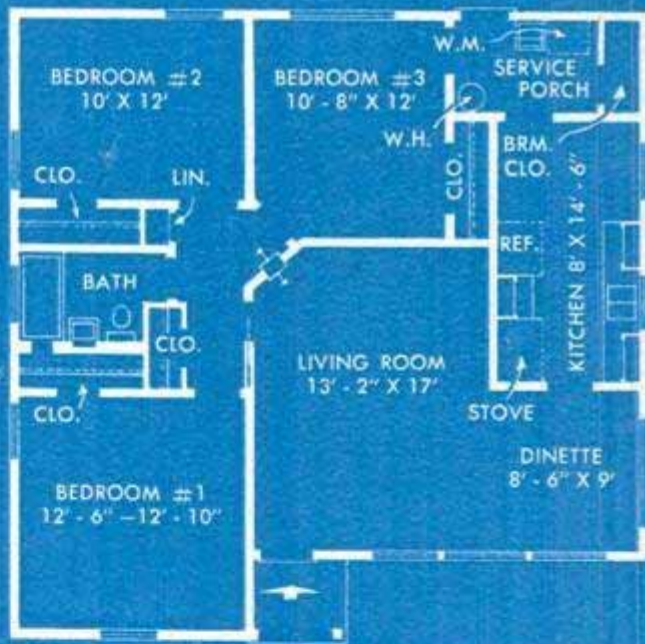
**L**IKE TO BUY a partly built house and finish it yourself, saving a thousand dollars or so on the price? That's what people are doing in Santa Barbara, Calif.

Here's how it works: Leslie B. Nelson, contractor, erects the framework of your house and completes the exterior walls and roof. Then he turns the shell over to you. All the heavy construction work has been done.

"Go ahead and finish it," Nelson tells you. "In the garage you'll find all the wallboard needed for the interior walls and ceilings, all the asphalt floor tile, all the other materials you'll need. Here is the hardware; here are the cabinets for the kitchen and bathroom. I'll deliver all the paint you need after you've selected the colors you want.

"This set of tools is yours. Keep them after you finish the house. And here's a book of instructions that tells you how to install the wallboard, tape the joints and paint the surfaces. It tells everything else you need to know. Just follow the instructions."

Nelson puts an unfinished two-bedroom house on your lot for \$7950. The residence is an attractive California ranch-house type containing a combination living-dining room, kitchen, service porch, two bedrooms, bath, and plenty of closets. The exterior is of colored stucco and redwood paneling. There is a concrete-slab floor under the whole house.

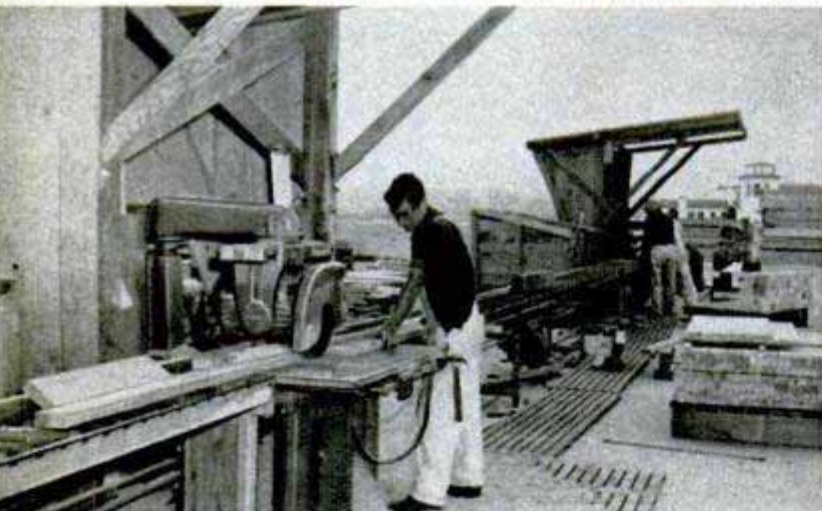


Top, with a box of tools furnished by contractor, the purchaser of three-bedroom unfinished house is ready to complete job. Floor plan shows livability of home. Below, the same house under construction





In Nelson's house factory, standard sections of a home are prefabricated. Above, carpenters are nailing a roof girder laid out on sturdy pattern table



Lumber that goes into the prefabricated wall sections is cut to size in outdoor production line

All interior and exterior wall panels for one partly built house are lifted in single package onto storage rack awaiting trucker



A cedar-shingle roof and large windows in steel sash add to the attractiveness of the design. The house contains 920 square feet of interior living space plus garage and covered porch. Both in layout and quality of construction the house meets government standards for insured financing.

Working steadily, you can complete the construction of the house in four or five weeks. Then it has a market value of about \$11,000, depending on the value of the ground.

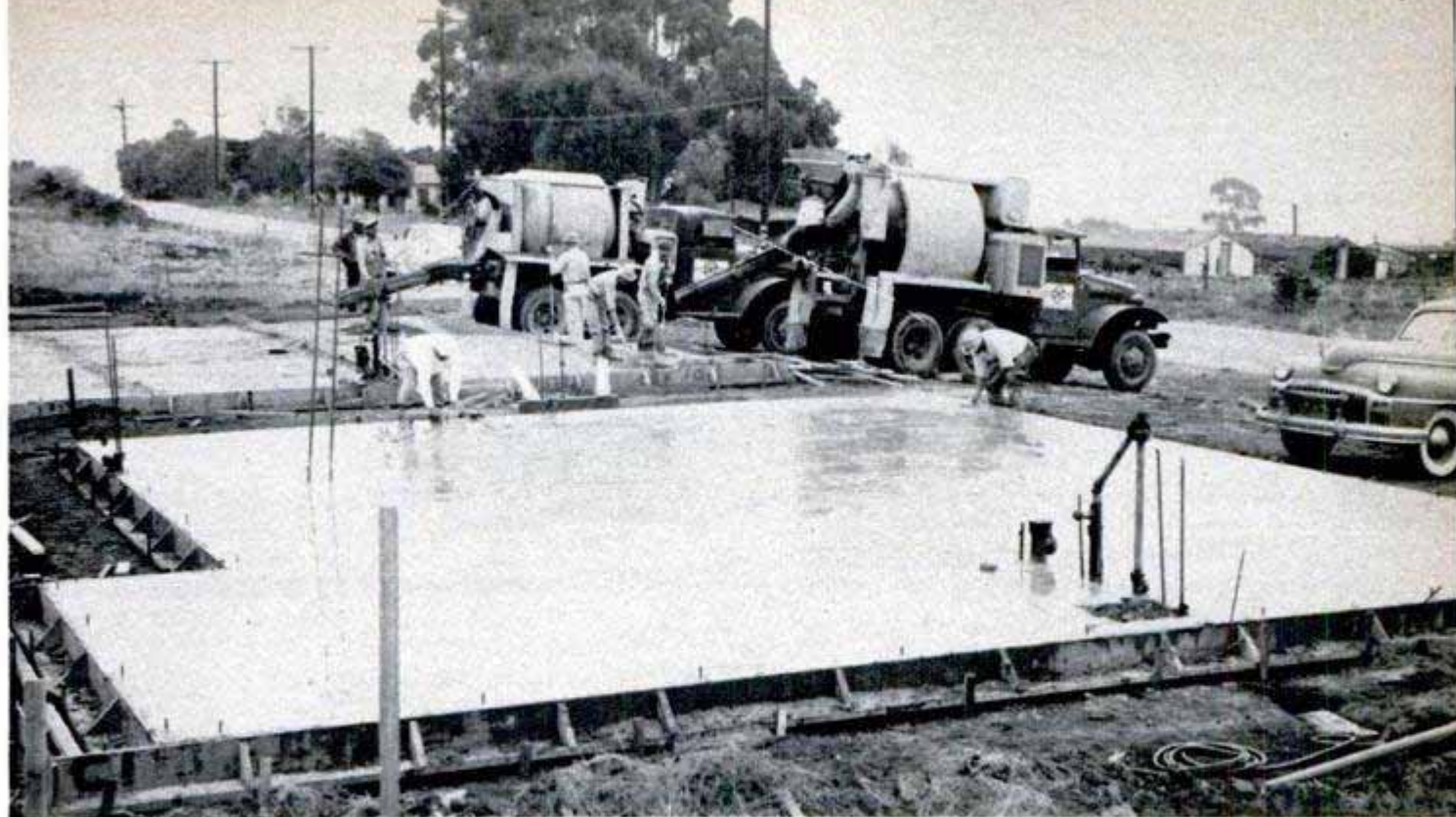
Most purchasers work on their new homes during the evenings and on week ends. On this basis it takes about two months to complete a house. An inspector makes regular visits to check the work and to advise on minor construction problems that might crop up.

A three-bedroom home with attached single-car garage costs \$8450, incomplete. This house has 1206 square feet of area in addition to garage and porch. It will be worth some \$12,000, house and lot combined, when completed. Some of the owner-finished houses, in fact, could sell for quite a bit more. A choice of several floor plans for each size of house is available, as are various exterior treatments. For a few hundred dollars extra an owner can have a fireplace built into the house at the same time that the frame is erected.

A young garage mechanic and his bride, a retired couple from the Middle West, the owner of a local store and his wife—these are typical purchasers of the Nelson-Way houses. Nearly everyone has some mechanical ability and a desire to use his hands, and owners find that they can't go wrong when they follow instructions. In fact, Nelson says, the quality of the work performed by the homeowners often is higher than that of professional workmen.

"During their construction work," he adds, "the owner and his wife often put their heads together to plan minor changes and additions they can make themselves, giving their house some unusual features."

All that a purchaser of a partly built home needs is a level lot that has a mini-

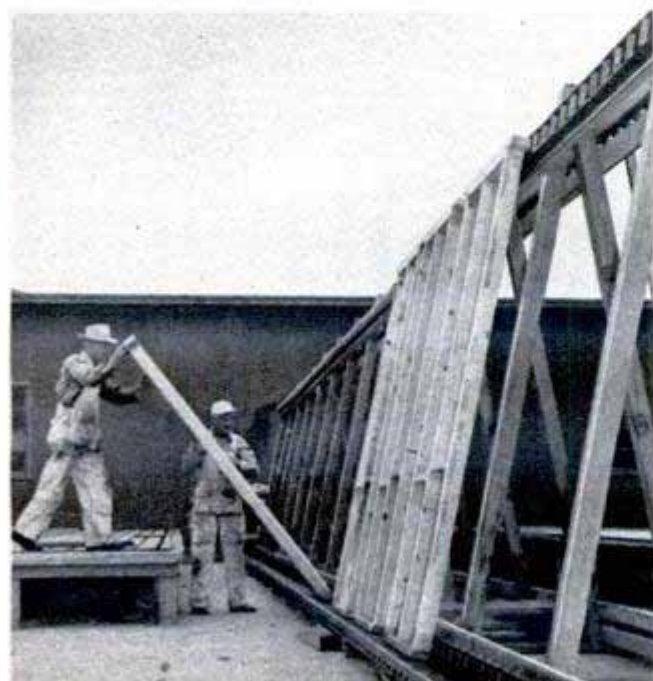


After concrete-slab floor of Nelson house is poured, it is only a few days before framing is in place

mum value of \$1000 and that is located in a zoned residential area. The lot serves as the down payment. A construction loan is obtained from a bank to pay for building the house and then, upon completion, application is made for regular FHA financing. This usually covers 80 percent of the value of the property and is paid off in regular monthly payments over a period of 20 years.

The originator of the partly built home idea is a husky young man who started out in the construction business in 1947 with \$1000 that he borrowed on his car. He operated as a regular contractor for several years and then, as construction costs kept mounting, started hunting for ways to keep

On pattern table in prefab factory, completed partition is moved onto specially built rolling production line



prices down. One of his ideas was a prefabrication method by which frame partition units, roof trusses and other parts of standard wood-frame houses can be manufactured ahead of time instead of being assembled on the job as is ordinarily done.

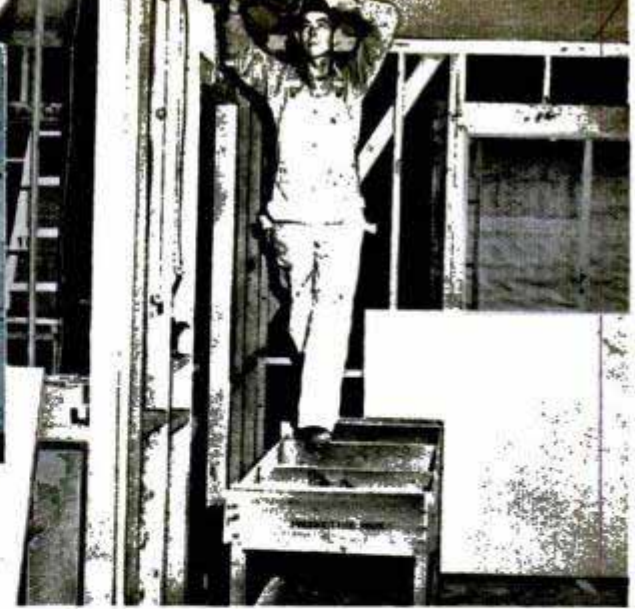
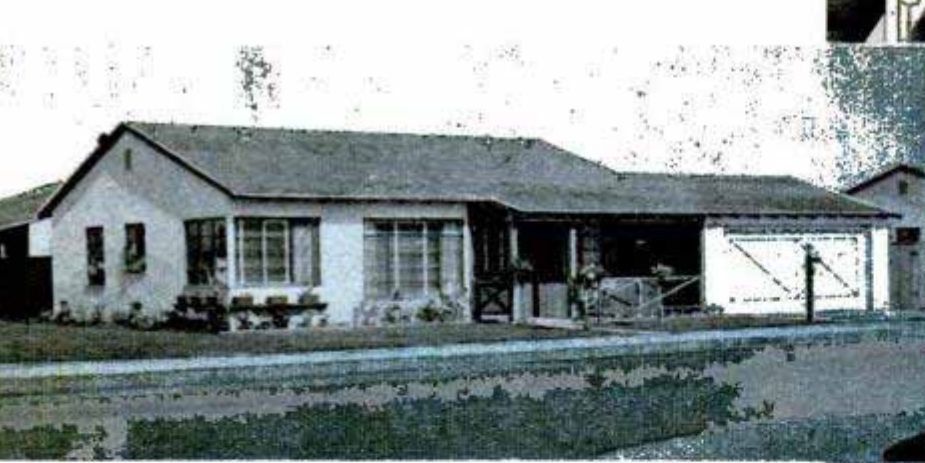
Today Nelson operates a regular house factory in which all the framing for six complete houses is manufactured every day. Most of these houses are built on a wholesale basis for companies that are erecting tracts of houses in the Santa Barbara area or in towns as far as 100 miles away. One order on his books may call for the components of 138 houses that are to be delivered to a new tract, another may call for 185 houses, variously designed. To meet a special order from one builder he furnished 5600 doors on prefabricated jambs, complete and ready for installation.

In Nelson's factory all the wood required for making up standard sections of one of the house designs is cut to size on a battery of power saws, then transported to the tables on which the sections are assembled.

All the framing required for a single house of a particular design is placed in a stack, then picked up by a large lift truck and placed in a storage area, ready to be trucked to a building site.

This prefabrication system cuts construction costs to some extent but there is still a tremendous amount of work to be done after the frame of a house is erected. That's where Nelson got his idea of teaming up with an owner and letting the owner save money by doing much of the skilled and semiskilled finish work.

He tried it with a couple of owners and it



Buyers are inspired by completed houses like the one above before they tackle job of finishing one of the homes. Owner at right is installing ceiling panels. The contractor supplies full instructions

worked. Then, with the next few partly built houses that he sold, he worked out the details of the plan as it exists today. The idea caught on rapidly and now Nelson has a backlog of orders for 400 partly built homes in the area around Santa Barbara.

The sequence of construction works out like this: After an owner's lot has been approved for financing and after the owner has selected the size and design of house he wants, one of Nelson's construction crews moves out to the site and installs the floor plumbing, then pours the concrete-slab floor. Prebuilt framing and roof trusses are trucked to the site and are erected in a couple of days.

A crew of electricians installs all the wiring; rough plumbing is installed; the shingle roof goes on, and the first coats of exterior stucco are applied to the house. Within 10 days or two weeks the house is ready for the owner to begin his work.

Nelson's responsibility doesn't end there. For one thing, an owner may have trouble in taping the joints between sections of wallboard to make the joints invisible. A crew comes in and does that chore to give

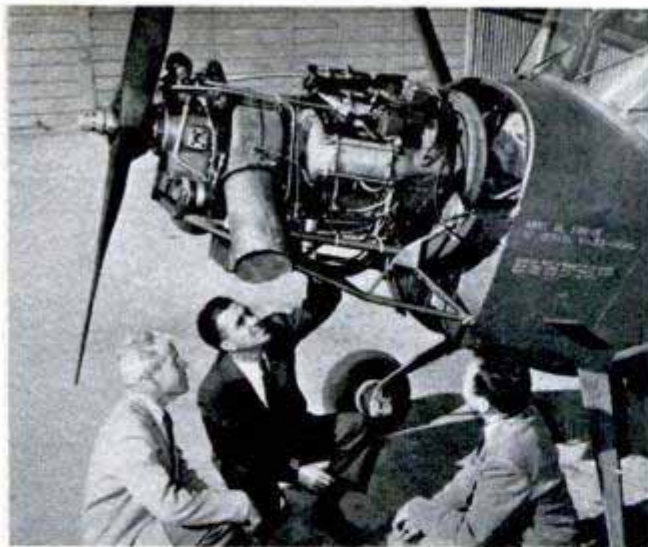
the job a professional touch for the owner.

Too, few amateurs can do a neat job of setting ceramic tile and so an experienced tile setter installs the kitchen and bathroom tile after the owner has finished placing his cabinetwork. Plumbing fixtures and a two-way gas wall heater are installed by trained crews when the owner is ready for them. The final job that the contractor does is to apply the tinted finish coat of stucco to the exterior of the house. By then the owner has moved into his new home and is ready for the last job of all—landscaping his grounds.

Within the next year or so, Nelson expects to expand his operation to include many parts of the West. With a factory in Texas and another possibly in Oregon he'll be able to serve many of the Western states. Eventually, the idea may spread to include the whole country. Almost any housing contractor, Nelson figures, can assemble one of his preframed houses in a few days, subcontract much of the rest of the work, and turn a partly built home over to an owner at a considerable saving in price, almost anywhere. ★ ★ ★

Below left, owner measures wall before installing wallboard; right, attaching cabinet hardware in kitchen





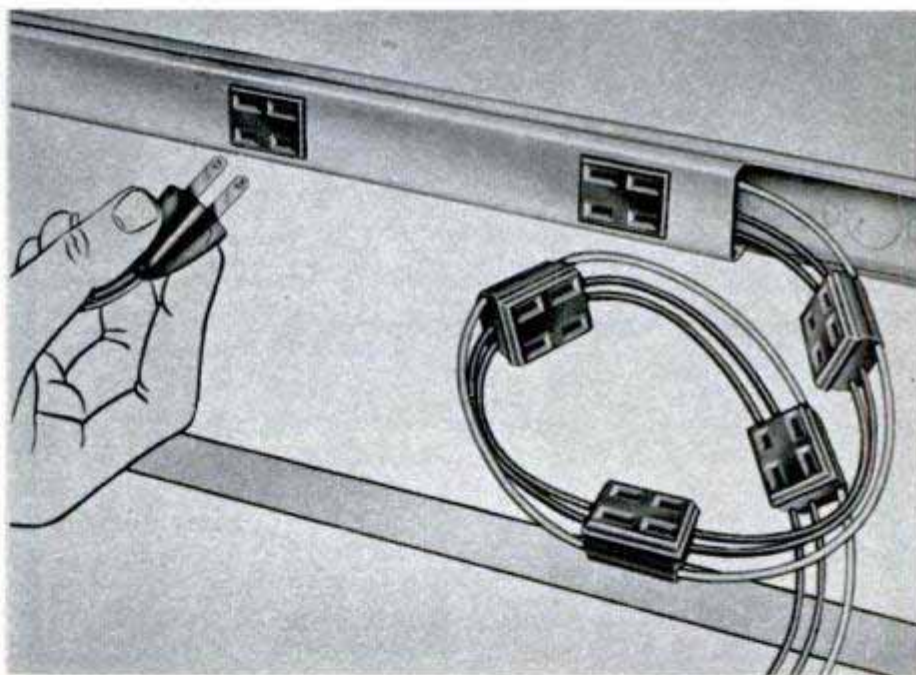
## Turboprop Engine Experimentally Powers Light Plane

Turbine-propeller power is being used experimentally to fly the Cessna L-19, a lightweight combat veteran of the Korean war. Weighing 250 pounds and rated at 250 horsepower on take-off, the gas turbine is 125 pounds lighter than the six-cylinder piston engine that normally powers the

light observation and liaison plane. Developed by Boeing, the new engine uses almost no oil, and its fuel system eliminates the need for fuel-mixture control, carburetor and the attendant carburetor heat-control system. It can operate on all grades and ranges of fuel.

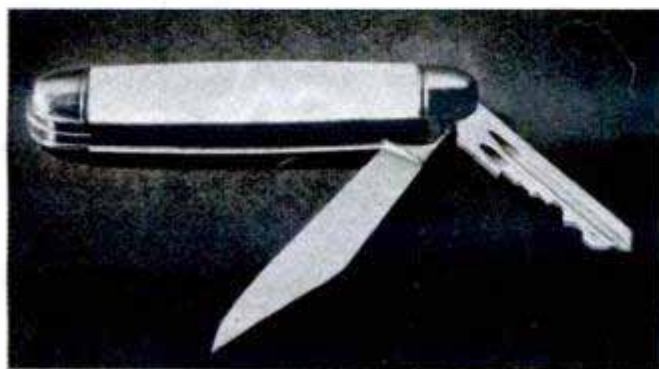
## Hollow "Baseboard" Contains Outlets

Prewired electrical outlets which eliminate the clutter of extension cords can now be easily installed in shops and homes. Double outlets are fitted into 50-foot lengths of triple wire at intervals of 30 inches. One outlet in each receptacle is "hot," the other switched. The switched outlets, used for lamps, can be turned off by a single wall switch. The hot outlets are used for appliances, and supply current at all times. Wire and receptacles are contained in a hollow steel baseboard, which fastens to the wall with screws. The pre-



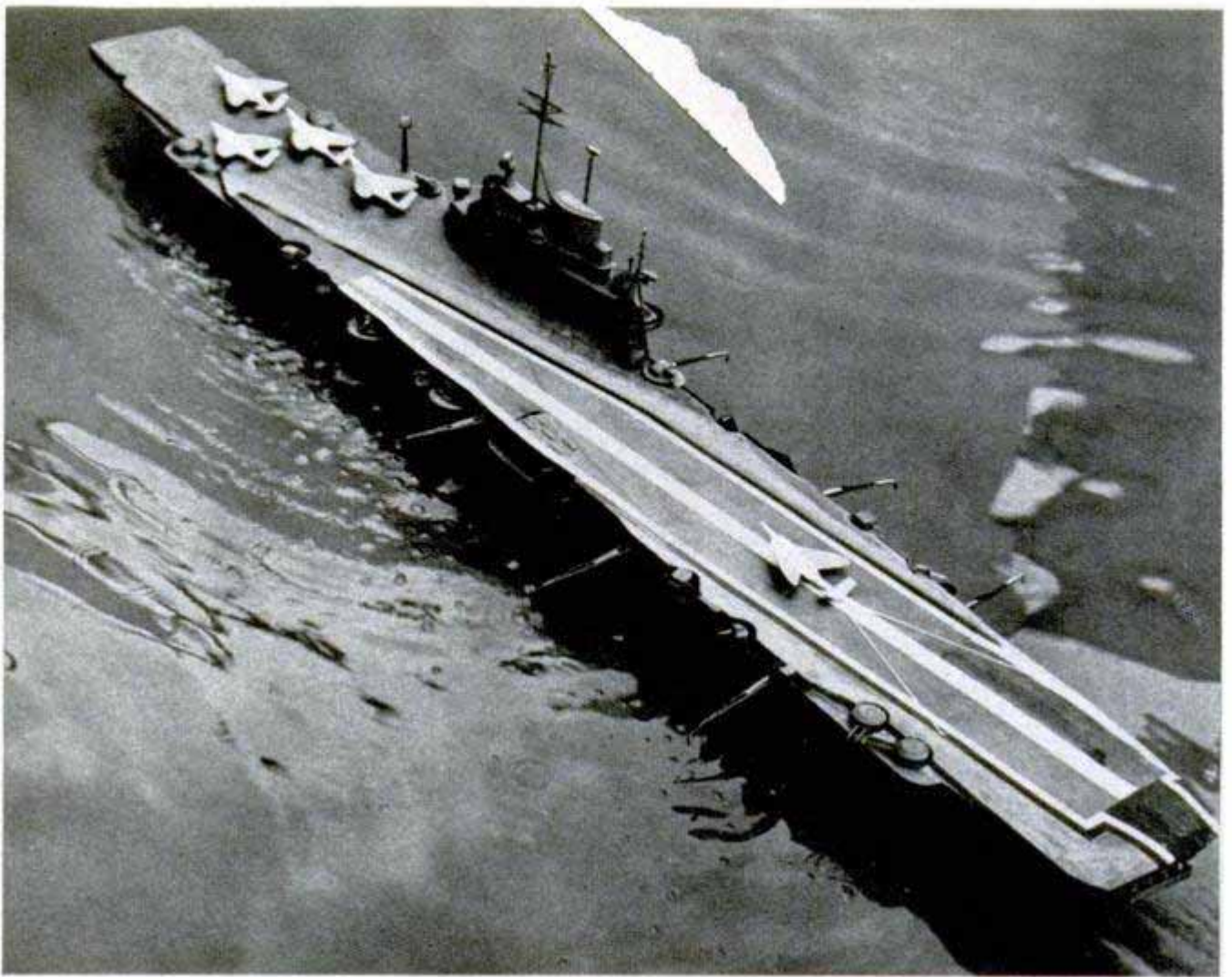
wired outlets snap into openings of the baseboard cover.

## Auto-Key Knife Prevents Accidental Car Lockouts



Losing your car key won't be a disaster if you carry a pocket knife that contains a spare key in place of a second blade. The knife has a brass key blank which folds into the knife like a blade. When ordering, a buyer gives the manufacturer's car-key number, and the blank is cut to fit.

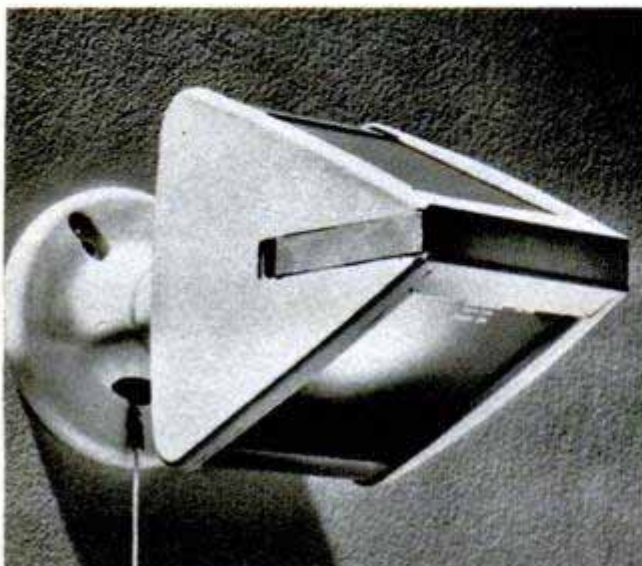
☐ California, with 9845, leads in private aircraft ownership, followed by Texas, 6404; Illinois, 4779 and New York, 4308.



## Angled Deck for Aircraft Carriers Allows Increased Traffic

More and faster airplanes can land on a carrier deck when a new "angled deck" technique is used. Now under development by both the British and the United States navies, the new plan involves marking out the flight deck so that aircraft may land at an angle of about eight degrees to the fore-and-aft line. An aircraft that is not stopped by the normal method of hooking on to one of a series of arresting wires can fly straight

off over the side without altering its course. Since parked aircraft are not in line with the landing, as they are on conventional aircraft carriers, the separate emergency-barrier area can be eliminated. An emergency barrier in the same area as the arrester wires can halt aircraft unable to make a normal landing. In effect, the angled deck increases the length of the flight deck by 40 percent.

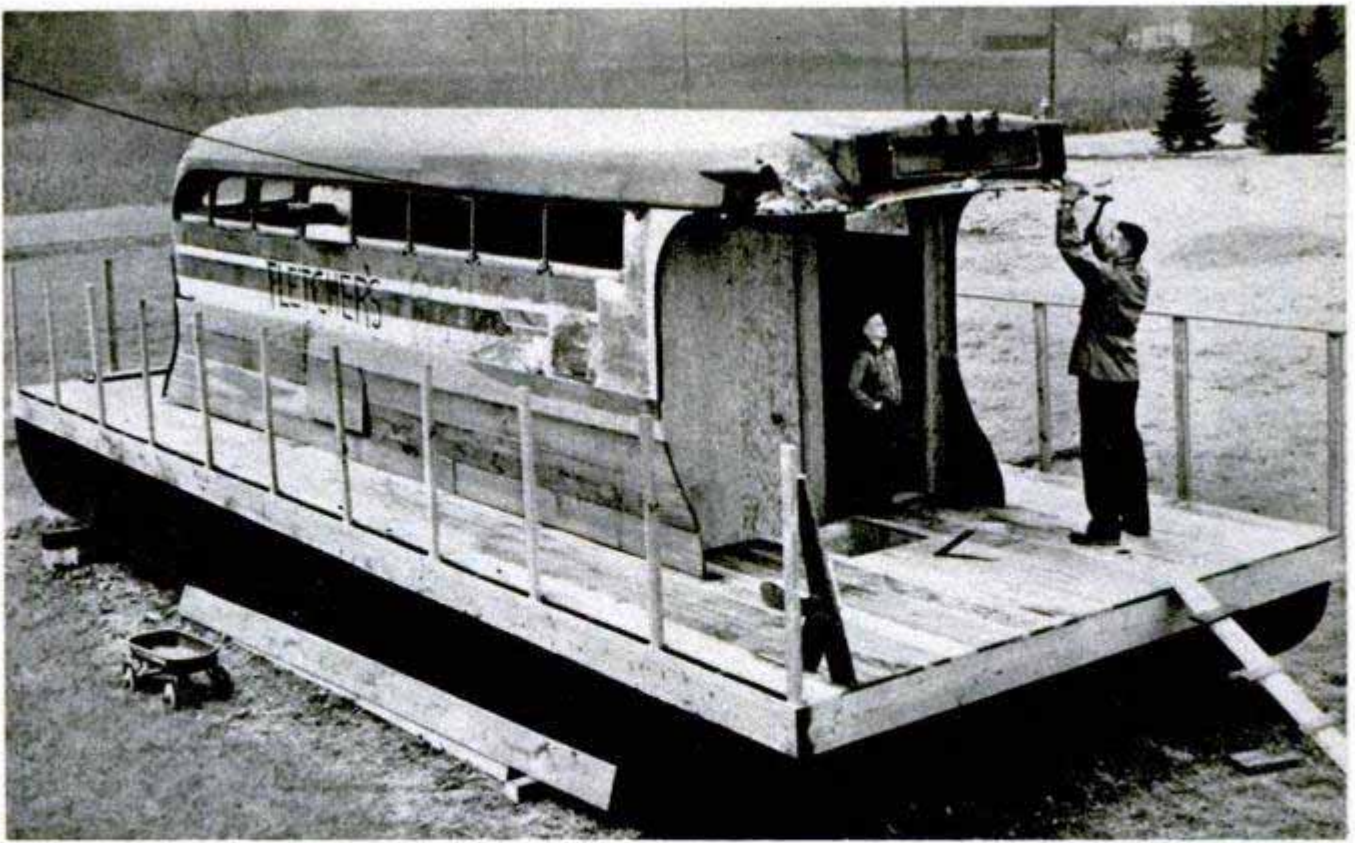


## Two-Way Safelight Aids Amateur Photographers

Illuminating a small working area or the entire darkroom, a two-way safelight for amateur photographers who develop and print their own pictures can be used with either one or two filters. It may be screwed into an overhead or wall socket. One filter and a 15-watt lamp are supplied.

Sources of available products described in this issue are listed on pages 12, 14 and 16. Sources of further information on other articles are listed in our free WHERE-TO-FIND-IT LIST. For your copy just write to the Bureau of Information, *Popular Mechanics*, 200 East Ontario Street, Chicago 11





### Salvaged Bus Used as Superstructure on Motor-Driven Barge

Starting with a damaged bus, Alfred Fletcher, mayor of Excelsior, Minn., is constructing a motor-driven barge to cruise the waters of Lake Minnetonka. The boat will

get its buoyancy from two 40-foot steel pontoons on which deck and bus body are mounted. Power will come from two 25-horsepower outboard motors.

### Pocket Magnifier Illuminates Small Objects for Close Inspection

Clipped to the pocket like a fountain pen for carrying purposes, a 10-power magnifier contains two pen-light batteries and a tiny bulb which lights the object. Weighing only 2½ ounces, the magnifier is mounted on a six-inch handle. It is designed for use when reading micrometers and other fine scales

and for on-the-job inspection of small parts, castings, small joints and welds. The magnifier's unique lens construction, plus the use of a black-coated diaphragm, allows light to enter the lens from the side and be cast upon the object without any direct light reaching the user's eye.



### Electronic Thermometer

Body temperature is taken speedily and accurately by an electronic instrument designed to speed processing of blood donors. Said to be twice as accurate as a clinical thermometer and 60 times as fast, it registers a dial reading in as little as 4½ seconds. Individual mouth cylinders are quickly slipped into the end of the connecting wire.

Ⓢo great are the aerodynamic forces exerted on a supersonic fighter that the plane's control system must be able to put 100 times more pressure on the control stick than a human pilot can apply with his own strength.

# The Ship That Turns

**V**IOLENT STORMS lash the seas, and somewhere a giant freighter rams half her 500-foot length up on a rocky beach. A thousand miles out on the angry ocean a cargo ship is snapped in two like a matchstick and both halves toss about at the mercy of the elements. SOS signals crackle on the distress frequencies.

Twenty-four hours a day for 365 days a year, Capt. Frederick Zickl and his crew at any instant may be called to the rescue of a battered ship in almost any part of the Atlantic, from Gander to Recife, between Hatteras and the shores of Europe. Their unique charge, the SS *Curb*, a new kind of salvage vessel operated by the Marine Salvage Department of Merritt-Chapman & Scott, stands a 'round-the-clock alert at her berth in New York Harbor. Big maritime catastrophes are the business of this powerful little ship. She can be ready to plunge out on another assignment in the hour it takes to assemble her crew.

Often her job of making a "wreck" seaworthy out on the

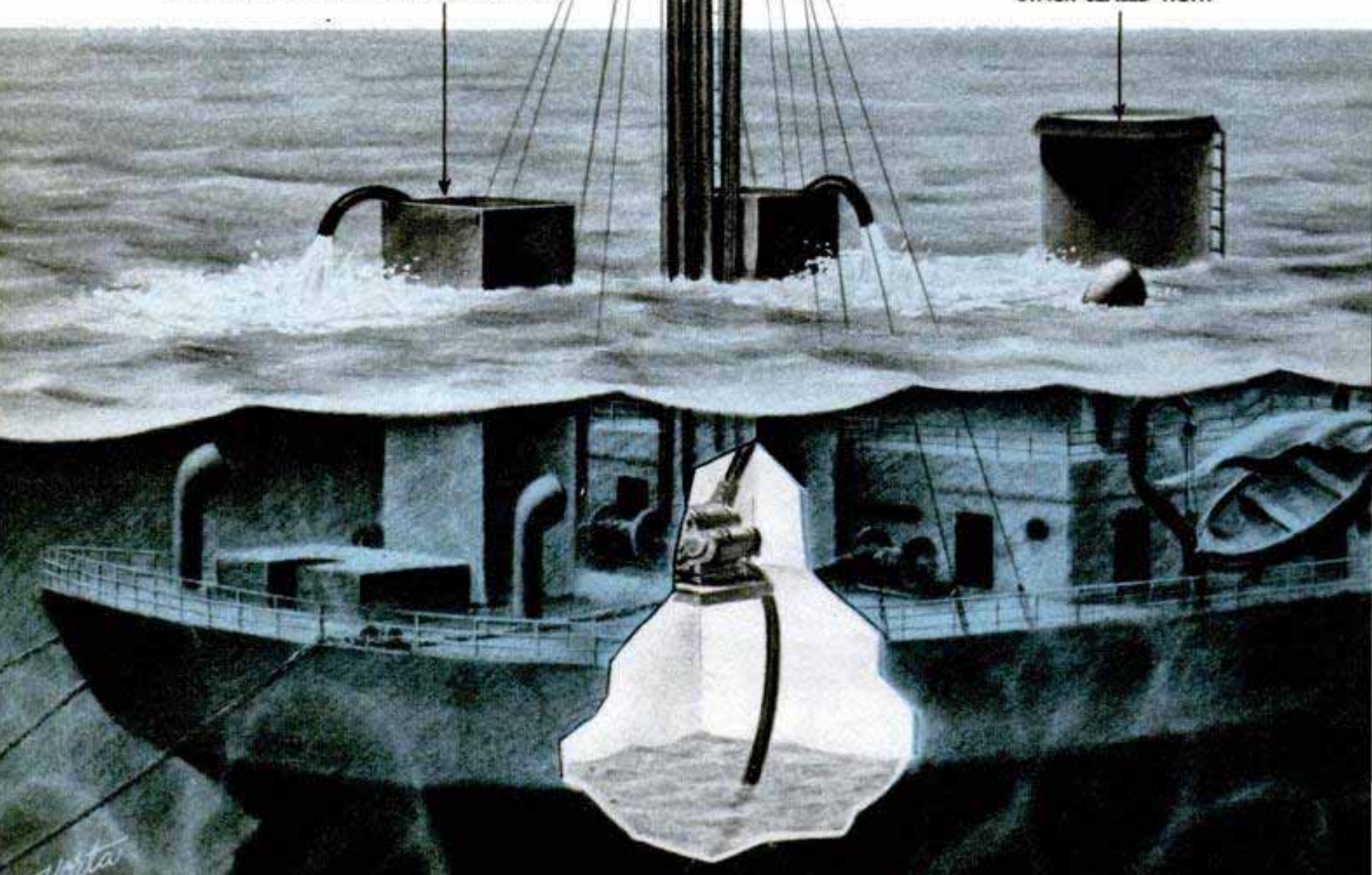
DIVERS SEAL OPEN-ENDED COFFERDAMS OVER HATCHES. PUMPS ARE SET UP AT DECK LEVEL TO EMPTY THE FLOODED HULL

ocean would stagger a fully equipped shipyard. The *Curb* is a miniature shipyard afloat—plus. Unassisted, she has pulled foundering 12,000-ton ships off the rocks. If necessary she could tow the mighty SS *United States* 100 miles or more without help. Her men and her log brim with dramatic stories of how she has patched great rents in the hulls of "wrecks" on the high seas, and seen them safely home. Wreck, you soon learn, is a term these salvage experts apply to any disabled ship, whole or in pieces.

Built in 1944 for the Navy, the *Curb* is one of four similar ocean-going bulldogs operated by Merritt-Chapman & Scott, a heavy construction company specializing in vast projects both ashore and afloat. The ships are strategically spotted up and down the Atlantic.

Like her sisters *Cable* (based at Key West), *Rescue* (out of Jamaica, B.W.I.), and the smaller *Resolute* (New York), the *Curb* looks from afar like a squat, giant tugboat. But no ocean-going tug in the world delivers the power

STACK SEALED TIGHT



# Wreck into Rescue

By  
**Richard F. Dempewolff**

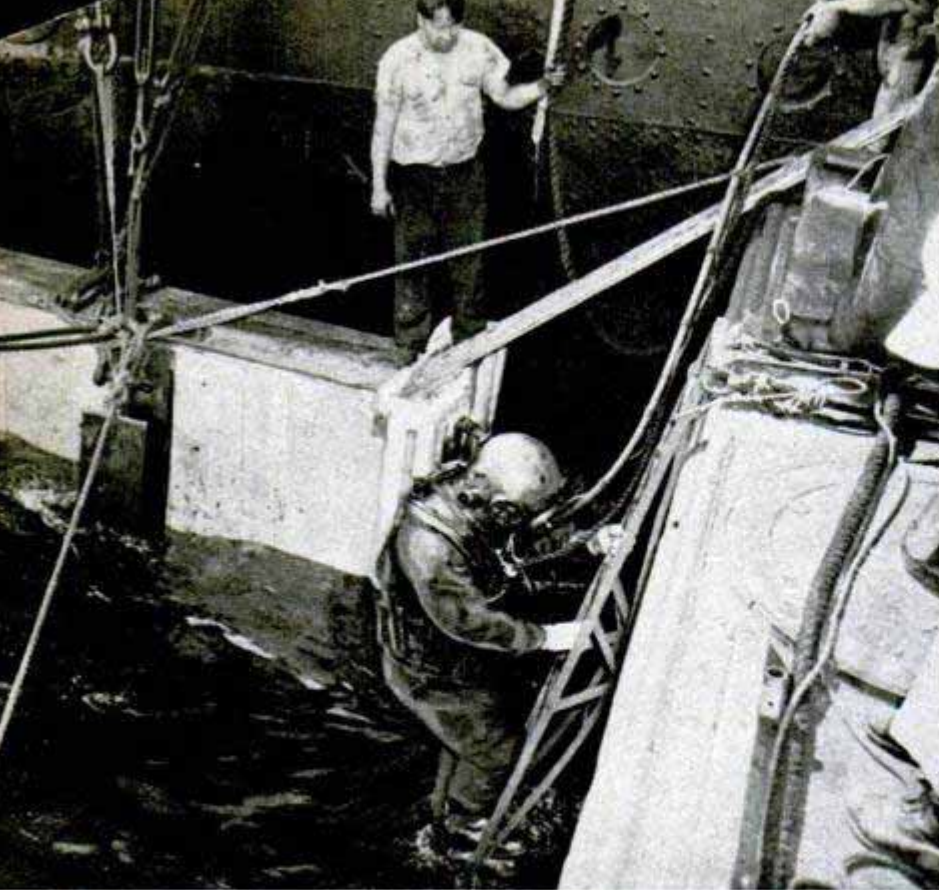
Divers from the *Curb* seal cofferdams on stricken ship's deck. Boxlike compartments are pumped out so men can work inside. Meanwhile a big patch has been tailored to fit over a gaping hole in the hull. Pumps force compressed air into hull to drive out the water



SOMETIMES COMPRESSED AIR IS PUMPED INTO HULL TO FORCE WATER FROM DOUBLE BOTTOM

ANCHOR CABLES WILL KEEP SHIP STEADY AS IT RISES

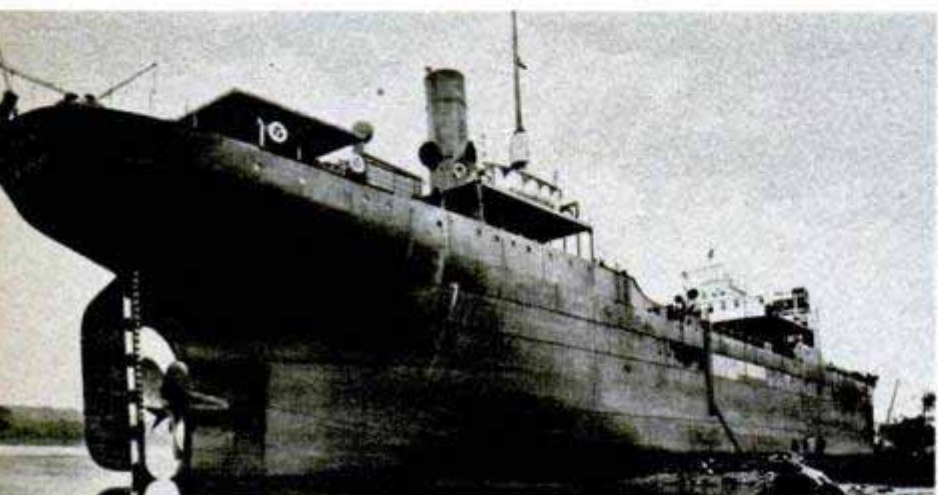
MADE OF WOOD AND STEEL, HUGE PATCH COVERS HOLE IN HULL. PATCH IS BUILT TO CONFORM TO CONTOUR OF HULL AND IS SEALED WITH HEAVY GASKET BY DIVERS



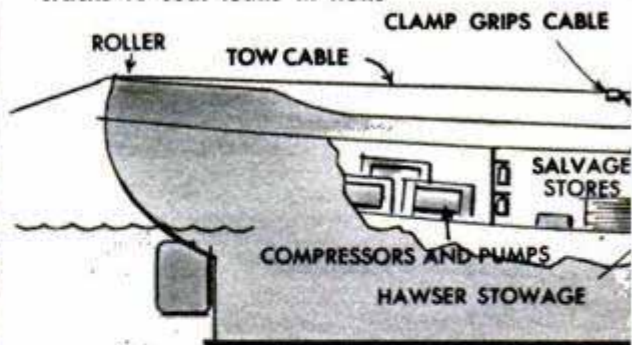
Diver descends to fit a big tailor-made patch on the hull of a damaged ship. He'll carefully seal it in place with felt gasket



Stored in the honeycomb of the *Curb's* hull are miles of steel cable and rope for pulling wrecks off beaches. Below, how far ashore can a ship go? Hurricane deposited *SS Phoenix* on edge of highway. She was relaunched by digging trench under hull



*SS Curb* is a floating shipyard. In workshops and compartments she carries everything from lathes to laundry soap which is jammed into cracks to seal leaks in hulls

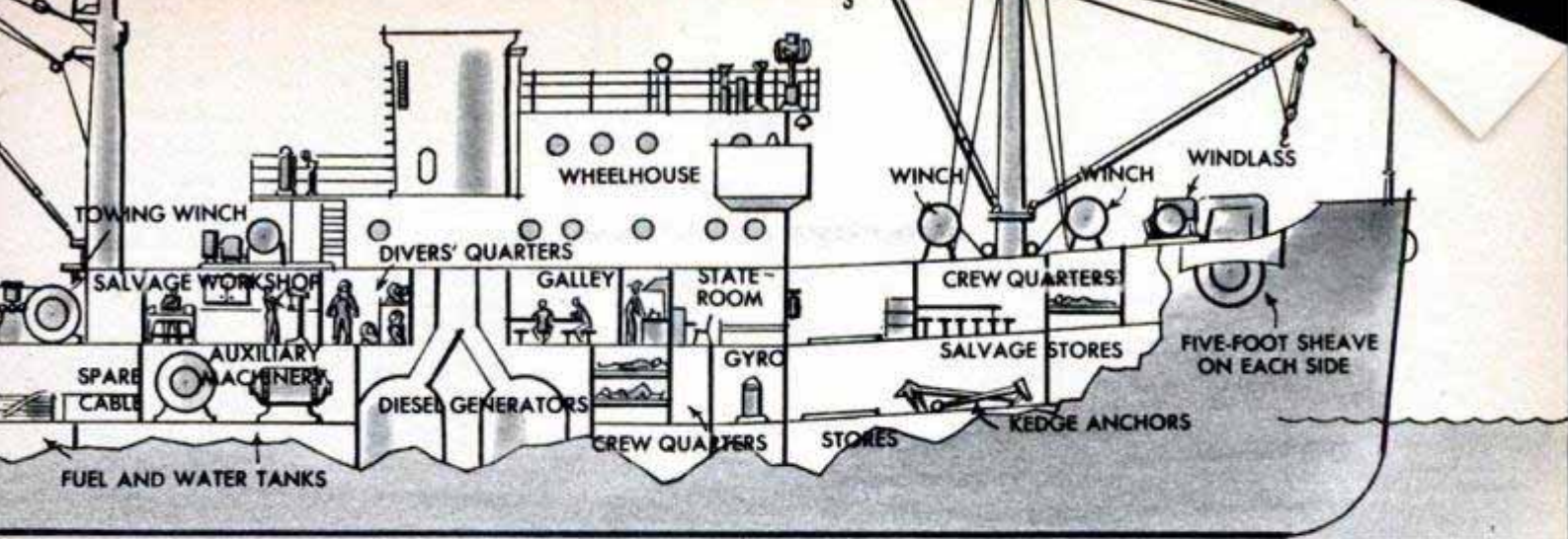


packed into the cramped spaces of her hull, which measures 223 feet long and 43 feet abeam. Everything about the *Curb* is outsize, from the eight odd-looking, four-ton anchors she carries for kedging big ships off beaches, to the massive towing winch aft of her pilot-house. The drum of the winch carries nearly half a mile of two-inch steel cable, weighing about seven tons, and is driven by a powerhouse capable of exerting 40,000 pounds of sheer pull. Two bow sheaves, five feet in diameter and two feet across, nestle in sockets on each side of the blunt prow like a pair of frog's eyes. Over these huge spools cable or Manila line can be passed to keep it from chafing. Each spool will support 70 tons of line pressure.

Four diesel-electric engines that turn up a total of 3000-shaft horsepower, turn her twin screws and jam the 1200-gross-ton ship into the seas at 19½ knots.

Skipper Zickl and his 43-man crew (28 to run the ship plus 15 specialists under a salvage officer) never know how long they'll be out. "We recently got a job near by, yanking a freighter off a bar," Zickl reveals. "A couple of tugs had been hauling on the wreck without success. We hooked up our beach gear and had her afloat in a few hours. It looked like a short, easy job, but before we got back to Staten Island we were re-assigned by radio to several other wrecks down the coast and didn't see New York for two and a half months."

Hence the *Curb* carries food and



water to last three months at sea. A big evaporator insures drinking water no matter how long she's out. With speed held to 12 knots (about 14 miles per hour), she can cruise 9000 miles without refueling. Besides all this, the ship must carry every imaginable item needed to put a wrecked or beached ship back in service. Things she can't carry—like steam turbine engines or hull sections for big ships—must be repaired piece by piece in her shops. Her assortment of equipment includes everything from a heavy-duty sewing machine to a concrete mixer.

On a job, crews of mechanics sweat over chunks of steel in the big salvage workshop aft of the crew's galley on main deck. To the clang of a forge, the roar of a welding machine and the hiss of a metal lathe, they can turn out virtually any repair necessary to get a damaged vessel to port.

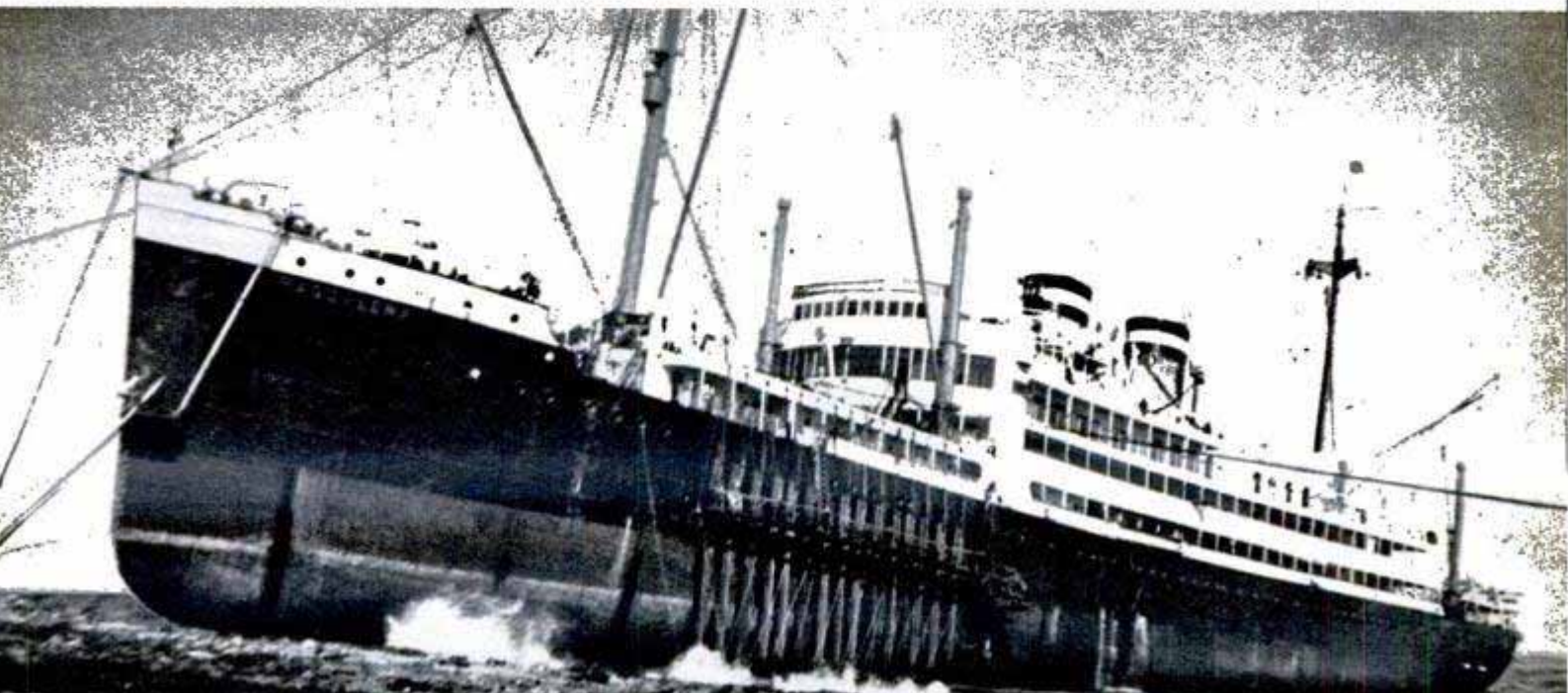
Other compartments are jammed with miles of wire cable as thick as your wrist,

and miles of Manila rope up to 12 inches in circumference. Portable motor-driven pumps, carried to a wreck in the *Curb's* motor launches, can empty a swamped ship at a rate of a million gallons an hour. The *Curb's* generators are capable of supplying electricity by overwater cable to disabled ships. In its hold you bark your shins on stacks of pneumatic drills, jack hammers, chipping hammers, boring machines, 250-pound steel blocks with steel sheaves, anchor and chain shackles.

Huge timbers for making "patches" to cover rents in a wrecked ship's hull are racked along bulkheads, lumberyard fashion. A separate diving locker contains several complete rubber diving suits and big metal helmets, underwater telephone equipment and torches for the men who go down to "case" the situation and repair underwater damage.

Towing a disabled ship to port is about the simplest kind of job the *Curb* does, but

**Beached ship was repeatedly jacked up on big timbers, then pulled off them to "walk" it back into the water**



it can pose difficulties. In a rough sea, it takes expert handling to shoot or run a messenger line across to the wreck so that the two-inch cable can be hauled between the ships. That cable weighs 6¼ pounds per foot. Once lashed in place it's a murderous thing. "I've seen it snap so taut in a heavy sea that it sang a tune," says Zickl.

The only ship the *Curb* ever lost was a tow job—an Army freighter that had caught fire and was sinking when the first line went aboard. While under tow, the ship went down—so fast there was no time to release the big wire. That was one time Zickl and his crew were glad to see a \$3600 two-inch steel cable break.

The real potential of the salvage vessel comes into play on more complicated rescues. Recently the *Curb* beat its way to Cape Charles to pull a Liberty ship off the rocks. Long before they could see the ship, officers on the bridge picked her up on the radarscope. C. E. Frederickson, the radio officer, was talking to her skipper via short wave.

"We finally spotted her. She was way into shoal water," Zickl reveals. "At high tide we got within 600 feet of her, and the fathometer said we had exactly six inches of water between our own keel and the bottom. To stay there would have been foolish. We had to rig more than a mile of tow cable on buoys between us to do the job. But we had her off with kedging anchors in 48 hours."

It usually takes much more than the *Curb* tugging a line to get a ship off a beach. At full tilt she can only exert a maximum pull

of about 35 tons. You get some idea of how little this is when you know that for every foot of draft a big ship goes around, 48 or more tons of horizontal pull may be needed to free her, depending on the kind of bottom she's sitting on. If only 10 feet of her bow rest on the bar, a big, round 360-ton heave may break her loose—provided jagged rocks don't snag her.

On arrival at a disaster scene, such as the beached Liberty ship, some 15 men, including salvage officer, divers, tenders, carpenter, pump engineer and a crew of "wreckers" clamber into the *Curb's* motor launch and head across heaving seas to the wreck. With them goes a portable five-watt radiotelephone so they can talk back and forth with the *Curb*. In an hour, divers are surveying the wreck's underside for damage. Other men may peer through a big boxlike underwater viewing glass from the launch to observe bottom conditions around the ship, and take soundings to determine the best direction to pull her out. Salvage and pump engineers look for leaks inside the grounded vessel.

In most cases, there's repair work to do before the ship can be pulled loose: Broken seams, holes punched through the bottom by rocks, water pouring into double bottoms. Over to the wreck, by highline or launch (no piece of gear on the *Curb* is so big the boat can't carry it), go generators, compressors, hoses, welding torches and other equipment. With underwater-welding equipment divers patch small holes. This can be hazardous in heavy seas or strong tides. "One of our divers," Zickl



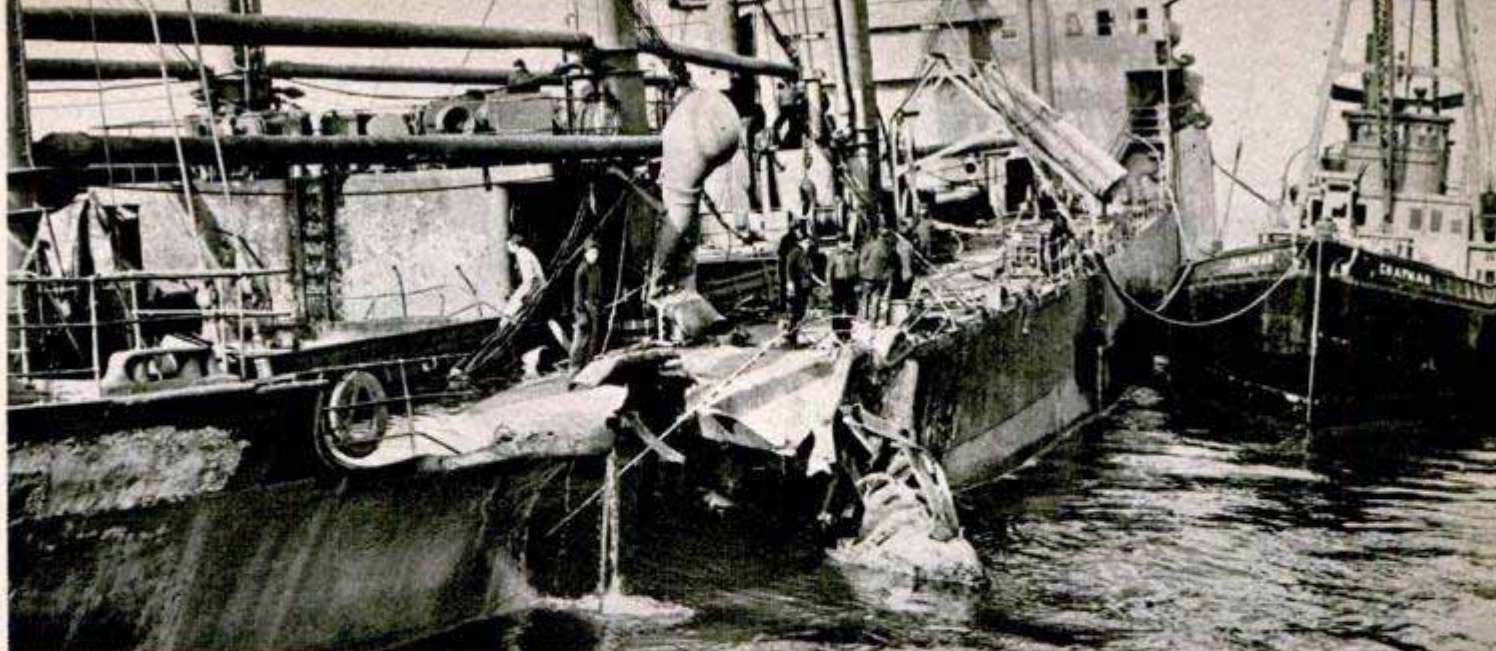
SHIP AGROUND ON REEF

SALVAGE SHIP EXERTS 35-TON PULL ON CABLE

CABLES TO EELLS ANCHORS ARE PULLED BY SHIP'S DECK WINCHES, EACH HAVING A 75-TON MUSCLE

THE GREATER THE PULL ON THE LINE, THE DEEPER THE ANCHOR IMBEDS ITSELF. SOMETIMES ANCHORS DIG 20 FEET INTO OCEAN BOTTOM

EIGHT-TON EELLS ANCHOR



Huge hole was slashed in the side of this ship as a result of a collision at sea. After measurements were taken, crew of the *Curb* made a big patch of steel, wood and canvas to fit the exact contours of the hull

reports, "was welding a patch under a damaged ship recently. He was so absorbed he didn't notice the tide was ebbing until the big ship started settling on him and things got crowded. By creeping and wriggling he squeezed out barely in time."

The salvage workers use ingenious stunts to find and plug holes. Burlap bags of sawdust, resembling big pillows, are submerged around the wreck's hull. The sawdust is released and drifts toward holes or split seams, is sucked into them by the pressure and automatically plugs the gaps.

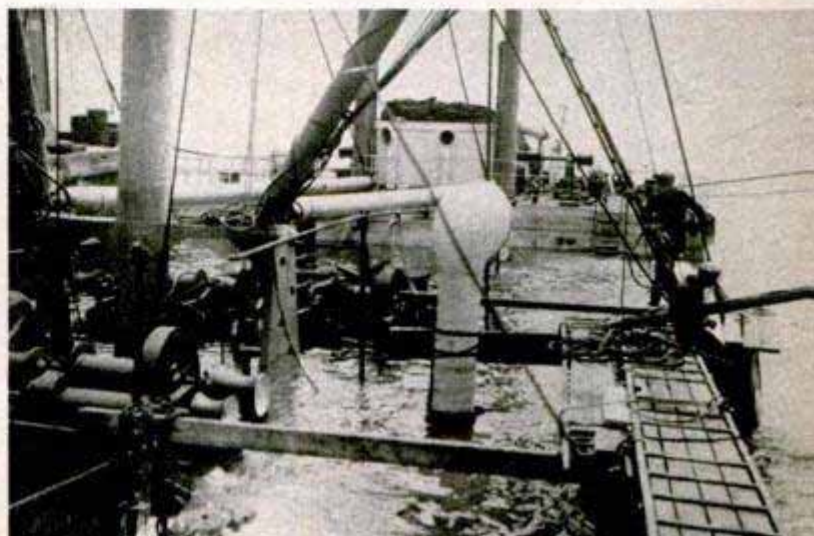
(Continued to page 242)

Drawing shows how grounded ship can be refloated by kedging. Stricken ship pulls on anchors that bite into mud while rescue vessel pulls on its towline



Big tow cable, fed over spools on *Curb* to prevent chafing, is made fast to a ship wallowing at sea

Freighter, its decks awash, must be given quick aid by divers who plug holes in hull with sawdust

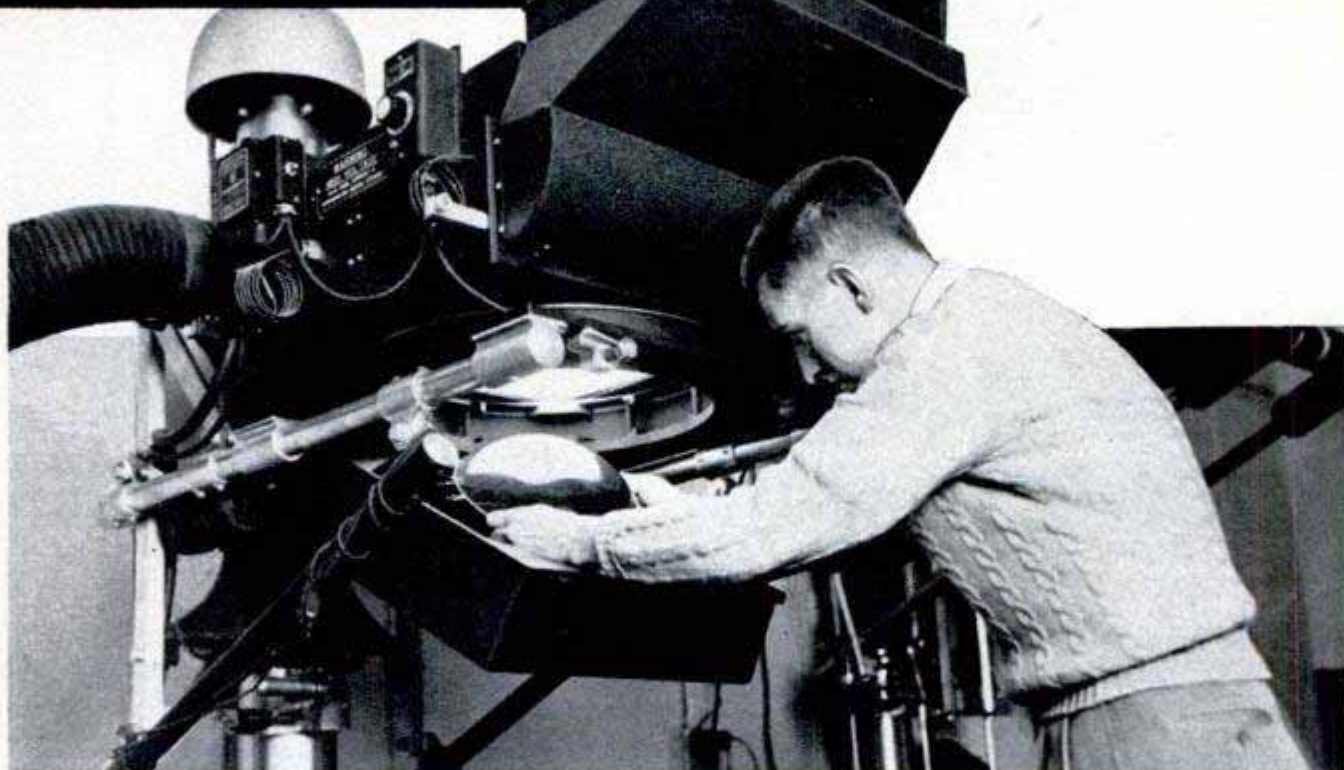


# SPHERICAL





# CAMERA



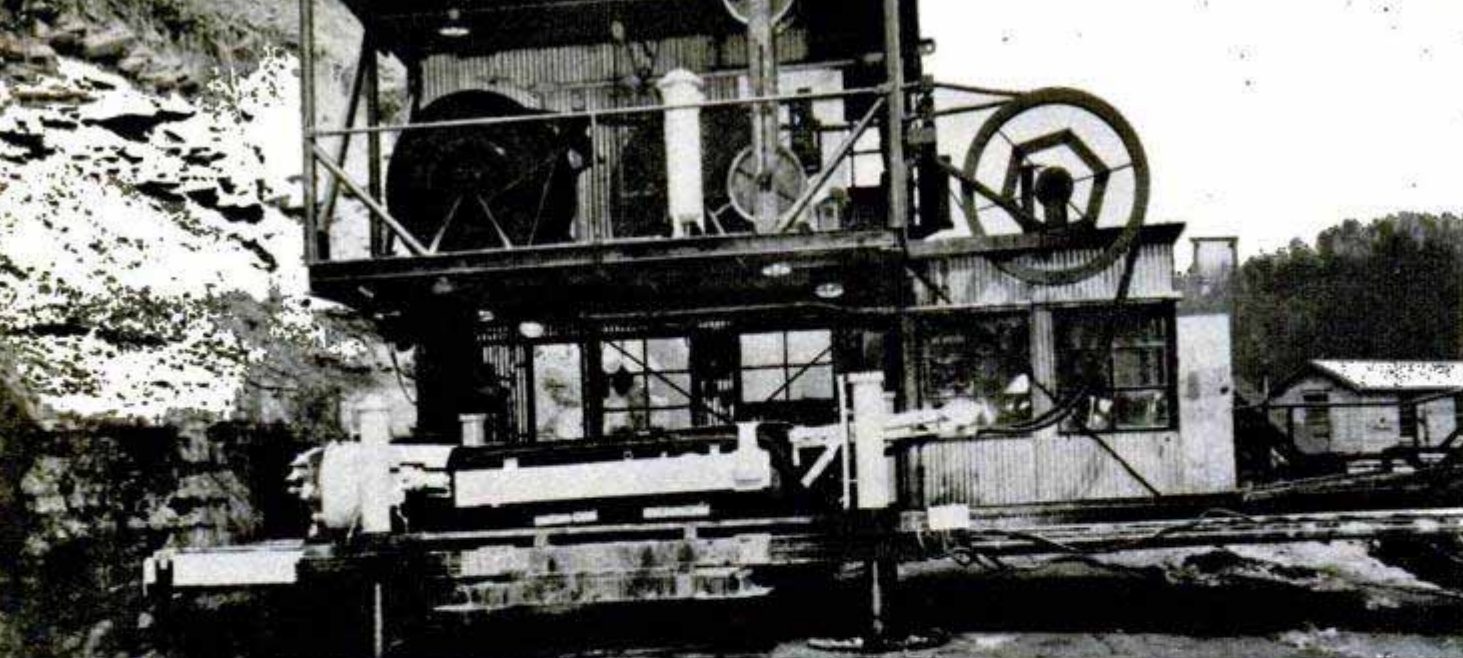
Photograph on opposite page was taken with new camera at 34,000 feet and shows area of 380 square miles. Above, "salad bowl" negative is placed in projector which converts concave image to 40-inch-square print

**S**HOOTING from 34,000 feet, an aerial camera developed for the United States Air Force scans 380 square miles—recording the picture on a glass "salad bowl" negative. The camera, which has a 120-degree, solid-cone field of view, uses a ball-shaped lens. The glass-shell negative is coated on the inside with a fine-grain spectroscopic emulsion and has a radius of curvature equal to the focal length of the lens. The camera was developed by the Physical Research Laboratories at Boston University. It produces an undistorted image of uniform sharpness. When in

operation the ball-shaped lens, housed in the inner sphere, rotates at a fast speed. Around this sphere, the "shutter," a hollow, larger sphere, revolves at a slightly different speed in the same direction. When the slits in the two spheres coincide, the capping shutters are automatically activated to let light through and expose the emulsion-coated glass shell. A special projection lens transfers the concave negative image onto a flat print. The lens was designed by Dr. James G. Baker of Harvard College Observatory, and the camera by Harry Gewertz, Boston University. ★ ★ ★

Left, Harry Gewertz, camera designer, places negative in position. Right, negative shows image of Boston





Carbide and Carbon Chemicals Co. photos

Rig, mounted just opposite an outcrop seam of coal, is ready to bore deep into hill. Reels hold power cables

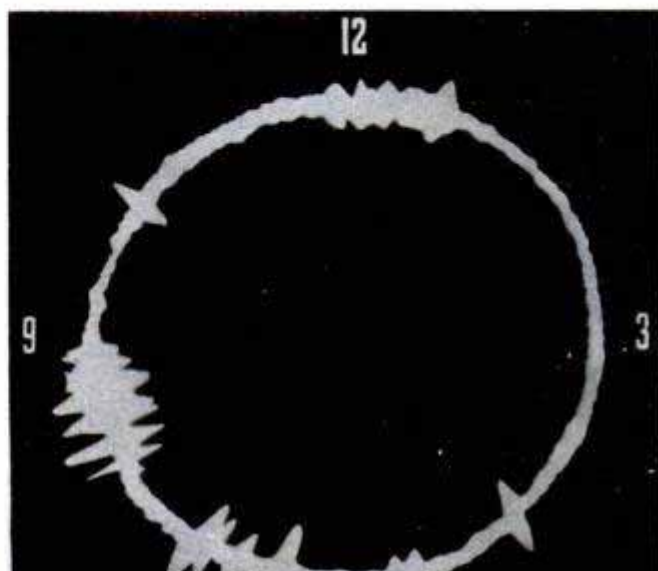
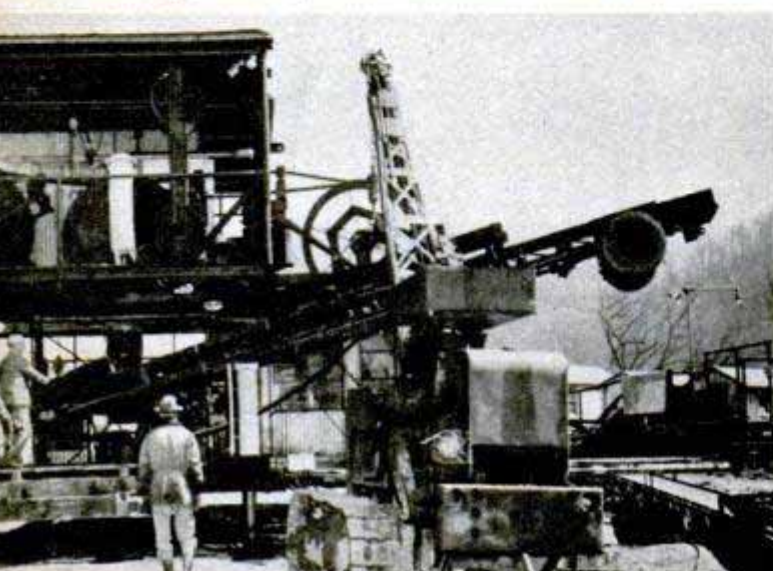


Cutter's four overlapping heads have whirling carbide teeth. Operator is pointing to sensing instrument which sends signal to cab. Below, extra conveyor is dropped into place to give the cutter a longer reach

## Mining Rig Has Long Arm

WITH A detachable arm that "grows" almost 1000 feet, a new mining rig reaches deep into the side of a hill to bring out the coal. The rig, a double-deck structure mounted on hydraulic jacks, is positioned along the face of an outcrop seam. The cutter consists of four overlapping heads with whirling teeth which bore a neat hole ten feet wide and three feet high. As the coal is cut, it is carried to the rear of the machine on a conveyor belt. Whenever the arm has reached its limit an additional 30-foot conveyor section is added. In this way the cutting heads can be made to bore as deep as 1000 feet into a seam. Built into the sides of the cutter are two sensing instruments called "stratasopes" which send back messages to two oscilloscopes in the cab. When the teeth cut through anything harder than normal coal, "blips" appear on the oscilloscope screens. This enables the operator to guide the cutters along the seam.

Pattern of "blips" registered on screen by sensing instrument tells operator where to guide the cutter





Atomic Energy Commission, Nevada Proving Ground photo

Blue shock wave spreading from A-bomb tells scientists of densities and temperatures aloft

**THE**

## **SKY UNFOLDS ITS MYSTERIES**

By *Thomas E. Stimson, Jr.*

**L**IKE SHREWD EXPLORERS who gather in advance every bit of information about a new region, research teams now are probing the upper air with every available tool.

They are preparing for the day when we'll travel to the outer fringes of the atmosphere and look out on cold, empty space.

Already the scientists know many of the conditions that pioneer explorers of the upper air will encounter.

There's the band of poison air 12 to 20 miles above the earth that would be fatal to anyone who breathed it. It would be lethal, if compressed for breathing, because of its high percentage of ozone or heavy oxygen.

There are the invisible clouds that you can look right through, 60 to 400 miles up. Ordinary light passes through the clouds; most radio waves are reflected from their surfaces.

And hundreds of miles up, eerie ghost winds blow 1000 miles per hour in air so thin these hurricane gales wouldn't even ruffle your hair.

Most important of all from the standpoint of staying alive is the lack of pressure and warmth. It's true that the temperature 500 miles up is calculated to be 4000 degrees

Crew inflates "Moby Dick" balloon that will carry instruments and transmitter to altitude of 20 miles

Air Force photo



**EXOSPHERE**

500 MI.

600 MI.

SPEED OF ROCKETS NOW ON DRAWING BOARDS APPROACHES THE VELOCITY OF ESCAPE FROM THE EARTH

400 MI.

RADAR CONTACT WITH MOON

300 MI.

GUNSHOT INAUDIBLE THREE FEET FROM EAR

**WHAT MAN KNOWS ABOUT THE ATMOSPHERE**

200 MI.

HIGHEST TWO-STAGE ROCKET

ROCKET-SKIN TEMPERATURE DEPENDS ON SOLAR RADIATION

100 MI.

MOST METEORS, SMALLER THAN PEAS, ARE CONSUMED BY FRICTIONAL HEAT

HIGHEST ONE-STAGE ROCKET

50 MI.

HIGHEST ALTITUDE FOR EXPERIMENTAL ANIMALS CARRIED BY ROCKETS

POWER OF RECIPROCATING ENGINE FALLS TO ZERO  
BLOOD BOILS AND BODY INFLATES FROM LACK OF PRESSURE

NOCTILUCENT CLOUDS

25 MI.

SOUNDING BALLOONS

20 MI.

WEATHER BALLOONS

15 MI.

10 MI.

5 MI.

TROPOSPHERE

HIGHEST FLIGHT OF MAN

MOUNT EVEREST

400-1000

320

70

+170°

-28°

WIND—M.P.H.

TEMP.—F.

80

20

CIRRUS CLOUDS

NACREOUS CLOUDS

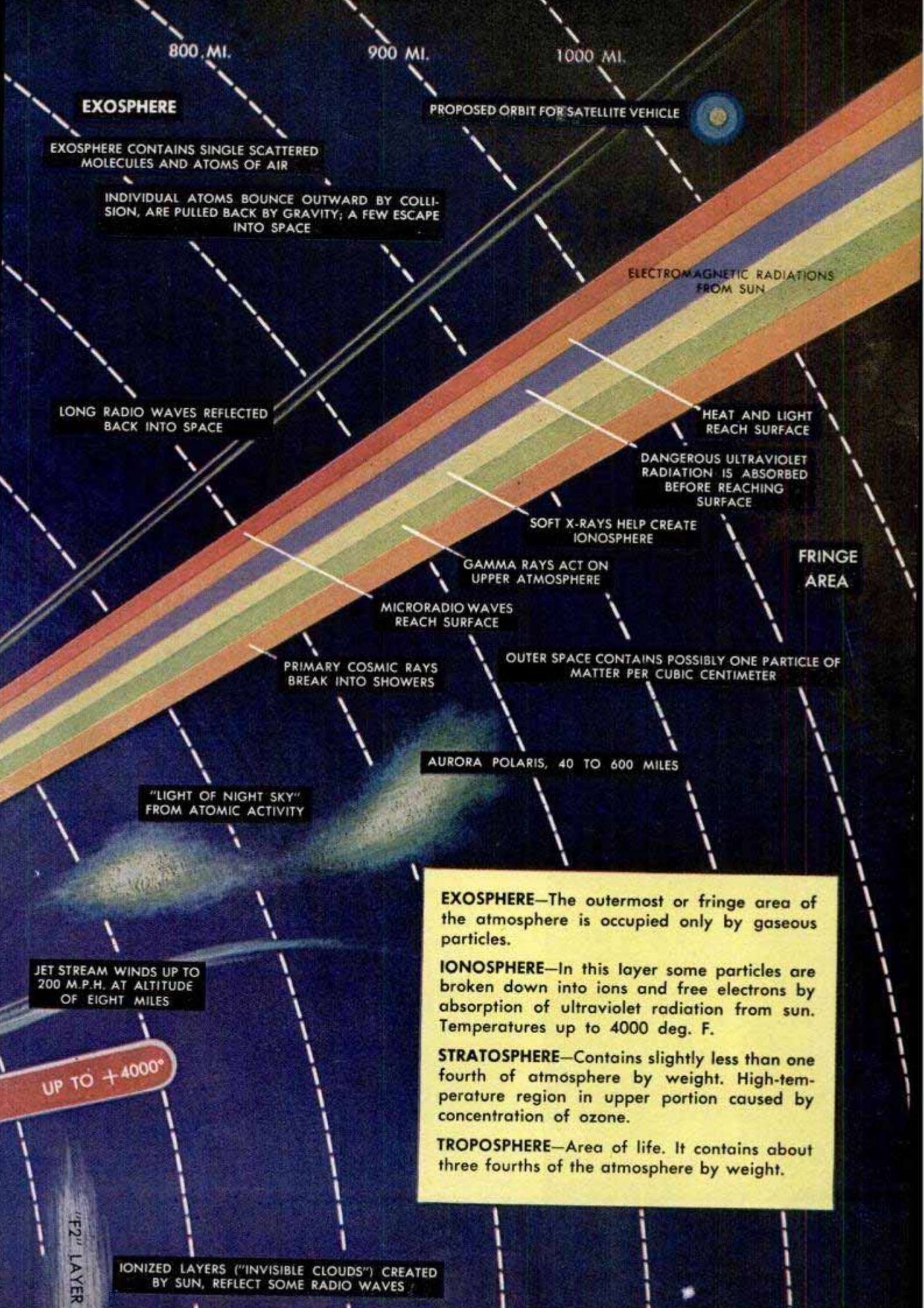
"D" REG

"E" LAYER

"F1" LAYER

**EARTH**

CUMULUS CLOUDS



**EXOSPHERE**

EXOSPHERE CONTAINS SINGLE SCATTERED MOLECULES AND ATOMS OF AIR

INDIVIDUAL ATOMS BOUNCE OUTWARD BY COLLISION, ARE PULLED BACK BY GRAVITY; A FEW ESCAPE INTO SPACE

PROPOSED ORBIT FOR SATELLITE VEHICLE

ELECTROMAGNETIC RADIATIONS FROM SUN

LONG RADIO WAVES REFLECTED BACK INTO SPACE

HEAT AND LIGHT REACH SURFACE

DANGEROUS ULTRAVIOLET RADIATION IS ABSORBED BEFORE REACHING SURFACE

SOFT X-RAYS HELP CREATE IONOSPHERE

FRINGE AREA

GAMMA RAYS ACT ON UPPER ATMOSPHERE

MICRORADIO WAVES REACH SURFACE

PRIMARY COSMIC RAYS BREAK INTO SHOWERS

OUTER SPACE CONTAINS POSSIBLY ONE PARTICLE OF MATTER PER CUBIC CENTIMETER

AURORA POLARIS, 40 TO 600 MILES

"LIGHT OF NIGHT SKY" FROM ATOMIC ACTIVITY

JET STREAM WINDS UP TO 200 M.P.H. AT ALTITUDE OF EIGHT MILES

UP TO +4000°

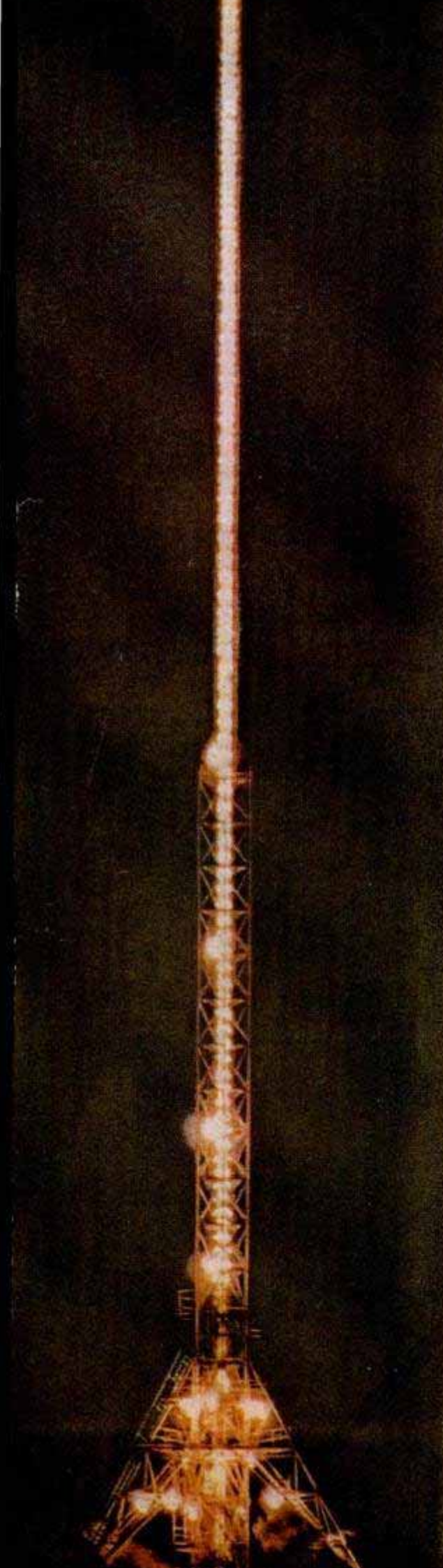
**EXOSPHERE**—The outermost or fringe area of the atmosphere is occupied only by gaseous particles.

**IONOSPHERE**—In this layer some particles are broken down into ions and free electrons by absorption of ultraviolet radiation from sun. Temperatures up to 4000 deg. F.

**STRATOSPHERE**—Contains slightly less than one fourth of atmosphere by weight. High-temperature region in upper portion caused by concentration of ozone.

**TROPOSPHERE**—Area of life. It contains about three fourths of the atmosphere by weight.

IONIZED LAYERS ("INVISIBLE CLOUDS") CREATED BY SUN, REFLECT SOME RADIO WAVES



F., well above the melting point of steel, but this is the temperature of individual molecules and atoms. Not enough of them are present even to keep you warm.

Heat is a problem only at lower and colder altitudes. In denser sub-zero air the skin friction of a rocket results in a surface temperature in excess of 1000 degrees.

An amazing thing about these unearthly conditions is their relative nearness to us. Sixty miles up, a distance you can drive on the ground in less than an hour, the air is so thin that it is equal to the vacuum inside an ordinary light bulb. Even at 10 miles up, less than the distance you may travel to work every day, your unprotected body would expand like a balloon and your blood would boil because of the lack of pressure.

Man hasn't yet been able to climb to the top of Mount Everest, less than six miles high, and his highest flight to date, wearing a space suit and sitting in the pressurized cockpit of a rocket airplane, is only 15 miles. He must ascend another 95 miles to reach the altitude regarded as the mechanical border of space (where lack of pressure and other factors are roughly the same as in space itself) and he must travel hundreds of miles farther before leaving all the atmosphere behind him.

Quite possibly some such trips will be made in the next few decades. Already monkeys have been carried 80 miles up in the pressurized nose of a research rocket. This was a case in which "the operation was a success but the patient died," for the monkeys survived the rocket trip without harm and then perished from parachute failure or the searing heat of the White Sands desert after they landed. One of the next big steps will be a rocket trip by a human being.

There are other reasons besides rocket travel for studying the earth's gaseous covering. "Three dimensional" weather forecasting, commercial air travel and radio communication, to mention only three, are all being improved because of research aloft.

During the war the pilots of B-29s bound for Japan often encountered extreme headwinds at 20,000 to 30,000 feet. When they turned in the opposite direction their ground speed would increase to about twice the indicated air speed.

These experiences were one of the first indications

White Sands Proving Ground photo

**Left, Aerobee research rocket roars upward in pulsing night flight to send back facts on atmosphere. Below, balloon-carried apparatus blows soap bubbles that are traced to determine minor air currents**



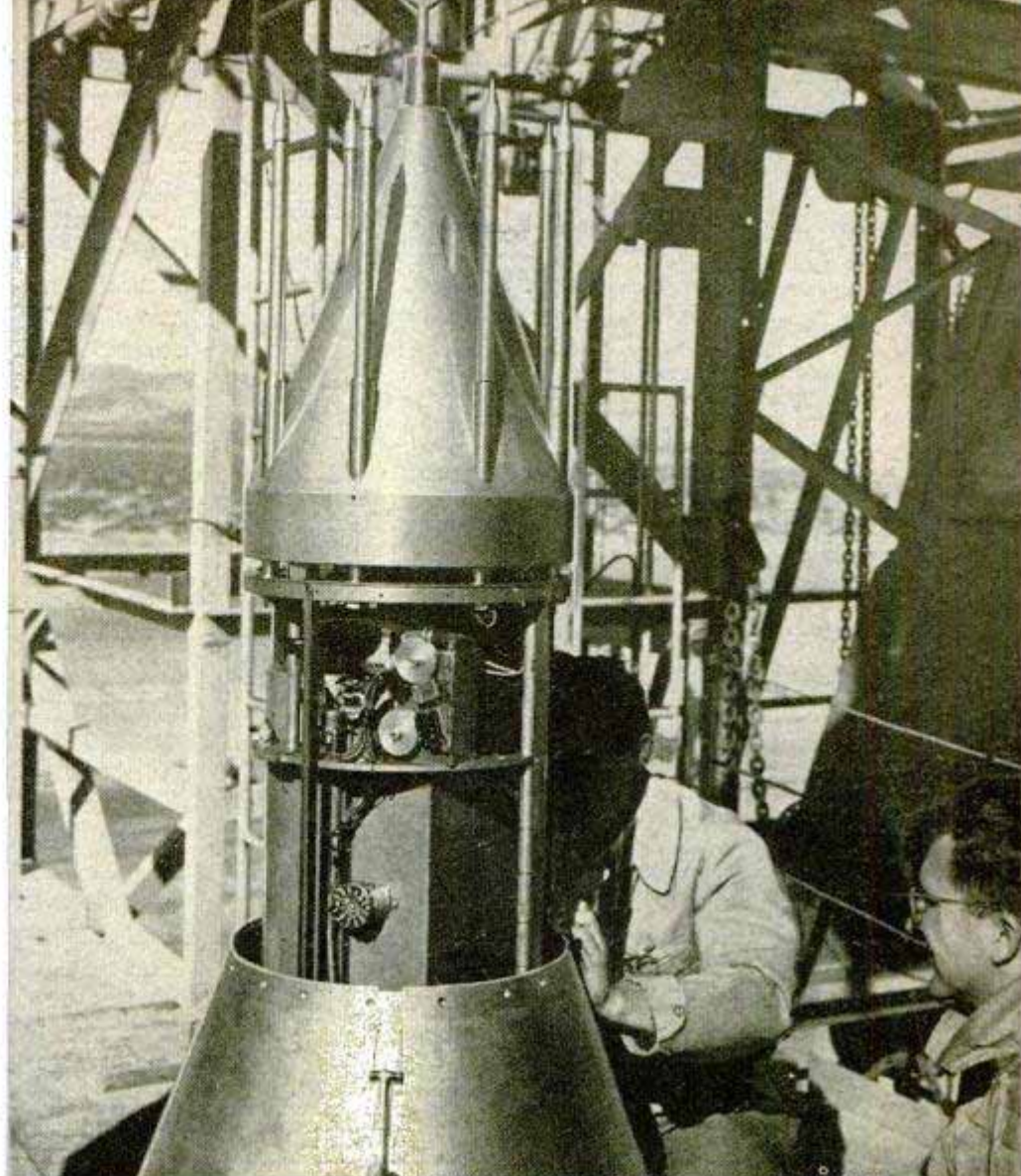
of a totally unsuspected phenomenon, a vast eastward-flowing current of air that has been found high in the sky. Now called the "jet stream," the current is being studied with sounding balloons that are tracked by radar.

The current is situated in general above the horse latitudes, where surface winds are at a minimum. It sweeps across North Africa and India and out into the Pacific. A continuation of the same stream starts in the Pacific west of Mexico, crosses the southern part of the United States and extends out into the Atlantic.

The jet stream is weak at 10,000 feet, strongest at 40,000 feet where its top speed may approach 200 miles per hour, and becomes weaker again at higher altitudes. Its greatest velocities occur in various sharply defined high-speed streaks that are separated by areas of slower air. The precise path of the current varies almost from day to day and with the seasons, yet it is always present. A counterpart of the jet stream is believed to exist in the southern hemisphere.

Just a few months ago two jet planes based at Patuxent River, Md., began making regular flights to pin down the ghost winds. The stream is being studied extensively because, now that we are entering the age of jet air transport, full advantage can be taken of upper winds. Often it would pay an eastbound pilot to go out of his way to hook a ride on the jet stream, or to avoid it if he is westbound. Airline meteorologists are studying ways of forecasting the path of the jet stream. High-speed electronic computers are one of the tools they use.

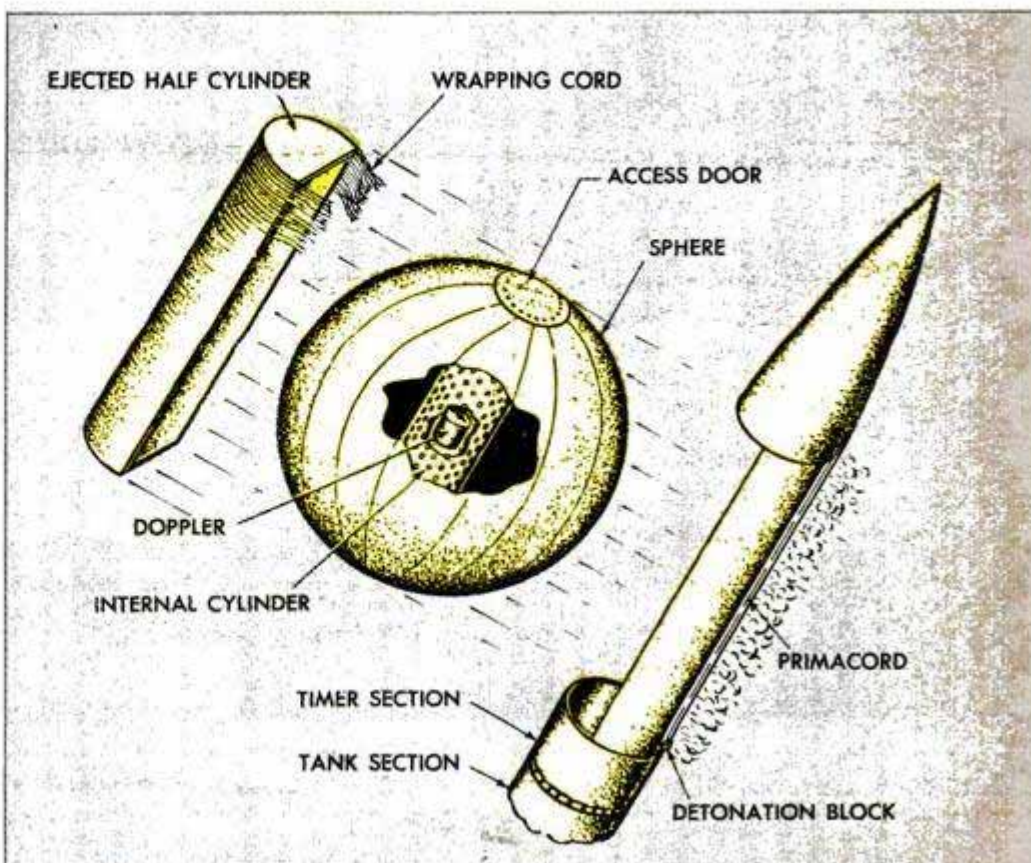
Meteorologists suspect that the jet stream has a great deal to do with the steering of the warm and cold air masses that cause varying weather conditions on the surface. If this is true,

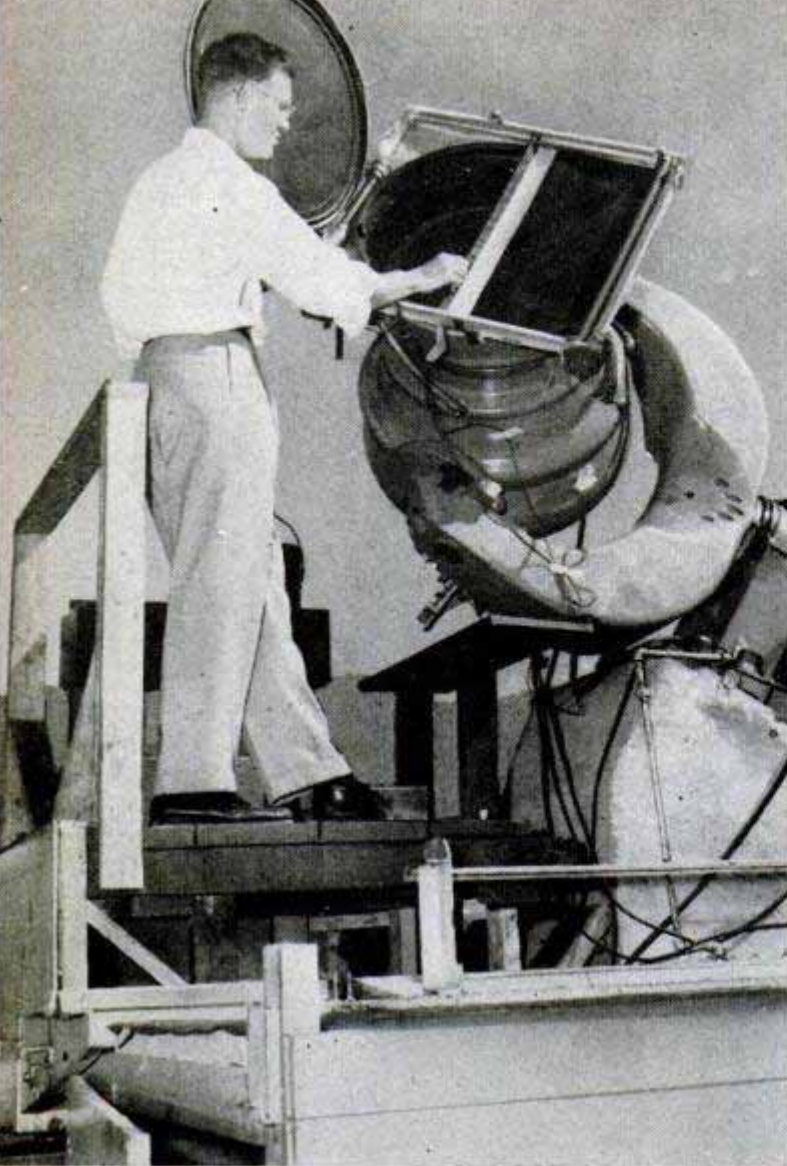


Army Ordnance photo, White Sands Proving Ground

Meteorological research instruments are packed into the nose of a rocket. Readings will be automatically transmitted to the scientists

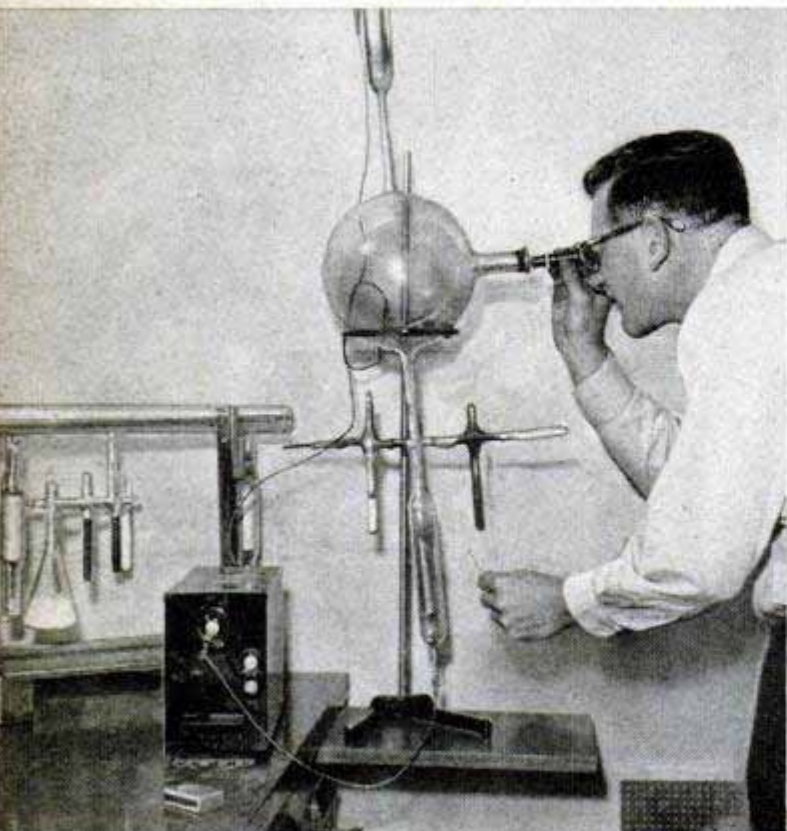
Plastic sphere, exploded from rocket by Primacord, is automatically inflated. Internal radio transmits rate of fall to indicate air density





Air Force photo

In "T Day" experiments, several cameras at scattered points photographed meteors. Wind effect was determined by comparing the photos. Below, aurora polaris is created and studied inside laboratory vacuum tube



studies of the jet stream may result in more accurate long-range weather forecasts.

Probably there are other useful winds at somewhat higher altitudes. One of the present tasks is to find and chart them. The Air Research and Development Command and the Office of Naval Research are studying conditions at 75,000 to 100,000 feet with huge "Moby Dick" and "Skyhook" plastic balloons that carry 80 pounds or more of sensitive meteorological instruments plus automatic radio transmitters that relay the readings to ground stations.

Contrary to previous assumptions, it is believed now that winds and currents exist all the way up through the atmosphere to its fringe.

Winds at 35 to 50 miles above the earth have been detected by photographing the drifts of faintly luminous meteor trails and also by studies of radar echoes from the ionized trails of meteors. Radar experiments at Stanford indicate that winds at that height are chiefly from the southwest or are "confused" and have average velocities of 70 miles per hour.

Higher still, winds of 300, 600 and even 1000 miles per hour have been reported as the result of radar tracking of invisible clouds of ionized particles. These clouds form part of the electrified layers in the ionosphere that reflect short radio waves and thus make long-range radio communication possible on earth.

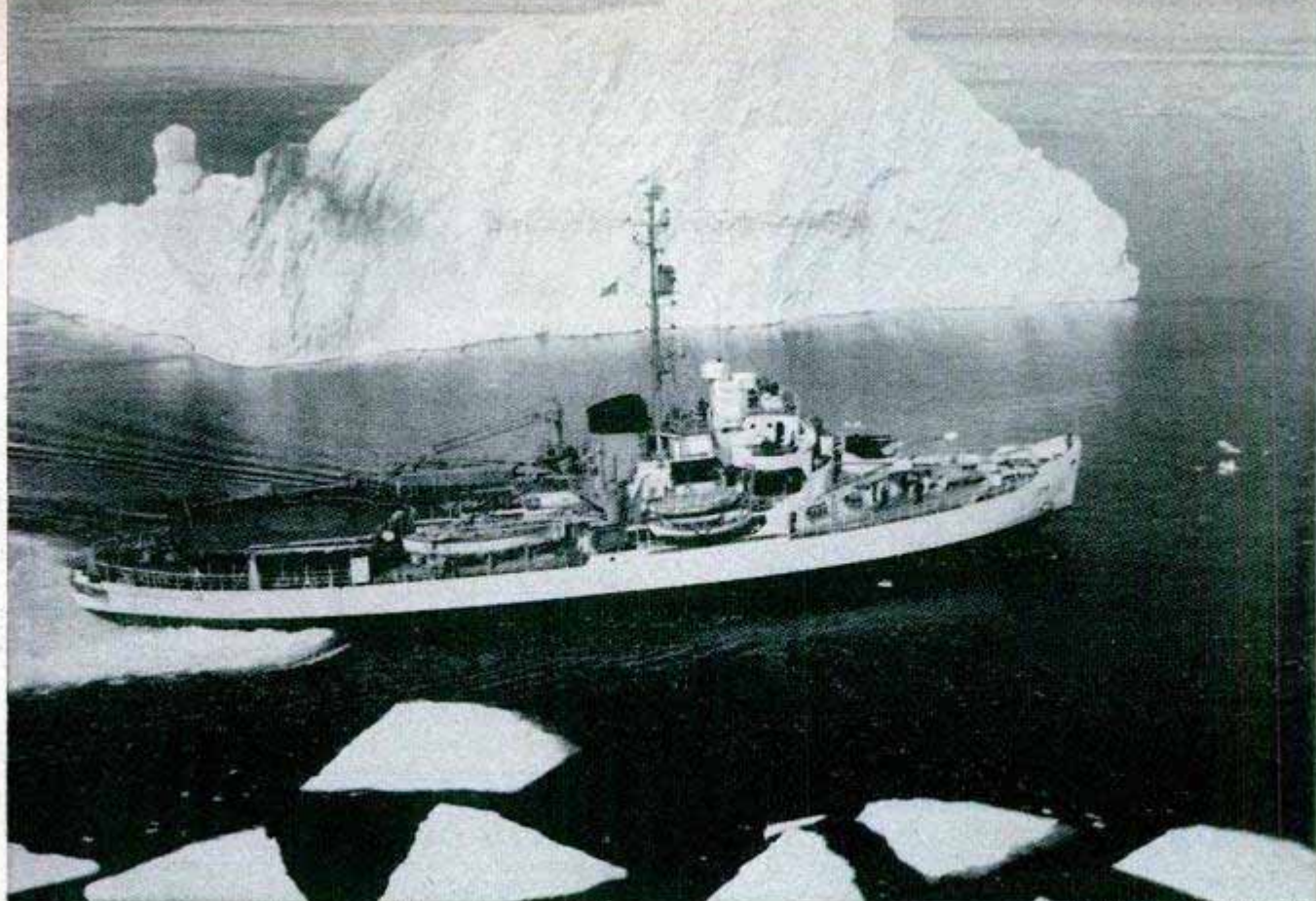
It is suspected that even the outermost regions of the atmosphere are never still. The gravitational pull of the moon and sun are thought to create aerial tides in which much of the upper atmosphere moves first in one direction, then in another.

There is always electricity in the air, even on a clear day. Yet in spite of the fearful demonstrations of power produced in thunder and lightning storms (some 2000 are always in progress) there is not enough electricity in the atmosphere to be commercially valuable. Dr. Gerhard F. Schilling of the University of California at Los Angeles estimates that the current flowing from the entire earth to the atmosphere amounts to only 1500 amperes, or about 1500 times as much as it takes to light a 100-watt bulb. In lightning storms, the path of the current is reversed.

One of the chief virtues of the atmosphere is that it not only disintegrates nearly all of the meteors that otherwise would strike the earth, it screens out most of the harmful rays that ceaselessly travel through space. Ultraviolet radiation from the sun would kill every living thing on the earth's surface if most of this energy weren't absorbed in the atmosphere. Cosmic radiation, likewise, could turn the earth

(Continued to page 256)





Department of Defense photo

Icebreaker *Eastwind* reached farther north than any power ship in naval history to find rays from outer space

## THE NAVY HUNTS COSMIC RAYS

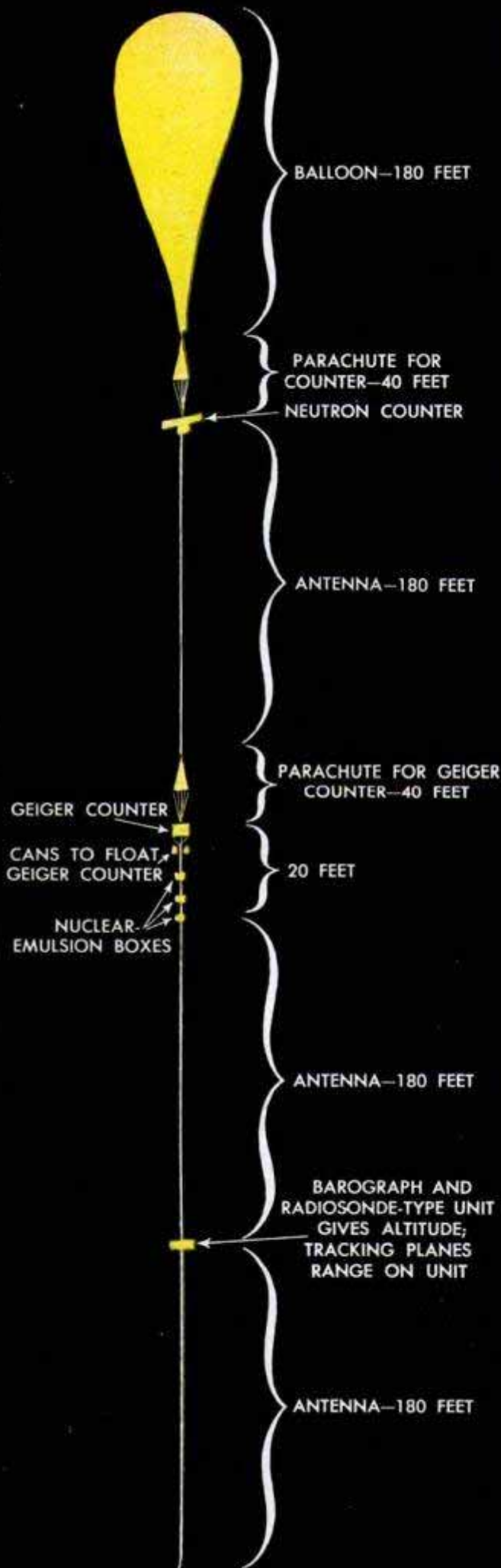
Sheath insulates heated rocket just before launching

**M**YSTERY ABUNDANT in star-spangled space beyond our earth's protective envelope of atmosphere. And one of the deepest is the cosmic-ray puzzle. Where do these strange emanations from space originate, and how lethal are they beyond the shielding atmosphere? These are questions that have baffled scientists for years. And now, men studying space medicine against the day when the first manned rocket roars skyward, are eager for answers. If the rays are too dense out there—and many think they are—space travel may be further off than we think. A heavy dose of cosmic rays could produce the same horrible effects as radiation from an atom bomb.

This much is fairly well established: The mysterious rays are made up of streams of atomic particles, not as concentrated as the stream of electrons that lights your TV tube, but similar in principle. In the speeding streams are protons, positively charged pieces of atom nuclei; mesons, atomic bits with a mass between that of the electrons and protons, and heavy nuclei, or atoms that have been stripped of the electrons that normally orbit around them. Somewhere in the great void, these pieces of atoms have been shot out like electrons from a cathode gun at speeds close to the speed of light—



# BALLOON TRAIN



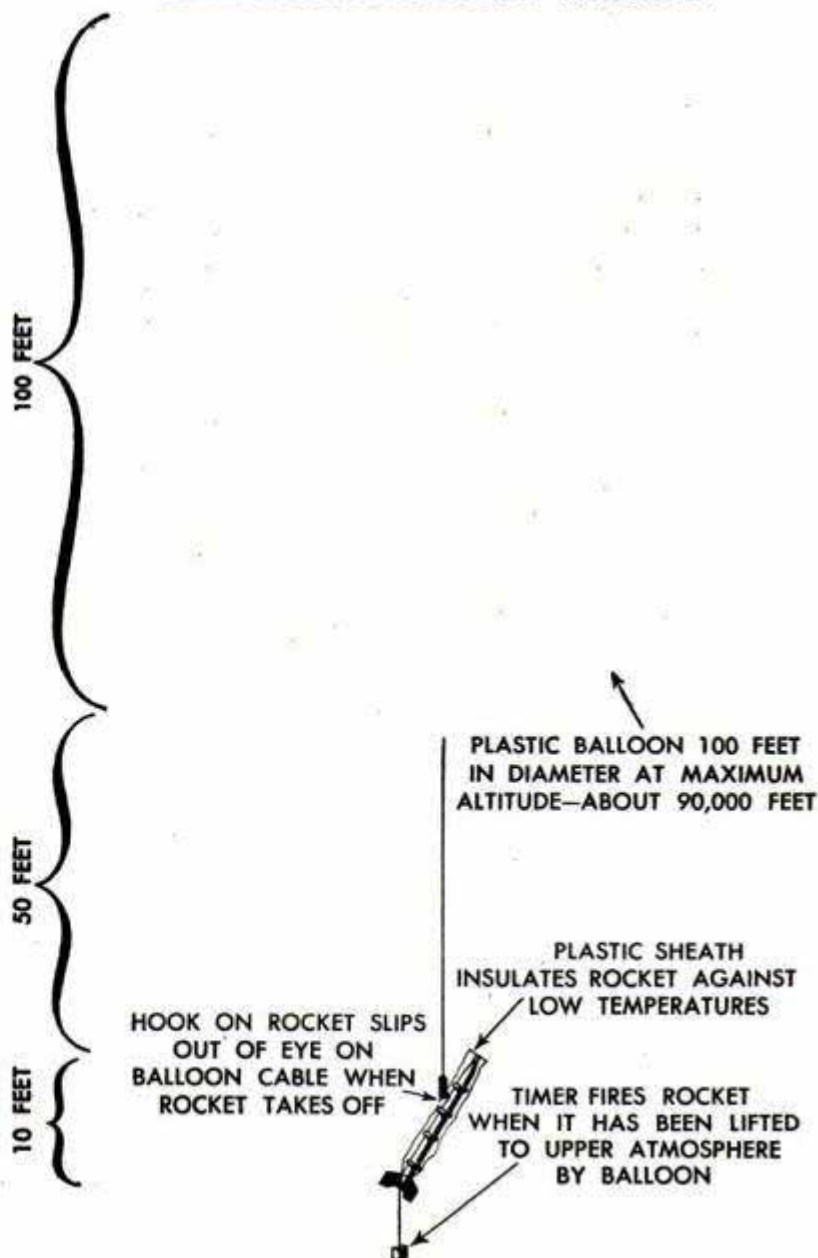
186,000 miles per second. Their energies are millions of times greater than can be produced in any manmade accelerator.

These zipping cosmic particles constantly bombard the earth. Most of them carom off atoms that make up the gases of the atmosphere, smash them and send their particles flying in all directions. In doing this the cosmic particles—called primary radiation—are slowed down and many are stopped before reaching the earth's surface. Only the most powerful speedsters from outer space, plus barrages of secondary-radiation particles from exploded air atoms, reach the earth's surface. Hence, an earthbound laboratory is on the wrong end of things to learn much about the space rays. The proper place for a cosmic-ray lab would be about 40 miles straight up.

To solve this problem, scientists under the direction of the Office of Naval Research have launched huge plastic balloons, carrying 850-foot trains of equipment strung out beneath them like tails on mammoth kites. While the balloons hover about 14 miles above the earth, cosmic particles

Scientists used two methods to obtain data: Balloon carried train of instruments, or a rocket to be fired at high altitude

## BALLOON-LAUNCHED ROCKET

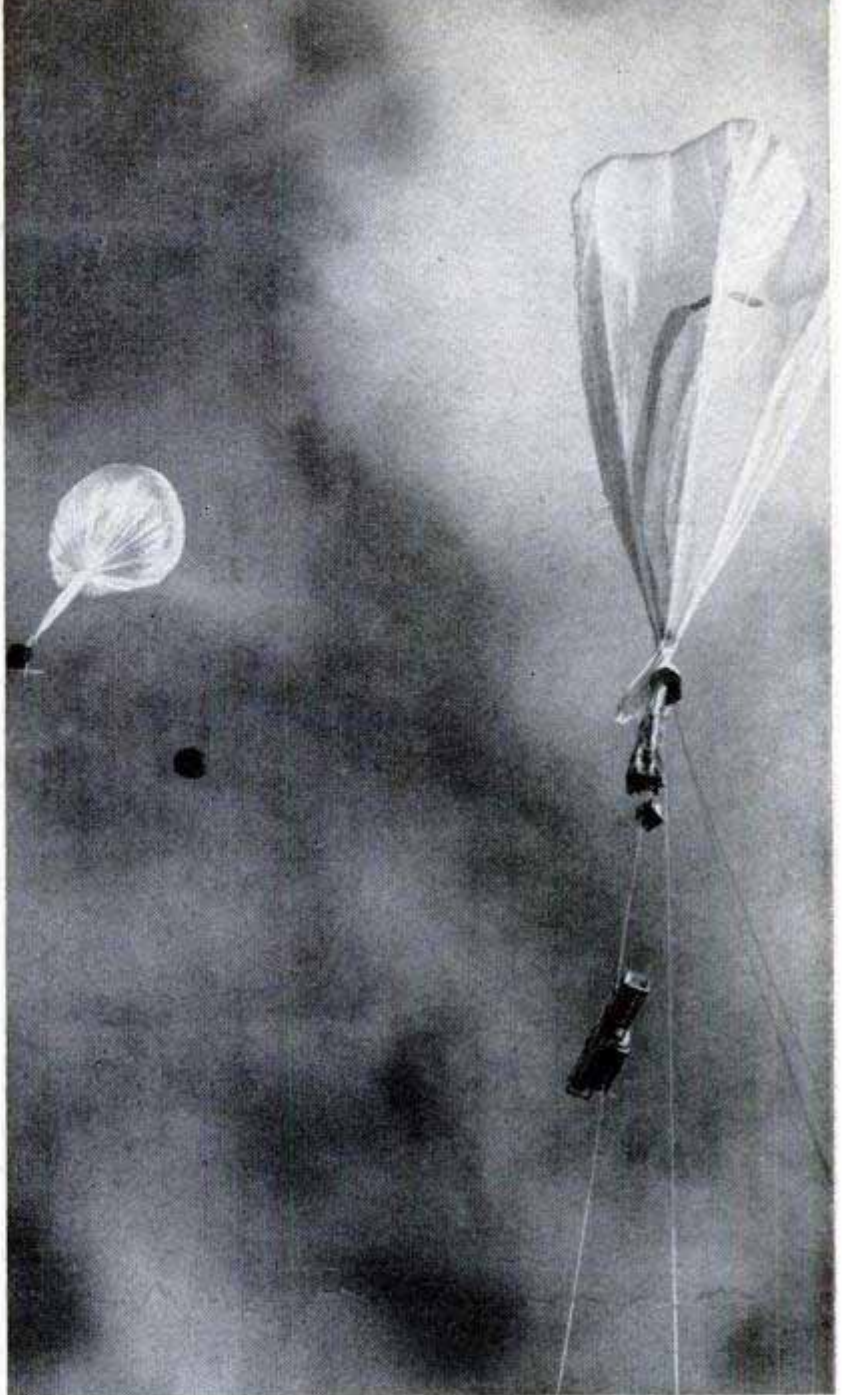


coming past leave microscopic tracks on stacks of photographic plates. Later, by studying the plates, scientists can determine the types of particles that have zoomed through, the direction they've taken and the density of the rays. Twenty-four exposed plates have enough tracks to keep a team of scientists busy studying for two years. Geiger counters click off a continual count to show the intensity of the barrage. Radios constantly feed information about what's going on up there to scientists down below.

These airborne space labs are fine. Some of them reach 111,000 feet, where they float for several hours, then parachute their counters and contraptions earthward. Above that height, big Viking or Aerobee rockets laden with counting, tracking and telemetering equipment have done part of the job. But big rockets don't stay up more than a few minutes—and they're too expensive to fire often enough to provide more than fleeting glimpses of cosmic-ray activity way up yonder. Scientists had to find a better and cheaper way.

So last summer a team of nine nuclear physicists and rocket experts from the Navy and several universities prepared for a voyage out of Thule, Greenland, on board the Coast Guard's rugged little icebreaker *Eastwind*. In an orderly bustle led by project director Lt. Malcolm Jones, USN, one of the youngest nuclear physicists in the business, the team loaded aboard a supply of huge balloons made of plastic only  $\frac{1}{1000}$  inch thick. Fully inflated, they would measure from 55 to 100 feet in diameter. Also stowed away were a number of Navy Deacon rockets about eight inches in diameter and ten feet long, with special noses containing particle counters and telemetering equipment. While these rockets were not so big or high-flying as Vikings, they were much more expendable and easier to handle. To get them up high, the men had an ace up their sleeves.

(Continued to page 266)



For altitudes up to 90,000 feet, big balloons carried long trains of antennas, radio gear, Geiger counters and other instruments. ↓ Bearded scientists make last-minute check of equipment for measuring cosmic rays before attaching it to a rocket or balloon train

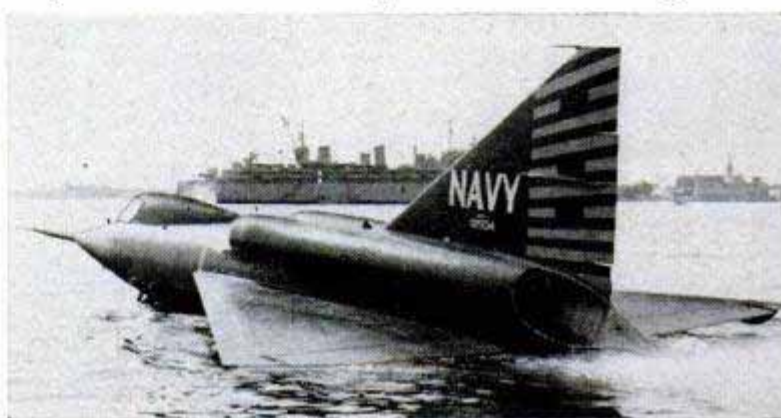
Department of Defense photo





## Delta-Wing Seaplane Uses Hydro Skis to Improve Landings

Jet-powered, the world's first delta-wing seaplane is undergoing flight tests at San Diego, Calif. The Navy's XF2Y-1 Sea-Dart is a high-speed fighter-type craft and is the first combat-type plane with hydro skis to improve its rough-water landing and take-off characteristics. It has no horizontal tail, but is equipped with a triangular vertical fin and rudder. "Elevons" on the trailing edge of the wing replace the conventional ailerons and elevators for control action. Built by Consolidated-Vultee, the XF2Y-1 is powered by two Westinghouse



turbojet engines. All performance details are classified for security reasons.

## Airline Capacity Increases

With five times as many airliners and each averaging twice the size of those used in 1943, today's United States commercial air fleet can carry 10 times as many passengers as it could 10 years ago and can carry them twice as fast. There are currently 1016 aircraft operating, with a total seating capacity of 38,436, in contrast to 204 planes that carried 3974 passengers in 1943.

## Formula Tells Auto Interval

Here's a quick way to figure the distance at which you should follow the car ahead of you, as reported by the Connecticut Highway Department: Divide your speed in miles per hour by five. Multiply the answer by itself. Add to that your speed in miles per hour. Thus, if you are traveling along at 50 miles per hour, you should follow no closer than 150 feet.

## More 1953 Automobile Prices to Add to Specifications Table

Several automobile companies had not announced prices at the time the specifications table (*PM*, Feb. 1953, pages 118-119) of the automotive supplement went to press. The following prices will complete the listing with the single exception of the

1953 Nash Rambler. This listing is set in the same type as the original table so you can add it to your copy of the February issue if you wish. The prices are for four-door sedans and do not include taxes, shipping or handling charges.

<b>BUICK</b>	
40 Special 8 .....	\$2021
50 Super V8 .....	2466
70 Roadmaster V8 .....	2971
<b>CADILLAC</b>	
Series 62 .....	\$3666
Series 60 .....	4305
Series 75 .....	5408

<b>CHEVROLET</b>	
One-Fifty .....	\$1670
Two-Ten .....	1761
Bel Air .....	1874
<b>NASH</b>	
Rambler .....	N.A.
Statesman .....	\$2178
Ambassador .....	2557

<b>OLDSMOBILE</b>	
"88" V8 .....	\$2327
"98" V8 .....	2786

<b>STUDEBAKER</b>	
Champion 6 .....	\$1705
Commander V8 .....	1940



# Detroit Listening Post

*By Siler Freeman*

**T**HE LONG-AWAITED spring market is about to get its test. Auto plants, for the first time in years, expect to gear production to demand. Early predictions have been optimistic and off-season sales satisfactory. But the big test is ahead.

Plymouth buyers will soon be offered a semiautomatic transmission of the torque-converter type. It will be used with the regular transmission and will serve as an interim device until a fully automatic transmission can be tooled up.

Nash will be one manufacturer with a new product for the spring market—the new Rambler. Restyled by Italian designer Farina, it is due this month. The Rambler has long amazed its competitors, selling for more than the larger low-priced models.

Nash is said to have a plan to meet price competition when necessity arises. Having about \$300 in accessories as standard equipment now, it can revise downward by making this package optional.

Another Nash prospect is the new small car which it is producing in England. This isn't due until late summer, but president George W. Mason has high hopes for it, after having sampled the market with his previous NXI model. The new car, however, has greater size and horsepower.

Another test ahead involves the rash of so-called American sports cars. The list is ever widening for these custom convertibles. They are essentially warm-weather cars and the spring sunshine should be the signal for a test of popularity.

Plastic-bodied sports roadsters are another innovation to watch. Buick's experimental lightweight single-seat model, the Wildcat, made its debut at the General Motors show in New York and was greeted with ohs and ahs. But will it sell?

The Wildcat is mounted on a 114-inch wheelbase, which puts it in the small-car class except that like Le Sabre (after which it is designed in a fashion) it is so low and overhangs so much that it looks longer. It is powered by Buick's largest engine, the 188-horsepower Roadmaster V8 and the new Dynaflo twin-turbine transmission.

Ivan L. Wiles, general manager of Buick, admitted that the plastic-bodied car is an

experiment. Since it involves molding the body instead of making expensive dies, it can be tested without too great an outlay.

Midseason changes are being rumored for some 1953 models. One of the larger companies that brought out a new car last fall has been disappointed in its acceptance. Dealers too are dissatisfied and have been urging the factory to do something to pep up sales. The result may be the dropping of a small wheelbase line and using the longer wheelbase for all its body styles.

Other changes may involve power plants. V8 engines, scheduled originally for some 1953 lines, were held off because of tooling difficulties. Some of this tooling has been speeded and the manufacturers face the decision of holding the V8s for 1954 models or making a midyear shift on 1953 models.

Deciding factor will be how tough the competitive market gets. If rivals' sales start soaring at its expense, a company will be quick to make the change in power plants as an added sales inducement.

The spring spotlight will also be on horsepower. With two cars already over the 200 mark, competition may force others to keep pace. Horsepower is becoming a delicate subject because increased power means higher speeds and the rising traffic toll makes speed an unpopular subject. But competitive position and demands from the sales departments could force the issue.

General Motors seems to be just as split on power brakes as on automatic transmissions. Cadillac ignored power braking for 1953, but Buick and Oldsmobile adopted it and are promoting it. A high Cadillac official told this reporter he did not feel it was necessary on his cars because the wide brakes gave it the safety factor needed for fast and accurate stops. He also mentioned the faster lining wear on power brakes.

The coming season will also test the air conditioners now being offered. GM's unit is priced at around \$600 and Chrysler's will probably be competitive. At this figure, it will not be as popular as power steering or automatic transmissions, but in the rich Texas, California and New York areas, there will be demands for it.

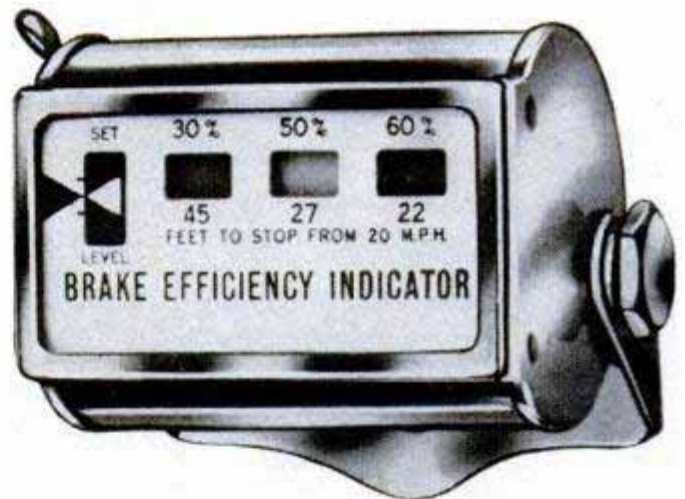
## Sailor's Pneumatic Gun Harpoons Fish and Shoots Game



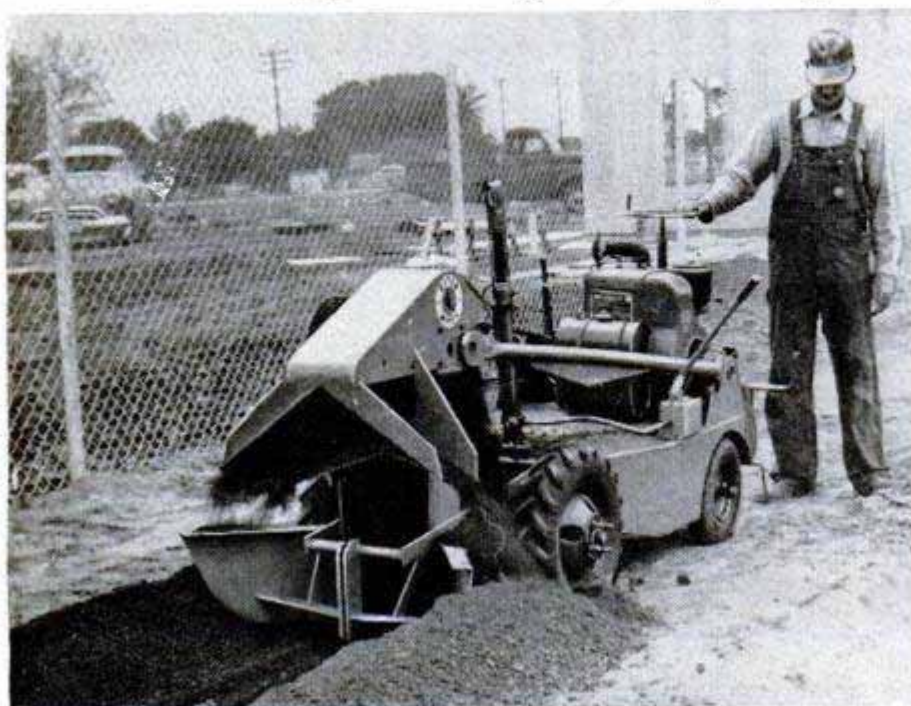
Capable of harpooning fish underwater or bringing down large animals on land, a weapon built by sailor-inventor Otis McDonald uses compressed air for ammunition. Made of scrap parts at a cost of \$10, the gun has already killed a deer with its lead pellets and a 30-pound barracuda with the larger of its two harpoons. Accurate up to 30 yards, the weapon is powered by a carbon-dioxide cartridge or a small air compressor which is mounted on the mahogany stock.

## Dashboard Meter Determines Efficiency of Brake System

Not much bigger than a cigarette lighter, a self-contained dashboard instrument measures the braking efficiency of any car or truck. During a test stop, brakes are fully applied and colored shutters appear in one or more of the three windows on the dial face to indicate the quickness of the stop. Behind each window is a ball within a balanced tube which reacts to throw the shutter if the force of the stop is great enough. The first tube is weighted to register at 30 percent, the second at 50 and the third at 60 percent. The reading remains on the dial until the driver trips a lever on the side of the device which resets the instrument's dials for next test.



## Small Trench Digger Has Big Capacity Despite Its Lightness

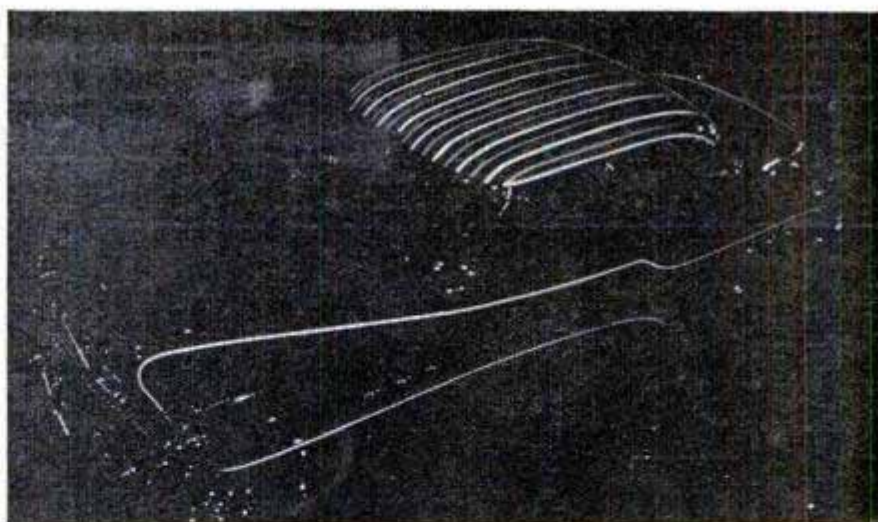


Self-contained and operating under its own power, a small ditch digger is said to do the work of a machine four times its size. Digging trenches from 4½ to 6 inches wide and 24 to 42 inches deep, the unit trenches up to 24 feet a minute. It has a variable-torque hydraulic drive which automatically adjusts the forward speed of the trencher as soil conditions change. Weighing 1200 pounds, it is powered by a two-cylinder, air-cooled engine and has a road speed of eight miles per hour when traveling between jobs.

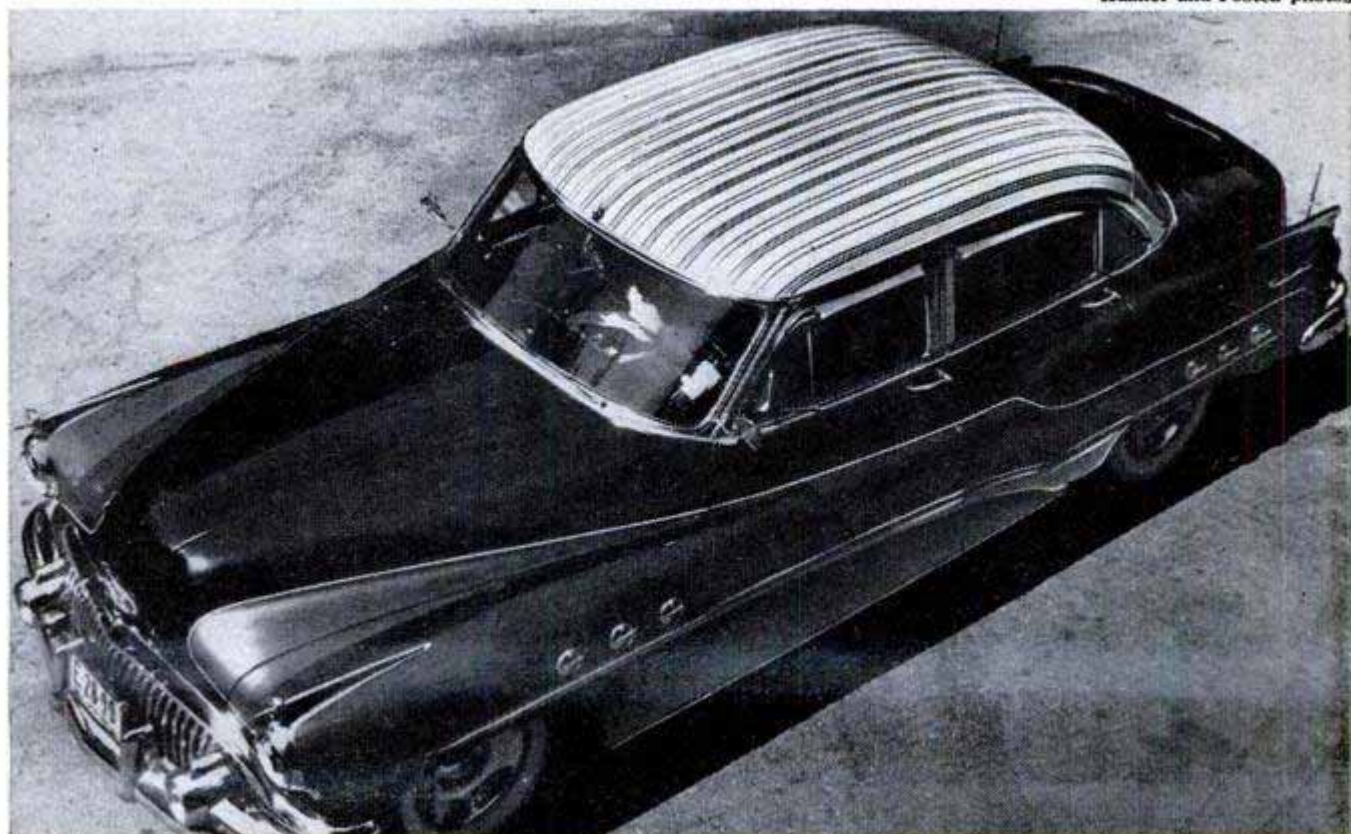
# Striped Roof Glow's In Dark

WHEN John Khoury, owner of a Buffalo, N. Y., auto paint shop, wanted a car that would publicize his business, he gave his 1951 Buick a paint job that draws attention day or night. Red and silver reflective cellulose tape was applied in stripes along the roof and side panels. Three shades of beige paint were used between the stripes. But the car is more than just a paint job. Built into it are a tape recorder, a public-address system, a hydraulic lift for the hood, plus such performance aids as methanol injection, special pistons and ignition, high-compression head and dual exhausts. To complete the effect, the upholstery is unborn-calf skin. The conversion took approximately 250 spare-time man-hours.

Below, striped roof looks like a fine fabric. In dark, top photo, red and silver stripes reflect light. Right, the chrome-plated, revamped engine is souped up to 200 hp.

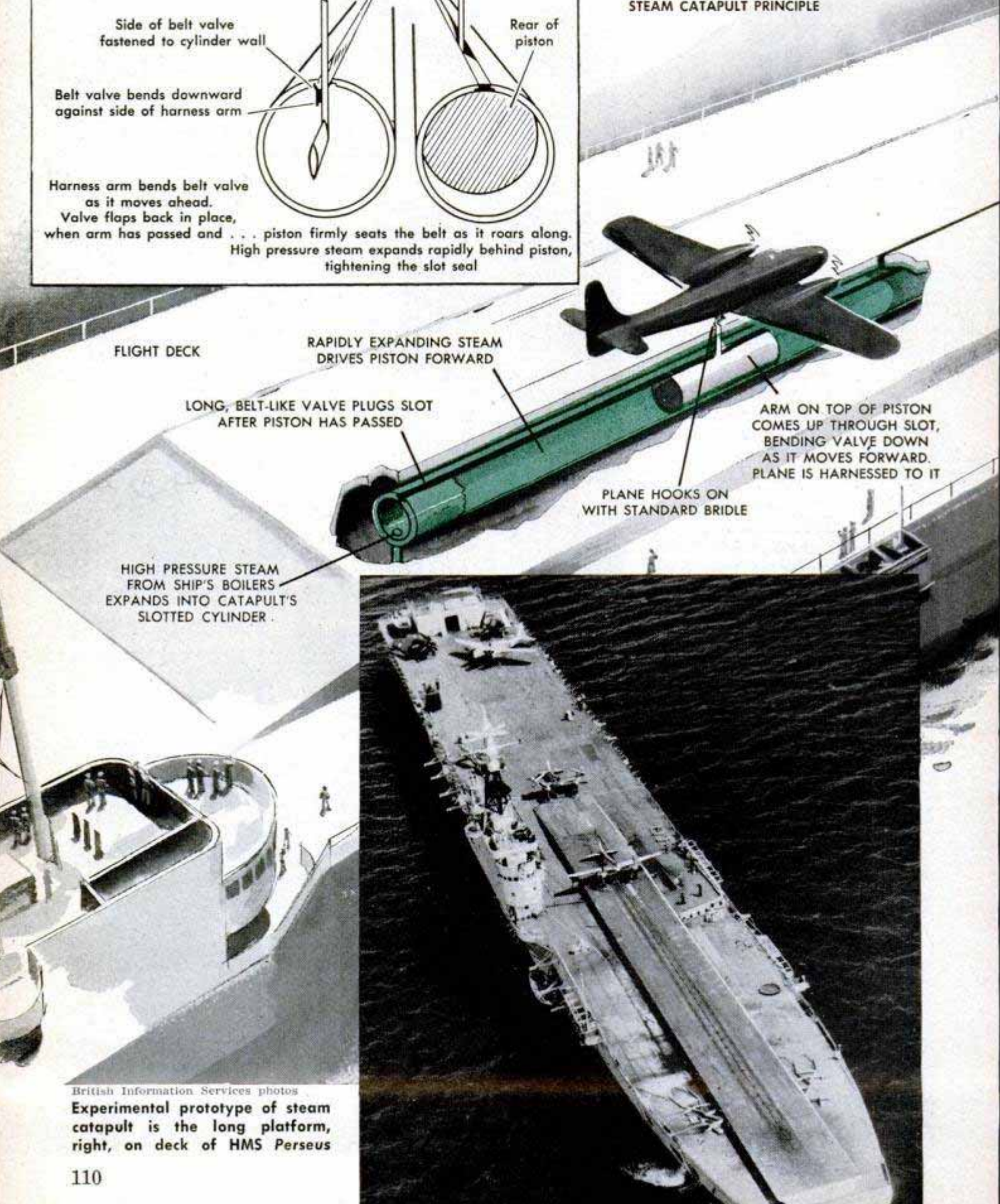
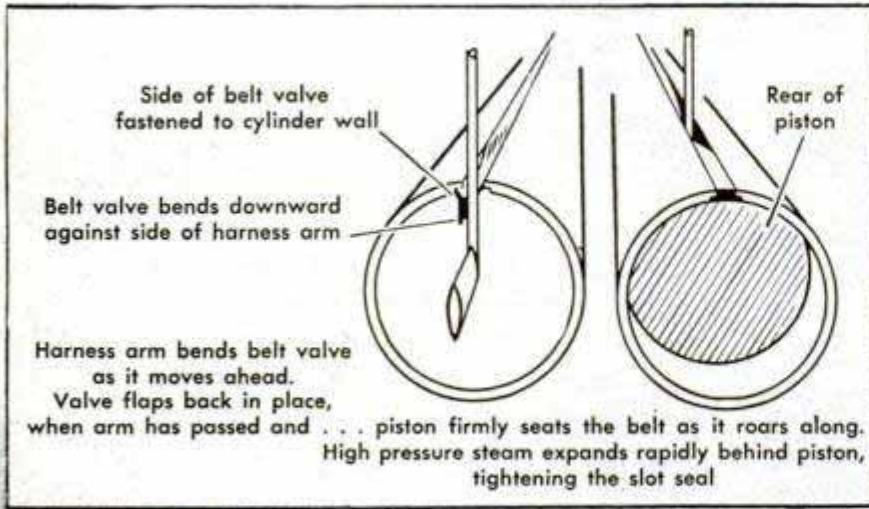


Kuzner and Postek photos



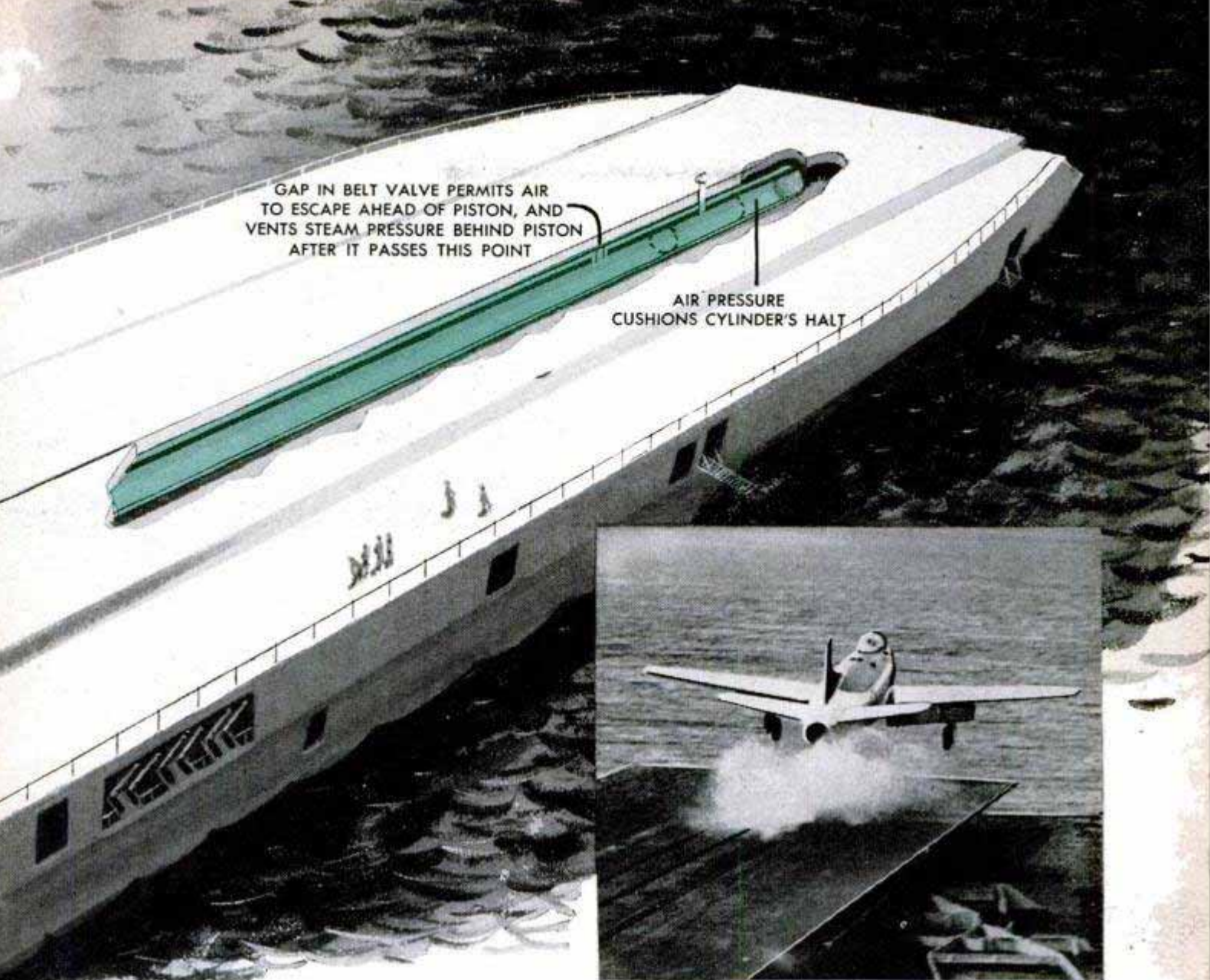
# STEAM CATAPULT GUNS PLANES FROM CARRIER DECK

ARTIST'S CONCEPTION OF STEAM CATAPULT PRINCIPLE



British Information Services photos  
 Experimental prototype of steam catapult is the long platform, right, on deck of HMS Perseus





GAP IN BELT VALVE PERMITS AIR TO ESCAPE AHEAD OF PISTON, AND VENTS STEAM PRESSURE BEHIND PISTON AFTER IT PASSES THIS POINT

AIR PRESSURE CUSHIONS CYLINDER'S HALT

More than 200 piloted planes have used new catapult

WITH A ROAR and a burst of white steam, jet planes are being flipped into the air from carrier decks at full flying speed by the herculean arm of a new kind of catapult.

The stub-winged jets have such high take-off speeds that most ordinary "cats"—consisting of cylinder, ram, pulley and wire-purchase arrangements—haven't been able to handle them too well. Even to launch propeller-driven craft, carriers must head into the wind and turn up full speed on the screws in order to pull a stiff breeze over the bow, thus assisting the standard catapult's usual 70-odd mile-per-hour push.

If the steam battering ram, now undergoing tests on the HMS *Perseus*' flight deck, proves out, tomorrow's aircraft carriers will be able to throw their jet flocks into the air downwind or from a harbor anchorage.

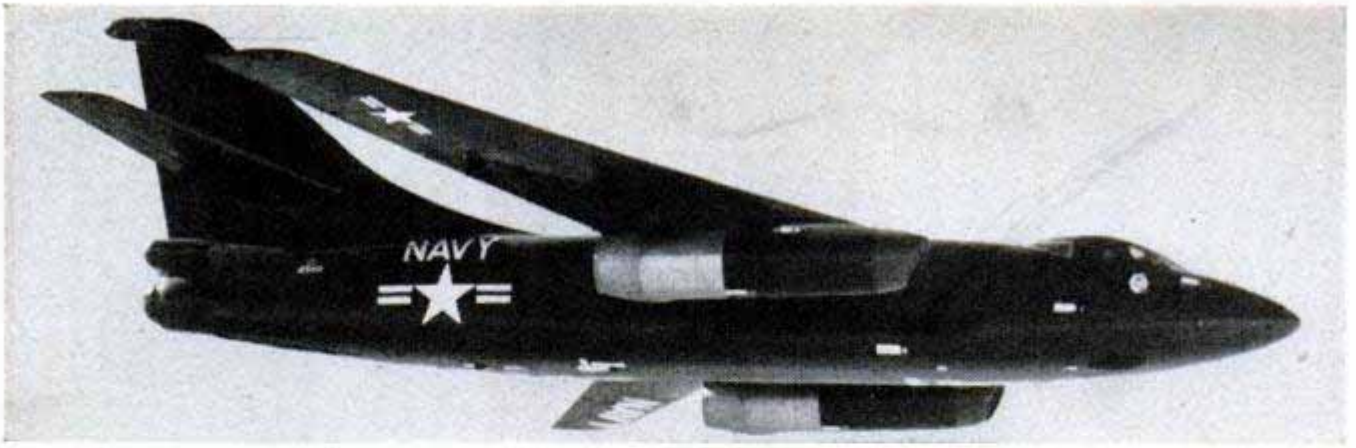
The new catapult, invented by a British naval officer, uses a long slotted cylinder. The hook to which the plane is harnessed for its bulletlike ride down the deck is con-

nected, through the slot, to a piston in the cylinder. At the instant of launching, high-pressure steam from the ship's main boilers is released into the cylinder. The piston rockets down the long tube like a high-powered shell in a big gun barrel, and the plane goes with it. On reaching the end of the cylinder, the piston is stopped by a braking device. The plane detaches itself from the arm bridle and is flung into the air at tremendous speed.

Secret of the device's success is the long beltlike valve that seals the cylinder slot as the piston whams along inside it, thus keeping the cylinder steamtight.

Though details of the catapult are on the top-secret list, British naval engineers admit that it is based on the same principle used in an experimental two-mile railroad built near London in 1840. Between the tracks of this ancient affair, the inventors laid a tube with a continuous slot along its top. A continuous belt, hinged to the slot edge on one side, was seated in the gap

(Continued to page 280)



## Carrier-Based Jet Bomber Approaches 700 M.P.H. Top Speed

Built to fight above 40,000 feet, the Douglas A3D twin-jet attack bomber is reputed to have a top speed approaching 700 miles per hour. It will operate off car-

riers or land runways. The Navy announced that the sweptwing A3D will fly faster, farther, and with a greater striking load than any other known airplane of its size.

## Speeding Suns of Orion Could Circle Earth in Two Minutes

Two giant stars, each many times larger than our sun, circle about each other at terrific speeds in the constellation of Orion. According to Canadian astronomer Joseph A. Pearce, the smaller star is eight times as massive as the sun and travels 190 miles per second. At that rate, it could circle the

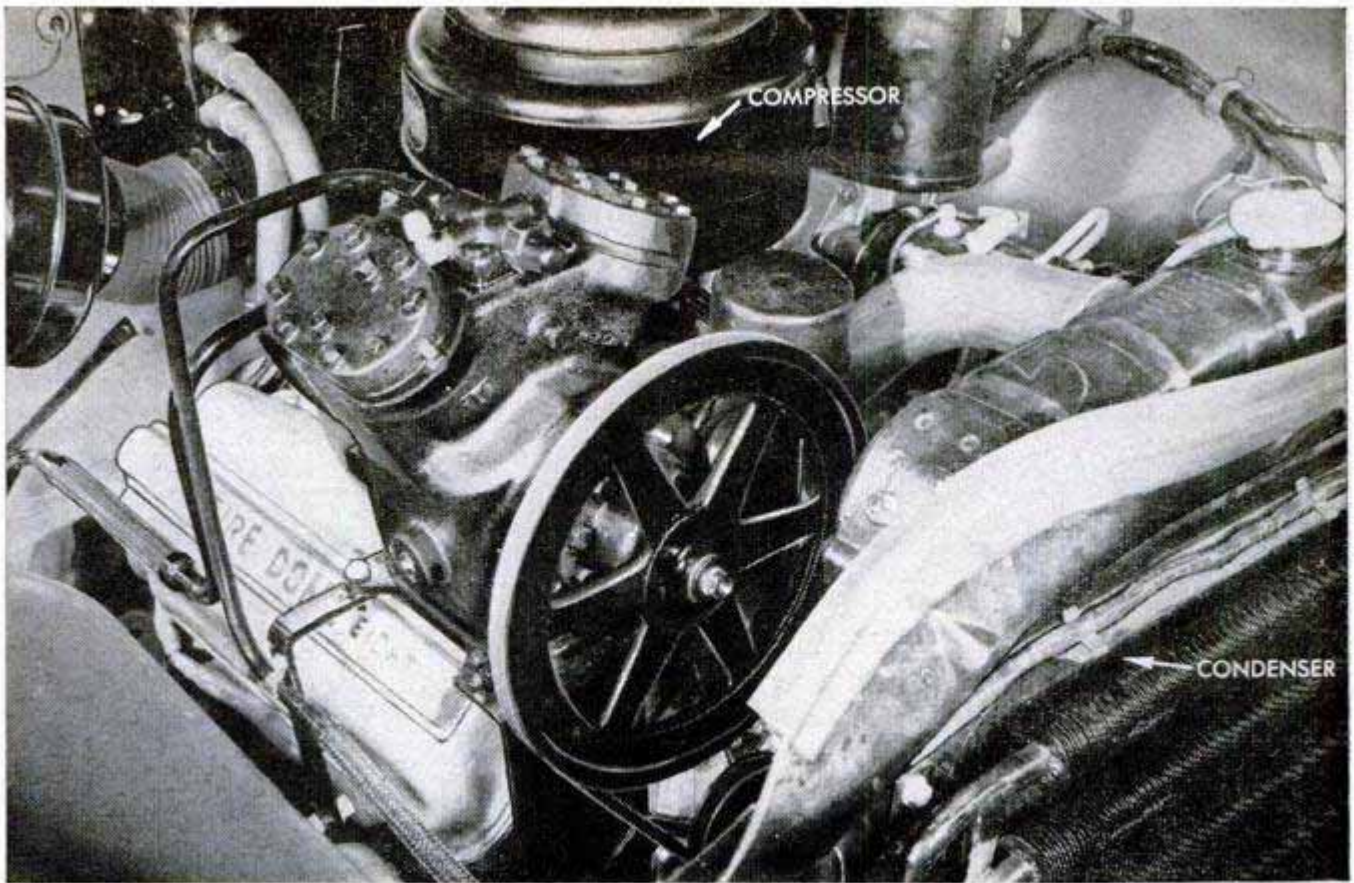
earth's equator in two minutes. The larger star, 13 times as bulky as the sun, covers 122 miles per second. The enormous bluish stars whiz around each other every 27.2 days. So distant from us that they appear to be one star, the two bodies are 1250 light years away.

See A form

## Spanish Pegaso Sports Car Is Broad, Low and Fast



Spain is breaking into the world automobile spotlight with its speedy sports car, the Pegaso. Available with either of two V8 engines, the low-slung, broad two-seater is said to go well over 150 miles per hour



Packed under hood of DeSoto is a belt-driven four-cylinder compressor. Condenser is ahead of radiator

## Air Conditioner Cools Summer-Hot Car in Four Blocks

AUTOMOBILE experts predict that the next big "must" for car buyers will be air conditioning. First, it was automatic transmissions, today it is power steering and tomorrow it may be air conditioning.

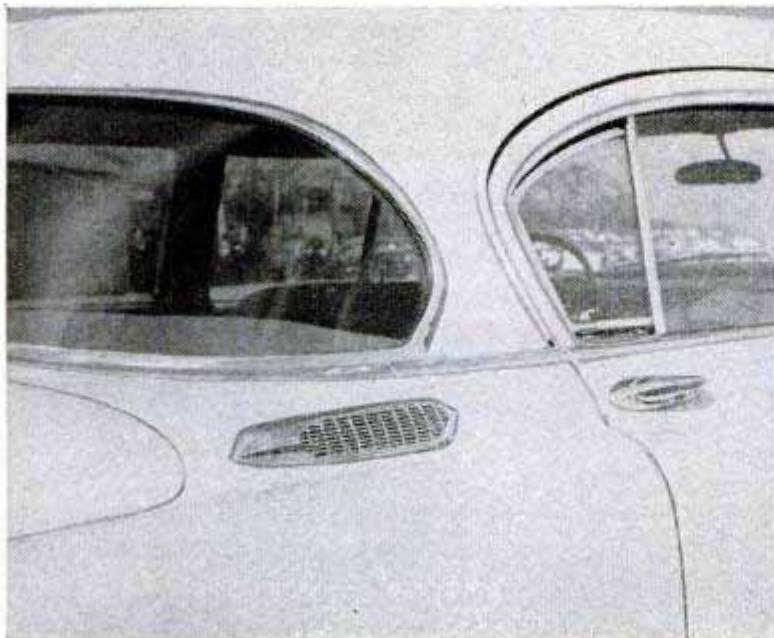
Not only do air conditioners cool the air, but they also remove dirt, dust, pollen and humidity, making them a boon in certain parts of the country. There is nothing less comfortable than a closed sedan that has

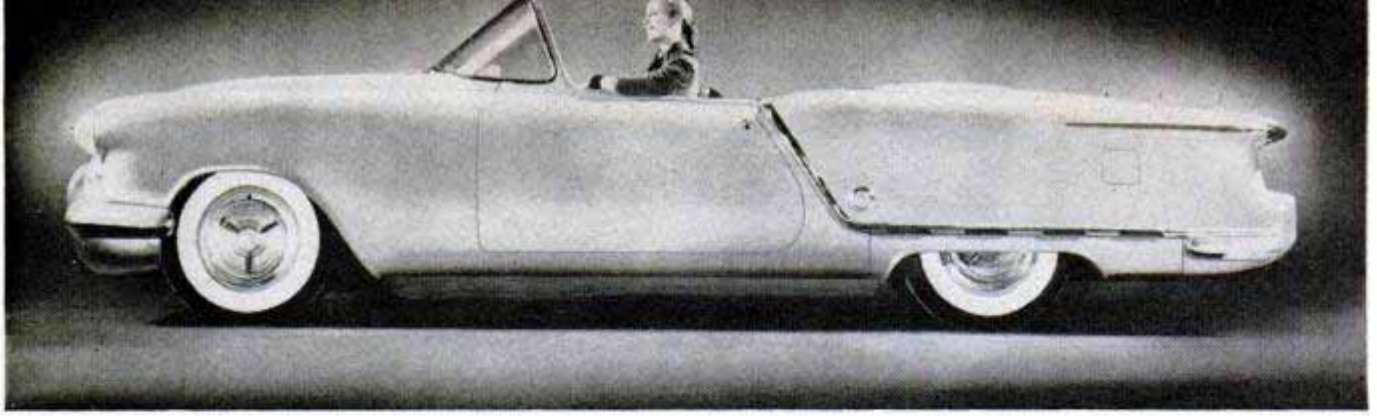
been parked in the July sun all day. Air conditioners will cool its inside air down to the 70s within the distance of four city blocks. That is the claim for the unit now being installed as optional equipment on DeSoto and Chrysler models.

To make this miracle possible, engineers had to squeeze space where there is little to spare—under the hood, floor and rear deck of the sleek 1953 car.

Outwardly, the air-conditioned car is little changed. Two neat grilles mounted above the rear fenders are fresh-air intakes

Coils (not shown) in trunk cool air which enters car through register on rear shelf





Oldsmobile's plastic Starfire is long and low. Its features include a checkerboard-type grille, panoramic windshield that extends beyond the door opening and a 200-horsepower engine with a 9:1 compression ratio

## "DREAM CARS" STEAL SPOTLIGHT AT

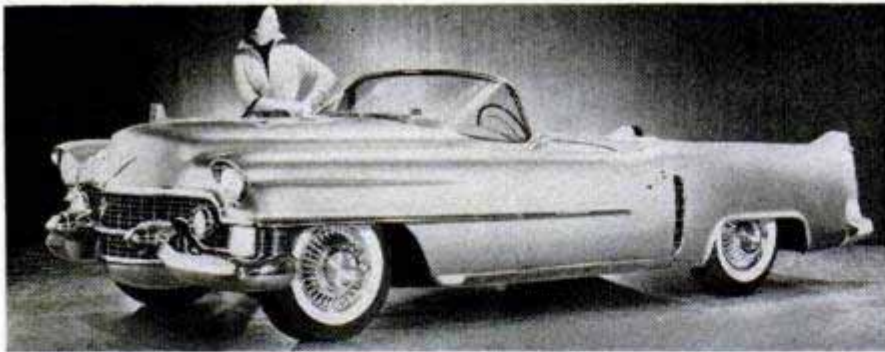
WHEN GENERAL MOTORS unveiled its complete 1953 line at the Motorama show in New York, the biggest hits of the show had no price tags—at least not yet!

Show stoppers were five "dream cars" built by the various divisions to demonstrate new styling effects and to test public response to sports-type bodies.

Four of the cars have plastic bodies. Pontiac, with a steel body, is the lone exception. However, GM top brass says that even if public response to these models is favorable, it's unlikely that production models will be plastic. ★★

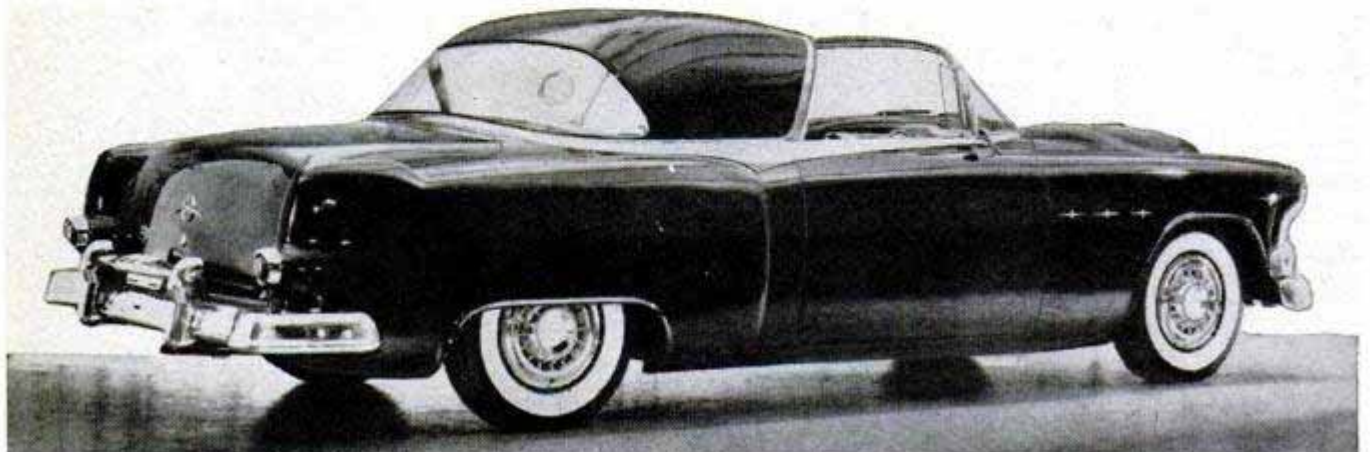


Buick's dream car is the plastic-bodied Wildcat that has a sleek elegance enhanced by the fact that it uses little chrome ornamentation. The interior is trimmed in brilliant green leather. "Roto-Static" front-wheel disks remain stationary while the wheels revolve about them for sparkle

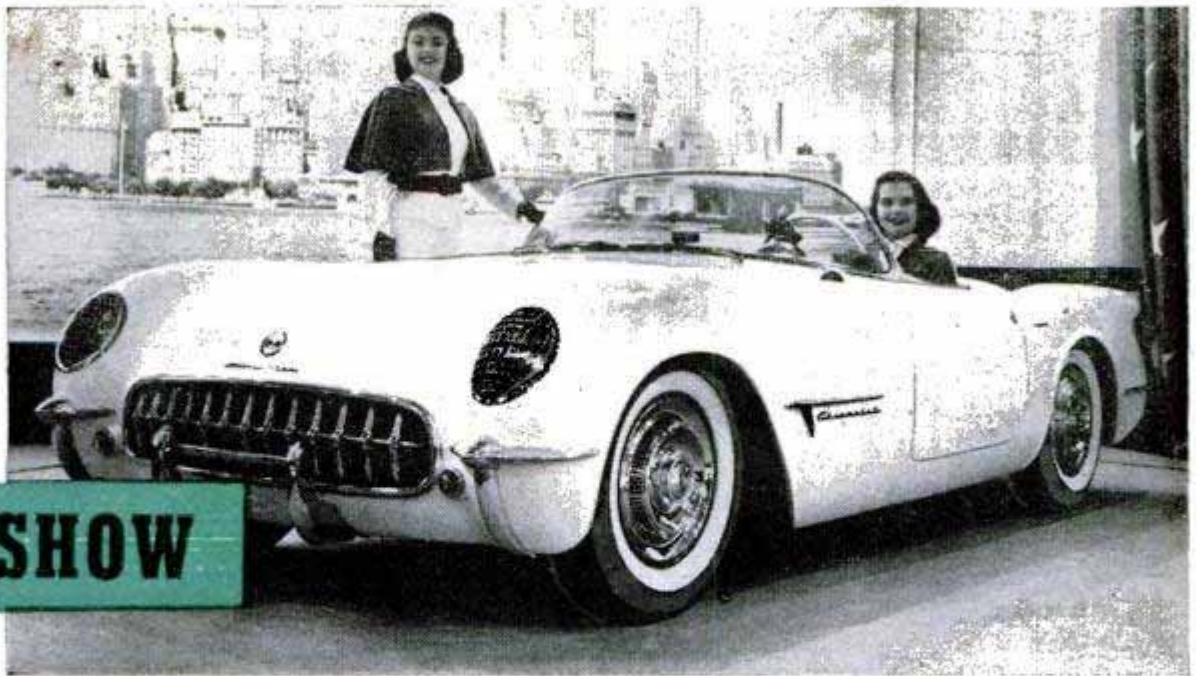


Cadillac named its plastic car Le Mans. With the finned rear fenders and hooded headlights, it has a noticeable resemblance to the standard-production Cadillac line

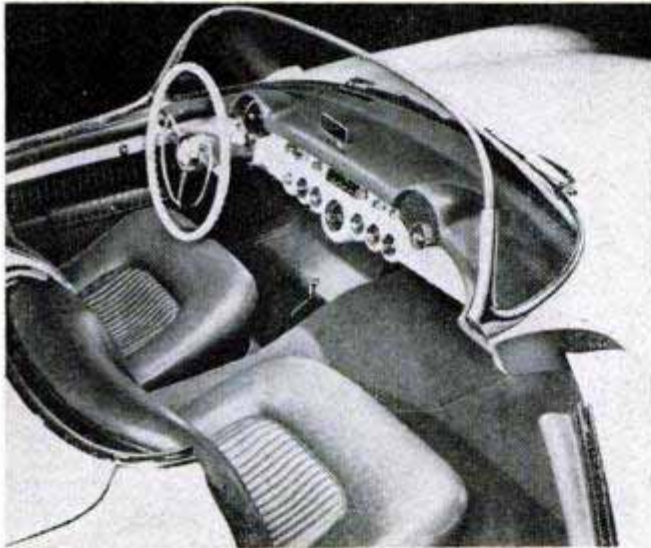
Pontiac's steel-bodied La Parisienne is a sleek landau. Equipped for chauffeur and footman, it has a hydraulically operated right front seat that moves forward 11 inches for easy access to rear passenger compartment



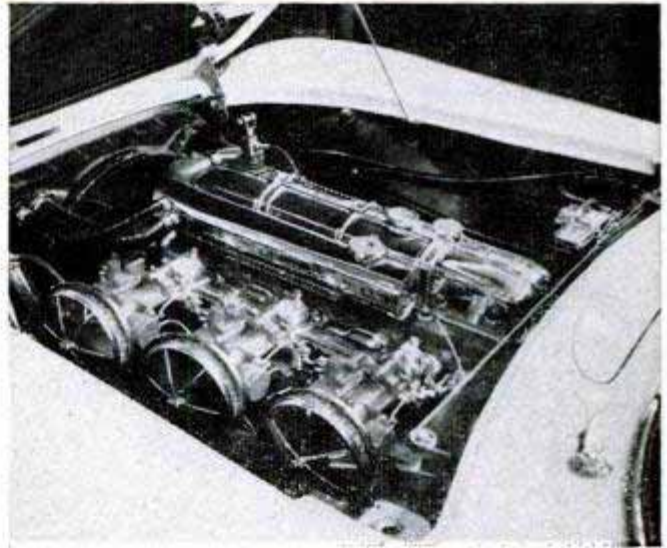
## GM SHOW



Chevrolet's Corvette was probably the most popular "special" model at the show. Its plastic body is only 33 inches high at the doors. Wheelbase is 102 inches; over-all length 167 inches. A manually raised canvas top drops out of sight into a covered compartment behind the seat.



Interior is sports-car styled: Bucket seats, tachometer on dash, floor-mounted shift. The windows are stored in trunk, go on like old-time side curtains



Power plant is a 1953 Chevrolet aluminum-pistoned engine boosted to 160 horsepower by dual exhausts, increased compression, triple side-draft carburetors

Chrome is used sparingly on all the cars. Rear wheels on the Corvette are unskirted. No definite promises were made on any of the models, but the rumor is that the Corvette may be on sale in a year—price unknown





**T**HE OTHER DAY I rode alone in the back seat of a new car at 60 miles per hour. Nothing remarkable in that—except for one thing: There was no one in the front seat. The car turned, slowed down and speeded up with no one at the wheel. If, as a kid, you ever had the handle of your coaster wagon come off while rolling down a hill, you know how I felt.

## IT'S SAFER TO CRASH

By Richard F. Dempewolff

My "driver" was a maze of electronic gear, operated by an engineer throwing switches in a pilot car 100 feet distant. A cable, strung from booms on each car, carried the impulses. As the scenery whipped by, I'd hear a

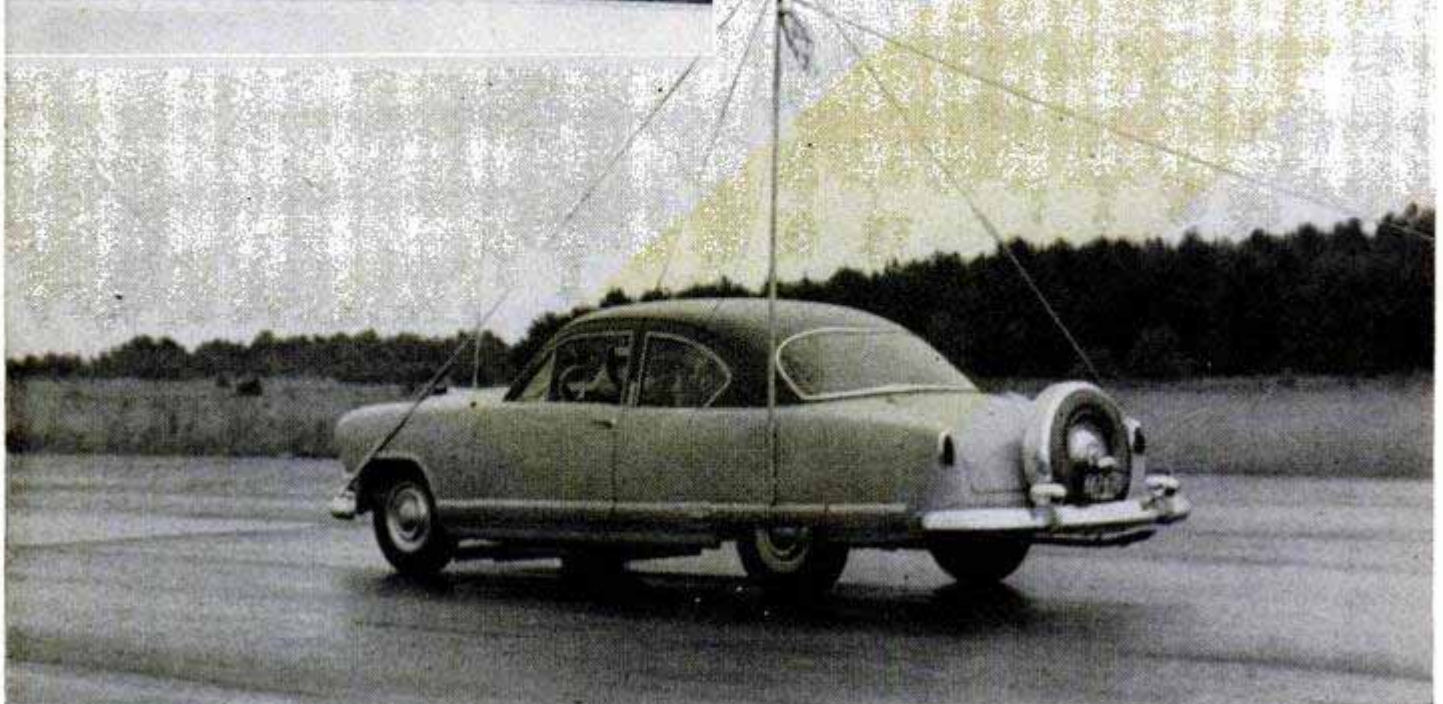
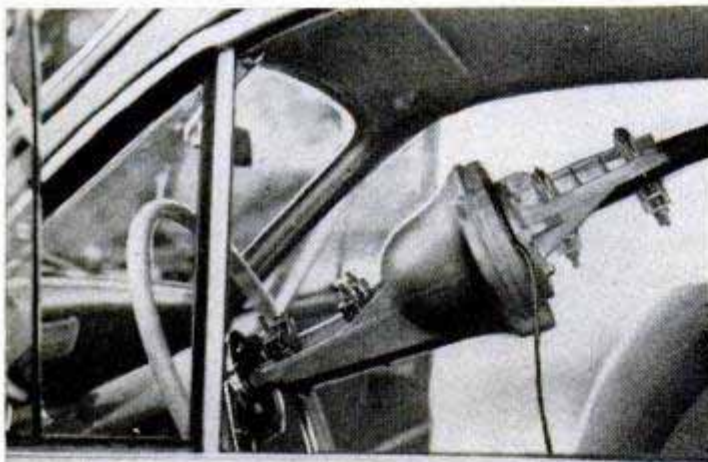
Like a circus bareback rider, the driver who started the crash car steps from his outrigger board to a car moving alongside

Robot mechanism on wheel steered crash car to its doom

grinding noise and see the steering wheel, activated by selsyn motors, slowly turn. A click as a solenoid dropped, and we'd slow down; another click, and away we'd zoom.

The reason for this fantastic remote-control car was not just to give editors eerie rides. Remember our story last September, "What's It Like to Crash"?

Impulses guiding driverless crash car moved via a cable strung from pilot car 100 feet behind





## LIKE THIS— WITHOUT A DRIVER

Cables flying after the pilot car cut loose, the shiny new car clipped rear bumper of one parked "target" and sent another (hidden behind it) spinning for nearly 40 feet from point of impact of mile-a-minute smashup

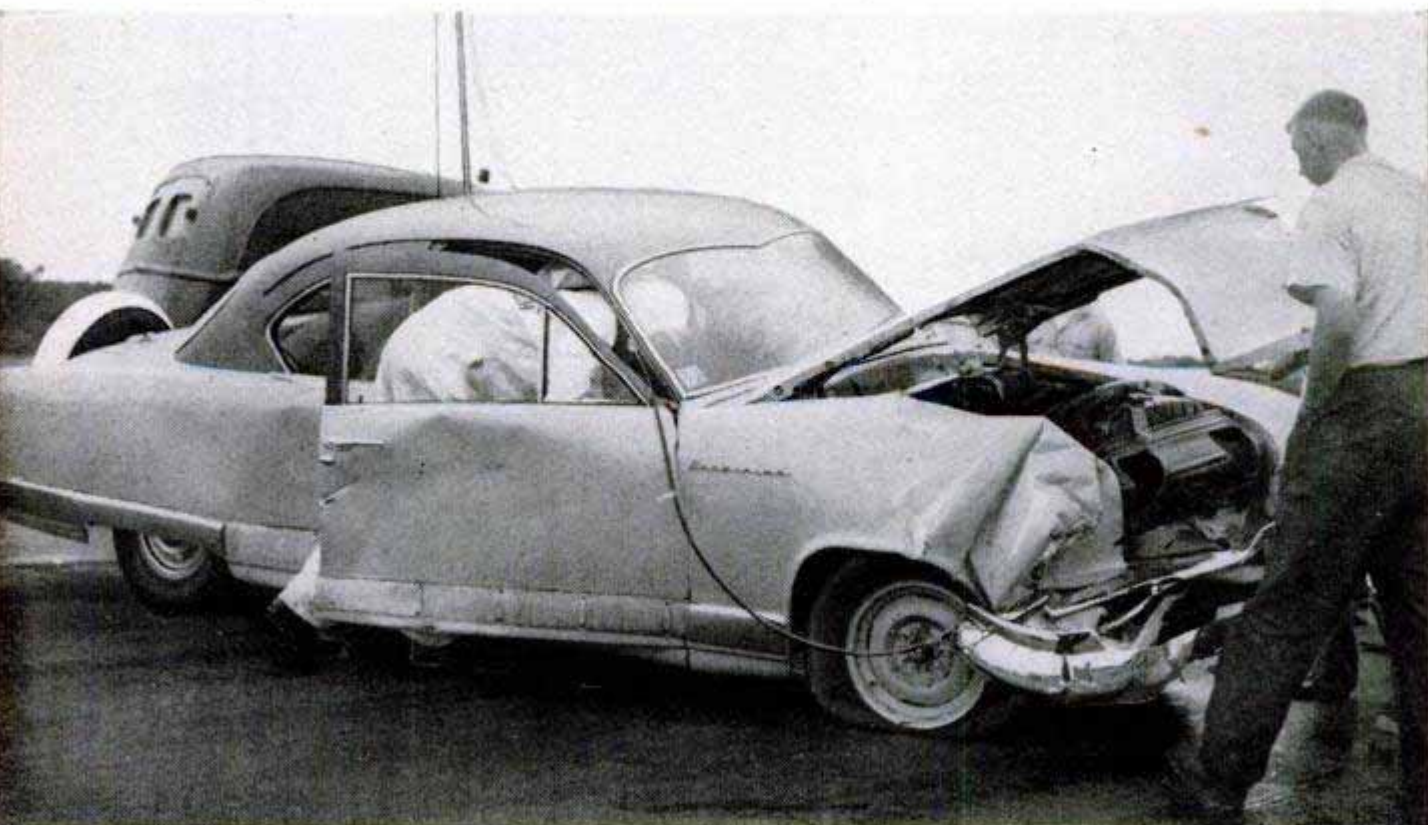
Well, this get-up was contrived by Motor Vehicle Research engineer, Len Bell, for the purpose of racing that unmanned car down the runway of an airfield and smashing it to smithereens at 60 miles per hour to see what would happen in a head-on collision. Cans of oil, shoes, a frying pan and other objects were loaded on the ledge behind the rear seat. A weighted human dummy was in the front seat. A well-cushioned movie camera was ready to shoot the catastrophe from the back seat.

A group of old cars at one end of the runway was the "target." An engineer started the crash car, then the control car took over, guiding it like a dog on leash. A third sedan moved alongside the crash

car, and the engineer transferred to it by an outrigger board. Then the unmanned car, with pilot car behind, sped down the runway and with a sickening crunch, whammed into the old cars amid flying pieces of steel and glass.

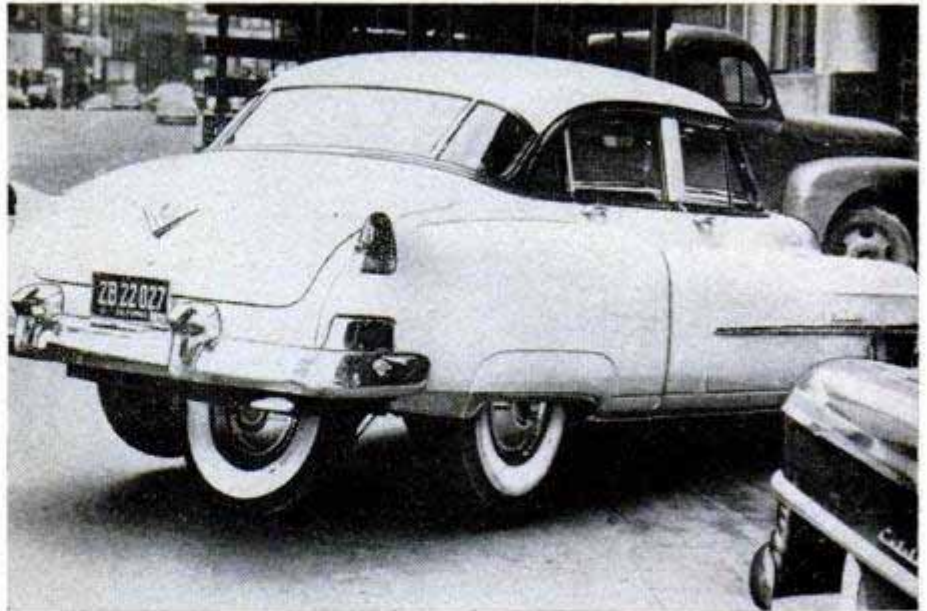
When the dust cleared, the crash car's front end was stove in, the "target" car was minus two front wheels and its side was caved in. Inside, the crash car was a shambles. The loose stuff on the ledge had scattered like shrapnel. The dummy had one knee pulverized and bumps to indicate hip fracture, dislocated shoulder, broken instep and back injuries. The movie camera was still grinding away to tell the engineers how to make cars safer. ★ ★ ★

This is what your automobile would look like if you hit a parked car while traveling 60 miles per hour



## Chain-Driven Spare-Tire Wheel Parks Auto in Small Space

Tight parking spaces offer no problem at all if you can use your spare wheel to drive sideways. A California inventor has built an accessory that puts the spare wheel in the trunk to work helping you to park. Hydraulic cylinders lower the wheel until it acts as a jack, lifting the rear wheels off the pavement. Then a chain drive powered by the driveshaft turns the wheel to move the car in either direction, allowing a 12-foot car to be parked in a 13-foot space.



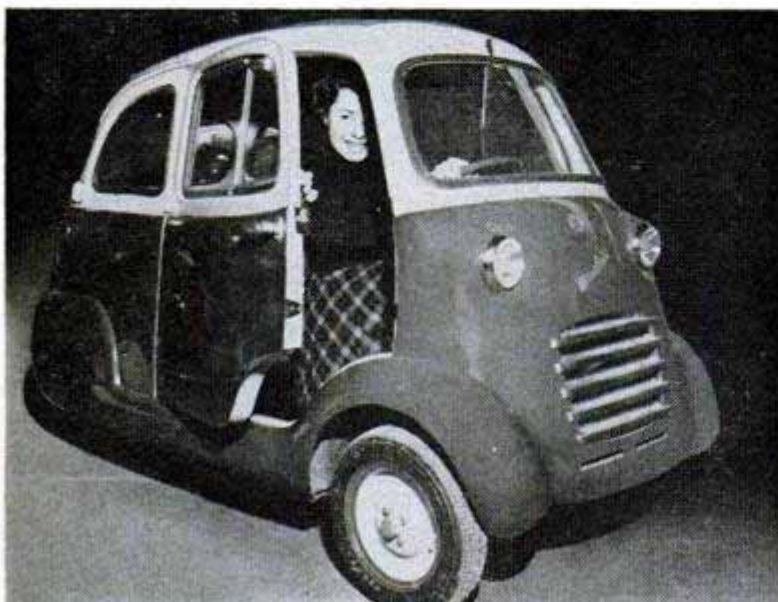
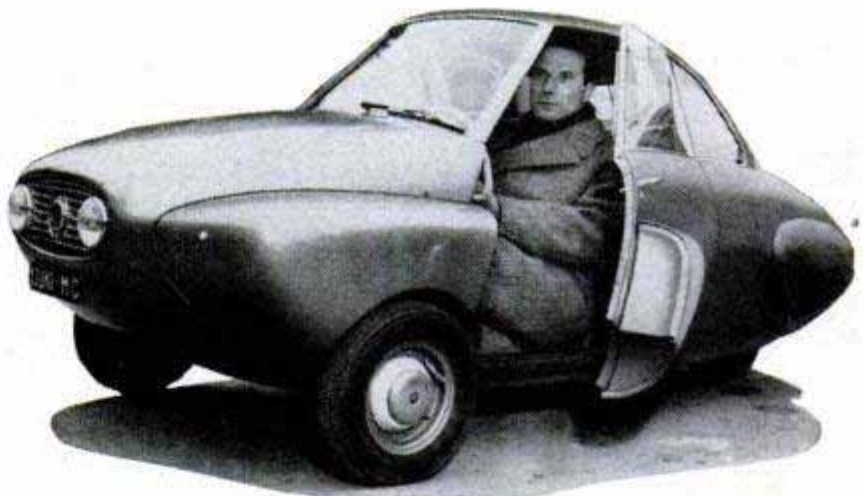
## Hydraulic-Fluid Indicator Mounted on Dash Flashes Warning Light

Quickly installed in any car, truck or tractor, a hydraulic-fluid indicator flashes a warning light on the dash when fluid runs low. A float-plunger rod operates an electrical contact, closing a circuit when brake

fluid in the master cylinder reaches a minimum safe-operating level. This switches on the red warning light on the dash, a signal for the driver to have fluid added and lines checked for possible leaks.

## Miniature Italian Car Runs on Three Wheels

Ideal for a date, but not recommended for large families, is a junior limousine exhibited at the recent motorcycle show in Milan, Italy. The sleek three-wheel vehicle is designed to carry up to 200 pounds in addition to the driver. Built by the Issi Works, it is propelled at speeds up to 50 miles per hour by a one-cylinder engine.



## Scooter Motor Powers Homemade Automobile

Another midget auto at the Milan exhibit, a homemade runabout with the lines of a delivery truck, was powered by a one-cylinder motor-scooter engine. Ezio Cingolani, builder of the three-wheel Microbo, claims it has a top speed of around 40 miles per hour.

☞ To guarantee there are no leaks in airtight containers for aircraft equipment, one factory seals the apparatus in helium-filled containers and uses an electronic "sniffer" to search the outer surfaces for microscopic leaks of the gas.





NACA photos

## Experts Deliberately Crash Plane for Fire Tests

DELIBERATE CRASHING of actual airplanes is helping the experts learn why and how aircraft fires start and spread. The National Advisory Committee for Aeronautics began the crash tests when laboratory experiments couldn't provide all the answers. Robot war-surplus planes are hooked to a monorail to keep them on course during

simulated take-off accidents. Seven high-speed movie cameras grind away as a plane strikes embankment, shears off propellers and the landing gear, hits trees or poles and ruptures its fuel tanks as shown in the accompanying photographs. Instruments in a fireproof, shock-insulated box measure temperature, vapors and decelerations.





# WHAT'S NEW FOR Your Home

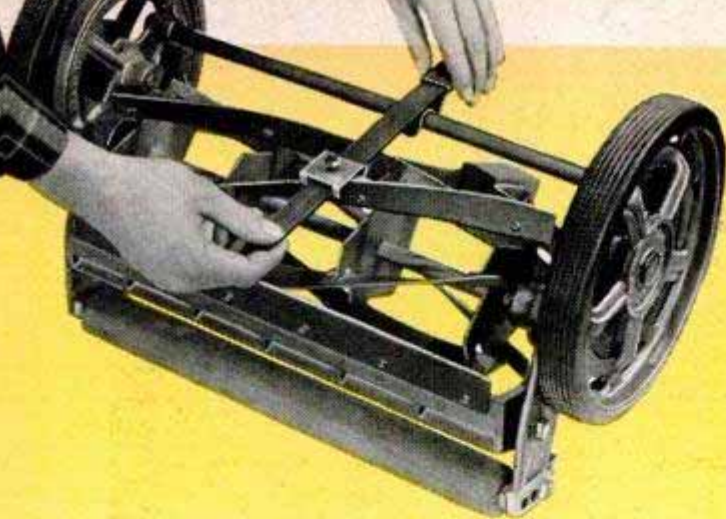
**INFRARED LAMP** for bathrooms mounts on the ceiling. A flick of the wall switch provides light and instant heat, takes shivers out of early morning and late-evening baths



**DEEP-FAT FRYER** features immersion-type heating element in direct contact with fat. Result is fast heating and preheating. Thermostat in control unit maintains fat temperature at any desired setting



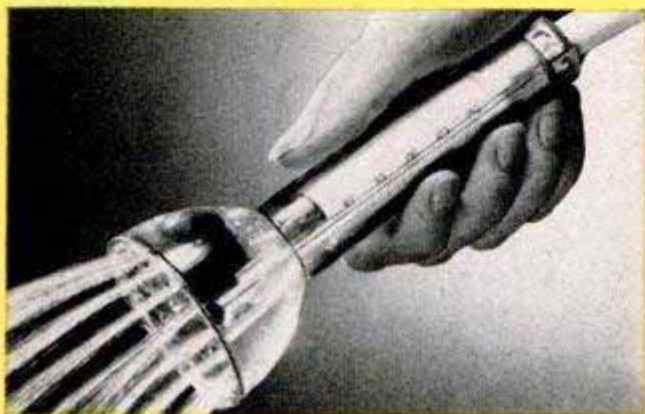
**POTATO PEELER**, an abrasive disk which mounts on shaft of electric mixer, quickly scrapes skin from apples, oranges, onions, potatoes and beets. Rotation of mixer bowl provides tumbling action



**MOWER SHARPENER** consists of a single-cut file mounting two fixtures, one of which is curved to rest on tie rod as file is pulled from left to right. Other fixture holds file against blade to sharpen it



**MOUNTING SUPPORT** allows you to hang storm windows safely, from inside the house. Hooked support bar holds storm window at an even plane as you slide it out and engage the two hooks at top of window frame



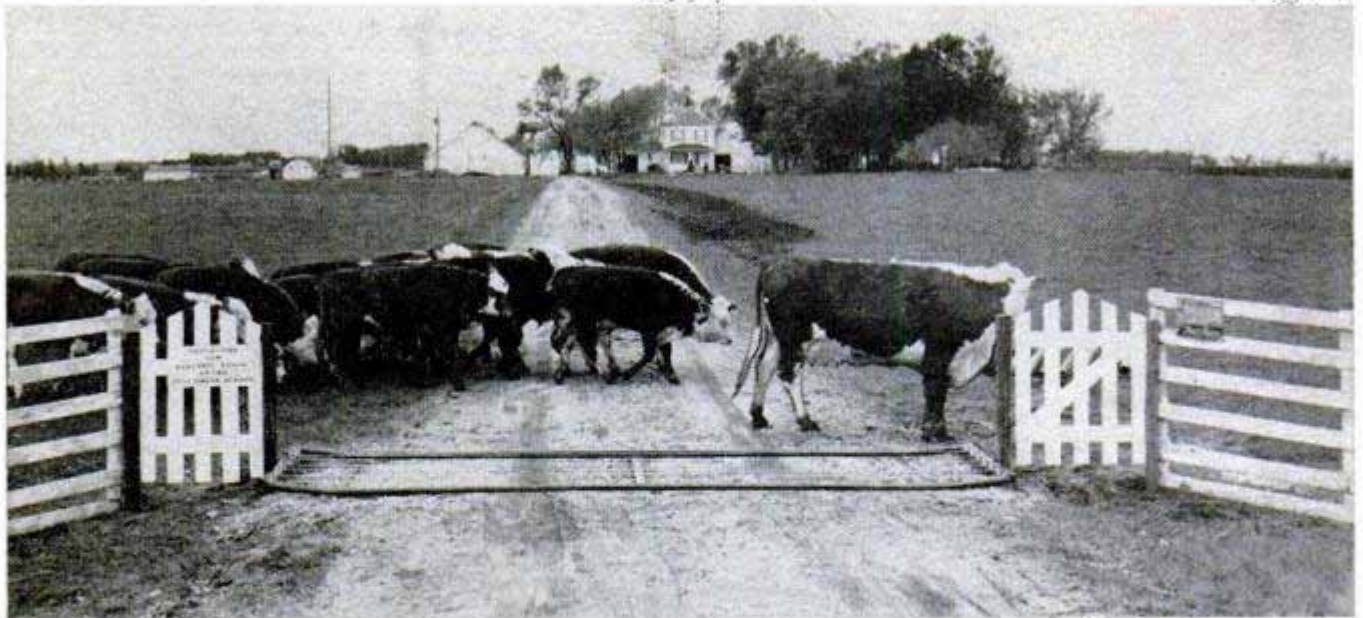
**PORTABLE DISHWASHER** runs entirely on water power. Tap water rushing through jets causes basket containing dishes to revolve in hot suds-filled bath

**BATH SPRAY** with built-in thermometer permits you to run proper mixture of hot and cold water for baby's bath. Made of durable, transparent plastic, the device won't rust, shatter or chip



**TOOTHPASTE DISPENSER** holds any kind of tube, empties it completely, keeps paste soft and fresh. Push of button deposits brush-length ribbon of paste





## Electric Livestock Guard Takes Place of Gate

There's a "hotfoot" in store for any animal that tries to cross a new electric stock guard. Placed flat in a gateway, it keeps livestock where it belongs, yet allows vehicles to pass. Consisting of a 120-pound steel framework in which cables are sus-

pending by springs, it is connected to the electric-fence circuit. The springs hold the "hot" wires off the ground, yet permit heavy vehicles to cross without damage. Added convenience and timesaving are its chief advantages.

## Screenless Television Set Produced for the Blind

Because many blind persons want to keep posted on television programs even though they can't see them, a set which receives TV sound only is being produced. In addition, the unit contains an FM radio receiver. Small and portable, the set measures just 12 by 8 inches. Control knobs are inscribed in Braille.



## "Soft" X Rays Preserve Food By Killing Decay Bacteria

Meat, fruit and vegetables sterilized with "soft" X rays under a new process will remain fresh for long periods of time without canning or refrigeration. Packaged in airtight paper, fiber, plastic, foil, glass or metal containers, the food is subjected to radiations produced at a comparatively low voltage. The rays penetrate the food-stuffs and kill the organisms that cause spoilage. Since no preheating or precooling is necessary, vitamins and flavor stay in the food. Low in cost, the process is easily adapted to mass production and the necessary equipment would not be costly.

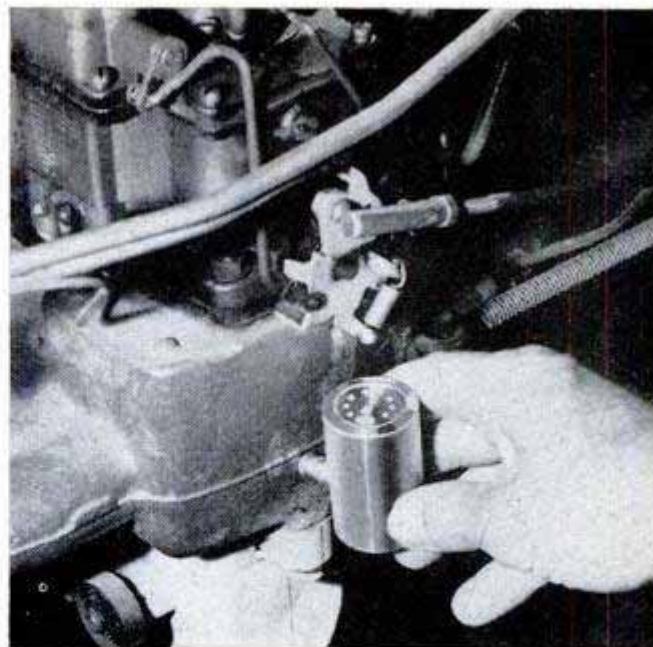
## *They Outsmart Death*

The downed Navy pilot slithered and slipped more than three miles across the mud and ice of North Korea, two enemy soldiers loping after him at a monotonous trot and pinging bullets into the ground all around him. Here's an escape story with suspense in every sentence. But still another story was written a short time later, when the pilot's escape was studied virtually step by step by the men of the Naval Aviation Safety Activity, who came up with a report that may save other lives in Korea. Next month's issue carries the story of these unsung Navy heroes, who pin down the causes of accidents and what each pilot can do to save his own life. Don't miss this exciting feature



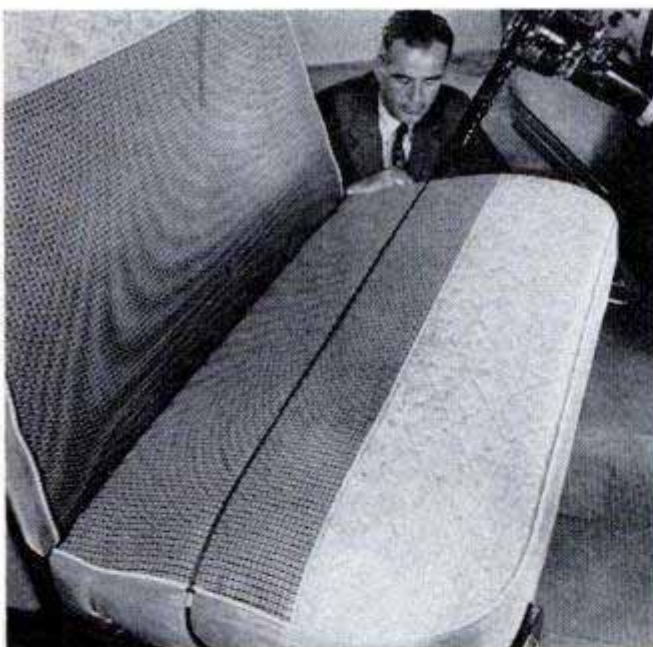
### Gauge Checks Engine, Brakes

Mounted on the dashboard of any automobile, a self-contained instrument measures acceleration, deceleration and steepness of grade. The compact seven-scale device also registers pulling power in pounds per ton in all gears, level-road power and hill-climbing ability plus braking efficiency. Periodic testing with the gauge enables a driver to spot motor and brake troubles.



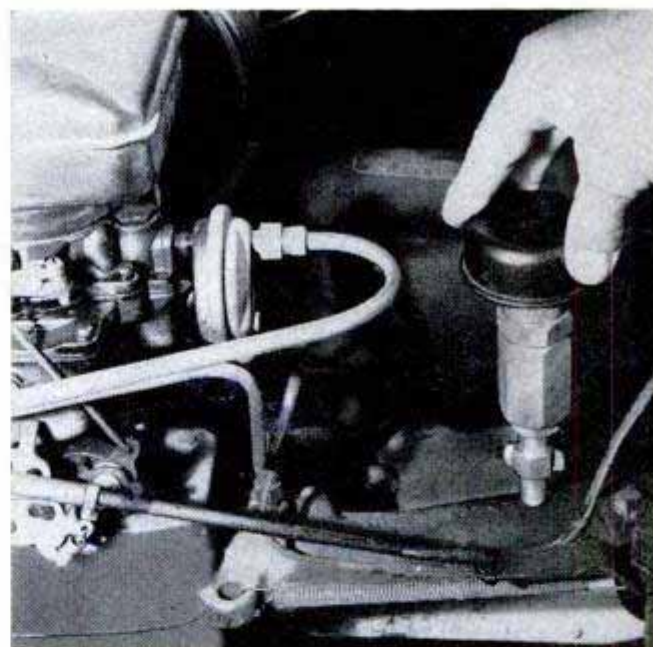
### Diaphragm Supplies Extra Air

Connected to the intake manifold of an automobile engine, a metal diaphragm feeds additional air into the manifold as the speed of the car increases. By maintaining the correct air-fuel ratio, the device is designed to improve performance and climbing power. It may be screwed directly into a threaded hole in the manifold, coupled to a vacuum line, or installed under the carburetor.



### Tape Eliminates Shock

Strapped across the upholstery of automobile seats or under the seat covers, a narrow tape grounds static electricity generated by the movement of clothing across the seats, thereby eliminating tingling shocks. The tape is easily installed without tools within a minute or two. It is available in a variety of colors to match the upholstery or seat covers.



### Breather Reduces Engine Vacuum

Engine wear and oil dilution are said to be greatly reduced by a spring-loaded breather device that automatically admits warmed air into the intake manifold when the engine is decelerating. By reducing combustion-chamber vacuum, the attachment reduces the sucking of oil from the cylinder walls as well as the drawing of excess gasoline through the idling jet.



Jidge, an old-timer hereabouts, tells a grandson of the rugged early days in the canyon

## **Cattle Ranch in**

**Y**EARs AGO, Zane Grey wrote *The Riders of the Purple Sage*, one of the most widely read of American novels. That story ends with the hero and heroine starting a new life in an avalanche-sealed canyon. Today there's a real-life counterpart to the fictional Westerner in J. H. (Jidge) Tippett, famed canyon cattleman of Washington and Oregon.

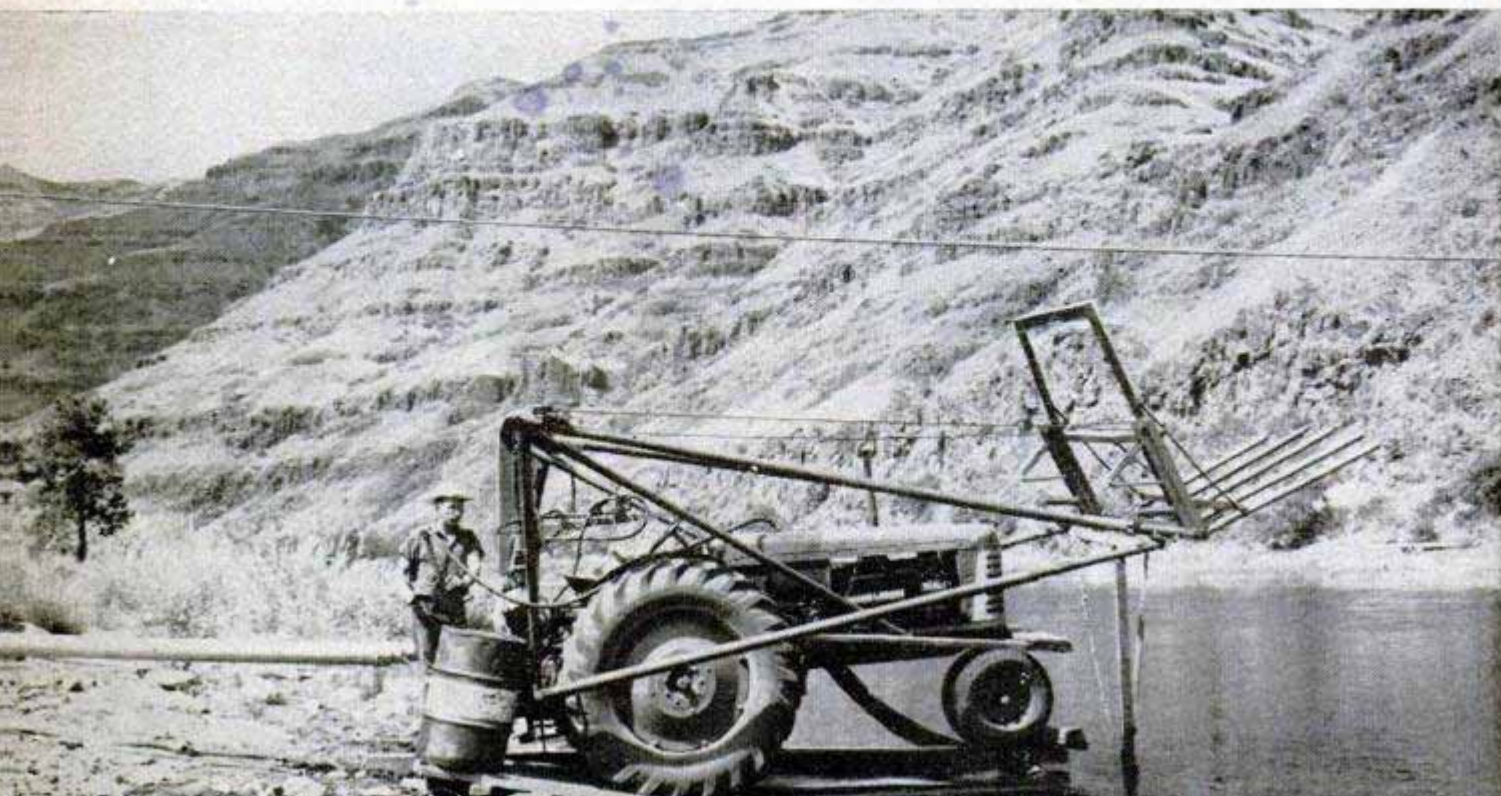
Jidge has fought his way to the top of the cattle business from the bottom of the Snake River canyon where it carves a jagged border stretch—more than 4000

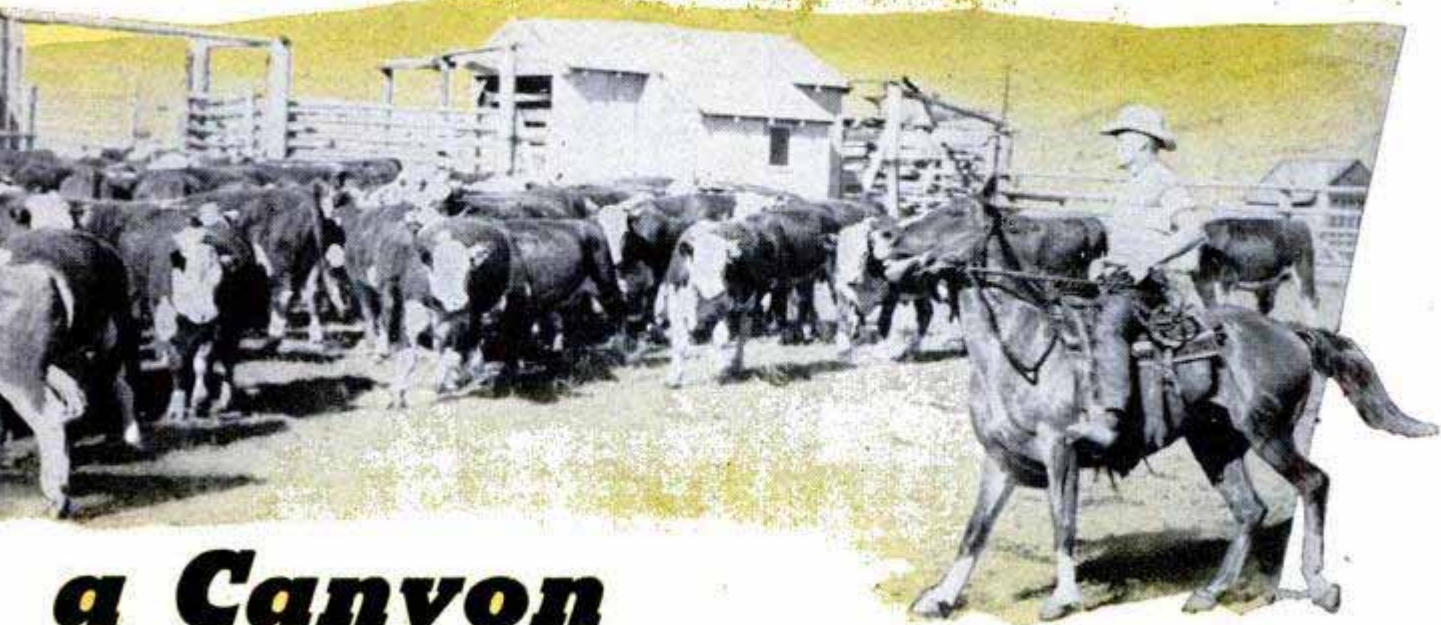
feet deep—between Washington and Idaho. No man can say the West has gone soft as long as Jidge is still in the saddle. Some days the 65-year-old rancher lives in the saddle from 5 a.m. to 9 p.m. with time out only for vittles.

Much of his high-walled range is such rough terrain it just plain scares some men—and horses. His horses must wear specially cleated shoes and must have about five years of canyon-climbing practice before being broken to ride.

His cattle graze on pastures so steep an

Snake River, which cuts the canyon, now is pumped by diesel tractor to furnish irrigation for the hay land





# a Canyon

By Rafe Gibbs

All Tippetts are horsemen. Here's Doug astride a good cutting horse, which wears cleated shoes in the canyon

**Judge Tippetts is a modern "Rider of the Purple Sage." His cattle range is deep in the Snake River Canyon in country so rugged it scares most men—and beasts**

animal sometimes falls and breaks its neck. Generally, ranchers drive their cattle out of rugged canyon country for the winter, but Judge reverses the process. He runs them all winter below the heavy snow belt on the rocky canyon walls.

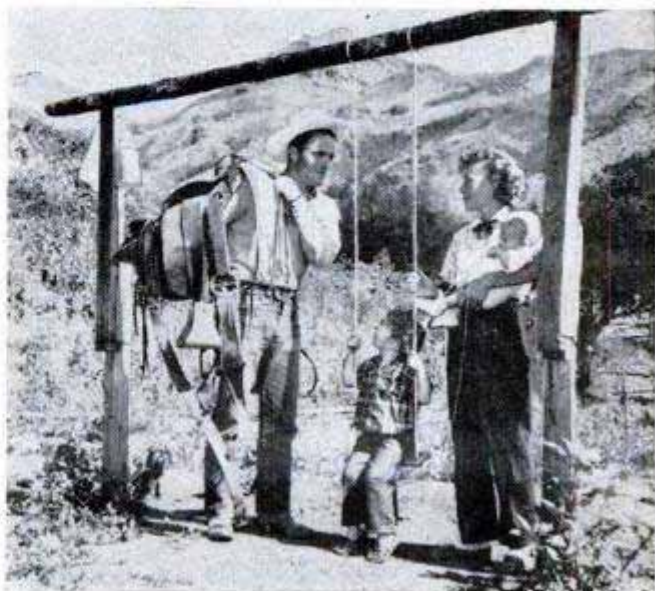
An obstacle course for raising cattle? Sure, but this man who answered the call of the canyon has—with plenty of moral and physical support from his wife, four sons and two daughters—overcome the obstacles. He has built up his original 720-acre canyon ranch on tumbling Joseph Creek to holdings that now include nine different ranches sprawling over into eastern Oregon. His spread covers 19,000 acres, including 3500 acres of irrigated land, plus grazing privileges on about 50,000 acres. In 1951 he was named Washington Cattleman of the Year.

The Snake River canyon, location of the main Tippetts ranches, is usually closed in from about November 15 to May 1. Except during blizzards, however, the Tippetts never have been exactly sealed up in the canyon. When the snow blocked mule and horse trails high up on the canyon walls, a snake-bitten man or a sick woman could get out by boat—and more recently by plane. And now, within the last two years, Judge has spent about \$25,000 widening the old pack trails, and you can drive a car down startling switchbacks to his most iso-

lated ranches. In the summer, that is. But generally speaking, the Tippetts have lived the life Zane Grey suggested in his dangling sage novel.

Judge drew his canyon courage from his father who first bucked the mighty walls in 1891. Judge was then four years old. His cattleman father yearned for "better grass and more water, and darned if I care where I find it." So he started eastward across the Blue Mountains with 60 head of cattle,

Home on the range to Don Tippetts and his family is deep in the canyon. The life is remote but rewarding





No moist spot goes unnoticed. Jidge Tippett brings in a bulldozer, scrapes around, and soon has a water hole

a wife and four children. The mother rode sidesaddle, one child in front, three behind.

Things happened, like the time the Tippett bull fought a battle to the death with a wild bull, and the races between the father's Morgan-bred horse and the mounts of other cattlemen. On the whole, though, Jidge as a boy thought the trip was dull—no Indian attacks.

Jidge started cattle ranching—with no ranch—in 1903 when he was 16. He had acquired 8 heifers at \$18 a head, and had \$26 left to buy a saddle. His horse was a wild one he'd caught.

Last house on the canyon's telephone line has an extra phone outside, handy for the neighbors to use



In 1919 Jidge bought that first spread of his own deep in the canyon and built a home for his pretty bride, a New York girl who had come west to teach school.

The Tippetts were just starting to expand when the drought came, killing off 150 head of cattle. The canyon walls seemed to press in tight that winter, but the Tippetts fought back.

"It was the only real drought I've known in the canyon," says Jidge. "But I learned one primary rule of raising cattle—too much feed on hand is just enough."

Then came the depression years. Through them all Mrs. Tippett set a good table—with a cash outlay in the toughest times of only 17 cents a day for a family of eight and two hired men.

Gardens gave forth well and long on the canyon floor, far below the early and late reach of winter. (At the top of the canyon, the altitude is about 5000 feet; at the bottom, 835 feet.) Wild berries, game and fish were abundant.

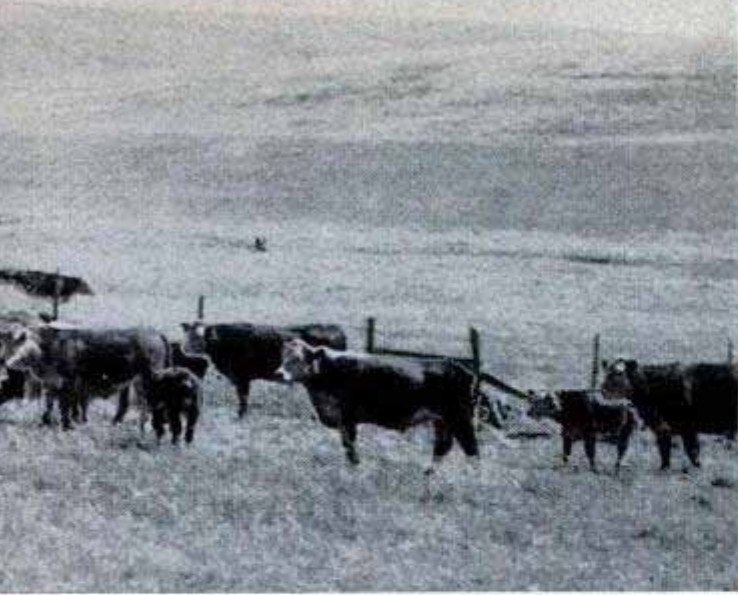
One neighbor of the Tippetts managed all right in the canyon without doing anything so arduous as raising cattle. He just hunted and fished to provide for a family of eight children.

Another neighbor, a bachelor, panned about 35 cents' worth of gold a day for a living. One day he struck a lode worth \$100, pocketed his rich find and set off down the river in his rowboat for the "outside." When he reached The Dalles, Ore., he learned the cost of living beyond the walls and came back to panning again.

Lonesome? Well, being lonesome is a state of mind, and in the canyon you set your mind to not being lonesome. You begin noticing the little things, such as the colors of the canyon walls that change from season to season, sometimes even from day to day.

When the Tippetts first took to the canyon there were quite a few homesteaders





band, Don Fouste, has settled on a Tippet ranch. The second sister, Barbara Wiggins, is the only one absent just now. Her husband is an Air Force officer in Tokyo.

"As kids I guess we just had so much fun varmint-hunting in the canyon the place grew on us," says Doug. "The varmints—crows, magpies, bobcats and coyotes—are still there for the shooting."

What happens when sickness or injury strikes?

"Well, God and the neighbors have looked after quite a bit of that," says Jidge. "You'd be surprised how much you can do without a doctor if you have to. You take care of a lot of things yourself, like the time I cut my hand with an ax. Lard and carbolic acid repaired the damage."

But sometimes an ax cut calls for more than lard and carbolic acid. During a recent closed-in period Don's wife gashed her hand while chopping wood. Don applied a tourniquet, then ran for the telephone to call for a plane to fly his wife to a doctor. Suddenly he remembered the phone hadn't worked for a month.

He could get his wife to a doctor by boat, but that would take six hours. A plane could do the job in 30 minutes, so he went to work on the telephone. Off and on during the previous month, he had tinkered with the thing by the hour. Now in a matter of minutes he had it going, and flew his wife to the doctor in a hurry.

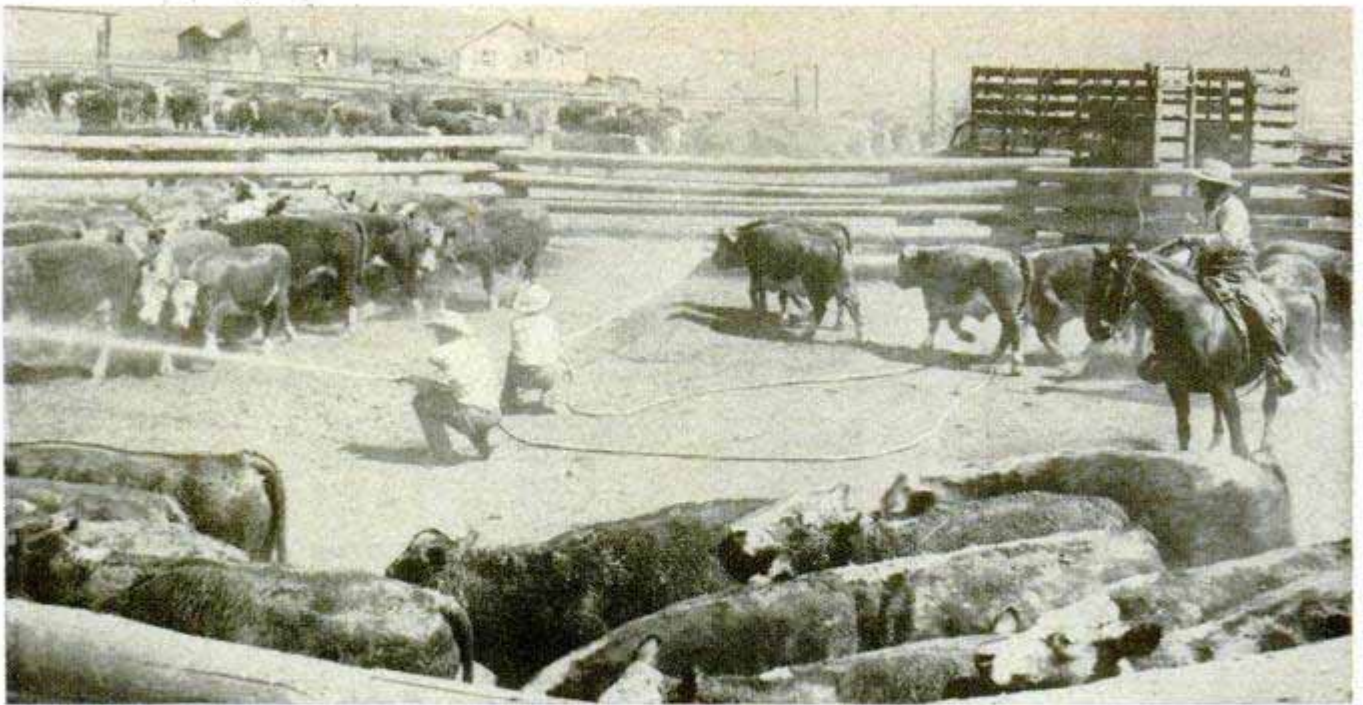
there, but most of the old-timers are gone now. Jidge bought up much of the abandoned land, some for as low as a dollar an acre.

As neighbors grew scarce the family became a closer-knit unit. Some of the children went to school in the schoolhouse on Joseph Creek and some went outside. High-school and college studies took the children away, but the canyon always beckoned them back, even on week ends.

Doug, youngest of the six, is now a student at Washington State College, but his college life is just an interlude. He'll rejoin his three older brothers, Jack, Don and Bob, and one sister Betty, whose hus-

**One winter, when elk raided Don's stacked hay, he built a corral around it with lumber delivered by parachute**





Cattle are sprayed with hoses. Only 15 cents' worth of DDT solution means up to \$10 more beef on each animal

Then there was the time Bob, at the age of 10, was riding his pony in the canyon. He dismounted to pick up a pretty rock and a hidden rattlesnake bit his hand. Bob jumped on his pony and raced for the Joseph Creek ranch house, a mile away. Jidge and Mrs. Tippett were gone but Clarence Spangler, a hired man, took over. There was no phone then, so he called a neighbor boy, and told him:

"Ride up the canyon and get the doc. Have him meet us with his rig at the canyon rim."

Then Spangler killed a chicken and

Jack, brother of Jidge, gets his electricity for \$6 a month from four-cylinder motor powered by butane



poulticed the bite with raw meat. This done, he pulled Bob up behind him on his own horse and headed 12 miles up the canyon trail. The neighbor boy had ridden fast, for the doc was there with his lathered team when Spangler and Bob arrived.

Somehow the canyonites always overcame all the difficulties.

"To be honest," says Jidge, "I never did anything the hard way. Always took the easiest course—at the time. So did my father. He used to cut hay in the canyon by hand because it was the easiest way. Then we packed a mowing machine in parts down the canyon by muleback. Now, of course, we have plenty of modern equipment including tractors.

"We used to pack lumber down on mules before we discovered a mule could drag the lumber, and next that lumber could be brought down between two mules. Now we haul it down in the summer by the truckload."

A truck was no good one winter, though, when elk were eating Don's stacked hay and he needed lumber in a hurry to build high corrals around the stacks. An airplane parachuted the boards to him.

In winter a commercial plane delivers mail to the canyon ranches by parachute. If there's trouble a signal is put out and the plane can make a landing—just barely. The "landing field" is more like a giant eagle's nest, nestling atop a knoll inside the canyon. A motor-driven eagle didn't do so well on a take-off last winter and still huddles with a broken wing at the nest's edge.

Jidge thinks the airplane has been a great boon to the canyon but rates the bulldozer one notch higher.

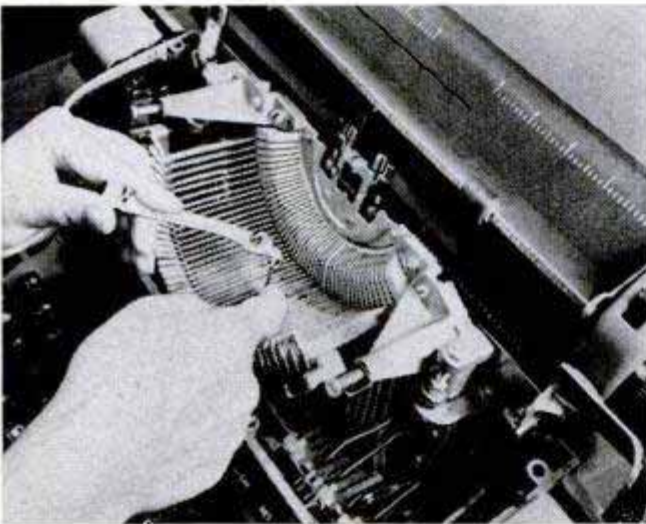
(Continued to page 276)



## Submarine Hunting-Killing Now a One-Plane Task

Submarine hunting and destruction, a job previously shared by a two-airplane team, is now accomplished alone by the Navy's new S2F-1, a carrier aircraft. The Grumman hunter-killer can cruise at low speeds while tracking its target and has

special navigational equipment for severe-weather operations. A retractable tail wheel is used in addition to a tricycle main landing gear. The S2F-1 has two Wright R-1820 engines, of approximately 1300 horsepower, and carries a crew of four.



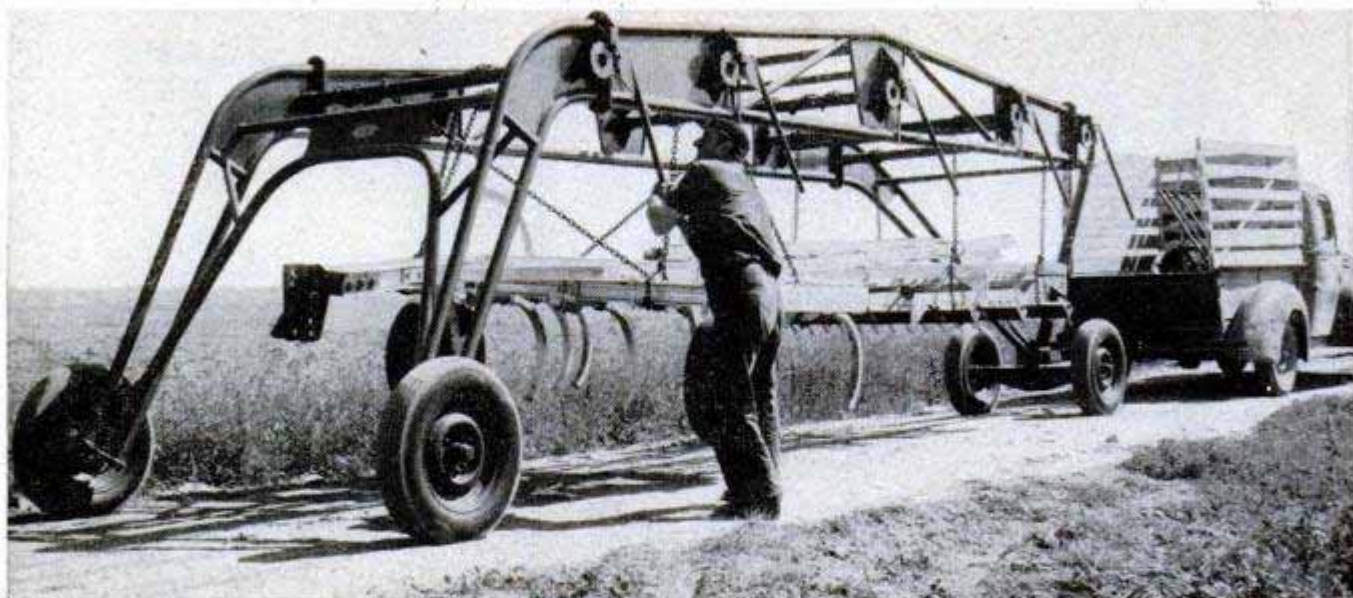
## Changeable Type Bars Quickly Replaced

Type bars are unhooked and replaced in a few seconds on an electric typewriter designed for quick switchovers from regular typing to foreign-language or scientific work. The old type bar is unhooked and slipped past the connecting bar after which the new bar is easily inserted. Mathematical, chemical and foreign-language symbols are among the many special type bars available. Developed by IBM and the Atomic Energy Commission, the changeable bars permit many kinds of work to be done on one machine.

## Augered Bulldozer Handles Big Loads

Radical in design, a bulldozer for small tractors does not have its moldboard mounted at an angle. Instead, an auger rotates to move earth and snow to the side. Heavy loads can't cause the tractor to drift from its course, a common problem with angle-mounted scrapers. Careful work close to buildings is possible. Powered by the tractor take-off, the unit operates at two speeds: Slow speed for dirt and high speed for fast snow removal.





## Overhead Trailer With Hoist Totes Farm Implements

Farm machinery, lumber, pipe and other materials can be slung beneath a new carrier and moved from place to place. Four rubber-tired wheels support an overhead tubular frame equipped with lifting spools. Ratchets on the ends of the spools are

turned by jack handles to lift the machinery or material off the ground. One man can pick up a 4000-pound load, move it as desired and drop it to the ground again with the carrier. The unit has an over-all weight of 1500 pounds.

## Aluminum Putty Hardens in Air

Putty made of an aluminum compound can be worked, molded and formed like clay, yet hardens into metal upon exposure to the air. The hardened metal can be drilled, filed and machined like any other piece of aluminum. The plastic aluminum is designed as a sculpture material and for modelmaking, carving, building up castings and jewelry repairing.

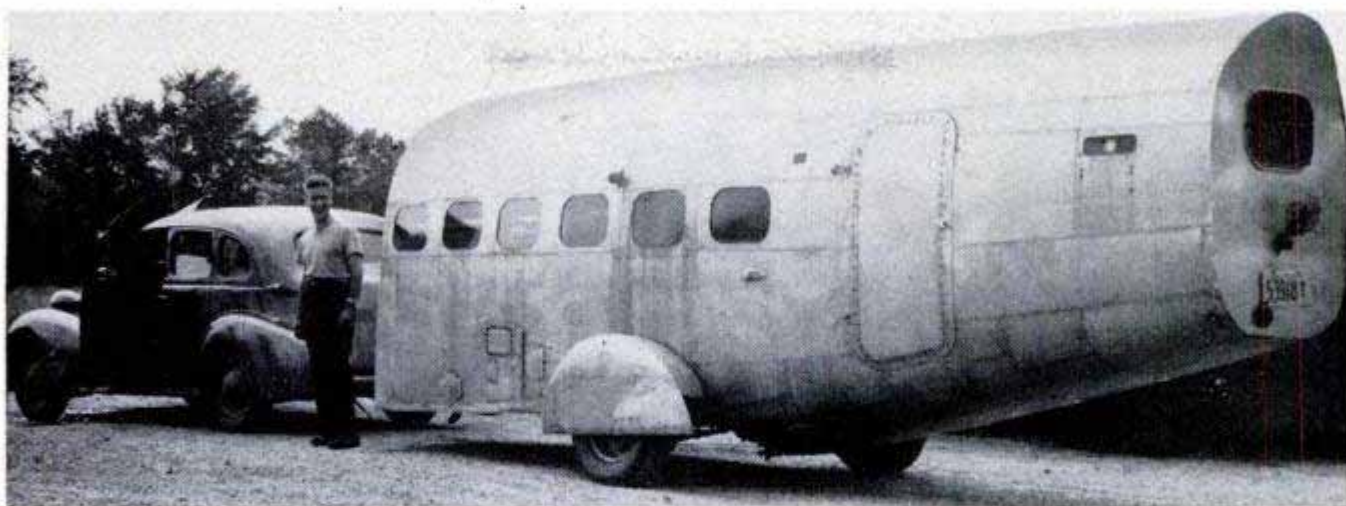
## Plastic Lacquer Gives Tough Coating

So durable that it makes a satisfactory covering for bowling pins and croquet balls, a bright new wood lacquer consists of a highly glossy plastic film up to 25 times as thick as ordinary enamel. Resistant to checking caused by alternate heat and cold, it also differs from ordinary enamels in being able to withstand flame. It can be brushed or sprayed in regular manner.

## One-Man Bomber Designed for Ground-Troop Aid



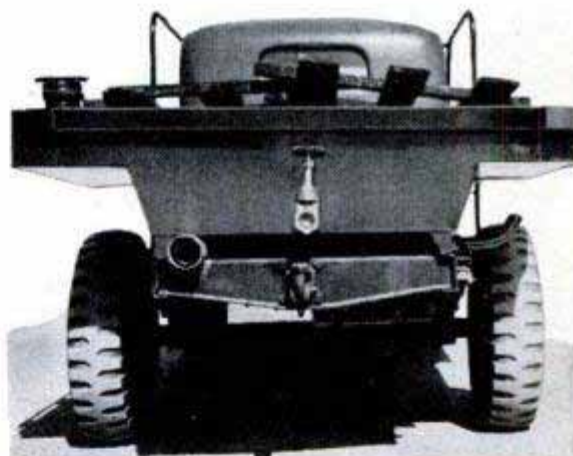
Designed for ground support, a 30-foot "baby bomber" built by Fletcher Aviation carries two .30-caliber machine guns, 2000 rounds of ammunition and rockets. A single seater with a 250-horsepower engine, it has a 187-mile-per-hour top speed and lands at 41 miles per hour. A contract has been signed with the Toyo Aircraft Company and it is expected to be the first airplane manufactured in Japan since the end of World War II. Production costs are said to be  $\frac{1}{12}$  those of a current-model jet fighter.



## Fuselage of Scrapped Bomber Converted to Vacation Trailer

Using the broadest portion of a scrapped bomber's fuselage, J. T. Carson of Sudbury, Ont., Can., built himself a novel vacation trailer home. He cut the obsolete plane in half just to the rear of the wing, and ahead

of the tail section, then covered each end with aluminum paneling. He added wheels and springs and kept the original door as the trailer entrance. Carson's trailer has five bunk beds and eating quarters.



## "Camel" Trucks Readied for Long-Range Desert Travel

Equipped to operate in the dry and trackless wastes of Africa's Somaliland, trucks of an American geophysical expedition carry huge quantities of water and gasoline. Bolted to the rear frame of each

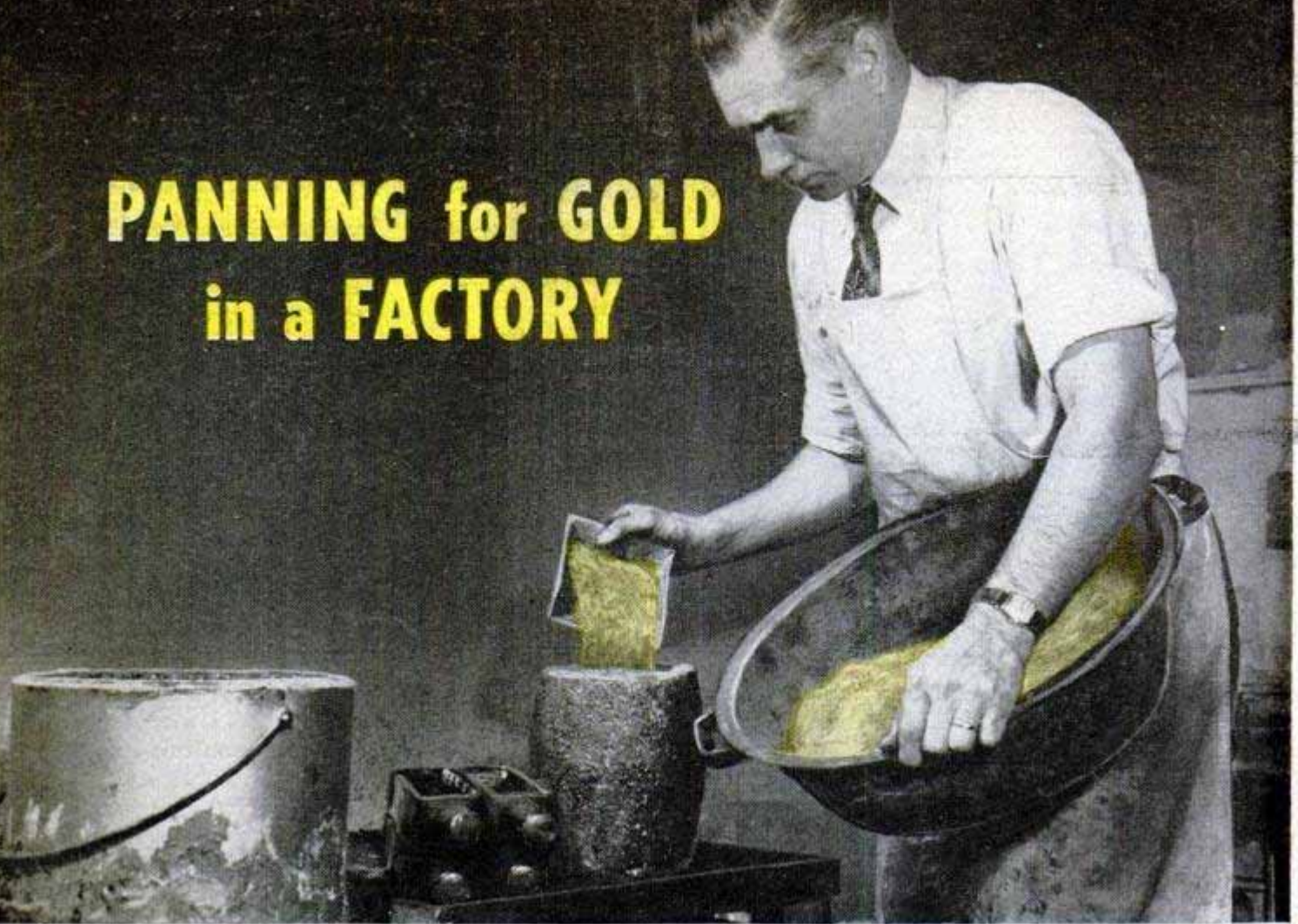
truck is a 340-gallon tank. The front half of the tank contains gasoline which feeds directly into the engine. The back section carries water for the radiator and other uses. Flared over the wheels on each side, the top section of the tank forms a roomy truck bed for cargo. To protect the truck cab and crew members from thorn bush, a framework of thick pipe extends from the front bumper up alongside the hood and cab. Heavy steel mesh protects the radiator from damaging branches. Puncture-proof tire tubes and extra springing for heavy loads complete the outfitting of the trucks for operation on a six months' basis far from supplies.

### *Capitol for the World*

Pay a visit next month to the United Nations, at home now in its own sparkling capitol along New York's East River. It's a real showplace, too—a skyscraper with sheer glass walls, a conference building with cantilevered balconies and an assembly hall with a wonderland of electronic circuits. Here are new building techniques, too, from a 39-floor structure that literally slides on roller bearings to elevator buttons actuated by nothing but the static electricity in a delegate's finger. An April story in full color will take you on an exciting tour of the UN's new world capitol

☞ One of today's giant transport planes carries enough fuel to drive a passenger automobile around the world 6½ times.

## PANNING for GOLD in a FACTORY



Floor sweepings in a watchcase factory are burned to an ash and put in a refining urn, above. At high temperature the scum is separated from the gold

By James R. McCarthy

**D**ID YOU EVER hear of panning for gold in the heart of a modern American city? Well, it is going on in hundreds of manufacturing plants from New York to Los Angeles. And the total amount of gold dust recovered probably exceeds that extracted by patient gold panners from the mountain streams and old workings of the far West.

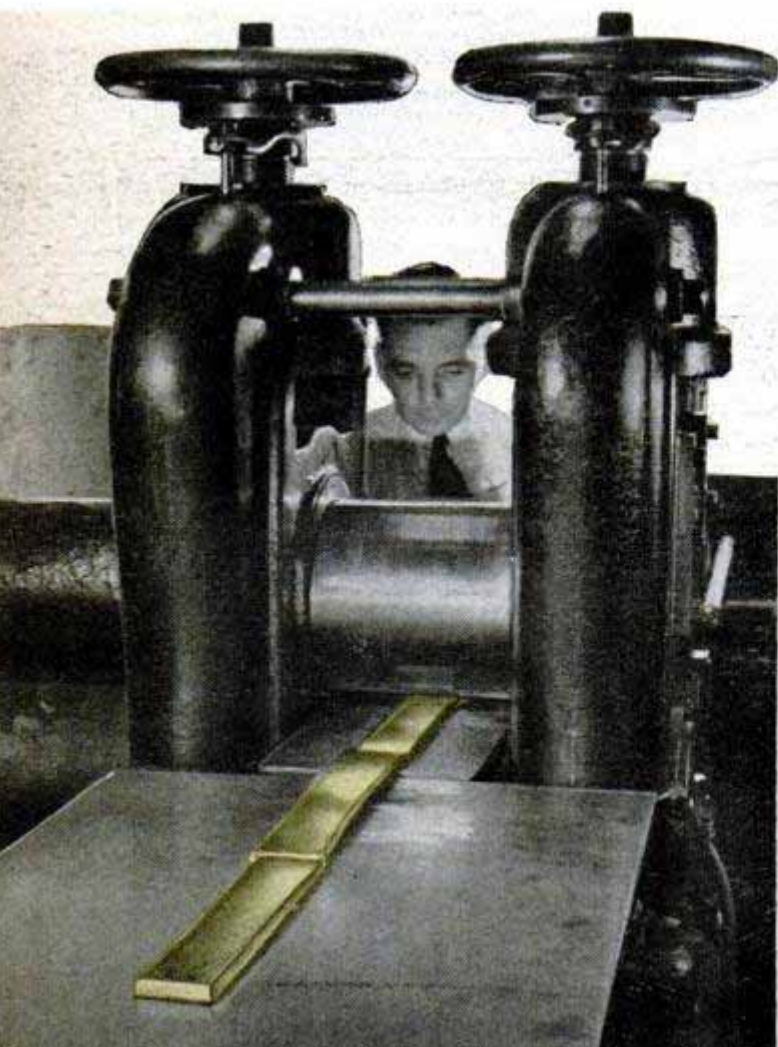
Each year precious gold dust worth thousands of dollars is recovered in American plants dealing with gold, particularly jewelry and watchcase manufacturers. Where do they find it? On workmen's clothes, shoe soles, tools, workbenches, wash water, on the floors and in the chairs, in filings and waste material.

This is particularly true of watch-manufacturing plants, which produce thousands of watchcases annually. The cases may be 18 or 14-karat gold, or gold-filled. All solid-gold cases use gold alloyed with copper, zinc, nickel and silver to make 18 or 14-karat gold.

One of the most dramatic examples of this type of gold panning is to be found at the Gruen Watch Company, Cincinnati, Ohio.

In the making of watchcases, much gold

Some gold particles are thrown off while the metal is being rolled into sheets as thin as .016 inch



literally is dissipated in the air. "Vanishes" is not quite the word, which is where the gold panning comes in. You may wonder how and why the gold dust escapes and how it is recovered. A trip through the Gruen plant will provide a vivid and dramatic answer.

First, let us follow a bar of fine gold from the time it arrives in the factory until it emerges as part of a beautiful wrist watch. It is pure gold — 24 karat — and must be melted and alloyed with pure nickel, copper, zinc or silver — depending upon whether the case is to be white, pink or yellow gold. It must be rolled to finer tolerances than those permissible for rings, for instance, because watches require greater precision. This filled gold must be rolled, annealed and rerolled several times until the proper thickness is obtained—and also the correct hardness so the metal will draw properly in the dies.

After passing through the rolling mills, the stock is ready for the first blanking and forming operations. It goes to the large hydraulic presses which form the various watchcase designs — oval, rectangular and round. Later come the polishing and final finishing.

During all of these operations, gold dust flies into the air, minute particles get into the workers' clothes, shoes, tools, workbenches, wash water, or drop on the floor and get mixed with filings and other waste



Air circulating through the gold-using plants is filtered and the metal collected in cans like this

matter. You can't see it. But when you look for it scientifically, it can be found.

All waste water used in washing the watchcase is filtered and settled to save any gold which otherwise might flow into the sewer. Waste materials are burned and the gold dust refined from these ashes and even mop water from the floors goes into special settling tanks.

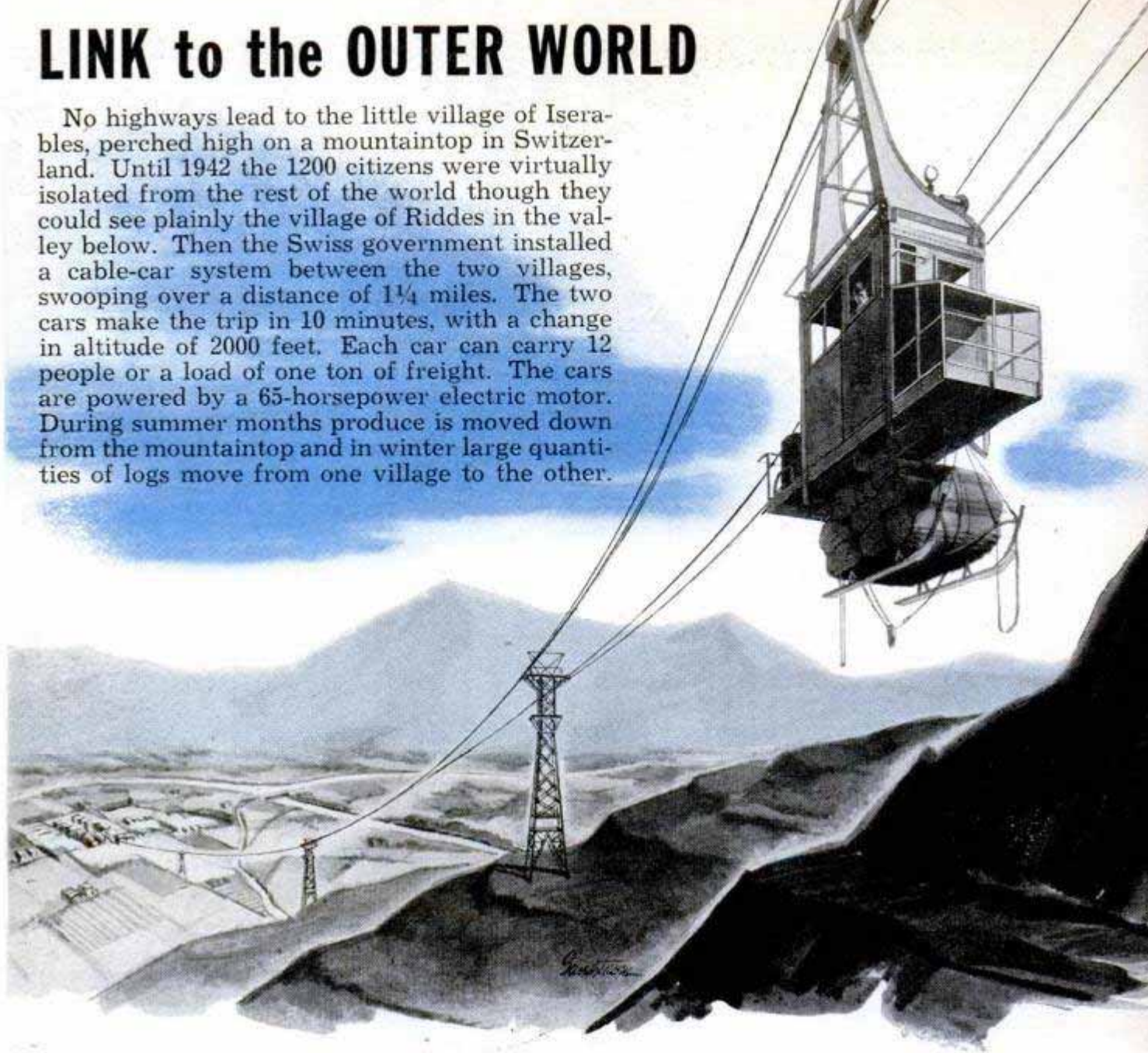
How much of this gold is recovered annually? Technicians at the Gruen factory hesitate to say. But one thing is certain. It could keep a person in pocket money for a long, long time. ★ ★ ★

During polishing operations the gold dust is sucked through screens directly below the operator's hands

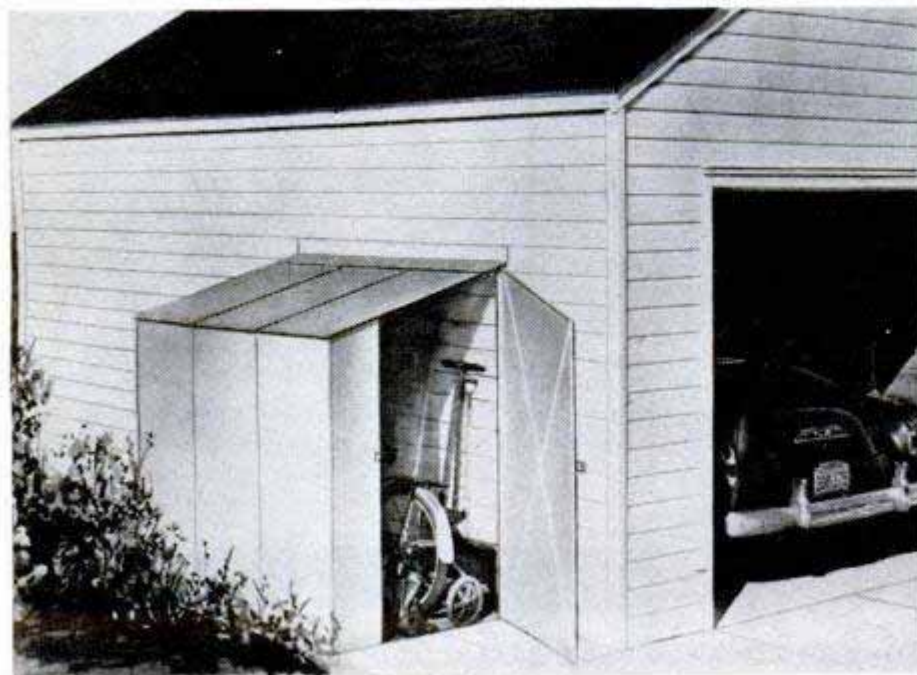


# LINK to the OUTER WORLD

No highways lead to the little village of Iserables, perched high on a mountaintop in Switzerland. Until 1942 the 1200 citizens were virtually isolated from the rest of the world though they could see plainly the village of Riddes in the valley below. Then the Swiss government installed a cable-car system between the two villages, swooping over a distance of 1¼ miles. The two cars make the trip in 10 minutes, with a change in altitude of 2000 feet. Each car can carry 12 people or a load of one ton of freight. The cars are powered by a 65-horsepower electric motor. During summer months produce is moved down from the mountaintop and in winter large quantities of logs move from one village to the other.



## Storage Lean-To for Garage Sold as Unit All Ready to Assemble



If your garage is cluttered with everything from lawn mowers to bicycles, you'll welcome a storage building that is sold in package form and can be put up in two hours. Made of steel, the four-foot-wide building attaches to the side of the garage in lean-to fashion. The three-foot door will admit power mowers and garden equipment readily. Sold in hardware stores and building-supply houses, the structure comes packaged in two easily carried cartons. All hardware is included.



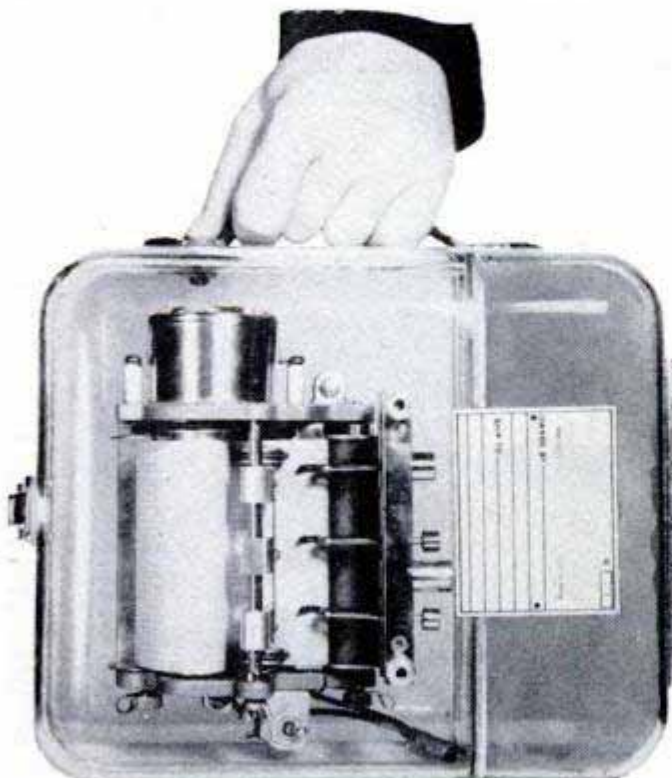


## Amateurs Build 150 M.P.H. Experimental Air Racer

Amateur plane builders—the instructors and students of a West Virginia aircraft service—have put together a trim midget racer that flies faster than 150 miles per hour. Only 15 feet long and with a 19-foot wingspan, the tiny, 85-horsepower plane handled easily in flight-test maneuvers and landed at about 100 miles per hour. It took one year to move from the drawing board to the runway and the cost of the entire project was an estimated \$10,000. Initial test flights of plane proved satisfactory.



## Mechanical "Watchman" Records Impacts as It Travels With Shipment



Recording the type and severity of impacts over a 28-day period, a clock-driven meter enables the shipper to tell what happens to his shipment from the time it leaves his plant until it is delivered to the customer. Because the impacts are recorded on a moving tape that is ruled into hourly divisions, responsibility for damage due to rough handling can be traced. It also is sensitive enough to detect delays in shipment—the recording styli showing no movement. It is packed inside the crate with the merchandise or, if desired, attached to a freight-car wall.

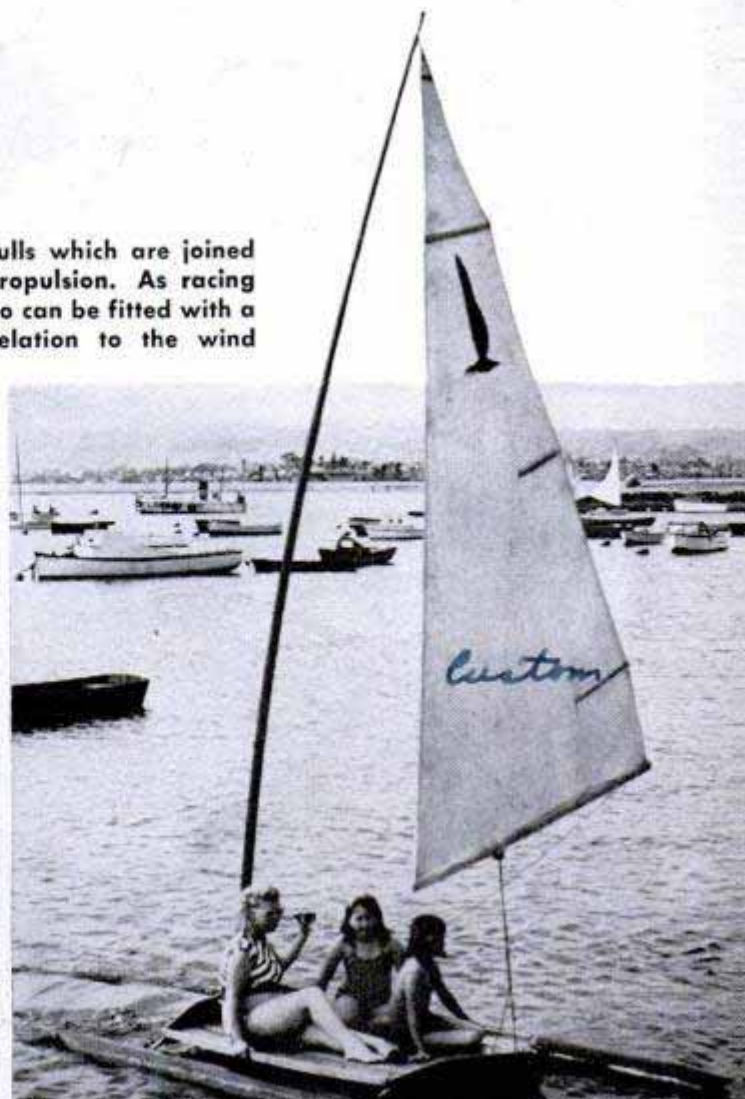
Our WHERE-TO-FIND-IT INDEX, listing the names and addresses of manufacturers and sources of further information for the products and articles in this issue, is available free upon request. This index is one of the many services offered to *Popular Mechanics* readers by the Bureau of Information. For your copy of the index, just write to the Bureau of Information, *Popular Mechanics Magazine*, 200 E. Ontario, Chicago 11



## NATTY CATAMARANS

Catamaran above and left is a new 34-foot, twin-cabin cruiser with aluminum mast and booms. It can carry 12 persons, sleeps four for extended cruises

Boats below consist basically of two 12-foot plywood hulls which are joined with ribs and can be outfitted with various types of propulsion. As racing craft they have been clocked at 38 miles per hour. They also can be fitted with a "free floating" sail that finds its own attitude in relation to the wind





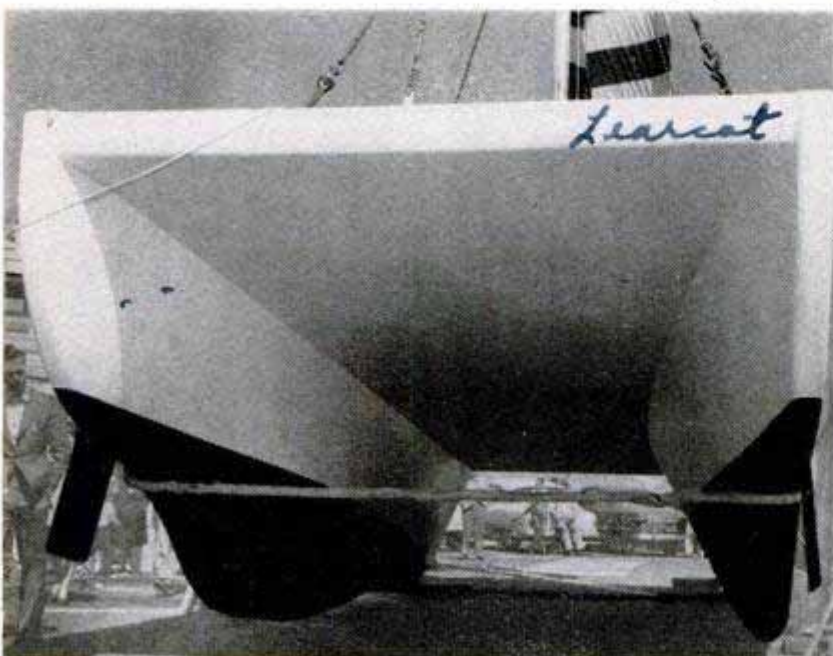
## SPORT AIRFOIL DECKS

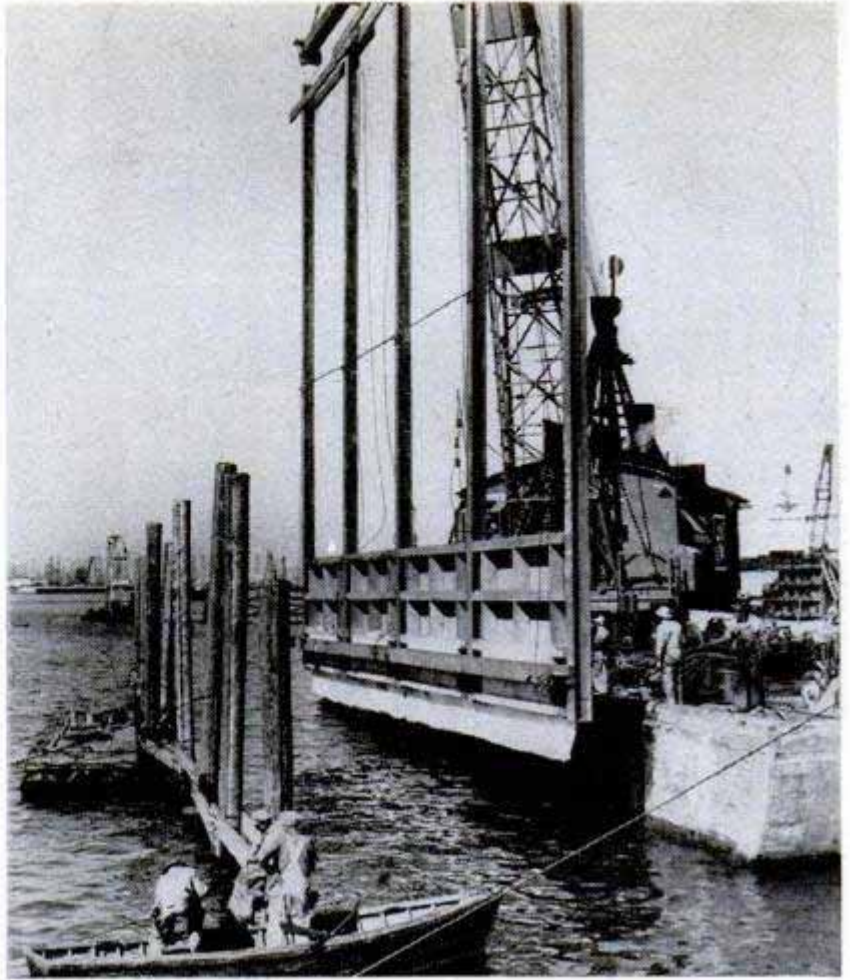
CATAMARAN FANS, who are rapidly increasing in numbers and enthusiasm, can select their craft from a broad range of new twin-hulled boats. Catamarans now on the market include everything from a little 12-foot craft designed for racing or sailing to big supercruisers. Manufacturers are borrowing ideas from aviation and applying them to their unique "cats." The platform, or deck, that joins the twin hulls of larger craft is shaped like an airfoil, tending to lift the ship out of the water and reduce drag, thereby increasing the speed. ★ ★ ★



With a 24-horsepower engine and carrying seven persons, "cat" shown in above photos makes more than 25 miles per hour. Air flowing under deck cushions ride and lifts boat to wave tops. Craft has a shallow draft—five inches at rest and 2½ inches cruising

Cabin cruiser draws only 20 inches of water at anchor, even less when underway. The deck, which is really an airfoil in cross section, tends to give added buoyancy and reduce drag as twin hulls knife through the water





## Cloth Sleeve Retains Concrete in Building Quay Wall

Simple cloth sleeves filled with sand are playing a large part in the construction of a \$670,000 quay-wall and wharf-construction project in the harbor at Long Beach, Calif. The concrete walls of the project, which extend under water, are being poured inside big forms which have a framework of steel I-beams. When such a

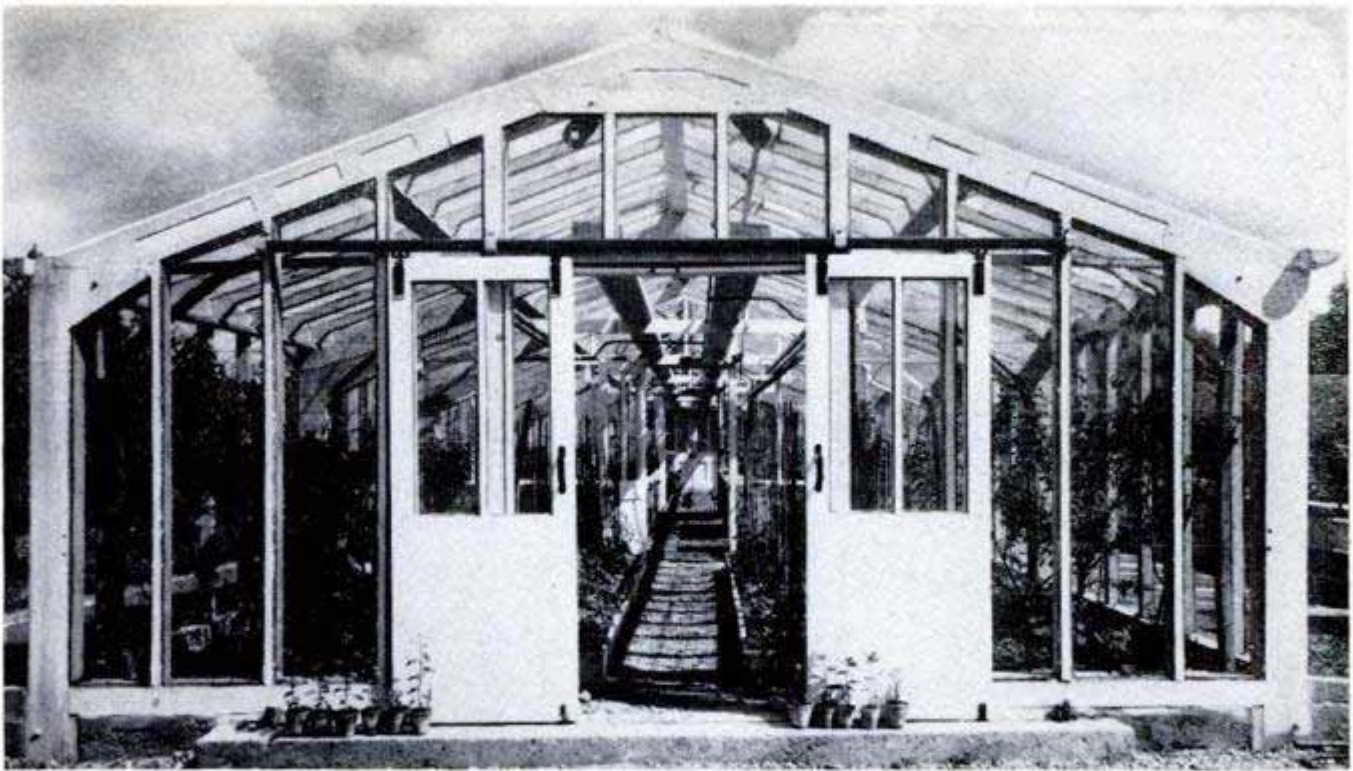
framework is ready to be slipped into place, the long cloth sleeve, filled with sand, is attached to the bottom. With the frame lowered into the channel water, the canvas fills the openings along the uneven bottom of the channel. Thus the sleeve prevents the concrete from flowing out from under the forms.



## Fire-Warning System Made for Home Use

Installed in attic, garage and basement of a house, a home fire-warning system sounds an alarm when surrounding air reaches a critical temperature. Under special arrangements, a warning is also sent by the device to the nearest fire station. Power is supplied from the regular household circuit, but in emergencies a stand-by battery takes over and switches off again when standard current is restored. A trouble bell rings when the battery runs down or the machine is not operating properly. False alarms are prevented by a supervisory relay.

☐ The world production of sugar is about 35,000,000 tons annually.



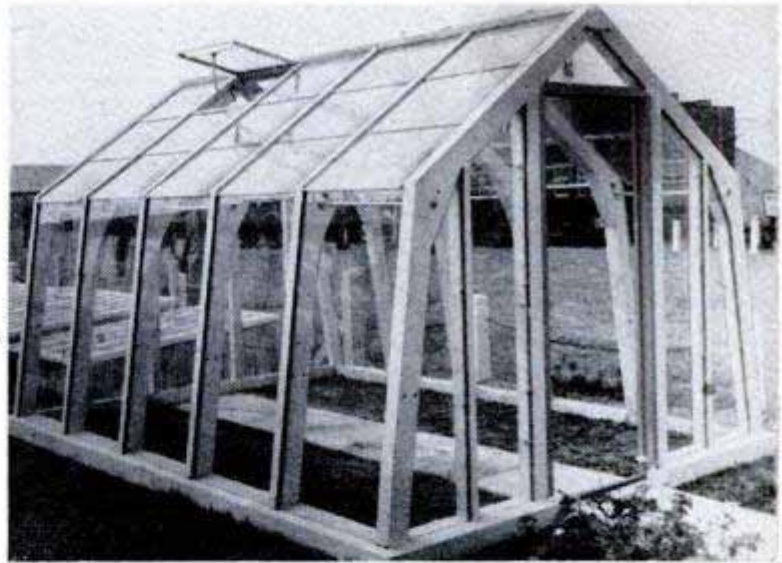
Prefabricated greenhouse, quickly assembled, will last indefinitely. All materials are supplied by factory

## Concrete Replaces Steel in Prefabricated Greenhouse

Factory-made reinforced-concrete sections replace steel framing in a greenhouse that can be assembled by unskilled workmen. Two men, without special equipment, are able to erect the structure which requires a minimum of foundation work. Doors, hinges, glass, braces and other necessary structural parts are furnished by the company to meet a variety of needs. Made in England where steel is at a premium, the greenhouse is distributed both there and in the United States.

☐ Temperature of the earth's center is 8400 degrees Fahrenheit, estimates Dr. J. A. Jacobs of the University of Toronto.

Variety of sizes and models is manufactured. Structure is anchored by substantial concrete base below ground surface



## Electronic Detector Locates Wall Outlets

Finding hidden wall outlets, pipes and furnace ducts is the purpose of a small electronic detector. A loop of wire connected to a closed circuit causes a needle to be deflected upward when a metal object is near. The device locates by measuring the effect of eddy currents on the pipe or outlet box.

☐ Bulk concentrate from 3,650,000 tons of nickel-copper ore will be pumped annually to reduction plants through a newly completed 7½-mile pipe line in Canada.

75% OWN V8s

POPULAR MECHANICS OWNERS POLL  
CONDUCTED BY FLOYD CLYMER

1. I own a 1953 Dodge:  Meadowbrook 6  Meadowbrook Spl.

2. I use regular gasoline  Premium (high test) gasoline

3. Average gasoline mileage in city 17 m.p.g. in country 17 m.p.g.

4. Oil consumption: One quart every 1000 miles. I change oil every 1000 miles.

5. My Dodge is equipped with:  
Conventional 3-speed transmission  Gyro-Matic Drive (Fluid Drive)   
Conventional transmission with overdrive  Gyro-Torque Drive (torque converter)

6. Roadability at high speeds: Excellent  Good  Unsatisfactory   
Conventional transmission with overdrive  Good  Unsatisfactory

7. Maneuverability in traffic: Excellent  Good  Adequate  Poor   
Conventional transmission with overdrive  Excellent  Good  Adequate  Poor

8. Acceleration: Excellent  Good  Adequate  Poor

9. What is the most satisfactory cruising speed of your Dodge? 70 m.p.h.

10. My main reasons for buying a new Dodge: I travel about 40,000 miles a year and have found Dodge very dependable and sturdy (although "asleep" until now)

11. Rate these points:

Visibility, forward: Like  Acceptable  Dislike

Visibility, rear: Like  Acceptable  Dislike

Riding qualities: Like  Acceptable  Dislike

Horsepower output: Like  Acceptable  Dislike

Exterior body styling: Like  Acceptable  Dislike

Interior body styling: Like  Acceptable  Dislike

Shorter wheelbase: Like  Acceptable  Dislike

Door handles: Like  Acceptable  Dislike

12. Specifically what are your complaints on the Dodge? Can see only a short distance down road through rear-view mirror. Loss of some riding comfort on highway due to shorter wheelbase.

13. Have you ever owned a Dodge before? Yes  No  How many? 3

14. Would you buy another Dodge? Yes  Possibly  No  Poor

15. How is your dealer service? Excellent  Good  Average  Poor

16. An overall rating of your Dodge: Excellent  Good  Average  Poor

17. What specific improvements do you want in your next car? vision through rear-view mirror - nothing that would add considerably to price such as power steering, etc.

Write additional comments on reverse side. This questionnaire will be tabulated fairly and your name will be held in strict confidence. Thank you.

Mail promptly to:  
FLOYD CLYMER  
Popular Mechanics Owners Poll  
1268 So. Alvarado St.  
Los Angeles 6, California

Your name: \_\_\_\_\_  
Street: \_\_\_\_\_  
City & State: Denver 8, Colo.  
Occupation: Salesman

POLL AVERAGE:  
19.6 M.P.G. - COUNTRY  
15.9 M.P.G. - CITY

A FREQUENT COMPLAINT

14% DISLIKE IT

79% OWNED DODGES BEFORE

ONLY 7% SAID NO

Comments - I am well pleased with my new Dodge. I climbed Loveland Pass at an average of 30 m.p.h. - never dropping below 25 - and in high gear all the way! This is a climb up to 11,992 feet. This is the first Dodge that could do that!



# OWNERS REPORT on the 1953 DODGE

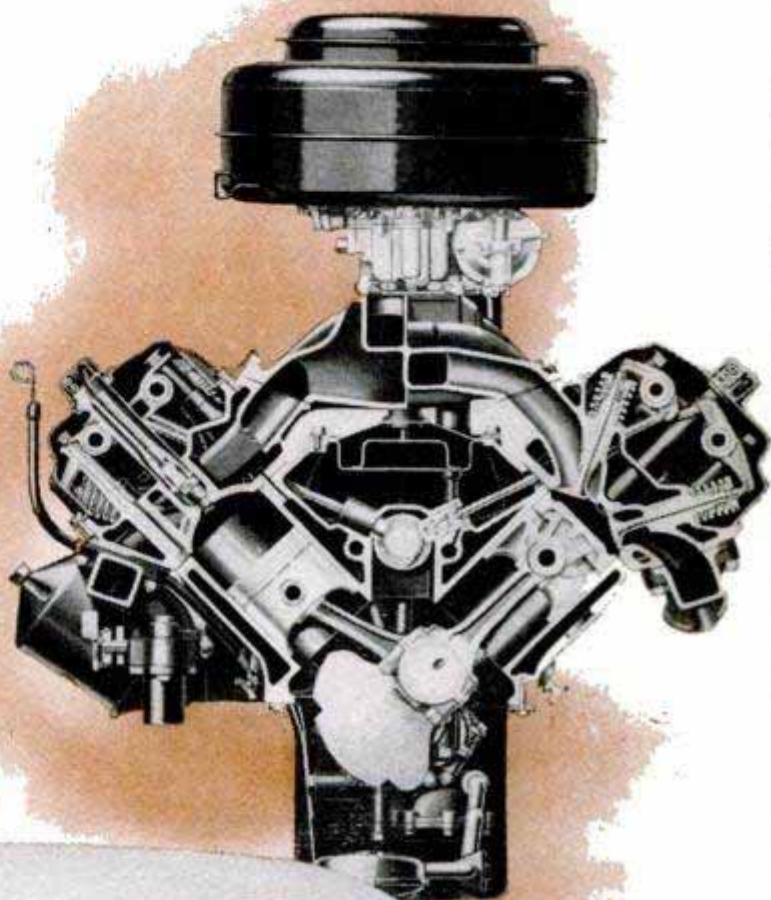
**D**ODGE OWNERS are anxious to talk about their 1953 cars—and that's understandable because Dodge has a brand-new V8 engine plus an all-new body. Rarely does a manufacturer introduce both in a single-model year. To the owners whom we polled this month, the 140-horsepower engine (called the Red Ram V8) is the outstanding talking point.

The belief, as expressed by a New Milford, N. J., inspection supervisor that "Chrysler products are best from an engineering point of view" was echoed frequently by the Dodge owners. A Cleveland, Ohio, inspector gave among his reasons for buying a new Dodge, "The little odds and ends in the car that Chrysler builds better . . . such as turn signals, windshield wipers, battery case. . . . Comfort for passengers is stressed rather than styling."

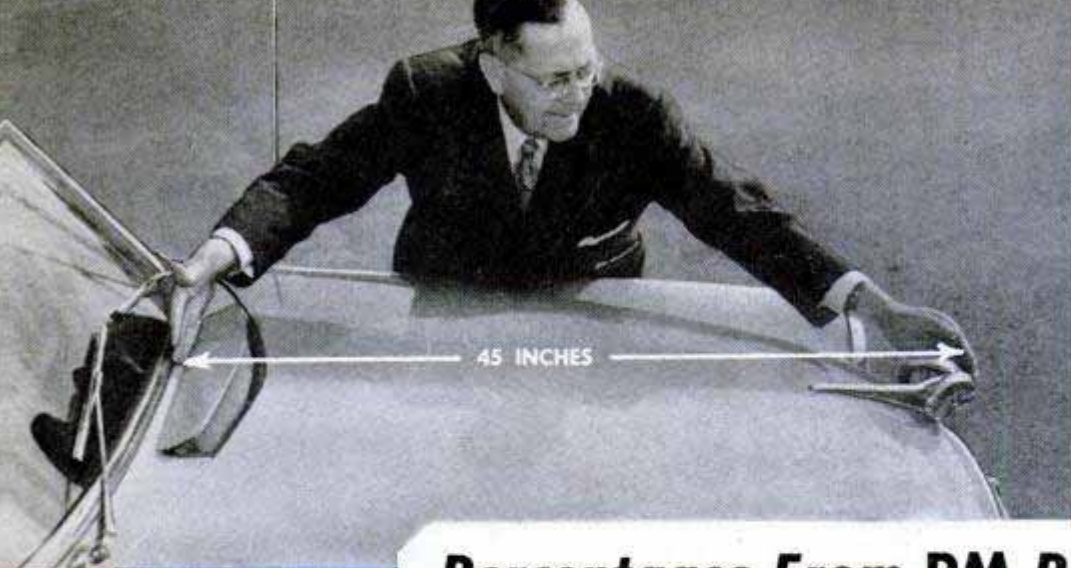
Dodge engineers will certainly like this comment from a Texas sheriff: "My main reason for buying a new Dodge is that I need a fast car in my business, one that I can depend on in any kind of weather. There won't be many cars that can get away from my Dodge."

By Floyd Clymer

Drawing shows short piston travel in the Red Ram V8



Big news in the Dodge line in 1953 is the V8, so Clymer made his test in a four-door Coronet V8. Seventy-five percent of the owners in the survey also drive the Red Ram V8



Clymer found out Dodge's short hood, only 45 inches from ornament to the windshield, gives fine visibility directly ahead of the car

## Percentages From PM Poll

	V8	Six
Owners of Coronet V8.....	75%	
Meadowbrook 6.....		25%
Owners using regular gasoline..	68%	85%
premium gasoline..	32%	15%
Average gasoline mileage		
in country .....	19.6 m.p.g.	18.7 m.p.g.
in city .....	15.9 m.p.g.	15.2 m.p.g.
<i>(Overdrive-equipped cars did 2.8 m.p.g. better than Gyro-equipped cars)</i>		
Average mileage for adding one quart oil.....	1251	1346
Owners having		
Gyro-Torque Drive.....	65%	
Gyro-Matic Drive .....	27%	43%
conventional with overdrive	5%	28%
conventional only.....	3%	29%
Owners rating roadability		
excellent .....	77%	62%
good .....	21%	36%
unsatisfactory .....	2%	2%
Owners rating acceleration		
excellent .....	75%	28%
good .....	21%	50%
adequate .....	4%	22%
poor .....	1%	1%
Owners rating maneuverability		
excellent .....	86%	85%
good .....	14%	15%
unsatisfactory .....	1%	
Average cruising speed reported	60 m.p.h.	56 m.p.h.

### OWNER COMMENTS ON PARTICULAR FEATURES

	Like		Acceptable		Dislike	
	V8	Six	V8	Six	V8	Six
Visibility, forward...	93%	100%	5%	0	2%	0
Horsepower output...	91%	55%	8%	41%	1%	4%
Visibility, rear.....	86%	96%	10%	4%	4%	0
Riding qualities.....	77%	83%	20%	17%	3%	-1%
Exterior body styling..	76%	79%	23%	21%	1%	0
Interior body styling..	65%	66%	29%	21%	6%	13%
Door handles.....	67%	47%	18%	40%	15%	13%
Shorter wheelbase...	60%	55%	26%	30%	14%	15%
					V8	Six
Previous owners of Dodge cars.....					79%	53%
Previous owners of five or more Dodges.....					17%	6%
Owners who will buy another Dodge.....					72%	55%
might buy another Dodge.....					21%	40%
will not buy another Dodge.....					7%	5%
Owners rating dealer service excellent.....					52%	45%
good .....					24%	19%
average .....					15%	32%
poor .....					9%	4%

### OWNERS' RATING OF CAR

	V8	Six
Excellent .....	59%	34%
Good .....	33%	51%
Average .....	5%	9%
Poor .....	3%	6%

### CHIEF PURCHASE REASONS

*(Order of popularity)*

	V8	Six
Previous satisfactory Dodge ownership.....	1	4
Red Ram OHV V8 engine.....	2	
Mechanical features—engine, transmission, etc.	3	1
Styling—exterior and interior.....	4	2
Driving ease and handling qualities.....	5	7
Because Dodge is made by Chrysler.....	6	8
Purchase conditions—trade-in allowance, dealer service, etc.....	7	3
Riding qualities .....	8	5
Economy of operation and maintenance.....	9	6

### MOST FREQUENT COMPLAINTS

Rattles, body squeaks—poor fitting or assembly	1	1
Engine noisy—tappets especially.....	2	
Short wheelbase .....	3	
Heater unsatisfactory—slow or poorly located. (Many owners reported heaters unavailable.)	4	
Mechanical difficulties—brakes, shock absorbers, etc.....	5	
Location of rear-view mirror.....	6	
Interior trim or upholstery poor or poorly fitted	7	2
Riding qualities—choppy ride from short wheelbase.....	8	
Low gasoline mileage.....	9	
Thin or poor paint work and chromium trim..	10	3
Low power for acceleration or hill climbing..	4	

### IMPROVEMENTS DESIRED IN NEXT CAR

*(Order of preference)*

	V8	Six
Tighter body fitting, better workmanship....	1	1
Longer wheelbase .....	2	
Quieter engine—less valve noise, etc.....	3	
Increased gasoline mileage.....	4	
Larger or heavier car.....	5	6
Fully automatic transmission—no clutch pedal.	6	3
Easier steering—power-assisted or otherwise..	7	
Relocate rear-view mirror.....	8	
Better quality interior trim and upholstery....	9	4
Interior light controlled by doors on both sides.	10	5
Increased horsepower .....		2



But several owners agreed with a Canton, Ohio, man who said: "Gyro-Torque shift from third to fourth gears is somewhat slow (1½ to 2 seconds release time for shift)." This is said frequently about Gyro-Matic and Gyro-Torque.

One way to judge a new model is by the response to the question, "Would you buy the same make again?" In the Dodge survey, 72 percent of the owners said yes, 21 percent said possibly and 7 percent said no. More than 79 percent of the owners replying had owned one or more Dodges previously. The survey emphasized the V8 trend in that 75 percent of our sample had purchased the new Coronet V8 and only 25 percent had bought the Meadowbrook 6 or Meadowbrook Special.

Other comments by Dodge owners were: "This new Dodge is terrific compared to my 1951 Diplomat. Terrific getaway at lights and terrific passing power at all speeds. There are no rattles, believe it or not."—Waltham, Mass., assembler.

"I'm very satisfied; I feel I have a luxury car in the small-car field."—Rockville Centre, N. Y., physician.

"I have had Dodges since 1920, and I wanted to try the new V8 engine. Parts are cheap and always available and Chrysler stands behind its products."—Phoenix, Ariz., teacher.

"My Dodge dealer is tops and stands back of the car with good service at reasonable prices. The car is fast and easy to handle—economical, too."—Chicago attorney.

As always, our questionnaire asked about specific complaints. One of the most frequent was the shorter wheelbase; 60 percent of the V8 owners like it, 26 percent say it is acceptable and 14 percent dislike it. As in most surveys, several replies indicated dissatisfaction with the gas mileage. The over-all averages show that Dodge owners get 19.6 miles per gallon in country driving and 15.9 in the city. Considering the fact that 77 percent of the owners had Gyro-Torque or Gyro-Matic Drive (Chrysler's versions of automatic transmissions) this mileage is not too bad, as all automatic-transmission cars, regardless of make, get from 2 to 4 miles per gallon less than the same make and model using conventional or conventional with overdrive transmissions. Owners of overdrive cars reported 2.8 miles per gallon better than Gyro-equipped cars and, surprisingly, owners of six-cylinder Dodges av-



Front-end springing could be stiffer, according to Clymer. It is so soft that there is a tendency to "roll" on sharp turns

eraged nearly 1 mile per gallon less than V8 owners.

Several persons remarked that the rear-view mirror is in the wrong place and sometimes obstructs forward vision. "It is dangerous in . . . a sudden stop," one owner said.

Miscellaneous dislikes included:

"Mechanics for Dodge dealers are not acquainted with new models before the cars are sold to the public."—Chicago fireman and Dearborn, Mich., construction examiner.

"The ash tray is in the wrong spot for the driver."—Ft. Collins, Colo., housewife and Bellefontaine, Ohio, Air Force officer.

"There is a blind spot at each corner of the windshield. The heater is noisy and not adequate for very cold weather."—Ogden, Utah, Army officer.

"People driving alongside us tell us to close our door tighter when it is closed but doesn't look it."—Reported by an Ocean-side, N. Y., housewife.

"I don't like the hole in the top of the hood. There ought to be some other way to get better engine ventilation."—Waco, Tex., attorney.

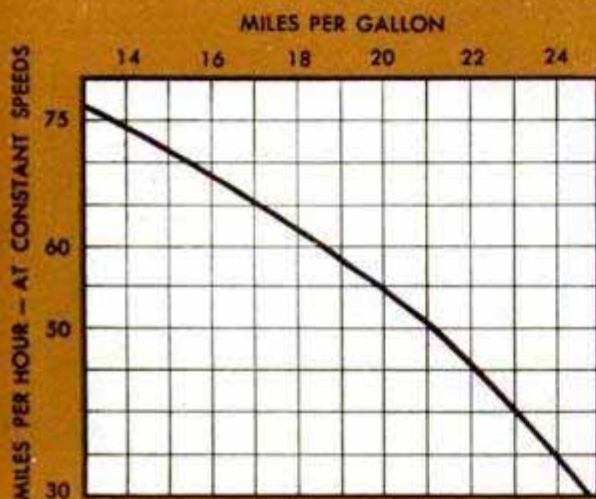
Gas-filler opening in the rear is more satisfactory, but some owners said the pipe didn't have enough slope to handle flow





High-speed driving over blocks convinced Clymer that the owners are right when they say the new Dodge has good riding characteristics

### ECONOMY TEST—1953 Dodge V8 Coronet Gyro-Torque Transmission



At constant 30 m.p.h.....	24.8
At constant 50 m.p.h.....	21.1
At constant 60 m.p.h.....	18.6
At constant 75 m.p.h.....	13.6

#### CROSS-COUNTRY DRIVING

Los Angeles to Las Vegas, Nev.....	22.9
Las Vegas to Lake Arrowhead mountain resort.....	20.3
Lake Arrowhead via Mojave Desert and Bakersfield to Los Angeles.....	23.4
Regular gasoline of various brands used during test	

#### ACCELERATION TEST

¼ mile from zero	19.4 sec.
½ mile from zero	32.2 sec.
0 to 30 m.p.h.	5.1 sec.
0 to 60 m.p.h.	16.3 sec.

All tests made using Drive Range.  
Top speed by speedometer.....110-112 m.p.h.  
Actual top speed about 8% less (speedometer variation)

"I expected more than I got for the \$3300 I paid. Not enough car for that money. Chrysler should put a little more into its cars with less emphasis on immediate profit."—Summit, N. J., woman.

The question, "What specific improvements do you want in your next car?" always brings a wide variety of replies. This time several owners, including a Mt. Vernon, N. Y. secretary and a Girard, Kans., farmer suggested that the hood lock be returned inside the car. Others prefer push-button door handles to Dodge's pull-out type. A Cheyenne, Wyo., pipe-line tester and a Nashville, Tenn., fireman suggest that the Coronet model "needs more slope on the gas-tank filling spout." A Detroit bookbinder and others wished for some cheap type of power steering. As previously noted, many of the owners prefer a longer wheelbase.

Several Meadowbrook owners, including a W. Quincy, Mass., carpenter, said they had bought their cars because they knew the reputation of Dodge trucks as being tough and durable.

"Chrysler products are the best engineered cars in the world. I've owned 58 cars (20 of them Chrysler-built) and in 40,000 miles of driving per year I find Dodge cars cost me less per mile to run than any other make and I've tried them all."—Los Angeles salesman.

A Detroit painter praised his Meadowbrook highly but observed that "the brake pedal is too close to the steering column. The driver's foot hits the post unless he turns his foot sideways."

A Topeka, Kans., man wrote: "When Dodge is able to perfect its bodies . . . it will then be at the peak of perfection. Dodge has the best motor on the road."

A Las Vegas, Nev., owner said: "The assembly of all makes of cars is 'lousy.' Poor workmanship and lack of interest seems to predominate instead of the pride in workmanship we had before the war. Dodge is no worse and no better than any other make and I like my V8 real well. Economy is good and it handles fine on desert roads."

A Los Angeles contractor said: "One oiling system for both engine and torque converter is excellent and a timesaver; one oil check is all that is needed for both units. Chrysler engineers are always a step ahead."

One comment that might apply in a survey of any make came from a Wyandotte, Mich., steelworker who wrote: "I like the '53 Dodge very well, but being in the steel mills I know pretty well what goes into the body, frame and such. I don't think much of any of the late-model cars. You can't expect

(Continued to page 260)

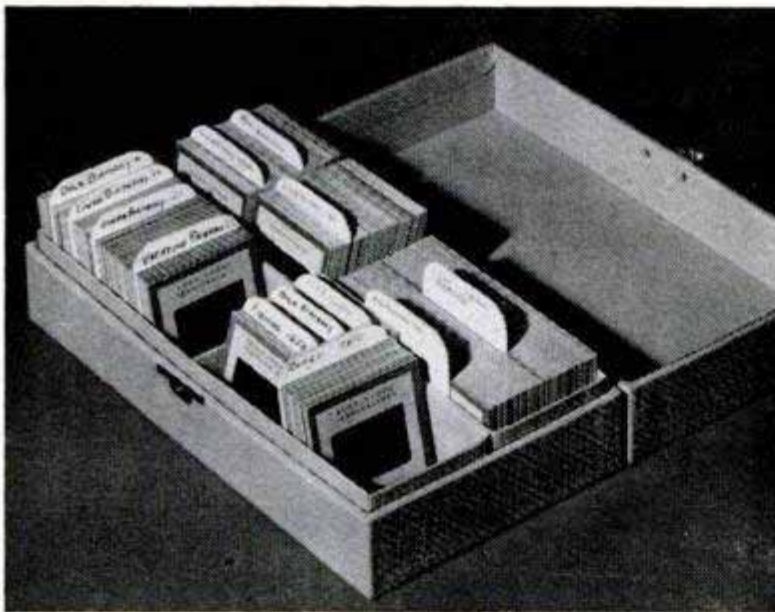


## Sweden Tests Small Single-Place Delta-Wing Jet

In-flight changes in a new Swedish delta-wing airplane's center of gravity are made by pumping liquid between trim tanks in the nose and tail. The Draken, made by the Saab Company, is also unusual in hav-

ing a wing that is longer than its span. A turbojet engine powers the experimental craft and a drag parachute cuts its landing run. Equipment includes a camera for recording fluctuations in the instruments.

## Roomy File Case Holds Two-Dimension or Stereo Projection Slides



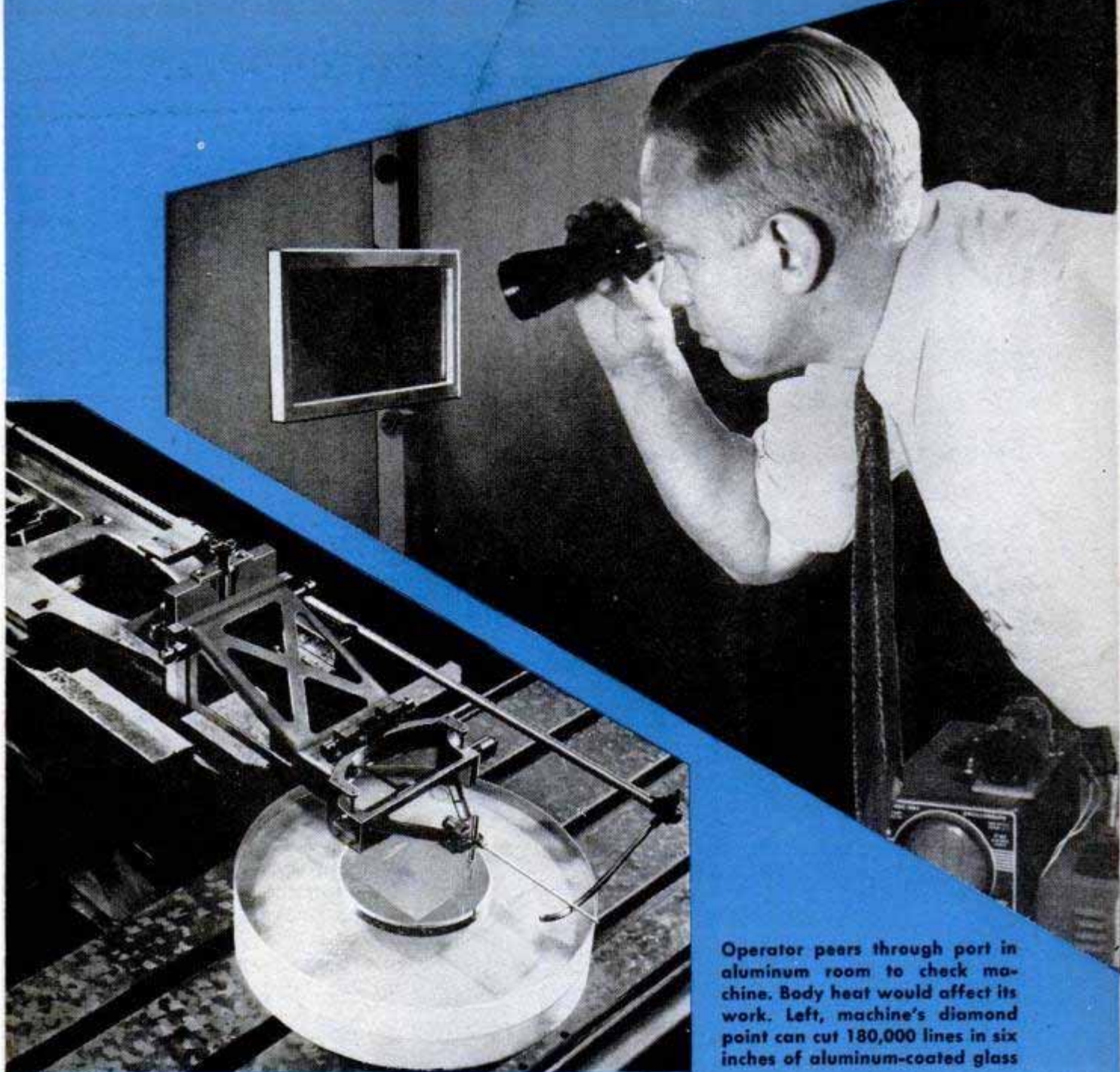
Sturdy and attractive, a file box for 2 x 2-inch transparencies snaps shut for easy carrying. The box will hold either 360 cardboard slides, 124 glass slides, or 160 stereo slides. It contains four sections and 12 removable dividers, permitting the titling of as many as 16 groups of slides. The dividers, which project well above the tops of the slides, carry subject titles and permit quick location of films by the projectionist.

☐ Approximately 200,000,000 motors are at work in American homes today, estimates Westinghouse, with the average urban home using from 12 to 15 units.

## Darts Impelled From All-Steel Blowgun Can Pierce Plywood

Sportsmen who tire of such newfangled weapons as the rifle and shotgun can turn back the pages of history and hunt with a blowgun. A modern version of the ancient weapon of the tribes of Borneo, it is five feet long and will shoot a steel dart through a sheet of 1/4-inch plywood at distance of 30 feet. The gun has a 1/2-inch bore and is all steel except for a mouthpiece. Darts are impelled by a quick, forceful puff.





Operator peers through port in aluminum room to check machine. Body heat would affect its work. Left, machine's diamond point can cut 180,000 lines in six inches of aluminum-coated glass

## “BURIED” LABORATORY

**I**N AN UNDERGROUND laboratory at Rochester, N. Y., there's a machine so sensitive that if a person stands over it for a few minutes it may be thrown out of adjustment for many hours. The slightest temperature change may cause intolerable errors in its work.

This remarkable instrument of the Bausch & Lomb Optical Company is a ruling engine for making diffraction gratings. Its job is to cut grooves in glass, but its work is done with such precision that it may cut as many as 180,000 lines in a six-inch glass. The resulting grating performs the same function as a prism—it analyzes the light from a sample of any unknown

substance to identify its ingredients. Such gratings and prisms are indispensable to science and industry.

The heat from a person's body may expand the grating machine by as much as 1/10,000,000 inch, which may cause a “big” error in its work. Therefore, the instrument has been installed below ground in a room within a room, and elaborate precautions are taken to protect its environment.

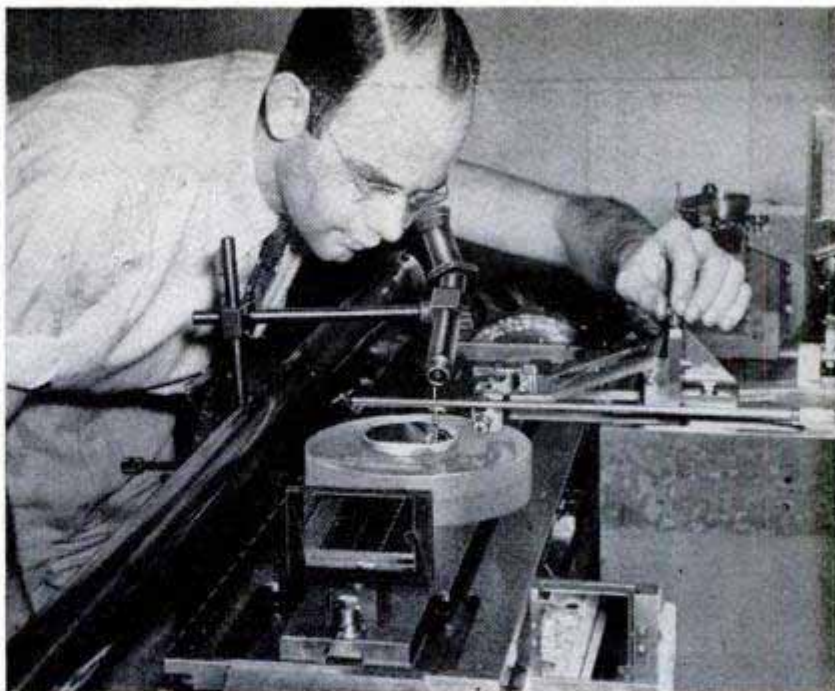
The laboratory is built on solid rock with side walls 21 inches thick. The floor itself, covered with a vibration-absorbing material, measures 13 inches in thickness. The grating engine is mounted on a three-ton block of concrete and the entire mass is

supported on steel springs. An aluminum room has been built all around the instrument, so in effect it is floating in air. A special air-conditioning system prevents the temperature from varying more than  $\frac{1}{10}$  degree, and the humidity is kept almost constant. Thus the grating engine and the gratings upon which it works are almost free from disturbances of temperature, humidity and vibration. To isolate it further, some of the engine's operating parts are floated in mercury. The operator remains outside the room when the machine is at work.

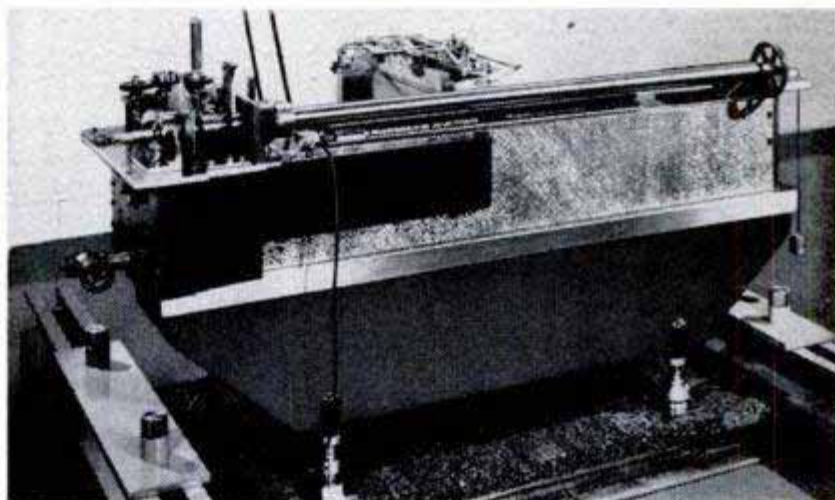
A diamond point engraves precise, parallel grooves in the glass. Just as important as the number of grooves per inch is the kind of grooves, for each groove must be cut to exactly the right shape or the light reflected from it might cause an error in spectral analysis. By varying the shape of the grooves, the operator can produce gratings for special jobs.

Although gratings are seldom seen or heard of outside a laboratory, some scientists class them in importance with the microscope. Thanks to the laboratory and its temperamental tool, even more precise gratings now are being made for science and industry.

\*\*\*



Precise adjustment is made in the ruling diamond, for the shape of each cut is just as important as the number of cuts per inch. Below, the machine is mounted on springs which rest on a block of concrete. Concrete, in turn, rests on bedrock and entire room is air-conditioned

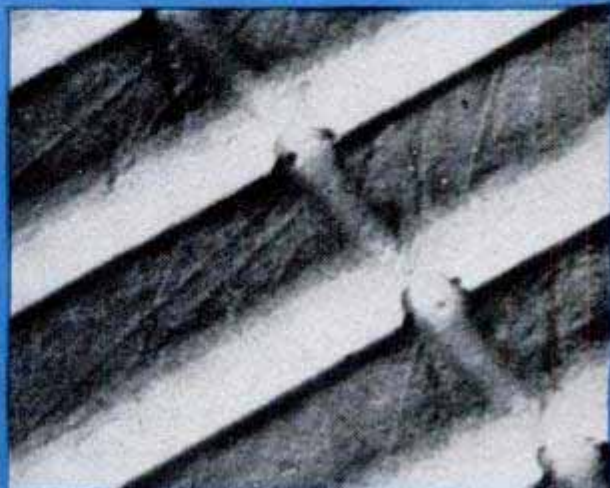


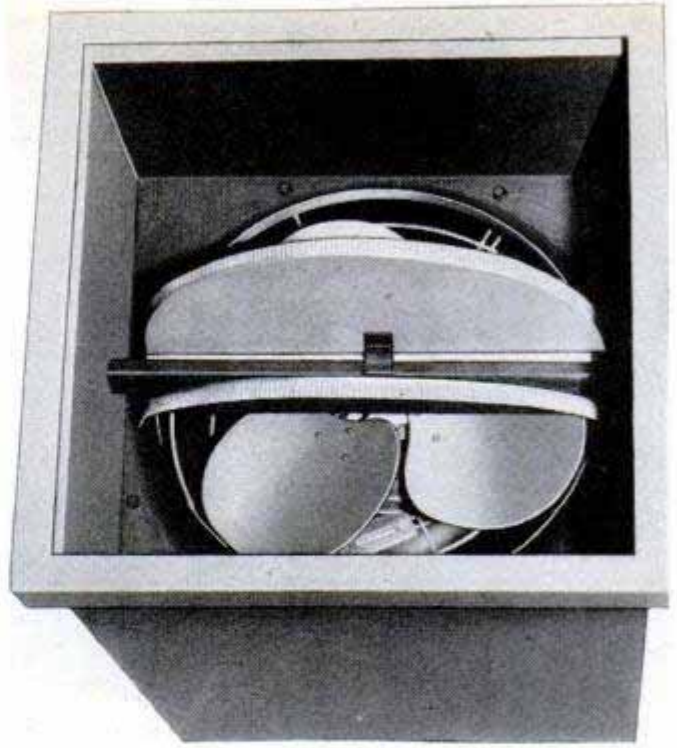
## GROOVES GLASS

Photomicrograph, taken at a magnification of 20,000, shows just a few of the 50,000 ruled lines per inch



Photomicrograph at 7900 magnification has fewer lines. Line at right angle is a scratch in the glass





## Dummy Chimney Contains Complete Attic-Fan Unit

Eliminating the need for large louvers on the gables of a house, a direct-drive attic fan is housed in a dummy chimney that is attached easily to the roof. The packaged unit comes complete with a  $\frac{1}{4}$ -horsepower motor and automatic dampers with rain

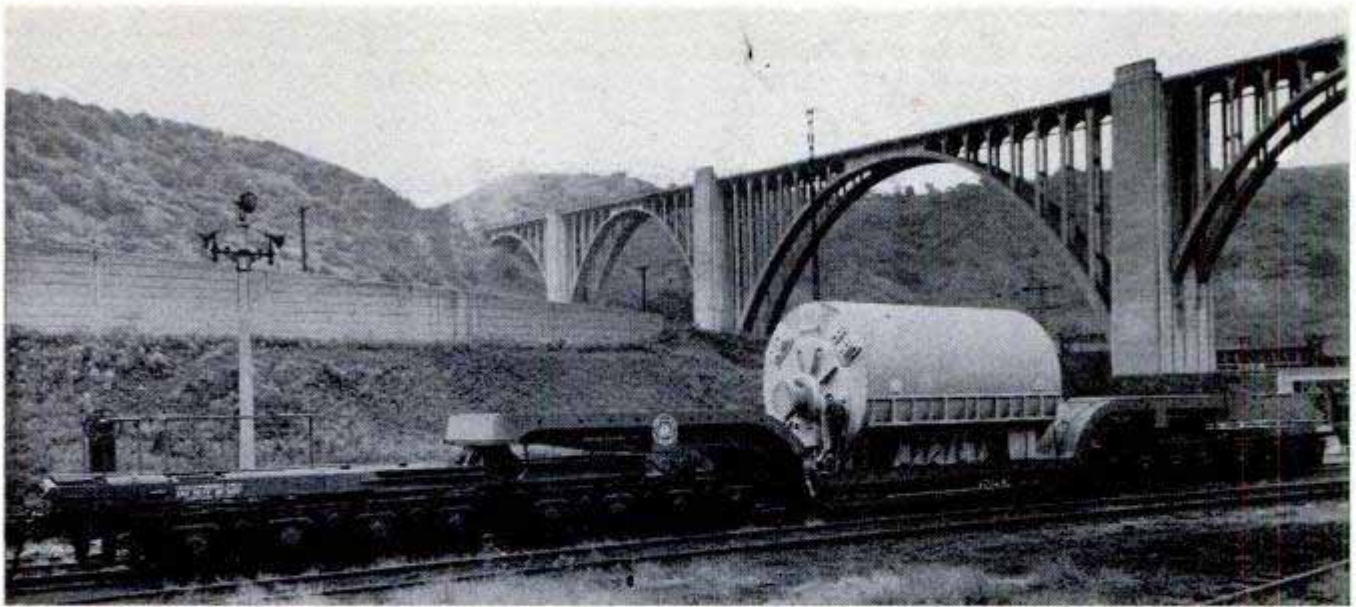
drains. Only the chimney is visible from the outside of the house. The overhead dampers open automatically when the fan is in operation. Variable speeds cause an air movement of 2000 to 3000 cubic feet per minute, ample for the average home.

## Electronic Sentinel Warns of Approaching Objects



Guarding the entrance to a New York research center is a radarlike detector which signals the approach of cars and people. Extremely short radio waves are focused into a beam by an 18-inch aluminum reflector placed in the gatehouse and aimed toward the road. If the object is stationary, nothing happens but, if it is moving, the returning waves successively go in and out of step with those being sent out, causing an alarm to operate. A moving person may be detected at 100 feet, an automobile at several hundred feet. Main difference between the device and radar is its continuous, rather than pulsing, signal. The proximity fuse, which is actually a tiny radio transmitter in itself, is the detector's closest military counterpart.

☐ America's transportation system includes over 27,000 miles of inland waterways; 40,000 miles of airways; 150,000 miles of pipe lines; 227,000 miles of railroads and 3,300,000 miles of public roads.



## Underslung Flatcar Is Designed to Carry Large Loads

One of the largest railroad cars ever constructed, a 124-foot mammoth weighing half a million pounds carries a load equal to its weight. Freight rests on a lowered platform supported at each end by 16-wheel

sections. A typical mission for the super-flatcar was a recent journey from Pennsylvania to Texas with a giant 90,000-kilowatt turbogenerator, shipped completely assembled and ready for installation.

## Inexpensive Drug May Eliminate Malaria

Malaria, the world's foremost disease problem, could be eradicated completely by a powerful new drug, in the opinion of some authorities. Called daraprim, the drug is 12 or more times as powerful as chloroquine, the standard antimalarial drug. Daraprim is inexpensive to manufacture. Unlike some suppressants, it is

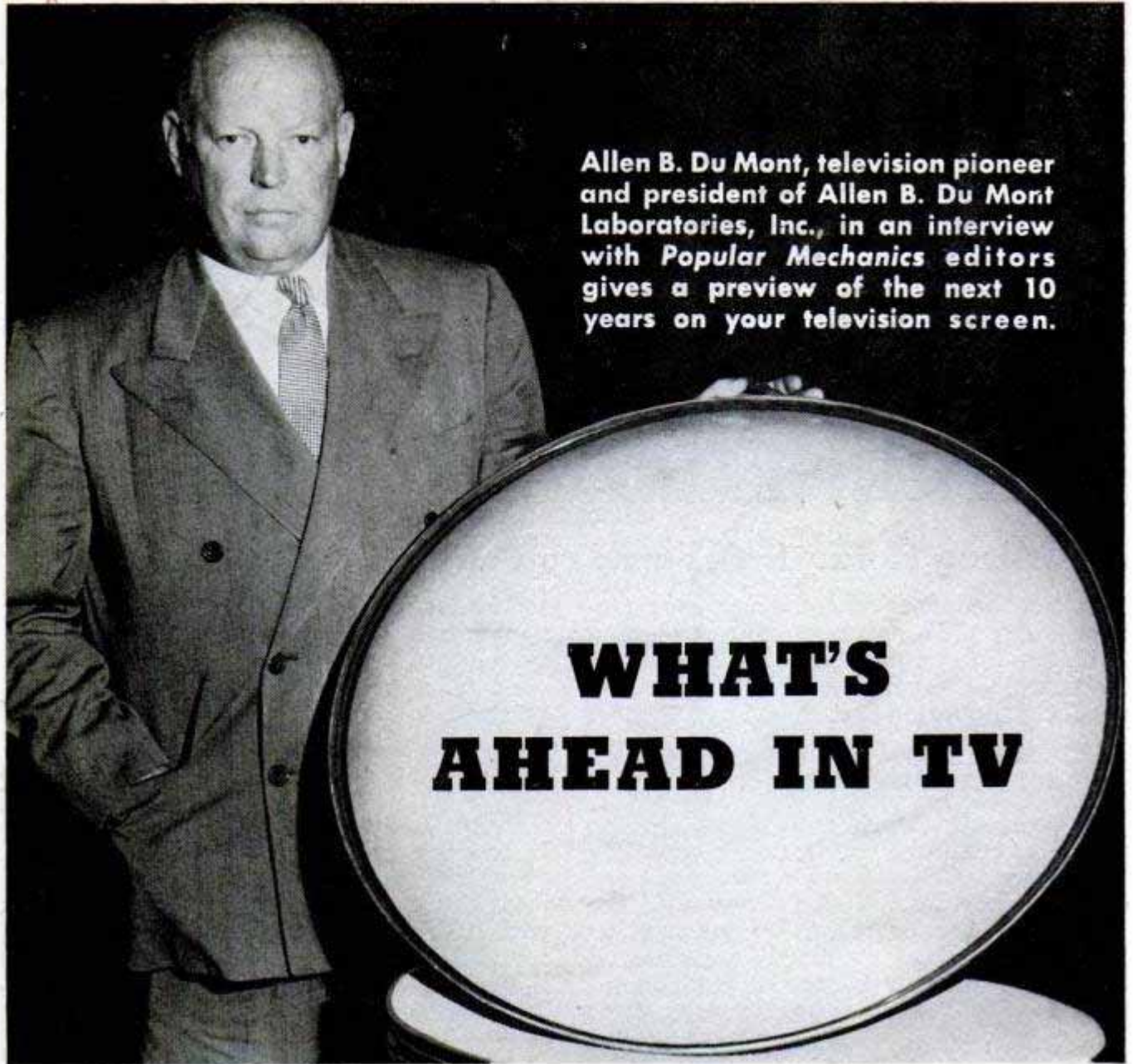
tasteless and does not discolor the skin. In one test in an isolated African village, every person was treated at a time when most of them would normally be infected with malaria. The human population was completely cured and the mosquitoes in the area, which would have picked up the infection, also were malaria-free.

## Recording Mask Uses Microphone for Speeding Rate of Dictation

With a new recording mask an inexperienced stenographer can take 200 words of dictation per minute and an expert can double that speed. The mask can be used to record the words of a lone dictator or those of several men seated around a conference table. It consists of a rubber-and-plastic cover which fits over the lower portion of the stenographer's face. Inside the soundproof cover is a microphone which can be connected to any conventional dictating machine. The operator simply repeats the words she hears immediately after they are spoken. The mask prevents her voice from being audible to anyone in the room. When she wishes to transcribe the dictation, she sim-



ply plays it back on an ordinary transcriber and listens to her own voice. In addition to speeding dictation and eliminating errors in the use of shorthand symbols, the mask makes it possible for the blind to take dictation at a fast rate of speed.



Allen B. Du Mont, television pioneer and president of Allen B. Du Mont Laboratories, Inc., in an interview with *Popular Mechanics* editors gives a preview of the next 10 years on your television screen.

## WHAT'S AHEAD IN TV

**QUESTION:** Two years ago you objected to the efforts that were being made to establish a system of color TV. Do you still feel we're not ready for color?

**ANSWER:** The objections I voiced had to do with the quality of the proposed systems. We have had color for some time. In 1928, Baird demonstrated it in England. We had hearings in this country in 1941 and 1946. At those times the Federal Communications Commission decided it was not ready. Then, in 1948, we had additional hearings. In spite of the fact that the industry was unanimously opposed to the introduction of color, the commission went ahead and standardized on a system that I felt never had a chance. That particular system was an incompatible system, fundamentally mechanical. The larger you made the picture the more difficult it became. For instance, if you wanted a color picture on the 21-in. receivers we have today, you would need a 6½-foot color disk and a 15-horsepower motor on it. It is quite obvious

that this is not practical in the home.

**Q: What about the rotating-drum type?**

**A:** It makes the set a little smaller, but it is still a tremendous apparatus, with about 2½ times the cubic content of the present set. There are many other objections. It has only a third the detail of present black-and-white sets. Furthermore, you only transmit 24 pictures a second, so if you have a bright picture, you get flicker. A terrific disadvantage is the fact that it is incompatible. When you transmit those color signals over the air, none of the black-and-white sets can receive it unless you put this tremendous disk or drum in front of the cathode-ray tube and make changes in sweep circuits and various components. The reason I have been opposed to color is that I did not think this system was ready. Another system proposed in the 1948 hearings, the so-called electronic system, had just been born. It was not, and still is not ready. After the hearings, major manufacturers formed the National Television Sys-



tem Committee. This committee has been trying to develop a satisfactory electronic system. They are now transmitting daily experimental programs for field testing in Philadelphia, New York, Syracuse and Chicago. Our tests show that circuitwise the thing looks pretty good. The difficulty at present is the factory cost of the cathode-ray tube—about \$200. That means a 17-inch table-model set would sell for between \$600 and \$700, or possibly more. There is another objection. The color picture is not as sharp as black and white. It is a serious problem to register three colors. That problem, together with the cost of the tube, has to be solved before color is commercially practical.

**Q: Will development of the new tricolor tube help speed things along?**

**A:** It is a step in the right direction. So is the system they are working on. This electronic system is compatible. You can transmit these color signals over the air and they can be received excellently by all the present black-and-white receivers. Furthermore, this system has the potential of providing just as good a detail as the present black-and-white system. Thirty pictures are transmitted per second, as they are in the present system, so you have no apparent flicker. It also has the advantage that the larger you make the picture the easier it is to make the tube, which is just the reverse of the other system.

**Q: When am I likely to be able to buy a color-television set?**

**A:** Just a rough guess would be five to ten years from now. In my estimation, it will be at least a year before the N.T.S.C. will be able to submit the system to the F.C.C. Judging by the speed the F.C.C. has shown in the past, I would be surprised if they decided on anything sooner than three years after they received it. That makes four years. It will take at least a year after that for manufacturers to tool up and get into production. So, five years, with everything going right, would be the absolute minimum. I think it will be longer than that. Even when we have color, the receiver will always cost about twice as much as a corresponding black-and-white receiver. And I think color programs will always be a relatively small percentage of the total programs transmitted. I cannot see where color will supplant black and white for many years, if ever. Your receiver is more expensive. It costs much more to put those programs on the air. You have had the same situation in color movies. Today only about 20 percent of all movies are made in color.

**Q: Are there any startling advances in the wind for black-and-white television?**

**A:** There have been terrific advances

since 1946. We have gone from a small to a large tube so people can sit anywhere in the living room and comfortably see the picture. We have gone from a round tube to a rectangular tube, which allows a smaller cabinet for an equivalent size and more pleasing picture. Another advance is the use of a filter face in the cathode-ray tube. What that does is to give you a good picture in a normally illuminated room without losing contrast. The use of a cylindrical instead of a spherical face lets you sit in a room with lights lit and the light does not reflect back. Another advance you'll see more and more is the self-focusing cathode-ray tube. All these things are what happened just to the tube. Noise immunity of sets has been improved tremendously. In the early days, automobile ignition, diathermy and so forth, would cause the picture to jump around. Now you can have a steady picture even in places so remote you can hardly see the image. The complexity of the controls has gone way down. We never had much trouble teaching the kids to run the set, but people over 40 had a heck of a time tuning them. Now even grownups can tune a set. We have found out how to do things with less parts and less tubes. Cost has come down and the reliability has gone up.

**Q: Are there any startling improvements that we may see in the next year or two?**

**A:** Now, with the lifting of the band freeze, the F.C.C. has added 70 additional channels. So, people in the remote parts of the country will soon be able to receive TV signals. It costs more to put in a tuner that covers the 82 channels, so I think more-expensive models will have 82 channels. Other models will have only 12 channels. In the models with 12 channels, if you are in a district where there are ultra-high-frequency transmitters, you can put a "strip" in the set. It is a much cheaper way of doing it.

**Q: Would you explain just what the new UHF channels will do for TV?**

**A:** These ultra-high-frequencies give 70 additional channels, so we can have a nation-wide competitive service. With only 12 channels you cannot do that. You have to space your stations 170 or 180 miles apart. And you cannot have three or four stations in the major towns. With this new allocation scheme practically every town of over 5000 population will have its own local television channel.

**Q: There are no systems in use, to your knowledge, that would eliminate the necessity for having microwave stations at such frequent intervals?**

**A:** Absolutely not.

**Q: I had heard that you were working on a light-wave system and hoped you**

might want to say something about that.

**A:** We have been working on a system of transmitting television by means of a light beam, but in that particular case you still have to have stations throughout the country to transmit from place to place. As a matter of fact, with a light beam they'd probably have to be closer together.

**Q: What would be the advantage of the light beam?**

**A:** We have been working on it to try to provide a method of distributing television programs to the smaller cities that can't afford ultra-high-frequency programs. It costs between \$50,000 and \$100,000 minimum for a small UHF station. We are hopeful that our system would provide a transmitter for a small city for between \$5000 and \$10,000. It is purely economics. It would be good only for an area five miles from the transmitting point.

**Q: Approximately what stage of development has your light-beam TV reached?**

**A:** We have been working on it for four or five years and all I can say is that we are making progress. When we started, we could only transmit 50 feet. Now we are up to about a mile and a half or two miles. We want to expand that even more before we go ahead commercially with it.

**Q: Is there any advantage to building microwave links for TV around the world?**

**A:** Microwave circuits are utilized for telephone as well as television signals. They can transmit over a single circuit about 720 telephone conversations simultaneously, and it is a cheaper arrangement. I think ultimately it might pay the telephone people to build microwave circuits to Europe. If they do that, television circuits, likewise, would be available. From what I have seen of the programs in Europe, I doubt whether many of them would give much of a Hooper rating over here. On the other hand, some big event like the coronation this year would be of interest. Of course, they can take that on film and get it over here in pretty short order. But, if you had microwave circuits, your difference in time of five hours would mean that you would do the same thing we are doing on the Coast now. Most of our programs for Coast distribution are filmed and run at a later time. That is all you would use the microwave circuit to Europe for in most cases.

**Q: Is there anything afoot that will beam signals trans-Atlantic or trans-Pacific?**

**A:** I have seen a lot of proposals. They have talked about putting a cable to Europe; also of extending the microwave circuits, which now go to Quebec, up through Labrador, Greenland, Iceland, and then the Faro Islands. Theoretically, I think it can be done. A circuit would require hops of not much more than 250 miles. By using

the low end of the VHF band, I think it is possible to do that. If we could get the proper short-wave frequencies now allotted to radio and so on we could transmit television throughout the world. Some day it may be important to do so. If it can solve all this fighting and create better understanding among people, it might be more important than the circuits we have today.

**Q: Are there any other things on the fire that are likely to simplify television sets so that the set owner is not faced with heavy repair problems?**

**A:** In our new sets, terminals are right at the back of the receiver. A serviceman can put his test instruments on without having to take the chassis out, which speeds things up. New safety glass in front can be removed to change the tube without taking the chassis out of the set. Other manufacturers are following suit.

**Q: What about transistors? Are they likely to figure in television sets soon, and will that influence size of sets?**

**A:** At the present time transistors are in the development stage. They have great possibilities for reducing the size and weight of the television receiver. At the present time the cost of manufacturing transistors is extremely high so that from a commercial standpoint it is not practical to use them. Transistors suitable for replacing certain tubes in a television set cost from \$12 to \$24 apiece, as compared with the cost of tubes which might run from 25 to 50 cents apiece. If the manufacturing processes for transistors can be improved and the cost brought down, they will probably have a wide application in this field.

**Q: Will there ever be portable sets and small table models comparable to the little table model and walkie-talkie radios?**

**A:** For bedside use and for mobile use it is possible. Of course, you will have a smaller picture in that receiver.

**Q: Do you think that perhaps in the next five years we may see these smaller sets of a portable nature?**

**A:** I think there is a good chance that they may come to pass for a specialty market.

**Q: There has been a lot of talk about education by television. What is the cost of setting up a small station in a university and televising programs for classrooms?**

**A:** Sets run between \$200 and \$400, depending on picture size. The transmitter costs between \$50,000 and \$100,000. Cameras and control equipment would add another \$50,000 or \$75,000. That would be an absolute-minimum station. Schools in Philadelphia, Los Angeles and the Montclair State Teachers College have been doing a lot of experimental work with it. They take a central spot and use the finest professors

for instruction throughout the whole state. It should, if it works properly, increase the general level of education and I think it may result in certain economies over what we have today.

**Q: Why wouldn't it be cheaper to do this on film and have projectors in the classroom? There is no time element involved in it, is there?**

**A:** I think there is a time element involved in certain subjects—political history for example. The cost of putting it on film, as we found in commercial broadcasting, is generally two to three times as much as direct pickup. And educators have found that there is something in the intimacy you get by transmitting the programs simultaneously. You lose it in the film. There's another use of television in education at Western Reserve. They have been running actual college-credit courses over a commercial station in Cleveland. A person, by paying the normal tuition fee, can take that course and, at the end, go to the college, take the examination and get full college credit. Of course, anybody can look in and get the information free, but they must pay the fee to take the examination. The lecture over television was 30 minutes instead of 55 minutes as in the college, but students taking it over television had a 15 percent better grade. The reason, according to the president of Western Reserve, was that they used the finest professors on television. Secondly, those professors spent about seven hours in preparation of every

lecture. It is much finer instruction. With overcrowded schools it indicates that, with proper teaching, you might give a person better education in a half day than you do now in a full day, and utilize the schools to a greater advantage. Critics who feel that people will tune in educational programs to the exclusion of entertainment programs, I think are greatly exaggerating.

**Q: Will there be more of this type of education via TV in the next two or three years?**

**A:** Yes.

**Q: Will it be on national hookups or just in local areas?**

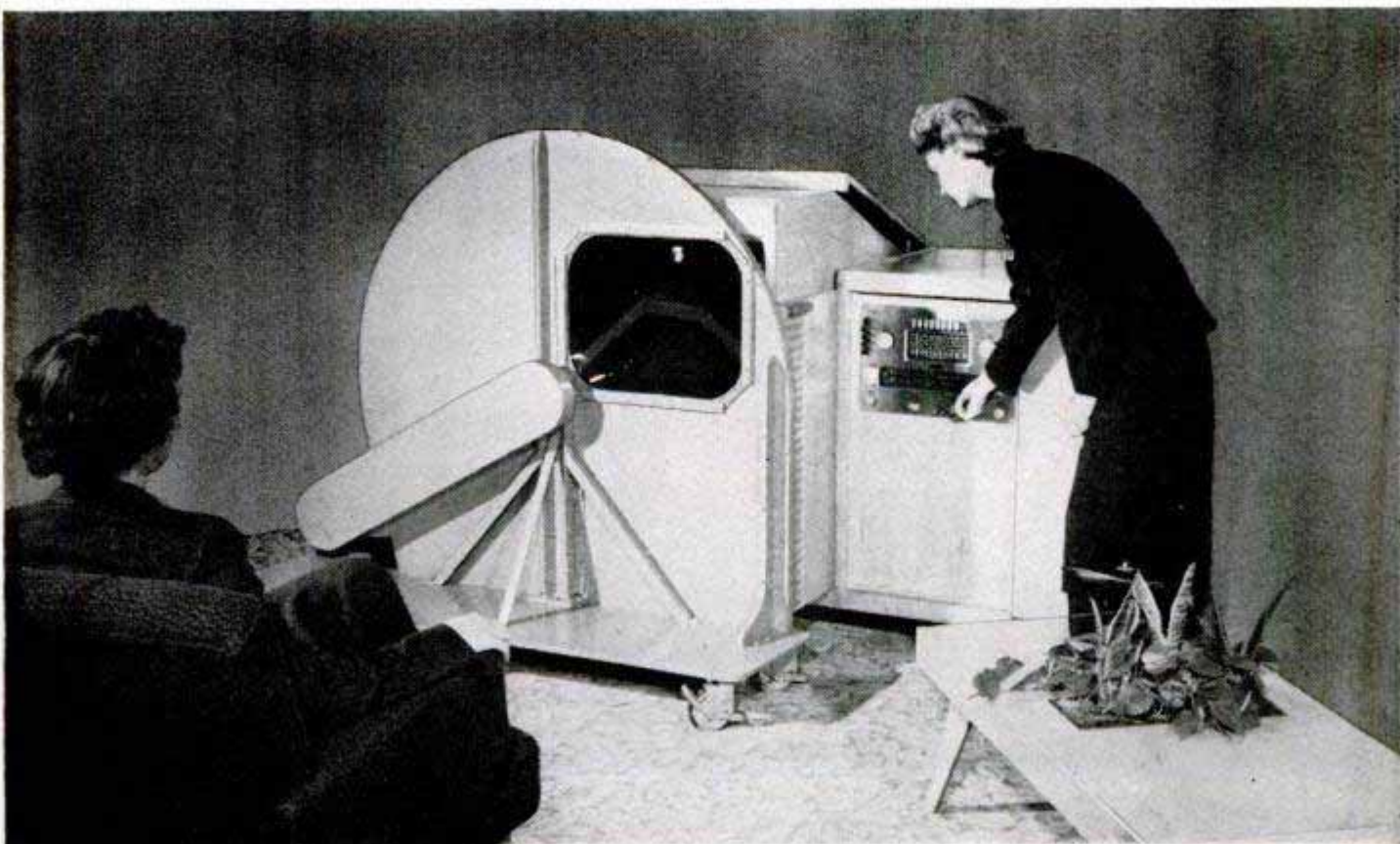
**A:** That is hard to say, but I think it will start with local rather than national.

**Q: What are some of the new things coming up out of the laboratories for TV?**

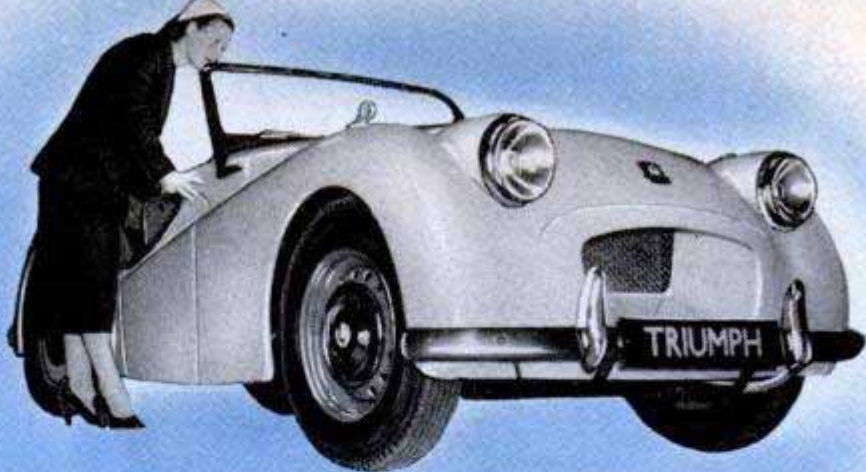
**A:** We have developed much cheaper cameras that are simpler and have fewer controls. They can be left on indefinitely for things like smoke control. The camera monitors the stack. Down in the furnace room men know exactly what is going on up there at any time. They are used to watch dangerous operations like blast furnaces, testing of jet engines and so forth. Television will be used extensively in connection with guided missiles. Several weeks ago the Army in Korea sent pilotless bombing planes out equipped with television which guided the planes right to the spot they wanted to bomb. We have supplied quite a bit of three-dimensional equipment

(Continued to page 254)

Du Mont engineers built this monstrosity to show the size of wheel needed for mechanical TV color system

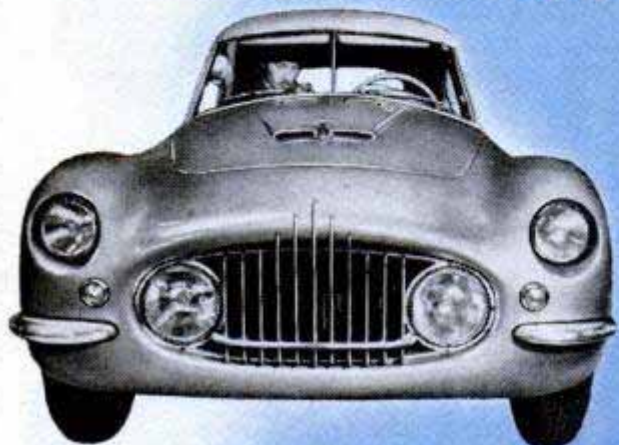


Surprise entry was Standard's Triumph roadster. It has a souped-up Vanguard engine, goes 90, gets 24 miles per gallon. Price: \$1554 in England



## INTERNATIONAL AUTO SHOW FEATURES SPORTS CARS

WITH 300 CARS from six nations on display, the famed motor show at Earl's Court, London, placed marked emphasis on sport models to attract American buyers. Conventional models were shown also (18 United States firms were represented), but most interest was in the sleek sportsters. Cars from France, Italy, Canada and Spain were on display in addition to American and British models.



Above, the sleek Fiat sports car was one of the models brought from Italy. Alfa Romeo and Lancia were also shown



Above, luxury plus is the custom-made Daimler 8 with clover designs in a two-tone-blue paint job

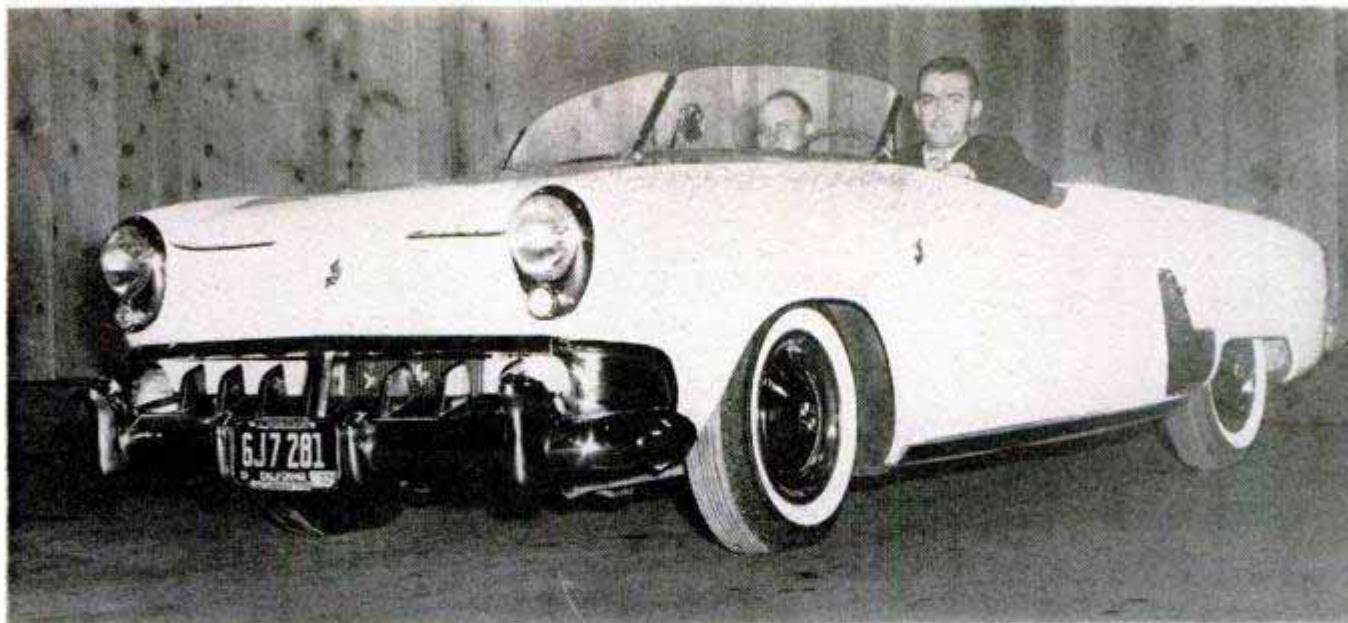


Above, Allard's Palm Beach three-seater comes with four or six-cylinder engine. Below, another Allard, the Monte Carlo, has a bonnet that opens hydraulically



Above, A.C. Motor's Buckland sports car. Rolls Royce displayed the Bentley convertible (not shown here) at the London show. It is designed to hit 120 miles per hour

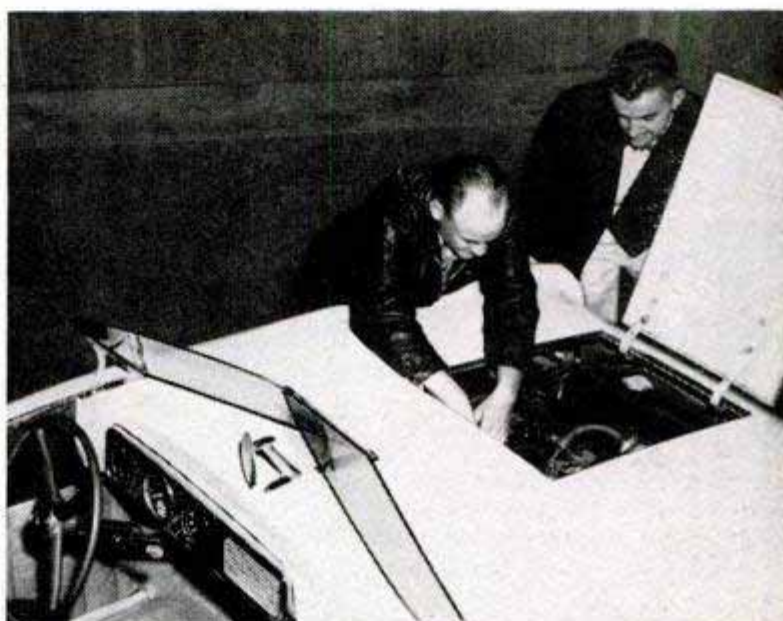




Glimpse of the future is provided by sleek customized automobile that was once just another business coupe

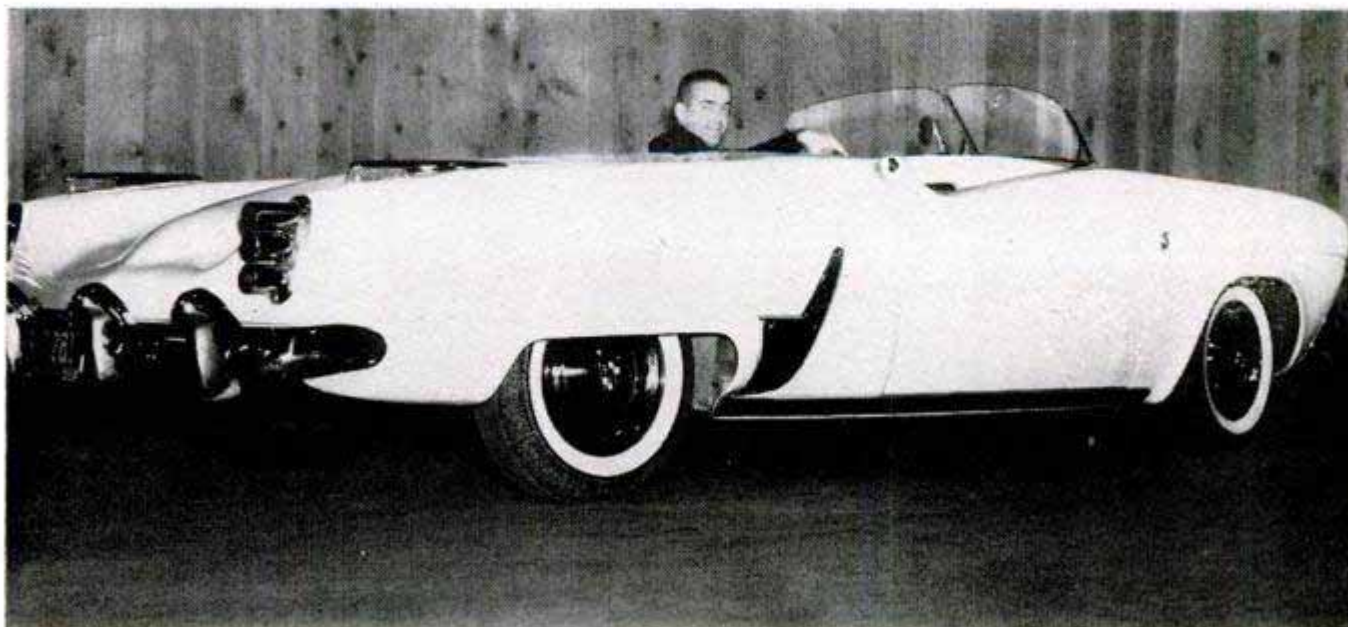
### "Automobile of Tomorrow" Built From 1948 Studebaker

STARTING with a 1948 Studebaker business coupe, Jack McAuley of Merced, Calif., has fashioned a long, low roadster of the future. Conversion included removal of the original body, hand-forming the sheet-metal panels that make up the new hood and deck, and reworking and installing four 1950 Studebaker fenders. Engine horsepower was boosted by increasing the bore and compression, installing high-lift valves and lightening the flywheel. Designed to provide good performance plus a good ride, the car will go 100 miles per hour and delivers as much as 20 miles per gallon of fuel.



Engine is serviced through panel set in middle of the hood. Dimensions of opening permit removal of engine for repairs or replacement. Tachometer was added to standard instrument panel

Attractive rear of roadster allows no access to trunk. Large storage compartment is reached by tilting seat



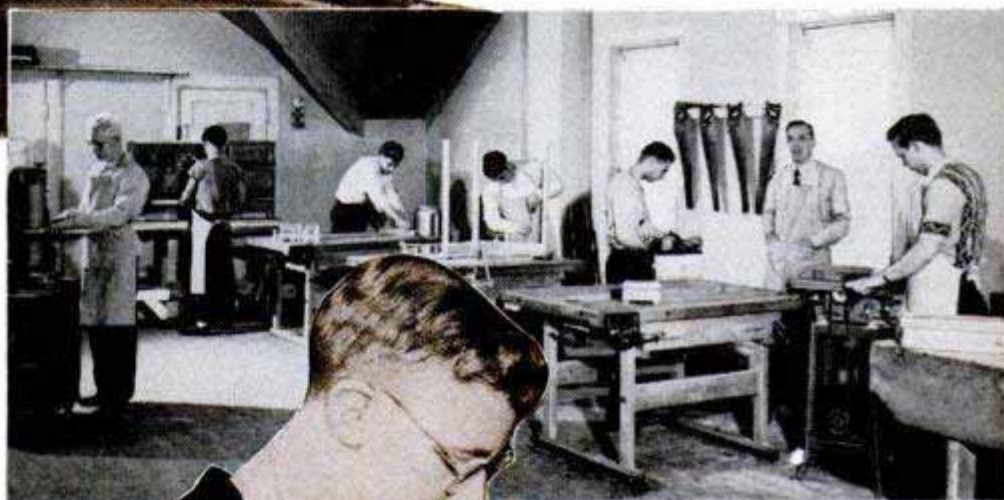
# The Blind Learn Crafts With Power Tools

**W**ISCONSIN IS OBSERVING a quarter-century-long testimonial to the safety of power tools in the hands of blind youngsters. At Janesville, where the handicapped are taught to use standard woodworking machines in preparation for jobs in private industry, there hasn't been an injury serious enough to require stitches since the state school's first powered equipment—an 8-inch Delta circular saw—was installed in 1928. The classes have averaged about 20 pupils yearly. Extra safety devices have never been added to tools used in the shop.

★ ★ ★



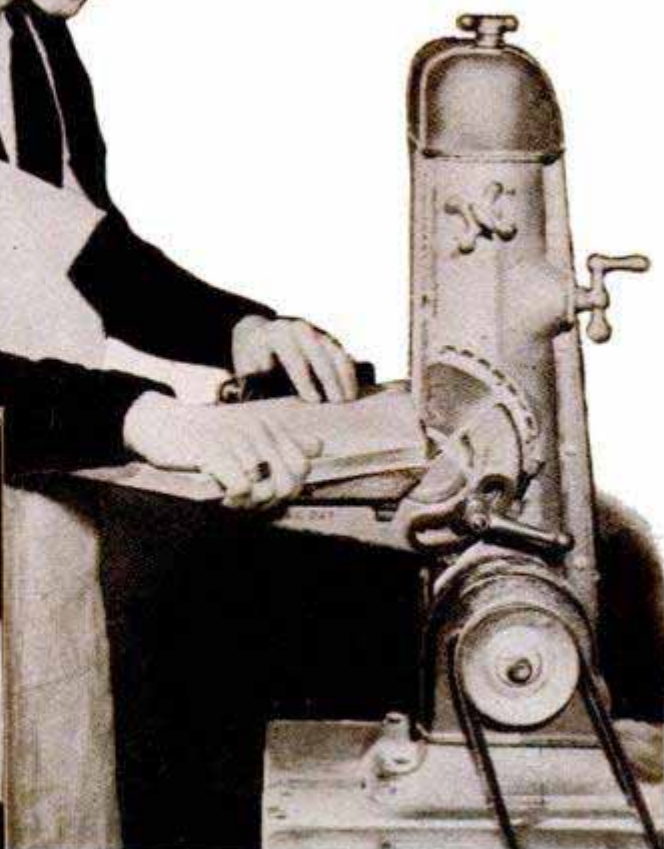
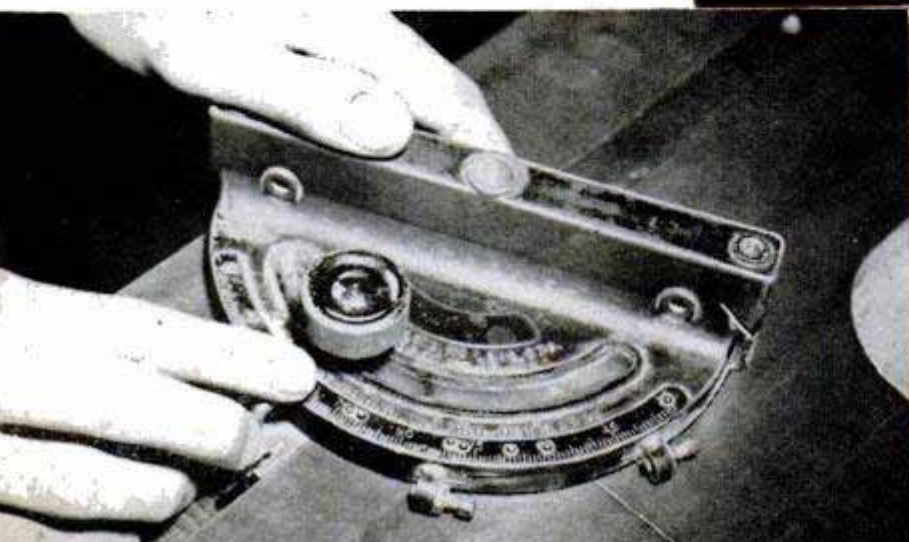
Running a wood lathe, a blind boy at the Wisconsin school turns the leg of a partly completed chair



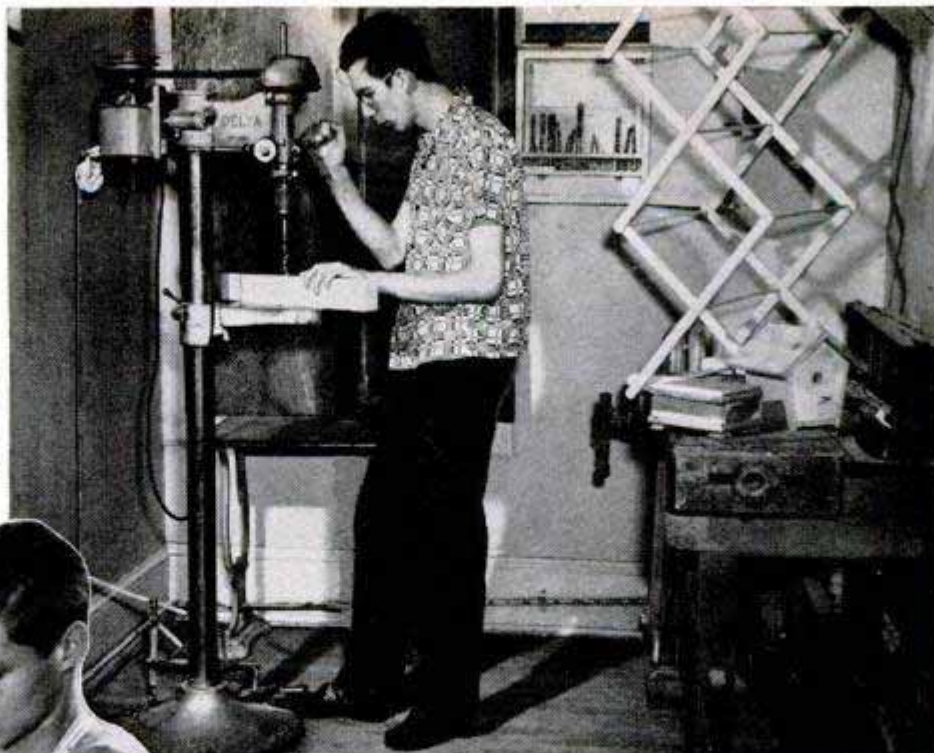
Instructor Frederick Hoyer, second from the right, oversees the work of six of his students in the shop

There is no hint of a handicap in the movements of the youth at right as he expertly operates belt-type sanding unit

Tiny raised knobs on tools' miter gauges enable pupils to locate degree points to make adjustments and measurements



No special concessions are made for the blind trainees. Their power tools, like jointer below, have only the usual safeguards



Doll furniture, a clothes-drying rack, a birdhouse and a cedar chest, a few of the most popular items made at the Wisconsin school, are shown with drill-press worker above



Instructor Hoyer, left, helps familiarize a newcomer with the working of a circular saw. The classes average about 20 pupils

*Back of booth.*



Trucks are detached from conveyor line for movement about cars. Arm fastened to bottom of truck drops into device in chain

Freight checker in main office talks with handler. Foot controls leave both hands free for paper work. Waybills stay in office



# Conveyor Loop Speeds Transfer of Freight



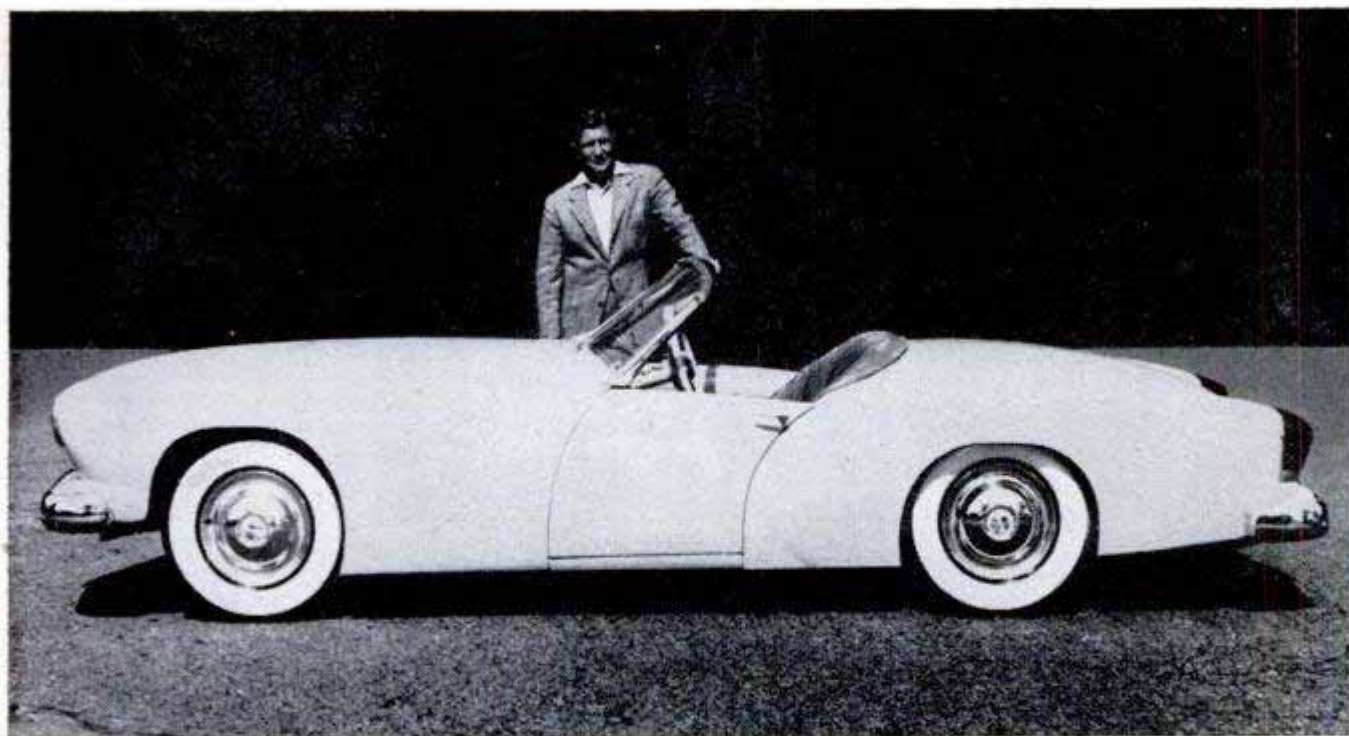
FREIGHT HANDLING has been streamlined at the new Santa Fe depot in Chicago, where checkers direct operations by intercom, and trucks pulled by two endless chains carry goods to and from the cars. Nine freight checkers in the main office receive waybills and relay orders to loading and unloading crews equipped with portable two-way speakers which plug into platform outlets. Freight trucks, towed by a roller-type chain recessed in a floor slot, serve the three outbound and three inbound tracks.

Portable two-way speakers can be connected at any of 132 outlets in freight station. System relieves crew of paper work, speeds cargo handling



Conveyor chain concealed in slot pulls trucks at speeds of 110 to 160 feet per minute. Entire system has capacity of 500 trucks in two circuits

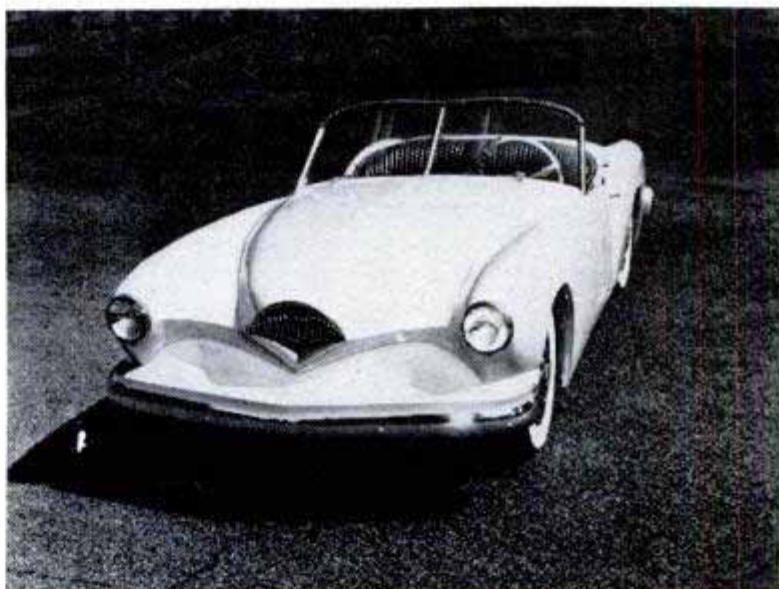




Built for Kaiser-Frazer, the Darrin body may forecast the plastic sports car K-F promised for this year

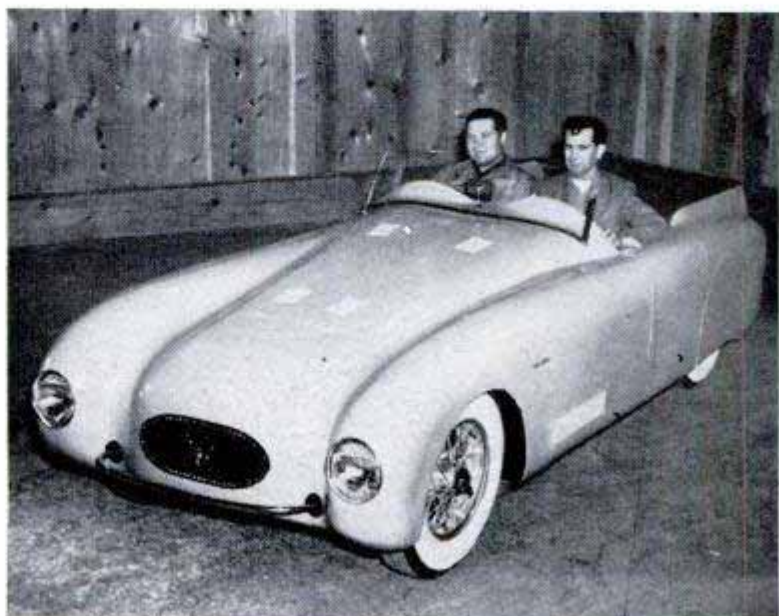
## Glass-Fiber Sports Car Has Sliding Doors

You'll never recognize the chassis beneath the long, low sports body of glass fiber designed by Howard Darrin. It's the little Henry J, dressed in luxury. Sliding doors eliminate the designer's concern for curb height. When the handle is turned, the door slides forward. There has been no commitment about production runs on this body, it being the only one of several plastic models that Kaiser-Frazer had commissioned to be built for the Henry J chassis.



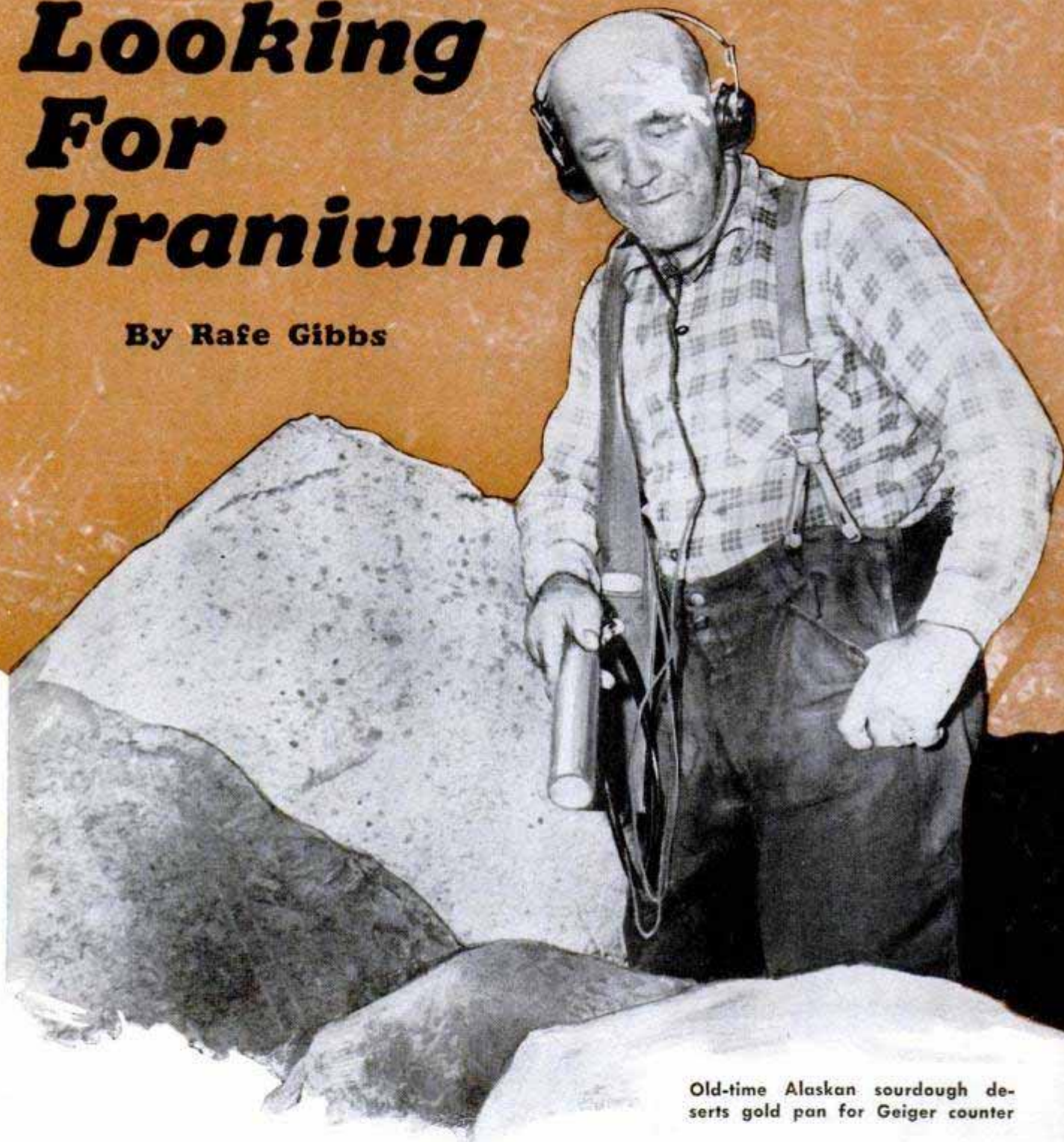
## Another Glass-Fiber Body—It Mounts on the MG Chassis

Even the MG has been dolled up in a sleek, streamlined suit of glass fiber. Weighing only 107 pounds, the new body attaches directly to a standard MG chassis. The only major change involved is in the wheels—15-inch wheels are used on the plastic model to lower the car's appearance. Because it completely hides the MG "personality," the body will most likely start a violent controversy among MG owners. Bumper and windshield are easily detached for road racing. Fins run along the top of each rear fender. No changes were made in the instrument panel. The bodies are in limited production in California at present.



# Everybody's Looking For Uranium

By Rafe Gibbs



Old-time Alaskan sourdough deserts gold pan for Geiger counter

**W**ITH BOBBED HAIR bouncing, a woman prods her horse down a craggy slope after a stray cow in the mountains beyond Leesburg, Idaho. The cow rejoins the herd. The horse is reined in for a rest. But the rider does not rest. She fumbles in her saddlebag for a metal box, then hops down and moves along the slope, holding the box like one witching for water. Cowgirl Elva Swanson is looking for uranium-bearing ore with her Geiger counter, that sensitive little instrument which detects any radioactive substance.

It's a quiet day in Monticello, Utah, nes-

ting high on the east slope of the Abajo Mountains. The sun is warm and beckoning. A man ought to be fishing on a day like this. Donald T. Adams, attorney and state senator, shifts his lean frame uneasily at the desk of his law office. Then, abruptly he gets to his feet, turns the key on the office door, climbs into his car and points it toward the wide-open spaces of San Juan County. Only Attorney Adams isn't going fishing. He's going uranium hunting.

Over in the rugged mountain country of Jefferson County, Mont., an airplane wings low through the blue V of a canyon. Stunt-

Mobile gamma-ray logging unit drops scintillation probe at left in deep drill holes in search of uranium

Bogue Electric Mfg. Co. photo



ing? Not Kent Howard and Dick Peterson. They are out prospecting for uranium on the properties of the Elkhorn Mining Company. Their plane is equipped with a scintillometer, which might be classified as a super-Geiger counter. The scintillometer has a lead-covered directional shield containing a photoelectric cell. The shield eliminates airplane-instrument interference, and the cell picks up ground radiations from altitudes up to 1500 feet.

Assaying the sample scenes above, you get an idea of today's high-grade and steadily mounting interest in hunting the stuff of which atom bombs are made. Three years ago an old-time Colorado prospector told us: "This boom will fizzle out any day now when they don't find enough uranium in these parts to blast a hole big enough to bury a coyote." Today he is out in the desert himself, hopefully listening for the tick of a Geiger counter.

Shortly after World War II, the Atomic Energy Commission and the United States Geological Survey published a pocketbook entitled "Prospecting for Uranium" (obtainable from the superintendent of documents in Washington

Kate Mullins, who has hunted for gold many years, learns about uranium prospecting from Prof. Lewis S. Prater, who is conducting an advanced class at the University of Idaho

for 30 cents). Maybe its sales aren't in a class with the government's guide on child care, but to date about 100,000 copies have been sold.

Jesse C. Johnson, director of the AEC's raw-materials division, recently reported: "There are probably more individual prospectors looking for uranium today than for any other metal."

Throughout the country, the AEC has set up laboratories for testing ore samples. The number of samples now processed runs about a thousand a month. Hundreds more





**Amateur uranium prospector (right), who operates a gas station, has an expert check his small samples**

are checked monthly by state bureau of mines laboratories. And thousands more are gone over on the spot by prospectors who have studied well the chapter in the booklet on "Testing for Uranium."

How is the ore panning out? Well, everything that makes a Geiger counter tick isn't for the mill. But high-grade uranium deposits now have been found in such widely scattered parts of the United States as Florida, Tennessee, Kentucky, Michigan, Min-

nesota, Wisconsin and the Dakotas, with the major discoveries in the Far West. Mining operations are currently centered on the Colorado Plateau—130,000 square miles of gently level mountain tops and violent colors stretching into corners of Utah, New Mexico, Arizona and Colorado. In addition, there are the vein deposits of central Utah, and the uranium discovered in the Permian-phosphoria formations of Idaho, Montana and Wyoming.

In 1951, incentive bonuses for good-grade ore totaling more than \$250,000 went to Western uranium miners. Blair Burwell of Grand Junction, Colo., president of the Colorado Mining Association, commented:

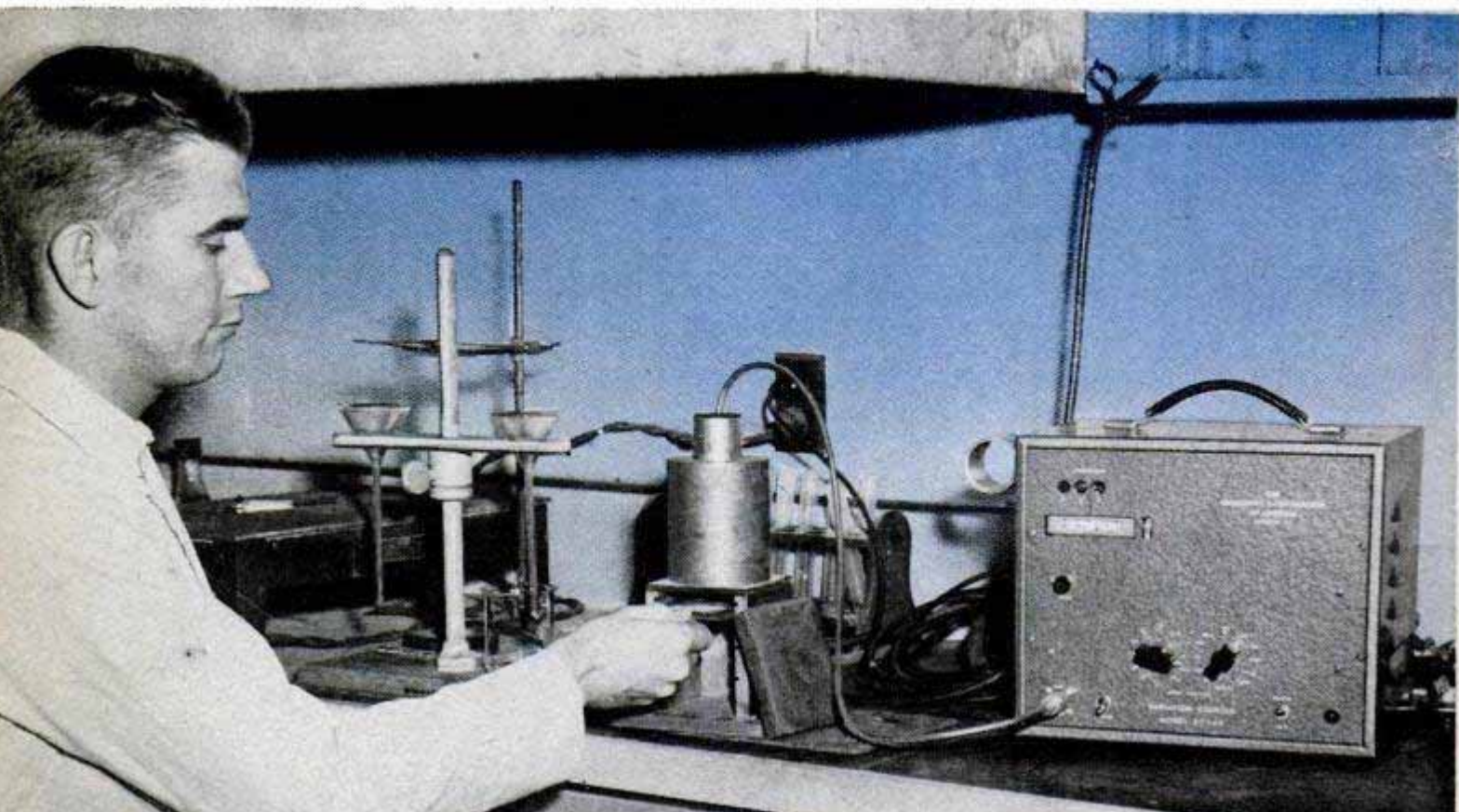
"Deposits in the Colorado Plateau alone give this country one of the greatest sources of uranium, if not the greatest, in all the world."

Burwell added that the Colorado Plateau contains three great uranium fields, with the possibility of a fourth. He pointed out that uranium production is now the state of Colorado's largest mining industry, with a payroll of \$1,500,000 to \$2,000,000 a month and a milling program for 1952 of \$7,000,000.

In Utah, mineral production—aided by new uranium finds—rose to \$244,800,000 in 1951 to become the state's number-one source of new wealth, greatly surpassing even manufacturing and agriculture.

The quantity of uranium is there. On the other hand, the government has not yet paid out the special \$10,000 bonus offered for the delivery of 40,000 pounds of very high grade uranium-bearing ore (20 percent or more of uranium oxide). None of

**Rich uranium strike? Radiation-scaler machine in lab gives the answer in shielded test of powdered ore**





In photographic test for radioactivity, key (left) is placed on unexposed plate. Then ore sample to be tested (center) is placed over the key. If sample contains uranium it will produce key image shown at right

the strikes in the United States—to date—compares in quality with the ore finds of the Shinkolobwe Mine in the Belgian Congo or the Eldorado on Great Bear Lake in northern Canada.

Recently we drove into Marysvale, Utah, and every store window had samples of uranium-bearing ore found in the blazing mountains beyond the town. Even the service stations were cluttered with the stuff. When we told an operator to “fill ‘er up,” we were given uranium talk and gas in equal proportions.

New towns have been born, and others reincarnated. Ever heard of Hite, Utah?

Hite is located on the Colorado River in the area the late novelist Zane Grey once described as the “yellow and purple corrugated world of distance.” There are two roads across the desert to Hite, neither exactly recommended (use second gear on

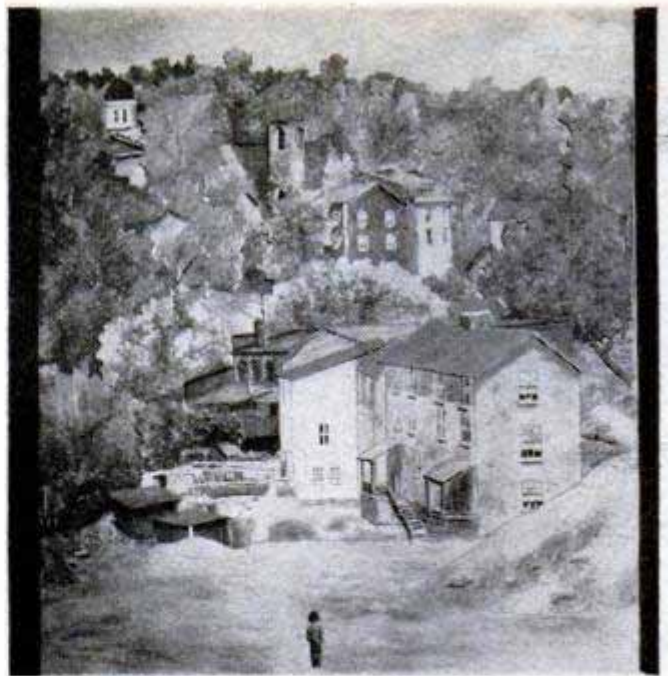
sand stretches, and don’t stop). One road meanders north 140 miles from Blanding, and the other 120 miles south from Green River.

Mostly Hite has been a one-man, or one-man-and-one-woman, town. It was settled in the 1870s by Cass Hite, a former member of Quantrill’s Civil War guerrillas. In 1893, Hite started a rumor of a big gold discovery—some think for spite. Prospectors and miners struggled to get equipment, including huge dredges, to the site. You can see some of the stuff weathering there today. There was no gold to speak of. The disappointed—and angry—ones tried to find Hite to lynch him, but he hid out a couple of years till things blew over. In the current century, Hite’s population for many years consisted only of Mr. and Mrs. Arthur Chaffin, who operate across the Colorado a

(Continued to page 250)

Uranium miners use air drill to make holes for dynamite charges in making tunnel to area of successful test





### Three-Dimensional Pictures Constructed of Wood

When Carroll P. Ruhl of Baltimore sees something which pleases him, he makes a three-dimensional picture of it—in wood. The finished picture is a realistic relief. Slight projections of the wooden parts give shadows, depth and an illusion of space. Ruhl begins his pictures by sketching against a base board the objects as they

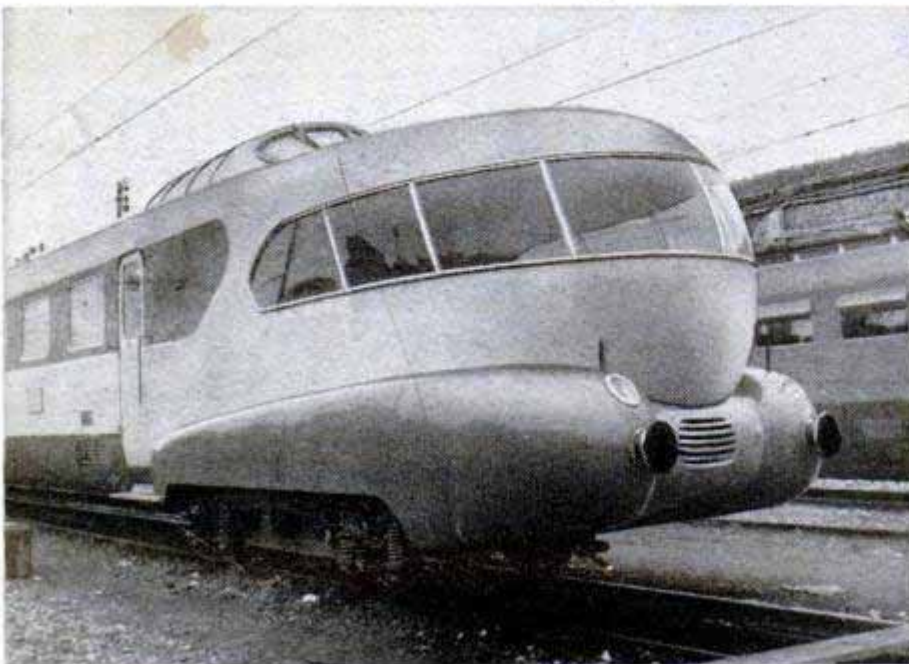
would appear in a flat picture. Then he carves thin pieces of balsa to duplicate objects in the extreme background, gluing them in place on the board. He repeats the process with objects closer to the spectator until the foreground is completed. The finished picture may range from a fraction of an inch to an inch in thickness.

### Radioactive Tritium Is Constant Light Source

By mixing radioactive tritium with stilbene, a crystalline substance, scientists have produced a light source that yields almost constant luminosity and yet has essentially no health hazards. Tritium constantly gives off beta rays which cause the stilbene to fluoresce. The brightness diminishes at a

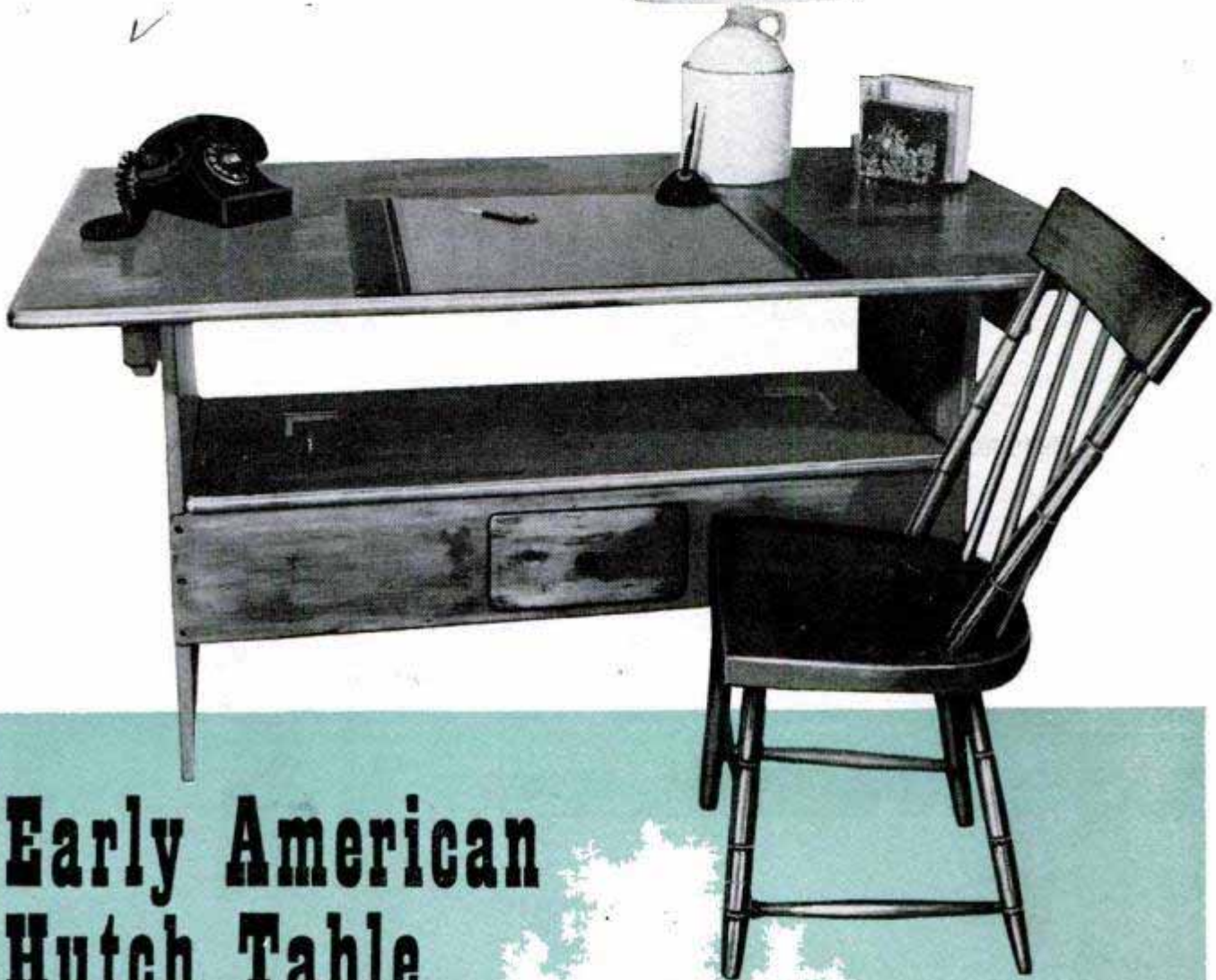
rate of only about five percent each year, whereas radium-activated sources of the type now used lose half their light in six months. The material provides a constant light for use in calibrating instruments containing phototubes as well as being of value to those who need a constant light source.

### Italian Streamliner Runs Through Initial Tests



Under test in Milan, Italy, a weird-looking electric train goes through its paces. Two disk-shaped bumpers replace the traditional cowcatcher; twin headlights recessed in sweeping front fenders strike an automotive note. Built for the Italian railways, the new train will be placed in regular service soon.

☐ In a test by the Bureau of Mines, a coal-mine explosion was clocked at 5000 miles per hour, or about six times the speed of a jet plane.



## Early American Hutch Table

By Carlton Strickland

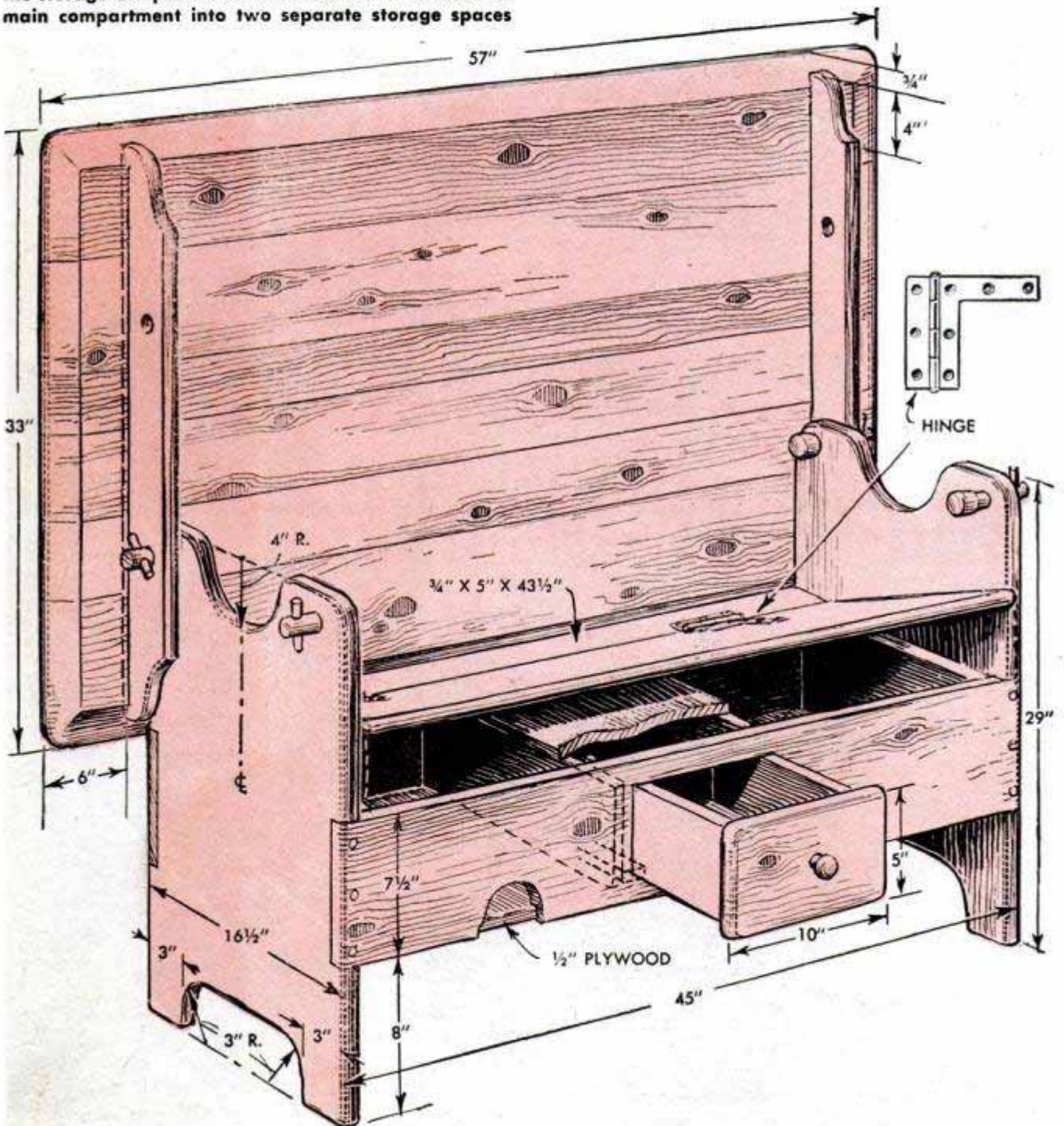
**O**RIGINAL TABLES of this type were designed and built by early craftsmen with only a few hand tools. Because of space limitations in colonial homes many of the furnishings were designed to serve a dual purpose. The hutch table is a good example. With the pivoted top folded down as in the photo above, it can serve as a writing table or dining table seating four to six persons. Fold the top back as in the photo at the right, and you have an attractive fireside bench, or settle, as it was sometimes called. Tables of this type often were fitted with a storage compartment having a hinged top as in the detail on the following page. This compartment





One of the unusual features of the hutch-table construction is the fully housed drawer at the center of the storage compartment. This construction divides the main compartment into two separate storage spaces

gives the hutch table its descriptive name. Although the table can be built of walnut, birch or maple, knotty white pine is the traditional wood. This must be genuine white pine of a soft, clear texture and containing only tight, red knots. In selecting the stock, discard all pieces having large, encased knots which may loosen and drop out when the stock is worked. Before cutting material, lay the pieces side by side and arrange them to give the most attractive knot pattern, especially for the top and endpieces. Use  $1\frac{1}{8}$ -in. pine for the top. All other parts can be  $\frac{3}{4}$ -in. stock. Cut the individual pieces slightly longer than specified and glue and dowel together to form the required width. Use at least four  $\frac{3}{8}$ -in. dowels in each joint. Then trim to length and sand both sides smooth. Bevel the edges and round the corners as indicated. As-

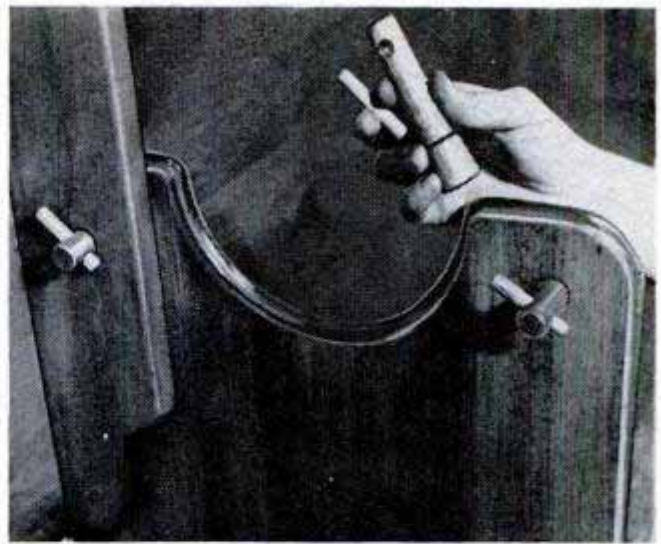




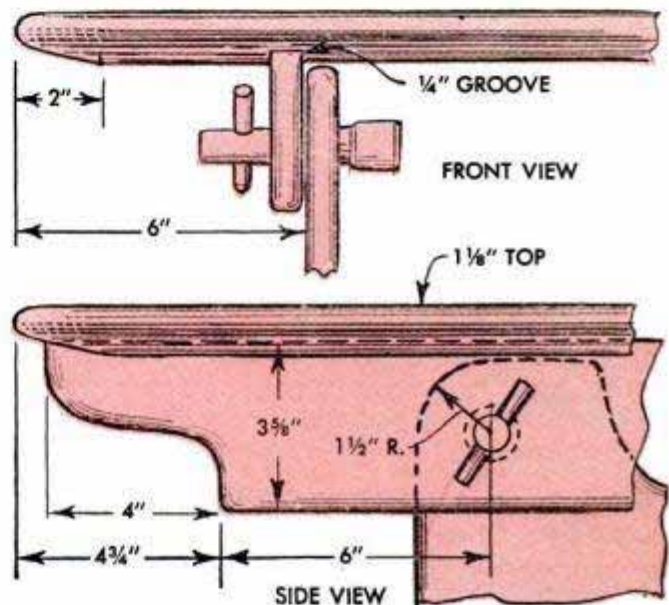
semble the endpieces in the same manner, trimming the ends to give the finish dimension. Make the scroll cuts in both ends of each endpiece, then sand thoroughly to remove saw marks and round the corners in the scroll cuts slightly.

Cleats located near the ends of the top serve both as stiffeners and pivot strips. They are of  $\frac{3}{4}$ -in. stock with scroll-cut ends and are placed edgewise in  $\frac{1}{4}$  x  $\frac{3}{4}$ -in. grooves cut in the top. The cleats should be joined to the top with dowels and glue. If desired, screws driven into counterbored holes can be substituted for dowels. After driving the screws, the holes are plugged with short dowels or covered with hardwood screw-hole buttons. Four  $\frac{5}{8}$ -in. holes are located and drilled near the top corners of the endpieces as in the details below and on the opposite page. Now invert the top and use the drilled endpieces as templates to drill registering  $\frac{5}{8}$ -in. holes in the cleats for the four shouldered pins. Two of these pins serve as pivots and the other two as locking pins. The pins are turned down from 1-in. dowels, the diameter of the shouldered portion on the two pins which serve as pivots being a full  $\frac{5}{8}$  in. The other two are shouldered slightly less than  $\frac{5}{8}$  in. so that they will be a loose fit in the holes. All pins are fitted with retaining keys made from  $\frac{1}{4}$ -in. dowels.

The endpieces are joined to stretchers which are open-mortised into the edges at the front and back. The joints are glued and screw-fastened and the screw holes are plugged with dowels. One stretcher is cut out for the center drawer and the  $\frac{1}{2}$ -in. plywood bottom is nailed into rabbets cut in the stretchers. Endpieces are fitted in the compartment as shown in the detail on the opposite page, and the ends of the plywood bottom are nailed to these for added support. The drawer is boxed into a separate compartment as detailed. This construction divides the main compartment into two separate storage spaces. The compartment top, or lid, is hinged to a 5-in. strip which is nailed, or screwed and glued, to the back stretcher and the endpieces. This method provides sufficient clearance so that the lid will remain in position without a brace or other support when fully opened. If desired, hammered hinges of the H-type



Shouldered hardwood pins fitted with retaining keys prevent tilting of the table top when in the horizontal position. The back pins serve as pivots when the top is raised to vertical position to form seat back



can be substituted for the type shown.

Prepare the surfaces for finishing by sanding all exposed edges smooth and slightly rounded. An attractive finish that closely matches the original can be produced by reducing Van Dyke brown oil color in a half-and-half solution of linseed oil and turpentine and applying this improvised stain with a soft cloth, rubbing until the desired color is obtained on the bare wood. Allow to dry thoroughly and then apply a sealer, two coats of white shellac and wax. ★ ★ ★

## Badminton Court Marked on Lawn With Trimming Mower

We found that a trimming mower is more satisfactory for periodically outlining the boundaries of a badminton court on a lawn. Cutting much closer than a regular lawnmower, the trimmer produces plainly visible lines in the grass that are slightly wider than limed lines, but which present no danger of possible lime burns to children

playing in the area. Each time the lawn is in need of mowing, the lines should be mowed first. If mowed a week after the lawn is mowed for the last time in the fall, the lines will be visible the following spring. To assure the clean-cut lines required the trimmer blades should be sharpened often.

Jean K. Tool, Englewood, Colo.

## Workbench Mounted on Casters Secured by Doorstops



Handy "brakes" for securing a workbench mounted on casters in one position can be provided by employing a pair of spring-loaded doorstops in the manner shown. The doorstops are screwed to the front legs of the bench so they effectively contact the floor when pressed down with the foot. Doorstops of the kind having rubber feet are most ideal for the purpose.

## Stopping Leaks at Sill Cock



Leakage of a lawn-hose connection at the sill cock frequently is caused by an insufficient number of threads on the cock which prevent the hose fitting from being tightened effectively. One way of remedying this is by adding another washer to the connection to take up the slack.

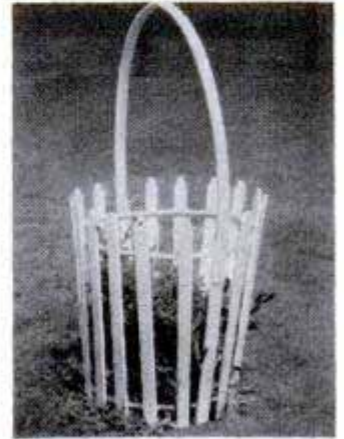
## Weight of Firebrick a Factor In Oil Burner Economy

If your oil-burning furnace seems less economical than similar installations in your neighborhood, the reason may be that the firebrick used to line the fire pot is too heavy. Recent experiments have proven that the lighter the weight of the firebrick, the greater the fuel savings because the lighter brick heats up faster. The oil does not burn completely until the firebox is hot,

and soot is formed during this period of incomplete burning. The faster heating-up characteristics of lightweight firebrick shorten this soot-forming period from minutes to seconds, saving not only fuel but also the necessity of frequent soot removal from the heating system.

## Attractive Plant Enclosure Resembles Flower Basket

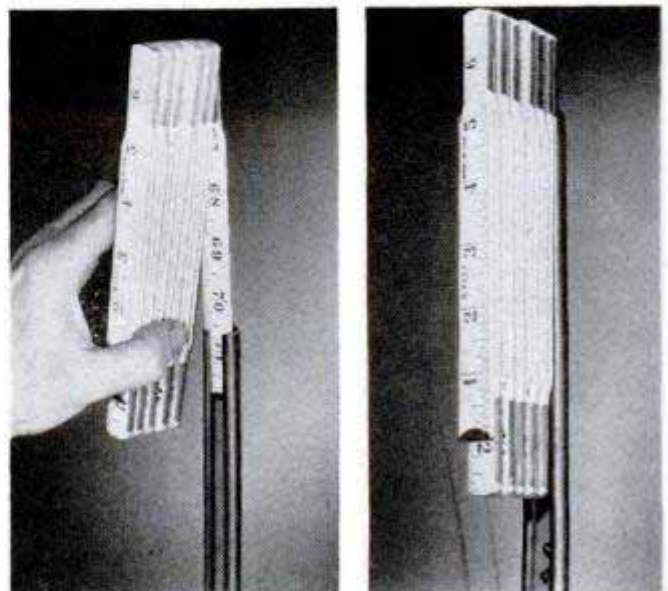
To protect newly planted flowers and small shrubs, one homeowner made several portable enclosures resembling oversize flower baskets that could be moved easily whenever necessary. Short pieces of wood lath were pointed at the upper ends and attached to hoops as shown, a smaller hoop being used at the bottom to make the sides taper. Another piece was curved over the top to form a handle. The enclosures, which may be wired to stakes driven in the ground for extra stability, then were painted white.



Grover Brinkman, Okawville, Ill.

## Holder for Folding Rule From Old Curtain Rod

When mounted on the wall of a workshop, a 10-in. length of telescoping curtain rod of the type shown will provide a convenient rack for a folding rule. Drill two holes about an inch apart in the lower end of the rod clear of the rule and drive in screws. For insertion of the rule, fold an end slightly to one side, hook it behind the flanges of the rod and lower into position.





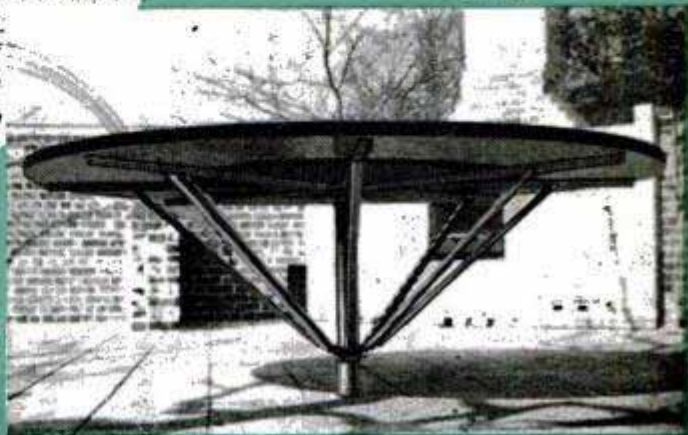
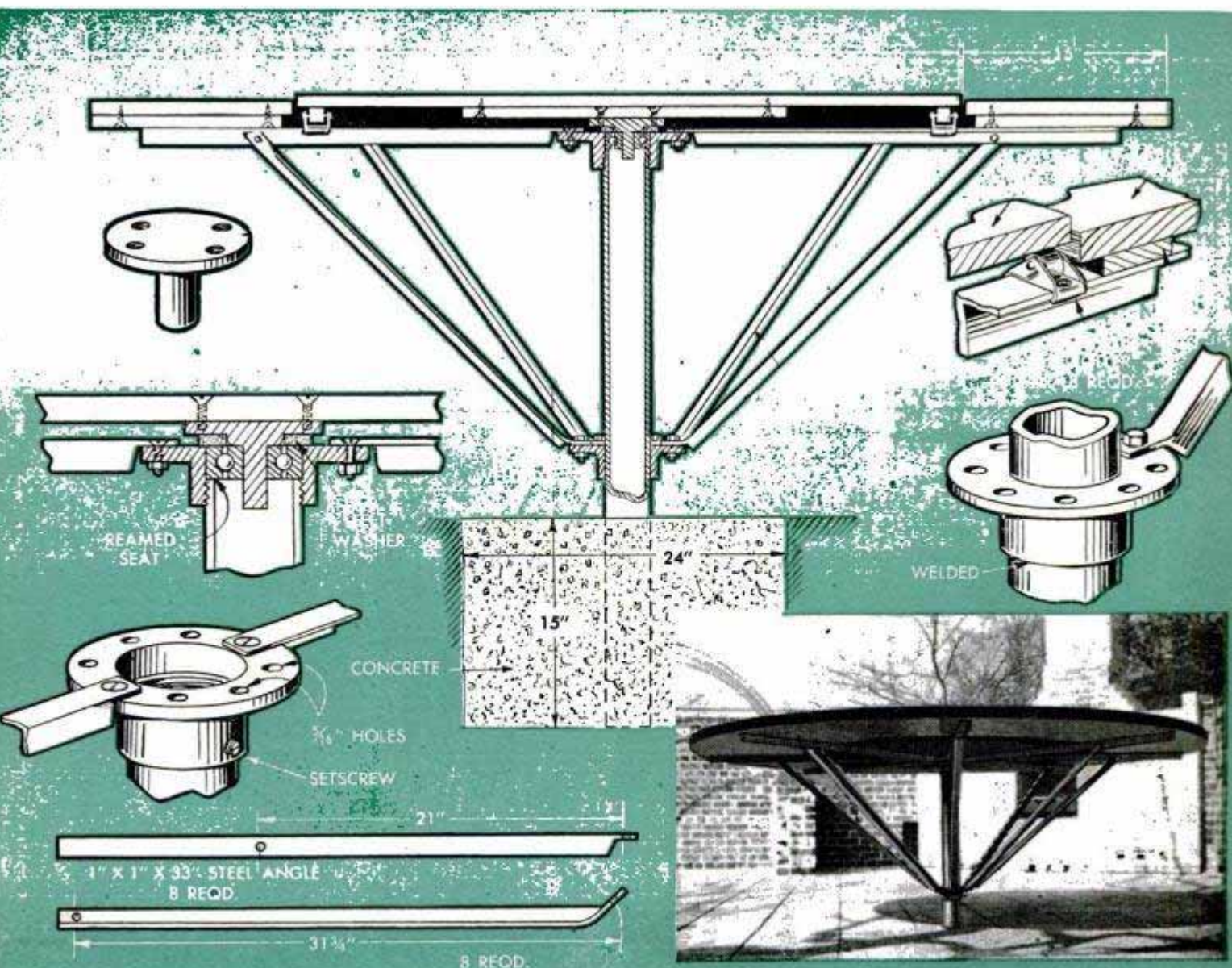
WTM 56

# LAZY-SUSAN BARBECUE TABLE

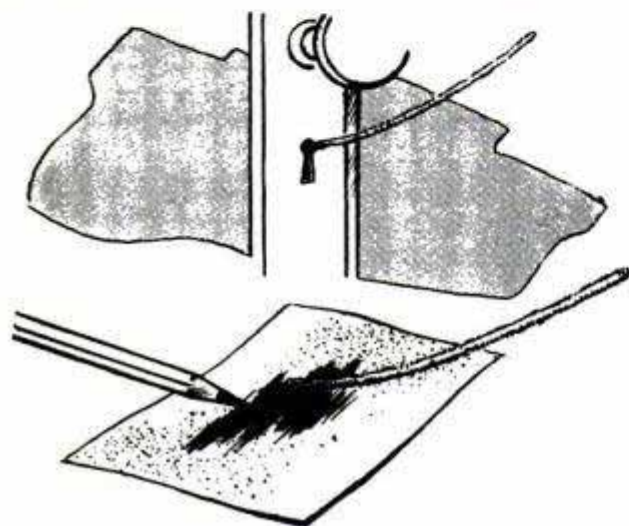
FEATURING a built-in Lazy Susan, 48 in. in diameter, this giant-size barbecue table is supported by angle-steel ribs which branch out from a pipe column like a huge umbrella. The circular top is cut in the shape of a ring from  $\frac{3}{4}$ -in. outdoor plywood. The Lazy Susan disk, also cut from outdoor plywood, rotates on a ball thrust

bearing and rides near the rim on drawer rollers mounted on eight spokes radiating from a collar on the pipe column. The lower ends of the ribs, which support the spokes, bolt to a second collar welded to the pipe. The lower collar, of course, must be bored to allow it to slide over the pipe.

George Sloat, Hayward, Calif.



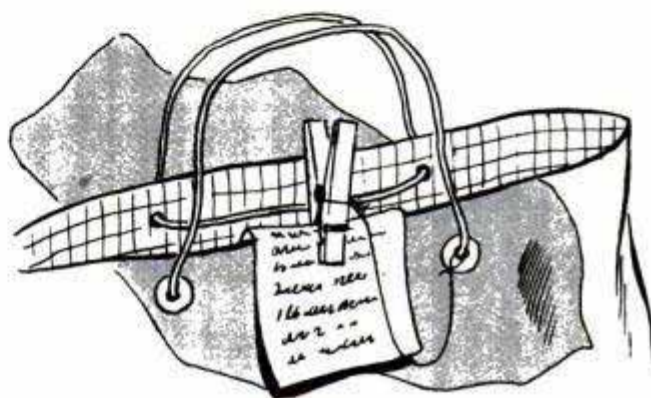
# Solving HOME PROBLEMS



**POWDERED GRAPHITE** applied to inside of door lock with pipe cleaner effectively lubricates lock without removing it from the door. Graphite may be obtained by rubbing common lead pencil across fine sandpaper

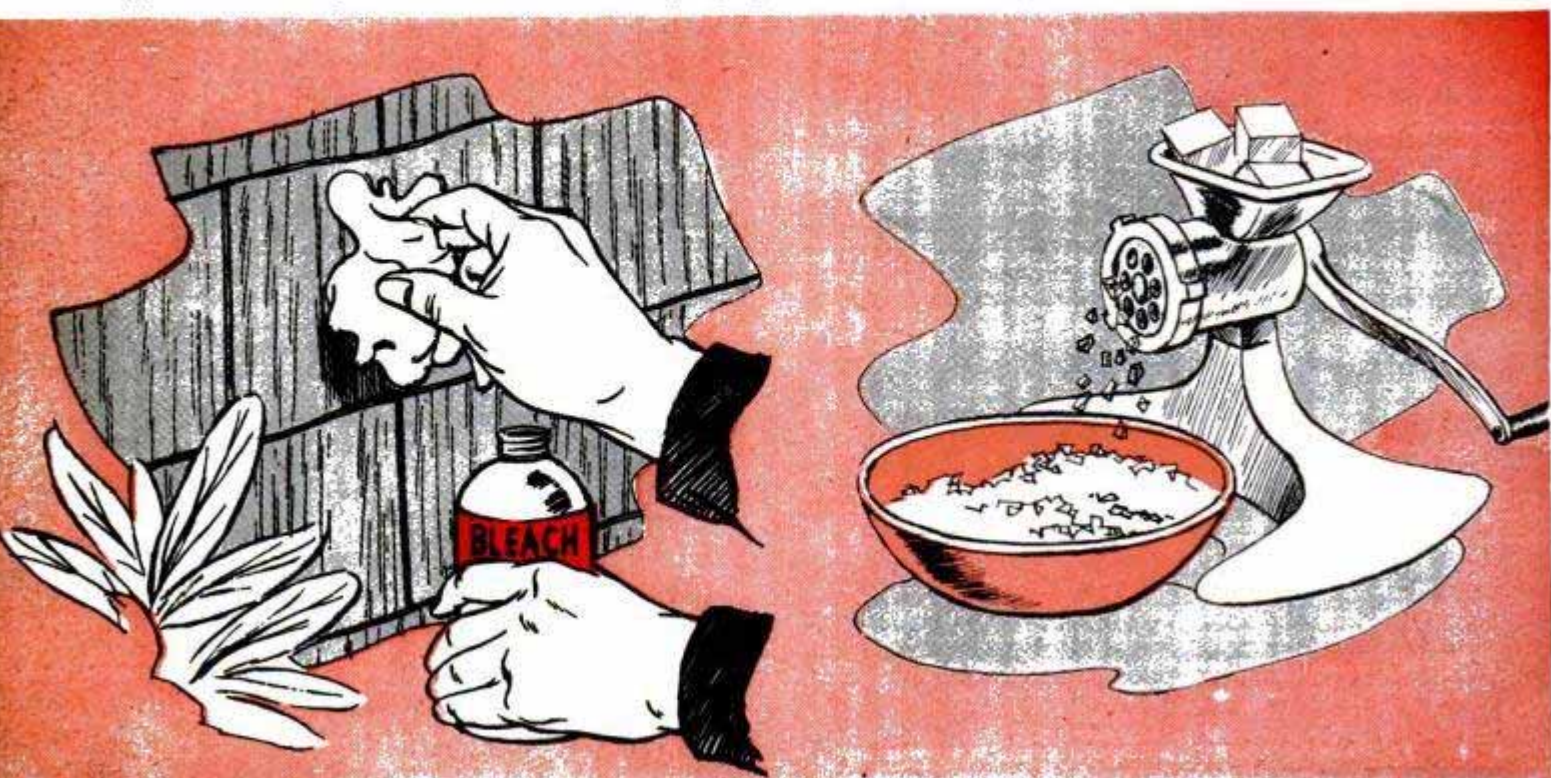
**STAINS ON CEMENT** or asbestos-shingled walls caused by crushed plant leaves can be removed by sponging with household bleach. Stains will disappear from shingles about an hour after sponging

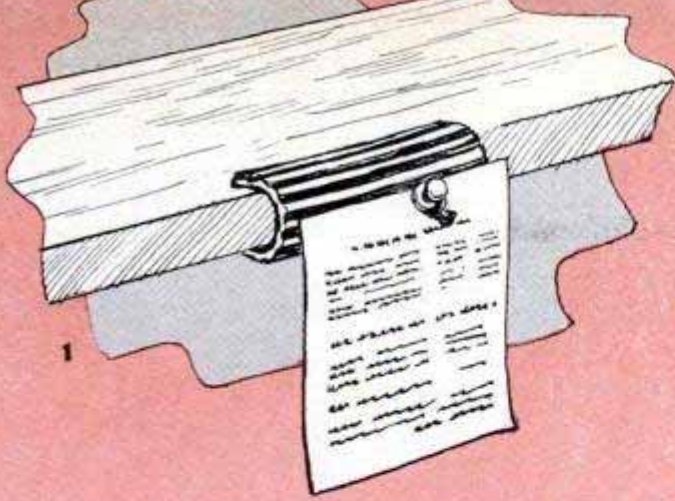
**DRAWER LINERS** can be cut and fitted in a fraction of usual time if fitted to bottom of inverted drawer. In this way the drawer sides do not interfere with trimming the paper or other lining material



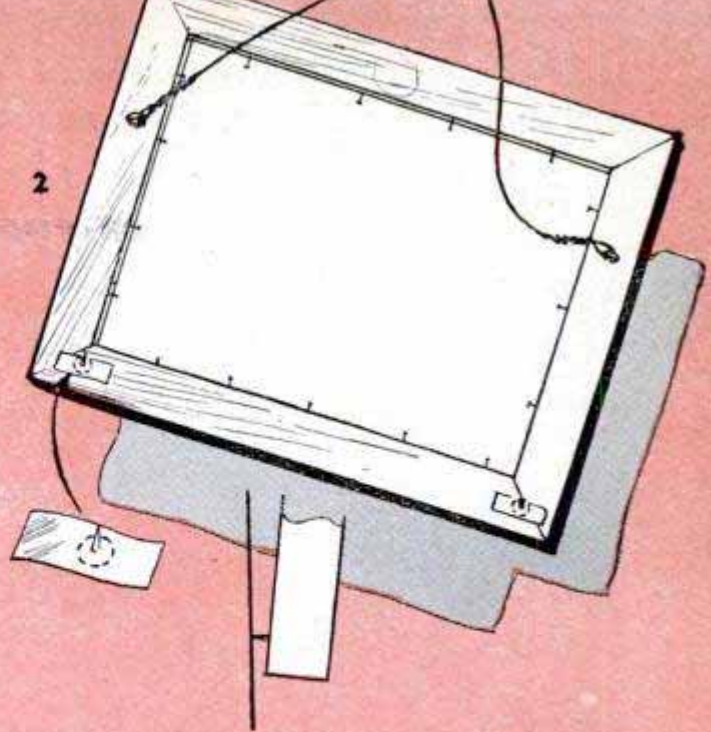
**GROCERY LIST** will not be misplaced if it is clipped to the edge of a shopping bag with a spring-type clothespin. The clothespin may be tied to one of the bag handles with a length of string or twine

**FINELY SHAVED ICE** for chilling beverages and special party desserts can be made quickly by breaking up ice cubes in an ordinary food chopper. Use a wadded cloth to press the ice cubes into the chopper



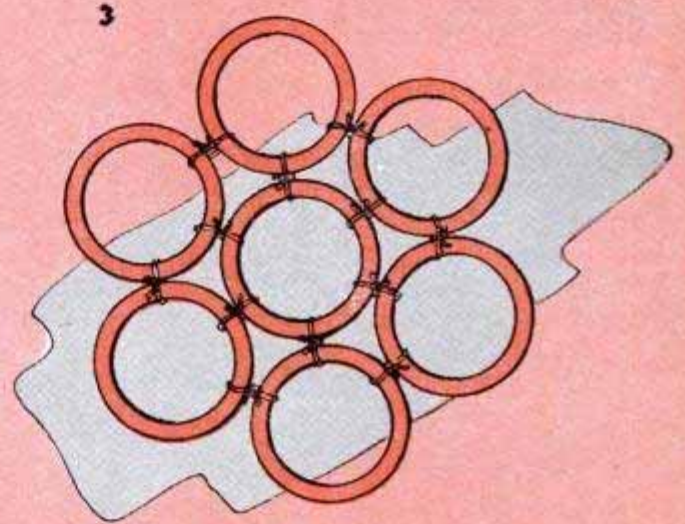


1—RECIPES AND SHOPPING LISTS can be pinned to the edge of a shelf without marring painted surface by fastening them to a pad made from garden hose. Slit hose section firmly grasps sides of the shelf



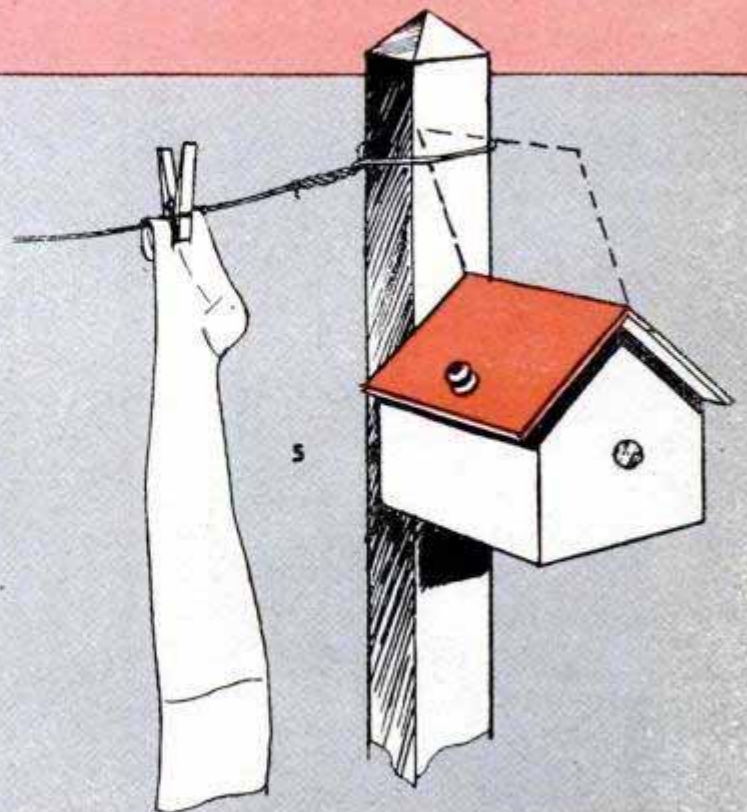
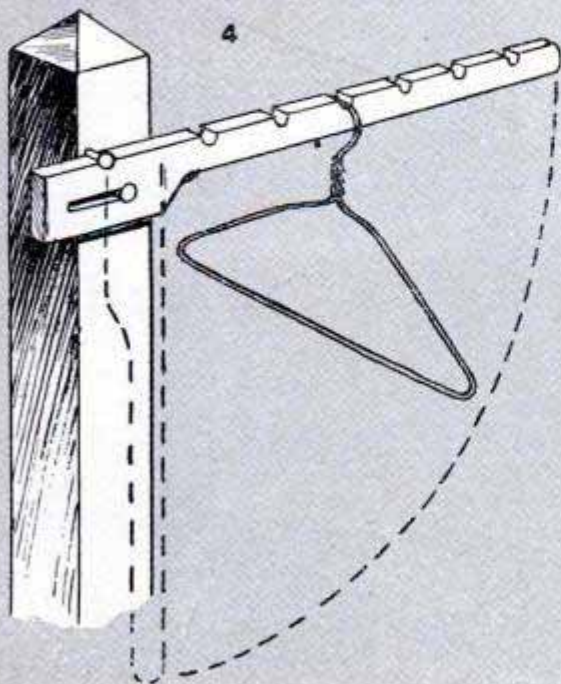
2—PICTURE FRAMES hung on wall won't slip out of line if thumbtacks are mounted on the back of the frame with adhesive tape as in the drawing. The projecting points of tacks rest against wall surface

3—HOT PAD made from rubber fruit-jar rings prevents damage to table and counter tops often caused by hot pans and serving dishes. Six outer rings are tied around center ring with white or colored cord

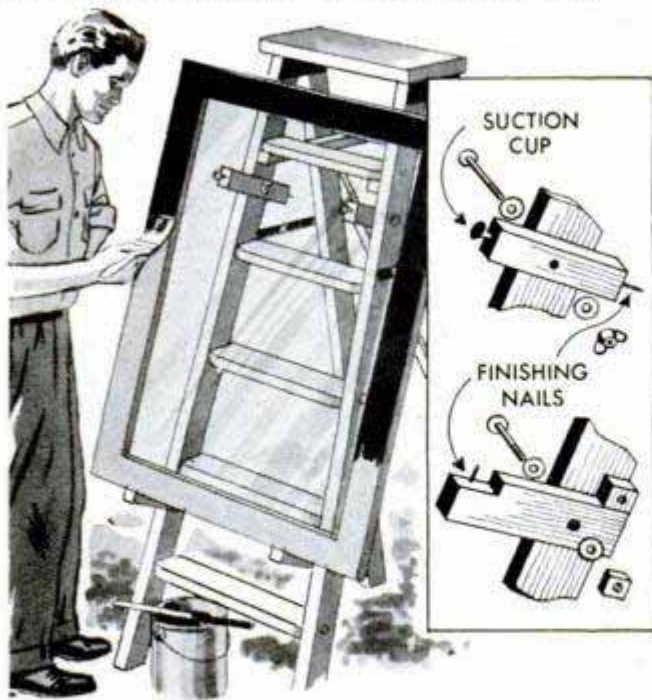


4—FOLDING EXTENSION ARM on clothes post provides space for airing clothes on wire coat hangers. Back of slotted arm hooks under bolt when in horizontal position and notches keep hangers from slipping

5—SIMULATED BIRDHOUSE fastened at a convenient height on a clothes post forms a neat container for clothespins. One side of roof is hinged to permit easy access to clothespins while keeping them dry



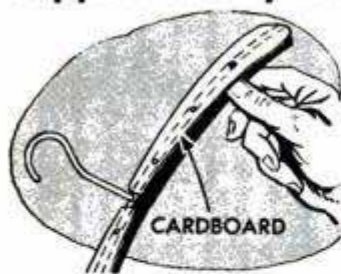
## Ladder Used as Painting Stand For Screens and Storm Windows



Your stepladder can be converted into a painting stand for screens and storm windows with the fittings shown in the illustration. Suction cups on the upper fittings hold storm windows for painting. The block is reversed for screens, which are hung on the finishing nails. In the lower fitting, a pointed finishing nail keeps the lower edges of the painted windows and screens from contacting any surface. Both upper and lower brackets are turned vertically to be out of the way when the ladder is stored.

R. A. Lossie, St. Paul, Minn.

## Cardboard "Epaulets" on Hangers Support Heavy Garments



Plain wooden coat hangers usually are not wide enough to provide adequate shoulder support for heavy garments such as overcoats. Special hangers for holding

such garments are made easily by fitting the ends with pieces of heavy cardboard attached to the upper edge. These are shaped so that they flare to a width of about 2 in. near the ends. Brads may be used to attach the cardboard pieces to the hangers.

R. Hanscom, Elmhurst, Ill.

## Wet Paper Aids Plaster Patching

When patching holes in plastered walls, cleansing tissues, paper towels and other similar papers can be of use in retaining the new plaster in the hole. Wet the paper,

wad it and press into the hole to be repaired, molding it carefully to fit the hole. Then apply the fresh plaster over it. The porous paper absorbs some of the plaster and becomes an integral part of the wall.

Kenneth Van Allen, Detroit, Mich.

## Automatic-Washer Drain

To drain an automatic washer without steaming up the room, use a section of pipe in the stationary tub drain as shown in the diagram. This procedure will save the cost of providing a separate drain for the washer, and will also allow the tub to be used for other

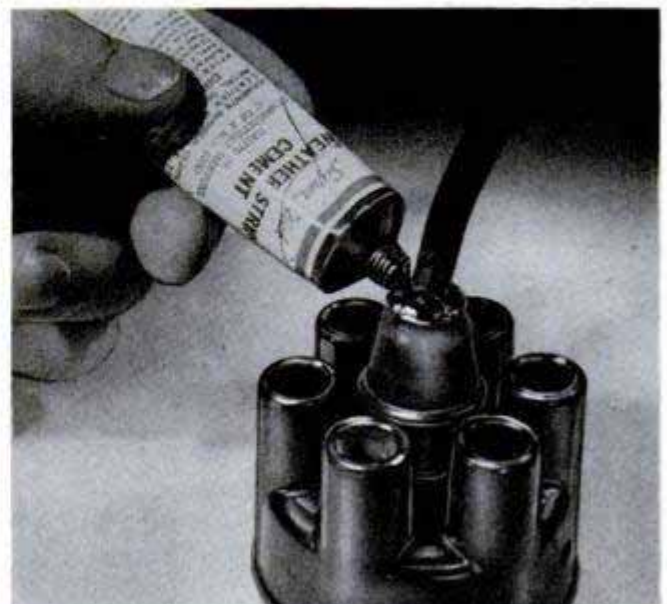


purposes while the washer is draining. When the washer is located in the kitchen, the pipe used in this fashion will carry the water directly to the sink drain without danger of overflowing.

Mrs. T. F. Watts, Charlotte, N. C.

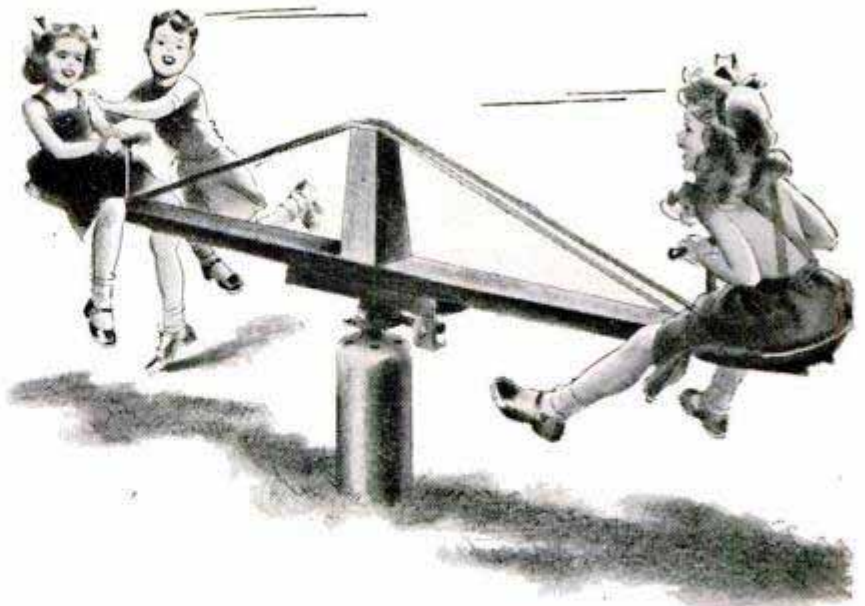
## Car-Distributor Nipples Sealed With Weather-Strip Cement

After they have been in use for a certain period of time, the rubber rain-guard nipples on automobile-distributor wires have a tendency to swell in size, loosen or work up so they no longer offer protection. One way to keep them in place while at the same time providing a rainproof seal is by coating the seam between the wire and the nipple with weather-strip cement. Applied directly from its tube, the tacky cement will form a flexible, long-lasting seal.

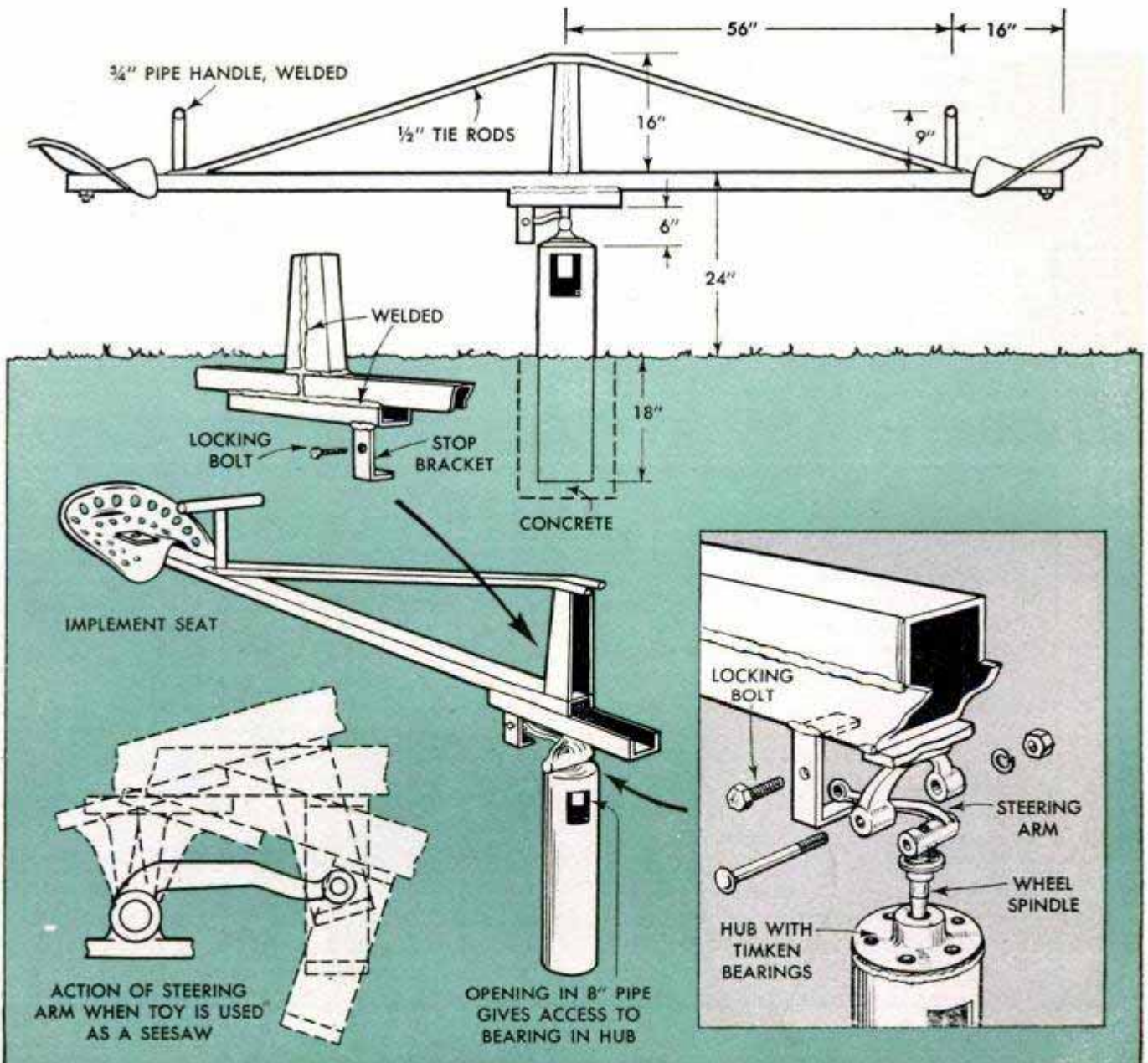


# SEESAW DOUBLES AS MERRY-GO-ROUND

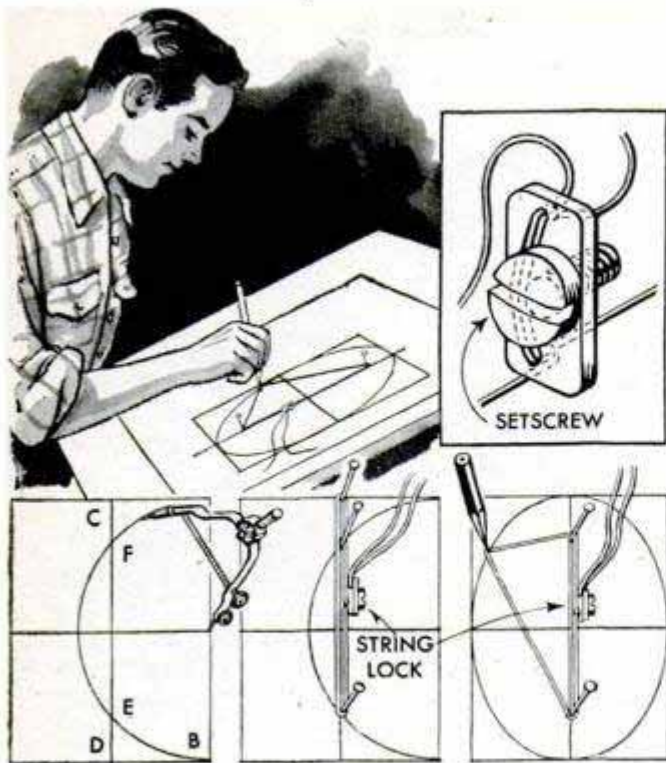
BUILT from scrap steel and auto parts, this novel back-yard toy combines the features of a seesaw with those of a merry-go-round. When used as a merry-go-round, the unit rotates on an old car-wheel spindle-and-hub assembly, plus a steering arm. The latter is used to lock the beam in a horizontal position when the toy is used as a seesaw. A U-shape bracket, through which a bolt is passed to engage the eye in the arm, limits the stroke and keeps the seats from striking the ground and jarring the riders. Note opening in side of pipe to permit access to bearing unit. To prevent its pulling out of the hub, a nut can be put on the wheel spindle. Lubricate before using.



Comfortable implement seats were used on the original toy but suitable seats can be cut from wood. The supporting pipe column, which houses the hub-and-spindle assembly, is embedded in concrete



## Setscrew Lock Replaces Knot In Cord Used by Draftsman



Replacing the knot in the loop of string often used by draftsmen to construct an ellipse in a rectangle, the lock shown in the detail permits the loop to be adjusted quickly to any size. To construct such an ellipse, quarter the rectangle, as shown in the lower diagram, and inscribe an arc with a radius from the compass point to B. This intersects the center line at E and F. Insert pins at these points and also at C. Draw the loop tight around the pins at C and E, tighten the setscrew in the string lock and remove the pin at C. Now with the pencil held tightly against the string, an ellipse can be drawn automatically.

Walter White, Chicago.

## Proper Cleaning of Paintbrush Important With Modern Paints

The finely ground pigments and quick-drying materials contained in many present-day paints tend to "gum up" brush bristles easily, making proper brush cleaning more important than ever. The cleaning operation should begin with the removal of the excess paint from the brush by wiping it off lightly on the rim of the paint can. Then press the brush, flat side down, into the proper cleaning fluid. The cleaning fluid should be poured into a deep bucket to a depth of about 2 in. Work the solvent well into the heel and squeeze out the paint with the fingers. Always work from the ferrule toward the tip of the brush. Repeat two or three times and dip-rinse in thinner each time to help clean out the paint. For stub-

born cases, wash with mild soap and water, then rinse thoroughly and shake dry. Finally comb out the bristles and carefully wrap in heavy paper. To store, lay the brush flat in a cool, dry place.

## Tallow Feeder With Lath Handle Permits Mounting High on Post

Small birds are more likely to be attracted to a tallow feeder that is well out of reach of dogs, cats and children. To provide a feeder 8 or 10 ft. above the ground which can be reached easily for refilling without

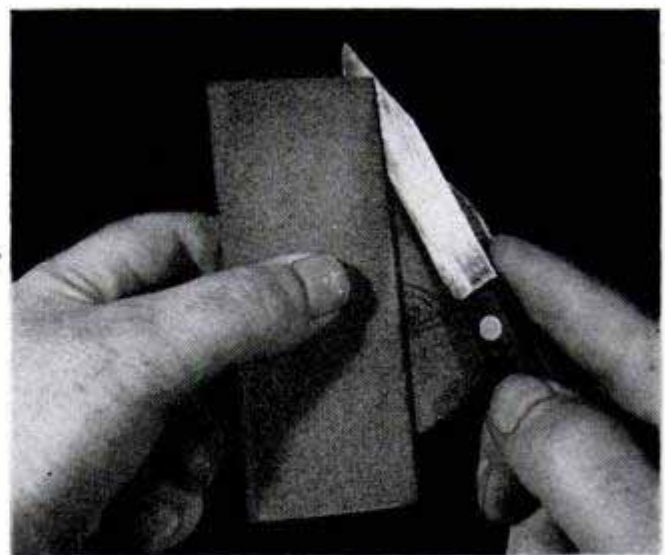


using a ladder, obtain a small can having the cover still attached and bend to form a perch. After perforating the underside to drain rainwater, nail the can to one end of a lath 3 or 4 ft. long. This same end is drilled so it can be hooked over a nail driven into a tree or post, allowing the remainder to hang down within easy reach.

## Emergency Knife Sharpener

If you have a couple of flat abrasive stones, they can be used as an emergency knife sharpener by gripping them together as shown and pulling the knife blade between them. Twist the blade slightly to the left on one stroke and to the right on the next to conform with the bevels on the edge.

Ken Murray, Colon, Mich.



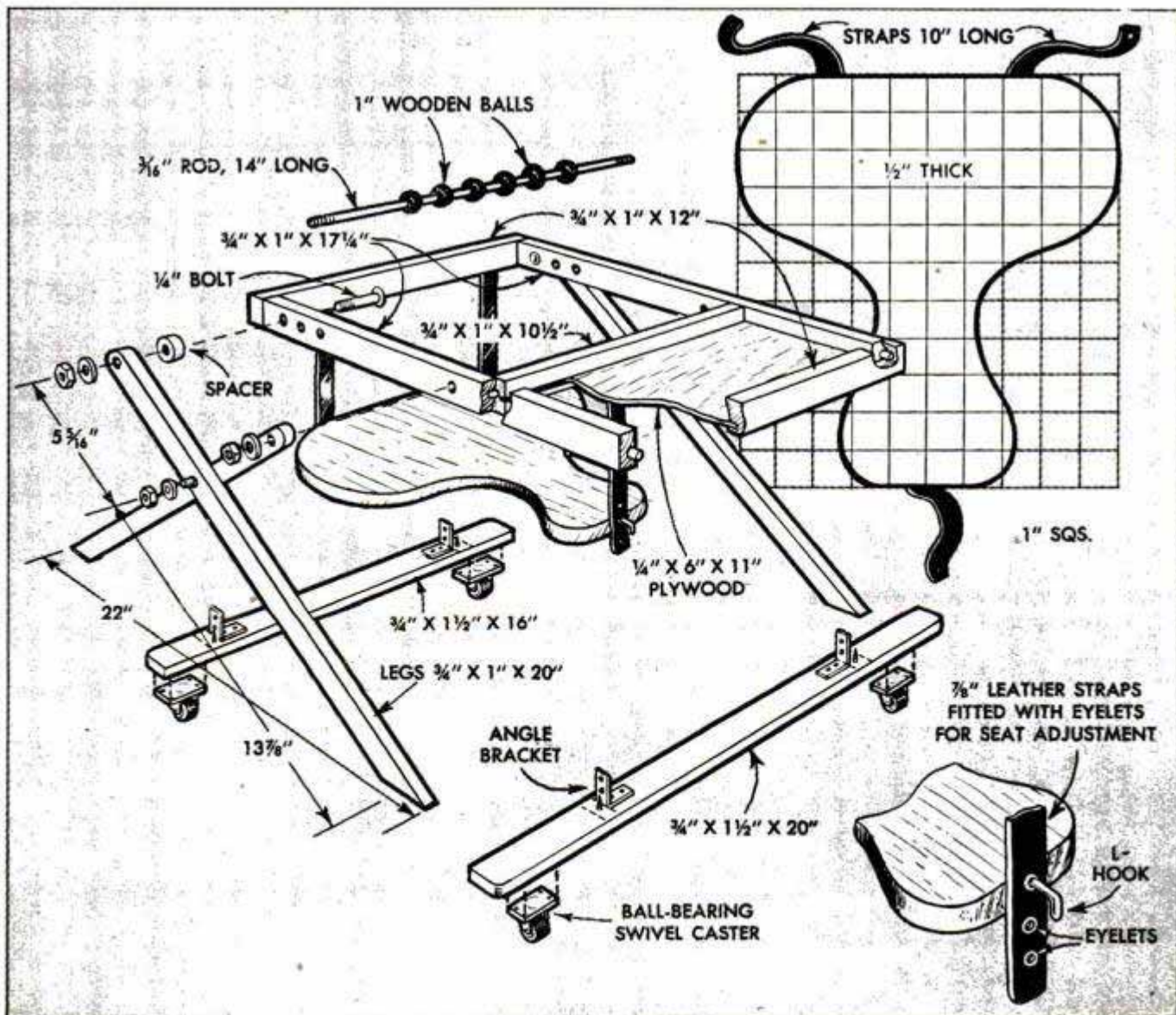
Clear lacquer will give a lustrous natural finish to plywood if it is used slightly thinned. Successive coats are brushed on and steel wool is used between coats. A final waxing will give a warm glow to the finish.



# Combination WALKER-STROLLER

By Adrien Levis

HERE'S A PROJECT for the proud craftsman-father to have ready when baby shows signs of walking. Featuring a suspended seat which can be removed or swung aside when he becomes bolder, the walker doubles as a lightweight stroller which promotes good posture through its free-swinging seat. Details below show how the various members go together, and the little material required should be easy to find in the shop scrap box. The straps supporting the seat are attached with screws to the top framework, while the lower ends are fitted with eyelets for unhooking the seat. Metal corner angles are used to add rigidity to the legs. In painting the stroller, select a nontoxic paint that will not be harmful to the child.



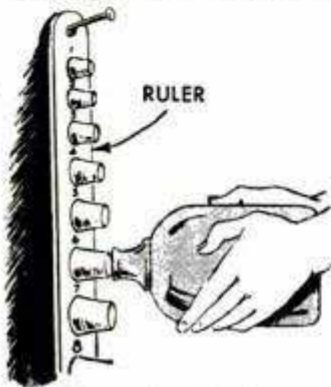
## Stair Tread Warns of Last Step When Coming Down Ladder



To avoid a dangerous misstep when descending a stepladder with full hands, trim an ordinary rubber stair tread to size and attach it firmly to the bottom step. The difference in "feel" between the rubber surface and the wooden ones above it will warn you that you have reached the bottom step.

R. F. Donovan, Guttenberg, N. J.

## Gauge for Determining Cork Sizes



To speed the work of finding a cork of suitable size for any bottle, one druggist employs a gauge which consists of a ruler with corks of graduated sizes cemented to it. The number of the bin or drawer in which corks of that size are stored is printed alongside each cork. The gauge may be used as it hangs on the wall, or removed for measuring larger bottles.

## Protecting Acid-Bottle Caps

In cases where acids and other strong chemicals stored in bottles having plastic caps show signs of not only destroying the waxed lining but also the inside of the cap as well, use candle wax to form a protective seal. After rinsing out and drying the cap, simply drip candle wax into the cap to a depth of approximately  $\frac{1}{8}$  in.

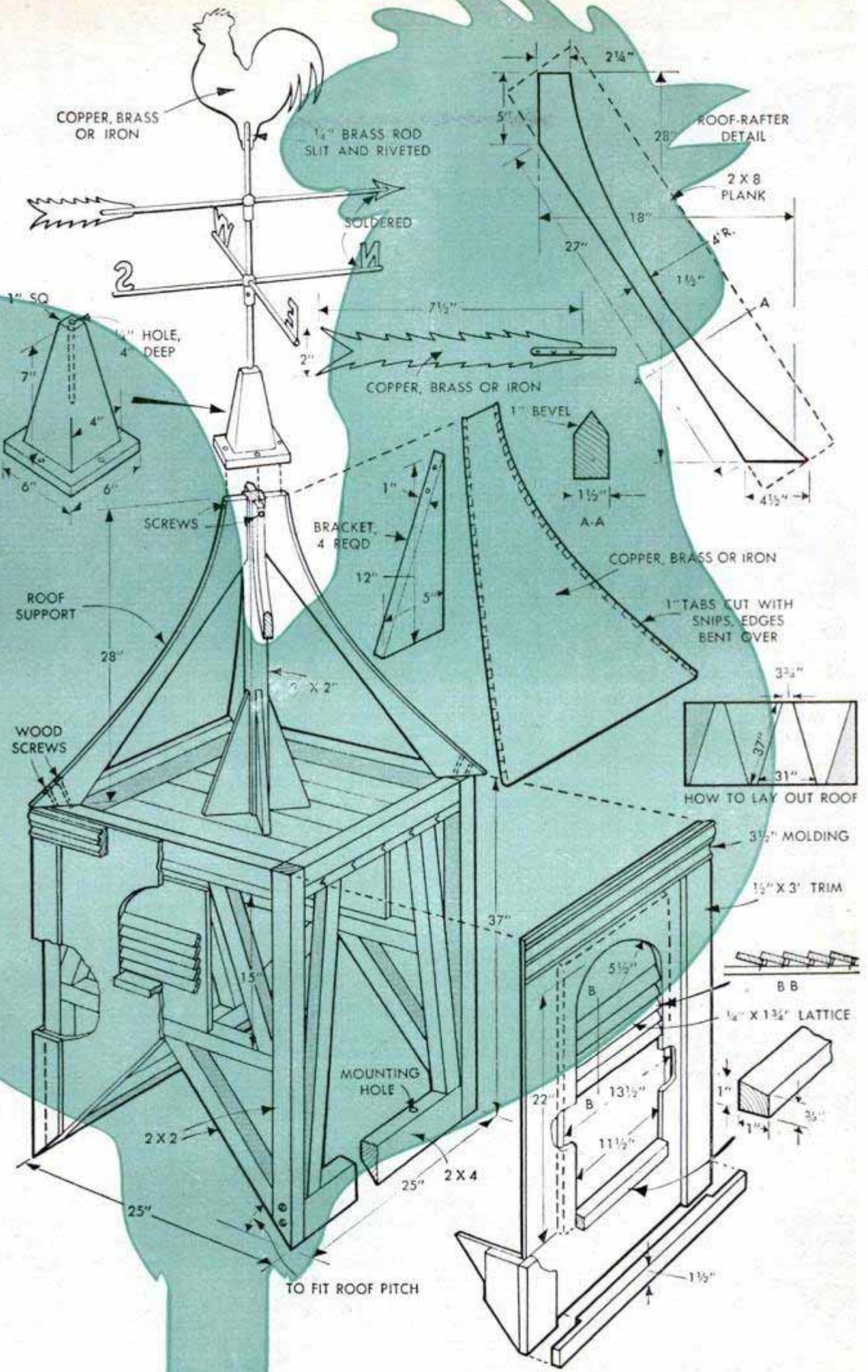


By  
Clifton W.  
Billings

# GARAGE CUPOLA

*with weather vane*

A GARAGE CUPOLA with weather vane adds that finishing architectural detail so often needed to complete unattractive roof lines. The design of this one permits its use on roofs having a wide variation in rafter pitch. As detailed, the cupola is suitable only for a two-car garage as it is roughly 6 ft. in height, not including the weather vane. If desired, the over-all dimensions can be reduced proportionately and lighter materials used. Section B-B in the construction details on the opposite page shows how false louvers are installed. However, the cupola can be made to serve as a ventilator by changing this construction to open louvers, and placing the cupola over an opening cut in the roof at the ridge. In this case, flashing must be installed to prevent leaks and fine-mesh screen should be placed back of the louver slats to keep out small birds. Construction of the frame employs simple butt joinery, but note especially that the lower horizontal frame members are beveled on the lower edges to suit the roof pitch. Determine the angle of the bevel from the roof. The "ceiling" of the louver compartment is of tongue-and-groove pine flooring and the sides and ends are cut from waterproof plywood. The sheet-metal roof is supported by four band-sawed rafters, the upper ends being joined to a center upright with screws. The band-sawed edges are beveled as in section A-A. Light sheet copper is best for the roof, although galvanized sheet metal is a good substitute if protected with paint after the first year or so. All parts of the weather vane are painted black. ★★★

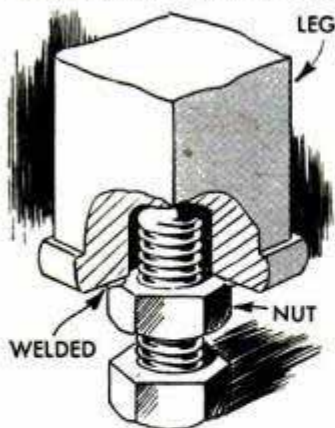


## Mothproof Blanket Storage Provided by Rubbish Can



The housewife's annual spring problem of where to store woolen blankets can be solved with a galvanized rubbish can. After the blankets have been cleaned, they are placed in a new can and the lid of the can is sealed with wide masking tape. Blankets may be kept all summer without danger from moths.—Courtesy of the Wheeling Corrugating Co., Wheeling, W. Va.

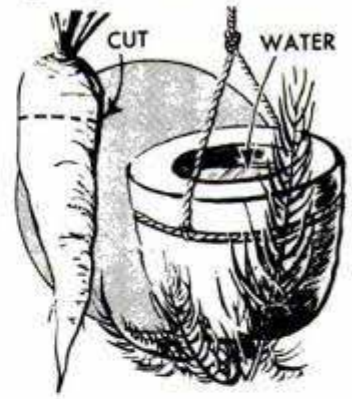
## Screws in Card-Table Legs Permit Height Adjustment



When we found that our new metal card table was higher than our old one after placing them together for Canasta and light refreshments, we were disappointed. I solved the problem by fitting leveling screws in the end of each leg of the table. First I drilled a hole large enough to receive a short machine screw and then soldered a nut over the hole. This allowed turning the screw into the leg to bring the low table level with the other. If a table has wooden legs, simply drill undersized holes and thread the screws in them. The screws also will keep a table from teetering on uneven floors.—Ed Packer, Chicago.

## Carrot Makes Hanging Basket

Attractive miniature hanging baskets to decorate kitchen windows and knick-knack shelves can be made from large carrots. Cut off the upper end of the carrot, as shown in the detail, and trim off the foliage  $\frac{1}{2}$  in.

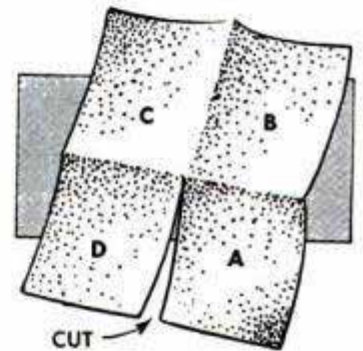


from the carrot. Hollow out the inside, hang by means of colored string such as is used in gift wrapping, and fill with water. In a short time new fernlike leaves will begin to curl up from the bottom in a very eye-pleasing effect. Turnips may be treated in the same manner.

Hi Sibley, Nuevo, Calif.

## Nonslip Sandpaper Pad From Single Sheet

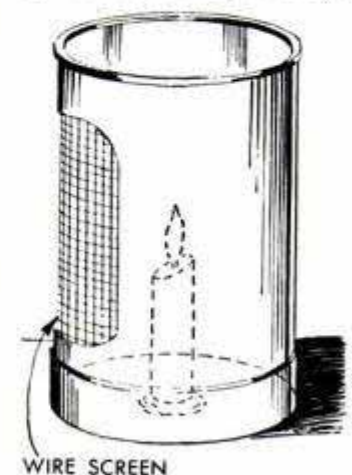
To form an efficient, nonslip sandpaper pad from a standard-size sheet of sandpaper, one craftsman folds and cuts the sheet in the manner indicated. Holding the sheet with the slit on the bottom and the abrasive side uppermost, A is folded under against B, after which A and B are folded under against C. Then D is folded over B, forming a pad in which no two abrasive sides rub together.



Ernest A. Sanborn, Richmond, Vt.

## Camp Lantern Improved Quickly

A windproof camp lantern can be made by cutting an opening in the side of a baking-powder can and inserting screen wire to cover the opening. A candle is attached to the cover, and holes are punched in the top of the inverted can to permit the heat and smoke to escape. The screen will break the force of an ordinary wind to prevent the extinguishing of the candle flame.



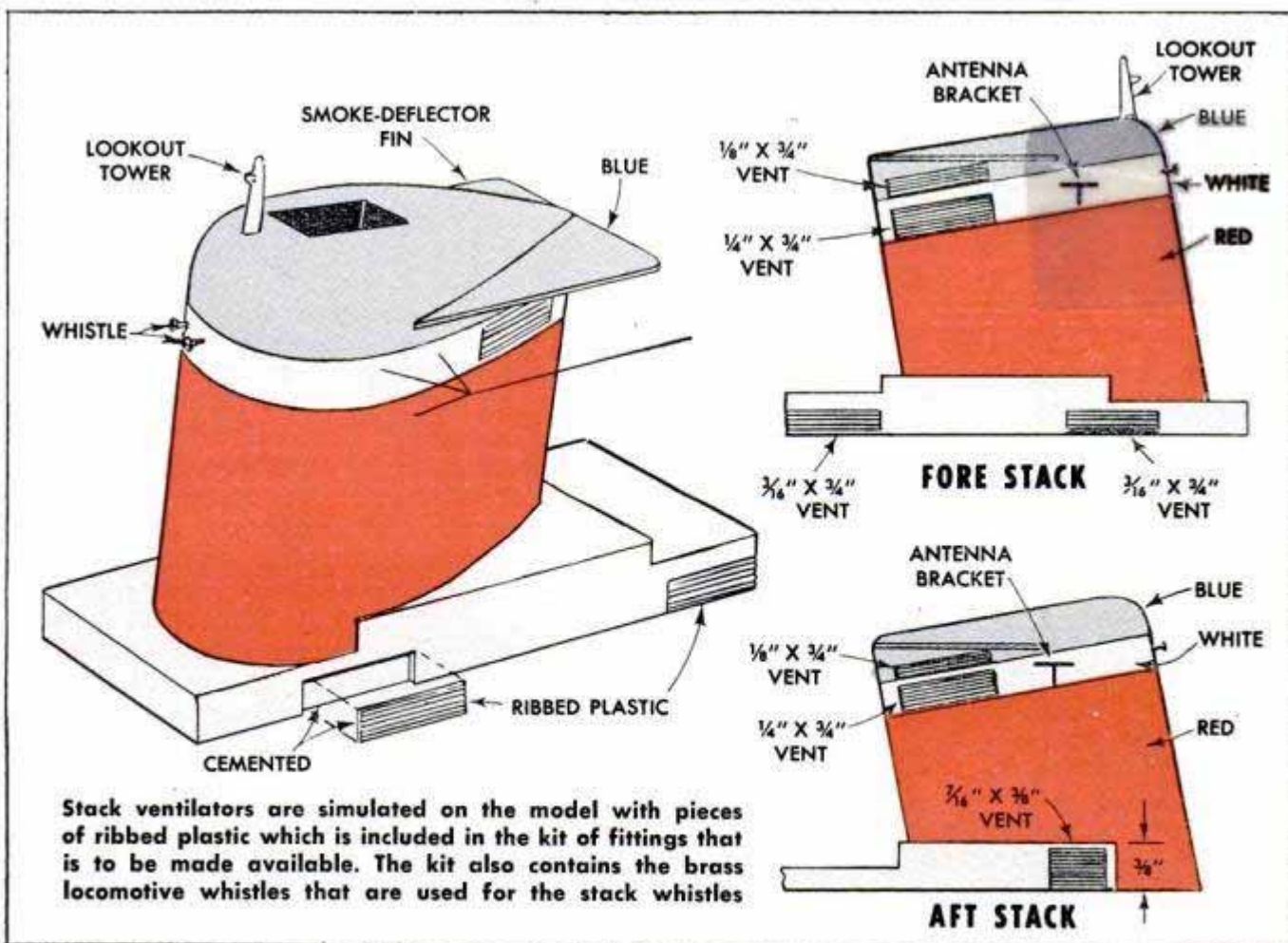


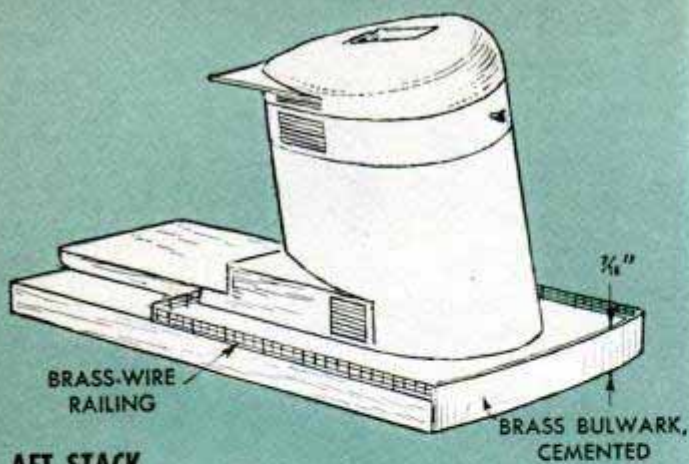
# 36-in. Model of the Part IV SS UNITED STATES

By Wayne C. Leckey

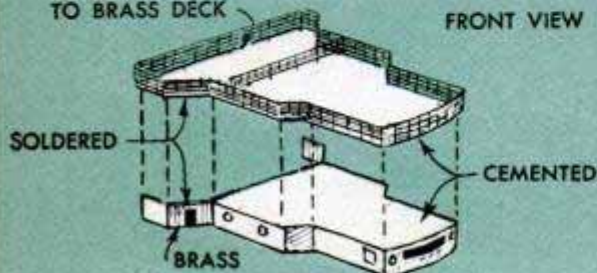
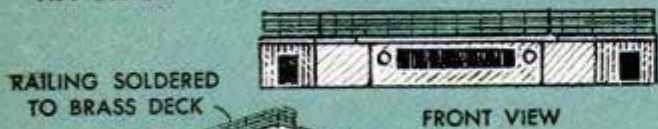
**T**O RESUME WORK on your model of America's mighty speed queen of the seas—the SS *United States*, the finishing touches are added to the stacks in readiness for final assembly. These include the ventilators, whistles, antenna brackets and lookout tower. The ventilators are simulated with sections of ribbed plastic which are cemented, flush, in recesses in the stacks and the decks to which the stacks are glued. The details below, which include

actual-size profile views of both stacks, give the sizes of the ventilators and show where they are located on each side. To correct an error in the depth of the notch at the base of the aft stack, which was previously given as  $\frac{1}{8}$  in., the notch should measure  $\frac{3}{8}$  in. as shown here. Each stack is masked and painted red, white and blue, a band of white separating the other colors as shown in the detail. As indicated, the dome of each stack and its smoke-deflector fin are painted dark blue, and in the case of each color, the ventilators are painted over and later cleaned

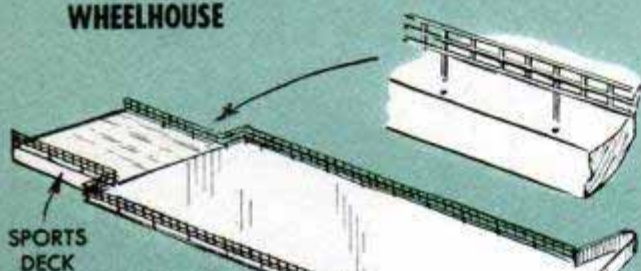




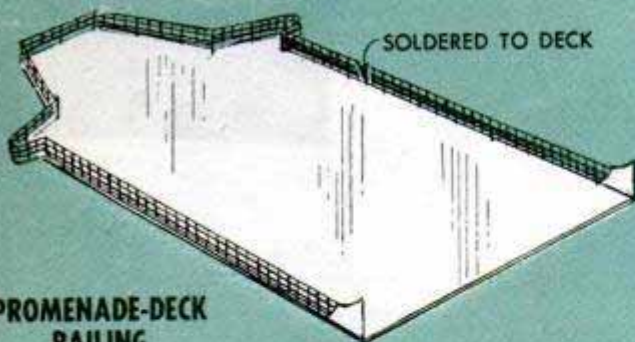
**AFT STACK**



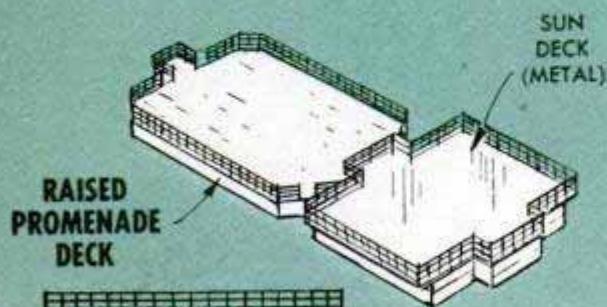
**WHEELHOUSE**



**NAVIGATING-BRIDGE DECK**



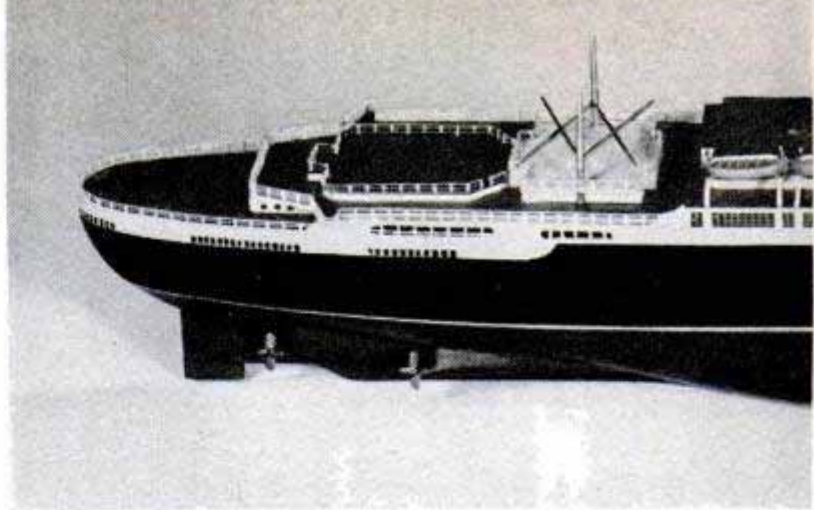
**PROMENADE-DECK RAILING**



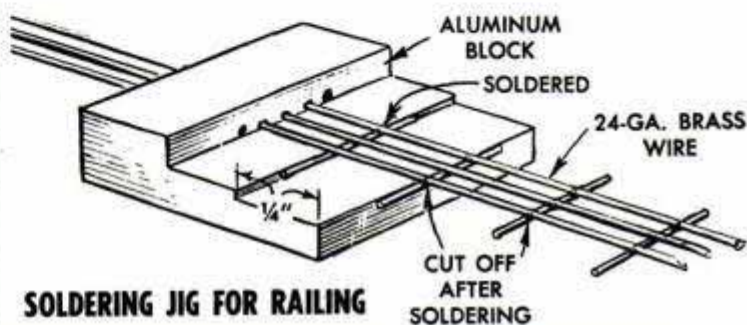
**FRONT VIEW**



**SIDE VIEW**



This side-view photo of the PM test model of the SS United States shows the progress to date. The model is being built by professional modelmakers in order to pass on to the reader the assembly methods used



**SOLDERING JIG FOR RAILING**



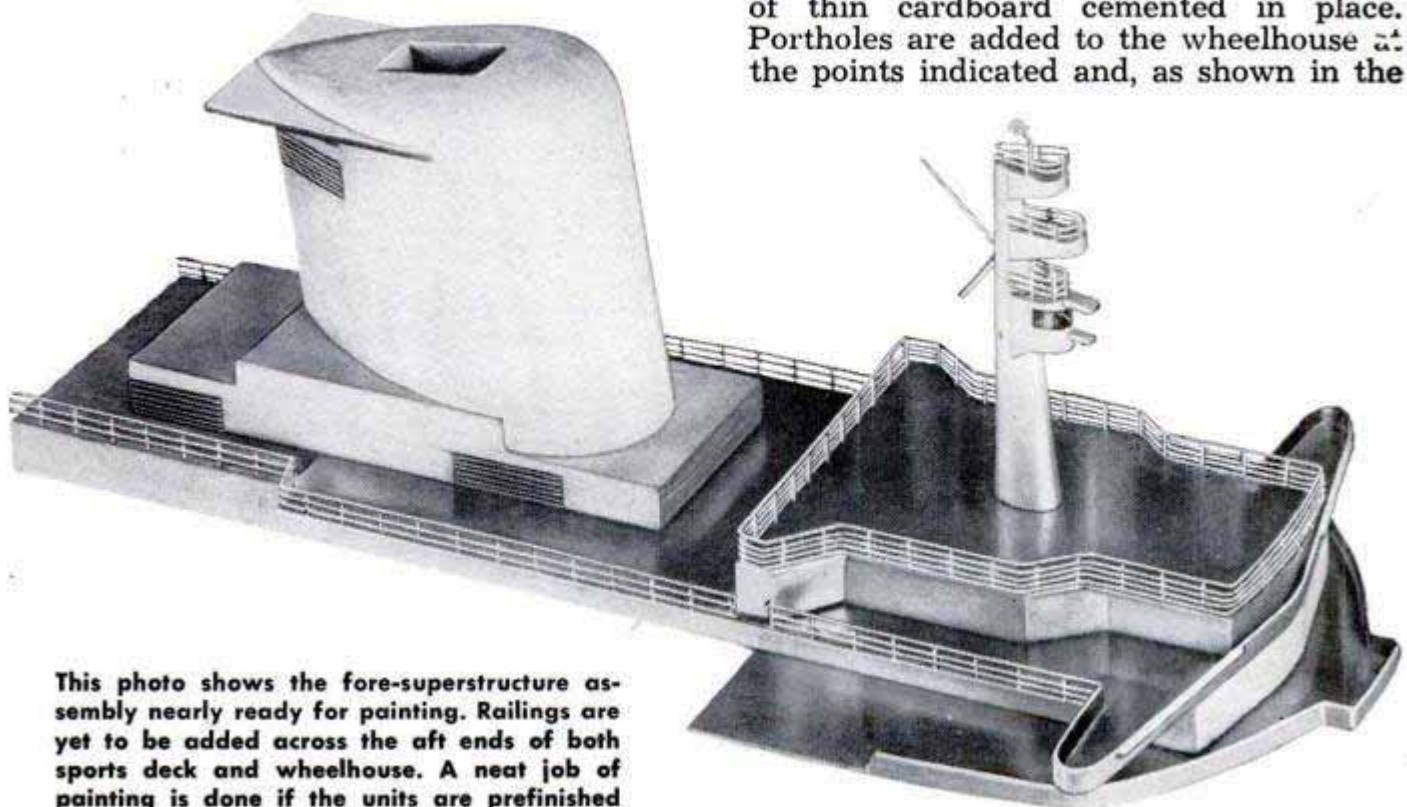
of paint by running a pin in the grooves of the plastic. The antenna brackets are made of fine wire and soldered together in the form of a tripod, after which each bracket is inserted in tiny holes drilled in opposite sides of the stacks. Tiny brass locomotive whistles are used for the stack whistles, two being fitted in the fore stack and one in the aft. Finally, the lookout tower is added atop the fore stack. Each stack and the deckhouse on which it rests is made up as a complete unit, fully painted, and set aside for final assembly. You'll note in the case of the aft-stack deckhouse that, in addition to a railing, a brass bulwark is cemented to the fore end of the deckhouse. The fore-stack deckhouse is painted white all over, as is the aft deckhouse itself. However, the top of the sports deck on which the deckhouse rests is painted dark green while the sides, railing and bulwark are white.

Perhaps the most tedious part of building the entire model is fabricating the tiny railings which skirt the various decks. The drawing at the left, picturing individually each deck of the superstructure, shows just where the railings go. In addition to these railings, there is one added to the stern of the hull, along both starboard and port

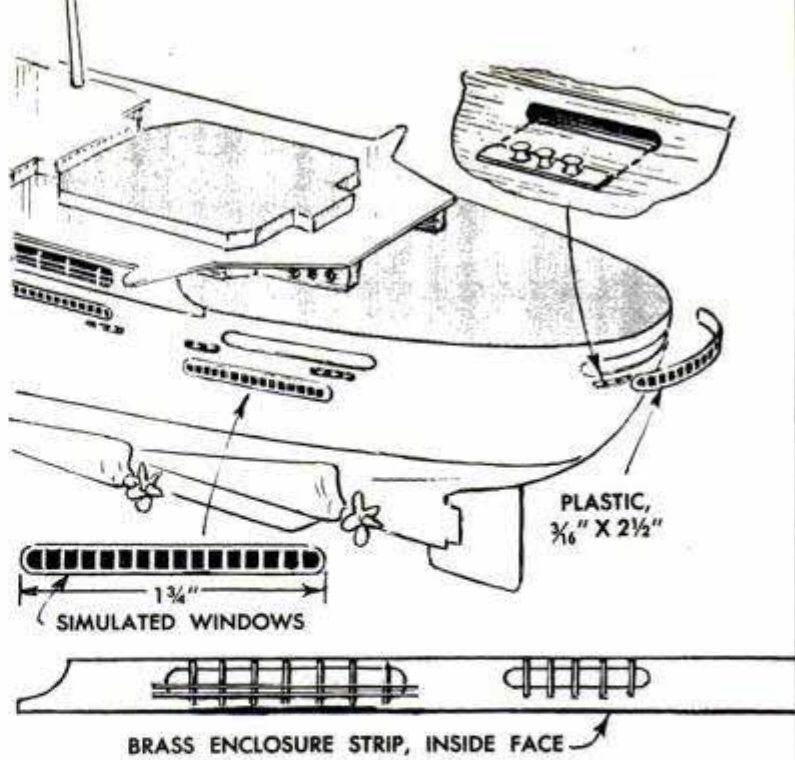
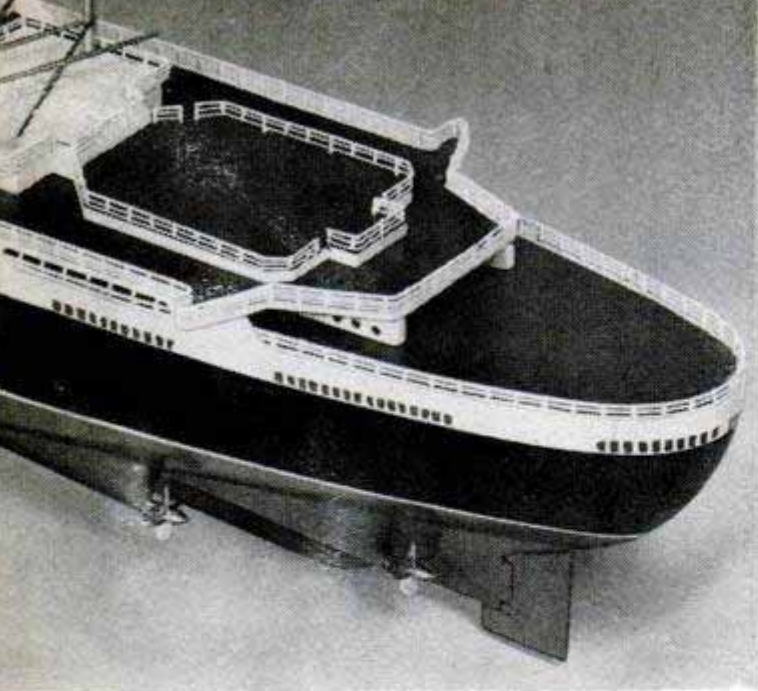


sides of the sports deck and at the bow. With the exception of the wheelhouse-deck railing and the one on the metal promenade deck, which consist of four horizontal wires, all other railings are made up of three brass wires. The full-size section of railing pictured below the soldering jig is typical and gives the proper  $\frac{1}{4}$ -in. spacing of the posts. Where railings are added to wooden decks, every fourth post is left projecting about  $\frac{1}{4}$  in. for installing the railings as close to the edges of the decks and hull as possible. In the case of metal decks, all posts are snipped off evenly and flush with the bottom wire to permit soldering in place. In all cases, the bottom wire of the railings rests directly on the deck. The stepped-block soldering jig provides one way of making the railings, but other methods may be worked out by the builder. When the jig is made of aluminum, the solder will not adhere, nor will the jig burn, although you can get by with a hardwood jig which will last quite a

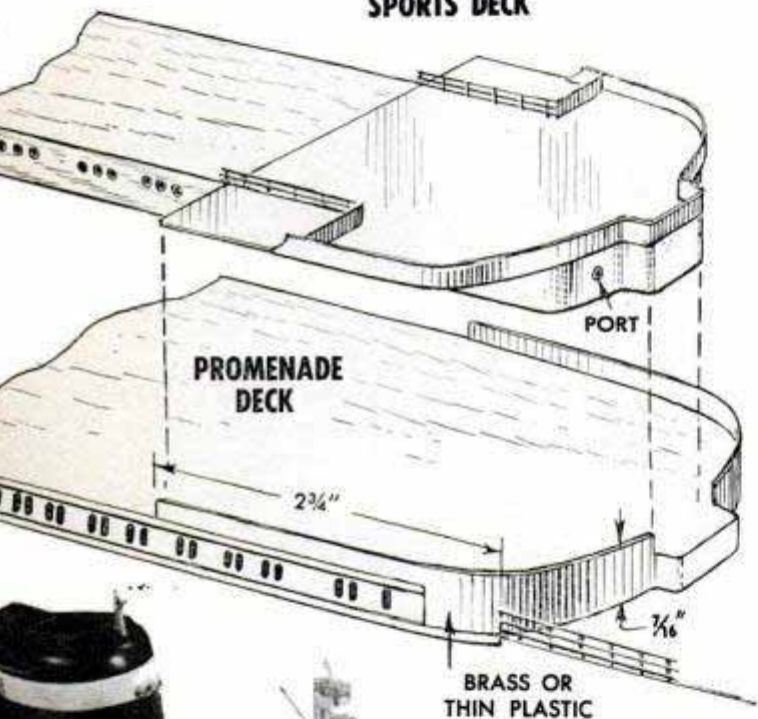
while before becoming charred and requiring replacement. A small strip of aluminum placed under the wires at the point of soldering will make the jig last longer. The holes in the jig should be of a size to allow the wires to pass through snugly. The steps in the jig automatically space the posts uniformly and position them accurately. Solder is flowed sparingly over each intersection of wires, using a small-tip soldering iron. Later the soldered joints are cleaned up with a thin, flat file. A study of the various photos will orient you in just where the railings are added. All railings are painted white, and openings in the railings are later fitted with tiny stairs, which are located according to the plan view, Part I. The metal deck of the wheelhouse, which overhangs the sides of the latter about  $\frac{1}{16}$  in., is cemented to the wheelhouse and then small pieces of brass are bent to conform to the shape of the aft end and cemented flush with the edges. Note that small doors are represented here which are merely pieces of thin cardboard cemented in place. Portholes are added to the wheelhouse at the points indicated and, as shown in the



This photo shows the fore-superstructure assembly nearly ready for painting. Railings are yet to be added across the aft ends of both sports deck and wheelhouse. A neat job of painting is done if the units are prefinished



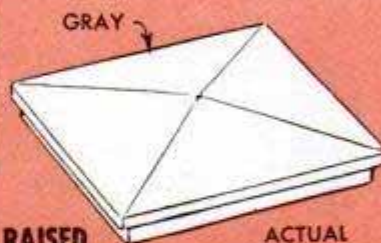
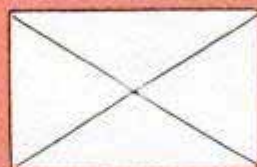
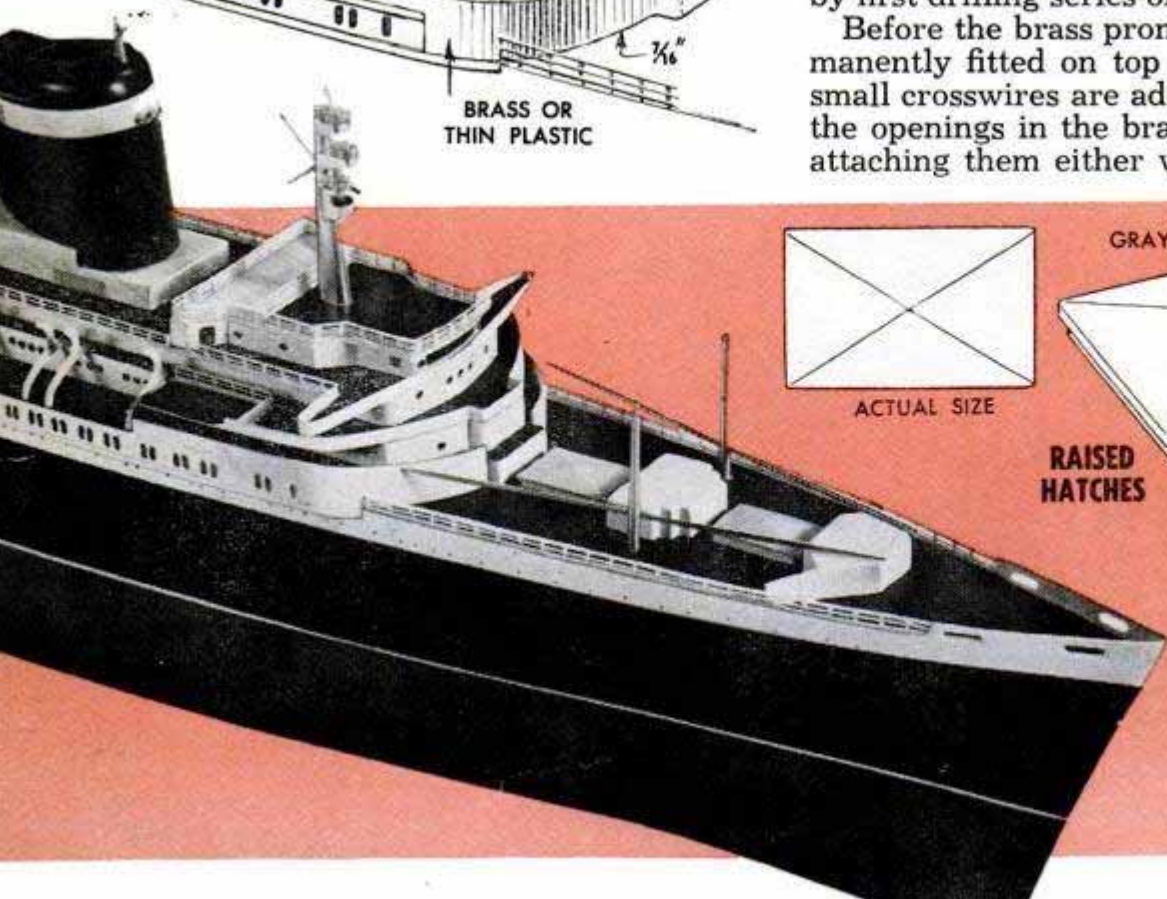
**SPORTS DECK**



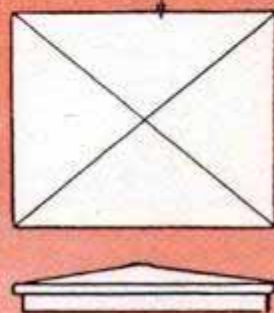
front view of the wheelhouse, a small window is represented by a strip of plastic, scored on the back and painted black, before cementing it in a recess. A porthole is added at each end of the window.

Similar windows are set flush in recesses on both sides and at the end of the stern as indicated in the detail at the top of the page. In addition to the windows, chocks are also installed at the stern on a line below the windows and are likewise set in recesses. A tiny chisel will be required to cut the recesses for the windows, first tracing around the plastic strips with the point of a knife and then carefully cleaning out the waste. Openings for the chocks are made similarly by first drilling series of overlapping holes.

Before the brass promenade deck is permanently fitted on top of the upper deck, small crosswires are added to the inside of the openings in the brass enclosure strips, attaching them either with cement or sol-



**RAISED HATCHES**

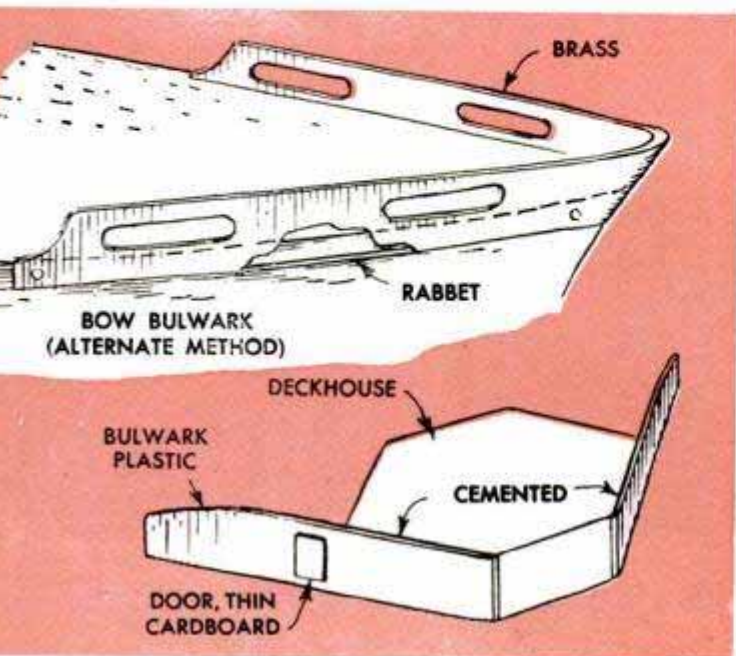




der. The fore end of the wooden promenade deck is fitted with bulwarks which conform to the rounded end and blend into the windows for a distance of  $2\frac{3}{4}$  in. along each side. It will facilitate painting and a neater job will result if you finish each deck as it is completed. Except for the aft portion of the wheelhouse deck and the sun deck of the raised promenade deck, which are painted white, all decks on the model are painted dark green. The davits are white and the lifeboats are painted aluminum. The latter are suspended from the davits with very fine wire, threading it through holes in the davits and eyes already cast in the lifeboats. To keep the boats in neat, straight rows, place a drop of airplane cement on the wires to hold them rigidly. In studying the photo at the top of the opposite page you'll notice that three portholes are fitted at the aft ends of the upper deck. If you find that the bow bulwark is difficult to shape thin enough without breaking, you can use a strip of brass for this, as detailed below, fitting it flush in a shallow rabbet. This bulwark maintains the same outward flare of the hull. Fore-deck fittings consist of two raised hatches, set lengthwise and in line with two deckhouses. The foremost deckhouse is fitted with two bulwarks which are cemented to the leading faces of the house and extended to butt against the deck railing. A small door is simulated on each side with thin cardboard. Both deckhouses are painted white all over, while the raised hatches are done in white around the edges and painted gray on top. The sizes of the hatches, as well as the deckhouses, were given in Part II.

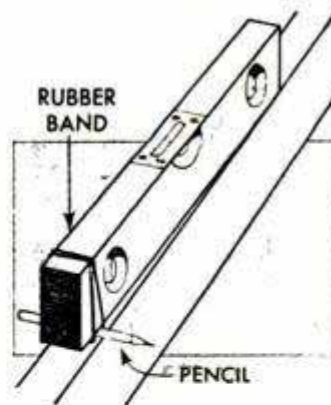
Part V, the concluding article of the series, will explain how the final fittings are added and will show how to make a protective glass case for your completed model.

(To be concluded next month)



## Checking Slope of Sidewalk Forms

When forms for a cement walk are to be sloped, a pencil or stick secured to the underside of the level at a point where a "level" reading is obtained will make it possible to check and maintain the same degree of slope throughout the installation.



If a rubber band is not available, strips of adhesive or masking tape will suit the purpose just as well.

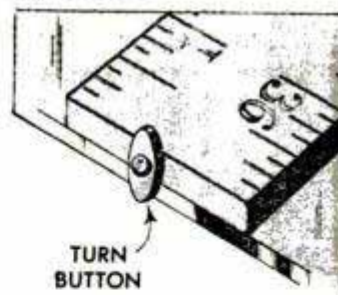
## Lighter Fluid Frees Stuck Chimes

When the plunger of a door-chime mechanism sticks, a drop or two of lighter fluid applied at the guide opening usually will free it. Push the doorbell button several times after applying the fluid to make certain that the plunger moves freely. Note that lubricating oil should not be used on the plunger at any time.

J. F. Landusky, Appleton, Wis.

## Small Turn Button on Yardstick Aids in Measuring Glass

To assure accuracy as well as speed when measuring panes of glass, one glazier attached a small metal turn button to one end of a yardstick so it could be hooked



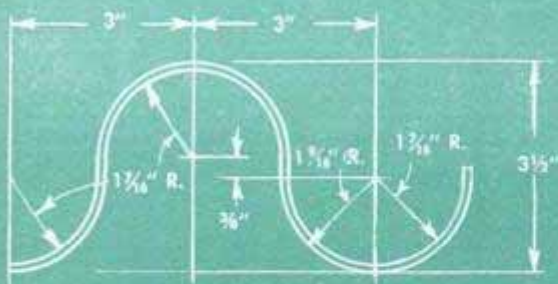
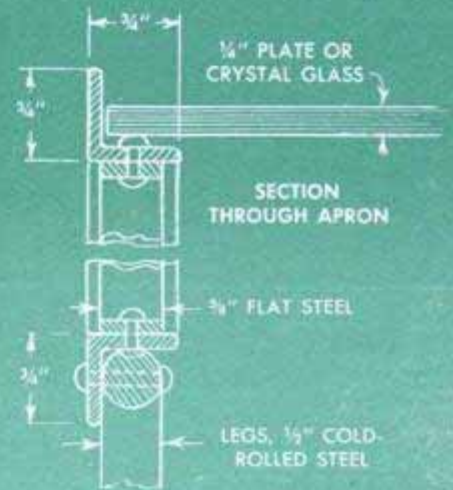
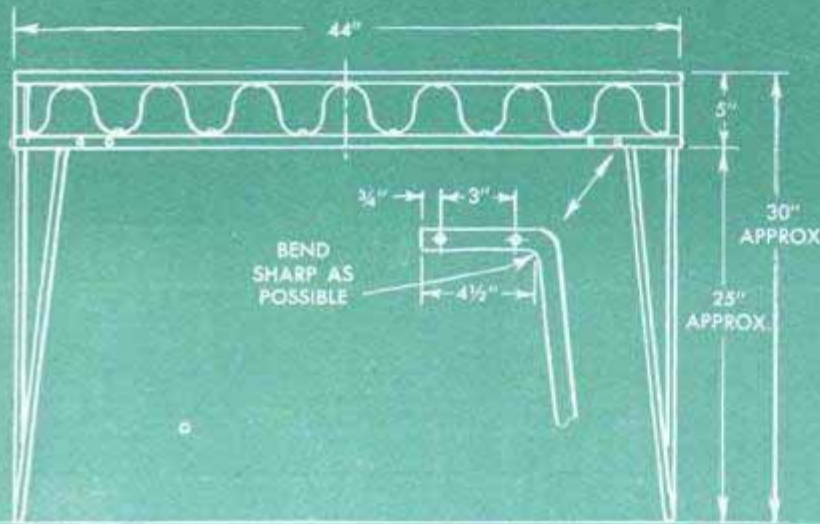
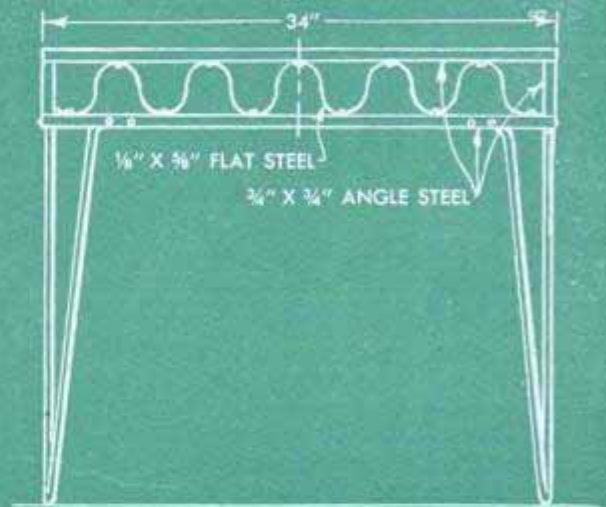
over the edge of the glass as shown. When not needed, the button may be turned parallel with the end of the yardstick.

## Sign Barricades Door to Room Having Freshly Painted Floor

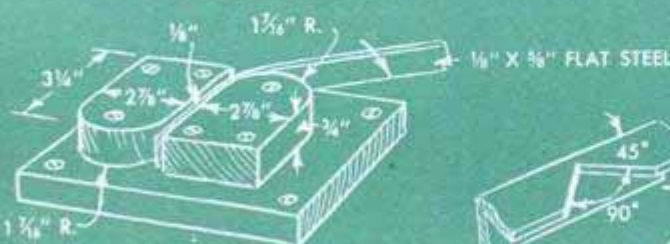
After painting the floor of a room, one housewife reminds other members of the family of the condition of the floor with a sign hung in the door which in itself serves as a barricade. The "wet paint" sign is suspended from a curtain rod that is attached to the wall on both sides of the door with rubber suction cups.

☞ To repair large cracks in a plastered wall, use a punch-type can opener to rake the cracks to a depth that will remove all loose pieces. Fill the beveled groove that results with new plaster.

# PLAN of the MONTH...



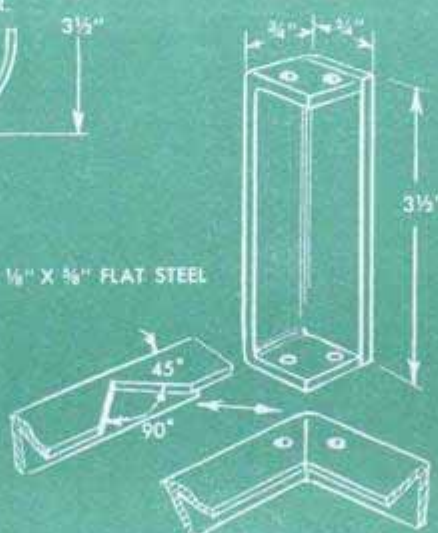
DETAIL OF WROUGHT-IRON APRON



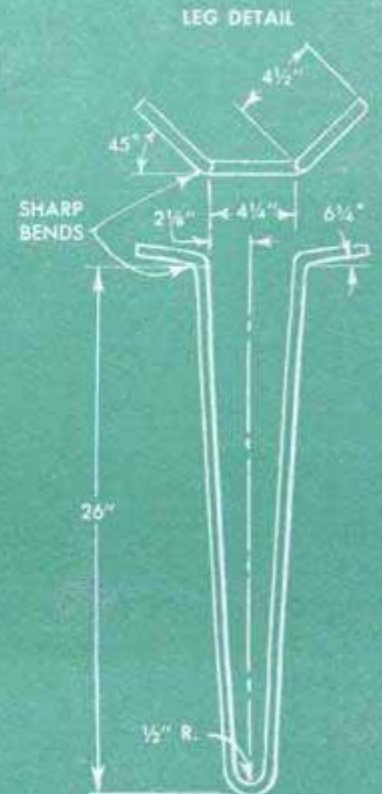
MAKE JIG FROM HARDWOOD AND FASTEN TO HEAVY BENCH

JIG FOR BENDING WROUGHT-IRON APRON

DETAIL OF CORNER POST



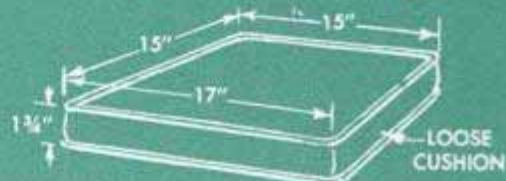
MITERED CORNER OF APRON FRAME



LEG DETAIL

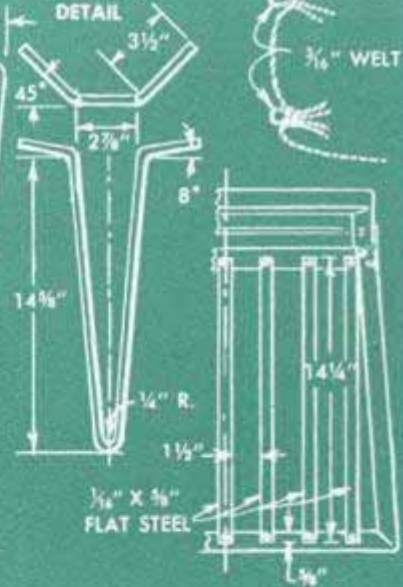
# Garden Table and Chairs

Wrought-iron furniture showing the influence of modern design is now the height of fashion, so designer John Bergen has followed this trend in creating this attractive garden furniture. Parts of these tables and chairs can be welded, riveted or bolted together. A bending jig should be made as shown so all curved parts will conform. Before finishing, the metal should be washed with a strong solution of caustic soda. Use rubber gloves when applying this solution as it will cause severe skin burns. Rinse thoroughly with clear water to remove all traces of caustic soda, then undercoat with a primer of zinc chromite or red lead. Final coat can be either glossy enamel or flat paint, depending on personal preference



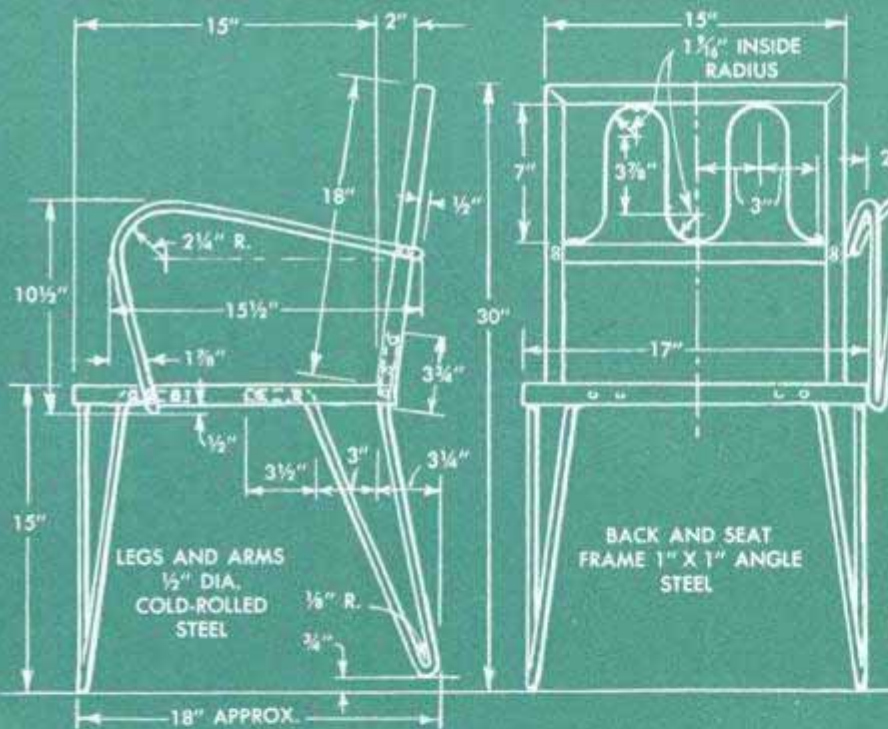
FILL CUSHION WITH 2" CORED FOAM RUBBER 1/2" WIDER AND LONGER THAN CASE

FRONT-LEG DETAIL



3/8" X 3/8" FLAT STEEL

PLAN OF SEAT



BACK AND SEAT FRAME 1" X 1" ANGLE STEEL

## MATERIALS NEEDED

### Angle steel

- 2 pcs.—3/4"x3/4"x13'—Apron rails of table
- 1 pc.—1"x1"x5 1/4"—Seat frame of chair
- 1 pc.—1"x1"x5'2"—Back frame of chair

### Strap steel

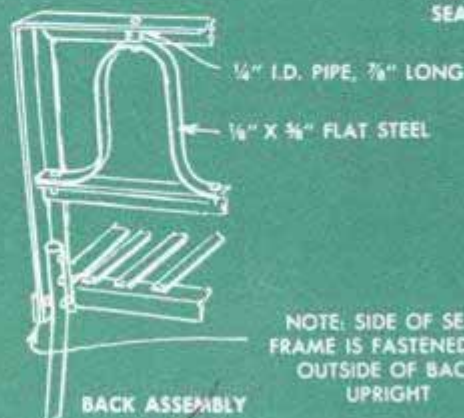
- 2 pcs.—1/8"x5/8"x4'6"—Table ends
- 2 pcs.—1/8"x3/8"x6"—Table sides
- 1 pc.—1/8"x3/8"x3"—Chair back iron
- 7 pcs.—1/16"x3/8"x14 1/4"—Seat straps

### Cold-rolled steel rod

- 4 pcs.—1/2" dia., 5'6" long—Table legs
- 2 pcs.—1/2" dia., 3'4" long—Front chair legs
- 2 pcs.—1/2" dia., 3' long—Back chair legs
- 2 pcs.—1/2" dia., 5'2" long—Chair arms

### Miscellaneous

- 1 pc.—33 3/8"x43 3/8" Plate-glass table top
- 2 pcs.—3/8" i.d. pipe, 7/8" long—Back spacers
- 1 foam-rubber pad, cored—2"x17"x15"
- 1 yd. upholstery, 36" wide



BACK ASSEMBLY

NOTE: SIDE OF SEAT FRAME IS FASTENED TO OUTSIDE OF BACK UPRIGHT

## Sawhorse Aids Washing Of Window Screens



To keep window screens off the ground when washing them with a hose, one homeowner places each screen on a sawhorse in the manner illustrated. When one side is finished, the screen simply is leaned against the opposite legs and washed from the other side. This not only eliminates extra handling but also simplifies inspection of the screen as it is being washed.

W. F. Schaphorst, Newark, N. J.

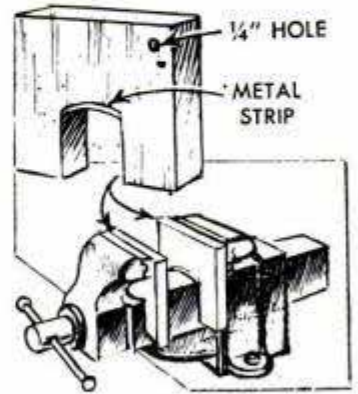
## Too Much Water Used by Battery Indicates Overcharging

If your storage battery takes an excessive amount of water, very likely it is being overcharged, according to the chemical engineer of one large battery-manufacturing company. Overcharging can ruin a battery by oxidizing the grid structures and by warping the positive lead plates. The most common cause of overcharging is a faulty voltage regulator, but when the battery seems unusually "thirsty" both the voltage regulator and the generator should be checked. It may be necessary, especially during hot weather, to adjust the voltage regulator to correct the condition, while in others a new voltage regulator will be needed. In cold weather, the car must be driven several miles before the battery is warm enough to accept a charge. This, plus the harder starting and use of the heater,

tends to keep the battery from overcharging. During warm weather, the battery begins charging as soon as the engine is started and, unless auxiliary electrical equipment is used, most starts are quick, all of which contribute to the possibility of overcharging.

## Auxiliary "Jaws" on Machinist's Vise Prevent Marring Wood Surfaces

In order to use a machinist's vise for woodworking, one craftsman made wooden facing blocks for the jaws. A little wider than the jaws and a snug fit over the vise slide, they protect the work from damage by the metal jaws. The

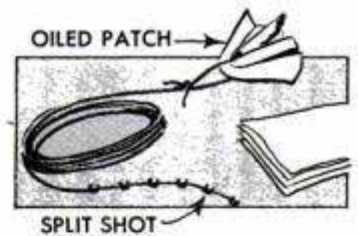


facing blocks should be made of hardwood or hardwood-faced plywood. A metal strip is inserted as shown in the diagram to protect the face block from the slide. A hole drilled in each block allows it to be hung on a nail near the vise when not in use.

Arthur D. Roberts, Peaks Island, Me.

## Flexible Gun "Rod" Easy to Carry

Carrying this gun-cleaning rod is no problem for the hunter because it is nothing more than a piece of fish-line. A loop at one end takes the



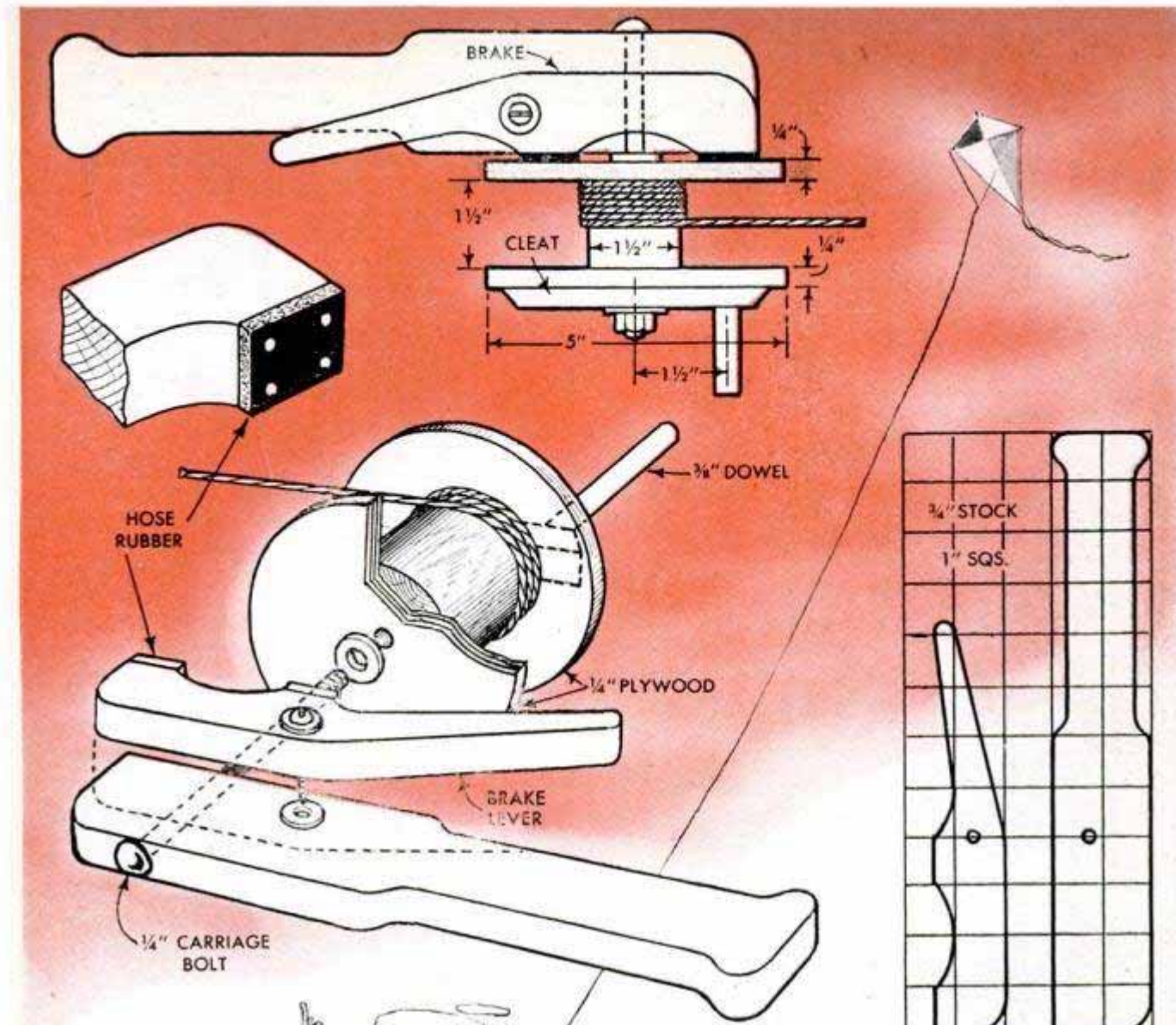
cleaning patch, and five or six split shot clamped on the other end provide weight to drop the cord through the gun barrel.

Clyde Allison, Cadillac, Mich.

## Paint Dab Identifies Color in Can

Opening stored paint cans to identify the color can be eliminated by putting a dab of paint on the can. If the swatch is applied at the level of the paint, it will also show the amount of paint remaining in the can. The proper time to apply the mark is immediately after using paint and before brush is cleaned and put away.—R. F. Donovan, Guttenberg, N. J.





# KITE REEL

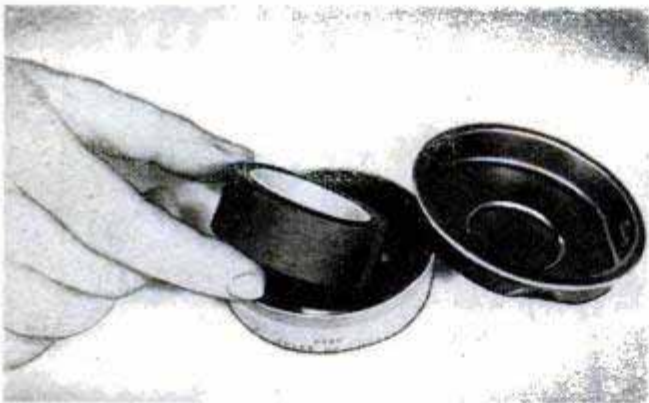
By Hi Sibley

FITTED WITH a thumb brake designed to prevent string breakage, this simple kite reel will be the envy of your pals when March winds blow. The brake, "shoed" with pads of hose rubber, is pivoted to the top of the reel handle and bears against the side of the reel flange when pressure is brought on the brake lever. Slight pressure will slow the unwinding reel gradually and bring it to a complete stop without a sudden, string-breaking jerk. The drum of the reel can be wood or a small condensed-milk can. A single bolt, with a washer between, holds the handle to the reel and lets it turn freely. Peen the end of the bolt slightly to keep the nut from backing off. An important point in assembly is to locate the pivot hole in the brake so that both rubber pads lie flat against the inside flange of the reel.

# TAPE DOES THE TRICK



The variety of tapes available—cellulose, friction, adhesive, masking and many others—find a countless number of uses around the home. The wide range of textures and colors in which the tape is made lends it to decorative as well as practical purposes. Here are some new ideas on using tape to add to those that you might already have



Friction tape often will dry out and lose some of its adhesive qualities if not properly stored. To prevent this, store tape in an empty shoe-polish can

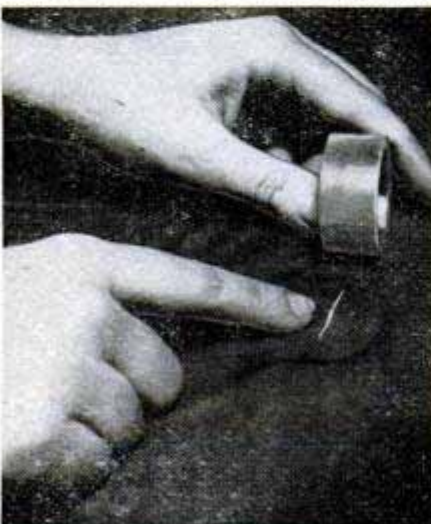


Nail file is cleaned quickly with cellulose tape. Press strip of tape firmly over file teeth and then lift to remove grit. Repeat operation if necessary

To repair torn oilcloth or plastic tablecloth, apply adhesive tape to underside of tear and cellulose tape to top. Cellulose tape may be transparent or of matching color

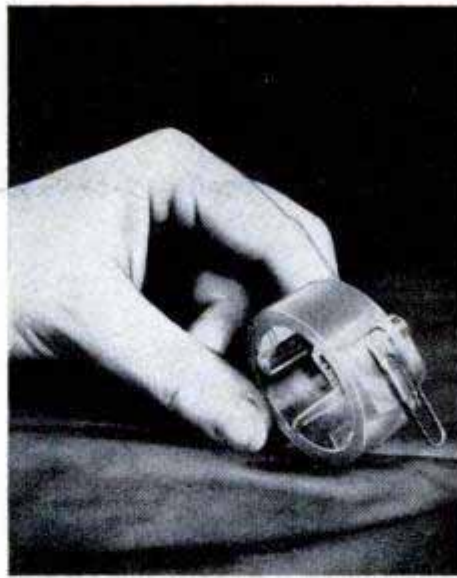
Ordinary decal transfers are removed easily with cellulose tape. Cover the surface of the decal with strips of tape and then peel back the tape slowly to lift the transfer

Tin can serves as covered storage container for leftover grease if end is removed with rotary opener and hinged to can with tape. Tab is provided for other edge of lid





Bottles carried in a suitcase or packed for moving won't spill if the caps are taped to the necks of the bottles



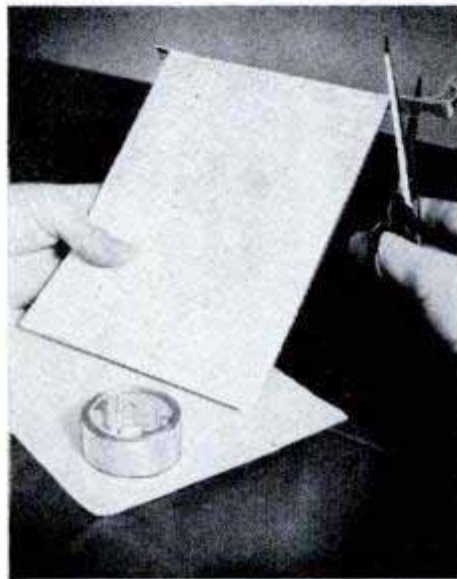
Cellulose tape is easier to remove from roll if paper clip is placed over end before it is pressed against the roll



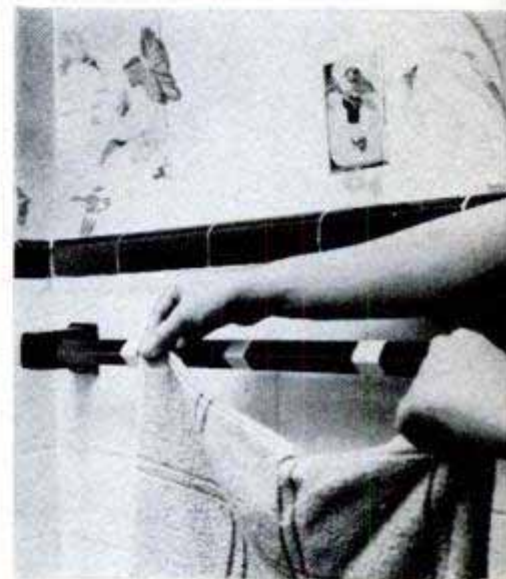
Torn or worn-out pocket can be temporarily repaired with a strip of adhesive tape



Wrapping tape, adhesive side out, around rolled magazine provides tool for delinting and dusting garments. Roll taped magazine over the fabric



Scratch pads are made from scrap paper by pressing strip of cellulose tape across aligned edge of paper stack and then cutting excess tape from pad

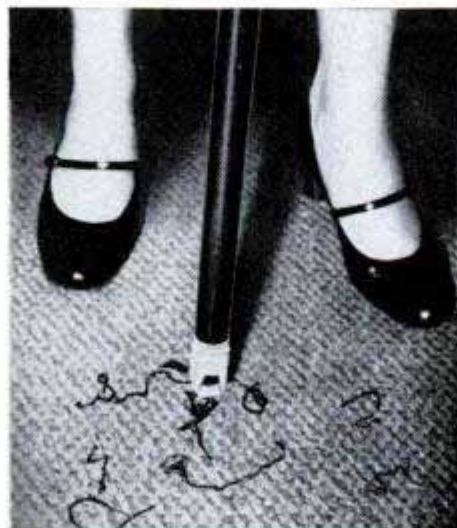


Wrapping towel bars with two or more rings of adhesive tape will keep towels from slipping off the bars

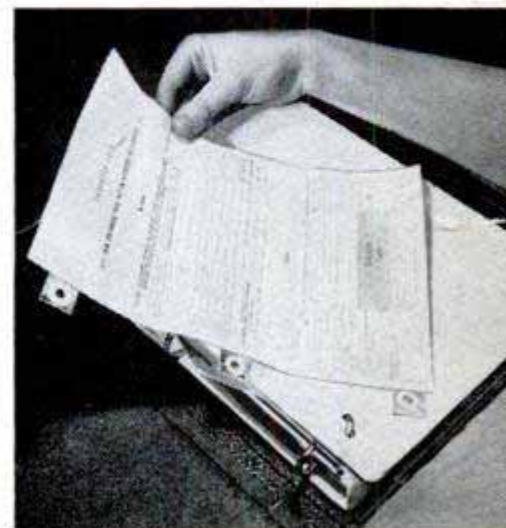
If shower-curtain rings tend to slip from the rod, keep them in place by closing the open ends of the rings with narrow cellulose tape, as below



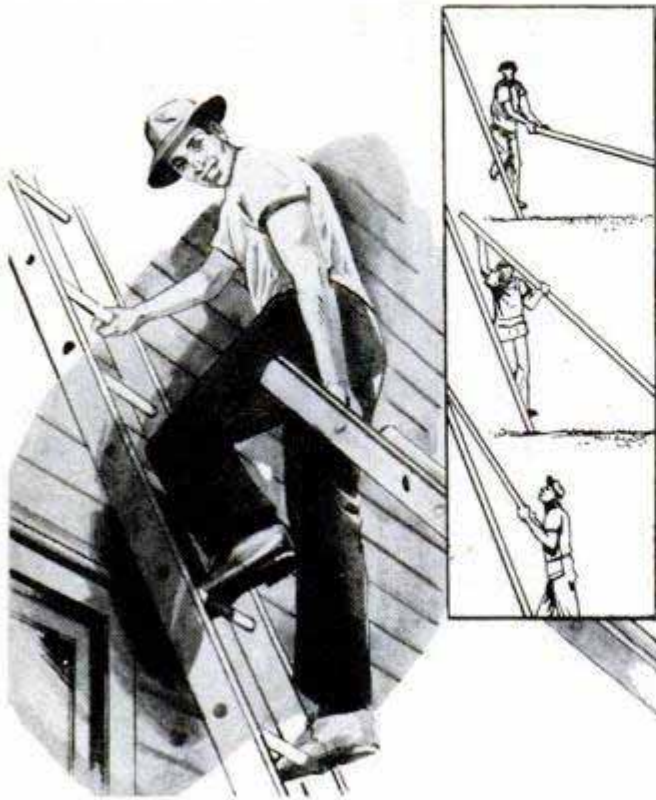
Tape fastened adhesive side out to end of stick speeds job of picking up lint and thread from sewing room floor. Use adhesive or cellulose tape



To insert forms in a ring binder, fit edges with tabs made from cloth reinforcing rings and cellulose tape

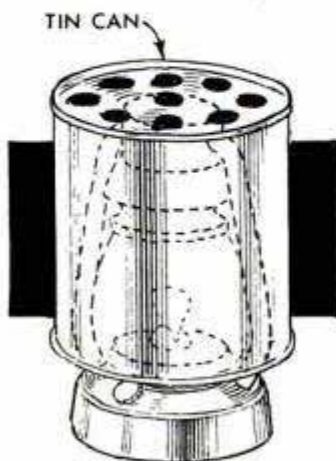


## Heavy Two-Piece Ladder Put Up One Section at a Time



A heavy two-section ladder can be put up against a building with less work and danger by one man if the following method is used. The lower section is leaned against the building, with the top section on the ground in front of it. Pick up the top end of the upper section and ascend the lower section as far as is practical. Then, with a hand-over-hand movement, continue to slide the upper section up until there isn't enough room to continue this method. Next, return to the bottom of the ladder, grasp the lower end of the upper section and slide it through the fasteners at the top. Now it can be pushed up to the desired height in the usual manner.

## Tent Stove Improved From Lantern



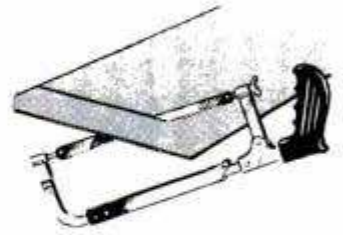
It's easy to convert a lantern into a heating stove for a small tent by covering it with an inverted can or pail having a perforated bottom. This concentrates the heat thrown off by the lantern, causing air which enters at the lower end of the can to heat quickly and

pass through the holes in the end now forming the top of the stove. The can also provides a convenient rest for a pan when

heating small quantities of water. *Caution:* Because of the fire hazard involved, as well as the danger of the lamp smoking and giving off deadly fumes, this arrangement should not be used in a closed tent or while occupants of the tent are sleeping.

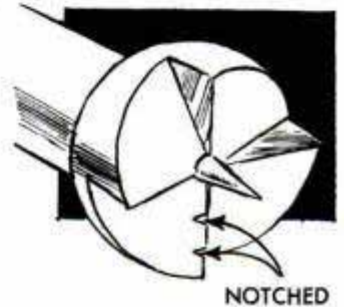
## Extending Range of Hacksaw

In some cases a cut ordinarily beyond the range of a hacksaw can be made by inverting the blade and continuing as indicated. This method is applicable when the cut is to be made only part way through the work, or when a continuous cut is preferable to completing it from the opposite edge.—Henry Josephs, Gardenville, Pa.



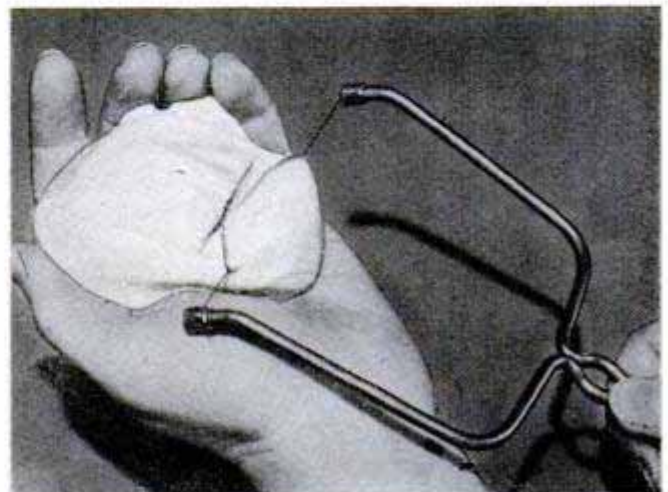
## Lathe Work Easily Indexed

One craftsman has found that when he notched one of the spurs of the live center in his wood-turning lathe, he could remove the work from the lathe when it was partly finished and later put it back for further turning. The notched spur registers in the wood, making it possible to return the work to its original position where it will rotate true.—Howard E. Moody, Upper Jay, N. Y.



## Clay and Similar Compounds Cut Readily With Cheese Cutter

Stiff modeling clay, putty or similar compounds may be cut easily in the exact quantities desired by using a cheese cutter of the type shown. The cutter may be purchased in practically any ten-cent store.





# Paint-Mixing Guide for Matching and Touching Up

By John Baker

A KNOWLEDGE of paint-color mixing is useful for the home craftsman who often has to touch up a nicked wall or match an article of furniture. If a few simple rules are followed, there is nothing difficult about color mixing. The most important thing to remember is to add the color to the white paint in small amounts, bringing it slowly up to the desired shade. The paint should be stirred thoroughly as the color is added to break up the pigment and mix it completely, thus avoiding streaks. To get an immediate idea of how the color you have mixed will look when it is dry, apply a small amount to a blotter. All colors used in the following formulae are colors in oil, which can be obtained from most paint stores in quantities as small as  $\frac{1}{4}$  oz.



## Color Formulae

The colors in oil specified in each of the formulae below are added to white in the proportions shown

**APRICOT:** Add a little bulletin red, lemon yellow

**BLUE, delft:** Cobalt blue, a touch of lampblack

**BLUE, pale:** Add a small amount of Prussian blue.  
To deepen, add more Prussian blue

**BROWN:** Use burnt umber alone. Add white to lighten or Venetian red for a reddish brown

**BUFF:** Quite a little raw sienna. For a rich buff use a little French ocher and burnt sienna

**CORAL:** Chrome yellow, medium, and vermilion

**CREAM:** Raw sienna. Darken with more raw sienna

**ECRU:** Add yellow ocher and a little burnt umber

**FAWN:** Burnt umber, 3 parts, yellow ocher, 2 parts

**GREEN, apple:** Add light chrome green and a little chrome orange to the white

**GREEN, blue:** Prussian blue and chrome green

**GREEN, jade:** Considerable chrome green and a little Prussian blue and Venetian red

**GREEN, olive:** Chrome yellow and lampblack

**GREEN, sea yellow:** Chrome green medium, raw sienna and a trace of chrome yellow

**GREEN, soft:** Chrome yellow, chrome green and raw sienna

**GOLD:** Chrome yellow and a little Venetian red

**GRAY:** Add lampblack to white. Add a little Prussian blue for French gray

**GRAY, stone:** Raw sienna and raw umber. For silver gray, add lampblack

**IVORY:** A little raw sienna and a trace of vermilion

**LAVENDER:** Ultramarine blue, 3 parts, madder lake, 1 part

**LILAC:** A little ultramarine blue and rose madder

**MAIZE:** Chrome yellow, medium, and lemon yellow

**MAROON:** Venetian red, a trace of lampblack and a trace of Prussian blue

**ORANGE:** Chrome yellow, medium, and a little vermilion

**ORCHID:** Rose pink added to white

**PEACH:** Chrome yellow and a little vermilion

**PINK:** Vermilion added to white

**RED, brick:** Vermilion, 2 parts, Indian red, 1 part

**ROSE:** Small amount of Tuscan red, vermilion

**ROSE, old:** A small amount of crimson madder

**SALMON:** Quite a bit of orange chrome, deep

**SAND:** Yellow ocher and a trace of lampblack and vermilion

**TAN:** Add burnt umber to white

**TOPAZ:** Chrome yellow, medium, a little vermilion

**WISTERIA:** Cobalt blue, 2 parts, crimson, 1 part, and a trace of ivory drop black

**YELLOW:** Chrome yellow added to white

**YELLOW, colonial:** French ocher, 2 parts, chrome yellow, medium, 1 part

DESIGNED for a popular model of a folding wheel chair, but readily adapted to any model, this battery-powered drive unit makes it possible for most chair patients to get around easier. When fitted with this electric drive, the chair is entirely push-button controlled — steering, brakes, forward and reverse—and also is provided with mechanical steering for use where practical. A pull on two conveniently located knobs enables the operator to disconnect the drive unit and roll the chair away. Reversing this procedure by backing the chair into the unit and pushing on the knobs, couples the drive unit to the chair. These features make it possible for almost any patient to travel at will.

If ramps are provided to circumvent steps, the chair can be driven onto a porch or into a hall where the unit is disconnected and left until needed. In this way, the average chair user can connect the unit, travel down the ramps to the sidewalk and take a "spin" around the neighborhood unaided.

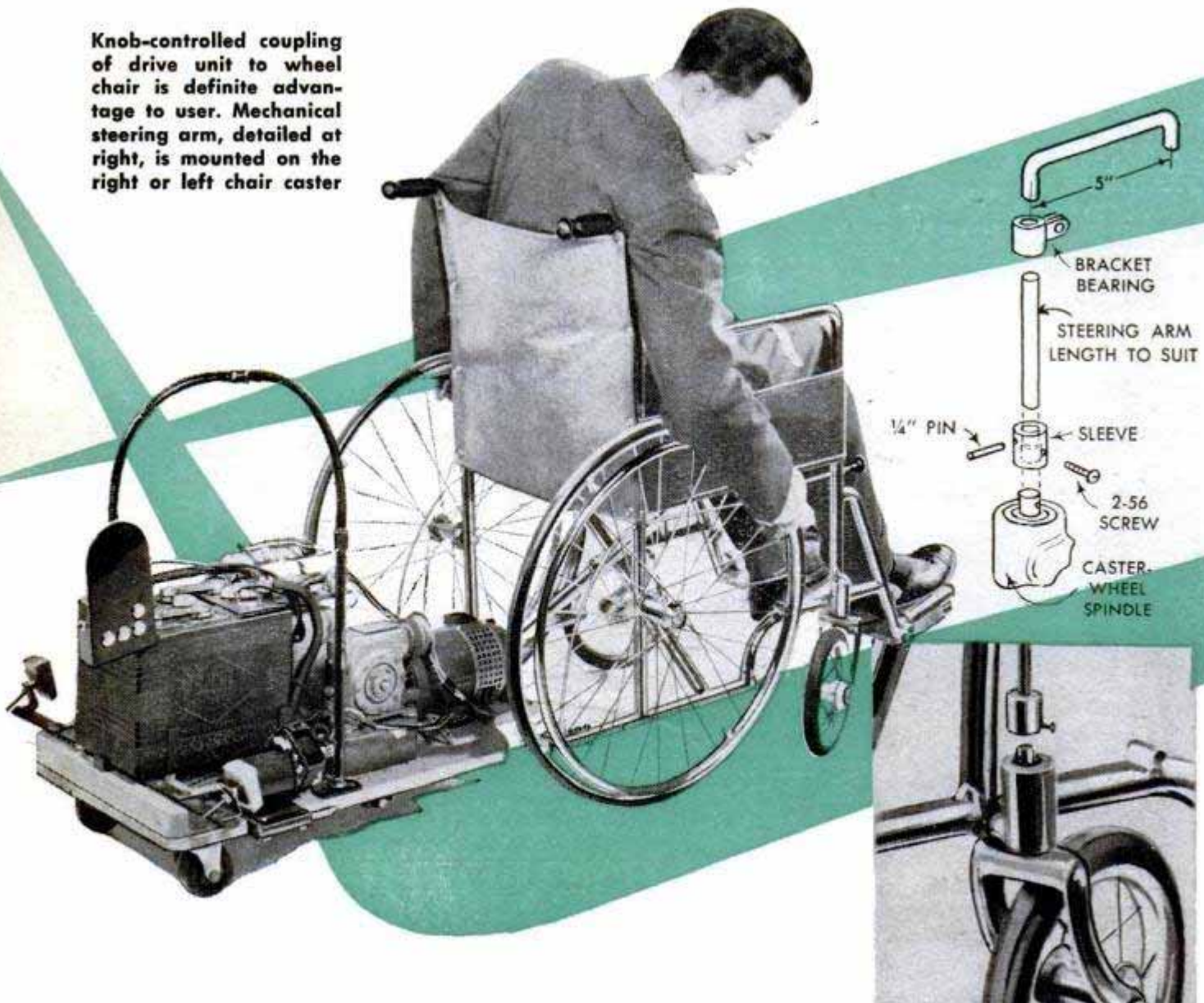
Upon returning, the chair is driven up the ramps and the unit disconnected, after which the chair may be propelled around the house by hand.

Driven by a 2-hp. electric motor powered with a 6-volt storage battery, the compact unit fits underneath the chair where, with its neat cover, it appears to be a standard part of the chair.

The particular motor used on the chair pictured was a 24-volt d.c. type, original equipment on the B-29 airplane, which can be obtained inexpensively as surplus. If you wish, almost any similar motor can be used, provided that it has sufficient power to push the chair up gradual inclines. Other major parts of the drive unit include four Ford starter relays to provide the forward and reverse control, two Packard or Buick starter solenoids and relays for the electrical steering control, a 10-to-1 speed reducer, a 6-volt car battery and a 15 or 20-amp. battery charger. A 110-amp. battery will operate continuously for approximately

# MOTORIZED WHEEL

Knob-controlled coupling of drive unit to wheel chair is definite advantage to user. Mechanical steering arm, detailed at right, is mounted on the right or left chair caster



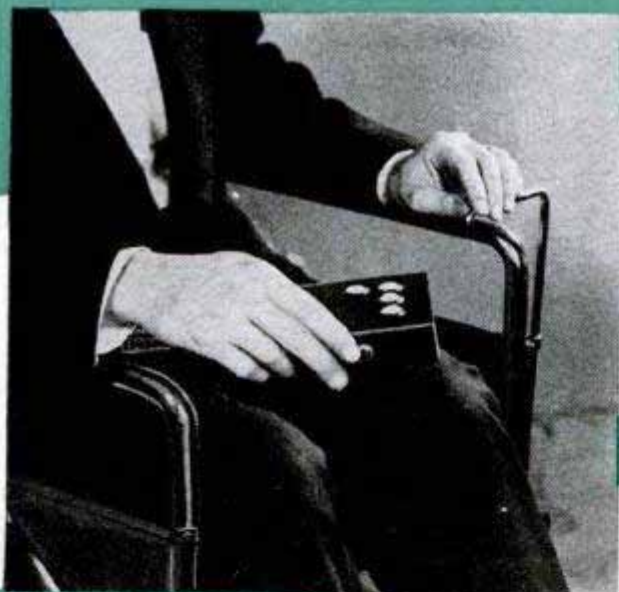
2 hrs. without recharging, and will power the unit intermittently for a somewhat longer period. The heavier the battery, of course, the longer it will operate the chair without need for recharging.

Before the 24-volt motor can be powered by the car battery, however, it must be converted to 6-volt operation. This is done by re-mounting two of the four brushes. These brushes, which have been grounded to the frame, are insulated from the frame by inserting mica or thin fiber insulation between the brush mounts and the frame as well as around the bolts. Then a flexible lead is brought outside the motor from each pair of brushes. The field coils are connected in series and two leads, one from each open end of the coil series, also are brought out from the motor. These four leads should

Concealed with streamlined aluminum cover, compact drive unit becomes part of chair. Wooden end of cover is painted to match the chair



## CHAIR

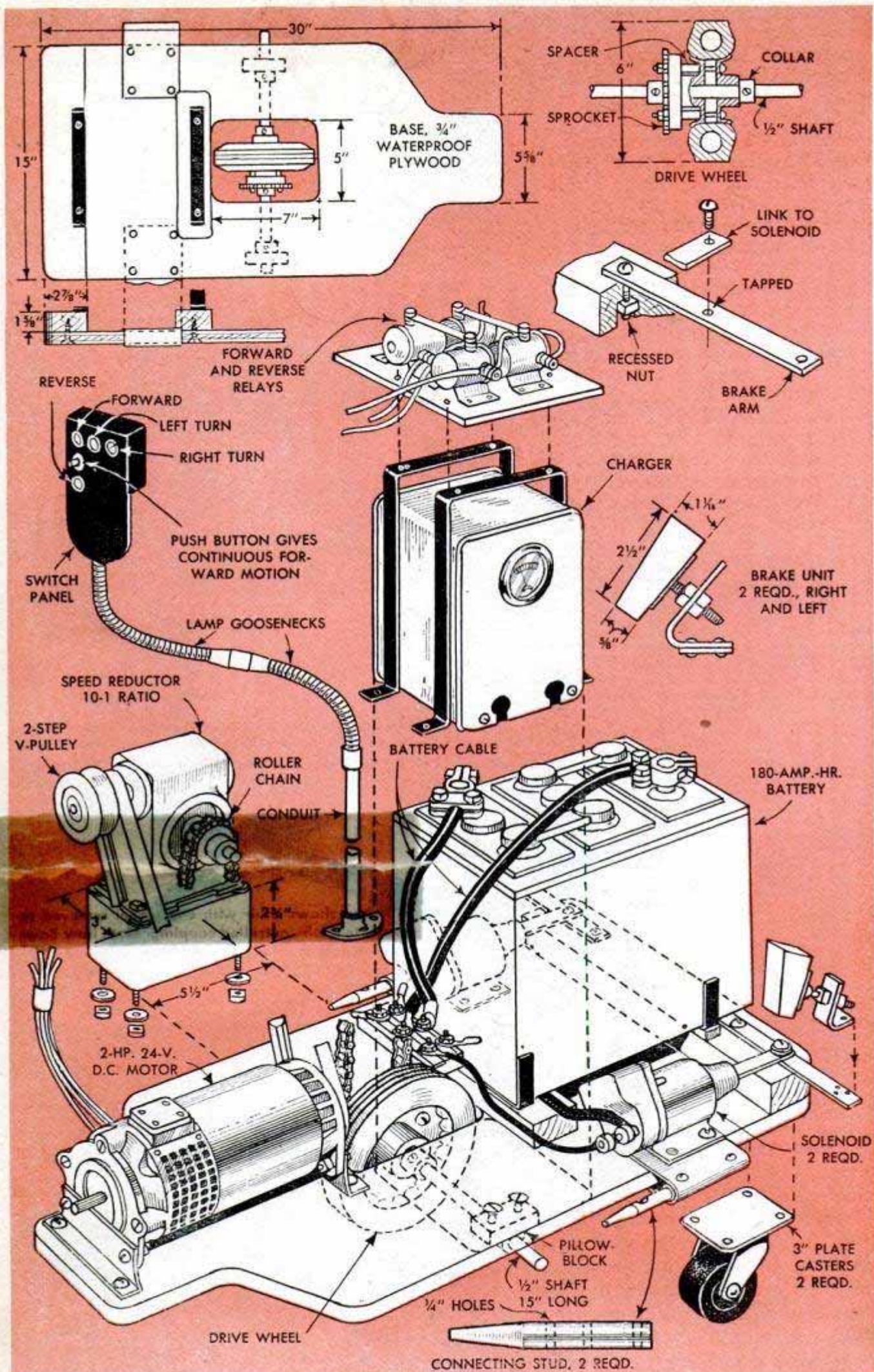


After depressing switch for continuous forward operation, left, finger can be removed from button and chair will run until button is again depressed. Either mechanical or electrical steering may be used

Photo below shows chair with one wheel removed to demonstrate knob-controlled coupling. Note how Bowden-cable knob at front of chair is easily reached by the user. Right-hand coupler is similarly installed

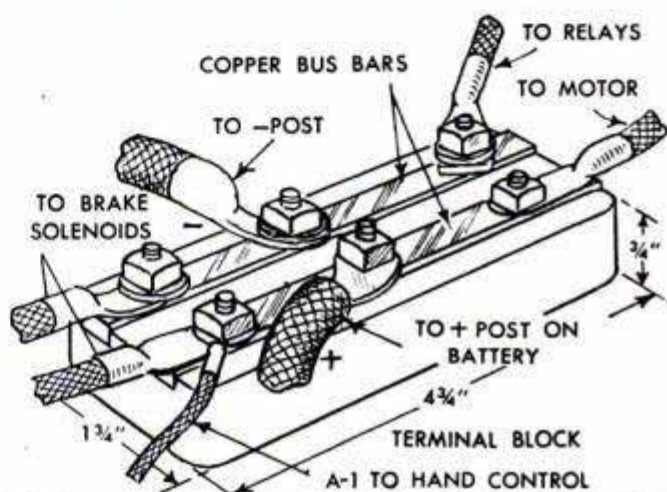
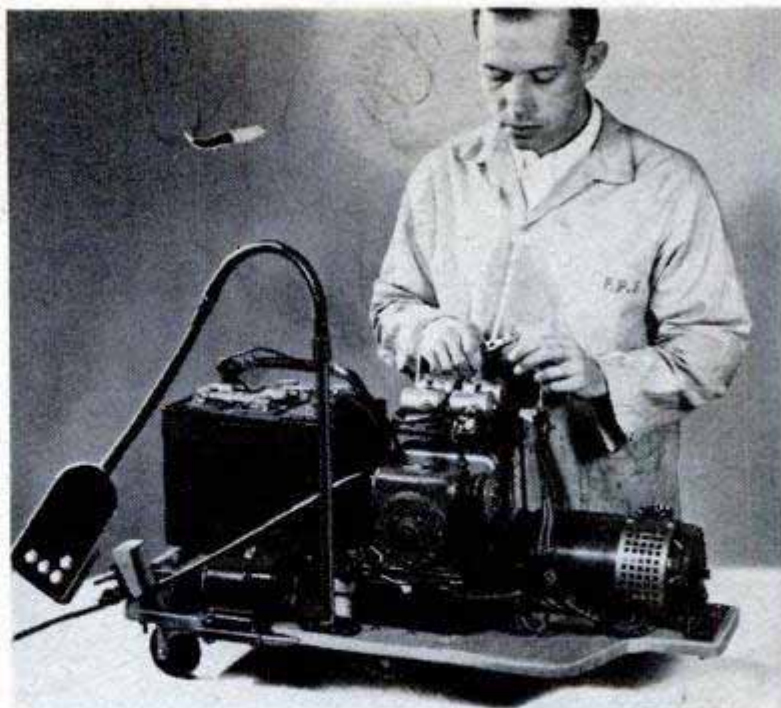


Built and tested by the Craftsman editors of *Popular Mechanics*, this wheel-chair unit is an ideal project for service clubs and civic organizations. To aid anyone who is interested in making one of these units available in his community, free plans and a brass plate on which the donor's name may be engraved are available upon written request

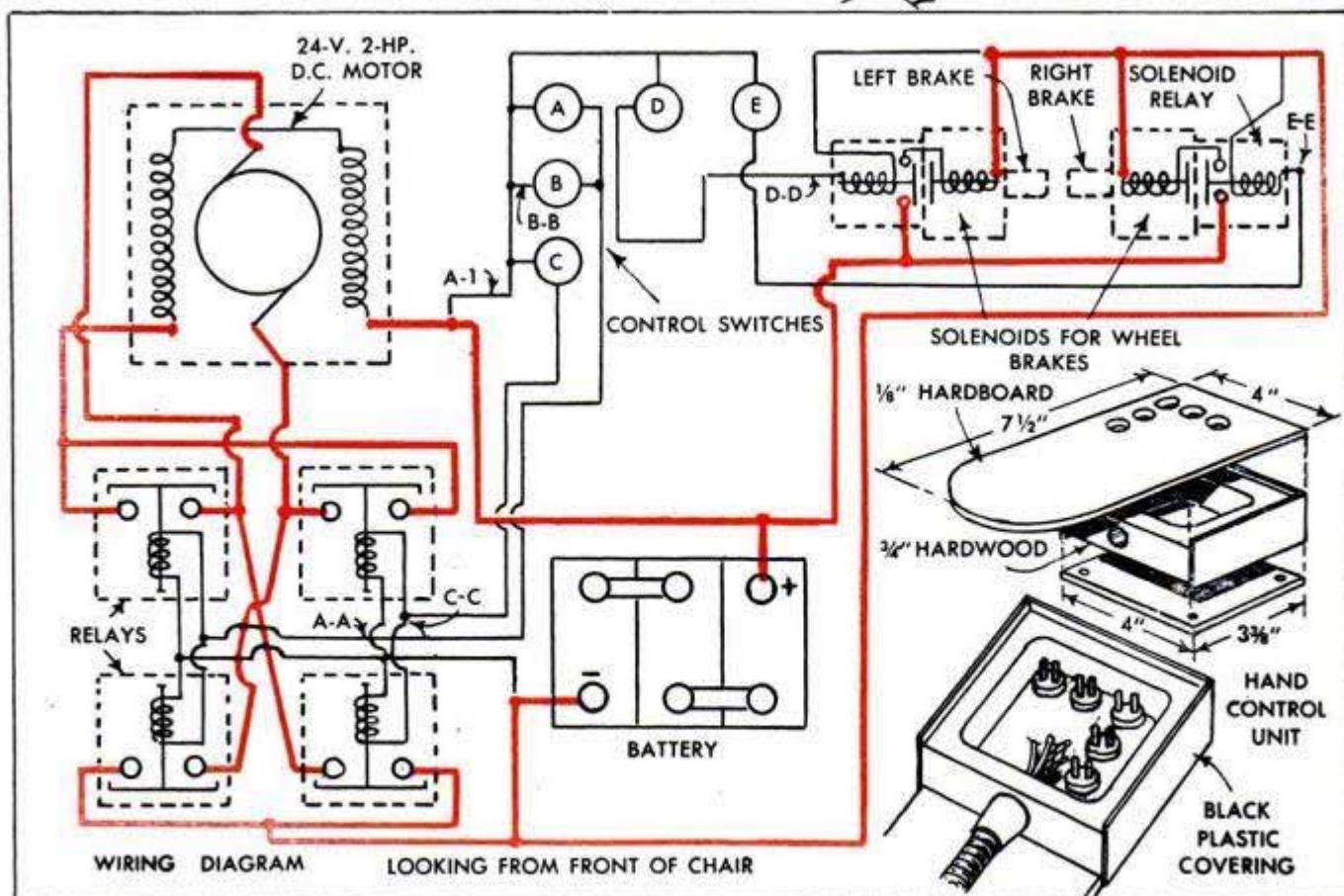


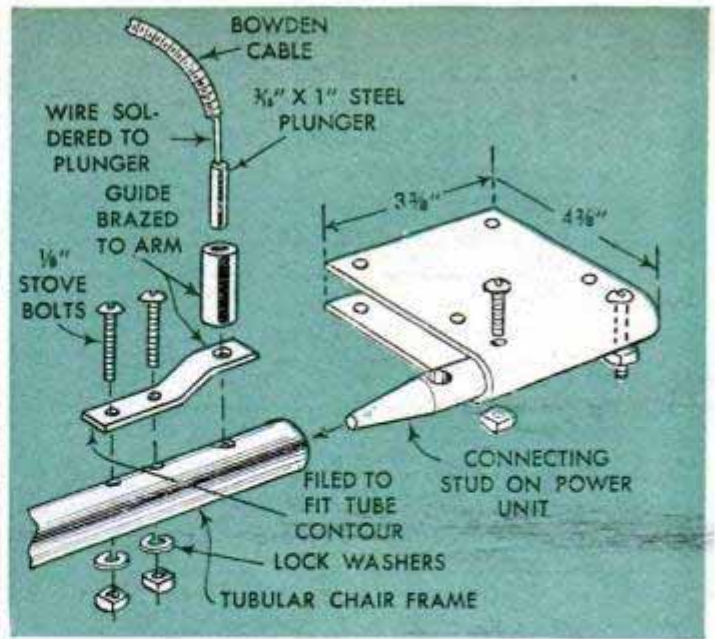
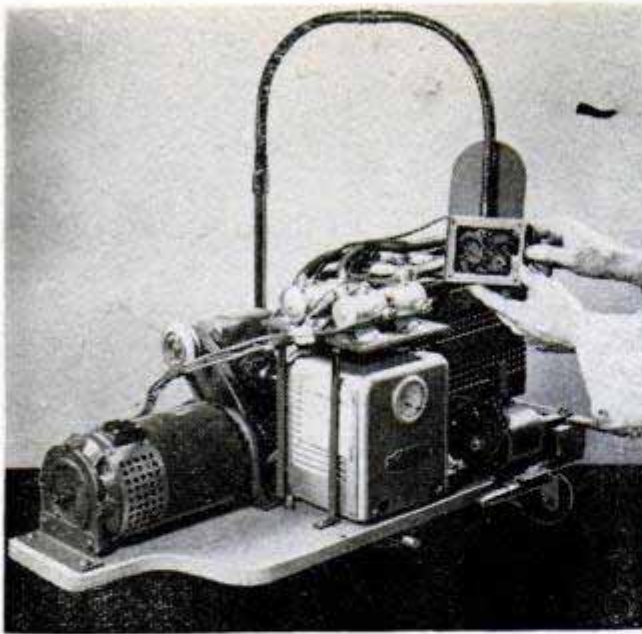
be of low-tension primary wire (automotive) heavy enough to carry the current—No. 8 or larger.

The converted motor is mounted on a plywood base which is made as detailed on page 194. If the wheel chair on which you are working is not the same as the original, chances are that the dimensions of the base panel must be varied to a certain extent. Cut the panel narrow enough to clear the lower horizontal chair-frame members and any obstructions, and lay out the position of the motor on the front center of the panel so that the motor will slide under the pivoted cross brace of the chair. Then locate the position of the 6 x 2-in. semi-pneumatic drive wheel so it will be in line with the two large chair wheels when mounted, and cut the opening for the drive wheel and sprocket. Take extra care to locate the axis of the drive wheel in exact alignment with the axis of the chair wheels and also to center the drive wheel between the chair wheels. If this is not done, the chair will tend to wander toward one side or the



Control switches are shown in wiring diagram according to location in panel. The push switch, B, is continuous forward control. Push buttons: A, temporary forward; C, reverse; D, left brake; E, right brake



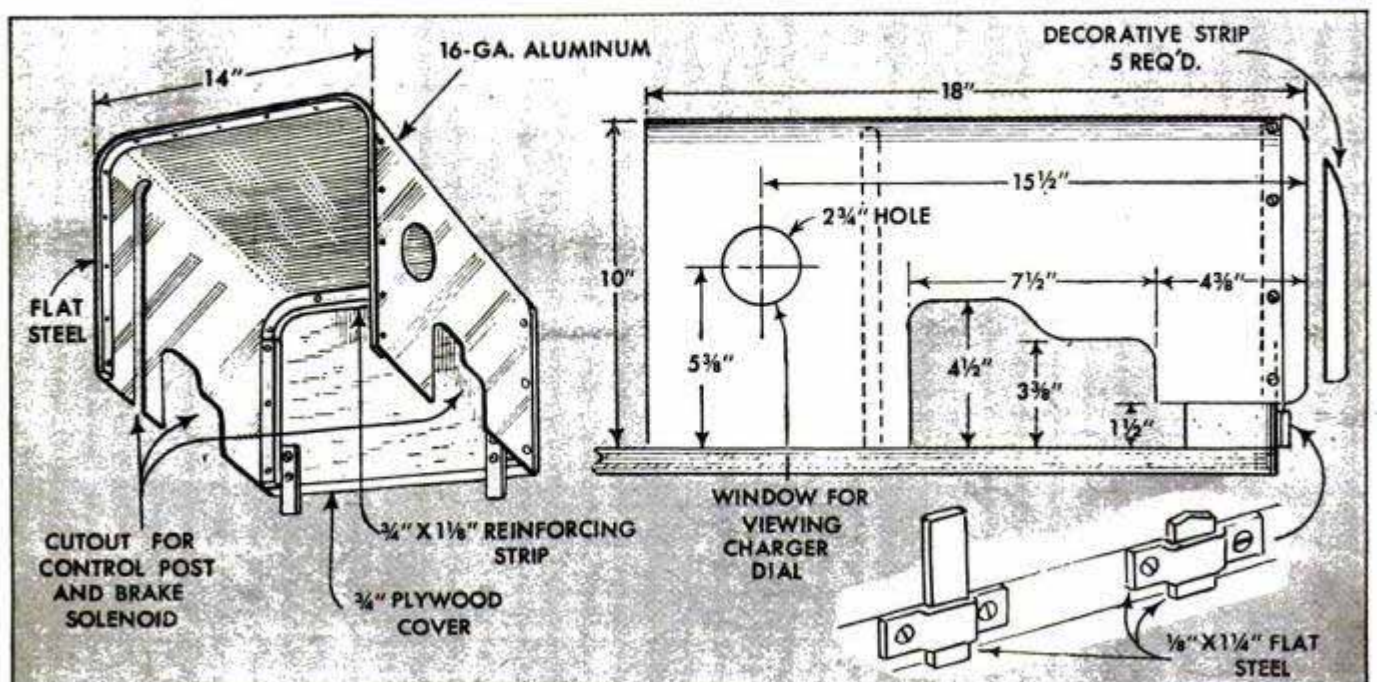


other while being driven straight ahead.

Mount the four starter relays on a plywood panel which is fastened to a frame made of flat steel, the frame being large enough to fit over the battery charger. Then turn the connecting studs from tool-steel rounds, drill and bolt to sheet-metal brackets—one right and one left-hand. With the drive wheel, speed reducer and relay frame temporarily mounted, block up the base and locate the positions of the two connecting-stud brackets. Roll the chair over the base until the reducer and V-belt just clear the center cross bracing and mount the stud brackets so that the tapered ends of the studs completely enter the chair-frame tubing, bringing the ends of the tubing against the sheet-metal brackets. Then disassemble the unit, cut the base panel to length and add the battery-mounting blocks and brackets. Note in the detail on page 194 how the steering-brake arms are piv-

oted to the rear battery-mounting block.

Make the two brake units as in the detail. A rectangular metal plate, countersunk for a 1½-2-in. flat-headed bolt, is screwed to the back of the wooden brake shoe and the bolt is attached to a flat-steel angle bracket. Rivet or bolt an angle bracket to each brake arm and fasten the shoe to the bracket. As positive grasping and releasing of the brake shoes are important to easy steering, be sure to locate the brackets so that the shoes bear against the wheel-chair tires when the solenoids pull the brake arm to a position at right angles to the chair wheels. Be sure to locate each solenoid so that the brake is fully applied before the solenoid plunger seats at the base of the coil, and also so the solenoid arm will move the brake shoe back from the tire when switch is released. It is important that the solenoids do not seat completely when the switches are closed, as this will cause a



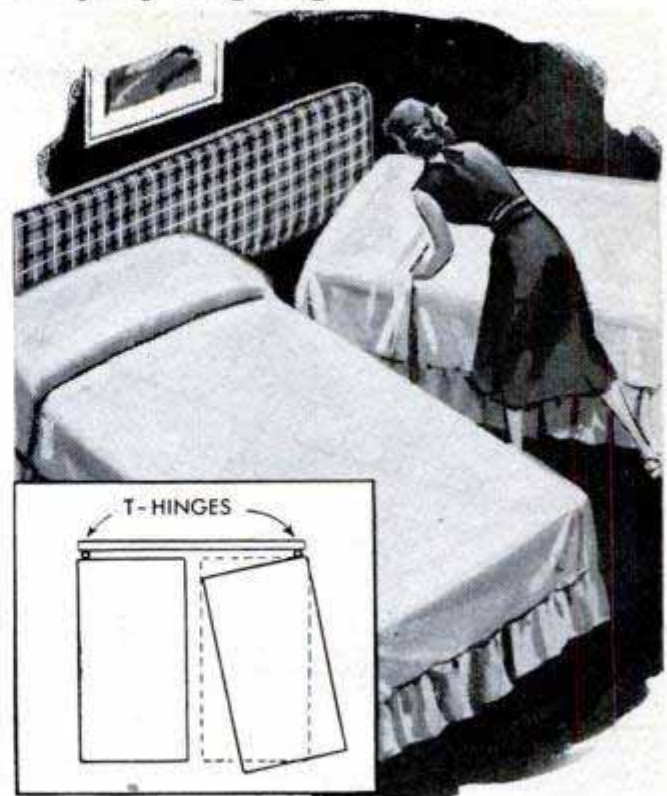
"dead short" in the high-amperage circuit. When the drive wheel, casters, brake solenoids, motor and speed reducer have been permanently mounted on the base, you are ready to begin wiring the unit according to the diagram on page 195. A switch panel is made similar to the one detailed to the right of the wiring diagram. The light-gauge wire used for the switch circuit is brought from the switch to the relays through a flexible cable improvised from two lamp goosenecks and then through a length of rigid conduit which provides an upright to clear the motor unit. The conduit is threaded and turned into a pipe flange, the latter being cut off on one side flush with the edge of the base panel. The base is drilled for the switch wires and the flange is screwed or bolted to the base directly over the hole so that the wires can be brought under the base and then up near the charger. The terminal block is simply a wooden block which is grooved for two lengths of copper bus bar and fitted with six terminal bolts.

Note in the wiring diagram that the high-amperage circuits are shown in red and the low-amperage, or switch, circuits are shown in black. Heavy wire, at least 8 ga., should be used for all portions of the circuits shown in red on the diagram. Although standard battery cable can be used to carry the current to the terminal block,  $\frac{3}{8}$ -in. copper tubing shielded with rubber hose was found to be practical for this purpose.

The battery charger is mounted permanently on the drive unit so that the battery can be recharged overnight merely by parking the unit near a wall receptacle and plugging in the charger cord. Although the charger leads may be connected to the battery-post clamps as pictured, it is more convenient to connect them to the positive and negative sides of the terminal block.

When the unit is assembled to this point, recheck the alignment of the connecting studs for smooth operation and then drill the tubular chair frames to take the coupling pins. Carefully align the holes in the chair frame with the holes in the connecting studs and then make the coupling brackets, guides and plungers as shown in the upper right-hand detail on the opposite page. The end of the Bowden cable is anchored just inside the drilled guide with two small setscrews. The coupling buttons are fitted to the front frame members of the chair by drilling and tapping the tubing for the threaded shanks, and the cable is brought through holes drilled in the rear vertical frame members. Finish the drive unit by adding an aluminum-and-plywood cover as detailed on the opposite page, varying the dimensions, of course, to suit any changes in your particular unit. ★ ★ ★

## Twin Beds Hinged to Headboard Simplify Aligning When Moved



One way of keeping twin beds aligned with each other is to hinge them to a single headboard in the manner illustrated. Connected at the outer corners by T-hinges, the beds swing apart at an angle which permits easy access to the inner sides for making the bed or changing the linens. If the beds have steel legs, holes must be drilled for attaching the hinges with small bolts. The headboard, which may be made long enough to permit the use of a night table between the beds, can be either a wide plank or thin plywood mounted on one side of a light wooden frame and covered with a bright-colored cloth or plastic fabric.

## Protecting Watch Sent by Mail

To assure protection for a wrist watch that is to travel by mail, enclose it in a metal spectacle case. Use cotton or crumpled soft tissues to cushion the watch from the sides of the case and then wrap the latter with heavy paper.

## Wild Goose . . .

a low, sleek trailer that weighs less than 1000 lb. and tows like a zephyr at 50 to 60 m.p.h. without whipping. Only 10 ft. long and approximately 5 ft. high, Wild Goose opens for complete living quarters that include a soft bed, gas stove, icebox, food storage, etc. See the how-to-build-it story next month and get ready for those fishing trips and that long vacation tour you planned.



# REPAIR

*your own*

# CAR BODY

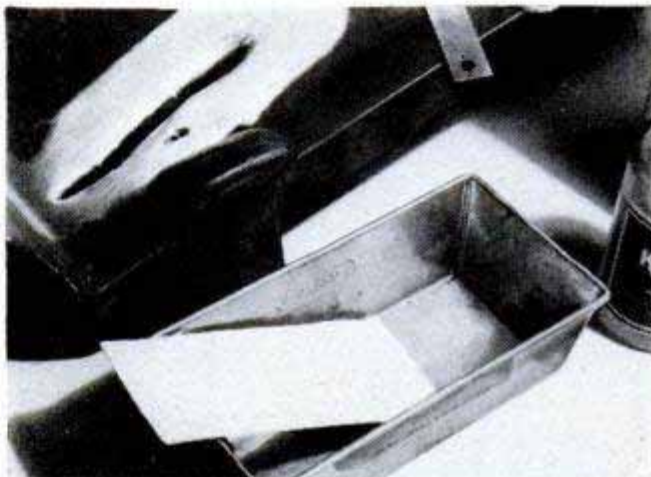
By Ed Packer

Plastic material is applied to small scratches and dents with a wide putty knife as pictured at left. Although material works like ordinary putty, it sets very fast. Usually no more than one stroke of the putty knife is possible and for this reason material is built up above the surrounding surface and later ground off



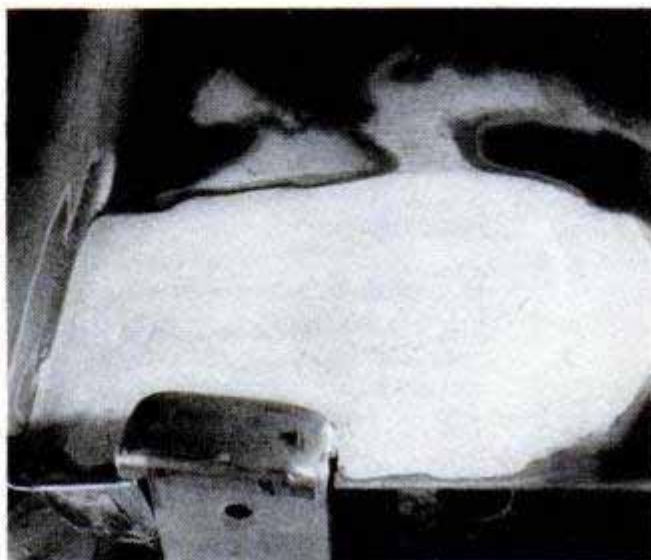
Heretofore a gash like this in the body metal required a major repair, but with new plastic patching materials it is reduced to just a few simple steps

Next, a fiber patch is cut to size, dipped in solvent and laid over the opening. It is pressed quickly into place so that it will adhere to edges of opening



First step is to remove all paint and rust, exposing bare metal in and around the break. Then the metal is thoroughly cleaned to remove any loose particles

Then the fiber patch is coated with plastic which is built up above the surrounding surface and allowed to harden. It is then ground down to contour

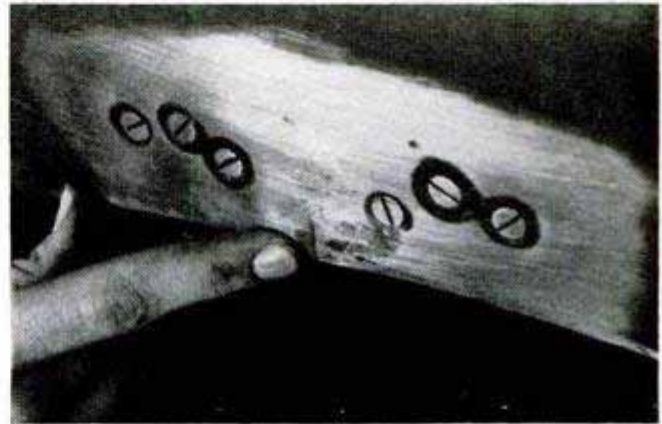




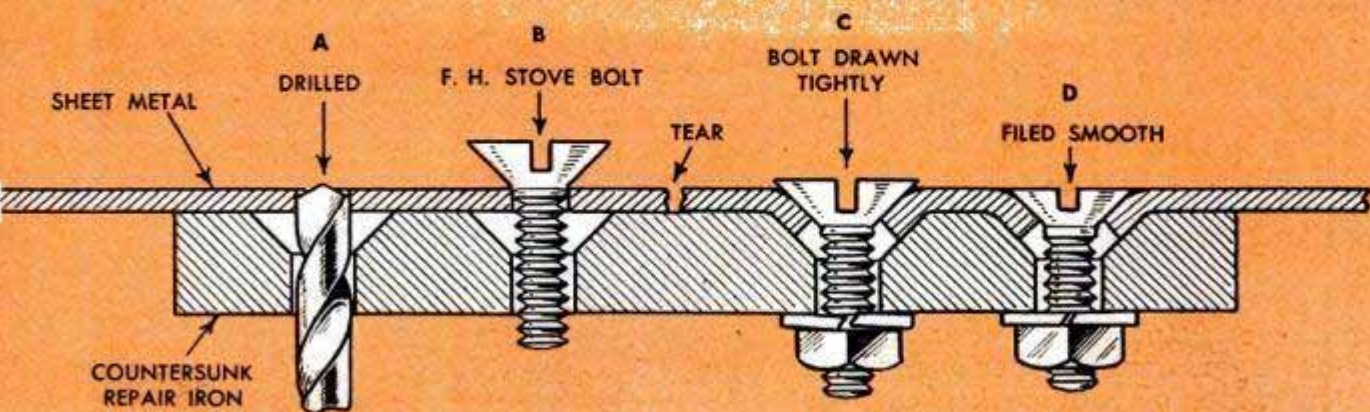
**H**AVE YOU BEEN wondering what to do about repairing the dents, dimples, deep scratches and breaks that appear in the body and fenders of a car after a year or so of ordinary use? The gash pictured in the center left-hand photo on the opposite page is an example of the minor damage to car bodies and fenders that can be repaired easily with new sheet-metal repair kits now available. The first step in repairing such a break is to remove all paint and rust with emery cloth or an aluminum-oxide abrasive and expose bare metal all around the break. Then a special fiber patch, included with the kit, is dipped in solvent and laid over the opening. After pressing the patch into close contact with the metal, it is coated with plastic applied with a wide putty knife. When dry, the built-up repair is smoothed and feathered at the edges with abrasive so that it takes the same contour as the original shape. Any similar break or small spot where rust has eaten through can be repaired by this method. Breaks that extend to an edge must have additional support. Such a break is shown in the upper right-hand photo which shows a cracked fender bead before repairing. This break is reinforced with a repair iron attached with stove bolts as in the detail below. The iron must be bent to the curve of the fender at the point of the break so there will be no distortion when the bolts are drawn tight. Note that the holes in the iron are countersunk, but that the holes drilled in the body metal are not. Where possible, clamp the iron in place and drill the holes in the sheet metal as at A. Then the screw or stove bolt is inserted as at B and drawn down as at C, so that the bolt head countersinks the sheet metal in the manner shown. As a final step, the bolt head is filed flush as in detail D. Ordinarily the bolts should be spaced about 1 in. apart. After filing the break flush with the surface, the repair is finished with an application of the plastic which is smoothed



A break in the metal that extends to an edge, such as this one in a fender bead, requires reinforcing with a repair iron. The latter is attached with stove bolts driven through from the outside of the fender



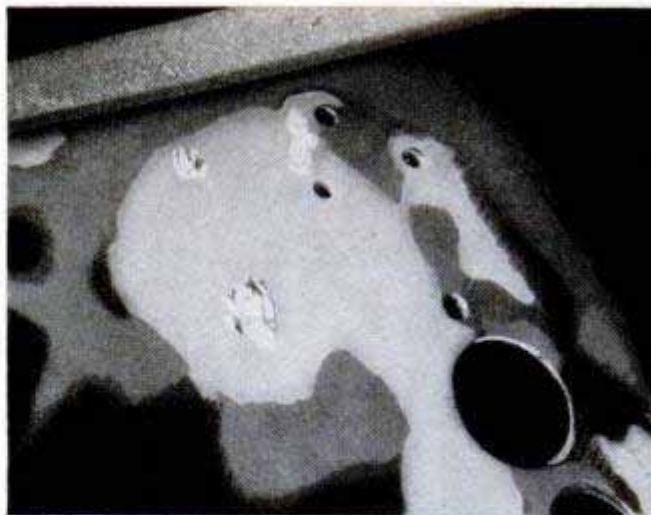
Above, after fastening the reinforcing iron in place, the bolt heads are filed flush before applying plastic. Below, here's the finished job all ready for metal primer and enamel or lacquer. Note the true contour



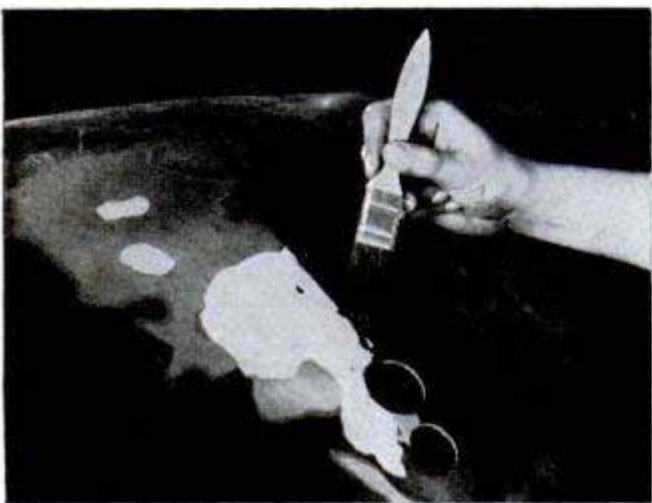
FOUR STEPS IN MENDING TORN SHEET METAL WITH COUNTERSUNK REPAIR IRON



Above, a straightedge or flat file can be used to determine the contour. Below, although finish can be applied with a brush as shown, it is recommended that metal primer and finishing coats be sprayed on



After building up the patch with plastic on a large area check with the straightedge to locate any low spots. Level these by applying small dabs of plastic. These are ground down to contour after drying



to contour after drying. In most cases it will be necessary to remove paint and rust from the surrounding metal in order to assure a perfect bond of the plastic filler. On some types of breaks due to rust or collision it will be necessary to straighten the metal or bring it back into contour with a dolly and bumping hammer before reinforcing and finishing with plastic. Before

applying the plastic, read the directions on the container and follow these in all details. Generally you will be instructed to build up deep scratches and breaks with two or more applications. Where a repair is made on a contour, the material must be built up slightly above the surrounding surface to permit feathering the patch into the curve by grinding.

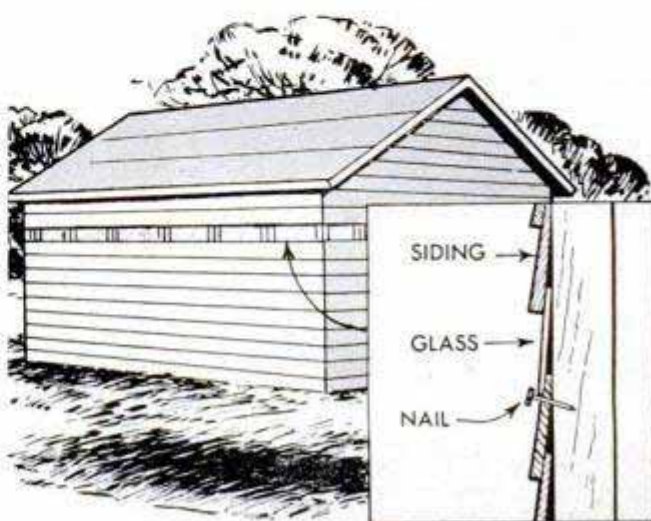
After surfacing, the patch is ready for metal priming and finishing to match the body color. This can be done with brush application but, for a professional job, rent a paint-spraying unit from your dealer and spray both the primer and the finishing coats of enamel or lacquer. Before applying the primer, go over the surface of the patch lightly with fine emery cloth, rubbing at an angle with any fine scratches that may remain from grinding. It is important that the surface of the patch be as smooth as the surrounding metal. After applying two coats of finishing material over the primer, allow it to dry thoroughly, then polish with a rubbing compound. ★ ★ ★

## Glass Replacing Strip of Siding "Lights" Windowless Garage

To provide light for a dark, windowless garage, one car owner replaced strips of siding on the back and sides of the building with panes of glass cut to the same width. The panes, which are calked together at the ends and are held in place by nails driven along the lower edges as shown, should be joined over the studs.

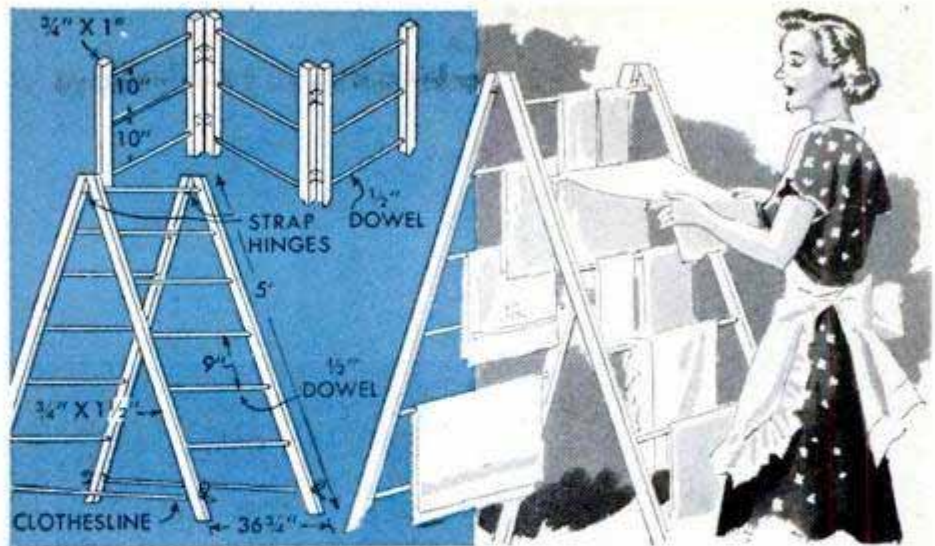
B. Franklin, Azusa, Calif.

ⓘ When there is a possibility of snow, just slip several layers of newspaper under each windshield wiper of your parked car, the paper being large enough to cover the windshield. Before using the car, remove the paper and the snow along with it.



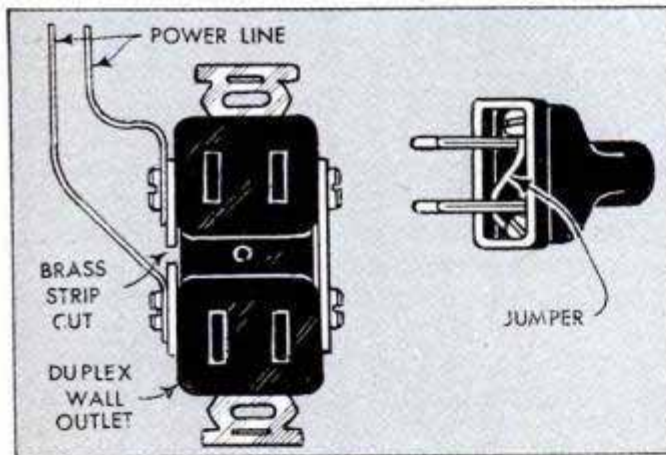
# Indoor Drying Racks Fold Compactly for Storage

Any homemaker will find either of these indoor clothes-drying racks a welcome addition to her laundry equipment. Both are simple to make and have a surprising capacity for damp clothes. The hanging bars are 1/2-in. dowels fitted into side pieces and glued, preferably with a waterproof glue. All dimensions are given in the detail. Note that two lengths of clothesline prevent the "stepladder" drier from spreading when open. The line is pulled through holes drilled in the legs and knotted at each end to hold it in place. Sand the driers carefully after as-



sembly, making sure there are no splinters or sharp corners to catch on the clothes. No other finishing is required.

## Safe Electrical Outlet in Shop Prevents Injury to Children



To prevent small children from turning on our workshop power tools, a neighbor and I worked out the simple altered outlet shown in the illustration. Before current will flow to the tools, the dummy plug with a jumper wire across it must be placed in the wall outlet. By hiding the dummy, the craftsman can be sure that no one will turn on his power tools while he is away. If someone should plug two tools into the altered outlet, no damage will result since both tools will then be in series and neither will receive sufficient current.

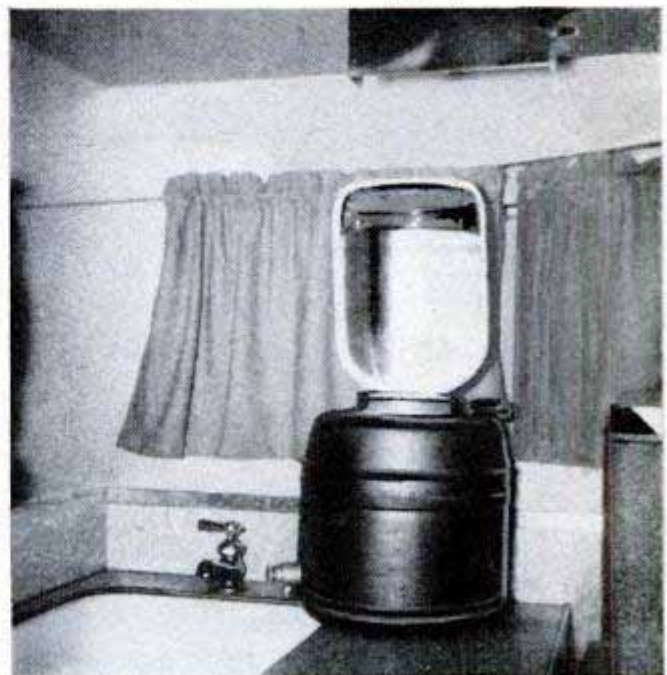
Arthur Trauffer, Council Bluffs, Iowa.

## Gallon Bottle Doubles Capacity of Vacuum-Jug Water Supply

When water piped directly to each site at a trailer camp is not available, we place an inverted gallon bottle on top of a vacuum jug to provide water obtainable from a tap. The bottle not only doubles the capacity of the vacuum jug but also is filled easily from most faucets found at filling stations and camps where facilities often are inadequate. Another advantage is that one or two extra bottles may be filled and kept on hand in the trailer to eliminate repeated trips to the source of supply. If desired, ice cubes may be added to the jug to cool the water for drinking.

Arthur S. Davis, St. Louis, Mo.

¶ You can prevent leather-bound books from cracking by rubbing them once a year with a greaseless emulsion which is especially prepared for this work. It can be obtained from most department stores.



# Flash Booster and Photoflash Control Box

By  
A. E. Turner, Jr.



**T**HIS COMBINED flash booster and photoflash-control box makes any photographic session less fatiguing for both the photographer and the model. Small and portable, it allows individual control of all lights from the camera position. A flick of the switch turns the unit into a powerful flash booster, permitting the most complex flash shots by either open or synchronized flash. The unit pictured was built in a 6 x 6 x 6-in. metal utility box, resulting in a very professional-looking piece of equipment. The pictures of the completed unit show the positions of the switches and receptacles. The left side of the cabinet is cut out for four output receptacles, the large holes for the receptacles being cut with a hole saw. However, if a suitable saw is not available, scribe the outline of each hole, drill inside the outline with a small twist drill and punch out the slug. Then file the sides of the hole smooth. Slots for the circuit breaker and three-way switch may be cut in the same manner. On



the front panel there are four toggle switches, a selector switch, a circuit breaker and two pilot lights. The right side of the box contains the 110-volt input receptacle, the solenoid receptacle and the remote-control receptacle. The circuit breaker should not be rated over 15 amps., the rating of most home circuits. Various types of fuses can be mounted in place of the circuit breaker if desired, cutting the cost somewhat. The selector switch is an ordinary three-way switch permitting either the 110-volt a.c. or the 4½-volt d.c. circuit to be selected for use. The four toggle switches mounted on the front panel are numbered and a corresponding number is given to the output receptacle each controls. The pilot lights indicate which circuit is ready to operate. With the addition of a flush-type doorbell button on the top of the box, the d.c. pilot light also will serve as a built-in test light. For operation as a flash booster synchronized with the camera, the shutter cord from the camera solenoid is plugged into the solenoid receptacle and the required flash extensions are plugged into the output receptacles. The three-way selector switch is turned to d.c.

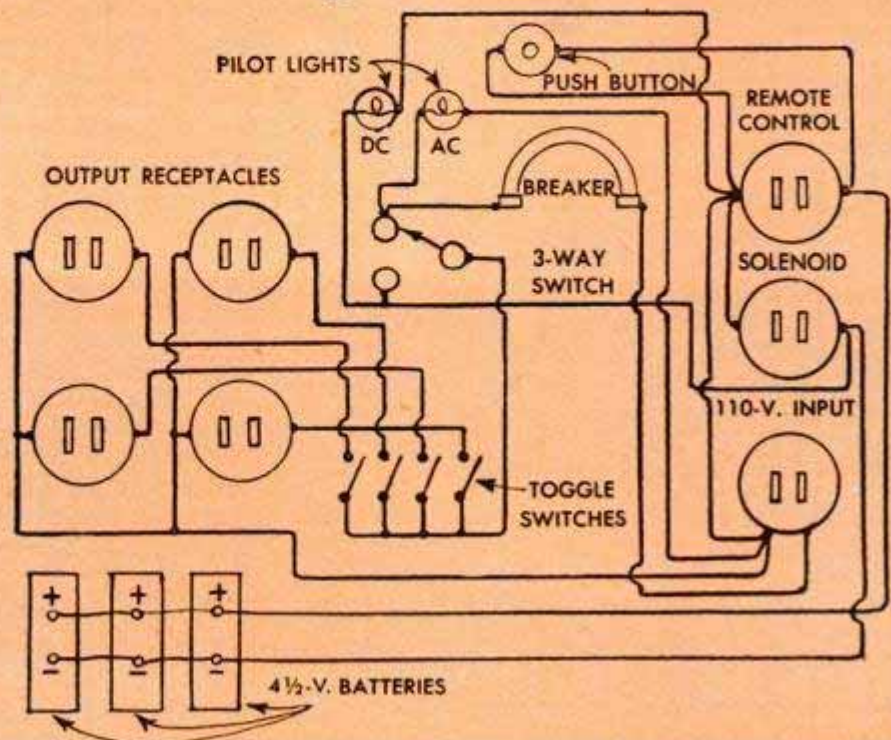
## PARTS LIST

- 6 Amphenol female receptacles
- 1 Amphenol male receptacle
- 4 s.p.s.t. toggle switches
- 1 15-amp. circuit breaker
- 1 Three-way switch
- 1 Flush-type push button
- 1 110-volt pilot light
- 1 6-volt d.c. pilot light
- 1 6 x 6 x 6-in. utility box
- 1 Chrome cabinet handle
- 1 Male plug
- 2 Female plugs
- 1 Pear-shaped push button
- 5 ft. No. 14 wire

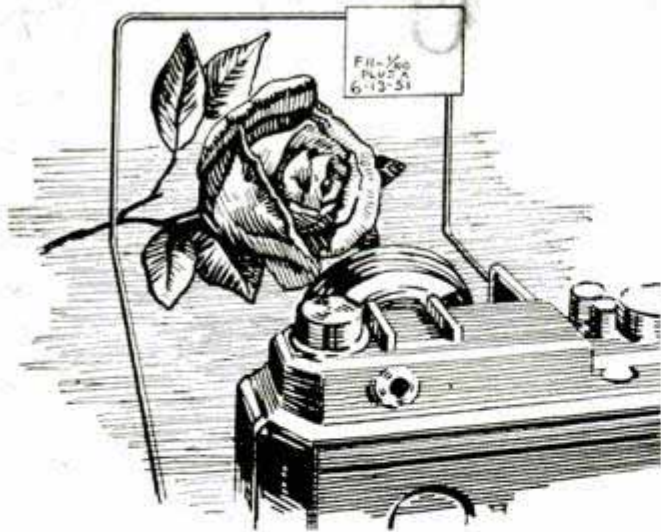
and the proper toggle switches turned on. The exposure can then be made either by the push button or by a remote-control push button plugged into the remote-control receptacle. To operate the unit as a photoflood-control box, the feeder cable is plugged into the male input receptacle on the box and into a wall outlet. The selector switch is turned to a.c. and the lights are plugged into the output receptacles. It is then ready for use. ★ ★ ★



Photo above shows front and right side panels. Below, front and left side panels. Photo, upper right, pictures back of unit, showing three 4½-volt batteries taped together to provide 4½ volts of direct current



## Useful Data Included in Photograph With Aid of Card and Wire Frame

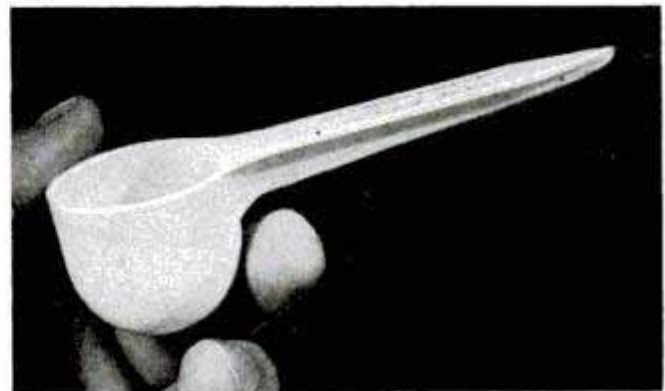


When using a candid-type camera having a focal-plane shutter for close-up photography, this simple device will enable you to record on the print data such as the shutter speed, type of film, the date and any other information that may be desired. First form a frame from coat-hanger wire similar to the one shown, inside which the camera is moved until the desired composition is achieved. Now attach a small white card, upon which the data has been written, to one of the upper corners of the frame. In framing the subject allow sufficient room at the top for the data so that it later may be cropped or trimmed from the print.—Eugene Lee Burner, Morgantown, W. Va.

## Coffee Measure Is Useful When Mixing Photo Chemicals

A plastic coffee measure, of the reinforced type shown, is useful for weighing and mixing photo chemicals. If the handle is filed to a point, it can be used to break up packed chemicals, such as sodium carbonate, which tend to settle into a mass that is frequently difficult to loosen.

☐ When using electrically heated print driers on a table, place a metal-covered asbestos stove mat or a piece of hardboard under them to protect the top from heat.



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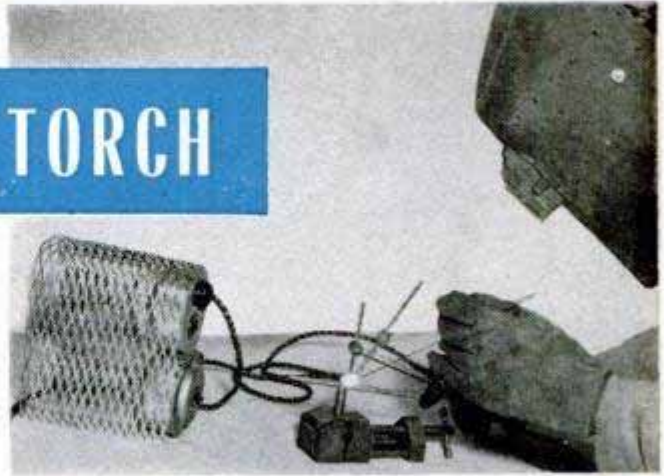


# SHOP NOTES

## TWO-HEAT ELECTRIC TORCH

600 watt  
By Evan Wright

TWO OUTLET BOXES, a duplex receptacle, two porcelain sockets, a toggle switch and two 60-watt heater elements provide the parts for the resistance unit of this homemade electric torch, which is designed to handle both light brazing and hard soldering. The sockets are screwed to the bottoms of the outlet boxes and wired according to the diagram with asbestos heater cord. With the switch in the "off" (low-heat) position, only a small amount of current passes through the torch, whereas in the "on" (high-heat) position, both heater elements operate to send full amperage through the torch. Both welder's gloves and electric-welding goggles should be worn when operating the torch. *Caution:* Plugged in, the torch becomes electrically "hot" and should be treated as such to avoid a shock from touching the exposed parts. In use, the tips of the two carbons are brought together by squeezing the handles. The carbons are held together momentarily and then slowly spread apart. This produces an arclike flame which is directed at the work and controlled by varying the pressure on the handles. The arc will form better with the switch at high heat, after which the current is cut to low heat. Use only cored carbons made especially for electric torches

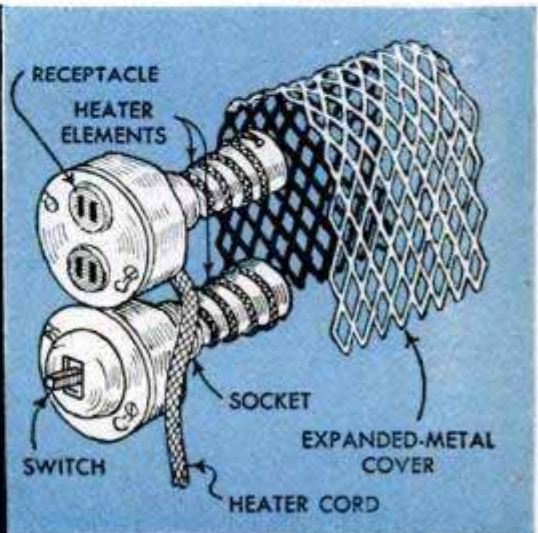
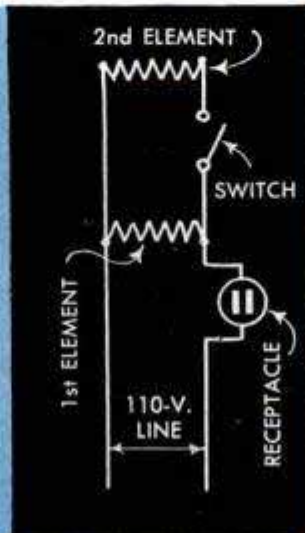
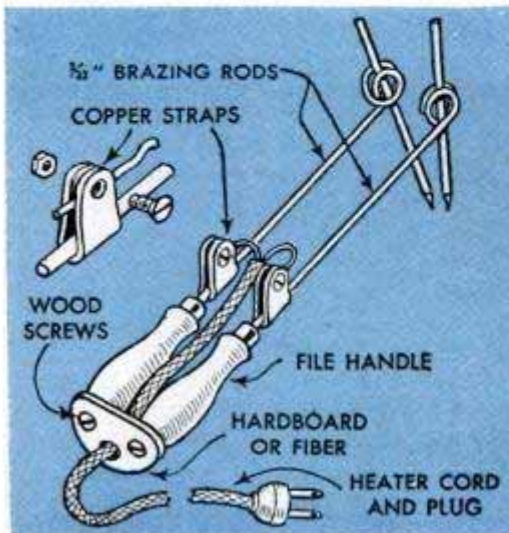


The two heater elements in the resistance unit are safely shielded with a cover made of expanded metal

and readjust carbons as they burn away.

For light brazing, use a  $\frac{1}{16}$ -in. rod. Be sure that the parts to be brazed are clean and covered with a good flux. Heat the rod red-hot and dip it in the flux until it is covered with a glassy film. The important part in brazing is to have a well-fluxed rod. Now heat the spot to be brazed until it is bright red. Bring the rod down on the heated area and, if properly heated, the rod will melt and tin the spot smoothly. After the joint is tinned, add enough rod to finish the job, keeping most of the heat on the work and just enough on the rod to melt it as needed.

For silver soldering or hard soldering, the pieces to be joined are cleaned and fluxed as before. Then, silver brazing compound in the form of powder, flat sheet or wire is placed between the fluxed pieces and heat is applied until the silver flows and fills the joint.

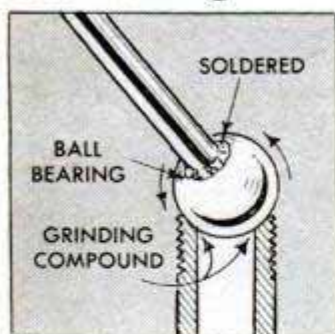


## Draftsman's Triangle Cleaned With Insulation Board



To clean the edges of his triangles and T-square, one draftsman wipes them against the edge of a scrap piece of insulation board. Although somewhat porous, the board is firm enough for working loose and wiping off any particles of lead or dried ink that might otherwise interfere with effective use of the tools. A small hole is punched through one end of the piece so it may be tied with a string to the drawing board.

## Ball Bearing Used as Grinding Tool



A ball bearing of the correct size brazed to a length of welding rod makes an excellent tool for use with valve-grinding compound when reseating flared tubing or check-valve seats. It will

also be found useful for reseating ball valves in spraying equipment.

Clinton Hull, Costa Mesa, Calif.

## Paint Protects Steel Finish During Heat Treating

To retain the original finish when hardening carbon steel, paint the work with a varnish-base type of aluminum paint before placing it in the fire. The aluminum film excludes the air from the red-hot steel and prevents oxidation until the work is

quenched. The film that remains is a combination of metallic aluminum and aluminum oxide which can be removed with a mild abrasive or a mixture of lye and water. Use of the paint will permit the work to be ready for treatment within an hour.

Peter Harrison, Irvington, N. J.

## Doorknob Substitutes for Pestle

Farmers, orchardmen and gardeners who find it necessary to crush lump or crystal chemicals for sprays and soil treatment sometimes find themselves with no suitable mortar and pestle at hand.

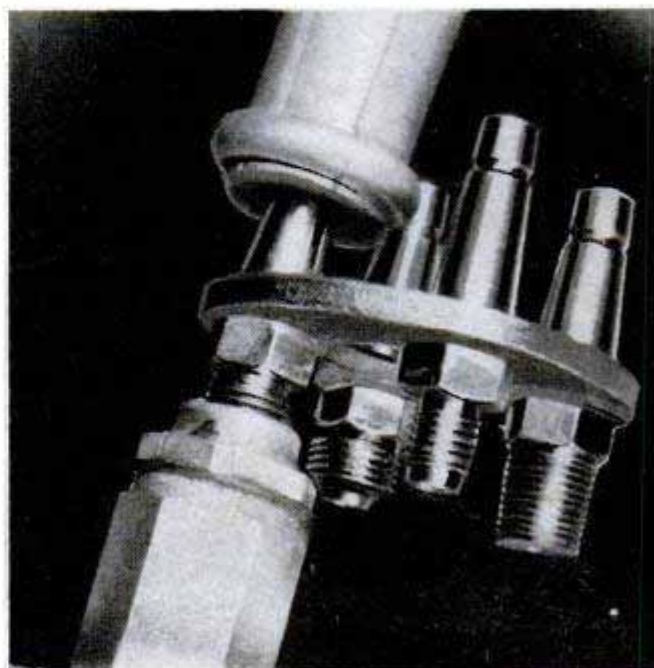
DOOR KNOB ASSEMBLY



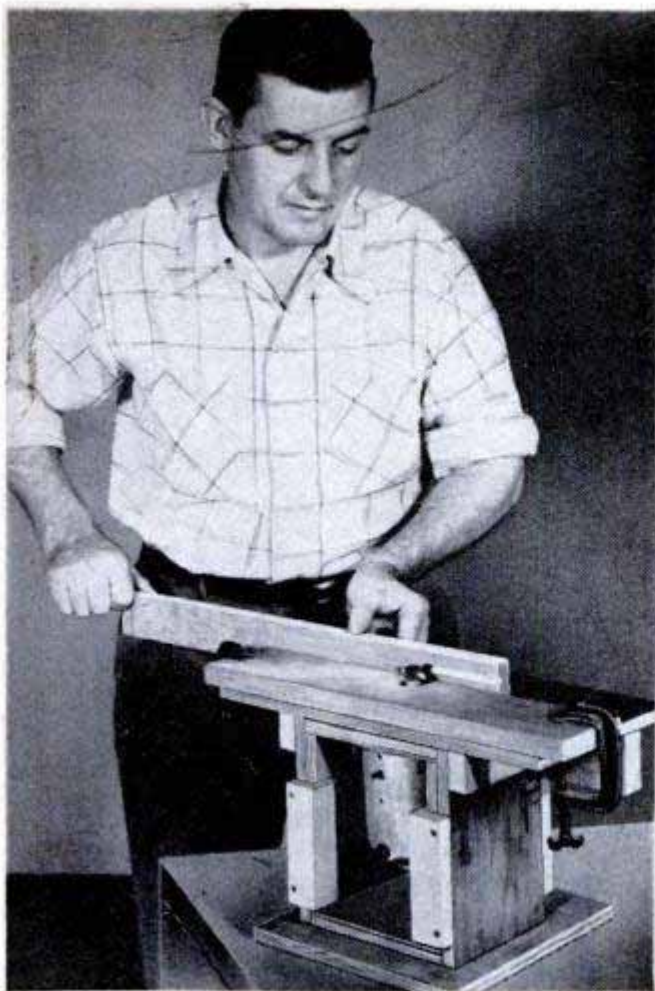
In this case, a doorknob assembly used with a pan, as shown, will serve as effective substitutes. Since the chemicals used in photo developing also tend to lump up, photographers will find this pestle useful, too.

## Test Fittings Mounted on Washer Aid Distributor Checkup

To aid in the selection of the proper fitting required for testing the vacuum-spark advance on an automobile distributor, one repairman mounted the four fittings that were provided with his testing set on a large iron washer, as illustrated. To do this, he drilled  $\frac{3}{8}$ -in. holes at 90-deg. intervals on the washer, inserted the fittings in the holes and brazed them in place. In addition to keeping the four fittings at hand for quick use, the washer also helps keep them from being mislaid among other tools.



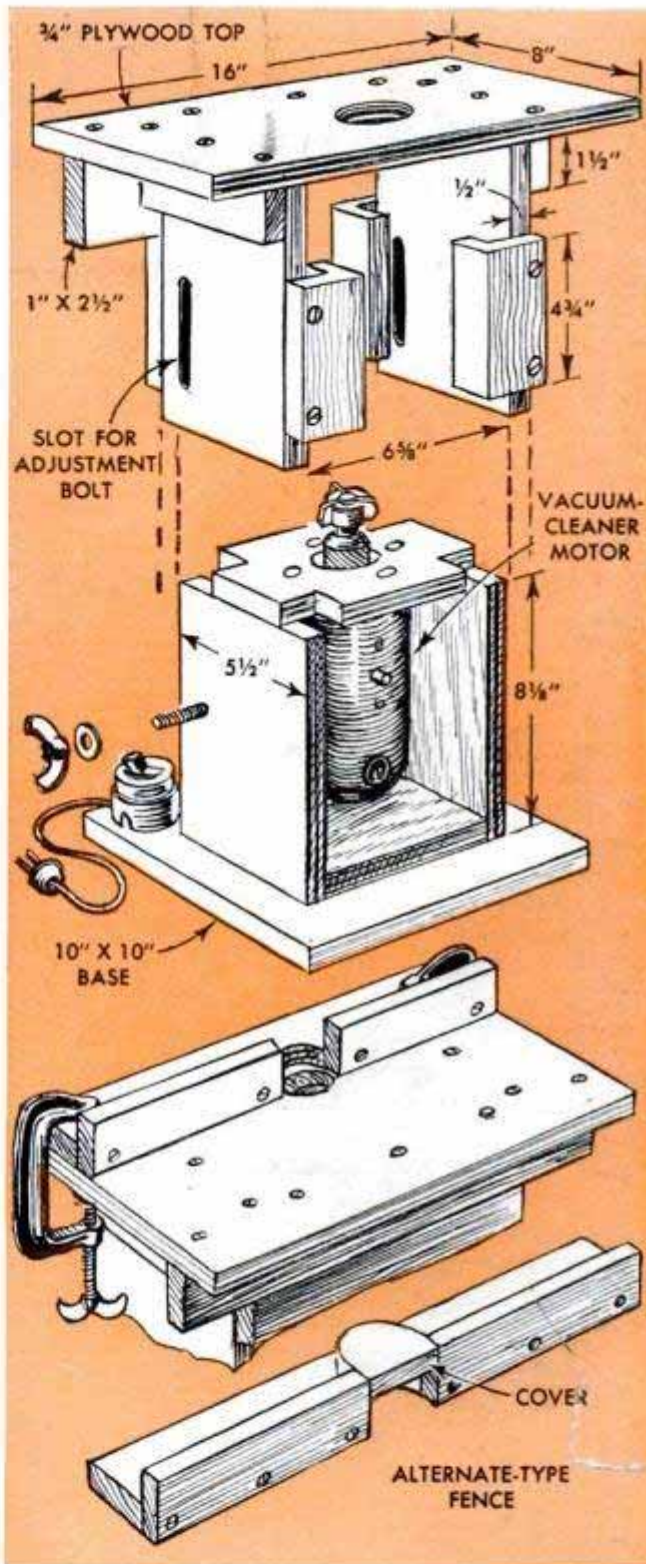




## Make Your Own WOOD SHAPER

By Paul Will

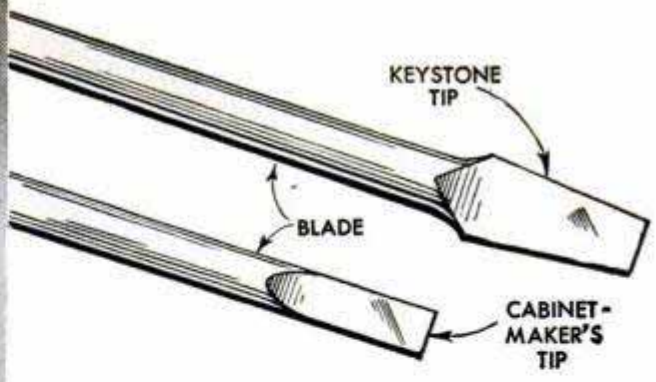
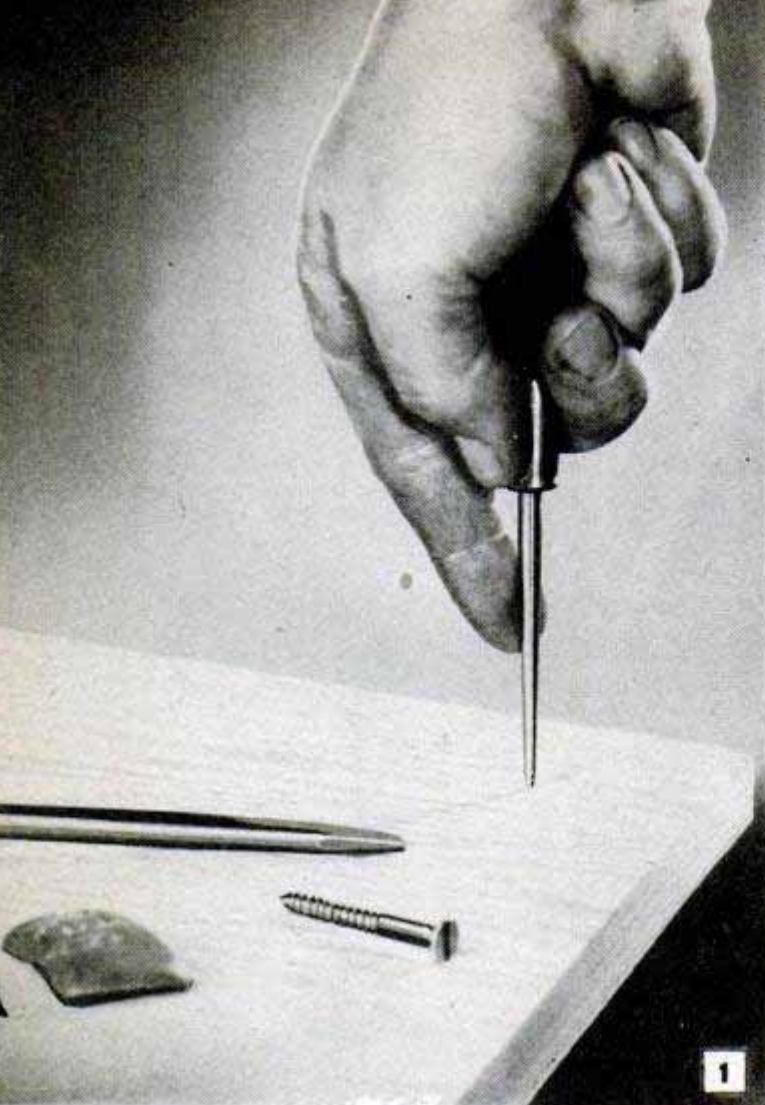
IT'S NOT PRACTICAL to attempt making curved moldings by hand when a small shaper will turn the trick in a jiffy and produce a job of professional appearance. This shaper is as simple as such a machine can be made and it was put together for the price of an old vacuum-cleaner motor, a drill chuck and a few small pieces of plywood. When purchasing the cleaner motor be sure to obtain one of the type which is flange-mounted to the fan housing, as this flange must be utilized when attaching the motor to the stationary frame under the shaper table. Of course, the motor must be in good condition. Drill chucks are available which can be adapted for holding small shaper cutters of the type having an integral shank. For shaper cutters requiring a spindle mounting, small work arbors may be used. These usually come with a sleeve to fit the motor shaft and a long threaded spindle which provides ample space for mounting depth collars. Note that the plywood shaper table is mounted on a sliding frame held in position by an-



These details show the simple construction of shaper. Note method of mounting vacuum-cleaner motor

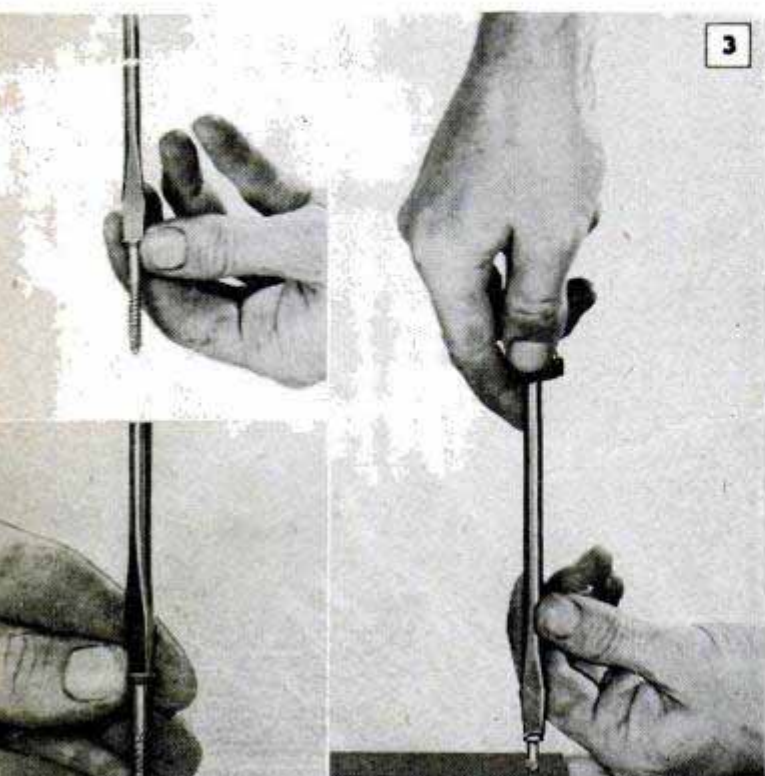
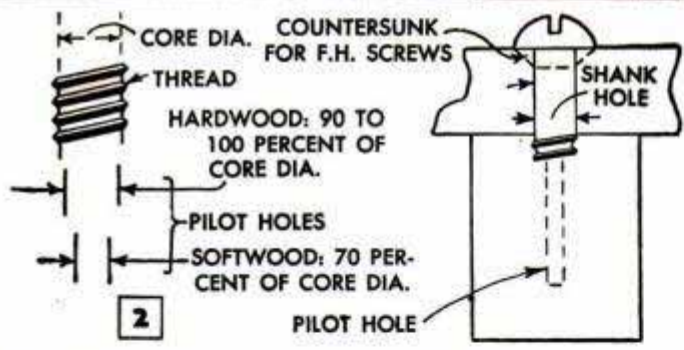
gular hardwood guides screwed to the vertical supports. This permits the table to be raised and lowered while the motor remains stationary. A 1/4-in. bolt fitted with a wing nut and sliding in a slot in one upright provides a means of locking the table.

In the photo above, the machine is shown cutting a straight molding with a guide, or fence, clamped to the shaper table. If desired the table can be made somewhat larger than that indicated. This will make it easier to handle strips or wide stock such as a table top. Fit a feed-through switch in the cord to control the motor.



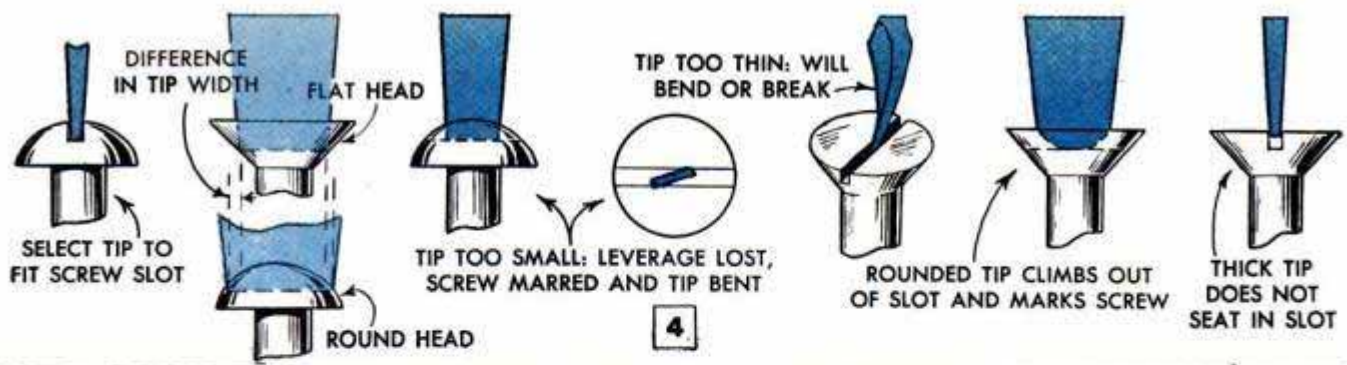
# How to Use SCREW- DRIVERS

By E. R. Haan

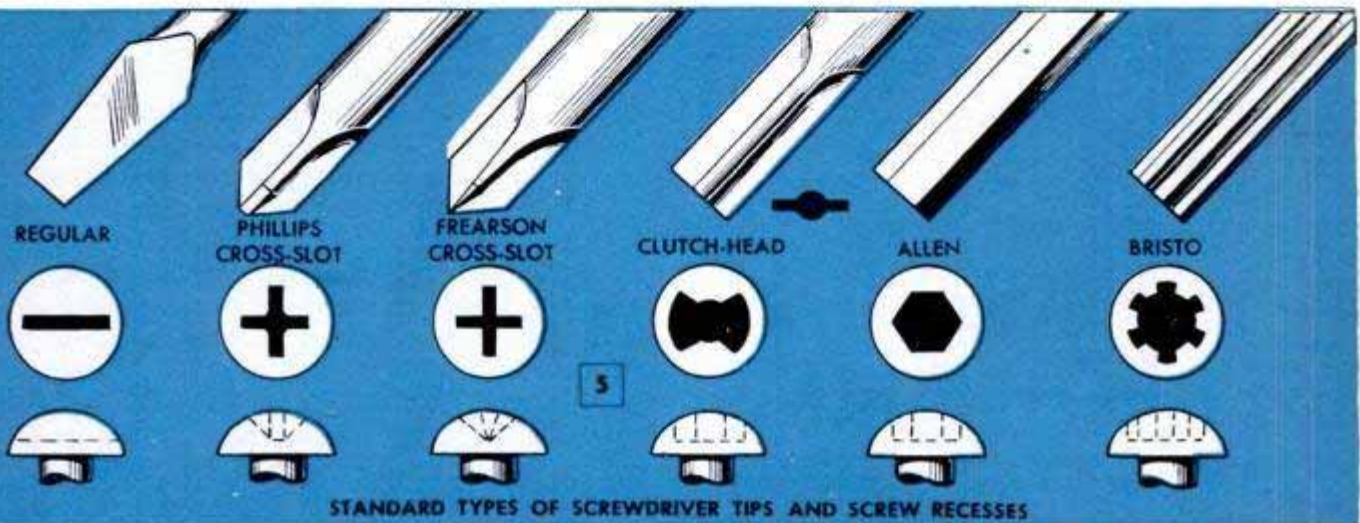


**T**HE SIMPLE JOB of driving a screw into wood can result in a rather discouraging effort, or it can be made an easy operation if you utilize the tricks of the experienced workman. By following approved procedures you'll avoid injured fingers, marred work and damaged or broken screws.

**Select correct screwdriver:** Select a driver that fits the slot in the screwhead, both in width and length. It's important to remember that flat-headed screw slots are narrower at the bottom than at the top. If the screwhead is countersunk, the corners of a screwdriver blade that fits the full width of the slot will project and tear the wood as the screw is driven down flush. The correct width of blade to use is shown in Fig. 4. If the tip is too narrow, there will be considerable loss of leverage and more turning force or torque will be required to drive the screw. High-quality drivers are designed so that their tip widths and thicknesses are slightly less than the lengths and widths of standard screw slots, as shown in the table in Fig. 4. The blades and handles are proportioned in size to withstand any torque to which they are subjected in normal use. Square shanks can withstand



SIZE OF DRIVERS TO USE FOR DIFFERENT SIZE SCREWS																				
SCREW NUMBER	0	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	24	$\frac{7}{16}$ "	$\frac{1}{2}$ "	$\frac{9}{16}$ "
REGULAR BLADE	$\frac{3}{32}$ "		$\frac{1}{8}$ "			$\frac{1}{8}$ " - $\frac{3}{32}$ "	$\frac{3}{32}$ " - $\frac{1}{16}$ "	$\frac{3}{16}$ "			$\frac{1}{4}$ "	$\frac{1}{4}$ " - $\frac{3}{16}$ "	$\frac{5}{16}$ "	$\frac{3}{16}$ " - $\frac{5}{16}$ "	$\frac{3}{8}$ "	$\frac{3}{8}$ " - $\frac{7}{16}$ "	$\frac{7}{16}$ "	$\frac{1}{2}$ "	$\frac{1}{2}$ " - $\frac{9}{16}$ "	$\frac{9}{16}$ "
CROSS-SLOT BLADE	NO. 1					NO. 2					NO. 3			NO. 4						



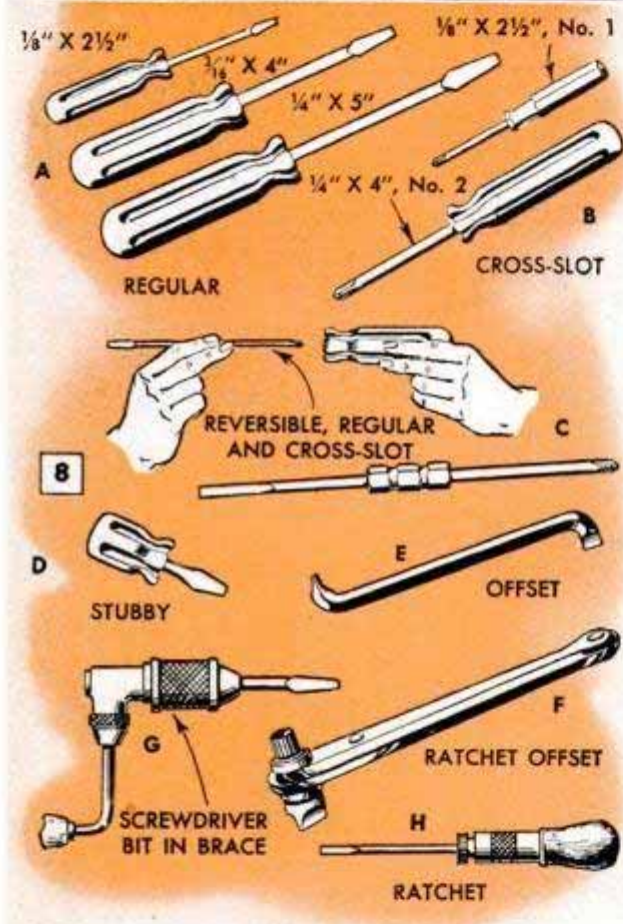
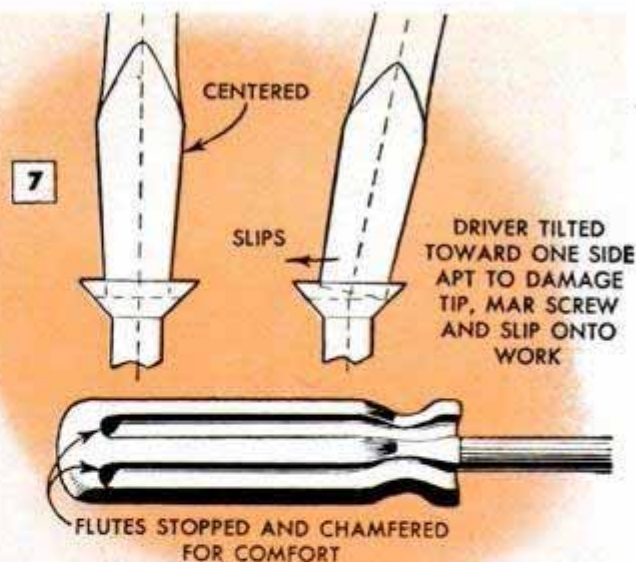
greater turning torque than round ones.

**Types of driver tips:** Fig. 5 shows various types of driver tips, or bits, and also the screwheads they fit. Ordinary slotted screws are the most common, but cross-slotted screws also are used extensively. The cross-slotted Phillips screwhead has modified U-shaped slots of uniform width and the Frearson screw has V-shaped slots with tapered sides. While a cross-slotted driver will fit into many sizes of the type of screw for which it is intended, it is best to use drivers of the proper sizes, as indicated in the table in Fig. 4. Drivers having clutch-head tips lock tightly in the screwheads when turned clockwise. The driver is unlocked simply by turning it in the opposite direction.

**Driving a screw:** The most common error in driving a wood screw is applying too much pressure on the driver when starting the screw. When starting small screws in softwood, punch a hole with an awl, Fig. 1, or other pointed tool. For large-size screws in softwood, and for all screws in hardwood, drill both a shank hole and a pilot hole, Fig. 2. Without a starting hole, ordinary screws tend to follow the grain of the wood and are difficult to drive straight. Providing a

pilot hole eliminates the hard work of driving the screw and also prevents splitting the wood, especially near the edges and ends of the stock. For flat-headed screws, the shank hole should be countersunk so that the screwhead will seat flush with the surface. When a screw is used to attach metal to wood, Fig. 3, the upper part of the pilot hole is often enlarged to accommodate the screw shank, especially when driving screws into hardwood or when using large screws. Further ease of driving results from coating the threads with soft soap before starting. By following these simple precautions to minimize friction, screws won't break from driving strain.

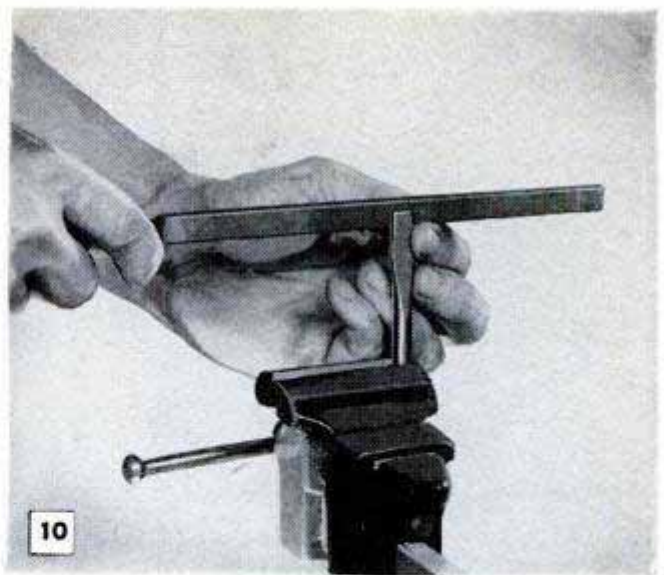
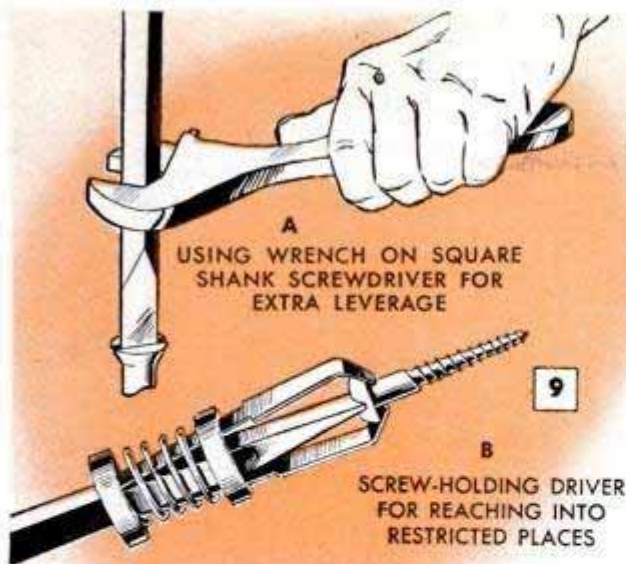
When starting a screw, place it on the driver tip and hold both screw and tip together with the fingers of one hand, Fig. 3, while grasping the handle with the other hand so it rests comfortably in the palm. Then put the screw point in the starting hole, retaining the same grip but permitting the hand holding the screw to rest on the work. The screw should be at right angles to the surface unless the work requires that it be driven at an angle. Apply very little pressure on the driver while turning it in a clockwise direction until the screw point



edges to minimize irritation and skin abrasion, Fig. 7.

**Types of screwdrivers:** Three regular screwdrivers in the sizes shown in Fig. 8, A, are a good selection for the home tool kit. In addition there will be occasional need for two sizes of cross-slot drivers, detail B. To avoid duplicating sizes in each type, you can obtain drivers having reversible blades with a different type tip at each end, detail C, Fig. 8. For cramped quarters use either a "stubby" driver, D, or an offset driver, E. Stubby drivers have short handles and are made with both light and heavy-duty tips. Offset drivers (regular, cross-slot or combination tip) usually come in four sizes and also can be obtained in the ratchet type, detail F. Where considerable work must be done in driving or loosening screws, you can save time and effort by using a spiral driver, Fig. 6, which merely requires pushing down on the handle to turn the blade in either direction, according to the setting of the ratchet control. It also can be locked for use like an ordinary driver. Be sure to push the spiral driver slowly while holding the screw for starting, using light pressure until the screw is firmly engaged. Some spiral drivers have hollow handles in which interchangeable screwdriver bits of different sizes or styles are kept at hand. The assortment also may include drill bits of various sizes. Ratchet drivers, Fig. 8, H, have handles that turn the blade in either direction by ratchet action. The ratchet can be disengaged by moving the slide to the center position. When turning in large screws, a driver of the type made to fit a bit brace often is used, detail G. Because of the increased leverage of the brace, it is important to use a driver of the correct size. Avoid using the full leverage to loosen tight screws or to drive those not provided with adequate pilot or shank holes as the heads may break. An-

engages the wood. As soon as the screw holds firmly, transfer your fingers to the screwdriver blade, letting it slip between them to keep the tip centrally on the screw shank. Apply just enough pressure on the driver to keep it in the slot, and hold the driver blade directly in line with the screw, Fig. 7. Tilting the driver when starting a screw causes it to go in at an angle, while tilting it after the screw is fully engaged may cause the driver to slip out of the slot. When cross-slot drivers are tilted, one of the wings is likely to break off because of unequal pressure. The handle of a good screwdriver is rounded and smooth at the end (dome) to provide a comfortable palm rest, and the stopped flutes have rounded

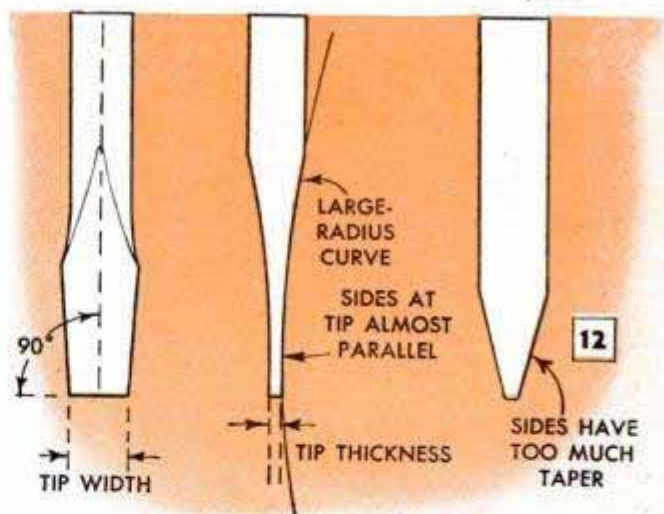
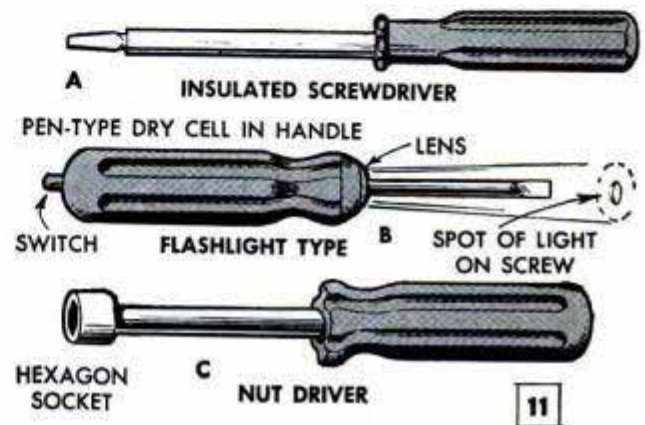


other way to obtain extra leverage is to use a wrench on a square-shank driver, Fig. 9, A. When screws must be driven in places inaccessible to the hand, use a screw-holding driver, Fig. 9, B.

Drivers having insulated blades, Fig. 11, A, are used by electricians and radio and TV servicemen. If a nonmagnetic driver is required, use one having a beryllium-copper blade. Flashlight drivers, detail B, illuminate the heads of screws hidden in shadows. Nut drivers, detail C, Fig. 11, come in various sizes. They are similar to screwdrivers but have hexagon sockets for use on hex nuts.

**Misuse of screwdriver:** Screwdrivers can be damaged quickly by prying, by scraping and by hammering on the handle. The tip of a good driver is heat-treated to the correct degree of hardness and toughness to resist wear and strains of normal use. Don't use a good driver to short across the terminals of a storage battery as the heat may draw the temper of the blade. Using the driver for such jobs as scraping loose mortar from brickwork will round the sharp corners of the tip, causing it to slip out of the screw slot.

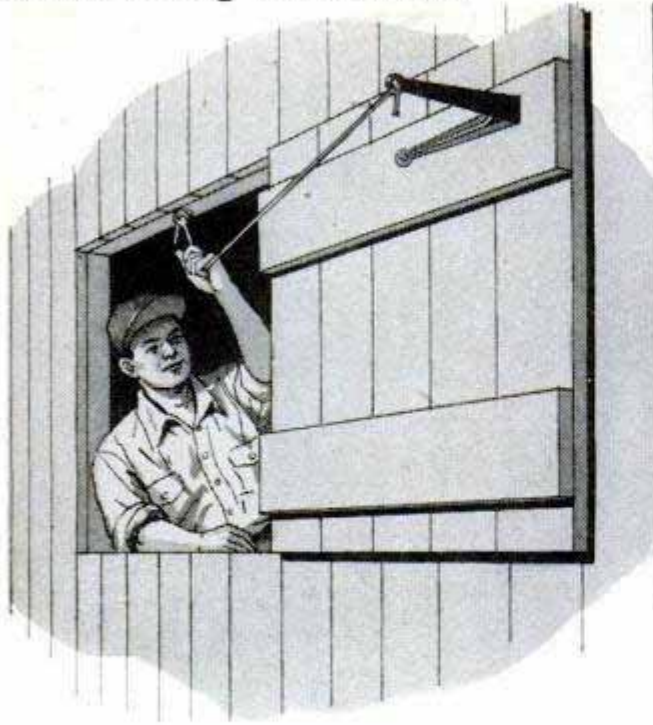
**Tip maintenance:** When driver tips become worn, bent or chipped, they should be reground to the correct size and shape. This can be done by grinding and then dressing with a file, as in Fig. 10. Be careful to retain the original taper, width and thickness of the tip. It should be straight and at right angles to the axis of the blade, as in Fig. 12. The sides of the blade near the end should be almost parallel so that the driving torque is transmitted to the sides of the screw slot uniformly. Too much taper will prevent the tip from reaching the bottom of the slot. Too thin a tip will bend or break. When restoring the tip by grinding, touch the wheel lightly in short passes to



avoid overheating the metal. Also dip the blade in water while grinding. Screwdrivers are available with variations of both the cabinetmaker's tip and the keystone tip, as shown in the detail at the right of Fig. 1. The cabinetmaker's tip has parallel sides so that the driver will follow the screw into a deep counterbored hole without binding or otherwise damaging the wood. Variations of this tip are supplied for fine work on typewriters, instruments and light machine assembly. These tips are cross-ground on a coarse wheel to provide a sure grip in the screw slot. In cross-grinding, be careful not to increase the taper. ★ ★ ★

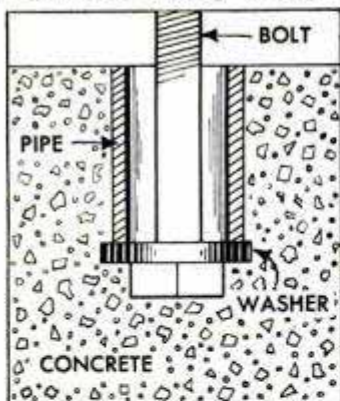
(Next Month—How To Use Handsaws)

## Shelf Bracket on Barn Door Aids Closing From Inside



Employing a pull rope to close the top section of a barn door from inside the barn, one farmer makes the operation easier by the use of a shelf bracket attached to the outer edge of the door as shown. The arrangement makes possible increased leverage on the rope, which is strung between the extended end of the bracket and a large screw eye which is driven into the top member of the doorframe.

## Loose Anchor Bolt in Concrete Permits Easy Alignment



When mounting heavy machinery on a concrete foundation, difficulty is sometimes encountered in aligning fixed anchor bolts with the mounting pads on the machine. To avoid this trouble, one mechanic drills the holes in

the concrete slightly larger than the washer size that fits the anchor bolt. When the hole has been drilled to the required depth, the bolt is centered in the hole and the washer placed over it. Then a short length of pipe, having a diameter slightly greater than the bolt, is centered in the hole with the lower end bearing on the washer. The upper end of the pipe should be just flush with the surface of the concrete. Then the hole is filled with a thin mixture of concrete and, after it has set partially, the bolt is

moved sidewise in several directions to loosen the head in the fresh concrete. When set in this manner, the anchor bolts remain loose so they can be shifted slightly inside the pipe sleeve to align with holes in the machine pads. However, due to the washers over the bolt heads, the bolts remain anchored when the nuts are tightened.

Harry J. Miller, Philadelphia, Pa.

## Gouges and Cracks Filled Uniformly

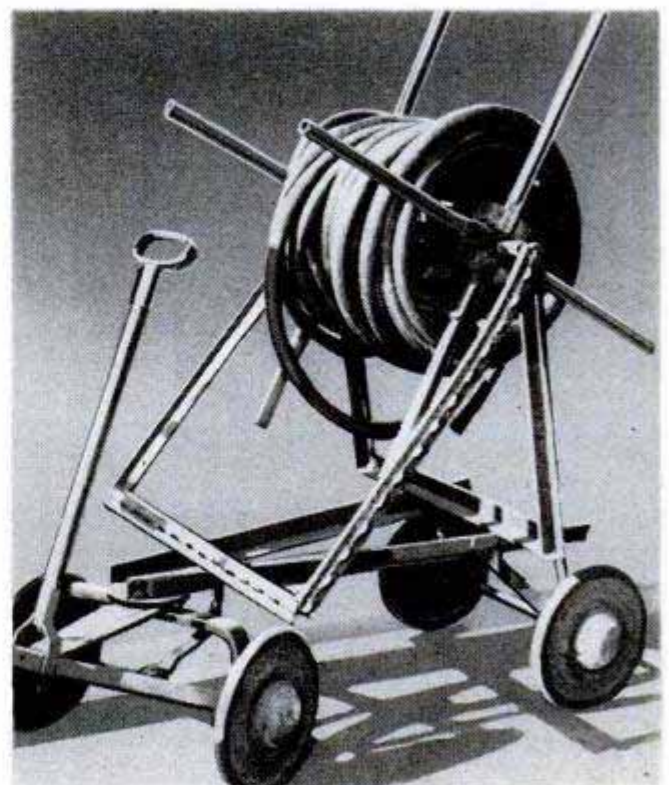
Oil-base texture paint is ideal for smoothing gouges, shallow holes, scratches and minor cracks in plaster walls. The paint is applied with a putty knife. Usually, one sweep of the knife will be sufficient to apply the paint uniformly.

Gerald Dailey, Ferndale, Mich.

## Toy-Wagon Carrier for Hose Reel

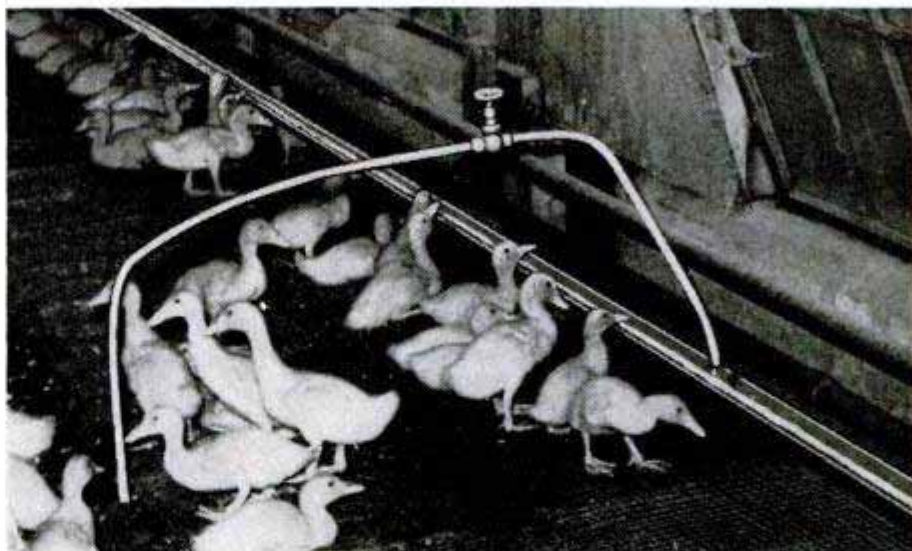
Requiring easy portability for a long length of hose used daily at a number of different locations about several farm buildings, one farmer designed and built this portable hose reel from discarded steel fence posts, pipe and the chassis of a coaster wagon. The posts form the supporting frame for the reel, the ends of which are made by welding the flattened ends of four short lengths of pipe to a square steel plate mounted on the shaft. The reel drum consists of four lengths of steel rod, threaded at the ends and inserted through holes drilled in the pipe arms of the reel. The rods are held in place by nuts turned onto each end. The reel frame is welded to the coaster-wagon chassis.

A. M. Wettach, Mt. Pleasant, Iowa.



To assure a clean water supply at all times for a flock of ducks, one poultryman installed a trough constructed of  $1\frac{1}{2}$  x  $1\frac{1}{2}$ -in. steel angle which runs the full length of the poultry house. Mounted on wooden supports and sloped slightly toward one end where it drains into a dry well, the trough is supplied with water directed into it through a length of  $\frac{1}{2}$ -in. pipe in which a valve is incorporated for controlling the flow. In some instances, a better arrangement is to slope the trough toward both ends, supplying the water at the highest point. Poultry in the area of the trough stand on screen-covered frames that are placed over a ditch to dis-

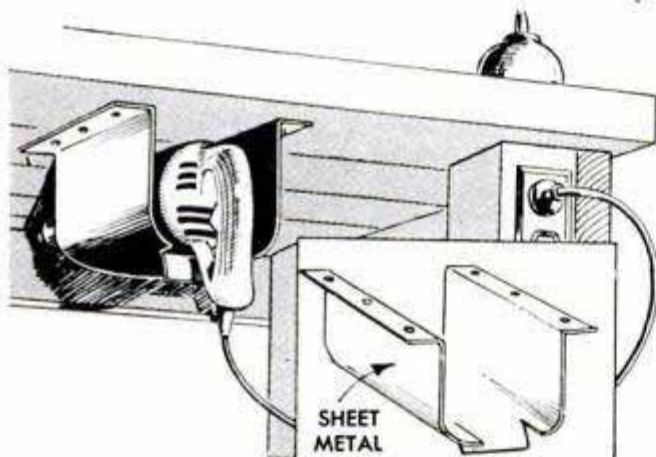
## Steel-Angle Trough Carrying Running Water Assures Clean Supply in Poultry House



pose of food and droppings that otherwise might be transferred to the trough.

Charles L. Stratton, Hollis, N. H.

## Cradle for Electric Hand Drill Permits Storing Close at Hand



One way to store your electric hand drill safely out of the way, but always within easy reach, is by keeping it in a sheet-metal cradle attached to the underside of your workbench. Cut and bend down a portion of the front edge of the cradle as shown to accommodate part of the drill handle. Next, bend over the ends and punch holes for screws in order to secure the cradle to the bench.

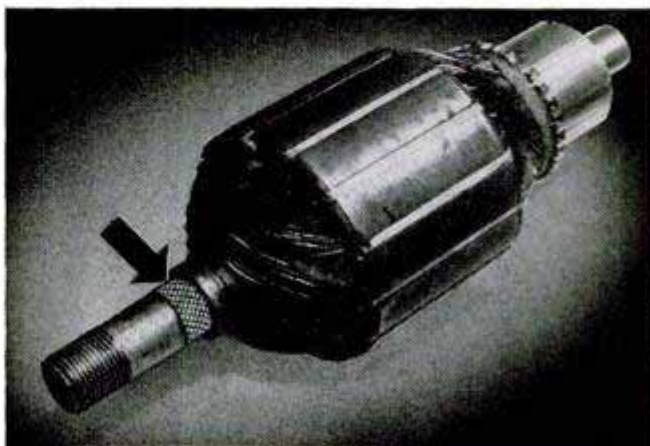
## Paper Clamp Applied to T-Square Simplifies Ruling of Lines

When ruling parallel lines, one artist attaches a spring-type paper clamp to the end of the square in such a way that the tool will not slide out of position should he relax his grip momentarily while moving it on the drawing board. The clamp is applied to one edge of the square, which is slightly longer than the board is wide, and pressed tightly against the edge of the board. In drawing the head of the square against the opposite edge of the board, the clamp thus serves as a brake to lock the square in whatever position it is moved.

Useful tap and drill data as well as conversion tables can be kept close at hand by printing them on a paper disk and cementing it to the wheel of a hand drill. Print with India ink and protect with a coat of shellac or lacquer.

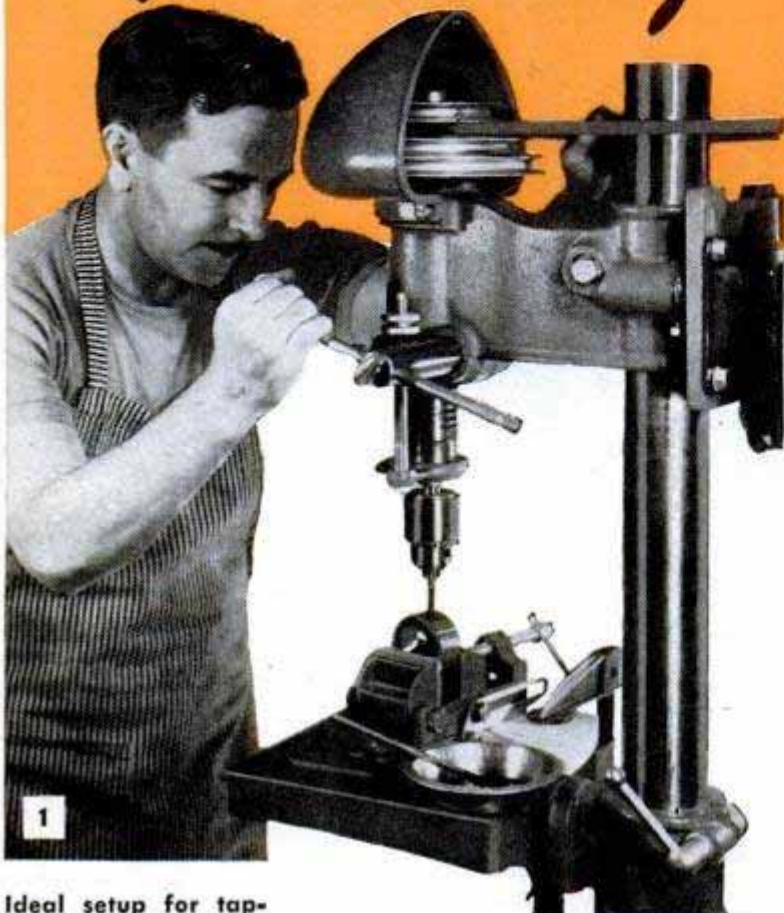
## Save Generator Armature By Knurling Shaft

When the ball bearing on the shaft of a generator is loose, the cost of a new armature frequently can be saved if the shaft is knurled where the bearing fits. Do this lightly if the bearing is only slightly loose, or produce a deep knurl if quite loose. After knurling, press the bearing firmly into place with pressure on the inner race so as not to strain the bearing.



# Threading with TAPS and DIES

By Sam Brown



1  
Ideal setup for tapping can be made on drill press. Tap is turned by hand, by pulling on belt or by using tap wrench

**H**AND TAPS and dies provide a simple, fast method of cutting internal and external threads in metal or plastic. Even in shops where screw-cutting lathes are available, the faster method of threading with a hand tap or die is used almost universally for small diameters. Procedure is quite simple and precise work is easy to accomplish with the extensive range of sizes and supplemental data that are available on related tap-and-drill sizes and thread systems. Tables No. 1 and 2, and the typical examples worked out below, show how to go about selecting a tap and the proper tap drill. They also show how to determine the correct thread system to use for the job at hand.

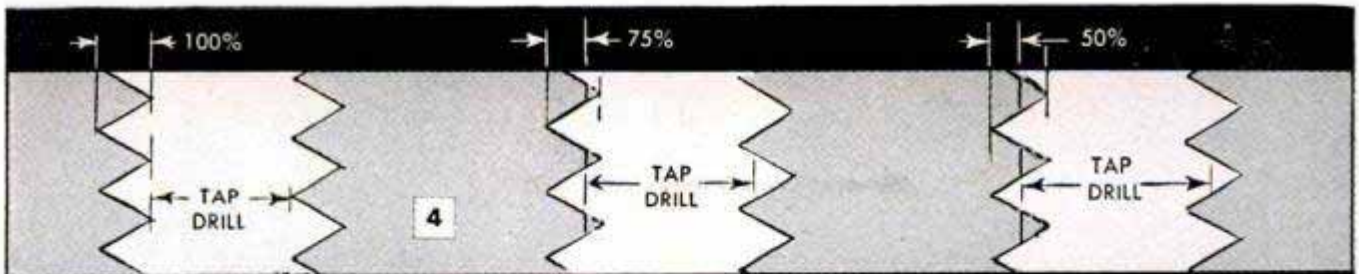
A practical setup for many tapping jobs can be made on the drill press. Drill the tap hole in the work and then chuck the tap to cut the thread. In this operation the important thing is to allow sufficient room to remove the drill and insert the tap without disturbing the setup. The spindle is turned by pulling on the belt by hand as in Fig. 1. The feed lever is held down with just sufficient pressure to overcome the tension of the quill spring. This method can be used with taps up to  $\frac{1}{4}$  in., but larger tap sizes will require turning the chuck as in Figs. 3 and 5.



## How to Use Tables

**Example No. 1:** Selecting tap when size of screw is not known. Measure diameter of screw as in Fig. 6. Assuming that it measures .137 in., run down third column in Table No. 1 to the nearest value which is .138 in. Note in the first column that this is the diameter of a No. 6 screw. Then check with a pitch gauge to determine the number of threads per inch. Common threads on a No. 6 screw are 32, 36 and 40. Thus a 6-32, 6-36 or 6-40 tap would be selected for the job. If 6-32 tap is required, run down first column in Table No. 1 to 6-32. Right-hand column shows No. 36 drill for 75% thread



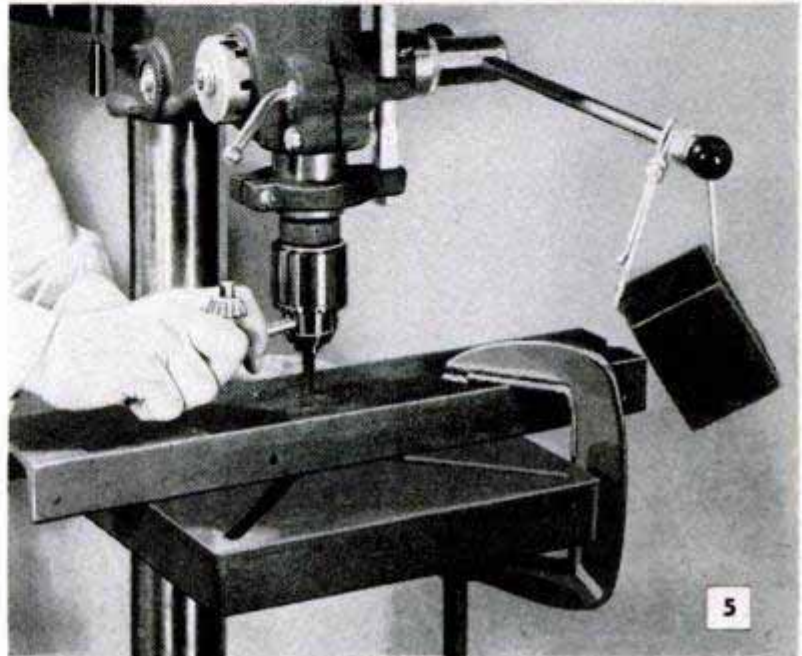


**FULL THREAD TAKES MORE EFFORT TO CUT. IT IS HARD ON TAPS AND IS ONLY 5% STRONGER THAN A 75% THREAD**

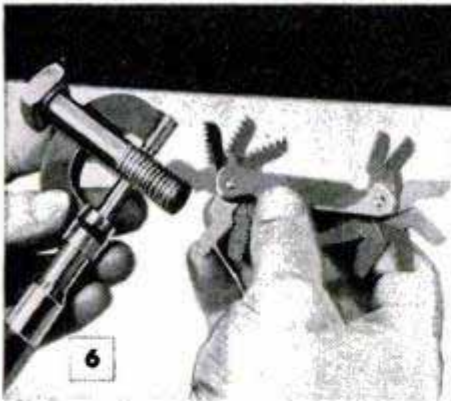
**75% THREAD IS RECOMMENDED STANDARD FOR MOST WORK EXCEPT MACHINE TAPPING, WHICH IS DONE BEST WITH 50-60% THREAD**

**50% THREAD IS 80% AS STRONG AS 75% THREAD. IT IS EASY TO CUT AND GOOD FOR ALL JOBS EXCEPT THIN WORK LESS THAN ONE TAP DIA. THICK**

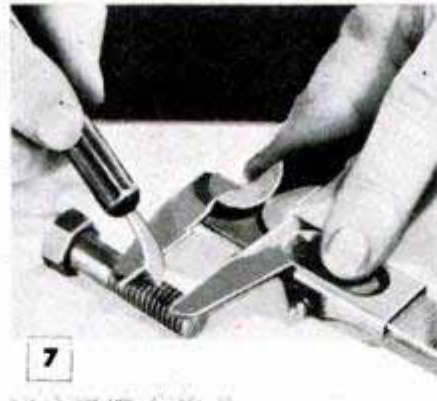
Although individual taps and dies can be purchased as you need them, it is better to obtain a standard tap-and-die set in the sizes most commonly used. Taps in the set can be ordered with either taper or plug ends as in Fig. 2, and the bottom taps for blind holes can be added as they are needed. Bottom taps are used to run the thread to the bottom of a blind hole. They are not used ordinarily in through holes. The taper tap is used instead, as it is easier to start, cuts freely and is easy to turn. When purchasing taps individually, keep in mind that machine taps cut threads for numbered machine screws while the hand taps cut threads of fractional-inch sizes.



**When the chuck wrench is used to turn the chuck when tapping in drill press, attach a weight to the drill-press feed lever**



**Thread diameter and pitch are determined with mike and pitch gauge**



**Without a pitch gauge, count the threads per inch or half inch**



**Lacking other means, determine size of internal thread with tap drill**

YOUR DRILL →

6-32

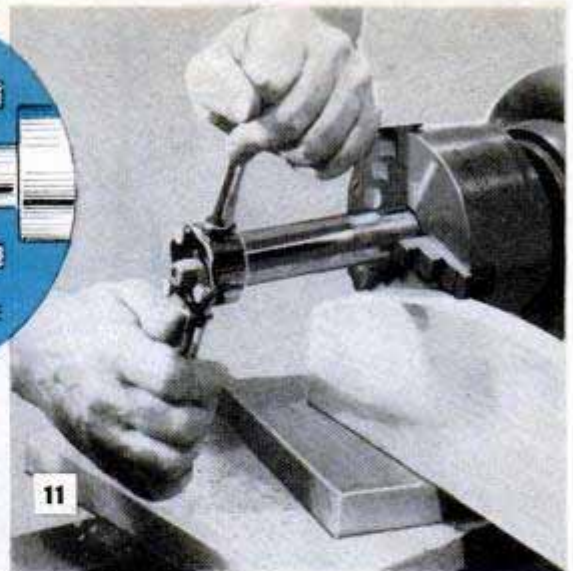
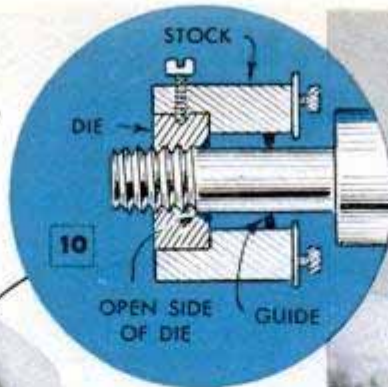
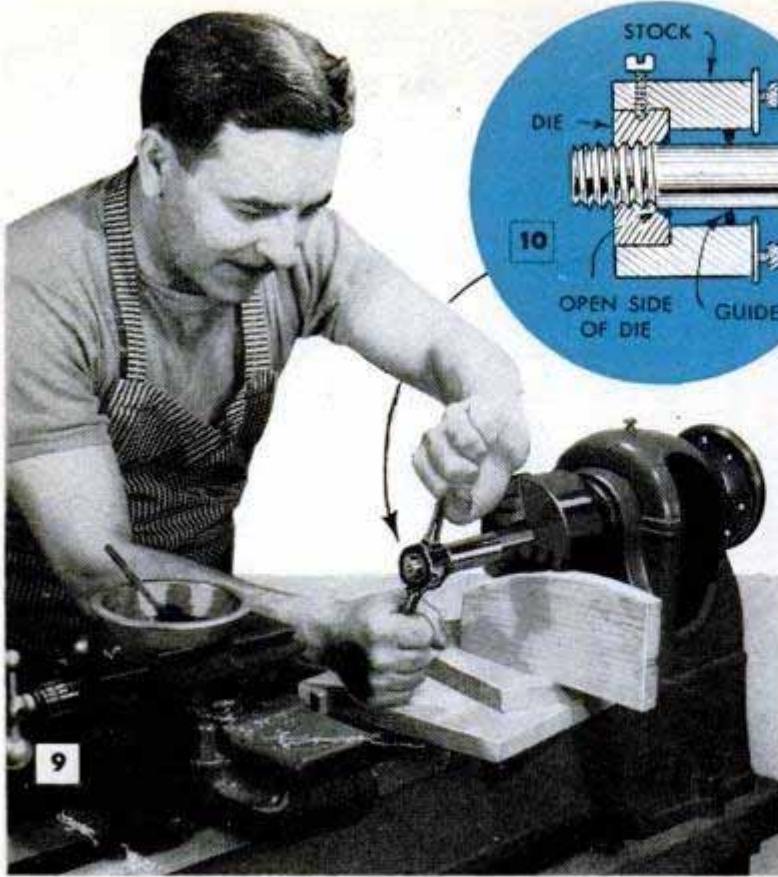
50% = .117 < .109

70% > 75% = .107

100% = .097 ↑

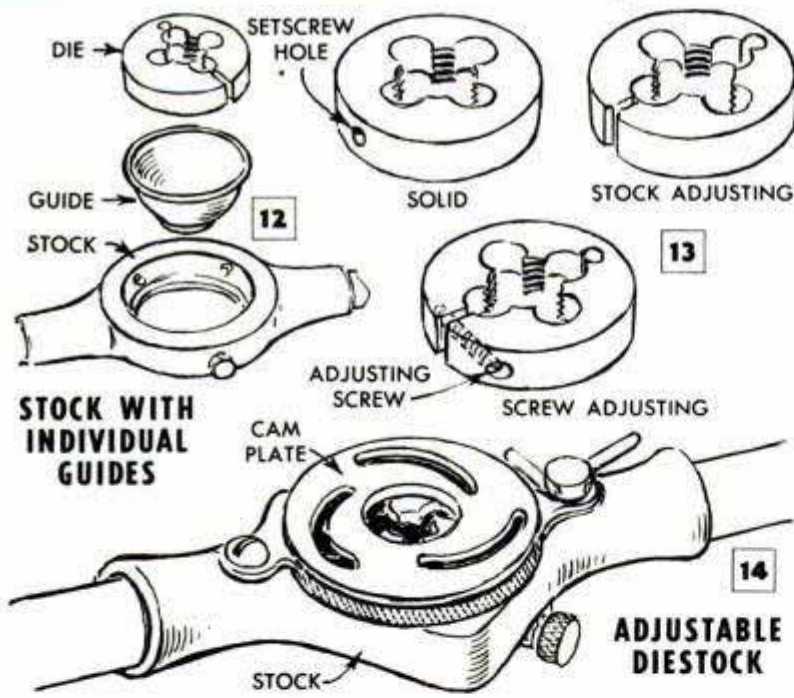
TAP DRILL RANGE FOR 6-32 THREAD. FIGURES FROM TABLE No. 1

**Example No. 2:** Same as Example No. 1 except that a No. 36 tap drill is not available. In Table No. 1 note that any size of drill between .097 in. and .117 in. in diameter can be used as a tap drill for a 6-32 tap. Consult Table No. 2 and locate drill in this size range. From this it can be seen that a 7/64-in. (fractional-size) drill is the size nearest to that required. In a decimal size this is about .109 in., and will give approximately a 70-percent thread as in the figures at left showing range of tap drills for a 6-32 thread



Threading with a round die held in a stock can be done in a lathe. Stock and die are reversed when threading to shoulder

When it is necessary to determine specific threads, a micrometer caliper and a screw-pitch gauge, Fig. 6, are required. Lacking the pitch gauge you can count screw threads per inch or half inch as in Fig. 7 and, when the length of the screw will permit, the tap also can be used as a gauge. On some internal threads where the mike and gauge cannot be used, one method is to check with drills as in Fig. 8, then determine the thread as explained in example No. 3 on the use of tables. Experienced machinists often can determine standard thread sizes accurately by eye alone. Also the nature of the job generally provides a fairly accurate clue. For example, in most machine assemblies N.C. (National Coarse) threads are commonly found. In automotive and airplane work N.F. (National Fine) threads are used, and on precision jobs and in instrument building N.F. or N.S. (National Special) threads are generally found.



Tap-drill sizes which will permit tapping 50, 75 and 100-percent threads are commonly used, Fig. 4. A 75-percent thread is a good

## How to Use Tables

(Continued from page 215)

**Example No. 3:** In tapped holes too small to mike or check with a pitch gauge, insert drills until the hole stops a given size. Suppose, as an illustration, that the hole passes a 3/32-in. (.094) drill but stops a 7/64-in. (.109) drill. It is reasonably accurate to estimate the size of the hole as .105 in. which would be the tap-drill size used originally. Using the figures at the left, locate the nearest values in the 75-percent column in Table No. 1. With these it is possible to determine the thread size required

# THREADS and TAP DRILL SIZES

TABLE No. 1

TAP or SCREW	THREAD SYSTEM	OUTSIDE DIA.	TAP DRILL			DRILL for 75%	TAP or SCREW	THREAD SYSTEM	OUTSIDE DIA.	TAP DRILL			DRILL for 75%
			50%	75%	100%					50%	75%	100%	
0-80	N.F.	.060	.052	.048	.044	3/64	7/32-24	N.S.	.219	.192	.178	.164	16
1/16-64	N.S.	.063	.052	.047	.042	3/64	32	N.S.	.219	.199	.188	.178	12
72	Obs.	.063	.054	.049	.044	3/64	22	Stove	.222	.198	.186	.174	16
1-56	N.S.	.073	.061	.055	.050	54	15/64-24	N.S.	.234	.207	.194	.180	10
64	N.C.	.073	.063	.058	.053	53	14-20	N.S.	.242	.210	.193	.177	10
72	N.F.	.073	.064	.060	.055	53	24	N.S.	.242	.215	.201	.187	7
5/64-60	N.S.	.078	.067	.061	.056	1/16	1/4-18	Stove	.250	.224	.211	.198	8
72	Obs.	.078	.069	.065	.060	52	20	N.C.	.250	.218	.201	.185	7
2-56	N.C.	.086	.074	.068	.063	50	24	N.S.	.250	.223	.209	.195	4
64	N.F.	.086	.076	.071	.066	50	27	N.S.	.250	.226	.213	.201	3
3/32-48	N.S.	.094	.080	.073	.066	49	28	N.F.	.250	.227	.215	.203	3
50	Obs.	.094	.081	.074	.067	49	32	N.S.	.250	.230	.220	.209	7/32
3-48	N.C.	.099	.086	.079	.072	47	5/16-18	N.C.	.312	.276	.258	.240	F
56	N.F.	.099	.087	.081	.076	45	20	N.S.	.312	.280	.263	.247	17/64
7/64-48	N.S.	.109	.096	.089	.082	43	24	N.F.	.312	.285	.272	.258	I
4-32	N.S.	.112	.092	.081	.071	45	27	N.S.	.312	.288	.276	.264	J
36	N.S.	.112	.094	.085	.076	44	32	N.S.	.312	.292	.281	.271	9/32
40	N.C.	.112	.096	.088	.080	43	3/8-16	N.C.	.375	.334	.313	.293	5/16
48	N.F.	.112	.098	.091	.085	42	20	N.S.	.375	.343	.326	.310	21/64
1/8-32	Stove	.125	.108	.099	.091	42	24	N.F.	.375	.348	.334	.320	Q
32	N.S.	.125	.105	.094	.084	3/32	27	N.S.	.375	.351	.338	.326	R
40	N.S.	.125	.109	.100	.092	38	7/16-14	N.C.	.437	.391	.368	.344	U
5-36	N.S.	.125	.107	.098	.089	40	20	N.F.	.437	.405	.388	.372	25/64
40	N.C.	.125	.109	.100	.092	38	24	N.S.	.437	.410	.397	.383	X
44	N.F.	.125	.110	.102	.095	37	27	N.S.	.437	.413	.201	.389	Y
6-32	N.C.	.138	.117	.107	.097	36	1/2-12	N.S.	.500	.446	.419	.391	27/64
36	N.S.	.138	.120	.110	.101	34	13	N.C.	.500	.450	.425	.400	27/64
40	N.F.	.138	.122	.113	.105	33	20	N.F.	.500	.467	.451	.435	29/64
9/64-40	N.S.	.141	.124	.116	.108	32	24	N.S.	.500	.473	.459	.445	29/64
7-30	N.S.	.151	.129	.118	.107	31	27	N.S.	.500	.476	.463	.451	15/32
32	A.S.M.E.	.151	.131	.120	.110	31	9/16-12	N.C.	.562	.508	.471	.454	31/64
36	N.S.	.151	.133	.124	.114	1/8	18	N.F.	.562	.526	.508	.490	33/64
5/32-32	N.S.	.156	.136	.125	.115	1/8	27	N.S.	.562	.538	.526	.514	17/32
36	N.S.	.156	.138	.129	.120	30	5/8-11	N.C.	.625	.566	.536	.506	17/32
28	Stove	.163	.144	.135	.125	1/8	12	N.S.	.625	.571	.544	.516	35/64
8-30	N.S.	.164	.142	.131	.120	30	18	N.F.	.625	.589	.570	.552	37/64
32	N.C.	.164	.144	.133	.123	29	27	N.S.	.625	.601	.588	.576	19/32
36	N.F.	.164	.146	.137	.127	29	11/16-11	N.S.	.687	.629	.599	.569	19/32
40	N.S.	.164	.148	.139	.131	28	16	N.S.	.687	.647	.626	.606	5/8
11/64-32	N.S.	.172	.152	.141	.131	9/64	3/4-10	N.C.	.750	.685	.652	.620	21/32
9-24	N.S.	.177	.150	.136	.122	29	12	N.S.	.750	.696	.673	.641	43/64
30	N.S.	.177	.155	.144	.133	27	16	N.F.	.750	.709	.688	.668	11/16
32	N.S.	.177	.157	.146	.136	26	27	N.S.	.750	.726	.713	.701	23/32
3/16-24	N.S.	.187	.160	.147	.133	26	13/16-10	N.S.	.812	.748	.715	.682	23/32
32	N.S.	.187	.167	.156	.146	22	7/8-9	N.C.	.875	.803	.766	.730	49/64
24	Stove	.195	.173	.162	.151	24	12	N.S.	.875	.821	.793	.766	51/64
10-24	N.C.	.190	.163	.149	.135	25	14	N.F.	.875	.829	.806	.782	13/16
28	N.S.	.190	.167	.155	.143	23	18	N.S.	.875	.839	.820	.802	53/64
30	N.S.	.190	.168	.157	.146	22	27	N.S.	.875	.851	.838	.826	27/32
32	N.F.	.190	.170	.159	.149	21	15/16-9	N.S.	.937	.865	.829	.793	53/64
13/64-24	N.S.	.203	.176	.163	.149	20	1-8	N.C.	1.000	.919	.878	.837	7/8
12-24	N.C.	.216	.189	.175	.161	16	12	N.S.	1.000	.946	.918	.891	59/64
28	N.F.	.216	.193	.181	.169	14	14	N.F.	1.000	.954	.931	.907	15/16
32	N.S.	.216	.196	.185	.175	13	27	N.S.	1.000	.976	.963	.951	31/32

N.C.—National Coarse (formerly U.S.S.)  
 N.F.—National Fine (formerly S.A.E.)  
 N.S.—National Special (various threads from older systems)

Stove—Stove bolts, Manufacturers Standard  
 A.S.M.E.—American Society of Mechanical Engineers. Most threads in this older system are included in the National system.

TABLE No. 2

## DRILL SIZES

INCH	DECIMAL	WIRE	INCH	DECIMAL	WIRE	INCH	DECIMAL	WIRE or LETTER	INCH	DECIMAL	LETTER
1/64	.014	80	3/32	.089	43	13/64	.199	8	25/64	.390	
	.015	79		.093	42		.201	7	.397	X	
	.016			.094			.203		.404	Y	
	.016	78		.096	41		.204	6	13/32	.406	
	.018	77		.098	40		.205	5	.413	Z	
	.020	76		.099	39		.209	4	27/64	.422	
	.021	75		.101	38		.213	3	7/16	.437	
	.023	74		.104	37		.219		29/64	.453	
	.024	73		.106	36		.221	2	15/32	.469	
	.025	72		7/64	.109			.228	1	31/64	.484
.026	71		.110	35	.234	A	1/2	.500			
.028	70		.111	34	.234		33/64	.515			
.029	69		.113	33	.238	B	17/32	.531			
.031	68		.116	32	.242	C	35/64	.547			
1/32	.031		.120	31	.246	D	9/16	.562			
.032	67	1/8	.125		.250	E	37/64	.578			
.033	66		.128	30	.257	F	19/32	.594			
.035	65		.136	29	.261	G	39/64	.609			
.036	64		.140	28	.265		5/8	.625			
.037	63	9/64	.141		.266	H	41/64	.640			
.038	62		.144	27	.272	I	21/32	.656			
.039	61		.147	26	.277	J	43/64	.672			
.040	60		.149	25	.281	K	11/16	.687			
.041	59		.152	24	.281		45/64	.703			
.042	58		.154	23	.290	L	23/32	.719			
.043	57	5/32	.156		.295	M	47/64	.734			
.046	56		.157	22	.297		3/4	.750			
3/64	.047		.159	21	.302	N	49/64	.766			
.052	55		.161	20	.312		25/32	.781			
.055	54		.166	19	.316	O	51/64	.797			
.059	53		.169	18	.323	P	13/16	.812			
1/16	.062		.172		.328		53/64	.828			
.063	52	11/64	.173	17	.332	Q	27/32	.844			
.067	51		.177	16	.339	R	55/64	.859			
.070	50		.180	15	.344		7/8	.875			
.073	49		.182	14	.348	S	57/64	.891			
.076	48		.185	13	.358	T	29/32	.906			
5/64	.078		.187		.359		59/64	.922			
.079	47	3/16	.189	12	.368	U	15/16	.937			
.081	46		.191	11	.375		61/64	.953			
.082	45		.193	10	.377	V	31/32	.969			
.086	44		.196	9	.386	W	63/64	.984			

average for hand tapping but in machine tapping 50 to 60-percent threads are common. Cutting a 100-percent thread requires extremely careful work with a hand tap to avoid breakage of the tap and damage to the thread. When joining pipe in mechanical assemblies a 50-percent tap drill is commonly used. An example of this is the use of a 3/8-in. drill for a 50-percent thread in 1/2-in. pipe as in Table No. 3. If a free-running thread is required, mechanics sometimes use steel wool, as in Fig. 15, to cut the thread slightly oversize. First the hole is tapped in the usual manner, then the tap is withdrawn and wrapped with one full turn of fine steel wool. After the tap is restarted in the threaded hole, it is turned in to its full length. The steel-wool wrapping in effect "rolls" the thread to a slightly larger diameter.

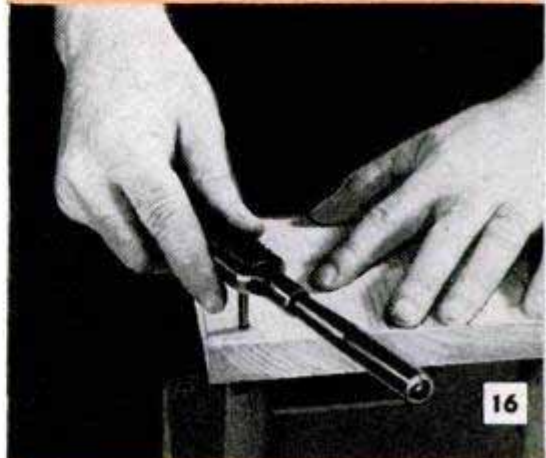
Thread-cutting dies take the place of the screw-cutting lathe for ordinary work in both large and small shops where accurate duplication is not required. Frequently the work involves a turning or shouldering operation in the lathe and here the lathe can be used as a holding device for starting the die, Fig. 9. Corners of squared work should be broken to permit the die to start readily. Note when using ordinary round dies of the split type that the threads are chamfered from one side of the die. Always start the die from the chamfered side as in Fig. 10 and when a die holder, or stock, is used as in Fig. 11, where the thread is to be run up to a shoulder, the die is reversed in the stock.

The various types of common round dies are shown in Figs. 12, 13 and 14. The inexpensive solid die is suitable for average work but either the stock-adjusting or screw-adjusting die should be used where any variation in the thread may be required. Fig. 16 pictures a plug tap being started with the aid of a wooden guide, and Fig. 18 shows how to use a piece of tape as a depth stop. Machine screws, in Fig. 17, can be made from wood screws.

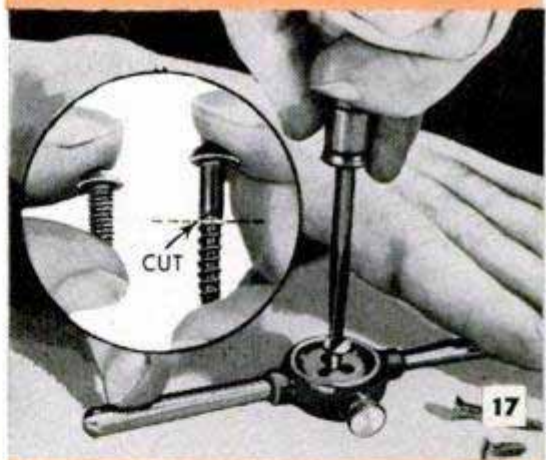
★ ★ ★



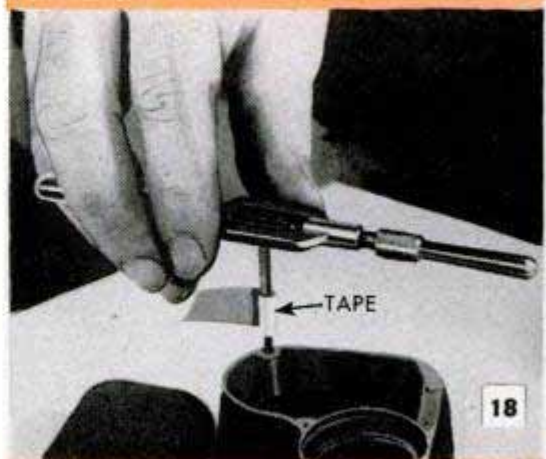
Steel wool forms free-running thread



Start plug tap through wooden guide



Make machine screws of wood screws



Adhesive tape can serve as depth stop

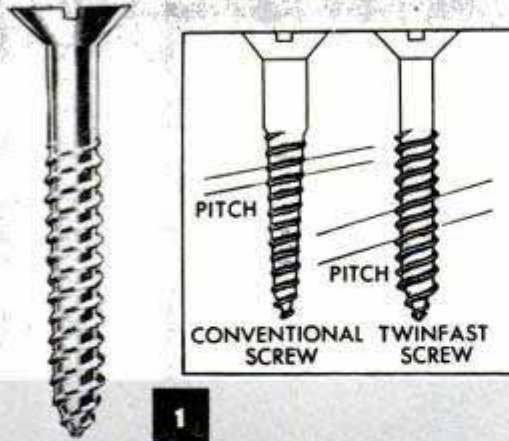
### Straight and Taper PIPE THREADS

TABLE No. 3

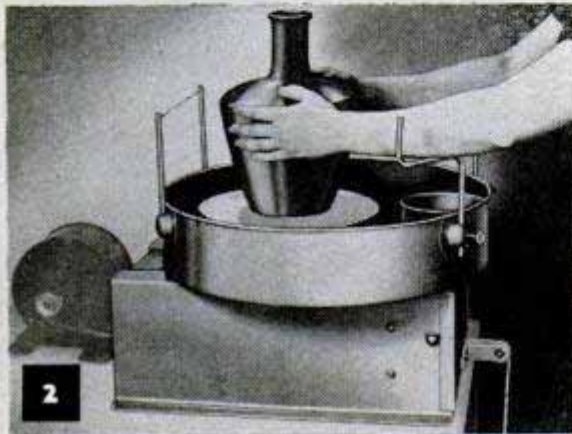
Pipe Size	Threads per Inch	Actual Outside Dia.	Outside Of St. Thread	TAP DRILL			Regular Tap Drill
				50%	75%	100%	
1/8"	27	.405	.404	.375	.360	.345	11/32
1/4"	18	.540	.534	.490	.467	.445	7/16
3/8"	18	.675	.671	.627	.604	.582	37/64
1/2"	14	.640	.835	.778	.749	.721	23/32
3/4"	14	1.050	1.046	.989	.960	.932	59/64
1"	11 1/2	1.315	1.308	1.239	1.204	1.169	1-5/32
1 1/4"	11 1/2	1.660	1.653	1.583	1.549	1.514	1-1/2
1 1/2"	11 1/2	1.900	1.892	1.822	1.788	1.753	1-47/64
2"	11 1/2	2.375	2.366	2.296	2.262	2.227	2-7/32

Tap-drill size in right-hand column permits full thread for straight or taper tap. Plumbing requires taper tap

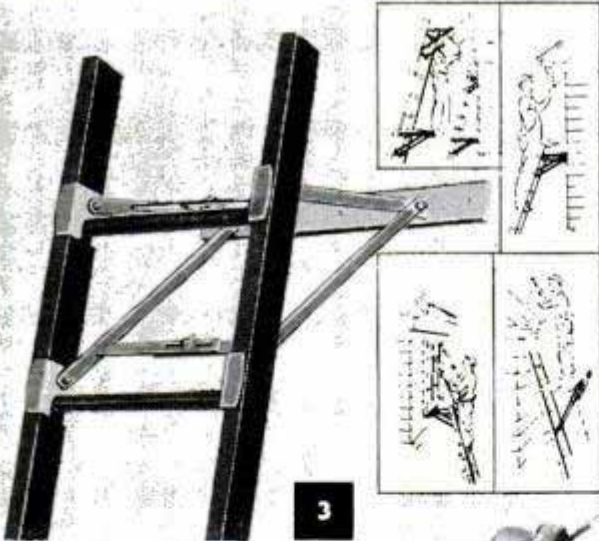
# SHOPPING FOR TOOLS



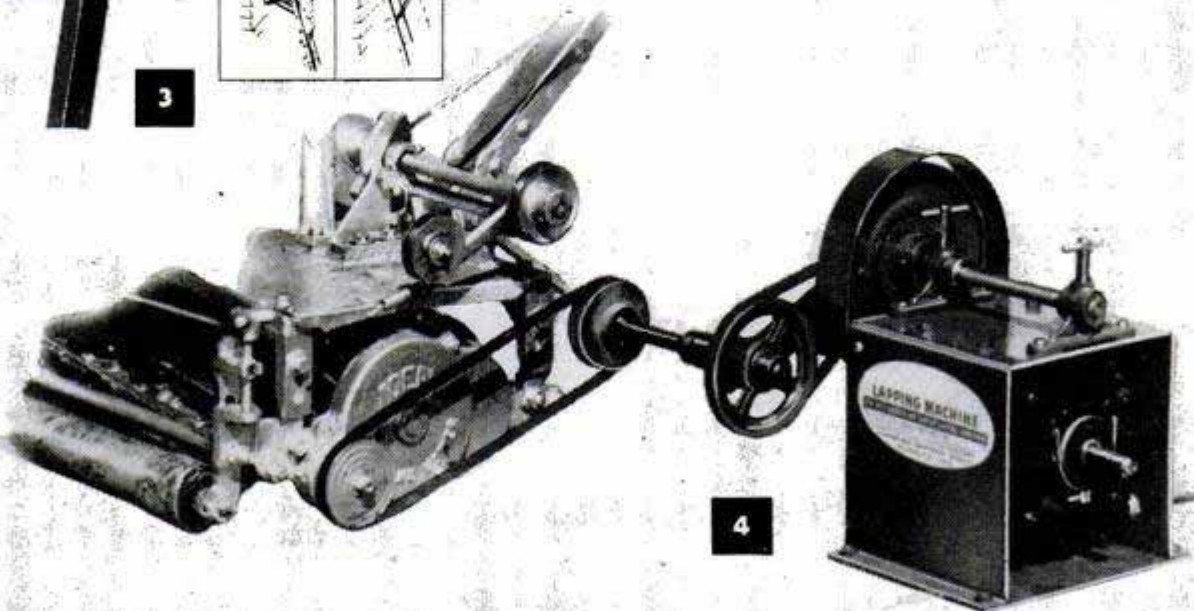
**1. CENTER-POINT WOOD SCREWS** drive twice as fast as conventional screws and with less tendency to split the wood or break under hard driving pressure. Start easily due to the tapered screw thread which centers at the point. Drive without eccentric movement, and relieved shanks eliminate the need for a counterbore in all but the hardest woods. Available in steel and brass, in all standard wood-screw sizes



**2. POTTER'S WHEEL** for professional and amateur use has a reversible throwing head 10 in. in dia. with concentric circles etched on its surface to assist in centering the work. A foot-controlled variable-speed drive gives a speed range from 30 to 150 r.p.m. Convenient water container fits inside housing. Wedging wire and gauge sticks clamp into brackets for production of repetitive work. Comes with or without motor



**3. LADDER BRACKET** serves as an offset bracket and scaffold support. Offset feature permits working under wide cornices and on eaves above gutters. Bracket is adjustable for width to fit ladders of different sizes. Bracket arms are fitted with friction clamps that slip over the rails and slide down on the rungs. This type of bracket mounting transmits the load to the rails instead of the rungs. Fits either side of ladder



**4. PORTABLE LAPPING MACHINE** for reconditioning reel-type lawn mowers of the heavy-duty type has reversible motor mounted in a metal base which supports a jackshaft. A swiveling torque arm mounted on jackshaft carries the drive shaft. This connects to the reel shaft of the mower by means of collets supplied with the machine. Blades are ground with special lapping compound, samples of which are furnished

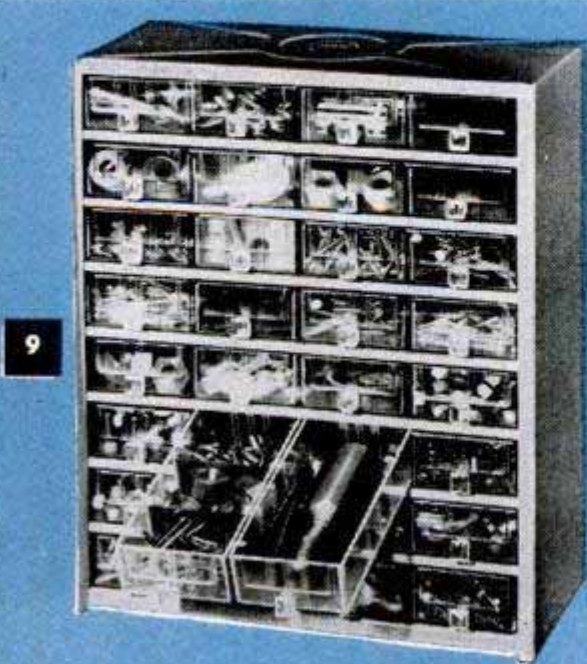
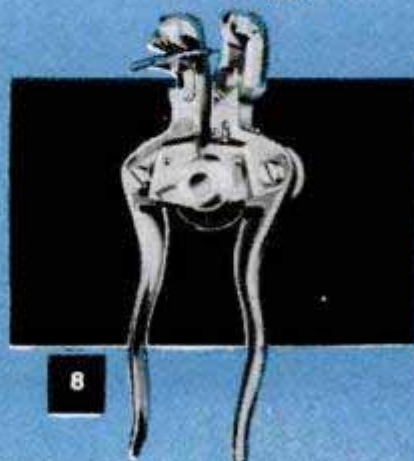
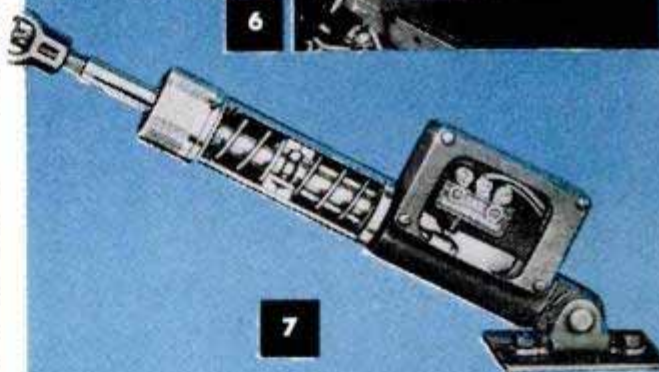
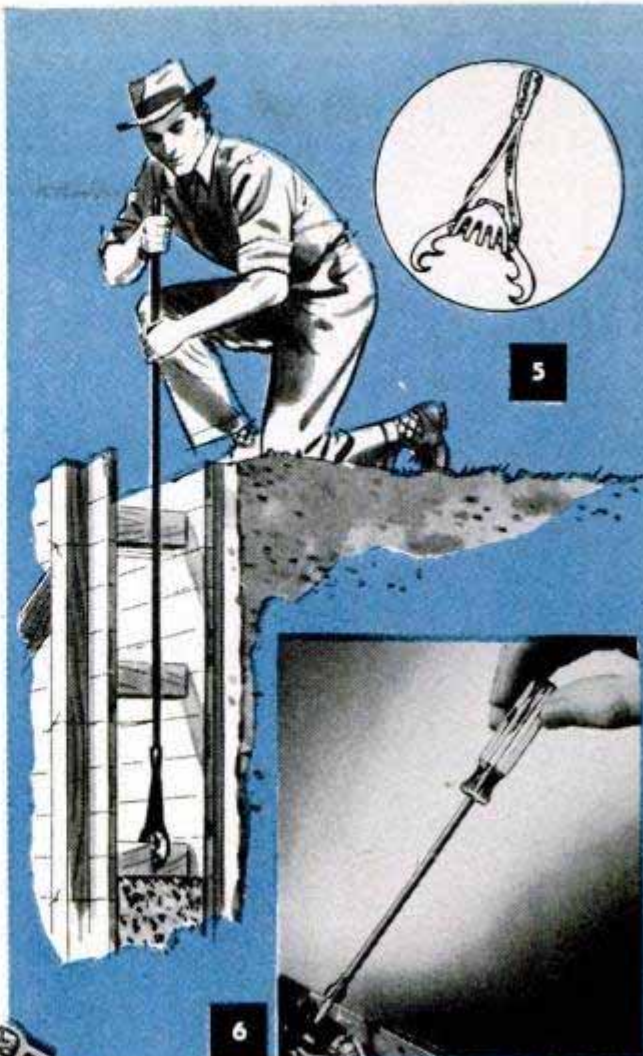
**5. CONCRETE-FORM-SPACER REMOVER** saves time and prevents damage when removing spacers from concrete forms. Consists of pivoted, spring-actuated grapples attached to a handle of convenient length. In use tool is opened by forcing pivoted grapples outward until they lock. Then the unit is lowered into the space between the sides of the form and placed over center of the spacer. Pressing down closes grapples

**6. NUT STARTER** is designed to reach into inaccessible places. A spring holds the screw or nut firmly in jaws until it can be started by one-hand operation. After starting nut, tool releases itself and can be withdrawn. Tool is similar to a screwdriver with a slender shank and a handle of Tenite plastic. Handle is fluted and rounded at top end to form a comfortable grip. Available in sizes from 3/16 to 7/16 in.

**7. OVERLOAD RELEASE** for torque-arm speed reducer provides positive protection for driven machines developing shock loads. Release operates both mechanically and electrically to slacken drive belt, stop motor and sound warning bell. It can be calibrated to operate under varying load conditions. After unit has been tripped by overload it is returned to operating position manually. Movement cocks overload release

**8. AUTOMATIC WIRE STRIPPER** features a delayed-action release that prevents the wire from being bent or crushed out of round. Action is fully automatic, as simply closing the handles causes the stripper to grip the wire, cut the insulation at the desired point and strip it free in one movement. Strips solid and stranded wire from 8 to 22 gauge, also strips parallel cable, such as 300-ohm TV and FM

**9. SMALL-PARTS STORAGE CABINET** has transparent plastic drawers housed in a sheet-metal cabinet. Cabinets are unit construction so they may be stacked or placed side-by-side. Drawers are 5 3/4 in. long, 1 1/4 in. deep and 2 3/4 in. wide and cabinets are available in sizes to accommodate from 8 to 64 drawers each. Drawer dividers and index sets are supplied. Dividers fit either lengthwise or crosswise of drawer



## Hinged Board on Scaffold Plank Prevents Sagging Under Load



To eliminate the uncertain footing caused by the bending of a lightweight scaffold plank as he worked, one painter used a narrow board hinged to the underside of the plank as shown, to act as a truss. The board is cut sufficiently shorter than the plank to allow ends of the plank to be slipped over the steps of a stepladder. In use, the hinges not only permit the board to hang edgewise beneath the plank for maximum strength, but also allow it to be folded flat when transported or stored.

G. E. Hendrickson, Argyle, Wis.

## Universal Welding Clamp



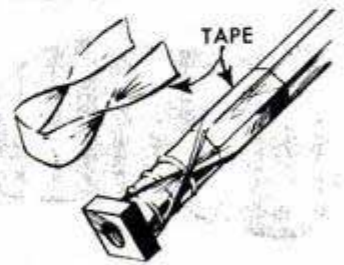
To solve the problem of holding parts in position for welding, one custom welder designed and built this universal clamp. First, he made a floor stand by welding a length of pipe to a truck wheel as in the detail. An adjustable band clamp is made by bending flat steel to a radius to fit over the pipe with projecting wings, or webs, which are drilled for two small bolts provided with wing nuts. Then a round lug is welded to the clamp and drilled through to take a short length of steel shafting, which turns freely in the hole. Next, a curved arm is welded to the short shaft, the arm being built up by

bending  $\frac{1}{4} \times 1\frac{1}{4}$ -in. flat steel to the required radius and then welding on a stiffener of the same material. A C-clamp is welded to the free end of the curved arm to complete the assembly. In use, the work is held in the C-clamp which can be located in almost any convenient position either by turning the arm or raising or lowering it on the pipe column.

L. H. Houck, Jefferson City, Mo.

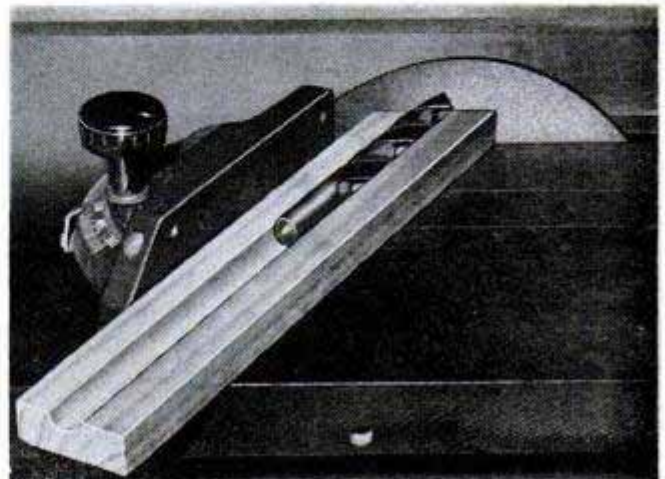
## Starting Small Nuts in Places That Are Hard to Reach

The difficulty of holding a small nut to be started on a bolt that is in a place hard to get at, often can be overcome by using a strip of cellulose tape over the end of a lead pencil. The tape is twisted to leave the gum side exposed at the end of the pencil. Then the nut is stuck to the tape as shown so that it can be started on the bolt.



## Jig for Sharpening Drill Bits

For those who only occasionally sharpen a twist drill and do not want to invest in an expensive attachment, a simple jig for use on a bench saw may be made from a 1 x 2-in. block of hardwood grooved as shown in the photo. One end is cut off at an angle of 59 deg., the angle at which most drills are ground. The miter gauge of the saw is set at 59 deg., and the saw arbor, on which a grinding wheel is mounted, is tilted at 12 deg. to provide proper clearance. In use, the drill is held in the jig with the lips parallel to the table. Slide the jig against the wheel, taking two or three light cuts until the drill lip is sharp. Both lips must be of equal length and should be checked with a caliper or drill gauge. If one lip is too long, regrind until both are equal.—Jack Richman, Muncie, Ind.



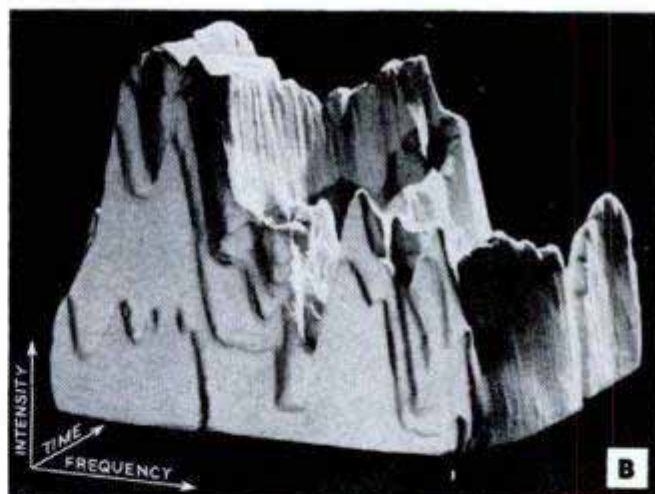
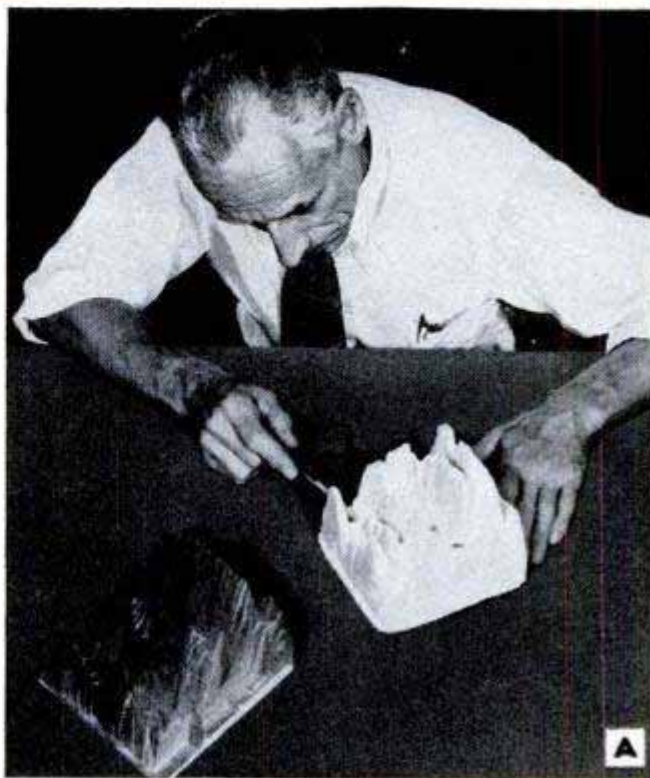


## ADVENTURES IN SOUND

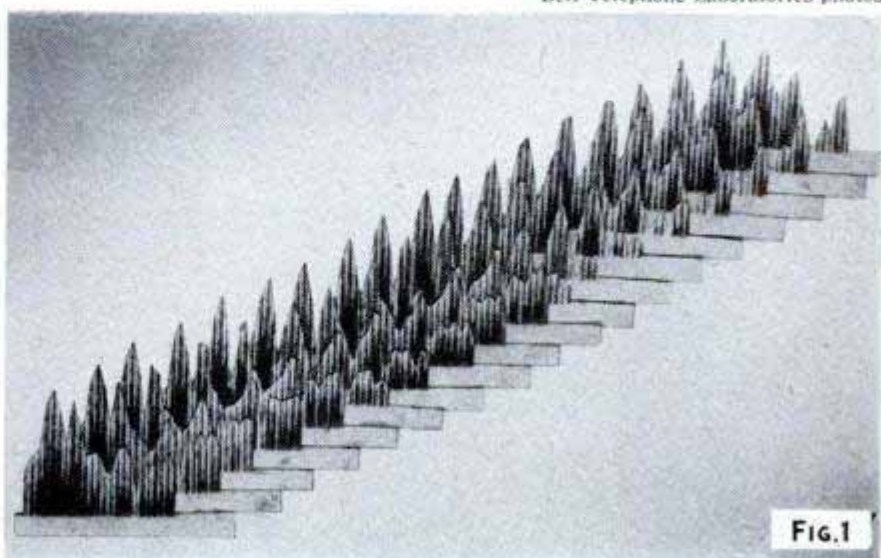
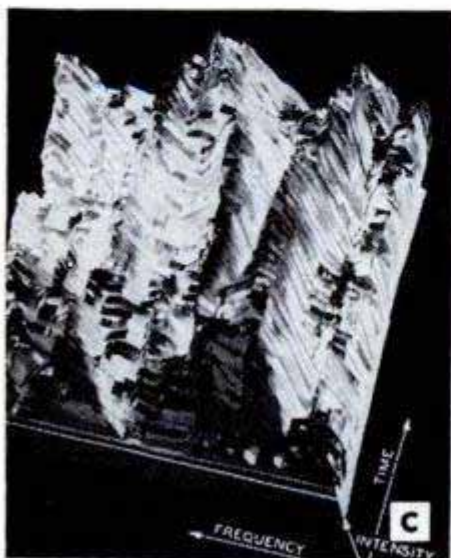
**SOLID SOUND** is a descriptive term given by scientists at the Bell Telephone Laboratories to the product of an interesting experiment in visualizing sound in three dimensions. For example, they wanted to find out what the sound "five" in three dimensions would look like. Standard sound spectrographs could give them wiggly lines showing a continuous cross section of the peaks and valleys of any given sound like five shown in exploded-view strip, Fig. 1. These jagged strips very nicely pictured time along their length, and frequency along their width. But there remained another dimension to sound — amplitude, or fullness.

By carefully measuring the differences in each major peak and valley along the jagged spectrograph picture, a painstaking engineer could find the amplitude. However, this was like trying to guess the shape of a mountain by looking at a long strip of progressive cross sections. This problem was solved by taking spectrograms of various sounds, and then snipping them into short pieces, each representing a slice of time only  $\frac{1}{2}$  second long. With a pantograph, these tiny sections of sound were enlarged on sheets of plastic and cut out. Then, the sound slices were placed one behind the other to form what the scientists called a "loaf" of the entire word. These plastic models were used to make molds.

Technician in photo A is finishing a plaster model of the plastic loaf shown in photo C. Plaster model, photo B, represents the male voice uttering the word five.

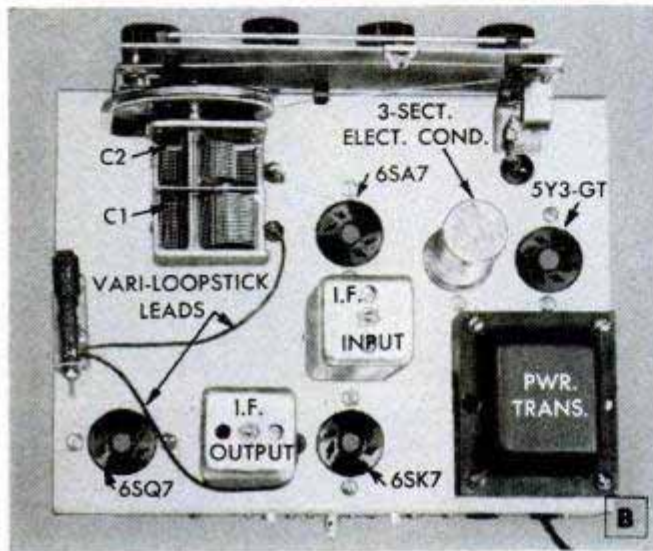
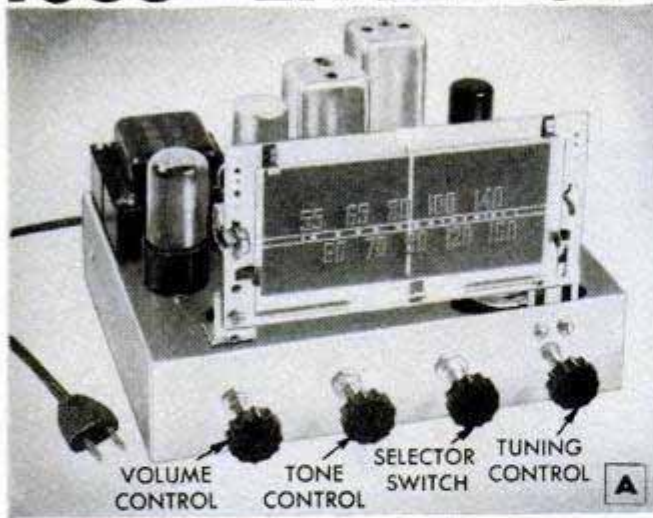


Bell Telephone Laboratories photos



# 1953 "LITTLE GIANT" HIGH-FIDELITY

By Lothar Stern



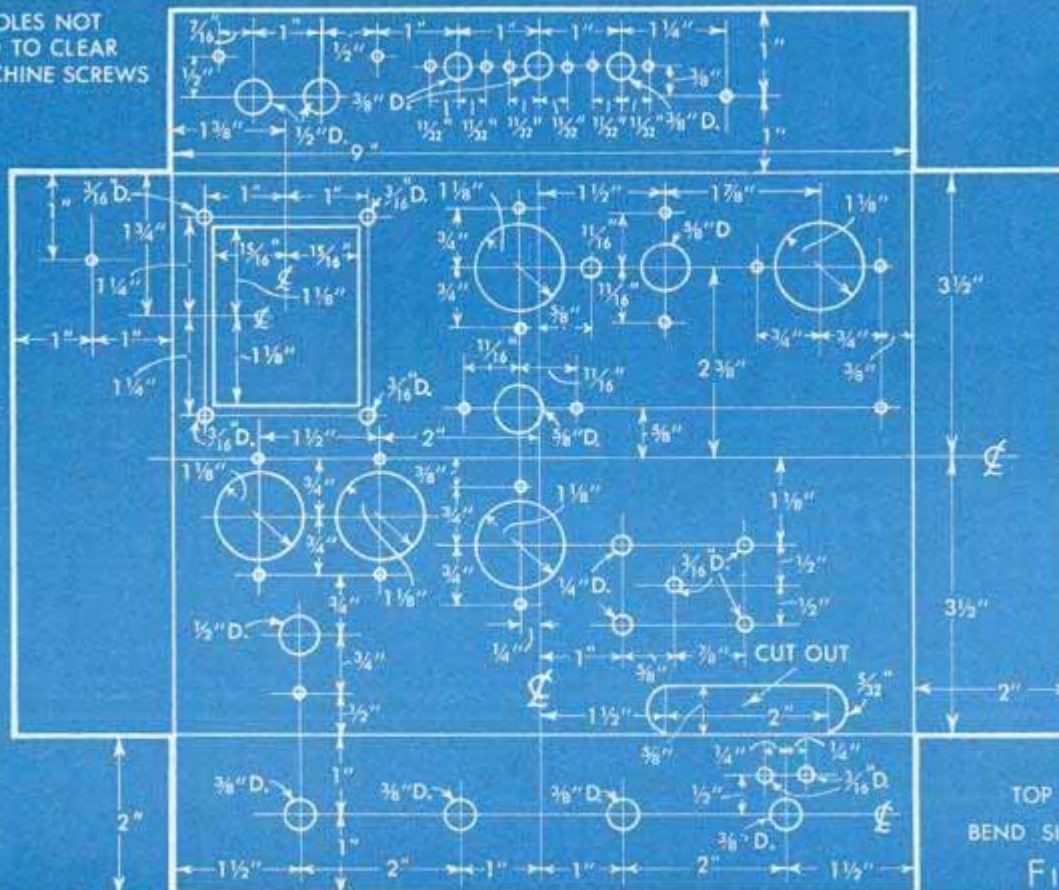
MUSIC LOVERS all over the country have become increasingly interested in improving their home sound systems. High fidelity is now a frequently heard term associated with good audio amplifiers, record players and loudspeaker systems. A necessary unit in the modern music system is a good AM broadcast-band radio tuner, and very few tuners qualify for high-fidelity reception and reproduction uses.

Radio student and experimenter readers of *Popular Mechanics Magazine*, who have been building the high-fidelity audio amplifiers and loudspeaker systems appearing in recent issues, have requested a student-

## RESISTORS

- R1=8.2 megohms, 1/2-watt carbon
- R2=22,000 ohms, 1/2-watt carbon
- R3=33,000 ohms, 1/2-watt carbon
- R4=2200 ohms, 1/2-watt carbon
- R5=1.5 megohm, 1/2-watt carbon
- R6=100,000 ohms, 1/2-watt carbon
- R7=220,000 ohms, 1/2-watt carbon
- R8=1 megohm, 1/2-watt carbon
- R9=100,000 ohms, 1/2-watt carbon
- R10 and R11=1 megohm potentiometers  
Mallory, type U-53 taper No. 1  
(one with S.P.S.T. cover switch)
- R12=3000 ohms, 10-watt wire-wound
- R13=15,000 ohms, 5-watt wire-wound
- R14=3.3 megohms, 1/2-watt carbon
- R15=150,000 ohms, 1/2-watt carbon

NOTE HOLES NOT MARKED TO CLEAR #6 MACHINE SCREWS

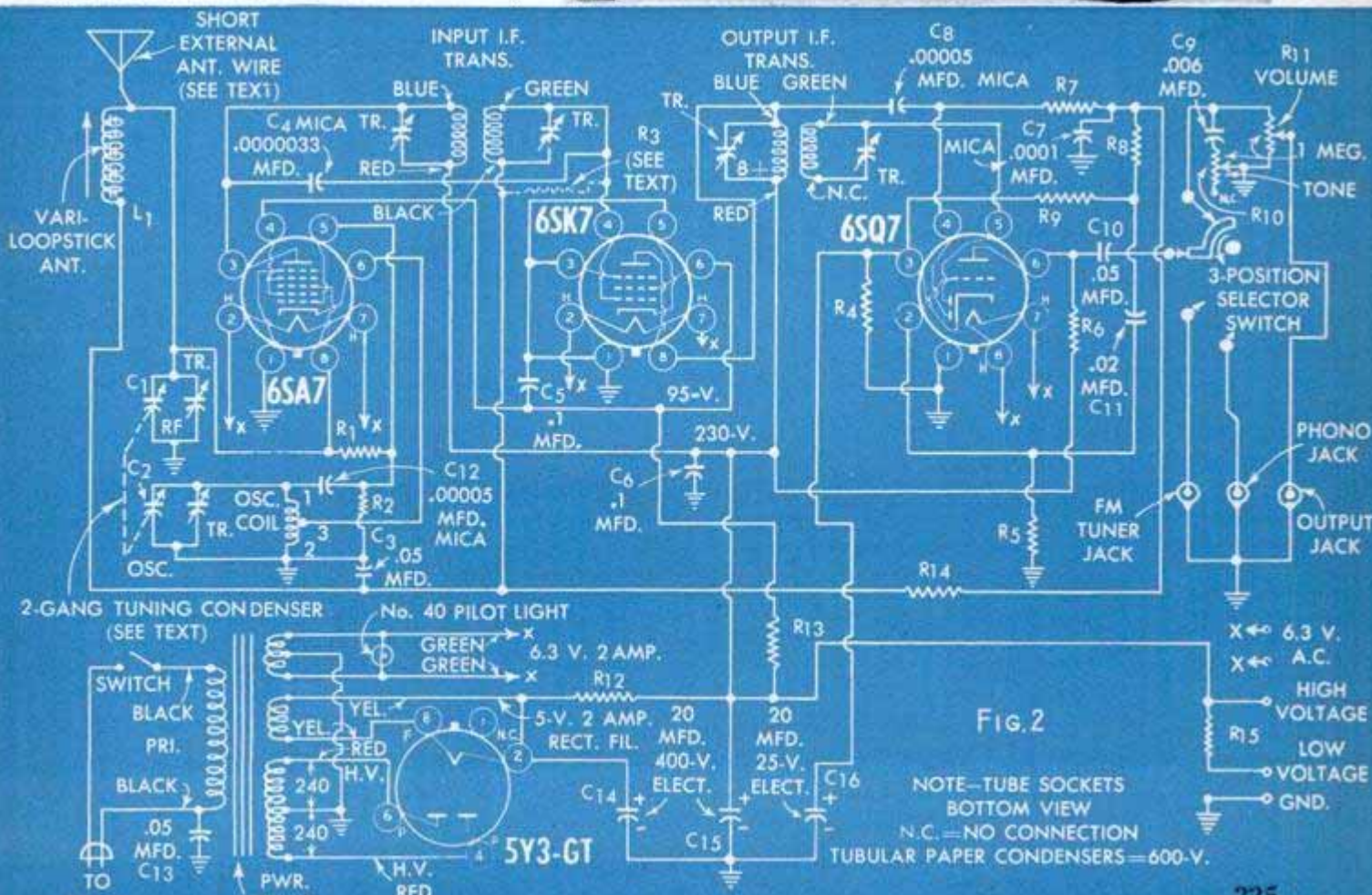
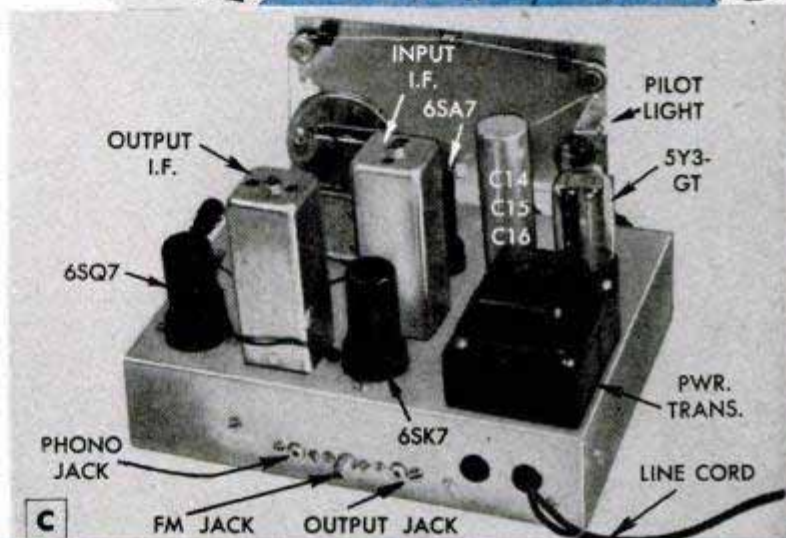


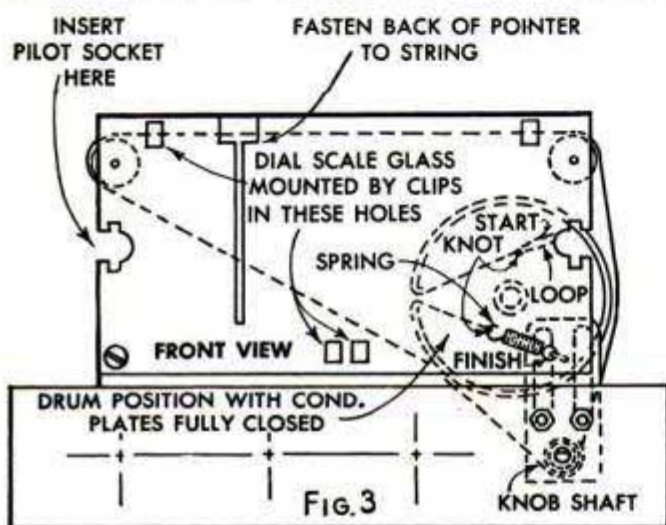
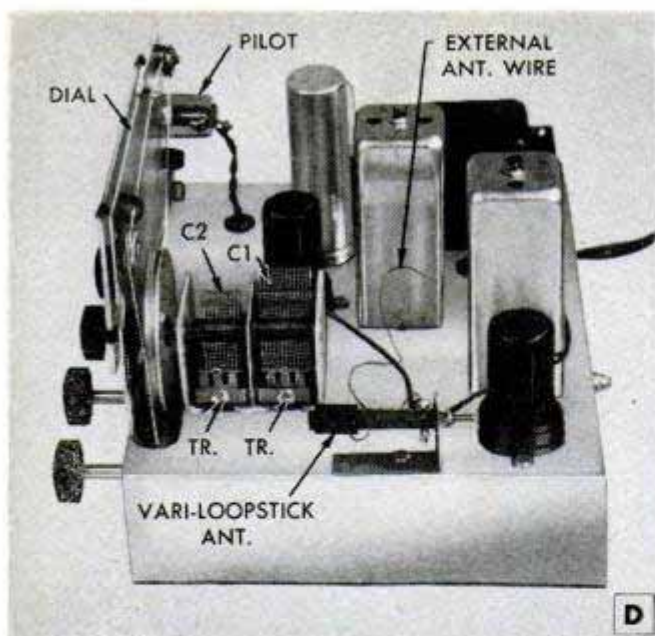
# AM SUPERHETERODYNE TUNER . . . .

construction article for a suitable AM tuner for their Hi-Fi installations. As such a radio tuner can be used with any radio amplifier, this compact high-fidelity AM super tuner was especially designed for the 1953 annual "Little Giant" project for advancing radio students and experimenters.

This easy-to-build and comparatively inexpensive tuner is not a complete radio; an amplifier and speaker are required for a complete unit. It operates on 105-125 volts a.c. and has a tuning range of 530-1650 kc. Automatic volume control provides relatively uniform signal strength over the entire band. An output selector switch and several input jacks are incorporated so any switching from radio to phono, etc., can be done directly at the tuner. Another good feature is the provision for power takeoff for phono pre-amplifiers which do not include their own power supplies; see lower right, Fig. 2.

Photos A, B, C, D and E should be examined carefully before beginning construction. The standard-size chassis base is 2 x 7 x 9 in.;





all drilling details are given in Fig. 1. Hole locations are measured from the center lines, see symbols. The complete schematic circuit diagram appears in Fig. 2. All fixed-condenser values are given; see chart for resistor values. The two-gang variable tuning condenser, C1 and C2, is a superhet two-section unit with a 19-plate oscillator section C2 (170.7 maximum and 8.7 minimum mmfd.). The r.f. section C1 has 27 plates (with 431 maximum and 11.0 minimum mmfd.). Each section has one 2-17 mmfd. trimmer (Tr.). This is a standard superhet type available from all of the large radio-parts houses.

The first tube in the circuit is a pentagrid converter (6SA7) which combines an oscillator and mixer in one envelope. From the audio amplifier, the signal passes to the selector switch where a tone-and-volume control is inserted. You will note that these controls are in the circuit regardless of the setting of the selector switch. Thus you can use these controls with an accessory FM tuner or a record player if desired.

The Perco i.f. transformers used in this tuner are specially designed to provide a full 10-kc. band width. This broad tuning

is necessary for high-fidelity AM broadcast reception. The input i.f. is type No. MO-145; the output i.f. is type No. MO-146 and the oscillator coil is also a Perco type No. B-130. They are made by the Charles S. Linell Engineering Corp., and are available from radio-parts houses. The Vari-Loopstick antenna completely eliminates the need for a bulky loop antenna. It mounts in any position and needs no orientation; the one used is called the Grayburne Vari-Loopstick and it has a micrometer screw adjustment for maximum peaking efficiency and for precise tracking across the entire broadcast band. It is listed in parts catalogues for about 60 cents. It is far less directional than the old loop type; this feature is desirable because the wide band width of the tuner necessarily limits its gain. You will find a short length of enameled wire already connected to the "hot" end of the loopstick antenna (the end that has the red lead to be soldered to the stator plates of the variable-condenser section, C1). This wire is coiled around the antenna but it must be unwound and stretched out—away from the chassis, see photo D. If the tuner is installed in a cabinet, merely tape this short wire to the inside of the cabinet. The sensitivity of the tuner can be further increased to bring in distant stations by attaching a 6-ft. piece of antenna wire to the free end of the short wire on the loopstick antenna. When doing this be sure to remove the enamel from the wire before attaching the extension.

A transformer is employed in the power supply, eliminating possibility of shock.

Construction should begin with the mounting of the tube sockets. Be sure to mount the sockets as follows: Looking down on the chassis in photo B, the 6SQ7 socket key-slot points left; the 6SA7 and the 6SK7 key slots point down; the key slot in the 5Y3-GT tube socket points up. This is important in running short leads, etc. Next mount the tuning condenser and the dial assembly—see Fig. 3. The bolts supporting the dial mechanism are mounted on the nuts on the outside of the dial plate. The variable-condenser rotating drum is mounted with the inner, or flange, side toward the rear of the chassis. This dial assembly is the Croname Croflex-type 231 and it is furnished with a bronze escutcheon just as shown in photo A. The entire dial assembly is listed in parts catalogues for about \$4.50 and it includes a clip-on pilot-light socket. The tuning ratio is 13 to 1. When stringing the dial, Fig. 3, the pointer is adjusted to the last mark on the left end of the scale with the variable-condenser plates closed.

Mount the Vari-Loopstick antenna last to

(Continued to page 236)

# TELEVISION TODAY

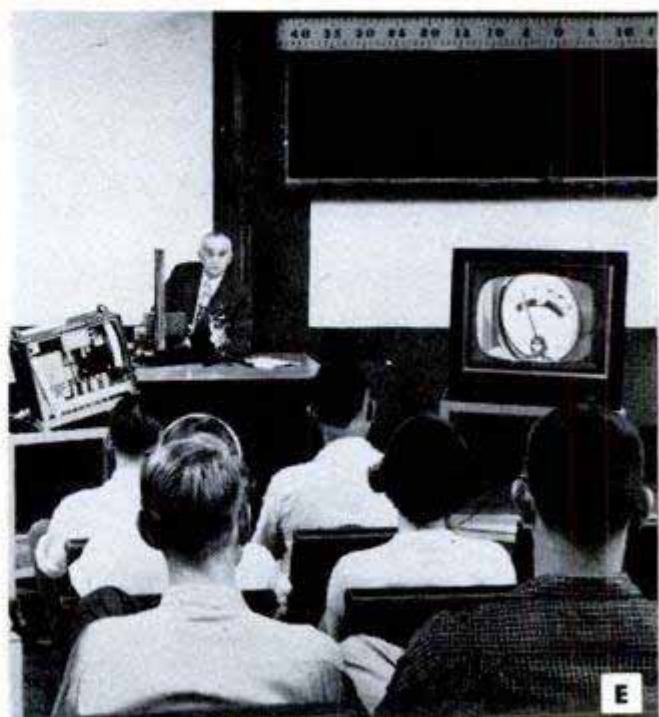
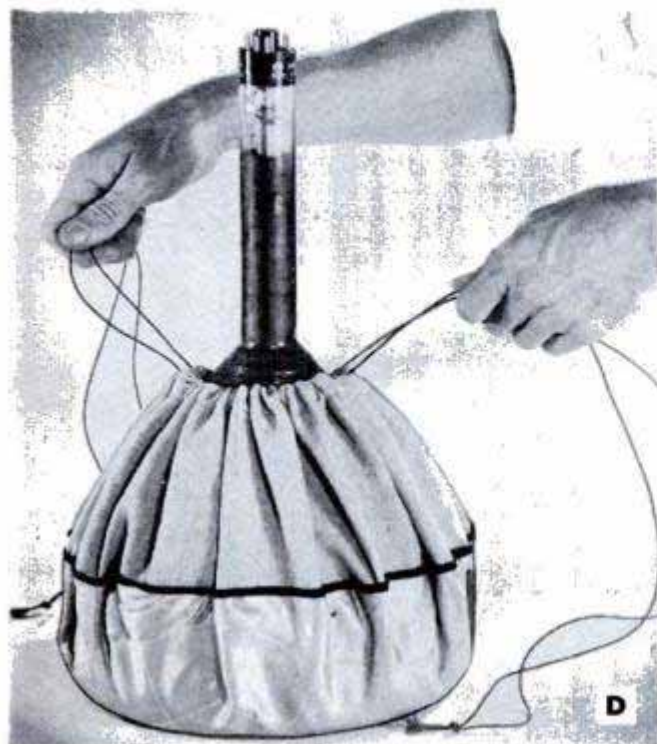
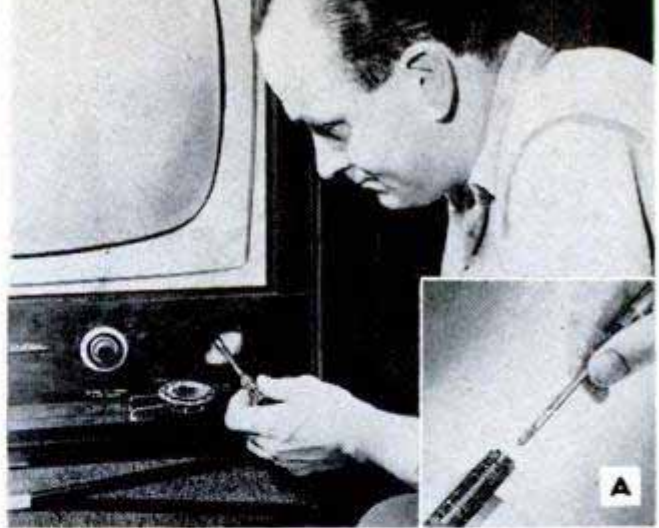
**SPECIALLY DESIGNED** tools for TV servicemen enable them to meet emergencies without costly delays. One device that saves from one half to three quarters of an hour service time is illustrated in photo A. This timesaving tool is a slug-retrieving screwdriver for standard-coil TV tuning units. The method employed is very simple. When a slug slips out of its tuning position, the blade of the retriever is slipped into the unit opening until it engages the slot on the head of the slug. When the contact is made, the nonmagnetic holding mechanism firmly seats a locking pin and then the slug is withdrawn and placed in position.

A good idea of the size of the largest TV picture tube made by General Electric is shown in the contrast between the tube and the small kitten in photo B. The tube is a 27-in. all-glass rectangular, magnetic-focus, magnetic-deflection type.

The manufacturer of the TV-tube-brightener unit illustrated in photo C claims that it will extend the useful life of the picture tube by increasing the filament voltage in gradual steps. It turns on and off with the TV-set switch.

Protection for both the TV tube and the serviceman is provided for by the quilted, padded cushion shown in photo D. Commonly known as the "no scratch panty" by the service fraternity, it is available for tubes of all sizes and insures safety.

Cornell University students get their basic physics from the television screen shown in the classroom, photo E. For certain experiments ordinarily viewed individually through microscopes, TV is a timesaver.

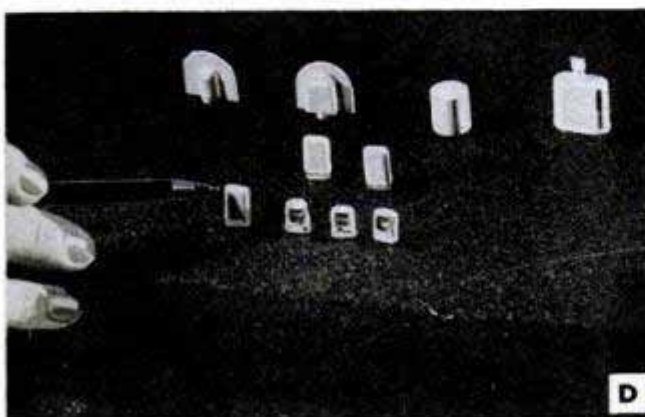


## TRANSISTORS IN EXPERIMENTAL APPLICATIONS

ALTHOUGH the transistor is not expected to supplant the electron tube, it does perform many of its functions in a wide range of applications useful to radio, television and industry. Recent demonstrations made at the David Sarnoff Research Center of RCA in Princeton N. J., show that much scientific progress has been made with these tiny units made from specks of germanium crystal. They were shown operating an experimental transmitter, TV receiver, radio sets, loudspeakers and other devices. Each development was in the form of a battery-operated laboratory model which, it was emphasized, is still in the experimental stage.

Appraising the present status of transistor development, Dr. E. W. Engstrom said: "We haven't yet worked out mass-production techniques for transistors and although germanium itself is available, it requires careful processing to get it in the form that gives transistors their remarkable characteristics. Thus, the cost of even those few types of transistors that are available in limited quantities is still high."

Photo A shows a cutaway view of an experimental transistor-operated ukulele developed at the RCA research center. In operation, a small magnetic pickup transfers the vibrations of the strings to four junction transistors. Amplified sound from a small loudspeaker issues through an opening below the frets. The experimental portable TV sets, photos B and E, employed transistors and no tubes except the 5-in. picture tube. Photo C shows an experimental auto set operating from 11 experimental transistors, directly from the car's 6-volt storage battery. Ten types of transistor units are illustrated in photo D. Doctor Engstrom said that although transistors perform some tasks more effectively than tubes, there are now, and always will be, applications where only vacuum tubes can be employed.



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for every boat*

**LIGHTWIN . . . . . 3 H.P.\***  
Finest of light motors—smooth, quiet, powerful—only 32 lbs.!  
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Brand new this year! New Auto-Lift Hood. Gearshift, Roto-Matic Control and Cruis-a-Day Tank. Engineered for new Evinrude Simplex Remote Controls. **\$225**

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Popular 47-lb. "all-rounder" for family and fishing boats. Duo-Clutch, Safti-Grip Drive. **\$210**

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America's top outboard motor. Most power per pound and per dollar. Gearshift, Roto-Matic Control, Cruis-a-Day Tank. Engineered for remote controls. **\$300**

Give yourself *all* the fun there is in fishing! There's a bass hole that's always been too many miles away?

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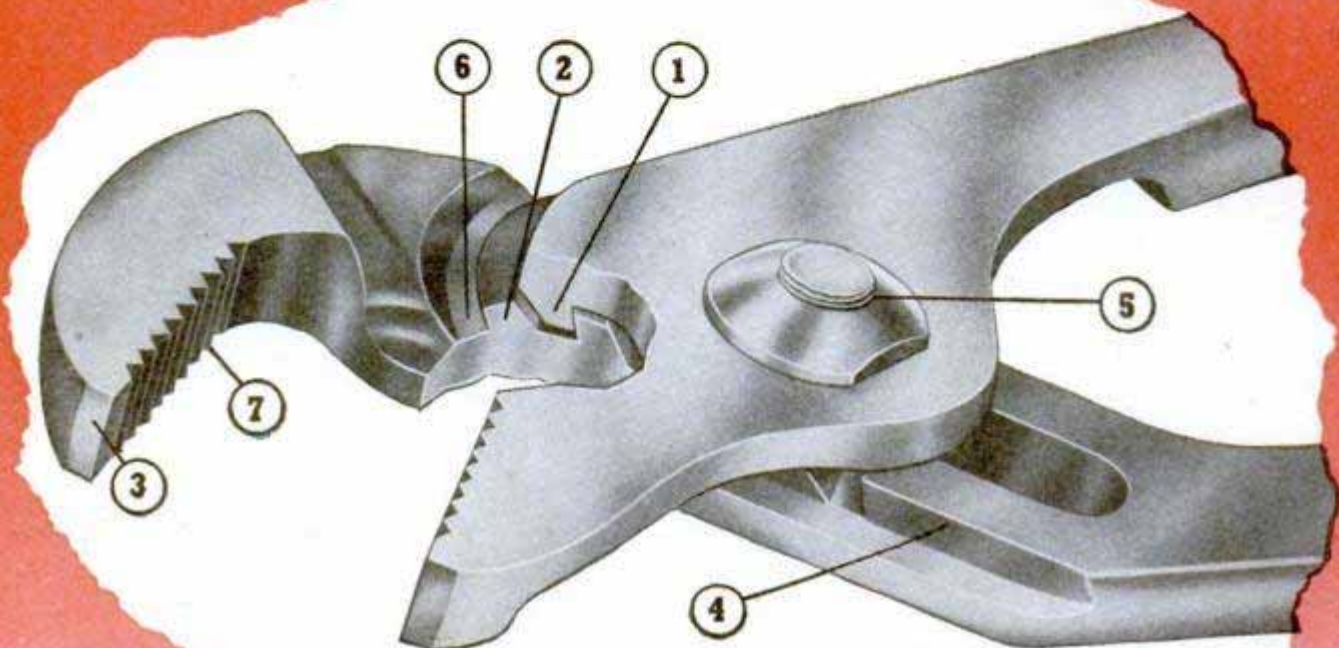
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THE PLIER DESIGN THAT OBSOLETE ALL OTHERS



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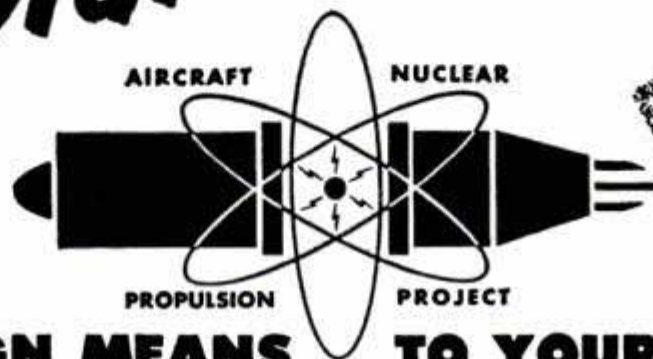
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# Design Draftsmen and Draftsmen



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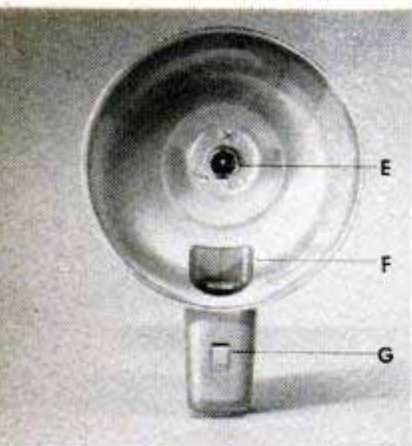
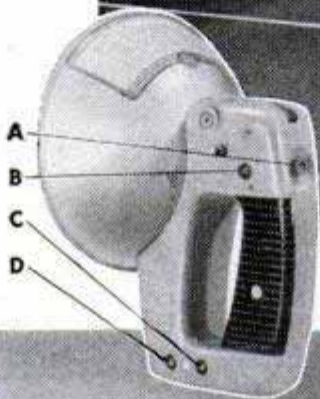


# Catch it with "flash"

Some of your best snapshot opportunities happen indoors. *The new Kodak Ektalux Flashholder* "catches it" every time. Its 22½-volt battery-condenser power fires lamps dependably and uniformly—peaking time of lamps is more consistent. With Standard Bracket for use with most roll-film cameras, \$29.75.

*Right:*

**Accessory outlets on the "Ektalux"**—Button **A** for Solenoid (\$15.40) permits tripping shutter from Flashholder. Outlet **B** accepts the Remote Release (\$4.71). Outlets **C** and **D** take Extension Units (\$12.40 each.)



**Lamp system is flexible**—For midjet lamps, note socket **E**; provides for two-way focus. **F** is socket for medium-base lamps, removed by ejector **G**. Exposure table on back of reflector.

**Low price for new Kodak Standard Flashholder—\$8.25.** Here is dependable flash for most internally synchronized cameras. New rugged hand-grip battery case . . . new rubber cushion riveted to bracket . . . new heavy-duty lamp ejector spring . . . new, handy exposure table on back of reflector.



**Ideal for press cameras, too**—The Ektalux Flashholder can be fitted to most press-type cameras. Flashholder and camera lock together firmly and detach quickly. Kodak Ektalux Flashholder with Press Bracket, \$33.85.



**Dependable multiple flash**—Two Extension Units can be plugged into separate outlets on the Flashholder; another Unit can then be hooked to each. Socket in the base fits tripod or Kodak Flexiclamp.



**Convert your old Flashholder to never-fail battery-condenser power**—Kodak B-C Flashpack delivers peak energy during battery life. Less battery, \$2.95.



**Get into your own flash pictures**—Attach Kodak Auto-Release to any camera equipped with cable release . . . set it . . . 10 seconds later shutter is tripped automatically. \$3.86.



# Enlarge it for thrills

Making enlargements can be a thrilling experience. You can select the ideal portion of your picture . . . eliminate unwanted areas . . . make the enlargement even better than the original print. On this page you see the latest enlarging equipment for both beginner and advanced fan. Your Kodak dealer will be glad to show it to you.



**Beautiful enlargements with the moderate-priced Kodak Hobbyist Enlarger—\$44, inc. lens.** New integrating-sphere lamphouse gives extra brilliance, even light distribution. Cold light protects negatives.

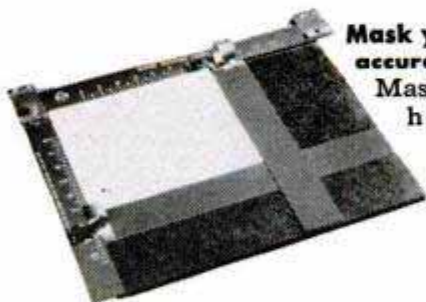
**Fine, versatile enlarger—\$99.50 (without lens).** The Kodak Fluorolite Enlarger features reflected cold light for speed, even illumination. Converts for copying, slide making, many other uses.



**Easy to set up—**Simple design gets the Hobbyist into action fast.

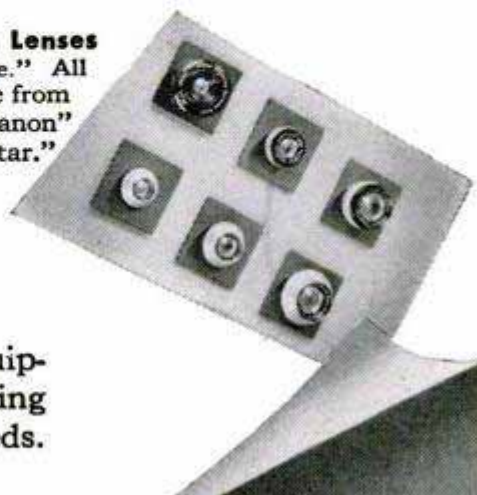


**Rotary negative carrier—**Glassless, open-frame, open-hinge type. Loads quickly.



**Mask your enlargements accurately—**Kodak Masking Easel, 11 x 14, holds paper flat. Heavy base insures steadiness. \$9.60.

**Kodak Enlarging Lenses for the "Fluorolite."** All Luminized. Range from 50 mm.  $f/4.5$  "Ektanon" to 4-inch  $f/4.5$  "Ektar." From \$14.



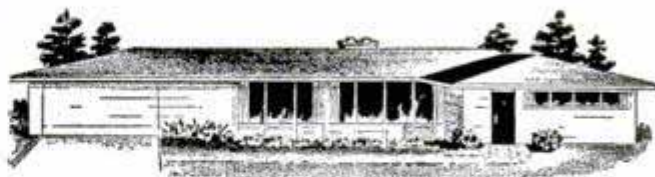
Your Kodak dealer will be glad to demonstrate this equipment for you. His professional advice is free for the asking. Why not make him headquarters for all your photo needs.

*Prices subject to change without notice*

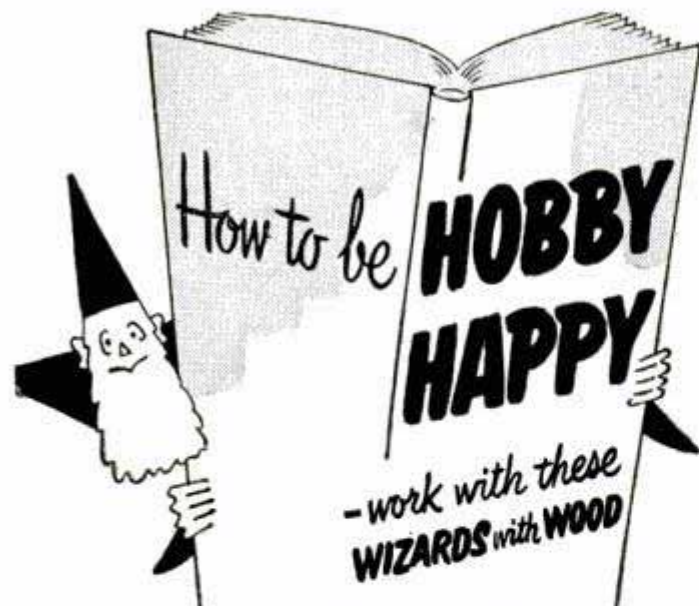
**Eastman Kodak Company, Rochester 4, N. Y.**

# Kodak

# 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.



Do you make or mend things of wood? Then you want them to turn out reliably right. To succeed every time, use Weldwood Glue, Firzite and Satinlac. Ask for them at hardware, paint or lumber dealers.

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Produce those magical "woody" effects — on hard wood or soft, plywood or solid lumber with White Firzite. For light pastel tones, tint with Colors-in-Oil. (On fir plywood stain jobs, tame that wild grain with Clear Firzite.)



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## Dustproof Concrete Floor



Q—The concrete floor in my basement seems to powder, or dust, unduly. Although the surface appears to be hard and durable, sweeping with a floor broom always seems to collect a considerable amount of very fine dust, a portion of which gets into the air and eventually settles over everything. Isn't there some way to seal the surface and prevent this?—W. B., Ohio

A—There are several concrete sealers available which should prove satisfactory. In recommending these we are assuming that the floor is not dusting excessively or breaking up due to faulty mixing or application of the concrete. A small amount of dusting is normal, especially when the unprotected floor is subjected to hard wear. The important thing in using any of the prepared sealers is to follow the manufacturer's directions in all details. Usually you'll find these printed on the container. Ordinary zinc sulphate, in the proportion of 3 lb. to 1 gal. of clean water, makes a good sealer for a concrete floor that is not subjected to excessively hard wear.

## "Corrosive Atmospheres"

Q—I'm planning to build a home near the seashore and I've been told that I should use non-corrosive metals as much as possible in the construction. What are these noncorrosive metals as used in the home. What is electrolysis?—D. A., Mass.

A—Seacoast atmospheres are generally rated second as corrosive atmospheres. Industrial atmospheres get the first rating. The noncorrosive metals in common use in home construction — gutters, downspouts, screens, water pipes — are copper, aluminum, bronze and brass. It's a general practice of builders to avoid placing dissimilar metals in close contact as the presence of an electrolyte formed from water and certain impurities sets up what is known as a galvanic action with resulting rapid corrosion of one or the other of the metals in contact. As an example, if exposed copper and steel parts are in contact in any way, the steel will become badly corroded in a comparatively short time. However, if copper and lead parts are placed in contact, the electrical potential is greatly lessened and ordinarily there are no injurious results to either metal. As a practical example of what not to do, don't attach copper parts with steel nails. Use copper nails, or aluminum nails if

(Continued to page 234)



**Miles ahead  
in POWER**

Get the Best  
**BUY AMERICAN**

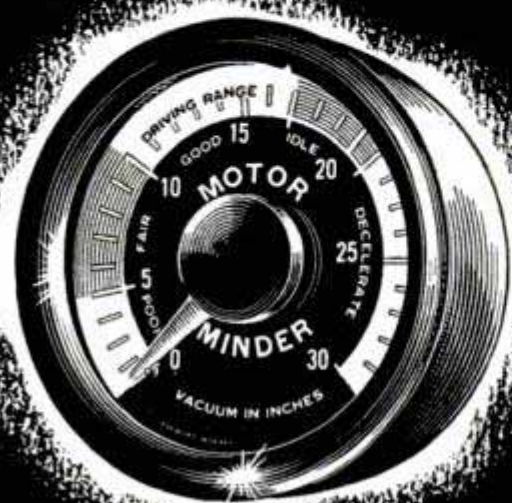
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wheeler on the road. And an improved 55 HP, 74 OHV motor. Bring along a buddy and ride the Hydra-Glide today. Or send for free illustrated literature. Enclose 25 cents for your copy of the action-packed, picture-filled ENTHUSIAST Magazine. Harley-Davidson Motor Company, Dept. P, Milwaukee 1, Wisconsin.

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**STEWART-WARNER**

Instrument Division, Department N-33  
1840 Diversey Parkway, Chicago 14, Illinois

(Continued from page 232)

aluminum gutters are installed. Of course, there are practical limits to the extent to which this rule can be carried out in dwelling construction. Brass valves and other fittings are regularly installed with steel pipes. Copper heating pipes are attached to cast-iron boilers, and so on.

**Bearing Wall**

**Q**—I'm planning to build a six-room, 1½-story home and will do part of the work myself. I'm confused by some building terms and would like to know more about them. For example, what is a "bearing" wall and where is it located in relation to the rest of the structure? Also what is a "collar" beam? Where is it located in the structure and what purpose does it serve?—T. R., Tex.



**A**—In a general way, a bearing wall is any wall that supports a portion of the weight of the structure above it. However, the term is more or less flexible in meaning, its application depending to some extent on the type of structure. In ordinary house construction the term is more frequently restricted to mean an inner wall in the building that serves both as a partition and as a support for lapped ends of the second-floor joists, also the ceiling joists of the second floor if the structure is full two-story. In common construction the plan generally locates the bearing wall over a girder located near the center of the building. In this manner the weight from above is carried down to the masonry footings under the girder supports. This arrangement effects a more uniform distribution of weight without setting up lateral stresses that might in time affect the entire framing of the structure. Collar beams are horizontal members nailed or bolted to rafters at a point about midway between the ridge board and the plate. It's a common practice to attach the beams to alternate rafters in ordinary gable-roof construction, although they are placed higher in some cases in order to obtain standing room under the ridge. Frequently collar beams are used in combination with ridge gussets which are notched over the ridge board and nailed to both rafters.

**Coloring Bricks**

**Q**—Recently I removed a porch, the roof of which enclosed a chimney. Common brick were used in the unexposed portion and now I would like to color these to match the rest of the chimney. About five courses are involved on three sides and the mortar joints are rough, not trowled smooth. How can I color the bricks to match?



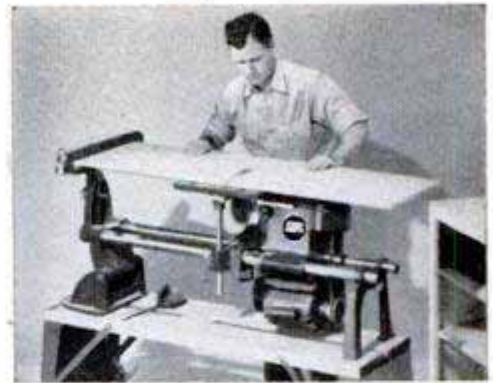
R. C., Ind.

**A**—First of all we would suggest that you break out enough of the old mortar so that the joints can be repointed to match those in the rest of the chimney. One way of coloring the bricks to match is to tint outside white paint with Venetian red to the color depth required. In specifying Venetian red we are assuming that the brickwork above and below the affected area is red in color. Try the mixture on a common brick first, allowing it to dry so that you can determine whether or not the color matches. Another way, probably somewhat more durable, is to mix equal parts of boiled linseed oil and turpentine and add enough Venetian red to give a matching tint. This is applied directly to the dry bricks and acts as a stain. It also is possible to remove the five courses and replace them with bricks of a matching color and surface texture. Masons have different methods of doing this and we would not recommend that you try it unless you are experienced. Consult your local contractor.

# Will the power tool you buy have these quality features?

If you're thinking of a SHOPS MITH it has, because there's no costly duplication of parts.

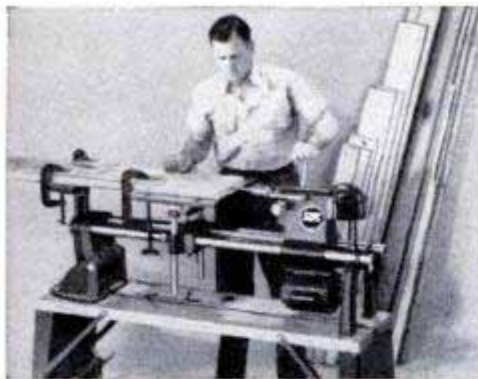
Therefore, SHOPS MITH can afford to give you top quality, through and through. You have *one* four-ball-bearing arbor assembly... *one* strong, substantial table... *one* precision headstock... *one* heavy-duty motor. Multi-purpose SHOPS MITH is the largest selling power tool in America because it packs the most quality in the smallest space at the lowest cost. Fill out and mail the coupon for the 16-page illustrated booklet—it's free!



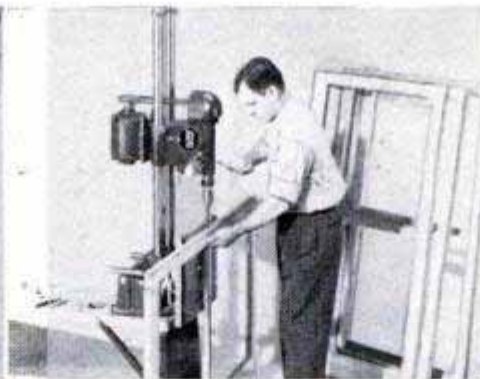
**EXTRA CAPACITY AS CIRCULAR SAW**  
Effective table size of 54" x 17" allows you to cut to center of an 8' panel. Up to 48" between fence and blade!



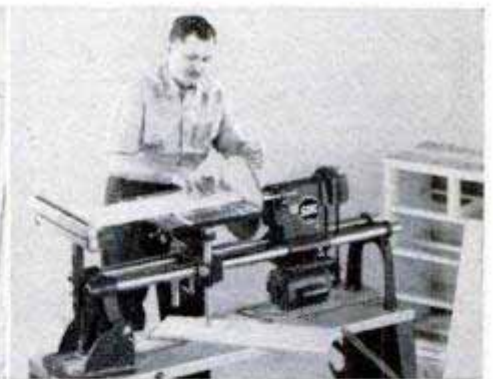
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Tool rest slides parallel to workpiece; instantly adjusted and locked in position *without stopping motor*. Turn flat or hollow pieces while *facing work!*



**LARGE CAPACITY AS HORIZONTAL DRILL PRESS** Drills, bores, reams, countersinks. No limit to length of work! Makes dowel drilling easy, accurate; precise right-angle drilling.



**REAL PRECISION AS VERTICAL DRILL PRESS** Stress-proof 3/8" steel spindle, induction-hardened tip. 4 ball bearings, centerless-ground quill. Drills to center of 15" circle! 27" chuck to table.



**EXTREME ACCURACY AS DISC SANDER**  
Large, rigid table. Miter gauge is precision jig for any angle. Accurate "jointing" of edges. Disc can be fed into work for sanding duplicate parts.

Complete 5-tool unit **ONLY \$189.50**

Motor\* and bench extra

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Please send my free copy of the SHOPS MITH catalog and the name of my nearest dealer.

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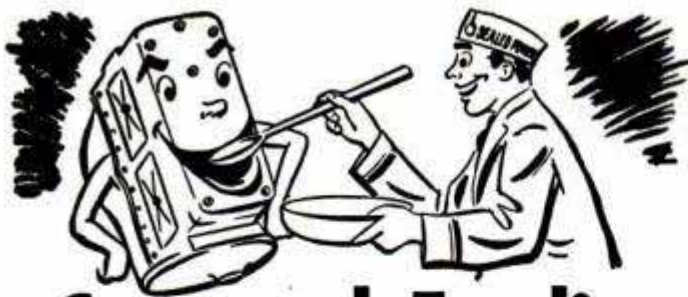
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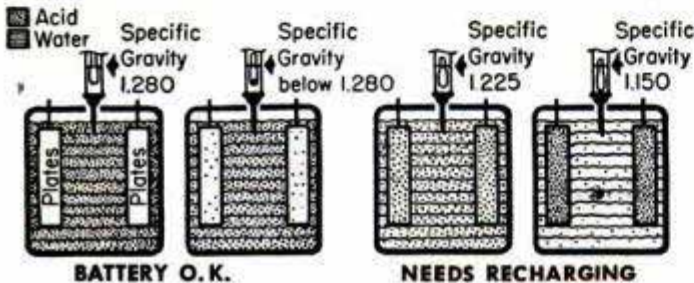


# Care and Feeding of Engines

BY S. P. CORP

## PAMPER YOUR BATTERY

Don't neglect your battery merely because it has power enough to operate your starter. Give it a few minutes' attention at least once a month. Be sure the mounting is tight. Use a mixture of baking soda and pure water to clean off all dirt and corrosion. Have specific gravity checked at any gas station. If it reads below 1.225 in warm weather or below 1.250 in cold weather, have it recharged.



Continued operation below charge permits a hard, crystalline sulphate to develop on plates. This will cause damage if battery is overcharged for a long time on a trip, or when voltage regulator is out of adjustment. Keep the charge consistently between 1.260 and 1.280.

If your battery requires water every week, the charging rate needs adjustment.

## WHAT CAUSES HARD STARTING?

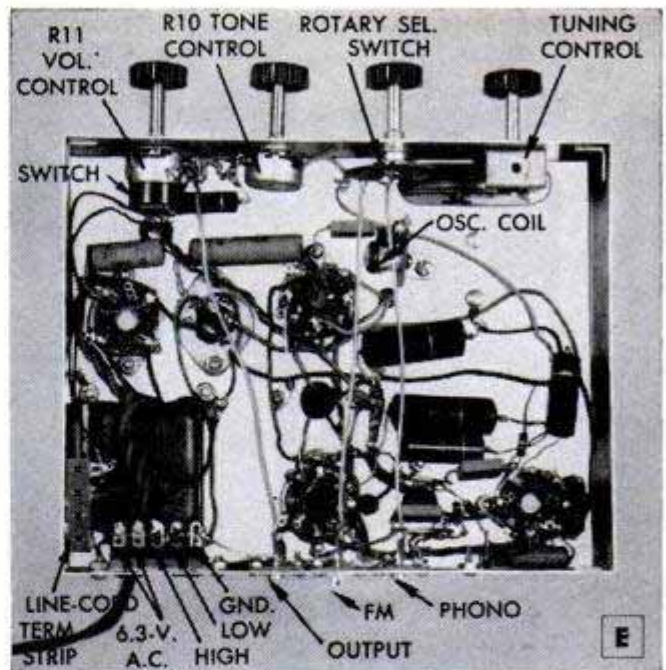
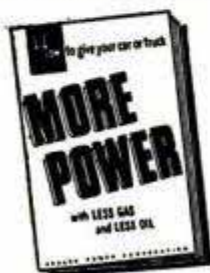
Distributor, spark plugs, starter, battery, generator, voltage regulator, or wiring—any of these can contribute to hard starting. Watch all wiring for loose or corroded terminals. Spark plug and coil wires should be replaced if insulation is checked or cracked.

Your car has a one-wire electrical system. Current is returned to battery or generator through a "ground" formed by the metal of the body and engine. To insure a good ground, generator, starter, regulator, distributor, spark plugs and battery must all be securely fastened to clean, tight surfaces. The battery's woven-wire ground strap should have clean, tight connections.

If your starter is dirty, has worn brushes or loose connections, it may rob excessive current from battery or coil, preventing proper firing of spark plugs. A good engine tune-up includes a complete check of the whole electrical system.

## WRITE FOR FREE BOOKLET

"More Power, Less Gas, Less Oil" is a free illustrated booklet on car care. Write for it, and learn how Sealed Power KromeX Ring Sets fight heat, friction, abrasion, corrosion—the four deadly enemies of ring life. Sealed Power Corporation, Dept. G-3, Muskegon, Michigan.



## 1953 "Little Giant" High-Fidelity AM Superheterodyne Tuner

(Continued from page 226)

prevent damage to it during construction. It is important to keep all leads as short and direct as possible. Leads connected to the grid and plate terminals of the sockets should be well separated from each other. This is particularly important in the i.f. stage (6SK7 tube). All connections should be carefully soldered with rosin-core wire solder. Wire the i.f. transformer leads first as short leads here are important. When wiring the tubular condensers observe the polarity as indicated by the bands. These bands indicate the ground, or negative, side as shown by the curved line in the condenser symbols that appear in the schematic circuit diagram, Fig. 2. The 33,000-ohm resistor R3, connected to pin No. 4 of the 6SK7 tube, should be the last part installed, as this resistor, shown in dotted lines, must be removed after alignment has been completed.

When the wiring is completed, insert the tubes, connect the amplifier to the output terminal, plug in the line cord and turn on the tuner. Remember this tuner operates on an a.c. line supply only. After warm up some stations should be heard. The i.f. transformers are factory aligned, but a slight adjustment may be required for peak performance. If a vacuum-tube voltmeter is available, connect it across the AVC circuit (from the black lead of the input i.f. transformer to ground) and adjust the i.f. trimmers for a maximum negative reading on the meter. If a signal generator is used for alignment, it should be set at 455 kc. and coupled to the tuner loopstick. To do

(Continued to page 240)





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When you see these trade marks on television sets, radios, "Victrola" phonographs, and other electronic instruments you are assured the highest quality—born of research, fine engineering and craftsmanship.

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RCA, as the pioneer, continues to lead in every major advance . . . in all phases of TV.

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Little Nipper and the familiar phrase "His Master's Voice" have appeared on recordings made by the greatest artists in the world—for more than half a century . . .

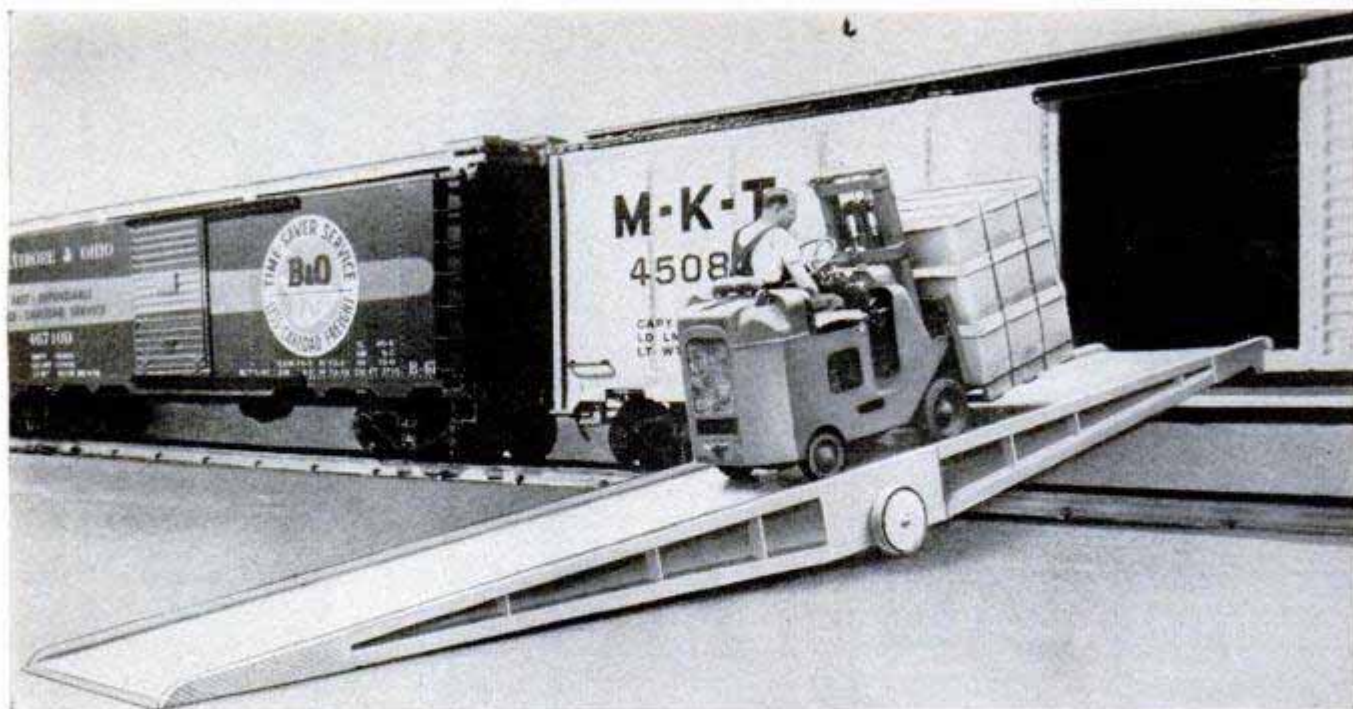
These same high standards of quality make NBC the nation's leader in radio and television broadcasting. You can depend on RCA and RCA Victor trade marks as *guardians of quality*—the sure guides to finer performance, greater dependability, better value and service.

Tmks. ®



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## Portable Freight Ramp for Railroad Yards

Loading or unloading railroad cars can be downright difficult if no loading dock is available. To solve the problem, one company is making a light, portable ramp which is wheeled to the side of a car and raised at the connecting end by means of a hydraulic lifting mechanism. Safety

curbs with rounded edges prevent damage to equipment. Capacities of the five models, all of them 30 feet long but varying in width, range up to 16,000 pounds. Constructed of magnesium alloy, the ramp can be moved into position by a single worker. Bridge-type bracing provides strength.

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# I WASTED MONEY BECAUSE A GAUGE WAS MISSING

by JOSEPH CATANZANO

That's a fact . . . I'd been tossing dollar bills out of the window of my car because a gauge was missing from my dashboard. I didn't realize *how much* I'd been wasting until I installed the Mile-O-Meter my wife gave me for my last birthday. That's the day I began to save . . . I've got four new tires now to prove it.

## MOUNTED MILE-O-METER ON MY DASH

The instructions that came with the Mile-O-Meter seemed complete enough, but I didn't realize *how*



complete until I lifted the hood of the car and began to follow directions. I actually finished the entire installation without doing anything really

complicated! I mounted the Mile-O-Meter itself at the corner of the dashboard on the driver's side, using one of the screws on the windshield flange to hold the bracket. I didn't have to drill a single hole.

## GAS SAVINGS ARE MOUNTING

I got my first shock when I took the car out for a trial spin that day. The Mile-O-Meter indicator practically shouted at me that I was pouring gas out of the tail pipe! I tried it again, this time keeping a light foot on the accelerator. The difference in gas consumption, shown clearly on the relative miles-per-gallon scale, almost floored me . . . I was traveling practically as fast, with just about as much power, yet I was using far less gasoline than before! Now all I have to do is drive so the Mile-O-Meter indicator points as far to the right as possible. When I do that, I know I'm getting my best mileage . . . and the gas savings are really mounting up to prove it.

## AVOIDED COSTLY REPAIRS, TOO

About three months ago, I noticed that the indicator on the gauge flickered downward every second or two. I didn't *hear* anything wrong with the engine, but according to the tune-up chart supplied with the Mile-O-Meter, I had a spark plug that wasn't firing properly. By following directions, I found which plug was fouled, replaced it . . . and saved myself expensive trouble later on. Another time, the Mile-O-Meter indicated that my carburetor needed adjustment — and, with the tune-up chart, enabled me to adjust it myself! The way the Mile-O-Meter works sounds a bit complicated, but as

(Joseph Catanzano, 75 Mary St., Arlington, Mass., is typical of thousands of enthusiastic Mile-O-Meter owners. We thought his experiences with the instrument would interest you.)

I understand it, the gauge is kind of like a doctor with his finger on your pulse all the time . . . it gives a continuous report on the general "health" of your engine. It does this by measuring the vacuum in the intake manifold, just as a mechanic does when he's tuning up your car. As a result, I know when adjustments are needed to avoid those wallet-busting repairs.

## I'M REALLY SAVING MONEY!

It's the truth . . . I'm really saving money. I'm getting three or four more miles to every gallon. I *see* (instead of *hear*!) when my engine needs attention. And, I've been able to make many of the minor repairs and tune-ups myself, because the Mile-O-Meter and its chart showed me how.



## YOU OUGHT TO OWN A MILE-O-METER

I admit it . . . I'm sold completely on the Mile-O-Meter. If you don't have one on your dashboard, the chances are you're still wasting just as much money as I did. You've got everything to gain by installing a Mile-O-Meter . . . and nothing to lose, because they're always sold on a "money back if not completely satisfied" basis. You ought to send your order in right away.

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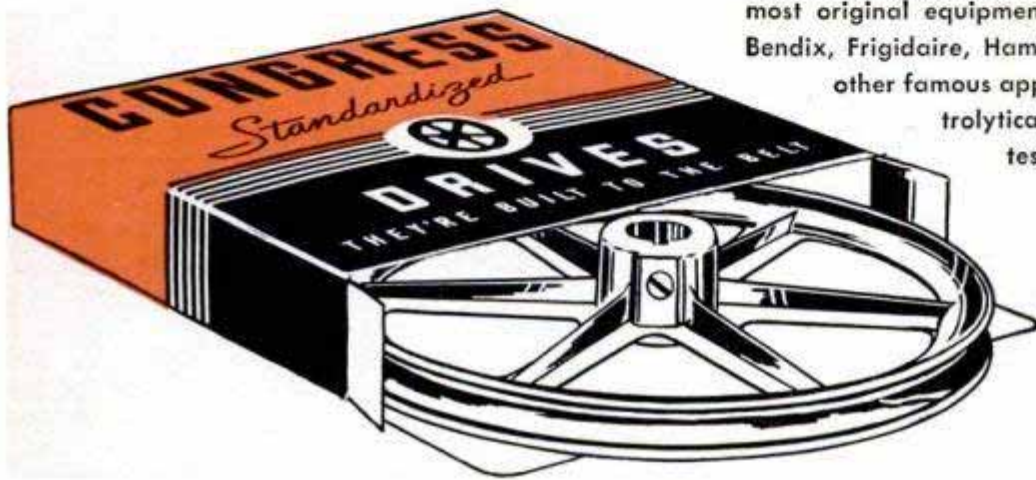
this, merely bring the "hot" lead of the signal generator near the loopstick. After the i.f. transformers are carefully aligned, the removal of resistor R3 will cause a decided increase in volume and sensitivity. Next, adjust the slug in the end of the Vari-Loopstick antenna for greatest volume on a station at the low-frequency end of the band (preferably below 900 kc.). If you have no aligning equipment merely tune in a station around the middle of the band and *carefully* touch up the i.f. trimmers for maximum volume.

Now tune the receiver to a station at the high-frequency end of the band around 1200 kc. and adjust the trimmer on the r.f. C1 rear section of the tuning condenser for maximum volume. Now with the station tuned in, determine whether the frequency of the station to which you are listening coincides with the reading of the dial pointer. If it does not, tune the receiver until the pointer indicates the frequency on which the station should come in, and then adjust the trimmer on the oscillator C2 front section of the variable condenser until the station is heard again. Finally, readjust the trimmer on the C1 r.f. section of the variable condenser for maximum volume and your tuner is ready and should operate perfectly. The tuner is provided with terminals for connecting and powering equalized preamplifiers for use with magnetic phono-pickup cartridges. The 5-lug terminal strip—see photo E—provides the necessary ground and B-negative on the first terminal; terminal at left is the low voltage, 80-100 volts of B for the well-known GE preamplifier. The next terminal is the high-voltage B of about 230 volts B required for other makes of equalized preamplifiers, or for a microphone preamplifier. A hole with a rubber grommet is provided for these power leads in the rear of the chassis next to the line-cord outlet—see photo C. If excessive hum is heard in this tuner, merely reverse the position of the line-cord plug in the wall socket. If "whistles" are encountered as a result of oscillation, the connecting leads in the circuit previously referred to are not as short and direct as they should be. Shielded wire should be used to connect the tuner to the audio amplifier. This wire should be as short as possible to keep attenuation of high-frequency notes at a minimum. Low-loss microphone cable is recommended. The FM input jack may be used as a phono jack if the use of two record players is desired. Detailed student material list R-417 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage. ★ ★ ★

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## Ship That Turns Wreck Into Rescue

(Continued from page 93)

Laundry soap jammed into cracks and crevices around loose rivets makes a temporary seal. The *Curb's* concrete mixer may churn out cement which is poured into leaky double-bottom spaces to fill and seal them. Meantime the *Curb's* portable pumps are sucking water from the wreck's flooded compartments. Chicken-wire boxes cover the hose ends so floating debris won't be sucked into the pumps and jam them— ". . . like the cargo of prunes that broke loose and gummed up the whole works in a half-sunken freighter we rescued recently," Chief Mate Pete Lyall recalls.

Meantime the deck of the *Curb* is a confusion of milling men, miles of cable and heavy gear. During this close-in work, Captain Zickl has full control of his ship right from the bridge. By throwing a switch, he takes all engine-room responsibilities from the engine-room crew. With levers and push buttons in his wheelhouse, he can change engine speed and direction instantly.

Down on deck, the kedging anchors are broken out. Twelve feet long and six feet across, these 8000-pound mud hooks are designed to help haul a stranded ship afloat. Hinged on a five-inch-diameter steel pin to

the massive shaft is a crown of steel from which two long sharp flukes project along the shank sides. On the ocean floor, flukes dig into the bottom. The harder the pull on the cable, the deeper the anchor digs.

In 600-foot lengths, the 1½-inch steel cable from each anchor is run across to the wreck, where the ends are secured with steel block and tackle to the ship's deck winches. Then the *Curb* runs out to the limit of the cables and "plants" from two to six anchors at various points in the direction the ship is to be pulled.

On board the stranded ship winches grind the cable taut. Then, her topline made fast to the ship, the *Curb* heads out to open water as far as the tow cable allows.

At a given signal everything starts at once. Deck winches on the wreck haul at maximum power through the tackles against the planted anchors—each purchase exerting a pull of about 75 tons. If all goes well, the ship begins to creak. There's a scraping shudder as she drags inch by inch over the bottom. The *Curb's* stern is deep in the water churned up by her own screws, going full tilt, as she weaves from side to side to help "wiggle" the wreck loose. Finally with a great surge, the grounded ship slides back, settles comfortably into deep water and is back in

(Continued to page 246)

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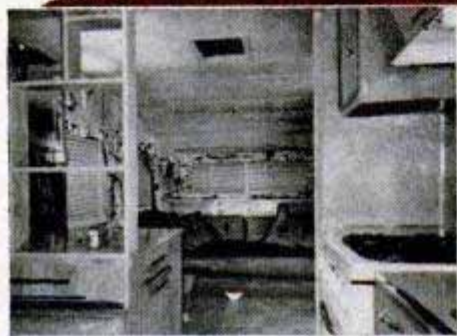
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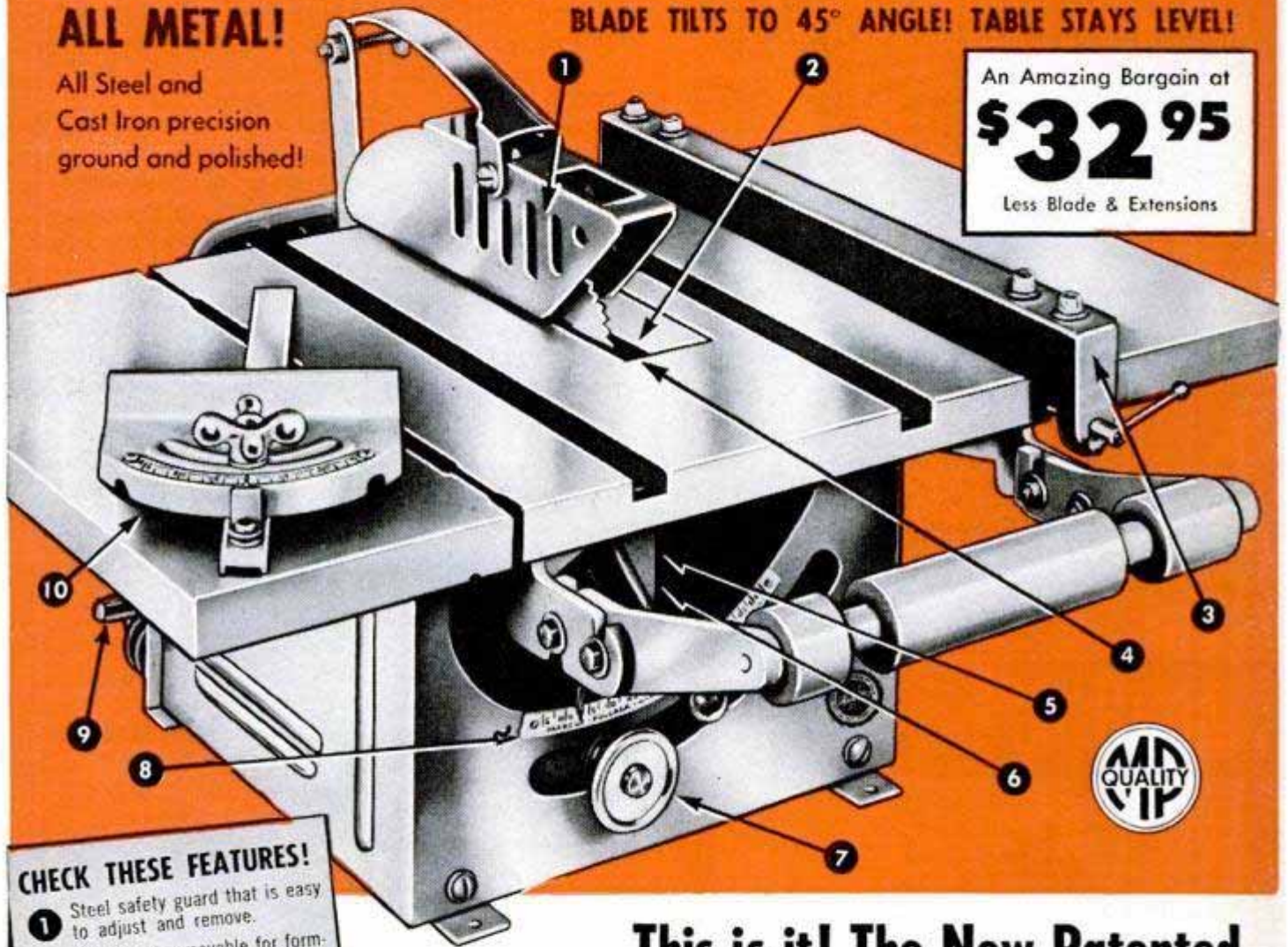
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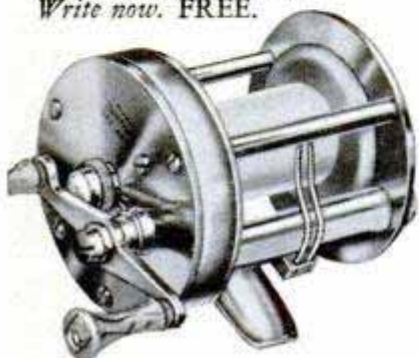
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business. Actually, by hauling against those anchors the beached ship has helped pull itself clear by its own bootstraps.

Jobs like the Liberty ship, where everything goes smoothly, are relatively easy, according to Zickl and Lyall. More often there are complications. Days or weeks go by while everyone sweats and stew, working day and night against the clock. If a wind comes up and seas grow rough, the beached ship may rise and fall, pounding herself to pieces on the bottom.

The Curb doesn't always come off unscathed. Zickl tells about pulling a transport off a quicksand bar in the Mississippi mouth in a dense fog, with a seven-knot flood pouring down the stream. "Chicken coops, trees and parts of houses kept whacking us," he recalls. "Before the job was through, we wound up on a stone jetty with a lighthouse blinking in our cabin ports. We had a dented hull and damaged propellers."

Working with ponderous tools in lashing seas provides its own form of torture for salvage men. "If you're careless enough to grab the gunwale as you jump from boat to ship in a heavy sea, and the vessels kiss each other at that instant—good-by fingers," Zickl points out. Skipper Zickl tells about one man standing beside a big cable where it came aboard from a tanker the Curb was towing through a North Atlantic hurricane. Suddenly the cable slid a few inches sideways. "It broke both his ankles," the captain recalls grimly, "flipped him in the air and when he came down he broke an arm besides."

Poisonous fumes are another hazard in salvage. Sea water, leaking over some cargoes in a foundering ship, can bring on chemical reactions. Those prunes are a good example. Wheat and corn, too, break down and form a toxic gas. A few whiffs and you're dead. To cope with this, the Curb puts blowers in the flooded compartments of wrecks before men go in to work.

"We never know when we start out just what kind of crazy problem we'll face," says Lyall. "Ships land in fantastic places. Like the 500-foot freighter *Phoenix*. During the hurricane of 1938 she wound up in a meadow, clear out of the sea, her bow snagged in some telephone poles along a concrete highway. They had to dig a trench along the entire length of the vessel and slide her back in the water."

Some ships jam themselves so far up on the beach that even kedging against all the anchors won't move them. Then salvage crews try other Herculean stunts to do the job. Most fantastic, perhaps, is the system of "spuds and jacks." When the *Magdalena*,

(Continued to page 248)

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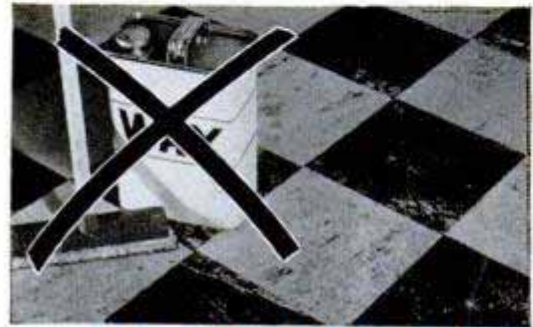
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a big German freighter, went aground at Curacao, her bow was completely high and dry on the rocks. After most of her cargo was removed, huge timbers or spuds were planted against the rocks on each side of her, then raised and lashed against her sides. On top of each spud a jack was placed and wedged firmly against the ship's steel sheer strake. Slowly, the jacks were raised, lifting the ship's entire bow off the ground. Meantime two salvage boats, hitched by tow cable to the *Magdalena's* stern, pulled her backward off the jacks. It's like jacking up a car, and shoving it back until the jack falls over. By repeating the process over and over, the ship was inched backward.

Not all ships that the *Curb* must rescue are just foundering or aground. Some are sunk, with nothing but funnels or masts jutting from the whitecaps. The divers first go down to survey hull damage. Holes and rents are patched under water. Then huge cofferdams are built to fit over each of the openings in the deck. These 70-ton box-like affairs, open at top and bottom, are high enough to extend above the surface of the ocean when sealed to the ship's deck. Pumps suck the water from the cofferdams. Men and pumps now have a dry place to work on the sunken ship's deck. Big pump hoses are lowered into the waterlogged ship and the hull is slowly emptied, deck by deck. Sometimes air pressure from the salvage vessel's compressors is used to force water from the ship's double bottom and other confined spaces. If the patchers have done a good job, the sunken ship finally will become buoyant and surface.

Making patches for yawning holes on a sunken ship's hull is a big job. Constructed of wood, canvas and metal, they fit over the outside of the hull and must conform to every curve of the battered ship. Divers work tediously for days to get the proper contours. One of the *Curb's* biggest patch jobs occurred recently when a big cargo ship was rammed near New York. Within 45 minutes of the time Zickl and his crew arrived, divers were down surveying the damage. They reported by telephone that the ship was sinking fast. Minutes later the *Curb's* towline was made fast. The ship was hauled to shoal water where she would rest on the bottom without submerging entirely. Within one week divers and engineers had blueprinted and constructed a patch some 50 feet square. So distorted were the hull plates around the hole that the edges of that patch looked like cross sections of a mountain range. Yet the patch was a perfect fit. A few days later the *Curb's* battery of pumps had gone to work, and a \$10,000,000 ship and \$5,000,000 cargo rose to normal water line. ★ ★ ★



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## Everybody's Looking for Uranium

(Continued from page 163)

plank-patched, but sturdy ferry, powered by a Model-A Ford motor. Hite, however, is booming now, and so is the Chaffins' ferry business. The town is near one of the West's richest uranium discoveries—just how rich is a secret.

The ore is an unusual bornite—not like the carnotite which is the most general source of uranium in the area. It is streaked with pitchblende, which is the stuff that has made Shinkolobwe and Eldorado such outstanding producers of uranium. The Vanadium Corporation of America has established a mill there, which is operating around the clock. Employees are all checked by the FBI, visitors are restricted and nobody mentions production figures.

Life has been a little rugged in Hite and in White Canyon, a community rising across the river around an old trading post, but it is rapidly improving. Tents, just as in the days of '49, are the dominating dwellings. Last year the only entertainment was movies shown with a home projector in a cottonwood grove.

In this land touched little by the scientific advances of civilization, the Atomic Energy Commission recently revealed that it was running down other sources of uranium, far underground, with a newly developed "superdivining rod." The instrument is declared to be 10 times as effective as the most powerful Geiger counter.

Technically, the device is called a scintillation probe and detecting circuit. Encased in a 30-inch tube are a special sodium-iodide crystal, a photomultiplier tube and an amplification system. The sodium iodide detects the invisible gamma rays given off by uranium and radium. AEC officials explained that it is most valuable in determining whether the gamma rays come from uranium or other radioactive materials.

AEC geophysicists have used it on test holes near Blanding up to 200 feet deep, but say that it is good for greater depths. The instrument speeds up the logging of holes as much as 20 times.

Within the last year, the AEC itself has been able to shift somewhat from the theory that "uranium is where you find it" to "uranium is where it ought to be." Data, much of it obtained from oil and mining companies, is being sifted and test holes sunk accordingly.

But AEC officials are quick to add that they are still counting heavily on the individual prospector, including the rank amateur. As one official put it: "Scientifically

(Continued to page 252)

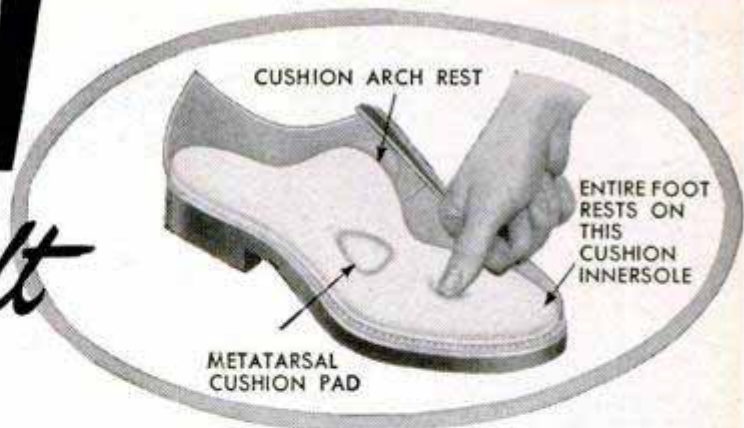
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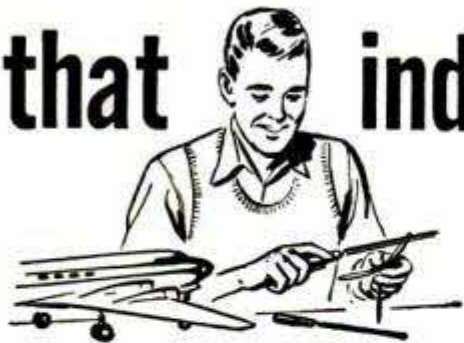
No. 283  
(Oxford)



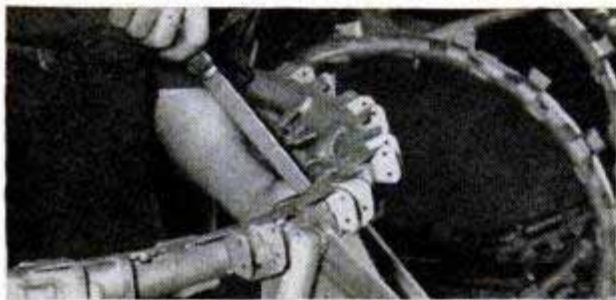
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# Choose the files that industry uses



(Above) B-47 jet bombers being assembled at the Boeing Airplane Company's Wichita plant. (Below) Filing operation on an aluminum-alloy structural part for a Boeing plane in Seattle plant.



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FOR EVERY PURPOSE

trained persons often don't make the best prospectors. They get too many set ideas. Amateurs are forever going out and accomplishing the unlikely."

To obtain close-up views of some of these amateurs who were engaged in the big uranium rush of '52, we attended one of the several traveling schools on uranium prospecting conducted in Idaho by Prof. Lewis S. Prater of the Idaho State Bureau of Mines at the University of Idaho. The school was held at Salmon, a 4000-population cattle-and-mining town tucked away in the mountains near the state's Primitive Area. Squeezed into the seats of the vocational-agriculture classroom in the high school were 30 or more serious-minded adults. Maybe a fourth women.

In telling these people what to look for, Professor Prater pointed out that uranium has been discovered in more than a hundred different minerals of varying content and color in just about every corner of the world. But right now the AEC is primarily concerned with three—pitchblende, carnotite and autunite.

Pitchblende, the richest known source of uranium, is usually a drab gray in color, shading sometimes to green or brown. It may be earthy, dull or glassy in appearance, is as hard as steel and occurs in veins. Carnotite is canary yellow and relatively soft. It generally occurs as scattered deposits in sandstone beds. Autunite is yellow or apple green. The texture of the mineral is pearly, occurring as mica-like crystals—often as thin coatings.

Uranium is estimated to be probably a thousand times more plentiful than gold, but, unlike gold, it is never found in the earth's crust as a native element. It is always combined with one or more of the other elements to form a mineral.

The United States has worked out agreements to receive all or the bulk of uranium produced in the Belgian Congo, Canada and the Union of South Africa. It is currently seeking similar arrangements with other countries, including Brazil and Mexico. But, in time of war, it would be much handier to have a sufficient supply of uranium produced within the borders of the United States.

In the shadows of Idaho's Primitive Area, we climbed a mountain with Enoch Stewart, 74-year-old retired mining engineer. He had to assist his tall, thin frame up the slopes with a cane. But, finally, standing on a high butte, he gazed across a valley, and waved the cane.

"See that ridge over there?" he asked. "I've got a sneaking suspicion it might have uranium, and before I get much older I aim to go hunting for it." ★ ★ ★



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## What's Ahead in TV

(Continued from page 153)

to the Atomic Energy Commission. The three-dimensional feature allows them to operate controls remotely.

**Q: Is three-dimensional TV a feature that the consumer is liable to see?**

**A:** I don't think so. It requires about twice the band width for the transmitter. With all allocations already made it would mean a complete revision of allocations. Furthermore, you have to wear special glasses with Polaroid lenses or you have to have glasses with red in one eye and green in the other. To get people to put on glasses to look at television, I think, is something that is pretty hard to do.

**Q: What do you see for television in the distant future for the average consumer?**

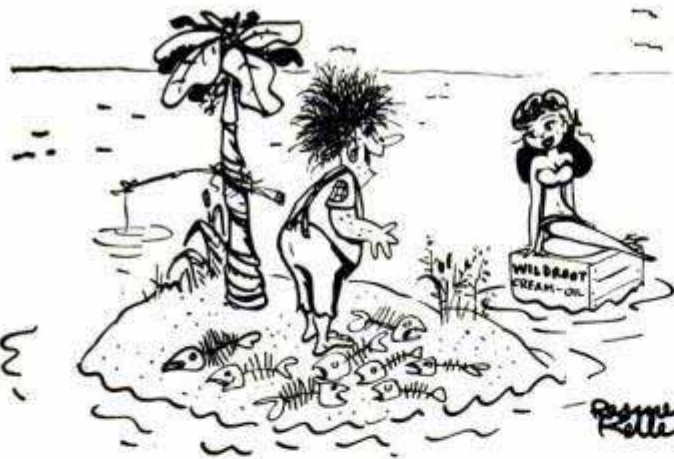
**A:** With all the new stations going up within two or three years, the networks can afford to spend more money for programs because if they can distribute programs widely enough the cost per listener is decreased and this will mean vastly better programs throughout the country. Another thing: At present there is only one microwave circuit to the Coast, so people there can only see one network show at a time. In a short time we will probably

have four microwaves to the Coast, one for each network. I think the public can look for greatly improved programs over the next five years. ★ ★ ★

## World's Oceans Rising As Glacial Period Ends

Melting polar ice has been the main cause in raising the general level of the world's oceans five inches since 1895. That's the report of Dr. George F. Carter, chairman of the John Hopkins University geography department, who recommends that future harbor facilities be designed to accommodate a sea-level rise of at least 24 inches within the next century. We're just emerging from the glacial period, Carter points out (though a relapse is always possible). If and when all polar ice melts, sea level will rise 100 feet. "The East and Gulf coasts of America," he says, "would be altered beyond recognition. Long Island, most of Florida and great slices of the other coastal plain states would be under water. An inland sea would be created in the San Joaquin-Sacramento Valley; the Imperial Valley would become an extension of the Gulf of Lower California."

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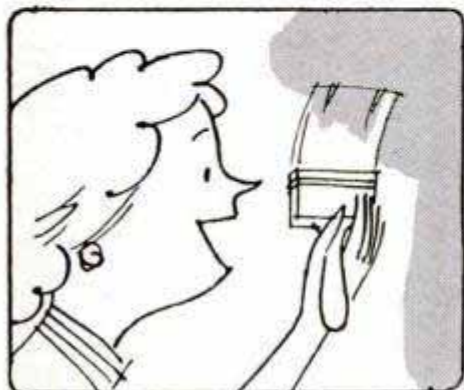
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### CAN YOUR SCALP PASS THE FINGERNAIL TEST?

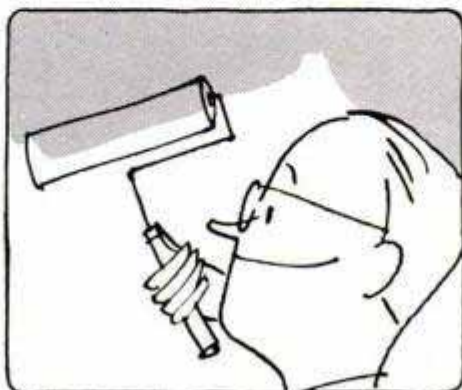
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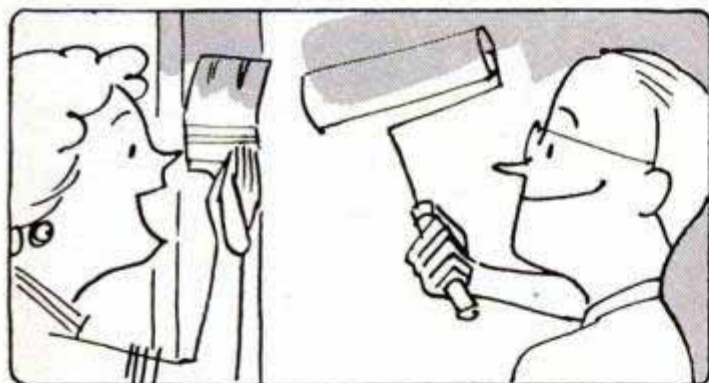
**GOLD BOND VELVET** is the easiest-going wall paint you ever used! Ready-to-use without the usual mixing or thinning. Dries in minutes to a velvet smooth surface that won't crack, chip or peel.



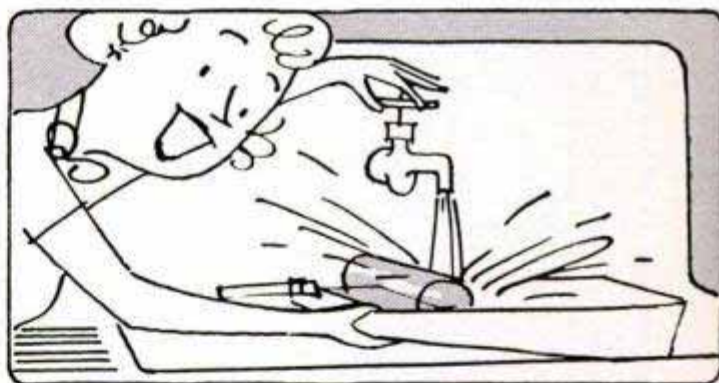
**FLOWS ON!** Just dip your roller or brush in Gold Bond Velvet and see how it goes on almost by itself! It eliminates what professional painters call "drag." No "painty" odor, either.



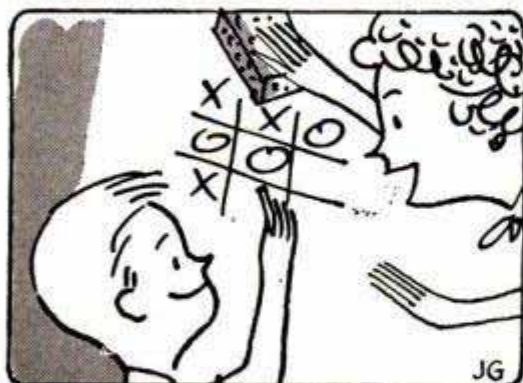
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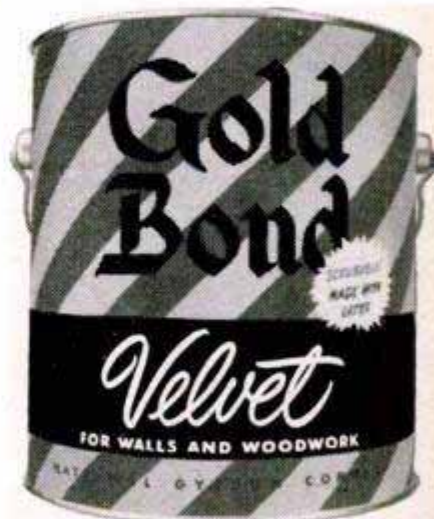


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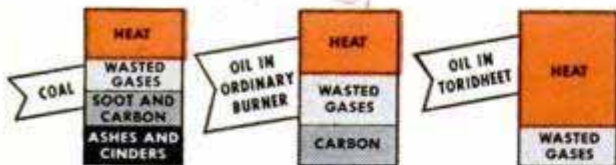
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## The Sky Unfolds Its Mysteries

(Continued from page 102)

into a dead, sterile sphere except for the atmospheric blanket. Electroerosion from cosmic rays has been suggested as the reason why vast areas on the airless moon are covered with powdery dust.

Scientists regard the atmosphere as a vast electrochemical factory in which solar energy is constantly producing chemical and electrical reactions. Ultraviolet energy in particular seems to have important effects. It is thought that the absorption of ultraviolet rays high in the atmosphere produces the free electrons that form the E, D and other ionized layers of the ionosphere.

Closer to the surface, some of the ultraviolet causes oxygen atoms to reform as ozone or heavy oxygen. This produces heat. It is calculated that at about 18 miles' altitude the temperature of the air is some 170 degrees. The ozone area extends down as low as 12 miles and acts as a filter that allows only a harmless fraction of the ultraviolet energy to reach the surface.

Studies of the ultraviolet are leading to a better understanding of why the ionization layers appear and disappear with the time of day, changing the angles at which short-wave radio waves are reflected back to earth. The varying "skip" distances sometimes permit two radio stations to communicate with each other, sometimes not.

Recently O. G. Villard, Jr., and A. M. Peterson of the Stanford University electronics-research laboratory found a way of using the ionosphere to determine at once whether radio communication between two points is possible. Their scatter-sounding method uses the small amount of radio energy that is reflected back toward the transmitter when the signal strikes the earth. Both the outgoing signal and its echo are reflected from the ionosphere. Using a radar type of viewing screen, it's possible to tell at a glance whether communication to a certain area would be good, poor or impossible at that moment.

Aside from rockets, balloons and radar impulses, scientists are using other ingenious ways of studying the composition of the atmosphere. These range all the way from blowing soap bubbles from balloons (so the movement of the bubbles and hence the air current can be recorded with telephoto cameras) to the detonation of huge charges of explosives on the ground.

Sensitive microphones, scores and hundreds of miles away, pick up the reflections of these explosions that are bounced back from layers in the atmosphere. From this information it's possible to determine the

(Continued to page 258)

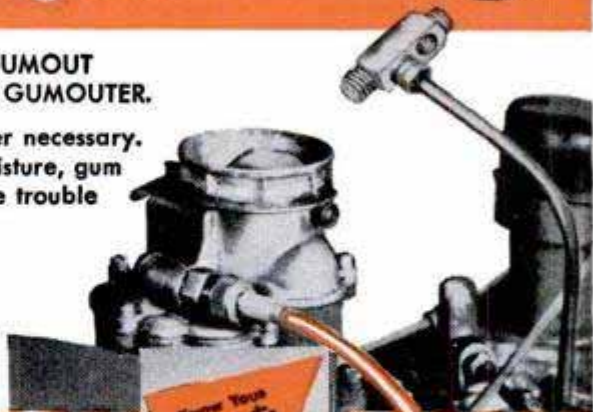
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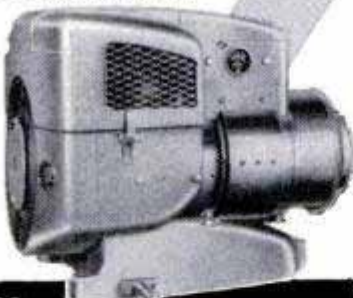


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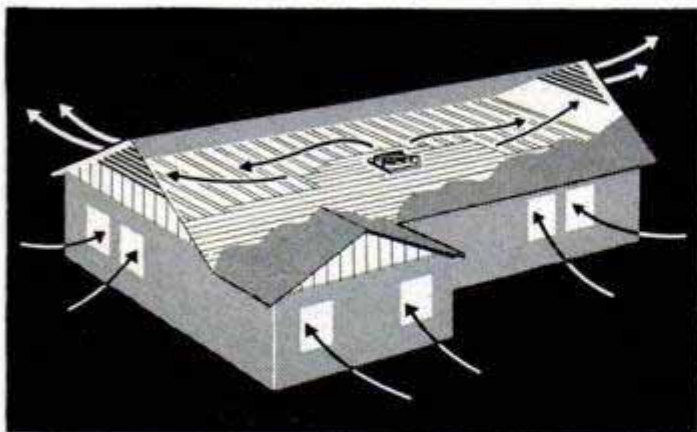
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densities and hence the temperatures 20 miles above ground. From the temperature information, in turn, other facts can then be quickly deduced.

The Navy has used 1200-pound charges of TNT in the Arizona desert for such sound-transmission studies. Other groups have taken advantage of A-bomb explosions in Nevada and have studied the reflections of those sound waves from the upper air.

In one coordinated program to learn more about temperatures and winds as high as 70 miles aloft and to check the accuracy of each technique against the others, the Air Research and Development Command recently conducted a four-part, coordinated experiment at Holloman Air Force Base in New Mexico.

At approximately the same time on "T Day," studies were made by the use of high-altitude rockets, by ground explosions of TNT, by the recording of meteor trails with special photographic devices and by penetrating the night sky with a powerful searchlight beam.

Even with all the knowledge that we are acquiring there still remain many mysteries in the atmosphere. Not yet understood, for instance, are the auroras, the northern and southern lights with colored streamers that often glow in the night air 40 to 600 miles above the earth. Recently Dr. Donald H. Menzel of Harvard suggested that the spectacular displays occur when the earth becomes enveloped in vast clouds of hydrogen gas thrown out by the sun.

Pulled toward the poles by the earth's magnetic field, the hydrogen particles may pour into the atmosphere and excite the oxygen atoms that are present. The energy involved in the lights, Doctor Menzel estimates, is as much as the earth receives normally from the sun in a day. He suggests that an important connection between the lights and the future weather may be found through such studies.

Another phenomenon that puzzles science is the strange "light of the night sky," a faint glowing of the atmosphere. The light amounts to about five times the illumination from starlight and appears to be generated from 60 to 200 miles above the earth. Spectral studies show that the glow comes mainly from the luminescence of oxygen and nitrogen atoms and also from excitation of sodium atoms, an element whose presence high in the air is a mystery in itself.

More information about this is being sought at UCLA where Dr. Joseph Kaplan some time ago created an artificial aurora polaris in a huge vacuum tube and where at present an associate, Mark Brook, is reproducing the "light of the night sky" in vacuum tubes and glass pipes. ★ ★ ★

C2

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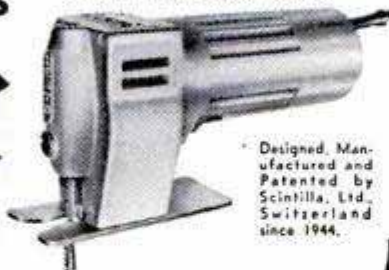
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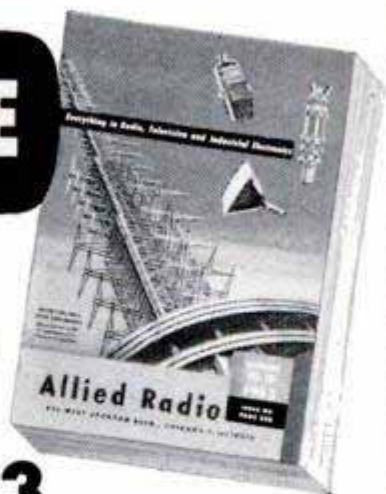
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# Stop RADIATOR TROUBLE Now!

★ Unless you are asking for trouble—your radiator deserves a *thorough* spring cleaning! Get rid of winter's accumulated rust and dirt the easy, effective way—with these three BOWES radiator conditioners. Then you can enjoy care-free spring and summer motoring.



## BOWES RADIATOR KLEN-ZUR

Quickly removes rust and scale . . . contains no harmful acid . . . makes cooling system like new.

## BOWES RADIATOR RUST-ROUT

Protects the cooling system, prevents accumulation of more rust . . . lubricates water pump, too.

## BOWES RADIATOR STOP-LEAK

Effectively seals any existing leaks and helps prevent new leaks.

**DRIVE IN WHERE YOU SEE THIS EMBLEM**



★ It takes so little time to condition your cooling system for spring and summer driving . . . yet it can be so costly and troublesome to neglect it. Don't delay—prepare NOW for spring and summer with BOWES Cooling System Chemicals.

BOWES "SEAL FAST" CORP., INDIANAPOLIS 7, INDIANA



Even with Dodge's torque converter, you must use the clutch pedal when shifting from neutral into drive

## Owners Report on the 1953 Dodge

(Continued from page 144)

much from nothing. Having worked on all kinds of automobile steels for the past 40 years, I can easily see why all the bodies are so awfully poor."

A Plymouth, Mich., machinist wrote, "The Coronet has a lot of zip to it, holds the road very well at all speeds . . . very good visibility and extra-good brakes. It is an easy car to drive." A Chicago fire-department engineer said, "At this early date I am well pleased with the '53 Dodge. It has excellent maneuverability and quick response to any traffic condition."

"Outside of slow-shifting transmission and 'springy' front end, my Dodge is the best car I've ever driven. Good economy, low-cost service, comfort, pep and ease of handling all appeal to my wife and me. I've just bought a new one for my son," said a Pasadena, Calif., salesman.

A San Diego, Calif., merchant wrote: "The new short hood is a safety feature and the shorter wheelbase is fine for parking. The '53 rides better than previous models. Dodge engineers have hit on a winner. I'd like better interior finish."

**And now for my own test:** The test car was a four-door Coronet powered by the new Red Ram 140-horsepower OHV 90-degree V8, which actually is a cut-down version of the Chrysler FireDome V8. The test was made in the mountains and desert, over highways and back trails of Southern California and Nevada, for a distance of 920 miles. Part of the test was made through rain and over snow-covered roads in the

(Continued to page 262)



**For Discriminating Users**



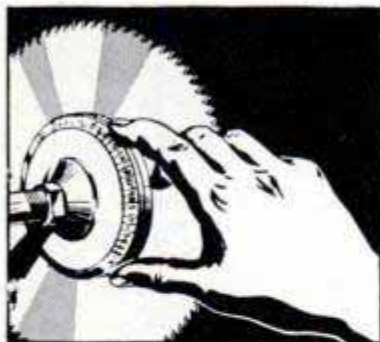
Scientists, explorers and engineers choose Burgess Batteries where lives depend on battery power, because they are recognized as best by the experts. Insist on using Burgess Batteries in your flashlight. Burgess Battery Company, Freeport, Ill.; Niagara Falls, Can.

**A Quality Dry Battery For Every Purpose**

**NOW—40 different cuts with AMAZING, NEW**

*Warren*

**DADO SAWING WASHERS**



**ON YOUR SAW BLADE!  
NO Warp...  
NO Wobble...  
NO Burning!**

**ONLY \$4.95 PER SET**

**4 Washers Mean Perfect Balance**

Make clean, smooth parallel grooves at any angle—no chewing, no sanding. Just dial your cut—no trick screws, no vibration, strengthens blade for straight cuts. Warren Washers greatest improvement in 30 years—and most copied—look for the name on the box and washers. It costs no more to get the best—WARREN, IT'S GUARANTEED! At your dealer or order direct. Give arbor size— $\frac{1}{2}$ ",  $\frac{3}{4}$ ",  $\frac{5}{8}$ ", 1"—sent postpaid.

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**WARREN DADO SAWING WASHERS CO.**

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1953 BOAT KITS BY  
U-MAK-IT**

**30 Models 8 TO 23 FEET**

**21 FT. OUTBOARD AND INBOARD CABIN CRUISERS**

Roomy cabin sleeps 2. Includes full size toilet room, galley, sink & ice chest.

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**18 FT. OUTBOARD AND INBOARD CABIN CRUISERS**

Fast Vee bottom hull, speeds up to 25 M.P.H. Accommodations for 2.

*New*

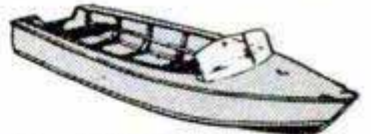


**ROWBOATS OUTBOARDS INBOARDS**

8 to 14 Ft.

12 to 21 Ft.

16 to 23 Ft.



**NEW 1953 CATALOG**

44 PAGES, shows construction details. Incl. everything to build your own—hardware, engines, conversions, paint & color chart.

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**KIT BOAT OWNERS**



Protect your boat with Fiberglas. Makes new & used boats permanently watertight. — Lengthens lifetime, strengthens construction, increases value & safety.

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## how to build a BIGGER BEDROOM with YOUR SCREWDRIVER!

You don't have to push out walls...or go through major remodeling...to get bigger bedrooms.

Just use smooth-folding "Modernfold" doors—instead of space-stealing swinging doors—on closets. You'll add enough room for another chair, lamp, desk, or bedside table.

A screwdriver is the only tool you need to hang steel-framed Vinyl-covered "Modernfold" doors. And since "Modernfolds" open and close *between* door jambs, they can't bang against furniture or stand dangerously ajar.

### NO TRICK TO INSTALL



STEP 1. Slide head track onto trolleys, raise door to standing position, screw it in place.



STEP 2. Attach jamb clips, screw jamb post to them. No planing or fitting.

**NOTHING MORE TO DO.** Door's in! No hardware to set. No painting or finishing needed—ever!

See "Modernfold" doors at your distributor soon. He's listed under "doors" in your city classified directory.

*Sold and Serviced Nationally*

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Please send further details  
on "Modernfold" doors.



the doors that fold  
like an accordion

**modernfold**  
DOORS

by NEW CASTLE

Name.....

Address.....

City..... Zone.....

County..... State.....

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mountainous Lake Arrowhead district of Southern California.

I put the V8 Dodge through every conceivable kind of driving test. It is a well-engineered car with a surprising amount of acceleration, power and speed.

The 241.4-cubic-inch engine has a compression ratio of 7.1:1 and reaches its peak of 140 horsepower at 4400 r.p.m. Torque is 200 foot-pounds at 2000 r.p.m. The bore (3 $\frac{3}{16}$  inches) is greater than the length of the stroke (3 $\frac{1}{4}$  inches), which results in a minimum piston travel for the slipper-type pistons used and permits short and rigid connecting rods. Hemispherical combustion chambers with extra-large laterally arranged valves and hydraulic lifters contribute to quiet operation. The engine is extremely free of vibration at all speeds, but it does have that V8 hum.

The test car gave average economy (see economy chart). The V8 engine operates satisfactorily on regular gasoline, as 68 percent of the owners reporting testified. The ride is smooth. Chrysler Oriflow shocks are tops in controlling the ride and leveling out the bumps. The front end, however, is too flexible. There is considerable tendency to roll on sharp curves if taken at high speed. Front springing should be stiffer. The steering is easy, with little wheel road shock transmitted.

The engine packs a wallop in the mountains and the car has an extremely fast top speed of 110 miles per hour although the speedometer, like all others, I found to be fast by about 8 percent. (I always use speedometer readings in my reports. Even though all speedometers are slightly inaccurate, stop-watch and electrical readings have no meaning for the average driver who depends on his speedometer for guidance). The V8 topped my favorite 32-percent two-block-long hill from a standing start at 28 miles per hour, which is faster than any other stock United States car I've ever tested on the same hill.

While there was some fading when used constantly in the mountains, I found the brakes to be average. The hand brake operates on the drive shaft, which I don't like. I like it to operate directly on the wheels. It is satisfactory when used as a parking brake only, but if used very often for emergency stops, drive-shaft brakes quickly lose their adjustment.

The body is roomy and well built. I found no water leaks when driving through rain or snow, but water from an overnight snow-storm seeped into the trunk. A few minor squeaks and rattles developed, which is not unusual in any new car. Incidentally, the Dodge I tested was one of the first 1953

(Continued to page 264)

From "TURTLE-PACE" Troll to WATER SKIMMING Speeds...

# One Hand Does All!



**Amazing MARTIN AQUAMATIC Twist-SHIFT gives simple ONE HAND CONTROL of SHIFT, SPEED, STEERING while you face forward!**

Think of it! Ten horses harnessed in a handclasp! That's what you get in the powerful MARTIN "100". AQUAMATIC Twist-SHIFT does all the work... you enjoy more "free hand" time for fishing fun. And because you face front at all times, all obstacles are right in sight. For the "extra push" needed on rough lakes... for fast "back to camp" speeds... and for the slowest, quietest trolling of all your fishing days, MARTIN's "100"

answers all needs. Ask the man who "MANS A MARTIN"... then see your dealer, first chance!

*Martin*  
OUTBOARD MOTORS

**FULL YEAR GUARANTEE** with nation-wide service—Only MARTIN has it!

**MARTIN "100"**  
with Aquamatic  
Twist-SHIFT  
10 H. P. Twin  
58 lbs.

See the classified pages of your phone book—for the location of your nearest Martin Outboard Motor dealer.

## Experience the "New Standard of Performance" with these exclusive MARTIN MOTORS features

- Mechanically-Controlled Intake Poppet Valves—quicker starting, faster acceleration, quieter, automotive smoothness.
- Oil Sealed Lower Unit—all moving parts in a constant oil bath—no messy greasing!
- Inboard Vertical Stern Adjustment—correct boat "trim" with a turn of a single knob!

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Canadian Sales by: MARTIN MOTORS,

Division: National Pressure Cooker Co. (Canada) Ltd., Wallaceburg, Ontario

MARTIN MOTORS are priced from \$129.75 and up F.O.B. Factory.

(Prices and specifications subject to change without notice.)

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**MARTIN "75"**  
with Aquamatic  
Twist-SHIFT  
7.5 H. P. Twin  
49 lbs.



**MARTIN "45"**  
"Twist-GRIP"  
4.5 H. P. Twin  
36 lbs.



**MARTIN "20"**  
2 1/2 H. P. Single  
29 lbs.

**MAN A MARTIN — "Best Outboards Ever Built!"**

# How to refinish Marred Metal Surfaces

**YOU DON'T HAVE TO BE AN EXPERT** to refinish refrigerators, stoves, metal furniture or toys. It's easy with the right materials and methods.



**REMOVE ALL RUST** by sanding with Medium "Production" Paper. Sand an area somewhat larger than damaged area. (If surface has been waxed, first remove the wax with strong soap and hot water.)

**SANDE EDGES** of damaged area with Very-Fine "Wetordry" Tri-M-ite Paper so old finish slopes toward the center. Use soapy water as a sanding lubricant. Apply metal primer and allow to dry overnight.



**SMOOTH PRIMER COAT** with Very-Fine "Wetordry" Tri-M-ite Paper. Lightly scuff old paint surfaces around damaged area to completely dull the old finish and blend with the primer coat. Use soapy water as lubricant.



**BRUSH ON ENAMEL.** Allow to dry for two days. Wet with soapy water and sand with Extra-Fine "Wetordry" Tri-M-ite Paper. Then switch to Super-Fine "Wetordry" Tri-M-ite until edges are invisible.



Look for this emblem—it identifies your 3M dealer

Headquarters for high quality 3M Sandpaper and other refinishing supplies.



3M

HOME & SHOP PRODUCTS

3M SANDPAPER... "SCOTCH" BRAND TAPES... ADHESIVES

## MINNESOTA MINING & MFG. CO.

Dept. PM3, St. Paul 6, Minn.

Please send me **FREE** complete instructions on home refinishing jobs checked below.

- How to refinish marred metal surfaces     How to refinish marred furniture     How to enamel and finish unpainted furniture     How to varnish or lacquer unpainted furniture

NAME.....

ADDRESS.....

CITY.....ZONE...STATE.....

models produced and, as with all makes of new cars, it takes a few thousand assemblies to iron out early production "bugs."

Dodge has substituted the pull-type door handles for the twist type formerly used, and they work satisfactorily. The inner-door operating lever is well located and is

## 1953 DODGE SPECIFICATIONS

### ENGINE

	MEADOWBROOK MODELS	CORONET MODELS
Type .....	6-cyl., L-head	8-cyl., V-type, OHV
Bore and stroke.....	3 1/4 x 4 3/8 in.	3-7/16 x 3 1/4 in.
Piston displacement ...	230.2 cu. in.	241.3 cu. in.
Brake horsepower .....	103 at 3600 r.p.m.	140 at 4400 r.p.m.
Compression ratio.....	7.0 : 1	7.1 : 1
Transmissions .....	3-speed conventional.	Overdrive optional. 3-speed conv. with fluid coupling optional. 3-speed with fluid coupling and overdrive optional. Gyro-Matic Drive optional on all models except Meadowbrook station wagon. Gyro-Torque Drive optional on Coronet models only.

### GENERAL

Steering ratio (over-all).....	21.4 : 1	21.4 : 1
Steering wheel, lock to lock.....	4 turns	4 turns
Turning radius .....	22 ft. 3 in.	20 ft. 8 in.—sedan and coupe 19 ft. 9 1/2 in.—convertible, Diplomat and Sierra
Brakes .....	Conventional hydraulic with bonded linings (no rivets).	
Tire size .....	6.70 x 15	7.10 x 15
Recommended tire pressure .....	24 lb.	24 lb.
Shipping weight (4-dr. sedan, unladen).....	3205 lb.	3365 lb.
Wheelbase .....	119 in.—sedan and coupe 114 in.—other models	119 in.—sedans and coupes 114 in.—other models
Tread, front .....	56-5/16 in.	55-15/16 in.
Tread, rear .....	59 1/8 in.	58 3/4 in.
Height over-all (unladen).....	62 in.	62 in.
Width over-all (unladen).....	73 1/2 in.	73 1/2 in.
Length over-all (unladen).....	201 3/8 in.	201 3/8 in.
Road clearance .....	8 in.	8 1/4 in.

### CAPACITIES

Oil .....	5 qt. (6 qt. with filter)	5 qt. (6 qt. with filter) plus 7 qt. with Gyro-Torque transmission.
Water .....	15 qt.	20 qt.
Gasoline .....	17 gal.	17 gal.

### INTERIOR DIMENSIONS

Front-seat width .....	60 5/8 in.	60 5/8 in.
Rear-seat width .....	60 1/2 in.	60 1/2 in.
Headroom, front .....	36 3/8 in.	36 3/8 in.
Headroom, rear .....	36 3/8 in.	36 3/8 in.
Legroom, front .....	44 1/2 in.	44 1/2 in.
Legroom, rear .....	42 5/8 in.	42 5/8 in.

better than average in operation. I especially like the fact that the window can be raised or lowered by 1 3/4 turns of the crank.

Vision is excellent. Dodge has dropped its two-piece windshield for a single one-piece curved design. Corner posts are narrow. The rear-view mirror should be relocated to eliminate a partial blind spot from some angles. One of the best features is the

(Continued to page 272)

## IN YOUR GARDEN

# Friendly Soil

Some garden soils are just naturally "unfriendly." Because they are poorly structured, they pack, cake and crack — often get hard as a brick — make it extremely difficult for seeds to germinate and emerge . . . When treated

with Krilium soil conditioner, this type of soil can be maintained in loose, porous, crumbly, easy-to-work particles — "friendly" to all phases of seed germination, root formation and plant emergence.

The story of Krilium soil conditioner and its proved ability to maintain soil in "friendly" condition is really very simple and basic. Soil should be prepared for seeding, the same as always. Then, Krilium should be mixed into the soil according to simple, easy-to-follow directions. It acts almost instantly—maintains soil in loose, crumbly particles. This effect lasts for years—keeps soil from packing, caking and shrinking under the impact of repeated sun and rain. Naturally, this means that proper germination, strong root formation and easier emergence are encouraged—seeds and plants get a good, healthy start, because they live in a "friendly" environment.

This year, put Krilium at the top of your garden shopping list. Use it to change your "problem" soil to "friendly" soil—see the big difference as your vegetables and flowers break through.

Folium: Monsanto Trade-mark  
Krilium: Reg. U. S. Pat. Off.

### Step-by-step results of Krilium soil conditioning

(RIGHT) This "profile" photograph shows early stage of germination in Krilium-treated soil. Note loose, crumbly structure.



(LEFT) How root formation and the beginnings of free and easy emergence are encouraged by proper soil structure.

(RIGHT) Showing completed emergence and the formation of a strong, healthy root growth. Plants are firmly established.



### New Leaf-feeding Fertilizer

Folium — the new Monsanto water-soluble, leaf-feeding fertilizer — is now available at your dealer's. Use it as a companion to Krilium — get the double benefit of soil that is properly conditioned and plants that are properly fed . . . Krilium in 1-lb. and 5-lb. garden mixture and 10-lb., 25-lb. and 50-lb. full-strength mixture for treating large areas. Folium in 2-oz., 1-lb. and 5-lb. packages . . . MONSANTO CHEMICAL COMPANY, Merchandising Division, 1700 South Second Street, St. Louis 4, Missouri.

# Krilium

SOIL CONDITIONER

Helps Germination, Root Growth,  
Emergence . Maintains Loose,  
Porous, Crumbly Soil

A Product of Monsanto Chemical Company



Serving Industry . . . Which Serves Man

# Here's how for home painters



**Keep your ladder steady.** Empty paint cans will spread the weight over a comparatively large area, will keep ladder from sinking in soft earth. To preserve metal gutters, use Devoe Zinc Dust Primer—specially made to protect and beautify metal surfaces.

**Varnishing made easy!** Varnish flows better, dries faster, if applied at warm temperatures. Best way is to keep the can in a pan of hot water while working. One of the finest varnishes is Devoe's 87 Spar Varnish—tough, highly resistant to water.



**Painting clapboards can be easy!** Do the underneath edges of clapboards first. Then coat the face of the boards . . . it prevents dripping. If repainting your house, better use Devoe Wonder-1-Coat House Paint. Cuts repainting time and costs practically in half.

**What's the perfect painting day?** Dry and warm! Don't paint in cold weather (under 50°); or in direct rays of summer sun. Wait 3 days after heavy rain; be sure morning dew is gone before starting. Paint porch floors with Devoe Floor & Deck Enamel.



Remember Devoe's most wonderful product, Wonder-1-Coat House Paint . . . gives 2-coat beauty and protection in just one coat, saves you hundreds of dollars in repainting costs. Your Devoe dealer (in Classified Phone Book) will be glad to help you with all your painting needs.

**DEVOE**  
PAINT

## The Navy Hunts Cosmic Rays

(Continued from page 105)

"Our plan," explains Lieutenant Jones, "was to launch the Deacon rockets suspended by a simple hook to a cable underneath the high-altitude balloons. A balloon would lift a rocket through most of the earth's atmosphere, at which point a timed firing mechanism would start the rocket. It would take off from there, slip its hook from the cable ring, and bore up to altitudes it could never have achieved from an earth launching. Hooks on each rocket were placed back from the nose so the Deacon would be carried at a slight angle. When it took off, it would barely miss the side of the balloon on the way up."

There is one place on earth where incoming cosmic-ray particles have the best chance of penetrating the earth's magnetic field—the geomagnetic pole. "We hoped," says Lieutenant Jones, "that up there we'd have a better chance of finding some of the real low-energy particles from outer space, which never get through elsewhere. Above the atmosphere at that spot our rockets should be boring into a pretty close approximation of primary cosmic radiation as it exists out in the solar system."

This was the reason for carrying the balloon rockets way up into the polar ice fields, struggling with cumbersome equipment against winds and weather on the cramped quarters of an icebreaker—the only kind of ship capable of penetrating so far. It would have been easier to spread out on a comfortable air field in Long Island, or the commodious deck of a big aircraft carrier. But Long Island was in the wrong place, and a carrier couldn't penetrate the ice fields without danger of freezing in, or splitting her hull.

Two types of launchings were to be made—the balloon-rocket tests, and experiments using balloon-borne trains of neutron counters and nuclear emulsion plates that would be parachuted to earth after the balloons burst.

Late in August the *Eastwind* with her cargo of scientists, rockets and balloons ground her way through frigid seas between Greenland and Ellsmere Island, where the ocean is frozen over most of the year. At one point the little ship was only 442 nautical miles from the North Pole. She had crossed the most northerly latitude ever reached by any ship under its own power. Finally, at a point near the geomagnetic pole's location some 100 miles north of Thule in the Kane Basin, she hove to and the fun began.

"Uninflated," says Jones, "some of our

(Continued to page 268)

**weekend remodeler..** *YOU TOO*  
*can easily install this floor and wall tile*



**THE ALL PURPOSE FLOOR TILE**

HAKO VINYL FLEX is so easy to install because it is square cut and flexible. No special tools needed . . . fit and cut at walls and doors with household shears. Choose from 13 beautiful colors. This inexpensive, durable, grease-proof, plastic tile is non-tiring under foot, resists indentations and retains its bright, gleaming beauty for years with minimum care. Ideal for every room in your home.

**THE NEW**  
  
**Poly-krome**  
 RESILIENT  
 TERRAZZO  
 TYPE TILE



**THE *Moderne* IN FLOOR TILE**

Add gay, cheerful, distinctive appearance to your floors, with HAKO POLY-KROME TERRAZZO TYPE TILE. Here's superb quality, long-range economy and easy installation. Vivid, multi-colored chips in each lovely 9"x9" square give your room sparkling new beauty. Ten colors, to fit any decor.

**Coronet** WITH POSITIVE  
 PLASTIC WALL TILE WATERPROOF PROTECTION

Anyone can install beautiful HAKO CORONET PLASTIC WALL TILE . . . and at low cost. Choose from 18 colors. Deep beveled edges, long service, economy through the years. An easy, inexpensive way to remodel your bathroom and kitchen.



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 Please send me illustrated literature and installation instruction booklets. Enclosed is 10¢ to cover cost of handling and mailing. I am interested in  
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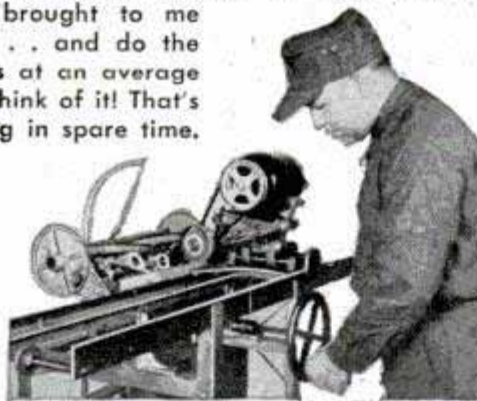
# WHAT DO YOU WANT?

## A GOOD BUSINESS OF YOUR OWN?

### A HIGH PAY SPARE-TIME JOB?

## Then FOLLOW THIS PROVED SUCCESS PLAN!

Here is your chance to be your own boss, secure financial independence, build a future for yourself and your family in a profitable business in your own garage or basement. J. S. of Michigan writes, "I figure my profits (last season) at over \$1,000.00." Mr. C. H. R. of Ohio says, "This season I have taken in \$3,688.20." J. P. of Pennsylvania writes "I spent only 40c for a newspaper ad and have done nearly \$500.00 worth of business." Another owner writes, "I have had 4 mowers a day brought to me since last May . . . and do the grinding evenings at an average of \$2.50 each." Think of it! That's \$10.00 an evening in spare time. If you want to get ahead, make big money, be your own boss. Act Now. Write today for full details of our proved success plan.



### ONLY ON THE UNIVERSAL LAWN MOWER GRINDER

can the inside face and edge of the stationary blade, and all reel blades, be ground to proper clearance

### ALL IN ONE SET-UP

WITHOUT REMOVING ANY BLADE FROM THE MOWER

. . . that's why this business is simple, easy, and interesting. No experience or long hours of study are necessary. A leading National Magazine says, even an inexperienced worker can do a good job. We furnish complete instructions, everything you need to get started . . . But you must take the first step. Just fill in and mail the coupon below. Do it right now.

ROGERS MFG. CO., DEPT. M-33, LINDSEY, OHIO

### SEND THIS COUPON NOW

ROGERS MFG. CO., Dept. M-33, Lindsey, Ohio  
Please send me full details about the profit possibilities of Lawn Mower Sharpening.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

plastic balloons measured 180 feet long. Once we got a bubble of gas in them they towered higher than a 10-story building. Some of the trains we sent up measured nearly 900 feet long. All of this material had to be arranged and launched free and clear from a deck space measuring 60 by 60 feet. Trying to keep things from snarling up was a man-size job."

Wind and weather plagued the men. Small five-foot balloons were used to hold some of the balloon-train instruments clear of the deck while others were being slowly lofted on the big skyhook. The sea was dotted with icebergs and many areas were completely frozen in, so it was impossible for the ship to attain speeds equal to the wind in order to help launching. On many days work had to be abandoned.

"It was a touchy business," Jones recalls grimly. "With 200 pounds of balloon and some 300 pounds of equipment to loft, you're left with only about 35 pounds of lift in the skyhook. Any little thing can mess up a whole launching. Near the entrance to Smith Sound, in August, we launched one balloon in a snowstorm. It got up all right, but with three inches of wet snow on top of it the thing rose slower and slower, finally reversed itself and sat right down on the Greenland coast. Some flights would get just above the clouds, ice up, and settle in the ocean, miles away."

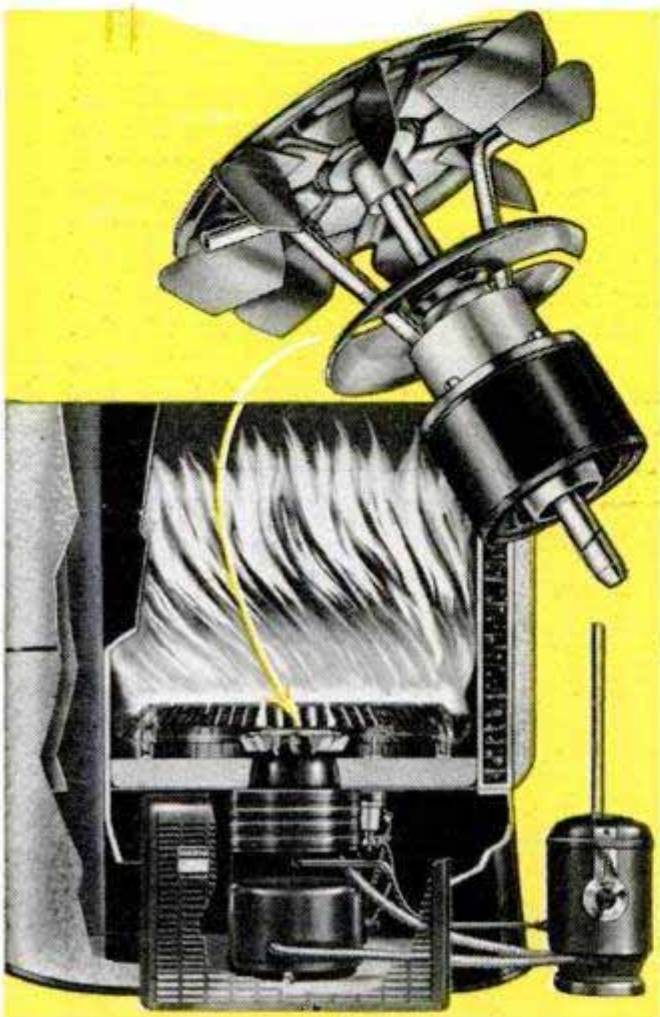
In spite of difficulties, five of the balloon-rocket flights were eminently successful in obtaining data for Dr. James Van Allen of the State University of Iowa. Three balloon trains brought down valuable research material for Dr. Martin Swetnik of New York University. The men developed special techniques for the rocket launchings. The instrumented rocket nose was fastened to the barrel in place of the regular cone. The rocket was kept warm by heaters on the frigid deck. An instant before launching, the men pulled a plastic sock over the entire rocket—a protective coat of insulation to keep the Deacon warm as the big balloon lofted it through the polar air. At high altitude, the timing mechanisms dangling beneath the rocket at the bottom of the train let go. A whoosh of red flame spurted from the Deacon's tail pipe and, with a jolt that ripped off the plastic sock and parted the cable holding the timer, the rocket zoomed up to heights 40 or 50 miles above the earth. For three to four minutes the crackle of cosmic rays hitting the counters in the rocket's nose was radioed back to the ship, where men recorded and analyzed the data.

The little rockets had reached the greatest heights known to have been achieved in those latitudes. And, while no one will

(Continued to page 270)



# here's why...it's so reliable!



**THE**  
**TIMKEN**  
*Silent Automatic*  
**WALL-FLAME**  
**OIL BURNER**  
*has only one*  
*moving part!*

You are assured of maximum reliability when you install a Timken Silent Automatic Wall-Flame Oil Burner! The one moving part—with its integral oil distributing tubes and fans—does all the work. Nothing else moves. Nothing else wears. Actuated by an electric motor, the mono-rotor rests on a steel ball pressed into the bottom end of the shaft, with the result that the rotor spins like a top—freely, easily and with little wear. The basically different, basically better wall-flame burner is the heart of every Timken Silent Automatic oil heating unit—conversion burners, furnaces and boilers. See your Timken Silent Automatic Dealer or mail the coupon below.

**no pressure!**  
**no blowtorch roar!**

No complicated pressure pump is required to force the fuel oil through a pin-point atomizing nozzle. No blower is required to send a blast of air into the ashpit. It's whisper-quiet!



**NO "OIL CAN" LUBRICATION!** The shaft of the mono-rotor is lubricated by the fuel oil flowing through the burner, eliminating the need for "oil can" lubrication—at any time!

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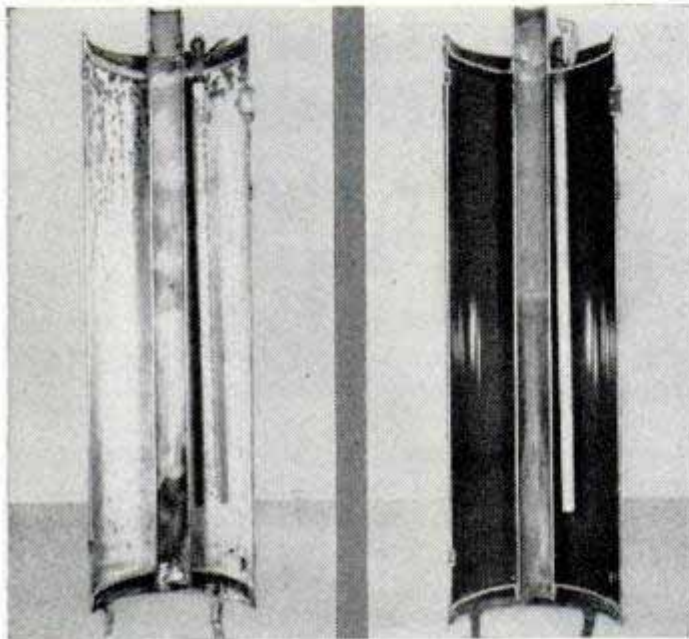
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# RUST

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Automatic Water Heater



#### ORDINARY WATER HEATER INTERIOR

Unretouched photo shows how rust eats away unprotected metal in just one year of use. Note deep rust pits!

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Unretouched photo shows that Permaglas glass-surfaced steel tank does not rust . . . because glass can't rust.

More than 2,000,000 ordinary water heaters have to be replaced every year! Every minute, without warning, rust kills another!

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# A.O. Smith

PERMAGLAS-HEATING PRODUCTS

say yet what they discovered up there, the expedition's scientists admit that findings agree with the things that had been predicted, based on previous cosmic-rocket-flight findings in lower latitudes. "We found something, all right," Lieutenant Jones says, cryptically.

Nuclear emulsion plates and counter records carried on the big balloon trains are still being analyzed. Most of the equipment parachuted seaward at the end of the flight, to be retrieved by the Navy icebreaker *Atka* after three PB4Y-2 Navy aircraft located the impact spots. But some of the instruments came down on the Greenland icecap. Snowstorms in September covered them so completely that helicopters couldn't go in after them. A standing reward of \$100 for any Eskimo recovering them next summer may bring them in. When they're found and all the cosmic data is reviewed, scientists will be one step closer to solving a vital mystery of the universe. ★ ★ ★



## German Zipper Mattress Facilitates Cleaning

Housewives can quickly clean a Zipper mattress invented by Anton Lehner of Munich, Germany. The cover of the mattress is removed by slide fasteners and the inside upholstery taken off with another set of the same fasteners. This separates the springs and the padding, making both portions of the mattress easy to handle and to clean. The mattress was recently displayed at a fair in Munich.

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**Save \$250 to \$500**  
**\$15.50** Instruction included. Rated 200 Amps. 28 Volts. 2500 R.P.M. Ship. Wt. approx. 50 lbs. Stock No. 707.  
 PRICE F.O.B. K. C. MO.

CONVERTS TO ARC WELDER 200-250 AMP. OR LIGHT PLANT CAP. LOAD 5000 WATTS

Stock No. 711 D. C. Generator R-1 Jack & Heintz, rated 300 Amp. 30 Volts. Gov't cost \$300.00. Instruction for converting to welder or light plant incl. Also instructions and diagram for converting the R-1 or P-1 generator to Combination Welder \$25.50 and Light Plant Included. Only.

**Carbon Pile GENERATOR VOLTAGE REGULATOR**  
 For use with 24 or 32 Volt D.C. Generators. Also recommended for the P-1 and R-1 type generators in "build your own" Light Plant. Only. Postpaid. \$6.95

### R-21 HEAVY DUTY RHEOSTAT

Brand New for regulating voltage on ELECTRIC WELDERS, model trains, electric blankets, lights, control photoflood lamps, etc. Rated 16-32 ohms. Size 3 1/2" x 2 1/2". Postpaid. \$6.95

**WEAVERS HYDRAULIC HAND PUMP**  
 BRAND NEW INCL. BUILT IN CHECK & RELIEF VALVE. For hydraulic jacks, presses, hoists, etc. For operating hydraulic cylinders to pump oil or hydraulic fluid under pressure, and is capable of delivering 1000 lbs. pressure. Wt. 10 1/2 lbs. A \$9.95 (add \$50.00 val. Instr. incl. Price \$9.95 postpaid)

**Valuable Gears — Borgains — Speed Reducers**  
 10-1 or 5-1 ratio, 90 degree angle. Shaft driven 1/2" spline shaft with 3 mounting holes 5/16". Gears held in forged and machined aluminum housing with two needle bearings, one bronze bearing, and three high speed shielded bearings. Rated \$5.95 paid  
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**D. C. GENERATOR.** Brand new. Navy Type for Farm—Home—Ranch. Delivers 430 Volts D.C. at 3450 R.P.M. Ball bearing supported. Fan cooled armature. Self lubricating bearing. #21120-A. Wt. \$7.50 21-lbs. Now only.

**ROMECC WOBBLE PUMP.** Hand lever operated. Ideal for Camp, Farm, Ranch, for fuel transfer to boats, etc. Self priming, including built in relief valve. \$8.50 paid  
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**VOLTMETER, DC.** The Basic Element of this meter is 30 volts DC Voltmeter with zero center. Internal resistance is 300 Ohms. Dial may be easily calibrated to read DC Volts. Brand New. \$3.95 paid  
 \$25.00 value.

**SENSATIONAL SELSYNS**  
 Two or more connected together, work perfectly on 110 V. A.C. For weather vanes, rotating directional antennas or controlling distance operations. With diagram and instructions. Wt. 3 1/2 lbs. \$7.95 Postage paid  
 PER PAIR.

**Hydraulic Solenoid Control Valve**  
**BENDIX. No. 81560.** For remote control operation and to operate one single action or double action hydraulic cylinders with 24 V. D.C. 800 to 1500 P.S.I. connections are 5/50" thread. Applicable for 115 V. A.C. Instructions & Data included. \$3.50 ea. \$6.50 pair  
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**RIGHT ANGLE DRIVE** with 1 to 1 ratio through 90 degree bevel gears. Drive and take off shaft are 1 1/2" dia. Self lubricating. Size 3 1/2" x 2 1/2" x 1 1/2". Rated 1 1/2 H.P. at 1750 R.P.M. Ideal for use with power tools, etc. Has three mounting holes on 1-5/16" center. Price \$3.50 postpaid.

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**HYDRAULIC PRESSURE GAUGE.** Ideal for High press. hydraulic systems, adjusting pressure, relief valves, etc. Range 0 to 2000 PSI. 2 3/8" square, 1 3/4" deep. Black face with white pointer & numerals. Uses 3/4" postpaid tubing fittings. \$3.50 paid

**CUNO OIL FILTER — Brand New**  
 Aircraft type. Filters oil without cartridge replacements. Just turn handle and cartridge is clean. Standard 3/8" inlet and outlet ports to accommodate 1 1/2 gallons per minute. STOP CHANGING OIL. Instructions \$4.95 postpaid  
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 Send CHECK OR M. ORDER. PRICES F.O.B. KCMO EXCEPT when marked POSTPAID U.S.A.

**ELECTRIC MOTORS**  
**GEAR HEAD MOTOR.** Heavy Duty 1/4 H.P. 24 V. D.C. 4300 R.P.M. Series Wound, reversible motor, to drive a reduction gear unit giving a 14:1 ratio. The gear shaft runs 600 R.P.M. Unit is applicable for 110V. A.C. Instructions incl. Stock #921. \$8.95  
 Stock No. 2832 is 1/4 H.P. 28V. D.C., 4000 R.P.M. with simple instructions to convert to 28-32V. A.C. Gov't. cost \$3.95  
 Stock No. 4049 is 1/4 H.P. 24 V. D.C. 2000 R.P.M. Mfg. by Pesco, applicable for 115 V. A.C. Instructions incl. Base mounted \$3.50  
**DELCO MOTOR 6 Volt DC.** Shaft is 1/2" in dia., 1 1/4" long. Size 5"x3" two mounting studs. 1200-2000 RPM. \$2.35 (add 50 cents Now Only. Postage)

**AIRCRAFT STARTING MOTOR.** Operates on 6 to 32 volts. Gives high torque, slow speed and tremendous power. Applicable for pulling or moving heavy loads. Makes ideal winch or heavy duty hoist. For belt or direct drive. Mfg. by Jack & Heintz. O. Cost over \$300.00. Ship. Wt. 5.5 lbs. \$9.95 f.o.b. Stock #JHG4. \$9.95 KCMO.

**ECLIPSE MOTOR & GEAR UNIT**  
 Brand New including 24V. D.C. Motor. Gear ratio 4:1, can be adapted for 2:1, 40:1 & 20:1. Ideal GARAGE DOOR OPENER, HOIST, PUMP JACK, HAY-LIFT, LAWN MOWER DRIVE, DRIVE FOR POST DRILL, etc. Gear unit applicable for 110 A.C. Diagrams & instructions incl. Gov't cost \$221.00. Wt. 23 lbs. \$9.95 f.o.b. only. \$9.95 KCMO.

**BEAM ROTATOR MOTOR**  
 Brand New with instructions for use on 110V. 60 cycles. Powerful geared motor for TV aerials, ham, FM, etc. Light weight, rugged. For ventilating louvers, furnace dampers, and check drafts. \$35.00 value. \$7.95

**VICKERS CONSTANT DIS- PLACEMENT HYDRAULIC PUMPS.** Brand New Stock No. PF-713-20. For any type liquid pumping job. 375 gal. per hr. at 3750 R.P.M. 1000 P.S.I. .410 cu. in. per rev. Gov. cost \$100.00 \$17.50 post-Data and instr. incl. \$17.50 paid

**VACUUM AIR HYDRAULIC GENERAL PURPOSE PUMP.** Large volume heavy duty, for water, oil, insecticides and as AUTOMOBILE DRAIN-CASE PUMP. Capacity 150 G.P.H. will draw 26" mercury. With high overload factor. For direct drive, readily replaced with a pulley. 3/4" pipe thread. Data & instruction incl. Stock #75. Wt. 12 lbs. \$9.95 Now.

**Adel Self-Priming ELECTRIC PUMP**  
 For pumping light oils, oil burners, fluid metering, fuel pump, tool post grinder, coolant, pressure lubricating pump, etc. 1/30 H.P. rated 1200 R.P.M. Applicable for 24 V. D.C./A.C. or use on 110 Volt A.C. Size 6 3/4" x 3 1/2" x 3 1/4", rated 3 G.P.H. Diagram and instr. \$9.95 post-incl. \$50.00 val. \$9.95 paid

**ROTARY PUMP** for pumping WATER FROM POOLS, OR BASEMENTS, SUMP, pumping lubricants. For Garden & lawn sprayers. For use with hydraulic cylinders, vacuum, in dental lab, etc. Capacity 180 G.P.H., 200 lb. pressure, 29 in. vacuum, 500 to 3000 R.P.M. Steel shaft Std. 1/2" \$6.95 (Add 50c in. Stock #101. Instr. incl. Postage)

**PESCO CENTRIFUGAL HEAVY DUTY PUMP**  
 Including built in motor. Applicable for 24 V. D.C./A.C. or 110 V. A.C. The motor is explosion proof constructed for gasoline fuel, oils, water, fuel booster, etc. 3/4" hose connection. Rated capacity 400 G.P.H. Instructions incl. Gov't cost \$172.00 \$9.95 Stock #659.

**PESCO FOUR VANE ROTARY LARGE VOLUME UTILITY PUMP**  
 For Water, Oil, Insecticides, etc. including built in relief and pass valve. Capacity 400 G.P.H. 1/2" drive spline shaft. 3/4" pipe inlet and outlets. Rotates either direction or in any position. Engineering data incl. \$7.95 post-(Stock #600) only.

**HYDRAULIC HOSE 2000 P.S.I. PRESSURE FOR OIL, FUEL & AIR. HIGHEST QUALITY.**

Length	Fittings	Tube Size	Price
13"	(3/8" Female)	1/4"	\$ 1.50
37"	(1/4" Female)	3/8"	\$ 6.50
26"	(3/4" M. & Female)	1/2"	\$ 1.50
30"	(5/16" M. & Female)	3/4"	\$ 1.85
22"	(3/4" Union Flare nut)	5/8"	\$ 1.65

Free Hose listing. Write us your requirements. (Big Discount to quantity users).

**HYDRAULIC OIL** In Gallon sealed cans Mfg. by R. M. Hollinghead or Socony Vacuum to exact Gov't Specification. \$1.75 per gal. Wt. 10 lbs. \$1.75 add postage

**Stratopower Constant Displacement HEAVY DUTY PUMP**  
 For operating Hydraulic cylinders, hydraulic motors on tractors, Bulldozers, Construction machinery. Lift trucks. For fuel or oil transfer. Industrial applications, etc. Delivers up to 400 G.P.H. at 3750 R.P.M. Rated 1200 P.S.I. 3750 to 4500 R.P.M. HAS BUILT IN RELIEF AT HEAD. Rotation either direction without adjustment. \$100.00 value. Engineering data and instr. \$17.50 incl. Stock #37. Wt. 8 lbs.

**Stock No. 512**  
 Double action hydraulic cylinder 2 1/2" Bore, 4" Stroke, 3/4" Dia. shaft including built in Hydraulic control valve which may be operated with rod or lever, Clevis mounting. Overall length shaft retracted 14". \$75.00 f.o.b. value. Wt. 9 lbs. \$9.95 KC, Mo.  
**Stock No. 472 — Double action** with built in overload relief. 1" bore, Stroke 4", 7/16" Dia. shaft. Length 8 3/4". A tremendous bargain. \$4.50 post-paid

**Stock #27 — Single Action for Air or Hydraulic** 2 3/4" Bore, 2 3/4" dia. shaft, 5/4" stroke, use as snubber or Hyd. Cylinder. \$35.00 value. \$6.95  
**Stock #11 — Double action** 1 1/2" Bore, 6" Stroke, 3/8" Dia. shaft. Clevis mounting base and shaft end. Capacity 1160 lbs. with 1000 P.S.I. input. \$9.95 post-\$50.00 value.

**Stock #303 — Double Action 2" Bore, Stroke 1 1/4", 1 1/2" Dia. shaft.** Overall length shaft retracted 23". 2000 lbs. capacity with 1000 PSI gives 2800 lbs. with \$14.95 f.o.b. our stratopower. Wt. 14 lbs.  
**Stock No. 12 Hydraulic Cylinder Double Action** output 12560 lbs. with 1000 P.S.I. input. Gives 17584 lbs. with our STRATOPOWER PUMP 1400 P.S.I. or will produce 34168 lbs. with 3000 line pressure. Can also be operated on low pressure system. 4" Bore, 10 1/2" Stroke 1-5/16" Dia. Shaft, clevis mounting. O. Gov't. cost \$300.00. \$25.50 f.o.b. KC, Mo.

**PESCO HYDRAULIC FLOW EQUALIZER & PRESSURE BALANCER VALVE.** Brand New. Guarantees equal flow and equal pressure for two cylinders or two systems. Capacity 360 G.P.H. 1500 P.S.I. Data & instructions incl. A \$75.00 value. Stock 1-D-397 \$14.50 post-only.

**HYDRAULIC CONTROL VALVES**  
**Precision Valve #329.** For controlling a single action or 1 double action cylinder. When lever is in one direction it puts pressure on one cylinder connection and opens exhaust from opposite cylinder. When lever is released it returns to the neutral position and locks cylinder. \$8.95 Post-Brand new.

**VICKERS Four Way Hyd. Control Valve #137**  
 For two double action cylinders allowing operator to raise or lower the both cylinders simultaneously or raise one and lower the other at predetermined rate \$14.50 post-and speed.

**FOUR WAY HYDRAULIC CONTROL VALVE**  
 Poppet type Valve shuts off on neutral position. Has 3/8" A.C. Tube ports - 9/16-20 thread, capacity 1500 P.S.I. Brand \$5.95 post-new. Stock #1032.

**ADEL PRECISION VALVE #10335.** Brand New. This is for a double end cylinder control or for two cylinders that are to work in opposition to each other. \$5.95 post-\$35.00 value.

**Large Volume hydraulic pressure relief valve,** 3/4" ports, spring loaded. Range 1250 P.S.I. adjustable up to 3000 \$4.95 postpaid P.S.I. Brand New.

**PESCO PRESSURE AND RELIEF CONTROL VALVE.** Brand new. Designed with 3 ports and external pressure adjustment. Relief valve is spring loaded, and adjustable for controlling pressure regulation. Has two ports for normal flow, one for relief line to fluid supply or to pump inlet. No. 575. Engineering data incl. A terrific bargain! Only \$4.95 post-paid

**VICKERS PRESSURE RELIEF VALVE.** Brand new adjustable for protecting hydraulic systems using positive displacement pumps. 1/2" AC tube size tapped 3/4-18 thread. Stock \$5.50 No. 501. Postpaid.

**VICKERS UNLOADING VALVE** Brand New—By passes full amount output of the pump while the cylinder is not in operation. Takes starting load off of electric motor driving the pump. 1/2" AC TUBE PORTS \$8.50 post-Price.

**ALTERNATING SHUT-OFF VALVE**  
 Brand New. High pressure. Operates by worm-gear cam operating poppets to alternately close & open either pair of four ports. Standard 3/4" pipe post-ports. \$50.00 value only. \$5.50 paid

**Hydraulic Accumulators — Bendix Ball Type** Dia. 5 1/4". Built to stand 2000 P.S.I. Stock #A-65. Wt. 4 lbs. only. \$5.50  
**BENDIX ACCUMULATOR.** Ball Type. Dia. 1 1/2". Built to stand 2000 P.S.I. Wt. 15 lbs. Stock #A-85. Only. \$15.50

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around this scientifically designed steel form which also provides circulating heat and assures perfect Fireplace operation.

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TELLS HOW TO BUILD YOUR FIREPLACE—Step by Step

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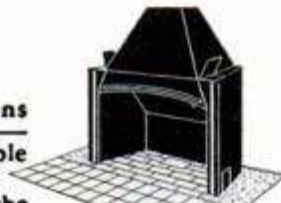
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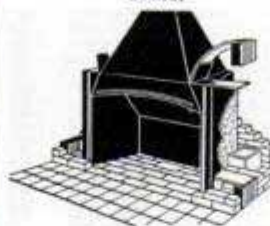
Enjoy circulating heat and the radiance of an open fire in your Home, Playroom, Cottage or Camp.



Foundation



Fireplace form set on foundation includes firebox, damper, down draft shelf and smoke dome.



Brick, stone or cement block can be used around the form.

- Send free directions for building heat-circulating fireplace.
- Send Book "100 Fireplace Ideas." Pocket size book, sent free.
- Send larger book, 8½ x 11, beautifully illustrated, 25c.
- Send outdoor fireplace folder with 10 beautiful designs Free.

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short, sloping hood (only 45 inches from the front of the hood to the lower portion of the windshield). It is an excellent safety feature in that it improves vision directly in front of the car. The average driver can see the road about eight feet in front of the bumper and that's good. Chair-high seats are very comfortable and large doors afford easy entrance. I like the 4½-inch shorter wheelbase for easy parking.

At the front of the hood is a slot through which fresh air can flow directly over the engine to the air cleaner—a good idea.

Both the seat springs and upholstery could be better, as they are not what one would expect in a car in the Dodge price class. Even though there is ample adjustment to the front seat, the method of locking is not good. With the left side of the seat securely locked, the right side tended to shift back and forth.

There is tremendous trunk space. When you press a button, the trunk lid opens automatically and it can be closed without locking.

The gasoline filler cap is at the rear of the body instead of on a fender. This new location makes it easier for a serviceman to reach the opening if he is on the right side.

The test car was equipped with the Gyro-Torque unit, which is a torque converter coupled to a hydraulically operated semi-automatic transmission. I say semiautomatic because Dodge, like Chrysler and DeSoto, still retains the clutch pedal which must be used to engage any gear when starting. Once in action, the shift lever can be moved from Power Range to Drive Range or back without the use of the clutch. There are two forward shift-lever locations—up for the Power Range in which two speeds are available, and back for Drive Range, also with two speeds. Thus the two lever positions enable the driver to select any one of four forward speeds. Once in Drive or Power Range, you start or stop without use of the clutch pedal.

I have three criticisms of the Gyro-Torque. One is that when the switch-starter key is turned the engine will start whether the car is in gear or not. The second is that when the throttle is released, the upshift into fourth gear is very sluggish and takes far too long. This upshift should be faster. My third dislike is that, unlike with ordinary automatic transmissions which will shift with a partial-throttle opening, the throttle must be completely closed before a Gyro-Torque or Gyro-Matic upshift occurs.

The torque converter is excellent and the engine torque is multiplied tremendously so that both fast acceleration and good power on hills or in mud are assured. Below

(Continued to page 274)

**WAR SURPLUS  
and NEW  
MANUFACTURE**

# GENERATING PLANTS

**AVAILABLE for  
IMMEDIATE  
DELIVERY**

**SHOP BY MAIL AND SAVE**

**Large Stock — Many Sizes from 350 Watts to 25 KVA**



**TINY TIM BATTERY CHARGER**  
Item #301 Model 125 to charge 6 and 12 volt batteries — 12 volts — 300 Watts; Heavy Duty Generator; Push button self-starter; Sturdy single-cylinder air cooled Continental 1.3 H.P. engine; 2 qt. gasoline tank in base; Ammeter; Generator cut-out; Concealed coil, etc.; Speed and charging rate control; Attractive orange finish; Weight 93 lbs.; Length 15 1/2", width 11 3/4", Height 14 3/4", F.O.B. Chicago..... **89.00**

Item #183 — 3000 to 4000 WATT GENERATOR SET—FEA-

**TURES — Power for your home or business. Simply connect to power panel or house circuit. • Constant voltage regardless of load. • Push button start or stop. • Easily made full automatic start or stop. SPECIFICATIONS—Size 19"x30"x48". Steel skids, weatherproof housing, requires no building. Wt. 725 lbs. • Hercules 4-cyl. 10 HP gasoline engine. Load governor. Oil filter. Quiet muffler, 6-volt starter, generator. • Hobart 115 volt, 60 cycle, 3000 to 4000-watt generator. Furnishes either single or three-phase power, 2 or 3 wire. • Panel contains oil gauge, voltmeter, ammeter, circuit breaker, voltage regulator, start button. Today's cost over \$1200.00. SALE PRICE, F.O.B. Chicago.....**



ITEM #183

**465.00**

**NEW GROBAN MANUFACTURE  
MODEL 251**

2500 watts, 115 volts, 60 cycles, single phase, A.C. electric generating plant, powered by dependable 6.5 H.P. Wisconsin engine—Two pole ball bearing belt driven high efficiency generator with heavy duty windings for high torque motor starting loads. Rated 3000 watts for intermittent service. Light weight portable rugged unit, easily transported to job site. Consumes 3 quarts of gas per hour at rated load. Dimensions: 24"x20"x24", ship. wt. 220 lbs. Complete with fused outlet box and voltmeter. F.O.B. Chicago... **349.00**



Item #2510

Item #182, Onan Power Unit PE-95C is an electric generating set consisting of a 4-cylinder, 4-cycle, L-head, liquid-cooled, electric starting gasoline engine, directly connected to an AC generator of the revolving field type. Uses approx. 1.1 gal. of gas per hr. at rated load—generator is rated at 5 KW, 60 cycles, single phase. **795.00**

Item #82A, same model as above, with dual voltage 110/220 V. F.O.B. Chicago..... **845.00**

Item #300—Model C1B—3 KW—110 Volts D.C. This mighty mite develops 3 KW—28.5 amps. D.C. Standard Delco generator direct coupled to a Model Z2P Briggs and Stratton 1 cylinder, 5-7 HP, air cooled, rope starting gas engine. Instruments include voltage control rheostat & voltmeter. Ideal for Power Tools. **295.00**  
Wt. 275 lbs. F.O.B. Chicago.....



**LOGAN AIR CYLINDER**

Item #350 — Double acting pneumatic cylinder, 6" bore, 6" stroke, 1 1/2" shaft. Adjustable cushions at both ends. Flange mounting at shaft end. Overall length closed 18". Ideal for use in 125 PSI systems. Shipping weight 40 lbs. F.O.B. Chicago..... **39.50**



**LOGAN 4-Way, Foot Operated AIR VALVE, Item #59, Model 6520—Ideal for operating air vises, presses, air machinery, and other double acting pneumatic devices. Heavy cast construction. Standard 1/2" pipe thread ports. Overall dimensions 8 1/2" x 5 3/4" x 7 1/2". Gov't Acquisition cost \$42.00. Shipping weight 28 lbs. An outstanding buy. F.O.B. Chicago..... **15.00****

**HEAVY DUTY HYDRAULIC and AIR EQUIPMENT**

Large supply of new labor-saving, economical hydraulic equipment in many types and sizes. Use these positive, highly efficient smooth pressure hydraulics on presses, arbors, lifts, loaders, power control, positioning, brakes, plastic dies, auto frame alignment, etc.

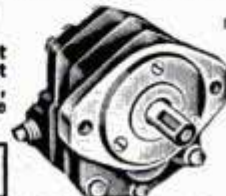
**ALL ITEMS UNCONDITIONALLY GUARANTEED**

ITEM #42—Double action hydraulic cylinder, 4" bore, 18" stroke. Rated lift capacity with 1000 PSI line pressure is 12,500 lbs. Ship. wt. 30 lbs. F.O.B. Chicago. An Excellent Buy for..... **32.50**

ITEM #16C—Double acting hydraulic cylinder, 1 1/2" bore, 26" stroke. Will lift 1760 lbs. with 1000 PSI line pressure. Weight 8 lbs. A \$55.00 value. Now only..... **16.95**

ITEM #1036—Double acting hydraulic cylinder, 3" bore, 36" stroke, 1 1/2" pipe thread ports, 1 1/2" solid steel shaft. Overall length closed 49" clevis mounting at base and shaft. FEATURES • Cup & Chevron Packing • All Welded Construction • Precision Ground and Honed Construction • Will lift 7000 lbs. using 1000 P.S.I. line pressure. F.O.B. Chicago..... **50.00**

ITEM #150—Double acting hydraulic cylinder, 2 3/8" bore, 12" stroke. Use either foot or clevis mounting. Will lift 4400 lbs. using 1000 P.S.I. Overall length 19 1/2". Shipping weight 8 lbs. Postpaid..... **18.00**



Item #55  
**MULTI PURPOSE  
Hydraulic Pump  
or Motor**

Silent, High Efficiency, Helical Gear Type Ball Bearing, Hydraulic Pump or Motor

Rated 8 Gal. Per Min. At 1500 R.P.M.—Delivers—1000 P.S.I. Using 6 H.P.—Reversible Rotation—3/4" Pipe Thread Inlet and Outlet Ports—1/4" Drain Port—3/4" shaft with keyway and flat for either direct or pulley drive. Dimensions—5 3/8" high, 7 1/4" long, 5 3/8" wide. Shipping weight 18 lbs. F.O.B. Chicago..... **45.50**

Item #126 — Four-way, open center control valve with built in adjustable relief valve. Factory set at 1000 P.S.I., spring loaded neutral position, for use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Fully balanced plunger type, smooth, positive, easy operation. Can be used as single unit or mounted in series of any combinations desired. Has 3/4" pipe thread inlet and outlet. 1/2" pipe thread cylinder ports. Newly manufactured to our specifications. Shipping weight 8 1/4 lbs. An outstanding buy! F.O.B. Chicago... **21.50**



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For Stationary or Portable Use  
**HEAVY DUTY RANGE TO 250 AMPS.**  
New 'Magic Terminal' for Low Current 30 to 100 Amps.

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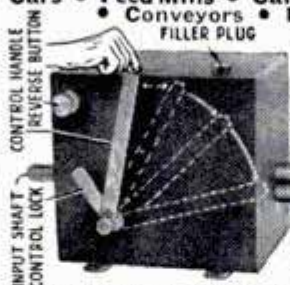
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**USE FOR: • Reamer Drives • Midget Cars • Feed Mills • Canning Machines • Conveyors • Lathes • Milling Machines • Motor Boats • Cream Separators • Garden Tractors • Pumps**



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200 GALLONS PER MINUTE**

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Suction Lift	Head Pressure	Gal. Per Min.	H.P.	R.P.M.
10'	75'	260	6.0	3500
10'	65'	200	5.2	3500
10'	80'	40	1.5	2500
10'	50'	140	5.0	3500
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# How To . . . . BY MASTER

## HOW TO GET ACCURATE LONG MEASUREMENTS



For measurements which are longer than the folding rule you own. Open rule fully. Clamp a piece of lath to the end of the rule as indicated in the sketch (being careful that ends overlap.) Butt free end of rule to one wall, and pull the free end of the lath until it touches the far wall. Tighten wing nuts to hold measurement.

## HOW TO START SMALL SCREWS EASILY



When working with extremely small screws, first insert them through a piece of heavy paper, as indicated in the sketch. When you are ready to use them, hold paper in position so screw is where you want it. Screw it in and tear off the paper. You will find it speeds up a tedious job.

## HOW TO SPLICE A BOARD WITHOUT LOSS IN LENGTH



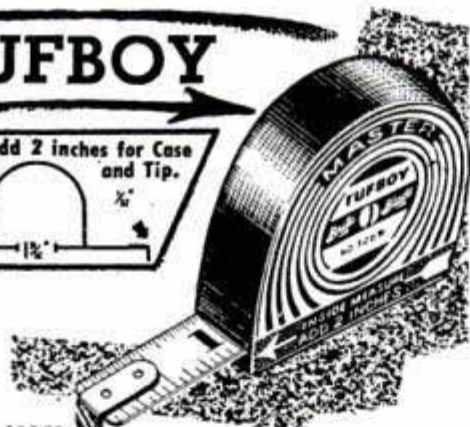
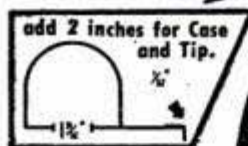
Measure and cut a piece from timber (A) (through the thickness) twice as long as the piece you cut from timber (B). Reverse the pieces as indicated in sketch and fasten securely.

## TUFBOY

● For an inside measurement add 2 inches for Case and Tip.

● Blade replaceable without tools.

● Blade is graduated on both edges.



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Each month we will print the best in home workshop short-cuts. Why not make a card index of them for handy reference? . . . If you would like detailed literature on the points discussed, just drop a card to "HOW TO", c/o MASTER RULE CO., Mulberry St., Middletown, N. Y. If you have a "Short Cut" which you feel should be printed in "HOW TO" send it along. If we use it we will give you a bonus, your choice of any wood rule or steel tape in the Master line. All entries become the property of the Master Rule Co., and will not be returned.

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# MASTER

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WOOD AND STEEL TAPE RULES

speeds of 45 miles per hour, by depressing the throttle you can engage what Dodge refers to as the "scat" gear (actually third gear) which gives faster acceleration for passing or on hills. Unfortunately, this gear does not operate above 45 miles per hour.

Dodge has one oiling system for both engine and torque converter. The 12-quart engine-oil capacity (13 quarts are required if the oil filter is changed) takes care of the oil needed in the torque converter—a unique and trouble-saving feature. The converter is supplied by the engine-oil pump. Dodge recommends that the oil be changed twice a year (spring and fall). (Owners reporting in the survey added one quart of oil on an average of every 1251 miles.) The result of this unusual system is the elimination of a heat exchanger, two separate lubrication systems and one pump.

The Coronet four-door sedan axle-gear ratio is 3.54:1 with Gyro-Torque Drive. The gear ratio on the Gyro-Torque Diplomat model is 3.9:1. Incidentally, the Diplomat and convertible models have 114-inch wheelbases, which is 5 inches shorter than the other models.

Dodge buyers now have the choice of six transmissions: 1. Manual transmission, standard on all models; 2. Manual transmission with overdrive, optional on all models; 3. Manual transmission with fluid coupling, optional on all six-cylinder models; 4. Manual transmission with fluid coupling and overdrive, optional on all six-cylinder models; 5. Gyro-Matic with fluid coupling, optional on all models except six-cylinder station wagon; 6. Gyro-Torque, optional on all Coronet V8 models.

In addition to the new V8 model, Dodge also offers the time-proved six-cylinder 7.1:1 compression L-head 230.2-cubic-inch engine developing 103 horsepower. (Dodge calls it the "Get-Away Six"). ★★★

## Combination Washer-Drier Saves Time and Space

Washing and drying in one continuous operation, a completely automatic laundry unit finishes an average eight-pound load in 68 minutes. The operator inserts clothes and soap and sets two timers. The unit washes, rinses, damp dries or fluff dries, using a simple tumbling action. Safe low heat and high airflow results in minimum insulation and compactness. Only 36 inches wide, the machine is about the same size as an ordinary spin washer. It can be used separately as either a washer or drier and requires the same plumbing installations as any automatic washer. An optional heater will raise the water temperature as much as 25 degrees if necessary.

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 <p>Tiny concentrated crystals that dissolve in water and provide complete, instant feeding action.</p>	 <p>Can be used directly on leaves (even on exposed roots) because it's applied as a liquid.</p>
<p>Like regular Vigoro, new Instant Vigoro is so complete it can make plants grow and thrive even in plain sand.</p>	

**Feeding Instructions:** For foliar (leaf) feeding: Mix one level tablespoon of Instant Vigoro to gallon of water and wet leaves thoroughly. For soil application: Mix two level tablespoons of Instant Vigoro to gallon of water and apply to 12 square feet of area. For applying through water hose: Make a concentrated solution of four ounces of Instant Vigoro per pint of liquid to be metered through the attachment.



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## Cattle Ranch in a Canyon

(Continued from page 128)

"It's tops for two reasons," he says. "It has built us roads on the canyon wall, and carved out new water holes for us."

By 1938 a road had been constructed from Asotin, Wash., down into the canyon to Rogersburg, which had once been the scene of gold-mining booms. This road, though, didn't serve Jidge's ranches in distant draws of the canyon.

Finally, two years ago, Jidge hired men with bulldozers to build his own roads. Contractors refused to bid on the job. They looked at the canyon walls, wildly beautiful but formidable, and shook their heads. Jidge had to pay by the hour.

Before the roads came, just getting salt to the cattle was a sizable chore. For 28 years Jidge rode horseback up the canyon for 20 miles, leading a string of mules to bring in the salt, which he scattered to the cattle on the way back.

Jidge keeps a bulldozer around now in case he finds a moist spot in the ground, indicating an unexploited spring. With the bulldozer he gnaws away at that hint of water until he has another drinking place for his cattle. Today Tippet cattle can choose from 60 springs and 29 ponds.

"If water holes are plentiful, cattle will eat available grass evenly," said Jidge. "You can't adequately distribute cattle with salt. They'll go farther for water than for salt—and when they get to the water they're inclined to stay there."

Besides opening up new springs and ponds for his cattle, Jidge has drilled wells. In the winter he tries to prevent his stock from drinking the icy water of the Snake. But in the summer good use is made of the Snake water for irrigation. On the ranch operated by son-in-law Fouste, water is pumped from the river with a diesel tractor and distributed over hay land through a sprinkler system. The tractor chugs beside the river day and night, but if it is needed for other work it can be uncoupled from the water system in 10 minutes.

For many years, Jidge ran his cattle in the canyon winter and summer, but eventually he saw that the grass wasn't holding out so he began to buy and lease land in the gently rolling Willowa valley of Oregon, high above the canyon. Now, come spring, he drives his cattle out of the canyon to the top-land grass, 75 miles away. The cattle are trail-drifted for three days; for two of those days they are on Tippet land.

In the Oregon country, Jidge has some well-known neighbors—the movie actors

(Continued to page 278)



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**LOOK AT ITS SIZE!  
TABLE IS 42" LONG!**



No chance for big, wide, or long boards to tip up, slew sideways, or slip on this big, solid 42" precision-ground table! 32" fence is longer than most jointer tables!

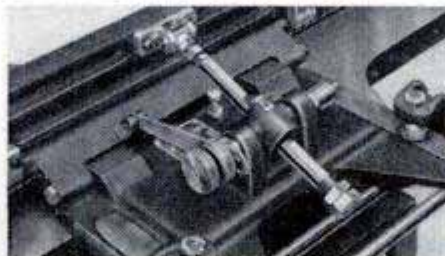
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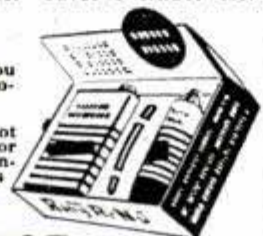
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Walter Brennan and Eugene Pallette. A brother, Jack Tippett, also ranches there.

"The Oregon land is indispensable to us now," says Jidge. "Over-grazing is the easiest way for a cattleman to go broke."

He has developed an elaborate system of shifting pastures, and has built 150 miles of fences at about \$500 a mile. It's too rocky for postholes in the canyon, so posts are simply propped up on top of the ground with boulders. Rock jacks, these supports are called.

With the canyon relieved of summer feeding, the grass grows lush. Little supplemental feeding of hay is necessary during normal winters. Last winter, 1800 head of Tippett cattle in the canyon required only 100 tons of hay, but 700 head left in the high country went through 500 tons.

Jidge is a cattleman from the tip of his pointed boots to the crown of his broad-brimmed hat. He raises cattle—nothing else.

"And when you do that," he comments, "you've got to watch pretty carefully the pounds on each cow. Sure, the price of beef is high today, but so is the cost of raising it."

One way those extra pounds are added is with regular spraying and dipping of the cattle. Jidge is credited with having one of the first dipping vats in the country. The cattle are sent wallowing through chemical solutions to kill lice and ticks, then sprayed when necessary to free them of horn and heel flies.

Jidge has a pet solution for spraying. It's a 50-50 mixture of DDT and alkanite mineral, diluted with enough water so it will flow freely from the spray guns. The alkanite is a powderlike substance which causes the DDT to cling to the cattle for about 90 days.

"It always makes a man feel good to watch cattle which have been nervous from the biting of pests lie down in the pasture after spraying," says Jidge. "It costs us about 15 cents a cow to spray, but from the spraying we figure we get \$6 to \$10 worth of additional beef."

One type of pest that doesn't often bother the canyon cattle is the rustler. It's just too hard for the rustler to get at them. One year, though, a rustler managed to loot the canyon of 80 head of yearlings without getting caught. Jidge hasn't figured out yet how he did it.

"One thing we're certain of," says Jidge. "Cows don't fly."

He sums up their life in the canyon this way: "Except for that one year of thieving and that one year of drought, the canyon has been a good place for the cattle—and us Tippetts." ★ ★ ★

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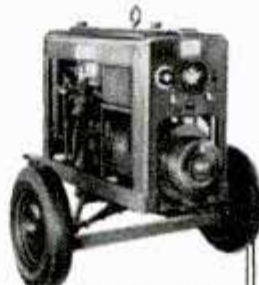
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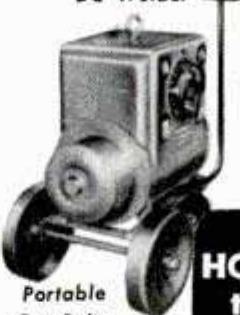
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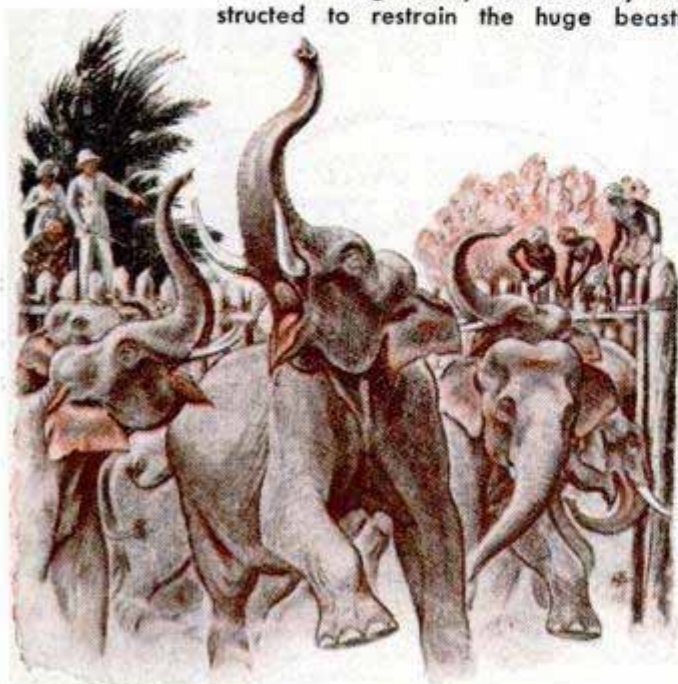
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AC SPARK PLUG DIVISION  GENERAL MOTORS CORPORATION

## Steam Catapult Guns Planes From Carrier Deck

(Continued from page 111)

and made a perfect seal. From the rear of a piston in the tube, a steel arm poked up through the slot and was attached to the front car. Little rollers in front of the arm lifted the belt valve, allowing the arm to move forward.

Another set of rollers behind the arm pisted the belt back in place on a seating of beeswax after the arm had passed. Ahead of the piston, pumps exhausted air from the sealed tube, creating a vacuum. Atmospheric pressure pouring into the tube through the lifted portion of the belt valve provided push and the piston rushed forward into the vacuum. The odd little train hung up a speed of 80 miles per hour and, on a couple of occasions when the brakes were not applied in time, the whole string of cars ran right through the terminal station and out the gates.

The new catapult, instead of removing air ahead of the piston and using atmospheric pressure like the antique train, uses high-pressure steam to provide push. Hence, the belt valve opens into the tube, instead of upward from its surface. Air ahead of the piston is pushed out through a valve at the end of the cylinder, or exhausted by high-speed vacuum pumps to provide even more zing. The Vickers Supermarine Attacker—a heavy British jet fighter—has been launched with the same ease as a two-engine Short Sturgeon.

For the past year, all kinds of pilotless aircraft have been whammed off the deck of the *Perseus* to test the big cat's efficiency. One unpowered plane was tossed skyward with such efficiency that it climbed to 1500 feet and circled the ship for four minutes while everyone ran for cover. They didn't come out until its tank finally ran dry and it dumped in the sea. To date, more than 1000 concrete weights and unpowered planes have been successfully launched by the steam catapult. More than 200 piloted craft have soared skyward under its mighty push. Pilots describe it as a "hot" ride, but smoother than a standard cat, due, they believe, to the resilience of the steam and the steadier build-up of speed.

Indications are that the United States may use the steam catapult for her existing and proposed supercarriers. The British are hoping to fit it into aircraft carriers of the Royal Navy and the navies of Canada and Australia, in order to give new supersonic fighting planes the liveliest heave ho in history. ★ ★ ★

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**SET 30** selected H. S. Straight Shank Drills 6L from 1/8" to 1/4", lengths up to 7". \$2.98 PPD.  
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 These new and used H. S. precision Drills with 1/2" shanks can be used in a 1/2" elec. drill or a 1/2" capacity lathe or drill press.

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"**First look for seams.** At places where you'd expect to feel seams (where fenders join body, etc.) there are *no* seams. The joints which join the body's top, sides and bottom are welded to form *one* solid unit. This eliminates seams which could hold moisture and form rust."



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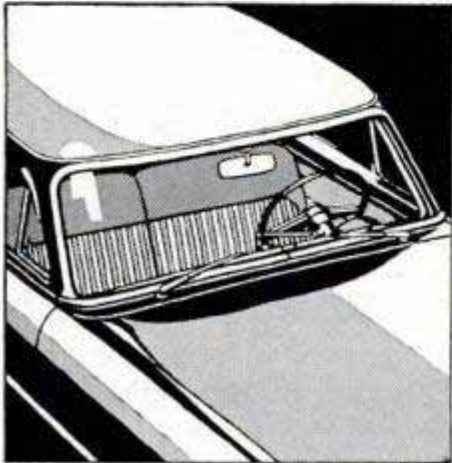


"**Now open the door.** The door corners are curved. This permits the use of a continuous band of rubber weather-stripping, for a tighter fit. Ford's push-button rotary door latches are the most modern design . . . let doors open easily . . . stay closed safely."

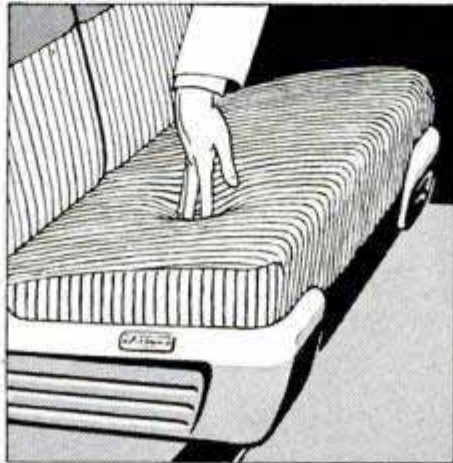
*Worth more when you buy it . . . Worth more when you sell it!*

# '53 Ford

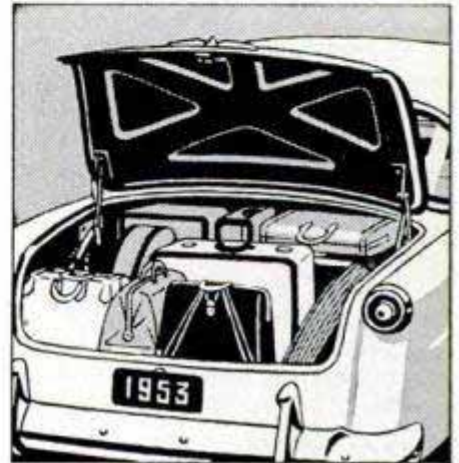
# the quality body” says Dr. Roy K. Marshall



“Ford’s one-piece windshield is smoothly curved in one solid piece to give you unobstructed, undistorted visibility. The same is true of the car-wide rear window. And the side windows are big picture windows which let in all the scenery.”

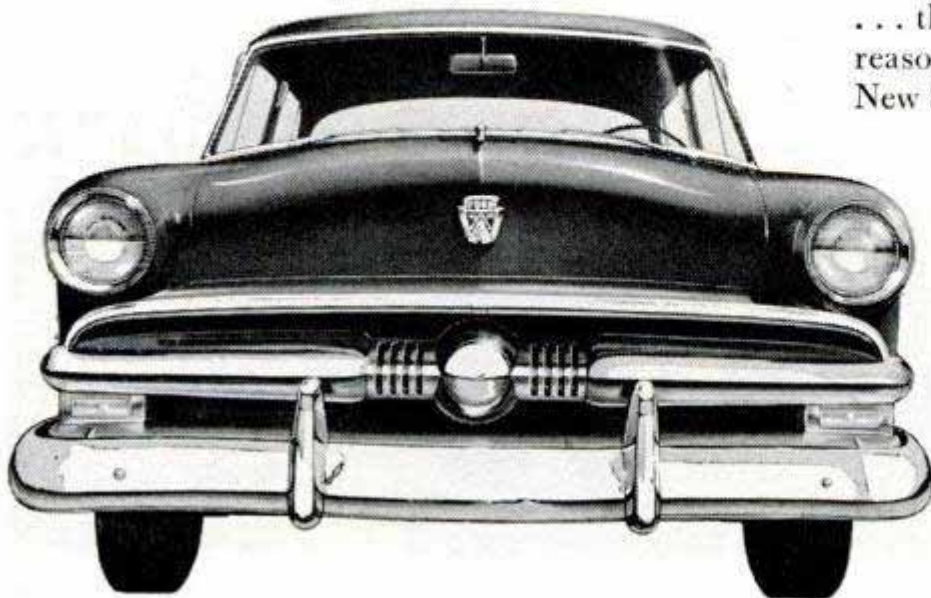


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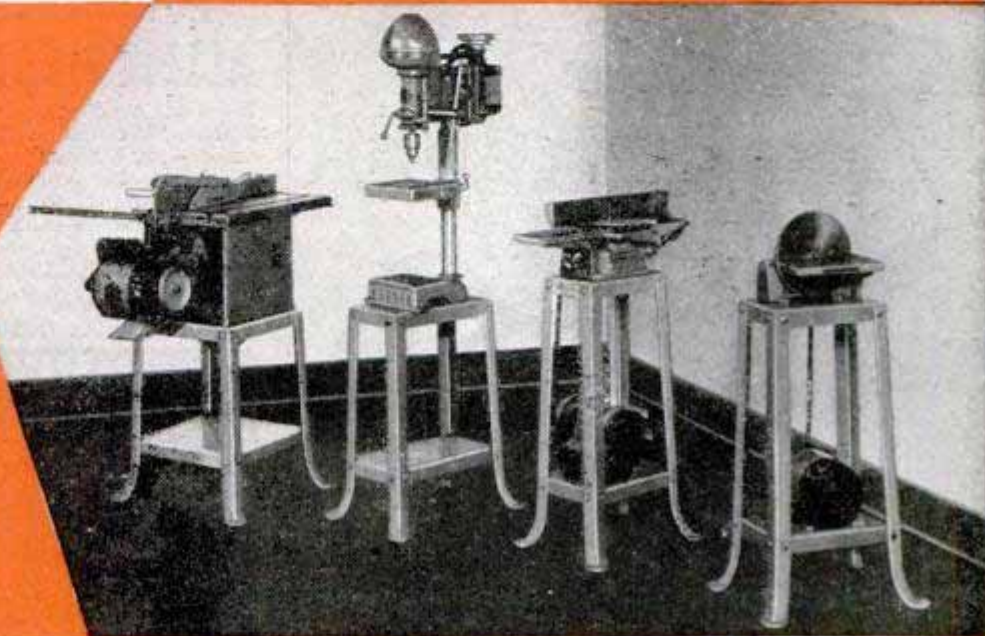
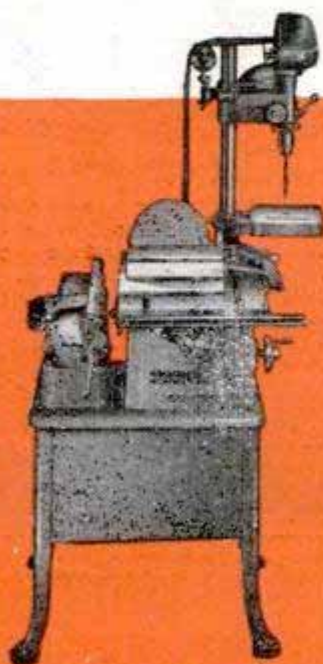
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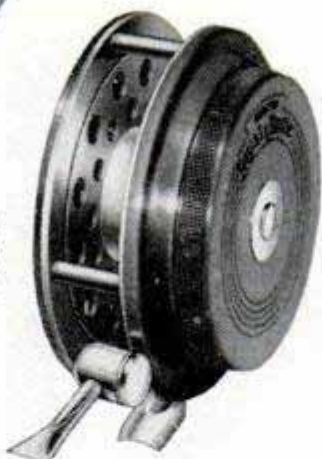


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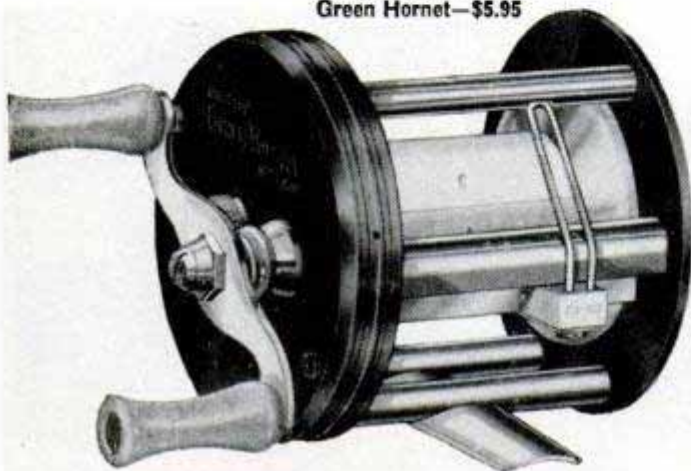
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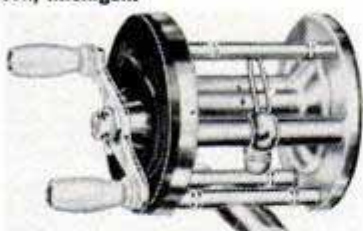
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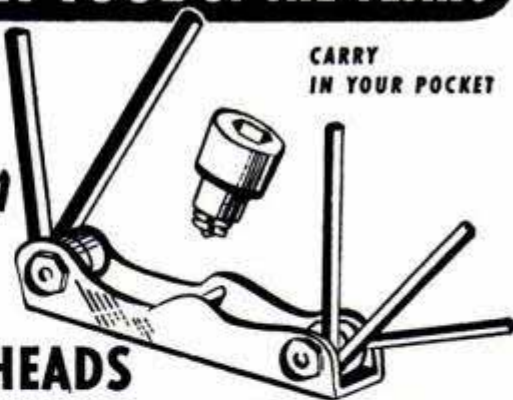
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**ECONOMY MFG. CO.**  
DEPT. P STONE MOUNTAIN, GA.

### Made \$2,600 Last Season

"Last year we sharpened and repaired about 1000 lawn mowers for a net profit of \$2,600," says E. G.

**FREE PLAN** tells how to start in spare time. **FREE BOOK** shows how to sharpen all power mowers. You make 99% profit! Low prices—easy payments. Write

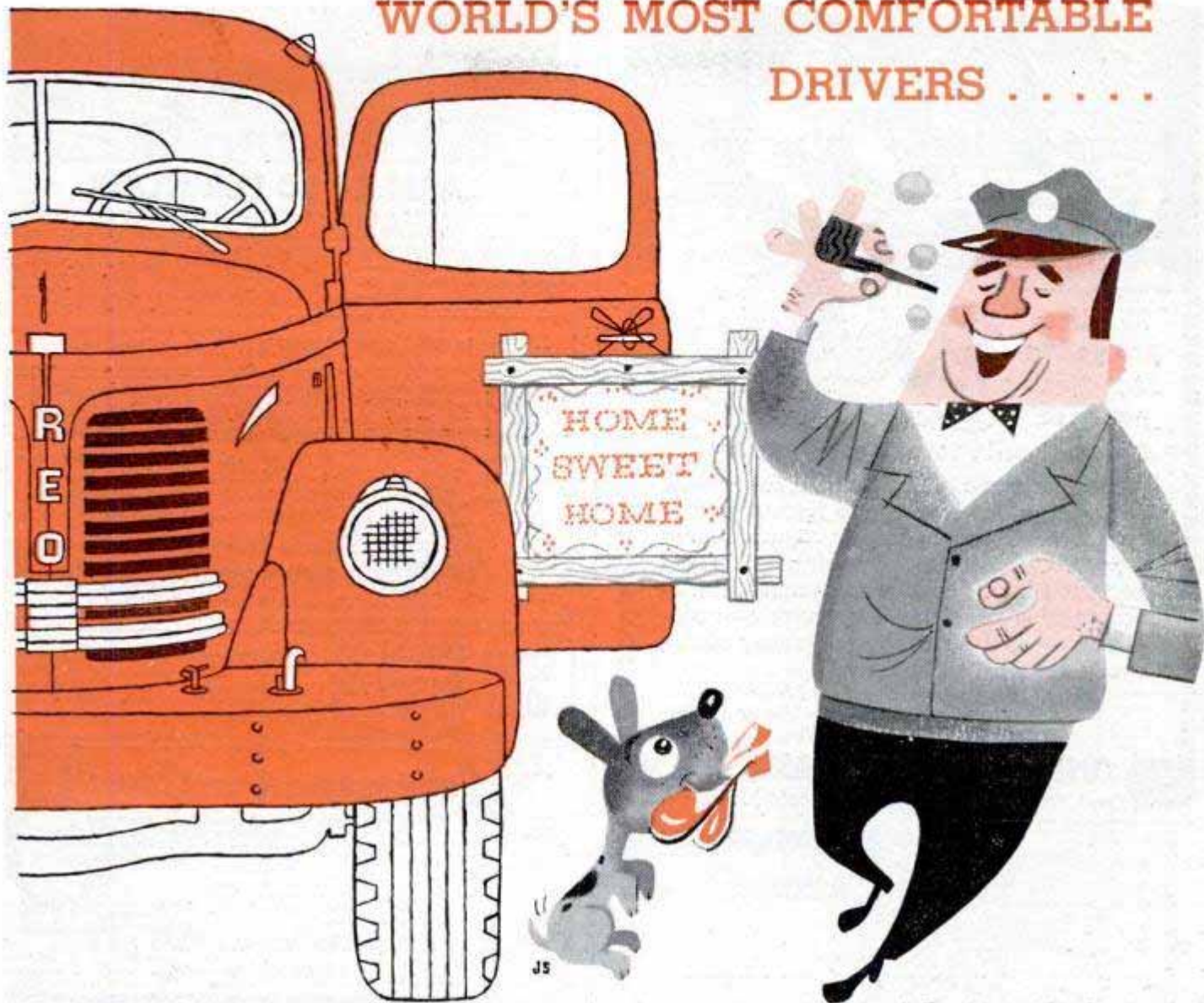
"I have made a good living and have put money in the bank besides!" writes W.T.J.

**FOLEY MFG. CO.**  
307-3 Foley Bldg.  
Minneapolis 18,  
Minn.



**FOLEY LAWN MOWER  
SHARPENER**

*Thru REO'S doors pass the*  
**WORLD'S MOST COMFORTABLE**  
**DRIVERS . . . . .**



**THE IMPROVED REO CAB GIVES YOU THE  
 SMOOTHEST, SAFEST RIDE IN AMERICA!**

Reo took your word for it! In re-designing the improved Reo cab, we asked truck drivers what they wanted...and here are all the vital features you need for greater driving safety and comfort. New increased head and leg room! New full 30" door opening. New more comfortable steering wheel angle with unobstructed driver viewing! New dependable electric windshield wipers with 103 degree action! New spacious utility compartment and cab cor-

ner pockets! New factory applied undercoating for quiet, fatigue-free driving! New full foam rubber seat back in all tractor models! Frankly, it's sensational. But don't take our word for it. Test drive a new Reo. Sit in the new executive driver's seat and see for yourself. (P.S. If you want to get the boss man interested tell him to check on the sensational power and economy of Reo's Gold Comet engine.)

**REO MOTORS, INC., Lansing 20, Mich.**

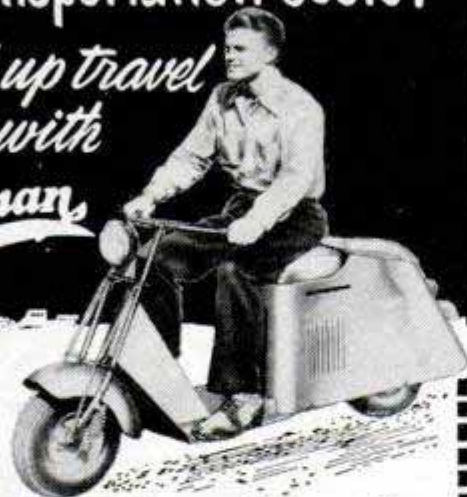
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*Haul of Fame!*

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Speed up travel  
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*Cushman*



75 miles  
per gallon  
40 miles  
per hour

**3/4¢ per mile total operating cost!**

You'll get there quicker and cheaper with a Cushman, powered by the famous penny-stretching Cushman Husky engine. It's no wonder Cushman is the world's best transportation buy! Drive a Cushman—eliminate parking problems. Dependable—economical—you'll be time and money ahead every day with a Cushman!

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Kitchens  
Bathrooms  
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Dens  
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## Do it yourself with Marlite!

You can do a professional job in a few hours with Marlite plastic-finished wall and ceiling panels. Large, economical panels go up fast over old or new walls with ordinary carpenters' tools. Permanent, soilproof finish is easily cleaned with a damp cloth. See genuine Marlite in a wide variety of colors and patterns at your building materials dealer.

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Subsidiary of Masonite Corporation

**FREE!** Mail a postcard for "How-To-Do-It" instructions and full color remodeling folder.



# Marlite®

PLASTIC-FINISHED  
WALL AND CEILING PANELS



## EARN \$6.00 PER HOUR

At a cost of 20¢ with the NEW JENZ SUPER CHIEF STEAM CLEANER. Portable—No moving parts—Cleans anything—Any place—Motors—Chassis—Machinery—Floors—Buildings—Oil Rigs, etc.—Oil fired—Economical—Fully tested and warranted. 75 lbs. steam in ten min.—Model 90. Complete as illustrated..... **\$388.50**

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Precision-built to perform better over the years. Free Catalog.

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The Gem Maker comes complete with all necessary equipment, including a super-charged diamond blade for sawing, and all wheels for grinding, shaping and polishing; also complete instructions. The complete equipment as shown, less motor and belt, for only \$29.50, f.o.b., Burlington, Wisconsin. Write today for information and literature.

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- Frees Sticky Valves
- Stops Hydraulic Valve Clatter

Buy it at your favorite gas station

Use Easter Seals. Help Crippled Children.



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### When You Use WRAP-ON ELECTRIC HEATING CABLE

Protects to 35° Below Zero

No more worry, expense or inconvenience from frozen pipes! Just wrap plastic coated cable around exposed or shallow underground pipes and plug into 115 volt outlet. Maintains low heat — like electric blanket. Uses only small current. Thermostat turns on only when needed. No radio or TV interference. Low prices — complete with connections. Satisfaction or money back.

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Only Dremel Offers All These Features:

- WORLD'S FINEST FINISHING SANDERS**—Patented Straight-Line Action sands with the grain of the wood—eliminates cross grain scratches and orbital swirls.
- MORE SANDING SURFACE PER DOLLAR** means more work done. Faster action (14,400 sanding strokes per min.); more than three times as fast as other type sanders!
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**FREE SANDING GUIDE**  
A handy, 16-page "How-to-do-it" booklet containing helpful hints on sanding and refinishing procedures packed FREE with each Dremel Sander. Extra copies, 25c.

**MAKE THIS SIMPLE TEST!**  
Sand a piece of wood, by hand, using the four different sander motions illustrated below. Note how the slightest cross-grain action produces scratches and swirls... how sanding *with-the-grain* leaves a scratch-free, satin finish. This test proves conclusively why professional craftsmen *always* sand with the grain of the wood... never cross grain. **YOU BE THE JUDGE!** If you are not 100% convinced that Dremel straight-line action is the finest, most effective sanding method known, we sincerely don't want you to buy.



**MODEL 2000**  
Heavy-duty model; 21 sq. in. (31 $\frac{1}{8}$ "x7") sanding base. Price includes sturdy steel storage case, 25 asst'd. abrasives, **\$24.50** polishing pad

**MODEL "A"**  
Hobby and household model sander, polisher, massager (above, right); 12 sq. in. (2 $\frac{3}{4}$ "x5 $\frac{3}{8}$ ") sanding base. Price includes 6 abrasives; 1 polishing pad, 1 massage pad **\$14.85**

**AMAZING FOOT-A-MINUTE (7,200 Strokes Per Min.) CUTTING SPEED!**

**FREE PLANS!**  
Make your own Jig Saw Table. Complete plans and six project patterns included FREE.

Only **\$5.85** with 3 saw blades

**FREE PROJECT PLANS**

**A Rugged Tool for Home and Shop DREMEL Electric MOTO-SAW**

Here is a genuine craftsman's tool with dozens of household and workshop uses. It is perfect for all sorts of coping and jig saw work; making window valances, knickknacks, hobby projects, etc. High-speed, reciprocating-type motor easily cuts asphalt and rubber tile, also masonite and formica — wood up to  $\frac{3}{4}$ ". Perfectly safe for children — so easy to handle that women love to use it. Has only two moving parts, never needs oiling. A high quality tool used by craftsmen, tile layers, and carpenters.

**"A TOOL THE WHOLE FAMILY CAN ENJOY"**

Cuts scrolls like magic!

**SEE YOUR LOCAL DEALER:** Dremel Tools are sold at better dealers everywhere. If your dealer can't supply, order direct on a five-day trial, money-back guarantee. Remit in full, and we will ship postpaid. Or, send only \$2.00 now, pay postman balance plus postage and C.O.D. fee.

**DREMEL MANUFACTURING CO. DEPT. 113-C RACINE, WISCONSIN**

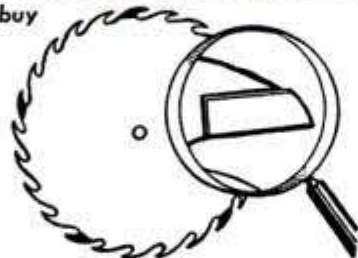
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IN A FEW MIN. FOR ONLY \$1.00

Complete kit, nothing else to buy

**8 genuine Tungsten Carbide tips, flux and alloy included with instructions.**



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**—ORDER TODAY! FROM CARBIDE HEADQUARTERS!**

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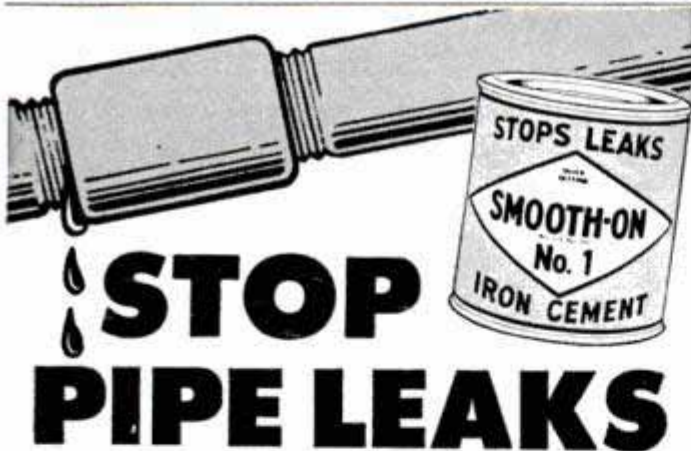
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Carbide Saw Kit @ \$1.00       Free Catalogue of Tools

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# STOP PIPE LEAKS

with Smooth-On No. 1 Iron Cement. For over 50 years a home repair stand-by for stopping steam, water, oil and gas leaks in boilers, furnaces, tanks, stoves, etc. and for tightening loose parts. Get a 1 1/4 oz., 7 oz., 1 lb. or larger size at your hardware store and keep it handy.

**FREE 40-PAGE REPAIR HANDBOOK**

Shows many useful repairs you can easily make around the house and on the car. 170 pictures. Write NOW for free copy.

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Do it with **SMOOTH-ON**  
THE IRON CEMENT OF MANY USES



No. 10-W  
\$2.60

## Double-Lever Action Locks Jaws with TON-GRIP

Look INSIDE the most useful tool in the world! Only Double-Lever action could provide Ton-Grip. See how a squeeze of the hand locks jaws to work! Won't slip. Can hold, twist, bend, pull, ratchet, cut! How you'll USE it! 7" and 10" only \$1.85 to \$2.60. At your hardware dealer.

Manufactured Only By

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## SET-UP - KNOCKDOWN SAWHORSE with Jiffy BRACKETS



No nails or bolts... use 2x4's for legs, 2x4 or wider for crossbar. Rugged, sturdy, easy to move, saves storage space. Sold by hardware and building material dealers, or order direct.

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Cards, stationery, circulars, tags, labels, photo and movie titles, advertising, etc. Save money. **Print for Others, Good Profit!** easy rules sent. Raised Printing like Engraving, too. Sold direct from factory only. Write for free catalog of outfits and all details. **KELSEY PRESSES, M-37, Meriden, Conn.**

## NEW, IMPROVED CALCULATOR FOR WOODWORKERS only 25c

Instantly gives information on lumber, nails, concrete mixes, painting materials, etc. Convenient, simple to read. Just set dial for nail specifications, to convert linear to board feet, find bit sizes for screws, compare characteristics of woods. 6" diameter heavily varnished cardboard. Send 25c, no stamps, please to Greenlee Tool Co., 2103 Columbia Avenue, Rockford, Illinois.

**Buy happiness for crippled children. Use Easter Seals.**

**SAVE MONEY! Prevent Costly Repairs!**



**Detek-Tro-Lex**  
Gives You Immediate Warning of Dangerous Electrical Faults

Dial shows battery state of charge, faulty cells, hot generator, defects in voltage regulator; loose connections, short circuits. Gives advance warning, preventing costly repairs. Easily installed. Fully guaranteed. At your dealer's or order direct... \$13.75 postpaid (cash with order); specify 12-volt or 6-volt.

**IMPORTED MOTOR CAR CO.**  
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# OLD FRIEND OF OLDSMOBILE



1911 Autocrat Roadster



1921 V-8 Sport Roadster



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**AC Spark Plugs are  
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on nearly as many  
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**AC** Spark Plugs have been used on every Oldsmobile since 1911. And AC engineering advancements have kept pace with today's high-powered, high-compression engines like the 1953 "Rocket." These modern ACs have insulators of patented **CORALOX**, the material that has made all previous types of insulators obsolete. **CORALOX** gets hot quicker to burn away oil and wet carbon deposits . . . resists the deposits of oxide coatings from fuels . . . stays clean longer . . . provides 4 times greater heat conductivity . . . has 3 times the mechanical strength . . . 10 times greater electrical resistance at high temperatures. These outstanding **CORALOX** advantages mean:  
**GREATER GAS ECONOMY—SMOOTHER PERFORMANCE—LONGER PLUG LIFE**



1953 Oldsmobile FIESTA—  
Exciting New Sports Car



PATENTED  
**CORALOX**  
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# PEEL OFF PAINT with Klean-Strip



**New-type  
remover is fast,  
safe, clean, and  
easy to use!**

**No wash! • Non-inflammable!**  
Sold at leading paint, hardware and  
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**KLEAN-STRIP TAKES OFF ANY FINISH**

**make it with \$4..**  
worth of sand and cement

**SELL IT FOR \$90**

**manufacture  
much-wanted  
concrete outdoor  
fireplaces in your  
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**\$4 worth of  
sand & cement  
& only \$12.50  
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this beautiful  
fireplace!  
Maker sold it  
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### your own business at home

No experience needed. Exclusive Molds and Process available only to franchised dealers. We supply full instructions and equipment, 2 days free instruction. Your franchise fully protected. Two men can make 5 fireplaces daily. You can sell all you produce . . . for \$90 to \$180! We help you get started,

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. . . and we'll gladly arrange for convenient monthly payments for the balance.

**ACT! Write Now For Details on Valuable Protected Franchise, Your Area. Reserve Your Territory Today!**

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**Steel-Grip  
INDUSTRIAL  
Safety Apparel**

To be Sure of the Genuine  
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## Asbestos Gloves for HOT Jobs

Handle hot things with safety. Wear Industrial's famous 200-14 asbestos gloves. Made of 2½ lb. Underwriters Grade cloth that resists burning. Big roomy cut, airy and comfortable. One piece construction with no seams at wrist or working edges to burn or pull out. Furnished lined or unlined. Over 40 years experience in designing safety apparel made these dependable gloves. Many styles. Write for catalog.

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Every fine Fuller steel screw driver and wood chisel has our famous unbreakable amber handle. Fully guaranteed. At hardware stores everywhere. Wholesale Distributors! Write for Catalog Pages & Prices.  
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World's largest makers of Amber-Handle Tools  
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**MAGNETS** OF ALL TYPES — 10c UP  
AMAZINGLY POWERFUL!  
6 ounce horseshoe magnet—\$1.50.  
Our Leader, 1 lb. magnet lifts 40  
lbs. \$2.95. New alloy—will not wear  
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jakes, or rivers easily! 7 small magnets \$1.25 with  
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**DRAIN WASH TUBS, CELLARS, CISTERNS  
IRRIGATE—FILL TANKS—DRAW WELL WATER**

Pumps 2800 GPH. 420 GPH at 75' High or 1600 GPH from 25' well. Sturdy, Rustproof Alloy Metal. Six Blade Impeller. Uses any 1/8 to 1/2 H.P. Motor. Will not leak or clog. Fits any garden hose. Immediate Money Back Guarantee. Send Check, M.O., or C.O.D. **895 IN U.S.**

**MOORE MANUFACTURING CO.**  
SWEDSBORO 1 NEW JERSEY



## UP TO 6 MILES MORE PER GALLON

Reported by Hundreds Using  
**MIRACLE ACTION TUR-B-LIZER**

Carburetor specialists say Tur-B-Lizer is best patented improvement they have seen. Tested in over million miles of driving. Write for full facts or send \$3 for 6 cyl. type, \$4.50 for 8 cyl. Easily installed. Try Tur-B-Lizer in your car. If you do not notice immediate improved performance and gas savings claimed by users, your money will be refunded.

**Mechanics—Salesmen: Make good money full or part time. Write for best territories now.**

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## TOP SPEED For RACING or FUN

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 (7½ to 50 HP). Write for FREE 1953 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-73, Grand Rapids 3, Mich.



# ENTER \$1,000.00 CASH SYNCRO SANDER CONTEST

IT'S EASY!

IT'S FUN!

NOTHING TO BUY!

WIN one of these 43 CASH PRIZES!

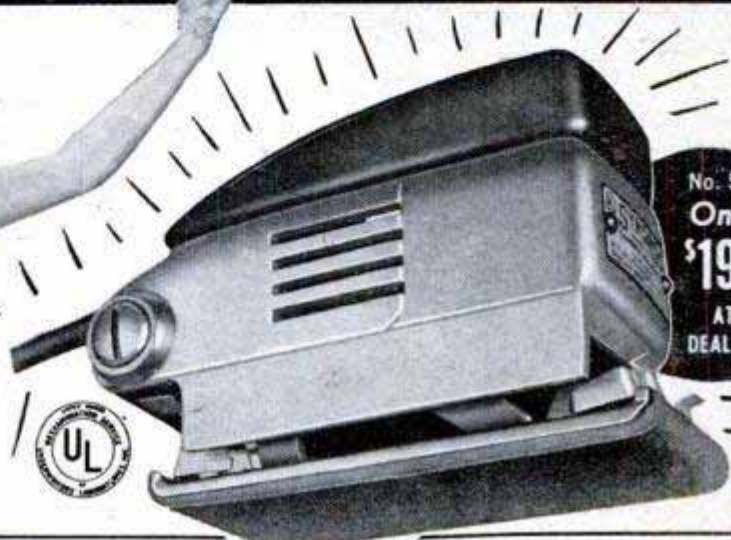
- 1st Prize **\$500**
- 2nd Prize **\$200**
- 3rd Prize **\$100**
- 40 Prizes **\$5 Each!**

### HOW TO ENTER

(1) Find the correct "missing" Jingle Words. It's fun—easy! Look for them *now* below sander picture in type following "Syncro Sander Features."  
 (2) Complete the Contest Sentence in 15 additional words or less. (3) Give hardware store name. **That's all!** Use "Ad Entry Blank" or plain paper—send it direct to Syncro. **OR** use Entry Blank printed in Free Contest Folder—get at dealers' or mail Ad Coupon. Send no money — no wrappers — and there's **NOTHING TO BUY!**

### BRIEF CONTEST RULES

• Judges: WALT DURBAHN, master craftsman, TV star; RUSSELL JOHNS, Publisher; HARRY J. HOBBS, Publisher. Their decision is final. • Prizes Awarded on combined basis of correct Jingle completion plus aptness of thought in finishing Contest Sentence in 15 additional words or less. • Period: Contest starts March 1, 1953, ends May 31, 1953. All envelopes bearing Entries must be post-marked not later than midnight May 31, 1953. • Prize Winners notified and paid soon after June 15, 1953. • Contest limited to Continental United States.



No. 504  
Only **\$19.95**  
AT DEALERS

**SYNCRO SANDER FEATURES:** Sands 10 times faster than hand-sanding. SMOOTHER finish, too! Proven best for vertical and overhead use because it is so powerful, so much LIGHTER. Syncro is the only electric sander with Double-Arc motion which cleans as it sands. Works so easily you "finger-guide-it!" Save money and TROUBLE doing your own refinishing at home with Syncro. Just remember—Syncro is the only sander giving you a GUARANTEE which says, "Syncro Power Units guaranteed against burn-out all during your ownership or replaced free!" (The Missing Jingle Words are among those you have just read).

Isn't this FUN! Nothing to buy — no wrappers or labels to send—just a few minutes of your time and you may WIN one of the 43 CASH PRIZES totaling **\$1,000!** Just correctly complete the Missing Words Jingle—finish the Sen-

tence (both shown in Coupon-Blank below) and mail your Entry now! Or send Coupon for Free Contest Folder—or drop in at your nearest hardware to TRY a Syncro Sander and get a FREE Contest Folder. *Hurry!*

**\$1,000 CASH CONTEST FOLDER FREE AT HARDWARE STORES OR SEND COUPON!**

### Use As ENTRY BLANK or INFORMATION COUPON

Fill-in missing words of CONTEST JINGLE:

**SYNCRO SANDER HAS A LOT OF FEATURES OTHERS HAVEN'T GOT:**

S \_\_\_\_\_ ER, L \_\_\_\_\_ ER, \_\_\_\_\_ -FREE PLUS AN HONEST \_\_\_\_\_ EE!

Complete This SENTENCE in 15 additional words or less: I LIKE SYNCRO SANDER BECAUSE \_\_\_\_\_

Hardware Store Name \_\_\_\_\_

MAIL TO SYNCRO CORPORATION, OXFORD, MICHIGAN Contest Dept. D-33

Your Name \_\_\_\_\_

St. & No. \_\_\_\_\_

City \_\_\_\_\_ STATE \_\_\_\_\_

I'll enter LATER Send FREE FOLDER

**SYNCRO ELECTRIC SANDERS**

SYNCRO CORPORATION CONTEST DEPT. D-33 OXFORD-MICHIGAN USA

SYNCRO POWER UNITS GUARANTEED AGAINST BURN-OUT DURING YOUR OWNERSHIP OR REPLACED FREE!

# SELF-CONTROL STARTS HERE



AND TO RESTORE  
CAR PERFORMANCE

## OIL-CONTROL STARTS HERE

To stop oil-pumping, replace worn engine  
connecting rod bearings

Things aren't always what they first appear to be . . . an oil-pumping engine, for example. You may blame the piston rings for oil pumping caused by worn engine bearings. *Correction must start at the worn bearings.* When bearings are worn, they decrease the efficiency and shorten the life of the best of new piston rings. Give new rings a chance to do their own job—check for worn bearings, too! Replace, in sets, with Genuine Federal-Mogul Oil-Control Bearings, for renewed power and economy. Ask your mechanic!



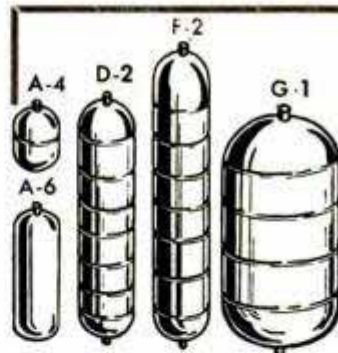
**FEDERAL-MOGUL SERVICE**  
(Division of Federal-Mogul Corporation)  
DETROIT 13, MICHIGAN

CONTROL OIL-PUMPING  
WHERE IT STARTS—REPLACE WITH

# FEDERAL-MOGUL

OIL CONTROL

## BEARINGS



# STEEL AIR TANKS

Steel pressure tanks suitable for compressors, pneumatic units, gases, hydraulics, and liquids. Rated at 500 lbs. per square inch pressure. 1/4" standard pipe thread openings on tank ends as shown.

				Size	Wt. Lbs.	Internal Volume	Price
A-4	Carbon Steel	—New	7 1/2"	5 1/4"	1 1/2	104 cu. in.	\$1.50
A-6	Carbon Steel	—New	14 1/2"	5 1/2"	3 1/4	280 cu. in.	3.50
D-2	Stainless Steel	—New	24"	x6"	5	500 cu. in.	5.50
D-2A	Carbon Steel	—New	24"	x6"	5	500 cu. in.	4.50
F-2	Stainless Steel	—New	45"	x6"	11	1000 cu. in.	9.50
F-2A	Carbon Steel	—New	45"	x6"	11	1000 cu. in.	8.50
G-1	Stainless Steel	—New	24"	x12"	18	2100 cu. in.	11.50
G-1A	Stainless Steel	—Used	24"	x12"	18	2100 cu. in.	9.50

Prices F.O.B. Chicago. Include approx. postage on orders paid for in advance. C.O.D. orders enclose 25%, balance sent C.O.D.

**U. A. S. Corp.** Dept. PM3 5637 W. 63rd Pl.  
Chicago 38, Illinois



### CAR OWNERSHIP COSTS LESS WITH A HULL AUTO COMPASS

It's easy to make a wrong turn without a Hull Auto Compass, drive blocks or miles before getting straightened out. Wasted miles add up amazingly . . . which is why a Hull Auto Compass pays for itself over and over. Write for local dealer's name, free literature.

**HULL MFG. CO.** P.O. Box 246-D3  
WARREN, OHIO

**Beaconlite** \$6.95  
ILLUMINATED  
**STREAMLINE** \$4.95  
STANDARD (not illus.)

## ONE-MAN SAWMILL LOW \$50.00 AS . . . 50.00 DOWN



Take BELSAW Portable Sawmill right to the trees—turn out valuable lumber for local yards—do "custom sawing" for neighbors. BELSAW lasts a lifetime. No crew needed. Power with old auto engine. Beginners get excellent results. Send postcard for FREE BOOK, "How To Make Lumber."

**BELSAW MACHINERY CO**  
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AT  
YOUR  
DEALER

# BULL-TOOLS

Largest mfrs. of elec. drill accessories

Bertram Engineering Co., Kansas City, Mo.

## WINDOW SCREENS FOR . . .

When you're in the car — driving, parked, napping, or at an outdoor movie, you can keep bugs out and still get lots of fresh air. Gary Insect Guards (Pat. No. 2,619,168) will fit all cars except hard tops and convertibles.

ONLY  
**\$1**

EACH  
POSTPAID

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Use Easter Seals. Help Crippled Children.

## POWER MOWERS & KITS

FREE  
PLANS

LOW FACTORY  
PRICES DIRECT  
TO YOU

3 & 4  
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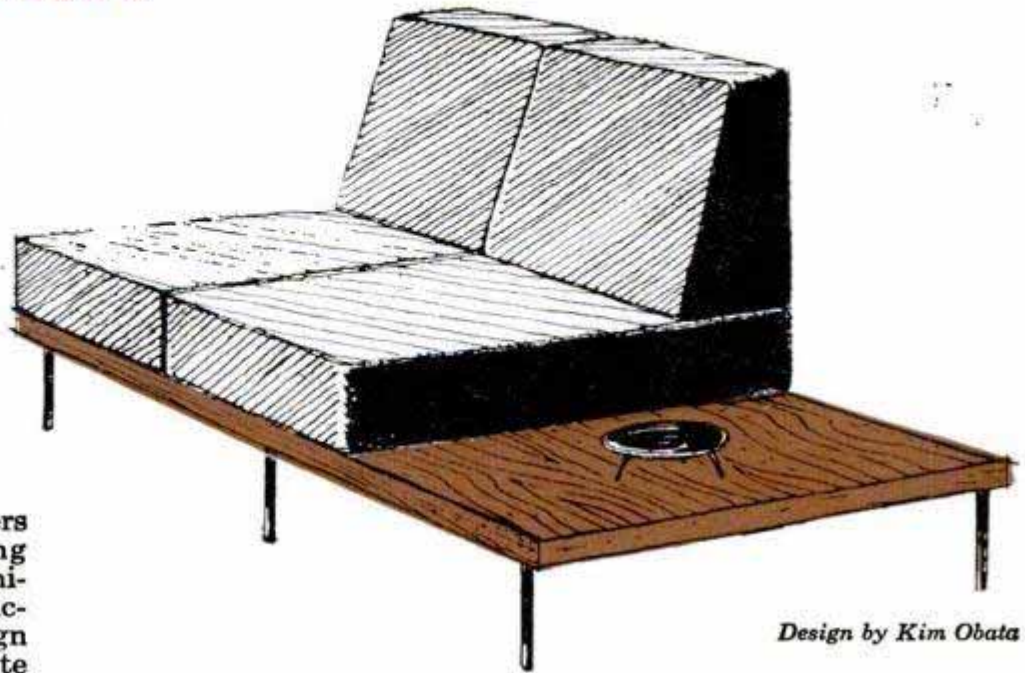
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*Design by Kim Obata*

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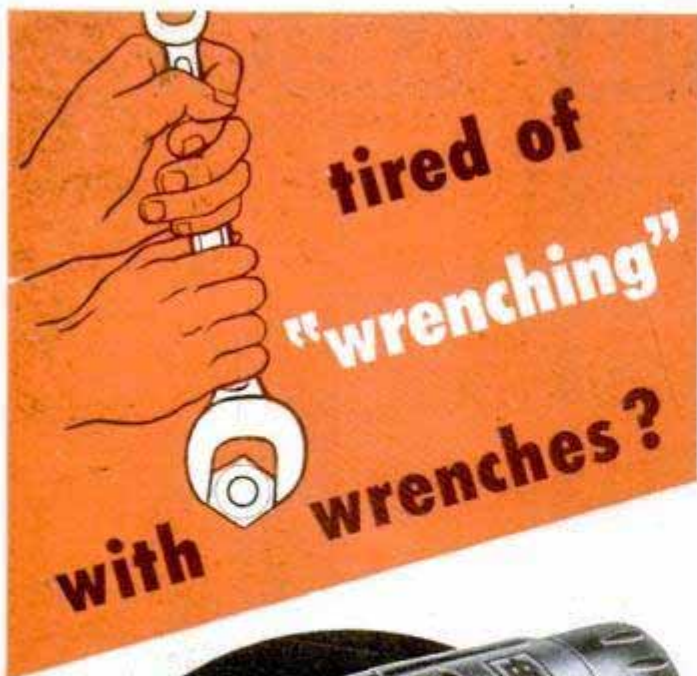
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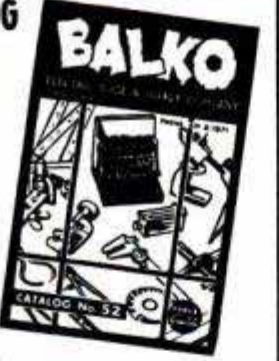
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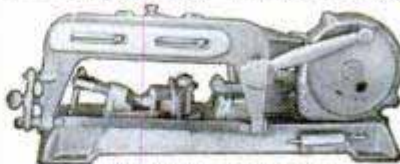
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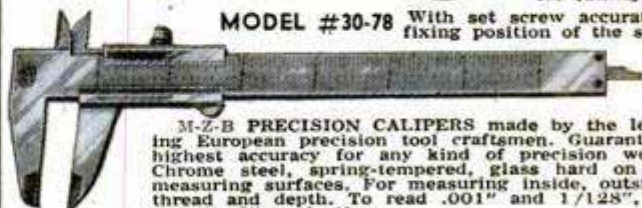
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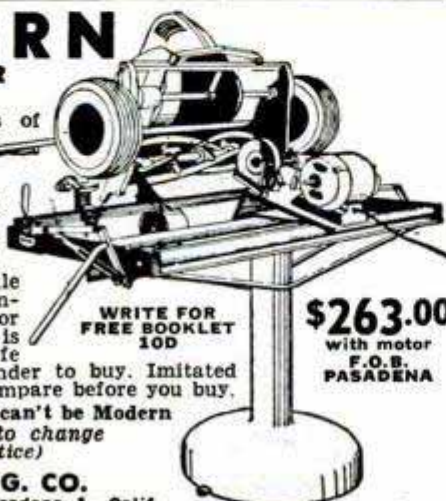
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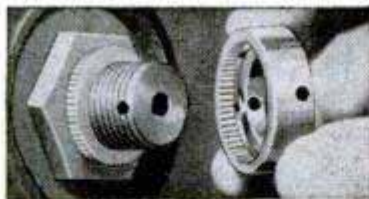
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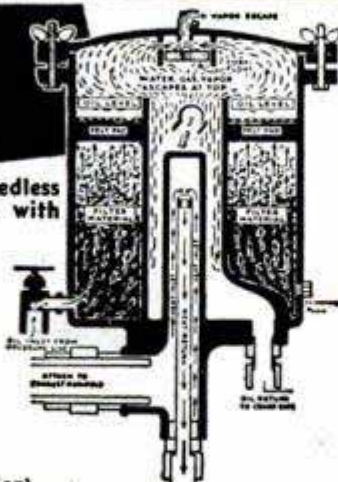
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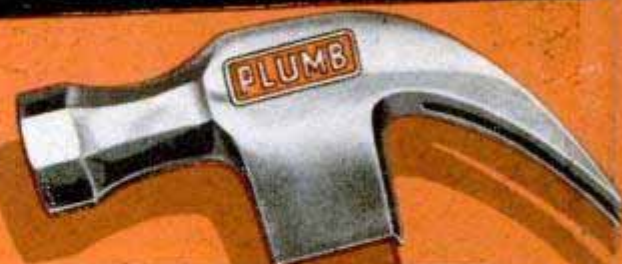
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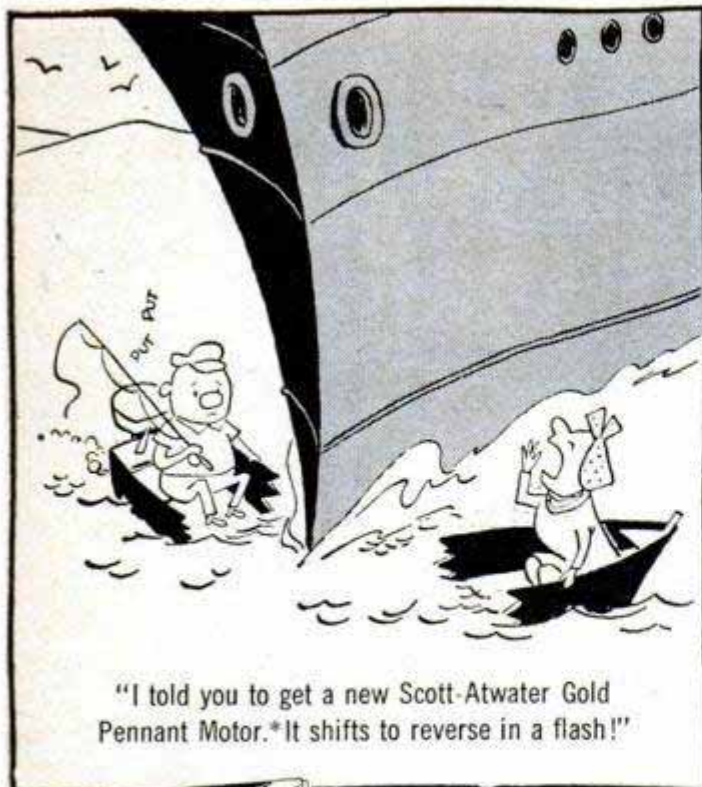
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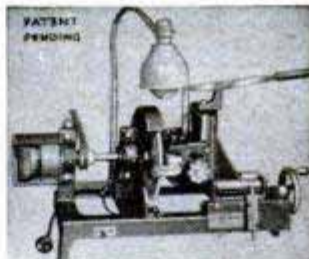
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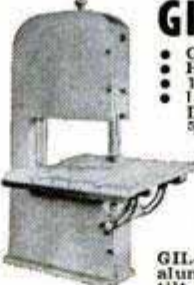
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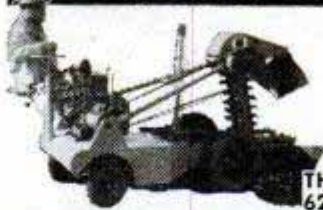
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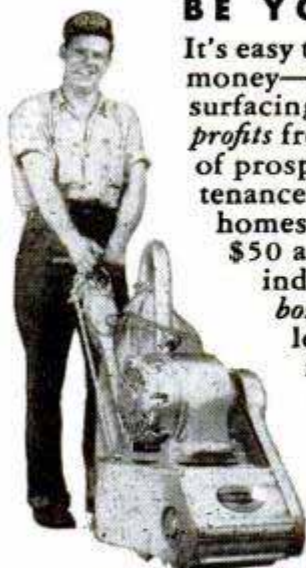
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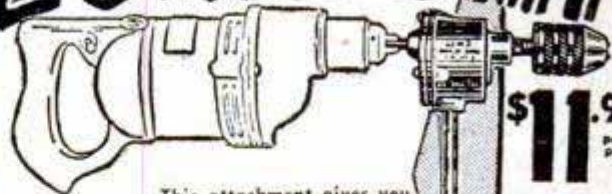
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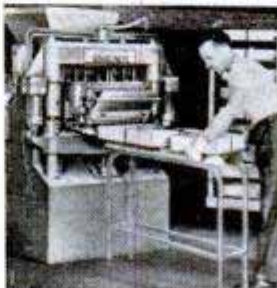
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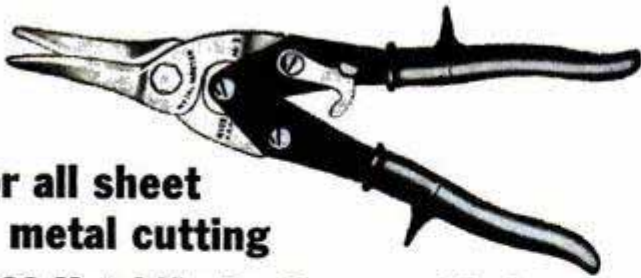
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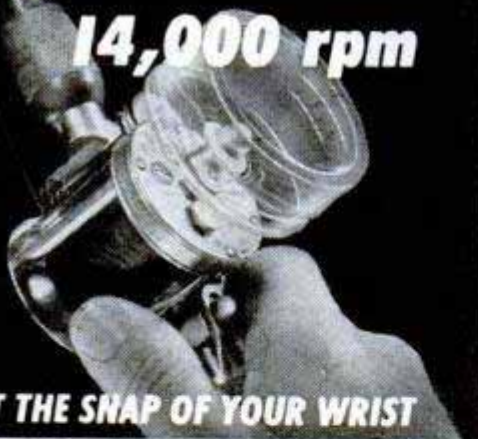
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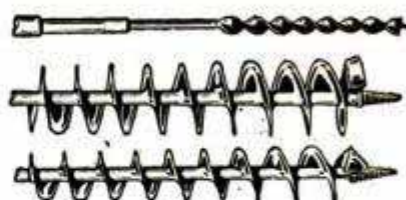


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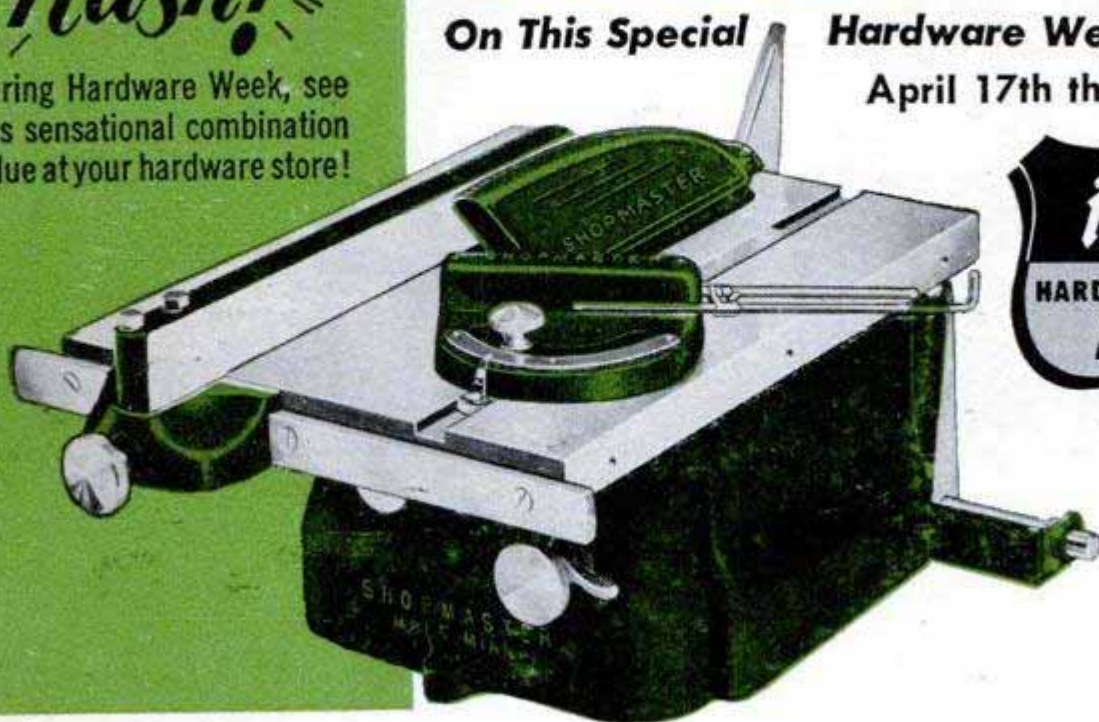
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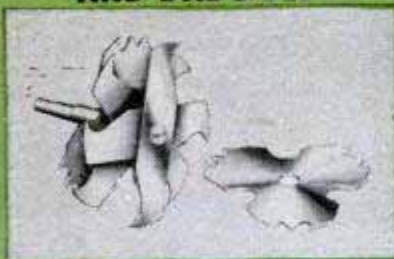
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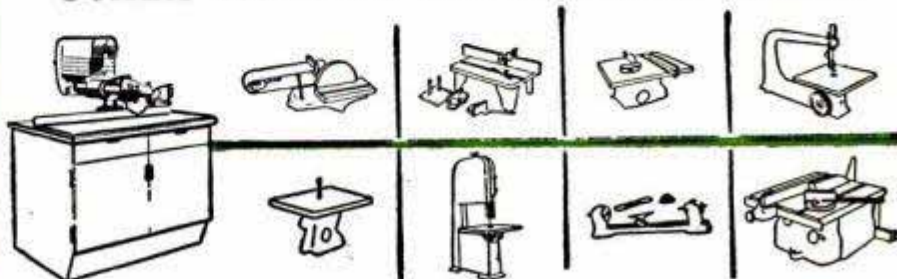
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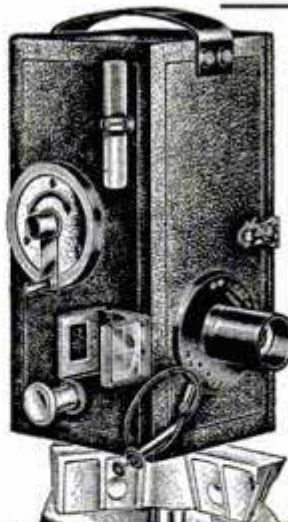


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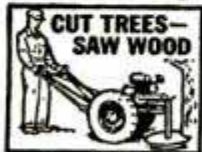
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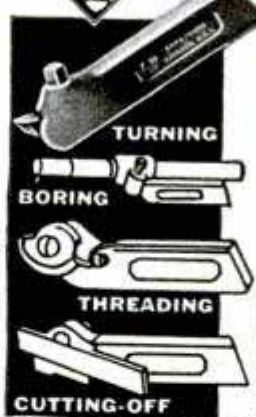
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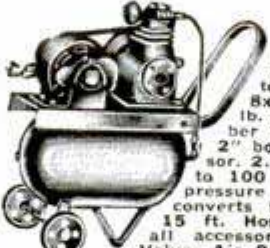
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**SPECIAL LOW PRICE AIR COMPRESSOR OUT-FIT for Spraying, Tire Inflation, etc.** 1/2 H.P. Heavy Duty 110-V-AC Motor. Cap or Rep./ind. Type. 8x18 in. Stainless Steel 300 lb. test Tank, mounted on Rubber Tired Wheels with handle. 2" bore x 1 1/4" stroke Compressor. 2.8 cu. ft. per min. pressures to 100 lbs. Automatic adjustable pressure switch. Quart Spray Gun converts to bleeder or non-bleeder. 15 ft. Hose and Tire Chuck. Plus all accessories, Check Valve, Safety Valve, Air Pressure Regulator, Air Filter and Gauge. Completely assembled into a Compact Balanced Unit. Ready to use. 1/2 H.P. as described above. #A-33. Only \$77.50 SAVE \$10.00—1/2 H.P. Outfit K.D. you assemble. Only \$67.50 BIGGER, EXTRA HEAVY DUTY, AUTOMATIC AIR COMPRESSOR UNIT. BIG 1/2 H.P. HEAVY DUTY Capacitor A.C. 110/220-V-Motor. Giant Stainless Steel Tank, 12x24 inches, 500 lb. test. Bigger Precision Air Compressor, 2 in. bore x 2 in. stroke, 3.5 CFM. pressures to 150 lbs. Big 10 x 175 Rubber Tired Ball Bearing Wheels, DeLuxe Equipped, Safety Valve, Check Valve, Auto Pressure Switch, Off Valve, Hose, Tire Chuck, Gauge, Air Regulator, Air Filter, Quart Spray Gun. Completely assembled Unit. Ready to use. 1/2 H.P. as described above. #A-55. Only \$107.50 SAVE \$10.00—1/2 H.P. Outfit K.D. you assemble. Only \$97.50 #K-55

## Volume Blowers for Heating, Ventilating, Exhausting

- Blowers for forced drafts, heating boosters, exhausters, coolers, dryers and dust collectors, 110 volt A.C., 50/60 cycle motors.
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ABOVE OUTFITS SHIPPED F.O.B. CHICAGO



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MARCH 1953

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**SANDER-POLISHER KIT.** For furniture, the car, every waxing, polishing, sanding job. Powerful motor, trigger switch, instant release lock. Lamb's wool polisher, complete set of sanding discs, rubber backing pad and adapter, and drill chuck. Two packages of world-famous Johnson's Wax—liquid and paste. Model 1540K ..... **\$29.95**

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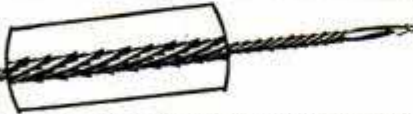
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 Outstanding tool for home, shop & all trades. If not available at your dealer, send check or M. O. Literature available.

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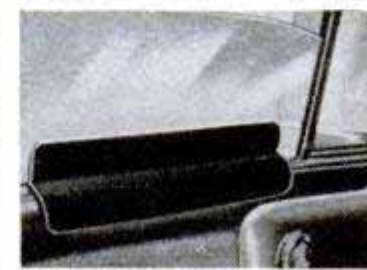
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 Gets Weeds... roots and all

Promotes healthier lawns. Ideal for gardens. Extracts weeds without damage to plants. No stepping on flower beds. No stooping, no bending, no backaches. WEED-O-MATIC makes weeding a pleasure.

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Ingenious construction. No intricate parts. Weed ejector and extractor prongs never fail to work. Rubber grip handle. Steel tubing finished in Chinese red. WEED-O-MATIC will last for ages. Send \$3.95, check or money order. Shipped post paid. Satisfaction guaranteed or money back.

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- Includes 2 Voltage ranges for both 6 Volt and 12 Volt systems.
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- Incorporates direct-reading resistance range which will accurately measure all resistances commonly used in the electrical circuits of all battery-powered automotive equipment.
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Handsome round cornered molded bakelite case 3 1/8" x 5 7/8" x 2 1/4". Complete with all test leads and instructions.

**\$13.90**

**SHIPPED ON APPROVAL NO MONEY WITH ORDER - NO C. O. D.**

Try it for 10 days before you buy. If completely satisfied send \$3.90 and pay balance at rate of \$2.00 per month for 5 months — No Interest or Carrying Charges Added. If not completely satisfied, return to us, no explanation necessary.

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Please rush 1 Model 60. I agree to pay \$3.90 within 10 days after receipt and \$2.00 per month thereafter.

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**NO-TANK PUMP!** *SAVE on tank and fittings*

**New conveniences no other pump offers**

**Goulds Balanced-Flow Jet** brings you a remarkable advance in water pump engineering. It's easy to install almost anyplace — no costly, bulky tank, fewer fittings! It's self-priming, self-adjusting — automatically delivers all the water you want to all outlets at same time, within capacity! Quiet, compact, trouble-free — only one moving part; corrosion-resistant coated. Send coupon today!



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Send free, 20-page booklet on Balanced-Flow and other Goulds Pumps. Also distributor name.

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**112 PIECE ASSORTMENT FOR ELECTRIC GRINDER \$3.95**  
 \$10.00 VALUE - ONLY

Here's what you get! Mounted Stones on 1/8" mandrel, Drum Sander, Sanding Sleeves for sander, Rotary Cutters, Wire, Scratch Brush, Bristle Brushes, Circular Saw, Buffing Wheel, Grinding Wheel, Rubber Polishing Wheel, Cut-off Wheels, Rubber Cylinder, Mandrels to fit above tool, asst'd Sanding Discs, Sharpening Stone, etc.



**18 ROTARY CUTTERS \$5.85**  
 \$13.50 Value  
 Illustrated 1/2 actual size

Assorted disc cutter on 1/8" or 3/32" shank. Will fit all hand grinders. Ideal for cutting wood, metal, or plastic. Brand new.



**12 MINIATURE CUTTERS \$1.00**  
 FOR CUTTING WOOD, PLASTIC, or METAL



Actual size. Asst. shapes on 3/32" shank. For die makers, home workshop, etc.



**7 HIGH SPEED TWIST DRILLS \$1.00**  
 15 DRILLS FOR ONLY \$2.00! Order Today!



7 Popular Sizes—up to 1/4" Brand new, ideal for home or shop use. Fits all standard chucks.

**5 DRILLS FROM 1/4" to 1/2" DIAMETER—\$1.95**

**SURPRISE VALUE 100 Pieces \$1.00**  
 FOR ELECTRIC GRINDERS

Grinding Wheels, Cut-off Wheels, Sanding Discs, Mounted Stones, Sharpening and Honing Stones, Rotary Cutting Burs, Abrasive Cartridges, Mandrels, and many other items.

**HEAVY DUTY FLEXIBLE SHAFT WOODWORKERS' DRILLS**  
 A SENSATIONAL \$2.00 VALUE AT P.P. U.S.A.



Overloading impossible with new "Slip Clutch" power shaft. Overload stops rotation automatically, with warning "click". No damage or wear on cable. Sturdy ball bearing handpiece. Motor end takes 1/2" shaft. Adapter for 3/8" or 3/4" shaft. \$1.30.

1953 Illustrated Catalog 10c

**FLEXIBLE SHAFT - ONLY \$4.95**



Fits all electric drills & hand power tools. 35 3/8" long. Dillite bearing. Core of specially wound, high carbon steel wire in flexible steel casing. Will accommodate tool shafts up to 1/8" dia. For lathes, electric drills, etc.

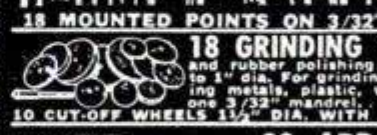


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 With 12 Bands in Assorted Grits. 3/2" dia. x 1" long on 1/8" arbor with 12 bands

**ONE DRUM, 1" DIA. x 1" LONG ON 1/4" ARBOR WITH 6 EXTRA SLEEVES \$1.00**



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 1/2" Mandrel



For grinding on plastic, wood soft and hard metals. Regular \$5.40 List Val. 12 wheels on 1/4" Mandrel \$3.60



**18 MOUNTED POINTS ON 3/32" MANDREL \$2.50**

**18 GRINDING WHEELS \$1.00**  
 and rubber polishing wheels up to 1" dia. For grinding & polishing metals, plastic, wood. With one 3/32" mandrel.



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**ADAPTER CHUCK \$1.50**  
 With 2 interchangeable collets, opening from 3/32" to 1" on 1/8" mandrel. Price each only.



**2 CIRCULAR SAWS \$1.50**  
 ON 2 MANDRELS - ALL AT ONE LOW PRICE

1" diameter saws on 1/8" Mandrels. For cutting wood, plastic, or soft metals. Order at once! Send Check or Money Order.

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**One for All garden work**

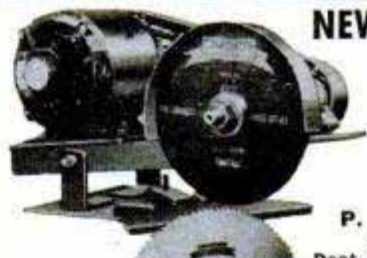


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**\$139.50 Freight Extra**  
 Dealers throughout U. S. and Canada. Write today for dealer name and address.

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## NEW SAW SHARPENER

Improved #64 Hand Gummer sharpens all types circular saws 4" to 20" diam. Ideal for saw shops. Self-Centering adjustment for quick, easy set-ups. Complete with 1/4 HP motor, 1 grinding wheel & cord. \$79.50 FOB Portland. Wt. 70#. SEND FOR FREE LITERATURE.

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**5 BIG POWER TOOLS in ONE**

**8" TILTING TABLE SAW**

**HORIZONTAL DRILL PRESS**

**GRINDER**

**30" LATHE SANDER**

RETAIL PRICE \$125.00

**FACTORY TO YOU \$79.95**

SUPERSHOP is a PRECISION-BUILT WORKSHOP. 100% ball bearing. All running parts precision ground. Big capacity. Extra rugged. Amazing value. Write for FREE catalog.

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**BUY WELLWORTH PRODUCTS**

**AT SAVINGS UP TO 75%**

**PORTABLE SPRAY OUTFIT**

**1/3 H. P. HEAVY DUTY MOTOR**

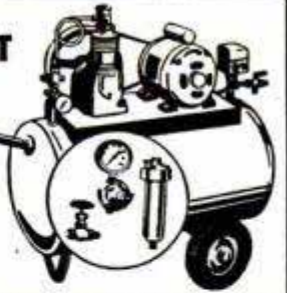


Paint sprayer mounted on 7 1/2 x 25 inch tank, 1/3 H.P. 110 V. 60 cy. Heavy duty motor, 10 ft. cord and plug, V belt drive, Piston type Compressor with 2 Compression rings, 1 oil ring, 2 inch Bore, 1 3/4 inch stroke, displacement 2.86 C.F.M. at 60 lbs. pressure. Safety valve. External and internal atomizing gun, fan, round and angle spray nozzles; quart cup; maintains 35 to 40 lbs. working pressure. Oil and water extractor, 20 ft. heavy duty two-braid air hose with leakproof fittings. Complete with carrying handle. Wt. 90 lbs.  
**Special Price \$67.50**  
 Complete Outfit.....  
 Spray Gun Sold Separately... \$12.95

Regular Price... \$125

**AUTOMATIC COMPRESSOR UNIT WITH 22 GALLON TANK**

1/3 H.P. heavy duty capacitor motor, 110 volt A.C., compressor 2" bore, 1 3/4" stroke, piston type, splash feed lubrication, 14"x32" tank, automatic pressure switch, CFM 2.8 at 100 lb. pressure. Check valve, safety valve, air regulator with gauge and filter, 20 ft. air hose with air chuck for inflating tires. V. belt drive. Ball bearing wheels, with 2"x8" rubber tires. Portable with handle. Ship. wt. 150 lbs.



With 1/3 h.p. motor  
 Reg. price \$175  
**\$98.50**

With 1 1/2 h.p. gas engine  
 Reg. price \$200  
**\$124.50**

Regulator, gauge and filter sold separately. Price for the 3 items... **\$8.95**

**LELAND LIGHT PLANTS**

2500 watts, 115 volts, 60 cycle AC single phase, ball bearing with 25% built-in overload; Briggs and Stratton 6 1/2 HP gasoline engine or equivalent. Belt Drive with guard, 2 plug-in receptacles. Brand new 1952 stock. List price \$748. Special price... **\$395**  
 5000 watt Hobart light plant. Remote control, push button start. List price \$1800. Special price... **\$595**



**WELLWORTH AIR COMPRESSORS**

Aluminum piston, stainless steel valves, 3 piston rings, bronze bearings, splash lubrication. Intake muffler, V-belt, cast iron fan cooling flywheel.  
**Model W800 COMPRESSOR 2"x1 3/4"**, 2.8 c.f.m. Operates with 1/4 HP or 1/3 HP motor up to 150 lbs. Weight 20 lbs. Special price... **\$20.50**

**MODEL 200 COMPRESSOR**  
 2 1/2" x 2". 2.55 to 4.80 c.f.m. up to 150 lb. pressure. Operates with 1/2-3/4 HP motor.  
**Special Price \$27.95**  
 Shipping wt. 24 lbs.

**MODEL W7 COMPRESSOR**  
 2 cylinder 2 1/2"x2". 5.10 to 8.50 c.f.m. up to 150 lb. pressure. Operates with 3/4-1-1 1/2 HP motor.  
**Special Price \$54.50**  
 Shipping wt. 45 lbs.



**RED SEAL CONTINENTAL GAS ENGINE**

Red Seal, 2 HP with 6 to 1 reduction gear. Operates at 450 R.P.M. For lawn mowers, scooters, garden tractors, pumps, compressors, generators, etc. List Price \$79.50. Shipping wt. 54 lbs.  
**SPECIAL PRICE \$47.50**  
 Same engine, 3600 r.p.m. **\$47.50**  
 SAME, 2 1/2 H.P. **\$62.50**



**MODEL W501 COMPRESSOR**  
 2 cylinder 2 1/2"x2 1/2". 12 c.f.m. up to 150 lbs. pressure. Timken Bearings. Motor required 2 HP.  
**\$116.75**

**MODEL W503 COMPRESSOR**  
 2 cylinder 3 1/2"x3". 30 c.f.m. up to 150 lbs. pressure. Timken Bearings. Motor required 5 HP.  
**\$176.60**

**Wellworth V-BELT CLUTCH**

Takes starting load off engine or motor. "A" belt, 2.35 pitch diameter, 3/8" bore, ball bearing. Positive action. Price \$7.50. 3/4" bore, \$8.50. Bushing for 1/2" shaft, 15c.

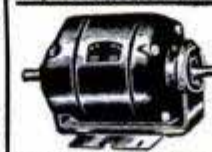


**MERCURY CLUTCH**

3" A-belt pulley. Centrifugal action for heavy loads, 5 1/2 hp or less. \$22.50 list. Special Price **\$9.95**  
 3/4" bore **\$10.95**



**1/3 H.P. MOTOR**  
 DELCO double shaft, 1750 R.P.M. 115V. A.C. Split phase, rubber mounted, high torque starting, overload capacity. Makes a dandy, low cost grinder. Wt. 28 lbs. **SPECIAL \$15.95**



**GEAR HEAD MOTORS**

**Right Angles 110V. AC**  
 1/30 h.p. 6 RPM **\$14.50**  
 1/20 h.p. 285 RPM **\$1.95**  
 1/30 h.p. 1250 RPM **10.25**



**1/20 H.P. MOTOR**

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A precision designed instrument. 7-1/2" long — nickel silver. For all proportional reductions and enlargements. Has graduations for lines and circles. Ratio: lines, 3/4:1 — 10:1; circles, 4:1 — 20:1. Has hardened steel, adjustable points. .... **\$14.00**  
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One Phone and headset . . . . **595 EACH**

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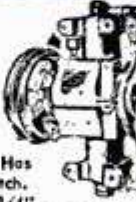
Special! For Hunter, Camp, Farmer. All leather with soft chamamois lining. Has tum-down ear flaps, covered with warm sheepskin for added ear protection. Leather covered, long billed visor. Sizes. Small, Med., Large. . . **259**

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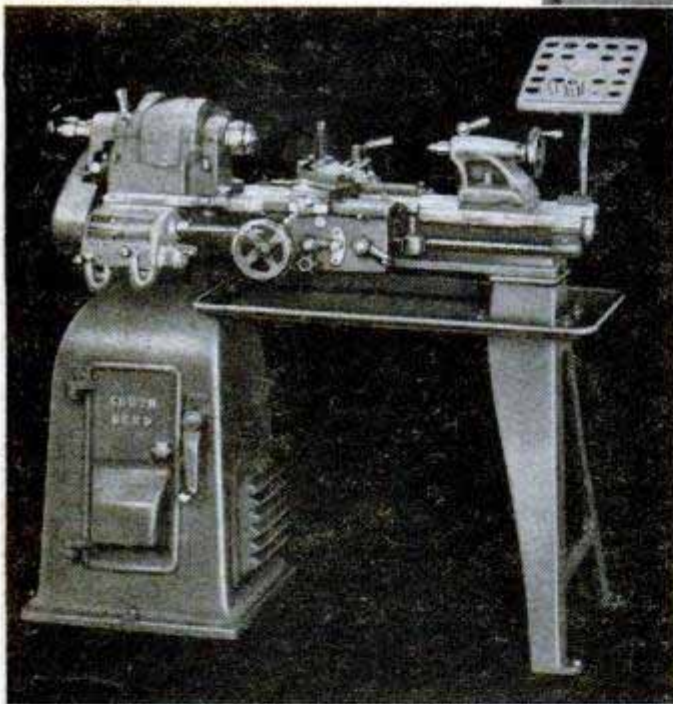
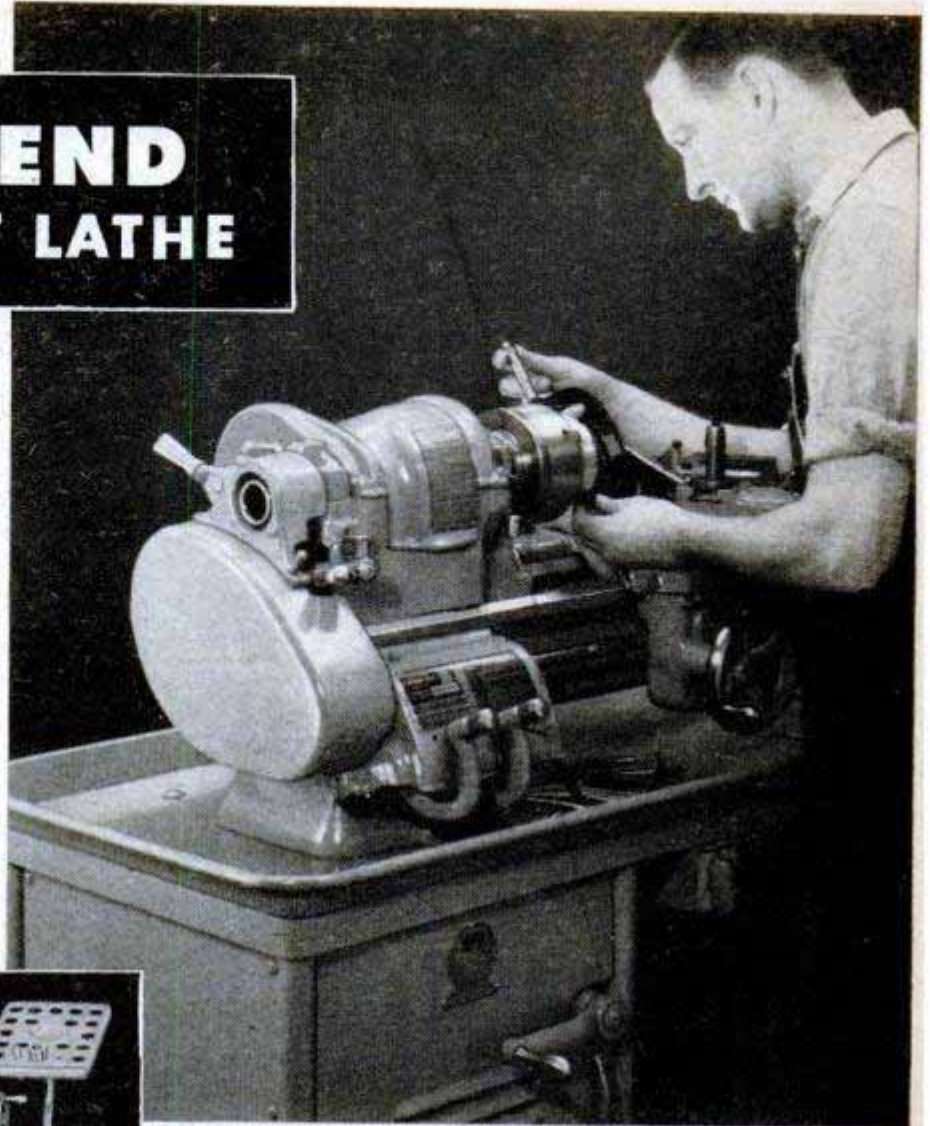
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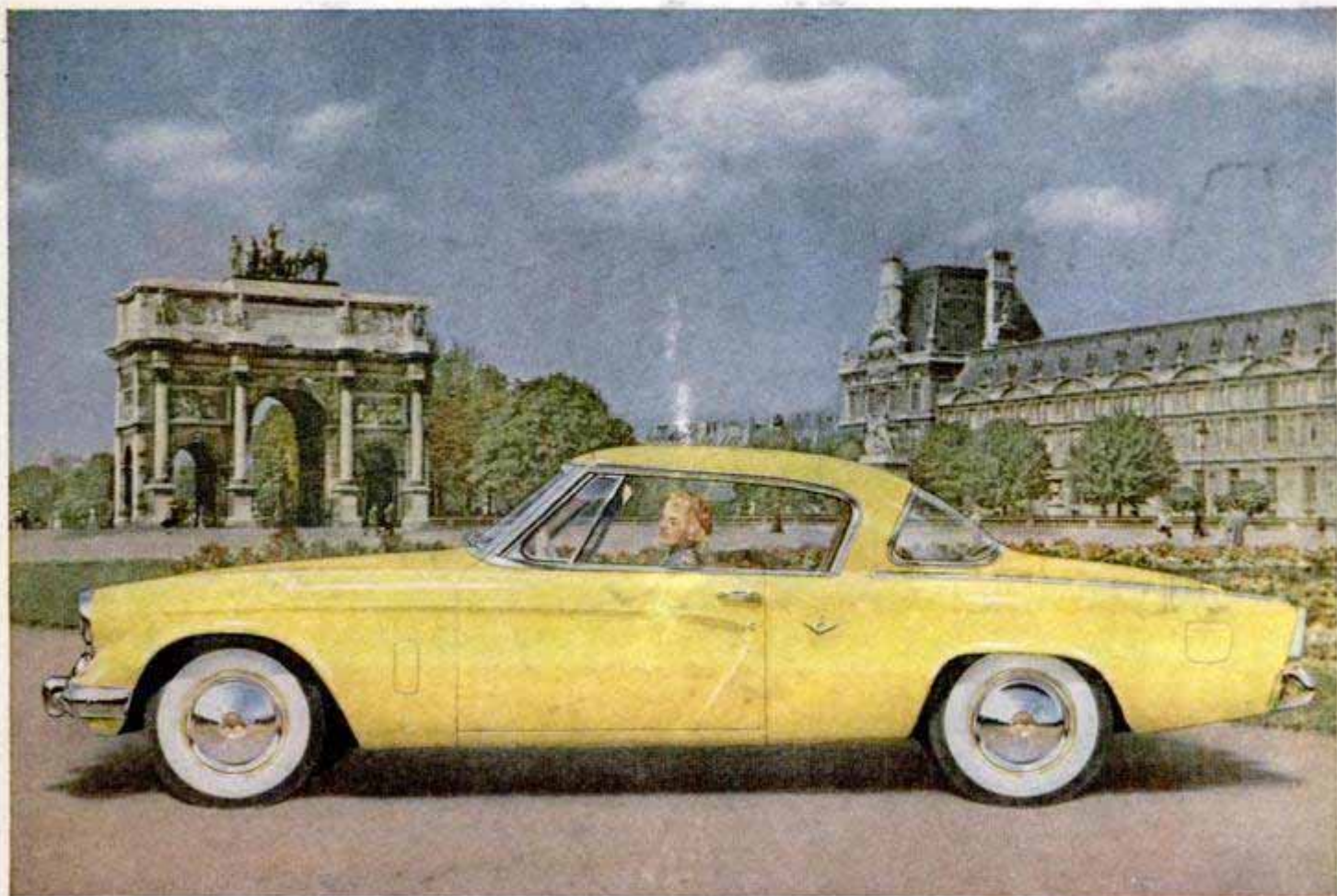
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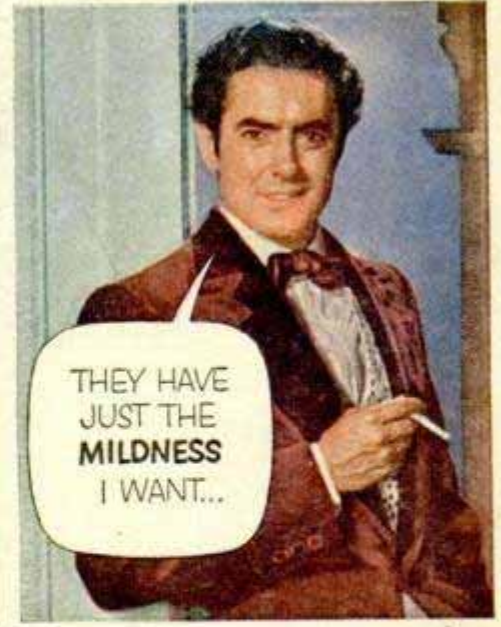


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