

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

REG'D. TRADE MARK, GREAT BRITAIN, NO. 410426





Commander State 4-door sedan.

White sidewall tires and wheel trim rings optional at extra cost.

*Presenting*

## **THE NEW 1951 STUDEBAKER**

A grand new

*Studebaker Champion*

**in the lowest price field!**

**One of the 4 lowest price  
largest selling cars in America!**

A brand new V-8

*Studebaker Commander*

**A truly great car  
that sparkles with brilliant  
new performance!**

Stop in and see these styled ahead, engineered ahead, enduringly built new 1951 Studebakers! They're on view now—at a nearby Studebaker showroom!

*Studebaker Automatic Drive or overdrive available on all models at extra cost*

**STUDEBAKER...THE THRIFTY ONE FOR '51**

# IT'S HERE! 3-Speed Bicycling!

Now you can shift gears  
on your bike just as  
you would in a car!

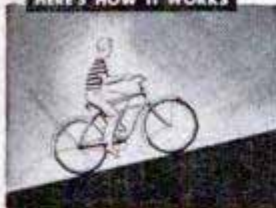
NOW, with a flick of your finger you can change from low, to second, to high—quickly and smoothly.

This amazing new development, called Tripspeed, marks the greatest advance in cycling since the invention of the coaster brake. Tripspeed gives you a choice of three different gear ratios, quick sure braking, smooth free-wheeling, constant control at all speeds and at all times. Bicycling now becomes safer, easier, more fun with...



## TRIPSPEED

HERE'S HOW IT WORKS



1. **LOW** (a 25 percent reduction) for hill climbing, bad roads, etc.



2. **SECOND** for all normal riding on good roads, level stretches.



3. **HIGH** (a 33 percent overdrive) for far greater speed.

**BEST NEWS OF ALL**, you don't have to buy a new bike! Tripspeed can be installed right in the hub of your present New Departure Coaster Brake.

Your dealer, your bicycle repair man, has Tripspeed right now. Ask him to show you how easy it is to have the best hill climber, the speediest, safest bike in town!

**FREE BOOKLET . . .** The exciting story of Tripspeed—how it works and how you too can get one. Just fill in and mail the coupon at right.

1892



Fingertip Shift,  
Gives You Safe,  
Constant Control  
at all times.

ANOTHER "NEW DEPARTURE" BY

**New Departure**  
DIVISION OF **GENERAL MOTORS**

### Just Look at these Great Features

TRIPSPEED is compact and weatherproof.

TRIPSPEED is sturdy, durable, easy to install.

TRIPSPEED converts any New Departure coaster brake to three speeds.

TRIPSPEED has a back-pedaling brake with each gear.

TRIPSPEED has "synchromesh" action. Gears can be shifted at any time.

TRIPSPEED has handle-bar control. Your hands never have to leave the handle-bars.

### MAIL THIS COUPON

Dept. P, New Departure Division  
General Motors, Bristol, Connecticut

Please send me the FREE booklet about Tripspeed, the great new conversion unit that makes bicycling easier, safer, more fun!

Name.....

Address.....

City..... Zone..... State.....

This One



DECEMBER 1950

1

The "ALL-GLASS" headlamp gives most light when new  
... most light throughout life



"ALL-GLASS"  
sealed beam  
HEADLAMPS



**General Electric headlamps are**

**ALL-GLASS** ..they do not grow dim!

Road and laboratory tests prove the average G-E Sealed Beam headlamp gives 99% of original light output right up to the end of lamp life. They do not grow dim, because:

**1** "All-Glass" seal makes possible the one-piece construction that

keeps out dirt and moisture.

**2** Rugged filament supports—filaments won't shake loose.

**3** Reflector *stays* mirror-bright.

**4** Hard-glass lens gives accurate beam pattern.

Check your lights . . . and replace burnouts with General Electric "All-Glass" headlamps!

*You can put your confidence in—*

**GENERAL**  **ELECTRIC**



# TAKE TO THE AIR FORCE



## There's a Man's Job for YOU in the U. S. AIR FORCE

When you choose the U. S. Air Force as your service, you're choosing top technical training for war or peace in 42 career fields. You'll enjoy good pay, with additional pay for flying. You'll be assigned to specific duty according to your aptitudes. And you'll know the pride that goes with being *one of the best*, in a topflight outfit!

Take to the Air Force . . . for an interesting, rewarding and exciting life. Come war or peace . . . choose the Air Force way. Visit your nearest U. S. Army and U. S. Air Force Recruiting Station today for complete information.

**GET ON TOP...STAY ON TOP...  
WITH THE U. S. AIR FORCE**



### AIR FORCE TRAINED SPECIALISTS:

If you're a former Air Force specialist, with one or more of 200 most essential MOS skills, you can re-enlist in the Reserve for three years in your old grade at last honorable discharge . . . for direct assignment to a year of active duty. Reservists can go back on active duty in present grades. Civilian jobs are protected under Selective Service. You are needed . . . NOW!

**THE U. S. AIR FORCE NEEDS MEN  
for these and other fields:**

RADIO AND RADAR MAINTENANCE  
AIRCRAFT AND ENGINE MAINTENANCE  
WEATHER • ARMAMENT SYSTEMS

# American Flyer

3/16" SCALE  
AND HO GAUGE

WORLD'S MOST REALISTIC TRAINS



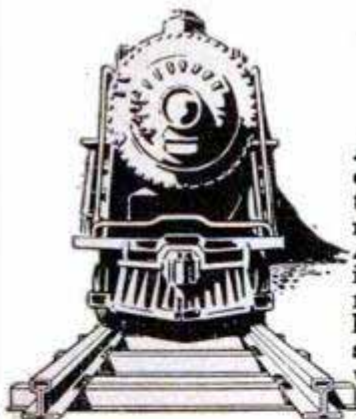
## REAL SMOKE AND "CHOO-CHOO" SOUNDS

**No. 4904T Pacific 3-car Freight**—The faster your train goes, the more smoke it puffs, the louder are the "choo-choo" sounds. Powered by famous Gilbert motor. Complete with real, 2-rail track, making 140" oval, 3 realistic cars, transformer, \$29.95. Denver and west, \$31.50.



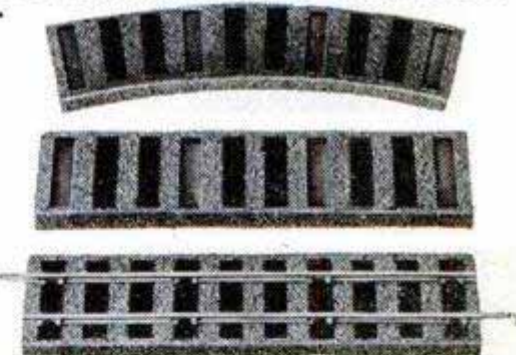
## SUPERB NEW SANTA FE PASSENGER

**No. 5008 Santa Fe 3-car Passenger**—Built-in Electronic Horn. Authentic scale model. Over 5 feet long. 3 ultra modern aluminum cars, including Vista Dome Pullman. Locomotive powered by two Gilbert motors. Real 2-rail track, making 160" oval, \$62.50. Denver and west, \$65.00.



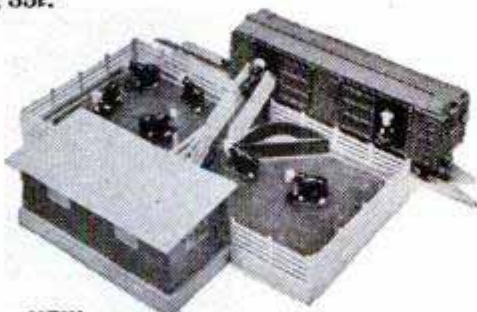
## REAL 2-RAIL TRACK

American Flyer track looks like the track of a real railroad. There's no old-fashioned third rail in the middle. For further realism, track can be mounted in new American Flyer Rubber Roadbed, finished to resemble real ballast. Reduces noise. Non-slip back holds tracks securely in place without tacks. Curved or straight sections, each, 30¢. Denver and west, 35¢.



## TALKING RAILROAD STATION

Produces voice of train announcer and other true-to-life sounds of busy station. Stops train by remote control—starts it automatically. \$16.95. Denver and west, \$17.80.



## NEW OPERATING STOCK YARD AND CAR

An exclusive American Flyer sensation! Watch the steers mill around when you press remote control button. See them climb up ramp and enter car. Most amazing of all, you can make them file, one by one, out of car and down to stock pen again. \$14.95. Denver and west, \$15.70.

## GET THIS GIANT TRAIN CATALOG



Cost over \$125,000.00 to produce!  
56 big full-color pages.

Illustrates and describes all American Flyer train sets—locos—cars and spectacular equipment. Free at stores selling American Flyer or send 10¢.

Gilbert Hall of Science,  
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Rush Giant Train Catalog.  
I enclose 10¢.

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This offer good only in U.S.A.

# PYROIL fights these enemies of your car . . .

- DRY STARTS
- FRICTION WEAR
- GUM AND SLUDGE
- BATTERY DRAIN
- CORROSION

There's no need to let the first cold snap find your car vulnerable to attack on vital engine parts. Now is the time to add Pyroil, to protect your car against the extra risk of cold-weather driving.

Pyroil contains the special property of making motor oil cling to cylinder walls and piston rings. That's why Pyroil eliminates "dry starts"—it keeps engines free of sludge and reduces wear due to friction, rust and corrosion.

Pyroil is economical ammunition for fighting these enemies of your car. You'll find Pyroil at your nearest gas station. Just ask the attendant to 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 50c pieces. **MOTORISTS**, it's yours for the asking—sent postage paid.

Manufactured and Guaranteed by  
Pyroil Company, 110 Pyroil Bldg.,  
La Crosse, Wisconsin

Canadian Distributors: Central  
Purchasing Agencies, Ltd.,  
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**PYROIL COMPANY**  
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La Crosse, Wisconsin

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**



### Helicopter Ambulance

"This war is the first time that helicopters have been used to evacuate wounded men from the front lines," writes Lt. Comdr. Arthur L. Schoeni as a postscript to his story of the "Handy-Andy Eggbeaters," appearing on page 73 of this issue. This photograph from the war front in Korea shows a Marine helicopter dropping in to pick up casualties. The wounded are carried in metal "pods" attached to each side of the fuselage below the doors. On one day press reports told of 18 Americans saved by the "windmill" ambulances, including two fighter pilots who were snatched from behind the enemy lines.

### They Did As They Were Told . . .

Mr. Milburn is snowed under, but digging out. Last June we published an article titled "Bring on Your Inventions," which proved to be a very compelling headline. It told of a development service for inventors, operated by the Milburn Manufacturing Company at Burlington, Ky. Mr. Milburn tells what happened in this letter to the editor:

"I have been wanting to write you for some time, as I thought you might be interested to know the effects of your story. . . .

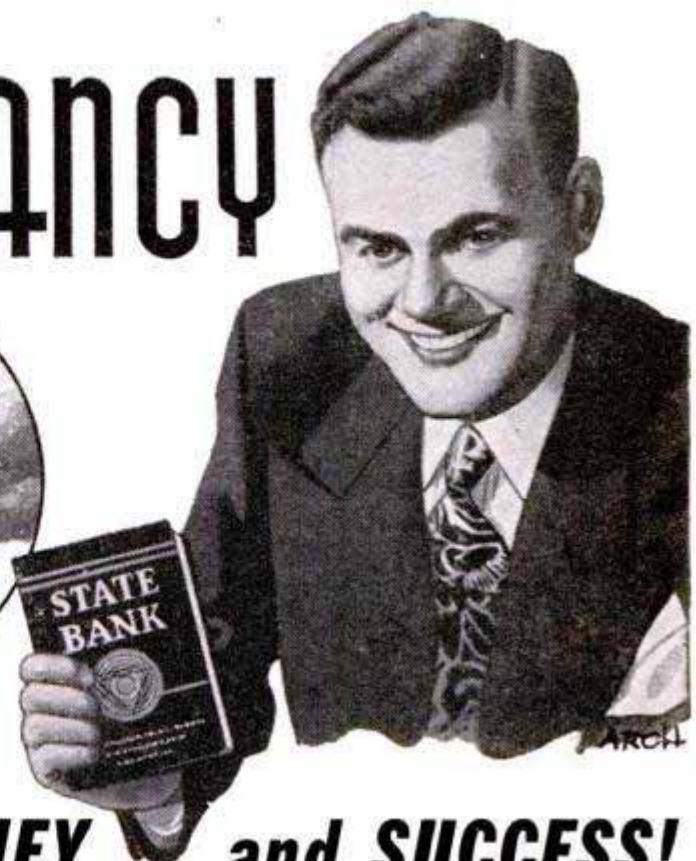
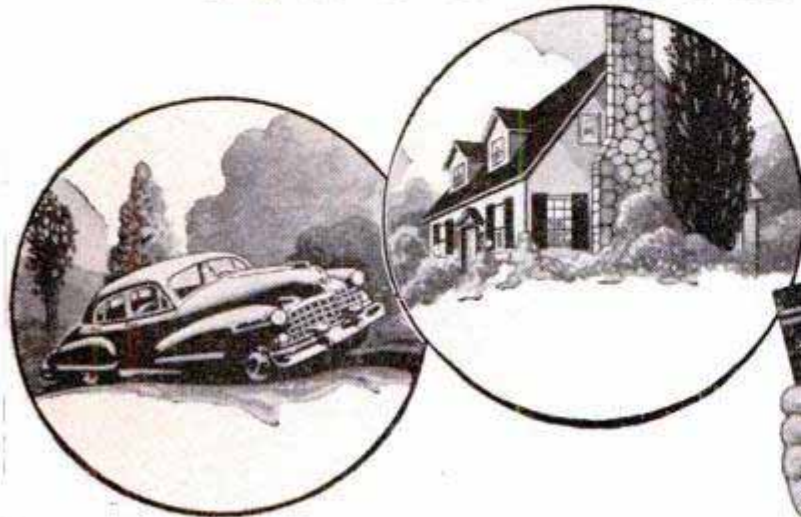
"As of September 1st, we have received 8476 letters from the story. I am proud to say that all of these letters have been answered personally. Many of them were people who wanted advice about their invention. Some of them had patents and wanted to know how to sell them. . . .

People visiting us here number 512 to

(Continued to page 8)



# 5 reasons why ACCOUNTANCY



**offers you MORE MONEY... and SUCCESS!**

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

**REASON #2.** The demand for accountants is great—everywhere. All businesses must have trained accountants to cope with ever-growing requirements. It's a profession offering wide opportunity—always—to the man who knows.

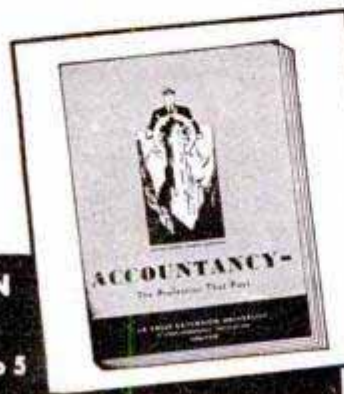
**REASON #3.** You can fit into any business, anywhere in the country—because accounting principles are universal. Think what this means in terms of security and independence!

**REASON #4.** Accountancy is open to all. Any man or woman of good intelligence, who enjoys figure work and is willing to follow LaSalle's systematic "problem method" plan, can rapidly qualify for a highly profitable, enjoyable

lifetime career... and he doesn't have to finish his training before beginning to "cash in."

**REASON #5.** Without losing a day from your present work, you can prepare in spare hours at home, at low cost, under LaSalle's step-by-step "Problem Method" of "learning by doing." This famous plan accounts for LaSalle's remarkable record of having trained nearly 10 per cent of all Certified Public Accountants in the U. S. . . . and of having put many thousands of others into high-paying careers.

Send today for LaSalle's interesting booklets, "Accountancy, the Profession That Pays," and "Success Reports." Learn about the five great fields of opportunity... and LaSalle's time-tested plan for helping men and women to rapid advancement, higher income, greater prestige and professional standing. The coupon below will bring these fact-filled booklets to you—without cost or obligation. Mail the coupon NOW.



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Dept. 1264H, 417 S. Dearborn St., Chicago 5, Ill.

Please send me, free of all cost or obligation, your 48-page illustrated book "Accountancy, the Profession That Pays," and the booklet "Success Reports"—send also "Ten Years' Promotion in One"—a book which has helped many men.

Name..... Age.....  
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City, Zone, State.....

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# AVIATION



## ESSENTIAL

**in peace or war**

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AND PARENTS**

We have an urgent demand for Embry-Riddle graduates. Aircraft manufacturers and operators need thousands of properly trained young men for essential positions in civilian aviation.

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Check One  Veteran  Non-Veteran

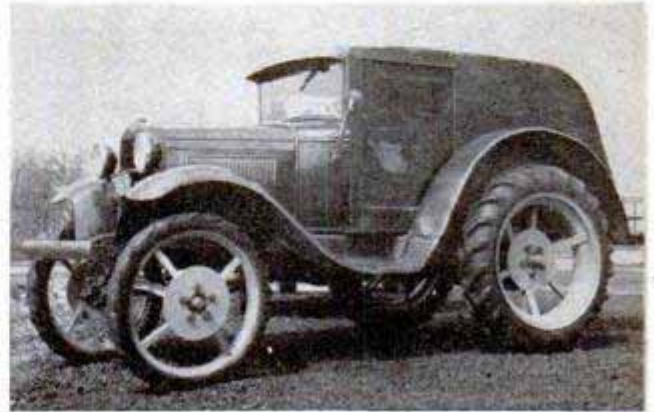
**TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD**

(Continued from page 6)

date. Some of these people have driven from California, Texas, New York, etc. There have been 372 long-distance calls responding to the story.

"We are still receiving about 20 letters per day and a few calls and visits. You may be sure that for a few weeks they almost covered us up with mail, but at this point is well under control.

"I felt that you might like to know the figures on your story and what a punch your magazine carries. . . ."



### Letter to the Editor

Imagine my surprise upon reading your August, 1950 issue when on page 127 I saw described the "Mail Buggy."

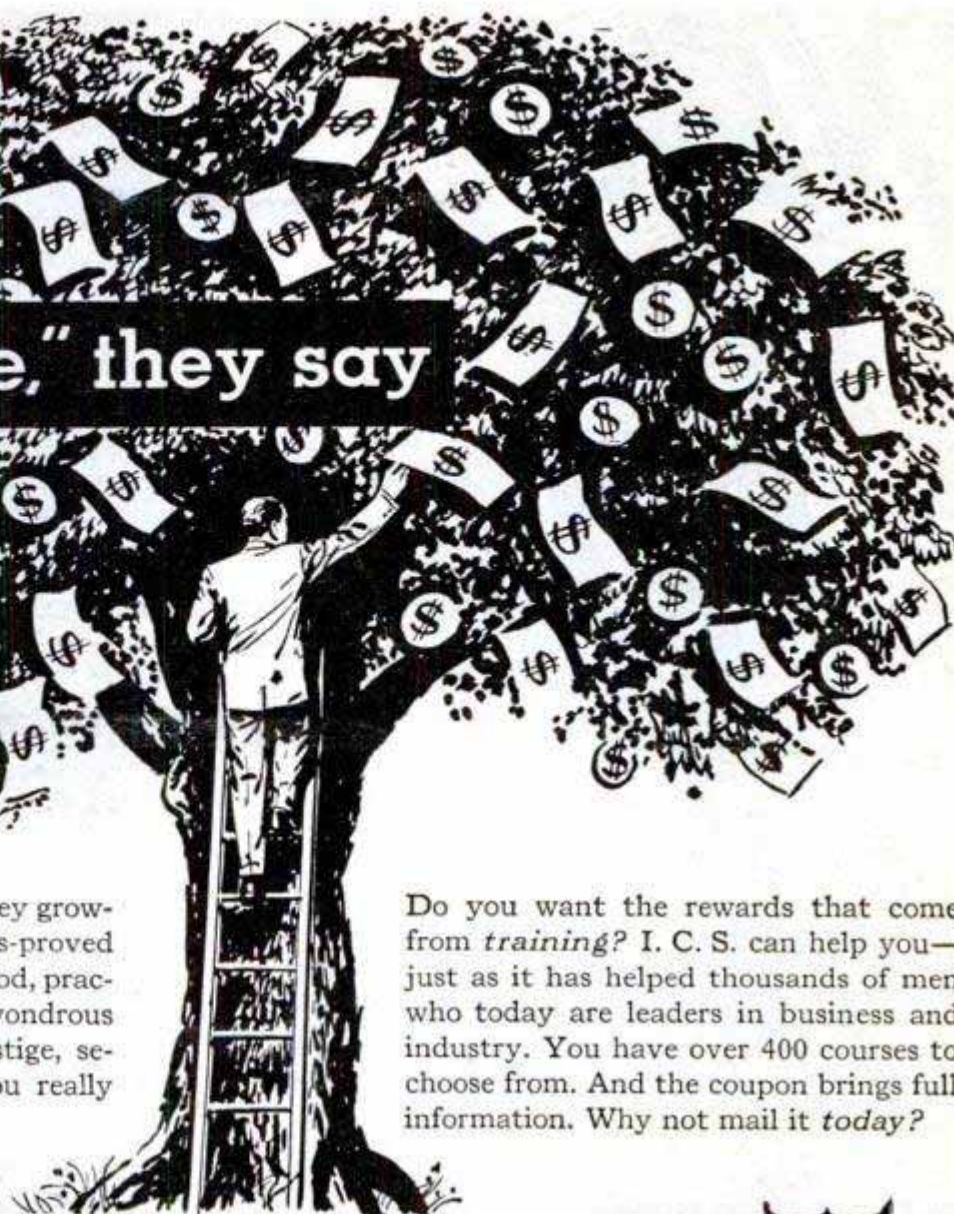
That designation, "Mail Buggy," used to be right. This "weird vehicle" is what used to be a stilt-mobile and was manufactured somewhere in Wisconsin. The machine is the same in every respect as it was when originally manufactured for mail carriers excepting that I replaced the back wheels, which were much larger in circumference and had a smaller tire in diameter; by that I mean to say that the tire used to be about a 6-inch tire whereas the one I have on now is about a 15-inch tire. The fact is, it is a tractor tire. I took off the original wheels and replaced them with smaller wheels but carrying a tractor tire. My reason for doing that was that I am using this outfit to take me from the place that it was photographed at Bartelso, Ill., and where I keep the machine, to my clubhouse down in the wildest and most inaccessible part of Clinton County. This machine has long ago served its purpose as a "Mail Buggy." It now serves, to my way of thinking, a much better purpose. It is a "Fishing Buggy."

Last Sunday we were down at my clubhouse, and one of the boys wanted to take a trip down to the river which is about a quarter of a mile south of my lake, which is a very large lake. He said though that he felt that we probably couldn't get through because of some of the sloughs which he

(Continued to page 10)

**"Impossible," they say**

**M**AYBE they're right about money growing on trees. But here's a success-proved fact: a career firmly rooted in good, practical *training* bears rich and wondrous fruit. Money, promotions, prestige, security—many of the things you really want in life.



Do you want the rewards that come from *training*? I. C. S. can help you—just as it has helped thousands of men who today are leaders in business and industry. You have over 400 courses to choose from. And the coupon brings full information. Why not mail it *today*?

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Without cost or obligation, please send me full particulars about the course BEFORE which I have marked X:

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Correspondence</li> <li><input type="checkbox"/> Certified Public Accounting</li> <li><input type="checkbox"/> Commercial</li> <li><input type="checkbox"/> Cost Accounting</li> <li><input type="checkbox"/> Federal Tax</li> <li><input type="checkbox"/> First Year College</li> <li><input type="checkbox"/> Foremanship</li> <li><input type="checkbox"/> Good English</li> <li><input type="checkbox"/> Higher Mathematics</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Motor Traffic</li> <li><input type="checkbox"/> Retailing</li> <li><input type="checkbox"/> Salesmanship</li> <li><input type="checkbox"/> Sign Lettering</li> <li><input type="checkbox"/> Spanish</li> <li><input type="checkbox"/> Typing</li> </ul> <p><b>Air Conditioning and Plumbing Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Conditioning</li> <li><input type="checkbox"/> Heating</li> <li><input type="checkbox"/> Refrigeration</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Advertising</li> <li><input type="checkbox"/> Bus. Law</li> <li><input type="checkbox"/> Commercial Art</li> <li><input type="checkbox"/> French</li> <li><input type="checkbox"/> High School</li> <li><input type="checkbox"/> Illustration</li> <li><input type="checkbox"/> Postal Civil Service</li> <li><input type="checkbox"/> Retail Bus. Management</li> <li><input type="checkbox"/> Secretarial</li> <li><input type="checkbox"/> Stenography</li> <li><input type="checkbox"/> Traffic Management</li> </ul> <p><b>Chemical Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Chemical Engineering</li> <li><input type="checkbox"/> Chemistry, Analytical</li> <li><input type="checkbox"/> Chemistry, Industrial</li> <li><input type="checkbox"/> Chemistry, Mfg. Iron &amp; Steel</li> <li><input type="checkbox"/> Petroleum Refining</li> <li><input type="checkbox"/> Pulp and Paper Making</li> </ul> <p><b>Civil Engineering, Architectural and Mining Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Architecture</li> <li><input type="checkbox"/> Building Estimating</li> <li><input type="checkbox"/> Civil Engineering</li> <li><input type="checkbox"/> Contracting and Building</li> <li><input type="checkbox"/> Highway Engineering</li> <li><input type="checkbox"/> Lumber Dealer</li> <li><input type="checkbox"/> Reading Structural Blueprints</li> <li><input type="checkbox"/> Sanitary Engineering</li> <li><input type="checkbox"/> Structural Drafting</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>Communications Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electronics</li> <li><input type="checkbox"/> Prac. FM and Television</li> <li><input type="checkbox"/> Prac. Telephony</li> <li><input type="checkbox"/> Radio, General</li> <li><input type="checkbox"/> Telegraph Engineering</li> </ul> | <p><b>Electrical Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Electric Light and Power</li> <li><input type="checkbox"/> Lighting Technician</li> <li><input type="checkbox"/> Practical Electrician</li> <li><input type="checkbox"/> Power House Electric</li> <li><input type="checkbox"/> Ship Electrician</li> </ul> <p><b>Internal Combustion Engines Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Auto Technician</li> <li><input type="checkbox"/> Diesel-Electric</li> <li><input type="checkbox"/> Diesel Engines</li> </ul> <p><b>Mechanical Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aeronautical Engineer's, Jr.</li> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Forging</li> <li><input type="checkbox"/> Heat Treatment of Metals</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Metallurgy</li> <li><input type="checkbox"/> Machine Shop</li> <li><input type="checkbox"/> Machine Shop Inspection</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Mechanical Engineering</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Mold-Loft Work</li> <li><input type="checkbox"/> Patternmaking—Wood, Metal</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Sheet-Metal Drafting</li> <li><input type="checkbox"/> Ship Drafting</li> <li><input type="checkbox"/> Ship Fitting</li> <li><input type="checkbox"/> Tool Designing</li> <li><input type="checkbox"/> Toolmaking</li> <li><input type="checkbox"/> Welding—Gas and Electric</li> </ul> <p><b>Railroad Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Brake</li> <li><input type="checkbox"/> Diesel Locomotive</li> <li><input type="checkbox"/> Locomotive Engineer</li> <li><input type="checkbox"/> Locomotive Fireman</li> <li><input type="checkbox"/> Locomotive Machinist</li> <li><input type="checkbox"/> Railroad Section Foreman</li> <li><input type="checkbox"/> Steam and Diesel Loco. Eng.</li> </ul> <p><b>Stationary Engineering Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Boilermaking</li> <li><input type="checkbox"/> Combust. Engrg.</li> <li><input type="checkbox"/> Marine Engineering</li> <li><input type="checkbox"/> Power Plant Engr.</li> </ul> <p><b>Textile Courses</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cotton Manufacturing</li> <li><input type="checkbox"/> Rayon Weaving</li> <li><input type="checkbox"/> Woolen Manufacturing</li> </ul> |
|---|--|---|--|

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Who Specialize in Care of the Skin

**USE MENNEN BRUSHLESS**

Than All Other Brands Combined

• Helps Make Beards Up to 47% Softer for Shaving

(Continued from page 8)

thought we would not be able to cross. He was very much surprised when we "walked" through the sloughs and mud just as if they weren't there. Then to be a little more cocky I had him chain his boat on the back end, and when we went back to the clubhouse we dragged the boat from the river through high weeds and again through the sloughs which he thought we would not be able to navigate.

These machines are not being manufactured any more, and I am very careful with this machine because, as some of the boys say, they feel that I prize it much higher than I do my pleasure car. I think that is right, because I can replace my pleasure car, but I would have a hard time replacing this machine.

In closing I want to say that I certainly got a big kick out of seeing this in your magazine. I would have gotten a much greater kick had it been described belonging to the proper person and also for what it now is being used.

Very truly yours,  
D. L. Schaeffer,  
President,  
Farmers Bank of Trenton,  
Trenton, Ill.

### Apologies

An article in our July 1950 issue, "Patterns in Tile," in describing colorful concrete tile, gave as examples the tile work appearing in the Ambassador Hotel and Union Station in Los Angeles. The article failed to state that tile work on these buildings was done by the Valencia Tile Company, predecessors of the present California Spanish Tile Company.

### Letter to the Editor

A word of congratulations to you for the oil-tanker story which appeared in your August 1950 issue. (A Super-Tanker Feeds Oil-Thirsty America, by Richard F. Dempewolf.) This article will go a long way towards helping to inform the American public of the tremendous amount of work and expense which goes to providing them with petroleum products which they have come to accept as an everyday need.

The wide readership which your publication enjoys is serving well the American public in giving them the facts on our American way of life which I, among millions of others, feel is a good way of life.

Very truly yours,  
H. B. Miller,  
American Petroleum Institute,  
50 West 50th Street,  
New York 20.

# WHAT Every AUTO MECHANIC Wants to Know

A motor vehicle is a machine of many parts, each part designed and constructed for its own special function.

All good mechanics, like good doctors, should know the working theory and operation of each part and understand what causes trouble and how to remedy it.

## LET AUDELS AUTO GUIDE SOLVE YOUR PROBLEMS

Every auto mechanic, helper, serviceman and operator can use AUDELS AUTO GUIDE. The information it gives saves time, money and worry. Highly endorsed by all users. It presents the whole subject of auto mechanics from A to Z in plain language and simple terms.

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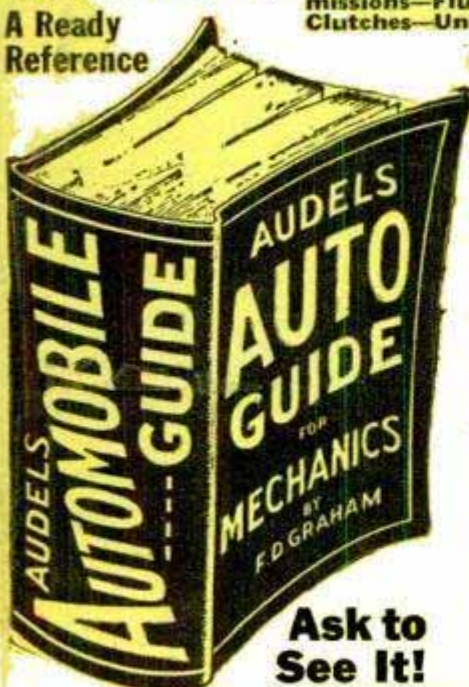
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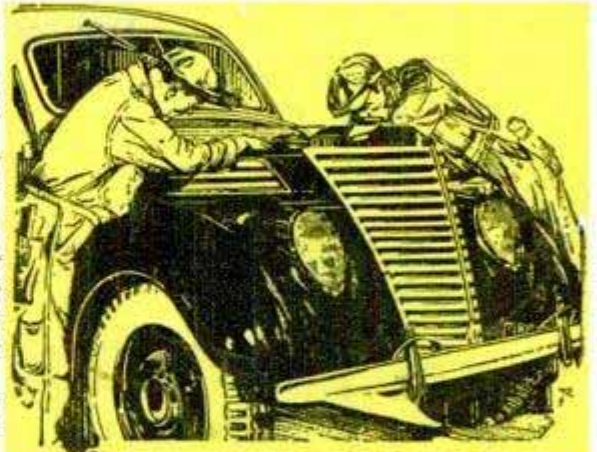
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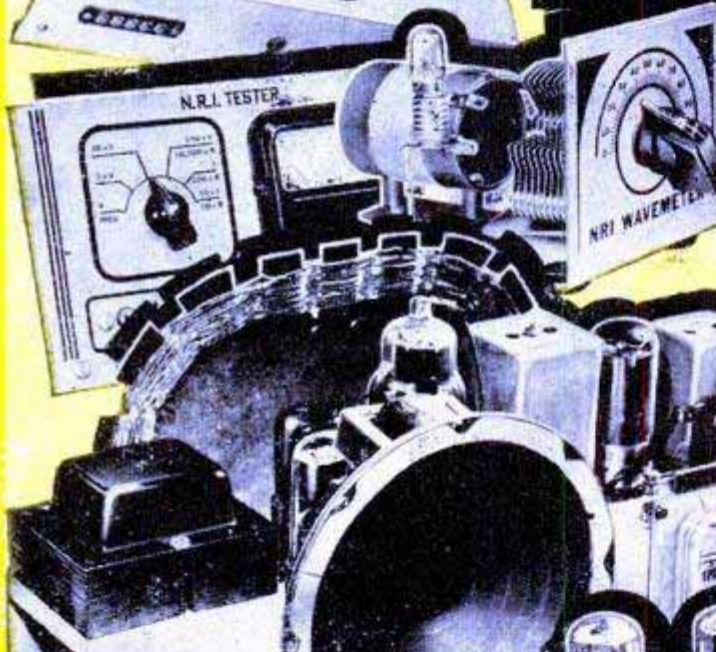
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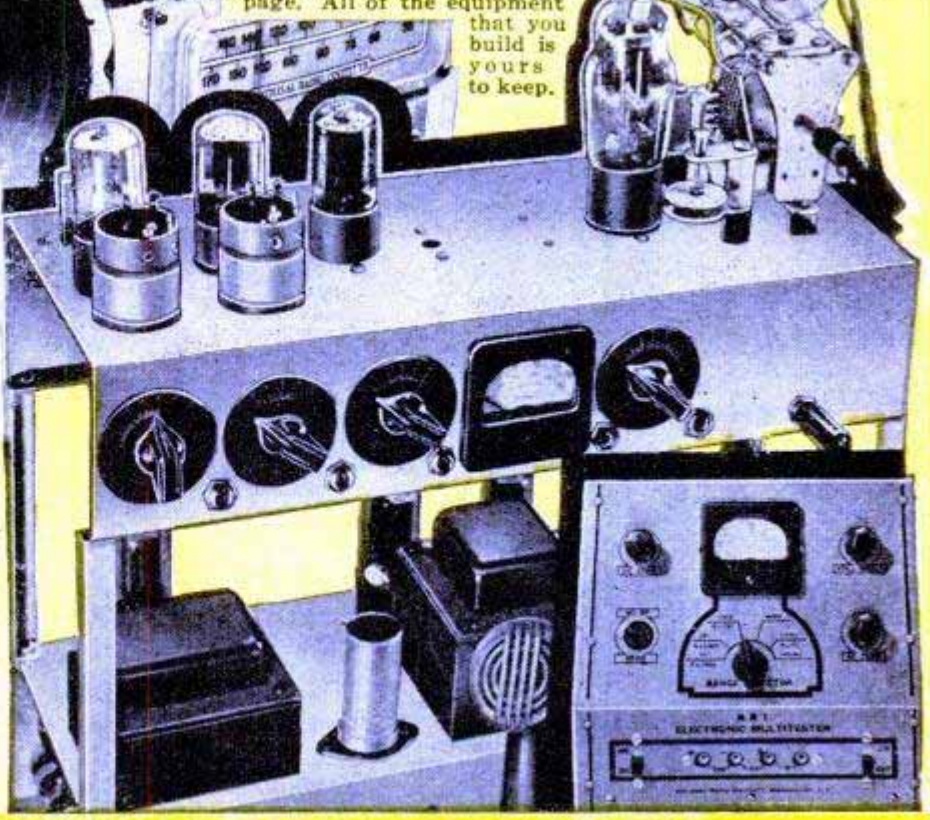
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# INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

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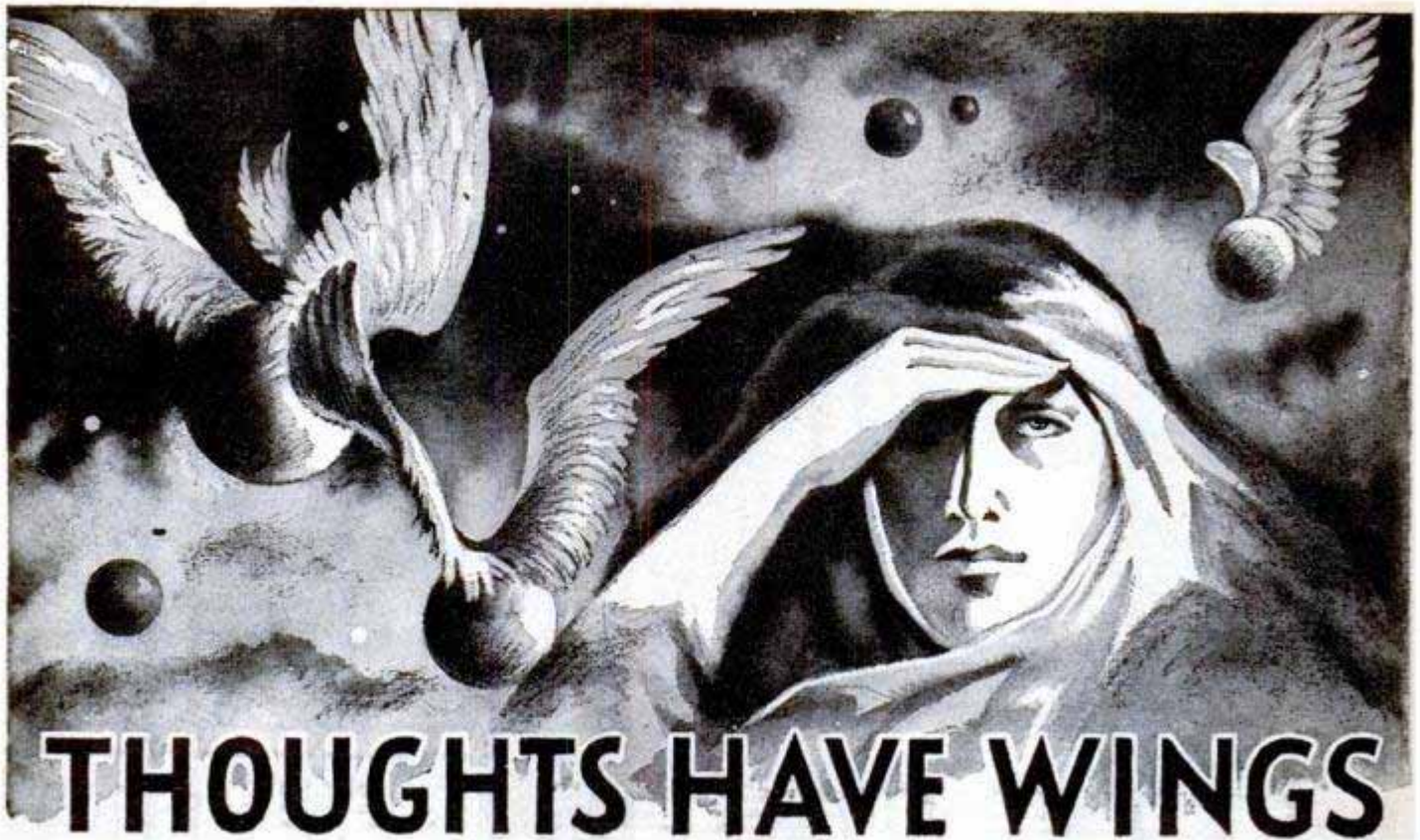
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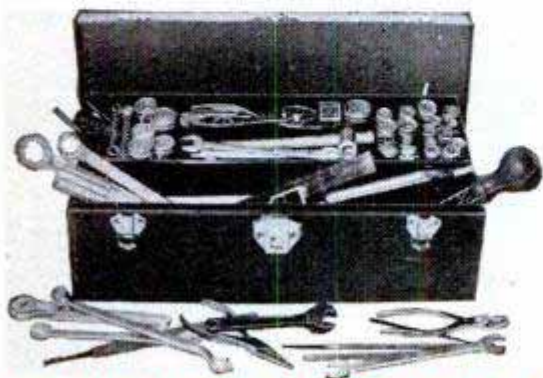
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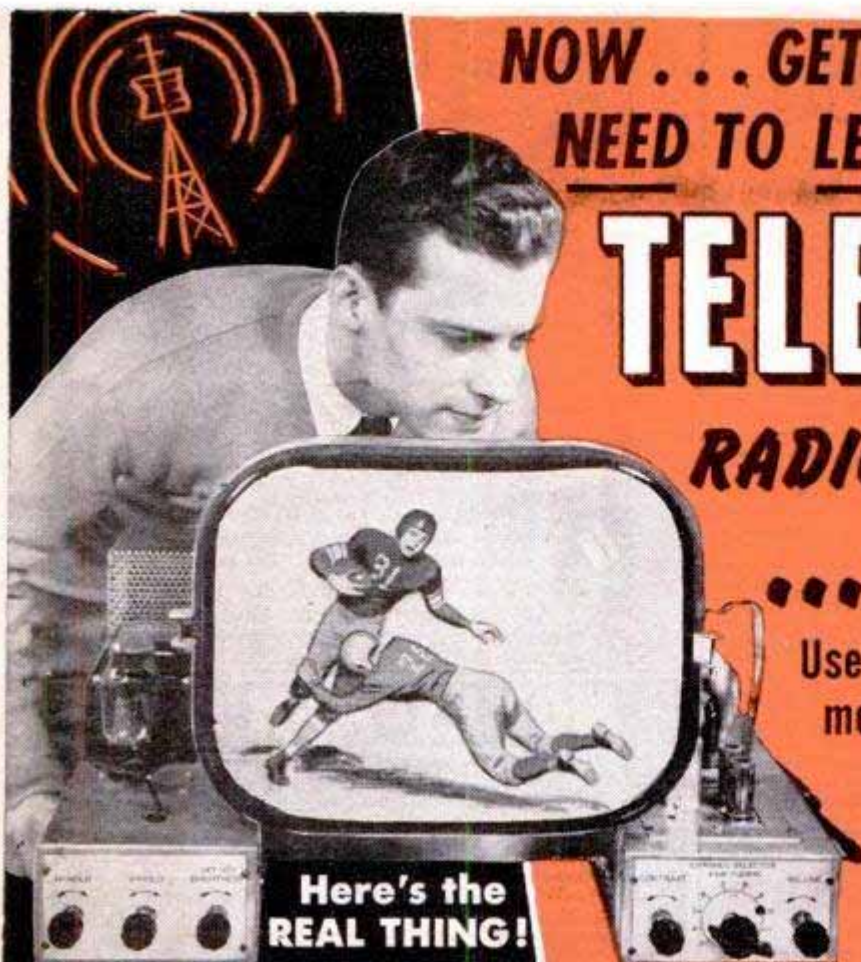


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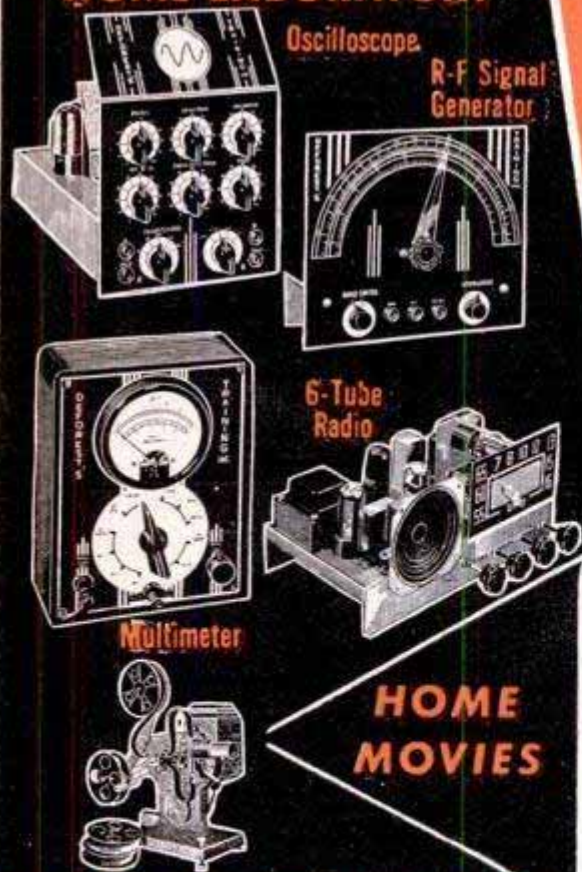
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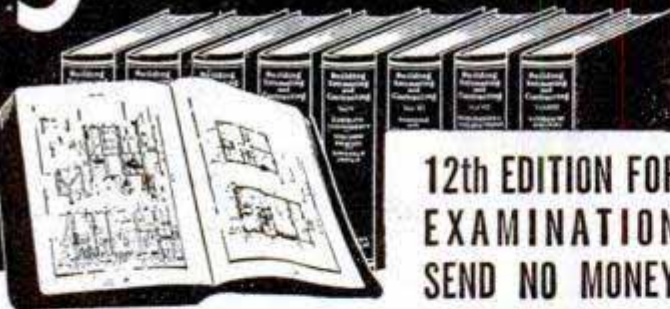
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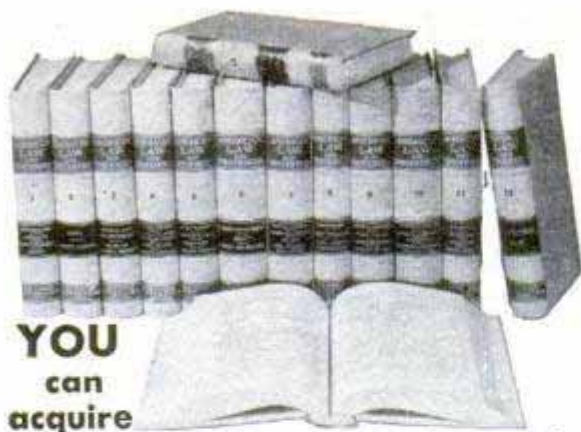
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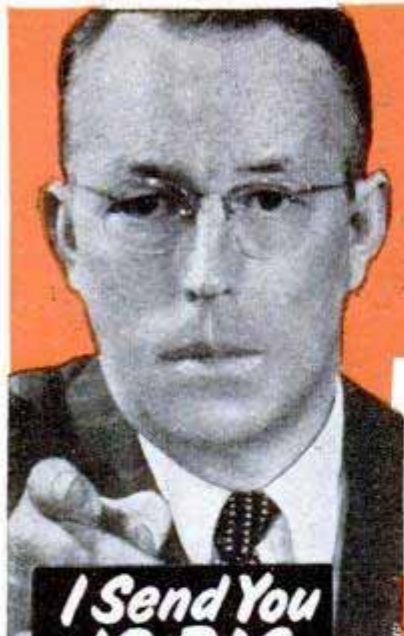
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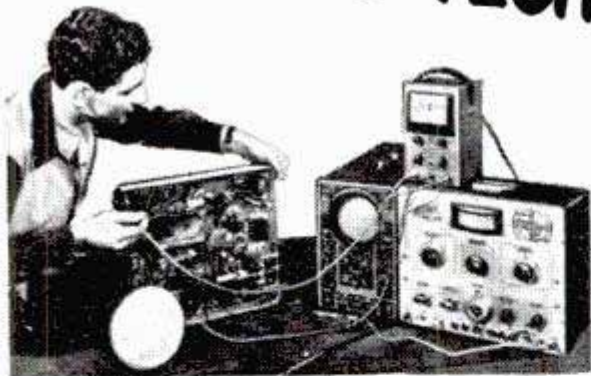
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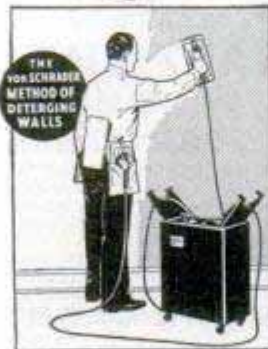
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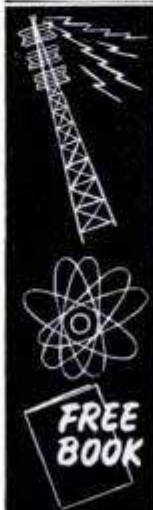
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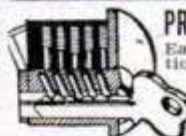
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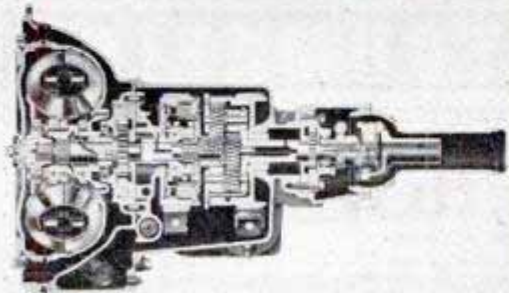
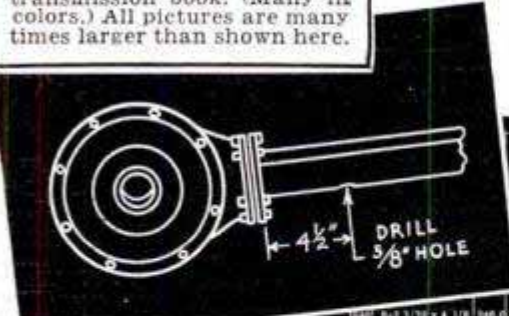
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1939	...	...	...
1940	...	...	...
1941	...	...	...
1942	...	...	...
1943	...	...	...
1944	...	...	...
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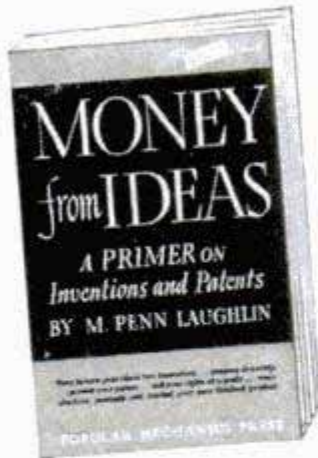
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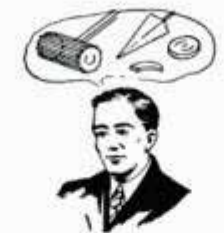
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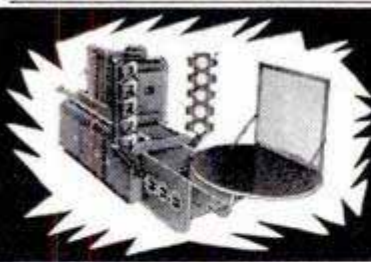
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**\$46** FROM Square foot plywood. Jigsaw necessary. Write, Woodarts, X-38, Bridgewater, Mass.

**OWN** A printing business. Good profit printing cards, stationery, etc. in spare time. Easy rules furnished. Have home shop. Send dime for complete printer's supply book and samples. Kelsey, Inc., Z-24, Meriden, Conn.

**LEARN** Sewing machine repairing at home. Earn \$125.00 week spare time. Plus, new machines, motors, etc. wholesale. Free particulars. Taylor Service Co., Hamilton, Ohio.

**BUY** It wholesale! Manufacturers, distributors offer 850,000 items. Literature free. Olsen, 1231-A East Third St., Duluth 5, Minn.

**UNPAINTED** Figurines. Beautiful models. Write for new wholesale price list. Oman, 642J Broadway, St. Paul 1, Minn.

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

**MADE** \$24,500 Using money making plans from Schemer Magazine, world's oldest mailorder publication. Box 775M, Alliance, Ohio. Year \$2.00. Sample 20c.

**WRITE** For free booklet and catalog telling how to earn substantial profits in your spare time by forwarding new and renewal subscriptions to all magazines for your friends and neighbors. Oldest U. S. agency. Established 1869. Moore-Cottrell, North Cohocton, New York.

**MAKE** Flexible molds! Cast plaques, bookends, figurines! Free sample! H. Tooker, 630-R Chestnut, Hamilton, Ohio.

**BE** Appointed state notary public now! Details. Stationers, Helotes 50, Texas.

**COMMERCIAL** Deep frying course. Mock chicken legs, potatoes. New and proven methods. Learn about this money-making field. \$2.50 p.p. Concession, Toledo 13, Ohio.

**NATURAL** Molding Latex. Extra thick. Free sample. W. Wooley, 115-A Donald, Peoria, Ill.

**PROFITABLE** Business making and building with easy-laying interlocking building blocks. Rex Products, Dept. 10, Piqua, Ohio.

**\$25** WEEKLY Working two hours daily. No canvassing. No manufacturing. Lycke, Box 2471-A, Cleveland 12, Ohio.

**POPCORN** And potato chip equipment. Long Eakins Company, 5060 High, Springfield 99, Ohio.

**WANTED** Unused U. S. postage stamps, small discount. Advance Stamp Co., 24 East 23rd St., New York.

**CO-PUBLISH** And advertise in The Central Mail Advertiser. Sample copy 10c. Low rates. Large circulation. Bagby Printing Co., Georgetown, Ohio.

**RECAST** Old batteries into new. Latest achievements. Battery Laboratories, Minneapolis.

**EARTHWORM** Breeding. Valuable bulletins on successful methods mailed free. Earthmaster Publications, Dept. 14, Sun Valley, Calif.

**LIQUID Marble**—Colorful, glossy! Molded, brushed, sprayed! Cast novelties, statuary, colored tiles. Flexible molds. Comparison floors. Particulars free. Marbleizing Service, Edwardsville, Illinois.

**EXTRA Money.** No selling; operate vendors. Amazing profits, details free. Silver King, Suite B, 622 Diversey, Chicago 14.

**HOW** To set up and run a mirror shop! Resilver mirrors. Make chipped glass nameplates. Electroplating salts and rectifiers. John Sprinkle, V60, Marion, Indiana.

**READ "Advance"**—The voice of mail order. Offers money-making opportunities, sources of supply, personal guidance, etc. Issued monthly. Sample copy 25c. Yearly subscription \$2.00. Advance Publishing Company, 313 East 21st Street, Suite 450, New York 10, N. Y.

**MAKE Money** making new greaseless doughnuts at home on electric machine. Wholesale to grocers, drug stores, cafes, hamburger shops. Send for free recipes and plans. M. Ray Company, 3605 South 15 Ave., Minneapolis 7, Minnesota.

**START** Mailorder bookshop—Everything furnished. 25c brings booklet, samples, exciting ideas. General Publications, Ossining, N. Y.

**OPERATE** Profitable mail order business. Write Walter Service, 4159-A East 112th, Cleveland 5, Ohio.

**MAILING** Postcards selling repeat merchandise is profitable. Everything supplied. Details free. Gordon Publishers, Box 23, Pawtucket, R. I.

**137 WAYS** To make money, in home or office, business of your own. Full particulars free. Elite Co., 220 Grand St., New York 13.

**BRUSH** Plating outfits connect to a battery. No tanks necessary. Good paying business at home plating autoparts, bathroom fixtures, bicycles, reflectors, silvering mirrors. No shop or experience required. Outfits furnished. Free booklet. Gunmetal Co., Ave. H, Decatur, Ill.

**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.

**OWN A Venetian** blind laundry on protected territory basis. 50 units successfully operating. Total cost \$6750.00 on time payment plan. Ask for booklet "Aiming at a First Year \$15,000 Profit." D. L. Laundry, Inc., 101 S. 44th St., Philadelphia 4, Penna.

**EXPORT-Import** offers trained men unlimited big paying job opportunities. Buy at low foreign labor costs. Sell at high American dollar living standards. Gain own business, financial independence, etc. Free facts book. International Trades, 246-P Fifth Ave., New York City 1.

### MONEYMAKING OPPORTUNITIES

**MAKE** Silhouette portraits at home. Easily learned. Fascinating work. Offers good moneymaking opportunity. Sample, details, free. J. Odell, Route 4, Warren, Ohio.

**MAILORDER** Specialist. What have you? \$10 personal report—free. Smith Advertising Agency-PM, Excelsior Springs, Mo.

**DRAW** Cartoons for money! Easy home course. Free literature. Modern Books, Box 1063-M, New York City 7.

**FREE** List. Used ball gum, peanut vendors. Bowers Vending, Claypool, Ind.

**YOU** Can buy thousands of articles wholesale. "Supply Source Directory" 10c. Ideal Service, Park Ridge 40, Illinois.

**WIN** Cash, cars in prize contests! Write for copy filled with current contests, winning hints and tips. Send only 25c. Wright Contest Digest, Dept. 17-N, P.O. Box 2266, St. Louis 9, Mo.

**BARGAINS.** New and used arc welders. Electric or gas engine. a.c. or d.c., all sizes, portable or stationary. Write needs. Hobart Welders, Box M-1204, Troy, Ohio.

**EARN** Money at home. Your own mail-order business. Free details. Hunt Service, Burt, New York.

**EASY** Ways to earn extra income are described in Money Making Hobbies. 132 projects you can make and sell anywhere. 160 pages, \$2.00. Popular Mechanics Press, 200 E. Ontario St., Chicago 11, Ill.

**NEW—Unusual** opportunities in "backyard profits"! Interesting booklet free. Pickett's, Florence, Kentucky.

**COSTS** 4c. Sells fast for \$1.00. Formulas, sales plan \$1.00. Pacific Sales, 1458A, Wenatchee, Wash.

**WOULD** You pay 3%—first \$350 made? Book "505 Odd Successful Businesses" free! Expect something odd! Pacific-PM, Oceanside, Calif.

**UNPAINTED** Bookends, plaques, novelties. Free list. Plastercraft Arts, 1611 East Fifteenth St., Cheyenne, Wyoming.

**MAIL** Order opportunities. Ask for "How." Lou Wiltsch, Steelville, Mo.

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

**MAKE** Money with your typewriter or sewing machine. Details free! Heidorn, Box 184, New York 25, N. Y.

**RAISE** Bean sprouts in dark room. Pays well. Complete instructions plus 25 other practical money making plans and 60 handicraft markets, \$1.00. D. Nickell, R-3 Box 84, Bend, Oregon.

**FREE** Literature—Thousands wholesale supply sources. Moneymaking business ideas. Wilkin Company, Hillsboro 4, Ohio.

**FORTUNES** Won by contest fans! Enclose stamp for lifetime opportunities! National Contest Bulletin, Box 2685-P, Miami 16, Florida.

**EARN** Money at home! Work mornings, afternoons free. Big income possible. Details free. Chambers Enterprises, Box 871, Augusta 1, Georgia.

**BUY** Nylons direct from mill. Make good profits on fast selling nylons. Quick delivery on any quantity. Write for confidential wholesale price list. Joy Hosiery Mills, Delawanna 13, New Jersey.

**WORK** At home. Get orders by mail. Everything supplied at low cost. Big earning possibilities. Write: Edmondson, Box 4865-P, Atlanta 2, Ga.

**ASSEMBLE** And sell Swiss musical churches. Complete kit \$3.95 postpaid. Piltzcker Imports, Wood-Ridge, N. J.

**RESURFACE** Butcher's chopping blocks with easy, fast-working, portable electric machine. Unique service in wide demand with little competition. Large steady profits from full or part-time work. Hill Machine Company, Box 677B, Rockford, Ill.

**TESTED** Mail order plan shows you how to make money. Write Chambers, 1826 Ward Street, Berkeley 3, Calif.

**QUICK** Profits taking magazine subscriptions, handling greeting cards. Cassell Publishers Service, Westfield, N. J.

**CASH** For box tops, labels, wrappers, etc. Send 25c for buyer and items desired. Northland Service, P.O. Box 23, Laurium, Mich.

**DOLLARS** In personalized baby record books. Sell by mail. Use same literature we do. No-Co-Ro, Oakland 6, Calif.

**RAISE** Your business value, standing, as state notary public. Information. Stationers, Helotes 50, Texas.

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

**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.

### CHEMISTRY

**OH Boy!** New book of science. Experiments, formulas, secret processes, together with catalogue of laboratory supplies, only 25c. National Scientific Company, 2204 W. North Avenue, Chicago 47, Illinois.

**URANIUM** Ore sample, weighing scale, catalog of chemicals, apparatus, kits, \$1.00. Catalog only. 10c. Rex Laboratories, 2849-A Birchwood, Chicago 45, Illinois.

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

**CHEMICALS** And apparatus for industrial, analytical, and private laboratories. Catalog 15c. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester, 20, N. Y.

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

**NEW** Idea chemical and apparatus outfits for home experimenting. Photo-scales, microscopes, chemicals, biological and laboratory supplies in small quantities. Catalog 15c. Established 1931. John H. Winn, 124A West 23rd Street, New York 11, N. Y.

### PLASTICS

**PLASTIC:** Sheets, cut pieces, and scrap in clear and colors. Rod, tubing, acetate, dies, jewelry findings. Send \$1.00 for 4 pound scrap assortment and fabricating manual. Regal Plastic Supply, 720 Main, Kansas City, Missouri.

**COMPLETE** Line internally carved gifts and jewelry. Free catalog. Pilot Plastics, 67 C-Fulton St., New York City 7.

**PLASTICS**—Complete line. Wholesale, retail. We make our own full-color carving dyes. Casting plastic at quantity prices. Catalog, bargain lists, ideas, instructions, 10c. Gem-O-Lite, Box 686B, North Hollywood, Calif.

**NEW** Liquid plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Send 25c for exciting new home project manual showing how to get started. Castolite, Dept. P-101, Woodstock, Illinois.

**AMAZING** Liquid plastic kit \$3.25. Embed photographs, keepsakes, coins, make solid objects, clear, colors. Beautiful results in half hour. Easily tooled. Inexpensive hobby. Send 15 cents for catalogue. Kristalon Plastics, Dept. Z-120, Box 29, Wilmette, Illinois.

**MOLDED** Plastic letters and numbers. Samples 25c, information free. Plastic Exchange, Box 302, Bradenton 3, Fla.

**50c LB.** Masked plexiglas. Good sized pieces. Smaller pieces (some unmasked) 25c lb. Min. order \$1.00. Add postage; no c.o.d. H. Wilson, 6711 Lewis, Long Beach, Calif.

**LUCITE.** Plexiglas. Any size sheets, masked. Square foot (12 x 12) cost, 1/16". 96c; 1/8", \$1.25; 3/16", \$1.52; 1/4", \$1.80. Colors add 10%. Include 10% postage. Almac Plastics, 230 Fifth Ave., New York 1, N. Y.

**INTERNAL** Carved roses, orchids, swans, goldfish, butterflies, etc. Jewelry and gifts. Crystal Floral Novelty Co., Bound Brook, New Jersey.

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

### FORMULAS, PLANS, ETC.

**MAKE**—Sell cleaners, soaps, polishes, flavors, cosmetics. No machinery. Formula literature free. Kemico, Park Ridge 16, Illinois.

**WATERLESS** Hand cleaner. (No ammonia.) Easily made. Good profit. 2 dependable formulas \$1.00. Wipe-on auto paint, all colors, complete formula \$1.00, both \$1.50. Neiko Chemical Service, 3462-WP, Merchandise Mart Sta., Chicago 54, Ill.

**FORMULAS.** Trade secrets, for nearly everything. Catalog free. Creative Publishers, Winnetka 6, Illinois.

**10,000 FORMULAS** And trade secrets. Free literature. Stillman, 555 Kingston Ave., Brooklyn 3, N. Y.

**CINOKETE** Manufacturing instructions and formulas, full lines: perfumes, flavorings, auto specialties, polishes, etc., \$2 each. Plastics, Box 1574, Boston 4, Mass.

**MAKE** 1951 Your biggest money year with Miller's modern manufacturing formulas. Fifty years supplying the best. Literature free! Miller, Chemist, Dept. 1517, Tampa, Florida.

**RELIABLE** Formulas, Polishes, cleaners, etc. List free. Monde, Pulaski, Wisconsin.

**MONEY** Making formulas, ideas, trade secrets. Literature free. Ultra, 3519 Troost, Kansas City, Mo.

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

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

### HELP WANTED

**\$5 HOUR** Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

**AGENTS**—Sell automatic fire alarms. Low-cost, big profits, needed in every home, store, farm. Write Harmony Brass Co., Plano 3, Ill.

## AGENTS WANTED

IS \$210 A week worth a penny 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. PMC-12, 6 N. Michigan, Chicago 2, Ill.

"FOG-Stop" windshield cloth. Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee, 161, Akron, Ohio.

40% PROFIT—Buy direct. Power mowers—51 models. Prepaid. Rotacut-PM, Excelsior Springs, Mo.

ABSOLUTELY Free! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 5705, Cincinnati 3, Ohio.

WANTED—Purchasing agents. No money or experience required. Write Dept. C, Purchasing Manager, 2719 Lawrence, Chicago, Ill.

UP To \$50.00 in a week and tailored suit for yourself without paying one cent. Write for plan. Progress Tailoring Co., Dept. M-217, Congress & Throop, Chicago 7, Ill.

LOOK Here! Wanted—Men to start in business on credit. Sell some 200 farm-home products. Thousands our dealers now make quick sales, big profits. For particulars write Rawleigh's, Dept. L-192-PPM, Freeport, Ill.

\$1.00 STARTS You in business. Sell men's neckwear full or part time. Low investment big profits. Send \$1.00 receive sample tie, free color catalogue, selling plan, wholesale price list. Radio City Neckwear, Dept. M8, 112 W. 50th, New York City 19.

WIN Suits and earn money! Both easy with amazing plan. Show finest made-to-measure tailoring to friends, neighbors. No experience or investment. Free outfit. Write Stonefield Corp., 532 S. Throop, Dept. M-817, Chicago 7, Ill.

FREE Complete sales kit. Sell personal initialed belts and buckles, cap badges, tie holders, etc. Choice of 2000 emblems. Write for free selling outfit today. Hook-Fast, Box 1425PM, Providence, Rhode Island.

WOMEN Who can sew and alter dresses, make extra money part time taking orders for big manufacturer. All sizes. Amazing values. Everything furnished. Harford Frocks, Dept. D-135, Cincinnati 25, Ohio.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

MEXICAN Feather pictures. Sell on sight; 200% profit! Free details; sample 10c stamps. Sylvia-PH, Apartado 9036, Mexico City.

200% PROFIT. Bulk or packaged rat killer. Kilesem, Crystal Beach, Fla.

AGENTS Wanted by seat cover manufacturer. Featuring the only triple chain stitched seat cover made in America. No trade exposed. Mono, 6545 Santa Monica Boulevard, Hollywood 38, California.

STRANGE "Dry" window cleaner. Sells like wild. Replaces messy rags, liquids. Simply glide over glass. Samples sent on trial. Kristee, 160, Akron, Ohio.

FREE Sample nylon stocking of world's only nationally advertised hosiery line actually guaranteed against runs, snags or excessive wear, regardless of cause! It's amazing but true. Every weight from sheerest 15 denier to heavy 70 denier—all gauges to luxury 60 gauge. Amazingly low prices, starting at \$1.08 prepaid for sheerest 15 denier 51 gauge. Not sold in stores. Good Housekeeping guarantee seal. Also complete line men's hosiery guaranteed one full year or replaced free. Full variety lingerie in crepe, satin and nylon, featuring all nylon slip at \$2.95, satin slip at \$1.58, etc. Housecoats and robes. Kendex sales people will earn one million dollars this year. Get your share. No money or experience needed. Pay nothing now or later. Just show free outfits. Write orders. We deliver and collect. Advance cash plus huge bonus. Earn money spare or full time. Become manager; appoint others to sell for you; earn steady income on their sales. Man or woman—young or old, you can earn more money than you ever thought possible. Everything you need is furnished free and prepaid, including nylon stocking, samples of materials, sales books, 36-page salesmanual, color cards, etc. Simply write your name and address on postcard and mail to Kendex Corporation, Babylon 93, N. Y.

GENUINE Fur coats, capes, jackets. Lowest prices. Free wholesale catalog. HMJ, 150P W. 28, New York City.

EARN Big profits! Every home needs new Tapaline Multiplug that makes 8 appliances available from one outlet. Sample \$1.50. 16-page catalog of household items free. Sunshine Sales, Dept. WP-6, Loudonville, Ohio.

GARAGE And service station jobbers—Cash in on our new patented tool for pressure lubricating auto speedometer cables. Fast, profitable, \$3.50 seller. Write General Engineering, 1745 Pontius, Los Angeles 25, Calif.

NYLONS Direct from mill. Sample free. Guaranteed against runs. No experience or money needed. Also nylon slips, briefs. Earn big money spare or full time. Become manager, appoint agents. We pay you 40c for every \$1 your agents earn. Sell men, women necessities needed all year 'round. Ergim Co., 992 Columbus Ave., New York.

MEXICAN Feather pictures. Christmas novelty \$1.00 (stamps) brings \$2.00 worth samples. Refunded if unsatisfied. Aztec Art-P, Apartado 762, Mexico City, Mexico.

PERFUME—Sideline to independence. Learn all free. International, 6347 Parnell-AM-12, Chicago 21, Illinois.

AMAZING! Silk 'n' lace women's garters, hankies, sets. Big profits. Free samples, swatches, moneymaking details. Holiday, 85-06 96 St., Woodhaven, N. Y.

BUY Thousands of nationally advertised products direct from manufacturers and distributors. Write for "Buy Direct and Save." Service Publishing, 1420-A Investment Bldg., Pittsburgh 22, Penna.

\$75 WEEKLY—Men, women everywhere. Write Interstate, 5546 Metro, Los Angeles 55.

EASY Money, wonderful work. Mix water with our concentrates. Make flavors, lotions, perfumes, shampoos, cleaners, polishes, 125 products. Free catalog. Qualco E20030 Russell, Detroit 3.

MAKE Products yourself right at home. Windshield cleaner, rug cleaner, vanilla, spot remover, moth killer, auto polish, radiator cleaner, glass cleaner, soapless shampoo. Use just one ingredient formulas. No mixing. Amazing profits. Complete set \$1.00. Ideal Formula Service, Park Ridge, Ill.

SCHOOL Seniors! A postal will bring you our wonder, Kwick-Sell Cardalog of popular graduation name cards. Biggest profits! Only firm giving free Golden Memory Book and Souvenir Chest. Don't miss out. Hurry that postal! Craftcards, Box 235 (L), Pittsburgh 30, Penna.

FAST Profits—No investment. Send for big, free catalog. Plastic aprons, tablecloths, etc. 150 sure-fire items. We guarantee sales. Write The Halliday Co., Dept. M-9, 15-19 Pennington, Passaic, N. J.

MEXICAN Feather pictures. Christmas novelty \$1.00 (stamps) brings \$2.00 worth samples, details. Refunded if unsatisfied. Aztec Art-P, Apartado 762, Mexico City.

THERE'S Big money taking orders: Personal initialed buckles with belts, tie holders, choice of over 3,000 emblems, cap and breast badges for every purpose. Uniforms, work clothes, embroidered with company name, trademark, sales message, etc. Prospects everywhere. Latest styles, finest fabrics. Write for selling kit. Hook-Fast Co., Box 480PM, Roanoke, Virginia.

BIG Money taking orders: Shirts, ties, Sox, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-BG Lincoln, Chicago.

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.

MAKE \$20 A day! Sell Staybright brass name plates for front doors. Write Hubstamp, 357-E Congress, Boston, Mass.

\$184.00 CONTINUOUS Profit from every \$8.00 investment. Shampoo powders in bulk. Bottle yourself or sell powders. Request convincing facts. Morael Manufacturing Company, 505-R Fifth Ave., New York City 17.

BE A money maker. Represent magazines year around. Wonderful home work. Big Christmas profits now. Liberal commissions. Everything furnished. Write for free catalog. McGregor Magazine Agency, Dept. 500A, Mount Morris, Ill.

MAGIC Cleaner—Laundry soap deal. Hotter than a firecracker. Big profits. Sample free. Bestco, 4642 No. Central, Chicago.

SCHOOL Seniors—Earn sensational profits selling classmates America's most beautiful graduation name cards. Largest selection. Outsell all others. Free sample kit. Printerart, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

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.

DRESSES, 18c; Coats \$1.00, blouses 35c. Free catalog. Crown, 164-P Monroe Street, New York.

WRITE for free booklet and catalog telling how to earn substantial profits in your spare time by forwarding new and renewal subscriptions to all magazines for your friends and neighbors. Oldest U. S. agency. Established 1869. Moore-Cottrell, North Cohocton, New York.

SELL Balloons! Combs! Novelties! Excellent sideline. Carleton House, Texas City, Texas.

JEWELRY Factory desires salesmen, distributors, jobbers. Pickcraft, 19 Bank Street, Attleboro, Mass.

SELL Big money-maker to men and women. Easy handwork makes fast-selling useful articles. Sunmade Company, Brockton 64, Mass.

GOLD Lacquered window sign letters. Large sizes penny each. New foils. Absolutely beautiful. Free samples. Atlas, 544 W. 79th, Chicago 20.

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.

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.

WHERE To buy 800,000 articles direct from manufacturers. Including hundreds of scarce items. Sent free. "Your Profits Under the Spotlight." Glass Publishing Co., Ellwood City, Penna.

AGENTS—300% Profit selling genuine gold window letters; stores and offices. Free samples. Metallic Letter Co., 438-B North Clark, Chicago.

## HIGH-GRADE SALESMEN

MAN! This is hot! Make \$6.35 on every sale! Make over \$30.00 a day! We have new adding machines in original cartons. You can sell for only \$12.95! Yes, only \$12.95, and you'll make 49%. They're executive model portables, precision built, fully guaranteed. Send for life-size color photo and full details. Write today to Lightning Adding Machine Co., Inc., Dept. P-1, 543 So. Spring St., Los Angeles 13, California.

AUTOMATIC Fire control. Beautiful units for the finest homes. Powerful units for serious hazards. Low selling price and guaranteed highest profits. Red Ball Inc., P.O. Box 1552, Salt Lake City, Utah.

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-1250, 7530 Greenwood, Chicago.

\$5 HOUR Easy! Sell name plates for houses. Free sample, order blanks. Write: National, 214 Summer, Boston, Mass.

PRINTED Cellophane tape for advertising, labeling, industrial parts marking. Complete line. Excellent commission. Department PM, Topflight, York, Penna.

ADVERTISING Specialties. Steady income. Earn \$20 day up working 5 hours selling calendars, pencils, yards, leather, plastics, good-will gifts for West's largest adv. jobbers. Few territories open for exp. dependable, ages 33 to 50. Write Banco, 836 Montgomery, San Francisco.

POSITIVELY New—Over 100% profit. Two sided reversible neckties. Free details. Farrell Company, Dept. P-17, 1377 Van Zandt, Cincinnati 31, Ohio.

MAN To earn \$85 week and up. Long needed invention. Advertised in Saturday Evening Post. Full or part time. Exclusive territory. No investment. Free sample outfit. Write Red Comet, Inc., Dept. 814, Littleton, Colorado.

SHINER-Hook: New sensational seller to fishermen, dealers. Free sample. Nelson Company, St. Paul 2, Minnesota.

**AD Matches!** Sell amazing designs—20, 30, 40 and 240-light book matches. Big 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-12, Chicago 32, Illinois.

**SALESMEN**—Would you like a seagoing yacht for one dollar? The writer has one, and after 45 years of successful selling, tangibles and intangibles, has condensed a few priceless and proven secrets of his successes into one small pocket book you can carry with you. This booklet is unlike anything you have read and satisfaction is guaranteed no matter what you are selling. For example the writer sold and placed 34 ordinary life insurance policies in a single day. (Not industrial or group.) A world's record. See "The Insurance Salesman," Oct., 1934. Mail one single dollar for "P.M.S." to Stroud and Sowle, 195 26th Ave., #5, San Francisco 21, Calif. (Crew and Sales Managers, 6 for \$5.00).

A Fine income, your own nylons free! Show nylons, lingerie, men's socks with amazing free replacement guarantee against runs, snags, tears. Write for free sales kit. Group organizers invited. Rosalee Hosiery Co., Clifton 58, N. J.

**SELL** The fastest money maker out! Handy Hannah automatic wax dispenser pays you over 100%. Every housewife wants it. Saves time, labor, stooping, mess, waste. Press button and wax is released. Sample and details write Everett Young Co., Whitman, Mass.

**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.

**BIG Money** taking orders. Shirts, ties, Sox, pants, jackets, sweaters, shoes, uniforms, etc. Sales equipment free. Experience unnecessary. Nimrod, 4922-AN Lincoln, Chicago.

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**ACHIEVE** Business and financial success in your own collection-credit agency business. Home or office. Quickly learned. Free folder. Write Cole & Associates, Syracuse 2, N. Y.

**IT'S Fun** learning a language by Linguaphone. At home, in leisure time, quickly, easily, correctly master Spanish, French, Italian—any one of 29 languages through proved Linguaphone conversational method. Send for free book. Linguaphone Institute, 83-W Radio City, New York City.

**BE A** real estate broker through home study or classroom instruction. Write for free book. Approved for veterans. Weaver School of Real Estate, 15 E. Pershing Rd., Box CP-12, Kansas City 8, Missouri.

**LEATHER** Carving. Fascinating, highly-paid art; age-old secrets now taught for first time in home study course. For hobby, profession or profitable business, write: Baird School of Leather Carving, Box 1367-M, Dept. 11C, Manitou Springs, Colo.

**MAKE Up** to \$35-\$45 week as a trained practical nurse! Learn quickly at home. Booklet free. Chicago School of Nursing, Dept. M-12, Chicago.

"**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. 11012-C, Pleasant Hill, Ohio.

**STUDY** For game warden, fish, park, forestry, patrol and wildlife conservation service. Details free. Write Delmar Institute, D11, Denver, Colo.

**USEFUL** "Dictionary of Electrical Symbols and Formulas." 25c. Michigan Technical Institute, 2281 W. Fort Street, Detroit 16, Michigan.

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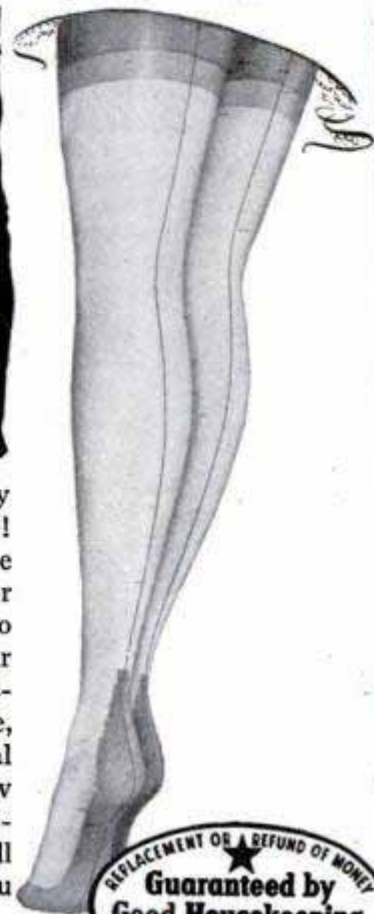


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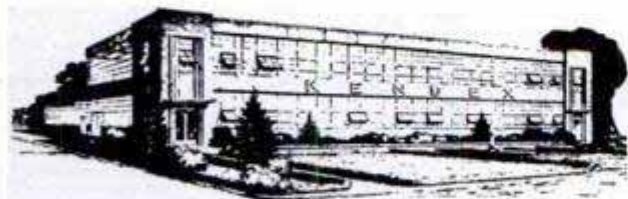
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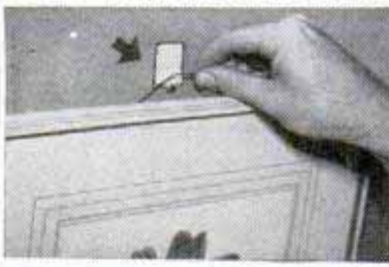
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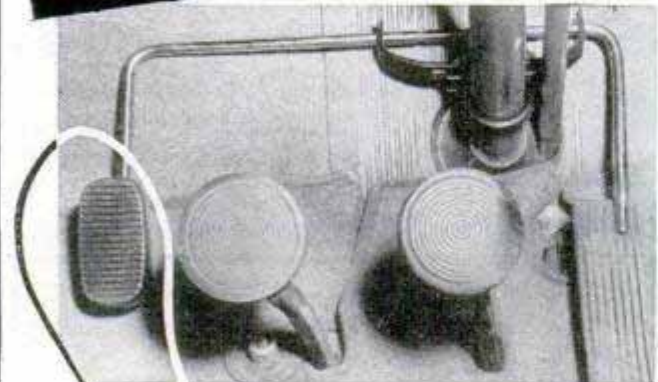
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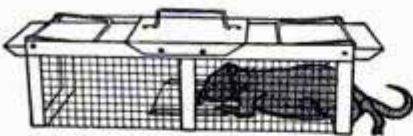
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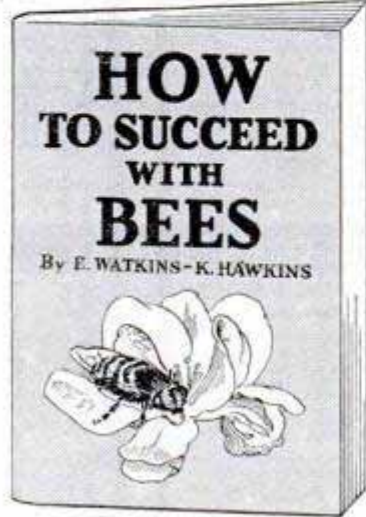
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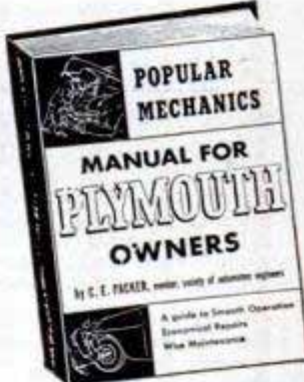
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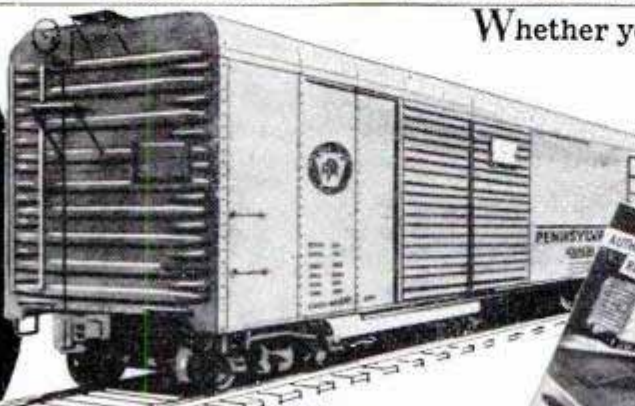
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## those handy-andy eggbeaters

by Lt. Comdr. Arthur L. Schoeni, U.S.N.R.

**I**N THE BLUE SKIES over Panama a small brightly painted target airplane, used by pilots or by anti-aircraft gunners to sharpen up their shooting, buzzed along blithely ignoring all radioed impulses by the "mother" control plane.

Out of control, the target drone was flying wild, imperiling the near-by military encampment and the homes nestled around it. Into the breach rushed a helicopter. Chasing the little drone, the helicopter outmaneuvered and caught up with it. As it sped along, the pin-wheel pilot steered his aircraft so that it came directly over the top of the wild-flying target plane.

Heavy drafts of wind from the spinning rotors of the helicopter shot downward on the plane. Hitting the wing surfaces, the downdraft tilted the drone





Hovering over the Mexican volcano, Paracutin, an Army Sikorsky helicopter carries a group of volcanologists. Despite turbulent air, this Handy Andy provided a stable platform. Photo below shows how a helicopter dropped raft to couple off Hawaii and "pushed" them to shore against tide

so that it veered from its Kamikaze course. The pilot then dropped a small smoke flare on the plane, which sent it into a spin ending in a crash at sea.

That incident is just one of the thousand-and-one odd and unusual uses the Navy or Air Force has found for helicopters since the end of World War II. Helicopters are nothing new in the aviation picture, but during the war nobody did much about the pinwheels. Many fighting pilots looked on them as Buck Rogers stuff. They saw practically no combat action, but since the end of hostilities the helicopter really has come of age in a big way.

Private enterprise has made use of helicopters for such things as flying the mail through city





**Downdraft from the rotors of Navy helicopter helped dry a rain-soaked field before a model-airplane meet**

areas, crop dusting or short-haul hops, but the military has really put them to work.

An Air Force captain and his wife were swimming in inner tubes near Hickam airfield in Hawaii. Offshore currents swept them onto a reef 250 yards out, from which a rescue boat was unable to save them. An air-rescue helicopter was sent out and dropped the pair a life raft. The tide sweep threatened to carry them farther to sea, so the pilot hovered over them to the seaward and used the rotor slipstream to "blow" them right up onto the beach.

The Navy uses helicopters in many ways for military tasks on its aircraft carriers, battleships and cruisers. But its pinwheels also find time to perform odd jobs like hovering over swimming sailors to guard against sharks and chasing spent torpedoes after firing practice.

Then there was the picnic party down by the Naval Air Station at Pensacola, Fla., which was late coming home one week end. A searching helicopter found the party — the borrowed Jeep had run out of gasoline. So the pinwheel pilot landed, siphoned some gas out of his tanks and the picnic party went home happy on aviation gasoline.

The Marines have a down-draft story of their own, too, with a slightly different twist.

Corsair fighter planes dropped bombs on a target near Cherry Point, N. C., starting a small brush fire. A rescue helicopter from the Marines' Air Station took a party of fire fighters out to size up the fire. The pilot brought his plane over the flames to give them a better look. Hovering over the blaze, he speeded up his rotors. The downdraft from the spinning blades literally blew out the fire. No ground crew of fire fighters had to be sent out.

In New Jersey, a helicopter from Lakehurst searched for and found a crazed ex-serviceman who was terrorizing the

**"Taxicab" of the fleet not only drops life rafts and picks people out of the drink, but carries admirals and messengers between ships**





In the Antarctic, a Navy photographer uses helicopter as a steady "tripod" to get some aerial shots.

Below, when bombs dropped by Marines started brush fire in North Carolina, helicopter "blew" out fire



neighborhood with a pistol. After posses had failed to find him, the slow-flying search helicopter spotted the man in a clump of trees.

Helicopters have a long record of saving civilians' lives as well as those of Navy and Air Force personnel. Scores of persons in the Middle West were saved a year ago when helicopters flew in food and medical supplies to snow-isolated farms. One Army sergeant was flown to a farm and acted as midwife at a child birth. He also attended a Nebraska farmer with a broken leg and treated six other persons for severe frostbite.

After long days of fruitless effort helicopters dismantled and flown north in transport planes were reassembled and rescued 18 persons from the Belgian airliner crash at Gander, Newfoundland. The Navy sent out an aircraft-carrier load of big transport helicopters to Greenland to rescue a plane load of Air Force men marooned for many days on the ice cap. Dozens of Navy pilots are alive today because helicopters picked them out of the ocean behind their carriers when their planes crashed on take-off or landing.

Out on the outer banks of Cape Hatteras, residents have come to rely on helicopters when trouble strikes. Coast Guardsmen fly expectant mothers inland and transport injured persons to hospitals. Navy helicopters fly doctors to otherwise inaccessible swamp areas to treat student pilots forced down and injured.

When a whipping fuel line knocked a crewman off the carrier Midway into the frigid Atlantic, the plane guard helicopter picked him up in three minutes. A fighter plane crashed on a sandbar in the Gulf of Mexico. A helicopter picked up the pilot who stood on the wing and never even got his feet wet.

A carrier's boxing team was flown over to a near-by ship to participate in matches with that ship's team. Armed with pistols, helicopter pilots from the Naval Air Station at Lakehurst hunted and shot wild dogs, formerly war dogs in the Sandy Hook area. The animals had become a menace to the residents. A helicopter pilot reconnoitering a forest fire spotted a fawn in a clearing, so he dropped down and rescued the animal from the flames.

At sea, a destroyer's washing machine ran out of soap, so a helicopter flew over a load from another ship so the men could boast of white "whites." One high-ranking Navy admiral got in his required submarine dives in the Caribbean by flying from his flagship to a sub by helicopter, making the dives and returning, all in an hour.

Down at Corry Field, Fla., some model-



airplane enthusiasts wanted to hold a model meet but the Admiral Mullinex Field was soaked from recent rains. A helicopter was called in. It hovered a few feet over the ground and downdrafts from its rotors swept aside the puddles and dried out the ground sufficiently for the meet to go ahead as scheduled.

Pilots know hitting a bird in flight can destroy a plane, so before important test flights at the Navy's big Patuxent River Air Station, a helicopter carries a shotgun-armed marksman aloft to clear the air of buzzards.

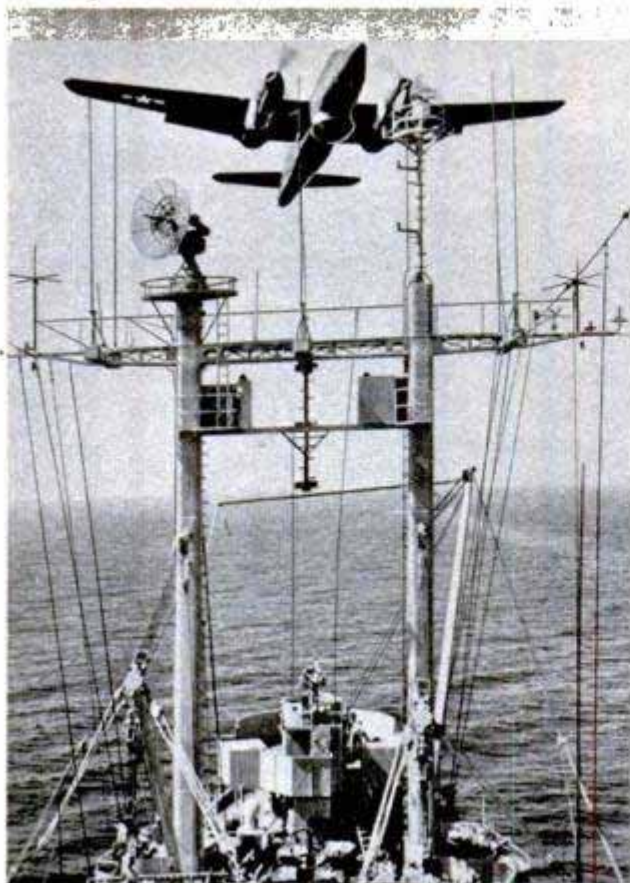
At that same air station, the Navy was having some trouble getting civilian laborers at a far spot on the giant air base to work at a good rate. One day the Admiral in charge dropped out by helicopter to see how work was progressing. The laborers were leaning on their shovels but when the Admiral stepped out of the pinwheel the dirt flew. The supervisor thereafter requested frequent "flyovers" by helicopter—just any helicopter.

Some other odd uses for helicopters included using them to take lead-line soundings in sea areas where water was too rough for boats, flying the commanding

(Continued to page 248)

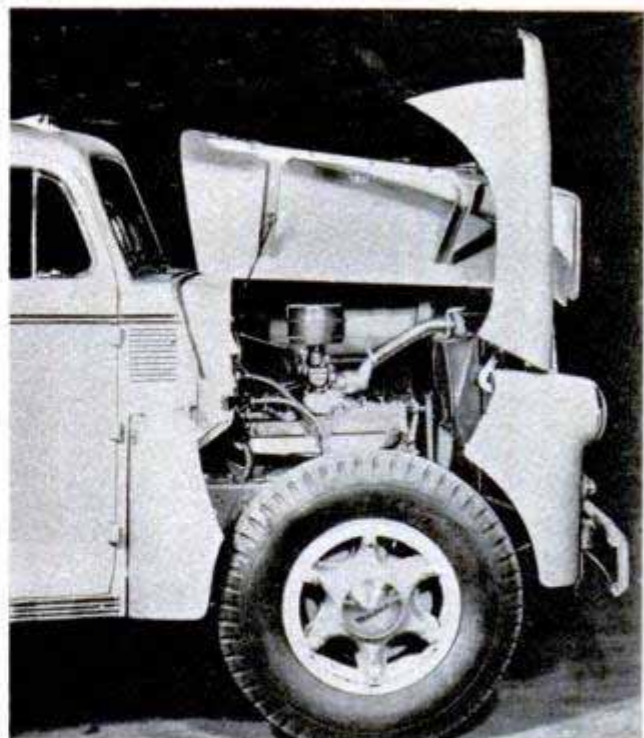
Helicopter comes to the rescue when target drone is out of control. Downdraft guides it away from base. Below, off Korea, helicopter hovers over a sinking F9F jet to rescue pilot from the carrier Valley Forge





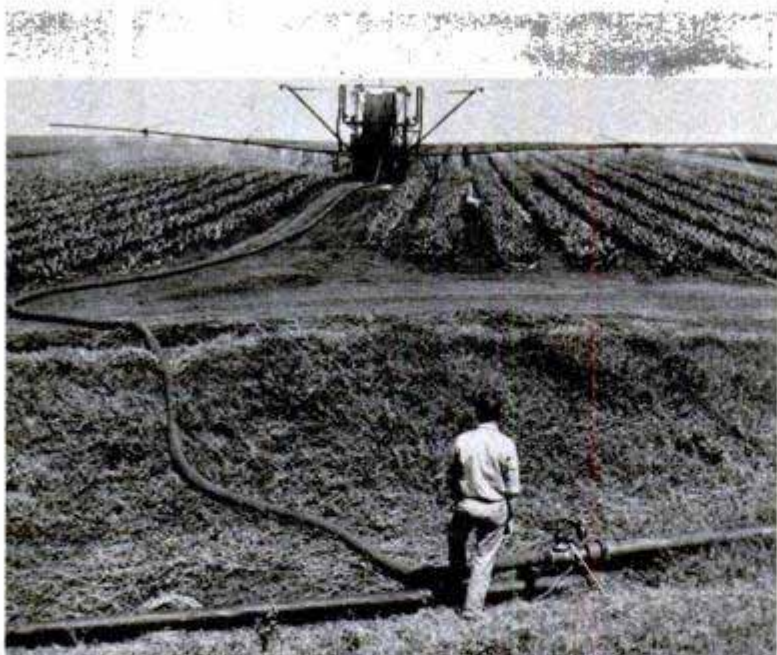
### Flying Messenger

Low-flying American planes dropped messages to convoy flagships during the Korean landings. In this way, use of radio was avoided as such messages might have been picked up by the enemy.



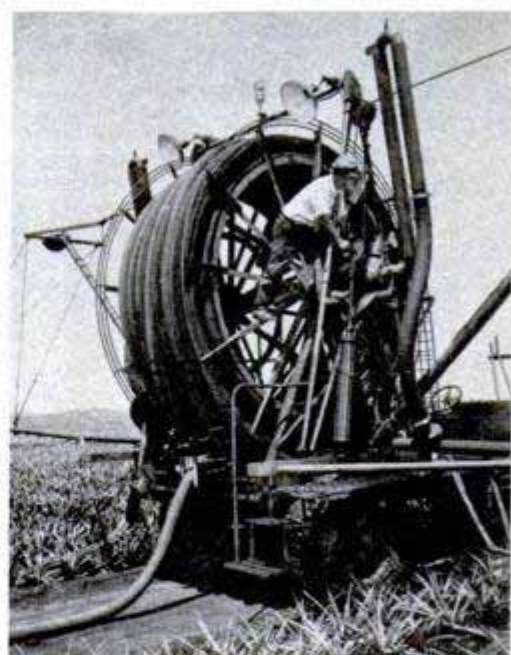
### Hinged Fender Speeds Repairs

Mechanics will welcome the new Federal truck with its hinged front fenders that swing forward, completely uncovering the engine, steering mechanism and front-wheel brakes. The concealed hinge holds the fender upright out of the mechanic's way during maintenance and repairs. Because of this accessibility, a radiator core can be removed in less than 10 minutes.



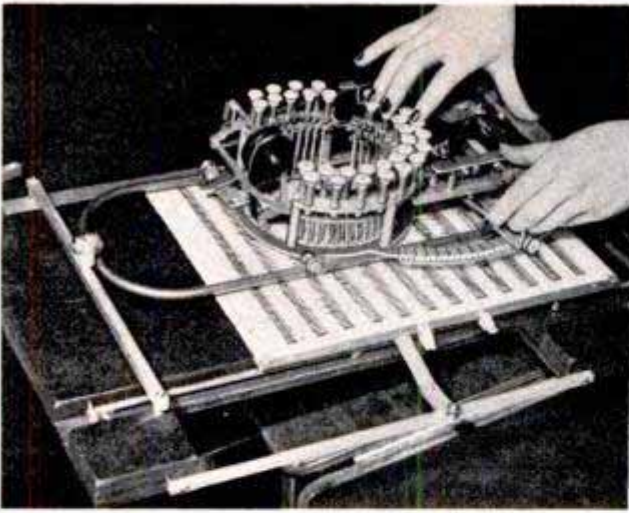
### Shower Bath for Pineapples

One of the biggest reels of "garden hose" in captivity carries water to a huge sprinkler used on a Hawaiian pineapple plantation. Two 50-foot spray booms, mounted on a truck, extend over the plants and irri-



gate 12 acres every 8 hours, providing an equivalent of 1½ inches of rainfall. A large reel on the truck holds 800 feet of 4-inch hose which connects to the water main and reels out automatically as the truck is driven across the field. The rig has a capacity of 800 gallons of water a minute.





### Mechanical Note Writer

Composers and arrangers don't have to spend hours hand-lettering their scores now that a musical typewriter is available. The machine has a circular keyboard containing all the notes and signs the musician needs. When finished, the typewritten score looks like a printed sheet and is just as legible.

### Daylight Tank Develops Movies

Motion-picture film can be developed as soon as it is exposed with a daylight developing tank that automatically winds and rewinds the film in the solutions. Once the tank has been loaded, all operations can be performed in the light. When the reversal process is required, a transparent tank is used. Business firms using microfilm can quickly process their own film, assuring complete privacy for their records and permitting immediate forwarding or disposal of the material being copied. The tank, which is powered by a small electric motor in the lid, develops up to 200 feet of movie film at a time. A larger model handles 70-mm. X-ray film.

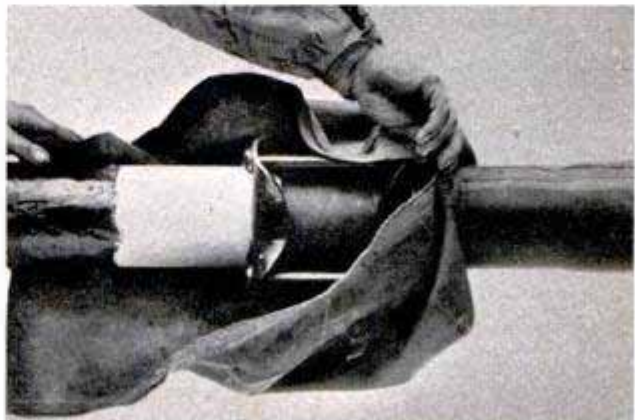


### Aluminum Screen Is Radiant Heater

Electric heating strips of aluminum screen or foil that are installed under floor surfaces are being introduced by a California company. They do not produce the objectionable humming noise created by iron or steel-mesh heating elements. The aluminum elements can be installed under tile, plywood, linoleum and most other types of flooring as well as in concrete slabs. Operating through a 24-50-volt transformer from house current, they consume up to 15 watts per square foot. The temperature adjacent to the element does not rise above 120 degrees and the average floor temperature is 75 degrees.

### Zip-On Coating Stops Corrosion

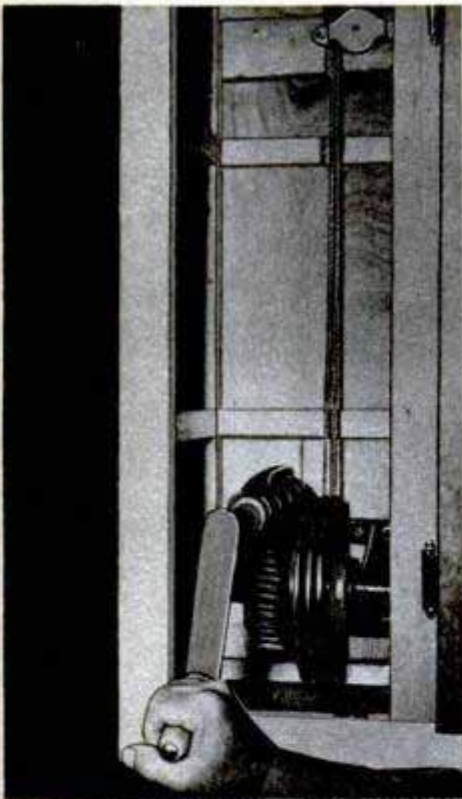
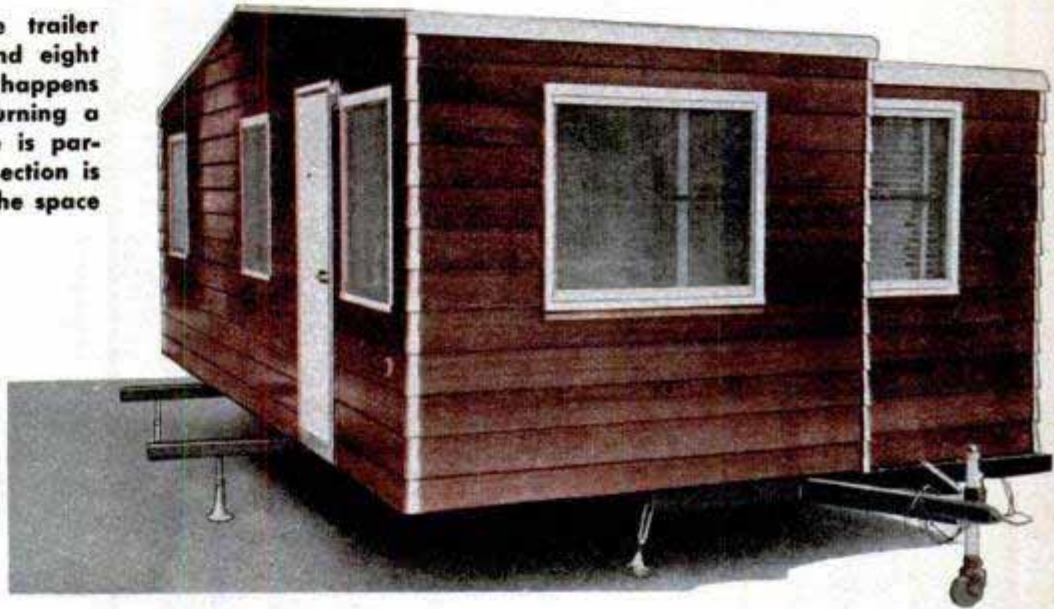
Applied in a fraction of the time required for hot coating, an anticorrosion coating for pipe joints is closed snugly by a slide fastener. Designed for use on couplings, welded and insulating joints, the coating eliminates the hazards of handling hot materials. The zipper and ends of the sleeve are sealed with a cold compound.



# Telescoping



Ready for the road, the trailer measures 23 feet long and eight feet wide. But look what happens when the owner starts turning a crank. At right the home is partially "unwound." Outer section is moving to left to double the space



Simple hand crank operates gears to "build" the big living room of the home on wheels. Right, set up and landscaped, this home has a living room, dinette, a kitchen, a bath and a bedroom



# Trailer Home

By Claude M. Kreider

**B**Y MERELY turning a crank the owner of this trailer can double its capacity.

The trailer has telescoping rooms that fit snugly together on the road, then "unwind" to form a modern three-room-and-bath home. The owner pulls up at his chosen site, steps into the kitchen of the trailer and turns a crank 100 revolutions. The gears connected with the crank lower a new floor section flush with the one on which he is standing and move an outer shell of the trailer out over the new floor. The owner then swings folding beams out under the new section and supports them with screw jacks. Presto—he has the room of the original trailer plus a living room as large as all the rest of the vehicle. The home can be ready for occupancy 10 minutes after it leaves the road.

On the road, the trailer measures 23 feet long and has a standard 8-foot width. The expanded living area has interior dimensions of 14½ by 22½ feet. The weight of 7400 pounds handles easily behind an ordinary car. Only about 400 pounds of weight rest on the trailer hitch.

The trailer is designed as a seasonal home to be towed to the beach or the mountains. It may also be used by families who work on large construction jobs throughout the West in localities where housing is at a premium. Such workers sometimes have to move about as some stages of the project are completed.

The trailer proper has a dining nook; a kitchen equipped with refrigerator, gas range, double sink and cupboards; a bathroom with a shower, lavatory and toilet; and a bedroom with a full-size bed, coil springs and an innerspring mattress. Reading lamps beside the bed rest on twin bedside tables.

Exterior electric connections are provided at both front and rear of the trailer. Several outlets are spaced throughout the rooms.

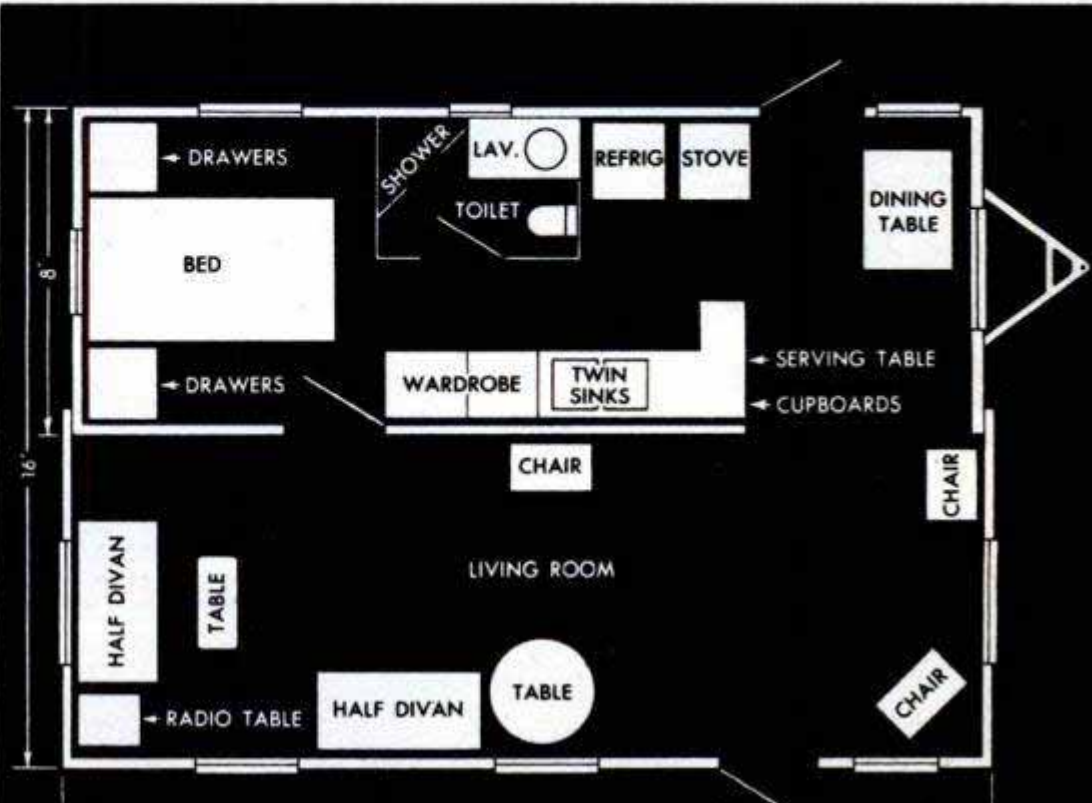
On the road the living-room furniture is carried in the dining nook and bedroom. As soon as the living room is slipped outward, the furniture—including two divans, three tables and three chairs—can be moved into place.

The telescoping living room fits snugly over the trailer proper. When it is extended the joint is sealed to exclude wind, dust and rain.

All the walls, floors and ceilings of the trailer are insulated. The interior is curly birch, varnished to a natural finish. The exterior walls are made of eight-inch rabbeted redwood, oiled and varnished.

Double-hung windows are used instead of the conventional trailer-type windows. Heavy plate-glass panes operated by pull chains move in metal channels. All the doors and windows are fitted with Venetian blinds. The inside head clearance of the trailer is seven feet.

Diagram shows how the outer shell moves away from inner shell to double the space. The joint between the two sections is sealed against wind and rain

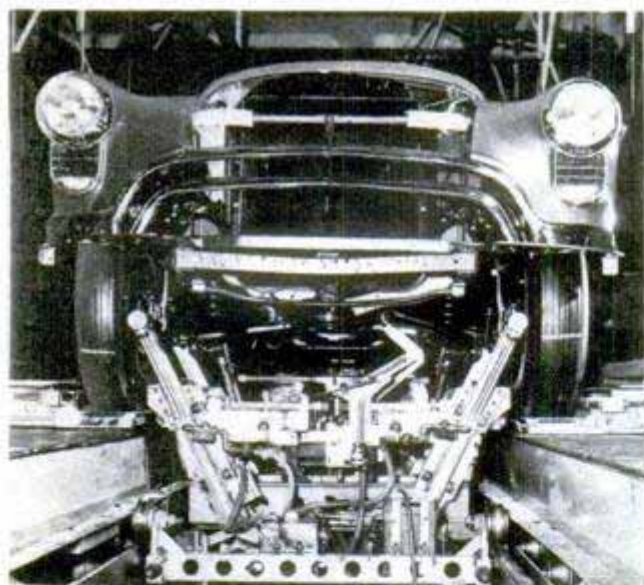




## Illuminated Garden Ornaments

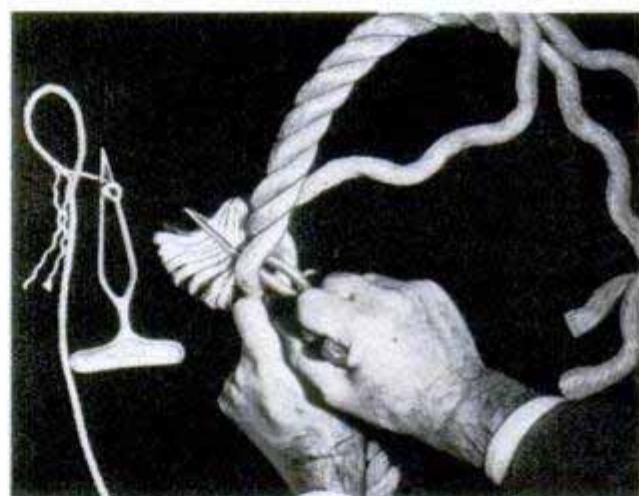
Garden ornaments, illuminated from the inside like Japanese lanterns, can be made to any design by a spray-on process. A wire frame is fashioned in the desired

shape. Then the coating, in liquid form colored as desired, is sprayed over the frame. It dries immediately to form a thin skin. Subsequent coatings thicken the covering. Illumination is provided by electric bulbs inside the waterproof ornament.



## Aligner Sets Exact Wheel Toe-In While Car Is Assembled

Precise toe-in of front wheels is set into new cars while they roll along the final assembly line in the Oldsmobile plant. A wheel-alignment machine moves with the car 12 feet along the conveyor line. Gauge arms on each side measure the toe-in and show the operator how much tie-rod adjustment is necessary. The machine also centers itself automatically, permitting an accurate spoke setting to be made on the steering wheel so that the horn ring and spokes are in a normal position for driving.



## Rope Splicer

Splicing a rope—usually a difficult job for a landlubber—is made easy by a tool with a point shaped like an arrowhead. Strands to be drawn through the rope are held in the eye of the tool. Made of bronze, the tool can be used on all ropes up to one inch in diameter. It can also be used on small-size wire ropes.

Sources of available products described in this issue are listed on pages 14, 16 and 18. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available without charge from the Bureau of Information, 200 East Ontario Street, Chicago 11, Illinois

# SOWING PICTURES



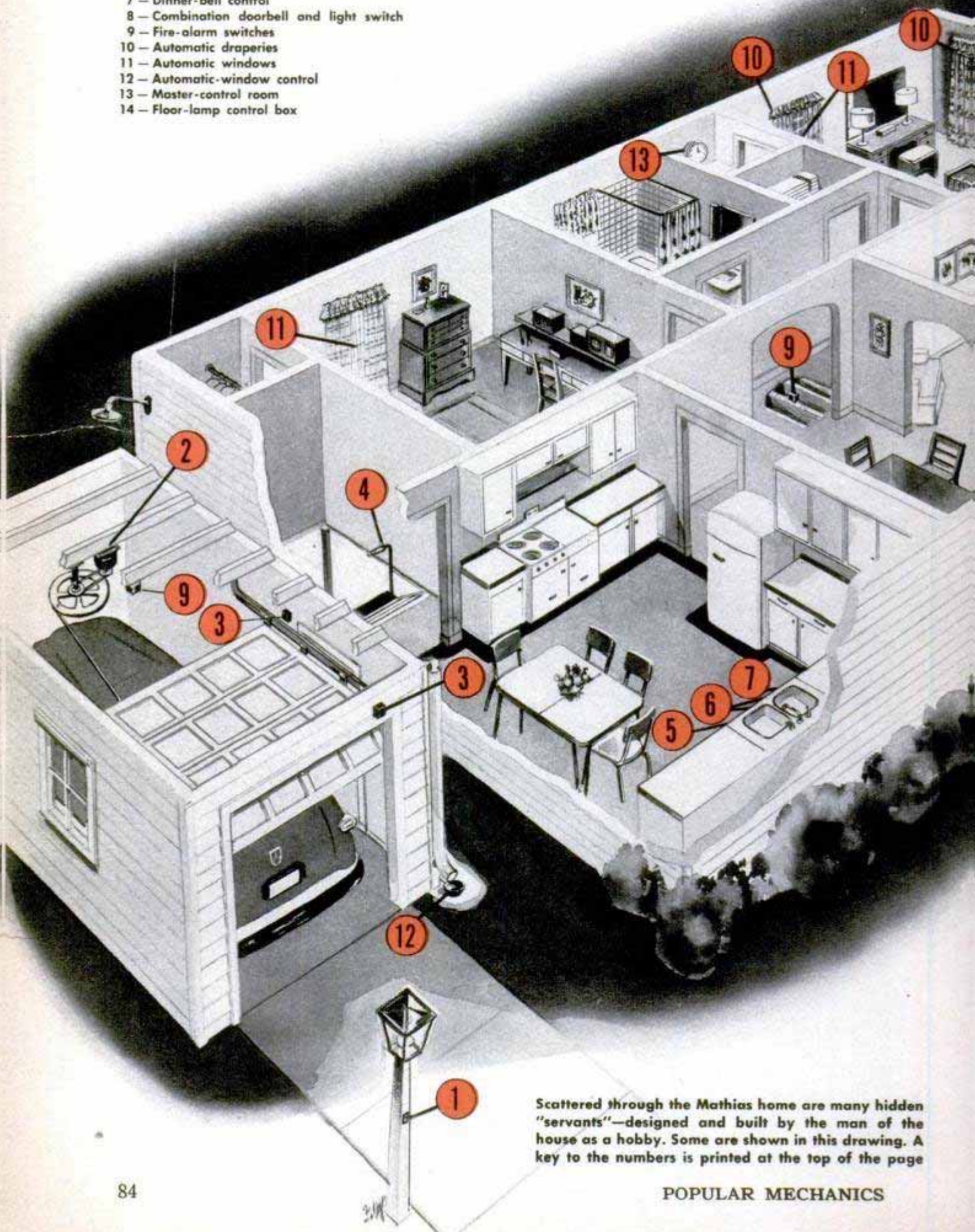
SEEDS by the thousands are the "paint" of a unique artist in Ventura, Calif. Mrs. Ellen Cunnane started gathering seeds years ago as a hobby. Noticing the amazing variety of shapes, sizes and colors, she decided to try to duplicate one of her husband's oil paintings with seeds. So successful was she that she has been painting with seeds for 15 years. Her "canvas" is a sheet of white or gray paper, to which she applies paste with a fine brush. She mounts each seed on the paper individually.

Using a fine brush, the seed painter covers her "canvas" with a coat of paste. Then with tiny scissors or tweezers she mounts each seed. Her "palette" consists of many small boxes of seeds, each labeled

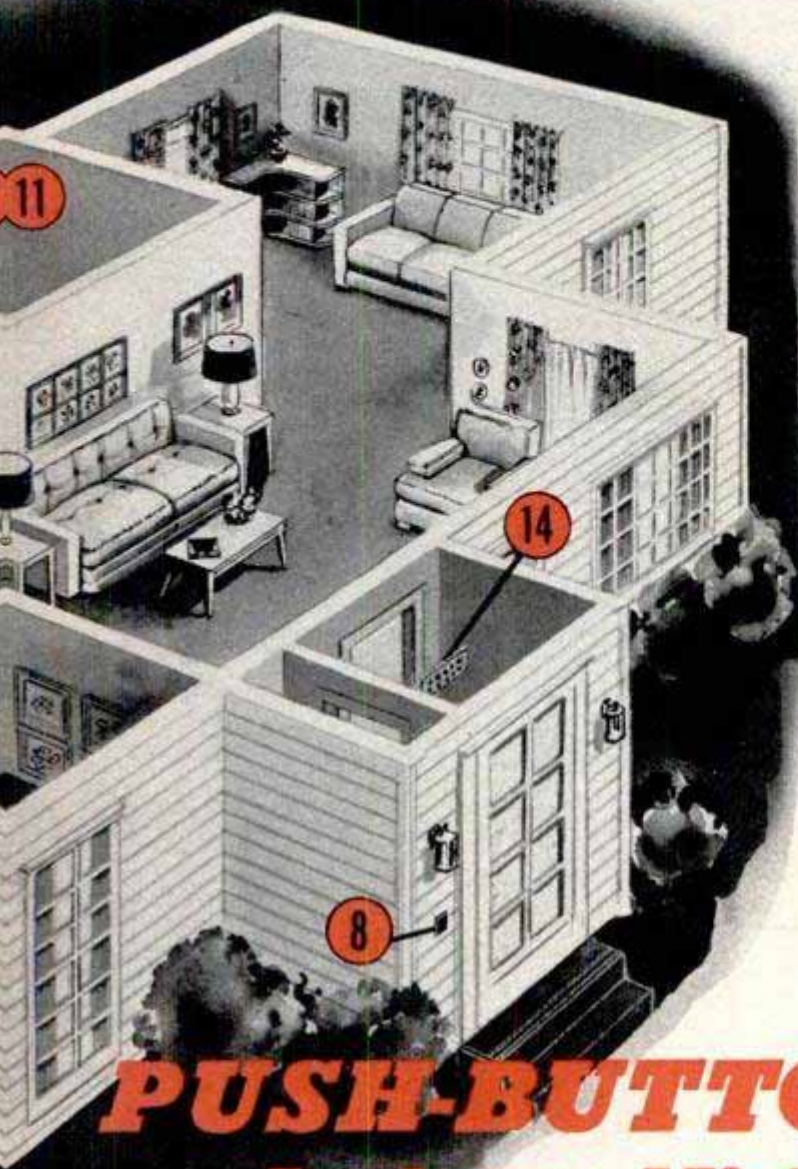
Girl walks her dog down a village street in one painting. First pictures, made 15 years ago, look new today



- 1 — Lock-switch for garage door
- 2 — Garage-door motor
- 3 — Burglar-alarm switches
- 4 — Basement elevator
- 5 — Garage-door control
- 6 — Radio controls
- 7 — Dinner-bell control
- 8 — Combination doorbell and light switch
- 9 — Fire-alarm switches
- 10 — Automatic draperies
- 11 — Automatic windows
- 12 — Automatic-window control
- 13 — Master-control room
- 14 — Floor-lamp control box



Scattered through the Mathias home are many hidden "servants"—designed and built by the man of the house as a hobby. Some are shown in this drawing. A key to the numbers is printed at the top of the page



Once an ordinary closet, the master-control room is lined with many switches, timers and relays

## **PUSH-BUTTON MANOR** *Jackson, Mich.*

By Arthur R. Railton

**R**EMEMBER those wartime dreams of lazy living in postwar homes with push buttons to do all the work? Well, like most of us, you're probably still getting by in a house where the only push button rings the doorbell. But there's at least one fellow who is making those dreams come true.

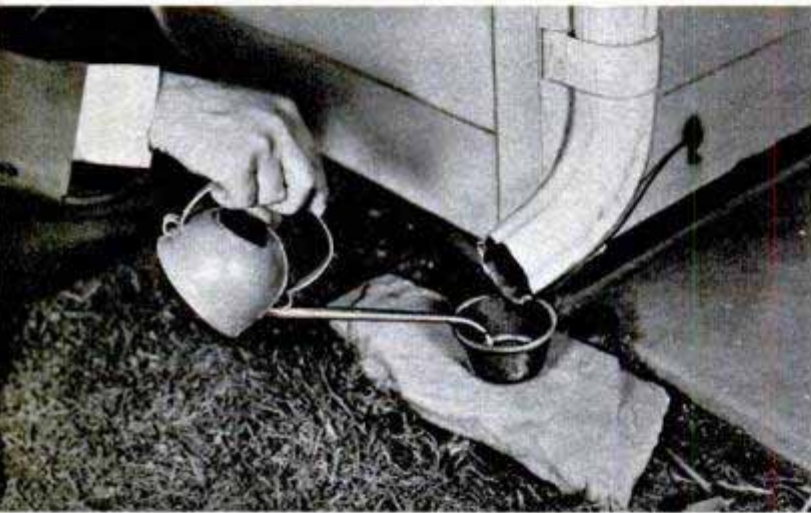
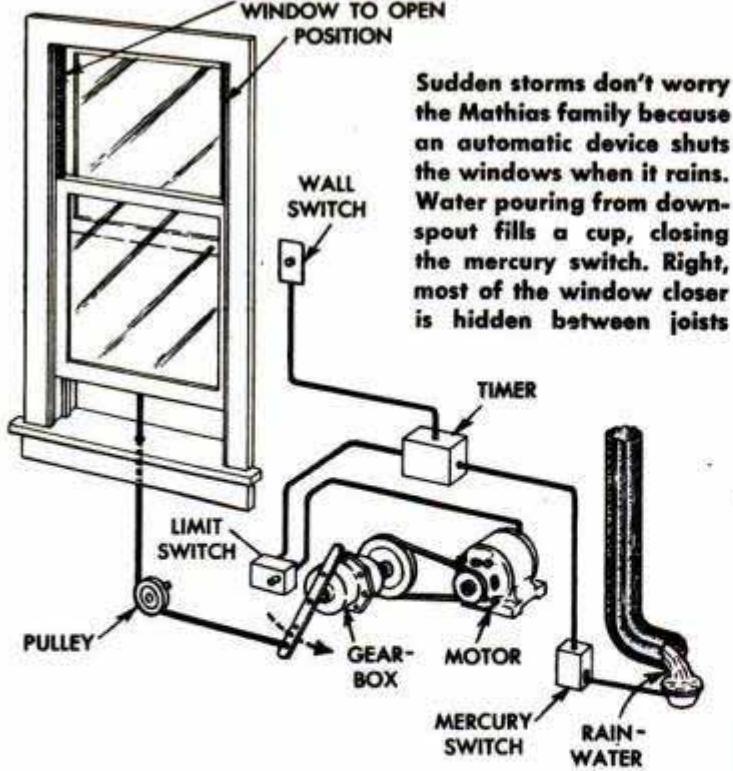
Emil Mathias of Jackson, Mich., traces his mechanical aptitude back to his youth when he harnessed the wind to grind the family's weekly supply of coffee. A small windmill, some gears, a shaft or two, all went together to create a power coffee grinder that Mathias still remembers as one of his favorite devices.

Ever since that day, about 25 years ago, he's been figuring out ways to make electricity and mechanics do more work around the house. He still recalls with a smile another youthful venture. It was an elec-

tric doorbell chime. Five pie pans and a magnetic clapper were the raw materials. Hooked up by young Mathias, they provided a reasonable facsimile of today's fancy-sounding door chimes. And that was a quarter of a century ago.

Today, he and his wife and son live in a neat, six-room house where just about anything can be done by pressing a button. To make this possible, Mathias has strung 7000 feet of wire and installed innumerable switches, relays and motors. He uses low-voltage current, reducing the fire hazard and expense. Incidentally, his electricity bill is not much larger than that for an ordinary household, despite the many push buttons.

To the casual visitor, the Mathias house looks no different from any other comfortable American home — until Mathias



To demonstrate how the ingenious window-closing device operates, Mathias pours some water into the cup under the downspout, simulating a sudden rainstorm

Below, right, this clockless timer uses the heat from a tiny light bulb to open a thermostatic switch that automatically turns off the light at the front door

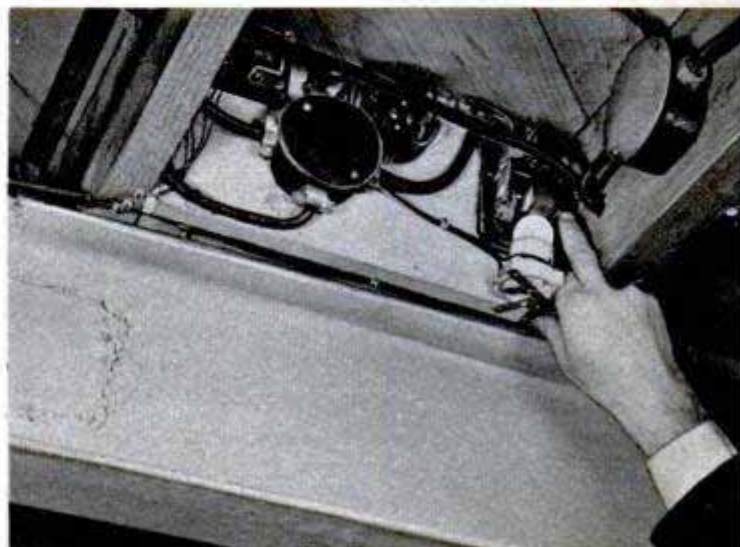
Below, once operating a bombsight in a big bomber, this war-surplus motor now has a peaceful duty. It opens and closes the draperies in the Mathias home

touches a switch and things begin to happen! Everything is hidden away between floor joists or walls. There are no dangling wires. You wouldn't suspect the presence of scores of mechanical servants that await your command.

But just step into the nerve center of the system, a closet in Mathias' bedroom, and you realize that this house is unlike any you've ever seen! The walls of the closet are lined with paraphernalia. Switches, relays, clocks that turn on things, clocks that turn off things, thermostats, transformers, rectifiers, yards of wire connecting everything to something else! To the uninformed, it's an electrician's nightmare, but to Mathias it all makes sense. Everything has a practical function. There's no Rube Goldberg scheme in the place.

Mathias believes that half the fun of having something is making it. Every one of his mechanical servants is his own design and construction. He admits he could have bought commercial models in many cases, but where's the fun in that?

"Take that elevator I'm building on the





basement stairs," he explains. "I could buy one of those home elevators, but that would eliminate most of the fun. So I'm building one myself."

When the doctor said Mrs. Mathias should cut down the number of trips up and down stairs, Mathias went to work on the elevator. He got a few lengths of square door track, like the kind barn doors slide in, and bolted them to the side of the stairway. A rectangular steel platform, just large enough for one person to stand on, is the "cage." Its supporting brackets slide smoothly inside the door track. Push-button switches on the safety railing at waist height control the reversible motor that operates the elevator. Push one button, you ride downstairs to the basement. Push the other and you ride up!

Step into the bedroom and Mathias flips a wall switch. The draperies close automatically over the two windows. A surplus bombsight motor in the basement does the work. He throws another switch and the windows close. The radio in the living room can be turned on and off from the bedroom (and from the kitchen and basement as well). Extension speakers bring the sound to you wherever you are.

Clocks in the closet shut the radio off at 10 o'clock each night and turn it on at 6 a.m. On Saturdays and Sundays, the radio stays on until 11 and resumes at 8 in the morning. A special switch cuts out the shut-off clock, if Mathias wants to listen to programs after the usual sign-off hour.

When Mrs. Mathias sits down at her dressing table she doesn't have to fumble with the twin lamps to turn them on. She merely pulls out the center drawer a fraction of an inch and the lights go on. A microswitch in the drawer does the trick.

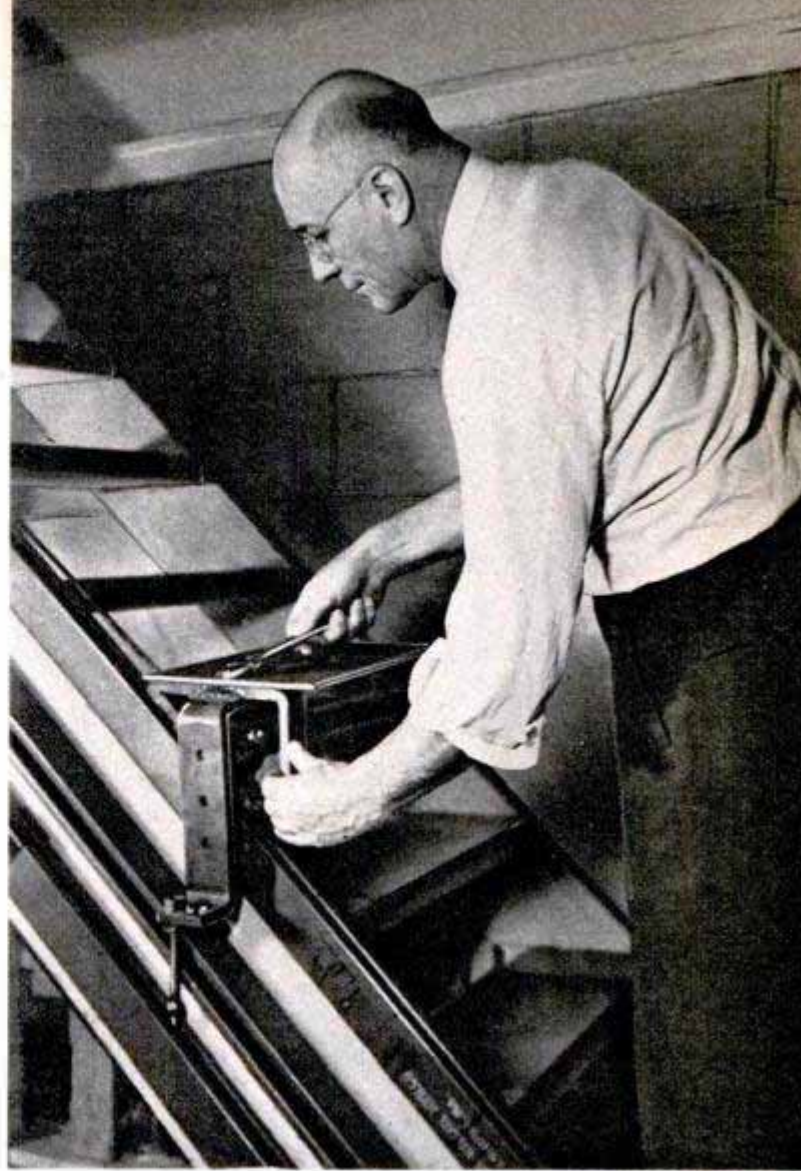
The house and garage are protected by a burglar alarm that goes on automatically at bedtime and shuts itself off in the morning. If anybody opens a door in the house or garage during the night, the yard lights go on and a buzzer sounds in the bedroom. An interphone picks up any sounds in the garage and pipes them into the bedroom.

Scattered around the house are fire alarms—simply spring-type clothespins held open by a thin thread. Should fire break out, the thread burns through, releasing the clothespin jaws which close a circuit, sounding an alarm.

Should it rain during the night or when the Mathias family is away, there's no chance of water damaging the plaster or furnishings. Beneath a downspout is a small metal cup that tips down when filled with water, operating a switch that closes the windows!

The garage doors are opened and closed

(Continued to page 252)



Newest project is an electric elevator to the basement so Mrs. Mathias won't have to climb the stairs

Below, Mathias took time out from his electrical hobby to make this crank-down, dogproof garbage-can lid

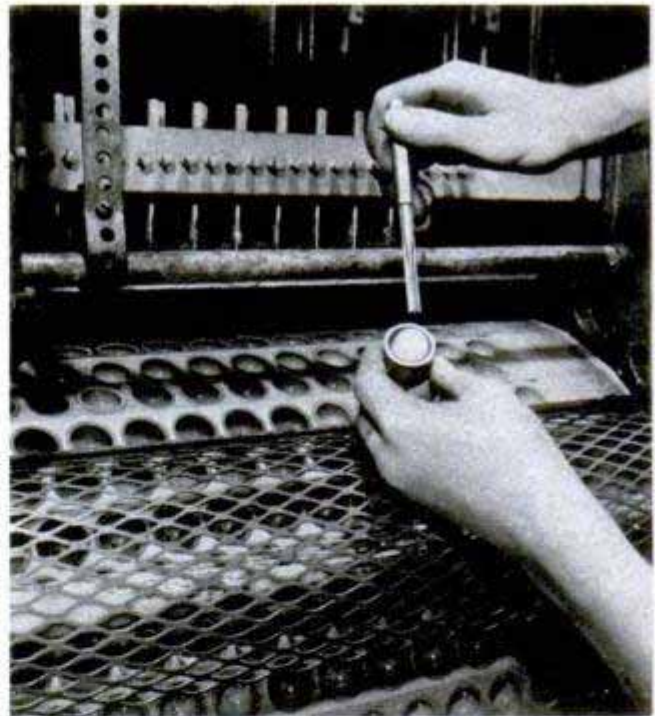




## Aluminum House Window Has Screen and Storm Sash

Delivered to the building site assembled and ready to hang, a new aluminum window comes complete with storm windows and screen, all in one unit. The glass is mounted in Koroseal plastic instead of putty and the screen is also plastic. Both

house and storm sash are quickly removable for washing. The window unit is simply nailed into position just as it comes from the factory and requires no painting or glazing. Each of the four sash can be raised or lowered as desired.



## Machine Pits 1000 Pounds of Cherries Per Hour

Cherries are pitted at a rate of 1000 pounds an hour by a new machine that handles the fruit in tiny rubber cups. The cherries enter the machine on a conveyor belt and each falls automatically into one of the 700 cups. Needles then punch out the pits, forcing them through small holes at the bottom of the cups. The rubber

pockets absorb the shock which otherwise would tear the cherries apart. The cups are on a rotating cylinder which tips the cherries onto another conveyor belt where they are sorted while the pits are carried away in a stream of water. The machine is said to reduce waste in cherry pitting from about 18 percent to 9 percent.



Here's Roy Halvorson, a man who has cut 11,000,000 Christmas trees and reaped the praise of conservationists

## Meet Mr. Christmas Tree

By Clifford B. Hicks

AT THE very moment you are happily stringing lights and tinsel, popcorn balls and high spirits on this year's Christmas tree, a rugged old logger named Nick Finni may be honing his ax, ready to snake your next year's tree out of the wilds of northern Minnesota.

Old Nick's ruddy face will be pleasantly wreathed in the good humor of a year-round Yuletide, and his eyes will have a twinkle that would do justice to Santa himself. It's a rather surprising fact that even Christmas trees have succumbed to the machine age—they now are cut out of the north woods on a controlled, mass-production basis many months of the year. Yet despite this industrialization there is enough romance wrapped around Old Nick and his fellow tree-cutters to satisfy even a four-year-old's conception of the proper inhabitants of Christmas Tree Land.

Nick's boss, Roy Halvorson, is the ingenious man who has developed a preservation

Nick Finni—Santa minus a beard—saws down another swamp spruce. Foliage is sparse except at the top

Basgen-Presley photos





**Old-time cutter toted these two bundles of trees out of the muskeg last winter—for use this Christmas!**

system whereby Christmas trees can be turned out the year 'round, making a stable industry out of a fly-by-night enterprise which, in past years, has been a national disgrace. It's true, of course, that a good many opportunists still are slashing through our valuable forests to take advantage of the average American's yen for a tree

**Bundles are stacked on a swamp sled, an iron dish big enough for Paul Bunyan himself. Tractors tow the sleds across swamp or snow to the highway. Tractor here is gradually settling into water of the spongy swamp**

“about this high” during the Yule season. But Halvorson — “Mr. Christmas Tree” — has discovered how to “preserve” trees indefinitely. He has combined this system with a unique phenomenon of nature to “make” Christmas trees without damaging our timberland. His factory in Duluth, Minn., runs full-tilt 7½ months of the year turning out gay little trees; yet his scientific methods have drawn the unqualified praise of leading conservationists.

Take a look at the figures. In his lifetime Halvorson has harvested a whopping 11,000,000 trees out of the wilds of Minnesota and Canada. To find them he has selectively cut 110,000 acres of wilderness; and to conquer the wilderness he has constructed a thousand miles of tractor roads, 3000 miles of survey lines and 7500 miles of trails, all cut straight and in cardinal directions. This Christmas, housewives will buy about 1½ million Halvorson trees in grocery marts and 10-cent stores.

Damage to our forests? None. Here's what Dr. T. Schantz-Hansen, Director of the University of Minnesota's Cloquet Forest Experimental Station, has to say about this tremendous logging operation: “Roy Halvorson's cutting methods improve the forest and contribute much to the economic life of the north country. The State of Minnesota owes him a vote of thanks for his very real contribution to the true conservation of Minnesota's forests.”

The secret of Halvorson's contribution is the little 50 to 100-year-old tree itself. In





Trimmer at the factory in Duluth whisks off straggly lower branches and makes a fresh cut across the trunk. In the background are just a few of the 1,500,000 trees that Halvorson will sell through small stores this year

its natural state the northern or "swamp" spruce is a scrawny, ugly tree you wouldn't think of bringing into your home — yet through Halvorson's magic it becomes a sparkling symbol of the Christmas season.

Covering vast areas of northern Minnesota and Ontario is the muskeg—a spongy swamp country. In winter the muskeg is a frozen wasteland and in summer it's a

treacherous bog that can suck you down to your hips in motionless water. No undergrowth flourishes here except sphagnum moss and Labrador tea, which die each winter to add another layer to the sponge. In this sterile land the northern spruce makes its stand, struggling up through the layers of moss to grow in forests so crowded that only the tops of the trees receive

Huge electric mixer whips up a fresh batch of the water-emulsion paint, which gives trees a waxy protective coating. Right, mechanical hands grab trees and swish them through paint, then whirl off the excess

Basgen-Preasley photos





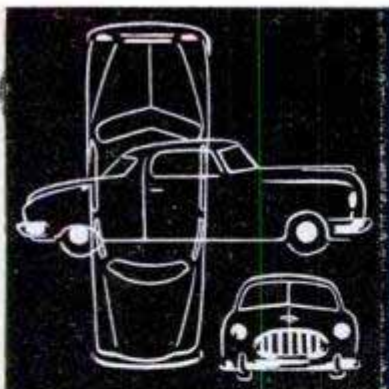
Trees circle the "merry go round" machine which installs the metal stands and fills them with an artificial sap that retards the dropping of needles. Trees are produced in three colors—green, silver and white. Below, Halvorson's daughter June trims a white tree



sunlight. Each tree wages a fierce struggle for existence against its neighbors. Its barren trunk rises like a pole to a height of 10 to 25 feet. At the peak the trunk tufts out into a densely branched, perfectly symmetrical top, three or four feet high. The wood in these swamp forests is so poor it doesn't pay to cut the trees. Nature turned down a blind alley in producing the dwarf spruce until Roy Halvorson came along.

Roy is an energetic 46-year-old, as cheerful as his gay little product. When he was a school kid in Duluth he tramped the woods early each December, cutting trees to earn Christmas money. At 14 he joined forces with an elderly man to market them. One hitch developed—the old-timer insisted on cutting big evergreens 10 to 20 feet high, whereas Roy figured smaller trees would sell better. Come Christmas Eve, all the small trees were sold and most of the larger ones still awaited buyers.

(Continued to page 226)



# Detroit Listening Post

*By Siler Freeman*

**A**S THE automotive industry comes down the home stretch to the highest production pinnacle in its half-century history, only two things are certain for next year:

1. Output will be cut in 1951 an estimated 10 to 25 percent, this range depending on how seriously the defense program cuts down manpower, materials and freedom from controls.

2. Prices of new cars will be higher.

A 10 to 25 percent reduction in schedules for 1951 would still leave the industry in an enviable position. The plants would still look forward to a receptive market for more than 5,000,000 cars and trucks, more realistically perhaps 6,000,000 unless a "shooting war" turns the plants into another "arsenal of democracy."

At any rate, the impact of government orders on manpower and materials is not expected to be felt before the second half of next year.

The manpower pinch has already been felt among skilled labor. The diversion of engineers, technicians, tool and die makers to defense work started when Cadillac took on the tank job in Cleveland and has continued. It probably will not lessen next year but get worse, as government orders get the emphasis.

Luckily for the auto industry, the 1951 model work was out of the way before the inroads started on the skilled trades. It is not so good for the 1952 models, which have not yet been finalized. The industry still feels confident it will have 1952 models, again subject to the factor of an all-out war.

Guessing right now is that any indication of trouble on a global scale will cut the 1951-model runs short and bring the 1952s on the scene much earlier than expected. The 1952 changes are on a much larger scale than the new models just appearing in dealer showrooms.

High-compression engines are still the engineering high spot of the future planning in the industry. The hectic maneuverings within the various companies have been somewhat stymied by the war situation. But the planning goes on.

Ford's overhead-valve V-8 is being de-

layed by tooling and will not be ready for the 1951, but is almost certain to be in the 1952 models. Buick's new engine, latest of General Motors offerings in high-compression power plants, will not be ready for the 1952 models and will be held off until 1953. It involves an expenditure of about \$60,000,000 and the building of an entirely new plant to receive the new job.

Ethyl Corp. recently demonstrated the intrinsic value of the combination of anti-knock fuels and high-compression engines. It showed in actual tests of 1925 engines and fuels compared with 1950 engines and fuel that at about the same price levels, two gallons of the modern fuel used in the new engines are actually worth more than three gallons of the 1925 gasoline.

An interesting part of the tests was the use of the next step in high-compression engines. This is an 8 to 1 compression ratio GM research job which was used in an Oldsmobile and gave 25.7 miles per gallon. Packard now has the highest compression ratio, 7.8 to 1.

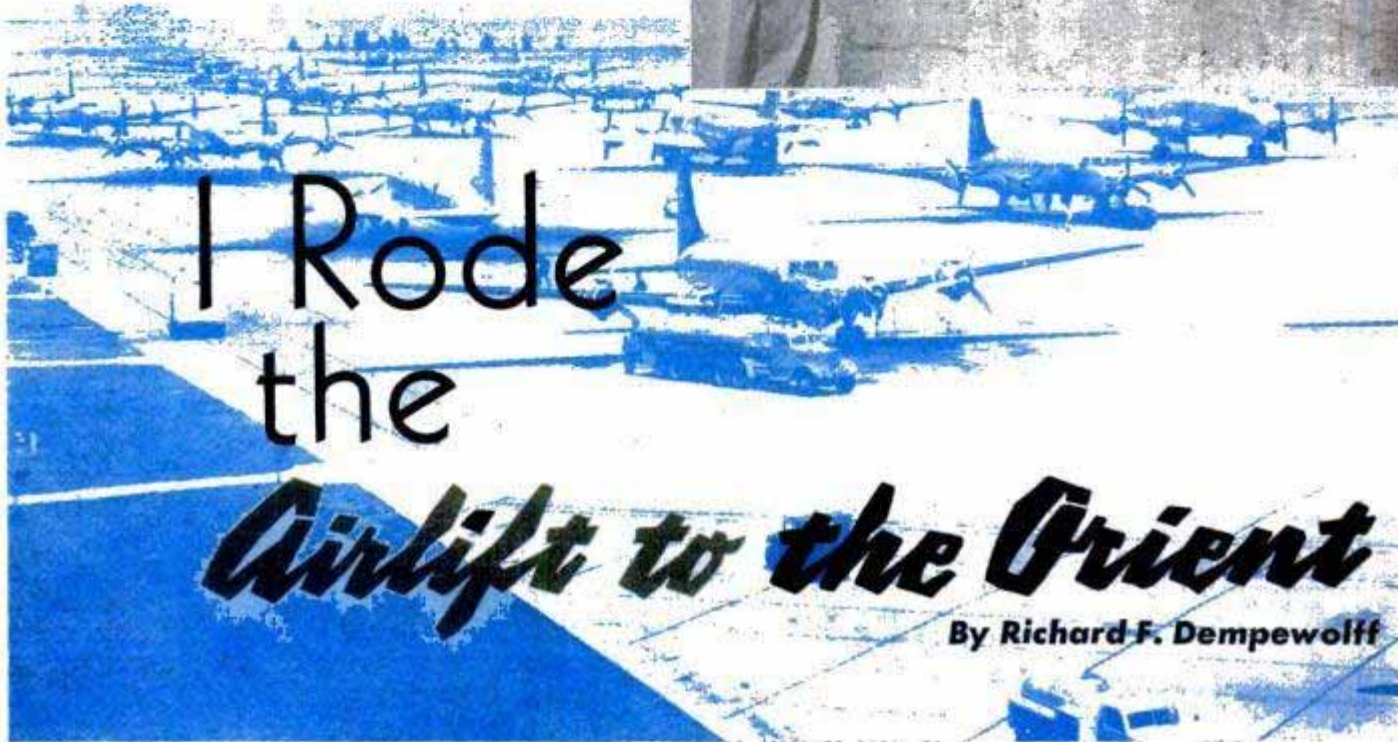
But here again, the uncertainties ahead may upset planning. High-compression engines need high-octane fuels. And the military is getting jealous of the motorists' inroads in its supplies of high-test gasoline. The stepping up of compression ratios could very well be reversed if premium grades are robbed of too many octanes.

Higher prices, however, are an established trend in the industry. Every 1951 car brought out so far has been priced above its 1950 counterpart. The surprise has been that 1950 cars have not been boosted in the face of climbing labor and material prices.

Only General Motors and Chrysler lines remain to be shown to complete the changeovers to new models. Neither is expected to hold the line, despite the huge profits their annual reports are expected to show. Like the record production this year, earnings are almost certain to show the inroads of a nation on a semiwar footing next year.

Indication that the auto companies face an "austerity" program may be found in GM's cancellation of its annual Waldorf Astoria show in New York.

This is a firsthand report by a Popular Mechanics editor who flew on a big C-97 loaded with military freight to Tokyo and returned on a "flying hospital"



# I Rode the *Airlift to the Orient*

By Richard F. Dempewolff

At Fairfield-Suisun Air Base in California a huge fleet of four-engine planes awaits take-off. Top, map shows airlift routes over the Pacific

## Part I

New C-97A has a side hatch being loaded here with a self-propelled cargo hoist. Older C-97s had only the rear opening beneath the tail

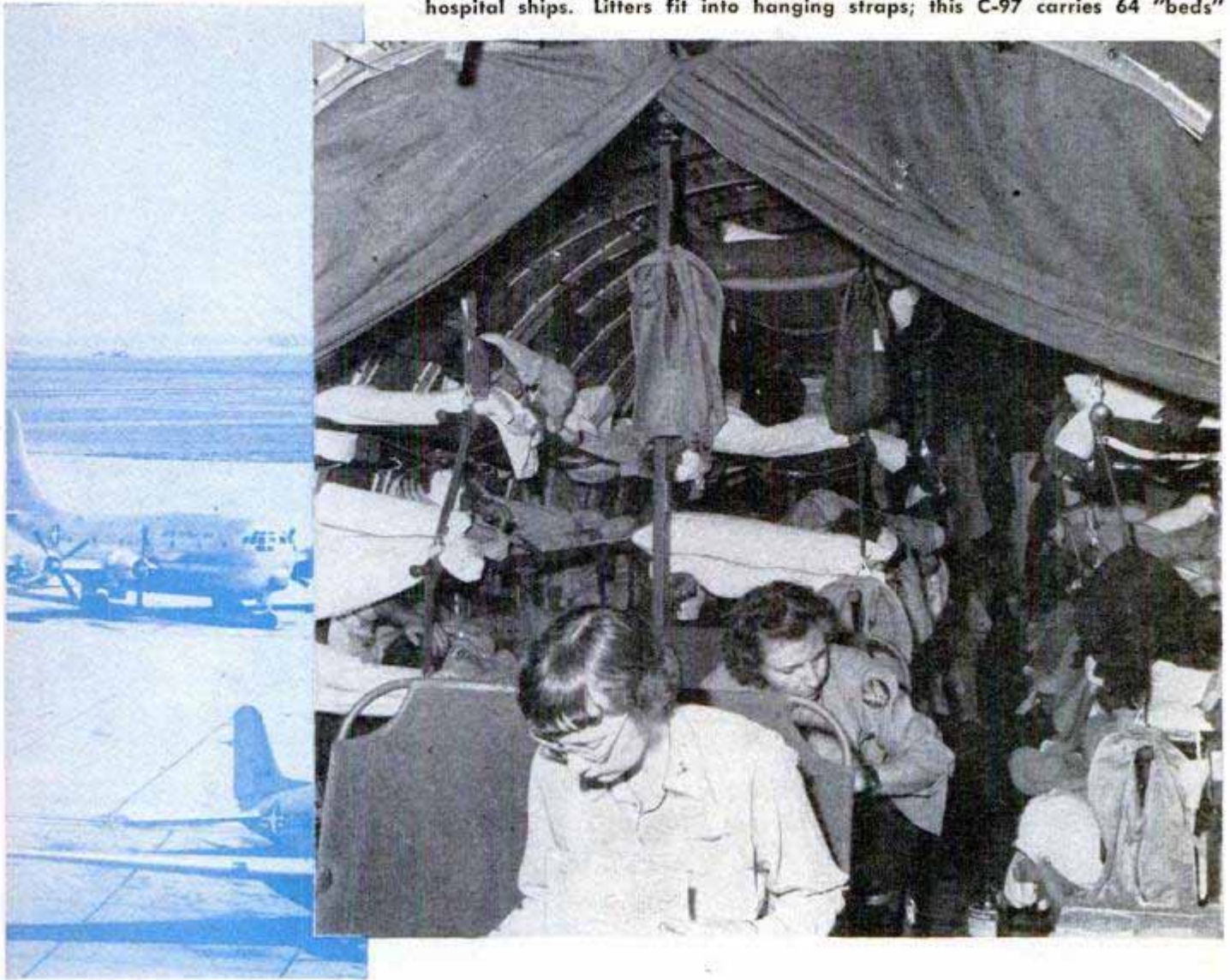


FROM Fairfield-Suisun air base in California to Tokyo's Haneda field I rode with 10 tons of war freight packed into the twin decks of a giant C-97 "convertible" air liner. From Tokyo I flew back in the same craft, now a hospital on wings, hurrying home with 64 of our wounded men resting on tier after tier of litters. One thing I made sure of before the return trip—no wounded soldier would be "bumped" to make way for a mere journalist.

Waiting in the control tower at Fairfield-Suisun, nestled in the sun-baked hills 45 miles northeast of San Francisco, I watched them go—monster four-engine planes, one on the "heels" of another. From dawn to dawn they roar down the



At Haneda field in Tokyo, the planes undergo a quick transformation to hospital ships. Litters fit into hanging straps; this C-97 carries 64 "beds"



mile-long concrete runways in a thundering parade, kicked off by the prevailing breeze that gives the field its name. Suisun (pronounced soo-soon), the sergeant informed me, is an Indian word meaning west wind. It's the "soo-soon" that helps lift the heavily loaded C-74s, C-54s and double-decked C-97s of this incredible fleet into the air with their staggering loads of gasoline, troops and war materiel. For these big babies are off on the first leg of an airlift that reaches 6000 miles over the Pacific—longest airlift in military history.

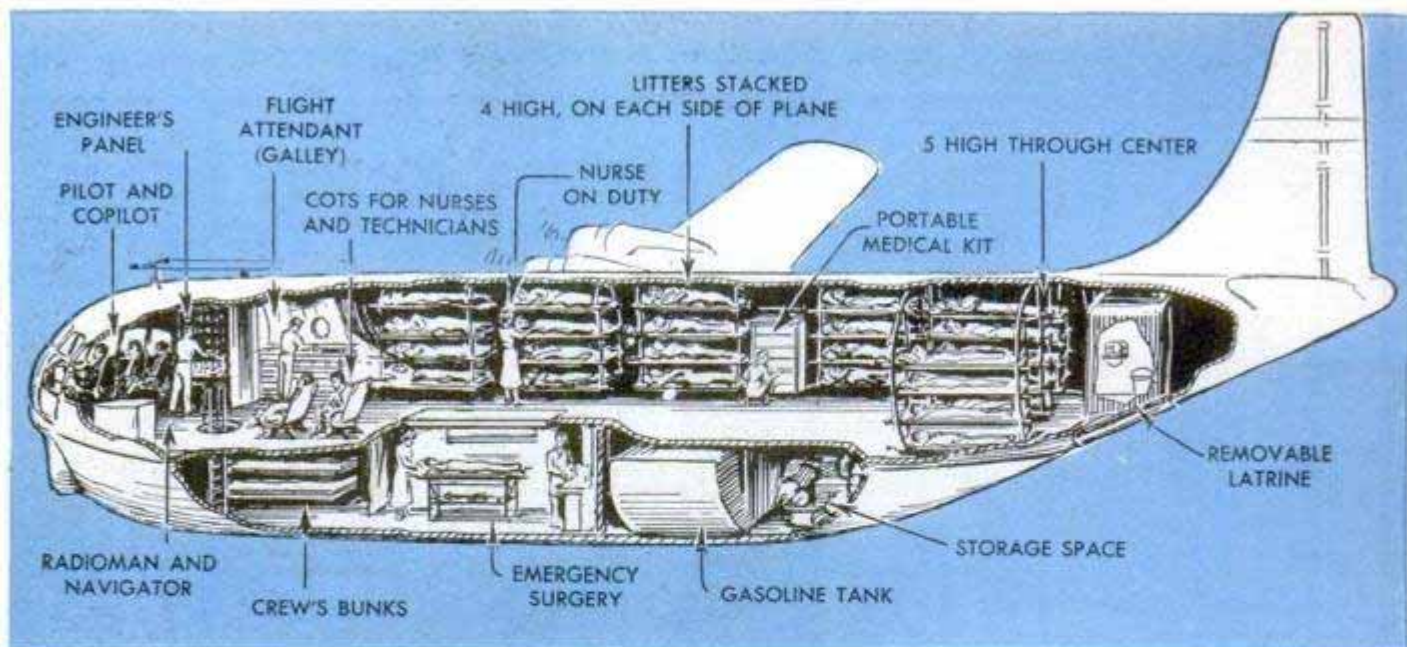
Thirty to forty hours later, their heavy tires will screech down the runways of Haneda Air Base in Tokyo. Another few hours and the cargoes of men and materiel will be right out on the battle lines.

For their return, cargo holds of the air freighters are cleaned. In 20 minutes, straps and stanchions are lowered and bolted to the decks. These provide racks to hold up to 74 litters for wounded men who are being moved from the front—within hours of the time they are hit—to hospitals near their home towns in the States. At the time of my trip there were 100 airlift planes

in the air constantly over the Pacific Ocean.

When the Korean war began last June, the Pacific Division of the Military Air Transport Service consisted of a mere handful of C-54s. Today, the aprons at Fairfield and other airlift ports bristle with the propellers of some 200 aerial behemoths. Not all are military planes. Many still carry the insignia of 17 different U. S. commercial airlines, the RCAF and even a Belgian airline. The "commercials" were diverted to the MATS command last summer, thus making up the emergency fleet. Gradually the commercials are being returned as MATS is able to handle more tonnage with its own fleet.

Seen on a military ramp, the "lift" is an odd-looking conglomeration of aircraft. Among the commercials, which make up about a fourth of the fleet at this writing, each company provides its own crew and uniforms. But there's no telling which crew will be flying whose plane. They may be reassigned on occasions to expedite flight schedules which, at rush periods, often call for nose-to-tail departures that are five minutes apart. You can see "Pan



Cutaway of the double-deck C-97 shows how it is transformed to hospital ship including emergency surgery

Am" uniforms debarking from Alaska Airlines planes; "United" uniforms may take off in Northwest's transports.

"I'd give anything," one American Airlines pilot said with a grin, "to see the report a Russian pilot at Haneda airport in Tokyo made to his chief. He saw me debark from a Capital Cargoliner, followed by my second officer who was wearing a Pan Am outfit. He did a double take and shook his head in amazement, 'those crazy

capitalists' written all over his face."

There's nothing "crazy" about results delivered by the lift, though. Before Korean Reds poured down across the 38th parallel last June, MATS planes in the Pacific hauled about 70 tons of men and materiel a month. By August, they were moving 100 tons a day. "And that tonnage is increasing," says Major General Laurence Kuter, MATS commander who headed up the Berlin airlift and is now applying his know-

Pilot Leon Musgrove is a busy man at take-off or landing. There are 125 items on the take-off check list and it takes 20 minutes to clear them all



how to the Tokyo run. In one early 40-day period, according to the general, some 1500 tons of critical cargo and 15,000 passengers—the equivalent of almost a full division—were lifted across the big pond. No one will let on what the lift costs, but this much is known: every time one of those big planes makes a round trip, it burns up 14,680 gallons of gasoline—enough to keep your car rolling for about 22 years!

You get some idea of the immensity of the operation when you stand on the loading aprons at Fairfield, see the long lines of planes, and watch the bustle. Fork lifts and hydraulic elevator trucks scoot back and forth across the concrete, laden with high-priority cargo in odd-looking crates: whole blood—packed in two circular racks of jars

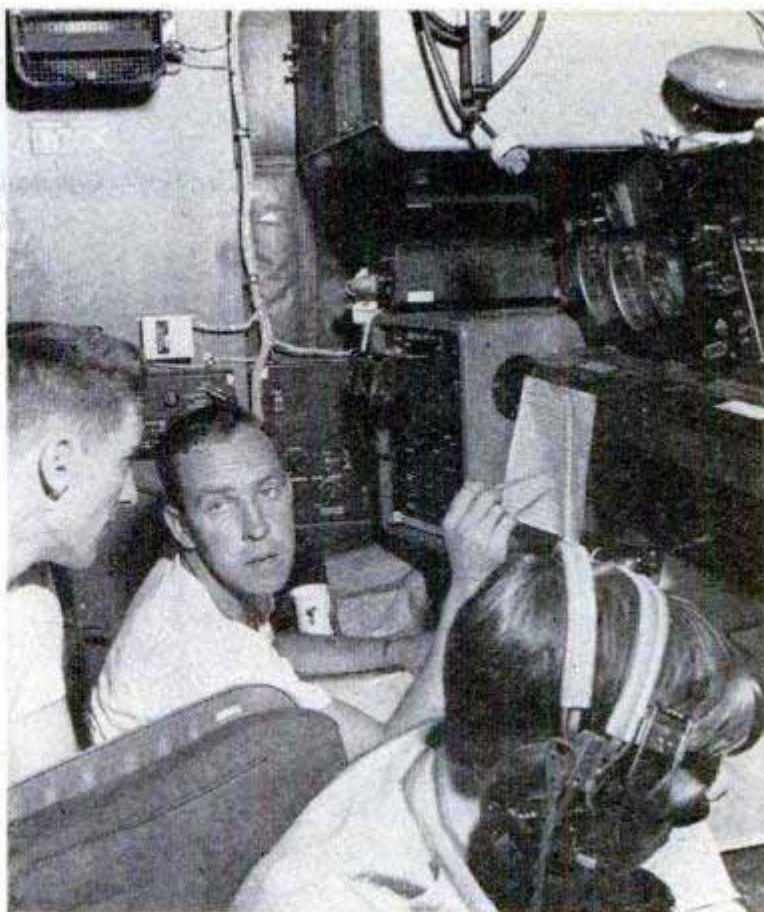
that fit snugly around a canister of chipped ice in an insulated carton, plasma, rockets, ammunition, tank parts, machine-gun mounts, radio parts, engines to keep big bombers flying and plastic cowlings for fighter planes.

Built-in elevators, slung by steel cable from each corner, drop from the bellies of big C-74s to receive and lift the cargo aboard. Above the yawning tail hatch of a double-bellied C-97 Stratofreighter, a hydraulic hoist whines as it pulls a massive bomber engine off a truck and into the cavernous cargo space on the top deck. On another, a small field vehicle bounds up a steel ramp, disappears in the darkness and is bolted to the deck. Several times a day the acres of warehouses at Fairfield are filled and emptied.

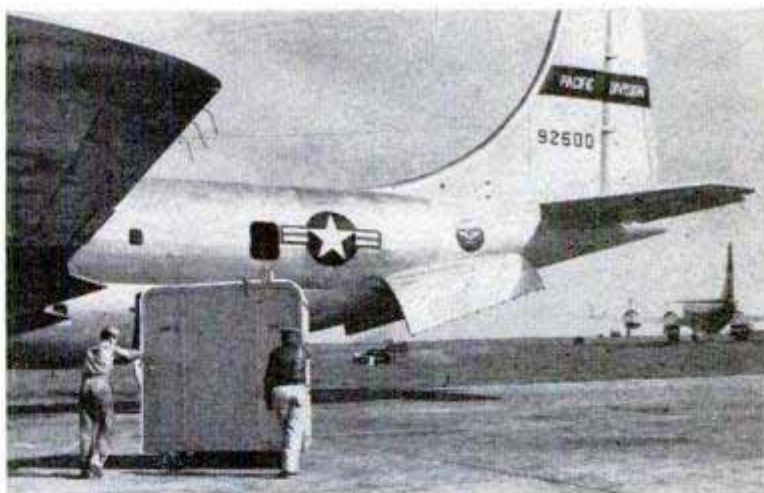
Without referring to tables, expert logistics crews know the load limits, speed, gas consumption, lifting power of the hoists, width of cargo doors on each of the three types of planes used. No time is lost getting things aboard. At Honolulu, where cargo is sometimes switched, loaders have diagrams of planes painted on the warehouse floors, so loads can be predistributed for weight, balance, size and shape, and moved right out to the plane in sections—sort of a prefab loading operation.

Over toward the operations building, men with steel helmets, high boots, rifles and packs are filing aboard a C-54 "plush job." These are special troop units, needed in a hurry: Signal Corps specialists, ordnancemen, highly trained combat-infantry teams. A few hours ago they came in by truck from inland training camps and were loafing around the lounge drinking Cokes, writing letters home, or spending a last few minutes saying good-bye to friends and relatives, while weapons carriers hauled their gear out to the waiting planes. In another two days they'll be half way around the world, on a battlefield, or wherever they're needed.

Not all troops ride the plush jobs. Many climb in with cargo and sit on litters running along the sides of the plane. These, the boys told me, were far more comfortable than the old hard steel lengthwise bucket seats. Later, I discovered it was true. At night, more litters are strung up in tiers, and everyone will get a bed to



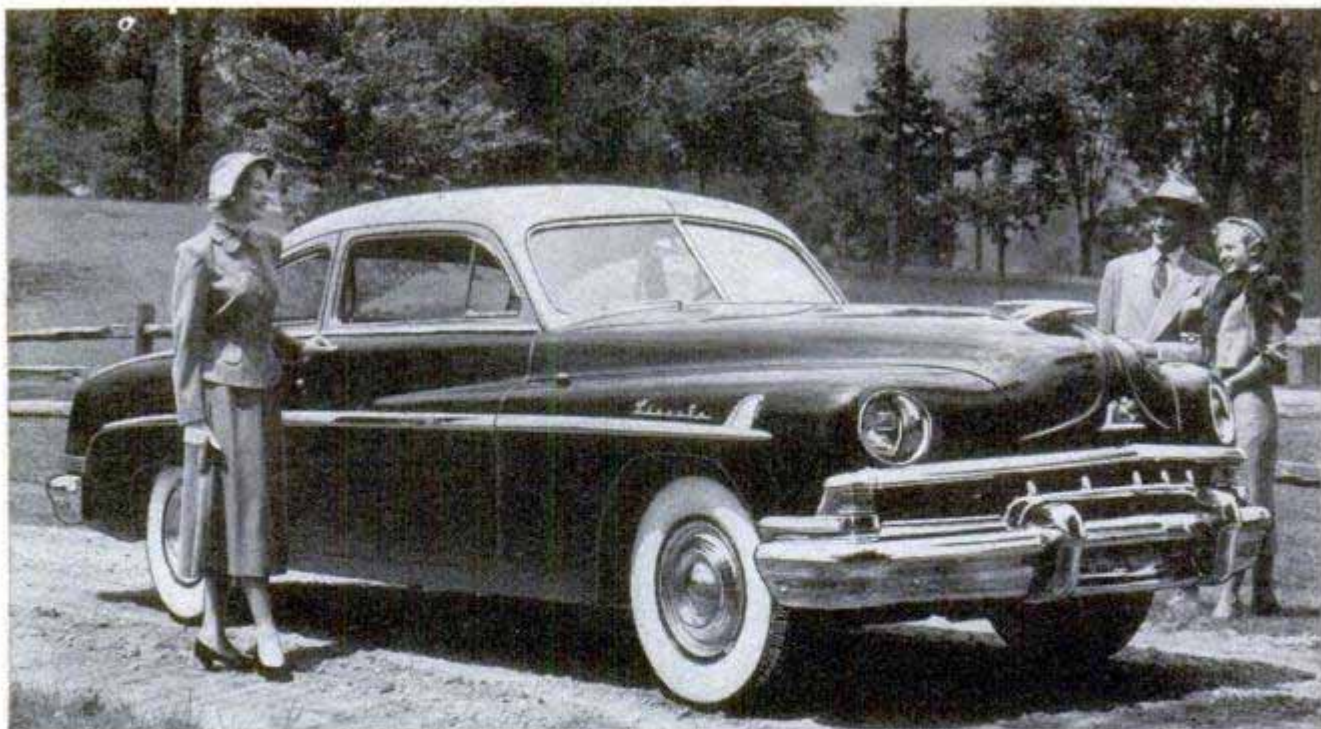
Loran operator over Pacific constantly computes position and feeds information back to man at "How Goes It" graph at Fairfield. Below, portable lavatory was a necessary innovation aboard C-97s designed for freight but converted for passengers



stretch out on. "It's not bad," said one GI, "if you don't mind staring at a knothole in an ammunition crate six inches from your nose for 40 hours."

Most planes leaving Fairfield carry both cargo and men. The C-54s will start with 8000 pounds of freight, or 35 passengers. The C-97 takes off with 21,000 pounds, or part of that and 50 passengers. The C-74, biggest of all, starts with 26,000 pounds, or 74 passengers. All of them can pick up more en route since the gas load is lighter for the hops from Honolulu to Japan.

(Continued to page 266)



## 1951 Lincoln With the Long Look

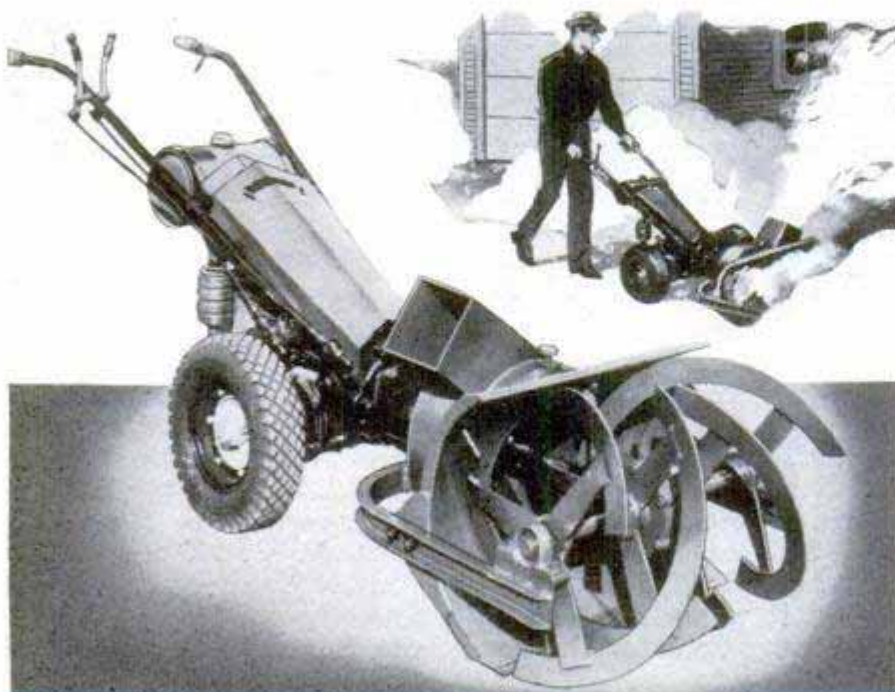
Extended rear fenders, a wider rear window, new grille and bumpers are among numerous body changes in the graceful '51 Lincolns and Lincoln Cosmopolitans. Headlamps have been moved to the outside and there is a new taillight assembly. The general effect is a lower and longer appearing car without an increase in over-all

length. Although the power plant remains essentially the same, it has been stepped up from 152 to 154 horsepower with a compression ratio of 7.1 to 1. Lincoln will continue to use Hydra-Matic transmissions in the '51s. A new engine, scheduled for this car, has been delayed until next year. Interiors of the cars are luxurious.

## Reflector Rims on Auto Wheels Shine Warning

Applied to the rim of each wheel, a ring of highly reflective material helps prevent automobile accidents. Of special value when the car is pulling away from the curb or crossing the highway, these reflecting

rings pick up the headlight beam of any approaching car, warning the driver. They reflect enough light to be seen several blocks away. Cut to fit standard wheel sizes, the rings are cemented to the wheels.



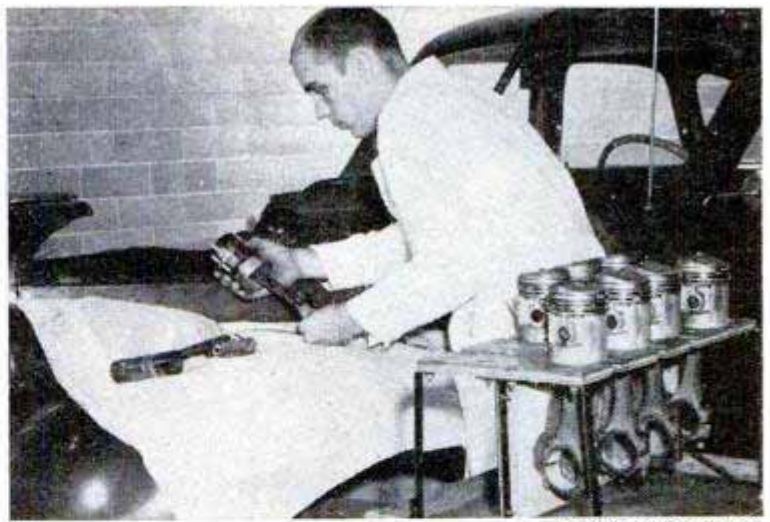
## Snow Blower

Snow up to four feet deep is blown away by an attachment for a garden tractor. The snow blower is quickly adjusted to throw snow either to the left or right. It cuts a 25-inch swath in the snow, tossing it well away from the path.

☐ For the first time in history, automobiles outnumbered horses on United States farms in 1950, the Department of Agriculture putting the number of farmer-owned cars at 5,800,000, and horses 5,310,000.

# Chrome "Skin" Doubles Life of Piston Rings

DURING early operations in the African campaign of World War II, tank and aircraft engines were practically useless after only a few hours in an atmosphere saturated with dust and sand. The Armed Forces had to extend the life of this vital equipment—cost no object. Because of high resistance to wear, chrome "skin" piston rings were sent to the fighting front and proved to increase the life of engines up to five times. Today, after seven years of research and field-testing, chrome ring sets are available to motorists at a cost that compares with ordinary rings. Installations in all types of engines have shown the life of rings and cylinders to be more than doubled, according to the manufacturer. Applied over a thread finish on the edge of the compression ring, .004 to .007 inch of solid chrome gives the rings and cylinders long life.

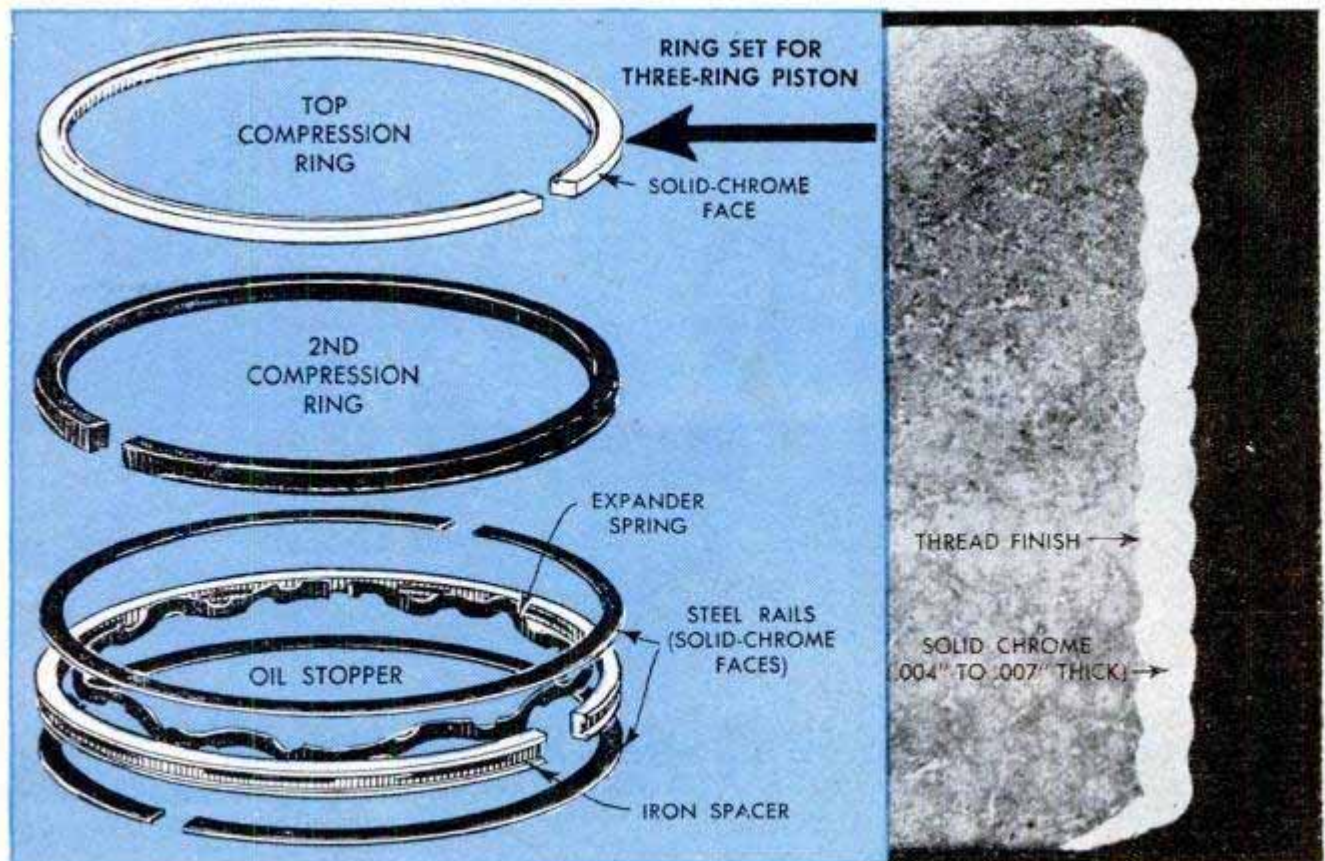


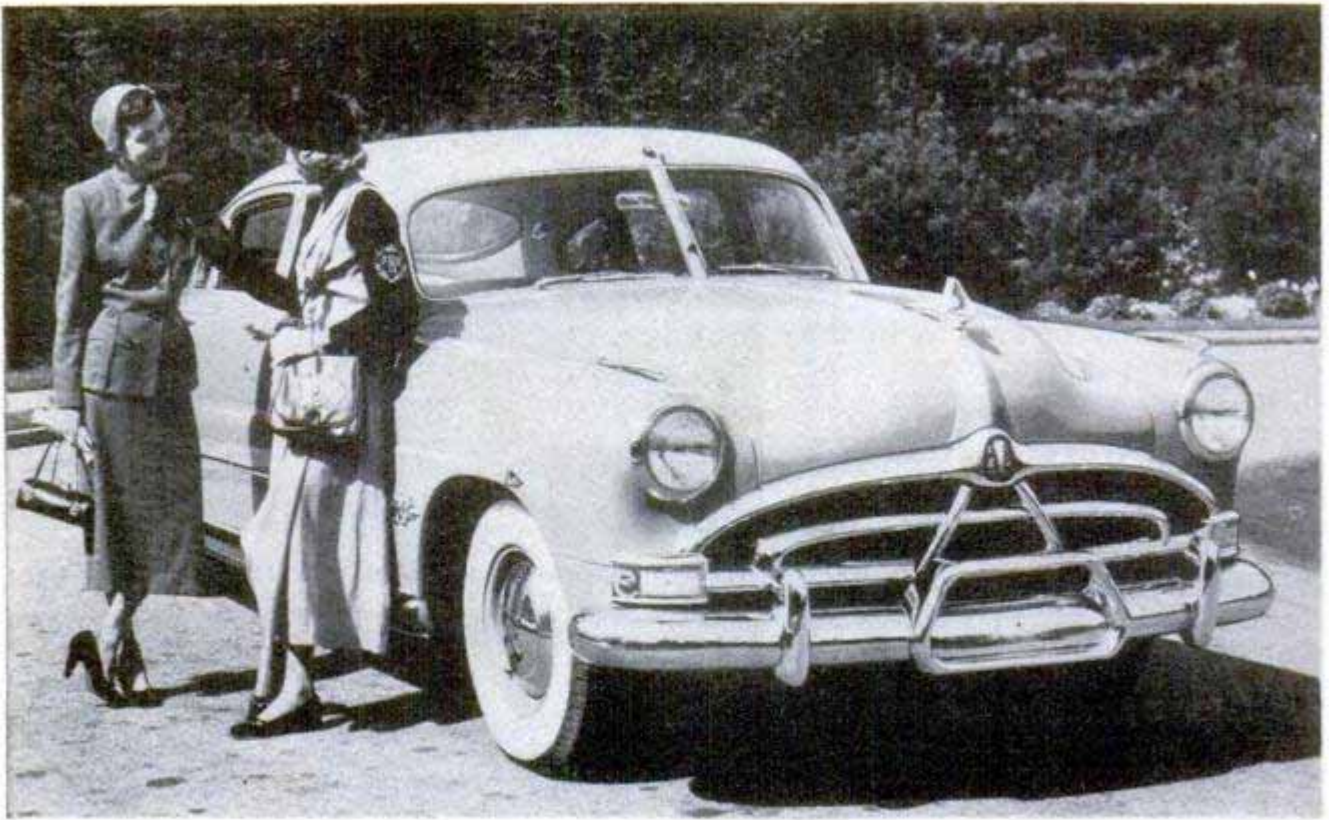
Perfect Circle photos

Mechanic replaces piston fitted with set of long-life rings



Center, installing chrome-faced, oil-stopper rail. Below, left, detail of three-ring set showing photomicrograph of top compression-ring edge, right. Solid chrome over thread finish gives highest resistance to wear





## Hudson Features New Six-Cylinder Engine

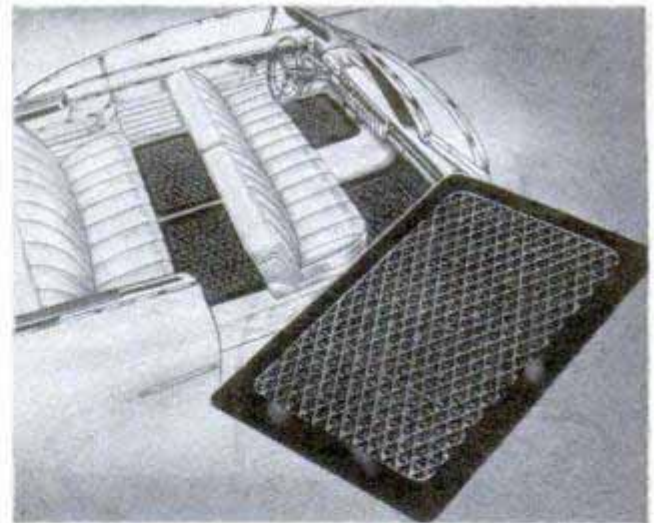
With its 1951 line the Hudson Motor Car Company introduces the industry's most powerful six-cylinder engine. The new power plant develops 145 horsepower and has a compression ratio of 7.2 to 1. This

engine is used in an addition to the line called the Hornet which replaces the Super Eight. The company has adopted a new waterproof ignition. Hydra-Matic Drive is available on the Hornet and Commodore.



## Bayonet Unipod

While photographing the war in Korea, Sgt. Ray Turnbull of the Signal Corps devised a camera attachment that seems particularly fitting for such work. He fastened a threaded socket to the top of a bayonet. After screwing the camera into the socket, he jabs the bayonet into the ground and takes his pictures from a steady unipod.

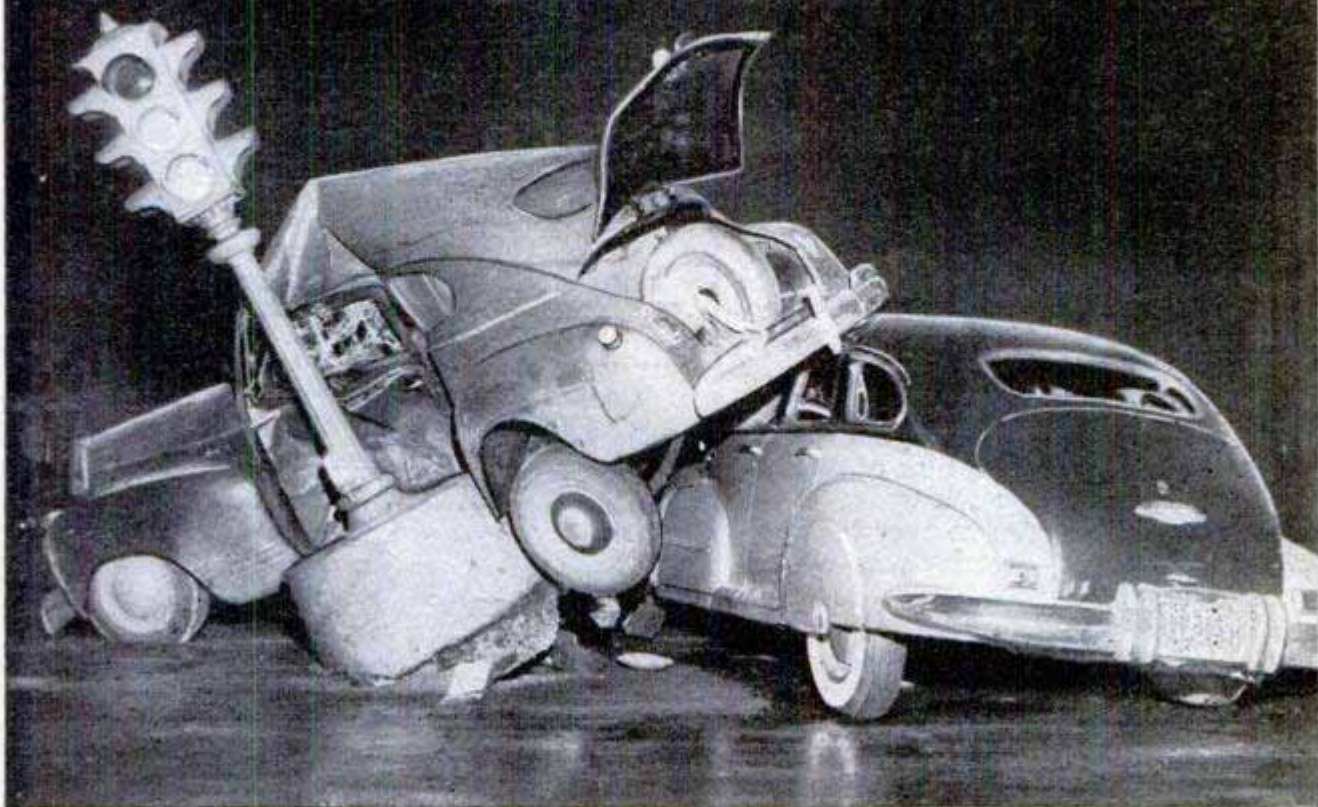


## Car Rugs

Rubber "throw rugs" for automobiles protect the original mat from wear and dirt and, at the same time, make cleaning easier. You simply lift out the rugs, shake them and put them back clean. The rugs come in various colors and are shaped to fit each make of car.

☐ Some kind of rubber—real or synthetic—is used in 116 places in the average automobile manufactured today.

# Driver, Take Your Choice— LIFE OR DEATH ON ICE



Winter driving is as hazardous as we make it. Accidents like this can be prevented, say the driving experts

By Arthur R. Railton

**I**T'S RAINING AND FREEZING. The road you're driving on is as slick as a toboggan slide. Suddenly, stabbing through the damp darkness, your headlights pick up a huge truck straddling the highway. What do you do?

There's no time to experiment. You must be right the first time. The wrong move might make you a statistic—another victim of winter driving.

During the winter months, the highway death rate zooms upward as much as 50 percent above summer rates in northern states. In the South, it bounces up nearly 30 percent.

These zooming death rates can be reduced if drivers use increased caution and proper equipment for winter driving. You wouldn't dress the same in winter as in

summer and, for safety's sake, you shouldn't drive the same. Driving experts of the National Safety Council (who should know because it's their business) state that you can reduce braking distances on icy highways by more than 50 percent—a 50 percent that may mean life for you.

There are many devices, such as chains, special tires, sanders, defrosters and fog lights, designed to make winter driving safer. Yet none of these will assure you of safety and long life. You must drive with added care when roads are slick even though you are using every safe-driving accessory made. It's a simple, undecorated fact that we haven't licked the problem of winter driving and until we do you'd better slow down if you want to live.

Let's look at some of the factors that

## STEER INTO THE SKID

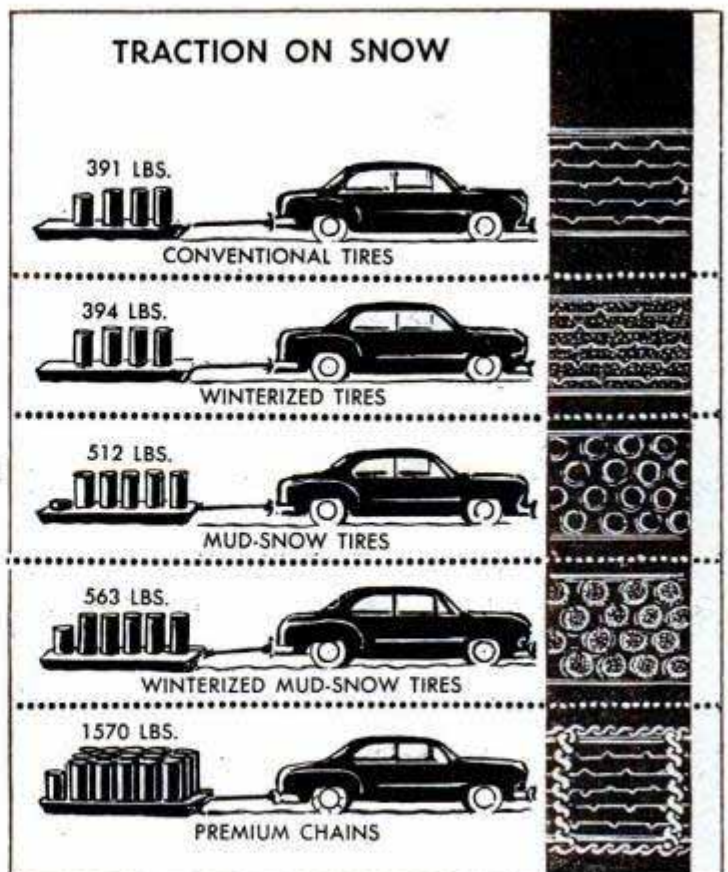


make winter driving as dangerous as tangling with a playful gorilla. Take temperature as an example. There probably isn't an outside-air thermometer on your car, but it is just as important as your speedometer when roads are ice covered. In one test by the National Safety Council, stopping distance for a car going 20 miles an hour at 26 degrees Fahrenheit was 122 percent greater than at 4 below zero! The same car, the same driver, the same tires, the same speed—but at the sub-zero temperature the car traveled only 107 feet compared with 238 feet when the mercury rose close to the melting point.

How's that? Simply because the warmer air and the friction between the tires and ice are enough to coat the surface with a thin film of water. And you know how slick water-covered ice can be if you've ever taken a cropper on an icy patch some warm winter day.

Air temperature is just one of the variables that make winter driving complex. There are so many uncertainties that not even the most skilled driver can afford to ignore the dangers. The average driver, and he represents most of us, can minimize his chances of accident by being super-cautious and by following a few simple driving rules.

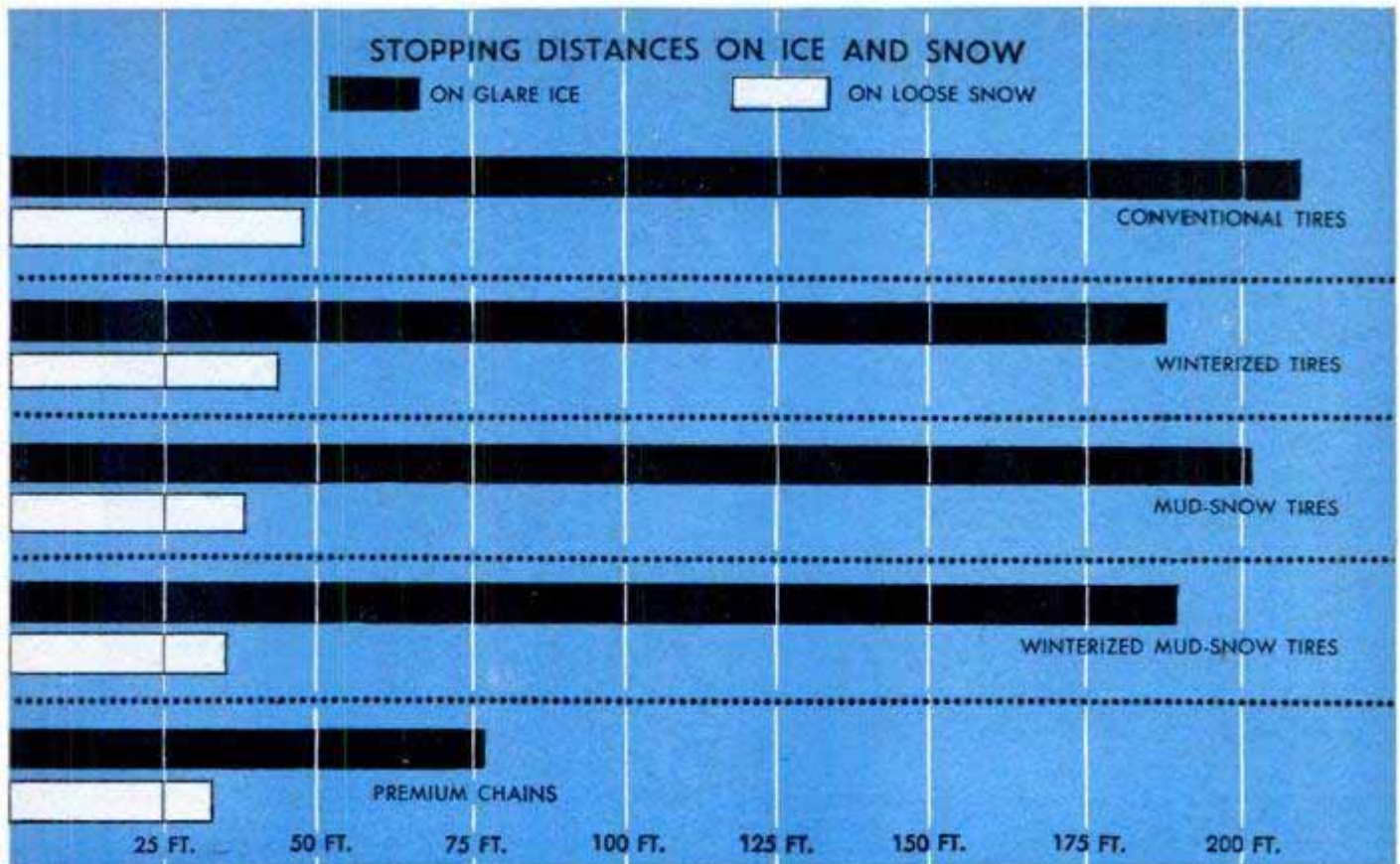
The best way to avoid skids, obvious as it sounds, is not to let one start.



Diagrams show drawbar pull, above, and stopping distances, opposite, with the four types of tires and premium chains. The tires and chains being tested were on rear wheels only. Winterized tires have conventional tread with lacerations or materials embedded in the rubber to increase traction. Mud-snow tires have the rugged knob or cleat tread design. Winterized mud-snow tires are lacerated and premium chains are those with reinforcing cleats or teeth on cross links. Below, in testing truck tires and chains this dynamometer truck was used to measure and record the pull on drawbar







Once a high-speed skid starts, you toss your fate into the lap of coincidence. If you're on a crowded highway, almost no amount of skill can prevent an accident. If there are no other cars near by, you can, by manipulating the throttle, brakes and steering wheel, minimize the skid and stay on the road. That old reliable rule about "turning in the direction of the skid" is a good one and it works, but it will prevent accidents only when there is room for the corrective action to take effect.

How can you prevent these dangerous skids from starting?

First, slow down. The faster you drive the more momentum you develop. Therefore, there is more tendency to skid when you try to stop or to make any change in your direction. On icy pavements, at all

speeds, handle the wheel, accelerator and brake pedal as though they were new-born babies. Sudden moves may mean sudden death! The mere act of releasing the accelerator abruptly when you're rolling along the highway can cause a skid as the compression of the engine suddenly slows down the wheels. Any quick change of direction is an invitation to crash. When you have to turn the front wheels, ease them around carefully after slowing down. It helps to accelerate slightly as you are making the turn, but be gentle about it!

There is an exception to the "think fast move slow" rule. It's the art of braking. There you must think fast and move fast for best results. Expert pumping of the brake pedal reduces braking distance as much as 18 percent, The Safety Council

**Dynamometer truck is towed on ice during traction test for University of Wisconsin's Truck Research Project**



## SAFE-SPEED CHART

IF A SAFE SPEED ON DRY CONCRETE IS 50 MILES AN HOUR, THESE ARE SAFE SPEEDS ON GLARE ICE. IN ALL CASES STOPPING DISTANCES WOULD BE THE SAME



engineers learned. But the pumping must be done skillfully.

For emergency stops, the pedal should be jabbed on and off like a trip hammer. This is a fast maneuver that requires considerable skill. It should be performed at a rate of about five on-off cycles a second. Be certain that the brake is fully applied and fully released with each stroke. To do this properly, you have to be fast and heavy-footed, but it is much more effective than the gentle pumping technique. However, the jab-jab system won't work unless your brakes are responsive. Sluggish brakes don't release fast enough. So, right now, have your brake system checked to make certain it will do the job when you need it.

For normal stops (and for the inept

driver who doesn't want to try the trip-hammer technique), the slow pumping method is recommended by the National Safety Council. It won't stop the car as fast as the jab method, but it is easier to use and safer for inexperienced drivers. To use this system, you apply the brakes until you feel the wheels lock, then release and repeat until you have stopped the car.

Every winter you'll see motorists letting air out of their tires to increase traction. Don't do it. It is true that soft tires do give a very slight increase in braking capacity, but this is more than offset by a greatly increased tendency to side skid. Anyway, soft tires wear out faster and make blow-outs more likely. So keep your tires up to recommended pressures at all times.

For the driver who wants the best in

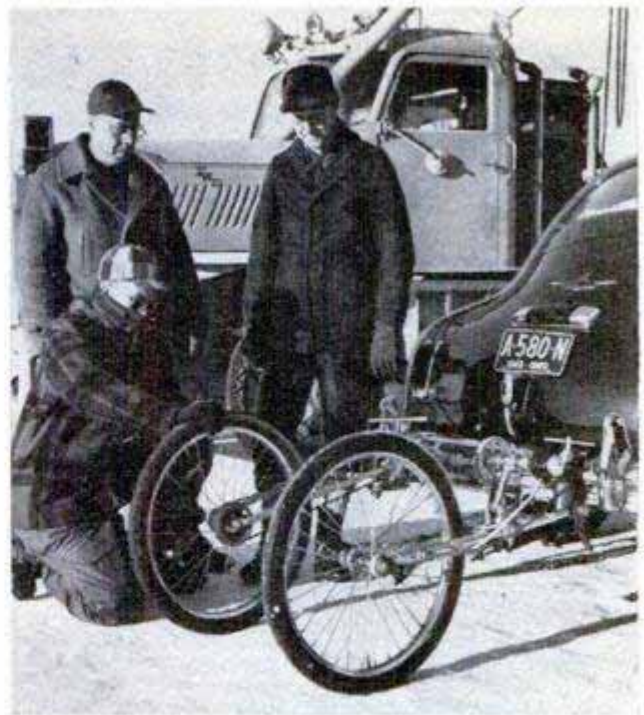
Below, left, caster-mounted wheel between front wheels of truck is a slip-angle meter and it measures the amount of skidding as vehicle is moving. Right, one of the truck sanders tested in the Safety Council study



safe winter-driving accessories, chains are essential. Any kind of metal-link chains helps you stop and go more safely, but there seems to be some evidence that ordinary round-wire chains increase the tendency to side skid. Because of this, "premium" chains, those with reinforcing teeth or cleats on the cross links, are the "best buy" in safety. In fact, premium chains on the rear wheels only stop vehicles faster on glare-ice tests than regular chains on all four wheels.

Recent years have seen the development of "winterized" tires of many types. Every company has a special technique for increasing friction between the ice or snow and the tire. Drivers should not assume that any winterized tire is as effective as chains. There isn't a single tire tread available today that comes close to providing the braking ability of premium chains on glare ice, although some specialized tires do help in stopping on ice.

The average stopping ability for chains was 46 percent better than for conventional natural-rubber tires alone. These tests by the Safety Council included stops on glare ice, loosely packed snow and granular ice and were with chains on rear wheels only. The best of the special winter-tread tires tested showed a 22-percent improvement in stopping ability over the conventional tires. The poorest winter tire actually was 6 percent less effective in stopping than the conventional tire!



Trailing fifth wheels were used during the tests to assure precise measurements of speeds and distances

What type of winterized tire is best? The tests on lake ice and snow seem to show that for all-around driving the best tire is a grooved-lug mud-snow tire. It had a composite rating of 132, compared with 100 for the control tire, a conventional natural-rubber tire. This composite rating includes stopping, traction and cornering ability.

(Continued to page 254)

Air view of the Safety Council's test course on Pine Lake, Wis. The big circle was used for cornering tests





Masked worker tests viscosity of metallic brew used to spray fabric used in lining of coat shown at right

### "Radiant" Cloth Holds Heat

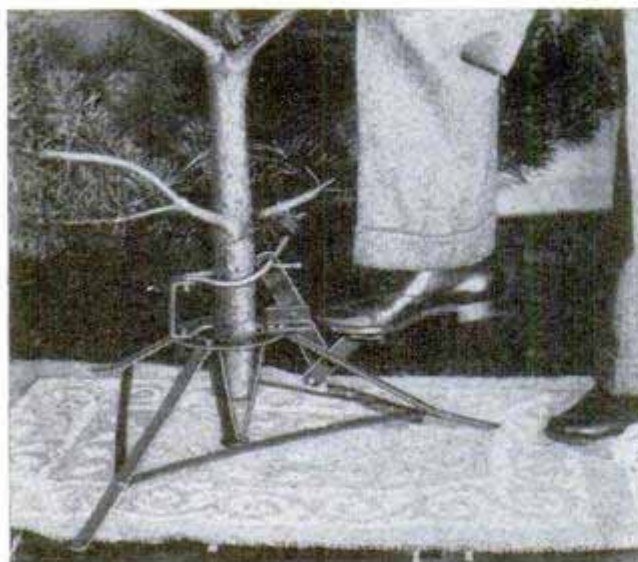
Any fabric sprayed with an aluminum solution reflects back to the body much of the heat normally lost by radiation. This new textile finish, called Milium, is now in limited production with most of the output

devoted to lining materials such as rayon satins, crepes and twills. It is also used in an all-weather jacket for golfers. Manufacturers are considering its possibilities for bedding and draperies while military authorities are studying the process for application to sleeping bags and flying suits.

### Dust Jackets for Grain Prevent Insect Damage

Weevils, beetles and other pests which eat up about 10 percent of the nation's grain crop after harvest may soon be going hungry, thanks to a one-shot chemical treatment. Applied in dust or talc form, the chemical is a relatively new insecticide

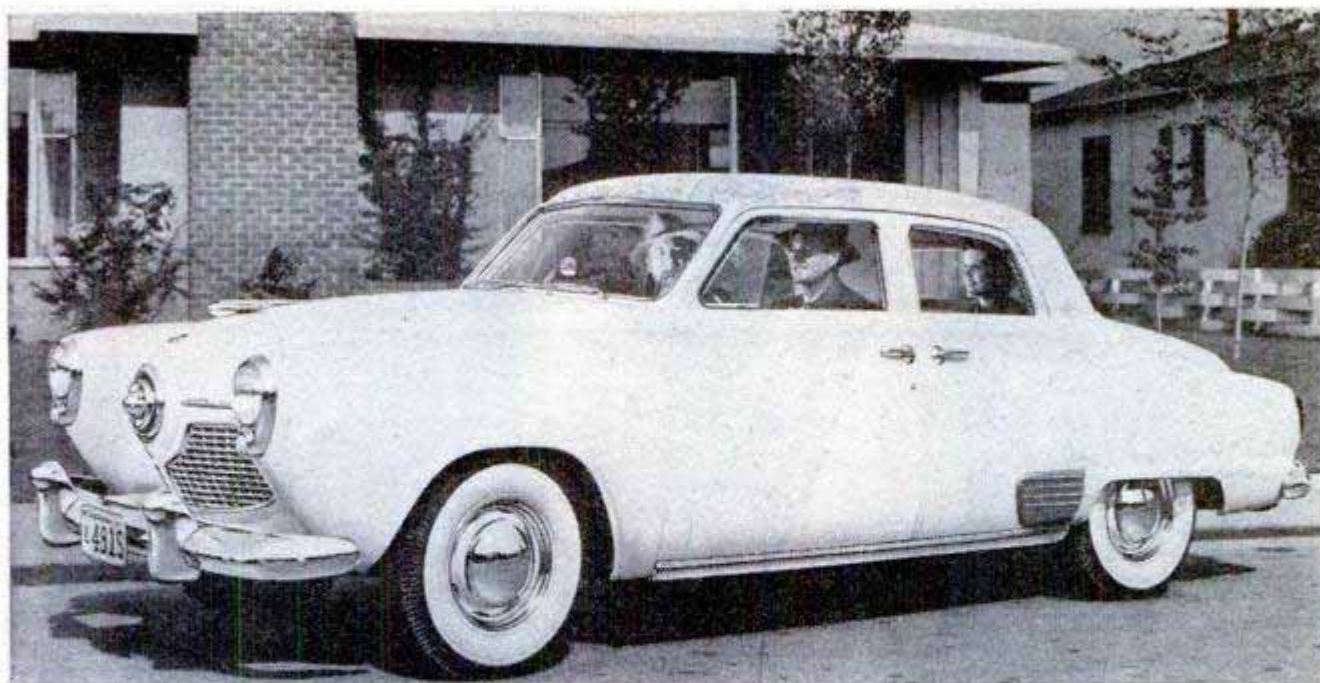
called pyrenone. The dusts cling to the kernels, providing an insectproof jacket that lasts as long as 9½ months. The chemical is harmless to humans or animals and is expected to eliminate fumigation which kills insects but provides no lasting protection.



### Christmas-Tree Holder

Easy to operate, a new Christmas-tree holder has a steel ring that closes around the base and holds the tree upright. After a foot pedal is depressed, the tree is set into the stand and aligned by conical guides. Releasing the pedal tightens the ring around the base. A 21-inch tripod provides stability and affords enough clearance to set the base in water.

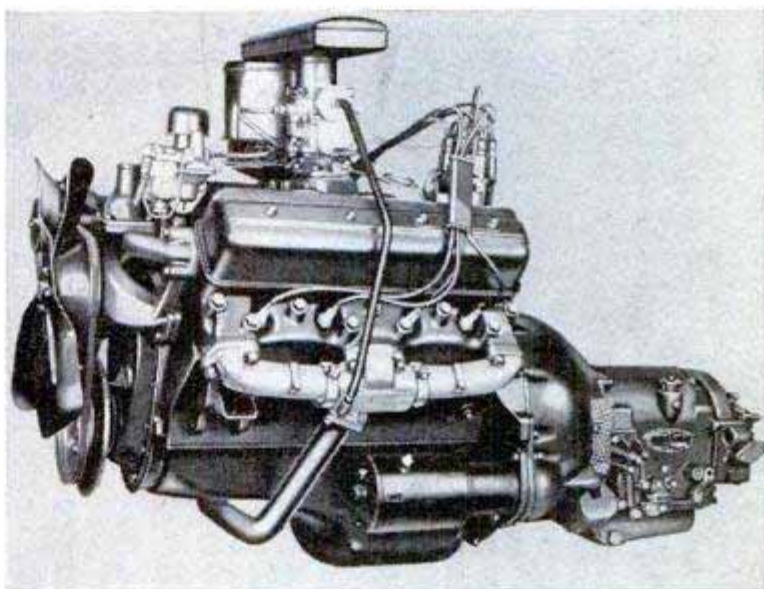
DDT proved to be one stone that kills two birds in Department of Agriculture experiments in California rice fields. DDT powder mixed with the seed rice killed both mosquito larvae and tiny shrimp that feed on rice seedlings.



With a new grille and "spinner," the Champion Regal sedan still retains the distinctive Studebaker design

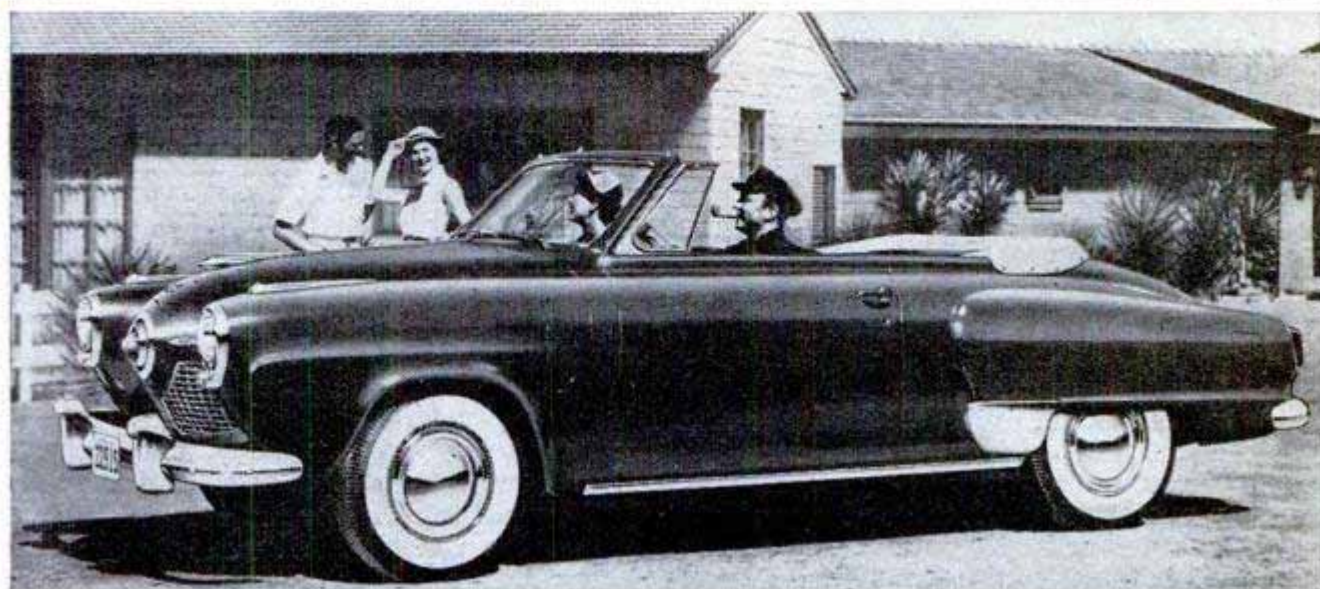
## V-8 for Studebaker

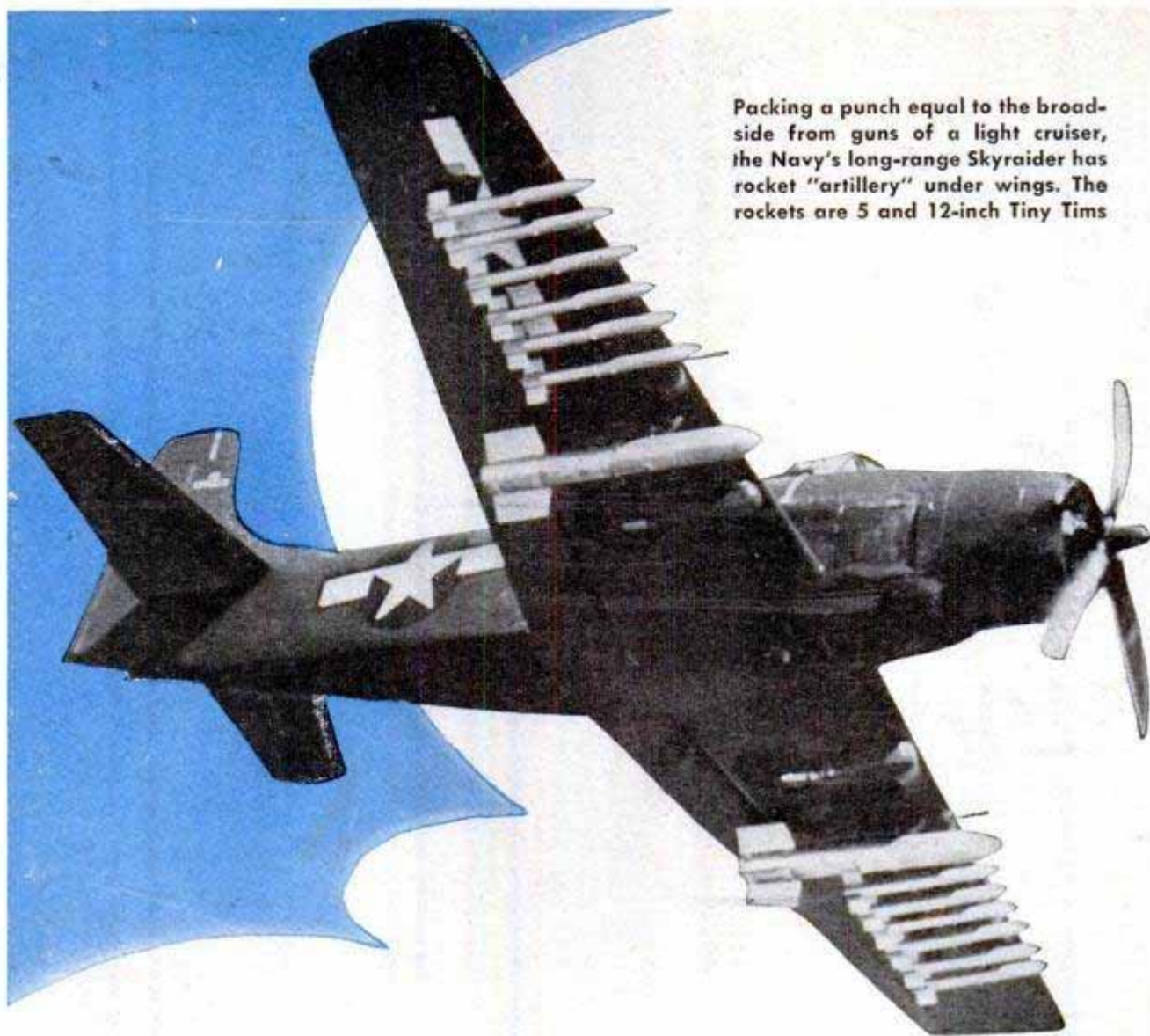
CONTINUING this year's parade of new cars, Studebaker's 1951 line features a V-8, valve-in-head engine on Commanders and optional automatic transmission on all models. Body designs are little changed. A new radiator grille, plastic "spinner" and redesigned tail lamps and trunk handle are the most obvious changes. Wider rear springs increase lateral stability and one-piece windshields give greater visibility. The economical Champion engine is unchanged except for a new oil-pan design to provide clearance for centerpoint steering, which is standard on all 1951 models.



Rated at 120 horsepower, this new V-8, valve-in-head engine is the Commander's power plant. Compression ratio is 7 to 1

Here's the Commander convertible. Automatic transmission is available on all models including the Champion





Packing a punch equal to the broadside from guns of a light cruiser, the Navy's long-range Skyraider has rocket "artillery" under wings. The rockets are 5 and 12-inch Tiny Tims

## WEAPONS WITH A NEW WALLOP!

By Richard F. Dempewolff

**I**F G. I. JOE on the battle front could get his hands on some of the gadgets being readied for production in the mysterious labyrinths of our Armed Forces' research labs, he'd feel better. Even most of our newest nonatomic weapons—which are the most immediate concern of men in the front lines—are veiled in secrecy. But a few hints at what's cooking have been seeping from official crannies.

Up in the Navy's Bureau of Ordnance, men are now testing a big antisubmarine rocket that takes off from a new type of shipboard launcher at incredible speed and packs a jolt staggering enough to blow any sub clear out of the water. A monster plane, already prototyped by the Air Forces, will carry 240 men or 50,000 pounds of cargo. It can deliver tanks to the front lines. Work

is also afoot to develop a tank that can be dropped to beleaguered infantry by parachute. In the anti-aircraft end of things, there's the 75-mm. Skysweeper which, as one Army Ordnance man puts it, "automatically does everything but sweep up the debris of planes it knocks down." Instead of being hooked up to a radar tracking center on one end and an electronic computer on the other, the Skysweeper has everything in one package. Its own radar finds the target, its own computer computes aim, its own mechanism aims it and keeps it tracking the target while it automatically triggers itself and peppers the sky with an inferno of VT-fuzed shells.

For "potting" supersonic enemy planes above the reach of the Skysweeper, the Navy has a little pencil-thin, air-to-air

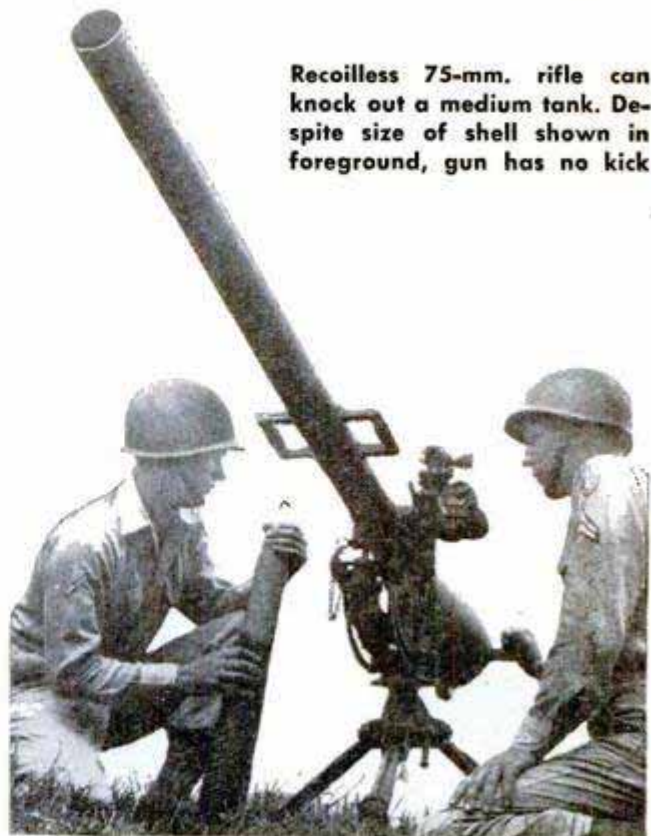


Formidable is the word for Army's 8-inch gun below being tested at Aberdeen Proving Ground. With the carrier shown in background it has combat-loaded weight of 99,075 lbs.

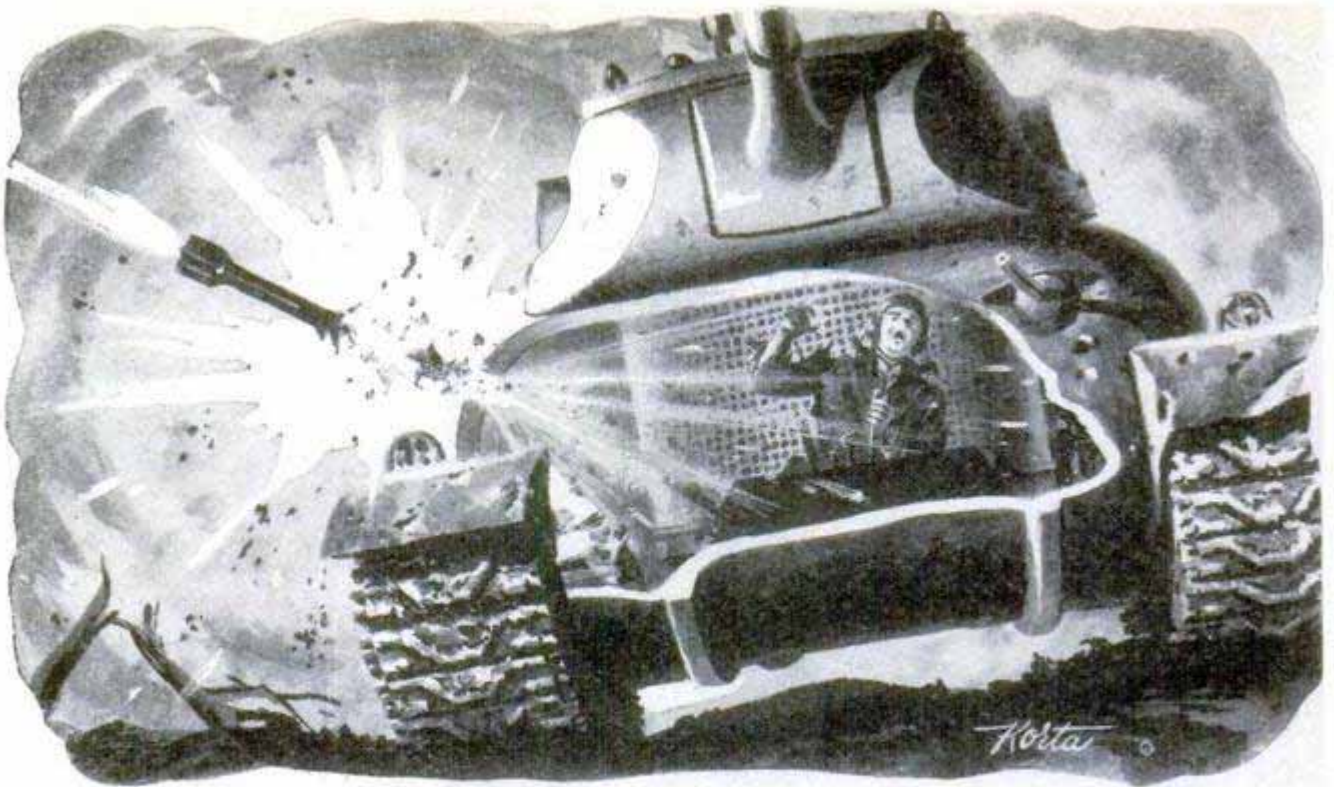
rocket affectionately dubbed the Mighty Mouse, which they have developed for all the services. A score of "mice" can be hooked on a big fighter plane. They have folding fins to reduce air resistance on the mother plane, are aimed simply by aiming the plane's nose at the target, and can be fired singly or in salvo. They take off like lightning streaks, catch up with and blow to smithereens any high-flying supersonic craft in the sky.

Short of an A-bomb, probably the most fantastic weapon on hand is Army Ordnance's Earthquake bomb. This Goliath of an aerial menace weighs 42,000 pounds, is almost 5 feet in diameter and 27 feet long—with its fins on. It packs enough TNT in its monstrous warhead to crumble several city blocks.

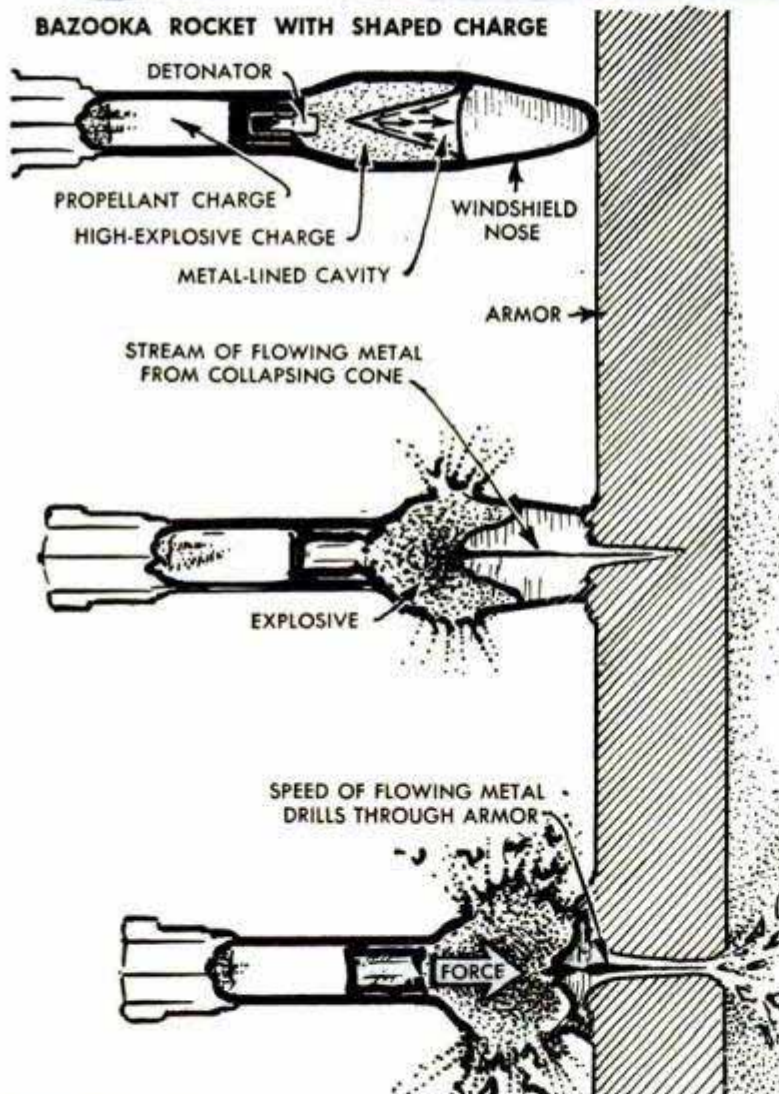
All these and many other new implements of war are fine for tomorrow, when production wheels roll full tilt. Of more immediate interest to the G. I. a few weeks ago was something to stop tanks. Early in the Korean war high-powered shells



Recoilless 75-mm. rifle can knock out a medium tank. Despite size of shell shown in foreground, gun has no kick



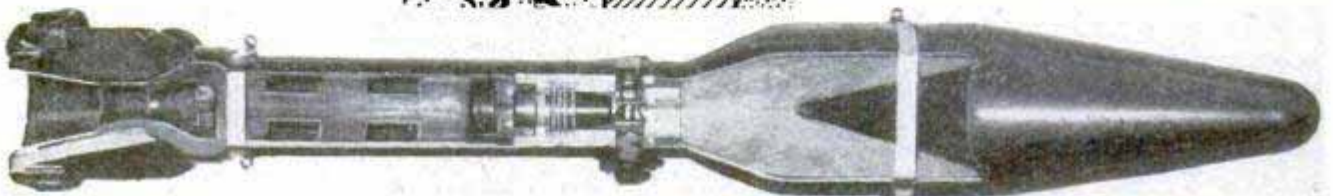
**BAZOOKA ROCKET WITH SHAPED CHARGE**



When shaped-charge rocket hits tank a supersonic jet of hot metal cuts tough armor plate like wax and creates havoc

of the armor-piercing variety bounced off the armor of Soviet tanks like golf balls. Land mines lumped up their ride a little, but they kept right on going. Then the Army reached down in its sock and pulled out the 3.5 bazooka (which gets its title from the inside measurement of a light portable launcher that folds in half for easy carrying). The 3.5's projectile is a slow-moving, wobbly, 3-foot rocket projectile—with a muzzle velocity of only 325 feet per second, a range of less than 900 yards, and a fiery tail somewhat less than frightening. It looks as though it couldn't make a dent in cotton batting. Not only did it dent the Communists' heavies; it drilled holes through them and completely demolished the interiors. Right

Diagram shows progressive steps in the detonation of a shaped-charge bazooka shell. Explosive force is increased four to five times because at front of the cavity it comes from both sides and meets in the middle. Below, cutaway of shell





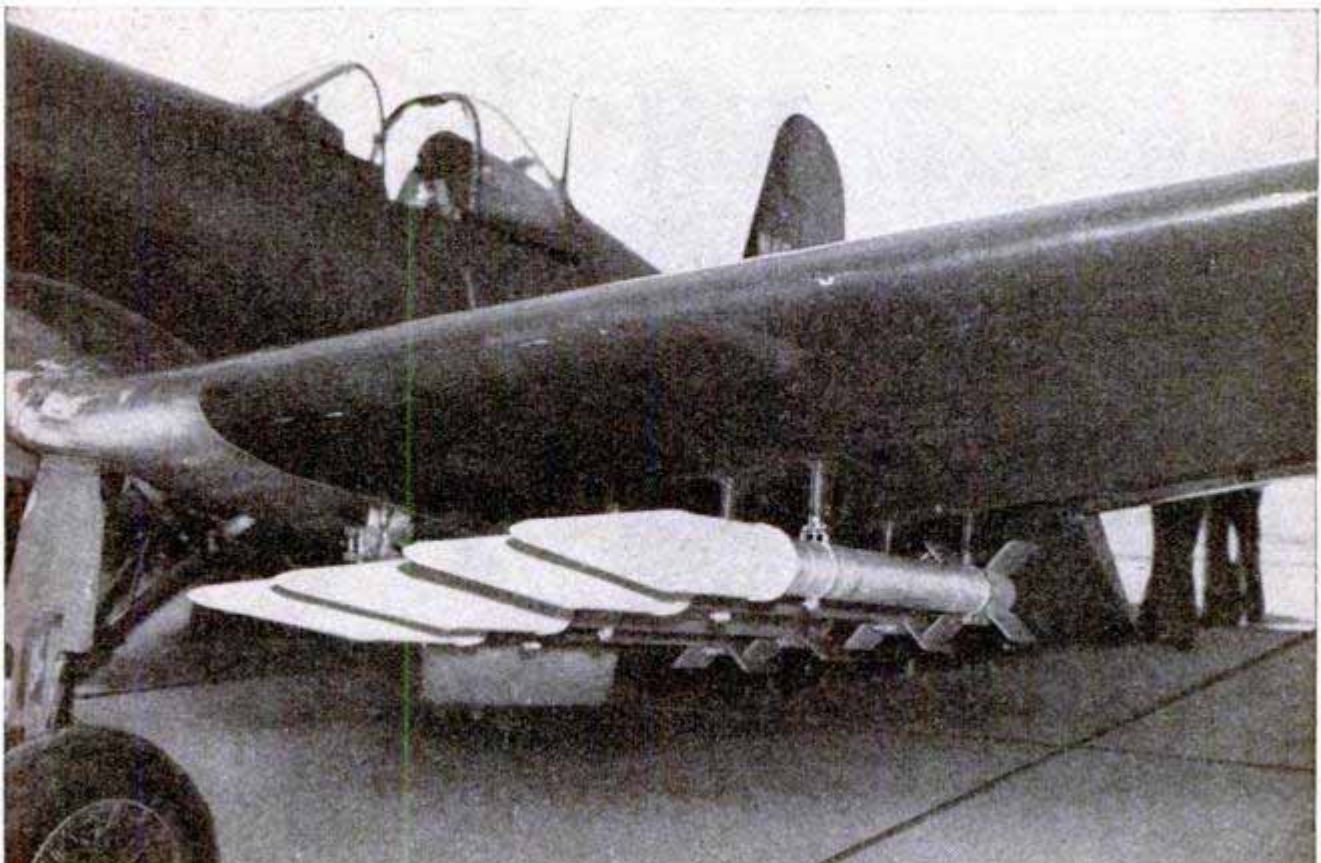


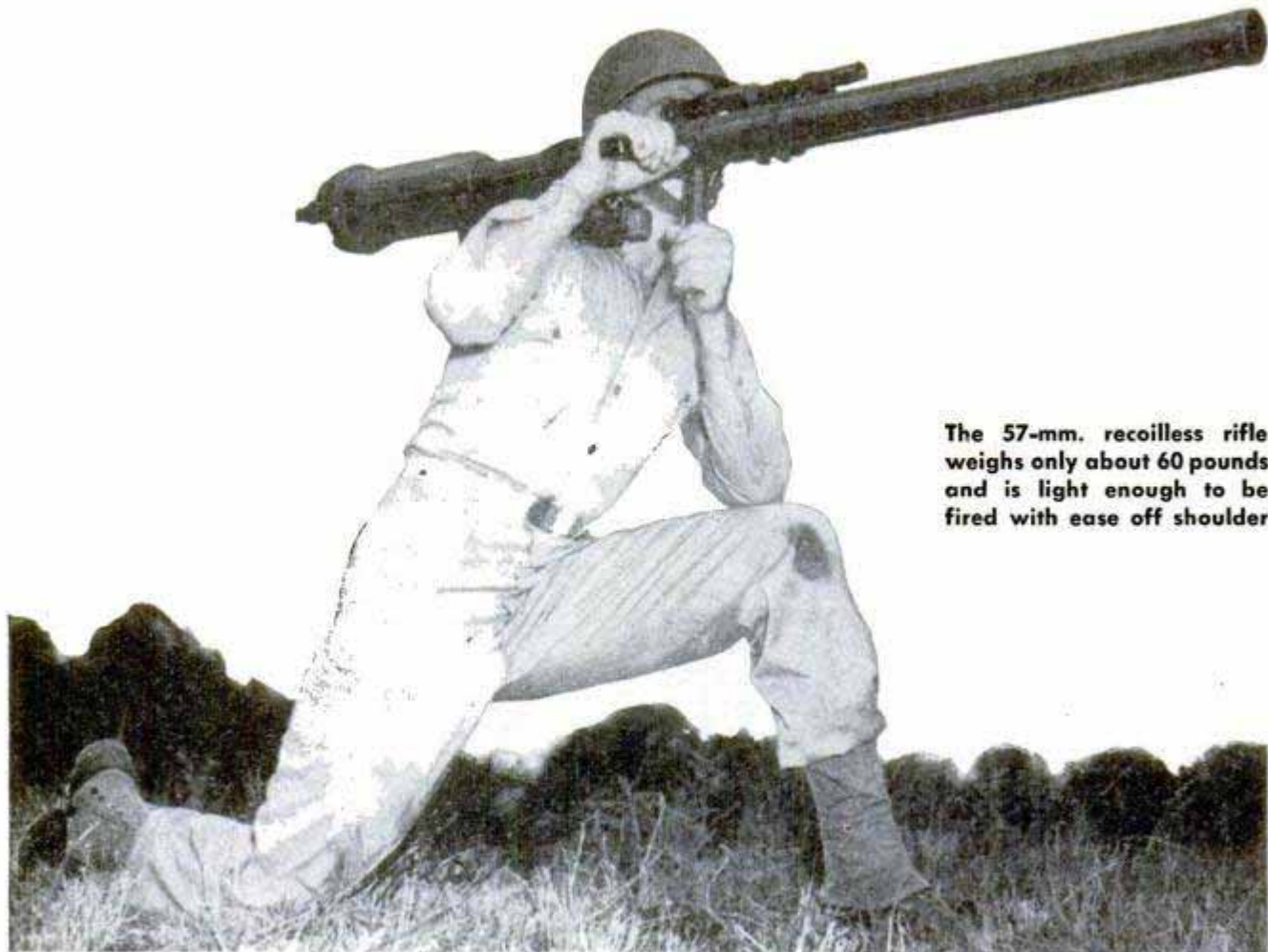
Infantry sergeant demonstrates the 3.5 bazooka which fires a three-foot rocket projectile. The muzzle velocity is only 325 feet per second and range 900 yards. It stops heavy tanks

on the heels of the new bazooka came a 90-mm. shell for use in the big guns on our 45-ton General Pershing tanks. A high-velocity projectile, with a range many times that of a bazooka rocket, makes it a sure-fire tank-killer.

Actually, velocity has little to do with the effectiveness of either of these weapons. They'd do about the same job if you could get close enough to throw them at a tank without being caught in the draft. Both get their lethal sock from a built-in "shaped charge," an old ordnance trick known by mining engineers for more than 100 years, and used on a small scale by the Germans and the Japanese in the last war. The Japanese shaped-charge weapon was

Beneath the wing of this Navy Corsair hang four new antitank rockets of shaped-charge type used in Korea





**The 57-mm. recoilless rifle weighs only about 60 pounds and is light enough to be fired with ease off shoulder**

hooked to the end of a pole, jammed against a tank by a soldier at the other end, and triggered by hand. The tank was demolished, and the soldier joined his ancestors.

A shaped charge is simply a method of

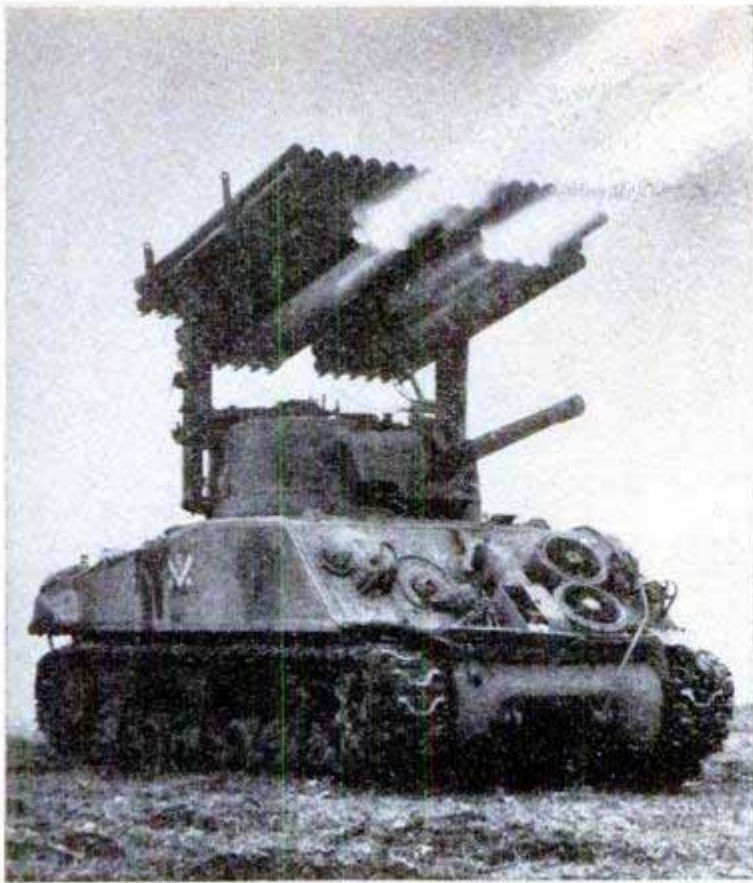
arranging an explosive so most of its blast will focus in one pin-pointed direction. This is done by making a concave hole in the powder at one end. The sock of the blast will bounce out that end like light

**Navy's guided missile Bat has 10-foot wingspread and carries a general-purpose bomb. It glides to target guided by radar**



waves focusing off the reflecting mirror of a telescope. In the new shells something else has been added. In the cone-shaped hole carved out of the front end of the explosive charge, a thin metal cone liner is fitted. When the shell hits its steel target, the charge goes off, starting a tremendous shock wave that travels along the sides of the metal liner, collapsing it as it proceeds. So tremendous and fast is the pressure on the cone that the metal in it, instead of breaking up, flows like a liquid. At the cone's apex, a long thin jet of its own steel spurts straight out in a supersonic ribbon, moving about 2000 miles an hour, continuing until the blast is over and the cone is flattened. The horrendous pressure of that jet-propelled stream of hot metal is so much greater than the strength of any known armor, that it will penetrate with almost no resistance—like a high-pressure fire-hose

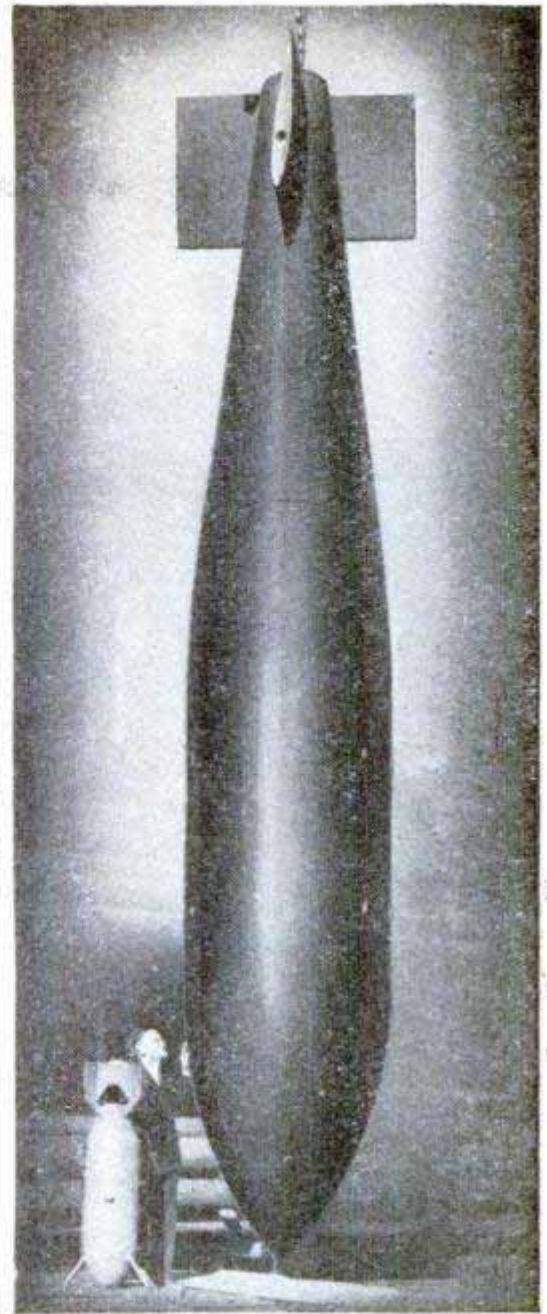
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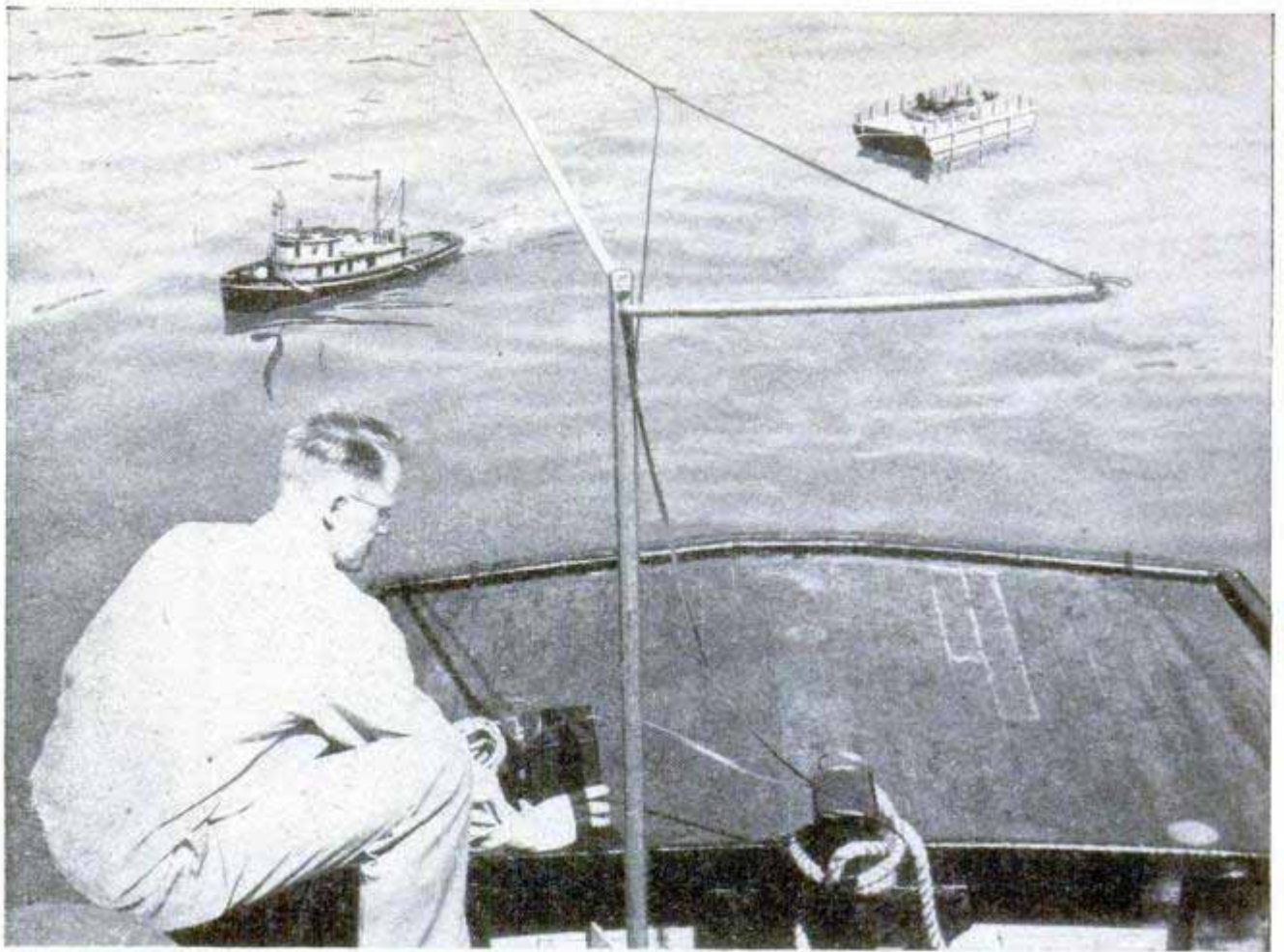


Special launcher mounted on tank fires 4.5-inch rockets one at a time. Time exposure here gives effect of firing a salvo

Right, man is dwarfed beside Earthquake bomb which is 27 ft. high, weighs 42,000 pounds and could level many city blocks

Below, T-8 transport has just "broken apart" and will pull away to allow tank to be unloaded; it can carry a heavy tank





Little tug is steered by impulses sent out through the radio antenna in the foreground. It pulls its own barge, loaded with an anchor. Below, the model is cast off beside its big brother



## Radio-Guided Ship Model Tows Miniature Barge

From two miles away a model of an ocean-going tug can be steered by radio. The little ship, a  $\frac{1}{32}$  scale model of an Army craft, weighs 50 pounds and develops enough power to pull a rowboat with two occupants or a miniature barge carrying an anchor for a deck load. A motor from a large electric fan, operating on a motorcycle storage battery, provides the power. The motor turns a three-bladed wheel at 1000 revolutions per minute. Instead of an anchor, a large storage battery sometimes is placed on the barge as a deck load and coupled to the engine. The radio receiver is installed under the pilothouse. Both parts of the model's superstructure can be removed for work on the motor or receiver. The power winch, lifeboats and rigging all work exactly as they do on the full-size craft. The antenna for sending out impulses to guide the tug can be set up on shore or placed aboard a boat. Two brothers, Jack and James Emel, spent eight months building the ship.

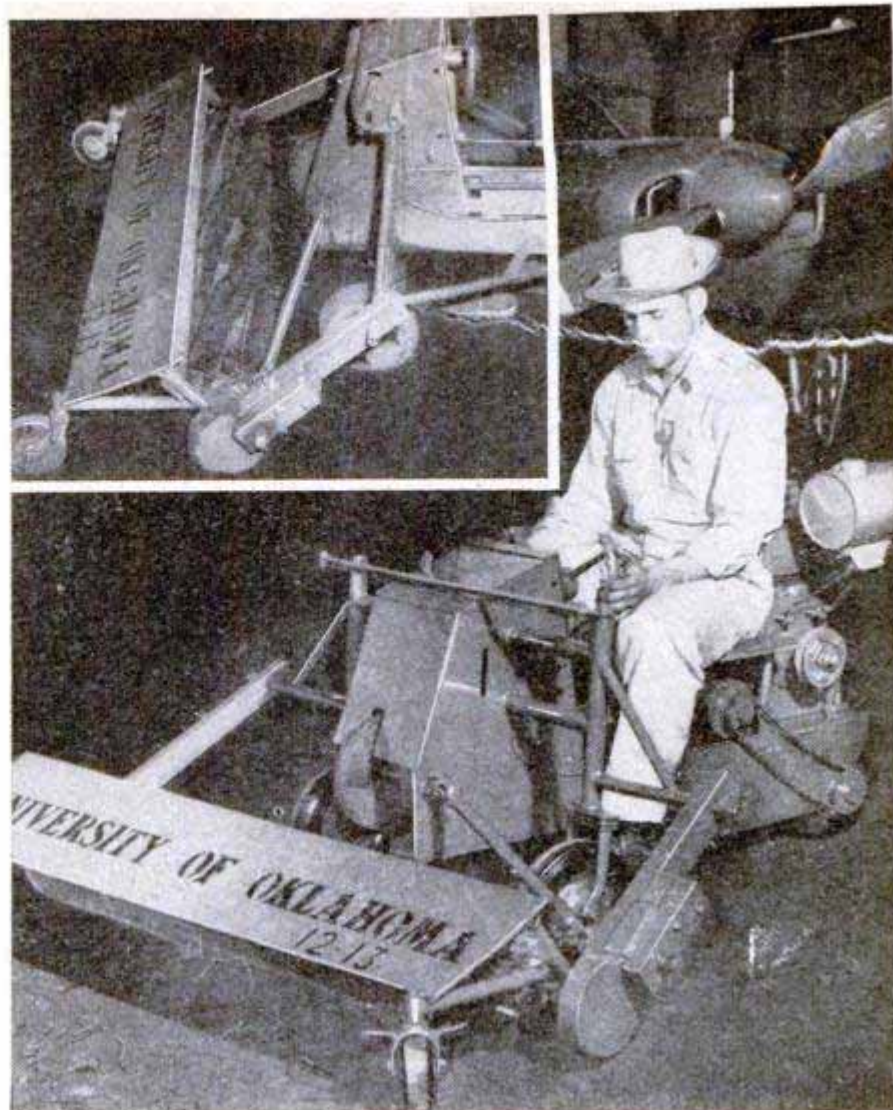
## Homemade Sweeper Cleans Hangar Floor

Two Oklahoma mechanics have fashioned salvaged parts into a power sweeper that cleans a 170 by 240-foot airplane hangar floor in less than an hour. The job was formerly a half day's work for four men with hand brooms. Its rows of brushes are bolted to a four-foot-wide metal drum that turns 700 times a minute. The machine's muffler and steering wheel came from junked planes and the wheels were on a bombsight trainer. Now the inventors are converting the hydraulic system from a Curtiss Helldiver plane into a lift that will raise and lower the sweeper's big brush.

## Old Railroad Rails Serve Many Uses

Don't look now, but your porch glider may be made of metal that once carried speedy streamliners across the country. There are about 20 mills in the country that convert old railroad rails into metal bars used in the manufacture of fence posts, clothes poles, wheelbarrow handles, porch gliders and other items. The rails are not remelted,

simply heated to rolling temperature and sliced into three parts: the head of the rail; the middle section, called the web; and the flange or base. Each of these sections is then rolled to the required size and shape for its new use.



Copyright: Mirrorpics

## Mobile X-Ray For Animals

Injured animals can be X-rayed at the scene of the accident with a portable machine being used by England's Royal Society for the Prevention of Cruelty to Animals. It will save the lives of many animals which would otherwise be destroyed because veterinarians did not know the extent of their injuries.

☐ It costs the average motorist \$441.52 to drive his car one year, according to the latest survey made by the American Automobile Association.



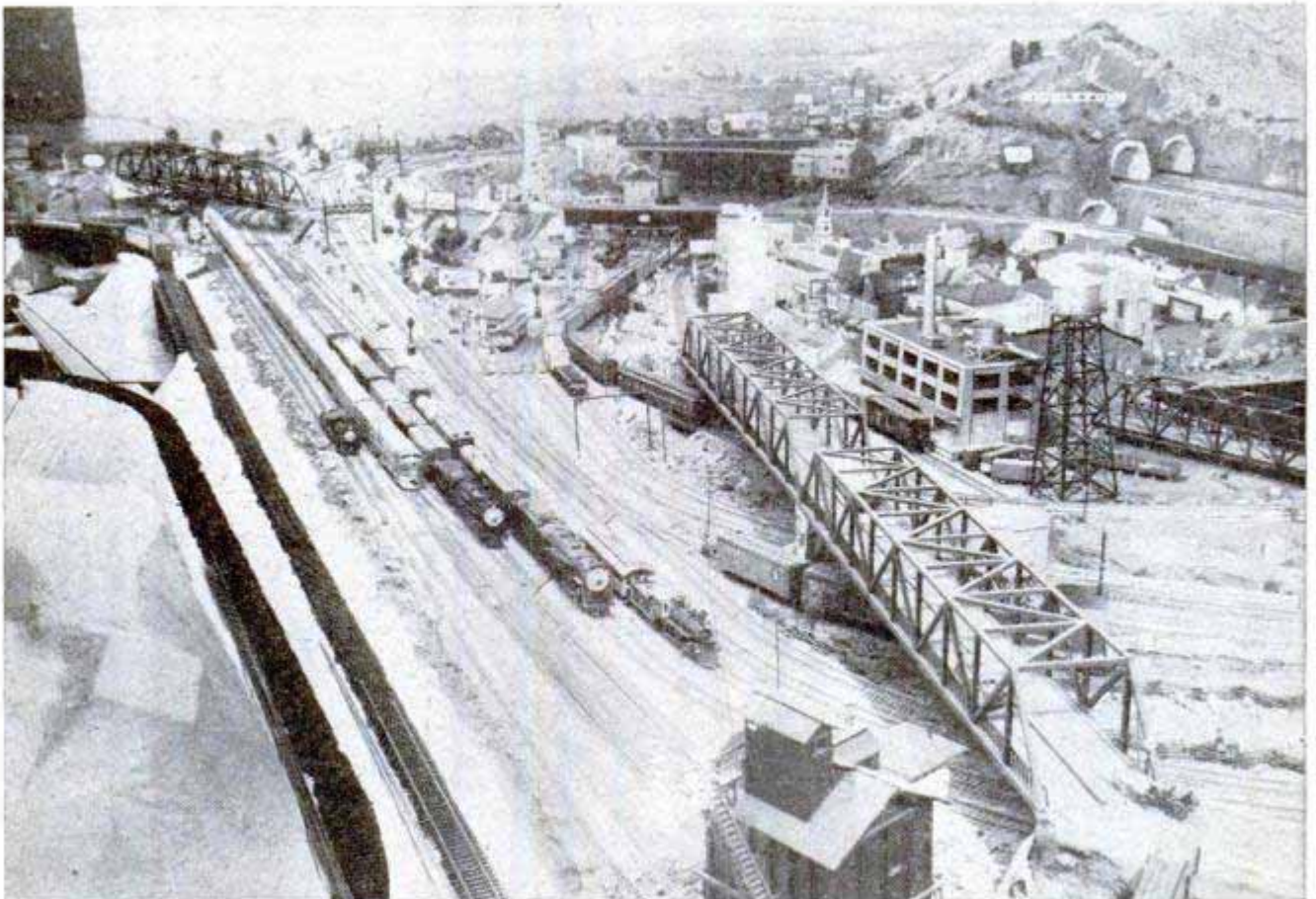
# Spare-Time Railroader

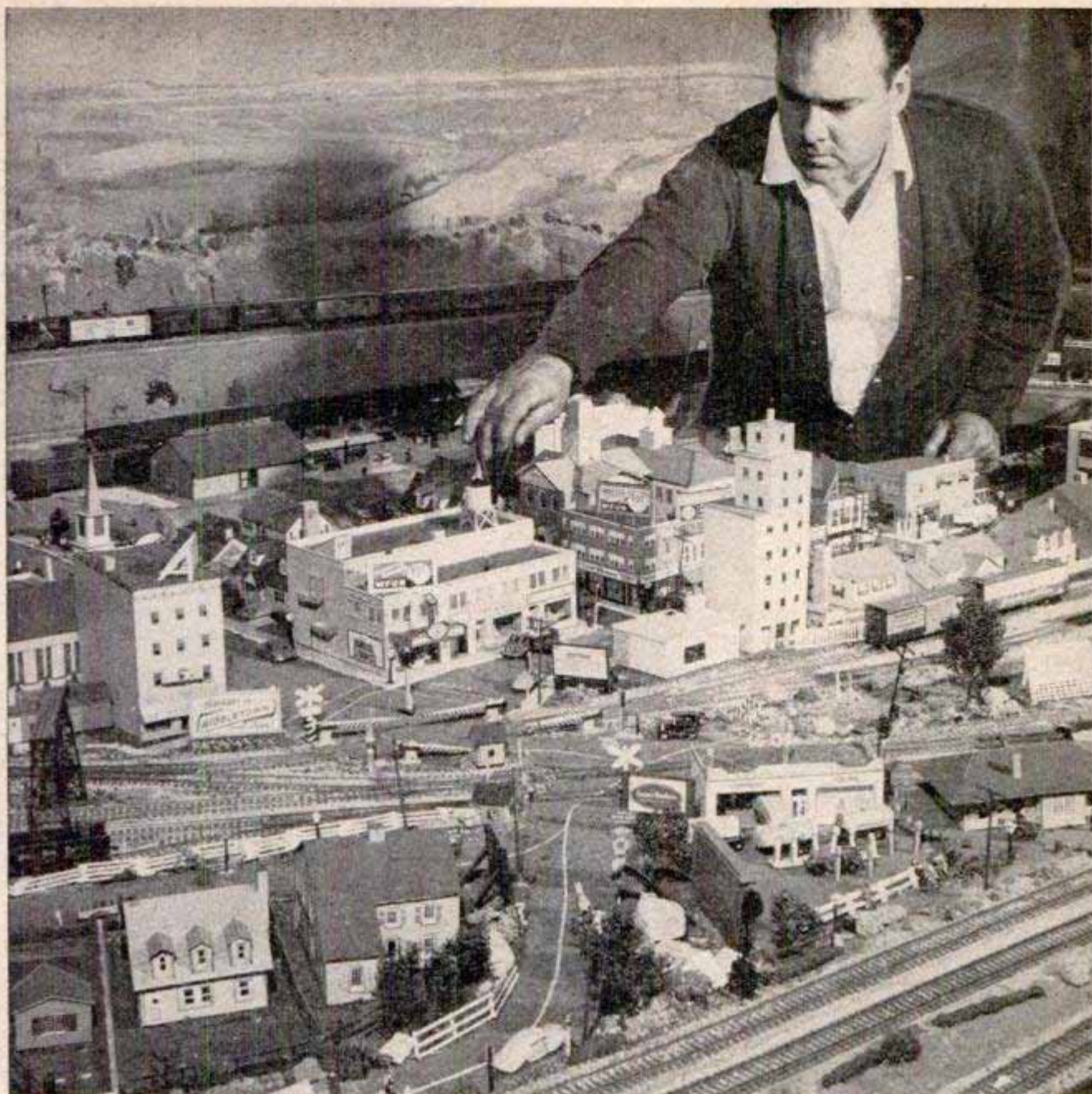
Engine passes a slow-moving freight on a curve. At right, a tiny farmer heads for town behind old Dobbin

**WHEN HE** was a small boy, Watson D. Pritchard rode in the engine cabs of his grandfather's shortline railroad in West Virginia. Now Pritchard, a Los Angeles electrical engineer, has his own shortline railroad in his back yard, and it duplicates many of the scenes of the West Virginia countryside. In his two-car garage he has constructed a model railroad that covers an area 15 by 20 feet and contains more than 1400 feet of HO double track. The shortline is complete with several subur-

ban communities, farms, river crossings and mountain tunnels. In Middletown, the metropolis of the layout, there are more than 100 buildings which Pritchard has fashioned from cardboard. In the Middletown Terminal, about 100 people wait for the next scheduled train. The line's rolling stock consists of 39 passenger cars and 100 freight cars, with seven engines to move them. When made up for scheduled runs, the trains include three freights, a Super Chief and a local passenger train.

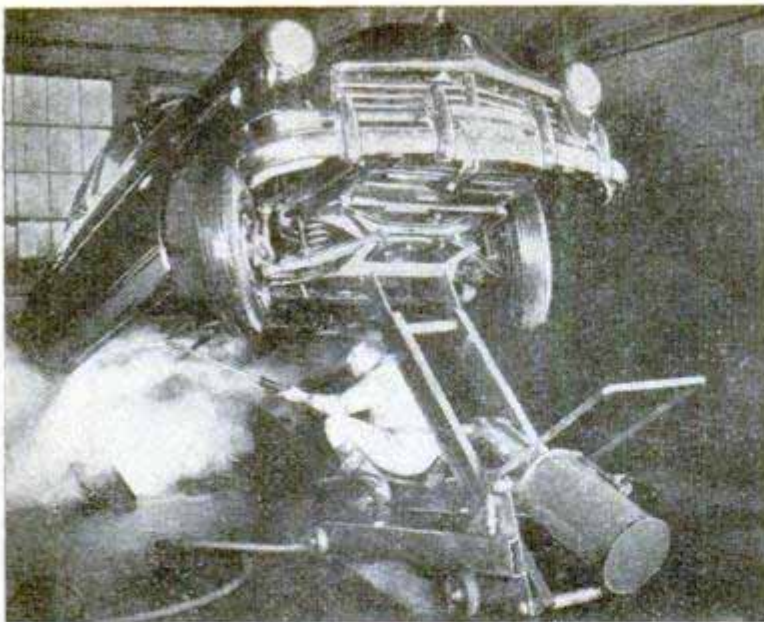
There's a four-trunk main line in the layout. Realistic backgrounds came from Pritchard's boyhood memories





Metropolis of Middletown consists of about 100 cardboard buildings. Below, left, tiny hobas made of lead hook a ride on the tender. Right, Pullman porters and redcaps add a touch of realism to observation car





## Portable One-End Lift Speeds Work on Cars

Capable of lifting either end of a car to a height of more than four feet, a pneumatic lift speeds car repair and maintenance. An excellent auxiliary greasing lift, it is especially useful in small garages where space limitations don't permit a full-size lift. It is completely portable and can be stored in a corner of the garage when not in use. Only 44 pounds of air pressure are required for each 1000 pounds of load. The lifting hook locks at six different heights ranging from 21 to 50 inches to provide absolute safety for mechanics.

## Turbine-Powered Truck

As powerful as conventional engines 10 times heavier, the world's first turbine-powered truck has been started on intensive highway-endurance and mountain-driving tests. The 200-pound, 175-horsepower unit occupies only one thirteenth the space taken by the diesel engine it replaced in the 10-ton test vehicle. Though similar to a jet airplane engine in design, the turbine's power is harnessed to turn a shaft rather than being exhausted as jet thrust. It runs equally well on light or heavy fuel oil, kerosene, gasoline and even bottled gas, consuming two to three times as much fuel as diesel or gasoline engines of similar rating. Developed by the Boeing



Airplane Company for the U. S. Navy, the turbine will next be tested for possible use as boat propulsion.



## Small Racing Sulky Pulled by Dog

One of the proudest lads in Copenhagen, Denmark, is a six-year-old whose father built him a racing sulky. Peter's little sulky is pulled by his big police dog. Made of metal tubing, the cart gives the boy all the thrills of a real racing rig, including the fun of handling the reins.

Sources of available products described in this issue are listed in the index, starting on page 14. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from the Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois





Wing floats from amphibious planes keep the craft afloat and give it a weird appearance. Right, when the operator pedals, there's a powerful thrust against water

## Watercycle

Like a strange bug, a homemade watercycle crawls across the surface of a lake or river. The weird craft was built by William Dein, an employee of the Republic Aviation Corporation. Dein purchased some surplus wing floats used on amphibious airplanes, fastened them together with a framework and mounted part of a bicycle atop the structure. The operator pedals, and presto—the craft moves across the water.

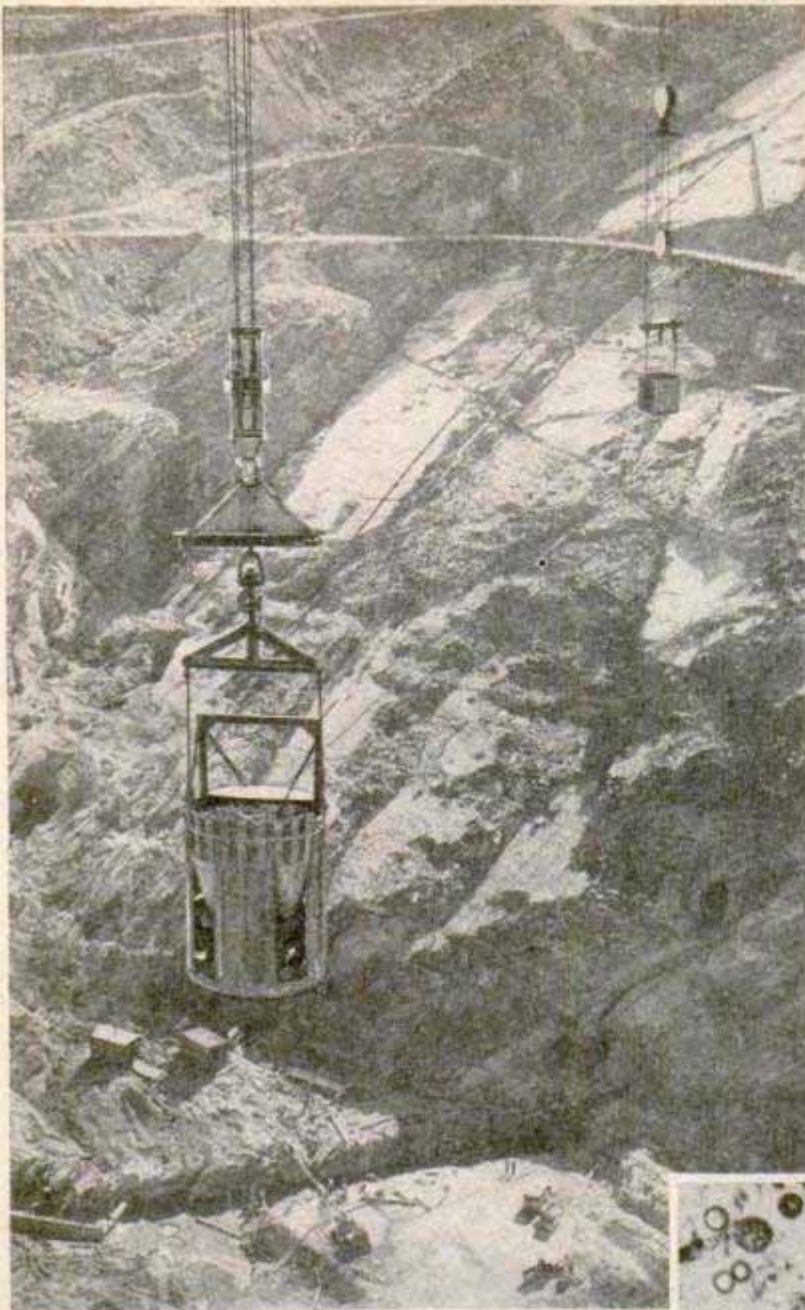


## Fuel Pours Into Jetliner at Rate of 200 Gallons per Minute

Jet-propelled airliners, which require tremendous quantities of fuel, are now refueled four times faster by a system developed for the Avro Canada Jetliner. The lightweight underwing refueling system is virtually fireproof and has automatic shut-offs to prevent overfilling. Fuel lines are connected to the underside of the wing, eliminating any necessity to climb on the wing during refueling. The fuel is pumped in at a rate of 200 gallons a minute. Float switches stop the pump when each tank

is filled. The spark hazard is eliminated by connecting the external fuel pump to the plane's electrical circuit. The system will refuel a plane with 3000 gallons in 6 minutes, instead of 25 minutes required with the older system.

☐ More than 300,000 calls handled daily by operators in the Pentagon Building, headquarters of the Department of Defense, make it the busiest private branch telephone exchange in the world.



Riding on an overhead cable, this huge bucket is carrying fly-ash concrete to Hungry Horse Dam. Below, fly ash looks and feels like portland cement



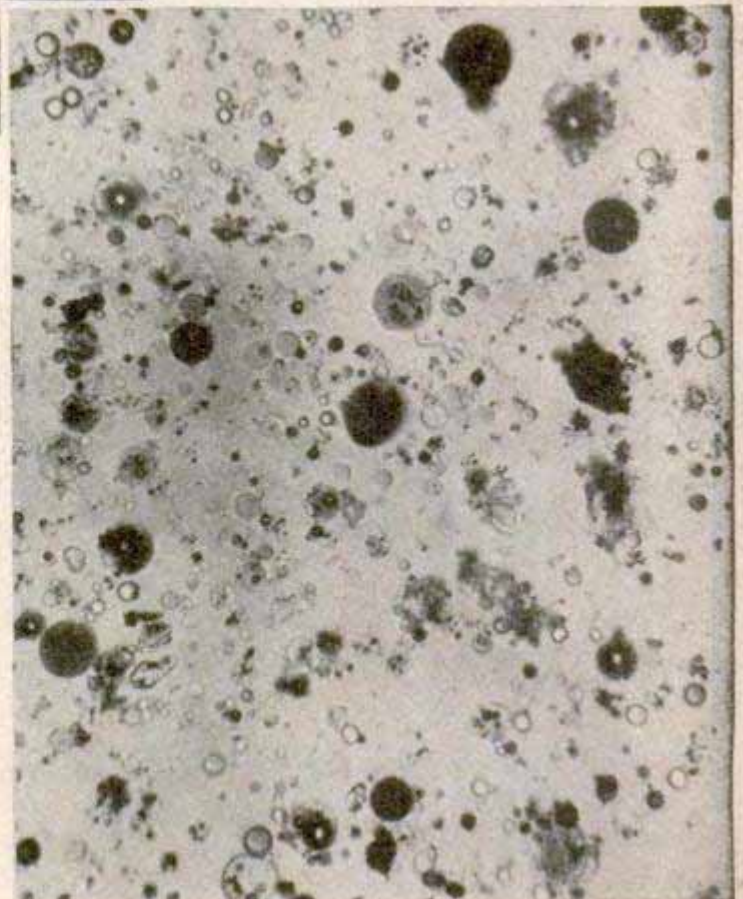
Millions of dollars are being saved by building huge dams with concrete using the waste that flies up smokestacks

*By Richard H. Syring*

GOING UP in smoke" isn't as wasteful as it used to be. Today, fly ash, the annoying material that pours from smokestacks of giant power plants, has a productive role in our economy. The airborne dirt that was, and in many cities still is, the bane of the tidy housewife is now being used to build dams, highways, conduits and other concrete products.

Out in northwestern Montana, the United States Bureau of Reclamation is using this smokestack waste in its mammoth Hungry Horse Dam, the largest dam under construction in the world today. Stretching across the south fork of the Flathead River, this concrete barrier will contain carload upon carload of fly ash removed from the smoke of Chicago power plants, saving millions of dollars for the

Below, fly ash is made up of spherical particles as this photomicrograph shows



# CONCRETE FROM FLY ASH

taxpayers. Estimates on the savings in concrete alone run from \$2,000,000 to \$3,500,000 and the total cost of the dam is expected to be as much as \$5,000,000 less, thanks to the former waste product.

In the past 16 years, the Bureau of Reclamation has been one of the nation's largest users of concrete. Power dams and irrigation projects that dot the West, turning barren fields into fertile farms, have gobbled up 32,000,000 yards of concrete. The problem of reducing the cost of concrete has long plagued this government agency.

The Bureau's big concrete laboratory at Denver has been testing various cement substitutes for years. In some earlier dams, pozzolanic materials were used. They included volcanic, siliceous sedimentary rocks, burnt clays and shales or industrial by-products. None of these materials has any binding properties by itself. However, combined with the lime set free in the hardening of cement, pozzolan forms a compound that will set under water.

The various forms of pozzolan aren't new. The remarkable features of this substance were known to the Romans who used the volcanic ash found near the town of Pozzuoli, from which pozzolan gets its name. A form of pozzolan was used in the

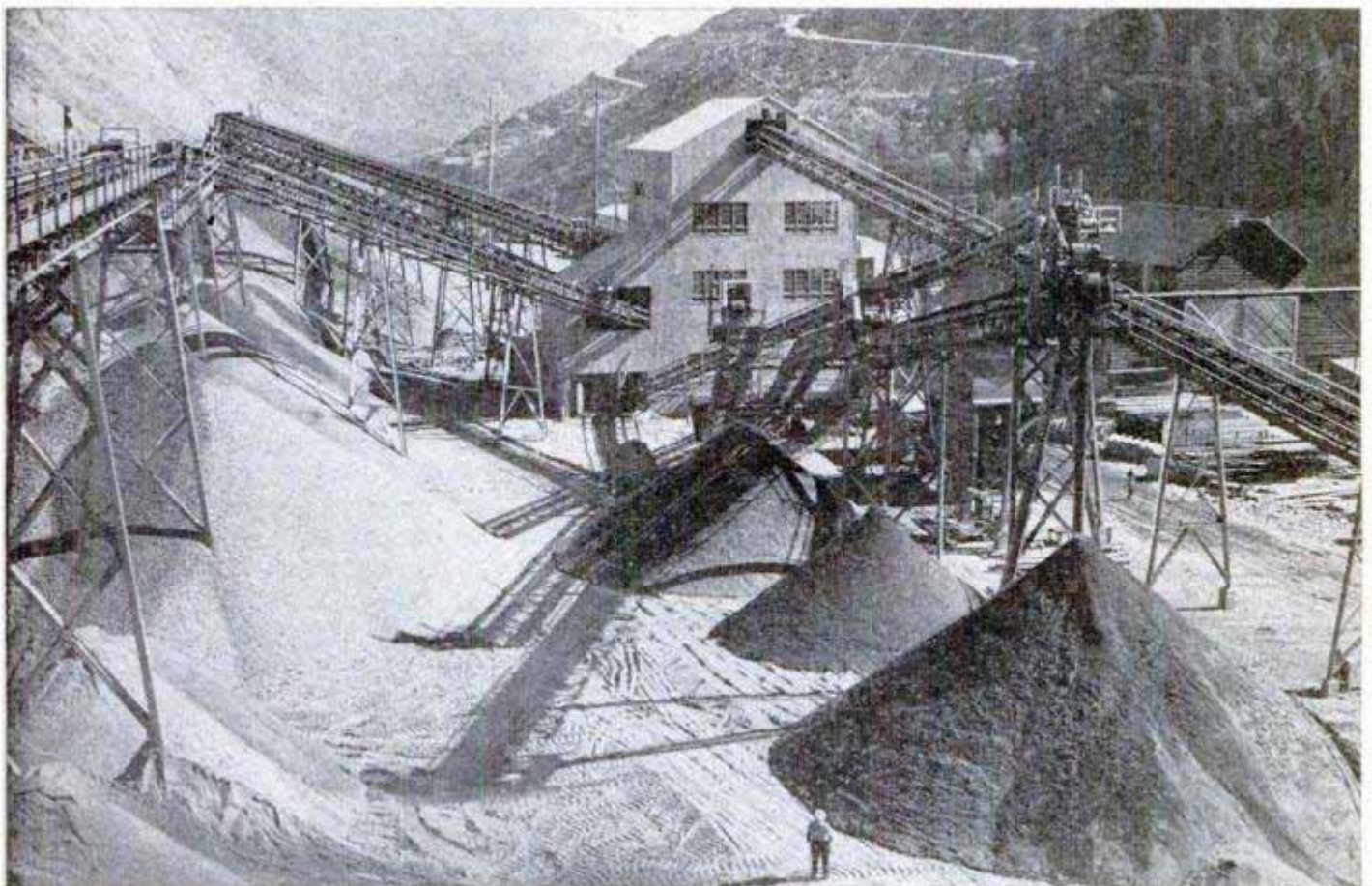
Pantheon and Colosseum which have withstood the elements to a remarkable degree for almost 2000 years.

But pozzolan materials that can be used for concrete are scarce. Sometimes they are expensive to prepare. Other times they are found in deposits too far from construction projects to make their use practical. Because of these limitations, the Bureau of Reclamation has searched for years for natural materials which were readily available at comparatively low cost.

When the researchers discovered that fly ash is one of the best and cheapest pozzolanic materials, they not only solved the cheaper concrete problem, but also eliminated the disposal problem that was pestering our large power plants. Removed from the smoke by electrostatic precipitators, the fly ash is now being shipped by the carload to Hungry Horse Dam and other projects around the country.

Fly ash is a fine flue dust that results when powdered coal is burned. Somewhere between 50 and 90 percent of all the ash in the coal is carried through the boiler in the smoke. It's a minute, hard, crystalline substance that looks and feels so much like cement you couldn't tell the difference. The minute particles are spherical in

**At Hungry Horse, building materials are carried by 14,000 feet of conveyor belts, some of which are shown here**





Left, fly ash is also used to make concrete pipes on this machine. Right, dumping concrete at Hungry Horse

shape. Researchers say that this round shape is a most important characteristic. The particles act as tiny ball bearings in the concrete mix, giving it great workability and permitting the concrete to be made with a minimum of water.

L. W. Bartsch, head of the Denver lab's engineering division, says this is of extreme importance because concrete is stronger when less water is used.

Out at Hungry Horse Dam, fly ash is replacing 30 percent of the cement. Previously, the bureau used one barrel of cement (equal to four sacks) to one cubic yard of concrete. In the new and cheaper mixture, two sacks of cement and 90 pounds of fly ash are used per cubic yard. Contractors are buying pozzolan for \$1.00 a ton in Chicago, which means about \$11.50 a ton delivered to Hungry Horse, a good \$10.00 a ton less than portland cement.

Not only does fly ash cut cement costs, but it also means lower costs for cooling the concrete as it sets. During hydration or hardening, concrete gets hot. Ordinary cement concrete generates from 80 to 95 calories of heat per gram of cement, which is enough in mass structures to raise temperatures from 60 to 80 degrees within 14 days. It takes about 28 days for the cement concrete to set. Use of fly ash with the cement will shorten that period by at least six days.

Hungry Horse Dam is a massive structure. It will be 330 feet thick at the base, 39 feet thick at the top and it extends across the canyon for 2115 feet. The concrete is poured in huge blocks, allowing for the shrinkage that occurs during cooling. The blocks are then grouted with cement

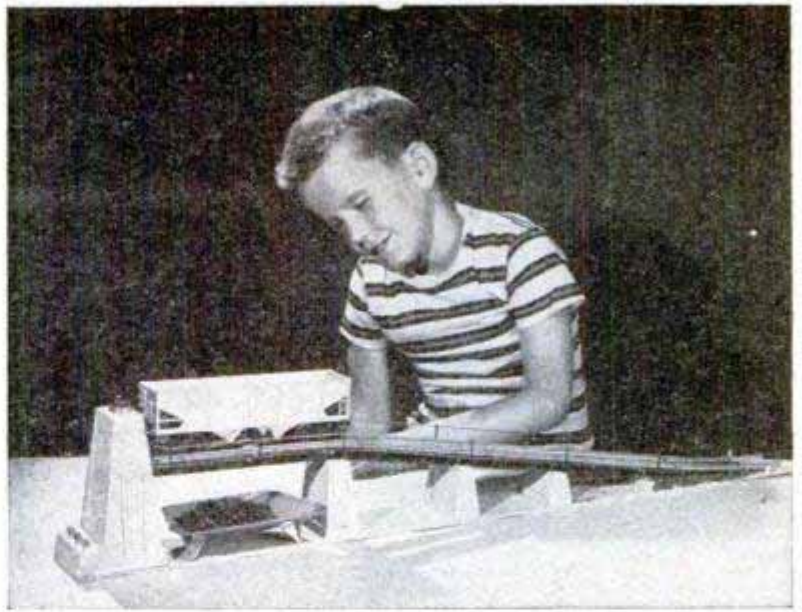
to form a single monolith. The fly-ash concrete requires less space between the blocks and that means less sealing work, an important saving in time and labor on a construction project as large as the dam at Hungry Horse.

However, even with the cooler mix of fly-ash concrete, it is necessary to run one-inch, thin-wall steel tubing through the concrete for cooling. Cold water is pumped through the tubing to carry off the tremendous heat released by the hardening mixture. When the water comes out of the tubing, it is boiling hot. Hungry Horse Dam will use about 1000 miles of tubing to speed the cooling process. Engineers estimate that enough heat will be liberated at Hungry Horse Dam to heat 800 five-room homes for a year in a cold climate. When the concrete has cooled, the tubes are filled with concrete.

But Hungry Horse Dam is not the only user of fly-ash concrete. Miles of electric cable have been laid in pipes made with fly-ash concrete. The addition of pozzolan to the mix permits a reduction of 20 to 33 percent in the amount of cement used. The pipes made with fly ash are denser and stronger than those made in the normal manner with straight cement mixes.

In Detroit, the Edison Company, faced with the problem of disposing of its fly ash, discovered that the waste material makes a satisfactory mineral filler in "blacktop" road construction.

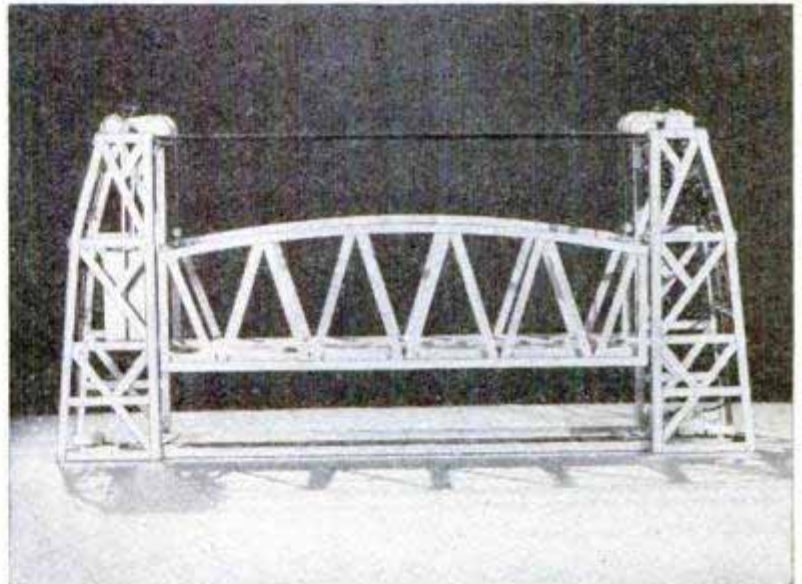
No longer just a nuisance that must be removed from smoke for health reasons, fly ash is rapidly becoming a valuable by-product that may make smoke elimination profitable as well as healthful.



## "Workin' on Railroad" By Remote Control

Completely automatic and detailed down to the last rivet, there are now a coal ramp and hopper car, a lift bridge and an oil derrick and pump for model-train fans. A knuckle coupler on the hopper car holds it at the top of the ramp and the bottom is opened remotely to dump cargo into a waiting bin. The bridge has automatic or remote-control operation. Its center span is raised by chains and has a section that can be removed. A "walking beam" operates the pump with a rocking motion at slow speed and flow is simulated by an illuminated oil column.

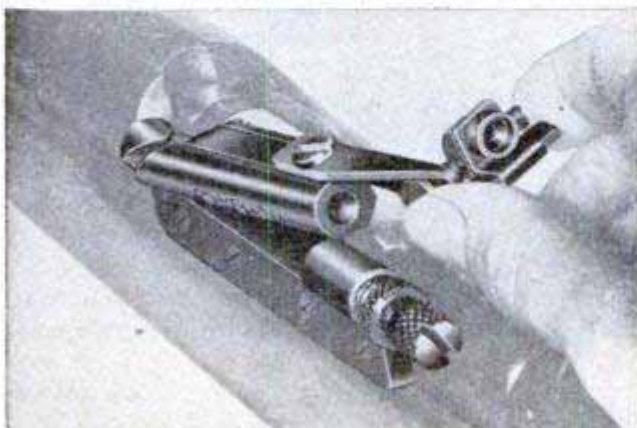
Oil derrick and pump at left simulate all moves of big equipment. Coal drops from hopper car, above, with realistic clatter. Below, center span of model-railroad bridge is lifted by chains

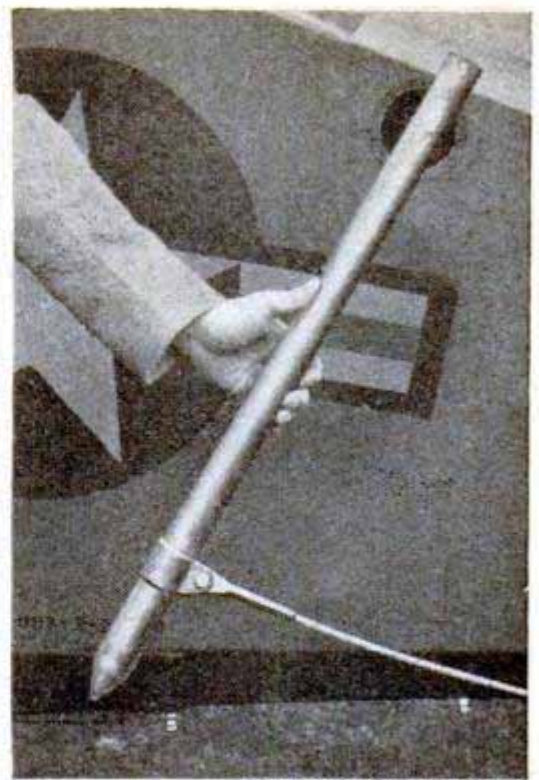
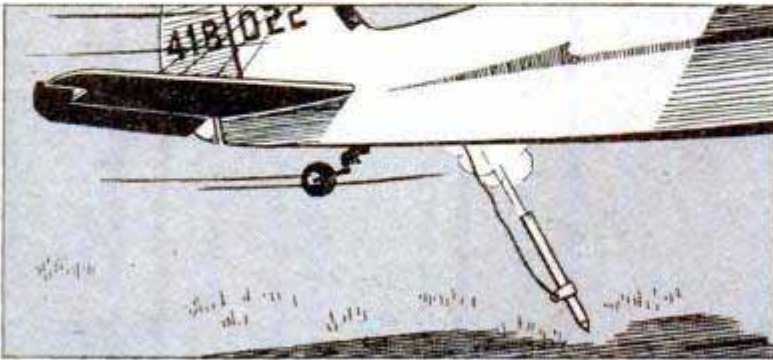
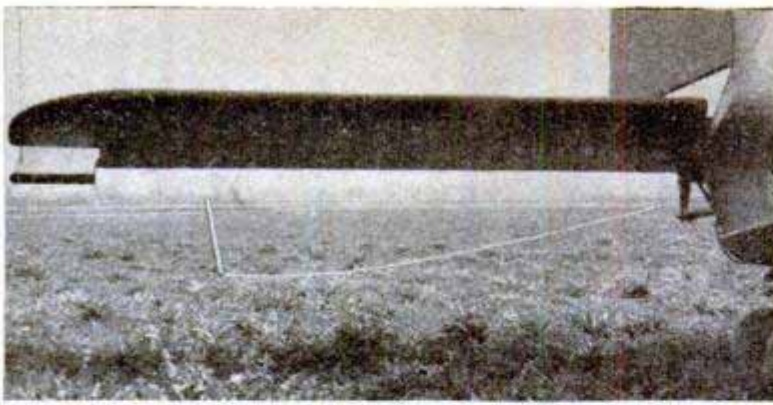


## Quick-Change Mount for Sportsmen's Rifle Sights

Sportsmen can change from telescopic to receiver sights instantly without making zeroing adjustments when they use a zero-return mount. With only one moving part, which sets or releases the V-shaped interplane lock, the mount assures perfect cen-

tering of the scope reticle. The receiver sight is mounted low for accurate sighting and has two eyepieces, one for hunting and the other for target shooting. The sight also has micromatic windage and elevation adjustments.



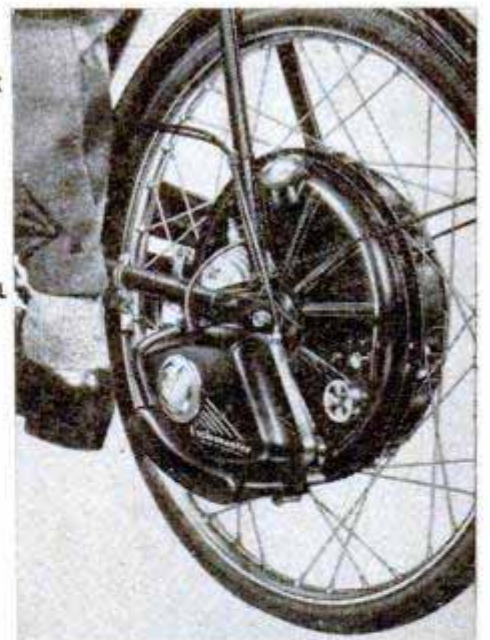
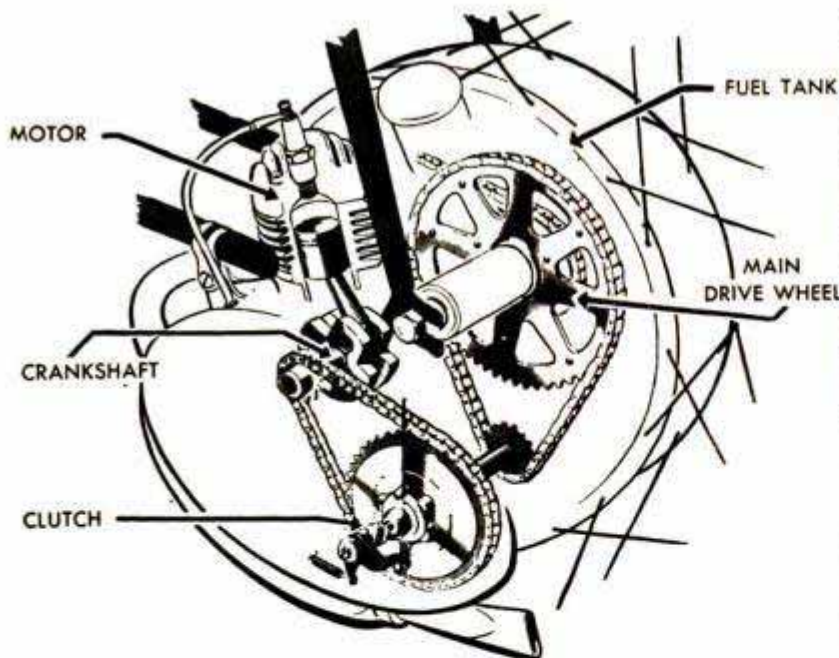


Air Materiel Command photos

## Plane Anchor Is Shot Into Ground

Light airplanes are brought to a stop in less than a fourth of their usual landing run by a 28-inch steel tube which serves as an anchor. The slender tube, filled with rocket propellant, is fired into the ground from a holder near the tail as the plane approaches the field. Attached to it are 200

feet of steel ribbon wound on a hydraulic reel that absorbs the energy at the time of the braking action and permits a smooth, easy stop. An L-13 landing at 75 miles an hour and normally requiring 700 feet of runway space can be halted in 168 feet. The explosive anchor was developed by the U. S. Air Force for use where planes must use small fields in combat areas.



## Rear-Wheel Motor Powers Bicycle

Everything necessary to convert a bicycle into a motorbike is built into a wheel assembly that replaces the standard rear wheel of the bicycle. The enlarged hub of the wheel contains a circular fuel tank. The tiny motor, which is mounted on the left

side of the wheel, drives the bike at 20 miles an hour and averages 300 miles to the gallon. The single piston drives a crankshaft which transmits power to the wheel by gears and chains. Installation is simple, requiring only about a half hour. The motor is being manufactured in England and is designed for 26-inch-wheel cycles.



## *How Fast Can We Fight?*

**By James L. H. Peck**

**Blurring speed! A Republic F-84 landing at a U. S. Air Force base**

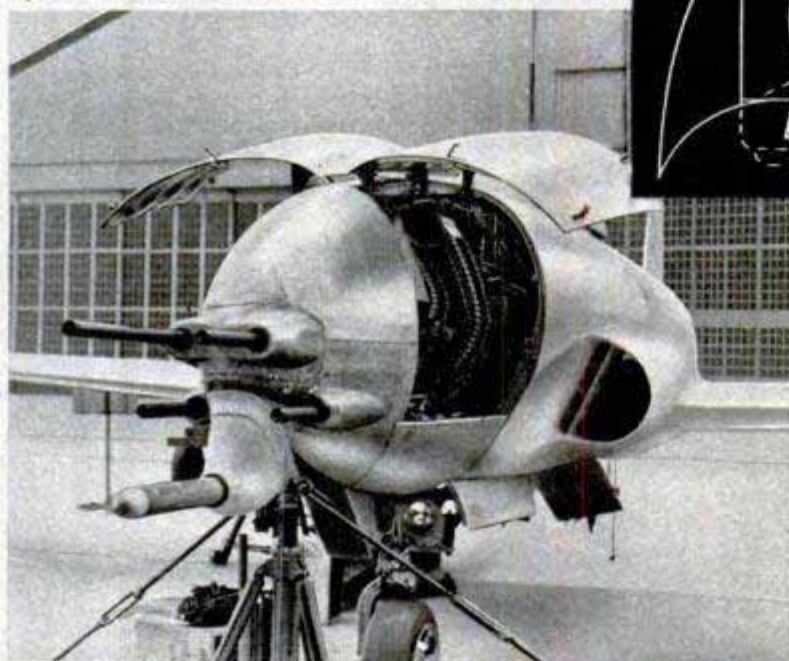
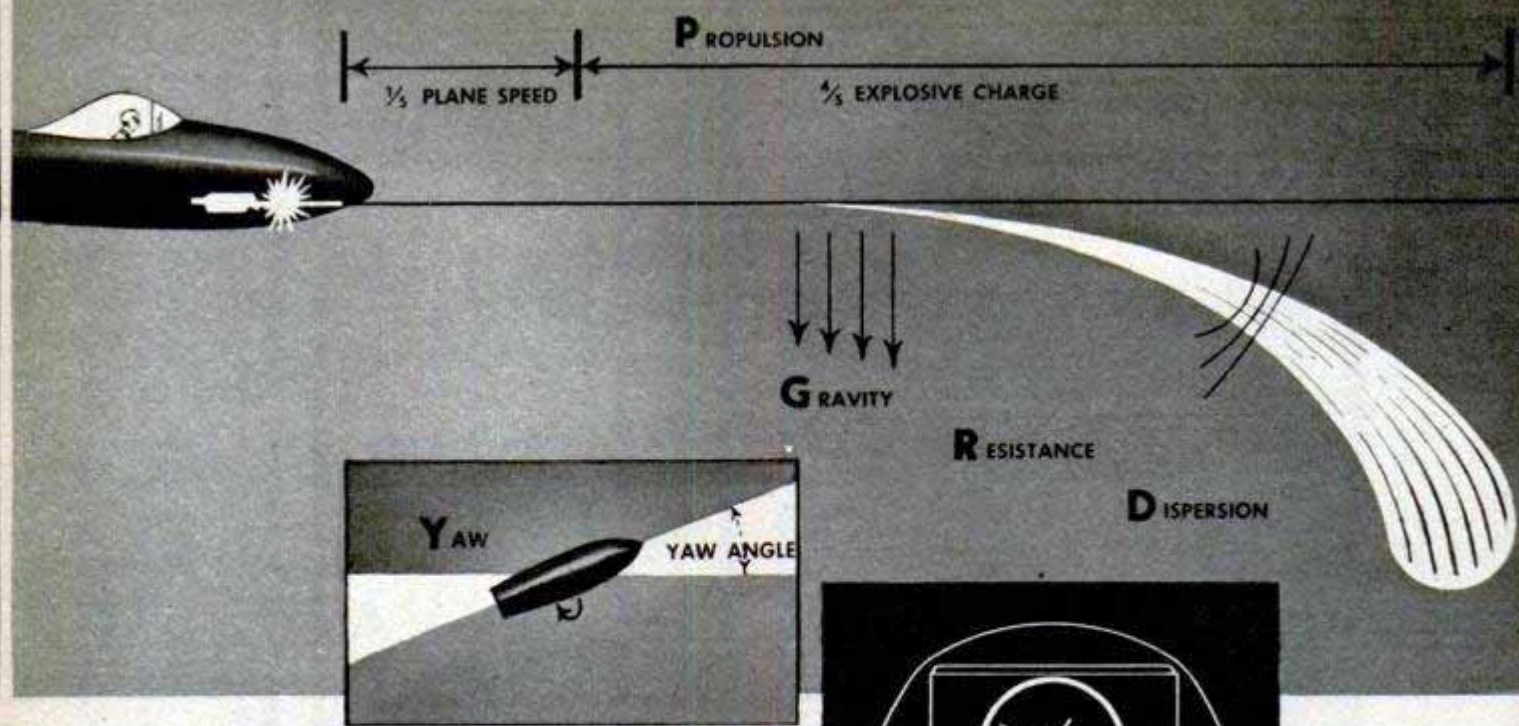
**F**EW AMERICAN defense problems so urgently need immediate solution as the question: How fast can we fight?

Operational fighter aircraft now fly at transsonic speeds. Faster ones are undergoing service-test trials. But the airman's ability to fight at today's—and tomorrow's—combat speeds will depend upon his weapons as well as his warplanes. We streamlined the aircraft but did not succeed, until recently, in streamlining the armament.

A fighter pilot needs all of the high performance he has available to climb quickly to high altitudes, and to overtake any hostile aircraft. But, from a tactical standpoint, this speed begins to work against him from the moment the

**Hits by any one of this salvo of "Mighty Mouse" rockets could cripple largest of today's bombers**

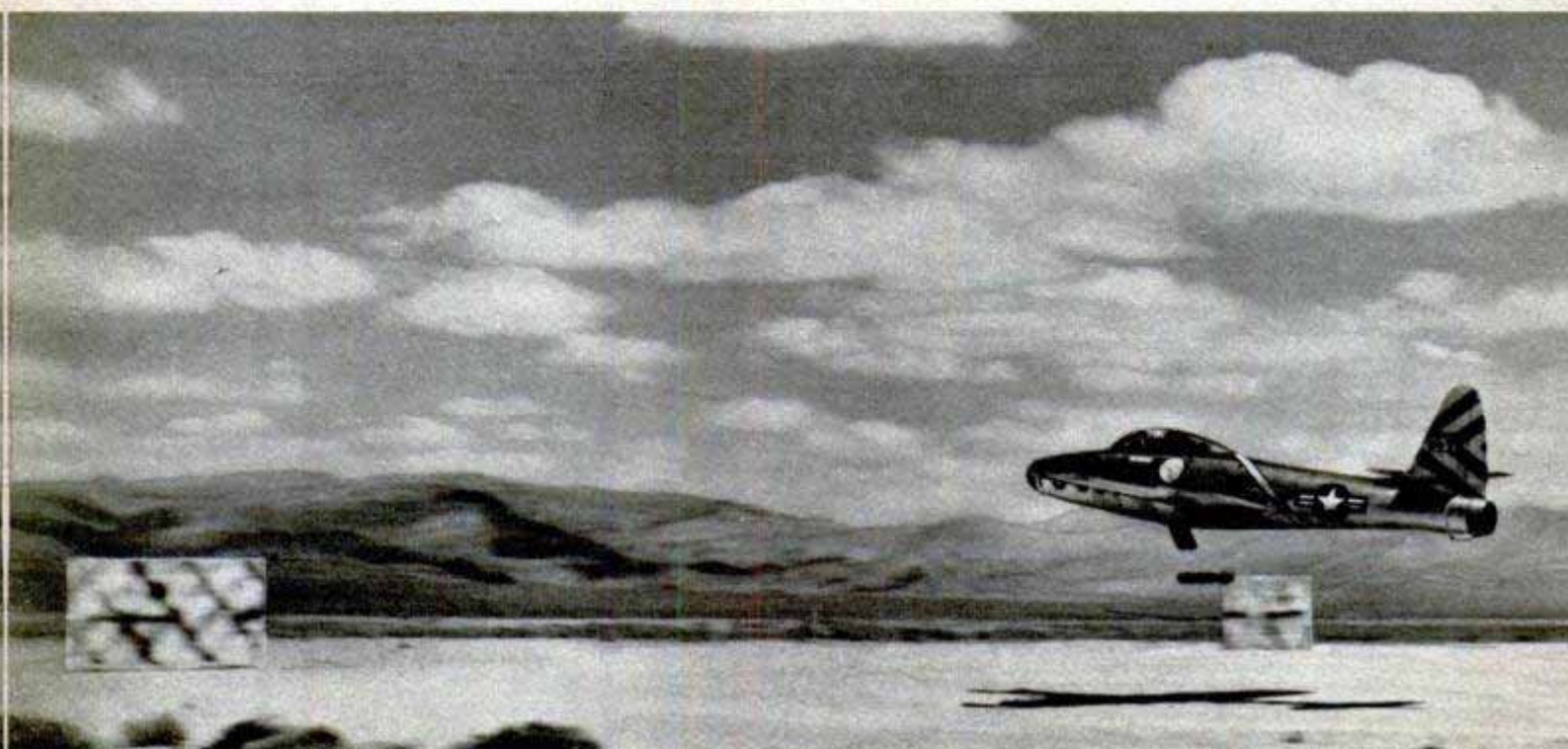




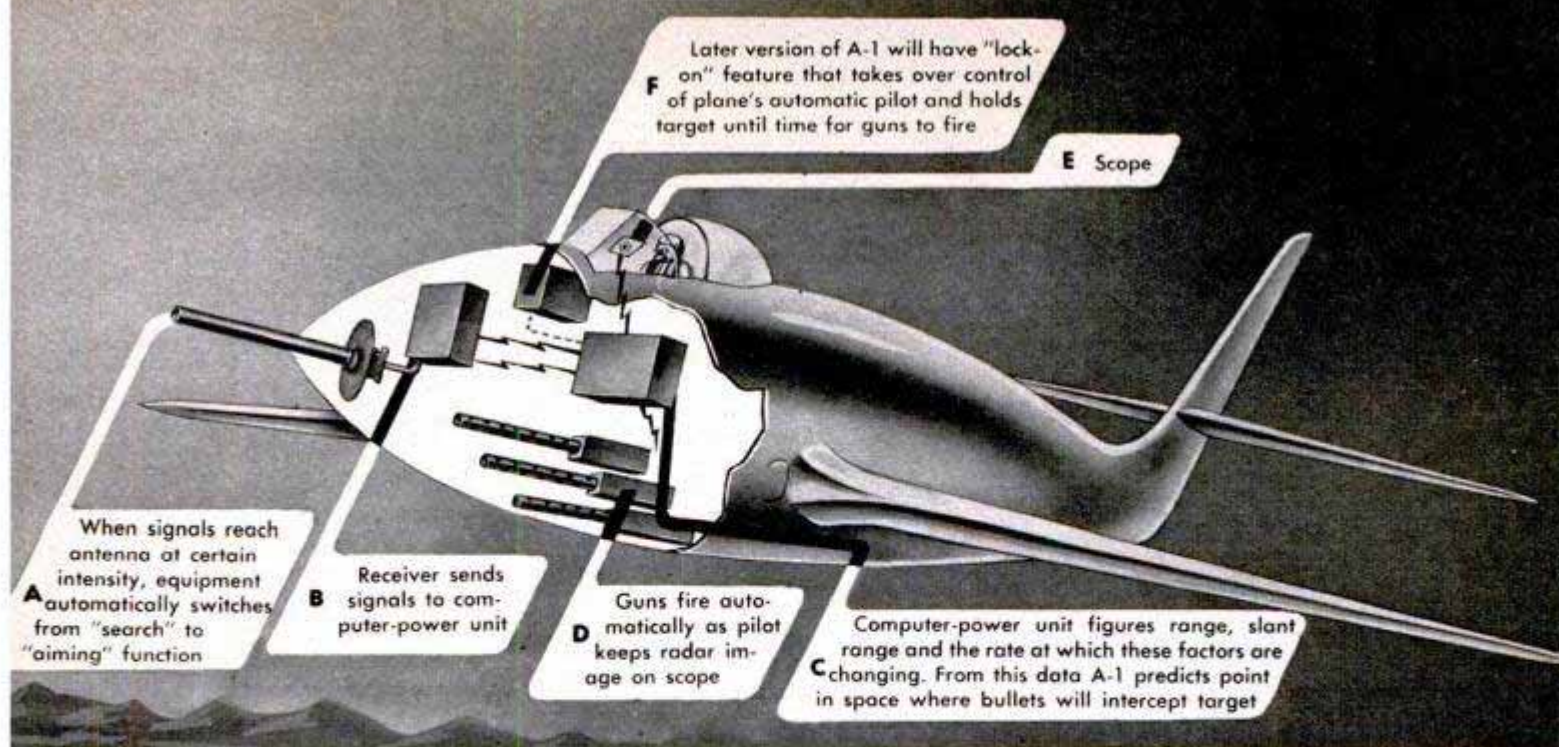
Sketches above show factors affecting bullet after firing. Airplane's speed adds fifth of missile's force. Gravity causes four-yard drop in 800 yards and air resistance cuts velocity one third. Dispersion, bullet yaw and "mushing" by plane further alter course to target

Radomes, like one below nose guns, hold gear used in search and aiming

For low attack, bomb dropping from F-84 hit ground and skipped to target







At a given range, coming versions of A-1 radar sight shown in cutaway will take control of plane's automatic pilot and hold the target, even against evasive action. Flyer's sole job will be to press firing switch

enemy is sighted. This transsonic warrior has only half the time to recognize, sight on, and fire at his target as did the 1941-45 aces who flew Mustangs, Thunderbolts, or Lightnings.

Anticipating these and other problems which would arise from the use of transsonic aircraft, USAF planners called into conference nearly four years ago the best brains from Wright, Eglin, and the Headquarters directorates within the Pentagon who could contribute to the development of high-speed weapons and tactics. Ordnance experts, tacticians, aero-medical men, and electronics specialists submitted potential problems. With these, they also contributed data and possible theoretical solutions.

Out of this came a set of "interim" tactical requirements. These, they agreed, would have to be met circa 1951—long before that push-button era of all-missile warfare. Moreover, with their solution would also come a clearer conception of the tactical employment of missiles, when these did finally become available for Air Force operational use.

This prescription for combat called for equipment and techniques that would carry out these tactical functions:

**DETECT** targets beyond the pilot's range of vision. A pilot flying 700-m.p.h. penetrators and interceptors would require, even in clear weather, airborne intercept gear as well as ground "vectoring." At altitude, such a pilot would—if approaching head-on a plane of similar size and performance—be able to spot the enemy visually at a maximum distance of six miles, even if the foe were streaming a vapor trail.

He would have just 12 seconds for recognition, two seconds to aim and track, and about two seconds' in-range shooting time.

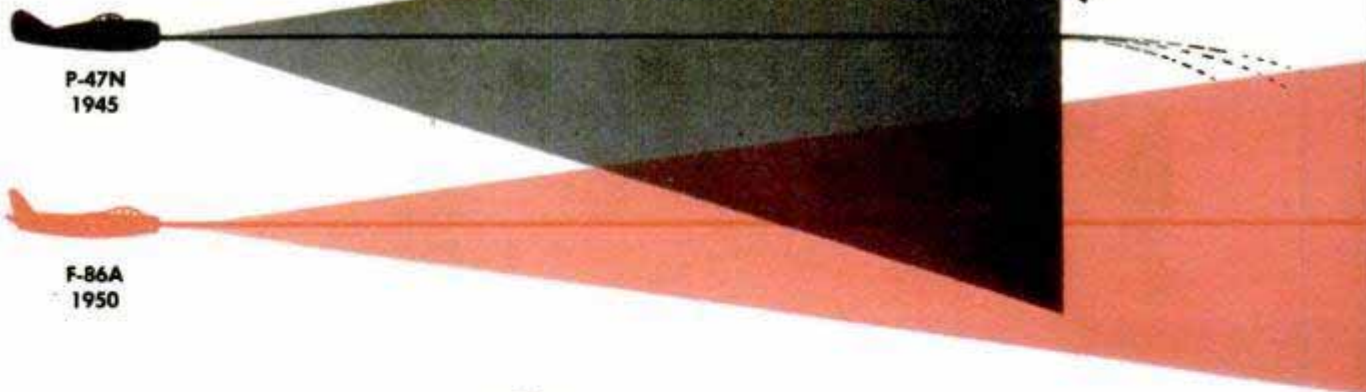
**IDENTIFY** immediately a target within or beyond the pilot's vision. Wartime IFF (Identification of Friend or Foe) radars worked reliably much of the time, but they were not foolproof. New devices would have to be made more simple and positive to meet the requirements of transsonic combat.

**SIGHT** automatically and furnish the pilot with prompt range and deflection indications, or compensations therefor. Wartime sights provided adequate range information, but airmen had to estimate their "lead" when shooting at some "angle off" the target's line of flight. The 700-m.p.h. pilot would have too little time for visual estimates; and the speeds would, moreover, influence human perceptions adversely.

**SHOOT** at twice the cyclic rate of fire and at double the range of the wartime M-2 caliber .50 machine gun. These would be minimum requirements, since the transsonic pilot would close on his target twice as fast and have only half the shooting interval.

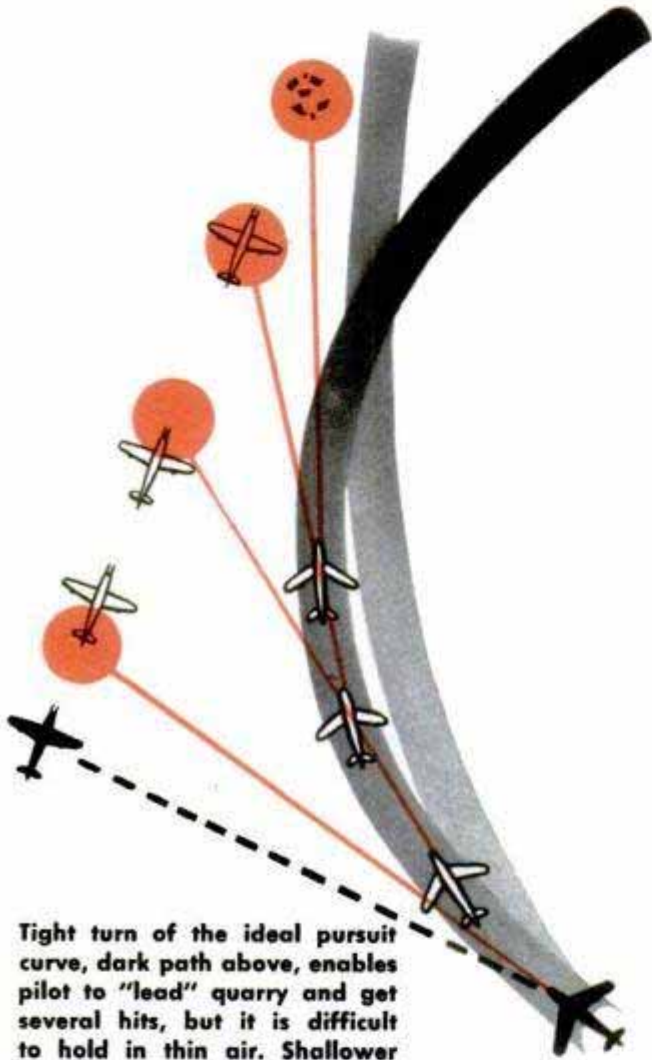
**KILL** the target with improved firepower. This would be increased by means of projectile size, shape, or explosive power so as to give the fighter pilot fire superiority even with the fewer hits he could be expected to register in high-speed combat.

Those minimum requirements have been met ahead of schedule, despite limited appropriations. Several interim weapons and devices have been developed to the point of service-test or production status. And research is progressing rapidly on allied



P-47N  
1945

F-86A  
1950



Tight turn of the ideal pursuit curve, dark path above, enables pilot to "lead" quarry and get several hits, but it is difficult to hold in thin air. Shallower curve allows less shooting time

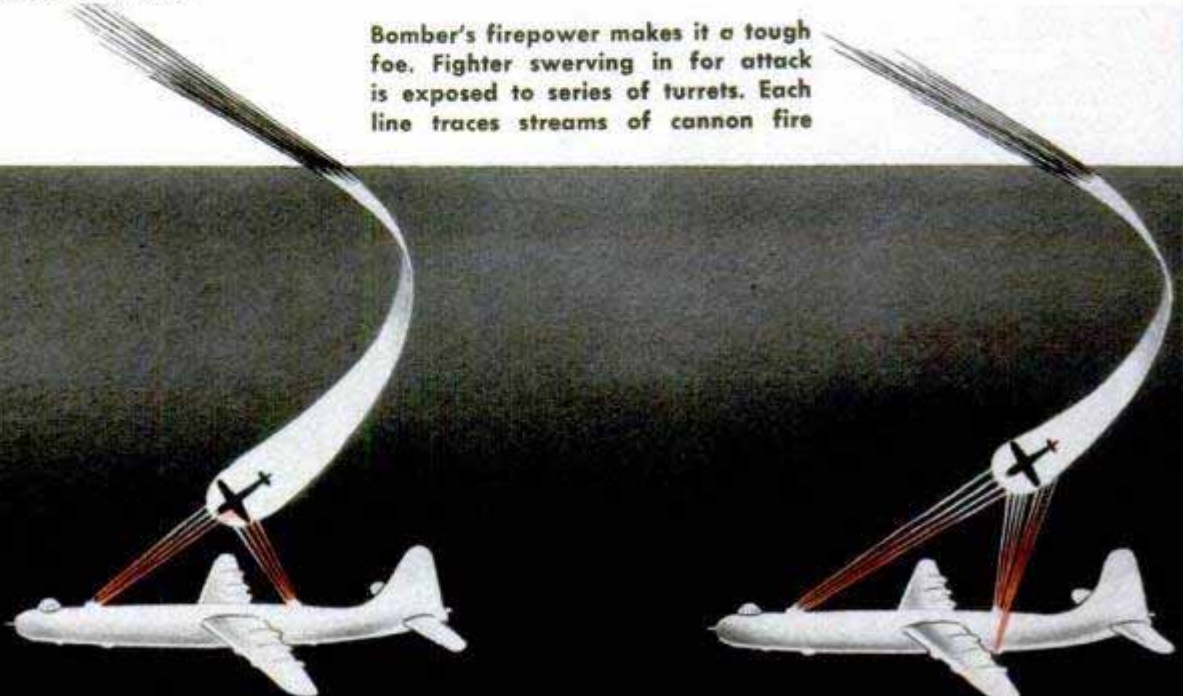
phases of both ordnance and electronics.

The M-3 caliber .50 machine gun arms several fighter models already in operational service. Maximum effective range is 800 yards, double that of the wartime M-2 gun. Shooting twice as fast, the M-3 has a cyclic rate of approximately 1200 rounds per minute. The improvement was made largely through the use of a new barrel design and lining, better feed and ejection mechanisms, and improved lubrication.

Essentially the same modifications were made to produce the new Mark 4 20-millimeter cannon, with a cyclic rate exceeding 600 rounds per minute and a maximum effective range of 1100 yards. The high-velocity Mark 1 caliber .60 machine gun shoots approximately 1000 rounds per minute. With a muzzle velocity exceeding 3300 feet per second, it shoots a flat trajectory and has a maximum effective range of 1100 yards.

The fourth new weapon is a subcaliber rocket, the "Mighty Mouse." This 2.75-inch flies farther and faster than the wartime 4.5-inch M-8 or 5-inch HVAR, and is better suited for aerial combat than either. Quantities of them can be carried in compact launchers under a fighter's wings or fuselage. Ordnance people will not say whether or not the Mouse is fitted with a proximity fuse, but they do claim that a

Bomber's firepower makes it a tough foe. Fighter swerving in for attack is exposed to series of turrets. Each line traces streams of cannon fire



Weapon development has been pressed to keep abreast of increasing air speeds. The cones at left contrast effective combat ranges of M-3 caliber .50 machine gun and earlier M-2, with former firing twice as fast. Dipping lines indicate areas of doubtful efficiency

20 MM.  
CAL. .60

M-3 CAL. .50

"MIGHTY MOUSE" →

800 YDS.

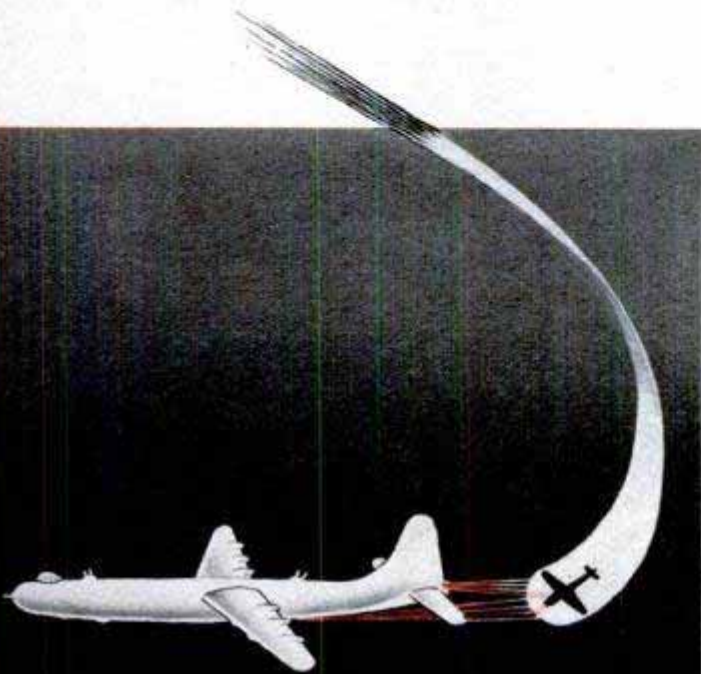
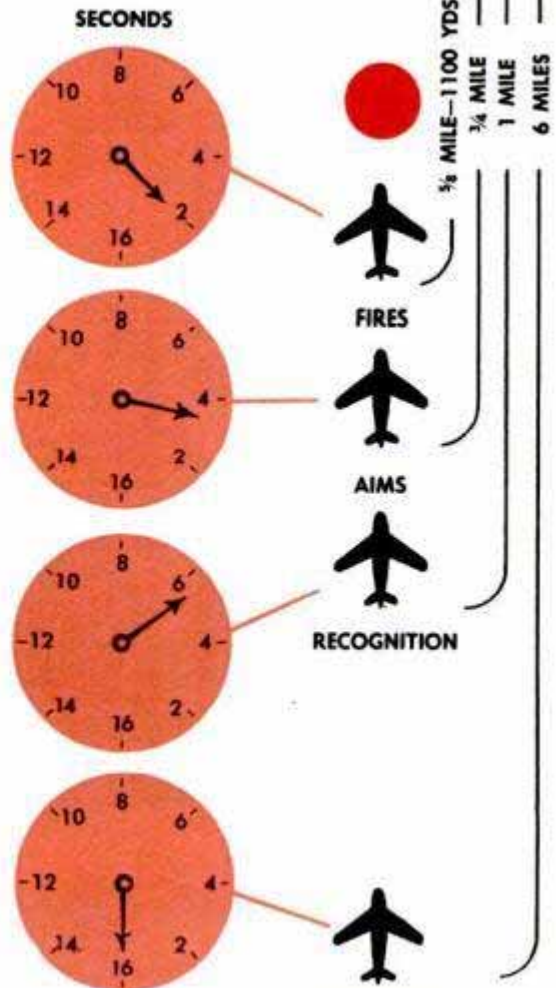
1150 YDS.

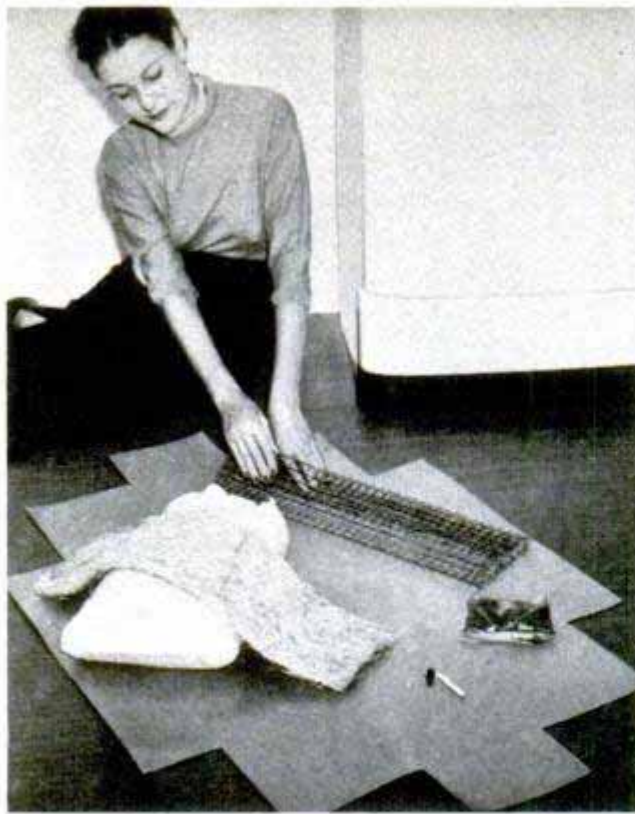
single hit will put the whammy on the largest bomber. (This weapon and the caliber .60 gun are products of interservice exchange. The USAF developed the caliber .60 gun, now shared with the Navy. Naval ordnance experts developed the Mouse, used jointly by both services.)

To aim this armament, operational fighters are now equipped with one of three types of gyro computing gunsights, the K-14A, 14B, or Mark 18. A twist grip on the throttle is worked by the pilot to keep his target framed within the sight reticle and to track target movement. Lead is indicated automatically by a pattern of six diamonds. When the pilot lines up on his

(Continued to page 260)

With target at a 90-degree angle, gyro sight above automatically computes lead for perfect shot. Clocks below show how pilot of transonic plane would spend 16 seconds left before meeting a foe seen approaching head-on from six miles away





### Parcel-Post Garden

Packed flat and delivered by mail, an indoor flower box requires no soil. The box is made of plastic-coated cardboard. The amateur gardener folds it along precreased lines to make the waterproof container. A metal grid then is placed in the bottom of the box to support a mat of wood excelsior.

The remainder of the box is filled with sawdust in which the seeds, plants or bulbs are placed. Included in the kit is a six-month supply of dry plant food which is mixed with water and poured into the box. The kit contains all the materials except the sawdust, and bags of sawdust are available for persons living in areas where sawdust is difficult to obtain.



### Portable Sun Screen

With a portable sunshade made of louver-type screening, you can regulate the amount of sunshine coming through to insure comfortable tanning. In the vertical position, the screen's angled louvers completely shut out the sun's rays without interfering with visibility and ventilation. It is mounted on an aluminum stand that can be set up anywhere.

### Striking Strip for Matches Resists Moisture

Water or perspiration won't affect a new striking strip for book matches. A match can be struck immediately after the excess water is wiped off. The strips, which are being colored gray, were kept under 100 percent humidity for six months without deteriorating or becoming soft. They will not bleed off and can be carried without danger of staining the pockets or shirts of workers or sportsmen.



Three miles from shore, fisherman at left repairs net attached to birch pole. Right, after shaking net a few shad have to be picked off by hand. Fishermen work at low tide and must hurry because the tremendous tides of the Cumberland Basin rise and fall as much as 28 feet in a six-hour period. Below, mud flats at low tide



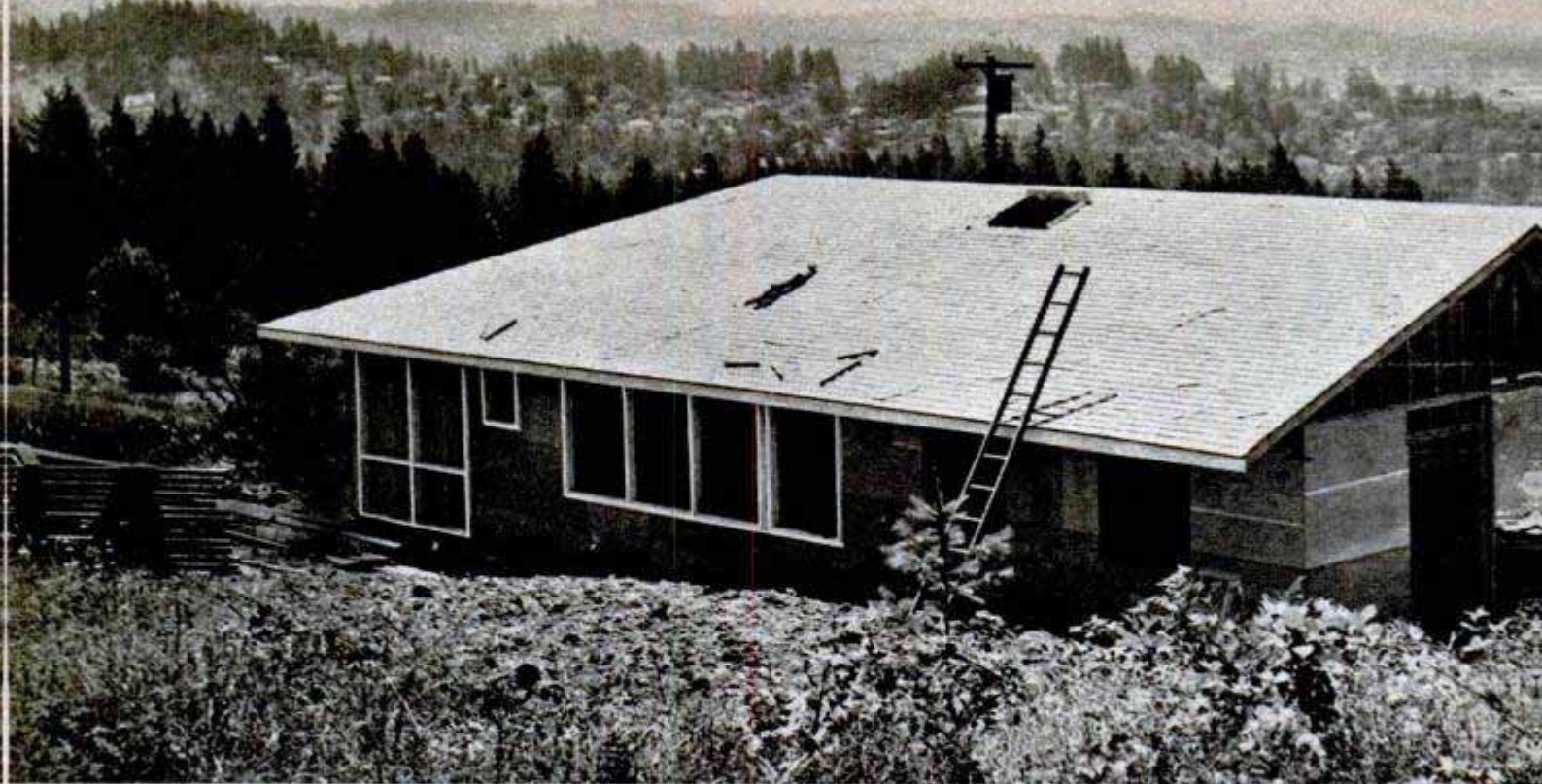
## Fishing With a Ladder

SEVEN fishermen who live near the head of the Bay of Fundy, Nova Scotia, gather their harvest of shad from mid-May to September with a team of horses, wagon and a ladder. The fish are caught high off the ground, when the tide is high, in nets stretched between 12-foot poles. The fishermen drive a wagon over the mud flats to collect the fish. They use 28 nets, each 23 yards long, and a good catch is about 150 fish. The wagon trip is made twice every 24 hours at low tide.

Below, team waits while Edmund Brine removes 2½-pound shad from net. The season is from mid-May to September and these hardy fishermen wage a constant battle against tides and fog

*Imperial Oil Limited photos*

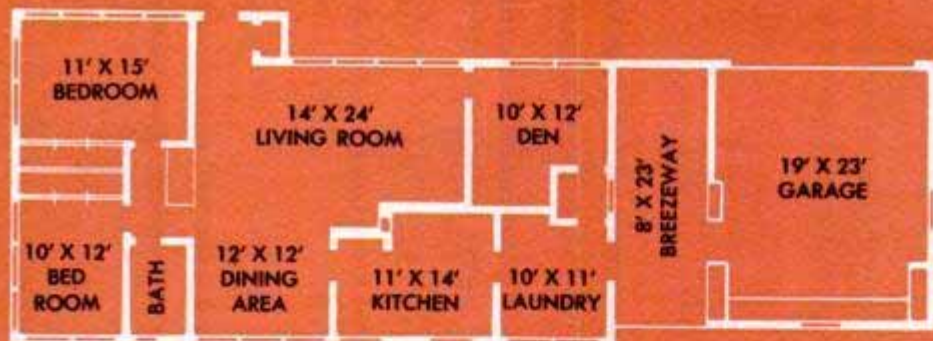




Its roof completed, the house begins to reveal its final form. Sign, right, was put up by a realty company

# I'm Building the Popular Mechanics

By Tom Riley



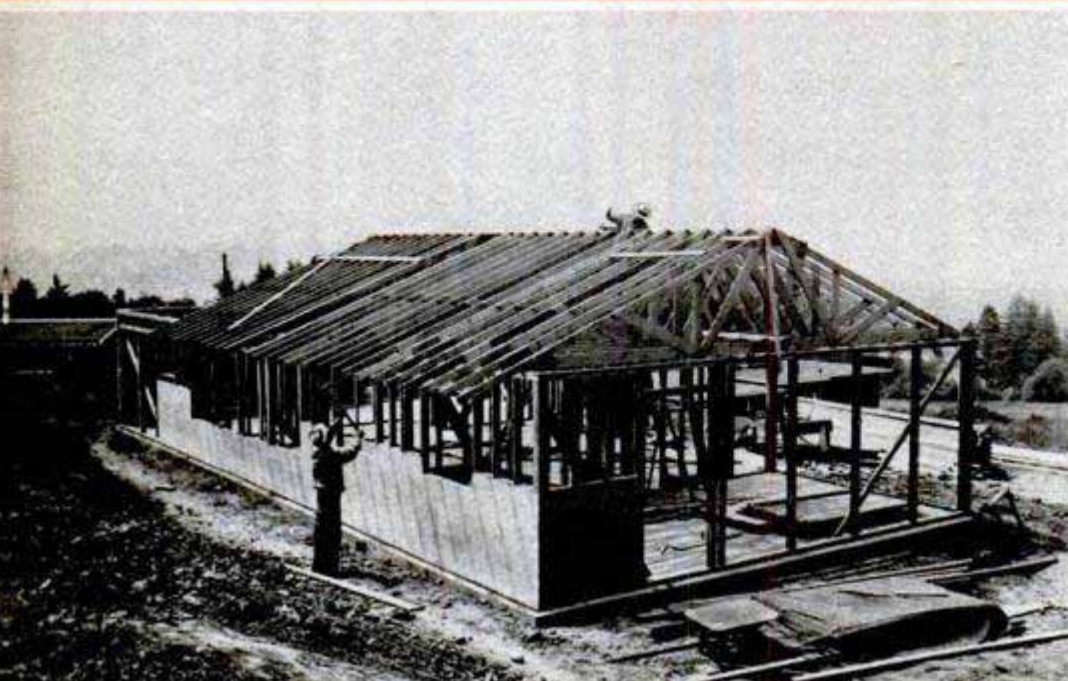
FLOOR PLAN

**W**HEN WE STARTED on the floor beams of the *Popular Mechanics* ranch house our muscles had finally stopped aching from the concrete work and things really began to hum. Our dream home has complete and adaptable plans (I sometimes marvel how the editors and architect John Whelan thought of everything) and at the start this amateur builder had the choice of a wood floor with full basement, a radiant-heat concrete slab or the new stepped-down wood floor. My wife and I chose the stepped-down wood floor, having always wanted a true one-level home and not wanting the jarring solidity of the concrete slab.

My friend, Norman Chapman, and I first

Riley, on ground, uses a sledge to align roof trusses. Helper on roof is checking the ridge line

POPULAR MECHANICS





Left to right, Riley, James R. Ward, crafts editor, and John Whelan, the architect, talk over the house plan

## Plywood Ranch House

### Part II

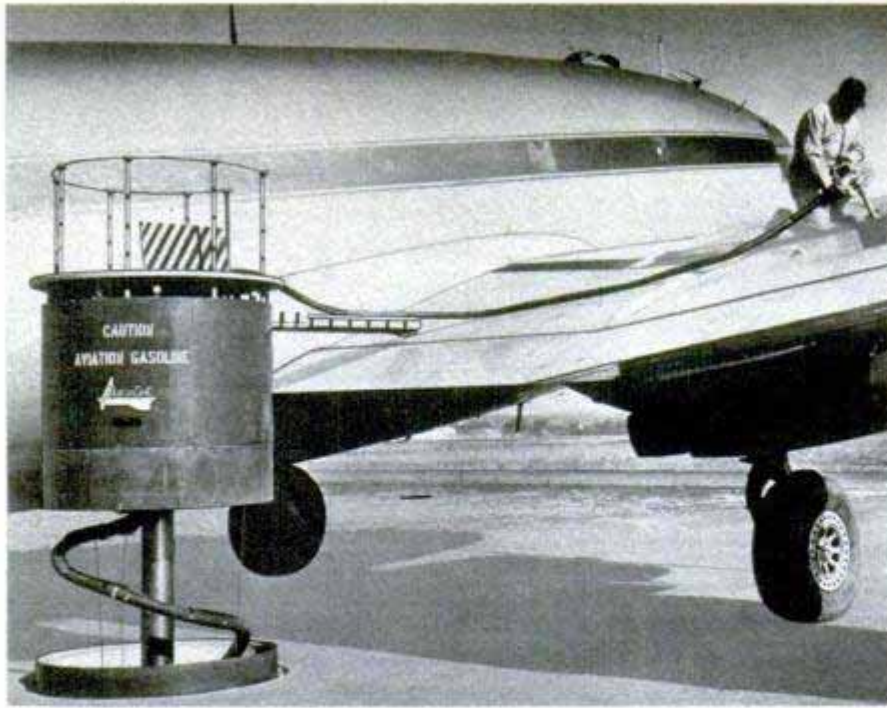
placed the 6 by 6 floor beams on their short posts. The 2 by 10 floor joists rest directly on them and also lock down inside the "step" of the concrete foundation. There's an important item here that's often overlooked in the hurry of house construction—the preserving of wood members that touch concrete. We doubly preserved everything, painting the concrete surfaces with asphalt and also soaking the wood members that touch them with one of the new wood preservatives to discourage rot and termites.

Then there was the bridging to make, the crisscross bracing between the floor joists that prevents "joist roll" and squeaking of the floor. This is a hard, slow job with a hand-saw, one reason why it's often done poorly, but we are using a portable power saw as everyone advised and a contractor showed us how to set the saw blade at an angle in a simple jig

(Continued to page 248)

Even in construction, a woman's place is in the home! Riley's wife, Vinita, helps by handing nailing blocks to him





## Pump Pops Up To Fuel Planes

Fueling units that rise and have walk-way extensions to the airplane wing are a new time and space saver at airports. A hose, meter, ground wire and CO<sub>2</sub> equipment are within the steel cell, which is five feet in diameter and three feet thick. Fuel is fed from a remote storage tank. The attendant turns a switch that raises him and the cell to the desired height in less than a minute. When not in use, the top of the cell can be lowered flush with the surface.

## Emergency Door Lock

Installed on the inside of a door, a new lock prevents unauthorized persons from leaving a building unless they sound an alarm. The lock is designed primarily for use in buildings and projects where important documents and valuable materials are stored. Keys for the lock permit authorized persons to pass through the door at any time. In an emergency such as a fire, anyone can leave through the door by pushing a striker, which breaks a thin piece of glass. This unlocks the door immediately, but also sounds an alarm to inform authorities that the door is being used.

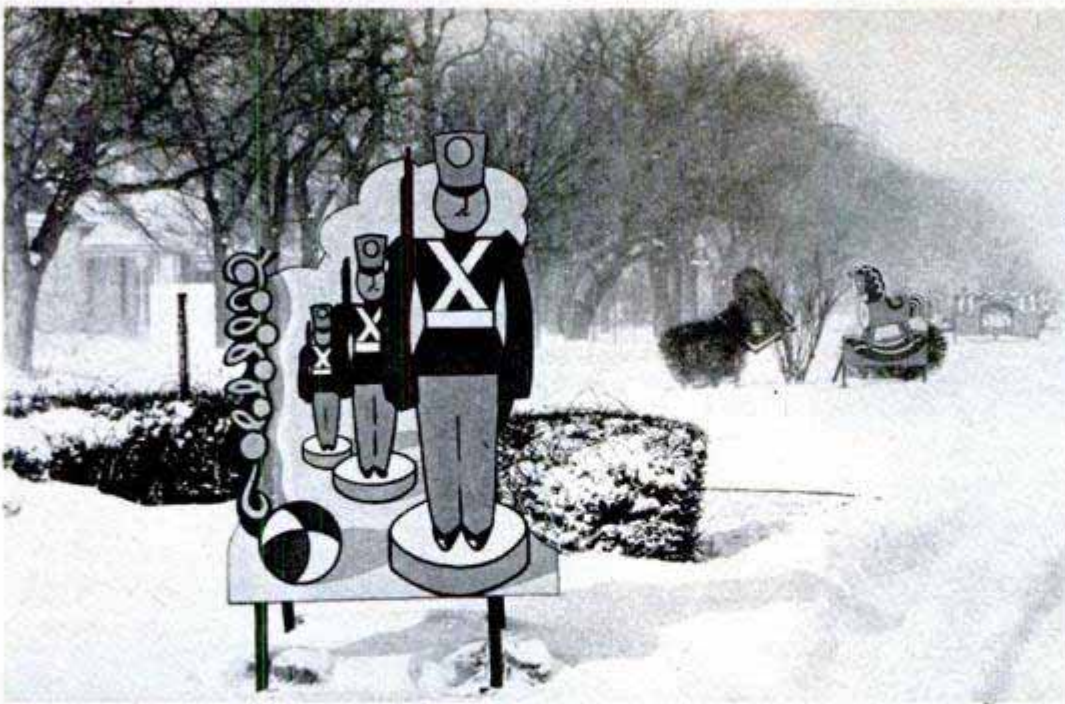


## Camera Caddy

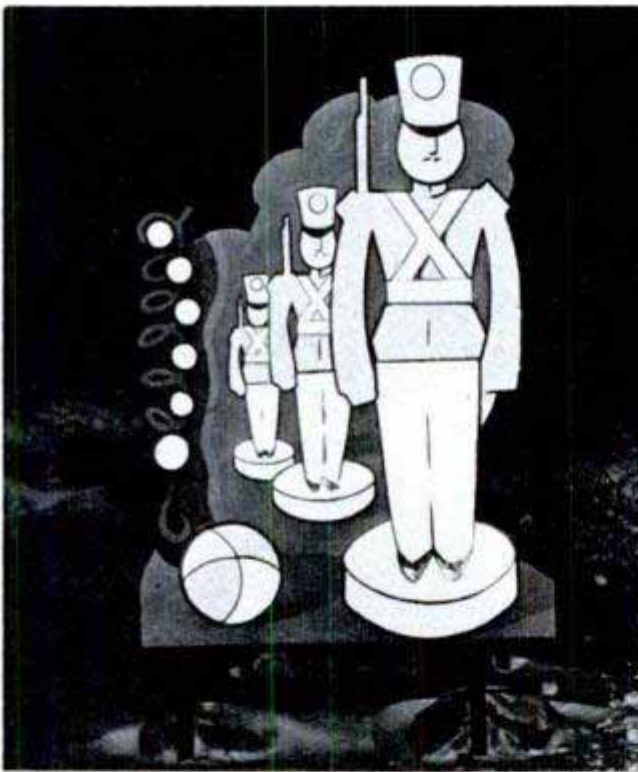
Tired of lugging heavy camera equipment a mile or more through a big factory, Westinghouse photographers have come up with a back-saving camera caddy. They adapted it from a golfer's two-wheel cart by riveting canvas supports to the metal frame and using leather thongs to tie on their equipment. Now with one hand they can roll all their gear to the machine which is to be photographed. At the shooting site, a metal leg is dropped down to support the caddy while the equipment is unpacked. The cart, when collapsed, is small enough to fit inside a car trunk.







During the day toy soldiers, a rocking horse and other cheerful figures stand guard along the streets in an attractive display. At night, the same figures spring to life in brilliant colors whenever an automobile passes by



## Unlighted Decorations Glow in Dark

Inexpensive Christmas decorations shown here on the streets of McCook, Neb., are not wired for electricity, yet they reflect brilliant colors when they catch the light of auto headlamps. Made of ¼-inch plywood, the figures first are painted and then covered with a highly reflective material in the desired colors. Wood supports are anchored with sandbags. The decorations can be used year after year, permitting the city to enlarge the display each year with funds otherwise needed for replacements





## Traffic Light on Bus Protects Children

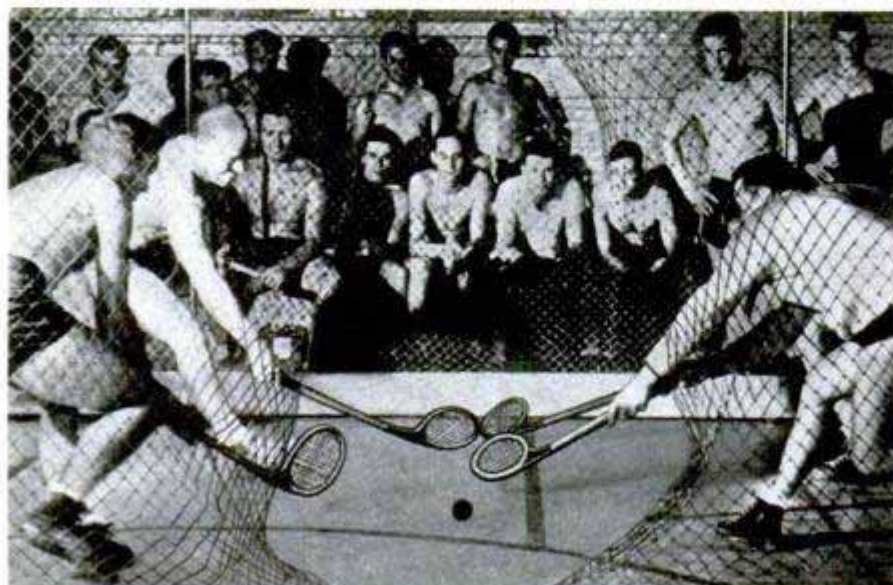
Attached to the side of a school bus, a portable traffic light provides safety for children crossing the street. The three-signal light is installed on the driver's side of the bus where it can be seen by motorists who are approaching from both directions. The new safety aid was invented by Fred S. Martin, who is the superintendent of accident investigation for the Chicago Transit Authority.

## "Rough Roads" in Laboratory Check Auto Vibrations

Fisher body engineers have "moved" rough roads right into their laboratories in their study of vibration and its effects on passenger comfort. The first of the two tests they have devised is a method of creating vibration by spinning one of the front wheels of the car. The wheel is thrown out of balance by the addition of small weights to one section and the car is placed on a hoist. A flexible shaft, powered by an electric motor, is attached to the wheel. As the unbalanced wheel is spun, it sets up vibrations which are transmitted to the body of the car. The second test is termed the mechanical oscillator test. In it an offset cam is set against the frame of the car and the powered flexible shaft attached to it. The cam is then rotated against the various sections of the frame and the amount of vibration transmitted to



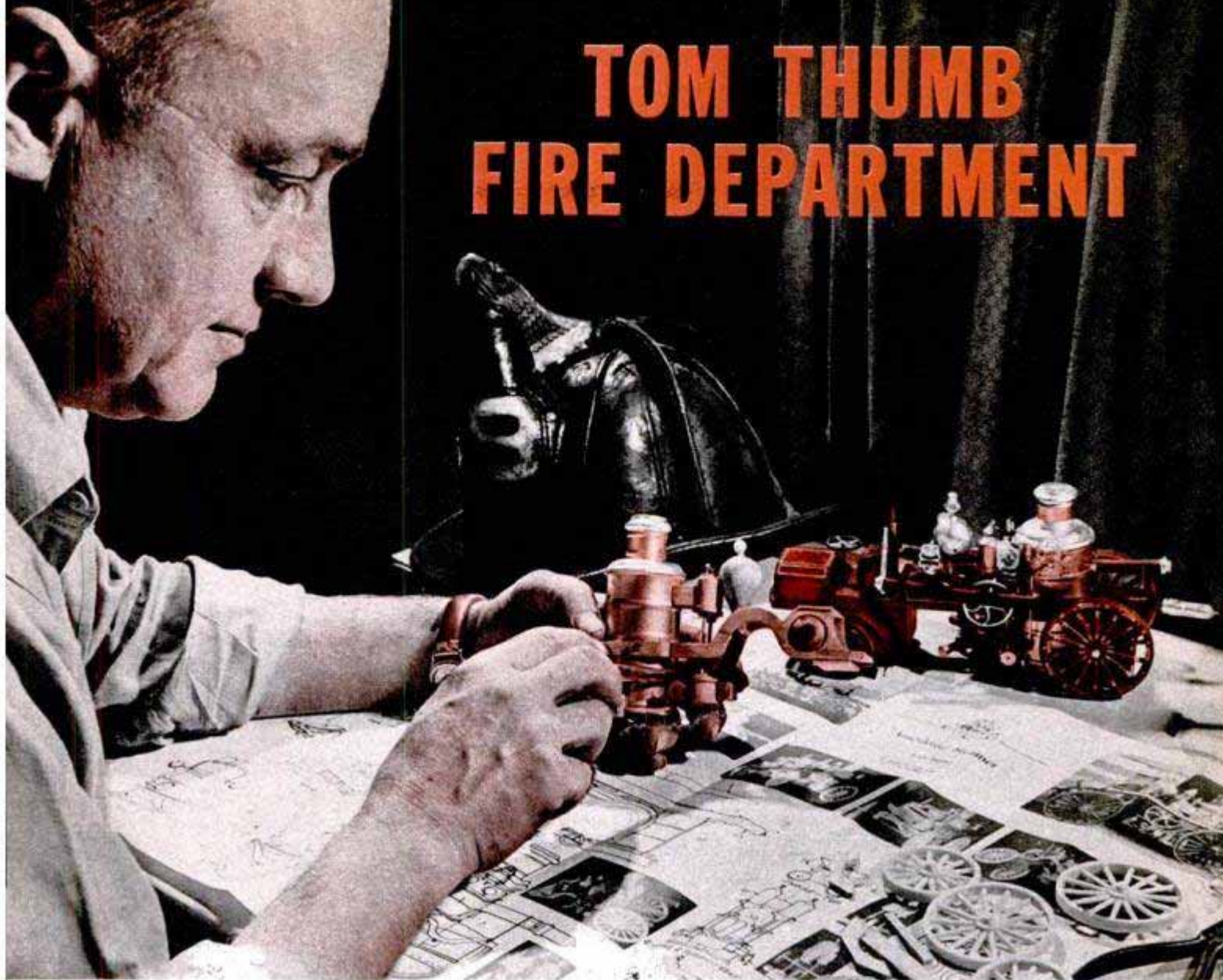
the various sections of the body is measured. In both tests, delicate vibration meters, so sensitive they can be used to measure a human's heartbeat, are used to ascertain the exact amount of vibration which is transmitted to the different body areas of the automobile.



## Florball

Played on a portable court, Florball is a fast, new racquet game. It embraces principles of hockey, tennis, golf and handball. Goals are scored by driving a sponge-rubber ball against eight-inch-high boards at either end of the court and three goals in succession are needed for one point. The ball has to be kept on the floor when serving and close to it at all other times.

# TOM THUMB FIRE DEPARTMENT



**Photographs by  
Alfred Eris**

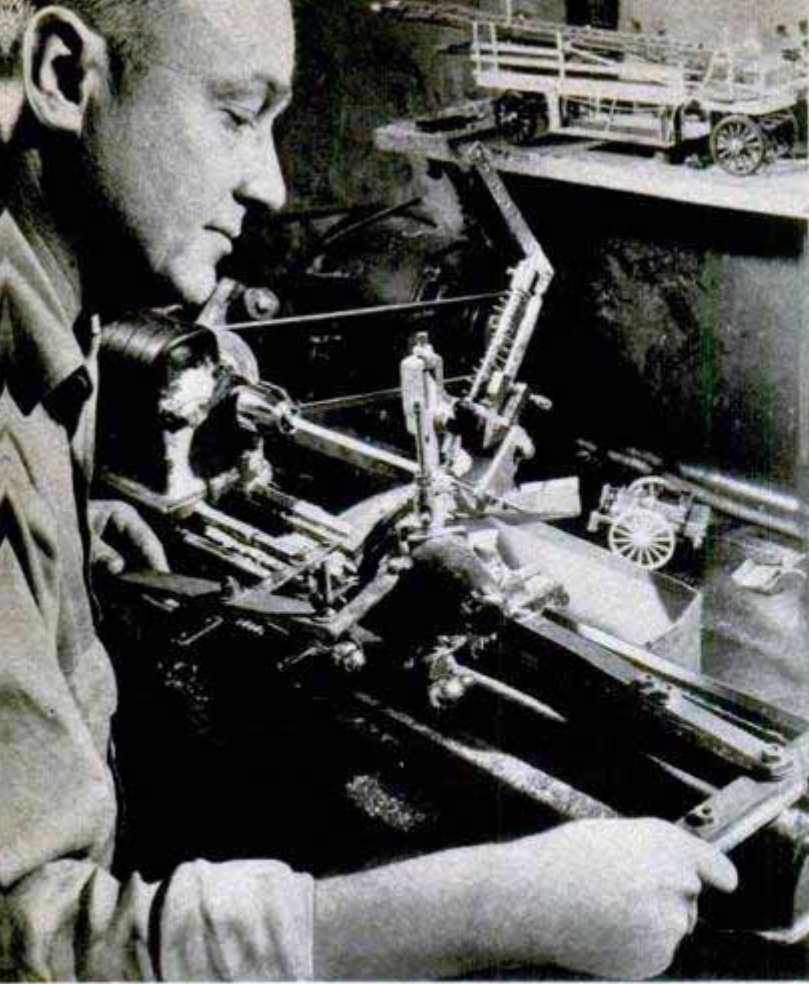
"Chief" William H. Low assembles his model of the Amoskeag Steamer of 1898 used all over the U. S. as late as 1948 for stand-by service. Below, Bill, Jr., in a British helmet inspects Halloway Combination

THERE'S something about a fire engine that William H. Low of Braintree, Mass., has never been able to get out of his blood. Most "fire masheen" fans, known as "buffs" or "sparks" in certain parts of the country, must be content with watching the red engines race by or looking at old prints. Not Bill Low. He is chief of a Tom Thumb Fire Department that has become a nationwide enterprise.

Just a little over three years ago Low was trudging the streets of Boston selling corrugated packaging materials. One day when sales were at a low ebb and his spirits even lower he heard the whine of fire engines racing up the street. As the fire buggies clanged by in glamorous parade he noticed that everybody on the street had stopped to watch with sparkling eyes.

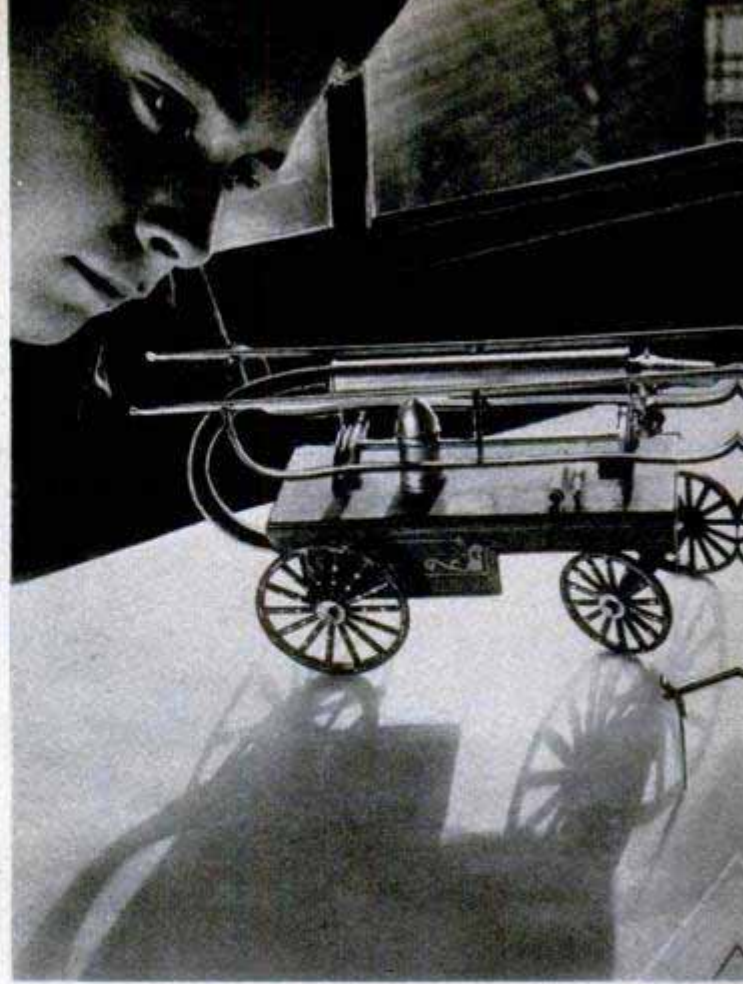
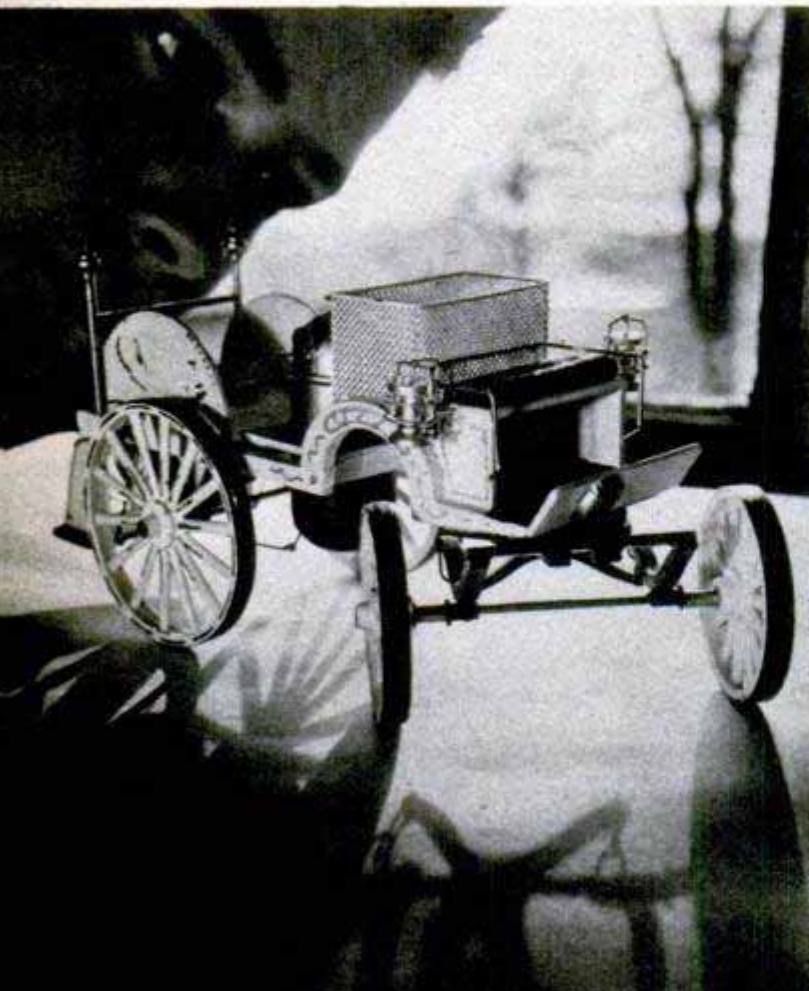
Then and there an idea was born that has already placed more than 35,000 fire-engine kits in the hands of delighted owners from coast to coast.





Here the "chief" is at work on one of his specially adapted machines which turns out small wood parts to exact scale. Low builds all the original models

Below, combination hose and reel model of 1850 was widely used throughout U. S. It has a cloth-cushion seat, die-cast lanterns and molded-plastic wheels



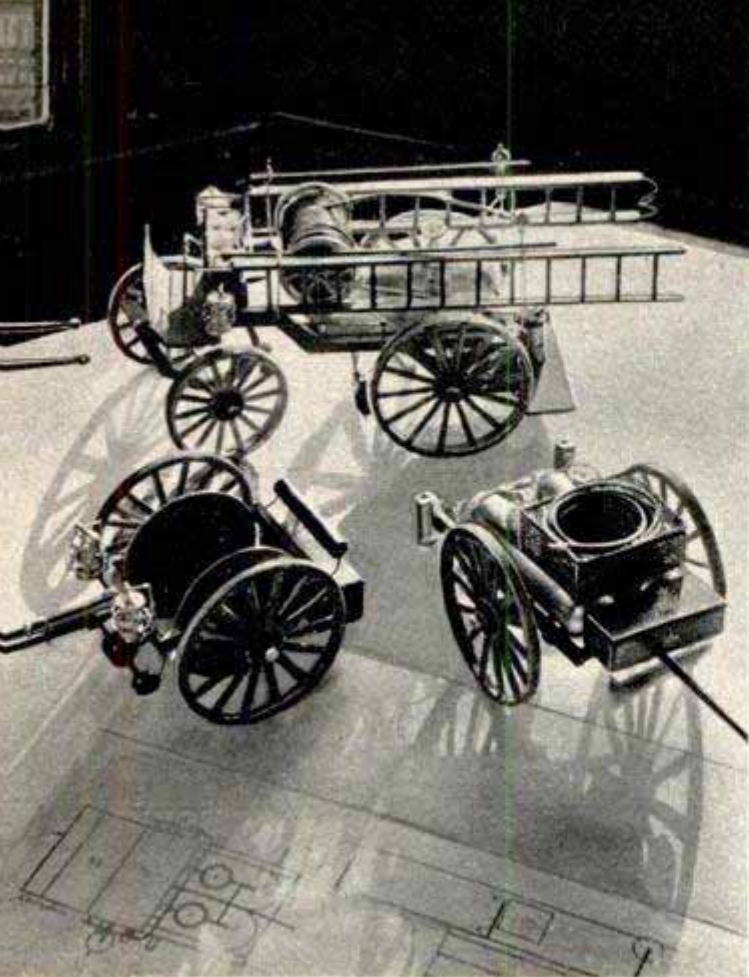
Famous 1853 Blue Boy was one of the finest engines of its day. Low uses old advertisements and photos in making first model from which kits are developed

First he enlarged his basement workshop and set to work on early models. After exhausting research he built several original models with specially adapted machines and jigs. Then followed months of breaking down the numerous details and producing kits which can be easily assembled. He now has seven kits ranging from 50 to 130 pieces each.

His earliest models include chemical-engine and hose-reel trucks introduced early in the 19th century. Among these are such famous engines as Blue Boy, introduced in 1853, and the Amoskeag Steamer of 1898. He has a chemical engine combination developed in 1875 which was used in small towns up to a few years ago.

Present-day manufacturers of fire engines are cooperative when Low tries to unearth data about early engines, but many records have disappeared. His study is packed with helmets and books on fire-fighting and his shelves are lined with models. He employs three workmen in the shop and now has to sub-contract such parts as plastic wheels, lanterns and axes.

The shop boasts a "tapper" connected to the local fire station and when it rings out an alarm bedlam reigns. Workmen and the Low family (including the dog) pile into cars and race away to the scene of the blaze. They call this local research.



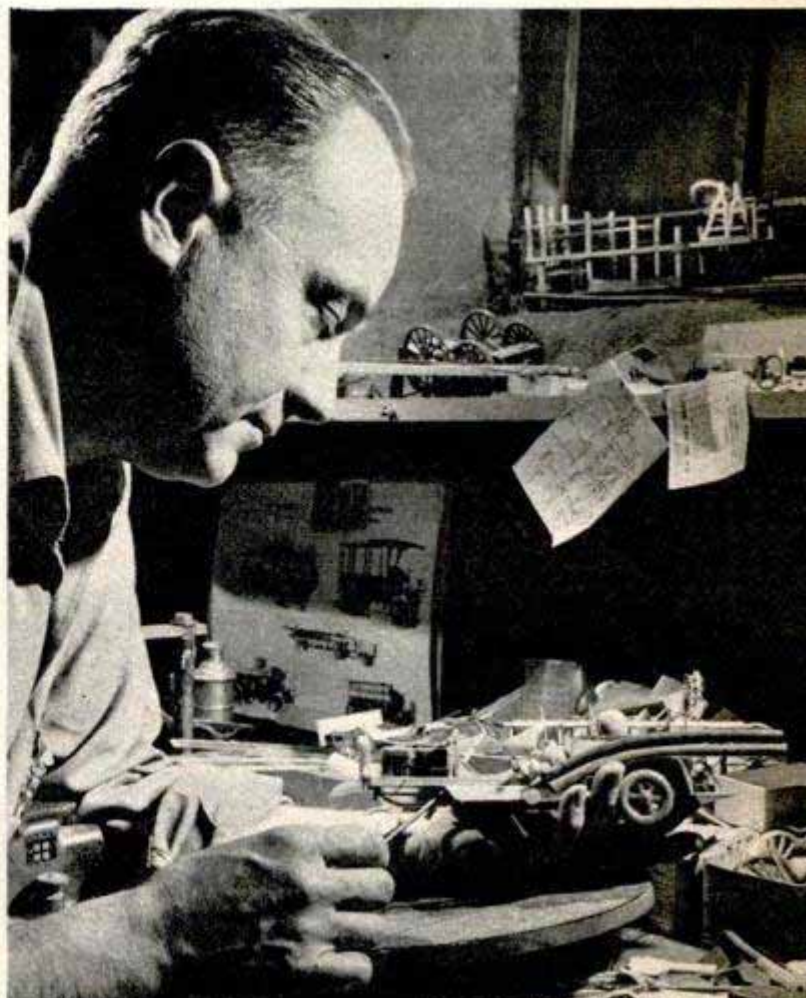
In foreground are the two earliest models in Low's collection, early 19th century chemical engine at left; hose-reel truck, right. At rear, combination



The Lows—Sr. and Jr.—are handling a light city service ladder apparatus which won a silver star award back in 1895. Low's study is full of exhibits

A busy corner of the basement workshop where Low and his crew (one is missing) turn out thousands of fire-engine kits. Firemen are favored customers

Below, Low at work on the prototype of a new engine which will be carefully analyzed for breakdown into 75 or 100 parts which must be easy to assemble





## TV Floor Chair

Television spectators who like to lounge on the floor in front of the set now can lean comfortably against a padded backrest. The collapsible seat, similar in style to a familiar type of lawn chair, has a long pad which extends out across the floor. The

pad not only provides a cushion for the viewer, but also prevents the backrest from scooting across the floor when he leans against it. Adjustable to three positions, the backrest places some viewers low enough so that they don't interfere with the view of others who are seated on conventional chairs.

## Age of Sturgeon Is Told by Counting of Rings in Chest Fins

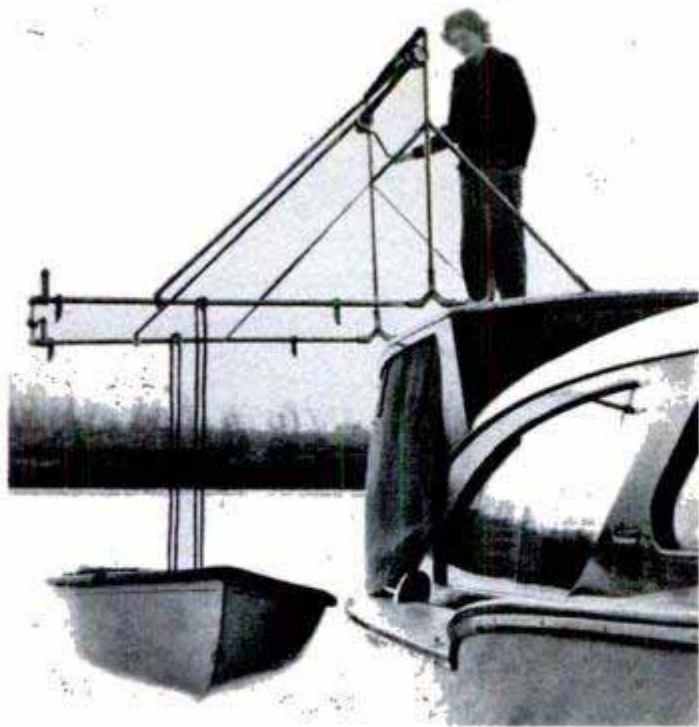
Fishermen have been hauling in giant white sturgeon for years, but until recently there has been little knowledge about the life span of this largest fresh-water fish of North America. Fish experts at Bonneville Dam on the Columbia River have discovered that the chest fins of sturgeons grow like trees, in cycles that are marked by rings. The age of the fish can be determined, the experts believe, by counting these rings. They are seeking further evidence to support their theory. One 10-footer recently examined was estimated to be between 46 and 50 years old. The record sturgeon catch is a 12½-foot 1285-pounder caught near Vancouver, Wash., in 1912.



Cross section of this fin shows sturgeon to be about 16 years old. Just count the rings

Fish was caught by R. B. Laroy, Kalama, Wash., in channel drift. It weighed 90 pounds



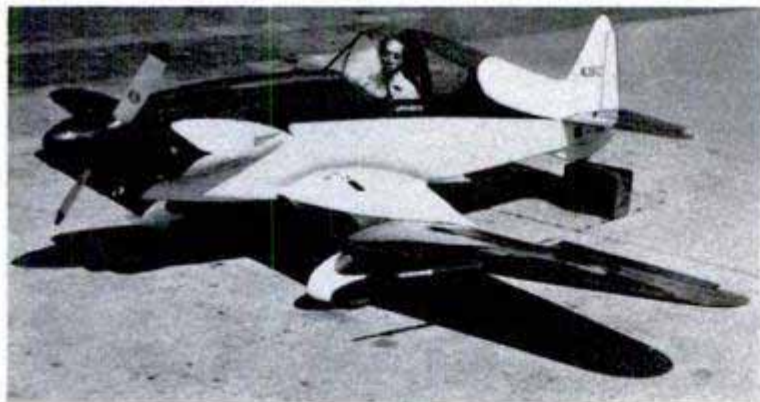


## Dinghy Hoist

So simple a child can operate it, a new hoist raises or lowers a dinghy in 60 seconds. All the work is done by a crank and self-locking worm gear. The dinghy is raised straight up from the water, tipped automatically to a vertical position and



then swung down on the cabin top where it locks in place. Stowed upside down, the dinghy does not have to be covered for protection against the weather. Another version of the hoist is designed for storing the dinghy on the transom.



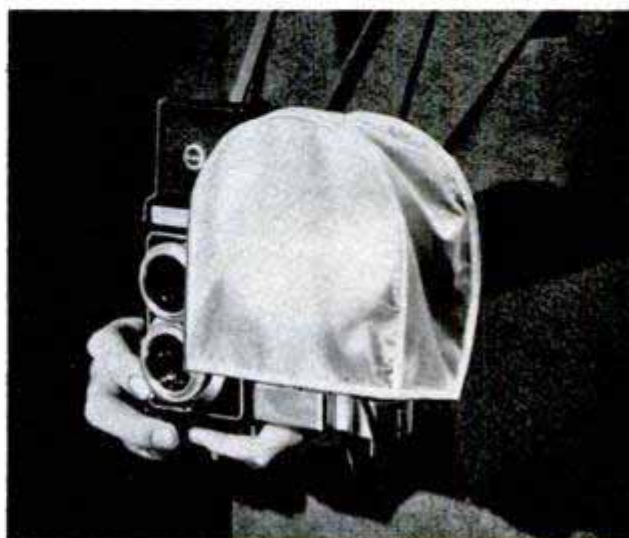
## Wheels on Wing

Both the weight and drag of a midget racer built by Neal Loving of Detroit are reduced by attaching the wheels directly to its gull wing. The need for struts is eliminated. It also has a steerable tail wheel, faired in by spring-loaded flaps that open when the wheel is turned. The trim craft has a 20-foot wingspan and is 17 feet 7 inches long.

## Plastic Shield Diffuses Flash

Quickly slipped over the entire reflector assembly, a plastic shield for flashbulbs protects the subject from flying glass should a bulb explode on a close-up shot. One side of the shield is clear plastic. The other side has a dull finish which diffuses the light, providing softer tones for flash portraits.

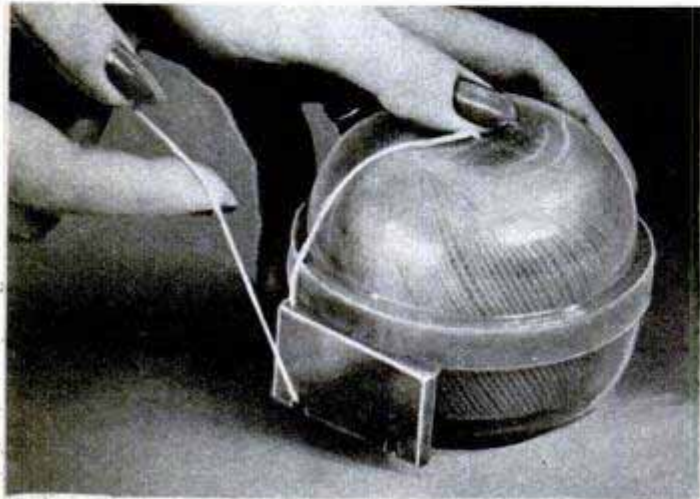
Information not listed on articles in the index, starting on page 14, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11



# WHAT'S NEW *For Your Home*



**SNAP-IN WASHER** for faucets is made of Monel metal and will last indefinitely

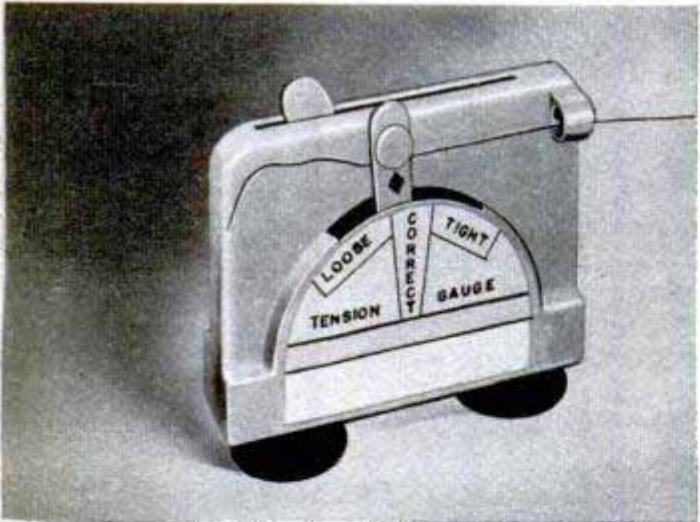


**CORD CAGE** made of plastic dispenses twine neatly, has a built-in cutting edge



↑ **WASHERS** by the inch: ropelike, semimetallic material can be shaped into a self-lubricating washer to fit any opening

↓ **STRETCHER** for curtains has no pins, holds fabric by metal rods inside the two hems



**TENSION TESTER** tells whether the thread tension on a sewing machine is correct

**HANDLE HOLDER** traps mops and brooms by their own weight in a rubber grip







**ELECTRIC OVEN** can be mounted near eye level anywhere in the kitchen for convenience, need not be attached to the range

**RUBBER MOLDING** shapes itself around straight or curved walls and cabinets. It is held in place by rubber or linoleum cement



DECEMBER 1950



**ALL-PURPOSE** piece of furniture for Junior has three main parts which snap together in various combinations to form a high chair, stroller, desk and chair or car seat

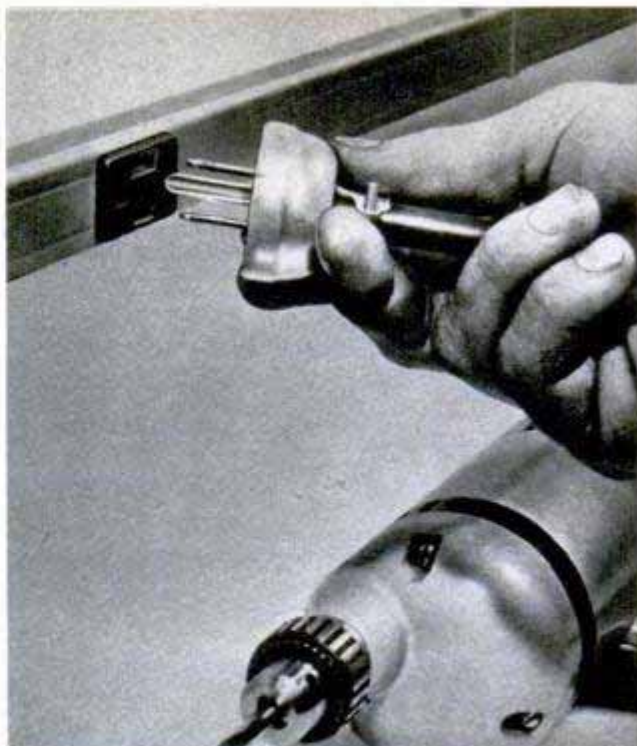


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### Balance Bar for Stepladder

Designed for attachment to a stepladder, a handy balance bar keeps the ladder from toppling over. Holding onto the bar, the housewife can reach out and work in a wide circle without upsetting the ladder. The bar is fastened to the top platform by an oversize C-clamp.



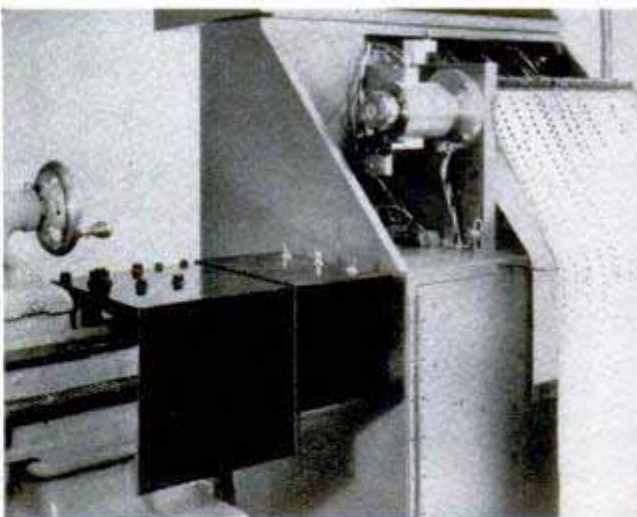
### Electric Channel Installed in Strips

Electric receptacles, grounded for safety, can be installed in strips. The six-foot channels can be joined to make a strip as long as desired, with outlets at 6 or 18-inch intervals. In addition to the two conventional slots in each outlet, there is a third slot containing a copper insert connected to the steel base. When the base is grounded to the earth, each receptacle is grounded. Thus either the conventional two-prong plug or three-prong plug for grounded equipment can be used.



### "Piano Roll" Operates Four Lathes Simultaneously

Inexperienced persons can turn out precision work on as many as four lathes at a time with the help of an electronic robot that controls the machines' operations by means of a perforated "piano roll." The preparation of the roll is simple and takes only a few minutes. Blueprints are trans-



lated into holes in the paper which is fed through an electronic controller. Impulses then actuate the cutting tools. Productivity even with inexperienced operators is increased as much as seven times by the rolls, which can be used over and over, producing uniform work each time.

# PIPES

## by Old Masters

*By Michael Day*

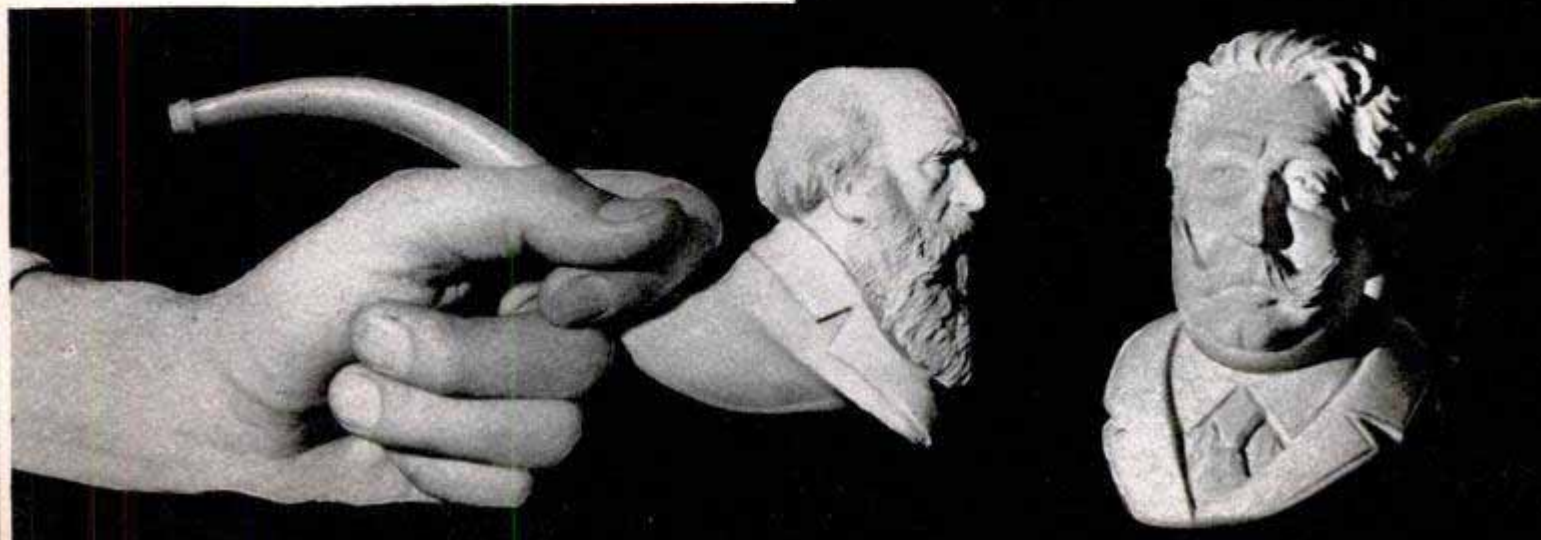
**I**N A WORKSHOP above a unique pipe shop in Washington, D. C., the atmosphere hummed with strangely assorted activity. Over near the door one man sat at a workbench whittling a queer-shaped object from a battered tenpin that had seen too many days at the far end of a bowling alley. Close by, the guide wheel on a cutting machine thumped over the contours of a bulbous iron casting, which bore as much resemblance to a pipe as a lump of clay. Yet, on the other end of the machine, a singing saw blade, guided by the curves of that iron model, bit into a piece of seasoned brier and precisely turned out the delicately rounded bowl of a pipe.

At drying racks, men picked over an assortment of Algerian brier blocks which gave the room a spicy oriental aroma. From the finishing room came the whirr of sanding and polishing machines, and the roar of big blowers sucking pungent particles of brier dust from the air.

Out of all this confusion in Sid Bertram's little pipe factory pours a steady assortment of natural brier pipes to join the famous collections that line the cases, like works of art in a museum, in the shop below. Here are \$200 to \$1000 meerschaums whose bowls have been carved into heads, skulls or hands by master craftsmen using needle-sharp tools and magnifying glasses to achieve the ultimate in intricate detail. There are briars carved in relief and full round, varying in size from the three-foot

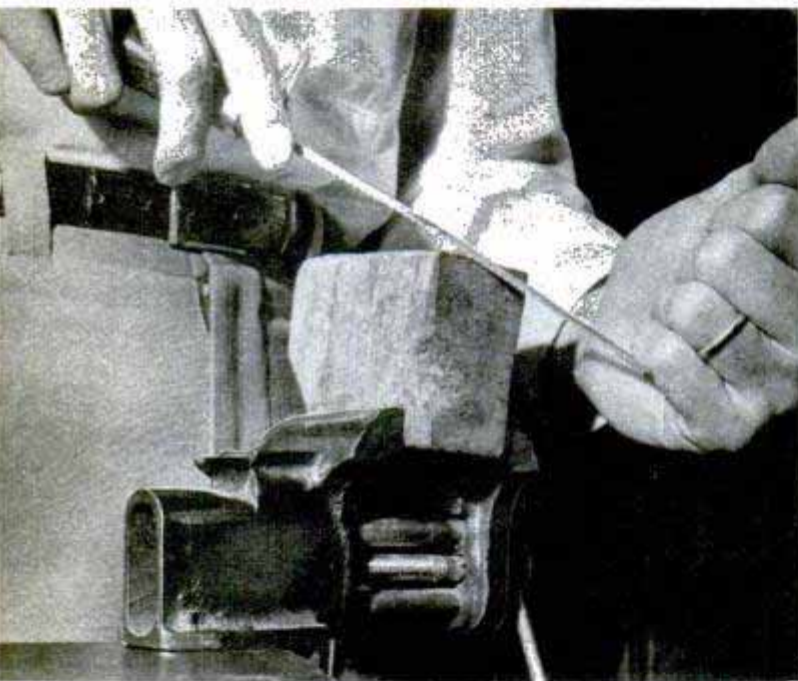


This three-foot French-carved brier is the biggest pipe in Bertram's collection. It was made from a single root. Below, fine Rothenfeld meerschaums

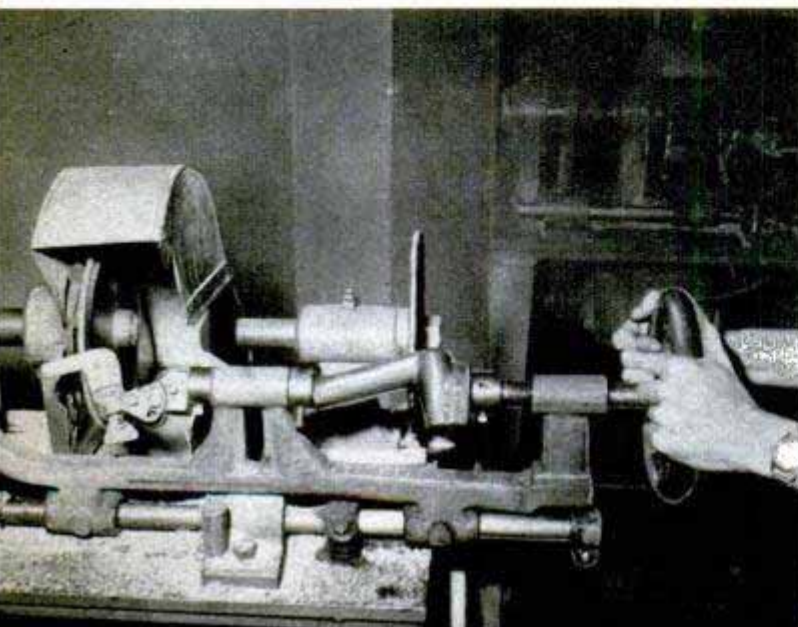




Algerian brier root looks like this as it comes from the ground. It makes the best pipes. Below, carving tough brier block begins with coping saw



Below, iron model guides saw blade (under hood) and out comes a perfect pipe bowl. Right, outside top of bowl and well of the pipe are drilled from the brier block by a whirling three-pronged blade



monster sculptured from a whole root, to three-inch miniatures for ladies. There are pipes with long stems and short, curved or straight, big pipes and little, with fat bowls or thin, whose unvarnished sides gleam with the luster of old pine paneling.

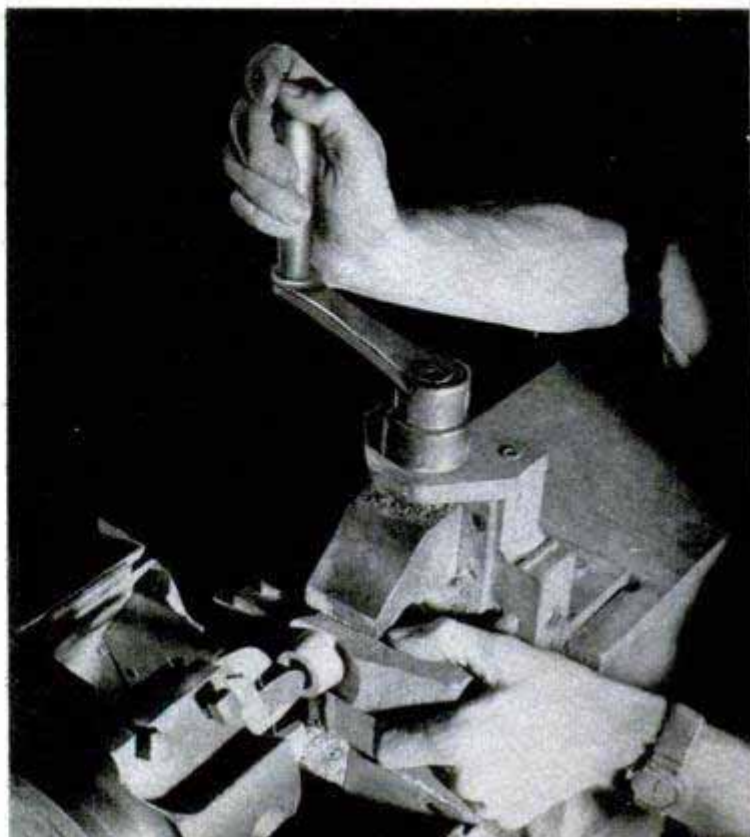
Like many old-school master pipemakers, Bertram does not believe in coating his pipes with any kind of paint, stain or varnish. "After smoking a natural brier for a short time," he says, "you will notice the pipe 'sweating.' This is the result of natural brier in action, absorbing heat and moisture from the burning tobacco inside the bowl, and allowing it to seep through the pores to the outside and evaporate."

This, according to natural brier fans, means that the pipe is "breathing," sopping up nicotine and tars, removing the bite and bitterness and keeping the smoke cool. Smokers who don't care for the burnished tan color of a new natural brier have only to wait a little while. Eventually the juices seeping through open brier pores will color the pipe to a dark cherry mahogany.

"Until the last war," Bertram explains, "brier pipemaking was a secret craft. Methods of curing the wood and turning bowls were family secrets."

Bertram himself is the third in a line of family pipemakers who still harbor a special technique for curing the rare wood. Grandfather Bertram brought the system over from Leipzig in 1870. Today, the final stages of that curing process are still secret.

The best pipes are made from the root of Algerian brier—a scrawny, two-foot shrub with a fat, knobby, reddish underpinning or burl. Brier was first used in the middle 1800s when a Frenchman, visiting



Napoleon's birthplace on a holiday, accidentally broke his only pipe—a meerschaum. He quickly carved a makeshift bowl from a handy native bruyere root, stuck the amber stem from his shattered meerschaum in it, and then discovered that he had something.

For years, pipemakers had been looking for a material that would smoke "cool." Pipes of the day were of clay, meerschaum, porcelain and hardwoods that cracked under heat.

So, when the Frenchman's bruyere turned out porous as a sponge, but tough as oak, the brier pipe was born. Pipe craftsmen grabbed at it, and developed their curing secrets.

Today, laborers in Algeria and Corsica, where the best bruyere comes from, dig the root and perform initial curing—a long process taking years. First the sap is boiled out in huge kettles. Then the burl is buried in wet sand for months, where it seasons evenly without checking. Finally, the root is removed and cut into blocks that are racked in a dry place for more months.

Cutting brier root is an art almost as delicate as diamond cutting. The burl cutter sights and tests the grain of the root, then carefully cleaves it. "The king of pipes," any expert will tell you, "is the one with beautiful straight grain running up and down the bowl." Degree of grain perfection, and quality of the burl (whether or not it is pitted or marred) are what determine whether a pipe is worth \$2.00 or \$25.00.

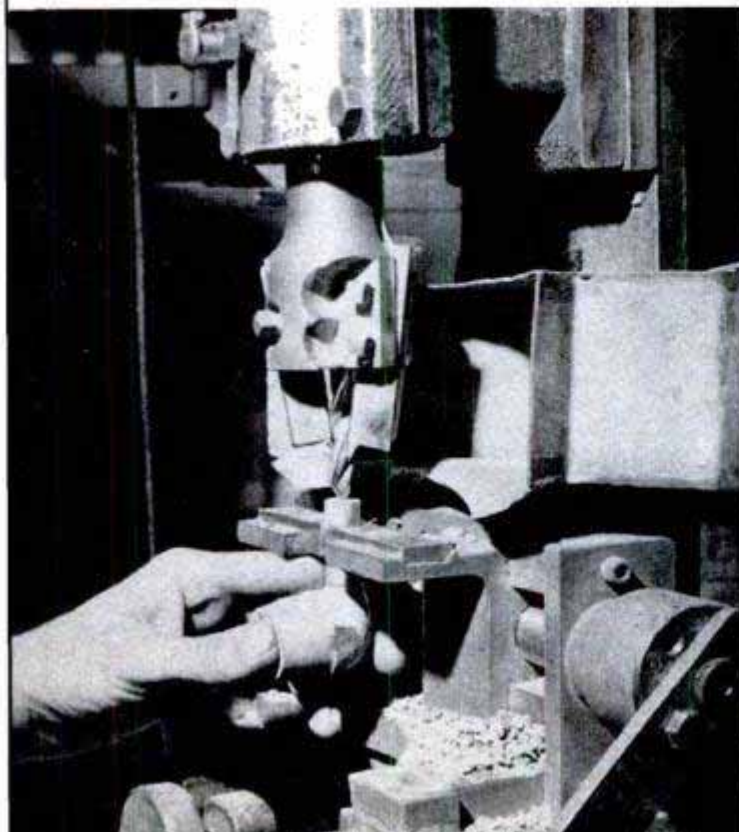
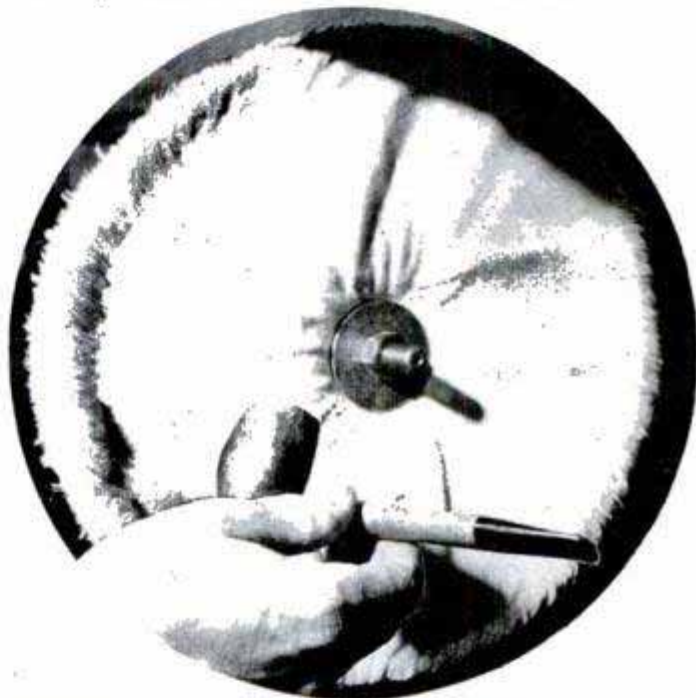
The cut, semicured blocks arrive at the pipemakers in big burlap sacks, and after further curing by special formula, they are ready for the magic that will turn them

into pipes. Most of them will never make it.

"We never know," says Galen Martz, Bertram's foreman, "what we'll find inside those blocks. They may look good outside, and be pitted like wormy apples once we start turning them."

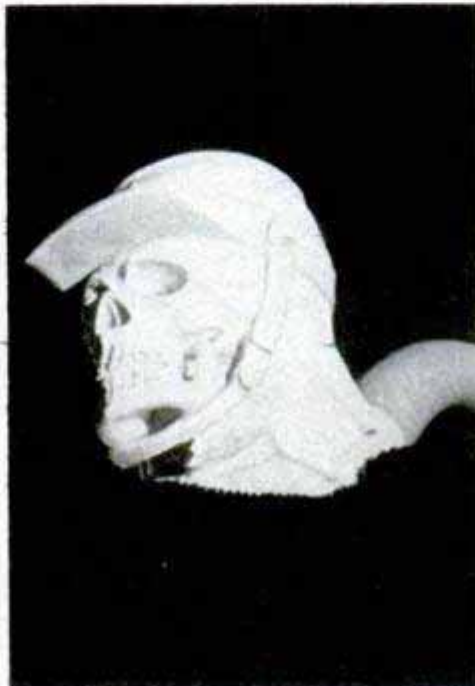
The process begins with a pattern—and that's where the tenpins come in. Unlike most modern industries, pipemaking can't be handled entirely by machines and mathematics. Pipe shapes are too varied and awkward. Models over which the guide wheels of the saws must run to produce proper contours in a pipe bowl must first

Special drill press (below left) cuts hole in stem into which mouthpiece will be fitted. Contours of the bowl are perfected (bottom right) by holding the pipe against spinning emery wheel. Final touch is buffing the natural brier which is never varnished

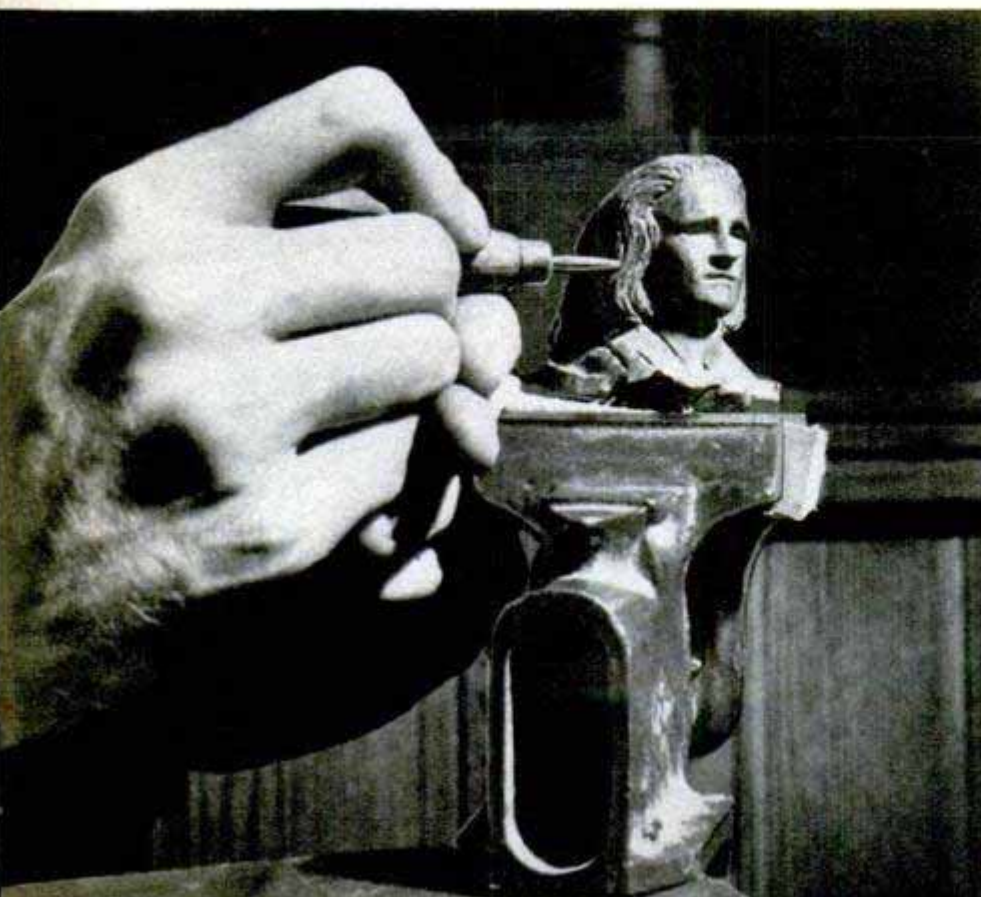




Carved meerschaum, aristocrat of pipes, is worth over \$200. Blocks in front of the hand are examples of sea rock amber used in stems



Left, special tool for punching V-shaped eyes in carved pipes was made by Ernest Mehaffey, Bertram craftsman, from a stainless-steel tube sliced off at the end. Right, meerschaum Foreign Legion skull pipe. Below, carving of a full head like this one of Franz Liszt takes 25 hours of labor. Tool is end of file with a needle point



be handcarved in wood. "Tenpins," says Martz, "are good close-grained maple, so we buy up old ones from local bowling alleys."

The guide models are painstakingly whittled from the tenpins and tested, until they produce just the shape pipe desired. Since the scale and contours are exaggerated, the models look unlike any pipe bowl known to man. They are wide and squatty, but when the contours are transmitted to the saw, proportions on the brier block will be perfect. Finally, the model is cast in iron, which is finished off by hand and used on specially designed duplicating saws, which will turn out as many replicas of the bowl as desired. One whirling machine with a knifelike bit resembling Neptune's three-pronged fork, turns out the top of the bowl and bores the well. Another rounds off the base. A specially adapted drill press runs the hole into the stem, which will be fitted with a rubber or amber mouthpiece.

The rest is a hand process. Expert craftsmen sit at whirling emery wheels, turning the pipes until they are smooth as glass. Many of the pipes, though good, will have what the men call "pinholes"—tiny pocks uncovered by the grinding. These were caused by bugs gnawing at the brier root when it was growing back in Algeria. They must be filled and burnished by hand. In a natural brier, such filling shows and no attempt is made to hide it. Finally, the natural wood is buffed to a soft glow.

Despite the tremendous amount of handwork, good pipe craftsmen can turn out an amazing number of finished products. During the war, Bertram's factory employed as many as 21 pipemakers who ground out more than 3500 pipes a week.

Though no handcarving is officially produced at Bertram's, one of the young veteran craftsmen, Ernest "Bud"

(Continued to page 236)

# Human-Fly WHIRLIGIG

LITERALLY stuck to the wall are patrons of a new amusement-park ride in Frankfurt, Germany. Fun-seekers climb into a giant drum, about 15 feet in diameter, which is open at the top. The drum begins to revolve, building up speed. When whirling at top speed the floor drops away, leaving the patrons stuck against the wall with a centrifugal force double their own weight. Tables, chairs, clothing or anything else can be suspended against the wall. Above the drum the amusement park has constructed several tiers of balconies from which the spectators can watch the fun. The antics of the riders are plainly visible because at top speed the drum rotates only 15 miles an hour. About 30 persons can climb into the drum and be "glued" to the wall at the same time, frozen into any position they may choose.



Above, spectators line the tiers of balconies to watch the strange behavior of those "glued" to the wall of the spinning drum. Onlookers have almost as much fun as those inside the whirligig. Below, left, patrons are frozen against the wall by centrifugal force. Right, chairs, tables and clothing stick to wall without support

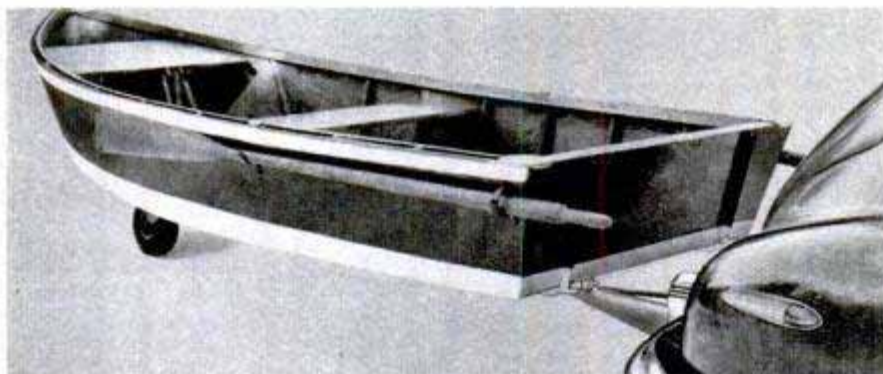




## Radar Measures Rainfall Over 200-Mile Area

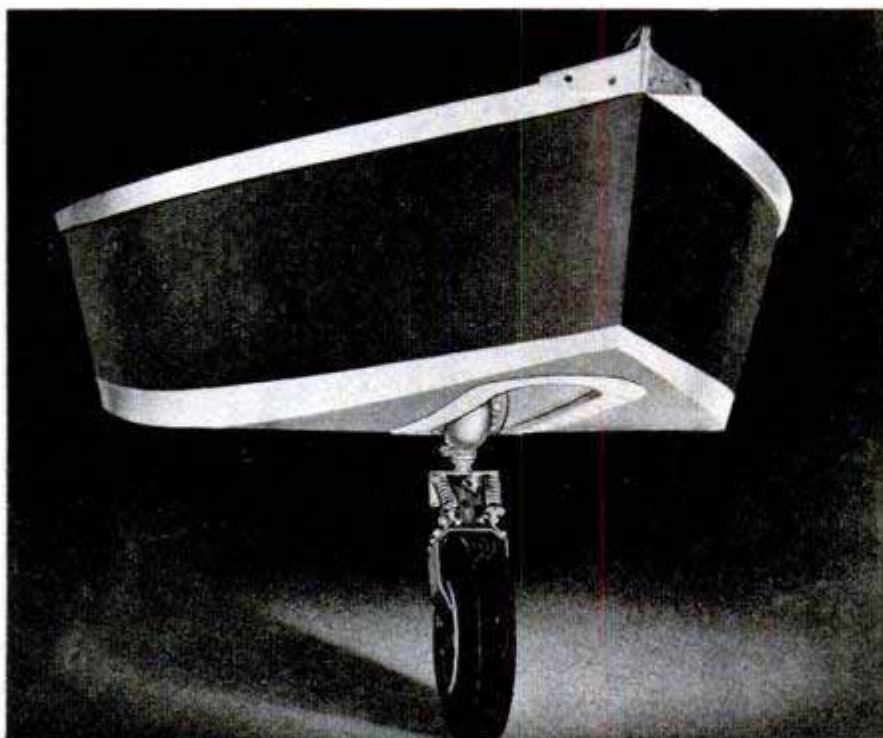
Weathermen are now watching rainstorms come and go over a 200-mile area by radar. The radar beam scans the area 24 hours a day to present a continuous picture of weather conditions. A movie camera photographs the radar scope as it operates. Single-frame time exposures are made, one for each 360-degree sweep of the beam. This film provides a condensed record of

the weather, more accurate than 54 rain gauges could provide. By varying the intensity of the radar waves, the meteorologists can measure the amount of rain that is falling in any area. By watching the movement of storms on the radar scope, they can predict local weather conditions. The radar rain gauge is operated by Illinois State Water Survey meteorologists.



## Rowboat With Wheel Is Its Own Trailer

Serving as its own trailer, a plywood rowboat has a bow wheel that retracts into a metal well when the boat is launched. A two-point trailer hitch that comes with the boat eliminates sway at high speeds and prevents jackknifing when the car is backed down to the water. One person can handle the boat on land, picking up the stern and pushing in the manner one would push a wheelbarrow.



## Paper-Pulp Waste Makes Rubber

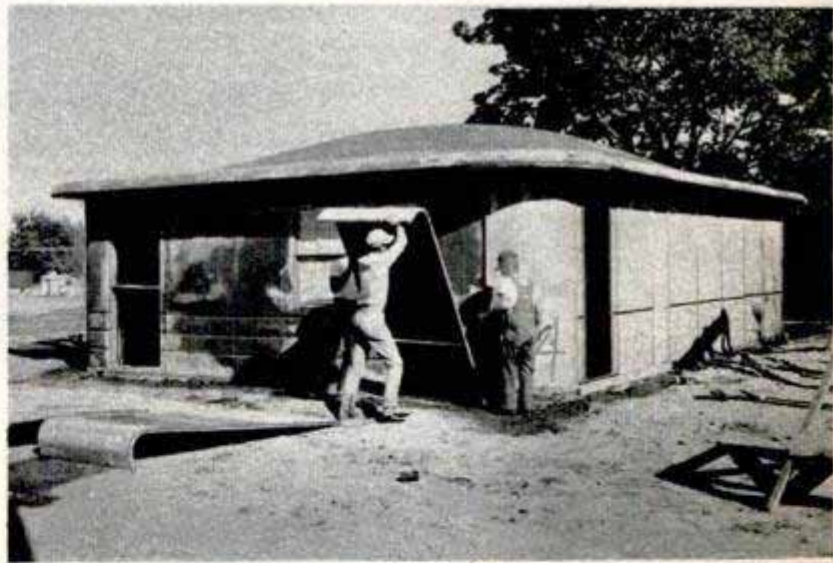
Raw materials for synthetic rubber can be obtained from a waste product in the manufacture of paper from spruce wood. The chemical is called PADMS, short for para alpha dimethyl styrene. Early tests seem to indicate that synthetic tires made with this new styrene might be superior to those now manufactured.



# Twelve-Hour CONCRETE HOUSE

IN 12 WORKING HOURS a new concrete house can be "blown" into existence. Even the roof is built by blowing concrete against a ready-made form. Wall forms are erected first. Steel mesh and bars for reinforcing the concrete are tied to the forms, and steel window frames and electrical outlets are installed. When all is ready, workmen standing inside the house spray the forms with concrete from pneumatic hoses. The wall is built up to a thickness of four inches, and when it has hardened the forms are removed, leaving the cast shell of the house. The metal forms are specially treated so the concrete will not adhere to them as it hardens. Similar forms are then set up to build the roof, which also is made of sprayed concrete. When the roof hardens these forms are removed to complete the exterior of the home. The smooth, interior dome ceiling is 11 feet 9 inches high from the floor to the peak. A two-bedroom home of this type with an area of 816 square feet can be built for less than \$4000. Because of its concrete and steel construction the home is vermin and termite proof and will withstand severe earth shock, a factor to be considered in California where the construction method was developed. As a finishing treatment, the home is given a coat of waterproof paint. No dressing is needed because the walls are cast against the smooth metal forms. Several different types of homes are built by joining the forms in various combinations.

Top, workmen tie reinforcing mesh and steel bars to the ready-made metal forms. Window frames and electrical outlets also are installed before any concrete is applied. Center, concrete is blown against the wall form with pneumatic hoses. Right, after concrete hardens the forms are removed. Below, finished home, built in 12 working hours for \$4000, has five rooms



# BIRDS IN BRACELETS



Banded towhee is free to depart, yet fails to realize it. Small birds on their backs frequently won't attempt to fly



Pelicans wear bracelets at St. Petersburg, Fla. Bands permit a study of the life history of the birds. Above is a special type of band used by a Canadian bird hobbyist. Thousands of birds that have been banded scatter as missionaries

By **Hugo H. Schroder**

**T**HE 12-YEAR-OLD BOY had just shot down a marsh hawk. Elated at his marksmanship, he ran over to retrieve the fallen bird. One look showed him that the hawk had an odd-looking bracelet around one of its legs. The discovery frightened the boy, for he believed he had shot down a very special bird. He promptly buried the hawk, and a long time passed before he told what he had done and thereby learned the secret of the banded bird.

The bracelet had been clamped around the hawk's leg by one of the many wildlife students scattered across the country, who consider the study of bird movements a fascinating hobby. These men, in cooperation with the U. S. Fish & Wildlife Service, have come up with virtually the only substantiated facts on bird migrations, nesting habits, flight times and age.

Here's a bird-bander's kit. It includes bands of different types and the tools for installation



Bird banders fasten to the bird's leg a light metal bracelet which contains a number. The Fish & Wildlife Service provides the bands and keeps the records. When he has released a bird, the bander sends the number, kind of bird, point of release and date to the service. Years later the bird may turn up thousands of miles away, but if the number corresponds, the service knows it is the same bird.

Of the more than 5,000,000 bands installed up to 1945, there have been more than 300,000 returns.

The records have turned up some interesting facts. For example, all migration is not on a north and south axis. Certain kinds of birds fly in other directions. Some from northwestern regions wander far southeastward, while others move from west to east.

One unusual winter flight was discovered by Lockhart Gaddy, whose wild goose refuge in Ansonville, N.C., harbors thousands of Canada geese each winter. Gaddy bands some of the birds that spend the cold months in his refuge. Two were shot down in southern Illinois just four days after he banded them. This proved that the geese moved westward when they were supposed to be settled for the winter, and they covered more than 500 miles in four days.

A brown pelican banded in California was reported 1400 miles north of its point of release. A blue-winged teal was banded in Quebec and eventually was shot down in British Guiana.

A mourning dove from Missouri was brought down by a hunter in Guatemala two years after it was banded. Laughing gulls from Virginia eventually scattered

and were recovered in Colombia, Guatemala and the Canal Zone.

Banding has also proved that birds occasionally fly the Atlantic—in both directions. A ring-billed gull banded at Georgian Bay, Ontario, was killed at Horta, Azores. A black-headed gull released in Holland was taken the following year in Labrador.

For a long-distance flight there aren't many that can beat the record of a Swainson's hawk. A bracelet was clamped on its leg and the bird was released in Saskatchewan. A year later it came fluttering down at the feet of a hunter in the Province of Cordoba, Argentina.

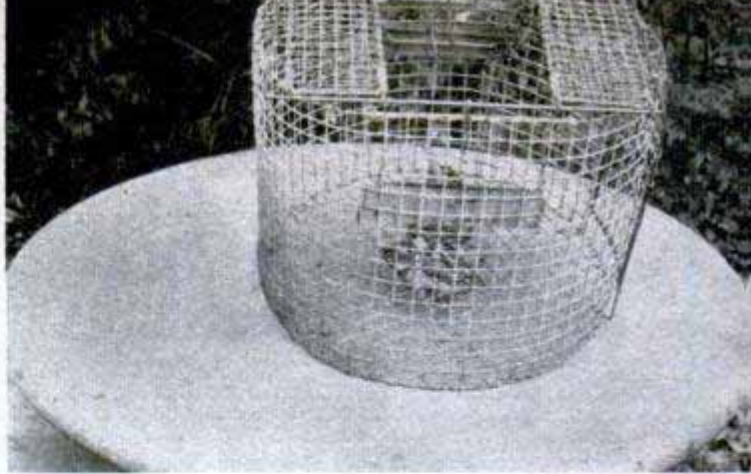
Until recently one of the unsolved mysteries of migration was the location of the winter home of chimney swifts. Thanks to banding, it has been discovered that many swifts spend their winters in Peru.

Band is installed on leg of a gently held cardinal. Note the special pliers for closing bands of different sizes

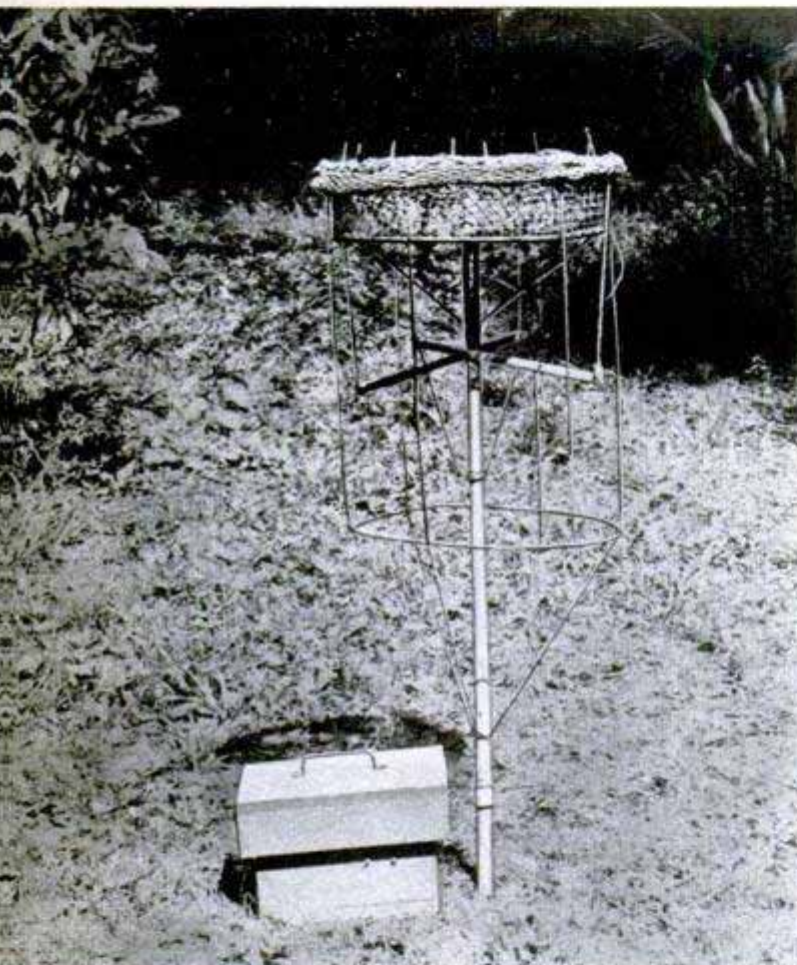




Doors on this trap snap shut when bird steps on a treadle. It has two compartments for snaring birds

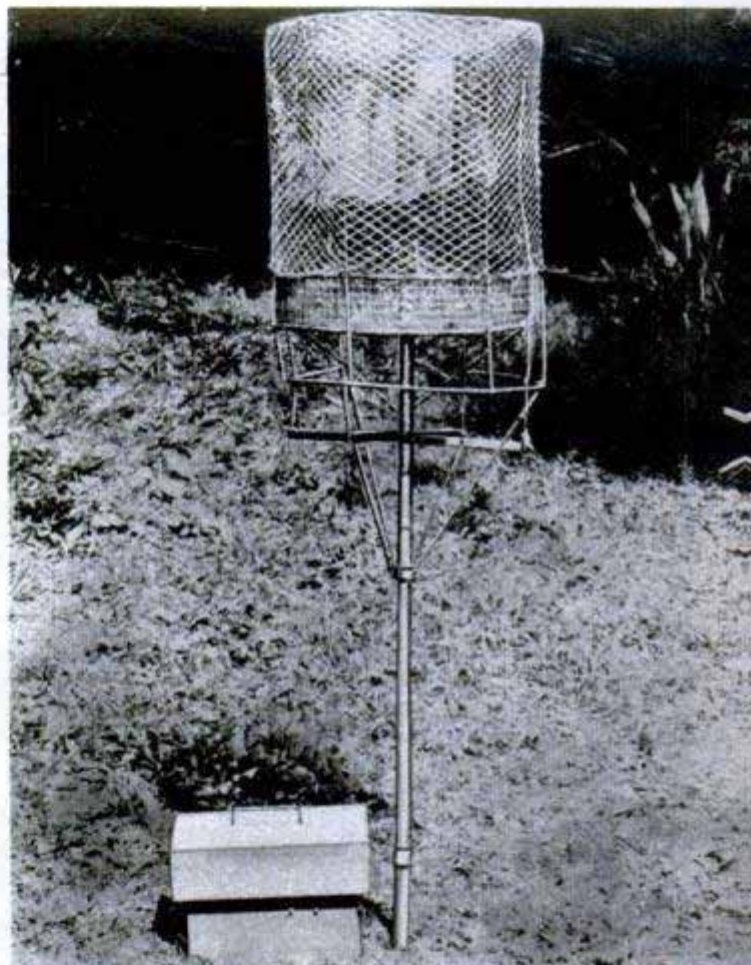


Bird is completely surrounded by netting in a circular trap, which even closes a drawstring at top



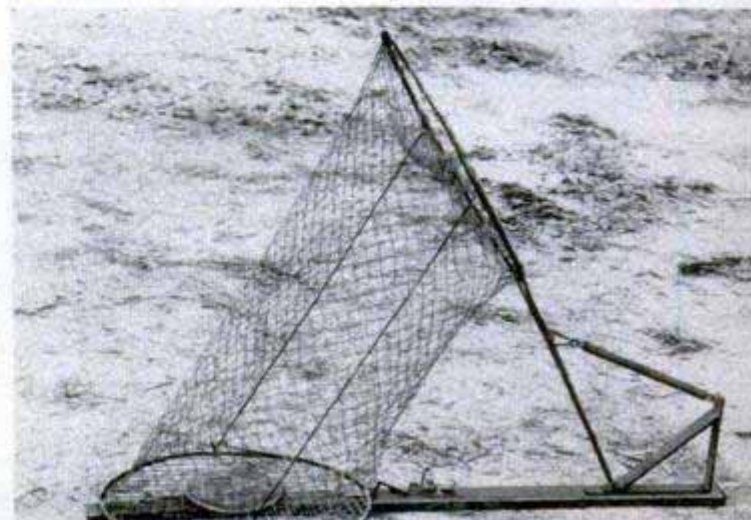
Ingenious trap developed in Florida is electrically tripped by bander when bird steps on bait platform

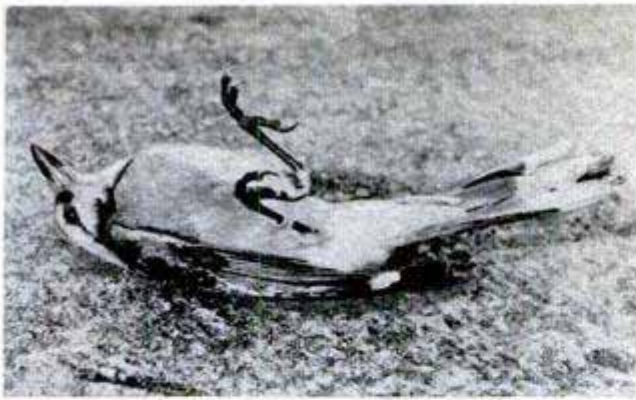
Automatic trap has a baited pan in the center. When the bird steps on the pan, the spring is triggered



Same trap as the one at left, now closed around bird. Cloth netting covers the quick-operating wire frame

Trap at left in the shut position. Many traps are developed by banders themselves during their work





Dead? No, bird on its back is virtually hypnotized, still believing it is held captive and that it can't fly

Then of course there's the bird that finds a home and likes it well enough to return. A Harris sparrow banded in Iowa returned to the same area every year except one until 1933. A chimney swift given a bracelet at Quincy, Ill., was found at the same place 11 years later.

Until bird students began banding their feathered companions, they could only speculate on the life expectancy of a particular species. Now numerous records of longevity are available. An osprey, banded as a nestling, was found dead at its point of release 21 years later. In 1920 a Louisiana heron was fitted with a bracelet. In 1934 it was captured and released again.

The bands also give some indication of the odds in favor of a bird living through the hunting season without being peppered by lead. One banded mallard was lucky—it returned to the same nest box from 1927 through 1933. For seven years it managed to escape the hunters' guns.

One summer a large number of ducks was banded at the Bear River Refuge in Utah. Eventually, they produced returns from almost every state west of the Mississippi, 13 of them turned up in Mexico and nine were brought down in Canada.

Typical of the hobbyists who enjoy studying bird movements is a former Canadian banker who retired and spends his winters in Florida. Deciding to band bald eagles, he devised a rope ladder for ascending to the lofty aerie instead of using the conventional spurs for tree climbing. So far this one hobbyist has slipped bracelets over the legs of more than 1000 eagles.

In Canada, Jack Miner and his sons have converted birds into missionaries. They band thousands of wild geese which stop over at their refuge in Kingsville, Ont. The Miners use a special type band, quite different from the official United States bracelet. It is much larger and includes Miner's name and address, a control number for the bird, a direct quotation from the Scriptures and the Bible reference from which it was taken. Frequently, the geese turn

up at the Gaddy refuge in North Carolina. Occasionally geese are found with a band on each leg—the Miners' and the official United States version.

Many varieties of traps are used in capturing the birds for banding. Large cages snare geese and other wildfowl. Cage traps are placed over chimneys for capturing large numbers of swifts. Nest boxes have wood or metal covers which can be slid or dropped over the nest, thus making the nesting bird a temporary captive while he is banded.

The easiest trap to make is the drop trap—simply a box which is propped up with a stick to which a string is attached. When the bird approaches the bait under the box, the bird student pulls out the prop.

There also are a good many traps of the automatic type in which the bird himself touches off the trigger by stepping on a treadle. Other types include water drip traps, traps fastened to trees to capture woodpeckers, and traps which are placed along the water's edge to snare shore birds.

Birds are not always easy to remove from the traps, so some traps have a receiving cage of smaller size which confines the bird while the bander gets a firm hold that can do no harm. Many of the traps, though, are small enough so the operator can seize the bird by cornering it.

(Continued to page 254)

White ibis, about to be released, sports a new piece of jewelry. Band must be snug fit so it won't snag





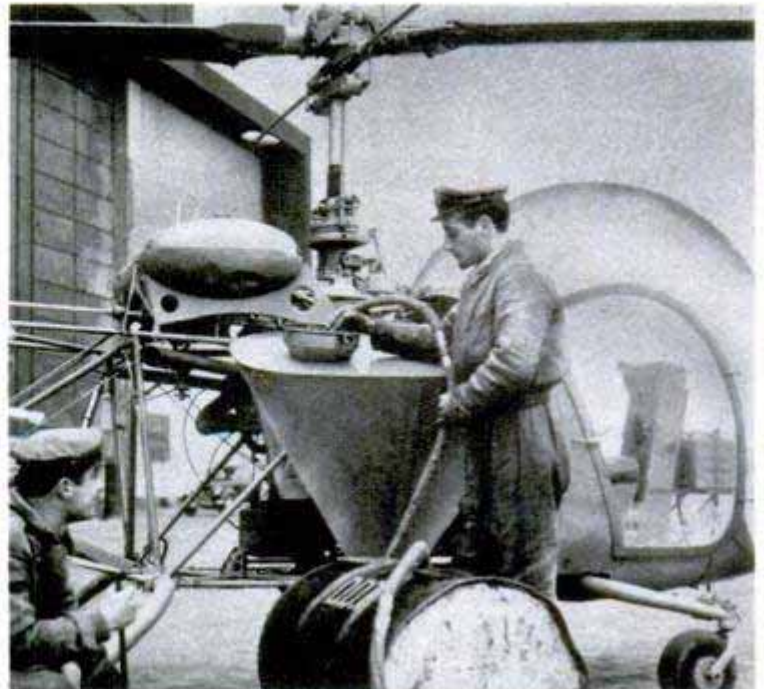
Helicopter hovers over Sardinian mountain, spraying every possible mosquito breeding place with deadly DDT

## Man Recaptures Sardinia From Mosquitoes

HELICOPTERS spraying DDT have ended Sardinia's 3000-year reputation as a malaria pesthole and made it livable for a million immigrants from overcrowded Italy. The "battle" for the island was financed by Marshall Plan funds. Seven tenths of Sardinia is uninhabited mountains and the low-flying helicopters reached steep hillsides and rocky gorges that spray guns and airplanes have never been able to touch.

A protective film of DDT and oil laid over every possible mosquito-breeding inch of the island had to be renewed at seven-day intervals, since the insect can grow from egg to adult in 10 days. Thousands of Sardinians tramped the island with spray guns, covering even the mule prints on mountain roads. Now, with the mosquitoes gone, the government is reclaiming interior swamps and desert for the expected settlers.

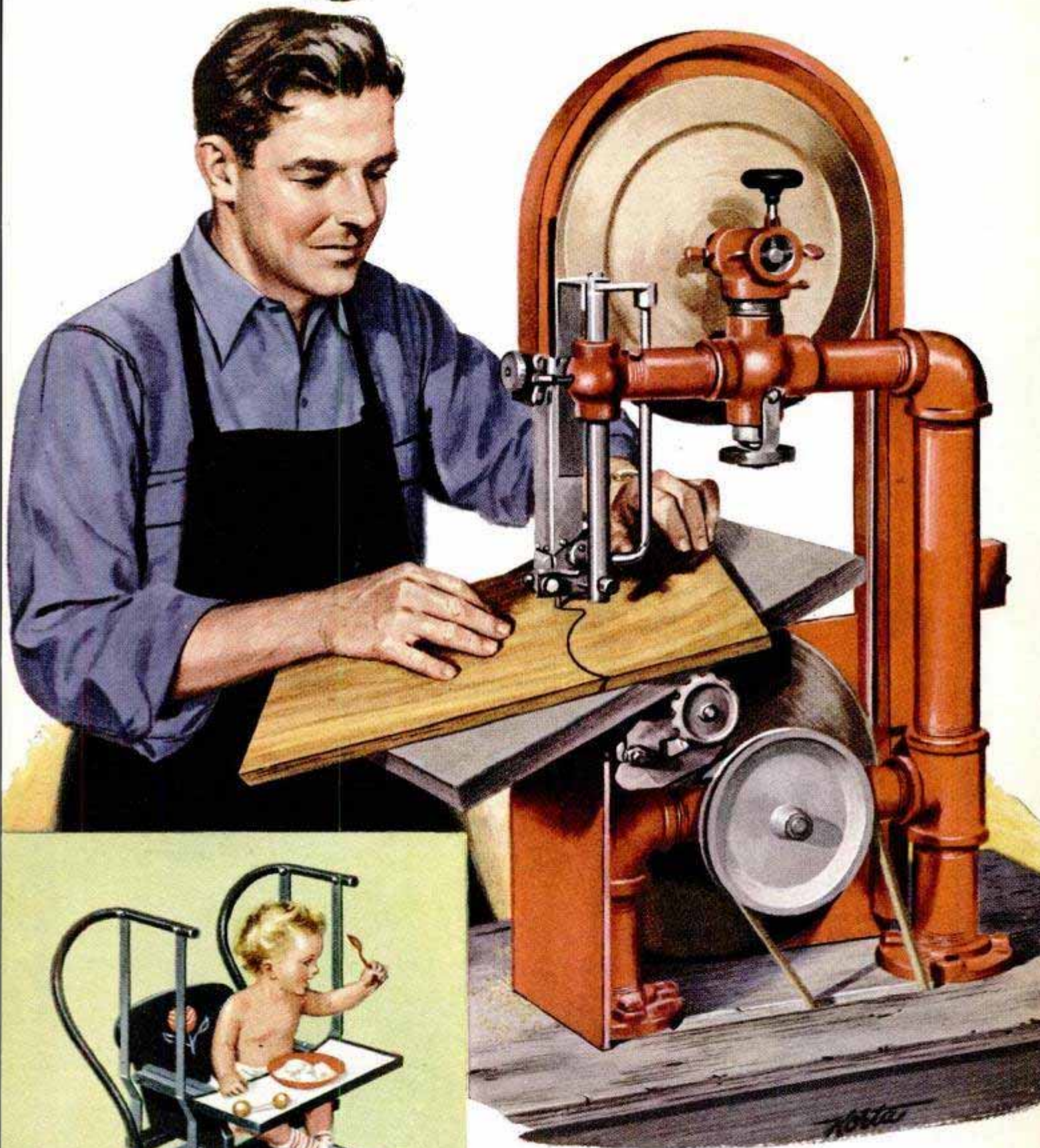
Workers spray churches, homes, even mule prints on the road. Below, helicopter pauses for a reload of DDT



the

POPULAR  
MECHANICS

# CRAFTSMAN



Need a bandsaw? This home-built one of pipe fittings and odd parts cuts both wood and metal. Part I on page 204 gets you started  
Baby swing, page 171, features glider action

# Keep it a

## INSURANCE AGAINST A TREE FIRE

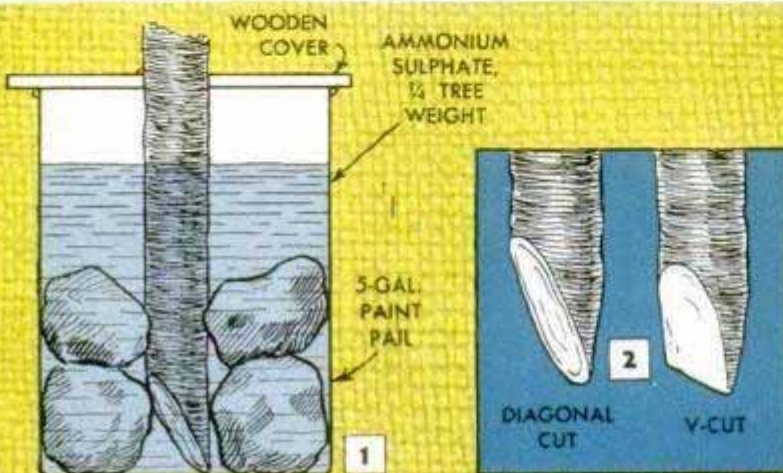
excellent nontip base for a tree can be improvised from a 5-gal. paint pail as in Fig. 1. To permit the tree to absorb the maximum amount of water, it is best to cut the end of the trunk at a slant as in Fig. 2. Stones or bricks keep the trunk centered in the bottom of the pail, while a two-part wooden cover holds the tree vertically and keeps the water from evaporating.

In addition, there are several types of fire-resistant coatings that greatly retard the spread of flame when applied to the branches of a Christmas tree. One formula which produces a shiny, transparent coating consists of a mixture of sodium silicate (water glass), 9 parts by volume and water, 1 part. A soapless detergent is mixed with the water in the proportions of 1 teaspoonful per quart of water. Whether dipping or spraying the tree, it should be kept in mind that a heavy coating is necessary to insure maximum protection. For spraying, the coating may have to be thinned somewhat.

Faulty wiring in tree lights is an ever-present fire hazard, as the slightest spark may be sufficient to ignite a dry tree. So each year make it a practice to inspect your light sets carefully before placing them on the tree. Look especially for loose wires where they enter the sockets and any frayed wires between sockets, and then either buy new sets or make the necessary repairs to be sure they are safe. If your lights are of the type that do not have socket clips for attaching them to the tree, do not resort to the practice of twisting them around the branches as in Fig. 3. This soon results in the wire breaking, causing a short in the wiring. And as a common-sense precaution, do not leave the tree lights burning when no one is at home.

TO MOST of us, Christmas just isn't complete without an illuminated tree, but careless use often has brought a tragic end to this happiest of birthdays. Being filled with pitch and resin, a Christmas tree, especially one that has dried out, can become a roaring mass of flames in a matter of seconds.

Keeping the fire hazard low can be done by exercising a few simple precautions. When setting up an indoor tree be sure to stand it in water. Keeping moisture in the tree is, perhaps, the best insurance against fire. Not only does it retard drying out, but the moisture prevents the needles from falling, particularly in the case of a spruce tree. While the addition of 2 lbs. of ammonium sulphate to 1 qt. of water is sometimes recommended, the United States Department of Agriculture has found that plain water does just about as well. An





# Merry Christmas

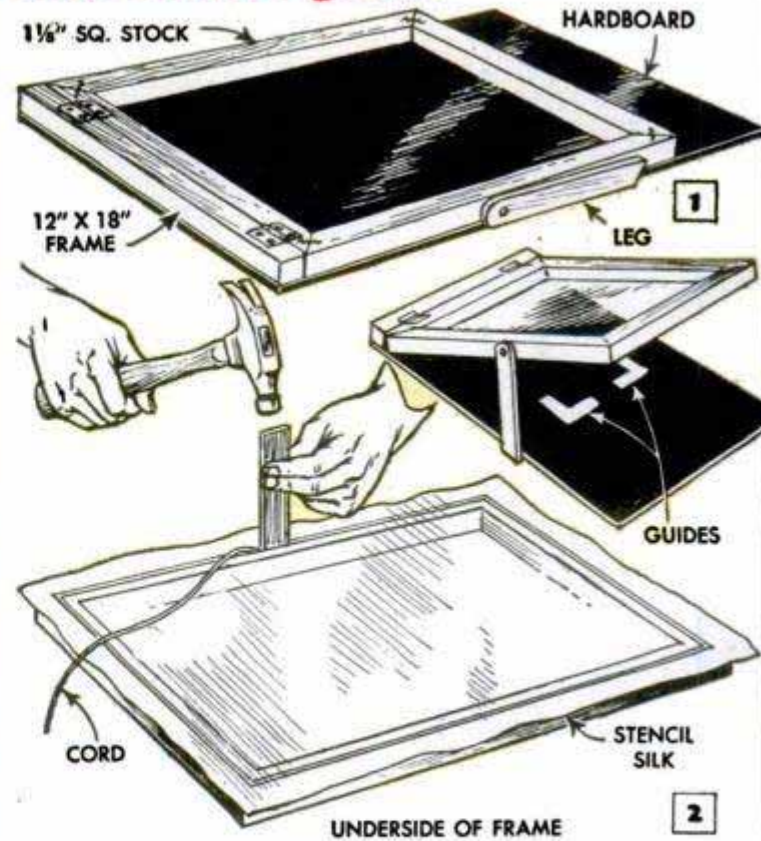
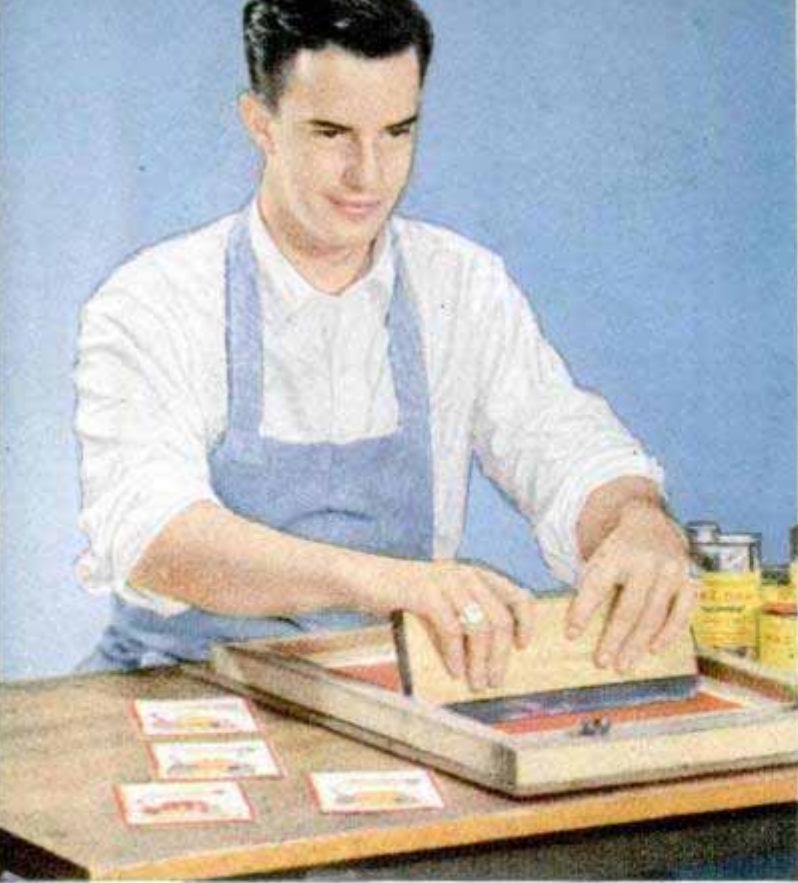
MAKE YOUR OWN GREETING CARDS

By Paul Will



WHEN CHRISTMAS draws near, many take care of the greeting-card problem by simply going out and buying them. But the card that bears a really personal and sincere greeting is one that represents the handiwork of the sender. Today, most of the personalized cards are limited to the photographic type, largely because they can be mass-produced with a minimum of effort. While photo cards offer a variation from commercial cards, in most cases they lack color. However, there are several other types of greeting cards that can be duplicated in quantity, as well as color, on a production

# Silk-Screen Cards



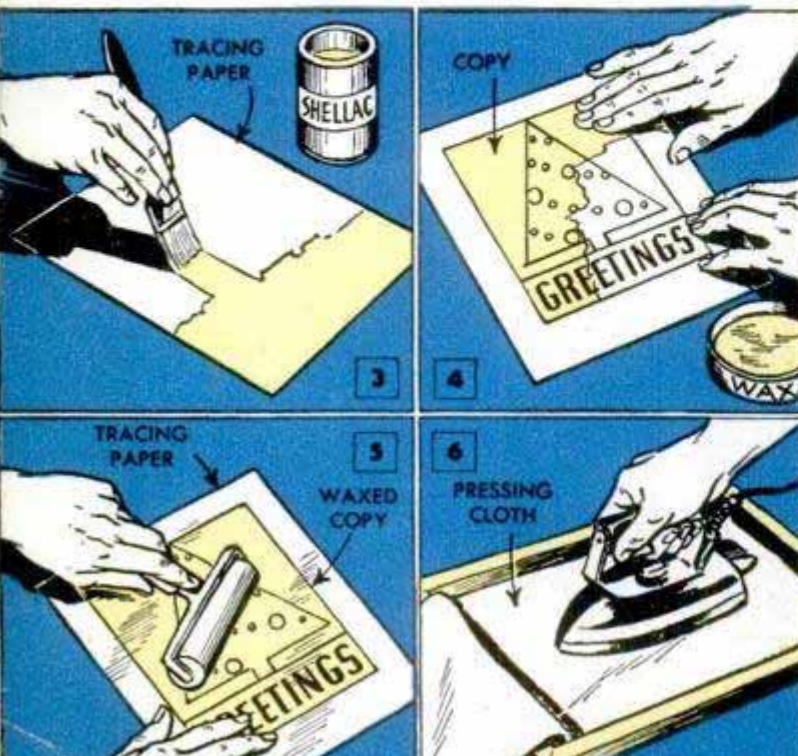
basis. The group of cards on the preceding page pictures five different types: (A) spatter, (B) monoprint, done with a roller, (C) collage, (D) silk-screen and (E) cellophane. All are easy to produce at home from fairly common materials and tools.

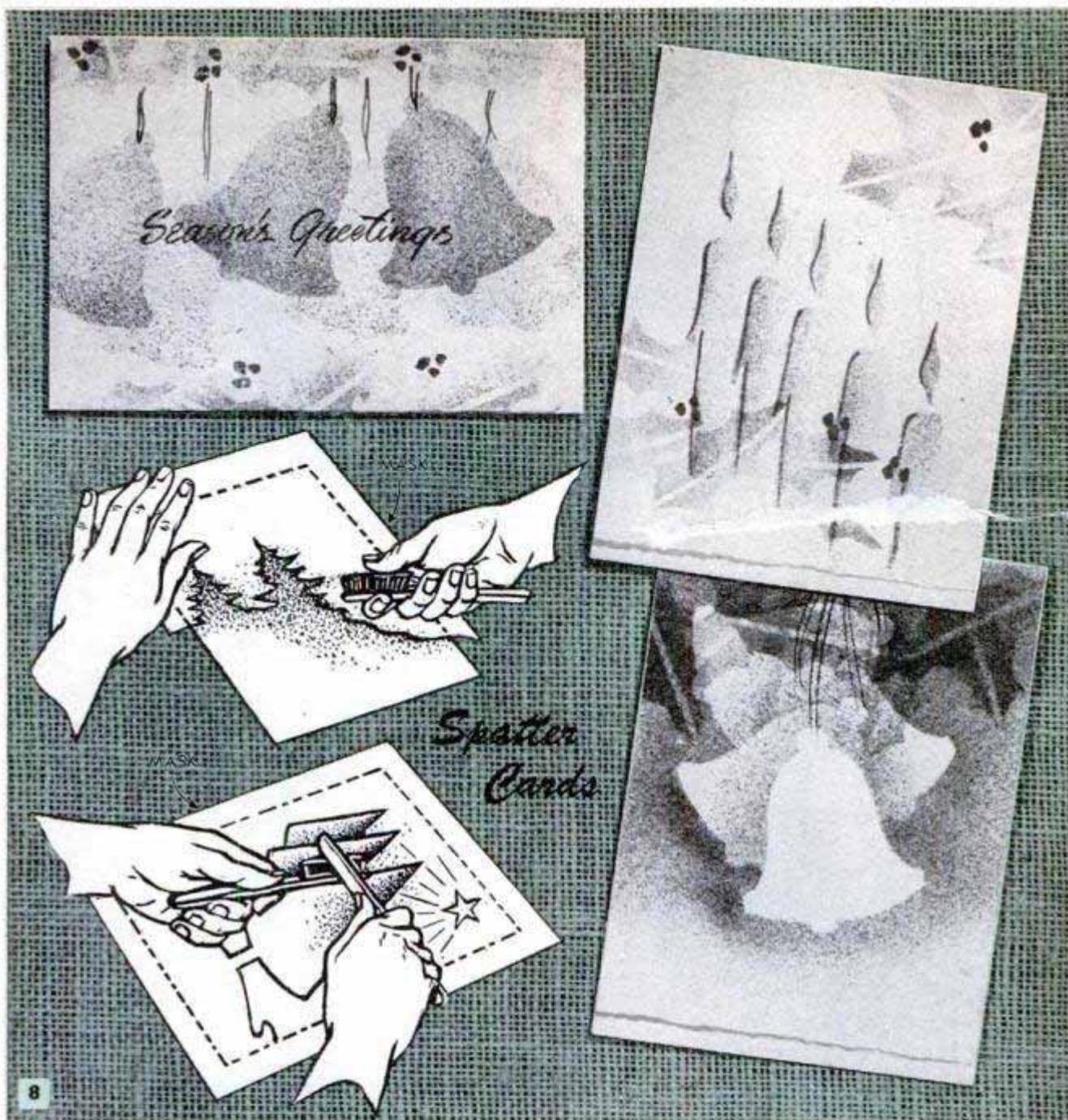
**Silk-screen process:** Printing by silk screen requires a frame such as the one detailed in Fig. 1. This can be purchased as part of a kit including paints, or you can easily make one yourself. The underside of the frame is covered with No. 6 or 8 stencil silk. The silk is stretched taut as a drumhead and held by a length of cord which is wedged into a groove running completely around the frame, Fig. 2. The use of loose-pin hinges in hinging the frame to its base makes it convenient to remove

the printing frame for cleaning and when applying the design.

Two different methods of printing may be used. In the direct method, the design to be printed is first drawn on paper, then placed under the silk and traced onto the screen with a fine pencil. When this is done, a medium, called resist (tempera show-card colors), is applied to the screen to block out portions of the design not to be printed. Areas of the screen surrounding the actual card size are masked off with paper and tape to save paint and keep the unused portion of the screen clean.

The design is reproduced by forcing paint through the open meshes of the silk screen, using a rubber squeegee as shown in the photo on this page. In the indirect method,





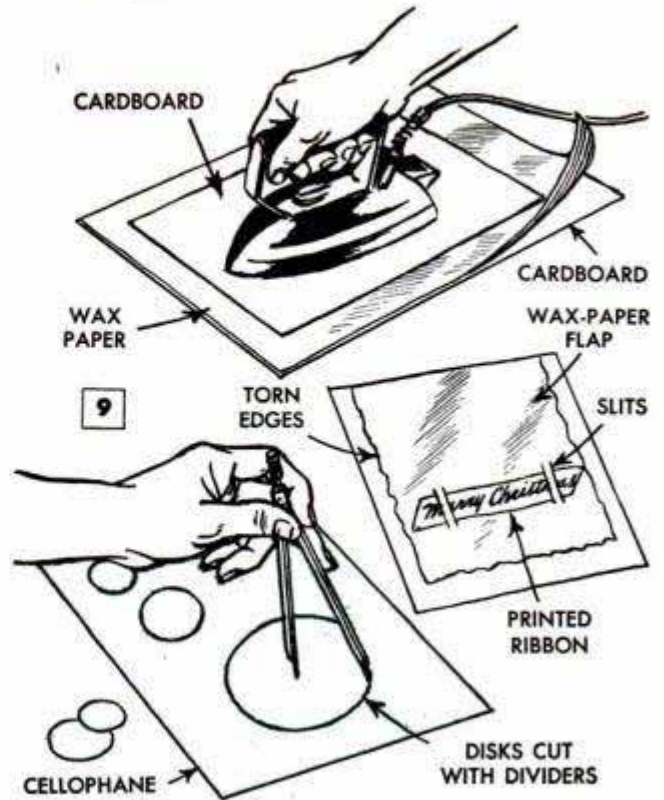
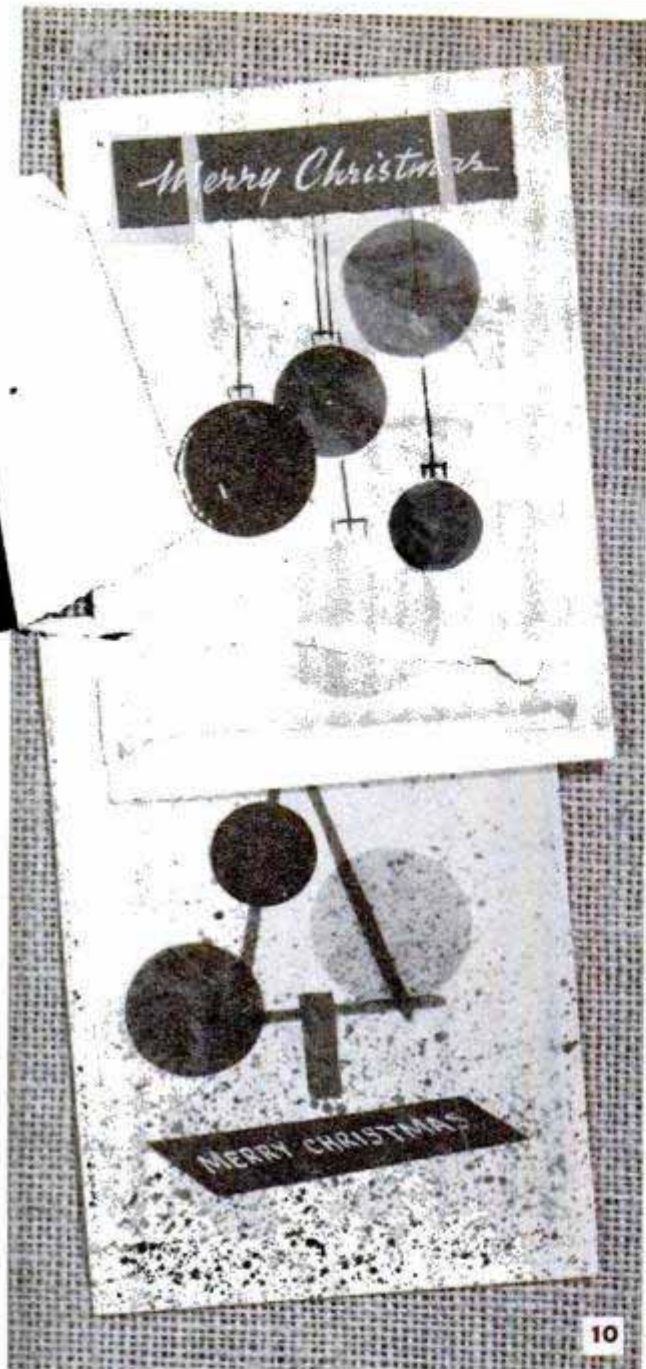
the design is made into a stencil which is attached to the underside of the screen, and the paint is transferred to the card through the stencil. Figs. 3 to 6 inclusive show the steps in preparing a stencil. First, a piece of tracing paper large enough to cover the entire screen is coated with shellac. Then the card design is coated with a thin film of wax with the fingers. Next, the tracing paper, shellac side up, is rolled over the waxed copy. Now all portions of the design that you want to print are cut out with a razor blade and finally the stencil is attached to the underside of the screen by pressing with a medium-hot iron. A quantity of thick silk-screen paint is poured onto the screen and wiped across the open portions of the stencil with the squeegee. Duplicate work is held in register under the screen by cardboard guides which are fastened to the base of the unit. By using

colored paper for your cards, a two-color job can be produced with one printing.

Fig. 7 shows an example of four-color silk-screen work. Here, the tree branches, greeting and border of the card are drawn directly onto the screen and a separate tracing-paper stencil is made for each ball. The screen pattern is run off first and then, when the cards are dry, the screen is cleaned and each colored ball is printed in turn, registering the stencil of each in the proper position on the underside of the screen. Printing can be done on almost any material, wood, cloth, metal or paper.

**Spatter technique:** A toothbrush is the main item you need for producing spatter cards. Several sample cards are shown above, consisting of a single fold, the lower edge of the front flap having a torn, or deckled, edge. The card design is produced by means of paper masks or stencils which

## Cellophane Cards



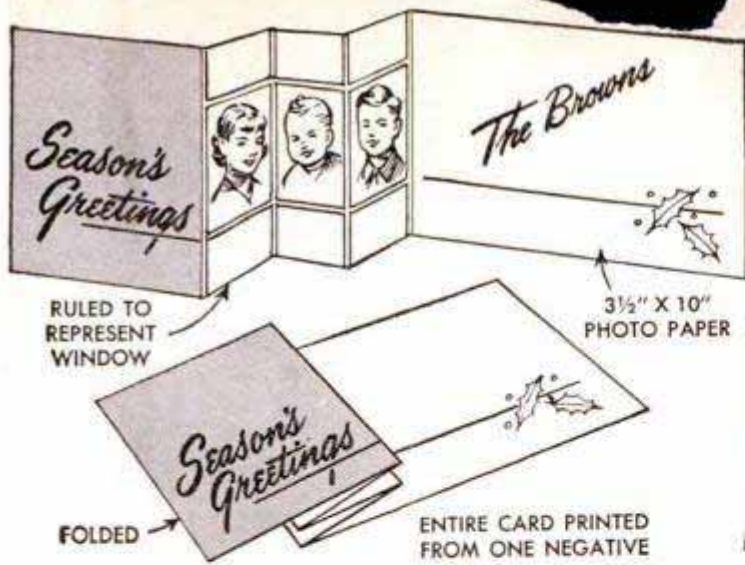
are placed over the areas that are not to be spattered. Fig. 8 shows two methods that can be used to flick the paint from the toothbrush, and another good method is to hold a tea strainer over the card and rub the brush over the wire mesh. Using show-card paints, dip the brush in the paint and hold it about 4 in. from the work.

**Collage:** Card C, page 159, shows an example of a collage. This type of card is made of scrap bits of material, such as lace, tinsel, cotton, cloth, etc. The card pictured features a background of yellow burlap pasted to a cardboard backing, to which

## Novelty Cards



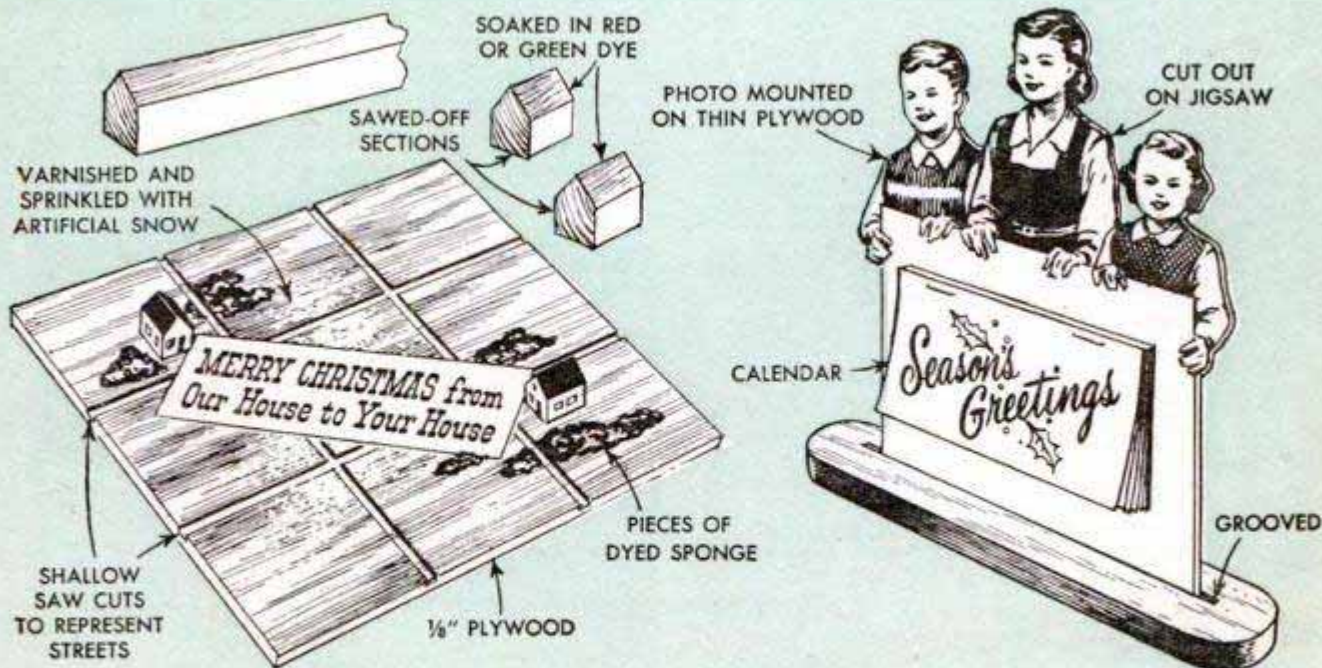
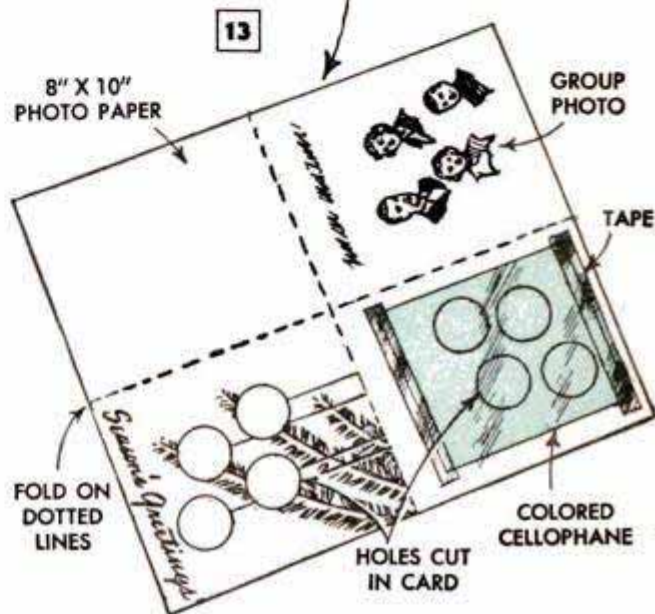
11



are pasted a tree of grasslike material, a shadow of greenish-gold paper, a tree trunk of Manila paper and a greeting cut from a strip of printed gift-wrapping ribbon.

**Wax paper and cellophane.** This is, perhaps, the quickest and most inexpensive type of card to produce. Here, balls, trees, candles, etc., are cut from colored cellophane and fastened to the back side of a wax-paper flap which adds a "frosty" effect to a twig or other design painted on the card itself. A household iron is used to stick the cellophane to the waxed paper as shown in Fig. 9, and Fig. 10 gives two examples of what can be done. Note in the lower card that spatter work is used also.

**Photo and novelty cards:** Figs. 11, 12 and 13 offer suggestions for several unusual cards. Fig. 13 shows how color can be introduced in the case of a photo card by using a cellophane insert between the folds.



## Forms Spud for Chopping Ice

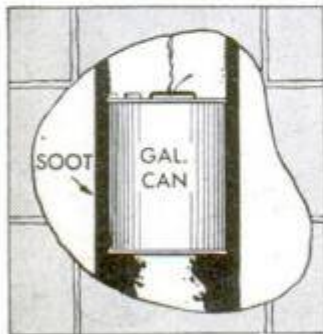


WOODEN HANDLE

1" PIPE

To save time and extra exertion often spent in chopping through thick ice with an ax, one ice-fisherman made this pipe-fitted spud which quickly cuts through to the water. The blade of the spud is a short length of 1-in. pipe, the end of which has been cut off at an angle and sharpened with a file. The pipe is driven over a tenon formed at the end of a long wooden handle, and pinned, if desired, to assure that the parts will not separate in use. If a heavier spud is desired, one can be had simply by cutting off one end of a 40-in. length of 1-in. pipe. A third style of spud can be fashioned from two lengths of pipe and a reducing coupling, using a pipe of smaller diameter as a handle and joining the two members with the coupling. The cutting edge of the spud can easily be touched up with a file.—W. Fehlberg, La Crosse, Wis.

## Can Lowered Through Flue Removes Chimney Soot



A simple way to clean a chimney is to lower a water-filled can through the flue, thus removing excess soot or other obstructions. Select an empty can having a handle or bail

fill the can with water and lower it down the full length of the flue.

Victor H. Lamoy, Upper Jay, N. Y.

## Electric Wires Kept From Fraying By Applying Fingernail Polish

When connecting the bared ends of electric wires, such as lamp cords, to the terminals of a plug or outlet, the wire, even though twisted, tends to fray when the screws are tightened. To prevent fraying and assure good contact, twist the ends of the wires and apply a drop of fingernail polish to the extreme tip of each one to hold the strands in place. Application of a little fingernail polish also will prevent fraying of the silk covering where it has been cut away from the insulation.

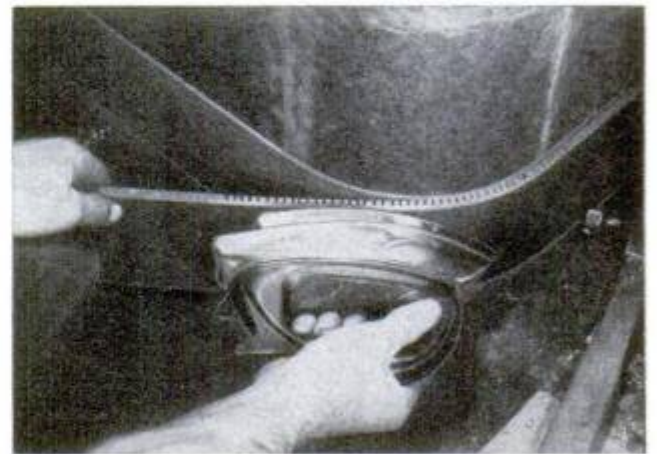


William B. Eagan, Louisville, Ky.

## Hardboard Kerfed on Underside Is Bent to Small Radius

Bending  $\frac{1}{4}$ -in. hardboard to a small radius is done easily if the board is kerfed on the underside. The photo shows a strip of  $\frac{1}{4}$ -in. hardboard being bent to a 5-in. radius with the heat of an ordinary pressing iron. The back of the hardboard was notched at  $\frac{1}{4}$ -in. intervals throughout the area to be bent, making the saw cuts  $\frac{1}{8}$  in. deep or half the thickness of the board. As the particular job pictured required a  $\frac{3}{8}$ -in. thickness, this was built up by first applying a strip of  $\frac{1}{8}$ -in. hardboard to the surface. This was bent without notching simply by applying heat and gradually bending the board around the radius.

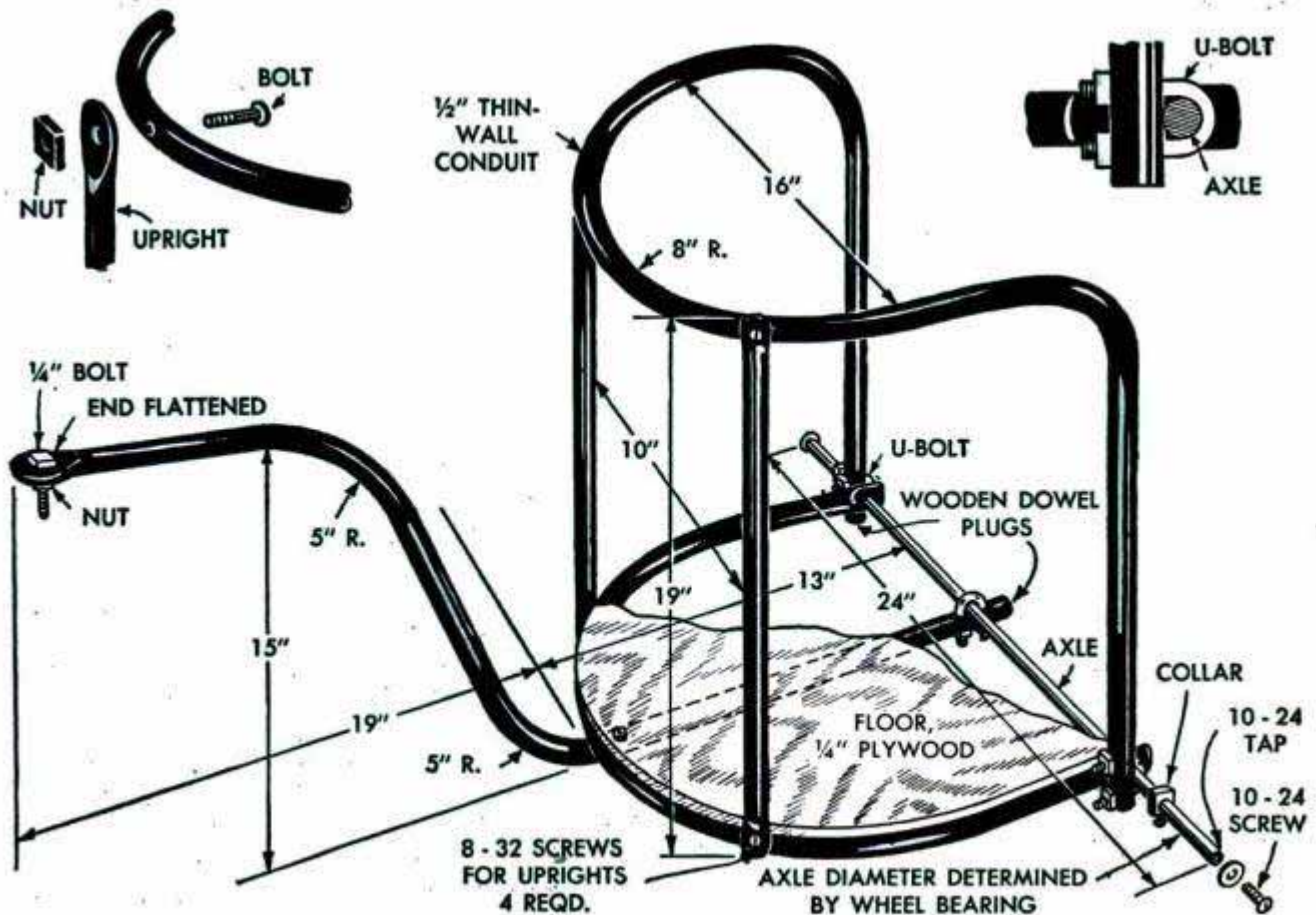
Michael Ligocki, Gary, Ind.



# Have Fun With This Chariot-Type Tricycle Trailer



Rolling along on semipneumatic wheels, this little trailer will double the enjoyment the youngsters get from their tricycles. The frame, rail and tongue are all bent from thin-wall conduit, either by using a standard pipe bender or by filling the conduit with sand, plugging the ends and then bending by hand. The trailer-hitch bolt engages a hole drilled in a piece of flat iron which is bolted to the tricycle-seat frame. The wheels are fastened with cotter pins or the axle is drilled and tapped for attaching them with roundheaded screws

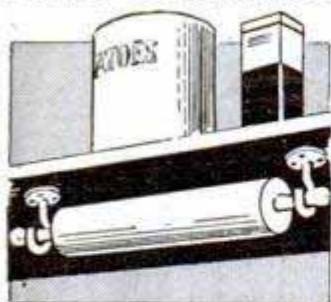




### Calculating Roof Pitch in Degrees

To find the pitch of a roof in degrees, you can use a yardstick, a straightedge and a level to arrive at a reasonably accurate answer without involved calculations. The straightedge, which could be a selected length of 1 x 2, is cut 57 in. long, and a carpenter's level is temporarily fastened to the top center of the straightedge. With one end of the straightedge resting on the roof, move the other end along a yardstick held vertically on the roof. When the bubble level is centered, the reading on the yardstick at the end of the straightedge is about the same as the pitch of the roof in degrees. This is based on the fact that a circle with a 57-in. radius has a circumference of nearly 360 in., thus each inch mark on the yardstick roughly indicates 1 deg. of pitch as both the straightedge and the roof itself serve as radii of the circle.

### Under-Shelf Rack for Rolling Pin



In addition to conserving drawer space, this rolling-pin rack is a real timesaver for the housewife who does a considerable amount of baking. The rack is made by attaching two screw hooks or clothesline hooks to the underside of a kitchen or pantry shelf. The hooks are fastened in a convenient location and spaced to receive the handles of the rolling pin. However, if the pointed tips of the hooks are likely to interfere with removing the rolling pin from the rack, the tips should be cut off and rounded before mounting the hooks.

Use thread of a contrasting color for basting so it is easy to locate when you wish to remove the stitches.

### Hanging Ornamental Flowerpot

An ornamental flowerpot having three holes in the rim can be hung neatly by using ordinary cotter pins as eyes to engage lengths of chain. After cutting three equal lengths of lightweight chain, attach a cotter pin to the bottom link

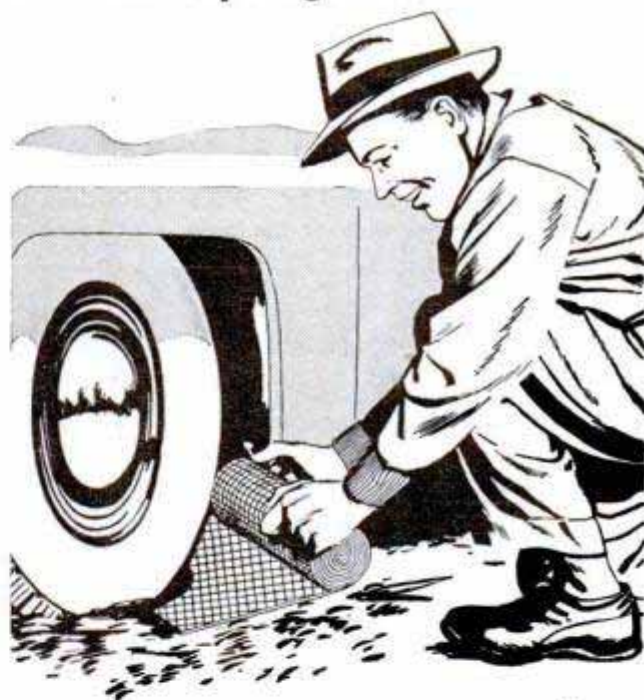


COTTER PIN

of each length and then pass the pins through the holes in the flowerpot rim. Bend the arms of the pins outward to anchor them in place and slip the loops at the free ends of the chain over a stiff wire ring to permit hanging them from a hook. The cotter pins should be about  $\frac{1}{2}$  in. longer than the thickness of the pot rim.

Wm. A. Novak, Maywood, Calif.

### Car Freed From Icy Pavement With Nonslip Rug Mats

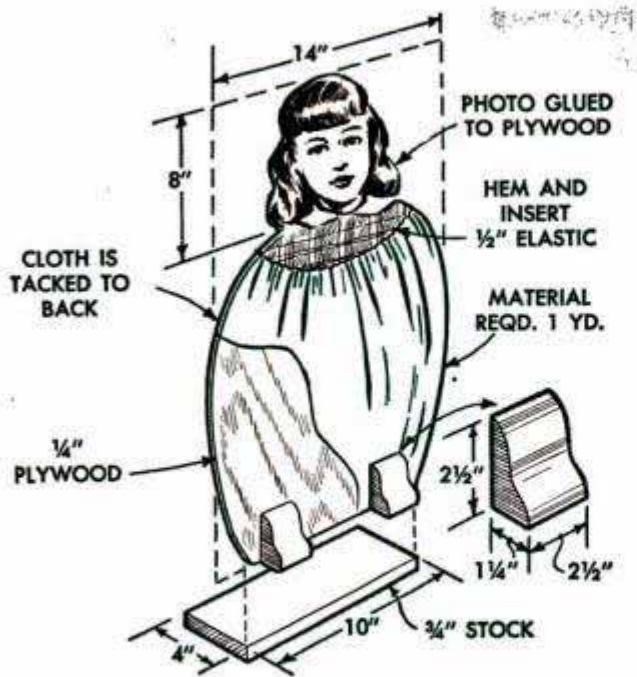


When there is danger of becoming stalled on icy pavement, carry two pieces of corrugated-rubber rug mat in the trunk of your car. The pieces should be about 15 in. wide by 6 ft. long, and a semicircular notch the same width as the tire is cut in one end of each piece. Then, when traction is impossible on the slippery road surface, stretch out the mats in front of the rear tires, placing the notched portion around the tire as shown in the drawing. The mats will grip the road surface providing sufficient traction to free the car. The two mats can be rolled together for compact storage.

G. Jaffin, Silver Spring, Md.



# Personalized Laundry Bag for Child's Room

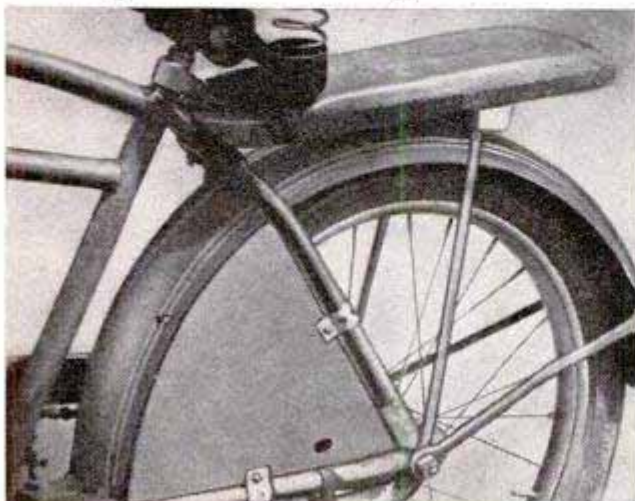


Topped with a portrait of its little owner, this child's laundry bag looks much like a life-size doll, and its novelty will go far to encourage children to take care of their soiled clothing. A good close-up snapshot of the child is selected and that portion of the negative showing only the head and possibly part of the shoulders is enlarged as close to 8 x 10 in. as possible. Then the enlargement is glued to the top of a 14 x 25-in. sheet of 1/4-in. plywood, after which the latter is jigsawed to outline the photo and follow previously marked guide lines in order to form the rounded contours of the cutout. The laundry bag itself is made from a piece of colorful fabric (about one sq. yd. will do). This is hemmed along the top edge and fitted with a length of elastic. Then both the fabric and elastic are drawn around the edges of the plywood and tacked

to the back. If the enlargement includes the shoulders of the model, the photo probably will cover the plywood which would otherwise be exposed just above the elastic when the bag is partially filled. However, if only the head is used, a simulated dress can be painted directly on the plywood or made from fabric stretched taut and tacked to the back. The plywood cutout is held upright by two wooden blocks fastened to the front and a 4 x 10-in. piece of wood attached along the bottom edge at the back. For a neater appearance, the tacked edges of the fabric can be hidden with another piece of fabric or cardboard which is cut to shape and stretched across the back of the plywood, tacking it along the outer edges. If fabric is used, its edges should be folded double before tacking.

Herman R. Wallin, Washington, D.C.

## Safety Panel on Bicycle Wheel Guards Foot From Spokes



After one youngster had caught his foot in the rear wheel of his bicycle and taken a serious fall, his dad mounted a safety panel on the bicycle frame to shield the forward portion of the wheel. The guard is a wedge-shaped section of hardboard cut to fit between the frame members and rounded to conform with the shape of the fender. The panel is held to the frame with sheet-metal clamps as pictured.

Grover Brinkman, Okawville, Ill.

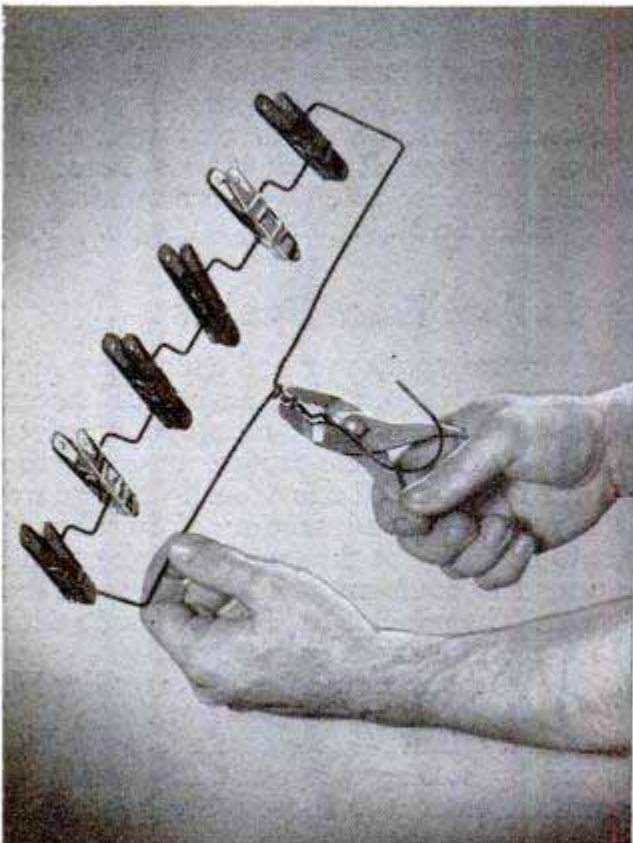
☐ A leaky inner-tube patch can be removed by holding it against a hot exhaust manifold until it is thoroughly heated. It then can be peeled off easily.

# Solving HOME

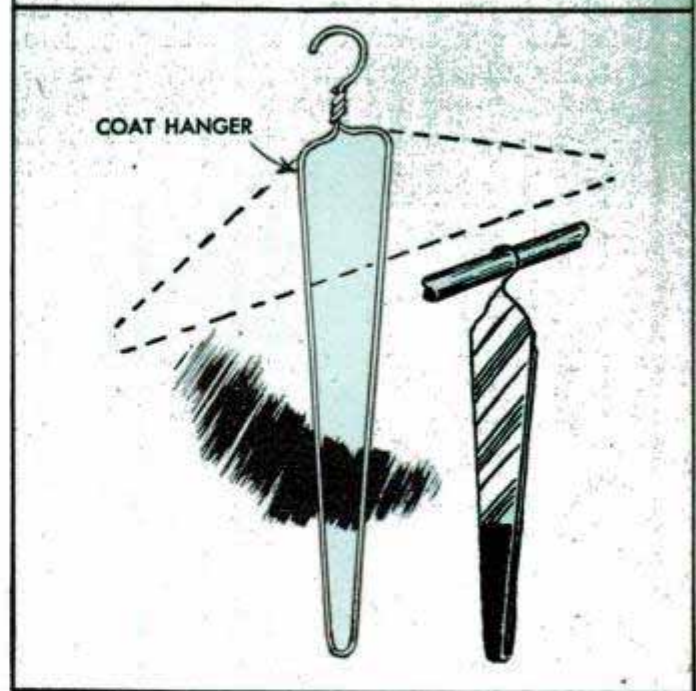
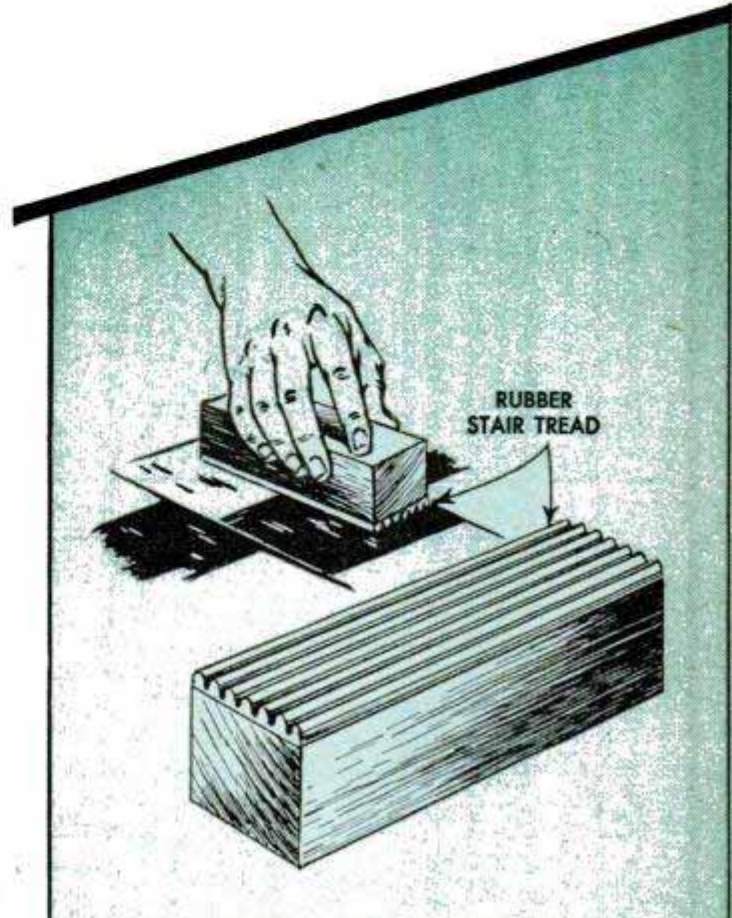


**SEED PACKED** in cardboard cartons without inner liners often is lost through the bottom edges of the carton. This is corrected by sealing the bottom of the carton with cellulose tape pressed over the edges

**DRYING RACK FOR HOSE** that doubles as a skirt hanger is made by slipping plastic clothespins on a wire coat hanger. Open the hanger with pliers and slip the coil springs of the clothespins over the wire



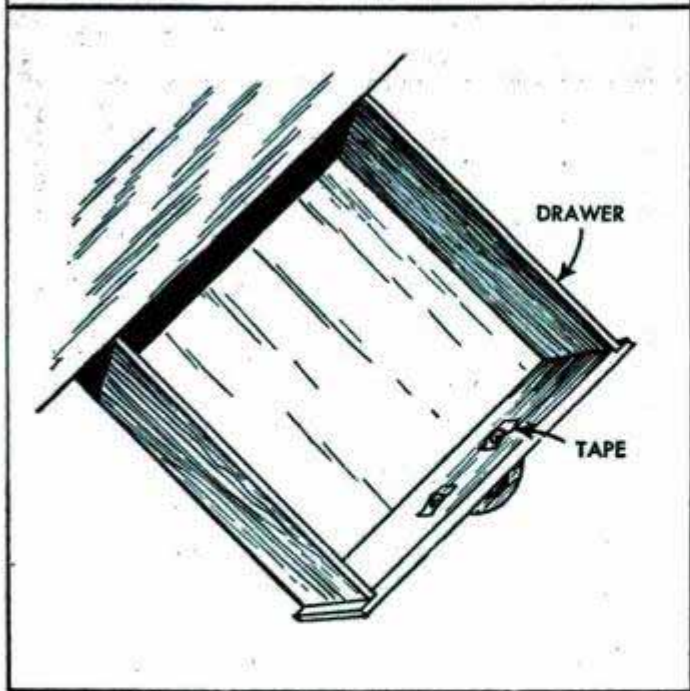
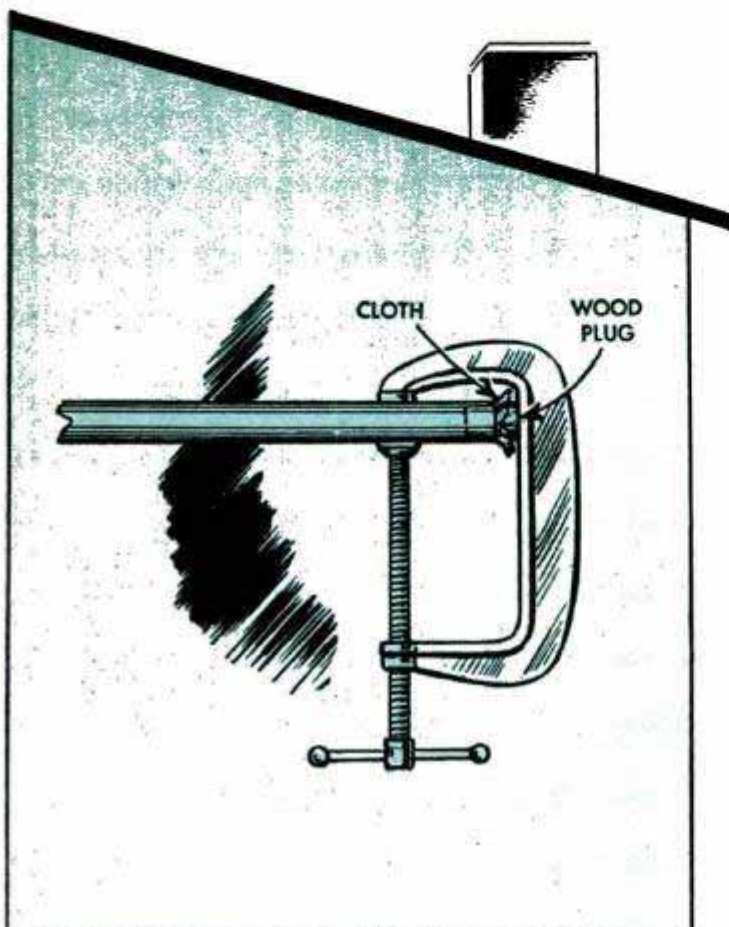
**CORRUGATED-RUBBER SCRUB BRUSH** cleans linoleum and painted surfaces efficiently and acts as a squeegee to remove excess water. The brush consists of a piece of stair tread cemented to a wooden block



**YOUR TIES** will always have that newly pressed look if each one is kept on a tie stretcher while hanging in the closet. Bend the stretcher from a wire coat hanger and just slip the tie over the end as shown

# PROBLEMS

**WATER PIPES CAN BE PLUGGED** temporarily when pipe caps are not available. Press a wooden plug into the end of the pipe, wrapping it with cloth if necessary for a tight fit. Then use a C-clamp to anchor the plug



**COVERING DRAWER-PULL FASTENINGS** with tape prevents snagged clothing. Place a strip of cellulose or adhesive tape over each fastening, pressing the tape tightly to the inside of the drawer front



**CAN TOPS** are kept from dropping into the food when opening the can if a suction cup, fitted with a handle, is first pressed against the lid. Drill end of a  $\frac{1}{4}$ -in. dowel and turn it onto the suction-cup screw

**BRUSH HANDLE** doubles as a paint-can opener if it is fitted with a piece of metal to permit prying open the lid. The metal is drilled and then fastened to the end of the brush handle with two small wood screws

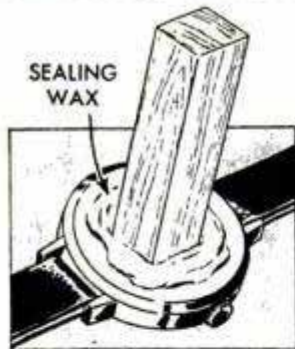


## Spools Screwed to Cabinet Door Provide Kitchen-Knife Holder



Paring knives are always within easy reach if they are kept in a holder made from wooden thread spools. Just fasten several spools side by side to the inside of a cabinet door, using long flat-headed screws. Then place the knives in the holder by slipping the blades in the slots formed by the flanged ends of the spools.

## Removing Wristwatch Back



When all usual methods fail to unscrew the threaded back from a wristwatch, try using sealing wax and a small block of wood. Drop a little of the melted wax on the watch back and press the end of the block

into the wax, holding it in place until the wax hardens. Then grasp the block and twist it slowly to unscrew the back of the watch. To remove the block, heat the sealing wax slightly with the flame of a match or cigarette lighter.

G. E. Hendrickson, Argyle, Wis.

## Unfinished Furniture Painted Easily By Using Shellac as Undercoat

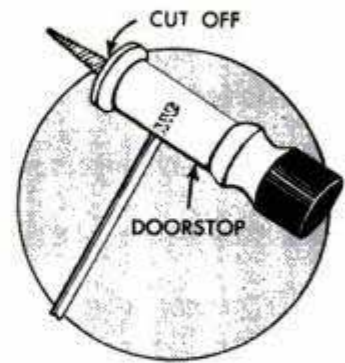
To attain a professional-appearing finish when painting unfinished furniture, use shellac as an undercoater. In addition to sealing the wood to stop absorption of the paint, the shellac forms a smooth, hard

film which provides an excellent surface for painting. Old furniture which does not harmonize with the present color scheme can be given a rich-looking, modern finish quickly by coating with black shellac.

A. E. Kessler, New York City.

## Doorstop Forms Small Hammer

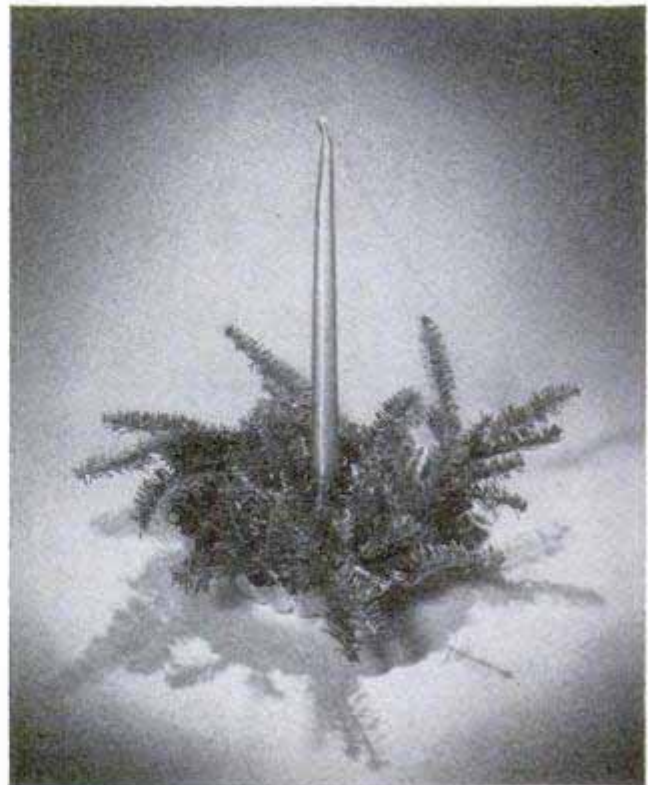
Fitting a metal doorstop with a handle provides a small rubber-tipped hammer for modelmaking. The threaded screw is cut from the shank of the doorstop and then a hole is drilled and tapped in the side of the shank. A 5-in. length of rod is threaded and turned into the hole to form the handle.



George J. Berkwitt, New York City.

## Centerpiece for Dining Table Utilizes Angel-Cake Pan

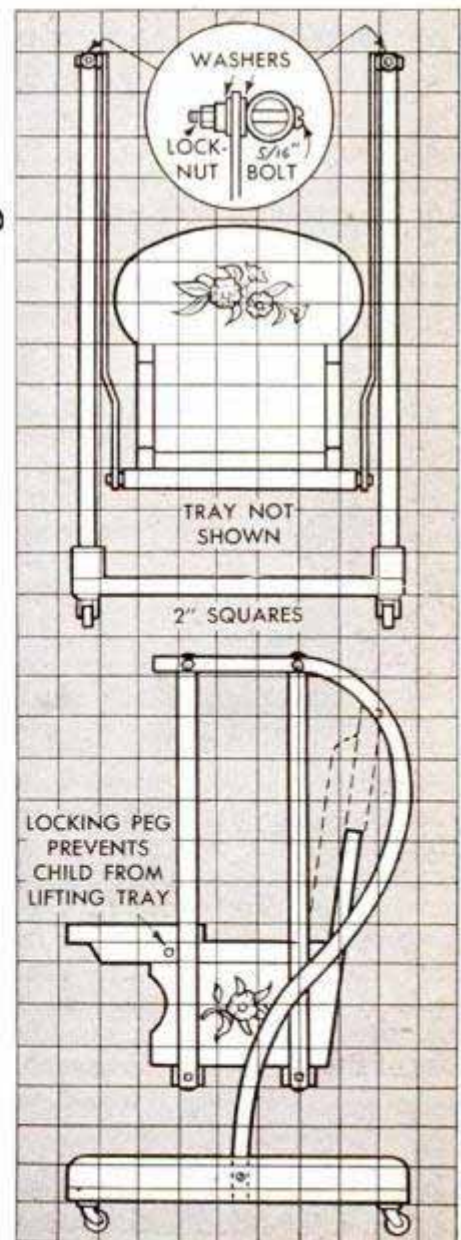
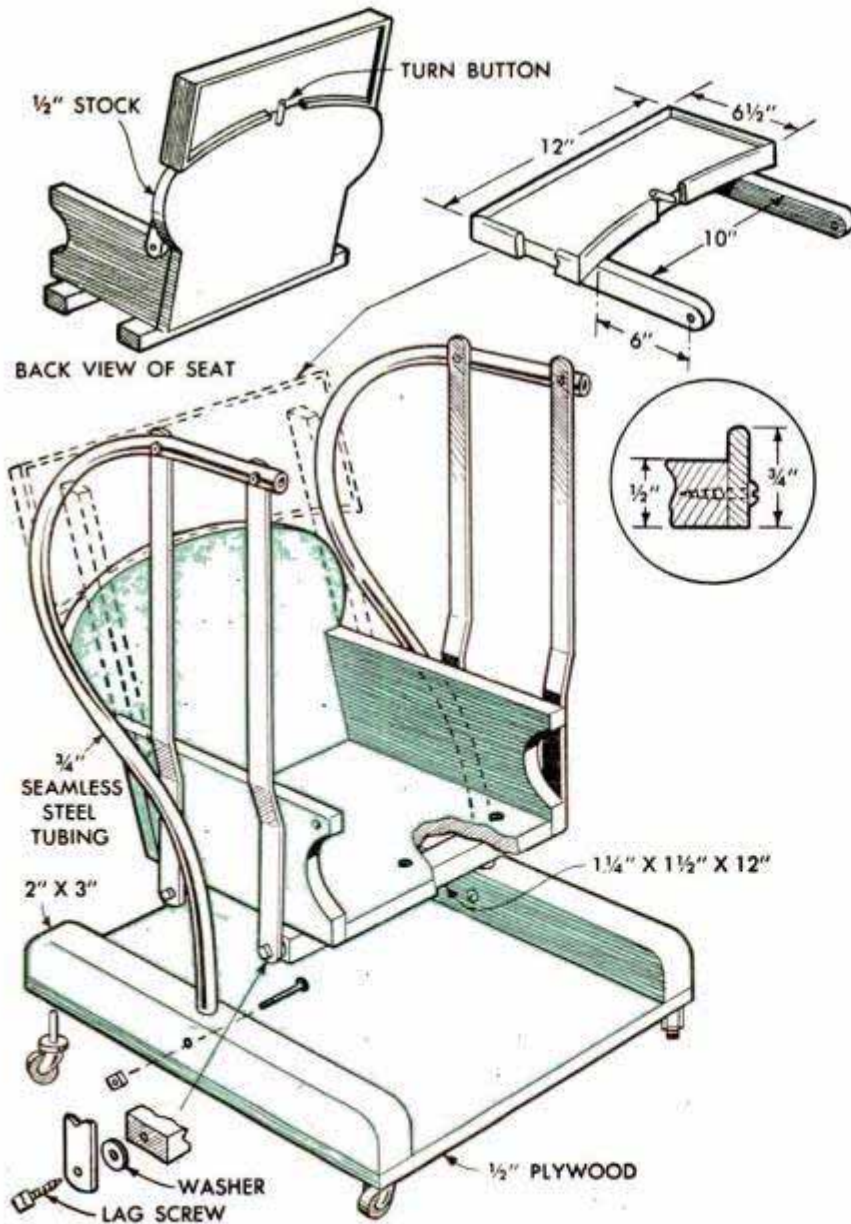
If you have an extra angel-cake pan or large gelatin mold, you can use it to provide an attractive centerpiece for the holiday table. First dip the tin in vinegar and let it dry. Next, dip it in vinegar again and, after it has dried, rinse it in water. Then coat the pan with clear shellac or paint as desired. Set a long tapered candle in the center hole of the pan and arrange fresh or artificial flowers or evergreen sprigs in the trough around the candle.



# Child's Glider Swing

By Hi Sibley

DESIGNED so that it may be rolled from room to room, this novel swing will keep baby amused as mother works near by. The tray remains level while the swing is in motion, and when locked in the down position will serve as a belt to hold a lively youngster safely in place. The platform consists of a panel of  $\frac{1}{2}$ -in. plywood mounted on four casters, and the seat is suspended on parallel hangers supported by two curved uprights made of steel tubing. To bend the tubing, plug one end and pack full of dry sand. Plug the other end, heat in a forge or with a blowtorch and bend around a wooden form. Finish the wooden platform in natural grain. Paint the tubing light red, the seat in ivory and add a decal decoration. To retain oil on the bolts and lag screws, wind two or three turns of soft cotton cord between the washers and flat-iron hangers.



## Handleless Cabinet Door Is Opened Easily With Plumber's Force Cup



## Plastic Container Dispenses Fuel To Model Gasoline Engines

Spray-shampoo bottles of pliable transparent plastic are just the thing for refueling model gasoline engines. To adapt the bottle for dispensing the fuel, fit it with a length of transparent-plastic hose, reaming the hole in the bottle cap with a rattail file until the hose can be forced into the opening



with a turning motion. This will form a liquid-tight seal at the joint of the hose and bottle cap. The hose should project about  $\frac{1}{4}$  in. into the bottle to trap any foreign matter in the fuel. As an aid in metering the fuel, use India ink to graduate one side of the bottle

in fractions of an ounce. The head and a portion of the shaft cut from an aluminum knitting needle or a golf tee will provide a stopper for the hose. To use the dispenser, remove the plug from the hose and press the end of the hose over the fuel-tank filler tube. Then squeeze the bottle until the desired amount of fuel has been injected into the tank, and kink the hose to prevent loss of fuel. Fill the dispenser like a syringe.

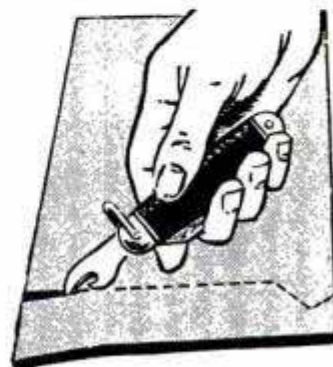
Richard Warner, Oswego, N. Y.

☐ Bait minnows used for ice fishing will not freeze and become brittle if they are kept in a jar filled with glycerin.

If the handle should break off a closed cupboard or linen-closet door, it is not necessary to pry the door open and take the chance of damaging it. Instead, press a plumber's force cup against the surface of the door and simply pull it open. Be sure not to press the cup over any holes left by the handle as, of course, no suction would be formed.—Pat Fey, New York City.

## Hooked Can-Opener Blade Provides Linoleum Knife

Sharpening the inside edges of a hook-type can opener increases the uses of a jack knife to include cutting linoleum and snipping cord. Although the blade will not serve as well as a regular linoleum knife, it



is a handy substitute for odd jobs, and adapting it for this purpose does not interfere with its function as a can opener. When using the linoleum knife, be sure to tilt it at a slight angle to the work, as this will bevel the edges of the cut and separate the material to prevent binding.

Andrew Vena, Philadelphia, Pa.

## Reinforcing Vacuum-Bottle Filler Lessens Chance of Breakage

The chances of breaking the fragile filler of a vacuum bottle are reduced to a minimum if it is reinforced with rubber or cellulose tape. Remove the filler, wrap the tape around the vacuum-seal projection at the bottom of the filler and then wrap the tape spirally to the neck.

Paul Vanuk, Rahway, N. J.

## Sanding Block From Softboard Results in Better Work

Next time you tackle a job of hand-sanding, try using a block of softboard (insulating sheathing) as a sanding block. Two 3 x 5-in. pieces stacked one on top



SOFTBOARD

of the other will form a block convenient to handle, and the resiliency of the material speeds attaining an even surface.

Harrison Neustadt, Miami Beach, Fla.

# One-Evening Projects

By R. J. DeCristoforo

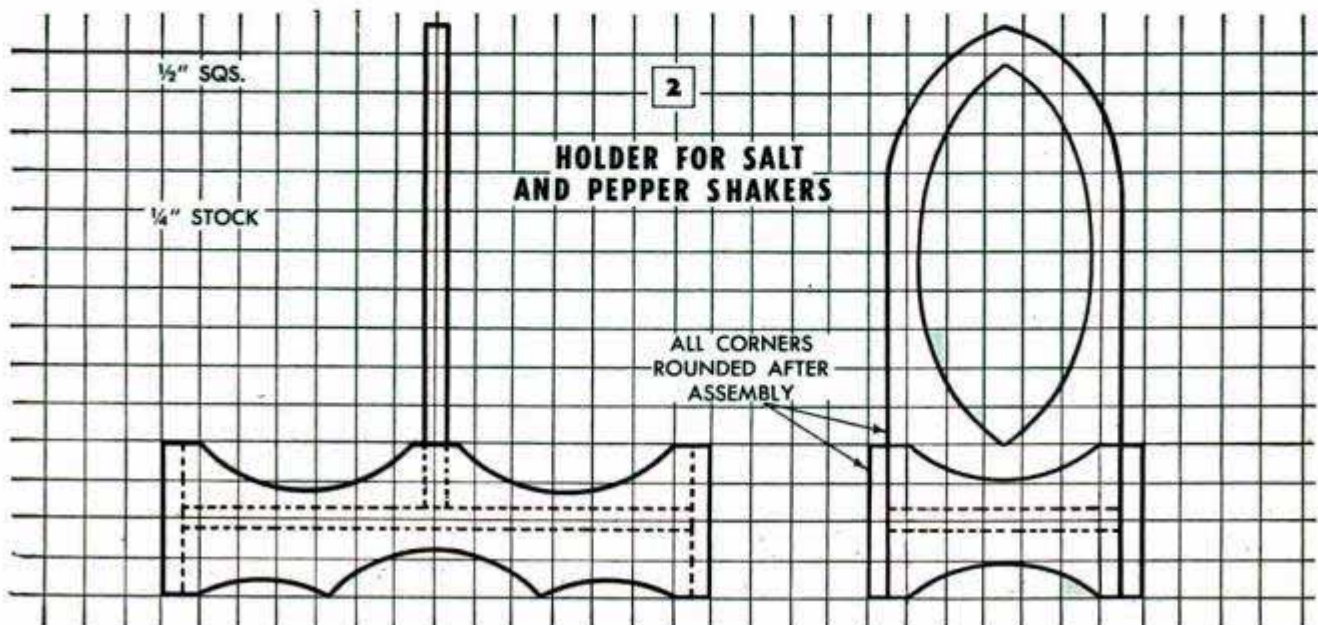
A COUPLE of the seven projects included in this article can be made easily in a few hours. All the items feature neatness of appearance as well as simplicity of construction and are especially suitable for decorative or utility purposes in the kitchen or dinette. Carefully made and painted in suitable colors, the projects provide attractive gifts that will delight your friends and, as almost all the parts lend themselves readily to multiple cutting, the items can be mass-produced rapidly and inexpensively for sale at a handsome profit. If you wish to put your spare time to work, a neighborhood gift shop and the local department store will doubtless provide a market for these items that will keep your power tools humming.

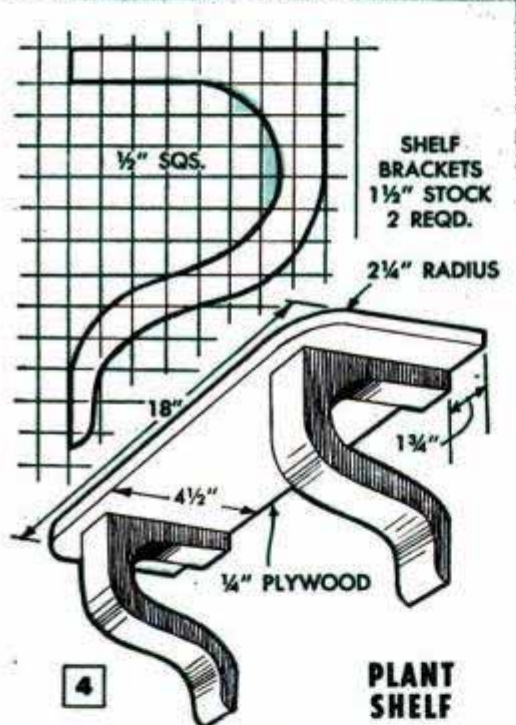
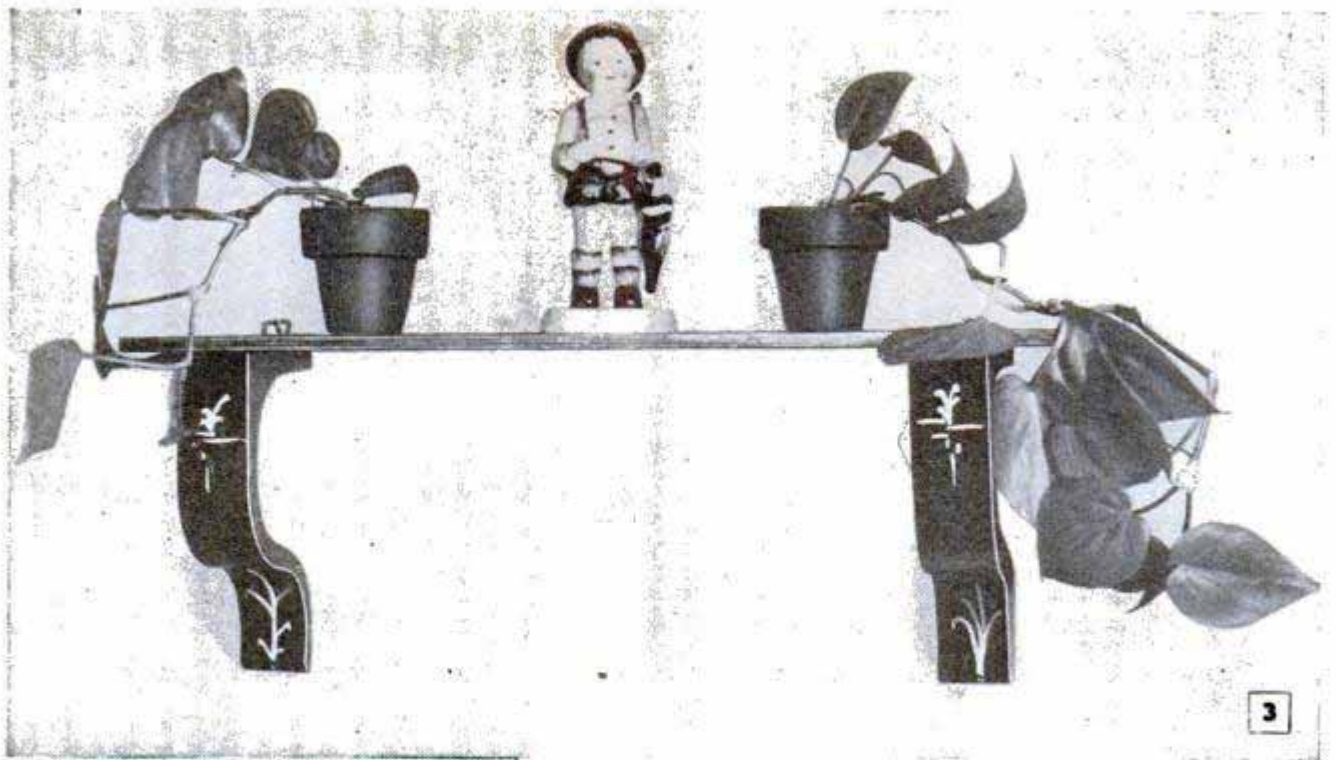
Half-round molding, some 1½-in. pine and ¼-in. plywood or solid stock are the materials needed, although any wood scraps approximating these dimensions will serve to make reasonable duplications of the projects. Gum-faced plywood is excellent for this type of work because of its adaptability to sanding and painting. However, the prominent grain of fir plywood presents a surface that is somewhat difficult to paint.

The holder for salt and pepper shakers, which is pictured in Fig. 1 and detailed in



Fig. 2, is made entirely from plywood. Although the size given in the squared pattern is suitable for a great many types of salt and pepper shakers, some of the larger novelty designs likely will require altering the dimensions of the base. When laying out the scallops, the rounded top of the handle and also the center cutout, you can be sure that matching arcs are identical by using the rim of a jar, small bowl or water tumbler to draw them on the pattern or directly on the work. After establishing the desired arc, mark the edges of the glass rim with a china-marking pencil (grease pencil) so that the arc can be duplicated exactly. After cutting out the parts, join them with glue and brads. Then finish with enamel, varnish or clear shellac which

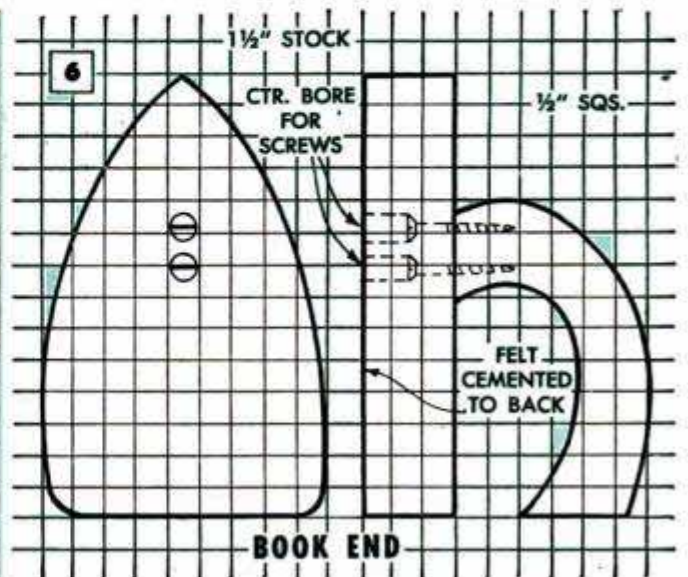




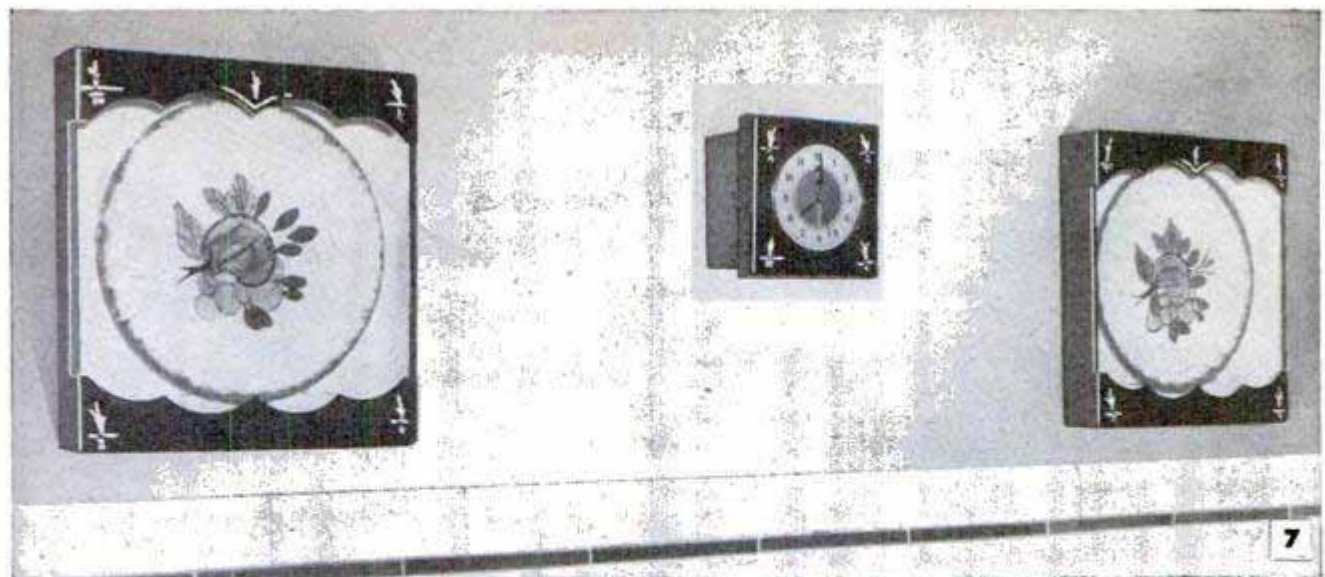
has been colored with lampblack or other pigment.

A neat wall shelf, Fig. 3, for potted plants, novelty planters and knickknacks consists simply of a 4½ x 18-in. piece of plywood mounted on two wooden brackets. The bracket design, shown in the squared pattern in Fig. 4, is enlarged on paper which has been ruled to form ½-in. squares and then is transferred to a piece of 1½-in. pine. After brackets have been cut out on the jigsaw, the curved portions are carefully sanded. The plywood shelf is fastened to the brackets with brads or countersunk screws driven from the top, the brackets being located 1¾ in. from the ends of the shelf. Loops for hanging the shelf are provided by driving a staple into the rear edge of each bracket and then bending it upward to project above the shelf. Screw eyes also can be used for this purpose if they are driven through the shelf and into the brackets near the back of the shelf. The loops are merely slipped over nails or screws driven into the wall.

Kitchen book ends for holding cookbooks and in-





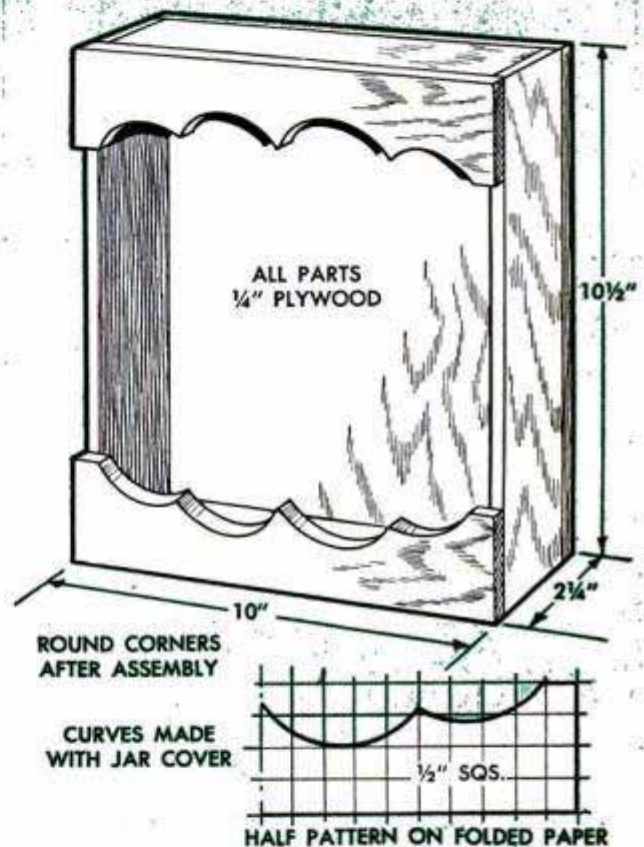


7

struction pamphlets are simulated pressing irons set on end. Both the base of the iron and the handle are painted the same color except for contrasting stripes which are run along the outer corners of the handle as pictured in Fig. 5. The book ends are cut from 1½-in. pine as detailed in Fig. 6, and the handles are attached with screws and glue, the screws being driven in counterbored holes in the base of the iron. These holes will not be noticeable when the book ends are in use, but they may be plugged with short pieces of dowel after assembly. The dowels, which should be a tight fit in the holes, are sanded flush with the surface before painting. If the book ends do not seem heavy enough, their weight can be increased by boring several holes in the wooden base and partially filling the holes with lead. These holes are plugged as the others were or covered with wood putty.

Fig. 7 pictures a pair of shadow-box plate holders and a matching clockcase. The three can be used as a set or the shadow boxes as well as the clockcase can be used alone. The shadow boxes are assembled from plywood, using simple box construction, as in Fig. 8. The matching scrolled pieces at the top and bottom can be cut out in pairs or four at a time, if you're making both shadow boxes. In this case also, jar rims will come in handy for scribing the arcs of the scallops. The brads used in assembly won't be noticeable if their heads are set below the surface and the holes filled flush with wood putty. Brads are driven into the back of the shadow box to center the plate when it is mounted. If you are making the boxes for sale or for a gift and do not know the design or coloring of the plate which will be inserted in them, it is best to paint the inside of the boxes white regardless of the colors used on the outside.

The clockcase is made as in Fig. 9, the

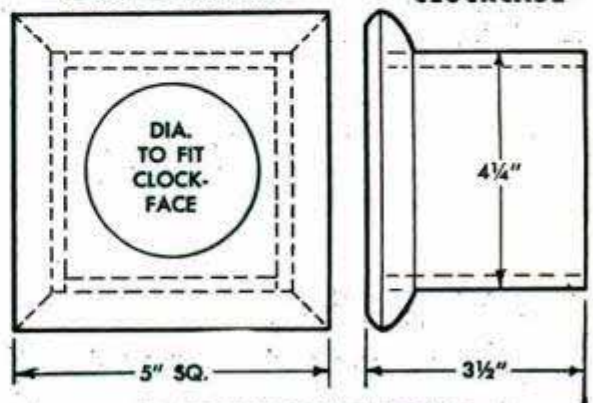


**8 PLATE SHADOW BOXES**

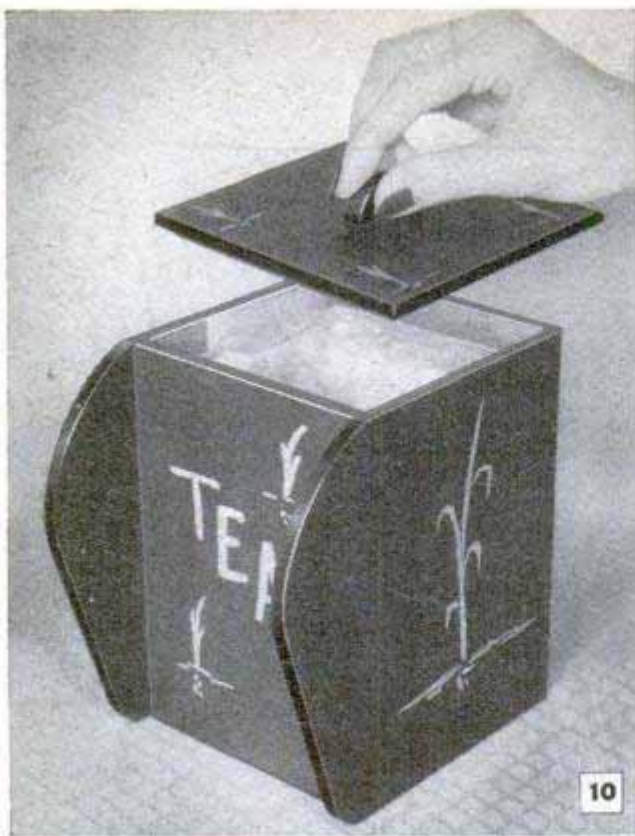
DIMENSIONS MUST BE ALTERED TO FIT CLOCKWORKS

9

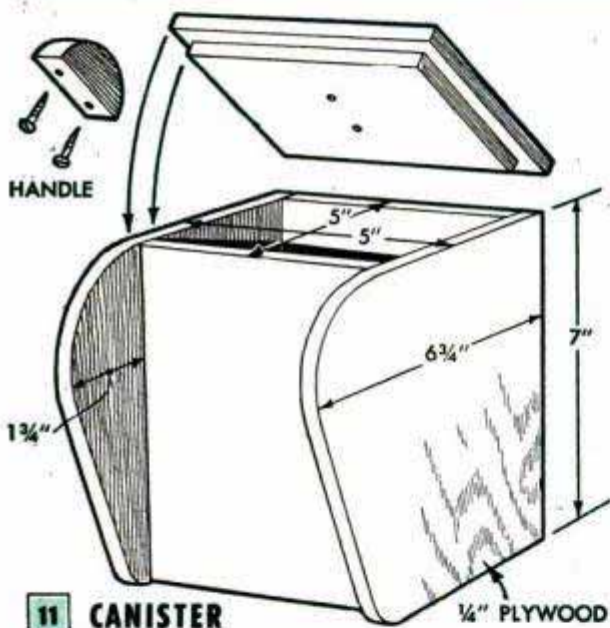
**CLOCKCASE**



FRAME, HALF-ROUND MOLDING  
ALL OTHER STOCK ¼" PLYWOOD

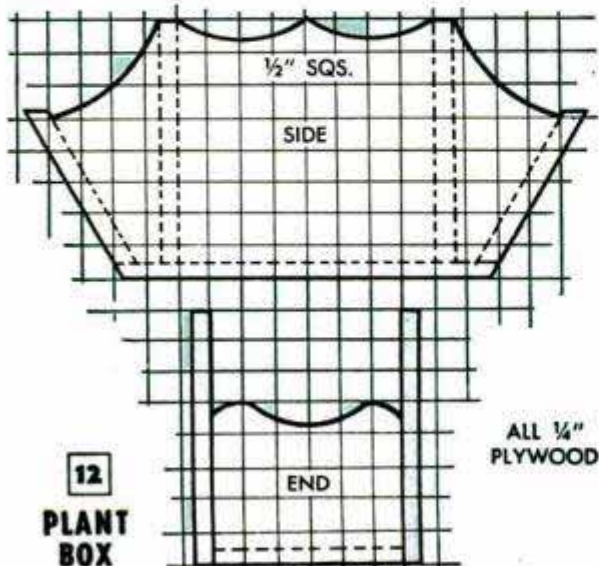


10



11 CANISTER

1/4" PLYWOOD



12 PLANT BOX

ALL 1/4" PLYWOOD



13

dimensions being varied to fit the particular clockworks on hand. The hole for the clockface can be cut quickly with a hole saw if you have one. Otherwise, lay out the circle on the work and jigsaw and sand it to the desired radius. Note that the front of the clockcase is framed with half-round molding. This is cut in two lengthwise and the outside edges are rounded as shown.

The plywood canister, Fig. 10, can be tilted forward and set at a convenient angle for scooping out the last of the contents. Canisters can be made in pairs for tea and coffee or in sets of four graduated sizes for tea, coffee, sugar and flour. Liners of sheet metal or cardboard covered with wax paper should be provided as they will not only protect the contents but also facilitate cleaning. The handle, shown in Fig. 11, is a semicircular piece cut from 1/2-in. stock.

Filled with artificial flowers or growing plants, the plant box pictured in Fig. 13 and detailed in Fig. 12 is just the thing for a window-sill decoration or a table centerpiece. The box is divided into three compartments, all of which can be left unlined for artificial flowers or fitted with sheet-metal liners to serve as a planter. A liner can be made only for the center compartment, if desired, leaving the two outer sections for artificial flowers.

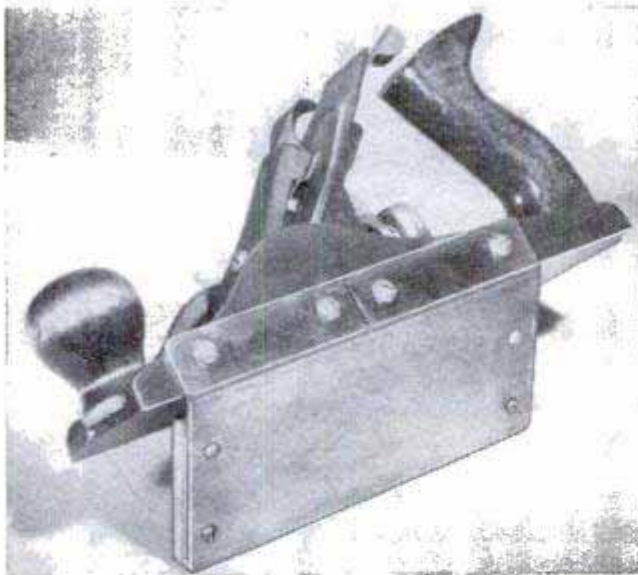
All the pieces should be sanded carefully before painting or staining and the sharp corners should be rounded slightly with sandpaper. A coat of shellac will fill and seal the wood surfaces prior to painting. The finish coat of paint should be allowed to dry thoroughly before applying the lettering and decorations. If you don't feel confident of your hand-painting abilities, it will be worth while to cut a stencil for the decorations or apply them by the silk-screen process, particularly if you intend to produce the items in any quantity. Decals are easy to use and provide a wide variety of decorative effects for this type of work.

# Decorated Stationery for the Holiday Season

Your stationery will be in tune with the season if the edge of the paper is decorated with artists' oils floated in a water bath. A year-round color theme can be had in this way, using pastel shades for spring and summer, browns and reds for fall, Christmas colors during the holiday season and blues for the late winter months. Christmas colors, for example, may be red, green and yellow with the green predominating. After selecting the desired colors, mix each one with a little turpentine to thin it out. Then partially fill a shallow cake pan with water and pour the paint onto the surface where it will float to give a marbled effect. Be sure to pour the oil colors slowly onto the water, and use more of one color than the others. Then dip the edge of the stationery or note paper into the floating



paint, immersing the paper no more than  $\frac{1}{4}$  in. as too much color will destroy the pleasing effect. If matching envelopes are desired, touch the edges of the flaps to the paint bath.—Paul Will, Chicago.



## Fence Fastened to Plane Provides Mitering Guide

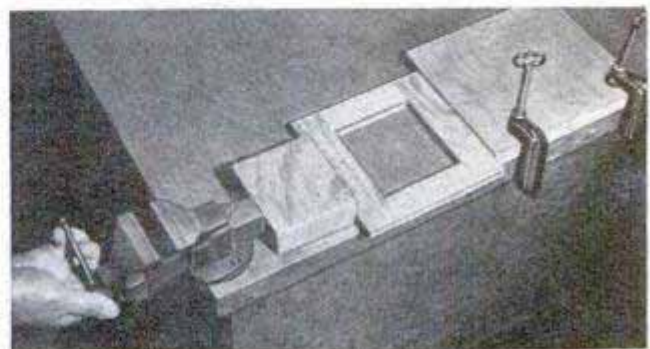
By fitting an ordinary block or jointer plane with a sheet-metal fence, you have an accurate guide for mitering the edges of wooden panels. Cut a piece of  $\frac{1}{16}$ -in. sheet metal 4 in. wide and about two thirds the length of the plane. Bend the top edge of the sheet to the desired angle by clamping the metal in a vise and then hammering over the edge  $\frac{3}{4}$  in. from the top. Screw a strip of  $\frac{1}{4}$ -in. plywood to the inner face of the fence, and attach the fence to the plane with small machine screws which are driven into holes drilled and tapped in the side of the plane.

Morris S. Dollens, Los Angeles, Calif.

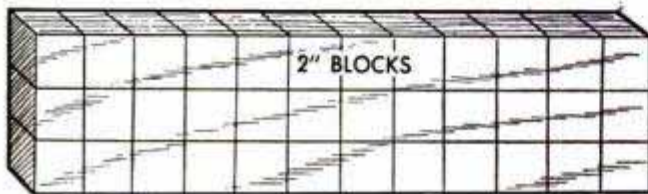
## Vise Clamps Small Work Between Wooden Blocks

A suitable bar clamp can be improvised from a bench vise and a couple of blocks of wood in just a few minutes. Clamp one of the blocks to the top of the workbench and place the second block against the end of the vise shaft. Then lay the work on the bench between the two blocks of wood and tighten the vise so that the shaft will press the work together as it moves outward from the rear of the vise.

Louis Hochman, Sherman Oaks, Calif.



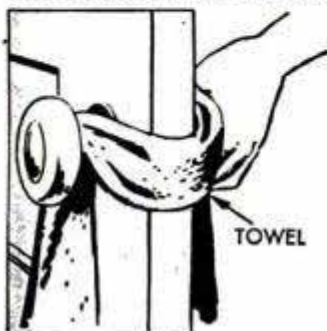
## Making Wooden Blocks for Children



A quick and inexpensive way to make a generous set of building blocks for your child is to cut them from a plank and then paint them to suit. Mark the plank lengthwise and crosswise to form squares of the same dimension as the thickness of the board, being sure to allow for the width of the saw cuts when laying out the squares. Rip the plank lengthwise into strips and then saw along the cross marks to form the individual blocks. After cutting, paint the blocks with a nontoxic enamel, glue appropriate numbers, decals or animal pictures clipped from magazines to the faces of the blocks and then coat with clear shellac. The latter will facilitate keeping the blocks clean and also prevent the pictures from wearing off. If the glue does not adhere to the paint, roughen the surface with sandpaper before gluing.

Warren W. Howe, Longview, Wash.

## Towel Draped Across Door Edge Prevents Accidental Slamming



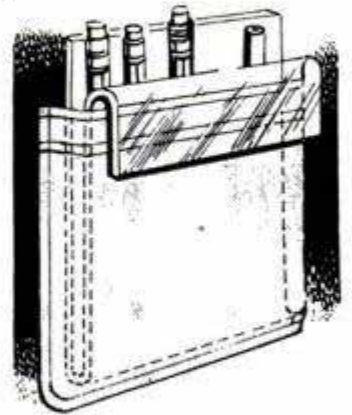
There will be no danger of thoughtlessly slamming a sickroom door and disturbing the patient if a towel is used to dampen the sound and to keep the door from closing tightly.

Drape a small hand towel over both door-knobs so that it stretches across the edge of the door as shown in the drawing.

David Deutsch, Brooklyn, N. Y.

## Plastic Liner Protects Shirt Pocket From Damage by Pencils

If you carry several sharpened pencils in a shirt pocket, this easily made plastic liner can be used to protect the shirt from being soiled or damaged by the pencils. Just cut a strip of sheet plastic to fit snugly in the pocket, heat the plastic and bend it double, leaving a space the thickness of a pencil between the plastic folds. Then bend down one end of the plastic to slip over the edge of the pocket.



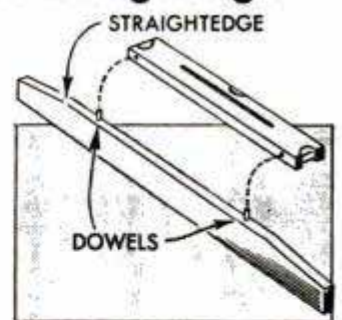
T. C. Evans, Baltimore, Md.

## Ice Cube Numbs Injured Finger

Removing a splinter from a finger is less painful if an ice cube is held against the injured area immediately beforehand. Just press the ice against the finger until the flesh is numb from the cold.

## Level Anchored to Straightedge

When a wooden level is used in conjunction with a straightedge it is more convenient to use the two together if two dowel pins driven in the top of the straightedge are used to attach the level. The dowels, which engage corresponding holes drilled in the level, serve to hold the level in place when using it horizontally. The level is also kept from shifting when checking for plumb. The straightedge must be thick enough so the weight of the level will not cause it to tip when being used horizontally and left unsupported.



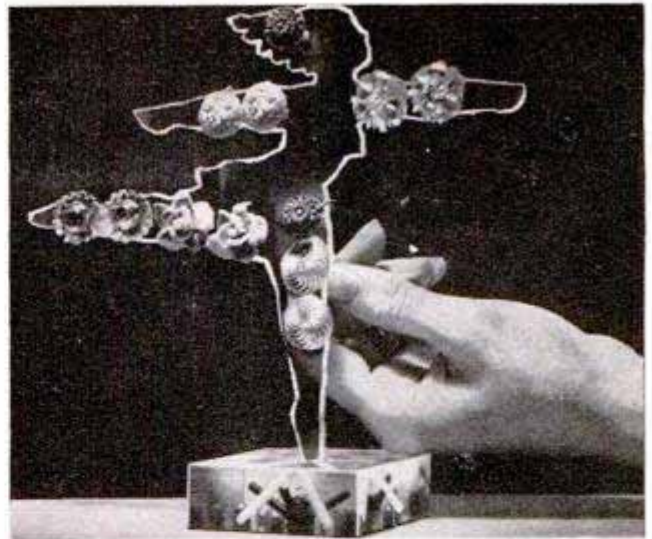
## Clay Shields Glass Cutter

To protect a glass cutter from rust as well as damage resulting from contact with other tools, completely enclose the cutting end in a wad of modeling clay before storing. Wipe the cutter with an oiled cloth to keep the clay from adhering to it.

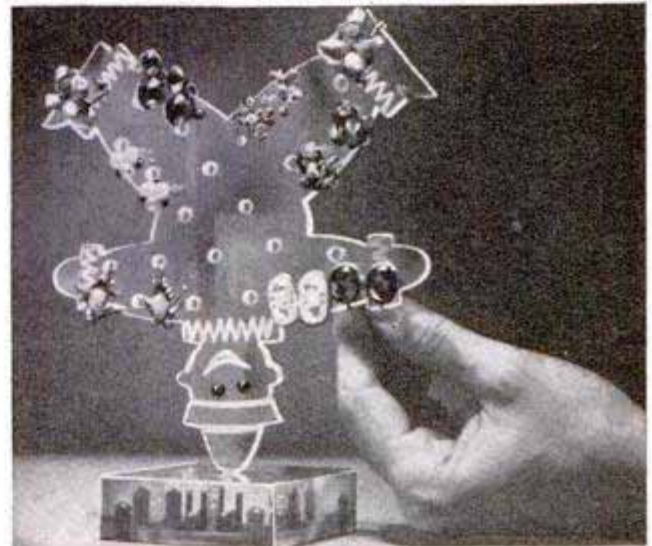
# HOLDERS for Earrings

By Herman R. Wallin

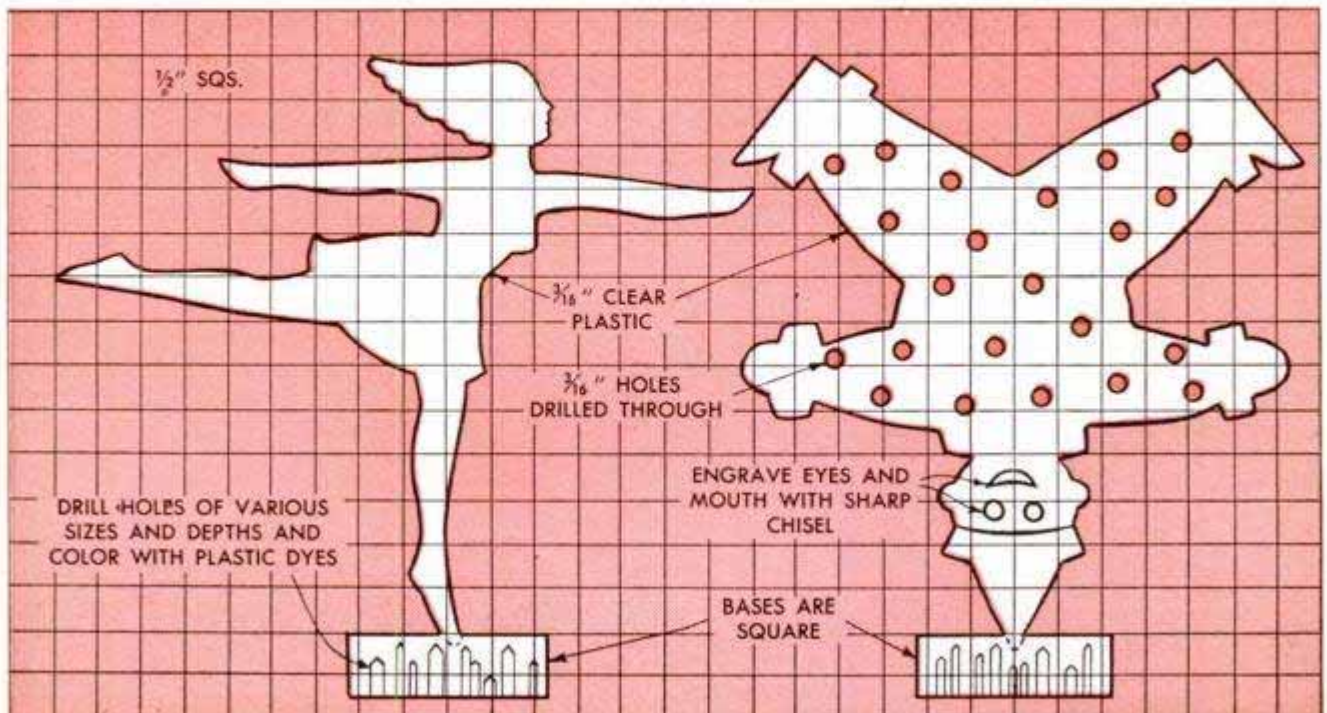
THESE plastic earring holders not only are attractive and useful additions to the dressing-table appointments, but each one is an especially interesting one-evening project for the crafter who likes to work plastics. The first step in making either cutout is to enlarge the squared patterns to full size and transfer them to the protective paper covering on a sheet of  $\frac{3}{16}$ -in. clear plastic. Then cut on the pattern lines with a hand or power jigsaw, using a fine-toothed blade. After sawing, go over the edges with a fine file to remove the saw marks. Now, polish the edges with a buffing wheel charged with rouge polishing compound. The wheel should be run at a slow speed as, otherwise, heat may soften the plastic. Note in the details below that the tip of the clown's hat and the dancer's toe are extended somewhat for attaching to plastic bases. These edges should be left square. Holes in the body, arms and legs of the clown are drilled clear through, but the eyes, mouth and other lines are cut into the surface with a sharp-pointed tool. Holes also are drilled in the bases to varying depths with drills of different sizes. The holes are filled with plastic dye and after allowing time for the dye to color deeply, the excess is drained out. The eyes of the clown are dyed blue and the mouth red. When the cutouts are finished, force the dancer's toe and the tip of the clown's hat into shallow holes drilled in the bases and cement in place.



Clear plastic is used for this cutout and base. Holes of various sizes drilled in the base from the bottom are dyed in harmonious colors by using plastic dyes



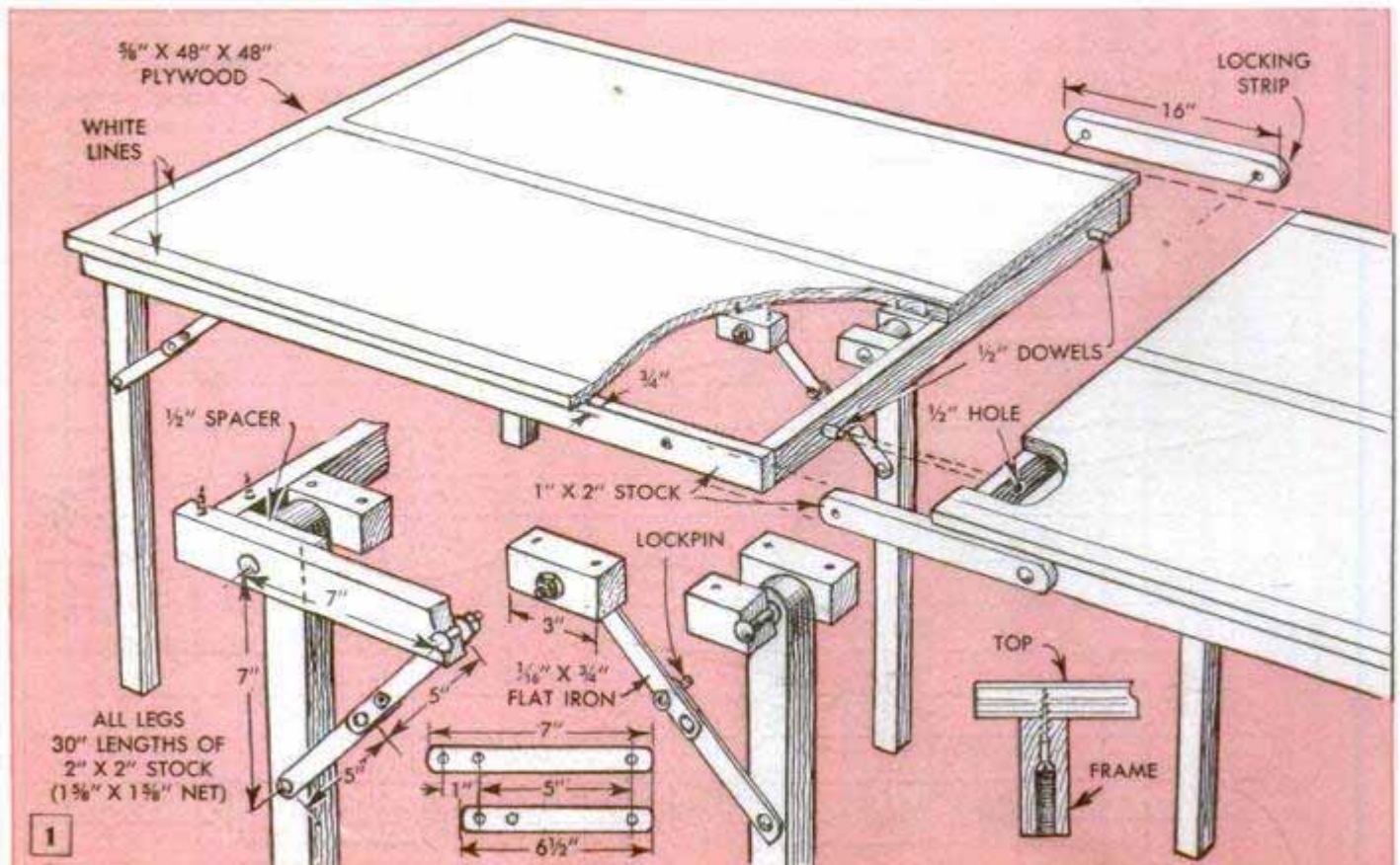
Although standing continually on his head this clown cutout provides a novel rack for hanging clusters of colorful earrings. Eyes, nose and ruffles are engraved



# Two Take-Apart UTILITY TABLES

By Elma Waltner

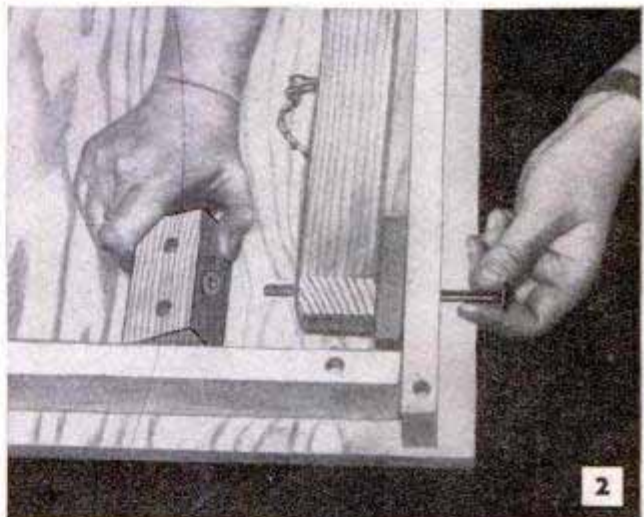
THESE all-purpose plywood tables will have many uses around the home, three of which are suggested at the left. The tables also can be readily taken apart and stored in small space when not needed. The one shown on the opposite page is made from a 4 x 8-ft. panel of plywood cut in half, making two separate sections with side rails and folding legs added. Locking strips and wing-nut bolts fasten the sections together for use as one large table. After making the top in two separate 4 x 4-ft. squares, thoroughly sand the edges and make the framework or side rails. These are glued and screwed to the lower side of the top boards, using 1 1/4-in. screws in countersunk holes drilled through the edge of the side rails as shown in the detail, Fig. 1. Round off the top ends of the legs and cross drill for the 1/4-in. bolts which hinge them to the mounting blocks, Fig. 2. The legs are held in the open position by folding table brackets, which may be purchased ready to attach or made up from flat iron to the dimensions shown in Fig. 1. Care must be used in laying out the dimensions for the screws holding these brackets in place. Any inaccuracy in locating the screws will prevent the legs from folding properly. The detail in Fig. 1 shows the dimensions for brackets, how they are riveted together and the location of the drilled holes for



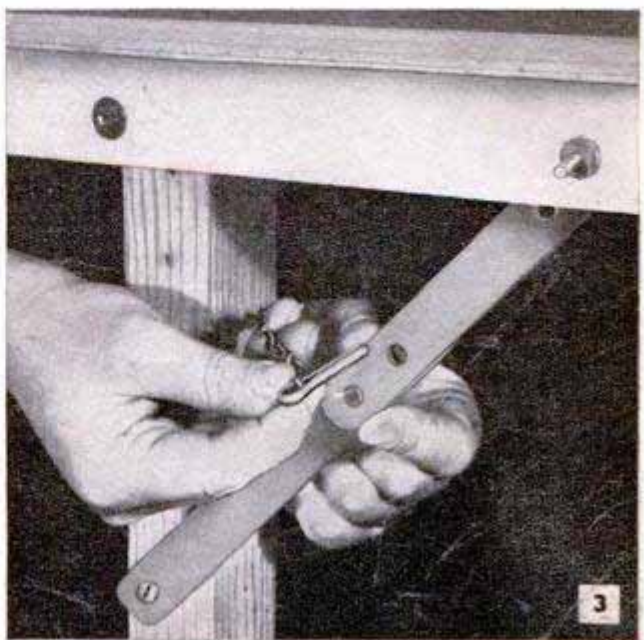


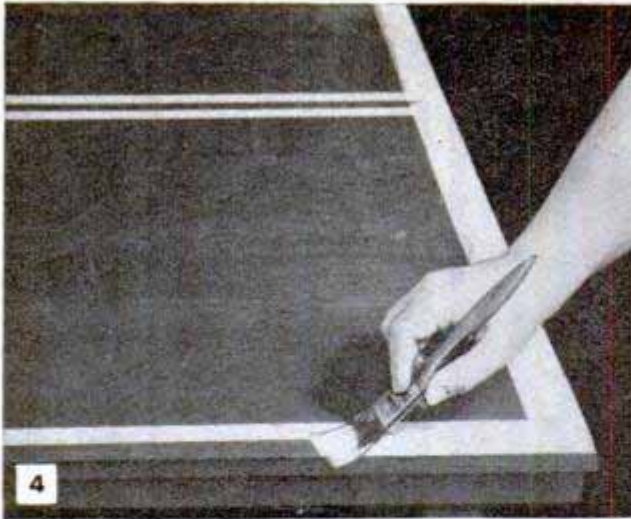
inserting the cotter key, Fig. 3, when the brackets are extended for locking the legs in an open position while the table is in use. Center locking strips for holding the two table sections together are made up from 1 x 2-in. stock 16 in. long. Matching holes are drilled through the strips and into the table side rails for the insertion of 1/4-in. bolts, which are fitted with wing nuts for quickly clamping the two parts together, or for quick removal when collapsing the table for storage. When the carpenter work has been completed, thoroughly sand the various parts and apply two coats of exterior enamel undercoater, painting the entire table surfaces, top, bottom, side rails and legs as well. When dry, apply a third coat of exterior, dark-green, flat-finish enamel. While 5 x 9 ft. is the regulation size for a table-tennis table, the game can be played on this undersize table. The white lines can be made 3/4 in. wide and neatly applied by first laying off the lines with decorator's masking tape, as in Fig. 4. Be sure edges of the tape are firmly pressed down in perfect contact with the table top at all points so that the paint cannot run under. Two coats of white paint will be needed to make a good finish. When the paint has thoroughly dried the tape may be stripped off.

The utility table shown in Fig. 5 is entirely of plywood construction. The simple lock joints, which hold the base rigid without the use of any fastenings, allow the table to be quickly assembled for use or readily taken apart for storage. It is of regulation height for table tennis. If the table is to be used outdoors it should be built of exterior-type plywood which will



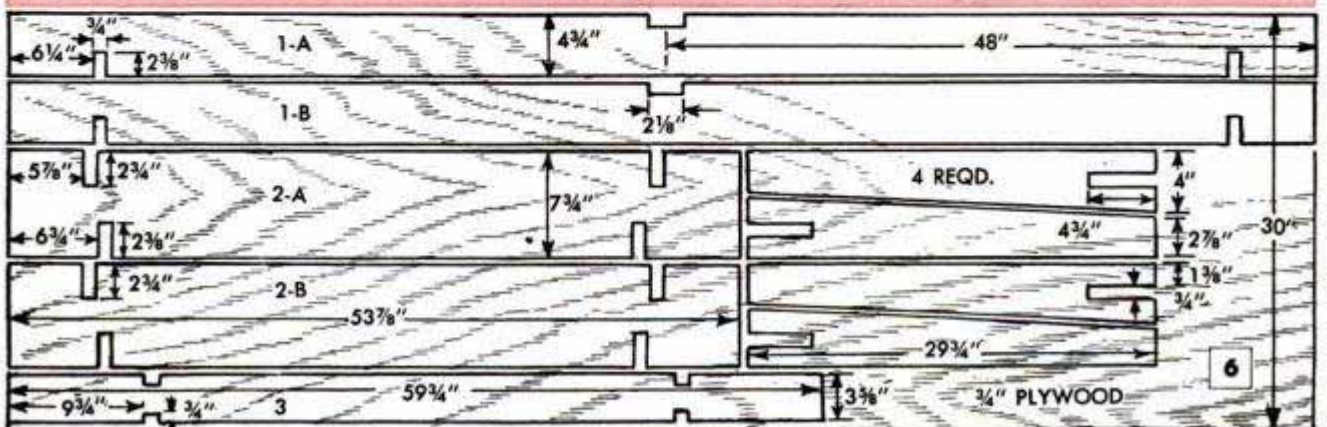
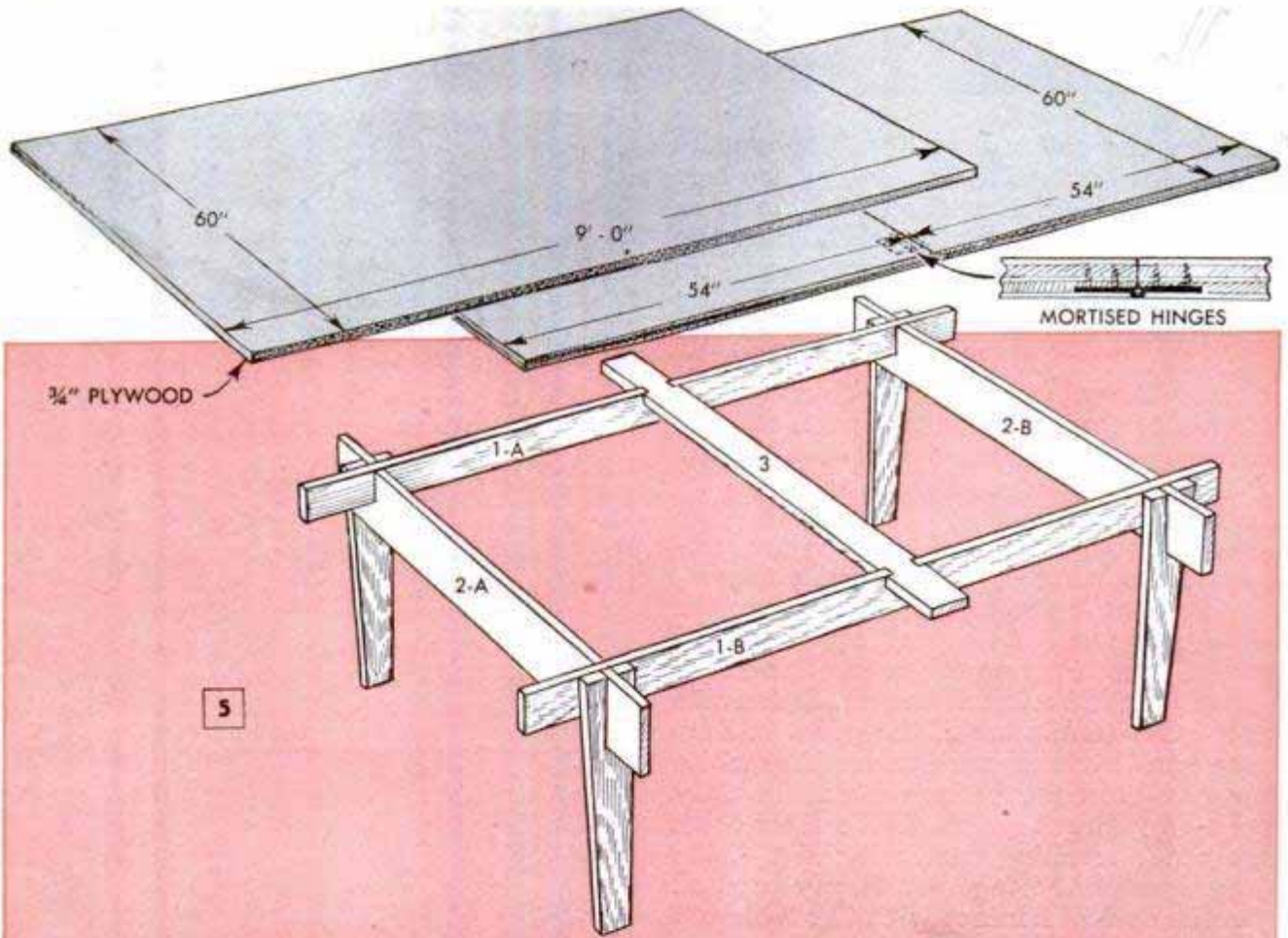
Hinge legs with bolt through side rail and mounting block; then screw block to table top. Below, insert cotter key in table bracket to lock the leg in place





Paint white lines around the edge and lengthwise down the center of the table top. Lay out lines with decorator's masking tape. Apply paint with soft brush. Strip off tape when paint is thoroughly dry

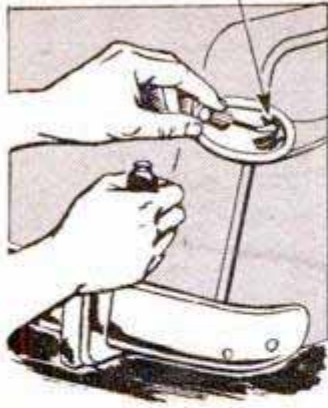
stand up well under all weather conditions. For indoors, where not permanently exposed to weather or repeated wettings, use the ordinary grade of plywood which is considerably less expensive. Panels  $\frac{3}{4}$  in. thick are preferred. The top can be made from one piece, 5 x 9-ft., which can be had on special order, or two pieces 5 x 4 $\frac{1}{2}$ -ft., hinged in the center, as shown in the detail in Fig. 5. The pieces for the base, the rails and the legs, can all be cut from one 96 x 30-in. panel. Carefully mark the frame pieces to the dimensions shown in the drawing, Fig. 5, and cut them with a sharp handsaw or power equipment if available. The notches in the various panels should be accurate in width. They can be made easily by drilling a hole at the bottom line and sawing each edge into the hole. The corners can be trimmed with a chisel.





## Refinishing Taillight Lenses With Red Fingernail Polish

FINGERNAIL POLISH

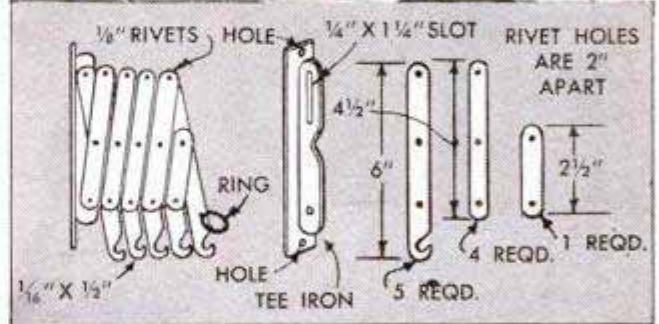
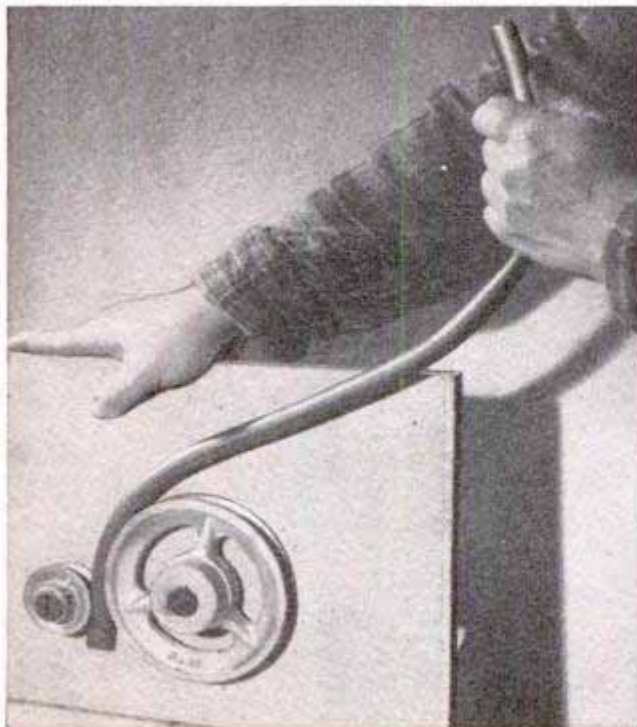


Prolonged exposure to sun and weather sometimes bleaches plastic taillight lenses and dulls their surface, resulting in a loss of color when turned on and detracting from the appearance of the lens during the day-time. To restore

the lens to a bright, safe red, coat it with red fingernail polish. If the surface of the lens is rough, first smooth it with fine sandpaper. Then, thin the polish with acetone and apply a light coat to the lens with long, fast strokes of the brush to attain a transparent coating. It is best to do this with the taillights turned on so it is easy to tell whether or not the polish is being applied evenly.—Frank C. Byrnes, Chicago.

## Tubing Bent Around Pulley To Prevent Kinking

There is always the danger of kinking when bending copper or aluminum tubing. However, this trouble may be eliminated by placing the tubing between two pulleys which are mounted on a board a short distance apart. The tubing is worked between the pulleys while making the bend gradually. Best results are obtained by moving the tubing up and away from the larger pulley as the bending progresses.



## Hanging Clothes From Lazy Tongs Saves Space in Small Closet

Having trouble selecting any one certain garment from an overloaded wardrobe closet? By equipping the closet with a flat-iron lazy tongs made to support several coat hangers, you may be sure of easy access to the garments. Insert a ring through the first flat-iron section to serve as a handle for pulling out the lazy tongs.

T. Sparks, Warrington, England.

## Spectacle Case Clamped on Saw Muffles Sound of Filing

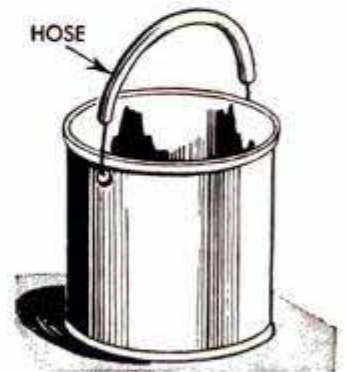
One carpenter uses a discarded spectacle case to muffle the annoying squeaking sound when he is filing the teeth of his handsaw. He merely clamps the case over a portion of the blade not being filed and then moves it along the blade as necessary.

## Rubber Hose Slipped Over Bail Forms Comfortable Handgrip

Although empty 5-gal. paint pails find many uses around the home, the wire bails are hard on the hands when heavy loads are carried. To provide a comfortable handgrip, remove one end of the bail from the boss on the side of

the pail and slip a length of rubber hose over the wire. The hose should be long enough so it will not slip out of position.

W. B. Kennedy, McCool, Miss.



## Double-Hung Clothesline Conserves Space in Yard or Basement



Double-hung clotheslines are real space-savers when it comes to hanging socks, washcloths and the smaller articles of clothing. If the space for hanging your wash is limited, string one or more of these double lines by locating the top one as high as you can reach and then locating a second line two or three feet below it.

## Rubber Band Around Paint Can Indicates Level of Contents

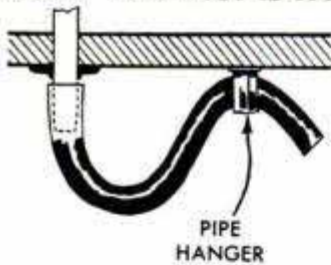
You will know at a glance how much paint is left in the partially empty cans that accumulate in the shop if you use a rubber band to indicate the amount remaining in each can. Just slip the rubber band over the can and adjust it approximately to the same position as that of the paint level.



Ira A. Minor, New York City.

## Trap Improves Trailer Icebox By Forming Water Seal

Slipping a short length of rubber hose over the drain outlet of a trailer icebox forms a water seal which prevents warm air from entering the box through the drain. The hose is looped as shown in the



detail and the free end is attached to the underside of the trailer floor by means of an ordinary pipe hanger. —Clinton R. Hull, Costa Mesa, Calif.

## Simulated Pork-Rind Bait

Scraps of drumhead material cut to the desired shape and length provide imitation pork rind that can be used over and over again with your fishing lures. The material, which can be obtained from many music repair shops, needs no preservative.

R. A. Jenkins, St. Louis, Mo.

## Improved Tipup for Ice Fishing Made From Three-Pronged Branch

If you want an extra ice-fishing tipup and have no materials with which to make one, you can improvise a suitable one from a three-pronged branch. Cut two of the arms shorter than the third one and notch the third arm to permit tying the fishline securely. Tie a piece of colored cloth to the end of the tipup to serve as a warning. Be sure that the spread of the two smaller arms is greater than the diameter of the hole in the ice. Otherwise, the tipup is likely to be pulled right through the hole.

Kenneth Gabrosek, Fly Creek, N.Y.

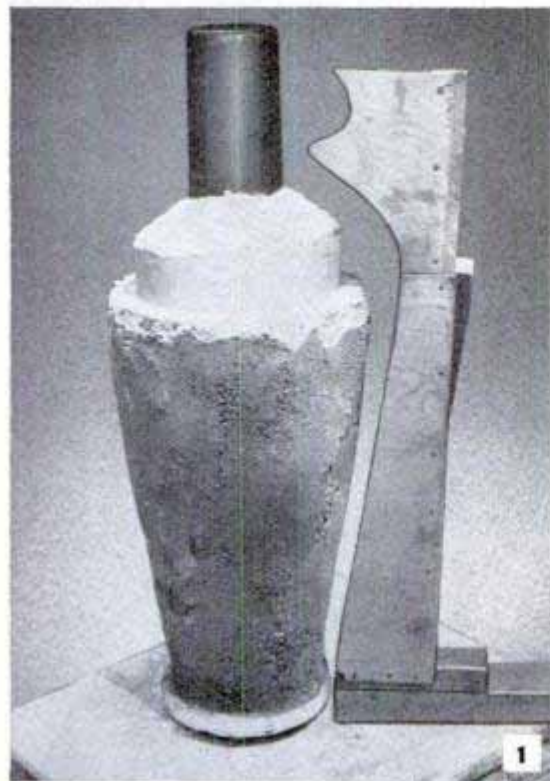
## Cork Backs Plaster Patch

Small holes left in a plastered wall by removal of a pipe can be patched quickly by using a bottle cork to serve as a backing for the plaster. The cork should be trimmed so that it can be pressed in the hole flush with the face of the lath.



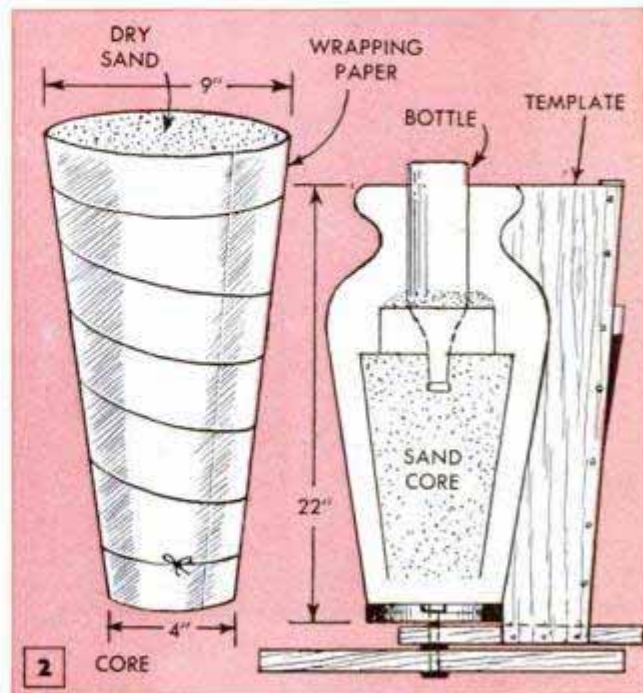
# GARDEN URNS

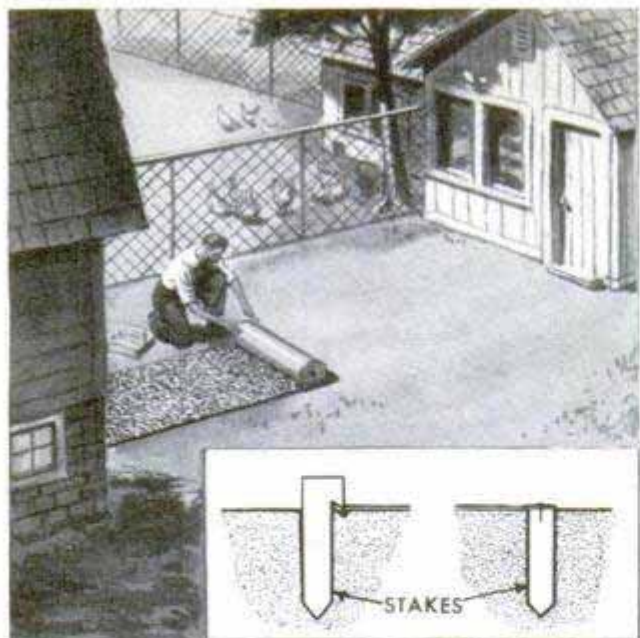
*molded in concrete*



By Dick Hutchinson

LENDING a Spanish touch to the entrance of a ranch-type home, these large ornamental urns are fashioned without molds. Built up on a modified potter's wheel, a workable mixture of sand, 1 part, and portland cement, 3 parts, is applied to a core of sand held in a wrapping-paper form. The sectional drawing in Fig. 2 shows how the core is set on a 2-in.-thick base of concrete placed on a turntable and then covered with a 1-in.-thick layer of concrete. The core at the top is made up of a paper collar filled with sand in which a bottle is placed inverted to form the neck opening. When set, the concrete is wet thoroughly and more concrete is applied to build up the outside to conform with the plywood template, Fig. 1. The bottle is removed and the urn is turned upside down to pour out the sand. A thin brush coat of water and red-iron oxide is daubed over the outside of the urn.





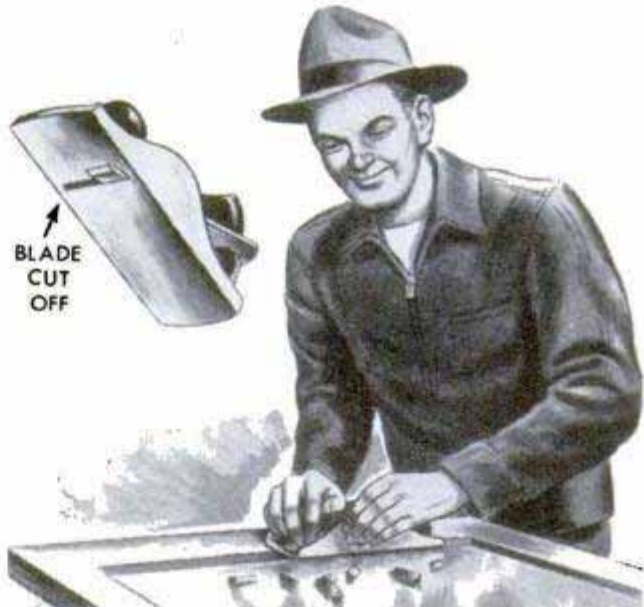
### Asphalt Roofing Laid on Ground Provides Temporary Walk

Roll roofing laid directly on the ground and held in place with stakes provides an excellent substitute for a concrete walk. It is inexpensive and sturdy, making it ideal for providing a reasonably dry path on new construction where there will be considerable delay in laying concrete walks or on the farm between the various out-buildings. Two methods of anchoring the roofing are shown in the detail. One consists of a notched stake which is driven into the ground to grip the edge of the roofing. The other method is accomplished by tacking the roofing to the tops of stakes which have been driven flush with the surface of the ground at intervals of a few feet.

Ralph J. Patterson, Fairfield, Me.

### Old Putty Removed From Sash With Altered Plane Blade

Removing putty from window sash is done quickly by one glazier who uses an old plane blade to do the job. One half of the cutting edge is ground off the blade which is then set in the plane at the required depth. In use, the plane rests on the sash frame while the projecting blade chips away sections of the putty as the tool is pushed along.



### Varnish Aids in Patching Plaster

When patching a plastered wall, brush the edges of the old plaster with varnish. Allow the varnish to dry until tacky and then add the patching plaster. The varnish will result in a better bond, giving added strength and a neater-looking job.

L. Larsen, Ludington, Mich.

### Walnut Phonograph Top Forms Modern Hopper-Type Picture Frame



Don't throw away that old walnut phonograph top. It will make a deep picture frame of real interest and beauty to hang over your modern radio or television set. After removing the original finish and filling any holes or deep scratches, including the holes left by the hinge screws, coat the top with shellac, and then rub with linseed oil to bring out the natural luster and rich grain of the wood. A three-dimensional scene was fashioned for the frame shown by gluing a calendar illustration of a marshy lake to the inside of the phonograph top. Then two carved wooden ducks were fastened in flight formation over the background, using small screws driven from the back of the frame. An engraved brass strip not only titles the picture but also conceals the spot where the lock used to be.

Maurine Russel, Denver, Colo.

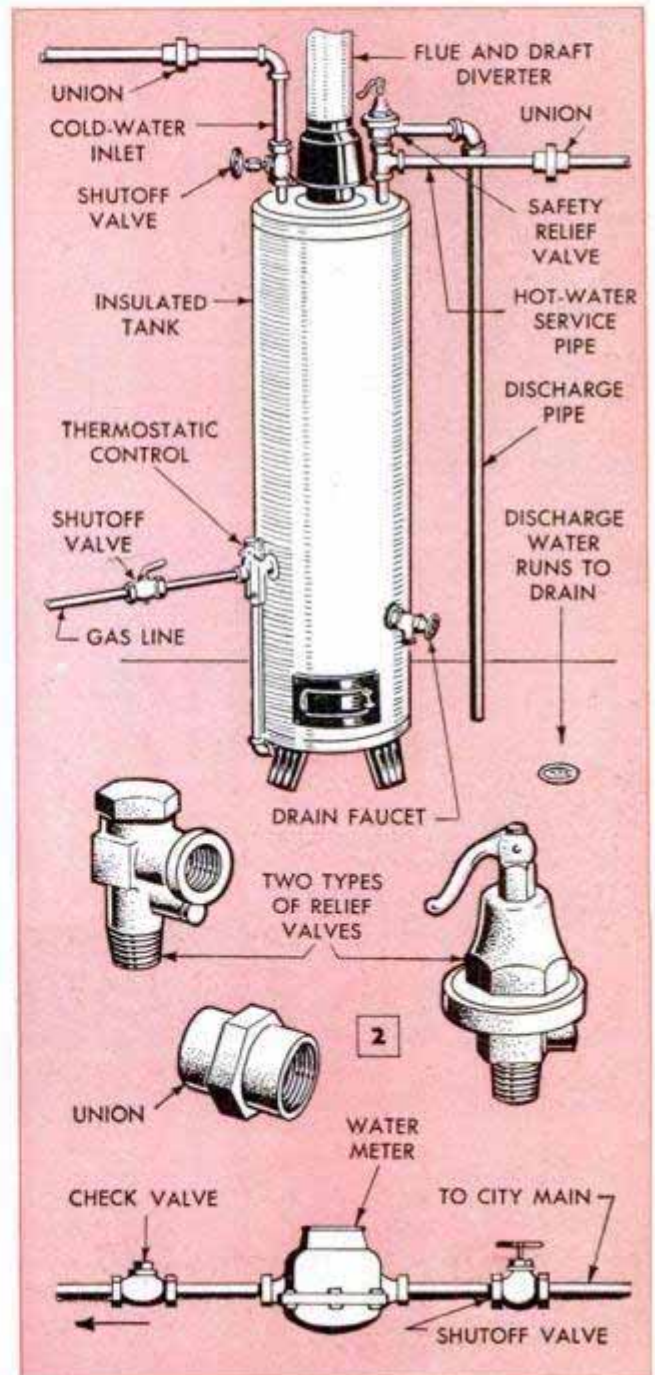
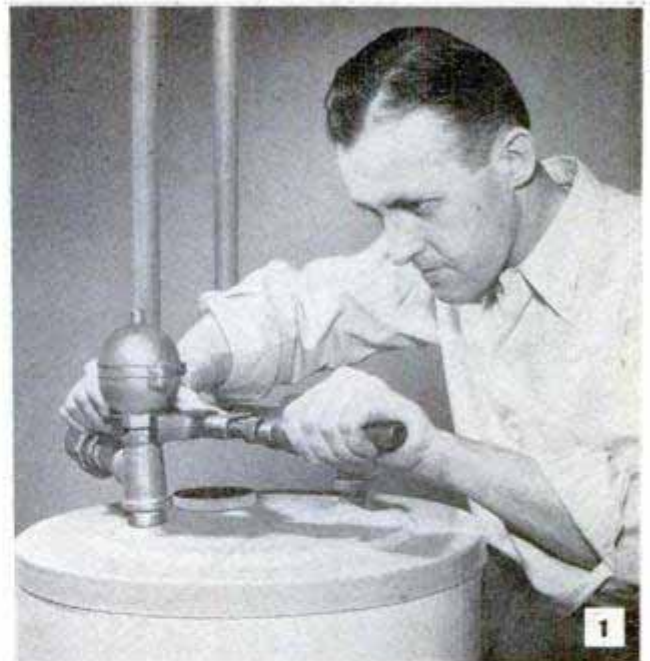
# Installing HOT-WATER HEATERS

How to maintain top efficiency and avoid common troubles. Includes safety features, "side arm" heaters, tempering tanks, heat exchangers and installation

By E. R. Haan

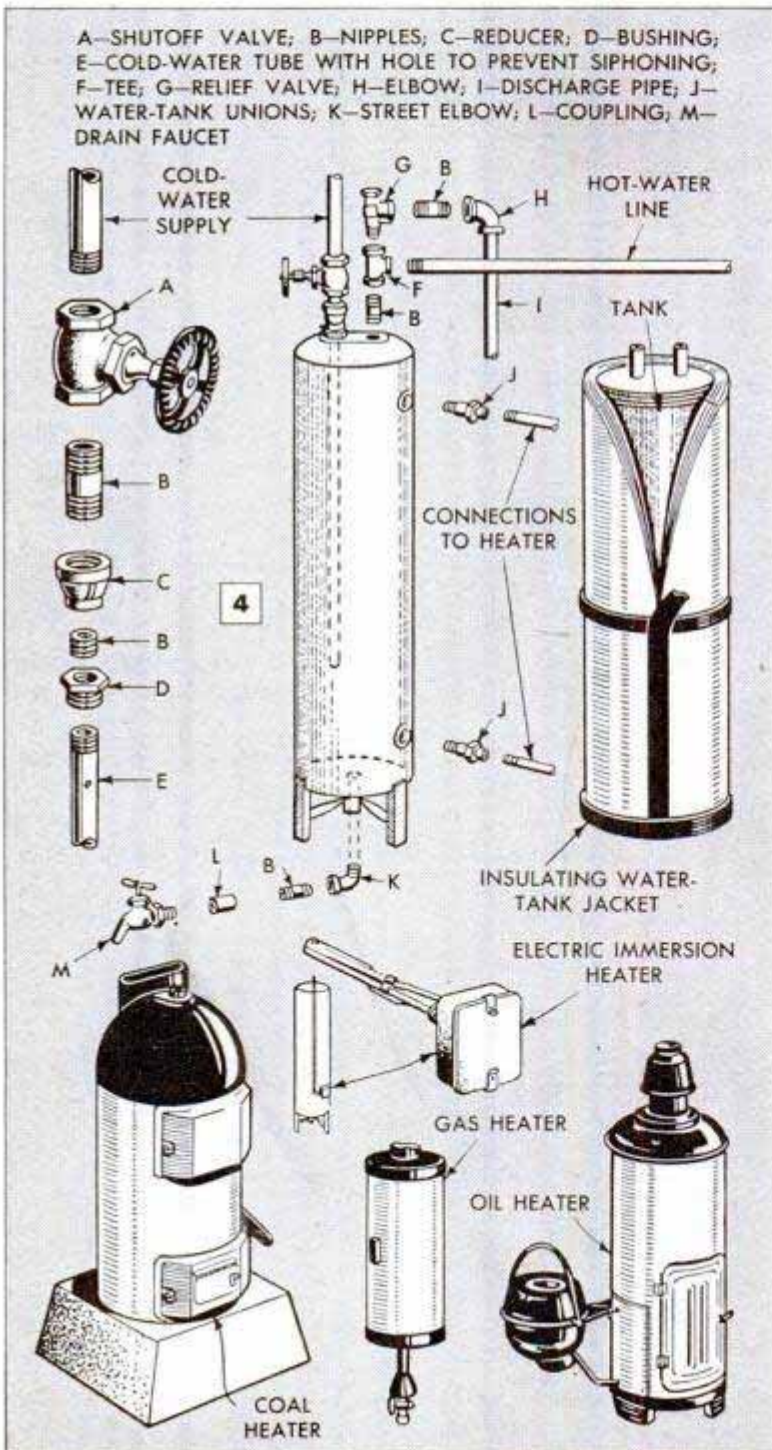
**H**OT-WATER heaters of the automatic types designed to use electricity, gas or oil are available in a wide range of sizes for new installations. There also are special conversion units which can be installed in tanks connected to older-type furnace coils or other sources of heat. One of these is a simple electrically operated immersion unit which can be installed in any existing tank to convert it to full automatic operation at very little cost. Another inexpensive unit is a thermostatically controlled gas valve especially designed for converting a hand-controlled gas heater of the older type. Although these newer units are fully automatic in operation, they require periodic checks to keep them operating at peak efficiency. Before installing a new heater, it's a good idea to check costs of electricity, gas and oil in your locality so that you can install the heater utilizing the most economical fuel.

**Safety controls:** As heated water expands and tends to build up excessive pressures, every automatic water heater must be provided with safety controls on the burner unit and also should be fitted with a pressure-relief valve, Figs. 1, 2 and 4. One type of relief valve opens when excessive pressure develops and also is fitted with a fusible plug that melts at about 210 deg. F. The pressure element usually is adjustable to open under pressures ranging from 50 to 125 lbs. per sq. in. Of course, the fusible plugs are replaceable, several being supplied with each new unit. Two types of these valves are shown in Fig. 2. Some other types of relief valves have a manual tripping mechanism that should be test-operated once or twice a year to see that the valve is in reliable working condition. In some installations it also is necessary to install a check valve in the cold-water line





A—SHUTOFF VALVE; B—NIPPLES; C—REDUCER; D—BUSHING;  
E—COLD-WATER TUBE WITH HOLE TO PREVENT SIPHONING;  
F—TEE; G—RELIEF VALVE; H—ELBOW; I—DISCHARGE PIPE; J—  
WATER-TANK UNIONS; K—STREET ELBOW; L—COUPLING; M—  
DRAIN FAUCET



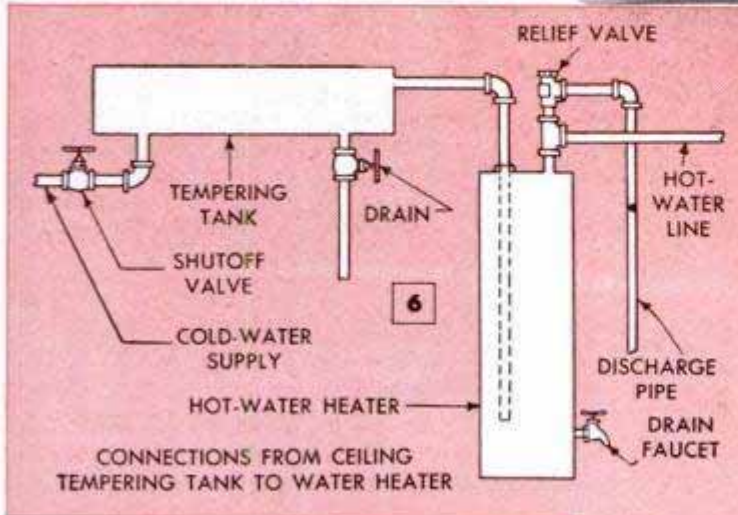
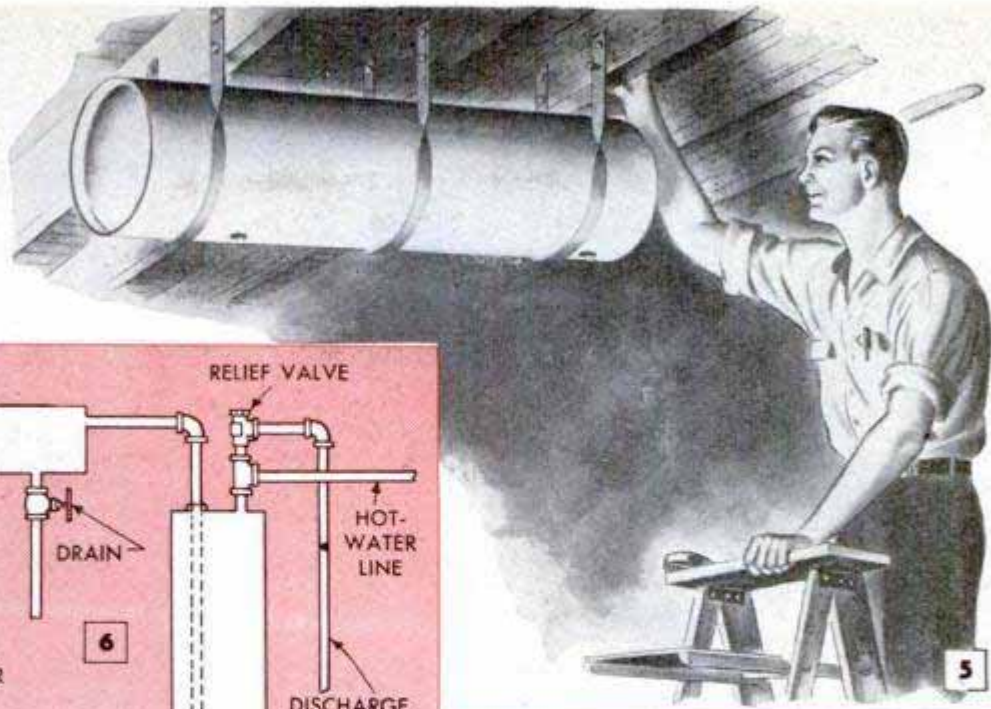
as shown in Fig. 2. This valve protects the water meter from being damaged should hot water back up against the normal pressure in the water line. Electric heaters are controlled by thermostatic switches which ordinarily do not require attention. The heating unit is turned on and off automatically between the heat ranges for which the thermostat is set. Automatic gas-fired water heaters have thermostatically controlled burners which maintain uniform water temperatures and will shut off the gas supply completely in case the pilot light goes out.

**Pipe and flue sizes:** Pipe connections on the heater tank determine the size of pipe to use in connecting the unit to the water supply lines. The main hot-water lines usually are of  $\frac{3}{4}$ -in. pipe while  $\frac{1}{2}$ -in. pipe is used for branch lines. Pipe smaller than  $\frac{1}{2}$  in. should not be used. Pipe runs from the heater to existing lines are connected by means of unions as in Fig. 4. Of course, electric heaters do not require flues, or vents, but all gas, oil and coal-fired water heaters require flues either to an existing chimney, or direct to the outside. Many homeowners install vent pipes, or flues, of stainless steel as this material does not corrode. Gas and oil-burning water heaters should always be fitted with a draft diverter of the type in Figs. 2 and 3.

**Water-heater installation:** Gas and oil-burning water heaters are comparatively easy to install. Just place the unit on a level floor, or a concrete base 2 to 3 in. thick, and as close as possible to a flue opening in the chimney. Flue or vent-pipe sizes generally are 3 to 4 in. in diameter for gas, 4 to 5 in. for oil and 4 to 6 in. for the coal-burning heater. In connecting the gas and oil supply lines, follow the directions of the heater manufacturer in all details. A shutoff valve should be installed in the cold-water line near the tank and, in oil-burning heaters, it is customary to install a valve in the fuel line near the burner, as in Fig. 2. A shutoff valve is not required in the hot-water line. Never locate a shutoff valve between the relief valve and the tank.

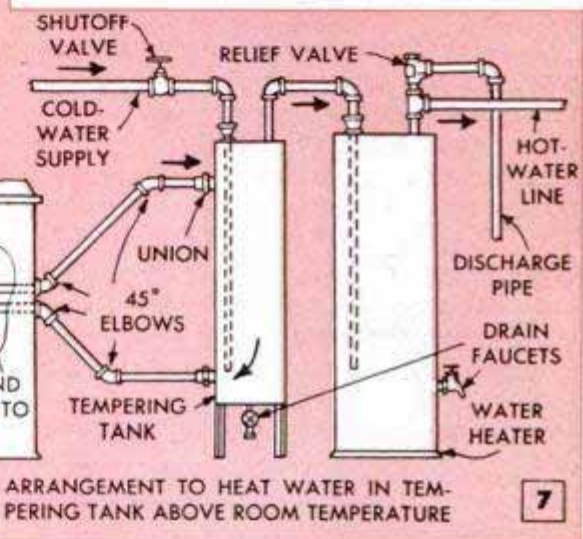
Hot-water storage tanks having

A tempering tank saves on water-heating costs. Such tanks are generally installed overhead, being hung from joists with flat-iron bands



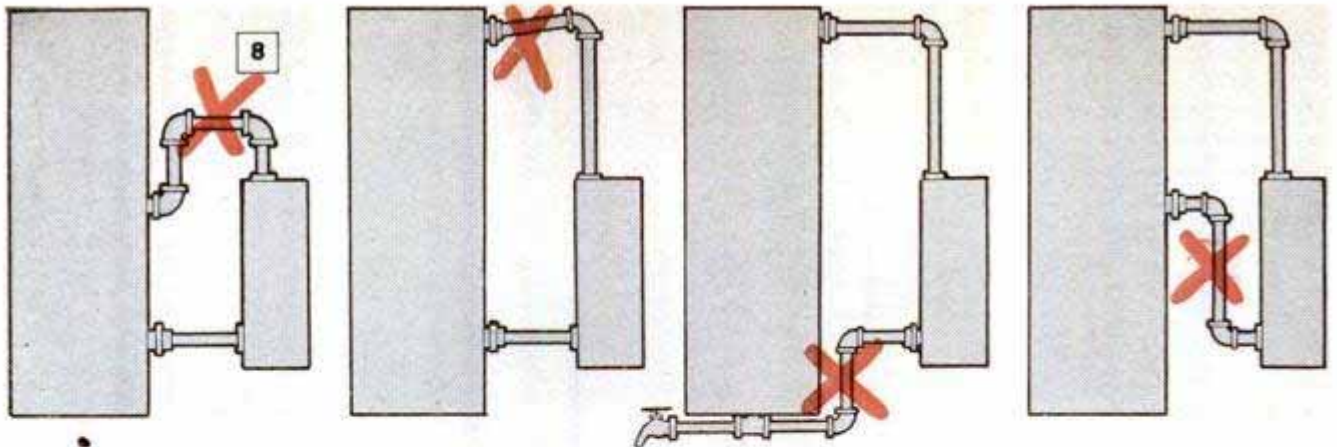
no built-in heater units have six standard tappings and come uninsulated. The tank stand, pipe fittings, relief and drain valves and the cold-water tube are installed as in Fig. 4. The cold-water tube, preferably of brass, usually is about 4 ft. long for a 5-ft. tank. It extends inside the tank so that cold water is discharged near the bottom to prevent cooling the hot water above. A small hole is drilled near the top end of the pipe, its purpose being to prevent hot water from being siphoned out of the tank when cold water is drawn from the system at a level lower than the top of the tank. After installing the storage tank it will pay to insulate it as in Fig. 4. This will prevent a 15 to 30-percent heat loss by radiation. It also is advisable to insulate long runs of hot-water pipe for the same reason.

**Connecting separate heater:** When separate heating units of the gas, coal or oil-fired types are hooked up to hot-water storage tanks, inefficiencies in heating are caused by faulty installations such as those detailed in Fig. 8. Gas-fired side-arm heaters should be connected as in Fig. 9, and as in Fig. 12 when a water back is used in the furnace or boiler. The hot-water pipe from the heater to the tank should rise vertically from the heater and then run horizontally to the tank connection. When making the right-angle bend, use two 45-deg. elbows and a short nipple rather than a single 90-deg. elbow. Fig. 9 also shows the installation of a thermostatic gas-con-



trol unit for full automatic operation of the heater. If desired, an electrically operated immersion unit, Fig. 4, can be installed in place of the side-arm gas heater. This unit also is controlled automatically.

**Tempering tanks:** Worth-while savings can be made in water-heating costs by the installation of tempering tanks in which cold water is preheated to room temperature before entering the heater tank. Figs. 5, 6 and 7 detail common methods of installing tempering tanks. In ordinary installations, it is regular practice to hang the tank from the floor joists as in Figs. 5 and 6, but it also can be arranged as in Fig. 7 and connected to a heating coil in the boiler or furnace. A 20 or 30-gal. tank usually is sufficient for either type of installation. The ordinary pipe connections are shown in Figs. 6 and 7. Note that in both types of installations drain valves are provided. In a coal-fired furnace or boiler the water coil projects only a short distance into the firebox. On furnaces or boilers in which intermittent flash heating with gas or oil is used,



8  
THREE 90° TURNS AND DOWNWARD FLOW OF HEATED WATER RETARDS CIRCULATION; CENTER CONNECTION TO TANK NOT ADVISABLE

DOWNWARD TRAVEL OF HEATED WATER TO TANK RETARDS FLOW. USE SHORTER VERTICAL PIPE TO GET UPPER ONE HORIZONTAL

COLD-WATER RETURN AT TANK BOTTOM PERMITS SEDIMENT AND RUST TO CIRCULATE WITH WATER; SEDIMENT WILL CLOG LOWER PIPE

COLD-WATER RETURN FROM CENTER OF TANK KEEPS LOWER PORTION TOO COLD AND UPPER PORTION TOO HOT

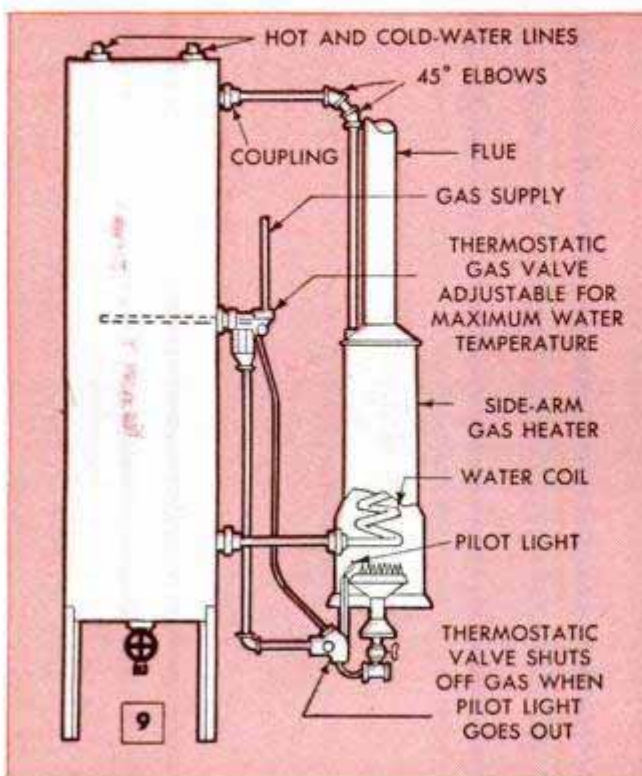
the return bend of the coil must be inserted farther into the firebox in order to obtain satisfactory results from the installation.

**Heat exchangers:** In many homes, various installations are used to warm the water in a storage tank by piping in steam or hot water from the boiler. In some cases a steam or hot-water coil is submerged directly in the storage tank. The details in Fig. 10 show both the direct and indirect types of hookups for this purpose. With the indirect method, water from the storage tank flows through a coil submerged in a smaller tank in which hot water from the boiler is circulated. A coil connected to a storage tank may be placed inside a steam or hot-water boiler below the water line. In these systems steam or hot-water lines from the heating plant are automatically

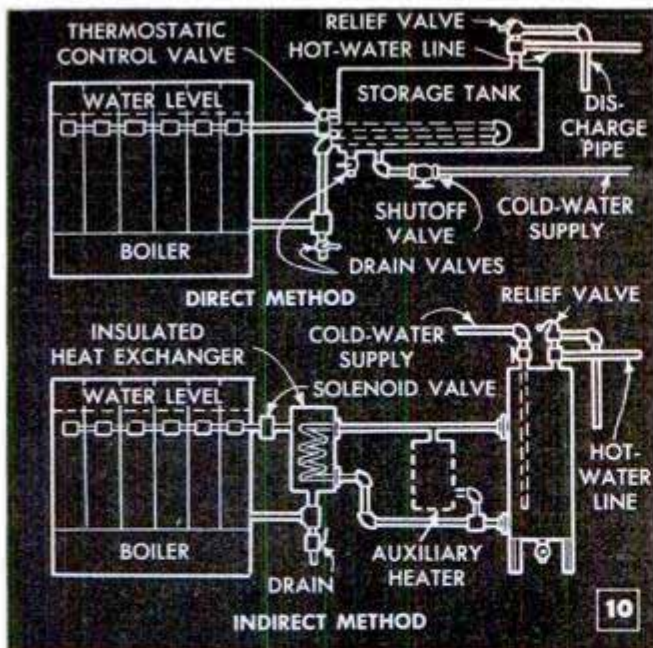
opened and closed by thermostatic valves or by aquastats on the storage tank, which prevents overheating of the water. Very often heating plants equipped in this way are used throughout the summer season for heating water. In these installations special controls are installed to prevent circulation of heated water or steam throughout the heating system. As a rule, however, an auxiliary water heater, shown by the dotted lines in the lower detail in Fig. 10, is used during the summer months.

**Water backs:** A water back, Fig. 12, should always be installed in the furnace or boiler in a level position, as otherwise a pocket of live steam may form at A, and blow back periodically through the line into the storage tank, causing a sharp, metallic hammering which in time will damage the installation. Water backs generally overheat during the coldest weather when the heating plant is operating over long periods at full capacity. The lower detail in Fig. 12 shows one practical way to utilize excess heat from the installation by circulating the water through a radiator installed in a room directly above the storage tank. This type of installation is frequently used when hot water is drawn from the storage tank only at comparatively long intervals.

**Liming of heating coils:** In localities where only hard water is available, heating coils in side-arm heaters, water backs and furnaces gradually become coated inside with deposits of lime. This hard coating not only acts as insulation, requiring more and more heat to keep up the water temperature as the coating thickens, but it also restricts the water passage and eventually clogs the coil. Hot water circulating through a restricted passage may cause such severe hammering that it will loosen the pipe joints and cause leakage. The remedy, of course, is then to install a







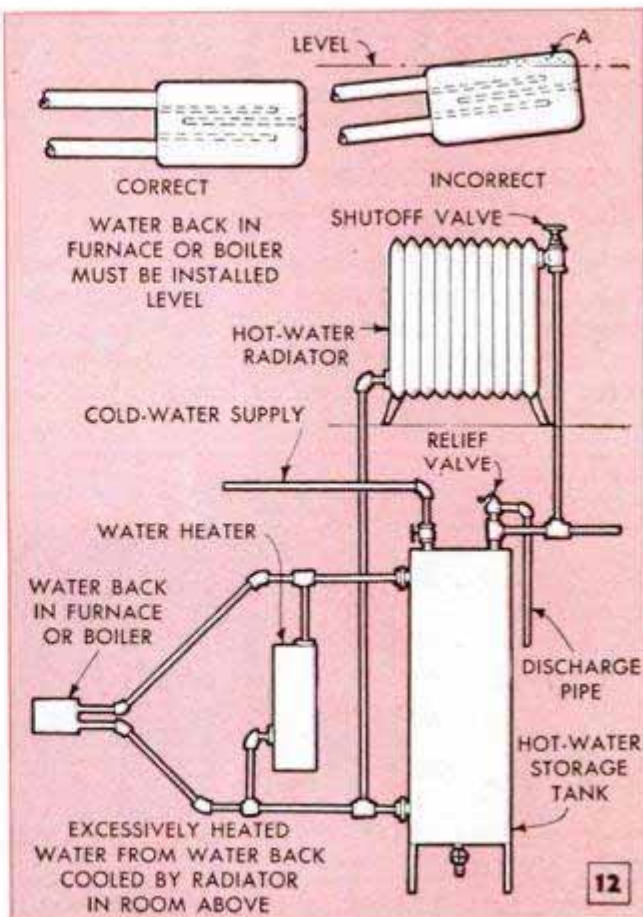
water softener and replace the faulty coil.

**Flushing and refilling storage tank:** Impurities contained in water settle to the bottom of hot-water storage tanks and form a film of sediment across the bottom of the tank. It's a good idea to open the drain faucet at the lower end of the tank once a month and drain off 2 to 4 gal. of water. This precaution will remove most of the accumulated sediment and keep the tank comparatively clean. However, a thorough flushing of the tank at least once a year is advisable. To do this, shut off the heating unit and close the valve in the cold-water supply line. Open a hot-water faucet at a level above the tank. Then drain the tank completely. Leave the drain faucet open and turn the valve in the cold-water line full on so that the full force of the water strikes the tank bottom. This will dislodge sediment and wash it out through the open drain faucet. In some cases it will help when cleaning and flushing an older tank to remove the cold-water tube and insert a hose so that a forceful stream of water can be directed around the sides and across the bottom of the tank. After a thorough flushing, close the drain faucet, open the cold-water valve and refill the tank and the line until water runs from the hot-water faucet. Then start the heating unit. When flushing tanks connected to a cast water back, do not fill the tank with cold water until the water back has cooled sufficiently to prevent breakage. On automatic gas heaters the baffle tube in the vent should be removed at intervals and cleaned as in Fig. 11. Wipe off all the dirt and rust which have collected and then swab the vent tube, or flue, with a stiff-bristle flue brush. Be sure to replace the baffle in the same position as it was originally. Periodic cleaning of the flue and baffle gives faster heat transfer

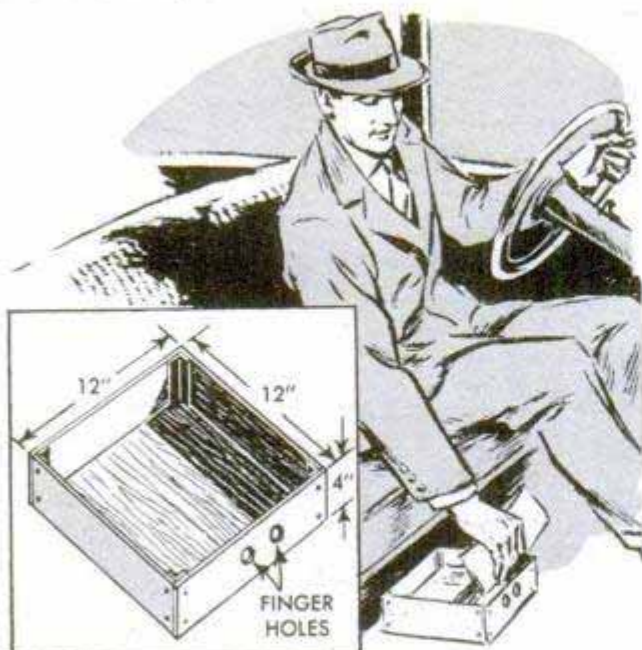
and there will also be greater economy in water-heating costs.

**Leaky drain faucet:** Sometimes a persistent leak will develop in the drain faucet at the bottom of the tank. Usually it will be necessary to drain the tank in order to make a reliable repair. As a rule, a thorough cleaning of the parts and the installation of a new washer will stop the leak unless, of course, the seat is badly corroded.

In gas installations it is likely that the work will have to be approved by your local utility company before the gas is turned on.



## Tray Slipped Under Car Seat Holds Maps and Sundries

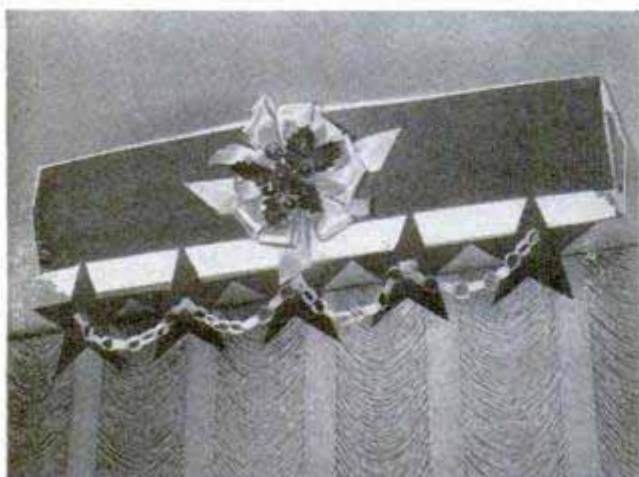


The overflow from the glove compartment can be stored out of the way and yet within easy reach if such items as road maps, rags and a flashlight are kept in a wooden tray that fits under the front seat of the car. Although the dimensions given provide a tray of a convenient size, it is best to check under the car seat to see if there are any obstructions which will limit the width or depth of the tray. The corners of the tray are reinforced with sections of angle iron, and fingerholes drilled through the front aid in grasping the tray when sliding it out from under the seat.

Robert Hertzberg, Jackson Heights, N. Y.

## Fluorescent Fixtures Decorated With Christmas Trimmings

Trimming fluorescent ceiling fixtures with colored paper adds to the holiday atmosphere of the room. As the bulbs burn cool enough to permit using paper decorations, treatments similar to the one photo-



graphed can be used to decorate most any type of fluorescent ceiling fixture. In this case, a panel of heavy red paper was cut to fit over the frosted glass panel of the fixture, allowing five stars to hang below the lamp. Chains of white crepe paper join the stars, and a white satin bow, having a cluster of varicolored ornaments in the center, is tacked with thread to the paper panel. The latter is fastened to the ends of the fixture with cellulose tape.

## Glass Fuses Provide Paint Cups

Both the model-maker and the amateur artist will find that the glass inserts of burned-out plug fuses form handy individual paint cups that are not easily upset. The brass threads can be removed from the fuse by grasping the edge of the brass with a pair of long-nosed pliers and rolling the thin metal around the nose of the tool.



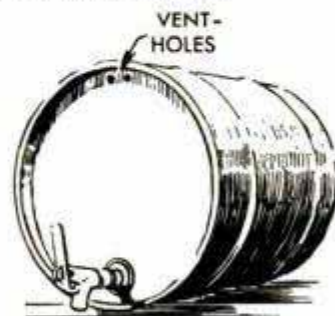
Andrew Brennan, Philadelphia, Pa.

## Lubricating Car-Window Channels Prevents Binding of Glass

Failure of car windows to move freely is not only inconvenient but is also injurious to the lifting mechanism. To assure that the glass will move easily in the channels, lubricate them with a mixture of paraffin and carbon tetrachloride. Mix enough paraffin in the liquid to form a creamy fluid and then brush the mixture on the fabric in the glass channels. The mixture will penetrate the fabric and, after the carbon tetrachloride evaporates, the paraffin will be deposited on the surface.

## Venting Outdoor Fuel Drums

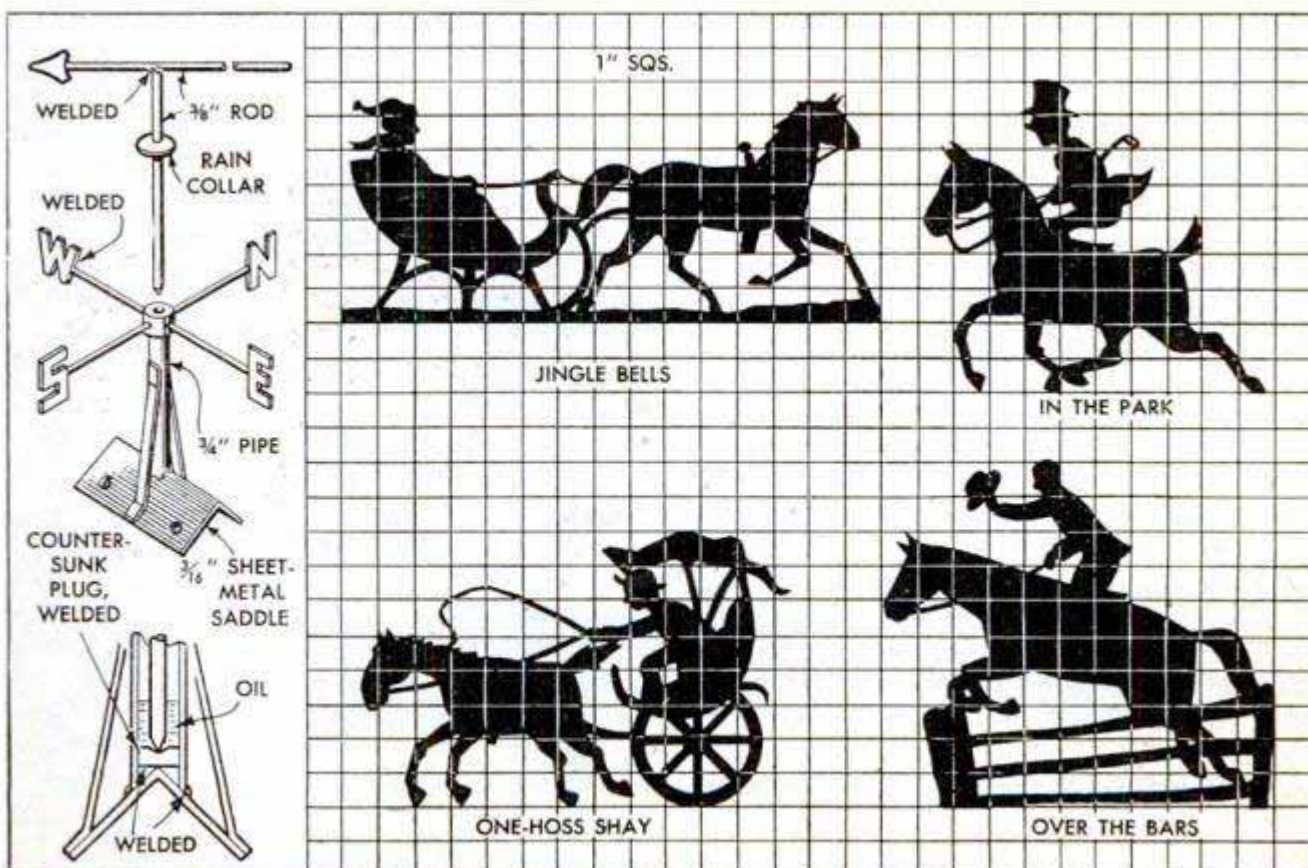
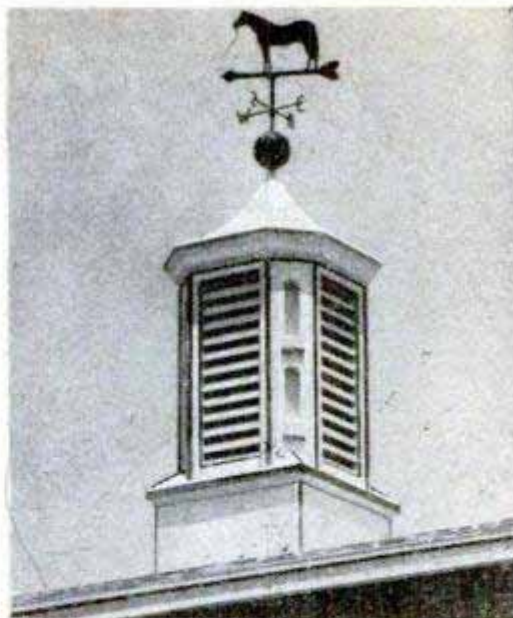
One of the simplest ways of venting an outdoor fuel drum which is mounted horizontally is to drill one or two ventholes just under the rim at the end of the drum. Two  $\frac{1}{16}$ -in. holes will allow

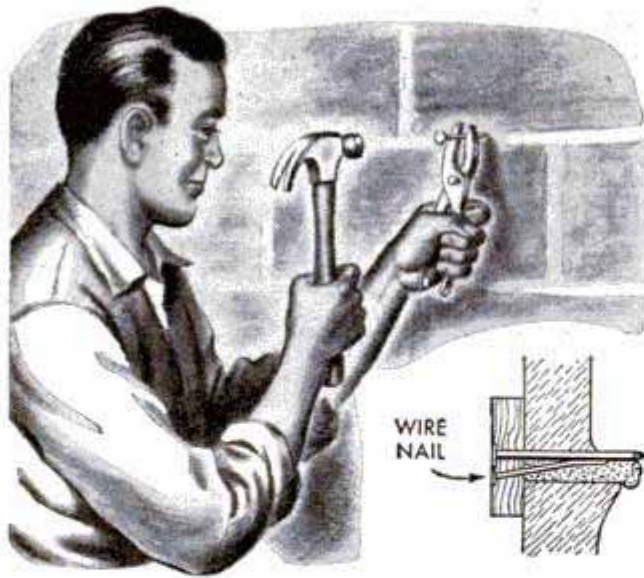


the fuel to flow freely from the spigot and the overhang of the rim will prevent moisture from entering the drum through the holes.—Dan Lobianco, Somerville, N. J.

# WEATHER VANES

WIND DIRECTION may not be important to most homeowners but a weather vane pointing to windward atop the garage cupola adds that final touch in decorating the exterior of your home. The metal vane can be almost any design that suits your fancy, but profiles, or silhouettes, of horses either at rest or in action have always been the favorites. Shown at the right and detailed below are suggested cut-outs for sheet-metal vanes which can be made of steel or aluminum, the latter being somewhat easier to work and less subject to corrosion. After you've selected the design you want, sketch it full size from the details and transfer the pattern to the sheet metal. Cut on the pattern lines with the jigsaw, using a fine-toothed, metal-cutting blade. Rough edges and sharp corners are then smoothed with a fine file and the completed cutout is riveted or welded to the directional arrow, which is made up from a length of  $\frac{3}{8}$ -in. rod slotted at one end to take a sheet-metal arrow point, or head. The assembly is then welded to a  $\frac{3}{8}$ -in. rod which pivots in a pipe sleeve. The lower end of the pivot rod is ground to a blunt, rounded point which seats on a metal plug welded to the inside of the pipe sleeve at the lower end as in the sectional view. The direction letters are cut from sheet metal and welded to short rods which are then welded to a coupling turned onto the upper end of the sleeve. The open top of the sleeve is closed by a brass rain collar soldered to the pivot rod while the lower end of the sleeve is welded to an angle-iron base which has been drilled for fastening to the ridge of the roof with wood screws. Finish both the vane and mounting assemblies with two coats of flat-black lacquer.





### Boards Fastened to Block Wall With Hammer and Nails

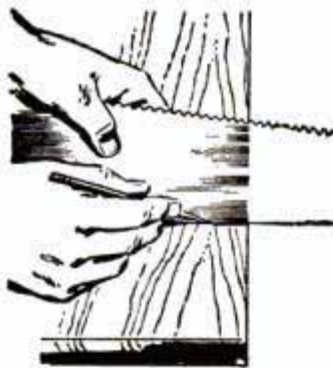
When a star drill and toggle bolts are not available to attach shelf brackets, furring strips or backboards to a concrete-block wall, here is how you can use a hammer and some 8d or 10d nails to do the trick. Grasping one of the nails in a pair of pliers, hammer the nail into the mortar at the edge of one of the blocks. When the nail bends after a few hammer blows, select a new nail and continue to deepen the hole. It will usually take five or six nails to pierce through the mortar. After the necessary holes have been made in this way, use a large concrete nail or an ordinary nail of larger diameter than the hole to fasten the board. Should the board work loose owing to the load or vibration, drive a wire nail, 1½ or 2 in. long, on each side of the concrete nail so that the point will be driven against the shank of the concrete nail. The wire nails being harder will dig somewhat into the metal of the larger nail, holding it tightly in place.

Frank M. Burtick, Jr., Alma, Mich.

### Reflection in Saw Squares Board

To mark a board for sawing off the end squarely when a try square is not at hand, use the blade of your handsaw. Hold the blade across the board with the top edge of the blade down, noting the reflection of the edge of the board

in the side of the blade. When the reflection lines up with the edge of the board, as shown, the blade is at a right angle to the edge and can be used as a straight-edge to mark the board square.



100 W.P.

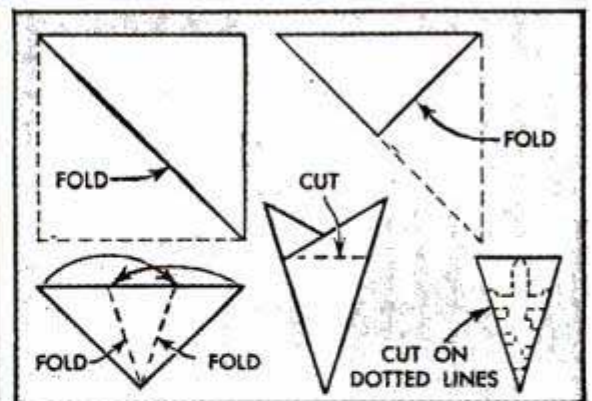
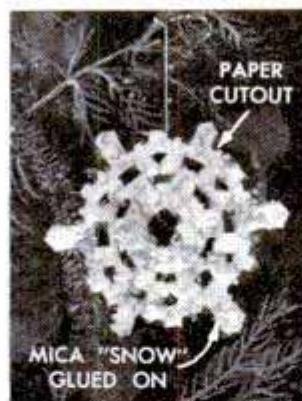
### Caster Cups Support Cot Legs

Camping on soft ground often results in the legs of a folding cot working their way into the tent floor, causing the cot to tilt at an uncomfortable angle. To prevent this, carry along several metal caster cups and place one of them under each leg of the cot when setting up camp.

Lee H. Schimpf, Tulsa, Okla.

### Christmas-Tree Ornaments Cut From Paper Simulate Giant Snowflakes

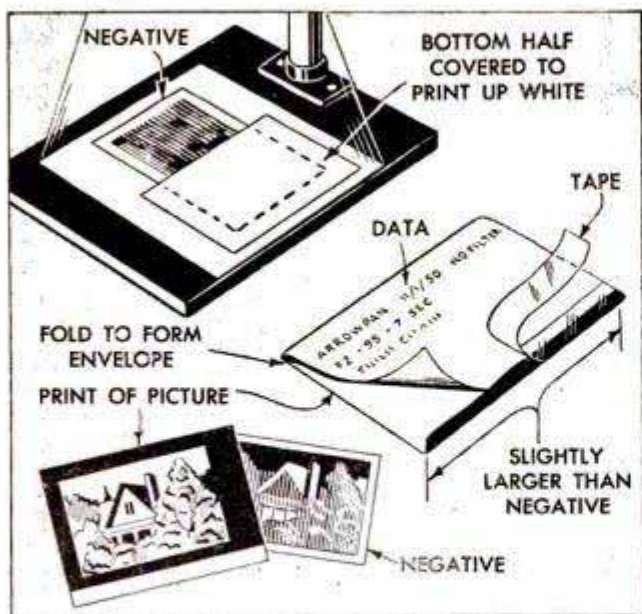
If you enjoy making your own Christmas-tree ornaments and would like something a little different this year, dress the tree in these paper "snowflakes." They are easy to make by coating a paper cutout with artificial snow. Cut the paper into 3-in. squares and then fold each square as shown in the upper details, first diagonally and then double through the center. Next, fold both corners of the triangular piece toward the center, as in the lower left-hand detail. Cut the folded piece of paper straight across the top, leaving a wedge-shaped piece, and then cut the design in this piece as indicated by the dotted lines in the lower right-hand detail. When unfolded, the paper will resemble the snowflake pictured except that it will have 12 points. To get the



6-pointed flake, simply cut off every other point near the outer ring of the design. After you are satisfied with the over-all appearance of the snowflake, coat it with paste or mucilage and sprinkle with artificial snow. After the paste has dried, shake off the excess particles of snow and tie the flake to the Christmas tree with colored wrapping string or ribbon.

Paul Handley, Philadelphia, Pa.

# Negative and Print Filed in One Packet



Most amateur and professional picture shooters have lost at least one valuable negative because of a haphazard system of filing. After experiencing this myself, I adopted this foolproof filing system whereby both the print and the negative are filed in one handy packet, including exposure data, date and other specific information pertaining to that particular negative. The process is simple. Place a sheet of printing paper, twice the size of the negative, on the enlarger easel and lay the negative, emulsion side down, on one half of the paper. Cover the other half of the paper so that

it will print white. Lay a piece of plate glass over the parts to hold them flat. Then make the exposure and develop and ferrotype the print. Now, fold the unexposed portion to the back of the print as in the right-hand center detail. Tape the fold securely in place and there's the file envelope for the negative with the print on the front as you see it in the lower left-hand detail. Write data on the back of the envelope with India ink so that you will have a permanent record. It's a good idea to use glossy paper as this withstands handling.

Michael Ligocki, Gary, Ind.

## Wire Recorder Saves Time by Handling Data on Photographs

Photographers who do considerable work in the field can save time by using a wire recorder to keep track of pertinent infor-

mation. Details and remarks can be recorded in a moment and then edited later when time is available. The recorder is set up in the front seat of the car, and the necessary 110-volt a.c. is supplied by a war-surplus converter carried in the trunk.

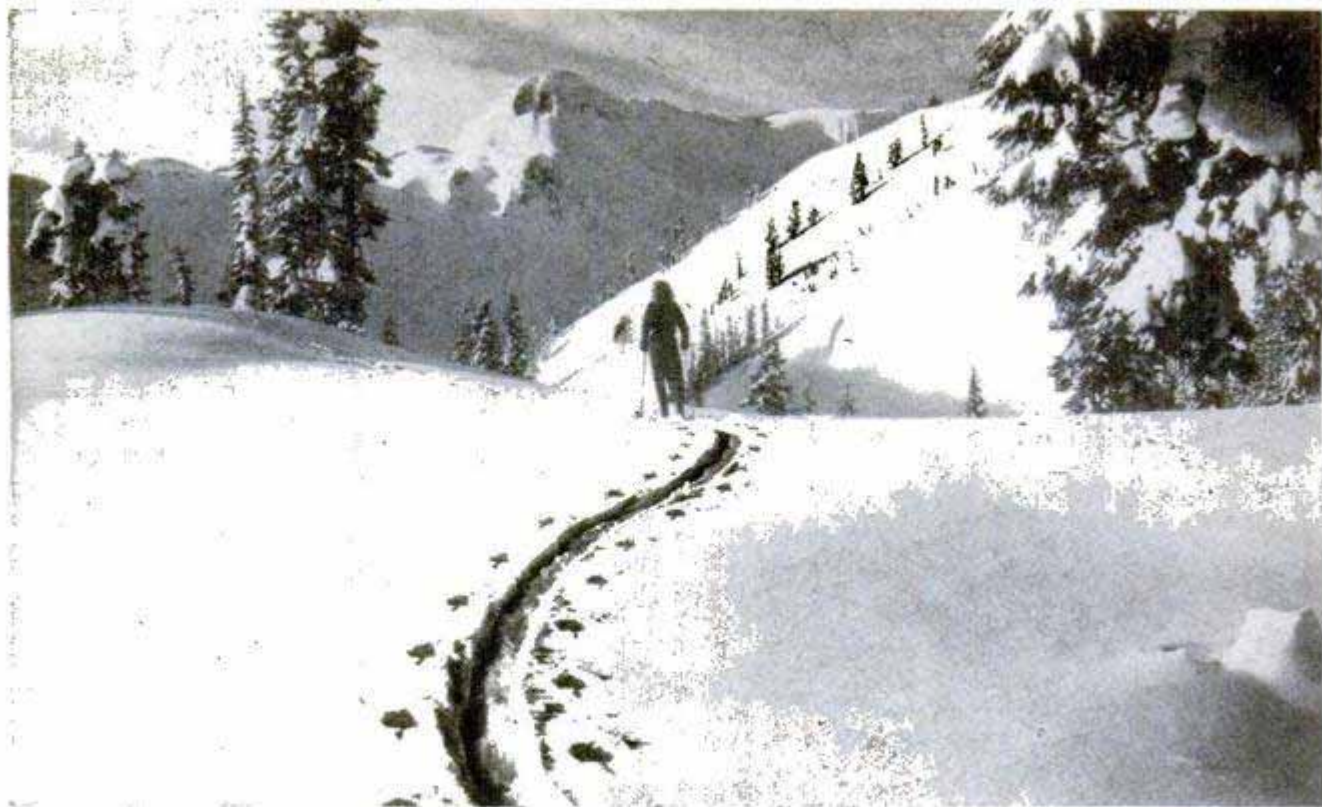
Robert H. Horn, Yakima, Wash.



## Pipe Rack Holds Darkroom Items

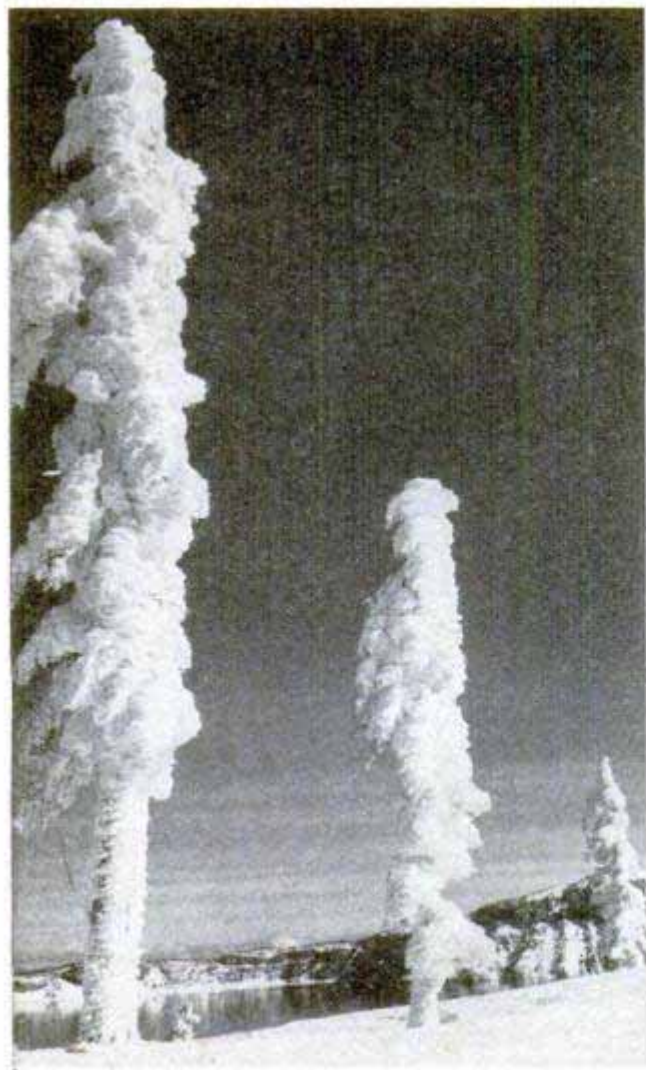
Stirring rods, print tongs, spotting brushes and similar darkroom items will be at hand when they are needed if you store them in an inexpensive pipe rack. Either the table stand or wall-type rack may be used, depending on your particular setup.





Side-lighting emphasizes snow texture. Filter increases the contrast between the shadows and high lights

Side-lighting gives the strongest filter effects. Panchromatic film, yellow filter produce dark sky



## Picture Winter Through a Filter

**S**NAPSHOOTING the cold, brilliant beauty of winter snowscapes takes more than just a good eye for picture composition and a knack of making the proper exposure. There's the problem of oblique natural lighting, for the sun will be low, even in the midday sky, and the picture-shooting "day" will be only a few hours long at best. Bright, pin-point reflections and broad halations may "burn up" the film even though the exposure is timed short. On some winter days the low haze over a snowy landscape diffuses weak, slanting sunlight and scatters reflections from distant objects so much that backgrounds "gray out," foreground subjects lose sharp outline and the sky goes "white" in a blending of subject and mass that results in a flat, uninteresting negative.

The solution to these picture problems of the winter snaphooter is careful use of the right filter. Combine the correct filter, exposure, and winter-picture composition and you're well on the way to producing a salon-quality print.

When the sky is dark and overcast, or when it's gray and cloudy outside, no filter is needed, but when the sun is shining brightly on the snow and the sky is a rich, clear, blue—that's when a filter, through its ability to control light of different col-



Red filter produces this dramatic effect. Note strongly rendered shadow and sky tones



A yellow filter and ordinary film produced this natural effect, strongly contrasting the snow and figures with sky

ors, gets the picture in all its true values.

The action of a filter is to stop or filter out light of certain colors, allowing the rays of other colors to pass through freely, while still others are partially absorbed in varying degrees.

By absorbing a certain portion of light, all filters reduce the amount of light reaching the film and to compensate for this the exposure must be increased. The number by which the exposure should be multiplied for the filter and film used is called the multiplying factor or filter factor for that particular filter.

There are two classes of filters used in black-and-white photography, correction filters and contrast filters. Correction filters enable the film to record the image at the brightness values as seen by the eye. Contrast filters are used to lighten or darken certain colors, causing a brightness difference between two colors which would otherwise photograph nearly the same.

Control of sky brightness is one of the most frequent uses of correction and contrast filters. A blue sky can be darkened to make white clouds stand out more prominently or to emphasize a subject seen against the sky. Yellow and red filters and the Pola-Screen are used for this purpose and their effectiveness depends on the blueness of the sky. One of the most helpful filters is the medium-yellow. With ordinary snapshot film its use results in pictures which look natural. Sky tones appear in their proper relation to everything else

Use of filter here increases contrast, produces a snappier print and emphasizes texture in the snow





Effect of ordinary film when no filter is used. Note how the snowman, the horizon line and sky all blend together

Strong side-lighting emphasizes snow texture. Yellow filter helps heighten contrast and feeling of texture in the snow



When shooting directly into sun, with lens shielded, filter gives interesting sky tones

in the picture area. Clouds stand out clearly against the sky, and contrasts between light and shade appear in the picture much as they do in the scene photographed.

In ordinary winter photography, the use of a medium-yellow filter with ordinary snapshot film is a must because it takes a filter to darken sky tones and differentiate between a snow-covered hill or horizon and the sky behind it, and to accentuate the shadows which give the snow surface texture and interest. If ordinary snapshot film is used in winter without this filter, snow-covered hills and horizons may appear to blend with the sky while the snow itself will appear a flat, uninteresting blanket.

For use with panchromatic film, a heavier and more strongly corrective filter is desirable. The deep-yellow, or G filter, gives the best results in this case. This filter has a more pronounced effect on sky tone than the medium-yellow because it cuts out more of the blue light. Clouds, therefore, stand out more strongly against the sky, and snow-covered tree branches or hills contrast more definitely with sky tones. Since the filter also has a strong effect on the blue light reflected from shadows in and across the snow, it is extremely useful for heightening apparent texture of the snow itself. Just as the medium-yellow filter can be considered





Showing how red filter, used for strong contrast in sky, can "wash out" all interesting flesh tones

standard for use with ordinary snapshot film, so is the deep-yellow filter standard for use with panchromatic film.

The next strongest filter, so far as effects produced are concerned, is the red, or A, filter. This filter has a very decided effect on sky tone and is used where extreme contrast is desired. If, in your winter snapshots, you want white clouds to stand out dramatically against the filter-darkened sky, then use a red filter. Such extreme effects, however, should be used in moderation. An occasional picture of this tone quality is interesting in the album collection but it's better to sprinkle an occasional red-filter shot here and there in your picture collection than it is to try to build up a collection of pictures made with red filters alone. Do not, however, attempt to use either a deep-yellow or a red filter with ordinary snapshot film. The reason for this is that orthochromatic film is not sensitive to red light and these filters admit too high a percentage of red or deep-orange light. Use these filters only with panchromatic film.

The Pola-Screen filter is the closest approach to an all-around filter because it is variable in its effect. The effect produced depends upon the position of the filter when it is slipped over the lens. Results



Using a medium-yellow filter results in a pleasant sky tone for informal portraits such as shown above

in sky-tone control equivalent to a medium-yellow, a deep-yellow, a red, or even a deep-red filter may be obtained if desired, but the over-all characteristics of the scene will not be otherwise altered.

The Pola-Screen filter is the only corrective mechanism which can be used to control sky tone with color films. In usefulness, therefore, it is one of the most broadly helpful of all filters.

The usefulness of any filter in winter photography is, however, determined to a large extent by the way it and the camera are used. Here are two pointers in that respect which we all would do well to remember.

First, filters should be used only on bright sunny days with a clear blue sky. Second, for maximum sky-tone control and contrast, full advantage should be taken of side-lighting, since filters produce their strongest effects when the camera is pointed at right angles to the sun. This is due to the fact that the sky at right angles to the sun has the deepest hue. As a result, the waves of colored light—which the filter either passes or blocks out of the lens—are at their strongest in this region. The more directly the camera is pointed toward the sun, or the more directly away from it, the less effect will the filter have.

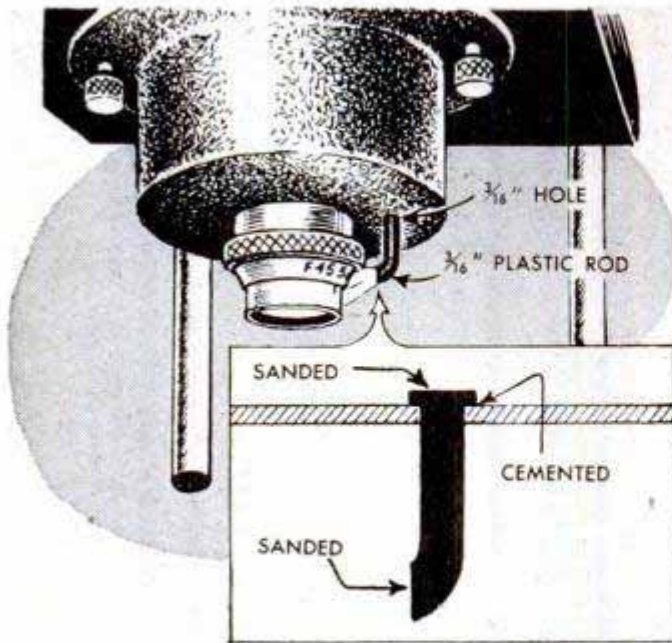
## Glossy Prints Dried Quickly With Fan and Heat Lamp

Drying glossy prints on ferrotype tins can be done quickly with the aid of a fan and infrared heat lamp. Play the lamp on the prints to remove the moisture and use the air stream from the fan to blow the

moist air away. Either the fan or the lamp will speed drying when used alone, however, the combination of the two does an exceptionally fast job.

Virginia Hanson, Santa Monica, Calif.

## Enlarger Lens Illuminated With Red Plastic Rod

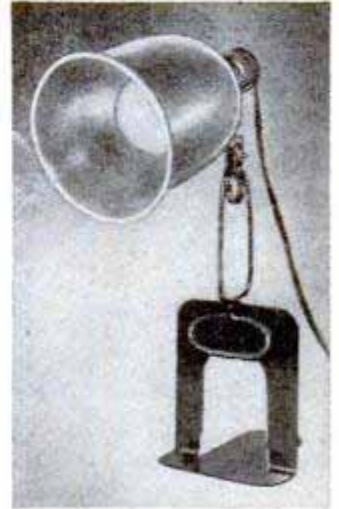


Fitting the lens board of your enlarger with a curved length of plastic rod will direct a faint red light from the enlarger lamp to the index mark on the lens mount, thus enabling you to check the lens stop opening at a glance without turning on the darkroom lights. Using either red fluorescent plastic or clear plastic dyed red, turn and bend or mold a short length of rod to the shape shown in the detail. Both top and bottom faces of the rod are sanded

and the remainder of the rod is painted black so that the only light emitted from the plastic is the tiny red spot opposite the lens mount. Note that the shouldered end of the rod is cemented to the edges of a hole drilled in the lens board.

## Book End Doubles as Stand For Clamp-On Reflector

Sometimes a particular photo setup, such as a low light for background illumination, requires the use of a clamp-on photoflood reflector without a convenient spot to mount it. When this happens, try using an ordinary sheet-metal book end as a stand for the reflector. Clamp the reflector to the book end as shown in the photo, and place a couple of the books on the base of the stand if there is a tendency for it to tip over.—John J. Rea, Urbana, Ill.



Chemical-bottle caps of various sizes provide handy lens caps. If desired, felt or velvet can be glued to the inside of the cap.

## Books That Help You Get Things Done

Are you a man who likes to venture into unfamiliar fields and get things done—a man who is precise and will not tackle a job until he is familiar with all phases of its mechanics so that he can produce good work? Then, the how-to-do-it books prepared by the editors of *Popular Mechanics*, who also like to do things themselves, will save you many hours of hard work.

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to-do-it instructions for making greeting cards, gifts and toys. You will also find featured articles on selecting and decorating Christmas trees with special emphasis on safety precautions. Send \$2.00 and the book is yours by return mail.

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All books are available from *Popular Mechanics* Book Dept., 204 E. Ontario St., Chicago 11, Ill.

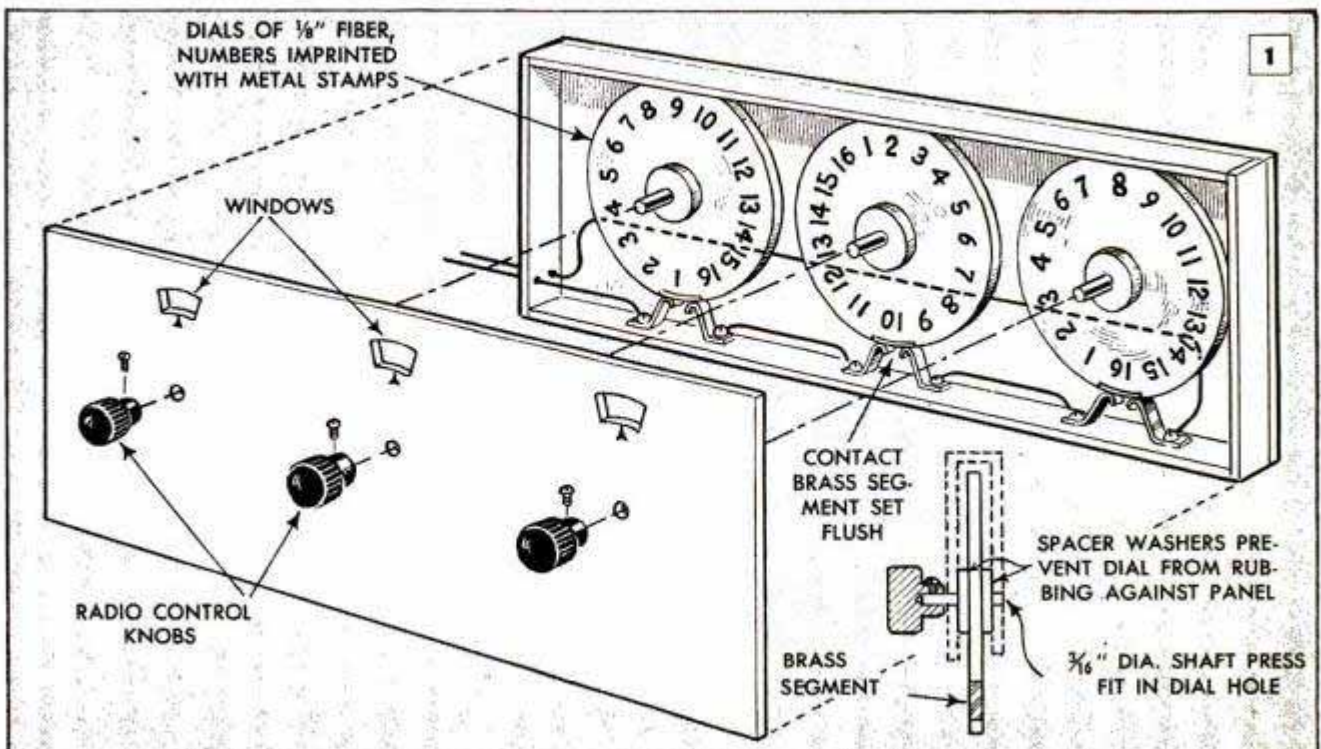
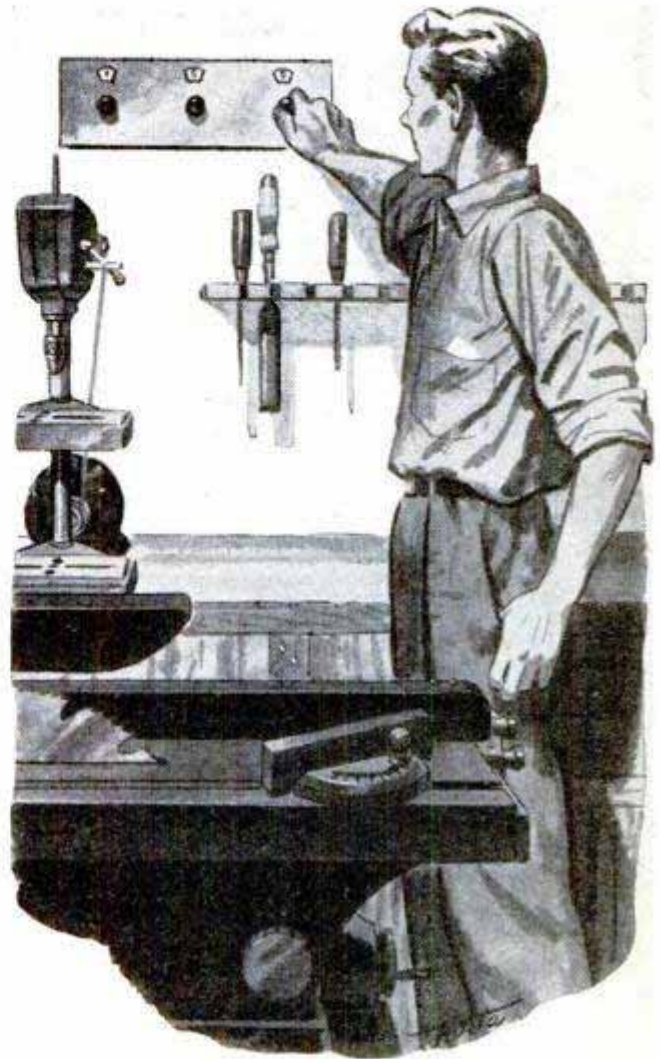


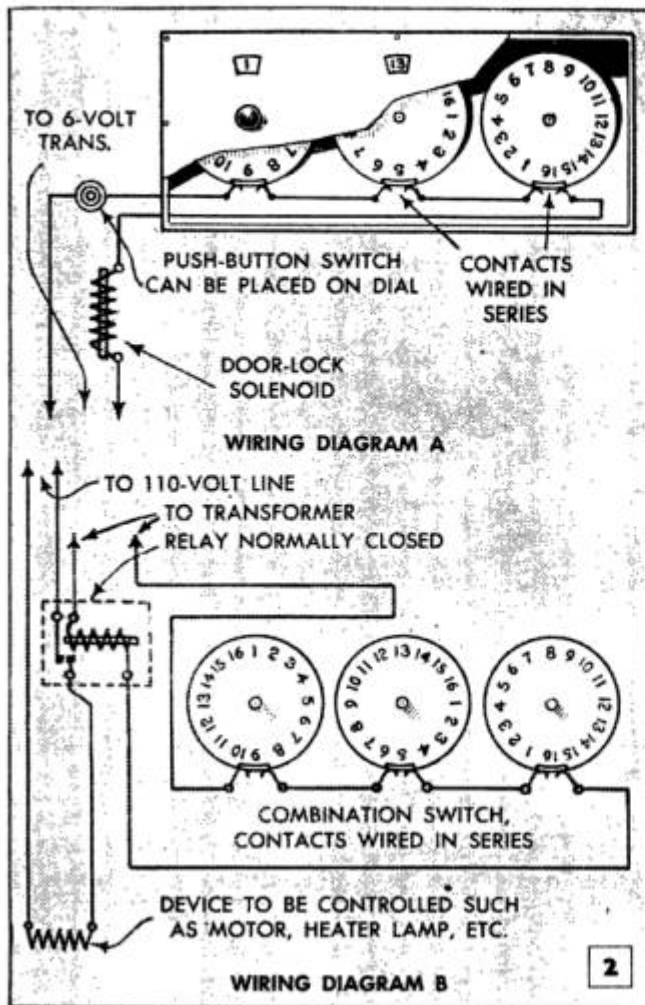
## Combination ELECTRIC SWITCH

By John Beaton

**I**F YOU have electric motors and appliances that you wish to prevent unauthorized persons from using, this combination switch will solve your problem. It is also ideal for use in connection with a solenoid door bolt to prevent small children from opening drawers and doors that are used frequently by adults so that locking them with a key would be an inconvenience. Another use is as a substitute for a key switch to open or close a mechanically operated garage door. As pictured in diagram A of Fig. 2, only 6 to 12-volt current from a small transformer should be wired through the switch when it is used with a solenoid door bolt. If the switch is used to control a motor or other 110-volt appliance, a 6 to 12-volt circuit is used through the switch to operate a relay, diagram B of Fig. 2, the relay being a normally open or closed type, depending on its use.

As detailed in Fig. 1, the switch consists of three numbered fiber dials, each about 3 in. in diameter. These are mounted side by side in a shallow box behind a control panel having projecting knobs for turning



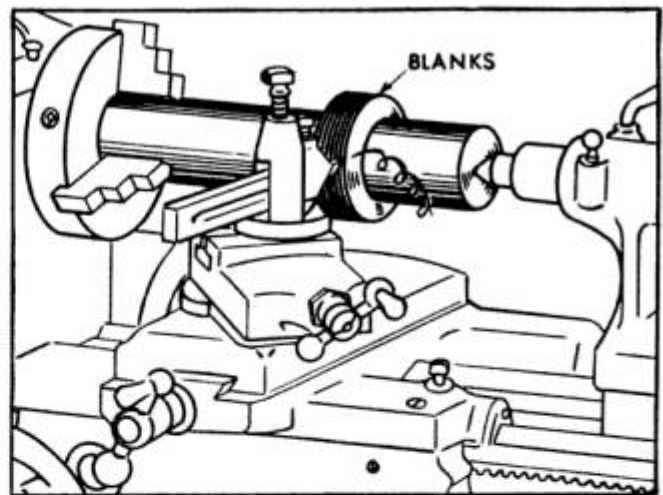


the dials. Each dial is numbered from 1 to 16 and carries a short brass segment, flush-fitted into the rim. This segment is sufficiently long to span two stationary bronze contacts when the dial has been turned to expose the correct number in the control-panel window. All three dials are fitted with brass segments of the same length, but the segments must be located opposite a different number on each dial. Of course, you can use any number combination you like; the important thing is to make sure that the segment is located exactly opposite the number selected. The stationary contacts are wired in series, so that when all three dials are turned to the correct combination the circuit is closed. Moving any one of the three dials opens the circuit, but when the switch is reset after use, all the dials are moved, making it necessary to know the combination before the circuit can again be closed.

Note that each of the dials is mounted between spacer washers and that the control-knob shaft is a press fit in a center-drilled hole. If possible, drill the shaft holes after the control box has been assembled. If it is desired to cut the power momentarily to a particular tool or appliance without disturbing the setting of one of the switch dials, a push-button switch can be wired in the circuit as shown in Fig. 2, diagram A.

## Shafting Holds Disk Blanks Between Centers for Multiple Turning

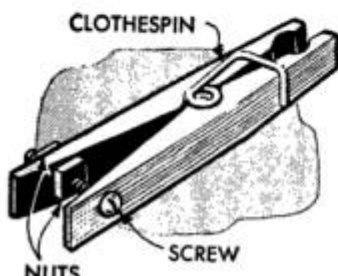
By clamping thin, sheet-metal stock between two short pieces of shafting, thin disks can be accurately turned to a specific diameter without marring the surface of the work with a center hole or other means of mounting. The shafting used in clamping the work should be slightly smaller than the diameter of the finished blanks and one length of shafting should be longer than the other. The ends of each shaft are faced square and the shorter piece center-drilled for supporting with the tailstock center. Use a ball-bearing tailstock center if available. The longer piece is held in the three-jaw chuck. Using the ball-bearing center in the tailstock allows the rough blanks to be firmly clamped between the two pieces of shafting by merely tightening the tailstock handwheel. A medium speed,



light cuts and a keen-edged tool combine to give best results.

Alex Brechko, Jackson Heights, N. Y.

## Improvising Small Caliper From Spring-Type Clothespin



A pair of small calipers, which can be used to check turnings with sufficient accuracy for modelmaking, can be improvised quickly from an

ordinary spring-type clothespin. This is done by drilling through the arms of the clothespin and inserting a machine screw which is turned into two nuts as shown. Simply tighten the screw to open the jaws of the clothespin the desired distance. When the screw is backed off, the tension of the spring will force the jaws closed.

# How to Weigh Cattle With a Length of String

INCHES	WEIGHT	INCHES	WEIGHT	INCHES	WEIGHT	INCHES	WEIGHT
26	80	43	257	60	637	77	1285
26½	82	43½	266	60½	652	77½	1308
27	84	44	275	61	668	78	1331
27½	86	44½	284	61½	684	78½	1354
28	89	45	294	62	700	79	1377
28½	92	45½	304	62½	716	79½	1400
29	95	46	314	63	732	80	1423
29½	98	46½	324	63½	749	80½	1446
30	101	47	334	64	766	81	1469
30½	104	47½	344	64½	783	81½	1492
31	108	48	354	65	800	82	1515
31½	113	48½	364	65½	817	82½	1538
32	118	49	374	66	835	83	1561
32½	123	49½	384	66½	853	83½	1584
33	128	50	394	67	871	84	1607
33½	133	50½	404	67½	889	84½	1630
34	138	51	414	68	908	85	1653
34½	143	51½	424	68½	927	85½	1676
35	148	52	434	69	947	86	1699
35½	153	52½	445	69½	967	86½	1722
36	158	53	456	70	987	87	1745
36½	163	53½	467	70½	1007	87½	1768
37	168	54	478	71	1027	88	1791
37½	174	54½	489	71½	1048	88½	1814
38	180	55	501	72	1069	89	1837
38½	186	55½	513	72½	1090	89½	1860
39	192	56	526	73	1111	90	1883
39½	200	56½	539	73½	1132	90½	1906
40	208	57	552	74	1153	91	1929
40½	216	57½	565	74½	1175	91½	1952
41	224	58	579	75	1197	92	1975
41½	232	58½	593	75½	1219		
42	240	59	607	76	1241		
42½	248	59½	622	76½	1263		

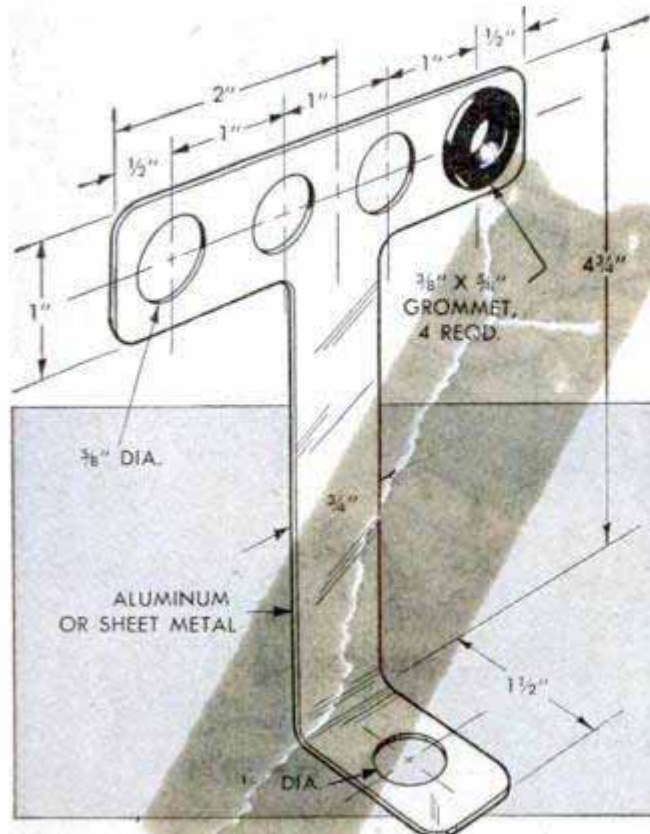


To estimate the weight of a calf, steer, cow or bull, draw a length of string tightly around the body of the animal just behind the front legs. Measure the string and find its length on this chart to arrive at a close estimate of the animal's weight

## Special Brackets for Spark-Plug Wires Reduce Low-Speed Missing

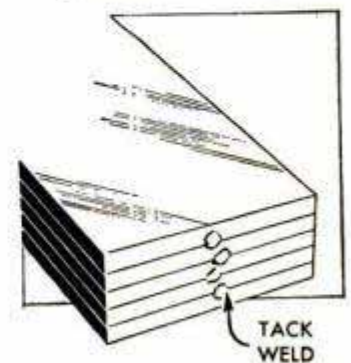
Sometimes the low-speed missing of 1949 Ford V-8s and Mercurys is the result of the grouping of the spark-plug wires which run from the distributor to the far bank of cylinders. The engine missing is caused by the leakage of high-frequency current

between the four long wires, particularly when high-compression loads exist. I have found that if the original brackets which carry the wires are replaced with sheet-metal brackets made as shown in the detail, the current leakage will be cut down greatly and the chances of missing reduced. It may be necessary to bend the upright of the bracket slightly to align the wires and, if you are comparatively inexperienced, it is best to disconnect and replace one wire at a time to avoid disturbing the firing order.—Delmer H. Clow, Venice, Calif.



## Drilling Holes in Duplicate Parts

When holes in duplicate parts must be drilled in exact alignment, you can be sure that the parts will not slip out of line by tack-welding them together. Place the parts one on top of the other and tack-weld between the layers at opposite ends of the stack. In this way, the work is easy to handle on the drill press with no possibility of shifting.—W. F. Schaphorst, Newark, N. J.

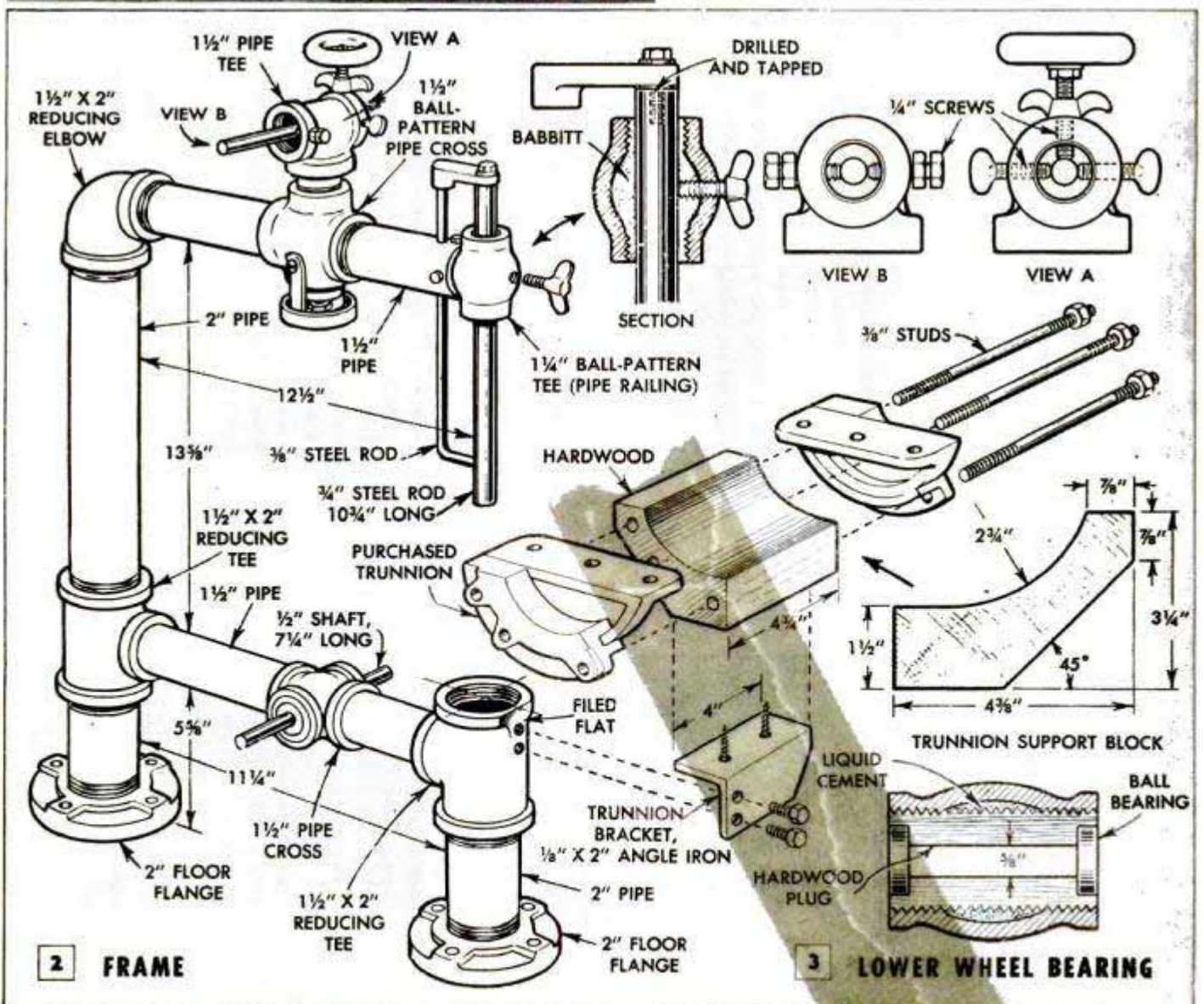
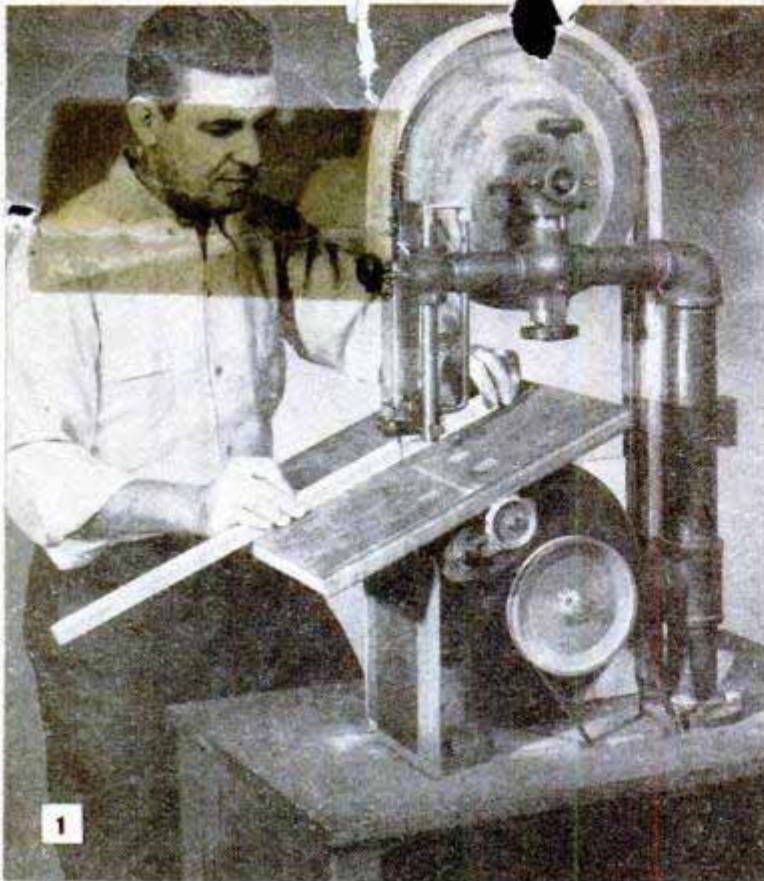


# TWO-SPEED Cuts Wood

By A. L. Mills

## Part I

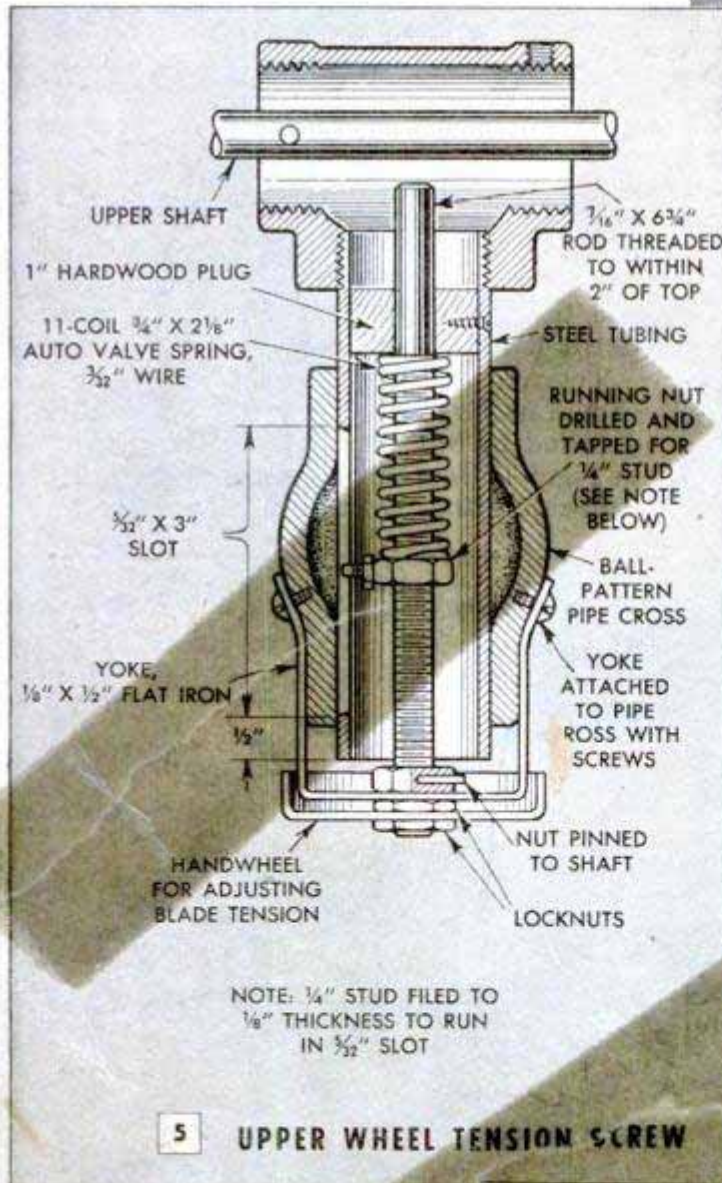
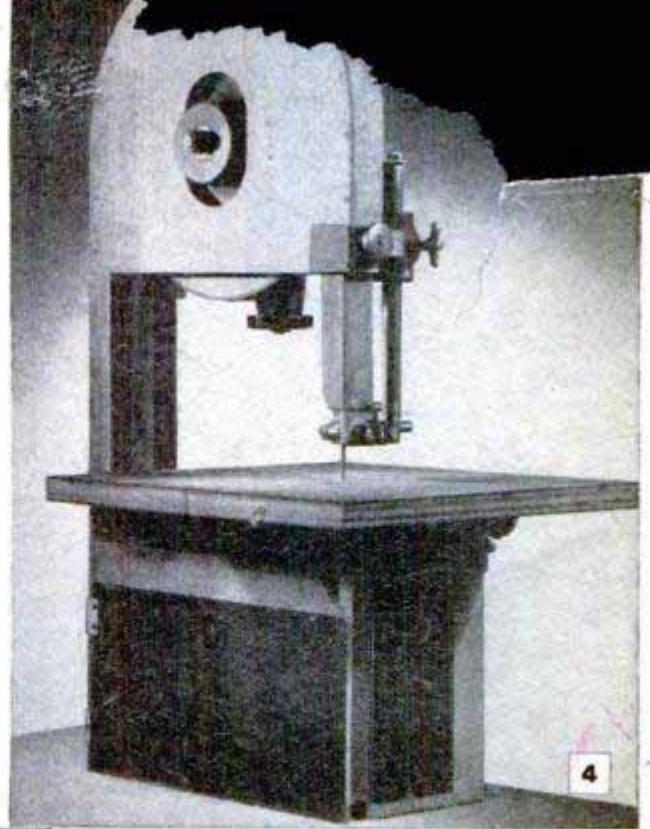
**T**HIS BANDSAW for cutting wood and metal is a home-built unit throughout, yet it has every essential feature of the average dual-purpose-type machine. The frame is assembled from pipe and fittings, band wheels are made from hardboard for lightness and strength and are mounted on ball bearings. The table tilts on double trunnions, Fig. 1, and the upper wheel-bearing assembly is fitted with a spring-loaded blade-tensioning-and-tracking device. The necessary speed reduction for metal cutting is made through



# and Metal

two step pulleys on a jackshaft mounted in a base which has been especially designed and built to reduce vibration to the minimum. A simple belt shift to direct drive provides the higher speeds necessary for cutting wood. Note the trim, neat design of the machine in Fig. 4.

Fig. 2 details the frame and Fig. 3 the lower wheel-bearing and the trunnion assembly. Long and short pipe nipples, reducing elbows, tees and floor flanges are assembled to form the frame shown in Fig. 2. One thing to note especially at the outset: You will see in Fig. 2 that the over-all dimensions are given from side to side and not from center to center. In detailing an assembly of this type made from pipe fittings it is not possible to give precise center to center dimensions. Those given represent the distances on the original assembly with the threaded joints drawn moderately



tight. Because of slight allowable variations in threading and tapping pipes and fittings, frames built up in this way from a number of fittings may vary somewhat in over-all size. Probably the best procedure is to make a trial assembly, drawing each of the joints as nearly as possible to the same tension. Then check the dimensions. If actual measurements are slightly over or under, it usually is possible to correct the error by tightening or loosening several joints.

Note in the frame assembly, Fig. 2, that the blade-tension unit is fitted into a ball-pattern pipe cross, and also that the steel rod, which supports the upper blade guide, slides in a bearing formed by pouring molten babbitt into a ball-pattern pipe tee. Views A and B, Fig. 2, show opposite ends of the pipe tee which houses the wheel-tilting mechanism. At the inner end, next to the wheel hub, the spindle pivots on two pointed set-screws provided with jam nuts. At the opposite end two horizontal set-screws bear against the spindle to prevent lateral movement. The spindle is tilted by a vertical screw fitted with a small handwheel and provided with a wing nut for locking the adjustment. This assembly is supported on a short length of steel tubing, threaded at one end and turned, or ground, to a sliding fit in the pipe

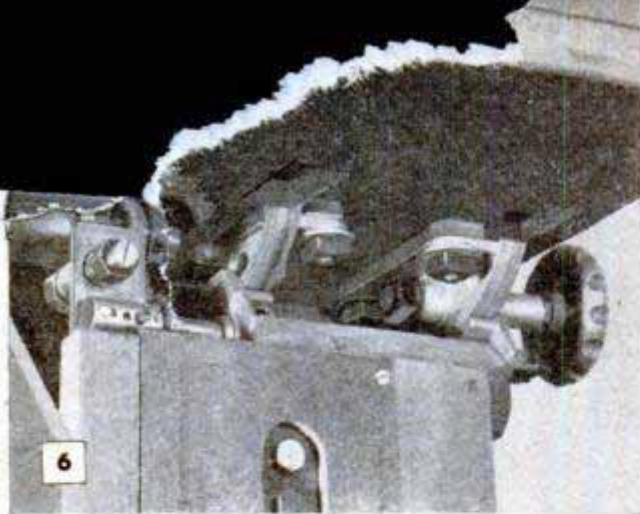
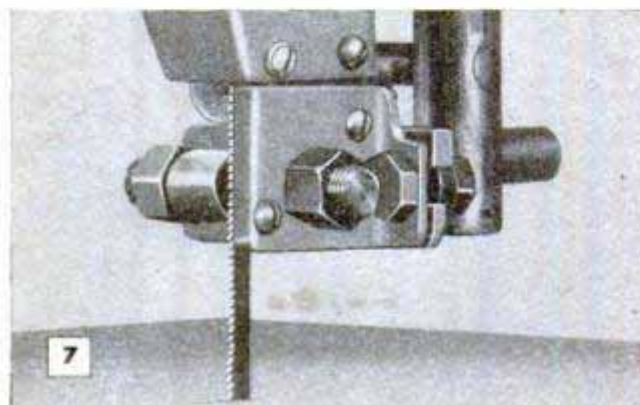
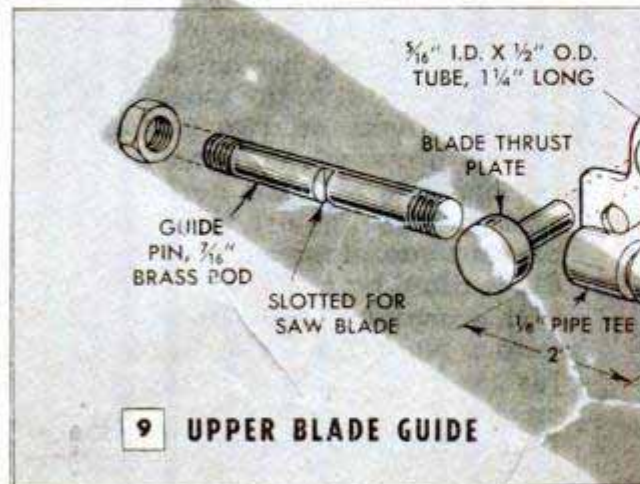
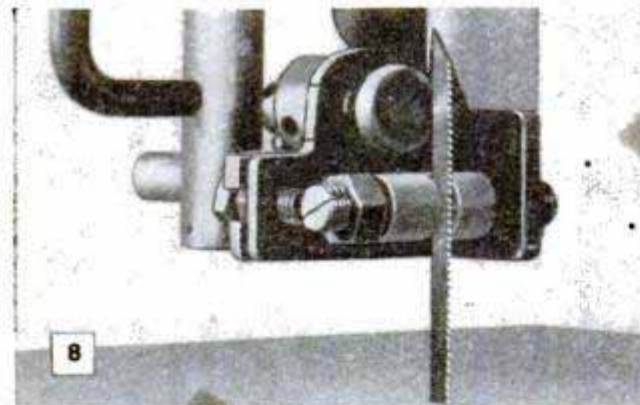


Table trunnions and lower guide in place on the band-saw frame. Note that table is recessed for clearance



Above and below are views of the upper blade guide completely assembled and with the blade in position



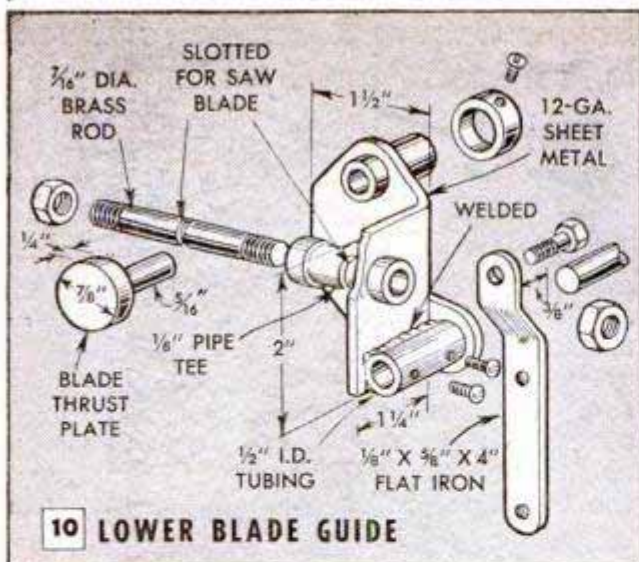
9 UPPER BLADE GUIDE

reamed out as in Fig. 5. A hard-wood plug, forced into the upper end of the tube and fastened with three wood screws, forms a bearing for the upper end of the tension spring. The running nut which bears against the lower end of the spring is prevented from turning by a short stud which turns into a tapped hole in the nut. Flats are filed on the opposite end of the stud permitting it to enter a  $\frac{5}{32}$ -in. slot cut in the wall of the tubing. The stud is provided with a jam nut to hold the adjustment securely. The lower end of the tension screw is fitted with a handwheel and is supported by a flat-iron yoke bent to a U-shape and attached to the pipe cross with short cap screws. To give ample range of adjustment of the upper wheel, the  $\frac{7}{16}$  x  $6\frac{3}{4}$ -in. tension screw is threaded to within 2 in. of the top end as in Fig. 5.

Construction of the lower wheel bearing is easily worked out from the detail in Fig. 3. The double trunnion, which is purchased, is quite simple to assemble by following the upper details in Fig. 3. Note that a flat is filed on one side of the reducing tee at the front of the frame and that two holes are drilled and tapped for cap screws which hold the trunnion bracket. The trunnion must be assembled completely before attaching to the frame. An underside view of the trunnion is given in Fig. 6. The locking handwheel has a threaded sleeve that is turned onto a stud which passes through a hole drilled through the two halves of the outer trunnion. One of the halves of this trunnion is slotted to permit the table to tilt 45 deg. forward.

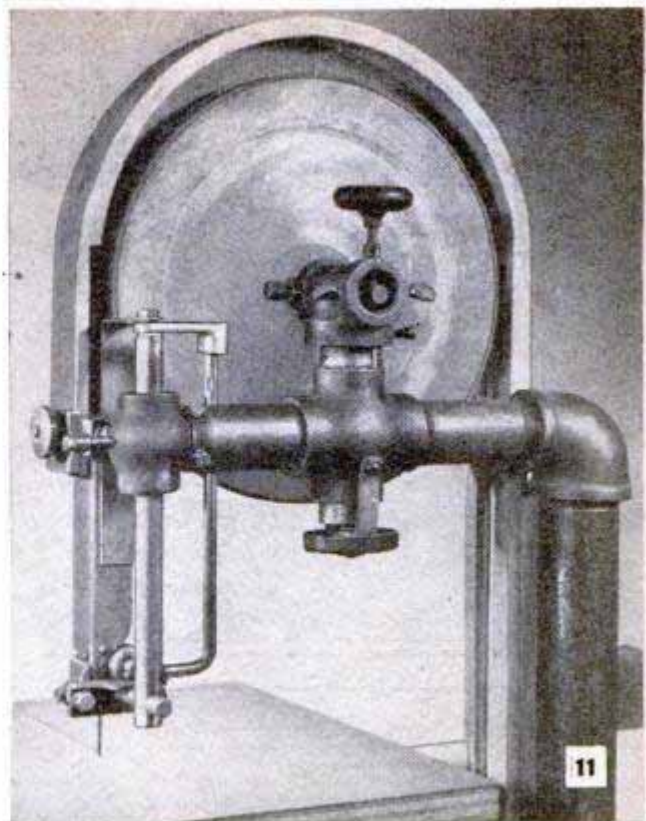
Two views of the upper blade guide are shown in Figs. 7 and 8, and the assembly is detailed in Fig. 9. The first thing to note in Fig. 9 is the relation of the slotted angle-iron mounting pad to the rest of the parts





which make up the complete guide. The short length of tubing which forms a bearing for the blade thrust plate fits into a collar welded to the top of the pad. The latter is welded to a short support rod which passes through a hole drilled transversely at the lower end of the sliding guide rod, Fig. 2, and also Figs. 7 and 8. When the assembly is made, a second rod,  $\frac{3}{8}$  in. in diameter, is attached to the sliding guide rod with a bracket arm at the upper end. The smaller rod is passed through a hole drilled in the upper arm and the lower end is then bent at a right angle and inserted in a hole drilled part way through the sliding rod, Figs. 8 and 11. This rod, sliding parallel with the support rod, serves to hold the blade guide in the same position relative to the saw blade when the guide is raised or lowered.

The two angles, Fig. 9, are bent to shape from 24-ga. sheet steel and are drilled and tapped as indicated. The brass guide pin is threaded at each end and slotted at the center for the saw blade. The guide pin is an easy, sliding fit in the reamed pipe tee and a nut on each end permits a lateral adjustment to position the blade in the center of the wide slot in the tee. The thrust plate and the assembled guide pin are shown in position in Fig. 8. Fig. 9 shows a  $\frac{5}{16}$ -in. dowel pin, or plug, in the left-hand slot of the mounting pad. The projecting

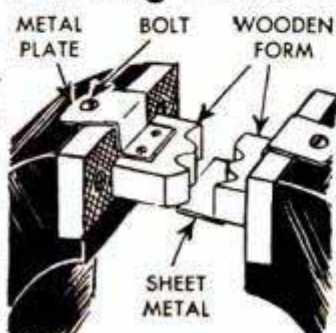


end of the pin enters a hole drilled and reamed through the left-hand angle bracket of the guide and serves to hold the parts in alignment. However, if desired, the hole can be tapped and a cap screw used as in Fig. 8.

The lower blade guide, Fig. 10, is quite similar to the upper guide except that it is supported by a horizontal rod and a flat-iron bracket, which is bolted to the angle bracket and to the side of the lower pipe tee. The horizontal rod enters a hole drilled in the outer half of the trunnion which is next to the guide. The opposite end is inserted in a bushing welded to the side of the angle bracket. Parts of this guide can be made at the present stage of the construction, but do not attach it to the frame until the table has been made and fitted in place and the wheels completed and mounted on the spindles. Then, with a blade in place on the band wheels, it is an easy matter to locate the lower guide in the correct position.

(To be continued)

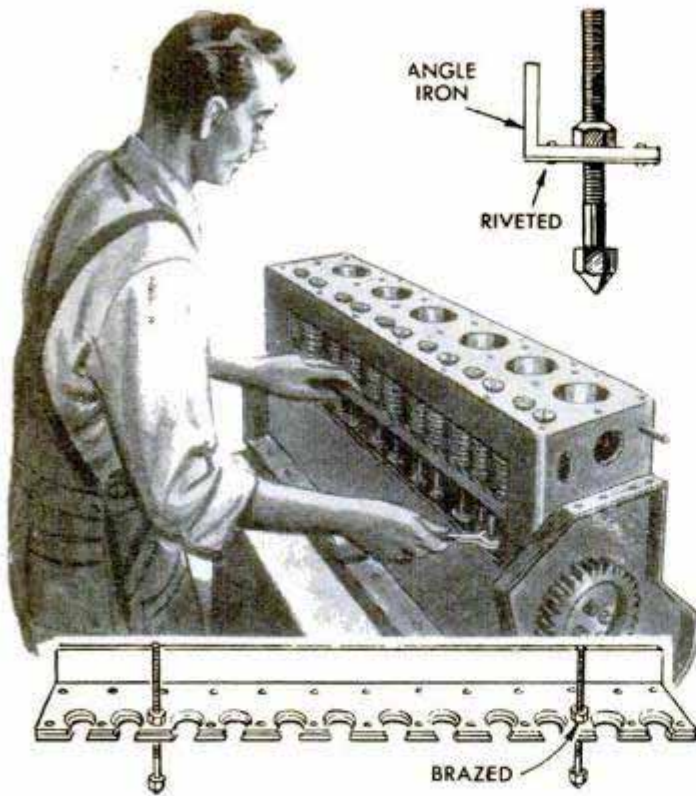
## Forming Press for Sheet-Metal Parts Improvised From Bench Vise



When forming a number of thin sheet-metal parts, the bench vise can be made to serve as a press by using hardwood forming dies cut to shape on the jigsaw. Each die is held in

the vise by a strip of sheet metal bent as shown. The strips are fastened to the vise with machine screws driven in holes drilled and tapped in the vise jaws. A piece of sheet metal fastened to the bottom of one of the forming dies acts as a stop holding the work in position. A turn or two of the vise handle will bring the dies together with sufficient pressure to form the part.

E. M. Harris, Kansas City, Mo.

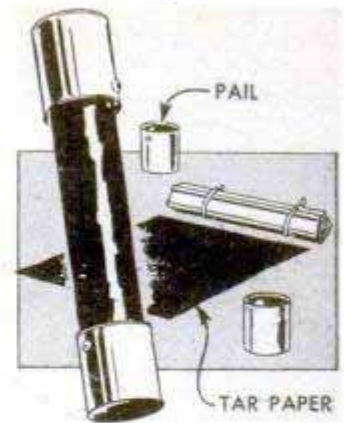


### Gang Valve Lifter Saves Time

With the aid of this gang valve lifter, all of the valve springs, on some engines, can be lifted at the same time. However, on others, only a four-valve gang can be used because of webbing in the engine block. The tool is easily constructed from 1 x 2-in. angle iron and a strip of  $\frac{1}{8}$  x 2-in. steel plate. The sketch shows a 12-valve lifter, for a 6-cylinder engine, with holes drilled in the 2-in. face of the angle iron. These holes are laid out with their centers accurately in line with those of the valve stems. To give the valve-spring washers a narrow ledge to rest on, rivet a strip of  $\frac{1}{8}$  x 2-in. cold-rolled steel to the bottom of the angle iron. Drill holes through the steel strip, making them concentric with the holes in the angle iron but  $\frac{1}{4}$  in. smaller. Slot the edge of the lifter to each hole for valve-stem clearance. At a point near each end of the tool, drill and tap holes for the  $\frac{7}{16}$ -in. lifting screws. To increase the threaded surface through the angle iron for these screws, weld or braze a  $\frac{7}{16}$ -in. nut directly over each hole. The lifting screws are merely  $\frac{7}{16}$ -in. cap screws, 4 in. long, threaded practically their full length. The heads are turned to a blunt point in the lathe. When the tool has been slipped into place under the valve springs and these screws turned with a wrench, as in the illustration, the valve springs are lifted and compressed so that the valve-stem keys or pins can be easily removed. The gang lifter is left in place until the grinding job is completed and the valve-stem pins replaced. The gang lifter can then be lowered and removed from the engine.

### Binder Canvas Rolled in Tar Paper Is Protected From Rodents

If it is inconvenient to hang a binder canvas where rodents cannot reach it, the canvas can be stored safely by rolling it in tar paper or old linoleum. Use paint or syrup pails to enclose the ends of the tar-paper roll.

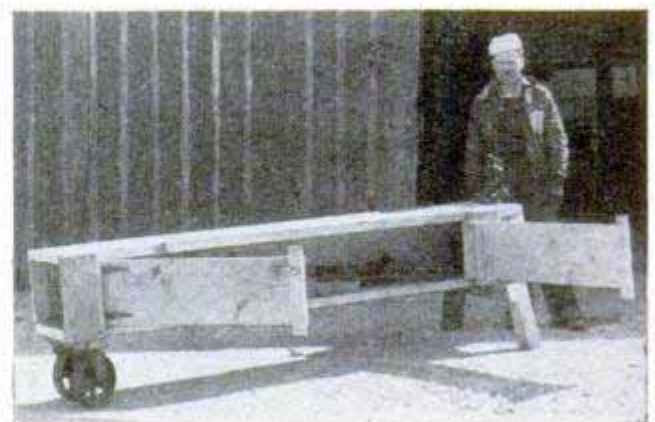


### Hydrometer Measures Salt Content Of Water-Softener Brine Tank

To keep a constant check on the salt supply in the brine tank of his water softener, one homeowner built a simple hydrometer from a short length of glass tubing of the type having one end closed. In this he placed a sufficient number of lead shot to keep the tube floating upright. Then he corked the open end tightly and placed the tube in a saturated salt solution. When floating free, the water line on the tube is noted and the glass is scored at this point to form a witness mark. When the mark on the tube sinks measurably below the surface of the brine solution it indicates that fresh salt should be added.

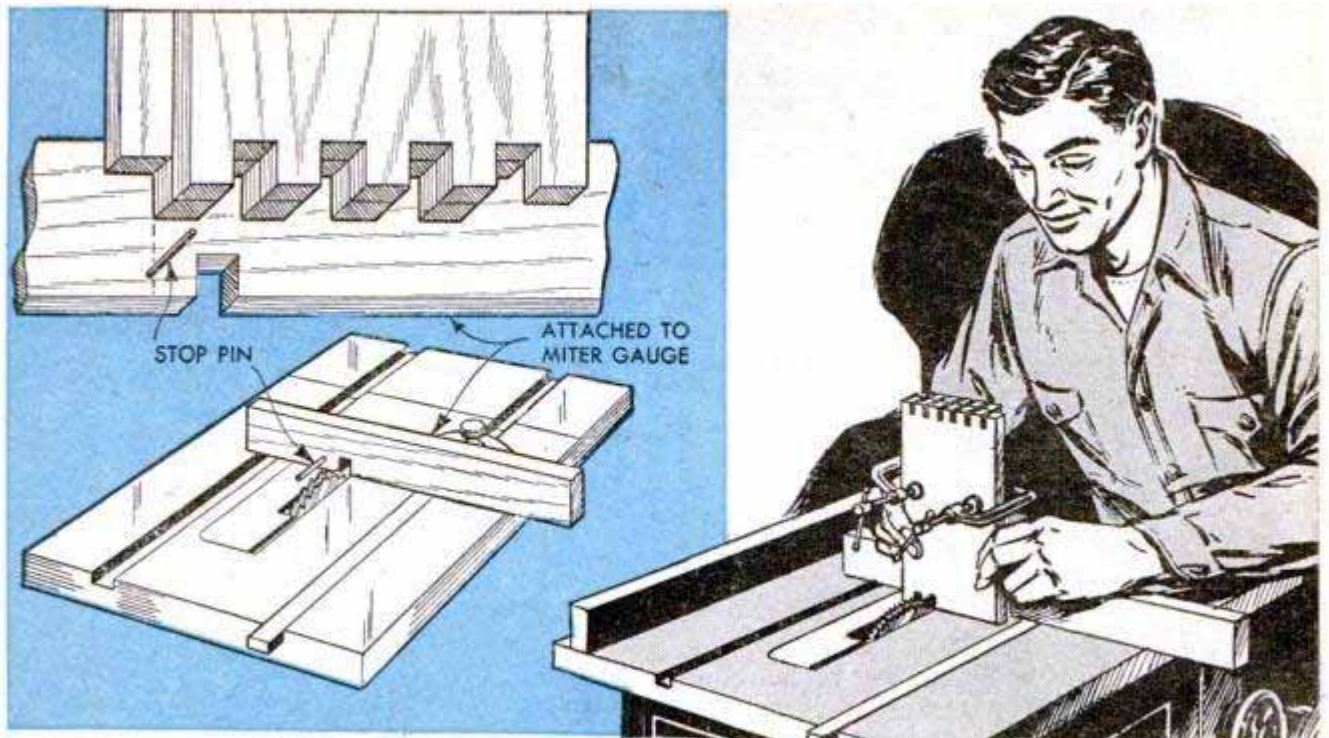
### Portable Bench and Toolbox

This portable workbench and toolbox was made up from 2 x 16-in. native lumber, 10 ft. long. A pair of caster wheels mounted on one end and conventional legs on the other end make it possible to push the



bench to the job like a wheelbarrow. A pipe vise is mounted on one end. Tools and materials are stored in the compartment below the bench top and are always conveniently at hand. Two hinged doors fitted to the front of the compartment offer protection with free access to the tools.

# Making Box Joints on Your Circular Saw



Here's an easy way of making box joints, sometimes called dovetail joints, on your circular saw. First, rip the sides and end-pieces of the box to size from stock of the same thickness. Then assemble the dado head on the saw arbor to cut a groove approximately equal in width to the thickness of the stock. Raise the head, or the saw table, depending on the type of machine, so that the dado will cut a groove of the same depth as the thickness of the stock. Now, screw a strip of  $\frac{3}{4}$ -in. stock, about 3 in. wide and 18 in. long, to the miter gauge and, with the dado head adjusted to the proper height, cut a groove across the lower edge of the strip. Then measure to the right, from the right edge of the groove, a distance equal to the exact width of the groove. Drive a brad or fin-

ishing nail at this point to serve as a stop pin for spacing the successive cuts uniformly. In running the grooves with this setup it generally is best to work the ends and sidepieces of the box in pairs. Stand one of the sides and an endpiece on end and offset the edges a distance equal to the width of the groove. Clamp the pieces together in this position. Now place them against the miter guide with one edge flush with the right side of the groove in the guide strip. Pass the work over the dado head to make the first cut. Slide the work to the right against the stop pin and run the second cut. Now, lift the work, place the last groove cut over the pin, lower the stock to the table and slide it to the right. Now you're all set to space the series of grooves across the ends of the pieces.

## Eaves Trough Fitted to Side of Coop Provides Poultry Feeder



A length of eaves trough mounted outside a coop or fattening pen, as pictured, provides an easily filled feeder for the birds kept inside. The open-end trough is attached with regular wire hangers nailed to the pen and should be tilted at a slight angle to permit drainage of rainwater.

## Removing Rust From Metal Scrap

Rust can be removed from salvaged metal scrap by rubbing it off with an old hacksaw blade. Mount the blade in the hacksaw frame and then run it across the surface of the metal, using a simultaneous forward and sideward motion.

Danton Go, Kapatagan, P. I.

# How to Turn PLASTICS



By Sam Brown

**I**T'S FUN to turn plastics in either a metal or wood-turning lathe. Common craft plastics turn beautifully, the chip comes off clean in a long, paper-thin ribbon and the surface left by a sharp tool requires a minimum of final finishing operations. Turnings that involve curves, such as candlesticks and lamp bases, are best handled on a wood-turning lathe as the tool must be worked freehand. Turning straight, true cylinders or tapers is best done on a metal lathe where the position of the tool is fixed and the feed uniform. Turning characteristics of common plastics are similar to non-ferrous metals and ordinary metal-turning operations can be duplicated on plastics. Nearly all plastics will take a fairly sharp knurl; they face off and shoulder perfectly and can be worked successfully with shaped cutters. With care you can run a clean, sharp thread.

General turning data is given in the table, Fig. 1, while Fig. 5 lists suitable lathe speeds and converts feet-per-minute (f.p.m.) to revolutions-per-minute (r.p.m.) for specific diameters. As an example of how these tables work out, suppose you are turning down a 1-in. spindle of the

thermoplastic Tenite II, Fig. 1 shows the correct speed to be 300 f.p.m. and referring to Fig. 5 you will see that a surface speed of 300 f.p.m. on a 1-in. spindle requires a lathe speed of 1150 r.p.m. However, surface speeds ranging from 100 to 400 f.p.m. will work satisfactorily. Note from the table Fig. 1 that the phenolics (cast resins) require a high spindle speed and a slow tool feed, and that the reverse is generally true of the thermoplastics. The speed recommendations apply quite closely to all work under 2 in. in diameter, but on work over 2 in. in diameter the turning speeds for thermoplastics can be increased considerably because of the longer cooling cycle.

A good indication of the correctness of procedure is the shape and nature of the chip. If it gums and adheres to the point of the lathe tool, the speed is too high; if the chip tends to shatter or powder, the tool is dull or the feed is too fast. But with the correct adjustments and the proper feed you get a long, ribbon chip that curls away from the tool point without breaking, Fig. 6.

Much of the technique of turning plastics requires a careful study of methods of

**1 PLASTICS TURNING DATA**

	TECHNICAL NAME OF PLASTIC	REPRESENTATIVE TRADE NAMES	FEET-PER-MIN. SPEED	FEED RATE (INCH PER REV.)	REMARKS
THERMO-SETTING	CAST PHENOLIC	CATALIN, MARBLETTE	400 OK 100 to 600	.004 or less	Slight odor. Turns easily with mild pressure. Cuts can be up to 1/8" deep. Heavy feed causes a powdery chip.
	LAMINATES	FORMICA, MICARTA	200-300	.004 or less	Very abrasive. Best turned with carbide tools. High-speed tool bits should have positive rake of about 15°.
THERMOPLASTIC	CELLULOSE ACETATE	LUMARITH, TENITE I	300 OK 100 to 400	.007 or less	Sourish odor. Turns very easily with light pressure. Cuts can be up to 3/16" deep. Heavy feed causes excessive tearing. Both plastics in this group are practically identical in physical properties. Excellent for hand turning.
	CELLULOSE ACETATE BUTYRATE	TENITE II	300 OK 100 to 400	.007 or less	
	ACRYLIC	LUCITE, PLEXIGLAS	200 or less	.010 or less	Sweetish odor. Use firm pressure when turning by hand. Slow spindle speed.
	POLYSTYRENE	PLAX, STYRON	120 or less	.015 or less	Mild odor. Requires firm pressure. Gums easily and must be worked at low speed.

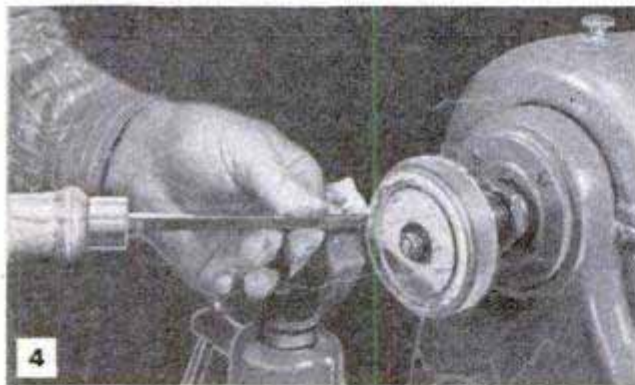
**METHODS OF CHUCKING SHEET PLASTIC**



**Chucking plastic disks with hardwood follow block**



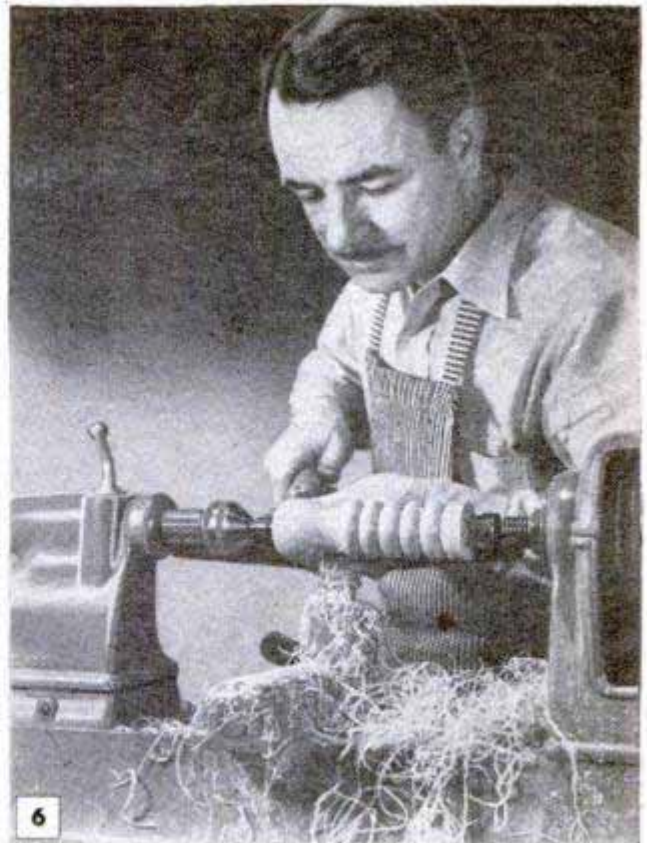
**Plastic sheet is screw-fastened to block of hardwood**



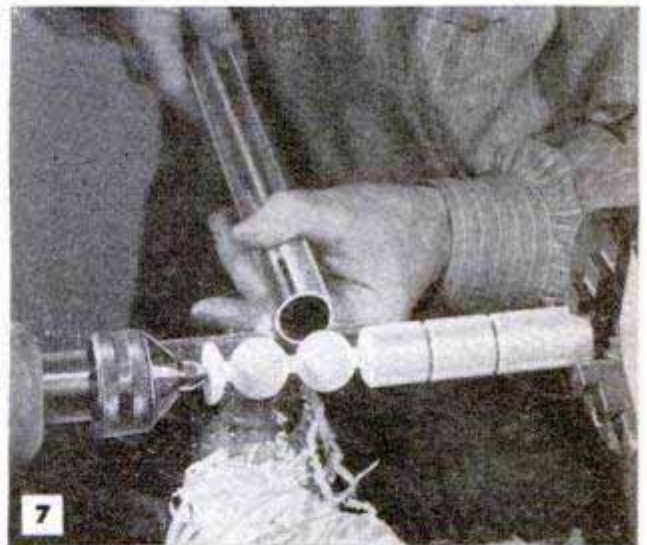
**Plastic held by small bolt through the center hole**

**5 F.P.M. to R.P.M.**

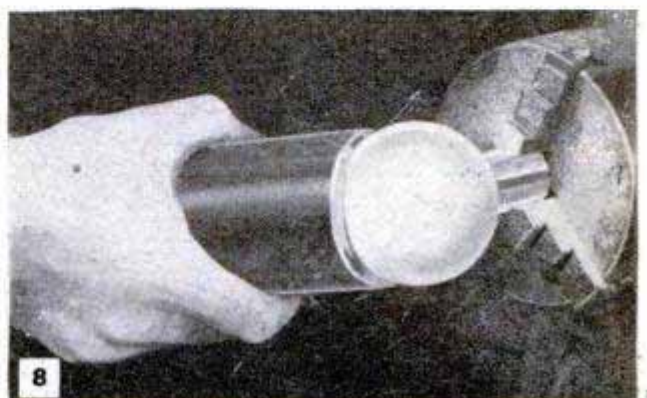
DIA. OF WORK	FEET PER MINUTE						
	100	120	200	300	400	500	600
	REVOLUTIONS PER MINUTE						
½"	764	917	1528	2290	3056	3820	4580
¾"	508	610	1016	1530	2032	2540	3060
1"	382	458	764	1150	1528	1910	2300
1½"	254	305	508	754	1016	1272	1508
2"	191	229	382	574	768	956	1148
3"	127	153	254	382	502	636	764
4"	96	115	191	286	384	476	572
6"	64	76	127	192	256	320	384
8"	48	57	96	144	192	238	288

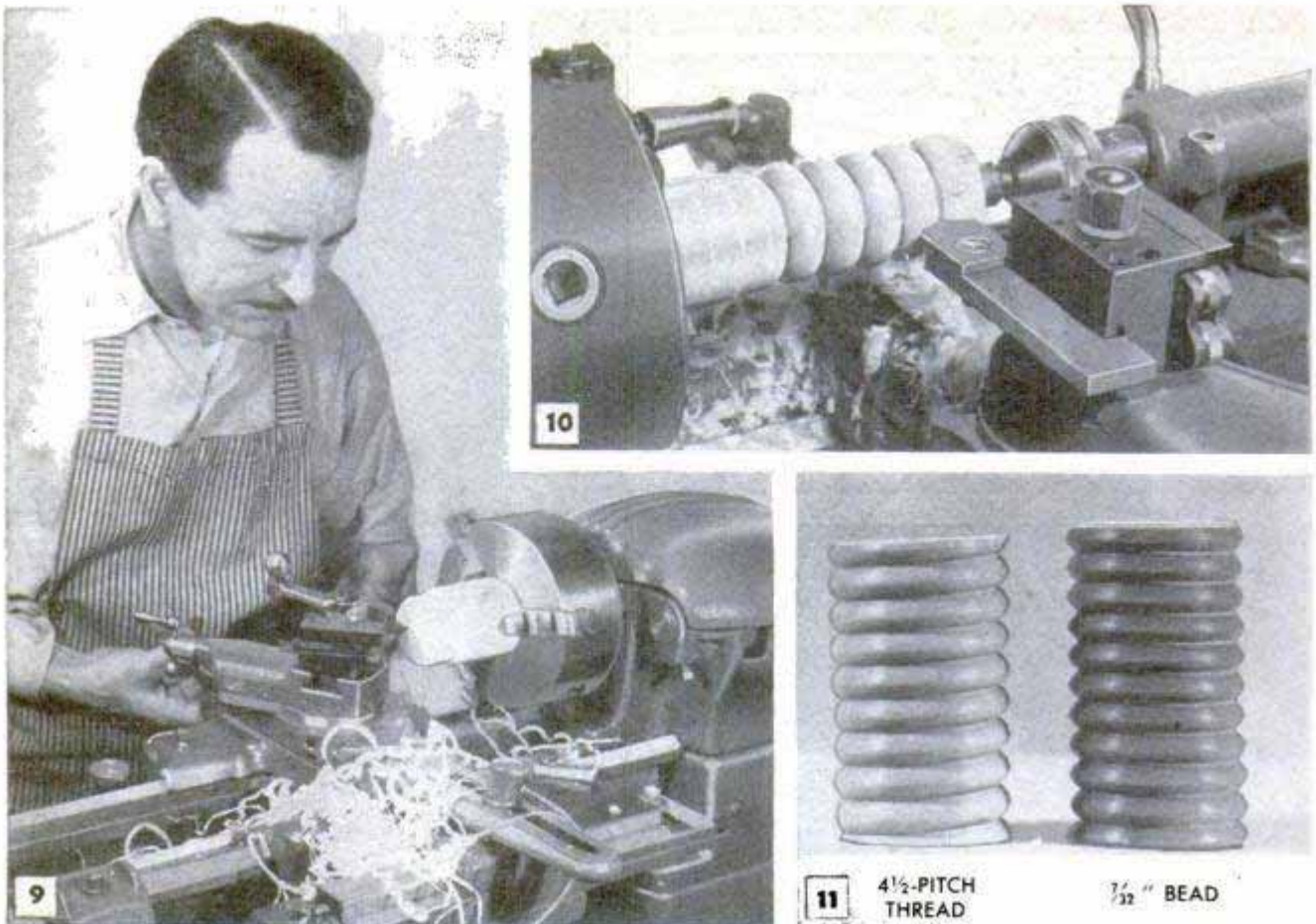


**Long, paper-thin chips indicate that turning setup is correct in all details. Negative rake is obtained by holding the tool handle slightly higher than point**



**Above and below, it's easy to turn plastic balls by using a short length of steel tubing as the turning tool. End of tubing is ground to form cutting edge**





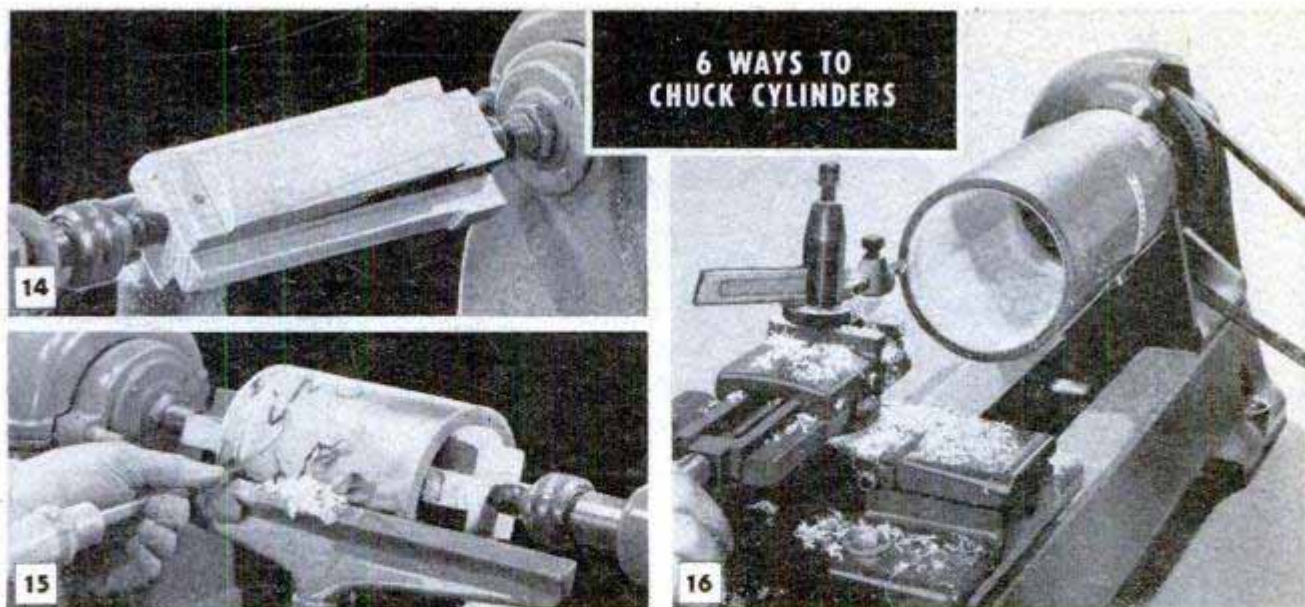
Beads and spirals are turned with a molding cutter mounted on a holder as in Figs. 10 and 12. Work longer than 4 in. should be supported on ball-bearing tailstock center as in Fig. 10. Short pieces are chucked as in Fig. 9



chucking the work. Figs. 2, 3 and 4 picture the fundamentals, and Fig. 9 shows the stock being held in a conventional 3-jaw chuck on a metal lathe. In Fig. 2 the plastic disk is clamped against a wooden backing plate with the tailstock center bearing against a hardwood follow block. In Fig. 3 a square of sheet plastic is simply screw-fastened to a block of hardwood attached to a faceplate. After the turning is completed it is cut free with a parting tool. Fig. 4 shows the simplest method of mounting thin sheet plastic where a center hole is permissible. A bolt passing through the center of a hardwood disk attached to the faceplate, holds the plastic disk firmly in place for turning. Figs. 7 and 8 show how to turn plastic balls to perfect spheres by means of a piece of steel tubing ground square across the end. The ball is rough-turned with the regular turning tools and then finished with the tube tool, the inside diameter of which should be about three quarters of the finished diameter of the sphere.

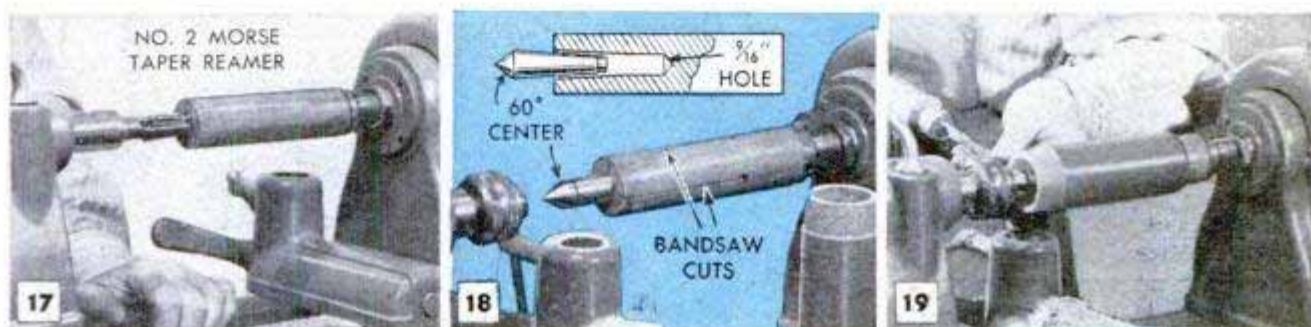
Plastic rounds (spindles) are mounted between centers in the same manner as are wooden squares. With the center head of

a combination square, score two lines at right angles to each other across the ends of the work to locate the centers. Then saw down the scored lines to a depth of about  $\frac{1}{16}$  in. on one end so that the lugs of the spur center will engage for a positive drive. Drill a small hole in the center of the opposite end of the piece so that the cup center will engage. In a metal lathe, the plastic also can be mounted between 60-deg. centers and driven with a dog just as in metal turning, or short rounds can be chucked as in Figs. 9 and 10. If the piece is more than 4 in. long, the outboard end should be supported by a ball-bearing tailstock center, Fig. 10. The latter illustration also shows how to utilize a molding cutter to form perfect beads by mounting the cutter on a short length of  $\frac{1}{4}$ -in. flat steel, Fig. 12. Then the unit is mounted in the toolholder of the metal lathe, Fig. 10. By connecting the carriage to the lead screw, the molding cutter will form a spiral as pictured at the left in Fig. 11. Of course, the thread feed must be equal to the width of the bead. While large beads, Fig. 10, can be spaced accurately enough with pencil marks, narrow beads are spaced by turning

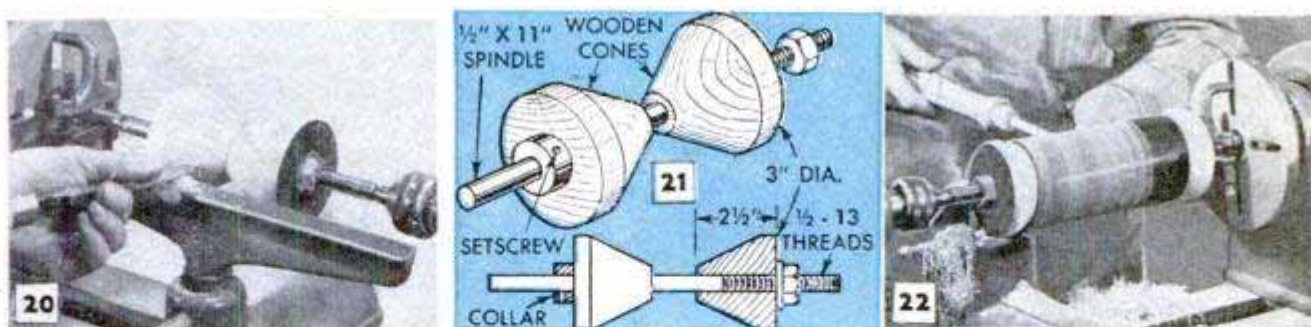


## 6 WAYS TO CHUCK CYLINDERS

**TAPERED HARDWOOD MANDRELS** are used in chucking large hollow cylinders. The mandrel is tapered slightly to fit the taper of the cylinder. Mandrel can be solid or built up. For light turning operations, hollow cylinders up to 8 in. long can be gripped internally in the lathe universal chuck, without support at outer end



**THE EXPANDING, OR WEDGE, CHUCK** is ideal for holding small-diameter work. The chuck is drilled and slit lengthwise to take a standard Morse-taper center and chuck grips work by advancing the center into the hole



**THE CONE CHUCK** is especially useful for holding thin-wall cylinders. Two tapered turnings are placed on a threaded shaft and held between centers. Work is held securely between cones by tightening a nut on shaft



**THE SPINDLE, OR FRICTION, CHUCK** holds work by friction alone. For internal turning, the chuck is recessed to hold the work, the recess being slightly smaller than the diameter of the work. Work is limited to short lengths

## 27 FINISHING SCHEDULES FOR PLASTICS

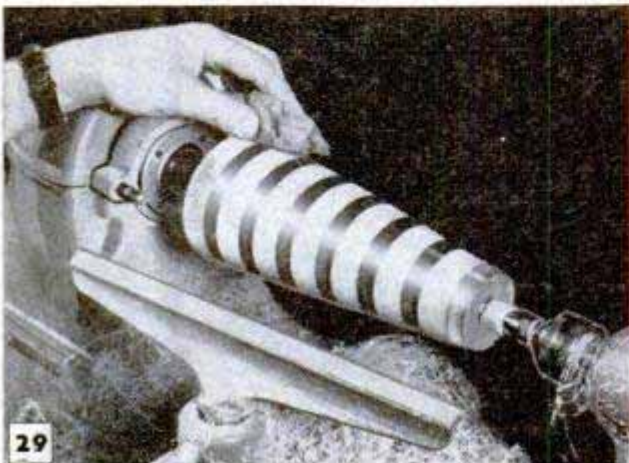
TYPE OF PLASTIC	FIRST ROUGH	SECOND ROUGH	FIRST BUFF	SECOND BUFF	EXTRAS
PHENOLICS	Sand 150 Grit, Wet	Sand 240 Grit, Wet	Learock 155 or equal (Alum. Oxide)	Learock 304B or equal (Whiting)	
ANY	Sand 150 Grit, Wet	Sand 240 Grit, Wet	No. 2-0 or 3-0 steel wool		
ANY	No. 2-0 Pumice with water is equivalent to sanding operation		Any fine buffing compound, usually tripoli		Dry Buff
ACRYLICS	Sand 150 Grit, Wet	Sand 240 Grit, Wet	Learock 855 or equal (Sand 400 Grit)	Learock 884 or equal (Whiting)	Optional—low bake at 120° for 2 hrs.
ACETATES	Machine Smooth	Sand 220 Grit, Wet	Learock 855 or equal (Tripoli)	Learock 832 or equal (Lime)	



26 Wet sanding removes the tool marks and smoothes the surface ready for buffing and polishing operations



28 Above, high polish is easy to produce with buffing compounds. Below, use steel wool on wood-plastics



29

the compound parallel with the work and reading the spacing direct from the micrometer sleeve. For example, the  $\frac{3}{16}$ -in. beading shown at the right in Fig. 11 is spaced  $\frac{1}{32}$  in. between the crowns, making each individual bead about  $\frac{3}{32}$  in. wide. In thousandths this is .218, or roughly, .200 in. which is just two full turns of the compound handle for each new spacing. In turning a spiral the width of the bead is .218 in., approximately equal to a  $4\frac{1}{2}$ -pitch thread. Beads and spirals are worked at slow speeds, using light cuts.

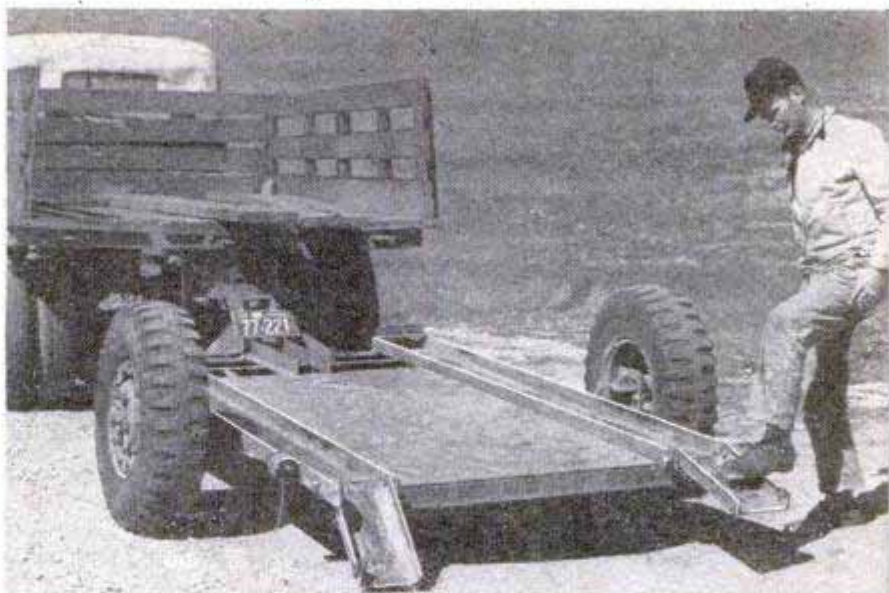
The first rule in ordinary plastics turning is simply to grind the cutting tool with plenty of clearance and keep it sharp. Fig. 13 details the important points in grinding the tool, but this applies to the square tool bit held stationary in the toolholder. In working with hand tools on the wood lathe, the slight negative rake is obtained simply by holding the tool handle a little higher than the cutting point. Among the hand-held lathe tools, the roundnose tool is most commonly used in turning plastics. Because of the radius of the edge, it offers the minimum area of contact and is less likely to leave chatter marks. Figs. 14 to 25 inclusive picture and detail methods of chucking and turning hollow plastic cylinders and tubes of varying length. Wedge chucks, various types of hardwood expanding chucks, or mandrels, and cones are commonly used. As a rule, the chucks are made in the lathe to suit the job in hand.

Fig. 26 shows a common setup on the wood lathe for polishing the plastics job after turning. Fig. 27 gives recommended finishing schedules. Speeds for wet sanding and buffing can be somewhat higher than for turning. When the job is composed of wood and plastic as in Fig. 29 the dry, rough sanding is followed by a rubbing with fine steel wool. After sanding has removed fine scratches and tool marks, a high luster is produced in a jiffy with a buffing compound applied as in Fig. 28. In sanding and buffing, care must be taken not to heat the work unduly.

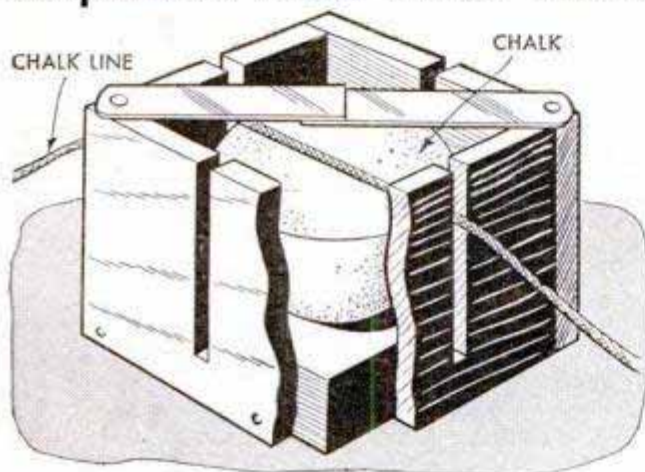


# Two-Wheel Trailer Safely Hauls Farm Tractors

Mounted on an under-slung axle, this trailer is used to haul four-wheel farm tractors at highway speeds. Channels for the tractor wheels are mounted on the trailer bed, hinged sections of the channel folding downward to provide a ramp. After loading the trailer, the hinged sections are folded flat on the bed to chock the tractor wheels. If desired, a hinged ramp of flat steel can be substituted for the channel sections to facilitate loading three-wheel tractors.



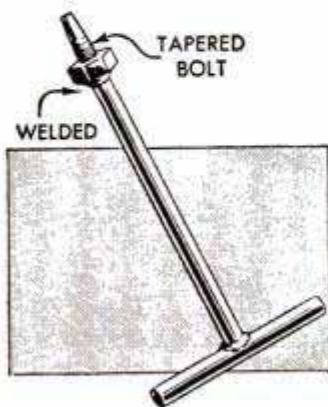
## Carpenter's Chalk Holder Prevents Soiling Hands



Carpenter's chalk kept in this holder will neither soil the hands when chalking a line nor crumble when stored in the toolbox. The holder is made in the form of a box  $1\frac{1}{4}$  in. deep and slightly larger than the diameter of the chalk. Two saw kerfs are cut across the box to guide the chalk line, and two strips of sheet metal, which are fastened to the corners with the ends overlapping, hold the chalk in place. In use, the holder is held in the hand. The string is then inserted between the metal strips and drawn across the chalk through the saw kerfs, as shown in the drawing.

## T-Wrenches Align Oil Pan When Bolting in Place

Replacing an oil pan is a less difficult job if two of these T-wrenches are used to align the bolt holes. The wrench is made by welding two lengths of rod to form the T-shaped handle, and then welding a bolt to the end of the handle. The bolt, which should be the same size as the oil-pan bolts, is ground to a taper, leaving enough threads intact near the base of the shank, however, to hold the oil pan temporarily in place. Turn the wrenches into bolt holes at opposite corners of the oil pan to align the holes. Then remove the wrenches after the rest of the bolts have been started.



ily in place. Turn the wrenches into bolt holes at opposite corners of the oil pan to align the holes. Then remove the wrenches after the rest of the bolts have been started.

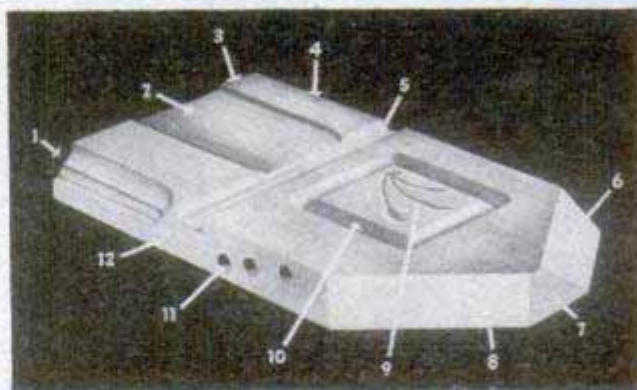
## Rump Strap for Dairy Cow Stops Switching of Tail

Even though the barn is thoroughly sprayed twice daily to eliminate flies, dairy cows accustomed to switching their tails during the day in order to keep off the pests frequently continue this habit during milking. To prevent it, one dairyman attaches a loop of rope or webbing to the milking-machine strap and places the loop in the position pictured to keep "Bossy's" switching tail under control.

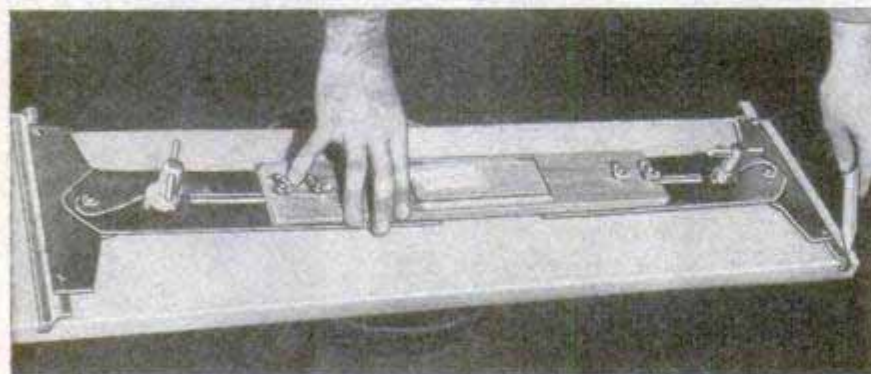
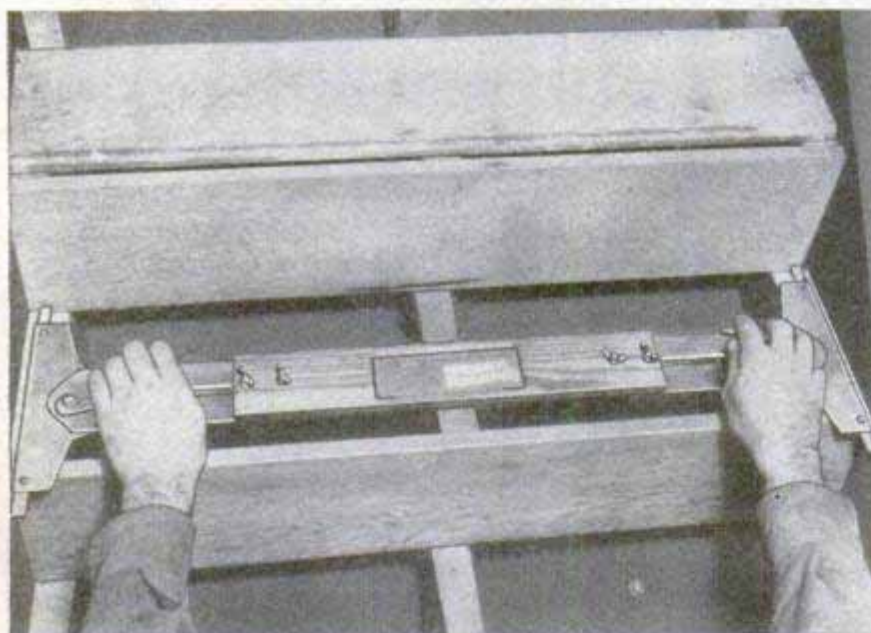


☐ To remove printing-ink stains, soak in turpentine and then sponge with alcohol.

# SHOPPING



**TWO-SPEED RADIAL SAW** that does just about everything required in ordinary cabinet work has been made available to contractors and home craftsmen. Accessories include boring table, router-shaper table, miter gauge for accurate crosscutting, arbors for buffing, grinding and wire wheels, dado and molding heads and wood lathe. Numbered block above gives an idea of the multiplicity of cuts that can be made

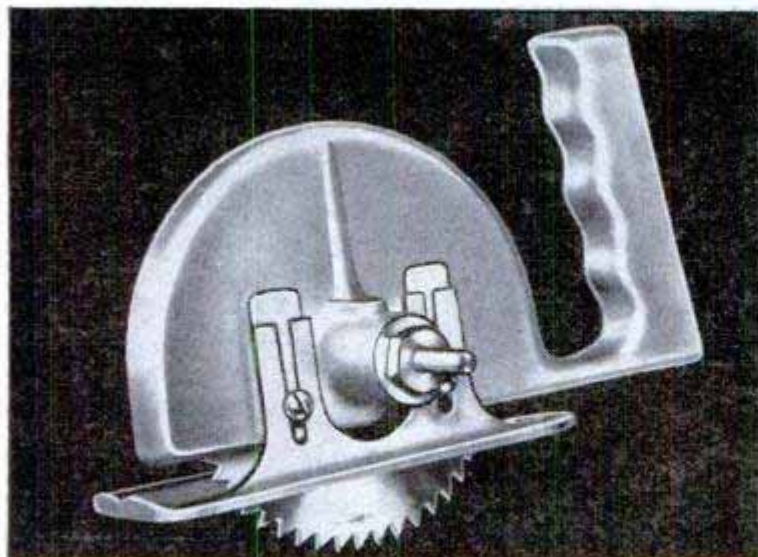


**AUTO-SET TEMPLATE** for measuring and fitting stair treads, closet shelves and flooring simplifies and speeds up these time-consuming jobs. The two ends of the template are adjusted to span the stringers as pictured, or, are forced against the skirt boards in closed stairways, and the adjustment locked. Then template is placed on the stock for marking



**MAGNETIC DRIVER** for hex-head screws and nuts has powerful magnet installed in hex socket to hold screw in place for starting in hard-to-reach corners. One-handed operation leaves other hand free to hold parts being assembled. Tool is about length of average screwdriver. Available in standard sizes from  $\frac{1}{4}$  to  $\frac{1}{2}$  in.

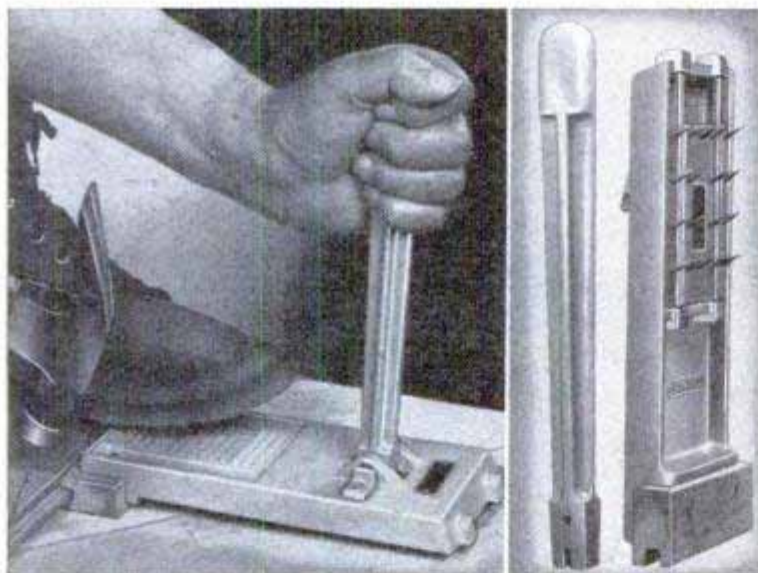
# FOR TOOLS



**CIRCULAR-SAW ACCESSORY** for use with any  $\frac{1}{4}$ -in. portable electric drill has 4-in. blade that can be used for ripping and crosscutting. Saw is adjustable for  $\frac{1}{4}$  to  $1\frac{1}{2}$ -in. cuts

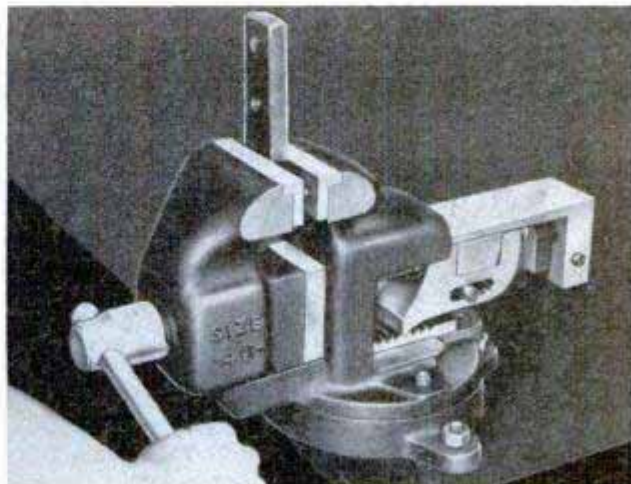
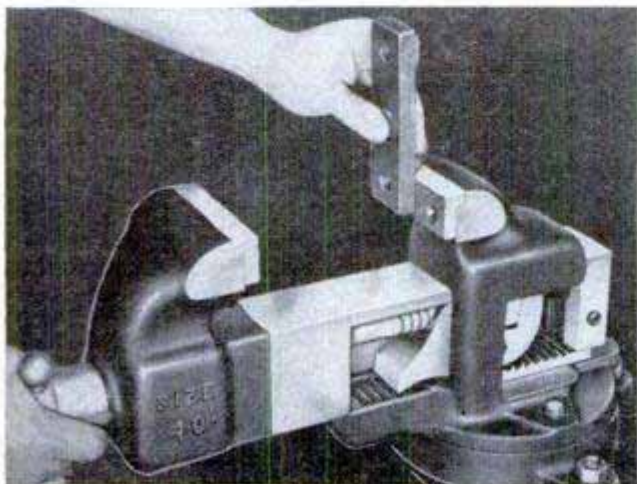


**SELF-CONTAINED TAMPER** for earth and gravel fills is pictured above in operation. It is actuated by a piston sliding in a cylinder in which a fuel mixture is fired by magneto ignition. Thrust from piston can be adjusted to lift tamper from 12 to 20 in. It falls by its own weight. The tamper is operated by one man and will compact from 10 to 20 cubic yards of earth per hour on a quart of fuel, a gasoline-oil mixture similar to that used in two-cycle engines



**FLOOR JACK** of a new type with lever action is a timesaver when laying top flooring or decking. Jack has many other applications as tightening aid when assembling parts for nailing

**SLIDE-SET VISE** for machinists and metal-working craftsmen is simple, fast and positive in operation. As pictured in the two views below, the handle is turned counter-clockwise to release the movable jaw, which then slides to any position. After engagement, the handle is tightened clockwise in the conventional manner as in the right-hand photo below. This construction eliminates the necessity of spinning the handle to open or close the vise jaws



## Unusual Christmas-Tree Display Projects Through Store Window



One merchant achieved an unusually interesting Christmas-tree display by having the tips of the tree branches seemingly project right through the show window. This was done by setting up the tree close to the window, causing some of the longer branches to bend against the pane. These branches were cut off flush with the glass and then cemented to the outside so that the branches appeared to continue through the window. Ordinary household cement is used so that pulling off the branches will not endanger the plate glass.

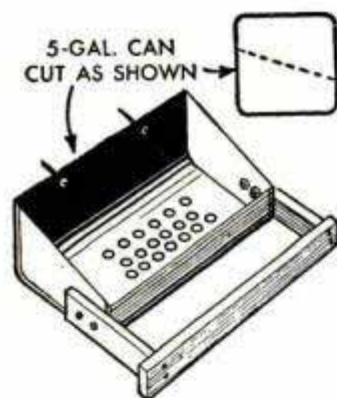
Opie Read, Jr., Chicago.

## Eaves-Trough Chicken Feeder Handles Wet Mash

Poultrymen who prefer to feed wet mash to young chickens in low trough-type feeders can make an excellent and inexpensive feeder for this purpose simply by fitting wooden endpieces into short lengths of round eaves trough. After cutting the eaves

## Laying Nests Made From Oil Can Are Fitted With Wooden Perches

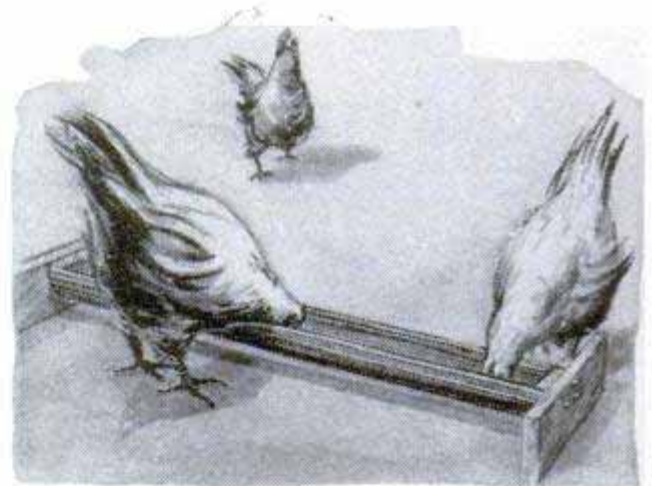
A square 5-gal. can, cut in half along the dotted line as in the detail and fitted with a wooden perch, makes two laying nests for the poultry house. The units can be attached to the walls



individually or in batteries. In batteries, they can be placed one unit above the other, or in line horizontally along the wall. After cutting the can, it's a good idea to snip the corners, turn the sharp edges in and hammer them flat.

The wooden perches can be attached with small stove bolts or roundheaded screws driven from the inside of the nest. Punch a pattern of small holes in the bottom of each unit to permit air circulation and to facilitate cleaning.

Albert Zanelli, Kahoka, Ark.



trough to the lengths required, a semicircular block is nailed in each end. Then the block is nailed to short lengths of 1 x 4-in. stock. The latter, which are nailed horizontally, support the feeder and prevent it from being tipped or upset easily.

Charles B. Mason, California, Mo.

## Self-Dumping Trailer Operated by Tractor Carries Heavy Load



This two-wheel, self-dumping trailer has a flat bed or platform fitted with slots for a standard hay rack. Designed for use with a tractor, the hitch is hinged so that, when the front latch is released, a slight backward motion of the tractor tilts the bed and dumps the load. Of very strong construction, the trailer will hold all the weight a tractor can move, including farm machines and equipment, baled hay and feed.

L. H. Houck, Jefferson City, Mo.

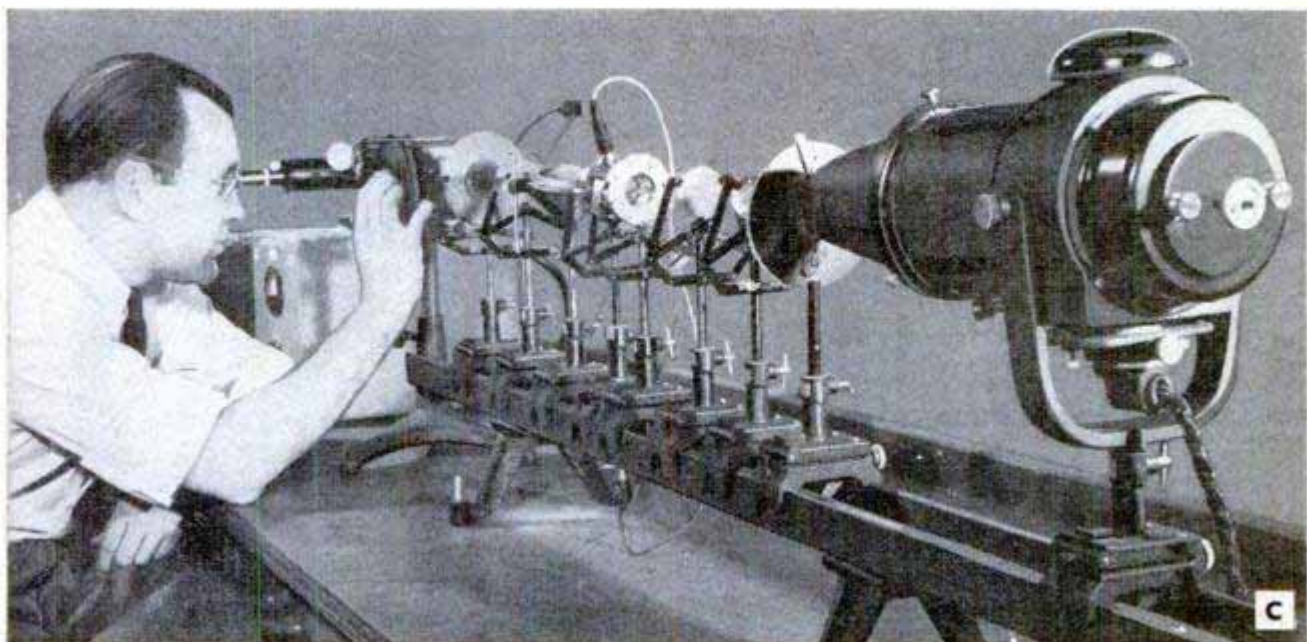
## TV MIRRORS "SEE" ONLY ONE COLOR

IF YOU would like a mirror that reflects your favorite color and no other, the men to see are the color-television specialists of the Westinghouse Research Laboratories. By depositing ultrathin layers of metallic compounds on clear glass they are able to produce mirrors that reflect only one color—either red, green or blue.

The mirrors are used at both the transmitting and receiving ends of their color-television system. At the transmitting end they pick up the color picture and break it down into its three basic colors—red, blue and green—which are sent in the proper sequence. At the receiving end another set of mirrors "gather" the colors for the picture.

To make one-color mirrors, a clear sheet of glass, photo A, is placed in a big glass-jar "oven" surrounded by a wire cage. This is lowered as shown in photo B, sealed, and evacuated of air. Special metal compounds are heated until they evaporate, and as the vapors rise in the jar they strike the glass sheet to apply a smooth, even coating. The thickness and number of layers deposited on the glass determine which color the mirror reflects.

The research scientist in photo C is studying how colors change under the influence of electricity. The telescope-like device can produce all colors of the rainbow by changing the voltage applied to a light beam.



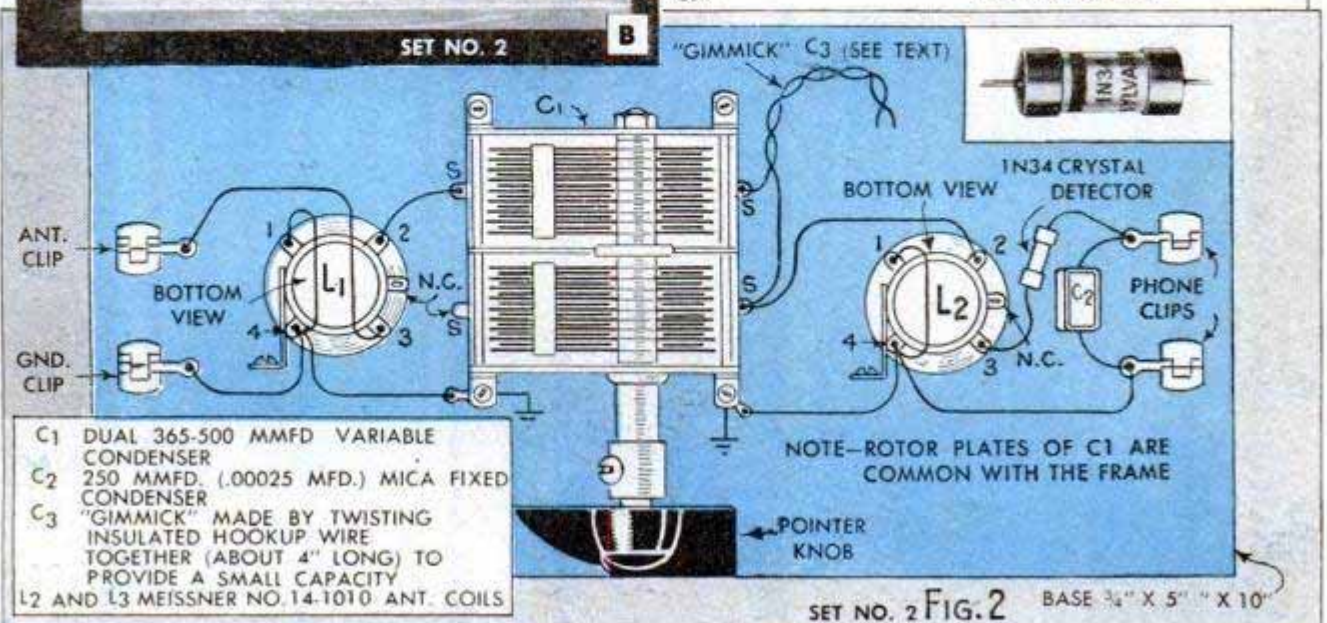
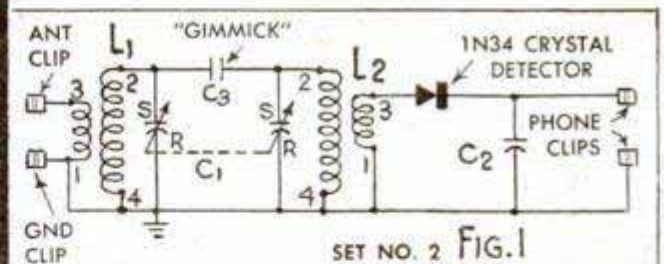
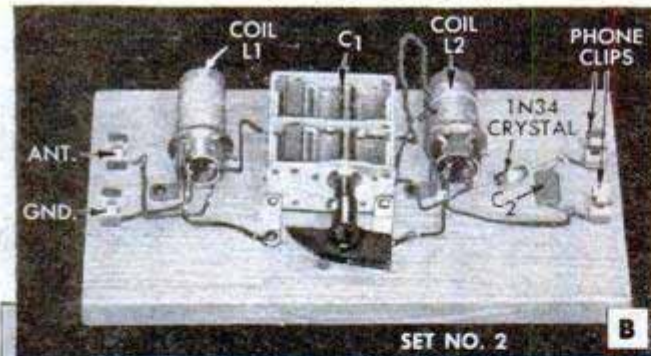
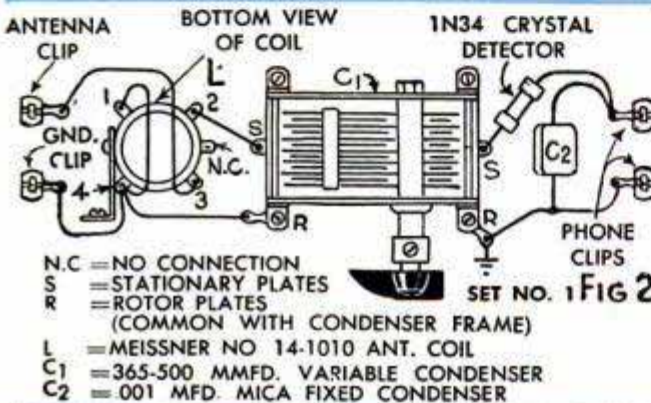
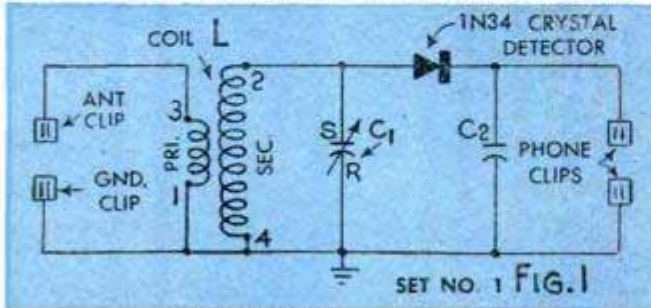
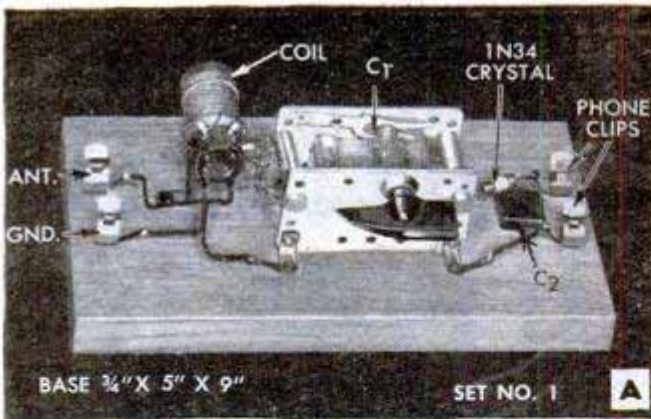
# THREE GERMANIUM DIODE CRYSTAL

By L. M. Dezettel

CRYSTAL sets have been a favorite of experimenters for many years as they are easy to build and they reproduce voice and music with true lifelike quality. The three crystal sets described here use sensitive Sylvania 1N34 germanium diodes as fixed crystal detectors. The diodes are available from all radio-parts houses.

Set No. 1, shown in photo A, is assembled on a  $\frac{3}{4}$  x 5 x 9-in. piece of well-sanded soft pine wood. All parts are mounted with  $\frac{1}{2}$ -in. No. 6 roundheaded wood screws. Set the parts up on the baseboard and mark the locations for the wood screws. Use a No. 36 drill, and drill about halfway into the wood at each of these points. Small angle brackets are employed to mount the variable condenser on the baseboard. Use  $\frac{3}{16}$ -in. 6-32 machine screws to fasten the brackets to the variable condenser; do not use longer machine screws. The same assembly method is used for all three receivers.

The schematic circuit diagram for set No. 1 is shown in Fig. 1, and the pictorial wiring diagram appears in Fig. 2. This is a standard crystal-set circuit using an inexpensive factory-wound coil. Variable condenser C1 can be any capacity between 365 mmfd. and 500 mmfd. It will provide reasonably loud signals from

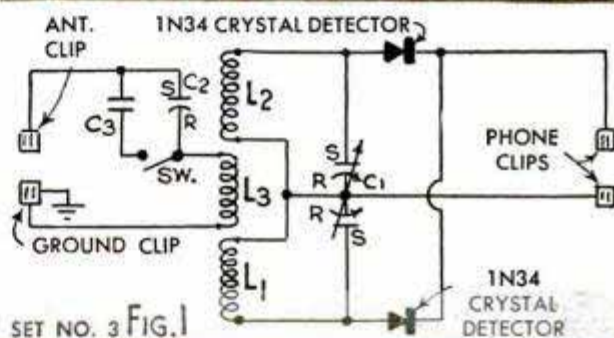
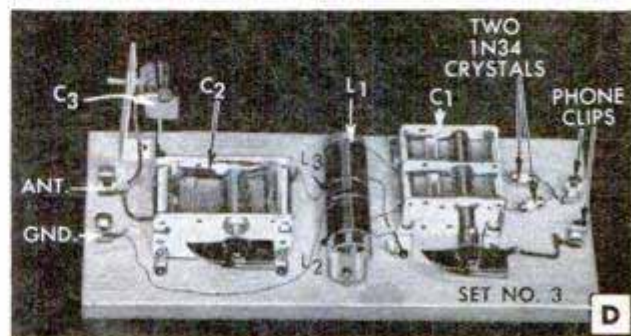


# RECEIVERS FOR BEGINNERS . . .

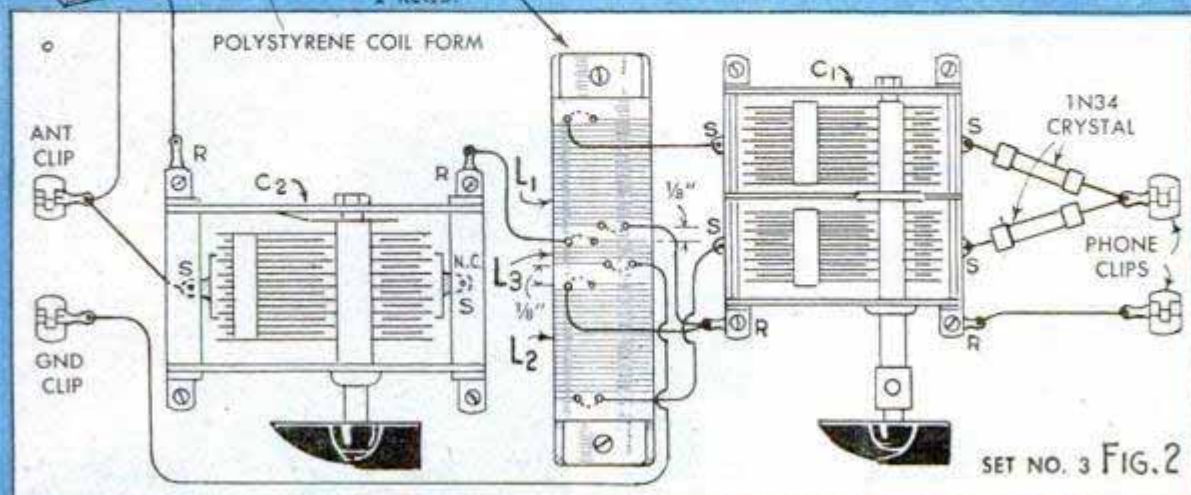
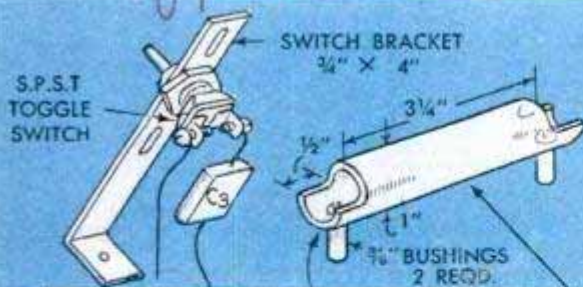
local broadcasting stations in dual-type headsets with an impedance of 2000 ohms, or higher. The antenna should be a high, well-insulated outdoor type at least 100 feet long, although antennas as short as 40 feet will work. The ground should be made to a cold-water pipe.

The practical receiving range of any crystal receiver is limited to about 40 miles for powerful broadcasting stations. Set No. 2 is double-tuned for improved selectivity. Two coils like the one used in set No. 1 are employed and each coil is tuned by one section of a dual variable condenser. Coupling between the two tuned circuits is by means of a "gimmick" made by twisting two pieces of insulated wire together for a length of about 4 in. This is condenser C3. The longer this "gimmick" the louder the signals, but the poorer the selectivity.

Set No. 3 is an experimental arrangement using two 1N34 diode crystals in push-pull to provide louder signals than conventional crystal circuits. The coils are hand-wound to provide a split secondary winding with a primary winding between. Both primary and secondary are tuned. The dual-section variable condenser tunes the secondary of the coil to the frequency of the station. Condenser C2 in primary L3 tunes the station but it has its greatest effect on very long antennas. If the desired station operates on 850 kc. or higher, "open" the toggle switch on the bracket. Detailed student material list is R-396. *now out of print*



- C1 DUAL 365-500 MMFD. VARIABLE CONDENSER
  - C2 SINGLE 365-500 MMFD. VARIABLE CONDENSER
  - C3 .001 MFD. MICA FIXED CONDENSER
  - L HAND-WOUND COIL ON A 1" DIA. POLYSTYRENE TUBE (SEE TEXT)
  - L1 AND L2 120 TURNS OF NO. 32 ENAMELED WIRE
  - L3 43 TURNS OF NO. 32 ENAMELED WIRE
- ALL THREE COILS ARE CLOSE-WOUND IN THE SAME CLOCKWISE DIRECTION AND SPACED 1/8" APART  
NOTE-VARIABLE CONDENSER ROTORS ARE COMMON WITH FRAMES



NOTE- N.C. - NO CONNECTION

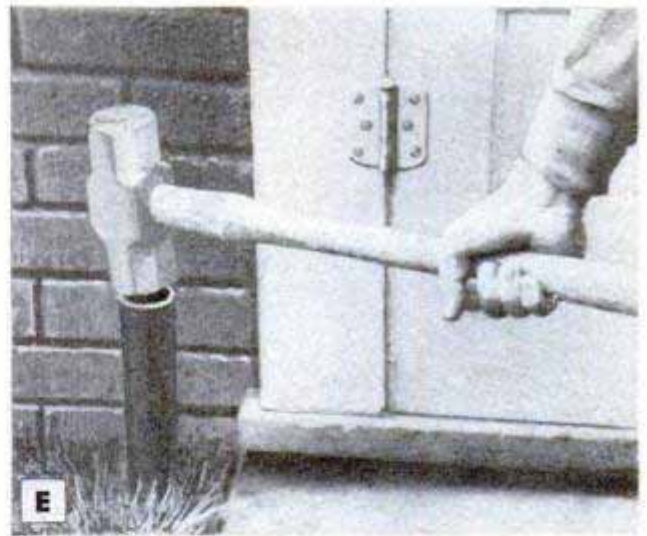
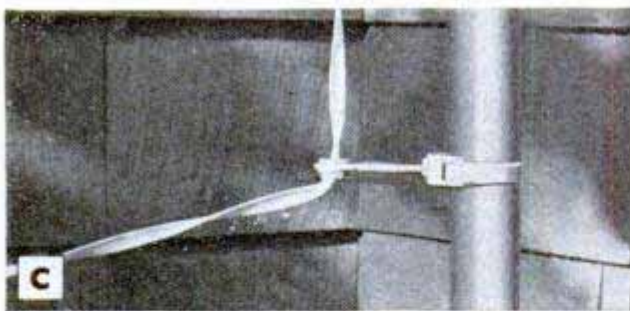
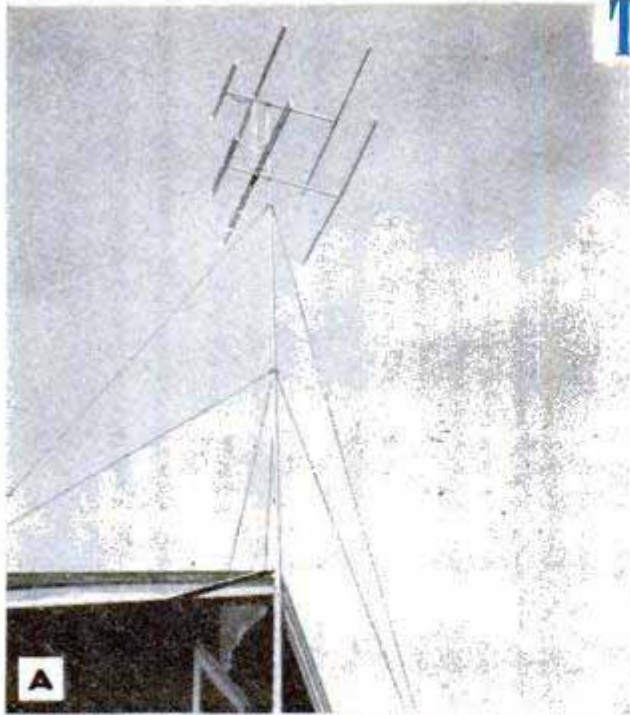
BASE 3/4" X 3" X 12"

# TV ANTENNA INSTALLATION WITH

By Harry F. Leeper

**M**ANY homeowners wish to keep TV antennas off the roof if possible. Chimney mounts are not always practical for supporting the necessary high antenna-mast installations in fringe areas remote from television transmitting stations. Such TV antennas must be at least 45 feet from the ground, or higher in many locations.

Two practical solutions for this problem are illustrated and described on these pages. Both installations were made with metallic tubing extended from the ground up the side of the building to support the multiple-bay antenna arrays and only a few guy wires are required. The installation illustrated in photo A shows the tubing supported at the end of the roof ridge. A strap-iron bracket at the attic window provides another firm support as illustrated in photo B. This mast supports a two-bay Inline high-low TV antenna array with a single 300-ohm twin-lead lead-in. This is twisted and brought down through several TV lead-in standoff insulators attached to the tubing as shown in photo C.



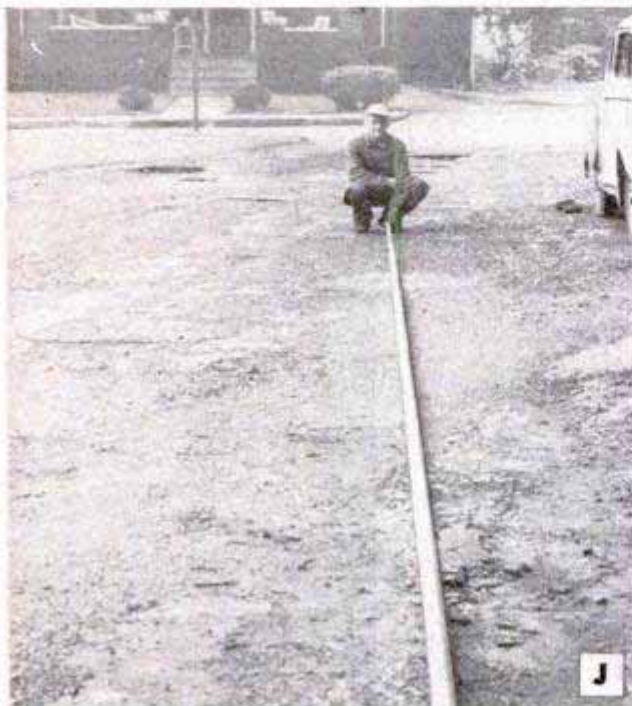
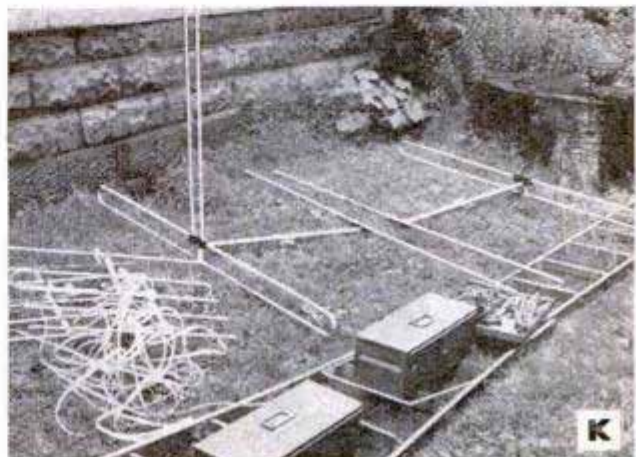
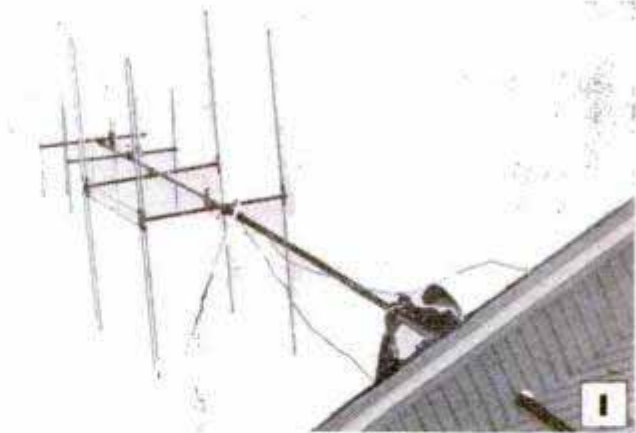
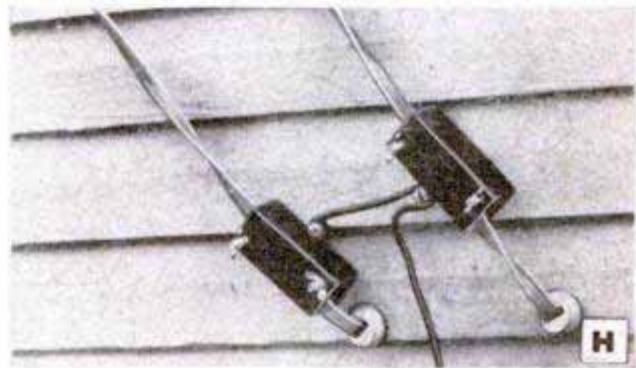


## MINIMUM ROOF ATTACHMENTS

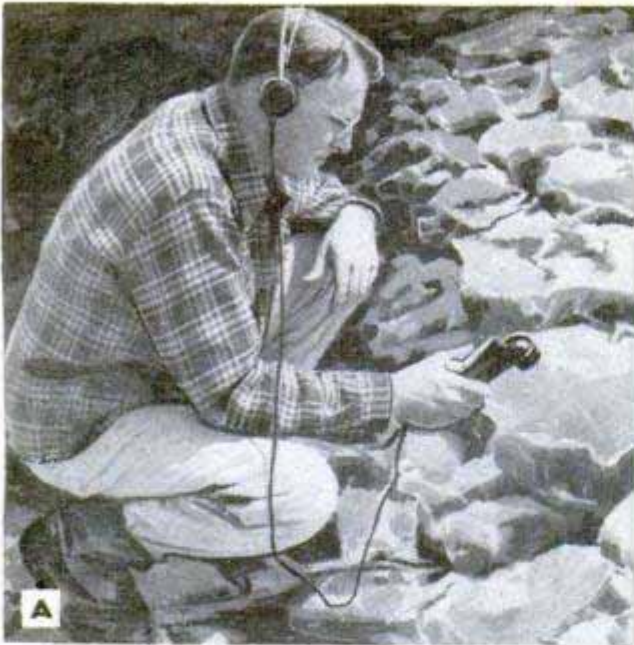
A much higher and heavier installation is illustrated in photos G, H, I and K. Photos G and I show the final steps in the completed installation, looking up from the ground.

The antenna array is a combination In-line double-stacked for the low bands, and a Yagi-type array for the high bands is mounted on top. Two twin-line lead-ins are used with lightning arrestors in each lead-in as shown in photo H. These are mounted on the side of the building and grounded; lead-ins enter the building through porcelain tubes. A double-throw switch is used at the receiver. The antenna array was assembled on the ground as shown in photo K.

In making this particular installation, the pipe assembly consisted of four 10-foot lengths of 2-in., one length of 1½-in. tubing and one length of 1-in. tubing. Since the top lengths overlap, the total length of the antenna mast is 56 feet. Photo J shows the lengths bolted together ready for installation. The 2-in. pipe was joined flush by using short pieces of pipe and additional split tubing inside the adjoining lengths and by bolting through the entire assembly above and below the joint with ¼ x 2½-in. bolts. Any similar method may be used. For the base, a 6-ft. length of 1½-in. pipe was driven 5 feet into the ground as illustrated in photo E to take the 2-in. pipe; the cement base block, photo F, is optional. Rings for the guy wires, photo D, were placed where needed on the top sections of the antenna mast, after the tubing was through the overhang opening. In both installations the guy wires were fastened to short lengths of angle iron screwed to the underside of the roof overhang.

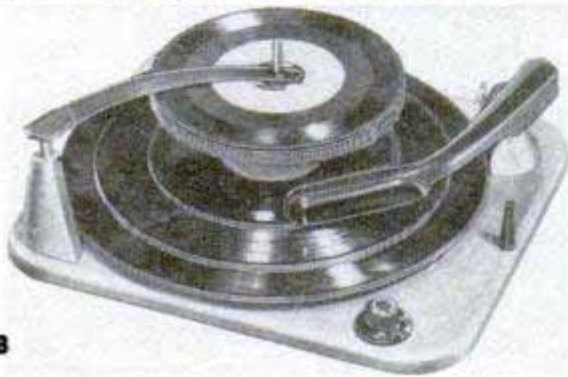


# RADIO-TELEVISION and ELECTRONICS TODAY



**A**

**A**—Pocket-size Geiger counter is only 9 in. long and 2¾ in. in diameter. It employs subminiature electronic elements. The weight of the entire unit, including headphones, is only 1¼ pounds. Power is supplied by a flashlight battery and vibrator unit

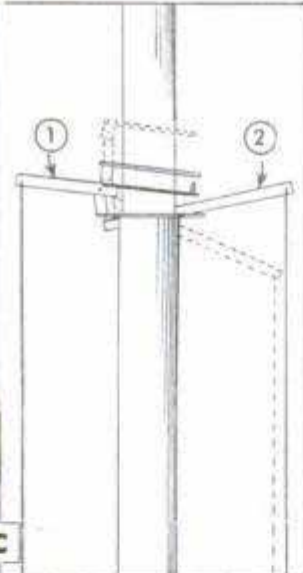


**B**

**B**—Three-speed record changer is completely automatic on all three speeds; the standard 78 r.p.m., the 33½-r.p.m. long-playing record and the 45-r.p.m. record. Changer has adaptor for large center hole



**C**



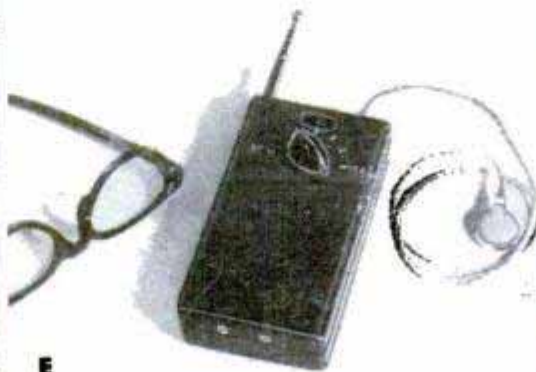
**C**—Jack-Up TV-antenna tower features variable height and quick lowering without the use of tools for making necessary antenna-array repairs. It is adjustable for either ground or roof installations. Jack handle (2) raises upper tube; lever (1) lowers it

**D**—Before installing a TV antenna on a chimney mount, turn off furnace primary-line control if the furnace is oil or gas-fired. Bank fire in the case of a coal furnace to protect installer from exhaust gases

**E**—Tiny personal FM receiver covers the entire FM band 88-108 megacycles. It employs two subminiature tubes. Built-in telescoping antenna extends to 14 in. Power is supplied with small A and B-batteries



**D**



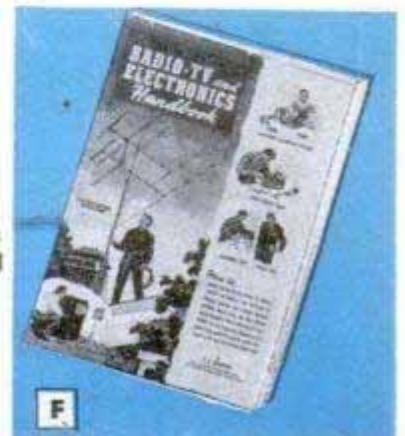
**E**

**F**—**RADIO-TV and ELECTRONICS HANDBOOK** is written especially for millions of radio and TV set owners, radio beginners, students and experimenters by Frank L. Brittin, Radio-Television and Electronics Editor of *Popular Mechanics Magazine*. You need no previous knowledge or experience in radio and TV work to put the information contained in the book into immediate practical money-saving use.

Learn how you can install TV and FM antenna systems; how to adjust and tune TV receivers and how to make many radio repairs yourself, eliminating unnecessary service calls.

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Over 500 photographs, drawings and diagrams illustrate the 160 fact-packed pages. Glossaries of commonly used radio and TV terms and color codes are included. Order your copy of **RADIO-TV and ELECTRONICS HANDBOOK** today from your local bookstore or send your order direct to Popular Mechanics Press. Price \$2.50.



**F**



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Take the man who is a crank about his gun ... won't settle for less than a famous "name" make ... Winchester, Remington, Ithaca, for instance ... and takes care of it like a baby. Ten to one, he is a real hunter.

Take the man who is a crank about tools ... wouldn't give kit-room to anything less than a Bonney Wrench. Ten to one, he is a real mechanic. Yes, you can usually spot the real mechanic by his tools.

*This is one of a series of spirited sporting scenes (in full color, without advertising) available on request. Write for your free set today.*

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You can save yourself some dough and maybe get out from under a big repair bill if you'll drive right down to your motor specialist and ask to see his Danger Zone Book.

This book takes all the mystery out of car repairs—shows what the parts look like, what they cost, what the parts look like, what they cost, what the parts look like, what they cost, what the parts look like—installing them will be. And—most important—the book shows what you can save by having repairs done when first needed.

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*Tough Guy*



**WARNING ZONE**

Engine loses pep ...

**DANGER ZONE 1**

Engine begins to smoke ...

**DANGER ZONE 2**

Engine pumps oil badly ...

**DANGER ZONE 3**

Destructive wear sets in ...



**Needs a tune-up**

**Clean**, adjust and re-time ignition. Clean fuel supply and carburetor screens. **Adjust** carburetor. Adjust tappets and fan belt. Check compression and vacuum readings for symptoms of ring wear.

**Needs new piston rings and minor engine repairs**

Replace piston rings. Align rods. Adjust rods or replace rod bearings. Reseat and reface valves.

**Tune engine.**

These repairs are comparatively inexpensive and put the engine back in peak condition for thousands of economical miles. Delay puts the engine in Danger Zone 2.

**Needs new piston rings and major engine repairs**

Replace piston rings. Replace piston pins. Adjust—probably replace—main bearings. Align rods. Adjust rods or replace rod bearings. Reseat and reface valves. Tune engine.

These repairs naturally cost more than those needed in Danger Zone 1, but they put the engine back in condition for thousands of additional miles of satisfactory service. Delay leads to costly Danger Zone 3.

**Needs new piston rings and complete overhaul**

Repairs cost three or four times as much as in Danger Zone 1.

Remove engine. Rebore cylinders. Replace pistons, pins, rings. Replace main bearings. Align rods, refit or replace rods, or replace rod bearings. Overhaul valve lifters, rocker arms. Replace timing chains or gears. Reseat, reface valves. Replace guides and springs. Replace camshaft bearings. Clean oil lines. Overhaul oil pump.

Clean, re-install and tune engine.

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**STEEL-VENT PISTON RINGS**



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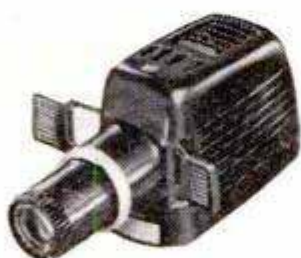
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# Care and Feeding of Engines

BY S. P. CORP

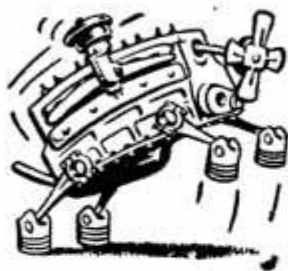
## WINNING THE COLD WAR

There's a perpetual cold war between winter weather and your automobile engine. If your car seems to be on the losing side when you try to start up some zero morning, it is best to get a thorough check of fuel and ignition systems. Have each cell of your battery tested to make sure it is fully charged, with no weak cells. Get a voltmeter check of your starting system. Be sure you are not using a too heavy motor oil. Your engine should be timed with a tachometer, especially if it has automatic transmission. Idling too slow may damage the starter. Generator springs and brushes should be clean and the commutator should not be dirty or burned. Faults in generator relay, current regulator, or voltage regulator may cause hard starting. Distributor, coil, carburetor, and fuel pump all deserve attention, too. All must be right, to win the cold war!



## WHY ENGINES BUCK

Let's say an engine is idling smooth as a purring kitten, but it begins to buck like a steer when you hook a vacuum gauge into the line to check compression. That's because you hooked in between crankcase ventilator and intake manifold,



you cut off some of the air which ordinarily mixes with the fuel mixture from the carburetor. That causes an excessively rich mixture to feed directly to the cylinders, and the engine isn't used to such rich stuff. It bucks. You can avoid such a disturbance by hooking vacuum gauge into the special

plug provided for that express purpose in most intake manifolds.

## RING OUT THE OLD

It's getting close to the year's end. Time to take stock, to get ready for a new year. Among the old things you'll want to get rid of may be the old piston rings in your car. Give your car a real break. Start 1951 with the world's best piston rings—Sealed Power Piston Rings. There is a Sealed Power Ring Set specifically engineered to do the best possible job in your engine, whatever the make, model, or condition of wear. The Sealed Power MD-50 Steel Oil Ring is the finest oil control ring ever built—the only ring with the Full-Flow Spring. It works even in badly tapered and out-of-round bores. Ask for the free illustrated booklet, "7 Ways to Save Oil." It may save you some real money. Just address a postal card to Sealed Power, Dept. G-12, Muskegon, Michigan.

## Meet Mr. Christmas Tree

(Continued from page 92)

The incident taught the 14-year-old a lesson he's never forgotten. "You've got to make it easy for a customer to buy," he says today. "That's why you'll find my trees in grocery stores. The housewife can pick up her cranberries and pumpkin for Christmas dinner, tuck one of my little trees under her arm and walk home. A good many people prefer a large tree, but the big market is in the smaller size."

Roy's first job was as a tomato salesman in a produce warehouse where he met and married the bookkeeper. That fall he worked after hours, hauling small trees from the swamps to the newlyweds' basement. Every night Ede, his bride, trimmed off the lower branches while he cut birch disks to serve as stands. By December the basement was bulging, so Roy set off for Minneapolis with 2000 of the trees. Making a fortune seemed a cinch—until the weather turned warm. Needles began to fall and by the time people were ready to buy, his trees were bleak little skeletons.

Here he absorbed lesson number two—never skip the scientific approach. Roy poured over botany books, consulted forestry laboratories. He learned that each needle is clamped in place by two tiny sacs filled with sap; when the sap dries the needle falls. Very well, he'd keep the sap from drying. He started dipping and spraying trees with every liquid he thought might turn the trick. Tung oil worked very well, but after a few days in a warm room the tree exuded a disagreeable odor. Silicate of soda, suggested by a laboratory, made the needles drop off very quickly.

At last he hit on a water-emulsion paint consisting of pigment, oil and water. It not only gave the tree a waxy protective coating but also a beautiful green coloration which covered the unattractive yellow-brown of the natural dwarf spruce. To the formula for the coating he eventually added a fungicide.

Here's the history of any one of the little trees you may see in the grocery stores this month:

Last winter Roy and Dana Worrall, his chief forester who formerly managed the Christmas tree stands for the state of Minnesota, took off in Halvorson's four-seat plane and ranged thousands of miles in search of muskeg country. When they spotted a likely looking patch of wilderness from the air they sent a scouting crew in on snowshoes to check the trees. If the area was part of Halvorson's own 10,000 acres of timber, he sent in his cutting crews.

(Continued to page 232)

# A Welcome Gift!



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Choice, crimp cut, mild, flavorful tobacco—all ready for Christmas in a colorful, gift-packed Yuletide package... with a built-in gift card right on top!

# Prince Albert

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## Clinic



## for Homemakers

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### Ice Dams



**Q**—My home has a low-pitched roof with a wide cornice, and during the last winter I noticed several damp spots on the ceiling near the outside walls on the north side of the house. On going into the attic I found that water was dripping from the roof boards near the lower ends of the rafters and running through the attic floor onto the plaster. What could cause this?

G.T., Plainfield, N.J.

**A**—Condensation is nearly always a possibility, but, judging from your description, your trouble is more likely due to the formation of ice dams on the roof just above the cornice. Because of heat loss to the attic from the rooms below, and also because of heat from the sun on warm winter days, the roof is warmed sufficiently from the ridge down to a point near the plate to melt snow and ice which collects on the roof. However, the area of the roof immediately above the cornice from the eaves to the wall line is much colder. Water coming from a higher level freezes on the roof at the wall line, or a short distance below it, and forms a dam. This usually happens during the latter part of a winter day when the temperature drops below freezing. Whenever the heat is sufficient to melt the snow above the wall line, water is trapped above the dam, from where it will gradually seep under the shingles and into the attic. The only remedy that can be considered permanent is the installation of one or two courses of heavy roll roofing under the shingles and reaching well up above the wall line.

### Figuring Length of V-Belt

**Q**—I want to change the pulley sizes on a home-shop power tool having a single V-belt drive. But how does one measure the pulleys to get a V-belt of the correct size? All instructions I've seen say to measure around the outside of the pulleys; not at the bottom of the grooves. B.U., Los Angeles, Calif.

**A**—Usually either the instructions that came with the machine or the repair parts list will specify the correct belt size and length to use. However, we assume from your letter that you wish to use pulley sizes differing from those that

(Continued to page 230)





*Anne Baxter says... These  
Gifts are Close to  
a Handy Man's  
Heart!*

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**"ALL ABOUT EVE"**  
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Light weight makes them easy for women  
to use in housework, tool



**NEW HOME-UTILITY 1/4" DRILL KIT** is easy to operate, fun to use, packed with uses for home, farm, workshop! Contains speedy H-U 1/4" Drill, 7 high-speed bits, wheel arbor, 4" wire wheel brush, 3 sanding discs, rubber backing pad in sturdy, streamlined metal kit!

**All for \$29.95**



**HOME-UTILITY 1/4" DELUXE DRILL KIT** gives you H-U 1/4" Drill, horizontal bench stand, 13 high-speed bits, 4" wire wheel brush, 3" grinding wheel, 3" buffing wheel, buffing compound, wheel arbor in handy metal kit.

**All for \$39.95**



**5" Sander-Polisher**  
**\$32.95**



**1/4" Drill**  
**\$19.95**



**1/2" Drill**  
**\$41.50**



**6" Bench Grinder**  
**\$42.00**



**6" Heavy-Duty LECTRO-SAW**  
**\$54.50**

**8" Heavy-Duty LECTRO-SAW** \$84.50

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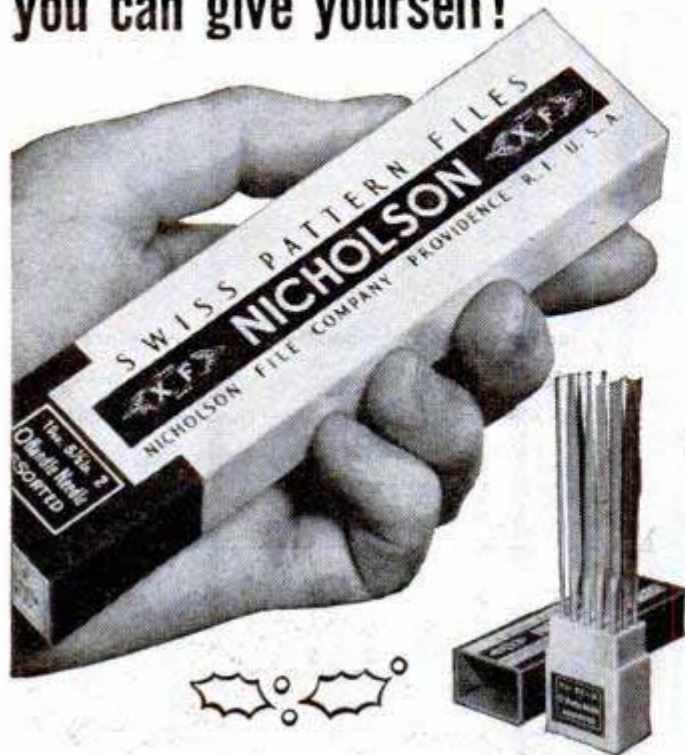
HOME-UTILITY Division, BLACK & DECKER Mfg. Co.  
Dept. H12M, Towson 4, Maryland



**NEW HOME-UTILITY SANDER-POLISHER KIT** contains versatile H-U 5" Sander-Polisher, 3 sanding discs, lambswool polishing bonnet, drill chuck, 7 high-speed bits, 4 wood augers, countersink, electric wax, auto polish, rubber backing pad in streamlined steel case.

**All for \$49.95**

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22 Acorn St., Providence 1, R. I.  
(In Canada, Port Hope, Ont.)



# NICHOLSON FILES FOR EVERY PURPOSE

(Continued from page 228)

were supplied with the new machine. One fairly accurate method is to measure around the outside of the pulleys with a flexible steel rule. Of course, this must be done with the pulleys in place on the shafts. This method of measuring is done somewhat more accurately by cutting two lengths from a discarded V-belt, each of which is long enough to reach a little more than halfway around each of the pulleys. Tape the lengths of V-belt in place and then measure the distance around the pulleys with a measuring tape, flexible rule or a length of cord. Another way of computing the length of the belt is to use a formula that runs something like this: Add the diameters of the driving (motor) and driven (machine) pulleys and multiply by 1.57. Then add twice the distance between the centers of the pulleys when they are mounted on the motor and machine. The final figure is the length of the belt required. It's a good idea to make sure you are driving the machine at the correct speed with the new pulleys.

## Winter Planting

**Q** — I've been told that I can sow garden seed, such as lettuce, radish, beets, onions, etc., in a well-spaded plot of good soil in late fall before the ground freezes and cover the plot with straw. Then, in the spring, I can harvest vegetables two to three weeks earlier than normal. How about it? Can it be done?

A. T., Ft. Wayne, Ind.



**A**—Of course it can be done, as a stunt, and, if Nature cooperates fully by breaking the season just right the following spring, you can harvest certain garden crops as much as a week to 10 days earlier than your neighboring gardeners. However, at present at least, the procedure can be regarded only as a novel experiment and not as a practical gardening measure. If you decide to try it, select an open, well-drained plot exposed to direct sunlight and sow the seed in the late fall when the soil is fairly dry and in a light, friable condition. Sow the seed at the normal depth and cover as you would in the spring. Rake the topsoil lightly and then cover with dry straw to a depth of about 2 ft. The straw covering should extend 2 to 3 ft. beyond the edges of the planting. Wheat straw is best. Weight the covering with woven wire and boards, or planks, to prevent it from blowing away. Remove the covering in the early spring as soon as the danger of freezing is past.

## Insulating Ducts

**Q** — I have recently had a forced air heating system installed in which there are several long runs of warm-air duct in the basement and I think that these should be covered with an insulating material, such as asbestos paper, to prevent loss of heat. My heating contractor says this is not necessary. Who is right? R. F., Mason City, Iowa.

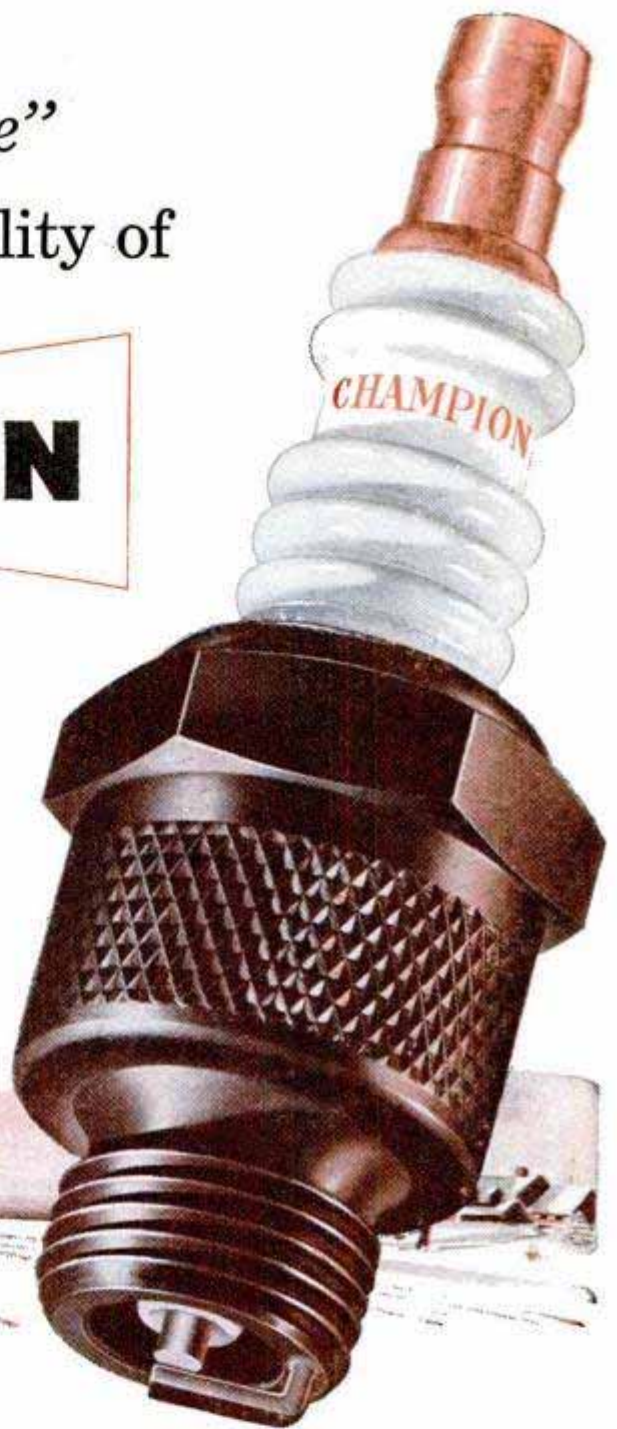


**A**—Your contractor is right, in the sense that any thin, noncellular material is of little or no value in insulating against heat loss from the warm-air ducts. To be measurably effective as insulation it would require wrapping each duct with six or more thicknesses of ordinary asbestos paper—an unnecessary expenditure of time and money. There is, of course, a cellular material made for the purpose of insulating warm-air ducts, but we would not recommend its use on the rectangular ducts of a forced warm-air heating system as we do not think it is necessary, especially where the unit is installed in a basement.

*"Operation Frostbite"*  
Calls for the Dependability of

**CHAMPION**

Spark Plugs



**BE A CHAMPION DRIVER**

*... Keep Plugs Clean for Winter Starting!*



Most service calls in winter involve cars that won't start. Dirt and oil accumulations on spark plug insulators often short circuit plugs under cold, damp conditions. Be sure to wipe off insulators frequently.

Plugs dirty on the outside are likely to have carbon or oily deposits on the inside at the firing end, causing hard starting and a wasteful engine. Have electrodes cleaned and regapped often. Replace with new Champions when necessary.

Champion dealers are backed by the world's best spark plug engineers and equipment to give you top performance with Champion Spark Plugs. It pays to let them inspect your plugs frequently for full power and economy!

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

**SEARS**  
ROEBUCK AND CO.

**TRY IT  
10 DAYS!**

**YOUR MONEY BACK . . . without  
question . . . if this superb**

**CRAFTSMAN**  
REG. U.S. PAT. OFF.  
**ELECTRIC SHAVER**

**doesn't give you the FINEST  
SHAVING you've ever known!**



Complete in  
handsome,  
handy  
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case



**\$17<sup>50</sup>**  
Complete  
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**Here's why CRAFTSMAN gives you such  
a quick, smooth, comfortable shave!**

- Double-action square head and TWO round heads combine efficient long-hair cutting EDGES with effective, close, smooth-shaving SURFACES!
- These heads are set on a scientifically designed, face-fitting contour-angle . . . to give maximum shaving surface for faster, smoother, better shaving!

Prove the faster, cleaner, smoother shaving of this superior CRAFTSMAN shaver on your OWN face in this easy 10-day test! Compare its smoother-shaving ability and its low price with ANY other shaver! UL approved! One-year guarantee and service at no extra cost! For 110-120-volt AC-DC use. See it . . . buy it . . . at your nearest Sears Retail Store TODAY!

**CRAFTSMAN by SEARS, ROEBUCK and CO.**

If a good stand was found on state land he waited until the trees were sold at public auction and submitted his bid. Providing his bid was tops, he sent Old Nick Finni and the other 75 cutters, under woods boss Joe Mavec, to bring in the trees. Every time Roy cuts a tree off state-owned land, two cents of the purchase price goes into the state school fund. In his lifetime Roy has paid \$200,000 to the state schools, so the once-worthless swamp spruce has educated a good many Minnesota children.

To do the cutting, boss Mavec and his men first built a tractor road through the muskeg, corduroying it with logs in all bad spots. From the tractor road, the men cut footpaths through the swamp. Then the cutters tramped the muskeg in search of trees with symmetrical tops. It was Old Nick Finni, perhaps, who found our scrawny tree somewhere in the swamp. With a few strokes of his saw or ax he felled it, trimmed off the top about three feet long and tied the top into a bundle with nine other such tufts. Eventually, the stump and trimmings of the tree were swallowed by the swamp, and a little hole now exists in the overhead tent. Through it sunlight pours to give other struggling trees an opportunity for life. No more than five percent of the trees in any area are cut in one season and all cutting is done under the supervision of government rangers.

Old Nick carried the bundle of trees out to the tractor road where it was loaded aboard a swamp sled—a Paul Bunyan “dish” made of iron. In winter the big pan slides over the snow; in summer it slips over the bog behind the tractor. At the nearest highway point our tree was shifted, along with 10,000 others, to a huge truck, thence to the factory at Duluth.

Here a wonderland of mechanical equipment went to work on the tree.

First an operator seized our tree and zipped it through a circular saw, trimming off the lower branches and making a neat, fresh cut across the bottom of the trunk. It ended up on a hand truck beside a girl who operates a fascinatingly active machine called the undercoater. This is a huge tube which runs up through the ceiling above her head. About waist-high there's an opening in the tube, and just beneath the opening is a well which is full of waxy liquid. Looped through the tube is an endless chain with mechanical “hands” which seize and hold the tree. The tree gurgles down through the liquid, disappearing from sight, then climbing up out of the liquid inside the tube. As it ascends, the “hand” spins it rapidly to whirl off excess undercoat. Seconds later

(Continued to page 234)

# 3 Workshop Favorites to Please any Craftsman!



## CRAFTSMAN Rotary Electric Tool Outfit

For tool-room, production line, or home shop

GRINDS	CUTS	ROUTS	BRUSHES
SHARPENS	CARVES	SANDS	CLEANS
DRILLS	ENGRAVES	POLISHES	Has many
SAWS	ETCHES	BUFFS	other uses!

Unequaled for its type, at ANY price! A perfect Christmas gift! Check these features! 50% more power than any other rotary tool of its type we know of! Cool-running, even after hours of use! New tapered design, strong metal housing — not plastic! New precision 3-jaw chuck adjusts 1/64 to 1/8-in.; takes 3/32 and 1/8-in. shank tools AND wire gauge drills. Large bronze bearings and ball thrust bearing. On-off switch. Condenser (cuts radio interference). Powerful 15,000 R.P.M., 110-120-volt, 25-60 cycle AC-DC motor; 6-ft. cord; plug. Underwriters' Labs. approved! 7 1/2-in. long. 54-piece set with cutters, saws, drills, polishing and emery wheels, bench stand, etc., in 11x8 3/4 x 3 1/2-in. workshop case.



Use it on WOOD, METALS, LEATHER, PLASTICS, GLASS; other materials.



1/64 to 1/8-in. chuck capacity



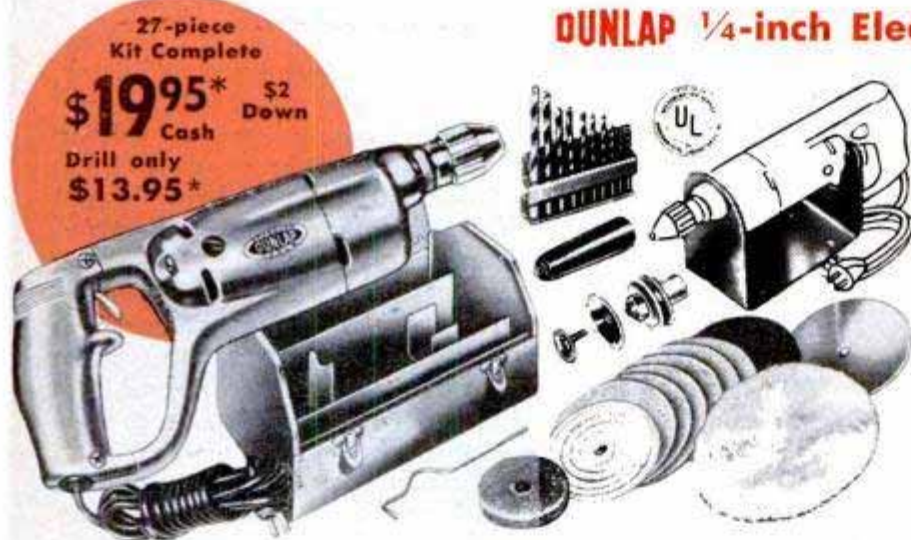
120° rotating bench stand



Cool running; easy to handle

54-piece Set  
**\$28.95\***  
Cash  
\$3 Down

## DUNLAP 1/4-inch Electric Drill and Utility Kit



**Drills . . . Grinds . . . Sands . . . Polishes!**

Handy, dependable, precision-built! Powerful enough to drive 1/4-in. bits in steel! Entire drill *UL approved!* 1/4-in. 3-jaw chuck. Triple reduction gears; aluminum alloy frame. 110-120-volt, 25 to 60-cycle AC-DC motor; 6-ft. cord, plug. 1500 R.P.M. 12 in. long. Complete with 10 HIGH SPEED drill bits (1/16 to 1/4-in.); 4-in. cloth buffer; 3-in. grinding wheel; 5 1/2-in. sheepskin bonnet; 4 3/4-in. rubber sanding disc; 6 assorted sanding discs; disc template; adapter; auxiliary handle; paint mixer; drill stand; in handy 13x6 1/4 x 6-in. steel carrying case.

## CRAFTSMAN Electric Magnetic Jig Saw

Look at its capacity!

Cuts wood up to 1-inch thick;  
Plastics up to 3/4-inch thick;  
Aluminum up to 3/32-in. thick;  
Brass up to 1/16-inch thick;  
Zinc up to 1/16-inch thick.

A perfect hobby gift for young or old! Use it anywhere; just plug it in! *UL approved!* Magnetic unit gives 7200 SAFE, short cutting strokes per min. (TWICE former power)! Smooth edges need no sanding. 8 1/2 x 8-in. table; rubber feet. All-metal; well made. For 110-120-volt, 60-cycle AC use only. With six 5-in. pin-end blades, 5 1/2-ft. cord and plug, and instructions.

ONLY  
**\$12.95\***  
With 6 blades

Cuts to center of 22-in. circle



\*Prices slightly higher south of the Ohio and west of the Mississippi rivers.

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Famous for fine quality . . . precision performance . . . low price!

# Coleman

# Gifts

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ANNIVERSARY  
MODEL



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For better, quicker meals and more fun on all types of camping and outing trips, picnics or backyard parties. Instant lighting. Cooks like city gas stove. Folds up... carries like a suitcase.

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**LEADING OUTDOORSMEN**  
Everywhere!



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For more hours of fun in camp. 20 times as bright as ordinary wick-type lanterns. Storm-proof. Safe. Can't spill fuel. Sturdy. Instant lighting.

### Coleman POCKET STOVE

For the man who travels light. Fits in hunting coat pocket. Instant lighting. Burns any kind of gasoline. Safe. Cooks like city gas. Complete with two aluminum cooking utensils. See your Coleman dealer for demonstration of these products. Mail coupon for free literature.



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on the floor above, another operator is carting it to the drying racks.

When the undercoat is dry the tree passes through the same treatment again, only this time it is pulled through a paint bath. Halvorson now produces trees in three colors—green, silver and white. All three paints are waxy coatings, so there is a film of wax over every needle and every sap-filled sac.

The tree then moves down a conveyor to the first floor where a worker inserts it into the "merry go round machine." A clamp seizes the trunk and carries the tree upright around the complicated mechanism. At one stage a cutter neatly dowels the bottom of the trunk, at another a metal stand is automatically jammed into place over the dowel. Another bit of machinery squirts a fluid which Halvorson calls "liquid life" into the stand.

Roy has been working on the fluid for years. It gradually moves up the trunk of the tree and flows out to the needles to keep them from drying. The liquid is a secret formula, very similar to the natural sap. He hints that it is 90 percent water, contains an artificial sap and glycerin.

Thus our finished tree is covered with a shimmering waxy paint and has a little metal stand, filled with "liquid life." These elements add up to longer-life. Halvorson, a cautious man, won't guarantee how long the needles will stay in place, maintaining that the tree is a cut plant and therefore will die sooner or later, depending upon the temperature and humidity at which it is kept. A thick file of testimonials proves that the process works, though. A woman in arid La Jolla, Calif., put her tree out on the patio after Christmas. Late the following July her husband hinted that it was time to stop playing Santa Claus, even though the tree looked exactly as it did when they bought it. Eventually hubby burned up the tree, but not before the woman had trimmed off all the cones and some branches, which she used to decorate gifts the following Christmas.

The finished tree is packed in a carton and placed in cold storage at 20 to 25 degrees, where it may stay for as long as eight months. In November it is shipped out under Ede's astute direction. Halvorson is proud of his good market in Venezuela, the West Indies and the Orient. Carloads are shipped to the Northwest and New England where, it may be noted, millions of local trees are available for cutting.

Sales, in ratio to population, are highest in Georgia for one reason or another. Southerners prefer silver trees, while Northerners have a fondness for green.

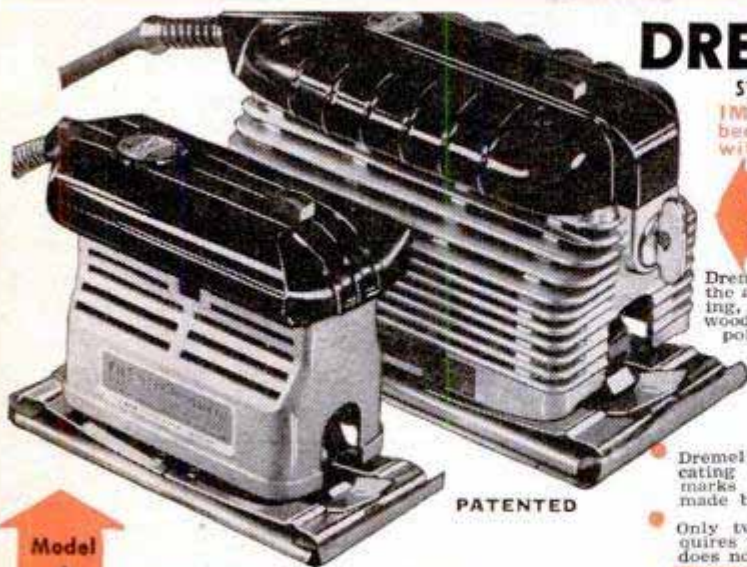
(Continued to page 236)



FOR PLEASURE AND PROFIT IN SHOP AND HOME

# IDEAL CHRISTMAS GIFTS TO GIVE OR GET!

PRACTICALLY DESIGNED . . . EASILY OPERATED . . . QUALITY BUILT . . . FULLY GUARANTEED



## DREMEL *Electric* SANDERS

STRAIGHT-LINE Action for Guaranteed SCRATCH-FREE Surfaces

**IMPORTANT**—Before you buy just any sander, remember you cannot get an absolutely scratch-free finish with rotary, orbital, or arc-type sanders.

Model 2000  
**\$24.50**

**FOR HEAVY-DUTY CRAFT AND WOODWORKING PROJECTS**

Dremel's new Model 2000 is a fast-cutting, production sander. It has the added stroke and extra power required for furniture and cabinet making, boat building or refinishing. Great for building operations, sanding woodwork, dry wall joints, siding and other surfaces. Does a superb wax polishing job, too. Weighs only 5 pounds yet has 21 sq. in. sanding surface. Over-all size 31 1/2" x 4 1/2" x 7". Complete with steel carrying case, 25 asstd. sheets sandpaper, polishing pad. \$24.50.

### LOOK FOR THESE DREMEL FEATURES

(IN MODEL A AND MODEL 2000 SANDERS)

- Dremel's Straight-Line Reciprocating Action leaves no sanding marks . . . removes scratches made by other type sanders.
- Only two moving parts . . . requires no oiling . . . sanding dust does not affect action.
- 14,400 cutting strokes per minute assure faster sanding-polishing.
- Cam-type holder permits changing paper in seconds.
- 8 ft. Underwriter's approved cord . . . operates on 110-120 volt, 60 cycle A.C. . . . fully guaranteed.

PATENTED

Model A  
**\$14.85**

**FOR HOBBY WORK, REFINISHING AND REDECORATING . . . . .**

Dremel Model "A" Sander is a time and labor saver for hobbyists, homeowners and housewives. Over a quarter million now in use. Like Model 2000, its straight-line reciprocating action will not leave cross-grain scratches and abrasive marks made by other type sanders. Ideal for sanding woodwork, cabinets, unfinished furniture, workshop projects, etc. Weighs only 2 1/2 lbs. Takes the drudgery out of polishing waxed surfaces—furniture, woodwork, etc. Sanding pad 2 1/4" x 5 1/4". Furnished with 6 sheets sandpaper, 1 sheepskin, 1 felt pad \$14.85.

## DREMEL MOTO-TOOL

THE POCKET-SIZE MACHINE SHOP



Don't confuse Moto-Tools and Accessories with so-called "bargain offers". Compare Dremel feature for feature with competitive tools. If our products are not superior in every way, we don't want you to buy.

Portable  
**DRILL PRESS**

Only  
**\$9.95**  
(Less Moto-Tool)



**MOTO-TOOL KIT NO. 2**  
With 23 Accessories  
(High Speed Steel Cutters, Grinding Wheels)  
**\$22.50**

**MOTO-TOOL NO. 2**  
(only) with one emery wheel point — **\$16.50**

Moto-Tool is the most versatile tool you can own—grinds, routs, drills, carves, engraves, polishes, etc. Look at these features: Approx. 27,000 R.P.M. • Dynamically balanced armature eliminates vibration. Oilless (oil-sealed) bearings • Dust-filtered air-cooling system • Weighs 13 oz. • Uses 110-120 v. A.C. • Used in plants of General Electric, Ford, Remington Arms, Nash-Kelvinator, etc.

## DREMEL *Electric* COPING SAW

CUTS SCROLLS LIKE MAGIC—SANDS AS IT SAWS



BLADE  
FACES  
4 WAYS

FREE  
PROJECT  
PLANS

JUST  
GUIDE IT!

Only  
**\$5.85**  
with 3 saw blades

**SAFE! AS A HANDSAW**

For home, hobby, repair work—no other tool pleases so much for so little cost. Works in any direction—delivers 7,200 strokes per minute smoothly, effortlessly. Saws through 3/4" medium-hard wood at a foot-a-minute speed. Touch-of-the-trigger, foolproof action. Only 2 moving parts, never needs oiling. Uses 110-120 v. A.C.

. . . for 6 useful projects packed with each saw

### WHERE TO BUY DREMEL TOOLS



Dremel Tools are sold everywhere. If your dealer cannot supply you, send remittance in full and we will ship postpaid. Or send only \$2, and pay postman balance plus postage and fee. Money back if not delighted after 5 days' trial.

DREMEL MFG. CO., DEPT. 110-M, RACINE, WIS.

## BIG VALUE!

### MOTO-TOOL KIT NO. 1

Moto-Tool Kit No. 1 contains the lighter Model No. 1 Moto-Tool and 34 practical accessories (steel cutters, grinding wheels, etc.) in an attractive lacquer-finish wood case. It's the biggest value in the field. With 34 Accessories Only . . .

**\$17.50**

**MOTO-TOOL NO. 1** with one emery wheel point . . . . **\$9.85**



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**\$498**



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**OTTAWA MFG. CO., 2-027 Garden St., Ottawa, Kansas**

*The*  
**GIFT**  
*THAT'S*  
**PRECISELY**  
*RIGHT*



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Since 1880 . . . Standard of Precision

Mechanics' Hand Measuring Tools and Precision Instruments  
Dial Indicators • Steel Tapes • Hacksaws • Band Saws  
and Band Knives • Precision Ground Flat Stock

**Buy Through Your Distributor**

A reporter, after interviewing Halvorson, once wrote a colorful story about the tree-cutters. There was an overstatement in the article to the effect that bears continually pilfer the cutters' lunch boxes. Upon seeing the story, one reader wrote a serious application for a job as lunch-box guard. Halvorson replied that "most of the stories of damage by wild animals are told by wild people." The man shot back a long letter of advice on how to "civilize the wild people" of northern Minnesota.

When Old Nick Finni heard about the wild people, he laughed 'til his little round belly shook like a bowl full of jelly. Then he sneezed, swallowed a tablespoonful of kerosene for his cold and loped off into the wilderness in search of your next year's Christmas tree.

### Pipes by Old Masters

(Continued from page 148)

Mehaffey, turns out carved briars to rival any of the masters, in his spare time. In three years he has done some 20 heads of famous composers and U. S. presidents. Each of the intricate carvings has averaged about 25 hours of painstaking labor, and found ready buyers at \$35 or \$40.

"The first one," Bud recalls with a shudder, "was carved with razor blades. I soon found out that that wouldn't do." Today he works with surgical knives and dental tools, plugging away evenings on his kitchen table.

All of Mehaffey's tools have been ingeniously contrived. Bits of sharpened nail-file tips make fine points for gouging hairlines in the tough wood. "I used to punch eyes with an awl-like tool," he says, "but I wasn't satisfied. I noticed some of the old meerschaum masters made V-shaped pupils, which brightened the face considerably. But how to get a 1/32-inch-high vee in rock-hard brier?" He solved it by browsing around shops until he found a piece of 1/16-inch steel tube. He cut off one end diagonally, pinched the lip into a vee and sharpened the edges with a file. Now he punches V-shaped eyes that give his figures a lifelike appearance that is almost startling.

Mehaffey took to pipe carving simply because the dying art appealed to him. Few living masters are at it today. His technique is as painstaking as that of any craftsman of bygone years. He works from busts and pictures, using calipers whenever possible, to get his proportions and scale true.

He starts with a perfect piece of brier block, marks off his general contours with

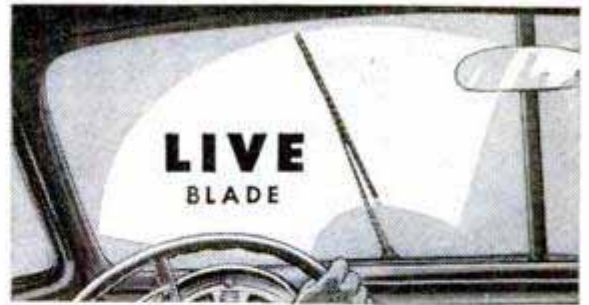
(Continued to page 238)



# WHAT LASTS FOREVER?



**THIS DEAD BLADE** still looks new but it blurs rain, smears muck, streaks glass. DEAD blades make dead drivers!



**THIS LIVE ANCO BLADE** wipes clean, clears rain, clears road muck . . . lets you SEE. Protects your loved ones.

**WHAT LASTS FOREVER?** Nothing does. This is especially true with Windshield Wiper Blades—even though made of finest natural rubber. Corrosive windshield film, wind burn and hot sun BAKE the life out of wiper blades, often in six months or less. DEAD blades cause dangerous windshield smear. DEAD blades make dead drivers. Make sure your car has live, new windshield wipers.

## Change Your Wiper Blades

Next time you buy gas, change to LIVE,

NEW ANCO BLADES . . . RAIN-MASTER for Flat windshields . . . CLEAR-FLEX for Flat or Curved windshields. They fit all cars—wipe quicker and cleaner than any other blades.

**Mr. Dealer:** Ask your ANCO Distributor about the sensational new ANCO Wiper Motor. A quick, easy replacement for lazy vacuum motors. Gives lots more power . . . lots less stall. Compensates for linkage wear to control wiping arc. Eliminates blade slap.

**THE ANDERSON COMPANY**  
GARY, INDIANA

## MAKE BIG MONEY!

Be a floor surfacing contractor and sand both new and old floors. Sanders are easy to operate and better still, you're your own boss. Write for latest "tell-all" booklet entitled "Opportunities In Floor Surfacing", enclosing 25 cents in coin or stamps to cover handling.



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Make Money  
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DOZER  
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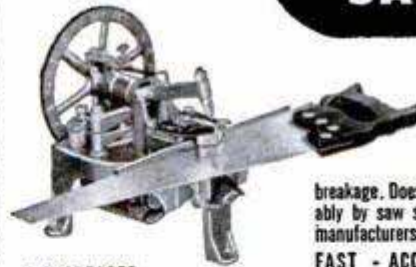
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LAWNS  
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Women can operate it.  
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Sets 400 teeth per minute on hand or band saws 4 to 16 point. Hammer and anvil action sets teeth accurately and uniformly . . . No tooth breakage. Does a perfect job. Used profitably by saw shops everywhere and saw manufacturers. Every machine guaranteed!

★ INCREASES PROFITS

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# SPLIT-SECOND STARTS for Any Car or Truck!

## WITH A Stewart-Warner *Electric Fuel Pump*



Make sure of quick, sure starts in any weather with a dependable Electric Fuel Pump. This Stewart-Warner Pump fits any car or truck. Feeds a steady, even flow of fuel into your engine as soon as you switch on the ignition. Thousands now in use!

Easy to Install. Complete fittings supplied. Do it yourself or see your local Carburetor Shop or Service Garage.

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Please send FREE Illustrated Booklet on the dependable new Stewart-Warner Electric Fuel Pumps.

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For Cars  For Trucks



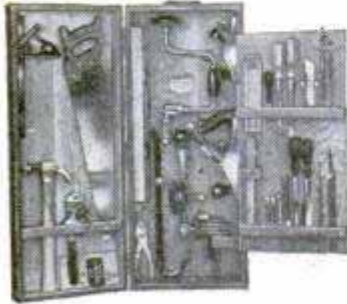
What better gift  
for man or boy!

# STANLEY TOOLS

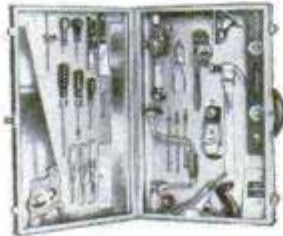
Give them Stanley Tools. Preferred by skilled tool users . . . priced for everyone. Sold in chests and gift packages. See them at your local dealer's. Look for the famous trade-mark.

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calipers, and cuts off excess wood with a coping saw or gouges. Then comes the whittling down with fine, sharp tools — measuring, chipping, slicing a hair of wood at a time. Brier is so hard it often takes hours to shape out a single delicate nostril the size of a pinhead.

Most fine pipe carving practiced by the European masters was confined to meerschaum. It's much easier to work, and a more precious material. Meerschaum is a magnesium silicate, found in liver-shaped lumps in Asia Minor. When removed from the soil it is soft and grayish. It is soaked in water and carved wet. It cuts like a raw potato and often malleable enough to shape with the fingers. When dried in the sun, it solidifies to a porous white substance like chalk, only harder. It is polished with beeswax. When smoked, it, too, absorbs the tobacco juices, and colors to a fine mahogany after many years.

For many years, a few master pipemakers turned out works of true art in meerschaum, and the most ingenious of these craftsmen supplied Bertram, with the result that today he displays one of the finest collections of carved meerschaum known. One of the greatest carvers was Ignatz Rothenfeld whose detailed pipe bowls are so cleverly conceived that their value ranges upward of \$200.

Many Rothenfeld pipes are still at Bertram's, and some of the finest appear in the pictures accompanying this article.

By and large, the most beautiful meerschaums were carved by Viennese masters like Rothenfeld. French carvings are more crude, but a few surpass themselves. The most valuable pipe in Bertram's collection is a foot-long carved French meerschaum depicting Napoleon's retreat from Russia. Bertram has refused a \$1000 offer for it.

The craftsmen at Bertram's are all veterans. Immediately after the war, Bertram announced that wounded veterans would make as good pipe craftsmen as anyone, and his shop was almost entirely staffed by men with battle disabilities.

Galen Martz, the foreman who has been in the shop for five years, started pipemaking from scratch after leaving service. "I saw Bertram's ad for a job opening in a pipe factory," he recalls, "and when I applied, I thought it was some kind of plumbing business." Today he's one of the most skilled craftsmen in the place. And to him, as well as all the other workers in the shop, pipemaking is not just a job, but a way of life.

### RULES FOR CARE OF YOUR PIPE

1. Before smoking a new natural brier,

(Continued to page 240)

# GIVE The Thrill That Comes Once-in-a-Lifetime

A large illustration of a Marlin 39-A lever-action rifle, shown in profile, angled upwards from the bottom left towards the top right. The rifle has a wooden stock and a long, tapered barrel. A decorative wreath with a bow is positioned behind the rifle's receiver and trigger guard area.

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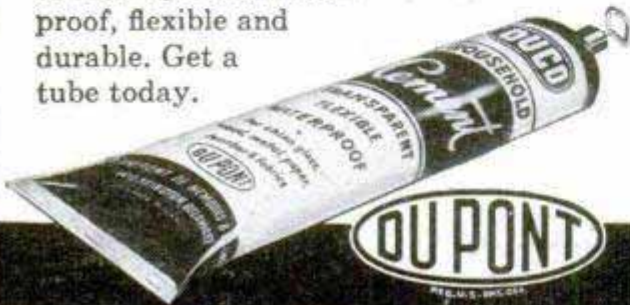


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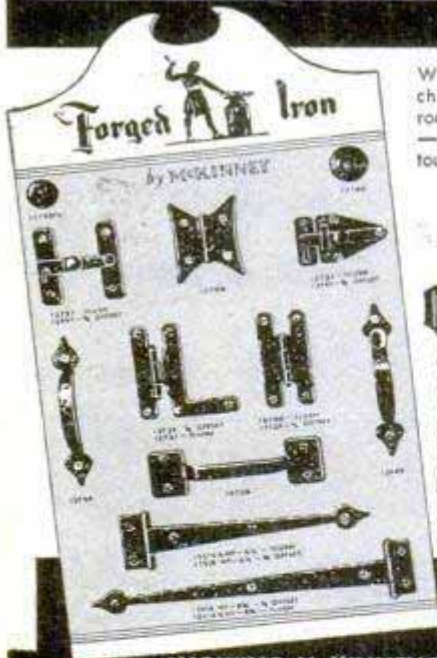
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moisten the inside of the bowl with a finger that has been dipped in port or sherry wine (or clear water).

2. Load the pipe rather firmly around the sides and light the entire surface evenly.

3. Don't allow the pipe to "cake" too much. Cake is carbon, which has a different degree of expansion from briar and may cause the bowl to crack. Natural briar, being porous, needs no cake to absorb heat and moisture. The bowl walls do the job.

4. To clean your pipe, dip a pine cleaner half its length in grain alcohol and thoroughly swab the stem. Also swab the outside and inside of the bowl with the same cleaner. Let the pipe dry a moment, then wipe it with a dry cloth. You will be amazed by the luster brought back to the bowl.

5. After cleaning, allow the pipe to dry for at least 12 hours. Veteran pipe smokers find it pays to rotate pipes, giving each one a good chance to dry and thus restore optimum absorption qualities.

## Weapons With a New Wallop!

(Continued from page 112)

stream boring into a soft mudbank. The liner of a tiny shaped charge, no more than 5 inches long and 2 inches in diameter, can bore a hole 7 inches into solid steel. Bigger charges and bigger cones do much better than that. What happens to Soviet-made tank armor is obvious.

The condition of the insides of tanks that have been hit tells some of the story. When the jet of hot metal and the gases pierce the armor, they raise the temperature inside a tank 500 to 600 degrees. Small pieces of hot metal fly around knocking things loose. Depending on where the shell hits, fuel may explode. Ammunition in the tank usually goes off. Of seven tank hits made by the first 3.5 bazooka rockets at Taejon, every tank looked fine from outside, except for the little one-inch hole drilled in its armor. But they were just shells. The insides were burned-out ruins.

New ordnance doesn't stop with shaped-charge shells. Nor are they the only new antitank weapon of note. One of these days, you'll be getting details on "squash head" ammunition, "capable," say the experts, "of knocking out or, at least, buttoning up the biggest tank going." As its name indicates, the squash-head shell flattens its nose against a tank like a mushroom, spreading itself over a large part of the tank's surface. The ensuing blast of its high-explosive charge is thus transmitted to a large area. "It will jolt the back teeth out of everyone in the tank, jar every rivet loose, break seams, explode ammunition,

(Continued to page 242)

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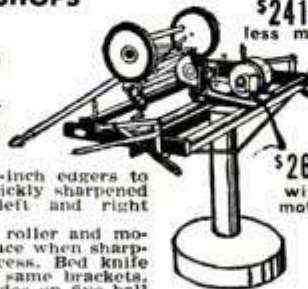
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jam the engine in a corner and otherwise disrupt a lot of steelwork," explains an Army antitank man.

These shells can be fired from many kinds of guns—including the new 75-mm. recoilless rifle developed by the infantry. Like its earlier cousin, the 57-mm. recoilless, the new rifle is open at both ends. The explosion goes out the back end, the projectile out the front, in an equal and opposite reaction that leaves the gun standing so still that it can be slung from a single wire and won't even jump a little. It has an effective range of 2000 yards. But stay away from the tail. The charge exploding through Venturi openings sends a searing cone-shaped fire 50 feet deep by 20 feet across, burning the shrubbery to the roots. A strong man can fire the gun from his shoulder. It weighs 105 pounds, is equipped with tripod, special 2½-ton truck and ordinarily calls for a crew of five. It's as accurate as a rifle, and its regular armor-piercing shells will knock off light tanks or blow a whale-sized hole in a brick wall. It can be used against pillboxes, armored and wheeled vehicles and people. For tougher targets, a 105-mm. recoilless is in the works.

More spectacular than developments in smaller arms are the things coming out of the rocket and guided-missiles program. Aside from the long-range dream of scientists working on big babies like the V-2 Bumper, some immediately usable equipment already is on the way. Almost ready for war work are a couple of rocket launchers, whose honeycomb of tubes will perch on big tanks or trucks and spray salvos of high explosive across enemy lines. The Army also has developed a new anti-aircraft rocket which will be able to destroy enemy planes at altitudes above 60,000 feet.

Men in the field constantly try new ideas to load more rockets on planes, shoot them faster and more efficiently. Latest trick was to take rockets off the usual underwing hangers, and put them in a magazine like rounds of machine-gun ammunition. Two such experimental rocket guns were mounted on a Navy Skyraider recently, giving it more fire power than the big 75-mm. aircraft cannon of World War II. Each gun fired 19 five-inch, spin-stabilized rockets which were completely housed in magazines inside the plane's wings. Rockets could be fired machine-gun fashion up to three rounds per second per gun—all 38 rockets, weighing almost a ton, could be whammed away in 6½ seconds.

The G.I.s in Korea got a first look at the effectiveness of bigger rockets when the Navy's Tiny Tim went to work for them. Tim, packing a wallop equal to a pair of

(Continued to page 244)

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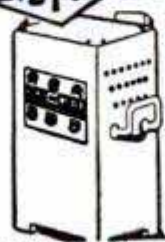
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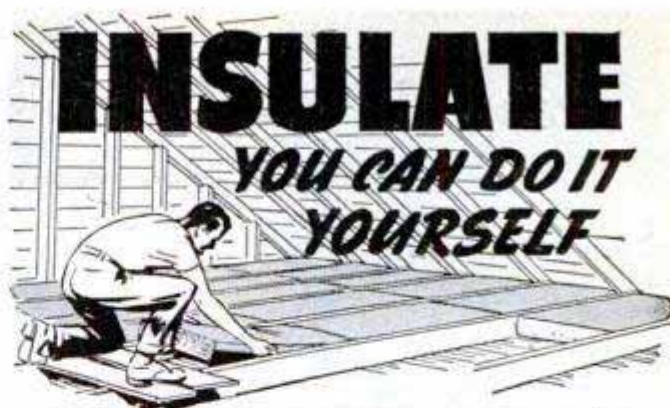
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Navy 12-inch guns, is larger than any combat-proven rocket to date. It measures 12 feet long, a foot in diameter and has an armor-piercing projectile that will zing through three-inch steel plate. It weighs more than half a ton—152 pounds of it a TNT warhead, with a 500-pound bomb just aft. Two Tims fit comfortably under the wings of a Douglas Skyraider in company with a dozen smaller rockets. A Martin Mauler can pack three or four. In a single sortie over North Korea on their first genuine combat mission, Tims helped wreck 13 locomotives, damage 23 others, blow up eight ammunition cars, set two fuel-oil trains afire, and were wholly responsible for complete destruction of the Han River bridge. After release, the Tiny Tim drives into its target under a jet from 146 pounds of solid fuel—so powerful the rocket motor burns out in a little over one second. Though designed as an air-to-surface missile, for operation against ships, Tiny Tim is fast proving its value against land targets.

Operational guided missiles, any expert will tell you, still present a host of problems, due primarily to the whimsical nature of Nature. There are too many things to correct for—wind, temperature, gravity, magnetism, fuel characteristics and on and on. When asked how far engineers could be sure of control over a big guided rocket, a famous Johns Hopkins' rocket expert recently scratched his chin, mulled it over a minute and replied: "Oh, about—uh, let me see—about 10 feet."

Nevertheless, a few guided missiles have proved themselves operationally — among them, the Navy's Bat. The almost forgotten little steel-and-plywood miniature airplane, an air-to-surface missile about 12 feet long with a 10-foot wingspan, with an electronic mind of its own, is still operating after a poor war record. But it's doing a much better job today than most people know. It carries a big general-purpose bomb, is slung under the wing of a mother plane and, though it has no motive power, it glides almost unerringly into its target, making corrections by radar up to the moment of impact. Though primarily designed for moving targets like ships, it can be used with success against bridges, strategic buildings, supply trains and the like.

"Push-button warfare" is tedious and deceiving, but a few successful projects like the Bat have encroached on it. A good example is in automatic navigation. Recently a pilotless plane was flown by complete remote control for many hundreds of miles.

Probably no field of military development has been as highly publicized as aircraft—high-speed jet bombers, like the

(Continued to page 246)



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**PLOW**

These rugged walking or riding tractors are ideal for farm, truck garden, orchard, poultry farm. Operate on a few cents an hour. A child can handle them.



**CULTIVATE**

**DO DOZENS OF JOBS** Both riding and walking tractors quickly and easily plow, cultivate, harrow, disk, bulldoze, spray, haul, grind, saw wood, etc. **LOW FACTORY PRICES** Buy direct or through your dealer. Year's guarantee!



**RIDING TRACTORS** 4 models from 5 to 12½ H.P., 58 in. wheelbase, 36 to 52 in. wide, 24 in. plant clearance. Hand or electric starter. Walking Tractors 1½ to 5 H.P.

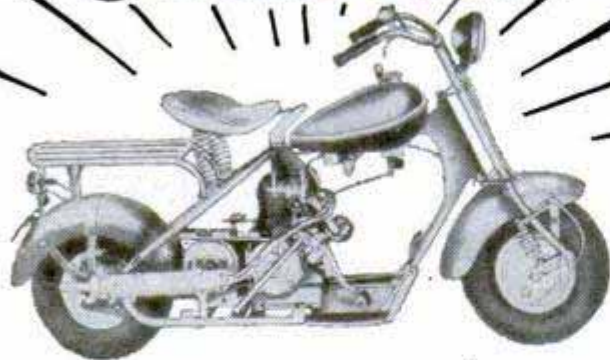
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Announcing the New CUSHMAN

# EAGLE



The sensational New Cushman EAGLE is ready! And, Boy! O Boy!—how you'll enjoy this entirely new thrill in motoring pleasure! It's big, husky, powerful, speedy! Has you moving at high speed within yards! Cruises up to 50 miles an hour out on the open road! Amazing fuel economy—up to 75 miles to the gallon! Luxurious comfort—big motor-bike saddle seat mounted on double coil springs . . . shock-absorbing springs on front wheel . . . big balloon tires designed for comfortable riding as well as easy steering and long life. Powerful 2-wheel brakes. 2-gallon (plus) fuel tank. Brilliant headlight, tail-light. Nothing else like it—and it's yours for only \$307.00 f.o.b. factory.



Long-time favorite for lowest cost motoring! Thousands in use. Cheaper than bus fare or operating your car. Handles easy. Slips through traffic, parks anywhere. Wonderful for getting to work, school or market—making deliveries. Famous Husky engine.

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**85**  
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**EARN \$6.00 PER HOUR**

At a cost of 20c 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—Economic—Fully tested and warranted. 75 lbs. steam in ten min.—Model 80. Complete as illustrated. . . . . **\$315.50**

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B-47 which crossed the country in less than four hours, higher-speed fighters that go so far beyond the sonic barrier that no one even shrugs anymore, "X" planes that fly to the limits of the stratosphere, hump-backed planes with special radar equipment for patrol, cargo planes with detachable cargo pods that will hold 20,000 pounds of equipment. But little has been said about the small improvements for military planes that may prove more important from an immediate, practical standpoint than the spectacular "X" craft.

There's a new liquid-propellant, rocket-assist take-off engine, for instance. Unlike the famous Jato unit, which burned out and was thrown away after a run, the new engine is a permanent part of the plane to which it is attached, and can be used over and over simply by filling it with fuel. Ramjets, using regular aviation fuels, have already been operated repeatedly on the wing tips of F-80 fighters. Since ramjets don't begin to function until a ground speed of about 350 miles per hour is reached, you can imagine what happens to any plane to which they are a party.

During World War II, everyone saw pictures of wing-mounted aircraft machine-gun barrels, warped and twisted beyond recognition as a result of heat set up by rapid fire. Navy Research and Development has the answer to that, now—a substance called nitro guanadine which is used as an ingredient in the explosive charge. It makes the powder burn cooler, without hurting the power of its bang.

All down the line, improvements are being made in equipment. The Signal Corps has gone all out to reduce sizes and weights of everything. The new Handie-Talkie field radio, FM variety, is less than half as big or heavy as its World War II predecessor. Some radio sets are reduced to cigarette-pack size, crystal rectifiers to the size of a match head. A new field switchboard weighs only 22 pounds, sits on a tripod and plugs right in. The last one weighed 72 pounds. A new "droppable" teleprinter weighs in at 45 pounds, compared with the 225-pound job the last war's field men had to juggle around.

All over the lot, plastics are replacing hard-to-get metals for use in snowshoes, sleds, toboggans, helmets, table tops, skis, breadboxes, lockers and scores of other items. Some of them are proving out.

All in all, a lot of things are happening in weapons. The big, fantastic ones—if we have them—are being kept quieter than the Manhattan Project. But plenty of the less spectacular ones mentioned here will soon be on their way to war if they aren't already.

# NEW Millers Falls "NEST OF SAWS"

BLADE TURNS AND LOCKS  
IN 8 POSITIONS



10-tooth blade for steel, cast iron, plaster, etc.

24-tooth blade for thin sheet metal, tubing, etc.

7-tooth blade for all woods and other soft materials

**Cuts Most ANYTHING—Most ANYWHERE!**

For carpenters, tinmiths, electricians, plumbers, home owners, farmers, hobbyists, auto mechanics

**\$2.95**

Sure-grip pistol handle and 3 quickly interchangeable blades — 10-tooth for hard steel, asbestos shingles, nails, bolts, etc. — 24-tooth for thin metals, gutter pipe, BX cable, etc. — 7-tooth for hard and soft woods, fibre board, Masonite, etc. Blade rotates and locks in desired position, handle stays always in the clear . . . makes work easy in tight corners, ends skinned knuckles. A Millers Falls quality tool and one of the handiest you can own. Ask for it at your hardware dealers — the new Millers Falls No. 725 "Nest of Saws" only \$2.95\* complete.

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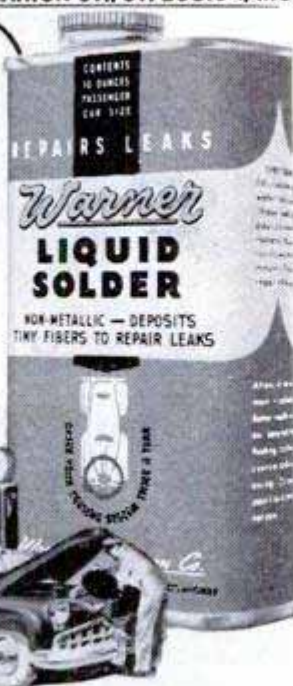
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. . . can be seriously damaged by a leaky radiator. Don't take chances—take care! Use Warner Liquid Solder . . . it's non-metallic, deposits tiny fibers to repair leaks anywhere in the cooling system. Fast, sure and easy to use—just shake . . . pour . . . and fret no more.



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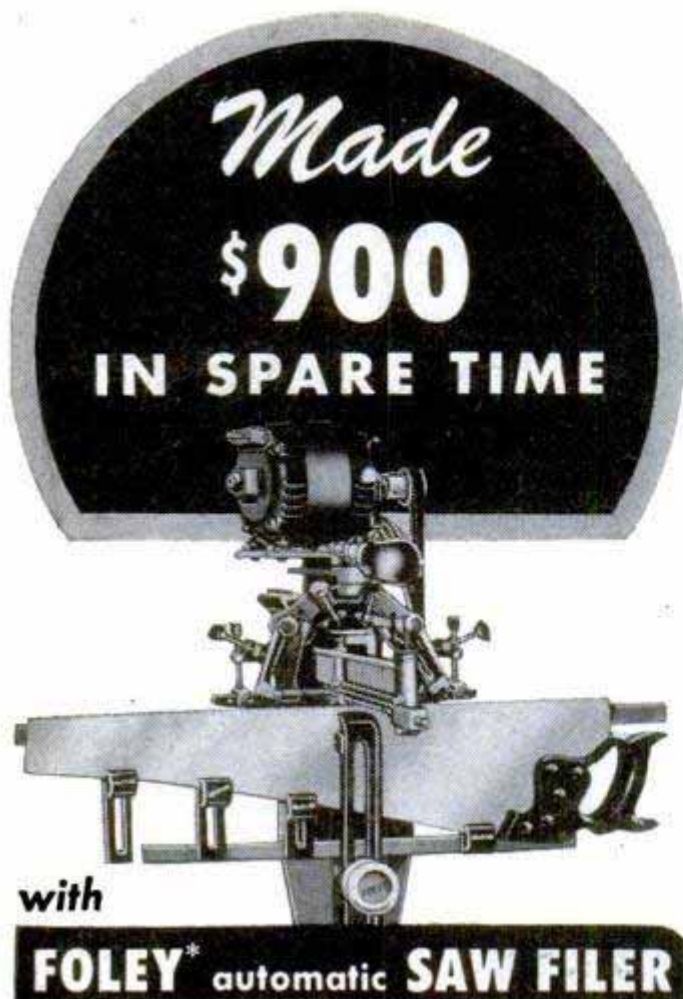
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"I did very well last year with my Foley equipment, about 950 saws and 240 lawn mowers, in my spare time. About \$900 for me." Leo H. Mix. Len Crego says: "I have done 4 or 5 thousand saws in my spare time in the 4½ years since I got the outfit, and they are all coming back."

Make up to \$2 or \$3 an hour in Spare Time. With the high prices of food, clothing and everything else, just think what you could do with extra money every week! With a Foley Automatic Saw Filer you can file hand, band and circular saws better than the most expert hand filer. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings you more customers. Cash business, no canvassing. No eyestrain, no experience needed.

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Shows just how you can start at home in spare time in your basement or garage. Just think—with a small investment, no overhead, no stock of goods to carry, you can get right into a cash business—and later on develop into a full-time repair shop. Send coupon today. No salesman will call.



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## Those Handy-Andy Eggbeaters

(Continued from page 77)

officer around a ship so he could inspect the sides, and counting muskrat hutches for the Federal Wildlife Service. The popular helicopter locates rocks and shoals for hydrographic mapping, rescues marooned hunters off a sandbar in a flood-swollen river, carries mountain artillery to Marine combat troops already landed by pinwheel. One day a small Navy vessel's engine was disabled out in the Gulf of Mexico and a helicopter flew a mechanic out to repair the damage.

Whether it is to fly chaplains around to ships of the fleet to hold services, flying mail, spotting gunfire or acting like an aerial taxicab, the ubiquitous helicopter has come to stay in the Navy and its sister services. Every day brings a new idea on how to put the Handy Andys to work.

## I'm Building the Popular Mechanics Plywood Ranch House

(Continued from page 133)

so that we could cut all the bridging in one hour's time.

Then came the subfloor. We used 5/8-inch unsanded utility-grade fir plywood for the flooring. It gives the smoothest and strongest flooring and is not too expensive at today's prices, especially as plywood is measured in square feet, covering more area than a board foot of shiplap, and it has no waste or "dropoff." The same plywood panels were used in our foundation forms. Personally, I was delighted most by the ease of laying the big sheets of flooring—only one day's work to place and finish the whole subfloor.

We assembled the stud walls the way modern contractors are doing it, completely finishing the rough wall while it is still flat on the subfloor. You lay the top and bottom plates (2 by 4s) together on the floor and mark off the positions of all studs and openings on both at the same time; then nail everything together, including the bottom plate and window headers. I found that the two of us could easily raise a 30-foot length of wall into place and we are far from a monopoly of muscles. Built this way the walls are well-nailed and there is no chance of making a mistake and getting a window or door out of line.

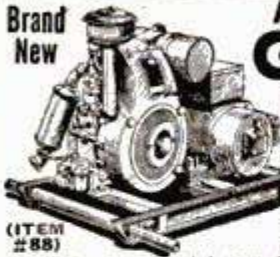
The house requires no tricky corner bracing because its wall sheathing is also plywood. Unsanded 5/16-inch fir plywood, the same utility or Plyscord grade as the 5/8-inch flooring, is all that is necessary here

(Continued to page 250)

# GROBAN'S NEW WAR SURPLUS SPECIALS

ALL ITEMS UNCONDITIONALLY GUARANTEED: ORDER TODAY

Brand New



## AUXILIARY ELECTRIC A.C. GENERATING PLANT

FOR GENERAL UTILITY AND EMERGENCY USE  
2500 WATTS - 115 VOLTS A.C.  
60 CYCLES

Plenty of current to operate your: Oil Burner, Sump Pump, Refrigerator, Home Freezer, Power Saw, Lights, Radio and Television, Home Water System Pumps.

Complete integrated heavy duty electric power plant. Signal Corps Model PE-75, driven by Briggs & Stratton, one cylinder, 6 1/2 H.P. Model ZZ, electric engine with killer button, oil bath air cleaner, governor, muffler, starting rope, and radio interference filter. The self-excited Leland or Westinghouse generator is rated 2500 Watts, 115 Volts, 60 Cycle A.C. single phase, belt driven, with guard and duplex receptacle.

When generator is not in use, you can use the engine separately to power other equipment. Mounted on adjustable steel skids, notched for carrying poles. Net wt. 310 lbs. Shpg. wt. 440 lbs. Dimen. 36"x19 1/2"x24". 12 month guarantee. \$726.00 value. **NOW 295.00**

**295.00**  
F.O.B. Chicago

## DIRECT CURRENT GENERATORS



For welders, plating, truck and marine use, D.C. appliances, lights, etc. Aircraft quality—lifetime grease sealed ball bearings. Heavy duty.

ITEM #89—Type M-2, rated 50 Amps.—24 Volts. Mfd. by Leece-Neville Co. Shpg. wt. 32 lbs. Gov't. Acq. Cost \$176.00. F.O.B. Chicago. **16.50**

ITEM #90—Type P-1, rated 200 Amps.—28 Volts, 2500 RPM. Mfd. by General Electric, Ford, Delco-Remy and Westinghouse. Gov't. Acq. Cost \$300.00. Shpg. wt. 70 lbs. **22.50**

ITEM #91—Type R-1, rated 300 Amps.—30 Volts. Mfd. by Jack & Heintz. Gov't. Acq. Cost \$380.00. Shpg. wt. 70 lbs. F.O.B. Chicago. **35.00**

Each individually packed in wooden box.

## D. C. GENERATOR — FOR 12 VOLT SYSTEMS

ITEM #99—BRAND NEW. Rated 15 Volts at 50 Amps. Use on 12 Volt circuits on trucks, tractors, ships, planes, battery chargers, auxiliary lights etc.

Base mounting with 4 bolt holes. 5/8" threaded shaft with keyway. Mfd. by Bendix-Eclipse. Gov't. acq. cost \$136.00. Shpg. wt. 53 lbs. F.O.B. Chicago. **21.50**

## UTILITY PUMP ROTARY VANE TYPE

Perfect For Water, Oil or Insecticides  
Sprays DDT, 2-4D, sulphur compounds, etc. Pressure to 150 lbs., 15 gals. per min. at 1200 RPM using 2 HP. As vacuum pump for milking machines, lab use, etc., delivers 20" vacuum, 4.5 cu. ft. per min. at 1500 RPM using 3/4 HP. Rotate either direction. 3/8" pipe thread ports, 1/2" standard shaft, 4 ball bearings. Easy to mount—ready to run. Shpg. wt. 13 lbs. (ITEM #51) F.O.B. Chicago. **16.50**



## Hydraulic Cylinders—Air or Oil

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., etc.

ITEM #70—Piston hydraulic cylinder, 3/4 HP. Permanent element type. 3/4" female pipe thread ports. Capacity, 16 gallons per minute. A \$13.00 value. Now **4.95** Postpaid

ITEM #4—All steel double action hydraulic cylinder, 1 1/2" bore, 27 1/2" stroke. Clevis mounting. Will lift 1000 lbs. with 1000 P.S.I. line pressure. Perfect for positioning and feeding movements. Shpg. wt. 4 lbs. Postpaid. **4.95**

ITEM #33C—Double action hydraulic cylinder, 1 1/2" bore, 4 1/2" stroke. Clevis mountings at both ends. Uses 1/4" pipe fittings. Postpaid. **8.95**

ITEM #32—Double action, 1 1/2" bore, 9" stroke, will lift 1760 lbs. with 1000 P.S.I. line pressure. Sure. Wt. 4 lbs. A \$45.00 value. Postpaid **10.95**

ITEM #41—Double action hydraulic cylinder, 2" bore, 6" stroke, clevis mounting at base and end of shaft. Overall length closed 12 1/2". Has 3/4" stainless steel shaft, uses 1/4" tubing fittings. Will lift up to 3100 lbs. with 1000 P.S.I. line pressure. Weight 7 lbs. Postpaid. **12.50**

ITEM #15—Double acting cylinder, 3" bore 10 1/2" stroke. All steel hydraulic cylinder, will lift up to 7000 lbs. with 1000 P.S.I. line pressure. Wt. 12 lbs. A \$78.00 value. Postpaid **19.50**

ITEM #31C—Double action hydraulic cylinder, 3 1/2" bore, 11" stroke. Aluminum alloy cylinder wall and all steel 1 1/2" diameter piston rod. Clevis mounting at base and shaft. 19 1/2" overall length closed. Will lift 9625 lbs. using 1000 PSI from Logan Heavy Duty Hydraulic Pump. Uses 3/8" tubing fittings. Value \$102.00. Shpg. wt. 11 lbs. F.O.B. Chicago. **22.50**

ITEM #6A—Double action hydraulic cylinder, 3" bore, 25" stroke, will lift 7070 lbs. with 1000 P.S.I. line pressure. Steel barrel, 1 1/2" stainless steel shaft. Gov't. acq. cost, \$176.00. Shpg. wt. 28 lbs. F.O.B. Chicago. **28.00**

ITEM #42—Double action hydraulic cylinder, 4" bore, 32" stroke. Rated lift capacity with 1000 P.S.I. line pressure is 12,560 lbs. Ship. wt. 30 lbs. AN EXCELLENT BUY **32.50**

ITEM #55—Hydraulic cylinder, 6" bore, 80" stroke, with flange mounting at base, machine thread at shaft end. Working pressure 1,000 P.S.I., maximum load capacity, 28,000 lbs. This cylinder has 3/4" pipe thread ports. Shipping weight 263 lbs. **75.00**

F.O.B. Chicago  
HI-PRESSURE FITTINGS for cylinders and valves available at 50c ea. for 3/8" pipe and 65c ea. for 1/2" pipe.

NEW! STATIONARY OR PORTABLE

## D.C. ARC WELDER

250 AMPS. MODEL 252  
FOR ANY WELDING JOB,  
LIGHT OR HEAVY

Stop Costly Repair Bills,  
Weld It Yourself and Save

Designed for many years of trouble-free service. This precision engineered Direct Current ELECTRIC ARC WELDER is offered at but a fraction of its original value. It can be mounted permanently or easily transported for portable use. Does the job instantly where and when you need it. Has dial type rheostat for easy pinpoint control and a high-low range switch. Run welder at 2500 RPM from drive pulley or power take-off of tractor, a 7 1/2 HP electric motor or a 10 HP gas engine. Use two V belts or flat belt (on pulley). Now... AT A FRACTION OF ITS VALUE. Price includes double V or flat belt pulley and instruction book. Shipping wt. 107 lbs. F.O.B. Chicago. **99.50**

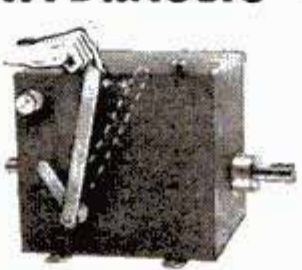


Only one or two jobs will pay for entire welder.

ACCESSORY KIT including welding helmet, electrode holder, two 10 ft. cables with clamp and 5 lbs. of assorted welding rods. (ITEM #66) Shpg. wt. 17 lbs. F.O.B. Chicago **10.50**

IF MORE INFORMATION IS DESIRED, write for WELDER CIRCULAR.

## FINGERTIP SPEED CONTROL HYDRAULIC TRANSMISSION



Variable output speeds ranging from 0 to input speed now available. Merely move control handle until desired speed is attained. Then turn locking handle to maintain the setting. Internal relief valves prevent overloading. Use input power of 1/4 to 1 1/2 H.P.

Use for reamer drives, midgeet cars, feed mills, canning machines, conveyors, lathes, milling machines, motor boats, cream separators, garden tractors, pumps, blowers, etc. This Westinghouse-Oil Gear Unit converted to commercial use from 40 MM anti-aircraft traversing mechanisms consists of a variable displacement hydraulic pump feeding a fixed displacement hydraulic motor. These components are contained in a crackle-finish steel oil reservoir (capacity 2 qts.). Adjustable relief valves set at factory for 100 inch pounds of torque may be reset up to 180 inch pounds. Independent reverse control allows full output power and speed selection in either direction of rotation.

Both input and output shafts measure 5/8" diam., include keyway. Input rotation is counter-clockwise facing shaft. Recommended input speeds not to exceed 750 RPM. Overall dimensions, 7 1/2" x 7 1/2" x 11 1/2". Gov't. acquisition cost, \$428.00. Shipping weight 26 lbs. Complete with 2 qts. of oil and full instructions. **54.50** Postpaid

LOGAN HEAVY DUTY

## HYDRAULIC PUMP

For operating hydraulic cylinders and hydraulic motors on tractors, bulldozers, construction machinery, lift trucks, industrial applications, etc. Delivers 10 GPM at 1200 RPM at 1000 P.S.I. using 6 HP. Has a 3/4" inlet, 1/2" outlet, 3/4" shaft with flat and keyway for direct or pulley drive. Has flange with 4 bolt holes for convenient mounting. Ship. wt. 22 lbs. Overall dimen.: 7" L x 5 1/2" H x 5 1/2" W. A \$105.00 value. FOR ONLY... **22.50** F.O.B. Chicago



(ITEM #29)

## HYDRAULIC CONTROL VALVES

ITEM #24. Four-way control valve with built-in relief valve, for use with one double action hydraulic cylinder, may be used with 1500 P.S.I. hydraulic system to open and close hydraulic cylinders. Ship. wt. 8 lbs. A \$38.00 value **9.95** Postpaid

ITEM #26. Four-way control valve for use with two hydraulic double-action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Ship. wt. 6 lbs. A \$60 value... **12.95** Postpaid



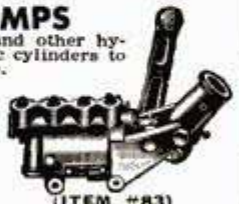
(ITEM #24)

## HAND HYDRAULIC PUMPS

Used for hydraulic jacks, presses, hoists and other hydraulic applications. For operating hydraulic cylinders to pump oil or hydraulic fluid under pressure.

ITEM #11—Hand pump has built-in check valve and is capable of delivering 1000 lbs. of pressure. Has alloy aluminum housing. Dimen.: 8" long x 3 1/2" high x 2 3/4" wide. Ship. wt. 3 lbs. A \$45.00 value Complete with handle... **8.95** NOW Postpaid

ITEM #83—Hand hydraulic pump with built-in transfer valve. **12.95** Postpaid



(ITEM #83)

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When the Filter in Medico Pipes or Cigarette Holders turns brown, throw it away with the nicotine, tars, juices and flakes it has trapped. Insert a fresh Filter for cooler, cleaner, dryer, purer smoking!



Real Filters  
...not mere hollow tubes!

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## MEDICO V. F. Q. (VERY FINE QUALITY)

Pipes of specially selected imported briar. \$2  
Wide variety of shapes. With 10 filters...  
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America's Outstanding Dollar (\$1) Pipe

Frank Medico Cigarette Holders \$1 & \$2

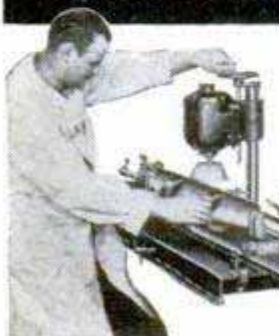
# MEDICO

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ALL MEDICO PIPES NOW MADE OF  
PRE-WAR QUALITY IMPORTED BRIAR

## LAWNMOWER SHARPENER OPERATORS



Increase your output...  
Year 'round business!

## NEW BED KNIFE GRINDER

sharpens all  
STRAIGHT EDGE TOOLS  
New Ideal Bench Grinder

doubles your output of sharpening jobs, speedily grinds straight blade knives. Sharpens all kinds of straight edge tools and ice skates. Write for FREE, fact-filled folder.

THE FATE-ROOT-HEATH COMPANY  
Dept. D-3, Plymouth, Ohio

and at today's prices is actually less expensive than shiplap. The sheathing was easy, taking us less than a day to complete.

One of the key details in the plans is use of modern trusses in the roof. The new trusses, built of ordinary lumber secured with 5/8-inch plywood gussets and ordinary 8-penny nails, allow you to have a living room extending completely across the house without any special beaming or bearing partitions. There are, in fact, no bearing partitions in the house—you can, if you wish, move the interior walls willy-nilly to suit your preferences in room sizes.

But frankly this poor amateur builder was a trifle dubious at first as to his ability to build the trusses correctly. Trusses always reminded me of bridges, factories and other huge projects. As Whelan predicted, I found that this is actually the easiest way to build a roof. And it is especially good for us amateurs. The roof cannot help but be true and there is no tricky sawing or fitting high in the air.

In a way it's an assembly-line job. We watched experienced contractors making these modern trusses and built ours the same way. You lay out a pattern on the subfloor with a pencil and straightedge, then nail scraps of 2 by 4 along the pencil lines to hold the truss members in place. One truss is then carefully cut to fit in this form and its pieces are used for patterns. As fast as one man can cut the pieces of lumber and plywood with a power saw, another can nail the trusses together in the form. The two men then simply hang the trusses upside down between the house outside walls, flip them right side up with a rope or pole, align them and the roof is finished. Made in a form, all the trusses are the same—your roof will be true and although you will use a little less lumber than with conventional raftering your roof will be twice as strong!

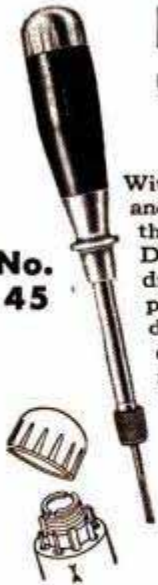
Shingling the truss roof is no difficult job. One thing I especially liked was that the roof is fairly low, as befits a ranch house, and we could walk on it anywhere without fear of falling. We used wood shingles and spaced the roof boards underneath a good 2½ inches to allow the shingles to "breathe." The only difficult part to the shingling was learning how to hold the shingle nails in the mouth!

(Continued next month)

Beginning July 1, 1952, aircraft speeds and distances in the United States will be standardized in knots and nautical miles, instead of conventional miles per hour and statute miles, according to the Civil Aeronautics Administration.

## A New . . . and Better Push Drill by "YANKEE"

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With a handle that fits your hand and a flange to rest your thumb, the ALL-NEW "Yankee" Push Drill No. 45 makes quick work of drilling small holes . . . in wood or plastics. Magazine handle holds 8 drill points ( $\frac{1}{8}$ " to  $\frac{1}{4}$ "). Improved chuck . . . drills can't pull out. Automatic return action clears chips. Buy it from Hardware Dealers and Industrial Supply Houses everywhere. Send for booklet "How 'Yankee' Tools Make Good Mechanics Better" FREE. North Bros. Mfg. Co., 217 West Lehigh Ave., Philadelphia 33, Pa.

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AT PAINT AND  
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6x30 — \$29.50  
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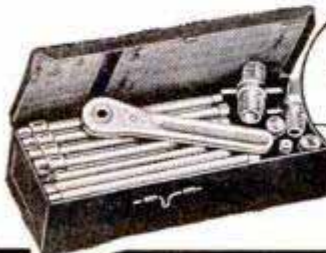
For Store Fronts and Office Windows. Anyone can put them on. Free samples. Liberal Offer to General Agents.

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## STOPS LEAKS PERMANENTLY

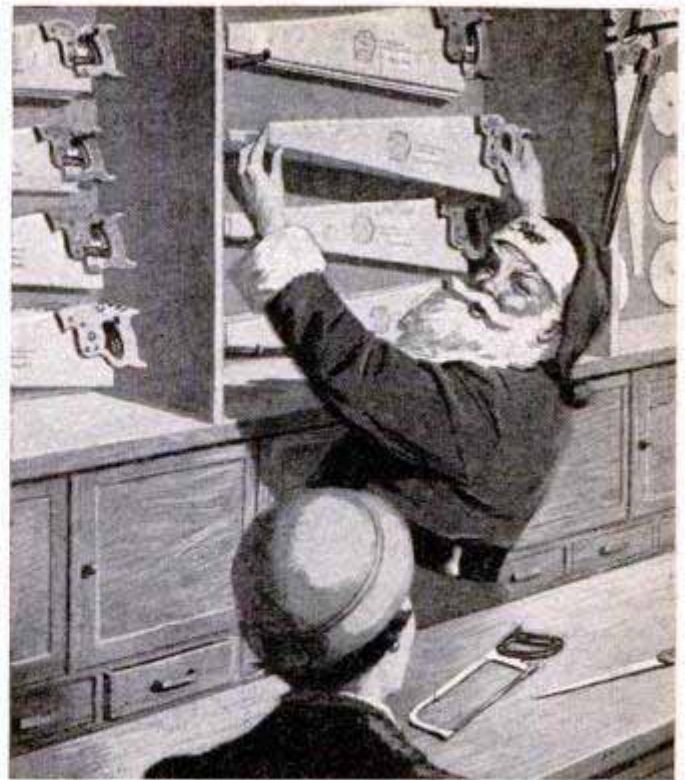
Cut your fixture replacement, water and fuel bills with Economy Renewable Seats. Make economical, permanent repairs quickly and easily with the Junior Kit (illus.). Repair bathroom, kitchen and laundry fixtures. Everything you need included in steel box. This is a natural for the "Fixit" shops—get extra income from making permanent repairs on your customers' faucets.

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For that man about the house . . . a gift he's sure to go for—a wonderful Disston Saw! Among the many types to choose from you'll also find the ideal saw for your boy. See your hardware dealer's selection of other fine Christmas gifts, too. Let your Hardwareman advise you.

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WORKS LIKE A CHARM FOR SMALL REFINISHING AND SPRAY PAINT JOBS!

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Gun has fine tool balance; factory-set to work smooth and quick, permanently adjusted for perfect spraying 4"-6" from object or area to be painted. Fool-proof, efficient! Complete kit includes polished Cast Aluminum Gun, Compressor, 18 foot hose, 4 oz. bottle, tire connector and spark plug adaptors. Compact, light; smartly packed kit fits in glove compartment. A "must" for motorists and hobbyists at \$5.95 complete (KIT GC).

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ONLY \$5.95

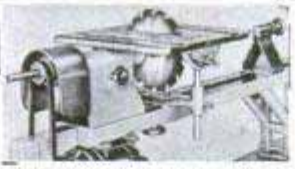
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**EMPIRE LEVEL MFG. COMPANY**

Dept. PM 10930 W. Potter Rd., Milwaukee 13, Wis.

## Push-Button Manor

(Continued from page 87)

remotely from a light post alongside the driveway. Mathias simply puts a key in a lock in the post, turns it and the door opens. Inside the garage he throws another switch and the door closes. Or he can open and close the doors from the kitchen. A 1/4-horsepower motor in the garage ceiling does the work.

Press the doorbell button and you automatically turn on the porch light. If there's nobody home, the light goes off in three minutes. A thermostatic switch is hooked into the light circuit. When you ring the doorbell, a relay turns on a small light bulb under the bellows of the thermostatic switch. It takes three minutes for the heat from the bulb to expand the thermostat enough to open the switch, turning off the light.

Mathias is a bit apologetic about the incompleteness of his push-button house.

"We've lived here only two years and it takes time to do everything," he explains.

In the house he lived in previously, Mathias had a complex system for checking locked doors nightly. Mrs. Mathias had challenged her husband to eliminate the nightly chore of walking around trying every door to make certain it was locked.

Taking up the challenge, he came up with the solution. A simple light circuit was set up to run through every exterior door lock in the house. When the bolts were all latched, the current ran through, lighting the lamp in the bedroom. If one was unlocked, the circuit was broken and the light failed to go on when he turned on the test switch. He's planning to add this to his new house and it will include the garage doors.

"There's always something for me to do," Mathias says. "I'm working on an automatic lawn sprinkler that will turn on the water during the night for any preset time. And I have almost finished work on a remote control that will enable me to tune the radio to any station from any place in the house.

"But what I really want to get working on is a mechanical waitress for our basement picnics. We have a long table and when there's a crowd here it takes too much time and effort passing food from one end of the table to the other. The way I figure it, electric trains running on tracks in the center of the table will do the job. There'll be switches at each plate and if you want more salad, you press the button and the train rolls up with the salad bowl."

Push-Button Manor will never be quite finished.



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Brikcrete is made in locally owned plants, using local materials and local labor. That's why high quality and low price still permit a 100% to 150% mark-up. We supply complete equipment; easy terms if required; generous co-operation. Exclusive manufacturing privileges in protected territory. Write for information. **Brikcrete Associates, Inc.** 4679 Division Ave. S Grand Rapids 8, Mich.



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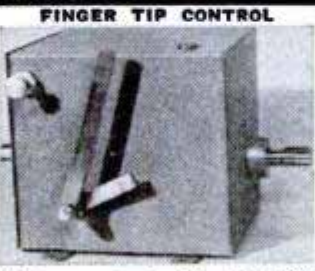
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Uses about 5 cents worth of electric power for overnight protection.

Safe to use with any standard anti-freeze.

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Fits all straight engines with "freeze plugs" 1" to 2 $\frac{1}{2}$ " dia. (Except Ford 6, small Jeeps and V-type engines).

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## Birds in Bracelets

(Continued from page 155)

The method of holding the bird for banding depends upon the size of the bird. A small bird is removed from a trap by placing the neck of the bird between the fingers or between the thumb and first finger.

Bands are spread wide enough so they can be slipped over the bird's leg easily. Pliers are used to close the band securely so it won't snag any vegetation.

Frequently, a small bird on its back doesn't realize it is free to depart. A blue jay was placed on the sidewalk so a photograph could be taken. It remained motionless for many minutes, and only fluttered away when it was tickled with a grass stem.

The Fish & Wildlife Service issues banding permits only to persons who are properly familiar with bird species. Others must vouch for their experience. Then the service provides the bands, and the bird student can begin his work.

If you kill a banded wildfowl during hunting season or find a dead bird with a band on its leg, you'll be aiding this widespread research if you report your find. Send the band, or its number, to the Fish & Wildlife Service along with a record of the date and place you found the bird. You don't have to identify the bird, for a check on the number will turn up its history.

The tiny bit of information on this one bird, when combined with hundreds of thousands of reports, provides many vital statistics on our feathered wildlife.

## Driver, Take Your Choice—Life or Death on Ice

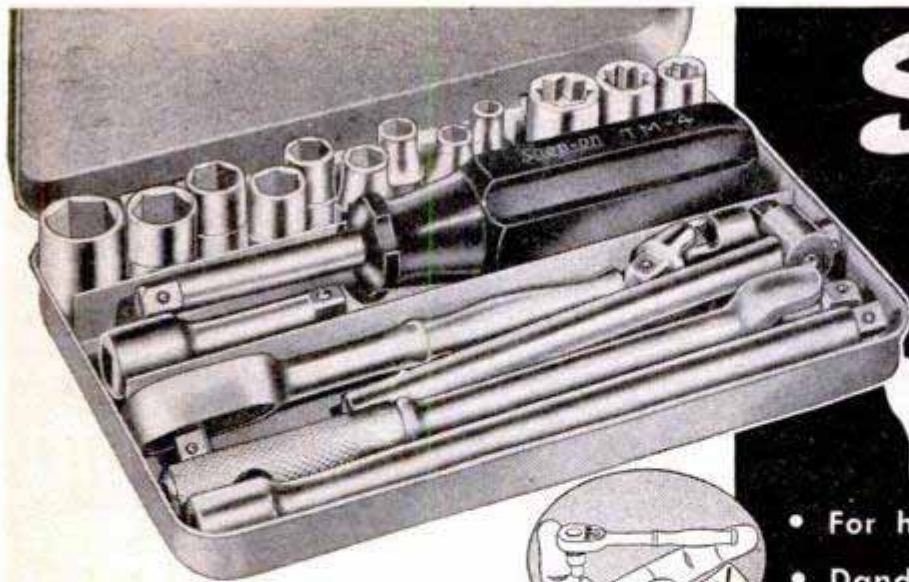
(Continued from page 105)

(To illustrate the superiority of chains again, the chain rating was 286 or 154 points better than the mud-snow tire!)

Second best in all-around score was another mud-snow tire, a stud-tread tire which had been lacerated for winter driving. The tread had been cut thousands of times with a sharp instrument to increase the number of gripping edges. This tire had an all-around rating of 128 compared with 100 for the conventional control tire. Two other tires, both conventional treads lacerated for winter, were close behind this second-best tire in the over-all rating.

Tires with embedded materials, such as salt, sawdust, steel chips, steel wool, steel coils or peanut shells, in the tread generally showed up poorly. Although designed as specialized winter tires they failed to prove their value. The best of

(Continued to page 256)



# Snap-on\*

## 19-PIECE MIDGET WRENCH SET

IN RED ENAMEL METAL BOX  
ONLY 6 3/8" x 4 1/4" x 1"

**\$18<sup>05</sup>** POSTPAID  
(Add local tax)



### FINEST PROFESSIONAL-QUALITY TOOLS

Famous Snap-on quality is incorporated in this 19-piece set for countless uses around the home, workshop, garage. Every item forged from finest alloy metals and carefully heat-treated for maximum strength and greatest durability. Add to that, Snap-on's lustrous chrome finish and you own the finest professional-quality wrenches money can buy!

Set includes: 6" Nut Spinner, 2" and 6" Extension Bars, Ratchet, 5 3/4" Plastic-Grip Handle, Sliding Bar, Universal Joint, nine hexagon sockets (3/16" to 1/2") and three square sockets (1/4" to 3/8").

\*Trade-mark of Snap-on Tools Corp.

- For household appliance repairs
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- Small instrument and car service

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Please send me the 119-TM-B Midget Standard Set.

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**FREE BOOK "HOW TO SHARPEN POWER MOWERS"** shows just how to sharpen any make of power lawn mower with the Foley. Prices \$97.50 to \$159.50—easy payment terms available. Mail coupon today—we'll also send **FREE PLAN** telling how to start your own business without previous experience. No salesman will call.

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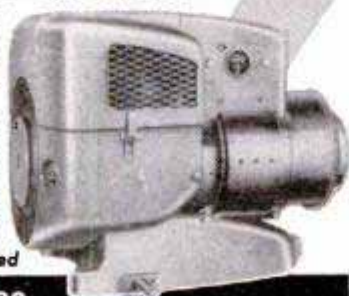
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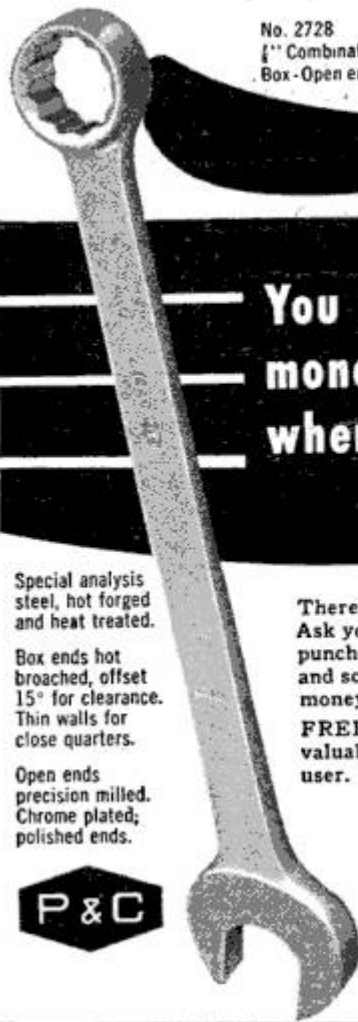


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(Zone)

the group was only 10 percent more effective than the control tire while the poorest was, surprisingly, 8 percent less effective than the conventional tread control.

In only one test did any tire match the performance of premium chains. That was in stopping on loosely packed snow where a lacerated mud-snow tire developed a rating equal to the chains.

In traction tests, chains were 600 percent more effective than the control tire. The best tire was only 56 percent better.

What does all this mean? For safest winter driving use premium tire chains. Yet, the Safety Council points out many drivers refuse to use chains. For them, the grooved-lug mud-snow tires are best.

If winter fogs are frequent where you drive, a pair of fog lights is a good investment. These lights must be placed as low as possible on the front of the car for good results. There is usually a gap in the fog just above the road surface and that's where you want to direct the light. Fog lights should have clear lenses. Coloring the lenses, amber or otherwise, does nothing except reduce the amount of light. The secret of a good fog light is its powerful beam that has a sharp vertical cutoff so there is no light above the horizontal.

Sanders are now being used on many trucks and, to a very limited extent, on pleasure cars. When the proper grit is used, they do increase stopping ability and provide added traction for hill climbing. However, they do not furnish protection against side skids. The grit should be sharp, hard and angular. Flat or smooth grit may actually make the ice slicker. When using sanders, never "lock" the wheels. Stopped wheels simply wipe away the grit as they slide along the ice. Intermittent brake application is essential so the tires roll over the grit and grind it into the ice.

The most important winter-driving hint is the simplest: Drive slowly on ice and snow. If you consider 50 miles an hour a safe speed on dry concrete, then on glare ice you should drive only 25 miles an hour even with chains. Without chains, your top speed should be about 15 miles an hour regardless of what tires you're using. These are equivalent speeds and your stopping distances will be the same for each of them.

On loosely packed snow, you're driving the stopping-distance equivalent of 50 miles an hour on dry concrete when you're going 38 miles an hour with chains or 30 to 37 miles an hour without chains depending on the tires you're using.

So slow down this winter and help reduce the death rate. Speed and ice are a deadly combination. Don't give them the chance to kill you.

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FOR ANY WELDING JOB LIGHT OR HEAVY, portable, or D.C. Appliances, PORTABLE AND RURAL LIGHTING, or

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Stock No. 535 - Type P-2, rated 200 amps. 28 Volts. Mfg. by Eclipse-Bendis. Gov't. cost approx. \$300

NEW, ONLY. \$24.50

Used, but in guaranteed condition - ONLY. \$17.50

Build your own light plant (cap. load 5,000 watts) the easy inexpensive way. Simple instructions included for P-2 generator.

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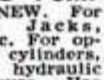


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Filled with CO<sub>2</sub>. Valve and safety locking pin. Applicable as tire inflator, fire extinguisher, spray painting, life raft, etc. Shatterproof. Size 12"x2 3/8". Wt. 3 lbs. Now only \$2.95

## VOLTMETER D.C. Brand New

The basic element of this meter is 30 Volt D.C. Voltmeter with zero center. The internal resistance is 300 Ohms. The dial may be easily calibrated to read D.C. Volts. Price \$3.50 Postpaid



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BRAND NEW. For hydraulic jacks, presses, hoist, etc. For operating hydraulic cylinders, to pump oil or hydraulic fluid under pressure. Has built in check valve, and is capable of delivering 1000 lbs. pressure. Wt. 10 1/2 lbs. A \$50.00 value. Instructions incl. Price \$7.95 Postpaid

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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. Sealed self lubricating chamber. Price \$4.95 (Plus 35c postage)

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#5AN31N18A—Use as 24/32 Volt D.C. motor, pulls 1/2 H.P. or 0/60 V. D.C. can be adapted to 110 V. A.C./D.C. 10,000 R.P.M. 1/2 H.P. by simple changes in connections. This unit can be adapted to independent and rural lighting, power, etc. Instructions incl. (Stock #790). Gov't. cost \$140.00. Wt. 30 lbs. Only \$5.95



## SENSATIONAL SELSYNS

Two or more connected together. Work perfectly on 110 V. A.C. For weather vane, rotating directional antennas or controlling distance control. Complete with diagram and instructions. Wt. 3 1/2 lbs. PER PAIR \$6.50 Postpaid



## PESCO FOUR VANE ROTARY POSITIVE DISPLACEMENT LARGE VOLUME PUMP

Including built in relief and bypass valve. Capacity 400 G.P.H. 1/2" drive spline shaft, 3/4" pipe inlet and outlets. Rotates either direction or in any position. Ideal for gasoline, oil and various types of sprayers. Engineering data incl. (Stock #600) only \$7.95 Postpaid

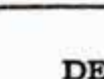


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For all cars, trucks, tractors or boats. Permanent type. \$4.95 Postpaid

## 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 12 gallons per minute. STOP CHANGING OIL. Instructions incl. \$4.95 Postpaid



**ELECTRIC MOTOR 1/2 H.P.** 27 V. D.C. R.P.M. 4000 No. 750. For Intermittent or Continuous Duty. 5/8" SHAFT. VARIABLE SPEED MOTOR CAN BE ADAPTED TO 110 V. A.C. or R.E.A. line by simple arranging armature brush leads. UNUSED. Instructions incl. \$5.50

**ELECTRIC MOTOR 1/2 H.P.** 24 Volt D. C. Amp. 22 #HCA24. Gov't cost \$75.00. Brand New. \$4.50

**ELECTRIC MOTOR 1/4 H.P.** 28 Volt D. C. #2832 with simple instructions to convert to 28-32 Volt A.C. Gov't cost \$82.84. Brand New. \$3.50

**ELECTRIC MOTOR 6 Volt D.C. Delco—New** Handles 6" fan blade. Use as windshield wiper motor, hot water car heater motor, commercial or toy applications. 3/4" Dia. 1 1/2" long shaft. Size 5" long X 3". 2 mounting studs. 1200-2000 R.P.M. NEW Only \$2.35 Postpaid

**DYNAMOTORS** Brand New Type DA-3A. Input 28 V. DC 10.5 amps. Output 300 Volts, 150 volts or 14.5 Volts. R.P.M. 4700 Continuous \$5.50 f.o.b. KC

**Dyn., New.** Input 28 V. 19 amps. Output 1000 V. D.C. Base mounting incl. G.E. Model PE-73-CM. Wt. 38 lbs. only \$4.50 f.o.b. KC

**Dyn., New.** Model 23350. Input 27 V. D.C. Output 285 V. D.C. \$1.75 Postpaid

**ECLIPSE MOTOR & GEAR UNIT** Brand New. This is a 24 V. D.C. motor with built in planetary and bevel gear reduction. Has 1- horizontal and 1- vertical take off shaft. Overall gear ratio to motor is 40-1 can be adapted for 2-1 or 20-1 ratio. Unit can be operated from 32 D.C. Farm light plant. Ideal as OVERHEAD GARAGE DOOR OPERATOR, DRIVE FOR SMALL HOIST, WELL PUMP JACK, LAWN MOWER DRIVE, DRIVE FOR POST DRILL, etc. Wt. 23 lbs. Gov't. cost \$221.00. (Instructions incl.) Only \$12.50

**Pesco Vacuum Air—General Purpose Pump** Here is a pump for air, fluid, pressure or vacuum. Standard 1/2" pipe thread. Delivers 300 G.P.H. at 2000 R.P.M. Runs forward or reverse. Self aligning shaft. Spline terminal for direct drive, readily replaced with a pulley. Use them for oil burners, MILKING MACHINES, COMPRESSORS, VACUUM PUMP, etc. Engineering report and instructions incl. Now only \$9.95 Postpaid

**Brand New Wonderful ROTATOR MOTOR** For rotating Ham, FM Antennas, Turntables, Telescopes, etc. Applicable for 110 V. A.C. 60 cycles or for 24 V. D.C. as reversible motor. Approx. 7 R.P.M. Free Swing, Reversible, Light Weight, Rugged, quiet. Motor & Gears oil sealed. Including 3 mounting lugs on motor. Simple instructions & diagram incl. Wt. approx 3 1/2 lbs. Stock No. 572. \$75.00 Value. Now Only \$6.50 Postpaid

**Adel Self-Priming ELECTRIC PUMP** For pumping light oils, oil burners, fluid metering, fuel pump, tool post grinder, coolant, pressure lubricating pump, etc. Double ball bearing series wound motor, continuous duty. 1/30 H.P. rated 12000 R.P.M. Applicable for 24 V. D.C./A.C. or use on 110 Volt A.C. Size 6 3/8"x3 1/8"x3 1/8". Remove pump and use motor as high speed grinder, etc. Diagram and instructions incl. \$50.00 value. \$8.95 Postpaid

**Pesco Centrifugal Heavy Duty Electric Pump** With built in 1/4 H.P. MOTOR included. BRAND NEW. COMPLETE. Self Contained, Explosion proof. Ideal for pumping Gasoline, Oil, Water and non-corrosive liquids. Applicable for 24 V. D.C./A.C. or on 110 Volts A.C. The Discharge is for 3/4" hose connection. Capacity 400 G.P.H. Use them for Cottages, Basements, Laboratories, Boats, etc. Here's your Greatest PUMP VALUE IN YEARS. Engineering data and instructions incl. \$85.00 value. Stock #659 \$12.95 f.o.b. KC. Only \$12.95

**Adel HEAVY DUTY VALVE #D-8660** Here's your four way hydraulic control valve for use with 2 double action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Brand New. \$60.00 value. Only \$8.95 Postpaid

**Adel PRECISION #10086 Brand New.** For controlling 2 single action cylinders or one double action cylinder. When pressure is applied to one cylinder the return to the opposite cylinder is opened. Connections are for 3/8" pipe thread. Including operating lever 6" long and has quadrant for locking in either position. A tremendous bargain \$8.95 Postpaid

**PESCO 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 \$60 Value \$12.50 Postpaid

**ROMEK WOBBLE PUMP** Hand lever operated. Ideal for camp, farm, ranch, for fuel transfer to boat, etc. Connections are 1/2" I.P.S. New. \$8.50 postpaid.

**Hydraulic Accumulators—Vickers Ball Type** Dia. 5 1/4". Built to stand 2000 P.S.I. Stock #A-65. Wt. 4 lbs. only \$5.50

**BENDIX or VICKERS ACCUMULATOR.** Ball Type. Dia. 10". Built to stand 2000 P.S.I. Wt. 15 lbs. Stock #A-85. Only \$12.95

**VICKERS CONSTANT DISPLACEMENT HIGH PRESSURE PUMP** Use it for any type liquid pumping job. 375 gal. per hr. at 3750 R.P.M. 1000 pounds pressure per sq. in. Can be used as hydraulic motor. O. Acq. \$100.00. Brand new, directions \$9.95 postpaid

**HYDRAULIC Check & Relief VALVE** \$2.50 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. 1/4" AC TUBE PORTS (3/4"-18) thread. Price \$7.50 postpaid

**AIR OR OIL HYDRAULIC CYLINDERS** Stock No. 33. Double action cylinder Bore 2", Stroke 3", shaft 3/4", Length 13". Shaft extends from both ends of cylinder. Capacity 6285 lbs. with 1000 P.S.I. Has a capacity of 8799 lbs. with our STRATOPOWER pump. Now only \$5.50

**Stock No. 27 Cylinder.** Air operated. Bore 2 1/2", Shaft 2 1/4", Stroke 6", one way Stroke. Can be used as snubber or Brake. Length 15". Wt. 11 lbs. \$6.50 f.o.b. Mo. Stock No. 11 Double Action 1 1/2" Bore, 6" Stroke, 5/8" Dia. Shaft. Clevis mounting base and shaft end. Capacity 1160 lbs. with 1000 P.S.I. input. Has a capacity of 1625 lbs. with our STRATOPOWER PUMP 1400 P.S.I. A \$50.00 value. \$8.50 Postpaid

**HYDRAULIC CYLINDER SPECIAL** Stock No. 12 Gives 12560 lbs. with 1000 P.S.I. input. Capacity 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, 8 1/4" Stroke, 1.5/16" Shaft. Clevis mounting O. Gov't cost \$300 A tremendous Bargain only \$17.50

**BRAND NEW Hydraulic CONTROL VALVES** Four way control for use with two hydraulic double action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Brand New. \$60.00 value. Only \$8.95 Postpaid

**STRATOPOWER CONSTANT DISPLACEMENT HEAVY DUTY PUMP** For operating Hydraulic cylinders, hydraulic motors on Contractors, 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 1250 to 1400 P.S.I. 3750 to 4500 R.P.M. HAS BUILT IN RELIEF AT HEAD. Rotation either direction without adjustment. Can be used as hydraulic motor \$85.00 value. Engineering data & instructions incl. Stock #37. Wt. 8 lbs. \$15.50

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**Adel HEAVY DUTY VALVE #D-8660** Here's your four way hydraulic control valve for use with 2 double action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Brand New. \$60.00 value. Only \$8.95 Postpaid

## STRATOPOWER CONSTANT DISPLACEMENT HEAVY DUTY PUMP



For operating Hydraulic cylinders, hydraulic motors on Contractors, 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 1250 to 1400 P.S.I. 3750 to 4500 R.P.M. HAS BUILT IN RELIEF AT HEAD. Rotation either direction without adjustment. Can be used as hydraulic motor \$85.00 value. Engineering data & instructions incl. Stock #37. Wt. 8 lbs. \$15.50

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**Adel HEAVY DUTY VALVE #D-8660** Here's your four way hydraulic control valve for use with 2 double action cylinders. Each cylinder may be operated independently of the other or in conjunction with the other. Oil may be locked in any of the cylinders to hold the piston at any required position. Brand New. \$60.00 value. Only \$8.95 Postpaid

**Adel PRECISION #10086 Brand New.** For controlling 2 single action cylinders or one double action cylinder. When pressure is applied to one cylinder the return to the opposite cylinder is opened. Connections are for 3/8" pipe thread. Including operating lever 6" long and has quadrant for locking in either position. A tremendous bargain \$8.95 Postpaid

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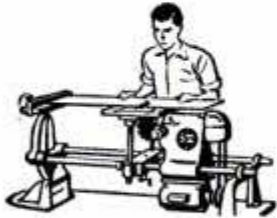


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With special, 1/2-hp., ball-  
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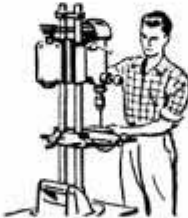
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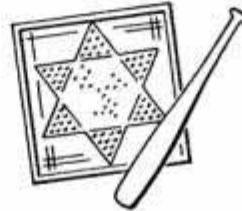
FURNITURE



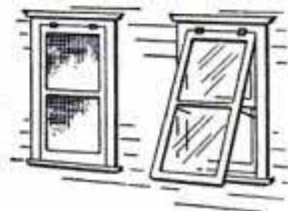
TOYS



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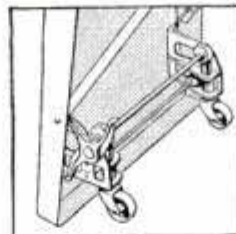
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Now your SHOPSMITH can be completely mobile. Move it, roll it, lock it — on specially designed, three-stage, retractable casters. They're easily mounted on any wood or metal bench.

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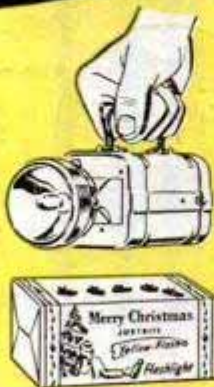
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**JUSTRITE MANUFACTURING COMPANY**  
Dept. 11, 2061 N. Southport Ave., Chicago 14, Ill.

## How Fast Can We Fight?

(Continued from page 129)

target a ringed dot called the "pipper," the diamond pattern slides out ahead of the target to indicate the proper amount of lead. This is accomplished by a gyro that operates as a function of the fighter's rate of turn.

These sights are popular with jet airmen; and they are good enough to permit one contestant in the Las Vegas gunnery meet to score, while flying a North American F-86 Sabre, 217 hits out of an allotted 240 rounds of ammunition.

Electronic sighting is, of course, the real answer. And the USAF has this in the remarkable A-1 radar sight, now being service-tested by several operational fighter units, as well as by experts at Wright-Patterson and Eglin Air Force bases.

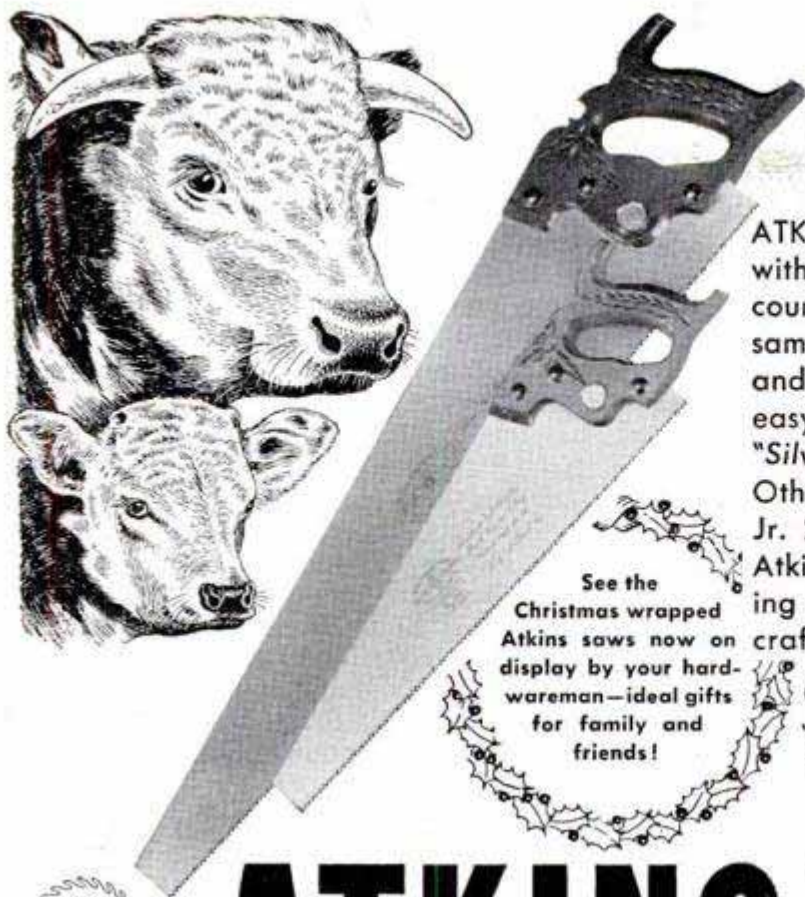
Although details are still classified, certain information has been released or is immediately obvious. The A-1C has a search function which is followed, in sequence, by automatic ranging and aiming functions. It can be used also in manual operation, and aims rockets or dive-bombing missiles as well as gunfire. In this application, the pilot triggers his release when the target is centered within the circular image or "reticle." In the automatic search-and-aim functions, the guns are fired electronically when the target fills the reticle. Range, lead, and other ballistic factors are compensated for automatically.

Further modification, the USAF indicates, will incorporate a "lock on" function. At a given range, the A-1 will latch onto the target by taking over control of the fighter's auto pilot. Even evasive action will not break the contact. The pilot has only to press an arming switch, then sit and watch it happen. Another significant feature is the new radar scope that projects the target image on an optical flat just aft of the windscreen, in the pilot's normal scope of forward vision.

The high fighter's battleground is the strange region of the "twilight limit," where, in a recent flight to 52,400 feet, this correspondent saw the sky as purple-black in color. Against this weird background a few first-magnitude stars were distinctly visible, despite the sun's brightness. There are too few reflective atmospheric particles at this altitude to scatter the sunlight, and this condition causes the darker sky color. Above this limit there is no twilight. Even in daylight, however, other planes appear as glinting slits of light instead of the dark silhouettes to which the lower-flying pilot is accustomed. Electronic supplement to

(Continued to page 262)





# Champions

ATKINS Jr.-65, identical in everything but size with the famous Atkins No. 65, its larger counterpart—same Perfection-Pattern handle, same super-fine steel, same precision balance and taper grinding! But reduced in size for easy handling by smaller hands! High-speed, "Silver Steel" quality through and through! Other saws in the Atkins Junior Line include Jr. 2, Jr. 4 and Jr. 6 — all small editions of Atkins saws which have proved their outstanding superiorities in the hands of particular craftsmen for many years!

See the Christmas wrapped Atkins saws now on display by your hardwareman—ideal gifts for family and friends!

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The New "HURON CHIEF"—A Wet Grinder For 8" to 18" metal lathes! BUILD IT YOURSELF from our semi-machined castings and save \$5. Grinds with coolant on wheel and work. Controls dust and heat. Will grind with the finish and precision of a specialized grinding machine. Does both external and internal work, valve and piston grinding, cutter and tool sharpening, production grinding, etc. WRITE for FREE illustrated folder and price list of castings, parts, grinding wheels, coolant, etc. Mention your lathe.

**HURON MACHINE AND TOOL CO.**  
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Winks and smiles come your way when shoes sparkle and shine. No one is well groomed unless shoes have that patent leather look. It's easy and thrifty to keep shoes smartly shined at home with Shine Boy Shoe Holder. Used by Army and Navy personnel. Fully guaranteed. Lasts a lifetime! Fits men's, women's and children's shoes. No bending. No mess.



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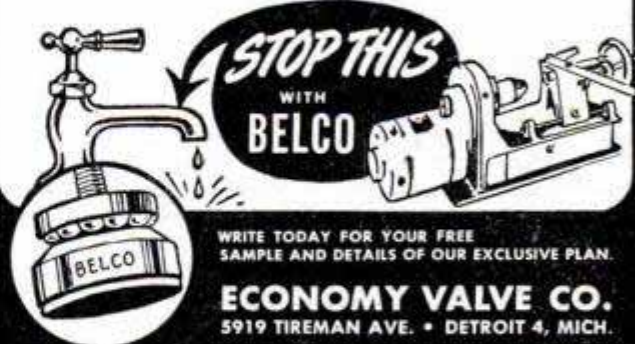
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Same Kit with 10" Combination Blade **\$24.90**  
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- Cuts to center of 24 inch circle
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  - 18x18 inch table tilts 45 degrees
  - Lower wheel and drive pulley runs on sealed New Departure Ball Bearings; Upper wheel runs on two 5/8" bore Oilite Bronze bearings.
  - Upper wheel tension and tilt mechanism of cast aluminum, completely assembled.
  - Upper and lower blade guides. Each has ball thrust bearing, self-lub bronze jaws
  - Rubber tired wheels. Choice of cast aluminum or make-your-own wood wheels on metal hubs.
  - Uses standard 78 inch blades up to 3/8 in. wide.
  - Fully enclosed mechanism for utmost safety.
- GIL-BILT Metal Parts Kit includes Plans, rubber tires, 1/4 inch blade, hubs for wood wheels, ball bearing spindle, tilt mechanism, guides, table tilt segments and all other metal parts.....**\$16.95**  
Same Kit with two machined ready-to-install 12" cast aluminum wheels.....**\$20.95**

Return Kits in 10 days for refund if not satisfied.

(Prices include postage within 600 miles. Over 600 add 5%)

Also available—Plans and Parts Kit for 8" Tilt/Table saw. Order Plans at \$1.00 each—sent postpaid anywhere in the world or write for FREE descriptive catalog.

**GILLIOM POWER TOOLS** P. O. Box 1-PN, Lambert Field St. Louis 21, Missouri

## The JIFFY metal CABINET

### YOUR ANSWER TO SMALL ITEMS STORAGE

at home, office, and shop  
(IDEAL GIFT, TOO)

So handy to keep nuts, bolts, screws, nails, parts, washers, stamps, hobbyists' needs, etc., at your fingertips.



THIS 32 DRAWER UNIT ONLY \$8.95 POSTPAID

Stop searching, get a 32 or 64 drawer Jiffy to keep those small items that usually get mislaid. Spot welded steel, gray enamel finish, metal drawer guides. Dividers included with aluminum drawers make possible three compartments per drawer. Looks good anywhere. Send check or money order, please—no C. O. D.'s. Prices below. Your money refunded if not satisfied. Dealers write for quantity discount.

#### SPECIFICATIONS

##### 32 Drawer Unit

6" Deep  
12¾" Wide  
15¼" High

##### 64 Drawer Unit

6" Deep  
25½" Wide  
15¼" High

##### Drawer Size

1¼" Deep  
2¾" Wide  
6" Long

#### WITH ALUMINUM DRAWERS

##### Dividers and Index Cards Included

One piece rustproof aluminum drawers for heavy service—good for work bench and industry use.

**32 drawer - \$8.95**

**64 drawer - \$15.95**

OHIO ORDERS ADD 3% SALES TAX

Marproof Rubber Feet included with all cabinets

POSTAGE PAID

#### NEW SPECIAL!

**ONLY \$2.95**

**8 DRAWER UNIT**  
(24 compartments)

**16 Drawer Unit \$4.95**  
(48 compartments)

**SPECIFICATIONS**  
6" Deep—8¼" High  
8 Drawer 6½" Wide  
16 Drawer 12¾" Wide

OHIO ORDERS ADD 3% SALES TAX

POSTAGE PAID

**KAYTEE PRODUCTS, Dept. M, Box 588, Canton, O.**

human vision is, therefore, most essential.

Planes such as the Sabre close head-on from the maximum visual distance in about 16 seconds. At altitude, one might not even see the approaching plane unless the eye happened to be focused on just the right sector of sky. "If the other pilot's aim is good, you may never know what hit you," explained Lt. Col. Walker M. "Bud" Mahurin, a top war ace who is now chief of Strategic Fighter Requirements Branch. "For this reason, among others, the element of surprise in transsonic combat is going to be almost frightening."

Because of their all-around armament and visual points of vantage, the bombers are less likely to be "bounced" successfully by unseen fighters. The invulnerability of the high bomber is, for the present at least, almost axiomatic. The difficulty in making high-altitude interceptions and the bomber's superior maneuverability are now generally appreciated. But there are other interesting reasons why modern bombers are hard to kill.

To gain a first-hand understanding of these tactical factors, this correspondent flew as an observer in a recent high-altitude combat demonstration over Andrews AFB. The pilots of the planes involved were two of the USAF's top jet instructors, Lts. Parks M. Rea, who later fought in Korea, and Richard G. Bull.

The F-80B target plane was flown by Lt. Rea along a straight course at 40,000 feet. He maintained a "B-36 speed" of 435 m.p.h. true. Our T-33A, with Lt. Bull flying from the rear seat to give this observer a good view through the gunsight up front, made several high side pursuit curves. Such attacks give the fighter pilot a maximum shooting interval, since he "leads" the target by turning in its direction. Passes were made at a true airspeed of 580 m.p.h. just under the T-33A's Mach number. During four of the six pursuit curves we flew—three from either side, approaching from the target's 3 o'clock and 9 o'clock positions—accelerated stalls were encountered just as the ship banked about 45 degrees into perfect shooting position.

Recovery was made promptly in each case by easing off the radius of turn; but the target plane slid ahead, meanwhile, to a point where our guns could not be brought to bear. These attacks were broken off close behind the F-80B's 6 o'clock tail position. The two shallower curves afforded only a couple of seconds' shooting time, since our plane could not continue to lead the target for any longer period of time. With or without stalling, the gunnery runs ended each time just below the

(Continued to page 264)

# Sale! WAR SURPLUS BARGAINS Sale!

## SPECIAL! MERCURY HEAT CONTROL

Made by Minneapolis-Honeywell—a name known for the best in controls. 1000 watts—115 to 220 volts. Element length 10 ft. Range 70° to 212° Fahrenheit. Control fans, motors, furnaces. This control makes an ideal automatic combination when hooked up to the heat booster below! List price \$16.00. Our price ..... \$4.95



## HEAT BOOSTER

Fits any 8", 9", 10" furnace pipe. 1500 RPM motor with 6" cord, mounting frame, 7" blade. Motor 110 volt 60 cycle 1550 RPM. Easy to install. Silent operation. Warm those rooms with long runs. Stock #583. Regular \$11.95. Your price \$6.95

## STAINLESS STEEL TUBE

HALF PRICE — 6' to 10' Lengths

SIZE	O.D.	WALL	MILL PRICE	OUR PRICE
1/4	3/16	01506	51c Ft.	Ft. 25c
3/8	11/32	01301	63c Ft.	Ft. 32c
7/16	13/32	01508	70c Ft.	Ft. 35c
1/2	15/32	01205	72c Ft.	Ft. 36c
3/4	11/16	05001	91c Ft.	Ft. 46c
7/8	1-3/16	03125	1.01 Ft.	Ft. 50c
1	1-3/16	105	1.10 Ft.	Ft. 55c
1 1/2	1-3/8	05015	1.74 Ft.	Ft. 87c
2	1-15/16	05003	2.20 Ft.	Ft. 1.10
2 1/2	2-7/16	0500	2.74 Ft.	Ft. 1.37

## ALL PURPOSE VISE

Opens to 7 1/4", 4 1/2" wide x 2 1/2" deep. 7" handle, 5/8" sq. thread. Wt. 8 lbs. Use it on the bench as a drill press vise. Ruggedly constructed and an amazing buy. Stock #570—Your price ..... \$2.95



## AIR COMPRESSORS

Gas or electric. Awarded from government.

1/2 HP	12 gal. tank	\$89.50
1 HP	50 gal. tank	\$229.00
1 1/2 HP	50 gal. tank	\$237.00
2 HP	50 gal. tank	\$264.00
3 HP	60 gal. tank	\$325.00
5 HP	60 gal. tank	\$385.00
7 1/2 HP	80 gal. tank	\$568.00
10 HP	80 gal. tank	\$642.00

## CLUTCH

For Motor-scooters, Motor-bikes, Lawn Mowers, etc. Mercury centrifugal clutch for use with any small gas engine. 3" "A" belt pulley. 5/8" bore. Brand new only. Stock #400. \$8.95  
8 1/2" bore. NEW ..... \$9.95  
1" bore ..... \$10.95



## BALL BEARING ARBORS



Grinding and saw arbor, has 1/2" double end shaft, 1 1/2" long with 2" center pulley. New Departure double roll ball bearings. Right and left hand thread. Self aligning Dodge pillow block, 10,000 RPM. Bearings alone list at \$10. Complete arbor new. Stock #305. Only \$4.95

## ELECTRIC RUBBER CABLE

(all new)

## CORD SETS

Extension cords 100 ft. Heavy duty. Plug, socket, and guard. No. 15 wire. Worth at least \$10.00. Stock #310. Our price ..... \$5.95  
Same as above 50' lengths \$4.95



## GENERATORS

300 Watt, RPM 3400. 110 and 220 volt, 1/2" shaft \$40.00; 1000 Watt, RPM 1800. 115 volt AC 60 cycle \$109.00; 2500 Watt, RPM 1800. 115 volt AC \$165.00; 3000 Watt, RPM 2800. 110 volt DC Delco ball bearing, 1" shaft. List \$343.00 to you at only ..... \$99.50

## LIGHT PLANTS

It's unbelievable. 50 to 75% savings. Use for: Farms, cottages, stores, garages, flood-lighting, drilling rigs, refineries, house trailers, fire departments, sound trucks, yachts, fairs, construction, airports, police radios, etc.

5 KW 120 Volts 60 cycle AC. ENGINE: Hercules 4 cycle. Gasoline. GENERATOR: Mfr'd by Hobart Bros. Unit includes remote control cable, 150' 2-wire, #6 and 150' 3-wire, #18, exhaust pipe, power cable plug, remote control stop start switch, automatic volt regulator. Valued at over \$300.00. Continuous duty 6.3 KVA at 80% power factor, frequency meter, radio and television filtered. Unit is completely automatic and cannot be damaged by lack of care. Net weight 770 lbs. Shipping weight 1070 lbs. 44" long, 22 1/2" wide, 30" high, 220 volt output can be supplied on all units at a small additional cost. List price today \$1900.00. Now priced for you at \$895.00. 2500 Watt, AC 115 volt 60 cycle, single phase. ENGINE: Briggs & Stratton, air cooled, 6 1/2 HP. GENERATOR: Westinghouse or Leland, belt drive with guard and Duplex receptacle mounted. NET WEIGHT 310. Gross shipping weight 441. Shipping size 36" x 19" x 20". Complete with \$30.00 worth of spare parts and rubber cable, tools, instructions and fully GUARANTEED. Was formerly priced at approx. \$700.00. Now priced for you NEW only ..... \$295.00  
Reconditioned ..... \$245.00  
Generator NEW ..... only \$165.00  
750 to 1000 watt, all single phase, 110 volt AC NEW ..... \$189.50

VOLTS	WATTS	PRICE
110-220	300	\$89.50
110	5000	\$895.00
110-220	10000	\$1195.00
110-220	25000	\$2100.00
110-220	35000	\$2750.00
110-220	60000	\$5500.00

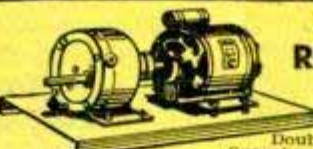
All units 10,000 watts and over, 110-220 single or 3-phase.

## BOOSTER FAN

10" ball bearing fan Mfg. by Robbins & Meyers. Can be run vertically or horizontally. 110 volt AC 60 cycle motor with plug and cord. New in original box. Use it for the kitchen as an exhaust fan, heat booster, etc. High pitch blade, 1/25 HP 1550 RPM. only ..... \$11.95



## GEAR REDUCER



Double reduction. Operates on any 1/6 to 1/2 HP electric motor. 22 RPM. Can be used as winch, barbecue, dummy elevator, operate turntable, electric garage door opener, television antenna. REGULAR \$38.00 NOW ONLY ..... \$16.00

## JARVIS GRINDER

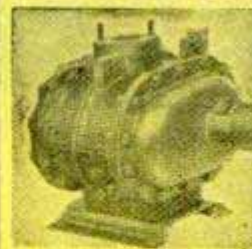
Three phase, 220-440 volt, with flexible shaft; 3450 RPM Totally enclosed motor.  
1 HP List \$165 Now \$65.00  
1 1/2 HP List \$195 Now \$75.00  
2 HP List \$225 Now \$85.00  
1/2 HP, 110 Volt stand & shaft ..... \$39.50

## ALL BRONZE GEAR PUMP



All bronze corrosion resistant Gear Pump. Will lift water 25 feet. Will deliver 1020 gnl. per hour at 1200 RPM. Develops 110 lbs. pressure or 250 foot head. Self-locking packing nuts, drain cock, reversible head. Will pump brine, salt water, oil, vinegar, gasoline, etc. Dimensions—10" L. x 7" H. x 5 1/2" W. Base holes 1 3/8" x 3". Shaft 1 1/16". 1" x 1" inlet and outlet. Wgt. 24 lbs. Mfg. by Sherwood Brass Works. Required 1 to 3 H.P. Motor. \$80.00 Value. NEW ..... only \$24.00  
More H.P. More Pressure  
Same pump. Belt drive, with motor  
1/2 H.P. Motor, 110 Volt, 220 Volt \$77.00  
3/4 H.P. Motor, 110 Volt, 220 Volt \$84.00  
1 H.P. Motor, 110 Volt, 220 Volt \$91.00

## SPECIAL! HOT ROD SUPERCHARGER



Here's a hot rod supercharger at a price you can't afford to miss. SEE HOW THIS TYPE SUPERCHARGER IS USED IN PICTURE and ARTICLE on Page 67 AUG. Issue of POPULAR MECHANICS. Mfg. by Borg & Warner. SPECIFICATIONS: 7 1/2" wide, 5" deep, 7" high. Weight 17 lbs. Compact and sturdy, 4 base mounting holes. 3/4" outlet, 5/8" shaft. Includes female Lovejoy coupling. Priced today at \$85. OUR SPECIAL SALE PRICE ONLY ..... \$16.95

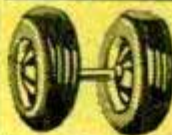
## HEAVY ELECTRIC CABLE

Electric rubber cable, 20 cond., No. 18, solid, 100 feet or more, per foot ..... \$ 12  
Electric rubber cable, 10 cond., No. 18, solid, 100 feet or more, per foot ..... \$ 08  
Electric rubber cable, 4 cond., stranded, No. 18, water and oil resistant; run in parallel No. 18; 100 ft. \$4.25; 250 ft. \$10.00; 500 ft. \$19.00; 1320 ft. reel ..... \$43.00  
Electric rubber cable, 2 wire, stranded, No. 12; 50 ft. with plug and lugs ..... \$7.00  
Electric rubber cable, 3 wire, stranded, No. 10; 65 ft. with lugs. Val. \$26.00 ..... \$13.00  
Electric rubber cable, 3 wire, stranded, No. 10, submarine cable, underwater, underground, overhead—50 ft., \$15; 100 ft. \$30; 250 ft. \$75; 500 ft. .... \$125.00  
Electric rubber cable, 3 wire, stranded, No. 6—150 ft. reels, with 1 male connector; 2 female, crouse hinds connectors—Value, \$211.00 ..... \$75.00  
Electric rubber cable, 2 wire, No. 4—75 ft. lengths, male & female connectors ..... \$50.00  
Electric rubber cable, 4 wire, No. 6 stranded, heavy duty. List price, \$2.36 per foot; 50 ft. \$30.00; 100 ft. \$55.00; 250 ft. \$125.00; 500 ft. \$225.00; 1,000 ft. reel ..... \$400.00  
Heavy duty R cable, 2 wire, 2.0 carry, 200 amp, 100 ft. \$80.00; 200 ft. \$150.00; 500 ft. \$350.00; 1000 ft. \$600.00.

## Mall Electric CHAIN SAWS

MODEL	BLADE	WT.	MOTOR	AC-DC	Cut	Reverse	Price
1E	12"	11	115	Volts	24"	Reverse	\$ 95.00
22E	18"	20	115	Volts	18"	Straight	\$195.00

(Single Gear)



## RUBBER WHEELS

Hollow core rubber wheels made by Goodrich. 2.75 x 10. Ball bearing 1/2" or 5/8" bore. 3 1/2" across hub ..... \$3.95

## BLOCK AND TACKLE

70-Foot 3/4 rope, 1 double block, 1 single block—both have swivel hooks, galvanized tensile strength, 4000 lbs.; No. 6 block, 3 1/2" wheel; weight 27 lbs. Value, \$27.00. Price ..... \$9.95

## HORNS and HOWLERS



Motor driven, (not a vibrator). Heavy duty with great power and long life. Adjustable for high, medium or low tone. 110 volt AC current. Weather proof. For alarm or signal horn on boats, school yards, factories, etc. List price \$47.00. N E W stock #302. Your price \$12.45

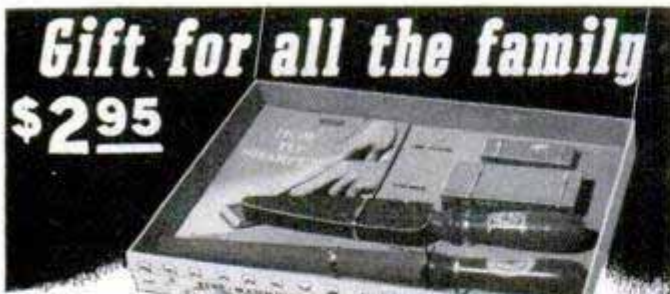
## and other bargain items

HEAVY DUTY GRINDER 1 HP, 3400 RPM, 3 phase, 220 Volt 60 cycle, 20 ft. cord, 24" Long, GUARANTEED. Mfg. by Thor & Chicago Pneu. Special SALE PRICE ..... \$29.50  
HAND WINCH Alloy frame, Bronze gears 24 to 1 ratio, 1/4" stainless cable with hook. Lifts 2000# 12" x 10" Wt. 20#. PRICE ..... \$27.50  
ROCKFORD CLUTCH Manual, bronze throw rope 1 1/2" bore, 1" female spline; 5" long, 3 1/2" OD. Takes to 25 HP. PRICE ONLY \$15.00  
STEEL AIR TANK 8"x4" 12 gal. 23 1/2" openings, 1 3/4" open each end, 150# pressure \$7.75. With saddle & legs \$10.95  
POWER PRODUCTS ENGINE 1 HP, 2 cycle, 17 lbs., 2.43 cu. in. disp., 2700 to 3800 RPM, All aluminum. List \$50. YOUR PRICE ..... NOW \$26.50

# ALL ITEMS GUARANTEED C & H ELECTRIC Co. AS REPRESENTED

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All prices F.O.B. Milwaukee, 25% deposit required on all C.O.D. orders. No C.O.D.'s under \$10.00. Use stock number when ordering. Many other bargain items not listed—write for our free circulars.



*The*  
**Sharp-N-All\* Home Kit**

Now—*always-sharp* scissors, kitchen knives, carvers, can-openers . . . also garden shears, sickles, scythes, hoes . . . and shop tools of all kinds (including Junior's jack-knife). This set includes four specially selected NORTON Abrasives Sharpening Stones, plus the new 32-page "How to Sharpen" Book telling how experts do it. Give the home a Christmas present of sharp edges on all cutting tools and utensils. \$2.95 at your hardware store — or from us direct.

**AND FOR YOUR SHOP** what better present than a selection of NORTON Abrasives INDIA® Files, ARKANSAS® Slips, a WASHITA® or ARKANSAS Bench Stone? Your dealer has them—or write us.

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**Does Difficult Jobs Like Magic**



low as  
**\$1.85**

He'll be more than delighted with this all-purpose tool that packs a world of power. You've never seen such gripping . . . **LOCKS** to work with more than Ton-Grip. Only the Genuine VISE-GRIP has these features: **Involute Jaw Curve** holds all shapes. **Knurled Jaw Tips** won't slip. **Thin Nose, Super Wire-Cutter.** With cutter—No. 7W, 7", \$2.25; No. 10W, 10", \$2.60. Without cutter—No. 7C, 7", \$1.95; No. 10C, 10", \$2.25. No. 7, 6", \$1.85; No. 10, 10", \$2.15.

ORDER FROM YOUR DEALER

Manufactured Only By

**PETERSEN MFG. CO., INC.**

Dept. P-12, DeWitt, Nebr.



"bomber's tail" at distances varying from 30 to 50 yards—point-blank range for tail gunners in a real bomber, even if we had escaped the side armament. That would have been improbable.

The speed differential between fighter and bomber is not high enough—nor does it promise in the immediate future—to afford the fighter pilot sufficient speed advantage. Although our runs were made at 580 m.p.h., the relative closing speed along the pursuit curve was actually this speed minus the F-80B's 435 m.p.h. From a turret gunner's viewpoint, we would have been hanging out in space at a mere 145-m.p.h. speed differential.

The fighter pilot is outgunned by at least two to one during any part of the exchange of fire. For these reasons, pilots currently favor the head-on attack, despite the terrific rate of closure. Less bomber armament can be brought to bear against fighters attacking from the front. Armament such as the Mighty Mouse promises to give the fighters the means to make such head-on attacks profitable.

At the moment, airmen favor the caliber .50 gun for high-altitude combat over the 20-millimeter and caliber .60 guns. Reasons: The reduced mass of the smaller .50 bullet meets with less resistance in the thinner air than do the larger 20-mm. shells. Thus, the .50 has almost equal range at altitude. The explosive effect of the 20-mm. leaves something to be desired, and the USAF wants a thinner-walled projectile which will accommodate greater amounts of explosives. The 20 mm.'s larger cartridge size limits the number of rounds fighters can carry, the same problem existing with the caliber .60 casing, which is nearly as large. For low and intermediate altitude operations, however, the larger guns are favored.

The next logical step in armament is, of course, the AAM (Air-to-Air Missile) robot that homes automatically without any of the present ballistic considerations. Within three years, at least one fighter-borne missile will be available to both services. This is the "Meteor," a 500-pound liquid-fuel rocket with a 25-pound warhead. Another missile under development is the "Oriole," a larger, 1500-pound job powered by a rocket-ramjet and with a range exceeding 20 miles. Both of the new missiles will be able to catch anything in the air with estimated top speeds of Mach number 3.0.

In the race against time, our present weapons progress is reassuring. One of the top ordnance experts answered the big question by saying, "We'll be able to fight as fast as we can fly."

# SURPLUS MACHINE SHOP TOOLS

## HIGH SPEED MORSE TAPER SHANK DRILLS



**SET 1H** 15 Different Size High Speed Morse Taper Shank Drills up to 9/16" with No. 1 and 2 tapers. \$50 value. Priced at only **\$6.49**

**SET 2H** 20 Different Size High Speed Morse Taper Shank Drills from 1/4 to 1". \$70 value. Priced at only **\$12.95**

**SET 3H** 10 Different Size High Speed Morse Taper Shank Drills from 1/2 to 1 1/4". \$50 value. Priced at only **\$9.95**

**SET 4H** 10 Different Size High Speed Morse Taper Shank Drills from 1 to 2" with No. 3, 4 and 5 tapers. \$180 value. Priced at only **\$39.95**

## HIGH SPEED TAPER SHANK CHUCKING REAMERS



**SET 5H** 20 Different Size High Speed Morse Taper Shank Chucking Reamers up to 1 1/2" with No. 1 and 2 tapers. Priced at only **\$6.95**

**SET 6H** 8 Different Size High Speed Morse Taper Shank Chucking Reamers from 1/4 to 1". Priced at only **\$4.95**

**SET 7H** 10 Different Size High Speed Morse Taper Shank Chucking Reamers from 1/2" to 1 1/8". \$65 value. Priced at only **\$9.95**

**SET 8H** 20 Different Size High Speed Morse Taper Shank Chucking Reamers from 1/4 to 1". Priced at only **\$9.98**

## HIGH SPEED STRAIGHT SHANK CHUCKING REAMERS



**SET 9H** 20 Different Size High Speed Straight Shank Chucking Reamers up to 1 1/2". Priced at only **\$6.95**

**SET 10H** 10 Different Size High Speed Straight Shank Chucking Reamers from 1/2 to 1 1/4". Priced at only **\$9.95**

**SET 11H** 15 Different Size High Speed Straight Shank Chucking Reamers from 1/4 to 1". Priced at only **\$6.95**

## HIGH SPEED HAND TAPS

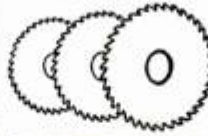


**SET 12H** 14 Different Size High Speed Standard Thread Hand Taps up to 3/4". Priced at only **\$2.95**



## HIGH SPEED MILLING CUTTERS

**SET 4** High Speed Milling Cutters. Set consists of two side 13H milling cutters, size 2 x 3/8 x 5/8" arbor and two side milling cutters, size 2 x 3/16 x 5/8" arbor. Set of four priced at only **\$3.95**



## SLITTING SAWS

**SET 7** Different Size High Speed Slitting Saws 2 3/4" dia. x 1" arbor. Thickness from .040 to .071. Cuts wood, aluminum, brass, steel, etc. \$25 value. Priced at only **\$4.95**



## BRAND NEW HIGH SPEED COMBINATION DRILL AND COUNTERSINKS

**SET 8** Different Size from C2 to M1 (1/16 drill x 13/64 body to 7/32 drill x 5/8 body) 60 degree 15H of countersink. These new countersinks sell new from 75c to \$2.50 each. Your price for this set of 8, while they last, only **\$3.95**

# HYDRAULIC DEPARTMENT

## BRAND NEW HYDRAULIC UNIT

Pesco 1P203 GearType Hydraulic Pump rated at 3 G.P.M. @ 3750 R.P.M. and 1000 P.S.I. Priced at only **\$6.95**



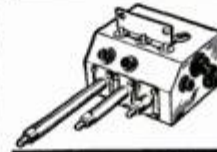
Discounts on quantity.

## 1500# Reconditioned PESCO HYDRAULIC PUMP

Gear type, rated 1500 PSI, 2 1/2 G.P.M. at 1500 R.P.M. 5/8" drive spline. No. 1P203 reconditioned guaranteed. Priced at only **\$6.49**

## FOUR WAY HYDRAULIC VALVE

High pressure Adel valve for controlling one cylinder or other hydraulic equipment. 3/4" pipe ports. Heavy steel construction. Priced at only **\$5.98**



## Master Hydraulic Control Valve

Will operate 1 or 2 hydraulic cylinders independently of each other or together by means of 3 control handles. Rated at 1000 PSI. Valve made of heavy steel with standard pipe ports. Cost new over \$125. Priced to you at only **\$6.95**

Write for our catalog describing thousands of machine cutting tools, hydraulic equipment, etc.

All merchandise is sold with money back guarantee of satisfaction and is shipped postpaid unless otherwise stated.

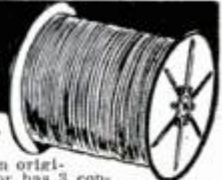
**T & T TOOL, 101 West Archer, Tulsa, Oklahoma**



# EASY TO INSTALL LOW-COST TELEPHONE SYSTEMS

Save Time & Steps With ARMY FIELD

# TELEPHONES & WIRE



Genuine Battlefield-Proven Equipment. Same as used by UN forces in Korea.

Hundreds of uses anywhere. You can install field telephones and have communication in a matter of minutes. Just string this low-cost, 2-conductor, weatherproof wire, attach to phone terminals and you are ready to ring and talk any distance. Simple as that. You can use from 2 to 8 phones—any number you may require—on the same line. No maintenance required. All prices FOB Sacramento. No COD. (Calif. residents add 3% for sales tax.) Small orders sent postage collect, heavy orders freight.

**TELEPHONE WIRE**  
This is genuine WWII Army Field Wire on original steel reels, 2-conductor. Each conductor has 3 copper, 4 steel strands for extra tensile strength. Excellent for all-weather, all-purpose communication. Used extensively by telephone companies, industry, engineering projects, ranches, etc., for extended field communication systems.  
**NEW, unused, excellent condition per mile (wt. 160 lbs.) \$16.00**  
**1/2 mile (wt. 80 lbs.) \$8.25 NEW, unused, good, serviceable condition per mile.....\$12.50**  
**1/2 mile.....\$6.75**

### EEB FIELD TELEPHONES

Factory reconditioned—new  
Ea. \$15.00 Per pr. \$29.50

Reconditioned—excellent  
Each \$12.50 Per pr. \$24.50

Send check or money order

**LORIS SALES, P. O. Box 1896-B-12, Sacramento, California**

# PROFESSIONAL TYPE BUFFING WHEELS

KIT OF 5 COMPOSITIONS

by Mail

**\$175**

(Reg. Val. \$1.95)



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for all sheet  
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32 East Fourth Street

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## I Rode the Airlift to the Orient

(Continued from page 97)

Three routes across the Pacific are followed by the thundering planes of the Pacific airlift. Shortest is a Great Circle course via McChord Field near Tacoma, Wash., thence to Anchorage, Alaska, out along the Aleutian Island chain to Shemya, and in to Tokyo. It adds up to 5688 miles. Flying time: 30 hours.

The other two routes chart a mid-Pacific course that is longer, but boasts better weather the whole way and has island strips capable of handling the wham of huge, heavily loaded aircraft setting down on them incessantly. Both routes leave Fairfield-Suisun for Hickam Field in Honolulu—the longest overwater hop in the Pacific: 2470 miles. Flying time is 9 to 12 hours, depending on the plane and wind. From here, the newer MATS craft and the commercial contract planes hop to Wake Island or Midway—two chunks of coral about the size of La Guardia Airport, and just as busy—then in to Tokyo. Total distance for the whole route is 6772 miles. Flying time: 36 hours. This was the route we were to follow.

Smaller, or more heavily loaded military planes go island-hopping out of Hickam, via Johnston, Kwajalein, Guam, Tokyo, for a total of 8083 miles. It takes them 45 hours.

From Tokyo, speedy shuttle planes take over the cargoes and move into battlefront areas. This is the newest wrinkle in air-lifting, known as "hose supply." The shuttle planes are the "nozzle" of the Air Force "hose." As this is written, the nozzle is aimed at Kimpo Airfield, just outside Seoul, Korea. But at any moment it might be turned toward Indo-China, the Philippines, Formosa or any other place where troops and supplies are needed.

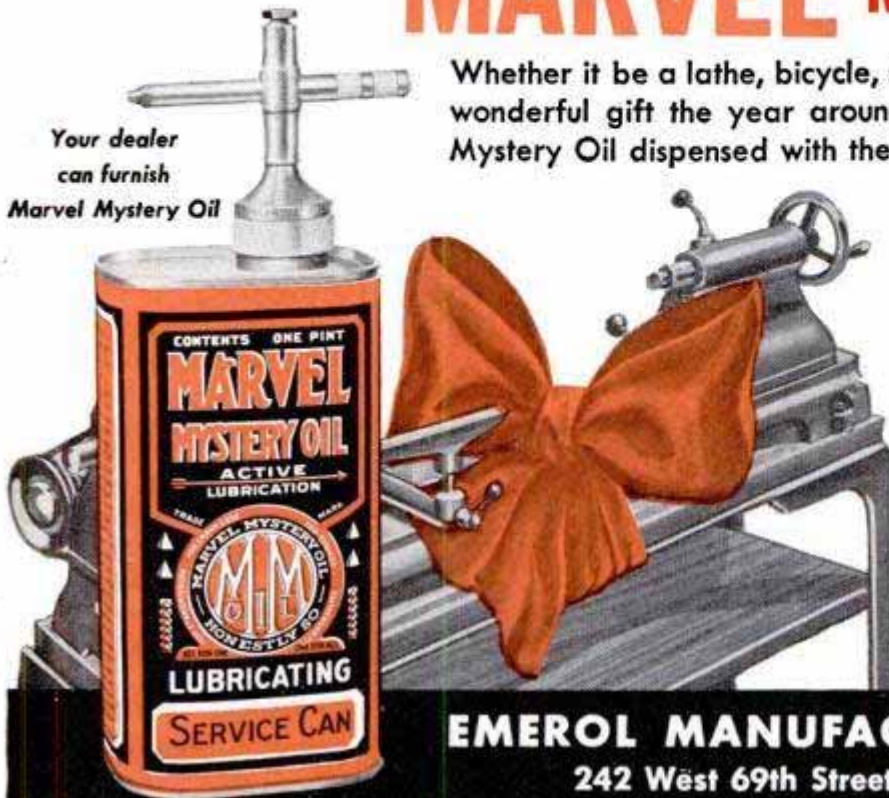
Most of the airlift planes carry a basic crew of five, including pilot, co-pilot, navigator, radioman and engineer. Though crews lay over at way points to rest, fresh crews replace them and keep the plane moving. Except for fueling and checking, planes seldom spend more than an hour or two at any stop.

In emergencies, they may fireball through in much less than the average time. That's what happened when U.N. troops in Korea needed something—and fast—to stop Red tanks. Within a matter of hours, big 3.5 bazookas, with shaped-charge rocket ammunition, were flying from interior arsenals in great trains of four-engine sky freighters. The bazookas were delivered right to the front lines by airlift in less than 30 hours in many cases.

(Continued to page 268)

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Sitting in the cabin of a big MATS plane, thrumming along over the cloud-specked Pacific with no land to be seen for a thousand miles in any direction, is a monotonous job. Pilots spend their time shooting the breeze, watching the nightmare of engine and flight instruments, and listening to the crash-crackle of the radio.

The latter is the principal means by which MATS operations at Fairfield keeps track of every plane in the air. Position messages, sent in every hour by planes in flight to the nearest Airways Communications Center, are relayed to a bustling office at Fairfield. Here, the position of each plane is transposed to a big position-plotting board. If a plane is in bad shape on fuel, the boys at Fairfield may realize it before the captain of a plane 2000 miles out in the Pacific is aware of his predicament.

In the vast areas of the Pacific, radio is apt to be whimsical. Pilots work whatever stations they can, skipping around the bands until they find one. "For instance," explains Charles Huffman, radioman on our big MATS Stratofreighter, "sometimes we can't raise Honolulu one hour out of the place—but we can read Fairfield, eight or nine hours away—or perhaps Seattle or Anchorage. Any contact will do, and if there's a station alive anywhere, I'll find it." Positions are relayed instantly to the proper station for further relay to the control center.

Moving wartime freight swiftly to battle-front destinations is only half of the Pacific airlift story. Even more ingenious is the removal of wounded from front-line aid stations back to the States in these same big planes which, in a few moments' time, change from barren freight boxcars to fully equipped aerial ambulances. All across the Pacific, technicians with typical American ingenuity have had to invent and rig equipment to handle this unprecedented cargo. I saw special ramps and lifts with which stretcher bearers load the big planes in half the usual time. Big ambulances, made from fleets of bakery trucks, carry nine litter patients each. At one place there's a huge 30-litter ambulance made from an old truck trailer.

And I listened to the medicos talk about the big, double-decked C-97 becoming a regular air hospital, with wards on the upper deck and surgery below. It was on one of these huge Boeing planes that I rode out across 6700 miles of blue Pacific with a load of high-priority cargo. Later I returned with 64 litter patients, a crew of 12, three nurses, two flight attendants and two medical technicians. But that is the subject of another article.

(Continued next month)



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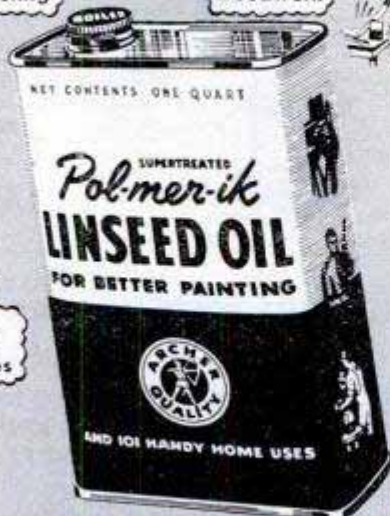
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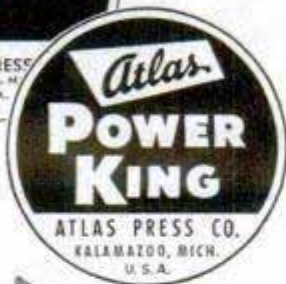
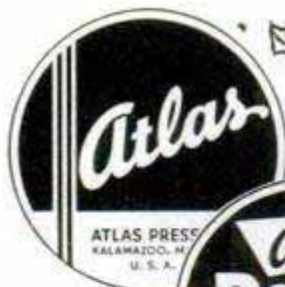
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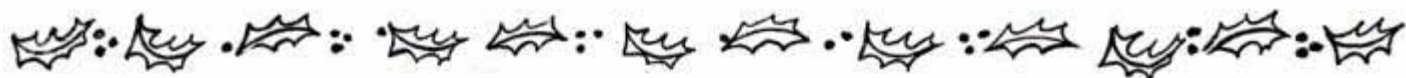
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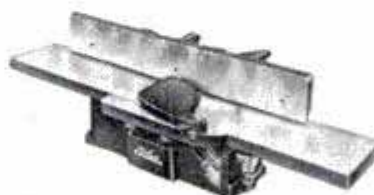
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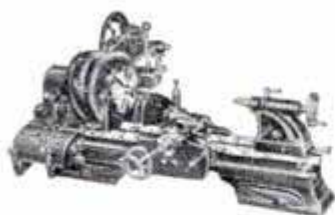
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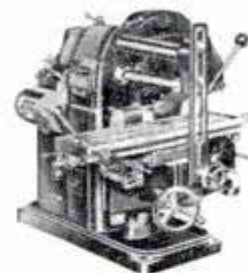
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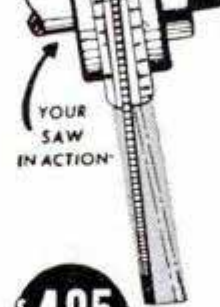
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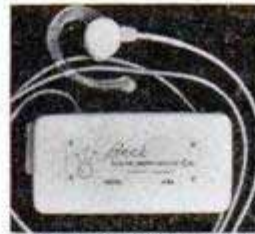
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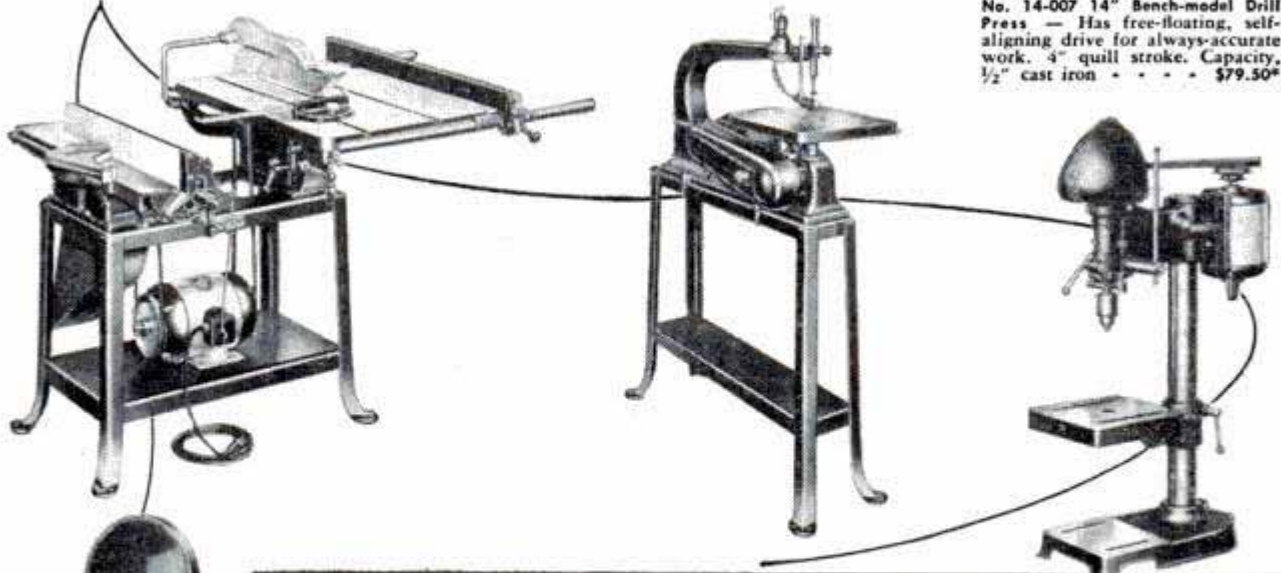
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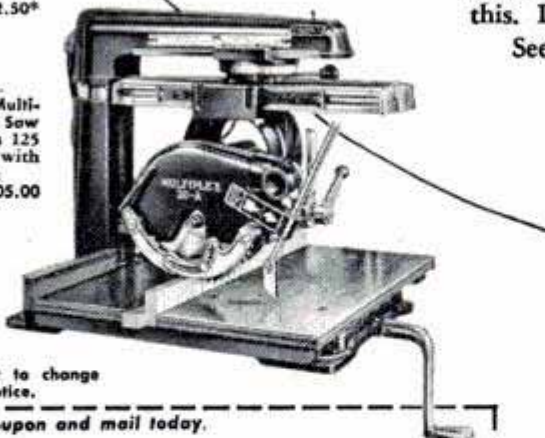
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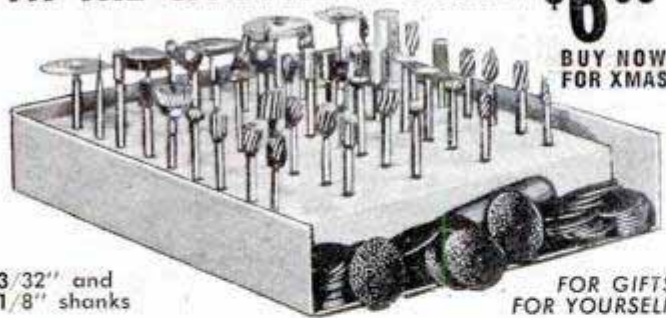
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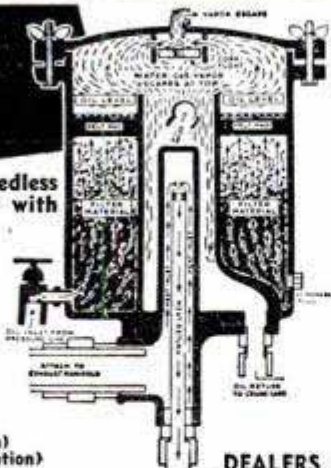
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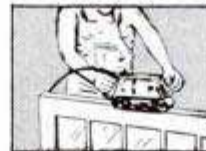
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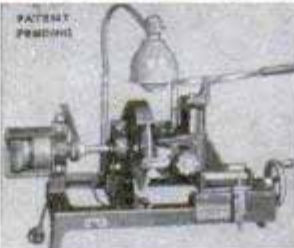


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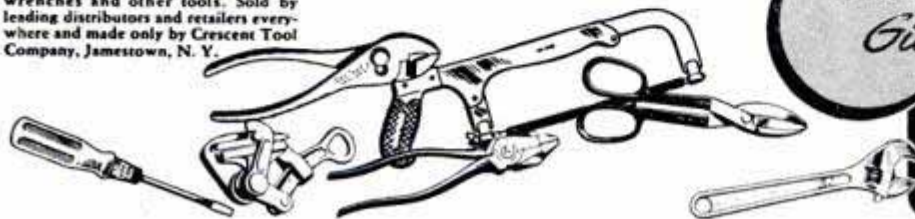
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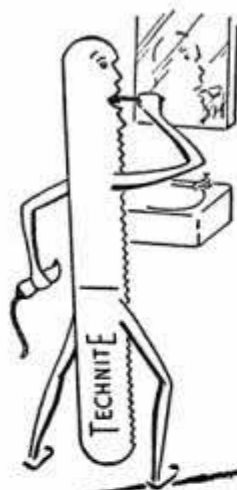
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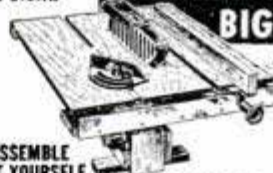
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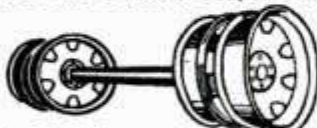
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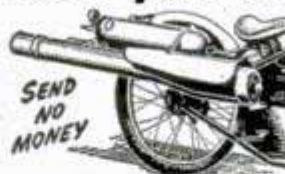
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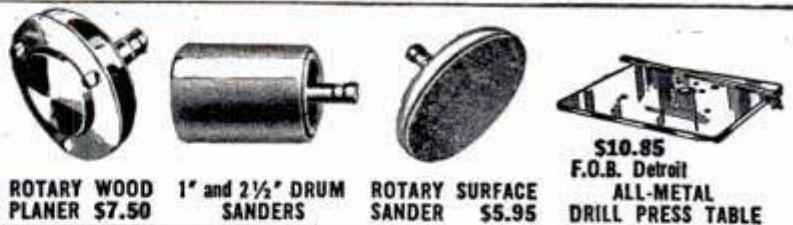
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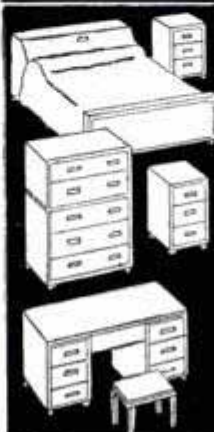
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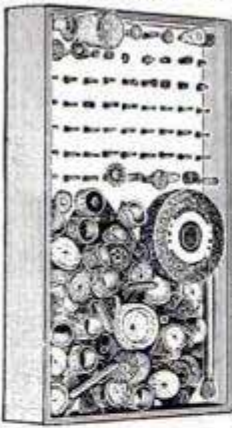
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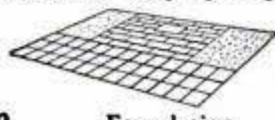


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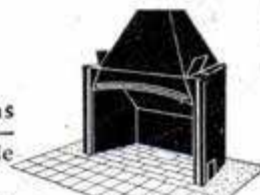


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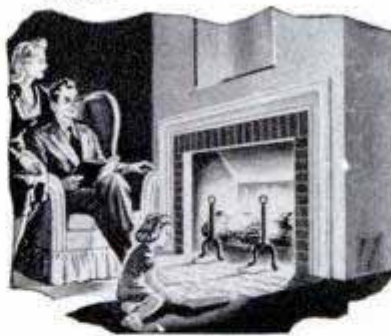
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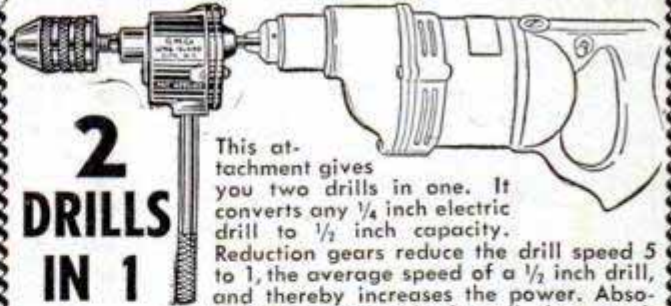
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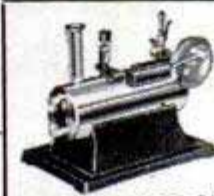
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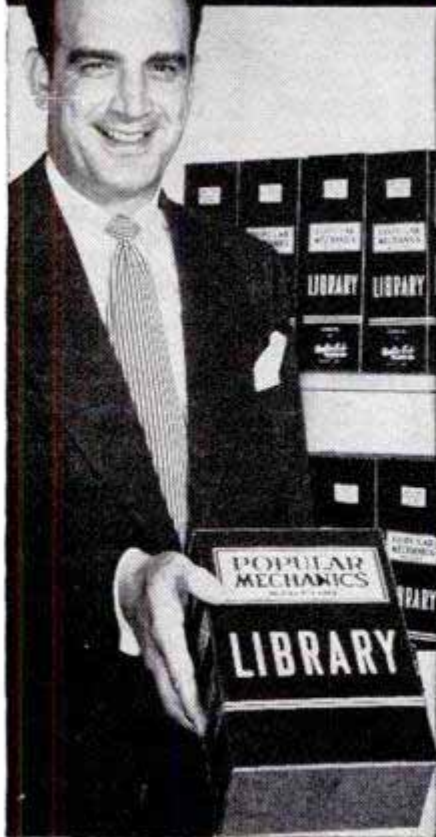
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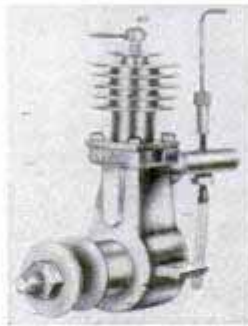
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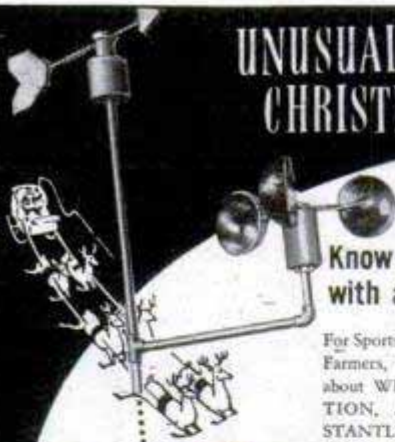
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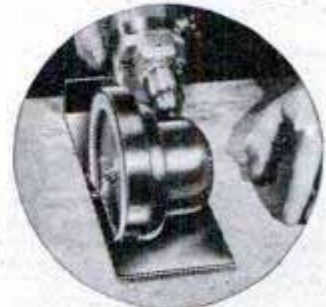
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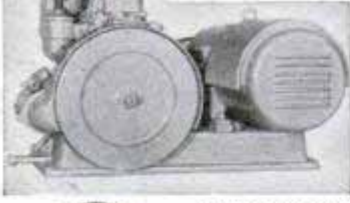
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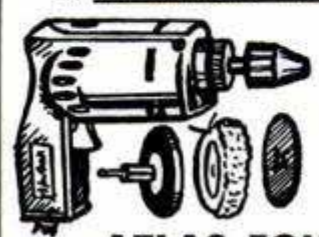
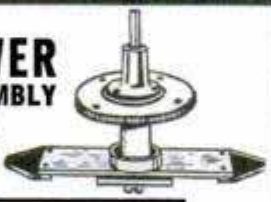


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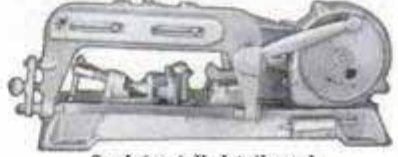
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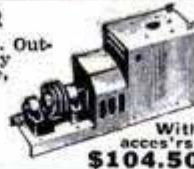
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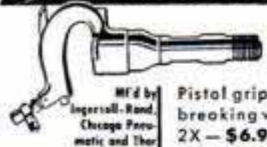
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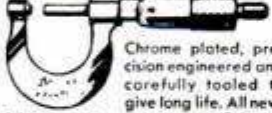
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### ... with new CARBOLOY "LIVE-SPIRAL" Masonry Drill

No packing or stalling. Spiral wire lifts dust as it drills. Tipped with Carboloy Cemented Carbide. Fits any rotary drill or hand brace. 1/4" drill—\$1.60. Also 1/4", 3/8", 1/2" in Kit C. Free folder at dealer's or write.  
 "Carboloy" and "Live-Spiral" are trademarks of **CARBOLOY COMPANY, INC., 11185 E. 8 Mile Street, Detroit 32, Mich.**

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Dual Purpose Spray Gun! Uses only 25 lbs. Air Pressure  
 • Thousands of uses in Home, Shop, Industry: Makes Auto Interiors Clean & New, Lines drawers, Marproofs lamp bases, Refinishes any object. All in colorful Flock. Etch & Frost windows, glassware, etc. Removes Paint & Rust from Autos, Tools. Guaranteed! Send \$19.75 or write for free information. Flocking supplies!

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Send post card asking for FREE catalog  
 Popular Mechanics Press, 200 E. Ontario, Dept. 601, Chicago 11

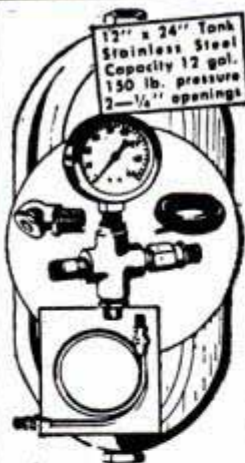
## BUILD HEAVY DUTY MACHINES

SAVE UP TO 90%— You can build, using our practical, easy-to-read plans, all kinds of machines, for home, farm or shop — scooters, portable sawmills, metal working machines, concrete machinery of all kinds, printing equipment, woodworking machines, midget autos, dish washers, farm equipment, freezers, tractors.

**FREE CATALOG HANDBOOK**  
 183 SETS OF PLANS  
 VALUABLE INFORMATION

**NICHOLS EQUIPMENT COMPANY**  
 D-11 PURVIS, MISS.





## WESTINGHOUSE Air Compressor

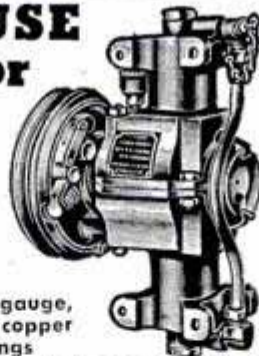
Reg. \$60.50 . . . Only

Model T-1 Brand New  
— 2 CYLINDER \$21.50  
PISTON TYPE.  
Operates with 1/2 H.P. Motor or  
equivalent gas engine.

Compressor has 2" bore, 1 1/4" stroke,  
ball bearing, 3.27 CFM at 600 R.P.M.  
Capacity up to 6.54 CFM. Size 9"x  
11 3/8"x6 5/8". Wt. 26 lbs.

Compressor, pressure tank, air gauge,  
air chuck, 20-ft. hose, pop valve, copper  
tubing with 4 brass flared fittings  
for connecting compressor to tank,  
4-way cross and 3 nipples.

COMPLETE OUTFIT, wt. 52 lbs. . . . \$32.50  
EQUIPMENT LESS COMPRESSOR, \$12.50  
COMPRESSOR SEPARATELY, \$21.50—TANK ONLY \$5.95

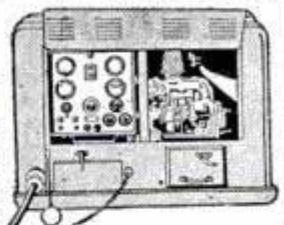


## LIGHT PLANTS

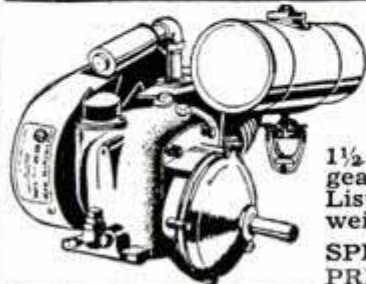
Brand New!  
War Surplus

Signal Corps Power  
Unit PE 197

115 volt 60 cycle  
A.C. single phase  
5 K.W. Hobart,  
water cooled, 14  
h.p. 4 cylinder  
Hercules engine.  
Remote Control,  
complete panel  
board with instruments. 150 ft. automatic re-  
mote control cable with reel; 150 feet #8 heavy  
duty wire with reel; housed in metal case with  
replacement parts and tools. Cable with reels  
alone worth \$400. Regular  
price of unit \$1900. Shipping  
wt. 1250 lbs. Our price, com-  
plete. . . . \$895.00  
f.o.b. Chicago



2 3/4 K.W. LELAND POWER PLANT . . . \$295.00



Save 50% on Gas Engines!

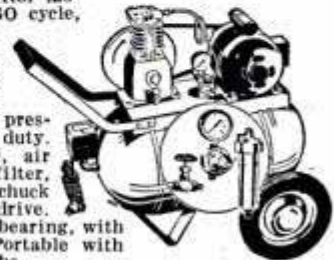
Red Seal Continental  
6 to 1 REDUCTION GEAR  
1 CYLINDER — 4 CYCLE

1 1/2 HP with 6 to 1 reduction  
gear. Operates at 450 R. P. M.  
List Price \$79.50. Shipping  
weight 54 lbs.

SPECIAL PRICE . . . \$39.50

## AUTOMATIC COMPRESSOR UNIT

1/2 H.P. heavy duty capacitor mo-  
tor. AC 110/220 volt, 60 cycle,  
2x1 3/4 inch piston type  
compressor, splash feed  
lubrication. 12x24 inch  
tank, automatic pressure  
switch. CFM 2.8 at 100  
lb. pressure, or 150 lbs. pres-  
sure for intermittent duty.  
Check valve, safety valve, air  
regulator with gauge and filter,  
20 ft. air hose with air chuck  
for inflating tires. V. belt drive.  
Mounted on 2 wheels, ball bearing, with  
2"x10" pneumatic tires. Portable with  
handle. Shipping wt. 90 lbs.



SPECIAL PRICE . \$89.50

## WELLWORTH V-BELT CLUTCH



Takes starting load off engines or motors. When  
speed is reached, a flip of handle shifts clutch  
from idling to driving position. Handles "A"  
belts, 3.35" pitch diameter, 5/8" bore. Ideal for  
use with lawn mowers, garden tractors, home  
workshop motors, etc. 3 1/2" long. Safe, easy to  
mount, sealed bronze bearings.  
positive action. Shpg. wt. 3 lbs. \$7.50

SAME CLUTCH FURNISHED WITH 3/4" BORE \$8.50

## 1/2" ELECTRIC DRILL

Streamline Design — U. L. Approved

Universal air-cooled motor—110/115 V. AC-  
DC Blower type fan for air cooling. Removable  
side handle for close quarter drilling. Jacob's  
Chuck with key. No load speed  
450 RPM; full load, 290 RPM.  
1/2" capacity in steel; 1" ca-  
pacity in hard wood. 10 ft.  
cord and plug. Shipping wt. 11  
lbs.

PRICE ONLY \$34.50

Same drill furnished with Ja-  
cob's Hex. chuck, only. . . . \$29.65



It's a  
Honey!

CHICAGO PNEU-  
MATIC RIVETER &  
CHIPPING HAMMER  
CP4X Pistol grip  
handle. Takes up to  
3/16" rivet. Weight  
6 lbs. List price  
\$73.00.  
BRAND \$22.50  
NEW . . .

## WELLWORTH ZIP SAWER, JR. PORTABLE HAND SAW

Takes the work out of hand  
sawing

Convert your electric drill into a  
portable power saw. Light weight—  
easy to use with any 3/4-inch elec-  
tric drill or flexible shaft. Saw blade  
3" diam. Maximum vertical dept  
of cut 1". Oil bearing lubrication.  
Oilite Bronze Bearing.  
Overall length 7 1/2".  
Shipping weight 2 lbs. \$7.95



## PORTABLE ELECTRIC HAND SAW

The Zip Sawer With ALL the Features

6 1/4" Diameter saw blade, 1/2" square arbor hole.  
Maximum depth of cut 2 1/8". (At 45°, 1 3/4")  
Minimum depth of cut 0". Angular adjustment 90°  
to 45°. No-load speed, 5200 r.p.m. Full load speed,  
3200 r.p.m. Amperes, full load, 8.0. Universal AC-  
DC motor, 110/220 volt. Dimensions: 11 1/4" long;  
9 1/2" wide (ripping guide removed); 7 1/8" high  
(without blade). Furnished complete  
with 6 1/4" diameter combination blade  
and 10 ft. cord and plug. Wt. 11 1/2 lbs.  
Price. . . . \$39.95



## "Wellworth" BLOWER

at a Bargain Price

Quiet operating. Double wheel in-  
let, double width blower. For heat-  
ing, ventilating, cooling, air wash-  
ing, exhausting and forced draft.  
DIMENSIONS: 10" wheel; outlet  
13 1/2"x11 3/8"; inlet 8 3/4". Height  
19". Width 18". Depth 16 1/2".  
C.P.M., 1/4" S.F. 1600; outlet vel.  
1375; motor 1/4 H.P. with overload  
relay; cord & plug  
110 v. 60 cy. A.C.  
Sht. wt. 67 lbs. . . . \$42.75  
Special price. . . .

BLOWER LESS MOTOR \$27.50  
AND DRIVE . . . . .

Prices f. o. b. Chicago.  
Money back guarantee.  
Send check or money or-  
der today. Prompt ship-  
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## NEW CATALOG

Motor guide, air compressors, home and  
factory workshop tools, light plants,  
luggage bargains. Send 10c for postage.

## WELLWORTH TRADING CO.

1831 S. STATE ST. DEPT. D-12 CHICAGO 16, ILL.

## NEW PACKAGED BOATS



17 models. 8'-16'; Trednic  
racers, cruisers; Outboard, in-  
board, skiffs. Assembled frames;  
Tri-Keel construction; Trednic  
bottom; spray rails; easy to build!  
SEND 25c FOR CATALOG!  
Catalog and booklet "Plywood Boats", \$1.00

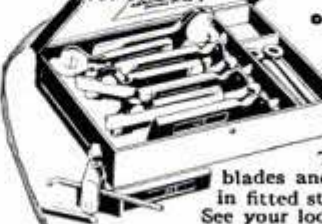
## BOAT PATTERNS—BLUE PRINTS

1950 Catalog—100 designs by naval architects. Racing  
classes, cruisers, inboard, outboard, sail. 6 to 35 ft.  
Plywood—Steel—Plank. Construction plans, full-size pat-  
terns. SEND 35c FOR CATALOG or \$1.00 for catalog  
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MARINE MART—DEPT. 24—BUFFALO 7, N. Y.

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No. 8-A SET



Be permanently  
tooled-up for every operation  
on your Metal Cutting Lathe.

No. 8-A Ace Tool Set  
for 9" and 10" Swing  
Lathes—fits shank size  
3/4" x 3/4" Includes Turn-  
ing, Cutting-off, Boring,  
Knurling and Threading  
Tools with high speed cutters,  
blades and wrenches. 8 complete tools  
in fitted steel case—nothing else to buy  
See your local dealer or order direct.

ARMSTRONG BROS. TOOL CO.  
5268 W. Armstrong Ave., Chicago 30, Ill.

\$26<sup>95</sup>

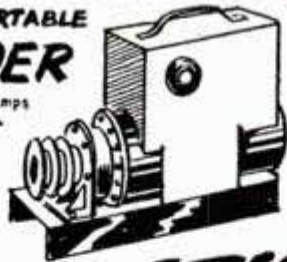
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## D.C. ARC WELDER

300 Amps Continuous. 350 - 400 Amps Intermittent. For ALL WELDING - LIGHT or HEAVY !!

This rugged air-cooled precision built electric ARC WELDER - designed to weld for hours comes complete with pulley reactor, output controls, Hi-Lo switches, rheostat. The heart of this unit is the famous R-1 generator, specially developed for B-29 Bombers, and with features no other generator has. Heavy steel frame, easily adapted to mounting on Jeep, Tractor or other power supply (10 H.P. gas or electric). Never before offered at this low price.



**97<sup>50</sup>**

### Ellinwood "44"

Here's a Real BUY!! This engine is rated from 4.4 to 5 HP. Has optional power take-off of 1 to 1 from crankshaft or 2 to 1 reduction from camshaft. Makes an ideal auxiliary power plant or can be used to drive pumps, generators, compressors, small boats, etc. Lightweight rugged and contains such fine component parts as Bendix-Timken-Air Mase, etc. . . . . ONLY



**5995**

**CONTINENTAL** The famous 4 cycle, air-cooled "L" head gas engine, 1 1/2 to 2 HP. Cheap power for Farm, Factory, Shop.

**3995**

NEW READY TO RUN

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**1180 RIVET GUNS**  
Pistol & Goose-neck Type  
Goose-neck \$55 **\$8.95**

10,000 in various popular makes, sizes, types, Cleco, Ara, Ingersol Rand, Chicago, Pneumatic Buckeye, etc.

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We stock 1000's Tons of NEW BEARINGS, BOLTS, NUTS, SCREWS, RIVETS and other small hardware. These were purchased in the past 5 years from ARMY, NAVY, War Assets Administration, Aircraft Factories, and other Govt. agencies. We are selling these at a fraction of their original cost. Most of the stock is in their original packings. All is new and clean. Please write us for particulars based on your requirements. Illustrated in Palley Tool Catalog.

### 3/4" HEAVY DUTY - 2 SPEED Portable DRILL

Never before such a value. Converted from aircraft starter-energizer. Ideal for all types heavy drilling. Has 2 speed control for 200 RPM low, or 275 RPM high. Heavy duty gear box gives extremely high torque. 3/4" Std. Jacobs Chuck. Universal ball bearing motor - 110 - 115 volt AC or DC. Length 32 inches.



Only **62<sup>50</sup>**

Equipped with 50h. Electric cable

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Made for Chemical Warfare Division for testing water, etc. A handy addition to the chemistry lab.

or an exciting experiment for the amateur. Set includes test tubes, complete instructions, 15 different items. Packed in attractive lucite box with cover & dividers. Set **\$1.39**

**Plexiglass & Nascollite clear plastic shts.**  
NASCOLLITE - Full sheets app. 1/8" x 37 1/2" x 49 1/2", app. 10 1/2 lbs. each **\$12.50**

**PLEXIGLASS - Full Sheet**  
5/16" x 36" x 24" ... Per Sheet... **\$13.00**  
5/16" x 36" x 48" ... Per Sheet... **\$25.00**  
Patenters write in for our special quantity prices. All above are new & marked. Also inquire about other large stocks of Plastics.

### NEW TARPS - HEAVY CANVAS

Mildew & Flame Resistant. Cheap outside storage! They are really moving at these prices.

9' x 16' . . . **\$11.95**  
5' x 7' . . . . . **3.95**  
16' x 16' . . . . . **25.60**

Rubberized Nylon Tarp 7' x 11' . . . . . **6.95**

New Rubberized Linen Tarp - 7' x 11' Waterproof, weighs only 3 lbs. Ideal for outside car storage. **5.95**

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**LINEMAN'S KIT** - Type used by U.S. Army Signal Corps. Consists of pair of heavy duty lineman's pliers with pipe jaws & side cutters - a fine quality 2 bladed wire-skining knife. In reg. Signal Corps leather pouch. **2.39**

# PALLEY

SUPPLY CO

Dept. PM-12 GLENDALE 1, CALIF.

SEE OPPOSITE PAGE FOR TERMS



### BRAND NEW COMPRESSION TESTERS

Tests Compression up to 200 P.S.I.

Made by U. S. Gauge Co. A highly dependable, accurate instrument for auto and diesel mechanics, garage, service station operators. Dial has large numerals, black indicator arm. Calibrations are in 5 lb. increments starting with 10 lb. to 200 psi. Hex angle stem is equipped with tapered rubber nose piece. Black dial case is 1 1/2" deep, 3 3/4" dia. Overall length, 9 1/4". Wt. 11 1/2" lb. **ORIGINALLY WORTH MUCH MORE. \$4.75**

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Wire Actuator-250V, AC. 5 amps. Dbl. acting. Normally open and normally closed. 3 terminals. UL inspected. Size 1-3/16 x 9/16". . . . . **4 for \$1. ppd.**  
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Can be used on Neon Lights, etc. Made by Electronic Laboratories, Inc., type S663. Delivers 3 volt power from 24V DC. Capacity 1L. Vibrator type R35. Has 3 threaded terminals, 1/2" dia., 1/2" high. Sturdy aluminum case, size, less terminals, 5 x 4 1/2 x 3-7/16". 4 mounting legs. Wt. 2 3/4 lb. Used in excellent condition. **ORIGINALLY WORTH MANY TIMES MORE. \$1.00**

Following 6 electrical items are used, but in good condition. Are priced to save you considerable money. **20 RPM.**

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110V AC. 60 C. Single Phase For experimenters, model builders, hobbyists, displays, etc. Has steel gears, brass side plates, 4 mounting ports. Size, less shaft, 4 1/2 x 2 1/2 x 3/8". Shaft, 3/16" dia., 1" long. Solder lug terminals. **\$1.25**  
Wt. 1 lb.

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Low Cost Unit Needed in Every Garage. . . . . Reveals condition of condensers, Coils, Armatures, Starters, Batteries, Battery Connections, High-Tension Wiring, etc.

Saves time—actually sells parts. **WRITE FOR FREE DETAILED INFORMATION.**

**JOBBERS Distributors Salesmen Write For Deal.**

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1/4 HP 1750 RPM **\$8.00** 1/2 HP 3450 RPM **15.00**  
1/2 HP 1750 RPM **17.50** 1 1/2 HP 3450 RPM **37.50**

Every Motor Fully Guaranteed  
Heavy Duty, Repulsion Induction or Capacitor Types, 110-220 Volts, 60-cycle, Single phase. Standard Makes (G.E., Wagner, Leland, Westinghouse, etc.). Rush your order TODAY—large stock of motors—1 & 3 phase. 32-v. direct current bargains. Prices f.o.b. **ROBERTS ELECTRIC CO., 7232 Madison, Forest Park 9, Ill.**



### 12 VOLT BATTERIES

**EXIDE - NEW - DRY CHARGED**  
8 1/2" x 5 1/4" x 8 1/2" high. 26 3/4 lbs. filled. Suitable for 12 volt foreign cars, hot rods, boats, light aircraft, etc. In self-contained shielded metal case. Filling instructions included. **\$14.95 each**

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72 pages of Machine Tools (taps, drills, dies, reamers, etc.) Hydraulic cylinders Air tools. Send 25¢ for your copy today.



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These Navy Arctic jackets are fully lined with the finest quality sheepskin obtainable. Comes with storm tabs and fur collar. Two deep patch pockets, adjustable waist and heavy duty zippers. Sizes 36 thru 44 in excellent cond. Cost Gov't approx. \$80. **ONLY 27.50**

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Here's a suit that will make surf fishing a pleasure. Made of rubberized canvas, with vulcanized seams. It will keep you absolutely dry. Has built in rubber gloves and 1/2 length rubber boots. Air tight Buoyancy pockets inside keep you balanced in deep water. Has 100% waterproof liner. **6.95** Guaranteed condition.

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Genuine top grade leather. Multi-compartment. Lock and Straps. Ideal for Artists, Students, Salesmen, etc. Used, good condition. . . . **7.95**

**AIR CORPS BRIEF CASE**

This is a genuine piece of AAF equipment. Made of best grade Brown Leather in a handsome Pebble finish with a light canvas liner. Has two full length map or paper compartments and three smaller pockets. An ideal case for students, salesmen, artists, etc. Full heavy duty zipper closure. 12" x 16". Shpg. Wt. 3 lbs. **ONLY 2.95**

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3 metal post. Cylindrical locking heavy duty 3/16" fabricated hinged cover. End identification window. Ideal for price books, salesmen catalogues, photoalbums, students, publications, Reference books, etc. Will hold 500 sheets, 8" x 14". **59c ea**

**PLEXI DOME**

Overall length 21" - Width at widest point 11" - at base 4". 6" deep. For Fish & Flower Bows - Cab Roof - Lights. **1.89**

**GOOSENECK LAMP**

Consists of 24 volt control box with dimmer switch, 18" flexible extension & frosted glass shade. Can be used on 110 volt current. **2.49**

**NAVIGATORS LAMP**

A handy light for desk, work bench, chart table, engine room, etc. Can be used on 6-12-24-110 V by changing bulb. 3 ft. shaft has 4 joints to adjust position. . . . **ONLY 2.95**

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U.S. Navy Portable Pistol Grip light. Has sealed beam and aiming sight. Ideal for search, spot or Emergency light on auto, boat, farm etc. . . . **2.25**  
24 Volt, 5" lens & carry case . . . **3.29**  
Set of 3 filters, Red, Gen, Amber. (specify type lamp) . . . **99¢**



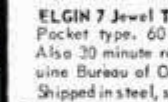
**16 mm MOVIE CAMERA** Has semi-telephoto 1-3/8" (35mm) lens with yellow filter - 3 shutter speeds: for normal (16 frames), semi-slow motion (32 frames), and for slow motion (64 frames) per second. Uses any standard Eastman film magazine - or Type "G" AAF magazine. Takes Black & White or Full Color pictures. Operates on 24V. (dry cell batteries) & requires slight conversion for hand use. Diagram furnished. Cost Gov't \$235.00. **24.50**



**CONVERTED GUN CAMERA** - Fully reconditioned with start switch on front. Grey Crackle Finish . . . . . **33.95**



**NEW WATCH** Here's a real Shock Absorbing watch. Has jewel movement, sweep second hand, luminous dial, chrome case. Guaranteed for one year. Ideal for young and old. . . . . **16.95**



**ELGIN 7 Jewel TIMER** Pocket type. 60 second dial divided into 5th's of second. Also 30 minute recorder dial, shatterproof crystal. This genuine Bureau of Ordnance watch has \$35.00 value. **15.95** Shipped in steel, shock-absorbing suspension case. Plus 102 P.D.T.W.



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**Genuine ARMY AIR FORCES**



**SUNGLASSES** HERE'S THE REAL McCoy! **ARMY AIR FORCE - 6 base.** Precision Polished & Ground. Glare-Free caliber lenses. Leather case to be attached to belts. Gold plated adjustable frame. Pearlaid sweat bar and pads. \$17.50 Palley value for **ONLY 13.95**

**NIGHT DRIVING GLASS**

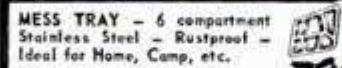
With 57mm yellow, amber, 6 base lenses. Optically precision ground and polished! Your doctor will recommend these. Not a cheap "Process" lens. Reduces headlight glare and sharpens "object focus" during night driving. **Men's size or Ladies Marlequin 14.29** **STYLE ND-1, \$16.00 VALUE** **SAME GLASSES but clip-on's. 13.95** Fit-over style without temple bars.



**Aviators (AN-6530)** Windproof & Distorted **GENUINE GOGGLES** Rubber or chamois covered frame. Clear or Green **GROUND LENSES** are inter-changeable. Adjustable nose bar. Ideal for flying, motor cycling, etc. . . . **11.69**



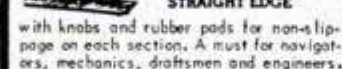
**GO-1 GOGGLE KIT** NEW! U.S. Navy - Has soft sponge rubber frame. 4 Polaroid lenses. 2 green, 1 red, 1 clear. Perfect for racing, cycling, etc. **89¢**



**MESS TRAY - 6 compartment** Stainless Steel - Rustproof - Ideal for Home, Camp, etc. Used but excellent condition . . . **79¢**



**ARMY PUP TENTS** 2 Man . . . Used . . . Perfect . . . **5.95**



**HUNTING KNIFE.** 6" Polished blade, leather sheath **1.69**



**BOLO KNIFE** 10" Parkerized blade, with case **1.19**



**15 MONKEY WRENCH** Adjustable Jaw - Opens to 4" Drop Forged. . . Auto Type. Cadmium Plated **89c** Black **79c**

**AAF FLEECE LINED JACKET**



Will keep you warm & comfortable in the roughest weather. Fur lined thru-out sleeves & body. 2 slash pockets & hvy duty zipper. Ideal for Farmers, Ranchers, Hunters and Mechanics. **9.95**

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Telephone type - Highly Sensitive with excellent, clear tone. This was the Signal Corps favorite. An ideal instrument for the radio "ham" and professional recording studio, broadcasting, home recording, public address, etc. A Sensational Buy! Complete with cord and plug. . . . **ONLY 2.29**

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Low Impedance. Ideal for amateur radio, crystal sets, or professional use. Adjustable ear phones. Used and in excellent condition. . . . **1.59**

**FIELD TELEPHONE**

A private phone or intercom system - Easy to operate. Reception up to 20 miles. Uses 2 standard flashlight batteries. Several phones can be used on same line. Set contains generator for ringing. leather carrying case & phone. **7.95**

**COMPLETE SYSTEM OF two generators PER & two phones. SET**

**Only 15.50**

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Match Box . . . . . **39¢**  
Jeweled Watch-Pocket . . . . . **1.29**  
Wrist Strap Type . . . . . **69¢**

**FLYING SUIT or Blue Bunny SUIT**

For hunting, winter sports, skiing or "bundling". As coveralls for cold outdoor, or farm work, 100% woven wool with extra flannel inner lining for double warmth & utility. Wiring so fine, flexible it does not interfere with movement. Can be used with or without heating or can be plugged into car, tractor, or truck battery. Sizes 36 thru 44. **\$3.49**



**EISENHOWER JACKET**

Trim, smart military cut jacket - for sports and outdoor wear. Warm and comfortable. Has two patch pockets - two inside pockets - adjustable side straps. Waist belt with buttons and snaps. . . . **ONLY 5.95 each**

**FLYING HELMET**

Fine grade leather - Chamois lined with chin cup on strap. Intermediate weight - Ideal for summer wear. **NEW ONLY 1.59**

**RUBBER BOOTS**

A Sturdy Boot of finest rubber. Completely Waterproof with adjustable strap. Warm with or without shoes. **3.95**

**FELT INNER-SOLE & SHOE PAD INSERT**

For Cold Weather (Sold only with boots.) Set complete. **1.50**

**NEW NAVIGATOR'S MAGNETIC COMPASS**

D-12 Type - Rotating verge range ring, calibrated in 1 degree increments from 9 to 360°. Two parallel grid wires for N-S line alignment. Fine for boats, etc. **14.95**

**JEEP CANS WATER or GAS**

Be sure of your reserve supply of GAS and WATER. Top condition. Gas type has screw top, takes standard flex nozzle. Water type - Porcelain lined - Gasket top. . . . **1.95**

**NEW PRESSURE TANKS**

Stainless Steel, Shatterproof & Rustless. Ideal for painting, cooking, spraying, ocean buoys, underwater fishing, or diving.

G-1-12 1/2 x 24 inches. 2100 Cu. In. capacity . . . . . USED	<b>4.25</b>
F-1-10 x 18 inches. 1000 Cu. In. capacity . . . . . USED	<b>4.19</b>
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D-2-6 1/2 x 24 inches. 500 Cu. In. capacity. Stainless Steel Construction . . . . . USED	<b>3.49</b>
D-2A-Corrosion resistant steel. Same as D-2 . . . . . USED	<b>2.49</b>
A-6-5 1/2 x 15 inches. 280 Cu. In. capacity . . . . . USED	<b>2.25</b>
A-4-5 x 8 inches. 104 Cu. In. capacity . . . . . USED	<b>1.35</b>

NOTE: All tanks listed are used are guaranteed serviceable and free from leaks or dents.

**TANK**

Dural with welded seams, 2" filler with cap, two standard pipe ports for hookup. Visible liquid level gauge on side. Ideal for Gas, Oil, Water, or "spare" on auto, tractor, truck or boat. Sturdy, light. Capacity 6 gal. . . . . **14.95**

**NEW TANK**

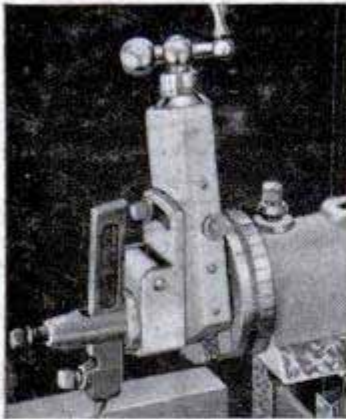
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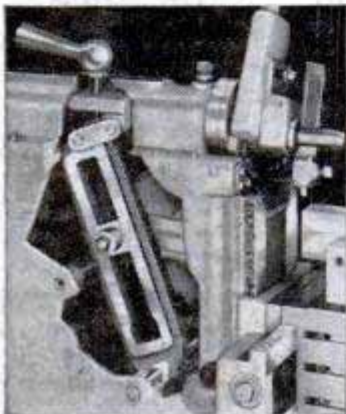
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**LARGEST FIRM OF ITS TYPE IN THE WORLD**

# SOUTH BEND 7" PRECISION SHAPER



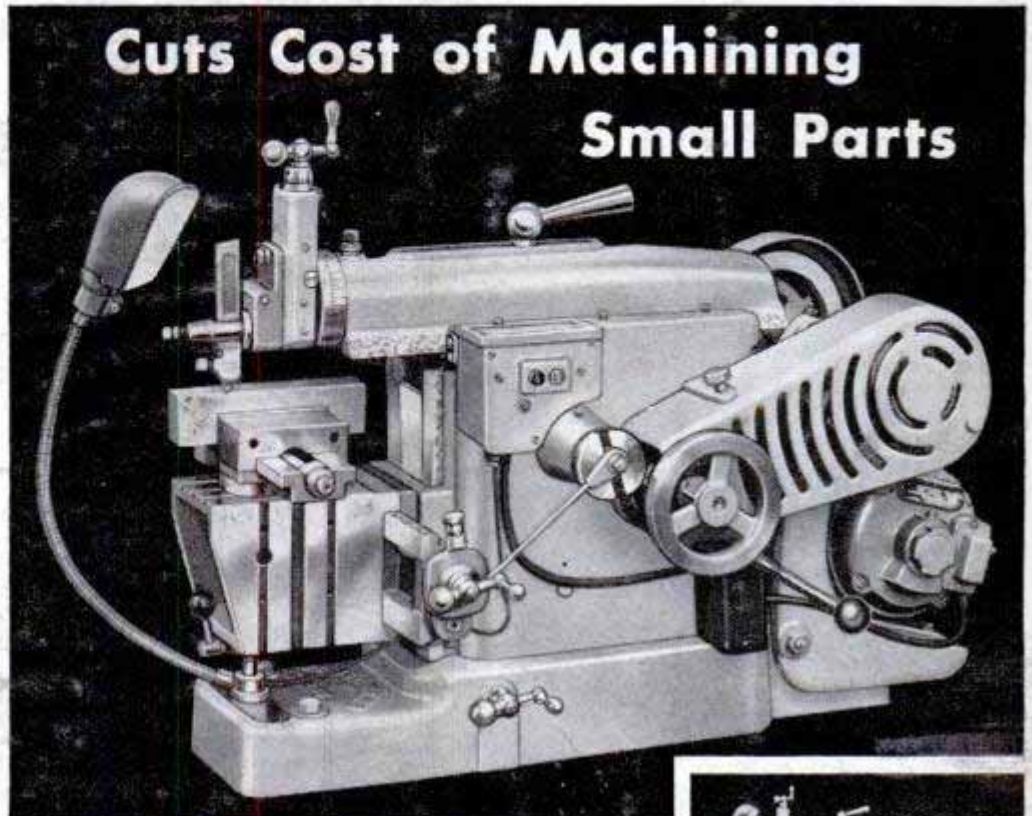
Tool head locks in any position. Rugged clapper box also adjustable.



Rocker and crank with graduated eccentric adjustment for stroke.



Guards on all belts and pulleys. Quick-acting belt tension release.



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### Saves Time...Saves Labor

It's fast—accurate—easy to operate. The South Bend 7" Precision Shaper can consistently give you low machining costs on small parts. Designed to handle a wide variety of work in this class, it will enable you to release larger shapers for heavier work, save on machine investment and economize on both power and upkeep. Find out how this versatile shaper can give you better production, toolroom or maintenance machining. *Send coupon for literature.*

#### SPECIFICATIONS

**RAM**—Stroke length—0 to 7". Strokes per minute (4)—42 to 195. Cutting speeds—3 to 114 feet per minute.

**TOOL HEAD**—Vertical feed—3". Swivels—360°. Tool Post opening—13/32" x 7/8".

**TABLE**—Horizontal travel—9-1/2". Vertical travel—5". Power cross-feeds (6)—.002" to .012". Ram clearance—1/2" to 5-1/2". Table size—5-3/8" x 5" x 6-5/16".

**WISE**—Jaw width—4". Jaw depth—1". Maximum opening—4". Swivel base.



Steel stand for shaper—3 drawers and built-in chip pan.

#### PRICES

7" Precision Bench Shaper . . . \$468  
(Price includes light fixture, vise, drive unit with belt guards, motor pulley, V-belt, switches. Steel stand and motor extra.)  
Steel Stand . . . . . \$137.50  
Motor—1/3 h.p., 115 v., 1 ph., 60 cy., A. C. . . . . \$36.05

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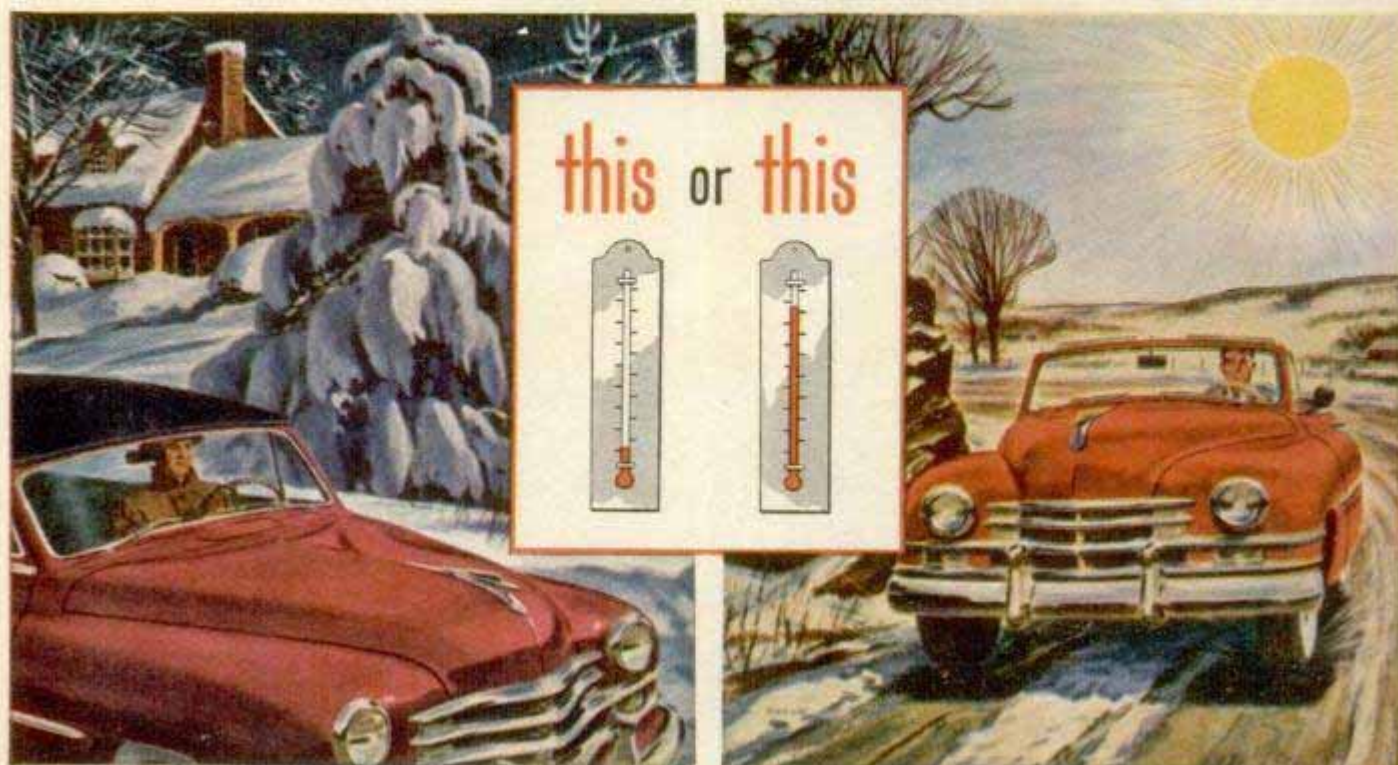
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