

ANC



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MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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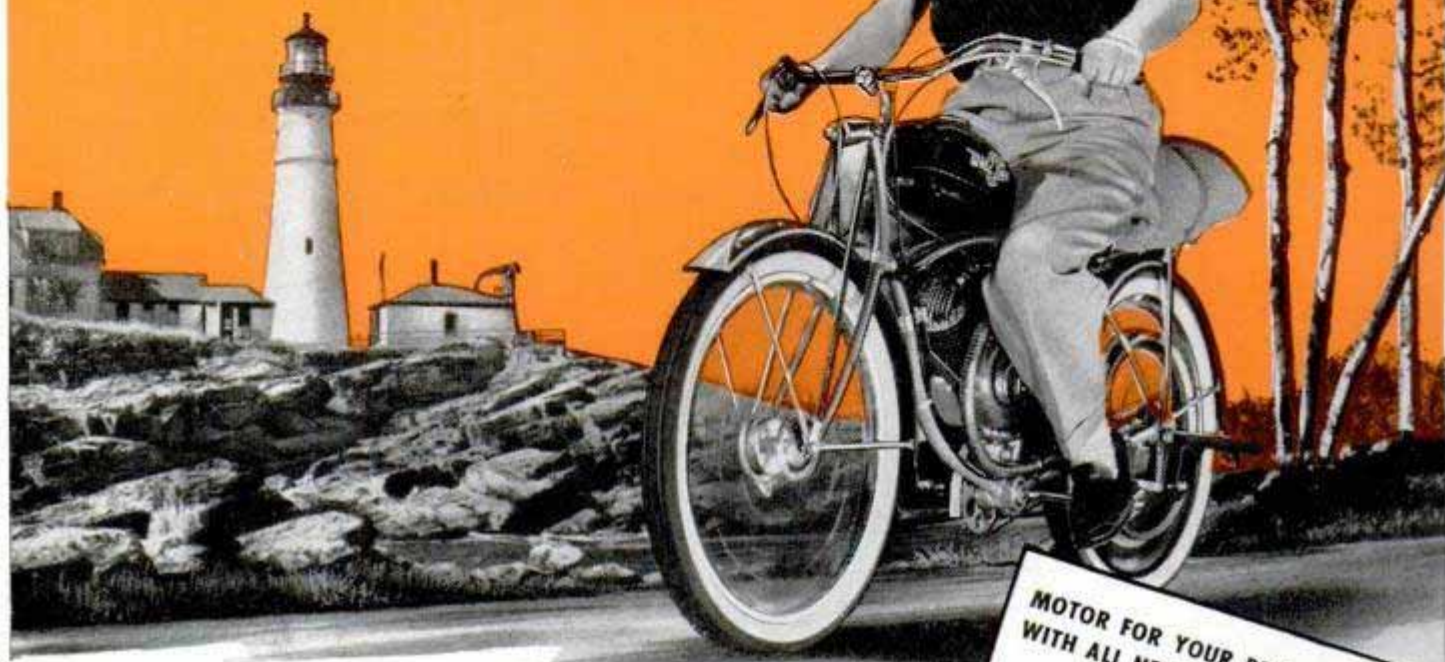
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"SPIDER" CARRIES A HUMAN FLY

7-122

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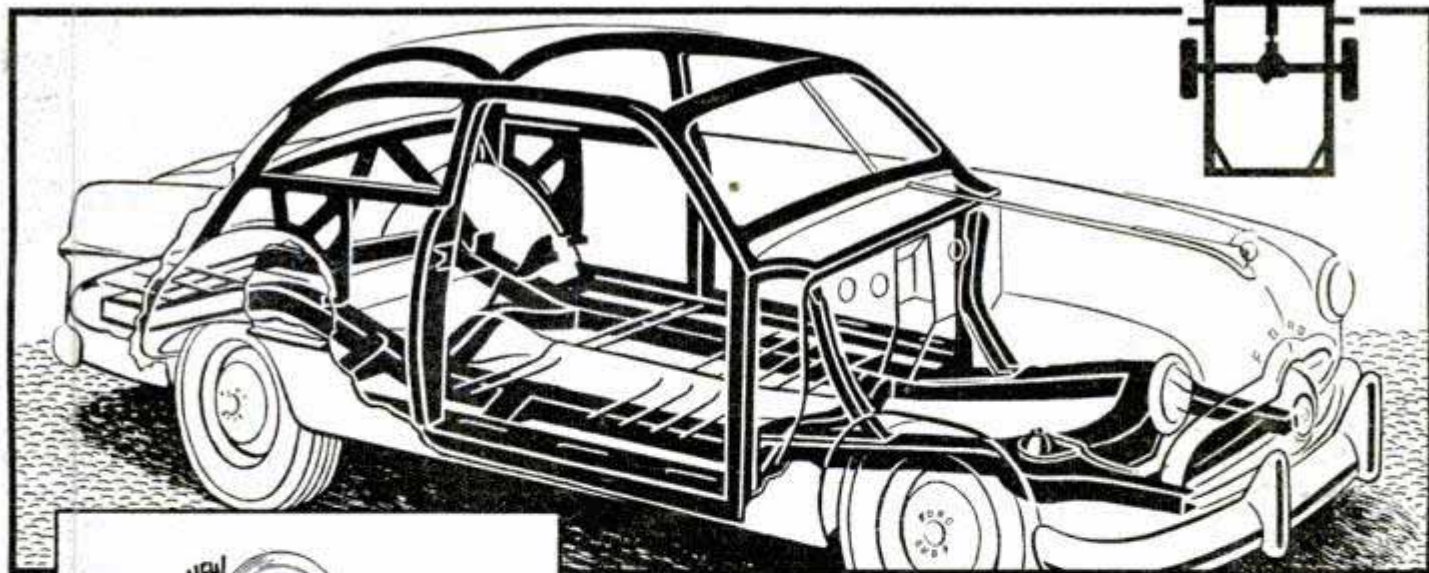
Solid Facts about the NEW FORD "FEEL"

There's a new "feel" in driving and only Ford has it!

One of the most important parts of this new Ford "Feel" is the sense of solidity and strength that comes from the new Ford frame and body. Side rails of the new frame are box-section, and there are five sturdy cross members for even greater strength. (Convertibles and Station Wagons have even heavier frames.) What's more, the famous "Lifeguard" Body is made of heavy-gauge steel and, combined with the frame, gives 59% more rigidity than ever!

No wonder drivers everywhere are so genuinely enthusiastic about the '49 Ford's remarkable feeling of solid safety and reassuring roadability.

For the new Ford "Feel" is really a brand new *kind* of driving—with new ease of control, new performance, new security, new fine car comfort. Try it, and then enjoy the greatest feeling of all—the prideful thrill of owning the "Fashion Car of the Year"...the '49 Ford!



There's a ^{NEW} Ford in your future

"DRIVE A FORD AND FEEL THE DIFFERENCE"



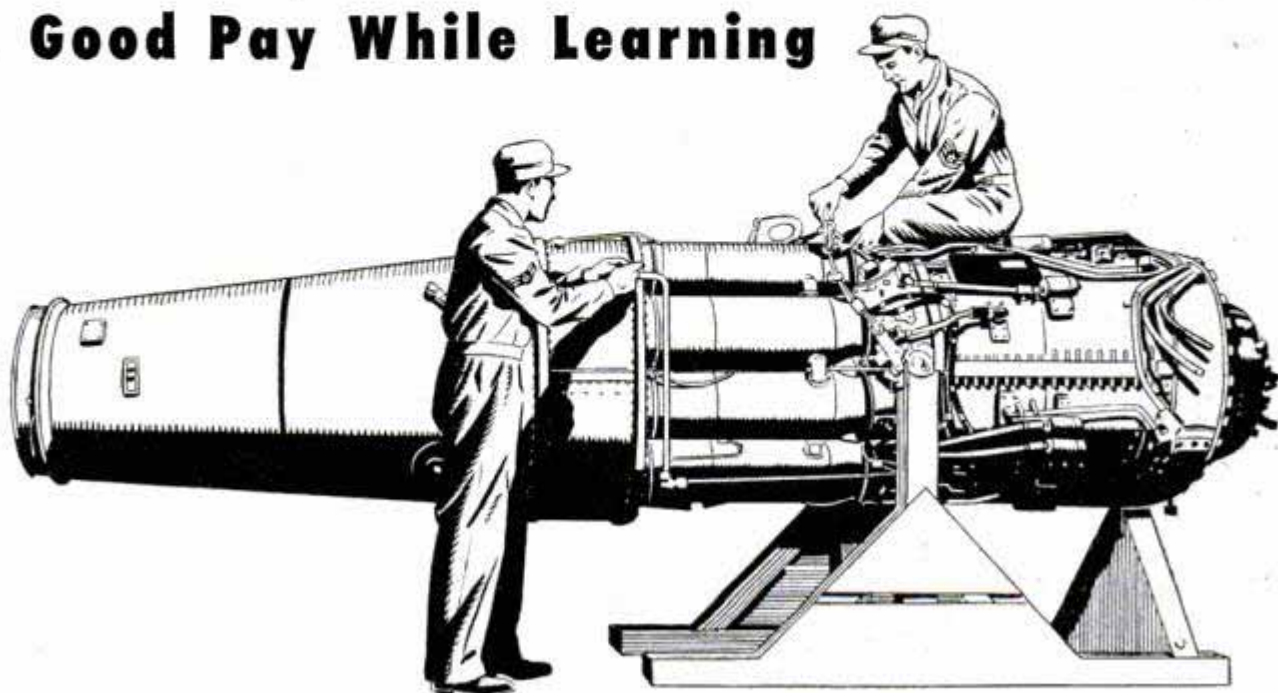
This One



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No Experience Needed . . .

Good Pay While Learning



If you are looking for a job with a *real* future, get into aviation . . . NOW. Today's *best* deal for the aviation beginner is in the United States Air Force. Look into the opportunities it offers and see for yourself.

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BEST OF TRAINING. Two kinds of training are open to men in the Air Force. You can learn on the job, under the world's most skilled experts. Or, if you qualify, you can go to the finest

Air Force technical schools while vacancies exist. It would cost hundreds of dollars to get such training elsewhere.

PROMOTIONS. Advancement in the Air Force is based on merit. Better jobs . . . non-commissioned ratings . . . go to the qualified men next in line. Right now skilled men are needed.

This is your *big* opportunity. Look into it *today*. You can get full details, without obligation, at your nearest Recruiting Station, Air Force Base, or by writing: Chief of Staff, U. S. Air Force, Att.: PMP-3A, Washington 25, D. C.

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U. S. ARMY and U. S. AIR FORCE RECRUITING SERVICE

Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

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



this month's cover

THAT HUMAN FLY dangling beneath the huge suspension bridge can crawl just about anywhere he wants to go. He can scale the top of the bridge, creep along beneath it or swing far below for a long look at the span's over-all condition. He can move any direction without any topside help. Secret of his mobility is that ingenious little stage he's standing on. Suppose the man wants to move sideways beneath the bridge. He presses a button and zooms up the cable. Reaching out a spare chain, he hooks it around one of the supports and detaches the hook that was supporting him. In this way he crawls anywhere beneath the bridge. For a close-up of this agile little platform, turn to page 122. And just opposite, you'll learn how engineers plan to span San Francisco Bay with a twin of the longest bridge in the world, and lay still a third "bridge" beneath the Bay's blue waters.

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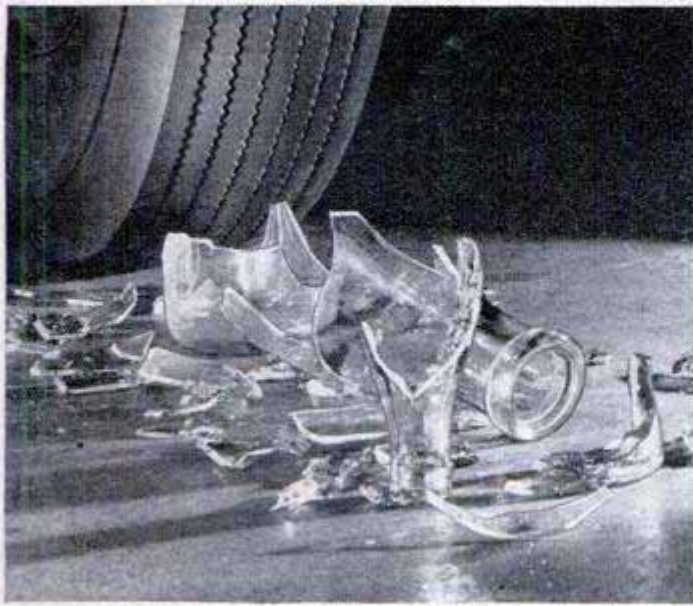
CRESCENT TOOLS



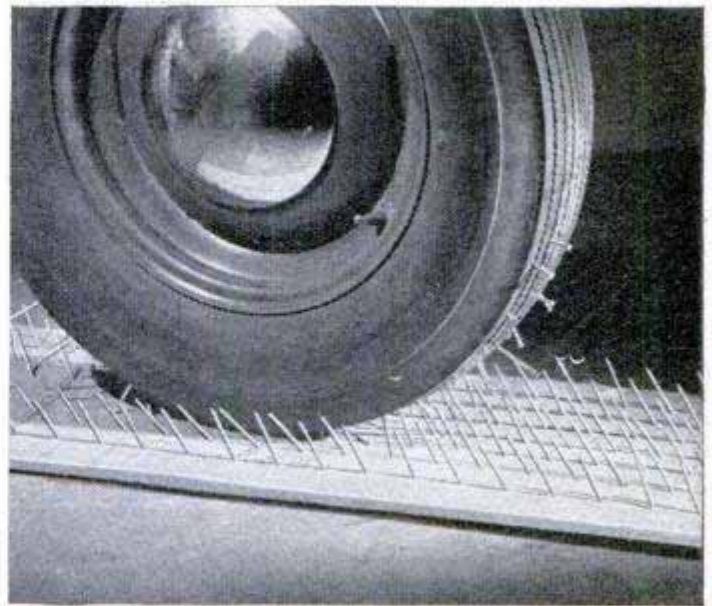
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"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by **CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK**

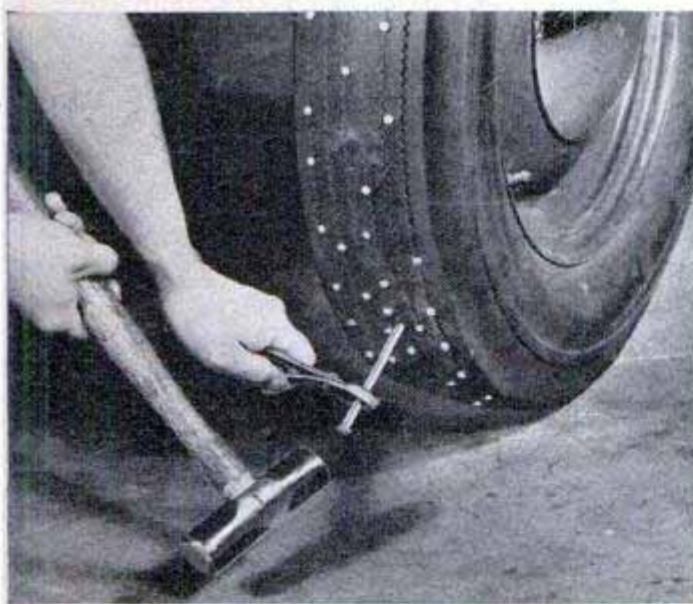
THE TUBE NO ONE CAN IMITATE!



1. EVEN JAGGED, razor-sharp glass won't make *this* tire go flat—it's equipped with a Seiberling Sealed-Air Tube, *the tube no one can imitate!* Because the Seiberling Sealed-Air Tube is *different from any other in the world,* it gives you puncture and blow-out protection you can get in no other way!



2. HERE YOU SEE the same tire being punctured *hundreds* of times, picking up more nails than you'll pick up in a lifetime of driving. And what happens? Nothing . . . each puncture is sealed *permanently* while you ride—no tire changing, no delays, no repair bills or ruined casings!



3. CHANCES ARE you'll never pound spikes into *your* tires. But Seiberling Sealed-Air Tubes can take even *this* extreme punishment because they're built around a revolutionary principle of tube design perfected and patented by Seiberling . . . built to give you *many years* of amazingly economical puncture and blow-out protection *in set after set of tires!*

HOW CAN THIS TUBE

- go 475,000 miles
- take 10,189 punctures
- ... **WITHOUT GOING FLAT?**

What is the secret behind the amazing performance of the Seiberling Sealed-Air Tube, *the tube no one can imitate?* How could one set of these tubes (as our files prove) go more than 475,000 miles, take thousands of punctures, outlast set after set of tires for over ten years—and not once go flat? What is the revolutionary principle of tube design, perfected and patented by Seiberling, that makes Sealed-Air Tubes not only the world's *safest* but also the most *economical* you can buy? The whole story, important to *everyone* who drives is told in a new book which we'll be glad to send you free. Mail the coupon below, now!

SEIBERLING

Sealed-Air TUBES

WITH PATENTED BULKHEADS

FREE: to everyone who drives a car or truck!

Today, before you have another dangerous flat tire or blow-out, send for the new book, "10,189 punctures . . . and not one flat!" Fill in and mail this coupon now! Address Seiberling Rubber Company, Dept. P-3, Akron 9, Ohio.

Name _____

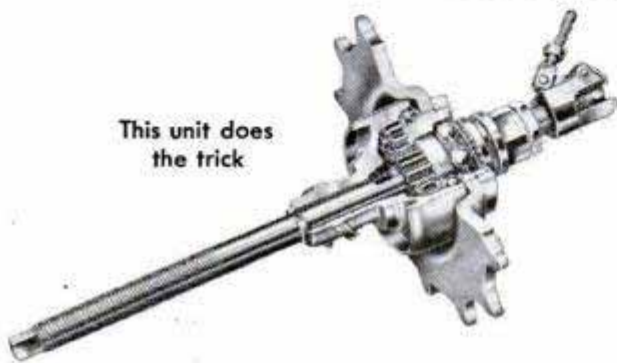
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New Departure COASTER BRAKES



1863

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in this corner.....

THE EDITORS



ASSOCIATE EDITOR Aubrey Cookman had no idea he was about to become a "Fogundsmogger" when we dispatched him to Germany last winter to fly the air lift into Berlin and tell its story. But he is one, and here's how, as 1st Lt. Hal L. Eustace of the 1807th AACS Wing informed him in a letter from Germany:

"Sir:

"The purpose of this epistle is to tell you flat to your secretary's face that you are a Fogundsmogger. Wait, don't swing yet—hear the rest of the story.

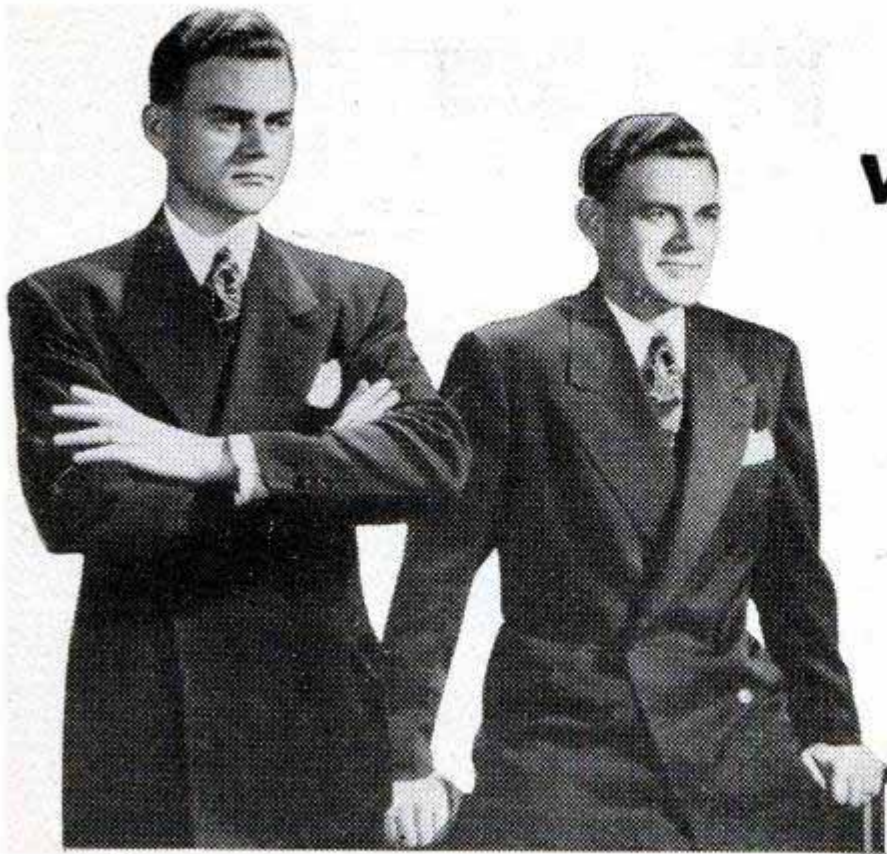
"Enclosed herewith is your ticket as an honorary member of a creme-de-la-creme flying clan, the Vittles Fog & Smog Club. These token mementos are being awarded to Vittles pilots who are forced to make radar blind landings in sub-minimum weather, after runs through the Rheinisch sky puree.



"Several hundred pilots have been awarded Fogundsmogger cards so far, and some of the boys have as many as four sub-minimum Ground - Controlled - Approach runs to their credit. GCA is getting a saturation test over here, and more than 25,000 GCA runs have been logged so far in Vittles. American units are snaking the air-lift planes in out of the fog at Celle, Fassberg, Tegel (Berlin), Tempelhof (Berlin), Rhein/Main and Wiesbaden. RAF units do the same at Gatow (Berlin) and Wunstorf.

"Those GIs who are handling the GCAs are something extra-special. Most of them are former officer-pilots with a lot of flying time behind them. Often the GI on the ground in GCA has more flying time than the officer-pilot he is talking down.

(Continued to page 8)



If YOU were Boss would YOU promote "YOU"?

Business is always willing to pay the man who knows—and pay him well. The man who is ready and will-

ing to take responsibilities—and capable of directing the efforts of other men is a valuable asset to any business organization. He never wants for a good job and above average earnings. He gets ahead.

We have helped thousands of men achieve promotion and more money—success sometimes beyond their dreams—a success that was started by a coupon similar to the one below.

Get out of that rut—don't be satisfied with a mediocre job at small pay—be a success in business—this coupon may be your first step.

Mail the coupon and we'll include "Ten Years' Promotion in One"—a book which has helped many men. Do it today—tomorrow never comes for the man who consistently puts things off.

Be honest now—

suppose that a better job had opened up in your company—carrying with it promotion and more money—could you qualify?

If you were boss, would you select "YOU" for that better job?

Consider before you answer.

First of all, could you *fill* the job? Has your experience fitted you for the step forward—have you been preparing for promotion apart from experience gained on the job?

Or have you just been filling a niche, doing daily tasks well but making no real and intelligent effort to learn and qualify for the job ahead so that if an opening should occur you would be ready to fill it?

The man who gets real promotion is the one who makes his own breaks—the man who slaves in the ordinary job at low pay just wishes and dreams of promotion and more money. Which are you?

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| <input type="checkbox"/> Bookkeeping | <input type="checkbox"/> Industrial Management |
| <input type="checkbox"/> Law: LL.B. Degree | <input type="checkbox"/> Stenotypy |
| <input type="checkbox"/> Business Management | <input type="checkbox"/> (Machine Shorthand) |
| <input type="checkbox"/> Salesmanship | |

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

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A Correspondence Institution
Dept. 664-R Chicago 5, Illinois

From Old Timers to new 49'ers **PYROIL** makes **YOUR** car run finer

because:

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Whether you're driving an old-timer or a new 49'er—ADD PYROIL—add miles to your car.

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

Name _____

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City or Town _____ State _____



"After the war, ex-officers were given the opportunity of enlisting in the grade of Master Sergeant. Quite a few pilots accepted the offer. Where could their flying ability best be used on the ground? GCA, of course. They are members of Airways & Air Communications Service, which is to the Air Force approximately what CAA is to civil aviation in the States. I thought you might like a Fogundsmogger as a souvenir of the second great air lift.

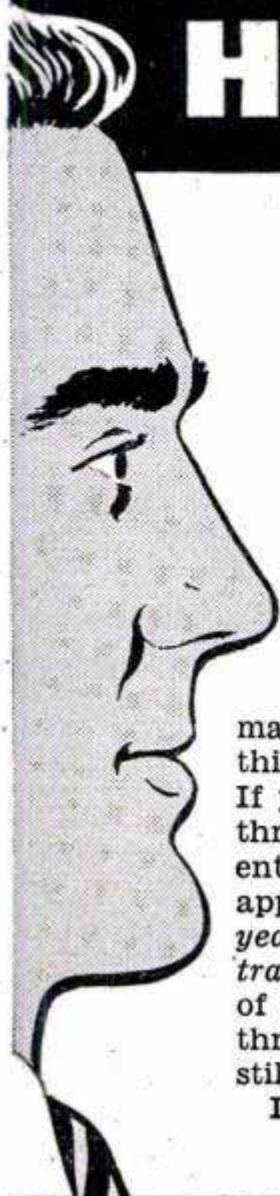
"Regards,
"Hal Eustace,
"1st Lt. USAF."

* * *



ONE OF the newest innovations in home heating is General Electric's wall-duct system, described on page 159. We are glad to note that one of the first installations is in good hands. Mr. and Mrs. Emil Piel of Caldwell, N. J., General Electric tells us, are building it into their new home . . . and among GE's packet of pictures we find the young couple studying *Popular Mechanics'* very popular book, "Your Home and How to Build It Yourself." Mr. Piel, a veteran of action over the Pacific as fighter pilot with the U. S. Marine Corps, is now a teacher of physics at Caldwell High School.

How do you rate?



LENGTH OF SERVICE IN WORLD WAR II

- 3 MONTHS
- 6 MONTHS
- 9 MONTHS
- 12 MONTHS
- 15 MONTHS
- 18 MONTHS
- 21 MONTHS
- (or more)

EDUCATION BENEFITS UNDER THE G.I. BILL

- 12 MONTHS
- 15 MONTHS
- 18 MONTHS
- 21 MONTHS
- 24 MONTHS
- 27 MONTHS
- 30 MONTHS (plus
one month for each
additional month of
service)

I. C. S. TRAINING TO WHICH YOU'RE ENTITLED

- 48 MONTHS
- 60 MONTHS
- 72 MONTHS
- 84 MONTHS
- 96 MONTHS
- 108 MONTHS
(Training benefits
expire at the end
of nine years)

YOUR veteran training benefits may be worth more to you than you think. Figure it out for yourself. If you are a qualified veteran with three months of service, you are entitled to a year's education in an approved resident school—or *four years of approved correspondence training*. If you have used up most of your entitlement and have only three months remaining, you can still study with I.C.S. for a *full year*. I. C. S. Courses do not interfere

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IMPORTANT: You must enroll within four years after your discharge or before July 25, 1951—whichever is later. The time for action is *now!* Mark and mail the coupon TODAY!

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Iron & Steel <input type="checkbox"/> Petroleum Refining <input type="checkbox"/> Pulp and Paper Making <input type="checkbox"/> Plastics <p>Civil Engineering, Architectural and Mining Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Architecture <input type="checkbox"/> Architectural Drafting <input type="checkbox"/> Bridge and Building Foreman <input type="checkbox"/> Building Estimating <input type="checkbox"/> Civil Engineering <input type="checkbox"/> Coal Mining <input type="checkbox"/> Contracting and Building <input type="checkbox"/> Highway Engineering <input type="checkbox"/> Lumber Dealer <input type="checkbox"/> Reading Structural Blueprints <input type="checkbox"/> Sanitary Engineering <input type="checkbox"/> Structural Drafting | <p><input type="checkbox"/> Structural Engineering</p> <p><input type="checkbox"/> Surveying and Mapping</p> <p>Communications Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electronics <input type="checkbox"/> Practical Telephony <input type="checkbox"/> Radio, General <input type="checkbox"/> Radio Operating <input type="checkbox"/> Radio Servicing <input type="checkbox"/> Telegraph Engineering <p>Electrical Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electrical Drafting <input type="checkbox"/> Electrical Engineering <input type="checkbox"/> Electric Light and Power <input type="checkbox"/> Lighting Technician <input type="checkbox"/> Practical Electrician <p>Internal Combustion Engines Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Auto Technician <input type="checkbox"/> Diesel-Electric <input type="checkbox"/> Diesel Engines <input type="checkbox"/> Gas Engines <p>Mechanical Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Aeronautical Engineer's, Jr. <input type="checkbox"/> Aircraft Drafting <input type="checkbox"/> Forging <input type="checkbox"/> Heat Treatment of Metals <input type="checkbox"/> Industrial Engineering <input type="checkbox"/> Flight Engineer <input type="checkbox"/> Foundry Work | <p><input type="checkbox"/> Industrial Metallurgy</p> <p><input type="checkbox"/> Machine Shop</p> <p><input type="checkbox"/> Mechanical Drafting</p> <p><input type="checkbox"/> Mechanical Engineering</p> <p><input type="checkbox"/> Mold-Loft Work</p> <p><input type="checkbox"/> Patternmaking—Wood, Metal</p> <p><input type="checkbox"/> Reading Shop Blueprints</p> <p><input type="checkbox"/> Sheet-Metal Drafting</p> <p><input type="checkbox"/> Sheet-Metal Worker</p> <p><input type="checkbox"/> Ship Drafting</p> <p><input type="checkbox"/> Tool Designing</p> <p><input type="checkbox"/> Welding Engineering</p> <p><input type="checkbox"/> Welding—Gas and Electric</p> <p>Railroad Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Air Brake <input type="checkbox"/> Diesel Locomotive <input type="checkbox"/> Locomotive Engineer <input type="checkbox"/> Locomotive Fireman <input type="checkbox"/> Locomotive Machinist <input type="checkbox"/> Railroad Section Foreman <input type="checkbox"/> Car Inspector <p>Steam Engineering Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boilermaking <input type="checkbox"/> Combustion Engineering <input type="checkbox"/> Engine Running <input type="checkbox"/> Marine Engineering <input type="checkbox"/> Steam Electric | <p>Textile Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Cotton Manufacturing <input type="checkbox"/> Loom Fixing <input type="checkbox"/> Textile Designing <input type="checkbox"/> Woolen Manufacturing <input type="checkbox"/> Rayon Weaving <p>Business and Academic Courses</p> <ul style="list-style-type: none"> <input type="checkbox"/> Accounting <input type="checkbox"/> Bookkeeping <input type="checkbox"/> Business Administration <input type="checkbox"/> Business Correspondence <input type="checkbox"/> Certified Public Accounting <input type="checkbox"/> Commercial <input type="checkbox"/> Cost Accounting <input type="checkbox"/> Federal Tax <input type="checkbox"/> Foremanship <input type="checkbox"/> Good English <input type="checkbox"/> Higher Mathematics <input type="checkbox"/> Motor Traffic <input type="checkbox"/> Retailing <input type="checkbox"/> Retail Store Management <input type="checkbox"/> Salesmanship <input type="checkbox"/> Sign Lettering <input type="checkbox"/> Spanish <input type="checkbox"/> Advertising <input type="checkbox"/> Commercial Art <input type="checkbox"/> French <input type="checkbox"/> High School <input type="checkbox"/> Postal Civil Service <input type="checkbox"/> Secretarial <input type="checkbox"/> Stenography <input type="checkbox"/> Traffic Management |
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Name _____ Age _____ Home Address _____

City _____ State _____ Working Hours _____ A.M. to _____ P.M.

Present Position _____ Employed by _____

Length of Service in World War II _____ Enrollment under G.I. Bill and P.L. 16 approved for World War II Veterans. Special tuition rates to members of the Armed Forces. Canadian residents send coupon to International Correspondence Schools Canadian, Ltd., Montreal, Canada.

WHERE-TO-BUY-IT INDEX

Source of supply appears after items commercially available

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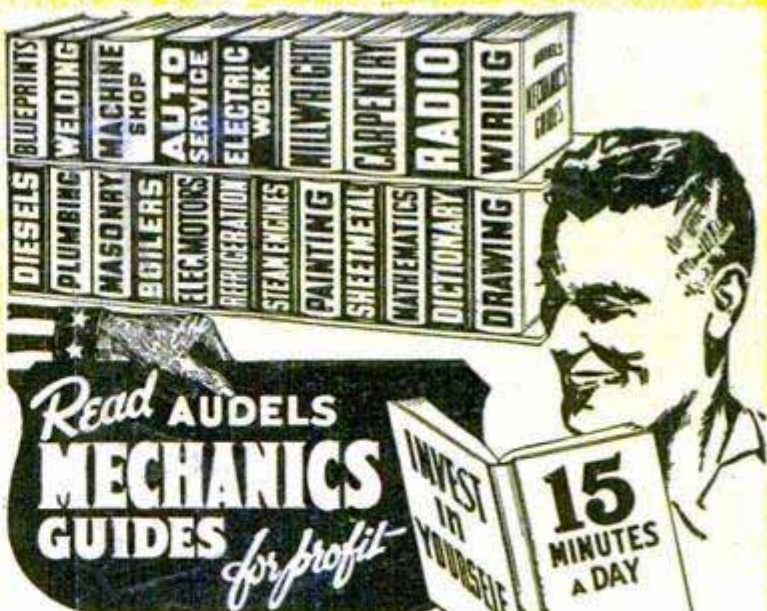
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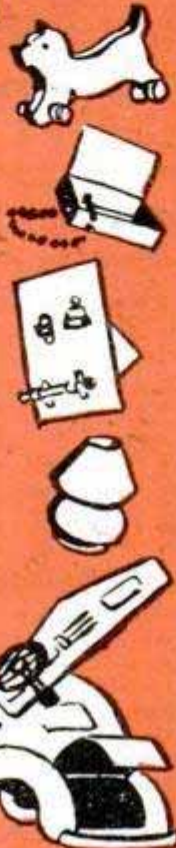
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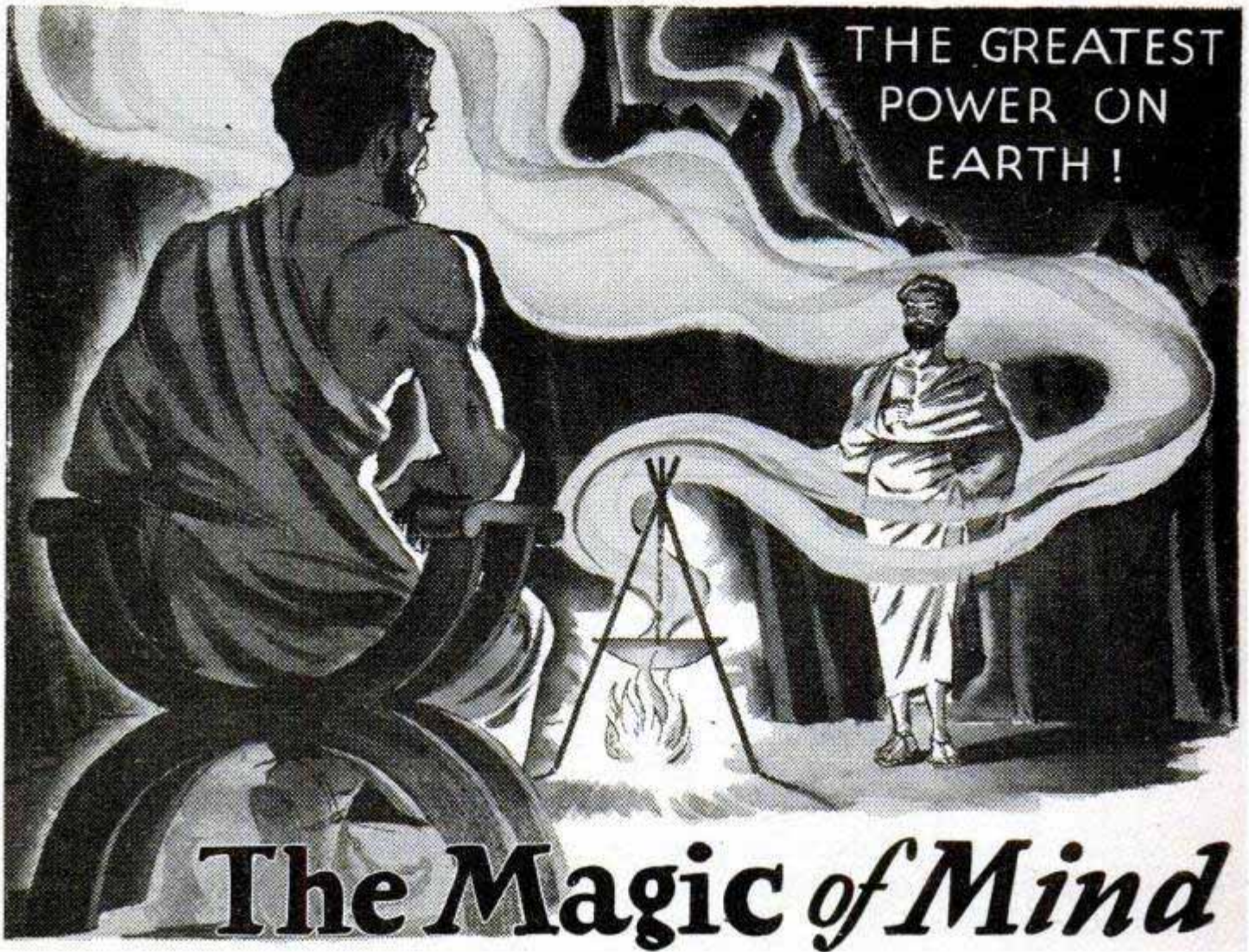
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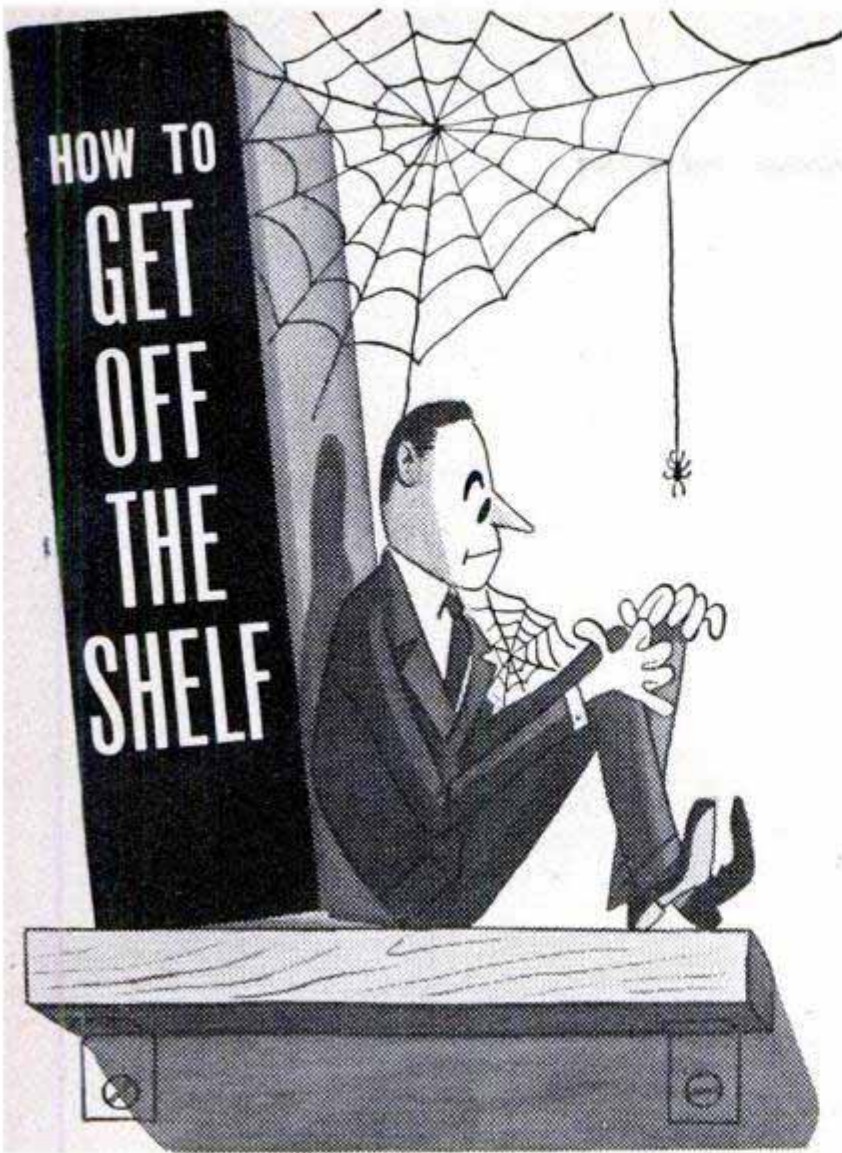
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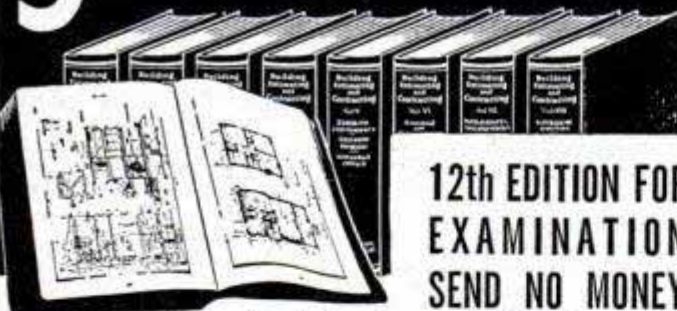
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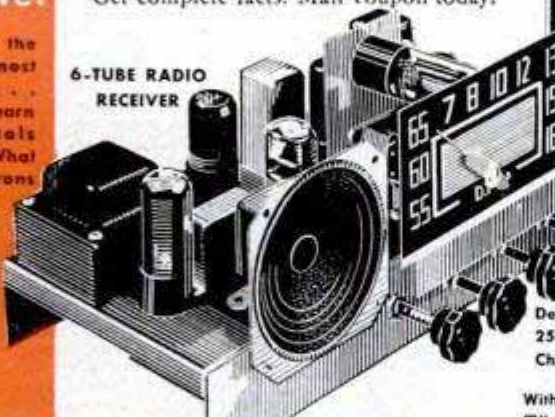
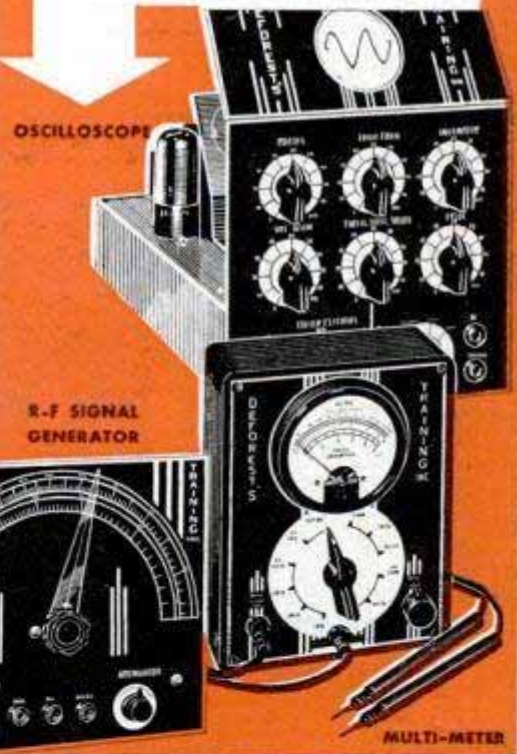


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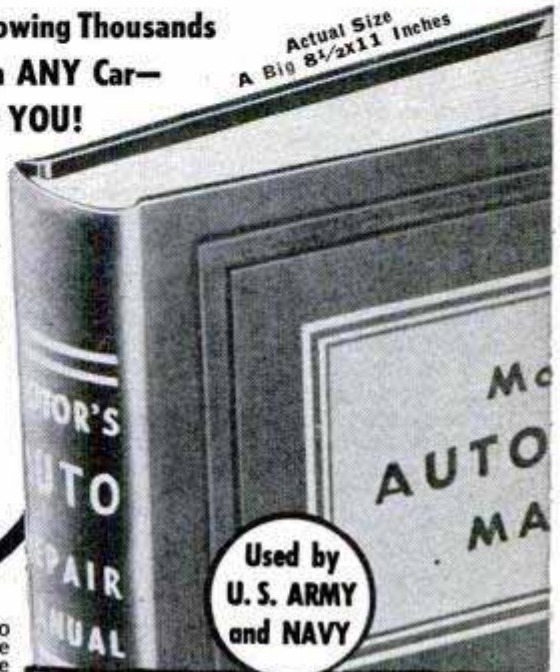
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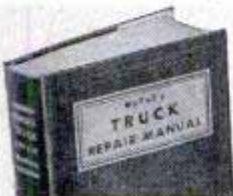
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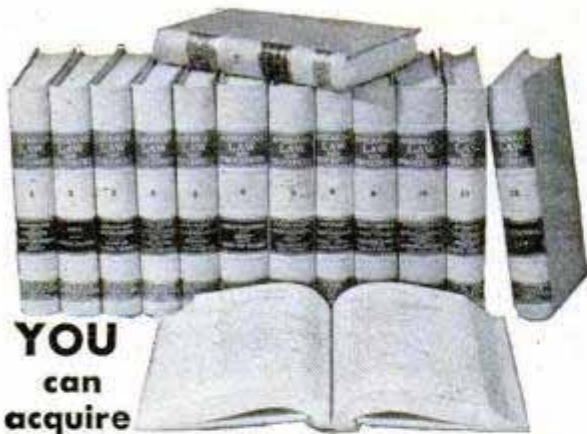
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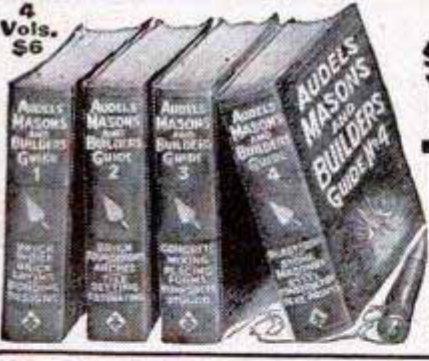
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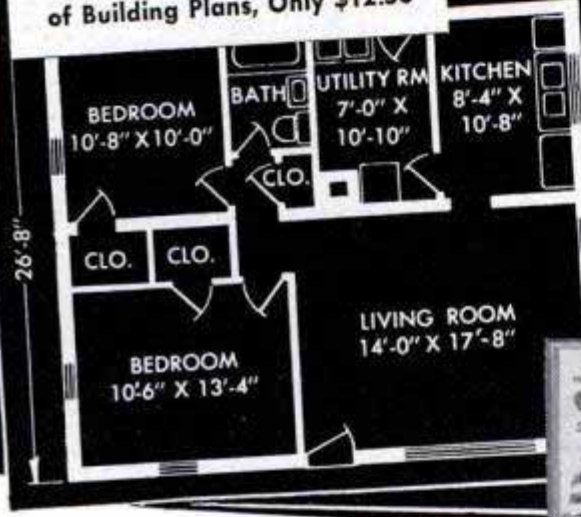
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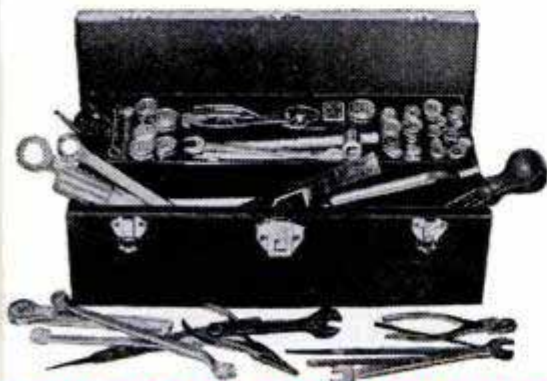
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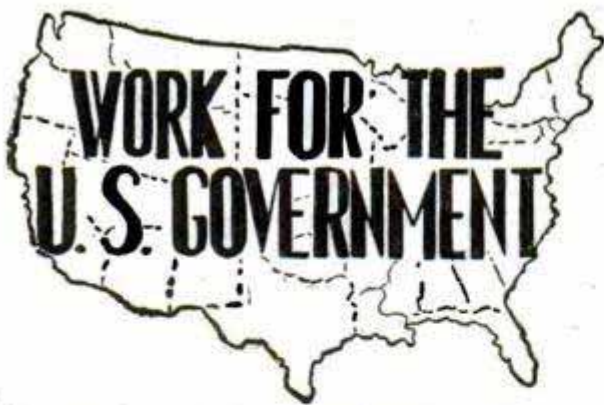
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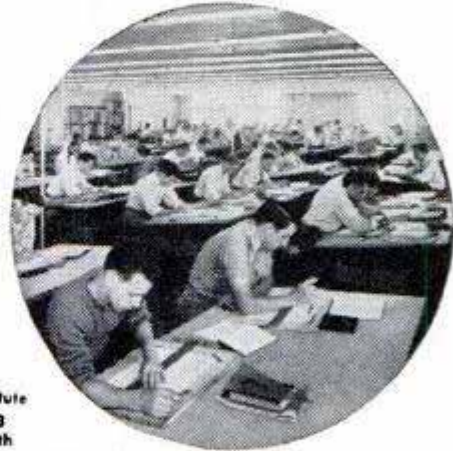
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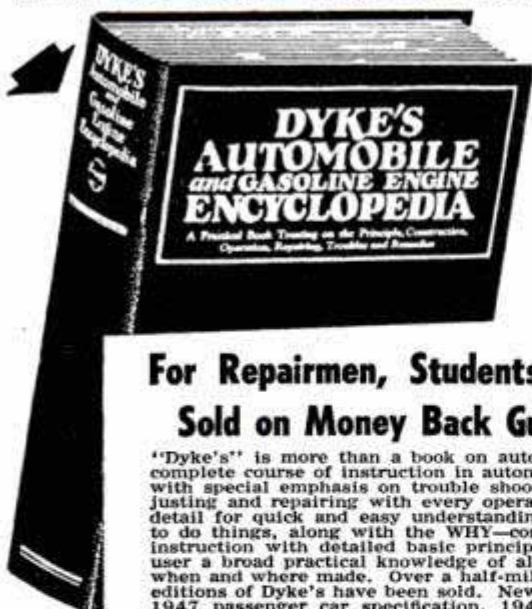
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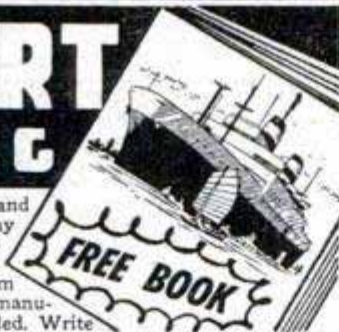
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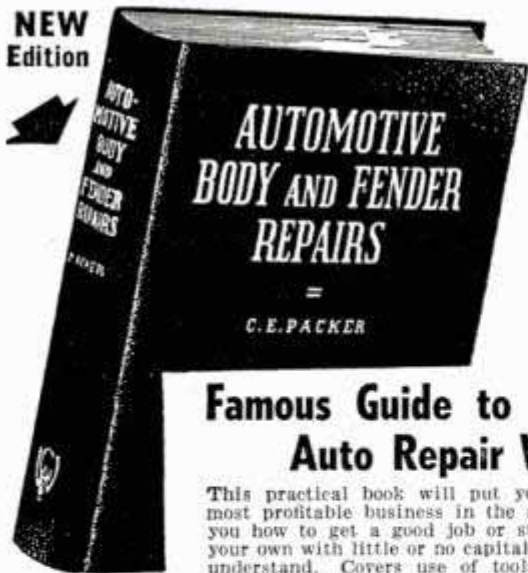


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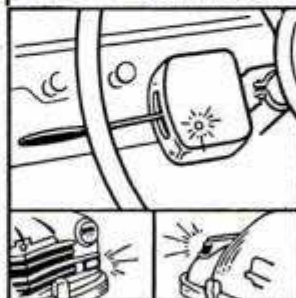
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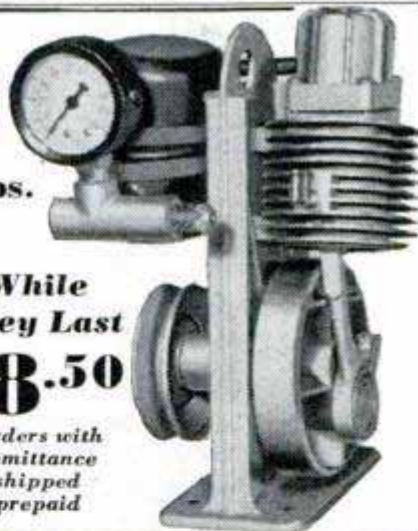
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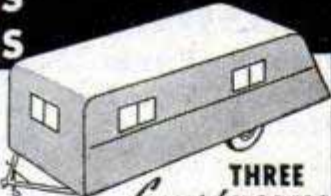
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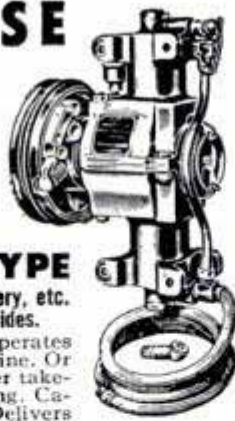
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SOUND, Silent 35mm. features, and shorts. Also 16mm. sound films. Simpson, 155 High, Dayton, Ohio.

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11,146 FORMULAS. Postal brings literature. Formulab, 1707 Maryfield, Ann Arbor, Michigan.

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HOT Tamale. Making for profit. Particulars. Box 384, Altus, Okla.

FORMULAS For nearly everything. Catalog free. Write Creative, Winnetka, Ill.

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BOYS Wanted. Over \$2.00 hour! Sell name plates for front doors. Free sample. Write Dept. 49, National Engravers, 214 Summer, Boston, Mass.

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PLASTIC Tablecloth covers, curtains, drapes, baby pants, bowl covers and other plastic articles selling like wildfire! Make big money now! Free details. Write L & M Co., Dept. 58-F, 510 St. Charles, St. Louis, Mo.

WANT Extra cash? Sell friends unusual gift wrappings, birthday, illness, everyday cards. Profits to 100%. Bonus. Write for free samples. Birchard, 27A Lester, Springfield, Mass.

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FREE Nylons given if Kendex hosiery runs or snags! World's only women's hosiery sold with written guarantee amazing everybody. Mere words could not express unbelievable money-making opportunity. Fantastic earnings become reality. Armstrong earned \$202 in 9 days. Watkins sent 92 orders in one day. Imagine replacing hosiery free regardless of cause—whether use or abuse! Truly sales dynamite for terrific profits. Even if you never sold before, three magic words: "Guaranteed Against Everything" will open doors for you—make women listen and pour money in your pocket. Complete line from sheerest to service (15-20-30-40-60 denier) all lengths 28 to 35 inches—latest colors—seamed full fashioned and seamless. No competition because Kendex guaranteed nylons not sold in stores. Also complete line men's hosiery actually guaranteed for one full year! Nothing like this anywhere. Includes rayon, nylon, lisle, wool, cotton, mixtures, etc. All styles, patterns, colors, prices to please everybody. Thousands shipped daily, 100,000 pairs constantly in stock for fast delivery. Over 30 years in business. You need no money or experience. Nothing to pay now or later. Show free outfits. Write orders. We deliver and collect. Big advance cash plus huge bonus. Earn money spare or full time—exclusively or side line. No restrictions. Become manager—appoint others to sell for you—earn steady income on their sales. Complete money-making outfits including salesbooks in color, samples of hosiery materials, etc. furnished free and prepaid. Simply mail name and address to: Kendex Company, Babylon 63, N. Y.

EVERYDAY Cards. Earn \$5.00 with every ten \$1.00 boxes of everyday cards you sell. Also new Plastic cards, personalized stationery, note paper and wrappings. Send for samples today. Howard P. Ellis, Dept. PM-6, Pitman, N. J.

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LEARN Mailorder free. Technicalities, tips. Diehl's, 168 Clinton, Buffalo 4, New York.

BUY Thousands of nationally advertised products direct from manufacturers. Write for "Buy Direct and Save." Consumers Assn., 218-F Investment Bldg., Pittsburgh 22, Penna.

DISTRICT Agents. Power mower, \$79.50. Sell users and dealers. Sales kit, free. Smith Agency, S-1006, Excelsior Springs, Mo.

BIG Money fast. Electric shavers, four headed, \$22.50. Label cost \$3.00. Particulars free. National Distributing, Calumet Building, Miami, Florida.

MUSIC Greeting cards. All occasions. Dorby Music Cards, P.O. Box 738, Morris-town, New Jersey.

1/2 MILLION Articles wholesale. Directory 25c. Printers, Box 1302-P6, Detroit 31.

NEW Notion millions need. Sensational profits. Tyform, 5829 Napoleon, Chicago.

SIGNS, No trespassing, etc., 25 different, 100-\$2.50. Retail \$10.00. Details, write, Feld Printing, Cincinnati 26, Ohio.

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RUST Eradicator. 125% profit producer. Liberal offer. Rex, Scarsdale, New York.

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BIG Profits. Retractable ball point pen. \$3.60 per dozen. Metal Products Mfg., 2067 Broadway, New York, N. Y.

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MAKE Money. You can sell. We'll teach you how and tell you where to get a job. Be independent for life. Send just \$1.00 to The Detroit Sales Plan, P.O. Box 2234, Detroit, Michigan.

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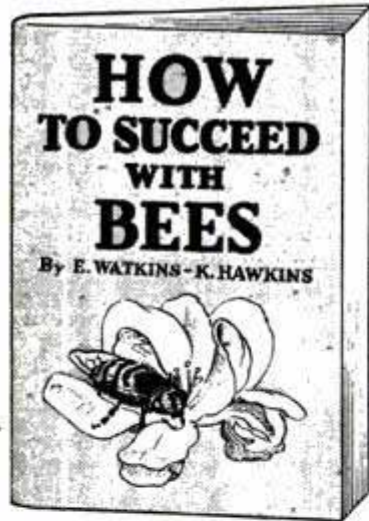
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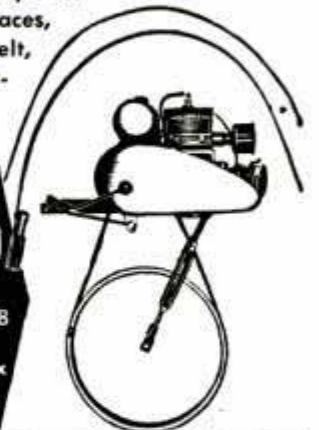
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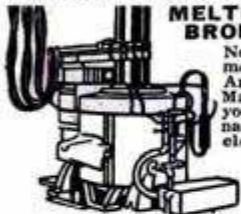
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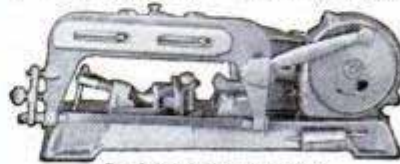


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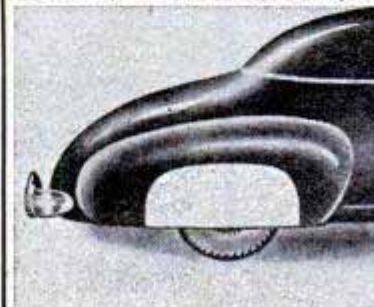
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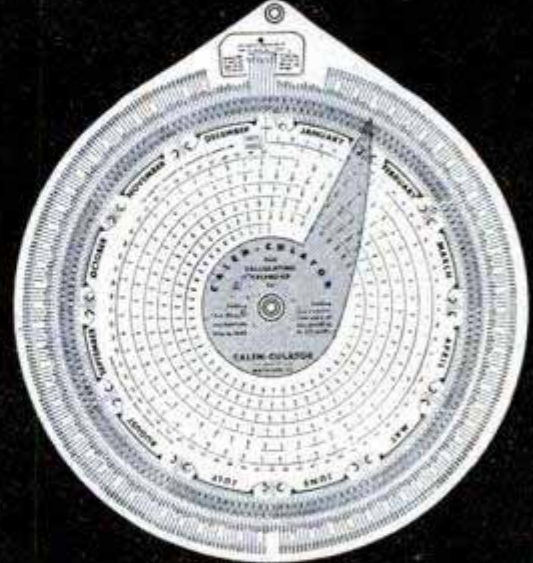
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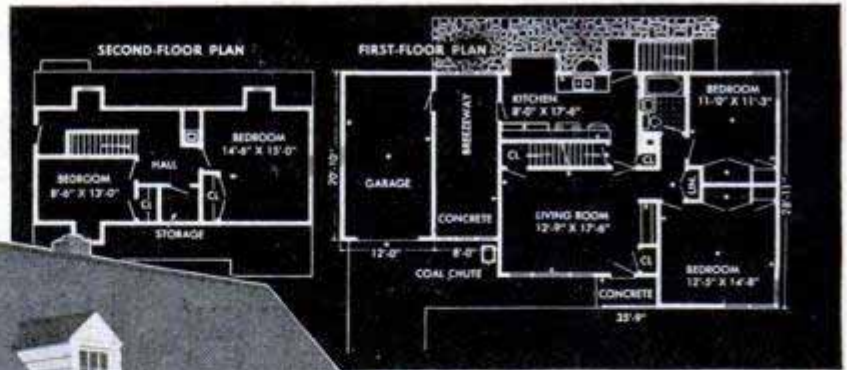
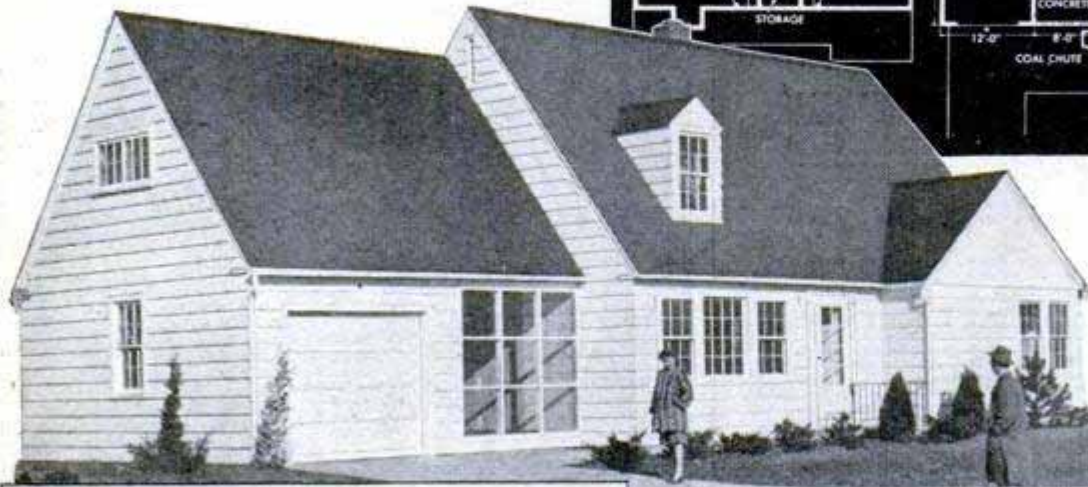
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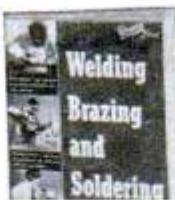
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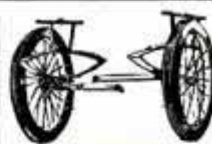
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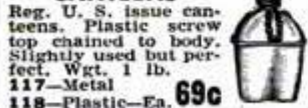
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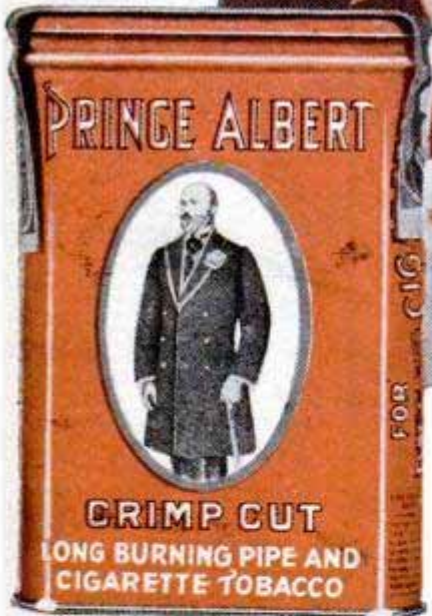
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POPULAR MECHANICS

JUNE 1949

WRITTEN SO YOU CAN UNDERSTAND IT
 VOL. 91 NO. 6

Voice of the Prowl Car

THE GREEN SEDAN with the freshly crumpled fender swung hurriedly out of a side street and joined the flow of traffic on Adams Boulevard. Just a little suspicious, the two officers in the cruising patrol car kept their eyes on it while one of them picked up the radio mike.

"This is car 36," he reported, "Give me a rolling make on California 6X9914. And check it for hit and run. New green two-door sedan."

"Thirty-six stand by," replied the loudspeaker on the instrument panel and then,

a block later, came the report: "A new green two-door was used in a market robbery at Western and La Plaine 15 minutes ago. Hit a parked car in getting away."

That was enough. The police car moved up alongside the other and herded it toward the curb.

The "rolling make" is a fast-action information service developed by the communications division of the Los Angeles police department. Officers can ask by radio for any available information concerning a car or individual of whom they are suspicious.

Police in radio patrol car call communications center for "rolling make" on suspicious-looking automobile





A radio operator at headquarters checks the latest crime reports and transmits any pertinent information back to the officers, often within 30 seconds of the time the call comes in. Within a minute he can also supply the name and address of the registered owner of any California car.

By means of the rolling make, officers questioning a suspect on the street can obtain an almost immediate report of the suspect's past police record, if any. Recently, when officers found a man prowling in an alley behind a warehouse, they questioned him and checked his name against papers he carried in his pocket, then asked headquarters for any information available. The report came back within a minute: "We have a warrant for his arrest. He's wanted for questioning about some fur thefts three weeks ago. Bring him in."

Recently, too, a pair of officers investigating a minor traffic accident on Sepulveda Boulevard found that the name of one driver didn't match with the name of the registered owner of the car he was driving, with Col-



Top, operator at KGPL takes down radiogram coming to Los Angeles from East on transcontinental police relay system. Below, only two bolts have to be loosened to replace transmitter in car trunk



In addition to radio transmitter in trunk, Los Angeles prowler cars have tape measures, flash cameras and other equipment used to take and record evidence, particularly if it pertains to traffic accidents



Incoming calls for police assistance are received at complaint telephone board. Messages are then put on endless belt and carried to dispatcher in microphone room next door, the "radio central" of the system

orado plates. The driver explained that he was using his uncle's car on a trip, with permission. Probably he was, the officers agreed, but then again the car might have been stolen. It would take only 10 minutes to find out.

They phoned a description of the car to the communications center in the city hall, where in turn a radiogram was sent to Denver. A few minutes later the officers were being informed that Colorado had no report that the car had been stolen and that the driver need not be detained.

Los Angeles has the largest and most complex communications system of any law-enforcement agency in the country. The police need it, for they have their hands full these days. Geographically, the city is the largest in the United States. Its 452 square miles of area are about 90 square miles larger than all five boroughs of New York City. Crime has been increasing along with the stepped-up inflow of population, which now amounts to more than two million people. Citizens call for police assistance on an average of every 30 seconds or so, between 2000 and 3000 calls every 24 hours.

Many of the calls are concerned with minor matters and can be handled in stride, but a citizen gets instant action if the matter is serious. Sometimes officers arrive while he is still on the phone. Frequently, they get there in time to capture a burglar or prowler.

Speed like this is possible because of a new radio dispatching system. A few years ago the city's four main police radio transmitters were operated as four separate systems; now they are all operated direct from one room in the city hall.

Today police calls are answered by an officer on duty at the central emergency telephone board, who writes down the address and the nature of the complaint and flips the message up onto an endless belt that carries it to the dispatcher in the adjacent microphone room.

The microphone room is the "radio central" of the system. Ten women radio and telephone operators are always on duty,

Teletype machines in communications headquarters link the Los Angeles police with law-enforcing agencies throughout state





Each button on microphone-room operator's panel represents prowl car and indicates its operating status

sitting in glass-walled booths around a semicircular table that partly surrounds the dispatcher.

Six of the operators have microphones and earphones that are connected directly to KGPL, the main transmitter for the metropolitan area. One operator is connected to KQJN in the West Los Angeles-Venice area, and one operator handles KQJP in the San Pedro area and KQJO in the San Fernando Valley. The two additional operators handle emergency messages over direct telephone lines that connect with the receiving hospitals, ambulances, the sheriff's office, the state motor-vehicle office and the record bureau where the latest information for answering rolling makes is compiled.

The panel in front of each operator contains a button for each radio car in her area. They can be turned to indicate when a car has been assigned to make an investigation, then turned back to show that the car is free again after the officers report that their investigation is complete. Also on the panel are lights that show whether the transmitter is in use by another operator or whether it is clear and ready for use. Most calls are made to individual cars, but it is also possible to broadcast through all transmitters at the same time to reach all cars on duty.

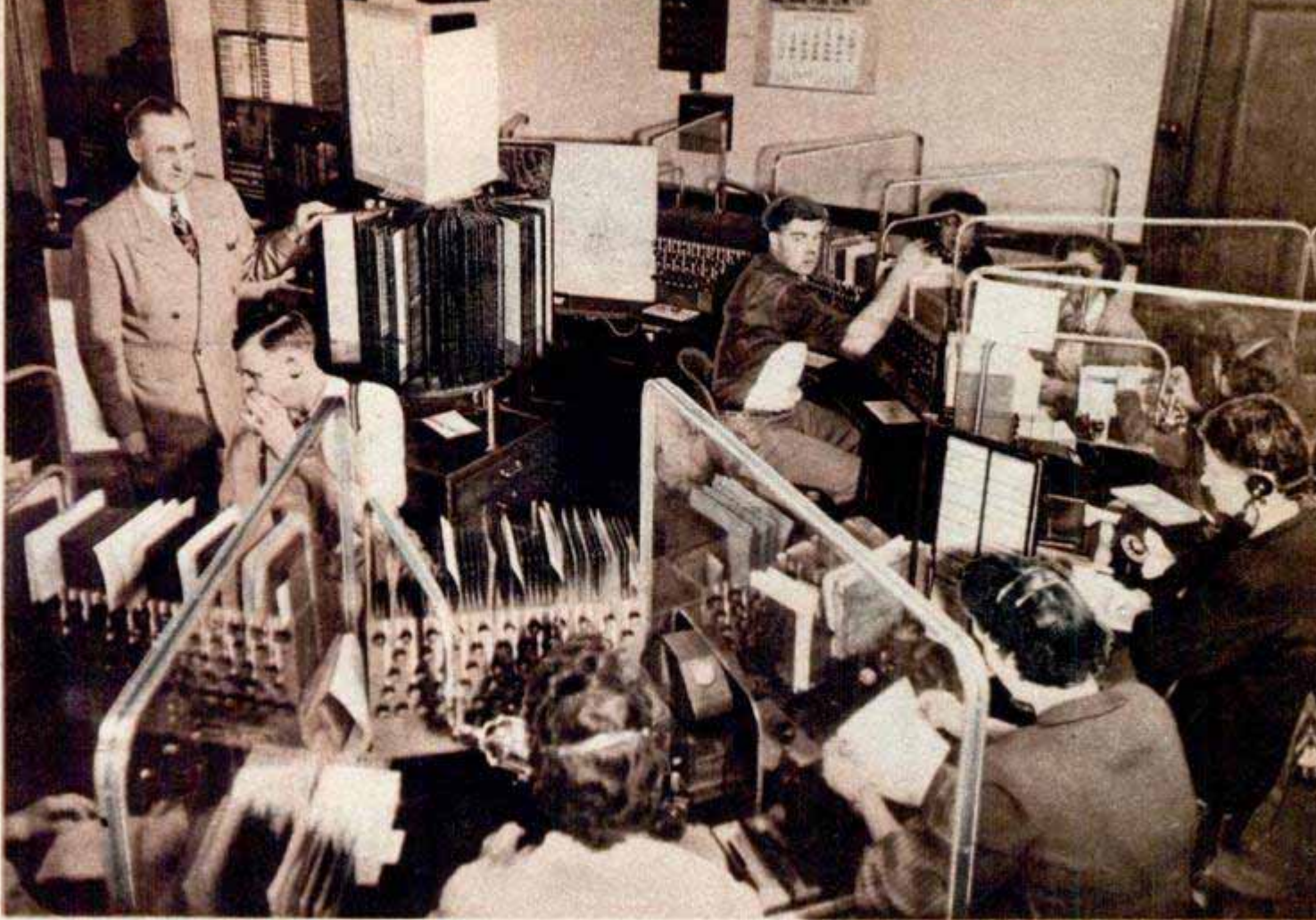
Messages coming into the microphone room from the complaint phone board are

examined by the dispatcher who determines the radio area of the address, pencils on the slip the number of the radio car that is to be assigned, and passes it to the proper operator. She time-stamps the paper, flips open her microphone switch, and calls and talks to the car that is to respond to the call.

This centralized control permits fast action and allows a tremendous volume of traffic to and from cars spotted over a large territory. On New Year's Day, for instance, 8986 different messages were transmitted from or were received at the radio central. The communications division is commanded by Lieut. William H. Durham, with Lieut. John D. Brady as assistant. Frederick C. Crowder, chief radio technician, is in charge of installation and maintenance.

The Los Angeles police have 475 cars equipped with receivers and transmitters, with a minimum of 150 always on duty. The automobile transmitters have 60 watts input and the equipment may be removed from a car as a unit and replaced with an identical unit if service is needed. Police motorcycles, now carrying receivers only, are being equipped with transmitters of 20 watts input. Late this year, the department will have a total of 950 vehicles equipped with two-way radio.

The central microphone room and the transmitters are linked by land wires. The whole system is designed to operate under



Dispatchers, within semicircle, determine radio area of complaint message and pass it to area's operator

various kinds of emergency conditions. Each of the three outlying, untended transmitters, for instance, is remotely controlled by operators on duty at KGPL, the key transmitter of the system. Each transmitter has an emergency power source that starts up automatically and takes over the load if the normal power supply fails.

If a transmitter itself breaks down, its traffic can be handled by one of the other transmitters. If the land lines go out of operation, communication is switched to a radio link that connects with KGPL. While this link can't handle the ordinary flow of

traffic, it would be satisfactory for a steady flow of emergency messages that would be radiated by KGPL. Too, each separate transmitter can be operated as an independent unit by operators who are sent out to man it. A mobile motor-generator stored at KGPL can be towed behind a fast car to any part of the city to act as a temporary transmitting station.

Incoming messages from cars in all parts of the city normally are picked up by antennas on top of the dome of Griffith Observatory that overlooks much of the city.

(Continued to page 246)

Transmitters on motorcycles are distributed between two boxes flanking rear wheel to equalize the weight





Bayou Oil Hunt

HUNTING OIL in the bayou country near Orange, Tex., is a rough-and-tumble battle with nature! Shell Oil geologists, always seeking new oil fields, take their sensitive instruments into the snake-infested swamps by jeep, sometimes along trails they have hacked out with machetes. One of their instruments is a gravity meter, which reveals the characteristics of the underground strata, thus providing a valuable clue in the search for oil-bearing deposits. The delicate meter has to be placed in a special shock-absorbing mount while traveling.

Top, left, even a jeep needs help in bayou country. Above, determining the elevation of next station by sighting through a Wye level. Left, the next station is plotted. Below, left, tripod goes right through floor. Below, reading the gravity meter





Focusing Magnifier For Reflex Cameras

By magnifying the complete picture as it appears on the ground glass of a reflex camera, a wide-field magnifier enables the photographer to compose and focus at the same time. The metal base of the magnifier covers the top of the viewing hood completely, thus preventing extraneous light from dimming the image. It is instantly attached or detached and the lens mount is threaded so that it can be raised or lowered to match the photographer's vision. The magnifier is produced in 10 models to assure a perfect fit on any standard reflex camera.

Car Bunk for Children

Small children can take naps during car trips on a collapsible bunk that fits above the back seat. The bunk completely fills the area between the two seats so children can't roll off. It raises them above the seat level, permitting them to see out the windows when they are awake. The bunk frame is made of hardwood and the top is water-repellent duck, 30 inches wide and 46 inches long. Collapsed like a card table, the bunk requires little storage space.

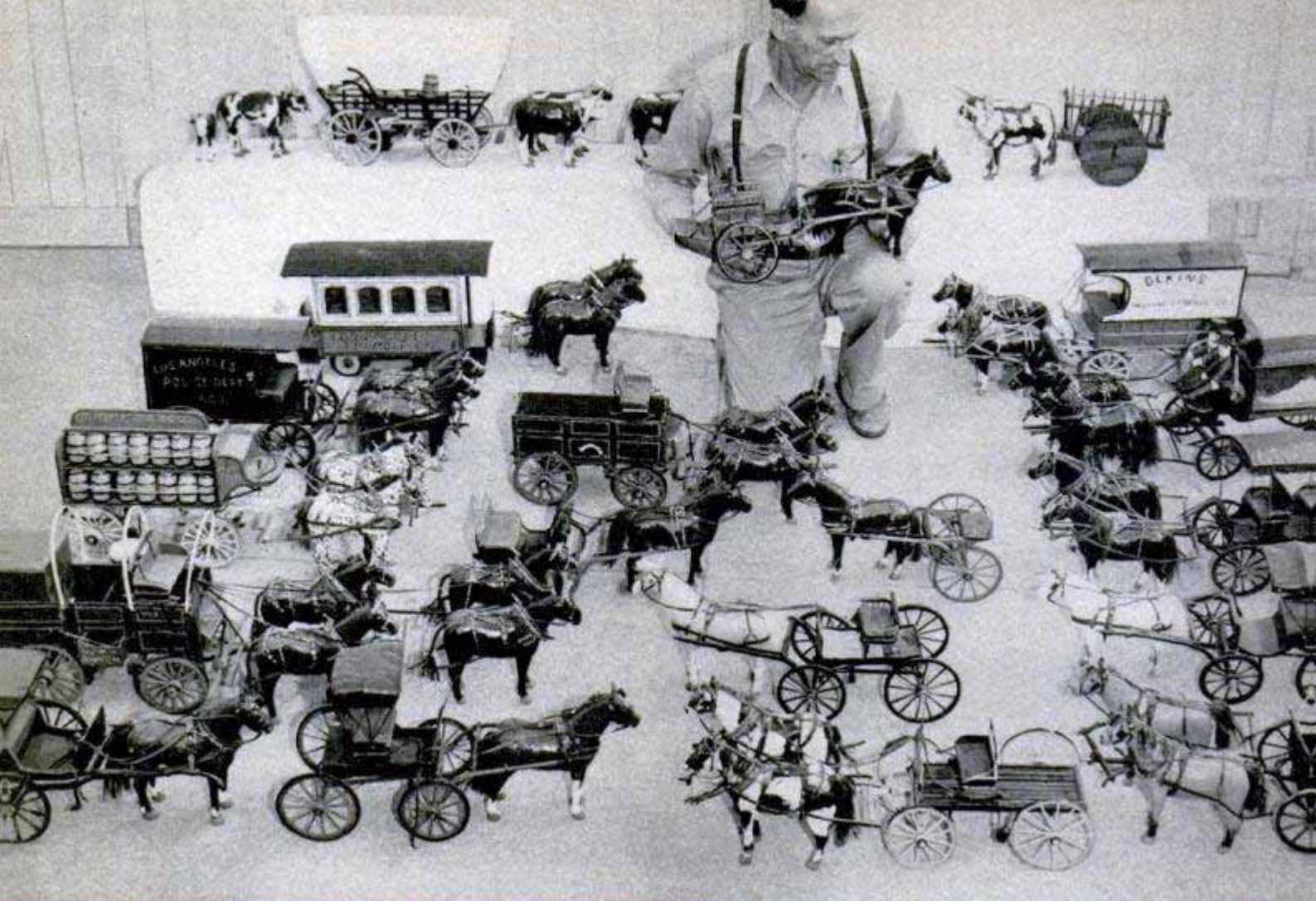
☐ The average farm laborer in the United States produces enough to feed 14 persons.



Hand Sprayer Pumps From Bucket

Because it can be used with a bucket, barrel or knapsack tank, a portable hand pump will handle all spraying jobs not large enough to warrant using a power spray. Completely self-contained and weighing only three pounds, the pump is operated by sliding the nozzle in and out of a metal cylinder that is attached to the end of the hose. Interchangeable nozzles and graduated disks make it possible to spray various intensities ranging from a fine mist to a straight stream. The pump sprays only on the downward stroke, eliminating the usual loss of solution that results from two-way pumping action.





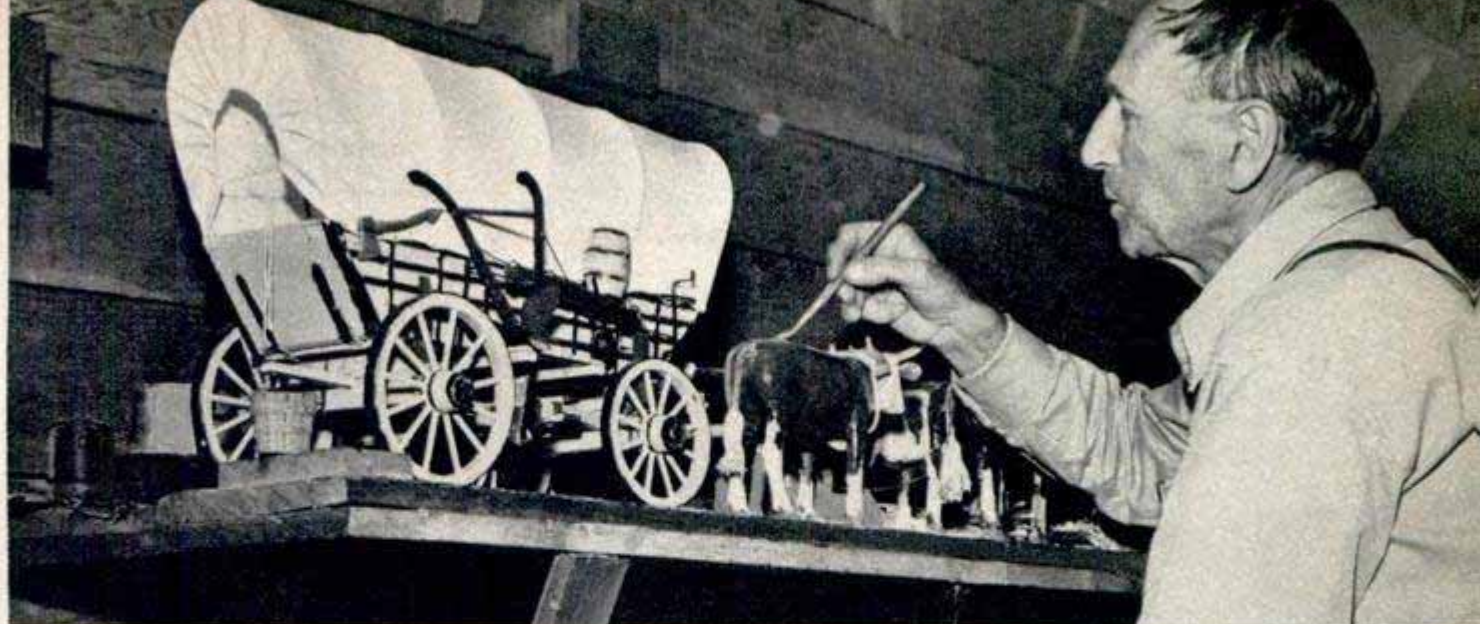
Here's just part of the hobbyist's collection of models. Included are a horse-drawn streetcar, beer wagon, express wagon, prairie schooner, "paddy wagon", oxcart

FRONTIER DAYS in balsa

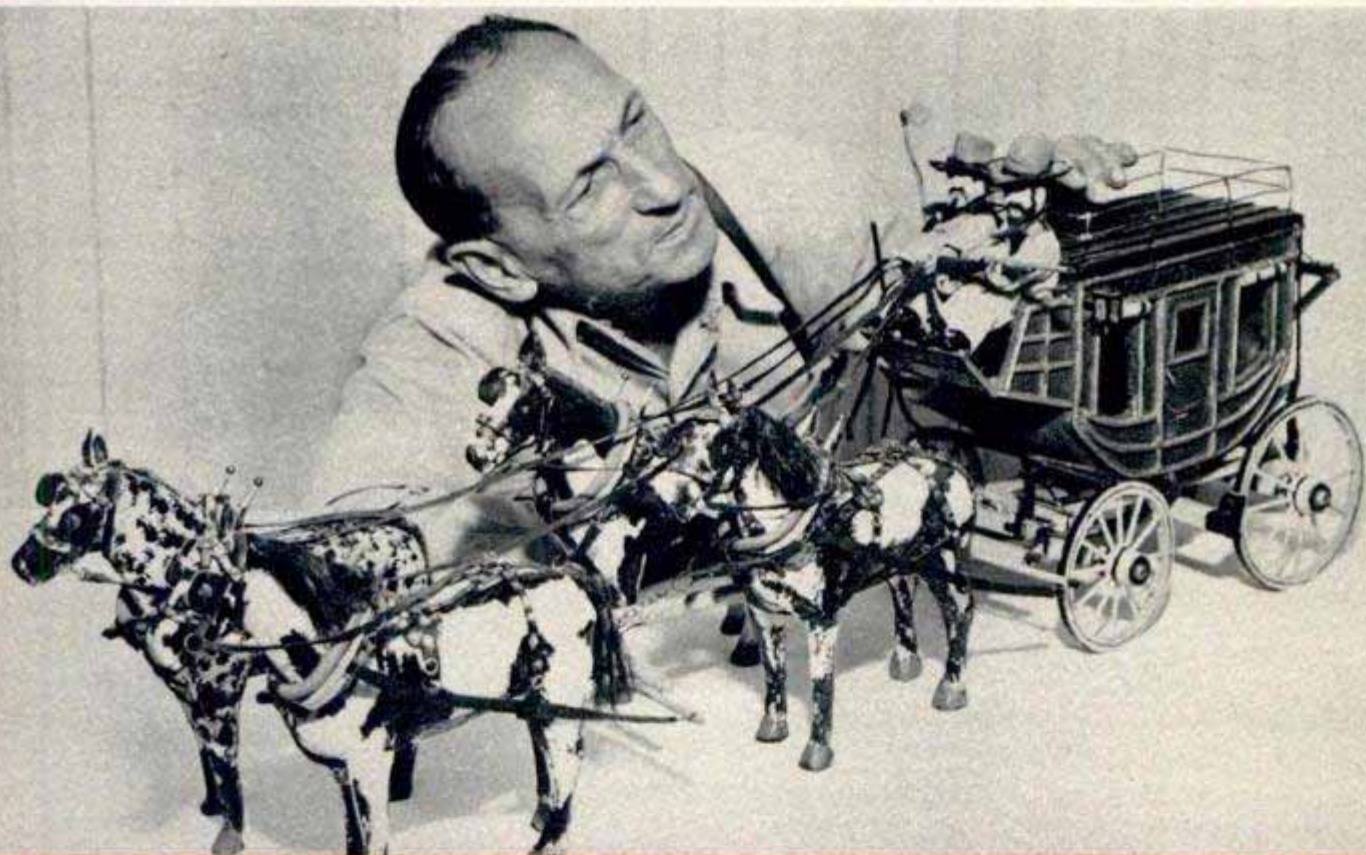
Ward carves the horses from balsa and glues on the legs. Manes and tails are made of goat hair or unbraided rope



SEVERAL years ago Lee L. Ward of Los Angeles fashioned a number of miniature saddles and sets of harness from old leather. Then he decided to carve some horses from balsa wood to hang the trappings on. Next he built a cart for one of the horses to haul. Today, Ward has a growing collection of horse-drawn vehicles that range from an Indian travois to the vehicles of a funeral procession. The collection includes a horse-drawn streetcar and a four-horse stagecoach complete with driver and armed guard. A covered wagon, drawn by oxen, is followed by a cow and calf. Ward has completed 25 vehicles and is at work on the next, one of the early RFD wagons used by the Post Office. Tails of the animals may be a short piece of unbraided rope or string; sometimes he makes tails and manes from goat hair. Rooster spurs make good horns for oxen and cattle. All the wagons are built of scrap material found around the home and workshop.



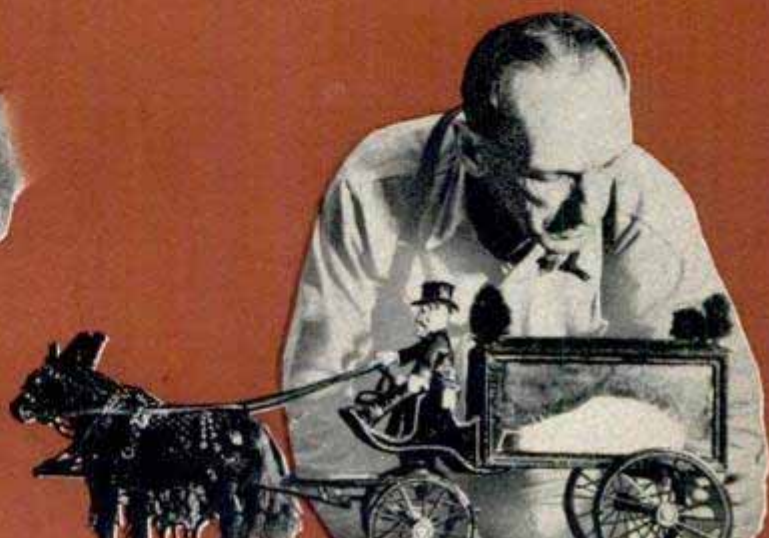
The craftsman touches up the oxen that pull authentic scale model of a covered wagon, complete with water barrel and farm tools. Below, Western stagecoach has leather springs; an armed guard sits beside the driver



Below, black horses pull an ornate early hearse. Hacks for mourners complete the funeral procession



Hobby started when Ward fashioned a miniature saddle from scraps of leather and needed a horse to carry it





One-Legged Table

Weighing only four pounds, a one-legged table adjusts to a height convenient to the user. The top, made of $\frac{1}{4}$ -inch Masonite, measures about 16 by 28 inches. When not in use, the metal leg swings up parallel with the top, permitting the table to be stored in a narrow space.

Accidents Take Biggest Toll Of Man's Productive Years

Fatal accidents take a greater toll of the productive years of the people of this country than do deaths from any one natural cause, according to a report of the American Medical Association. While more individuals were killed by heart disease and cancer than by accidents, the natural deaths occurred in persons who were older and therefore had fewer working years to live. Working years are considered those from 20 to 65. In 1945, for example, the number of working years lost from accidental deaths was 1,750,000, compared with 1,680,000 from heart diseases.

Video Multiscope Shows Time, News

Late news reports, the correct time and the weather forecast all are thrown simultaneously on television screens by an ingenious projection machine that may bring video stations close to the break-even point for the first time. Called the Multiscope, the projector has a lens system which throws a picture of a clock in the upper left corner of the screen and the weather report in the upper right corner. At the same time a ticker tape moving across the bottom of the screen shows the latest news. In the center is room for the name of the program's sponsor. Because the Multiscope replaces the test pattern, it can be used during hours when no programs are scheduled, providing a substantial new source of income to the station. Only one man is



News tape on reel appears with time and weather on television screen

needed to operate the projector. S. C. Quinlan and John H. Mitchell of television station WBKB in Chicago developed the instrument, which soon will be available to other stations.

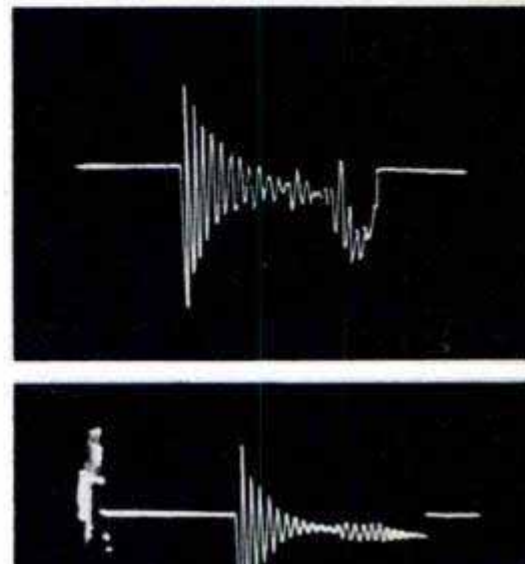
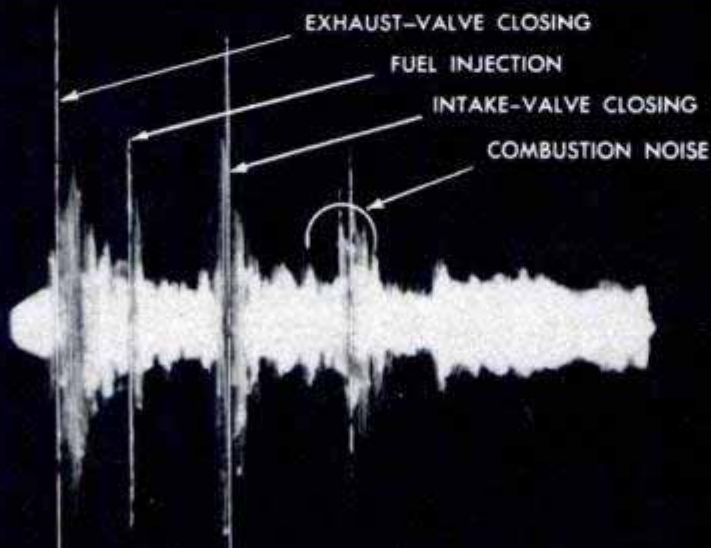
ENGINE 'TROUBLE SHOOTER'

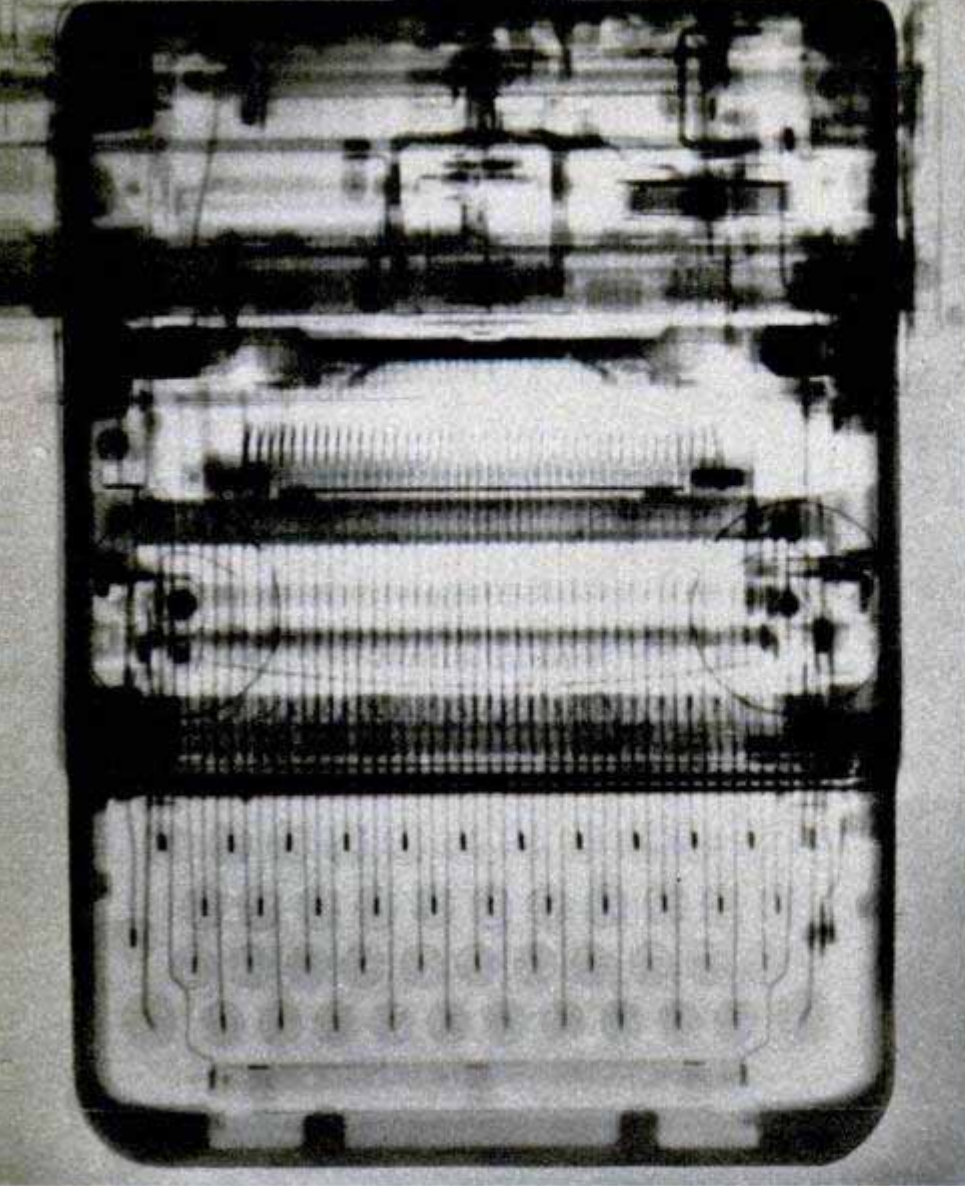
AIRCRAFT engineers now have an instrument they've long hoped for—an engine analyzer which tells them in advance that trouble may occur and locates the exact parts that aren't functioning properly. Developed by the Sperry Gyroscope Company, the instruments are being installed in Pan American Airways' Constellations and Boeing Stratocruisers. They give a continual visual check of the plane engines while the craft is in the air. When engine parts are not functioning properly, the trouble shows up in a graph pattern on a cathode-ray "scope" similar to a radar scope. Two kinds of images are seen—ignition patterns and vibration patterns. In the case of ignition patterns, the operator sees a wave form representing the voltage in the primary circuit of the ignition system. Every variation that occurs in the ignition system is reflected instantly in this pattern, making it possible to see the condition of magnetos, spark plugs, cables, breaker points, malfunctioning of the injection system, lack of combustion, engine roughness and other details. The vibration patterns show characteristics of combustion, knocks and detonations, the seating of intake and exhaust valves, piston slap and the failure of piston rings and wrist pins, among other troubles. Each trouble produces a particular pattern by which it is recognized. Vibration signals come from pick-ups mounted on each cylinder head, which "feel" all the noises in the engine. Pan American expects the instruments to reduce the time required for servicing and expense by locating troubles while planes are in flight, and to increase safety by anticipating imminent trouble.

Patterns below are shown as they appear to the flight engineer. Directly below is a normal vibration pattern. Pattern at upper right shows a spark plug firing normally, and below, graph of a fouled spark plug

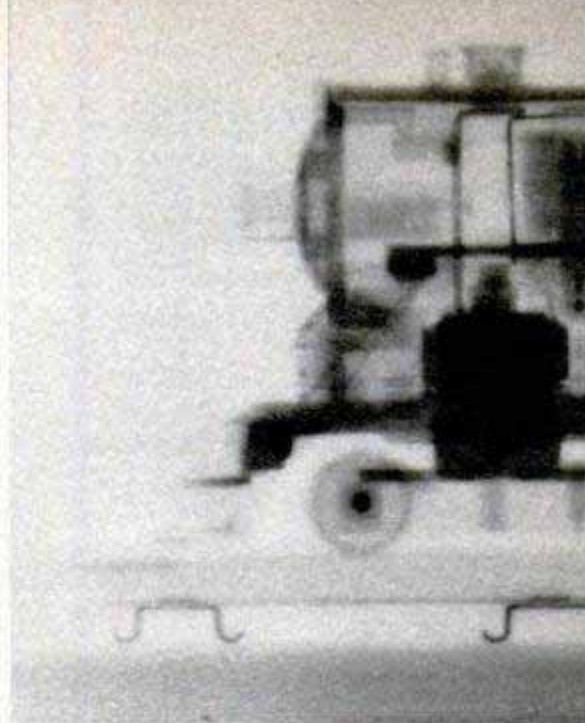


Compact engine analyzer fits the plane's control console. Flight engineer is pointing to the "scope" which shows the wave pattern. Below, nerves of the analyzer are vibration pick-ups mounted on cylinders





▲ Typewriter



▲ Model Locomotive

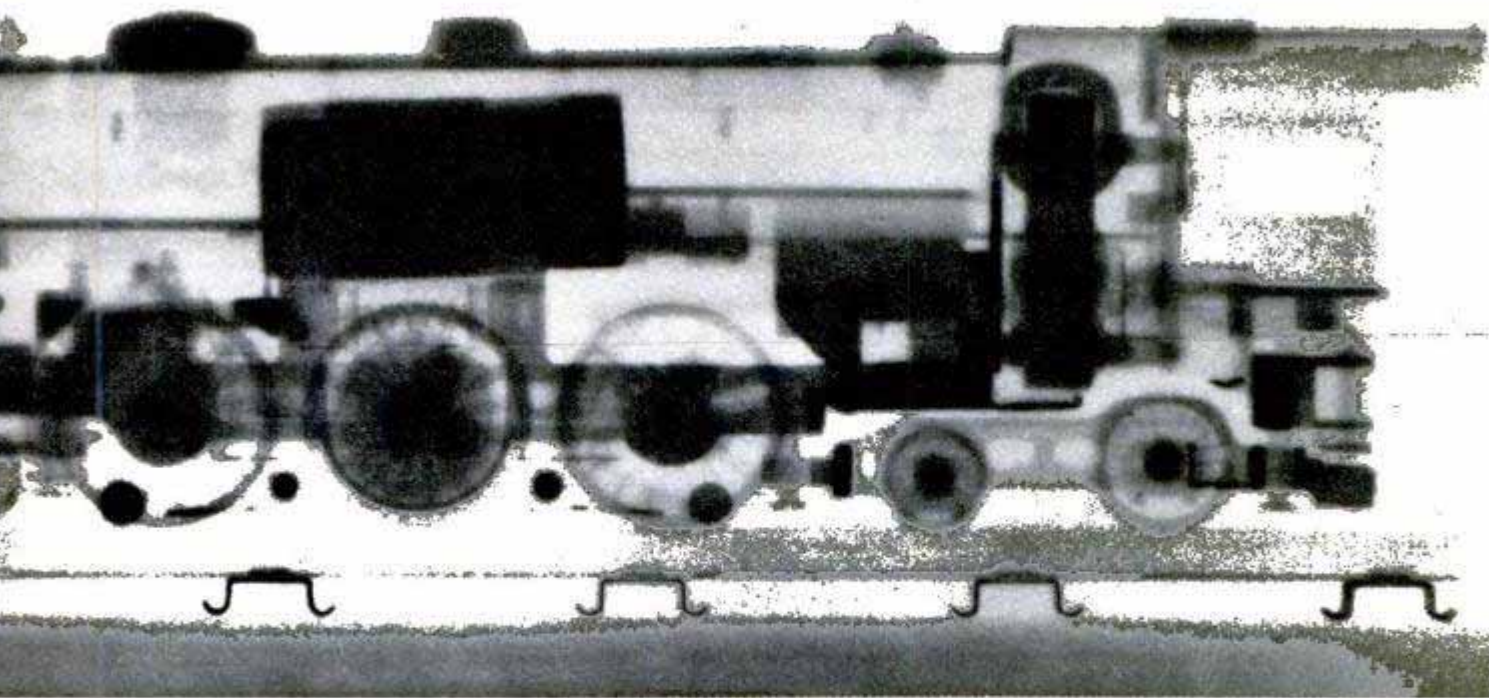
Take a look at ghosts of some familiar objects through the eye of a betatron, one of the powerful new instruments of the atomic age. Its real job is to peer through heavy castings; a physicist had a sort of "postman's holiday" taking these X-ray pictures

Phantom Photos With 20 Million Volts

By Joseph J. Miller

Assistant Physicist, Armour Research Foundation





Armour Research Foundation and Rock Island Arsenal photos

TAKING 20-million-volt X-ray pictures with a betatron isn't exactly a hobby, but I decided to try my hand at photographing everyday objects with this modern research tool.

The betatron is a powerful instrument used in nuclear research and in the quest for more basic medical information. Industry already is using the betatron as a super-eye which can peer through 12 inches of steel and detect a flaw as small as $\frac{1}{32}$ inch.

In my work for the Armour Research Foundation, I have been privileged to use the betatron at the Rock Island Arsenal. The accompanying radiographs—X-ray pictures—show the extraordinary effects that can be produced with the instrument.

The Rock Island betatron, usually used to inspect heavy castings, is an induction electron accelerator which produces an output of 20 million electron volts. The heart of the unit is the "doughnut," a circular vacuum tube with a hole in the center. Into

the tube are shot small particles called electrons which whirl at high speed around the circle, sometimes traveling 200 miles in less than a hundredth of a second before they leave the tube. As they emerge from the tube, they strike a metal plate where they produce X-rays.

The rays ejected by the betatron are so powerful that they can destroy the structure of tissue cells in flesh, bone and blood, and therefore would be fatal to a person insufficiently protected. For that reason, the betatron is installed in a "house within a house"—a room with concrete walls two to five feet thick, inside another building.

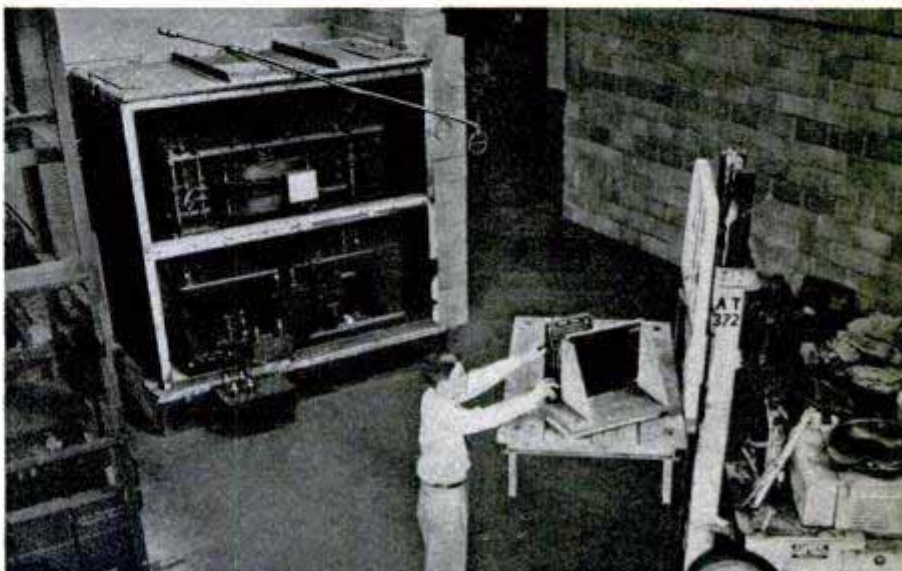
The X-ray pictures shown on these pages were made by James Bolton of the Rock Island Arsenal and myself in the same way that castings are examined. Photographers and technicians may be interested in the procedure.

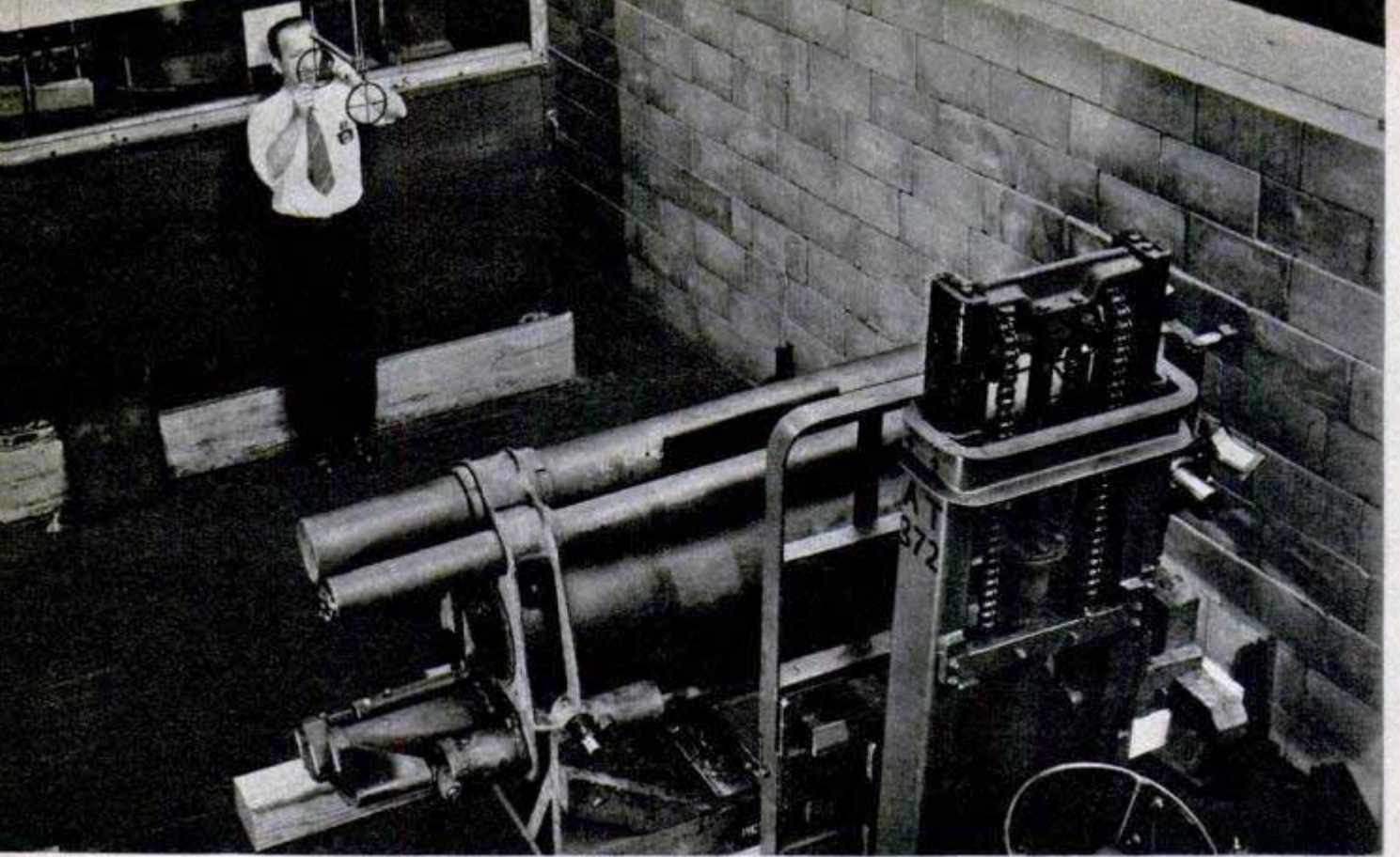
Suppose you want to penetrate to the heart of a casting, or take novel radiographs

▼ Submachine Gun



Author mounts a typewriter in front of the X-ray film holder. The rays from the betatron emerge at the square white spot





Bolton, who helped take these photos, lines up recoil mechanism of 155-mm. gun for inspection to detect flaws

of ordinary objects. Let's imagine that you are going to take an X-ray picture of a model train engine.

Since it takes approximately five minutes for the betatron to warm up, you first throw a switch which heats the filaments of all tubes and low-voltage supplies.

While you are waiting for the green "ready" light, you prepare the setup for your radiograph. In the darkroom you mount an ordinary type of X-ray film into a special holder, which keeps out all light but will not stop X-rays. Next, you mount the film a definite distance from the instrument, a distance you compute by taking the length of the locomotive and mul-

tiplying it by five, which will give you the minimum distance. You mount the train directly in line with the beam and place the film directly behind it.

Now you measure the approximate thickness of the metal in the locomotive and with the distance measured from the film to the betatron, you refer to a chart which tells you how much exposure to give the film. The chart is computed in roentgens, which is very similar to the amount of light you use in ordinary photography. You set the number of roentgens on a meter on the control panel, and the betatron automatically will shut off when it reaches the end of this exposure. It's almost as simple as setting the shutter on your own camera.

With the betatron warmed up, you push

▼ Telephone



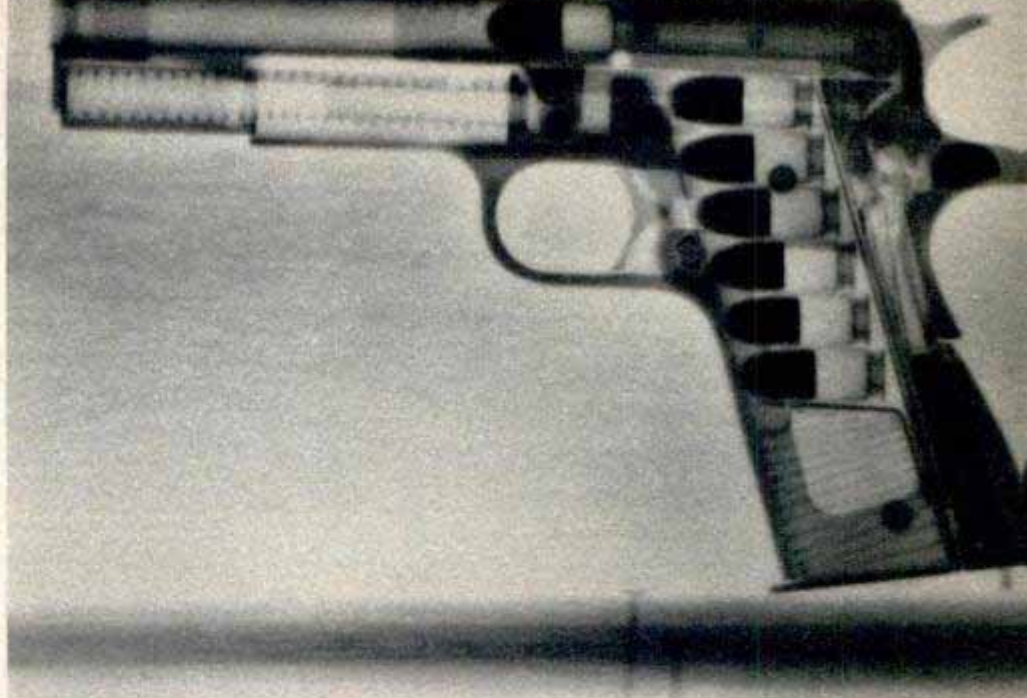
the switch marked "magnet power" and hasten out of the immediate area to escape the loud noise. After you've calmed yourself, you set the voltage indicator to 20 million volts, which is quite a bundle of energy. You adjust two other controls to get the maximum output indicated on the output meter.

The rest of the process is automatic. The rays go through the locomotive and strike the film to expose it. At the proper time the betatron turns itself off.

The pictures on these pages were taken on Eastman industrial type-M film, and a piece of lead .040 inch thick was placed just in front of the film to increase the density for a given exposure. The distance of the target from the betatron was 12 feet. The exposure time was from one to two minutes.

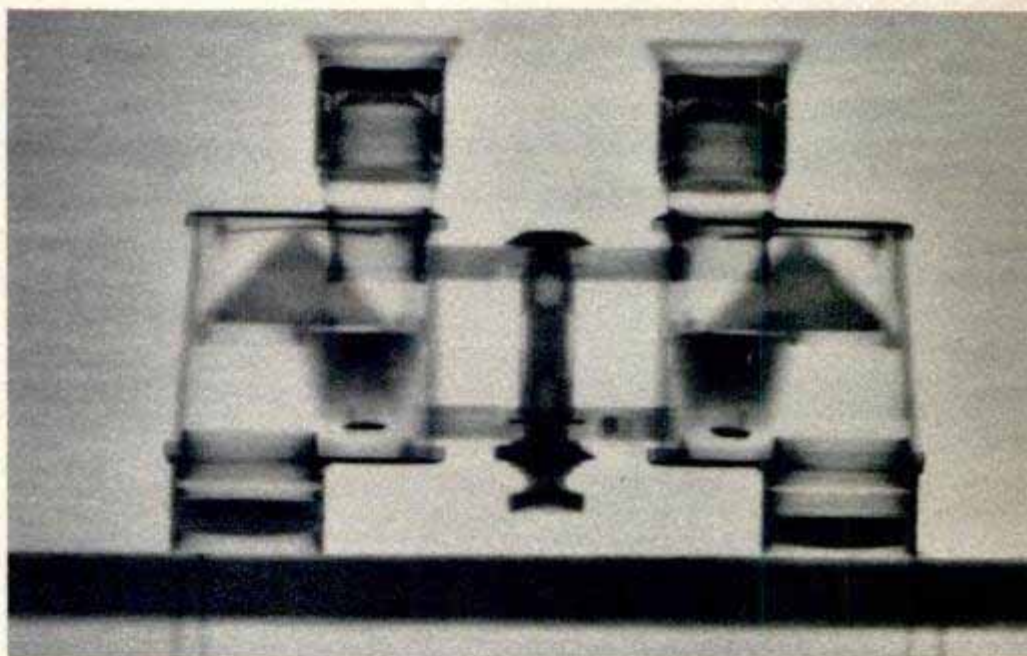
Now that you have something on your negative, you can develop and print it in the same way you handle ordinary film except that you use X-ray developer and fixer.

The only catch to taking pictures in this manner is that the betatron costs \$85,000, and if you are wealthy enough to afford such an ingenious "camera" you still must build a double building around it.



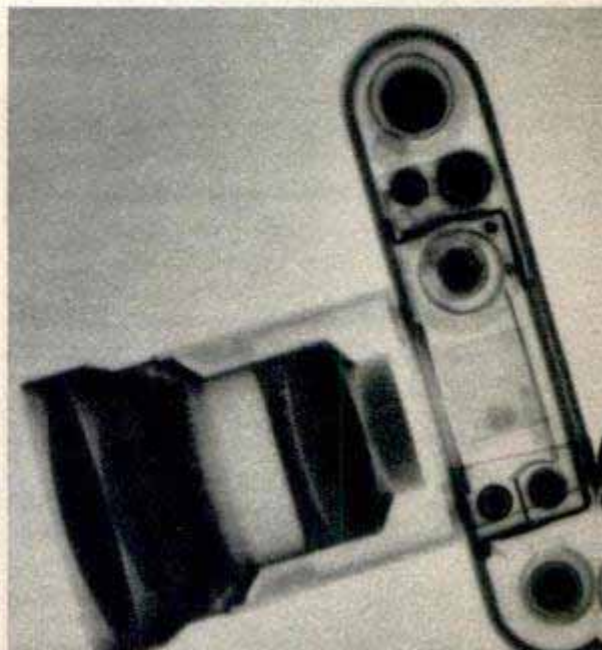
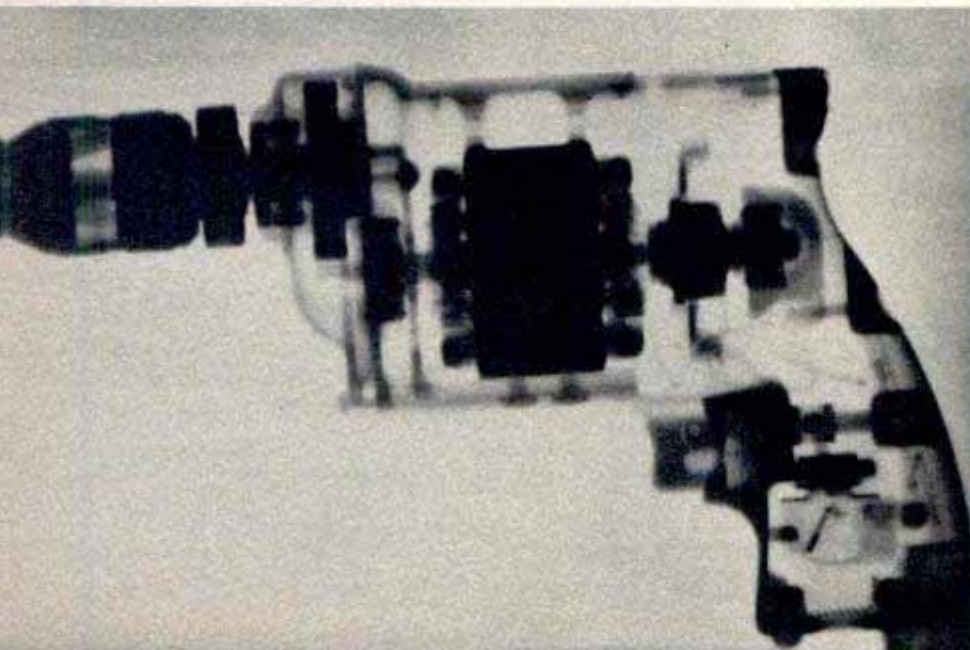
▲ Pistol

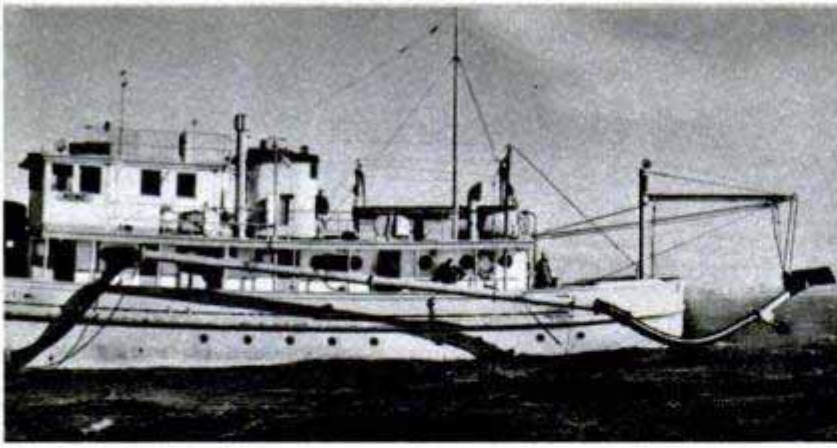
▼ Binocular



▼ Hand-Drill Motor

▼ Candid Camera





Vacuum Harvests Oysters

Oyster cultivators now are harvesting their crop with a giant "vacuum cleaner." The machine sucks oysters and almost everything else from the ocean floor. The nozzle, six feet wide and seven inches high, rides along the bottom on a dolly equipped with a rubber tire. A centrifugal pump creates a vacuum great enough to lift 2400

gallons of oysters and water a minute. The rate of catch is about 1000 bushels of oysters hourly. The process is reversed to unload the ship and deposit the catch on a dock conveying system that carries the oysters to a processing plant. Because the vacuum line also sucks oyster drills, a destructive snail, off the ocean floor, the machine helps in clearing this pest from the oyster beds.



"Hospital" Helicopter Evacuates Wounded

Battle casualties may be evacuated by helicopter in the event of another war. The British Royal Air Force recently demonstrated a method of carrying casualties on the outside of a helicopter's fuselage. A stretcher is secured to a special rigging on the side of the wingless craft. The wounded man then is strapped to the stretcher and the helicopter takes off for a hospital.

House-Number Post Holds Produce Signs

Farmers can put up produce signs in front of their homes quickly with a house-number post that is slotted to hold paddle-type advertising signs. As many as four paddles can be attached to the vertical post, on which the house number or farmer's name is printed with reflecting paint. Blackboard-type paddles are available if desired. The vertical post is made of aluminum to prevent rusting.



Many of the items described in this issue are already commercially available or ready to be marketed. For manufacturers' names and addresses, turn to the WHERE-TO-BUY-IT INDEX, page 10



How to Tempt a Fish

PART III SALT-WATER FISHING

By Joe Godfrey, Jr.

LIFE IS TOO SHORT not to find time for salt-water fishing.

There is a mystery about the sea that forever lures the angler. The all-connecting waters of the oceans, seas, bays and coves may lead to a sudden and surprising catch. Starting out to fish for snook, the angler may end up with a record tarpon; searching for mackerel, he may boat a broadbill swordfish, rarest of all the sea's great angling trophies.

The big, swift, ocean-roving fish may be caught in sheltered inland waters where they occasionally congregate, but are normally sought in their natural feeding haunts in the open sea. The catch may be measured in pounds or hundreds of pounds, but the pleasure of the sport can never be meas-

ured in numbers, but only in its thrills.

The bonefish has long been near the top of the list of the ocean's sporting fish. It is blessed with a speed that few can equal. It is shy and difficult to approach and is caught in warm, shallow, quiet waters where fishing conditions are close to ideal. For many years bonefish have been caught on special rods and light, matching lines coupled with reels that cast the lightly-weighted baits near the fish without alarming them. In recent seasons, standard fresh-water fly-fishing tackle has been

used to hook and hold them. Since they are far swifter than any fresh-water fish is known to be, this opens a new field to ambitious anglers.

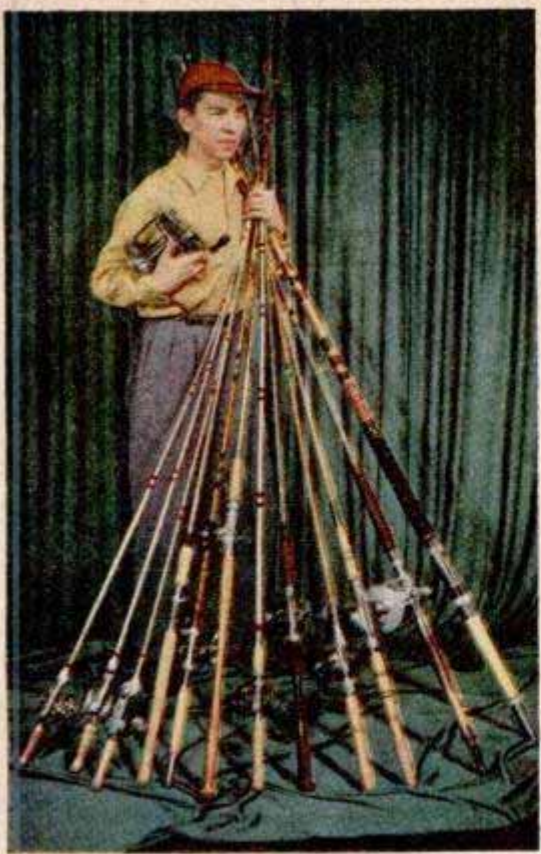
Homer Rhode, Jr., Coral Gables, Fla., has pioneered this type of fishing and

Striped bass is still a favorite of the surf caster



Striped Bass





Rods for salt-water angler range from light glass ones to wood and steel heavyweights

BAITS FOR STRIPED BASS: (opposite page)

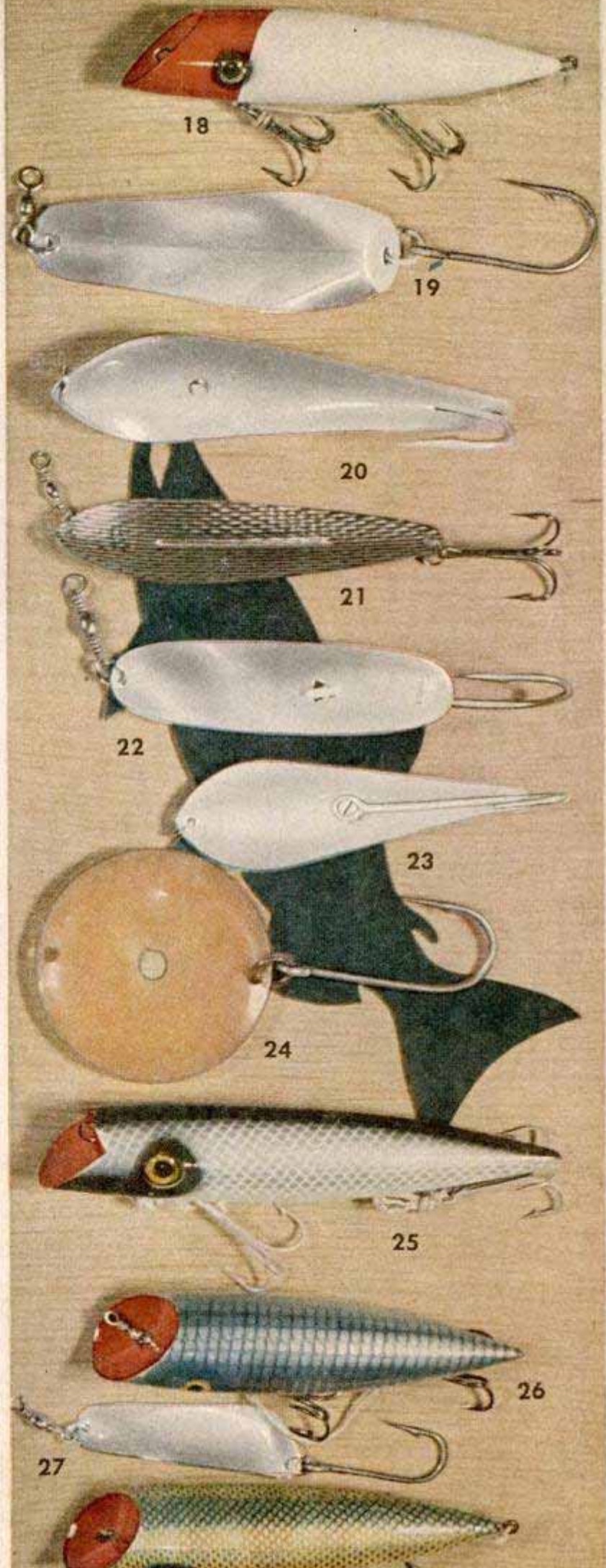
- 1—Johnson's Caper Spoon. 2—Jointed Pikie Minnow. 3—Striper Squid. 4—Bass-Aqua Plug. 5—Jointed Striper Atom. 6—Pike-Oreno. 7—Fishmaster Blue Mullet. 8—Trolling Squid. 9—Salt Water Squid. 10—Giant Amazin' Maizie. 11—Striper Popper Plug. 12—Martin Salt Water Plug. 13—Striper Atom Lure. 14—Eel Skin Rig. 15—Giant Walkie Talkie. 16—Fishmaster Mullet Plug. 17—Trix-Oreno.

developed a special streamer-type fly that closely imitates in shape and action the shrimp on which the bonefish feed.

The most successful plugs in bonefishing are the zaragossa type (surface plugs). These plugs are so balanced that they can be worked equally well on the surface or beneath the surface. The best retrieve is over grass beds and small channels on the flats with a moderate zigzag surface retrieve for a distance of about 30 or 40 feet, then smashing the plug underneath, working it in an erratic manner and increasing the tempo

BAITS FOR PACIFIC SALMON:

- 18—Red and White Rosegard Plug. 19—McMahon Spoon. 20—Buck White Spoon. 21—Williams Wabler. 22—Record Spoon. 23—Reflecto Spoon. 24—Canadian Spoon Bait. 25—Martin Plug. 26—Lucky Louie Plug. 27—Limper Jigger Spoon. 28—Rosegard Salmon Plug.

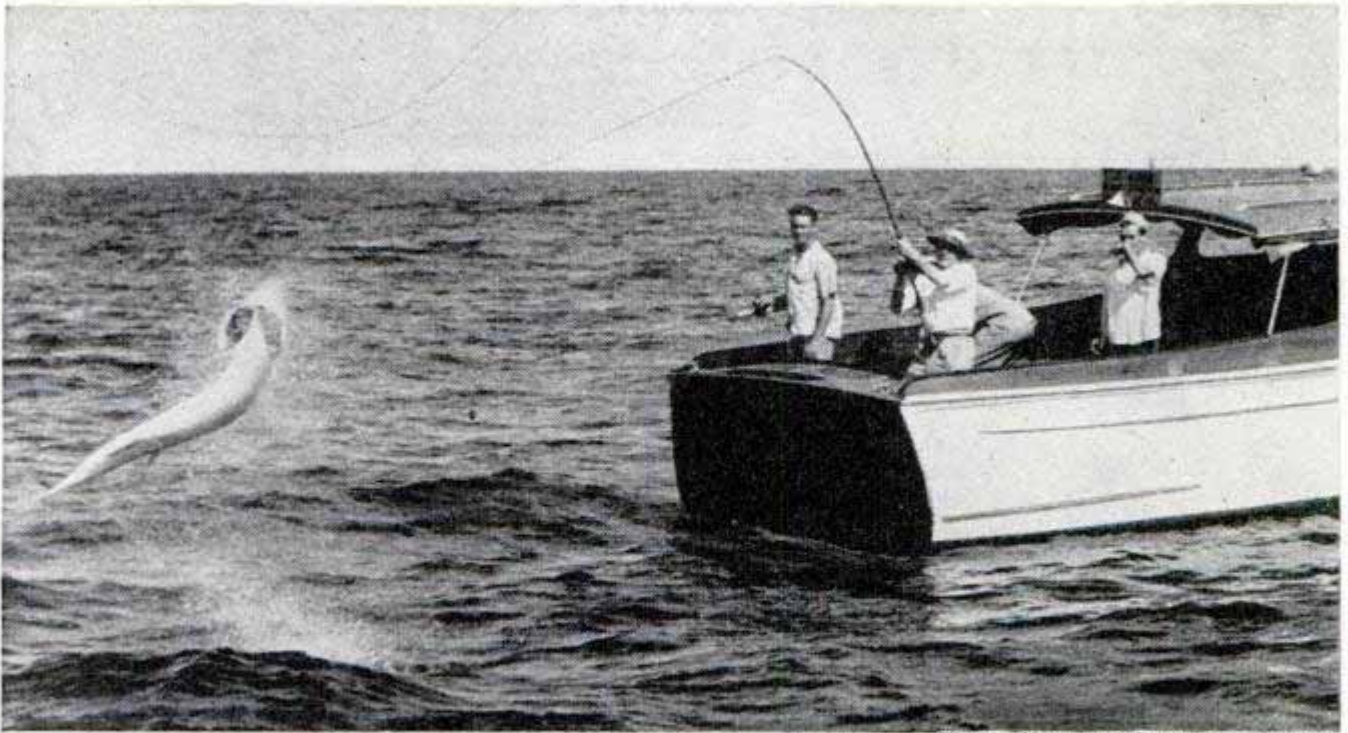


Bluefin Tuna



Bonefish





Florida News and Photo Service photo

← **BAITS FOR BLUEFIN TUNA:** 29—East Coast Feather Jig. 30—Bullet Head Nylon Jig. 31—Barracuda "J" Jig. 32—Full Feather Jig. 33—Jumbo Japanese Feather. 34—Bull Nose Feather Jig. 35—"K" Dude Jig. 36—Trolling Feather Jig. 37—'Cuda Feather Jig. 38—Bimini Feather Jig. 39—"J" Feather Jig.

↑ You can see right through the giant gills of this silver king tarpon, one of scrappiest fish in ocean

of the retrieve to an extremely rapid pace.

For casting the channels from midstream to the banks, a red-headed yellow feather is best. This is the same type that is used in Florida waters for pompano and bluefish. Big bonefish are seen regularly in the waters of the Florida Keys.

A recent dispatch tells of a bonefish from the Hawaiian Islands, caught by C. M. Cooke, III, which raises the world's angling record to 16 pounds.

Bonefish tackle (a four-ounce casting rod and six-thread line or a bass-weight fly rod with 200 yards or more of backing and a 15-pound test leader next to the fly) will also give an angler all the thrills he

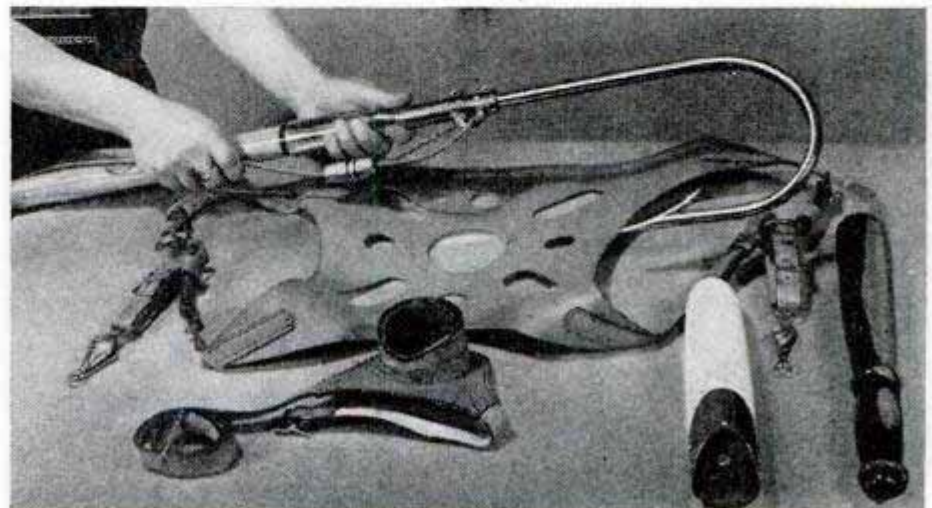
needs if he hooks into any of the other game fish of the same waters like the ladyfish, permit, barracuda, snook or tarpon.

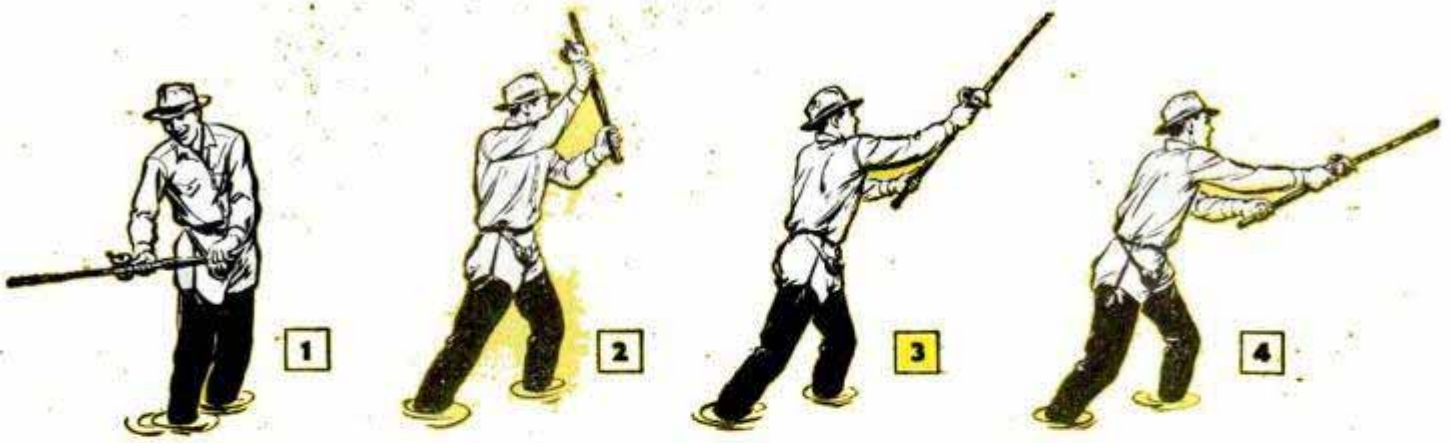
Tarpon are among the ocean's best performers. They strike artificial baits, can be caught by casting light tackle and are swift in their runs and endlessly spectacular in their leaps. Because their mouths are hard and bony, they are both hard to hook and hard to hold. All these sporting qualities are combined in a silvery fish that goes up to a record weight of 247 pounds, taken in the Panuco River near Tampico, Mex. The tarpon frequents the quiet inland or inshore waters where the great leaps and runs bred of the open sea are accentuated.

Flies and fly rods will take tarpon in the shallow bays and canals or any of the confined waters. Bait-casting rods will cover the same waters and either rod can be used

Big-game-fish accessories include a giant gaff with needle-sharp barb, harness, rod belt, teaser to lure fish and persuader to knock them out

← **BAITS FOR BONEFISH:** 40—Miracle Minnow. 41—Keys Bonefish Fly. 42—Eger Dillinger. 43—Fisherman's Favorite Wig-gling Minnow. 44—Polar Bear Fly. 45—Divided Wing Shrimp Fly. 46—Paul Bunyan Weaver. 47—Lunker Lure Pop-It. 48—Hot-Shot Lure. 49—Rhode Bonefish Fly. 50—Quilby Minnow. 51—Mustang Minnow. 52—H.R. Shrimp Fly. 53—Shrimp Fly. 54—Shrimp Bait. 55—May Wes Plug. 56—Gentleman Jim. 57—Fish-Obite. 58—Manning's Tasty Shrimp. 59—Midget Sea Witch.





In surf casting, hold right hand directly under reel with thumb resting on side of reel. Left hand grasps the butt of rod solidly almost at the end

As lure hits the water, drop butt of rod in whip socket; hold rod as shown for retrieving line or playing fish



Below, barracuda is most vicious of fish in southern waters, averages 25 lbs. It does much of the damage that is blamed on shark

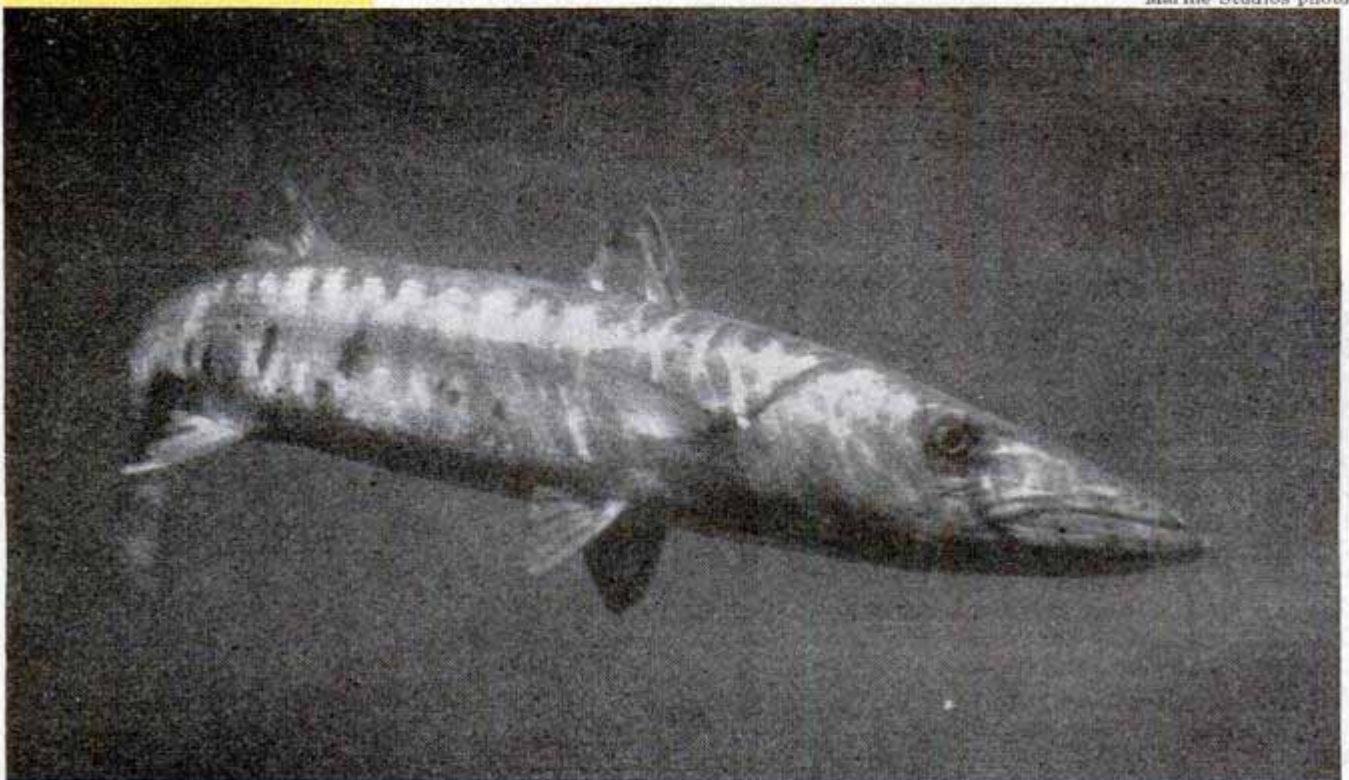
for tarpon under 50 pounds with regularity, but when these silvery fish pass the 100-pound mark, either the angler's skill must increase prodigiously or the weight of his tackle must rise to match a heavier foe.

Tarpon in channels and small rivers go for streamer flies on fly rods and for plugs on bait-casting equipment. In the Gulf of Mexico they hit big plugs and spoons that are trolled. At hot spots such as Boca Grande Pass it's a game of drifting with live crabs as bait.

There are millions of tarpon along the west coast of Florida in April, May and June; then along the coasts of Mississippi, Alabama and Louisiana in May, June and July; off Texas from May to September, and off Mexico from March to July.

It was in 1915 that Captain Bill Hatch worked out the drop-back method of fishing and opened the angling door to the sailfish and the marlin. These spearfish tap a bait with their spears and, having stunned it, turn and take it into their mouths. Hatch's development brought the marlin

Marine Studios photo



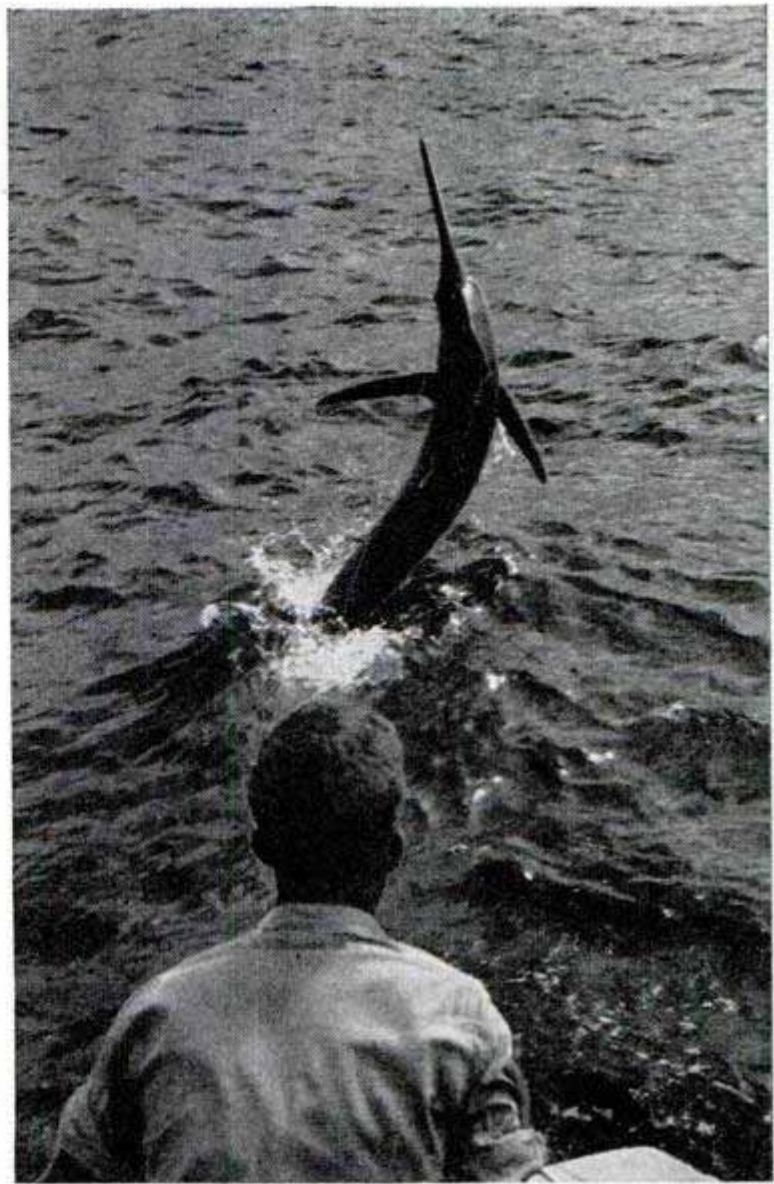


Numbered sketches show motions of body during a surf cast. Line should be wet before it is cast. Speed of right arm is increased until greatest power is applied as the rod passes perpendicular. At this point, most of thumb pressure on the reel spool is released

and sailfish, which had previously been considered only nuisances, into the forefront of the big-game-fishing field. Their amazing power to leap thrilled the angling world.

Hatch's discovery changed the contours of the fishing cruisers. They sprouted long, thin bamboo poles that swept out from their decks. The angler's line passes from his rod tip out to the outrigger's tip where it is held gently by a clothespin. From there it drifts astern to take the bait out to one side of the propeller wash, to hold it high and make it skip like a frightened fish.

When a sailfish or marlin surges up and strikes the bait with his bill, the strike is sharp enough to pull the line free from the clothespin. The slack lets the bait drift in the water while the sailfish turns to take it into his mouth before the line tightens again. The pressure is timed to come just when the bait is taken.



City of West Palm Beach photo

Giant blue marlin gives a mighty lunge in desperate effort to free himself beside boat. Average weight of this deep-sea monster is from 200 to 450 pounds. Below, St. Petersburg children try luck at surf casting during the annual Fishathon





Rocketing striped marlin puts up spectacular battle. Below, angler with surf-casting rod lands a huge snook

Marine Studios photo



The sailfish, long and slender, can skitter across the surface of the sea like a skipping stone. The word "tailwalking" was added to our language to describe this sailfish stunt.

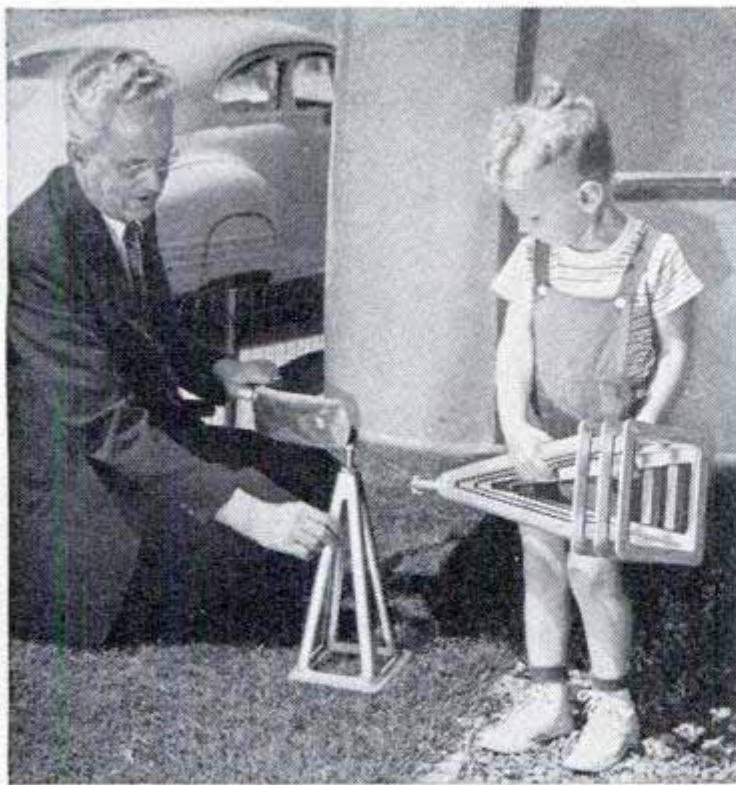
There are many varieties of sailfish, but the two most important are: (1) Atlantic sailfish, and (2) Pacific sailfish. Most Atlantic sails are caught in the blue Gulf Stream waters from Stuart to Key West, Fla., but every summer some of them are caught off the Texas Gulf coast. The Pacific sails are most plentiful at Acapulco and at Guaymas, Mex.

The marlin lacks a sailfish's high distinctive dorsal but has him trimmed for strength and speed. Most sailfish fall well below the 100-pound mark; most marlin go well above it and some go more than 1000 pounds. They are heavier throughout and more difficult to handle on a rod and reel.

Striped marlin are found in the warm waters of the world. The biggest ever taken on hook and line weighed 692 pounds—caught off Balboa, Calif. Blue marlin are found mostly in the Atlantic between Cuba, Cat Cay and Florida. The biggest weighed 737 pounds—caught off Bimini in the Bahamas. White marlin are smaller and range from Maryland in the summer to Key West in winter. The biggest weighed 161 pounds and was taken off Miami, Fla. Biggest Pacific black marlin weighed 976 pounds and was taken off Bay of Islands, N. Z.

The school tuna, ranging from 10 to more than 100 pounds, suddenly became the public's favorite. They were great sport, they were good food and there were lots of them.

(Continued to page 238)



Aluminum Trailer Supports Are Nested for Storage

Parked trailers are leveled and stabilized quickly by four cast-aluminum supports that nest together to require little storage space when traveling. Adjustable from a height of 13½ to 17½ inches, the stabilizers make it easy to bring the trailer to level. Although each stabilizer weighs only 2½ pounds, it will support up to 8000 pounds.



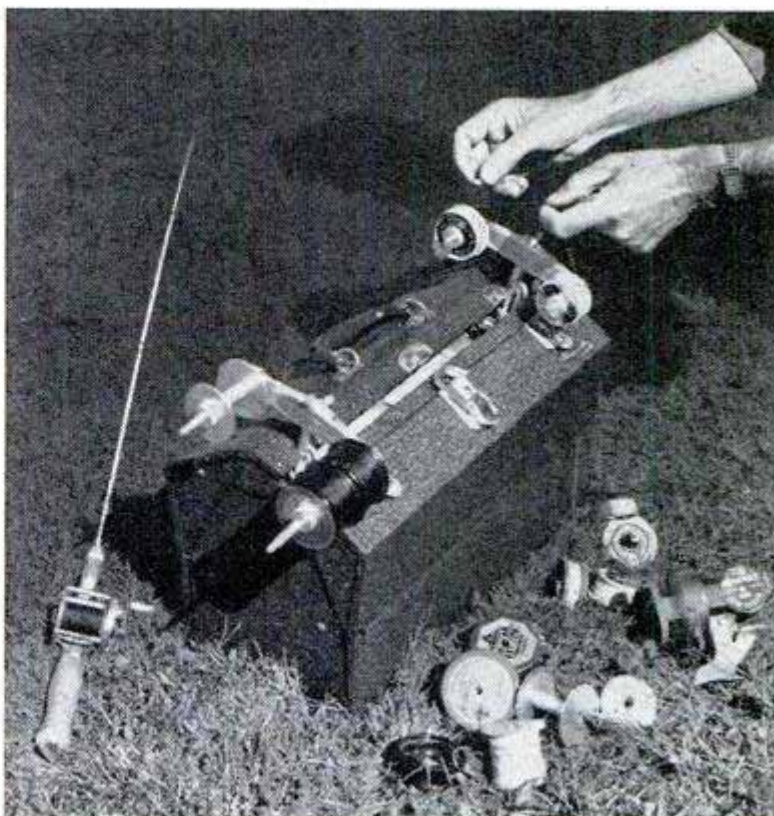
Floating Arm Supports Microphone

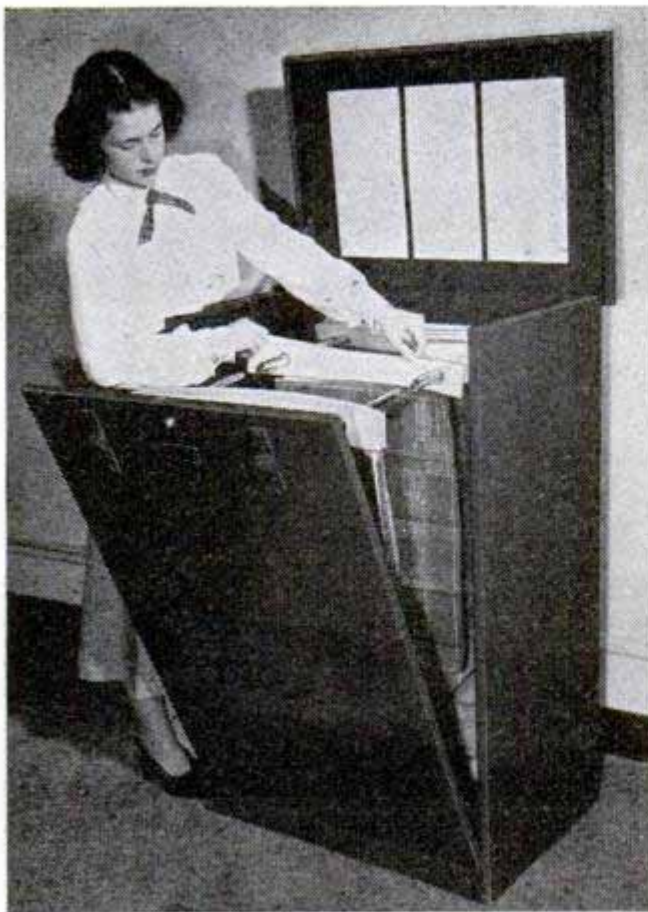
Adapted from an adjustable arm used on fluorescent lamps, a floating support permits movement of a radio or public-address-system microphone to any position instantly and quietly. No lock screws are used. Brackets to fit all makes of microphones are available and the support can be used with or without a floor stand.

Winder Takes Snarls and Kinks Out of Fishing Line

Twisted fishing line—frequently the cause of backlash and snarl—is eliminated by a new line winder that can be attached to the tackle box. The winder consists of a series of spools and a crank. It can be used to wind new line from its spool to the reel, for removing line when the reel is to be cleaned and oiled or for reversing a used line to move the “work end” to the bottom of the reel as filler. The spools on the line winder serve to store extra line. The winder is designed especially for use with spinning-type reels, and winds the line on them so evenly that a spinning spool will hold from 10 to 25 percent more line.

□ Paper pillows stuffed with shredded paper are being offered to overnight railway coach travelers in England on an experimental basis.



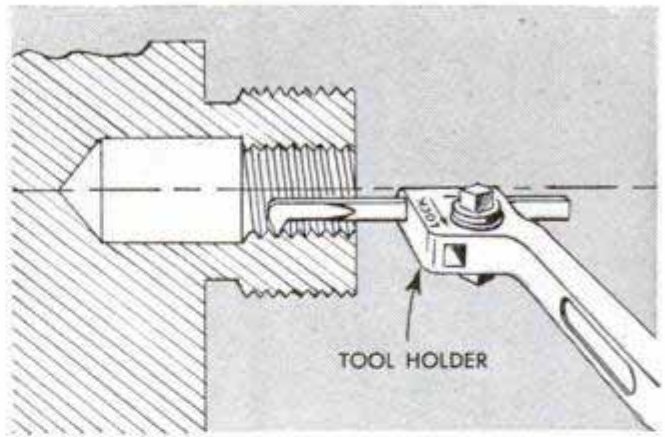
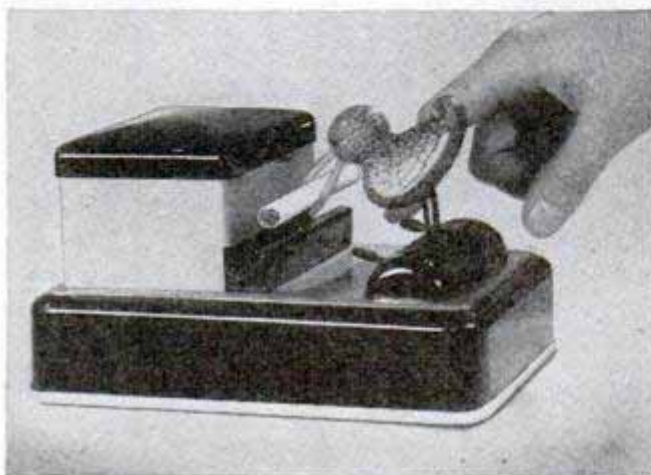


Cabinet Files Unfolded Blueprints

As many as 1000 blueprints and drawings can be filed in a fire-resistant steel cabinet which holds large sheets without folding. The prints hang smoothly and can be indexed. When the front panel is opened, the two suspension rods slide apart, permitting any one of the prints to be removed or inserted in its indexed position.

Duck Delivers Cigarettes

Cigarettes are delivered in push-button fashion by a tiny duck that dips into a disappearing drawer when a lever is pressed and comes up with a cigarette in its bill. The hopper, which takes both standard and king-size, holds slightly more than a package of cigarettes. There are two operating levers, one on each side of the bird.

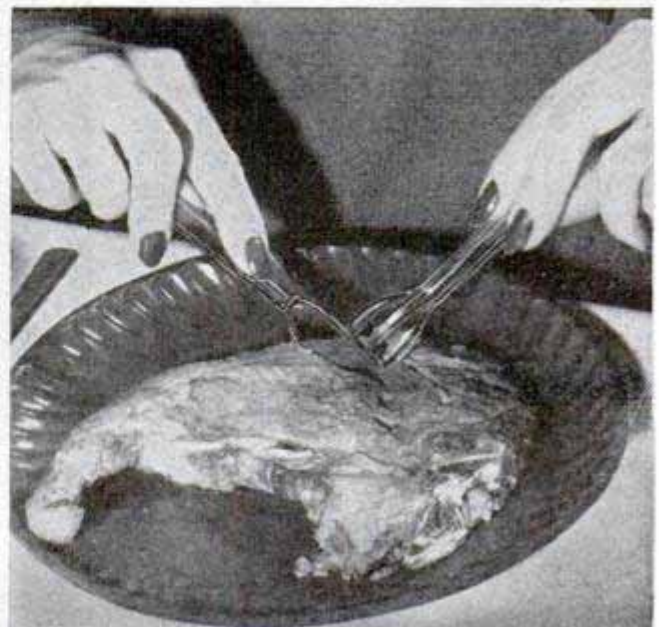


Multi-Purpose Tool Holder Can Be Reversed in Tool Post

Capable of a variety of jobs from shoulder turning to internal boring and threading, a multi-purpose tool holder replaces the large number of holders generally required for the workshop lathe. Because the holder has two tool-bit openings and can be reversed in the tool post, it makes possible a wide range of work including both right and left-hand operations. A quick-change bit-locking device allows the operator to change from one setup to another in a few seconds. Bits can be removed for sharpening without disturbing the position of the holder on the tool post.

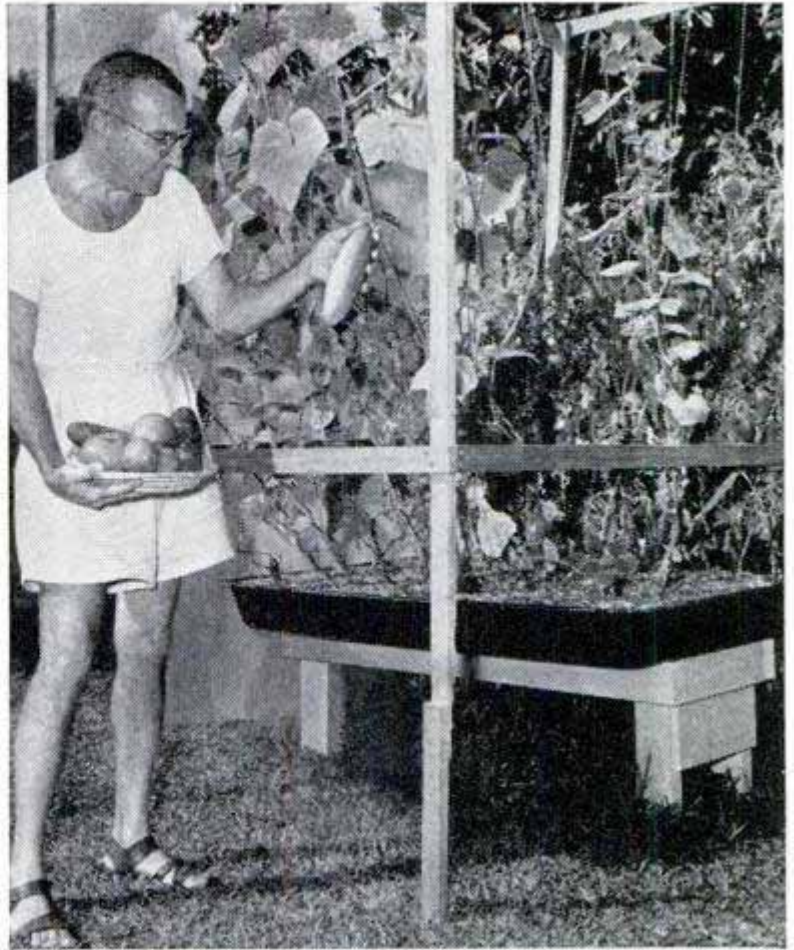
Plastic-Surfaced Paper Plates

Paper plates coated with plastic won't soak up any food, oily or watery, and have a surface that is hard enough to cut steak on. A thin film of odorless, tasteless plastic is bonded to heavy paper board to make the plates. They are manufactured in two colors and three different sizes. Plastic knives, forks and spoons also are available. The blade of the knife is sharp enough to cut meat.



Soiless-Garden Kit For City "Farmers"

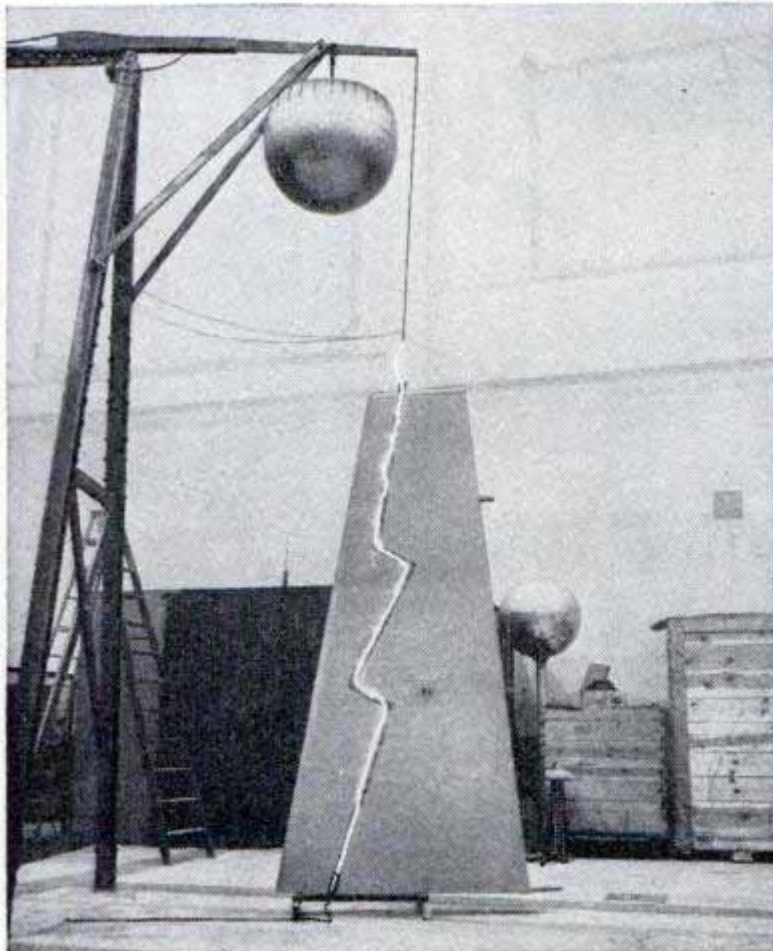
Even though your back yard is paved with concrete, you can still have a vegetable or flower garden, thanks to a soiless-garden kit that produces good crops with a minimum of work. The kit includes a large plastic bed with drain fitting, a short length of hose and a baffle strip. You fill the bed with gravel, crushed rock or cinders and you're ready to raise a crop. Chemical plant food is dissolved in water and sprinkled over the bed twice daily. The solution drains through the hose and is reused for several weeks. Plants are set 10 to 15 times closer than they can be in soil, thus giving you a much larger garden plot than the size of the bed would indicate.



Radio-Frequency Checker

With a new instrument no larger than an egg crate, engineers can discover when a radio station is broadcasting off its assigned frequency by as little as five cycles in a million. The monitor counts electrical impulses per second. In addition, it measures the amplitude of the waves being broadcast

and the amount of power being transmitted. The instrument, developed by General Electric, is about half the size of equipment now in use for the same purpose.

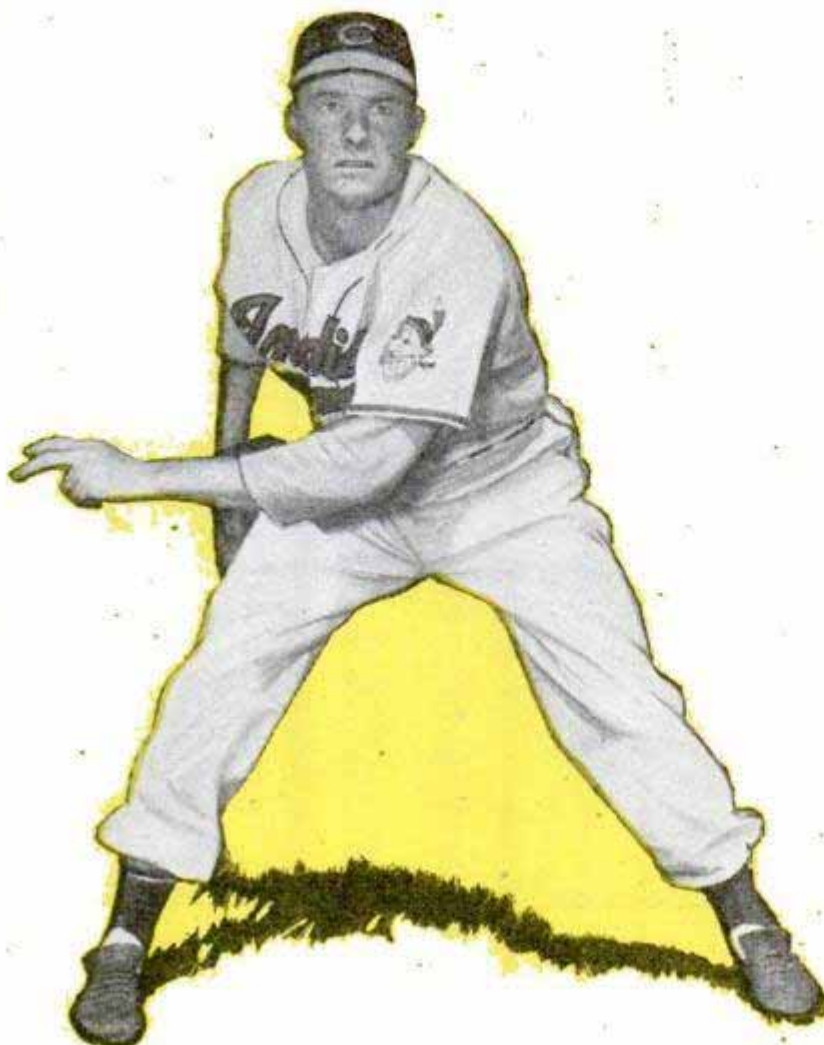


Paint Conducts "Lightning" Across Glider Elevator

Part of an experiment to determine a means of protecting airplanes from lightning, a two-million-volt charge of electricity was shot across a glider elevator without damage. The charge of man-made lightning was conducted harmlessly across the plywood elevator by a stripe of conducting paint. The stripe was painted in a zigzag shape to demonstrate how the high-voltage charge will follow the conductor around a sharp bend.

Plastic-Coated Work Gloves

Hands are protected against acid, alkali, heat and flame by a plastic-impregnated work glove. It conforms to the hand's natural grip and is washable. In tests the plastic-toughened glove has demonstrated higher electrical insulation qualities than gloves coated with rubber of the same thickness.



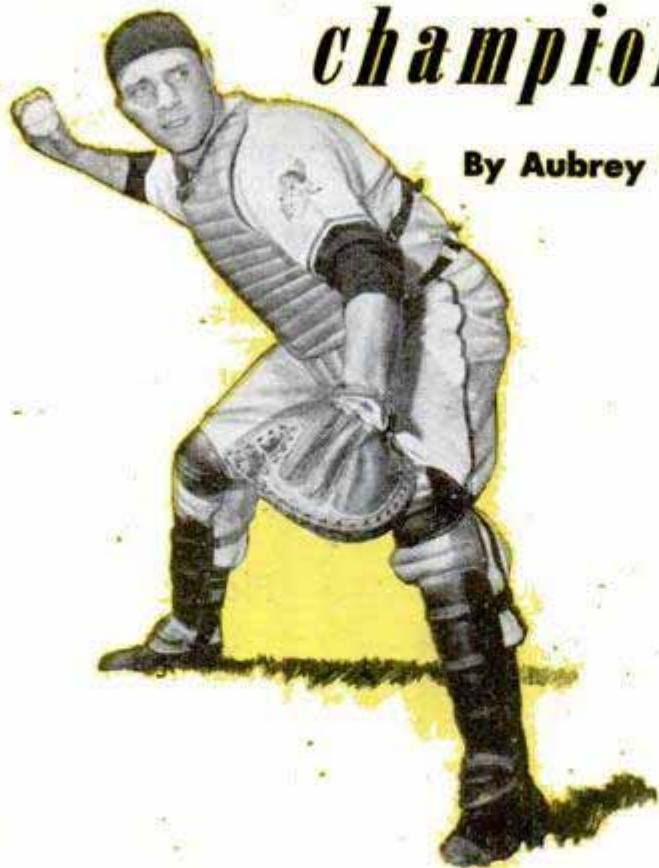
WHAT does it take to be a big-league pitcher?

Experts in the best position to observe, like catcher Jim Hegan of the world's champion Cleveland Indians, generally agree that speed and control are the biggest factors. The game's great have varied widely in size, shape and temperament, and many were famous for a particular kind of pitch, but every one had better-than-average speed and fine control.

Hegan knows how star hurlers perform. He catches a Cleveland staff that has been called the best ever assembled on one team. Two of its members, Bob Lemon and Gene Bearden, were 20-game winners last season. A third, Bobby Feller, with nearly 200 major-league victories and over 2000 strikeouts to his credit, ranks as one of baseball's all-time greats.

Take a lesson from champion pitchers

By Aubrey O. Cookman, Jr.



Above, demonstrating the proper position for a pitcher at the finish of his delivery — ready to move in either direction for a batted ball—is Gene Bearden of Cleveland. In '48 he won 20 games for the world's champions

Left, catcher Jim Hegan selects speed and control as two main attributes for a star pitcher. Indian staff he catches is one of the greatest ever assembled



Elaborate windmill windup wastes a pitcher's energy. Here Bob Lemon illustrates, from left to right, three stages in the smooth delivery with which he pitched 294 innings last year to top the American League

A government timing device clocked Feller's fast one at 99.5 miles an hour. Batters have a split second to decide whether or not to swing with the ball hurtling toward them from only 60 feet 6 inches away—the distance between the mound and home plate. But even with his natural speed, Feller couldn't climb to stardom until he mastered control.

Some pitchers laid the groundwork for good control as youngsters by throwing for hours at a time at stationary targets. Some would pitch stones or balls at a hole in the fence. Others have rigged up "picture frames" of canvas or poles, with a 17-inch-wide and 38 or 39-inch-high opening representing the strike zone for an average-size batter.

Reduced to its simplest explanation, pitching skill is the ability to throw consistently what the batter least expects or wants. Watching the pitchers work from Hegan's vantage point behind the plate, you get a better idea of the finesse that makes a champion.

Deceiving sharp-eyed big leaguers takes grade-A performance at all times. In their constant duel of wits, the pitcher can't afford to give the hitter an inkling as to what kind of a pitch he'll serve up. Coaches and rival players are watching him constantly for telltale signs.

Unconscious mannerisms sometimes betray a rookie pitcher's intentions. George Earnshaw of the Philadelphia Athletics originally had a habit of scuffing ground around the mound with his toe when catchers flashed the curve sign, while the call

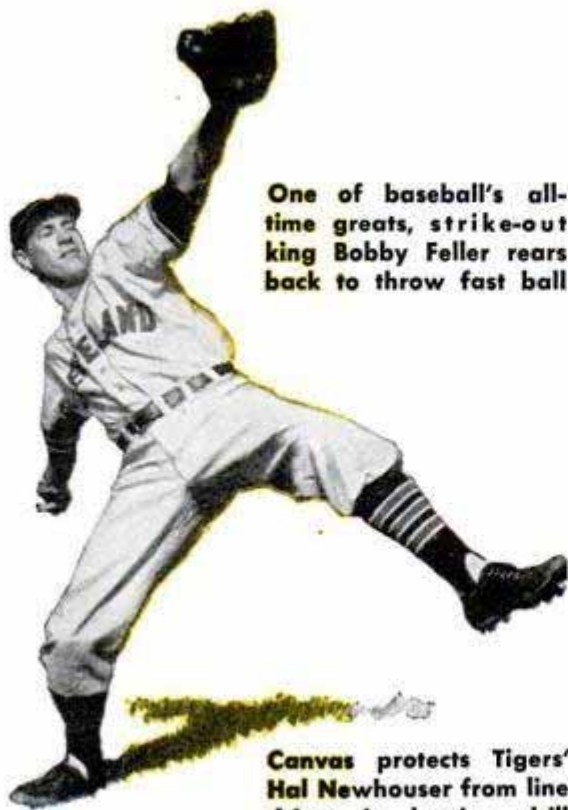
for a fast ball brought no such response. Until corrected, it was like posting an announcement each time for the hitter.

Urban "Red" Faber of the Chicago White Sox, a famous spit-ball pitcher, would overdo preparations for the saliva-applying operation when he was faking his favorite delivery. Opponents noting the exaggerated facial contortions could be reasonably sure Faber's wicked "spitter" wasn't shortly coming their way.

Babe Ruth, in his youthful pitching days, would unconsciously stick out his tongue when preparing to throw a curve. Others have unknowingly tipped off rivals by hitching up their shoulders prior to a certain type pitch, or crooking their wrist significantly during the start of the windup.

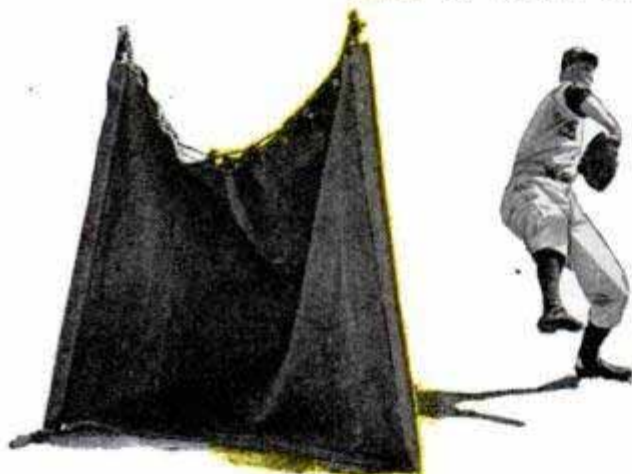
Managers and coaches are always on the alert to detect and correct these faults in their players. Occasionally a cagey pitcher will use these "giveaways" to his own advantage in double crossing rivals. Dizzy Dean used to allow the opposition to "discover" his preliminaries for a certain type pitch, adding to its authenticity by using it a few times in the expected manner, then crossing them up at crucial moments by switching at the last minute to a completely different kind of pitch.

Coaches teach youngsters to deliver all pitches with the same motion, generally a three-quarter style, about midway between sidearm and overhand. Except for a few freak specialty pitches, the fingering—the way the ball is gripped—is basically the same for all pitches. A smart pitcher masks the fingering with his gloved hand.

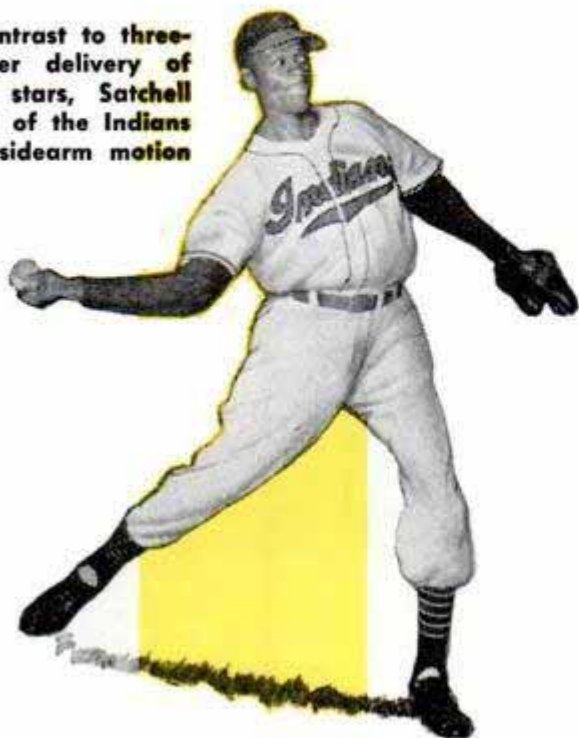


One of baseball's all-time greats, strike-out king Bobby Feller rears back to throw fast ball

Canvas protects Tigers' Hal Newhouser from line drives in batting drill



In contrast to three-quarter delivery of most stars, Satchel Paige of the Indians uses sidearm motion



For about 75 percent of all pitches, the forefinger and second finger are on top of the ball, the thumb is below it and the two remaining fingers fold down against the palm. Most experts advocate gripping the ball across the seams, rather than with them, to get better control.

A fast ball behaves differently from a curve because of the way the ball is released. There isn't time then for a batter to react to the knowledge, even if he had it.

Fast balls leave the hand with a downward snap of the wrist. A good, "live" pitch, in baseball parlance, shoots upward when it nears the batter. One that fails to rise and comes straight, level across the plate, is easy to hit, despite its speed, and it travels farther than breaking-type pitches.

Though held the same, a curve is thrown with an outward snap of the wrist so that the back of the pitcher's hand ends up facing the plate. The ball rolls off the first two fingers. Most effective curve-batters put pressure on the second finger, just before the release, and use the first solely as a guide. The ball has to be made to spin in order to curve.

Some hurlers finger a slow ball, or "change up," just as they do a fast ball or curve, but lift the top two fingers just as the ball is released. When thrown with the same motion as a fast one—except for the last-second wrist snap—it throws a batter's timing off badly.

The sharpest change of pace in baseball today is the "blooper ball" thrown by Rip Sewell of Pittsburgh. It floats platewards so slowly that batters can see the ball's seams and it arches down to them from as high as 12 to 15 feet, but Rip uses it sparingly and hitters aren't able to adjust their timing for solid swings.

Among the most effective "extra" deliveries is the knuckler. Manager Lou Boudreau of Cleveland claims it is the most baffling ball his star Bearden throws. Gene grips it with the nails of his first three fingers and the sphere sails up to the plate with virtually no spin, breaking downward. Some knucklers, like Dutch Leonard of the Chicago Cubs, hold it with two fingers on top, pressing the first joints against the ball.

Carl Hubbell, the former New York Giant southpaw, perfected a screwball that he held just like a curve. The difference was in the terrific inward snap he gave the ball on release, ending up with his palm facing the batter. This spin made the ball act like a reverse curve.

Early Wynn, another Cleveland star, has a bothersome slider which he grips like a curve, but holds slightly off center, and throws with less wrist snap. It breaks several inches but, unlike the curve, it "slides"



Hand of Yankee hurler Joe Page, above, shows his fast-ball grip. Wrist snaps downward as ball is released

away from right-handed batters without also breaking downward.

Some of the more methodical hurlers keep notebooks in which they jot down the data on the batting strengths and weaknesses of rivals. When a hitter like Rudy York displays a liking for pitches that catch the outside edge of the plate, it is pretty certain he'll never get one there when the game is close.

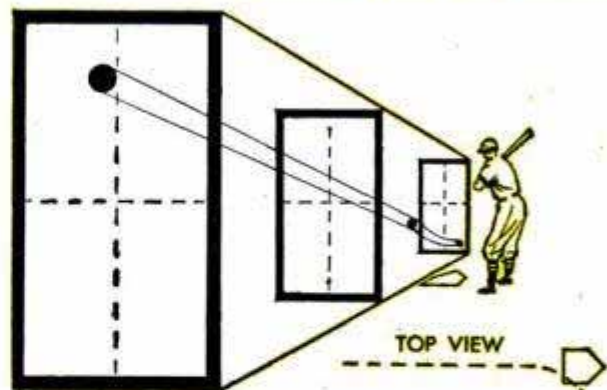
Hurlers have equally long memories for weak points. Feller, who has been playing against Joe DiMaggio for 10 years, thinks the Yankee star normally does the least damage to a ball that breaks low, on the outside corner.

Catchers are important to pitchers in analyzing the batter's stance and swing. This is particularly true when a newcomer is at bat. If he is a plate crowder, the catcher will probably call for balls that break in close to his bat handle. Or, if he stands too far back, the catcher might ask for a curve or fast ball that nicks the corner.

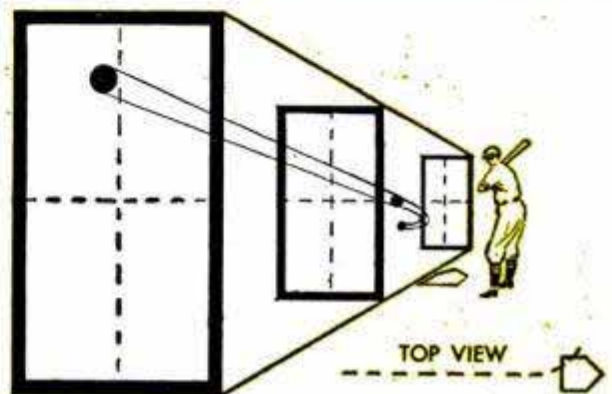
Ewell Blackwell of Cincinnati holds ball with his first two fingers slightly spread, below, for curves and fast one



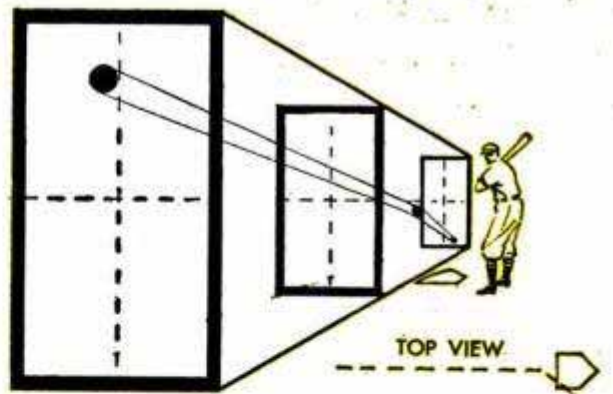
Looking down an imaginary corridor from mound to home plate, drawings below show how ball acts as it nears batter. Strike zone is the 17-inch width of plate and from hitter's knees to his shoulders



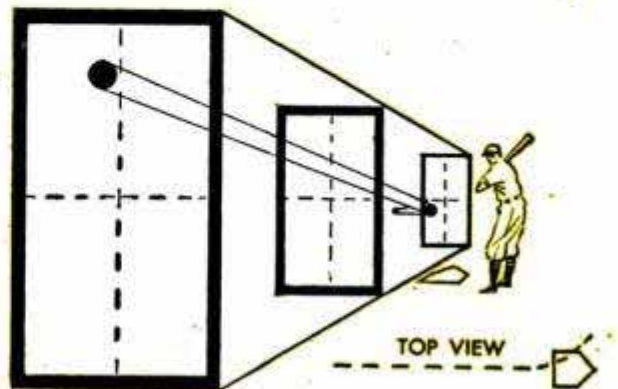
Bearden's knuckler veers downward and to right



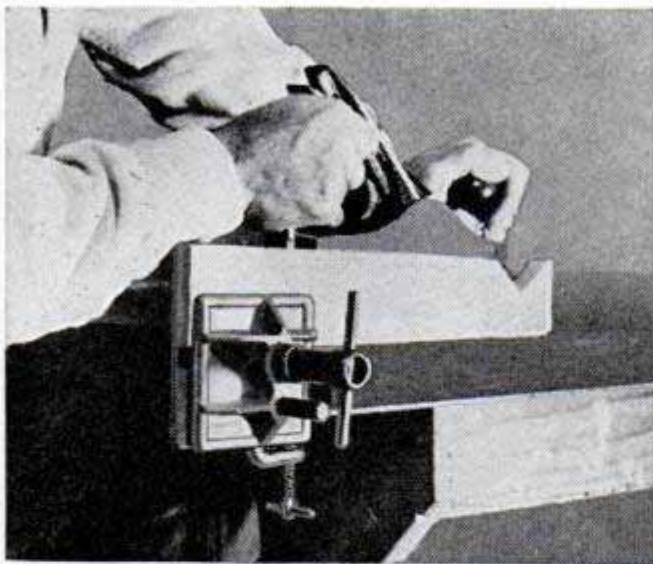
Feller's curve ball breaks both down and to left



Lemon's sinker pitch drops sharply and veers right

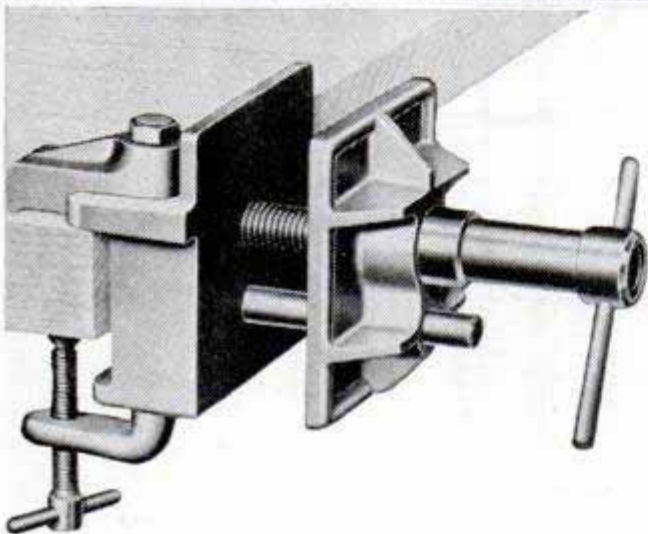


Wynn's slider curves left sharply, but doesn't drop



Sliding Lawn Edger Turns Furrow

Lawns are edged neatly and quickly with a new yard tool that slides along the grass. The depth of the cutting blade is adjustable. A curved plate on the rear of the edger turns the earth and grass aside to leave a furrow along borders. When the edger is used along walks and drives where such a furrow is not desirable, the curved plate can be lifted out of the way. All metal parts of the tool are cadmium plated.

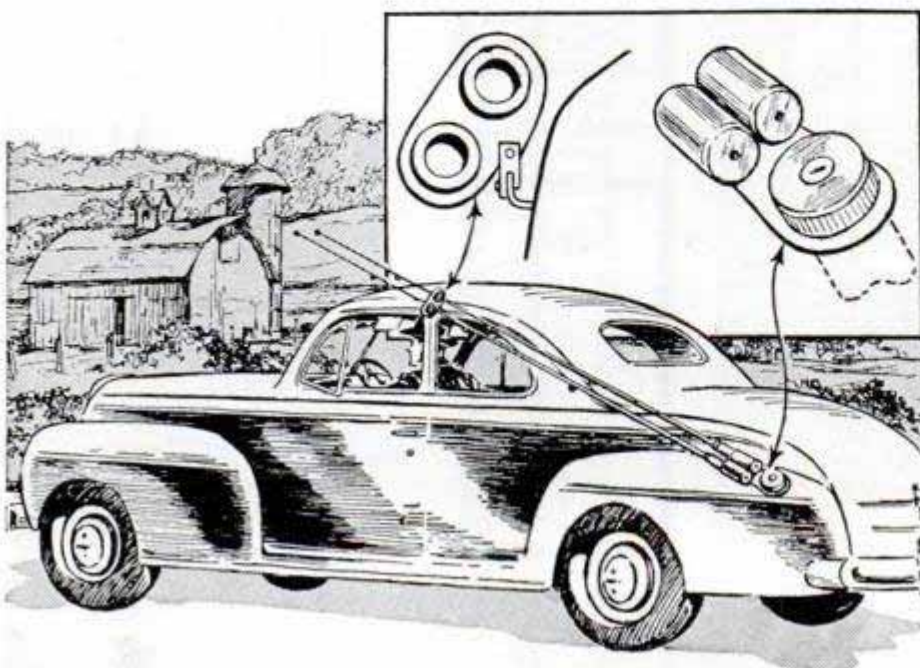


Vise With Telescoping Screw Can Be Carried in Tool Kit

Weighing less than $3\frac{1}{4}$ pounds, a portable vise that fits in your tool kit can be clamped almost anywhere. The main screw telescopes into the drilled handle. A reversible clamp permits clamping the vise to the side or end of a bench or saw horse.

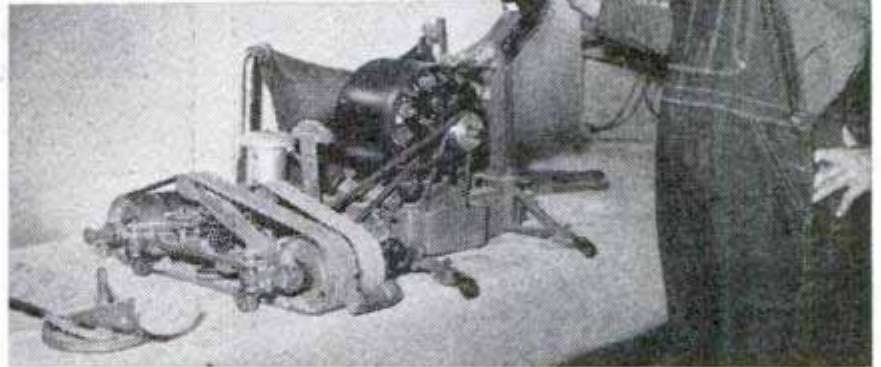
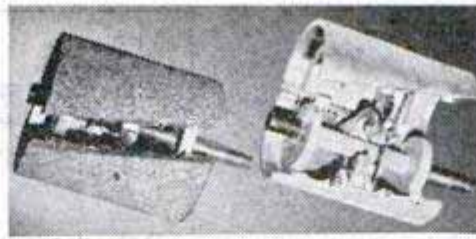
Aluminum Nails Won't Streak Siding

Aluminum nails that will not rust or produce unsightly streaks now are available for the siding and roofing of homes. The metal resists corrosion and its oxides have no objectionable color. An "etched" finish on the entire surface of the nail increases its holding power and helps paint adhere to the head. Used to fasten siding on homes, the nails need not be counter-sunk and puttied. They are available in a variety of sizes for most types of siding.



Fish-Pole Holder Clamps To Car

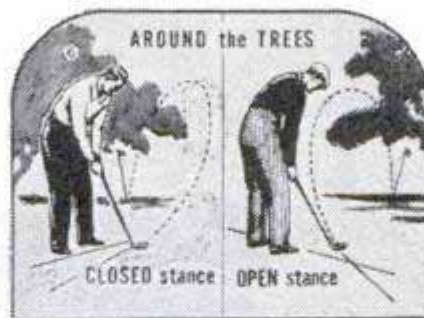
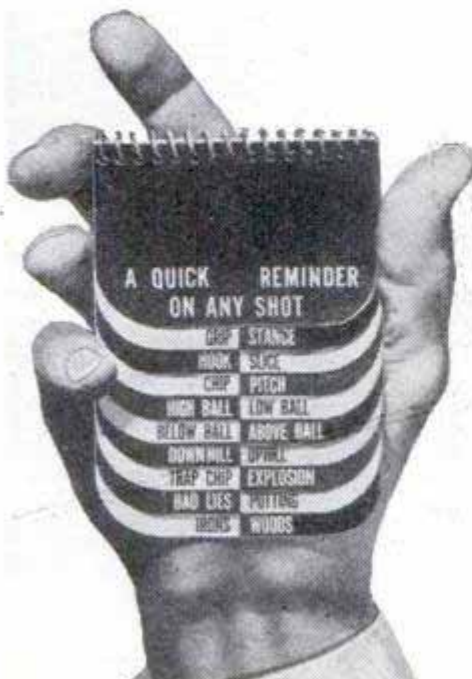
Fishermen who have trouble carrying long poles now can slip them into a holder that attaches to the car. One part of the holder consists of two tubelike pockets fastened to a metal ring. The ring is held in place by the gas-tank cap. Another part clamps above the window of the car. The tips of long poles can be inserted through holes in this part and held securely in the pockets.



Left, the combination sander in its normal position. Right, the two-belt bowling-alley sander. Insert at top shows the new sanding drum. Below, combination sander with side spinner in place for sanding edges

Power Sander Has "Edger" Adapter

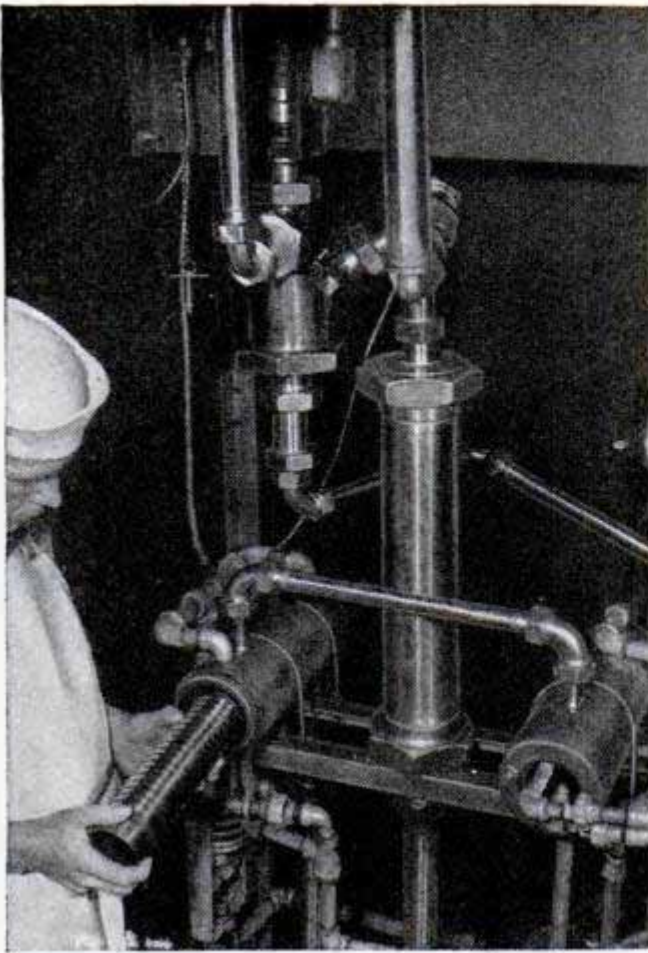
Serving as both a standard floor sander and an edger, a combination power sander has a side adapter that enables it to sand close to the baseboard. Invented by O. E. Hadwiger of Pueblo, Colo., the machine uses a hinged aluminum drum that snaps open for quick replacement of the paper. The adapter consists of a caster-equipped carriage on which is mounted a horizontal sanding disk. Attached to the side of the machine, the carriage supports it when it is tipped on its side for edge sanding. Hadwiger also designed a sander for bowling alleys. Its two sanding belts travel in opposite directions. The sander moves down the alley at a steady speed and reverses when it reaches the end of the alley.



Book Gives Golfers Coaching on Links

Proper club, grip, stance and stroke for every golf shot is described in a booklet small enough to be carried in the hip pocket and consulted during play. Each shot is diagrammed to help the golfer keep a mental picture of the correct swing.

☐ In 1948, traffic deaths in the United States dropped one percent from 32,500 in 1947 to 32,200, but injuries increased eight percent to an all-time high of 1,471,000.



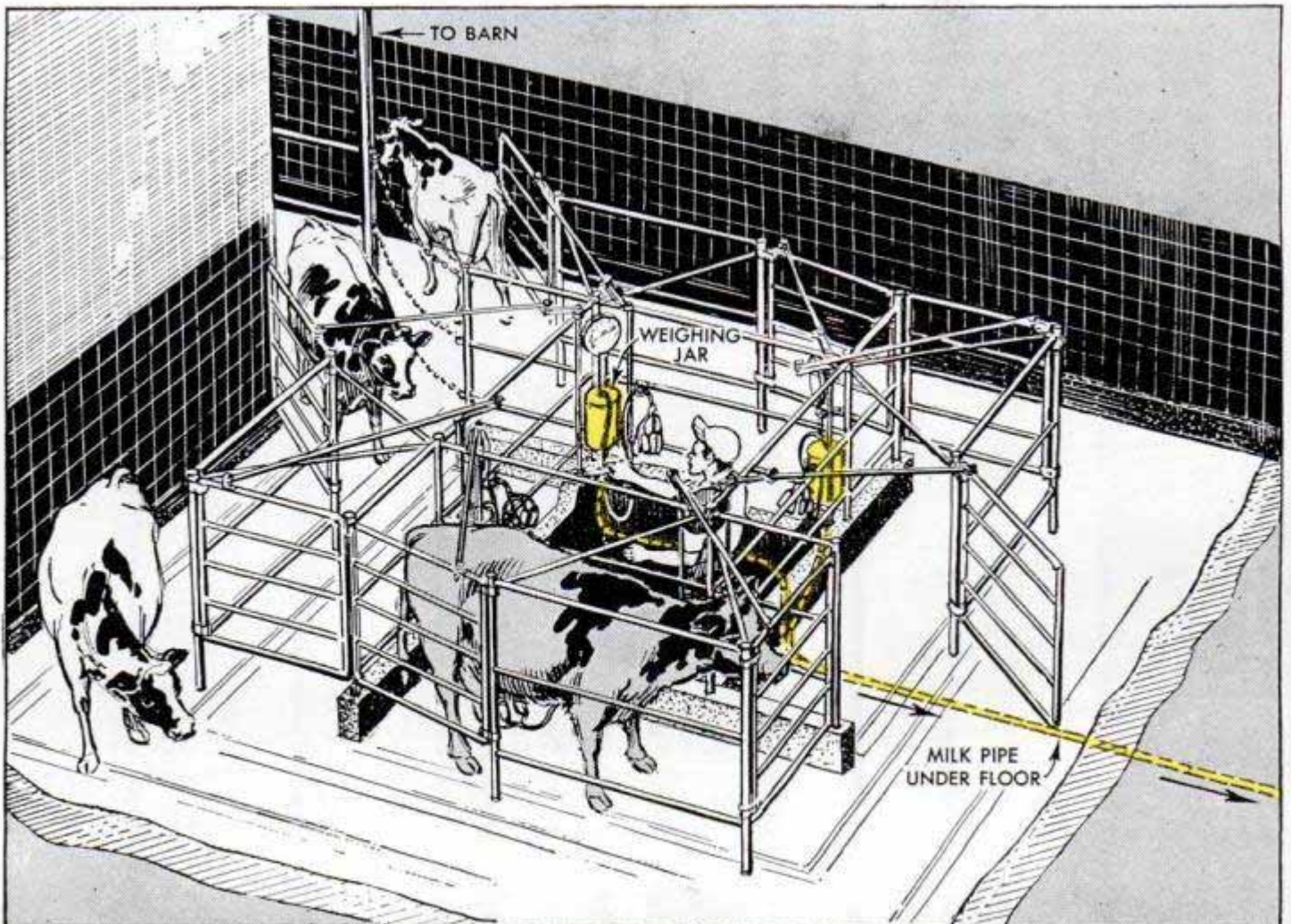
Above, removing the core of the flash pasteurizer which heats milk without burning it. Below, yellow portion of drawing is path of milk from cow to can

Canned Fresh Milk Is Coming



THAT GOOD old American custom of stepping out on the porch each morning to bring in the milk may soon take its place beside the morning jaunt to the well in history books and memoirs. If a fresh-milk canning process under development at an Indiana dairy farm proves successful, housewives may buy milk in cans at the corner grocery just as they buy canned vegetables today.

For years, canners have tried to can fresh milk. The new Stambaugh-Graves process



may be the solution. Developed by Dr. Roy R. Graves, former scientist with the Department of Agriculture, the technique has produced sample batches of milk that kept its fresh flavor several months after it left the cow.

There's a double secret behind the process. First, the milk is produced with an amazingly low bacteria count (less than 500 per cubic centimeter) and is piped from the cow to the can without exposure to the air. Second, a flash pasteurizer, developed by Graves, kills what few bacteria are present without leaving a heated taste.

In groups of four, the cows are milked in a spotless milking parlor and the milk is drawn through pipes into a vacuum tank in the canning room. From the tank, the milk goes through a homogenizer and the new flash pasteurizer where it is heated to 190 degrees. The pasteurizer consists of two steam jackets between which the milk is forced in a fast, turbulent stream to prevent scorching. Spiral grooves in the core section create the turbulence. A diversion valve sends the milk back into the tank for repasteurization if, for any reason, the temperature is not high enough to meet the requirements of the process.

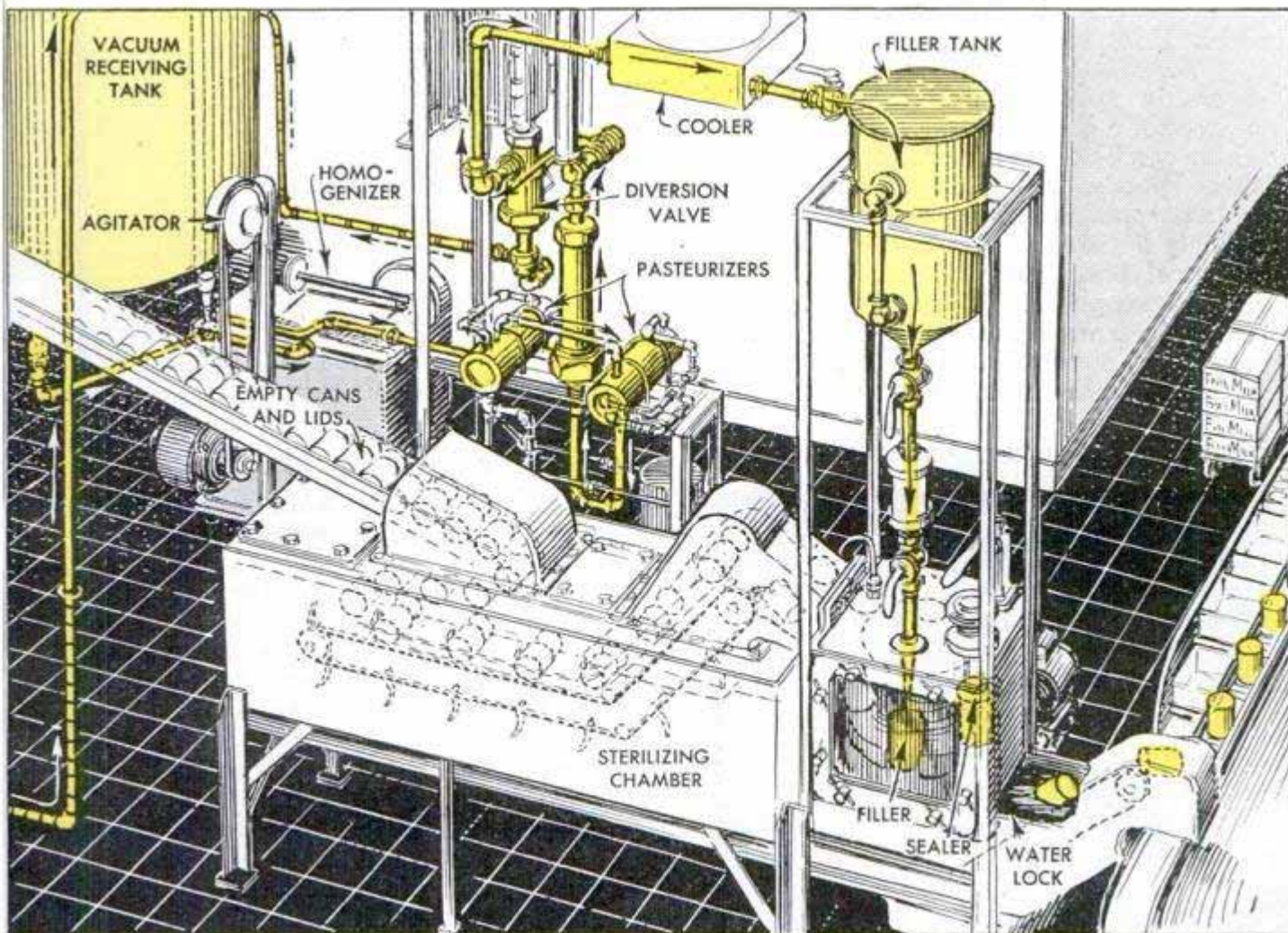
After partial cooling, the milk is piped to a tank on the canning machine. A positive pressure of nitrogen inside the tank and

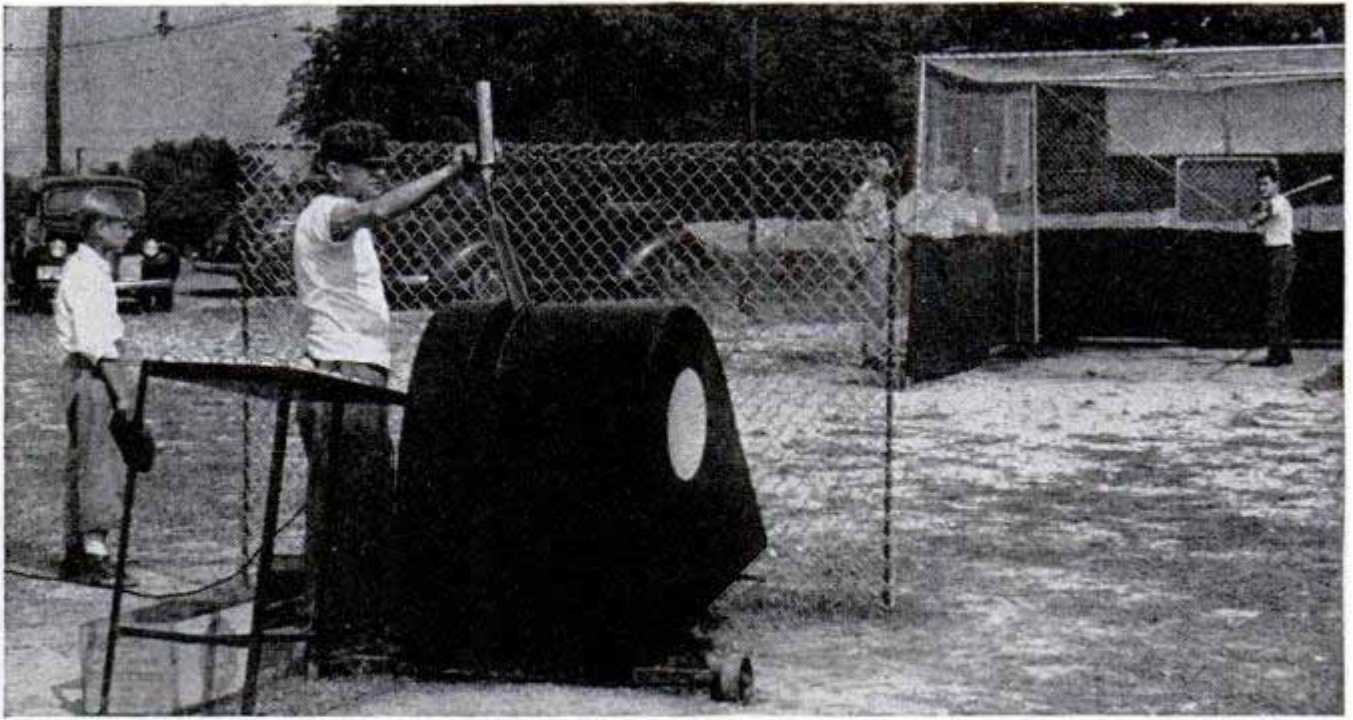
canning chamber of the machine keeps all air away from the milk. After a final sterilization inside the can, the milk can be stored at room temperature.

Still not perfected for commercial production, the system has produced test milk that tastes fresh after several months. The big unknowns as yet are the best preheating and sterilization temperatures. Because milk has to be heated to high temperatures so that it will not lose its fresh flavor over long periods of time, the problem is to do this without spoiling its delicate taste.

The pilot-model canning machine, provided by the Continental Can Co., sterilizes the cans and covers in boiling water before they enter the filling chamber. This is standard aseptic canning procedure. The canner's problem is to determine the best lining for the can so that no tinned flavor will be given to the milk.

These problems can be solved and Graves is sure that canned fresh milk is coming. When his process becomes commercially practical, you'll buy fresh milk at the store by the case. Distribution problems will be simplified since canned milk can be handled like any canned food. When you're ready to use it, you'll chill the can in the refrigerator and the milk you pour will look and taste just like the milk you used to get down on the farm.

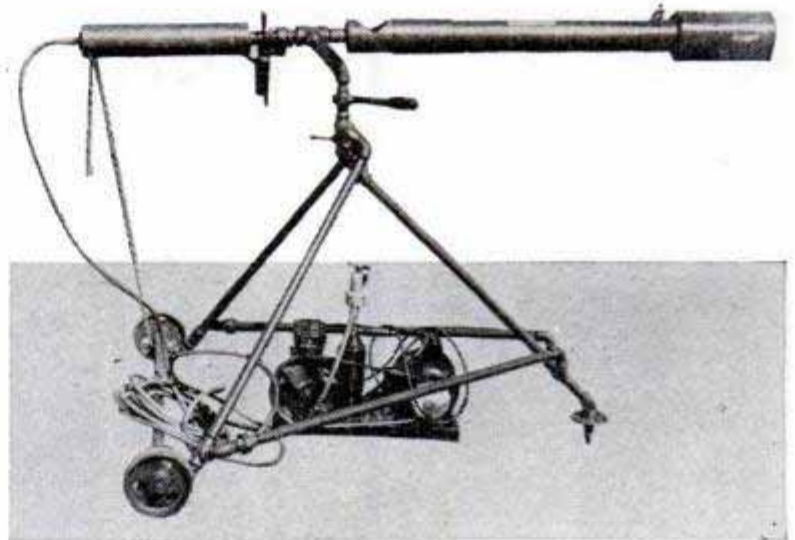




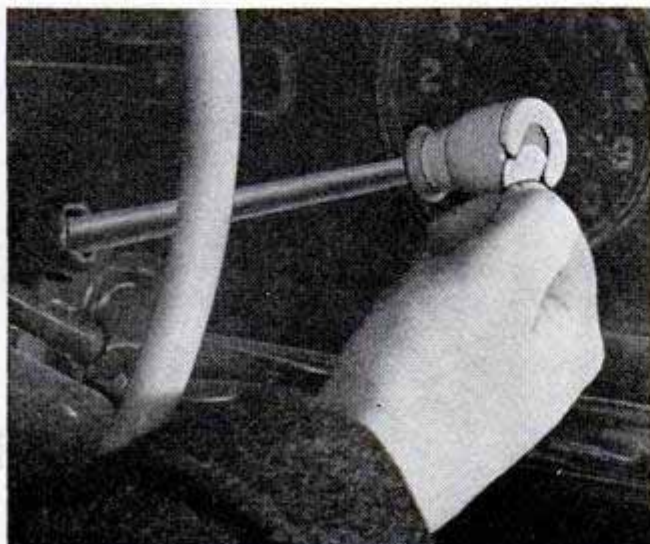
Mechanical pitchers, like the one being "loaded" above, are making public batting ranges popular in the East. The screen protects the operator. Below, a compressed-air pitching gun

Mechanical Pitchers For Batting Practice

Delivering an overhand fast ball that is always over the plate, a mechanical hurler can pitch all day without tiring. The machine, unlike the gun-type mechanical pitcher, throws with an overhand motion that enables the batter to time his swing just as he does in a ball game. Used by the Brooklyn Dodgers in spring training and also at public batting ranges, the machine can be set to throw at any of three speeds. The pitches have an unusual spin that gives them an extremely flat trajectory. Another mechanical ball tosser resembles a long telescope that is mounted on a tripod and fires baseballs by compressed air. A muzzle on the tube can be adjusted to make the balls curve, spin and



thus throw a curve in any desired direction. The device is also used to throw grounders, flies and line drives for field practice.



Coin Holder on Gearshift Lever

Small change for parking meters, toll bridges and newspapers is kept handy for the motorist by a gearshift coin holder that replaces the knob on the shift lever. Made of a plastic, the coin holder has a coiled spring that feeds the coins toward the removal slot. It will take any coin from a cent to a quarter in any sequence.

By quick-freezing bacteria and evaporating the ice under a high vacuum, Department of Agriculture veterinaries have preserved for more than nine years the cultures necessary for inoculation of cattle against shipping fever.



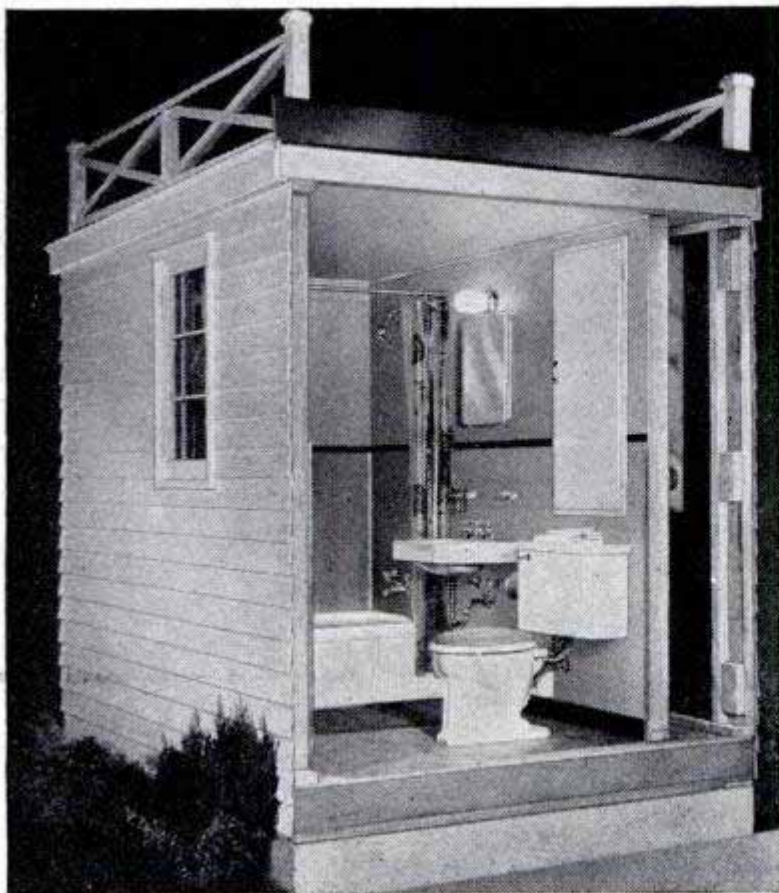
Driving Light Inside Grille Turns With Front Wheels

Designed to fit inside the center circle of the new Ford grille, a driving light swings laterally as the wheels are turned, illuminating the road when the car goes around a corner. The light is a Sealed-Beam fog-light unit with a clear lens. Because it swings about one third faster and farther than the wheels, the light shows the driver what's around the corner. A disconnecting mechanism frees the light's turning mechanism should the unit become frozen in the grille by an accumulation of ice or snow during winter driving.



Sidewalk Automat

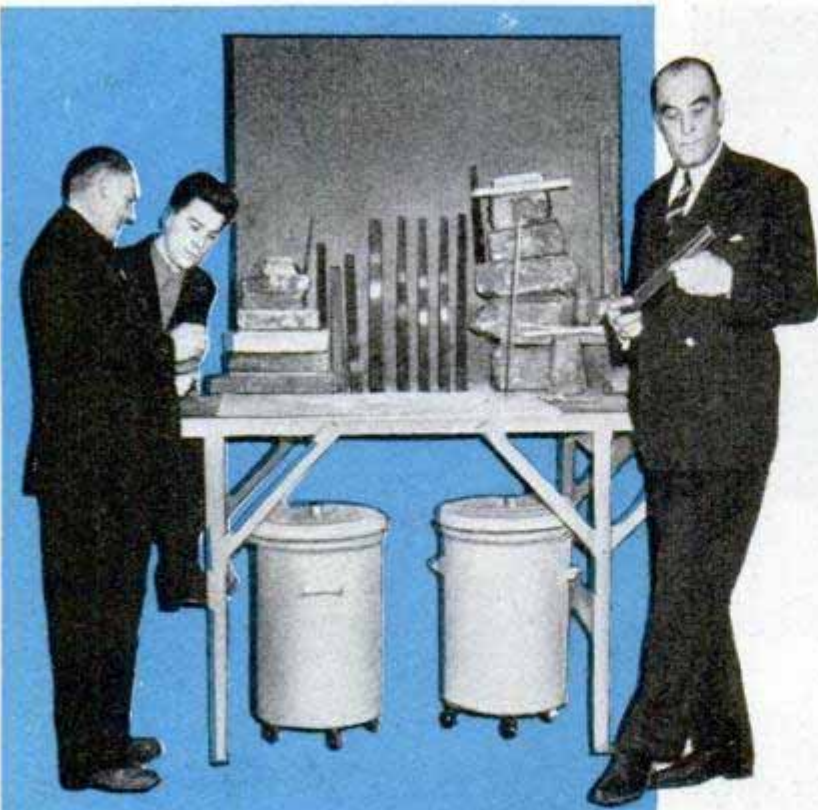
Holland has copied New York City's Automat and moved it outdoors. The coin-operated cafe takes up the entire front wall of a small restaurant. You drop in your money and take your food to a nearby table on the sidewalk.



Bathroom for Home Shipped As a Unit

Shipped as one big package, an extra bathroom for your home comes complete with everything from a linen cabinet to a built-in electric heater. All fixtures are factory installed and adding the room to your home requires only four connections, one electrical, two water and one for the soil pipe. Of frame construction, the bathroom unit is insulated on walls, ceiling and floor. A specially designed connection assures a tight, permanent junction to the exterior wall of the house, whether it is frame, stucco, brick or veneer.

Many of the products described in this issue are already available or are ready to be marketed. For the names and addresses of manufacturers or distributors, turn to the WHERE-TO-BUY-IT INDEX, starting on page 10



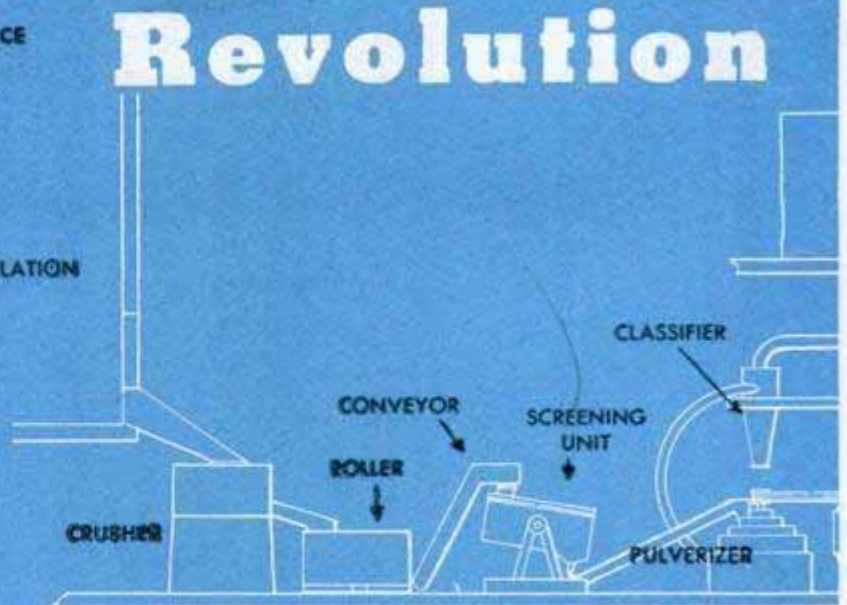
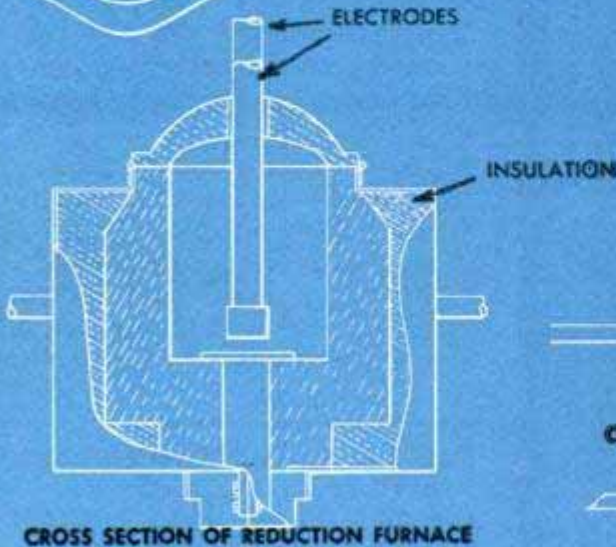
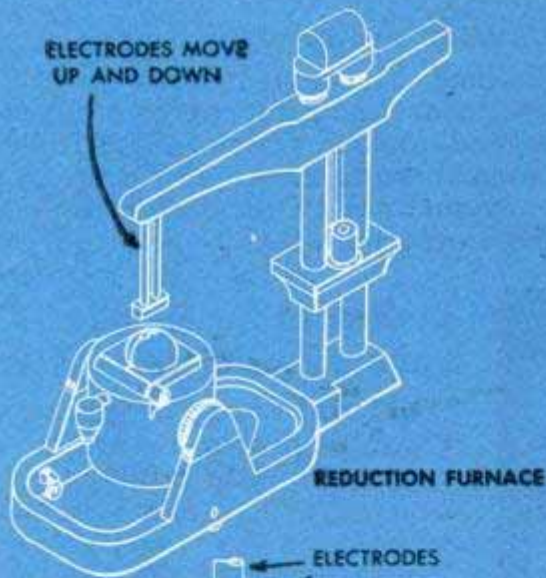
Dudley (at right) and assistants examine some of the pig iron and stainless-steel bars the little steel mill can turn out in a few minutes

IMAGINE a factory that produces any kind of finished steel within an hour of the time ore is poured into the machinery. Imagine a steel mill that converts any type of iron ore, even the lower grades, into pig iron or stainless-steel bar—and does it without smoke, noise or dust.

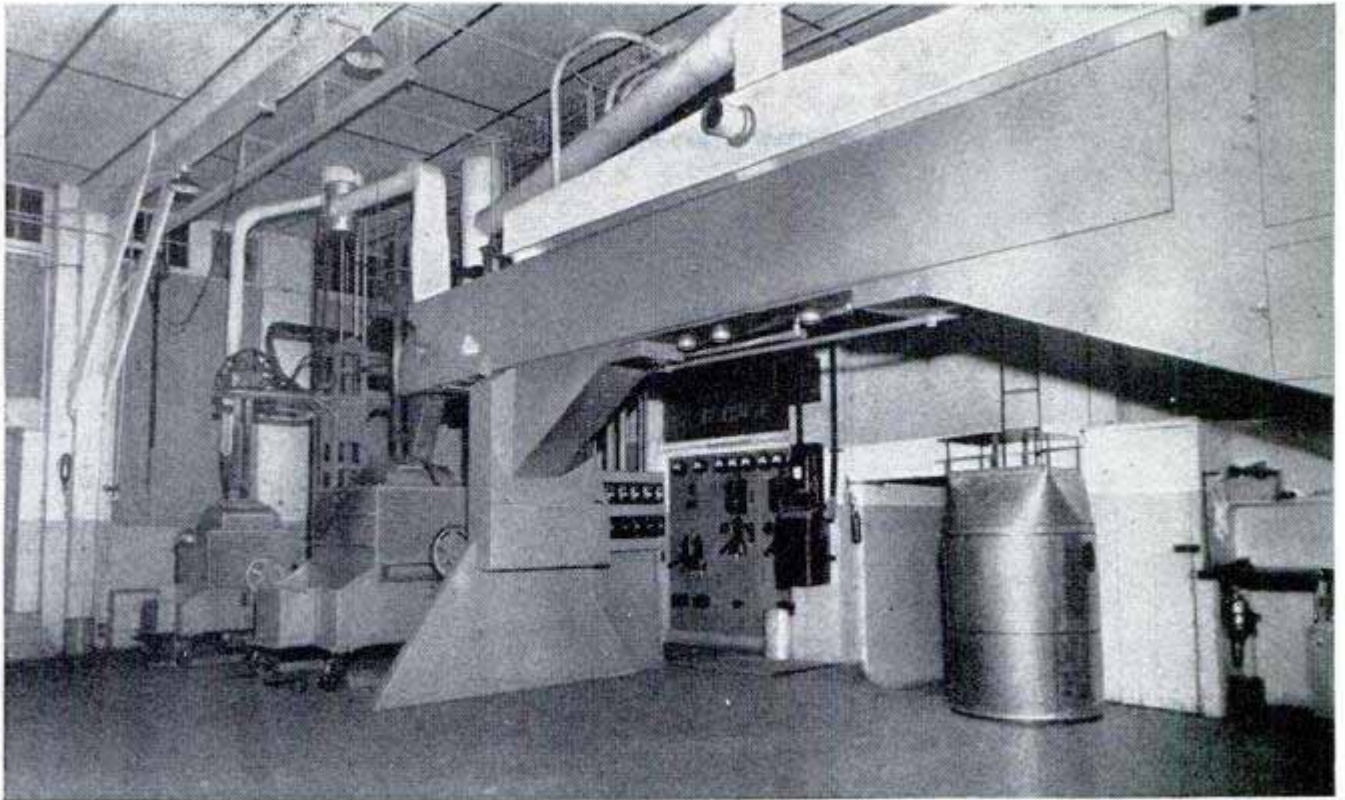
Such a steel mill exists—a pilot plant in Canada that may be the forerunner of similar plants. They could produce any type of processed steel right at the locations where the ore is mined. The pilot plant at St. Johns, Que., is as spick-and-span as a modern metropolitan shop and occupies an area measuring only 55 by 60 feet.

The new process, which could produce a steelmaking revolution, is the invention of Walter E. Dudley, who has demonstrated publicly that he can pour a batch of low-grade ore into one end of his machinery, talk for an hour or so and then pick up a finished bar of stainless or high-grade tool steel from the other end. Furthermore, he says it is possible to produce higher grade and higher heat-resisting steels or metals than those now turned out by conventional processes.

Timing, weight transit and heat control form the heart of the Dudley method. Dudley moves a definite amount of ore through the machinery at a rate timed almost to the split second. He thereby saves the valuable time generally lost in heat-



Revolution



Long enclosure in this "assembly line" is the preheating oven. Beyond is the efficient little reduction furnace

ing, cooling and reheating the material.

Ore, weighed to exact poundage per minute, is transferred into the crusher, where it is crushed to small particles. Clay and sand ores may be used without crushing, but must pass through the pulverizer.

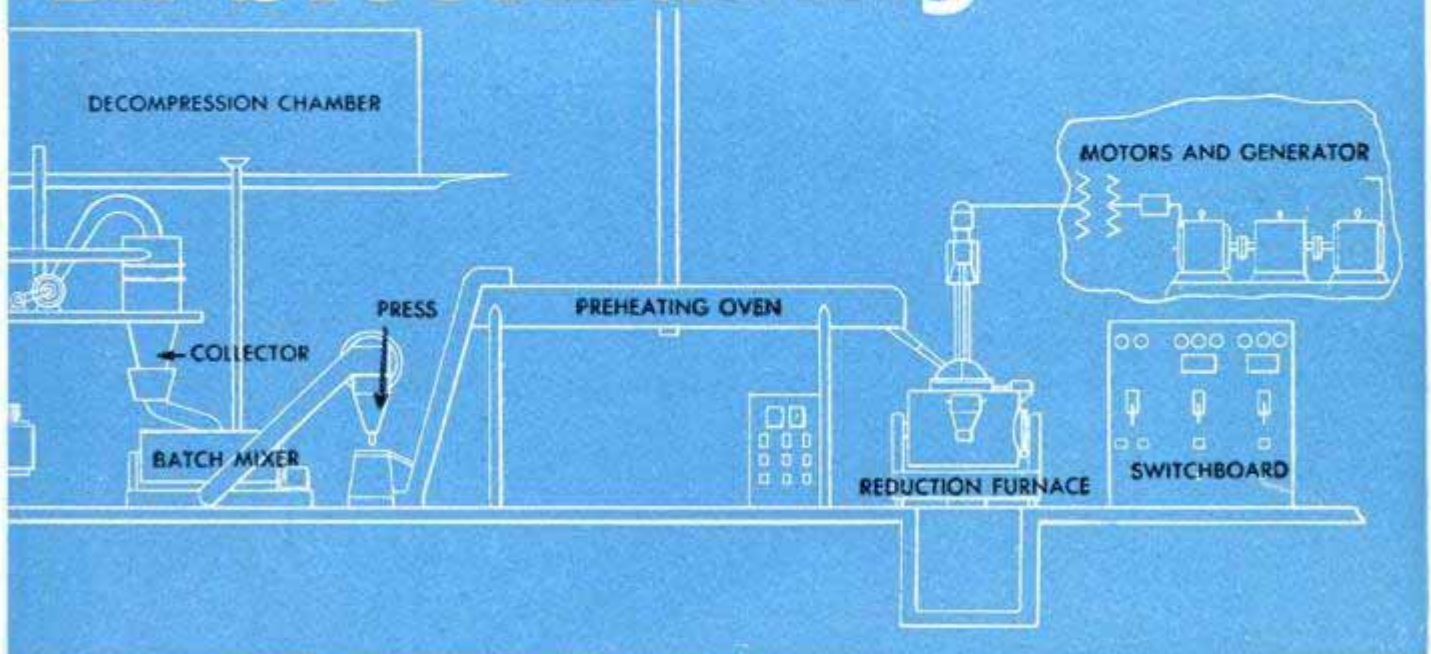
After leaving the crusher, the ore passes through a set of rolls, then on to a screening unit where the particles are sized. The particles then travel to a pulverizer, where they are reduced to a fine powder—300 mesh or finer. Inside a classifier these particles are sorted even further and air that

has been introduced into the powdery mass is eliminated. All ore except the very finest dust particles is reclaimed, thus keeping the weight virtually unchanged.

This powdery mass of ore then pours into the batch mixer where it is thoroughly combined with ingredients that include material for binding the powdered ore into briquettes, and reducing agents that yield iron from ore inside the furnace. These ingredients are mixed with the ore to produce a moist mass.

The ore then passes through a mechanical

In Steelmaking



device that spreads it evenly upon a traveling preheated belt conveyor, which carries it to a press. It is then pressed into briquettes about $\frac{1}{2}$ inch in diameter. From there the briquettes are carried, still on a minute-poundage basis, to a preheating oven about 25 feet long. At the beginning

they are subjected to a temperature of about 200 degrees, but by the time they drop from the oven to the furnace the temperature is 500 degrees.

The briquettes fall through a metal spout which is discharging the heated gases from the furnace. The actions of the furnace's electrodes and the preheating belt are closely timed. When the hot electrodes go down, the oven stops delivery; when they rise, the oven begins delivery.

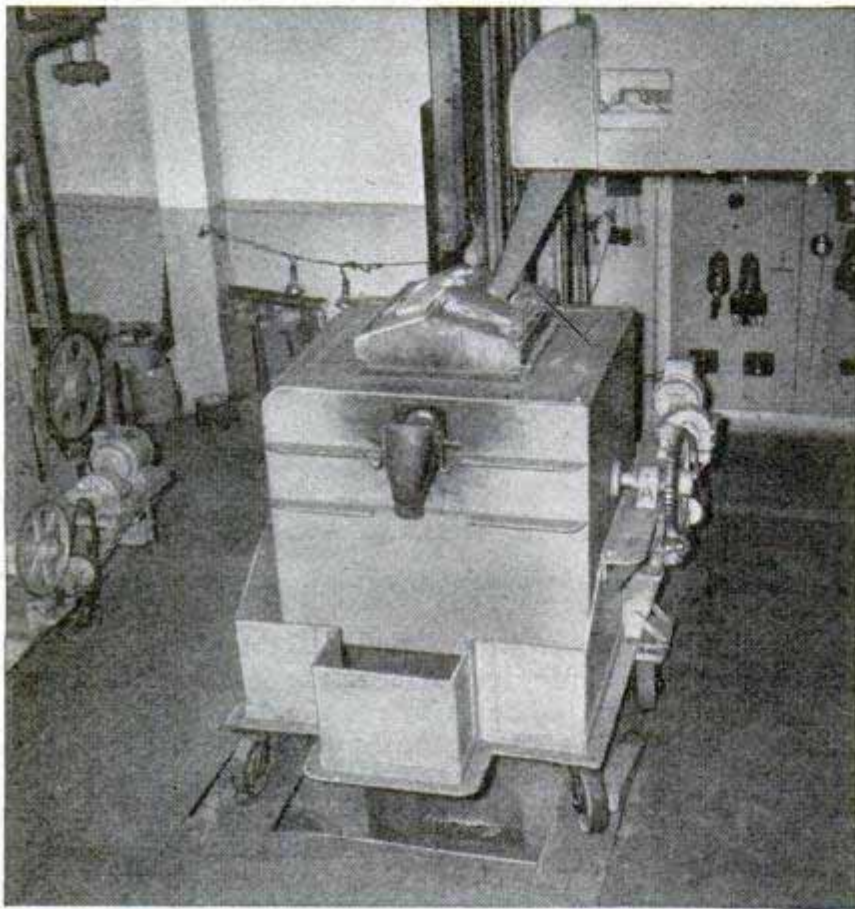
This reduction furnace, which corresponds to the blast furnace in conventional operations, deserves special attention. Electric current plus the reactions of the reducing ores, produce a temperature of 3000 to 7000 degrees with maximum efficiency, yet if you touch the outer shell of the furnace with your hand, you'll find it to be room temperature. The secret is a special type of insulation that holds all the heat in the melting zone of the furnace. Because the operation is continuous, the furnace is small and can be operated at the ore source.

At this stage in the process the furnace has converted the ore briquettes into molten iron, which is poured off at definite time intervals. The resulting pig iron may be shipped out for later use, or can be poured, still in a molten stage, into a small refining furnace. In this furnace the iron is processed to produce any type of steel.

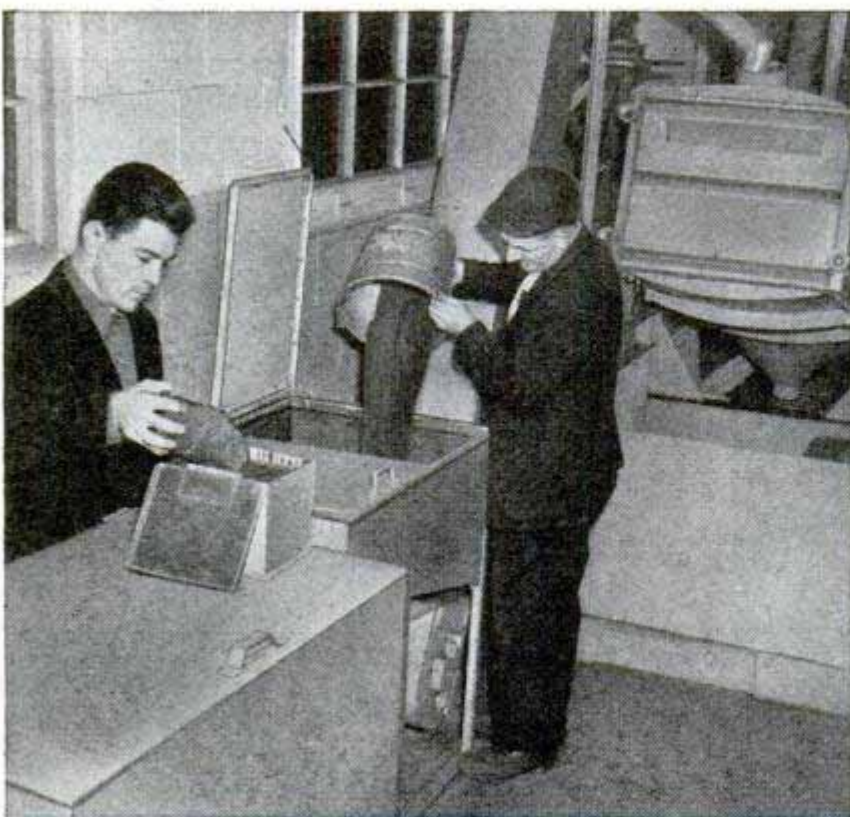
The capacity of Dudley's pilot plant is small — 500 pounds of low-grade steel or 100 pounds of high-grade steel per hour—but the product can be turned out at a cost which Dudley says is below conventional methods.

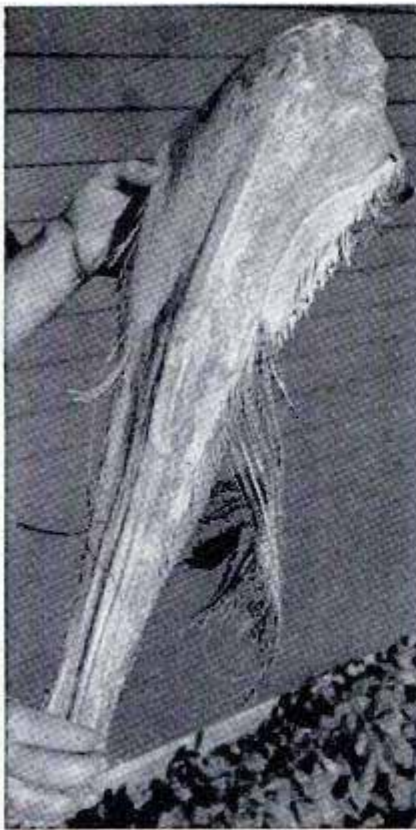
Such plants might be moved right to the low-grade ore beds to turn out steel billets. Thus, only the steel instead of a large mass of ore would be shipped.

With the equipment operating at a continuous high speed, the operator can pour finished steel bars or billets every half hour.



Reduction furnace has hot electrodes that move up and down at timed intervals to heat the ore briquettes. Below, ore is fed into the crusher. The assistant at the right is inspecting the resulting powdery mass

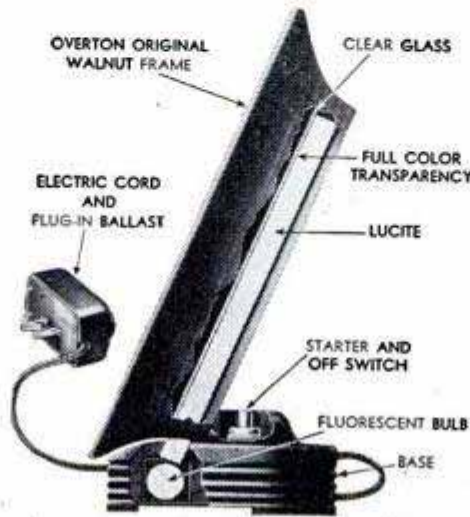
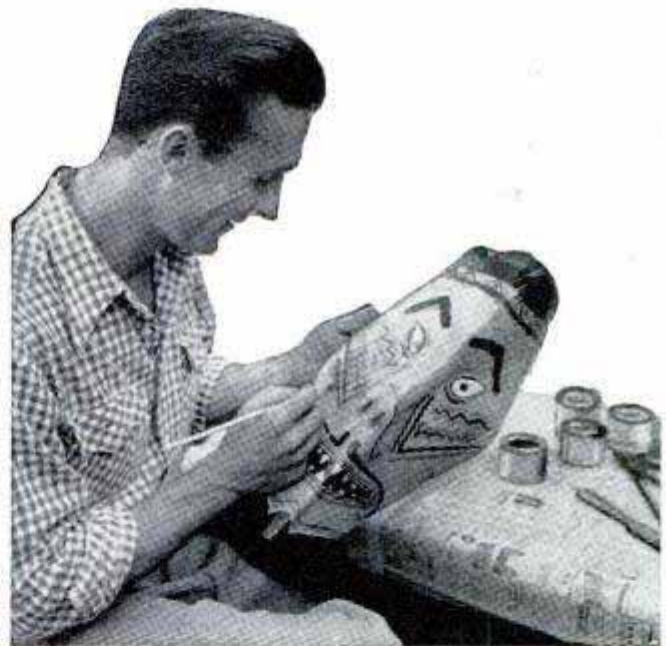




Above, the mask-maker selects a palm stem that is the right size and shape for the finished face. Above right, completed masks become wall decorations. Right, features are painted over base coat

Palm Stems Make Eerie Masks

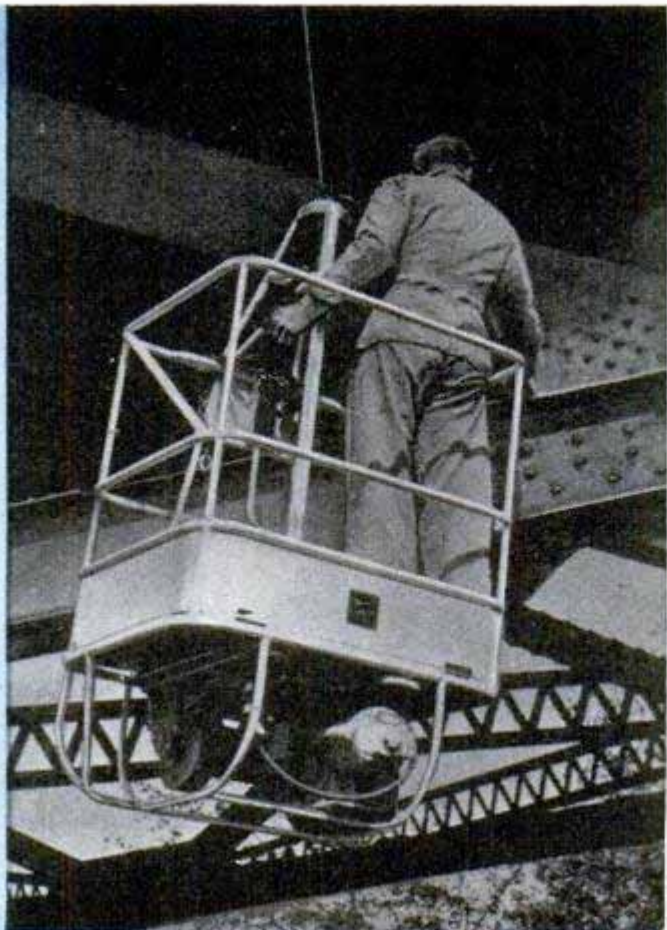
Some people see portraits in clouds or profiles on jagged mountainsides, but Richard Romecq of Sherman Oaks, Calif., has found imagery in the stem of a palm leaf. He creates such unusual masks from the stems that they are fast becoming popular for masquerade and theatrical use and for wall decorations. The hobbyist uses the bulging center of the stem as the nose. He paints the entire stem with quick-drying enamel to give it complexion, then adds the features suggested by African and Indian ceremonial masks. The fiber on the edges of the stems is sometimes left on to give the mask a whiskery effect.



Edge-Lighted Frame Shows Color Pictures

Color transparencies can be displayed without a projector when mounted in an illuminated walnut frame. The transparency is sandwiched between a sheet of glass and a piece of Lucite. In the bottom of the frame is a four-watt fluorescent bulb. When the switch is turned on, the light passes up through the Lucite block to illuminate the color photograph.

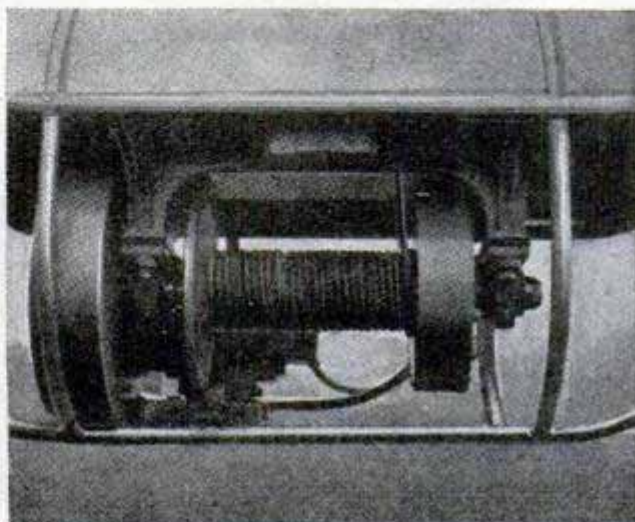
"SPIDER" carries a human fly



Dangling beneath a bridge, the staging supports a repairman directly in front of his work, regardless of where that work may take him on the structure

PAINTERS or repairmen can scale a steel tower or crawl beneath the girders of a bridge aboard a small platform that travels under its own power. The agile little stage can go almost anywhere on a steel structure. It is built of aluminum alloy and has a double guard rail that surrounds the operator. The stage is suspended on a wire rope which winds on an electric power drum beneath the platform. The workman can ascend or descend vertical drops up to 650 feet at an average speed of 18 feet per minute. Furthermore, he can move horizontally along a girder. When he comes to a cross member, he reaches beyond it and attaches a transfer chain which supports the platform as it swings under the obstruction. Three independent braking systems prevent the stage from falling.

← When workman meets a cross member while moving horizontally beneath bridge, he swings himself beyond with a transfer chain. Below, the drum and $\frac{1}{3}$ -horsepower motor are beneath stage





The Bay Bridge Is to Have a Twin

Here's how the San Francisco-Oakland Bay crossing will look when the twin, shown in black, is finished

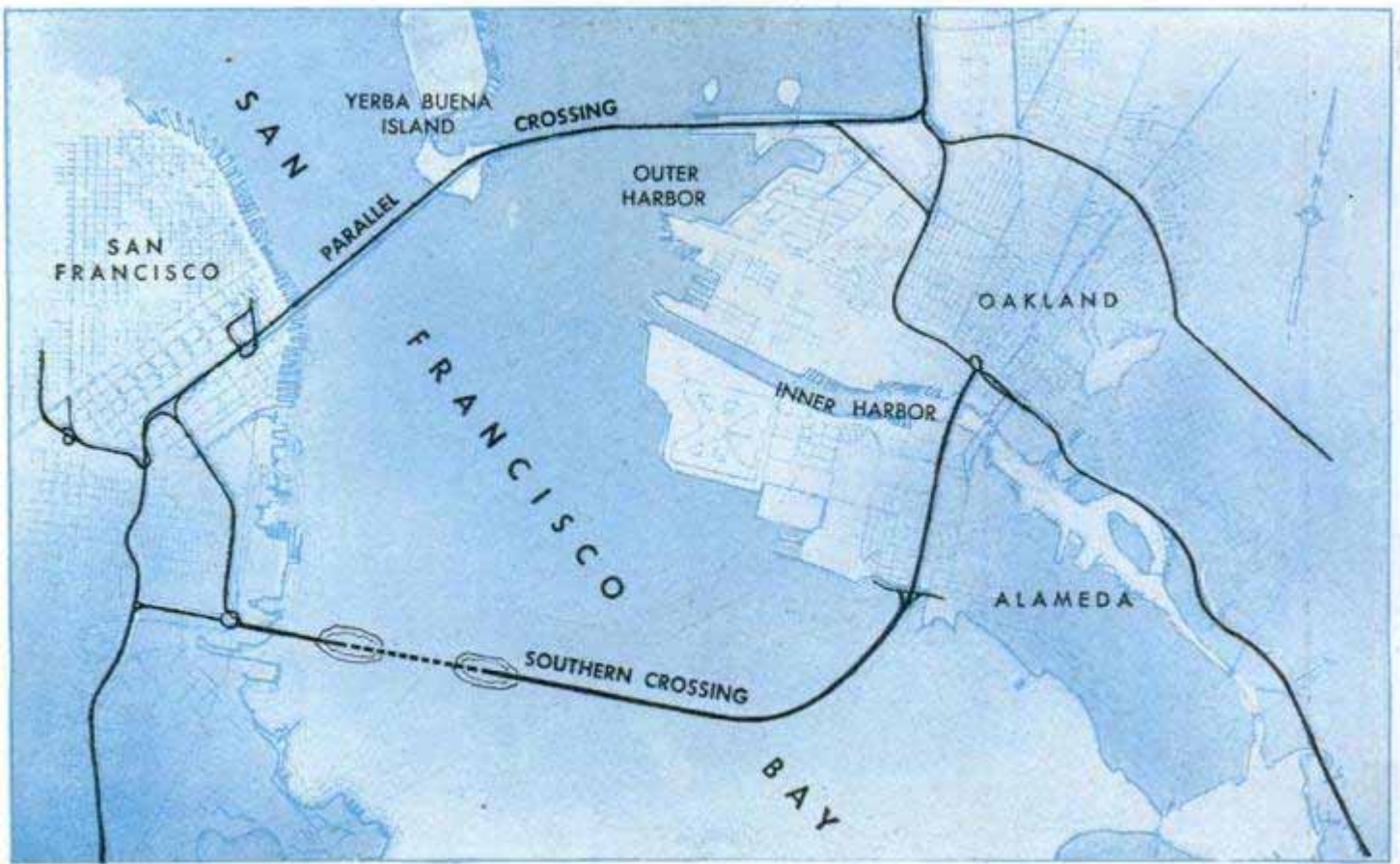
By Thomas E. Stimson, Jr.

ALREADY spanned by the two largest bridges in the world, San Francisco Bay is to have a third great structure built across its deep, turbulent waters.

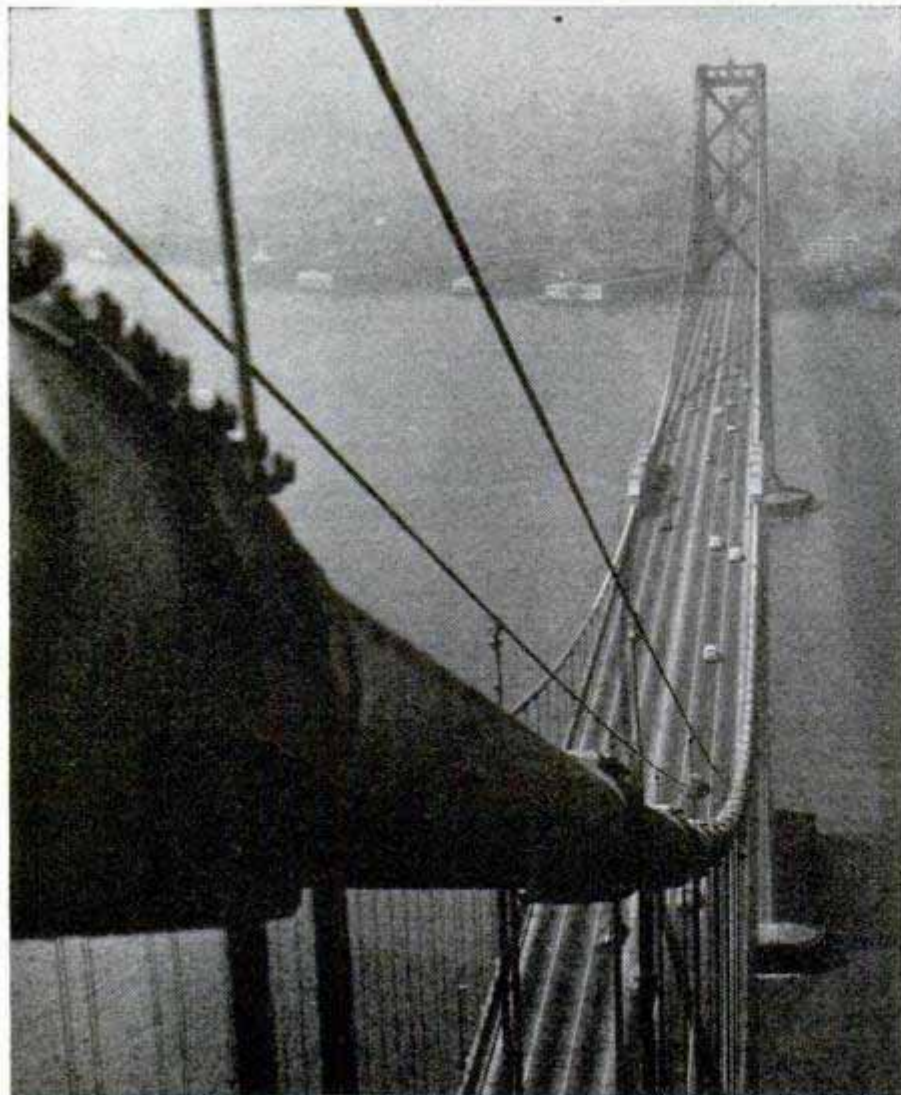
The Golden Gate Bridge that stretches across the entrance of the bay is the longest single suspension span in the world. In total length it is second to none except its neighbor around a corner of the harbor, the San Francisco-Oakland Bay Bridge that reaches across $4\frac{1}{2}$ miles of navigable water. This mighty double-deck structure

connects San Francisco to Yerba Buena Island by means of two suspension bridges placed end to end, then tunnels through the island and continues on to Oakland by a series of cantilever and simple truss spans. Counting its approaches, the crossing has a total length of $8\frac{1}{4}$ miles.

When it was built in 1936, it was thought to be adequate for at least half a century. No one dreamed that its six lanes for cars, three lanes for trucks and two lanes for trains would become choked with traffic

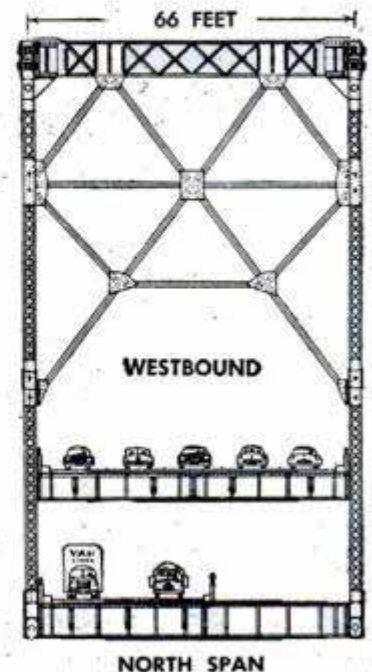


Parallel crossing will help carry northern traffic, proposed underwater crossing would span bay farther south



Bay Bridge, shown during a lull, handles 4500 cars per hour during rush

in little more than a decade. Today, some two million cars are using the bridge every month, a total of some 26 million vehicles for 1948. During morning and evening rush hours the traffic is at the rate of 4500 cars per hour. Including all types of transportation 200,000 people cross the bridge every day.





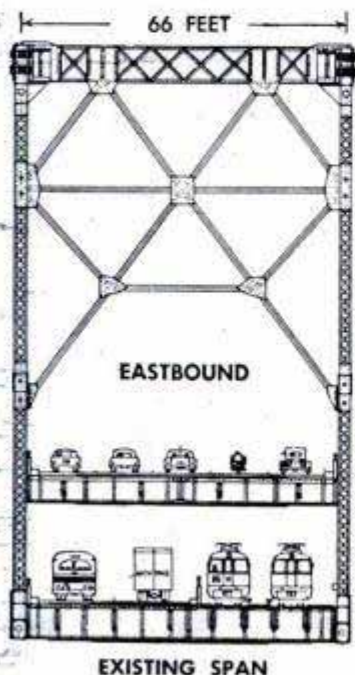
Mighty Golden Gate Bridge across the entrance to the bay is the longest single suspension span in the world

On one busy Sunday when an accident tied up several lanes on the bridge, cars were stacked up for 10 miles and it was hours before the jam was untangled.

To relieve this congestion and to prepare for greater traffic in the future, California is planning to build a duplicate bridge beside the existing one, then make each structure a one-way crossing. This would reduce the number of accidents, ease the present crowded condition and permit traffic to continue to move at its present speed

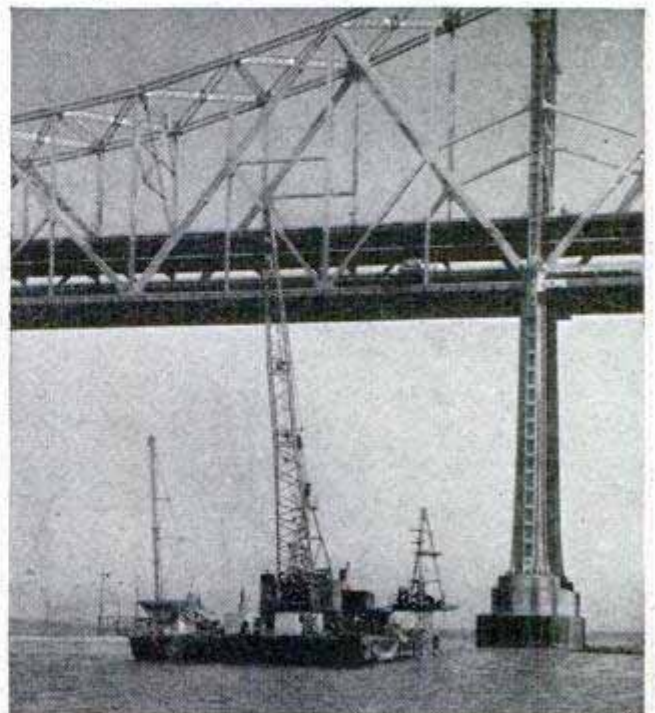
of 45 miles per hour. Construction is scheduled to start next year, with the bridge to be opened for use in 1954. Test borings have been completed and preliminary plans have been drawn.

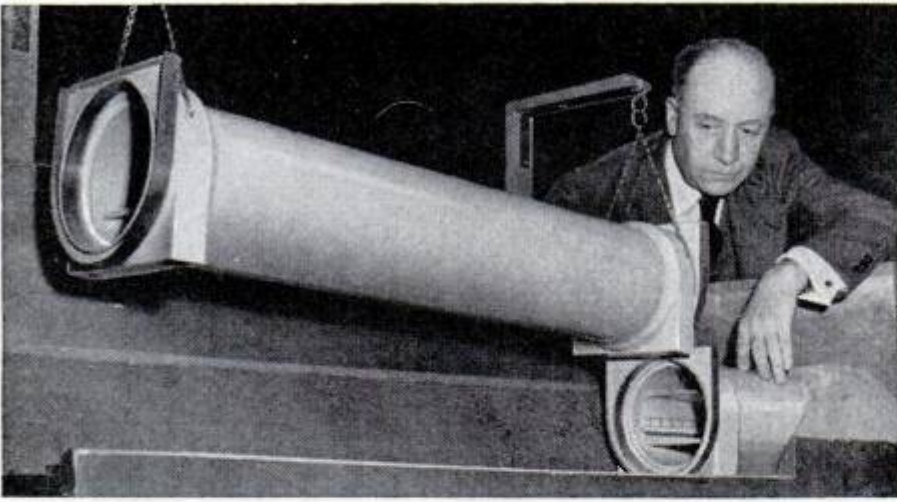
The new structure will parallel the existing bridge about 325 feet north of it. Because of its greater radius around one curve, the new bridge will be slightly longer than the present bridge and thus will become the world's longest, by a fraction of a mile, when it is completed.



Right, using a barge with derrick, engineers make sediment samplings of bottom. Samples will be used in designing the new span

← Sketches show how traffic will move on the existing span and the parallel bridge. Each bridge will carry traffic one way, with the lower lanes for truck use only





Southern crossing will consist of underwater tubes. This model was built by engineers to help work out system for sealing tube sections together

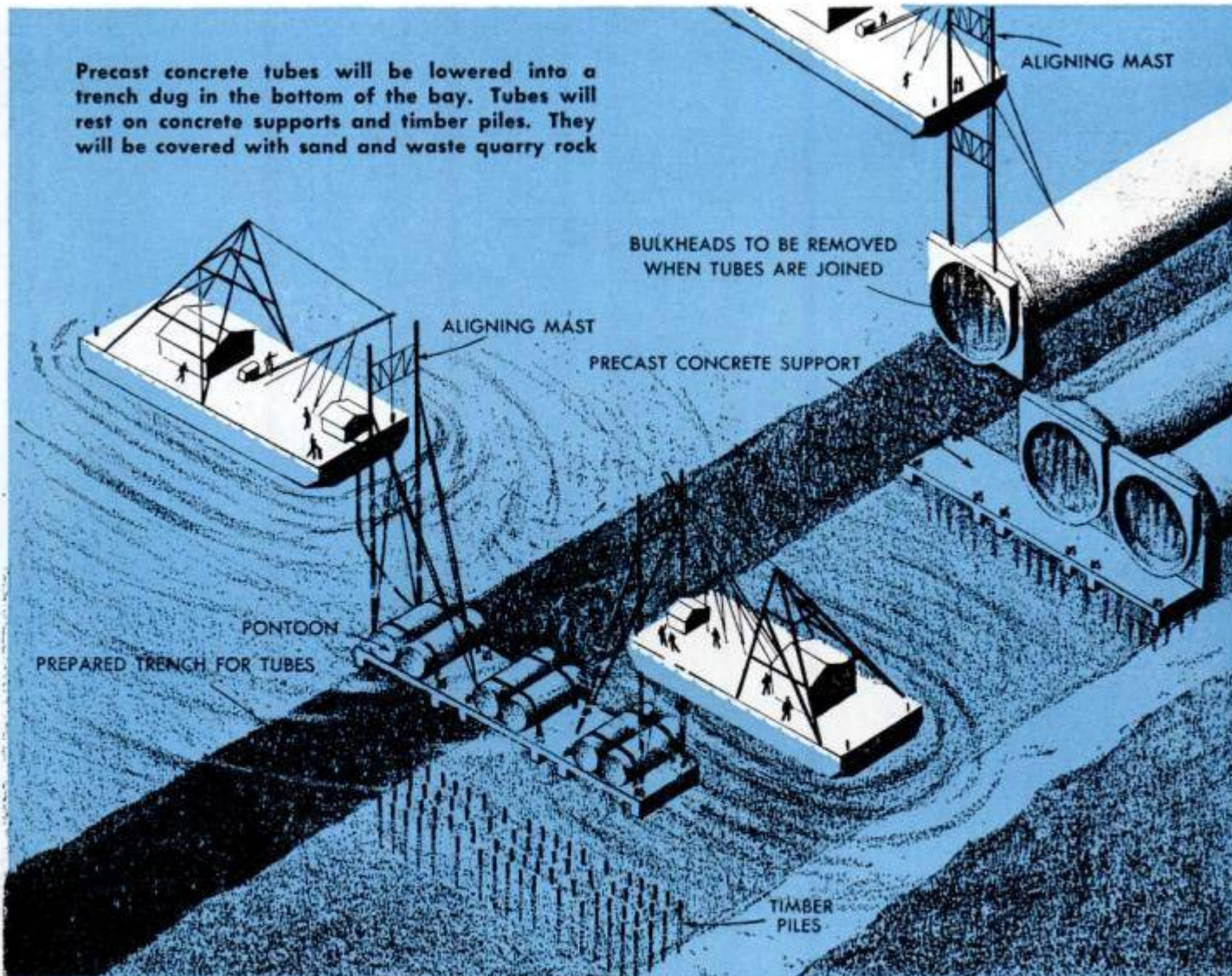
California has been making plans for some kind of additional bay crossing since 1945. During the past three years the state Department of Public Works has studied numerous proposals including high-level bridges at various locations and tunnels under the bay. One suggestion contemplated a series of dams with a highway along the top.

Of all the suggestions, the idea of a par-

allel bridge seemed the most suitable after surveys showed that 82 percent of cross-bay traffic would best be served by increasing the facilities at the present location. A percentage of traffic would prefer a crossing somewhat south of the present bridge. Possibly before the new bridge is completed a so-called "southern crossing" that will connect southern San Francisco with Alameda across the bay will also be under construction.

Another reason why the engineers recommended a parallel bridge is that the existing structure has proved eminently satisfactory from the standpoints of design and construction. It was a daring and unprecedented achievement at the time it was built, and time has proved that the plans were sound and the materials adequate.

The towers of the present bridge rise 700 feet above bedrock, 520 feet above the



surface of the water. Each suspension span is 2310 feet long between its towers, with side spans of 1160 feet each. The two suspension spans come together at a central anchorage that contains 335,000 tons of steel and concrete and that rises up from the bottom of the bay to the level of the bridge roadway.

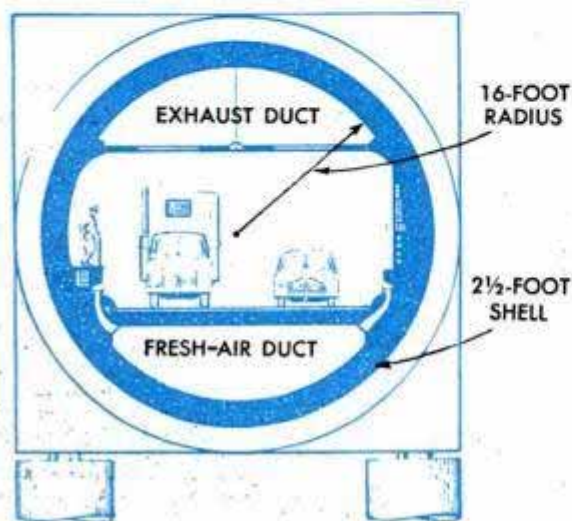
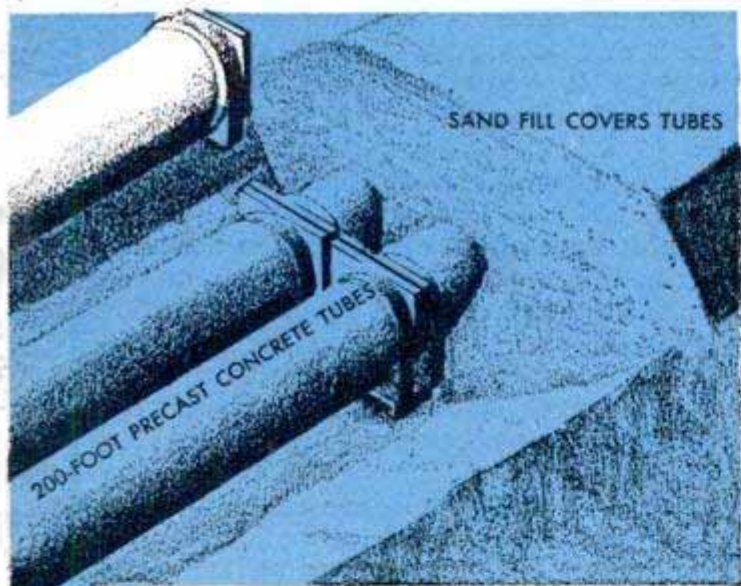
Each of the two suspension cables that supports the roadway contains 17,464 individual strands of wires. At the San Francisco end these cables are anchored in a monolithic concrete block that contains 68,000 cubic yards of material; at Yerba Buena, the island itself serves as the anchorage for its end of the cable.

It would be difficult to improve the present bridge, so only a few minor changes will be made in building the new one. Some of the rolled structural shapes are no longer available and other shapes of equal strength will be substituted. Possibly the cable saddles on top of the towers will be made of welded steel rather than of cast steel. These would be as satisfactory and somewhat cheaper. The portion of the bridge extending from Yerba Buena Island to Oakland, likewise, would duplicate the present structure in most of its features.

The principal difference between the old and the new bridges, the engineers declare, will be the cost. The old one, with its approaches, was built for less than 78 million dollars, a huge sum that now appears to have been a bargain. The cost of its duplicate will total about 155 million.

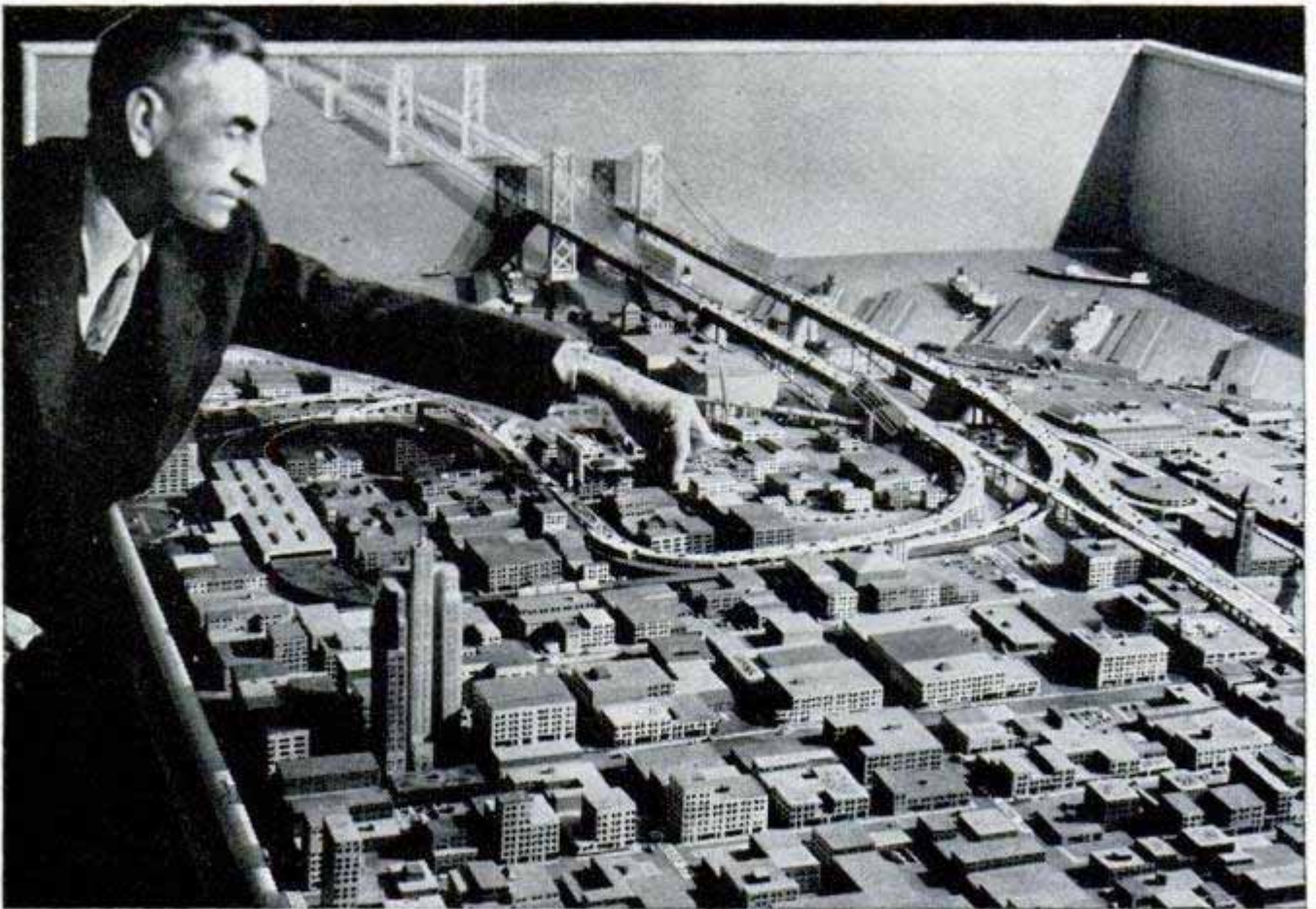
The present bridge is designed to withstand any anticipated earthquake shocks and is insured against all except war risks to the amount of 34 million dollars. The parallel structure will be just as strong but insurance companies will increase their present protection by no more than five million dollars to cover both bridges. The trouble is that there is not a sufficient combined insurance capacity in the world to warrant doubling the present coverage.

The present San Francisco-Oakland bridge has three lanes in each direction on its upper deck and these will be changed to provide five wider lanes, eastbound, when its mate is finished. The new bridge similarly will have a five-lane one-way upper deck for westbound travel. The lower deck of the present structure will be changed to provide two wide eastbound lanes for trucks and busses, while the lower deck of the new bridge will have two wide



Model of the rotary system shows how traffic will be collected and distributed for the southern crossing. Elevated roadways will eliminate the local traffic

Concrete tubes will have a fresh-air duct beneath roadway and an exhaust duct above. The diameter of each of the three parallel tubes will be 37 feet



Model shows roadway system that will be built to handle traffic at San Francisco end of twin bridges

Traffic entering or leaving east or Oakland end of bridges will be served by this complex road system



westbound lanes. Space for two electric train tracks is provided on the new bridge although this space eventually may be paved for vehicular use. The pair of bridges, it is expected, will be adequate for handling the traffic load up to and probably beyond 1970.

Traffic pays about eight million dollars a year in tolls on the present bridge, and in turn the state spends more than one million a year in maintenance and running expenses. Cost of the bridge will be paid off by 1953 in spite of the fact that the original toll of 65 cents per car was long ago reduced to 25 cents per car.

A staff of 250 people are on the bridge payroll and range from toll collectors and patrolmen to fire fighters and radio operators, not including a detail of state highway patrol officers who are stationed at the bridge headquarters.

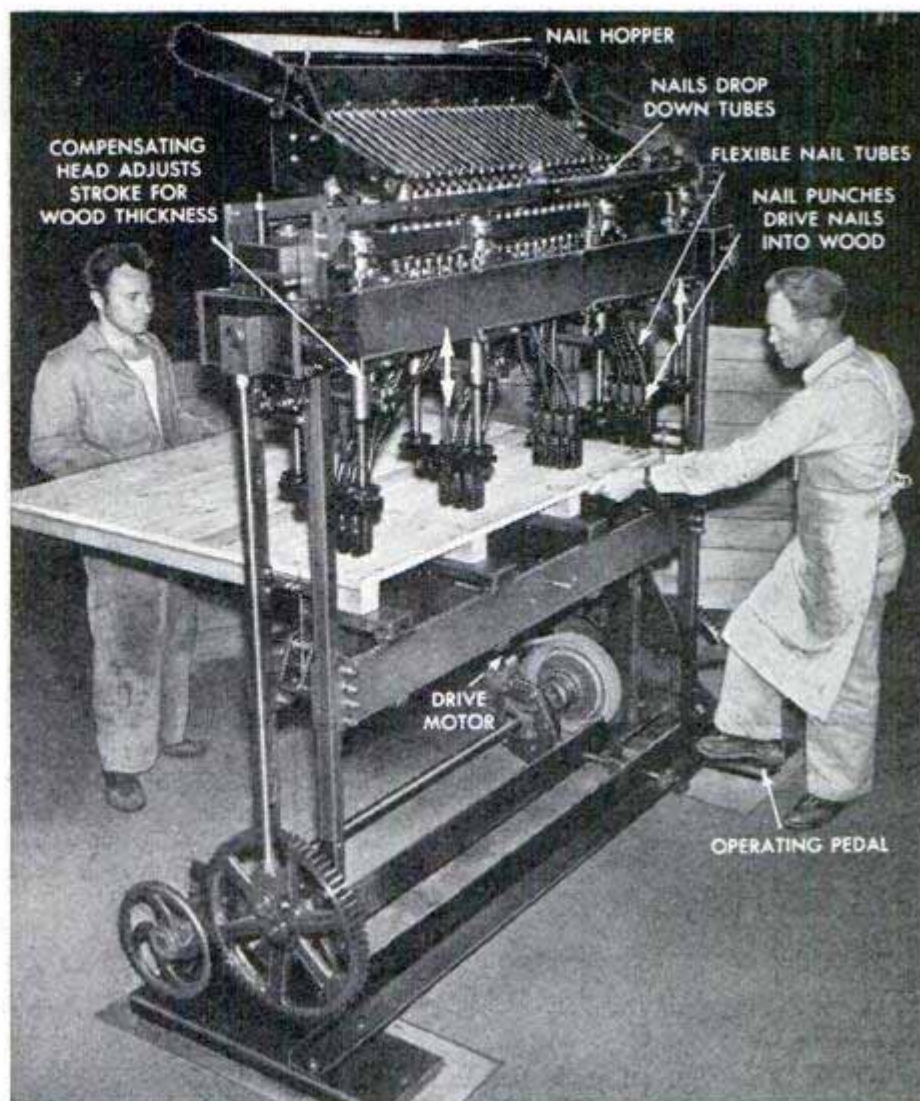
The staff uses 23 trucks, 19 pieces of auxiliary equipment, six passenger cars and a 43-foot work boat for maintenance work. Fourteen of the vehicles carry two-way FM radio equipment.

Preserving the bridge with paint, of course, is one of the big tasks. Repainting the structure started practically on the day it was completed but because of war delay, the first complete repaint job will not be finished until late this year. The bridge has 16 million square feet of surface and the complete paint job requires 75,000 gallons

(Continued to page 250)

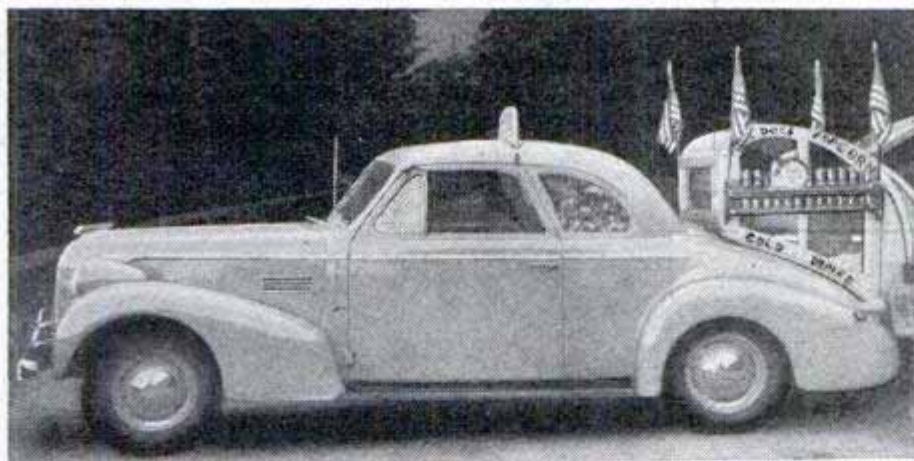
Machine Drives 2800 Nails A Minute

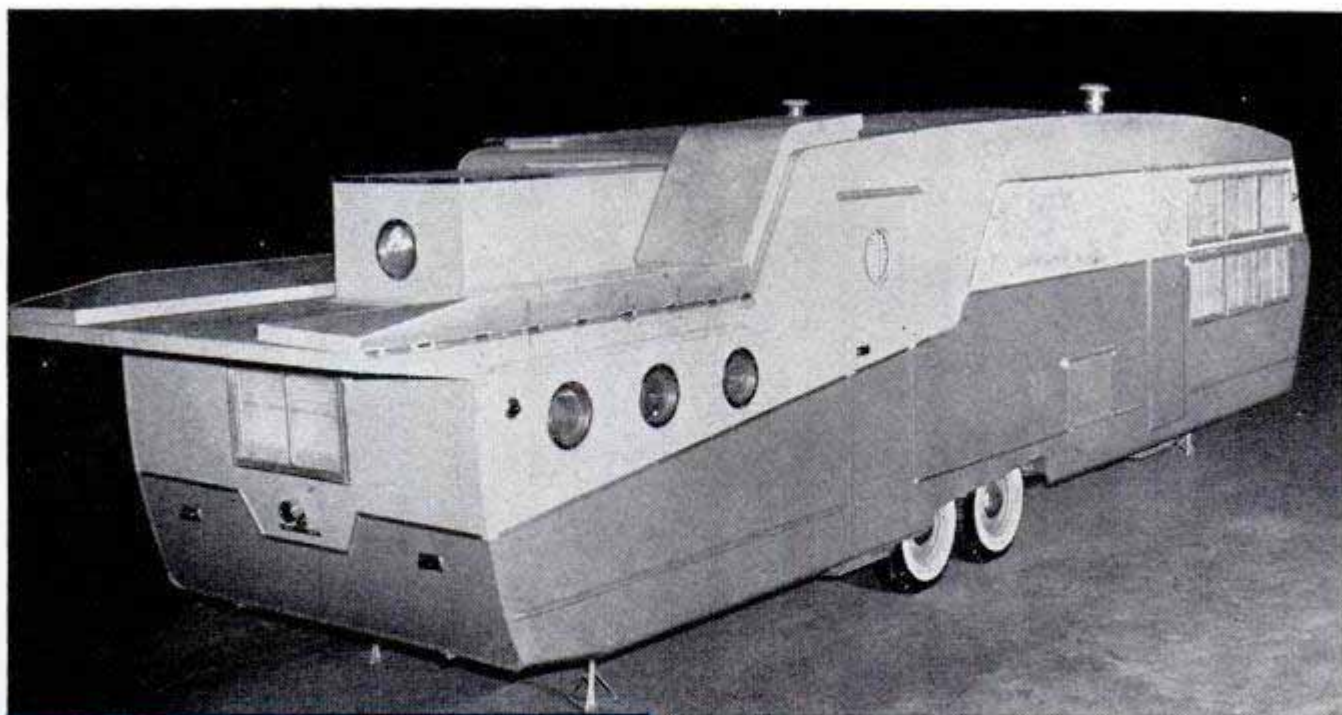
Wooden assemblies that include boxes, crates and picket fences are rapidly fabricated by an automatic nailing machine that can drive 24 nails at once in practically any nailing pattern at speeds up to 120 strokes a minute. An oscillating nail reservoir feeds the nails to chucks that position them and then punch them into the wooden assembly that is held on the operating table. The machine uses from 3 to 10-penny nails and is available in various sizes up to an operating width of 72 inches. Wooden pallets, panels for pre-fabricated houses, grids for industrial cooling towers and refrigerator cases, as well as many other wooden articles can be quickly assembled by the machine.



Hot-Dog Stand In Car Trunk

When Arthur Guyotte of Ashland, N. H., parks his business coupe and opens the trunk compartment he is ready for business. The trunk contains a complete built-in hot-dog stand with facilities for turning out hot dogs, toasted cheese sandwiches, popcorn and cold drinks. Guyotte cooks with gas carried in a pressure tank and a grill swings back for popping corn over the flame. The base of his boxlike stand has compartments for hot dogs, popcorn and buns. Outside racks on both sides hold extra pop bottles. Also in the base is an icebox where soft drinks are chilled. Guyotte carries 18 cases of pop in the car and 40 pounds of wieners.





Highway Yacht with a Sun Deck

Everything from a "pooch porch" to a sun deck that seats up to 16 is included in a new Flagship trailer. Above, as it appears en route, the nautically styled luxury coach is 32 feet long and 8 feet wide

Lower left, in harmony with the vehicle's seagoing lines, the twin beds are arranged bunk style, with a four-foot clearance to ceiling. Aisle between beds gives added headroom and space for dressing table

Below, living room soundproofed with a new plastic has Astro Dome in center of ceiling to admit more sunlight. Room is at front end of trailer, separated from the kitchen by a bar and a vine-covered trellis



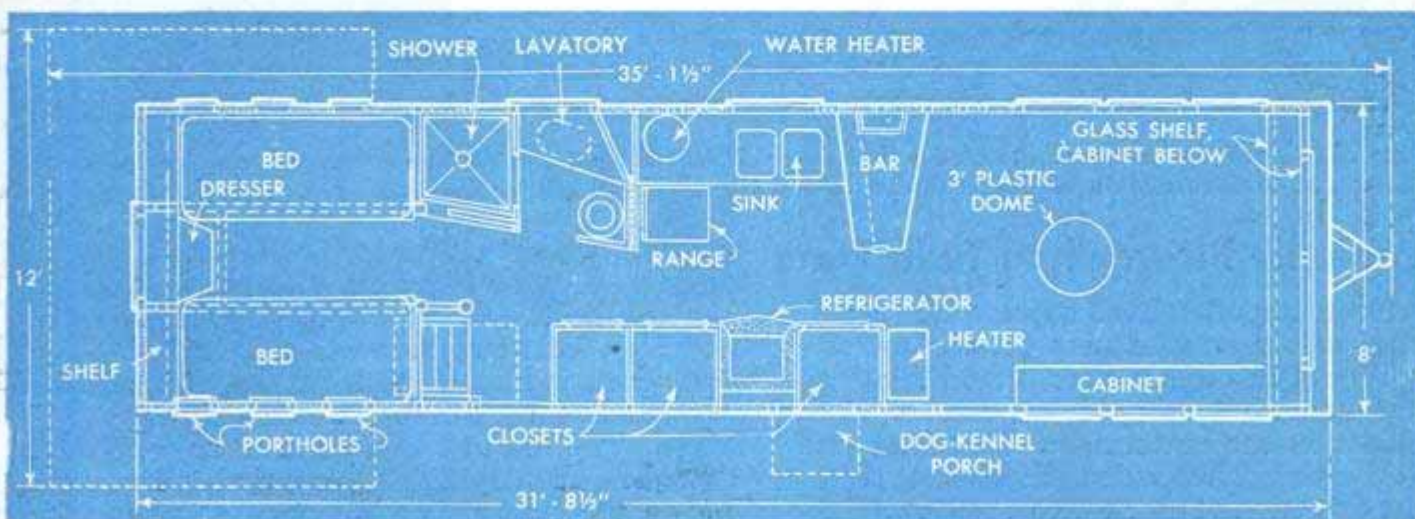


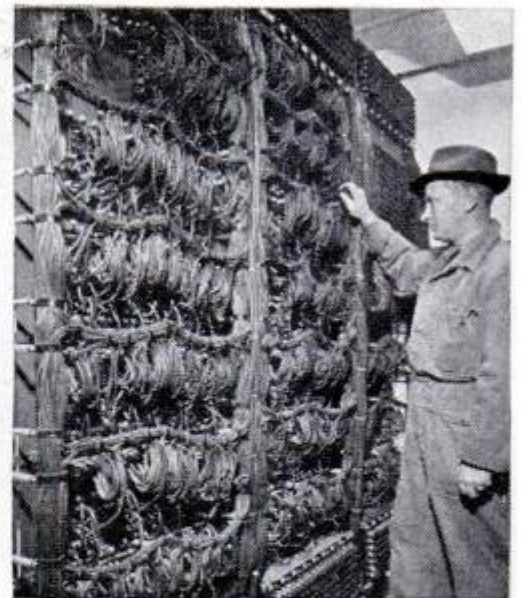
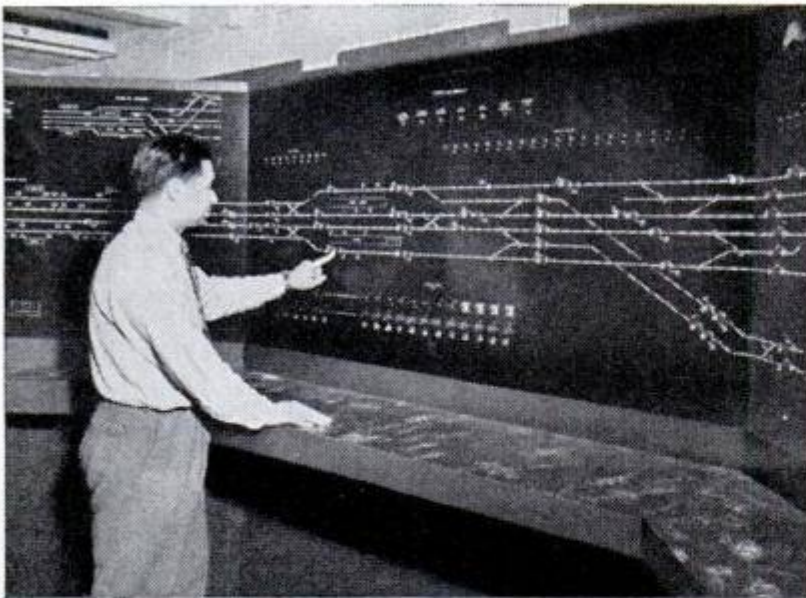
Above, completely assembled sun deck has awnings and plastic screens. Two feet of side sections fold down to enlarge floor space. Dog porch is in right foreground

Right, putting up the pipe framework for the porch takes about 1½ hours. Material is stowed on coach roof and covered when not in use. Disassembly takes ½ hour



Below, floor plan illustrates the compact arrangement of facilities. The full-size bath has a separate shower stall. Interior height of trailer is 6 feet 10 inches



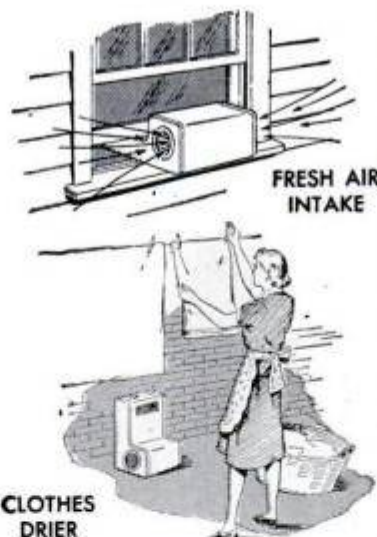
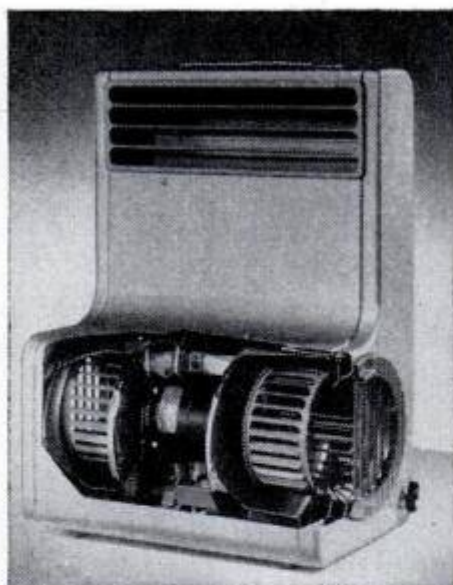


Buttons on replica of track automatically set switches and signals through maze of wiring behind panel

Push-Button Subway Controls

By pushing only two buttons of a new control panel, the towerman of a subway division in Brooklyn can set all switches and signals for routing a train. The same operation formerly required the towerman to throw as many as 30 switch-and-signal levers. In the new system he pushes one button at the point where he wishes the train to enter a track and a second button to show the destination. All intermediate

switches and signals then fall into place automatically. The control panel is a replica of the track pattern with each push button corresponding to a signal. If the towerman selects two conflicting routes simultaneously, red lights flash on the panel. The train movements can't be governed by a motorman; if he runs past a red signal, a trigger in the roadbed automatically applies the train's brakes. The signal system cost \$2,000,000 and can be operated by one man at the control panel.



Base of fan contains two separate blades that draw air into cabinet and discharge it at the top. Versatile fan can be used to dry clothes inside the house and for drawing fresh air into room or expelling stale air

Versatile Blower Has Twin Fans

Twin impeller blades draw air into the base of a versatile new blower and discharge it through a streamlined duct. The fan has an L-shaped cabinet with the blades in the bottom and the outlet grille at the top. The grille is adjustable so that the direction of air flow can be changed. A

carrying handle on the top of the fan makes it easy to move from place to place. The fan can be installed with the outlet grille outside a kitchen window to exhaust cooking odors and heat. With the outlet inside the window, the fan forces cool air into the room. The fan also can be used as a hair drier and for drying clothing that is hung inside the house.



Rifle Features Automatic Safety

Safety is an outstanding feature of a low-priced .22-caliber rifle designed especially for the beginner. Opening the bolt cocks the rifle and, at the same time, locks the safety so that it has to be released manually before each shot, thus reducing the chance of accidental discharges.

Automatic Transparency Projector Eliminates Handling of Slides

Operated by remote control, an automatic projector enables you to change slides from any place in the room merely by pressing a push button at the end of the control cable. From 35 to 75 slides can be placed in a metal magazine in the desired sequence and each time the control button is pressed a slide drops into place behind the lens. After projection, the slides fall into another magazine in proper sequence for future showings. To prevent warping, each slide is preheated before dropping into the projection slot. Between slides, a shutter closes the lens aperture, eliminating the usual slide wipe.



Gas-Powered Sprayer

Pressure for spraying insecticides and other chemicals is provided by a CO₂ gas cylinder mounted on a three-gallon tank. The tank can be filled to capacity with spraying solution. Turning a valve releases gas into the tank, where a constant pressure of 30 pounds is maintained. One cylinder contains 10 ounces of liquefied gas, enough for spraying 15 gallons or five tanks full of the spraying liquid. The cylinders may be sent to the factory to be refilled. A hand pump on the sprayer may be used to build up pressure if a gas cylinder is not available. The sprayer has a 30-inch hose with a 24-inch brass extension and nozzle.

Multiple Fuse Plug Has Replaceable Insert

Containing five separate fuse links, a multiple fuse plug eliminates the usual search for a new fuse when the lights go out. The inner section of the two-part plug contains five links and rotates within the outer shell to bring a new fuse into operating position. When all five fuses have burned out, you buy a new inner section.



WHAT'S NEW *For Your Home*

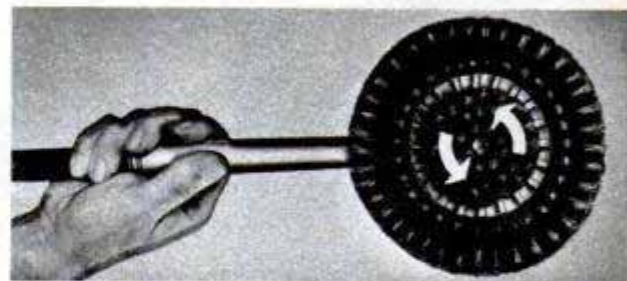


SAFETY BIB not only catches spilled food, but also prevents the child from standing up in his high chair. The strings of the bib tie to the chair legs, acting as a restraining harness

AIR CIRCULATOR, below, left, is also a coffee table. Beneath the flat top is a quiet-running fan that keeps air circulating without the usual uncomfortable drafts. It has a 3-speed switch

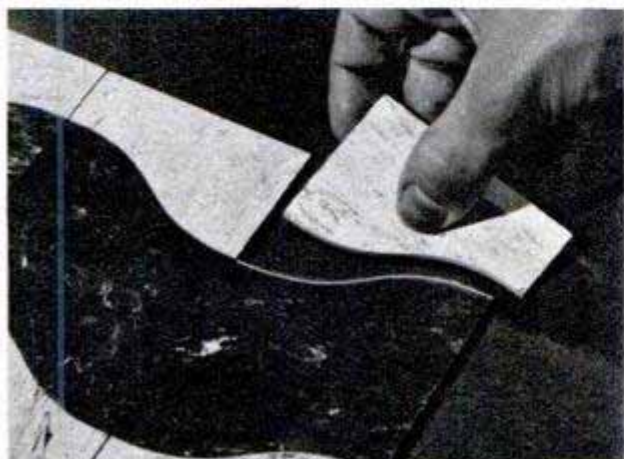


REVOLVING BRUSH is driven by water pressure from a faucet. Actually, there are two brushes: The center section that spins and the outer stationary brush that keeps water from splashing





STEAM VAPORIZER operates from 2 to 12 hours without refilling and it turns itself off when the water supply is exhausted



PATTERNED FLOORS are formed by a rubber tile cut in half on a double curve, making it possible to create many designs



BREAD BOX feeds a slice at a time as knob is turned, keeping loaf from drying

MEAT TOASTER cooks hot dogs and hamburgers when slipped into pop-up toaster



BASKET CART will haul anything from groceries to laundry. The tubular-steel frame has a folding stand that holds it upright when you park the cart. The two large wheels roll easily, even up and down stairs. The rack holds a standard bushel basket and pivots on the sides for dumping



HEAT AND COLD are provided by a combination range and refrigerator. You have a choice of gas or electric range. The electric refrigerator has four cubic feet capacity. It's just the right size for small apartments





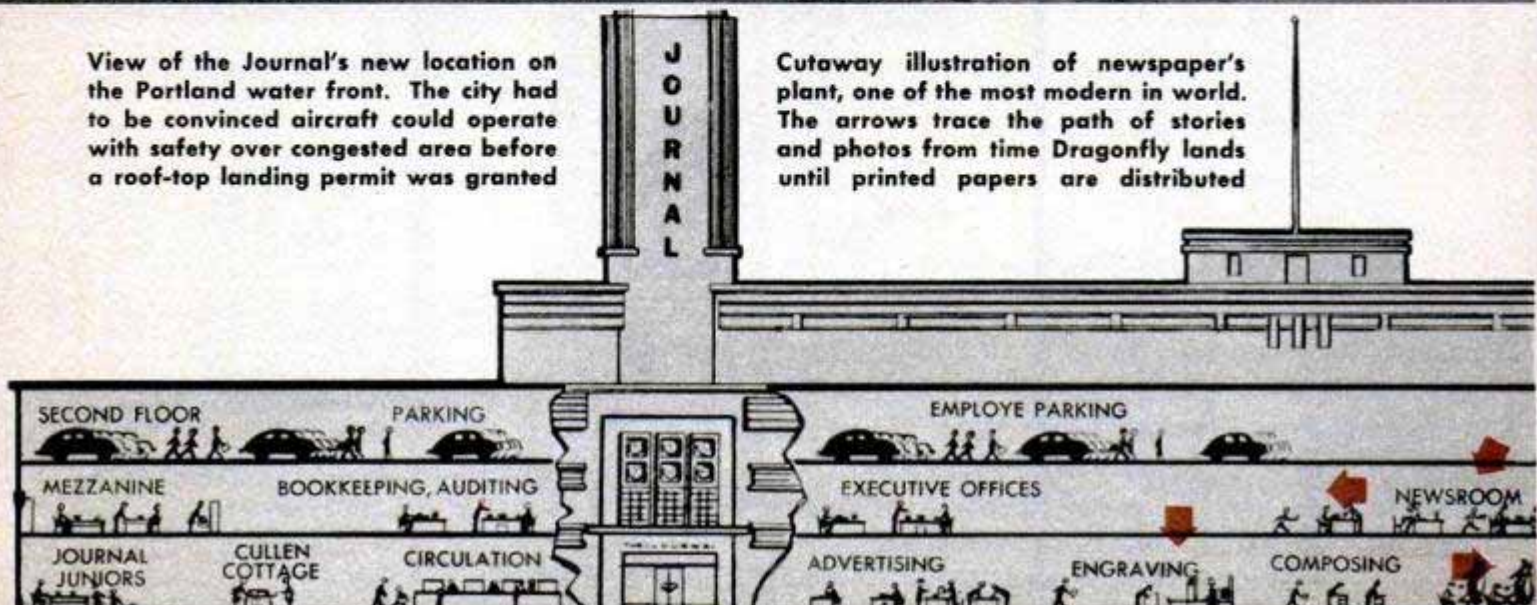
helicopter on the newsfront

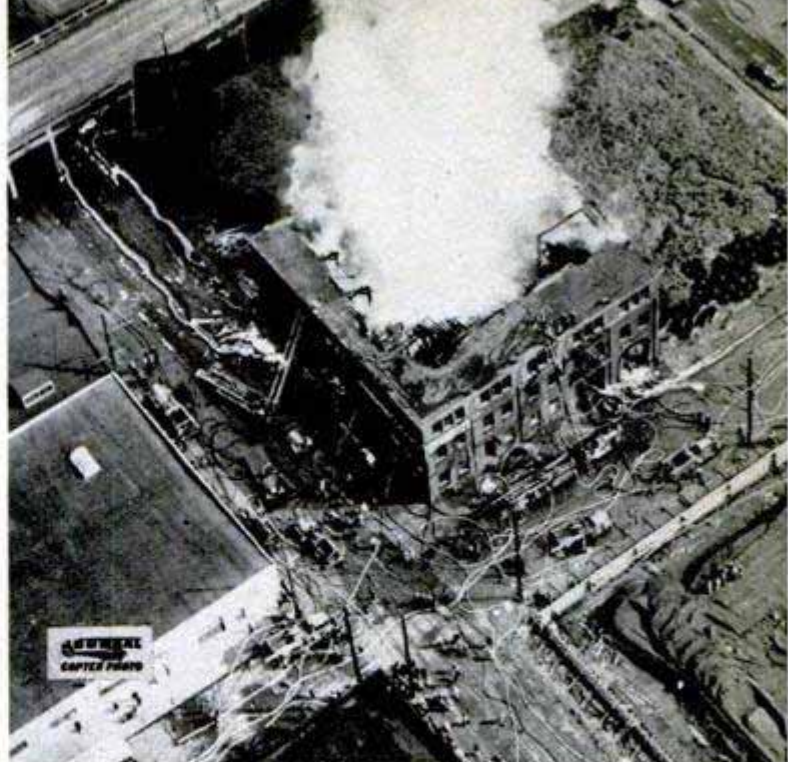
Starting out on an assignment, the Journal's Dragonfly can get up to 100 miles an hour within a few blocks



View of the Journal's new location on the Portland waterfront. The city had to be convinced aircraft could operate with safety over congested area before a roof-top landing permit was granted

Cutaway illustration of newspaper's plant, one of the most modern in world. The arrows trace the path of stories and photos from time Dragonfly lands until printed papers are distributed





Helicopter's low oblique perspective gave photo of train wreck, left, more complete conception than a dozen ground shots. Firemen studied hose patterns above to evaluate efficiency of respective units

By Hal Cooley

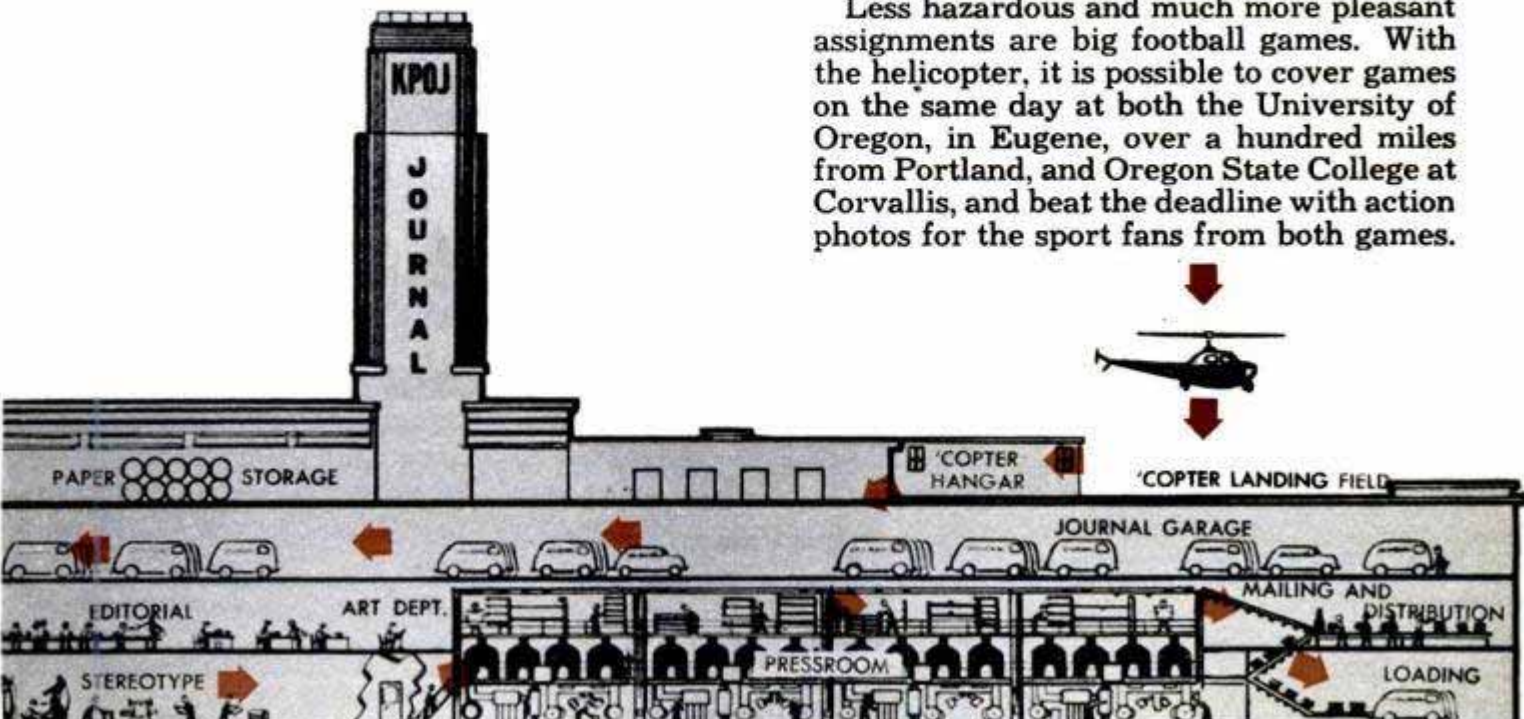
NEWS COVERAGE in the Oregon Journal (Portland) is slanted from the sky. It is produced with the help of a giant mechanical insect, the Dragonfly, that roosts on the Journal's roof during off-duty hours, 10 seconds from the city editor's desk.

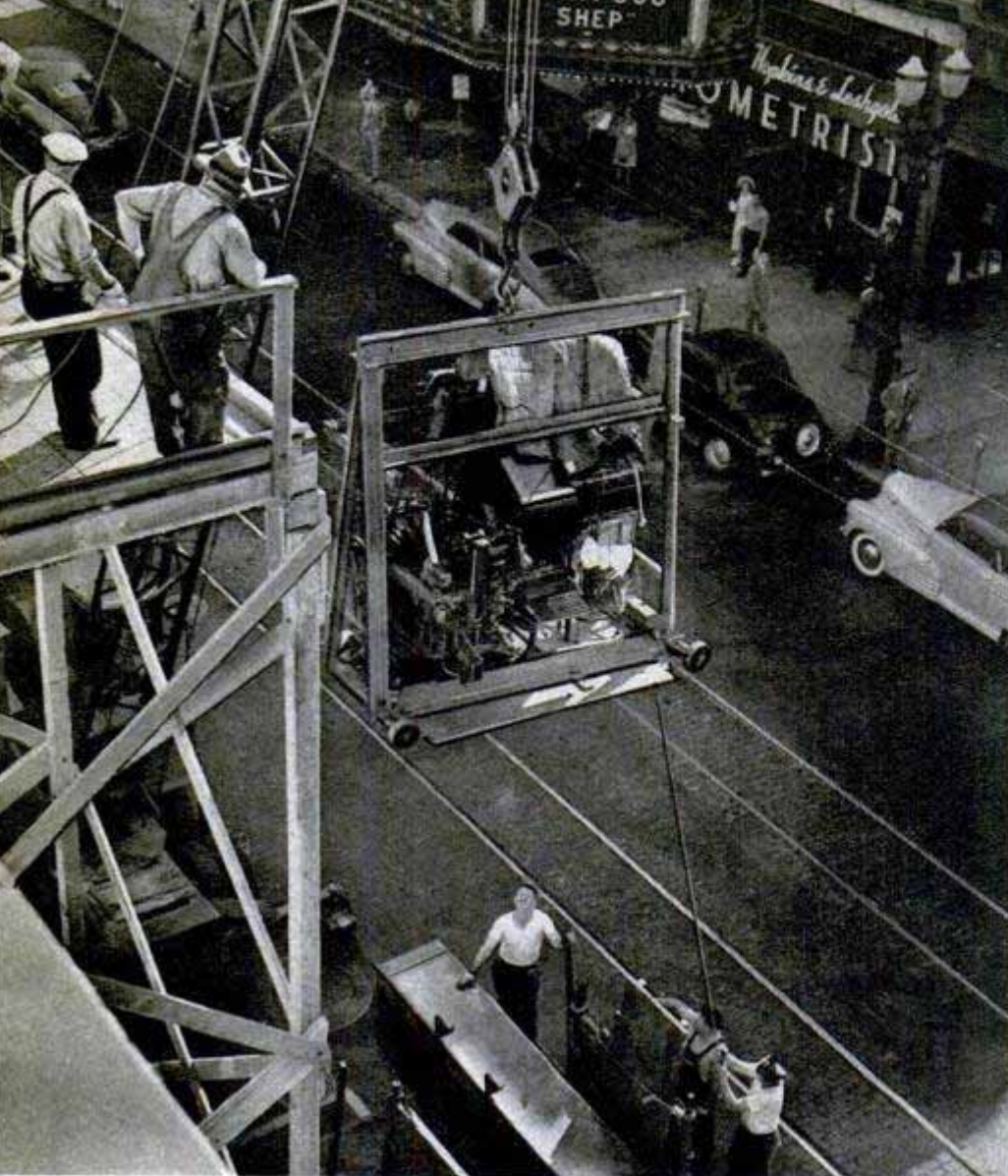
The Journal helicopter is the first to be operated permanently by a newspaper. With it, pilot-reporter and photographer teams are injecting an original touch in the handling of assignments as diverse as fires, murders, man hunts, sports events and outdoor festivals. Distance means little to the new helper with 100-mile-an-hour "legs."

Appropriately, the versatile newcomer's 100-square-foot home field is perched on top of a new three-story building housing some of the world's most modern newspaper-producing equipment.

In the Pacific Northwest, one of the most picturesque areas of the U. S., it has carried reporters and photographers into settings as primitive and remote as the Indians first found them. The machine once landed in a tiny clearing along the rugged, wooded shores of the Rogue River, which churns madly through the twisting canyons of the Siskiyou Mountains in southern Oregon, to dispatch by wire and radio the story of a crazed killer who had terrorized five people. Dramatic photos were returned to Portland by air.

Less hazardous and much more pleasant assignments are big football games. With the helicopter, it is possible to cover games on the same day at both the University of Oregon, in Eugene, over a hundred miles from Portland, and Oregon State College at Corvallis, and beat the deadline with action photos for the sport fans from both games.





Use of a specially designed carriage made it possible to move intricate and delicate Linotype machines to new building without injury. It was done so quickly they were operating again before metal pots had cooled

In a business that has always emphasized speed of operation, another Dragonfly accomplishment merited special plaudits. Pictures made from the air of Portland's world famous rose festival were flown back to the roof-top roost within 75 seconds after the last scene was snapped. The best a car and a police escort could do was 17 minutes. Copies of the newspaper with pictures of the prize-winning floats were being sold to spectators near the end of the parade route before they saw the last of the procession.

The aerial platform also gives Journal photographers a chance to shoot from unusual angles. It has enabled many Portlanders to get close-up views for the first time of the tops of many tall monuments and landmarks that had previously been just distant specks. Ship pictures, always a strain on the photographer's originality, are likewise open to new treatment by flying lensmen.

Photography is more difficult than would be supposed from ground observations of the craft. Although its ability to remain

stationary at low altitude is a wonderful virtue, a strong vibration in the cabin necessitates using shutter speeds of $\frac{1}{400}$ to $\frac{1}{800}$ second to get negatives of good definition.

Some of the helicopter-borne photographers have, however, made exposures as slow as $\frac{1}{50}$ second in emergencies when the light was poor and secured passable pictures. This is possible only through perfect coordination of pilot and photographer in manipulating the ship for the minimum vibration and torque, and by timing the camera at the split second when the most advantageous conditions prevail.

A technique employed by the Journal photographers, when making pictures from the Dragonfly, is to avoid having their cameras in contact with the sides of the cabin during an exposure. By so doing, their bodies absorb much of the vibration from the engine.

Most pictures are made through the side windows of the cabin, although good results have been

obtained by shooting down through the plastic nose of the machine.

The helicopter has also been the means of obtaining many formerly impossible news pictures from the ground. Its faculty for landing in a small area, less than 50 feet square, has placed Journal photographers in formerly inaccessible positions for picture scoops.

For example, during the Vanport flood, the helicopter landed a photographer on a flooded dike for exciting pictures that were made a second before a section of the dike gave way. The photographer was able to get away in perfect safety, where men with any other means of conveyance would have been stranded.

A faster, conventional-type plane, also owned by the newspaper, is sometimes teamed with the helicopter on news coverage. When distances are great, the paper can take advantage of the latter's greater versatility to secure material at the scene of the action, then utilize the former to relay it at a much greater speed back to the office in Portland.



Stories from aerial newsmen, and others, are edited and have heads written for them at the copy desk

The helicopter is a coupe model, built by Bell Aircraft and capable of speeds from one mile an hour to 100, at 10,000 feet or one foot. It flies backward, forward and sideways, or can hover stationary in the air. Full swiveling front wheels make it easier to handle on the ground in tight places.

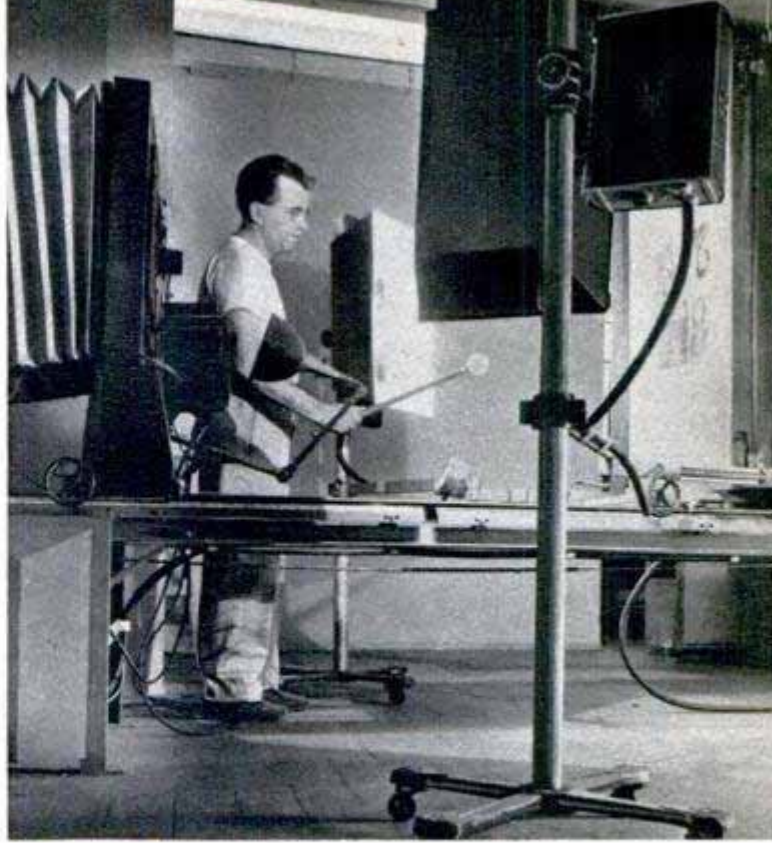
Its two-blade rotor is powered by an air-cooled Franklin engine. A small tail rotor provides directional control and offsets torque. It has been refueled at roadside gasoline stations.

The 'copter is painted white above and green below, split by an orange stripe, the same as the newspaper's delivery trucks. Two-way radio equipment keeps users in frequent touch with ground stations.

It wasn't easy to get authority from the city to fly a helicopter off a building downtown, where the Journal is located. But they got it when authorities were convinced that a dead engine wouldn't mean death and destruction in the center of their busy metropolis.

When and if the engine quits, the craft can be brought safely down in a controlled glide, with air rushing through the big rotors to keep them spinning. Athletic fields, parks and even the less-busy streets that are found in even the biggest cities could be used for emergency landings.

The Dragonfly of the newsroom has won its laurels and the admiration of the entire staff, even the drama editor. He became an enthusiastic booster after being rushed to an important open-air Elizabethan Shakespeare performance, and returned with pictures in time for his Sunday layout.



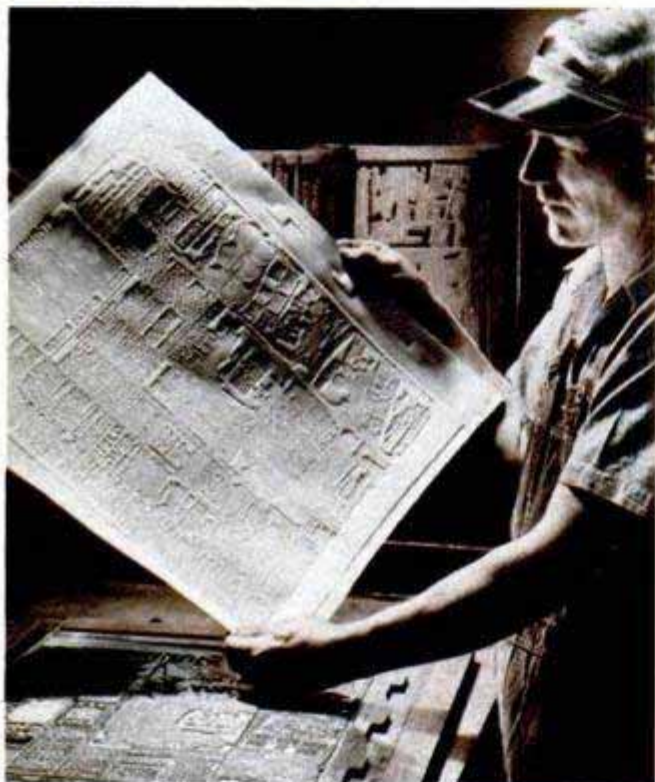
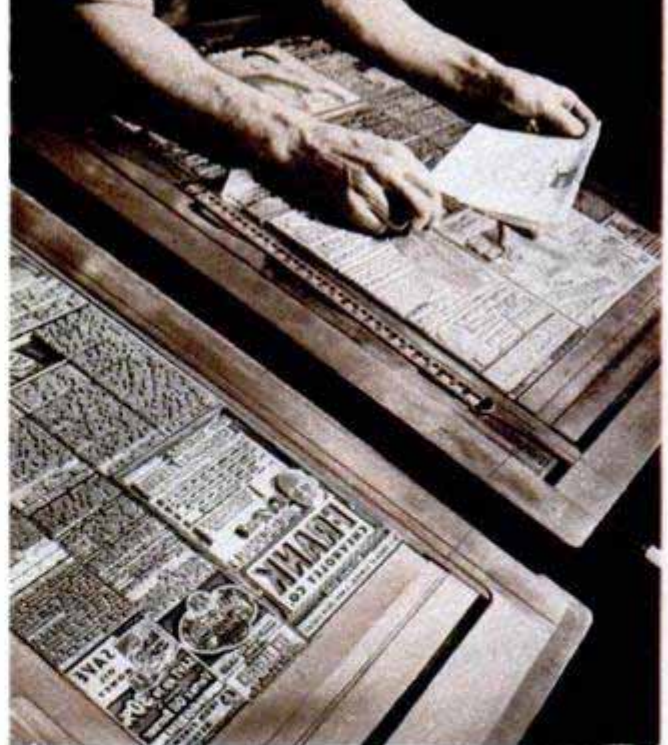
Photos sped back to Journal office are transformed into printable zinc plates by the engraving camera

The Journal's helicopter and splendidly equipped plant offer a perfect exhibit to illustrate the amazing machine triumph of a newspaper. It starts the transformation of the reporter's story through highly complicated and speedy Linotype machines, and then moves it on into the stereotype department, where story and pictures are transformed into a metal cylinder, and then on through conveyors to the huge presses, perhaps one of the impressive monuments to present-day mechanical engineering.

Next it goes through a maze of mechanical conveyors which function in the mailing department. With unerring accuracy and speed they dispatch hundreds of thousands of daily papers into their respective loading chutes, where a perfectly organized system of fast trucks deliver them to newsstands and carriers, who swiftly continue the work of presenting you with the news of the world at your doorstep.

The Journal's new Hoe press is the most modern and efficient machine of its kind. It is the largest newspaper press in the Northwest and can produce more newspapers per hour (135,000 forty-page papers) than any other. Its 700-ton weight rests on a concrete slab 12 feet wide, 150 feet long and 18 inches thick.

The slab is supported by 36 ten-inch concrete and steel piles, 30 to 60 feet long and driven to bedrock. This press foundation is separate from the main building, so the press vibration is not communicated to other offices. The sixteen units in the press, and their folders, extend 158 feet and are 26 feet high. The press units required 19



Linotype machines, upper left, set written word into type that spells day's news. Zinc plates, or cuts, and type are put in page form, above, in composing room

freight cars when shipped from New York.

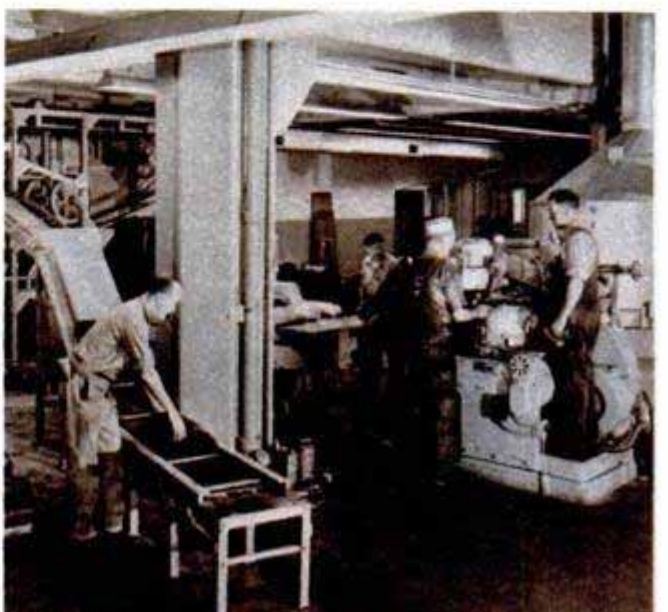
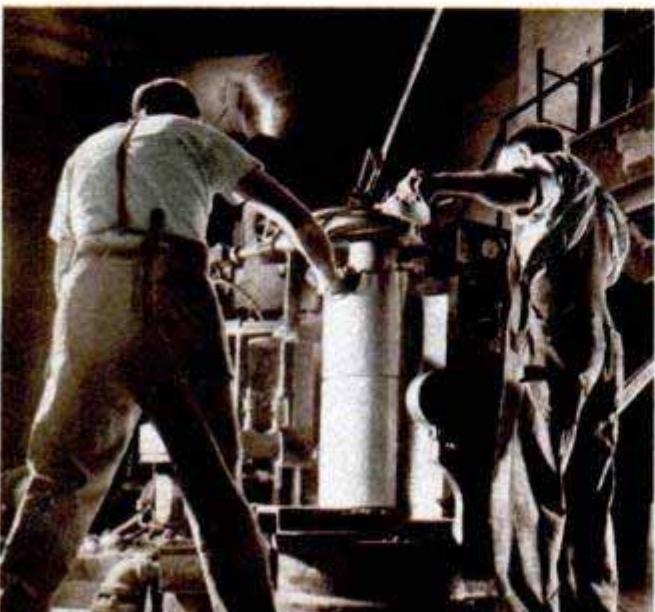
To operate the press and its accessories, 102 motors are required. Over 700 push buttons control the operation. Throughout this are 2010 electrical contacts and 35 miles of wiring. Four-color printing is possible on many pages, and two-color printing on virtually any page.

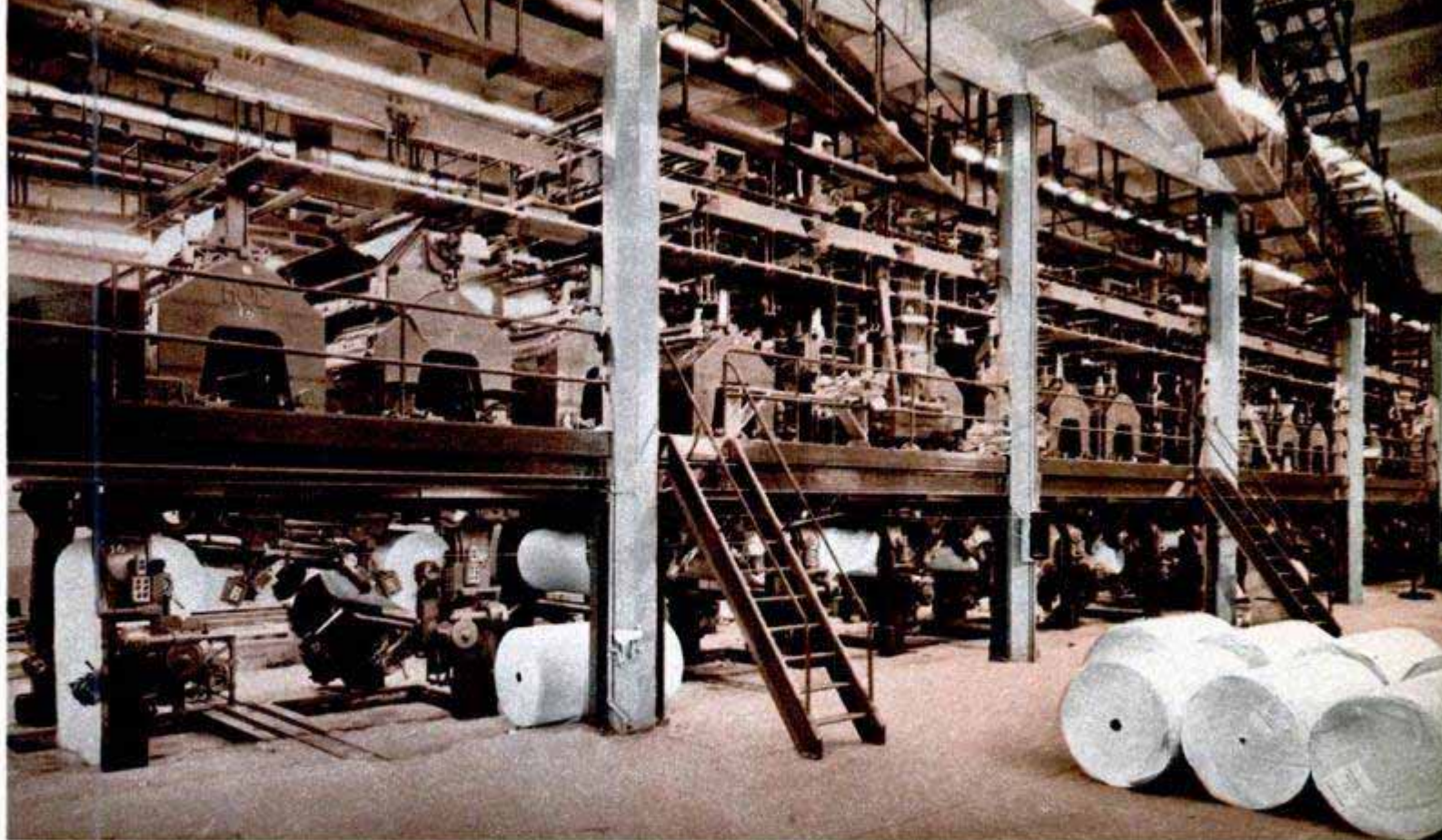
Thirty-five dynamic brakes on the press, aided by separate brakes on each motor, stop the press in four revolutions of the cylinder, even when the 700-ton machine is traveling full speed. This is not the stopping distance for emergencies only, but the normal stop.

If something serious should happen to the press while in motion, a shearing pin will break instantly at the point of trouble, thus freeing the gears. A new shearing pin can be installed in a matter of minutes after the trouble is remedied.

The plant uses 6,000,000 kilowatt hours of

Above, under 1600 pounds pressure, deep impression of page form is made on paper-composition matrix. Below, molten metal forced against matrix in casting forms a curved plate that goes to pressroom, right





Curved metal plates are next positioned and locked on cylinders of giant Hoe press, which prints, trims and folds completed newspaper. Largest press in the region, it turns out 135,000 forty-page papers an hour

electricity a year, an amount sufficient for the needs of 1482 average homes. The 27,000 watts of electricity required to heat the big metal pot in the stereotype room alone would keep 2700 lamps of 100 watts burning simultaneously.

The machine shops are needed to maintain the newspaper's extensive mechanical equipment. One, just off the pressroom, has a lathe, three drill presses, a shaper and a grinder. It is also equipped for doing both electric and acetylene welding. Another machine shop, in the Linotype department and specializing on work there, has a drill press, lathe and grinder.

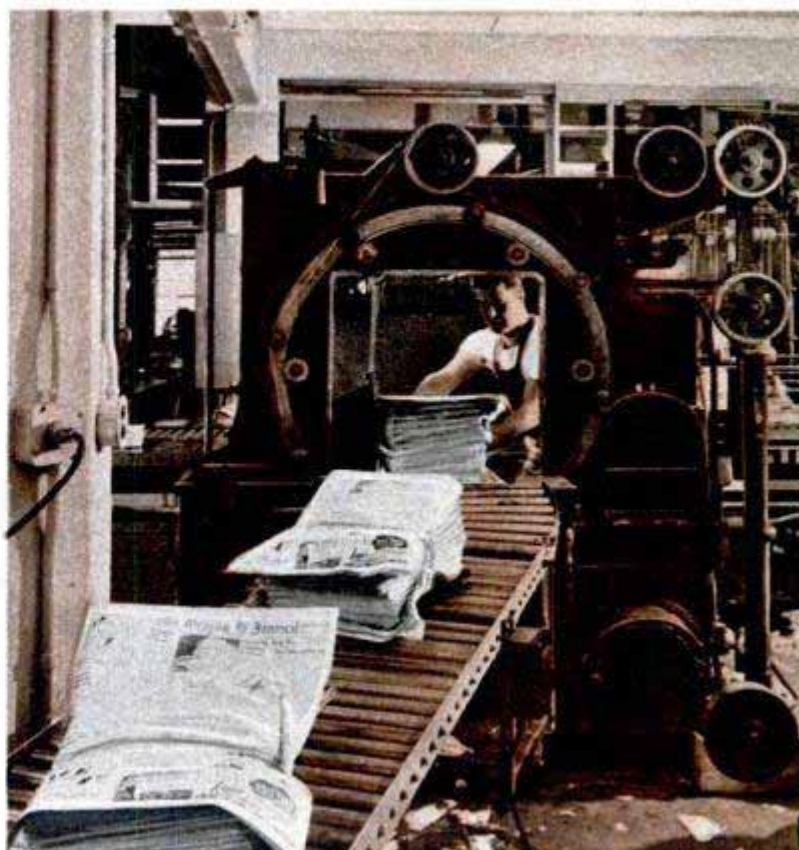
Much of the equipment in the new plant was specially designed by members of the Journal staff. Particularly impressive and successful is an elaborate conveying device on which the newly cast stereotyped cylinders are moved from the stereotype department to the higher level of the big, two-story-high presses.

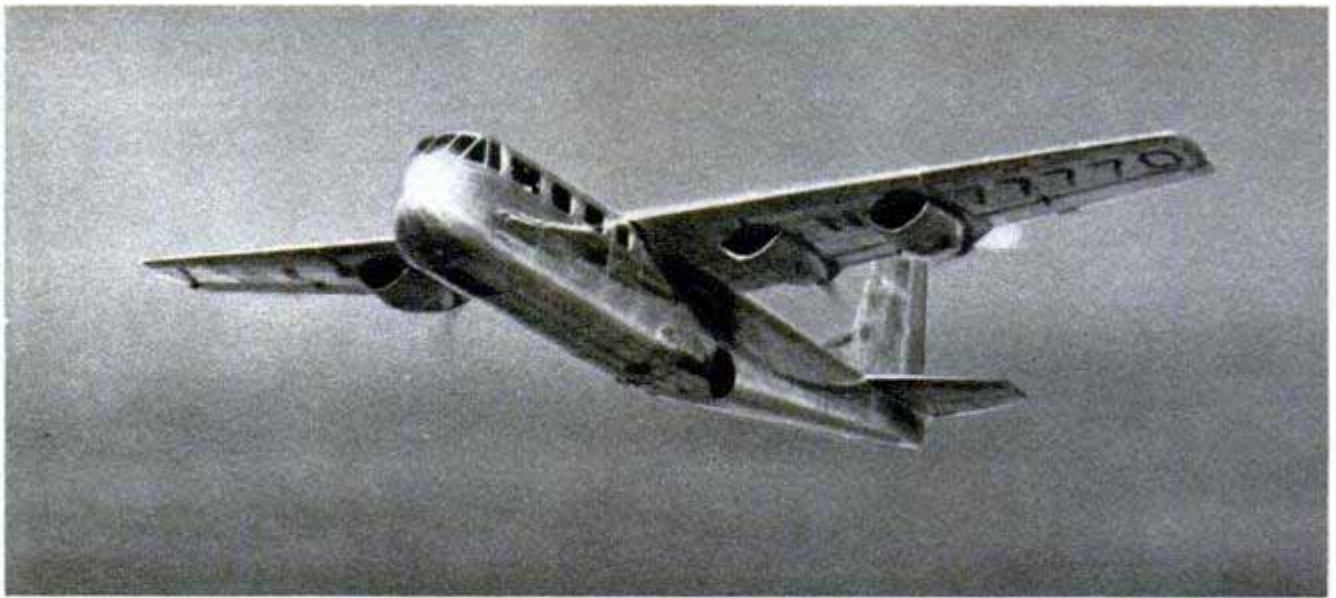
This machine has two arteries of travel. One is set for a casting unit which operates at four casts per minute, and the other for one that turns out three casts a minute. Both deliver plates in perfect synchronization to their respective positions by the press. It runs the chromatic scale in modern control devices, from synchronous electric contact mechanisms to electric eyes. The conveyor also returns the plates after their edition is run, for remelting in the electrically heated pots.

Viewing this vast panorama of giant-size,

precision mechanism, it occurs to one that the repertorial departments of modern newspapers have to ride hard to keep abreast of the color and drama that is constantly being unfolded through invention and engineering for their brother newspaperman of the apron and micrometer.

Newspapers move along on conveyors to the mailing room, to be counted, wire bundled, routed. Finally, they go down chutes to the waiting delivery trucks





First Four-Engine Personal-Type Plane

What is believed to be the world's first four-engine executive-type plane has been flown at New Orleans. Its builders claim the four comparatively low (115) horsepower engines provide a greater margin of safety than using one or two engines of equivalent power. Engines are mounted in pusher-type installations. The plane can be flown day or night in any kind of weather suitable for airline operation. Carrying five, it cruises at about



155 miles an hour and has a range over 1000 miles. The new plane is 34 feet long and has a 48-foot wingspan.



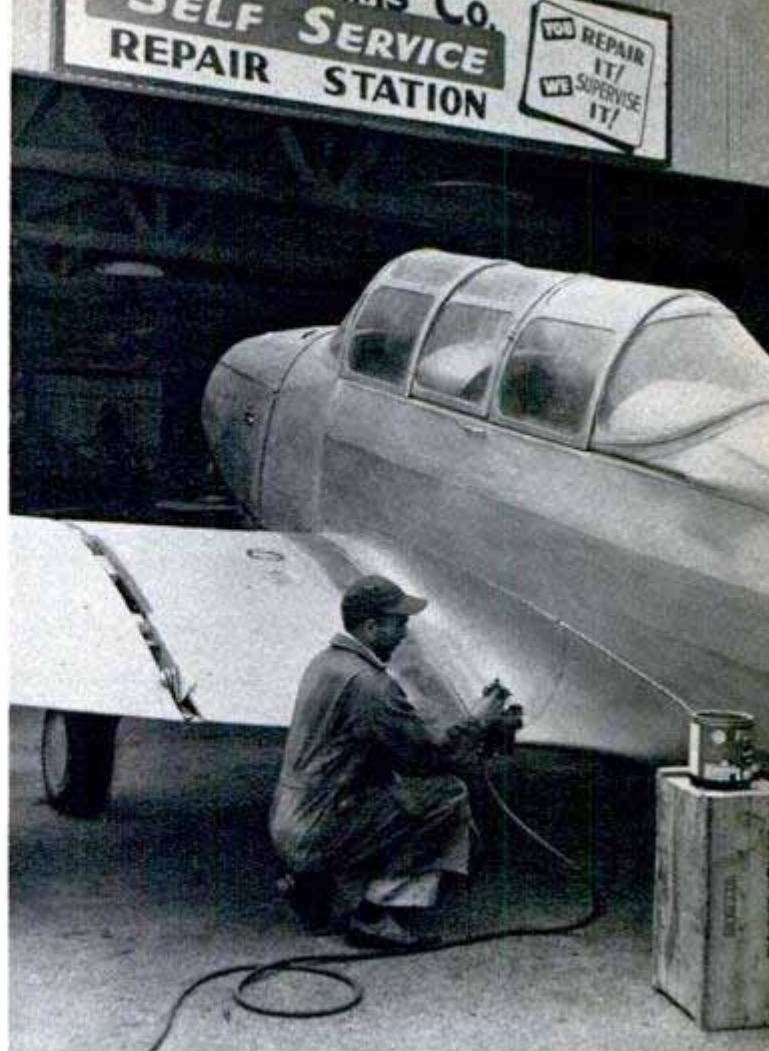
Ribbon-Eradicator Combination Makes Perfect Typing Simple

Erasing errors in typewritten material is simple when you use a ribbon designed for use with a liquid eradicator. Complete sentences can be eradicated from the page without the faintest smudge or trace of the deletion. The liquid removes the impression and leaves the paper clean and ready for retyping. A special ribbon, available in sizes and colors to fit any standard make of typewriter, must be used with the eradicator.

Better Light Diffusion

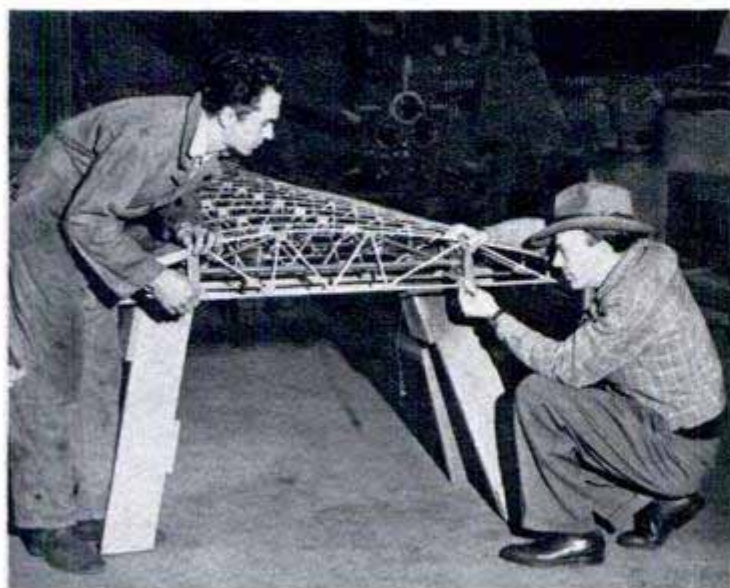
Almost perfectly spread light comes from a bulb coated on the inside with a newly developed silica substance. Unlike previous diffusion experiments, the coating does not appreciably limit light output. It was perfected by Marvin Pipkin of General Electric, who developed the first inside-frosted lamp in 1925.

repair your own plane



Most work, like the paint job above, is charged at a flat rate. Extensive operations, such as soundproofing a fuselage, at left, get a monthly rate

Private-plane owners help themselves to lower maintenance costs at the Compton, Calif., airport where the Stolp-Adams Co. runs a "cafeteria style" repair hangar. Under the close supervision of George Adams and Lou Stolp, partners in the self-service station, plane owners do their own repair work, thus cutting costs to a fraction of the usual charge. The company supplies the tools and sells the necessary materials, incidentally at a discount, for the job. Adams is a CAA-designated aircraft inspector and his supervision makes the repair work legal.



Complete overhaul jobs are done by plane owners at the self-service hangar. Above, installing a rib spar in a lightplane wing. Stolp supervises at left. Right, as Adams watches, flyers assemble engine after overhaul





Sight-seers wave to the cranberry workers from the rear platform of the old-fashioned observation car



ALL ABOARD!" With the last sight-seer swinging up the steps, the welterweight train chugs slowly out of the station and puffs along its narrow track toward the cranberry bogs.

According to Ellis D. Atwood, the owner of the strange little railroad, it's the only narrow-gauge steam line still operating commercially in the United States. The tracks of the Edaville Railroad are only 24 inches apart, making it less than half the gauge of its big brothers.

That's why it is a welterweight railroad—a line that falls somewhere between a kiddieland special and the standard lines that have survived through the boisterous history of American railroading. Don't think for a minute, though, that the Edaville is a toy or a back-yard hobby. The little railroad does a man-size job of hauling freight in and out of the cranberry bogs near South Carver, Mass., and more than pays for its operating expenses.

Atwood conceived the idea of operating a miniature railroad in 1941 when he learned that the equipment of one of the

← You can pay or ride free on this friendly railroad. Most passengers prefer to buy a ticket, have it punched by the conductor, then keep it as a souvenir

↓ Narrow-gauge Edaville line really earns its keep by hauling workers to the bogs and the cranberries back to the unloading platform during the harvest



CRANBERRY



Workers use big scoops to sweep up the cranberries while one of the little trains stands by for a full load

defunct narrow-gauge roads was about to be scrapped. He bought part of the equipment and has been running down extra cars ever since to provide complete rolling stock for his six-mile line.

Today Atwood has a total of 80 of the little engines and railroad cars including seven locomotives, and various passenger cars, parlor cars, baggage cars, box and tank cars, flat cars, cabooses, snowplows, a flanger and dump cars.

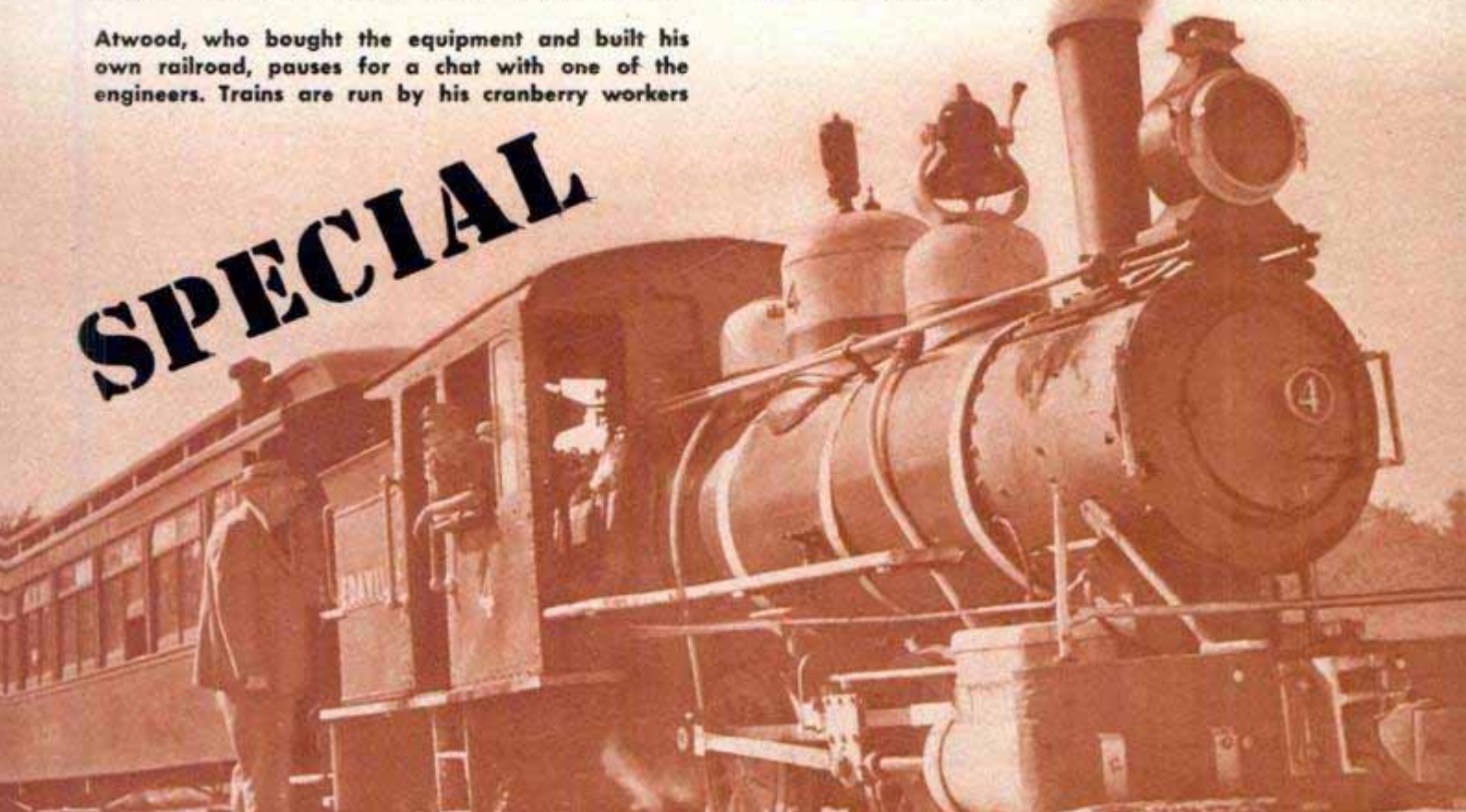
Five days each week the little railroad chugs along its narrow tracks hauling sand for the cranberry bogs, equipment, pickers and, at harvest time, cranberries. If Atwood had no railroad for these freight

operations, he would be forced to pay trucking costs that would far exceed the operating costs of the line. It has been estimated that during the cranberry harvest season he saves about \$200 per day through use of his little railroad, described as "1800 acres long and only two feet wide."

Once every two or three years the bogs must be covered with sand, and Atwood's railroad hauls about 10,000 cubic yards of sand each winter. Every winter, too, the bogs must be flooded to prevent the cranberry plants from being dried out by bitter winds. Atwood has combined the most modern equipment with the most old-fashioned, for at times you can see a miniature

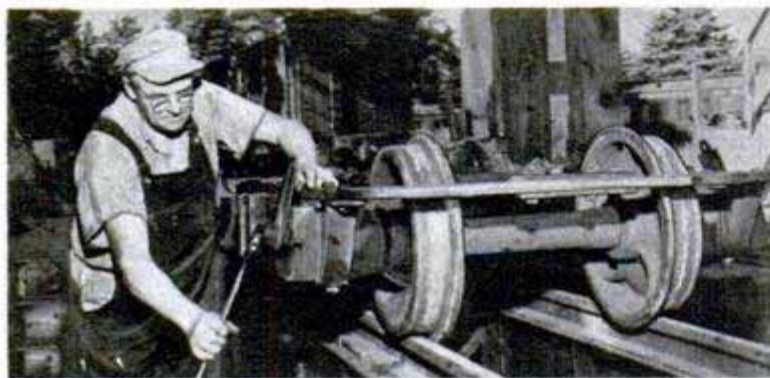
Atwood, who bought the equipment and built his own railroad, pauses for a chat with one of the engineers. Trains are run by his cranberry workers

SPECIAL





Engines are small but consume lots of coal. The men who run the trains don't consider them toys. Below, the railroad has a complete repair yard for keeping the equipment in top shape. Note extremely narrow, two-foot gauge of the little railroad



engine pulling a line of old-time cars loaded with workers to the fields, while overhead a helicopter hovers, dusting and spraying the bogs against insects.

But the Edaville line isn't all business. Atwood has made it his hobby, too, and every week end thousands of visitors take a ride in the old-fashioned, high-styled cars. In one year the railroad hauled 125,000 sight-seers.

It doesn't cost you a cent to ride on the railroad, but most people prefer to buy a 25-cent ticket, submit it to the conductor's punch and then keep it for a souvenir. The ornate passenger cars reflect the styling of the turn of the century. Repairs have been made but the coaches and parlor car look much as they did when they first were built.

During the Christmas season floodlights are placed atop a 10-car train and passengers enjoy a night ride around the cranberry loop.

The equipment of the narrow-gauge railroad includes a station, switching yard, repair yard, turntable and bridges. A regular crew is constantly busy repairing the engines and cars, for they can't be replaced once they are gone.

Operating personnel of the Edaville Railroad are cranberry work-

With the engine chuffing into the station the conductor waves the traditional red flag for the benefit of the sight-seers





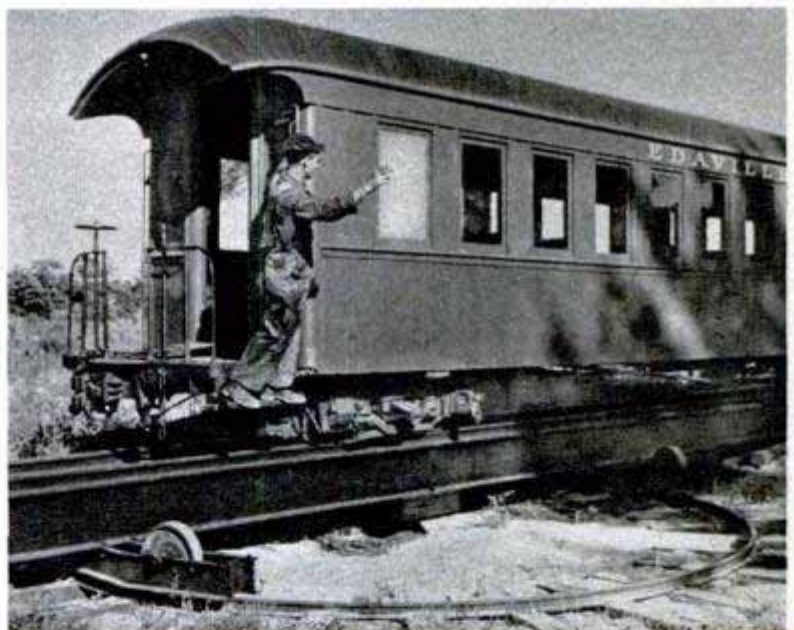
Hard-working engine rolls around one of the bends hauling a coach, two sight-seeing cars loaded with harvesters, a caboose

ers turned engineers, conductors and brakemen. A man may be working in the bogs one day and collecting tickets the next.

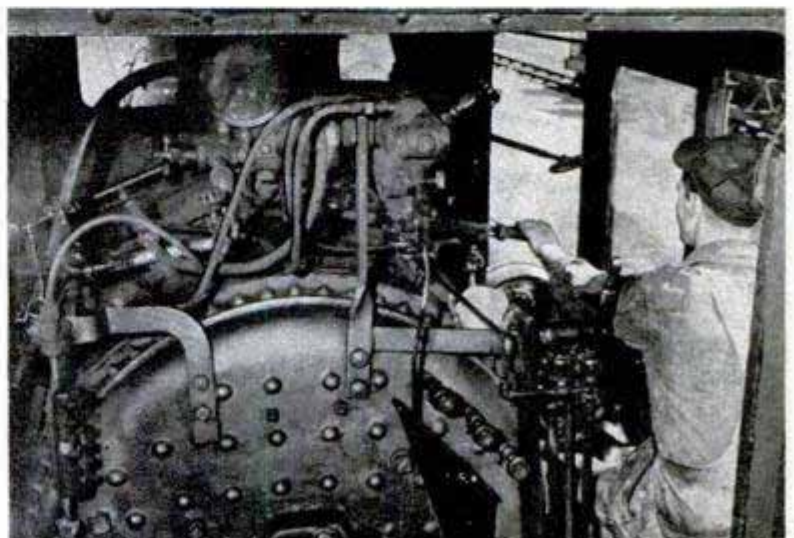
A trip around the bogs is a lesson in how cranberries are raised. The berries grow on land useless for other crops, but are a fairly expensive crop to cultivate. At harvest time the pickers kneel in the fields and sweep two-handed scoops through the plants, picking up the berries. After the bogs are hand-picked, they are flooded and a power boat cruises about, agitating the water to bring the loose berries to the surface where they can be gathered in wire nets.

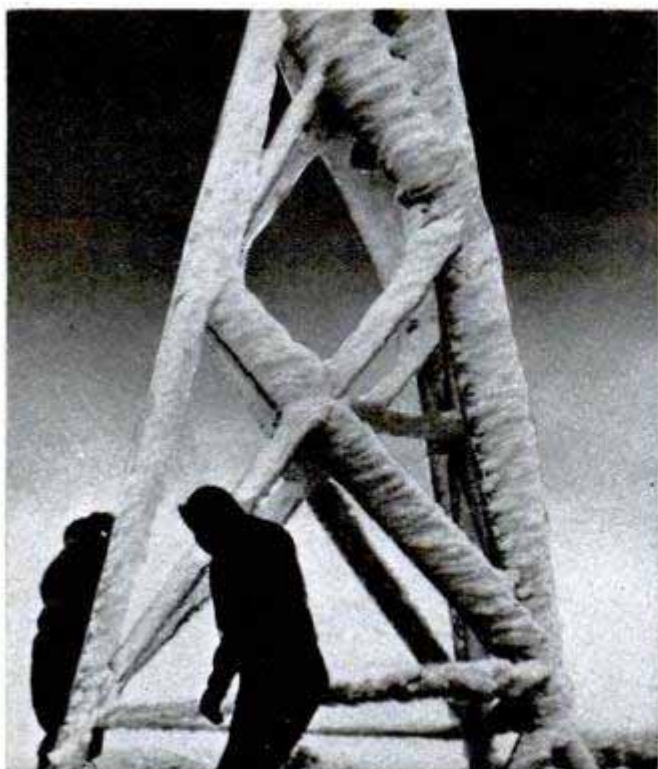
You can't tell as much about a cranberry by its color as by its bounce. Good berries bounce higher than bad berries, so that is how they are sorted. They are dropped into a container, and those that bounce over the sides land on a conveyor belt for a long trip to a Thanksgiving table.

Atwood, with the help of his little railroad, produces from 10,000 to 12,000 barrels of cranberries each year on his 1800 marshy acres. His pride in his business is matched only by his pride in the Edaville Railroad, which Atwood claims is a railroad that really runs on time.



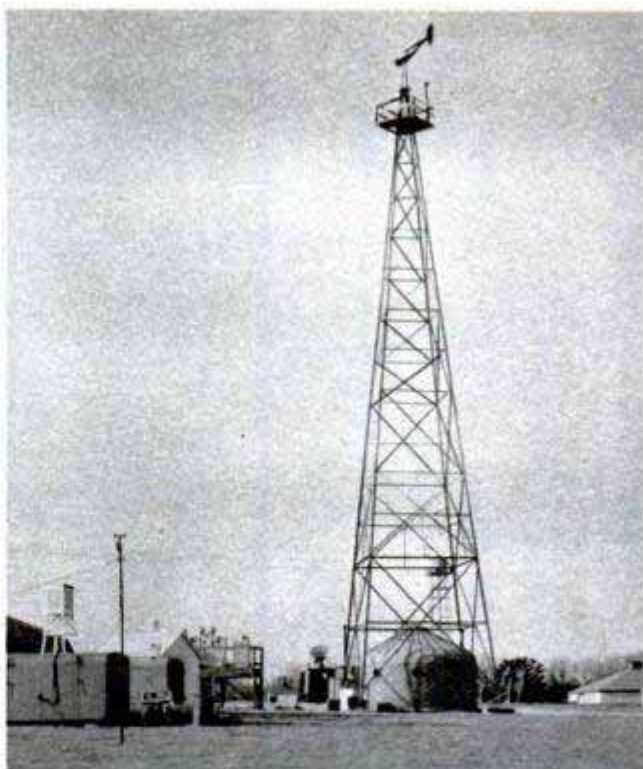
Turntable reverses cars on the narrow track. Repairs are made with care as the equipment can't be replaced. Below, the cab of the engine seems just as complicated as that of a full-size locomotive. Here the engineer eases throttle to start the train





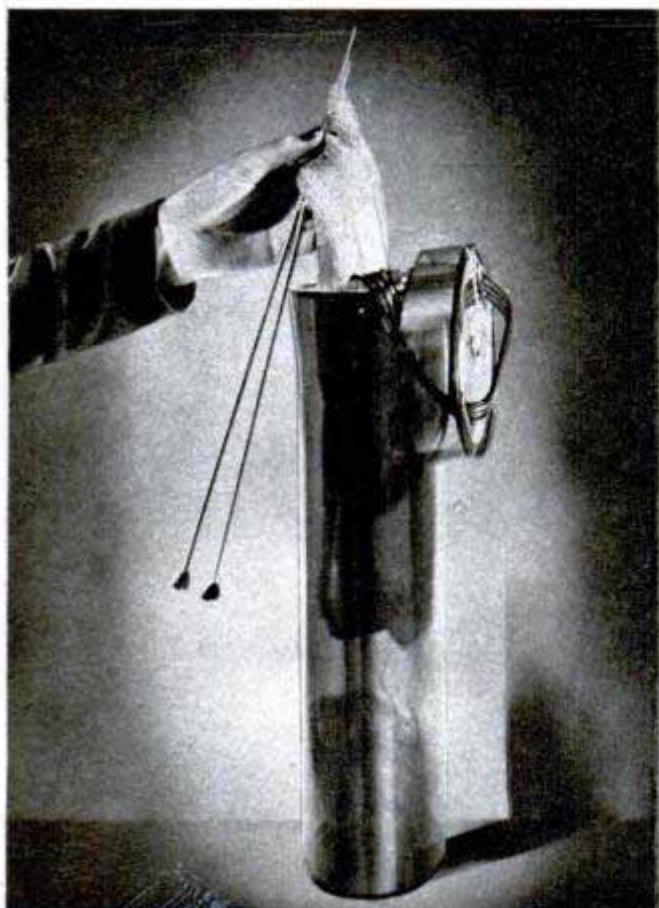
Robot Weather Stations

Wind-operated stations that send automatic weather reports are under test by the U. S. Signal Corps. Scientists of the Army and the Wind Turbine Company have developed a wind-driven generator which charges a bank of storage batteries. The batteries power a radio connected with instruments which automatically report the temperature, pressure, relative humidity, wind speed, wind direction, precipita-



U.S. Signal Corps photos

tion and sunshine intensity. A wind of seven miles per hour is sufficient to generate electricity, and one of 24 miles per hour will produce the generator's rated output. A regulator prevents overcharging of batteries. The equipment has undergone preliminary tests at Mt. Washington, N. H. If the experiments are successful, the weather stations will be installed at various spots, where they will report the weather for years without attention.



Transparent Knitting Bag

In step with the current vogue for knitting Argyle socks "on the go" is a lightweight bag made of Lumarith, a transparent plastic. Shaped like a cylinder, it comes in blue, red, green and amber in lengths of 8 to 14 inches.

Exhaust-Gas "Fertilizer" Increases Soil Yield

Exhaust gases from gasoline and diesel engines are being used in the Southwest to add the necessary acid elements to irrigation water to make the soil more productive. The usual method of reducing excessive alkalinity is to add sulphur to the soil, but this process is expensive. By using the exhaust fumes from engines that pump irrigation water, farmers acidify soil at virtually no cost except the initial cost of the equipment that mixes the gases with the water. The mixing is done by turbine agitators. This equipment costs about \$700 and provides the equivalent of \$400 worth of soil-acidifying chemicals every year at almost no operating cost.

Video Camera Lens "Sees" in Dim Light

Dim lighting is no longer an enemy of the television camera now that an extremely fast lens has been developed for video use. The new lens, called the Video Balowstar, picks up a bright image with only one foot-candle of illumination whereas previous lenses have required as much as 80 foot-candles. Designed for use under the most adverse lighting conditions, the lens makes possible the telecasting of concerts, night street scenes, church services and a variety of on-the-spot news events without supplementary lighting. Rated at f:1.3 with a 7-inch focal length, the "owl" lens is fully corrected for infra-red illumination, eliminating the fuzzy im-



Inventor Frank G. Back inspects his "owl's eye" Video Balowstar lens. Designed for television pickups under dim light, the lens costs \$2700

age that results when incandescent and natural lighting are used simultaneously on TV pickups.

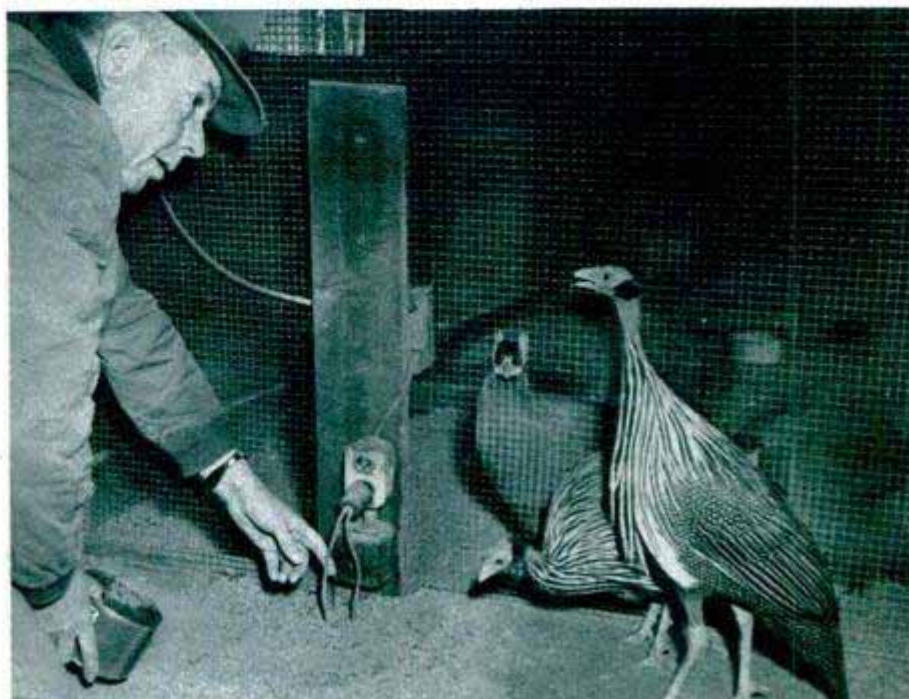


Mattress Massages Patient By Air-Pressure Action

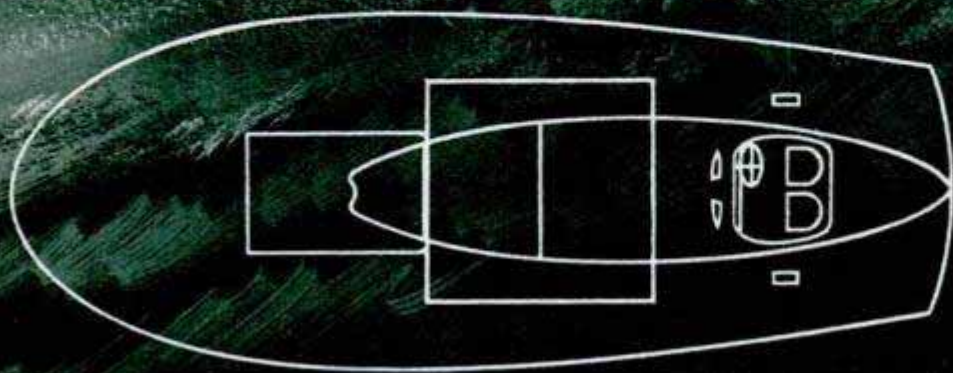
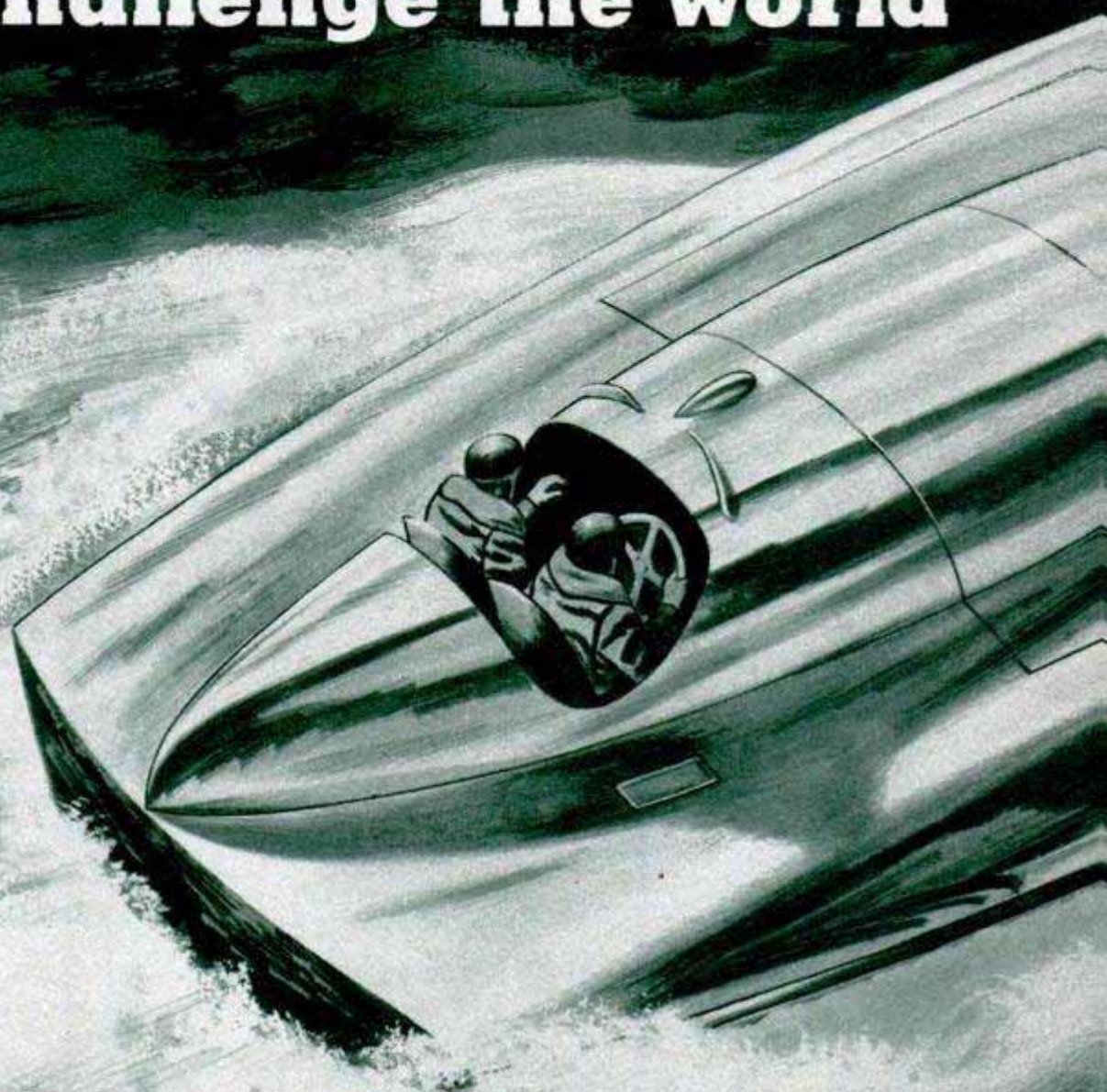
Gently massaging the body of a bedridden patient, a plastic mattress reduces the danger of bed-sores and also cuts down the amount of nursing care. The mattress consists of a series of air cells running across the width of the bed. Alternate cells are connected to a manifold which forms the edge of the mattress. The two sets of cells are alternately deflated and inflated by a small pump, producing a massaging effect on the body.

Soil-Heating Cables Save Birds

Small electric cables buried six inches underground saved the lives of hundreds of rare tropical birds last winter. R. H. Gibson of St. Helena, Calif., installed the heating cables in the bird pens on his game farm. Developed by General Electric, the cables saved many of the 4000 birds, as temperatures around 60 mean certain death to some species. A thermostat kept the pens at 70 degrees.

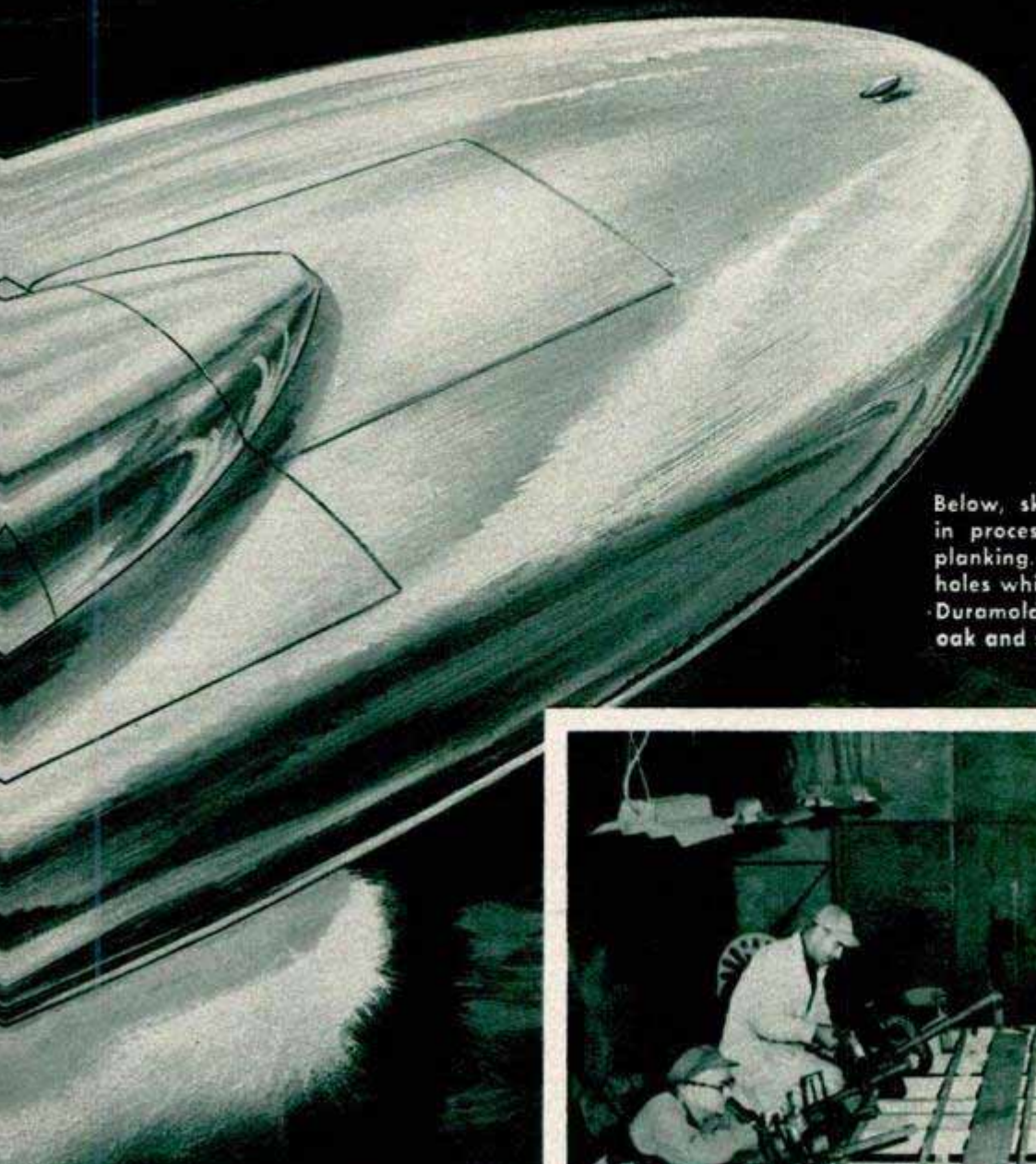


\$100,000 speedboat to challenge the world



Drawings show top and side contours of 32-foot super speedboat. "Step" in hull is visible in lower drawing. As boat gains speed, it rides on two forward stabilizers and aft bottom to reduce frictional drag and gain "air lift." With 3000-hp. engine, estimated speed is 160 m.p.h.



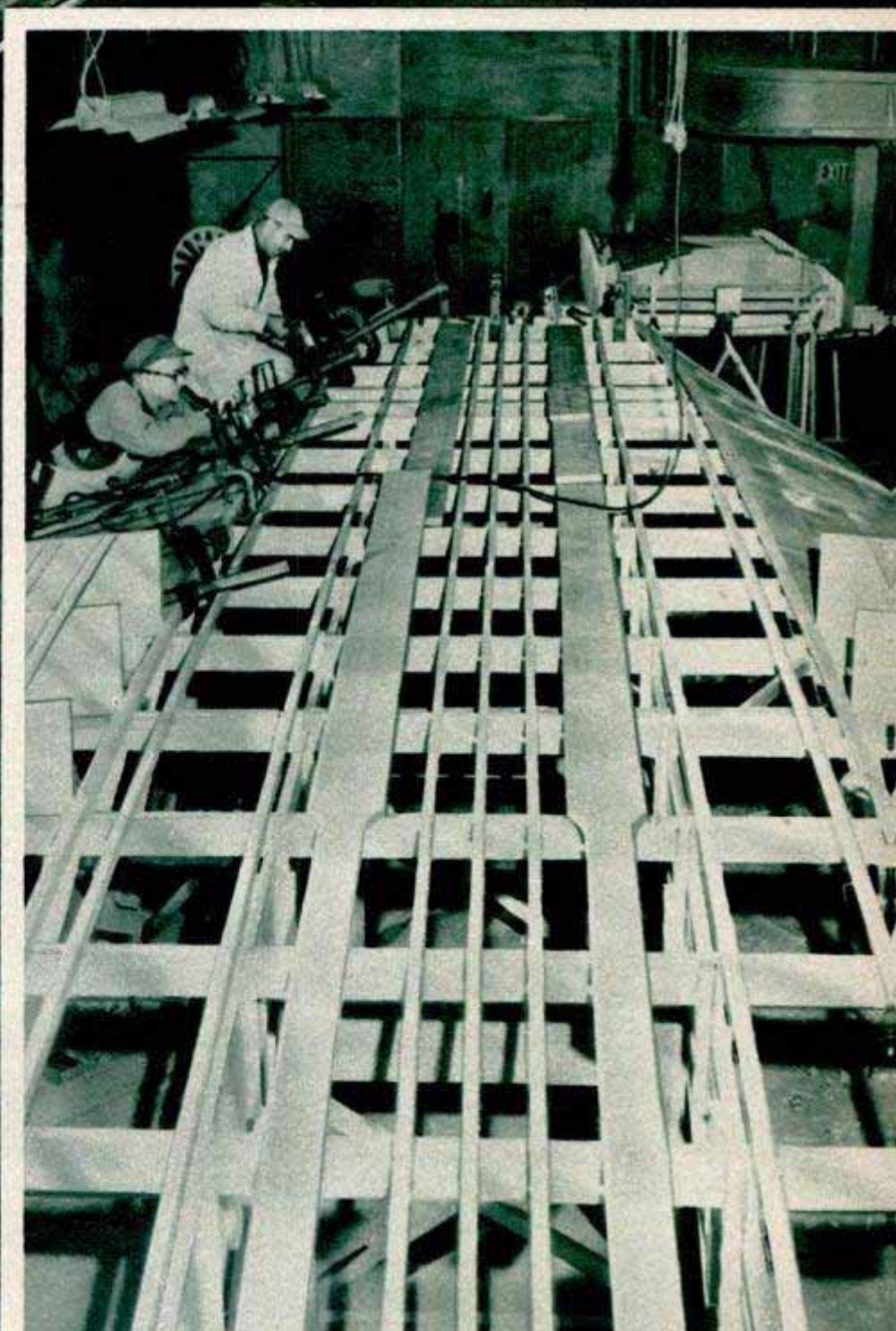


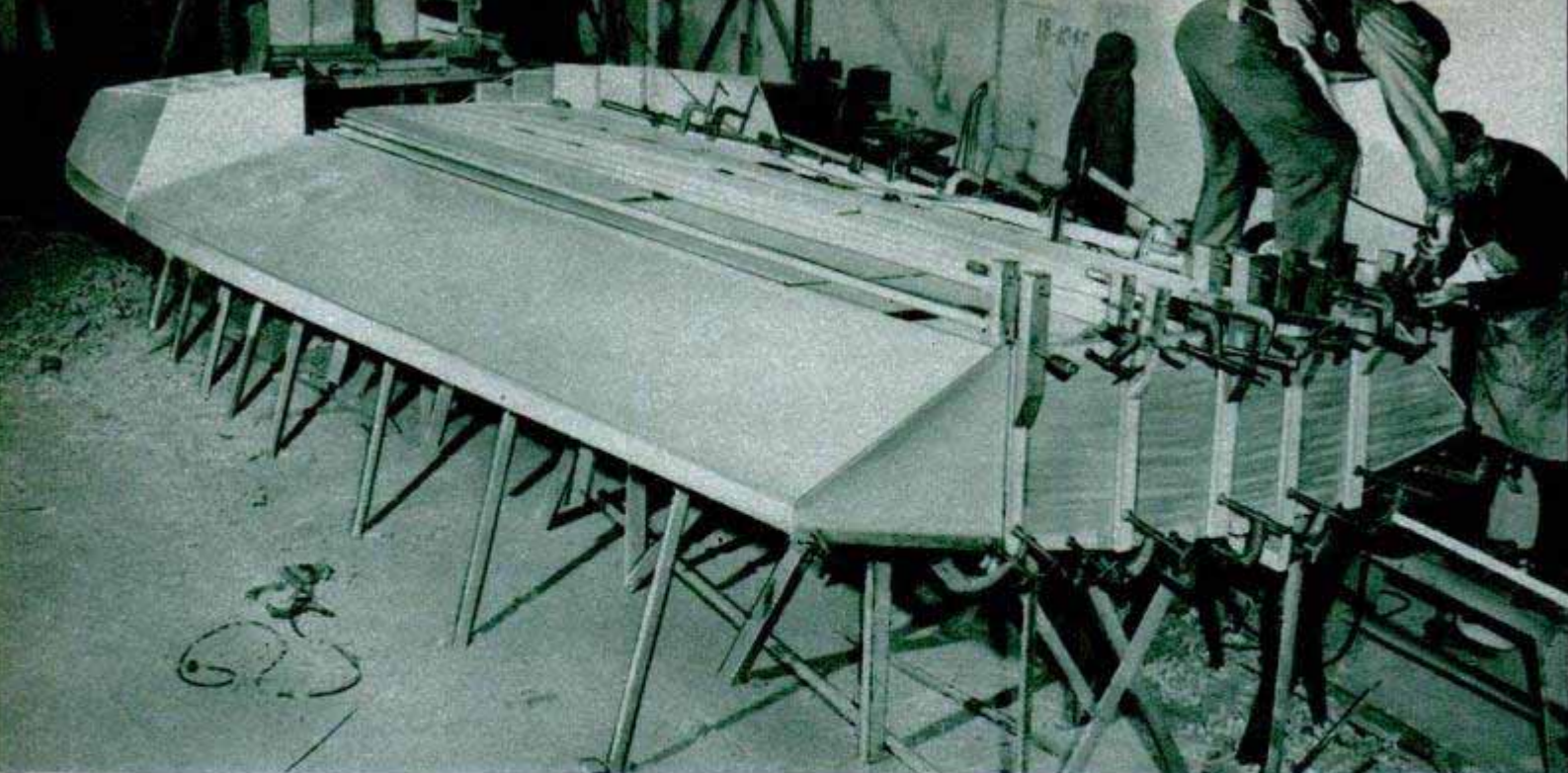
Below, skeleton hull of speedboat in process of being covered with planking. Workmen are drilling the holes while C-clamps hold material. Duramold birch plywood, laminated oak and spruce make a sturdy craft

WITH AN ESTIMATED top speed of 160 miles an hour, a flashy 32-foot speedboat is aiming toward a new world's record at the Harmsworth Trophy race which will be held on Detroit's St. Clair River July 29, 30 or August 1. The anticipated speed is 18 miles an hour faster than any boat that ever roared its way past a finishing marker.

The \$100,000 craft, now undergoing tests, is powered by a 3000-horsepower 24-cylinder Allison engine of the "W" type—two "Vs" in one crankcase. Engines of this design were originally planned for high-speed reconnaissance planes before jets upset the aviation appletart.

The speedboat is owned by Henry J. Kaiser, the industrialist, and was designed and built by the Ventnor Boat Corporation at Pleasantville,



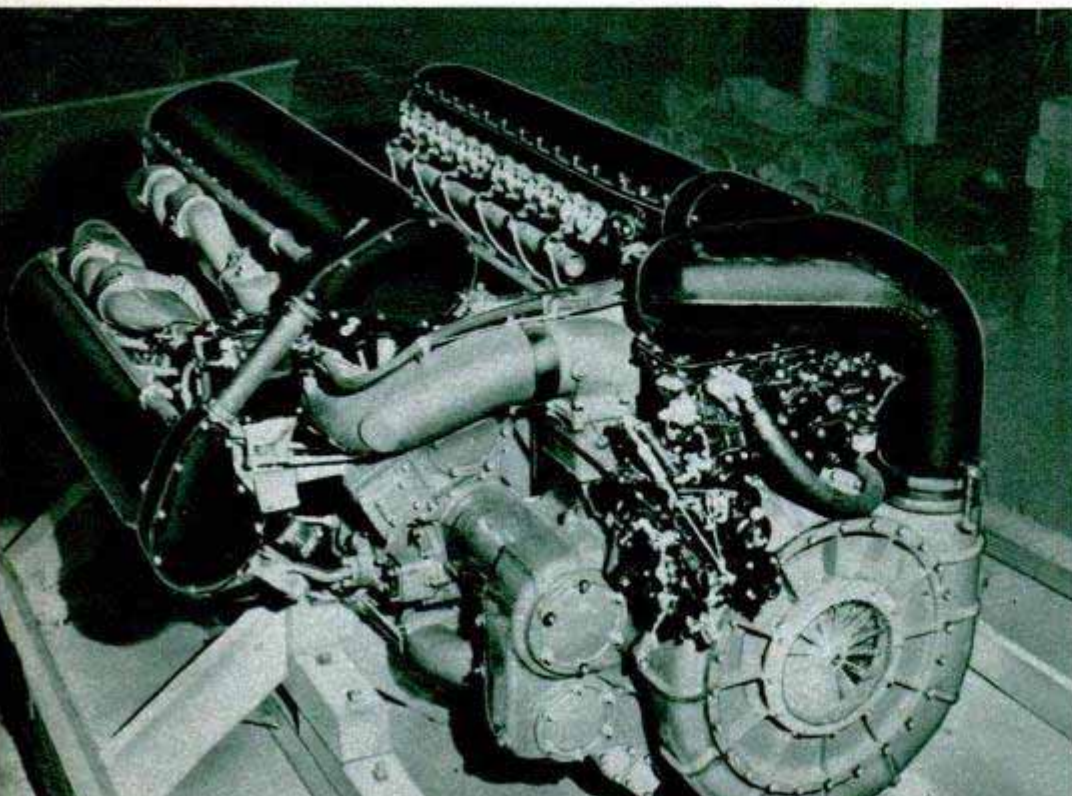


Stern-to-bow view of hull under construction. Builders hope it will stand the strain of 160 m.p.h. speed

N. J. This company has built some of America's fastest racing boats and designed the Bluebird, the speedboat in which Sir Malcolm Campbell set the world's record of 141.74 miles an hour in 1939. The Kaiser boat will probably be piloted by Guy Lombardo, noted orchestra leader and racer.

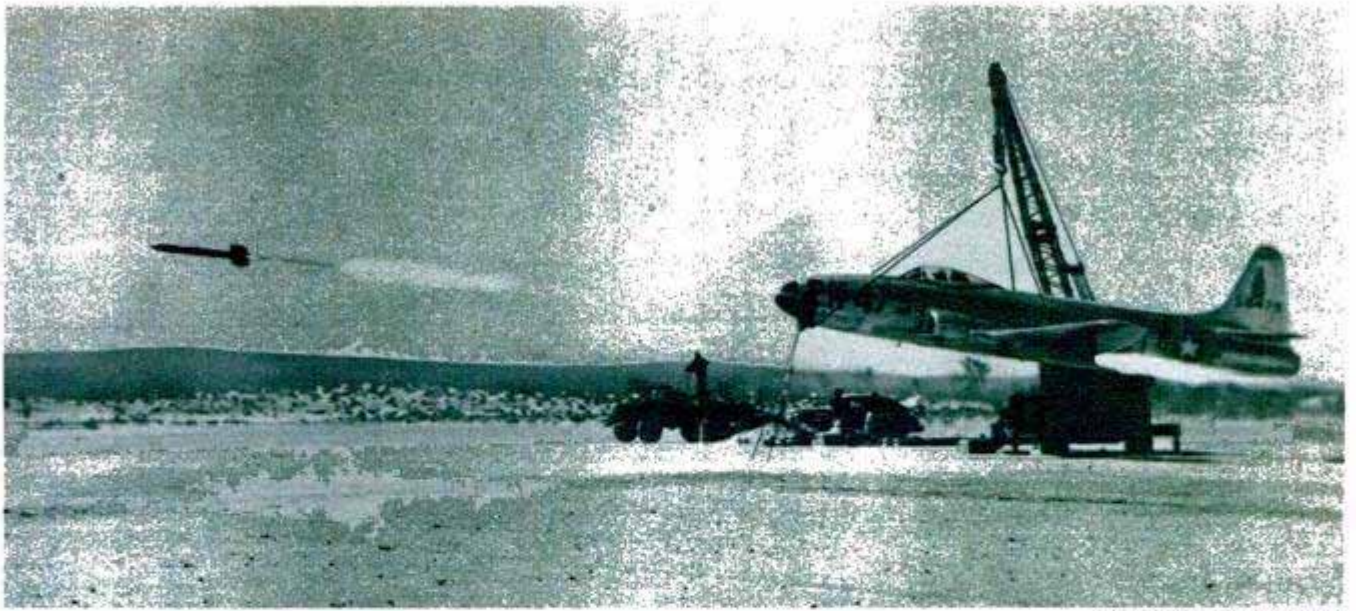
A distinctive feature of the new speedboat is its three-point suspension. When the boat is in motion it rides on its two front stabilizers and aft bottom. This reduces frictional drag, according to designer Arno Apel, and concentrates air under the bottom of the boat, giving it "air lift." At high speeds the boat is approximately 50 percent airborne.

Speedboat power plant — 3000-horsepower 24-cylinder aircraft engine



The boat is constructed of Duramold birch plywood and laminated oak and spruce framing. Engine spar girders are constructed of high-tensile aluminum and the deck is covered with aluminum alloy sheet. The high-powered, double-crankshaft engine will burn up aviation gasoline at rates estimated from 300 to 600 gallons an hour, depending on the speed. At 40 cents a gallon, this tremendous thirst will run the fuel bill up to \$240 an hour at top speed. The twin crankshafts, mounted in a common crankcase, turn two contrarotating propellers.

The Harmsworth Trophy race is being revived after a lapse of 16 years and will be conducted by the Yachtsmen's Association of America. Competing nations are represented by teams of a maximum of three boats. A committee of 10 chosen by Sheldon Clark of Chicago, commodore of the Y.A.A., selects the American competitors. Challengers from Canada and Italy will also be in the race. The Harmsworth Trophy has been held by the United States since Gar Wood, Sr., of Algonac, Mich., won it on Osborne Bay, England, in 1920. The Kaiser boat is expected to travel 35 miles an hour faster than Wood's famed Miss America X.

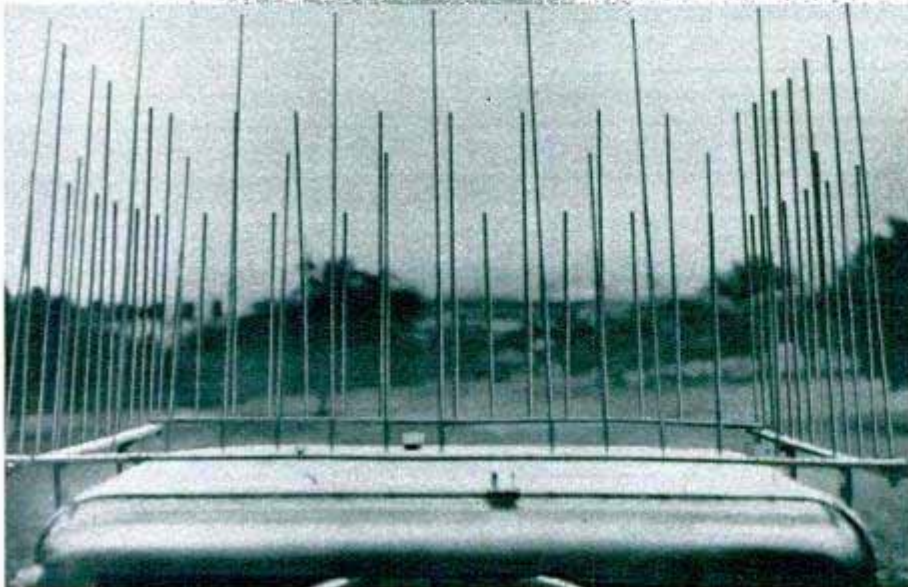
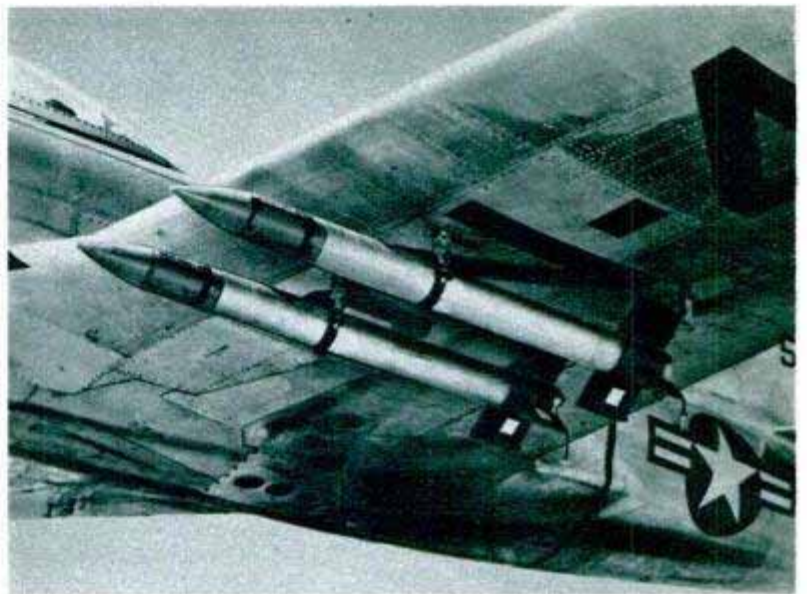


Lockheed Aircraft photos

Retractable Rocket Mounts for Fighter Planes

Development of a new disappearing rocket mount may make rockets standard equipment on all U. S. Air Force fighters. They retract into the wing when the last rocket is fired, eliminating the drag of old-type fixed mounts that reduced the plane's speed. Jets like the 600-mile-an-hour Lockheed F-80 will carry eight five-inch high-velocity rockets, four under each wing. The rockets travel 1350 feet a second under their own power, plus the speed of the plane.

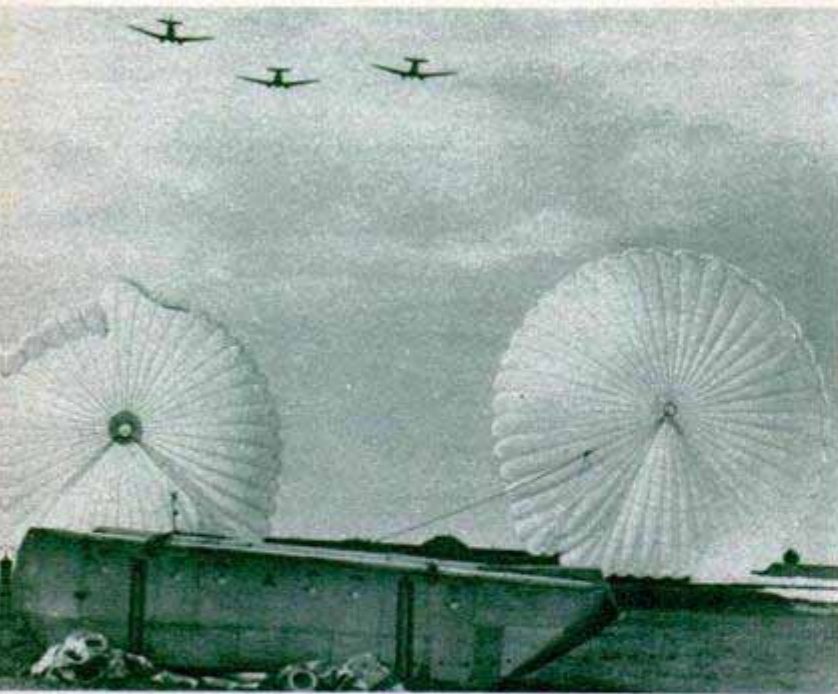
Top, an F-80 with its retractable rocket mounts being tested on the range. Right, close-up of mounts with rockets in place



Pronged "Scarecrow" Keeps Pigeons Away

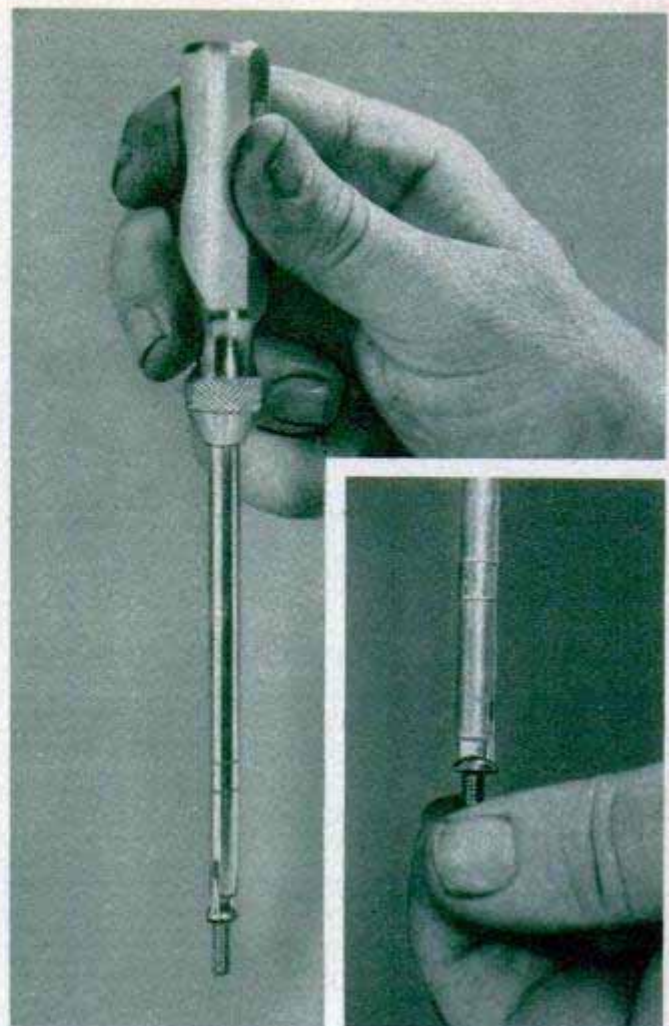
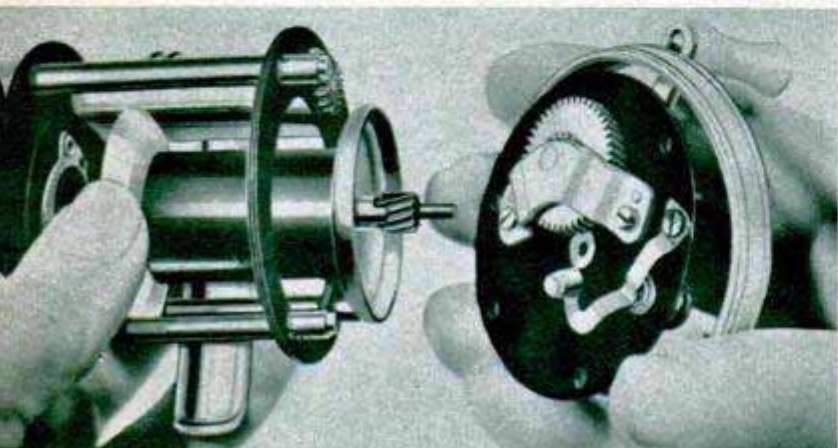
Faced with the problem of keeping birds off newly developed airport approach lights, Westinghouse engineers came up with a many-pronged "scarecrow" that is proving a puzzler to roost-seeking pigeons. It keeps birds from obscuring the lights and from flying into the path of landing planes. Called most powerful in the world, the lights penetrate 1000 feet of thick fog to guide incoming craft to the runway.

Under his own power and without mechanical help, man's top speed is just over 22 miles an hour.



Metal Crate Delivers Jeep by Parachute

Any type of freight can be loaded in a metal universal container and parachuted from a plane. A fully assembled jeep and trailer combination, ready for instant use, was dropped from a Halifax bomber in a demonstration by the British School of Land and Air Warfare.

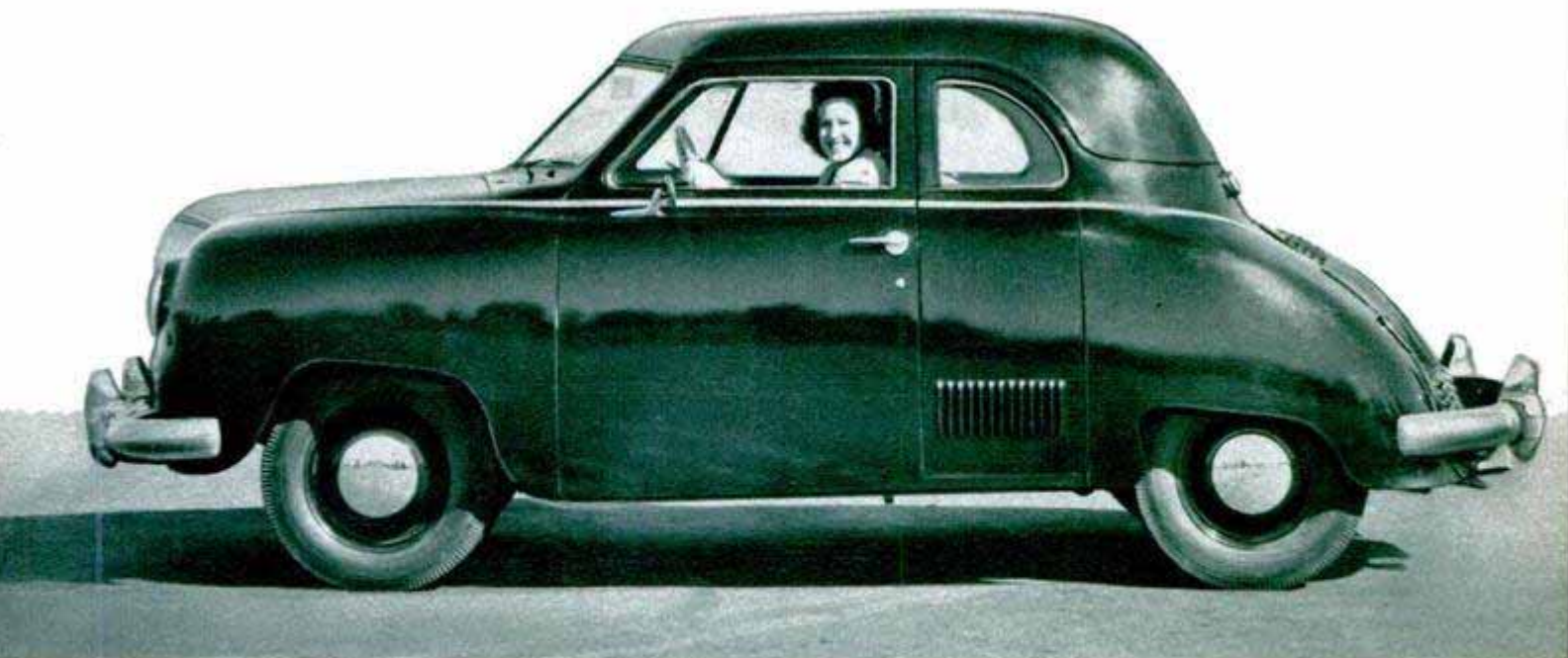


Spring-Action Screwdriver Holds Screw Firmly

By the spring action of its two slender bits, a new screwdriver grips the screw firmly, allowing it to be started in those hard-to-reach places. Pressure on the bits forces them into the shank, closing the gap between them so they can be inserted in the screw slot. When pressure is released, a spring inside the shank forces the bits out so they grip the sides of the slot. The tubular end of the shank rests against the screw head to keep the screw properly aligned during the driving.

Twist of Wrist Opens Reel For Cleaning or Oiling

By simply unscrewing a large ring an angler can expose the parts of a new fishing reel for cleaning and oiling. He can open the mechanism without any tools and without losing any of the small parts. Grit and old lubricant are brushed out, the parts re-oiled and the reel screwed together again without disturbing the adjustment. The reel is designed for casting light lures.

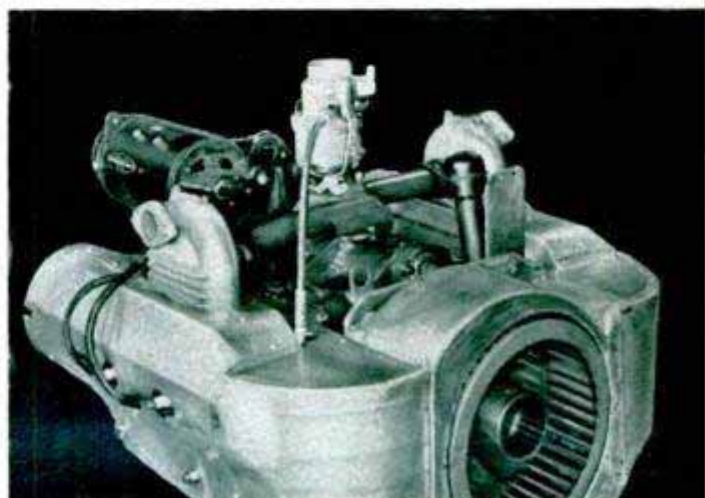
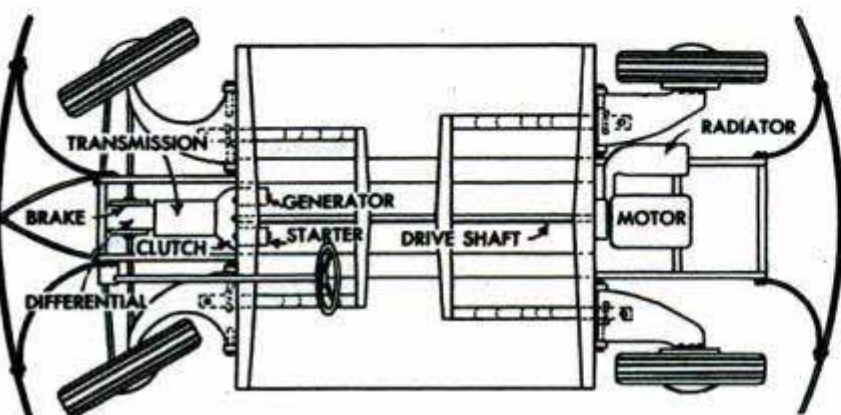


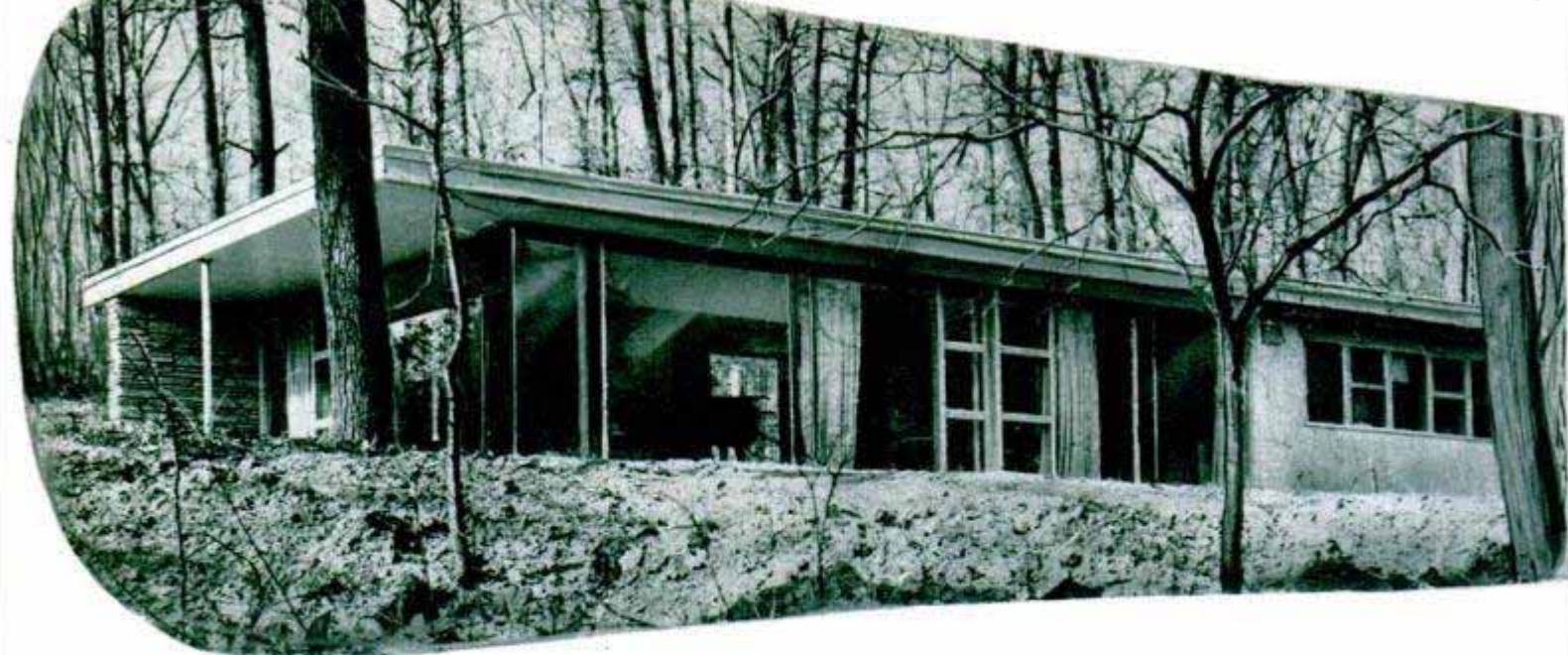
Midget Makes Bow

Getting into production in Kansas City, Mo., is the latest midget sedan in the automotive field. The car has a front-wheel drive, an airplane-type air-cooled four-cylinder rear engine, and present plans call for a body of molded plastic Fiberglas. Designed by Ben F. Gregory, the car will bear his name. It has been undergoing tests for 3½ years. The Gregory has an over-all length of 153 inches and its width of 67 inches accommodates three passengers in front and two on the back seat. Height of the car is 61 inches. Other specifications include hydraulic brakes, full knee-action springs, pressure lubrication, box-type frame construction with 13 attached panels, a tire size of 5.50 by 15 and a top speed of 70 miles an hour. The rear engine, which places noises and fumes behind the passengers, is installed in such a manner that it can be removed and replaced by one man in less than an hour.



Side view of the rear engine Gregory, top, shows simplicity of line and trim also evidenced in the front view at right. Below, a plan of the front-wheel-drive midget and the airplane-type engine





This striking house, completed by its owner, blends with the rustic surroundings despite its modern lines

TEN MONTHS of spare-time work by a young Pittsburgh engineer transferred his dream house from an architect's drawing board to a wooded hillside. It's the dream house he brought back to civilian life after the war.

The engineer, Robert J. Kirkpatrick of Westinghouse Electric Co., almost had to give up his dream while it was still on the drawing board. When he showed the architect's drawings to contractors their estimates ranged from \$17,000 up. Figures like that were too steep for the family budget.

But he didn't let his dream get away. After all, he thought, an engineer ought to

be able to do some more or less skilled labor to help chop down the \$17,000-plus figure. Then, he and his wife talked it over and decided they could postpone the two extra bedrooms for a while and that cut down the cost even more. Today, the Kirkpatricks and their three small sons are living very comfortably in a prize-winning home that cost them \$10,000.

Plumbing, concrete pouring, rough timbering and electrical work were done by contractors. The Westinghouse engineer did the rest. For 10 months, he worked at the task nights, week ends and even during his vacation.

Left, Mrs. Kirkpatrick tends garden all winter right in the comfort of her big living room, thanks to this corner flower bed. Right, the man of the house made these book shelves with aluminum tubes and pine planks



he built his own dream

The floors of the one-story house are concrete and contain the hot-water radiant-heating pipes. Two walls, the south and east, of the combination living-dining room are entirely glass. Some of the plate-glass sheets measure 8 by 10 feet. These transparent walls are continuously decorated by Nature's handiwork on the shrubbery outside, providing at least four changes in decorations every year.

Eliminating the two extra bedrooms created a sleeping-space problem that was solved with three-tier bunks in a storage area near the master bedroom. The three boys, one five years old, another three and the baby only a year old, almost think going to bed in the Pullman-car arrangement is fun.

Both interior and exterior walls are sandstone that Kirkpatrick laid himself with cinder blocks forming the core. A snack bar in the kitchen has "adjustable" stools that can be lowered as the boys grow taller. They're merely logs standing on end.

The house was awarded second prize in an architectural competition. The Kirkpatricks are proud of this, but they don't like you to call their home modernistic. They say, it's just a real homey house, modern in appearance and utility, but extreme only in comfort.



Above, monk's-cloth draperies cover the glass walls, providing both privacy and insulation. Below, a family portrait in front of the fireplace that dominates the living-dining room. Bottom, stools for the snack bar are logs that will be shortened as the boys grow up





"Light Pipe"

Despite twists or knots, a new flexible "light pipe" carries a beam to its target with four or five times the intensity of a flashlight. It is made of an amber-colored translucent plastic called Fosterite developed by Westinghouse during the war as insulation for radar equipment. Where light traveling through air diverges and spreads, the pipe's highly polished inside acts as a series of reflecting mirrors to prevent light leakage en route. The development of the pipe was a by-product of plastic research and no commercial application of it has yet been planned. It can be made in lengths up to six feet, with thickness varying from $\frac{1}{4}$ inch to 2 inches.

Fence With a Bounce

Erection of a rubber corral fence has cut down cattle injuries on a California ranch. The "fence with a bounce" was made from discarded oil-field-machinery belting.

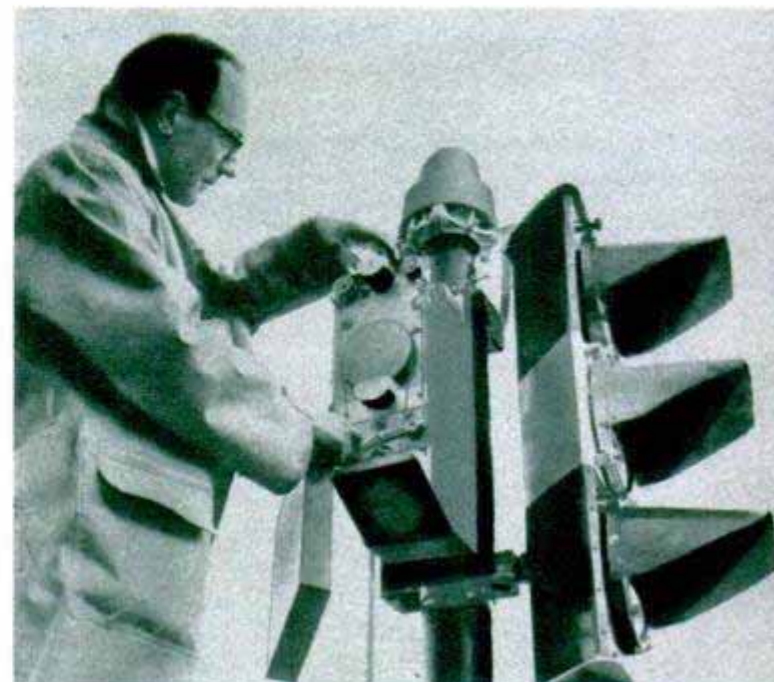


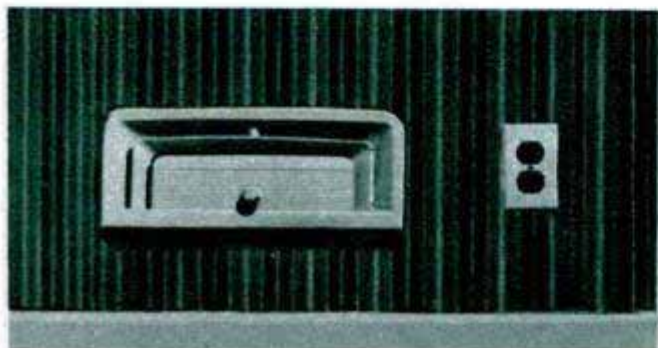
Shock Absorber for Light Planes

Bad bounces on plane landings are almost completely eliminated by an air-and-oil shock-absorbing strut. A landing ram which forces oil through a small opening into a compressed-air chamber absorbs the initial shocks of impact. The opening's size and the amount of air varies with the weight of the plane. Taxiing shocks are taken up with a knee-action effect by the air chamber. The strut adds only seven pounds to the net weight of small planes.

Talking Traffic Lights

Traffic lights that talk have been demonstrated in England. The talking attachment can be synchronized with existing traffic lights to broadcast messages that change as the color of the lights changes. A wide variety of messages in both male and female voices can be used. The talking signals are the invention of K. T. Barlow, a London engineer.





Above, fitting the plenum chamber to the top of the furnace. Circles near top are punched out to take the stovepipe ducts. Top left, installing a register between studs, showing the use of four-inch stovepipe. Left, completed installation of wall register

Stovepipe Heating System Cuts Installation Costs

Producing a blanket of warm air in front of outside walls, a warm-air heating system gives the sensation of radiant heating without its high cost of installation. Special registers direct the forced air upward in a fanlike pattern in front of the wall, instead of out into the room. The use of standard four-inch stovepipe instead of the more ex-

pensive rectangular ducts cuts installation costs as much as 50 percent, according to General Electric engineers who designed the system. An additional feature of the system is the freedom of furniture placement in rooms since pieces may be placed directly in front of registers without interfering with circulation.

"Window Shopper"

When a passer-by sees an item he wants in the window of a Detroit men's store, he can order it even though the shop is closed. Installed in front of the glass is a microphone connected with a tape recorder inside. The window shopper merely deposits a coin to operate the recorder and then leaves his verbal order for the desired item. Employees mail out the merchandise the following day. The coin is returned in the package.



Fortune Hunt in a Cave

Skip platform, right, carries guano along 1200-foot cableway from below cave to narrow-gauge railway. Below, miners inside the ancient bat cave sink knee deep in thick accumulation of mineral-rich deposit



By Gene Segerblom

Photos by Mark Swain

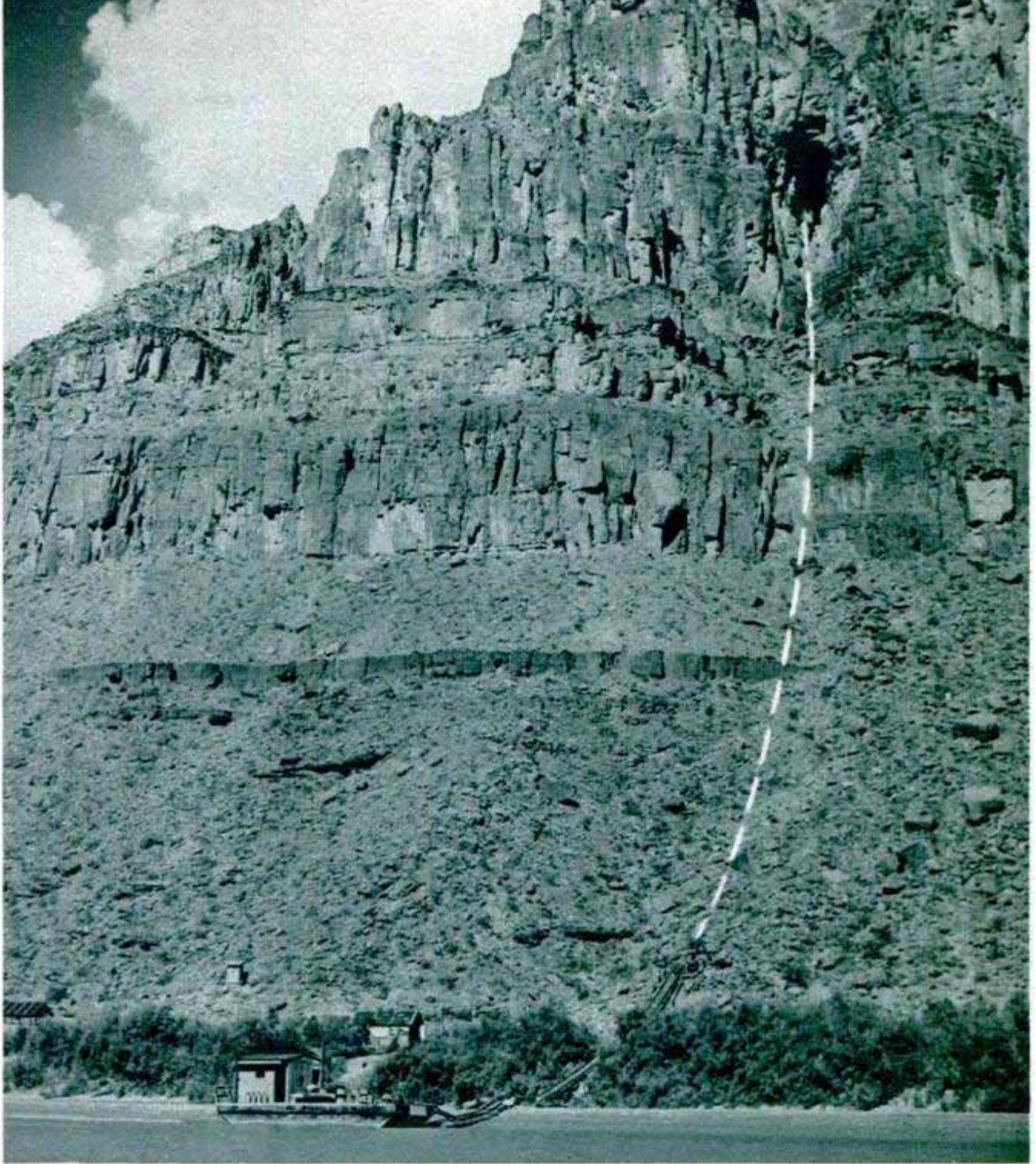
DISCOVERY of a fortune in guano in an ancient bat cave high on the lower north rim of the Grand Canyon has led to the most unique mining venture in Arizona.

The guano, rich in nitrogen used in fertilizer, had lain there undisturbed for thousands of years, until the waters of Lake Mead backed up the Colorado River, raising its level to within 2000 feet of the cave's 10 by 30-foot opening.

Then veteran river pilot Murl Emery, investigating the cave, found the guano — still perfectly preserved by the dry desert air.

That was nine years ago. It has taken Emery and his partner, Walter Swartz, from then until a few months ago to devise a practical method of turning the bat dung into pay dirt. Now, with a crew of six, they have set up a camp and worked out an ingenious scheme for getting the guano 2000 feet down the solid-rock mountain and out of the Grand Canyon.

Inside the cave, the guano is hand-shoveled onto a treadmill and carried to the entrance.

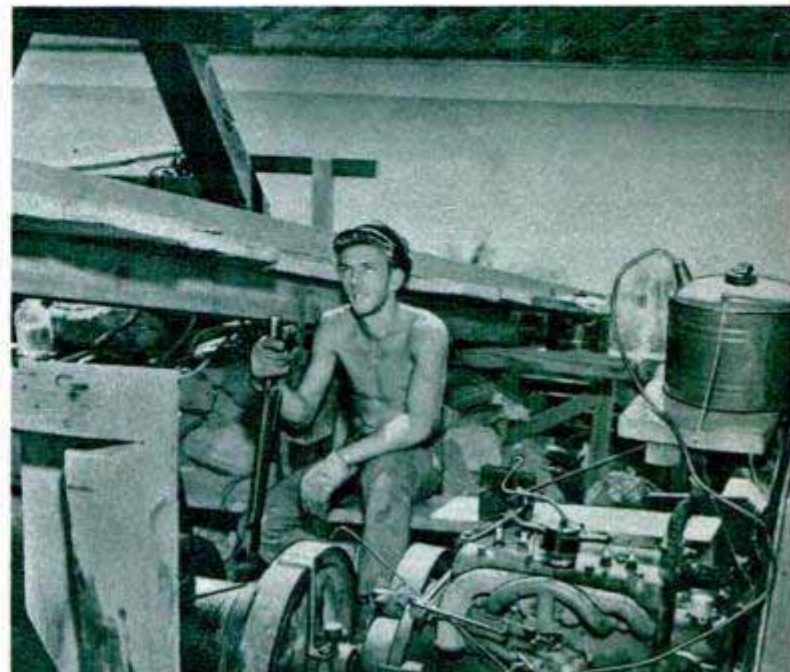


Broken line indicates path guano travels from cave to narrow-gauge railway that moves it last 150 feet to the Colorado River. Workers' camp and the barge are at lower left. Below, controls for the cableway

There it falls into a chute and goes through 400 feet of pipe.

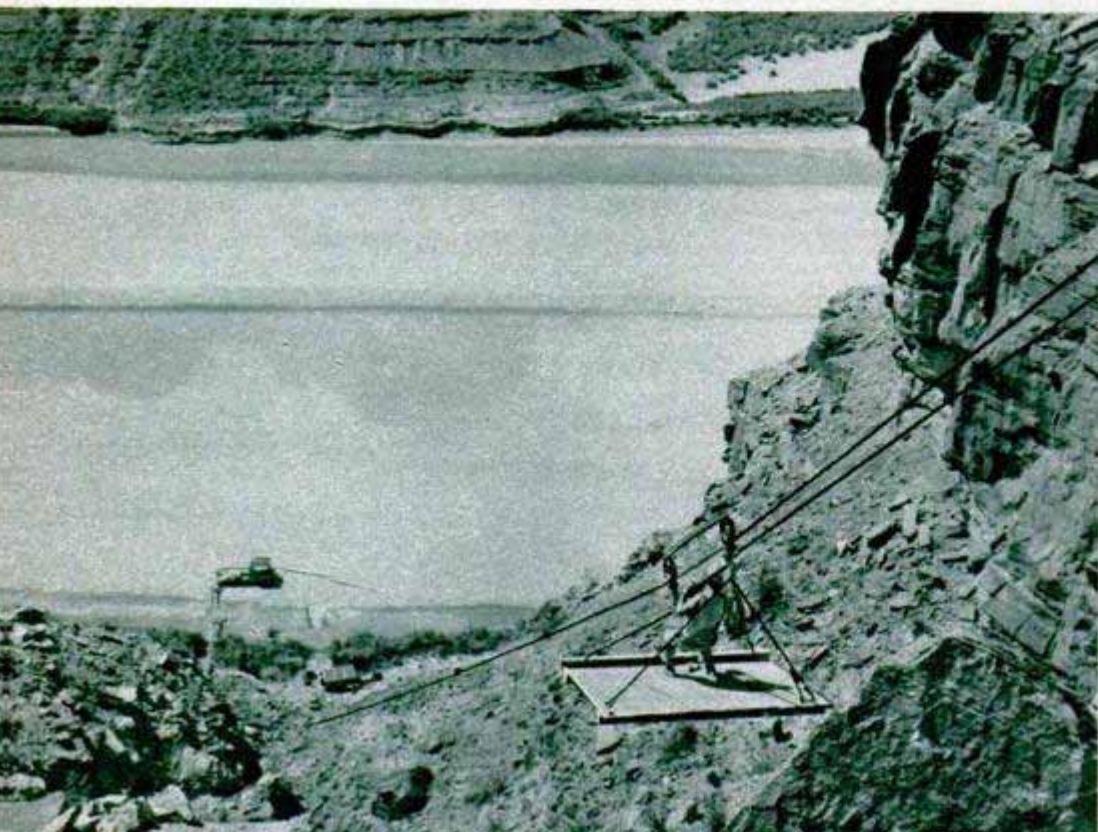
At this stage the guano is automatically sacked and loaded on a skip. From there it descends a cableway to a narrow-gauge railway. The rail cars move it the last 150 feet to the river's edge. Barges transport the sacks to Pierce Ferry, 14 miles downstream at the mouth of the Grand Canyon.

Because of the elaborate handling required, the guano-mining project has to pay well. Emery isn't certain how rich a strike they've made, but the part being worked now contains about 16 percent nitrogen and is worth around \$150,000 for fertilizer.





After bat manure has been chuted to sacking machine, it is taken to skip landing, above, for cable trip down steep canyon wall. Opposite bank of Colorado River is visible in background. Long, flat silt bar in the middle of the river, below, will be used for plane landings in dry season



The partners have already explored 1000 feet of the cave and dug out accumulations 22 feet deep without striking bottom. Emery believes there is still plenty of high-grade "ore" present to keep the operation going for a long time.

Although the first sackfuls cost more to mine and ship than they were worth, Emery and Swartz expect to have the operation perfected soon to the point that they can profitably deliver 300 tons monthly. It brings \$45 to \$75 a ton.

Few people would have struggled through all the red tape and difficulties the partners encountered before actual mining could get under way. First, permission to mine had to be obtained from the National Park Service, since the prehistoric cave lies inside the Grand Canyon National Park.

Transportation posed a second obstacle. The only means of reaching the cave is by the Colorado River, which is too silt-filled for large craft to navigate.

It takes a skilled pilot to get through the muddy waters even in a small outboard. Luckily, they have one in Pat Emery, Murl's son, who has spent much time on the river with his father. He can pick his way between hidden mud banks and avoid dangerous submerged logs and driftwood with uncanny accuracy.

Another difficulty is that the silt-packed water is "too thin to plow and too thick to drink," to quote an old saying. To top off the bad water, the high summer temperatures make thirst terrific. The miners haul in hundreds of cases of soft drinks for personal use and even make ice cubes out of soda pop.

The unique mining re-



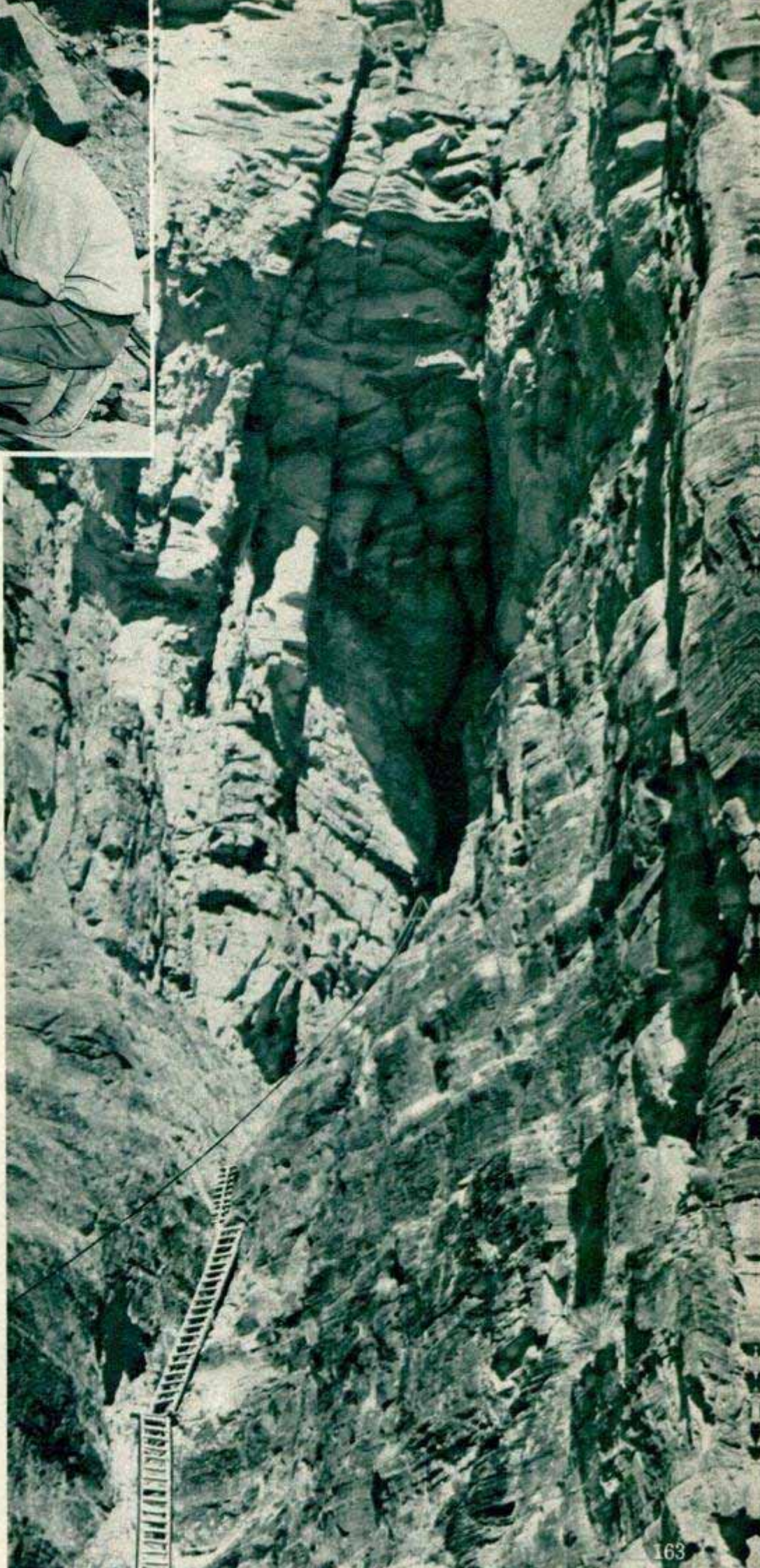
Army-surplus telephones connect all points on guano transportation system. Right, entrance to cave is a slit 10 feet wide and 30 feet high. Workers climb the ladders in foreground to scale 100 feet of vertical cliffside

quirements necessitated the installation of a Model-A motor hoist to run the skip, an electrical generator for lighting and raising equipment the 400 feet from the skip to the cave entrance, and a narrow-gauge railroad. Other unusual features that had to be brought in were an Army-surplus trench phone, used for calls between the camp and the cave, and the automatic sacking machine.

Both Murl and Pat are licensed pilots and expect to use the cake mud flat on the opposite bank for an airplane landing strip when the river recedes. That means of outside contact, however, will be lost for part of each year when snow and rain waters raise the level of Lake Mead and the river.

With the cave a full day's travel from Hoover (Boulder) Dam, work isn't likely to be slowed down by casual sightseers.

Grand Canyon has always been an awe-inspiring sight for tourists. Now it is also going to help make a small fortune for two energetic rivermen.



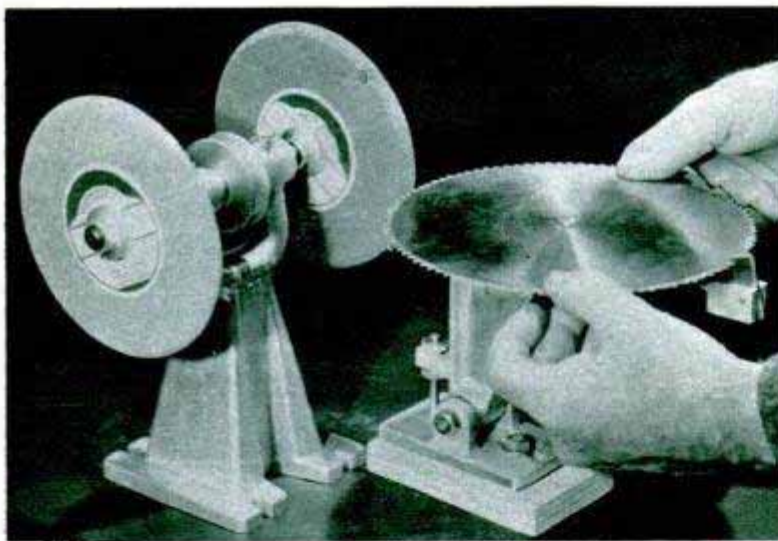


Lightweight Baby Carriage Carried Like a Basket

Weighing less than 35 pounds, a sturdy baby carriage can be collapsed and carried up and down stairs like a market basket. The cab, made of pressed wood, has two metal handles and is quickly removable for



use as a bassinet. The aluminum chassis is hinged in the center, allowing it to fold for carrying. Waterproof and stainproof, the quilted upholstery is Vinylite plastic. Baby's comfort is assured by bump-absorbing springs attached to the four cab supports. When the time comes, the carriage chassis can be converted into a stroller.



Circular-Saw Sharpener

Circular saws are sharpened quickly with the aid of a holder that keeps the blade perfectly round. The blade is mounted on the table of the holder and a projection engaged between two teeth. Then the blade is moved forward into the shaped grinding wheel until a block stops the motion. The projection is engaged between successive teeth until the entire blade has been sharpened. The holder will sharpen a crosscut blade in three minutes and a rip-saw or combination blade in five.

Paper Tape Used as Strapping For Packaging Metal Pieces

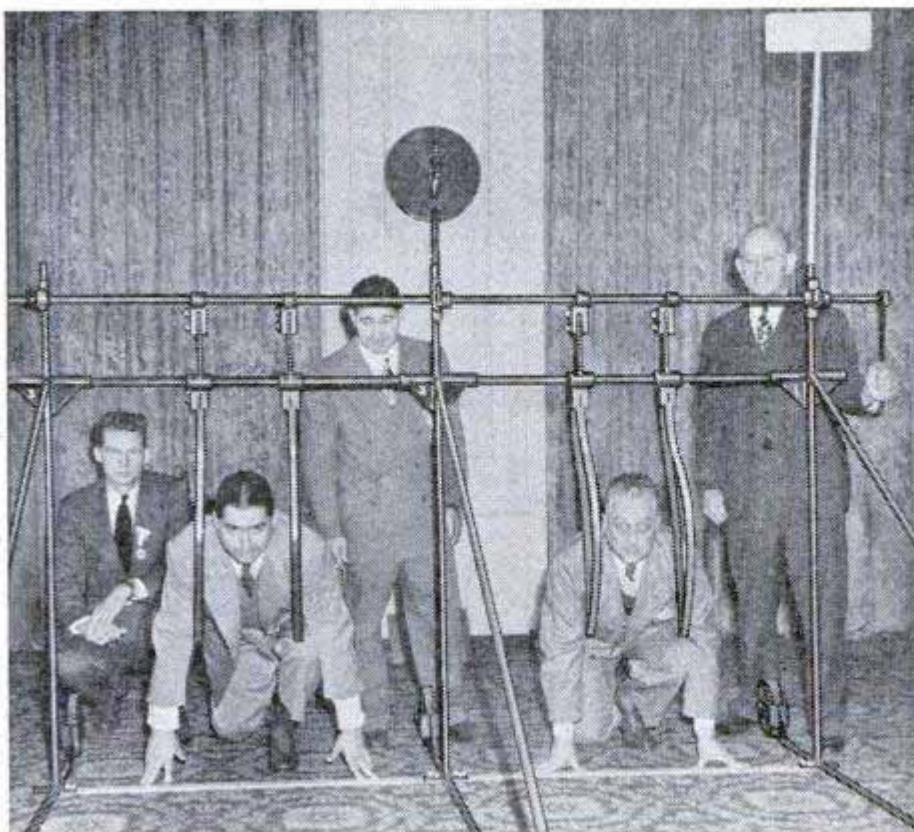
With a tensile strength of 180 pounds per inch of width, a new adhesive paper tape is much easier to use than metal strapping and it eliminates the need for packaging machinery. Two turns around the strips, sheets or tubes and the fastening job is completed. The unusual strength of the tape is partly attributed to a reinforcing of paper backing with threadlike fibers running lengthwise.

Pyrethrum, a potent insecticide made from imported flowers, can be produced synthetically by a process developed by scientists at the Department of Agriculture.



Italian Sports Coupe

Although still bearing the scars of war, the famed Alfa Romeo automobile manufacturing plant in Milan, Italy, is getting back into production with its sports and "super sports" models. These cars have won 68 prizes since 1924. In contrast to postwar American cars, the Alfa Romeo models have more curved than straight lines and a minimum of chrome trim. An innovation in the sports coupe is a window in the roof. The sports-model engine has six cylinders and a compression ratio of 7 to 1. This ratio is boosted in the super sports car to 7.5 to 1 which gives it greater power with a speed well over 100 miles per hour. The chassis for both models is a one-piece, electric-welded, sheet-steel structure of box form. The front wheels have independent suspension and coil springs that are enclosed with hydraulic shock absorbers.



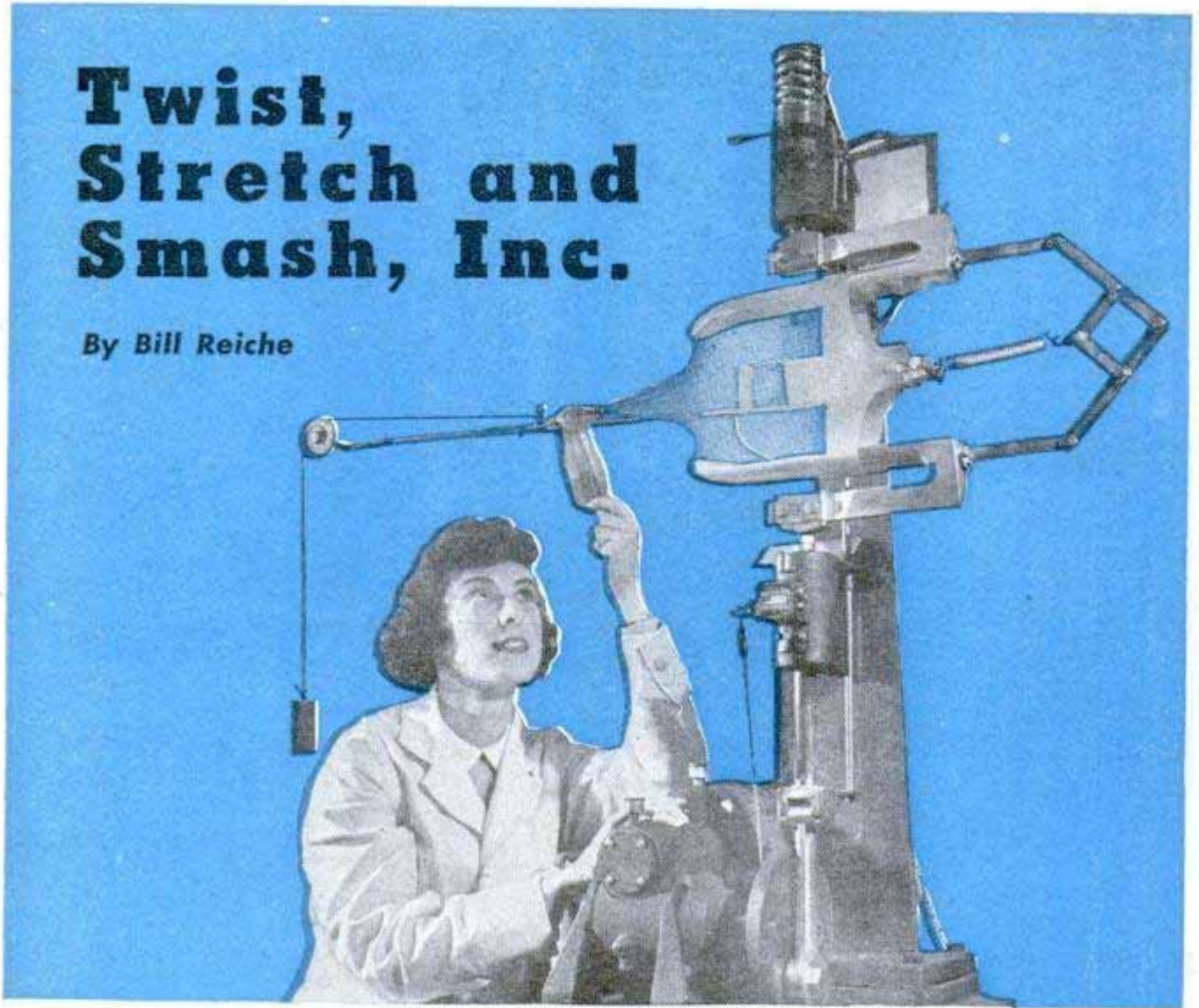
Starting Gate For Sprinters

False starts by sprinters are impossible with a starting barrier which fires a gun at the instant the gates are raised. The runners lean against the straps as they wait for the starting signal. When the starter pulls a lever at the end of the gate, the barriers swing up and trip a mechanism which fires the gun.

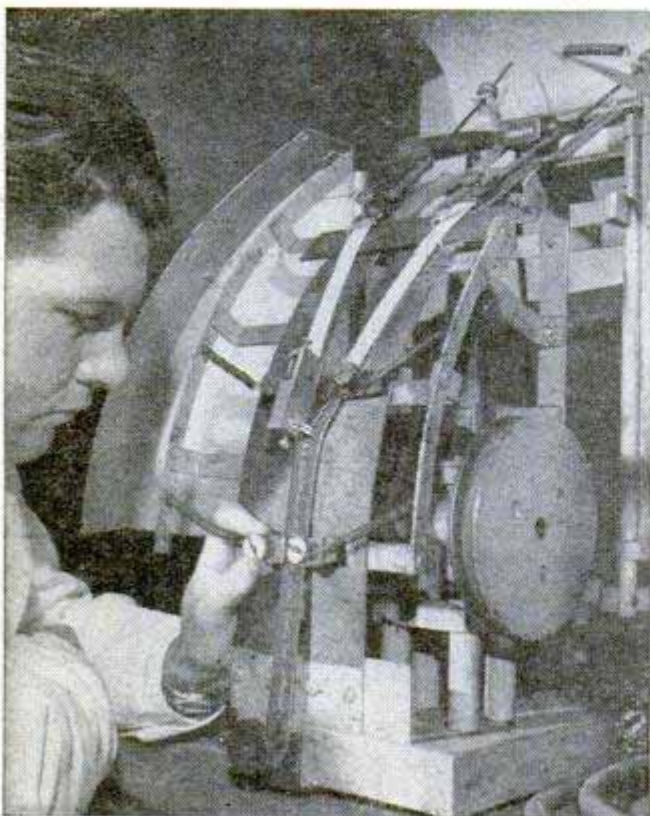
Many of the products described in this issue are now available or are ready to be marketed. For names and addresses of manufacturers or distributors, turn to the WHERE-TO-BUY-IT INDEX, on pages 10, 12 and 14

Twist, Stretch and Smash, Inc.

By Bill Reiche



Above, milady's nylon hose gets rough treatment on this scientific stretching machine. Below, a slide fastener is given the supreme test by this machine which opens and closes it more than 10,000 times



AMERICAN manufacturers pay the United States Testing Company more than a million dollars a year to have their products torn to pieces. Working for this company are hundreds of men and women who are among the most skeptical people in the world. They believe nothing until they have the proof. To them, claims mean nothing, because it's their job to discover by tests how good or bad a product is.

Hundreds of machines, many of them especially designed by UST, crowd its five-story, block-long building in Hoboken, N. J., making it a temple dedicated to the business of destruction.

Articles and materials of every description are subjected to abrasion, are pulled, pushed, flexed, struck, immersed and ignited—all to find out how good they are and, frequently, to develop better products.

This methodical vandalism is carried on for more than 30,000 American firms and totals more than 200,000 tests a year.

Started as a silk-testing concern in 1880, UST still does a substantial part of its testing in the field of fibers and fabrics, where the paramount factor is wear-resistance, which can be readily ascertained.

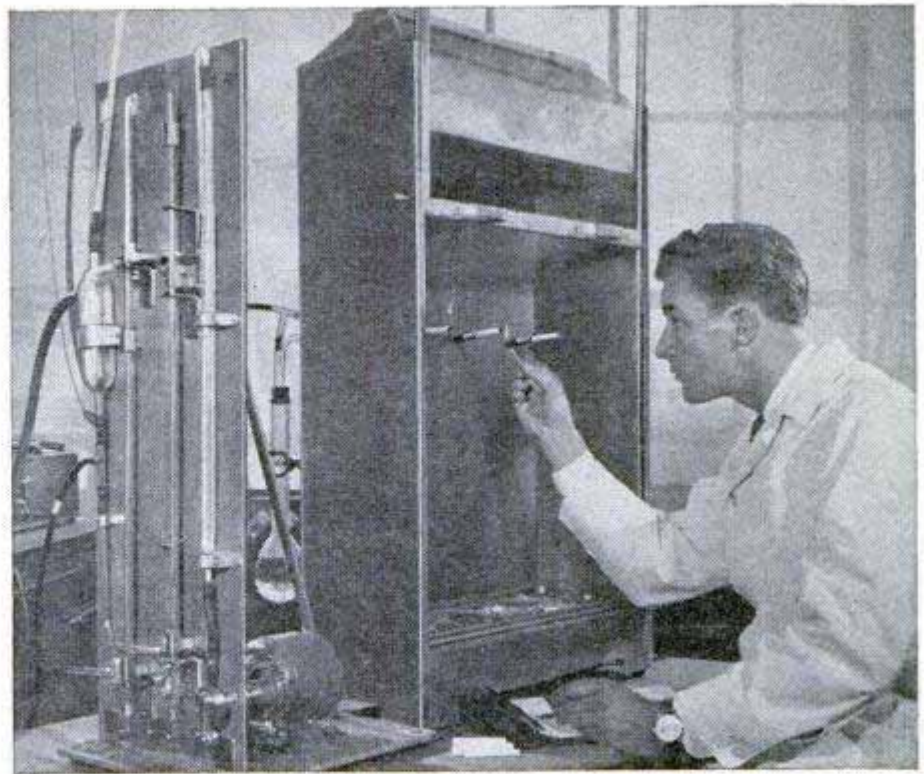
If your new blanket or coat is warmer

than the old one, the lab's warmth tester for thermal conductivity may have been responsible. This device maintains two temperature conditions at the same time, one at 98.6 degrees to simulate body heat and the other at lower temperatures accompanied by anything from a zephyr to a 15-mile wind. By placing the fabric between these two extremes, experts determine whether it retains the body heat or dissipates it.

A more rigorous test of color fastness than the hottest summer sun is the fadeometer, which revolves fabric around a 230-volt carbon arc light in a humidity-controlled chamber. Acetate rayon is tested for fading in the presence of illuminating-gas fumes, which have a particularly depressing effect on its colors.

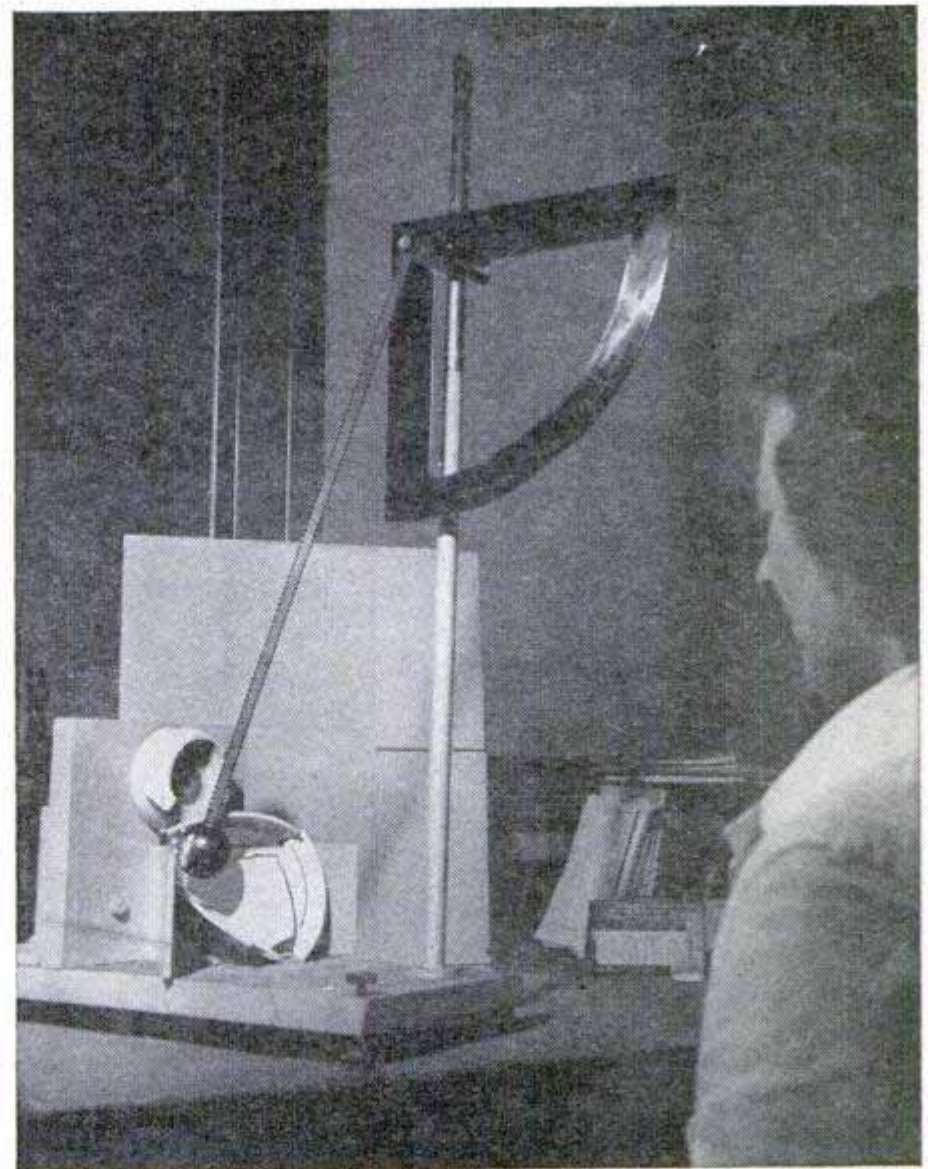
Some of the roughest, toughest moths in captivity have 28 days in heaven with UST acting as host. Specially bred for good appetites, they are placed in small cups containing various woolen materials to find out the inherent moth-resistance of each type. Temperature and humidity are held at the optimum figure for happy eating, 100 degrees Fahrenheit and 80 percent, and the result is gauged not only by the amount of fabric missing but by weighing the excrement of the moths.

Yarn has to be oiled to prevent snagging and breaking when it is woven, but the quantity of lubricant must be closely controlled so that it does not result in a too oily fabric. The test used to measure this oil content might have been invented by someone who recalled sliding down banisters as a child. A slotted piece of metal,



Even cigarette smoke takes a beating in the laboratory. Technician lights three cigarettes which are puffed mechanically as their smoke is analyzed

Unlike the bull in a china shop, this weighted pendulum breaks pieces of chinaware scientifically to determine points of weakness for manufacturer

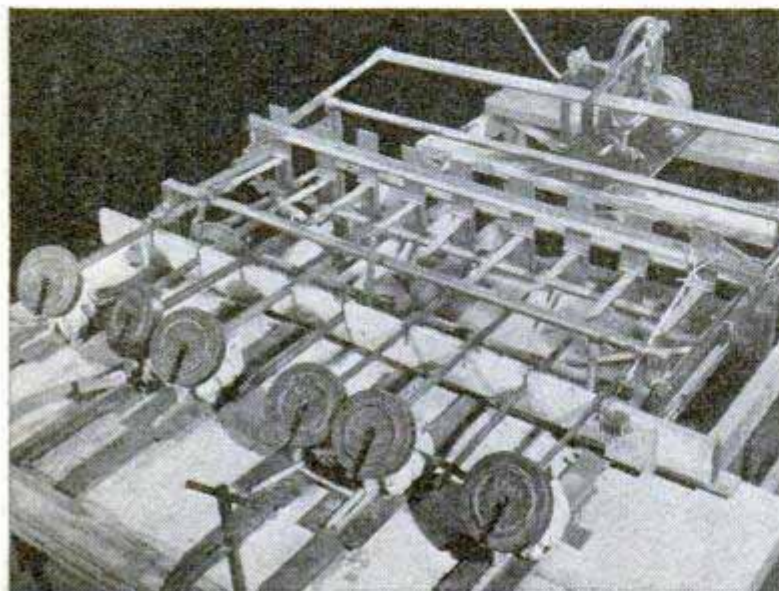




This machine rubs socks 20,000 times to test their durability



Above, extractor measures the oil, fat and grease in various materials. Below, mason's trowels are placed in this machine that rubs them back and forth on emery boards to test quality



called a rider, is placed at the upper end of an inclined 18-inch length of the yarn and permitted to slide down. The elapsed time indicates lubricity of the strand.

Women's stockings really take a beating at UST. One mechanical "leg" flexes continually to test resistance to knee action and garter strain. Another leglike test device has metal triggers at thigh, knee and ankle, which strike and extend the fabric many times a minute. Stocking heels and toes are rubbed by a fabric which approximates shoe-lining material.

Wheels run for days or weeks over carpeting to find out how long it will survive the moving of chairs and furniture in home use. A length of fishline is pulled back and forth over a rough surface to test its abrasion under load, and eventually perhaps to reduce the total of tales of woe about "the one that got away." Elastic is stretched well toward its limit by a tireless machine and then jerked a couple of extra inches.

Atomic science is not being ignored in the laboratory's constant search of new and better testing methods. One of its scientists, Joseph J. Pescatore, recently was graduated from the first class given at Oak Ridge in the uses of radioactive isotopes.

These tracer materials are expected to be of infinite value in quantitative and what might be called "fugitive" analysis and measuring. For instance, when the plasticizer leaves a plastic material, such as in a shower curtain, the material becomes brittle and cracks. It is known that the plasticizer "moves" to the edge of the material and bleeds off. By introducing Carbon 14 into the plasticizer as a tracer, both the movement and the rate of diffusion can be measured more exactly than heretofore.

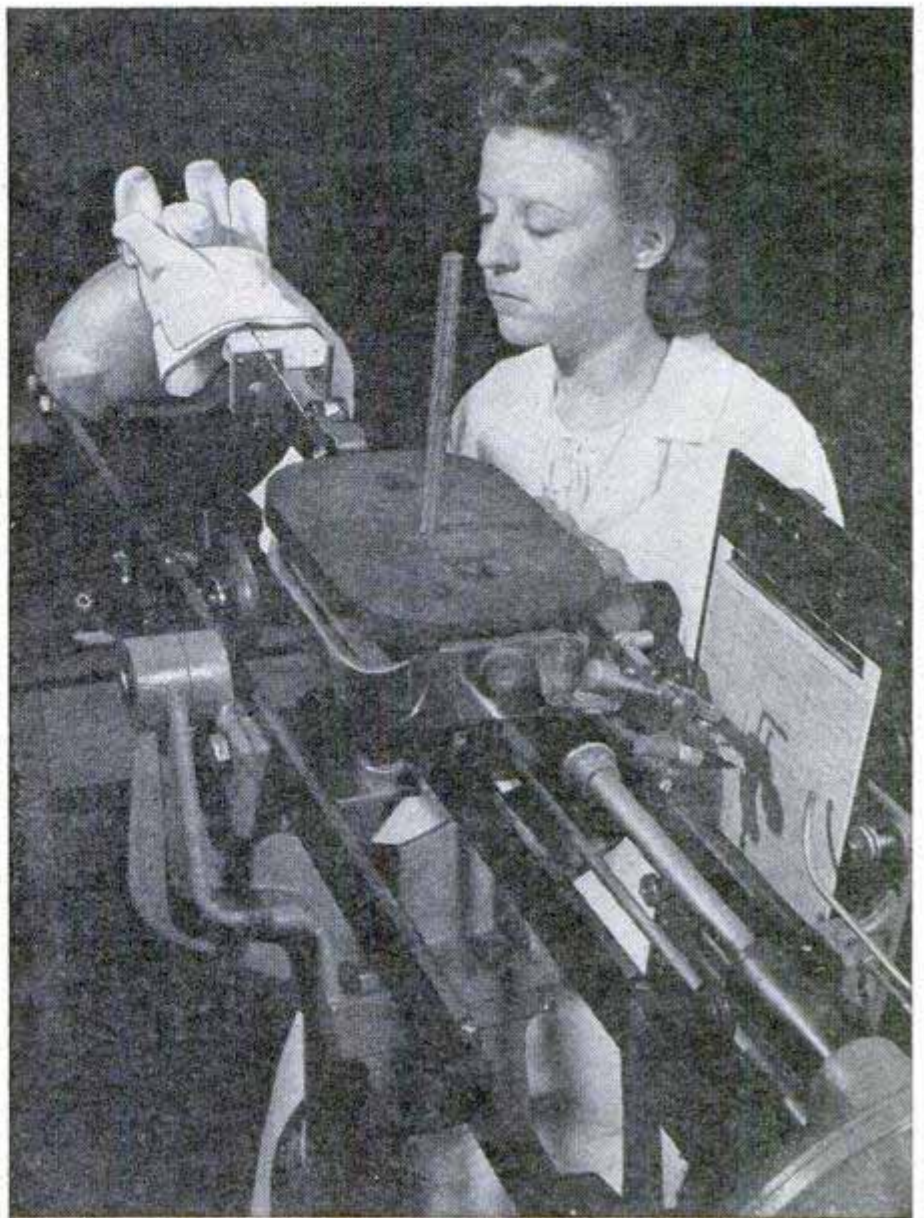
By introducing Cobalt 60, another radioactive isotope, into paint which is tested by artificial weathering, the process can be speeded up so that the month previously required for a year's normal erosion can now be cut to a few days. The ability to measure minute amounts of cobalt allows the technician to discover just how much paint has been lost by the amount of isotope lost.

The use of these same materials may also lead to the development of new colors for luminescent signs and permit closer control of lacquer and other coating materials.

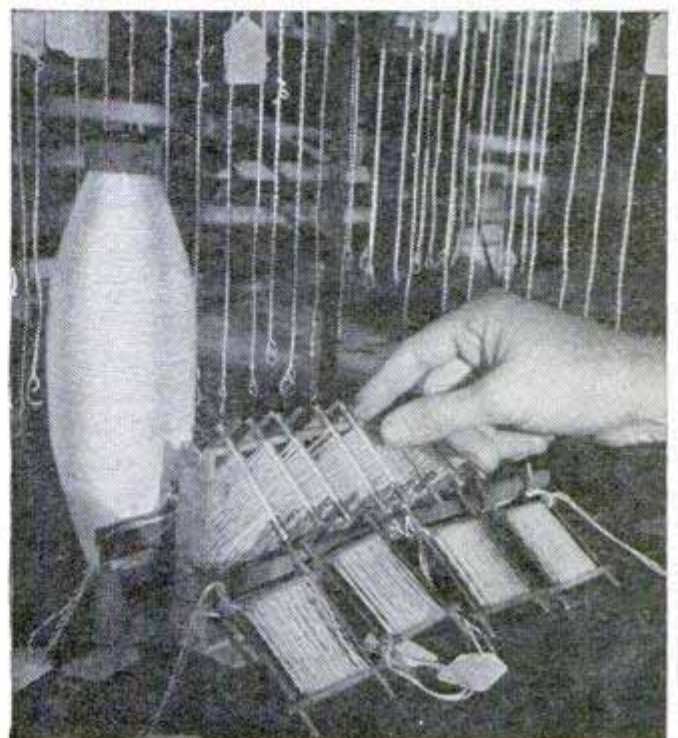
While the testing of yarns and fabrics is only one phase of the company's operations now, this activity still looms very large. Ninety-five percent of the silk imported by this country is examined in the Hoboken establishment.

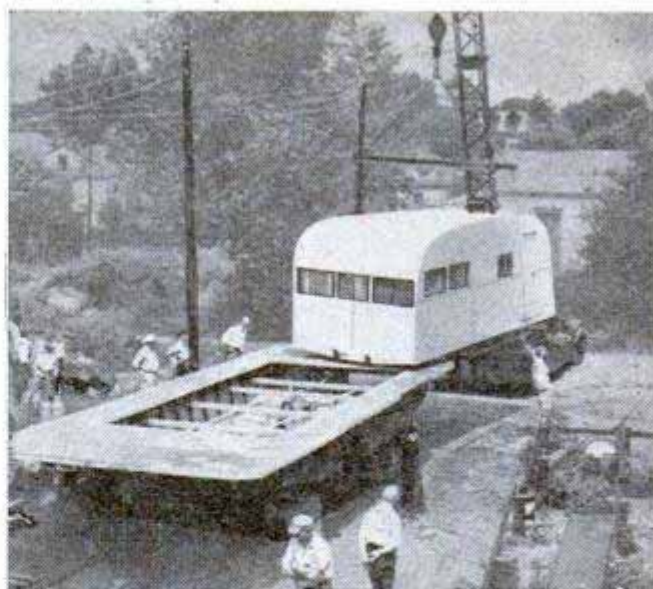
The ingenuity displayed at the lab is often amazing and amusing. One client sent in a batch of diapers and wanted to know how absorbent they would be—with babies of a given age wearing them in a supine position. The average weight of such babies was learned; then the weight which rested on the diaper; a rubber-covered surface, similar to a mattress was rigged up; a bowling ball was sectioned so one piece was the proper weight. A hole was bored through the ball and it was properly diapered. Ink-colored water was poured through the hole. The

(Continued to page 248)



Above, test device is so sensitive it measures accurately the force required to flex the finger of a work glove. Below, left, exposing fabric to carbon arc light in this fadeometer tests its resistance to fading. Below, right, the ability of nylon thread to take dyes is measured here





"Amphib" Trailer Sleeps Four

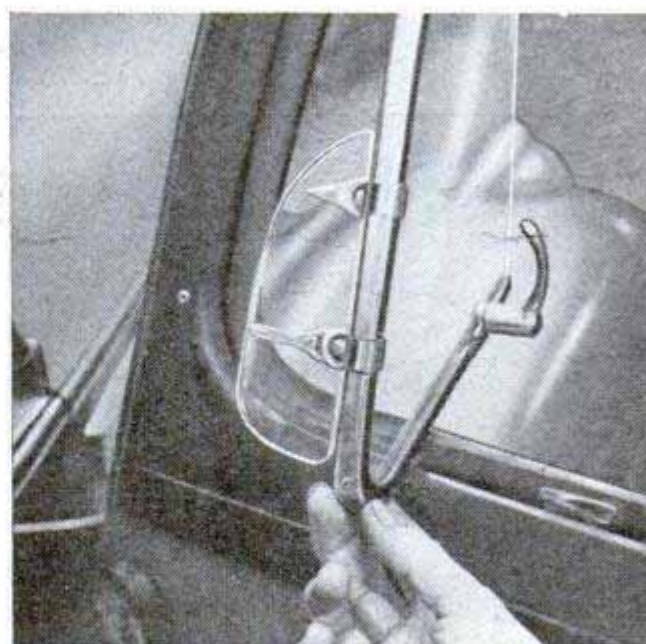
Regular house-trailer bodies, minus undercarriage, serve as cabins for a steel-hull houseboat that provides a comfortable floating home for four persons. The trailer body is lifted off its chassis by a crane and lowered onto the hull. Accessible through a hatch in the cabin floor, the houseboat engine is mounted in the welded hull. It takes only a few hours to convert the trailer into a houseboat. The owner can live on land in winter and on water in summer. The manufacturer is now designing a new model with which the owner can make the changeover himself by towing the house trailer off the hull, eliminating the need for the crane.



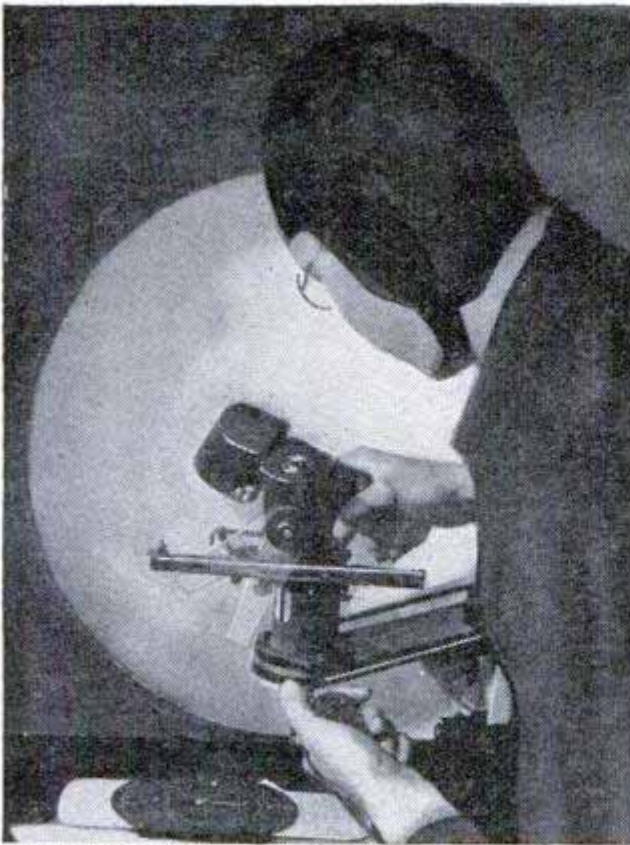
Top left, this houseboat also travels on land! In summer, it's a home afloat and, come winter, it goes ashore as a house trailer, above, when wheels are added. Top, a crane makes changeover for summer



REAR-VIEW MIRROR fastens to the top of the car door and can be adjusted easily from inside the auto. It is theftproof when the doors are locked. The mirror is attached with only one screw clamp and no holes need to be drilled in the door. It has a four-inch diameter and a face of beveled glass



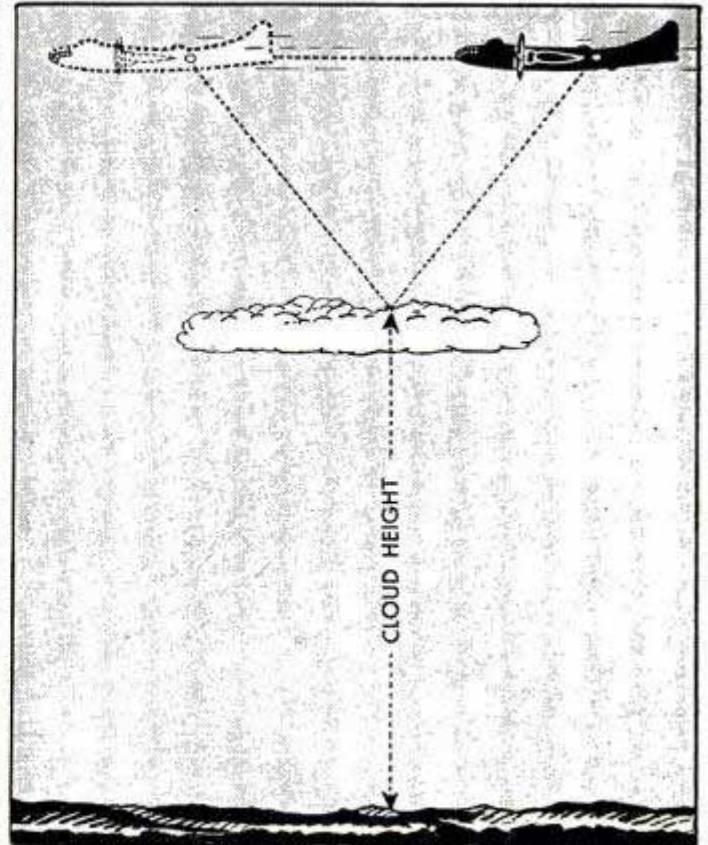
PLASTIC DEFLECTORS clip to the front ventilating windows of a car, improving air circulation and preventing rain from splashing inside. The curved wings do not interfere with normal movement of the windows. With the window partly open, the ventilator induces a sucking action to draw out stale air



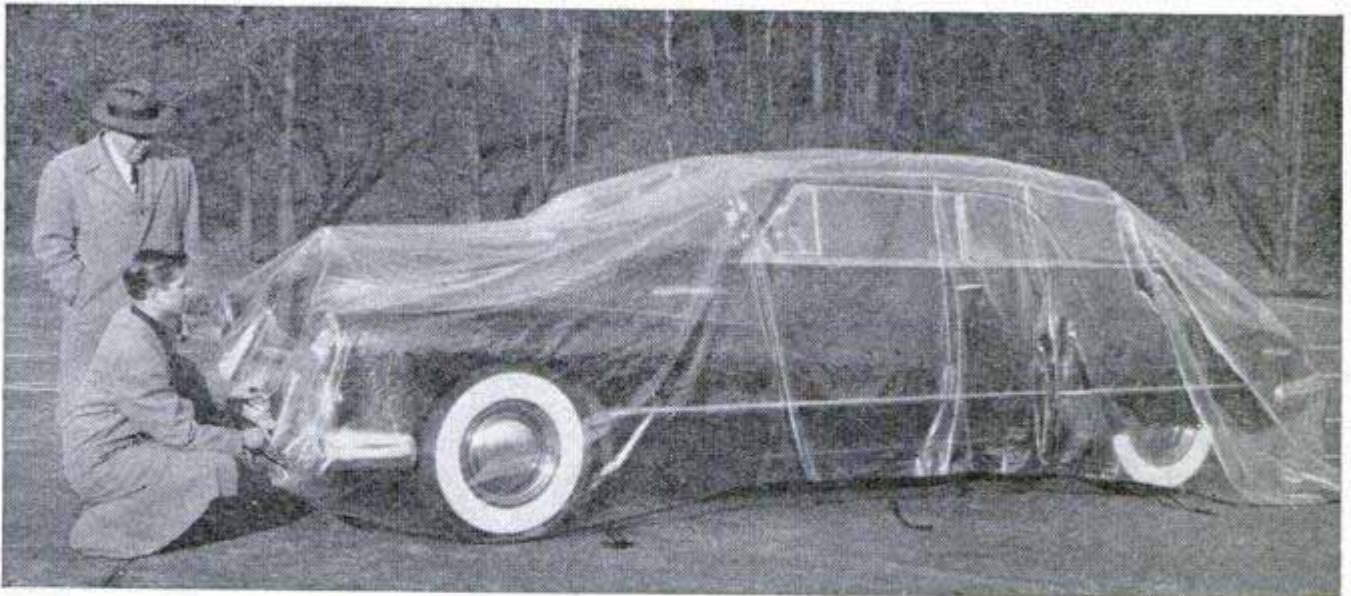
Signal Corps photo

Cloud-Height Indicator

With a modified illuminated gun sight, Air Corps pilots now can determine accurately the height of a cloud while flying above or below it. The instrument has two arms that slide along a graduated scale. The pilot trains the gun sight on some prominent cloud feature and tracks it for a minute or longer. During this period, one



of the arms remains fixed and the other moves. The vertical distance between plane and cloud then can be computed from the scale readings at the two arms, the air speed and time of tracking. The actual cloud height is this distance added to or subtracted from the plane's altitude, depending on whether the cloud was above or below the aircraft. The instrument was developed by the Army Signal Corps.



Plastic Auto Cover

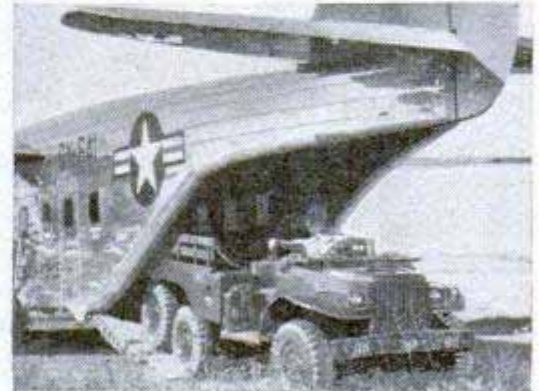
Motorists can "tie a garage" over their cars in the form of a plastic blanket large enough to cover the entire automobile. The translucent plastic sheet measures 20 by 30 feet, yet it can be stored in a 24 by

27-inch pouch only three inches thick. It is weather and acidproof, protecting the car against ice, snow, dust and salt spray. The edges are bound and have tie strings for fastening the cover to bumpers, wheels or other parts. The cover also can be used to protect cars stored for long periods.



← Soldiers file into the C-122, the new cargo plane that can transport 30 fully equipped men

Below, large truck is driven up the rear ramp and into plane, which carries a five-ton load



Flying Boxcar

Thirty fully equipped soldiers or five tons of military equipment can fly into a battle area in Uncle Sam's newest cargo plane, dubbed the flying boxcar. Officially

designated the C-122, the plane recently underwent its test flights and first public demonstration. It has a top speed of 250 miles an hour and a ceiling of 25,000 feet. A large truck can be driven up the rear ramp and into the fuselage.

Rain or Shine?

With an instrument that works like a slide rule, anyone can forecast the weather with reasonable accuracy. The weather guide gives forecasts for both 12 and 24-hour periods within the operator's immediate vicinity. It consists of a metal case containing a compass for calculating the direction of the wind, a set of colored pictures that show typical cloud formations, and knobs by which a pointer may be moved opposite the proper wind direction beside any of the cloud pictures. The forecast then is read through a slot in the device. The instrument is based on the principle that a particular type of weather can be expected to follow any combination of cloud types and wind direction. Each instrument is calibrated according to one of seven regions in the United States. The instrument, invented



by Dr. Irving P. Krick, is based on data obtained from a study of 50 years of Weather Bureau records.

BACK-YARD
STREAMLINER



The CRAFTSMAN

★ Exciting news will travel fast among young rail-road fans when Dad sets up this new back-yard streamliner for the first time. It looks and runs like the real thing, but it's only junior size, of course, and it operates at a safe forward and reverse speed. A housed third rail and a positive dead-man control are the built-in safety features. Construction story begins on page 182.

★ A new type of milk cooler, detailed on page 226, will be of special interest to dairymen because it is so easily built in a wide range of sizes. Bottom, ends and sides of the tank are insulated and the installation is designed to accommodate a drop-in type refrigeration unit.

★ Chessmen in the Staunton pattern turned and carved from crystal-clear plastic are a compliment to the skill of any accomplished chess player. You'll find complete information on page 195.

★ The practical shop article for the month, page 218, deals with safe operation of a circular saw.



INSULATED
MILK COOLER



PLASTIC CHESSMEN



HOW TO RUN A
BENCH SAW



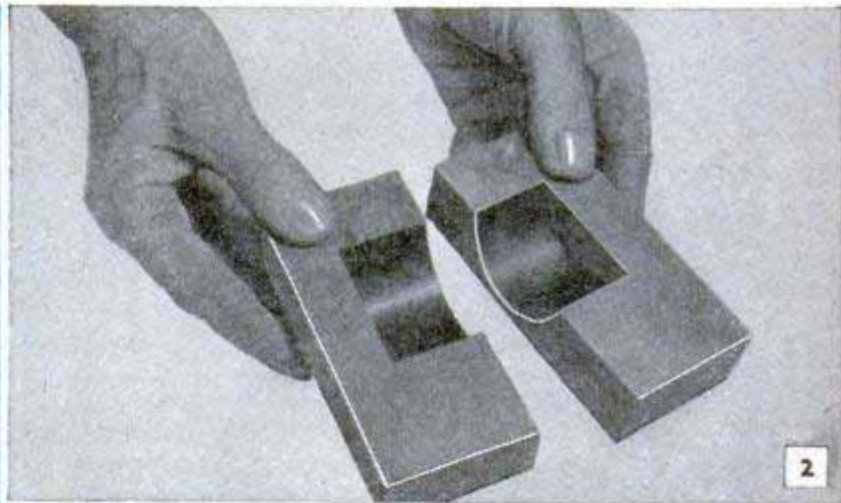
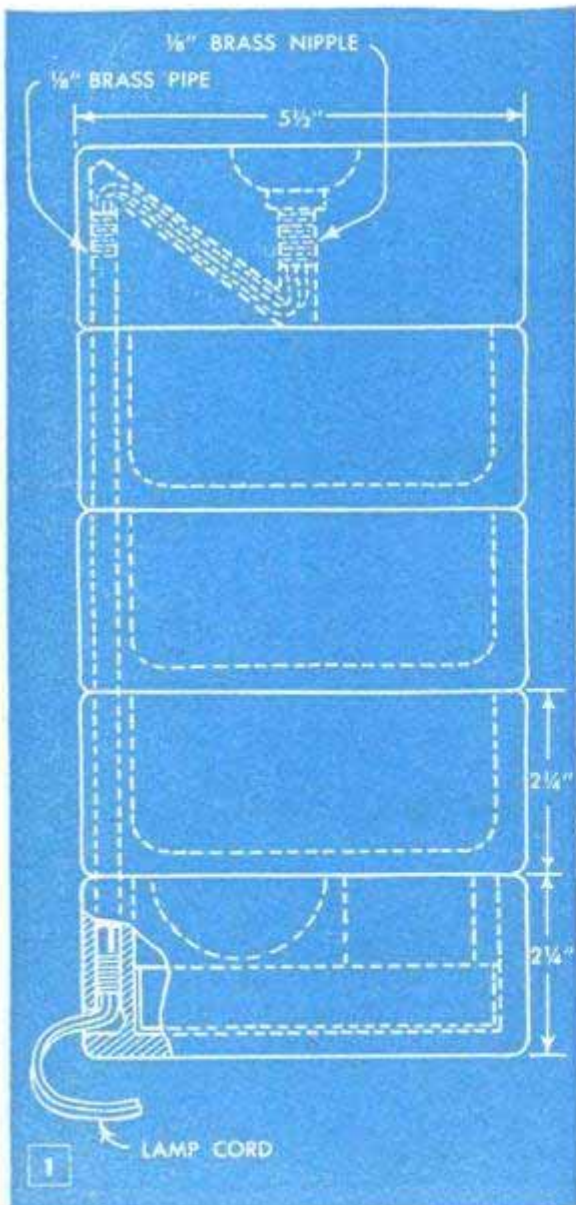
DESIGNED

By Benj. Nielsen

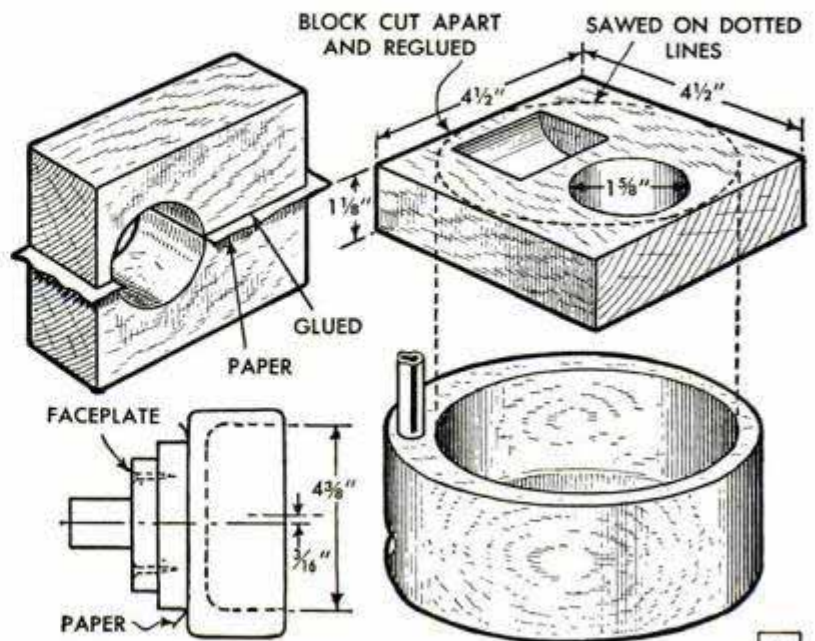


TRAYS CLOSED

THREE compartments for cigarettes plus an ash tray are all concealed in this attractive hardwood lamp base. When closed, the sections look like a solid wood turning, but swinging the sections to the right or left discloses the compartments for cigarettes and reveals the ash tray in the bottom section. In addition to its usefulness from the smoker's angle, the lamp also provides an excellent hiding place for jewelry and money. Using a good grade of walnut or maple, turn the five sections to an equal outside diameter as shown in the sectional view, Fig. 1. Then round the corners and, while the work is still in the lathe, finish the edges only, by applying a French polish. This is done by dipping a cloth pad in a mixture of sweet oil and shellac and holding the pad against the rotating work. The friction produces a glazed finish which is built up by repeated



2



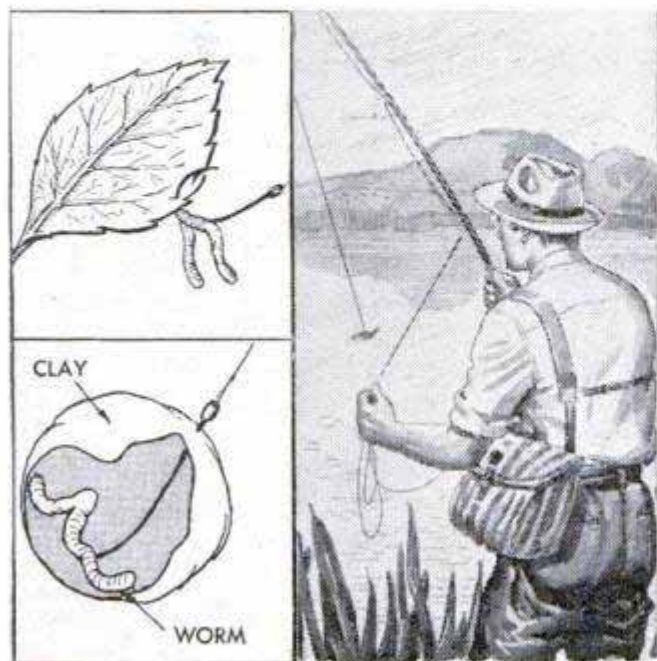
3

for SMOKERS

applications. Next, glue a wooden disk to the bottom of each of the four lower sections, sandwiching a sheet of paper between the pieces so the parts can be separated easily. Mount each section for turning by screwing the backing disk to the faceplate $\frac{3}{16}$ in. off-center, and then turn the recess to the diameter given in Fig. 3. Recesses in the original trays were turned to a depth of $1\frac{7}{8}$ in. but, of course, this can be varied to suit. Note that the recesses in the three center sections are turned with a fillet in the lower corner, but that the corners of the recess in the bottom section are cut square to accommodate a metal ash tray. A wooden cover, having a recess for matches and an opening to the ash tray, fits in the recess in the lower section and rests on top of the ash tray, Fig. 3. Two blocks of hardwood, $1\frac{1}{8} \times 2\frac{1}{4} \times 4\frac{1}{2}$ in., are used to make this cover. These blocks are glued together, separated with a sheet of paper, to form a block $2\frac{1}{4} \times 2\frac{1}{4} \times 4\frac{1}{2}$ in. Then a $1\frac{3}{8}$ -in. hole is drilled about $1\frac{1}{4}$ in. deep at least $\frac{1}{2}$ in. in from one edge of the block. This hole must be centered exactly on the joint of the two blocks. The blocks are cut apart along the joint and their edges glued together permanently to form the recess for matches, as shown in Fig. 2. After this, a $1\frac{5}{8}$ -in. hole is bored through the blocks between the recess and the edge of the cover, and the block is sawed to a disk shape, indicated by the dotted line. If desired, the ash tray and cover may be omitted and the lower section merely recessed in the same way as the other three. To hinge the base sections together, drill registering holes through the thickest portions of the sides, forming blind counterbored holes



slightly undersize in the top and bottom sections, so the threads of a length of $\frac{1}{8}$ -in. brass pipe will "take" in the wood. To assure perfect alignment of the holes, the three sections should be stacked and drilled at one time, and then one of these sections should be used as a guide to drill the blind holes in the top and bottom sections. Drill a hole for the lamp cord through the side of the bottom section, and drill and recess the top section as shown by the dotted lines in Fig. 1. Finally, assemble the parts and wire the lamp socket, feeding the cord through the brass pipe and fishing the end of the cord through the slanting hole with a length of wire bent to form a hook.



Bait-Shy Trout Lured Successfully With Camouflaged Worms

Even in the most hard-fished streams, trout find it difficult to resist a worm offered in either of these two ways. One successful method utilizes a twig with a leaf or two attached. After the worm-baited hook is pushed through the edge of the leaf, as in the upper detail, the twig is allowed to float downstream. When the leaf drifts over a likely looking pool, the hook is jerked free by a twitch of the rod tip. The bait then sinks slowly to the bottom, coaxing the trout into striking. The other method is to mold a ball of clay or mud over the worm and hook, as in the lower detail. The ball is lowered slowly into the water which washes away the covering and exposes the worm.

Debris Catcher Under Workbench Keeps Shop Floor Clean



Instead of sweeping shavings and sawdust from the workbench onto the shop floor, sweep the debris into a burlap catcher which pulls out like a drawer from under the bench top. Make the catcher by tacking a burlap bag to a square wooden frame and nailing strips of wood to the underside of the bench top to form runners for the frame.—Victor H. Lamoy, Upper Jay, N. Y.

Corncob Handles on Jumping Rope



Excellent nonslip handles for children's jumping ropes are provided by punching the pithy centers from corncobs. The ends

of the rope are passed through the corncobs, which are held in place by tying large knots at the ends of the rope.

Bicycle Seat Protected From Rain

When it is necessary to park a bicycle out in the open during rainy weather, the seat can be kept dry by covering it with a waterproof bag or plastic bowl cover. A sheet of any waterproof material, such as plastic or rubber, is made into a suitable seat cover simply by fitting it with a drawstring.



Arthur Trauffer, Council Bluffs, Iowa.

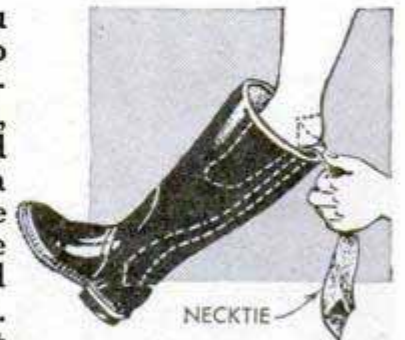
Paper Perforated for Ring Binder Without Using Punch

If the occasional need to perforate sheets of paper to fit a ring binder does not warrant buying a paper punch, you can perforate the sheets with the aid of holes made in one cover of the binder. Drill holes along the outer edge of the cover to correspond with the spacing of the rings and then lay the sheet to be perforated on the cover, positioning it over the holes. Perforate the paper with the point of a pencil as shown in the drawing.

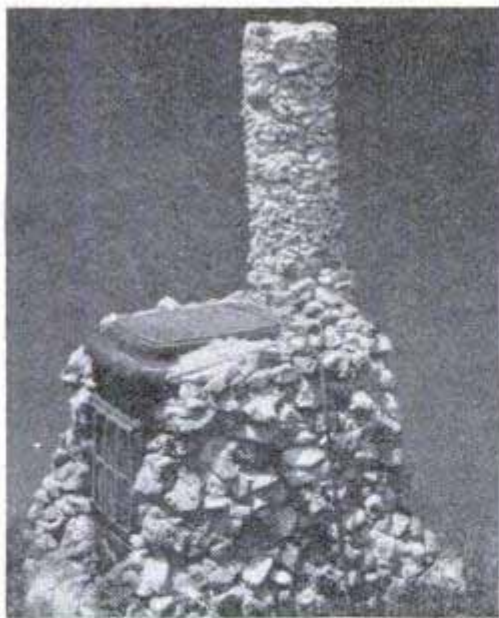


Necktie Serves as Shoehorn To Slide Foot Into Boot

Next time you find it difficult to slide your foot into a rubber boot, try using an old silk necktie as a shoehorn. Place one end of the tie in the boot and hold the other end. Then slip your foot in the boot, with the heel sliding along the necktie, withdrawing the tie after the foot is all the way in the boot.



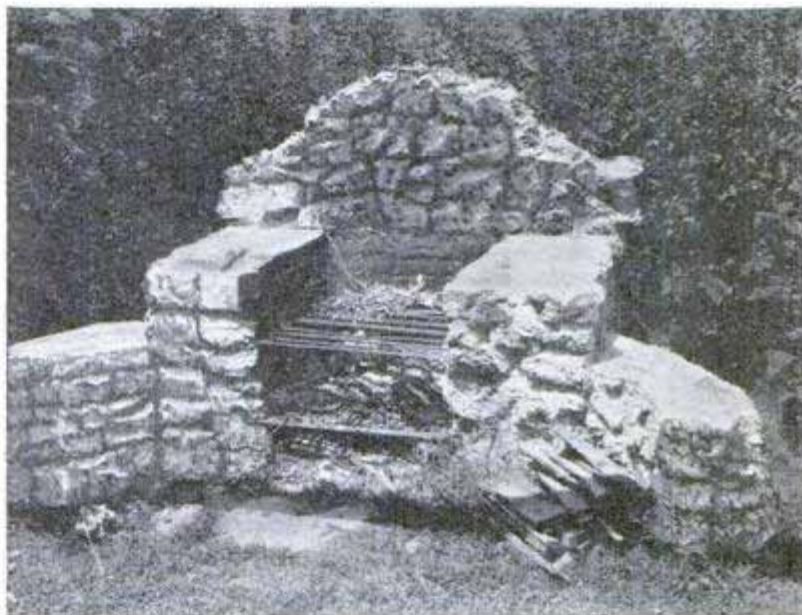
¶ To remove grass stains from clothing, sponge the stained portion of the fabric with ammonia and water before washing.



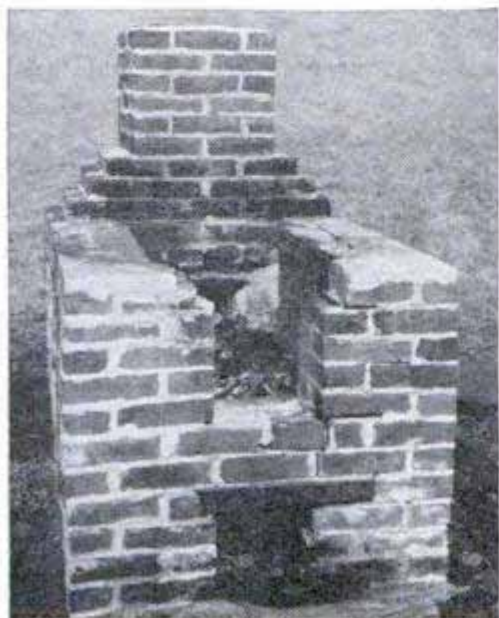
The outdoor fireplace, above, left, is simply a small stove camouflaged with rough stone set in mortar. Above, right, the top of this fireplace has a circular opening to take an old-fashioned iron kettle which can be replaced with an ordinary grate. The large stone unit, shown below, is ideal for a spacious yard

Dine in the Open

By Paul Hadley

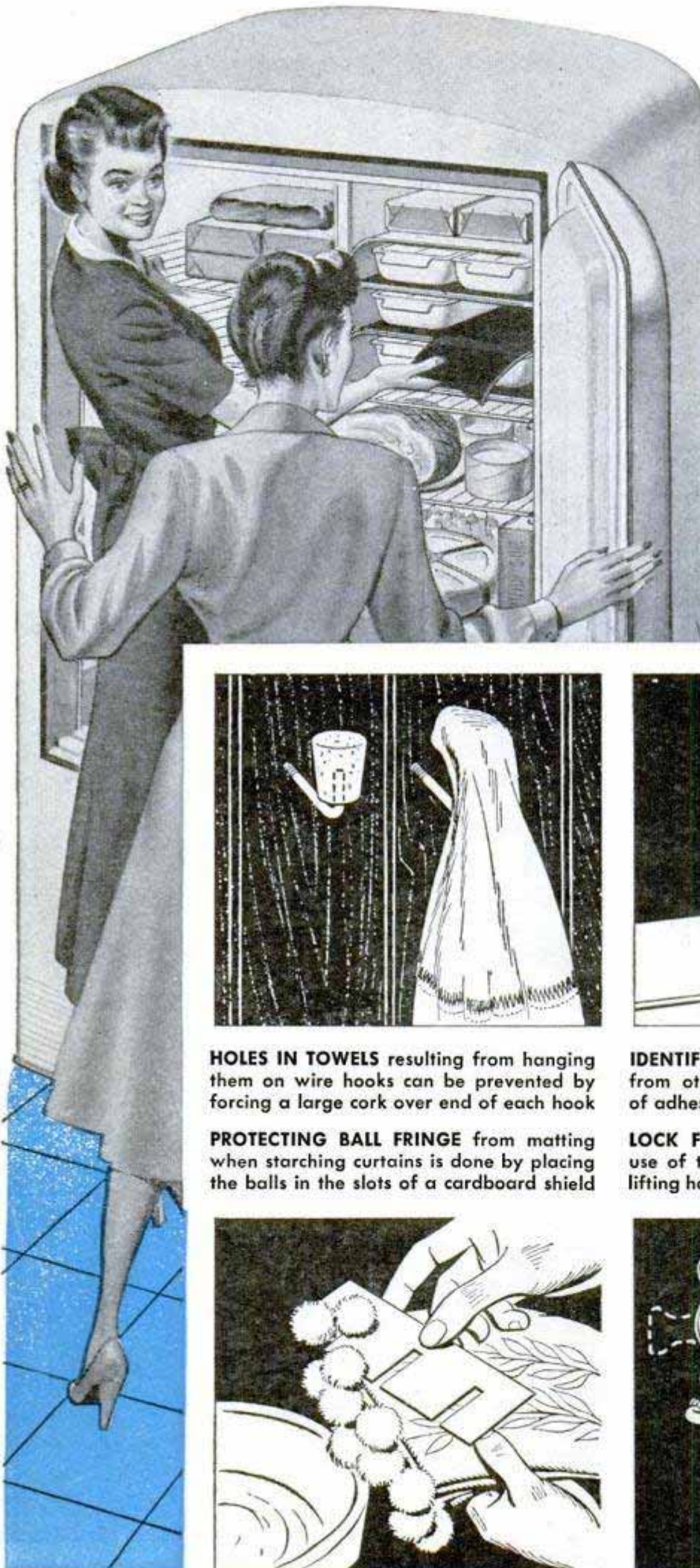


No previous experience in bricklaying is necessary to build a serviceable fireplace like the one shown in the lower left-hand picture. The double fireplace, below, right, has two separate fireboxes, both using a single flue. Built of stone, it is economical for small camps where it serves the purpose of two fireplaces



Solving

REMOVING ICE CUBES from the freezing compartment of a refrigerator is no problem if the trays are placed on pads cut from rubber stair treads. The trays will not stick tightly to the rubber, making them easy to remove



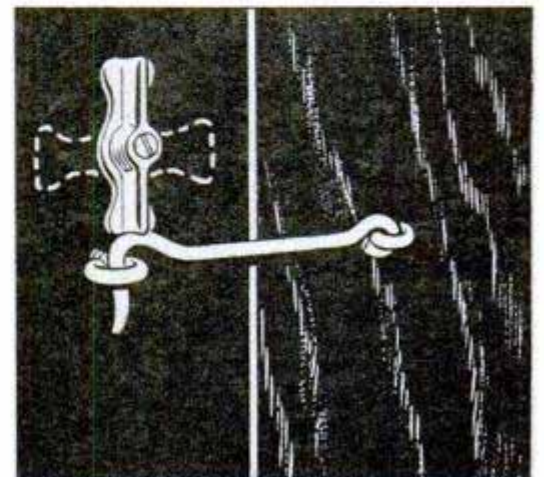
HOLES IN TOWELS resulting from hanging them on wire hooks can be prevented by forcing a large cork over end of each hook

PROTECTING BALL FRINGE from matting when starching curtains is done by placing the balls in the slots of a cardboard shield



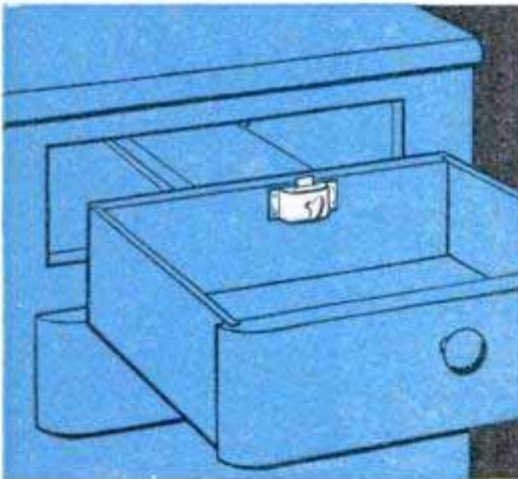
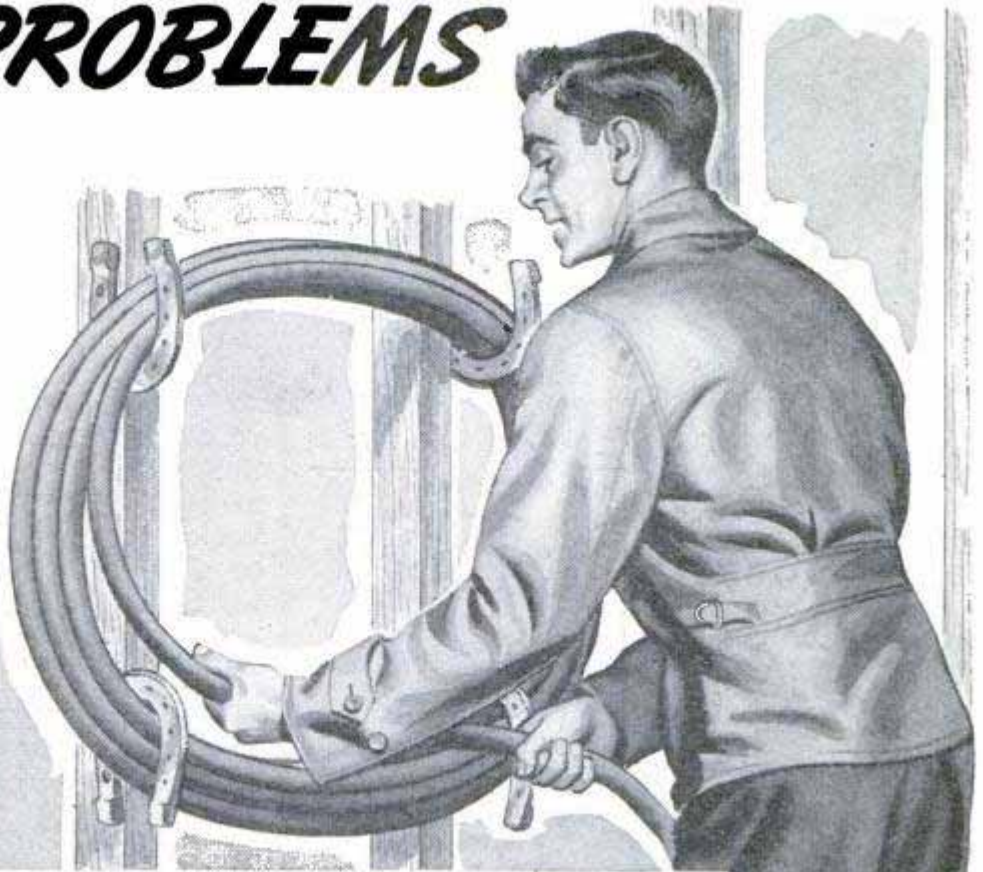
IDENTIFY BOTTLES of poison in the dark from other medicines by sticking a piece of adhesive tape over the cap of the bottle

LOCK FOR SCREEN-DOOR HOOK makes use of turn button to thwart entrance by lifting hook with wire poked through screen

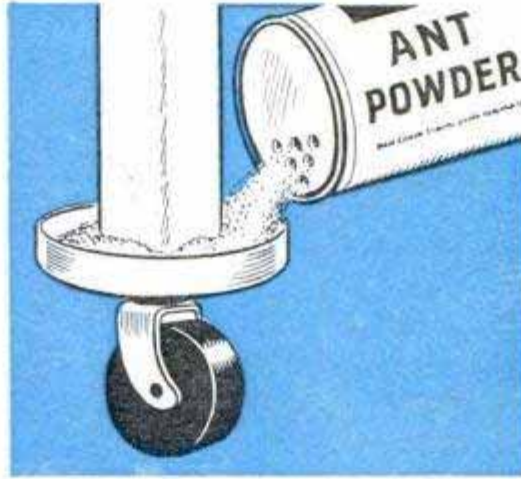


HOME PROBLEMS

STORING HOSE by coiling it around four old horseshoes nailed to the studs of a garage wall will keep the hose in excellent condition. Space the shoes so that the hose will wrap around them in a natural coil rather than in a rectangular shape, which would kink and damage it.



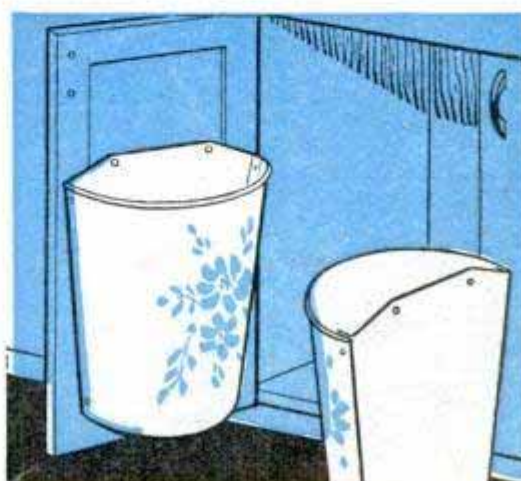
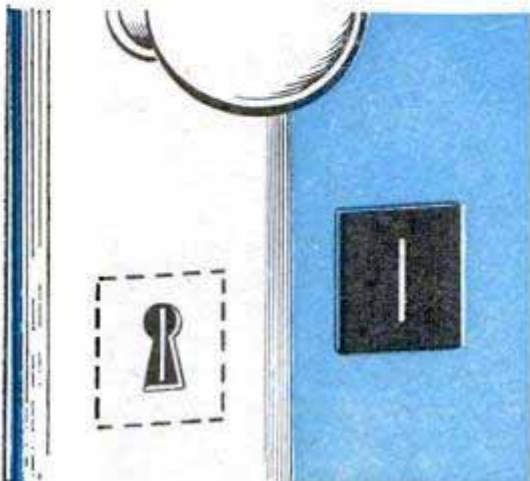
IMPROVED DRAWER STOP which permits easy removal of drawer is had by attaching cupboard latch to the back of the drawer



ANT TRAPS, consisting of can covers filled with insect powder and fitted to the legs of a table, keep ants from reaching food

KEY WON'T FALL from lock when a door slams if a piece of rubber is slit and cemented to back of the escutcheon plate

ON-A-DOOR WASTEBASKETS for a kitchen sink are provided by cutting round metal basket in half and fitting each with back



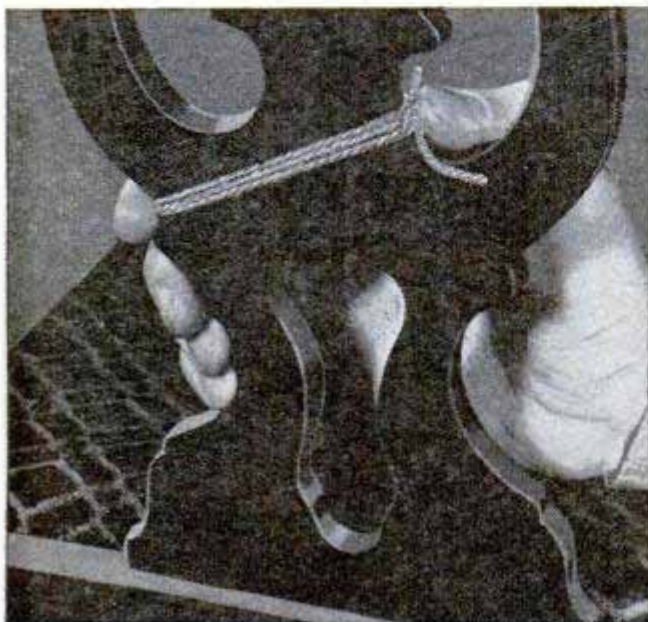
Utility Bag Becomes Fishing Creel When Fitted With Screen Panels



If you want to put an old canvas utility bag to good use and, at the same time, save the cost of a fishing creel, install screen panels in the bottom and ends of the bag to provide a serviceable creel. Use bobbinet for the screen and reinforce the edges of the panels with adhesive tape. Then, cut a rectangular opening in the flap of the creel to permit inserting the fish, and reinforce the edges of this opening with adhesive tape.—Opie Read, Jr., Chicago.

Use of String as Gluing Clamp Improved by Dampening

Common practice of using strong cord as a clamp when gluing irregularly shaped work can be improved if the cord is first dampened. Wrapped tightly around the work and tied securely, the damp cord will

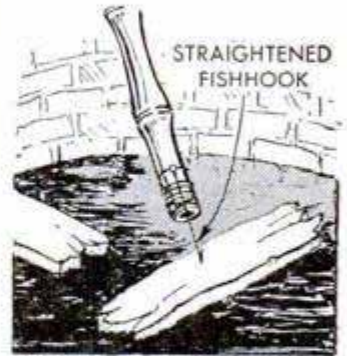


gradually shrink and draw tighter as it dries, thus applying continuous pressure to the joint. The cord is cut to remove it.

R. F. Donovan, Jersey City, N. J.

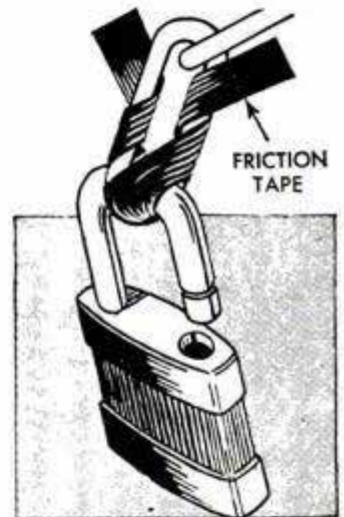
Retrieving Debris From Cistern

Pieces of wood floating in a deep cistern can be removed without the aid of a ladder if they are speared with a fishhook tied to the end of a cane pole. The hook is straightened and then tied tightly to the pole with fishline or strong cord, passing the line through the eye of the hook to keep it from being pushed upward.



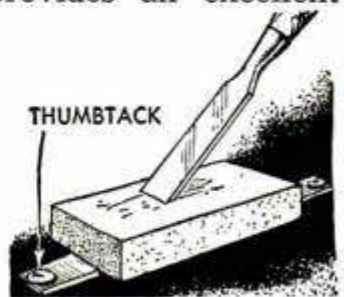
Padlock Secured to Boat Chain

To keep an opened padlock from slipping from a boat chain and being lost, fasten it to the chain with a strip of friction tape. Several turns of tape are wrapped around the bow of the padlock and the tape is entwined around the last link of the chain as shown.



Friction Tape Holds Oilstone

A good job of honing cannot be done unless the oilstone is held stationary. When at the workbench, the stone is simply clamped lightly in a vise. However, when out on the job, a strip of friction tape placed under the stone provides an excellent nonslip surface. Thumbtacks can be used to hold the tape, although, if it is quite sticky, the tape will stay in place under the stone without being fastened.



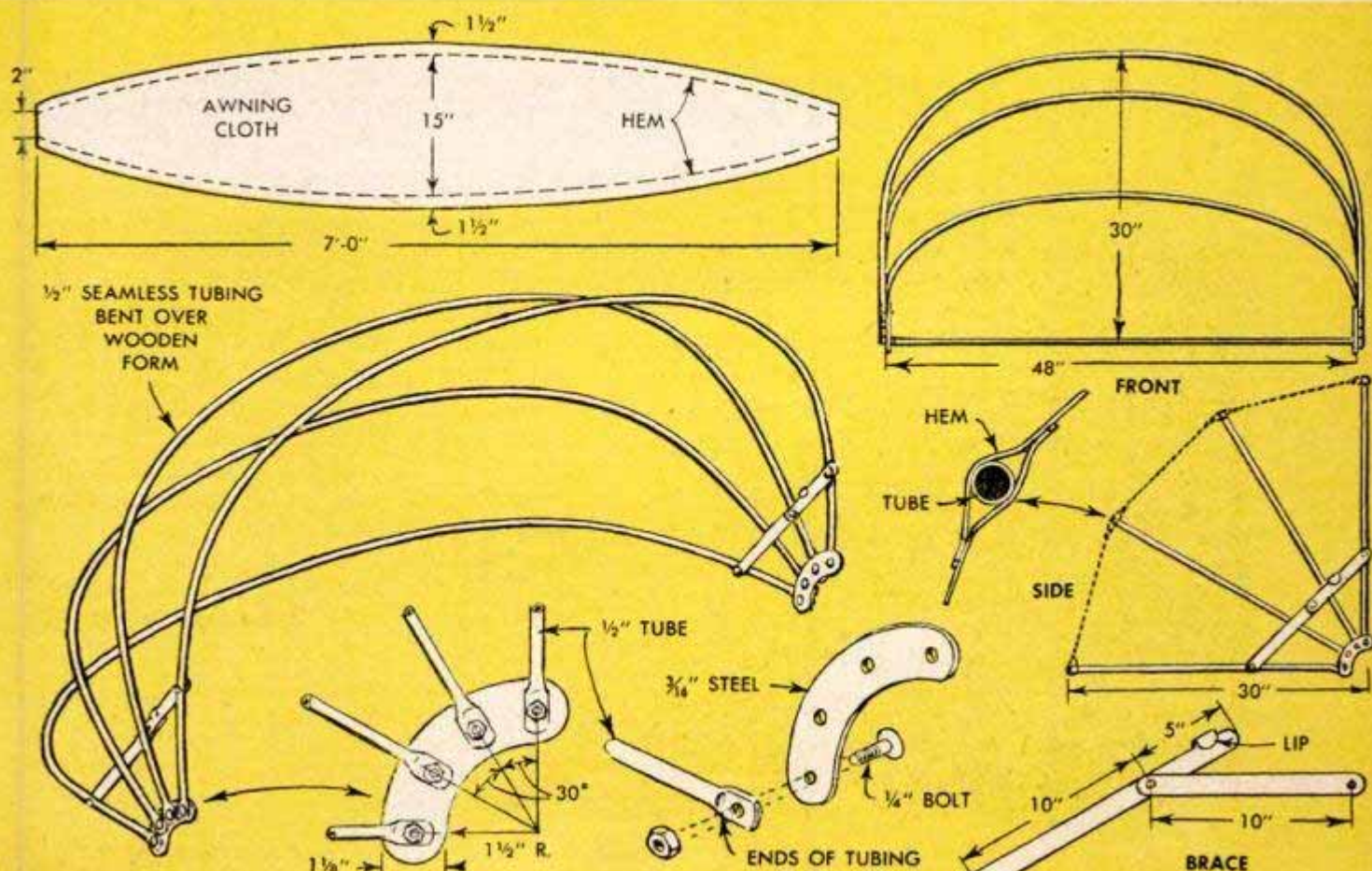
Provide a small child with his own laundry bag. This will teach him to place soiled articles of clothing in the bag and also save considerable time ordinarily spent in sorting and searching for misplaced items.

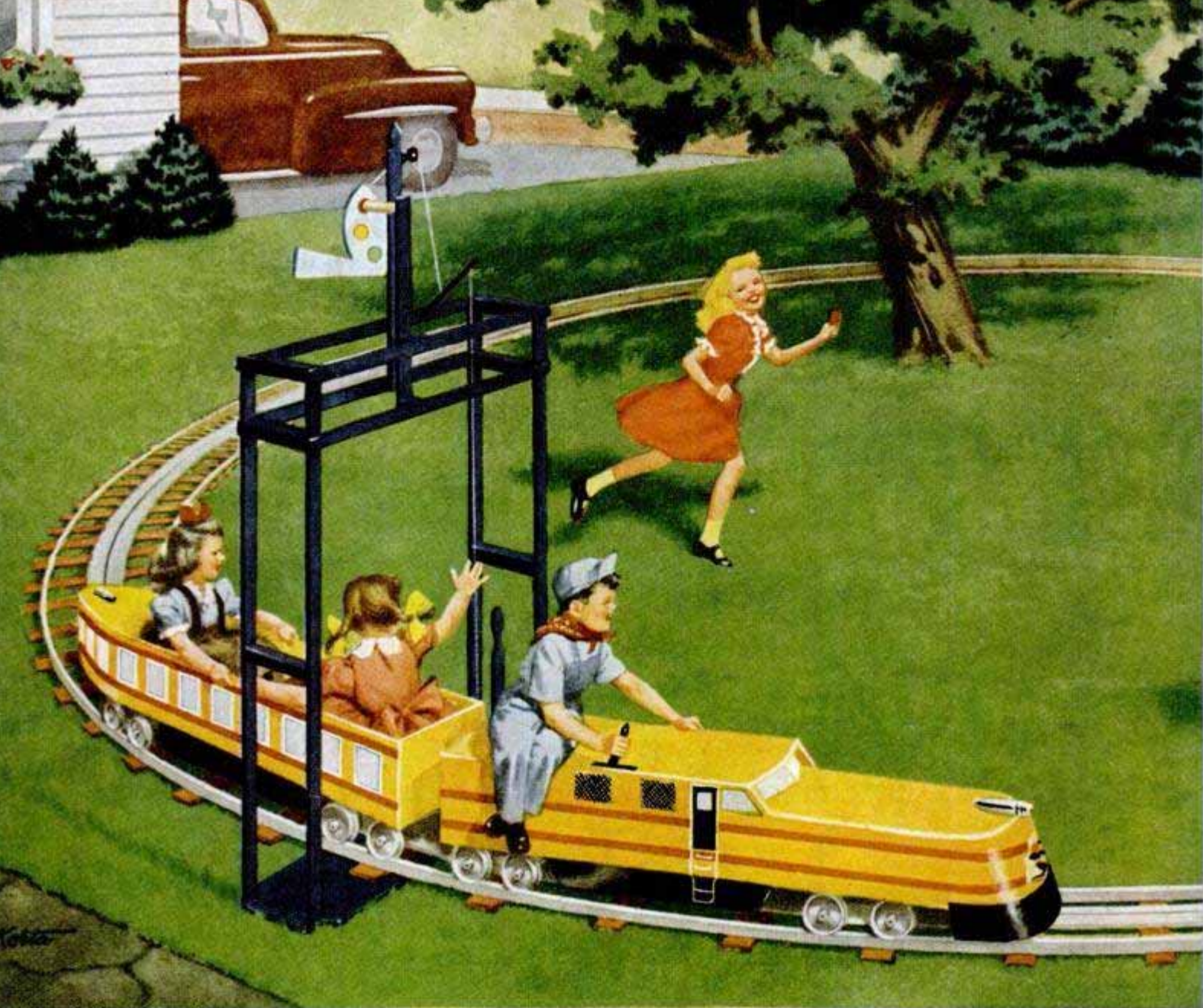


COLORFUL BEACH SUN HOOD

REMINISCENT of an old-time buggy top, this colorful sun hood is a popular adaptation of the common beach umbrella. The hood consists of four ribs of $\frac{1}{2}$ -in. seamless steel tubing, $7\frac{1}{2}$ ft. long, all being curved alike by bending over a wooden form. The ends of the ribs are flattened and drilled and then bolted to flat-iron quadrants. The covering is made of three sepa-

rate pieces of awning cloth. In sewing the pieces together, the edges are lapped $1\frac{1}{2}$ in. to form hems for the ribs. Card-table-leg braces are used to hold the hood open, these being fastened to the outer ribs with small machine screws. In bolting the ribs to the quadrants, peen the ends of the bolts so that the nuts can be backed off slightly to allow the ribs to pivot freely.





ALL ABOARD FOR FUN!

Exciting, electrified streamliner. Has one speed forward and one reverse. Dead-man control and fully enclosed third rail make toy perfectly safe. Compact power unit swivels with rear engine truck. Stock parts used throughout

By Marvin Hartley

WHEN WORD gets around that Billy has a real streamliner in his backyard, complete with semaphore, the small fry are sure to come running, for Billy will be the most popular Casey Jones in the neighborhood. Although the train is powered by 110-volt current, the toy is perfectly safe for a youngster to operate. All electrical connections are fully enclosed and the third rail is designed to make it practically impossible for children to contact. A dead-man throttle prevents the train from "running away." Pushing the

lever forward causes the train to move forward and pulling it backward reverses direction. When released, the throttle returns to a "dead" position. Using a worm-and-gear drive (40 to 1 ratio), the train travels at a speed of approximately $\frac{1}{2}$ m.p.h. While this is a slow yet safe speed for small tots, it can be increased to satisfy older youngsters by reducing the gear ratio and using a more powerful motor. The power unit, mounted on the rear truck of the engine, transmits power to the wheels by a sprocket-and-chain drive.



The engine and the coach are made from 1-in. lumberyard material. Both sides of the engine are cut exactly alike, according to Fig. 2. The cab begins at a point 14 in. from the front. Note that the nose of the engine is built up of six separate blocks, totaling $8\frac{1}{4}$ in. in thickness. The width of each block is given individually in the plan view in Fig. 1. The radius for each block is the same, $6\frac{3}{4}$ in., and is drawn on the bottom side of the work. Then the band-saw or jigsaw table is tilted approximately 15 deg. to produce an angle cut. After the pieces are cut, they are glued and clamped together in bread-and-butter fashion. This will give you a block that flares on three sides, which means that the side flare must be worked down with a wood rasp and sandpaper so it will gradually become flat at the point where it meets the sides of the engine. When this is done, a $\frac{3}{4}$ -in.-deep rabbet is cut on each side of the nose block to receive the sidepieces flush.

The top piece of the body is rounded and notched so that it will be flush with

The streamliner pictured in the illustration above varies somewhat from the original engine shown below, primarily in the location of the rear engine truck. This was changed to provide a better type of drive





Curved sections of track are made as a single unit and are braced with a wooden framework to retain proper radius

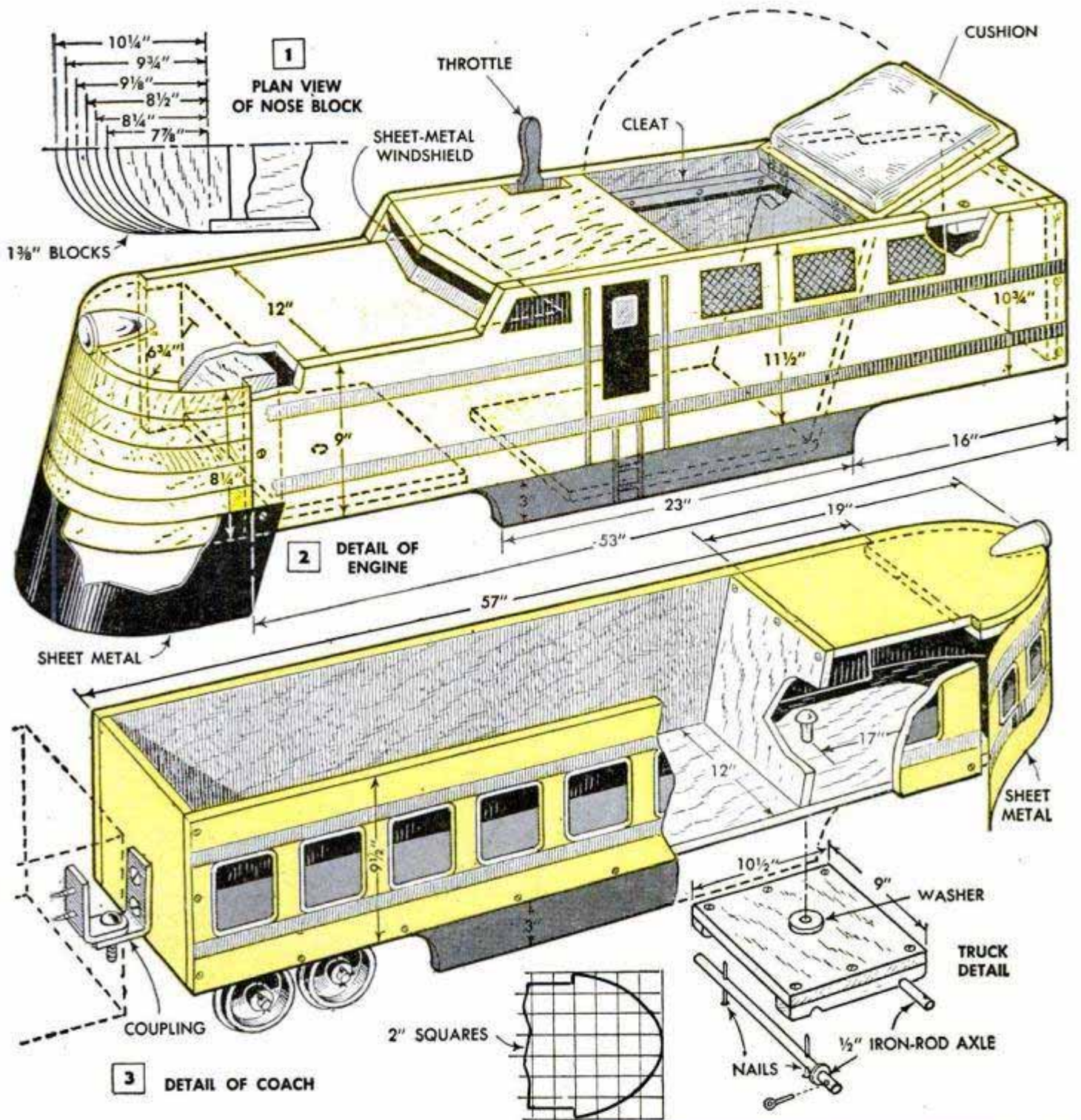
Painted windows continue around end of coach and red cellulose tape is applied to add striping on yellow body



the top edges of the sidepieces. A hinged section in the top of the cab opens to provide a padded seat for the engineer. Cleats which support the seat and the board to which it is hinged are screwed to the inside as shown. The section covering the power unit is fastened with screws to permit easy removal for servicing the unit. A sheet-metal windshield is added to the cab and an opening is cut in the top of the cab for the throttle. Note that the power unit is enclosed by a slanting board fitted as indicated by the dotted lines, and also that a floor board is added to the cab compartment. The front truck is pivoted on a board placed flush with the bottom edges of the body. Finally, a sheet-metal cowcatcher and a 3 x 23-in. skirt on each side of the body completes the engine. Fender-type bicycle lamps make neat lights for the train. If bullet-shaped ones are used, a recess can be made to embed them slightly in the wood and holes drilled for wiring them from the inside.

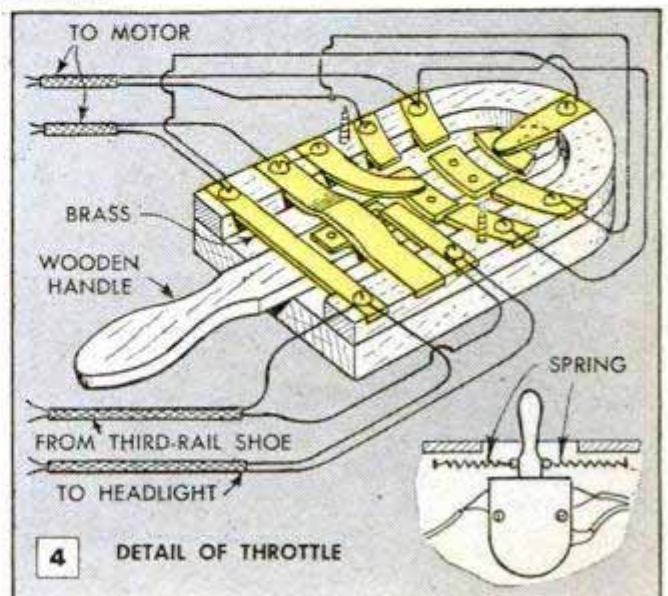
Fig. 3 details construction of the coach. Two 1 x 10 boards form the sides. These are screwed to top and bottom boards which are rounded at the rear end, following the pattern given in the squared drawing. The rounded end of the coach is covered with a piece of sheet metal, 8 $\frac{3}{4}$ in. wide, and brought around to lap the sides about 1 in. Note that a block is added to the underside of the top piece for nailing the top edge of the metal. The kingpin for the rear truck must be in place before enclosing the end of the coach. This is located 17 in. from the end. Both trucks for the coach and the front one for the engine are made alike, as shown in Fig. 3. Here, the wheels rotate on the axles, being held in place with washers and cotter pins. The axles are drilled and pinned to the trucks in half-round notches which are formed with a file in the $\frac{3}{4}$ x 1-in. cleats that are screwed to the truck base. A large washer is used to provide clearance between the truck and the body of the coach. As was done on the engine, 3-in. skirts are added on each side of the coach between the two trucks. The couplings, consisting of flat-iron pieces bent L-shape, are positioned one slightly above the other so that they will lap to take a small bolt.

The throttle detailed in Fig. 4 is actually a reversing switch, designed as a safety measure to return to an "off" position when released. This is

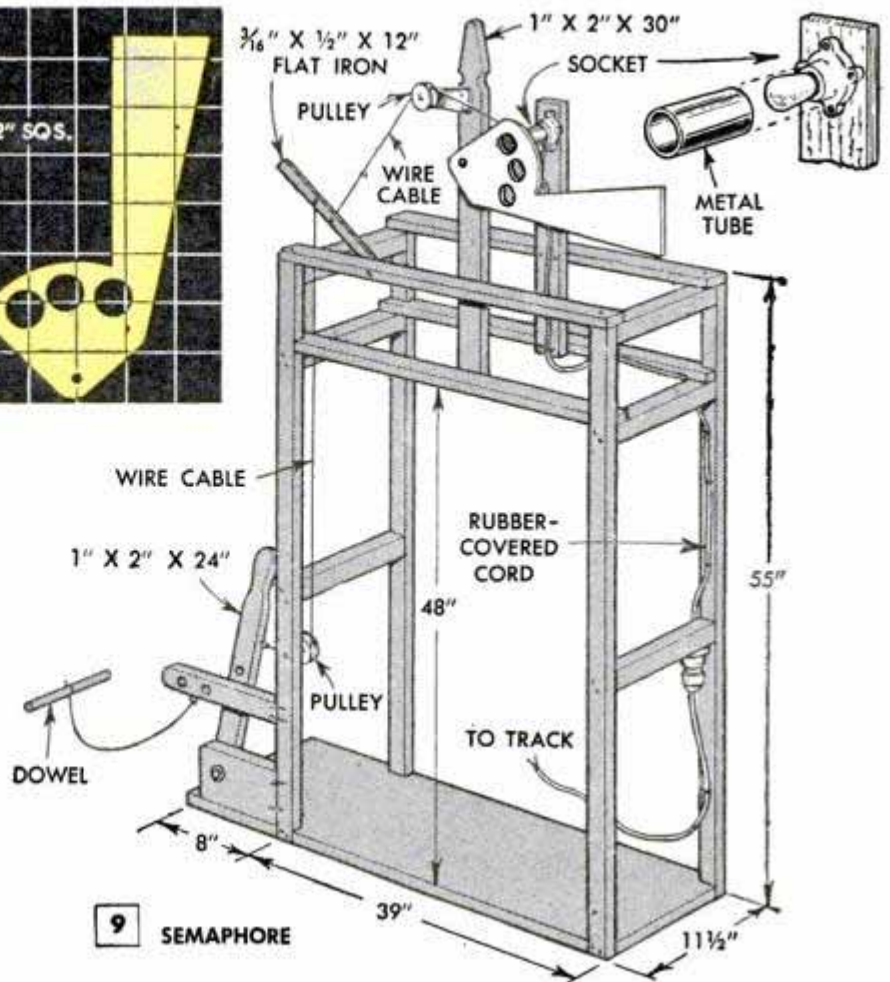


accomplished by two light-tension springs attached to the lever with screw eyes to exert an equal pull. The switch is so wired that the train lights will remain on when the throttle is closed. Brass contact strips in the switch are arranged in the manner shown. The strips fastened to the handle of the switch, which is pivoted with a flat-headed screw, make contact by passing under the others. When the switch is in the "off" position, the only parts making contact are the two shown with rounded ends and the narrow one at the side. The switch is wired as indicated and mounted with screws below the slot in the cab top.

Fig. 8 details the power truck. A worm, supported by pillow-block bearings and coupled to a 1/4-hp. motor, drives a



worm gear and a sprocket mounted on a jack shaft. The sprocket is chain-belted to a sprocket on the axle directly below. A second sprocket on the same axle is chain-belted to a sprocket on the other axle to furnish a positive four-wheel drive. The motor and worm-gear assembly are bolted to two flat-iron bars supported by four hardwood spacer blocks which in turn are bolted to the base of the truck. The complete unit is pivoted by a kingpin through a hardwood cleat fastened to the body of the engine with sections of angle iron. Note that the cleat passes between the truck base and the flat-iron bars and permits the whole drive unit to swivel on curved track. Gray-iron castings for the 16 wheels required can be purchased or they can be machined from cold-rolled



stock to the dimensions shown in the detail.

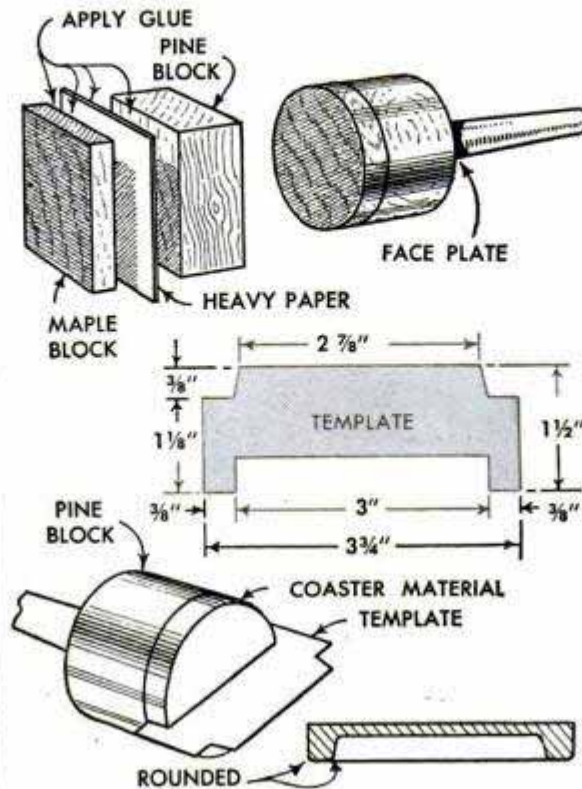
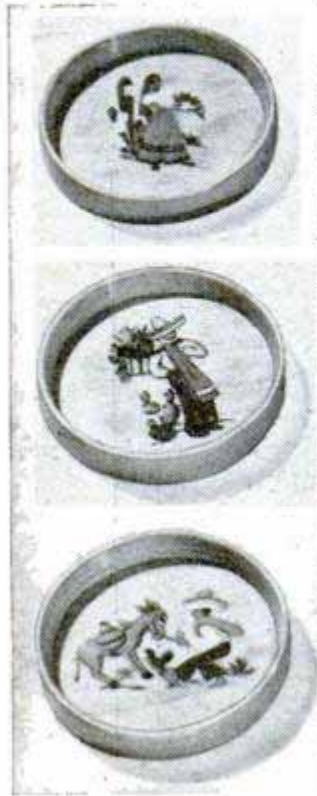
Power is transmitted from the third rail to the motor by a shoe coupled to the truck. In operation, the truck pulls the shoe along as it wipes against metal strips lining the sides of the third-rail assembly. Construction of both the third rail and the shoe is given in Figs. 6 and 7. The shoe consists of two wooden blocks spaced apart with small bushings and screwed together. The bottom block is fitted with brass contacts which are bent outward sufficiently to wipe lightly against the third-rail contacts. A duplex convenience outlet of the screw-on, baseboard type is fastened to the top block of the shoe and is wired and soldered to the contact strips in the manner shown. One side of the outlet is for plugging in the motor and the other is for the taillight. The shoe is coupled to the truck with a loose-fitting bolt which merely falls into a hole in the top of the shoe. The 3/4-in. wooden strips of the third rail are spaced apart with 4-in. cleats placed every two feet. Overhanging members screwed to the 3/4-in. strips provide a 1/2-in. slot for the shoe. Thus the electrical contacts of both the shoe and the third rail are fully enclosed from the top. The third rail is electrified by soldering a wire to each contact and fitting the wires with a plug.

An all-wood track, made up in 10-ft. sections, Fig. 5, uses 1 x 2s for the rails and 1 x 3s for the ties, the third-rail assembly

being centered between the rails and screwed to the ties. In making curved sections of track, the rails are bent to the desired radius and held so by a framework similar to the one shown in the upper photo on page 184. In the case of the third rail, it is made up of several short curved sections butted end-to-end.

A trestle, complete with a manually operated semaphore, keeps the engineer alert. Backed by a bulb and socket and controlled by a hand lever, the semaphore can be set to indicate either a stop, go or caution signal. Fig. 9 shows how the trestle is constructed. A pattern for the semaphore is made from the squared drawing and cut from 1/2-in. plywood. The 1 1/2-in. signal holes, which are backed with red, green and yellow Cellophane, are located on a radius drawn from the pivot point. A cable-and-pulley arrangement is used to raise and lower the semaphore and the lever to which the cable is attached is held in the desired position by a dowel stop. A porcelain socket, of the type having concealed terminals and fitted with a two-way plug, is mounted in an inverted position as shown. The third rail and 110-volt lines are plugged into this socket which is wired to the semaphore socket. Thus the track can be dismantled by unplugging the connections. A shade on the semaphore bulb directs the light through the holes. Use heavy rubber-covered cord for all the wiring.

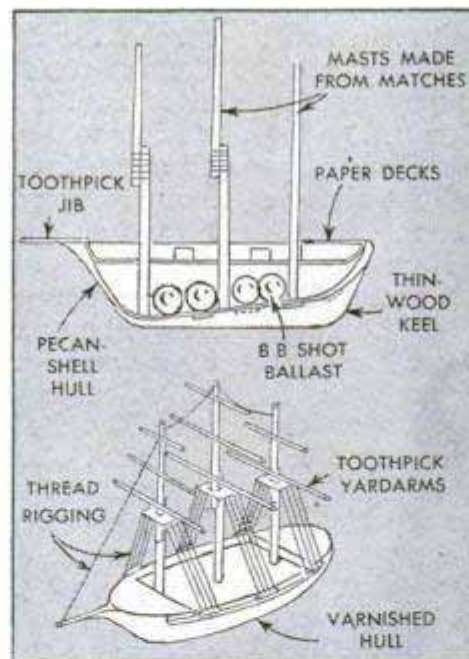
Novel Coasters Turned From Hardwood Pinch-Hit as Decorative Wall Plaques



When not in use, these unusual maple coasters form attractive wall plaques. Their back edges are drilled to permit hanging from a nail and the dished centers are hand-painted or decorated with decals. To prepare the hardwood for mounting on a lathe faceplate, glue it to a matching block of pine, inserting heavy paper between the blocks to facilitate separating them. A template of sheet metal or plastic, cut to the dimensions given, serves as a guide. After sanding the coasters, apply a thin coat of lacquer sanding sealer and affix the decal. Allow the decal to dry for 24 hours, apply several thin coats of lacquer and then polish.—Wallace W. Buffmire, Evanston, Ill.

Pecan Shells Ballasted With BB Shot Provide Hulls for Tiny Ship Models

Utilizing BB shot for ballast, tiny ship models that really float are made by gluing wooden keels to pecan or walnut-shell hulls. When sawing the pecan shells in half, the tips are left intact to support the bowsprit, or jib. Masts are of matchsticks, the yardarms are cut from toothpicks and the rigging is thread. Paper sails are glued to the yardarms and heavy paper forms the decks. After painting, the hull is given a coat of spar varnish.—C. D. Bassett, Ypsilanti, Mich.



Flameproofing Curtains and Drapes Helps Prevent Rapid-Spreading Fires

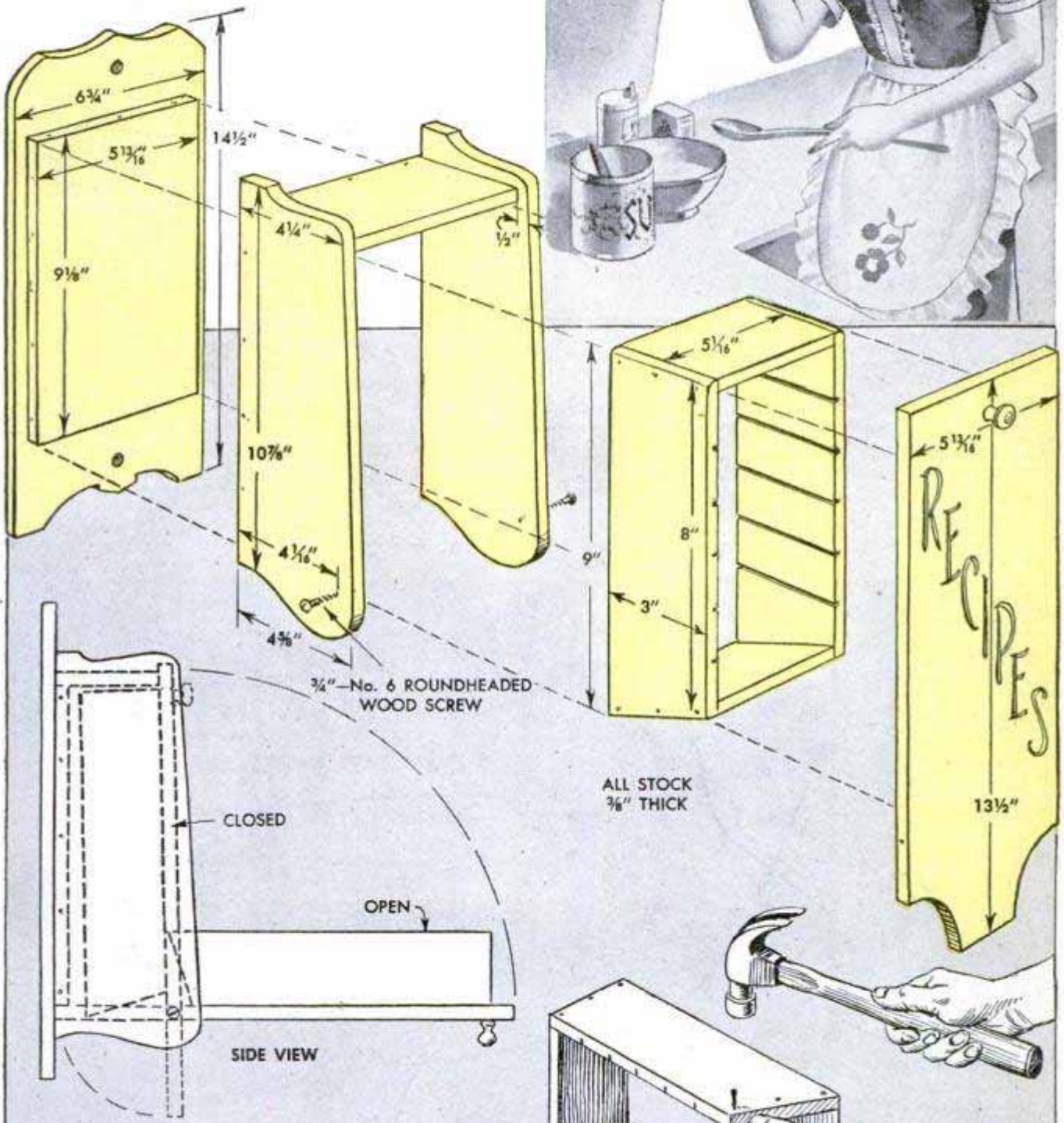
Washable curtains and drapes of cotton, linen or rayon can be flameproofed by immersing them in a solution of crystalline borax, 1 lb., boric acid, 13 oz., and water, 2 gal. The water is heated to dissolve the ingredients and the solution is cooled to room temperature. Then the fabric, which should be dry and clean, is immersed in the solution. Light fabrics require only dipping, but heavy fabrics should be soaked

from 10 to 15 min. to insure thorough impregnation. The fabric is wrung out by hand, dried and then ironed at a lower temperature than usual. This treatment does not affect the color of most dyes and it must be renewed after each washing.

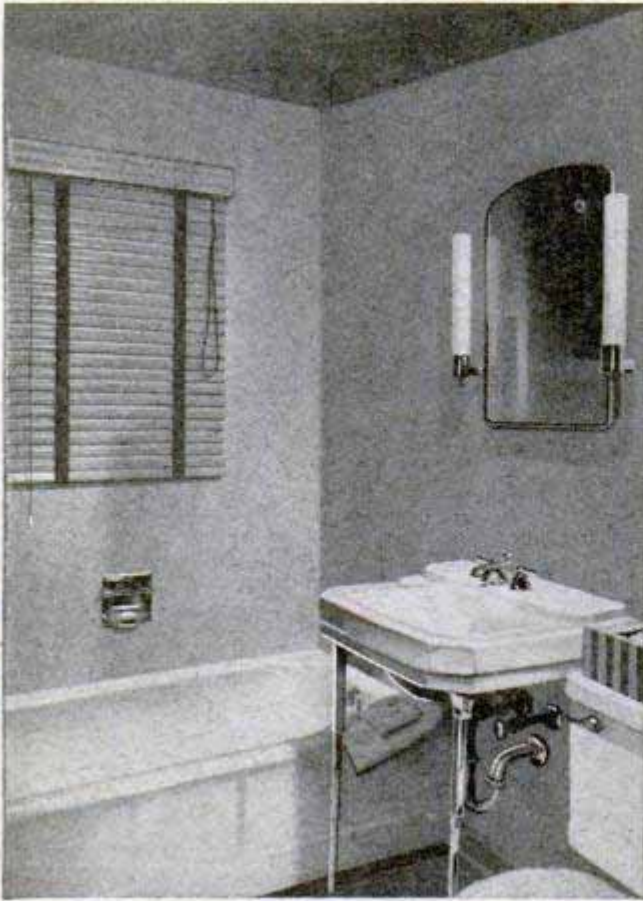
Minnow nets and trotlines can be made rotproof and water resistant by dipping them in raw linseed oil and then drying.

RECIPE FILE

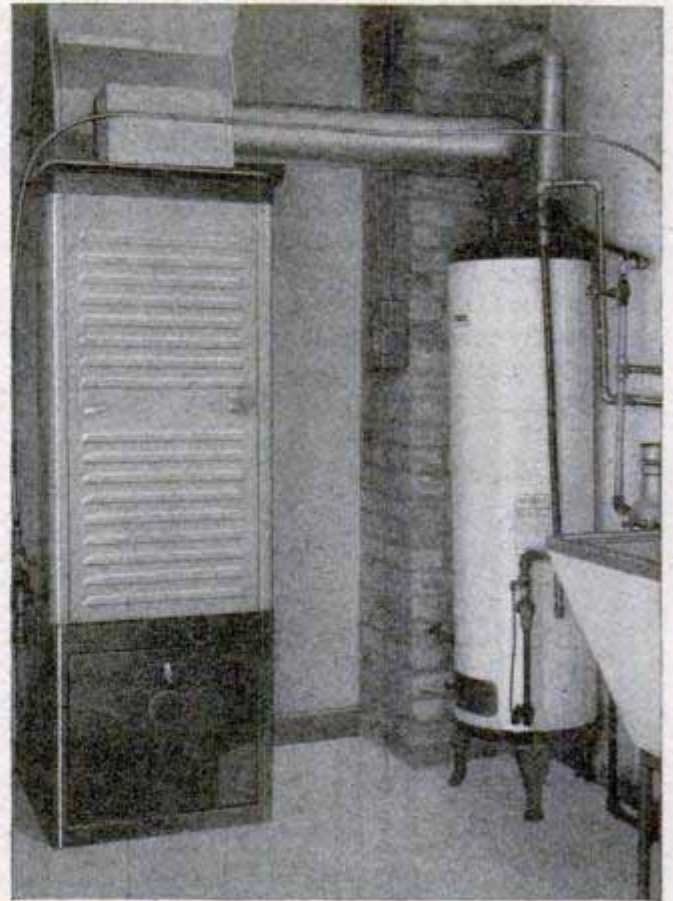
PATTERNED after the old-fashioned spice chest, this little cabinet features a drop front which opens to expose a handy recipe file. The front forms the bottom of the card compartment, which is pivoted at the lower end by two screws. The drawing shows how the parts go together. Note that the card compartment is slanted at the rear to counterbalance it when closed. The drawing shows how the parts go together. Note that the card compartment is slanted at the rear to counterbalance it when closed. Slant the saw cuts in the sides about 5 deg.



The extra piece nailed to the face of the back panel not only provides a nailing edge for the sides but it also serves as a stop for the tilting front when it is pulled open. The file compartment is balanced so that it will stay closed



Locating bathroom adjacent to utility room simplified plumbing and cut cost. Opening from utility room provides access to tub connections. Total cost of all fixtures, even including floor tile, came to \$169



This view of the utility room shows the compact arrangement of the heating unit, water heater and laundry tubs. Cold-air returns under the floor enter the furnace through a pit located below unit

Complete with eave troughs and front walk, here's your dream home fully landscaped and ready to occupy. Ornamental iron railings and colorful window shutters are final touches that will dress up the front



build-it-yourself

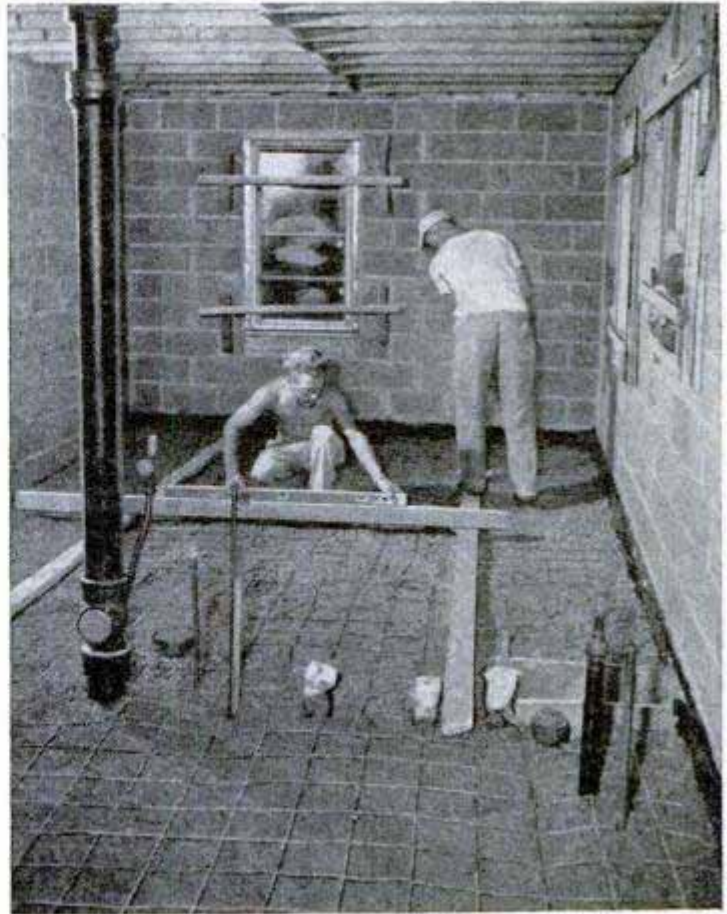
CONCRETE - BLOCK HOUSE

PART II

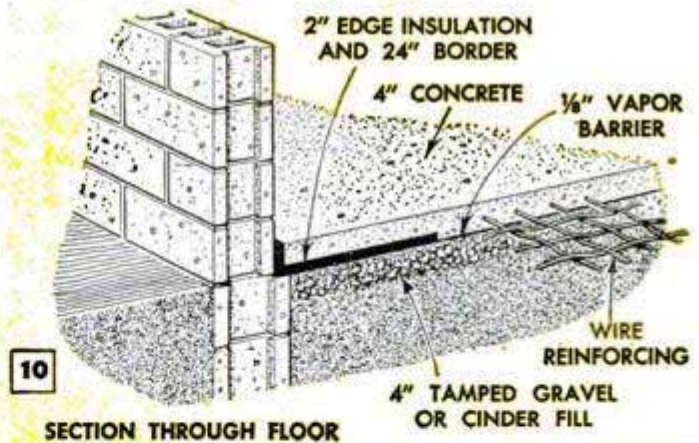
by Wayne C. Leckey

WITH CONSTRUCTION completed to the stage described in Part I, you are about ready to tackle the inside of the house. First, however, it is best to go ahead and shingle the roof, covering the chimney opening with tar paper or a tarpaulin to keep the inside of the structure dry. As the house does not have a basement, that part of the plumbing which is buried and the cold-air returns for the heating unit have to be installed before the concrete floor is poured. The pipes for the cold-air returns are formed from lengths of chimney flue lining, cemented end-to-end. The three returns required terminate in a pit located under the heating unit. This pit and the ones into which the pipes enter at the walls are cast at the time the floor is poured. Fig. 11 shows how the pits are lined with a wooden form and made a size to accommodate a standard floor grille. All plumbing, including the city water and gas lines, is located to enter the utility room. The drum trap for the bathtub, the drain for the laundry tubs and the connection for the closet are brought slightly above the floor line and stuffed with paper. Then, the sink drain is installed and the vent stack carried up through the roof.

Next comes the floor. If the window and door frames have not been installed, do this first so that the sash can be hung. Fig. 12 shows sectional views of the frames. A cross section of the insulated floor is shown in Fig. 10. After ground installations are filled in, a 4-in. layer of gravel or cinders is spread over the entire area. This is tamped and then covered with a $\frac{1}{8}$ -in. layer of insulating paper to form a vapor barrier. The paper is brought

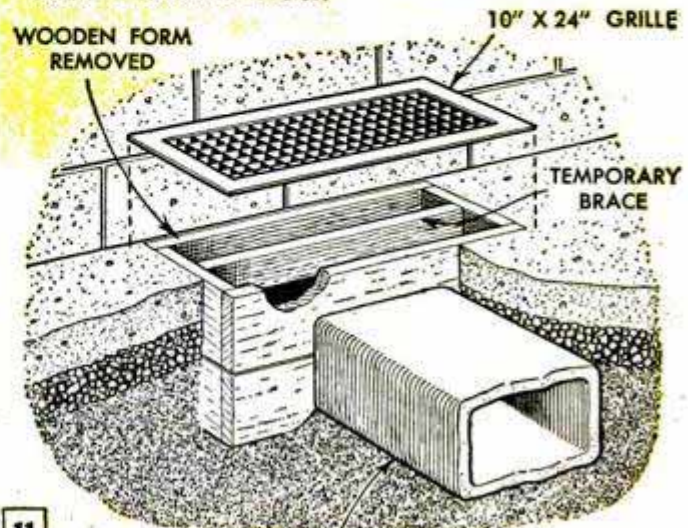


Here the floor is being poured. This is done, of course, after the plumbing and cold-air returns are in place, but before the remainder of the room partitions are erected



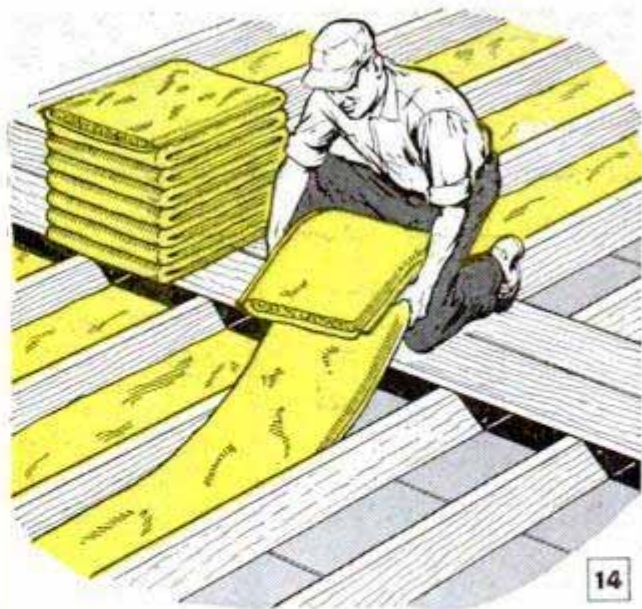
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SECTION THROUGH FLOOR



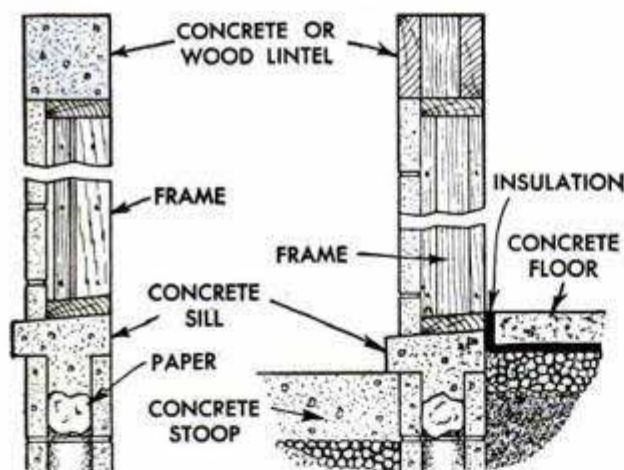
11

8" X 12" FLUE TILE USED FOR COLD-AIR RETURNS



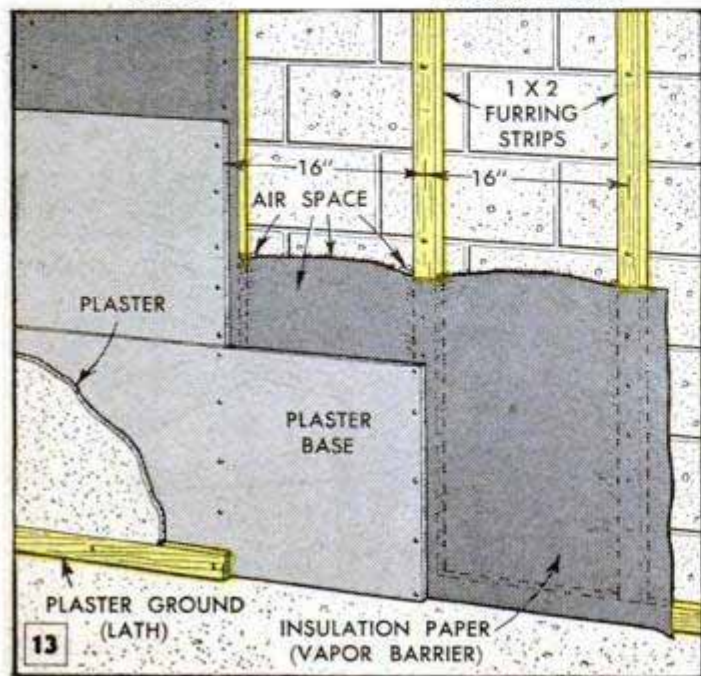
14

Left, plaster is applied directly to the walls of room partitions. Note all corners, including the ceiling line, are reinforced with metal lath. Plastering job, including materials, cost \$380



12 SECTION THROUGH WINDOW

SECTION THROUGH EXTERIOR DOOR

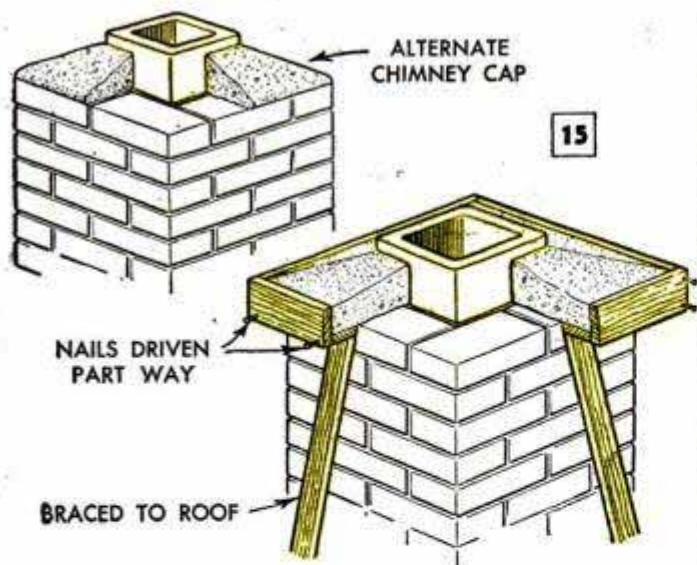


13

up above the floor line at the outside walls and a 2-ft. border of rigid insulation is laid all around the exterior walls. A 2-in. layer of concrete is poured over the paper and then wire reinforcing is laid in the soft concrete, after which it is covered with another 2-in. layer.

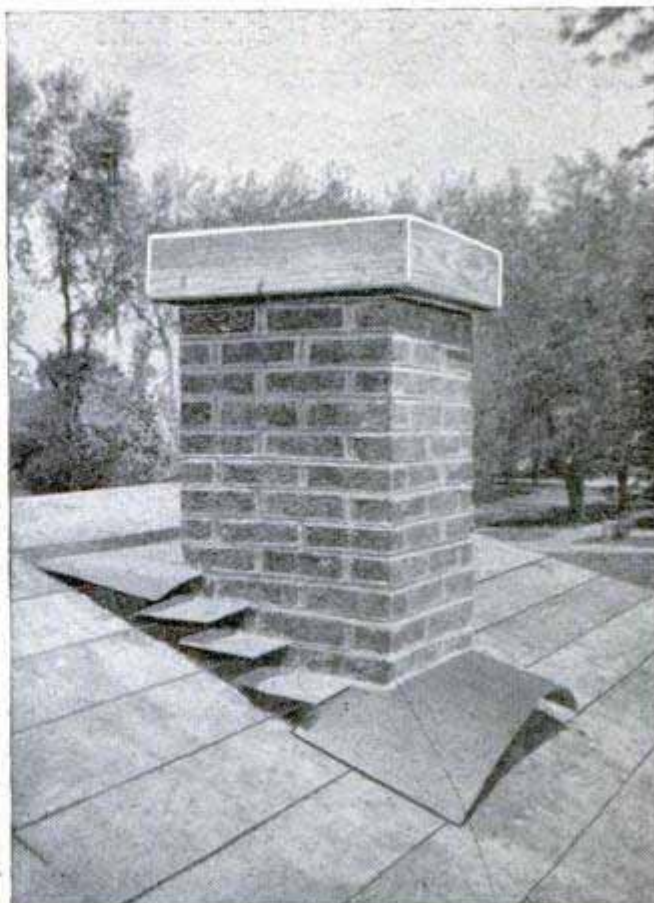
When the floor is completed, the 4-in. block partitions are erected. Where the walls run parallel with the joists, the top row of blocks merely extends above the ceiling line. But, where they run at right angles to the joists, it is necessary to notch the blocks to fit around the joists. The inside of the exterior walls is furred with 1 x 2-in. strips, as indicated in Fig. 13. These are placed vertically, spacing them 16 in. apart. No furring is necessary on the partitions. Insulating paper is applied to the furring strips in the manner shown in Fig. 13. However, before this is done, openings for convenience outlets must be cut in the wall and armored cable passed down through the wall from the attic. Note that the insulating paper is cupped slightly by pressing it inward to produce a double air space between the wall and the plaster base or lath. After lathing the walls and ceilings, strips of metal lath, called Cornerite, are nailed in all the corners.

The chimney, which is located in a corner of the utility room, Fig. 17, is erected before the walls are plastered. After two or three brick courses are laid, chalk lines are tied to nails inserted in the mortar joints and stretched to the opening in the roof. The lines are plumbed and positioned to allow for clearance where the chimney passes through joist and rafter openings, Fig.



16, and are used as a guide in keeping the chimney running straight. Fig. 15 gives a choice of two types of chimney caps.

Heating registers enter each room through the ceiling. A main duct connected to the furnace is located in the attic and is parallel with the bearing partition. Short leads to each room branch off from this duct. After the walls are plastered, all that remains is applying the trim to the doors and windows, completing the wiring and insulating the ceiling, as in Fig. 14. Final outside jobs consist of stuccoing the exterior surface and installing gutters.



Below, the chimney, resting on a footing under the floor, is erected in a corner of the utility room. Bricks are laid to chalk lines plumbed from starting course to roof, clearance being allowed at openings

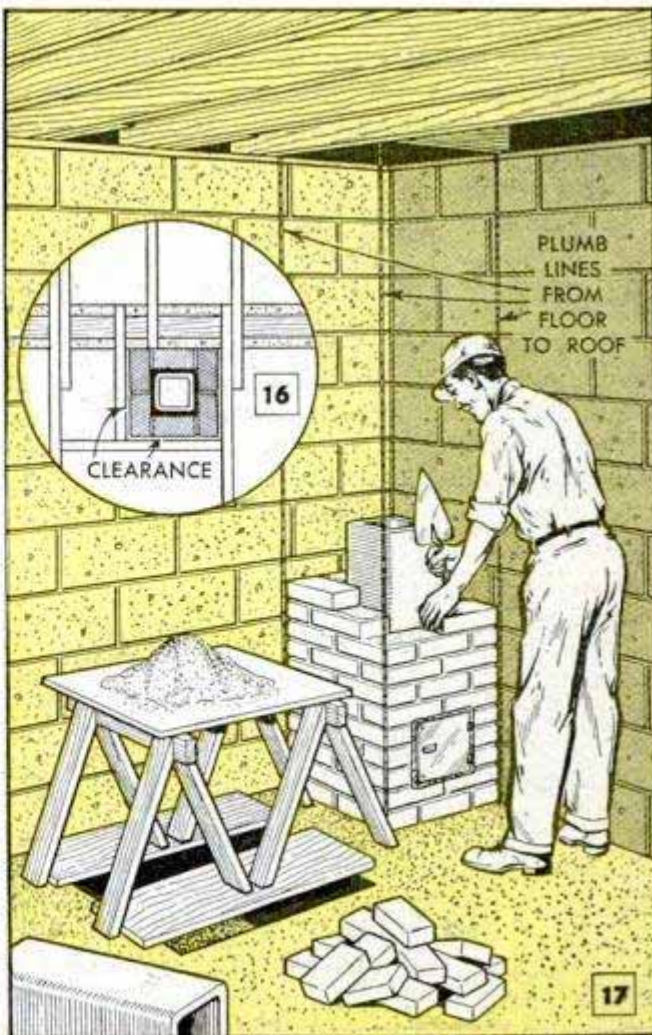
NOW THERE ARE TWO . . .

Popular Mechanics Build-It-Yourself houses, the Concrete-Block House described here, and Your Home And How To Build It Yourself, which was a frame-type house. Blueprints and the books on both houses shown below may be obtained by writing Popular Mechanics Book Dept., 200 East Ontario Street, Chicago 11, Illinois.

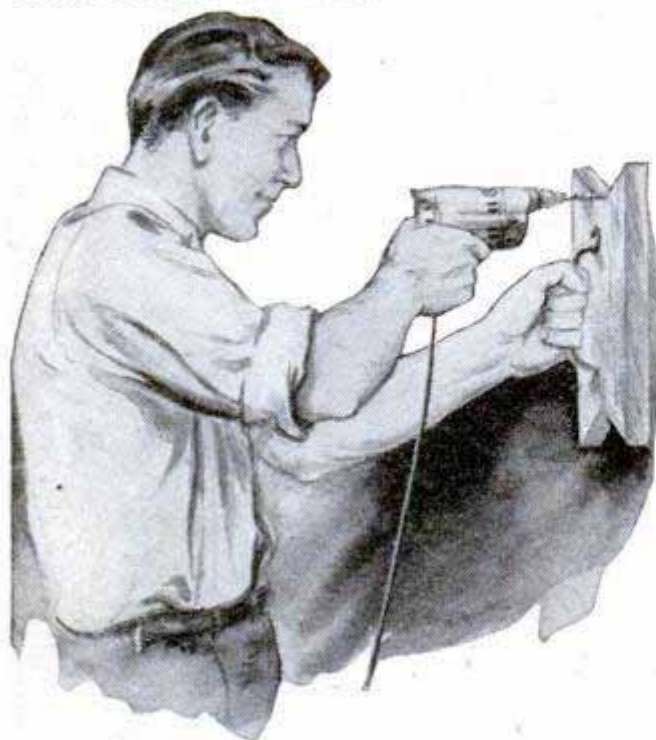


THE CONCRETE-BLOCK HOUSE, BOOK.....\$ 2.00
 Complete Set of Blueprints.....12.00
 Book and Blueprints.....12.50
 Duplicate Set of Blueprints..... 5.00

YOUR HOME AND HOW TO BUILD IT YOURSELF, BOOK\$ 3.00
 Complete Set of Blueprints.....12.50
 Book and Blueprints.....14.00
 Duplicate Set of Blueprints..... 5.00



Notched Jig Spots Electric Drill On Vertical Surfaces



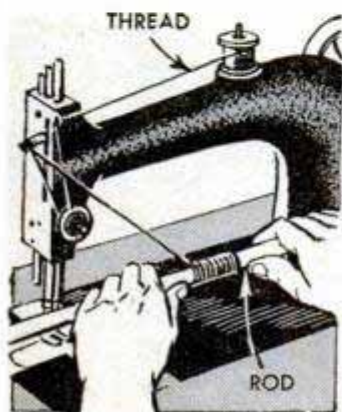
If you have difficulty spotting an electric drill when boring holes in plastered walls or other vertical surfaces, this notched jig will permit you to spot the drill accurately every time. The jig consists of a wooden block with a V-shaped notch cut in each end, the bottom of the vee being rounded slightly for the drill bit. To guide the drill, center the bottom of the vee exactly over the position of the hole and rest the bit in the notch. A screen-door handle facilitates holding the jig, and a rubber facing, glued to the underside of the jig, reduces vibration and slipping.

Mirror Frame Provides Shoehorn

The plastic frame of a broken hand mirror can be quickly fashioned into a useful shoehorn. Leaving the handle intact, cut the back of the mirror frame to the shape of a shoehorn and round the edges.

N. P. Smith, New York City.

Winding Fishing Rods



With the aid of a sewing machine, it is a simple matter to do a professional-like job of winding your own fishing rods. Just mount a spool of silk winding thread on the machine and run the thread through the tension arm as

shown. This holds the silk taut, allowing both hands to be used to rotate the rod.

Jack T. Kelley, Brooklyn, N. Y.

Manila Envelope Tacked to Wall Stores Sheets of Sandpaper

Drawer or shelf space can be conserved by storing sheets of sandpaper in large Manila envelopes tacked to a wall. The tacks are driven through the flaps of the envelopes so they are held open, and different grades of sandpaper are stored in separate envelopes.

Richard Hanscom, Elmhurst, Ill.

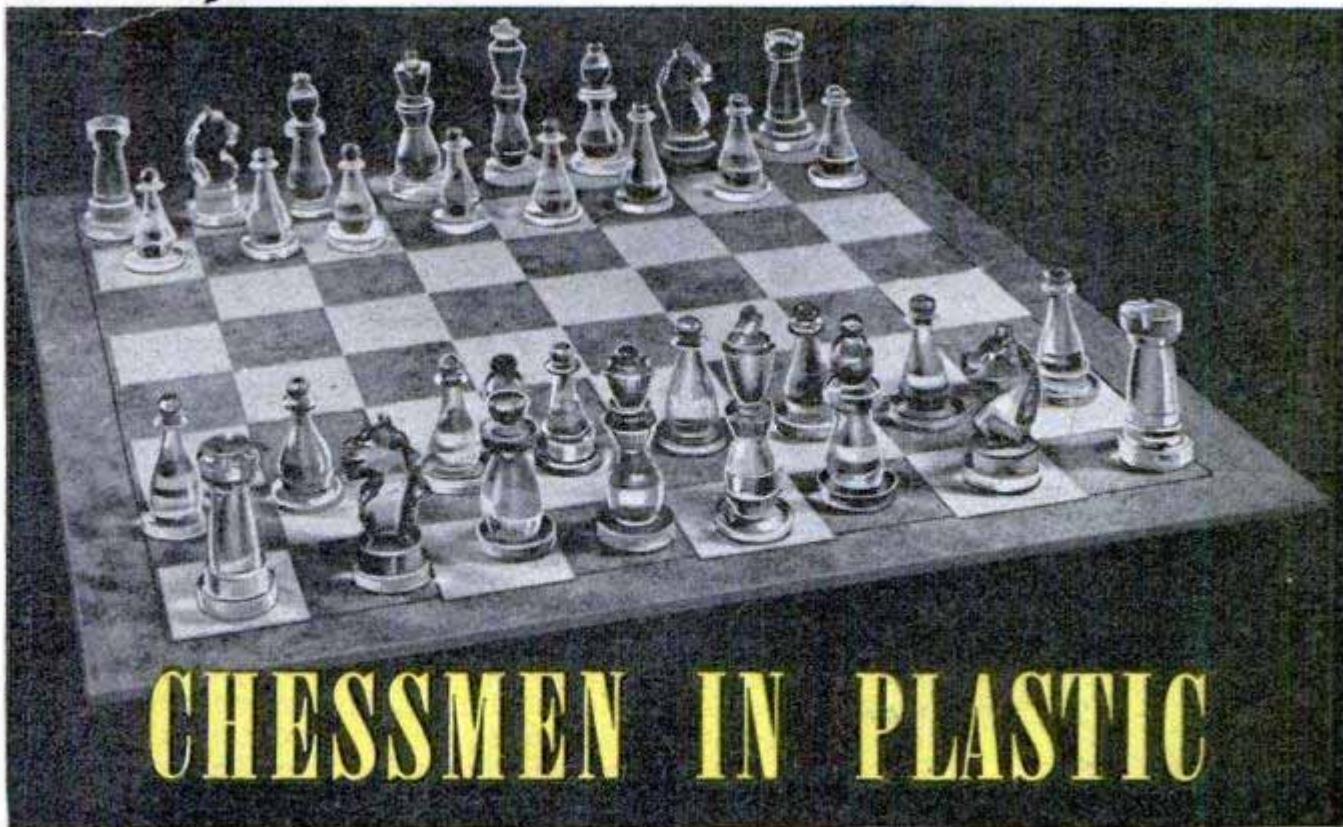


Brick Incinerator for Back Yard Reinforced With Iron Rod

Combining distinctive appearance with economy, this back-yard incinerator is built of 3-hole brick reinforced with iron rod. It is set up merely by inserting the rods through the holes in the brick as shown in the detail, the rods being long enough to permit driving them into the ground about 6 in. A wire grate can be installed near the bottom of the incinerator, if desired, and a hardware-cloth spark cover placed over the top.

W. A. Andrews, Sr., Kansas City, Mo.



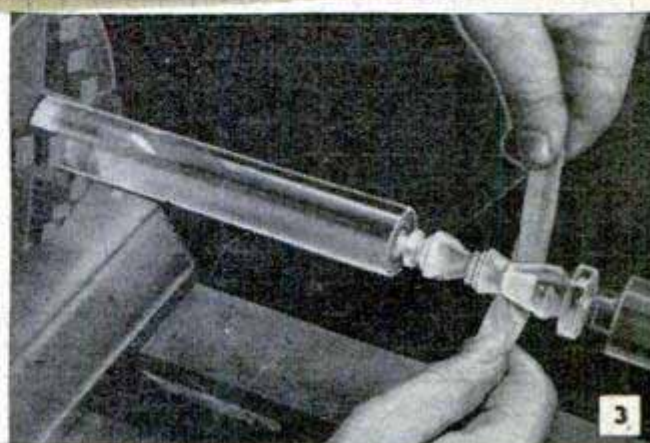


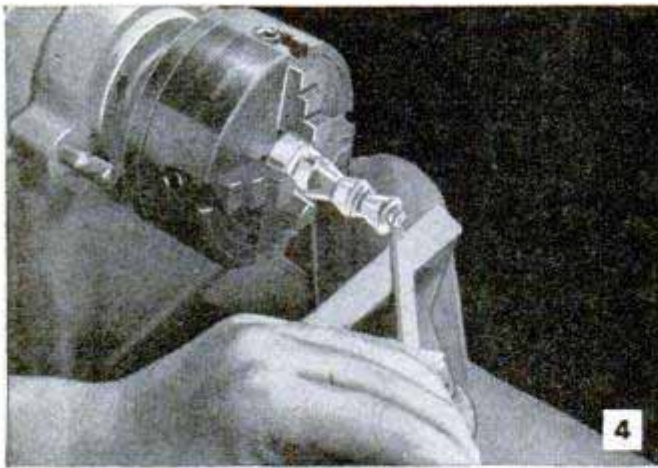
By Elma Waltner

TURNED and carved from crystal-clear plastic, these distinctive chessmen are ideal for your own use or as a gift that will compliment the skill of any chess enthusiast. One set is left the natural color of the plastic and the other set is stained red. The chessmen generally follow the Staunton design, the kings, which are the largest pieces, being 3 in. high, and the pawns $1\frac{3}{4}$ in. high. All pieces are turned from 1-in. transparent plastic rod.

When turning the plastic, it is a good idea to form the base of the piece at the tailstock end of the rod. In this way, there is a minimum waste of plastic, as the hole made by the tailstock center is in the base of the piece and the entire length of the rod thus can be utilized. The work can be centered accurately by mounting one end of the rod lightly in the lathe chuck and bringing the tailstock against the other end. The chuck jaws are adjusted in or out so the tip of the tailstock center is in the exact center of the end of the rod. Cardboard templates for all pieces except the knights aid in turning the work to the correct proportions. These are made by using a half pattern of each design, following the squared pattern in Fig. 7. Calipers are employed to check the contours of each piece, Fig. 1, and, by the combined use of templates and calipers, the corresponding pieces can be turned to identical size.

After the turning is completed, each piece is polished in the lathe before it is cut from the rod. To do this, hold jewelers'

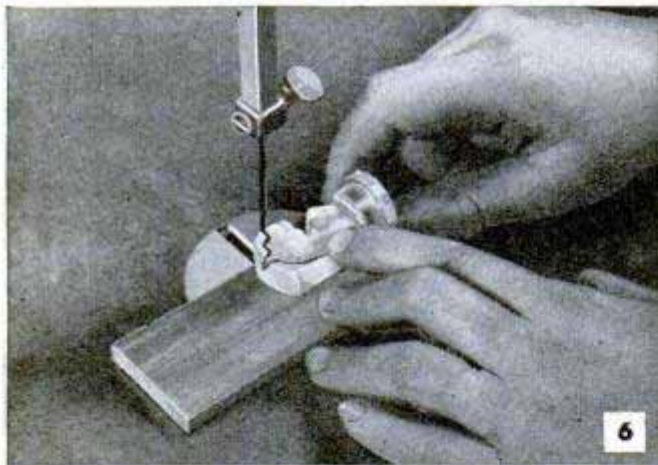




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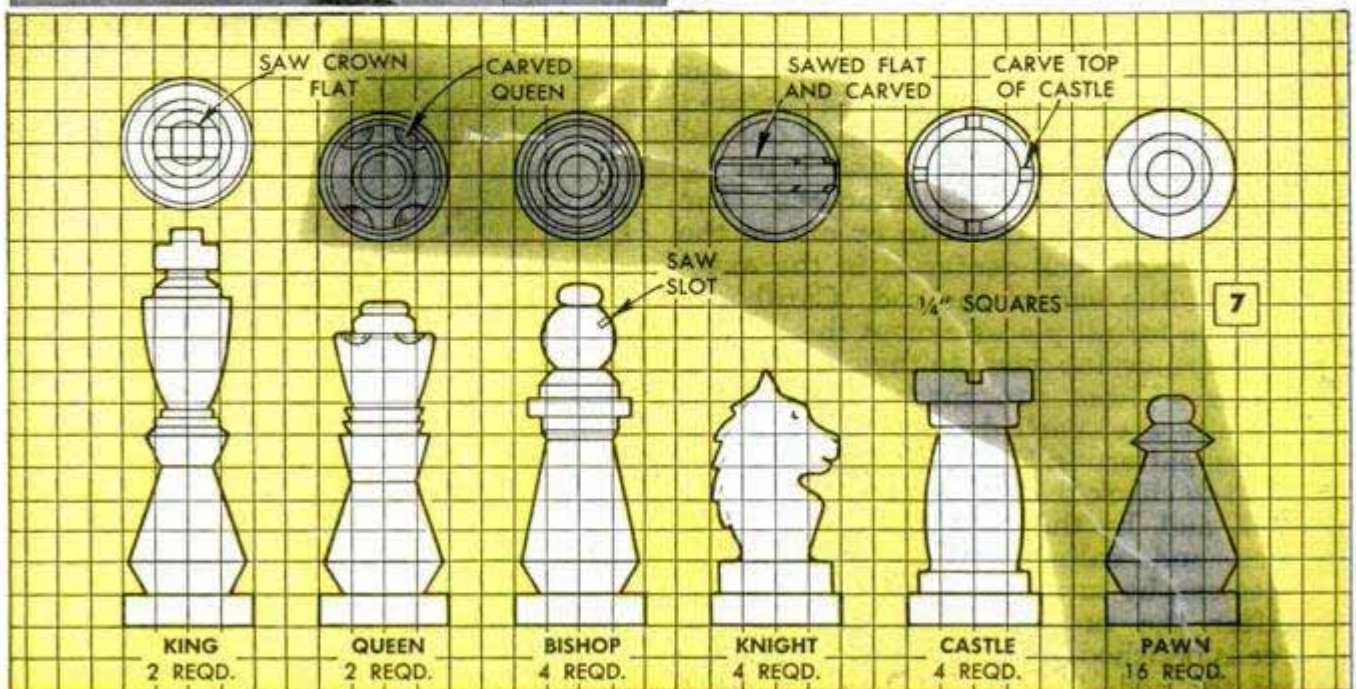
6

rouge against one side of the rotating piece and hold a dampened cloth pad against the other side, as shown in Fig. 2. This wet-polishing method will quickly produce a high luster on the surface of the plastic. With the piece still rotating in the lathe, it is given a final polish by holding a strip of soft cloth against it as illustrated in Fig. 3.

When the piece has been polished, it is cut free from the rod with a parting tool. Then, after removing the rod stock from the chuck, the base of the piece is chucked in the lathe and turning of the top portion is finished, Fig. 4. This is polished while the piece is still in the chuck. Then the work is reversed end for end in the chuck and the base is turned slightly concave, as in Fig. 5, so the piece will not tip easily. When chucking polished pieces, protect the surface in contact with the jaws by wrapping it with heavy paper. Give the pieces a final buffing or polishing by hand.

Now, square the crosses on the kings' crowns by sawing them flat on two sides and then polish. Carve the tops of the queens and castles (rooks), as shown in Fig. 7, and cut a slot in the top of each bishop. If available, use hand-grinder burrs for carving, chucking them in a drill press instead of a hand grinder to leave both hands free to manipulate the work.

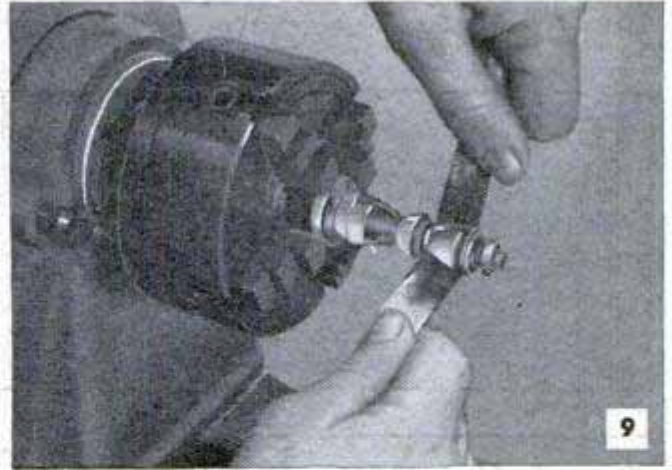
When making the knights, turn the upper portions roughly to shape and finish-turn the bases. Then, saw away the surplus stock on the upper portions so the sides are flat and about $\frac{3}{8}$ in. thick. Lay out the profile of the figure on one of the flat sides and saw it out. If a jigsaw is used for this purpose, a piece of wood must be laid between the saw table and the underside of the flat surface of the work to hold the piece level with the table, Fig. 6. When



7



8



9

sawing the pieces, it is best to use a skip-tooth blade or a blade having widely spaced teeth. The saw should be run at slow speed to avoid overheating and possible melting and distortion of the plastic. The carving of the knights is also done with hand-grinder burrs chucked in a drill press, as in Fig. 8. As the knights cannot be chucked in the lathe for polishing, they are finished with a buffing wheel charged with buffing compound.

After all the pieces have been polished, one set must be stained to distinguish it from the other. An easy way to do this is to mount the pieces to be stained in a lathe chuck, remembering to protect the polished surface from being marred by the

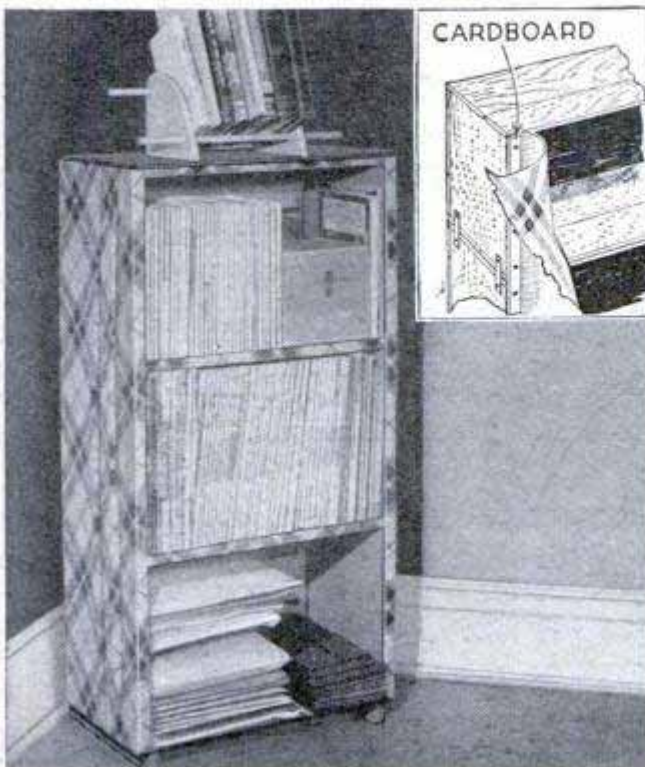
chuck jaws. Then the stain is applied to a soft cloth which is held against the piece as the latter turns in the lathe, Fig. 9. The pieces are reversed in the chuck to complete the staining. This method, of course, cannot be used for the knights, and the stain must be rubbed in them by hand. Applying the stain in this way does not produce a deep color, but rather a pale tint that is especially attractive in plastic. If deeper shades are preferred, the pieces may be stained by immersing them in a dye bath until a particular depth of color is attained. Although red stain was used for one of the original sets and the other was left clear, any desired color or color combinations may be used.

Orange Crates Covered With Fabric Provide Inexpensive Bookcase

Covered with brightly-colored fabric and topped with imitation leather, this inexpensive bookcase consists merely of three or four fruit crates stacked one on top of the other. The crates are bolted to-

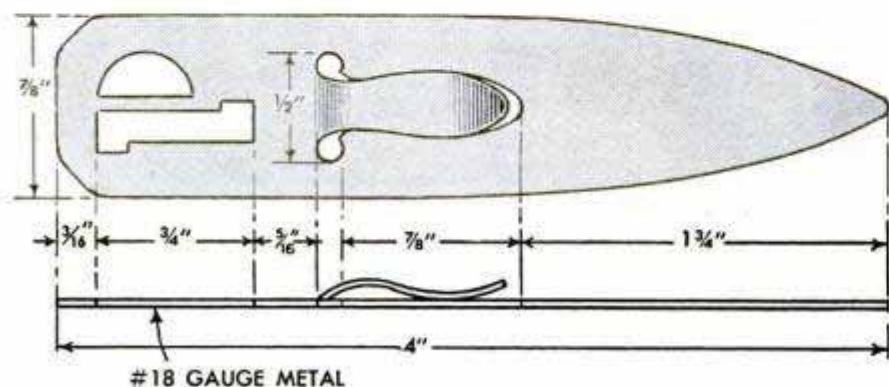
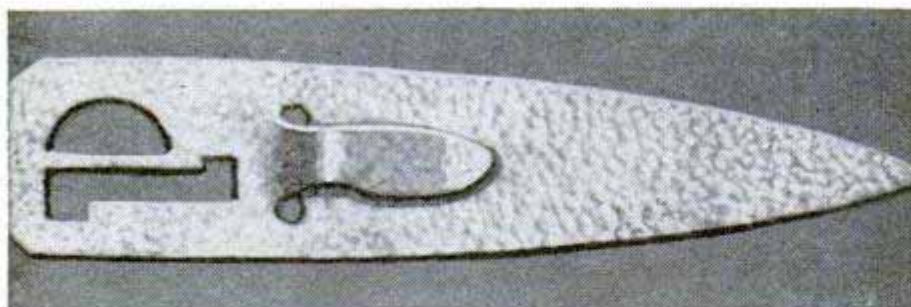
gether or fastened with strips of sheet metal, and the sides of the case and the edges of the shelves are covered with fabric. The shelf edges are covered to a depth of 2 or 3 in. To attach the fabric to the sides of the case, fasten it to the front edges with strips of cardboard, as shown in the detail, and stretch it across the sides. Then, pleat the fabric or stretch it taut and tack it to the back of the case. After cutting a piece of heavy cardboard large enough to cover completely the top of the bookcase, spread glue on one side of the cardboard about 1 in. in from the edges. Lay the cardboard with the glue side upward on a piece of imitation leather which is about an inch larger all around. Miter the corners of the leather, fold it around the edges of the cardboard and smooth it over the glued surface. Hold the leather in place with weights until the glue dries, and then fasten the top to the bookcase with upholsterer's tacks or furniture nails.

Ned S. Goss, Wilmington, Ohio.



☞ To prevent a cut in oilcloth from becoming an unsightly hole, place a strip of adhesive tape sticky side up on the underside and press the edges down smoothly.

Paper-Knife-and-Bookmark in Hammered Metal

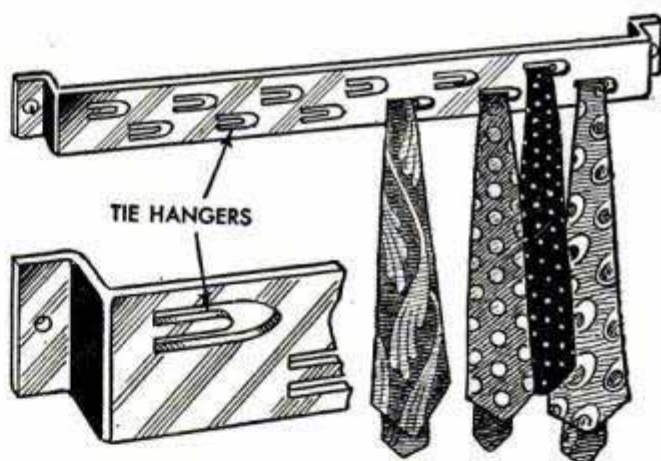


Made of hammered sheet metal, this initialed bookmark is handy for opening mail or severing untrimmed pages of a book. After the metal has been cut to shape, the clip is formed by drilling $\frac{1}{8}$ -in. holes $\frac{1}{2}$ in. apart and sawing with a jeweler's blade. Using the same procedure, an initial is cut into the upper end of the bookmark. Then the surface of the metal is hammered lightly with a ball-peen hammer and the clip is bent to an S-shape as shown in the lower detail. Finally, all edges are filed smooth and the metal is polished.

Attractive Rack Made From Plastic Permits Quick Selection of Ties

Bent from a length of heat-forming plastic, this novel rack keeps ties separated for instant selection. Dimensions of the rack are determined by its location and the number of ties to be held. The individual tie hangers are cut out U-shaped and staggered, as shown, to display each tie. The ends of the plastic are made pliable by heating in an oven set for 250 deg. F. Then, they are bent L-shaped for attaching to a wall or door with roundheaded screws. Handle the plastic with gloves and form in a vise or jig to produce the sharp bends.

A. V. Malone, Los Angeles, Calif.



Window for Head Net Protects Face While Allowing Unobstructed Vision

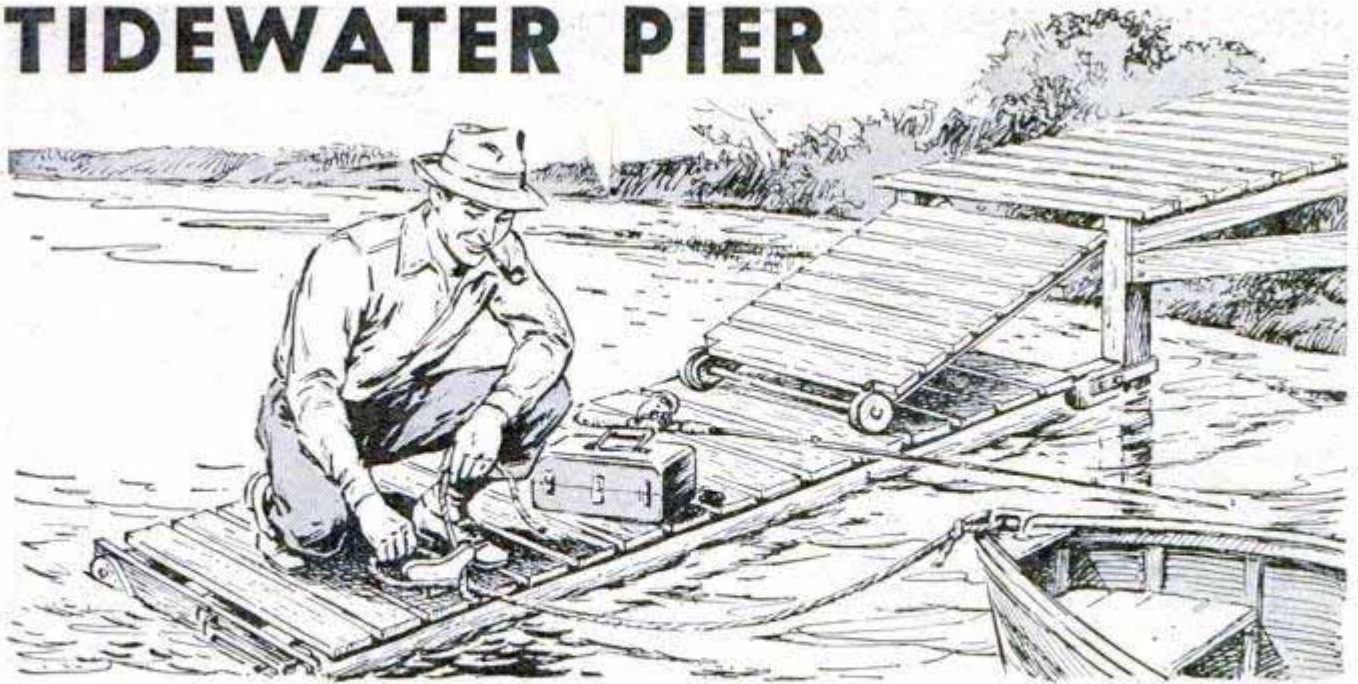


To relieve eyestrain caused by looking through the mesh of a head net for long periods of time, one fisherman mounted a rectangular piece of transparent plastic in the netting directly in front of his eyes. This permits clear vision while still giving the head complete protection from insects. An opening for the window is cut in the netting and the latter is cemented directly to the edges of the plastic.

Lemon Juice Provides Invisible Ink

With a little lemon juice and a new pen point, children can have a good time writing messages in invisible ink. When the lemon juice dries, the writing is not apparent. It is brought out by holding the paper over a source of heat, such as a hot lamp bulb.—Domenick Bava, Detroit, Mich.

TIDEWATER PIER

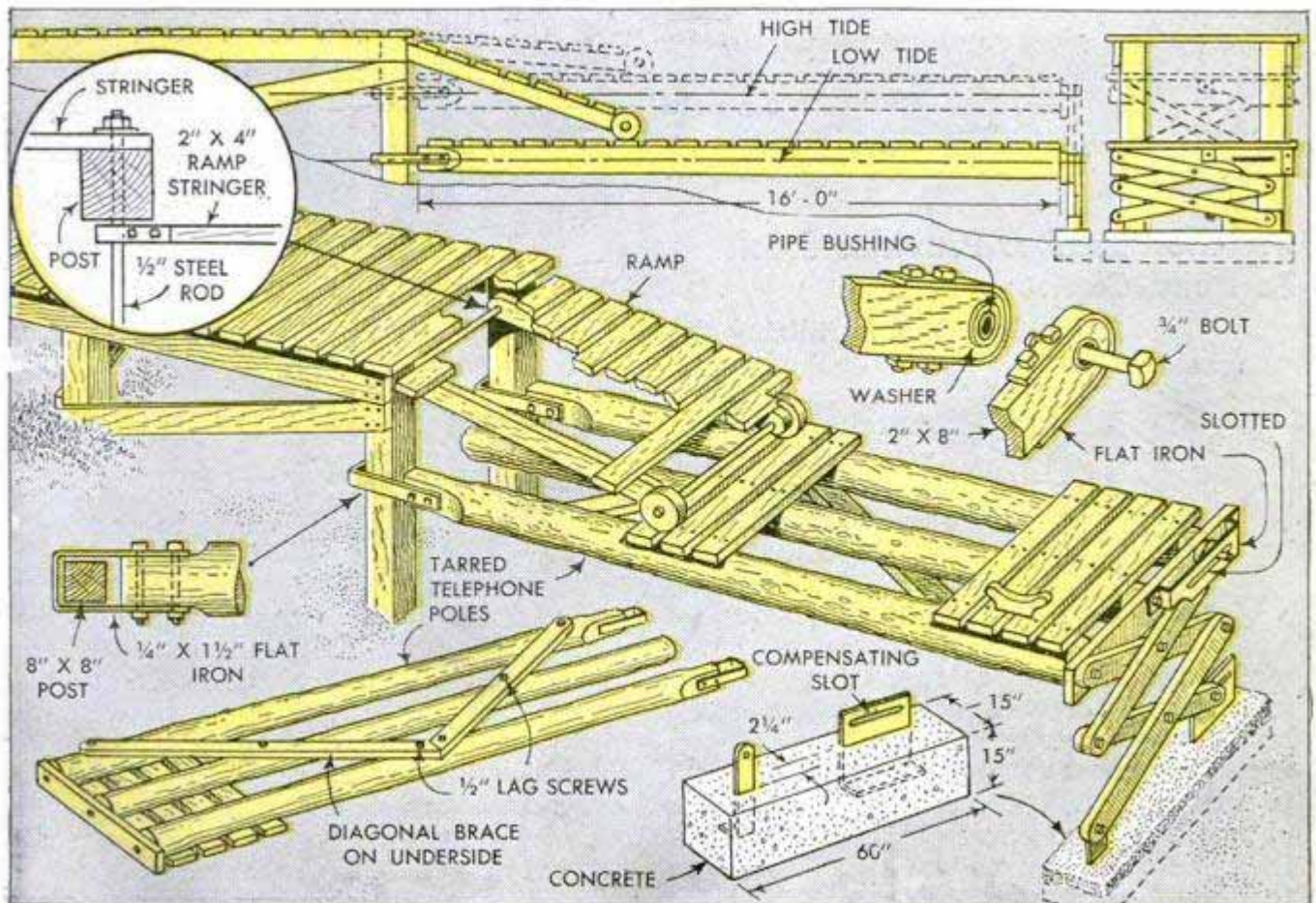


By Hi Sibley

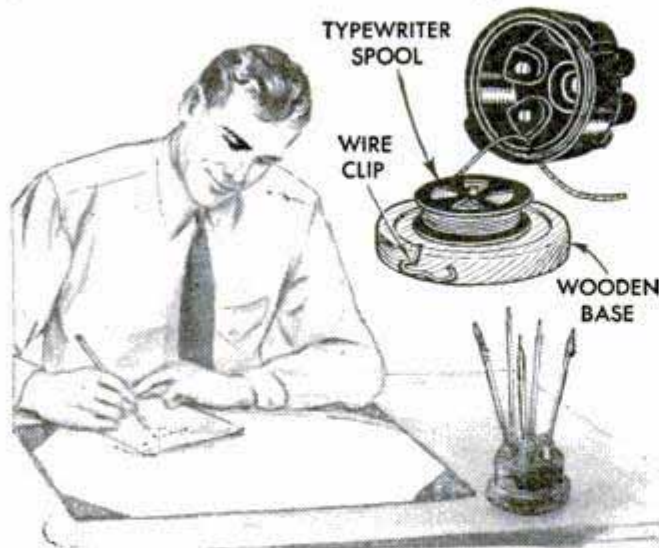
REQUIRING no pilings, this inexpensive boat landing which floats with the tide or water level is ideal for lake or river use. Designed to ride up and down on the posts of a fixed pier, one end of the landing is fitted with flat-iron yokes while the other end is anchored to a concrete block by means of a pantograph-type extension. Tared telephone poles are excellent for the timbers of the landing. These are braced diagonally on the underside, after

one end of each outer timber is shaped to take the flat-iron yokes, and then the surface is floored with narrow boards.

The pantograph extension, which checks side movement of the landing in rough weather, and the cast-concrete block to which it is anchored are attached to the outboard end of the poles in the manner shown. The whole assembly is floated into position, using the landing as a raft. Bolt- ing the yokes in place and adding a small ramp complete the job. Metal parts should be copper-painted for salt-water use.



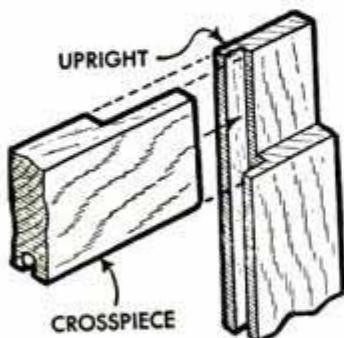
Pencil Holder and String Dispenser Made From Distributor Cap



Consisting simply of a car distributor cap mounted on a wooden base, this novel desk accessory holds several pencils or pens for easy selection. The cap is set in a groove or recess in the top of the disk-shaped base. To prevent the cap from turning, a small notch is chiseled outward from the groove to receive the lug on the bottom edge of the cap. If the cap is not a tight fit in the groove, it can be held in place with two wire clips bent to fit over the projections on opposite sides of the cap. The lower ends of the clips are inserted in holes drilled in the edge of the base. If desired, the pencil holder can be made to serve as a string dispenser by installing a typewriter-ribbon spool under the cap. The spool rotates on a nail driven into the center of the base and is wound with string which is passed through a hole made in the side of the distributor cap.

John M. Avery, Dexter, N. Y.

Matched Lumber Provides Stock To Build Cupboard Doors



By utilizing the grooved edge already cut in 1 x 6 matched flooring, you can make the frame members of paneled cupboard doors with just a handsaw. With the groove for the plywood insert ready-

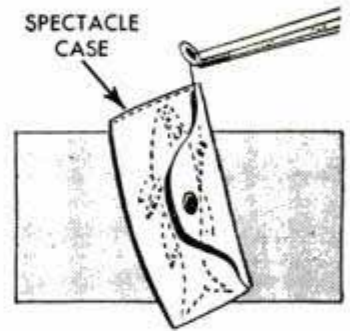
made, the flooring is merely ripped for width and the ends of the pieces half-lapped to fit together flush at the corners. If the thickness of the plywood is slightly greater than the width of the groove, a pass or two of a hand plane along both sides of the panel at the edges will taper it enough to allow it to fit snugly in the groove. Glue

and flat-headed screws, driven from the back side, are used to fasten the members together at the corners.

Herbert Fey, New Braunfels, Tex.

Spectacle Case Sheathes Lure

When walking along the bank of a stream to try to locate a new fishing spot, keep the lure or baited hook from becoming tangled in the brush by placing it in a spectacle case and snapping the cover closed. Either carry an old spectacle case for this purpose or use the case from a pair of sunglasses.

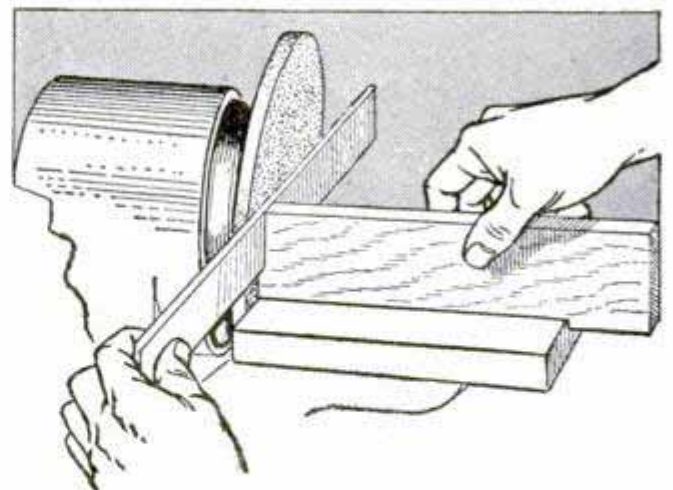


Tape on Edges of Book Pages Facilitates Turning Them

To facilitate turning the pages of reference books and manuals and also to protect them from wear, fasten cellulose tape to the edges of the pages. Cut the tape the same length as the page and stick half the width of the strip to the edge of the page. Then fold the strip neatly around the edge and attach the other half.

Frank G. Harris, New Orleans, La.

Jig for Disk-Sanding Thin Stock Insures Even Thickness



For sanding thin pieces of wood on a disk sander, this jig assures even thickness along the full length of the work, and also keeps the work from dropping between the disk and the table. The jig is merely a wooden block, which is notched to the required thickness. A portion of the underside is cut away to provide a stop by hooking over the edge of the table.

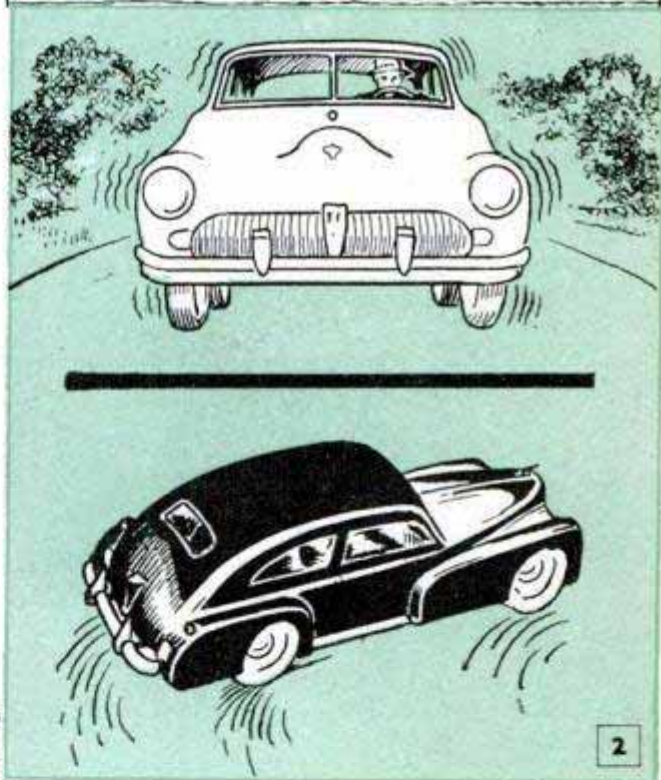
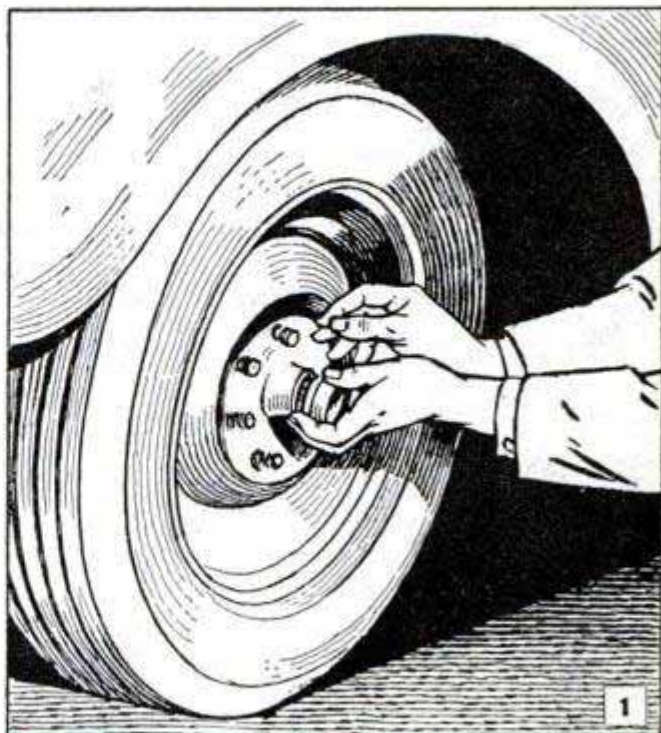
Dick Hutchinson, El Monte, Calif.

CAR NOISES HAVE MEANING

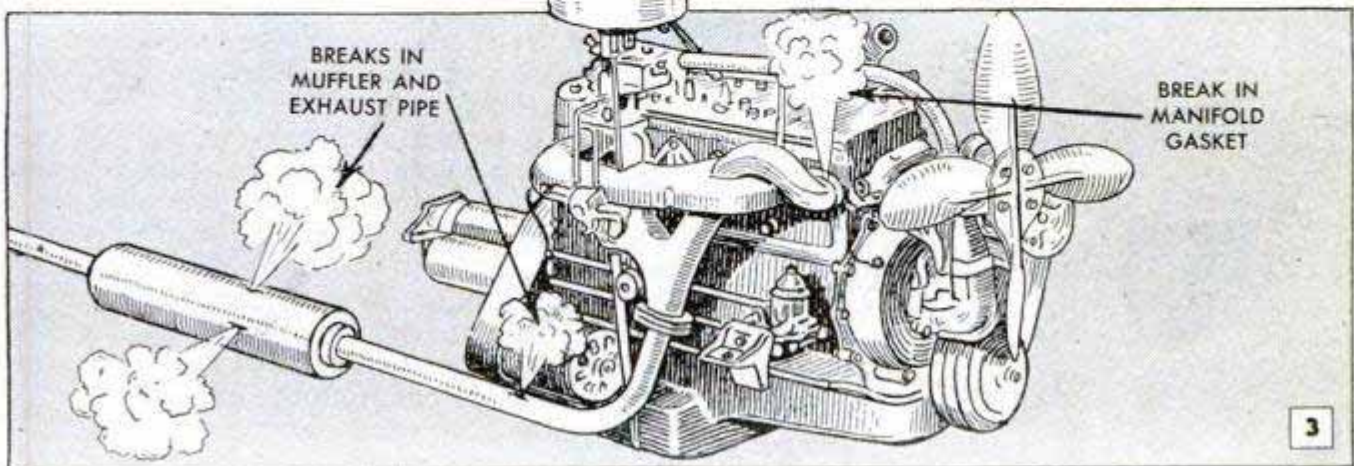
By C. E. Packer

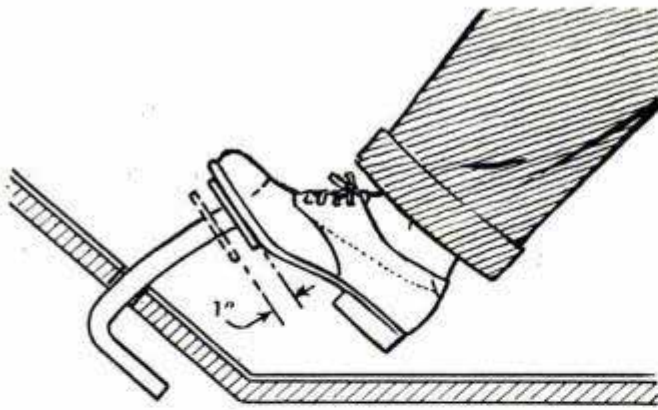
UNDERSTANDING the meaning of the various sounds which may develop in any car during use will pay off in safety and savings. Often a trained ear will save a big repair bill or avoid a serious accident. Harmless noises, such as body squeaks and rattles and certain minor chassis noises, have a way of developing and then disappearing during regular use. But noises of a sharp or dull metallic tone that persist, or that increase in volume or frequency, should be investigated. Noises developing in the rear axle, clutch or engine generally are of such a nature as to make location and identification of the trouble comparatively simple. But certain other noises indicating trouble in vital parts are not so easy to track down. A good example of this is the peculiar sound given out by a failing front-wheel bearing, Fig. 1. This failure rarely occurs except as the result of neglect in inspecting and lubricating the bearings at regular intervals. Lack of lubrication eventually will cause complete breakdown of the bearing and at the same time create a serious accident hazard. In the development stage, the unusual grind of a dry wheel bearing will be heard when first starting away from the garage or curb. On the highway, the sound will be "drowned" by the usual chassis and road noises.

The tip-off, telling the driver that the front wheels are unbalanced, usually comes through the steering column and wheel, but only after considerable damage has been done to bushings, shock absorbers and tires. The slightest perceptible drag on the steering wheel, a developing tendency of the car to wander from side to side on the highway, or a noticeable vibration

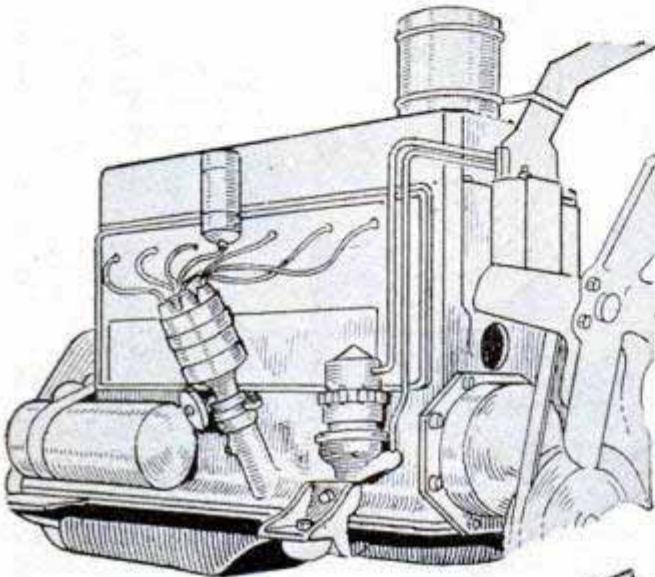


Leaks anywhere along the exhaust line from the manifold to the tail pipe may release dangerous gases into the car

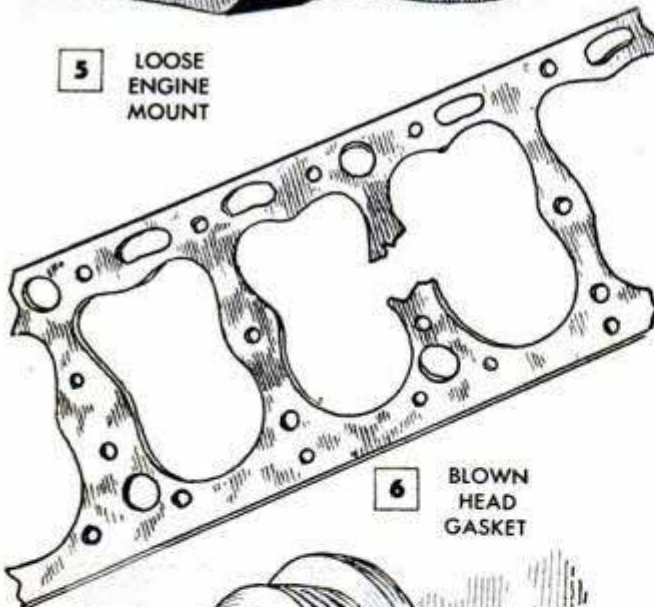




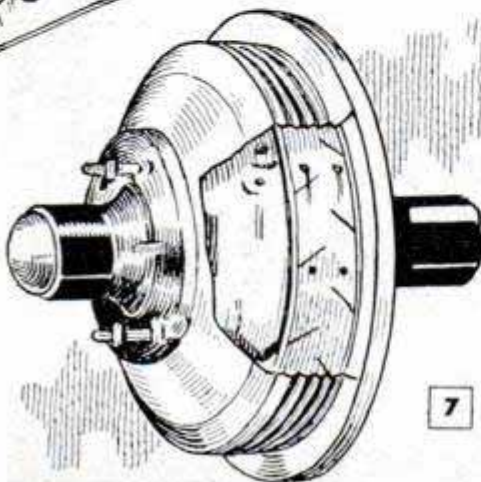
4 ADJUST CLUTCH PEDAL



5 LOOSE ENGINE MOUNT



6 BLOWN HEAD GASKET



7 SCORED BRAKE DRUMS



8

of the front end at certain speeds, Fig. 2, are indications that a bad front-end shimmy is developing. If the cause is not found and corrected immediately, the faulty condition can lead to a big repair bill. A serious accident hazard also is present, for front-end shimmy can cause a dangerous skid in wet weather.

The deep-throated roar caused by a rusted-out muffler is unmistakable evidence of the need of immediate repair but the low, rasping whistle of a pinhole break in the exhaust pipe or the muffled "beep" caused by a break in the manifold gasket may be even more hazardous to the occupants of the car, Fig. 3. Leaks at either of the latter points will release large concentrations of toxic gases into the engine compartment from which they may find their way into the interior of the car.

A defective clutch can cause a lot of unnecessary expense. Clutch chatter is not only annoying to the driver; it also delivers sledge-hammer blows to both the transmission and rear-axle gear train, and may seriously damage the universal joint within a short time. Check the free travel of the clutch pedal at regular intervals. On most cars, this should be from $\frac{3}{4}$ to 1 in., Fig. 4. If it is less than $\frac{3}{4}$ in., adjust the pedal clevis, Fig. 8, to give the right amount of free travel. It is well to remember that loose engine mounts, Fig. 5, can give out all the symptoms of clutch chatter, grabbing or slipping. The indications are so similar that it's easy to mistake one for the other. Any time you suspect the clutch, it's a good idea to examine the engine mounts, especially if the car is several years old.

A sharp, intermittent whistling sound



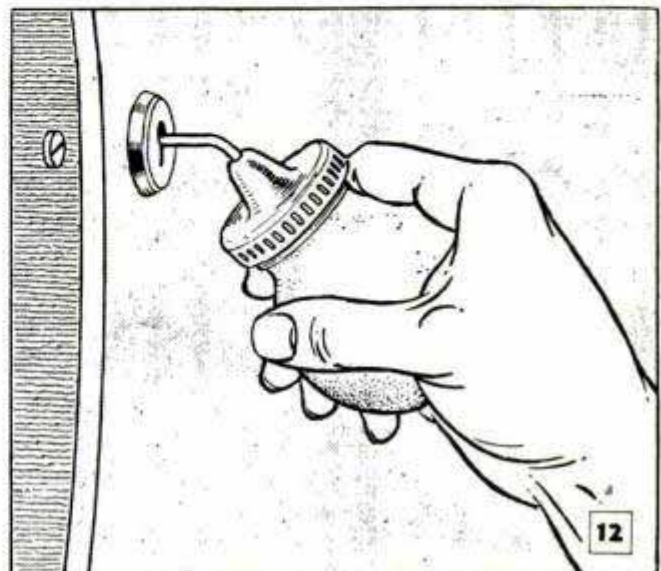
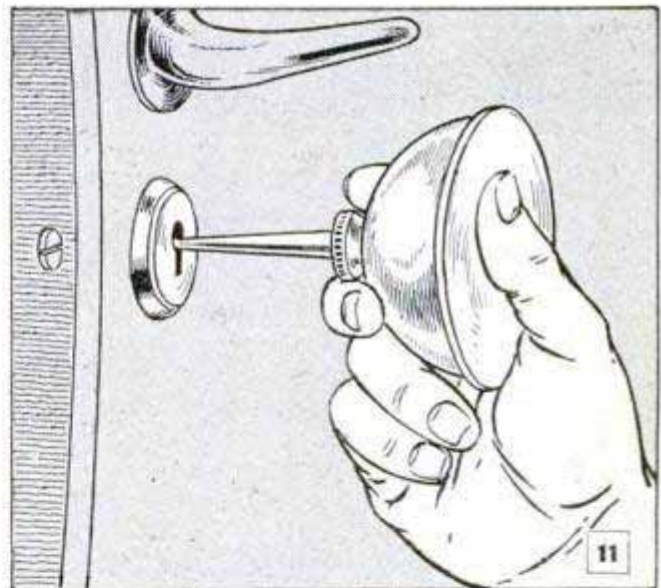
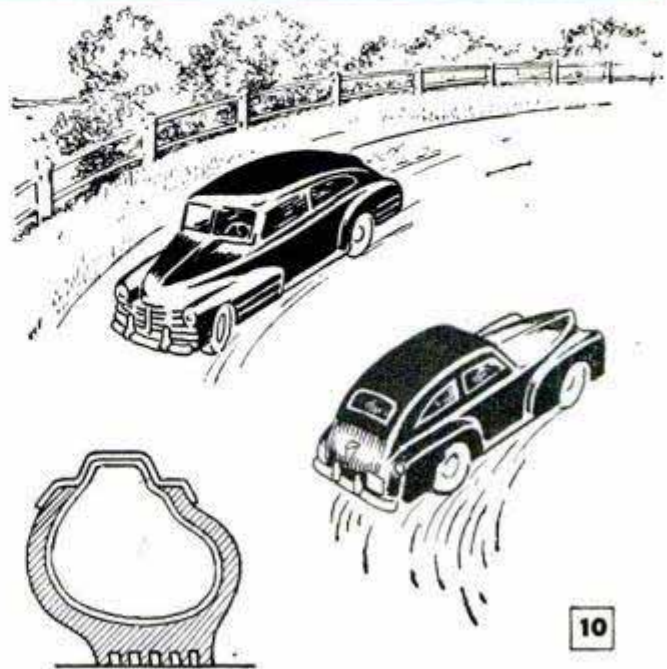
may indicate a blown head gasket, Fig. 6. Immediate and costly damage can result if the gasket blows between the cylinders as shown. Water or antifreeze will leak past the pistons into the crankcase and develop an emulsion which can damage bearing surfaces to such an extent that a costly overhaul will be necessary.

Shrilly squealing brakes are the advance warning of scored brake drums, Fig. 7. The first telltale squeal of protest does not mean that a drum is already scored, of course, but the thing to remember is that while new linings or new shoes are comparatively inexpensive, it costs money to renew drums or have them turned down.

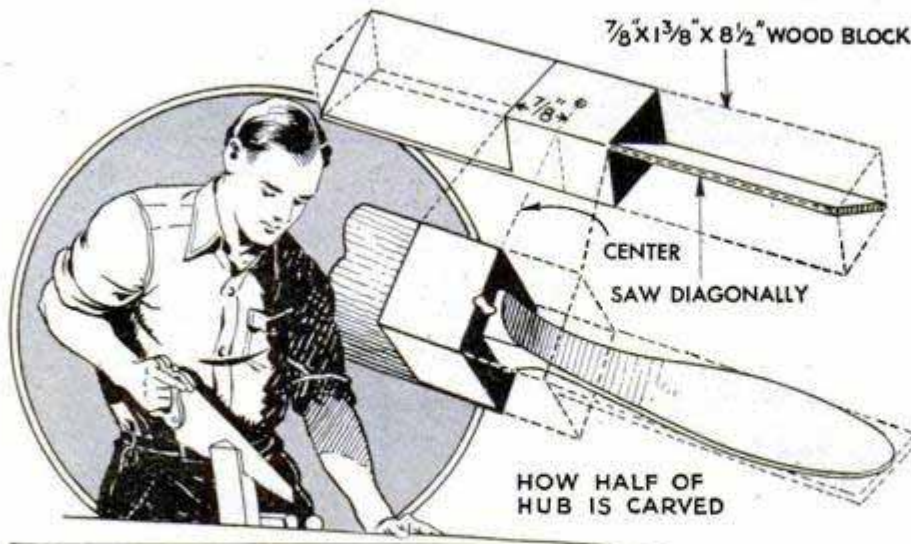
If you are driving on the highway at a good clip and suddenly hear a heavy, intermittent thudding sound, you have anywhere from 10 minutes to 10 seconds to stop before that tire lets go. Sometime prior to the blowout, the tire picked up a short nail or brad which passed through the tread and entered the fabric but did not puncture the tube, Fig. 9. Water and mud forced in through the opening soon rot and weaken the fabric, causing it eventually to bulge and then tear as a result of the air pressure. In most cases of this kind, the driver gets only a few seconds warning before the blowout occurs. If the treads of the tires are examined occasionally, it is possible to detect small nails, tacks or pieces of glass that have been picked up on the road and have become embedded in the rubber. Tires that "talk" on a turn are telling the driver that he's either going too fast for the radius of the turn, operating with insufficient air pressure, or that the wheels are slightly out of line. If you're lucky, you'll hear only the noise, but it's well to remember that squealing tires sometimes precede a dangerous skid, Fig. 10.

The hard, sharp rap of engine detonation, or compression ignition, is very destructive to vital engine parts. Ease off on the throttle the instant you hear it and, if it persists, switch to a higher grade of fuel. In some engines, retarding the spark timing slightly will correct the condition.

Door locks that squeak and are hard to operate will be helped by an application of benzene, Fig. 11. This will wash away the dust and grime and a few "whiffs" of dry graphite from a special applicator, Fig. 12, will make the lock work like new.



Roughing Out Pitch of Blades With Handsaw Simplifies Carving Model-Airplane Propeller



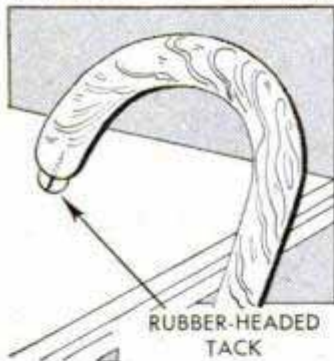
Before carving a two-bladed propeller for a model airplane, I first saw the block on each side, as indicated, leaving stock for the blade diagonally between opposite corners of the block. This roughs out the blades and insures that the pitch of both of them will be identical. After cutting away the waste stock, I carve the blades and hub to shape. The proportion of the width of the block to its thickness determines the pitch of the propeller blades.—Russell Thomas, Jr., Plaistow, N. H.

Inverted Mixing Bowl Forms Sturdy Base to Prevent Tipping Varnish Can

When varnishing a floor, the can of varnish is less likely to be accidentally upset if it is fastened to the bottom of an inverted bowl. A large mixing bowl will provide a wide base which is easily slid along the floor. Use pieces of adhesive tape to attach the can to the bowl.

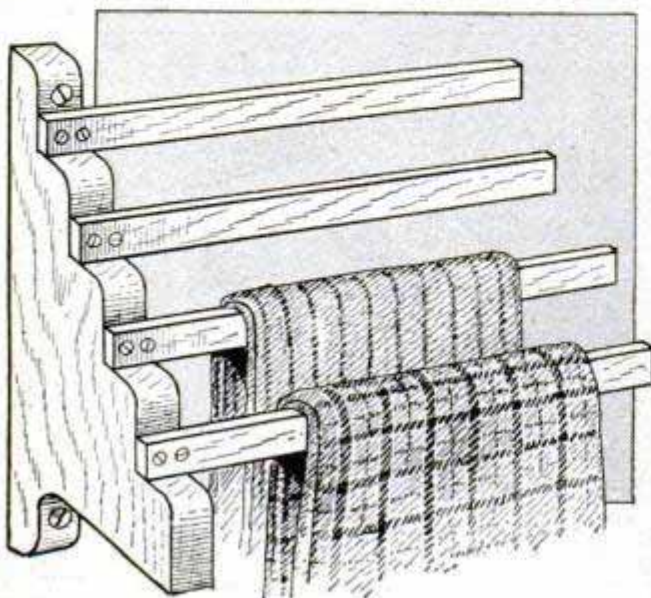


Rubber Tip for Cane Handle



A rubber-headed tack provides a nonslip tip for the crook handle of a cane or umbrella. When the tip is in place, the handle will not tend to slip off the edge of a counter or window sill.

Trouser Hanger Mounted on Closet Wall Saves Much Time and Trouble

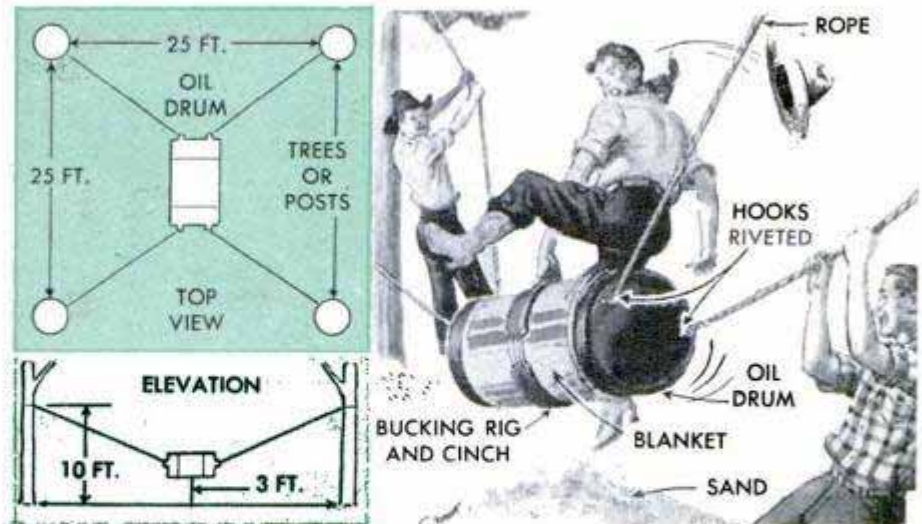


Instead of taking time to thread trousers through a conventional clothes hanger and then having to search for them when they are needed, you can keep four or more pairs of them ready for immediate selection on this convenient wall hanger. It consists of a wall bracket sawed from solid stock in a series of steps with a strip arm screwed to each step. Flat-headed screws, countersunk, are used throughout and the rack can be painted or stained to match the woodwork or other fixtures in the closet.

☐ To keep worms lively in the hottest weather, pack them in damp florists' moss in a clay flowerpot. For transporting long distances, wrap the pot in damp newspapers and cover with moist burlap.

Suspended between four posts or trees with lengths of rope, an empty oil drum provides a realistic imitation of a bucking bronco. The drum is fitted with a saddle blanket and a bucking rig is cinched tightly around it. Two or more people control the roughness of the ride by pulling and pushing on the ropes. Four hooks for attaching the ropes are welded or riveted to the ends of the drum, and the other ends of the ropes are fastened to the trees or posts about 10 ft. from the ground. To simplify setting up the outfit, hooks can be attached permanently to the posts with wire cable. The loops at both ends of the rope should be reinforced with metal thimbles to minimize wear. The ropes are adjusted to hold the drum about 3 ft. above the ground. A pile of sand or a gymnasium pad placed directly under the

Bucking Bronco Simulated by Oil Drum Suspended With Rope Between Posts



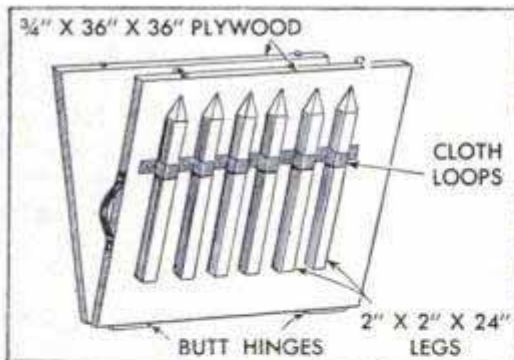
drum will cushion falls. If the hooks are welded to the drum and it has recently contained gasoline or other volatile liquids, remember first to fill it completely with water to prevent ignition of the fumes or, if possible, have the drum steam-cleaned.
Doreen Foote, Long Beach, Calif.

Compact Portable Picnic Table Folds to Suitable Size for Carrying in Car

Hinged at the center and its legs stored on the side of one panel for compactness, this 3 x 6-ft. picnic table, when folded, takes up little more room than a card table. It's a convenient size for carrying in either the trunk or the back seat of the car. The

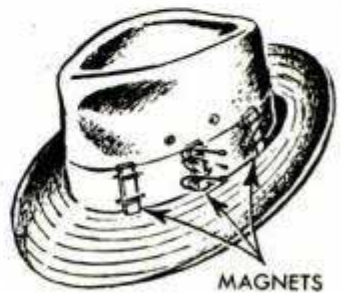
table consists of two plywood panels joined with two butt hinges set flush with the top surface so that the hinge joints are on the upper side when the table is open. A leather or canvas handle is attached to the edge of one panel to facilitate carrying. Hooks and eyes turned into the ends of the table lock it in the folded position. The legs, made from lengths of 2 x 2, are pointed at one end for easy driving into the ground. A strip of heavy cloth or canvas is tacked to the underside of one panel to form loops through which the legs are inserted for storage. When setting up the table, use the opened top to position the legs and drive two of them into the ground at each end and two at the joint.

M. K. Voedisch, Rockford, Ill.



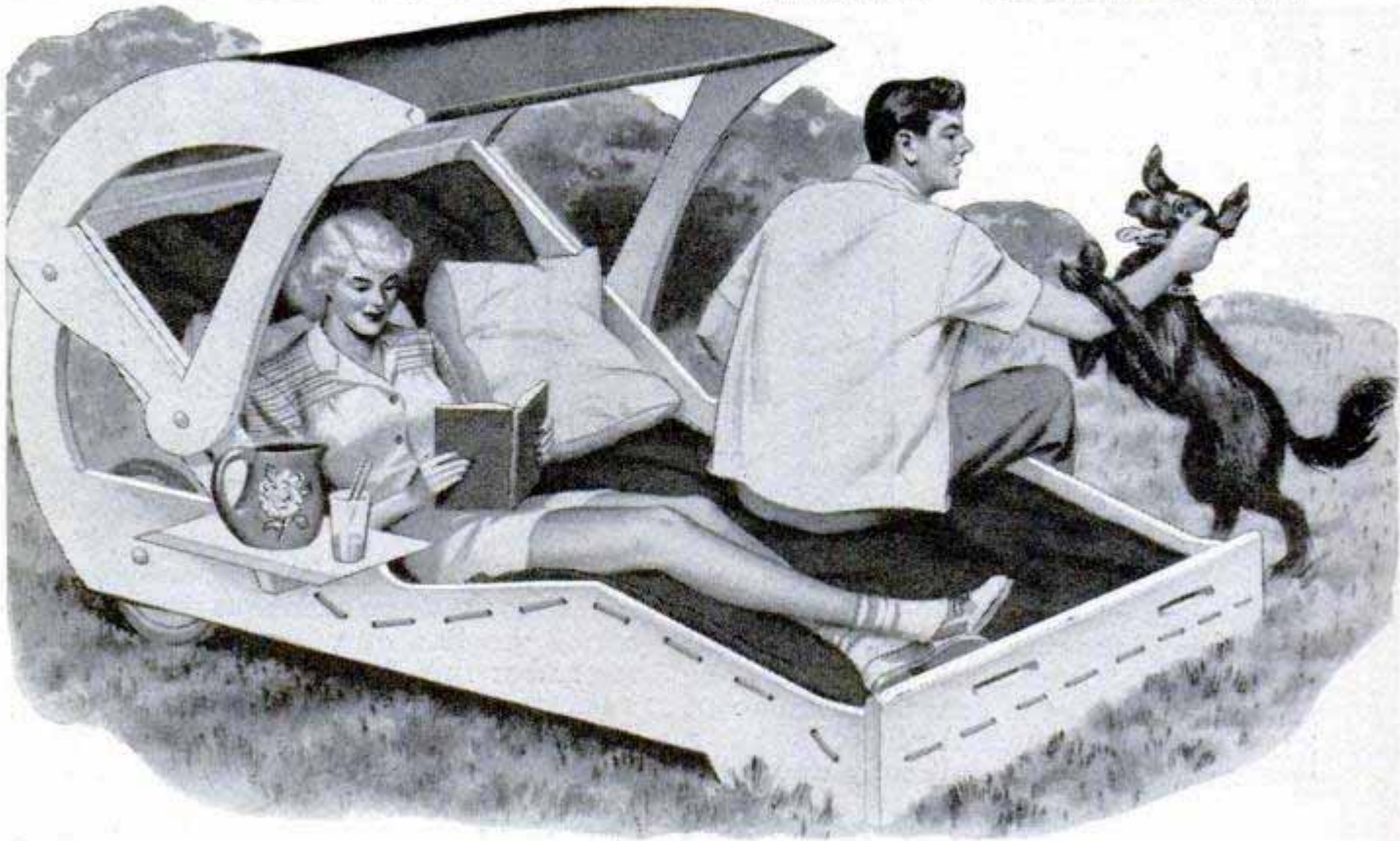
U.S. '57 Magnets Hold Fishhooks on Hatband

Attached to a hatband, two or three small magnets will hold several fishhooks within easy reach. The magnets are fastened with strong thread.



Ⓜ To prevent wax paper from slipping when rolling dough, moisten the table top before placing the paper on it.

TAKE IT EASY IN THIS GARDEN



By Tom L. Johnson

DESIGNED for lazy days in the shade, this big, comfortable garden lounge can be rolled where you want it like a wheelbarrow. In addition to being portable, the lounge features a sun hood, wide arms to serve as trays for refreshments, and a comfortable rope spring.

Only 28 pieces are required to build it, many of them being duplicate parts which can be sawed two at a time. The curved parts required for the hood are detailed in Fig. 1. These are keyed with the drawing, Fig. 3, to show where each part goes. Full-size patterns of the parts are made by ruling 4-in. squares on paper and drawing in the contours to correspond with the outlines given. A duplicate is required of each of the four parts, and also of the side rail of the chassis. A bandsaw is ideal for cutting the parts, especially the 2-in. stock. However, in the case of 1-in. stock (actually $\frac{3}{4}$ in. thick), the parts can be cut two at a time with a jigsaw. Note in Fig. 2 that pieces B and C are dovetail-notched to receive the three hood ribs. A fourth rib or nosepiece, around which the top covering is drawn and tacked, is shaped from $1\frac{1}{2}$ -in.-square stock as shown and fastened across the front.

The chassis is made of 2-in. material (actually $1\frac{1}{2}$ in. thick). While the pattern for the side rail is shown a full 8 in. wide,

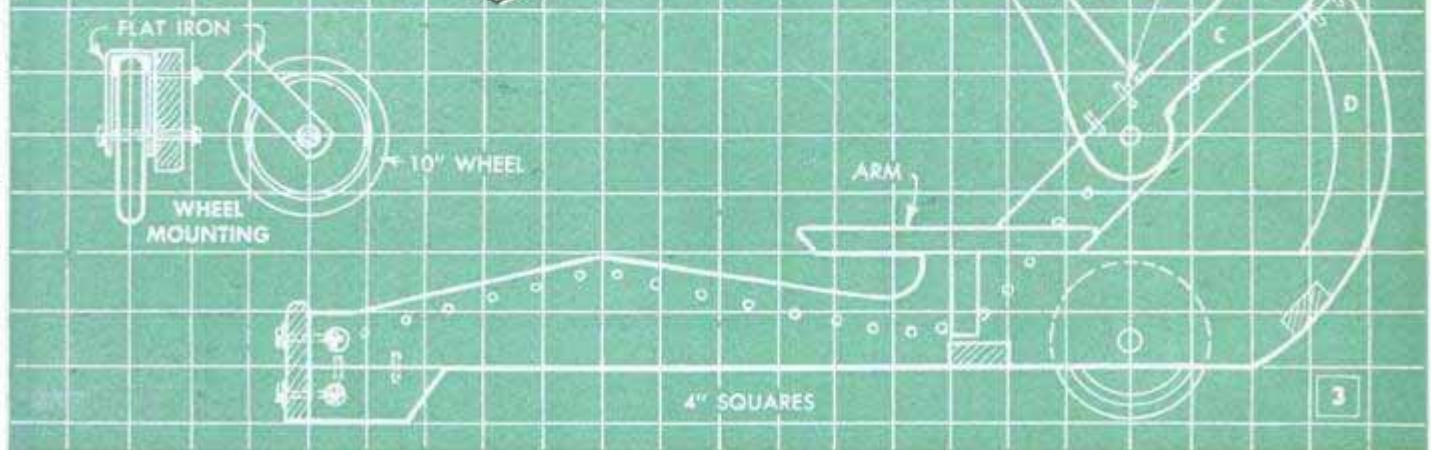
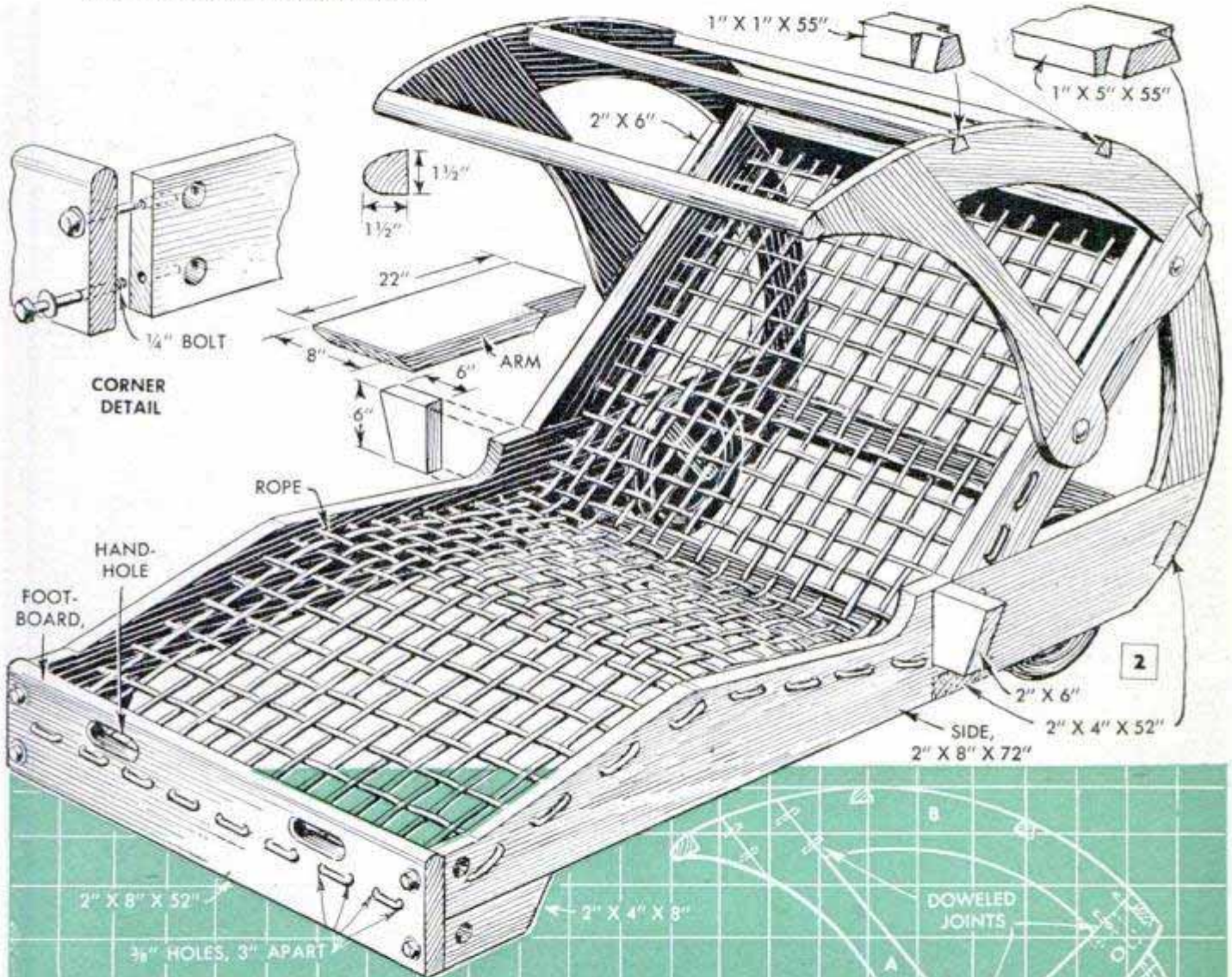
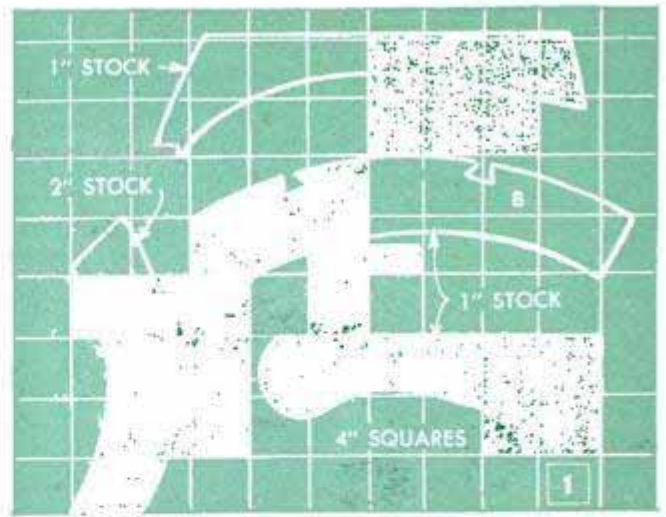
Fig. 3, a 2 x 8 plank can be used for this by narrowing the pattern slightly. The front ends of the rails are built up with 8-in. blocks of 2 x 4, doweled and glued with waterproof glue. The footboard of the chassis is bolted to the sides like a bed rail, which permits tightening the framework to take up wear. The pull-apart detail in Fig. 2 shows how $\frac{1}{4}$ -in. bolt holes are bored into the ends of the side rails to meet larger holes bored at right angles. The larger ones are for the nuts of the bolts. Hand-holes are cut in the footboard, the top edge is rounded, and then notches are cut in the side rails to receive 2 x 4 stretchers which are fitted flush and attached with lag bolts. The slanting back rest of the lounge is made of 2 x 6 stock. One end of each side member is cut at the angle indicated in Fig. 3 and the opposite end is cut off squarely and screwed to the ends of a 2 x 6 crossrail. Pieces D are doweled and glued to the slanting members and then the whole back rest is doweled to the chassis.

If a drill press is available, the holes for the rope can be drilled before the parts are assembled, or afterwards, if a brace and bit are used. Heavy sash cord or braided-cable clothesline is used to weave the spring. This is laced from side rail to side rail and then lengthwise over and under the alternate strands. When the spring is completed, the hood is bolted to the back rest and the top is covered with colorful awn-

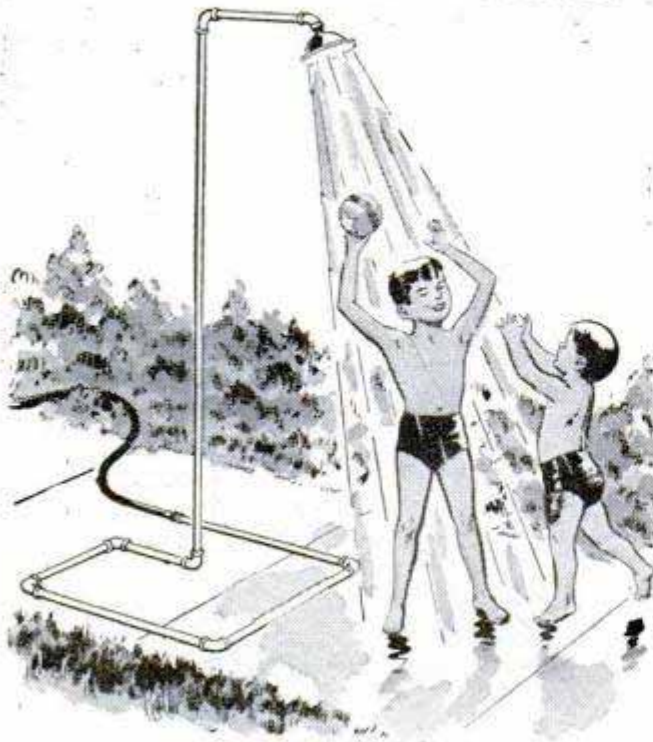
LOUNGE



ing material. Standard 10-in. rubber-tired disk wheels are attached to the chassis with flat-iron brackets as shown. Wooden wheels cut from 2-in. stock can be used if desired. The tray-type arms are notched to fit around the side members of the back rest and are supported by blocks cut from 2 x 6 stock. All wooden parts of the lounge are coated with linseed oil and then painted white. Two standard cotton-filled mattress pads measuring 27 x 72 in. were used to provide a soft cushion.



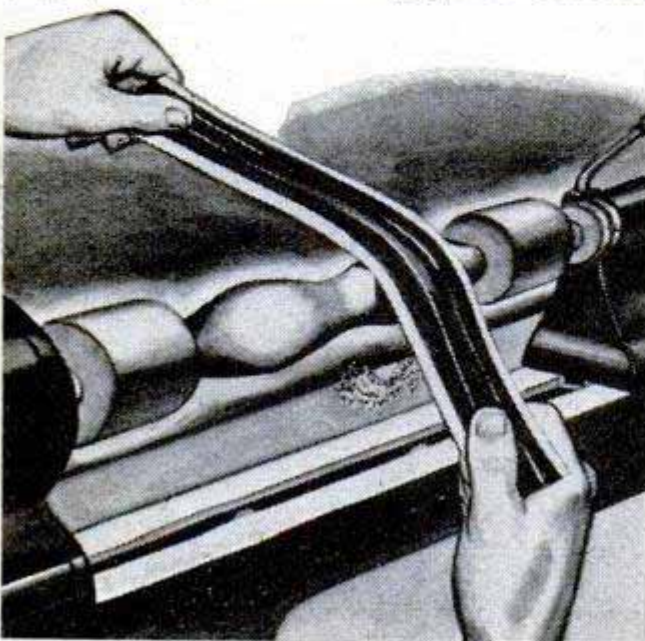
Bring the Beach to Your Back Yard With This Portable Lawn Shower



Your youngsters will look forward to sweltering summer days if they can cool off under this portable lawn shower. Supplied with water by a garden hose and made from standard pipe and fittings, it is easy to set up and take apart for storage. A little pipe compound, applied to the threads of the permanent joints, will prevent leaks.

Tape Backing on Sandpaper Strips Aids Sanding Lathe Turnings

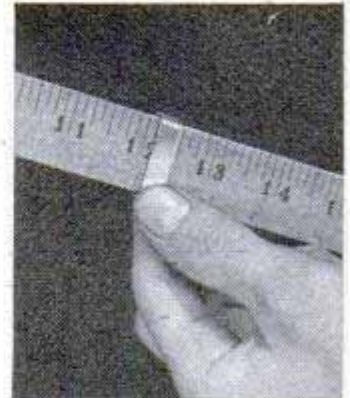
When regular sandpaper is used in strips to sand lathe turnings, it will last longer if it is backed with several strips of friction tape. In addition to permitting application of greater pressure without tearing the paper, the tape allows the paper to conform



to the contours of the turning without buckling. The tape strips should be the same length as the sandpaper and enough of them should be used to cover almost the entire width of the paper.

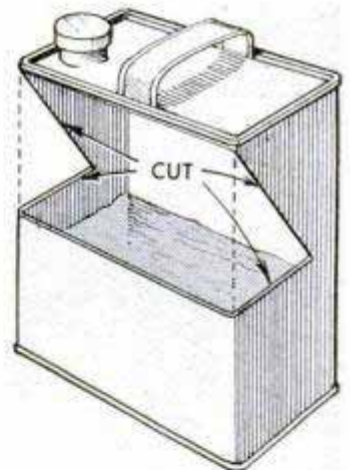
Sliding Marker Improves Rule

Transferring measurements with a yardstick is facilitated by fitting a sliding marker to the rule. The marker, made by bending a small piece of sheet metal around the yardstick, should slide readily but also should be tight enough to remain in position. Before bending the sheet metal, file all edges smooth to keep them from scratching the rule or causing the marker to snag.



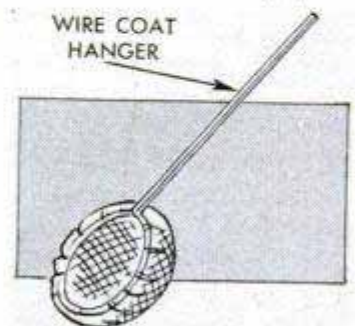
Novel Paint Can Is Dirtproof

If foreign matter is likely to fall into an open can of paint, pour the paint into a motor-oil can which has been cut away as shown. The top of the can serves as a canopy to protect the paint, and the brush can be dipped from the side, the straight side of the can being ideal for wiping the brush. The sharp edges of the can should be dulled with a file.—John D. Billings, Manset, Me.

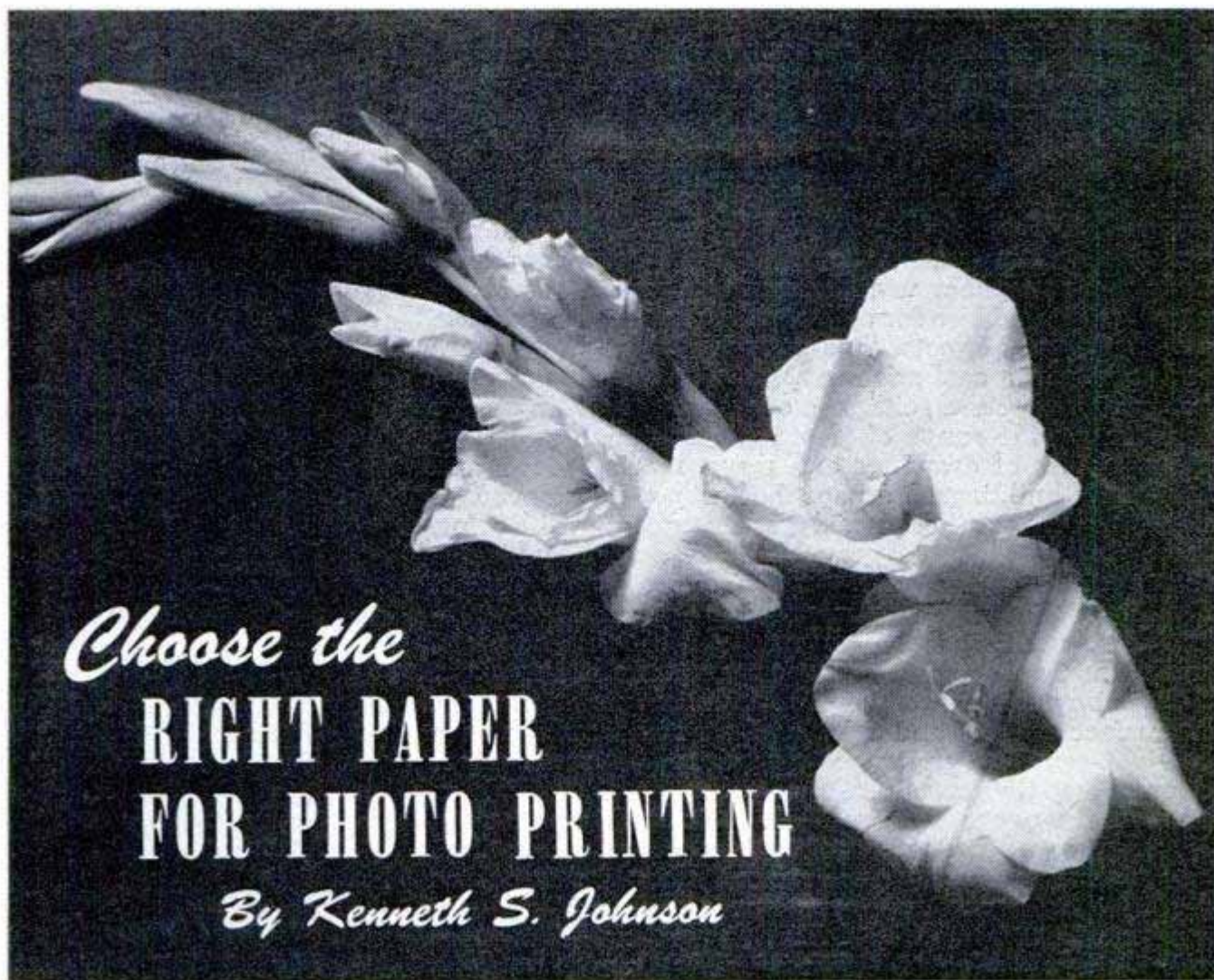


Coat Hanger Forms Minnow Dipper

Instead of trying to scoop those evasive minnows from a bucket with your hands, save time by dipping them out with this handy net. It consists of a wire coat hanger, which is straightened and bent to form a hoop at one end, and a circular piece of plastic screen mesh sewed to the wire hoop. Make the dipper small enough to fit in the tackle box.



M. B. Birge, Hinsdale, Ill.



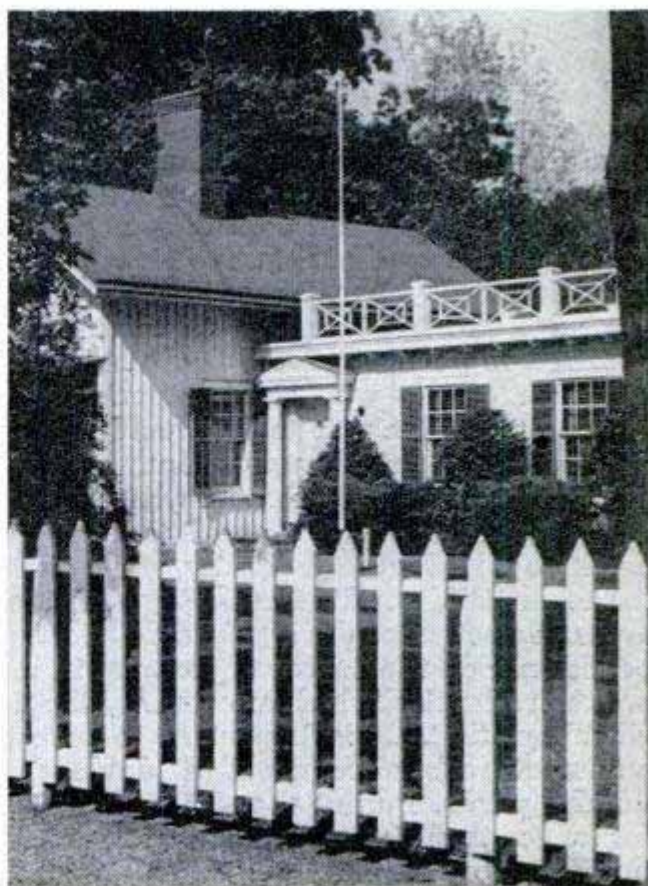
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FOR PHOTO PRINTING

By Kenneth S. Johnson

BY CHOOSING a printing paper to fit the subject, you can make those vacation pictures into something more than just a snapshot record of the trip. Moreover, that once-in-a-lifetime shot you took may yield a negative so thin and flat that it looks hopeless, but there are printing papers available which will get the most from such a negative. When printing from certain negatives, especially those vacation record shots, you will want to picture the soft warmth of the afternoon sun on a landscape, re-create in the print the weathered texture of unpainted wood. You may wish to subdue detail and bring out a fairly bold rendering of light and shadow, as in informal portraits or character studies. There also are papers that will capture the cold brilliance of moonlight on water, emphasize minute detail in some texture or pattern and record delicate high light and shadow on almost any picture subject.

The structure of the paper and the type of surface determine its ability to emphasize or subdue fine detail in a negative. Subjects which are attractive because of minute detail or pattern ordinarily are printed on glossy paper and dried to a high gloss on ferrotype tins. Somewhat less detail will be brought out in a print made on

Above, flower negatives having deep blacks and gray tones print well on medium-hard papers. Below, here special emphasis is placed on architectural detail



glossy paper, unferrotyped. Printing papers with a velvet, pebbled or eggshell surface absorb increasing amounts of detail in the order named. The velvet, or matte papers, are suited for character studies of elderly persons, landscapes of a pastoral composition and certain distant seascapes where mass and not detail is the desired feature of the print. Papers having either a pebbled or eggshell surface subdue detail to an even greater degree; yet they give the print much of the quality of brightness of the glossy paper. Many photographers use these rough papers for character studies and also for detail shots where it is desirable to create special effects. The pure-white printing papers tend to impart a cool crispness, snap and sparkle to brilliantly lighted scenes, either in or out of doors. These are ideal for a wide range of photo subjects such as snowscapes, copies of drawings and maps, marine views and light-toned buildings. Perhaps the best papers for average all-around use are those toned a warm, cream-white color. These do not give the gray-black separation which is characteristic of the pure-white papers, but their soft blending of the image values is especially desirable in outdoor close-ups of people, certain types of still-life shots, sunlit landscapes and in some types of exhibition prints.

These physical properties of the various papers, that is, the surface texture and color of the stock, combine with the light-sensitive emulsion to produce the tonal values that make up the reproduction of the image. The emulsion speed of the paper is a rough guide to the image tone it will produce when developed in standard solutions. Fast papers usually give tones ranging from neutral to blue black, while the medium-speed papers give warmer blacks or slightly brownish blacks. Rich, brown-black tones are consistently possible only with the slow papers. For general work, the fast bromide papers give the brilliant blue blacks needed to picture effectively such subjects as flood-lighted buildings, light reflections on wet pavements and work pictures of machinery and other industrial subjects. The chlorobromide papers, ranging from medium to slow speed, give the warm tones needed in nearly all types of outdoor photography, in informal portraits of both young and older persons, and for printing exhibition pictures on a rough-surfaced paper.

In the series of prints reproduced at the right, note that by choosing the correct paper good prints can be made from flat, normal and contrasty negatives of the same subject. Each type of negative gives the best results only on one grade of paper. The prints reproduced on the opposite page are not intended to establish any rule to be followed in portrait procedure. They are merely representative of the way most experienced photographers would classify the results obtained from the various types and grades of printing papers commonly used. When classifying negatives to determine what printing paper to use, keep in mind that the over-all tone, or blackness, of the negative is its degree of density, while contrast refers only to the variation, or difference, between the light and dark areas. Selection of the right grade and type of paper depends only on the degree of contrast in the negative, and not on its density, which affects only the time of exposure when printing. It is important to follow carefully the manufacturer's recommended developing time when making prints. Pulling the prints too soon or forcing them for longer than the recommended time usually gives very unsatisfactory results.



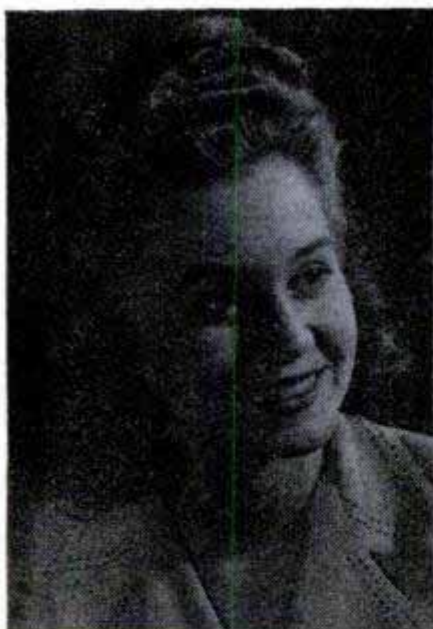
Flat, dense negative lacks contrast



Normal negative has right contrast



Hard, contrasty, with heavy tones



On soft paper, prints much too soft



Medium paper better, but still soft



On hard paper, it prints just right



Lacks contrast on most soft paper



On medium paper, comes just right



Hard paper emphasizes high light



Negative prints best on soft paper



It loses values on medium papers



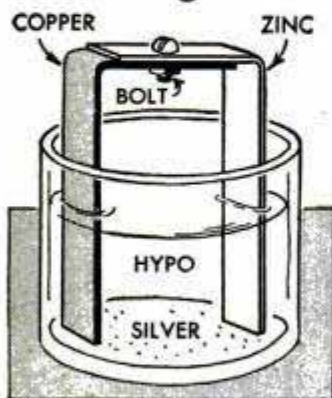
Blacks too heavy on hard papers

Extra Socket on Photo Reflector Adds Built-In Focusing Spot



When firing flash bulbs in a photoflood reflector, the bothersome job of having to remove a hot focusing bulb each time and then screw in a flash bulb when ready to shoot is eliminated when an extra socket is mounted on the reflector as shown. Wired separately from the reflector socket so it can be controlled independently, the extra socket permits a photoflood bulb to be left permanently on the reflector for focusing purposes. The extra socket also allows two photofloods to be used when greater light intensity is desired to overcome flatness. The wire from the extra socket can be spliced into the rubber-covered wire of the reflector.

Reclaiming Silver From Hypo



together as shown and placed in a glass jar containing the exhausted hypo. The metal strips provide an electrolytic cell in which the zinc from the electrode replaces the silver in the solution, the silver being pre-

cipitated. Adding a few drops of acid short-stop solution will speed the electrolytic action. At first, the solution will turn a dirty gray in color, but after a few days it will clear, the silver having settled to the bottom. The clear solution remaining on the top is poured off carefully and the rest is allowed to evaporate. The reclaimed silver will become an appreciable amount in a fairly short time.

Rubber Band Around Holder Indicates Unexposed Film

Although the sheaths of most film holders are marked to indicate when the holder is loaded, the markings on some make it difficult to tell without a close examination. In such cases, a rubber band stretched around the holder

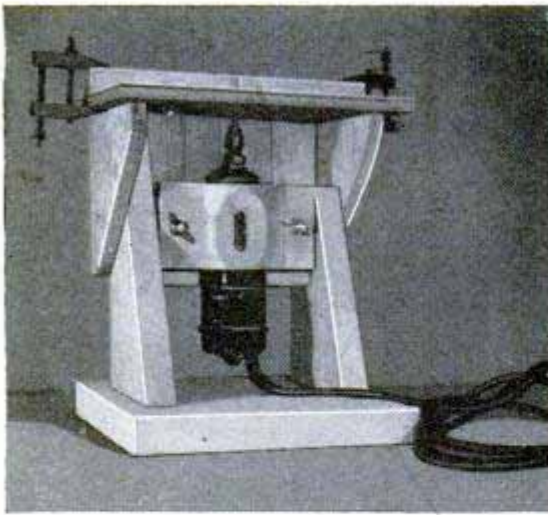


as shown will indicate a loaded holder at a glance. As the band must be removed to slip the holder in the camera and is not replaced thereafter, the absence of the band indicates immediately that the film has been exposed.

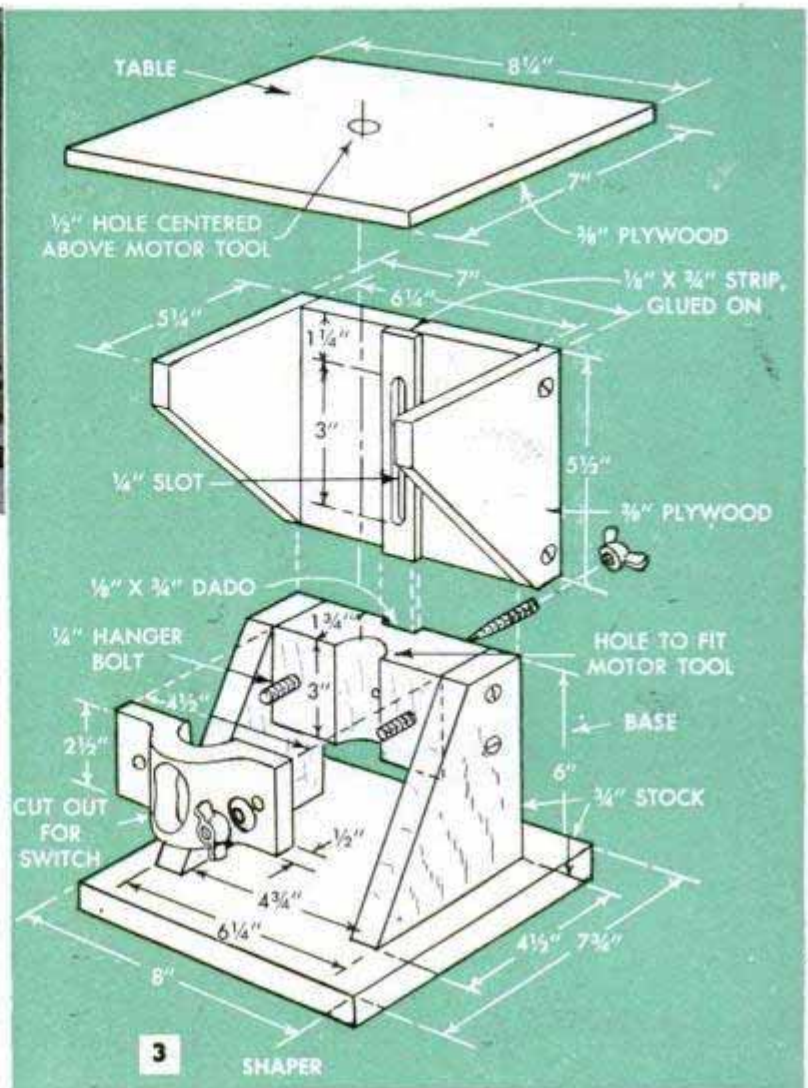
Stirring With Ice-Filled Test Tube Cools Developer Solution

If hot humid days play havoc with keeping developer solution cool, an ice-filled stirring rod will help maintain the proper temperature. Such a rod can be made by filling a test tube with ice and salt and capping the end with a rubber cork. Developer can be cooled by merely stirring it with the rod occasionally, or the rod can be left submerged in the liquid to bring the solution to the recommended temperature.



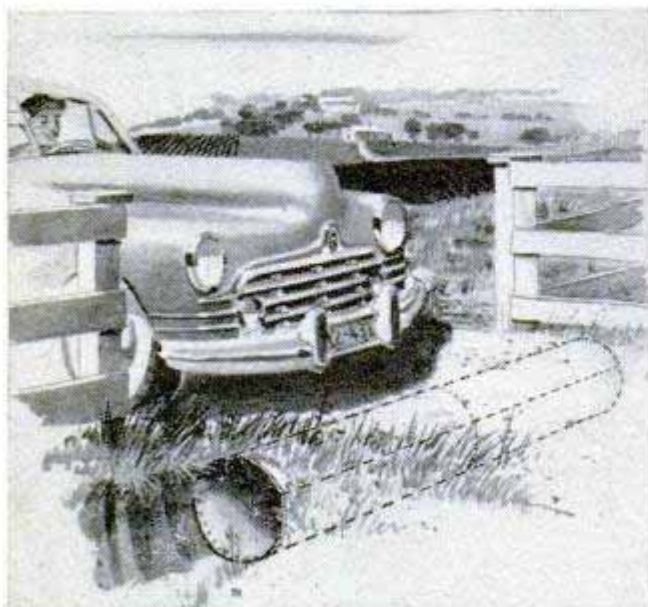


the headstock block first, cutting out the top cap, if necessary, to make the motor switch accessible. Then clamp the motor unit in place and carefully measure the distance from the top of the lathe bed to the center of the collet chuck. Use this measurement in locating the hole for the tailstock center. Be sure that the hole is centered laterally and drilled squarely through the tailstock base, as it is essential that the tailstock center be exactly aligned with the collet chuck to prevent binding and heating of the work. The tool rest is built up entirely of metal parts as dimensioned in Fig. 2. If the diameter of the stock to be turned is greater than the maximum capacity of the collet, it will be necessary to form a tenon on one end of the stock as in the lower detail, Fig. 1. The tenon should fit loosely in the chuck. The shaper, Fig. 3, consists of a base with a motor-unit clamp and a small plywood table attached to an



adjustable bracket. The up-and-down adjustment of the table permits changing the depth of cut. With the tiny shaping cutters available for hand grinders, you can cut many different molding shapes in miniature sizes suitable for scale-model homes, stagecoaches and other projects which require molded parts in small-scale sizes.

Hot-Water Tanks Buried Under Farm Lane Form Excellent Culvert



Placing two hot-water tanks end-to-end in a ditch provides a culvert for a farm lane that will last for years. Because of the smooth sides of the tanks, the culvert is free-flowing and easy to clean out. The ends of the tanks must be removed, and this can be done easily with a cutting torch.

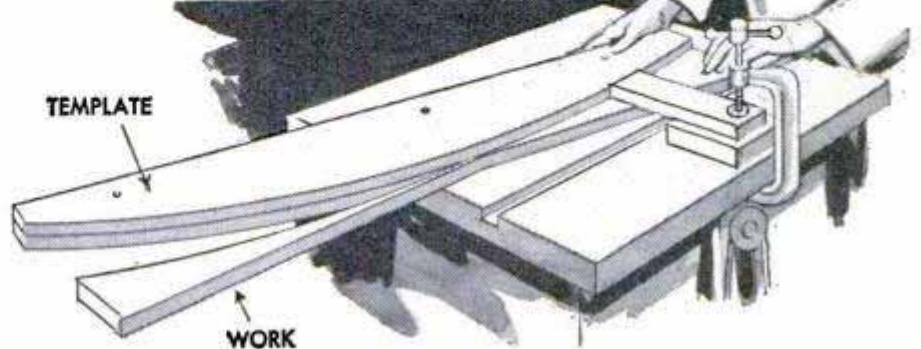
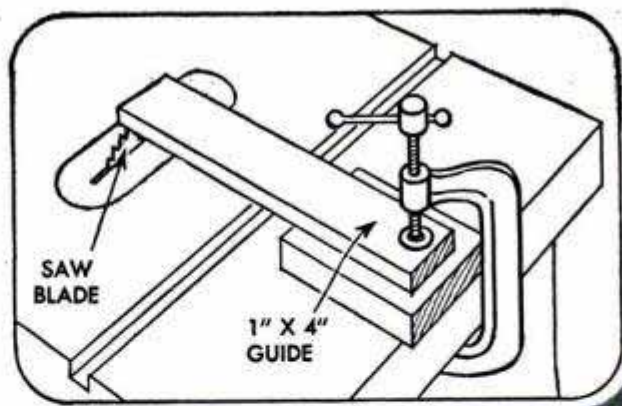
Chute Blinders Aid Loading Cattle

Observing that cattle are more reluctant to enter an open loading chute when they can see out through the sides, one truck driver in loading livestock for market drapes a tarpaulin over the slatted sides of the chute. The "blinders" keep the animals from being frightened by the height and they enter the chute willingly.

John Krill, North Lima, Ohio.

Curved Segments Pattern-Cut With Bench Saw

Pattern-sawing a sweeping curve in thin stock can be done quickly and accurately with a circular saw. The thickness of the blade determines the minimum radius that it is advisable to cut, and the teeth must have a wide set to prevent excessive heating and damage to the blade. The latter is raised to project only the thickness of the work, the right-hand face of the blade being flush with the end of a template guide which is clamped to the saw table on a line with the axis of the blade. A master pattern or template is tacked to the top of the work. Then both are fed slowly to the saw, keeping the template in contact with the overhanging guide. The work should be only slightly wider than the template to



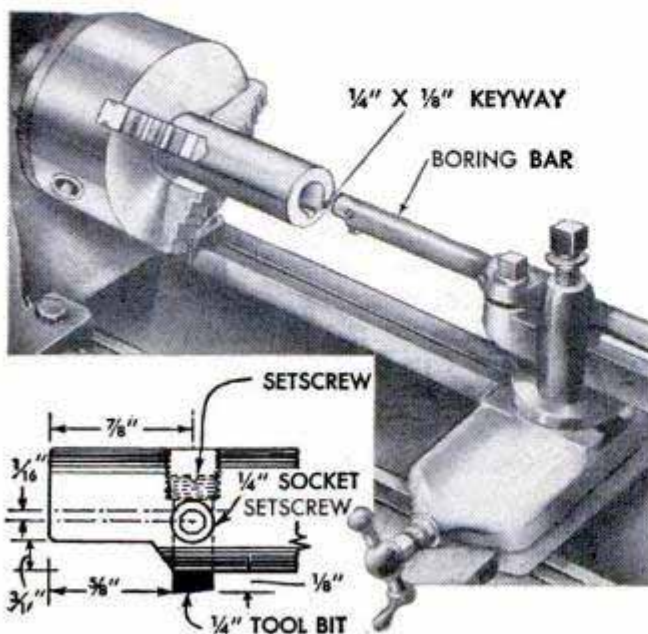
permit the waste to spring aside and open up the cut, thus easing the friction on the blade to prevent binding.

Metal Lathe Used as Shaper Forms Keyways in Bronze Bushings

Using the metal lathe as a shaper, one man found that he could cut accurate keyways in bronze sizing bushings by a simple adaptation of a discarded boring bar of the type held in a tool-post holder. The hole in the bar which takes the boring tool is counterbored and tapped for a headless setscrew. This setscrew provides for the necessary depth adjustment of the cutting tool. A second hole is drilled and tapped at right angles to the first to take a socket-headed setscrew, and a flat is milled on the forward

end of the bar to provide chip clearance ahead of the cutting tool. A short length of $\frac{1}{4}$ -in. tool-bit stock is ground with shaper-tool clearances on one end. The other end is squared. The tool is then locked in position in the holder with the socket-headed setscrew, and the headless setscrew is run down on the end of the tool to give depth adjustment. To set up for use, the bar is mounted in a boring-bar holder which is locked in the tool post. The work is centered in a 3-jaw chuck and the bar and cutting bit are positioned to take the first light cut. The tool is passed through the work by operating the lathe carriage with the hand feed, thus utilizing the carriage as a shaper ram. To cut the keyway to the required depth, several passes of the carriage are made, adjusting the tool bit for a slightly greater depth each time it is passed through the work.

Earl R. Goddard, Denver, Colo.

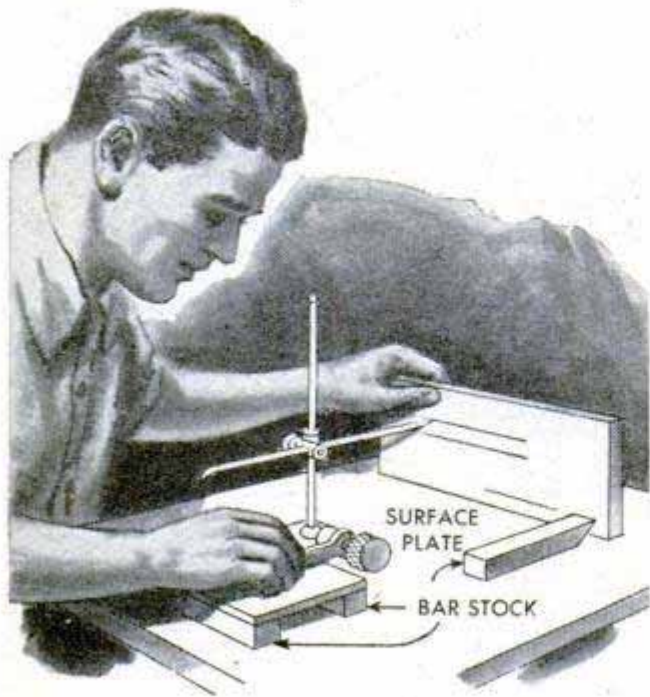


Cellophane Improves Stencils

Next time you hand-letter or draw on a duplicator stencil, try stretching a sheet of Cellophane over the stencil. Working on the Cellophane is easier than lettering directly on the stencil and results in clearer reproduction.

Louis Falcone, Hyattsville, Md.

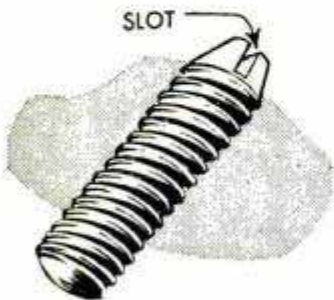
Handy Spacer Blocks of Bar Stock Save Time in Layout Work



When doing layout work, time spent in adjusting a surface gauge can be saved if several pieces of bar stock are kept handy to raise the base of the gauge a specific distance above the surface plate. For instance, if two parallel lines must be scribed, the surface gauge is adjusted and the bottom line scribed in the usual way. Then the gauge is set on two pieces of bar stock of the same thickness which raise it for scribing the upper line. By grinding a 45-deg. angle on one end of a length of bar stock, lines can be scribed the same distance above the surface plate as the thickness of the bar. This method also can be used as a substitute for a surface gauge by placing several bars one on top of the other to obtain the desired height.

Wm. McGinley, Waterloo, Iowa.

Cylinder-Head Guide Pins Made From Bolts



If you do not have a pair of standard guide pins to align a cylinder head when replacing it, you can make them from two bolts of the proper thread size. Cut the heads

from the bolts and taper and slot the head ends. In use, turn one guide pin into a bolt hole at the front of the block and another at the rear. After tightening several of the cylinder-head bolts sufficiently to hold the head in alignment, remove the pins and complete bolting the head in place. If the

tops of the guide pins do not extend above the cylinder head, they can be removed by using a magnetized screwdriver.

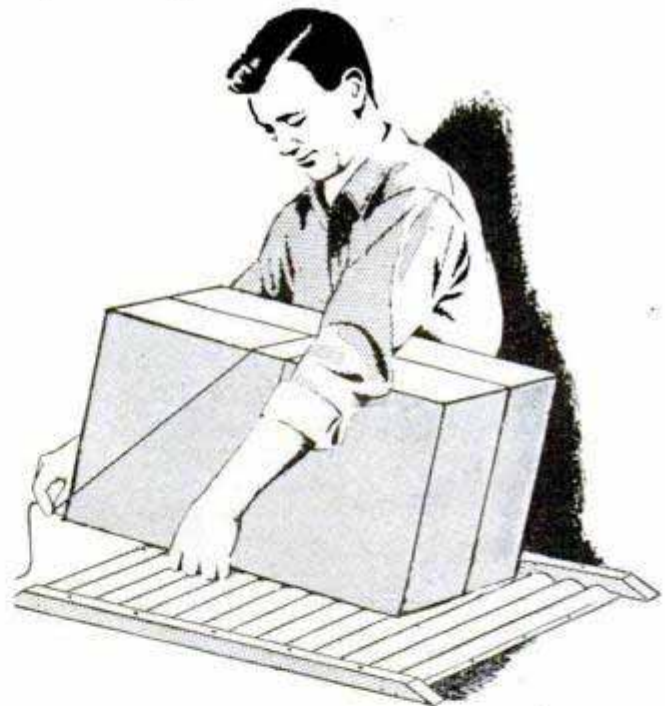
Circle Stamp for Shipping Tag Emphasizes Important Data

To call attention to specific information on shipping tags or to emphasize important data on identification tags, a rubber cap from an extension-cord plug can be used to stamp a circle of ink around the particular words



or numbers. These caps are readily available and require no alteration for this purpose.—G. E. Hendrickson, Argyle, Wis.

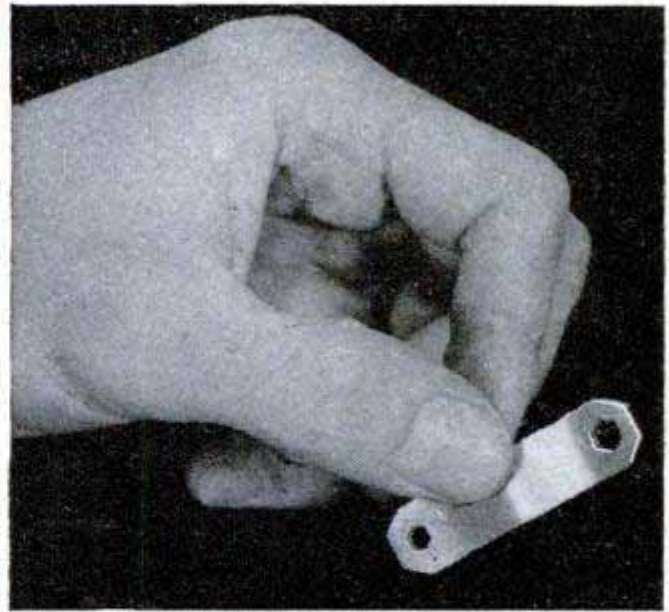
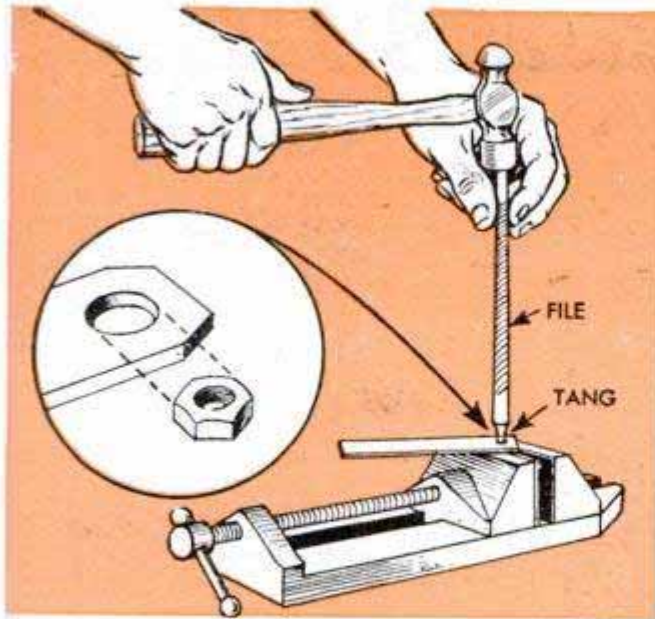
Wrapping Packages Facilitated By Corrugated-Metal Platform



Difficulty of picking up and turning heavy parcels for wrapping and tying on the shipping table may be overcome by tacking a sheet of corrugated metal to the table top. The corrugations in the metal make it easy to slip the fingers under the package when lifting it. To protect the fingers from the sharp edges of the sheet, tack a wooden strip along each side.

☐ When washing walls, start at the bottom and work up. In this way, drippings of the washing solution will run down the cleaned surface and not leave streaks.

File Tang Used to Make Box-End Wrenches



Repairing or adjusting clocks, radios and other home appliances often is delayed or completely halted for lack of a wrench small enough to fit tiny hexagon nuts. Next time you run into this trouble, take a strip of brass and make a box-end wrench to fit the particular nut. This can be done in a few minutes, simply by drilling a hole near one end of the strip and broaching it with the hexagon-shaped tang of a three-cornered file. To broach the hole, lay the strip across the open jaws of a vise and

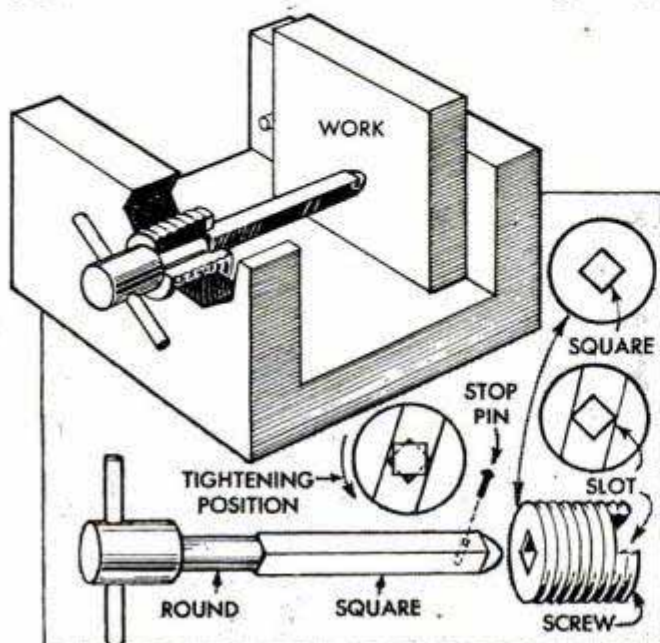
drive the file tang into the hole as shown above. Then file the corners of the strip at a 45-deg. angle to provide maximum clearance. Remember that the diameter of the hole drilled in the brass must be equal to the distance across the flats of the nut. Using sheet brass up to $\frac{1}{16}$ in. thick, wrenches can be made to fit nuts ranging from the smallest standard size to $\frac{1}{4}$ in. Double-end wrenches and a variety of similar tools for special jobs also can be formed in this manner.

Production Jig Setup Speeded With This Quick-Acting Clamp Screw

When certain types of repetitive work setups are made in the same jig or fixture, it's a waste of time to run a continuous-thread clamping screw in and out each time the work is changed. The clamp screw detailed can be fitted to a variety of clamping jigs, the action of the screw being very

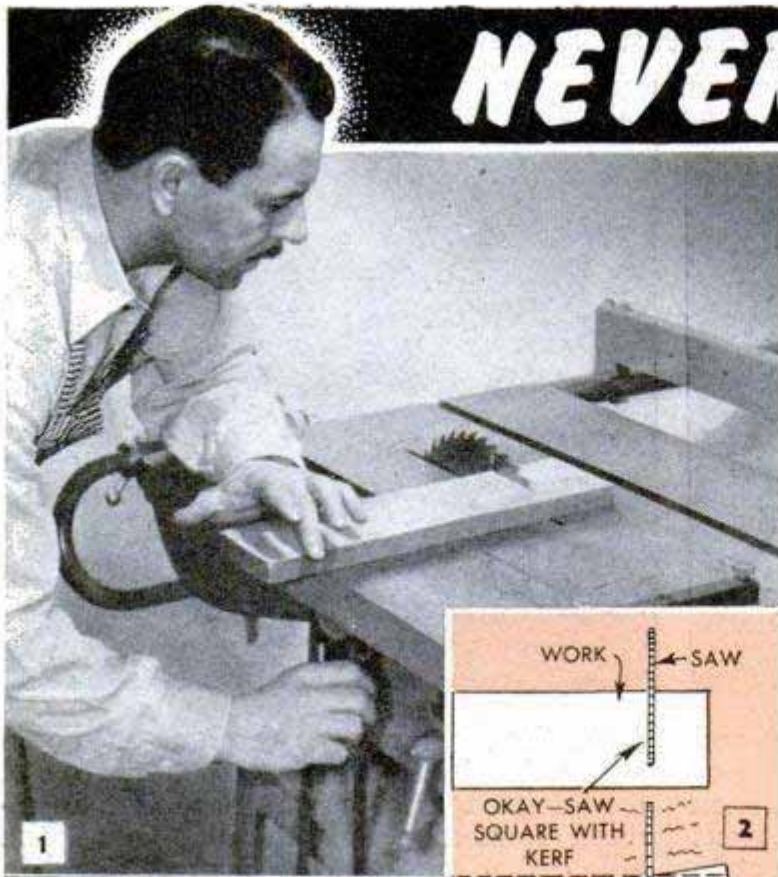
similar to that of the clamping screw on a quick-acting woodworker's vise. The screw consists of two parts—a clamping rod, or plunger, fitted with a turning handle, and a threaded sleeve. The squared section of the plunger passes through a square hole broached in the threaded sleeve, which turns into a tapped hole in the jig. The sleeve is slotted across one end, the width of the slot being equal to the corner-to-corner dimension of the squared hole measured at a slight angle with the diagonal, as in the end view showing the tightening position. In assembling the two-part screw, the plunger is inserted in the squared hole in the sleeve and a stop pin is driven into a hole drilled near the outer end of the plunger to prevent loss of the sleeve. Then the assembled clamping screw is turned into the tapped hole in the jig and the plunger is slid forward until its end contacts the work. A slight turn to the right locks it. To release the work, turn the handle to the left and withdraw the plunger. A few drops of light oil on the parts will keep them working freely.

H. Moore, Kirkstall, Leeds, England.



NEVER TRUST A

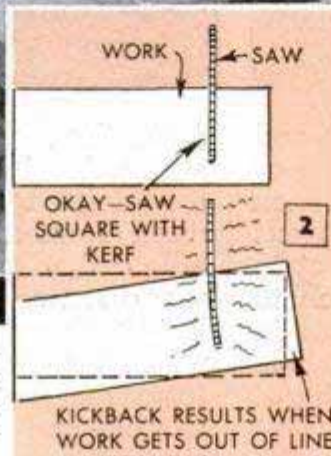
By Sam Brown



1

THE KICKBACK

KICKBACK ACTION CAN BE SHOWN BY SAWING A BOARD AND THEN SPINNING SAW BY HAND WITH BELT WHILE TWISTING WORK UNTIL BLADE KICKS WORK FREE



2

KICKBACK RESULTS WHEN WORK GETS OUT OF LINE

THE OPERATOR who acquires the habit of never relaxing vigilance while using a circular saw rarely suffers a serious injury. The machine seldom is at fault mechanically. It's that moment of inattention during an operation calling for the use of ordinary precautions that can cost you a finger or result in a less serious but painful injury. Most of the common operations are so simple and the work is done so quickly and easily that there frequently is a tendency for the operator to become a little careless in observing ordinary precautions. Simple know-how will eliminate or greatly minimize the hazards of the more tricky operations, such as running moldings and certain angle cuts. Late-model machines are provided with protective guards designed to cover the saw blade completely during nearly all the common



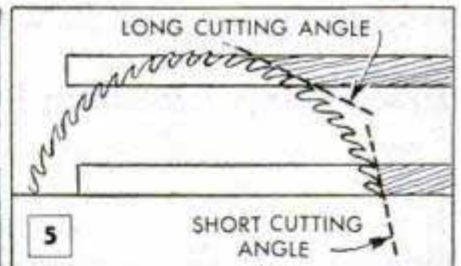
3

LENGTH OF SAW IN KERF



4

LENGTH OF SAW IN KERF



5

SHORT CUTTING ANGLE

SAW PROJECTION—low blade, although faulty mechanically, is safest

AVOID SCANT AND EXTREME PROJECTIONS—THE SAW SHOULD ALWAYS BE $\frac{1}{4}$ TO $\frac{1}{2}$ IN. ABOVE SURFACE OF WORK

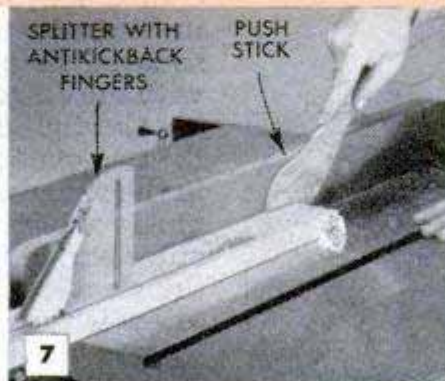
HIGH BLADE PUTS TOO MUCH OF THE SAW AREA IN THE KERF WHICH IS APT TO CAUSE KICKBACK OF THE WORK

HIGH BLADE POSITION CUTS WITH THE LEAST POWER AND DOES CLEAN CUTOFF WORK WITHOUT FEATHERING

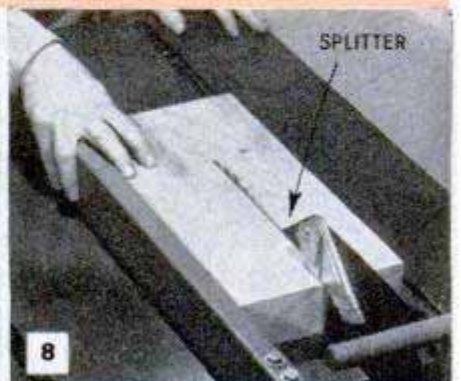


6

NOT LESS THAN 2"



7



8

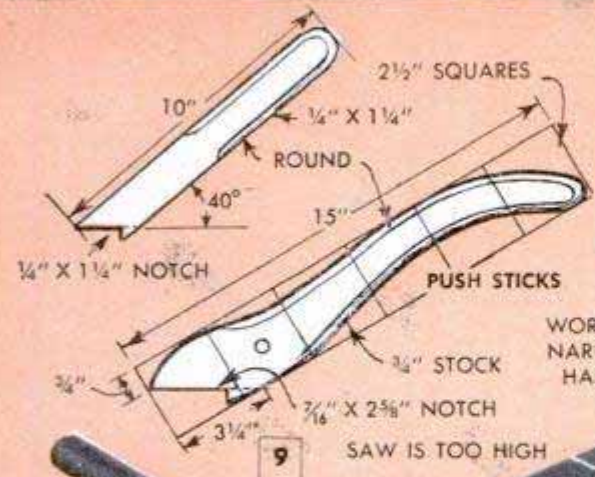
RIPPING FEED—splitter plus push stick is best system for narrow work

HAND ALONE CAN BE USED FOR FEED IF DISTANCE BETWEEN BLADE AND FENCE IS AT LEAST 2 IN. NOTE HOW FINGER IS ANCHORED OVER FENCE

PUSH STICK IS ALWAYS USED WHEN RIPPING NARROW STRIPS. AT END OF CUT, LEFT HAND IS REMOVED AND WORK FED WITH RIGHT HAND ONLY

A SPLITTER WITH ANTIKICKBACK FINGERS IS THE BEST PROTECTIVE DEVICE FOR ANY SAW. ALWAYS USE THE SPLITTER WHEN RIPPING WORK

CIRCULAR SAW



LONG SAW KERF
OFTEN CLOSES AND
BINDS BLADE

NO SUPPORT AT
END OF WORK

LOOSELY ROLLED
SLEEVES ARE AL-
WAYS DANGEROUS

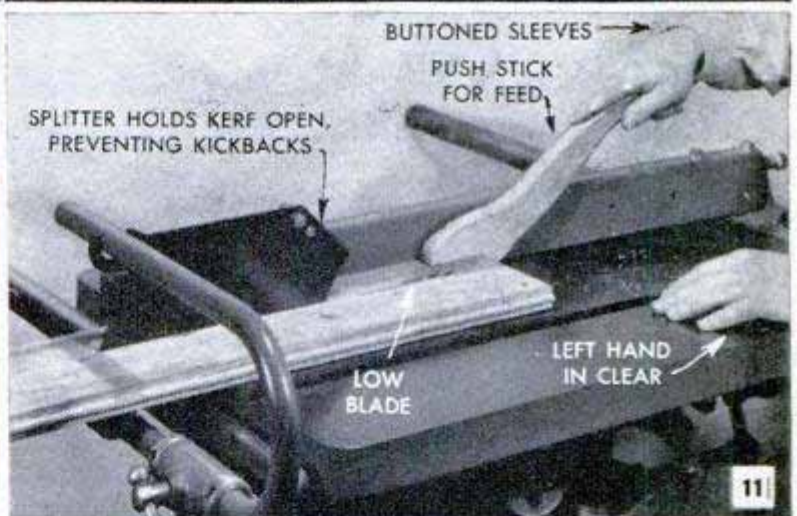
WORK IS TOO
NARROW FOR
HAND FEED

SAW IS TOO HIGH

LEFT HAND SHOULD NOT
BE USED FOR FEEDING
WORK AT END OF CUT

10

RIPPING FEED—six ways to take chances



RIPPING FEED—safest way to feed work

THE LITTLE CHANCES WHICH MANY CRAFTSMEN TAKE ARE SHOWN IN TOP PHOTO. PICTURE AT RIGHT IS PREFERABLE TECHNIQUE. LEFT HAND IS USED FOR FEED AT START OF CUT BUT IS REMOVED WHEN CUT IS NEARLY COMPLETE. THE LEFT-HAND PIECE OF WORK REMAINS ON TABLE AND CAN BE GENTLY TOUCHED WITH PUSH STICK IF IT SHOWS A SMALL UNCUT SECTION AT EXTREME END OF CUT. OUTFEED TABLE IS NECESSARY FOR LONG WORK, OR, WORKER CAN USE PULL-THROUGH TECHNIQUE

operations, such as ripping or crosscutting.

The kickback: This can be dangerous. You get a graphic idea of what happens by making the simple test shown in Fig. 1 and also detailed in Fig. 2. If the work is placed in any position on the table where it may bind suddenly while the cut is being made, the kickback results. In some cases, the stock may be caught by the blade and thrown with great force. Most circular saws are now fitted with a special guard having a built-in device, Fig. 8, which is effective in preventing kickback. The guard also includes a splitter which prevents the saw cut closing immediately behind the blade and causing it to bind. These fittings should be in place when the ma-

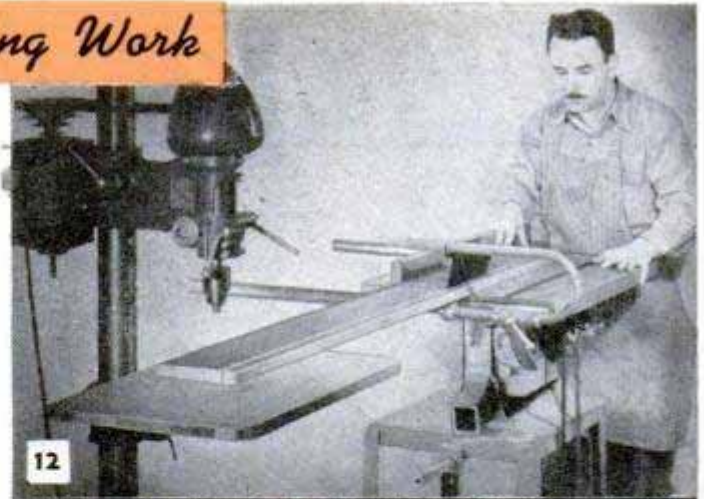
chine is used for ripping and crosscutting operations. In all the accompanying photos, the guard has been omitted for purposes of clarity.

Saw-blade projection: Saw operators do not observe any definite rule about this. The blade will cut equally well, whether it is lowered so that the teeth just clear the top surface of the work as in Figs. 3 and 6, or raised to the full height as in Figs. 4 and 5. With the blade in the lower position, more power will be required and also slightly more feeding pressure on some types of work. Where the blade guard is not used, the lower position is safer.

Ripping feed: Two things to watch especially when making ripping cuts are the

Two Good Ways to Rip Long Work

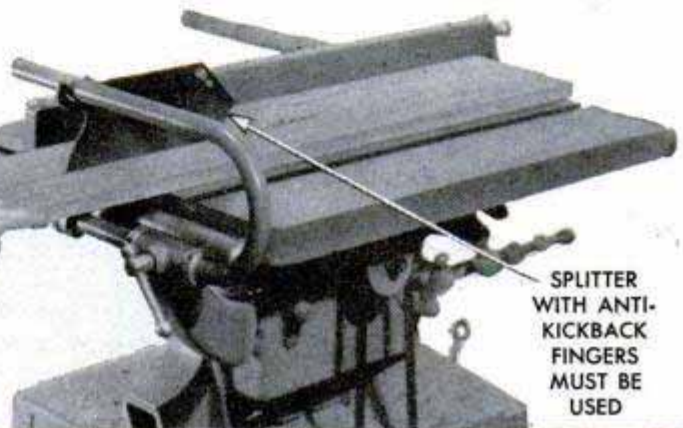
OUTFEED-TABLE METHOD, SHOWN AT RIGHT, IS PRACTICAL BUT OFTEN A BOTHER TO SET UP. THE BEST WAY OF HANDLING ANY WORK OVER 30 IN. LONG IS THE PULL-THROUGH, AS SHOWN IN THE PHOTO BELOW



12
DRILL PRESS SERVES AS OUTFEED TABLE TO SUPPORT SAWED END OF WORK FOR SAFELY RIPPING LONG STOCK



13



SPLITTER WITH ANTI-KICKBACK FINGERS MUST BE USED

PULL-THROUGH METHOD IS SAFE AND SIMPLE — PREFERRED BY MOST CRAFTSMAN FOR RIPPING LONG STOCK



14

USE AN AUXILIARY FENCE WHEN CROSSCUTTING LONG STOCK. USE BOTH HANDS FOR FEEDING WORK

danger of the blade binding due to closing of the saw cut or kerf, and the possibility of the blade lifting a splinter as it passes through the stock. If a splitter is used, the danger of binding is taken care of, but watch out for a splinter that lifts suddenly above the blade. Where the width of the stock between the fence and the blade is too narrow for safe hand feeding, use the push sticks, Figs. 7, 9 and 11. There is nothing wrong technically with the ripping procedure illustrated in Fig. 10 but the notes outline the added precautions to be taken, especially as the blade nears the end of cut. Fig. 11 pictures the safest procedure.

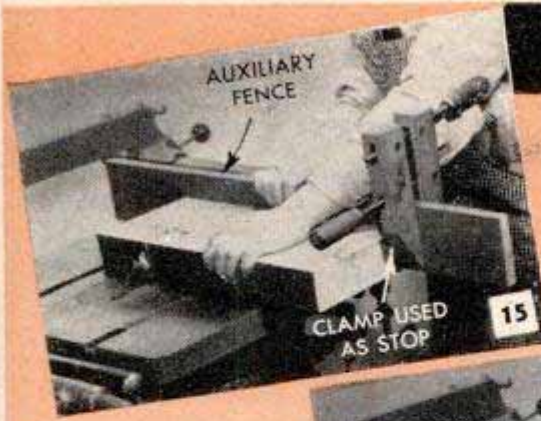
Long work: A safe method of handling

long work over a small saw table is to rig an outfeed table to support the overhang of the work as it is passed over the saw table, Fig. 12. In this case, the drill-press table is being used. Another way which is used by many craftsmen on small tables is the pull-through method shown in Fig. 13. Of course, a splitter and antikickback must be used, as it is necessary to release the work momentarily to change positions. The first half of the cut is made from the front of the saw table. Then the operator releases the work, steps to the rear of the table and pulls it the rest of the way.

Crosscutting: Crosscuts in long work are safe when you use an auxiliary cutoff fence as in Fig. 14. This fence is screwed to the miter gauge and supports the overhang of the work. The points to watch in crosscutting stock of any regular length are pictured in Figs. 15 to 26 inclusive. The methods detailed—what to do and what not to do—are especially applicable to the smaller machines. However, they also apply in a general way to large, production machines.

Work contact: Full contact of the work with the ripping fence and also with the miter gauge is important to safe operation. Figs. 27, 28 and 29 show why this is so. First, make sure that the fence is exactly aligned with the blade. It is easy to make

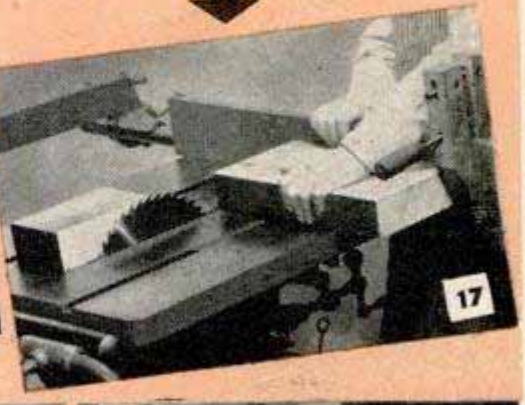
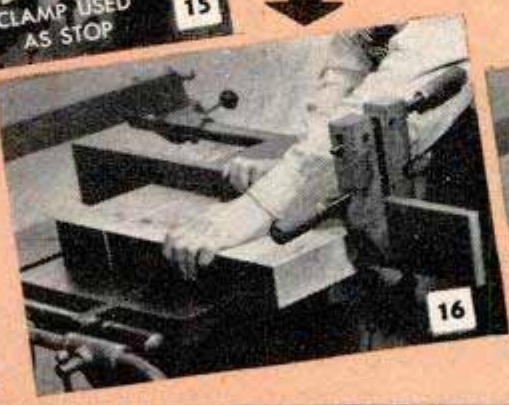
Here's Best Way to Crosscut



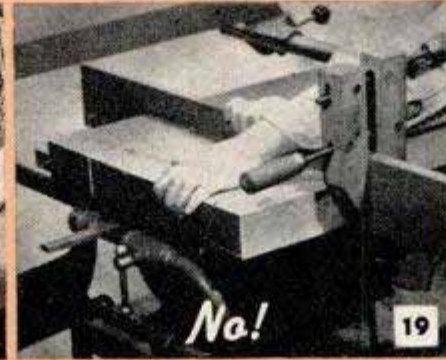
HOLD WORK AGAINST FENCE WITH LEFT HAND AND FEED WITH RIGHT UNTIL SAW HAS COMPLETELY CUT OFF WORK

PULL THE WORK BACK TO STARTING POSITION. DO NOT TOUCH PIECE CUT OFF UNTIL SAW HAS STOPPED

1 USE AN AUXILIARY FENCE INSTEAD OF A PLAIN MITER GAUGE IF CUTTING DUPLICATE PARTS TO EXACT LENGTH



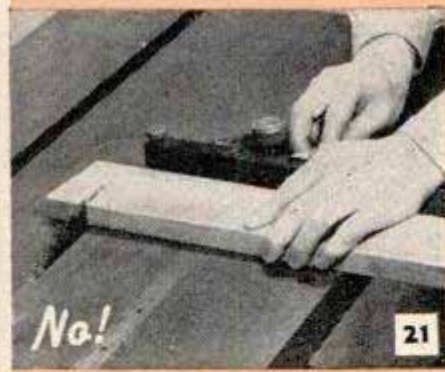
Points to Watch



NEVER PICK UP ANY FREE PIECE OF WORK WHILE SAW BLADE IS TURNING

AVOID AWKWARD AND DANGEROUS FEEDING OF WORK BEYOND SAW

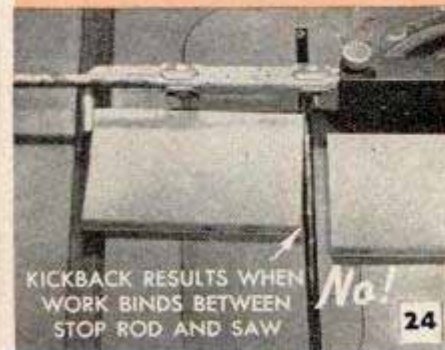
NEVER USE RIGHT HAND TO HELP FEED WORK WHEN CROSSCUTTING



WHEN USING MITER GAUGE AVOID EXTREME HAND POSITION. INSTEAD...

PLACE YOUR HAND AT THE CENTER OF THE MITER GAUGE AS SHOWN ABOVE

AUXILIARY FENCE IS BETTER, ESPECIALLY WHEN CUTTING SHORT WORK



KICKBACK RESULTS WHEN WORK BINDS BETWEEN STOP ROD AND SAW

No!

Yes!

Yes!

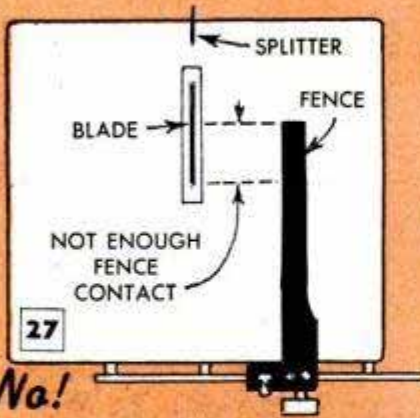
NEVER CUT OFF WITH THE STOP ROD SET AGAINST THE FREE END OF WORK

STOP ROD AGAINST SUPPORTED END OF THE WORK ELIMINATES BINDING

CLEARANCE BLOCK LOCATES AND PREVENTS BINDING OF FREE WORK

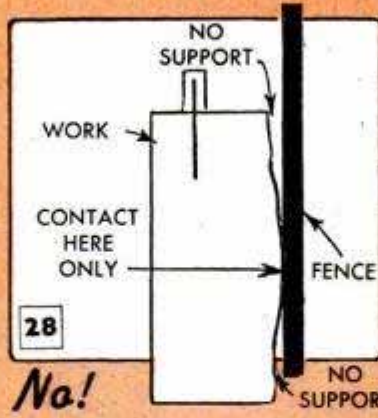
Watch Your Contact!

This type of error is the most common of all unsafe practices - uneven or small contact causes twisting or binding of work, leading to kickbacks and possible injury to operator



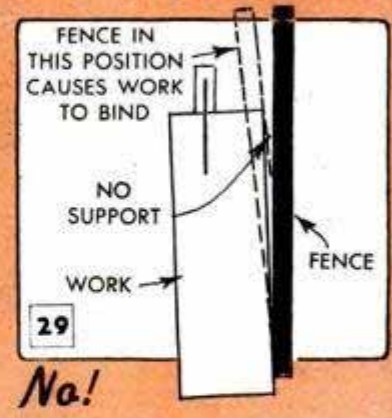
No!

A STUB FENCE, AS SHOWN ABOVE, IS DANGEROUS - EQUIP FENCE WITH WOODEN FACE SPANNING TABLE



No!

NEVER TRY TO RIP ANY WORK UNLESS IT IS FLAT AND HAS A STRAIGHT EDGE FOR CONTACT WITH THE FENCE



No!

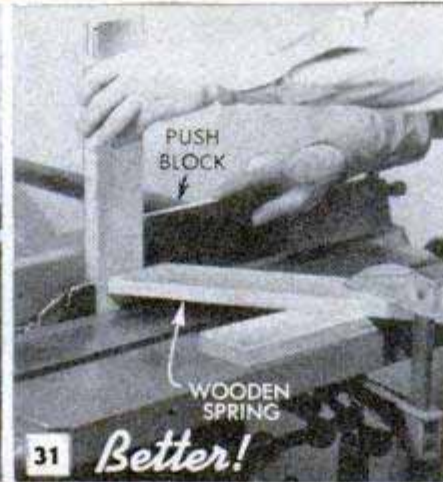
FENCE AND WORK MUST BE KEPT PARALLEL WITH SAW BLADE TO PREVENT BINDING AND KICKBACK OF WORK



30

No!

POOR CONTACT



31

Better!



32

Best!

CUTTING A TENON—always use a jig or wooden spring and push block to hold work



34

No!

NO SUPPORT



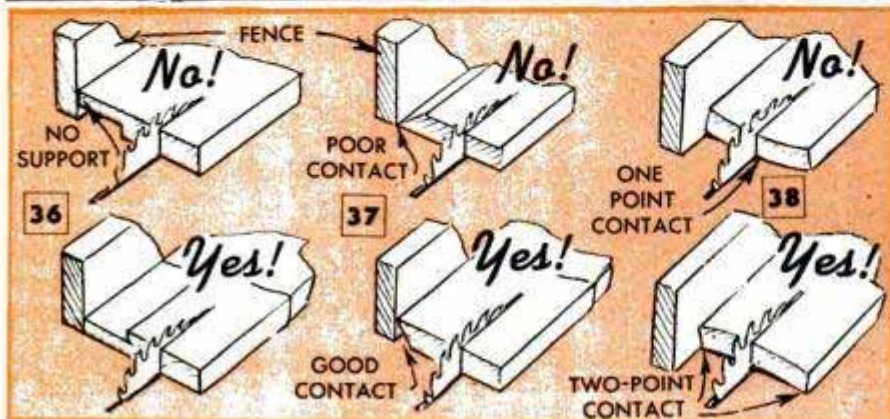
35

Yes!

GOOD SUPPORT

AUXILIARY FENCE SLIGHTLY ABOVE TABLE

RABBETING WITH DADO HEAD—good support needed



36

No!

NO SUPPORT

37

No!

POOR CONTACT

38

No!

ONE POINT CONTACT

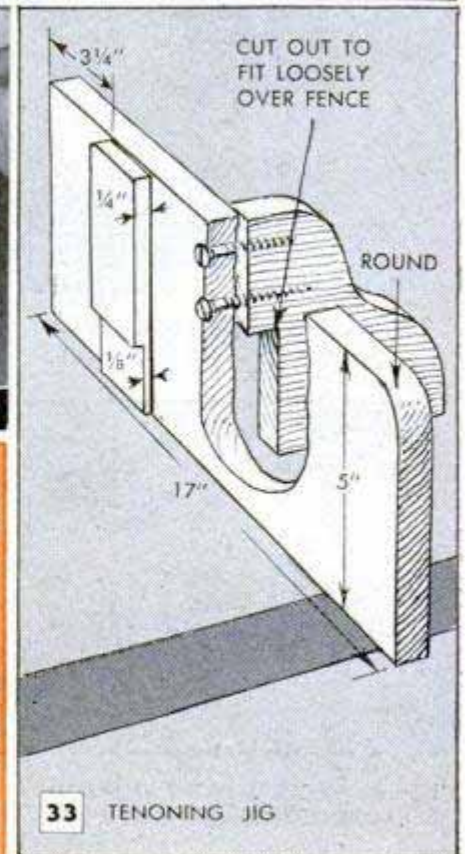
Yes!

Yes!

Yes!

GOOD CONTACT

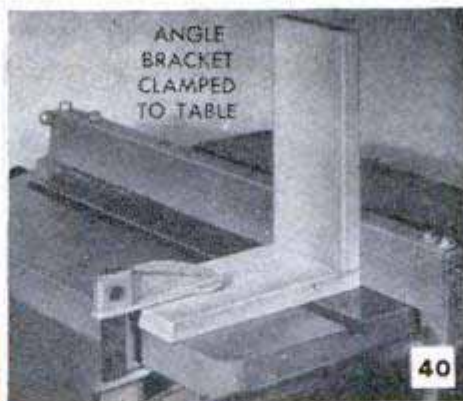
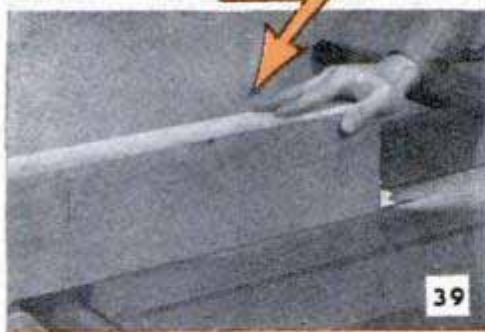
TWO-POINT CONTACT



33

TENONING JIG

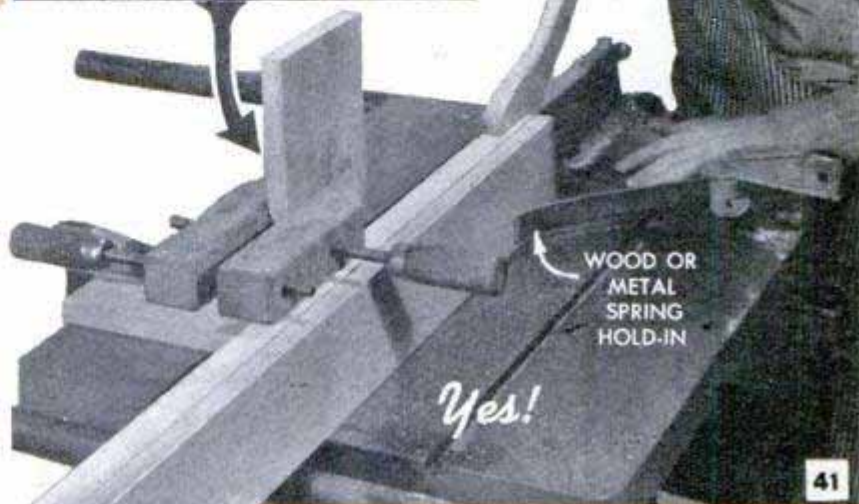
Take the Risk out of Resawing



No! A SLIP OR KICKBACK AT THIS POINT MIGHT CAUSE INJURY

this adjustment and it's a good idea to check it occasionally, just to make sure. Then if the edge of the stock is slightly irregular, plane it true so that you have a good bearing against the fence. Fig. 30 pictures an unsafe way of cutting a tenon. Fig. 31 details a better method and Fig. 32 shows the safest and surest method of all, using the tenoning jig detailed in Fig. 33. Good, firm support is needed when cutting a rabbet with the dado head. Fig. 34 shows what to avoid and Fig. 35 the right way to do it. Figs. 36, 37 and 38 show how to handle other less common ripping operations. The right way detailed in Fig. 38 applies only to narrow strips. Do not attempt to rip wide, deeply cupped boards in this manner. Either plane the board flat and true, or rip through the center with a handsaw. If the board is of short length and only a narrow strip is to be ripped from one side, you can do the job safely as in the upper detail by simply holding down firmly on the edge next to the ripping fence. A blade with a wide set will cut through without binding.

Resawing: The purpose of resawing is to obtain thin strips from stock of standard thicknesses. For example, if you have only $\frac{3}{4}$ -in. stock and need several narrow strips approximately $\frac{3}{8}$ in. thick, these are easily produced by resawing. Center-mark one end of the piece, place it on the saw table as in Fig. 42 and raise the blade until the teeth project about $\frac{1}{8}$ in. above the mark. Locate the ripping fence so that the blade will make the first cut through the exact center of the stock when it is placed on edge against the fence. Complete the setup as in Figs. 40 and 41 by clamping a wooden angle bracket against the back of the fence and adding the spring hold-in. The purpose of the angle bracket is to support a



KEEP YOUR HANDS IN THE CLEAR WHEN RESAWING



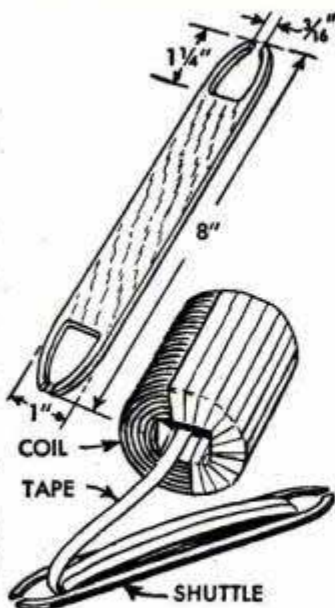
hand clamp positioned on the upright arm of the bracket to allow enough clearance so that the stock will pass under it without binding. The clamp prevents the piece being thrown upward should the blade bind slightly at any point along the length of the cut. Finish the cut with a push stick as in Fig. 41. Do not use the hand as in Fig. 39. When the first cut has been finished, turn the piece end-for-end and make the second cut in the same manner. This gives you two pieces each slightly less than half the thickness of the original piece, a fact due, of course, to the width of the saw kerf. Use a blade with a medium-wide set for resawing, but do not use a hollow-ground blade (planer saw) for this work.



Bumper Jack Serves as Stretcher To Draw Barbed Wire Taut

When stringing a barbed-wire fence, one farmer uses an ordinary car bumper jack to draw the wire taut. The bumper lift is slotted to grip the wire and one end of the shaft is bent to hook around a fence post. With the jack in place on a properly braced post and the barbed wire inserted in the slotted lift, normal operation of the jack handle will draw the wire as taut as necessary.—L. A. Burk, Burbank, Calif.

Taping Transformer Coils Speeded With Aid of Wooden Shuttle

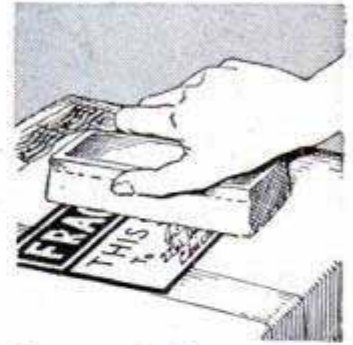


A real timesaver for wrapping transformer and generator coils, this wooden shuttle simplifies bringing the tape through the center of the coil. The shuttle is made approximate to the dimensions given and a slight twist releases a length of tape through the slot in either pincers-shaped end.—R. L. MacLean, Highbank, P. E. I., Can.

Use a sweeping motion of the brush when painting inside walls, entering from an unpainted area to avoid brush marks.

Labels Smoothed on Cartons With Blackboard Eraser

Addressed labels can be glued to a shipping carton quickly and without smearing the writing, if they are smoothed in place with a blackboard eraser. Similarly, the strips of gummed paper tape, which are used to seal the cartons, also can be smoothed in place with an eraser, saving a considerable amount of time.



Brush Torch Has Corncob Wick

For igniting brush fires, a long-burning torch can be made by forcing a dry corncob into the end of a length of pipe. Oil is poured into the top of the pipe and the corncob at the lower end serves as a wick.



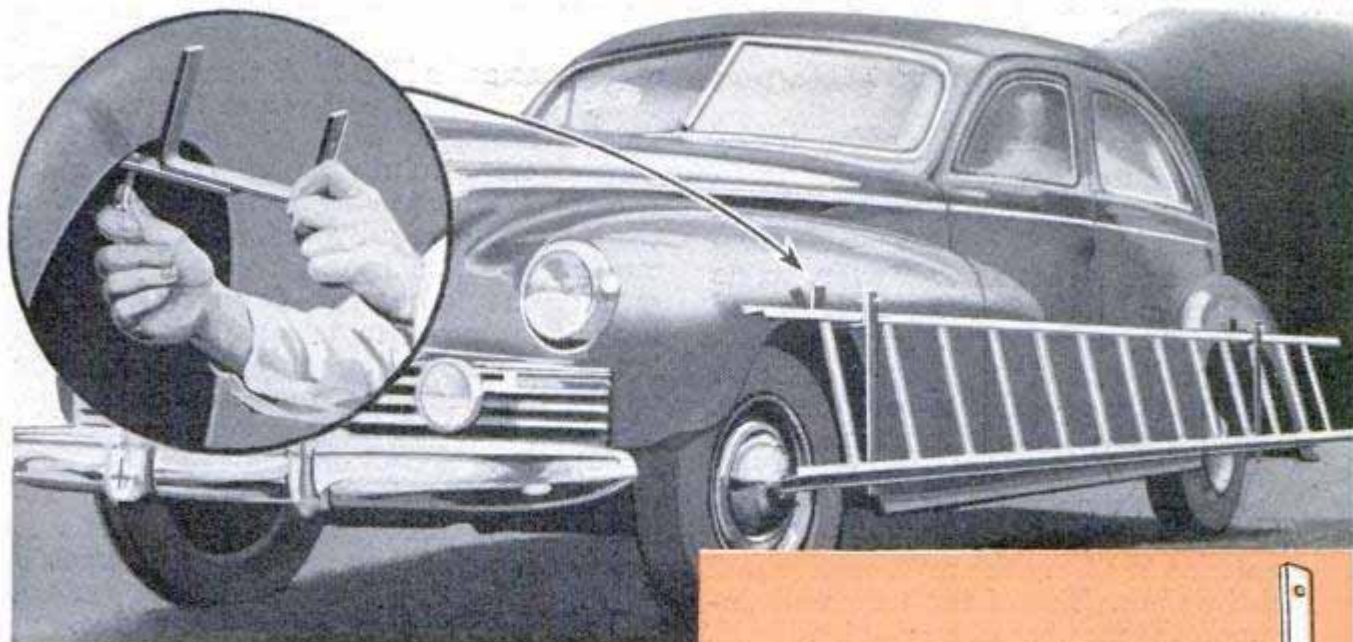
Milk Can Provides Funnel For Filling Grain Sacks

Cutting the bottom from an old milk can converts it into a handy funnel for sacking grain. The can is nailed to a stud or post in an inverted position, and the open end of the grain sack is wrapped around its mouth. A piece of sheet metal bolted loosely to the can rim clamps the sack in place.

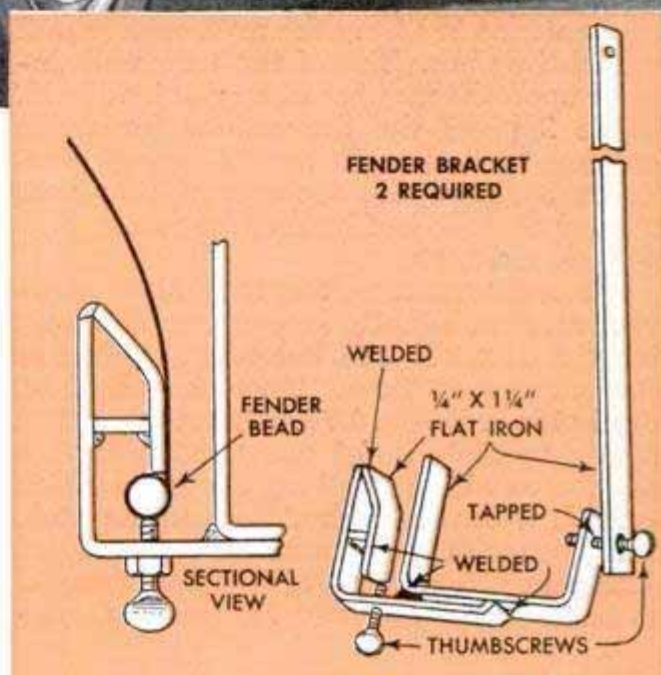
Harold Severson, Kenyon, Minn.



Side Carrier for Ladder Protects Car Finish

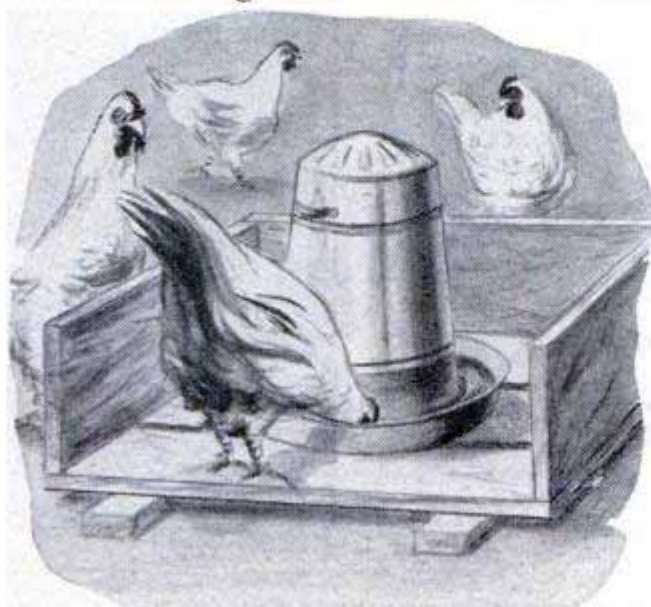


Confronted with the problem of carrying ladders and boards needed for repairing a newly purchased home, the Rev. Joseph S. Wright, Yonkers, N. Y., designed a pair of fender hooks which permit carrying the equipment on the side of a car without scratching the finish. The hooks are fastened to the fender bead with a thumbscrew and locknut in such a way that they cannot mar the exposed surface of the fender. Flat-iron guards hold the equipment away from the side of the car. Tightened with thumbscrews, the guards are hung downward when ladders are carried, and are swung upward when carrying wide boards. Equipment is quickly secured with lengths of rope.



Poultry Fountain Kept Sanitary by Setting on Three-Sided Platform

Setting a poultry fountain on a raised, three-sided platform keeps the chickens from scratching litter into the water and



also prevents water from accumulating around the fountain. The platform is made simply by removing one side from a crate or wooden box and placing the box on two boards to raise it off the ground. The boards on the bottom of the box should be spaced apart slightly to allow the water to drain.—Hi Sibley, Nuevo, Calif.

Hook Mounted at Front of Tractor Aids Pulling Hay Rope

Attaching a hook to the front of a tractor permits pulling a hay rope by backing away from the barn, making it easier to watch the tackle. In addition, returning to the barn is faster because the tractor does not have to be turned around.

☐ Typing paper will not slip on a worn typewriter platen if it is backed with a sheet of blotting paper.

INSULATED MILK-COOLING

By A. E. Youngquist

TO KEEP investment costs for milk-cooling equipment at a minimum, a number of farmers are building concrete cooling tanks in which electrical refrigerating units are installed. However, to do this economically the cooling tank should be insulated to avoid overloading the refrigerator unit during the summer and also to reduce the time needed to cool the milk.

When possible, the cooling tank should be located against two adjacent walls of a milkhouse or other building with the bottom of the tank below the floor level for convenience in lifting the milk cans in and out of the tank. Size of the tank will depend upon the number of cans it is to hold. Table 2 gives the dimensions for tanks holding from 4 to 12 cans of 40-qt. size. Table 3 shows the amount of materials needed exclusive of lumber for forms, pipe fittings, nails, etc.

After determining the tank size, excavate an area slightly larger than the tank to a depth of 2 ft. 7 in. below the surface of the milkhouse floor. Then install 2-in. drainpipe as in Fig. 4. Note that the vertical piping is made up of two lengths of pipe connected with a coupling, the top of which is flush with the finished floor in the tank. The bottom of the excavation is then filled with gravel to a depth of 6 in. and tamped to make firm foundation for the 4-in. con-

crete base as in Fig. 1. A temporary form of 2 x 4-in. stock will retain the concrete until it hardens. The concrete should be leveled off carefully to provide an even surface on which to lay insulation material. Cork board or equivalent rigid insulating material, 3 in. thick, and thoroughly waterproofed should be used. After the concrete hardens, remove the temporary forms and lay the floor insulation. A hole must be cut in the insulation over the drainpipe. The hole must be large enough to provide a 1/2-in. opening all around the pipe. This opening is then filled with hot asphalt. Insulation for the end and side walls is erected next. All butt joints and exposed edges of the insulation must be waterproofed with hot asphalt or seam filler.

Construction of the forms is shown in Fig. 1. These are held exactly 10 in. apart by placing wooden spacer blocks, 4 in. wide, between the outer forms and insulation and 3-in. wide spacers between inner forms and insulation. Spacers are removed as the forms are filled with concrete. Faces of the forms that will be in contact with the concrete should be oiled. Tar paper is placed against the foundation walls, as in Fig. 1, to prevent damage to the tank in the event there is any settling of the foundation walls. A concrete mixture of cement, 1 part, sand, 2 1/4 parts, and gravel or crushed rock, 3 parts, is recommended. The largest crushed rock used should not

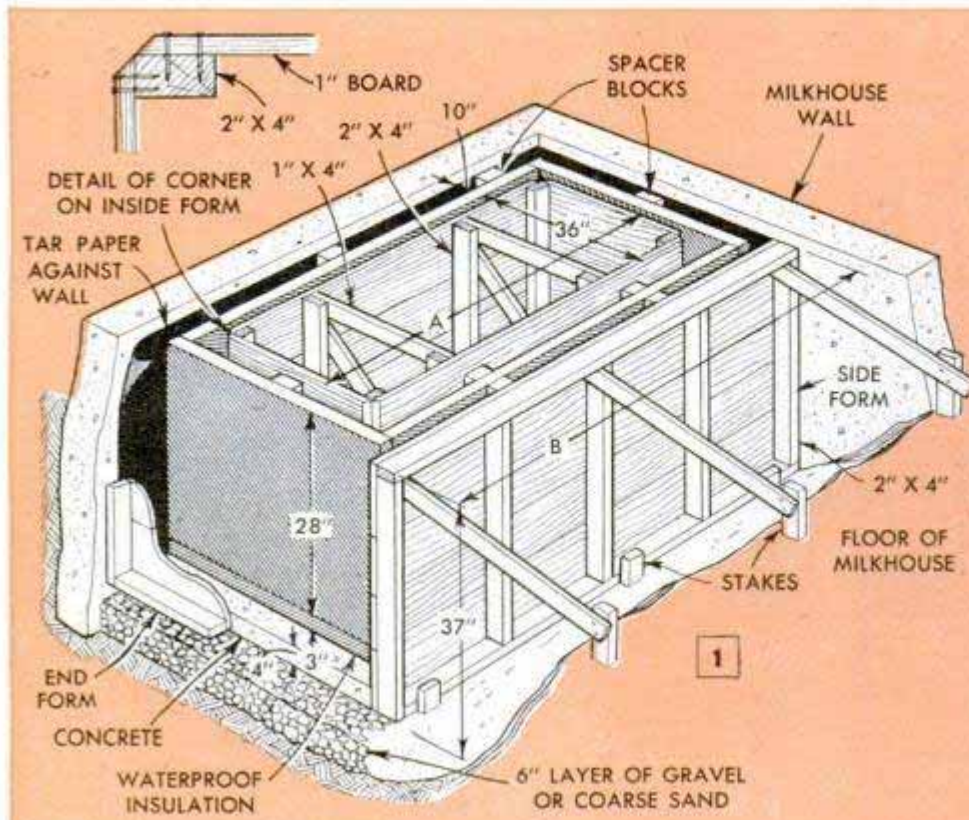


TABLE 2

TOTAL STORAGE CAPACITY 40 QT. CANS	DIMENSIONS (SEE FIG. 1)	
	A	B
4	4 ft.	5 ft. 8 in.
6	6 ft.	7 ft. 8 in.
8	8 ft.	9 ft. 8 in.
10	10 ft.	11 ft. 8 in.
12	12 ft.	13 ft. 8 in.

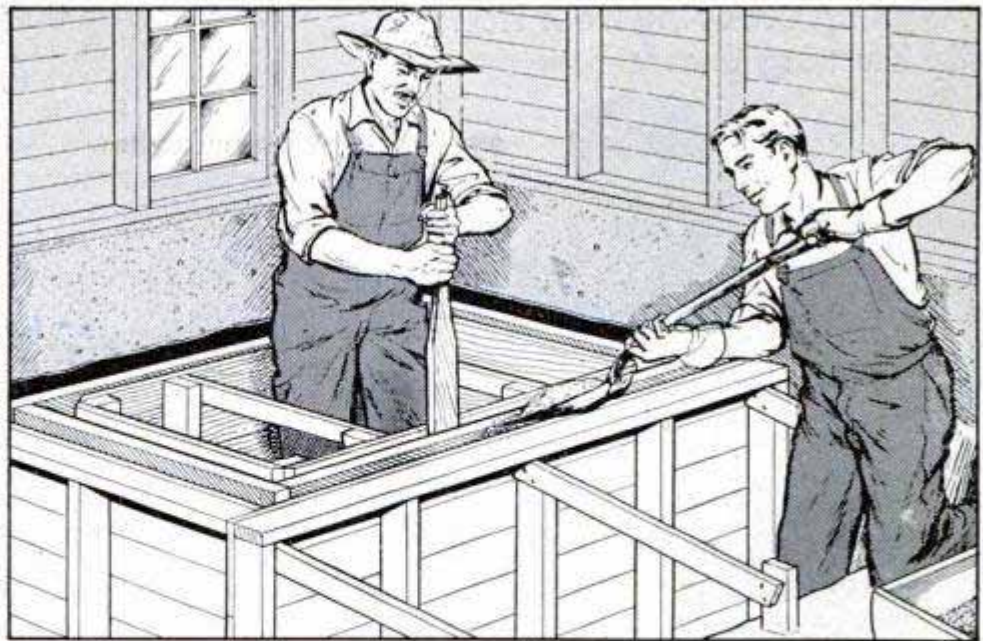
ALL TANKS ARE 36 IN. WIDE AND 27 IN. DEEP INSIDE.

IF COOLED NIGHT'S MILK IS TAKEN OUT TO MAKE ROOM FOR MORNING'S MILK, TANK NEED BE ONLY LARGE ENOUGH FOR CANS OF ONE MILKING.

TANKS

exceed $\frac{3}{4}$ in. in size. Before pouring the concrete, a tin collar is placed around the drainpipe coupling to leave a $\frac{1}{2}$ -in. space all around the coupling. When the concrete hardens, the collar is removed and the space filled with hot asphalt. Concrete for the tank floor is poured first. It should be troweled to slope slightly toward the drain. Concrete for the walls is poured in the forms in layers about 4 in. deep. Care must be taken to fill both the inner and outer walls to the same depth to prevent movement of the insulation.

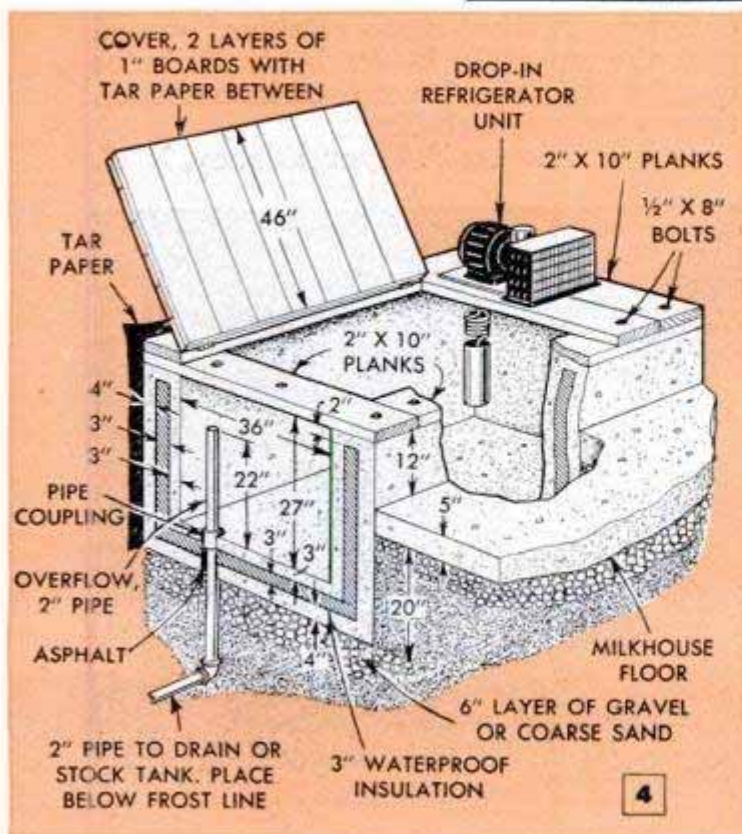
When the forms are completely filled, $\frac{1}{2}$ x 6-in. anchor bolts are embedded 2 ft. apart around the top edge of the concrete with the threaded ends projecting about



Concrete for walls is poured on both sides of the insulating material simultaneously. Avoid damaging waterproof covering on insulation when spading

TABLE 3. BILL OF MATERIAL

KIND OF MATERIAL	SIZE OF TANK					
	Amount	4 Can	6 Can	8 Can	10 Can	12 Can
Sand	Cu. Yd.	1.0	1.3	1.5	1.8	2.1
Gravel - $\frac{3}{4}$ in. Maximum	Cu. Yd.	1.1	1.4	1.7	2.0	2.3
Cement	Sacks	10	13	15	18	20
3" Vaporproof insulation	Sq. Ft.	60	77	94	111	128
Tar-paper cover	Sq. Ft.	18	24	30	36	42
1x6s Cover	Lin. Ft.	78	104	130	156	182
2x10s	Lin. Ft.	30	38	46	54	62
2x6s	Lin. Ft.	4	4	4	4	8



$1\frac{3}{4}$ in. After the forms are removed, 24 to 48 hours after pouring, the inside surface of the tank is given a wash coat of cement and water having the consistency of thick cream. The concrete should be cured by covering the tank with burlap which is kept constantly moist for 7 days. This is essential to assure strong, watertight concrete. The tank should be at least two weeks old before it is used. After curing, a thin layer of mortar consisting of cement, 1 part, and sand, 2 parts, is spread over the top edges of the tank. Wooden planks are then bolted to the top edges while the mortar is still wet, thus assuring a tight fit between the planks and concrete tank. All anchor-bolt nuts should be counter-sunk flush with the surface of the planks. A portion of the tank opening is covered with planking to support the refrigeration unit, Fig. 4. Details of installation are included with each unit when purchased. The remaining portion of the tank opening is enclosed with a hinged cover, Fig. 4.

Information courtesy Westinghouse Electric & Mfg. Co.

Aligning Drooping Door Handles By Twisting Shank



If your car looks prematurely old and neglected because of drooping door handles, you can remedy this situation quickly and inexpensively. First, note how far the handle sags from its normal position, measuring the distance with a rule. Then, loosen the setscrew, which is usually located in the edge of the door, and pull out the handle. Clamp the square shank of the handle in a vise at the same depth as it sets in the lock. The part of the shank which fits inside the lock will be noticeably worn. Now, with a monkey wrench, bend the shank exactly the amount needed to correct the sag in the handle, sighting the bend carefully and measuring it accurately. Try the handle in the door to see if it is properly aligned and rebend the shank slightly if necessary to correct any deviation.

Ed Packer, Chicago.

Prolonging Life of Fence Posts With Chemical Treatment

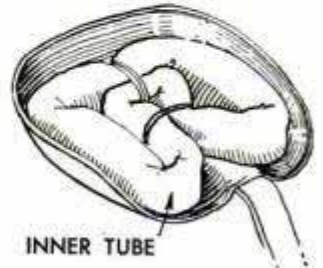
The useful life of newly cut, bark-covered fence posts is prolonged by introducing a preservative solution of chromated zinc chloride into the wood through the sap stream. This can be done by the glass-jar method which amounts to placing an inverted container full of the solution on top of the post and allowing gravity to distribute it. First, a disk-shaped wick of cotton or wool cloth, wetted with the solution, is tacked to the top of the post. This should completely cover the top end. A glass jar with a screw-type lid is selected, and eight or nine holes are punched through the lid with a nail. The lid is tacked over the wick, and the post is in-

verted while the jar, filled with preservative solution, is screwed to the lid. Then the post is set upright, and gravity does the rest. Sections of pipe or tin cans may be substituted for jars, and the method can be used any time of the year when the wood is not frozen. However, the posts must not be split. To make the solution, add 1 pound of the chemical to each gallon of water.

U. I. '51

Seat Cushion for Tractor Made From Inner Tube

A serviceable and comfortable tractor-seat cushion is easily made from an inner tube which is covered with canvas or heavy cloth. The inner tube is partially inflated and then bent and tied, as shown in the drawing, to fit the tractor seat.



Charles E. Mason, California, Mo.

Fluorescent-Bulb Rack on Ladder Speeds Electrician's Work

Maintenance men in factories and offices will find the changing of fluorescent bulbs of ceiling fixtures easier if several of them are carried in a special rack on one leg of a stepladder. Use of the rack allows a burned-out bulb to be removed and a new one installed with only one trip up the ladder. The lower ends of the bulbs are set in a large tin can screwed to the ladder leg about 3 ft. from the bottom in order to clear desk tops. A sheet-metal retainer fastened near the top of the ladder holds the bulbs upright. This ring is wrapped with friction tape to protect the bulbs.

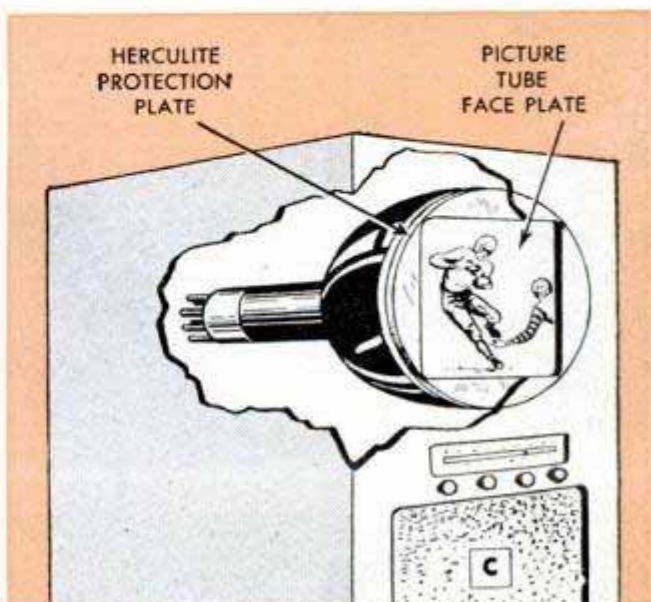
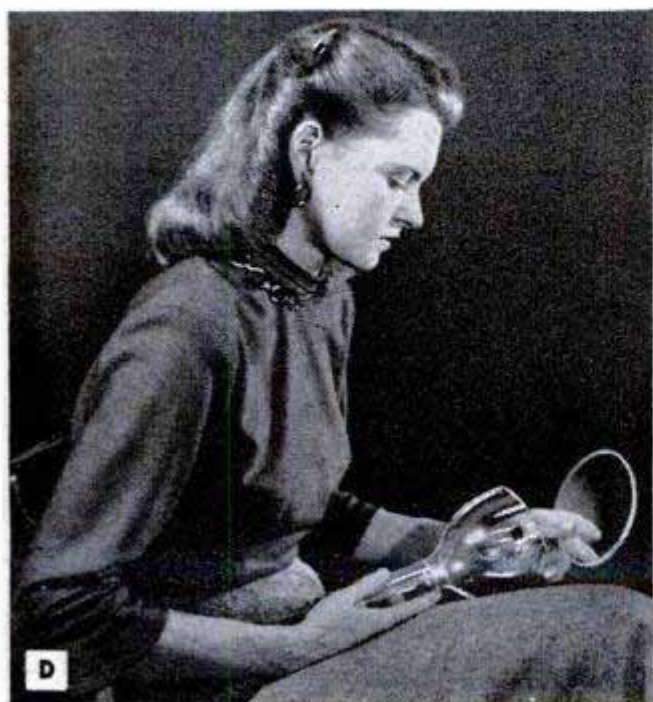
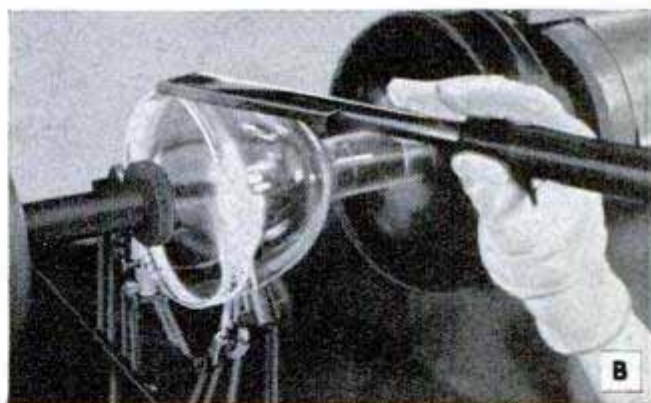
Thomas F. Flynn, Albany, N. Y.



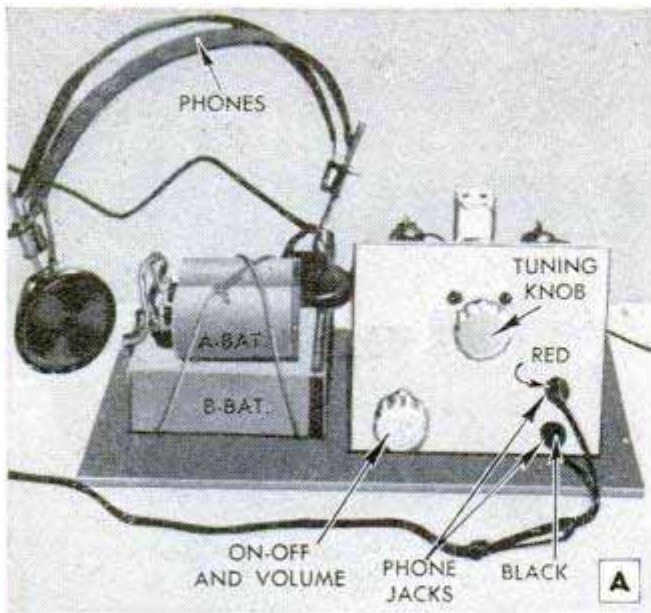
IMPROVED PICTURE TUBES

BETTER TV tubes at lower cost are now available due to improved design and mass production. RCA's 16-in. metal picture tube in photo A furnishes a sharp contrast to the standard 10-in. tube as demonstrated by Miss Diane Myers. Providing a picture fully $2\frac{1}{2}$ times that of the 10-in. tube, the new 16-in. tube has a metal cone to which the glass face plate and neck section are sealed by a special technique. The 16-in. tube provides a picture size intermediate between that of the 10-in. standard tube and the screens of projection-type TV receivers.

The slow process of molding glass blanks for picture tubes has been replaced by a standardized separate face-plate process developed by the Pittsburgh Plate Glass Company. The grinding and polishing operations are completed while the glass face plate is still flat. A close-up of the fusing operation which flame-seals the face plate to the tube proper is shown in photo B. These face plates may also be used on the new metal tubes. Caroline Tufts of RCA is holding one of the new face plates in photo D. Another TV-tube improvement by the Pittsburgh Plate Glass Company is a curved protection, or implosion plate of impact-resisting tempered glass that covers the tube face as illustrated in sketch C.



TWO-TUBE SUPER BATTERY



EASILY constructed and economical to build, this rugged little two-tube student-type super is ideal for camping trips or wherever a compact, sensitive, battery-operated broadcast receiver is required. For knockabout use, the small chassis base and the batteries can be mounted on a piece of hardboard and strapped down as shown in photos A, D and F. It is compact enough to carry in a small cardboard container or, if the builder prefers, it can be housed in a cabinet. The components are not critical and may be obtained from any radio supply house. Adjustment of the completed receiver is simple and requires no test equipment.

With a 15 or 20-ft. piece of wire for an antenna, all local broadcast stations may be received with clarity and good volume. The set has good selectivity and even sensitivity over the entire broadcast band. When a good outside antenna and ground are used, the distance-getting performance obtained with this receiver is equal to or better than that obtained from any 2-tube regenerative receiver, and it is without the squeal that is always present in the output of a regenerative set. The low battery drain of the two miniature tubes assures a long battery life. Two ordinary 1½-volt flashlight batteries, connected in parallel, provide the A-battery supply for the tube filaments; the B-battery consists of a portable-type 67½-volt battery for maximum sensitivity and volume. However, a 45-volt B-battery can be used for receiving local stations. Any type of crystal or magnetic headphones having a 2000-ohm impedance or higher may be used.

The 1R5 miniature tube operates in the same manner as the first detector in any type of superheterodyne receiver. The local oscillator section of this tube operates at a frequency that is 455 kc. higher than

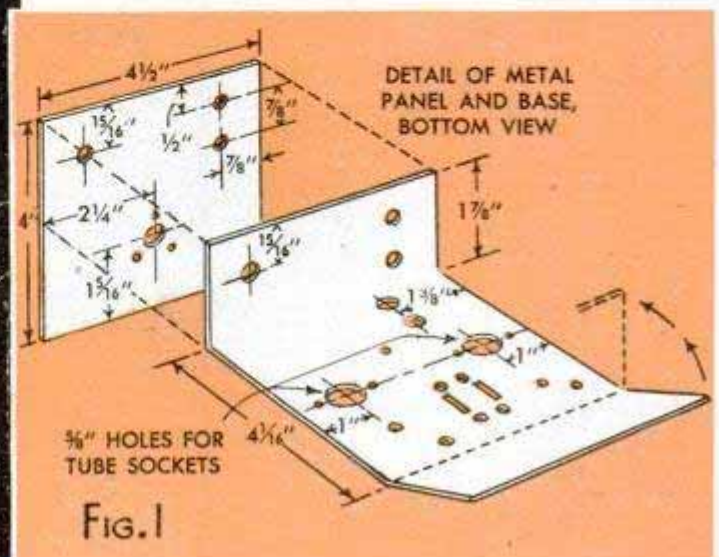
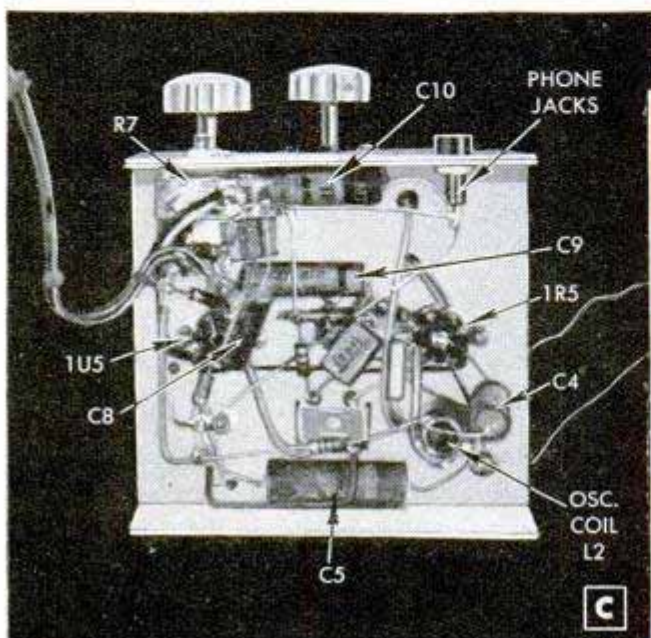
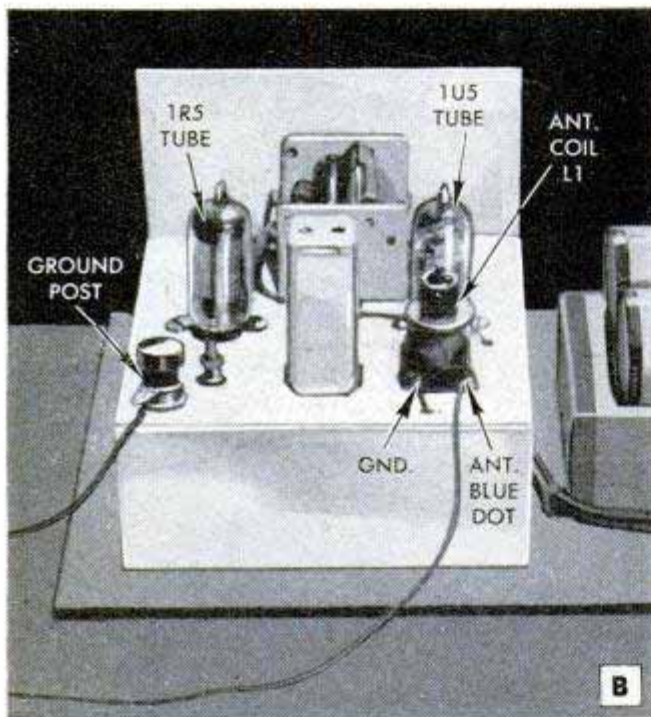


FIG. 1

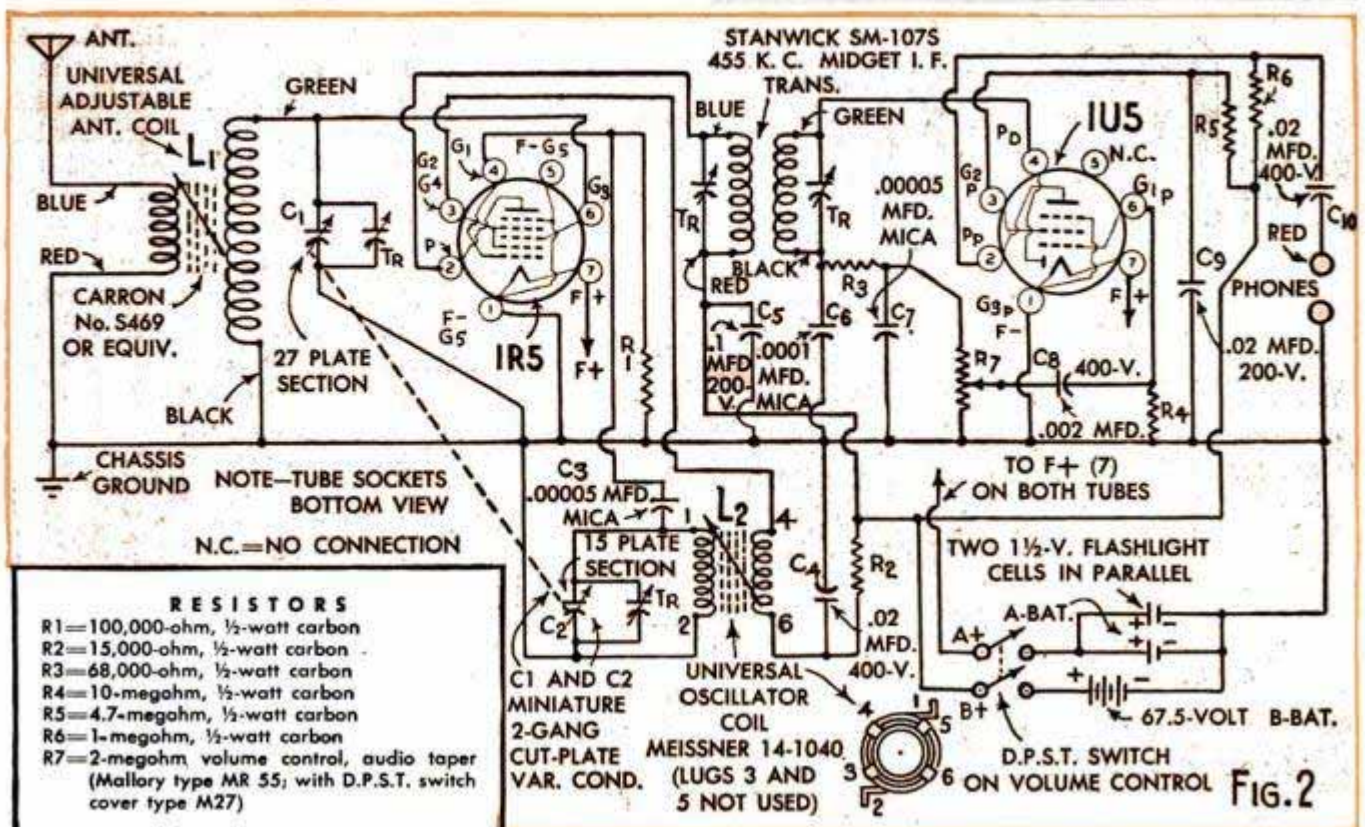
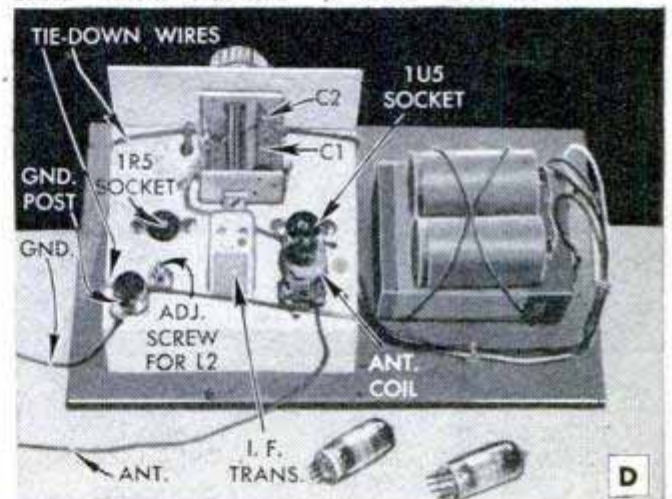
PACK SET FOR VACATIONS

the received signal. This signal from the local oscillator is mixed within the tube with the received signal to produce the intermediate frequency.

Construction should start with the forming and punching of the metal panel and chassis base detailed in Fig. 1. Either aluminum or sheet steel may be used; however, aluminum is preferred as it is easier to work. The front panel is fastened to the base by the volume control and the phone-tip jacks, the red phone jack being insulated from the panel and chassis. The miniature 2-gang superhet tuning condenser with trimmers is supported by the panel at front and a small bracket on the rear of the condenser frame, which is common with ground. Mount the tube sockets with the blank "key" spaces pointing out to each side of the chassis. Any cut-plate 2-gang variable condenser designed for a 455 to 456 intermediate frequency may be employed; the 27-plate section is 420 mmfd; the 15-plate oscillator section is 162 mmfd. However, the Meissner-type 14-1040 oscillator coil should be used as specified. Any universal-type antenna coil will function properly in case the Carron-type S469 is not stocked by your local dealer. The Stanwick-type SM107S I.F. transformer is a spade-bolt mounting style and the terminals are color-coded as indicated in diagram, Fig. 2.

All parts above and below the chassis are clearly indicated in photos A, B, C, D and

(Continued to page 234)



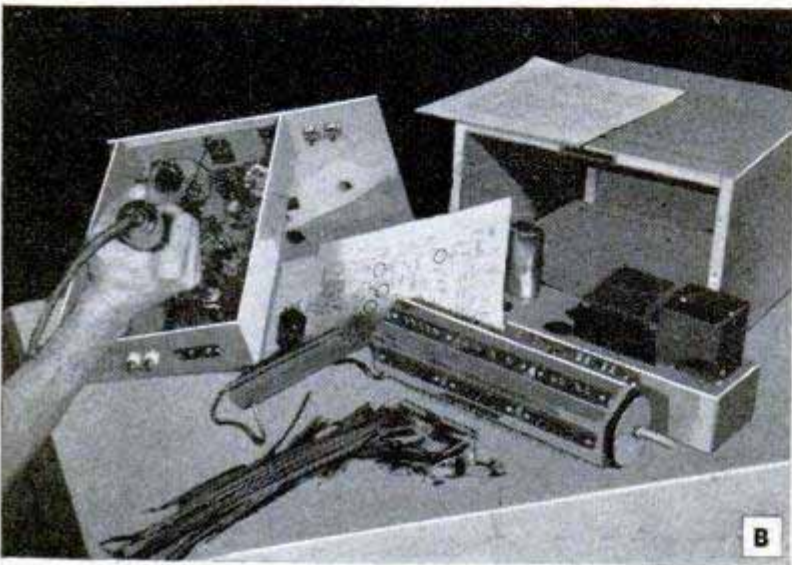
SIGNAL-SHIFTER KIT FOR RADIO "HAMS"

MANY AMATEURS favor the use of variable-frequency oscillators as exciters for final amplifiers. Constant research and refinements have resulted in a higher order of stability in this type of oscillator. In fact, stability equal to crystal control is possible, with the important feature that the transmitter frequency may be varied. Variable-frequency oscillators may be purchased commercially or built from plans described in handbooks. However, units built from these sources require a considerable amount of skill and careful adjustment afterwards. A well-known commercial signal shifter has been the Meissner. This unit is now available in kit form, including built-in power supply, at about half the price of the completely wired instrument.

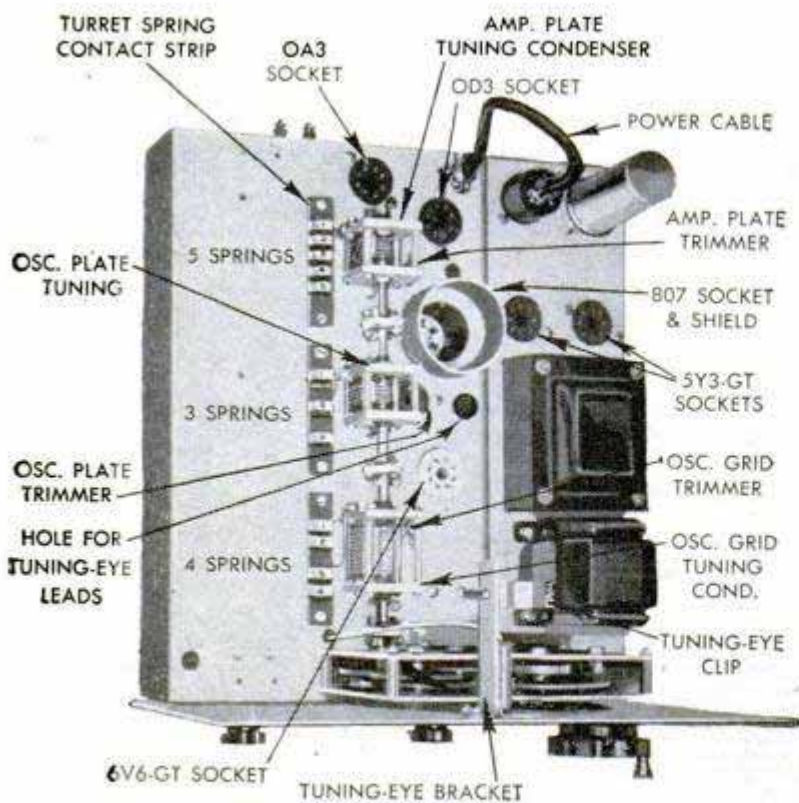
Now, any "ham," even the one with the new license, can build his own signal shifter. The kit includes the neat cabinet which matches well with other equipment on the operating table as shown in photo A. This new signal shifter features a rotating turret-coil unit for band switching. The coil appears in photo B, which was taken during actual assembly. It has six positions and provides for output on the amateur 80, 40, 20, 15 and 10-11 meter bands. These positions are indicated by the band-switch letters on the front panel in photo D. Photo C is a top view of the chassis with all tubes indicated. The kit includes assembly and wiring diagrams, and all tubes and necessary parts.



A

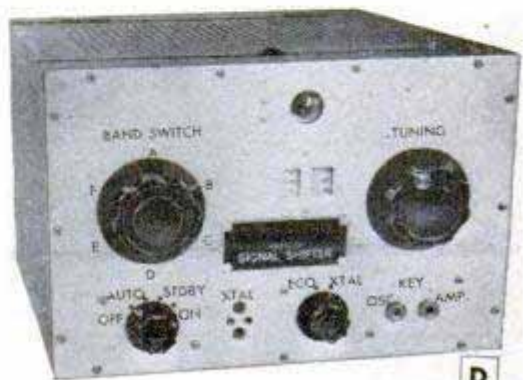


B



TOP VIEW OF CHASSIS

C



D



**KODAK
FLASH BANTAM
f/4.5
CAMERA**

**Leads to "double
reward" in color**

This trim camera, so small that it slips into your pocket, leads to *brilliant screen showings* of Kodachrome transparencies... gorgeous *Kodachrome Prints* (superb black-and-white enlargements, too). 4-element Kodak Anastar *f/4.5* Lumenized Lens... 4-speed 1/200 shutter... automatic film stop... die-cast body. 8 exposures on Kodak 828 Films. Camera, \$57.75; Flashholder, \$11.08. Prices include Federal Tax.

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**Projects bright images
up to 7 feet wide**

You'll enjoy sparkling color shows with this moderately priced projector. Lumenized optical system steps up screen brilliance 50%. And you can focus to a hair with the Kodak Projection Ektanon Lens, 4-inch *f/3.5*. Tripod Socket provides handy mounting on Projecto Case. 150-watt lamp and slide carrier included. \$27.50.

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superb optical system. \$181 to \$295, depending upon lens choice.

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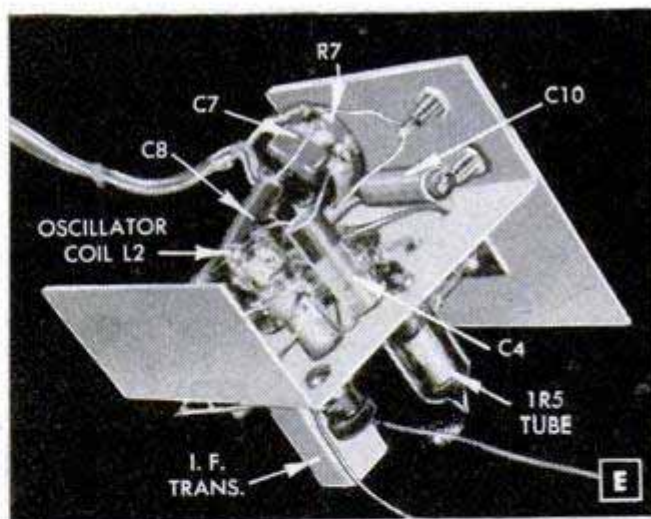


BEHR-MANNING
NORTON abrasives TROY, N.Y.

Two-Tube Super Battery Pack Set for Vacations

(Continued from page 231)

E; the filament circuit of the two tubes should be wired first. Complete circuit-wiring details appear in the schematic circuit diagram, Fig. 2; no pictorial diagram is given as this is not intended for a beginner's set. Make sure that all leads are as short and direct as possible. All connections should be well soldered, using rosin-core wire solder only. A good common-ground connection is important; in the model, all points which are grounded are connected together by a wire with the ground being made to the bolt holding the rear bracket of the variable tuning condenser. The small circular tube protruding from the bottom center of the miniature tube sockets acts as a shield between the socket prongs and should be connected to ground. The positive clips for the A-batteries were made from two $\frac{3}{8}$ -in. grid caps; the negative connection is made with a $\frac{1}{4}$ -in. strip of thin metal cut from a tin can. The strip is about 3 in. long and is bent double. The negative lead for the A-batteries is then soldered to the doubled strip at the bend, leaving two metal blades which are inserted between the paper jackets and the outside negative metal shells of the A-batteries. When connecting the clips on the positive terminals of the A-batteries, it may be necessary to scrape away some of the insulation or to cut the



clips so they will fit tightly. These clips do away with soldering when it is necessary to renew the cells for the A-battery.

To operate the receiver, connect the batteries, antenna and ground wires, plug in the headphones and turn the volume control to maximum. By adjusting the tuning condenser, several stations should be heard. With the variable condenser set at a point 15 to 20 degrees from the fully

(Continued to page 236)

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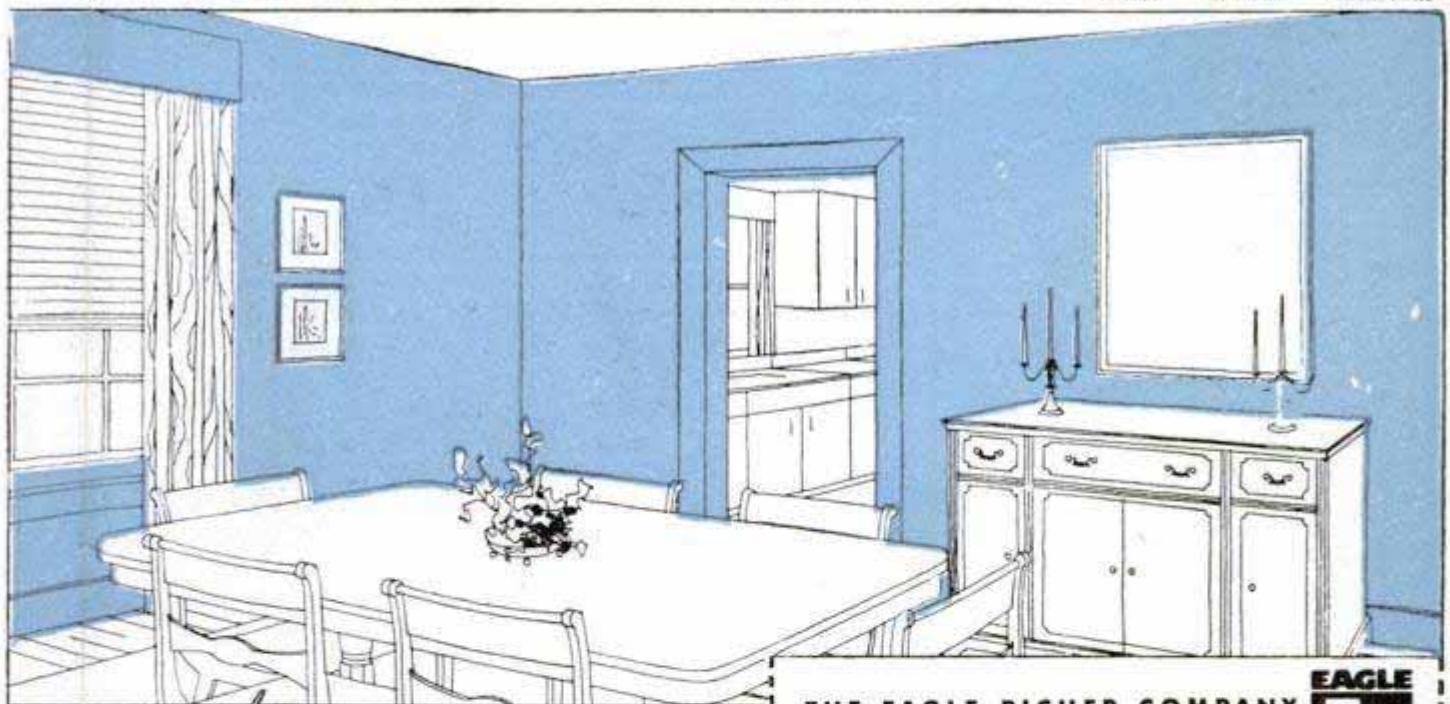
The color in this illustration, matched as closely as printing ink will permit, is Elfin Green. Other colors available in Eagle-Picher Decorator Paints are: Roman Ivory · Twilight Gray · Desert Sand · Dresden Blue · Harvest Peach · Lettuce Green · Daffodil · Potters Blue · Dusty Rose. There is a complete line of Eagle-Picher paint—for all interior and exterior painting.



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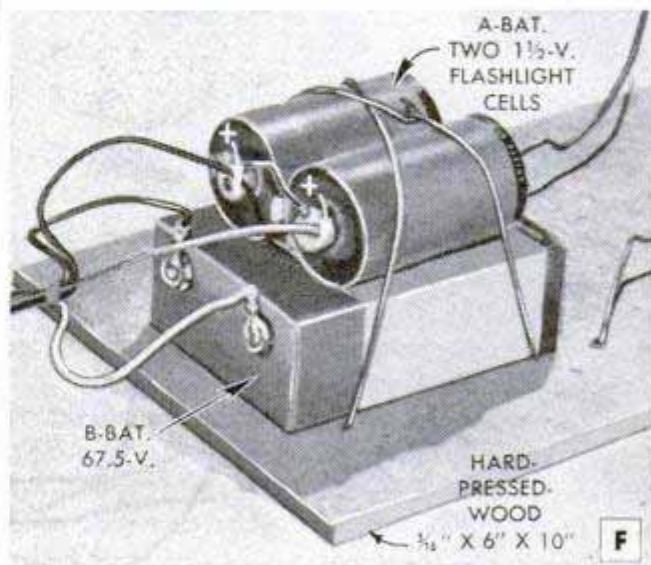
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closed position, adjust the iron core in the mounting end of the oscillator coil until a station around 600 kc. can be received. After making this adjustment, the locknut on the oscillator-coil adjusting screw should be tightened. Now, without changing the setting of the tuning condenser,



adjust the iron core in the antenna coil for maximum volume; lock the antenna coil core in this position with cement, or by tightening the locknut if one is provided. The next step is to turn the tuning-condenser plates out until you can tune in your highest-frequency local broadcasting station. With an insulated screwdriver, adjust the trimmer condenser C1 on the antenna section of the tuning condenser for maximum volume. This is the section with the largest number of rotor plates. In the event that the station on the extreme high end of the band cannot be received, the trimmer condenser on the oscillator section C2 of the tuning condenser should be loosened until this station is received. The I.F. transformer is factory-set and no adjustment should be necessary. However, it may be found that a slight adjustment will increase the volume. Adjustment of the I.F. transformer should be made only after all other adjustments have been made and the receiver is operating properly. In the preliminary tune-up, or if the set does not operate, do not change the adjusting screws on the I.F. transformer. Once the factory setting of the I.F. transformer is lost, it will be impossible to align this receiver without the use of a signal generator. Lack of operation is an indication of a wiring error, or a defective part.

In some cases where a long outdoor antenna is employed, the ground connection is not necessary. Detailed student material list R-378 is available from Popular Mechanics Radio and Electronics department upon receipt of ordinary letter postage.

6.6 to 1

17.4 to 1

4.11 to 1

58 to 1

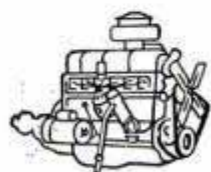
1.36 to 1

15.44 to 1

1.83 to 1

1.405 to 1

Every little ratio has a meaning of its own

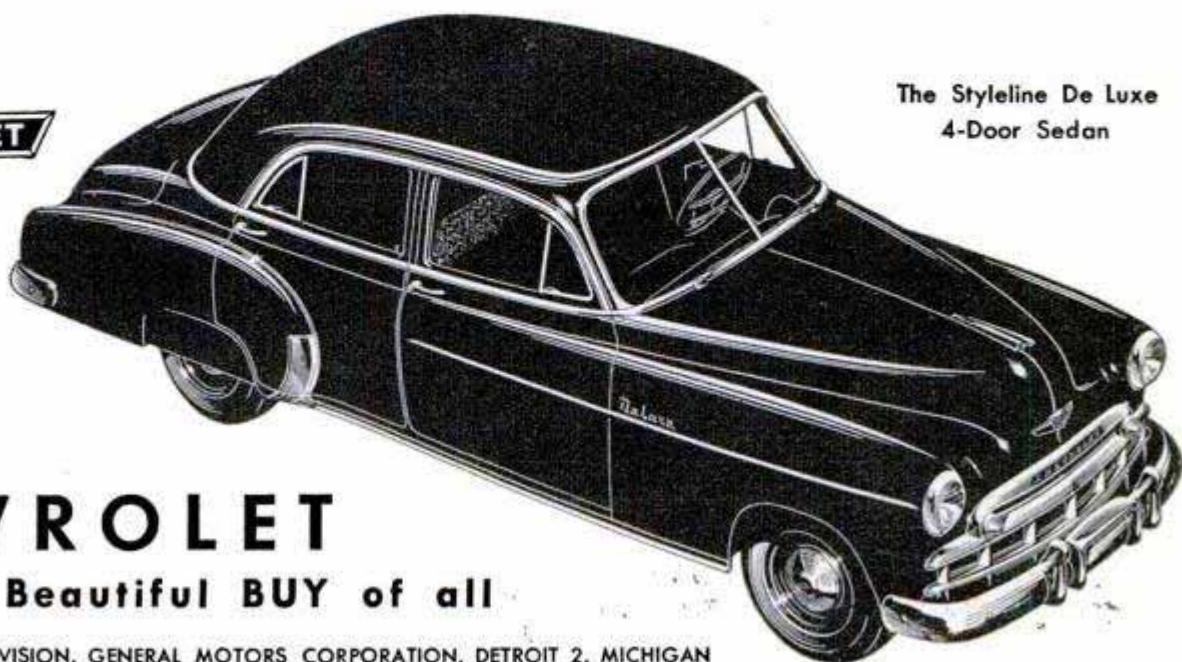
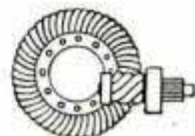


Compression ratio has been increased to a new high (6.6 to 1) in the 1949 Chevrolet valve-in-head engine—the ninth increase since 1925, when it was only 4.33 to 1, each increase meaning better efficiency. Today, in their search for higher power plus better fuel

economy, other manufacturers are following Chevrolet's lead and adopting the valve-in-head principle. Six makers have it in 1949; only three had it in 1941. . . . Other ratios also are important to top performance and ease of operation. Thus, the 1949 Chevrolet



steering ratio (17.4 to 1) assures easy control . . . and a new braking ratio (1.36 to 1) between front and rear permits faster stopping, without sliding the rear wheels. These and other ratios—such as transmission and final-drive gears, starter to engine, fan and generator speeds—have been worked out to a nicety. The result is a new high in Chevrolet's traditionally outstanding qualities—performance, economy, comfort, ease of control—and a new high in value and satisfaction to the owner.



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How to Tempt a Fish

(Continued from page 104)

Big tuna are tough. They have a habit of heading for the bottom when exhausted and only fairly heavy tackle can bring them to the boat. They make no spectacular leaps when hooked; every bit of their abundant energy is turned to racing speed.

Throughout the years the broadbill swordfish, first caught on fishing tackle in the Catalina area, remains the highest trophy of them all. These fish are rare and seldom inclined to strike when found. They are powerful and swift, occasional leapers. Their mouths are soft and difficult to hold a hook in. In all the years of fishing in all the waters of the world, less than 350 have been caught by anglers. Like spearfish, the swordfish is caught by using the drop-back method. The average fish is somewhere between 300 and 400 pounds but the record, from the Humboldt Current where it presses close to the steeply rising shores of Chile near Tocopilla, weighed 860 pounds.

The flounder fisherman with his simple tackle and his one-pound catch shares a thrill with a record-holder and his giant fish. The flounder, often called fluke, is one of the best eating fish and therefore is most popular with summer fishermen.

Flounders often hit a trolling feather jig

but mostly they go for a hardhead minnow. The fluke lies in the sand at the bottom and when a minnow passes by he streaks after the bait.

Although you can catch fluke while still-fishing with cut bait, by far the most interesting way is with a live bait that is moving. It requires a two or three-ounce sinker and a 1/0 or 2/0 hook. When a fluke strikes, the tugs are sharp and he has enough flap in his system to come in fighting at the boat.

One of the most popular ways to fish for flounder is drifting, using a cork that drifts with the tide.

Flounders are abundant from Massachusetts to the Carolinas, wherever the inlets have a sandy bottom. They are a light-tackle sport fish and anglers use a bay rod or a bait-casting rod, a 1/0 reel and a nine-thread line.

The weakfish is perhaps the most popular of the small sport fishes along our Atlantic coast. Thousands of anglers catch weakfish in New York, in Peconic Bay, in Gardiner Bay, off the Jersey coast, in Delaware Bay and as far south as Cape Hatteras, N. C.

The spotted weakfish is most plentiful from Virginia south to Florida, especially off Sea Island, Georgia, Jacksonville Beach, in the Indian River and off Melbourne.

(Continued to page 244)

FAVORITE SALT-WATER FISH

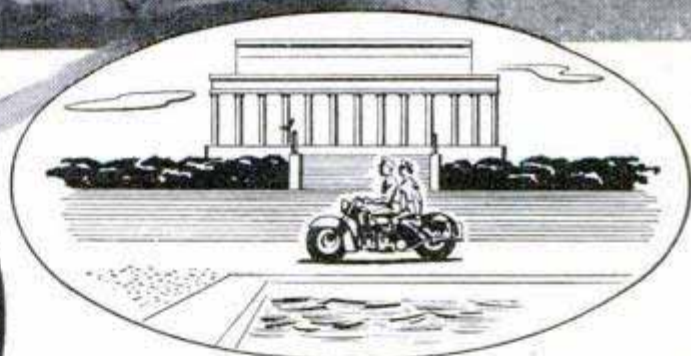
FISH	BEST GROUNDS	BEST SEASON	METHODS FOR CASTING AND LURES	AVERAGE WEIGHT	RECORD
Striped bass	Maine to the Carolinas; northern California to Washington	May 1 to Nov. 15	Still fishing; surf casting with metal squids or feather jigs; trolling spinner baited with worms; casting large plugs	2 to 20 pounds	73 pounds
Bonefish	Shallow, quiet waters of tropical seas, Florida Keys, Cuba, Bermuda, Hawaiian Is.	All year	Fly fishing with streamer-type shrimp fly; casting with surface plugs; live shrimp, hermit crab, finny crab, squid	2 to 8 pounds	16 pounds
Tarpon	Gulf of Mexico, up rivers in tropical waters, east coast of Florida	January to September	Still fishing with live crabs, mullet, sea robin; trolling with big plugs, spoons, some streamer-type flies	60 to 90 pounds	247 pounds
Sailfish	Gulf Stream, west coast of Mexico, Panama, Gulf of Lower Calif.	Atlantic, Dec. to May; Pacific, Jan. to Oct.	Trolling with cut strip mullet	Atlantic, 35 to 40 pounds; Pacific, 75 to 100 pounds	Atlantic, 106 pounds; Pacific, 221 pounds
Blue marlin	Cuba and West Indies	Off Bimini, Feb. to June.	Trolling with whole bonito, mackerel and bonefish	200 to 450 pounds	737 pounds
Tuna	Waters of the world	Off Cat Cay in April; Nova Scotia and California, summer months	Trolling with fresh bait, feathered jigs, strip bait, herring and mackerel	10 to 200 pounds	927 pounds
Swordfish	Off New York, Mass., Calif., Nova Scotia, Turkey and Chile	Atlantic, July to Sept.; Pacific, Aug. to Oct.	Trolling with cut bait, whole mackerel or squid	200 to 300 pounds	860 pounds
Summer flounder	Sandy bottoms from Mass. to the Carolinas	May to Nov.	Still fishing with live or cut bait; surf casting; sandworms, clams, night crawlers	1/2 to 4 pounds	19 pounds
Weakfish	New York to Florida	South Atlantic, January to June; north Atlantic, July to October	Shrimp or worms; casting small plugs, spoons, zaragossas; squid, sandworms, shedder crab; flies	1 to 6 pounds	17 1/2 pounds
Pacific salmon	Large rivers of the Northwest	June to Oct.	Trolling, "mooching," still fishing, casting; spoons, plugs, herring	10 to 25 pounds	83 pounds

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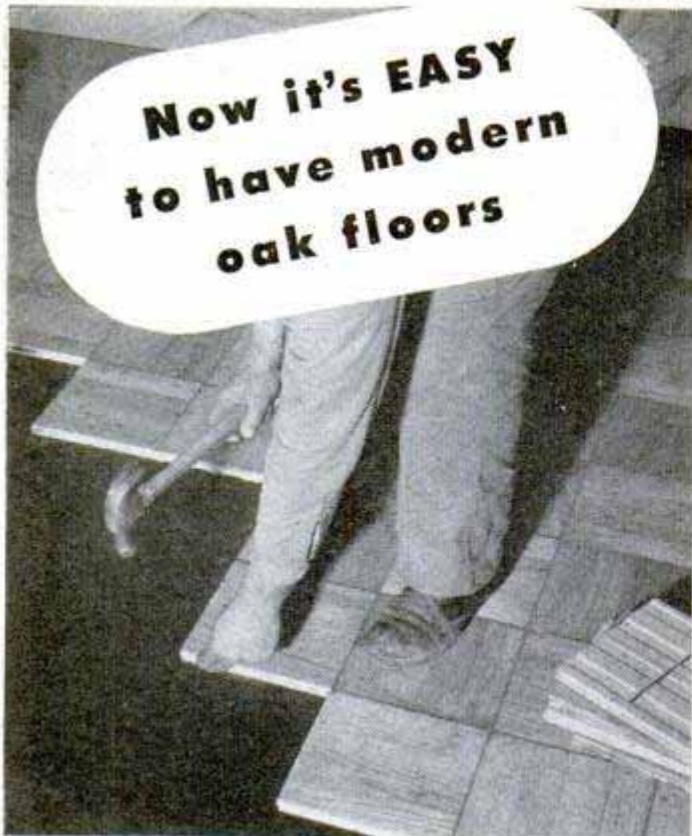
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Objectionable Odor in Newly Papered Rooms

Q—Recently we finished papering our new home and immediately we noticed an unpleasant odor throughout the house. It still persists even though we have used deodorants. We noticed that several spots on the walls in two of the rooms did not dry for several days but finally the dampness disappeared, leaving some discoloration of the paper. What is causing this odor?

R.M.—Sacramento, Calif.

A—It is not possible to say positively what is causing the odor you describe but we suspect that the wallpaper paste is at least indirectly at fault. If moisture was still present in the plaster at the time you papered, it would work its way to the surface. Pastes made with a starch or a wheat or rye-flour base would decompose, or "sour" under this condition, especially if no antiseptics were added or were present in the dry powder at the time of mixing. Some wallpaper pastes also tend to develop an unpleasant odor if they are mixed in solution and allowed to stand overnight before using. The only really permanent remedy for this trouble is to remove all the old paper and paste, allow the walls time to dry out, then apply a wall size and repaper. Use a prepared size and paste and follow the manufacturer's directions carefully when mixing both of these materials.

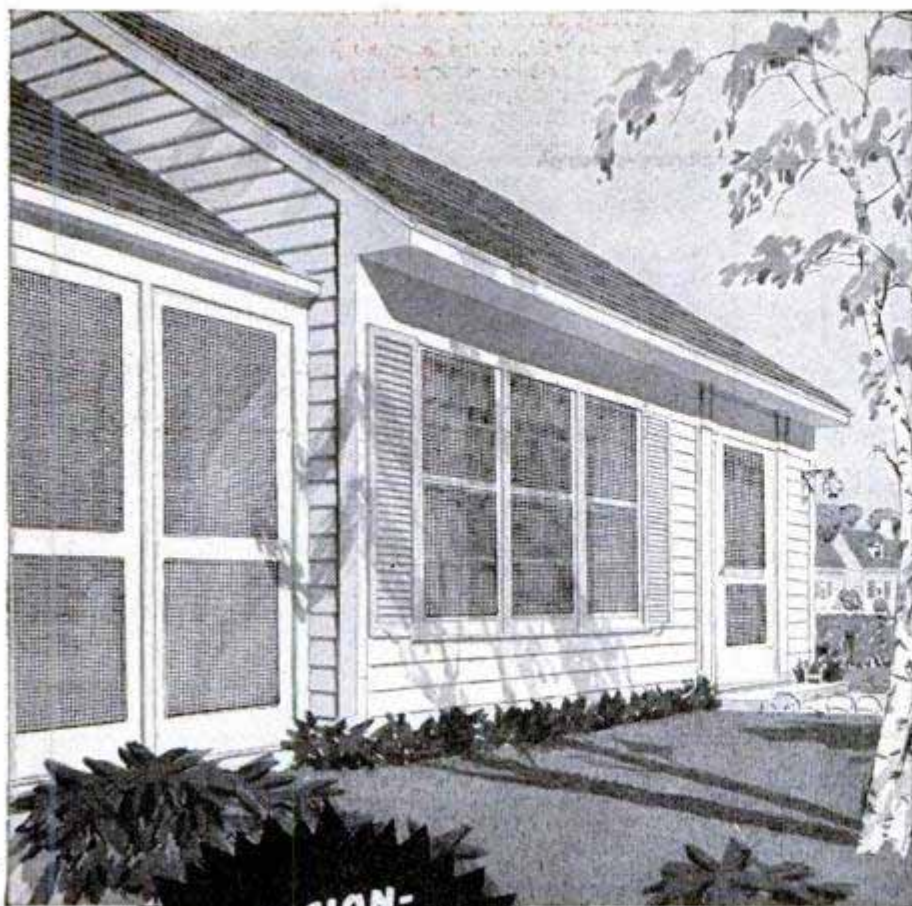
Lawn Mowing

Q—What is the correct way to mow a lawn? Should the mower blade be set to cut low, about 1 in. or lower, or should it be set to cut the grass 1½ to 2 in. high? Some say that low mowing will help to eradicate weeds. Is this right? R.B. — Grand Rapids, Mich.



A—No, except that low mowing is sometimes recommended when the lawn is infested with crab grass. In this case, low mowing late in the season helps to prevent reseeding of this pest. Good lawns seeded with the common native grasses should not be cut lower than 1½ in. high at each mowing throughout the entire season. If the lawn is rough or ridged in places, set the mower to cut 2 in. high. Exceptions to this rule are the methods of mowing bent grass and certain other lawn grasses grown in the South. The general practice is to mow these grasses quite close during the entire growing season. Special mowers having blades more closely spaced than regular lawn mowers are often used on bent-grass lawns.

(Continued to page 242)



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LONGER LASTING
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it's rustproof

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 CAN'T STAIN
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 AMAZINGLY
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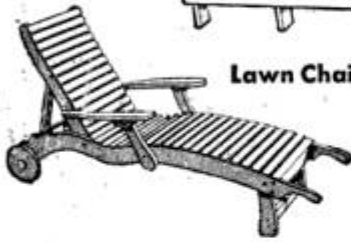


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Plastering Directly on Masonry Wall

Q—I am planning a new brick home and the cheapest wall construction seems to be brick backed by cinder blocks with the plaster applied directly to the inner face of the blocks. However, I'm told that such a wall draws dampness and that the moisture comes from the air in the house; not from the outside or from the ground. I'm wondering, is this information correct?

D.G.—Dallas, Texas.

A—Your informant is correct in stating that moisture will likely condense on walls of this construction. Such walls become cold when the outside temperature falls below that inside the house. Moisture from the air in the room condenses on the cold inner surface of the wall and the process is likely to continue as long as there is a wide variation between the inside and outside temperatures. Masonry walls should be furred with wooden furring strips to gain an air space between the inner wall surface and the back of the plaster. Usually 3/4-in. strips are sufficient, but some builders use strips 1 1/2 and even 1 3/4 in. thick, with a blanket-type insulating material between the strips. Over this they install a vapor barrier and then the lath and plaster. A new plaster base having a backing of aluminum foil is now coming into use in certain types of construction.

Regluing Old Chairs

Q—Some time ago I dismantled several old dining chairs and reglued the joints. For some reason the glue did not hold. Now all the joints in each chair are loose again. Joints are of the mortise-and-tenon type. What's wrong with this job? G.G.—East St. Louis, Ill.



A—You did not say what kind and type of glue you used and this leaves us rather uncertain of the cause. If you used a dry-powder glue, our guess would be that the powder was exposed to dampness sometime during storage. Either that or the glue—any of the dry-powder glues—was not properly mixed. Proportions of the mixture are quite critical and unless one follows the directions explicitly, the resulting mixture is apt to be either too thick or too thin. If the mixture is too thick, it will not bond the parts together at full strength. If too thin, most of the glue will be absorbed by the wood, resulting in a weak joint. There also is the possibility that not enough glue was used to assure an even coating on all the meeting surfaces of each joint. We suggest that you do the job over, using fresh glue carefully mixed in the proportions given by the manufacturer. Make sure there is sufficient glue in the joints so that a small quantity oozes out of the joints when the clamps are drawn up.

Lacquer Lifts Finish

Q—Recently I attempted to refinish an old chest of drawers with colored lacquer. The lacquer set so quickly I couldn't apply it with a brush, but had to use a spray gun. The lacquer wrinkled and peeled only a few minutes after application. What is wrong? C.M.—Kansas City, Mo.



A—There are several possible causes of the result you describe but we think it is likely that you used an industrial-type lacquer containing a fast-acting solvent. This would be practically certain to raise any nonlacquer finish over which it is applied, causing it to wrinkle and peel. You should have used a nonraising lacquer for this job. This lacquer contains a slower solvent and can be applied over most oil-base finishing materials, provided there is no trace of wax, grease, mineral oil or furniture polish on any part of the surface. Of course, you will have to remove all the damaged finish.

DEPENDABLE

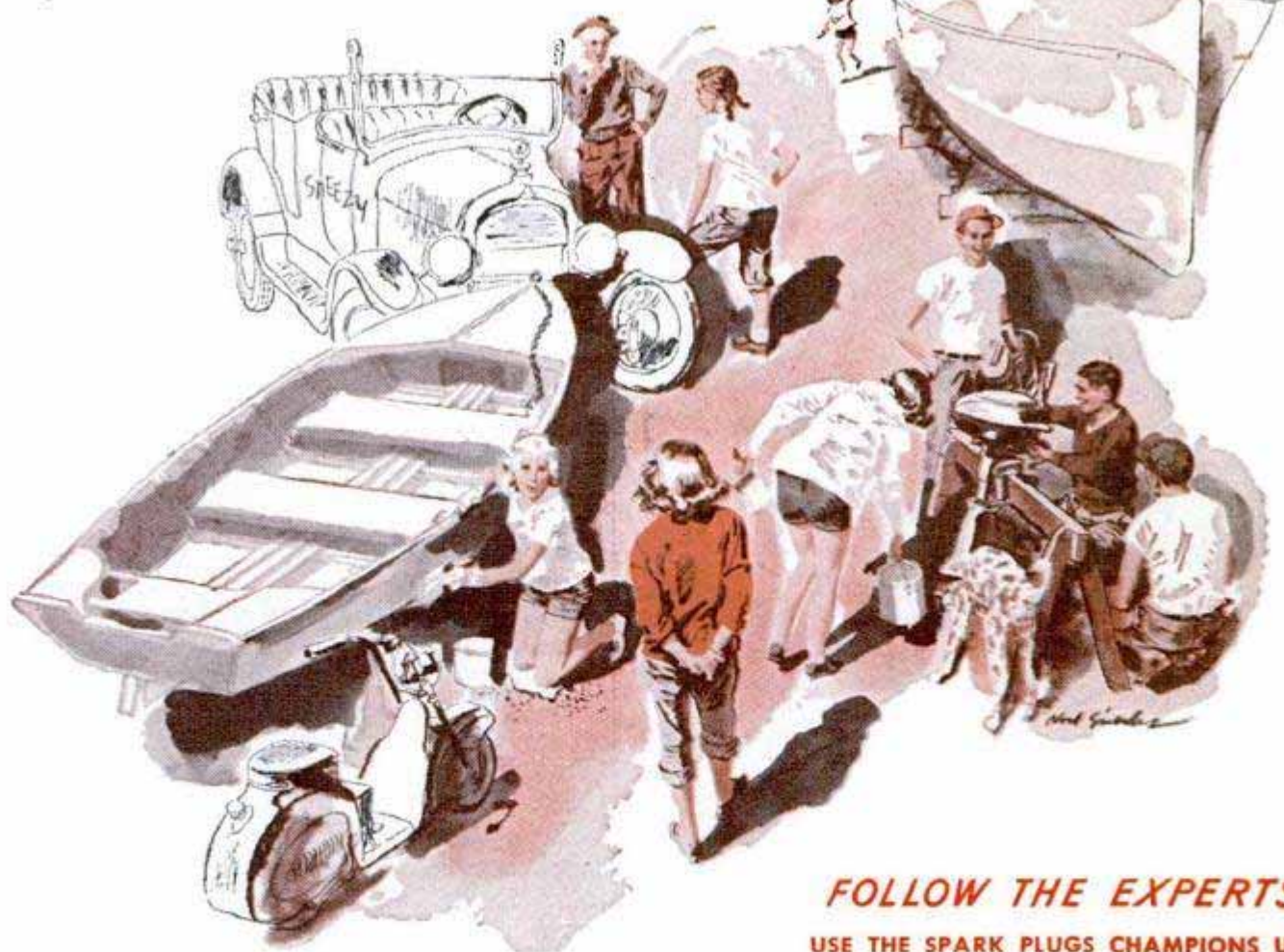
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... **WITH THE KIDS, TOO!** When you practically live on motorbikes, scooters, outboards and jalopies—when you'd rather race model powerboats, airplanes or cars than eat—you get to know something about what makes 'em tick, including spark plugs! Today's American kids, many of them engine experts in their own right, use dependable Champion Spark Plugs in vast majority for all their engines. Here again the reason must be better performance . . . and it is! That is why Champion has led in public acceptance for over a quarter of a century. Champion Spark Plug Company, Toledo 1, Ohio

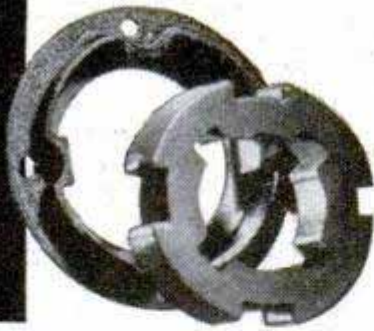


FOLLOW THE EXPERTS

USE THE SPARK PLUGS CHAMPIONS USE!

Listen to the CHAMPION ROLL CALL : : : Harry Wisner's fast sportscast every Friday night, over the ABC network

This die-cast resilient mount, with precision-fit rubber insert, is one reason Hoover Motors run so smooth, so quiet.

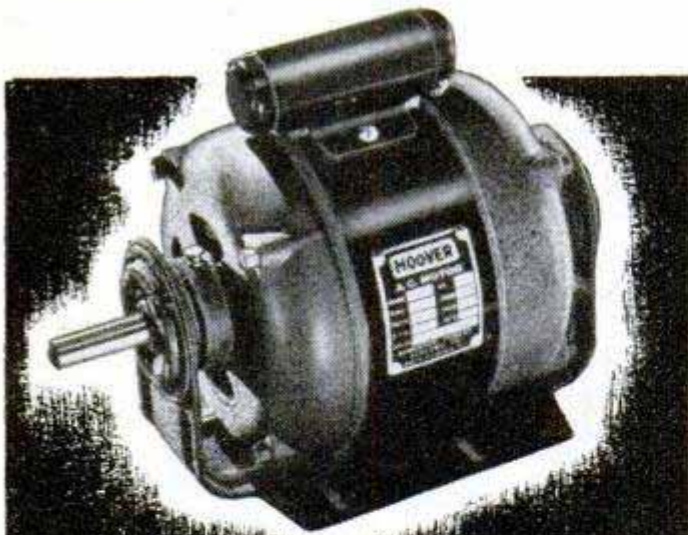


HUSH!

Yes—even under the toughest conditions of continuous operation, Hoover Motors run smooth, quiet, and cool.

Into each one goes the same engineered efficiency that has made the Hoover Cleaner world famous for forty years.

If you use a motor in the $\frac{1}{4}$ to $1\frac{1}{2}$ h.p. range, you need a Hoover Motor. Available at your nearest dealer's in sleeve or ball bearings, rigid or resilient mounts that meet NEMA dimensions.



HOOVER MOTORS

Made in capacities of $\frac{1}{4}$ to $1\frac{1}{2}$ H. P.
Product of Kingston-Conley Division,
The Hoover Company, North Canton, Ohio

Light tackle is also used in catching weakfish. Shrimp is the best bait on a very small hook, or you can use a small block tin squid with a worm on the hook. Small fishing plugs are used to catch big ones in Florida waters.

Top fish of them all, in the opinion of New Englanders and of some anglers on the Pacific coast too, is the striped bass. It attracts the special attention of close to a million sportsmen. The range is Maine to the Carolinas, and stripers were introduced in California and are plentiful there.

You catch stripers surf casting, trolling and plug casting. For fly casting you will need a six-ounce rod and a reel that holds 30 yards of fly line and 100 yards of 15-pound-test nylon line or six-thread cutty-hunk as backing. Big streamer flies will attract a striper on a running tide at dusk. Hook a big one and you may still be there at the break of day. The season is May to October.

Trolling requires a rod of 6 to 12-ounce tip and a free-spool reel with 200 yards of 6, 9, or 12-thread linen or nylon line. Troll a spinner baited with worms or an eel-skin rig, or a bass plug, and troll slowly.

If you like surf casting from the beach, then you need surf-rod tips six or seven feet long with a 30-inch butt, a free-spool reel and 200 yards of 9 or 12-thread line. For lures there is a nice variety from metal squids to feather jigs and plugs.

When the stripers are running along the eastern shores, the Pacific salmon are coming in to spawn in the Northwest. The hysteria is about even. The largest salmon is the Chinook, called king salmon in Washington and Alaska, and referred to as Tye salmon in British Columbia. Up the Columbia and other great rivers of the Northwest comes this monster; in August and September the fishermen go in for great salmon derbies. The biggest Chinook ever caught on hook and line weighed 83 pounds.

These great fish are caught while trolling, spinning and mooching. What is a "moocher?" A moocher is a salt-water troller in Puget Sound. A moocher differs from a troller in that he puts out many yards of line, using little weight, and depends on the length of the line and the slowness of the boat to put the bait on the bottom. He rows the boat with short strokes which makes the bait dart on and near the bottom. This often catches the large salmon.

In addition to the fishing in Puget Sound and Campbell River, we like the fishing below Bonneville Dam and also at the mouth of the White Salmon, the Little Salmon River and the Celio Falls district. They go to 40 pounds at Bonneville Dam and the steelhead trout go to 20 pounds and more.

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Get a "super shine" with less rubbing!

DU PONT NO. 7 POLISH



Contains
"stroke-saving"
methyl cellulose

For a dry, brilliant shine with less work . . . in less time . . . use DU PONT NO. 7 POLISH. Quickly and easily, it removes dull traffic film . . . produces a glittering new lustre to the finish of your car.

"Stroke-saving" methyl cellulose . . . found only in this patented formula . . . is an impor-

tant ingredient of DU PONT NO. 7 POLISH! It accelerates the clean-up—helps to bring back the original color and sparkling beauty of the finish.

More and more car owners are finding that DU PONT NO. 7 POLISH is the fast, easy way to new-car beauty. Buy it . . . try it *once* . . . and you'll see why!



For Better, Faster Car Washing

. . . DU PONT CAR WASH. Here's a new synthetic detergent that makes car washing a cinch! It cleans away grease, oil and dirt in a jiffy, without harming the finish or a polish job. And you don't have to dry the car. It will drain dry and bright—without streaks or spots.

DU PONT

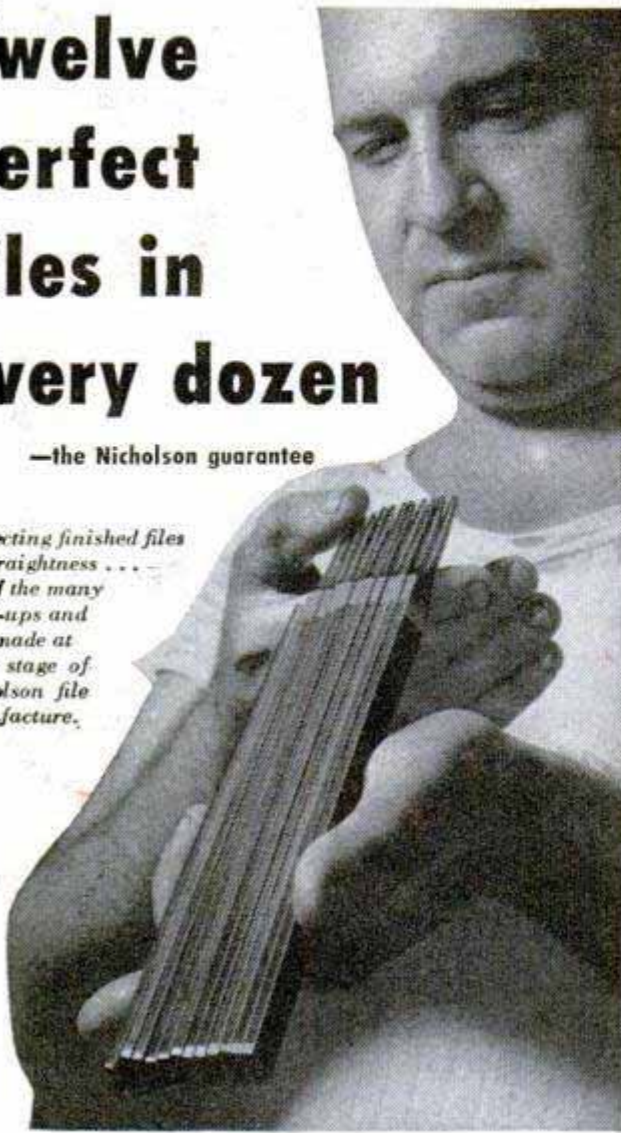
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Inspecting finished files for straightness . . . one of the many check-ups and tests made at every stage of Nicholson file manufacture.



We have to make good files or we could not make good on that guarantee. A "perfect" file is one which in practical use does the best job that is possible through being precisely straight, carefully balanced, uniformly hardened, accurately cut (with teeth even in height and sharpness), and made of the finest file steel obtainable.

Nicholson has had 85 years of experience in manufacturing files *exclusively*. Every Nicholson or "Black Diamond" file is designed, made and tested to give you the best file performance, the longest file life, and therefore the most file value. There's more satisfaction in making files that way, because we know there's more satisfaction in using them. As a craftsman you'll agree that makes a lot of sense. At good hardware stores throughout the continent.

• **FREE BOOK, "FILE PHILOSOPHY"** — tells about file kinds, use and care . . . 48 interesting illustrated pages. Post-card request brings you your free copy.



NICHOLSON FILE COMPANY
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(In Canada, Port Hope, Ont.)



NICHOLSON FILES FOR EVERY PURPOSE

Voice of the Prowl Car

(Continued from page 85)

Stand-by receivers are located at each transmitter for use if the main receivers happen to break down.

In addition to its city-wide system, Los Angeles participates in an inter-city police network that links it with communities from Santa Barbara, on the north, to San Diego on the south. A main repeater transmitter on Santiago Peak, in Orange County, picks up messages broadcast to it on its own frequency and radiates them at higher power over the whole region.

Tie-in with other cities in California and with state and other law-enforcement bodies is made by means of a battery of Teletype machines in the communications headquarters. The statewide Teletype system serves about 90 offices, including several located in adjoining states.

For communication with police in other parts of the country, the division uses the transcontinental police radio-relay system, of which Chicago, Kansas City and Denver are main relay points. KGPL is the California terminal of the system. An incoming radiogram that is destined, say, for San Francisco is received at KGPL, Teletyped to the communications center in the city hall, and from there is carried to its destination over another Teletype circuit.

The whole Los Angeles city police radio system is now being converted from AM to FM. Frequency modulation will help reduce noise levels in the receivers and will minimize interference from the numerous medical diathermy machines in the area. It will improve communication, too, when a car happens to move into a radio shadow area. Four mountain ranges, including one with a peak 5000 feet tall, are inside the city limits.

Even when the shift to FM is complete, radio technicians won't consider their system to be perfect. The next step, Fred Crowder says, will be to install radio facsimile equipment in the cars. Instead of listening to a voice and possibly making an error while copying the message, officers will pull printed slips of paper from their receivers, exact records of the commands and information transmitted to them.

Slip-Resistant Enamel

With Vinylite resins as a base, a new enamel for concrete, metal and wood floors has worn at least twice as long as other enamels in tests. It provides a slip-resistant surface that can be cleaned with soap and water. The coating dries fast and can be applied with brush or spray.

Only **AUTO-LITE**

**OFFERS CAR AND TRUCK OWNERS EVERYWHERE
THE SENSATIONAL ADVANTAGES OF A**

Resistor Type **SPARK PLUG**

Now standard equipment
on leading makes of
cars and trucks



Get these 4 Star Benefits

- ★ **A SMOOTHER ENGINE IDLE**
Wider spark gap helps eliminate occasional missing.
 - ★ **IMPROVED GAS ECONOMY**
Permits burning of leaner mixtures and reduces misfiring.
 - ★ **INCREASED ELECTRODE LIFE**
Up to 200% and more.
 - ★ **IMPROVED RADIO RECEPTION**
Reduces plug interference with radio, radar and television within 35 mv/m from 540 kc. to 150 mc. at 50 ft.
- ★ Because of its low rate of electrode erosion, the new Auto-Lite Resistor Spark Plug permits wider initial gap settings and makes these advantages possible.

ACCLAIMED BY CAR OWNERS COAST TO COAST!



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Start in Spare Time with a FOLEY SAW FILER

Here is a steady repeat CASH business you can start at home in your basement or garage, while you are working at your regular job. No experience is necessary to turn out perfect cutting saws—"the first saw I sharpened came out 100%. I think the Foley Saw Filer is a marvel of perfection," writes Clarence E. Parsons. Every saw you sharpen will bring you new customers. You will find you can make up to \$2 or \$3 an hour—\$20 to \$30 a week in your spare time as a starter.

With a Foley Saw Filer you can file all hand saws, also band and cross-cut circular saws. It is easy to operate—simple adjustments—no eye-strain. Patented jointing principle evens up all irregular teeth and makes an old saw cut just like new.

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"INDEPENDENCE AFTER 40!" shows you how to get plenty of saws to file without canvassing, and how you can develop into a general repair shop that will be your own business. This is a helpful, practical book that tells just what to do—send for your free copy today.



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Send me free book "INDEPENDENCE AFTER 40!"

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Address _____

Twist, Stretch and Smash, Inc.

(Continued from page 169)

diapers passed the test with flying colors—mostly blue.

The bacteriological laboratory has a number of functions, one of which is to cause its women staff members to break out in rashes. If a fabric or material which is to be worn or handled is suspected of toxicity, a small piece of it is fastened to the arm of one or more girls. If skin irritation follows, it gets a very low rating. Baby foods, candy, food wrappers and plastic dishes are among the many items checked.

This section performs such tasks as checking foods and medicinal preparations for vitamin content and bacteria, and it also sniffs scientifically at a variety of things. Its osmometer measures the intensity of odors in cosmetics, textiles, foods, plastics, insecticides and deodorizers.

The detergent laboratory, in addition to testing cleaning agents for a number of characteristics, is probably one of the few agencies which produces standard soiled fabrics. Carbon black and other efficient dirtying agents are precisely introduced into the material, giving it a superb tattle-tale-gray shade, which serves as a yardstick during the subsequent laundering.

Laminates, plywoods and plastics are tested by a 50-ton press in the plastics lab. Here also aircraft cameras are tested at 100 degrees below zero Fahrenheit.

Heavy hemp hawsers are broken under pulls of as much as 200,000 pounds and concrete blocks collapse under tremendous pressures. In the ultrasonics department, normally incompatible fluids are mixed in a transducer while being shaken at 400,000 cycles per second.

Much of the UST work is done for large companies, which never publicize the results. One firm had an electric appliance tested, not only by the laboratory, but by 25 housewives, serving as a consumer panel for UST. The women found everything wrong with it and the technicians rated it twelfth in the field of such appliances. The company re-engineered and re-designed it and it is now a satisfactory and fast-selling product.

Highest accolade of the company is its seal of certification, placed on products after rigid examination of the materials and of the process of manufacture, with periodic tests being made of the product as taken from the production line and from regular commercial outlets. Twenty-six manufacturers now use the seal and applications are under consideration from about 15 others.

ANNOUNCING MODEL "L"

30% More Power

Lowest Price for this type of machine in our 15-year history

Thousands of men, both in the cities and in the country, have discovered that Servi-Cycle is the right answer to the problem of getting to and from work—or wherever you want to go, day or night—quickly, safely, comfortably, dependably, and economically. When you ride a Servi-Cycle, you ride *all* the way, and you take the shortest route. This light, safe, easy-to-handle powercycle takes you along the open road or through city streets with amazing ease.

Traffic studies show that Servi-Cycle cuts bus-travel time in half. On busy streets, Servi-Cycle is faster than an automobile. By saving travel time, "The Servi-Cycle Way" adds many minutes to your day.

RIDE TO WORK



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**SAFE
DEPENDABLE**

NEW LOW PRICE

\$248⁰⁰
Delivered
Anywhere in U.S.A.

**U.S.
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ECONOMICAL

Servi-Cycle costs only a fraction of a cent per mile to operate. Many thrifty car owners go to work daily on a Servi-Cycle, and leave their more-expensive-to-operate automobile at home. With a Servi-Cycle, parking is not a problem . . . The New Model "L" Servi-Cycle—acclaimed "The World's Best Powercycle"—incorporates many refinements that have resulted from 20-years of engineering research and powercycle production. Material and workmanship are guaranteed.

OUTSTANDING FEATURES

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LOWEST PRICED COMPLETE POWERCYCLE

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WITH HARD-WEAR HANDLES

FOR FAST, ACCURATE WORKMANSHIP...

New for you... GREENLEE Socket Chisels with handsome, transparent and tough Hard-Wear handles. Beauties to look at. Beauties to hold with their correctly shaped handles of special hand-fitting design. And beauties to work with. For, they are in perfect balance and have those fine, bevel-edged GREENLEE blades so long the choice of true craftsmen. See your dealer for these fine new chisels. And remember, to get top quality always, get GREENLEE.



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SPECIAL OFFER... ONLY 10¢ FOR HANDY WOODWORKING CALCULATOR

Quick solutions to countless woodworking problems. Just set dial: convert linear feet to board feet; compare characteristics and workability of various woods. Also shows bit

sizes; nail specifications; tool sharpening hints; etc. Heavily varnished cardboard, 6" diameter. Send 10c to Greenlee Tool Co., 2106 Columbia Avenue, Rockford, Illinois, U. S. A.



The Bay Bridge Is to Have a Twin

(Continued from page 128)

of materials. Surfaces are first steam-cleaned and are also sandblasted where necessary. Two coats of lead paint are applied, then a finish coat of aluminum. Ninety percent of all painting is done with hand brushes because the wind might spread sprayed paint over passing cars.

Besides the plans for the new bridge, test borings and engineering details have also been completed for the proposed southern crossing. Instead of a high-level bridge under which ocean ships could pass, this crossing would consist of long trestles stretching out from either shore and joined by three parallel 6200-foot-long underwater tubes, each containing a two-lane highway. The idea is practical because the bay is relatively shallow at the site that has been selected.

The tubes would be buried in the bay bottom and would present no obstacle to shipping, nor would they interfere with flying-boat operations at the adjacent Alameda Naval Air Station. At each end of the underwater portion of the crossing a great artificial island would be built of sand to support ventilation and shop buildings and other structures.

To prepare a foundation for the tubes and for the sand islands, the existing mud bottom will be trenched to a depth of 70 feet, some 120 feet below sea level. This trench will be partly filled with a sand foundation and at its ends the sand will be built up above sea level to form the artificial islands. Tops of the islands will be some 134 feet above the bottom of the excavation and their sloped sides will be protected from wave and tide action by thick layers of waste quarry rock.

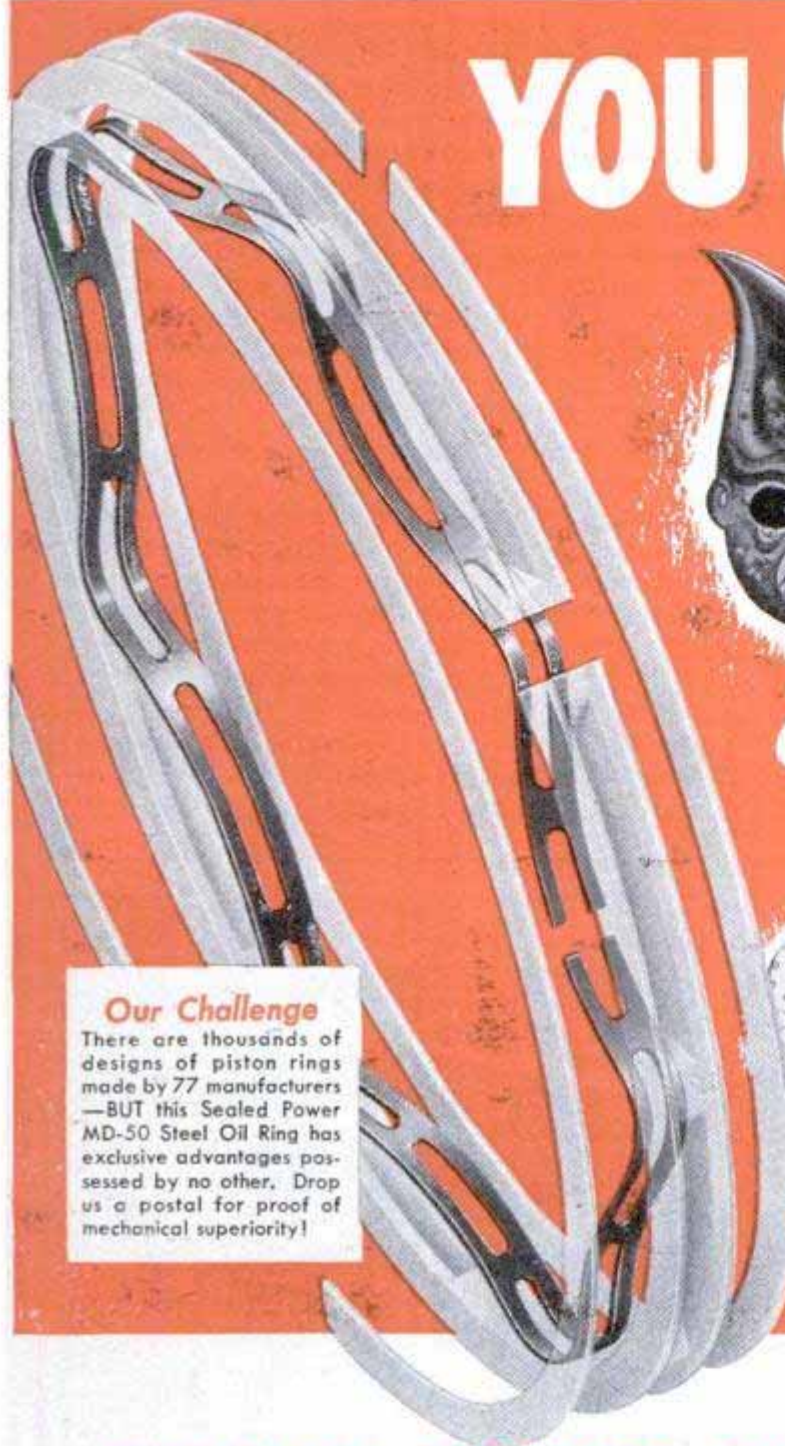
Each of the tubes will be 37 feet in diameter. The lower portion of each tube, under the roadway, will serve as a fresh-air duct, with a similar duct over the roadway ceiling for carrying off exhaust air.

The tubes will be built of reinforced concrete. The plan is to precast them in 200-foot sections in a convenient dry dock, then bulkhead each 5200-ton section at its ends and tow it to the site. Each section would be sunk into place by admitting water through a sprinkler system onto a thick layer of sand placed temporarily on the roadway. This technique would hold the water in place and avoid any shifting of balance during the sinking process.

The ends of the tubes would rest on precast reinforced concrete slabs previously placed in the trench and the slabs in turn would each be supported on 68 huge timber

(Continued to page 252)

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Oil Waste



Gas Waste



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There are thousands of designs of piston rings made by 77 manufacturers —BUT this Sealed Power MD-50 Steel Oil Ring has exclusive advantages possessed by no other. Drop us a postal for proof of mechanical superiority!

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Save Oil, Save Gas, Seal Power!

This great 4-piece Sealed Power Piston Ring can give your present car, truck or tractor 1949 pep, 1949 economy! It is the only piston ring with the exclusive Sealed Power Full-Flow Spring. All over America, it has helped thousands of car owners to end oil and gas waste and to restore original power. Ask your Sealed Power Dealer for the whole story!

Mail a postal card today for proof to back up our challenge! At the same time we'll send you our new illustrated booklet on 7 ways to save oil. It's free, and may save you real money. Sealed Power Corporation, Dept. G-6, Muskegon, Michigan.

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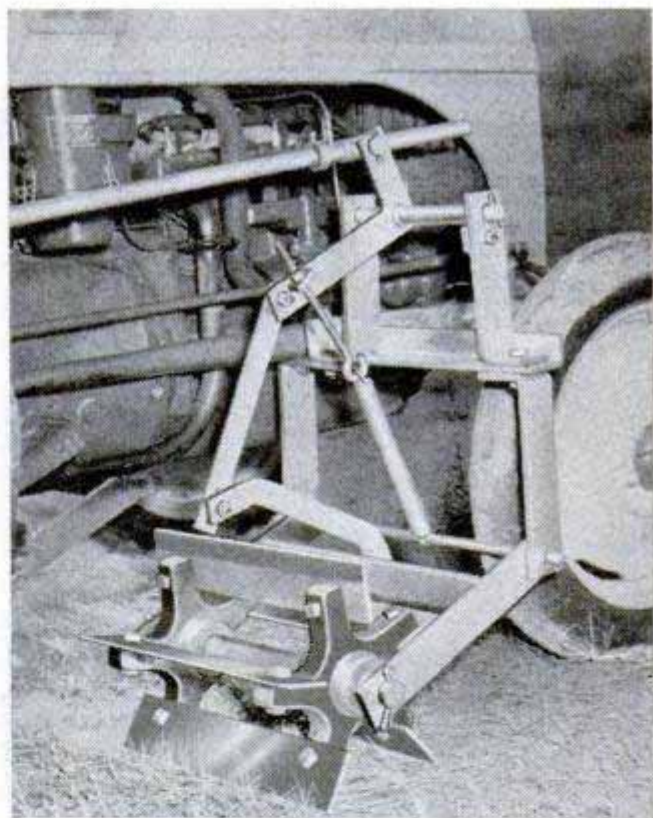
Riegel Textile Corp.
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piles driven down through the sand and into the clay bottom. Special means have been devised for joining the sections of the tubes so as to provide a watertight seal during the time that they are being permanently connected with concrete and steel. After the tubes are completed, they will be covered by a five-foot layer of sand plus an additional five feet of waste quarry rock. The southern crossing and its approaches, it is estimated, will cost about 178 million dollars and will require 5½ years to build.

One of the problems connected with both the parallel bridge and the southern crossing will be to provide extensive distribution highway systems for conducting traffic to and from the crossings. The planned road systems will be in the nature of elevated freeways that will tie in with the super-highway systems that are now under construction on both sides of the bay. The approach systems will also include elevated roadways that will lead direct to various points on each side of the bay.



Double-Row Stalk Cutter

Invented by a Texas farmer who had difficulty getting enough help and gasoline to run his farm during the war, a double stalk cutter has two rotary blades, one being mounted behind each of the tractor's front wheels. The cutter chops two rows of stalks at a time and turns them under. The Texan is now manufacturing a universal model that will fit any tractor.

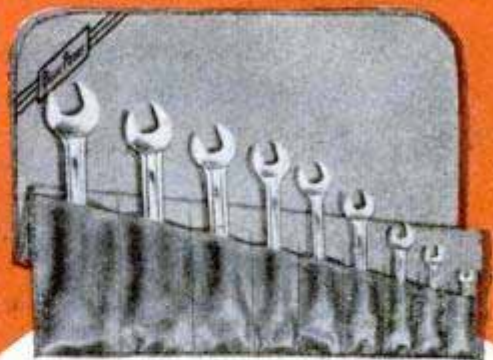
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Blue-Point Supreme

Open End Wrenches

are unequalled for strength,
toughness and
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Here are the eight superior qualities that make them the finest tools money can buy: 1. Thinner heads. 2. Narrower jaws. 3. Precision machined openings. 4. Greater strength. 5. Lighter weight. 6. Balanced design. 7. Sure-grip handle. 8. Finest alloy high carbon steel, heat treated from skin to core.



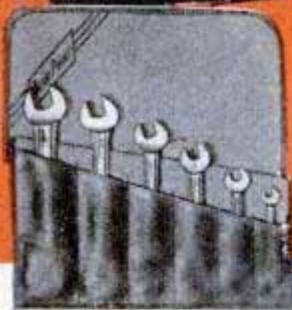
Blue-Point Supreme 9-Pc. Wrench Set

\$16¹⁵

In Kit Bag

TOOLS ONLY - - - - \$14.50

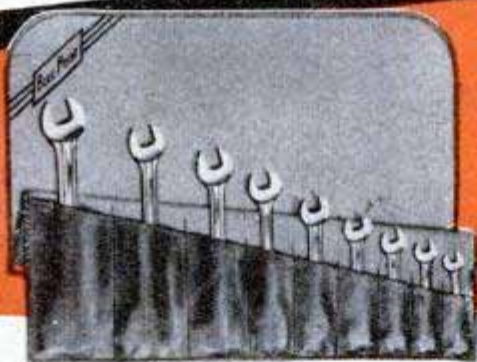
Here is one of Snap-on's most popular Open End Wrench Kits. There are 18 different wrench sizes that range from 1/4" to 1 1/4". They solve many of your nut-turning problems.



6-PC. WRENCH SET

12 popular wrench sizes on six handles. Sizes from 3/8" to 15/16". No duplication of sizes. In leatherette kit bag - - **\$8.50**

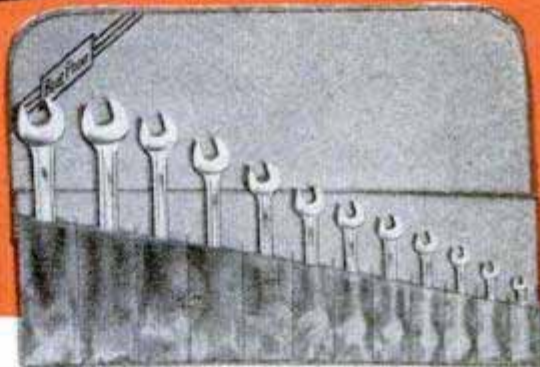
Tools only - - - **\$7.70**



STURDY 9-PC. WRENCH SET

13 wrench sizes with 5 most popular sizes duplicated on different handles. Sizes from 3/8" to 1". In leatherette kit bag, only - - **\$12.75**

Tools only - - - - **\$11.10**



POPULAR 12-PC. WRENCH SET

Full range of sizes from 1/4" to 1 1/8" with 7 most used wrench sizes duplicated on different handles. Complete in leatherette kit bag, only - - - - **\$17.00**

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Medicated vapor is delivered directly into the nostrils by a combination inhaler-vaporizer that requires no water or steam. Two tubes with plastic tips direct the vapor into the nasal passages. The device can also be used for vaporizing a room by removing the cover and its attached tubes. Heating action of an electric element vaporizes the medicine, such as tincture of benzoin or oil of eucalyptus.

Paper-Plastic Skin for Plywood

Plywood is strengthened and made abrasion resistant by a thin paper-plastic surfacing that is fused to both sides of the panel. The durable skin consists of special paper stocks impregnated with Bakelite phenolic resins. Fused to the plywood at the time it is produced, the surfacing provides an excellent surface for painting and finishing. It has also proved valuable for use as a concrete form material since its water-resistant quality permits it to be reused scores of times.

Ship-Steering Recorder

Even slight deviations from a ship's set course are recorded by a new naval instrument. Developed by General Electric engineers, the recorder automatically traces the ship's course. Connected electrically with the rudder and compass are two metal points in the instrument. A 12-inch roll of waxed paper passes beneath these points. The recorder calculates the deviation from the set course on the moving paper. Engineers report that the instrument will detect an error as slight as .2 degree.

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Larger tension balls; stiffer springs; grip firmly. Sockets stay on tight, in use!



Ratchet wrench heads and handles forged in ONE-PIECE! Stainless steel ratchet pawl and pin; stronger, longer wearing; **RUST-PROOF!** Will not break off! Reverses instantly; won't trip accidentally!

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Now! Outstanding **CRAFTSMAN** quality, with **FORGED SOCKETS . . . at a real saving!**

A terrific bargain at this special low price! In our belief, it's the finest set you can buy . . . and get such quality and craftsmanship; so many extra-value features! Designed for toughest automotive, aircraft and other professional use. 32-piece set includes: 1/2-in. square drive; ten forged 12-point sockets (7/16 to 1-in.); universal joint; 6 and 10-in. extensions; 9 3/4-in. reversible ratchet; 18-in. speeder wrench; 15-in. flex "T" with crossbar; and heavy duty, 19 3/4 x 6 x 3 3/4-in. steel tool box. 1/4-in. square drive; seven 6-point sockets (7/32 to 7/16-in.); 1/4 and 5/16-in. 8-point sockets; 3 and 6-in. extensions; 5 1/4-in. reversible ratchet; 5 3/4-in. flex "T" with crossbar; 4 1/2-in. slide bar; and 7 x 3 1/4 x 1 1/8-in. steel tool box.

Buy it NOW!

Get it TODAY at your nearest SEARS RETAIL STORE, or order DIRECT from your nearest SEARS MAIL ORDER HOUSE, using coupon at right. See the complete line of famous CRAFTSMAN tools in Sears Big Catalog, or nearest retail store.

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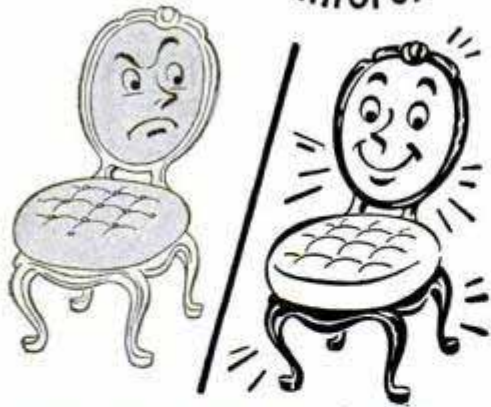
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SEND FOR THIS BOOK OF DESIGNS 48 pages of helpful tips on fireplace and outdoor cookery. Send 25c for your copy.



Another *Majestic* Product



Lift Truck Forms Broadcast Tower

Radio announcers covering sports events at Gull Lake, Mich., are using an industrial lift truck as a movable observation and broadcast tower. A pallet-type platform is attached to the truck for the announcers. The truck then wheels them from one vantage spot to another and raises or lowers them at will for interviews and a clear view of the sports event.

Science Shivers to a New Low

Brrr! Scientists at Ohio State University have achieved laboratory temperatures as low as .05 degree above absolute zero. They say absolute zero is unattainable. Absolute zero is 459 degrees below zero on the Fahrenheit scale and 273 below, Centigrade. The cooling device which produced this record low is known as a "cryomagnetic generator." The temperatures are so low they must be calculated from variations in an electrical circuit, since ordinary thermometers won't function under such conditions. The new device will help scientists study the atomic nucleus, as almost all molecular and atomic motions are "frozen out" at very low temperatures.

Crude oil is produced in 25 of the 48 states, the leading producers being Texas, California, Louisiana, Oklahoma, Kansas and Illinois, while Pennsylvania—where the petroleum industry began in 1859—ranks 13th.

LOT of REVOLVER for LITTLE MONEY



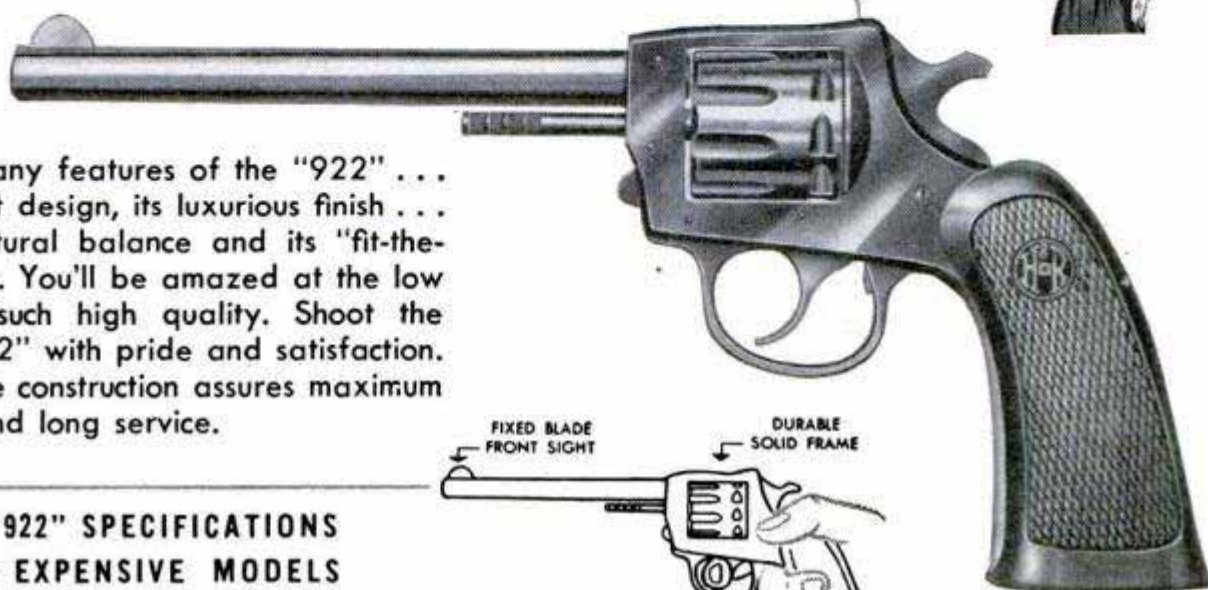
"922"

Solid Frame .22 Caliber

\$24.75



See the many features of the "922" . . . its clean-cut design, its luxurious finish . . . feel its natural balance and its "fit-the-hand" grip. You'll be amazed at the low price for such high quality. Shoot the H & R "922" with pride and satisfaction. Solid frame construction assures maximum accuracy and long service.



COMPARE "922" SPECIFICATIONS WITH MORE EXPENSIVE MODELS

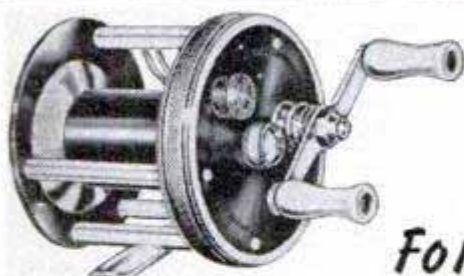
- 9-shot chamber
- 3 barrel lengths — 6", 4", 2½"
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- Fixed blade front sight
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See the H & R "922" at your gun dealer's. It's a thrifty investment in long-time fun and service.

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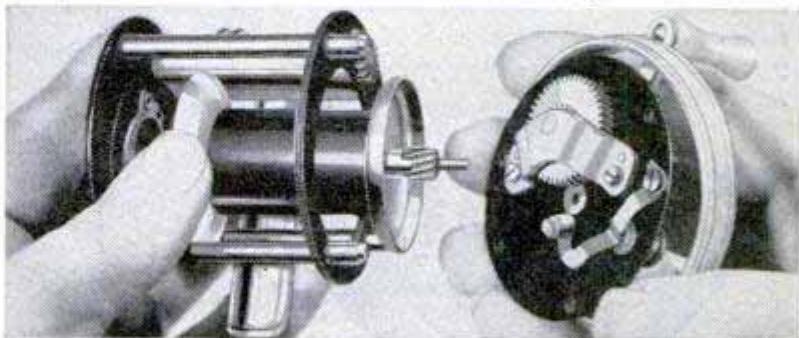
smoother, longer casts

Light tackle enthusiasts like this new Heddon "Pal" Reel because its light, sturdy construction assures smoother, longer casts. (Takes 100 yds. 12½ lb. line.) Its patented new head ring unscrews by hand. Head and spool pull out without disturbing adjustments, or losing parts. This permits better cleaning, oiling and assures the free, effortless operation of this fine, precision reel. Write for new catalog on Heddon Rods, Reels, Baits, Fishing Tips. It is the most interesting one we have ever published.

JAMES HEDDON'S SONS, 1286 W. ST., DOWAGIAC, MICHIGAN

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with removable head ring



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the same automatic screw driver used for mass assembly



Wasted time...wasted motion . . . in mass assembly screw driving cut down production and profits. That's why so many manufacturers use Millers Falls automatic spiral ratchet screw drivers.

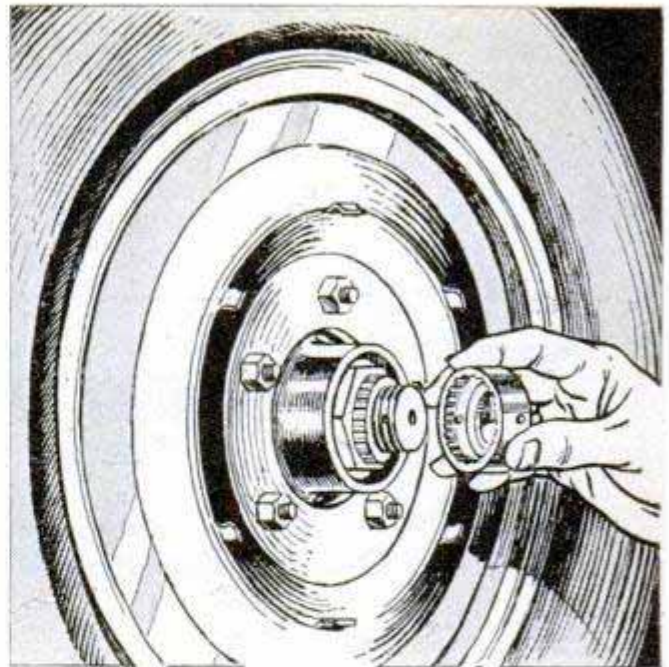
You can save time for more important work by using the same screw driver in your home workshop. Use it to drive or draw screws automatically . . . use it as a right- or left-hand ratchet, or as a rigid screw driver. And for easiest one-hand work, get a Millers Falls automatic with quick return action.

Millers Falls automatics are powerful, smooth acting, thoroughly dependable. Use yours with regular slotted or Phillips head bits . . . or convert it to an efficient automatic drill with a special chuck. Many sizes . . . the model shown costs \$4.90 at your hardware store — slightly higher in the West.

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SINCE 1868

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"Educated" Nut for Wheel Bearings

To guard against improperly adjusted front-wheel bearings, which are the cause of many accidents, an "educated" nut makes adjustments to one thousandth of an inch. Sixty serrations in the two-unit nut make it possible to lock and secure the bearing at its proper clearance. This is impossible with a regular castellated nut because it has only six adjusting points. With the new nut any mechanic can make a proper adjustment by running the nut section of the unit up to a firm seat, then loosening it to the point where the wheel rolls free. The cap section is then lined up with the cotter-pin hole, placed over the nut and secured with a cotter pin.

Underground Radio Broadcasting May Aid Mine Rescuers

Miners trapped underground may soon be able to direct their rescuers with a radio-communication system using low-frequency waves. Developed by the Bureau of Mines, the system successfully transmits voice through ground strata. The surface set uses 110-volt current while the underground receiver and transmitter are powered by a six-volt battery and vibrator power pack. The three-watt transmitter also sends signals along trolley wires, pipes and other metallic installations.

☞ Contrasted with American production of a daily average of 12 barrels per well, the 189 oil wells in the Middle East deliver an average of 5000 barrels each, for a total of 945,000 barrels. The 440,000 wells in the United States produce about 5,300,000 barrels daily.

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WITH 1000 USES!

The built in integral gear box has four 1/4" drive shafts turning simultaneously at the following speeds:
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 25 RPM—rocker for photo developing tray, cabinet makers glue wheel, erector sets, film puller for 16 mm, developer, operating laboratory equipment, etc.
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 This 1/20th HP, 115 V., 50/60 cycle, AC motor is precision built throughout.

Fully guaranteed—Money refunded if not satisfied
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CUTS IN ANY DIRECTION **NO CHIPS — NO DANGER**

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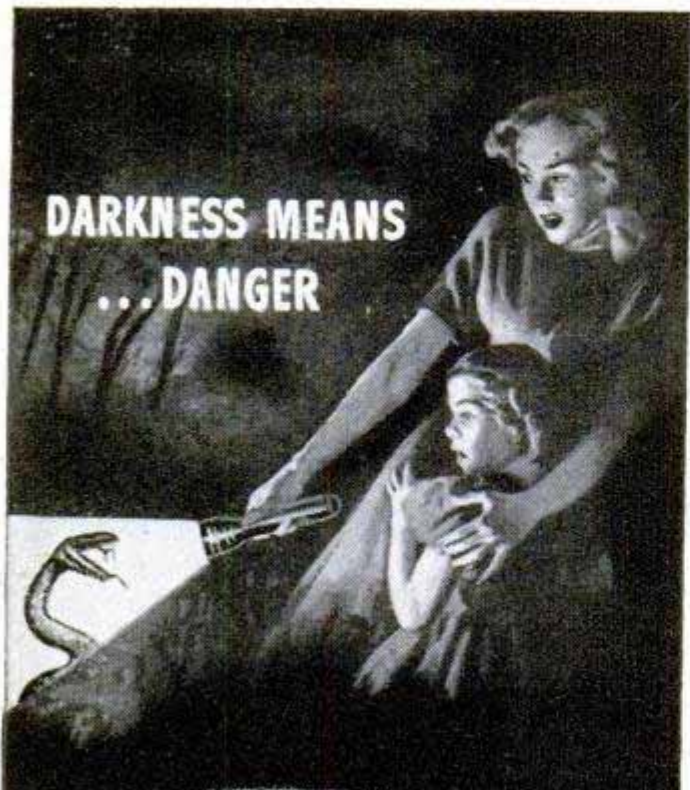
Tyler Spiral Blade slices cleanly through practically everything from foam rubber to steel. Cuts in any direction. Unusual design protects careless fingers. Unique, continuous blade edge opens new cutting techniques never before thought possible.

DELTA AND WALKER-TURNER OWNERS: Adapters available to make your machines perform these miracles. Guides and two Spiral Blades—\$24.50. Guides soon available for other Band Saws. Write.

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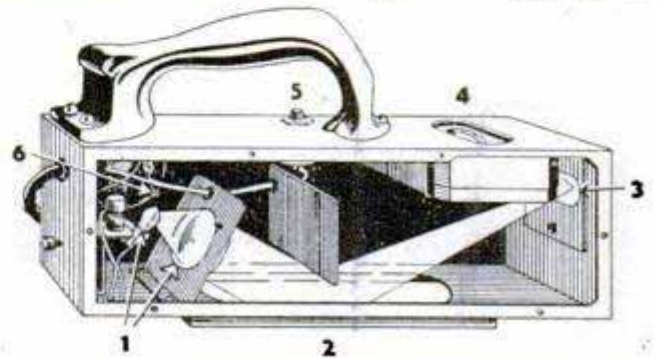
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OLIN INDUSTRIES, INC.

Meter Tests Painted Surface To Determine When to Repaint



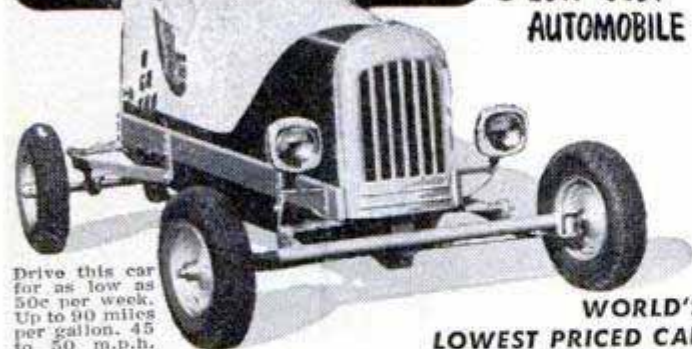
Top, testing the paint on a house wall to determine its reflectance value. Below, cutaway of glossmeter showing how it works: 1. Lamp and lens; 2. Painted surface being tested; 3. Target against which light is reflected; 4. Light meter; 5. Switch; 6. Rheostat

Whether or not a building needs repainting can be determined scientifically by an instrument that measures the gloss with a photoelectric cell. A companion instrument measures the reflectance value of the paint. The two meters are portable and have their own light supply. They operate from standard outlets or from a battery power pack.

Planes Sow DDT on Arctic Snow To Kill Mosquito Larvae

Mosquito-fighting has taken a new turn in the far North, where scientists have found that sowing DDT on Arctic snow in the winter keeps down the swarms of insects that make life miserable during the summer. The experiments have been made by Department of Agriculture entomologists in cooperation with Army and Canadian scientists. The DDT is sowed from airplanes. Melted snow forms a wet sheet on the plants of the tundra. Mosquitoes lay their eggs on this sheet, which now has become a deathtrap for both themselves and their young. One pound of DDT is sufficient to treat 10 acres effectively, the scientists have discovered.

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- MASS PRODUCED
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Drive this car for as low as 50c per week. Up to 90 miles per gallon. 45 to 50 m.p.h. Large enough for a husky six footer. A pleasure to assemble. Just bolt together our precision built parts. Get the facts. Send 25c for detailed circular with large photo, 4 view drawings, price of all parts. Better still, send \$1 (refunded first order) for this plus actual assembly book with 42 photos, drawings; blueprints of snow and ice conversions, etc.

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CROSLLEY of U.S.A. — leads the way

Here's the new economy car styled for the U.S.A.—made in the U.S.A. Larger, longer body lines, a clean sweep of design that's truly American.

New Crosley Station Wagon (above) is the biggest selling station wagon in the world. Sleek body lines. Seats 4, or 2 with 1/4 ton load. All steel. No increase in price. New Crosley Sedan Deluxe (below) is bigger, with speed-line styling, rich interior, choice fabrics. Seats 4 with ample luggage room.

All 5 new Crosley models—including Convertible, Panel Delivery and Pick-up Truck—look big, feel big, act big—cost little to buy or drive. Powerful Crosley engine takes steep hills in high, gives you up to 50 miles on a gallon of regular gasoline. And a Crosley costs less than an 8-year-old, high upkeep used car. Prices range downward from the Station Wagon at only \$929 F.O.B. Marion, Indiana.

For complete new catalog, write your name and address on the margin of this page, tear out and send to Crosley Motors, Inc., 2530-HF Spring Grove Ave., Cincinnati 14, Ohio.



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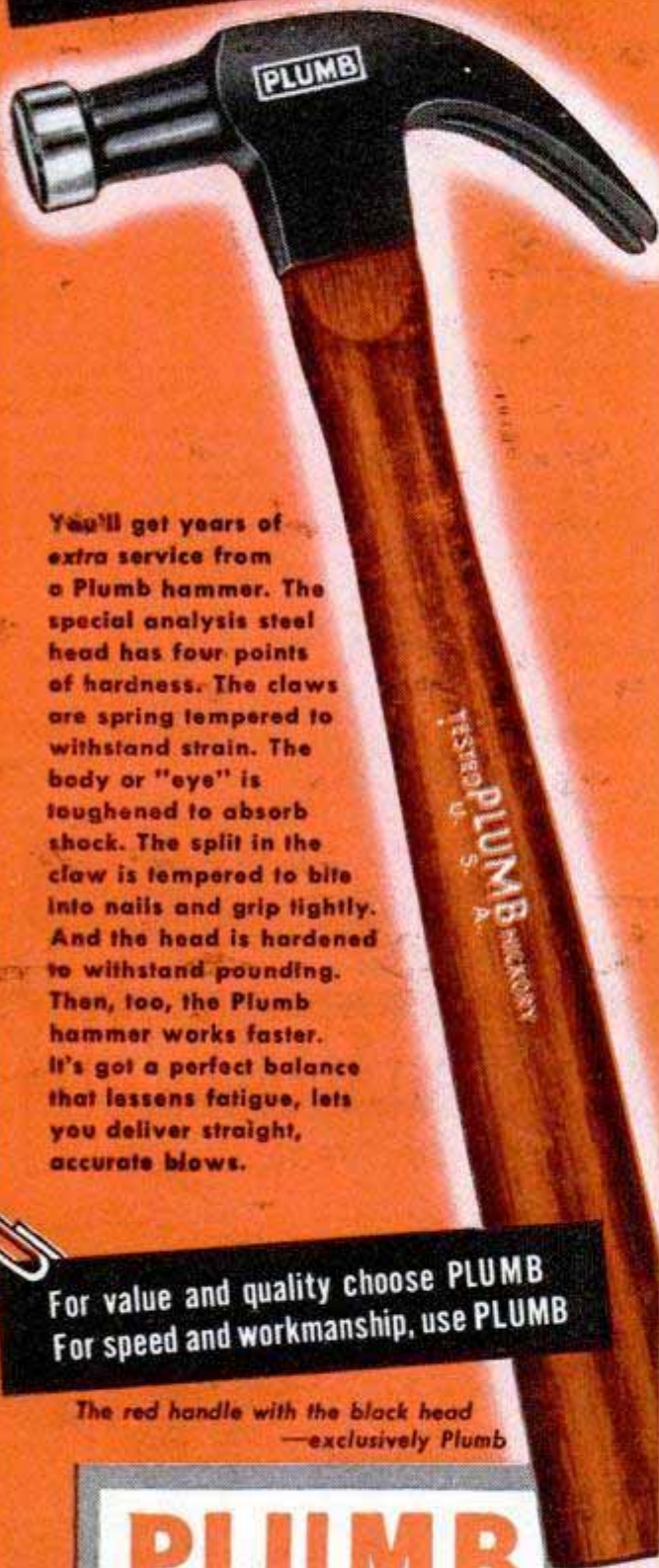


absorbs moisture—the cause of rust, warping, mildew in workshops, darkrooms, closets, playrooms, storage rooms, vaults. New, improved design gives 50% greater capacity, simplifies filling and emptying. Compact, inexpensive, clean, safe, odorless, thousands in use. Write for booklet and name of your nearest dealer.

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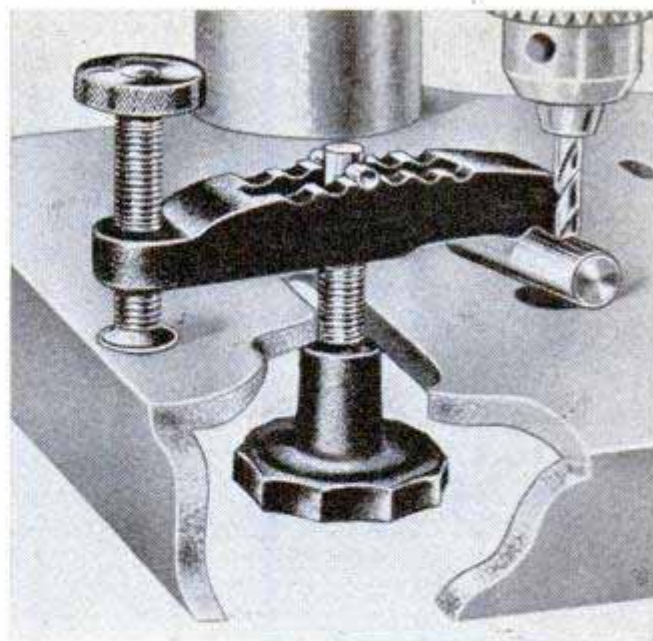
You'll get years of extra service from a Plumb hammer. The special analysis steel head has four points of hardness. The claws are spring tempered to withstand strain. The body or "eye" is toughened to absorb shock. The split in the claw is tempered to bite into nails and grip tightly. And the head is hardened to withstand pounding. Then, too, the Plumb hammer works faster. It's got a perfect balance that lessens fatigue, lets you deliver straight, accurate blows.

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Clamp for Drill Press Holds Work Securely

Capable of holding work of any shape and up to 2½ inches thick, a drill-press clamp has a T-design that permits instant installation and removal. Six pairs of grooves on top of the clamp make it flexible enough to fit any drill-press table with a slot at least 7/16 inch wide. Made of steel and cast iron, the clamp is especially useful for holding round work.

Papermaking Technique Ends River Pollution

Chemical wastes in papermaking that pollute rivers are eliminated by a new process in which the wood is digested with magnesium oxide instead of the calcium base traditional to sulphite pulp manufacture. The chemicals are reclaimed for reuse after the wood chips have been turned into pulp. Other parts of the wood, usually dumped into the river, are separated from the liquid by evaporation and burned to generate electricity. The process is being used in a new mill at Longview, Wash.

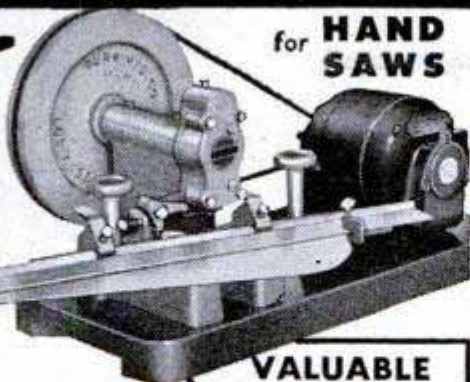
Fly Killer Surpasses DDT

DFDT, an insecticide developed by Germany during the war, is more potent than DDT in killing house flies and other flying insects, according to the U. S. Public Health Service. The chemical does not possess the broad killing power of DDT toward all insects, but is more effective against flying pests. It penetrates certain tissues of the insect's body more rapidly, but is not active for as long as DDT. However, it is less toxic to fish and animals that are warm-blooded.

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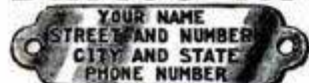
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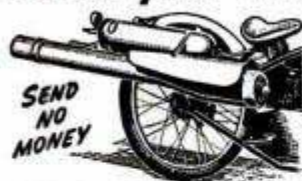
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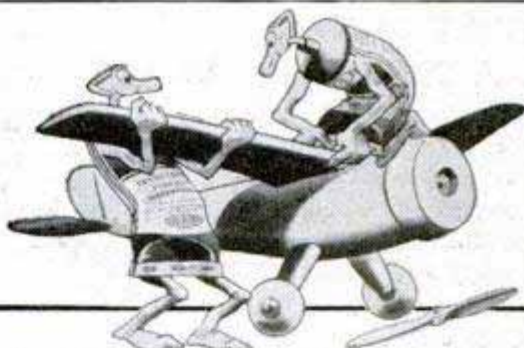
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CONTROL OIL-PUMPING
WHERE IT STARTS—WITH

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OIL CONTROL BEARINGS

1899 • 50 YEARS OF CONTINUOUS BEARING EXPERIENCE • 1949



Suspension-Spring Tool Balancer

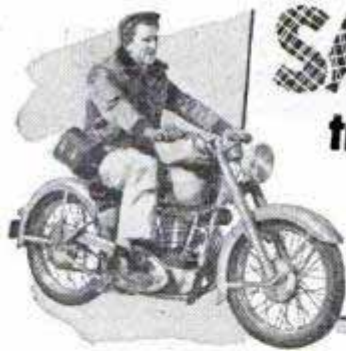
Tools weighing up to 10 pounds are always kept within reach by a new suspension-spring tool balancer. It has a working range of six feet. After the operation is completed, the released tool returns to its preadjusted position near the work area.

Swedish "Smoke Drinkers"

Smoke from Sweden's factories is providing cheaper carbon dioxide for carbonated soft drinks in that country. It had previously come to bottling plants in heavy steel bottles, weighing about twice as much as their contents and resulting in high transportation costs. Stockholm's Institute of Technology helped solve the problems of cleaning and separation.

Lemon-Peel Chemical Cuts Radiation Injuries

Derived from lemon peel, a chemical called calcium flavonate may aid in overcoming the blood-damaging effects of radiation injury, whether from atom bombs or in X-ray treatments for cancer. The lemon-peel chemical, given to guinea pigs in their drinking water, cut the mortality rate by about half when they were exposed to total body irradiation from X-rays. The chemical may be valuable in cancer treatments because with it patients could be given larger doses of X-rays without harm.



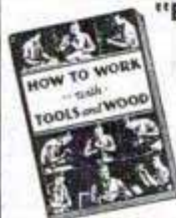
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Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for FREE information.



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Only **\$12.95** Complete



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Built-In-Head Motor and Compressor Unit



Now! An electric sprayer as easy to handle as a brush—and twice as fast! Sprays household enamel, lacquer, varnish, shellac, light oils and insecticides. No extras to buy! 25 oz. jar. 8 ft. cord. Mail the coupon for full information.



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MAKE BUILDING BLOCKS RIGHT IN YOUR OWN BACKYARD AMAZING GENERAL BLOCK MACHINE

CAPACITY 1000 BLOCKS PER DAY

\$199 LESS MOTOR ONLY F.O.B. PLANT SHIPPING WEIGHT 400 lbs.



Cinder and Concrete Blocks in big demand. Sell all you produce, to contractors and builder supply yards, at 15c to 25c each. Easy to start your own profitable business.

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- 1-Assorted machine screws, sheet metal screws and bolts, sizes 2-56 to 3/8-24, various type heads. 3 LBS. \$1.15—5 LBS. \$1.50.
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Add 5c per LB. for parcelpost on Screw-mix.

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Minimum order bearings \$1.00 add 10c postage.

Bore	O.D.	Type	Price
5/32"	5/8"	Ball	15c
3/16"	1/2"	Needle	15c
1/4"	5/8"	Needle	15c
3/4"	3/4"	Ball	22c
1 1/8"	7/8"	Ball	25c
1 1/4"	1 1/4"	Needle	28c
5/8"	1 3/8"	Ball	40c

SANDING BELTS

Carborundum & Behr-Manning
Minimum Order \$1.00

Size	Grit	Each
4"x48 1/2"	80 & 100	45c
4"x36"	120	35c
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DOES THE WORK OF 6 TOOLS IN 1
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JUNE 1949

MORE

ELECTRIC HOME-UTILITY TOOLS

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1/2" ELECTRIC DRILL... \$35.95

Drills up to 1/2" diam. in steel, 3/8" diam. in hardwood. Drives Hole Saws for cutting clean round holes up to 3" diam. in sheet steel.

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Contains Home-Utility 1/4" Drill, horizontal stand, 13 high-speed twist drills, wire wheel brush, grinding wheel, buffing wheel, buffing compound, wheel arbor—all in sturdy metal carrying kit.

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\$17.45

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\$8.25

BUFFING & POLISHING KIT

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ELECTRIC MOTOR 1/2 H. P. 27 V.D.C. R. P. M. 4000 No. 750. For Intermittent or Continuous Duty 3/4" SHAFT. VARIABLE SPEED MOTOR CAN BE ADAPTED, TO 110V.A.C. or R.E.A. line by simple arranging armature brush leads. UNUSED. Instructions \$5.50 incl.



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GREATEST PUMP VALUES EVER OFFERED—PESCO AIRCRAFT ELECTRIC PUMP. NEW. Complete with 1/4 H. P. electric motor. Self contained. Explosion proof. Ideal for pumping gasoline, oils, water, liquids. FOR FARMS, COTTAGES, BASEMENTS, LABORATORIES, AND BOATS. 24 Volts A.C. or D.C. can be converted to other voltage. Wt. 6 lbs. Ea. \$7.50

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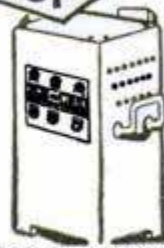
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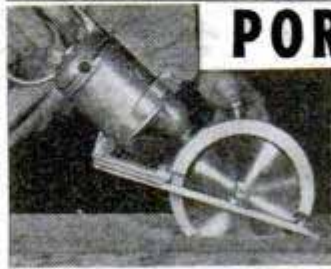
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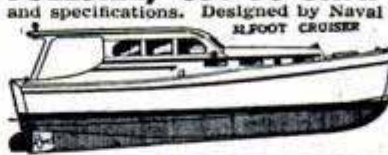
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Model 50 Ideal Bench Grinder doubles your output of sharpening jobs, speedily grinds straight blade knives. Sharpens all kinds of straight edge tools and ice skates. Write for FREE, fact-filled folder.



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In your own garage or basement, and earn \$25.00 a day or more. Mr. Hardy writes, "I am doing a fine business with the UNIVERSAL GRINDER. One customer sends another. I spent 40c for a newspaper ad and have done nearly \$500.00 worth of business." Mr. Helmeck of Canada writes, "We sharpened 750 mowers last year and are 1056 on this year's run. The Universal surely makes satisfied customers." Mr. Barton of California says, "The lawn mower business, with the Universal Grinder, has been a gold mine these last two years."



A Complete Single Unit • No Attachments Necessary
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Only on the UNIVERSAL GRINDER can the inside face and edge of the stationary blade, as well as the reel blades, be ground to proper clearance

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Now you can keep
nuts, bolts, screws,
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\$5.95
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Just think, 32 or 64 drawer cabinet to keep those small items that usually get mislaid. Spot welded steel cabinet, enamel finish, metal drawer guides. Looks good anywhere. Send check or money order please—no C.O.D.'s. Prices below. Your money refunded if not satisfied.

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12 1/4" Wide
15 1/4" High
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One piece rustproof aluminum drawers for heavy service—good for work bench and industry use.

32 drw. \$8.95
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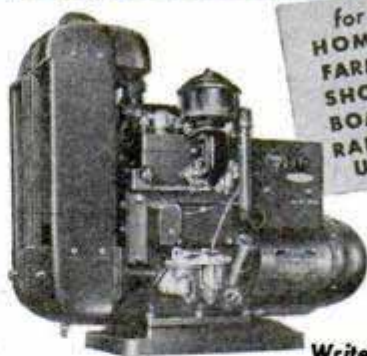
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3000 watt 110 volt DC powered by new 6 HP Briggs-Stratton model ZZZ gas engine. Rebuilt generator alone lists at \$243.00. Has volt meter, rheostat, 4 female plugs, and ball bearing 2.75 x 10 rubber wheels. Guaranteed. (Stock #320.)

ONLY
\$185



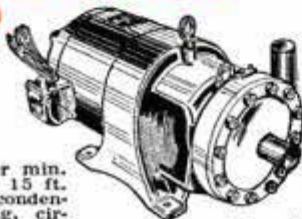
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Our price.....
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Good for water, oil, air, electrical installations and radio work. Available in 100 ft. lengths. Min. order 50 ft.
1/8", 3/16", 1/4" 9/16" per ft.4c
(your choice) per 3/4", 1", (your choice), ft.2c per ft.6c
5/16" per ft. ...3c 1-3/8" per ft.8c

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1" intake and outlet. Drip proof Master motor. 10 gal., per min. at a 48' head at 45 gal., per min. at a 20' head. 15 ft. lift. Ideal for condensation, sprinkling, circulating water in cooling systems and for air conditioning units. Stock #532.
AC-110 volt, Mfg. price 1/3 hp unit **\$75.00**
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All Bronze GEAR PUMP

All bronze corrosion resistant gear pump. Will lift water 25 ft. Will deliver 1020 gal. per hour at 1200 RPM. Develops 110 lbs. pressure or 250 ft. 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 3/4" x 3". Shaft 1 1/16", 1" x 1" inlet & outlet. Wt. 24 lbs. Mfg. by Sherwood Brass Works. Requires 1/2 to 3 HP motor. \$80. value for only **\$195** new (Stock #314)

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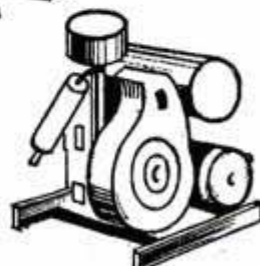
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LIGHT PLANTS

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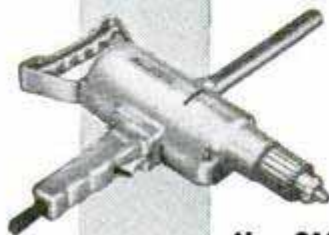
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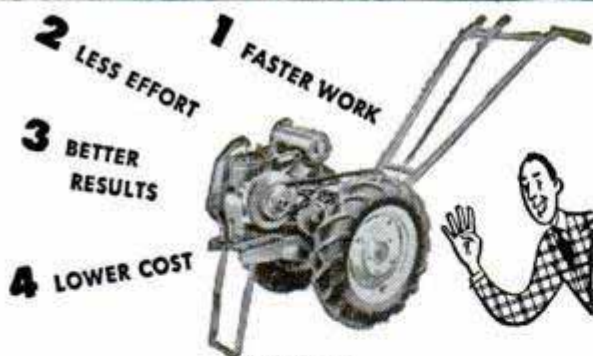
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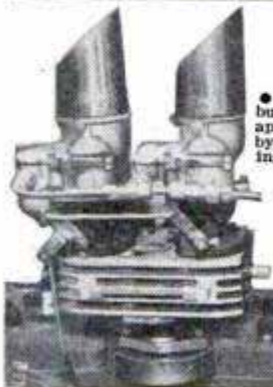
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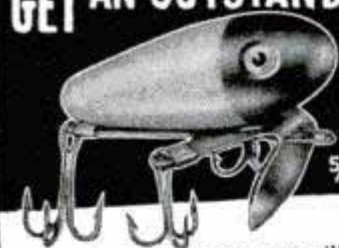
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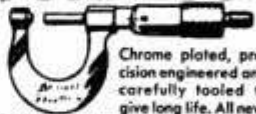
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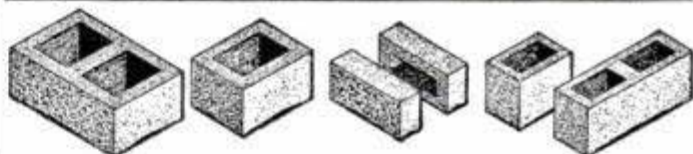
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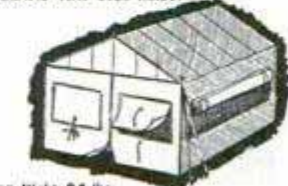
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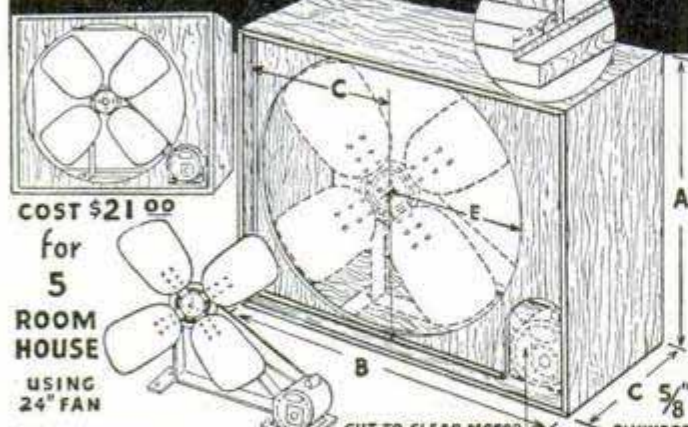
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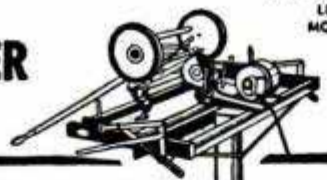
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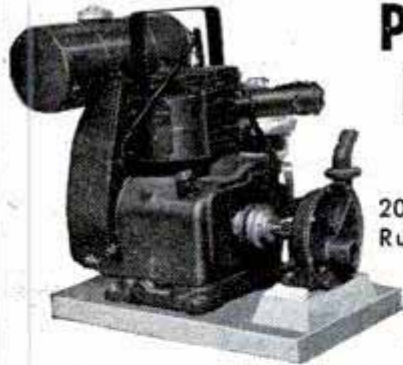


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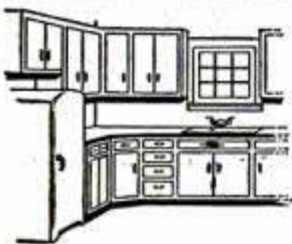
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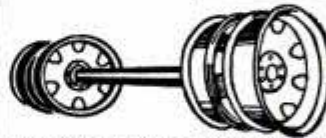
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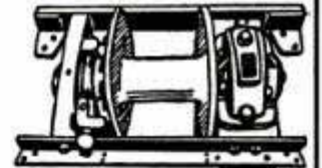
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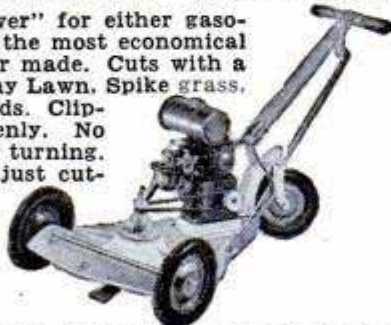
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8.50-20 (6)	8.72	8.25-20(10)	11.22	11.00-22(12)	16.92
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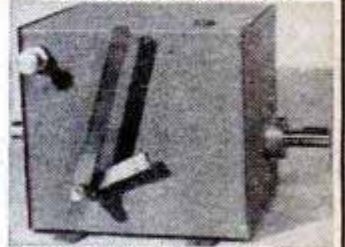
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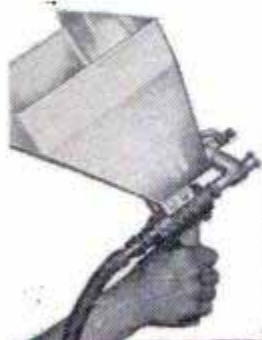
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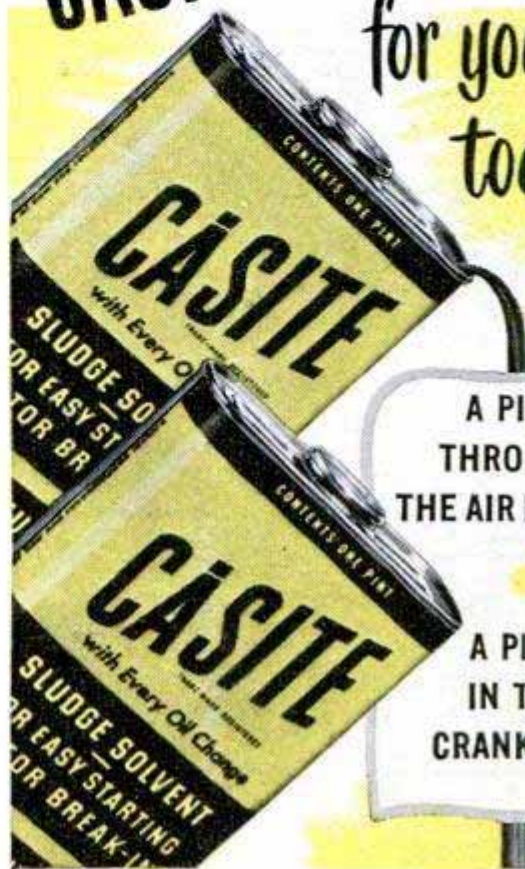


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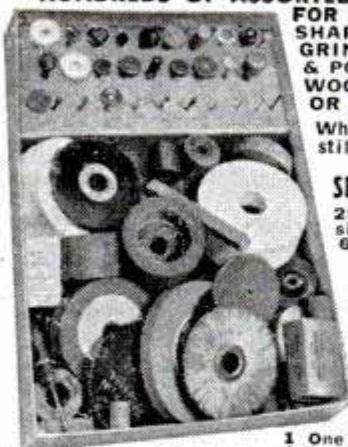
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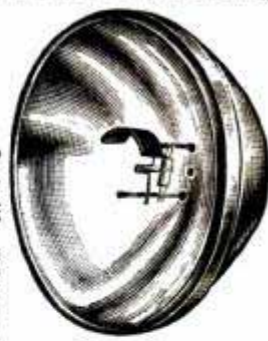
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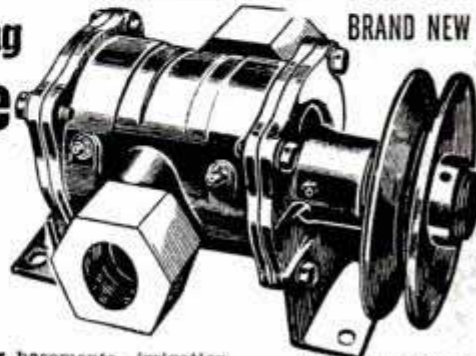
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Positive Pumping Pressure



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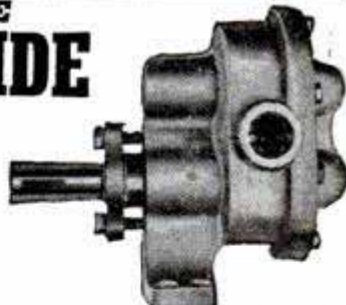
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BRAND NEW . . . for operating hydraulic cylinders and hydraulic motors on tractors, bulldozers, construction machinery, lift trucks, industrial applications, etc. Delivers 5 GPM at 1200 RPM at 1000 P.S.I. using 5 H.P. Has 1 1/2" pipe thread inlet, 3/8" pipe thread outlet, 3/4" shaft with flat and key-way 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**



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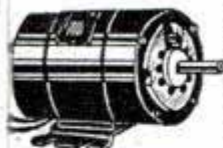
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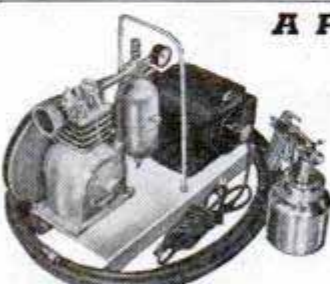
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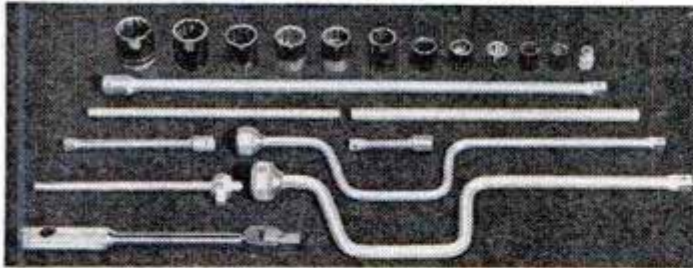
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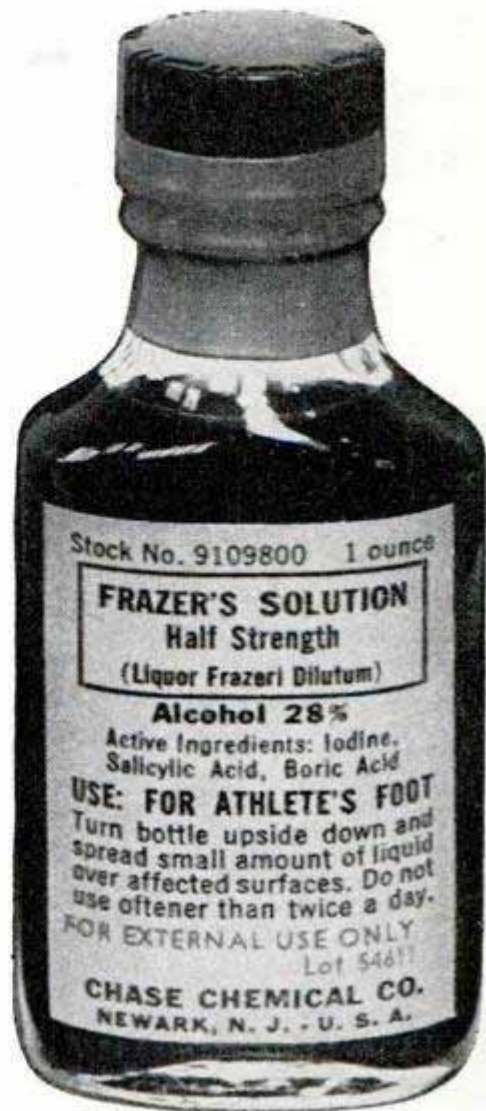
Air flows through these louvers freely. Due to arrangement of baffle plates, light does not show through ventilators. Hundreds of these vents have been installed in dark rooms. You will need two for your dark room. Install one in or near ceiling and one near floor.

\$7.50 Set of two, or \$4 each. Pay by money order or check. 25% with order on C.O.D.s. Prices FOB Fresno, Calif. Shipping weight 29 lbs. per set of two.

ARMY SURPLUS SALES

1820 TULARE ST. OF FRESNO FRESNO, CALIF.

KILL YOUR ATHLETE'S FOOT



Stock No. 9109800 1 ounce

FRAZER'S SOLUTION
Half Strength
(Liquor Frazeri Dilutum)

Alcohol 28%

Active Ingredients: Iodine,
Salicylic Acid, Boric Acid

USE: FOR ATHLETE'S FOOT
Turn bottle upside down and spread small amount of liquid over affected surfaces. Do not use oftener than twice a day.

FOR EXTERNAL USE ONLY

Lot 54611

CHASE CHEMICAL CO.
NEWARK, N. J. - U. S. A.

ATHLETE'S FOOT KIT 50c

Famous Frazer's Solution used by the U. S. Army all over the world. Kit consists of one bottle Frazer's Solution and two packs of Scholl Foot Powder.

ALL ORDERS FILLED THE DAY THEY ARRIVE, WE PAY ALL POSTAGE.

DO NOT DELAY, MAIL YOUR 50c TODAY

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HIGH PRESSURE HYDRAULIC PUMP

FOR HOME, SHOP AND FARM USE

Genuine Vickers constant displacement high pressure pump. Use it for any type of liquid pumping job. Will pump 400 gal. per hour at 3750 R.P.M. Precision piston type design provides 1000 lbs. per square inch pressure. Self priming. Standard thread 3/4 inch intake and discharge ports. With 3/8 inch splined shaft — just add pulley and power and you're ready to go.

HAS HUNDREDS OF USES

These pumps are brand new. Original acquisition cost approx. \$100.00. Can also be used as hydraulic motor; for rams, opening doors, hydraulic lifts, etc.—also for any liquid transporting job. War surplus, but brand new. Shp. wgt. 7 lbs. Will include at no extra charge an hydraulic control valve and ship postpaid when remittance accompanies order. (Control valve, only \$1.95.) F.O.B. Houston. Satisfaction guaranteed. Rush your order today.

\$9.95



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ZIPSCOOT \$49.75

America's Outstanding Scooter Value!

This smart looking speedster is easily and quickly assembled from our factory finished kits. Uses standard gasoline motor. Speeds up to 30 miles per hour. 100 miles per gallon of gas. Send 25 cents for assembly information, drawings, and illustrations. Kits available for immediate shipment.

Zipscot Company, Toledo 6, Ohio



SAY YOU SAW IT IN POPULAR MECHANICS

WORLD'S FIRST Pellet REPEATER

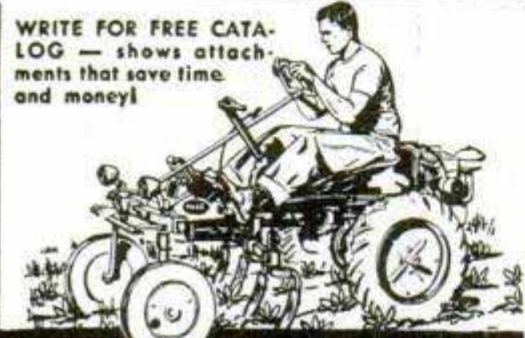
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PAGE Garden Tractor

New 1949 line with extra features! Riding and walking models, 1½ to 5 HP. Complete gear drive, no cheap belts or chains. Large tires—high clearance—easy to handle—power turn. Low factory prices—\$188 to \$436 with cultivator. Get benefits of 24 years of garden tractor experience!

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Collector's Items SCALE MODELS Authentic Americana



Selden's Horseless Carriage—Kit #C744
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Model builders have been waiting for these. Each an authentic collector's item—½" scale—steering gear works on all models—COMPLETE—wood parts cut to shape—plastic wheels, springs, brackets. Trim of die cut plastic—tractor and horseless carriage—includes decals. EASY-TO-FOLLOW DIRECTIONS and plans. Interesting, educational and decorative for den or office. Geo. B. Selden's Horseless Carriage, Pr. \$1.50. Surrey with Fringe, Pr. \$1.75. International Harvester Tractor TD-14, Pr. \$1.50. Also Victoria with Calash Top—Kit #C8411—Pr. \$2.35. ORDER NOW! Add 25c for packaging and postage—no C.O.D.'s.

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Only Eagle rules have riveted strike-plate joints

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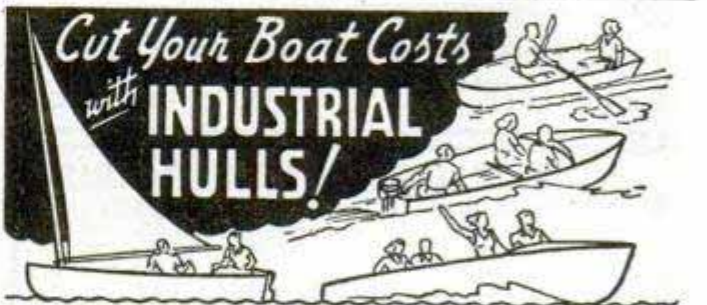
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FOR AUTO—HOME APPLIANCE & FARM IMPLEMENT REPAIRS! **ONLY \$28.50 COMPLETE**

WORKS ON IRON, STEEL & other metals . . . does work you'd expect from a larger, costlier machine; portable, easily carried; OPERATES FROM ANY properly wired 110 VOLT LINE. Also available for 220 volt operation at slight additional cost; has 8 metallic & carbon arc welding heat stages. **EASY TO OPERATE TRANSFORMER TYPE WELDER**—If inexperienced you can learn to do professional work by following the **SIMPLIFIED WELDING & OPERATING INSTRUCTIONS FURNISHED**—comes complete ready to operate with helmet, rods, cable, instructions. **SAVE TIME AND MONEY**—Do your own welding—Just a few repair jobs will pay for this machine. A practical and profitable machine tool for any workshop. Make money doing repair work for others. Costs a few cents to operate.



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ADJUSTING WHEEL PROTRACTOR GRINDING SURFACE

No experience necessary. Sharpen your old 3/32" to 1 1/2" drills with factory accuracy. Sturdy, all steel construction. Used by thousands. Ideal for production or home workshop. Use with hand or power grinding wheel. Money back guarantee. \$2.95 postpaid. C.O.D. postage extra.

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ONLY \$9.90 COMPLETE

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M-12 includes:
7 HI-SPEED TWIST DRILLS
Sizes 1/16" to 1/4"
Drill rack provides holes for 6 intermediate 64th sizes.
For Iron, Steel, Wood, Plastic, Etc.
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Sizes 1/4" to 1/2"
For Use in Wood Only. Designed especially for use in 1/4" capacity portable electric drills.

ALL-METAL TOOL BOX
Compartment designed to hold all popular priced 1/4" electric drills.



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The only drills expressly made to drill holes up to 1/2" Dia. in wood with 1/4" electric drills.

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New Improved 7" Flex Sander and Polisher

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BENDS POLISHES BUFFS
1/4" Shank for use in Lathes, Electric Drills, Drill Press, Flexible Shaft tools on AC or DC motors.

We have tested many sanders, some cost more, some less, but consider, in our estimation, this 7" Flex-Sander and Polisher to be today's best value—The Electric Drill King.




On Flat Surface
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An Excellent COMBINATION PACKAGE

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22"	4,000	18.00	1/6 hp 31.00
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Specify fan diameter wanted. Send check or Money Order (No C.O.D.)

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FOR YOUR SHOP**



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Mows and Trims Lawns



In One Simple
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8 1/4 Lbs.



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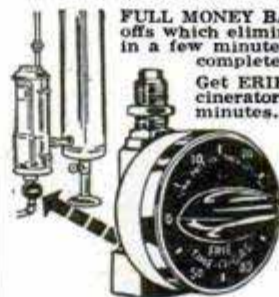
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110V, AC 50-60 cycles, cont. duty motor, deliver app. 100 C.F.M. For workshop, lab, kitchen, cellar, etc. Install yourself. Send for circular.
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Gives the feeling of riding on air . . . it is so comfortable. Leatherette and piped all around. Size 15"x14"x3". Each

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Gives the Wolf Call. Imitates a Barking Dog, etc. Simple to Install. EA.

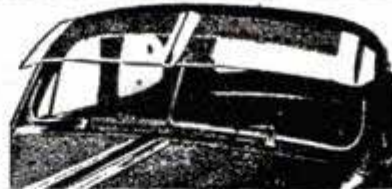
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100% Waterproof, Weatherized Material. Not Affected by Snow or Rain. Choice of Black or Tan.

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Easy to Install

Consists of main top proper, rear curtain and all needed binding and fittings. (Glass is not supplied.) All metal parts are of heavy bright chrome plated rust resistant. Tops are heavily stitched with treated thread and sewed for durability.

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Rebuilt by skilled mechanics. Assembly has Reborn Block with New Pistons, Pins, Rings, Reground Crankshaft, all New Bearings. Guaranteed 90 Days.

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We ship at outright price. Send your motor prepaid, must be suitable for rebuilding. Send in notarized bill of sale showing title number if any. We refund difference when we receive your motor.

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Made of all metal, prime finish, with Rubber beading to prevent rattle. Easy to Install. MC31N-9. Per Pair.

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15" & 16" Wheel sizes Dresses up your car.

Dressy wheel walls snap on instantly under regular hub caps.

Set of 4—**\$9.95**

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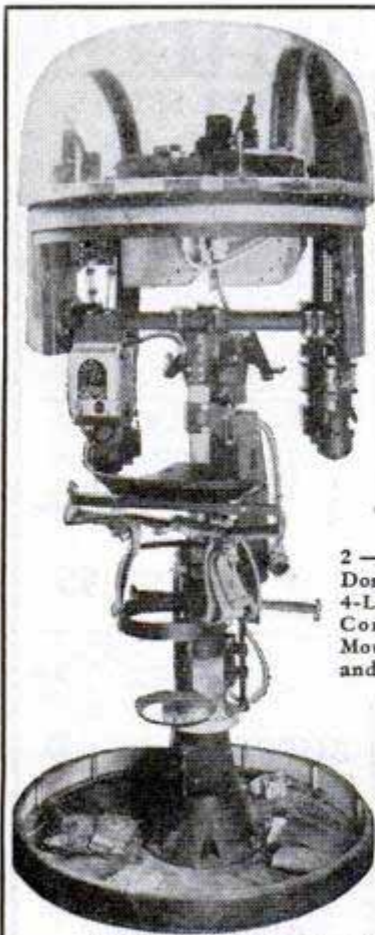
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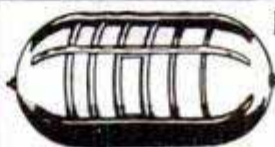
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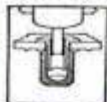
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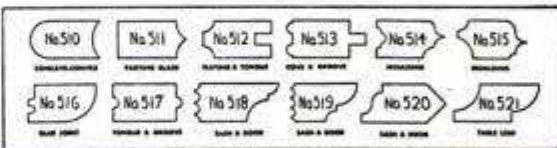
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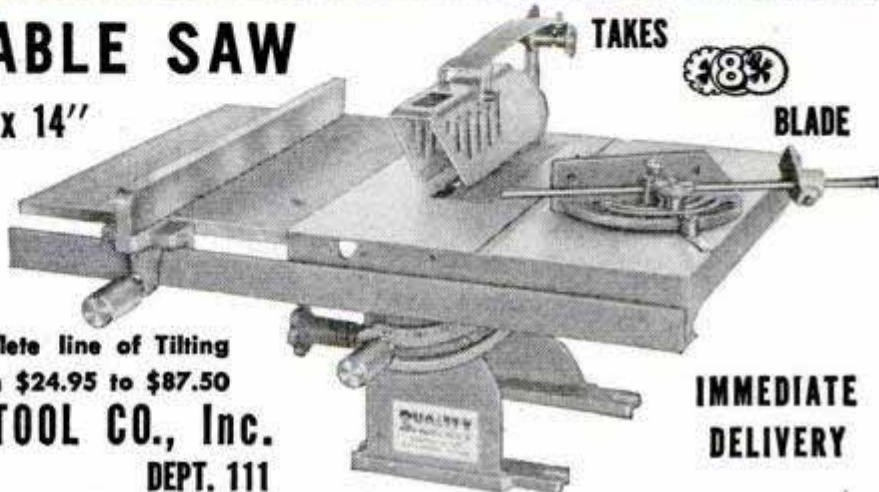


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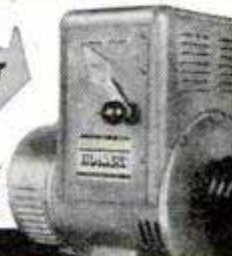
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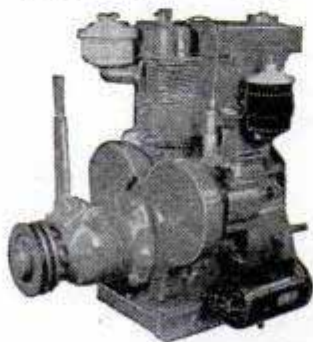


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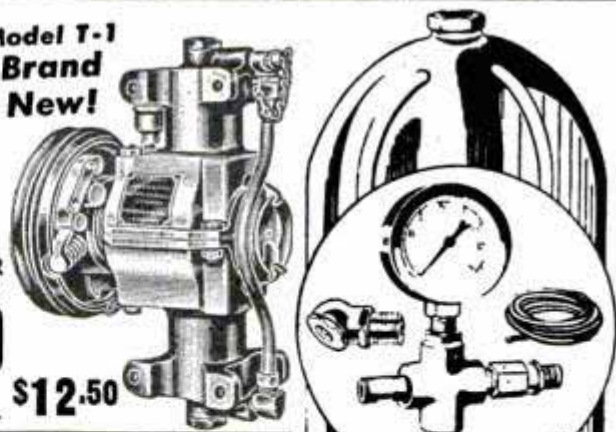
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Equipment less \$12.50
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Piston Type, 2-cylinder, 2 inch bore, 1 1/2" Stroke Ball Bearing AUTOMATIC CLUTCH, OIL FREE AIR 3.27 C.F.M. at 600 R.P.M. 6.54 at 1200. Suggested operating pressure 75 P.S.I. DIMENSIONS: 9" wide, 11 3/8" high, 6 5/8" deep. Wt. 26 lbs.

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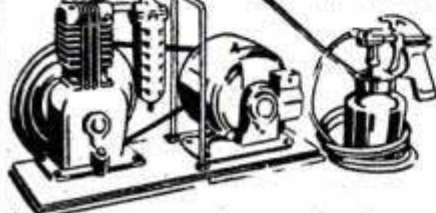
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12" x 24" Tank
Stainless Steel
Capacity 12 Gal.

PORTABLE SPRAY OUTFIT

Brand New

1/4 H.P. Heavy Duty



Compressor only\$17.50
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Adj. 1/4" pop valve ...\$1.50
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Same outfit less motor, \$35.00

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A HEAVY-DUTY PUMP AT 40% LESS

You pay less and get a larger, higher pressure, higher capacity, heavy duty coolant-type, recirculating pump. Also extensively used on evaporative coolers. Will deliver 60 gal. per hr. at 8 ft. head and 300 GPH at no head. Heavy duty 1/30 H.P. totally enclosed, 110V., 60C. motor with long life oiling. Noncorrosive shaft and pump. 10 1/2" high, 3/4" I.P.T. Shpg. wt. 12 lbs.

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Heavy Duty, 3/4" Core. Best piano wire. Ball bearing handle and arbor, rubber covered housing; for 1/2" motor shaft; for 1/2" bore wheels. Operates on 1/4 H.P. Motor at 1725 or 3450 R.P.M. \$29.00 Value, \$14.50. Wt. 8 lbs.



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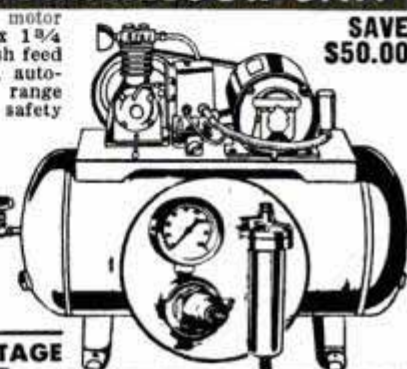
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1/3 H.P. heavy duty capacitor motor AC 110/220 volt 60 cycle, 2 x 1 3/4 inch piston type compressor, splash feed lubrication, 12 x 24 inch tank, automatic pressure switch, pressure range 100 to 125 lbs., check valve, safety valve, air regulator with gauge and filter, 20 ft. air hose with air chuck for inflating tires. V. belt drive. Shipping wt. 90 lbs.

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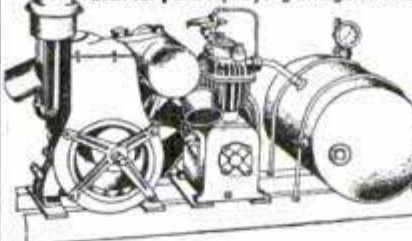
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SAVE **\$50.00**

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Ideal for paint spraying and general use



Compressor with unloader, wt. 160 lbs.\$128.00
Engine only, wt. 90 lbs. 87.50
Tank and accessories, wt. 110 lbs. 62.50

Compressor: Size 3 1/2 x 2 x 2 1/2 with unloader for continuous pressure service; displacement 10 C.F.M. at 200 lbs. pressure. Unloader set at 150 to 165 lbs. Compressor idles when 165 lbs. is reached, starts pumping again when pressure is down to 150 lbs. Wisconsin Gasoline air cooled, easy starting engine. 3 1/2 H.P. at 1800 R.P.M. 4.1 H.P. at 2400.

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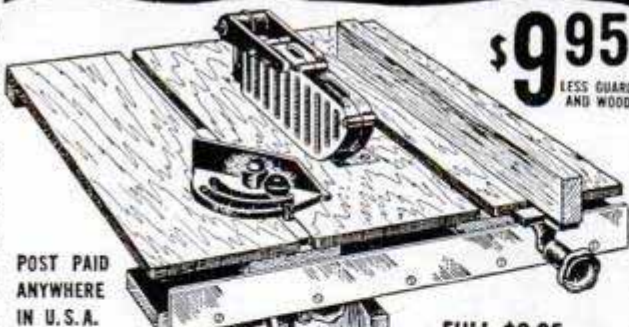
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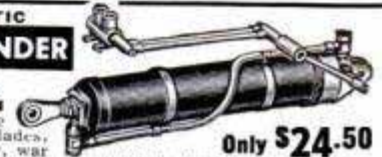
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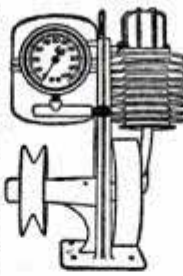
This power plant consists of a gasoline engine that is coupled to a 2000 watt 32 volt DC generator. This unit is ideal for use in locations that are not serviced by commercial power or to run any of the surplus items that require 24-32v-DC for operation. The price of this power plant tested and in good condition is only \$79.95 F.O.B. Buffalo, or we can supply in strictly "as is" condition for \$58.95 F.O.B. our New York City warehouse. These latter are exactly as received, in heavy steel-strapped gov't cases, and we are unable to determine if the individual units are new, or what the condition is if used, while the \$79.95 are some of the same that we have brought to Buffalo for testing and repair if necessary. We do not recommend gambling on the "as is" condition, except for quantity purchasers. We can also supply a converter that will supply 110v AC from the above unit or from any 32v DC source for \$12.95.

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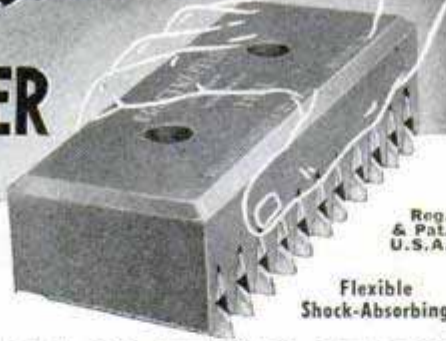
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VT-1 Self contained. 2 H. P. constant torque at all speeds with variable volume reversible, piston pump (controlled by outside lever) supplying piston hydraulic motor. Automatic pressure, dash pot for smooth control. Power output R. P. M. - 0 to 1/2 input R. P. M. in both directions. Input R. P. M. 1800 continuous 4000 intermittent. Dash pot can be removed for greater R. P. M. Ideal for Lathes, Duplicator Setup on Mills, Conveyors, Small Cars, Drives, Gearing, Etc. COST GOVERNMENT APP. \$400.00 You'll Chortle when you get it for ONLY **\$19.50**

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VTG-1-85 1 1/2" to 1 level gear reduction. 1/2" dia. with lever control for engaging & disengaging positive clutch, dual proof housing, pre-lubricated, brns. size 7"x8". A lifetime value **\$3.95**

VTG-2-12 line spur gear reduction 15 to 1, 3 1/2" gears. Final take-off 4 1/2" dia. 35 shaft. 1/2" Alum. spur gear with lever control for engaging and disengaging positive clutch, dual proof housing, pre-lubricated, bearings size 1 1/2"x2". Only **\$6.49**

Both above gear boxes can be used with above Transmission.

RUBBER GOODS

NEOPRENE SHEET RUBBER

Thick-ness	Width	Price per sq. ft.
#325 .020"	1/64 36"	.75
#328 .032"	1/32 22"	\$1.39
#329 .125"	1/8" 46"	\$4.75

Item #319 is laminated rubber sheet with cloth center. Flexible but very fine and heavy wear. Rubberized Hosp. or Bed Shts. 54"x72". \$10.00 Value Only **\$2.29**

AIRCRAFT CABLE

Alloyed steel, rust resistant, 3/16" dia. 18 ft. long, with turnbuckle ends **99c** ea.

Delivered 7 x 13 strand-on reels in any length...

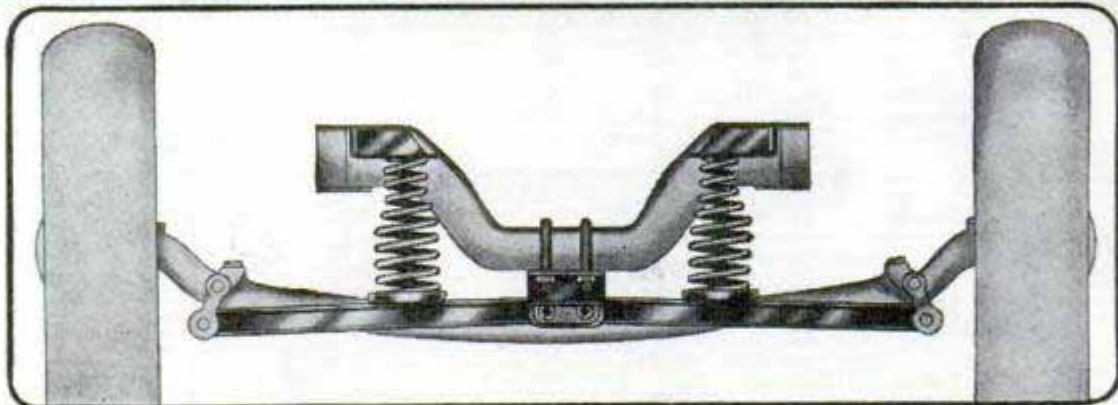
1/16"	3c ft.	5/32	5c ft.
3/32	4c ft.	3/16	6c ft.
1/8"	4 1/2c ft.	9/32	8c ft.

DOUBLE CASTER UNIT

2 Needle bearinged 5" Casters joined as a unit on a 7/8" x 8" rubber protected steel base plate. The unit is 9" high and will completely swivel. Ball bearings in swivel entirely enclosed. Bolts Furnished. If you have to move heavy machinery or rigs these are just the thing Unit **\$9.85**

... This New, Patented Front Coil Spring Assembly

Makes '35 to '48 Fords, Mercurys Ride Like a 1949!



Works on "HYDRA-COIL" Principle.. Soaks up the bumps!

If your Ford is a 1935 to 1948 make, or if you drive a '42 to '48 Mercury, you can enjoy "Hydra-Coil" riding and driving qualities—the greatest achievement in automotive comfort in years—with the Front Coil Spring Assembly! Ruts and bumps flatten out. Jolts and jars lose their force. Road shock is cushioned to velvety smoothness! There is as great a difference between the old, flat-leaf springs on Fords and Mercurys and the new "Hydra-Coil" type of spring assembly, as in a Model "A" and V-8 motor! And in addition to greater riding comfort, easier handling and less driving fatigue, the Front Coil Spring Assembly also increases the value of your car . . . by commanding a higher price or allowance when you sell or trade it!



... "Hydra-Coil" Springs ...

TRIED, Tested, Proved!

Mr. J. Patton, M.E., for one of the largest steel fabricators in the country, did the mechanical engineering on the Front Coil Spring Assembly for Fords and Mercurys, and supervised tests of component parts. Additional experiments were made in the engineering laboratories of two of America's prominent spring and forging manufacturers. Mr. Wayne Hart, Ford Agency Superintendent at Idabel, Oklahoma, says: "For over a year, on 'washboard' roads and the worst highways in the State, I tested your new Front Coil Spring Assembly on a Mercury for thousands of miles under actual driving conditions. It does not affect steering or wheel-alignment; it does not cause car "sway" at high speed or on curves. The steel forg-

Quick, Easy to Install!

ings are made of identically the same type of material as used in the Ford front axle. The unit is as strong, safe, and durable as the original equipment. When the wheels get a sharp blow in hitting a bump or rut, the Coil Springs absorb the jolt and cradle the force of the bounce to a gentle glide."

You can install a Front Coil Spring Assembly on a '35 to '48 Ford or '42 to '48 Mercury in about 1 1/2 hours. Instructions are clear, simple, easy to follow. No special tools or equipment needed. If you can use a wrench, hammer, pliers and screwdriver, you can easily equip your car with the "Hydra-Coil" type of spring assembly!

WARRANTY: Front Coil Spring Assembly units are GUARANTEED for 1 year against defective materials and workmanship. Designed to meet exacting precision engineering standards, every part in the assembly kit of this "Hydra-Coil" principle for Fords and Mercurys is GUARANTEED AS ADVERTISED—or money refunded!

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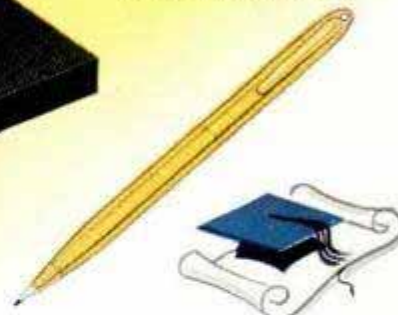


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