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MAGAZINE

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OCTOBER 1955
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Introducing the PM Young-Family House . . .
One-man remodeling jobs . . . An album of
medium-priced homes . . . How to bring your
kitchen up-to-date . . . Tips from color ex-
perts . . . Planning for future improvements
. . . An idea for your home on every page



**Build a carport
—Page 190**

THE PM YOUNG-FAMILY HOUSE—PAGE 153



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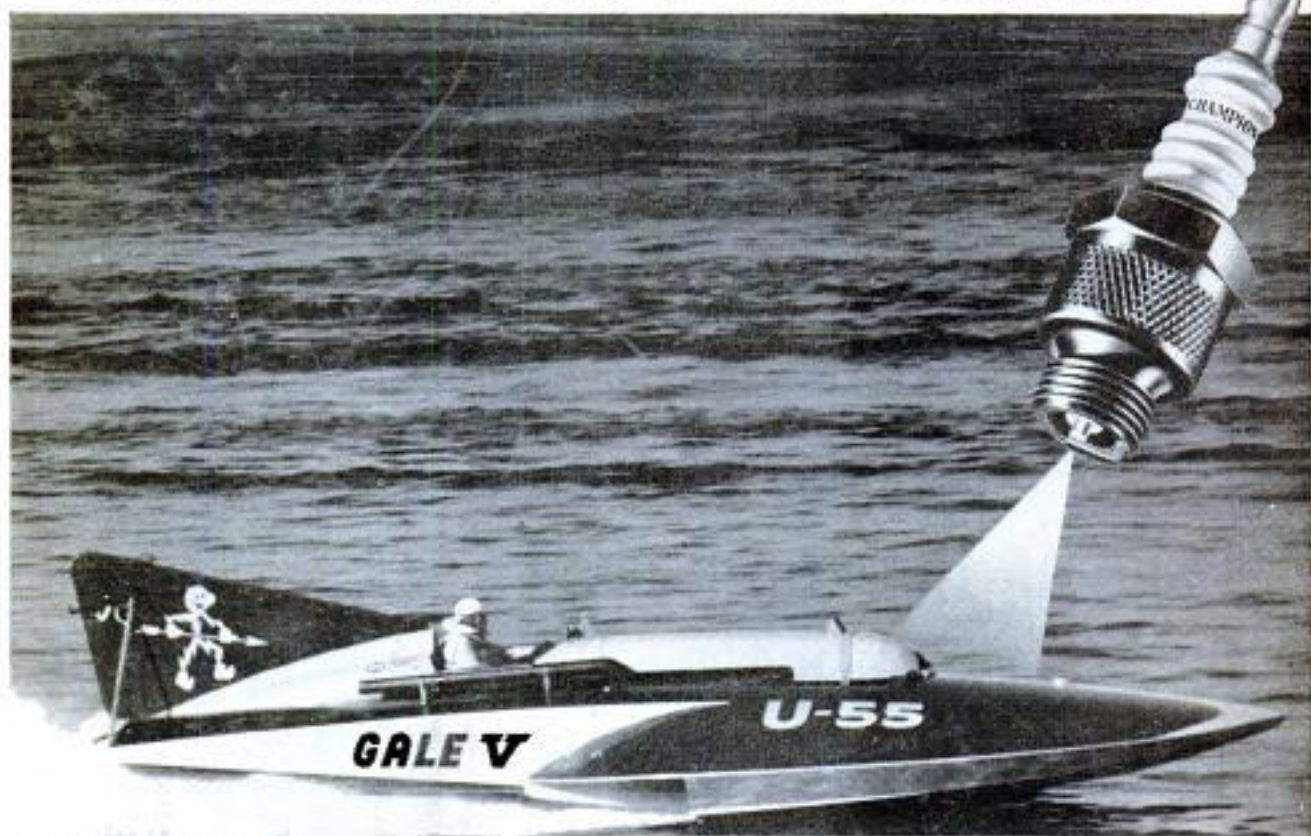
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Next Month

GOT A SECRET? We have. We know what all the 1956 cars look like. And we're itching to tell you. But we can't say a word except about Ford, Lincoln and Mercury (see page 102). Next month, we'll be able to show you nine more of them. Right now, we're only giving you this sneak-peek of two of them in silhouette (you'll have to guess which of the nine these are—we won't tell). Secrecy is a big thing in Detroit. The car you see above proves it. Those slipcovers hide the exterior styling changes for 1956. Parts of the proving ground where this photo was taken can be seen from nearby hills. Long-range cameras have given competitors advance photos of new models in previous years. This year, the new cars are wearing slipcovers to foil the "enemy spies." In November, you'll see what they are hiding



Information not listed on articles in the index, starting on page 88, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by writing to the Bureau of Information, Popular Mechanics, 200 E. Ontario, Chicago 11, Ill.

Published monthly by Popular Mechanics Company, 200 E. Ontario St., Chicago 11, Ill. H. H. Windsor, Jr., president; Wm. Harrison Peirce, exec. vice-pres.; D. F. Windsor, vice-president and secretary-treasurer; H. H. Windsor III, vice-president; W. F. Windsor, vice-president; Clover L. Perkins, advertising manager; Alan M. Deyoe, circulation manager. Single copy in the United States and Canada, 35 cents; subscription rates in the United States and possessions, Canada, Philippines and countries of the Pan-American Postal Union, 1 year \$3.50; 2 years, \$6.00; 3 years, \$8.00. To all other countries add \$1.00 a year over United States prices for overseas postage. If you plan to move, notify us at least 30 days in advance so you will not miss an issue. Give both your old and new addresses. Entered as Second Class Matter, September 15, 1903, at the Post Office at Chicago, Illinois, under Act of March 3, 1879. Entered as Second Class Matter at Post Office Dept., Canada. Registered as Second Class Matter at the Post Office at Mexico, D. F., Mexico, June 20, 1950. Copyright 1955 by Popular Mechanics Company. Copyright under International Copyright Union. Copyright in France. All rights reserved under Pan-American Copyright Union. Printed in the United States of America.

Volume 104 OCTOBER 1955 Number 4

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for other items and manufacturers of available products



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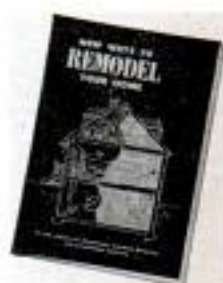
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ACROSS THE DESK



Dick Dempewolff, our Eastern Editor in New York, is not the Paul Bunyan type. Speaking strictly of his physical displacement, we should describe him as of less than average size. When he built the *Popular Mechanics* precut cabin a year ago (see



PM, March 1955) he lost a few indispensable pounds. How many more pounds he shed recently when riding the rugged range of the Army's Aberdeen Proving Ground in tanks and other monsters we have not dared to ask. That's Dick, second from the left in the M51 above, still able to smile as he gathers firsthand material for the article you'll see on page 115: "Can Our Tanks Take It?"

To the Editor:

"What Can We Do About Smog?" A very tantalizing question which your magazine presented very well (*PM*, July 1955). The most amazing fact discussed is that in a highly industrialized community (Los Angeles, Calif.) 1000 tons per day or 33 $\frac{1}{3}$ percent of the pollution is from automobiles.

As you have shown, there is a revolution in the making which will stop air pollution by automobiles. The vehicle powered by gas-turbine engines will not pollute the air with carbon monoxide. Gas-turbine engines use large quantities of excess air for dilution to tolerable working temperatures. This characteristic dilution gives exhausts which contain air, carbon dioxide and very minute quantities of carbon monoxide. Additives are not required for automotive gas-turbine fuels. Absence of additives will eliminate the lead and bromine-type compounds in gasoline-engine exhausts.

(Continued to page 8)



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an ACCOUNTANT'S CAREER



FREE SAMPLE LESSON

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

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

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

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

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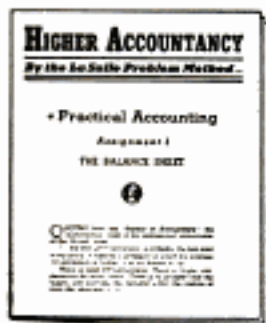
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(Continued from page 6)

So—at least a 33 $\frac{1}{3}$ -percent answer to the question "What Can We Do About Smog?" is—use *gas-turbine engines!*

W. M. M. Fowden, Jr., CDR, USN,
Annandale, Va.

☆☆☆

Few architects have had the opportunity of Rudard A. Jones to study the space needs of families in regard to their homes. As assistant director of the Small Homes Council, University of Illinois, he supervised tests over a period of years in "laboratory" homes occupied by real families.



We believe he was the best choice of all architects in the country to design the *PM Young-Family House* which makes its debut on page 153. Recently, he was borrowed by the State Department from the university and loaned to the Colombian government for two years. There he is living in Bogota with his wife, Ruth, and daughter, Wendy, designing small homes for Colombian workers.

To the Editor:

I was very much interested in the article and pictures on "Ice Carving" by John F. Krich in the June issue of *Popular Mechanics*, especially so because I too have made ice carving my hobby and, being in one of the hottest places in the world, I enjoy it very much, both as a good hobby to stay cool, and also it adds to my income.

Being a chef by trade, I make most of

(Continued to page 14)

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Blueprints <input type="checkbox"/> Sanitary Engineering <input type="checkbox"/> Structural Engineering <input type="checkbox"/> Surveying and Mapping <p>DRAFTING</p> <ul style="list-style-type: none"> <input type="checkbox"/> Aircraft Drafting <input type="checkbox"/> Architectural Drafting <input type="checkbox"/> Electrical Drafting <input type="checkbox"/> Mechanical Drafting <input type="checkbox"/> Mine Surveying and Mapping <input type="checkbox"/> Plumbing Drawing and Estimating <input type="checkbox"/> Structural Drafting <p>ELECTRICAL</p> <ul style="list-style-type: none"> <input type="checkbox"/> Electrical Engineering <input type="checkbox"/> Electrical Maintenance <input type="checkbox"/> Electrician <input type="checkbox"/> Contracting <input type="checkbox"/> Lineman <p>HIGH SCHOOL</p> <ul style="list-style-type: none"> <input type="checkbox"/> Commercial <input type="checkbox"/> Good English <input type="checkbox"/> High School Subjects <input type="checkbox"/> Mathematics | <p>LEADERSHIP</p> <ul style="list-style-type: none"> <input type="checkbox"/> Foremanship <input type="checkbox"/> Industrial Supervision <input type="checkbox"/> Leadership and Organization <input type="checkbox"/> Personnel-Labor Relations <p>MECHANICAL AND SHOP</p> <ul style="list-style-type: none"> <input type="checkbox"/> Gas—Electric Welding <input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy <input type="checkbox"/> Industrial Engineering <input type="checkbox"/> Industrial Instrumentation <input type="checkbox"/> Industrial Supervision <input type="checkbox"/> Internal Combustion Engines <input type="checkbox"/> Machine Design-Drafting <input type="checkbox"/> Machine Shop Inspection <input type="checkbox"/> Machine Shop Practice <input type="checkbox"/> Mechanical Engineering <input type="checkbox"/> Quality Control <input type="checkbox"/> Reading Shop Blueprints <input type="checkbox"/> Refrigeration <input type="checkbox"/> Sheet Metal Worker <input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking <p>RADIO, TELEVISION</p> <ul style="list-style-type: none"> <input type="checkbox"/> Industrial Electronics <input type="checkbox"/> Practical Radio TV Eng'ing <input type="checkbox"/> Radio and TV Servicing <input type="checkbox"/> Radio Operating | <ul style="list-style-type: none"> <input type="checkbox"/> Television Technician <p>RAILROAD</p> <ul style="list-style-type: none"> <input type="checkbox"/> Air Brakes <input type="checkbox"/> Car Inspector <input type="checkbox"/> Diesel Locomotive <input type="checkbox"/> Locomotive Engineer <input type="checkbox"/> Section Foreman <p>STEAM AND DIESEL POWER</p> <ul style="list-style-type: none"> <input type="checkbox"/> Combustion Engineering <input type="checkbox"/> Diesel—Elec. <input type="checkbox"/> Diesel Eng's <input type="checkbox"/> Electric Light and Power <input type="checkbox"/> Stationary Fireman <input type="checkbox"/> Stationary Steam Engineering <p>TEXTILE</p> <ul style="list-style-type: none"> <input type="checkbox"/> Carding and Spinning <input type="checkbox"/> Cotton, Rayon, Woolen Mfg. <input type="checkbox"/> Finishing and Dyeing <input type="checkbox"/> Loom Fixing <input type="checkbox"/> Textile Des'ing <input type="checkbox"/> Textile Eng'g <input type="checkbox"/> Throwing <input type="checkbox"/> Weaving and Weaving <p>MISCELLANEOUS</p> <ul style="list-style-type: none"> <input type="checkbox"/> Domestic Refrigeration <input type="checkbox"/> Marine Engineering <input type="checkbox"/> Ocean Navigation <input type="checkbox"/> Professional Engineering <input type="checkbox"/> Short Story Writing <input type="checkbox"/> Telephony |
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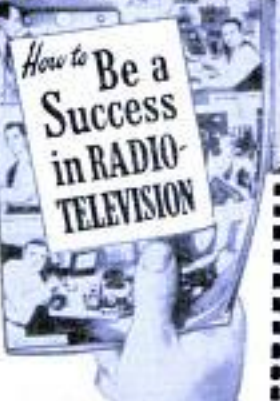
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(Continued from page 8)

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To the Editor:

Enclosed is a set of photographs of articles made by students at the Boys Technical Institute in Elazig, Turkey. For instructions and illustrations the boys used old copies of *Popular Mechanics* given them by our office in Ankara, Turkey.

We feel that you might be interested in this example of the use made of your publication in other parts of the world.

Robert W. Shackleton,
 U. S. Information Agency,
 Washington, D. C.



How to look good to your boss



The old tricks of "flattery" and "bluff" no longer work—though men still try them. Here's a new technique that seems to be paying off.

WITHIN the next twelve months, someone you work with will hit the jackpot on promotion. Overnight he'll jump to a key position—and everybody will wonder why.

Chances are, he's cashing in on a new way to impress the boss—*self-improvement on the QT.*

With jobs getting tighter, employers are giving the cold eye to men who obviously are trying to make an impression without anything to back it up. The phony eager beavers, overtime hounds and front office pets are due for a rude awakening.

Sincerity, honest work and *interest beyond the job* are getting the nod. And top dog is the man who uses his *spare* time to train for advancement.



I.C.S. sees this showing up in a great new surge of interest in advanced technical and business courses.

Men who look into correspondence training are suddenly clipping coupons and enrolling. Current I.C.S. students include a good many college graduates. Also engineers seeking courses in business management. And men who need a quick brush-up or refresher course.

Says James L. Morgan of the Morgan Cotton Mills, Inc., "We keep an eye on our I.C.S. students. They may study alone at home. But the results show up in their work—and make possible promotions otherwise impossible." Mr. Morgan speaks from experience—his own I.C.S. experience.

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

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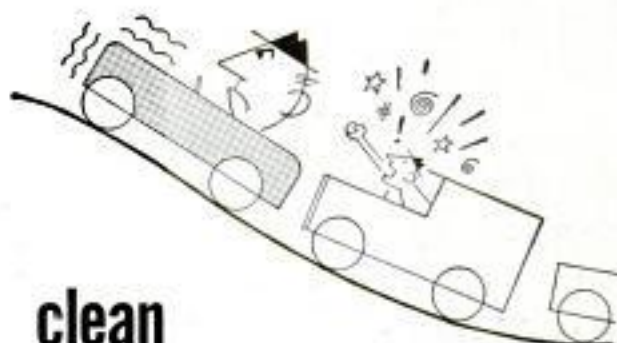
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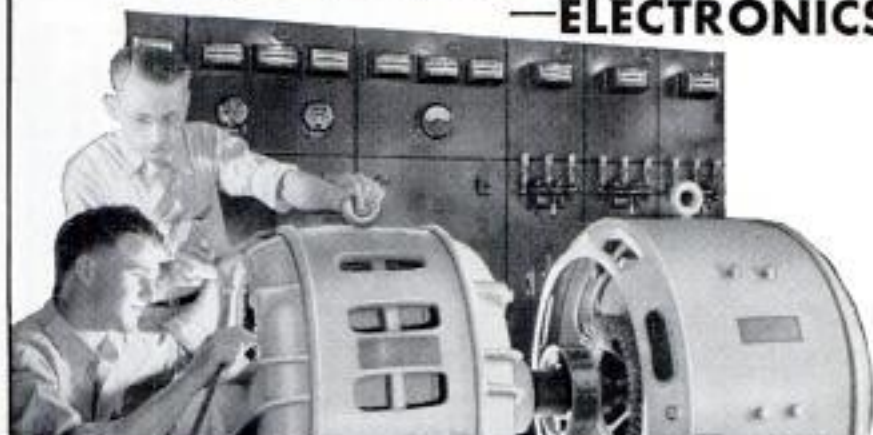
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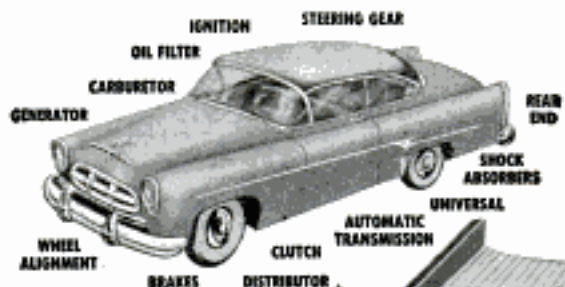
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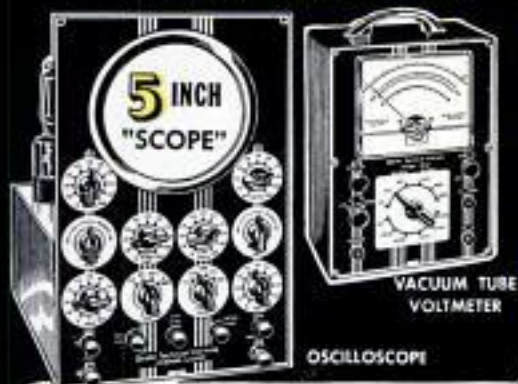


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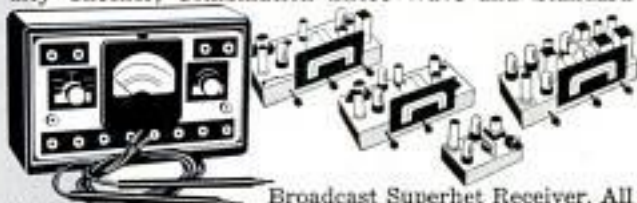
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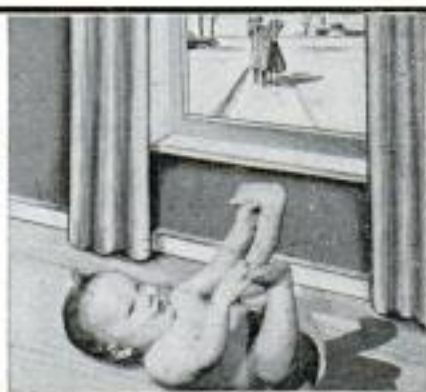
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D.C. CURRENT: 0 to 1.5/15/150 Ma. 0 to 1.5/15 Amperes
RESISTANCE: 0 to 1,000/100,000 Ohms 0 to 10 Megohms
CAPACITY: .001 to 1 Mfd. 1 to 50 Mfd. (Good-Bad scale for checking quality of electrolytic condensers.)
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28⁴⁰

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26⁹⁵

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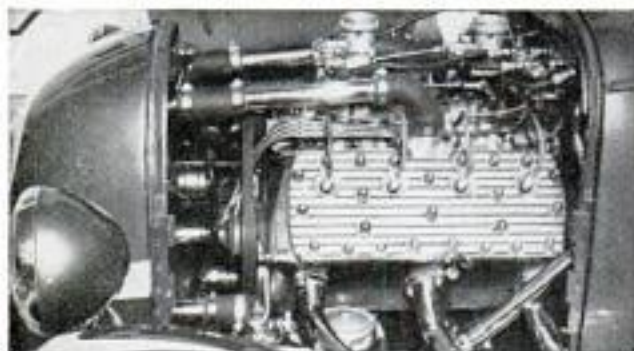
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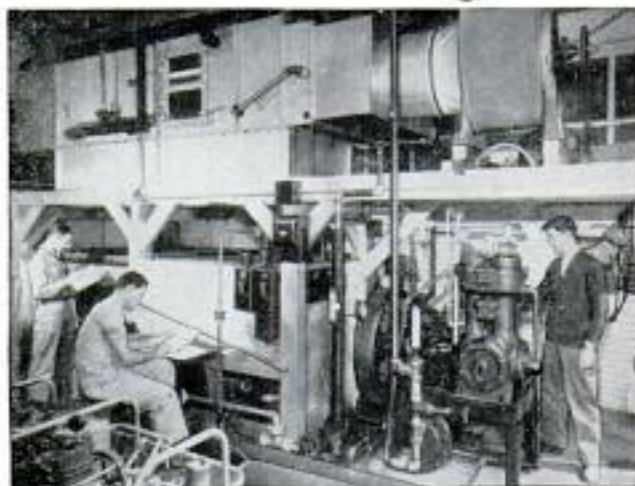
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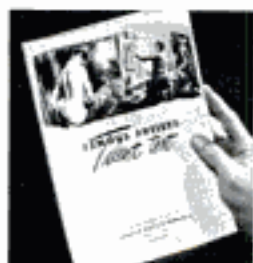
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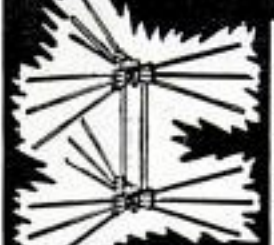
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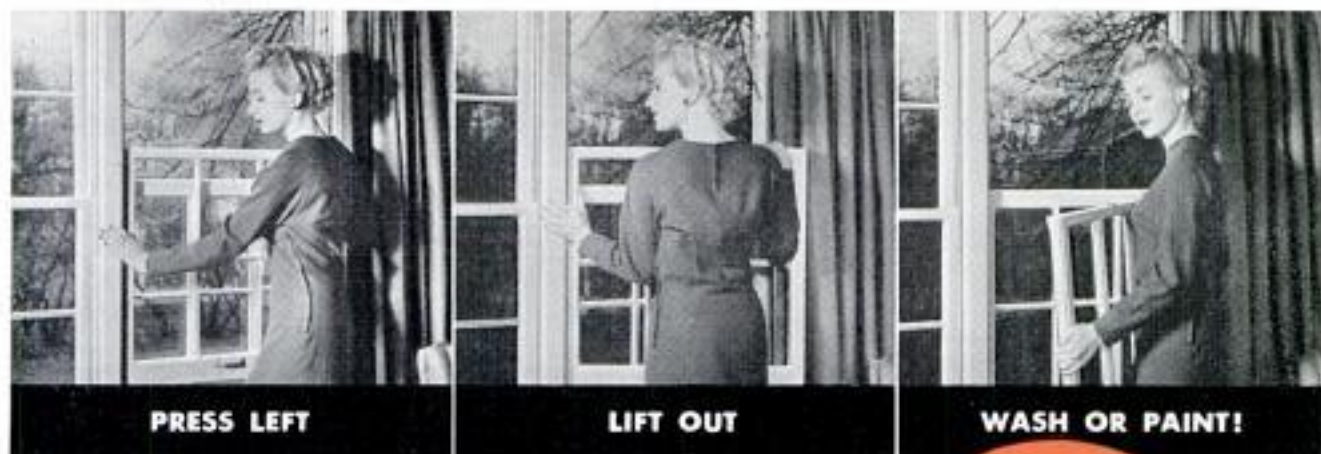
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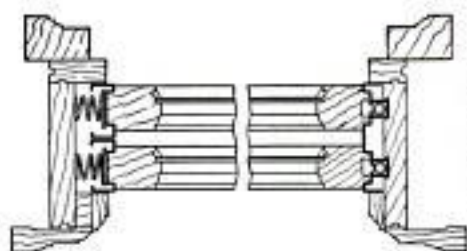


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Details show minor October '55 changes



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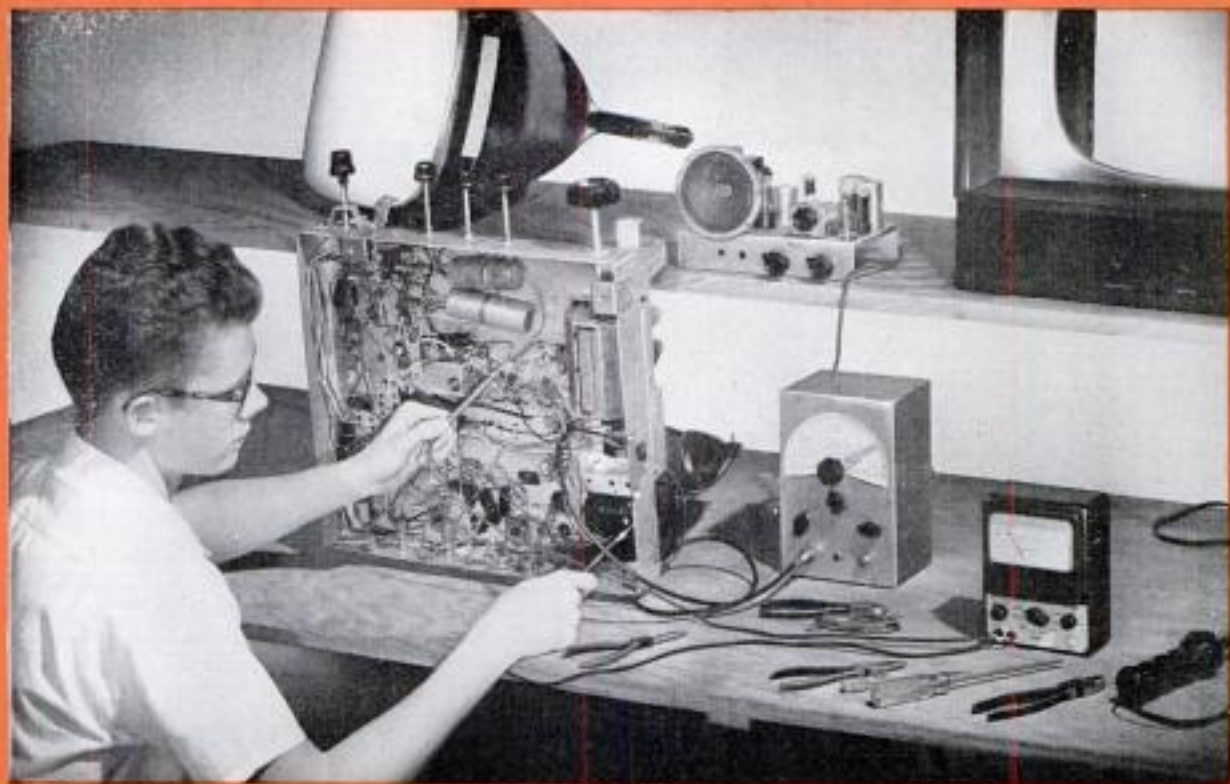
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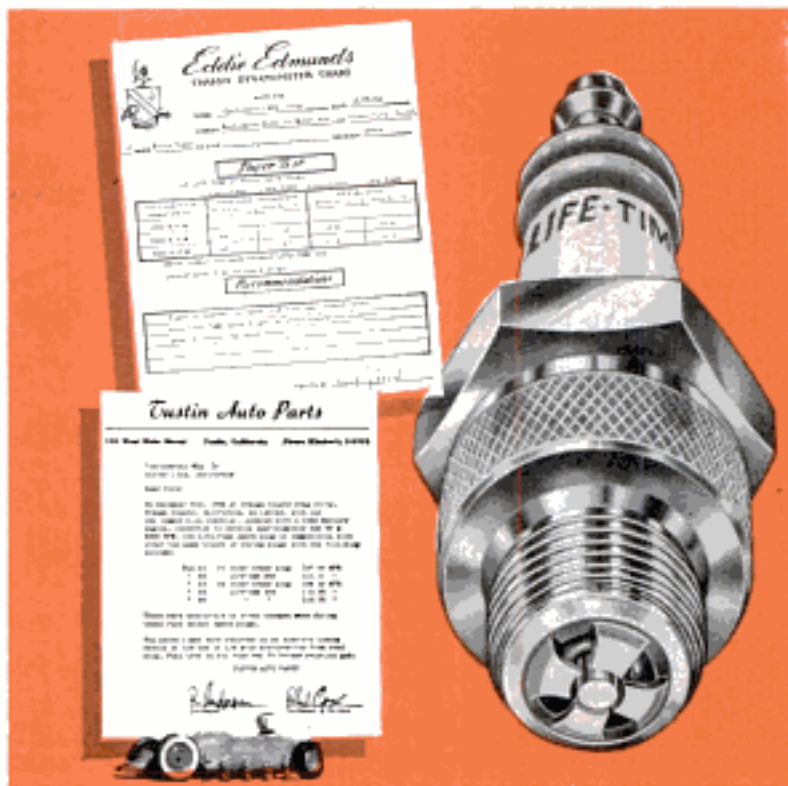
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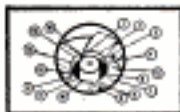


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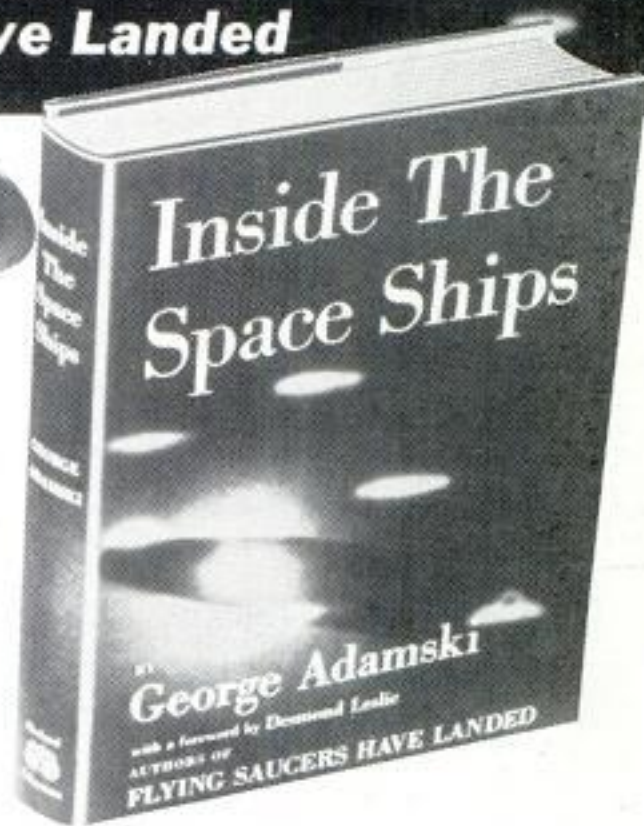
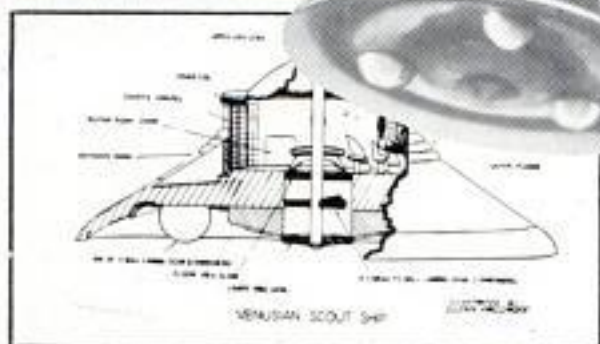
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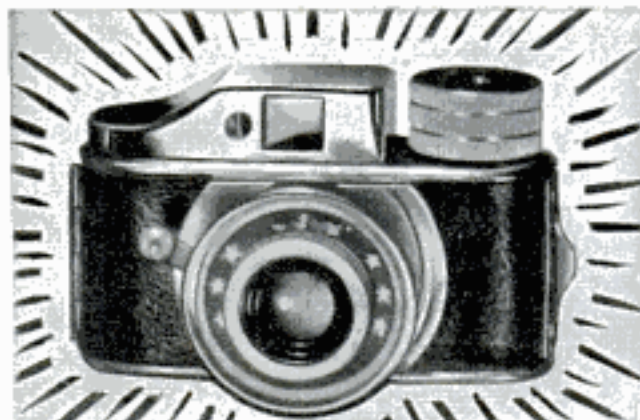
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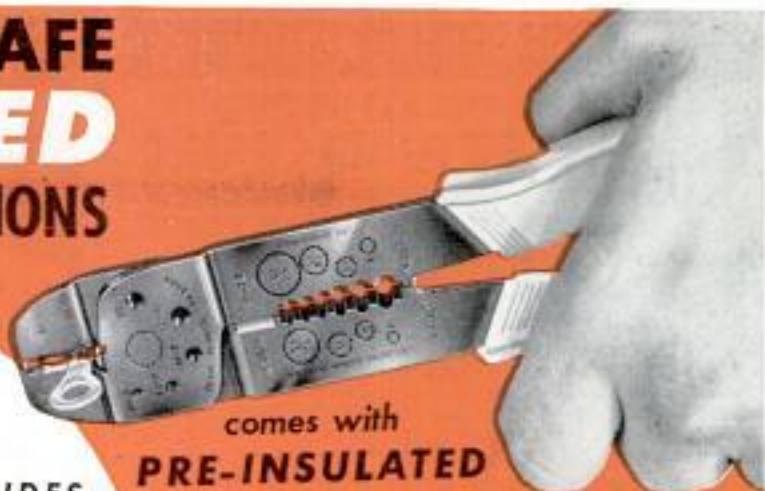
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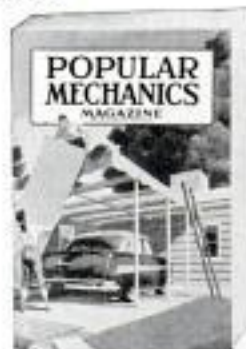
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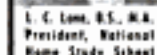
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750-16 (6)	7.52	800-18	5.92	800-20	9.02	1000-20	17.92
550-18	4.52	820-15	5.92	550-20	9.82	1100-20	19.92
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I'LL HELP YOU START RIGHT AWAY. Since succeeding beyond my wildest dreams in my own FLOK-KRAFT business, I have concentrated on helping ambitious men get started toward a successful future. My plan is designed to help you start at home in spare time, and build gradually toward a full-time business if you wish. Start RIGHT NOW. Fill out and mail the Certificate at the top of this advertisement today. I'll rush you FREE a MICRO-FLUFF Sample Kit and Illustrated Plan that shows you how to get started AT ONCE. I'll also arrange to send you the complete FLOK-KRAFT MICRO-FLUFF outfit to try out right in your home, without risk. Outfit includes simple instructions, hundreds of show-how illustrations that make everything easy, specially designed, high-velocity Applicator and generous supply of FLOK-KRAFT MICRO-FLUFF - EVERYTHING YOU NEED TO START RIGHT AWAY. You owe it to yourself to investigate. SEND NO MONEY. RUSH Valuable Certificate TODAY by Airmail. I'll show you how to START MAKING MONEY AT ONCE!

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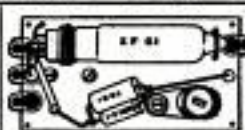
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If you have a little space in a SPARE ROOM, PORCH, BASEMENT, GARAGE ... ANYWHERE. Investigate this "chance of a lifetime" opportunity of breeding rare tropical fish for profit. The tropical fish "BOOM" IS JUST BEGINNING and here's your opportunity to cash in on it now. Experts estimate \$780 MILLION DOLLARS will be spent on tropical fish within next ten years. Investigate now—Rush coupon below.

YES BOB, I BREED THEM IN MY BACK PORCH. THEY ALMOST SELL THEMSELVES. TOO. BELIEVE ME THE 'BOOM' HAS STARTED

DID IT COST YOU MUCH TO START?

NO—ONLY A FEW DOLLARS, A LITTLE SPACE AND MY SPARE TIME AND THE LITTLE KNOWN BREEDING SECRETS ARE ALL YOU NEED TO START. IF YOU'RE INTERESTED—LEARN THE FACTS TODAY!—THE "BIG BOOM" HAS STARTED SO CASH IN ON IT **NOW!**

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Made of solid but porous everlasting sintered bronze, the Micro Bronze Filter screens out all particles of dirt and abrasives larger than .00023 inch in size (so small you could put a thousand of them on the head of a pin!). The Micro Bronze positively cannot channel or blow up... operates efficiently at all temperatures... never wears out, never needs replacing, merely occasional cleaning.

SAVES OIL CHANGES... SAVES DETERGENTS. Your oil is good for at least 10,000 miles with a Micro Bronze Filter. All the valuable additives are kept in, not soaked up and wasted by the filter. You never need buy another replacement pack as long as you live! Used with modern detergent oils, Micro Bronze will add thousands of miles to engine life, help prevent loss of engine power, save costly oil changes, pack replacements and engine overhauls!

DOES YOUR PRESENT FILTER PASS THE "ACID" TEST? If you have a Micro Bronze Filter with the built-in Acid Neutralizer your engine is getting the full protection it needs! In a simple test you can easily make yourself, the Micro Bronze special element completely neutralizes acids in 60 seconds!

BUILT-IN ACID NEUTRALIZER!



THE SINTERED METALS SECRET... Before World War II, the Germans discovered how to fuse microscopic balls of metal into solid but porous form. Following the war, this secret was made available to American industry and we've developed it for Micro Bronze Filters. This is a magnification of the filter wall.

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FITS EVERY CAR & LIGHT TRUCK. A Micro Bronze Unit costs only \$6.95, including all full-flow models. Easy to install, never needs changing. Micro Bronze Filter Housing \$9.95 for all cars with no filter equipment (does not include element). Use the easy-order coupon now.

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**I call this
machine . . .**

**"my little
money maker"**

It can be put anywhere in the house—in the kitchen, the basement, or the attic and it goes on making money for you whether you're there or not. Three times a day—while you're at work, while you're asleep, or while you're at the movies—it turns out a product that sells for \$6.00 and the cost of raw materials is only 54c. It will make 3 a day or 6 a day, just according to the way you set the switch, and the profit on each one is more than \$5. I'll be glad to tell you how to get one of these little money makers working for you.

By James Q. Mason

What a fellow makes in his regular job today is hardly enough to make ends meet. Higher taxes, higher costs of food and rent and almost everything else raise hob with the savings account. And I say that what a fellow puts away is even more important than what he makes. It would worry me sick if I couldn't save a little against a rainy day.

And that makes it almost necessary to make some extra money. There are lots of ways to do it, too. The magazines and newspapers are full of ads for agents to sell things. But if I had to make a living by selling, from house-to-house, I'm afraid I'd starve to death. I like to make something with my hands and either sell it by mail or let the stores sell it for me. There are lots of people like me.



Another thing: Lots of men—and women, too—don't want to get mixed up with something that might hurt them on their jobs. They want a plan they can operate at home—in spare time—one that they can work at any time they please and one that doesn't need any rented store or hired help.

And that's where my little money maker rings the bell.

Let's say you're like me. You want to make some extra money but you don't want to do any selling. All right—take a look at what you can do with this machine. I'll give you some facts that I discovered and your own common sense will tell you they're true.

If you're going to make something, it ought to be something that lots of people want—something that lots of people buy. It shouldn't be something that sells at just certain seasons—but all year 'round. And, it shouldn't be any flash in the pan. It's got to be steady—year after year—something that's not here today and gone tomorrow.



Well, give a thought to this: What's more permanent than babies? Ever since I can remember there's been more and more babies born every year. Last year three and a half million. This year more. Next year, more yet. Then answer this question and tie it in with your thinking: What's stronger than mother's love for her baby? And what is more powerful than love or sentiment in making people buy things. Now you've got the idea.

Every year millions of mothers want their babies' first

shoes preserved as mementos. These mothers have the shoes "bronzed" as they call it—by electroplating. Electroplating coats the shoes with copper and preserves them forever. And there's no big company that has a corner on the business of metalizing baby shoes.



Almost all of this work is done by little fellows in their kitchens or basements. Lots of orders come to you by mail when you send out circulars letting mothers know you can do the work. Lots of stores take orders, but they

have to turn over the work to you. There are six or seven ways to get orders without making any house-to-house calls. The big job is keeping up with them.

You see, you can clean up six pair of shoes in a few minutes. In a few minutes more you can dip them in the hardening solution like you see in the picture. Then you spray them with a conductive coating and hang two pair in the tank on copper wires. Just turn the switch and walk away. The machine does the rest. Eight hours later those shoes are ready to take out of the tank, burnish and mount and ship or deliver. Two pair every eight hours, whether you are asleep, awake or at the movies.



The materials cost 54c a pair. The retail price you get for electroplating is \$6.00—so the profit is more than \$5.00 a pair. Since you can do six pair a day you can see what the profit is, and the beauty of it is that the machine doesn't cost much. Almost anyone can afford the equipment and the book you get tells how to run the machine and how

to get orders. Anyone can follow the instructions.

Of course, there's a lot more information than what I can give here. But write me a note or send me a postcard with your name on it and I'll send you all the information right away by mail. I'll show you how to start; what you need to buy; where to get it at the lowest price; how to get orders coming in seven different ways; and everything you want to know about the business. When you get all the facts, you can decide whether you want to get a "little money maker" of your own. Everything I send you now is free—no charge and no obligation. I'll be glad to help you get a start. Address me, James Q. Mason, 1512 Jarvis Avenue, Chicago 26, Illinois. There's no catch to it. No one will call to try to sell you anything. I'll mail everything free, postage prepaid. Then you can decide. Write to me right away so I can help you get started making money.

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DOLLARS Daily! No canvassing! Free proof! Mailmaris, Cincinnati 36-F, Ohio.

SELL Polics by mail. Free list gives low cost source. Ballard's, 425 East Catherine, Louisville 3, Ky.

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

OPERATE Profitable mail order business. Splendid opportunity. Write Blair Co., Perkinston, Miss.

BUY Wholesale, 850,000 items. Write Info-Center, 216 West Jackson Blvd., Chicago, Ill.

UNUSUAL Opportunity, handspinning Angora wool. Fascinating, profitable. Angora House, PM, Springfield, Illinois.

EXPORT Business made easy! Expect something different. Complete setup, everything furnished. Hermes, 152 West 42, New York City 36.

FINEST Formulas for making world's fastest sellers. Literature free! Miller, Chemist, 1517-R, Tampa, Florida.

ADVERTISING Business—City, country. Low overhead, substantial income. Experienced advertising company offers complete setup. Harold, 69-S Bennett, New York City 33.

MINIATURE Trees. Why pay \$2.00-\$10.00 for growing secrets? Free details. Tiny Trees, Box 3684-P, Chicago 54.

BUY Wholesale! 100,000 name brand products! Save 65%!! Big profits selling others spare time! Free catalogs! National Buyers Service, Box 426EE, Oakland, Calif.

GET Merchandise orders by mail! Everything furnished—Orders filled. Big profits. Long, McKays Beach, Leonardtown 3, Md.

\$3.75 HOURLY Minimum, evenings. Preparing tax returns—Simplified! Auditax, 3475TAT, Los Angeles 34.

WHOLESALE! 10-30% Discounts! Appliances, tools, etc. Catalog 25c. Levesque Supply, Atlanta, New York.

WHAT'S New in mailorder? Let "Mail-order World," published monthly, keep you informed. Sample, 25c. Wayte, 1238 Elden, Los Angeles 6, Calif.

NEW, Unique plan can earn hundreds of dollars for you. Free details. No obligation. Write: Best Distributors, 200 West 34th St., New York City 1, Suite 1003.

"FROG Raising!" Season just starting. Get this year's eggs. New book tells how. Folder 10c. Broel-A, Box 306, New Orleans 1, Louisiana.

DOLLARS: Baby record books, Kitty Kat shoes, My Baby albums, eleven thousand new prospects daily. Sold by mail, use our literature. No-Co-Ro, Oakland 6, Calif.

WANT Up to \$100.00 weekly deposited in your mail box? Details free! Smith, 2708-P Ladera, San Bernardino, Calif.

BUY It wholesale! Manufacturers, distributors offer 850,000 items. Literature free. Olsen, 1231-A East Third, Duluth 3, Minnesota.

ELECTROPLATE Auto parts, novelties, mirrors, baby shoes. Easy, inexpensive home processes. Free booklet. Tyco Metals, Box 13231-MM, Houston 19, Texas.

WHOLESALE, Thousands of items. Supply source list, 10c. Idealer, Park Ridge, Ill.

LEARN Sewing machine repair. How to make big money at home sparetime. New machines. Everything supplied. Write Taylor Service, Box 2126, San Bernardino, California.

IMPORT-Export opportunity, profitable, world-wide, mail-order business from home, without capital; or travel abroad. Established world trader ships instructions for no-risk examination. Experience unnecessary. Free details. Mellinger E701, Los Angeles 24.

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

HOW And where to obtain capital. Particulars free. Star Service, Wapakoneta, Ohio.

BE Appointed state notary public now. Write, Stationers, Helotes, Texas.

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

FREE Folio "Up to \$45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home, sparetime! Haylines, Carlsbad, Calif.

MONEY in sparetime fixit shop at home. Repeat cash business. Experience unnecessary. No selling. Free booklet explains. Victor Foley Company, Columbia Heights, Minnesota.

WE Love our mailman—He leaves over \$1000.00 monthly in our rural mailbox. My college professor husband drafted a scientific home mailorder method. We bought a Texas ranch, live as we always wanted. Now we sell the Ranch Mailorder Method. Operates anywhere. Inquire: Eveningshade Ranch, Helotes, Texas.

RESILVERING Mirrors, formula 50c; two-way lookout mirrors. (No one sees you), 50c; coppered mirrors, 50c. All \$1.00. Nelko-Mir Box 3462-J, Chicago 54.

POPCORN And potato chip equipment. Eakins, Box 933-A5, Springfield, Ohio.

MEN—Income from local information. No selling. Neherco, LaVerne, California.

RUBBER Molds for casting plaques, figurines, novelties. Catalog illustrating over 100 fast sellers, 10c. Castcraft Studios, 568-PM Marlon Street, Brooklyn 33, N. Y.

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

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free book. Washington Mushroom Ind., Dept. 172, 2954 Admiral Way, Seattle, Washington.

\$25 WEEKLY Working two hours daily at home. Lycke, Box 2471-A, Cleveland 12, Ohio.

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

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

MINK Raising information free. Complete. Lake Superior Mink Farm, Superior, EEL, Wisconsin.

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

VENDING Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 72, 715 Ensor St., Baltimore 2, Md.

BRONZE Baby shoes. Instructions, equipment and mountings for genuine electroplated process. Free catalog. Hollywood Bronze Supply, Dept. B-3, 1624 East First Street, Los Angeles 33, Calif.

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

LIQUID Rubber. Make flexible molds. Free sample. Chaney, 1130 E. 16th St., Jacksonville 6, Fla.

GOOD Paying business silvering mirrors, plating articles in the shop and home by late method. No tanks or shop required. Free booklet. Gunmetal Co., Ave. H, Decatur, Illinois.

GROW Orchids at home—Profitable, fascinating. Year 'round, Maine to California. No greenhouse. Gorgeous cactileas, cymbidiums, etc. Successful home grower shows you how. Full details free. Flowerland, 4622 Wilshire, Los Angeles 5.

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

\$200 WEEKLY Cleaning Venetian blinds. Free book. Burt, 2434A, Wichita 13, Kansas.

WANT To make big money at home? \$5 profit in an hour possible with invisible re-weaving. Make tears, holes disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 8334-S Prairie, Chicago 19, Ill.

YOU'LL Be amazed at the tremendous profit possibilities in selling the finest quality Bibles available anywhere! Many men make \$30,000 yearly and more! Get my free proven Bible sales course plus catalog of many Morocco grain, genuine leather covered Bibles and related items. Joseph W. Cain, Wholesaler, Box 5065P, San Antonio 1, Texas.

BECOME A game warden, professional hunter! Join forestry, park, fishery services. Good pay! Opportunities open! Free revealing "Select-Job Chart," details, job-getting secrets. Write Home Study Institute R10, Los Angeles 19, California.

TELEVISION Repair business. \$39.50 total cost. Amazing 1 day training. No studying. New proven technique. Make \$15 to \$20 day immediately! No experience needed. Investigate! Free home-business plan. Write Electronic Engineering, 1036-PO So. LaBrea, Los Angeles 19, Calif.

MAKE Beautiful colored mantels, building and flagstone from concrete. Instructions \$2.00. Stonetex, 533 Manhasset Rd., Pittsburgh 27, Penna.

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

BE A landscape contractor. Make \$20 to \$60 a day. Start with smaller projects and work into larger jobs. We show you how. Easy-to-follow home study course. Write for free book, National Landscape Institute, Dept. M-103-C, 310 S. Robertson Blvd., Los Angeles 4E.

FLEXIBLE Rubber molds for plaster and Marble figurines. Sample and large illustrated catalog 25c, refunded on first order. K-C Novelties, Dept. 205, Southampton, Mass.

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

EARN Up to \$2000.00 monthly with spare or full time route of automatic 3 in 1 hot drink merchandisers in your community. We train you. Write Superior, 4555-H East Warren, Denver, Colorado.

\$25 DAILY Profits sharpening farm discs without dismantling or moving. No experience necessary. Free plan explains. B. T. Foley Company, Columbia Heights, Minn.

FRANCHISES Make profits! Become exclusive franchised distributor, agency operator. Nationwide opportunities. Information rushed. National Franchise Reports, 333 North Michigan, Chicago 1.

UNTOUCHED Mailorder opportunity. Establish industrial supplies mailorder business. High income, more repeats, lower overhead. Complete setup offered. Stewart Advertising, 1625 S.W. 19th St., Miami, Florida.

CONCRETE Specialty manufacturing. Profitable new business. Steel forms for twenty items. Catalog free. Vyke Co., 2435 15th St., Denver 2, Colo.

\$5.00 HOURLY Bronzing baby shoes! Mountings! Foster, 1320 Ardmore, Chicago 26.

WHOLESALE Catalog! 30-80% discounts! Appliances, musical instruments, typewriters, phonographs, watches, jewelry, recorders, housewares, etc. Consolidated Distributors, 21-11 Lafayette, Paterson 15, New Jersey.

METALIZE Baby shoes, jewelry, gifts. Free catalog. Publisher, Box 73136, Los Angeles 3.

BIG Money! Operating home mailorder business. Sparetime, small capital. Jackson, Newfoundland, Kentucky.

UNLIMITED Earnings weekly, spare time; never-before-offered set of proven, successful plans. Herco-B, 319 Sea, Quincy 69, Mass.

\$5 TO \$10 An hour. I've did it, I'm disabled now. Real genuine offer. Complete information \$1.00. Lucas, 2210 Carson St., Pittsburgh 3, Penna.

MAKE Perfumes, other products. Sell mailorder. Catalog free. International, 6347 Farnell PM-10, Chicago 21, Illinois.

WHOLESALE Catalog \$1, refunded. Quality Sales, Box 26, College Park, Md.

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

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

FREE Booklet concerning hundreds profitable businesses started sparetime at home. Richard Company, Box 366-P, Hayward, Calif.

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

REPAIR Sewing machines. Mechanical secrets, money schemes, advertising stunts. Booming! This vocation! \$1.00 lesson free. Purdy's, Box 207-M, Weatherford, Texas.

ARE You prepared to profit in the mail-order business? Free details. Albert D'Agostino, 144-17-A, Flushing 54, N. Y.

BE In your own business. Buy wholesale. Big profits. Get free nationally famous name brand mdse. Catalog, Dept. PM, Normandy Distributing Corp., 133 Fifth Ave., New York City, N. Y.

SAWDUST, Turn it into cash. Forty-nine methods. Instructions \$1.00. Sawdust Laboratories, Box 163, Islington, Ontario, Canada.

MAKE Big money in your spare time! Sell nationally advertised brand name merchandise. Appliances, cookware, housewares, watches, jewelry, dry goods, clothing, sporting goods, toys, gifts, etc. Build a profitable repeat business. Send for free 118 page illustrated color catalog with separate confidential cost sheet. Merit Home Products, Dept. PM10, 107 Manhattan Ave., Brooklyn 6, N. Y.

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

START Home manufacturing business. Make cleaners, soaps, polishes, cosmetics. Free literature. Kemix, Park Ridge, Ill.

IMPORT-Export mailorder opportunities! Details. Warner, Box 6, Fort Scott, Kansas.

YOU'LL Be amazed at the tremendous profit possibilities in the finest quality Bibles available anywhere! Many men make \$30,000 yearly and more! Get my free proven Bible sales course plus catalog of highest quality Bibles and related items. Joseph W. Cain, Wholesaler, Box 3063Q, San Antonio 1, Texas.

GROW Earthworms. Raise anywhere, sell breeding stock, soil culture, fishbait. Instructions free with orders. California Wonder Worm Farm, Box 4083 Catalina Station, Pasadena, California.

WHOLESALE Pricelist—Refrigerators, washers, televisions, power tools, typewriters, appliances, 23c. Belmont, 861-839 Dumont Ave., Brooklyn 7, N. Y.

START Profitable home business. Seal in plastic—Photos, licenses, documents, etc. No equipment needed. Agents-dealers, sell special "machineless" laminating kits; local, by mail. Everybody a prospect. Sales plans, details and complete laminating kit \$1 postpaid. Satisfaction guaranteed. Garen Sales, 1569-M7 Ridge, Zanesville, Ohio.

MONEY In shear sharpening. Repeat business. Details free. W. Zell, Summitville PM-2, Indiana.

SELL Subscriptions, all magazines. Free catalogue, supplies, prizes, exclusive aids. Subscription Service Co., Dept. A, P.O. Box 2070, Birmingham, Alabama.

PUSH-Button power mower. Terrific seller. Penn Grant, Grantham, Penna.

START Your own money-making mail order business the surest way, most likely to succeed! Hawkins, Box 1378, Sioux City 2, Iowa.

SHINE Cars without polish. New invention. Lightning seller. Cars gleam like mirror. Samples sent on trial. Kristee 113, Akron, Ohio.

VITAMINS! Terrific profits! Direct and mailorder sales to homes, offices, stores and get your own needs wholesale. Details free. VimVite, 2963PM Beverly, Los Angeles 57.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. MX-1055, 7530 Greenwood, Chicago.

MEN Wanted—Build luggage and cases at home. We sell your products, supply complete instructions, materials, everything. No special equipment needed. Free details. Casecraft, 805-G22 Sunset, Los Angeles 12, Calif.

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at sizable discounts. Postcard brings details. American Buyers, Hertel Station, Buffalo 16-C1, N. Y.

WORK From home in spare time. Start profitable magazine renewal service. We show you how; furnish everything free. No experience needed. Write McGregor Magazine Agency, Dept. 500-B, Mt. Morris, Illinois.

RUN Cafe, diner. How to get started, menus, foods, revealed in home training. Write for free book "Cafe, Diner Business." School of Restaurant Arts, BU110, Fremont, Ohio.

BECOME Tax consultant. Our students earn to \$3,000 in 3-month season, part-time. We train you—help you start. State approved. Union Institute, 68 Hudson, Hoboken 2C, New Jersey.

WE'VE Got a highly unusual deal for you on a new line of fire extinguishers. This is a new company, but you'll recognize the men behind it, who have had more than 20 years' experience in this field, when you write us, and it might pay you well to airmail us today. The Fire King Company, Inc., Dept. 12, Littleton, Colo.

MAIL Order minded? We list your name with over 500 mail order businesses. You receive fabulous mails. Money-making ideas, books, magazines, samples, etc. Tremendously worthwhile service only \$1. Satisfaction guaranteed. Mallorama, Box 476M, Lynbrook, N. Y.

\$100.00 WEEKLY. Mail-order distributors wanted. Work at home sparetime. Experience unnecessary. Write: National Distributors, 240 Rt. 17, Paramus 17, N. J.

SELL Mexican imports. Beautiful merchandise that sells on sight. Be first in your community. \$3.00 brings valuable sample, details. Westway, Box 312, Lockport, N. Y.

\$80.00 WEEKLY. Operate our selective mail-order business in your area, sparetime. Write House of Plastics, Paramus 31, New Jersey.

GIANT 100 Page catalog! Wholesale prices! BTS Products, Box 217, Oakland 18, N. J.

BANANA Syrup business—Formula \$1.00. Amark, 101 Weld, Rochester 5, New York.

\$70 WEEKLY—Home, spare time. Simplified mail bookkeeping. Immediate income, easy! Auditax, 3475TAS, Los Angeles 34.

A Monthly repeat business which you can operate in your own community. For free details write Grask, Dept. A-101, P. O. Box 494, McKeesport, Penna.

WANT Lifetime income? Distribute our wholesale catalogs, 1900 nationally advertised products, 60% savings. No selling. Wholesale catalog and monthly income plan \$1.00 (refundable). First National Supply Co., 347K - 16th Street, Ashland, Kentucky.

WRITE For: Free folio. Latest collection home retirement, business plans, 137 helpful formulas. LCL Distributors, 5909 Petersburg Road, Evansville 11, Indiana.

MAKE Extra money between now and Christmas. Sell subscriptions to all popular magazines. Liberal commissions. For supplies write DeSales Magazine Service, 60 East 42nd St., New York 17, N. Y.

MAKE Tough, attractive building plastic, easily 88 1/2% waste, 101 uses, 800% profit. Exclusive district. Grab it. Bays Laboratory, Oklahoma City 9.

PROFITABLE Home collection office. Experience unnecessary. Details. Hyatt, 411 West Walnut, Kalamazoo 42, Mich.

MEXICAN Leathercraft at the lowest price. Write to Santuario Hermanos, 831 E. Madison St., Brownsville, Texas.

BUY Wholesale name brand items. Triple J Industries, 132 Berkshire, Bridgeport 8, Conn.

EARN \$2.00 Hourly, making and selling sandals! Youngs, 1308-PM, South First, Arcadia, California.

MAKE Money helping others out of debt. Stop garnishments, save jobs, re-establish credit. Details. Borum \$7, 411 West Walnut, Kalamazoo 42, Michigan.

CASH For sawdust (forty methods). Tincans (thirty methods). Newspapers (eighteen methods). Instructions 50c each. All three \$1.00. Charles Company, 13-DXZ, Norwood, Ohio.

\$26,500 SALES in two weeks! Amazing radio-mail order method. Free details. Broadcast Service, 1412-F Great Northern Building, Chicago 4, Illinois.

\$1,000 MONTHLY, Home, mailorder, free advertising method. Revealing information. Seidel, 6000-AJ Sunset, Los Angeles 28.

MAIL-Order success. Follow our informative treatise 25c. Griffe Enterprises, Box \$1, Station D, Toledo 8, Ohio.

WHOLESALE! 10,000 Name brand products 30-60% discounts! New illustrated catalog. Terrific business plans included free! National Distributors, Paramus 11, New Jersey.

AMBITIOUS? We establish you in your own business, supply catalogues, circulars etc., ship orders under your name, paid or c.o.d., show you exactly what to do. Household items needed in every home. Sell direct, by mail or through agents. Complete details absolutely free. Write Topval Corp., Lindenhurst 718, New York.

LEARN New product promotion. Start national business from home promoting your own new product ideas. Sell through retailers, wholesalers, agents or by mail. Expert instruction. Details free. Banning A6, 45 South Los Robles Avenue, Pasadena 1, California.

MAKE New greaseless doughnuts in kitchen. Sell stores. Half profit. Free recipes. M. Ray, 3605 South 15th, Minneapolis 7.

PRINT Without a printing press! Amazing new method! Print colorful signs, banners, cards, posters, glasswear; anything at home. Big profits. Money-making opportunity! We supply everything. Beautiful sample, home-business plan free! Write Screen-Print Company, PM-10, Los Angeles 61, California.

35% TO 30% Discounts. Dealers authorization certificate and catalog \$3.00, limitation per county. Your chance to go in for appliance and jewelry mail order business at your own home. Frank Reiser, Manager, Box 1765, Paterson, N. J.

\$35,000.00 BONUS Offered by U. S. government—Fortunes being made in uranium! Free booklet shows "How To Make Money Prospecting for Uranium." Please enclose 10c for handling, postage. Geiger Co., 195-PM10b Sackett Street, Brooklyn 31, N. Y.

EARN Money at home spare time. Details free. Evans, 10431 Bonnie Drive, Garden Grove, Calif.

WANTED! Home producers, by manufacturers in our clearing house service. Become subcontractor, casting plastic products for these companies. Thousands of easy-to-make items required for consumer-industrial use. Cash in at home, without previous experience. Plastic Service Associates, Dept. 10-PM, East Boston 28, Mass.

LIQUID Marble—Brushed, sprayed! Mold novelties, tile. Particulars free. Marbleizing Service, Edwardsville, Illinois.

PROFITABLE Home mail-order business! \$20 to \$40 daily sparetime. Unusual! Edwards, Box 45733E, Los Angeles 45.

HOW And where to obtain money. Many ways to use your time to make big money. How I started with \$28 and built assets over half million dollars. Complete information postpaid \$2.00. Money-back guarantee. Particulars free. Business Consultants, 5851 N.E. 2nd Avenue, Dept. "C" Miami 37, Florida.

\$46 FROM Square foot plywood; jigsaw necessary. Details free. Woodarts, X-16, Bridgewater, Mass.

SENSATIONAL New profitable home career now revealed. At long last, you too can learn the amazing techniques of the portrait studios. Don't lose out, get your share of these steady, life long dependable profits. (Some portraits sell for more than \$100.00.) Be your own boss in this uncrowded field. Complete kit \$3.00 or valuable information free. John G. Marshall Co., Dept. PM-10, 187 N. 9th St., Brooklyn, New York.

SELL Quilt pieces by mail! Woods Remnant Co., Bedford, Penna.

MEN With cars or trucks—Start your own profitable business. No selling, no capital required. Complete plan \$1. Jack Lehrer, 156 Beach 86th Street, Rockaway Beach, N. Y.

FREE Spawn. Free instructions. Join National Association Mushroom Growers. \$1.00. Mushrooms, 32 Kendrick, Lawrence, Mass.

PEARL—And metalcote baby shoes: Brushplate gold, silver, copper. Castwood plastic novelties, etc. Big wholesale catalog. Liquid rubber, molds, models, casting, coloring, glazing materials. Samples 25¢ postpaid. Homecraft, 940-44 Belmont, Chicago.

UNCLAIMED Watches pay big profits. All brands. \$4.95 up. Illustrated folder free. Cosmos Sales, 81 East 125 St., New York, Dept. 26.

WHY Make others rich? Your home can be your factory. We supply parts, you assemble. Hanco, Box 97, Lombard, Ill.

HYBRID Earthworm business and stock; unusual and profitable, tremendous future potential, well established and advertised, nationwide coverage; 7 bins worms, est. \$3,500; 7 bins capsules—est. 297,500; 7 bins or 1,650 lbs. rejuvenator fertilizer, 3 rabbits, direct mail advertising material, good will; est. value \$20,535; these business items could easily be moved by truck to any location and business continued from there; sacrificed at \$12,000. F. & W. Stevens, Strout Realty, Main St., Marshfield, Mass.

BROCHURE, 400 Positions, profitable occupations for people over 60. Stommel, Box 104, Detroit 31, Michigan.

WORK At home. Free details. Ajax Products, 734 East 236th Street, Cleveland 23, Ohio.

MONEYMAKING OPPORTUNITIES

BRAND New opportunity. Free details. Reliant Sales Company, Box 55, Bangor, Penna.

LEARN Technical metaphysics and insure your future. Easy, inexpensive correspondence course. Simplest method known. Diploma. Write: Premier College of Technical Metaphysics, 2552 McKenzie St., Vancouver 8, B. C., Canada.

SELL Helbros watches-jewelry, 70% discount. Wholesale catalog 25¢. Dorinda, Box 77, Huntington Station, New York City.

MAKE Spare time money preparing and mailing sales literature. Adams Surveys, 3513-AT Sunset Blvd., Los Angeles 26, Calif.

SCHEMER Magazine, Canfield 1, Ohio. Mailorder and business plans. Year \$2.00, sample 25¢.

OPPORTUNITY Mails three months 25¢. Donovan, 791 Greenbelt, Levittown, N. Y.

PRIZE Contests provide fabulous and confidential home income opportunities! Here's how and where to win your share! Send stamp! National Contest Bulletin, Box 2685, Miami 16, Florida.

MAKE Money with camera. Professional secrets \$1.00. Brewer—Photographer, 3880 Hollywood, Hollywood 28, Calif.

"MONEY Getter's Bulletin." Prints helpful money-making ideas, plans, tips. Sample 25¢; details free. Distributors, Box 831-D, Monessen, Penna.

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

MAKE To \$300 extra. New! Different! No selling! No mailorder! Details free. J-M Enterprises, 601 1/2-A North Marsalis, Dallas 3, Texas.

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

FREE Literature describing moneymaking mailorder plans. Lewis Barlett, Richland, Georgia.

BUILD Sales by recruiting productive distributors selling direct or to retail outlets. Secure most concentrated circulation through classified columns of Salesman's Opportunity. Write for facts, Gilbert, Salesman's Opportunity, Room 1700, 850 N. Dearborn, Chicago 40.

FREE Folio "Up to \$45,000; Unlimited Vacations." No merchandise, equipment. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

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

GENERAL Contest Bulletin. Issued monthly. Sample, 25¢. 1600 1/2 East 5th, Duluth, Minn.

GROW Mushrooms. Cellar, shed, and outdoors. Spare, full time, year round. We pay \$3.50 lb. We paid Babbitt \$4,165.00 in few weeks. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Washington.

50,000 ARTICLES Wholesale. Source directory, dime. Nelko, Box 3462-D, Chicago 54.

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

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

ATTENTION: Typewriter owners. Make handsome profits. Write today. Groves Company, 682, Hastings 3, Nebraska.

START A profitable subscription business in spare time! We need men and women (young or old) as representatives for all leading national magazines. Liberal commissions paid for new and renewal subscriptions. Start earning money in this pleasant work at once! Clip this ad and send with your name and address to: Agency Bureau, Dept. PM, Hearst Magazines, 250 West 55th St., New York 19, N. Y.

\$100 OR More month spare time at home. Free information. World Sales Co., Box 179 PM, Ripley, Mississippi.

SCHOOL Seniors—Sell classmates America's most beautiful graduation name cards. Largest selection. Highest commission. Outsells all others. Free sample kit. Printcraft, Dept. M, 1509 Maple Street, Scranton 5, Penna.

BUY Wholesale! Save 66 2/3%! Appliances, furniture, jewelry, toys, sporting goods, tools. Free catalogs. National Buyers Service, Box 426EB, Oakland, California.

HAVE Home business—Get \$10 orders in every mail. Keep \$8.00. Everything supplied. National, Box 88-W, Dorchester 22, Massachusetts.

PRESERVE Living flowers to last indefinitely. Swell for gifts. Interesting hobby. Make money too. Free details. Old Town Gifts, 405 S. Clark Blvd., Clarksville, Indiana.

EARN Big money. Manufacture better mousetrap. Disposability assures reorders. \$1.00 brings complete plans. Dispos-O-Mouser, Box 2693, Dept. PM106, Sacramento, California.

NEW Comedy, religious, general T"x11" signs. 7c retail 50c. 15 samples, \$1.00. Lowy, 812 Broadway, Dept. 888, New York 3.

TREMENDOUS Profits selling genuine leather wallets (\$2.00 values), \$15.00 doz. Dorow, 1129 S. 34th, Milwaukee 15, Wis.

NEW Mail order opportunities. Free details! Central Sales, Robbins, N. C.

AMATEUR Artists, cartoonists. Turn your art ability into money. Hamilton, Box 4-PMA, Astoria 5, N. Y.

THOUSANDS Articles wholesale! Catalog \$1.00 refundable. Evanich, Stamford (Catskills), N. Y.

PRINTING And office supplies wholesale. 20,000 items. Literature free. Royal, Box 368-A, Cleveland 27, Ohio.

BIG Profits servicing new and renewal subscriptions for firms, clubs, churches, friends, neighbors. No experience. No investment. Free catalog and supplies. Hanson-Bennett Magazine Agency, Desk P-2, 180 N. Wabash Avenue, Chicago 1, Illinois.

TO \$50.00 Weekly. Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34.

\$5 TO \$10 An hour. I've did it. I'm disabled now. Real genuine offer. Complete information \$1.00. Lucas, 2210 Carson St., Pittsburgh 3, Penna.

\$9.00 RETURNS \$160.00 Repeats. 25c coin for sample. Ezee, Bayport 7, Mich.

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

START A buying service, buy wholesale thousands nationally advertised products. Make big profits selling at stable discounts. Postcard brings details. American Buyers, Hertel Station, Buffalo 16-D, N. Y.

ADDRESS Big hunting bound circulars. Earn cash commission. Write—Okaw River Kennel, Corden E-5, Illinois.

BIG Money. Mail order. Details 25c. Desert Mail Sales, Box 859-PM, Mojave, California.

LEARN Directing money-raising campaigns for churches, institutions. Spare time. Earned \$3065 in six weeks my first campaign on \$50 investment. Short course backed by 35 years experience. William Arbogast, 229 East Mason Avenue, Alexandria, Virginia.

HONEST Money fast, formulating top building specialty product. Free information. Larstone, 3419-9 East, Salt Lake City 6, Utah.

\$1,000. MONTHLY Possible raising earthworms! Backyard, garage, basement. Complete illustrated booklet explains raising, feeding, packing, marketing. 25c postpaid! Ozark Worm Farm-J, Willow Springs, Missouri.

SELL Sparetime from free wholesale catalog. Nationally advertised watches, jewelry, appliances. Save on personal needs. Big discounts, earn huge profits. No investment. Louis Perloff, Dept. PM, 723 Walnut St., Philadelphia, Penna.

\$5-\$10 AN Hour teaching driver training in your own car. Information, dime-stamps. Driving School Services, Box 428P, Coleta, California.

YOU Cast metal products. Free literature. Box 124, Lynwood, California.

50 MONEY Making plans and fountain pen, only 50c (coin). Satisfaction guaranteed. Campbells Studio, Millwood, Ky.

OPPORTUNITIES To save money and make money through products and services offered in new Coronet Family Shopper. See October Coronet now on sale at newsstands, or write Coronet Family Shopper, Dept. M, 488 Madison Ave., New York 22, N. Y.

EARN Cash weekly making perfumes. Write Stuart, Stevensville 3, Md.

SELF-Help books, courses. Free lists. Ralph Underhill, Beebe, Arkansas.

SELL Tintania gems; far more brilliant than diamonds. Catalog free. Diamonite, 2429 77th, Oakland 5, California.

OPERATE "Escalator" mailorder system, selling our products or any products. Most revolutionary mailorder system known. Postcard, Selbyco, Decatur 161, Ill.

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

\$100-\$400 MONTHLY Possible using pen-typewriter! Stamp brings home moneymaking opportunities "Packette," Argensio, B-208, Rutherford, N. J.

VENDING Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 15, 715 Ensor St., Baltimore 2, Md.

NEW Comedy, religious, general T"x11" signs. 7c retail 50c. 15 samples, \$1.00. Lowy, 812 Broadway, Dept. 897, New York 3.

WANT To go in business for yourself without capital? We show you how. Start part time your own home. Postcard brings details absolutely free. Topval Corp., Lindenhurst 720, New York.

PROFIT From your power tools. Manufacture new invention. Territory available, first offering. Free information. Roy Calais, 5665 Lemonwood, Baton Rouge, La.

ONE Hundred to five hundred percent profits importing low-cost fast-selling merchandise direct from Japan. Airmail \$1 for price list and simple home-business plan anyone can operate. Francis Justice Co., Akasaka P.O. Box 7-A, Tokyo, Japan.

OPERATE Profitable magazine subscription service. Earn big Christmas profits. New telephone plan. Handle renewals for all magazines. No experience or investment. Rush name. McGregor Agency, Dept. 500-C, Mount Morris, Illinois.

PROFITABLE Home business adds to retirement income. Operating information for interesting mailorder business. World Sales Co., Box 179 PM, Ripley, Mississippi.

AMAZING Profits! Free particulars. Peltcher, 4781 El Cajon Blvd., San Diego 15, California.

EXCEPTIONALLY Profitable homework opportunity. Free information. Baron's Recording, Lynden, Wash.

EARN \$10,000-\$25,000 Annually. "24 Avenues to Success" tells how. Booklet 25c. Valleypress, Descanso 3, California.

EARN \$10,000.00 Typing at home! New book reveals tried and proved formula for securing profitable typing work, with or without experience. Only \$2.00. Satisfaction guaranteed. Order today. Felgen, Dept. PM-10, Box 1125, Oak Park, Ill.

NEARING 60? Want salaried position, (no selling). Send for free information about a book listing many possibilities for you. G. & L. Company, 7312-B Antioch Road, Merriam, Kansas.

OVER \$200,000.00 in cash prizes offered this month. They are yours for the taking. Free details. Robert Spence, Dept. P, 7352 Central Ave., St. Petersburg 7, Fla.

\$145,000 INCOME Possible developing experimental mink. Complete information \$1.00. Huebl Minkery, LeSueur, Minn.

FORMULAS, PLANS, ETC.

FREE Formula catalog. Anything analyzed \$25.00. Western Chemical, Salem, Oregon.

MAKE Extra money, part or full time. 100 formulas only \$1. Ann Graham, 507-A Fifth Avenue, New York City 17.

15 EASY-To-make money-making formulas \$3.00. Write Jim & Jim, 552 W. O'Connor St., Lima, Ohio.

LIFETIME Business! Manufacture extremely profitable products! Lists free! Thermolab, Peoria 4, Ill.

MODERN Formulas for today's fastest selling big-profit products. Literature free! Miller, Chemist, 1517-N, Tampa, Florida.

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

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

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

ONE Commercial formula and catalog \$2.00. Millet-PM-Chemist, 1709 W. 7th St., Los Angeles 17, Calif.

PLASTICS

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

LAMINATING: Information, sample free. Plastic Press, Box 13, St. Louis 14, Missouri.

PLEXIGLAS Sheets for less. 1/2" x 12" \$1.75. Plus 15% postage. Catalog 25c. Plastic's, Box 1812, Salt Lake City 10, Utah.

SPECIAL Offer—Home repair kit with powerful adhesive plastic and fiberglass. Prize contest. Complete information brochure 10c. Adhese Sales Co., Box 282, Nixon 1, N. J.

PLASTIC Glue, 30 times stronger ordinary glue, easy to use. Kit \$1.50. Dunn, Box 5537, Chicago 80, Illinois.

PLEXIGLAS, Lucite. Square foot cost 1/16", \$1.15; 1/8", \$1.52; 3/16", \$1.86; 1/4", \$2.21; 3/8", \$3.28, 1/2", \$4.38. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, 23-25 Sussex Avenue, Newark, N. J.

LAMINATING Supplies. Free price list. Solomonson, 46 Cornhill, Boston 3, Mass.

PLEXIGLAS: Sheets, rods, tubes—Clear, tinted. Ideal for boat windshields. Paper-thin acetate. Vinylite sheets, rolls; Fiberglass. Polyester boat coatings; casting, embedding plastic. Plastic sign letters. Wholesale-retail factory distributor. Instructive catalog, 15c. Airmailed 25c Gem-O-Lite, 5350P Riverton, North Hollywood, Calif.

PLASTIC, Sheets, rods, tubes, etc. Free catalog. Parker Specialties, 9895 Monica, Detroit 4, Michigan.

PLEXIGLAS. Cut to size. Clear. Any thickness. Colors. Rods. Tubing. McClarin Plastics, P.O. Box 168H, Hanover, Penna.

CHEMISTRY

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

AMAZING New Book of Science. Experiments, formulas and catalogue of laboratory supplies. Only 25c. National Scientific Co., Dept. PM-10, 3204 W. North Ave., Chicago 47, Illinois.

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

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

CHEMICALS And apparatus for industrial, analytical, and private laboratories. Catalog 25c. Dept. M-50, Biological Supply Co., 1176 Mt. Hope Ave., Rochester 20, N. Y.

AGENTS WANTED

DAVY Crockett still steps sell like wildfire. Amazing demand, profits. Particulars. FunCraft, 1013 Garfield, Aurora 10, Ill.

MEN. Money! Miracle Glasstint tints windshield. Gives marvelous glare-proof protection, plus 1956 look. Sprays on in fifty. Reduces glare from sun, headlights. Lasts for years. Auto, truck owners buy on sight. Profits 100% up. Rush postcard for free details. Glasstint, 220 S. State, Dept. PM-10, Chicago.

COMBINATION Crucifix and sick call set. Indispensable every Catholic home. Sell for \$2.75; cost you \$1. Hundred lots. Regular \$5 retail value. Send \$1.50 sample. Mackley, 104 Worth St., New York City 13.

SELL Imported giftwares. Illustrated catalog free. Adams Associates, 30 West Washington, Chicago 2, Illinois.

MEN: Make \$1000 a month with 3-second demonstration of powerful, midjet Presto fire extinguisher to homes, offices, factories, car owners, garages, farms, etc. New chemical beats expensive extinguishers. Only \$3.98 with big profit. Merlite, 114 E. 32nd, Dept. 50-A, New York 16.

MAKE Money at home as headquarters for all magazines. Earn big Christmas profits. Liberal commissions. No experience—No capital needed. Supplies furnished. Write McGregor Magazine Agency, Dept. 500-A, Mount Morris, Ill.

60% PROFIT On cosmetics—Famous nationally advertised Hollywood Cosmetics pay 60%! Makes \$25 day up! Hire others. For free samples, details, write Stadio Girl, Glendale, Calif., Dept. PM-105.

BE Your own boss! No investment—No inventory. Big real profit-making wholesale catalog free! Dept. PM, Jay Norris, 445 Broome St., New York City, N. Y.

NEW Way to make money! Sell nothing yourself. Just offer free item to women for every two they sell for you. Household wares needed in every home. Postcard brings catalogue and details of amazing new kind of money-making plan. Absolutely no obligation. Topval Corp., Lindenhurst 31, New York.

TAKE Orders for chain saws, supplies. Good commission. Bero Bros., Newark 9, Ohio.

NEW Line portable electric power tools. National manufacturer sponsoring Perry Como's fall program. Send for free catalogue. Glasser Products, 389 Kingston Avenue, Brooklyn, N. Y.

REAL Diamond rings. Sell direct. Make big middleman's profit. No investment. Experience unnecessary. Free catalog, details. Gleamlight, 111-R No. Columbus, Mount Vernon, N. Y.

MAKE Money introducing world's cutest children's dresses. Big selection, adorable styles. Low prices. Complete display free. Rush name. Harford, Dept. P-5341, Cincinnati 25, Ohio.

MAKE Money selling outstanding line of regular ties, square ends, reversibles, feather, plaited, bows, knitted, Kerchief sets, mufflers. Free catalog. Philip's Neckwear, 30 W. 22nd, Dept. 415, New York City 10.

CASH In on tremendous demand for new cheap burglar alarm for automobiles, homes, stores. Nothing like it. Everybody wants one. 300% profit. Unique sample offer. Northwest Electric Co., 416-M Main, Mitchell, S. Dak.

WOMEN, Men, make money spare time plus new car as bonus for encouragement. Amazing hosiery guaranteed to wear without holes, snags, and runs, or replaced free. For example, lovely 60 gauge nylon guaranteed for as long as 1 1/2 years, or replaced free. Write Wilknit, 17510 Wash., Greenfield, Ohio.

YOUR Own business—Used suits \$1.50, overcoats 65c, mackinaws 35c, shoes 12 1/2c, ladies coats 30c, dresses 15c. Enormous profits. Catalog free. Nathan Portnoy Associates, 1218AA South Jefferson, Chicago 7.

NEW Silicone car polish. Shines without rubbing. Fast seller. Details free. Bonluth Products Company, Box 1078, Bristol, Oklahoma.

"FUN And Profit in Selling." Beginner's booklet by retired sales manager. Inspires confidence. Helps remove mystery from selling. Only \$1.00. R. Hyland, P.O. Box 2216, Cleveland 9, Ohio.

BUY Wholesale, 25,000 items, catalog 25c. Matthews, 1472-B1 Broadway, New York City 36.

CHAMOIS. Low cost top quality direct imports. 20x30 \$2.00. Babrok, PMS, Hudson Falls, N. Y.

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

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

SELL Amazing value 21 for \$1.00 Christmas, all occasion greeting card assortments. Newest tall cards, unusual wrappings, novelties. Profits to 100% plus bonus. Write for feature boxes on approval, 77 free samples personal Christmas cards, stationery, free catalog. Selling guide. New England Art Publishers, North Abington 1033-H, Mass.

SHINE Shoes without polish. New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trail. Kristee 76, Akron, Ohio.

150% PROFIT Selling 500 name and address labels. Retail \$1.00. You keep 60c profit. Free selling kit. Bruce, Box 71-Y, Boston, 1, Mass.

IMPORTING Without capital. Become successful U.S.A. resident agent for leading overseas manufacturers. High income, home operated, no risk. Complete arrangements furnished including U.S.A. distribution assistance. Impex, 1974-A Comstock, Los Angeles 25.

PROFIT With your own wholesale, name brand catalog. Appliances, watches, jewelry, gifts, tools. Imprint your name on cover. Full or part-time sales. Details free. Robel Sales, Dept. P.M., 487 Broadway, New York 13, N. Y.

WANTED: Men interested in making up to \$15,000 a year. Exclusive line of personalized articles. No investment. Free information and sales kit. Write Hook-Fast, Box 480 (PM), Roanoke, Virginia.

TREMENDOUS Profits! Every man, woman and child a customer. Suits \$1.50, pants 35c, dresses 30c, shoes 20c. Operate from store, home, car. Free catalog. Superior, 1250-A Jefferson, Chicago 7.

FREE Color catalog of religious jewelry. 100% profit. Virgin Mary heart necklace, sample \$1.00 (value \$2.50). Money back guarantee. Stephen-New York Inc., 1947 Broadway, New York 23.

CHRISTMAS—All occasion cards, novelties and gift items. Largest selection. Highest profits. Satisfaction guaranteed. Send for sample offer coupon now! Klotz Distributing Co., Dept. 89A, 1012 Western Ave., Toledo, Ohio.

EARN \$200 A week and up! Amazing profits are yours selling Seal-Tite, miracle puncture-proofing discovery! \$1.98 tube stops flats forever. Sure-fire! Appeal to America's 50,000,000 motorists! Complete sales kit free on request. M & M, Dept. M-2, 842 Third Ave., New York City 22.

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

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

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

\$1.00 PROFIT Selling \$2.95 photo enlargement deal. **Allen Studio, Riegler Bldg., Little Rock, Ark.**

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

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

CALIFORNIA Sweet smelling beads. Sensational sellers. Particulars free. **Mission, 2328 FR, W. Pico, Los Angeles 6, Calif.**

RUN Spare-time greeting card and gift shop at home. Show friends samples of our new 1955 Christmas and all-occasion greeting cards and gifts. Take their orders and earn to 100% profit. No experience necessary. Costs nothing to try. Write today for samples on approval. **Regal Greetings, Dept. 78, Ferndale, Mich.**

EARN \$30 A Day! Sell Dab-It, amazing pocket-size, stick-form, "no ring" spot remover. Works like magic! Guaranteed! **M & M, Dept. M-1, 842 Third Ave., New York City 22.**

EASY Money selling the new Pro Candid 35 mm. cameras. Your area is open for anyone to cash in on these fast-selling cameras. Selling kits furnished, cash commissions guaranteed. For complete information write **Beurline Industries Inc., 508 N. Robert Street, St. Paul 1, Minn.**

BUY Wholesale 450,000 products. Literature free. **Carter, Box 6011-B, Chicago 80.**

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

MAKE More money showing Elmira greeting cards this Christmas! Why more? Because Elmira offers more variety; beautiful cards for every taste, every purse. You get heart-warming, old-fashioned favorites and smartly simple ones for today's tastes. No matter who you sell, Elmira has a style to please everybody from grandmother to young Mrs. Executive. Send today for free personalized samples, catalog and sparkling assortments on approval with personalized stationery, imprinted napkins and lovely gift wrap-pings! **Elmira Greeting Card Co., Elmira 201, N. Y.**

GOOD Profits selling Mexican leather cards. Free sample. **Apartmento 7113, Mexico City 1.**

USED And new watches. \$2.00 up. Free list. **Southern Watches, Gray, Georgia.**

MAKE Perfect auto polish. Add water to concentrate. Free private labels. Employ salesmen. **Fripco, Dept. M1055, Box 765, Youngstown 1, Ohio.**

FOG-STOP Windshield cloth. Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. **Kristee, 79, Akron, Ohio.**

SELL Sunshine cards, the name quality has made famous. No investment or experience necessary. 21 card deluxe tall slim assortment sells on sight! Imprints, Currier-Ives, religious, gift wraps, many others. Samples on approval, write: **Sunshine Art Studios, Inc., Dept. PM-10, Springfield 1, Mass., Pasadena 1, Calif. (Note: East of Rockies address Springfield office.)**

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." **American Buyers, Hertel Station, Buffalo 16-A1, N. Y.**

BIGGER Profits selling greeting cards. Get list of sensational factory surplus bargains. \$1.25 boxes for 50c, \$1 boxes for 35c—while they last! Big line new 1955 Christmas cards, stationery, gifts. Assortments on approval. Personalized samples free! **Midwest Cards, 1113 Washington, Dept. 557-F, St. Louis 1, Mo.**

AT Last! Something new and sensational in latest tall Christmas cards. Make extra money fast! Show satins, velours, metallics. Gets easy orders. Pays up to 100% profit. 30 free samples. With name 50 for \$1.50. Big line. Amazing convertible pen-pencil, napkins, gifts, stationery. Several \$1.00 boxes on approval. **Puro Greetings, 2801 Locust, Dept. 340-M, St. Louis, Mo.**

TAKE Orders: Nurses, beauticians, waitresses uniforms. Highest commissions. Spare time. Repeat sellers. Everything supplied. **Manner, 3203-B Barnes Ave., New York 67, N. Y.**

PRINTING! Highest quality. Big profits. Free wholesale price list, supplies, details. **Napco, 2337-A Bath Avenue, Brooklyn 14.**

ENGRAVED Look! Embossed personalized stationery. Sells with ease. True money-maker. **Crestline, Box 21181, Los Angeles 21.**

YOU Can make a fortune with miracle discovery liquid cloth. Mends everything from boats to finest hosiery. Dries soft, durable elastic texture. Sells so fast production increased 34 times already. It's sensational! **Bard's Products, Dept. G, Evanston, Illinois.**

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

500% PROFIT. Retailers can't resist colorful, large "sale" signs. Big selection. Dynamic samples \$1.00. **Soik, 152 West 23, New York City.**

WE Put you into big mail order business, drop shipping orders, no investments. No minimum. Catalogues supplied. Terrific new sellers, tremendous profits. **Turner Company, 1170 Broadway, New York 1, N. Y.**

WANTED Agents, salesmen, distributors, jobbers. \$204 weekly selling miracle Double-Gloss, car wax, paste, restores showroom new to cars in minutes without tiresome buffing or rubbing. Waxes, glaze, cleans, and polish in one easy operation. Wipe on, let dry, wipe off, leaves the shiniest gloss possible to obtain on automobile finish, one application lasts 6 months. Rush \$1 for 1/2-lb. can demonstrator, retail \$2.00. **Norman Wiggs & Company, 1408 E. 52nd Street, Los Angeles 11, Calif.**

BUY IT WHOLESALE

WHOLESALE: Nationally advertised merchandise. Illustrated catalog 50c. **Gray, Box 708, Hollywood 28, California.**

WHOLESALE Catalog! 30-80% discounts! Appliances, musical instruments, typewriters, phonographs, watches, jewelry, recorders, housewares, etc. Consolidated Distributors, 21-20 Lafayette, Paterson 15, New Jersey.

BUY Wholesale! Nationally known brands. Large illustrated catalog \$1.00. Refundable. **D'Auria, Box 355M, Jackson, Mich.**

VALUABLE Free gift! Free "Wholesale Purchasing Secrets"! Save 40%-50%-80% nationally advertised appliances, watches, power tools, gifts. Everything for home, office, workshop. Write! **Panatron, 7721 S. Melrose, Hollywood 46, Calif.**

BARGAINS, Joblots, close-outs, 2000 items. Save to 50%. Clothing, hosiery, toys, toiletries, gifts, jewelry, television, etc. Get acquainted. 25c brings wholesale catalog plus free \$1.00 merchandise certificate. **Reliable Jobbing, 311-B North Des-plaines, Chicago.**

BUY Wholesale! Save 66%! Appliances, furniture, jewelry, toys, sporting goods, tools. Free catalogs. **National Buyers Service, Box 426EB, Oakland, California.**

THOUSANDS Nationally advertised brand name products. Discounts to 80%. **Meder, 550-PM Fifth Avenue, New York City 36.**

WHOLESALE Catalogue, general merchandise. Rush \$1.00 (refundable). **Wayne Bros., Dept. B-2, 740 Adams St. N. E., Minneapolis 13, Minn.**

POGO Sticks. Will carry 150 lbs. guaranteed! \$4.50 postpaid. **U. S. Industries, 803-A Macy Street, Los Angeles 12, Calif.**

FREE Catalog. Save. Buy vitamins direct. **Wholesalers, Bayport 7, Mich.**

WHOLESALE Catalog. Appliances, cameras, watches, Postcard. **Selbyco, Decatur 261, Illinois.**

BUY It wholesale. Appliances, cameras, tools. Rush 50c for catalog to **Edward Clemens, 318 W. Bridge St., Morrisville, Penna. (Refundable.)**

ELECTRIC Guitars, amplifiers, parts, wholesale. Free catalog. **Carvin-PM287, Covina, Calif.**

INDIVIDUALS, Nationally advertised merchandise, wholesale. Tremendous discounts. **Kingsley, Chepachet, Rhode Island.**

YOUR Cost as little as 25c on dollar! Household items needed in every home. Sell direct, by mail or to agents. Catalogue, confidential distributors' wholesale prices and money-making plans absolutely free. Rush postcard to **Topval Corp., Lindenhurst 324, New York.**

SALESMEN—DISTRIBUTORS

NEW Insulated jackets, shoes sell fast! Be first to take orders for amazing insulated leather shoes, jackets. Keep body heat in, cold, dampness, wind out. We furnish complete sales outfit free. Big monthly earnings possible on just 2 daily sales. 190 other money makers. Send postcard today. **Mason Shoe, MC88, Chippewa Falls, Wis.**

SALESMEN! New or old, up your income immediately! With pocket sized pamphlet, "Thirty Laws That Govern Top Salesmen," written by outstanding author and sales executive. Practice one law daily and watch your sales increase! No need to plough through books, absorb by doing! Money back guarantee. Mail only \$1 today to **Post Publications, 2 Depot Plaza (M) White Plains, N. Y.**

NO Trick to selling ties at 69c each! Free plan shows how easily you pocket \$1.33 hourly profit. **Loren Specialties, 2849-A10 Birchwood, Chicago 45.**

\$6.75 PROFIT On every sale of Lightning portable adding machines, retail \$14.95. Rush season just ahead. Don't delay, write for free colored photo, full details now. **Lightning Adding Machine Sales Co., Dept. A153, 2306 W. Slauson Ave., Los Angeles 43, Calif.**

100% PROFIT. Past money for you! Take orders for Sweet Georgia Brown cosmetics. Colored people buy it quick. Free sample. Write **Valmor, 2451-AC Michigan, Chicago 16.**

FREE Car deodorizer to salesmen selling to homes. **Odor-Zone, Yantic, Conn.**

AD Matches! Sell amazing designs—10, 20, 30, 40 and 240-light book matches. Bigger spot cash commissions; every business a prospect. Low prices for high quality. Repeats. Start without experience; men, women; full, part time. Buy nothing! Sales kit furnished. **Match Corp., Dept. PM-70, Chicago 32, Illinois.**

BIG Money-making opportunity. Exclusive line work uniforms. Jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit free. **Master Div., 571 Water, Ligonier, Ind.**

\$8000 PROFIT A Year—From just one sale a day! Keep safe, only full-size personal safe sold direct, lets you offer low-cost fire and theft protection that all homeowners, farmers and businessmen need—and less than 5% have! \$73.95 sale means \$26.45 profit, plus big bonus. No competition. Exclusive territory. Full details from **Manufacturer, John D. Brush & Co., 578 West Ave., Rochester, N. Y.**

SELL Calendars. You make big money daily. Giant line. Every business buys. Also business printing, book matches, advertising specialties. Big sales outfit free. Write, **Arrow Press, 515-S Fourth Ave. So., Minneapolis, Minn.**

STOP Thief! Amazing new portable safety box with built-in burglar alarm selling wild to business, individuals. Roars out loud alarm for 5 hours at slightest touch. Positive protection for cash, valuables. Low priced, anybody can afford. Write for sample offer. **Merlite-Alarm, 114 E. 32nd St., Dept. A-5010, New York 16.**

FRANCHISED Distributors make profits! Nationwide opportunities. Request interesting information immediately. **National Franchise Reports, 333 North Michigan, Chicago 1.**

ANYONE Can sell famous Hoover uniforms for beauty shops, waitresses, nurses, doctors, others. All popular miracle fabrics—Nylon, dacron, orlon. Exclusive styles, top quality. Big cash income now, real future. Equipment free. **Hoover, Dept. W-100, New York 11, N. Y.**

EARN \$30 A day showing our famous boots. Part or full time. No experience necessary. Write for free sales outfit. No obligation. **Jim Richards Shoe Co., Dept. M-10, Wellesley Hills, Mass.**

QUICKIE Electric. Cooks, bakes, fries. World's finest. 50% deal. Approval offer. Smith Agency-31, Excelsior Springs, Mo.

ADVERTISING Book matches—Cash in on big demand; sell union label matches. Cuts for all businesses and political parties. Free powerhouse selling kit, low prices, protection guaranteed on repeat orders. Cash commissions. Superior Match Co., Dept. M-1665, 7530 Greenwood, Chicago.

MONEY-Making opportunity! Take big profit orders for world famous patented varieties fruit trees. Also flowering shrubs, roses, vines. Big sales outfit free. Stark Bro's, Dept. 30106, Louisiana, Missouri.

GET New shirt outfit free: Make \$90.00 weekly on 5 average orders a day. Famous quality made-to-measure dress and sport shirts at \$3.95 up sell fast to all men. No experience needed. Full or part time. Write: Packard Shirt Co., Dept. 134, Terre Haute, Ind.

BUY Wholesale thousands nationally advertised products at big discount. Free "Wholesale Plan." American Buyers, Hertz Station, Buffalo 16-J1, N. Y.

AGENTS, Salesmen. Sell Futardine auto safety belts. 50% commission. Free details. Home Supply Service, Kiel, Wis.

WILL You wear new suits and topcoats without one penny cost and agree to show them to friends? You can make up to \$30.00 in a day even in spare time, without canvassing. Stone-Field, 432 South Throop St., Dept. J-926, Chicago 7, Illinois.

BIG Money selling sandal lawn aerators to home owners. 1000 prospects. Make a tip top lawn. Send for sample at wholesale price, \$3.54. Garden Specialties Division, 406 S. Main St., Los Angeles 13, Calif.

MEN! Make \$1000 a month with 3-second demonstration of powerful, Midget Presto fire extinguisher to homes, offices, factories, car owners, garages, farms, etc. New chemical beats expensive extinguishers. Only \$3.98 with big profit. Merlite, 114 E. 34th, Dept. 50-A, New York 18.

MAKE Up to 75c profit on each dollar! Household items needed in every home. Have others sell for you on commission. Sell wholesale to agents. Postcard brings details absolutely free. Topval Corp., Lindenhurst 325, New York.

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

DISTRIBUTORS—Large profits. Terrific repeat orders. Unique Italian brooms, details free. Write P.M. Peacock, 913 Bryant, San Francisco, California.

NEW Jobs open in selling! Send name, address for five free issues of Opportunity Magazine's money-making guide, listing hundreds of companies who'll pay you well, full or part-time. No experience needed. Opportunity, 850 N. Dearborn, Dept. 17, Chicago 40, Ill.

EDUCATIONAL AND INSTRUCTION

IT'S Fun learning a language by Linguaphone, world's standard conversational method. At home, quickly, easily learn to speak French, Spanish, Japanese, German, Russian, Modern Greek—Your choice of 34 languages. It's like living in another country. Complete recorded courses on free trial. Send for free book and details, no obligation. Try, don't buy! Linguaphone Institute, T-83-106 Radio City, New York City 20.

BLUEPRINT Reading for machine and building trades. Train at home. Learn to read blueprints with confidence in 10 easy lessons. Earn more pay. Literature free. Belton School, 1638-Y North Lawndale, Chicago 51, Illinois.

LEARN Piano tuning at home. Total cost \$63. Write White-Bartenbach, 1001B Wells, Lafayette, Indiana.

COLLEGE Degree—Independent study. Keep employed. Brentwood College, Box 19-721, Los Angeles 18.

WELDING Training pays at Hobart Welding School, Box M-1051, Troy, Ohio. VA contract. Best equipment. Catalog free.

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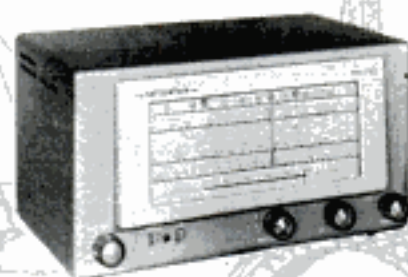
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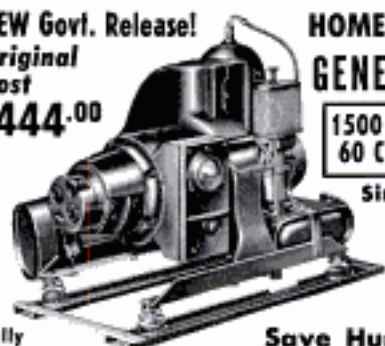
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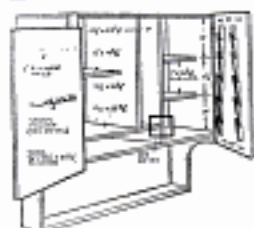
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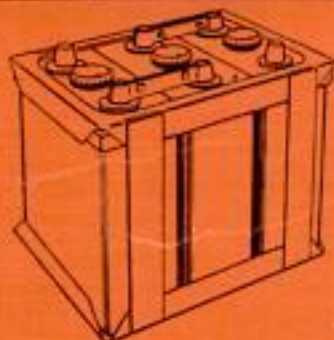
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45th



Year

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Auto Jack Adjusts to Slope

Triangular construction of a new bumper jack permits safe tire changing even on slanting road shoulders. The adjustable base of the jack rests flat on sloping ground. The brace is adjusted and locked so that the main shaft of the jack is absolutely vertical. A crank on top is used to raise or lower the jack, which can be folded compactly when not in use.



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POPULAR MECHANICS MAGAZINE



February 1949 issue told Ashby how to build fortune-finding geiger counter

POPULAR OCTOBER 1955 MECHANICS

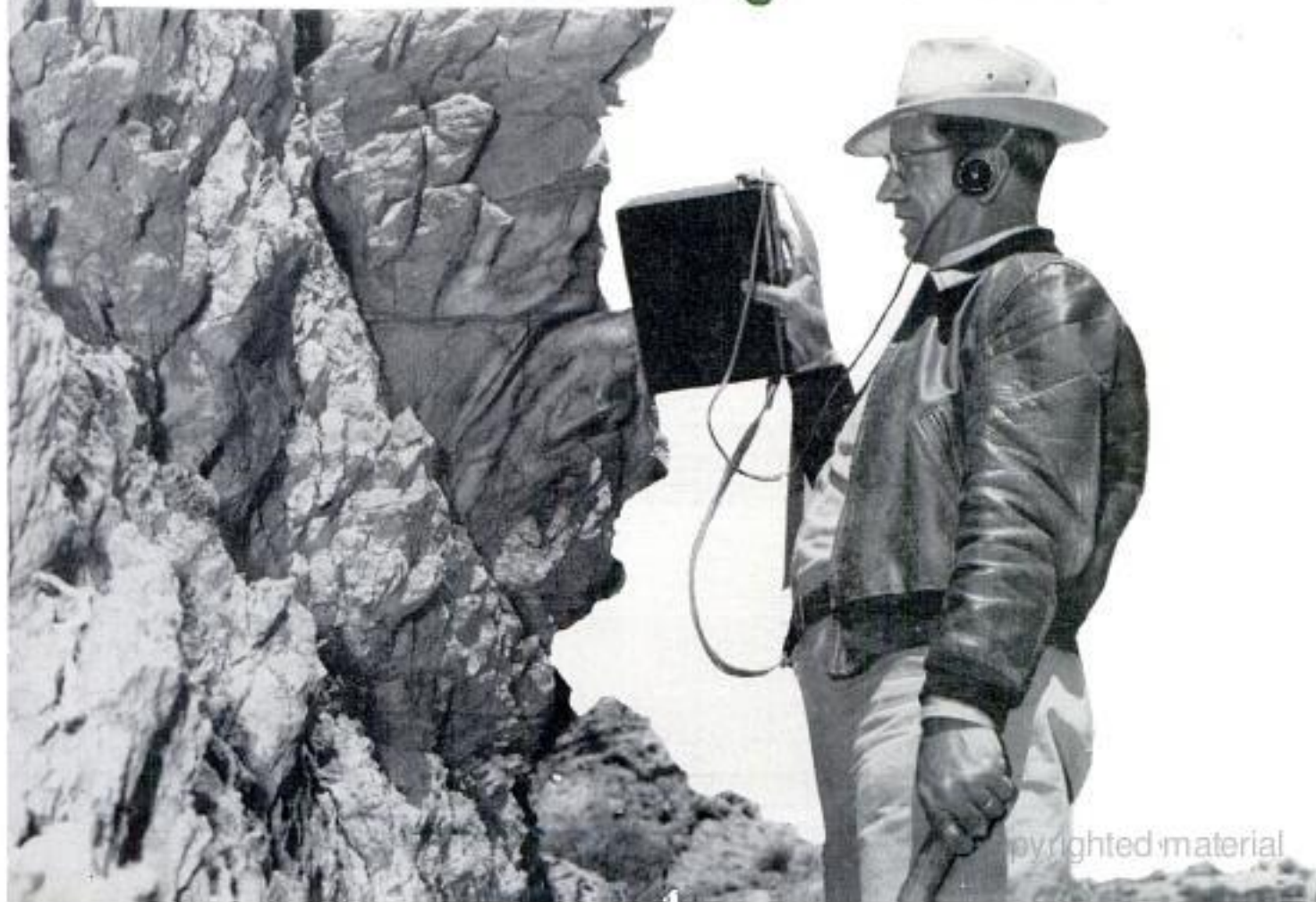
WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 104 NO. 4

IN FEBRUARY 1949 an alert and adventurous Los Angeles fireman named Jesse Ashby read an article in *Popular Mechanics* that described how to build a simple geiger counter at home. Today Ashby owns a major interest in one of California's most promising uranium mines, 2200 acres of red-hot pay dirt that is one of the biggest bonanzas in the Far West—discovered with his homemade counter.

Ashby's public-servant-to-riches story reads like a scenario that Hollywood would reject for being "too unbelievable." But it's true—and it offers vivid, real-life

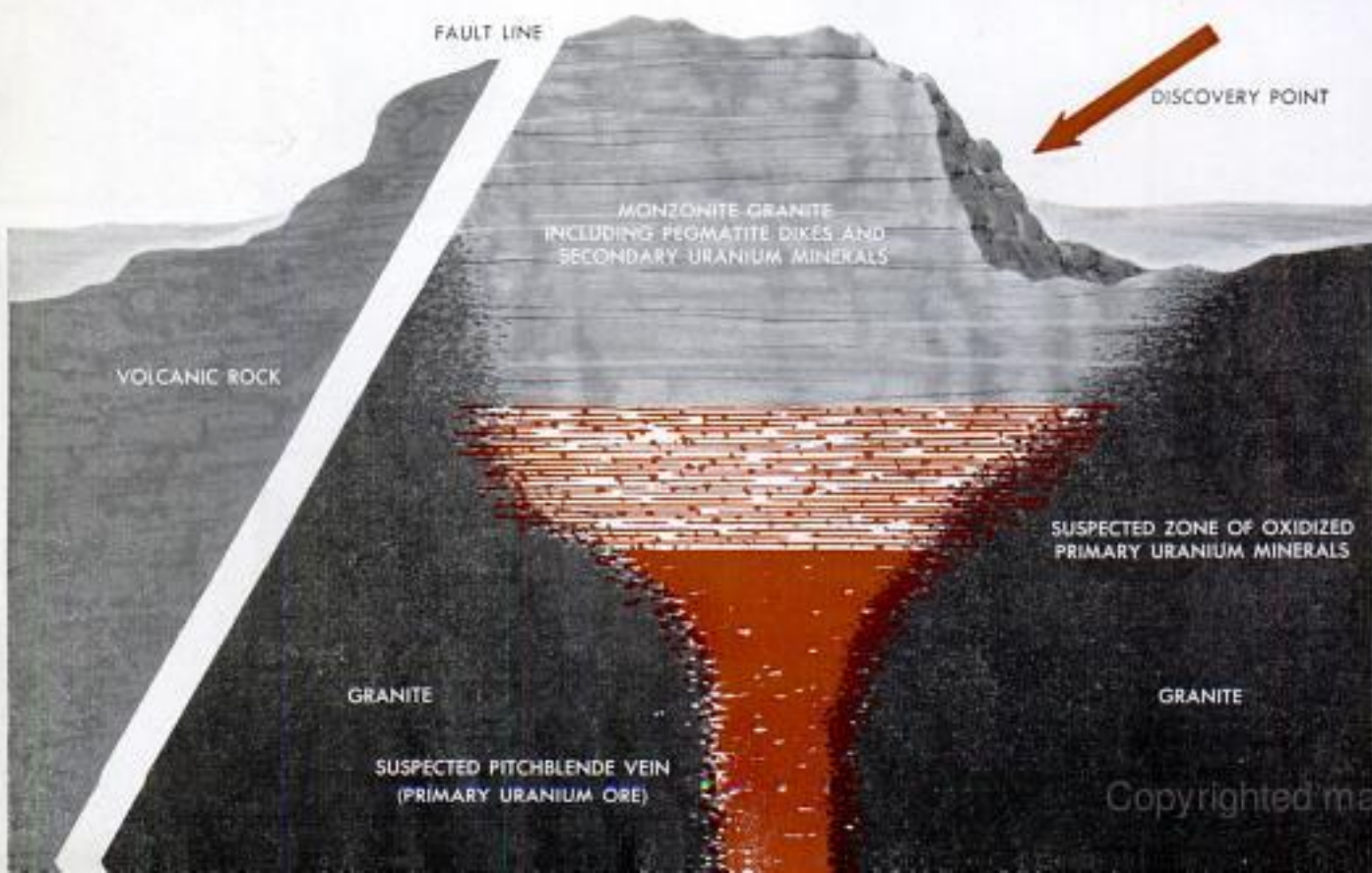
By Griff Borgeson

A Fireman Strikes Uranium With a PM Geiger Counter





Miners wheel another load of rich uranium ore from the mine. Below, cross-section drawing shows suspected geological formation in the discovery area. Formation is entirely different from sedimentary deposits in Colorado



proof that it sometimes takes no more than enterprise, luck and a little do-it-yourself talent to make a full-fledged uranium king.

Back in early 1949 Ashby was a captain in the Sun Valley branch of the Los Angeles Fire Department. He had an amateur interest in mineralogy, and his pretty wife Joan was an enthusiastic "rockhound." The two Ashbys often spent Jesse's days off collecting mineral specimens in the nearby Mojave Desert, and they had just started to attend night classes in mineralogy at a local high school.

One night at class the Ashbys heard a talk by Gilbert La Bine, discoverer of the fabulously rich deposits of pitchblende—pure uranium oxide—at La Bine Point, in Canada.

"I'm convinced that there's uranium in California, even though no one has found any here yet," he told his listeners. "It's up to you amateur and professional prospectors to find it."

La Bine showed the class ore specimens from his mine and demonstrated how they made a geiger counter clatter.

On their way home afterward Ashby told his wife flatly, "I'm going to get me a geiger counter, and I'm going to find some of that stuff!"

In those days a fairly serviceable geiger counter cost around \$200 or \$250. In spite of his enthusiasm, Ashby just couldn't invest that kind of money in an instrument. But then a fellow fireman solved the problem by bringing Ashby a copy of the February 1949 issue of *Popular Mechanics*, with the article on how to build a geiger counter in a lunch box.

This happened early in April, and Ashby went to work building his counter as soon as the parts arrived from the suppliers.

"The plans were very clear and simple, and I followed them exactly," he recalls, "except that I didn't have a lunch box handy, so I made a wooden container with the same inside dimensions."

On the last day of April he finished the counter and tested it with the radioactive

Today Ashby's instruments, in addition to old PM counter, left, include assay counter, center, that tells percentage of valuable ore in sample and scintillometer with long-range sensitivity

radium dial of his wrist watch. It worked.

The next day, May 1, was Joan Ashby's birthday, and Jesse had the day off.

"Let's head for the desert," he suggested. "While you hunt for agate I'll try out the counter."

About 90 miles from home, on a smoothly paved road in the Mojave, Ashby had a sudden impulse to stop and check his counter against a huge outcrop of rock just a few hundred feet off the highway. The counter buzzed wildly.

Ashby looked at Joan and said doubtfully, "Must be a bad connection."

"It has to be," she said. "Nobody's this lucky!"

But they checked and rechecked. Jesse





Ore from Ashby's mine is being stockpiled pending reconstruction of old mill that will concentrate it



Ashby determines value of ore sample by holding it against tube of his assay counter, watching needle

Map shows route taken by Ashby to scene of uranium strike. Mine is only about 90 miles from Los Angeles



would move away from the outcrop and the clicks would simmer down. Then he'd move back and they'd sizzle again.

And that was it. On his first stop, his first time out with the lunch-box counter, Ashby discovered what is now called the Rosamond Uranium Field. The discovery was a big one, and it took the Ashbys a long time to trace the limits of the ore body. They kept very quiet about their find until they knew just where and how far it extended. The counter did an unerring job in giving them this information.

Today Jesse Ashby's stroke of luck has grown into a big mining organization. Recently he decided that the property was too big for his own Uranium Mines, Inc., to handle alone, and consolidated with the Verdi Development Company.

Mining experts say that Ashby's strike is the most important in California to date. It is a formation entirely different from the layered shales of the Colorado plateau in which the uranium enrichment was deposited by sedimentary action. Ashby's strike is of uranium-rich rock in place, and the geologists suspect that it will get richer at depth, eventually turning into primary pitchblende, the purest uranium ore.

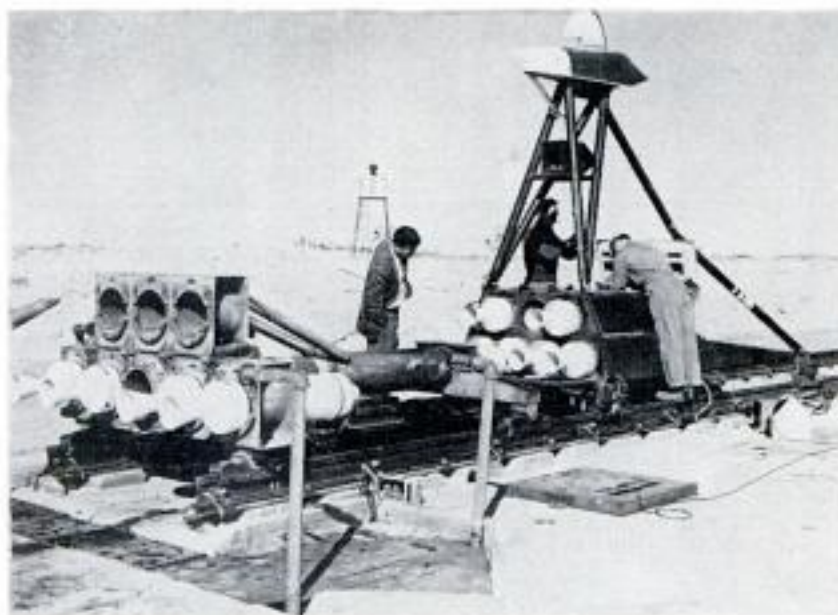
With the Rosamond Field under control, Ashby now spends much of his time exploring new prospects that are offered to his company by prospectors in most of the states west of the Rockies. Although he now uses the most costly, sensitive instruments that money can buy, he still keeps "the old lunch bucket" on the mantel at home.

"It put me in business," he says, "and I'll always respect it." ★ ★ ★

First German Plane Since War Powered By Volkswagen Engine

Powered by a Volkswagen engine, the first plane built in Germany since the end of World War II was put on exhibition at the fifth annual German Airport Day at Bremen recently. The plane is a glider-type, modernized for power, and has been named "The Motor Raab." Price-tagged at \$4000, the plane is said to fly for five hours on just five gallons of gasoline.

Spectators admire tiny Volkswagen engine in Raab



Supersonic Sled

Less than five seconds from start, a new rocket-propelled sled achieved a supersonic speed of 18 miles per minute—believed to be the world's record for a land vehicle. Built for the Air Force Flight Test Center at Edwards Air Force Base, the rail-mounted sled attained its 1100-mile-per-hour speed with the aid of a two-stage thrust. Eight rockets on a pusher sled gave the initial thrust, and seven on-board rockets the secondary thrust.

Double-Ended Lift Truck Faces Both Directions

There is no rear end to a two-way truck that has all controls duplicated for travel in either direction. One set of controls faces forward, the other rearward. All four wheels can be driven and steered. In addition, there is a lift fork on one end, either front or rear, depending on the way the truck is moving. A 100-horsepower engine powers the English vehicle.

For the first time, in April, more than 3,000,000 revenue passengers were carried by scheduled airlines in a single month.





Uncluttered, clean styling gives the 1956 Lincoln a quiet dignity, but its 285 horsepower makes it a bomb!

Lincoln Gets All-New Styling; Ford, Mercury Stress Safety

By Arthur R. Railton

WHAT CAN BE DONE to a race-winning car to give it the boulevard ride and make it radiate prestige—all the while retaining roadability?

Lincoln, first of the Ford Motor Company 1956 cars to debut, tossed that problem at its engineers who, they say, have solved it.

The 1956 Lincoln is high-styled with an all-new body that is longer, lower and wider than last year's. It has the full-wrap windshield that spread through the indus-

try like an epidemic in 1955. Abeam, the Lincoln is as uncluttered and sleek as a mink jacket. Chrome is limited to a stone shield in the form of a long, tapering spear that extends from rear bumper to front-wheel cutouts.

Horizontal chrome lines form the front grille and make the already wide car seem even wider. Park and direction lights are housed in the grille's main bar.

Similar horizontal lines emphasize the

Dash has been kept simple too. Accelerator linkage goes through the fire wall, leaving floor holeless

Spokes of Lincoln's concave steering wheel absorb impact, keeping driver from being impaled on column



width at the rear. You'll recognize Lincoln coming or going. Twin exhaust pipes end in chrome orifices (Lincoln calls them "jet pods") that are worked into the rear bumper. Enormous triangular taillights mark the ends of rear fenders that overhang the axle by about five feet.

Under the hood, Lincoln enlarged its V8 engine to a 368-cubic-inch displacement (bore and stroke are both up). Horsepower is 285 (up from 225) and torque is 401 pound feet (up from 342).

Despite this power boost, Lincoln's emphasis (as in the entire Ford Motor Company) is on safety. Here are some innovations: Safety latches to keep doors from flying open during a crash, spilling occupants on the roadway; concave steering wheel, shaped like a shallow funnel, which flattens on impact to absorb energy and protect the driver's chest from the column; optional seat belts and a shatterproof rear-view mirror.

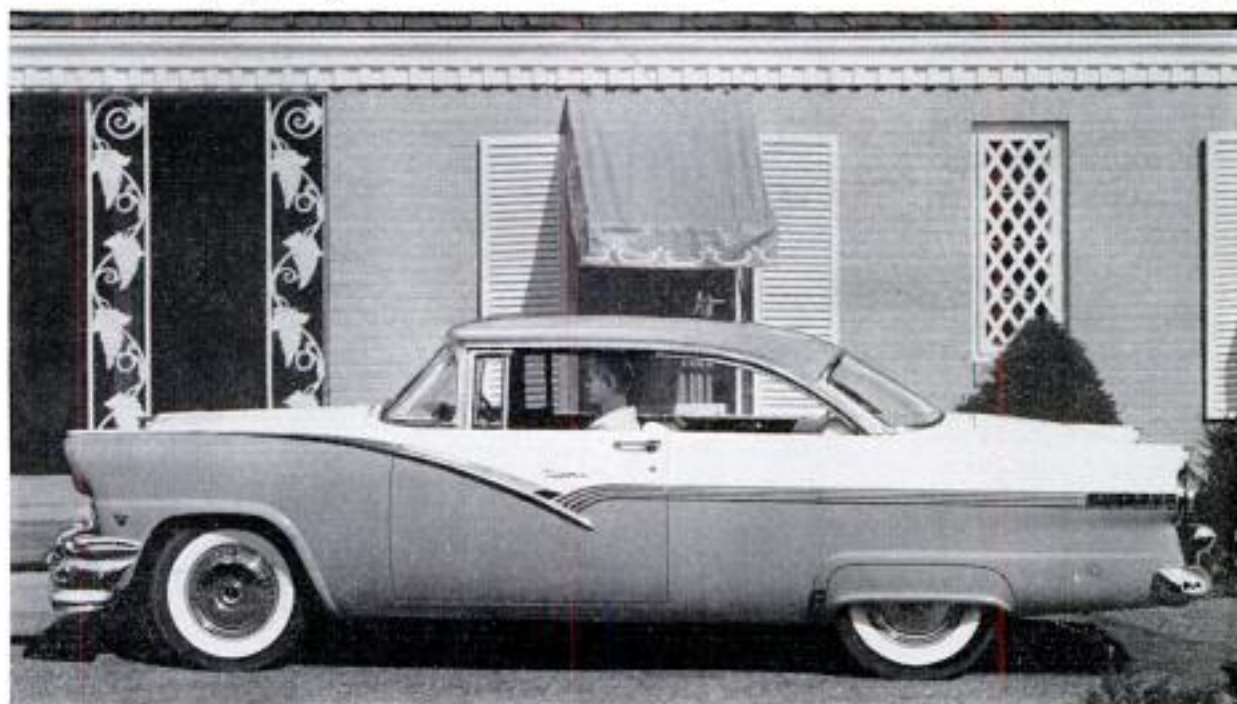
Other interesting points are: Compression is now 9.0:1; electrical system is 12-



Ford's safety equipment (arrows) includes padded sun visors, padded dash, concave steering wheel and seat belts. Rear-view mirror is shatterproof

volt; carburetor air is rammed through an intake scoop inside the front grille and ducted directly into the air cleaner (a

Most noticeable styling change in Ford is in the chrome molding of the Fairlane series. It dips farther back





Ford Customline models feature a new chrome trim that runs the full length of the car. Grille is restyled

thermostatic valve directs the air over the exhaust manifold in winter to warm it, eliminating carburetor icing); sound-deadening blankets completely line all sides of the engine compartment to hush an already quiet engine; dual-diaphragm spark advance improves acceleration during the transient period from part to full throttle and prevents annoying "ping"; accelerator linkage is through the fire wall, leaving the floor unperforated; valves are larger and



Mercury also has a restyled grille, new two-toning

their lift increased for improved breathing.

Riding quality of the 1956 Lincoln is noticeably softened over last year, but with slight, if any, sacrifice of roadability. Brief road tests of 1956 engineering-prototype cars disclosed no apparent loss. Despite the body being 12 inches longer and 250 pounds heavier, handling is virtually as good as on last year's acknowledged fine-handling car. Acceleration is excellent, showing a 10 percent improvement in the 0-to-40 range, 14 percent in the 0-to-80 range. Top speed is up 4 percent, say Lincoln engineers.

Ford Gets More Power

The 1956 Ford continues with the same body shell and exterior sheet metal as in 1955. Restyled areas are the front grille, taillights and various chrome trimmings.

Under the hood, though, there are meaty changes. The engine is bigger and flexes more muscle (and, it should be added, will probably use more gas). Horsepower is up

(Continued to page 328)





KEEPING UP WITH THE ATOM



WHAT WOULD HAPPEN if an atomic power-generating plant ran away—would an overheated reactor blow up and subject the neighborhood to deadly radiation of an atomic bomb? The danger is minor. To find out, atomic scientists deliberately let a nuclear reactor “run away” at Los Alamos, N. Mex., in 1953; the results have just been made public. The atomic power plant was allowed to overheat until the fuel elements were partly melted, then all controls were removed. A half mile away the scientists watched. Chunks of melted, twisted metal flew 350 feet from the site of the reactor, but the blast sounded to the watchers like that of “a moderate amount of chemical explosive.” While X rays from the atomic explosion were detected by instruments a half mile distant, the peak dosage was only one thousandth of a deadly dose and no large fraction of the actual reactor core material escaped the site as airborne material.

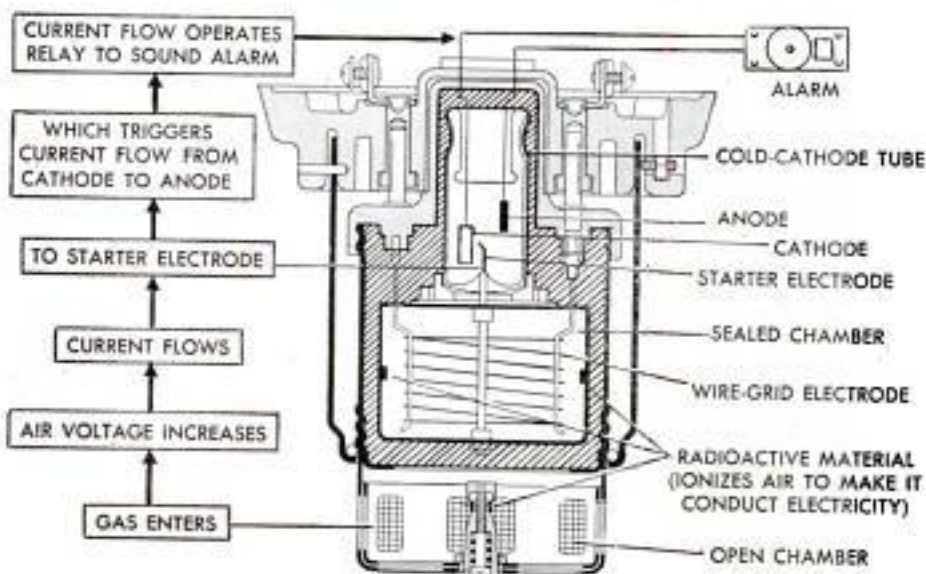


☆☆☆

Smoke and gases—not heat—trigger a new fire detector that employs radioactive materials. Inside the unit is a cold-cathode tube, plus two independent chambers. One chamber is sealed, the other open to the atmosphere. Bits of radioactive material inside the chambers ionize the air, making

it electrically conductive. Normally, each chamber is adjusted to give equal voltage. But when smoke or gas enters the open chamber, its voltage increases. Current flows from the open chamber to the sealed chamber and thence to the starter electrode in the cold-cathode tube. The starter electrode triggers a current flow from the cathode to the anode. This completes a circuit to set off a relay that sounds an alarm. Any number of units can be installed, all

(Continued to page 286)





Professor Tombaugh uses a blank globe to locate, by triangulation, hypothetical satellites of the earth

He Spies on Satellites

By Thomas E. Stimson, Jr.

HHEADQUARTERS, Outer Space Patrol." That's a fitting name for the odd metal shed from which a close watch will be kept on the satellite that the United States plans to launch in 1957-58.

Situated on the grounds of Lowell Observatory in Flagstaff, Ariz., the small building contains telescope-cameras so powerful they can record an object the size of a tennis ball at a distance of 1000 miles.

From this shed the United States already is maintaining a surveillance of the space that surrounds the earth, all the way out to the moon.

From here, presumably, regular observations are being made of the earth's first artificial satellite that is rumored to have been launched into space a year ago.

Exclusively reported in the May 1955 issue of *Popular Mechanics*, the existence of this manmade moon has not yet been officially confirmed. But unofficially it is understood that our first artificial satellite is still sweeping around the earth. The latest information is that its orbit is slowly changing into an ellipse because of the pull of the moon.

Possibly the success of this first experiment lies behind the announcement that we will launch an instrument-carrying satellite two years from now, in connection with the International Geophysical Year, to gather new information about outer space. Scientists say that the instrument satellite will be positioned at 200 to 300 miles altitude and will whiz

FLIGHT SEQUENCE





AEROBEE PITCHES DOWN
AND THIRD STAGE FIRES
AT 300 MILES



AEROBEE BURNS OUT
AND BEGINS COASTING
AT 410,000 FEET



AEROBEE FIRED
AT 110,000 FEET

Modified Aerobee rocket has been proposed
as a satellite. Right, smoke from booster
hides launching tower as rocket zooms up

around the earth every 90 minutes. The satellite, they report, will be about the size of a basketball, though this may refer only to its diameter. Several different sizes and shapes may be launched during the satellite program.

One proposal made by Aerojet Corporation, manufacturers of JATO and other rocket units, is to use a modified Aerobee sounding rocket as the satellite. The Aerobee is 20 feet long and 15 inches in diameter, powered with a liquid-fueled motor and launched by means of a solid-fuel booster unit. One 30-foot version, the Aerobee-Hi, has carried 100 pounds of instruments to an altitude of 123 miles.

Aerojet's idea for the satellite is to use an extra large booster under the rocket. This would lift the Aerobee to about 20 miles, at which point its own motor would take over until it is parallel with the earth. At the peak of its climb, about 300 miles, a small solid-propellant motor in the nose would fire, detaching the nose from the body of the rocket and accelerating the nose to an orbital velocity of about 16,000 miles per hour. There would be room in the nose cone for various measuring instruments plus telemetering circuits that would radio information back to earth.

Data on pressures, temperatures, cosmic rays and other phenomena could be obtained this way. But the actual tracking of the rocket itself will be done by astronomical instruments. The altitude of the satellite, its speed and direction of movement can be measured most precisely by the instruments already in use at Flagstaff. The eventual descent of the satellite into the atmosphere and its disintegration will be forecast



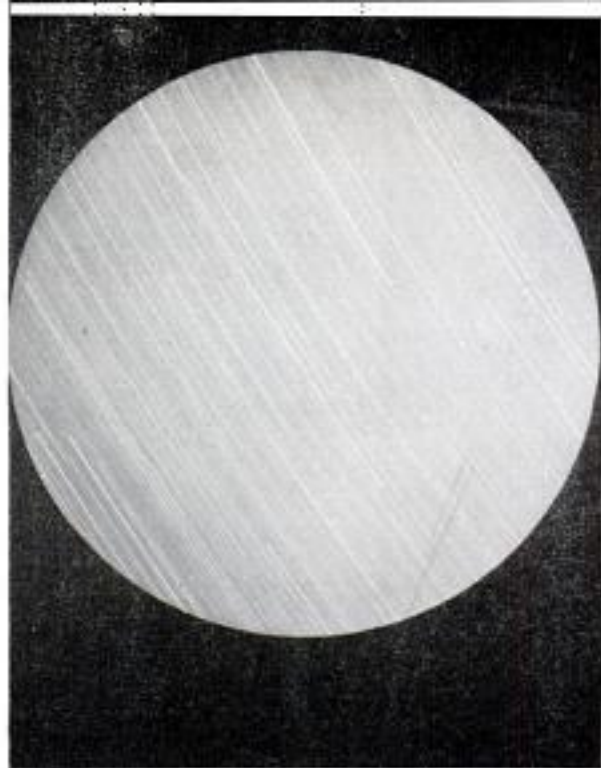


Plain wooden box houses Schmidt telescope so powerful it could spot a tennis ball 1000 miles away

with the aid of the same instruments.

Until now, the principal use of these instruments has been the seeking of any small natural satellites that the earth may possess.

Scientists suspect that these objects may exist, though none has been detected even by the world's most powerful telescopes. Until recently no one cared whether nearby space was totally empty or contained a satellite population, nor had anyone figured out a way of searching for them.

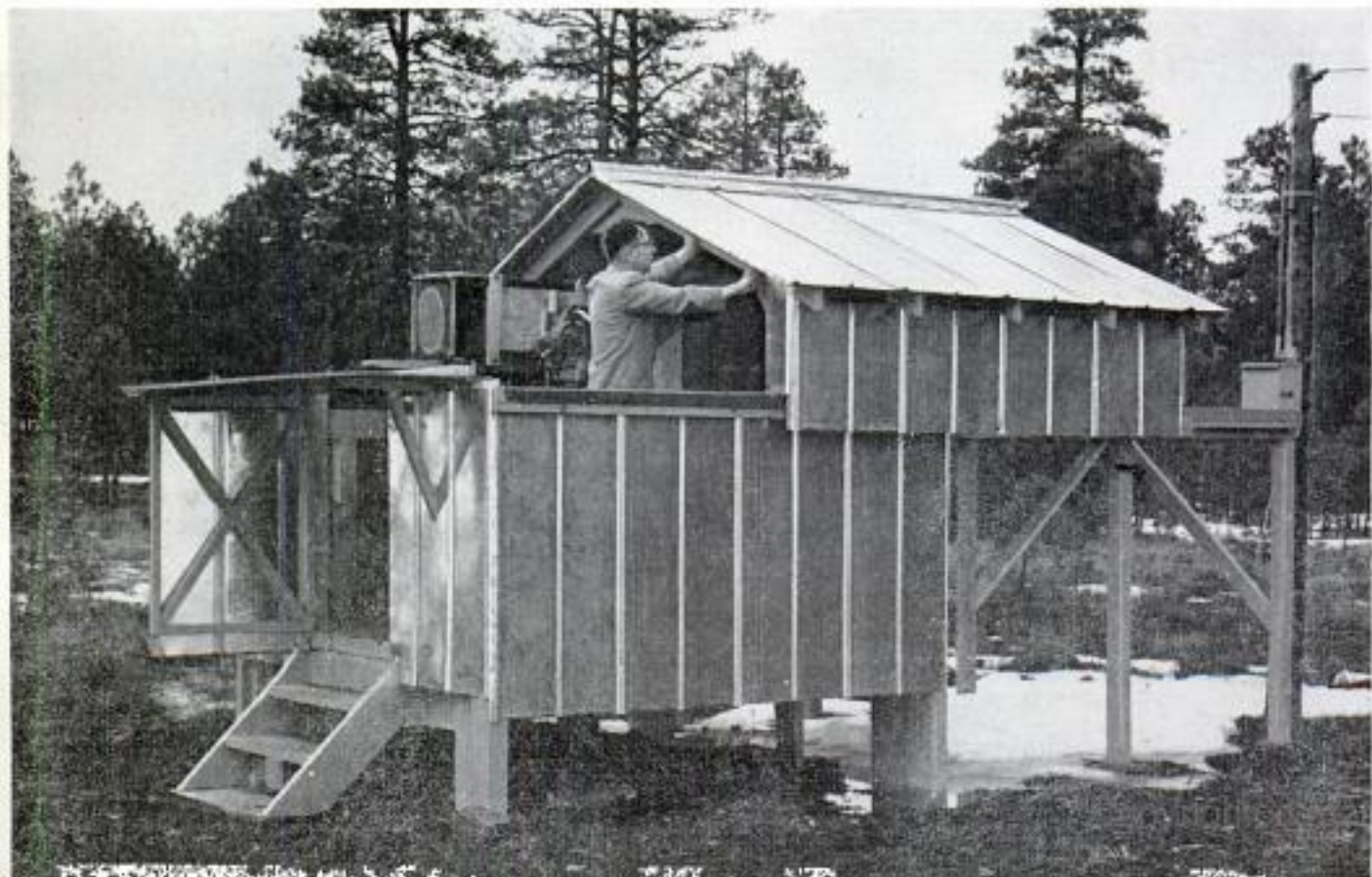


Typical film from satellite search shows long star trails. Satellite would appear as two bright dots

Such bodies might be chunks of debris left over from the creation of the moon or they could consist of material captured from an asteroid that had swept through earth's gravitational field.

A small natural satellite might be less than the size of an automobile or it might measure many miles across. It could be a solid mass or simply a loose jumble of rocks. Information about natural satellites, if they exist, would be extremely valuable in mapping out the program for artificial

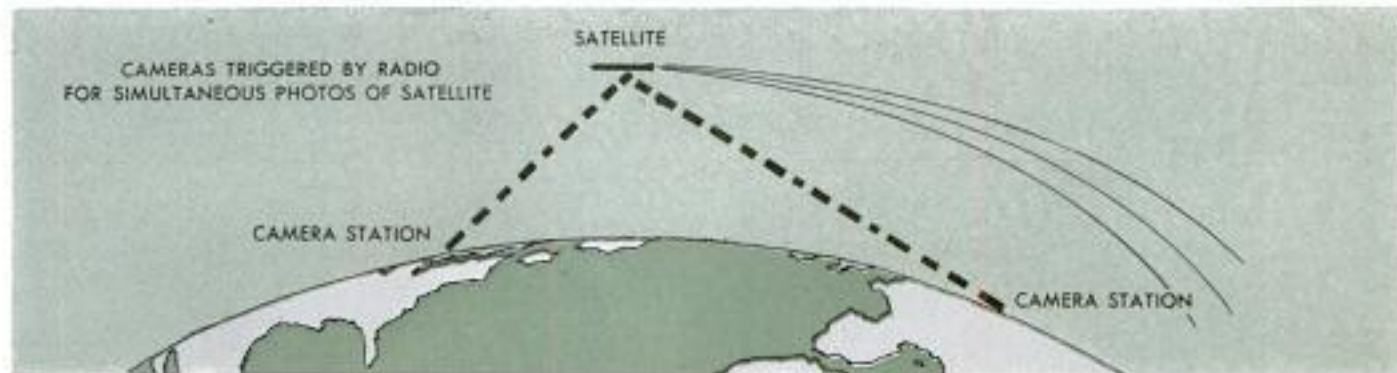
Roof of an unimpressive metal shed is rolled back to expose telescope that now is searching for satellites



erial



Telescope is pointed away from sun after dark and before dawn, when satellite would be "full" like a moon
Professor Tombaugh suggests the use of satellite and cameras to measure great distances on earth accurately



satellites, their altitudes and orbits.

The search for any such natural objects is being conducted by astronomer Clyde W. Tombaugh for the Army's Office of Ordnance Research. Professor Tombaugh is the discoverer of "Planet X," now known as Pluto, the planet that is farthest from the sun. He is an authority on finding hypothetical objects in the sky. Yet for his satellite search he had to invent brand-new methods. No previous astronomical technique would perform the job.

His discovery of Pluto came about after other astronomers concluded that an unknown object was affecting the motions of some of the outer planets. An undiscovered planet was suspected. Its probable position was worked out and many photographs were made of that part of the sky. But no new object was found. "Planet X" remained a mystery until Professor Tombaugh took up the search. He recalculated, much more precisely, the position that the unknown body would have to occupy. Then he pointed a telescope in that direction. He was rewarded by photographs containing an image of the object.

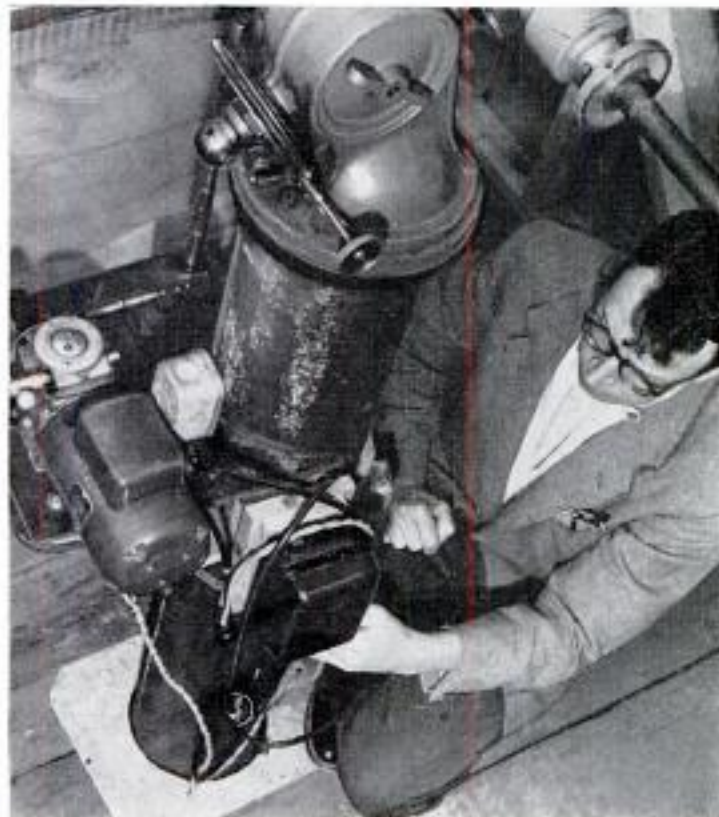
This method won't work for small earth satellites. If they exist they are too small to affect the motions of the earth and moon, so there is no theoretical way of pinpointing their locations. Nor can they be detected by telescopes that are geared to turn at the same rate at which the stars move across the sky. A small, close-in satellite would move too rapidly to build

up an image on film in a telescope that is turning at the usual rate.

Professor Tombaugh overcame this problem by calculating the speed at which a theoretical satellite would move across the sky, then geared his instruments (a Schmidt reflecting telescope with a 13-degree field and a K-24 aerial camera with a 40-degree field) to move at the same rate. This way, a satellite would literally stand

(Continued to page 332)

Drive mechanism of the telescope is set at speed at which a theoretical satellite would move across the sky at certain altitude





Morane Saulnier 760, French twin-jet executive transport, cruises above East River on demonstration flight

First Jet Transport for Private Flying

BUSY EXECUTIVES who fly can now look forward to jet-propelled airborne offices with the announcement that the first private executive jet transport is being demonstrated throughout the United States and Canada. The plane is the M-S 760, a French design brought to the United States by the Beech Aircraft Corporation. If there appears to be a demand for such a plane, Beech will manufacture it in this country.

Boasting a top speed of 405 miles per hour, the plane is a four-place, twin jet. The cabin is pressurized to maintain a

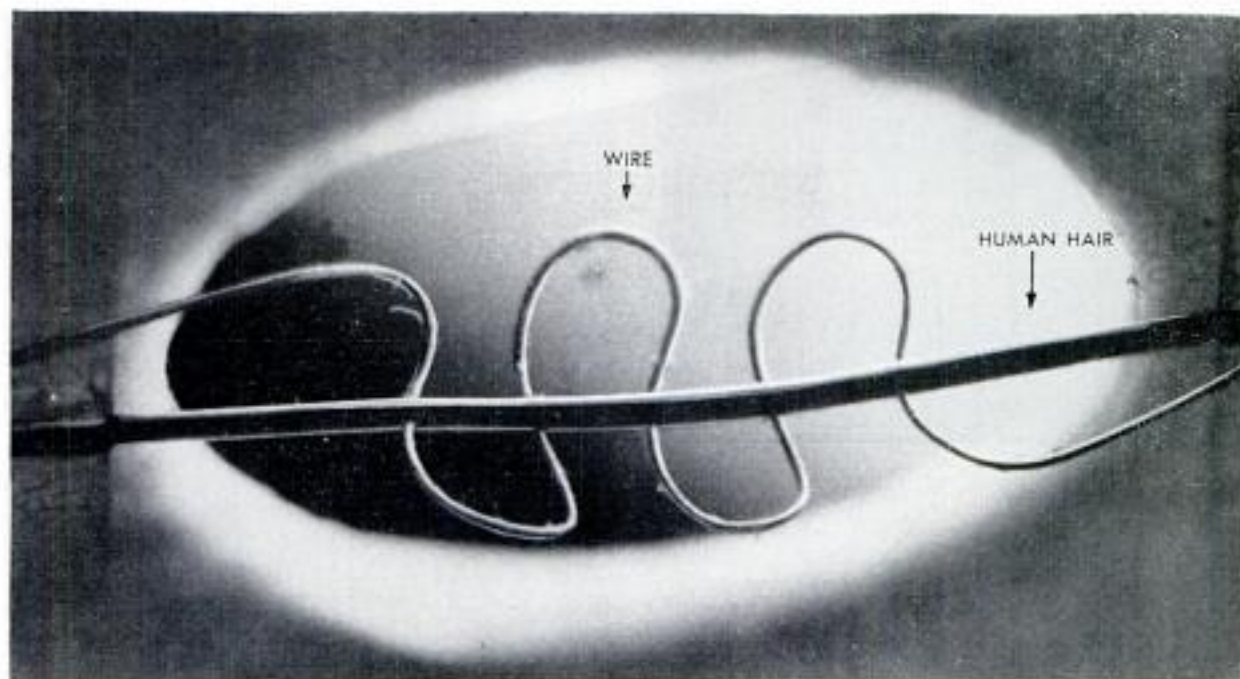
cabin altitude of 7800 feet when the plane is flying at 20,000. Its maximum range, cruising at 294 miles per hour at 23,000 feet, is 970 miles. Contemplated price tag on the M-S 760 is \$300,000.

To provide better visibility for both pilot and passengers, all occupants sit forward of the leading edge of the wing, inside a one-piece bubble canopy. They are protected against excessive sunlight by adjustable curtains overhead. In addition to being pressurized, the cockpit is also air conditioned.

Equipment, such as radio, electric motors and actuators, is easily accessible in the nose compartment

Spacious cockpit of M-S 760 is air conditioned and pressurized. Ladder stows in rear-cockpit armrest





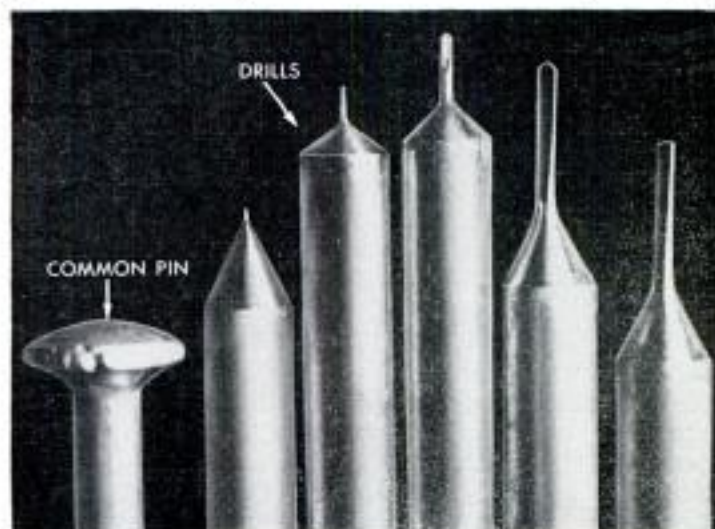
Midget Drill Pierces Hair

IT'S ONE THING to split a hair; it's another to drill holes in it. Precision-instrument makers of General Electric not only have drilled holes in a hair but have threaded wire through the holes. The technicians use a one-mil (.001-inch) drill so small it can't be seen by the naked eye, so delicate it could be broken by accidental contact with a piece of paper tissue. Working with a microscope, the steady-handed craftsmen can lace a one-mil wire through something even smaller than human hair—a strand of nylon stocking. All this has its practical applications. The ultrasensitive drill press is located in the engineering laboratory machine shop, where the highly skilled instrument makers are on call for unusual tasks in connection with experimental developments. The drill is used to make orifices in leak disks that control the flow of gas into a vacuum chamber, to drill tiny fuel-injection nozzles and to make holes for electron beams in X-ray equipment. Usually, smaller drills run at high speeds. But when using the one-mil size, drill operators must slow down the drill press to about 1800 revolutions per minute.

Microscopic view shows .001-inch-thick wire threaded through holes drilled in a human hair by the diminutive drill press



Instrument maker peers through a microscope as he brushes away minute chips left by drill too small to be seen by naked eye. Drills below range from .01-inch to .001-inch (beside pin)



Detroit Listening Post



By Leo Donovan

THIS WILL BE a year of refinement. On all except two cars, Lincoln and Rambler, the emphasis will be on refining the details—the big changes will wait for 1957.

A company can only engineer so much in any single year. When it brings out all-new bodies and, in some cases, all-new engines as was done in 1955, there isn't time for the important luxury details that the public loves to talk about and, more important, loves to buy and show the neighbors.

Lincoln, as you see on page 102, is new. Rambler, as you will see in December, is the same. But the rest of the pack has spent the year refining its details.

Here are some of them:

Push-button shifts. There will be two approaches here. One company's push-button shift is mechanical; another's is electrical. One is left-hand operated; the other right-hand operated. Both will cause lots of talk.

Push-button locking. You'll be able to lock all four doors, the glove compartment and perhaps even the trunk with just one motion in a 1956 car. No more checking to see if each door is locked individually. A single locking control will do the job for you.

Powered no-drafts. One 1956 model gives the driver complete mastery of his windows. He can even flip the no-draft vents open and shut by touching a button.

Heating system. Instantaneous heat is what comes from a new heater that burns gasoline instead of taking heat from the engine's cooling system. No warm-up is needed. The factory-installed heater mounts inside the engine compartment.

Sweep-second hands. Many 1956 cars will have clocks with sweep-second hands. With this added convenience the driver can check his 0-60 time at every stoplight.

Upholstery. After 1955, it's difficult to believe that there can be anything new here. But there is. One company will offer a completely redesigned seat unlike anything you've seen. It will have reversible upholstery. By day, it can be sporty with

bright colors. By night, it can go formal to match your evening clothes.

Music. If you prefer music without commercials, you'll welcome the latest accessory—a high-fidelity phonograph built into the dashboard. It uses a record that plays for an hour or more without changing.

Here Comes the Wedge

The front's going down and the back's coming up. In a style trend that should continue for several years, Chrysler is becoming wedge-shaped with a lower hood and a higher rear deck.

Virgil Exner, vice-president of Chrysler Corporation styling, points out that this trend is common to racing boats, jet planes and cars. And, he says, it is aerodynamically sound. His three latest "idea cars" (see page 113) follow this trend and, no doubt, so will the 1957 production models.

Before the Thunderbird, stylists at Ford considered the teardrop as the shape of the immediate future. But now Ford, too, is emphasizing rear ends rather than de-emphasizing them as with a teardrop.

General Motors' stylists have six new "dream cars" planned for the year's Motorama. Four of them are under construction now. Two more are just coming off the drawing boards. They will be more elegant than their predecessors, of course, and will have new styling features that may be worked into production models shortly.

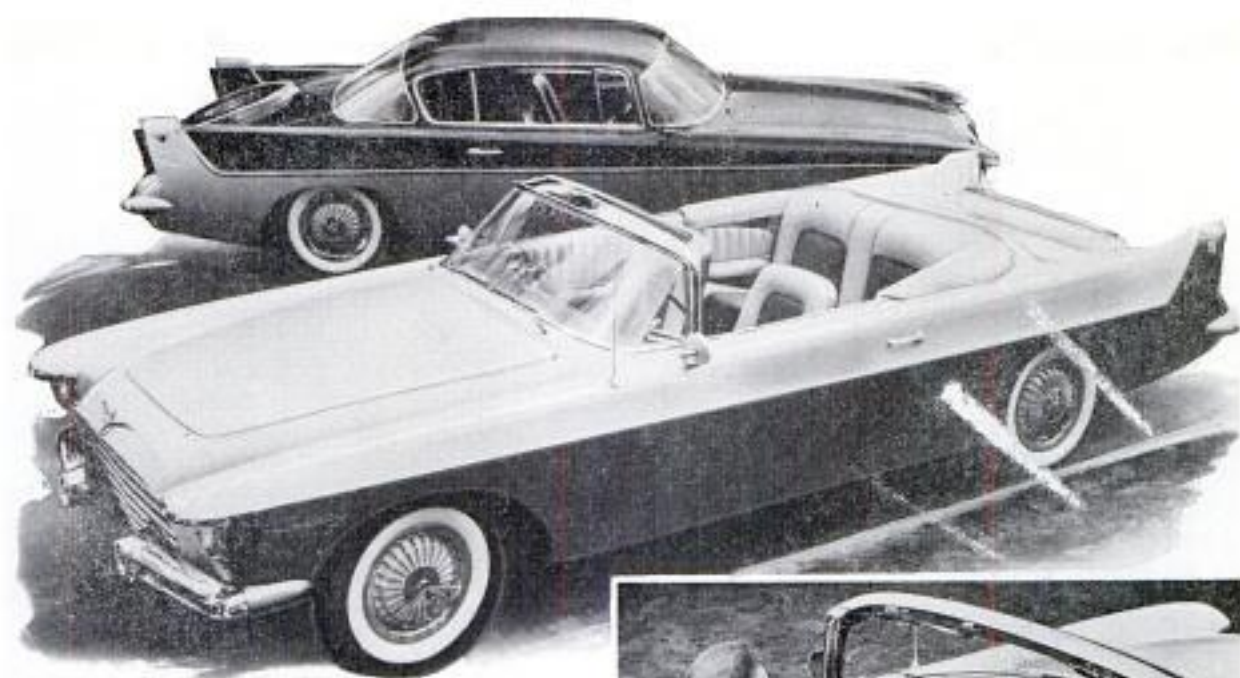
The Cadillac Eldorado Brougham, being groomed to compete with the Continental Mark II, may not be out until January.

The Two-Year Cycle

So competitive has the sales struggle become among manufacturers (it is even fiercer among dealers) that complete model changes may be made every two years from now on—or at least after 1957, the next year for big changes.

Since the end of World War II, the industry has been on a three-year cycle. To reduce it to a two-year cycle means scrapping costly tools and fixtures 33 percent sooner. What such a change will do to the smaller volume producers is not pleasant to consider. Amortization costs per car would have to go up drastically.

Incidentally, the term "facelift" is not a fair one these days. It is generally used in a disparaging way to describe how little is new on a new model. But facelifts today cost big money. It is estimated that the industry is spending \$350,000,000 in new tools for 1956, a year of facelifts generally. New rear decks, such as Chrysler will offer, cost many millions and the term facelift is not adequately descriptive. The industry needs a new word.



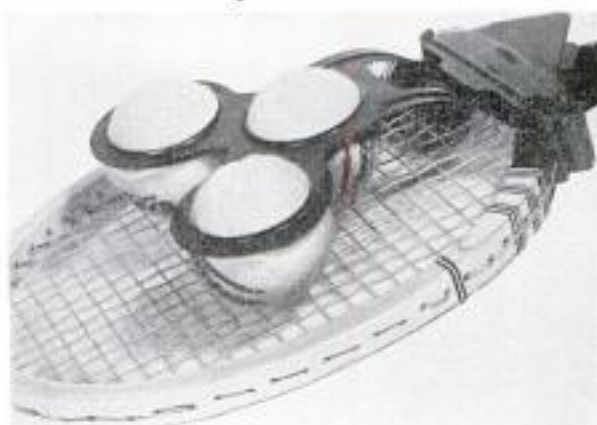
Are These '57 Chryslers?

Chrysler's idea cars may offer clues to the '57 line. Above, four-passenger Flight Sweep hardtop and convertible. Right, control console fits over hump between bucket seats. Below, two-seat Falcon roadster. Things to look for: Bodies seven inches lower than today's; simpler grilles; curved side windows; emphatic tail fins; long headlight hoods



Detachable Holder Keeps Tennis Balls Clamped to Racket

Three tennis balls are clamped to a racket for handy carrying by an easily attached or detached bracket. The device clamps to the handle and holds the tennis balls against the strings by spring tension. It is hinged to allow quick removal of one or more balls. Made of steel with rubber cushioning, it is finished in chrome or in various colors. It may be used in conjunction with a racket press.



☐ Belgrade, Yugoslavia, will be the site of an experimental TV station scheduled to begin permanent service early in 1957.

Heavy-Machinery Trailer Detaches Wheels From Bed for Loading

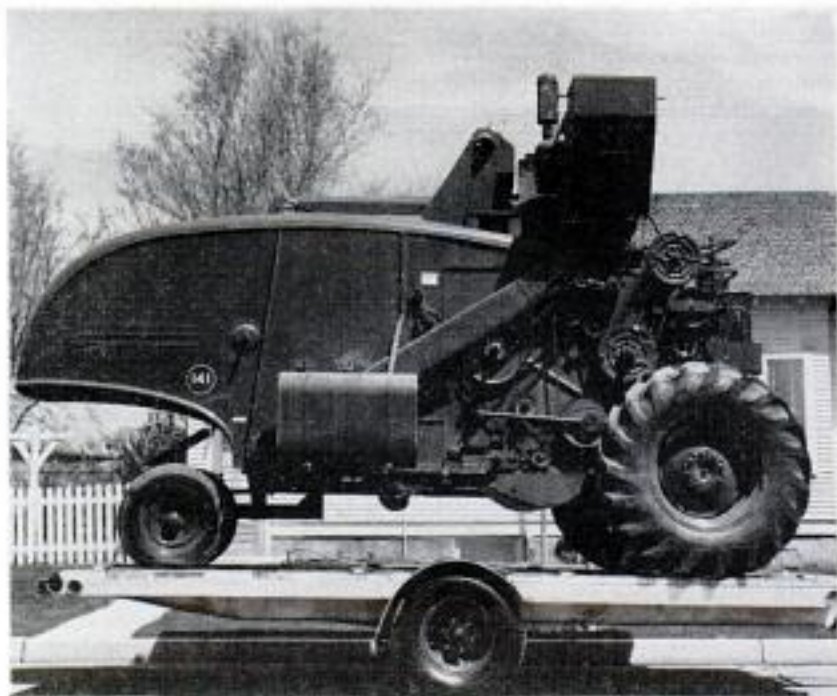


When a new heavy-machinery trailer is about to be loaded, the axle is unlocked and the bed pushed back over the wheels. With the front edge of the bed resting directly on top of the wheels, the angle of slope is small and loading is easy. After loading, bed and load are pulled forward over the wheels until the wheels are again in the wheel wells and the bed rests on its axle. A remote control locks the axle in position for travel. The 8 by 16-foot trailer has a hand winch.

With bed pushed back over wheels, loading is easy. Below, travel position

Cricket Chirps Tell Temperature

No thermometer? You can tell the temperature by listening to a cricket, which has a built-in thermometer according to engineers of Minneapolis-Honeywell Regulator Company. To find out the temperature, count the chirps for 14 seconds, then add 40. For example, 40 chirps in 14 seconds indicate a temperature of 80 degrees. Some Oriental peoples keep crickets in miniature cages as household pets.



Pontoons Fasten to Feet

Now you can attach a pair of pontoons to your feet and scoot around on top of the water, more or less like a water bug. A long pole with a paddle at each end is used for propulsion. A single paddle may also be used. The pontoons, 12 feet long, are made of aluminum tubing. They were invented by Dezso Nemeeth, a Hungarian refugee now living in Italy.

A CROSS A PASTORAL VALLEY in southern Maryland, the rumble of a giant M51 beats heavily on the sleepy afternoon. This tank-recovery vehicle weighs 58 tons and has a chunky boom the size of a bridge girder jutting over its tail. It's capable of squatting on its haunches and heaving a light tank in the air on the end of its massive lift. With a thundering roar it dips, plunging down the near-vertical slope in a maelstrom of noise and flying mud.

Nobody would pilot a \$205,000 vehicle with such abandon unless he was trying to break it up deliberately. And that's just what the driver of that machine was doing. The 48-mile series of nightmarish courses is the world's worst road.

Hideous as it is, the road carries a steady round of traffic. Tanks, trucks, trailers, gun carriers and odd-looking amphibious vehicles roar and buck over its frightening hills day and night, wham through its "shell holes," flounder in quagmires, slither around curves knee-deep in thick mud. For this ugly "highway" is the Army's torture rack for every new automotive development proposed for military service.

The maze of courses is laid out on 75,000 acres of hills, plains, swamps and ocean

CAN OUR TANKS TAKE IT?

By
Richard F. Dempewolf

M51 tank-recovery vehicle roars along 589-foot "road" paved with loose granite rocks each 2 feet wide

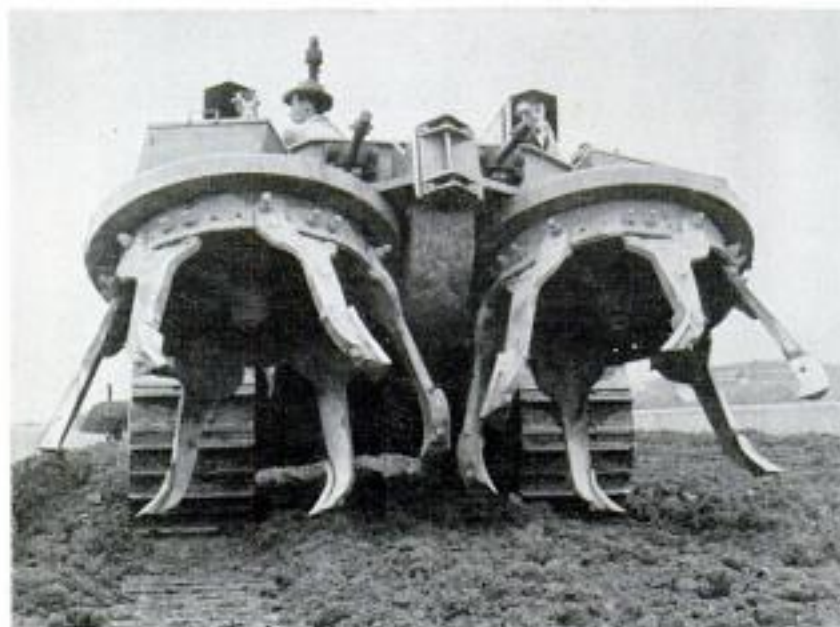




Before a new tank such as this M47 can qualify for service, it must be able to leap three-foot vertical wall at Munson without coming apart



Amphibious Otter must withstand 10 or 20 miles of these concrete bumps before taking other tests. Below, rotary plow keeps roads unpleasant



bay that comprise the Army's Aberdeen Proving Grounds, just north of Baltimore. The man responsible for devising many of them, and for operating them, is A. H. "Bud" Ford, a tall heavy-set fellow who started busting things up for the Army in 1944 when, he recalls, "the only Army vehicle test course was an open field with a few ditches." Today, Bud Ford and his 70 test drivers, plus expert machinists, operate a thumping big business under Eugene C. Barbero, chief of the Automotive Division of Aberdeen's Development and Proof Services.

Their job is to take every pilot model of proposed equipment that moves on wheels or tracks (as well as improvements and accessories) and literally drive them to complete collapse. "We've got to know just how much they'll take before they come apart," Ford explains. It's his duty to make sure that the vehicles accepted by the United States Army at least match those of any potential enemy. In effect, it's a shakedown cruise on wheels—to locate the bugs and suggest ways to eliminate them.

Actually, those 48 miles involve five separate courses.

At the Perryman cross-country testing area, vehicles groan under capacity load to test pulling power, speed, braking, maneuverability, suspension systems and shake-apart characteristics on "flat" country. Most of it is about as flat as a roller coaster. Part is a succession of huge potholes for heavy tanks and tracked vehicles; another section has "little" hummocks and holes only three or four feet deep for the smaller tracks. There's a



Truck with capacity load of soil ended up in this gully after its brakes failed. Accidents are few

two-mile straightaway for speed, seven miles of endurance run and a circular track for drawbar-pull tests.

At Churchville, vehicles get a dose of severe hills under the worst possible conditions. "We keep after it," says Myron Rider, supervisor in charge of the course. "The ruts and bumps have a tendency to flatten, so we gouge them out with dozers." In wet weather, Churchville is a river of mud; in drought it becomes a treacherous bog of powdered clay two feet deep; in winter it is a series of ice-coated ski-jump slides. Fillings have been jarred from a driver's teeth when the road was frozen, but it's also great for tearing power trains to pieces, overloading engines, transmissions and differentials, and testing traction



M41 cargo truck flipped over after the steering failed on a speed run at Perryman. Driver was unhurt

mobility under tough winter conditions.

Across 30 miles of miserable bog and soft sand beaches on Poole's Island in the Chesapeake Bay, weird-looking new amphibians like the Gull, Otter and Super Duck flounder up to their cabs in muck and tree roots, in a morass where the nearest hard bottom is 10 feet down. "In some places you can drive a 20-foot pole down in it and the thing will disappear," Ford claims. "Most dubious vehicles go in with a tow-line attached. Just in case." Engineers continually plow up the broad sand beaches to keep them soft and horrible for landing operations. A gigantic rotary plow that looks like a tank with a pair of four-foot-wide steel egg beaters on its rear, pulverizes the soil to a depth of about two feet.

Perryman mudbath is continually churned by tracks of vehicles like this 58-ton M51, which can tow a tank





Before it ever gets to Churchville or Perryman, every tank must wham through deep fording basin at Munson



Amphibious Super Duck, like fish out of water, bucks a mud wash on four-mile torture course at Churchville

Churchville's rutted route takes vehicles right through a stream to test fording ability. This is an M47 tank



On the ear-shattering cross-country trails at H-Field, you'll see the new T43 heavy tank, the M44 self-propelled gun and an array of new mobile weapons bawling away at targets while bouncing over shell holes, boulders and six-foot embankments. Mobile guns, big and small, are shot until they literally melt or explode under pounding combat conditions.

Most unusual obstacle course of all, though, is Munson, right on Aberdeen's main post. It comprises some 20 man-made hazards designed to drown, rack, bend, jolt, vibrate or tear tanks and trucks to pieces on a continuous destructive run. Here, war machines shudder at top speed over a half mile of concrete washboards that vary from 6 to 12-inch waves, some even, some staggered. Nuts and bolts shake loose and parts fall off. Slopes varying from 5 to 60 percent check the vehicle's brakes, fuel-system efficiency and resistance to oil starvation while it "stands on its tail." Will a tank's gun turret swing properly when the thing is almost vertical? "We soon find out on the 60-percent slope," says Ford. "A man can't walk up that hill with leather-soled shoes. I've seen tanks slide backward on it while the tracks ground forward at full power. To play safe with heavy equipment



Flat-bed Jeep under test on Munson course has folding steering wheel that permits driver to walk alongside

we tie it by a cable to a heavy tank that drifts down the other side and acts as a brake in case something lets go."

In a cobblestone bowl 84 feet across, trailers are pulled in a continuous circle by a whirling arm until their wheels fall off. Roaring tanks and trucks grind their

Massive new M44 self-propelled gun climbs the steepest grade at Munson. Here, tanks often spin and slide





Big tanks, like this M47 hitting the mud at Perryman, become covered with as much as two tons of caked mud



Newest mobile weapon to take the bumps and churn through the mud at Perryman is M44 155-millimeter self-propelled howitzer

New supply carrier must be able to climb over the 30-inch vertical barrier at Munson. Test also proves clearance of truck

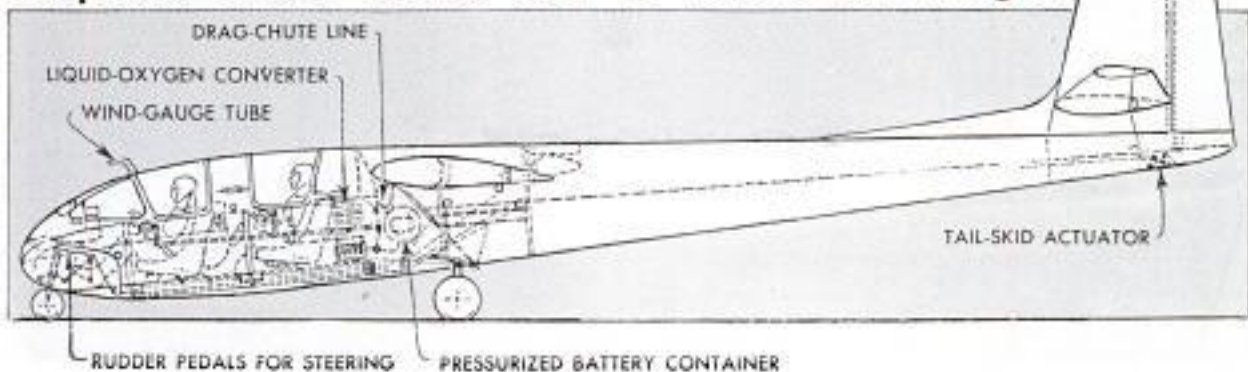


tracks, spin wheels and snap drive shafts along an 800-foot stretch of two-foot-deep loose sand. Like a bellyhopper hitting the water, they wham into the "mud wallow," a 250 by 950-foot bowl of slurp that gums up anything not properly sealed, and provides a powerful abrasive for wearing out vital moving parts improperly protected.

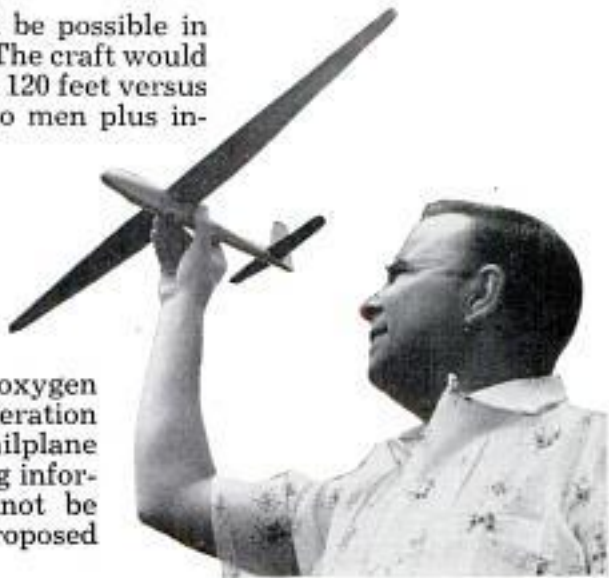
The vehicle under test may roll over a series of huge alternating humps known as the "frame twister," heave and shudder across almost a mile of wavy, lumpy "Belgian Blocks." It may slither through the controlled-soil basin where mud is made in any consistency desired. It may even be forced to tow a mammoth dynamometer that drags its heels just to make things tougher. It will plunge through a fording basin almost completely submerged, slam through a carefully engineered shell hole 4½ feet deep and 25 feet across, leap an adjustable gap to test its "bridging" ability, jump vertical walls up to 30 inches high. To test stability, it rumbles around a "roll over" track that slopes so steeply sideways that drivers would fall out if not lashed to their seats. "Our idea is not to test the drivers, however," Ford explains, "and when we're suspicious of a vehicle, we take precautions.

(Continued to page 288)

Proposed Glider Would Soar to 70,000-Foot Height



Soaring on the winds to 70,000 feet would be possible in a strato-sailplane designed by glider experts. The craft would have the same wingspan as an airliner (100 to 120 feet versus the 117 feet of a DC-7) and would carry two men plus instruments for flights of eight hours or longer. At its ceiling it would have a forward speed in excess of 200 miles per hour. Glider pilots already have soared to 45,000 feet on strong updrafts in California and were afraid to go higher because of lack of pressurization. The new craft, designed by the Southern California Soaring Association, will have a pressure cabin with oxygen plus heating equipment for comfortable operation in the thin sub-zero upper air. The strato-sailplane is proposed as a research vehicle for acquiring information about upper air currents that cannot be easily obtained by rockets or balloons. One proposed study would be of the jet stream.

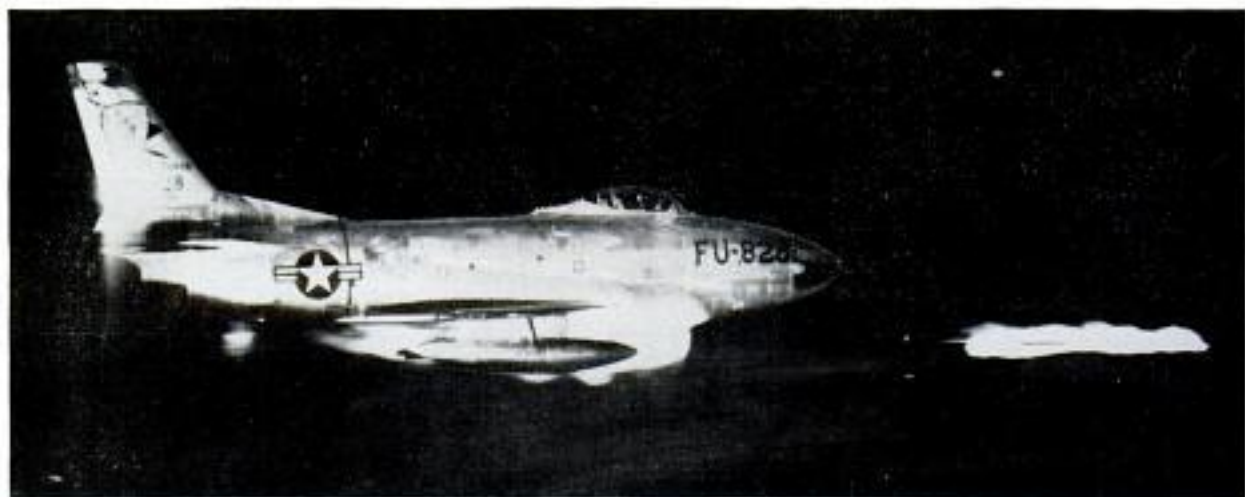


Triple Shade of Flexible Shop Lamp Doesn't Get Hot

You won't accidentally burn yourself on a new shop lamp with a metal shade that never gets hot. Protecting the lamp's reflector are two additional shades, one inside the other. At the top of the lamp are air vents to allow the escape of heated air

from the 100-watt incandescent bulb. The lamp is suspended from a flexible arm on a fixture that can be clamped on a work bench, drafting board or table or attached directly to lathes, sewing machines or other power tools.





Flying Photographer Shoots Flash Picture of Plane in Mid-Air

Some people, like Detroit photographer James Burns, will go to almost any lengths to get a good picture. To shoot a night picture of a jet plane firing a rocket, he mounted six flash reflectors in a salvaged fuel tank that he took aloft with him on a jet trainer. When the two planes were 60 feet apart and flying at 350 miles per hour, Burns clicked his camera and tripped a switch that fired three large flash bulbs in the side-mounted tank. The opening cut in the fuel tank had been covered with a sheet of Plexiglas to protect the flash units from wind. Several flash units were used so that more than one picture could be taken in one flight. The project was sponsored by General Electric to dramatize the 25th anniversary of flash photography.

Shot above of Air Force all-weather jet fighter interceptor is first night in-flight jet-to-jet flash picture showing rockets being fired. Below, technicians install the flash reflectors in side tank

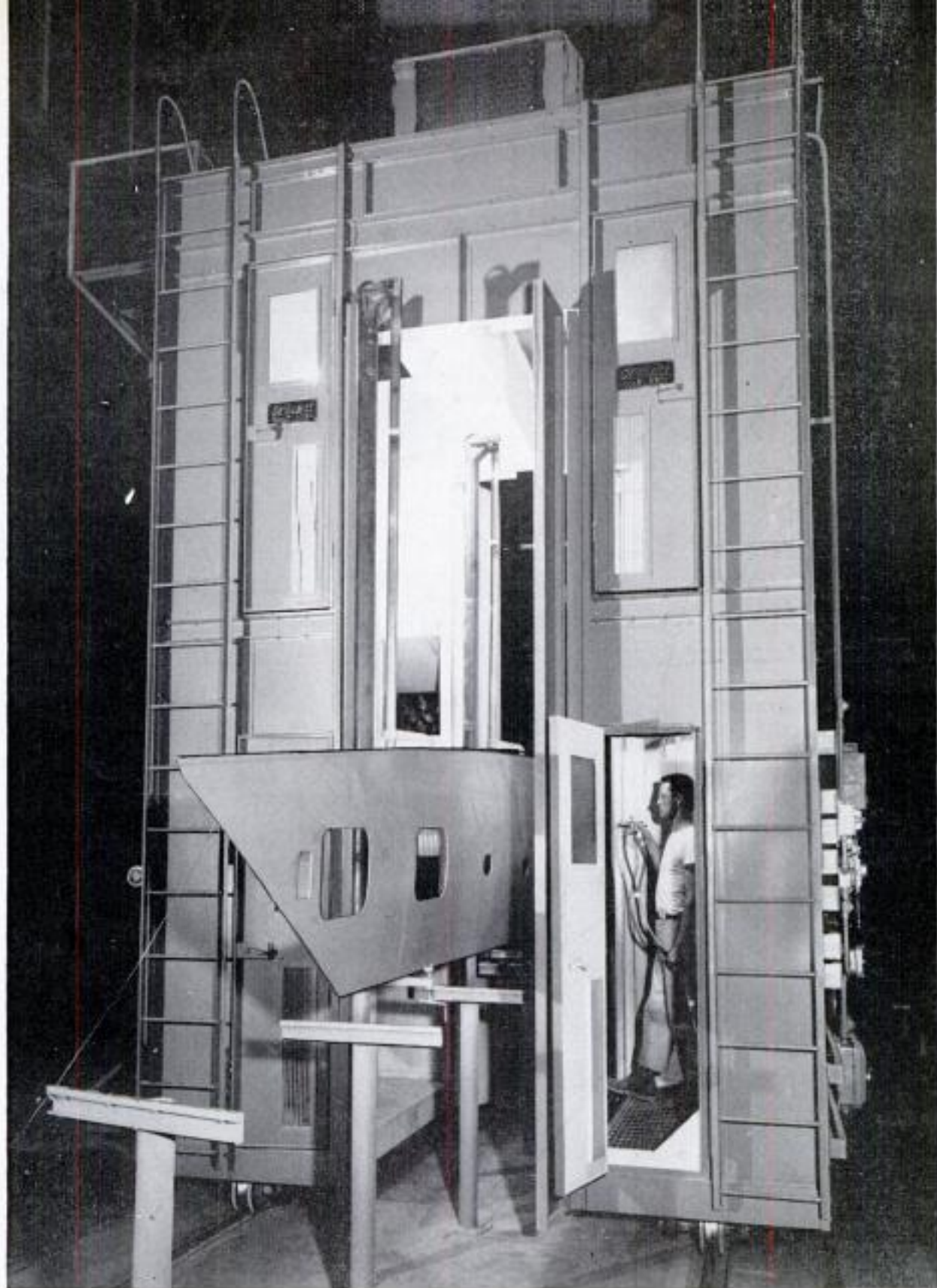


Directional Signals for Bike

Right or left turns are automatically signaled by directional lights for bicycles. Operated by standard flashlight batteries, the flashing signals are actuated by an automatic switch when the handle bars are turned. The lights can be attached to the bicycle frame or handle bars and are visible from the front, rear or either side.

Drugs Sterilized by Electrons

Sterilization of drugs already sealed in their containers is now being done with electron "bullets." The electrons, generated by a 2,000,000-volt Van de Graaff accelerator, and traveling about 175,000 miles per second, kill all living organisms in the drugs in a fraction of a second without appreciably raising the temperature or affecting the potency of the drug.



Giant Traveling Paint Booth Used to Spray Plane Parts

PAINTING of wing skins and spar chords of the B-47 Stratojet and the B-52 Strato-fortress in the Wichita, Kans., plant of the Boeing Airplane Company is now done in a giant mobile spray booth, 17 feet high. Clicking along a 110-foot track, the booth has an adjustable painter's platform on each side, enabling either of two operators to run the machine. The booth can travel

at speeds up to 25 feet per minute, and all power units, air compressors and exhaust systems, along with necessary fire-protection apparatus, are self-contained. During full operation, only 12,000 cubic feet of air per minute are expelled through an escape trench leading to the discharge tower. A comparable stationary booth requires 10 times that amount of air.

OWNERS REPORT:

Best-Liked Features:

"I like the easy way the Chrysler handles at all times -- on the road, in the city or through a field."

Iowa Farmer

"It has ample power -- lots of scat. And the best ride on the road today."

Ohio Business man

Most-Wanted Changes:

"Body could be more free of squeaks and rattles and possibly more economical on gasoline."

Iowa livestock dealer

"I don't like the door handles. Glove compartment is too small."

Washington field manager



By Floyd Clymer

THE TEST CAR, a Chrysler New Yorker V8 four-door sedan, was driven from Detroit via Indianapolis to Los Angeles for a distance of 2736 miles, which included some additional testing in the desert and back roads.

This car is powered by the Firepower 331.1-cubic-inch engine with hemispherical combustion chambers, developing 250 horsepower at 4600 revolutions per minute.

The car has good handling characteristics. Even with the typical Chrysler front-



Complaints:

"Interior styling is in bad taste. Too many colors. Should have a single-color upholstery."

Connecticut salesman

"Change outside door handles."

Illinois druggist

Why Buy Chrysler?

"I have always driven Chryslers."

Colorado printer

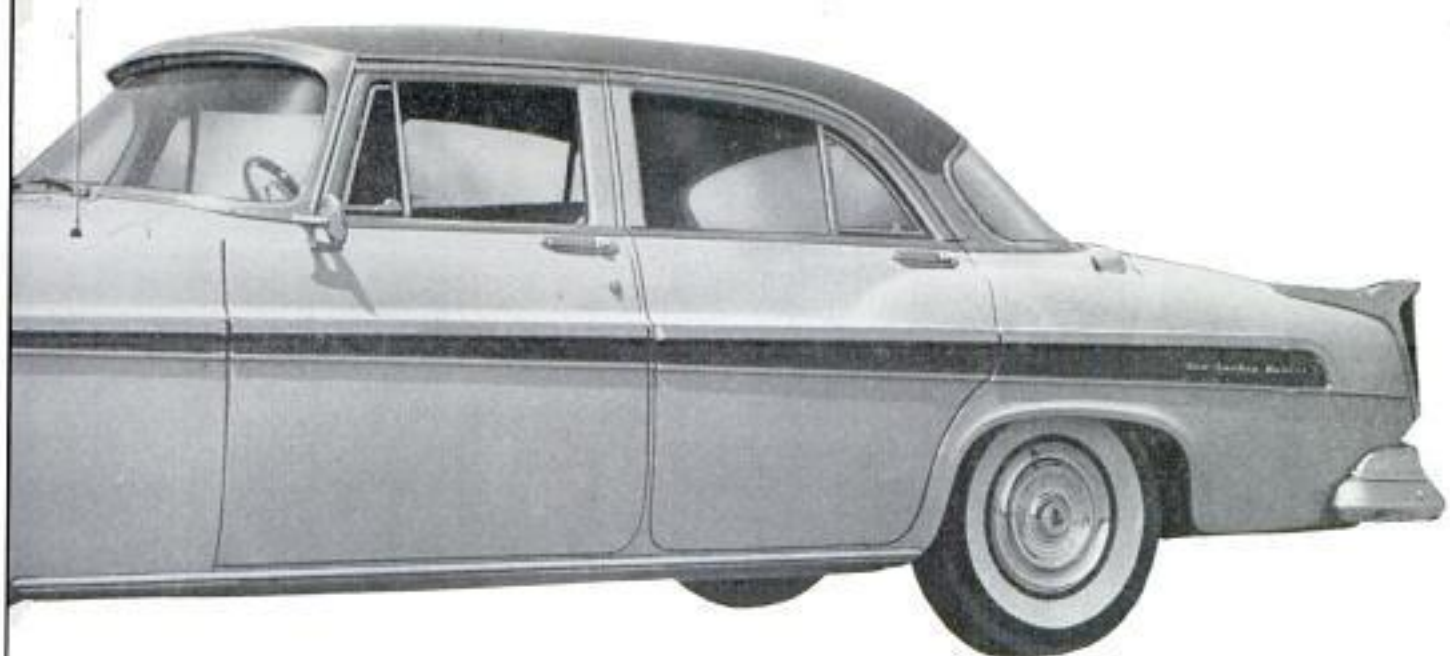
"The New Look!"

Illinois insurance man

CLYMER TESTS THE 1955 CHRYSLER NEW YORKER

end softness and some "roll" when cornering at high speeds, it is easy to handle and very responsive to the steering wheel. With the rear seat loaded with luggage and passengers, there was a tendency to hit bottom on severe bumps. The engine is free of vibration. It is the fastest stock four-door sedan that I have tested. It seems to loaf at 100 miles per hour and does 110 without much effort. The top speed by speedometer was 120 miles per hour—actual top speed

(Continued to page 300)



CHRYSLER OWNERS STILL SAY HANDLING IS BEST FEATURE

By Chrysler Owners

CHRYSLER SPENT MILLIONS on its new body style for 1955 (and sales figures show it paid off), but the owners are not infatuated by a pretty face: They still pick handling ease as the best-liked feature just as they did in 1954.

Once again this is a tribute to Chrysler engineering and its power steering, in particular. The big Chrysler handles like a small car, say the owners.

"It handles like a toy. Very nicely."—Illinois store owner.

"Power steering is the finest. General over-all handling is excellent."—Illinois salesman.

"I like the easy way the Chrysler handles at all times—on the road, in the city or through a field."—Iowa farmer.

But the owners like other things about the Chrysler. Second on the list of best-liked features is the car's performance. With the big 188 and 250-horsepower engines, it's no wonder that owners brag about power and performance.

Chrysler owners complain about the dashboard, especially the location and size of glove compartment (arrow)



Percentages from *PM* Poll of Chrysler Owners

Dealer service

Excellent	59%
Average	28%
Poor	13%

What did you trade in?

Chrysler	57½%
De Soto	5½%
Dodge	5½%
Plymouth	2½%
Other Big Three make	14½%
Independent make	6½%
No trade	8%

How was trade-in allowance?

Chrysler-product traders

Above average	33%
Average	58%
Below average	9%

Other Big Three traders

Above average	33%
Average	57%
Below average	10%

Independent traders

Above average	50%
Average	50%
Below average	0%

OVER-ALL RATING OF THE CHRYSLER

Excellent	81%
Average	17%
Poor	2%

Would buy another Chrysler?

Yes	77%
Might	22%
No	1%

Why did you buy Chrysler?

Previous ownership	31%
Exterior styling	22%
Engine, performance	5%
Best deal on trade	4%
Excellent dealer service	4%

What should be changed?

Improve interior quality	7%
Exterior door handles	5%
PowerFlite transmission	5%
Dashboard layout	2%
Needs no changes at all	45%

Most-Frequent Complaints

Squeaks and rattles	12%
Uses too much gas	12%
Small glove compartment	7%
Awkward door handles	7%
Water and dust leaks	7%
Upholstery poor, hard to clean	6%
Poor assembly	6%
Lacks headroom	5%
Poor heater, defroster	4%

22% of the owners made no complaints at all

Best-Liked Features

Handling ease	49%
Power, performance	37%
Riding comfort	35%
Body styling	25%
Visibility	9%
Roadability	7%
Dependability	5%
Power steering	5%
Roominess	4%

"Terrific response when you need it."—Illinois salesman.

Third on the best-liked list is riding comfort, fourth is the all-new body styling.

"So comfortable to ride in, like sitting in a big easy chair."—Iowa owner.

"All roads seem to smooth out no matter how rough they are."—Massachusetts dry cleaner.

"For many years I have made trips between Minnesota and Denver, usually driving straight through over 800 miles. With my advancing years, I have found these journeys increasingly difficult. However, since buying my 1955 Chrysler, the last three trips have been the least difficult due to handling ease and comfort."—Colorado businessman.

"Good looking without being flashy."—Vermont retired owner.

"Best-looking car on the market. Fine, simple lines."—Georgia housewife.

"Attractive curving lines. Not squat or boxlike."—Illinois executive.

"Styling is good. But then I liked the Airflow back in the Thirties."—Connecticut surgeon.

Owners Do Complain

The most frequently mentioned complaint was more annoying than serious—but there is nothing more aggravating than squeaks and rattles in a new car.

"There are several minor but annoying squeaks and rattles. In general, structural rigidity is excellent."—Washington, D. C., lawyer.

"Irritating noises in the body which

cannot be located."—Georgia salesman.

Next on the list of complaints is a very common one: The car uses too much gas.

"I don't like the low gas mileage. I expected about 14 miles per gallon in the city and 17 on long trips with this Windsor. Instead I am getting 9 and 12 miles per gallon. Transmission is excellent if it does not affect mileage, but I am sure it does."—Arkansas minister.

There were 22 percent of the Chrysler owners who did not register a single complaint about their new cars.

Third on the list of complaints is the size and location of the glove compartment. It is too far to the right and it is very small, say the owners.

Fourth most-frequent complaint is about the flush-mounted outside door handles. (Incidentally, advance news is that these will be different on the 1956 models.)

"Exterior door handle is poor design. Difficult to open door, particularly for children or when carrying bundles."—Delaware sales manager.

Water and dust leaks are listed as the fifth most-frequent complaint.

"Leaks even after undercoating."—Iowa salesman.

Why Buy Chrysler?

Asked to list the one factor that most convinced them to buy a Chrysler, the owners give previous ownership as the most common reason. Second is the new body styling; third, the engine performance; fourth, the good deal the Chrysler dealer offered; and, fifth, good dealer service.



Driving position is excellent, say owners, and Clymer agrees. A few say not enough room under wheel

"I have driven Chryslers since 1936 with very, very little trouble of any kind."—Iowa retired farmer.

"The new design and forward-look advertising sold me."—Illinois radio-time salesman.

Slightly more than half (57½ percent) of the owners traded in Chryslers. Another 13½ percent traded in another Chrysler Corporation car (Plymouth, Dodge or De Soto). There were 14½ percent of the owners who traded in other "Big Three" cars, 6½ percent traded an independent make (Studebaker, Packard, Nash, Hudson or Kaiser), and 8 percent made no trade at all.

Trade-in allowances offered by the Chrysler dealers seemed about as generous for other Big Three traders as for Chrysler traders. The owners who traded an independent make seem to think they did better, but the sample was small and perhaps not reliable. See the percentages on page 126 for a detailed summary of this.

Most-Wanted Change

Asked to list the one specific change they want made on their Chryslers, the owners do not agree in any large numbers on anything, except the 45 percent who say no change is necessary since they like the car as it is.

But 7 percent do ask that something be done about the interiors.

"Change the interior. Styling is in bad taste."—Connecticut salesman.

"Upholstery colors too glaring."—Washington, D. C., insurance executive.

"Upholstery is not in keeping with the fine styling and high mechanical standards of this car."—Iowa owner.

Chrysler owners also want the exterior door handles changed for easier operation. Quotations on this have already been given.



Some of the owners don't like front-grille styling. Clymer likes the fact that there are no projections

Third most-wanted change is the Power-Flite transmission. Some say it is too jerky when initially engaged, other say it downshifts too sharply, others say it downshifts at the wrong speed.

"Drops into low gear at too high a speed—12 miles per hour."—Illinois teacher.

Here are some quotations listing other changes the owners would like:

"I would try to make the glove compartment bigger. I would move the wiper-control switch to where the cigarette lighter is and vice versa (of course, I don't smoke)."—Iowa telephone worker.

"Move the windshield-wiper switch closer to driver."—Utah railroad engineer.

"Why can't some thought be given to design interior for storage of maps, sun glasses, etc.?"—Illinois dentist.

(Continued to page 304)

TEST DATA

1955 CHRYSLER NEW YORKER
Four-Door Sedan with PowerFlite

Acceleration Test

¼ mile from zero	- - - - -	19.2 seconds
½ mile from zero	- - - - -	31.7 seconds
0 to 30 miles per hour	- - - - -	4.5 seconds
0 to 60 miles per hour	- - - - -	15.6 seconds
Top speed by speedometer	- - - - -	120 miles per hour
True top speed about 110 miles per hour		

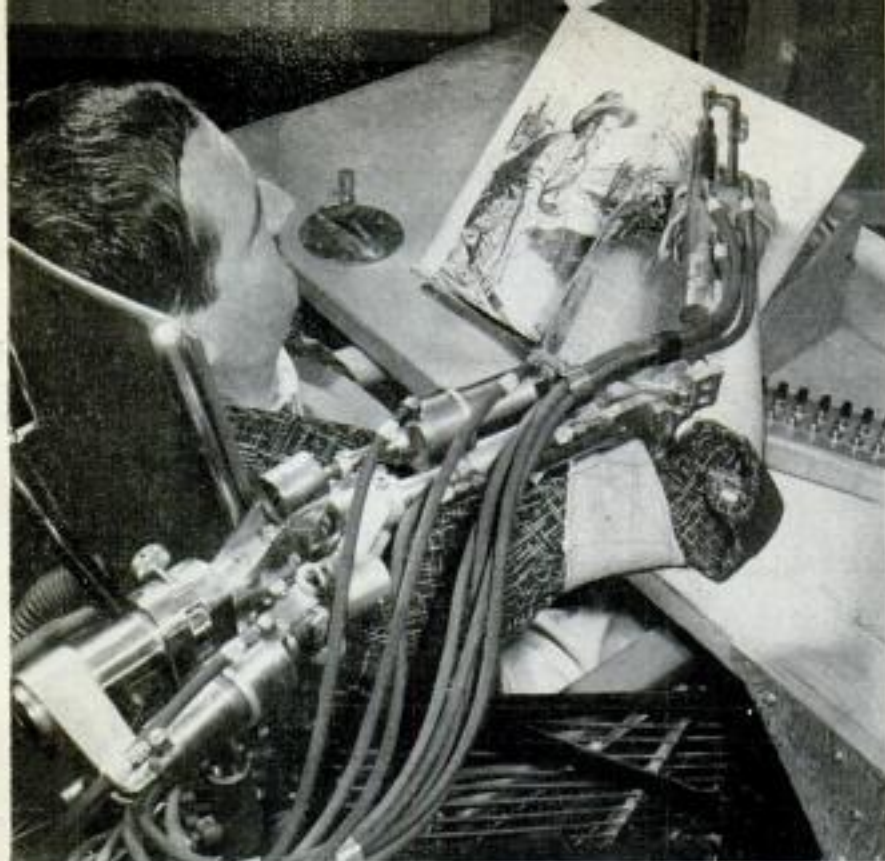
Economy Test

Constant-Speed Mileage

At constant 30 miles per hour	- -	21.2 miles per gallon
At constant 50 miles per hour	- -	17.9 miles per gallon
At constant 60 miles per hour	- -	16.4 miles per gallon
At constant 75 miles per hour	- -	12.1 miles per gallon

Cross-Country Mileage

Detroit, Mich., to Indianapolis, Ind.	-	15.1 miles per gallon
Indianapolis to Kansas City, Mo.	-	15.6 miles per gallon
Kansas City to Albuquerque, N. Mex.	- - -	16.4 miles per gallon
Albuquerque to Los Angeles	- -	15.6 miles per gallon
(Regular and premium gasoline used)		



Intricate construction of mechanical arm's hydraulic cylinders and hosing can be seen as patient thumbs magazine held on rack



Path of light bulb in photograph traces the extent of the hydraulic arm's reach

Hydraulic Arm—*New Hope for Paralytics*

FOOT PEDALS regulate a hydraulic arm built for a polio victim who has lost control of his arms but still has some strength in his legs. It was developed by engineers at North American Aviation for a fellow employee and is not yet being manufactured. With it, Marv Pulliam can feed himself, type a letter, turn book pages, answer the telephone and tune TV. The patient's arm is suspended by web straps from the

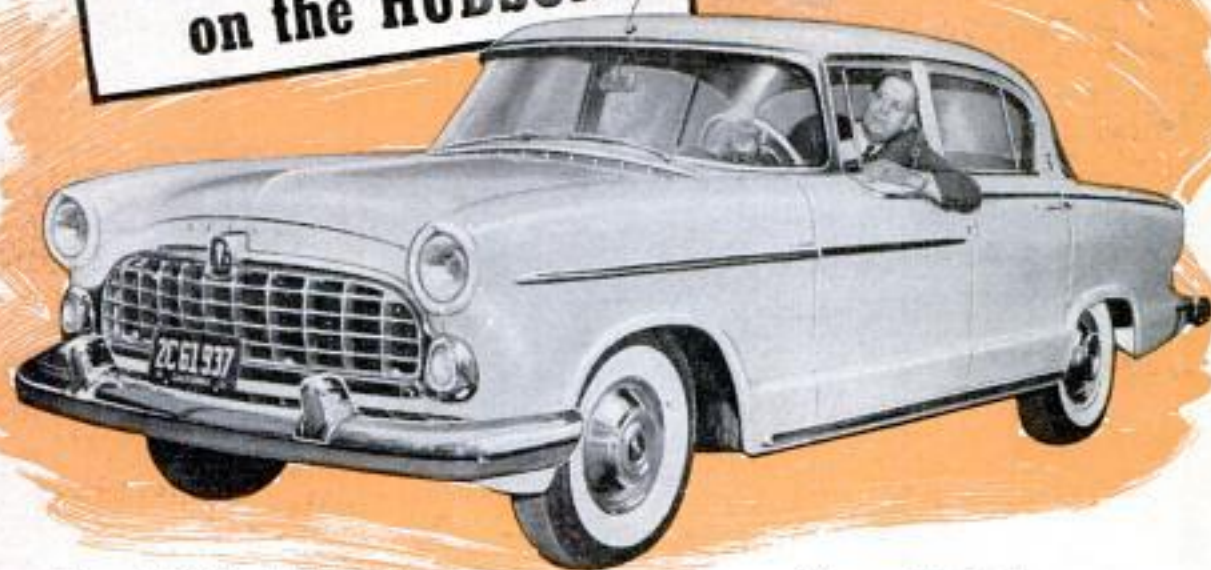
flexible boom that is the hydraulic arm. Eight rubber hoses supply the actuating cylinders with fluid pressured by an electric pump. The thumb and right hand fit into plastic guides while the index finger and middle fingers work in metal caps. The guides and caps are hydraulically controlled, as are wrist, elbow and arm supports. The speed of movement varies with the pressure exerted on the pedals.

Typing is possible with the mechanical arm, though such a feat involves long training and patience

Polio-stricken Marv Pulliam, for whom mechanical arm was built, lifts glass and sips through straw



OWNERS REPORT on the HUDSON



Best-Liked Feature:

"Most comfortable riding car I have ever driven. It absorbs road shock and does not tire you on long trips."

North Carolina textile worker

Why Buy Hudson?

"I bought Hudson because of past performance. Have owned them for 20 years."

Maine clerk

Complaint:

"Windshield-wiper switch in very poor place. Difficult to turn on and off."

Ohio division manager

Most-Wanted Change:

"Steering wheel should be lower. The shift quadrant is too hard to see."

Alabama salesman

HUDSON OWNERS PRAISE RIDE, HANDLING EASE AND STYLING

By Hudson Owners

HUDSON FOR 1955 made the biggest change in the whole industry. As a result of the creation of American Motors (by the merger of Hudson and Nash), the new Hudson is all different except for its power plant and even that is all new if you buy a V8. It is built in a different factory, in a different state, by different workers.

What do owners of this different Hudson think about their cars? To find out we asked 1000 of them and here are their answers.

The best-liked feature among the owners in 1955 is the same as it was in 1954: The comfortable ride of the Hudson. Second in the list of best-liked features is also the same: Handling. Third in 1954 was durability, but the 1955 owners put styling third.

Roadability was fourth in 1954, but has dropped to seventh in this year's model.

Here are some quotations from Hudson owners on the subject of riding comfort:

"Most comfortable riding car I have ever driven. It absorbs the road shock and does not tire or cramp you on long trips."—North Carolina textile worker.

"Rides wonderfully. The seats fit your back."—New York oilworker.

"You never tire from its smooth ride."—Pennsylvania railroad fireman.

Hudson's handling ability was given second place on the best-liked list:

"I drive about 86,000 miles per year, about eight hours a day. It is easy to handle, not tiring."—Alabama salesman.

"Hudson handles very well on curves



Hudson now has coil springs in the rear and a torque-tube drive. Clymer does not like this system with its greater unsprung weight

Reclining seats make a big hit with Hudson owners as does the new wrap-around windshield. Some complain of dash layout though



at fast speeds." — Florida dry cleaner.

Third of the best-liked features is the new 1955 styling.

"Smart styling, especially the grille. It gives the car a more-expensive look." — Massachusetts realtor.

"I like its distinctive styling. You don't see yourself coming and going. Other cars too similar." — New Jersey principal.

And Owners Complain, Too

Although there were 29 percent of the owners who didn't have a single thing to complain about, others did. Their most-frequent complaint was about the windshield wipers and wiper control switch.

Fourteen percent of the owners reported that either the wipers or the switch or both were inadequate or hard to use.

"Windshield wipers do not work at all times. They seem to stick around the curve of the glass. Wiper control switch and ignition key too close to steering post." — Washington school superintendent.

"Windshield wiper does not work when you step on the gas. This is the only fault that I can find." — Wisconsin park official.

"Wiper switch in very poor place. Difficult to turn on and off." — Ohio division manager.

"Rubber hoses on vacuum wipers do not hold up." — Texas schoolteacher.

"Wipers do not have enough power in them." — Illinois postal supervisor.

Second most-frequent complaint was the position of the steering wheel.

"Steering wheel is up too high. Should be lower." — Massachusetts milkman.

Third complaint was that the 1955 Hudson looks too much like a Nash.

"Looks too much like a Nash. It should be lowered." — New York design engineer.

Why Buy a Hudson?

The most frequently given reason for buying a Hudson is previous experience with the car, an experience that obviously must have been pleasant.

(Continued to page 132)



CLYMER TESTS the HUDSON HORNET V8

By Floyd Clymer

THE TEST CAR was the Hornet V8 four-door sedan with Ultramatic transmission and air conditioner. The test was from the factory in Kenosha, Wis., to Los Angeles, a distance of 2510 miles, including off-highway tests.

Powered by the Packard-built 320-cubic-inch V8 engine, this car is a new kind of Hudson. Including air conditioning, the car is some 325 pounds heavier than the previous six-cylinder Hornet.

Due to Hudson's 1955 drastic change and its acquisition by a new company, I somehow expected a mediocre automobile, at least until the change-over "bugs" were ironed out. But much to my surprise, very few bugs showed up. One surprise was that I could see less difference in the handling characteristics between the old and new models than anticipated.

The engine is extremely smooth, with minimum vibration. Acceleration is really good and the car has a surprisingly fast top speed. Top speedometer reading was only 100 miles per hour, which appeared

slow to me. Upon checking, the speedometer was found to be approximately seven percent slow. Actual top speed was about 107 miles per hour. This is the first car I've tested in which the speedometer was slow instead of fast.

Hudson now has torque-tube drive, a system I have never liked. In spite of the fact that Henry Ford built 19,000,000 torque-tube-drive Model Ts and Buick has gotten by with it for many years, I still prefer less rear unsprung weight. There is a little hopping around of the rear end when cornering fast or on washboard roads, due to the weight of torque-tube and radius rods used to tie the rear end together. In favor of torque-tube design, it must be said this construction does assure a rigid rear end and good alignment under all conditions. With Hudson's coil springs in the rear, the torque-tube radius-rod combination is necessary with conventional American car design.

The extremely long front coil springs

(Continued to page 280)

Percentages From PM Poll of Hudson Owners

OVER-ALL RATING OF THE HUDSON

Excellent	62%
Average	32%
Poor	6%

Miles per gallon in city

Hornet V8.....	13.1	m.p.g.
Hornet 6.....	14.1	m.p.g.
Wasp 6.....	16.7	m.p.g.

Miles per gallon on trips

Hornet V8.....	16.2	m.p.g.
Hornet 6.....	16.8	m.p.g.
Wasp 6.....	19.9	m.p.g.

Oil consumption of V8

None	32%
Some	62%
Considerable	6%

Oil consumption of 6

None	86%
Some	14%
Considerable	0%

What did you trade in?

Hudson	79%
Nash	2%
Big Three make	11%
Independent make	2%
No trade	6%

How was trade-in allowance?

Hudson-Nash traders	
Above average	43%
Average	53%
Below average	4%

Other traders

Above average	50%
Average	50%
Below average	0%

Would buy another Hudson?

Yes	74%
Might	23%
No	3%

Why did you buy Hudson?

Previous ownership	49%
Trade-in allowance	12%
New styling	11%
Dealer service	4%
Ride	3%
Six-cylinder engine	3%

What should be changed?

Lower steering wheel	9%
Return to step-down	8%
Improve wipers	6%
More power in Wasp	4%
Make shift dial visible	4%
Move hand-brake handle	3%
No changes needed	34%

Most-Frequent Complaints

Wipers and wiper switch	14%
Steering wheel too high	9%
Looks like Nash	7%
Water leaks	7%
Poor roadability	7%
Poor gas mileage	6%
Noisy engine	6%

29% of the owners made no complaints at all.

Best-Liked Features

Riding comfort	43%
Handling ease	33%
Body styling	20%
Performance of Hornet	19%
Roominess	16%
Reclining seats	14%
Roadability	14%

TEST DATA

1955 HUDSON HORNET V8
Four-Door Sedan with Ultramatic

Acceleration Test

¼ mile from zero	19.5 seconds
½ mile from zero	32.2 seconds
0 to 30 miles per hour	4.8 seconds
0 to 60 miles per hour	15.9 seconds
Top speed by speedometer	100 miles per hour
True top speed about 107 miles per hour (Speedometer actually 7 percent slow)	

Economy Test

Constant-Speed Mileage	
At constant 30 m.p.h.	21.4 miles per gallon
At constant 50 m.p.h.	17.4 miles per gallon
At constant 60 m.p.h.	15.9 miles per gallon
At constant 75 m.p.h.	12.4 miles per gallon

Cross-Country Mileage	
Kenosha, Wis., to Indianapolis, Ind.	14.8 miles per gallon
Indianapolis to Dodge City, Kans.	15.8 miles per gallon
Dodge City to Gallup, N. Mex.	15.6 miles per gallon
Gallup to Los Angeles	14.9 miles per gallon
(Regular and premium gasoline used)	

"I always buy Hudsons. They are durable. I have driven 80,000 miles with the same clutch. No major repairs."—Massachusetts insurance agent.

Here are some other reasons why owners bought Hudsons. They are quoted in order of frequency of mention.

"Hudson was the only car that was willing to give what I wanted for my Jaguar in a trade."—Chicago lathe operator.

"I buy Hudsons because I get a good trade-in allowance. I refuse to take a beating on a trade for a Big Three car."—Illinois insurance agent.

"People say there is no resale to Hudson. Well, I got a good deal on my old one by buying this Hudson. And after driving a Hudson for three years I wanted to own another one."—Illinois brickmason.

"Styling makes Hudson owners proud. It is a distinction to have one."—Washington, D. C. Army officer.

"Dealer service convinced me. The cars have been honest products and the dealer interested in keeping me satisfied."—Oregon sanatorium operator.

"I bought it because of that big six-cylinder engine. It never gives any trouble."—Illinois machinist.

"One of the main reasons for buying this Hudson was the reclining seats and beds. They should be in all cars."—North Carolina traveling man.

"The one thing that most convinced me was my wife—she liked the color."—Maine accountant.

What Should Be Changed?

When asked to list the one thing that they wanted changed, the Hudson owners repeated their complaint about the steering wheel being too high. Second on the list is a desire to return to the step-down body design. Third is improved windshield wipers. These and others are described below in order of frequency of mention.

"Steering wheel is too high. I am very short and had to have it lowered."—Ohio housewife.

"I would like to go back to the old step-down design and roadability. A Hudson owner is fanatical about his car. There still is no car like the step-down design. The only good Hudson feature retained is the Six and this has been hurt with use of torque-tube drive and rigid engine mounting."—Colorado salesman.

Quotations about the windshield wipers have been given already.

"I can't see the transmission quadrant because of the large steering column. Have to lean far forward to see where to shift."—Pennsylvania clerk.

Other Best-Liked Features

Fourth on the list of best-liked features was the power and performance of the Hornet. This and other features are described in the following quotations (listed in order of frequency of mention):

"I like the fast pickup in city driving. I like its cruising speed on the highway at 80 miles per hour without forcing it."—Illinois steelworker.

"Has lots of snap when needed for passing."—Ohio salesman.

"The new V8 engine is smooth and powerful."—Oregon engineer.

Incidentally, the number of V8 owners in the survey was too small to provide us with an accurate sample. All percentages and comments apply only to six-cylinder Hudsons unless otherwise stated.

"I like the roominess. Wide seats, no crowding. Plenty of headroom, front and rear."—Illinois owner.

"Wide and roomy. Has lots of trunk space for the tools that I need for my work."—Illinois cement mason.

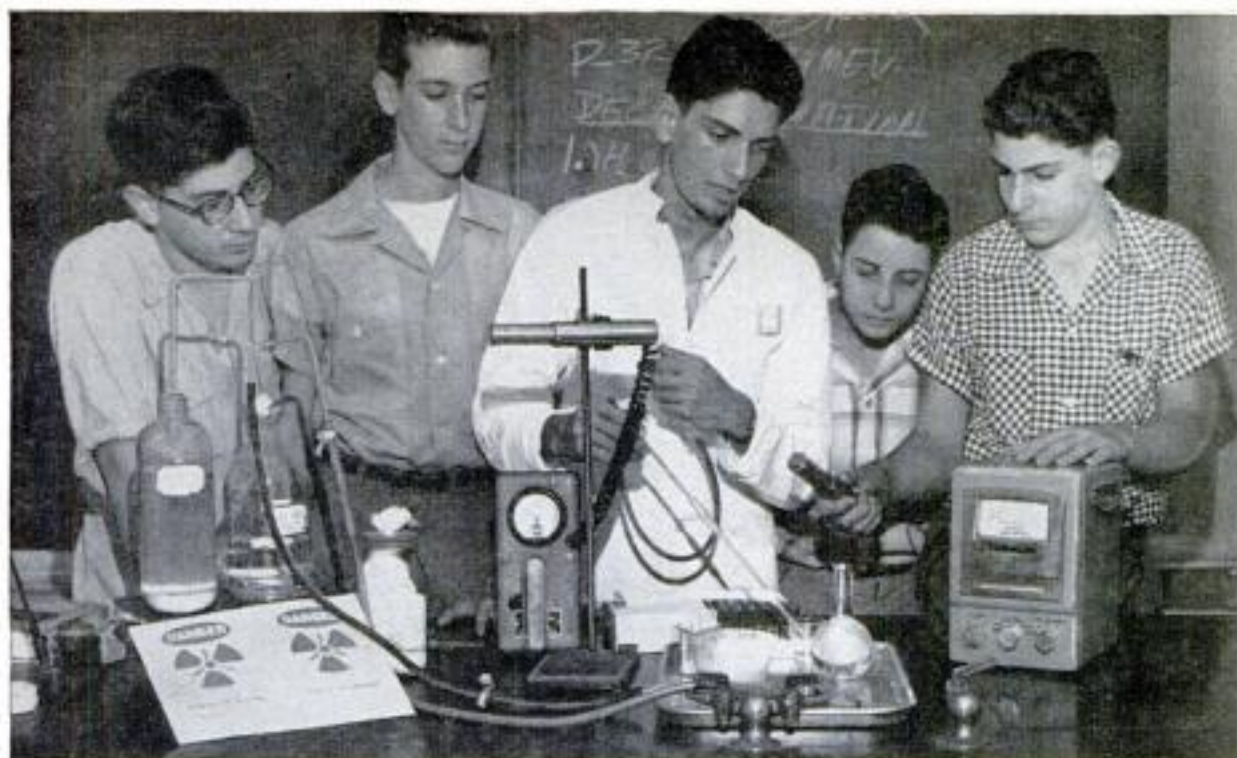
"I like the reclining seats and the radio with the twin speakers in dash."—Pennsylvania crane operator.

"We take a 5000-mile trip every year on vacation and use our car's reclining seats so we have no motel expenses."—Michigan salesman.

"It holds the road. I never have to worry and fight it when I speed."—Ohio waiter.

"I like the engine best. Have never had engine trouble with a Hudson."—Connecticut salesman.

(Continued to page 276)



Lab experiments aid classroom studies. Staff members of laboratory stay after school to work on projects

HIGH-SCHOOL ATOM LAB

ISOTOPES and gamma rays have lost their mystery for a group of Miami Beach, Fla., high-school students who operate their own atomic laboratory.

The junior scientists use radioactive materials obtained from Oak Ridge to supplement their studies of plant nutrition, photosynthesis, and zoology. Their lab, a 6 by 16-foot room adjoining a biology classroom at Miami Beach High School, contains instruments like an isotope rate meter and a survey meter donated or purchased at cut rates from equipment firms. In a nearby darkroom, the boys obtain X-ray pictures of plant and tissue sections containing radioactive tracer material.

Although the radioactive chemicals used by the group are not extremely dangerous, the boys take no chances. Remote-handling tools, brick shields and containers lined with concrete and lead are used for protection against gamma rays.

The lab was started in 1953 by student Charles Yulish, who by letters and visits persuaded the AEC and equipment firms to aid him in setting up a genuine radioisotope laboratory for educational use. Since then, the lab has received shipments of nine different kinds of radioisotopes.

Peter Roller, above right, checks radioactivity of chemicals with an isotope rate meter. Chuck Yulish, below, watches a mirror as he extracts radioactive Fe-59 from a beaker shielded behind bricks. Yulish, founder of the lab, was aided by his biology teacher





Expert uses quartz lamp to compare fluorescence of ink on a questionable stamp with ink on a genuine one. Stamp at top right was overprinted for airmail service. Below it is a fake. Note differences in type

Watch Out for the **STAMP FAKERS!**

By Ernest A. Kehr
Stamp News Editor,
New York Herald Tribune

SOME 20,000,000 men, women and children in America enthusiastically collect stamps. In fact, their enthusiasm frequently surpasses their technical knowledge. Obliging fakers have moved into this market, producing and selling imitation stamps as the real thing.

To combat this ever-increasing field of fakery, professional dealers, philatelic societies and individuals have had to establish laboratories for the scientific examination of postage stamps.

These laboratories have become necessary because none of our regular crime-investigation agencies is equipped to track down chicanery in this field. Governments protect themselves against the counterfeiting of stamps which are valid for postage, but they generally ignore stamps which have only a collector's value.

Knowing that their chances of being

caught are slim, and the chances of being prosecuted if they are identified even slimmer, the stamp fakers have enjoyed a heyday. They imitate hundreds of specimens for which philatelists pay fancy prices because the stamps are obsolete and scarce.

There are four general classes of philatelic fakes.

1. Imitation of an actual postage stamp.

Counterfeiters usually spurn this first class. Printing methods today are so advanced that successful imitation is all but impossible. Besides, the jeopardy of inviting the Secret Service and Postal Inspectors is too great. It is the only kind of counterfeiting which will bring swift, certain action by federal agents.

Fifty years ago, however, counterfeiters in Europe exploited this field for all it was worth. Their spurious products still may be found in grandfathers' collections. But



Top, triangular Latvian stamp was issued in 1920. Below it is a counterfeit produced five years later, with changes in aircraft and lettering. Top, right,

Mexico overprinted 300 stamps to honor Amelia Earhart. Faker printed imitation, below, which might have sold for up to \$250 if it had gone undetected

anyone with only a rudimentary knowledge of printing methods can spot these lithographed imitations of intaglio-printed originals at 20 yards. They don't fool anyone but the tyro so are the least dangerous of stampdom's fakes.

2. Imitated overprints and postal markings.

This second class really provides the philatelic sleuth with most of his headaches for it is one which fakers have most widely and profitably used to fleece the unsuspecting stamp collectors.

In many instances governments, unable to produce special stamps for special occasions, use existing stocks and hurriedly overprint them to fill some provisional postal need. In 1928, for instance, the purser of the SS *Ile de France* took a common 1½-franc stamp and had the ship's printer add a very simple "10 Fr." to prepay charges on ship-to-shore airmail. The basic

Sleuth compares enlarged photo of suspected stamp with similar enlargement of real thing, checking the minutest details





This fake fooled a New York dealer. Stamp was allegedly issued in Jaffa in 1872. Sleuth suspected a fraud because Arabic address made no sense. Right, real giveaway was watermarked paper, first used in 1886

stamp today still is worth about a dime while the genuine overprint sells for roughly \$300.

This is the natural setup for the faker. He buys supplies of the cheap basic stamp and with a basement printing press adds his own overprint.

"Port Fouad," applied to an Egyptian stamp of 1926, ups its philatelic worth from \$9 to about \$125. A rather crude "Aero Correo," put on a Honduran stamp worth 25 cents, changes its market value to \$5000.

There are literally hundreds of other examples that have lured the faker and mulcted the uninformed collector.

3. Faked "covers."

Making a faked "cover" is a faker's favorite field. A cover is an envelope or wrapper with all stamps and postal markings still affixed. A genuine postage stamp may be worth \$10, but if it is still affixed to the envelope on which it was used it may be worth as much as \$100. The faker will get a genuine stamp and a cheap contemporary envelope, put the two together and peddle the result as a real cover.

Not long ago, one of the fakers found a letter franked with a common United States three-cent stamp of 1857. This stamp was removed and a rare 90-cent stamp substituted. A little fancy brushwork and a forged postmark turned it into what appeared to be a rare philatelic gem.

Less than a decade ago, a British faker realized that collectors were paying fancy prices for envelopes franked with stamps issued for various colonies to commemorate the coronation of King George VI and Queen Elizabeth, although the unused

stamps of this series were rather common. He spent a few shillings for photoengravings of the genuine postmarks, pasted thousands of unused stamps on envelopes and added these imitation postmarks and made substantial profits before he was exposed.

4. Repairing damaged stamps.

Even the slightest defect will destroy the philatelic value of a postage stamp. A microscopic tear or a missing perforation tooth can drop the value as much as 90 percent. The stamp fakers take damaged copies of rare stamps and so expertly repair them that the average collector is fooled into believing he is being offered a perfect specimen. Some of these fakes, when examined by experts, have been found to consist of as many as four parts of different stamps cleverly laminated to form one "superb stamp."

An allied racket is the removal of postmarks, so that stamps may be offered as more valuable "unused" specimens. High-denomination British colonial stamps often are used for fiscal purposes. Because such stamps are philatelically taboo, the fakers get deeds, passports and other documents on which 10-shilling or £1 stamps had been used to pay revenue fees. With a bit of chemistry they eradicate the violet cancellation and add fake gum to the back of the stamp. Then they offer it as an unused stamp to some unsuspecting collector who thinks he is getting a bargain.

Most of the cleverest fakers never touch the great rarities. They confine their activities to doctoring material worth between \$5 and \$250. They know that they can dispose of 100 counterfeits at \$10 much

more readily than two at \$500 each.

In the first place the market for lower-priced stamps is much greater. In the second place their chances of detection are much smaller. The existing professional laboratories charge a minimum fee of \$5 to examine a questionable stamp. A collector will spend that much to be sure that a \$200 stamp is really genuine; he will not spend \$5 for a certificate of genuineness for a stamp which he bought for \$5 or \$10.

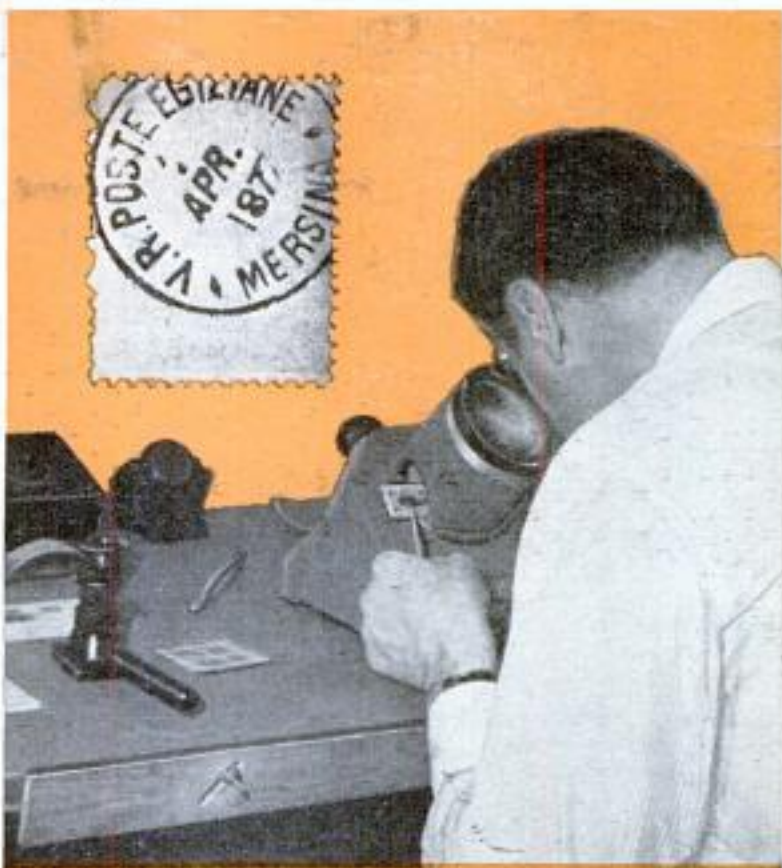
Since counterfeiting and fakery are so prevalent, and because officially established agencies are doing little to combat the evil, some dealers, societies and individuals maintain philatelic laboratories to do their own private sleuthing.

A philatelic lab is as full of scientific instruments as any research center. Their techniques, too, are modern. A stamp examined by qualified experts is subjected to so many tests that the philatelic sleuth usually will know more about the paper, inks and printing processes used for the stamp than the Postmaster General who originally authorized it.

Photographs of the questionable stamp are made and enlarged as much as 50 diameters, then compared with stamps known to be genuine. Under such examination, even the tiniest of differences in engraving, type shapes and sizes are betrayed or confirmed.

They are subjected to infrared and ultraviolet rays that reveal repairs not visible under ordinary magnification. Since faked ink invariably is different from that used on the original stamps, variations in fluorescence always show up in the laboratory. More recently, X-ray machines have been added to philatelic detection. Dr. Herbert Pollack of Chicago, and Dr. Harold S. Cheavin of London, both

(Continued to page 272)

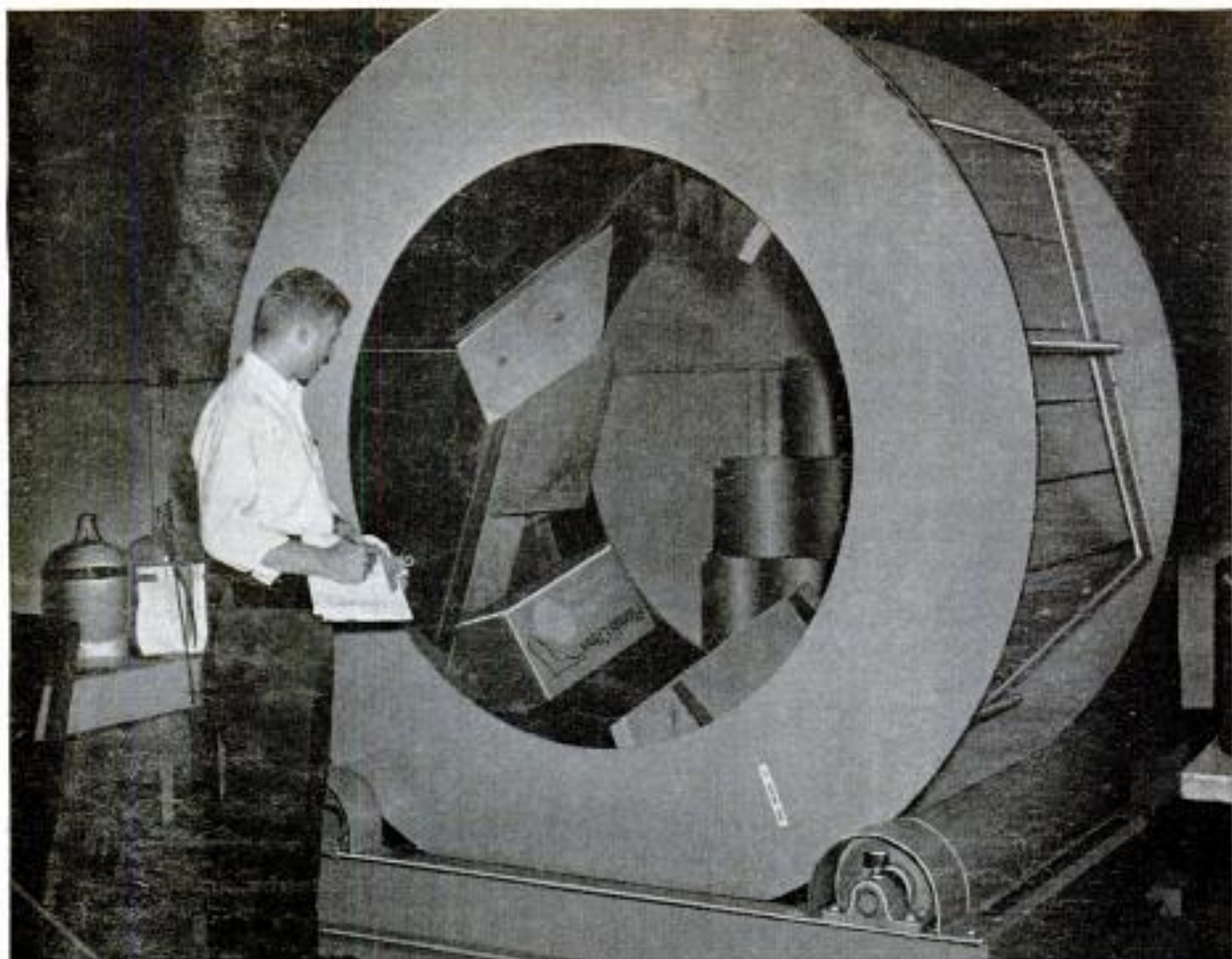


Electric viewer permits philatelic sleuth to check paper and printing. Top, filter brings out the postmark, eliminates all other details



At left is stamp partially obliterated by postmark. At right is same stamp as seen under X ray, showing all the details. Below, left, is a rare stamp offered as a "very fine, unused specimen." Ultraviolet light revealed that a postmark had been removed to boost value





In one rugged test at the institute, a seven-foot drum smashes paperboard cartons against baffle boards

Plotting a Future for Paper

EACH WEEK brings a good many strange requests to the Institute of Paper Chemistry at Appleton, Wis. One company wants help in developing wallpaper with a built-in insecticide to kill flies. Another wants advice on making a paper rug, a paper raincoat or a paper umbrella. Still another wants to work out an insect-resistant container, a wrapper that will impart a particular flavor to food, or a pop bottle with a built-in drinking straw.

Many of these requests are turned down as impracticable. But others, such as the fly-killing wallpaper, the latex-impregnated rug and the bug-baffling container have been successfully developed at the institute or with its help.

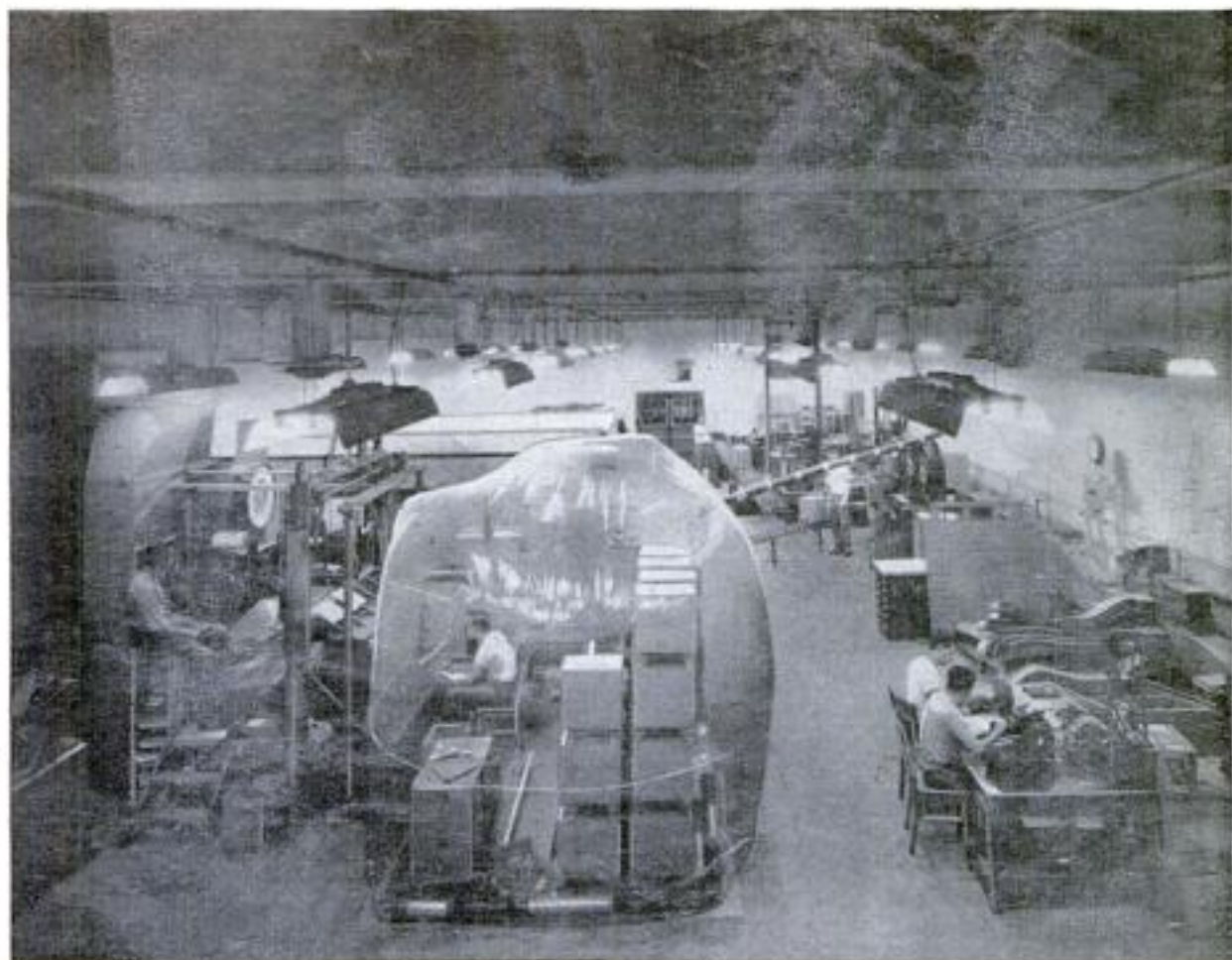
Less spectacular but more important are the institute's basic-research projects to produce better paper products.

On a gloomy day back in October 1929, a handful of men gathered at Appleton. History records that particular day as Black Friday—the day of the fateful stock-market crash—but to these men it was the founding day of a unique institution.

Later, three hopeful students showed up at the campus to become the institute's first students. They started their work under a staff of four men, with equipment valued at \$50. Today the institute has a staff of 235 and an annual operating budget of about \$1,500,000. In the years since that Black Friday in 1929, it has conferred doctor's degrees on 132 students, many of whom are executives in the paper industry today.

The institute was founded by the paper companies themselves in a unique experiment to fuse industry and education. It has a threefold purpose: To produce "scientific generalists"—men thoroughly trained in every phase of the industry, with vision and imagination to carry the industry into new fields in the future; to push forward the frontiers of knowledge through basic and applied research; and to maintain a central information depot for the industry.

Each year, members of the staff travel thousands of miles, searching out able college seniors for the coming year. In general, each of these young men must be in



Paper and cartons are tested under various humidities and temperatures in isolarium, an inflated plastic bag

the upper 10 percent of his graduating class, must have a degree in chemistry or chemical engineering and must meet strict personality requirements. From 15 to 24 men are selected, and each of them is awarded a scholarship of \$1500 a year. Of this fund, \$1000 is for his living expenses, so it is possible for the frugal student to obtain four years of postgraduate work without spending a penny. During the depression one outstanding student came, as he confessed later, "to get a meal ticket." Now he's vice-president of a company.

Since T'sai Lun invented paper about A.D. 100, papermaking has been more of an art than a science. There are about 3,870,000,000 papermaking fibers in a ton of pulp, but even the scientists at the institute admit there is much they don't know about these fibers. One goal of the institute is to train its graduates so well in basic science that in future years the industry will be operating on precise knowledge rather than rule-of-thumb experience.

The ratio of faculty members to students at the institute is 1 to 1.7. In his final year the student pitches into a research problem of his own. Meanwhile the 235 staff members are carrying on continual research.

Many of these projects delve into the

problem of utilizing waste products. Each year the paper mills of the United States and Canada must dispose of some 2,500,000 tons of lignin, up to 600,000 tons of fermentable sugars, 125,000 tons of acetic acid and 200,000 tons of lime. Of this waste material, lignin—the organic substance that, with cellulose, forms the major portion of wood—receives the greatest attention. Some institute scientists see the day when lignin may rival coal tar and petroleum as a source of synthetic chemicals. They are attacking lignin from every conceivable angle in an attempt to crack its secrets.

Already they have developed processes for deriving vanillin from lignin, and vanillin in turn has been transformed into a whole series of chemicals. In addition they have created mucilages, adhesives, plastics, tanning agents, soaps, fertilizers, highway treatments, fungicides and medicines from waste products. It's quite possible that the time may come when by-products of the industry are as valuable as the pulp itself.

Not long ago a pathologist at Vanderbilt University undertook a study of histoplasmosis, a relatively rare disease which was almost always fatal when fully developed.

(Continued to page 258)

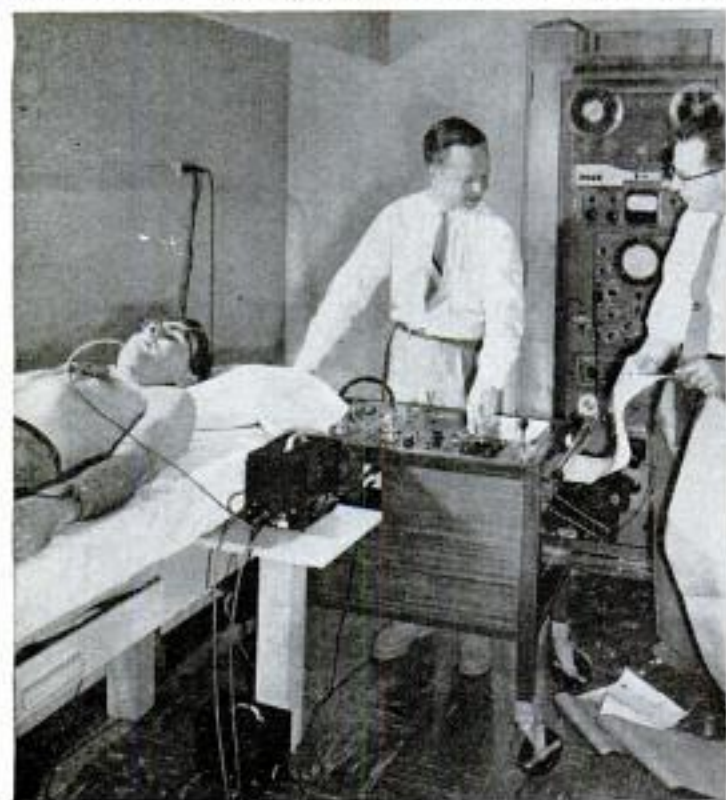


Fire-Escape Reel

Fire victims can lower themselves to the ground at the rate of six feet per second with a spring-wound "rescue reel." It consists of a 65-foot length of steel cable wound inside a metal ball that is hooked on the end of a rescue ladder. The victim straps on a safety belt hooked to the cable

and steps out the window. His weight causes the cable to pay out slowly in a safe descent. When he reaches the ground, the rescued person releases the safety belt and the cable winds up again. The device, operating somewhat like a window shade, was developed for use in West Berlin.

Electronic Stethoscope Picks Up Extremely Low Sounds



Heart sounds too low to be heard through a stethoscope register on a medical instrument developed by General Motors and the Medical College of South Carolina. A cross between a stethoscope and an industrial inspection tool, the Electro Stethograph picks up sounds as low as one cycle per second. Results are pictured on an oscilloscope or with a writing device that traces lines on graph paper. "Parent" of the instrument is the Surfagage, which has a tiny diamond stylus that is traced over highly machined automotive parts. Scratches cause vibrations that are detected by a sensitive pickup. The pickup is linked to a transducer that translates the vibrations into electrical signals. Attaching a stethoscope diaphragm to the pickup transformed the Surfagage into the Stethograph.

☐ Flameproof nylon net has been developed by a British company.



Take-Off Run of Turboprop Transport Is Nine Times Its Length

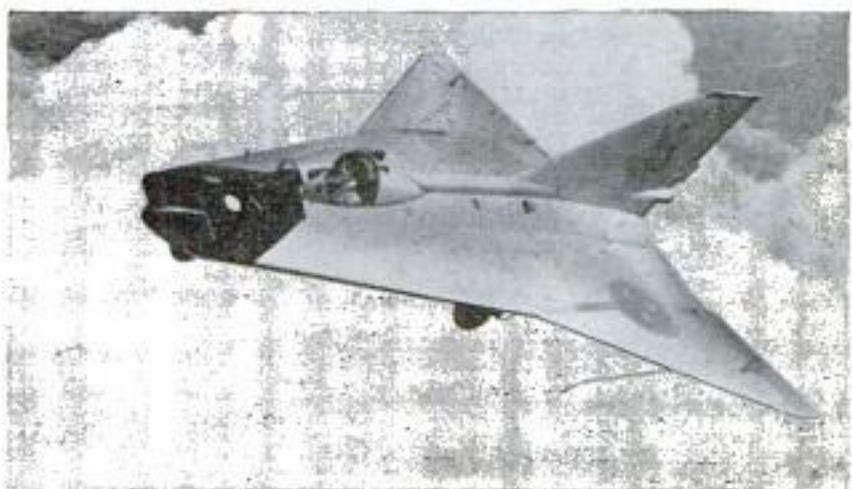
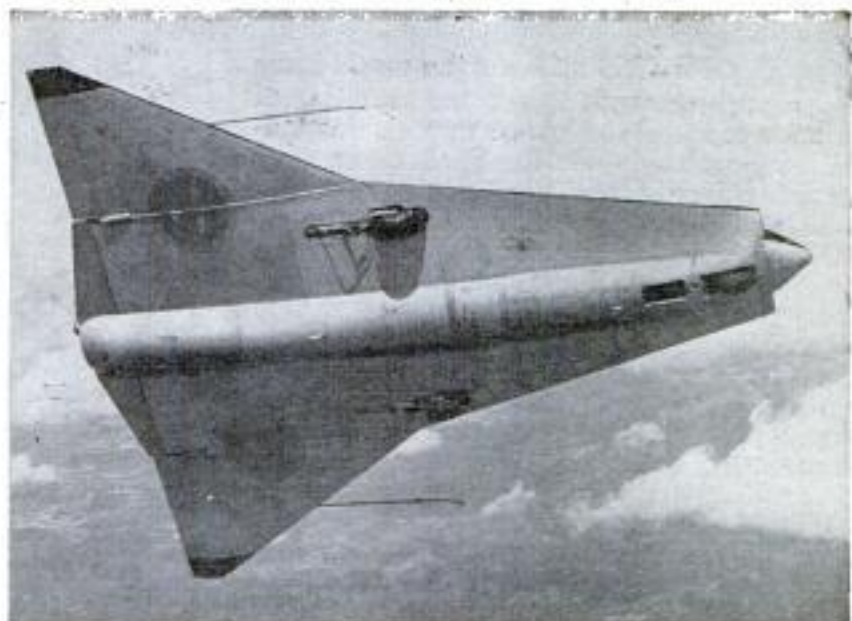
After an eight-second, 855-foot take-off run, the Lockheed C-130A Hercules recently took to the air for the first time. The take-off run was only nine times the length of the 54-ton air freighter, the Air Force's first production turboprop cargo transport. By the time it reached the end of the 10,000-

foot runway, the plane was 2500 feet aloft. According to Lockheed observers, it climbed off the field and gained altitude much faster than the jet chase planes that followed the flight. The plane returned to its Marietta, Ga., base an hour later, landing in an even shorter distance.

Double-Delta Wing On Swedish Jet

Representing a completely new principle in aircraft design, the SAAB-210 jet fighter is now being flight tested by the Swedish Air Force. The wing of this plane is of a double-delta design and differs from the average wing in that its length is much greater than its span. Another of the plane's unique features is the fact that the center of gravity can be moved by the pilot during flight. This is done by pumping liquid between trim tanks in the nose and tail.

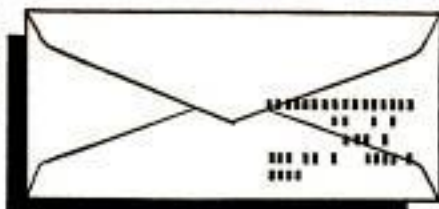
☐ Scheduled United States airlines—domestic, territorial and overseas—had their best safety record in 1954. Thirty-nine companies had no fatal accidents. Three domestic airline accidents cost the lives of 16 passengers and seven crew members, adding up to the lowest passenger-death rate in history—.09 deaths per 100 million passenger miles.



Inside the post office, one man stacks the incoming mail in the hoppers of coding machines



Machine feeds envelopes in front of operator. He presses keys which print addresses in code on backs of envelopes



Above is a typical coded letter. Below, transport belts stack envelopes from the coding units



ELECTRONS SORT *the* MAIL

POST OFFICES all over the world have always depended upon individual mail sorters to speed the letters to their destinations. Sorters break the mail down into zones. Other sorters take all the zone letters and sort them into subdivisions.

Canada now is installing a robot system to sort the mail. Eventually the Canadian Post Office hopes to have a fully electronic system.

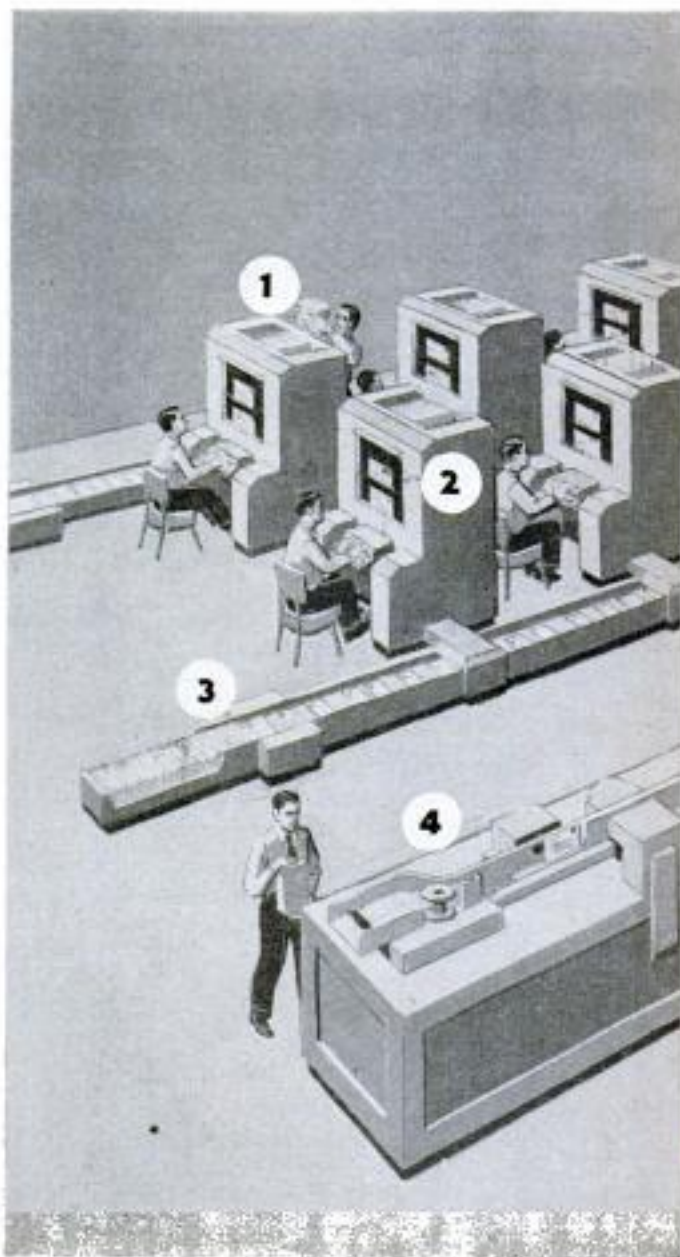
Here's the way the new system works:

A clerk deposits the incoming mail in the hopper of a coding machine. The envelopes are fed automatically to a window in front of an operator. The operator glances at the handwritten address and punches keys on the machine to print the address in code on the back of the envelope. The envelope then goes to a stacker.

An operator carries a bundle of coded envelopes to the distributor, which sends them one by one through an electronic reader. The reader, upon instructions from the electronic "brain," decides which of 16 stacks is the appropriate one for the letter.

Each of these 16 stacks then is run through another reader and sorted into 16 subdivisions. The result is 256 subdivisions of the mail.

The Canadian Post Office visualizes for the future an electronic robot that will be able to read typewritten and some handwritten addresses. Meanwhile it will be testing its new robot, which has a much greater memory capacity than most human sorters. ★ ★ ★





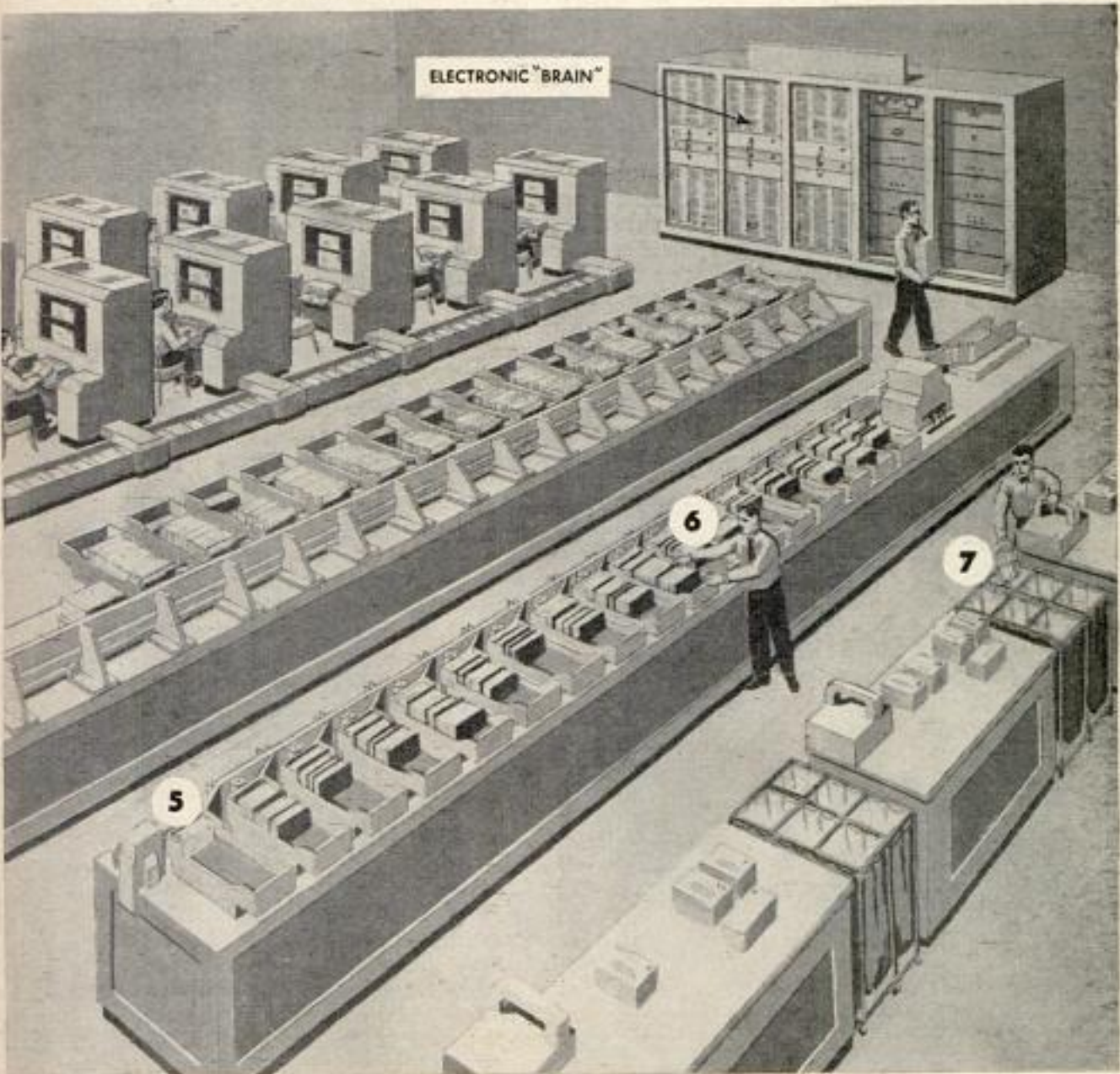
4 Envelopes are transferred to electronic reader which, upon instructions from electronic "brain," sorts coded mail into 16 stacks

5 Each stack goes into another reader for a further breakdown into 16 smaller groups

6 Each of resulting stacks is mail for one small area. These envelopes are bundled for delivery

Code-marked card goes on top of each bundle for identification when the bundle is dropped into distribution bag

Webster

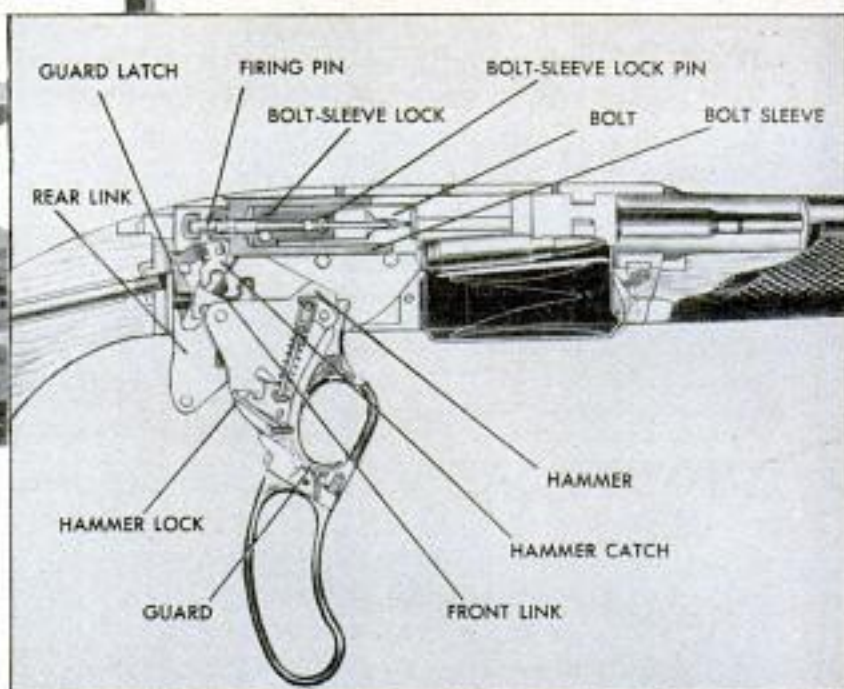


ELECTRONIC "BRAIN"

Lever Action on Rifle Has Built-in Trigger



Rifle, under test in bench-rest firing, has a trigger built into the lever. In operating the lever, the rifleman keeps his finger within the trigger guard. Parts of the lever action and receiver mechanism are shown at right



Called the Model 88, a new Winchester lever-action rifle has a trigger mechanism built into the lever. This makes it possible to combine the rapid fire of a lever action with the accuracy of a bolt action. The rifle has a rotating front-locking bolt which permits the use of high-velocity, high-powered cartridges. When the rifleman operates the lever, he keeps his finger within the trigger guard. As soon as the lever moves, the trig-

ger action is interrupted. If the trigger is squeezed through the entire stroke of the lever, it must be released again after the rifle is cocked in order to fire. The rifle's magazine has a capacity of five rounds if it is inserted with the action open. Shells are ejected at a 45-degree angle which permits low mounting of a scope on the center of the receiver. This is said to be the first lever-action rifle with a one-piece stock.

Fans at Race Track View Finish on Television Screen



Racing fans at Roosevelt Raceway, Westbury, N. Y., can see the finish of a horse race, no matter where they are seated, by watching a big television screen. The track is equipped with a closed-circuit television system with big-screen projection. The system permits patrons far from the finish line or those sitting at odd angles to see a close-up of the finish on the 20 by 20-foot screen.

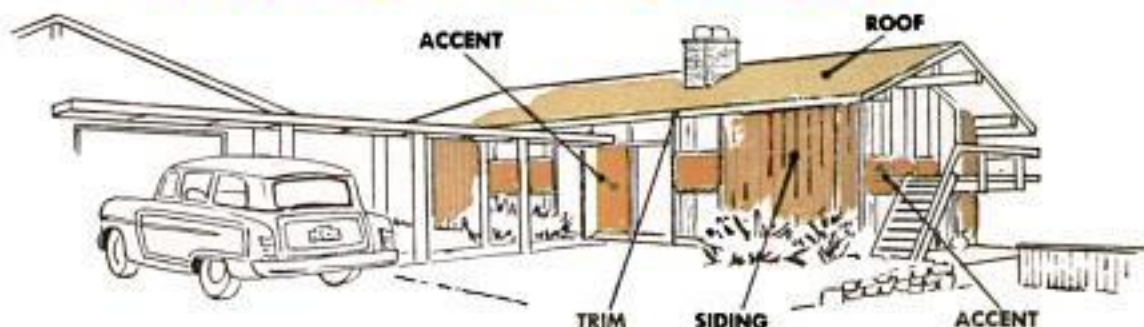
Color-Television Network Now Reaches 46 States

Color TV can be received in every state of the Union except Idaho and Montana. The Bell television network totals over 69,000 miles, with 47,000 channel miles equipped for color television. Color-TV facilities are installed in 247 stations in 138 cities. Also in the network are 48,000 channel miles of radio relay facilities and 21,000 channel miles of cable facilities. In 1948, this network totaled only 900 channel miles.



Courtesy of Carl Koch, Techbuilt, Inc.
 Proper use of color lends distinction to this modern home; sketch below shows the important color areas

COLOR TIPS for YOUR HOUSE



MOST OF THE EXPERTS — building contractors, real-estate salesmen, and a whole new profession known as color stylists—agree that use of the right colors will add \$1000 or more to the value of your house whether it be new or old.

With this thought in mind, *Popular Mechanics* has asked some of the nation's leading authorities on color and architecture to pass along their best tips to our readers. These include Beatrice West, associate of the New York Chapter, the American Institute of Architects, whose color schemes have helped sell more than 100,000 houses in 36 states; members of the distinguished TAC (The Architects Collaborative) of Cambridge, Mass.; Carl Koch, famed originator of the Techbuilt house, and W. Lockwood Martling, Jr., the Chicago architect

who has wrought miracles with color in remodeling "old clunkers."

"Just a few years ago, John Q. Public lived in a white house, wore a blue suit with a white shirt and drove a black car," says Beatrice West. "Today his house may rival the rainbow in beautiful colors, his shirt may be pink and his car a fire-engine red or yellow. He prefers color movies and looks forward to owning a color-TV set."

With all this color splashing over the landscape, there has developed a crying need for information on how to achieve harmonious color effects. Should that door be painted red or green or peacock? And what about the gable? The roof? The trim?

"You can work wonders with color tones," says Miss West, "whether you are building a new house or remodeling an old



Here are some approved



ROOF



WHITE

SIDING



CHARCOAL

TRIM



PEARL GRAY

ACCENT *



CARNATION RED

color schemes for your home



WHITE-MARBLE CHIPS



REDWOOD



LIGHT SPRUCE



PEACOCK



GRAY GREEN



GRAY GREEN



WHITE



NASTURTIUM



FROST BLEND



SPRUCE



LIGHT SPRUCE



CANARY



PASTEL RED



FRESCO RED



OYSTER WHITE



DRESDEN

WHITE-ROCK CHIPS



SAGE



WHITE



LIME



* Color schemes by Beatrice West applied to PM ranch house



Courtesy of W. Lockwood Martling, Jr.
Once a drab old-timer (above at right) this remodeled house is now gayest in the block; terra-cotta color lowers house
Hedrick-Blessing photo, courtesy W. S. Dippoun Co.
This house of soft greens and white illustrates the proper use of the contrasting red accent color on large front door



one. Color is design. It is also a means of expressing individuality. Never underestimate the power of color—for better or worse. That's why it should be handled with care. The right colors can make a small house look big or a big house look just right. And just as easily the wrong colors can make a small house appear smaller and a tall ungainly house taller. Color can turn a spotlight on architectural detail or hide it—whatever you desire. One nice thing about color is that it costs no more to put on the right one than it does the wrong."

An incident that happened in Dallas early in Miss West's career best illustrates the power of color. It was right after World War II and despite the housing shortage a development of prefabricated houses did not sell. Miss West, who was then working as an architect in her native Texas, was asked by the prefab manufacturer to visit the project and tell him what was wrong. There she found row after row of white houses with blue shutters and mottled roofs of red, blue and green. She worked out a color plan for the entire project of 300 houses and fixed up a model for demonstration purposes. All the houses were sold in a single week end and Beatrice West had found herself a new career. Soon she was planning the color for Levitt projects and National Homes.

"I am glad that the public has awakened to the glory of color on homes," she says, "but it's obvious that too many have plunged into the use of color without knowing



any of the rules. This produces what has been called the 'banana split' house complete with cherry on top. A lot of people let their tastes run wild with too many materials and clashing colors. I recall one house with a gray roof, a combination of green shingles and lime-colored siding, some stone on one side and brick on the other. The trim was painted shocking pink and a chartreuse awning finished it off—and I mean finished."

Carl Koch agrees on the dangers of using too much color in the wrong places. However, he feels that the experts should not squelch any person's desire for self-expression in the color of his home.

"With the Techbuilt house we try to provide as much opportunity for individual expression as possible," he says. "On the other hand, houses in a group should relate to each other, and color is an important way to do this."

Koch feels that houses of reasonable size should be subdued in over-all tones with the bright color accents confined to small areas such as doors and window panels.

Traffic stoppers like the banana-split house are something all homeowners are urged to avoid. But how does one obtain pleasing color effects with a professional touch? Are there any rules to keep from



Beatrice West, color expert, consults with builder on a color scheme. "Start with the roof," she says

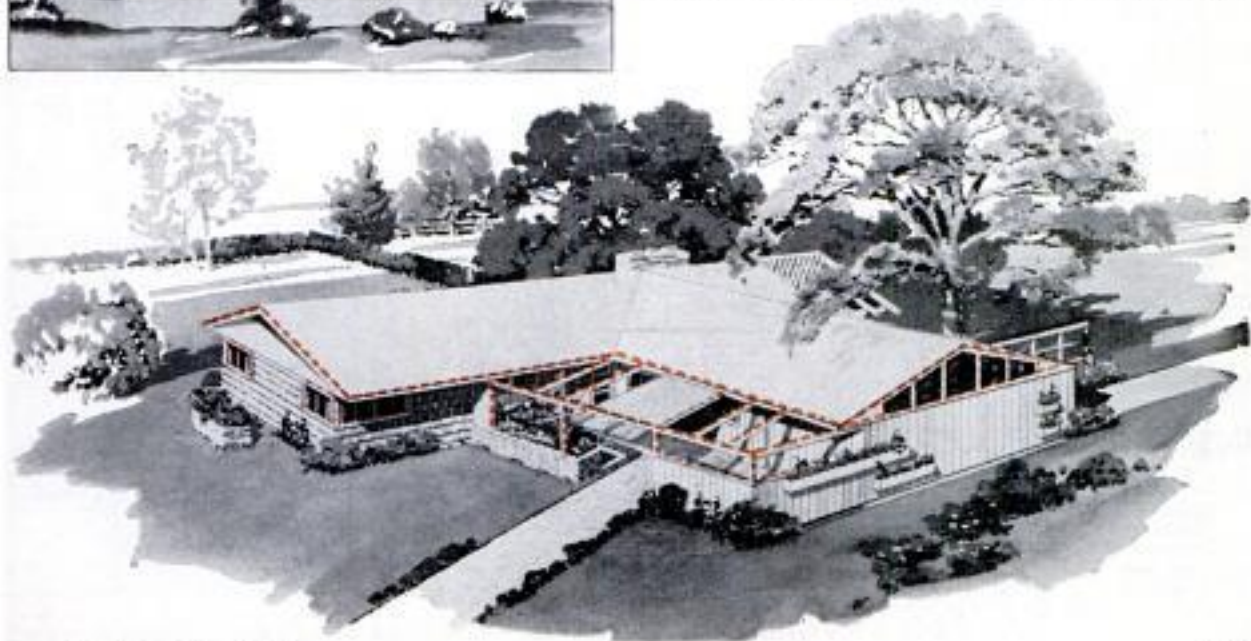
going overboard? The answers to both questions can be found in these 10 simple rules:

1. *Know the color areas of your house.* Generally, there are four distinct color areas: roof, siding, trim and accent. The positions of the first three are obvious. The accent area is usually small, such as a door or shutters, and is painted in contrast to the general tone of the house. The split-level house sometimes introduces a fifth color area when asbestos, plywood or some other material is used for part of the siding.

2. *Roof.* You start here. Remember the roof color is the key to the color scheme of any house. If you are building a new home,

(Continued to page 260)

Trim areas of houses (dotted red lines) reveal the architectural lines of a house—good or bad. Good lines of Rudolph Matern house at bottom were painted a contrasting color to point up attractive design





Check List

FOR RATING YOUR HOME ---OR BUYING A NEW ONE

[Score 10 for perfect (unqualified "yes"), 8 for good, 5 for fair, 0 for bad.
Superior rating, 450 to 500; good, 350 to 450; fair, 250 to 350; poor, 150 to 250.]

THE NEIGHBORHOOD

1. Is the neighborhood attractive?.....
(Big trees, well-kept homes, near park or pond)
2. Do you like the kind of people who live in the neighborhood?.....
3. Are streets curved or arranged to discourage through traffic?.....
4. Are the houses uncrowded?.....
5. Do houses offer pleasing variety of design?.....
6. Do homes have fair range of size and price?.....
(Desirable for normal community)
7. Do houses have varied window arrangement on front?.....
(All should not have picture windows)
8. Are some houses set farther back than others?.....
(Desirable)
9. Is public transportation convenient?.....
10. Are churches, schools, hospital, library, stores within reasonable distance?.....
11. Is house far enough away from any annoying railroad, airport, major highway, factory, dump or swamp?.....

THE OUTSIDE OF THE HOUSE

12. Is the house attractive?.....
(Simple in design with few materials, projections or "cute" decorations)
13. Is rear appearance pleasing?.....
14. Is the house easy to maintain?.....
(Such as painting)
15. Are large glass areas protected by roof overhang?.....
(They should be)
16. Is living-room floor proper distance above ground?.....
(Less than 12 inches good, over 18 inches poor. Does not apply to sloping lot.)
17. Is there provision for outdoor living?.....
(Porch, terrace, patio)
18. Is house reasonably private from street and neighbors?.....
(Fences, trellises, hedges, etc.)
19. Is there a turnaround so you don't have to back into street?.....
20. Is the lot big enough?.....
(Frontage of 75 feet or more good, less than 60 feet poor; or 7500 square feet good, under 6000 poor.)
21. Are there gutters on roof?.....
22. Is attic well ventilated?.....
(Louvers on gables, slots under eaves)
23. Is lot suitable for family needs?.....
(Games, gardening, etc.)
24. Is service entrance inconspicuous?.....

INSIDE THE HOUSE

25. Is living room arranged to avoid front-door traffic?.....
(Score zero if main entrance opens into living room)
26. Can you reach bedrooms without going through living room?.....
(If you can, score 10)

27. Is living room attractive?.....
(Windows on at least two sides, pleasant view, large enough for entertaining, door to porch or terrace, privacy from street or neighbors, fireplace, adequate storage)
28. Is dining room or area convenient to kitchen?.....
29. If kitchen opens into dining area, can it be closed off if need be?.....
(Desirable)
30. Is cabinet and work space adequate in kitchen?.....
(Including cabinets with sink or range, over 11 feet frontage good, under 8½ feet poor; should have 1½-foot counter on each side of sink, on at least one side of range and opening side of refrigerator.)
31. Is total length of "work triangle" between sink, range and refrigerator between 12 feet and 20 feet?.....
(Under 12 feet or over 20 feet poor. Traffic should not cross triangle.)
32. Are laundry facilities adequate?.....
33. Is service entrance handy to kitchen, laundry, garage?.....
34. Is bathroom well designed?.....
(Score 0 if tub is under window)
35. Are walls around tub and shower of tile?
36. Are there shutoff valves at each fixture in bathroom?.....
37. Is the number of bedrooms adequate and are they large enough?.....
38. Do all bedrooms have cross-ventilation?
39. Are closets big enough?.....
(Minimum 36 inches per person and 22 to 24 inches deep)
40. Is total floor area of all closets adequate?.....
(Over 60 square feet is good, under 40 poor)
41. Is there adequate storage space for trunks, boxes, sleds, screens, lawn mower and garden tools, summer furniture, bicycles, etc.?.....
(Over 50 square feet for general storage is good, under 30 square feet poor)
42. Is garage or carport big enough?.....
(Minimum 10 feet by 20 feet for one car)
43. Is water heater of proper size?.....
(Minimum 30 gal.; 3-bedroom house with 1½ baths, 40 gal.; 2 baths, 50 gal.)
44. Is there a light switch at entrance to every room?.....
45. Are electric circuits sufficient in number?.....
(Count fuse plugs or toggle switches in box—6 or more good, 4 or less poor)
46. Are there enough light receptacles on walls?.....
(Minimum, one double receptacle on each wall 3 feet long or more; two on each wall 15 feet long or more)
47. If there is a basement, is it dry?.....
(The neighbors will know)
48. Are the heating and cooling systems adequate in size and efficient in performance?.....
(If you are not an expert, get one.)
49. Is the sewer or septic tank satisfactory?.....
(Check with health department.)
50. Was the house designed by a good architect and constructed by a reputable builder?.....

TOTAL

(Adapted from material supplied by Southwest Research Institute, San Antonio, Tex., and Small Homes Council, University of Illinois)

NEW CEILINGS FROM OLD WITH

**PRE-PASTED
PLASTIC
TILE**

HOME SECTION

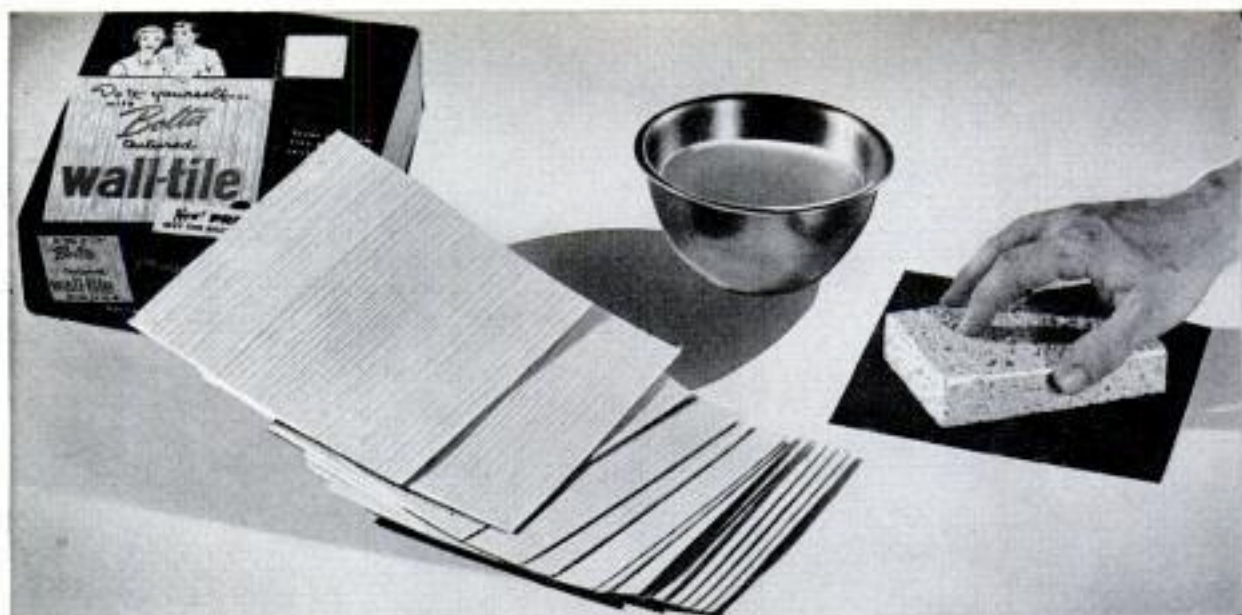
Wet the back, press in place and the cracked-ceiling problem is taken care of for good. New bamboo-texture tile conceals cracks, requires no special tools, adds smart modern look

Alternating direction of tile texture produces smart-looking basket-weave pattern when tiling is completed

MOST EVERY HOME has cracked plastered ceilings, whether minor or otherwise. Filling and repainting last but a few months, then the cracks reappear. Homeowners who have been faced with this periodic job will be interested in a flexible plastic tile that makes quick work of adding a new face to a bad-looking ceiling.

The tile are applied like floor tile but come with the backs already coated with adhesive which is activated simply by wetting with water. Available in nine different colors, the tile have a deep-textured appearance of bamboo wood and when laid at right angles to each other, they form an attractive basket-weave pattern. Each tile measures 8 x 8 in., is approximately $\frac{1}{16}$ in. thick and cuts like cardboard with either ordinary scissors or a photo trimmer. Being





Adhesive on back of tile is activated with water. A few strokes with wet sponge make adhesive sticky

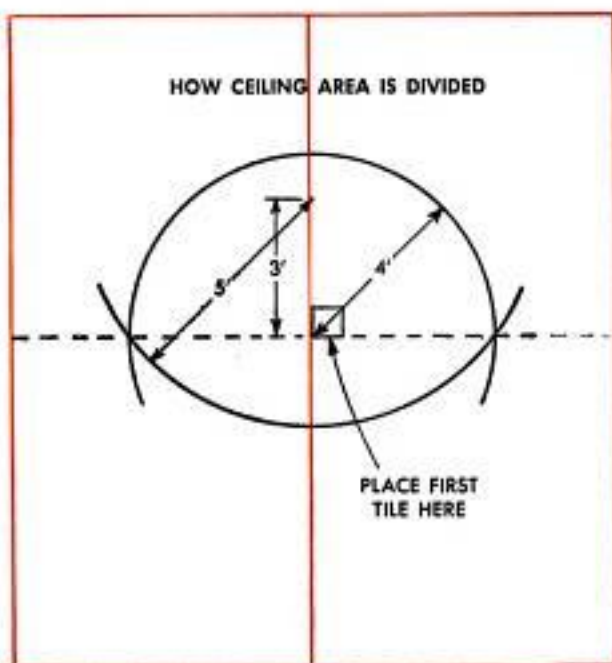


Above, cardboardlike tile is easily cut with regular scissors, cutting through from rear side. Below, paste filler, same color as tile, is used to fill any tile joints that might not be tight-fitting



of plastic, the tile is readily cleaned with soap and water, saving decorating costs.

Your first step is to divide the ceiling into four equal parts as shown below. Wetting the tile is done best with a sponge; it doesn't take much water to make the tile sticky. In applying the starting tile make sure it is placed squarely with the center lines and in contact with the surface at all points. Watch to see that each succeeding tile is placed at right angles to the adjacent one and tight against it. A wallpaper seam roller is ideal for rolling down the joints. A special matching paste filler is furnished for filling any open joints. This is pressed in with the finger and the excess rubbed off with a cloth. Adhesive smudges on the tile surface can be easily wiped off with a damp cloth as you go along. Tile also may be applied to cracked walls. ★ ★ ★





This attractive home was designed especially for *PM* families by Rudard A. Jones, A.I.A., Small Homes Council, University of Illinois. He has won national acclaim for space studies on houses

Introducing The *PM* Young-Family House

By Wayne Whittaker

THERE'S A LOT OF EXCITEMENT and originality in this new split-level home designed for *PM* readers with a young family. Interesting features include a lower-level playroom within sight of a ground-level kitchen, an outdoor living area with fireplace and terrace, a private-entrance courtyard and—of course—a cheery workshop for the male members of the family.

The ideal way to design a home for any family is to make a careful study of the family's way of life. This results in a custom-built house tailored to needs and

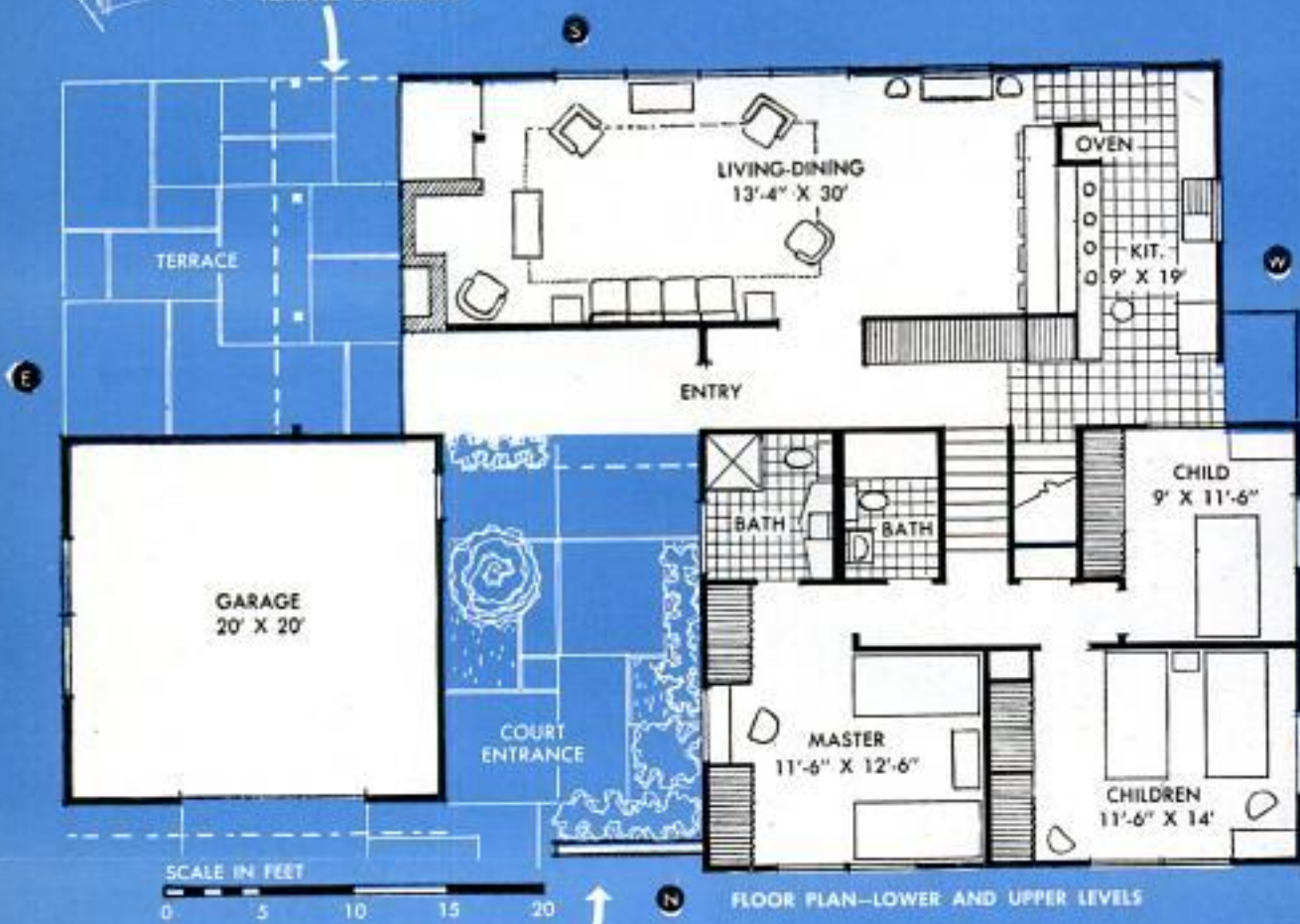
pocketbooks, usually a compromise between dreams and cash on hand.

One thought, however, is uppermost in the minds of the young father or mother planning a house. Whom is the house for? The answer is almost universal:

"The children!"

The Small Homes Council at the University of Illinois has made space studies for a number of years with real families living in "laboratory" homes. So the Editorial Staff of *Popular Mechanics* asked Rudard A. Jones, assistant director of the council,

Blueprints for this house are available for \$12.50. Write: Plans Dept., *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11



to design a home for the typical young PM family. This family consists of a father and mother in their early thirties, a daughter of nine and sons of six and two.

Introducing our readers to the family for whom this home was designed will be, in thousands of cases, like saying, "I want you to meet yourself." The family's life is centered in and around the home. They own a car, a dog and a TV set. They have no servants and they are proud of the fact that their house was designed for easy maintenance. Almost all of their entertaining, both for adults and children, is done in the home. Except for the children's school, the coming and going is 99 percent by the family car. Most of their meals are eaten in the kitchen area, but they don't like to feed their friends there. When the weather permits they prefer to live out-of-doors as much as possible. They consider three bedrooms and two bathrooms a necessity in their home.

The outside of the house presents an interesting silhouette of part flat and part gable roof. Exterior materials of horizon-

tal wood siding, panels of asbestos board and concrete block create a harmonious effect. The home has an intriguing entrance through a court partly shielded from the street by a wing wall that extends across the front of the house. This house lends itself to a variety of color treatments. The one selected by the architect consists of a white roof, charcoal siding, pearl gray on the trim and concrete block across the front, and a wall of deep red behind the entrance courtyard.

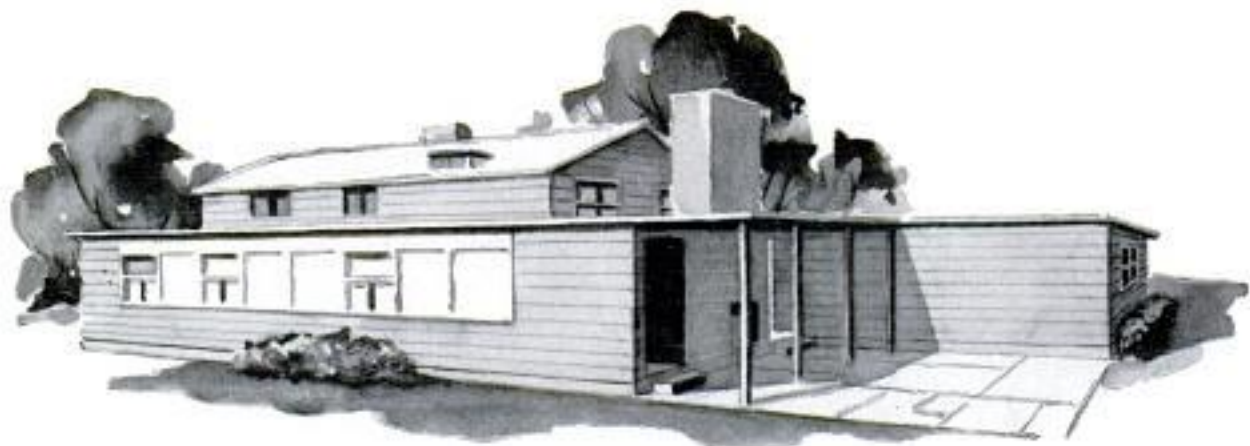
The house provides 1364 square feet of living area and has a living-dining space 30 feet long and 13 feet 4 inches wide.

To keep everybody in the family happy, Jones chose the split-level type of home.

"We settled on the split-level because this house makes it possible to take the greatest advantage of all available space," he explains. "In the conventional house, much of the basement area is wasted as far as living space is concerned. This area in our split-level house is only two feet below grade. It is light, cheerful and well ventilated—a perfect place for workshop,

Lower-level playroom is visible from kitchen through baluster-type open space on one side of hallway





Rear view shows outdoor living area with fireplace, also flat-roofed kitchen, dining and living-room area

playroom and the laundry. I consider the placement of the playroom in relation to the kitchen one of the outstanding features."

From her work area in the kitchen, the mother can look directly across the hall space and through an open-banister effect right down into the playroom. Thus, she can keep an eye on the children while at work and they can see her. This eliminates one of the greatest banes of the young mother — keeping the children out from underfoot and providing them a cheerful place for play activity without messing up the living room or dining area. If the family feels a need to hide the playroom from the eyes of visitors, an attractive bamboo curtain or screen can be closed in front of the opening.

The playroom is handy to a service entrance and no small muddy shoes have to track through any room of the house to reach it. Adjoining the playroom are dad's workshop, the laundry and space for a

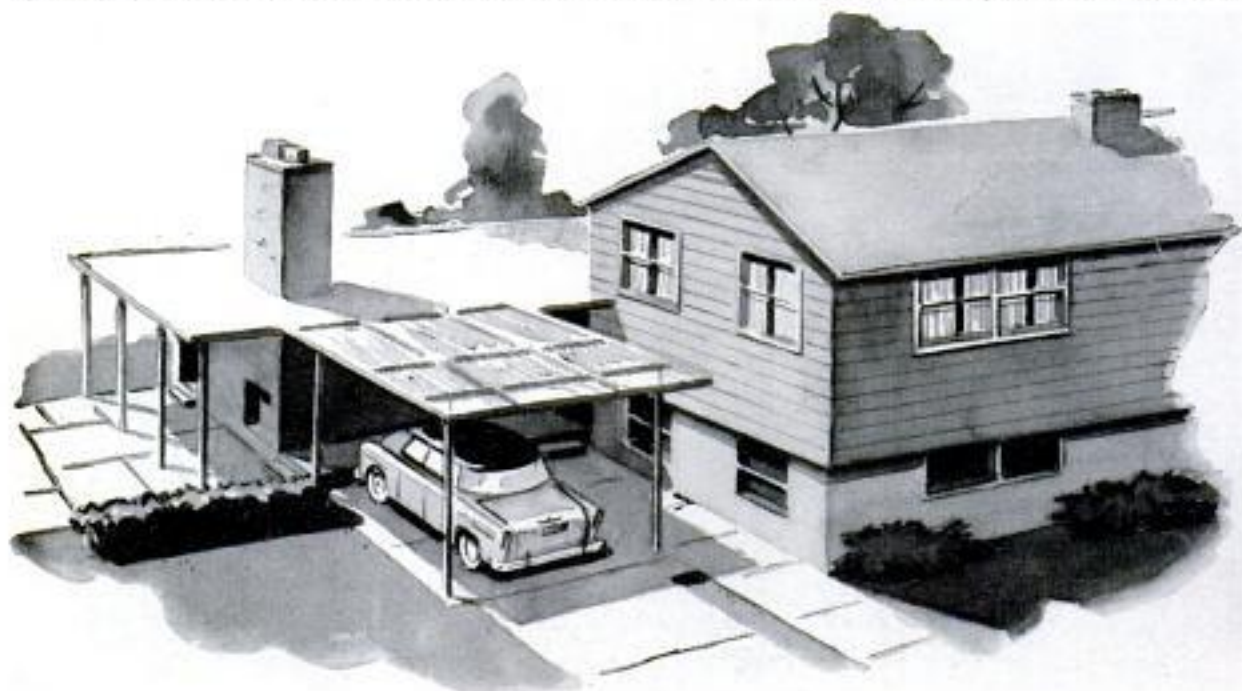
small lavatory which may be added later.

Location of the sleeping rooms on the upper level gives a nice feeling of security. Features of this area include a bathroom especially for the children and a private bathroom for the parents opening from the master bedroom. All sleeping rooms have good cross-ventilation, adequate closet space and asphalt-tile floors for easy maintenance. The bedrooms are far removed from the living-dining-entertainment area.

The kitchen and dining area were designed with step-saving in mind. A bar for daily informal eating is located with a pass-through to the cooking range and food-preparation counter. Food can be served directly from range to plates. The pass-through is also handy when the dining-room table is pulled out and the family dines formally. Although not shown in the plans, a folding screen may be placed between the dining area and the living room

(Continued to page 296)

By substituting carport for garage, house can be built for considerably less money and on a smaller lot





BEFORE

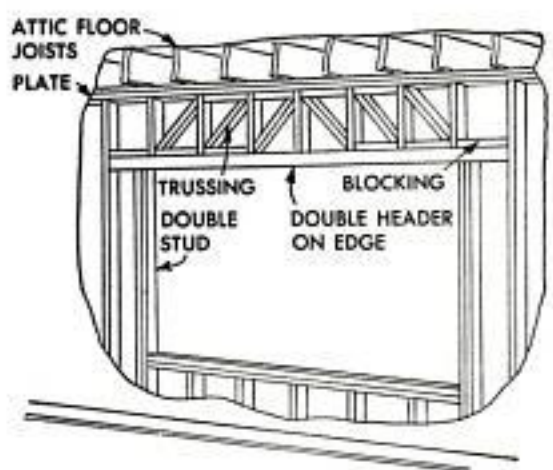


AFTER

ONE-MAN REMODELING JOBS

By W. Clyde Lamme

OFTEN IT TAKES only a simple change in architectural detail to bring a dated house right up to the day before tomorrow in appearance and livability inside and out. In some older structures you may wish to retain certain desirable characteristics of the old and add only a touch of new. Many older homes, especially those built within the last 50 years or so, are either square with a hip roof, or some variation of the common L-shape with gables and valleys in the roof design. Usually they are built full two-story with an attic and a dormer, or dormers, of unattractive detail and



BEFORE



AFTER

doubtful utility. Some old homes — often more than a half century old—have very attractive boxed and molded cornices and front-corner trim of a distinctive design.

Typical examples of these types are shown in the upper and lower views on the preceding page. The home in the lower before-and-after views was "up dated" to the owner's satisfaction by painting the exterior in an attractive color combination and adding a room-width window to make the interior more livable and the exterior more attractive. The old square home in the before-and-after views at the top of the preceding page was face-lifted by removing the ponderous porch and adding three multipaned windows and a door framed in reeded columns and a broken pediment. No other part of the structure was altered, either inside or out. The change in appearance not only adds inestimably to the value of the property, but also lends something to pride of ownership as well.

These two are typical one-man remodeling jobs, that is, they can be handled by the owner himself, even when he has only a limited amount of spare time for the work. The nature of the procedure on either job is such that the entire project need not be completed in a day or a week. It can be worked out a window or a door at a time. When working alone on such projects as installing windows and doors, keep a waterproof tarpaulin handy so that you can cover the opening quickly should a sudden shower catch you with the job unfinished. The same precaution is carried out when it is necessary to remove or alter a dormer and reroof the opening.

Before you cut large openings in walls, especially in full two-story structures, it is necessary to plan the installation of a suitable header to support the weight above the opening. Framing in a large window is an example and the detail on the preceding page shows one recommended method. It is used when framing in a large sash in either a one-story or two-story structure, unless the building is balloon-framed, as were many of the older two-story homes. In this type of framing the studs extend from the sill, or sole, as the case may be, to the rafter plate at the second story. Then it's the usual practice to cut the studs over the opening and support the ends on a header built up by spiking two 2 x 10s together and then placing edgewise. The ends of the header are carried across to full-length studs beyond the limits of the rough opening. Truss bracing like that detailed is not ordinarily installed.

Small one-story homes generally lend themselves to modernizing by simple exterior changes. The one pictured before and after at the top of this and the opposite



BEFORE

This home is typical of many built 50 or more years ago. Enclosed porch is probably a later addition



BEFORE

It would be hard to judge the age of this house, but it has been around a long time. Below, this small home of later type lends itself to simple remodeling



BEFORE



AFTER

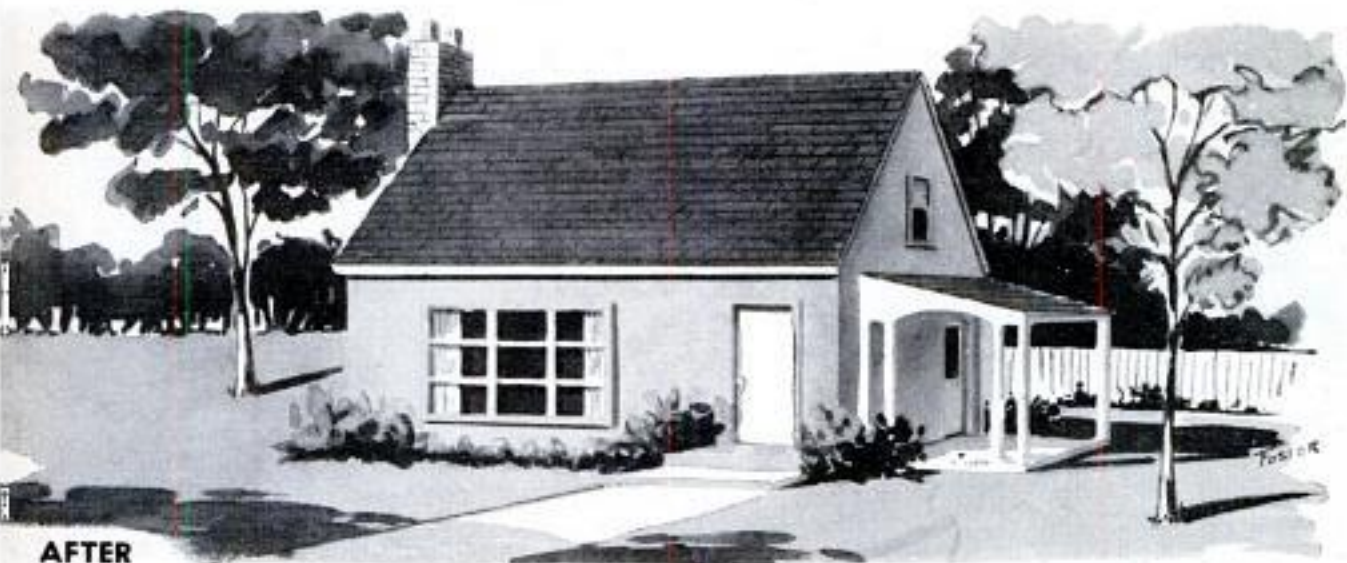
A new enclosed porch of modern design, new wide siding, attic louvers, a flower box and new plantings got this result — put the original structure in a new age group in value, appearance and in livability



AFTER

Above, note the before at the left and the after above. It's the same house, an outstanding example of what can be done with an old structure in good condition.

Below, the "picture window" replacement not only "upgrades" the exterior appearance of a small house, it also gives a feeling of greater space in the interior



AFTER



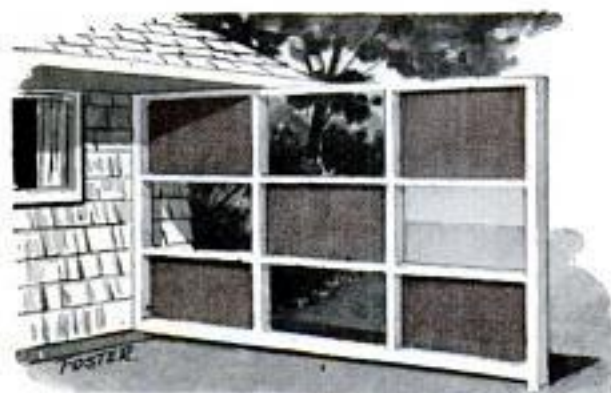
Sometimes a window is unattractive because of its proportions or location. Here's an example of what novel ornamental shutters will do for such a defect



When nothing else seems suitable, a stone planter usually will do the trick. It's easy to build and even when there's nothing growing in it, it's still attractive



Above, a fence is hardly a remodeling job in itself, but it may supplement the work nicely. Below, same thing is true of yard divider. It has a number of practical uses, depending on location and purpose



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page is a good example of what can be done. Note especially the change in appearance alone made by wide siding and the rebuilding of the existing porch. In this case it was found advisable to remove the imitation brick exterior, make a few minor repairs and add attic louvers before rebuilding the enclosed porch and finishing the job with wide siding. The only major structural change in this job is the porch, which was rebuilt completely in order to achieve the desired harmony of line and exterior detail.

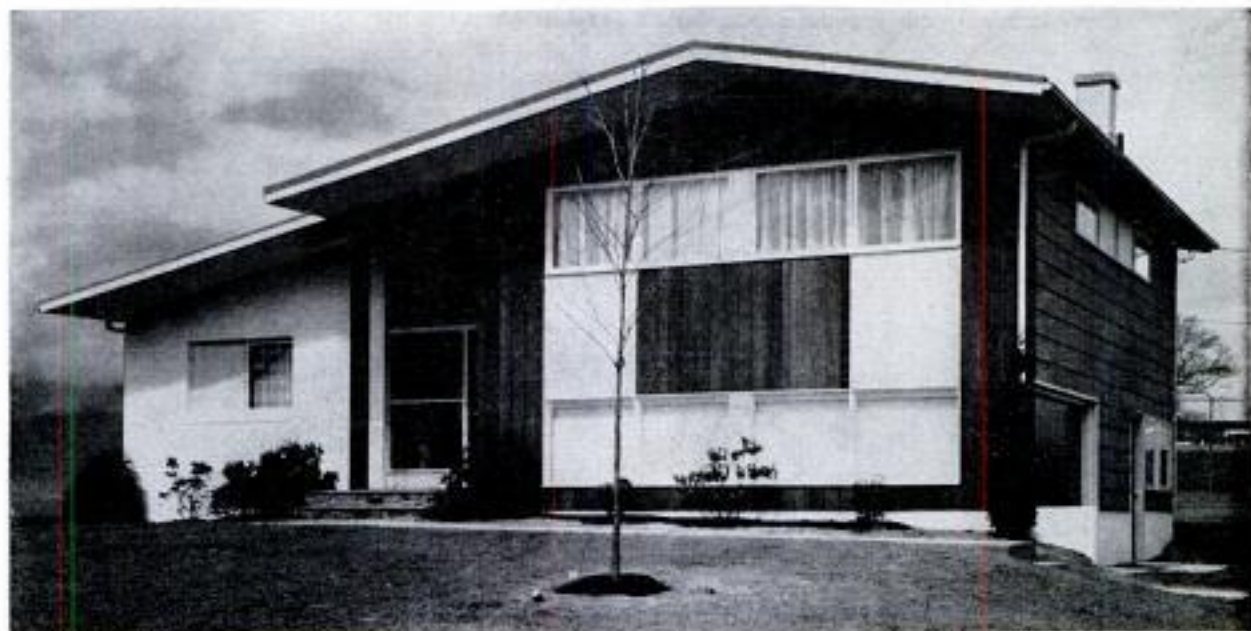
The larger home pictured in before-and-after views in the center illustrations on the preceding pages is something special. At first sight it looks like an undertaking beyond the capacity of one man to carry out even though he might be skilled in the work. But look at the illustrations a little more closely and you will see that the only major changes are the building of an attached two-car garage and the half porch which replaces the original and is a continuation of the garage roof line. The dormer was removed to straighten the roof line of the main structure. The owner replaced the original window sash on the second story and added two new windows downstairs. Then he added new siding and ornamental shutters, removed one chimney and rebuilt the other. In this case the question to be decided is not so much whether one man can handle the job, but whether he has sufficient time to devote to it. With one man making all the moves necessary to carry out such a project it's going to be a long time between start and finish. A lot of time can be saved by subcontracting such jobs as pouring the garage floor and rebuilding the chimney. Hiring an architect to plan the job for you is money well spent. He can save you both time and effort, even on jobs less involved than the one in question. Savings realized by doing the work yourself will be considerable.

Often a small home of more recent type can be greatly improved in appearance and livability simply by changing a window or door or adding an open porch. The small home pictured in the before-and-after views at the bottom of the preceding pages is an example. The "picture" window gives a feeling of greater space in the living room and at the same time has the effect of lengthening the structure. The porch can be anything desired, open like that shown, a carport, or enclosed with screen or glass.

In addition to remodeling the structure itself, there are other architectural details, or "applique," which can be included as a part of the job, or independent of it. The sketches on this page suggest four such applications. In these details placement determines beauty and utility. ★★★

POPULAR MECHANICS

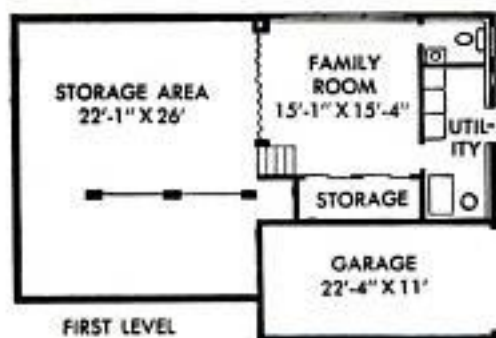
PARADE OF HOMES



This split-level home was built in Wayne, Pa., by Madway Engineers and Constructors. It was designed by Theodore Bradow. Exterior materials are brick, Philippine mahogany, plywood and asbestos panels. Home provides large storage area



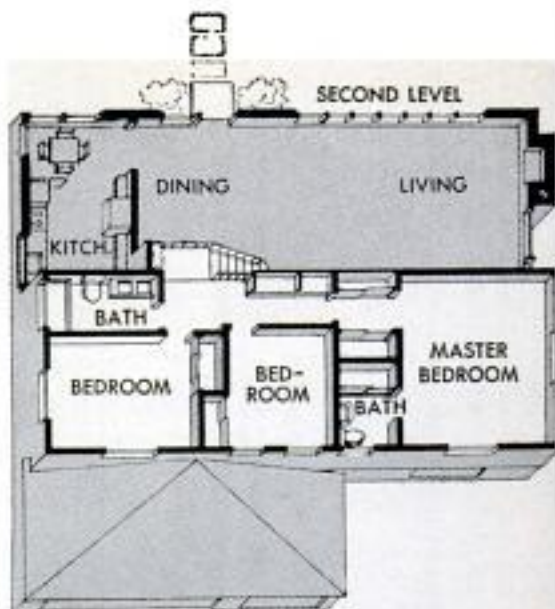
Three bedrooms, 2½ baths
 Floor area—1685 square feet
 Cost—\$18,500 (including lot)



ON THESE PAGES *Popular Mechanics* pays tribute to the combined genius of architects and builders that has made Americans the best-housed people in the world. The eight new homes pictured here were selected from hundreds of medium-cost homes and, in our opinion, represent the best in contemporary design, good construction and economy. Two are split-level homes, five have one story and one is a two-story house with part of the first floor below ground level. We salute the planners and builders.

Three bedrooms, 2½ baths
 Floor area—1425 square feet
 Cost—\$20,000 (including lot)

Architect Rudolph A. Matern designed this split level which was built on Long Island by Morton Brothers. Price includes built-in oven and range. Exterior is brick and wood siding. Living room has beamed studio ceiling, window wall and decorative open stairway to bedroom level. Basement area provides additional 499 square feet. Two-car garage on front is convenient for family coming and going



Three bedrooms, two baths
 Floor area—1800 square feet
 Cost—\$18,900 (not including lot)

Planned for low-cost construction, this rectangular house was designed by Edward H. Fickett and built by G.M.B. Corp. in Los Angeles County. Exterior materials are brick, stucco and redwood with a built-up type roof of colored rock. Foundation is concrete slab and construction is post and beam. Unique skylight area separates bedrooms from living space. House plan is available in six variations

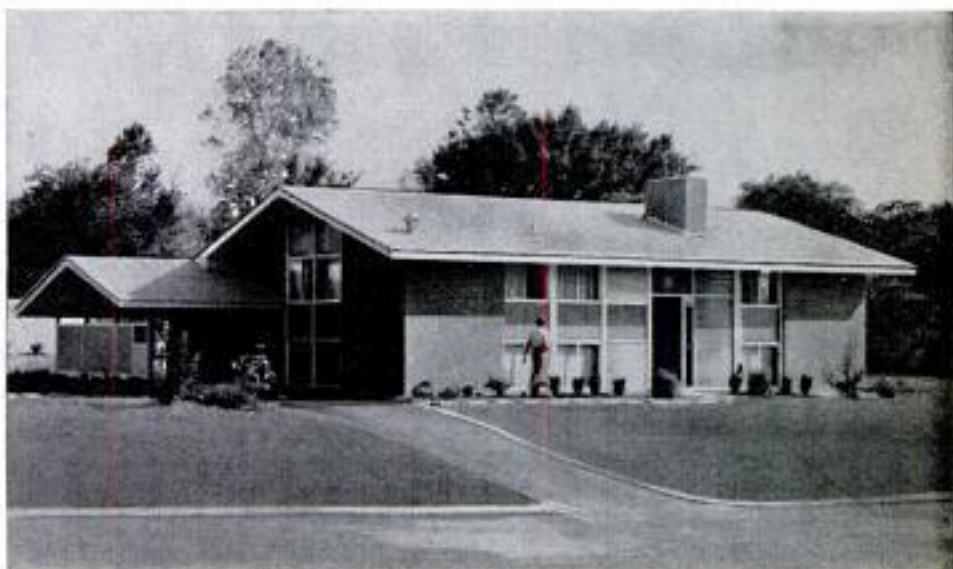
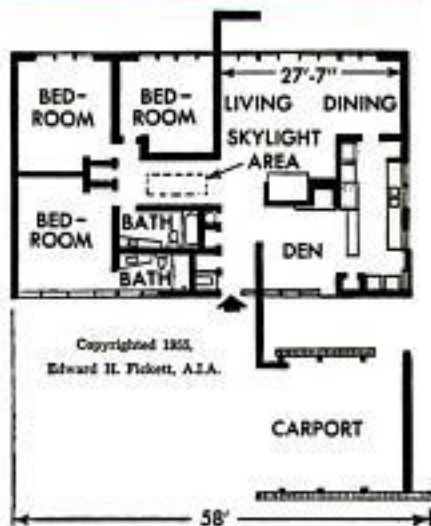


Three or four bedrooms, 1½ baths
 Floor area—2000 square feet
 Cost—\$23,950 (including lot)

This prefabricated Techbuilt house is built around a core containing the utilities and immovable fixtures such as stairs, chimney, fireplace and bathrooms. It was designed by Carl Koch, Techbuilt, Inc., of Cambridge, Mass., and built by Mayer-Raisher Bros., Inc., in St. Louis. Cost of the house has varied in different parts of the country. Roof, walls and floor are formed of Techbuilt panels. For exterior, Mayer-Raisher used brick veneer and horizontal wood siding. The non-load-bearing interior partitions can be shifted for numerous floor plans to accommodate growing families



HOME SECTION



OCTOBER 1955

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Three bedrooms, two baths
 Floor area—1466 square feet
 Cost—\$17,000 (not including lot)

Designed and built by the Crawford Corporation, Baton Rouge, La., this prefabricated house features a living area oriented toward the rear. A sectional glass wall in living room overlooks garden. Exterior is brick veneer and cedar shakes with a marble-chip roof. This low-pitched roof has a 42-inch overhang. Photo on this page shows rear view of home built in Louisville

Kara Steiler photos



Three bedrooms, 1½ baths
 Floor area—1500 square feet
 Cost—\$16,500 (including lot)

Place Homes, Inc., South Bend, Ind., calls this the "Gradement Home" because space equivalent to basement is brought up to grade in unfinished wing. This area can be finished as playroom and workshop, den, family room or for extra bedrooms. Foundation is concrete slab and exterior is vertical wood siding except for gables. The architect for this precut home is William H. Weist

Photo by Hube Henry, Hedrich-Blessing



Two bedrooms, one bath
 Floor area—1240 square feet
 Cost—\$17,000 (not including lot)

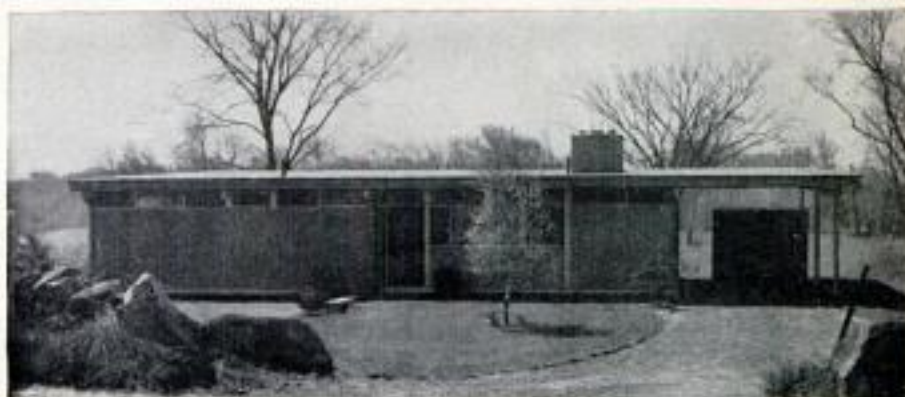
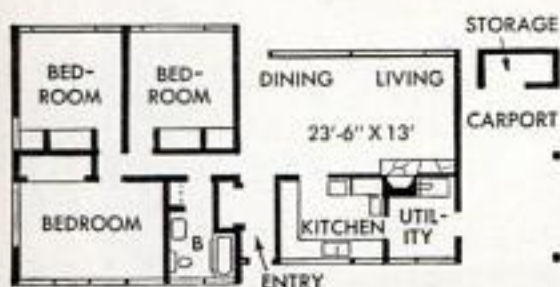
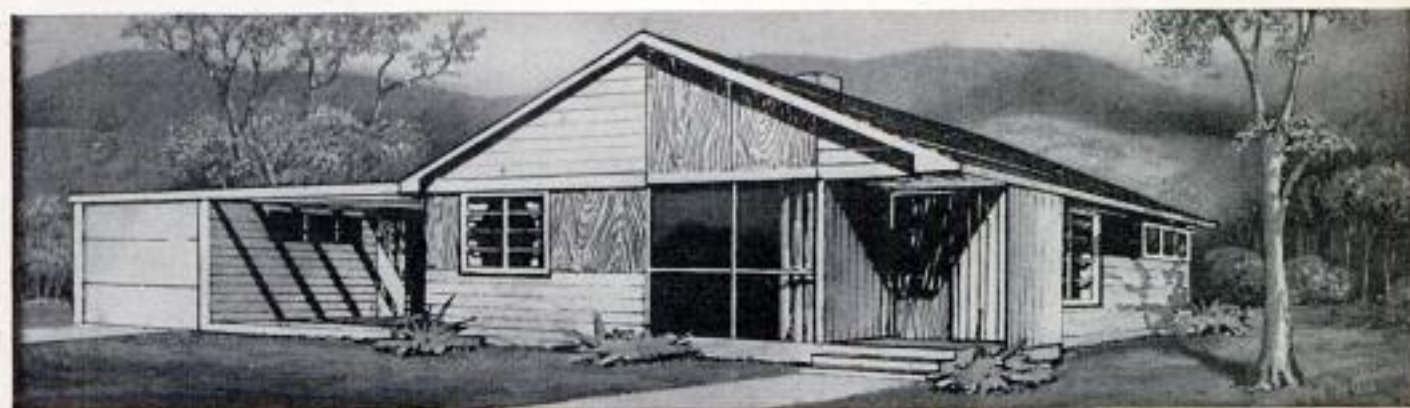
This farmhouse was designed for expansion to three to five bedrooms by the University of Illinois College of Agriculture in a housing-research program with other colleges. The plan has many variations including with and without basement. Between garage and kitchen is a workroom, or farm office, which is a feature of the house. Big windows and panels add interest to exterior



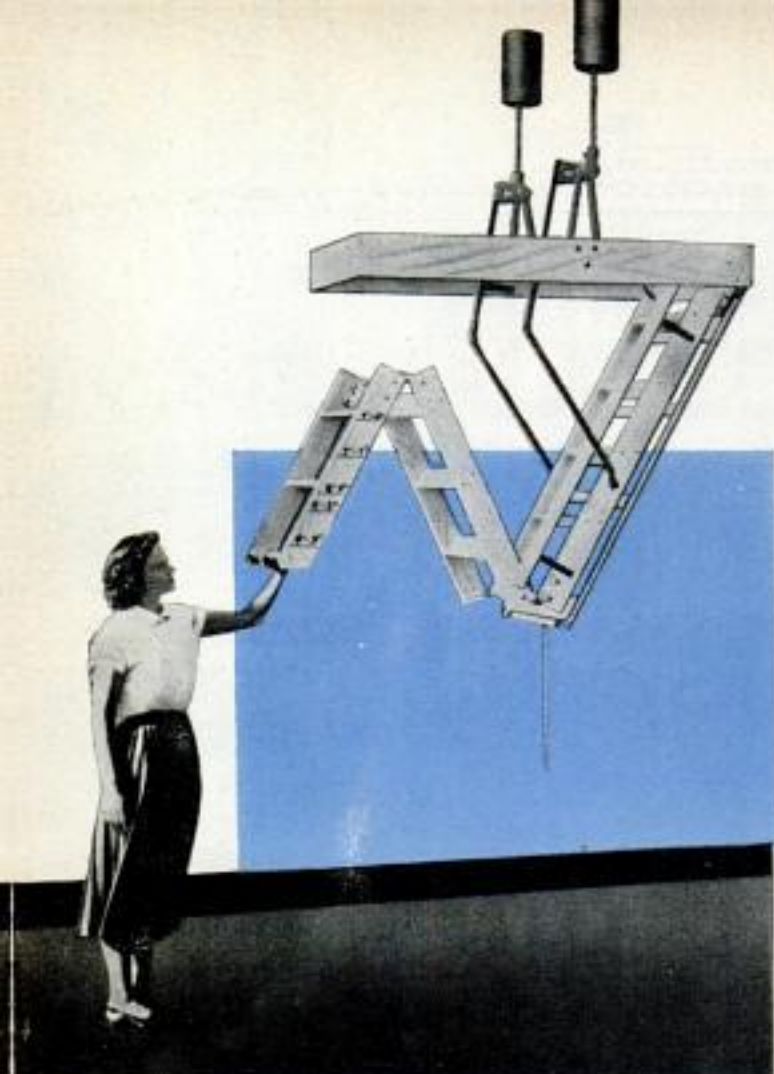
Three bedrooms, 1 bath
 Floor area—1250 square feet
 Cost—\$17,500 (not including lot)

Open-plan interior and glass walls at rear give a feeling of spaciousness to this home designed by The Architects Collaborative and built in Lexington, Mass., by the Moore Construction Company. Exterior is redwood vertical siding; foundation, concrete slab. Living-room floor is cork and house is radiant-heated. Roof is shed-type and beams extend through glass walls





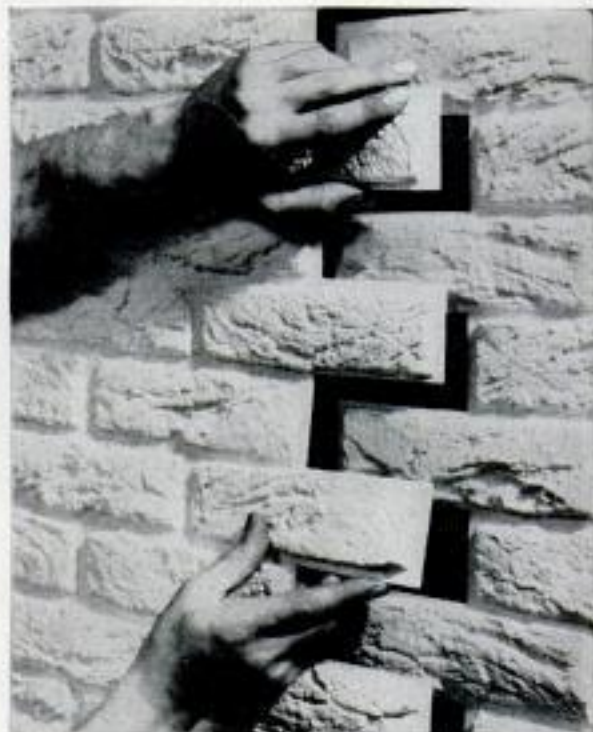
READY- *for the* DO-IT-



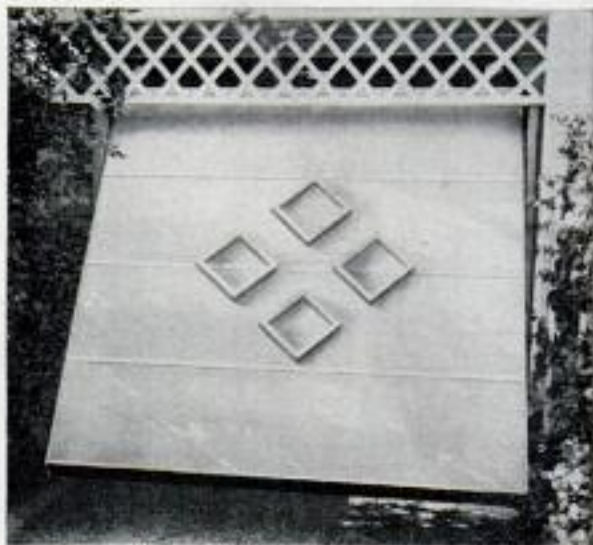
DISAPPEARING STAIRWAY with hydraulic checks is easy to install and saves building attic stairs. The frame fits 26 by 54-inch ceiling openings and is available in two new models to suit varied heights
Proclaton Parts Corp., 400 N. First St., Nashville 7, Tenn.

PLASTIC GARAGE DOOR (below at right) admits light to garage through translucent panels. It can be raised to serve as an attractive awning. Doors are made in many colors and never require painting
Tilt-A-Door Corp., 3800 E. Outer Drive, Detroit 34, Mich.

PRECAST SHOWER FLOOR floats on the subfloor and will not crack as the building settles. All you have to do is cut a hole in the subfloor for the drain connection, slide unit into place and calk around drain
Flat Metal Mfg. Co., 9801 Belmont Ave., Franklin Park, Ill.



PLASTIC WALL COVERING reproduces the texture and color of brick or stone. Molded in two by four-foot sheets, it is easy to install with an adhesive applied to back of mortar lines. Precut half bricks snap out for interlocking. Scissors will cut sheets
National Vacuum Molding Corp., 929 Old Nepperhan Ave., Yonkers, N. Y.



MADE AIDS

YOURSELF BUILDERS



CARPETING IS LAMINATED to an underlay of foam latex and hardboard and supplied in four-foot squares that are laid like tile. Seams do not show
Luxor Products Co., 360 S. Maple St., Akron 2, Ohio

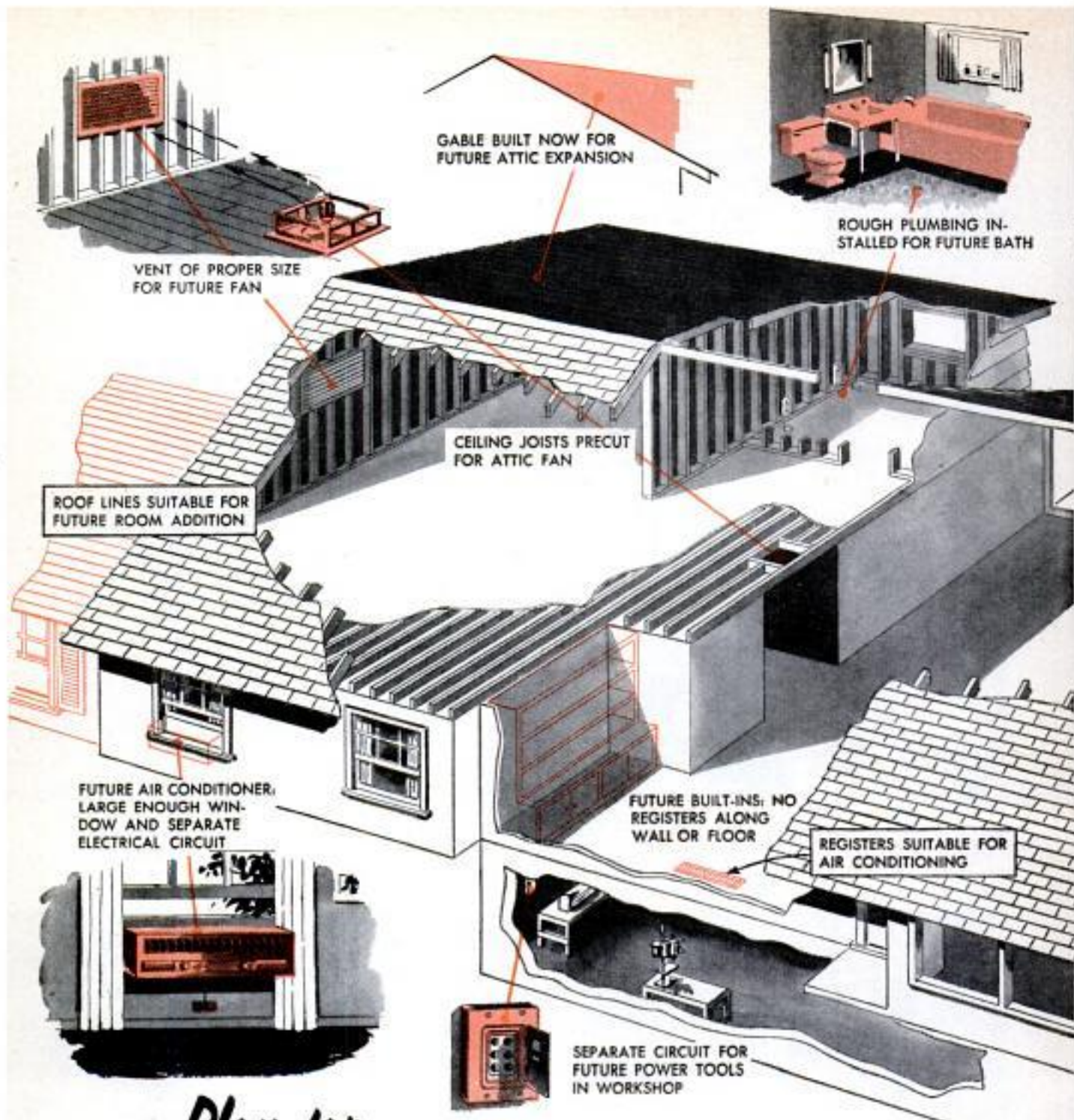


PREFABRICATED FIREPLACE can be installed in six hours with simple tools. It is made of steel with stainless-steel trim and has sturdy ceramic firebox
Uni-Bilt Div., Vega Industries, Inc., Syracuse 5, N. Y.



NO-PUTTY WINDOW has a new-type clip centered at the bottom of each pane and two on each side. A tight joint is maintained between glass and sash with felt gasketing. Requires no special skill to install
The Donley Brothers Co., Miles Ave., Cleveland 5, Ohio

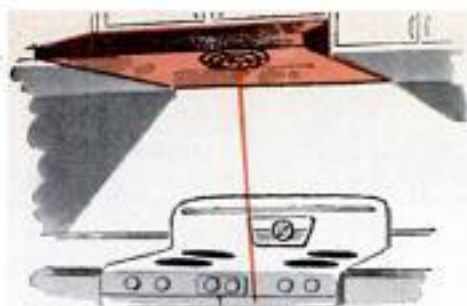
STORM-SCREEN DOOR features a compartment inside the kickplate for storage of screen or storm panels. This door, called the Kangaroo, saves time and effort at seasonal change-over, also storage
The Weather-Proof Co., Cleveland, Ohio



Plan for **FUTURE IMPROVEMENTS** *as You Build*

ELIMINATE THIS, do without that, cut every corner. This is the discouraging experience you likely will undergo when you build a new home. There are just not enough dollars in the nest egg to pay for everything you want. But you can plan for future improvements as you build. For example, if you hope to have a dishwasher eventually, plan the kitchen cabinets so

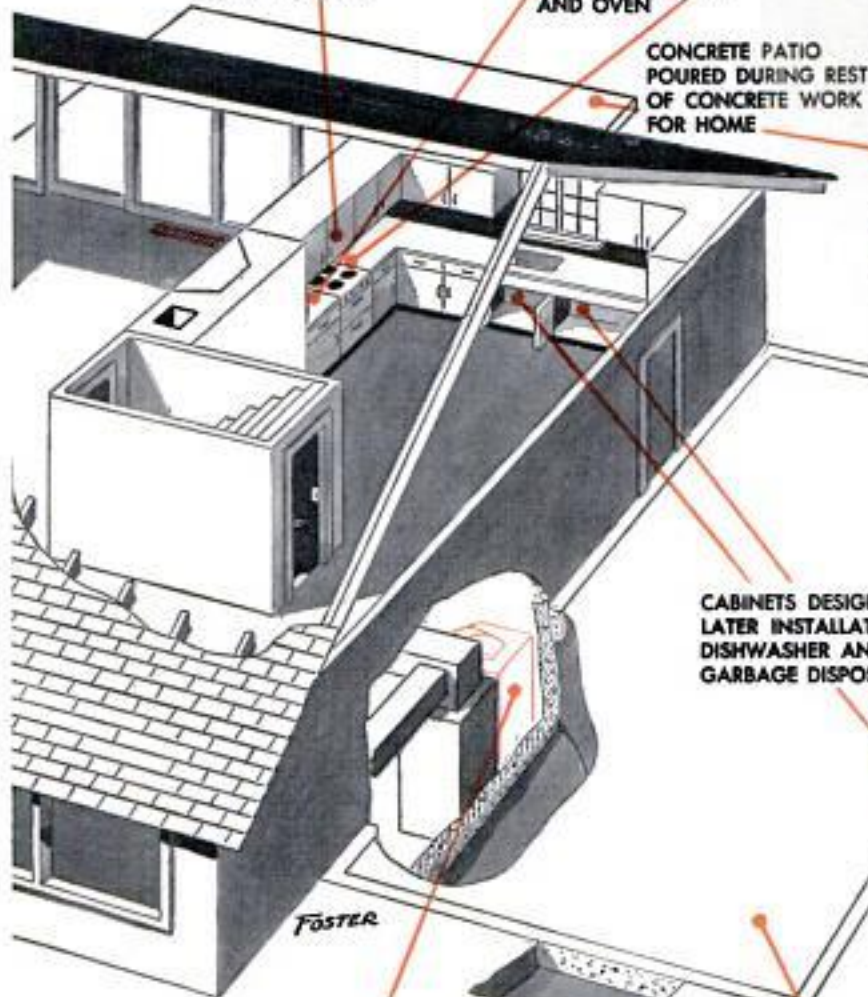
the dishwasher will simply replace one of the cabinet sections. Planning some built-ins in certain areas? Be sure there are no heat outlets, cold-air returns or electrical outlets in those spots. The house shown above has features taken from several different types of homes. Use the drawing as a check list in planning for the future—now. ★★★



DUCT SPACE AND ELECTRICAL OUTLET FOR FUTURE KITCHEN VENTILATING FAN



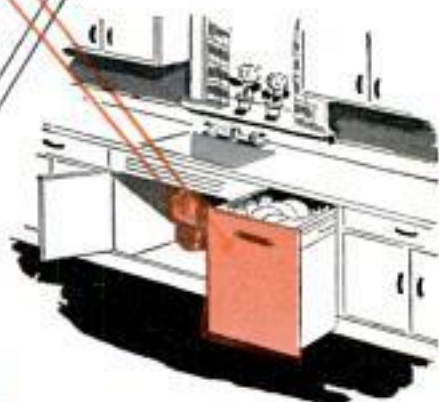
CABINETS DESIGNED FOR EASY CONVERSION TO BUILT-IN RANGE AND OVEN



CONCRETE PATIO POURED DURING REST OF CONCRETE WORK FOR HOME



CABINETS DESIGNED FOR LATER INSTALLATION OF DISHWASHER AND GARBAGE DISPOSER

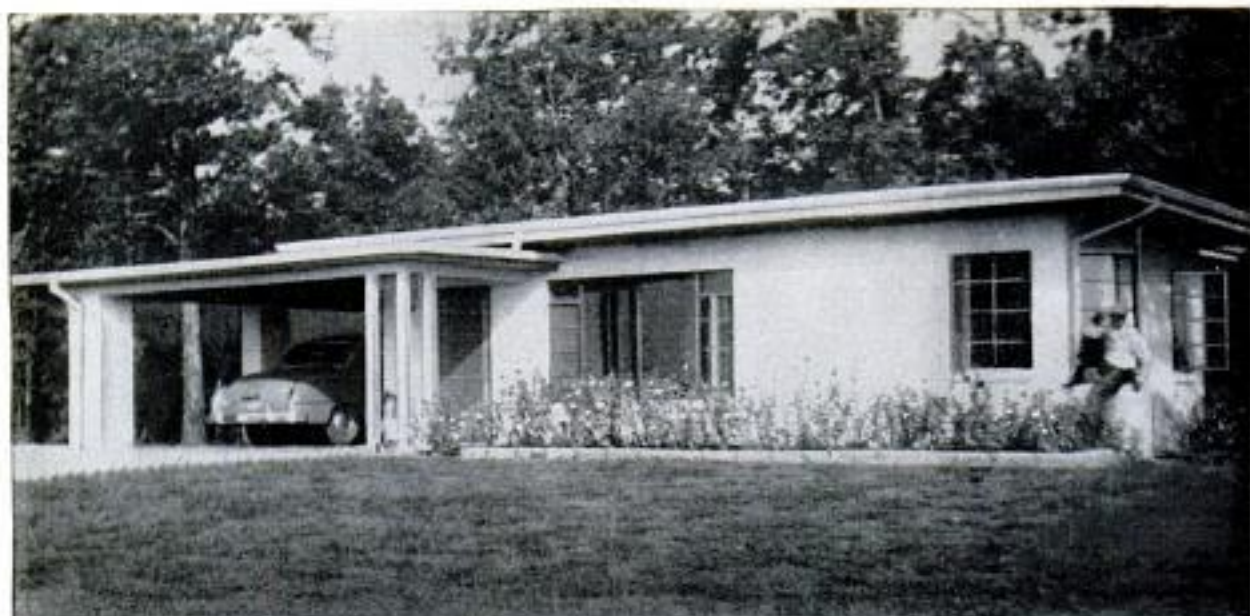


SPACE LEFT FOR AIR CONDITIONER BESIDE FURNACE



FOOTINGS AND SLAB POURED FOR GARAGE





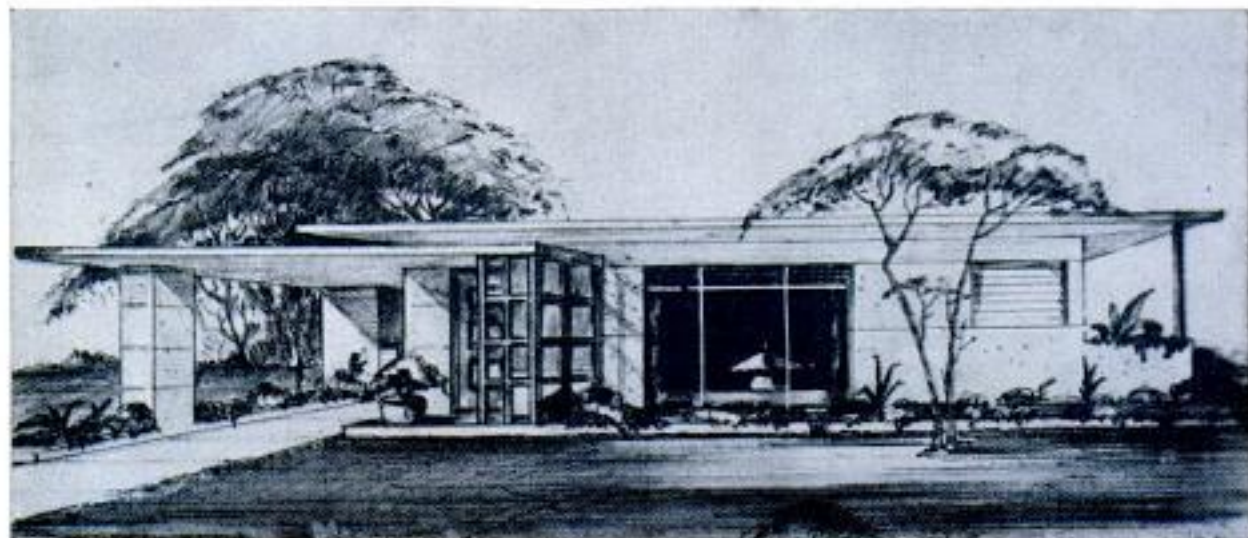
This three-room concrete-block house was designed for two things—spacious interior effect and economy

Retirement House Has no Bedrooms

WE WANT A SMALL HOUSE with lots of elbow room," a retired couple of Laredo, Tex., told Paul T. Haagen, well-known Chicago architect. He designed them a house with only 1075 square feet of floor area and with a living room 16 by 31 feet. The other two rooms, both good sized, are the combination bathroom and dressing room and the kitchen. Each room does double or triple duty. Attractive corner couches in one corner of the living room convert to beds at night and a folding partition provides privacy. Clothes closet, dresser and other bedroom paraphernalia are housed in the big bathroom. The kitch-

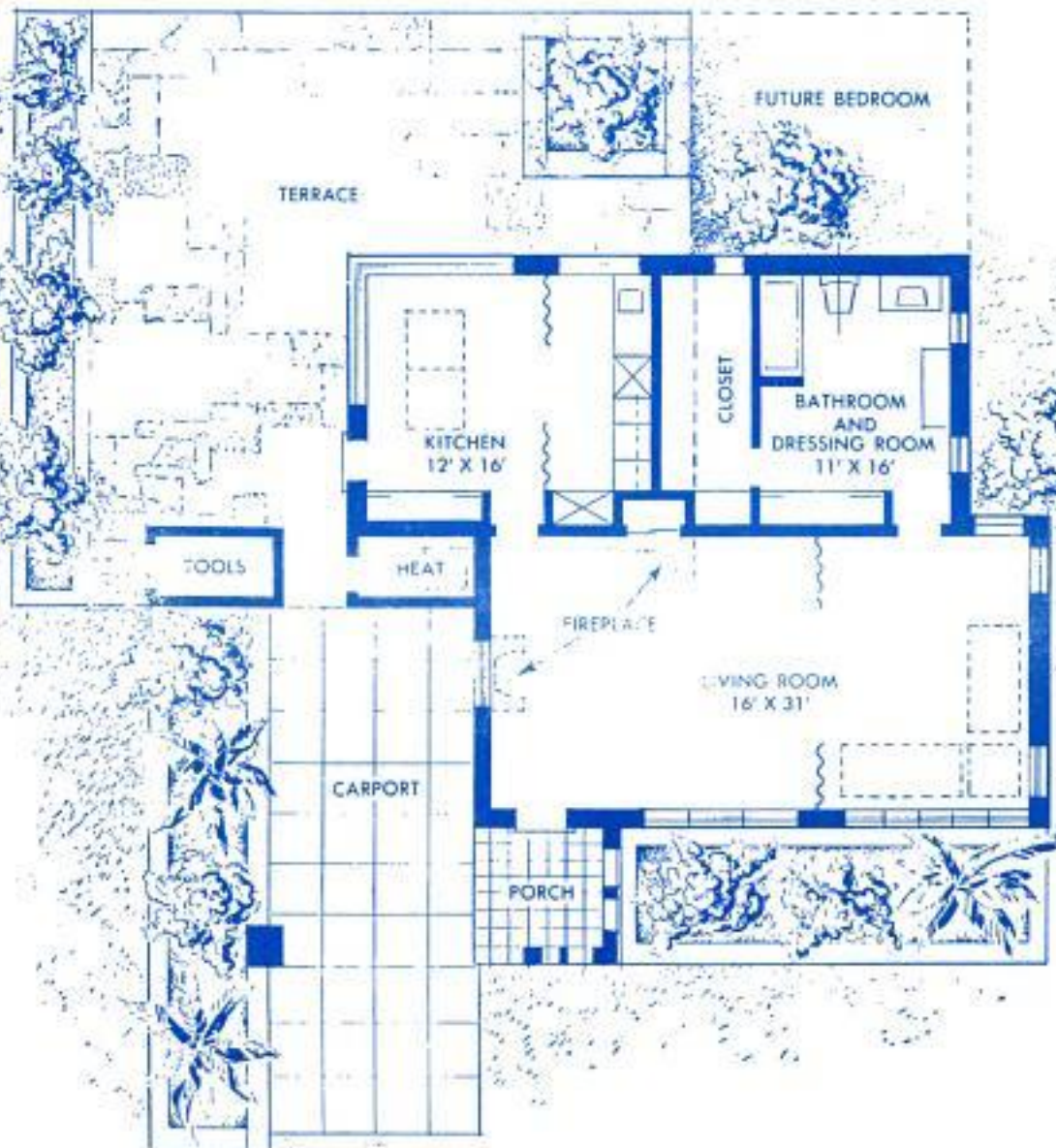
en also serves as dining room and utility room with its washing machine and drier. A small closet at one end of the carport houses the heating unit. The house was built of concrete blocks at a cost of \$10,000, entirely contracted. The interior walls were merely painted, but in most climates they would have to be furred and plastered or finished with wallboard. Variations of this basic plan include a gable instead of a flat roof, a basement with stairs going down from the closet marked "heat," an enclosed garage instead of the carport and the addition of a bedroom (see plan). Frontage, with carport, is 49 feet 6 inches.

Another version of the same house shows different treatment of the windows; roof can be flat or gable

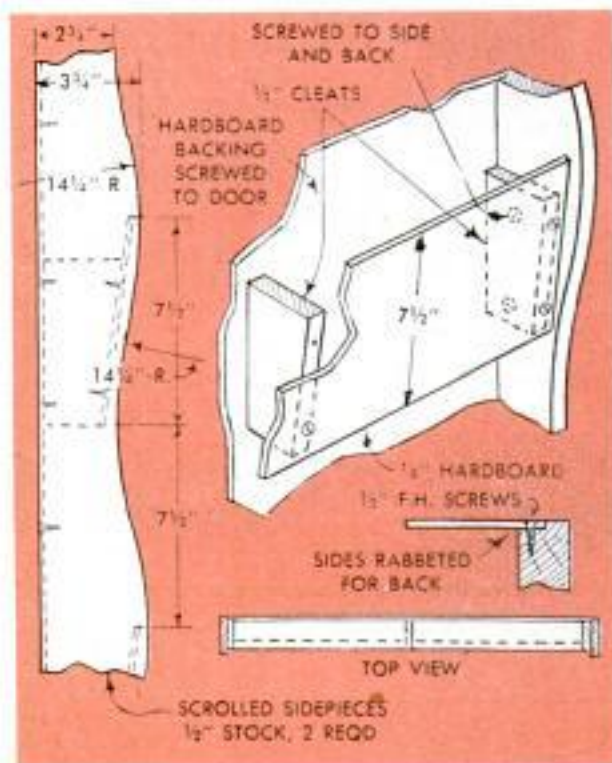




With couch beds and folding partition this end of the attractive living room becomes a bedroom at night



Shoe Rack on Closet Door Saves Time and Space



Attached to the back of a closet door, this specially designed shoe rack holds from 15 to 20 pairs of shoes in a minimum of space. It can be made half length if desired, or full length as pictured. The scrolled sides are cut from $\frac{1}{2}$ -in. stock, the back from $\frac{1}{4}$ -in. hardboard and the racks from $\frac{1}{8}$ -in. hardboard. The sidepieces are rabbeted to take the edges of the back panel, which is fastened with screws. Each rack is attached

to three cleats, two of which are screwfastened to the sidepieces and the third to the center of the back panel. The latter is installed with the smooth face to the front. When locating the cleats be sure that they are equally spaced. Sides and racks are finished to match the door by applying an undercoater and following with two coats of paint or enamel in the color required. Attach to the door with screws.

Graphite Applied to Inside of Lock With Toy Balloon



When the inside of a lock is to be lubricated with dry graphite, a more thorough job can be done with a toy balloon than with the usual applicator. Squirt a small

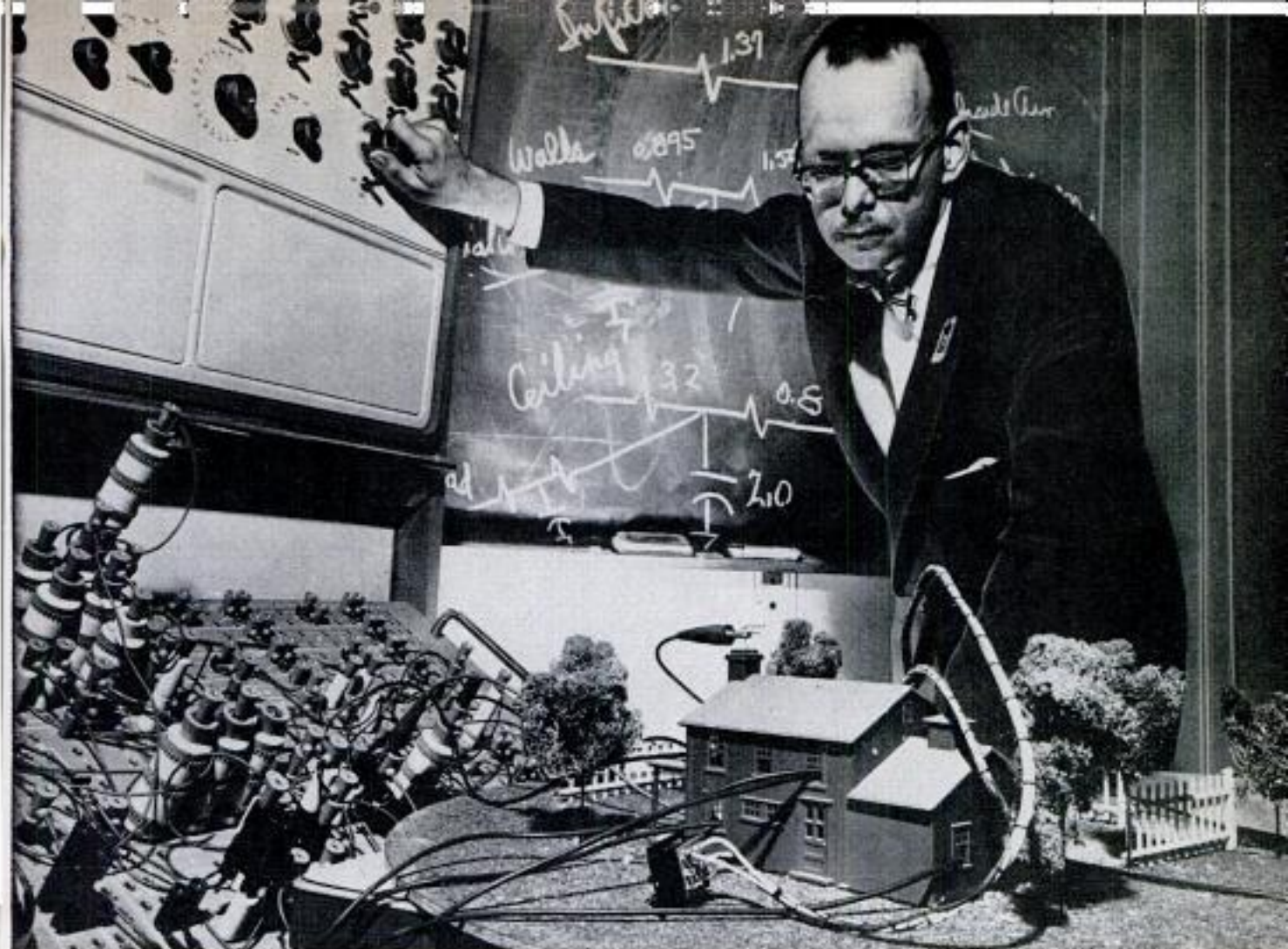
quantity of the graphite into the balloon and inflate it to about half its usual capacity. Hold the mouth of the balloon over the lock keyhole and gently tap the balloon with a finger while releasing the air. The graphite will be forced into the lock in a fine dust spray.

Vise Used as Wood Clamp

A machinist's vise can be used as an emergency clamp if the bench on which it is mounted is secured to a wall. Open the vise about halfway and place the work between the vise and the wall. Shim up with scrap wood and tighten the "clamp" by closing the vise.



W. H. McClay, Pasadena, Calif.



General Electric photo

Research engineer uses miniature house, maze of wires and computer to learn more about heating requirements

Since man first built a fire in a cave he has been interested in finding a better way to heat his home. Here is authentic information that will help you find an answer to an important question:

IS ELECTRIC HEATING FOR YOU?

By Elliott H. McCleary

YOUR NEXT HOME may have no chimney or furnace. Even though you live far north of the Mason-Dixon line, you would have no ashes to haul, no fuel lines to clean.

Even on the coldest days you would be kept toast-warm by an all-electric heating system. The heat would come from a heat pump, cables buried in the ceiling, radiant glass panels in the walls, baseboard or wall convectors or ceiling panels of conductive rubber.

Today, in Vancouver, Wash., Atlantic City, N. J., South Bend, Ind., and St. Louis, Mo., hundreds of homes are being equipped with all-electric heating systems. Tomorrow electric heating may be as common as other systems.

If you live in an area where electric

power is plentiful, electric heating may not be as costly as you think. An 1100-square-foot house near Detroit is heated by electricity for \$165 a year. A St. Louis house with 1000 square feet has an annual electric-heating bill of \$195. A ranch-style home in Fort Wayne, Ind., with 1289 square feet, is heated by kilowatts for \$158 a year.

Actually, these heating bills are much greater than they would be with conventional systems. "The same houses could be heated with gas or oil at one half or one third this annual cost," according to Prof. Seichi Konzo, nationally known heating expert at the University of Illinois. "Electric heating is expensive, even when power rates are low and standard fuels are high."

But many people are willing to pay a premium for the advantages of electric



General Electric photo

All-electric heat pump built into wall heats and cools entire home. The unit can be painted or wallpapered

heating. And the low installation cost of certain forms of electric heating results in big initial savings. The various types of heating panels eliminate the need for duct-work. No chimney is necessary and no extra space is needed for heating equipment. Houses can be closed in faster at a saving to the builder. These combined savings may reach \$1500 per house.

A 1000-square-foot house can be equipped

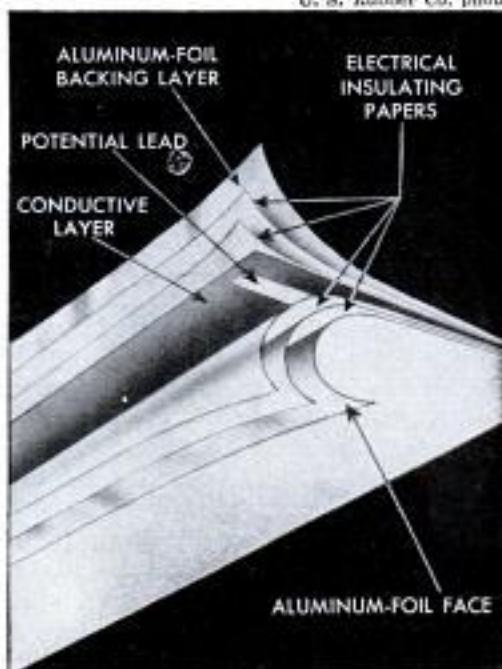
with electric panels for a cost to the contractor of \$450 to \$750, depending upon the local climate and the type of system used. This cost includes the price of individual room thermostats.

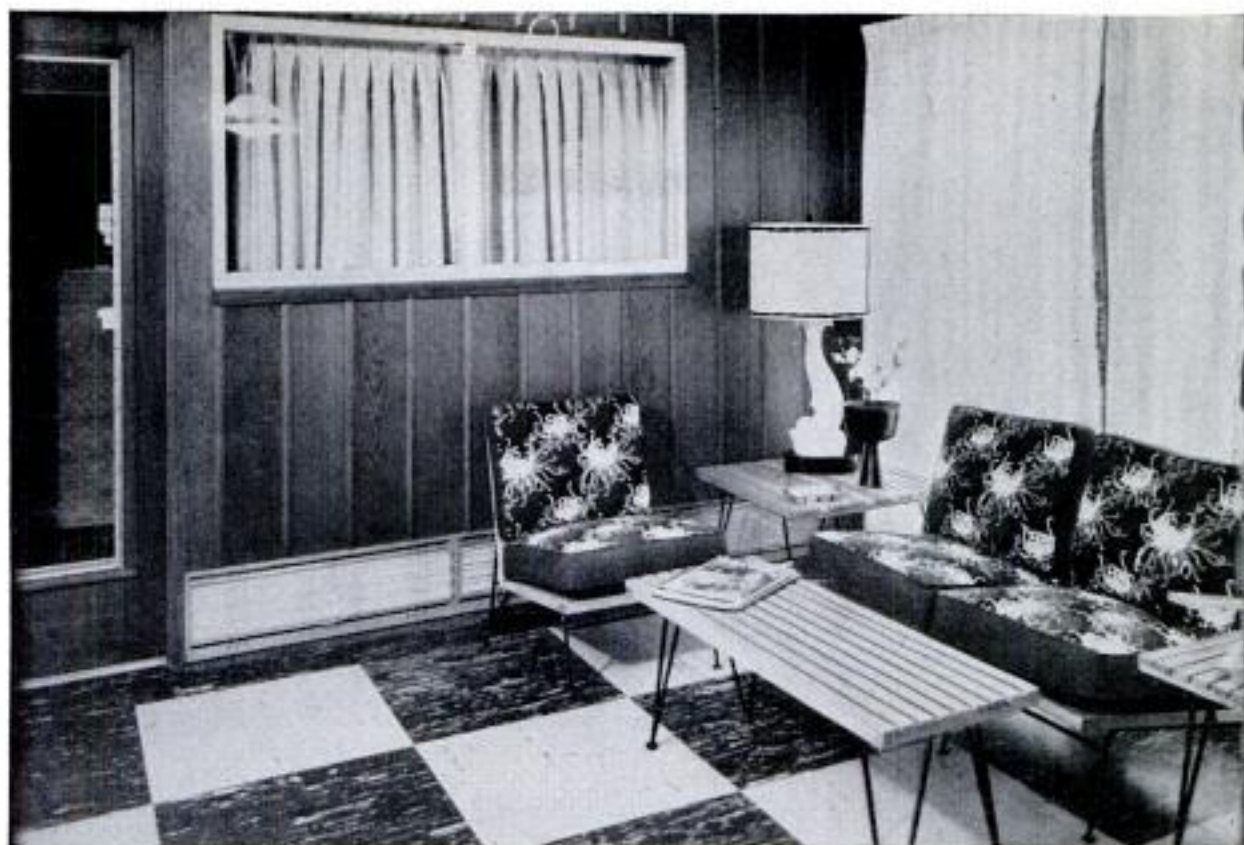
In all cases, electrically heated houses must be insulated to the hilt.

"In new homes," says Professor Konzo, "I specify six inches of mineral wool in the ceilings, the use of two-by-six in place of

Rubber heating panel is quickly cemented to ceiling. Rearrangement of molecules makes rubber conductive

U. S. Rubber Co. photo





Electriglas Corp. (Bergenfield, N. J.) photo

Radiant-glass panels along baseboard consist of heating wire fused into glass. Each room has thermostat

two-by-four studdings, and completely filled with mineral wool, the minimum use of windows and the maximum use of double panes as well as weather stripping for windows. I try to design for a total fuel bill of \$120 for the season, knowing full well that with gas I could do it for about \$45."

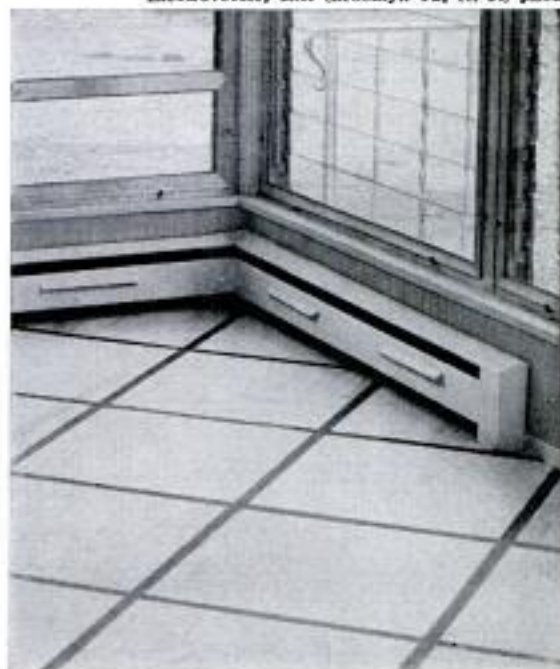
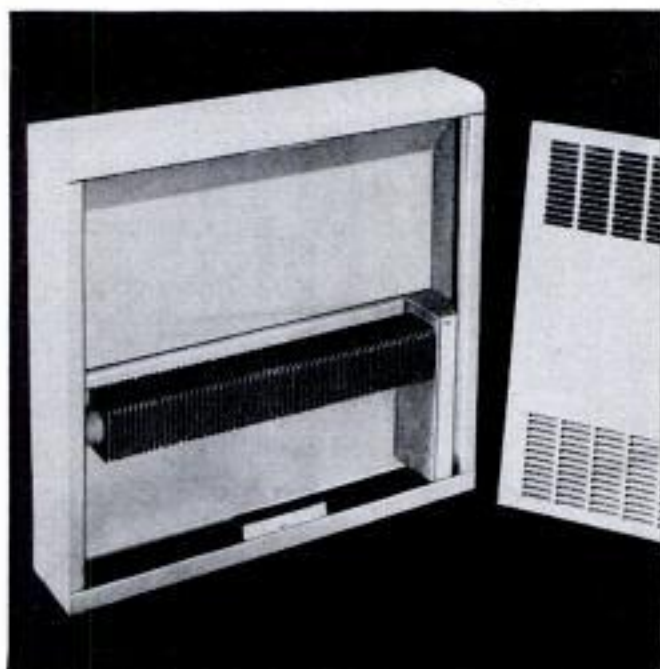
There are two radically different forms of electric heating.

One is resistance heating. Electric heat-

ing cables may be tacked to the ceiling and then covered with plaster or a second layer of plasterboard. A similar type is the conductive-rubber panel, which is cemented to the ceiling and then painted to match surroundings. Radiant glass panels consist of heating wire safely embedded in glass sheets which are fastened to the wall. Baseboard or wall convectors, often placed beneath windows, consist of heating cable

Wall and baseboard convectors have heating wire embedded in a core of ceramic inside metal-finned pipe

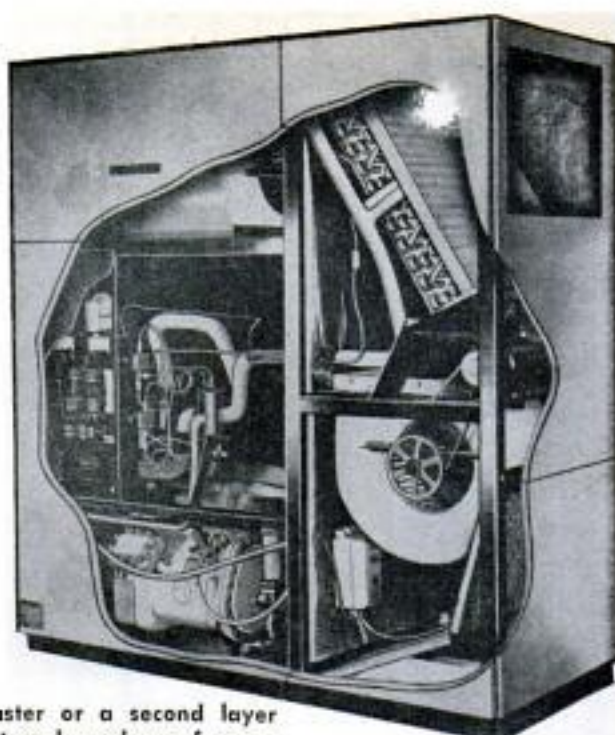
Electrovector, Inc. (Brooklyn 12, N. Y.) photo





General Electric photo

Heating cable stapled to ceiling is covered with plaster or a second layer of dry wall. Cutaway shows insides of heat pump that replaces home furnace



Westinghouse photo

inside pipes mounting fins that increase the heating surface. Heating units similar to portable bathroom heaters may also be built into the walls.

All forms of resistance heating have the same theoretical efficiency, although there are differences in the efficient and uniform distribution of that heat. All are usually equipped with individual room thermostats, so that uniform heating throughout the house is possible. There is no heat loss caused by overheating one section of the house in order that another section may be adequately heated.

The second form of electric heating is the heat pump. Although supplemental resistance heating is used with this system during freak cold periods, the normal operation of the heat pump does not depend upon resistance heat.

The heat pump extracts heat from outside air and uses it to warm inside air. It is basically a modified air conditioner. In the summer it takes heat from inside air and transfers it to outside air. In the winter it reverses this process, removing heat from outside air and giving it to inside air. This same principle of heat transference is what causes the blast of hot air emitted by your electric refrigerator.

Heat pumps are more expensive to install than are other forms of electric heating. It costs \$2500 to \$3000 to install a heat pump for a three-bedroom house with 1200 to 1500 square feet. This cost includes the expense of all the ductwork needed for such a system of central heating. It also includes the cost of a complete air-conditioning system for summer cooling.

On the other hand, heat pumps are the cheapest form of electric heating once they're installed. At any time of the year, they produce more heat per kilowatt than does any form of resistance heating. On some days, their theoretical efficiency is three times as great. When annual operation costs of a heat pump and a form of electric-resistance heating are compared, the difference is not this striking. Part of the reason is that the heat-pump bill includes the cost of summer cooling as well as winter heating. It also includes the cost of running an electric blower.

Heat pumps, because they include air conditioning and have a high installation cost, are now being sold to the semiluxury market. Recently, 460 medium-high-price homes in a project near Los Angeles were equipped with heat pumps.

It will be a while before mass production brings prices down. There are only about 6000 or 7000 heat pumps installed all over the nation.

Resistance heating is most popular in lower-priced homes that will not include air conditioning. For this reason, resistance heating is being pushed as an attractive feature of low-cost project homes.

The advantages of electric heating, no matter which type, range from cleanliness to convenience. If you have a heat pump, the air is filtered winter and summer. If you have radiant heat, draperies and upholstery are not laden with dirt blown up from the floor. There are no fumes or odors of combustion, no soot, no ashes, no grates to replace or fuel tanks to bother with.

(Continued to page 284)

HOME OFFICE Under Stairway

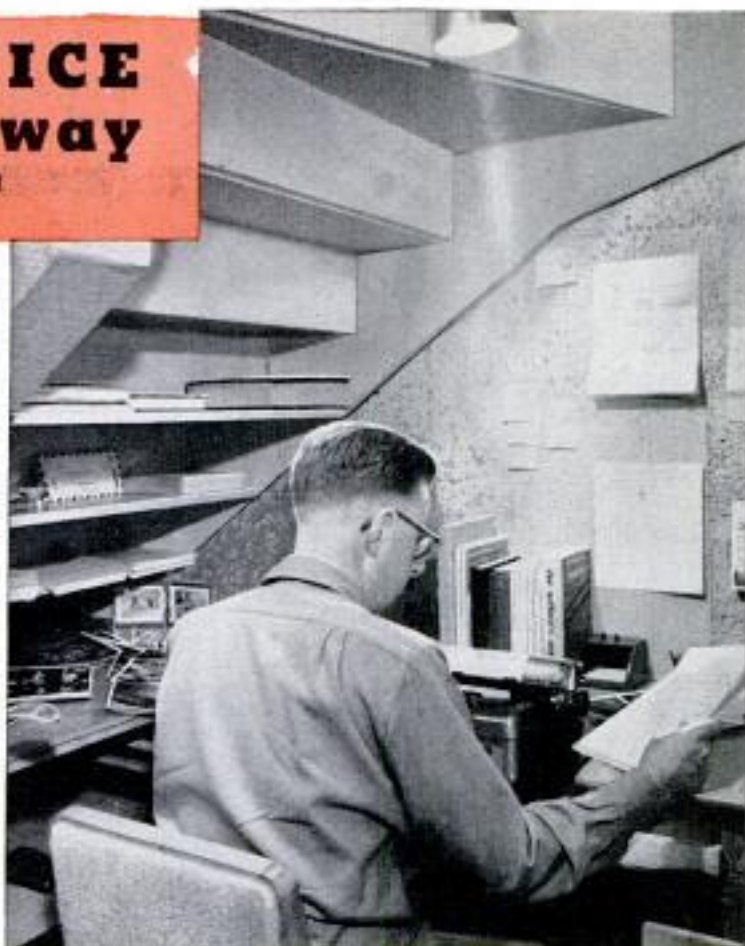
By Kenneth R. MacDonald

UNDER THE STAIRWAY of many two-story homes is an area often wasted or used for catch-all storage that can be converted into a home office, sewing room, hobby room, a study room for children or a quiet retreat for adults. In the case illustrated, the space, which was approximately 5 x 8 ft., was converted into an office for use by a magazine writer. A door may be used for complete privacy, or an arched opening into the adjoining room may be provided. And, if desired, the partition wall can be eliminated entirely to provide merely a cozy corner under the stairway.

In this case, the wall was eliminated entirely and a desk and storage shelves built in as indicated in the photo. Storage shelves were provided under the stair risers by supporting them on cleats nailed to the stair stringers. One end of the desk top, which is a piece of $\frac{5}{8}$ -in. plywood, is supported on a pedestal containing a large filing drawer and the other end is supported on a large cleat nailed to one of the stair risers. A typewriter is located in an opening cut in the desk top and is supported on a shelf directly under the top. In addition to supporting the typewriter, this shelf also provides additional storage space for writing materials.

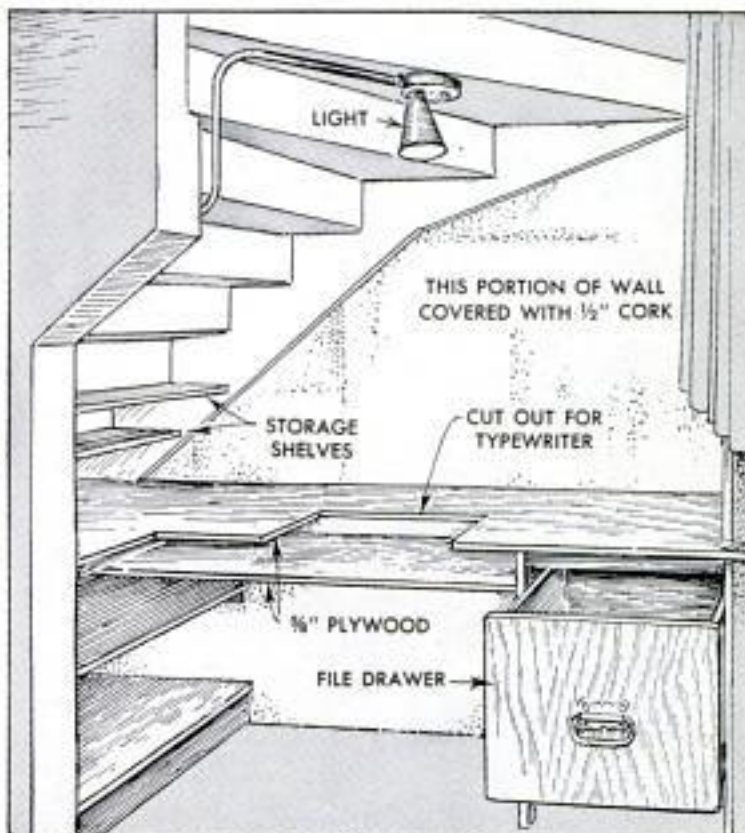
Below the desk and behind the first three stair risers, large shelves were provided by nailing cleats directly to opposite walls. If you wish to finish the desk with varnish, hardwood-faced plywood should be used. If the finish is to be paint, fir plywood will do.

Illumination is provided by a spotlight on the ceiling. The wall above the desk may be finished to match the adjoining room or, as in this case, it can be finished to contrast with the room and thus help set off the corner.



Notice above the compact yet efficient office that can be built under a stairway in a space no larger than 5 x 8 ft.

Details below show arrangement of plywood desk, filing drawer and storage shelves. Shelves are supported under stair risers



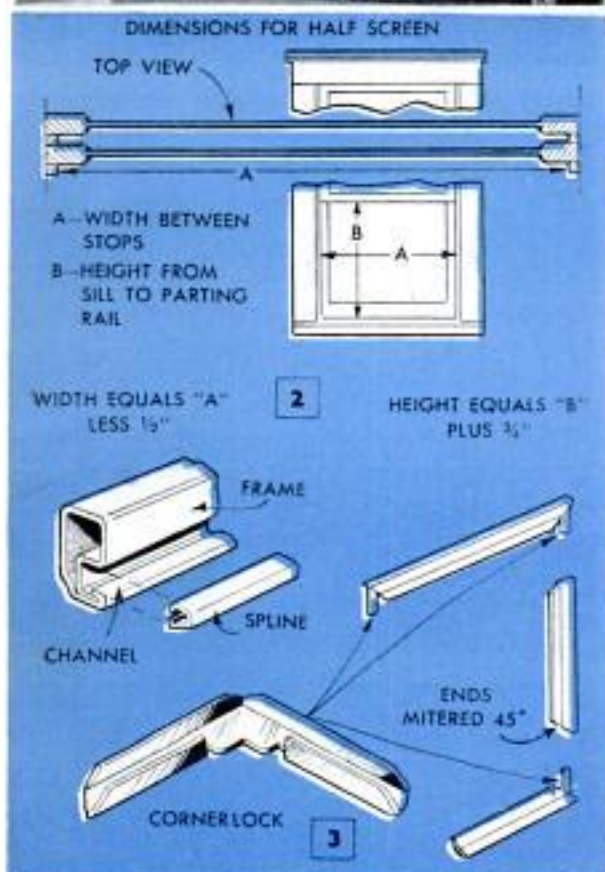
X590



MAKE YOUR OWN...

Aluminum WINDOW SCREENS

Lightweight metal screens do not warp, rot or rust and do not need painting

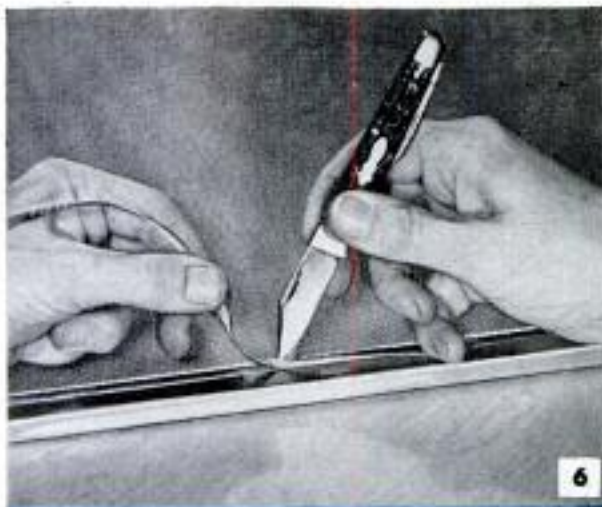


YOU'LL FIND IT EASY and fascinating to make window screens from stock aluminum parts obtainable at nearly all hardware stores. Tubular frame members have grooves for splines that hold the screen securely. The frame pieces are mitered at the corners and held together by means of slip-in corner locks as shown in the lower details of Fig. 3. The screen material may be aluminum, glass fiber or plastic.

For half screens on double-hung windows as shown in Fig. 1, take measurements as indicated in the details of Fig. 2. Cutting the miters at a 45-deg. angle is next. This must be done accurately with a hacksaw or other fine-tooth saw used in a miter box as in Fig. 4. One commercial kit of window-screen parts, the "Homeshield" made by American Screen Products Co., includes a miter box. This is screwed to a block which is gripped in a vise. After marking the frame stock for length and removing the splines, cut the miters. Put the pieces in the miter box so that the spline groove is face down. Make the miter cuts so the spline groove will be along the shortest edge. After sawing, remove burrs and sharp edges with a small file or sandpaper. To assemble, simply push the frame pieces onto the corner locks. Then cut the splines to length so the ends butt together at corners as in Fig. 7.

Application of screen cloth or wire is next. Lay the frame on a smooth bench top, with the spline grooves up. It is important that the frame be held squarely while installing the screen. On full-length screens, the frame is held in this position by means of finishing nails or with wood strips nailed to the bench top. Put a piece of 1/2-in. plywood inside the frame to hold up the





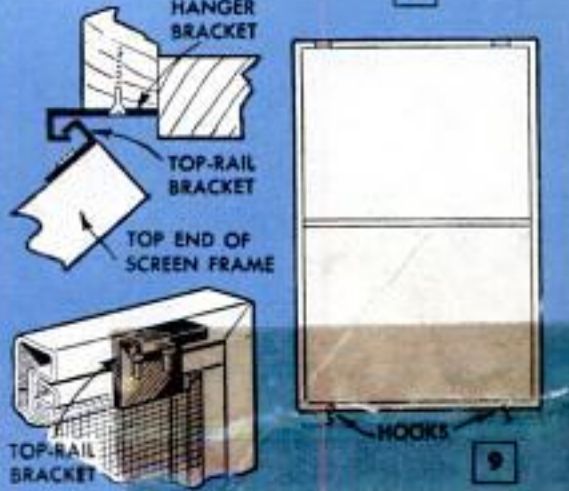
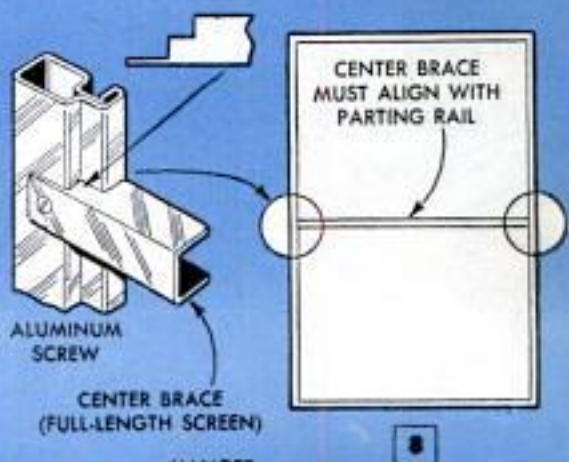
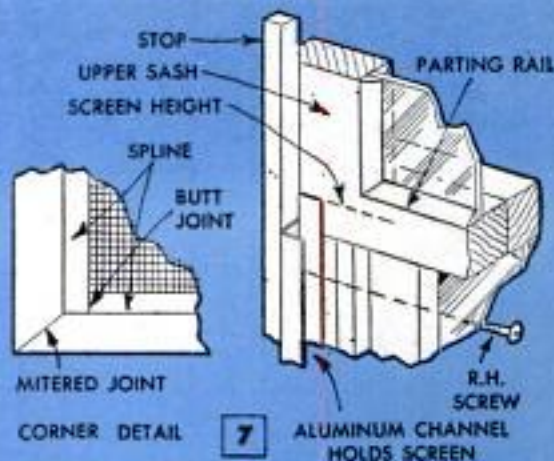
wire mesh so it will not sag at the center while assembling.

Glass-fiber or plastic screen is cut to the outside dimensions of the frame. Keep the screen square with the frame and force one spline into its groove at one edge as shown in Fig. 5. Tap a plywood or hardboard block with a hammer to force the spline into the groove gradually, moving the block back and forth. Repeat the procedure at the opposite edge and then at the other edges. Don't bow the frame by pulling the screen material too tight. Trim off excess glass-fiber screen with a knife or razor blade as shown in Fig. 6.

When using aluminum screen, bend the screen downward into the groove with a putty knife or screwdriver. The screen should fit along the inside edge of the groove only, where it will be held securely by the spline. After installing one edge, cut the screen at the other edge carefully with tin snips, cutting between two strands of wire. Then bend down the wire edge as before and install the spline.

Half screens can be held by means of aluminum retaining channels $\frac{1}{2}$ in. wide and $\frac{3}{4}$ in. deep. Drill three holes in each channel for roundheaded wood screws with which they are fastened to the inside of the window stops. Cut off the upper ends of the channels as shown in Fig. 7; this permits screens to be inserted easily.

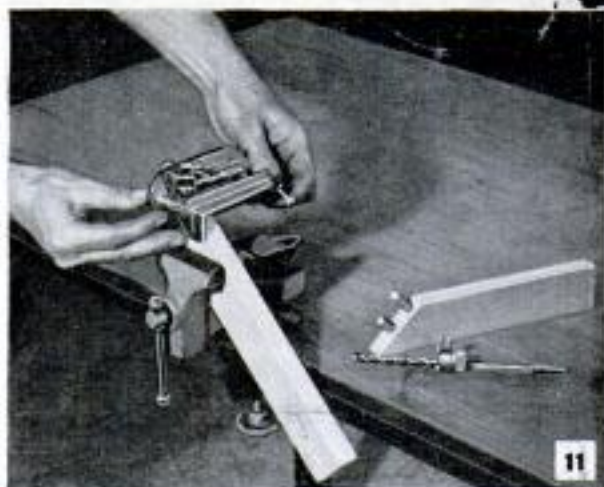
Full-length screens do not fit between stops of a window like half screens, but fit against the storm-sash stops, and are the same width and height as storm sash. A center brace is required on full-length screen frames. This is a length of channel stock, as shown in Fig. 8, cut at both ends and drilled so that sheet-metal screws can be used for fastening it to the screen frame. Fig. 9 shows how a full-length screen is attached to a window frame, with brackets made especially for the purpose. Two small hooks are fitted at the bottom edge. These have a screw eye with a machine-screw



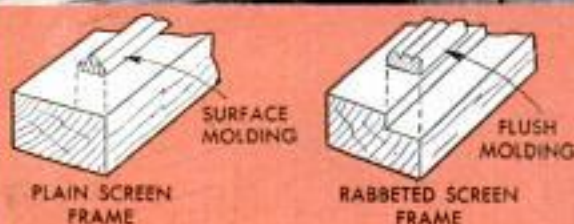
How to Make Strong Wood-Frame Window Screens



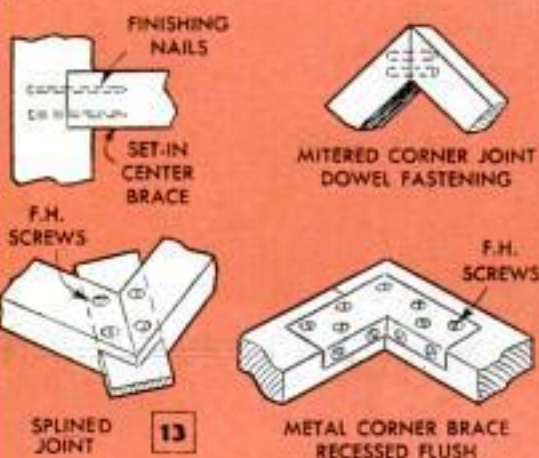
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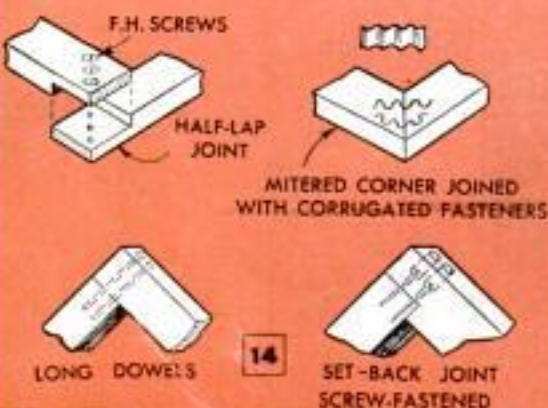
11



12 SCREEN-FRAME STOCK $\frac{3}{4}$ " OR $1\frac{1}{8}$ "



13



14



thread which permits fastening with nuts. Standard thicknesses of wooden window-screen frames are $\frac{3}{4}$ and $1\frac{1}{8}$ in. The latter thickness is preferable, but some older window frames do not accommodate it. This you can determine by measuring as shown in Fig. 10. Screen-frame stock may be plain, with the molding tacked on, or it may be rabbeted so the molding comes flush, Fig. 12.

A full-length screen requires a cross brace. This is let into the side members to obtain greatest strength, Fig. 13. There are numerous ways to make good corner joints. While the use of corrugated fasteners, Fig. 14, enables quick assembly, other methods assure stronger and more-durable joints.

A mitered corner, Fig. 13, having two blind dowels located at right angles to the miter cuts, is exceptionally neat and strong. Registering dowel holes can be bored in perfect alignment by using a dowel-boring jig as shown in Fig. 11. The mitered strips are pictured for the purpose of illustrating method of making the joint. In the absence of such a jig, you can substitute a spline for dowels on a mitered corner, which also produces a neat and strong joint, Fig. 13.

Corners also can be half-lapped, or they can be butted together and held with dowels or wood screws, or by means of metal plates, Figs. 13 and 14. Of all the joints detailed, the mitered corner joint with dowel-and-glue fastening and the butt joint with recessed corner brace are perhaps the strongest and most durable, especially for full-length frames. Most of the assemblies shown, particularly the doweled, splined and half-lapped kinds, require a coat of waterproof glue on all contacting surfaces for maximum strength. A good, time-proved method of getting a screen taut on a wooden frame is to bow the frame slightly as shown in the lower detail, Fig. 14, while the screen is being attached. ★ ★ ★



St. Charles Kitchens photo
 Typical of today's modern kitchen, this attractive one combines efficiency and charm. Cooking-appliance peninsula divides room into two separate work areas. Kitchen features custom-built steel cabinets

The Modern Kitchen

By E. R. Haan

WHAT A DIFFERENCE between today's kitchens and those of only a few years ago! Built-in cooking units, including wall oven-broilers and counter-top cooking plates or burners, have contributed greatly to the 1955 kitchen look. Inconspicuous or concealed hoods with forced draft instantly dispose of cooking odors and excess humidity. Under-sink grinders and quickly accessible incinerators dispose of food leftovers, vegetable peelings and similar waste, and automatic washers "do the dishes" with the greatest of ease.

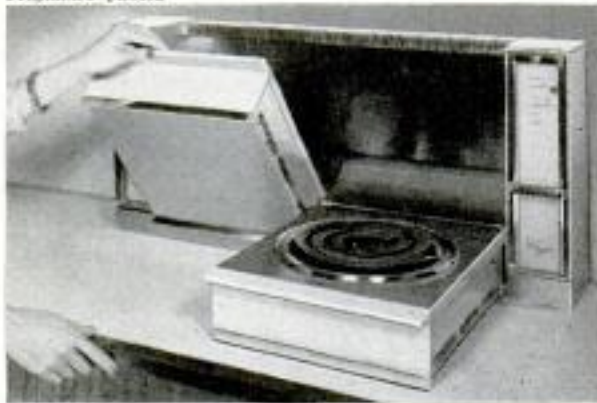
Wall oven-broilers: Wall oven-broilers are installed at comfortable waist height to eliminate stooping, and may

Close-up view of built-in cooking appliances in another kitchen. Waist-high oven-broiler saves stooping. Stove hood contains exhaust fan
 Calorie Stove Corp. photo





Frigitaire photos



In this attractive kitchen, electric counter-top cooking units fold out of way and turn off automatically

have a single, horizontally pivoted door, or twin, vertical doors that open or close in synchronism when either one is handled. Some units have a door fitted with a window. Two such ovens can be located side by side.

Completely insulated and vented at the front, most wall ovens have several heat ranges which are automatically and manually controlled in regard to both time and temperature.

Counter-top cooking units: Most surface cooking units fit into a cutout portion of a counter, have two to four burners or heating elements of various sizes. Frequently such units are located on an "island" or "peninsula" so that food being prepared can be reached from either side. Individual electric counter-top cooking units that fold back and turn off automatically are advantageous in that they do not require cutting out part of a counter.

Instant fume disposal: Instant elimination of cooking odors, smoke and humidity is possible by installing an



St. Charles Kitchens photo

Stainless-steel counter tops are sanitary and durable. Twin sinks have sound-deadening undercoating



The Formica Co. photo

Lustrous, colorful counter tops of hard laminated plastic also give "lifetime" wear; resist heat, stains, acids

inconspicuous metal hood equipped with an exhaust blower. This is located above surface cooking units or ranges so that cooking fumes are picked up at their source and quietly whisked outdoors through a duct that can be located in the space formed by a drop ceiling. Some of these units have an extra inlet located at the top of a wall cabinet to remove hot air at ceiling level.

"Lifetime" counter coverings: Lustrous, colorful counter coverings of great durability are available. Besides being resistant to mechanical damage under normal conditions of use, they are heat, stain, acid and alkali resistant, and are impervious to moisture so that they will not rot or deteriorate at sink edges or near faucets. These include a number of plastic materials,

Large kitchens are becoming popular again. In basementless homes many kitchens must also house laundry appliances as well as freezer. Inclusion of adequate food-serving area is fast becoming a must

The Formica Co. photo



pygriated material



Marsh Wall Products, Inc., photo

Above, beautifully prefinished 16-in. squares of hardboard offer a modern tile treatment for kitchen walls. Squares are applied with special concealed clips that fit grooved edges of squares

Below, in direct contrast, this kitchen shows walls of regular 4 1/4-in. plastic tile applied from floor to soffit. Notice how windmill insert in attractive tile floor relieves plainness
Hachmeister, Inc. photo



ceramic tile, stainless steel and Monel metal. Stainless-steel drainboards for sinks are extensions of the sink sides so that there are no joints. Parts of counters near cooking units may have stainless-steel inserts. Counter sections used for mixing, chopping and cutting may consist of tongue-and-grooved maple strips. Counters often are prefabricated to specified sizes and are covered with plastic coverings by manufacturers. The new, hard plastic laminates may also be applied successfully by homeowners themselves when replacing worn and deteriorating older coverings. In some prefab counters, both the counters and back splashboards are united and covered as a single unit with a continuous, unbroken layer of sheet plastic.

Wall and floor coverings:

Wall coverings for kitchens include ceramic tile, structural glass, panels or "tiles" of aluminum, stainless steel or enameled sheet metal; also many kinds of plastic tile and sheet plastics, as well as plywood, hardboard and wallboards of various kinds. Many of these are prefinished and are available in the form of large panels, "planking" and squares. Sometimes panels can be attached directly to a plastered wall by means of an adhesive as recommended by the manufacturer, or they may be fastened with clips, nails or staples to suitable backings as advised. Interlocking joints on some kinds conceal the clips or nails used for fastening.

Floors of ceramic tile or terrazzo are beautiful and give long-lasting service. Resilient floor coverings include numerous products such as linoleum, cork and various kinds of plastic tiles, which often can be applied by homeowners themselves at considerable saving.

Large, multipurpose kitchens:

Kitchens in many homes must serve a number of purposes besides that of food preparation and dishwashing. This is particularly true in basementless homes where limited space makes it necessary to put laundry equipment and a food



Libby-Owens-Ford Glass Co. photo

Corrugated glass conceals cooking area of kitchen from occupants of breakfast nook without loss of light

freezer in the kitchen. Frequently the laundry area is separated from the food-preparation area by cabinets.

In planning efficient utilization of kitchen space, use can be made of specially designed equipment such as a one-piece kitchen unit that includes an electric range, dishwasher, sink and disposal unit and a combination washer-drier.

In addition to the high-grade steel and wooden kitchen cabinets that are manufactured, it is also possible to build your own from stock lumber and plywood.

Kitchen-cabinet dimensions: Standard height of base cabinets is 35 or 36 in., the depth is 20 to 24 in., and the length is variable. Wall cabinets are 12 or 13 in. in depth, and the standard heights are 18, 24, 30 and 36 in. A drop ceiling over wall cabinets often presents a much better appearance than a void above them. Spacing between a wall cabinet and the counter of a base cabinet varies from 15 to 18 in. Counters usually project an inch or so beyond the front of base cabinets.

Drop ceilings: Framing and covering of a drop ceiling are shown in Fig. 3. Framing can be built separately and then attached to the wall and ceiling, nailing it to studs or joists if possible, after which the covering material is added. Where framing pieces do not cross joists, but run in the same direction, they are attached to a wall covering such as plaster by means of toggle bolts or other suitable screw anchors. The front of a drop ceiling should come flush with the front of the wall cabinets. No covering is needed on the bottom of the drop ceiling since it comes directly above a wall cabinet.

Wall cabinets: Wall-cabinet construction is detailed in Fig. 3. Sides, top and bottom



St. Charles Kitchens photo

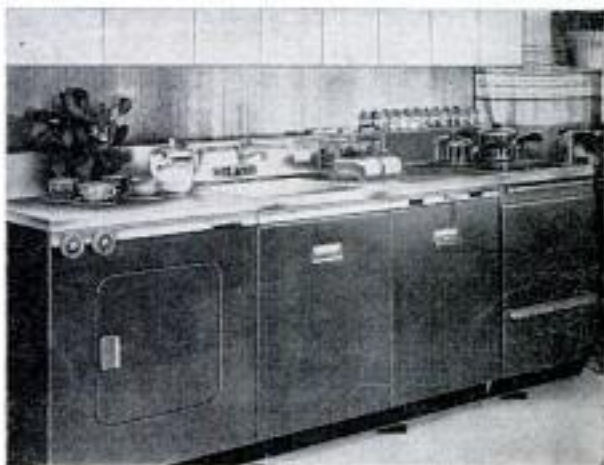
Step-saving dish-storage cabinet between cooking and food-serving areas is accessible from either side



General Electric Co. photo

Recently developed wall-cabinet-type refrigerator-and-freezer unit eliminates extra steps and stooping

Electric range, dishwasher, disposal unit and washer-drier are all contained in a single prefabricated unit



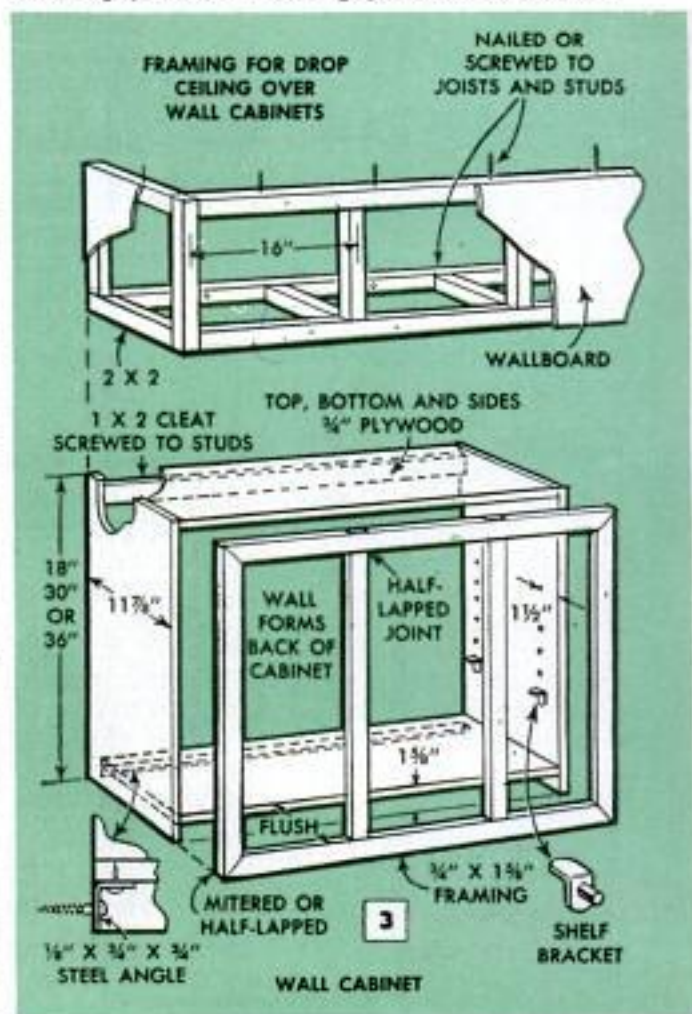
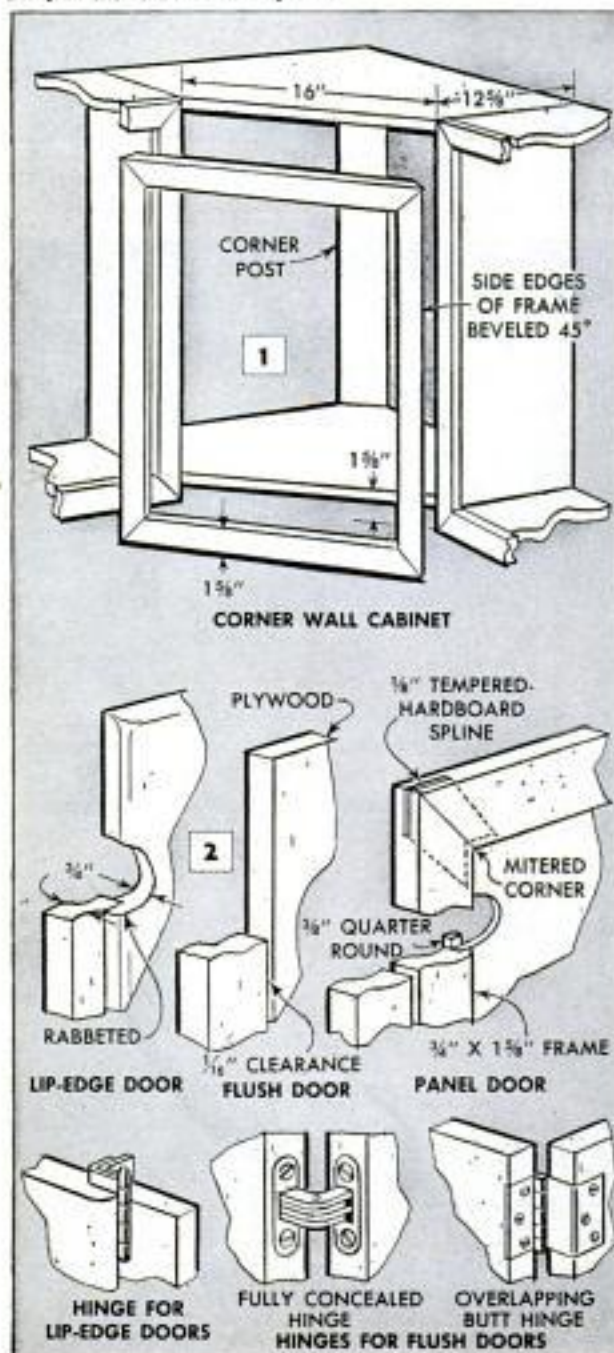


Libby-Owens-Ford Glass Co. photo

are of $\frac{3}{4}$ -in. int. although $\frac{5}{8}$ or $\frac{1}{2}$ -in. plywood can be used to reduce costs. A cleat under the top, screwed to the top and to the sides, and also a length of angle iron under the raised bottom, provide the means of attachment to a wall, with long wood screws that will extend no less than 1 in. into wall studs. Use of screws for this purpose permits the removal of cabinets at any time as may be desired. The wall forms the cabinet back. The front framing of the cabinet has mitered or half-lapped joints. The frame must be perfectly square. It is screwed to the plywood sides, top and bottom. Rows of equidistant blind holes in the sides are drilled before the cabinet is assembled. These accommodate metal shelf supports.

At corners two wall cabinets may be neatly joined to a corner cabinet as shown in Fig. 1. The corner space is accessible through a door which is set at a 45-deg. angle. Top and bottom of the corner cabinet are joined by a corner post, which is screwed to corner studs. Dowels can be used for joining the top and bottom of the corner cabinet to the adjacent wall cabinets.

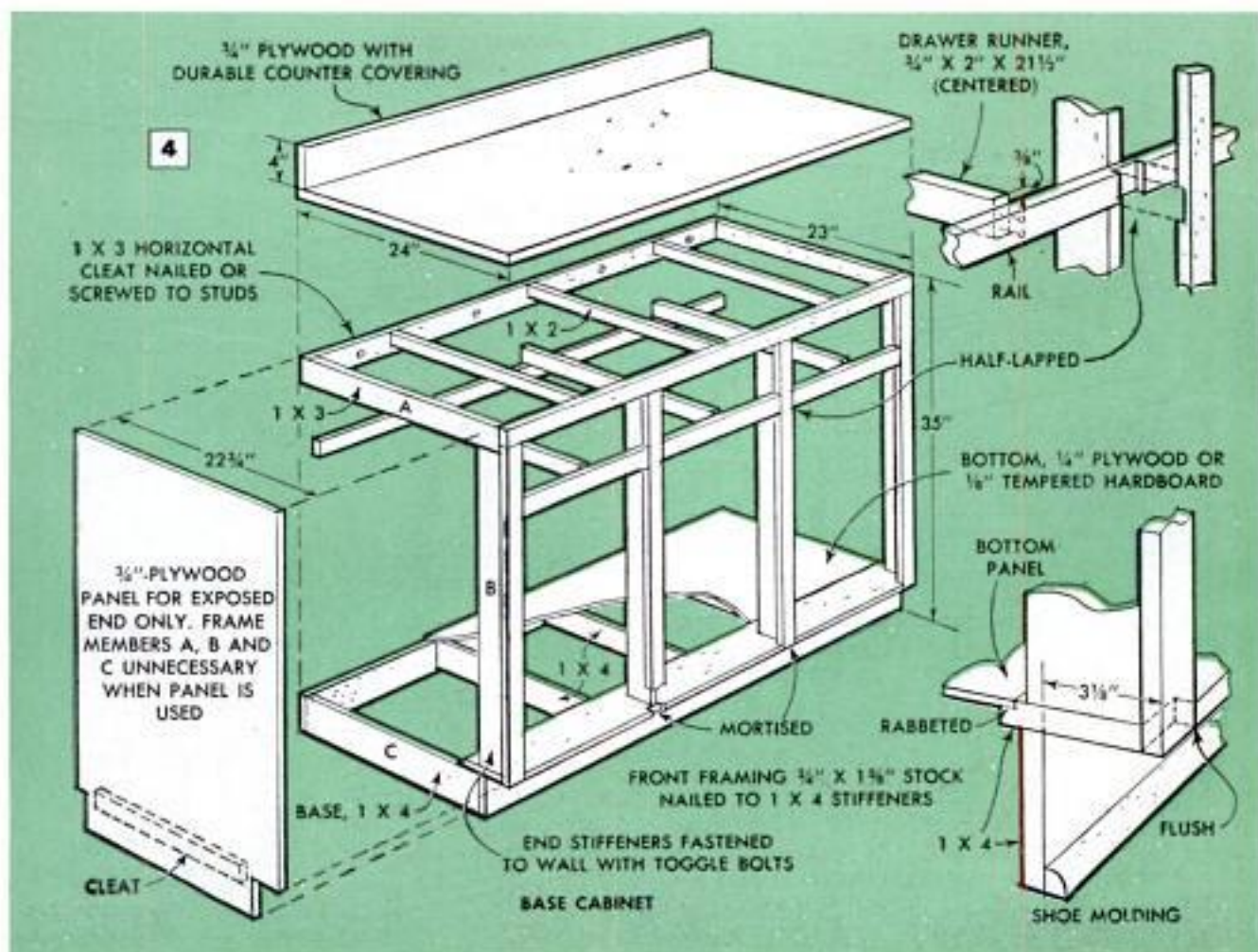
Cabinet doors and hinges: Three types of hinged cabinet doors are shown in Fig. 2. Lip-edge doors may be made from $\frac{5}{8}$ or $\frac{3}{4}$ -in. plywood. The 7-ply kind is least apt



to warp. A lip-edge door also may consist of a tempered-hardboard panel that projects $\frac{3}{8}$ in. beyond the edges of the frame to which it is attached. Flush doors may be single panels of $\frac{3}{4}$ or $\frac{5}{8}$ -in. plywood, or wood frames with inserted or attached panels of thinner plywood or hardboard. Mitered corners of the frames may be slotted for tight-fitting splines of $\frac{1}{8}$ -in. hardboard, which are glued in place to provide considerable added strength and rigidity. Fig. 2 shows three types of cabinet hinges that are least conspicuous when installed.

Sliding cabinet doors: Cabinets can be provided with sliding doors instead of hinged doors. Such doors can be made of corrugated glass, glass fiber, plywood or hardboard. Top and bottom edges of the doors should be set with mastic in metal channels that will resist wear. The door bindings slide in wider metal channels and they may be provided with tiny rollers or a ball-bearing track for easy action. Wall cabinets have either a vertical or a sloping front; either type may have sliding doors.

Base cabinets: Building of base cabinets is shown in Fig. 4. To get them absolutely level, the base may have to be shimmed up at spots if the floor is uneven or sloping. The shims should be nailed down so that

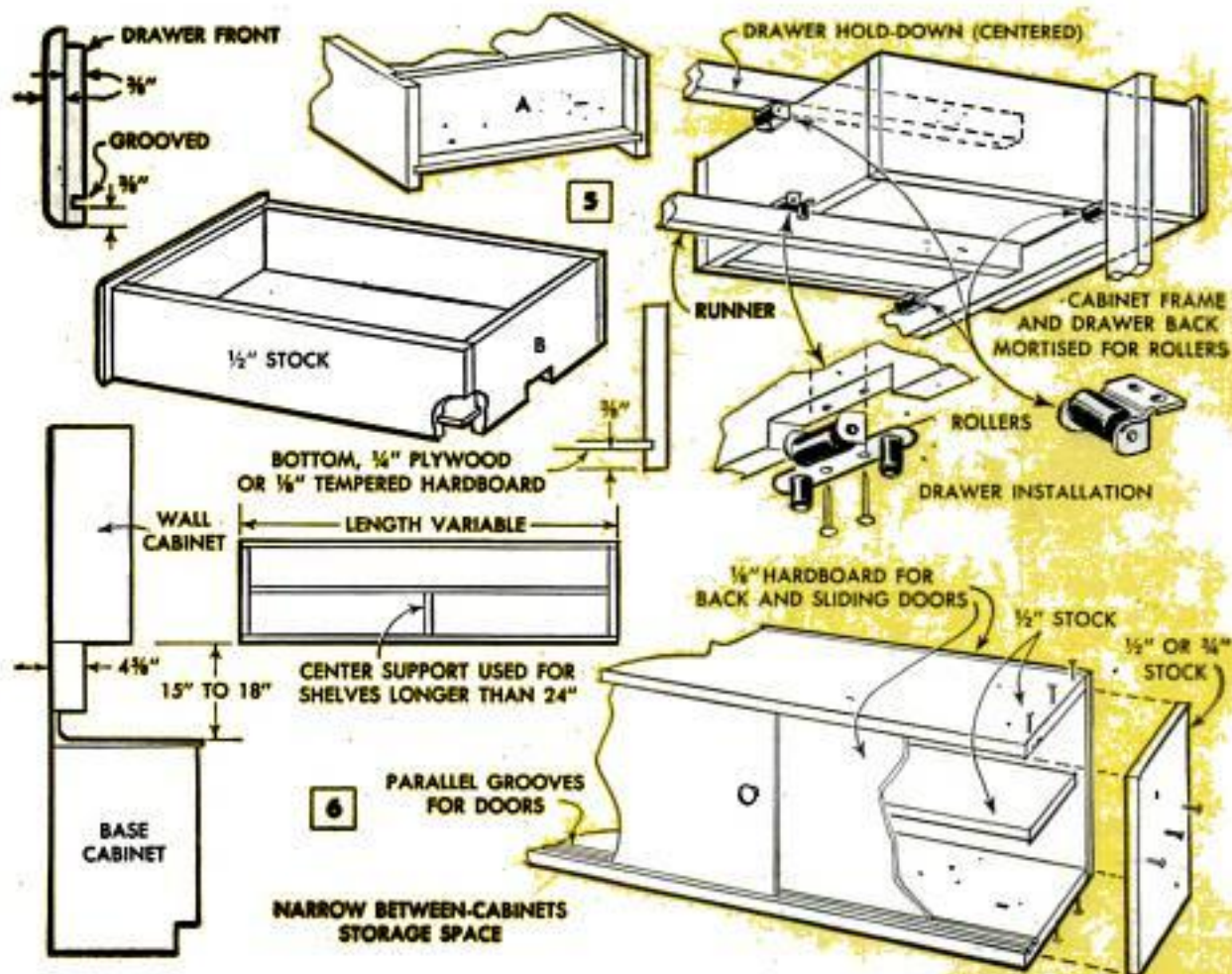




Typical drawer construction is shown in the details presented in the drawings below. Easy operation is assured by the use of drawer rollers that are applied with nails at the four points indicated in the drawing

they will not shift. The bottom of the cabinet may be $\frac{3}{4}$ -in. plywood, but cost can be reduced by using $\frac{1}{8}$ -in. tempered hardboard, nailed or screwed to crosspieces spaced 16 in. apart, and laid in a rabbet of the horizontal front frame member. In the method of construction shown, the front framing is reinforced by stiffeners, which, resting on the base, transfer all weight from the counter to the base, therefore the framing is not subjected to any strain. Partitions of $\frac{3}{4}$ -in. plywood can be substituted for stiffeners.

Drawer arrangements: Drawer construction is shown in Figs. 5 and 6. Two alternate arrangements of the back are possible. One is to fit the back into grooves cut in the sides so it rests on the bottom, detail A. The other is to have the back grooved to accommodate the bottom, detail B, in which case it extends past it. The sides and front also are grooved to take the bottom. Fig. 5 also shows the installation of inexpensive rollers that make drawers easy to open and close. The narrow between-cabinets storage unit shown in Fig. 6 uses space normally wasted. These storage units may have a narrow shelf and sliding doors. If the units are longer than 24 in., the shelf should be supported at the center. ★★★



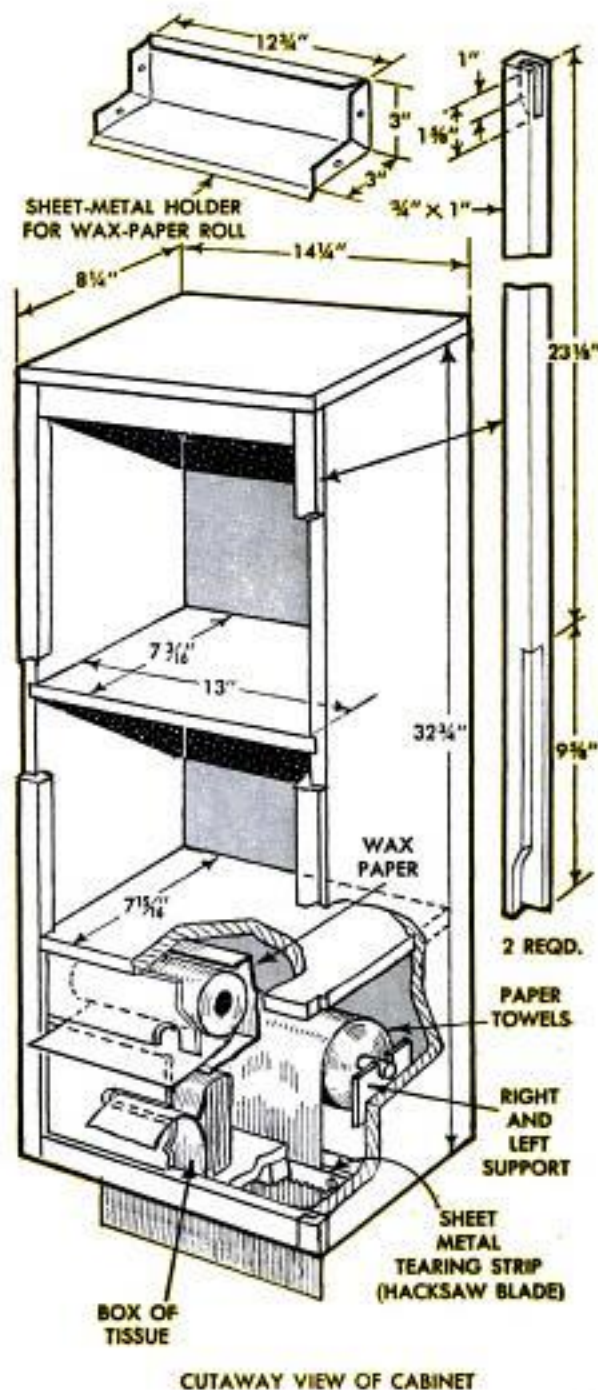
UTILITY CABINET

for your kitchen

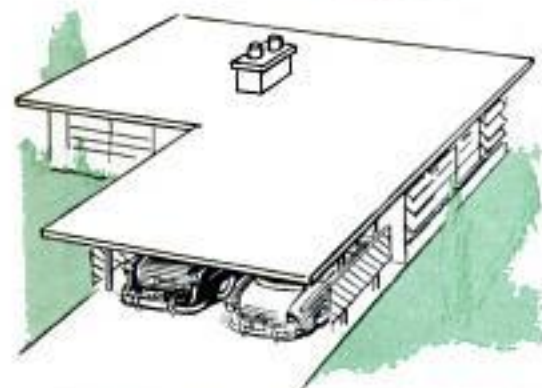
ANY ADDITION to the convenience and storage facilities of the kitchen is worth carrying out, especially if it saves time and steps. This handy wall cabinet has been designed to provide storage space for cookbooks and recipe files and also to serve as a wall rack for tissues, wax paper and paper towels. The dimensions given on the detail of the construction are those of the original cabinet. To fit the cabinet into your own kitchen you may have to make some changes. However, the construction is simple and the size can be altered without affecting the usefulness of the unit. Before cutting stock, make careful measurements of the space the cabinet is to fit. Then cut parts accordingly for width and length. If the cabinet is to be painted, use plywood for the sides, top and shelves. Facing strips and other small parts should be cut from solid stock. The lower panel, which is slotted for tissues and wax-paper tabs, is cut from $\frac{1}{4}$ -in. plywood and fitted into stopped rabbets cut in the vertical facing strips. Although not shown in the detail, the lower edge can be fitted into a groove cut in the horizontal facing strip. The back also is cut from $\frac{1}{4}$ -in. plywood. The lower shelf is pivoted at the back and is fitted loosely so that it can be swung upward for insertion of paper-towel, tissue and wax-paper refills. The pivots are pins made by driving small screws into the ends of the shelf near the back edge and then cutting off the heads, leaving about $\frac{1}{2}$ in. of the body of the screw projecting. These projections enter small holes drilled in the side panels. The bottom is slotted to permit passage of the paper-towel strip and is fitted with a tearing strip made by attaching a hacksaw blade to a cleat screwed to the bottom piece. To obtain a clean tear, it's best to use a hacksaw blade with fine teeth, about 20 or 22 teeth to the inch. The second shelf can be positioned anywhere you want it and the ends can be fitted into dados (grooves) as shown or supported on small cleats screwed and glued to the side panels. Do a thorough job of sanding before painting or enameling. Round all exposed edges slightly and then apply a sealer or undercoater. Sand lightly after allowing time for drying and finish with two coats of enamel in the color desired. When locating the cabinet on the kitchen wall, place it so the top shelf is within easy reach from the floor without using a step-stool.



A cabinet like the one pictured provides space for cookbooks, recipe files and a separate compartment for tissues, wax paper and paper towels, all within easy reach. Unit saves steps, time and drawer space



X149



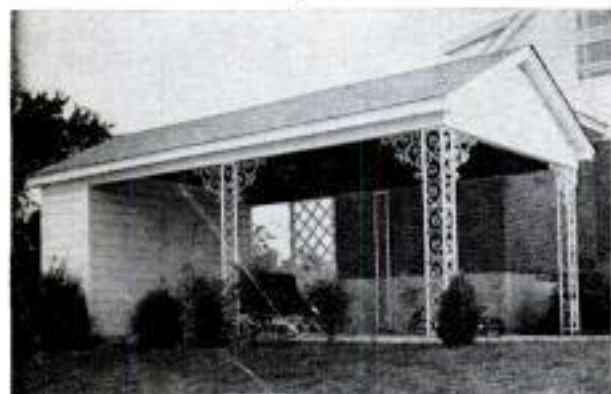
Kawneer Co. photo

One of several prefab carports on the market that comes knocked down and can be attached to house in a short time

BUILD YOUR OWN

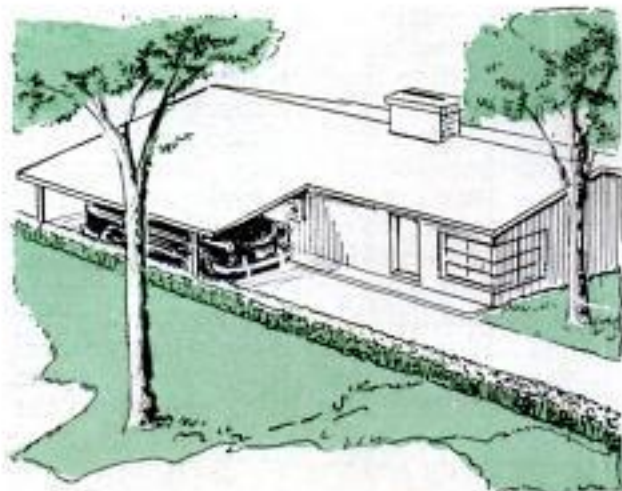
MODERN ARCHITECTURE of new homes as well as high costs is causing many home builders to substitute carports for garages. The modern ground-hugging home with its open atmosphere just naturally needs the airiness of a carport to complement it.

As shown on these pages carports are of many types. Some may be purchased knocked down and assembled by the homeowner, photo above, while prefabricated metal roofs only may be purchased in other cases, the owner providing the understructure, Fig. 2. Or, they may be built completely by the owner in the conventional manner.

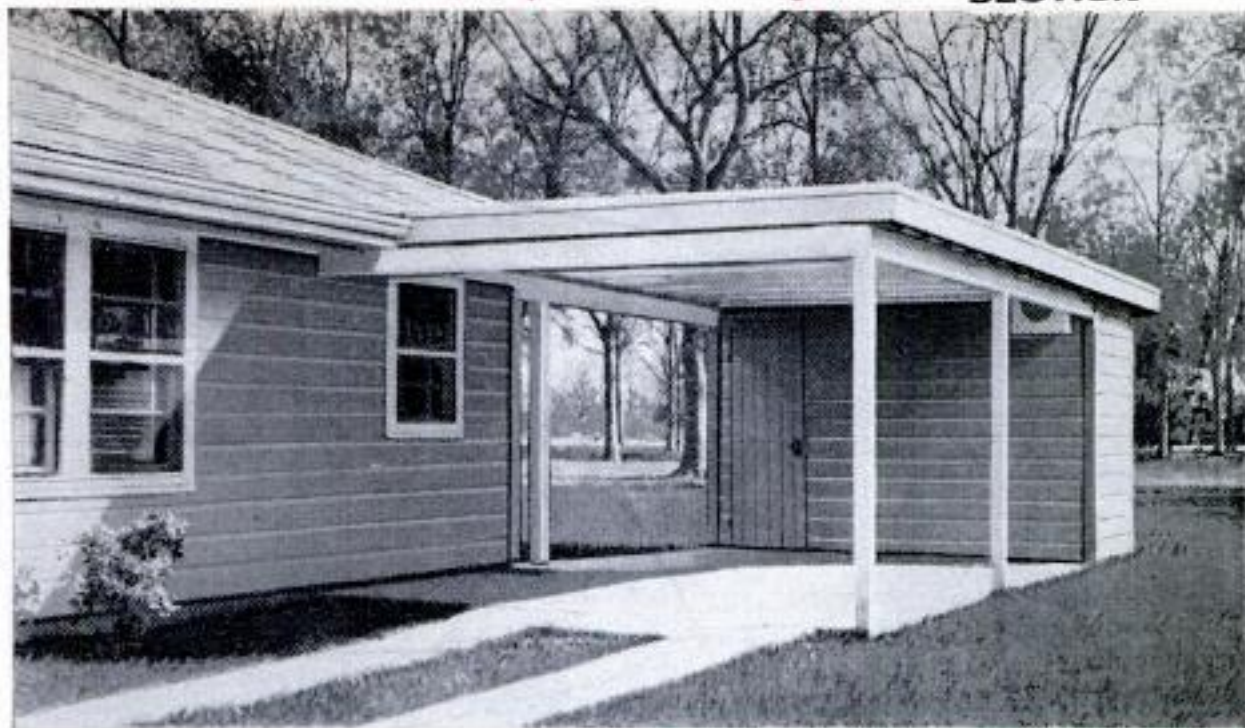


Tennessee Fabricating Co. photo

Ornamental-iron columns do a lot to dress up a carport and provide durable, nonrotting support posts



POPULAR MECHANICS



Most practical type of carport has one end housed-in to provide storage for bikes and garden equipment

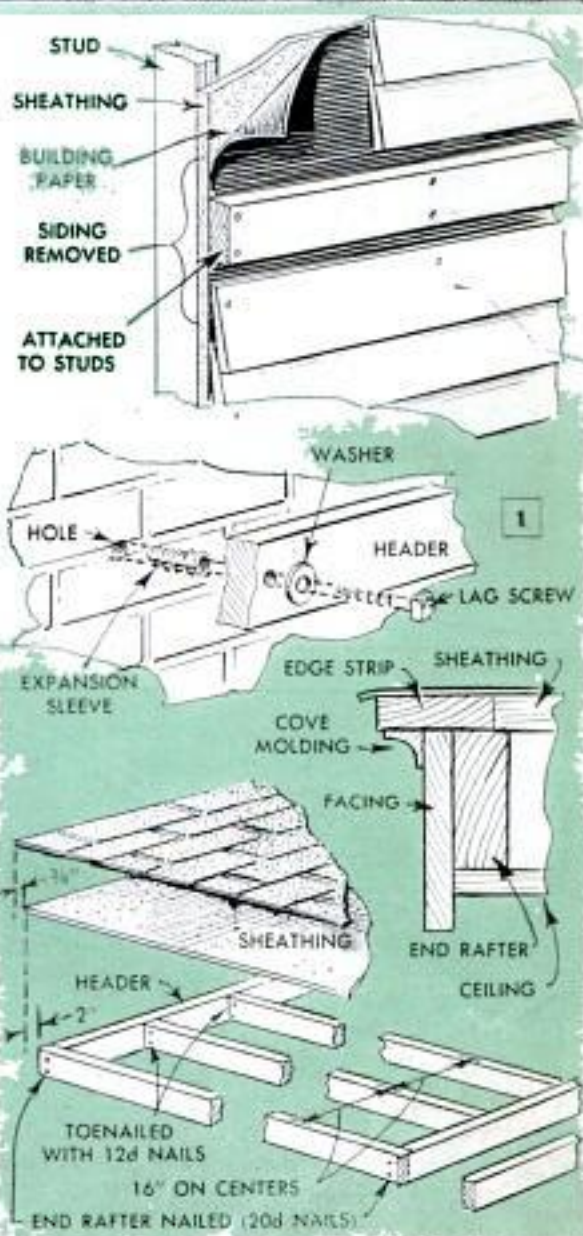
CARPORT

Minimum advisable dimensions for a one-car shelter are 10 ft. wide, 20 ft. long and 7 ft. high. The protection provided by a carport can be further increased by locating it in complete shade and away from prevailing winds. For example, an inside corner of an L or U-shaped house may enclose a carport on two sides.

The illustrations on the opposite page show several suggested types. A carport like the top one should have fairly uniform distribution of its weight on the angular supports, which may be lengths of 3-in. pipe embedded in large concrete footings. Ornamental-iron columns as shown in the lower photo are sometimes preferred to wooden posts or steel pipes. A flat roof may serve as a sun deck reached by a second-floor door.

General details of building an attached carport having a conventional shingled roof are shown in Fig. 1. Start construction by nailing or lag-screwing a header to the wall. Sometimes it can be attached without removing any siding.

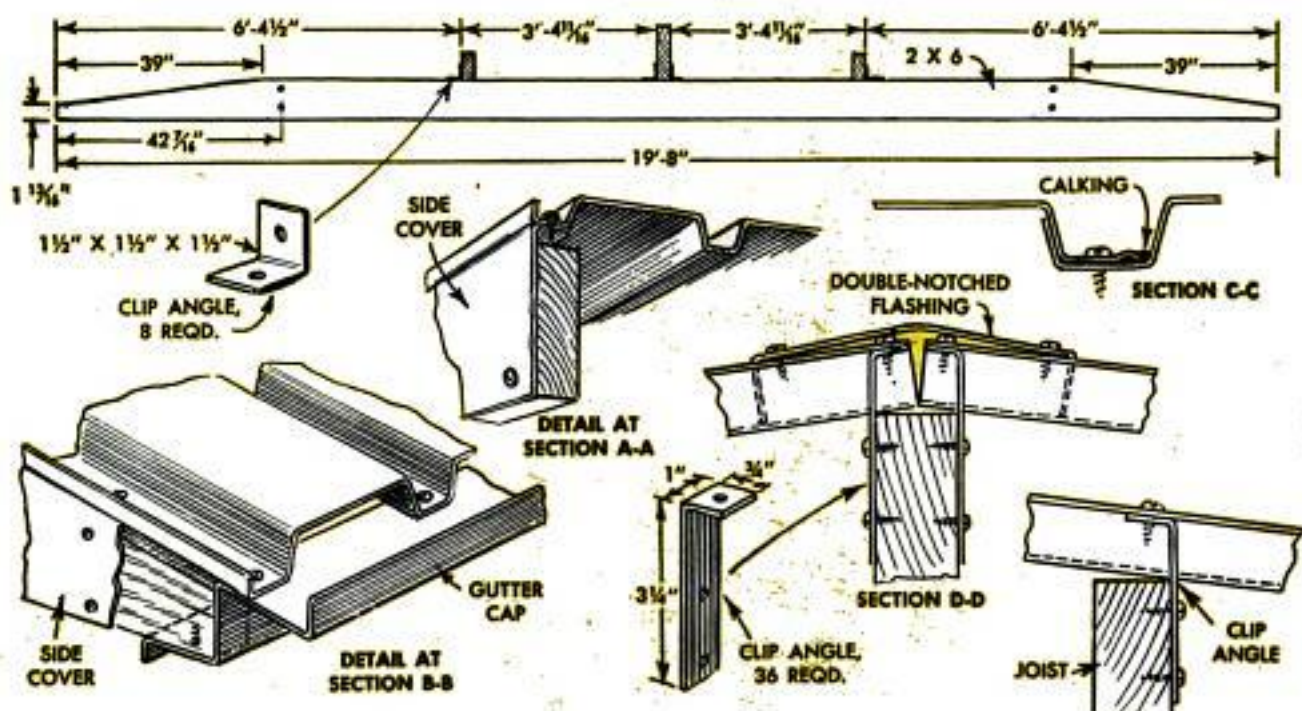
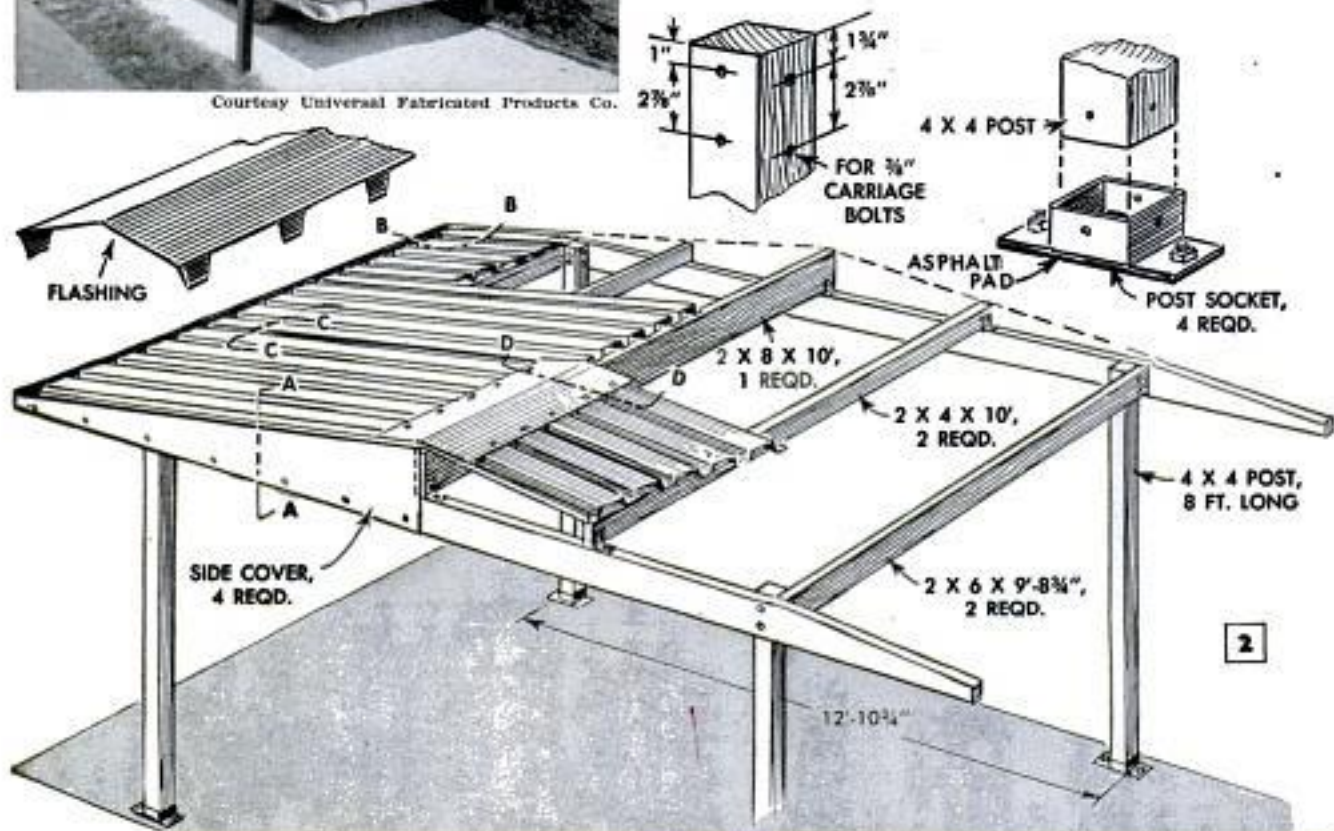
For rigid attachment to a brick wall use lag screws and expansion sleeves or other suitable wall anchors set in holes. Next, set up the posts or pipe supports and install a girder across them. Rafters may rest on the girder, the rafters being toenailed to it. Or, they may be assembled like the arrangement in the lower detail of Fig. 1. If





Courtesy Universal Fabricated Products Co.

This simple build-it-yourself carport features a lightweight aluminum roof that comes in kit form pre-cut to fit a supporting wooden framework of stock lumberyard material. Supporting framework goes together as detailed below, the various members being drilled at the points indicated for bolting together. Corrugated roof panels are lapped and caulked to make watertight joints. Roof kit, which includes four post sockets and all screws and bolts, retails for about \$200. Add about \$25 for the wood



rafter length between supports does not exceed 10 ft., 2 x 4s may be used. But for spans from 10 to 14 ft., use 2 x 6s.

Corrugated glass-fiber panels make an ideal roof for carports. Besides being translucent, the material is strong and lightweight and may be sawed and drilled. Under the glass fiber, single 2-in. rafters can be spaced 24 in. apart but for 32-in. spacing, use 4-in. stock or two 2-in. rafters nailed together. Bridging is installed as in Fig. 4 for strength and appearance. The joining edges of corrugated roofing panels are sealed by strips of special mastic tape, or by applying calking compound. Nail or screw holes should be pilot-drilled through the roofing material. Nails for attaching glass-fiber panels have resilient washers under the heads.

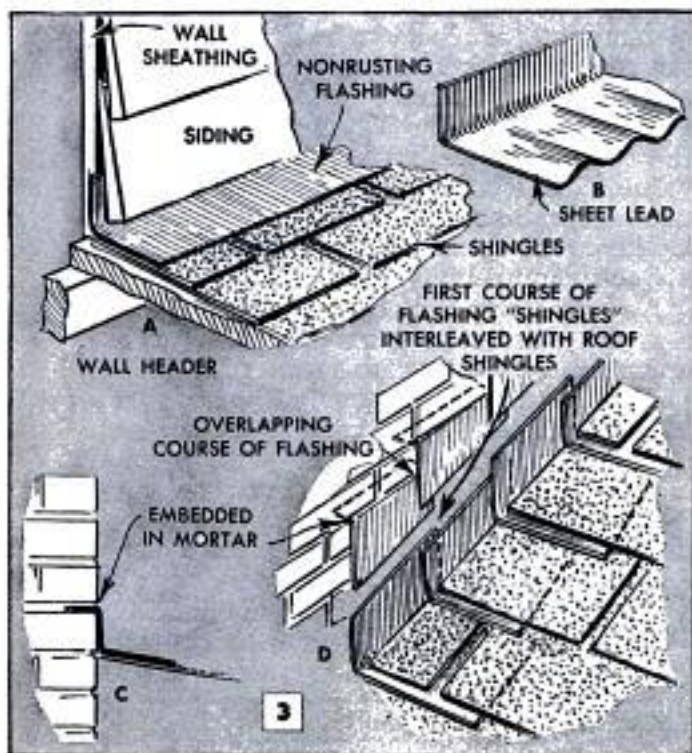
The lower-left details of Fig. 4 show how pipe can be substituted for wooden rafters to support a glass-fiber roof. The pipes are spaced to come under joining edges of adjacent panels. For attachment, use non-rusting machine screws fitting tapped holes in the pipe. The screws should also have resilient washers under their heads.

For leakproof joints between house wall and carport roof, it is best to install sheet-metal flashing. The flashing goes under the siding or shingles of the house and over the shingles of the carport roof as in detail A of Fig. 3. For flashing on corrugated roofing use sheet lead bent to conform to the corrugations as in detail B. Flashing between a brick wall and a roof, details C and D, is embedded in mortar. When the carport roof runs diagonally across brick courses, flashing is done with two layers of

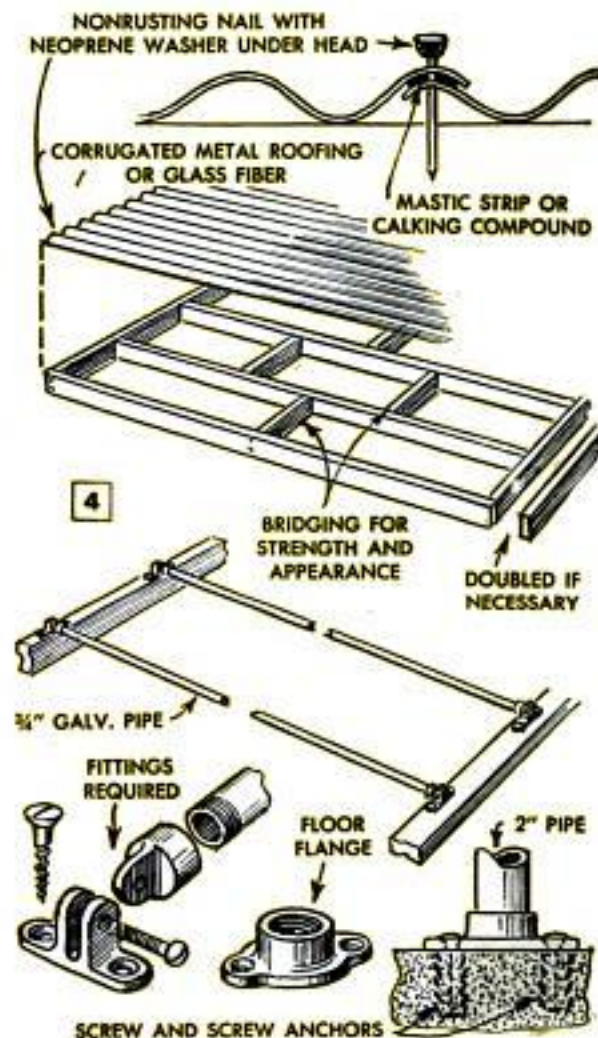


Filon Plastic Corp. photo

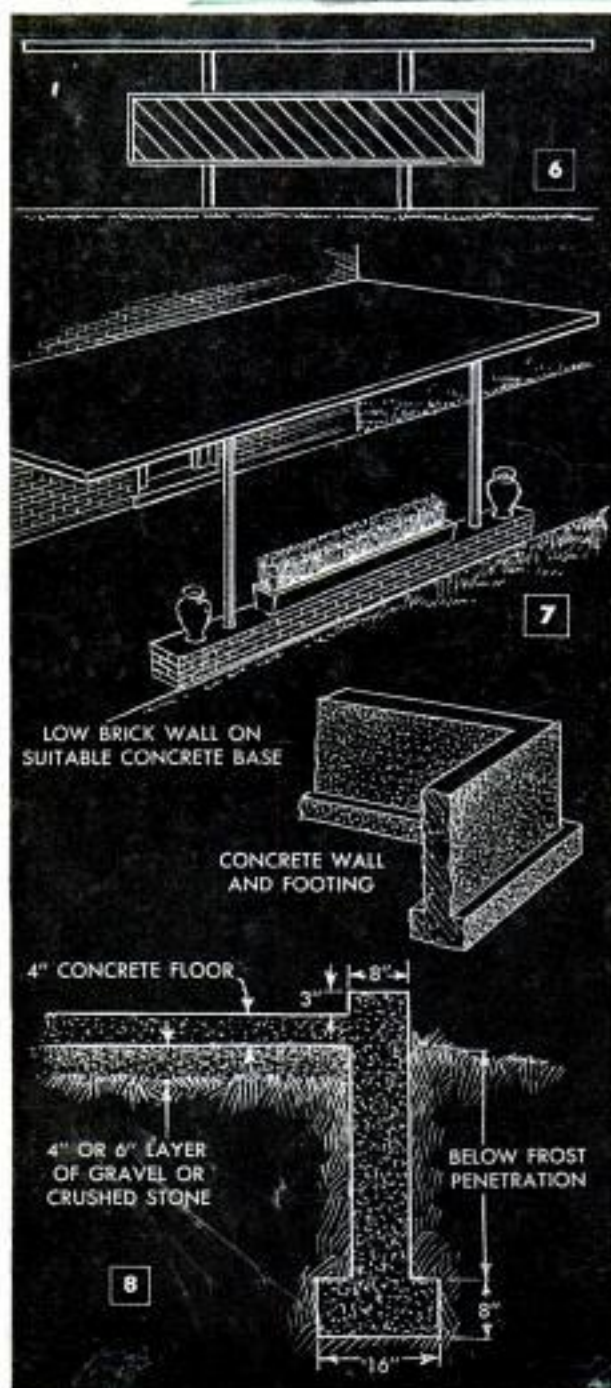
Corrugated glass-fiber panels are perfect for covering roof of carport. Material is translucent, featherweight and comes in many colors



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"metal shingles" as indicated in detail D.

The roof supports may be wooden posts, ornamental-iron columns or steel pipe. The latter should not be smaller than 2 in. in dia. As the pipe is threaded at both ends and is screwed into floor flanges, it can be adjusted easily for height. The upper flange is attached to the underside of the roof girder or header with wood screws. The lower flange is attached to a concrete slab or to a foundation wall by means of screws and screw anchors as shown in the lower-right detail of Fig. 4.

Fig. 5 shows a woven-wood weatherbreak that gives protection against weather and also provides privacy. It can be made from lengths of 1-in. lumber, or from strips of tempered hardboard. End posts can be built up from 1-in. lumber as detailed, to cover the ends of the woven boards. The ornamental panel shown in Fig. 6 may consist of natural-finish, bevel-edge boards arranged at a 45-deg. angle and held in a grooved frame. The V-joints produced by the beveled edges have definite decorative value. The low brick wall shown in Fig. 7 can be combined with a planter. A simple trellis covered with climbing vines also is attractive and will provide shade.

A gravel or crushed-stone floor often is entirely satisfactory for a carport. If a concrete floor is desired, this generally is laid before erecting the carport, although it can be added later. A concrete floor is much more durable if reinforced with welded wire mesh made especially for this purpose. The earth under a slab floor should be well drained. In northern climates much frost damage can be avoided by proper drainage.

Where a carport is to be transformed to a garage later, with walls like those of the house, concrete foundation walls and footings should be provided as shown in Fig. 8. In northern climates the footings should be set below frost penetration. ★★★

the

POPULAR
MECHANIC

CRAFTSMAN

WTM:57



By Clifford B. Hicks

ARE YOU CRAMPED for space to sleep overnight guests? One answer to the problem is a "bedroom" that folds into a bookcase in the manner pictured above. Two single beds, of the type that fold, roll into the lower compartment of this built-in. The space above the bed compartment is utilized for bookshelves, spaced as required. The photo above shows the lower bed compartment fitted with shutter doors, one pair of doors to each bed section. If desired, you can substitute panel doors or flush doors cut from $\frac{3}{4}$ -in. plywood. On the original built-in pictured, the shutter doors were made in the home shop to fit the space available. However, in most instances, standard ready-made shutter doors can be fitted, either by trimming the stiles and rails, or cutting the facing strips wider.

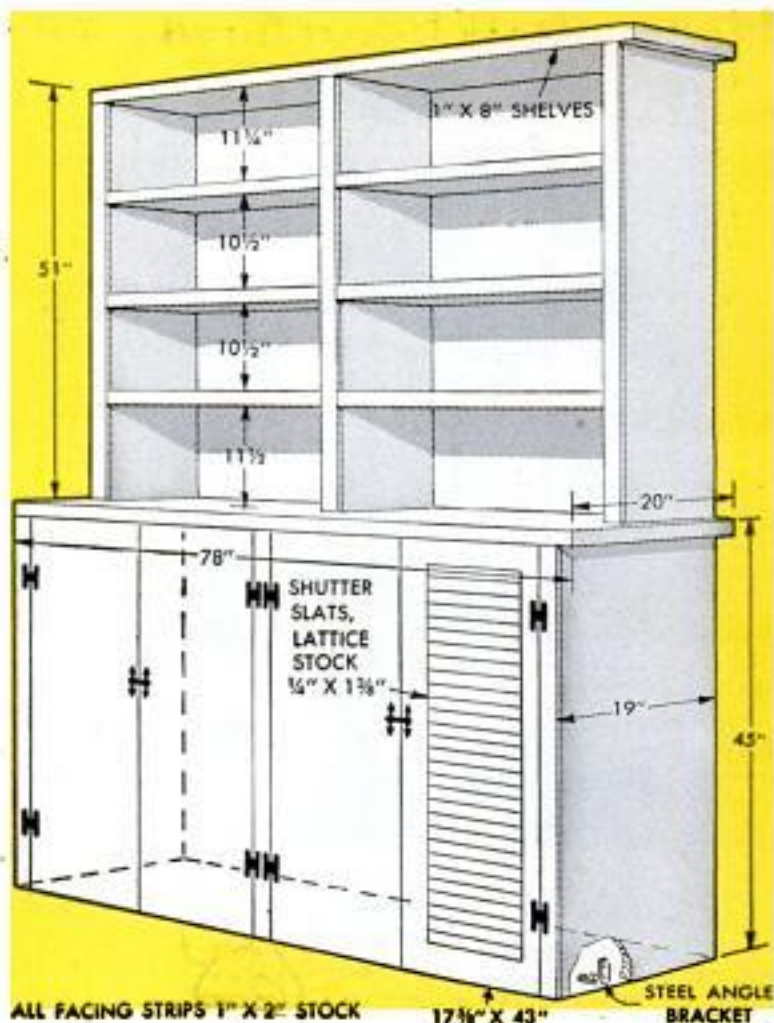
The dimensions given are only general in both height and width of the unit. The first

step is to make careful measurements of the space you have available. Then measure the beds folded, so that you have the over-all height and width plus the necessary allowance for clearance to permit them to be moved in and out of the compartments easily. Dimensions of folding beds of the type utilized may vary somewhat, so it is best to check each one individually.

The lower compartment consists of two end panels and a center divider, all cut from $\frac{3}{4}$ -in. plywood. To install, remove the baseboard and fasten the side panels and divider to the wall and floor with steel angle brackets. When the unit is installed in a corner, one end panel is simply screwed to the wall. The top of the compartment is cut to size from $\frac{3}{4}$ -in. plywood and attached to the panels with glue and finishing nails. Fit facing strips to the exposed edges of the top and nail and glue in place. If you wish to cover the top with linoleum or a

wood-grained plastic laminate, now is the time to do it. Sand the top smooth before cementing the plastic.

The endpieces and center divider of the upper bookcase section are cut from 1 x 8-in. solid stock. All three are dadoed (grooved) to take the ends of the bookshelves, the divider on both sides at the same points. You can, of course, use narrow cleats to support the shelves. You have a choice of using the room ceiling as the top of the bookcase, or of fitting a separate top piece. In either case, finish shelves and vertical members with facing strips, fastening the strips with glue and small finishing nails. Set the nailheads below the surface and fill the holes with wood putty. Nail a filler strip to the bottom of the top in line with the facing strips. Ordinarily, this should be $\frac{3}{4}$ x $\frac{3}{4}$ in., but the width may be varied to suit the doors available. In any case, the height of the openings must be sufficient to clear the folded beds. The inner edges of the door stiles should be beveled slightly so that they close without binding against the edges of the center facing strip. Hang the doors with surface hinges and fit each pair with bar latches as pictured. Be sure that each door clears the floor sufficiently to



permit it to open and close freely. Then cut and refit whatever portions of the baseboard are necessary. Finally, apply an undercoater and paint to match the color of either the wall or the woodwork. ★ ★ ★

Heated Wheel Joins Plastic Yard Goods

Plastic yard goods of the thermosetting type can be joined or seamed by using a heated wheel as is done in manufactured items. A soldering iron is used as the heating element in the homemade wheel. Remove the copper tip from the soldering iron

and substitute a short length of copper tubing, the end of which is flattened. A hole is drilled near the end of flattened portion to permit mounting a small copper washer with a screw and nut. The washer must turn freely on the screw. In use, the heated wheel is run over the material to be joined, using enough pressure for complete fusion.

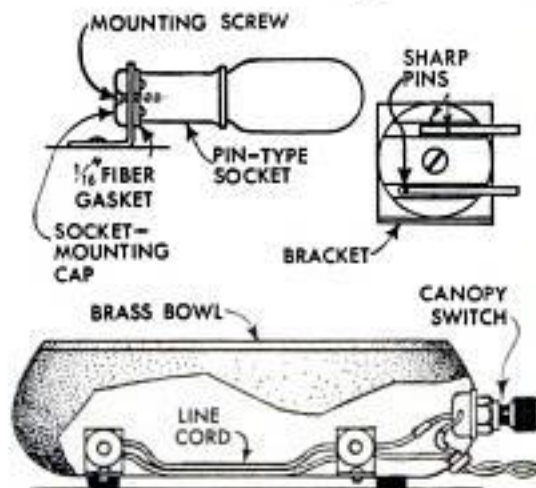


Painted Nursery Walls Decorated

When a child's room is painted and a contrasting color of enamel is used for trim, utilize the leftover trim enamel for unusual wall decorations. Simply enamel sheets of thin paper and allow them to dry. Then cut out animal or other figures from the reinforced paper. Use paste, rather than glue, to attach the figures, since paste will wash off easily when the walls are washed before the next redecorating.

Illuminated Flower Bowl Is Nighttime Decoration

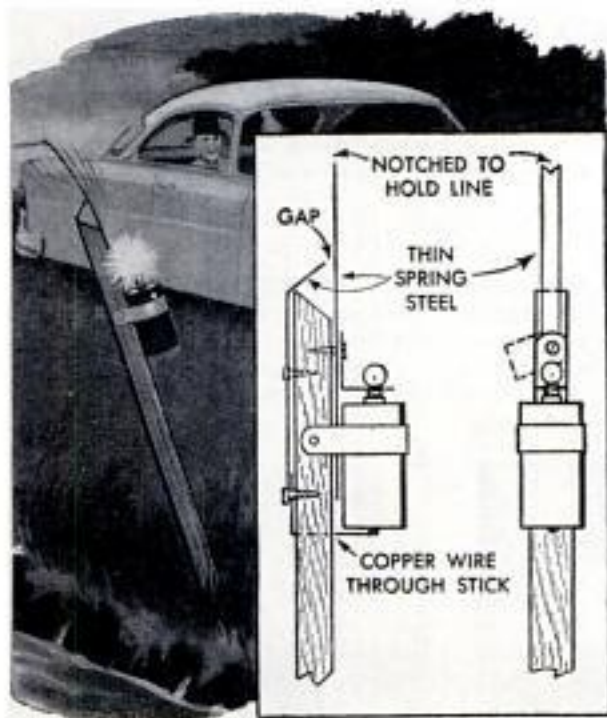
A large copper or brass flower bowl is strikingly attractive at night when illuminated so that light shines up through the plant. Two pin-type, or other screw-mounted sockets, are fastened to the bottom of the bowl by small angle brackets. Each bracket is cut from a strip of sheet brass $\frac{3}{4}$ in. long and 2 in. wide, each leg of the angle being 1 in. After the sockets are installed on the angles, if the pin-type socket is used, a fiber disk is fitted between the socket and cap to insulate the cap from the angle. In the pin-type socket, two pins in the cap are forced through the wire to make contact when the cap is screwed on the socket. Two holes are drilled in the bowl for the canopy switch and line cord. A rubber grommet



protects the wire from the sharp edge of the hole. Two 25-watt appliance lamps will furnish ample illumination at moderate cost. Unusual decorator effects can be obtained by using colored bulbs instead of regular white ones.

Clinton R. White, Costa Mesa, Calif.

"Electrified" Fish Pole Flashes Light When Catch is Hooked



You can sit in the comfort of your car when fishing on cold nights and let the fish signal when he is caught by turning on a light with this "electric" fishing pole. The pole consists of a length of wood to which a strip of spring steel is screwed to hold the line. A flashlight bulb in an L-shaped bracket is in constant contact with the center terminal of a flashlight dry cell and with the spring steel. The dry cell is held on the pole with a sheet-metal strap. A

copper wire contacts the bottom of the dry cell, passes through the pole and is soldered to a metal strip screwed to the opposite side of the pole. The metal strip projects above the end of the pole and is bent so there is a gap between it and the spring-steel strip. Tension on the fishing line bends the spring steel so it contacts the strip and closes the circuit to turn on the light. The dry cell should have a cover to insulate it from the steel strip.

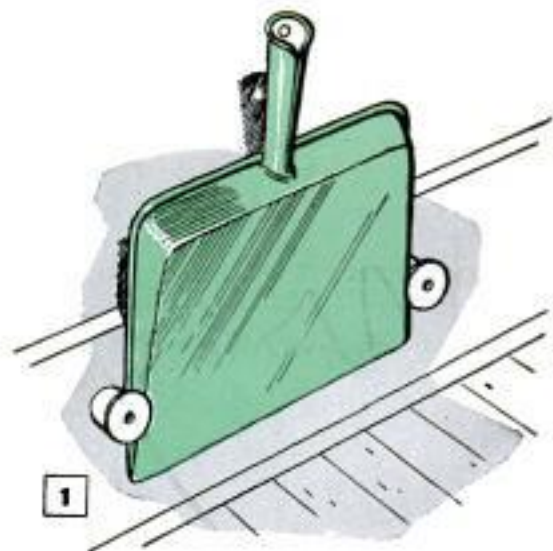
Joseph E. Desrosiers, Coventry, R. I.

Neckties Cleaned in Fruit Jar

Soiled neckties and other small articles can be dry cleaned in a fruit jar. Fill the jar to within 2 or 3 in. of the top with cleaning solvent, drop in the tie and screw the cover on tightly. Then shake vigorously for several minutes to loosen the dirt. Finally remove the tie and hang it in a ventilated place to dry. **Caution:** Remember when working with cleaning solvents that some of them are flammable and all of them must be used in a well-ventilated room. The jar may be used also with soap or detergent and water to wash small articles.



Solving HOME PROBLEMS



1. THE DUSTPAN is always easier to locate when you provide a rack made especially for it. Rack must serve a twofold purpose—hold the pan securely and provide incentive to replace it each time immediately after use. Cut a medium-sized thread spool in half and then nail the halves to the baseboard

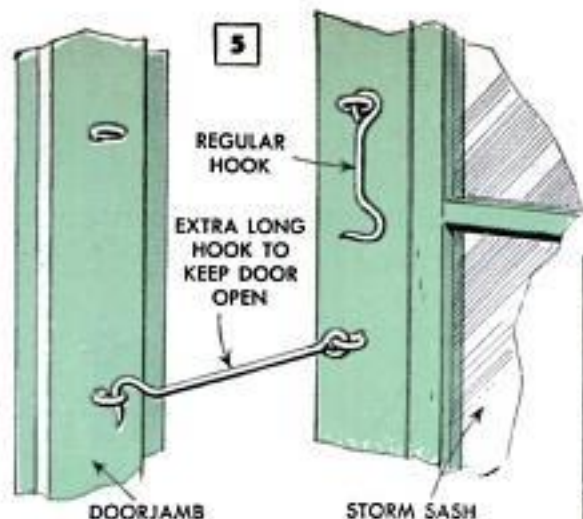


2. A FUNNEL of the type having a smooth neck, or spout, may cause trouble when pouring liquid through it into a glass container. The smooth neck prevents the escape of air from the container as the liquid enters. You can easily avoid the trouble by slipping a bobby pin over the neck of the funnel as shown

3. HOT-DISH HOLDERS not only should serve the purpose, they should be attractive as well. Single-faced corrugated paper used in window displays comes in a variety of showy colors and designs and is well suited for use in making hot-dish mats. Cut disks from the material selected and coat each side with water glass, applying two coats. This stiffens the corrugations and makes the material fireproof

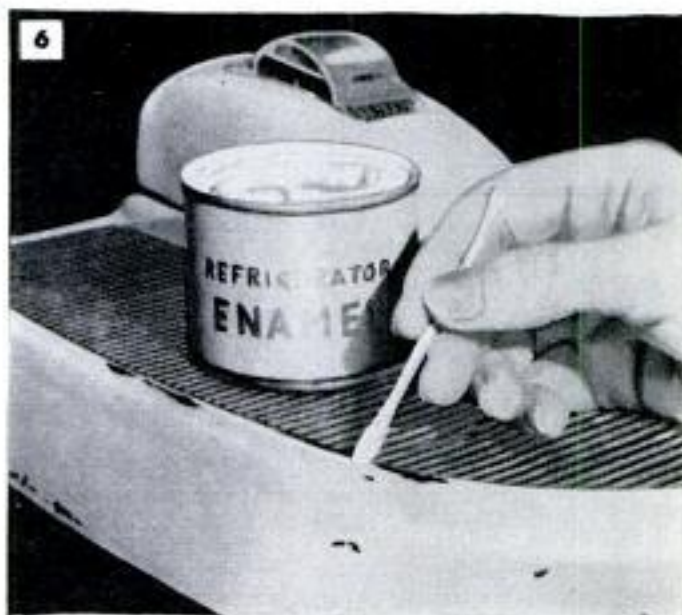
4. UPHOLSTERY WELTS on chair and sofa cushions usually are first to show signs of wear. However, the original newness can be restored by overcasting the worn welt with colored nylon yarn in manner shown



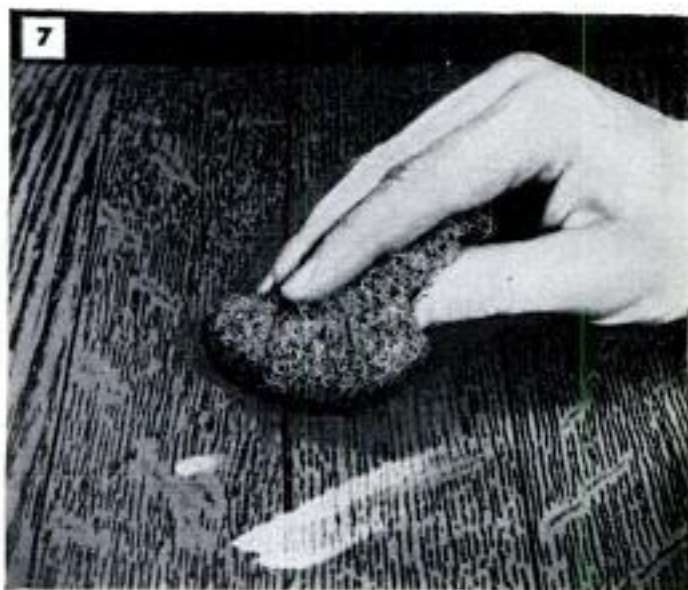


5. A STORM DOOR can be held partly open on winter days when extra ventilation is desirable simply by installing a long hook below the regular one. The rigid hook is much more satisfactory than the wedges often used, as it prevents the door from being blown open by wind. This can result in broken hinges or damage to the door itself. Hook is made from wire and two screw eyes

6. SMALL COTTON SWAB makes an excellent touch-up brush, especially where you have to work close to an edge without smearing paint or enamel on other parts. Swab, or applicator, is made by winding a small pledget of cotton on end of a toothpick or meat skewer. Wind the cotton tightly so that there are no trailing wisps to carry the paint beyond the line. Especially useful for applying heavy enamels



7. PAINT SPATTERS are easily removed from linoleum or hardwood floors with fine steel wool, even after the paint has partially hardened. Use light pressure and a short stroke, just long enough to cover the spot without dulling the finish on the surrounding area more than necessary. Wax and polish to eliminate any dull spots that may have been caused. Method usually is better than using solvents



8. STEEL-WOOL PAD keeps putty knife clean when you're glazing sash or replacing a broken pane. Form a pad of medium-fine steel wool and pour linseed oil on it. Then keep it handy to clean the putty-knife blade frequently as you work. Saves time and the job goes faster as the pad not only cleans the blade thoroughly, but coats it with oil as well. This coating enables you to put an especially smooth glaze on a fillet of putty

Illuminated "Balloon Face" For Nighttime Fun



Fun for Halloween and all gala after-dark occasions, this illuminated face will please any youngster. Tape, a balloon, heavy paper, a flashlight and a little imagination for painting the features on the balloon are all that are needed. The balloon is inflated and painted, then the paper is rolled into a cone, the large end of which fits snugly over the balloon. The small end of the cone is fitted over a flashlight, and both balloon and light are taped to the cone.

Cellulose Tape Over Knuckle Aids Removal of Ring



A tight-fitting ring sometimes can be pulled over a swollen knuckle by using strips of cellulose tape. Narrow strips of the tape are cut and fitted over the knuckle as shown. The tape grips the skin of the finger, preventing it from

being forced into a ridge ahead of the ring, and also provides a smooth sliding surface.

A. H. Waychoff, Phoenix, Ariz.

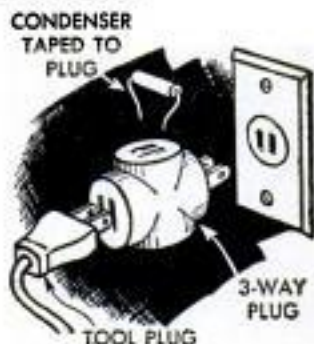
Prussian Blue Locates High Spots When Refitting Wooden Door

When refitting a door, a tube of Prussian blue can be used to simplify the job. Rub a small amount of the color along the door-frame where the door contacts it, then

open and close the door several times. The color will be transferred to the edge of the door most heavily where it is binding, thus indicating the spots that must be planed off to provide a satisfactory fit.

Radio Interference From Tools Eliminated by Condenser

Much of the radio interference caused by the use of electrical tools in the workshop can be eliminated by wiring a condenser across the line that carries current for the tool. One method is to bend the pig-tails of a .01-mfd., 600-volt capacitor (condenser) to fit into one side of a 3-way plug. After the pig-tails are inserted in the plug and make contact, the condenser is taped in place. As shown in the illustration, the 3-way plug is then used between the tool cord and the wall outlet. This method will also eliminate some of the interference caused by an electric razor.

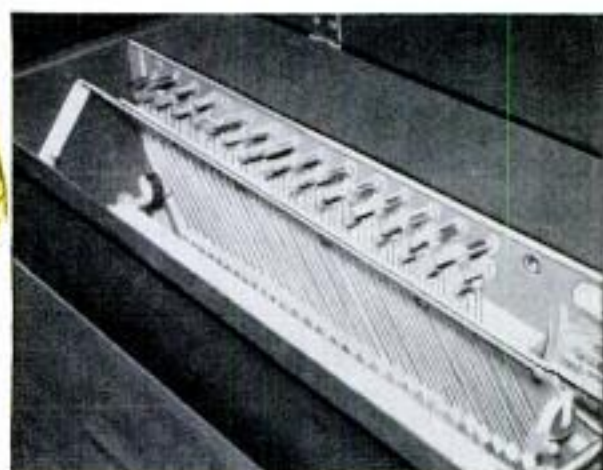
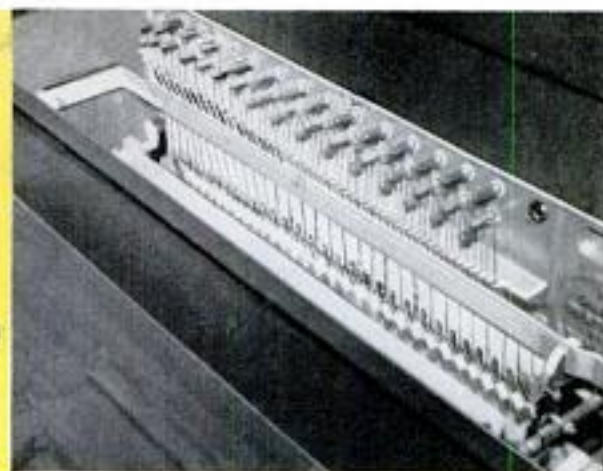
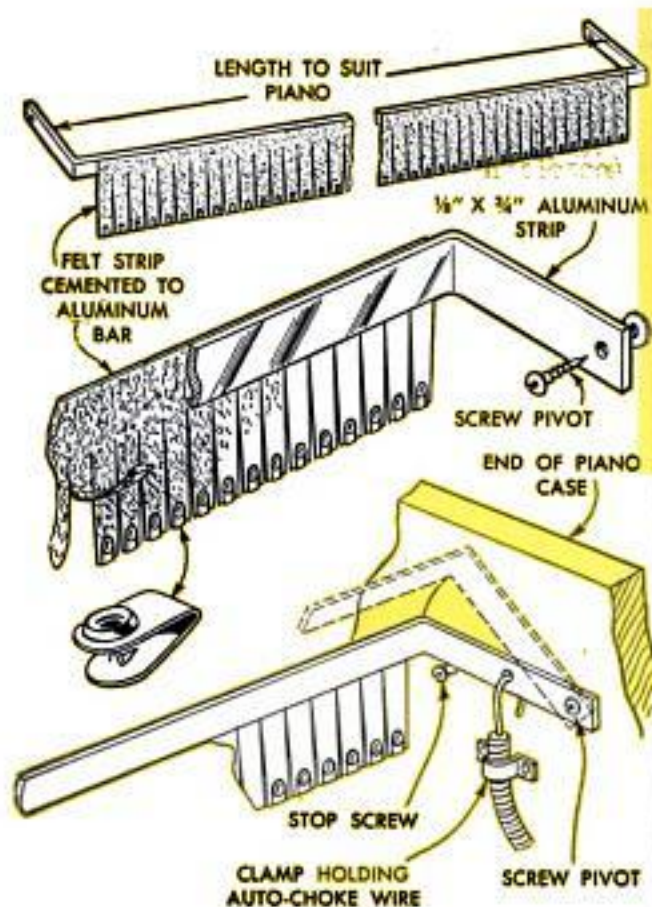


Lightweight Level Improvised For Jobs Around the House

Improvised from a yardstick and a small level, a lightweight but long level can be used for dozens of jobs around the house. Easily held with one hand, the level can be used to align large pictures, scribe level lines for installing wall tile and similar jobs. Make sure the yardstick to be used is straight by holding it edgewise on a table or other flat surface. When attaching the level to the yardstick, place both on a flat surface and align their bottom edges.



☞ To restore the color to a faded rug, sponge a small portion at a time with hot water, to which a little ammonia has been added. Use a clean duster to dry it thoroughly.



SPECIAL MUSIC FROM OLD PIANO

That popular "mandolin and guitar" tone can be achieved on your recreation-room piano by installing the simple attachment pictured in the photos. It consists of an aluminum strip, or bar, with the ends bent at right angles and pivoted to the ends of the piano case. A strip of felt is cemented to the outer face of the bar. The felt is cut to form separate tabs, as many tabs as there are felt-faced hammers. A pencil mark is made on each tab at the point where it is struck by the hammer. Then the felt tab is cut off just below the pencil mark and a pinch-type paper clip is installed at the end of each tab as shown in the details above.

This finished, turn stop screws into each end of the piano case to hold the bar in position. Obtain an auto-choke button and cable, cut to the required length and install as in the lower detail. The control button should project from the front panel of the piano case in a position where it is easily reached. Adjust the control so that when the button is pulled out the felt tabs will be lowered to a position in line with the hammers with the bar against the screw stops. When the button is pushed in, the control should lift the felt tabs clear of the hammers as in the lower photo.

L. F. Vogt, Westfield, N. J.

Pipe Cleaner Used for "Brushing" Spaces Under Ring Setting



You'll be surprised how effectively a pipe cleaner works in brushing out the dirt from tiny openings between the prongs of a ring setting and also under it. Dip the cleaner in soapy water, or a detergent solution which helps to loosen dirt quickly and restores the ring to pleasing brilliancy. Pipe cleaners also are effective for getting into chain links, fine filigree work of jewelry, and openings in intricately formed porcelain pieces such as statuary.

Display-Card Holders Improvised From Paper Clips



When display-card holders are not available, simple ones can be improvised from wire paper clips. Bend each clip in half and insert a card in the double-loop half. Two or more clips may be required on larger display cards.

Name in Reflective Tape Identifies Mailbox



Strips of reflective tape are used to print the name on this roadside mailbox. At night the name is clearly visible at some distance in the beams of auto headlights, providing easy identification of the farm owner. The reflective tape

also clearly indicates the presence of the mailbox so there is less chance of it being struck by a car.

A. M. Wettach, Mt. Pleasant, Iowa.

Playing Narrow-Groove Records For Square Dancing

Even though the turntable mechanism of a phonograph is mounted on springs, an additional shock-absorbing mounting is

necessary when playing narrow-groove records if any undue vibration is present. To provide the additional shockproofing, place the phonograph on a piece of $\frac{3}{4}$ -in.-thick sponge rubber. The phonograph needle then will not jump out of the record groove even when the phonograph is played for a floor-shaking square dance.

Thomas P. Ramirez, Fond du Lac, Wis.

Asphalt Strips Provide Seal Between Foundation and Sill

A more airtight joint between building foundation and sill plate can be provided by using strips of $\frac{1}{2}$ -in.-thick asphalt-saturated material, which is available at most building-supply yards. Because no water is used, the asphalt strips eliminate the moisture problem present when the sill plate is bolted down on a bed of wet mortar. Spaces, resulting from drying and shrinking of the sill plate, thus are avoided.



Grease Protects Clamp Pads

Chipping dried glue off the pads of clamps will not be necessary if a coating of petroleum jelly or grease is applied to the pads before the clamps are fitted on the object being held. Any excess glue which squeezes onto the clamp pads is not wiped off but allowed to dry. The dried glue then is brushed off with the fingers.



By washing crevices and corners of a cupboard or of a room itself with an alum-water solution, you can destroy red ants easily without damaging the woodwork.

SN 58



SPRING-BRONZE STRIPPING



Circular saw makes easy work of grooving each sash



ZINC RIB STRIPPING

DOOR-BOTTOM STRIPPING



ADHESIVE-BACKED FELT STRIPPING

IT PAYS TO WEATHER-STRIP

Heat is a costly item and when allowed to escape through windows and doors it's like money pouring through a hole in your pocket. Weather stripping will help "plug the hole" and save up to 37 percent of the total heat loss in an average five-room home.

By Wayne C. Leckey

DO YOU KNOW there is a hole equivalent to the size of a saucer in every non-weather-stripped window in your home? That's what the 21 lineal ft. of $\frac{3}{16}$ -in. clearance crack around a double-hung sash equal, and it's through this crack that a large amount of heat goes out and dirt-laden air comes in. Tests by the Weather-strip Research Institute show that a 15-m.p.h. wind against a non-weather-stripped window admits more than 45,000 cu. ft. of air—cold and damp—every 24 hrs.

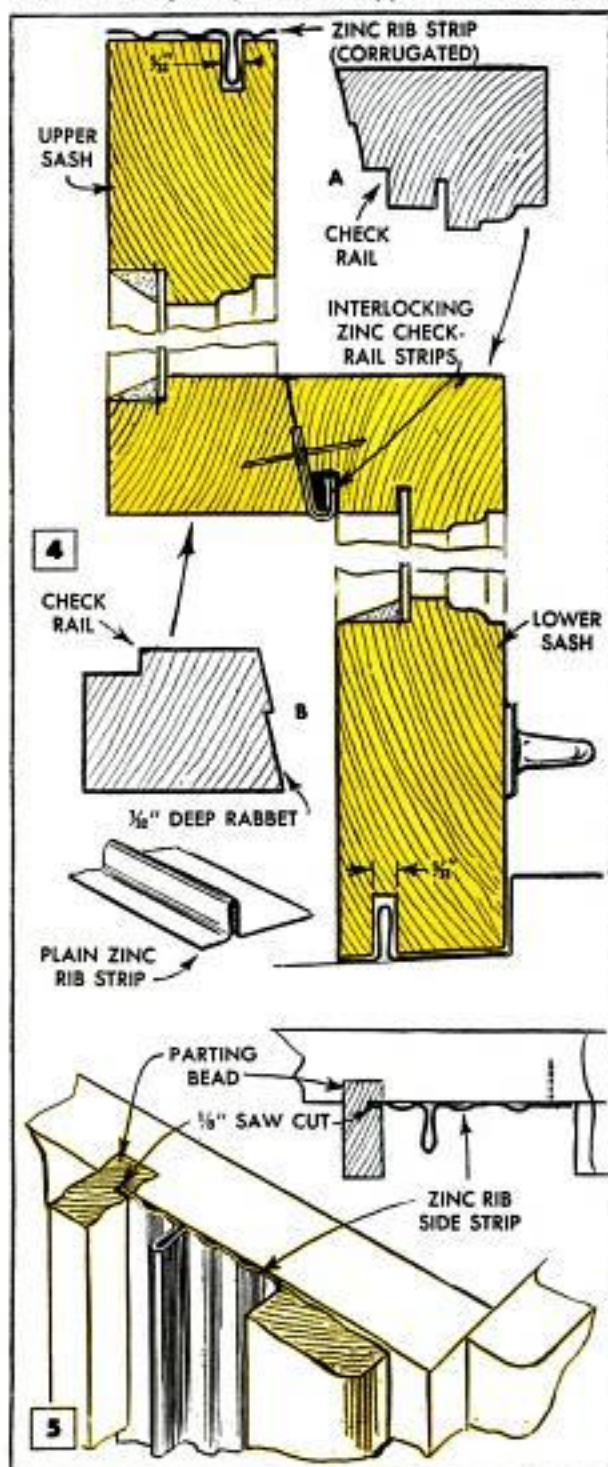
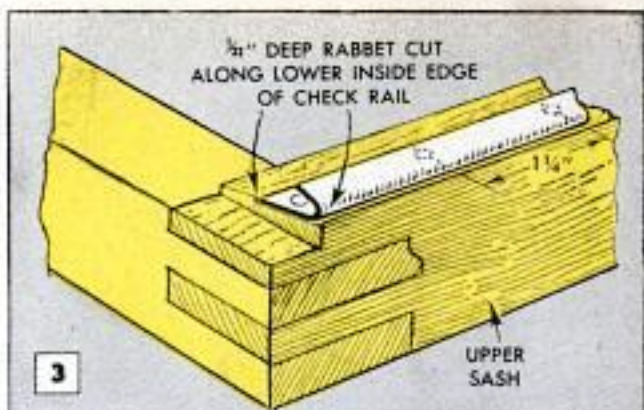
Weather-stripping doors and windows is a job most any handy homeowner can do himself. Of the many different types of window weather stripping, the zinc rib-strip type is perhaps the most permanent, although it does require more work to install than, for example, the stick-on type pictured in Figs. 7 and 8. Special grooving

planes and routers are used by professional installers, but the man with a home shop can cut grooves with a saw and drill press.

To install zinc rib-stripping on double-hung sash, first carefully remove the window stops, take out the lower sash and set it aside. Next, remove the left-hand parting bead. This is a $\frac{3}{8}$ x $\frac{3}{4}$ -in. wooden strip that forms a channel for the upper sash and which normally is a press fit in a groove in the window frame. In most cases, this bead is stuck with paint and requires careful prying to get it out. With this strip removed, the upper sash can be lifted out. Fig. 4 shows how each sash must be grooved and rabbeted for the zinc strips. A plain strip is used along the bottom of the lower sash, while a corrugated strip is used across the upper sash. In each case, a $\frac{5}{16}$ -in. groove is cut in the edges of the sash to fit



2 Interlocking hook strips are nailed to beveled check rails to seal opening between upper and lower sash



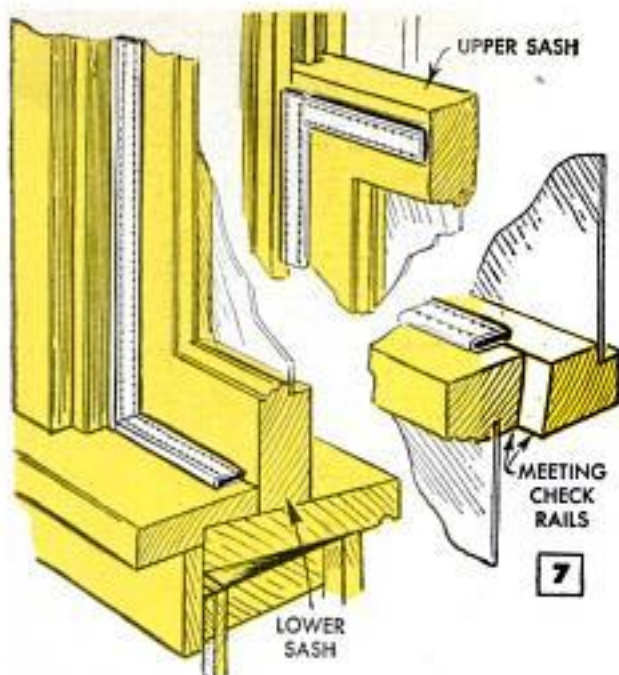
over the lip of the weather stripping. A circular saw is used to cut the grooves in the manner shown in Fig. 1.

Similar grooves are cut in both sides of the upper and lower sash to ride on corrugated strips placed vertically and tacked to the sides of the frame as in Fig. 5. Here you'll notice, too, that a saw cut is made $\frac{1}{8}$ in. deep in the inside face of each parting bead to help anchor the strips in place.

A portion of the upper ends of the zinc side strips must be cut out so they will clear the sash-cord pulleys. Where the side strips meet the head and sill strips, the ends of the side strips have to be cut at a 45-degree angle so the ribs of the head and sill strips will pass under. Nail the head strip to the frame, spacing the nails 3 in. apart.

The interlocking hook strips along the check rails, Fig. 4, are nailed in rabbets. The shallow rabbet in the beveled face of the upper check rail, detail B, can be cut easily with a circular saw, but the stepped rabbet in the lower sash, detail A, requires cutting with a router bit in a drill press and with the sash supported at an angle. The sectional drawing, Fig. 4, shows how the two strips hook snugly together when both sash are closed. Figs. 2 and 3 show how the large hook strip is nailed flush across the edge of the upper sash. The other strip is nailed similarly.





7

The upper right-hand side strip is held with a nail at the top and one at the bottom and with a nail above and below the pulley slot. Now to replace the sash: Place the upper left-hand side strip in its groove and slide both the sash and strip into the frame, adjusting the side strip to fit over the head strip. Nail as before, Fig. 6, and replace the parting bead. To replace the lower sash, fasten the right-hand side strip in place by inserting the flange of the strip in the saw cut in the parting bead and drive one nail at the top and one at the bottom inner edge of the strip. Install the lower left-hand side strip in the same way as the upper sash, replace the inside stops and finally nail the sill strip in position.

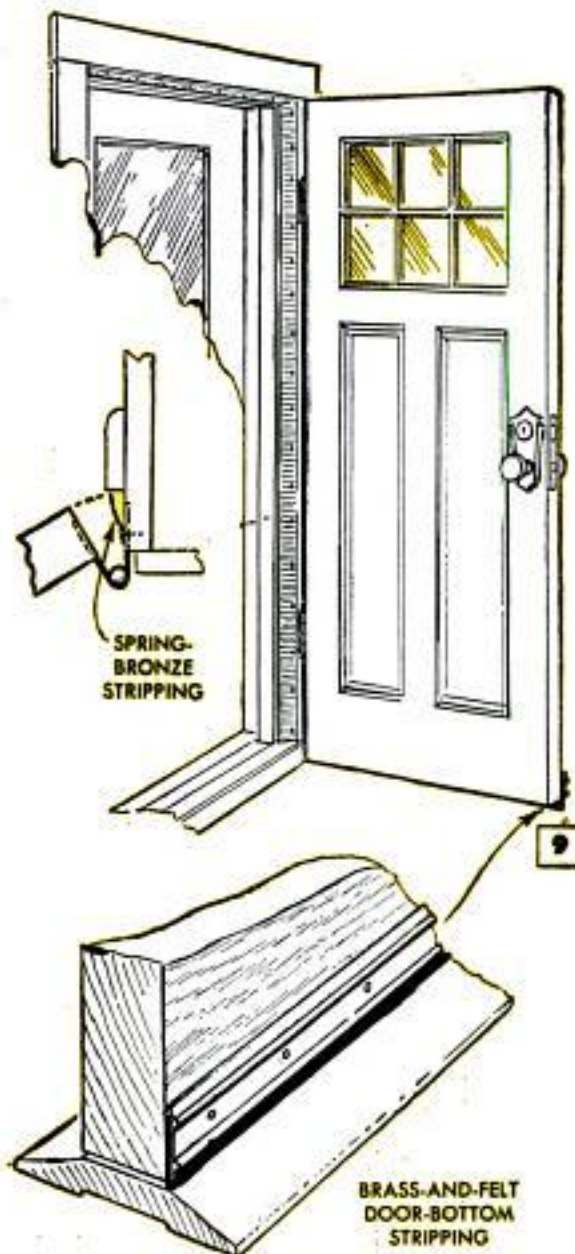
Spring-bronze weather stripping is used to weather-strip doors and is nailed to the jambs of the doorframe so the contact edge is about $\frac{1}{8}$ in. from the edge of the stop, Fig. 9. The important thing is to get the strip stretched properly so there are no buckles in the contact edge. Put on the head strip first, spacing the nails 1 in. apart to avoid buckling and resulting air leakage. Next, miter the upper end of each side strip and then fasten with a nail near the top and another 1 in. below. Stretch the bronze strip by driving an awl or ice pick through it near the lower end and into the wood. Press downward on the awl to stretch the strip, leaving the awl in the wood. Drive one nail at the middle, one at the bottom and two in between. Complete the nailing 1 in. apart as before. After the strip is nailed, the flange must be adjusted up or down so it touches the edge of the door at all points. If it must be raised slightly, run a dull-pointed tool along the crease of the strip a couple of times with an even, firm pressure.



Chas. Ayers Co. photo

Adhesive-backed felt weather stripping is pressed on and pulled off like masking tape. Ideal for apartment and home renters. Provides an effective seal

8



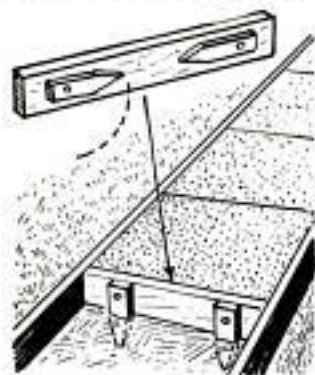
9

Nail Kegs Carried More Easily



When it's necessary to carry a couple of opened kegs, just fit them with large-sized C-clamps as shown, tightening the clamps securely so they cannot slip off. A keg then can be picked up in each hand, using the clamps as handles. The usual awkwardness of carrying a keg with two hands is thus eliminated.

Permanent Anchoring Stakes Swiveled on Dividing Board



To save time, one contractor attaches anchoring stakes permanently to his concrete-walk dividing boards. The stakes are bolted in place so that they can swing up out of the way when the boards are loaded on a truck or stored. When the

dividing board is put in position on a job, no time need be wasted in hunting for stakes or in shaping new ones.

Clothespin Holds Valve Stem While Tire Is Mounted

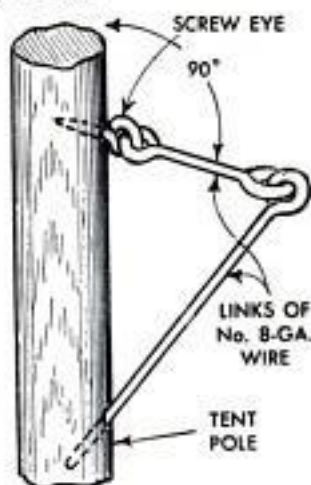
The use of an ordinary spring-type clothespin can make the changing of a tire much easier. After the valve stem has been pushed through the wheel hole, clamp the

clothespin over it so that it cannot slip back through while the tire is being positioned and mounted on the rim.

Howard E. Moody, Upper Jay, N. Y.

Tent-Pole "Clothes Hooks" Fold When Not Being Used

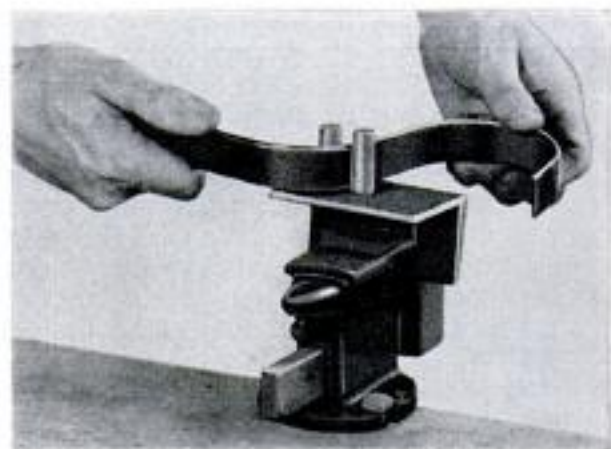
The problem of where to hang coats and other items in a tent is solved by using folding "clothes hooks" on the tent poles. As shown in the drawing, each hook consists of two links of wire and a screw eye. The short link hooks into the screw eye which is driven into the tent pole. The



straight end of the other link is fitted into a hole drilled in the tent pole at an angle that holds the upper link at right angles to the pole. When a hook is not being used, lifting the lower link out of the hole permits the hook to drop down and hang flat against the pole.

Curves Bent in Flat Steel By Using Vise-Held Jig

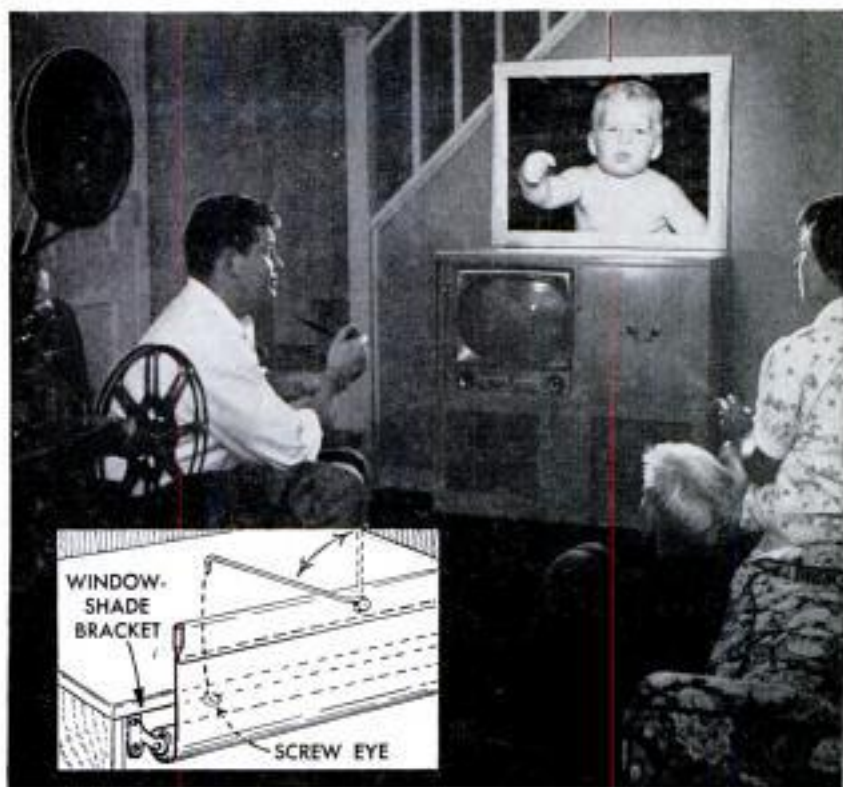
A simply made jig for bending curves in flat steel consists of two threaded steel pegs and a short piece of steel angle. The pegs are 1/4-in. lengths of 1/2-in. steel rod, threaded and turned into tapped holes in one side of the angle. The pegs are spaced 1/4 in. apart. Flat steel up to 1/8 x 1 in. can be bent in the jig.



☛The students in ceramics courses of one western college have found a use for cigarette ashes. These are mixed with sand and clay to produce an excellent pottery glaze.

Window-Shade Movie Screen Mounted on Back of Television Set

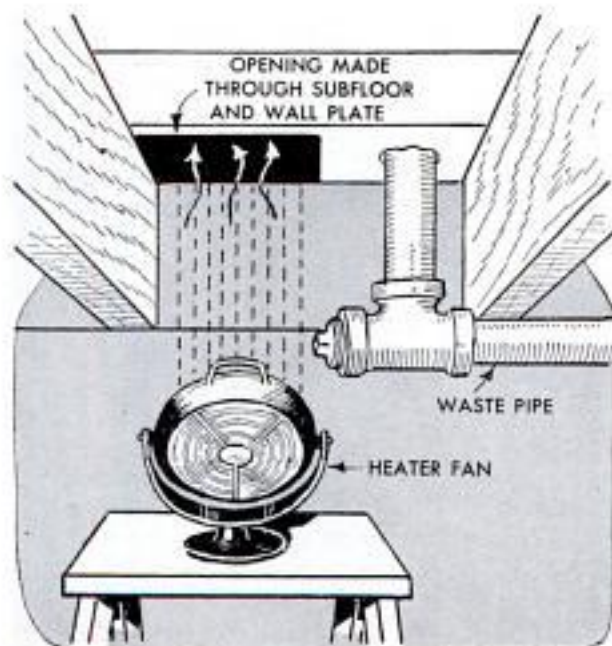
Because a television set is located so everyone in the room can see it, a hideaway movie screen fitted to the back of the set also will be properly located for best viewing. The hideaway screen is a regular window shade fitted in window-shade brackets screwed to the back of the set. When the shade is pulled up for use, a wire hook at the center of the shade engages a screw driven into the wall behind the television set to hold the screen in position. A screw eye driven into the back of the set holds the hook when the screen is lowered. For a better movie screen, purchase regular screen material and staple it to the roller.



Heater Fan Used for Thawing Frozen Pipe in Outside Wall

A frozen waste or water-supply pipe in an outside wall can be thawed by forcing warm air from a heater fan into the wall between the studs where the pipe is located. To make an opening in the wall, bore holes and use a keyhole saw to cut through the subfloor directly under the wall plate and also through the plate itself. If the wall contains batt or blanket-type insulation, there is an air-circulation space between the insulation and the outside sheathing

into which the warm air should be directed. This space also probably provides access to the frozen pipe, since the latter would not be likely to freeze if the insulation had been properly installed between it and the sheathing. If the frozen pipe is a waste line and the fitting at the lower end has a clean-out plug, open the plug and insert a length of rubber hose or tubing up to the point of obstruction. Connect the hose to the hot-water faucet and flush away the ice.



Auto-Compass Adjusting Tool Made From Brass Washer

Turning the compensating screw on an auto compass is much easier than with the edge of a coin, as is recommended. The tool is simply a brass washer soldered to a length of brass rod. A flat is filed on one edge of the washer so it fits snugly in the screw slot. Brass does not cause a magnetic effect on the compass and the handle of the tool provides leverage not available when using a coin.—Charles Erwin Cohn, Chicago.



Helpful Hints For Flowerpots

Want flowerpots to look more cheerful, cause less damage to woodwork and retain moisture for better plant growth? Check the hints on these pages



A quick method of adding beauty to an ordinary flowerpot is to set it into an inverted lamp shade

Generous-sized piece of sponge dropped into flowerpot before adding soil acts as moisture retainer, reducing need for frequent watering of potted plant

When potted plant must be left for several days without being watered, soak soil, then fit cardboard disk in top of pot to reduce moisture evaporation





Wren house is made by fitting wooden disk in top of flowerpot, enlarging hole in bottom to size of quarter



Cork cemented to window sill will prevent flowerpot from being tipped over or knocked off accidentally. Hole in pot bottom is fitted over the cork

To successfully grow plant slip started in water, gradually add soil to replace water. When container is filled, break it and place plant and soil in pot



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Coat of paint inside flowerpot will seal porous clay and prevent moisture from evaporating rapidly. Use rubber-base, or other paint that won't harm plants

Rubber fruit-jar ring cemented to bottom of flowerpot helps in two ways. It will prevent pot from sliding and also will keep water marks off woodwork



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Rubber-Covered Bottom Rung Is Safety Step on Ladder



Providing a rubber cushion on the bottom rung of a ladder will prevent possible accidents resulting when a workman descends the ladder carrying a load. The different "feel" of the rubber cushion will warn the workman of the bottom rung and thus prevent possible jarring or stumbling. The cushion is a length of rubber garden hose slit to fit over the rung and taped or tacked in place.

Damaged Screw Threads Restored



When a spare is not available, the threads on a damaged screw may be restored with cutting-type pliers. Rest the points of the pliers on a board and turn the screw between them with a screwdriver. Run the screw through several times.

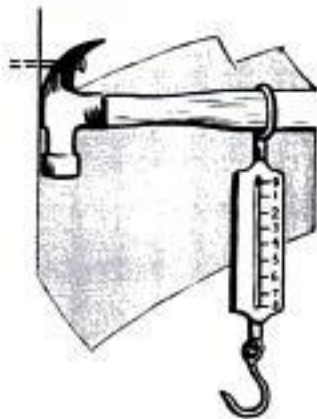
Dustless Stovepipe Cleaning

To clean a smoke pipe without soot flying over the basement, separate the pipe carefully at the joints and place one end of each section in a bucket of water. Then

rap the outside of the section with a stick, so that the soot inside is jarred loose. It will then fall into the water.

Emergency Barn Bracket

In an emergency, a bracket for use in the barn or shop, to support a scale, a lantern or other light item, can be made by driving a nail into the wall and hooking the claw of a hammer on it as shown. The nail should be driven in far enough so that the hammer handle hangs straight out from the wall. The ring of the appliance may be slipped over the handle, or if the ring is too small, a loop of twine can be tied to the appliance and then slipped over the handle.



Extension Chute for Jointer

A simple sheet-metal extension on the chip chute of a jointer will discharge chips and shavings into a waste box for easy disposal. As the shortness of the regular chutes is the reason that much of the waste drops onto the floor, the extension should be long enough to reach well into a box as shown. Fit the extension on hooks so it can be lifted out when not used.

M. C. Anderson, San Lorenzo, Calif.



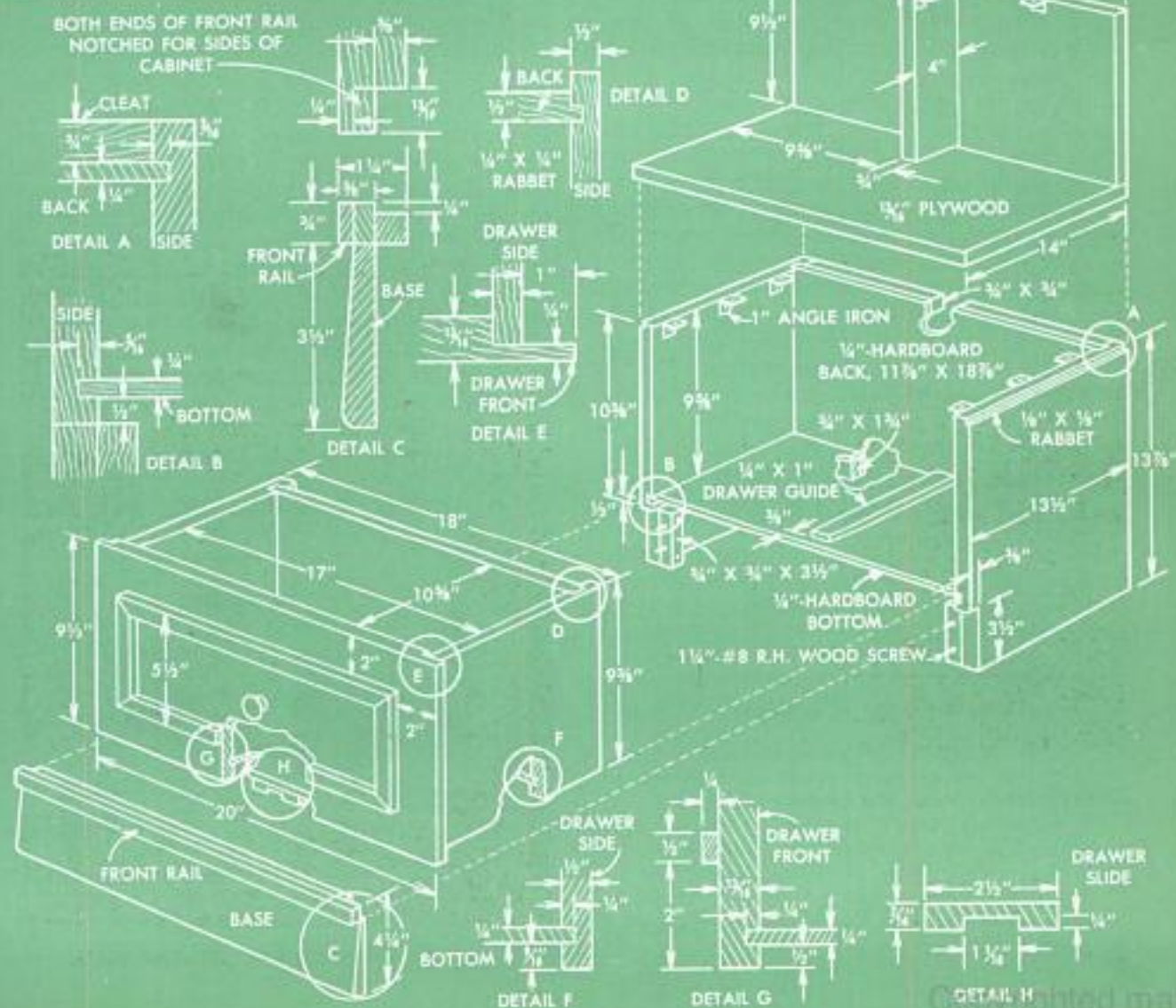
PATTERNCRAFT

MODERN NIGHT STAND

This eye-catching night stand, which offers two spacious shelves plus a roomy storage drawer, is designed as a companion piece for the twin-bed headboard detailed on the Patterncraft pages last month. However, it will fit in nicely with many modern furniture designs if made of the same type of plywood and finished similarly. The shelf section is built separately and fastened to the drawer unit with 1-in. angle irons. Rabbits at the tops of the endpieces hide the joints between the shelf and drawer units.

FULL-SIZE PATTERNS

If following magazine details is troublesome or difficult for you, make the night stand the easy way—use a full-size pattern with complete directions. To obtain your pattern, send 50 cents to Patterncraft, Popular Mechanics Press, 200 East Ontario Street, Chicago 11. Be sure to ask for Plan No. 120



Removable Fence Section Provides Oversize Gate



If your back yard is completely fenced in except for a narrow gate across a walk, and you have experienced occasional need for a wider passageway, try the following idea: Where the fence joins the house wall, as is customary, a wider opening can be provided. To do this, drive two or three large screw eyes into the house wall in vertical alignment to take a removable rod. Bend the top end to prevent it from slipping through the top screw eye. On a wire fence, twist lengths of heavy wire to loop around the rod and fence stays. On a wooden fence, use either screw eyes or drilled metal plates instead of wire, and also cut the rails at the first post for another detachable connection. For attachment to a brick or stone wall, drive the screw eyes into expansive sleeves fitted into holes drilled in the mortar joints.

Nail Hole in Plastered Wall Repaired With Wood Putty

When a nail on which a picture is hung breaks out of a plastered wall, wood putty can be used to repair the hole and permit re-driving the nail in the same spot. If the

Three-in-One Kneehole Desk

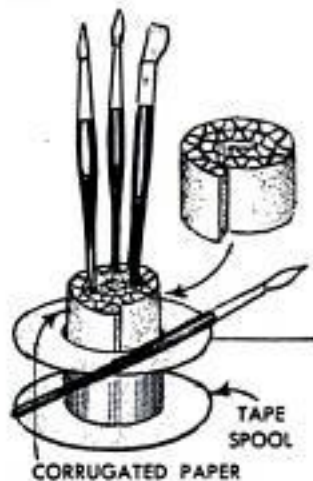
which houses both a portable sewing machine and a typewriter will appeal to almost anyone who has limited space. It's a real space saver as well as a good-looking piece of furniture. Watch for this functional desk in the November issue where it's shown in full color with complete details. You can make one like it in birch or mahogany

hole is small, just press the putty firmly into it; if it is quite large, build in from the sides with putty. Let each layer dry before applying the next one.

Bureau of Industrial Service, Inc.

Corrugated Paper in Tape Spool Holds Artist's Brushes

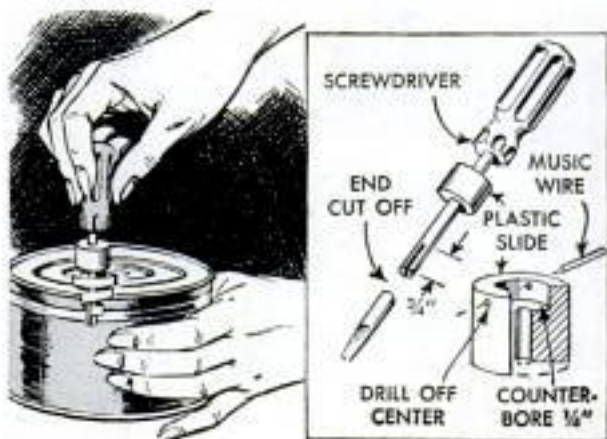
A practical holder for artist's brushes can be made by rolling a strip of light corrugated cardboard and inserting it in the center opening of an adhesive-tape spool. The ends of the brush handles are slipped into the corrugations. The spool flanges keep it from tipping.

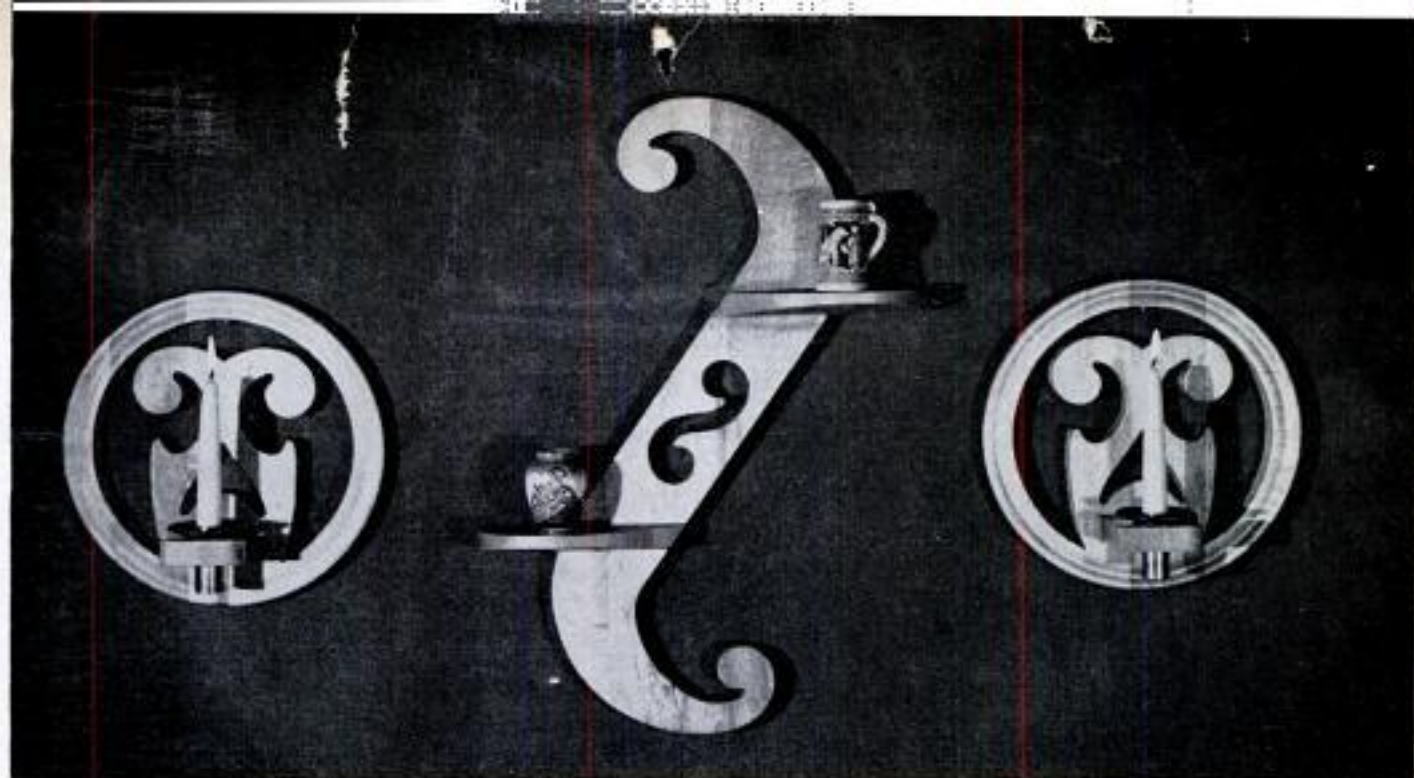


Opener for Vacuum-Packed Cans

Vacuum-packed coffee cans and other key-opened tins may be opened easily by using this tool, which is made from a piece of drill rod or a small screwdriver. Using a screwdriver makes it unnecessary to fashion a handle. Anneal the end of the blade by heating it to a dull red color and then allowing it to cool slowly. Next, saw off the tip, leaving the shank about 3 in. long. Hacksaw a slot in the end of the shank about $\frac{3}{4}$ in. deep. Pushing the spiral of metal off the tool after the can is opened is done by a slide on the tool. The slide is made by drilling a hole through a short length of plastic rod counterboring and adding a straight spring which bears against the shank of the tool for friction. The chance of cut fingers is eliminated and the large convenient handle makes it much easier to open cans with this tool than with the usual wire key.

J. B. Mullen, Barrington, Ill.

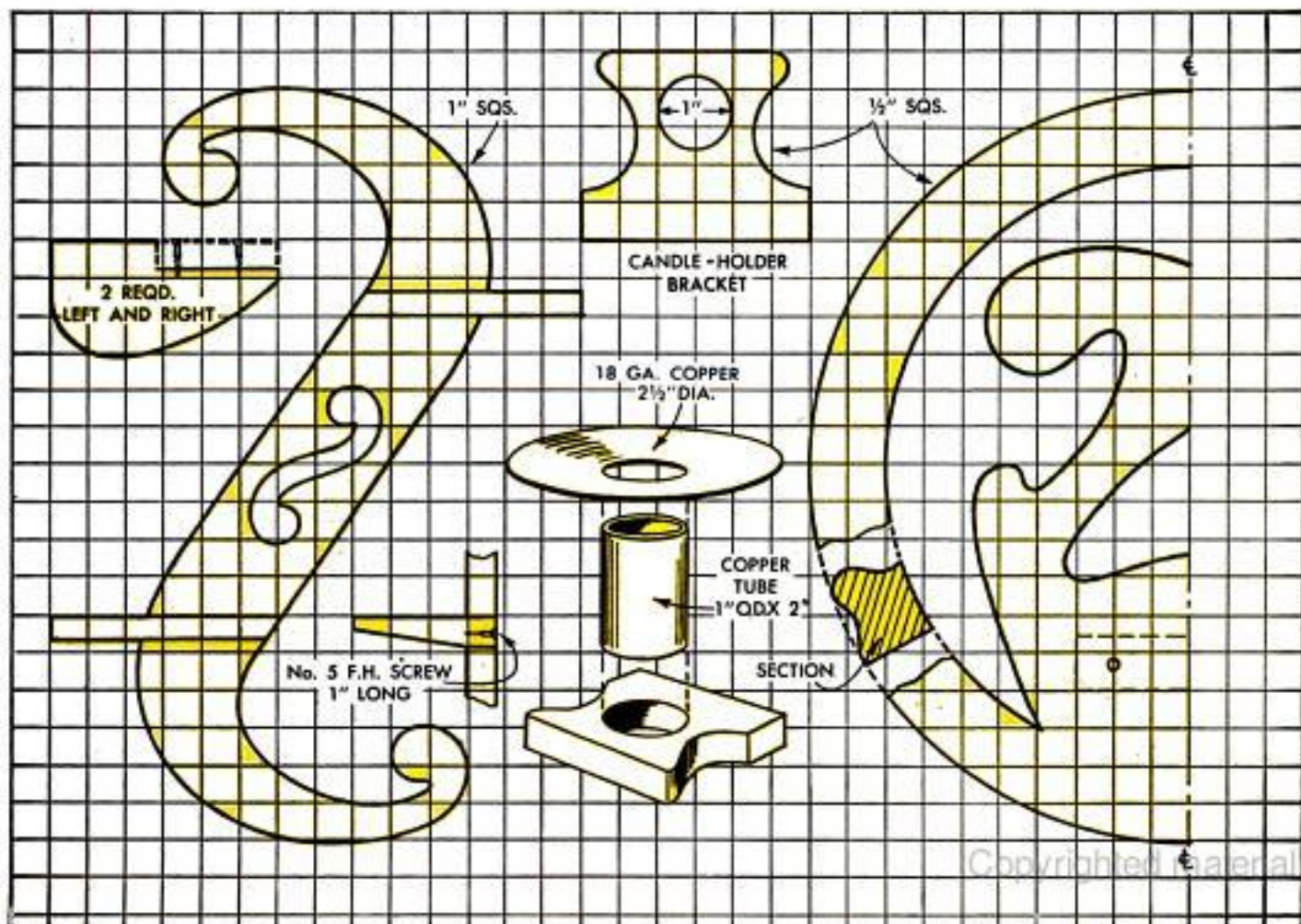




CANDLE SCONCE AND SHELF IN WOOD

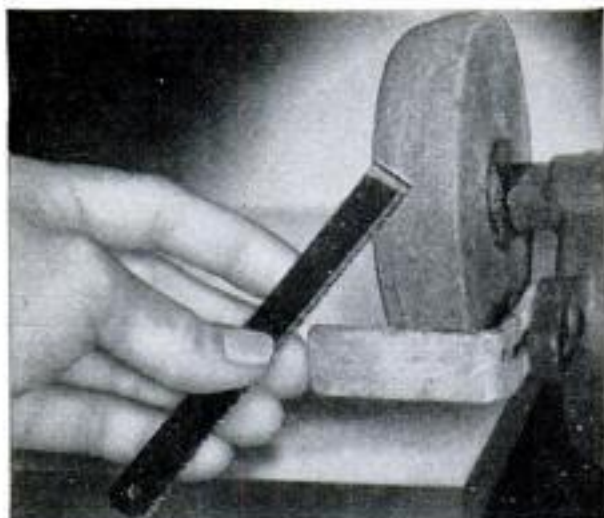
THAT BLANK SPACE on the living or dining-room wall—here's one good answer to the question of what to do about it. The candle sconces, in pairs with the wall shelf, have a decorative individuality that provides just the right finishing touch. Both are simple projects made by jigsawing and turning hardwoods selected for attractive grain. Jigsaw two disks to the diameter

given, mount in the wood lathe and turn the rims to the shape shown. Then jigsaw cutouts in each and fit candleholders. Make the holder and shelves by band or jig sawing to the pattern and sanding the edges smooth. Jigsaw the cutout at the center. Note how the shelves are beveled. Finish all three pieces in the natural color of the wood.—R. J. De Cristoforo, New York City.



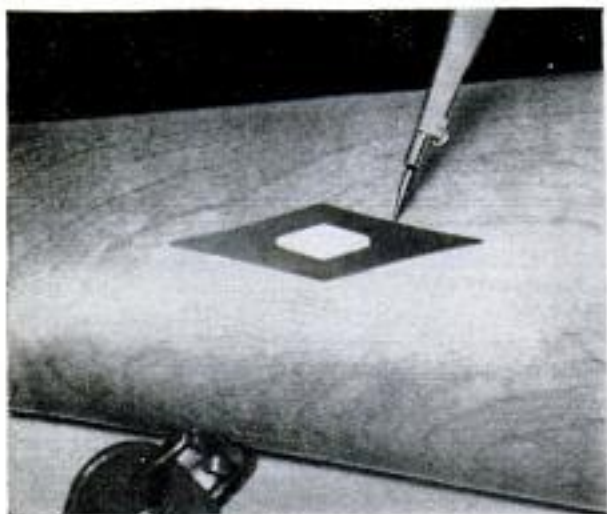
HOW TO INLAY YOUR

By Robert E. Jackson

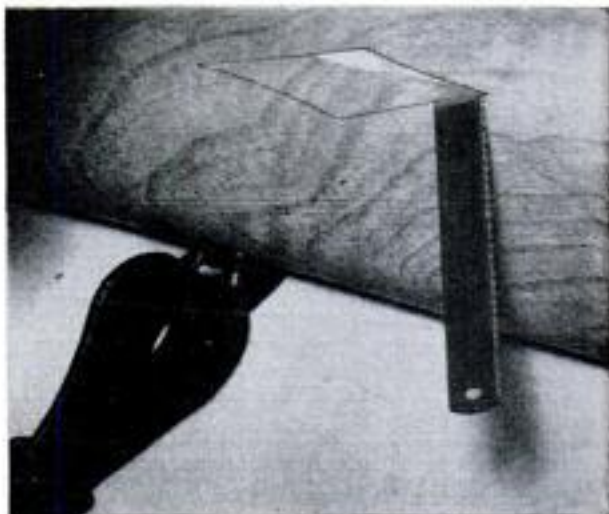


When no carving chisel is available, make one by grinding a sharp edge on a piece of hacksaw blade

DIAMOND INLAYS and forearm, grip-cap and butt-plate liners give any rifle stock that custom-made look that goes well on the gun rack or in the field. Doing the job yourself is easier than you think as the diamond inlays and liners come ready-made, the inlays in contrasting colors. The photo of the inlaid rifle stock at the right on the opposite page pictures a typical inlay-and-liner job on a standard stock of plain walnut. A forearm cap of black plastic has been added as a special custom-rifle feature. Many riflemen would prefer the larger diamond inlay in the stock and the smaller in the forearm, but that's a matter of individual choice. Liners under the forearm tip, grip cap and butt plate can be cut from



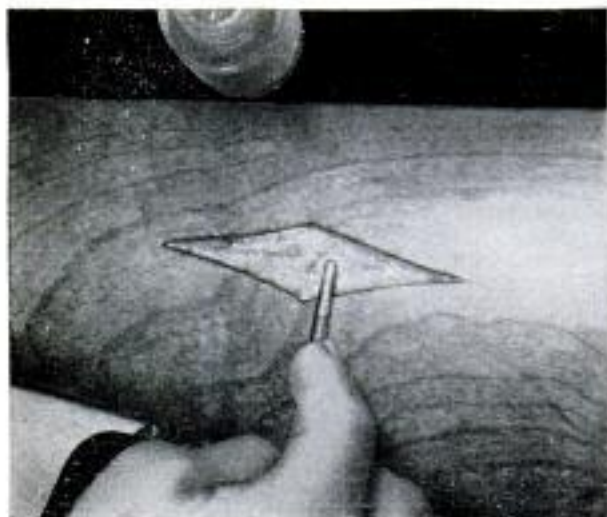
Mark inlay outline on stock with sharp scribe. Marks should be deep enough so they are easily followed



Cut down on pattern lines with improvised chisel. Care must be taken to obtain straight, smooth cut

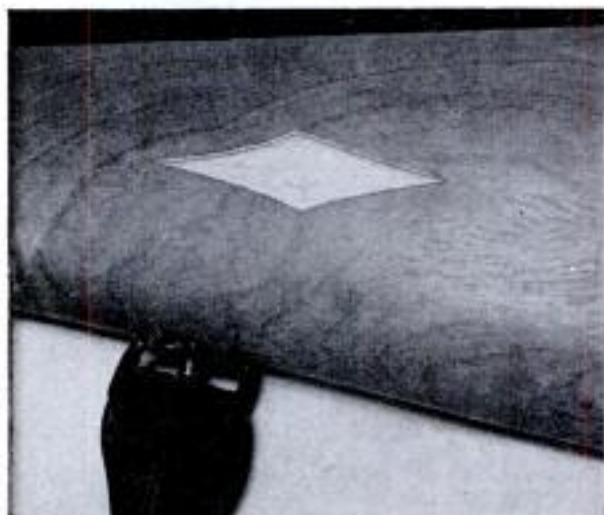
Apply cement to bottom of recess. Be sure to spread to a coating of uniform thickness over whole surface

Tap inlay in place over cement, using softwood under hammer to avoid marring stock or cracking the inlay



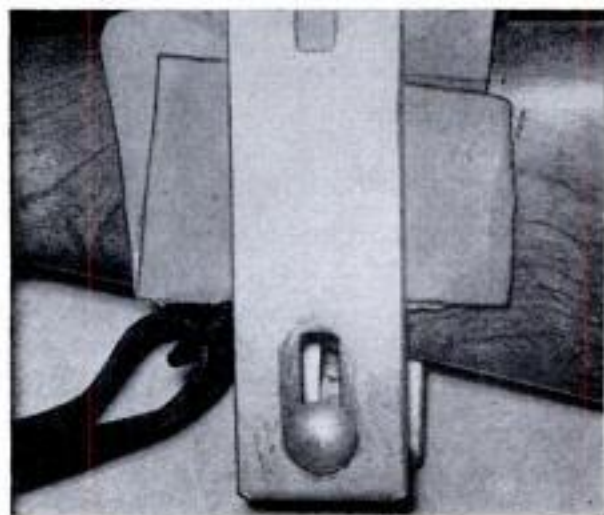
GUNSTOCK

white or colored plastic, $\frac{1}{16}$ or $\frac{1}{8}$ in. in thickness and dressed after installation with a file and 8-0 sandpaper. The photos show the six steps in locating and recessing a two-color diamond inlay in the buttstock. Stock inlays usually appear best when located slightly below the halfway point measured between the tip of the comb and the center of the butt plate. Mark around the inlay with a sharp scriber. Then make a suitable chisel by breaking a hacksaw blade and grinding one end to a keen edge. Remove the waste after cutting down on the pattern lines. The depth of the recess should be slightly less than the thickness of the inlay. Cement in place, tap into close contact with a hammer and block of softwood, then improvise a clamp to apply pressure until the cement hardens. ★ ★ ★



The finished recess should be slightly less in depth than thickness of inlay. This allows for finishing

After tapping inlay in place over cement, improvise a clamp to apply pressure until the cement hardens



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Trellises Mounted With Flat-Bar Brackets Quickly Removed

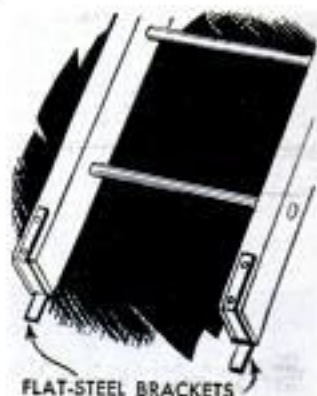


By using brackets bent from flat aluminum, trellises can be rigidly attached to wood or masonry walls in a manner that permits quick removal for painting or repairing the wall. Generally, four brackets are needed, but for a narrow trellis two near the bottom and one centered at the top are sufficient. Best appearance results if the trellis is spaced about 5 in. from the

wall. To make the brackets, drill $\frac{1}{8}$ -in. holes near the ends of 7-in. lengths of $\frac{1}{8}$ x 1-in. flat bar. Then bend the brackets at right angles 1 in. from each end, making the bends in opposite directions. For mounting the brackets on wooden walls, use wood screws; on masonry use screw anchors or expansion sleeves. The trellis is fastened to the brackets with $\frac{1}{4}$ -in. bolts and washers.

"Spiked Feet" on Ladder Bottom Prevent Slipping

A ladder used only for outside work, and never on paved surfaces, can be fitted with "spiked feet" to prevent slipping. The spiked feet are Z-shaped brackets, bent from $\frac{1}{8}$ or $\frac{1}{4}$ -in. flat steel. Dimensions will vary with ladder size. Screws are driven into the edge of the ladder through the upper leg of the Z-bracket. To reduce the chance of splitting, screws are not driven into the bottom of the ladder.



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MOVIE TITLES

When making up amateur-movie titles one problem is obtaining an adhesive that will hold individual letters in position on the surface of various materials used as backgrounds. With a pressure-sensitive adhesive it is possible to place the letters or numerals and then change them about until the arrangement and spacing are just what you want. Adhesive will hold even if letters have been removed several times

STENCILS

Ever have a stencil slip and smear the job at the last critical moment? When this happens there's nothing to do but remove the ruined pattern and try again. For a crisp, clean job stick the stencil to the surface with a pressure-sensitive adhesive and you'll be sure of the final result. When applying the adhesive to the back of the stencil, be especially careful to spread in a uniform film so there is no excess at the edges



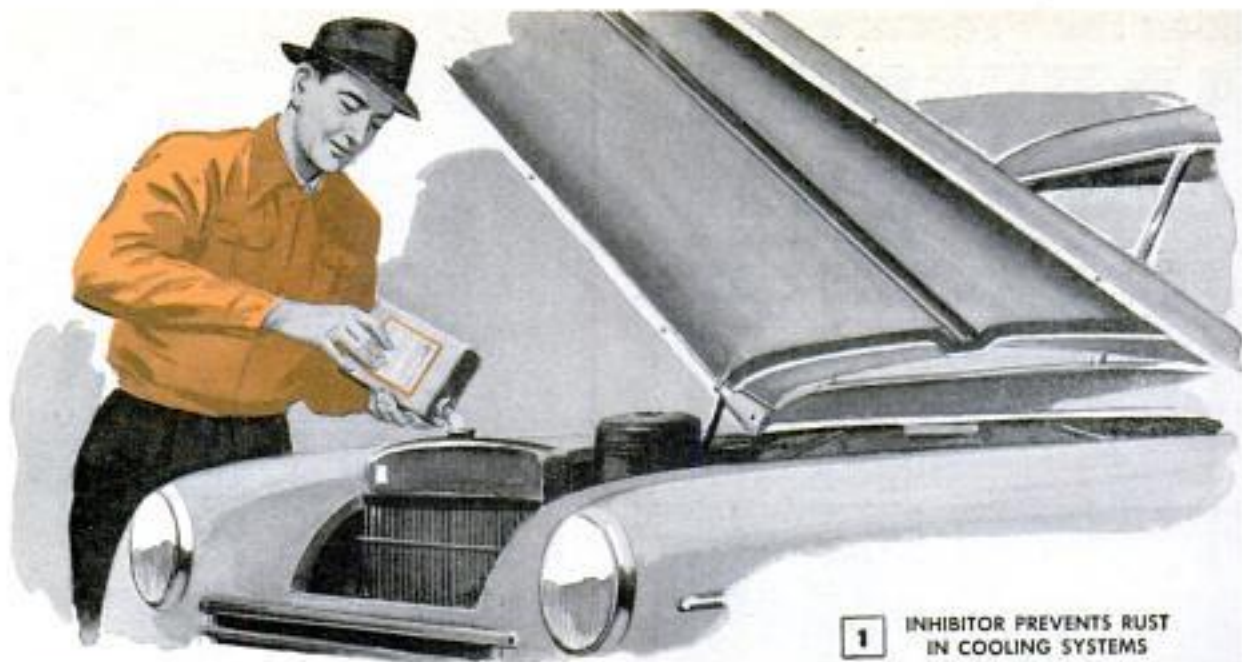
STAMP COLLECTIONS

Philatelists—stamp collectors, in case you didn't know—like an adhesive that permits them to mount stamps in an album, also remove individual specimens at any time without damage and mount on backing paper for exhibits, or for sale or trade. With the right adhesive this can be done a number of times without damaging stamps or album. Spread adhesive in a thin film. Remove excess by rubbing with finger

SPECIAL TAPE

You can make adhesive tape in any width or length required by cutting strips from crepe paper and coating either one or both sides with a pressure-type adhesive. It sticks anywhere, to almost any dry surface, and it stays stuck until you pull it off for reuse somewhere else. Works fine when used as a paint guard, as you can use the same length of tape over and over. Still another use for this special adhesive is holding paper shelf trim, especially that attached to the edges. Beats tacks or any other type of fastener





1 INHIBITOR PREVENTS RUST IN COOLING SYSTEMS

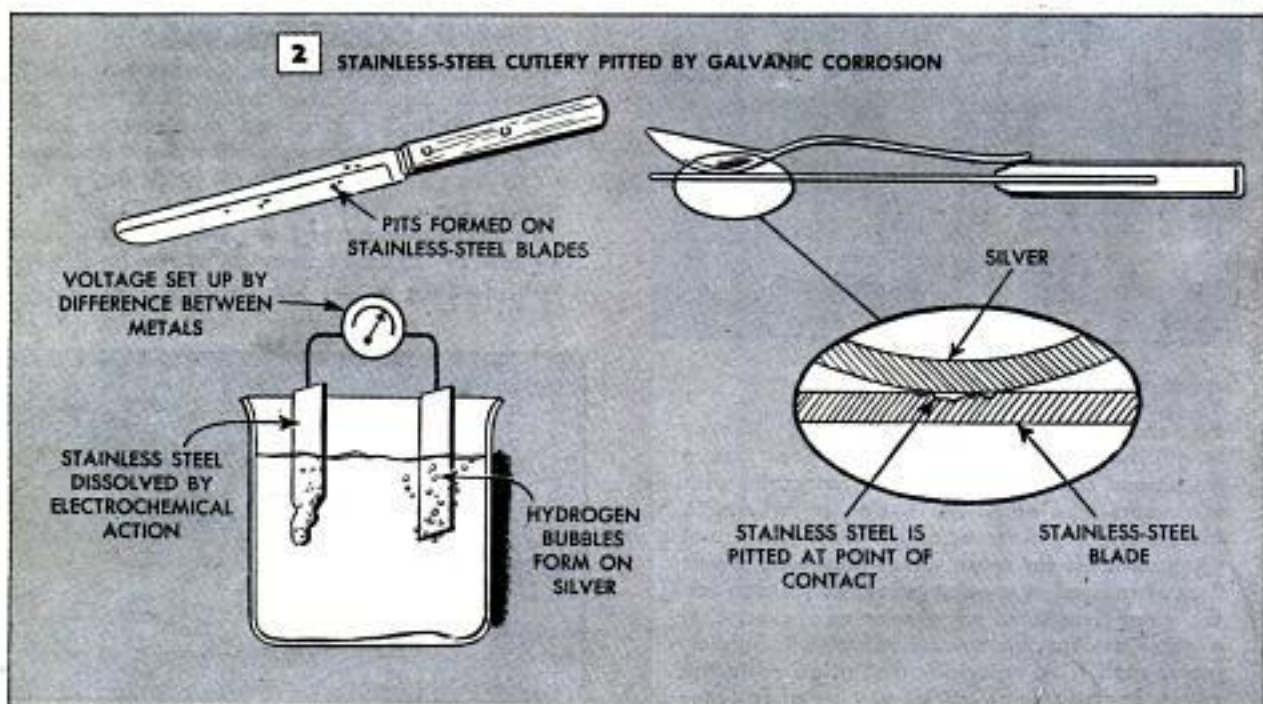
STOP RUST IN YOUR HOME

By J. B. Mullen

PART II

THERE'S NO MYSTERY about what causes the tiny discolorations that sometimes appear on the mirror-bright surfaces of stainless-steel kitchen utensils and especially stainless-steel cutlery. You're looking at the results of electrochemical corrosion. Although stainless steel is one of the inert metals and resists most corrosive agents, it still is more active than silver, as you will see from the activity series of metals charted in Fig. 3. It's there you can

put your finger right on the cause—an active metal placed in water with a less-active metal. Wet or soiled silverware in contact with stainless-steel knives, forks and spoons will start a corrosion couple which is low on the activity scale, but nevertheless is sufficiently active to cause damage to the stainless-steel ware. Corrosion of this type usually is localized and generally takes the form of fine pits because both metals are low in the activity



series and the more-active metal is pitted at the point of contact, Fig. 2. For this reason it is only rarely that the damage involves larger areas. However, it should be remembered that about the only effective prevention is to avoid placing the two types of tableware in contact in a drawer or tray while wet. Deep pits in stainless steel cannot be removed effectively, but the small black spots which show first can sometimes be polished out with a rubbing or polishing compound.

Common salt is the unsuspected source of many household corrosion troubles and the damage can range from deep corrosion of the family-car fenders to unsightly and ruinous pits in valuable silverware. Silver salt shakers are especially vulnerable, but other silver items may be involved if salty foods are placed in them and remain for any appreciable length of time. The large black spots on silver are practically impossible to remove entirely as generally the erosion has progressed to a considerable depth before the surface discoloration is noticeable. In some cases, the blemishes can be made less objectionable simply by putting the process of electrochemical corrosion to good use. Place the affected silverware in an aluminum utensil and then add water and sodium bicarbonate (baking soda) in the proportions of 1 oz. of sodium bicarbonate to 1 pint of water. Place the utensil on the kitchen range and bring the solution to a rolling boil, Fig. 4. In this process you form a corrosion cell in which the silverware is the cathode and the aluminum utensil the anode. In the process

3 CORRODED END

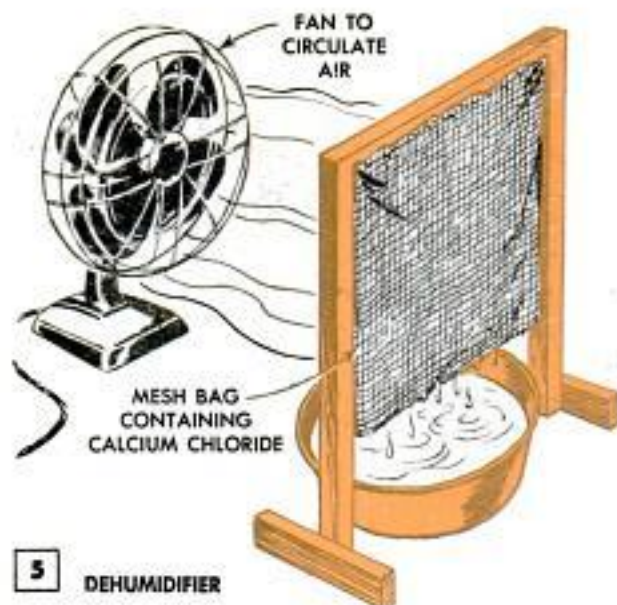
- MAGNESIUM
-
- ZINC
-
- ALUMINIUM
-
- CADMIUM
-
- IRON & STEEL
-
- SOLDER
-
- LEAD & TIN
-
- COPPER & ALLOYS
-
- NICKEL
-
- STAINLESS STEEL
-
- SILVER
-



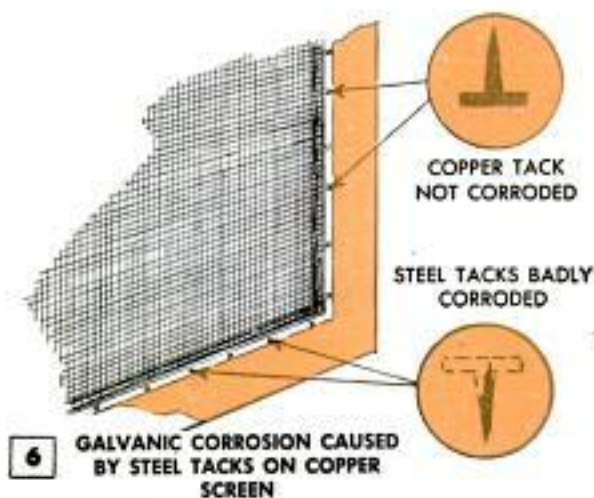
PROTECTED END

4 REMOVING TARNISH FROM SILVERWARE





5 DEHUMIDIFIER



6 GALVANIC CORROSION CAUSED BY STEEL TACKS ON COPPER SCREEN

the tarnish, which is silver sulphide, is converted back to silver at the cathode and the "plating" process not only removes the tarnish, but in most instances helps to efface the blemishes and the very small amount of metal removed from the aluminum utensil will in no way affect its usefulness. Ordinary tarnishing of silver is caused by hydrogen sulphide which is present in the atmosphere in varying quantities (more in and near large cities) in eggs and other foods, and in cooking gas. Tarnishproof chests and bags, which are especially treated to absorb hydrogen sulphide and also prevent it from reaching the surface of the silverware in quantity, are the best means of preventing tarnish, which is a mild form of corrosion.

Washing machines and other laundry equipment often become rather badly corroded, especially where the water is hard. Hard water forms a curdy material with soaps and this forms a film around certain parts which, if not removed, will collect on the surface of the metal and prevent rapid drying of the surface. Liquid trapped under this film causes the concentration-cell corrosion that does the damage. In extreme cases parts may be rendered unserviceable in a comparatively short period of time. However, this damage is easy to prevent simply by removing the affected parts at the end of each use period and washing and rinsing them thoroughly to remove any sediment that may have collected. Leave the machine open so that all parts dry quickly after use. Synthetic detergents ordinarily do not deposit the damaging film as fast as do regular soaps. The use of soft water also will materially reduce the amount of film deposit per washing. However, in either case it is good practice to clean the machine thoroughly after use.



7 TOOLS KEPT IN DAMP BASEMENTS SHOULD BE PROTECTED WITH INHIBITOR

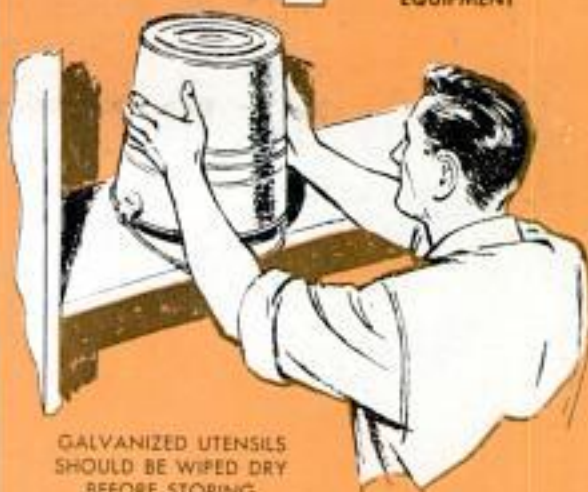
Basements are nearly always damp due to the high humidity of the air in the room or rooms. This can cause serious damage to tools, furnaces, laundering equipment and other items made of metal that may be stored in the basement during the summer months. Fig. 5 shows how to set up a simple and inexpensive dehumidifier which is quite effective in removing excess moisture from the air. A small electric fan to circulate the air speeds up the process considerably if operated at intervals aggregating perhaps two or three hours daily. However, the unit is fairly efficient when used without the aid of the fan.

Tools, Fig. 7, are especially susceptible to damage by rust if not protected with a film of oil, or better, an inhibitor made especially for the purpose. The latter forms a protective film over the metal which prevents the formation of corrosion cells even though the surfaces "sweat" during long periods of storage in racks or drawers. The film will withstand a certain amount of handling without breaking or rubbing off, hence it has a greater protective value than ordinary oil. Special inhibitors also are available to prevent corrosion in auto radiators, Fig. 1.

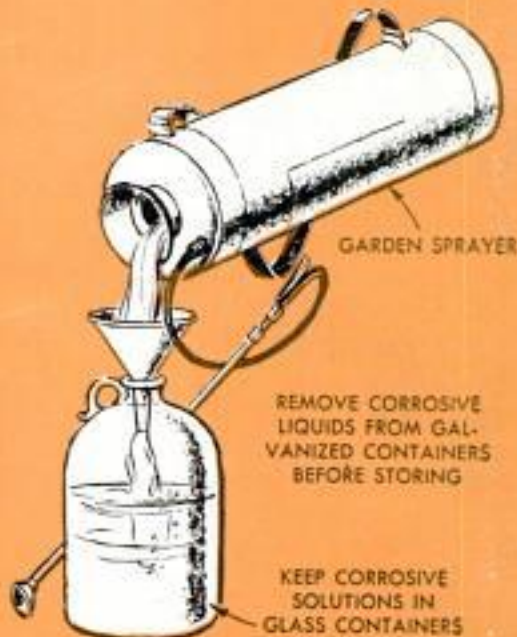
If you build your own screens, or repair those already in use, always use tacks or staples made from the same metal as the screen wire; otherwise galvanic corrosion will cause damage within a short time, Fig. 6. Don't use steel tacks or staples to fasten copper screen. For the same reason never use steel nails or screws to fasten gutter and downspout supports made from aluminum. Use aluminum nails to fasten aluminum, steel nails to fasten steel and so on in all cases where the parts form a metal-to-metal contact.

Garbage cans, garden sprayers and pails are typical of the household containers made from steel and galvanized. Although the galvanizing still will protect the metal even though the zinc coating is punctured or otherwise damaged, the units can be made to give much longer service if the suggestions given in Fig. 8 are carried out. Galvanized pails should be thoroughly rinsed after use and stored in an inverted position so that any water remaining inside can drain away quickly. Knapsack garden sprayers should be emptied immediately after use and thoroughly rinsed. Then invert the tank to permit water to drain away. Nearly all garden insecticides in liquid form are at least mildly corrosive and should always be stored in a glass container, rather than one of metal. Set the garbage can on wooden blocks and, if possible, keep it in a dry place where the blocks do not absorb undue amounts of moisture. ★ ★ ★

8 CARE OF GALVANIZED EQUIPMENT



GALVANIZED UTENSILS SHOULD BE WIPED DRY BEFORE STORING



GARDEN SPRAYER

REMOVE CORROSIVE LIQUIDS FROM GALVANIZED CONTAINERS BEFORE STORING

KEEP CORROSIVE SOLUTIONS IN GLASS CONTAINERS



KEEP THE GARBAGE CAN ON WOODEN BLOCKS

Odd-Shaped Masks Around Prints Provide Variety in Photo Album



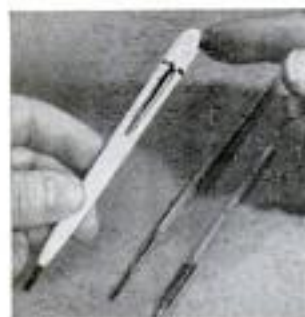
When making contact prints for a photo album, one photographer assures variety in appearance by using masks patterned from lens covers. A lens cover is placed on a sheet of black paper and a razor blade used to cut around it. Cookie cutters and other irregularly shaped objects can be used to provide an infinite number of mask shapes.

Paper Punch Marks Transparencies

A paper punch can be used to mark film slides so they can be inserted in a projector right side up. Simply punch a hole near the upper right-hand corner of each slide. Thus you can tell when the slide is in the proper position, even when operating the projector in a darkened room.

Mrs. Lawrence Allen, Lynchburg, Va.

Pen Converted to Lens Brush



Replacing the ink cartridge in a retractable-ballpoint pen with a small camel's-hair brush will provide a lens brush that can be clipped to a pocket and be ready for use at the press of a button. Remove the ink cartridge and cut the handle of the brush to match its length. Slip the brush into the cartridge spring and reassemble the pen. The brush now can be retracted or extended in the same manner as the ball-point cartridge.

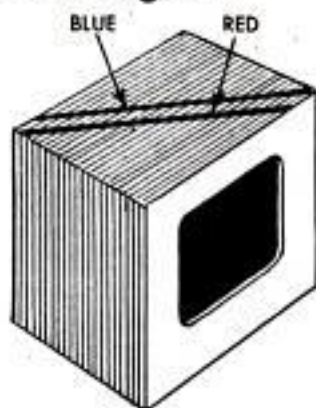
Endless Belts for Action Toys

Narrow strips cut from discarded sanding belts can be used to provide long-wearing endless belts for children's action

toys. Loops of twine, generally used to transmit power from small electric motors or crank-powered mechanisms, quickly stretch or break, but with ordinary care the sanding-belt strips will give good service for quite some time.

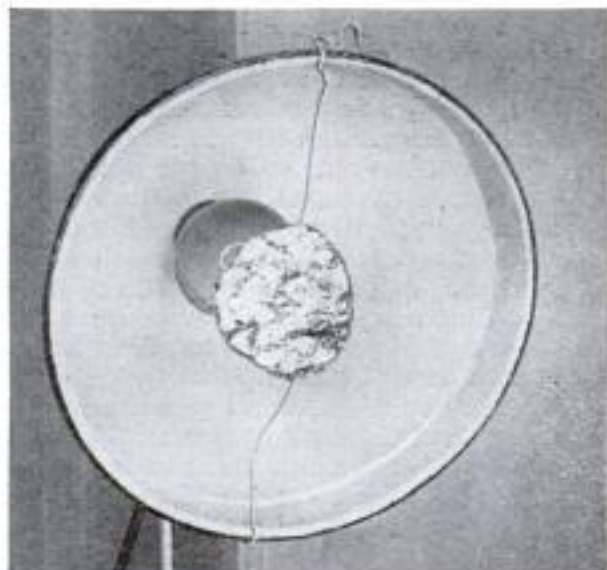
Sequence of Slides Indicated By Diagonal Lines on Edges

You can tell at a glance whether or not a series of colored photo transparencies are in the proper sequence if you draw two lines of different colors diagonally across the edges as shown. Two colors are necessary to show whether slides belonging at one end of the series have been placed accidentally in reverse at the other end, where the lines might still be in alignment.



Modified Floodlamp Reflector Produces Softer Shadows

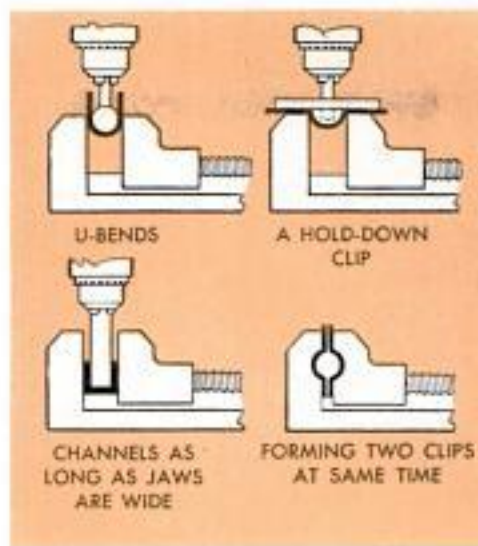
A photo floodlamp can be modified to produce a softer light by installing a disk of aluminum foil in front of the bulb. Most of the direct rays are blocked off by the disk so only reflected light reaches the subject. The disk is stapled or tied to a length of wire which is hooked to the edge of the floodlamp reflector as shown.



☐ Vinegar is a good solvent to use in cleaning fountain pens. Dismantle the pen, soak the parts in vinegar for an hour or two, rinse in water, dry and reassemble.

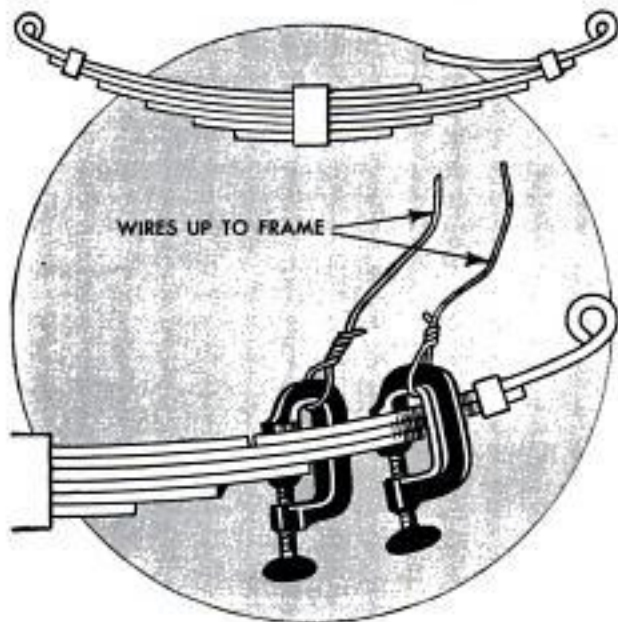
Drill-Press Vise Utilized as Base Die for Forming Sheet Metal

Because a drill-press vise has jaws that are parallel to each other and at a true right angle to the base, it can be used in conjunction with the leverage provided by a drill press as an accurate die for forming sheet metal. A turned sphere chucked in the press as in the upper left-hand detail forms sheet-metal U-bends. Once the jaws are set, dozens of duplicate bends can be made. The upper right-hand detail shows a method of making hold-down clips, using a forming die which consists of a carriage bolt on which a steel washer has been welded. Sheet-metal channels as long as the vise jaws are wide can be pressed by using a steel flat welded to a round bar which is chucked in the drill press. Clamping the vise jaws



together and drilling a horizontal hole between them will permit forming two clips at once against a round bar as shown in the lower right-hand detail. Clamp a doubled-sheet-metal shim between the jaws for die clearance when drilling horizontal hole.

C-Clamps on Broken Spring Leaf Provide Temporary Repair



When the main leaf of a spring on his delivery truck broke, one driver used two heavy-duty C-clamps to make a temporary repair so the rest of the deliveries could be made. The first clamp was fitted near the end of the spring so the broken end was forced down enough to permit fitting on the other clamp. If a bumper jack is available, it could be used to lift the weight of the truck so the spring leaf would lie flat. Both clamps then were turned tight. A length of wire was fastened to each clamp and to the truck frame to provide a "safety

chain," in the event that a clamp would slip off while the truck was moving. For greater strength in a temporary repair, a steel flat could be placed across the break and clamped in place.

Nathan Schoenbrun, Scranton, Pa.

Socket-Wrench Set Measures Fillets and Coves

When it is necessary to measure the radius of a fillet or cove and no radius gauge is available, use a socket-wrench set to do the job. The wide range of sizes in most sets will permit you to find one socket which will match the radius of the article to be measured.

Safe Torch for Burning Webs And Nests of Tree Spiders

A practical torch for burning the nests or webs of tree spiders can be made by nailing a scrap of insulation board on the end of a pole. Saturate the board with kerosene or fuel oil. When ignited the "torch" will burn for a considerable length of time.

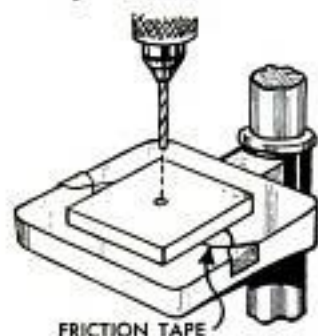




Wheeled "Granary" Towed to Hogs Saves Many Steps

A feed house built on the frame and wheels of an old manure spreader makes it possible to keep a supply of sacked or loose feed close to hogs in fields which are at a distance from feed barns. Short boards fitted in cleats on the doorframe permit adjusting the size of the door opening when loading the feed house with loose grain. Different kinds of feeds are kept separated by removable partitions. When the feedhouse is empty, a tractor is used to tow it back to the feedbarn for refilling.

Taped Drill-Press Table Keeps Block in Place



The problem of preventing a drill block from sliding off a drill-press table when a piece of work is removed can be solved by fitting the table with a strip of friction tape. Lay the strip across the table, sticky side up, then twist over the ends and press them against the sides of the table. When pressed onto the tape the block will be held securely for all practical purposes.

Foil Strips in Wound Coil Simplify Soldering Taps

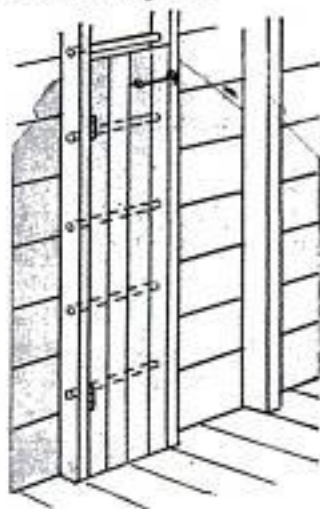
Soldering taps on a closely wound wire coil, without "shorting" adjacent turns, is possible by using strips of aluminum foil to which solder will not adhere. Fold the strips until they are thick enough to pro-

vide a snug fit between the turns. The foil will fold back out of the way of the soldering iron and, when the soldering is finished, can be removed easily:

Harvey Muller, Danboro, Pa.

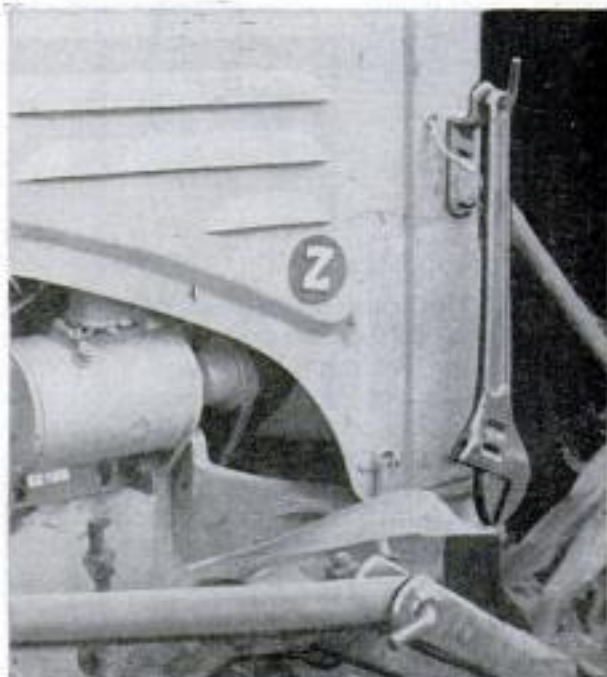
Children Kept Out of Hayloft

To prevent his small children from climbing into the hayloft of the barn where they might fall and be injured, one farmer covered the first five rungs of the built-in ladder with a simple gate as shown in the illustration. A latch was placed at a height that was out of reach of the children. The gate, made of 1 x 4 lumber cross-braced, was wide enough to fit between the ladder rails and was hinged directly to one rail.



Wrench on Front of Tractor Handy for Corn Cultivator

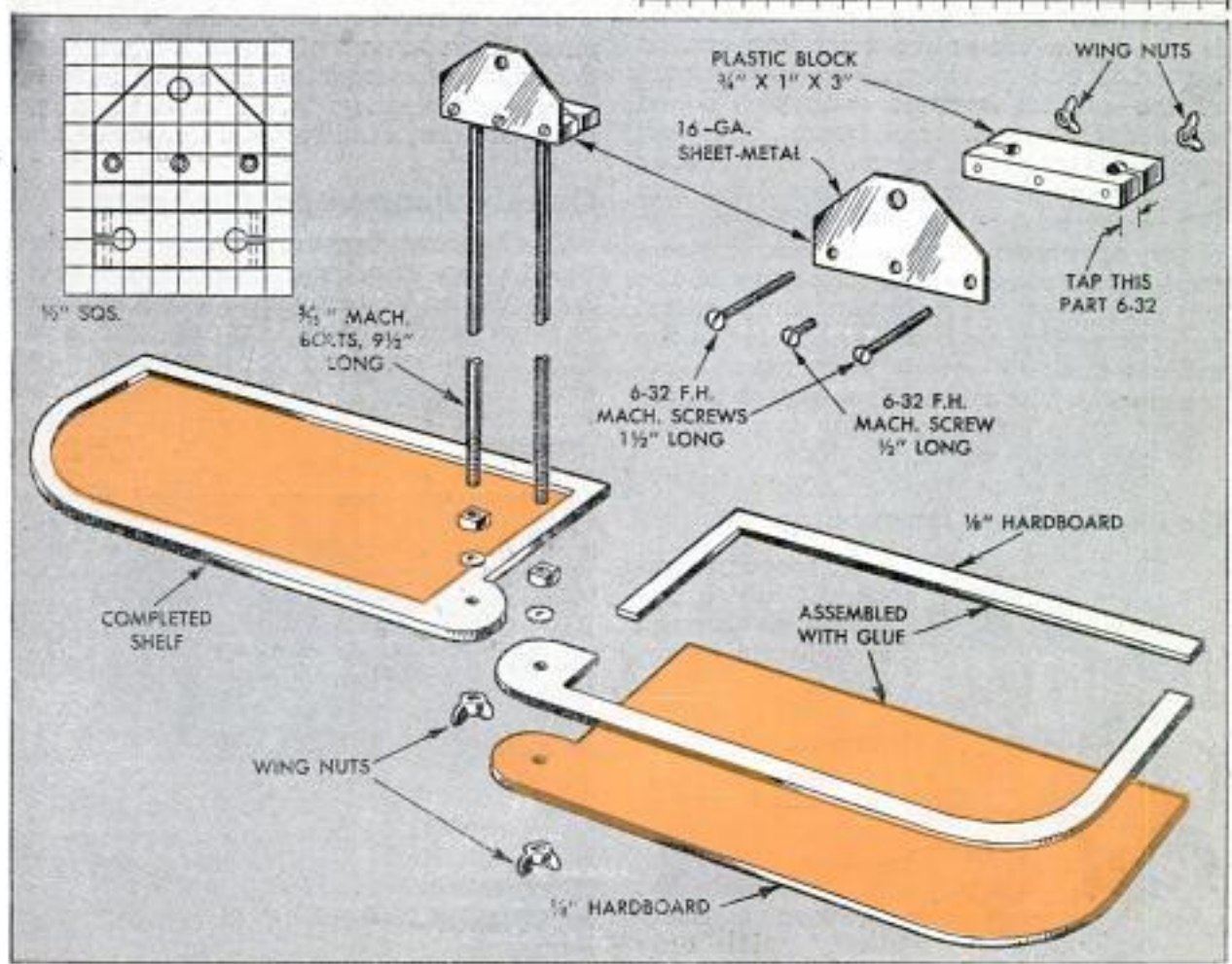
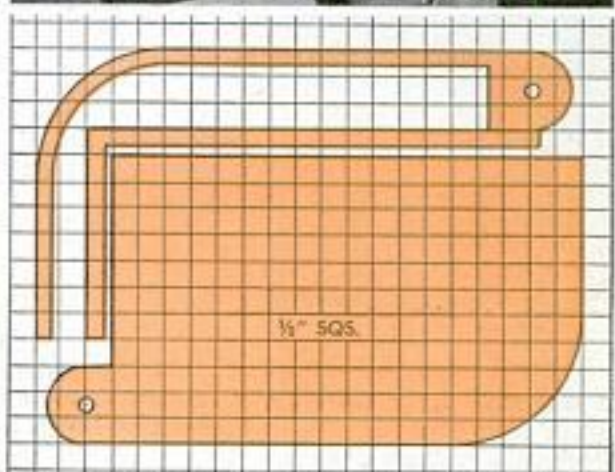
An adjustable wrench hung on a bracket at the front end of a tractor is always close at hand for adjusting a cultivator or other front-mounted implements. In this case, a hanger was made for the wrench by fastening a long carriage bolt to a headlight bracket with two nuts and lock washers, the head of the bolt being cut off and the bolt end bent up at right angles.



SWINGING SHELVES for your enlarger

ANYTHING that contributes to convenience in the darkroom, especially a small one, is well worth the building. These swinging shelves, which attach to your enlarger, are a good example. The shelves are made of $\frac{1}{8}$ -in. hardboard and each one has a raised edging of the same material to keep small items in place. Both shelves are supported by a bracket attached to the enlarger arm as pictured. The details below show the construction of the original unit, but some changes will be necessary in order to adapt the assembly to enlargers other than the one shown. The size of each shelf, given in the crosshatched detail at the right, can be varied to suit individual requirements. However, the length given is about the maximum when using $\frac{1}{8}$ -in. hardboard. If you require a somewhat longer shelf, then use $\frac{1}{4}$ -in. hardboard. Glue the edging to the shelves before cutting to the final dimension. The plastic clamping block, a part of the bracket, permits the shelves to be adjusted vertically. Loosening the wing nuts on the lower ends of the bolts permits them to swing.

M. G. Winterton, Tacoma, Wash.

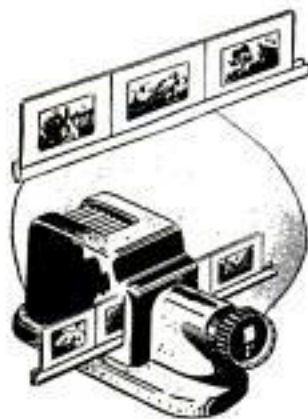


Compact Portable Workshop Built Inside Cabinet



Faced with the dual problem of limited space and the possibility of having to move in a short time, one homeowner built a compact home workshop in a metal clothes cabinet. The space occupied by the cabinet is small and the entire workshop can be moved in one operation. The bottom part of the cabinet is fitted with partitioned drawers for tools and small parts. The work surface is plywood covered with rubber tile. Narrow shelves have been fitted into the upper part of the cabinet for storage of jars of screws, nails, etc. A small fluorescent light bolted to the underside of the top shelf provides sufficient illumination, and two receptacle boxes are bolted to the cabinet back to permit plugging in electrical tools. The cabinet is not intended for heavy work, but is ideal for small repair jobs and hobby work.

Holder for Film Transparencies



To speed up running 35-mm. transparencies through a slide projector, fold a $\frac{3}{4}$ x 12-in. strip of sheet aluminum to form a channel that will hold six transparencies. This will enable them to be run through the viewer consecutively with only

one handling. To further reduce handling, make several holders and load them ahead of time, arranging pictures and holders in the order desired.

Mildred C. Algots, Glendale, Calif.

Loop Tied in Rubber Band To Provide Finger Grip

A finger grip in the rubber band usually snapped around a reel of movie film when it is stored will save time and temper when the band is removed. Make the finger grip by tying a knot near one end of the band. The resulting loop is easily gripped with the fingers.



Lowering Outside Supply Tank Prevents Oil-Stove Leak

The problem of leakage through a carburetor shut-off valve in an oil space heater when the fuel is gravity-fed from an outside tank, can be overcome by reducing the height of the tank. Designed for a low-pressure supply, the valve cannot retain the added force resulting from a raised tank. A positive supply of fuel will be assured if the bottom of the tank is only 6 or 8 in. above the inlet line of the carburetor. To prevent damage to the valve from foreign particles, install an oil filter in the line.

Quickly Improvised Clipboard

A clipboard for use around the house that has several advantages over the regular type, can be made from a piece of corrugated cardboard and spring-type paper clamp. The board can be made any desired size, is lightweight and can be disassembled for storage, or the cardboard simply discarded.



X603

SN 57



SHOP NOTES

METAL SHAPER FOR YOUR SHOP

By S. S. Miner

A METAL SHAPER is indispensable for certain machining operations where flat surfaces must be produced within very close limits, such as machining flats on castings, cutting keyways, rabbets and grooves and reducing the thickness of stock to a given dimension. This one has a 3-in. stroke, is manually operated and has been especially designed to reduce machine operations in the construction to the minimum. Cold-rolled-steel flats and squares are utilized for nearly all operating parts and the frame and base. These parts you can purchase cut to size with "store" edges at a very reasonable cost per piece. Joining edges and flat surfaces can be finished by hand to remove saw or flame marks and square the surfaces for fitting.

One thing to keep in mind before begin-

ning the construction: Hole layouts are given on the parts dimensioned on the following pages, but the hole sizes have been omitted. The reason is that you have a choice of two methods of assembly. On the original machine the parts were joined with socket-head screws, the screwheads countersunk flush. The alternate method is to drill the body and tap holes only, omitting the counterbores. This latter method effects a considerable saving in construction time and does not impair the efficiency of the machine in any way. Use 1/4-in. socket-head screws or hex-head screws except where other thread sizes are given. The length of the screw is determined by the thickness of the stock and also the location of the screw.

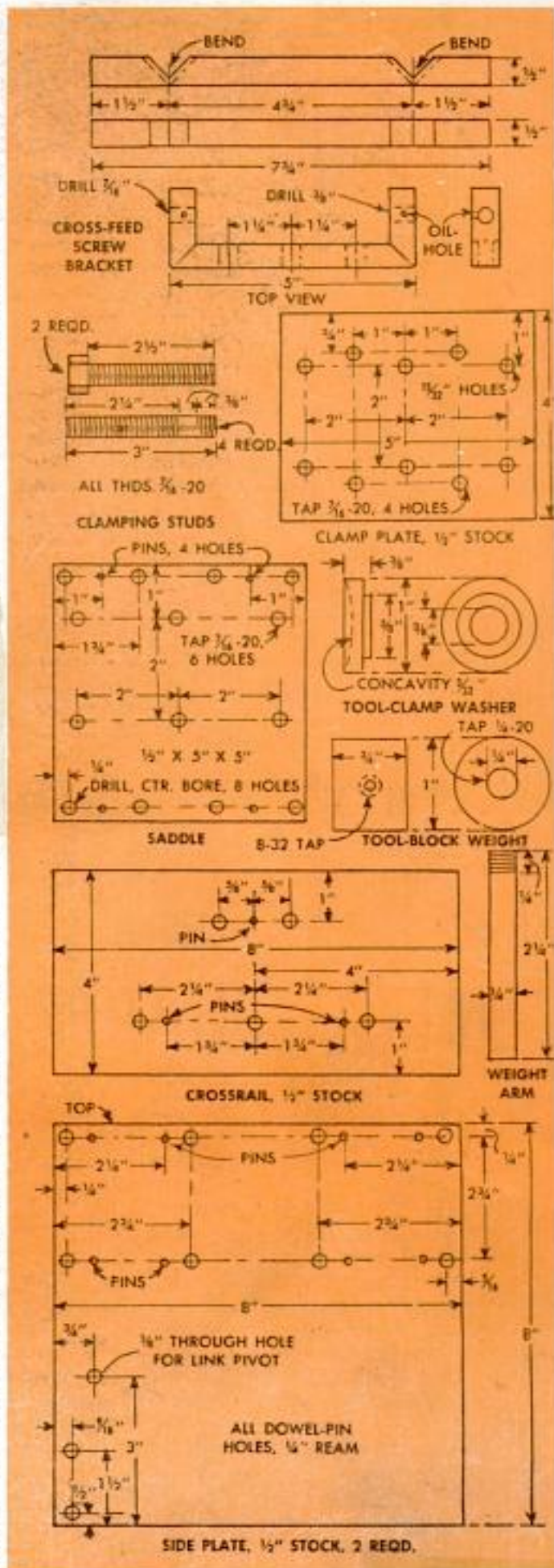
Begin construction with the base plate,

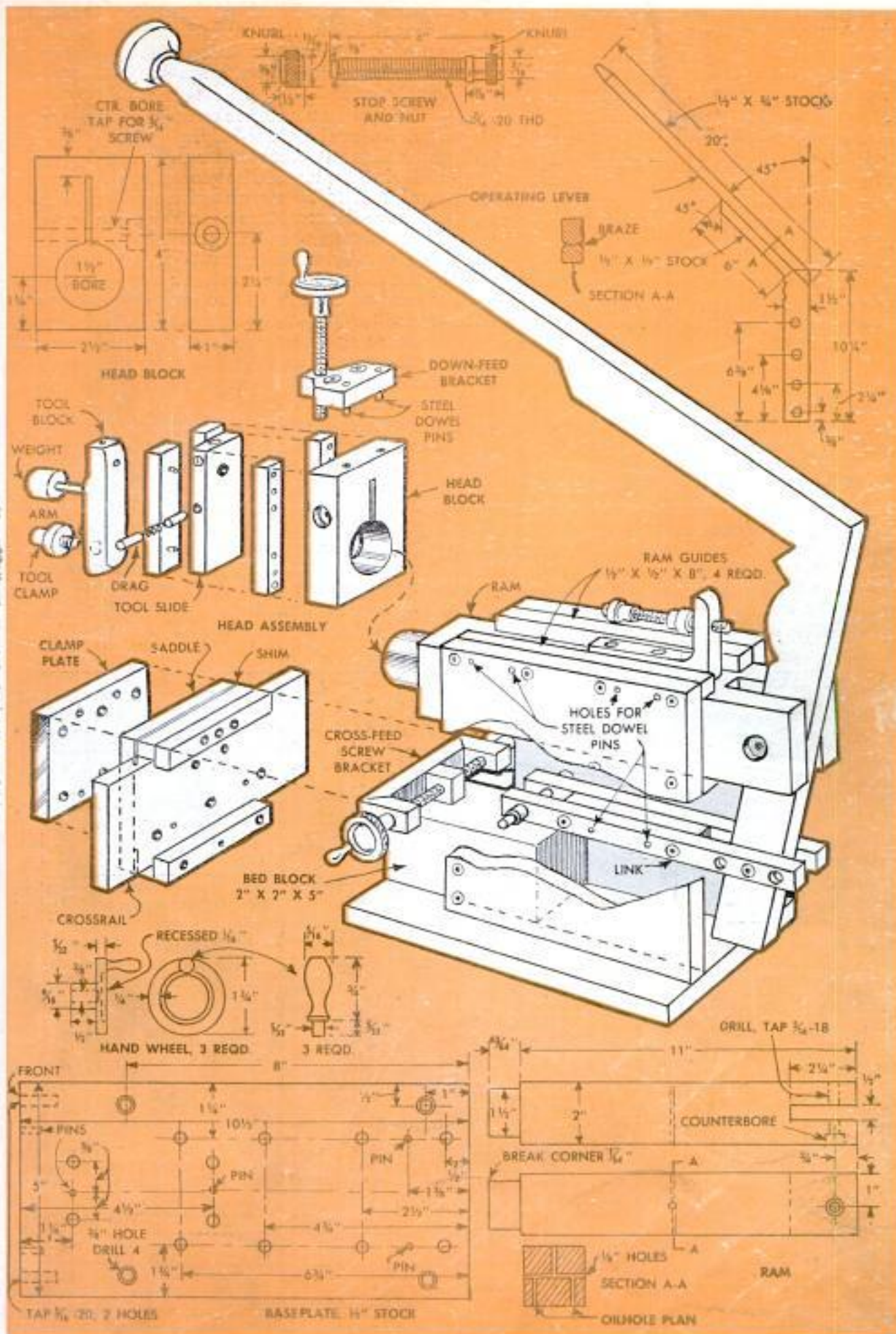
the two side plates and the bed block. Only the front edge of the base plate, the bottom edges of the side plates and the front end of the bed block are finished. This must be done with care to assure flat, true surfaces. Next, lay out and drill the body-hole pattern in the base plate and side plates and then use these three members as jigs when drilling the tap holes in the ram guides and the bottom edges of the side plates. Note the location of the dowel-pin holes in the various parts. Holes for the dowel pins are drilled and reamed so that the pins are a medium-tight drive fit. When body holes and holes for the dowel pins are drilled the parts must be clamped together securely. Then drill and ream the pinholes first. Drive the pins in part way before drilling the tap holes.

When the side plates and bed block are in place on the base plate the next parts to make and fit in place are the ram, the operating lever and the crossrail and saddle. The saddle cannot be made complete until the cross-feed screw bracket has been made and fitted. Note that the ram is slotted for the operating lever, counterbored, and that a round, $\frac{63}{64}$ in. long and $1\frac{1}{2}$ in. in dia., is turned on one end. This must be done in a metal lathe to assure the necessary accuracy. The ram must be a smooth sliding fit in the guides. Some light filing and smoothing with abrasive will be necessary to achieve the required fit. Note in the ram detail that section A-A gives the oilhole plan. These holes must be drilled before final assembly.

Make the operating lever and link next. Note in the lever detail that it consists of three parts, two of which are brazed to the third at a 45-deg. angle. Section A-A shows how the meeting edges are beveled before brazing. Form a radius on the body of the lever to provide a landing for the stop screw. Top end of the lever can be fitted with a plastic knob, or a handhold is easily shaped by grinding and filing. The link, which is a part of the lever assembly, consists of two steel squares pinned and screwed to a spacer. In this case the heads of the socket-head screws must be countersunk flush for clearance. Note also that the link pivot pin is grooved to provide a seat for the end of the retaining screw. The link is provided with bronze bushings.

The head assembly consists of the head block and the toolhead slide, the latter built up from steel squares and flats as detailed, the parts of the slide being assembled with screws and pins. The head block is a swiveling clamp which fits over the round turned on the end of the ram. When the assembly is complete with the down-feed bracket and tool block the entire assembly can be swiveled on the ram to locate the cutting





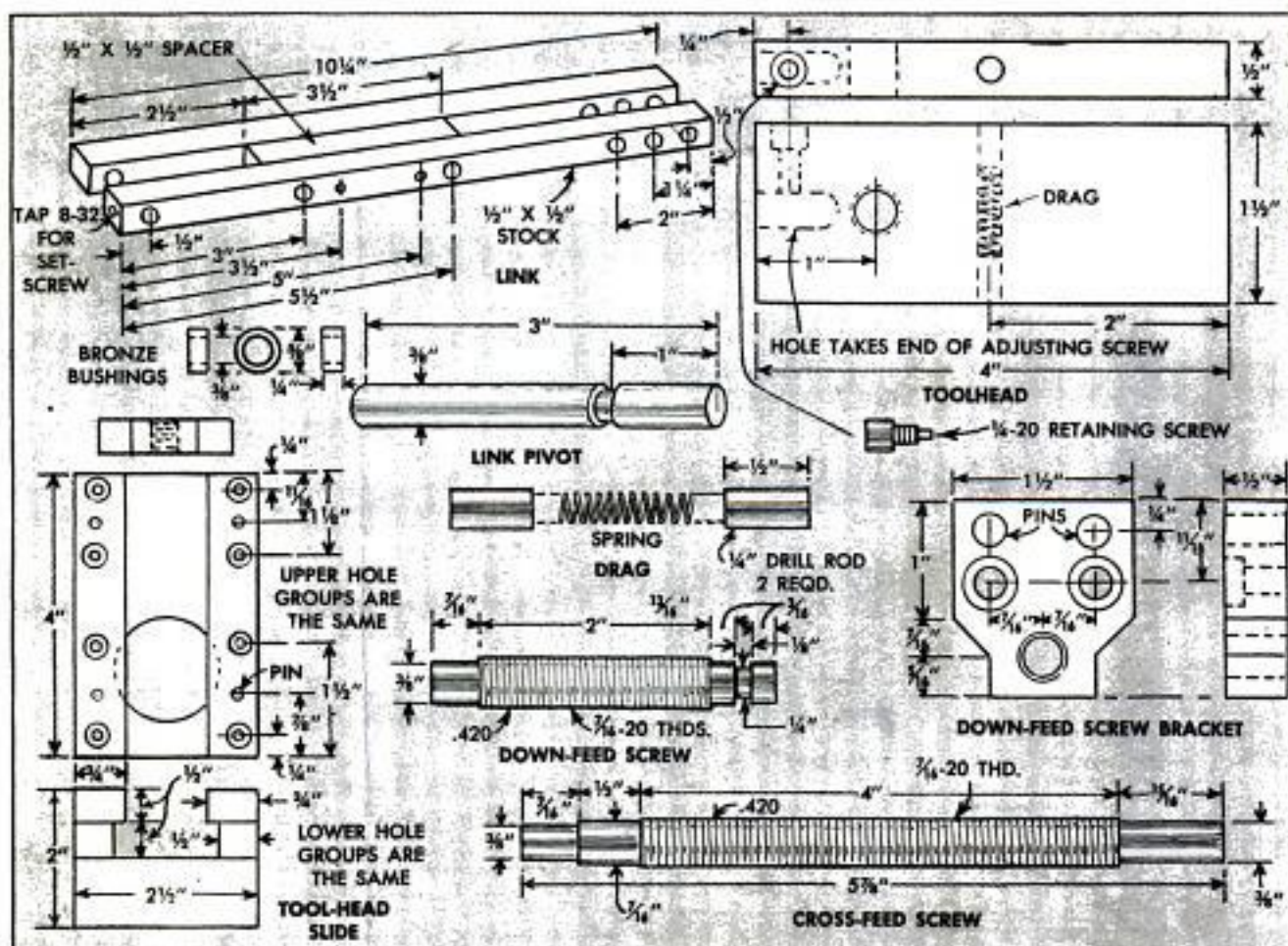
tool at any desired angle with the work. Note that the toolhead is fitted with a spring-loaded drag, which has the effect of taking slack out of the down-feed screw and also to prevent chattering on heavy cuts.

Beginning construction of the assembly with the head block, bore the block to $1\frac{1}{2}$ -in. dia. before slotting. The slot is cut with two hacksaw blades placed side by side in the saw frame. Take time to assure a straight cut and finish with a file. Then counterbore and tap for the clamping screw, the counterbore on one side of the slot, the tap hole on the other. Next, turn and thread the down-feed and cross-feed screws in the lathe. Now, note that the end of the toolhead is drilled to take the end of the down-feed screw and that the lower end of the down-feed screw is grooved to take the shouldered end of a retaining screw. Drill this hole to a depth of about $\frac{3}{16}$ in. and test-fit the end of the down-feed screw before final assembly. There will be a slight amount of end play in the screw and it is necessary to make sure that it will clear when run up or down. If it should bind on the bottom of the hole you will have difficulty adjusting the cutting tool. With the toolhead and slide completed and the parts fitted in the final assembly, dis-

assemble and fit the down-feed screw bracket. Note that it is both pinned and screwed in place and care must be taken to assure a true fit on the upper end of the head block.

The head assembly is completed with the addition of the tool-holding block. Note especially the elongated hole in the upper end of this block. The elongation permits the block to swing outward on the back stroke of the ram. The counterweight drops it into cutting position again as it clears the edge of the stock being cut. This elongation of the hole must be worked with a file and several tests made as the job progresses to assure just the right amount of clearance. The cutting tool is held in place by means of the washer detailed and a socket-head screw turned into a tapped hole near the lower end of the block.

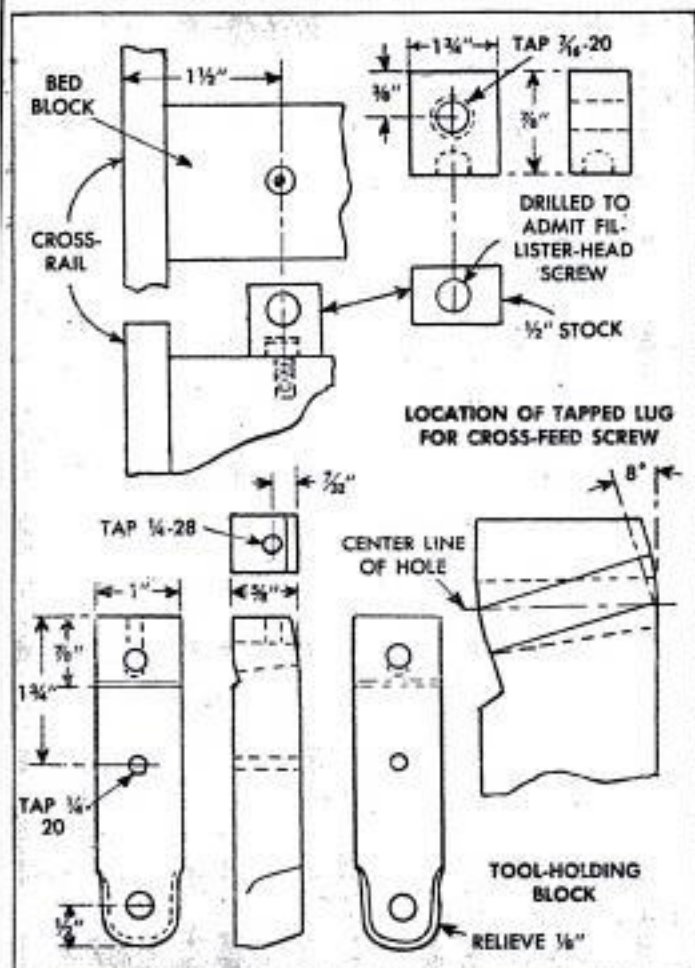
The cross-feed screw bracket is made by notching and bending a length of square stock. Note in the details that one leg of the bracket (after bending and brazing) is drilled $\frac{1}{16}$ in., the other $\frac{3}{8}$ in. Note also that the screw is shouldered to three diameters to permit it to be slipped into place after the bracket is bent to form. However, before assembling the screw in the bracket it is necessary to make the lug through which the screw is threaded at assembly.



This lug has a bottom hole which fits over a fillister-head screw turned into a hole tapped into the bed block. When making these parts a careful layout is essential to assure correct location of the holes so that the screw runs freely throughout the length of the threaded section. This is important as it should be remembered the feed of the work is by hand. If the screw is correctly aligned when assembled, but still has considerable drag, disassemble, and remount the screw in the lathe. Take a light cut over the threads to reduce the contact to about 60 to 70 percent. Usually this will ease the fit sufficiently so that the screw will run freely. Three handwheels are required, one for the down-feed screw, the other two for the cross-feed.

The stop-screw bracket is not detailed as it is necessary to fit it to the machine in order to assure that the stop is correctly positioned to assure contact with the landing on the operating lever. Take measurements from the assembly and make the bracket accordingly from $\frac{1}{2}$ -in. stock.

The saddle and clamp plate are the last parts to be made and fitted. The clamp plate is carried on four studs made as detailed and screwed into holes tapped in the saddle. Clamping is done by tightening nuts run onto the threaded ends of the studs. After assembly, test all parts. ★ ★ ★



OCTOBER 1955

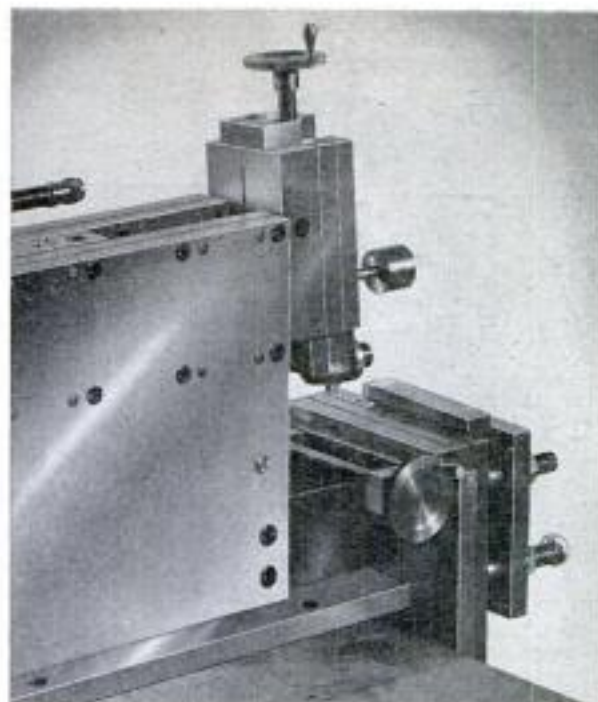
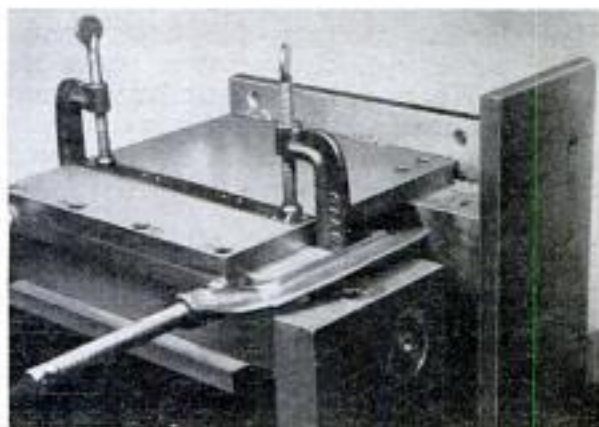
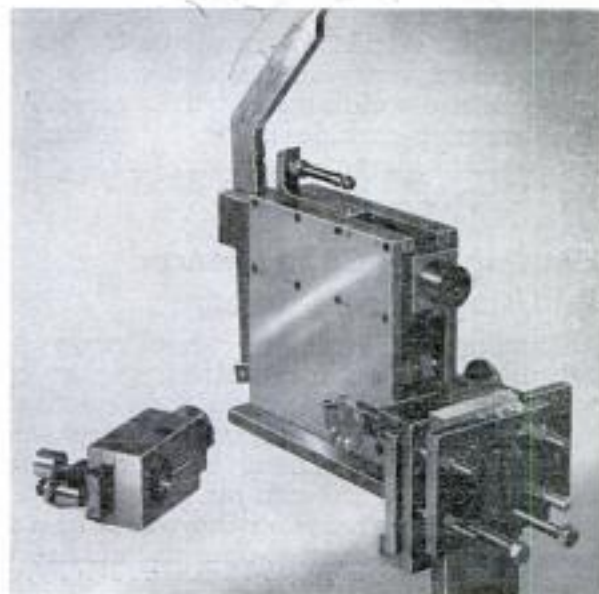


Photo shows head assembly and crossrail, saddle and clamp plate in position with work clamped in place



Above, method of clamping parts in position for fitting and drilling screw holes. Below, head assembly removed showing round turned on end of square ram



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Bench Stop Hooks Between Boards In Top of Bench



If your bench top is made up of several boards with open joints, a neat sheet-metal bench hook for holding light work can be bent as shown to fit between the boards. Held in this manner, the hook cannot shift, yet is quickly removed when not needed. Where it would be advantageous, as for continued use, the hook may be permanently fastened with a couple of small nails.

Inexpensive Small End Mills



Small end mills, used for machining oil grooves in sleeve bearings, can be made quickly and inexpensively from roundheaded machine screws and tungsten-carbide

blanks. The blanks are fitted into the screw slots and oxyacetylene welded with a low-temperature welding rod. After assembly, the tungsten-carbide blank is ground to the desired shape.—Eutectic Welding Alloys Corp., Flushing, N. Y.

Rattling Hub Caps Silenced By Using Gasket Cement

Rattling hub caps and wheel rings can be silenced with hard-setting gasket cement. Spread a thin layer of the cement on the hub cap or ring where it contacts the wheel. Allow the cement to partially harden and replace the cap on the wheel. Be sure to smear grease on the wheel first to assure that the cement does not adhere to the wheel. When the cement has set, the

grease can be wiped off. If the metal of the contact point has lost its spring, place a small amount of cement behind the metal to stiffen it. Permit it to dry thoroughly before snapping hub cap or ring back on the wheel.

Reduce Salt-Block Waste By Using Nail Keg

To reduce waste of salt blocks of the type having a hole in the middle, place each one on an empty nail keg fitted with a projecting length of pipe. The pipe is pushed through a hole drilled in the bottom of the up-turned keg and

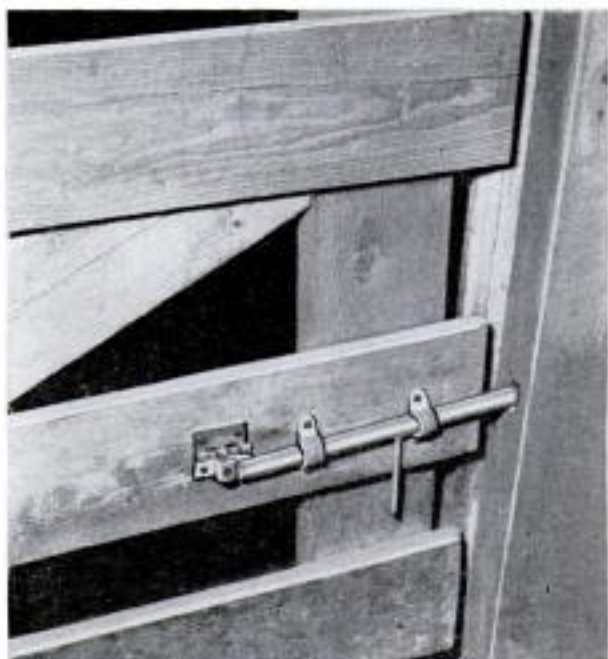


driven into the ground. The salt block then is slipped over the pipe to rest on the keg. Being off the ground, the salt will not dissolve from ground moisture nor become muddy and unappetizing to livestock.

G. E. Hendrickson, Argyle, Wis.

Fence Gate "Livestock Proofed"

Livestock cannot open the bolt lock on this gate when a hinged safety catch keeps the bolt from being drawn back. The catch consists of a nut welded to the free half of a butt hinge which has one leaf screwed to the gate. When the bolt is pushed into a hole in the gate post, the hinge leaf automatically drops. The nut prevents the bolt from being drawn back until the hinge leaf is lifted.



Holder Separates Leads Of Multiwire Cable



One electrician keeps the various leads in a multiwire cable separated when making connections by using a holder made from a short length of auto-radiator hose. The wires are simply pulled into

a number of slits cut in one end of the hose. One side of the hose is slit its entire length so the holder can be removed from the cable after all connections have been made.

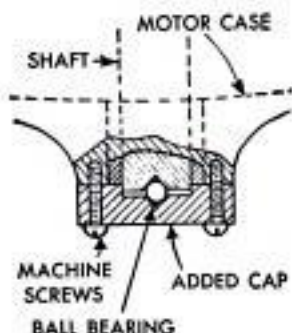
Carburetor Fuel-Level Gauge



A gauge for accurately determining the fuel level in a carburetor float bowl can be made from a 1-ft. length of clear plastic tubing and a modified float-

bowl drain plug. A spare plug is drilled and a 1-in. length of copper tubing is soldered into the hole. The plug is substituted for a drain plug in the carburetor to be checked and the plastic tubing is slipped over the copper tubing. When checking the fuel level, the engine is run at idle speed and the plastic tubing held vertically as shown. Compare the fuel level in the carburetor being tested with the level in a similar carburetor on an engine which is known to be operating satisfactorily.

"Thrust Bearing" Converts Motor For Use in Vertical Position



Often an electric motor designed for horizontal use can be fitted with a single steel ball at one end of the shaft to permit using it vertically. The thrust bearing is a hardened-steel ball bearing that fits in two mating

conical center holes, one in the end of the motor shaft and one in an added cap. The latter is machined to fit on the boss of the motor case so that the attachment screws will not interfere with the shaft bearings. To assure adequate lubrication of the thrust bearing, install a grease fitting in the cap.

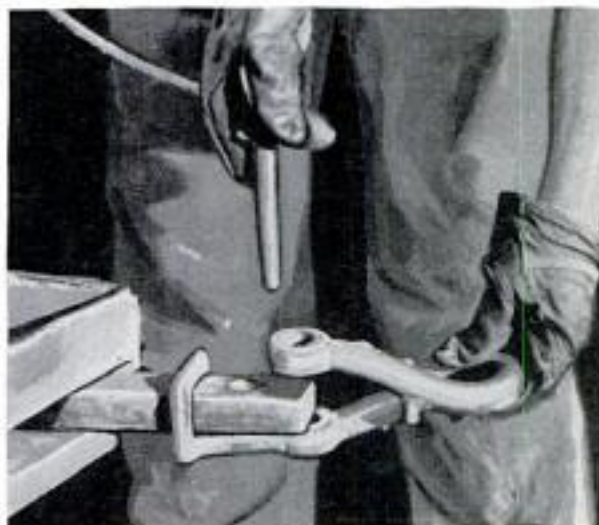


Nails Fastened to Bins Identify Contents

A convenient supply of nails, readily identified for size and type, is a feature in this farm workshop. The nail bins are 1-gal. antifreeze cans cut in half. A nail fastened to the front of each bin identifies the contents. Special shelves for the bins are built between the 2 x 4 wall studs so that no floor space is required.

Quick-Coupling Tractor Hitch

Faster hitching and more positive control when backing implements hitched to a tractor are possible with this rigid coupling. A length of steel rod is bent to a U-shape to slip over the end of the drawbar and then welded to a short piece of flat steel the same width as the drawbar. Welding a twisted clevis to the end of the flat steel results in the rigid coupling shown.



SN 57

CUT MOLDINGS on your circular saw

By Sam Brown

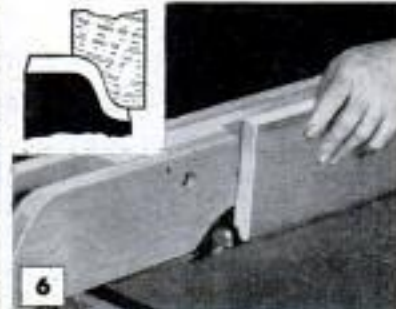
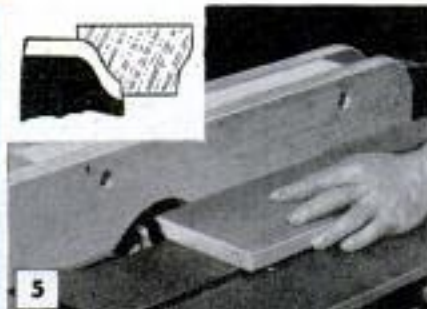
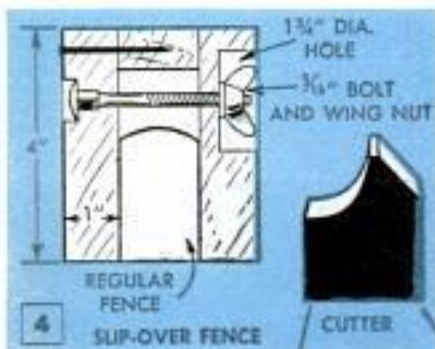


Wooden auxiliary fence is cut out simply by raising the rotating cutter. Cutout should be deeper than average molding cut



NEARLY ALL common straight moldings can be cut on the circular saw, using a special cutterhead that replaces the regular blade. Molding heads come in two and three-knife types, either one of which will produce smooth, clean work at standard saw-arbor speeds. Shallow moldings usually can be cut in one pass of the stock, only a few of the more involved shapes requiring two or more passes. By tilting the head and making adjacent cuts, almost any shape required can be made. Straight cuts can be run on the outside edge of the stock with a simple cutout fence to aid in working the stock past the cutterhead, but where the shapes are more complicated, or where whole-edge cuts must be made, it's regular practice to make up auxiliary jigs and guides to suit the job.

Mechanics of cutting: The molding heads, Fig. 1, generally require a special cutout fence or an equivalent wood facing with cutout, Fig. 2, fastened to standard fence. For a permanent fence, the style shown in Fig. 3 is excellent, the clamping wing nuts being recessed to permit working on both sides of the fence. The work can be advanced to the cutter in a flat position, Fig. 5, or in a vertical position, Fig. 6. Some cutter shapes permit only one work position, while others allow the work to be flat or vertical as desired. Generally, when a



FLAT

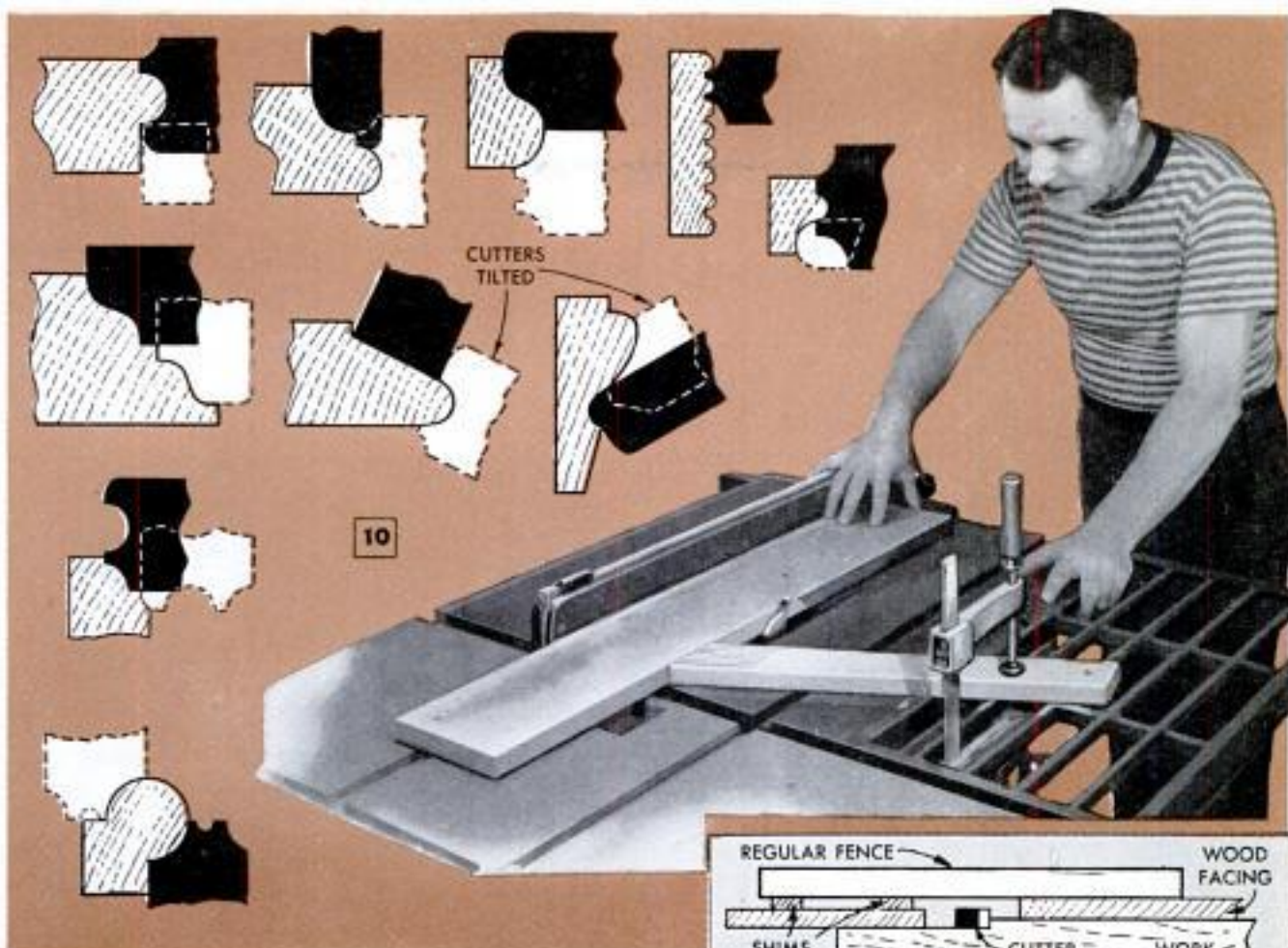
VERTICAL



RIGHT SIDE

LEFT SIDE

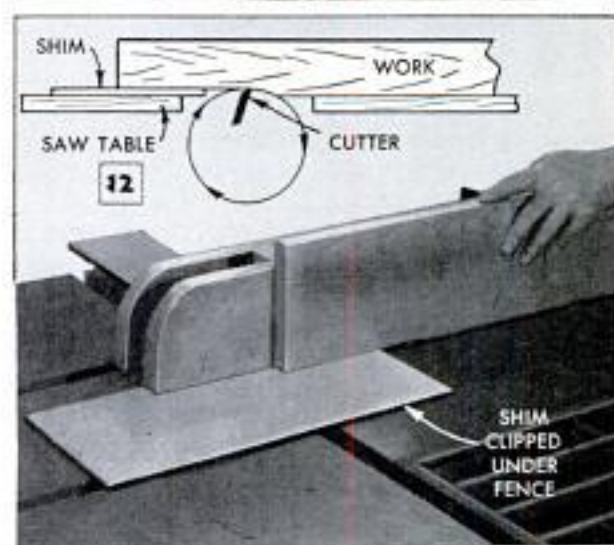
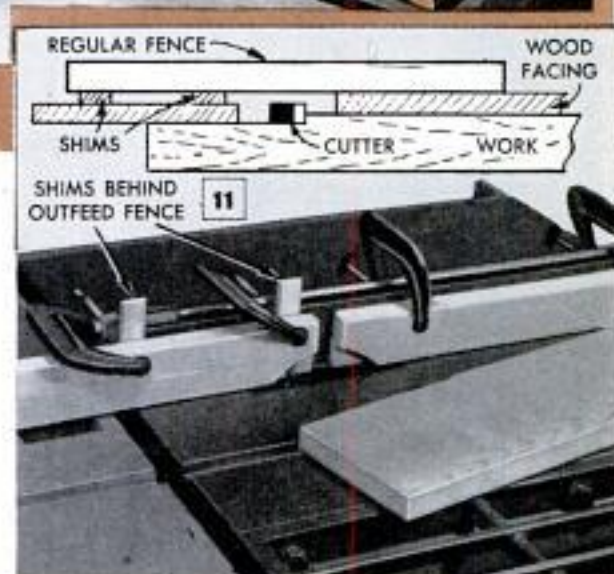
OUTSIDE CUT

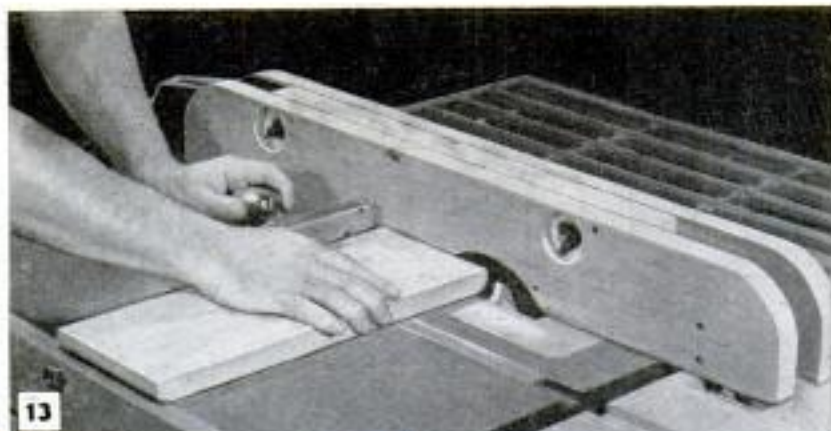


choice is allowed, the flat position is the more convenient. Cutting is done on the right or left side of cutter as required by the cutter shape, the cuts in Figs. 7 and 8 being typical examples. The standard technique of cutting is to mold on the inside, that is, the cut is made on the edge of the work next to the fence. Occasionally, cutting on the outside, Fig. 9, can be done to advantage.

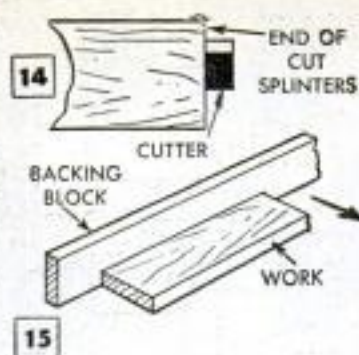
Outside cutting: As shown in Figs. 9 and 10, outside cutting requires a hold-in for safe operation. A molding cutter is not like a saw—it cuts almost as well sidewise as straight ahead. Hence, when making a cut on the outside, the hold-in is needed to prevent the cutter from hogging into the work. The specific cut shown—sweep-jointing an edge with straight dado knife—produces a fairly smooth surface, although not equal to the regular radial cut. Jointing in this manner is advantageous in smoothing a very rough edge.

Whole-edge cuts: Most cuts made with the molding head leave some uncut wood to serve as a guide against the fence or table. When the whole edge is removed, it is necessary to offset the outfeed fence or table in the same manner as in jointer or shaper work. When the fence is the guide, this is done with a two-piece fence, Fig. 11, with the outfeed portion shimmed to the



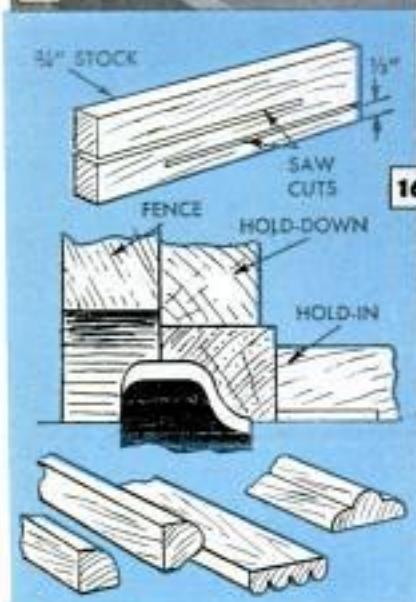


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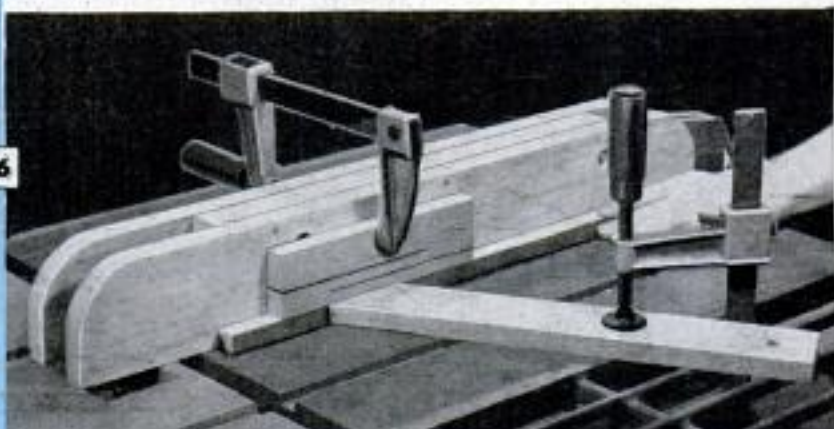


14

15



16



When it is necessary to mold across end grain, run these cuts first. Where only end grain is molded, use a backing block to prevent splintering, which is likely to occur as cutter passes edge. Narrow strips require a hold-down and hold-in clamped to saw table and fence as in lower photo. These must be correctly adjusted

desired depth of cut. A thin piece of metal or plastic is used in a similar manner when the table is the guiding surface, Fig. 12.

End cuts: End cuts across the grain, Fig. 13, will always splinter a little at the end of the cut, Fig. 14. When the work is molded all around, the splintered ends are cleaned by with-the-grain cuts, which are done last. If the ends only are to be cut, a backing block, Fig. 15, will prevent tearing. It also is good practice to slow up on the feed at end of the cut. If the end cut must be worked with the piece in vertical position, it is necessary to use some form of tenoning-jig support, as shown in Fig. 30.

Strip moldings: Much molding-head work is in the form of strip moldings. To handle this small stock, it is necessary to use both a hold-down and a hold-in, Fig. 16. With the setup made as shown, strips can be pushed into the cutter one after the other in rapid succession. When only a few pieces of strip molding are needed, the alternate method of working the shape on the edge of a wide board is often used.

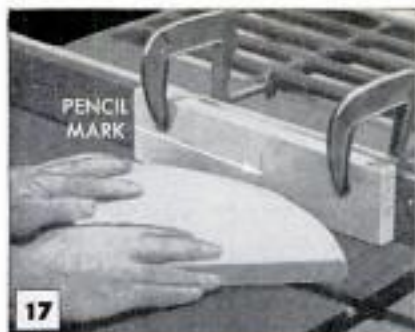
Other operations: Various other operations with the molding head are shown on opposite page, Figs. 17 to 28 inclusive, and described in the accompanying captions. Cove cutting with the molding head, Fig.

23, is an especially useful technique, and the use of the roundnose cutter makes the job cleaner and faster than similar work done with a saw blade.

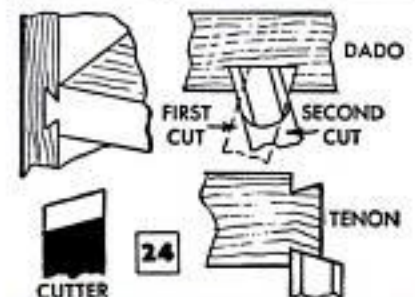
Joinery work: Other than moldings, the molding head does a remarkable variety of joinery work. Straight dado cutters, Fig. 36, available in all standard widths, do all the jobs of dadoing, rabbeting and grooving common to the dado head. Dado cutters are a little different from shaped cutters in that the face is milled, as shown. This gives a rake angle to the sides of the cutter. Side cuts are cleaner and the cutter stays sharp longer than a conventional straight knife.

The drawer-joint cutter, Figs. 29, 30 and 31, is one of several one-purpose cutters. This cutter is symmetrical and cuts both parts of the front-to-side drawer joint, Fig. 29. The front of the drawer is cut first. In this operation, the depth of cut is equal to side-stock thickness; the uncut wood on face can be an approximate $\frac{1}{8}$ in. The side of the drawer is cut with work flat on table, Fig. 31. Test this on scrap stock and you will see how the joint fits.

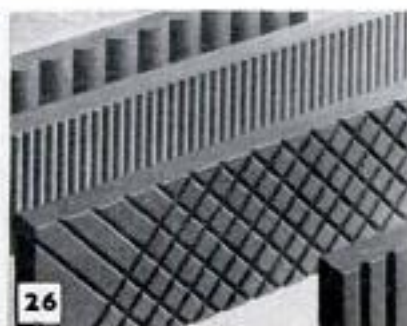
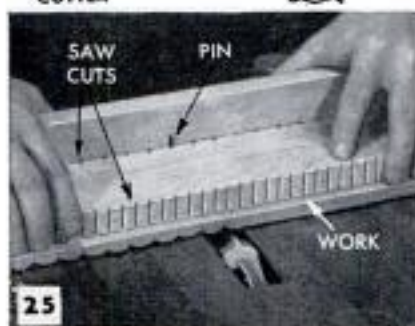
The door-lip cutter is another special-purpose knife which rabbets and rounds the edge in one pass, Fig. 32. One of many applications of the 45-deg.-angle cutter is the



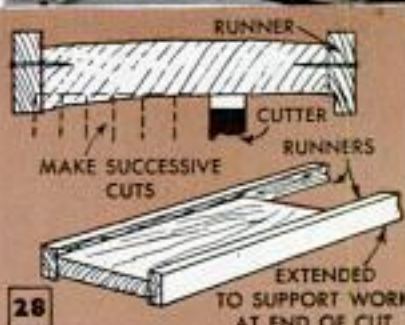
Curved work can be run freehand by keeping work tangent to center line of cutter. Works fairly well on both hard and soft wood where the mold is shallow. Usually it's best to run cut in several passes as otherwise it is difficult to hold the stock. Circular work can be molded quite easily, but requires a careful setup on an overhead pivot pin, or a V-block as detailed at the right. When molding edge of a disk more than 8 to 10 in. in dia. the V-block method usually is best

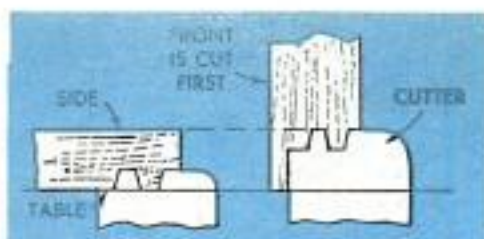


Dovetail grooving is easily done with a straight dado cutter ground at an angle of 11 deg. Groove is run with the cutter tilted 11 deg. as pictured and detailed. Work must be reversed for the second cut. Dovetail tenon is cut with the same cutter in a vertical position, the depth being accurately adjusted to give a dovetail of the correct width. It's a good idea to test the setting by running a cut on a piece of waste stock, readjusting the setting if necessary until the dovetail is a snug, sliding fit. Cutters must be razor sharp



Ornamental moldings in a variety of pleasing patterns can be made by running repeat cuts across grain, using a notched or saw-cut template against a stop pin as pictured above. In making moldings of this type, accurate spacing of cuts is of the first importance. Another job for which a molding head is well suited is surfacing short lengths of rough lumber to take out wind and warp. Use straight cutters, 1 in. wide, in the head, joint piece and nail supporting runners to each edge





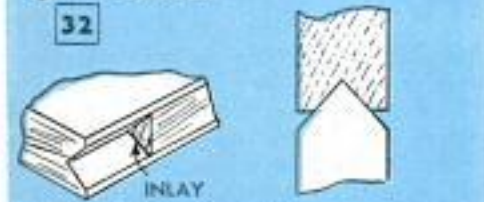
29



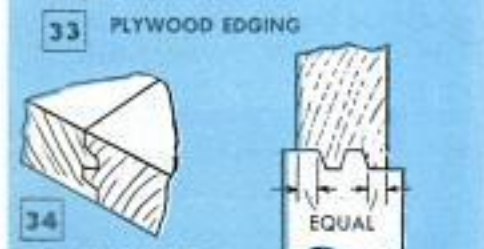
31



32



33



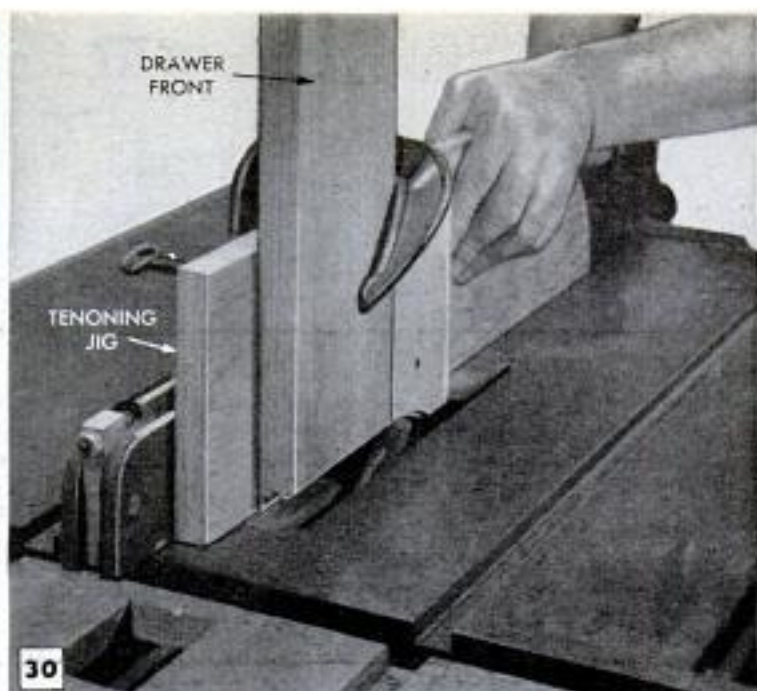
34



35



36



30

grooving of plywood edges to take an inlay facing, Fig. 33. The symmetrical glue-joint cutter is a one-purpose knife, used only for making glue joints. The work must be exactly centered on the cutter, Fig. 34. Properly centered, any two pieces will fit together when one of the pieces is reversed end for end. When the work has a definite face side, the reversal is done while cutting, molding one piece with face side next to fence and the joining piece with the face side away from fence.

The older style of tongue-and-groove glue joint, Fig. 35, still is preferred by many cabinetmakers. This is run with two cutters, one making the groove and the other the tongue. Both cutters are the same length so that when the depth setting is made for one, the same setting is used for the other. All work is done in the same position, that is, with face side to the fence or away from the fence as desired. When this is done, only approximate centering is required. Tongue-and-groove cutters can also be used for drawer and corner joints.

Molding shapes: Hundreds of molding shapes can be made with available cutters. A study of the samples shown in Fig. 10 will give you the general idea of how cuts are combined to produce various moldings. One special feature of molding-head work is that the cutter is easily tilted to any angle, greatly increasing the scope of pattern shapes.

Safety: The molding head is safe, quiet, easy to use. The main safety pointer is one common to all woodworking machines: Never run short, thin work. Specifically, watch out for short or thin work which may, when cut, fall through the table opening or slip into the fence cutout. ★ ★ ★

☐ When sandpaper cemented to a disk sander with pressure adhesive becomes loosened at the edge, it can be recemented by pressing with a hot clothes iron. Place the disk in a horizontal position and, as the heat of the iron softens the cement, place weights on the paper to hold it flat until cement sets.

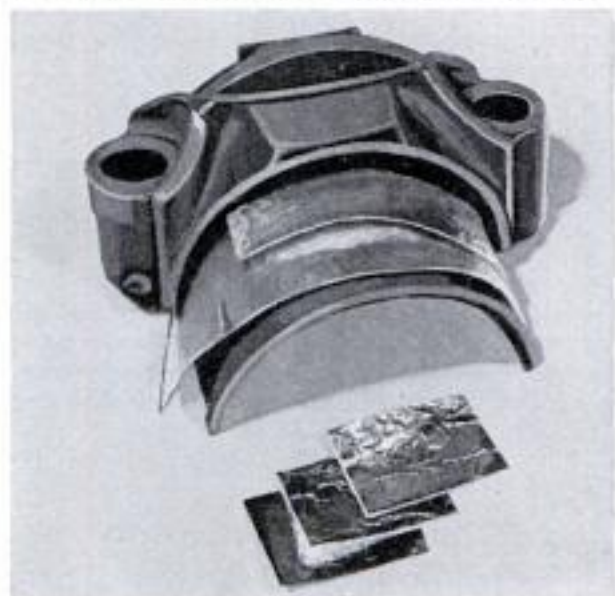
One-Man Logging Operation Permitted By Modified Truck

By modifying his pick-up truck, one farmer has made lifting and hauling heavy logs a one-man operation. The support arch over the tail gate is shaped from the steel rim of a manure-spreader wheel. A length of carrier track, of the type used in dairy barns, is run from the arch to the top of the truck cab. First, using the arch as support, one end of the log is raised by means of a cable and a hand hoist, after which the truck is backed up until the log is supported on the bed. Then the end of the log is chained to the carrier. Next, the cable is fastened near the lower end of the log and hoisted. As the log rises, it slides forward on the



track. When sufficiently well supported, the log is chained and lashed with cable to prevent it from swaying or sliding back.—William Gilman, Middletown Springs, Vt.

Emergency Connecting-Rod Repair Made With Aluminum Foil



Aluminum foil can be used as an emergency repair to tighten a loose connecting-rod bearing in a car engine, or as a semi-permanent repair in a stationary gasoline engine used for light service. First, cut a number of $\frac{1}{2}$ -in.-wide strips of foil slightly shorter than the full length of the bearing insert, place them on the insert of the connecting-rod cap and tighten the cap on the rod. Remove or add strips until there is a noticeable drag when the crankshaft is turned by hand. Remove the cap and discard one strip of foil—the thickness of the strip assures oil clearance in the bearing. Place one half of the remaining number of strips behind the upper insert, after punch-

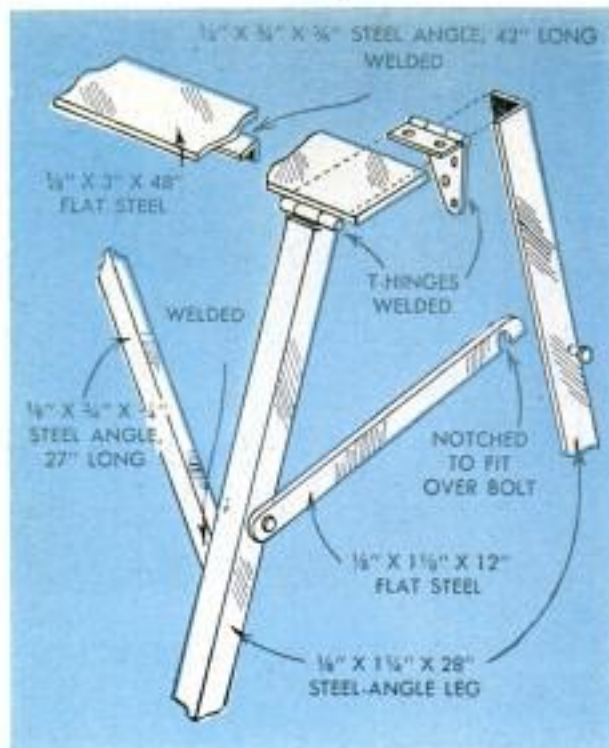
ing oilholes in them, and fit the other half of the strips behind the lower insert. The first strip, nearest the insert, is slightly shorter than the insert, the next strip is about one half this length. If a third strip is required, it should be slightly shorter than the second. The aluminum-foil shims should not be considered a permanent repair for a loose connecting-rod bearing in an automobile engine. The worn insert should be replaced with a new one as soon as it can be obtained.

Holes Punched in Spring Steel Without Annealing

Holes can be punched in spring steel, such as a clock spring, without the necessity of annealing it by center-punching just hard enough to cause a protrusion at the point where the hole is wanted, and then grinding off the protrusion. Repeat the operation until the hole is the desired diameter. This method can be used on metal up to about $\frac{1}{16}$ in. thick. Care should be taken not to strike the punch too hard, which might cause the steel to break or crack.



SN 57



Sturdy Metal Sawhorses Fold Flat to Save Space

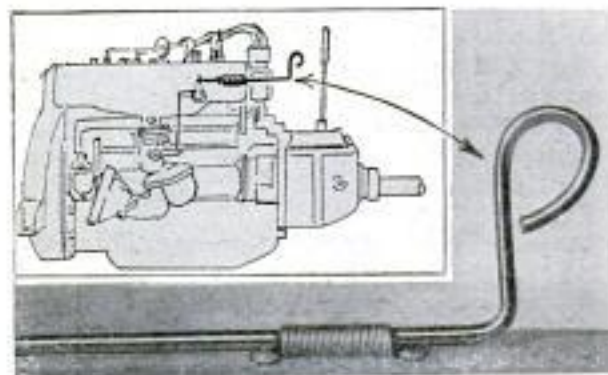
Regular wooden sawhorses are bulky items to store and carry. But this is not so with these sturdy all-metal ones which fold flat to take less room in both car and shop. About seven dollars will buy all the materials and a few dollars more will pay for the welding if you are not equipped to do it yourself. The dimensions given may be varied to suit. The top, for example, can be shortened to 3 ft. if you prefer. The flat-steel top has a stiffening member of angle steel tack-welded every few inches to the underside, and regular T-hinges are welded at each end as shown. The long leg of each hinge is tack-welded to angle-steel legs and

then bracing members, tack-welded to the underside of the top at the center point, are welded to the inside of the legs on one side of the horse. Finally, tie braces of flat steel are pivoted to the braced legs and notched at the opposite ends to hook over the projecting heads of short bolts fitted in the folding legs. If desired, the threaded ends of the bolts can be left projecting and fitted with washers and wing nuts to permit tightening the tie braces in place. Two coats of implement paint or similar enamel recommended for application to metal will keep the horses from rusting.

Walter Rudolph, Fairview, Pa.

Constant-Speed Throttle Control Uses Rod and Coil Spring

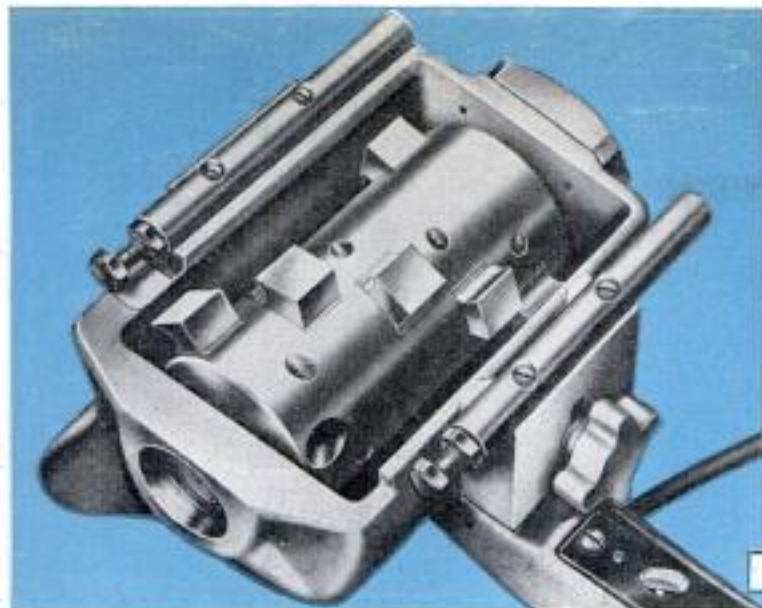
A simple, constant-speed throttle control for a stationary gasoline engine can be made from a length of steel rod and a coil spring. Bent to the shape shown, the rod is fitted at a convenient location on the en-



gine. The spring then is slipped over the rod and screwed to an adjacent surface by means of eyes bent in the spring ends. One end of the spring is screwed in place first. The location for the screw hole at the opposite end of the spring is determined by moving the spring end to one side until it binds against the rod. With all pull-back springs removed from the throttle linkage, the friction of the spring against the rod will hold any desired throttle setting, yet permit easy adjustment when necessary.

Ed Packer, Oak Park, Ill.

☐ A molded egg carton makes a handy tray for nuts, bolts, screws and other small parts. Coat the carton with shellac to make it more durable.



SHOPPING FOR TOOLS

1. MOTOR-POWERED PAINT SCRAPER eliminates hand labor entirely when scraping paint from clapboards, also reduces the constant fire hazard present when removing old paint with a blowtorch. Consists of a specially designed head which rotates at motor speed through a flexible shaft. In use the power unit is carried over the shoulder knapsack-fashion

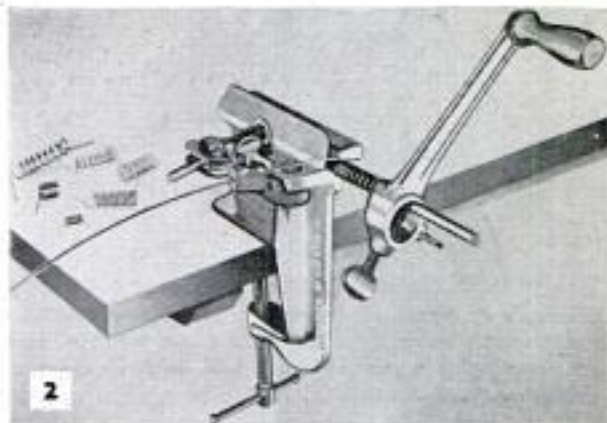
Stow Mfg. Co., 443 State St., Binghamton, N. Y.

2. HAND-POWERED SPRING WINDER makes any type of spring with any number of coils and pitch desired within the capacity of the unit. Spring diameter and pitch are easily changed by simple adjustments. These features make the tool especially adapted to use in small shops for repair and replacement of springs of a variety of types and sizes. Unit is designed to attach to a bench or table by means of a clamping device

General Cement Co., Rockford, Ill.

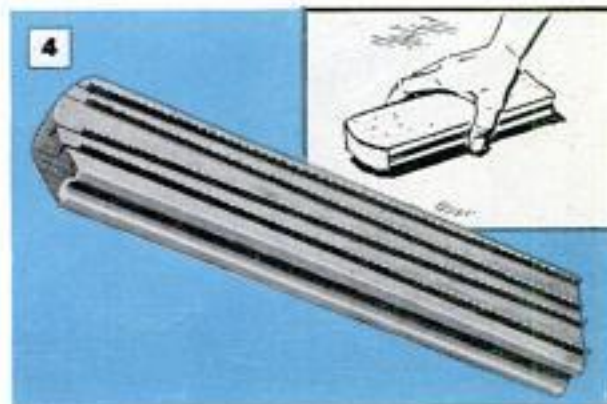
3. MICROMETER HANDWHEEL replaces the standard tailstock handwheel on small lathes and makes it possible to do extremely accurate reaming and drilling to depth. The large micrometer dials also aid in making various types of setups between centers where highly accurate control of movement of tailstock center is essential. Dial also is furnished separately

Strine Machine Shop, Cardington, Ohio



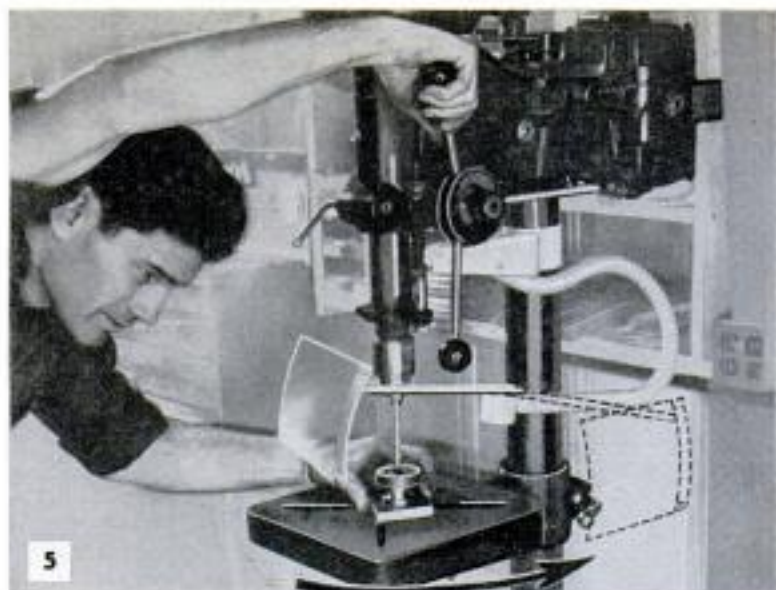
4. SMOOTHING TOOL takes the place of a sand block and a hand plane where it is necessary to work across end grain when fitting doors, sash and screens. Also is especially effective for smoothing plywood edges. Works equally well with the grain on both hard and soft wood. Removes old paint faster than sandpaper or scrapers. Consists of four specially hardened toothed blades anchored in grooves cut in a hardwood block

Fortune Laboratories, 1405 Main St., Des Moines, Iowa



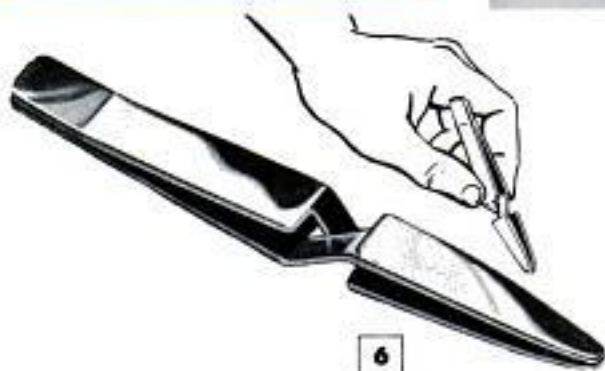
SHOPPING FOR TOOLS

(Continued from
preceding page)



5. EYE SHIELD automatically positions and retracts with each machine cycle when repetitive work is being machined. As pictured in operation on a drill press, shield is adjusted to move into position during the first 1/2 in. of spindle travel. As the spindle is returned to the original position the shield retracts automatically. Easily adjusts to any work position

Hard & Co., 3500 Pontiac Rd., Ann Arbor, Mich.



6. SELF-CLOSING TWEEZER is a necessary aid in any assembly operation which involves picking up, holding or clamping small parts in modelmaking, fly tying, making jewelry and in certain kinds of leathercraft. The self-closing, cross-acting feature permits the tweezers to be used as clamps for holding parts in position for soldering or tying, as they grip and hold with a uniform pressure until they are released

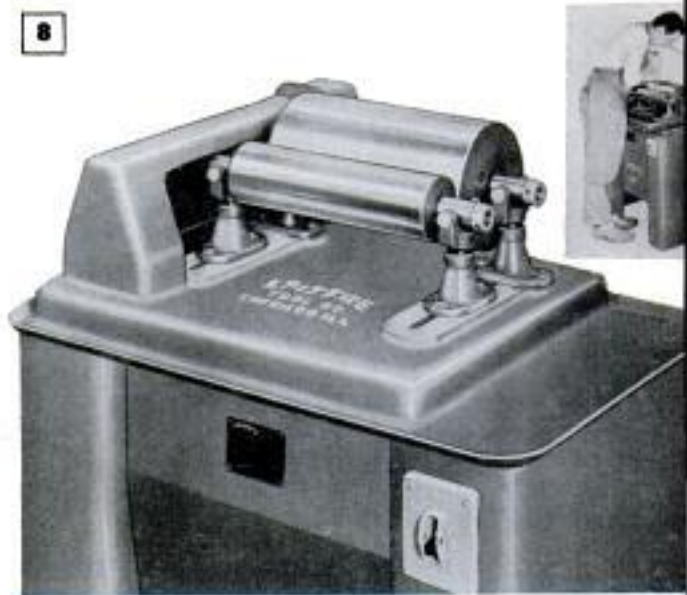
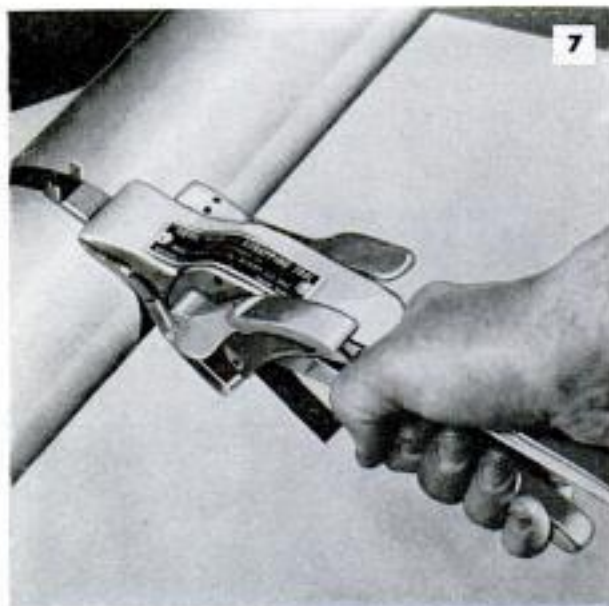
X-Acto, Inc., 48-41 Van Dam St., Long Island City 1, N. Y.

7. METAL-STRAPPING TOOL greatly enlarges the application of metal strapping as a fastener and connector and also as a binder and hanger for pipe, coils and certain hose connections which must be clamped and supported in position. Tool is only slightly larger than a heavy-duty pliers and automatically tensions the strapping and cuts off the excess by the simple operation of side levers. Easily carried in toolbox

Independent Metal Strap Co., Inc.,
230 Third St., Brooklyn 15, N. Y.

8. ROLLER LAPPING MACHINE laps metal, glass or plastic plugs, rods and pins to an extremely fine, accurate finish. Machine consists of two precision-ground rollers of cast iron, one 3 and the other 6 in. in dia. Rollers are parallel, 12 in. long and rotate in adjustable bearings. Large roller is cast with dual internal air chambers, each one vented by four openings. This provision holds temperature of work at a uniform level

Spitfire Tool Co., 2931 N. Pauls Rd., Chicago 41





9. HEIGHT GAUGE is aid in setting circular saw, dado and jointer heads to precise depth of cut. Also useful when setting up shapers, as the knives can be set to the correct height without the use of a rule or other measuring tool. Fine for relocating jointer knives in the head after sharpening, also for setting the outfeed table at correct height. Plunger is graduated

Adams Products Co., 119 Ann St., Hartford 3, Conn.

10. DRILL-BIT HOLDER attaches directly to portable electric-drill cord. Holds 13 bits, 1/16 in. through 1/4 in. by 64ths in the fractional sizes. Easy to attach or remove from the cord, no rewiring necessary. Cord is threaded through the holder, which can be positioned at any convenient point along its length. Made of rubber, the holder cannot be broken even by the roughest use. Also handy to carry in pocket or toolkit

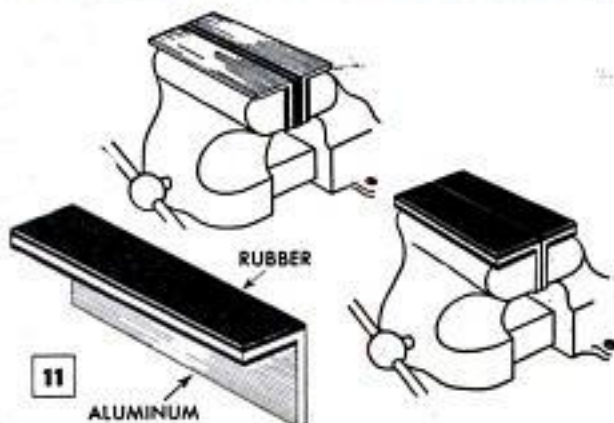
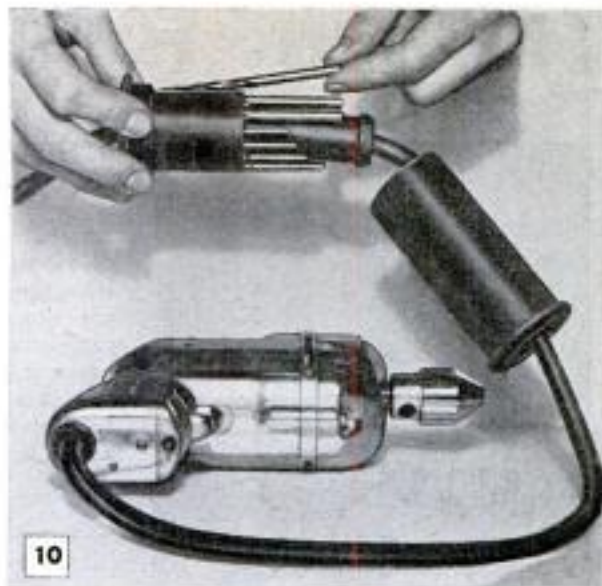
The Donart Co., 425 E. Plymouth Circle, Minneapolis 16, Minn.

12. GLUE-GUN ASSEMBLY for use on air line has a capacity of 16 oz. and comes complete with pressure gauge, regulator valve and 10-ft. air hose with connectors. Easy to clean as there is no tank or fluid hose. Useful to those who use catalyst glues having a limited effective pot life, and also for those who use cold glues on an interrupted schedule

John P. Fox Co., 5514 York Blvd., Los Angeles 42, Calif.



OCTOBER 1955



11. RUBBER-FACED AUXILIARY JAWS fit any metal-working bench vise and enable the user to grip or hold delicate work that would be marred or otherwise damaged by metal vise jaws. Holds irregular shapes

Truck Scale & Research Corp.,
1415 3rd St., S. St. Petersburg, Fla.

13. TWO-SPEED BANDSAW has built-in motor and is of three-wheel type with deep throat for handling wide stock. Third wheel is fitted with a tracking and tensioning device for band blades of varying widths

Victoria Guild, 137 Kensington Ave., Jersey City 4, N. J.



243

SHOPPING FOR TOOLS



COMBINATION TOOL is quickly converted to portable router, rotary jigsaw, dovetailer, by a change of motor to special tables, jigs and bits which are supplied either as regular equipment or as accessories. At left, unit is pictured set up as shaper, making rabbet cut on long, narrow stock

Porter-Cable Machine Co.,
Syracuse, N. Y.

Photos at right show three applications of new combination tool for home workshops. In top photo, unit is set up for cutting dovetails as used in drawer construction. Center photo pictures a dadoing operation, using special router bit and edge guide. Lower photo shows rotary jigsaw in use

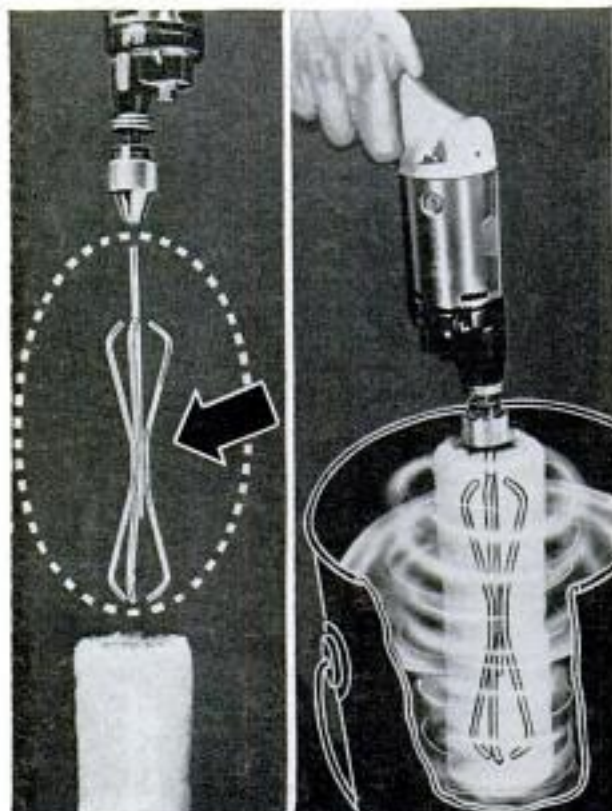


SPIN DRIER for paint rollers fits chuck of any 1/4-in. portable electric drill. Spins a paint roller dry in a few seconds. Just dip the roller in nonflammable solvent, force the spinner inside and lower into a pail

Star Sponge & Supply Co., 8031 Blackstone Ave., Chicago 19

BATTERY LANTERN has several new and novel features. Two 6-volt batteries wired in parallel form the case, or frame. Red warning light flashes 50 times per minute and is operated by separate toggle switch

Burgess Battery Co., Freeport, Ill.



RADIO



TELEVISION ELECTRONICS

APARTMENT-SIZE HI-FI SYSTEM MAKES MUSIC LIVE

IF YOU'VE BEEN listening to your favorite records on an old-fashioned phonograph because a high-fidelity system is too great a strain on the budget, here's a system that will both amaze and delight you. By devoting a few evenings of your time you can build this amplifier-speaker system

at a surprisingly low cost. When completed, you'll probably find that your records contain high and low notes which have never been reproduced before and that the music will take on a lifelike quality which makes listening a real pleasure.

The system consists of an amplifier, a speaker and a speaker enclosure especially



PARTS LIST FOR SPEAKER ENCLOSURE

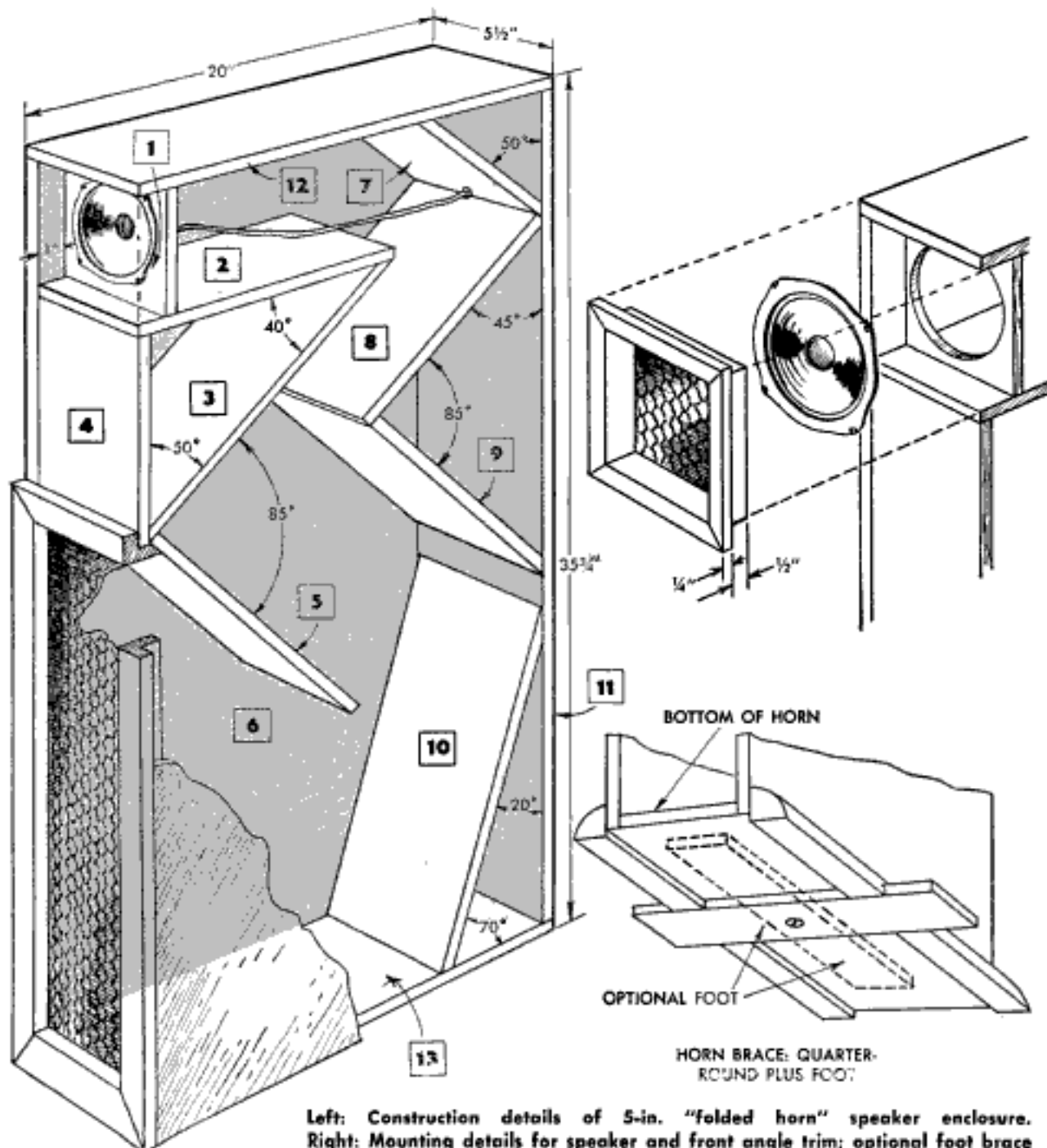
Part	Description
1	5" x 5" x 1/8". Cut 4-5/16" dia. center hole.
2	5" x 12" x 3/8".
3	5" x 15 1/2" x 3/8". Cut one edge to provide a 40° angle.
4	5" x 10 3/4" x 3/8".
5	5" x 13 1/2" x 3/8". Cut one edge to provide 85° angle.
6*	20" x 35 1/2" x 1/4". 2 pieces needed.
7	5" x 8" x 3/8". Cut edges to provide angles of 40° and 50° respectively.
8	5" x 12" x 3/8". Cut one edge to provide 45° angle.
9	5" x 10 1/2" x 3/8". Cut edges to provide angles of 85° and 50° respectively.
10	5" x 12 3/4" x 3/8". Cut edges to provide angles of 70° and 20° respectively.
11	5" x 35 1/2" x 3/8".
12*	5 5/8" x 20" x 3/8". File and sand width of piece after assembly for perfect fit.
13	5" x 19 3/8" x 3/8".

Speaker: Jensen extended range, type P5TX
2-conductor cable, any desired length.

Phone plug: Mallory type 75 or equivalent
Wood glue, headless brads, grille cloth, front trim.
* These parts should be made of good 1/4-in. ply-wood. All other parts can be white pine or fir.

ENCLOSURE ASSEMBLY INSTRUCTIONS

- Step 1. Glue and nail parts 1, 2, 3, 4 and 5.
Step 2. Glue and nail parts 6, 11, 12 and 13.
Step 3. Glue and nail parts 7, 8, 9 and 10.
Step 4. Glue and nail the assembly of step 1 to the assembly of steps 2 and 3.
Step 5. Mount speaker as shown in exploded view and solder the leads of a two-conductor cable to the speaker voice coil. Bring cable out through hole in rear of cabinet after knotting the cable just inside the cabinet to prevent a strain on the speaker lugs. Solder phone plug to external end of cable.
Step 6. Glue and nail opposite side (same as part 6) to the assembly.
Step 7. Construct front angle trim and attach grille cloth of any desired color, as shown in the exploded view, and attach this to main cabinet.



Left: Construction details of 5-in. "folded horn" speaker enclosure. Right: Mounting details for speaker and front angle trim; optional foot brace

designed for a small apartment where space is at a premium. The enclosure is only 5½ in. wide and blends in admirably with almost any type of furniture arrangement.

The speaker system. Much of the success of the entire system depends upon the speaker enclosure. The design principles shown here are used in expensive cabinets for large speakers. Yet, the fact that this same design, when applied to enclosures for small speakers, will provide immeasurable improvement for these units seems to have been overlooked. Here, then, is a "folded horn" type 5-in.-speaker enclosure which provides twice as much sound power, with greatly improved bass characteristics, as ordinary cabinets.

The detailed construction diagram for this enclosure, together with a list of the required materials and a recommended assembly procedure, is shown on page 246. To provide a mechanically strong cabinet all pieces must be accurately cut and all joints must be airtight. The use of a good wood glue and a sufficient number of nails (headless brads are preferred) to add strength to the assembly is a requisite.

In order to turn out a nice-looking job, some care should be used when fastening the inside boards to the side pieces. One good method is to pencil mark the location of the boards on the inside of the side pieces. Then, using a bit with a very small diameter, drill holes through the side panels at all points where brads are to be used. You can then start the brads from the outside with assurance that they will hit the boards inside.

The speaker should be installed before the final side is fastened into place. Any type of two-wire cable, such as ordinary

lamp cord, is suitable for the speaker leads. The length of the cable is of no consequence, but you should tie a knot in the cable at the point where it is brought out the rear of the cabinet. This prevents a strain on the speaker lugs in the event that the cord is inadvertently pulled.

Some front angle trim and grille cloth to fit the front openings of the enclosure are the final items of construction.

The amplifier uses a new television-type output tube in a push-pull triode output circuit. It produces a full 4 watts of audio power with a total distortion so low, less than 5%, that it is discernible only to a highly trained listener. The volume is more than adequate for any size living room and will probably have to be turned down to keep the neighbors from complaining.

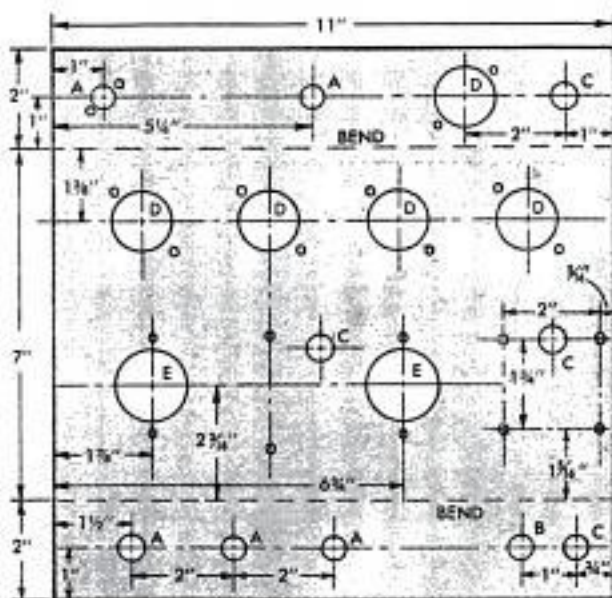
Following the super fidelity principle (*PM*, Feb. 1953), two wide-range tone controls are included. These permit the selection of practically any bass or treble frequency tilt to compensate for any particular record, room acoustics or personal preference. The amplifier is designed for use with any crystal or ceramic phono cartridge. Full power output is obtained with an input of only 0.3 volts.

Construction of the amplifier is so simple that anyone can build it in a couple of evenings with a minimum number of tools. A soldering iron, a screwdriver, a pair of long-nose pliers with diagonal cutters and some means for drilling and reaming the required number of holes in an aluminum chassis are about all that's needed.

Begin the project by purchasing all of the necessary parts as listed in the parts

(Text continued to page 268)

(Wiring diagrams on page 248)

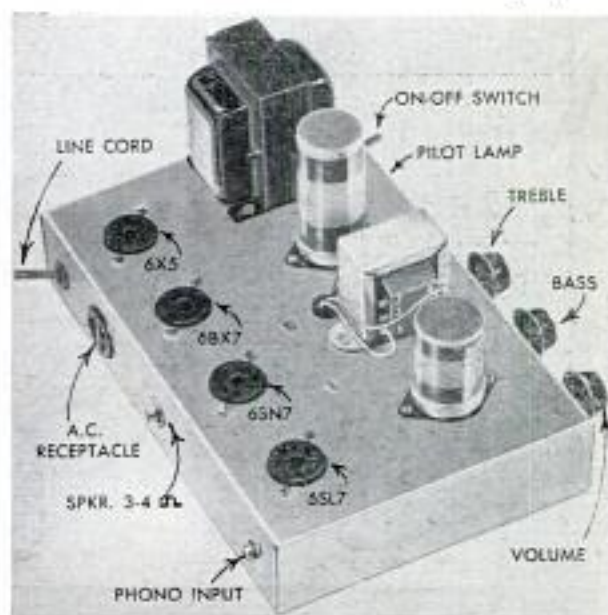


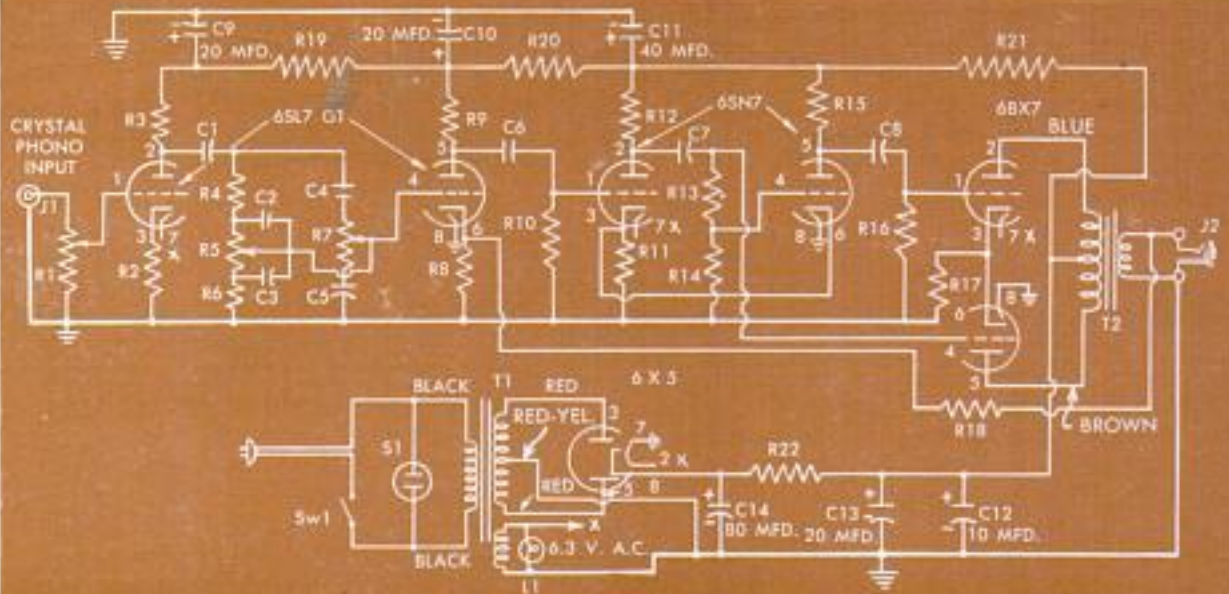
TOP OF CHASSIS LAYOUT

LEGEND

- A—3/8" HOLES
- B—3/16" HOLES
- C—1/8" HOLES
- D—1 3/16" HOLES
- E—1 1/2" HOLES
- UNMARKED HOLES TO CLEAR NO. 6 SCREW (27 DRILL)

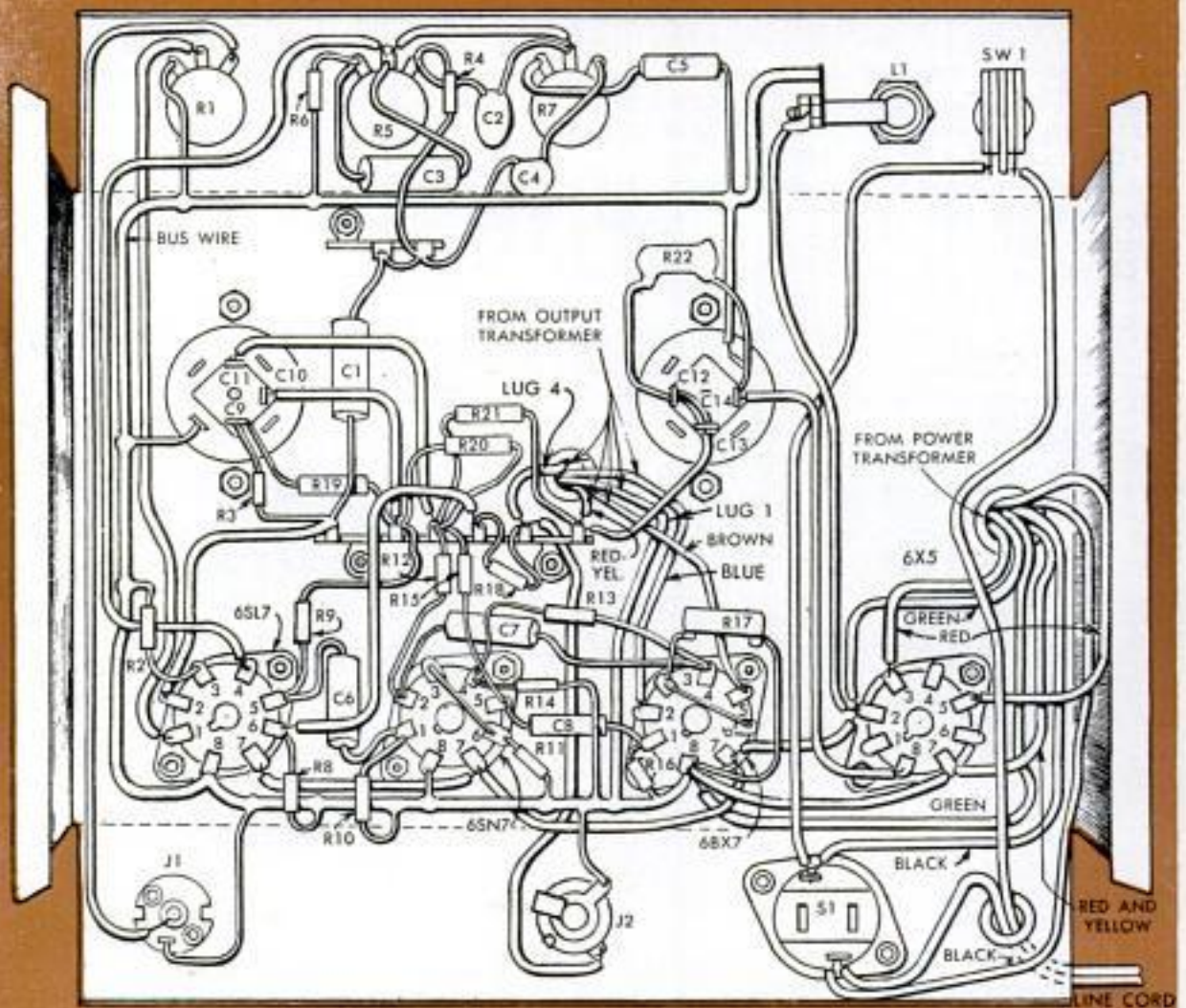
Left: Diagram showing sizes and locations of chassis holes. Below: Photo shows locations of major parts





Schematic diagram of 4-watt amplifier can be used to check your work after wiring has been completed

Pictorial wiring diagram of amplifier. Use of colored crayon to fill in lines will help prevent errors



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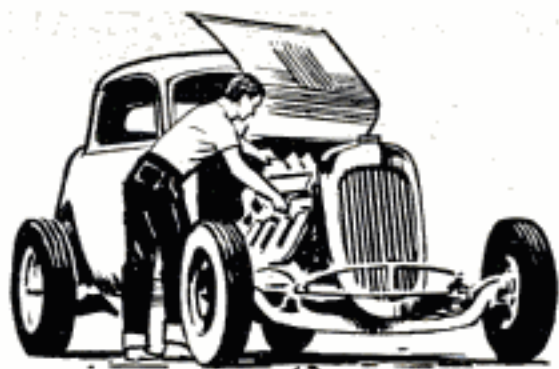
idea book



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BY SOUND—Turn the master control switch to "blower" position. Hear that low whir? It's from an impeller-type blower that is channeling cool air over all the internal surfaces. But apart

from its mechanical efficiency, the nice thing about this blower is its "shush." Won't compete with conversation or soft background music.

BY TOUCH—Snap the master control switch to its various positions. Rotate the lens barrel. Try the slide feeding action, the unique elevating mechanism. Notice how simply, how precisely, everything works? That's the secret of the Signet's exceptional handling ease.

BY SIGHT—With a slide in place, switch on the lamp and focus the lens. Notice that the images are crisp, sharp, and evenly lighted over the *entire* slide area. Above all, notice their brilliancy—even in the shadow areas. With a Signet, you can actually project a bright image in subdued room light.



Kodaslide Signet 300 Projector

with automatic changer
only \$69.50

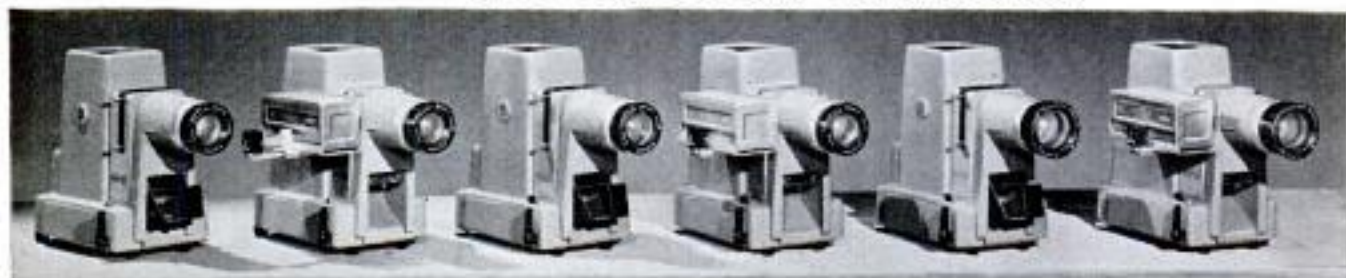
Kodak Projection Ektanon 5-inch, f/3.5 lens; Lumenized optics; 300-watt lamp; impeller-type blower; 2-way switch; individual leg tilt; automatic changer centers slides, returns them to 36-slide magazine; sea-foam green finish.



Kodaslide Signet Projector Case

holds projector with regular take-up changer, receiver and slide file box, or projector with automatic (36-slide magazine) changer and slide file box. Now only \$9.95

There's a Signet for you in this 6-way selection



Signet 300 f/3.5 with take-up slide changer (otherwise same as described above), \$59.50

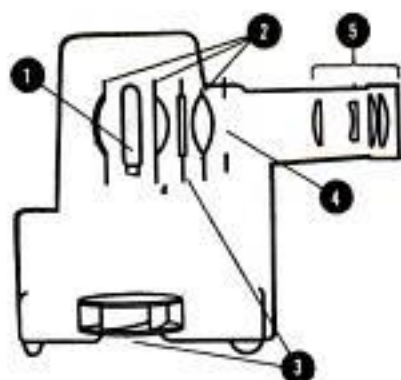
Signet 300 f/3.5 with automatic slide changer (see description above for details), \$69.50

Signet 500 with 5-inch, f/3.5 lens; 500-watt lamp; some versatility as 300. Frosty beige, \$72.50

Signet 500 f/3.5 with automatic slide changer (otherwise same as described at left), \$82.50

Signet 500 with 5-inch, f/2.8 extra-fast lens; 500-watt lamp; regular take-up slide changer, \$79.50

Signet 500 f/2.8 with automatic slide changer (otherwise same as described at left), \$89.50



What makes a Signet stand out?

That's easy. Performance. The kind of big, brilliant screen results that give any slide fan a thrill of satisfaction.

What accounts for the Signet's ability to project a superior screen image? In the cross-sectional diagram of a Signet, above, you'll notice that a powerful projection lamp (1) has been aligned between a front-surfaced hemispherical mirror and two Lumenized (hard-coated) condensers. This snug arrangement (2) concentrates and beams an exceptionally strong shaft of light through the color slide.

Since all lamps radiate heat, Kodak engineers have given the Signet the finest of cooling systems. The combination of a panel of heat-absorbing glass and an impeller-type blower (3), plus internal air baffles, protect the Signet inside and out. The housing doesn't even become hot to the touch.

A good picture has to be a steady picture. The regular slide changer on a Signet permits slides to be fed in singly from the top (4). It's a fast, smooth method that never jars the projector. With an automatic changer, slides are fed into the projector in any sequence from a 36-slide magazine—again without jarring the screen image.

The edge-to-edge sharpness and color clarity of a Kodak Projection Ektanon Lens (5) speaks for itself the instant you project a slide in a living room, classroom or auditorium. Ask your dealer to show you a lens-lamp-changer combination to suit your needs.

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KODASLIDE SIGNET 500	KODASLIDE SIGNET 300	FEATURE		
X	X	Projection Lens — $f/3.5$, 5-inch Lumenized Kodak Projection Ektanon Lens		
X		$f/2.8$, 5-inch Lumenized Kodak Projection Ektanon Lens		
X	X	Condenser System —Two Lumenized close-coupled condenser lenses collect and deliver maximum light to slide; aluminized glass reflector		
X		Projection Lamp —500-watt, medium preference base (also accepts 300- or 200-watt)		
	X	300-watt, bayonet base		
X	X	Operation —Automatic push-pull slide changer feeds slides in any sequence, skip or repeat, returns them to 36-slide magazine		
X	X	Regular take-up slide changer stacks in sequence; accepts Kodaslide Box for group slide filing and storage		
X	X	Takes single-frame stereo adapter		
X	X	Elevation —Individually spring-loaded front legs for 0-12° elevation		
X		Adjustable rear leveling leg		
X	X	Cooling —Quiet, impeller-type blower gives full-pressure cooling; channels cool air over all internal surfaces		
X	X	Aluminum heat-dissipating panels channel flow of air		
X	X	Extra-thick heat-absorbing glass		
X	X	Construction —Sturdy, die-cast aluminum housing		
X		Electrical System —3-position switch permits blower to operate independently of lamp. Thus, blower can be left on to accelerate cooling after projection		
	X	2-position switch, Blower and lamp operate together		
	X	Operates on 105-125 volts, AC. Long 12-foot attachment cord facilitates electrical connection		
X	X	Styling and Finish —Streamlined, functional design. All controls on right for convenience		
X		Frosty beige finish		
	X	Sea-foam green finish		
		Projection Throws		
		Long Dimension of Projected Picture	Distance from Projector Lens to Screen	
			35mm slides	828 slides
X	X	30 inches	10 feet	8 ½ feet
X	X	40 inches	13 feet	11 ½ feet
X	X	4 feet	15 ½ feet	13 ½ feet
X	X	5 feet	19 feet	17 feet
X	X	6 feet	23 feet	20 ½ feet
X	X	7 feet	25 ½ feet	23 feet
X	X	8 feet	29 feet	26 feet
X	X	9 feet	32 ½ feet	29 ½ feet

Care and Feeding of Engines



BY
S. P. CORP

ONE CAUSE OF HARD STARTING

When you start your engine, the mixture in the carburetor should be rich. Extra air added to the mixture makes it lean, causing hard starting. A badly worn throttle shaft will let in extra air—enough to affect combustion seriously. Check this shaft and replace it if it is worn to a point where it has an excessive amount of play. If the bearing surface of the throttle body is worn, replace the whole unit. This can be done by removing the carburetor, separating the lower section—which is the throttle body—and putting in a new or rebuilt body.

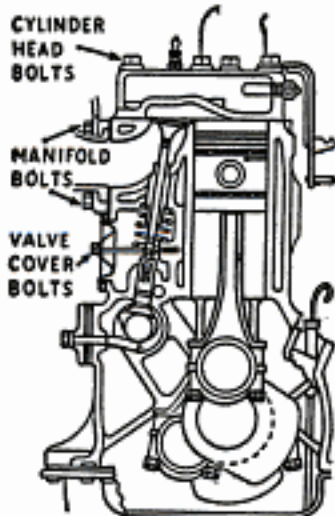


This can be done by removing the carburetor, separating the lower section—which is the throttle body—and putting in a new or rebuilt body.

WATCH TORQUE WHEN TIGHTENING BOLTS

After every fall and spring tune-up, let engine run till warmed up. Then use manufacturer's specifications in tightening bolts on cylinder head, intake and exhaust manifolds, and valve cover with a torque wrench. Over-tightening can distort engine block, causing cylinders to go out of round. Special care must be used with the valve cover bolt, which may, if too tight, distort valve cover, breaking gasket seal and allowing oil to escape to outside of engine. Average torque specifications:

- Cylinder head bolts. 55 to 65 ft.-lbs.
- Manifold bolts. 15 to 20 ft.-lbs.
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"Care and Feeding of Engines" is a new illustrated manual which is free on request, and which may save you a lot of money. A card with your name and address will bring your copy by return mail. And when you re-ring, be sure to use Sealed Power KromeX Ring Sets—for quick seating, immediate oil control, and double ring mileage. Top ring has solid chrome face to fight heat, friction, abrasion, and corrosion. They are the best rings money can buy, and your dealer has them or can get them for you. Sealed Power, Dept. G-10, Muskegon, Michigan.



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Clogged Drain

Q—I live in an older home having downspouts leading into tile drains. Lately during heavy rainstorms a small quantity of water has backed into the basement. It has seemed to me that the water is backing from the storm sewer, but my plumber says it is due to a partial stoppage of the downspout drains. Who is likely to be right?—O.P., Pa.

A—We think it likely your plumber is correct in his assumption. This is a fairly common occurrence in older installations where basement-floor drains and those from the downspouts lead to a single tile. Often these drains were laid with open-joint tile and the joints were not covered. In time one or more of the individual tiles may tip slightly out of line, opening the joint and permitting dirt and possibly gravel fill to enter and cause a partial stoppage. Slate particles from a composition roof, leaves and pieces of broken shingle tabs may also find their way into the drains through the downspouts. Tree roots are another possibility as the fine roots can force their way into the tile through the open joints. Any of these materials in sufficient quantity can result in a partial stoppage of the drains leading from the downspouts, causing the water to back into the basement. Where the stoppage is only partial, the quantity of water would ordinarily be small. Probably the first step is to have the drains rodded to clear away any obstruction that can be removed by this procedure. Should this be ineffective due to a tipped individual tile or one that has collapsed, then the only other permanent remedy is to ditch down to the drains, remove the original tile and replace with bell-end tile with cemented joints.



Canvas Roof Deck

Q—I want to build a sun porch with a flat deck and I'd like to know how to cover the deck with canvas. What does one put on first over the joists and how is the canvas laid? How is it flashed to the wall to obtain a waterproof joint? Is there some special waterproofing compound? How is it applied?—T. F., Kans.

(Continued to page 256)



**Spark plug engineering
takes another
great stride forward**

**with
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For years spark plug engineers have tried to solve the problem of seals that eventually break down and permit gas leakage between the center electrode and spark plug insulator.

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**Holds heat right where
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They are bright, colorful, cheerful — and 30" to 40" high. You can buy the finished figures — or the figures that merely need painting — or you can make them yourself, from start to finish.

If you are a real do-it-yourselfer, you select the full-size Easi-Bild* Pattern and trace it onto a sheet of Homasote Type RD. The pattern gives you complete instructions for every step, including the painting, specifies all materials. Your finished figure can be used outdoors or in. (You can tack the Santa Claus onto the front door and put a sleigh in front of the Christmas tree, to hold the gifts.)

From a single Santa Claus to a complete Nativity Scene (often a group project for school, church or club), you have a project that is worthwhile, satisfactory, and easy.

Homasote is the oldest and strongest insulating-building board on the market. Type RD is $\frac{21}{32}$ " thick, ideal for this purpose. The material saws and nails easier than wood, takes any paint or stain, lasts for years.

For finished figures, for unpainted figures (together with painting instructions and the paints), for the complete package of Easi-Bild Pattern, RD Homasote and paints—visit your local Homasote dealer. Or—use the coupon below to order any of the patterns, or secure the name of your nearest Homasote dealer.

*T.M. Reg. Easi-Bild Pattern Company

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- Santa Claus—35¢ Reindeer—35¢ Choir Boys—50¢
 Jolly Snowmen—35¢ Nativity Scene—\$3.00
 Sleigh—50¢ Send name of nearest Homasote Dealer

NAME.....

ADDRESS.....

CITY.....ZONE.....STATE.....

(Continued from page 254)

A—First of all, the joists are covered with tongue-and-groove flooring. Use 2 x 8, or better, 2 x 10 joists spaced on 16-in. centers if the span is more than 10 ft. It's a good idea to prime the tongued-and-grooved edges of the flooring boards before laying. Plane or sand smooth after laying, then apply two coats of outside oil-base paint. After this is thoroughly dry, coat the surface with paste white lead, spreading to a uniform thickness with a spreader of the type used in applying linoleum cement. Lay the canvas immediately, lapping about $1\frac{1}{2}$ in. at the joints and fastening with copper tacks. The flashing is carried up under the siding board and the horizontal flap is coated with paste white lead before the final strip of roof canvas is laid. Be sure, before permitting the paste lead to dry, that the canvas is pressed into close contact at all points. Allow the roof to dry for two weeks, then finish with two or three coats of outside oil-base paint in the color desired. White is preferred due to its reflective properties. The deck must be repainted every two to three years. Such a roof deck is not normally designed to be walked upon. If it is to be used as a sun deck, the surface should be protected with wood-slat walkways. These can be built in sections and fitted together to cover the whole roof area, or only a part of it, as desired. Although specifications usually call for 2 x 4s spaced on 16-in. centers as support for the slats, you can use 2 x 2s spaced on 10-in. centers. When the slat sections are laid be sure that they are laid with the 2 x 4 or 2 x 2 supports parallel with slope of the roof so that water will drain away readily. Remove the slat sections during the winter months.

Fall Lawn Seeding

Q—How late in the fall can one seed a lawn with a reasonable chance of success? I am given different answers to this question. Some say it depends on the winter, the weather at the time of seeding. Others say not later than the first week in October and some are positive the only time to seed is in the spring. I'm concerned primarily about the best time to seed a new lawn, of course, but I'd like to know about the proper time to spot-seed an old lawn for best results. How about the use of fertilizer on the new seeding?—C. N., Ind.



A—All of your informants are more or less correct in that conditions at the time of seeding and afterward determine to some extent the success of the project. The seeding can fail in spring as well as fall; in fact, any time between. A heavy rain can ruin a spring seeding and a sharp early fall freeze may catch a seeding just after germination, before the plants have developed a strong root system. Late spring seedings are always endangered by hot, dry weather, even though a watering schedule is carefully carried out. However, in your locality it should be possible to seed a lawn as late as mid-October with a reasonable chance of success. This assumes that the seedbed has been properly prepared beforehand and that soil deficiencies have been corrected by application of fertilizer of the correct analysis to provide a complete plant food. Many gardeners and homeowners prefer to seed both old and new lawns in the fall because this season offers the chance of getting the lawn established ahead of the weeds, which are always the main problem in spring seedings, especially in new lawns. Old lawns can be spot-seeded in the fall to good advantage and over-all seedings can be carried out whenever fertilizer is spread. Place a small quantity of fertilizer in the spreader hopper first, then a layer of seed and a layer of fertilizer and so on until the hopper is filled.



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TO ROUT

The rugged little work horse of the workshop in 90% of your woodworking jobs. Versatile, light weight and high speed, its motor is used to power the plane shown. *H15 Router* — \$39.95.

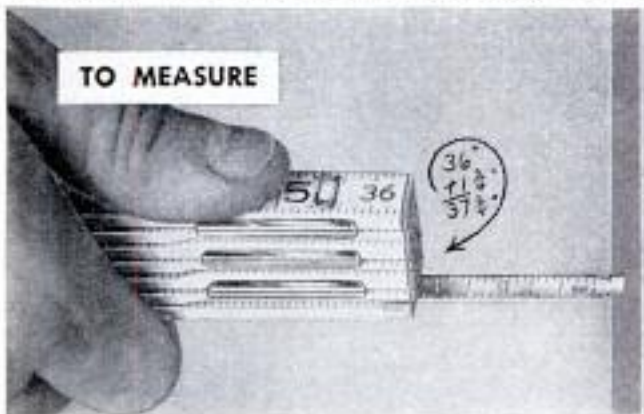
New! Router-Plane Kit

Combines H15 and H106 with gauge and bit in handy fitted carrying case. *H100* — \$89.95.



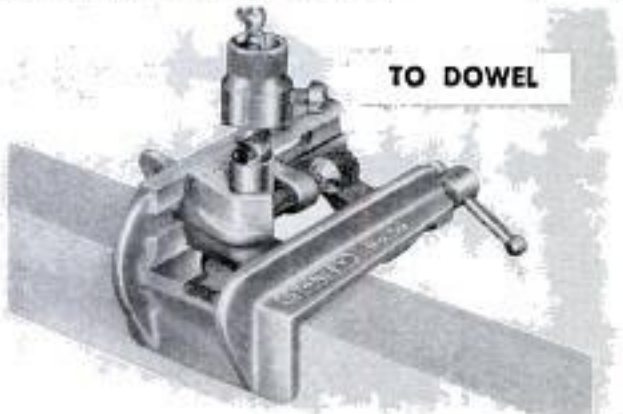
TO PLANE

This tool is a wonder for smooth and easy planing. Just right for fitting storm and screen doors and windows, trimming wood, plastic or aluminum veneers on table and counter tops. When you have H15 Router, Kit is all you need to convert to power plane. *H106 Plane Adapter Kit* — \$29.50.



TO MEASURE

Accurate measurement is fundamental in jobs of all kinds. Here is a new Stanley Zig-Zag Extension Rule with accuracy-plus features. Extra thick first leg has brass slide for inside measurements. Rule opens to even numbers, convenient marking gauge at 2", 4", 6", 8", etc. Plastic finish on sticks and nickel silver joints ensure longer useful service. *6 ft. No. X246 Extension Rule* — \$2.10.



TO DOWEL

Joining two pieces of wood together is one of the first jobs a woodworker masters... and it isn't really mastered until you do it with dowels. Here's a jig from the Toolbox of the World that makes good doweling easy. With it you can bore holes accurately in edge, end or surface of wood. 6 guides for $\frac{3}{16}$ to $\frac{1}{2}$ inch bits and depth gauge furnished. *No. 59 Doweling Jig* — \$5.95.

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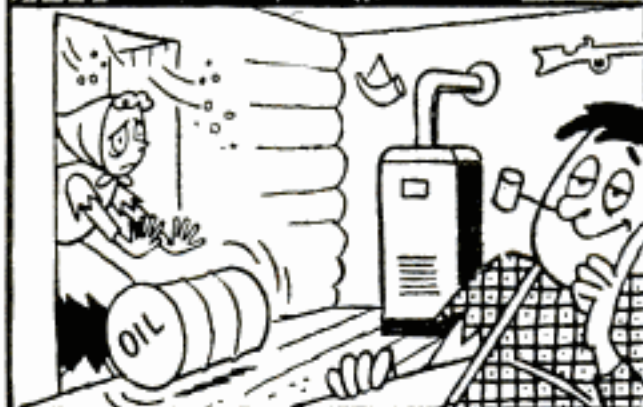
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Plotting a Future for Paper

(Continued from page 139)

The institute brought to his attention a new compound derived from the industry's waste. Using it as a medicine, he succeeded in curing histoplasmosis.

Research problems sometimes become mysteries for a scientific detective. In one case, crackers packed in paperboard boxes developed a strong, unpleasant odor. An institute scientist tested the crackers themselves, followed the box through the manufacturing process and investigated the inside wrappers. Blind alleys. At last he located the culprit—a drier used in the ink on the label.

While investigating a stream for possible pollution, an institute scientist noticed that a moldlike growth on the stream's surface resembled pulp fibers. From this random observation has come the startling possibility that someday we may be using mold-grown fibers to make our paper. In experiments at the institute, a drop of liquid containing thousands of these tiny plants is placed in a vessel holding water and chemical compounds. Within a few hours, cottonlike fibers appear on the surface and multiply with astonishing speed. Staff members make no claim that enormous quantities of pulp ever will be produced in this way, but they've made excellent paper from the fibers and the process seems to warrant further investigation.

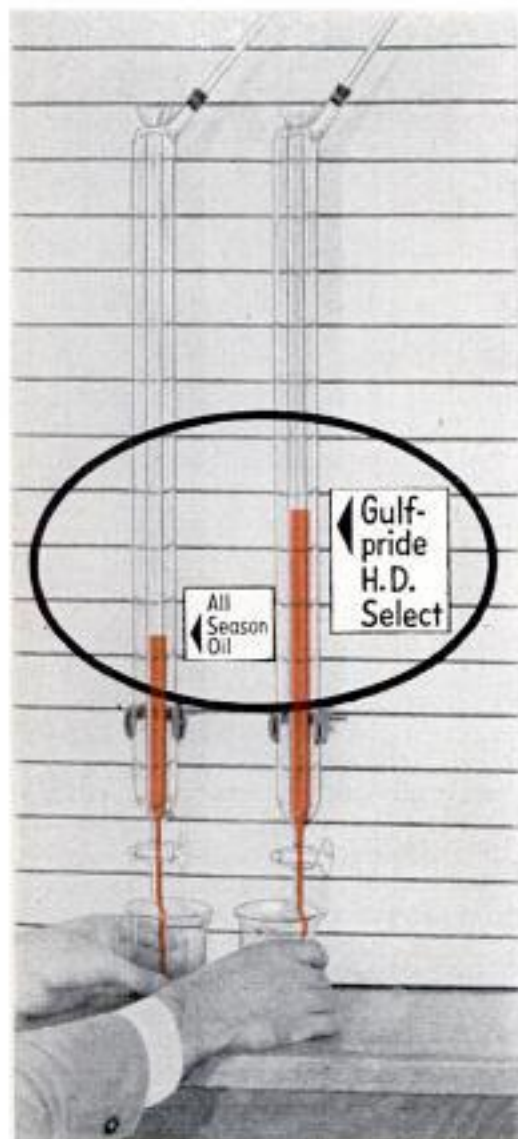
Still another big area of research is in the use of hardwoods for pulp. For example, in Wisconsin's 16,000,000 acres of forest, only 20 percent of the trees are softwoods from which pulp usually is made. Now, thanks to research at the institute and other institutions, many of the hardwood species of this country are being used.

How will we meet the pulpwood demands of the future? This question is continually asked at the institute, and some of the answers are being worked out there. Today we use nearly 400 pounds of paper per person each year. By 1975 authorities estimate we'll be using 500 pounds per person. According to the institute staff, this problem will be licked by meeting it on a broad front. The industry will push through reforestation projects, make better use of the entire tree, utilize new species, improve species through hybridization, find new sources of plant fibers—and just possibly it will manufacture pulp from mold growths.

At least part of these answers will come from the students who are studying today at the Institute of Paper Chemistry, for they will be the leaders of the industry tomorrow. ★ ★ ★

What a whale of a difference

Natural Viscosity makes !



As delivered to the consumer, New Gulfpride H.D. Select SAE 30 and a typical 10W/30 multi-viscosity oil are about equal in viscosity or "body."

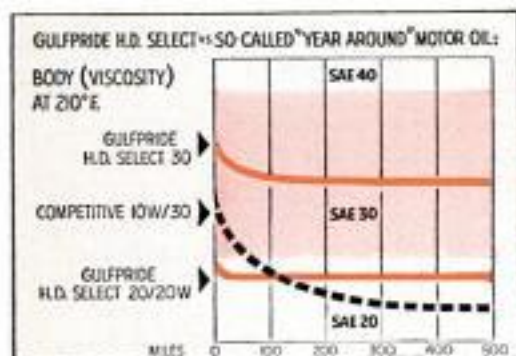
But see what happens after 300 miles of use in an engine. The multi-viscosity oil, in the viscosimeter at left, runs out much faster than before. The reason is that the thickeners, used to bolster the viscosity of multi-vis oils, *start to break down* within as few as 25 miles. The oil loses efficiency—while oil consumption increases.

Gulfpride H.D. Select, on the other hand, has *natural viscosity*—contains no thickeners that break down in service. And so, as the viscosity test shows, Gulfpride H.D. Select flows at the same rate as before, stays tough and full-bodied . . . assures lower oil consumption.

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New Gulfpride H.D. Select is available in 3 grades —SAE 10W, SAE 20/20W, SAE 30. Lets you follow the manufacturer's recommendations *for your car during each season.*



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Color Tips for Your House

(Continued from page 149)

you have a wide selection; if the house is older but the roof too good to replace, you are immediately limited in your color range. A light-colored roof (white, pale gray, ice green) makes a house appear taller. Use it on one-story homes. A dark roof makes a house appear lower. Use darker colors on two or three-story houses. If a combination of colors is used on a tall house, use the darker color above and a lighter one below. Choose your roof colors with extreme care because a roof should last 20 years.

3. *Siding.* Light colors are best for the smallest houses and there should not be too sharp a contrast between siding and roof colors. This rule can be broken when a white or very light roof is used. A low ranch-type house with dark roof and dark siding looks as if it had been pushed into the ground. If your house is the larger rambling type, a darker tone of siding with a light roof produces a pleasing effect. If part of the house is stone or brick, the siding color should pick up a tone from these materials. Contrasts between the color of the stone or brick and the siding break up the lines of the house. Keep this in mind wherever you use color: Do not do anything to break up the flowing architectural line of the house. Remember this, particularly, when you consider painting the garage door or some other good-size area a color that is in contrast to the siding. However, brick is often painted a color contrasting to the body of the house in a split-level in order to give a horizontal line.

4. *Trim.* The trim color can be the same as the siding, a lighter tone of the same color or in complete contrast. For example, white makes a fine trim for charcoal siding, or possibly light tan if the siding has a cocoa color. Ordinarily, a satisfactory trim color can be achieved by adding white to the siding paint until a lighter shade appears. The trim may be painted the same color as the siding, especially if the architectural lines of the house should be concealed. Trim color may be used on the garage doors with good effect if the contrast to the siding is not too sharp.

5. *Accent.* It is in this area that most of the color atrocities occur. This is the little splash of contrasting color that makes or breaks any color scheme. The most common mistake in regard to accent color is using it on the trim. Never use it on the eave, door or window trim, soffits, corner boards or fascia boards. Also, be careful of putting it on the garage door unless the

(Continued to page 262)



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house is unusually long and the chosen accent color is a cool one in some tone of blue or green. The safest places on most houses for the accent color are: The front door, a window box or trellis, a couple of well-placed shutters (if a two-story house has shutters on the first floor only), siding panels (often found on the split level of contemporary design), picture-window frame, lally column and screen or fence panels. If the accent color is picked up from the front door and carried to a panel in a wing wall or screen, a house apparently gains in size. The color of the neighbor's houses should also be considered, particularly in the selection of the accent color. Some of Miss West's most successful accent colors (carefully chosen for contrast with various color schemes) include carnation red, peacock blue, nasturtium orange, Dresden blue, and lime. None are primary colors. In dealing with these vivid accent colors, always keep in mind that a wet paint sample looks different from a dry one, also that color grows in intensity on larger areas.

6. *Gable ends.* Small homes look larger if gable ends are painted in the siding color. Trim color may be used on larger houses for the gable ends or in places where you want to call attention to some architectural effect, or if you want to reduce a vertical appearance. Don't get fancy with a combination of colors or stripes in this area.

7. *Fences or screens.* Trim, accent color or a combination of both may be used on fences, screens (open fences) or wing walls that extend out from the sides of a house.

8. *Patios and outdoor-living area.* Be sure that the colors used here harmonize with adjoining exterior and interior color schemes. With the use of colored concrete brick, now available in many shades, a patio can provide a year-round bright spot even in the winter.

9. *Ugly architectural features.* Hide them by painting the same color as the surrounding area. If trim or accent color is used on a bad feature of a house, it stands out like a beacon. This is particularly true of older houses.

10. Remember that a bad color scheme is worse than no color at all. Make sure of your scheme before you paint. Mistakes are costly to correct.

One of the great difficulties is deciding how a house will look by merely studying color schemes. Architect Martling solved this problem for his clients with numerous black and white prints of houses and a box of colored chalk. This makes it possible to try various combinations and get the general effect.

(Continued to page 264)

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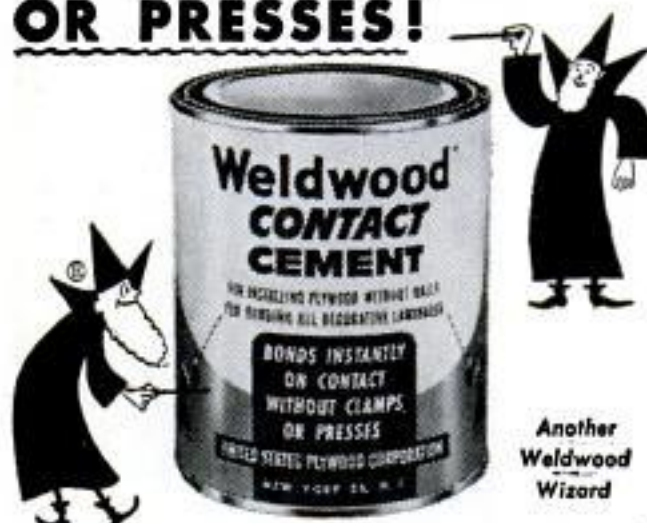
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The modern, or contemporary house, lends itself to distinctive color treatment—far more so than the traditional houses of the past. The Architects Collaborative, exponent of the best in contemporary architecture, has this to say about color:

"Our residential exteriors seem to lend themselves best to a basic single-color treatment, with well-defined areas like doors and panels as color accent spots. We avoid the use of extremely bright primary colors. For instance, instead of primary red we use a vivid shade of vermilion or terra cotta. Instead of primary blue, we use cerulean or Prussian blue. Greens seem most difficult of all to handle, especially in competition with nature's colors. Landscaping can be arranged to provide for changing color around the house."

One thing is certain: Whatever you decide to do about the color on that front door or that panel in the fence, no two persons will see eye to eye on the subject. However, knowing a few basic rules, especially in the use of accent color, should help. And don't worry too much about breaking a rule once in a while. Even the experts do that. ★★★

Fire-Warning System

Fire-sensing units can now be spotted throughout your house and connected to a central warning system that rings a bell and tells where the fire is. One of three lights on the panel flashes on to indicate a fire in the basement, in the attic, or on the first or second floor. Up to 10 fire-sensing units can be located in each zone. The fire-detectors are activated by abnormally high air temperatures.



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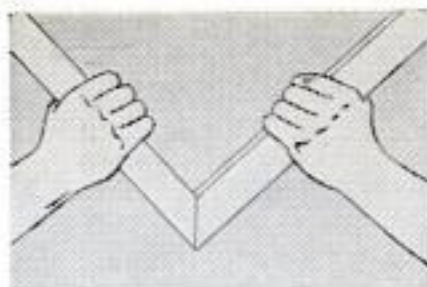
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See how it speeds things around your workshop... see how it handles toughest jobs like magic!



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When your job demands professional results... or where water-resistance is important... use the glue that professional cabinetmakers love to use... Weldwood Plastic Resin Glue. It's just about the best wood glue there is! Actually makes glued joints stronger than the wood itself! Grows even stronger with age. Highly water-resistant, stain and rot-proof. Spreads smoothly and easily. A little goes a long way. Where quality counts most, there's no substitute for Weldwood Plastic Resin Glue - deservedly America's largest selling wood glue.



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Delta makes the most complete line of circular saws on the market—ranging from the big 12" tilting arbor saws for industrial uses to the 8" tilting table saw. Every Delta saw is built to the highest standards of quality—built to do its job with precision, ease of operation and safety. Professional woodworkers in industrial plants,

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Light in weight, yet rugged in construction. Popular with small shop owners and builders, as well as home workshop enthusiasts. Offers many of the outstanding quality features found in the Delta Unisaw.

- Cuts stock 2 1/4" thick, rips to center of 48" panel.
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Apartment-Size Hi-Fi System Makes Music Live

(Continued from page 247)

list below. Then, punch and drill the chassis in accordance with the chassis layout diagram, and mount the various parts which must be fastened to the chassis with

AMPLIFIER PARTS LIST

RESISTORS

- R1, R5, R7— $\frac{1}{2}$ -meg. controls, audio taper
IRC 13-133, or equivalent
R2, R8, R11—2200-ohm, $\frac{1}{2}$ -watt
R3, R4, R9—100,000-ohm, $\frac{1}{2}$ -watt
R12, R15—100,000-ohm, $\frac{1}{2}$ -watt (1% or matched)
R6—10,000-ohm, $\frac{1}{2}$ -watt
R10, R13, R16—470,000-ohm, $\frac{1}{2}$ -watt
R14—27,000-ohm, $\frac{1}{2}$ -watt
R17—300-ohm, 5-watt, wire-wound
R18—22,000-ohm, $\frac{1}{2}$ -watt
R19, R20, R21—10,000-ohm, 1-watt
R22—200-ohm, 5-watt, wire-wound
(All resistors are 10% unless otherwise specified)

CAPACITORS

- C1, C3, C6, C7, C8—.05-mfd., tubular
C2—.005-mfd., disk-ceramic
C4—.001-mfd., disk-ceramic, 600-V.
C5—.01-mfd., tubular
C9, C10, C11—20-20-40/250-volt electrolytic
Mallory FP 320
C12, C13, C14—10-20-80/400-400-350-volt
electrolytic Mallory 333.B
(All capacitors 400-volt unless otherwise specified)

TUBES

- 6SL7GT, 6SN7GT, 6BX7GT, 6X5GT

MISCELLANEOUS

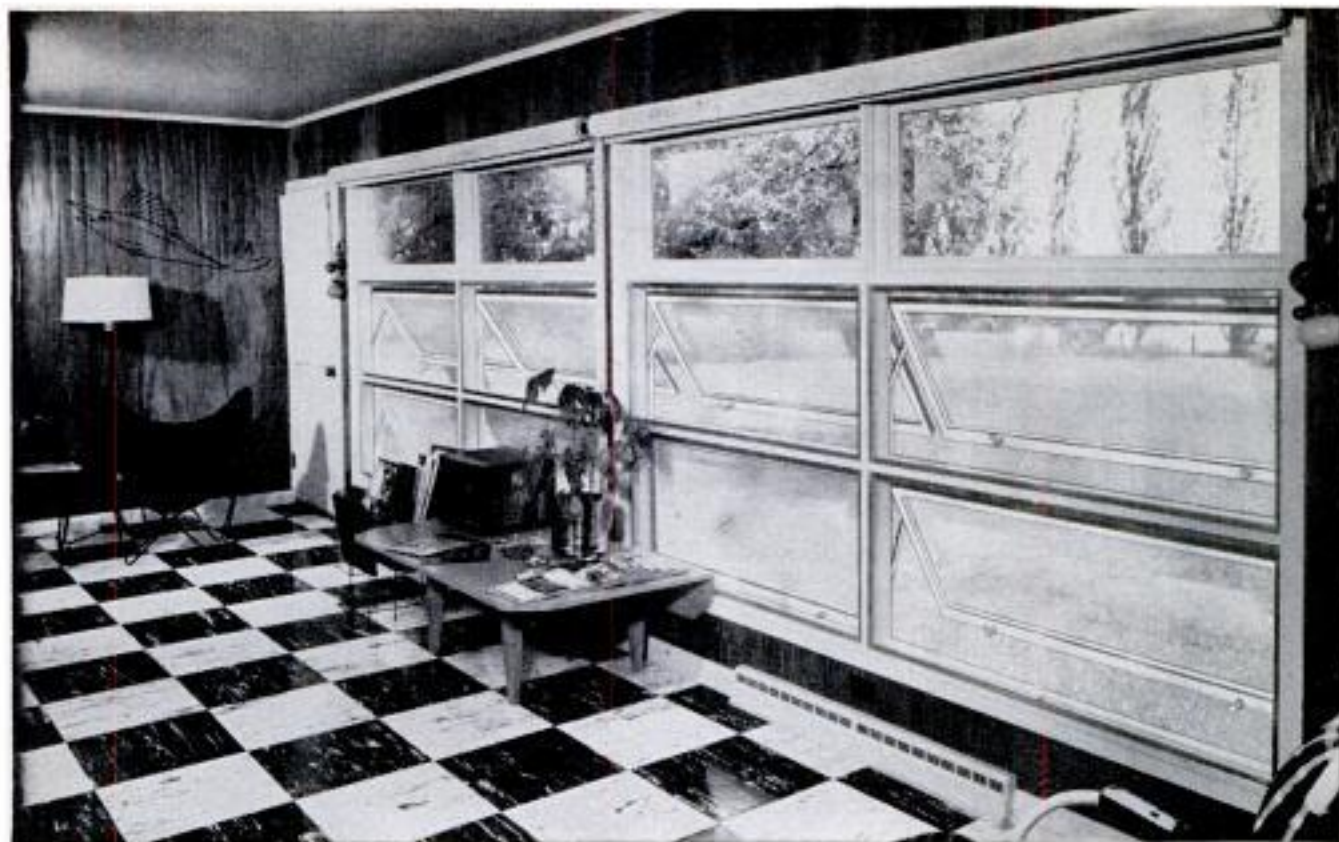
- T1—Power transformer, Stancor PC8419
T2—Output transformer, Stancor A3852
S1—A.C. receptacle, Amphenol 61-F
Sw1—S.D.S.I. toggle switch, H & H 20994-EW
J1—Phono-input jack
J2—Open-circuit jack, Mallory A-1
L1—Pilot lamp, type 51
1—Chassis, 2x7x11 in., Bud CB-1193
1—Line cord and plug
4—Octal sockets, Amphenol MIP-8
3—Knobs
1—8-terminal tie strip
1—2-terminal tie strip
1—Pilot-lamp bracket, Dialco type 431
1—Length of #14 tinned-copper bus wire
Assorted screws, nuts, lock washers and grommets,
hookup wire and rosin-core solder

screws and nuts. See the photograph on page 247 for the correct location of these parts.

The leads from the power and output transformers, as well as the line cord, are brought into the chassis through rubber grommets, and the filter capacitors should be mounted with the fiber wafers on top of the chassis so that the metal cans of the capacitors do not touch the chassis. All ground connections will be made to a common bus wire which is grounded to the chassis only at the input and output jacks.

When the major parts have been installed, the actual wiring can begin. It is suggested that the bare #14 bus wire be connected first. This wire runs from the pilot lamp, around one end of the chassis, and is finally anchored to pin 8 of the 6BX7 tube. The wiring details are clearly illustrated in the simplified wiring diagram on page 248.

Keep all wire leads as short and direct
(Continued to page 270)

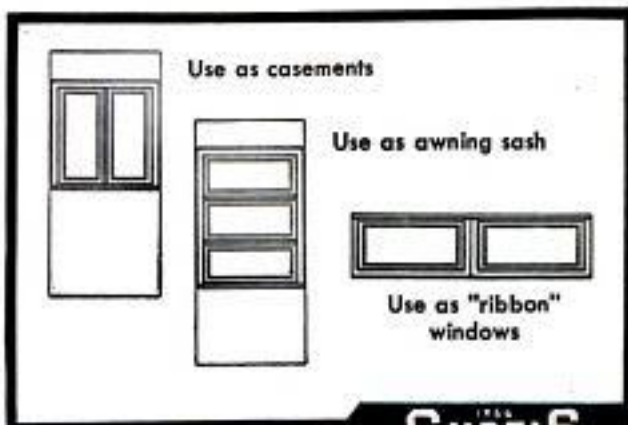


Wonder window provides a THOUSAND combinations—it's the Curtis Convertible

Here's the easy, low-cost way to have exactly the windows you want! The new Curtis Silentite Convertible is an *entirely* different kind of window. It's so designed that you can stack the sash both vertically and horizontally—use one basic unit to provide right or left swing casements, awning sash, ribbon windows and more than a thousand window combinations.

And this better, preservative-treated wood window is *ready to install*. It comes complete with operating hardware—simple, effective insulating glass—complete weather-stripping. You can get the Silentite Convertible in ten sizes of sash units—five sizes of louvre units to use with sash—three stationary frames for picture windows. Remember, the Curtis Convertible is a quality wood window—guaranteed by Curtis! Get the facts now—about Curtis Convertibles and other ready-to-install Curtis Woodwork for your home.

CURTIS WOODWORK
Heart of the home



CURTIS
WOODWORK
SILENTITE
the Insulated window

PSE-10-55
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Please send me literature on these Curtis Woodwork products:

- Convertible windows
- Weather-tight double hung windows
- Casement windows
- Birch kitchen cabinets
- Entrances and doors

Name.....

Address.....

City.....State.....

TIME SAVING TIPS

ALL YOU NEED IS A TUBE OF DU PONT DU CO CEMENT

REG. U.S. PAT. OFF.



STRONG

To tighten loose screws, coat them with strong "Duco" Cement—holds fast even in plaster!



Train ivy on strings attached to house with tough, weatherproof "Duco" Cement.



Emergency repair for flashlight lens—"Duco" Cement lets light through, seals rain out.

CLEAR



Put loose inlays back to stay—clear "Duco" Cement resets mother-of-pearl beautifully!



Put broken soap dishes, toothbrush racks back in service with waterproof "Duco" Cement.

WATERPROOF



To waterproof matches for camping, just dip in "Duco" Cement and wipe smooth.



Restore cracked book bindings—tough, flexible "Duco" Cement takes a lot of hard use!

FLEXIBLE



Fix belts. Rejoin layers of leather with strong, flexible "Duco" Cement.



NEW CAP HAS HANDY APPLICATOR TIP



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

as possible without actually stretching them from one connection to another. All leads and parts connected to pins 1 and 4 of the amplifier tube should be kept close to the chassis and as far removed from other leads as possible. This precaution will prevent oscillations and hum pickup.

None of the parts is critical with exception of resistors R12, R15 and R18. R12 and R15 should be 1% resistors. While the actual values are not important, it is essential that the values are within 1% of each other in order to obtain balanced operation. Resistor R18 should be of the value specified in the parts list if the amplifier is to be used with a 3 to 4-ohm speaker. A higher value will reduce the amount of feedback and thus reduce the fidelity. A lower value may give rise to low-frequency oscillations which will cause motorboating.

Operation. Interconnecting the various parts comprising the phono system is simple. All modern record players and changers, whether separate units or incorporated in a cabinet with other components, have an output lead with a plug to fit the phono input jack of the amplifier. Merely connect this plug to the input jack, and connect the plug on the speaker leads to the speaker jack of the amplifier. Then, rotate the amplifier tone controls to their approximate mid positions (this is the flat-tone control setting) and plug the a.c. cord of the record player into the a.c. receptacle on the rear of the amplifier.

Turn the amplifier and record player on by means of the amplifier on-off switch. Permit the amplifier to warm up for a minute before playing a record, and then you're all set to hear some fine music.

For best operation, the mouth of the speaker should be facing away from the phono pickup to prevent acoustic feedback. The enclosure should be set up with the speaker at the top, so that it is approximately at ear level. This permits best reception of the high tones which are radiated in a comparatively narrow beam. The low notes are reinforced in the enclosure and are radiated at a relatively wide angle.

If the amplifier is wired correctly, the system will provide excellent performance immediately. However, if loud howls or squeals are heard through the speaker, there is a good chance that the negative feedback circuit is providing positive feedback instead. To correct this, merely reverse the connections of the red and blue output-transformer leads.

The speaker system or the amplifier can be used individually, with other components. Used together, these units will convince you that low-cost components can, indeed, provide high-fidelity results. ★ ★ ★

BUY SET AND SAVE \$3.72

**CRAFTSMAN 5-PIECE
PROPANE
TORCH
SET**

**2300° F
FLAME**

*A few of the
MANY JOBS you can do . . .*

- Solder silver
- Burn off paint
- Light fires
- Melt lead, etc.
- Singe chickens
- Soften putty
- Soften asphalt tile
- Sweat copper fittings
- Free nuts and bolts
- Thaw out frozen pipes
- Economically solve any job that needs heat or flame

Regular
Price \$12.60
Special at

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Complete

You Save \$3.72
Until Dec. 31st

Long-lasting
throw-away
cylinder



UTILITY BURNER HEAD for heavy duty flame. Replaces PENCIL FLAME BURNER HEAD on angle tube.



FLAME SPREADER to heat large surfaces, to lay asphalt tile, etc. Use on Utility Burner Head.



SOLDERING TIP for flat surface soldering work . . . large coverage. Use on Pencil Flame Burner Head.

**Makes a Handy GIFT for
Hobbyist or Professional**

Packed specially in a colorful Christmas gift box, this master torch set makes a handy gift for the handyman! Powered by clean-burning propane, the fuel used in city buses! So safe, women use it every day for soldering jewelry, etc. When sold separately, cylinder and accessories cost \$12.60—you save \$3.72 by buying the set. Priced at \$8.88 at your Sears Retail Store until Dec. 31st.

Lightweight—a little less than 3 lbs.—torch handles easily . . . you can use it with just one hand. **Lights instantly** . . . with no pumping, priming or preheating! Turn gas jet, strike a match, and it's lit. Flame adjusts from needle-fine to coarse. Burns clean and hot in any position—even upside down! Does heavy duty work—from removing paint to melting aluminum—at a constant 2300° F. When long-lasting cylinder is empty, throw it away!

10-inch cylinder has 23/4-inch diameter . . . packs easily in tool box or pocket. Contains 1 1/2 liquid pints. Excess pressure relief valve on top. **UL listed.** All parts of high quality steel. Accessories interchange easily to do a countless number of special jobs. Convenient . . . practical . . . low cost . . . this CRAFTSMAN Propane Torch Set makes ordinary blow torches obsolete. With easy-to-follow instructions. (Replacement cylinders cost \$1.95.) At your nearest Sears Retail Store. Save \$3.72 until Dec. 31st only. Set \$8.88



CRAFTSMAN Hand and Power Tools by **SEARS, ROEBUCK and CO.**
Famous for fine quality . . . precision performance . . . low price!



solves woodworking problems in seconds!

Speed your jobs, get answers to countless building and woodworking questions immediately! Improved GREENLEE Woodworking Calculator converts linear to board feet, gives nail specifications, tool sharpening tips. Compares woods, gives bit sizes for screws, concrete mixes, painting information, etc. Convenient . . . simple to read. 6" diameter . . . heavily varnished cardboard. Special offer by the makers of famous GREENLEE tools . . . **Only 25c** (no stamps please)

TOOL FOR CRAFTSMEN
GREENLEE

The GREENLEE line of fine tools includes auger bits, electric drill bits, chisels, gouges, spiral screw drivers, drawknives, and many more. At leading hardware and building supply dealers.

GREENLEE TOOL CO.,
2110 Columbia Ave., Rockford, Ill.

Watch Out for the Stamp Fakers!

(Continued from page 137)

have been perfecting techniques with this instrument to detect fakery in the stamp world.

The stamp expert never relies solely upon mechanical instruments. He depends heavily upon a vast store of specialized knowledge which the faker rarely has. In 1906, for instance, Norway overprinted an obsolete stamp to use up existing supplies. A faker recently got quantities of the common basic stamp and decided to up their worth by adding his own overprint.

When one of these was offered for examination, it passed all the routine tests, so cleverly had the imitation been produced by the faker.

The questionable stamp, nevertheless, was declared fake. The basic stamp had been printed in two different shades of violet ink at two different times. The stamp expert knew that Norway used only stamps of the second printing for this provisional. The faker did not, and so applied his deceptively good imitation surcharge to stamps of the first printing.

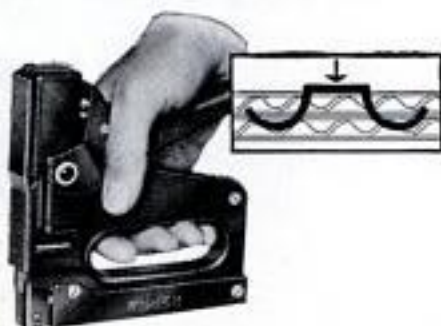
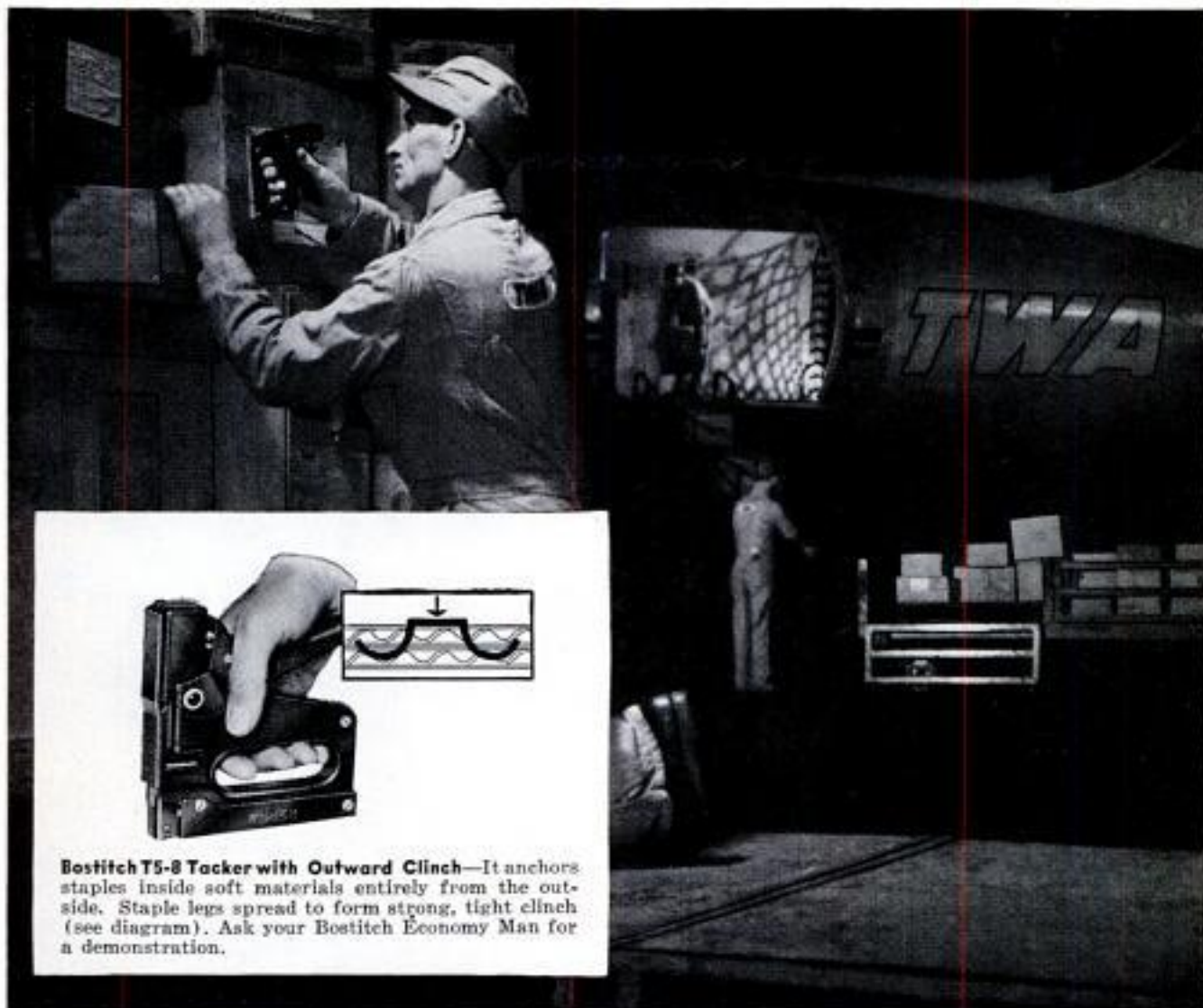
There have been many counterfeiters who produced excellent forgeries, but there has never been a single one which is perfect. And thanks to the efforts of the philatelic sleuths, the stamp-collecting fraternity is constantly being notified every time a new type of fake is discovered. With this dissemination of knowledge the faker is finding it difficult to peddle his wares and so is being driven out of the racket.

Only last year a group of British stamp dealers wrote the final chapter to the 50-year career of the cleverest and most notorious of all modern counterfeiters, who made a fortune from his chicanery solely because no government agencies molested his activities until philatelic sleuths got on his trail.

Counterfeiters will operate only as long as they have victims who'll buy their wares. You are a potential victim if you do any or all of the following:

1. Look for too many bargains.
2. Buy stamps from persons you do not know to be experienced and reliable.
3. Buy stamps about which you know too little.
4. Accept stamps without a reliable, written guarantee.
5. Accept stamps which have not been examined by a qualified philatelist. ★ ★ ★

Biggest single consumer of electric power in the United States is the Atomic Energy Commission, which last year took four percent of the nation's output.



Bostitch T5-8 Tacker with Outward Clinch—It anchors staples inside soft materials entirely from the outside. Staple legs spread to form strong, tight clinch (see diagram). Ask your Bostitch Economy Man for a demonstration.

STAPLES HOLD BETTER AT ONE-TENTH THE COST! Trans World Airlines overlook no detail in assuring the safe, swift arrival of air freight shipments. Shipping bills fastened to cartons with even the best tape sometimes tore loose in damp climates. And taping cost \$14 per thousand bills, not counting time taken to apply.

A Bostitch Economy Man suggested stapling the bills with a new Bostitch tacker that "spread-eagles" staple legs inside carton walls. TWA tried it, found stapling four times faster than taping and far superior in holding power. Cost: \$1.40 a thousand. Now all major TWA stations are Bostitch-equipped.

How much can you save by switching to Bostitch stapling?

Your Bostitch Economy Man can tell you. He's one of 350 trained fastening specialists working out of 123 cities in the U. S. and Canada. There are over 800 kinds of Bostitch staplers in his cost-cutting repertoire. Look up "Bostitch" in your telephone directory, or check the coupon at the right.

Fasten it better and faster with



BOSTITCH, Inc., 550 Mechanic St., Westerly, R. I.

I'd like to know exactly how stapling can cut costs in our fastening operations. I'm particularly interested in the applications checked below:

HI-SPEED PRODUCTION FASTENING

- stapling vs. riveting
- stapling vs. spot welding
- stapling vs. screws or bolts
- stapling vs. glue or cement
- stapling vs. tape
- stapling vs. tacks or nails
- stapling vs. solder
- stapling vs. wire or string

PACKAGING and CARDING

- sealing bags (cloth, paper or plastic)
- mounting products on display cards
- fastening items to individual cards

SHIPPING ROOM ECONOMIES

- preparing cartons for filling
- sealing filled cartons
- lining or padding crates
- applying shipping bills or tags

BUILDING APPLICATIONS

- applying asphalt roofing
- laying underfelt
- installing ceiling tile
- applying insulation
- installing low-voltage wiring
- applying shake shingle siding

OFFICE EFFICIENCIES

- filing
- routing
- posting
- binding folders and reports
- preparing advertising dummies

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

Completely NEW and ORIGINAL

Paramount wood



THE SECRET OF SIMPLICITY IS PARAMOUNT'S

"MAGIC-BOOM"!



Exclusive! The basic principle of Paramount's patented "Magic-Boom" is a combination Pinch-Lock Pivot Block Bearing that permits sliding, rotating and tilting movements never before possible in a multi-tool. Provides unlimited work combinations and new adaptations . . . precise alignment from one tool position to another!

MULTI-PURPOSE TOOL..

worker

Compact! Rugged! Simple to operate!

Does all complex woodworking jobs quickly and safely!

Simplicity of design eliminates mechanical troubles!

If you ever thought multi-tools were complicated to handle, confusing to operate, or troublesome to maintain—*get ready to change your mind!* A new engineering idea has made possible the greatest advancement in home workshop history. Not until now has there been a multi-purpose power tool so simple and compact in design—so easy to operate—so rugged in construction—so trouble-free in performance.

Compact—Only 2 feet square! Versatile—Unlimited work combinations!

Portable—Take it from job to job! Precision—To industrial standards!

If you are interested in a home workshop, or are considering the purchase of a power tool, you owe it to yourself to see the new Paramount Woodworker. The purchase of a home workshop tool is an investment for a lifetime of power tool satisfaction and trouble-free service. Shop every multi-tool on the market. Compare them one against the other. There is no better way to prove to yourself the

value and advantages of owning a new Paramount Woodworker!

Get the facts! Mail the coupon below for immediate information and name of your nearest dealer. See and operate the new Paramount Woodworker—examine the features that make it the most revolutionary multi-tool on the market. Once you do, you'll never be satisfied with any other power tool!

Only

\$279⁵⁰

COMPLETE

ASK DEALER FOR EASY TERMS

Mail this coupon today!

Paramount

with motor and attachments, ready to plug in.

PARAMOUNT WOODWORKER, Dept. PM-10

Ideal Metal Products, Inc., 1644 West LaFayette, Detroit 16, Michigan

Please send me complete information about the new Paramount Woodworker and the name of my nearest dealer.

NAME _____

ADDRESS _____

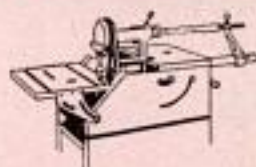
CITY _____ ZONE _____ STATE _____

TWO SAWS!



Standard cut-off saw and self-retracting push-up saw. Correct speed automatically fixed.

A LATHE!



Tilting, sliding and rotating feature for set-up flexibility.

A HORIZONTAL DRILL!



No limit to length of work. Finger-tip micro-adjustment for accurate set-ups.

A DRILL PRESS!

A 360° radial drill press. Precision control raises and lowers head without strain.



A SANDER!



Largest sanding table in home workshop field. Engineered drive insures correct speed.

Hudson Owners Praise Ride, Handling Ease and Styling

(Continued from page 132)

"Engine is easily worked on by the owners. No overhead valves."—Wisconsin farmer.

"I drive it for less cost per mile than any other full-size car. Hudson isn't a popular car, but if more people could be given the keys and made to drive one in a test drive, there would be more sold."—Iowa insurance man.

"Visibility is good. No distortion and no difficulty getting into car because of the pillar."—Illinois sales manager.

"I like the single-unit body which holds rattles to a minimum."—Michigan teacher.

Those of you who follow these surveys regularly will note that the Hudson is one of the very few cars in which squeaks and rattles are not listed high among the complaints. Fewer than one percent of the Hudson owners mentioned rattles.

"I like the brakes' safety feature (the hydraulic and mechanical linkage)."—Pennsylvania furnace man.

"I like the idea of having mechanical brakes if the hydraulic system fails."—Indiana farmer.

"I like the way it drives like a big car, feels like one, looks like one and is very

comfortable too."—New Jersey executive.

"Dependable. Any independent has to be better to sell."—Illinois carpenter.

"I drive 131 miles round trip each day to work five days a week and my Hudson has never failed me in any way."—Indiana owner.

"The spare tire is out of the trunk which gives you much needed room for luggage when traveling."—North Dakota cattle buyer.

Other Complaints

Listed in order of frequency of mention are the following complaints of owners:

"The only complaint I have is that it leaks when it rains. The drain rubber around the leading edge of the door doesn't line up."—New Jersey glassworker.

"Car rides fine but the secure, road-hugging feeling of the old Hudson is gone. You have to drive this car at all times."—Ohio factory worker.

"Engine too small for the Wasp Hollywood. It can hardly pull itself up a hill."—Minnesota parts man.

"Not pleased with gas mileage. This is my first Hydra-Matic and I don't believe I will buy my '56 with automatic transmission."—Colorado sales manager.

"Disgusted with the service. Garage tells

(Continued to page 278)

1955 HUDSON SPECIFICATIONS

ENGINE	HORNET 6	HORNET V8	WASP
Type	6-cyl. in-line, L-head	V8 OHV	6-cyl., in-line, L-head
Bore and stroke	3-13/16 x 4 1/2 in.	3-13/16 x 3 1/2 in.	3 x 4.750 in.
Piston displacement	303 cu. in.	320 cu. in.	202 cu. in.
Brake horsepower	160 at 3800 r.p.m.	208 at 4200 r.p.m.	115 at 4000 r.p.m. (with power kit 126 at 4000 r.p.m.)
Compression ratio	7.5 to 1	7.8 to 1	7.5 to 1
Transmission	3-speed conventional, overdrive, or Hydra-Matic	3-speed conventional, overdrive, or Ultramatic	3-speed conventional, overdrive or Hydra-Matic
GENERAL			
Wheelbase	121 1/4 in.		114 1/4 in.
Tread, front	59 1/2 in.		59 1/2 in.
Tread, rear	60 1/2 in.		59-11/16 in.
Tire size	710 x 15 tubeless		6.70 x 15 tubeless
Weight, unladen	3495 lb.	3806 lb.	3254 lb.
Turn-circle diameter	45 ft. 2 in.		41 ft. 10 in.
Steering-wheel turns, lock to lock	4.6 turns		4.3 turns
Length over-all	209 1/4 in.		202 1/4 in.
Width over-all	78 in.		78 in.
Height over-all	62 1/4 in.		61 3/4 in.
CAPACITIES			
Gasoline	20 gal.	20 gal.	20 gal.
Oil	7 qt.	5 qt.	5 qt.
Water	18 1/2 qt.	20 qt.	13 qt.
INTERIOR DIMENSIONS			
Front hiproom	65 in.		
Rear hiproom	64 1/2 in.		
Front headroom	37 1/2 in.		
Rear headroom	36 in.		
Front legroom	42 1/2 in.		
Rear legroom	40 1/8 in.		

Give Your Home the "NEW LOOK"



with **SIoux** Quality **ELECTRIC TOOLS!**

SIoux POLISHER-SANDER



IT'S FOR HIM



IT'S FOR HER

Complete Polisher-Sander Kit including SIOUX No. RC-1865

Electric Polisher-Sander; Molded rubber backing pad; 6" wool polishing pad; 1/2 pt. Auto Polish; 1/2 pt. Sioux-Venir (Wax); and package of fine, medium and coarse sanding discs. Only..... \$31.25
Optional extra drill chuck and set of drills.....\$3.45
Handle for polishing floors.....\$2.50



IT'S A POLISHER



IT'S A SANDER



IT'S A DRILL

SIoux FLAT SANDER

Here is the successor to tedious hand sanding. Oscillating, orbital action at 4,000 cycles a minute produces the smoothest finish on wood, fibre, metal, any material which you would sand by hand. No. 1850... \$45.80



SANDS WOOD SATIN SMOOTH



SANDS JOINTS SMOOTH



SANDS RUST OFF METAL

SIoux 1/4" ELECTRIC DRILL



No. RC-1822 Drill Tool Set with complete accessories for drilling, grinding, sharpening, wire brushing, polishing, etc. \$39.75

- Hole saws to 3/4"
 - Small design
 - Full powered
 - Lightweight
 - Permanently lubricated
- Drill 1/4" in steel
No. RC-1885 1/4" Electric Drill.....\$22.95



CLEAN



POLISH



DRILL



SHARPEN

SIoux ELECTRIC SAW

Powerful, rugged, with a world of surplus power. Perfectly lubricated; Motor, glass insulated; Helical, heat treated, steel gears; Blower keeps line of cut free of dust; Positive safety guard; 6 1/4" Saw Blade saws through 2x4's at 45° angle with plenty of blade to spare.



RC-1806
6 1/4" Heavy Duty \$74.50



MITRE CUTS



RIP SAWING



CROSS CUTS

STANDARD THE WORLD OVER

IN THE AIRCRAFT AND AUTOMOTIVE FIELDS AND IN INDUSTRY, THEY'RE THE TOOLS THE PROFESSIONALS HAVE USED FOR OVER 40 YEARS!

WRITE FOR YOUR FREE CATALOG



ALBERTSON & CO., INC., SIOUX CITY, IA.

"TWINSULATE" THIS WEEKEND



**SLASH HEAT BILLS up to 25%
with new double-action INSULATION**



Insulate your attic with new Gold Bond TWINSULATION®. Cut this winter's heat bills... and make your house up to 15° cooler next summer. TWINSULATION gives you a core of heat-blocking fireproof rock

wool *plus* a heat-reflecting covering of silvery aluminum *all* around it. This double-action combination keeps winter furnace-heat in, and summer sun-heat out! If you have an average size attic you can TWINSULATE it in a few hours. Do it this weekend!

NATIONAL GYPSUM COMPANY • BUFFALO 2, N. Y.

Send for booklet. Shows you how much money Gold Bond TWINSULATION can save you in heat bills. Mail coupon now!



NATIONAL GYPSUM COMPANY
Dept. PM-105, Buffalo 2, N. Y.

I enclose 10¢ for "Home Insulation" booklet.

Name

Address

City Zone County State

me they can't get parts."—Michigan owner.

"Tappets are very noisy."—Massachusetts kitchen manager.

"Sloppy assembly. Wiring not well organized. My car was an early model and may have been rushed through without careful attention."—Illinois editor.

"Hydra-Matic jerks something terrible. Hard to get at engine to work on it."—Indiana owner.

"Glaring design mistake is the second muffler that hangs down exposed to view."—Florida advertising executive.

"Dash and glove compartment are not very attractive."—Illinois machinist.

"I am 5 feet 8 inches tall and must practically throw myself over fender to check oil. Dipstick should be in handier position."—Illinois superintendent.

"Left ash tray almost inaccessible to driver because of shift lever. Handles for front windows too low on doors."—West Virginia postal clerk.

"Dry-disk clutch is stiff. Far inferior to old wet clutch."—Ohio inspector.

"Cannot adjust tappets while engine is idling. Should have door under fender to get at tappets."—Indiana machinist.

"Vent windows in front doors do not deflect enough air to prevent turbulence in rear seat."—Wisconsin clergyman.

"I cannot move the front seat forward or backward while driving."—Oregon housewife.

"Two-door Hollywood with reclining seats has exposed pawl on seat mechanism that damages clothing when getting in and out of back seat."—New York manager.

"Car bed somewhat disappointing. Very uncomfortable by itself because back seat is too low. Air mattress some help, but not enough. Needs a specially shaped mattress to level back seat."—California actuary.

"Hand brake is too low. Foot hits handle when moving from gas to brake pedal."—New York toolmaker.

"Trunk cover should have better lock and handle."—Minnesota superintendent.

"Rear doors do not open wide enough."—Illinois salesman.

There you have it—the good and bad about the 1955 Hudson, as reported by the owners themselves. On page 131 are detailed percentages summarizing this survey.

Turn back to page 131 for Clymer's road test of the Hornet V8.

☐ As an educational service, school children during summer vacations are allowed to fly between Birmingham and London at reduced round-trip rates of ten shillings (\$1.40) when empty seats are available on British European Airways liners.

"Miss
MOPAR"
says...

EXHAUST FUMES
CAN BE DANGEROUS
Does Your Muffler
LOOK LIKE THIS?

BE SAFE
BE SURE!
Let Us Install a
Safety Engineered
MOPAR MUFFLER

LOOK FOR THIS DISPLAY
—and get your MoPar
muffler—at your Plymouth,
Dodge, De Soto or Chrysler
dealer and from many
better repair shops.

GET
A
MUFFLER
CHECK
TODAY

Mufflers can be dangerous without being noisy!

It's a *smart idea* to have your muffler checked periodically! Even tiny leaks can mean *carbon monoxide* in your car's interior. (It takes only a small amount of this deadly gas to cause drowsiness and possible accidents!)

Next time you stop for service, have your muffler checked. If you need a new muffler, *play safe*—get a *double-walled* MoPar muffler, designed especially for your Chrysler Corporation car or truck.

MOPAR

PARTS DIVISION • CHRYSLER CORPORATION

GONE!



Most wallboard joints disappear with just one coat of these . . .

TEXOLITE* latex paints



TEXOLITE TEXTURE
Sand Finish
17 colors!



TEXOLITE RIPPLE
Smooth Stipple Finish
12 colors!

No priming...No mixing

One coat conceals wallboard joints finished with PERF-A-TAPE* system; all minor surface imperfections, too. Flows on freely and evenly with a brush or roller; dries fast to a luxurious textured-finish without "painty" odor. Ideal for imperfect plastered surfaces, too. See your TEXOLITE paint dealer or write Dept. PM-5,300 West Adams St., Chicago 6, Ill.

*T. M. REG. U. S. PAT. OFF.



UNITED STATES GYPSUM

Clymer Tests the Hudson Hornet V8

(Continued from page 131)

(about twice as long as used by most makes), controlled by direct-acting Monroe shock absorbers, do a good job of dampening the ride. Even over the most severe bumps at high speeds, the ride is solid and bottoming is almost impossible. Maneuverability, control and stabilizing on the corners are excellent.

The new Ultramatic transmission seems smoother than other Ultramatics I have tested recently. It is a four-element unit, utilizing a torque converter plus automatic upshift in gears (at driver's option depending on throttle position). I especially like the fact that, if the throttle is depressed about halfway at moderate speeds, the downshift takes place and it is smooth. Passing gear is available by flooring the throttle at speeds below 55. Below 15 miles per hour downshift to low is automatic.

The shift quadrant necessitates the driver leaning forward to see the position of the indicator, as the high steering-wheel hub obstructs vision. There is difficulty in locating the various driving positions. The movement of the shift lever is too short and sensitive. The transmission itself, however, is a thoroughly reliable unit.

The seating and driving position is comfortable, but the position of the steering wheel is awkward. There is not enough slant to the column and the top of the wheel is too high, especially with a short person, and it obstructs highway vision directly in front of the hood—which in itself is long, wide and rather massive. (I understand this will be changed by the time this is in print.)

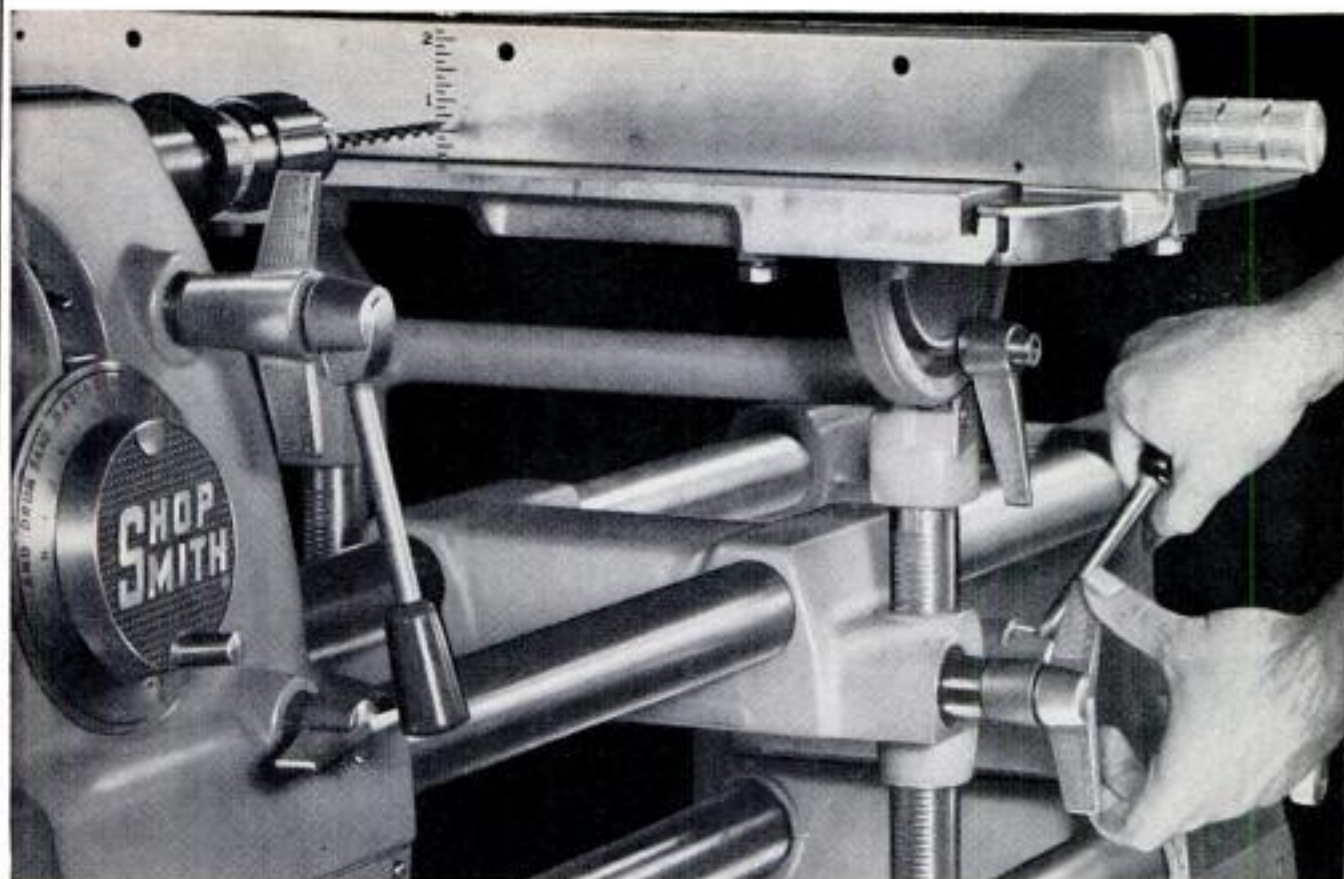
The wrap-around windshield extends farther back into the door panel than most others. There is ample room for entry through the front doors, with very little knee obstruction from the body panel curve against which the front door closes. Thumb pressure required to open the doors from the outside is rather heavy. The location of the armrest on the door is good, but the window sill is rather high for comfortable driving with the elbow resting on the sill.

The windshield wipers are vacuum-operated. They have more sweep and do a better job of wiping into the corners on both sides than most. Transparent colored visors reduce glare and can be seen through while driving against the sun.

There is an ash tray on each side of a large drawer-type glove compartment. I like this glove compartment better than the hinged-door type.

The interior is luxurious and spacious

(Continued to page 282)



Why *LONG* any *LONGER*?

NOW YOU CAN OWN SHOPSMITH FOR AS LITTLE AS \$3 A WEEK

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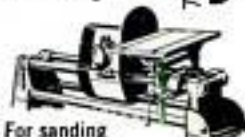
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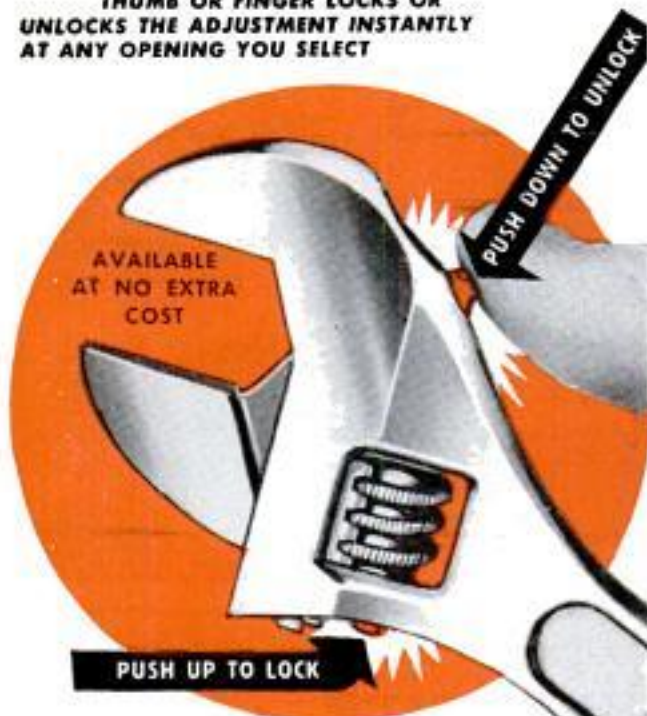
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with adequate headroom. The brake pedal is rather high in relation to the throttle. It should be wider for ease of operation with the left foot, which automatic-transmission drivers should learn to use.

Unit-type body-chassis construction is used. Body and chassis are welded as one unit. This not only makes for a stronger body but I have always felt that such bodies have fewer squeaks and rattles than the conventional type in which the body is bolted to the chassis. Not one squeak or rattle developed during the entire test.

The emergency brake operated by the right hand is in an awkward position, especially when the ash tray is pulled out. In my judgment, no car has better foot brakes than Hudson. We were caught in a cloudburst at Greensburg, Kans., where floodwater over the highway was hub deep for miles. The highway was closed for most of one night and for four hours, with all traffic stalled, the car stood in this water yet during the entire trip to Los Angeles when brakes were used often, and many times at high speeds, there was very little fading. The pedal hadn't lost more than one half inch of effective movement on the entire trip. Hudson has continued to build in a mechanical reserve-brake linkage that takes hold in the last inch of the brake-pedal movement should hydraulic pressure fail. It is a valuable safety feature.

In that severe rain, not a drop of water leaked into the body, which indicates good assembly and careful checking.

There was considerable heat across the Midwest and I was impressed with the air-conditioning system. Both the condenser and the compressor are located under the hood and the entire air-conditioning unit is mounted below the instrument panel on the right side of the car. The combined heater-air-conditioner provides fresh cool air if it is hot or heated air in cold weather. Certainly no car has a better air-conditioning unit for average hot-weather use than Hudson. The price is \$395, nearly half of the cost of most other units which I have found to be no better and in some respects not so good.

I still rate Hudson as the safest car built in America. I say this because of several features: 1. The unit construction whereby the chassis and body are welded together as one single unit; 2. the high quality of Hudson brakes and the added reserve safety feature of a mechanical linkage to take over should the hydraulic system fail; 3. the roadability, general handling characteristics and maneuverability of the car, and 4. its excellent acceleration and power which enable the driver to get out of the way in an emergency. ★ ★ ★

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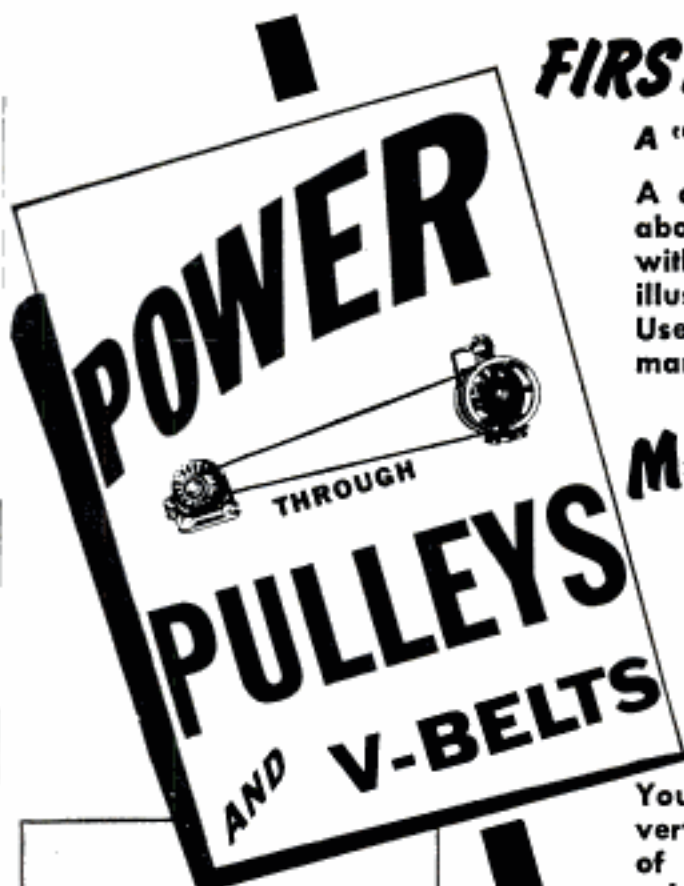
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Is Electric Heating for You?

(Continued from page 176)

Electric heating is safe. There is no flame, no possibility of an explosion, no trouble with an overheated chimney.

Which type of electric heating is best?

If you want a complete ducted system of air conditioning for your house you will probably favor a heat pump. Heat pumps offer the benefit of all-year air filtration. The house climate is similar to that of a home heated by conventional forced-air means.

Heating by resistance wires is probably the simplest form of heating known. Once installed, radiant-heating units require no care. Radiant heating is uniform and free of noise and drafts. Individual room thermostats keep each room at exactly the right temperature, and floor and ceiling temperatures even in rooms that are heated by ceiling panels are said to vary only three degrees.

Opponents of radiant heating claim that windows cloud up and that odors and smoke accumulate because of a lack of air circulation with this system. The backers of radiant heating say this just isn't true. Fresh air is constantly seeping into the best-insulated house, they say, causing gentle circulation throughout the home. They point out that these difficulties do not plague the users of conventional steam-radiator systems, which require no blowers either.

How long do the systems last? The life of a heat pump is said to be comparable to that of an electric refrigerator—15 or 20 years. Replacement or repair of the motor and of other parts is not expensive. Electric radiant-heating systems are said to last indefinitely.

The cost of electric heating varies greatly throughout the nation. But, wherever you live, your annual heating bill will probably be more if you use electricity rather than coal, oil or gas. Part and occasionally all of this difference can be recovered by savings in installation and building costs if you use resistance heat. If you install a heat pump, you will still probably pay more for heating than if you had used a conventional system. But you will receive air conditioning in the same package. If you happen to live in a mild climate, the cost of heating will be negligible in any case. A good estimate of the cost of heating your home by electricity can probably be secured from your local electric utility company, which should be told of your electric heating plans.

If you do decide to switch to electric heating, you'll be following a growing trend. ★ ★ ★

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a disc sander that
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GET A FLEXBAC[®] PAD KIT

from your local Hardware or Building Supply Dealer. One demonstration will convince you it's the slickest sanding pad ever made. There's nothing like it!

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COMPLETE**

including adapter for
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Specially made for keeping keen edges on your steel tools. Coarse on one side, fine on the other.



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Keeping Up With the Atom

(Continued from page 105)

connected to a central indicator that tells where the fire is and to another instrument that rings alarms, closes fire doors and performs other fire-protection functions.



Scientists at the Geneva atomic conference foresaw the eventual use of an inexhaustible supply of heavy hydrogen from the oceans for the production of energy by controlled fusion of light elements. While the hydrogen bomb is already developed, scientists have yet to put the fusion of light elements under control for generating power.



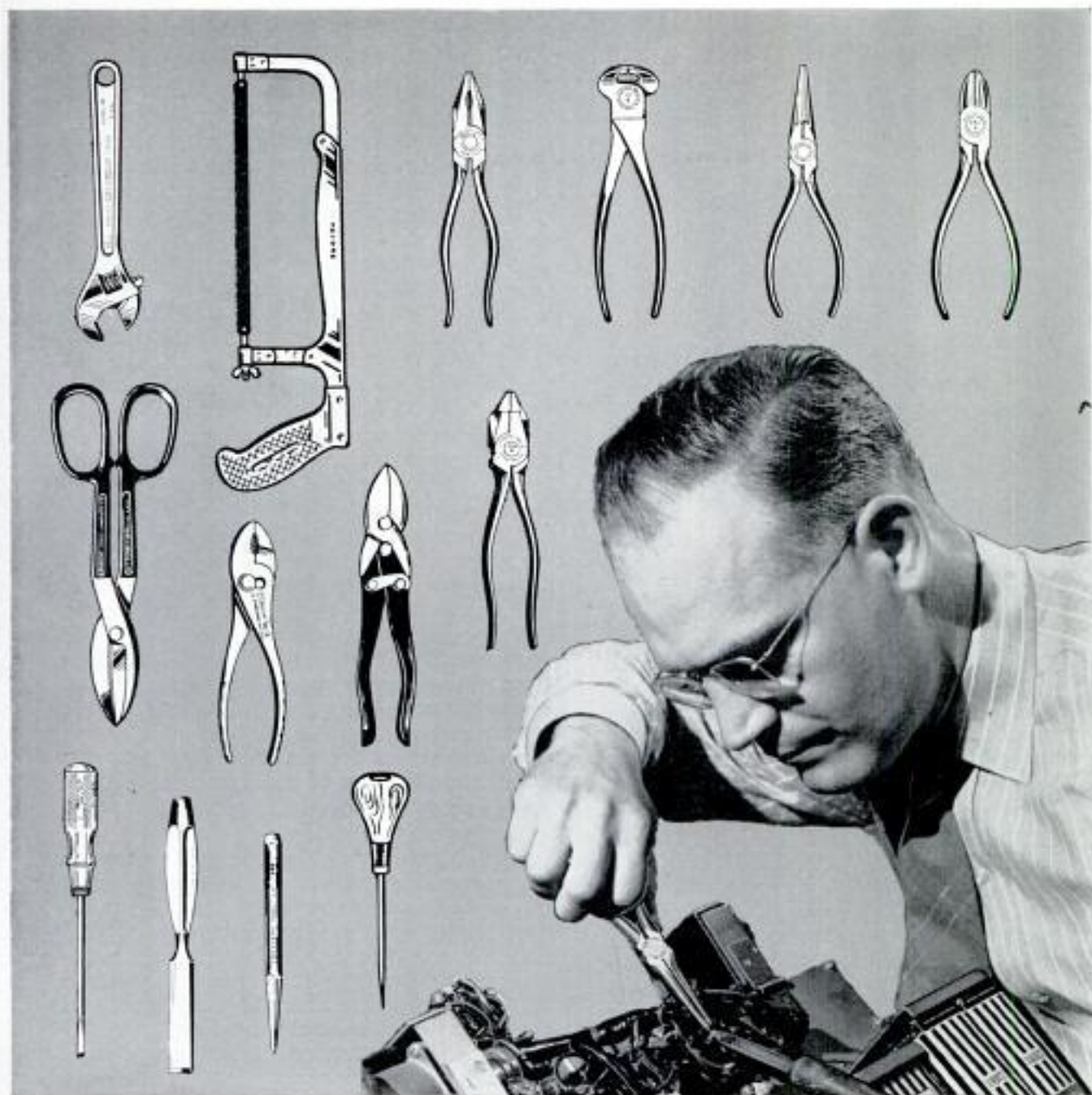
Eight large companies have joined forces to build the first nuclear reactor to be operated by private industry for research in industrial and medical fields. The participants are the Continental Can Co., Chas. Pfizer & Co., American Tobacco Co., Corning Glass Works, International Nickel Co., United States Rubber Co., Socony Mobil Oil Co. and AMF Atomics, a subsidiary of the American Machine & Foundry Co.



Florida landowners and farmers can readily determine the radioactivity of their soil samples on their own. Researchers at the University of Florida's College of Engineering have established an atomic-energy tester which the public can use in testing their samples for radioactivity. If the counter registers a sufficient amount of activity, the soil is taken to the experts for a series of tests to determine whether or not the mining of the parent lode is economically feasible.



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Exclusive hollow
 ground point →

steps-up
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Now bore faster, cleaner, deeper holes with small 1/4" electric drills and drill presses. No clogging, no binding. No wobble, no run-off either. New Irwin Speedbor "88" wood bits with exclusive hollow ground point and new spade-type cutters breeze through hard or soft woods, plywood, plastic. Forged in one piece from solid bar of special high carbon steel and hardened full-length to stay sharp much longer. Easy to resharpen with hand file. Size markings on both sides of head for quick selection. Hang-a-Bit hole for storing on nail or pin. Sizes 4/16" to 16/16". See the new Irwin Speedbor "88" when you visit your independent hardware dealer. *Patent Pending



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ROLL SETS

Durable red plastic rolls with individual pocket for each bit. Available in 4, 6 and 11 bit sets. Compact roll conveniently fits in tool box or



only
69¢
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IRWIN
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the original solid
 center auger bit
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 screw drivers
 screw driver bits

Can Our Tanks Take It?

(Continued from page 120)

Recently we had a van we knew might roll, so we built outriggers on it."

The 70 men who take the Army's vehicles on these punishing rides are a hardy lot, as good machinists as they are drivers. All are trained to become supervisors. "They have the most automotive know-how in the world," says Ford. "There are no 'cowboys' or 'daredevils' in this outfit. Any fool can smash a truck by slamming it off the road and into a tree. That's not the idea. But we can't have pussyfooters, either, or the vehicles would be dodging ruts and holes all day, and getting no true workout. Our men must drive consistently to the outer limits of safety, until parts give way under concentrated but normal rough use you'd find on a battlefield."

Most of that "normal rough use" would stand your hair on end. Yet Aberdeen's test drivers, who log up a half million miles of dangerous driving a year, have a far better record than civilians riding on flat concrete. The one and only lost-time accident in two years involved a man repairing—not driving—his vehicle. He leaned over to get a tool and cut his eyelid on a cotter pin. That doesn't mean there haven't been some narrow escapes that could have been fatal except for the skill of the drivers.

On the big hill at Churchville, tanks have snapped their tracks, lost control and gone on nerve-shattering dives into the brook at the bottom. Last winter a big 240-millimeter gun carriage spun backward and slid down on the ice, its locked tracks zipping along like gigantic runners under a sled. It thumped to a halt at the bottom and the driver climbed out unscathed. An M47 tank missed the turn at the bottom, plowed through an abandoned stone farmhouse and went roaring away virtually unscratched in a cloud of flying masonry and dust, the driver's crash-helmeted head tucked safely under the hatch rim. On a perfectly flat straightaway at Perryman, the steering mechanism on a roaring heavy tank went haywire. The driver hit the brakes, exploded a drum and wound up on an embankment at 53-percent list. The monster was so delicately balanced that the driver didn't dare move. Shifting his 200 pounds could have upset the equilibrium and rolled the multiton vehicle over him. A crane was summoned to hoist him out.

Just how much of a beating those courses can give a vehicle is indicated by the flood of breakdown reports that pours into Operations each day. "We may start with 35 vehicles running on all courses in the

(Continued to page 290)



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It's a Router!



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morning." says Charlie Dewey, "and by noon only four will be operating."

When a new vehicle comes in, a driver is assigned to it. He lives with the machine through all test phases, often walking it through the shops for its initial "tear-down" examination. Once reassembled, the machine begins its tortures. In a cold room it is frosted to 70 degrees below zero and started up, to see how it will function under arctic conditions. In a hot room it is baked to a sizzling 165 degrees and operated to test its desert stamina. Past that hurdle, driver and engineers wham it over the Munson torture racks in an effort to flunk it out quickly if it has a basic-design fault.

"One of the first indignities we inflict on a new truck," Ford reveals, "is to pick it up with a crane—one hook on front, one at the back. That tells us something about the frame. Recently, a 2½-ton truck we lifted folded like a book."

What the cranes don't do to a frame, the frame twister will. Anything riding across that 400-foot stretch of 28-inch alternating humps must be able to writhe like a snake and come out in one piece. "We've had 'em pretzel so badly that bolts sheared and popped out like bullets," says Ford. "Fans cut through radiators, axles crack in two. One tough-looking truck frame bent like an elbow halfway across. Plenty of vehicles have had to be picked off the middle of that thing with a crane."

Naturally, running tracked vehicles across the twister wouldn't prove much. So tanks have a special torture bed—589 feet of jagged granite rocks. "Three or four trips across that rock pile will tear a new set of rubber-cleated tracks to shreds, twist the steel beyond repair," Ford says, "but tests like that have brought vast improvements. Track on a heavy tank used to be shot in 200 miles of normal use. Today they'll do many, many times that."

But for pure grinding punishment, all the men agree that nothing at Munson is harder on a vehicle (or driver) than the Belgian Block road—a battering mile of rough, wavy cobbles on which the vehicles are driven around and around until something vital falls off. "Men riding the huge traction units on which the 280-millimeter atomic cannon rode when it was being tested on that road couldn't stay in the cab at anything over 12 miles per hour," Smitty recalls. "Sometimes, everything but the item being tested comes apart. A year ago we were towing a high-priority gun carriage on a 50-mile dose of Belgian Blocks. The carriage did fine. But we destroyed five tow trucks in 30 of those miles, and finally had to complete the test using

(Continued to page 292)

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*The most versatile
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Look for the Channellock line when you're shopping for hand tools. Channellock pliers offer features that you can't get with other makes. And when you buy a Channellock plier, ask to see the full line—you'll find a style and model to do any job better.



THE PLIER DESIGN THAT OBSOLETEs ALL OTHERS

CHAMPION D•ARMENT TOOL CO. • MEADVILLE, PA.

a modified light tank as the prime mover."

Once a vehicle has passed the quick shakedown at Munson, the driver takes over. If it's on tracks, he'll probably bounce it over 7000 miles of Munson, Perryman and Churchville before he's through. If it's on wheels, it will get up to 15,000 or more miles of punishment. Smitty, who put in 11 years as a test driver before retiring to office work, reels off the routine. "Usually 40 machines are running in each eight-hour shift around the clock," he says. "A driver's schedule generally calls for cycles of 500 miles. Each runs about 25 miles per shift—and that's a workout."

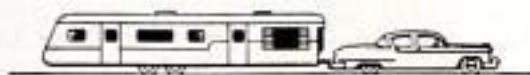
Every day for eight hours, the battered driver pilots his bucking charge over the same holes and ruts, back and forth, grinding the sobbing, creaking pile of machinery to pieces. Every few hours, he must stop to see if everything he started with—down to the last bolt—is still there. Usually it isn't. Twice a day, he must wash four inches of caked mud from his vehicle with high-pressure hose and lubricate his monster. It isn't unusual for a tank to come in from Perryman laden with two tons of caked mud. In winter, when it's frozen, tanks grind to a halt and the stuff must be loosened with a blowtorch first. Then, cleanup is a four-hour operation.

Perryman and Churchville are toughest on the drivers. Two years ago it rained for three weeks and there were actually five-acre lakes over the "road," with deep ravines hidden under the wavelets. "One driver rammed his tank into a seven-foot pond, conked out and sat marooned on the turret until we went after him in a boat," Smitty recalls.

At its best, Perryman is a rolling sea of mud. The rocking action of the heavy tracked vehicles piles up huge hummocks seven to ten feet high, with water-filled gullies between. Ride the copilot's turret in an M51 over the mess at full speed, as this author did, and you get the effect of sailing a 30-foot launch on a heavy sea. Only this sea is lumpier. Each time you hit a gully and plunge into a lake, the spray that hits you is brown and gritty with mud. Drivers at Perryman change clothes four or five times a day. An amateur (as this one will testify) can wind up after one run at Perryman with black and blue welts around his midriff from whamming the rim of the cockpit as the machine pitches and jolts—first forward, then backward, then sideways over the "roller coaster" course. Drivers soon learn to ride with their charge, "posting" like a horseback rider to ease the pounding. Copilots, who take inside temperature readings occasionally, have

(Continued to page 294)

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become seasick in the heaving belly of a tank at Perryman. At the end of a day's run on this course, driver and copilot wash down the steel hulk, as well as themselves, and take off for home with a hum in their ears that may last an hour or more. But not before a report has been turned in. For driver reports are the key to constant improvement of all the Army's automotive equipment. Typical remarks will read like this:

"Engine backfired through air cleaner when accelerating. Lost safety pin out of tow bar and bar unhooked once. Bars turned and sheared safety pins. Tow bar is bent at towed-load end. Noted pin started to work out of pintle block. Engine still pulls down transmission. Seems to be shifting out of lockup too late. Opened auxiliary gen. ½ hour. Noticed Number 5 shock absorber on towed load had bolts sheared out of top brackets. Washed and found three top brackets loose. Need welder to weld them to hull."

The classic remark made by a proud manufacturer who brought his latest product to Aberdeen for a going-over, is still quoted with a chuckle by everyone at the rugged Proving Grounds. "Well, I'm giving you a fine machine," the man said, "all painted and shiny. And when you're through with it I'll probably get it back on a shovel."

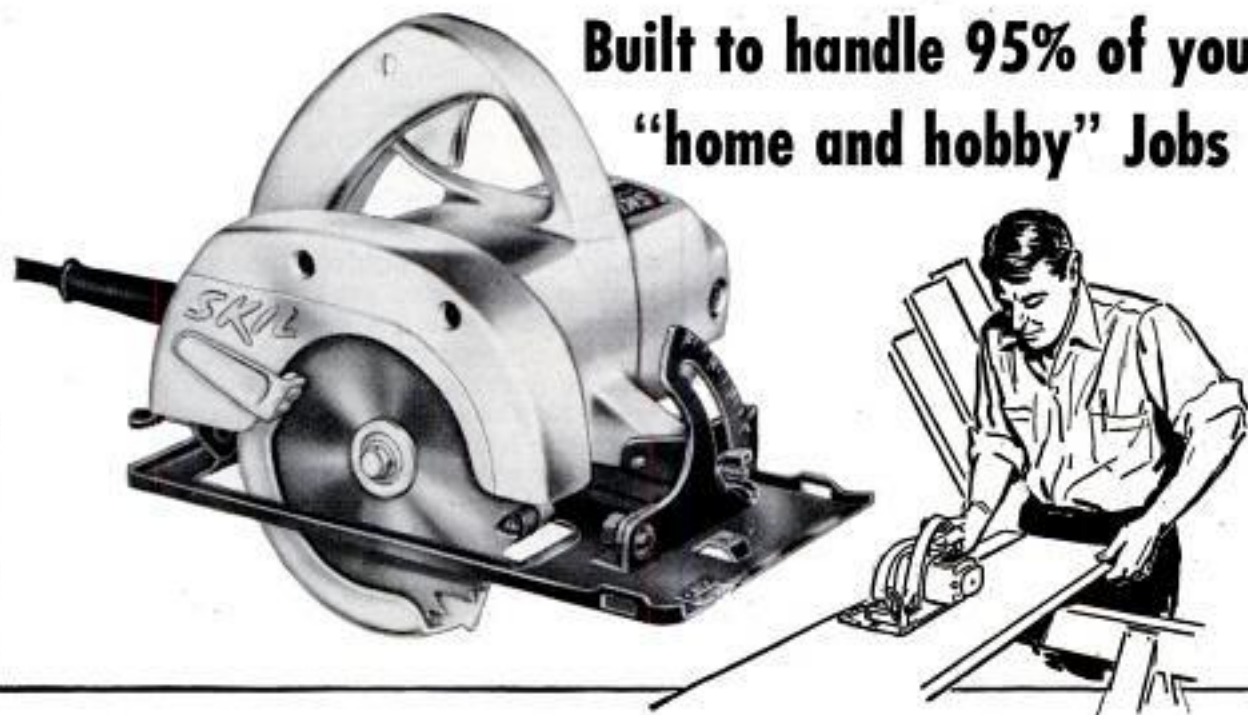
He was right. But because of Aberdeen's torture courses, today's Army vehicles are the toughest, ruggedest and most efficient in the business. Tank-engine performance has jumped from 100 to 400 hours of useful life, due largely to the things these men discovered. Tracks that used to split up under a few quick turns on rock or concrete go many more hundreds of miles under the roughest kind of treatment. Developments in suspension, clearance and accessory mounts have improved to a point where they are nearly indestructible. And these are only a few of the things that the jockeys riding mechanical steeds over the world's worst roads have helped to produce. Where they leave off, the fellows with drawing boards and slide rules start over again, in the constant effort to develop the world's best army on wheels. ★ ★ ★

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Bruce PREFINISHED Oak Floors

By the world's largest hardwood flooring maker

The PM Young-Family House

(Continued from page 156)

if the family wishes greater privacy. Other kitchen features are a waist-high oven, built-in counter-type range, dishwasher, garbage disposal and cabinets within easy reach.

For entertaining, the large living-and-dining area becomes one room. The house was planned to face north with a south exposure for the living-room windows. Entrance to the living room is handy to the front door, but traffic to kitchen or bedrooms does not go through this room. Both living and dining areas have cork floors, eliminating expensive wall-to-wall carpet.

A door opens from the living room onto a side terrace, or outdoor living area. The terrace is shielded on three sides by the house, garage and a fence with the open side looking out toward the back yard. This terrace provides an excellent outdoor play space for the children and is partly visible from the living room, dining and kitchen areas for purposes of supervision. An outdoor fireplace with a grill on the terrace provides a good entertainment feature. If a screened porch is desired, the flat living-room roof may be extended over part of the terrace. "The do-it-yourself craftsman can save money," says Jones, "if he does this section himself."

Actually, the house could be built as a do-it-yourself project as easily as a one-story ranch-type home. The outside walls on the lower floor are made of concrete blocks. The central bearing for the floor above (bedroom area) is a steel girder on steel posts. The floor framing is made of 2 by 10 joists, 16 inches on center. Working drawings for the house show conventional roof construction, but it could be built with easy-to-handle nail-glued trusses developed by the Small Homes Council and Purdue University. The living-room-kitchen section is built over crawl space.

The windows are a combination fixed-glass and awning type; all may be double glazed with storm panels or may be purchased with insulating glass that is never removed. Screens are fitted to the inside. Heat is supplied by a three-zone baseboard radiation system with forced hot water. The three-zone system provides for separate thermostatic controls for the three different levels of the house. Thus, if the south-side level has a lower heat demand during the day, the supply to that area will be reduced. The separate control also keeps the sleeping area at a lower temperature during the night without affecting the rest of the house.

(Continued to page 298)

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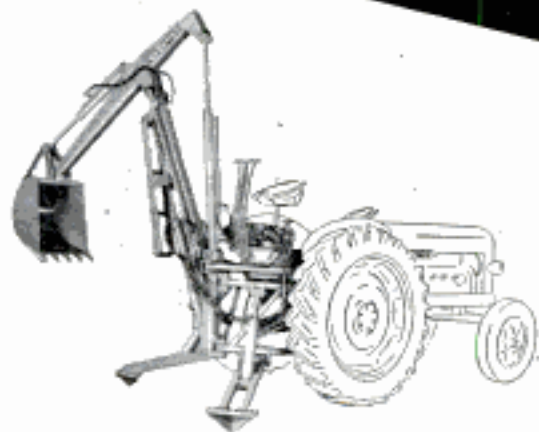
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3. Smooth, even flow! Anyone can do streak-free work, because each tapered "Tynex" bristle provides better, more even flow.



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"Tynex" is the registered trade-mark for Du Pont nylon bristles.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY.

It is estimated that the house and garage as shown on these pages would cost approximately \$22,000 in the Urbana, Ill., area. This does not include the lot. However, the cost can be reduced considerably by delaying construction of the garage, substituting a carport for the garage or omitting the paved terrace and fireplace. The house could be finished with one bathroom, leaving the second bath and basement lavatory for later do-it-yourself projects. The owner could do all of his interior decorating and put in all of the basement partitions.

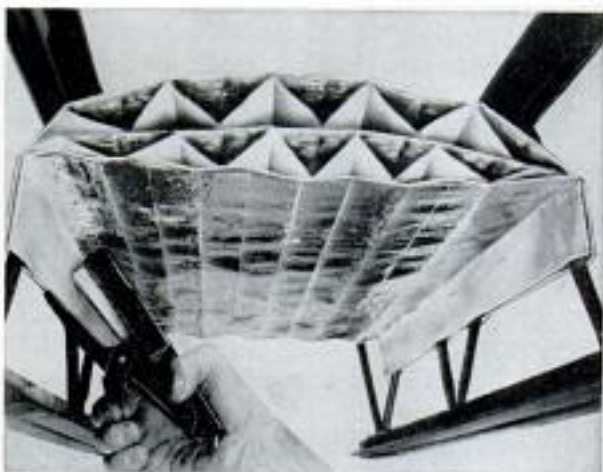
A carport could be built by extending the flat roof over the court entrance. This would also make it possible to put the house on a smaller lot.

One of the best recommendations for this PM Young-Family House is that the architect who designed it has incorporated many of its features (including lower-level playroom) into his own new split-level home.

★ ★ ★

Asbestos-Aluminum Insulation Blanket

Paper-thin asbestos combined with aluminum forms a new insulation blanket that resists fire. In addition, the accordion-fold blanket stops heat and vapor. Easily installed with staplers, the blanket is made for 16 and 24-inch joists and is available in rolls 125 to 375 feet long. It can be used on ceilings, roofs and crawl spaces. The paper-thin asbestos withstands temperatures up to 800 degrees before disintegrating; the aluminum sheeting, shielding both sides of the asbestos, melts at 1220 degrees.



☐ In one violent electrical storm studied by scientists, it was estimated that lightning generated every three minutes 200,000,000 kilowatts of power—equal to the rate of electric power generated in the United States.

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See them at the hardware, implement, auto supply or variety store that sells Indestro Tools, or write us for name of your nearest Indestro Dealer.

Double-Duty Wall-Klips included with these socket sets

Bright red or green baked enamel finish Wall-Klip of sturdy, one-piece construction that keeps tools orderly and firmly in place yet easily removable as needed. Two key-slots for wall mounting. Wall-Klip with following 19-piece Indestro Socket Set No. 1454: 1/2" Hex Drive: 8 Sockets, 7/8" to 1 1/4"; 6 3/4" Ratchet; 9 1/4" L-handle, Screw Driver Adaptor; 1/2" Hex Drive: 5 Hex and 2 Square Sockets and 4" L-handle. An 11-piece set with Wall-Klip is also available, if preferred.

Klip-Tite Holders included with these Indestro Wrenches

Box End Wrenches illustrated are packaged in red-enameled metal holders that open up to form convenient wall-bracket with two holes for easy mounting. Six wrenches in Klip-Tite Holder:

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Clymer Tests the Chrysler

(Continued from page 124)

being about 110 miles per hour as the speedometer was about seven percent fast.

Chrysler's power steering is good even though one is inclined to over-steer until accustomed to it. Little effort is required to turn the wheel and the front wheels straighten themselves after cornering without help from the driver. The 3½ turns of the wheel from lock to lock is rather fast for an American car, but it is highly desirable and makes for better cornering control and easier parking.

Chrysler's brakes are perfect for normal driving, although there was slight fading when used at extreme high speeds. The brakes were power-assisted and pedal action therefore extremely light.

Chrysler's PowerFlite transmission is fully automatic, consisting of a torque converter and two-speed planetary gear set. The torque converter and planetary gear break-away ratio is 4.47:1. Upshift takes place from 15 to 65 miles per hour, depending upon throttle opening. This can be a smooth operation with careful use of the throttle, but it can be a rough shift if the throttle is used carelessly. The downshift automatically takes place at 11 miles per hour and is a little on the rough side. By depressing the throttle below 60 miles per hour the automatic downshift takes place quickly and with a noticeable surge of instant forward motion. Above 60, the passing gear does not operate and it would be better if it did up to at least 70. PowerFlite is a strong, well-engineered unit that takes abuse and gives very little trouble.

The test car was equipped with Airtemp air conditioning. Controls can be quickly adjusted to desired temperature. A blower with a three-speed adjustment enables the driver to select the desired temperature. The fresh and cold-air inlet is mounted on the deck in back of the rear seat, the air being sent forward across the top of the car. This makes for good distribution.

No squeaks or rattles developed. And the most severe water test possible was experienced in a rainstorm of almost cloud-burst proportions in Oklahoma. In the middle of the afternoon rain and hail came down so hard that all cars on the highway stopped for about ten minutes, but no water seeped into the test car.

The New Yorker is a massive car with excellent bumper protection. Both front and rear bumpers are practical for either parking protection or pushing a stalled car, which still has to be done occasionally.

The interior is luxurious, with quality

(Continued to page 302)

Imagine!



My daddy's making Window Screens *in the* **Fall!**

YOU BET, WITH THESE HOMESHIELD® **SCREEN KITS**

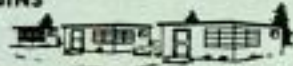
HE'S ASSEMBLING ALUMINUM SCREENS IN HIS SPARE TIME
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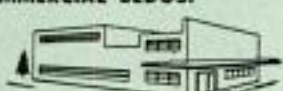
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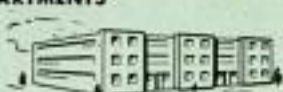
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Use coupon. Sizes shown are the maximum size screen which can be made from each kit. So just check the kit size which is the same as or larger than your present screen size.

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No more repairing or repainting! Replace your heavy, old-type screens or screen your new home with these sparkling, cost-saving screens. Thousands already in use... it's a proven new product that'll dress up your home for life!

These screen kits are complete, contain Aluminum frames, Fiberglass screening corner locks, installation hardware, clear directions — even a miter box. Anyone can assemble them in 5 simple steps!

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upholstering and appointments throughout. The doors feel solid and operate easily. I'm not impressed with the double operation necessary to open the doors: You push the front end with the thumb, which ejects a handle to be pulled by the hand.

Instruments are well located. I especially like the trip-mileage indicator and the speedometer dial. Even though there is an upper horn ring, there is no vision obstruction of the instruments. The speedometer needle is red against a black background and when driving against the sun, reading is difficult. The gauges for fuel, oil, temperature and amperes are needle type, which I think is much better than warning lights. Chrysler uses the six-volt electrical system.

The shift selector is mounted on the instrument panel and, as one becomes more accustomed to it, it seems to have some advantages over the conventional type mounted on the steering column. The windshield wipers are two-speed, electric and highly desirable even if a bit noisy. The wiper blades do not extend far enough on the outer edges of the windshield, but this is normal for modern cars with the massive windshields. The small glove compartment is mounted in the right side of panel.

Fresh air is admitted inside the body through a push-up cowl ventilator. The key starter is well located within three inches of the shift selector. The emergency brake operates at the rear of the transmission, as on all Chrysler products, and is effective. The rear-view mirror is wide, but when the car is heavily loaded, it is difficult to place the mirror in any position where you can see back farther than 100 yards.

Taillights are mounted high at the back end of the rear fenders. They appear as chromed gadgets that might have been added as an afterthought, or bought by the owner as an accessory from some speed shop. While they are functional and serve their purpose satisfactorily, they are not in keeping with Chrysler quality.

The car had 7000 miles on it at the time I left Detroit. I added three quarts of oil the first 1000 miles, possibly because the short-stroke engine had not been used hard enough to seat the piston rings, as it had been used around Detroit. After several hundred miles of fast and hard driving, the oil mileage improved greatly. At the end of the test I covered nearly 1000 miles before adding a quart of oil.

I have tested many fine automobiles over all types of terrain. Although there are a few things that I do not like, in my judgment Chrysler is the best automobile manufactured in America today. I say this because of its all-around qualities such as power, roadability and comfort. ★ ★ ★

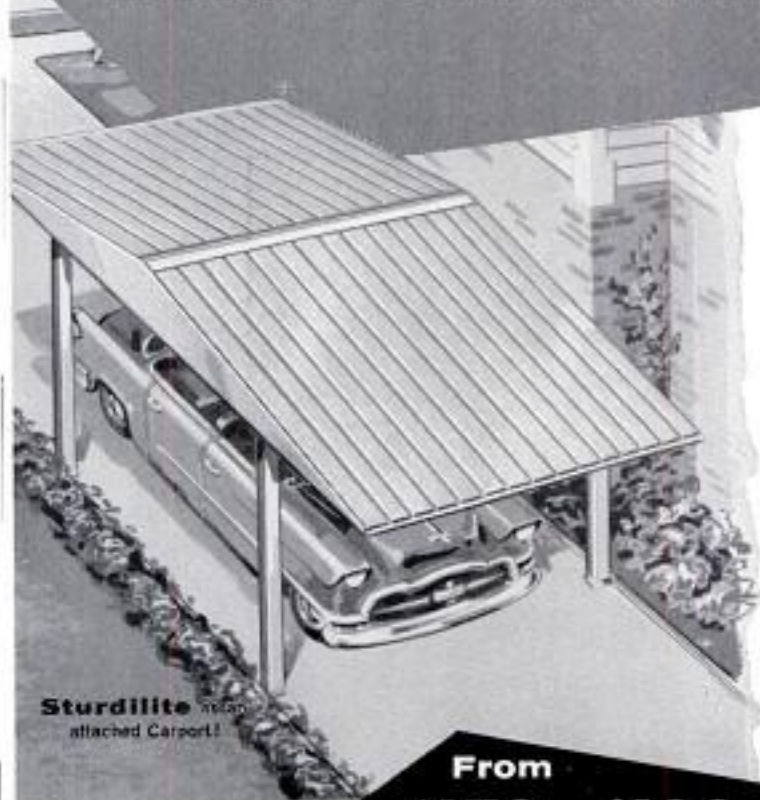
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IN JUST 3 TO 4 HOURS

Think of it! Only a few hours of pleasant work to replace your unsightly, troublesome wood hatchway with a lifetime, weathertight BILCO . . . the door installed on tens of thousands of new homes.

PAYS FOR ITSELF! Cost so little, yet never needs repair or replacement. Operates at a touch. Smooth, trim appearance adds amazing new beauty to your home.

Rush coupon TODAY for free folder and "Do It Yourself" pamphlet showing step by step replacement of wood hatchway.

THE BILCO CO.
DEPT. 43
NEW HAVEN, CONN.

**AMERICA'S FINEST
BASEMENT DOOR**

Gentlemen: Please send me "Do It Yourself Pamphlet" along with other literature showing sizes.

Name

Street

City State

Chrysler Owners Still Say Handling Is Best Feature

(Continued from page 127)

"Cover for gas filler should be radically redesigned. Gas-station attendants can't open it without a screwdriver—they don't have long fingernails like executives."—Ohio physician.

"For perhaps the few of us die-hards who prefer dignity rather than alarm in the

1955 CHRYSLER SPECIFICATIONS

	Windsor	New Yorker
ENGINE		
Type	8-cyl., V-type, OHV	
Bore and stroke	3.63 x 3.63 in.	3.81 x 3.63 in.
Piston displacement	301 cu. in.	331 cu. in.
Compression ratio	8.0 : 1	8.5 : 1
Brake horsepower	188 at 4400 r.p.m.	250 at 4600 r.p.m.
Transmission	Three-speed conventional std.; torque converter with gears optional.	Torque converter with gears standard.
GENERAL		
Shipping weight (4-door sedan unladen)	3925 lb.	4160 lb.
Steering ratio (overall)	20.4:1 (16.2:1 with power steering)	
Steering wheel, lock-to-lock	5.5 turns (3.5 turns with power steering)	
Turning radius	23 ft. 3 in.	23 ft. 3 in.
Wheelbase	126.0 in.	126.0 in.
Tread, front	60.2 in.	60.2 in.
Tread, rear	59.6 in.	59.6 in.
Height over-all (unladen)	60.6 in.	60.9 in.
Width over-all	79.1 in.	79.1 in.
Length over-all	218.6 in.	218.8 in.
Road clearance	6.2 in.	6.5 in.
CAPACITIES		
Oil	5 qt.	5 qt.
Water	24 qt.	25 qt.
Gasoline	20 gal.	20 gal.
INTERIOR DIMENSIONS		
Front-seat width	63.3 in.	63.3 in.
Rear-seat width	64.0 in.	64.0 in.
Headroom, front	35.0 in.	35.0 in.
Headroom, rear	34.5 in.	34.5 in.
Legroom, front	44.6 in.	44.6 in.
Legroom, rear	44.8 in.	44.8 in.

color of our cars, it would be nice if there were a greater selection of tones in the more subdued range."—Illinois owner.

Other Best-Liked Features

The following quotations of Chrysler owners describe other best-liked features in order of frequency of mention.

"Visibility. You sit high and can see where you are going."—Illinois owner.

"I like the safe feeling you have on curves. Roadability excellent."—Iowa service manager.

"Dependability. I use a car in my business and must have one I can depend on to keep going."—Iowa insurance man.

"I like the power steering best. My wife is delighted with the way the car responds."—Delaware chemical engineer.

(Continued to page 306)

Holt's WORLD-FAMOUS Do-It-Yourself Products

For the Motorist
and the Home

PISTON SEAL—

For restoring power and compression, stopping piston slap and reducing oil consumption.

GUN GUM—

For mending leaky mufflers, sealing pipes and joints.

BATREPAIR—

An acid-proof battery weld.

HOLTWELD—

For repairing cracked cylinders.

RADWELD—

For repairing leaky radiators.

NO-CRODE—

For keeping battery terminals clean.

SUPERTUNE COMPRESSION PRIMER—

For maintaining top engine tune-up.

LOY—

For permanently repairing anything broken, cracked, loose or leaky—metal, wood, glass, plastic, porcelain. It's real metal in a tube.

TRADE MARK
Piston Seal
ORIGINAL

Restores Power and Compression! Stops Piston Slap! Reduces Oil Consumption! Increases Mileage!

Good for 10,000 miles of carefree driving. Next best thing to a complete motor overhaul... at 1/20 the cost. Today's biggest seller. Millions of tubes have been sold throughout the World during the past 18 years. Undeniably safe for even the finest engines. Endorsed by leading technical automotive experts.

Easy to use

\$4.95 a tube **POSTPAID** for most cars

Stop Danger of Carbon Monoxide Gas

Holt's GUN-GUM MUFFLER SEAL

Sets like a weld in a few minutes!

\$1.69 CAN

No Tools Necessary Apply by Hand

Mends leaky mufflers—seals pipes and joints

Write for full details

At every Auto and Accessory Store
TREGLOWN CO., Inc., Fanwood 57, N. J.

Canada: 1366 Greene Ave., Montreal 6 (Prices slightly higher in Canada)

BUILD IT **FIX IT**

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AMBROID

- Ready-to-use
- Fast drying
- High tensile strength
- Transparent
- Waterproof

IT STAYS STUCK

Dries entirely by evaporation of the solvent. Quick setting—no distortion. Ideal for assembling, repairing, home crafts, electrical work, factory, workshop or household use. Send postcard for free literature.

Try Ambroid in your business, too. For over 40 years recognized as the leading industrial adhesive of its type.

Art galleries, museums, and leading industrial concerns, rely on **AMBROID**

TRY A TUBE TODAY—At most hardware stores and hobby shops. If your dealer cannot supply you, send 30¢ for big 2 oz. tube, postpaid. Money back guarantee.

AMBROID WEYMOUTH 88, MASS.

SPEEDY RIVETS

simply swat with a hammer

Fasten leather, cloth, paper, plastics. Quick, secure, permanent repairs... ideal for craftwork, too. Simply make a hole in each part to be fastened, push rivet together through holes, place on firm surface and swat with a hammer. Gilt, nickel, black, brown finishes. Large (6 per card) or small (10 per card) sizes.

AT HARDWARE COUNTERS EVERYWHERE

15¢ per card

THE DOT LINE

3229 S. Ashland Ave., Chicago 8, Ill.

Turn your summer porch
into a
**YEAR 'ROUND ROOM with
Gold Bond Building Products**



**Build it yourself
for only \$18* a month**

Your present porch can be the framework. With roof and floor already in place, just close in the sides and complete the room with easy-to-use Gold Bond Building Products. Staple up new fireproof Twinsulation... heat bills are cut as much as 25%... keeps your new room up to 15° cooler in summer. Build sturdy walls with Gold Bond Gypsum Wallboard. Decorate with scrubable Velvet Wall Paint.

*Cost of materials over 24 months—prices vary in some localities. Send coupon for complete, easy-to-follow instructions for building the room shown above.

**NATIONAL GYPSUM CO.
BUFFALO 2, N. Y.**



MAIL COUPON TODAY

NATIONAL GYPSUM COMPANY
Dept. PM-105, Buffalo 2, N. Y.

Enclosed is 10¢. Please send me Gold Bond How-To-Do-It Plan No. 16, showing me how to build my extra room.

Name.....

Address.....

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

"Roominess. It's our family car. Enough room all around and I'm 6 feet 3."—Georgia salesman.

"Power brakes. The wide brake pedal is a splendid convenience. I stop the car using my left foot."—Illinois attorney.

"I like the shift lever on the dash. It is up there out of the way. Set it and forget it."—Arkansas truck executive.

"My first choice is the over-all safety. Well-engineered car."—Wyoming farmer.

"Trunk is most spacious and for a salesman like myself it gives more room than usual to store sample cases."—Illinois traveling salesman.

"Comfort, performance and handling are the best in the business. About the only thing this car doesn't have is snob appeal."—Illinois purchasing agent.

And More Complaints

"Bright colors in interior are beautiful, but nylon seats very hard to keep clean."—Massachusetts Army man.

"Interior a little too fancy for farmers."—Iowa farmer.

"Never again will I buy a white-finish interior."—Illinois attorney.

"Haphazard workmanship on interior. The dashboard was set in crooked."—Ohio bartender.

"I am 6 feet 2 and can't wear a hat while driving. Roof too low."—Massachusetts traveling salesman.

"Defrosting system poorest I have ever used."—Ohio shop superintendent.

"Heater poor. People in back are cold, in front are roasted."—Washington ship captain.

"Windshield-wiper control out of reach to the right. Cowl control is under the dash where you can't see if it is open for summer or winter driving."—Illinois owner.

"Speedometer extremely hard to read at night."—Illinois nurse.

"Back end drags in driveway entrance with four in the car. I think the rear springs are too weak."—Georgia businessman.

"Brakes chatter when applied at high speeds."—Minnesota salesman.

"Rear-view mirror an atrocity. Can see only lower half of car following."—Illinois retired owner.

"Interior colors so repulsive they made my wife ill. Had portions of interior repainted at my own expense."—Illinois food broker.

"Should have easier method of adjusting front seat. My wife says present latch is awkward for her."—Georgia owner.

"Chrysler has done everything this year except eliminate the old-fashioned, trap-door air vent on cowl."—Vermont owner.

(Continued to page 308)



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ONE PIECE
HAMMERS · HATCHETS · AXES

GUARANTEED UNBREAKABLE
in all normal use

HEAD CAN'T FLY OFF. ESTWING unbreakable tools are forged in one piece. Saves all danger and expense of loose, broken or splintered handles. **PERFECT, PERMANENT BALANCE** for the easiest swing, most powerful drive. **SHOCK ABSORBING GRIP** is **GENUINE LEATHER** proven most comfortable and durable in all climates.

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HARDWARE STORES
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ESTWING MFG. CO., Dept. 10-M, Rockford, Illinois

\$4.25

HOME REPAIR TIP No. 19



PROTECT OUT-DOOR WIRING with "SCOTCH" 33 Plastic Tape wrapped tightly around joints and splices. Tough tape stretches to make waterproof seal, resists sunlight, oil and corrosion. Wrap splintery tool handles, too, with smooth, tight-sticking "SCOTCH" 33 Plastic Tape—39¢ or 79¢ at stores everywhere. Made by Minnesota Mining & Mfg. Co., St. Paul 6, Minn. © 1955 3M Co.

light, oil and corrosion. Wrap splintery tool handles, too, with smooth, tight-sticking "SCOTCH" 33 Plastic Tape—39¢ or 79¢ at stores everywhere. Made by Minnesota Mining & Mfg. Co., St. Paul 6, Minn. © 1955 3M Co.

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to MINUTES

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QUAKER STATE OIL REFINING CORP., OIL CITY, PA.
Member Pennsylvania Grade Crude Oil Association

"Difficult getting in and out." — Ohio funeral director.

"Trunk sometimes freezes shut in cold weather and is impossible to open until it warms up." — Utah student.

"Front grille should be simpler design." — Illinois toolmaker.

"Have changed tires 24 times and still have road thumping. Tire people say it is the car; car people say it is the tires." — Massachusetts park operator.

"Backup lights are in the wrong place. Always being broken by other car's bumper." — Illinois hardware dealer.

That is what the owners have to say about the 1955 Chrysler. For a detailed breakdown of likes, dislikes and other important information look at the percentage chart on page 126. ★ ★ ★

Turn back to page 124 for Clymer's road test of the Chrysler New Yorker.

Proposed Indian Statue Would Tower 250 Feet

Taller than the Statue of Liberty, a 250-foot granite Indian has been designed for a site near Gallup, N. Mex. The statue is to be the centerpiece of a \$9,000,000 project that includes a museum, a research center and a 30,000-seat amphitheater. It is to be designed in sections and assembled over a framework of steel. An elevator will be erected on the inside of the statue to carry tourists to the top. (The Statue of Liberty is 151 feet high and stands on a 154-foot pedestal.)



**CUT THE BOLT YOU NEED
TO ANY LENGTH**

**HEAT AND BEND
TO ANY SHAPE**

24" and
36" lengths

7 SIZES

$\frac{1}{4}$ " $\frac{3}{16}$ " $\frac{1}{2}$ " $\frac{3}{8}$ " $\frac{7}{16}$ "
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THREADED STEEL RODS

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**Install these superior
HYDRAULIC CONTROLS
Yourself!**

Smooth acting directional control valves — excellent feathering characteristics — minimum restrictions — performance comparable to the best. High performance hydraulic motor which may be used as pump — 16 gal. capacity at 1000 RPM and 1000 psi — May be used in combination to provide a fluid power transmission with a 10 horsepower capacity. Valve \$16.95, Motor-Pump \$56.50. Set up your own hydraulic systems for post-hole diggers, loaders, unloaders, stackers, dumping equipment, automatic lathe feeds, home shop presses. Sold by units or package including tanks.

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with **Handy Horse**
**ALL METAL
FOLDING HORSE**

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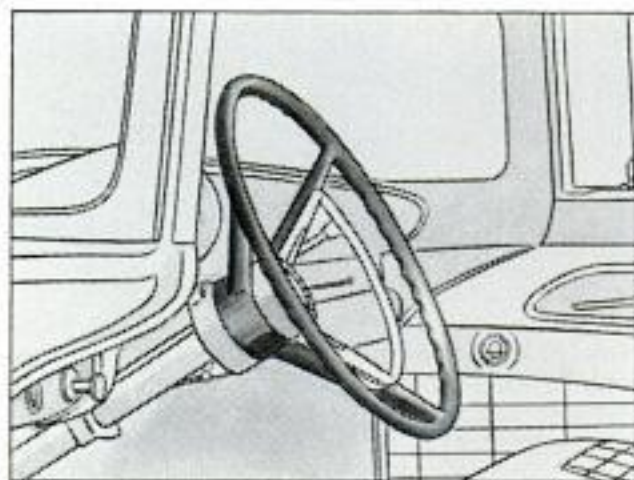


The story behind FORD'S exclusive new LIFEGUARD DESIGN

More than two years of intensive safety research and testing by Ford engineers in cooperation with universities, medical authorities and other safety experts have disclosed some interesting new data on accident injuries—and what can be done to reduce them.

For example, it was found that most serious injuries in accidents were caused by *three* common occurrences.

First... the driver being thrown against the steering post. This called for positive action, so Ford designed a new Lifeguard steering wheel with a shorter steering post and a specially-designed wheel that serves as a protective cushion in the event of an accident.

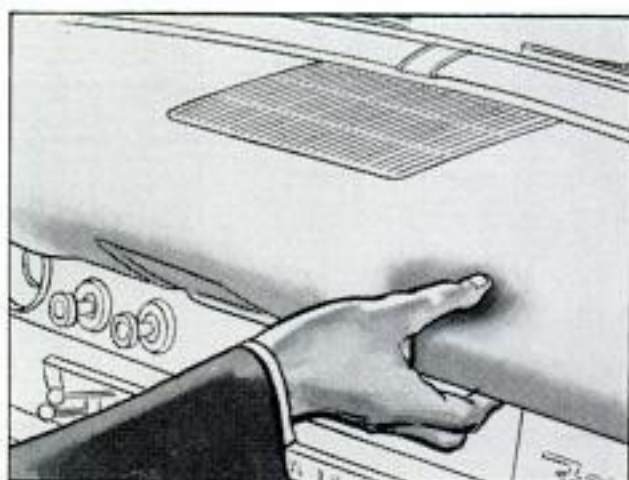


New Lifeguard Steering Wheel. Hub of wheel is more than three inches below plane of rim. Three uniformly spaced spokes are designed to yield under impact and reduce possibility of driver being thrown against the top of the steering column.

Second... occupants being thrown forward against hard surfaces within the car. This called for special padding of the instrument panel and sun visors. So, Ford for '56 is offering optional Lifeguard padding for these vital areas.

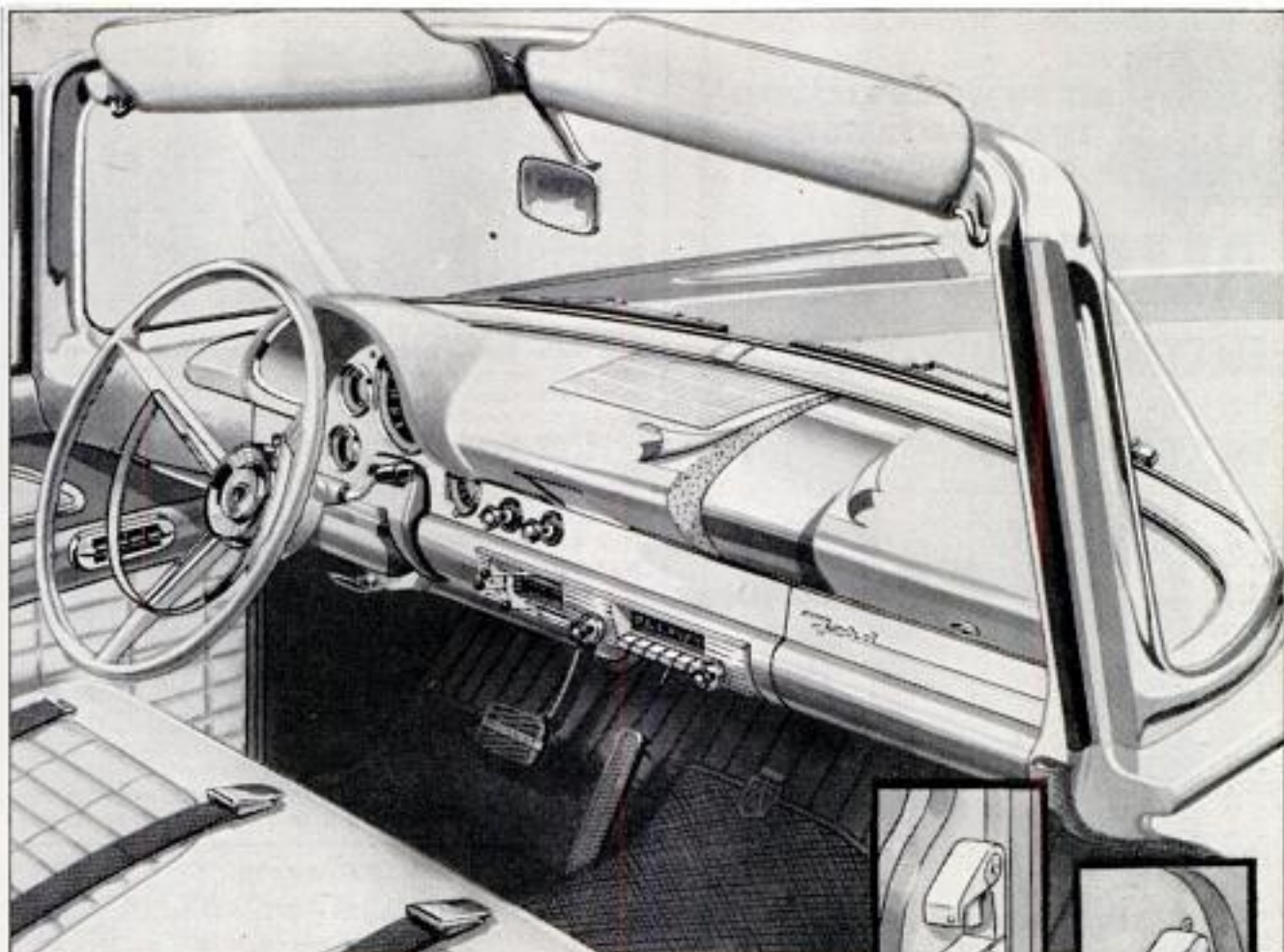
Third... occupants being thrown out of the car. Ford approached this problem in two ways. There are new optional Lifeguard seat belts available to hold driver and passengers securely in their seats. And every '56 Ford has new Lifeguard door latches that feature *double-grip* construction to reduce the possibility of doors springing open under impact.

For the *full* Ford Lifeguard design story—visit your Ford Dealer—soon!



New Lifeguard Padding. The composition and uniform cellular-like structure of the new Lifeguard padding material results in an extraordinary ability to absorb shock. For example, tests show it is five times as shock absorbent as foam rubber.

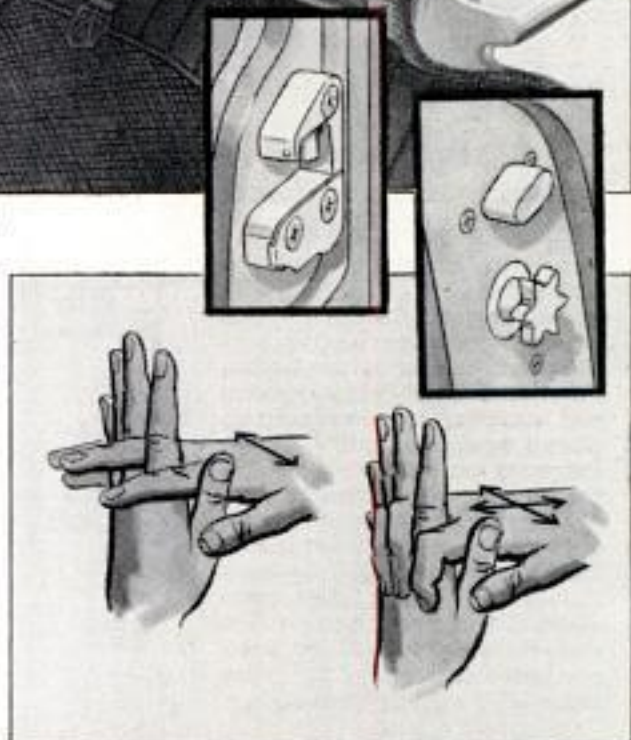
Let Lifeguard design start protecting



You will be safer in a '56 Ford with Lifeguard design



New Lifeguard Seat Belts. They're one-third stronger than CAA requires for aircraft. Each belt is securely anchored to all-steel flooring which is reinforced by husky steel plates. Buckles permit easy one-hand adjustment and finger-tip release.



New Lifeguard Door Latches. Conventional single-grip latches may disengage (like fingers above at left) and allow doors to open under impact. Lifeguard double-grip latches (like fingers above at right) resist disengagement fore-and-aft, in-and-out.

you now in the **'56 FORD**

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Push-Tite Friction Free Replacement Stem with Stainless Steel Balls

Increases service life per washer 10 to 20 times. New Design square top stem FITS ALL HANDLES. NOW AVAILABLE AT MANY HARDWARE AND PLUMBING DEALERS. If your local retailer cannot supply, order direct. Specify Hot or Cold. Prepaid U. S. A. Per Stem \$1.98

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Protect that gun!

3-IN-ONE oils your gun and prevents rust—never gums up the way many oils do! Ideal for fishing tackle too!



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Highly Respected Profession Offers You Unusual Opportunity to BE YOUR OWN BOSS

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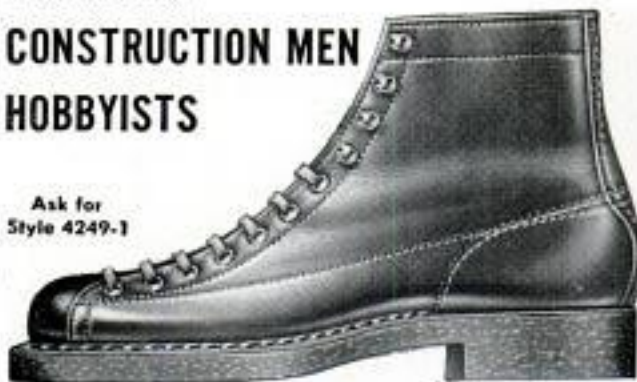
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... Designed with the working man in mind! Note how the shoe is laced from top to toe—allows you to adjust laces for most comfort whether you're working in a squatting or standing position. Long-wearing cork composition non-slip soles. Genuine rawhide laces. C&E 6-11 & 12



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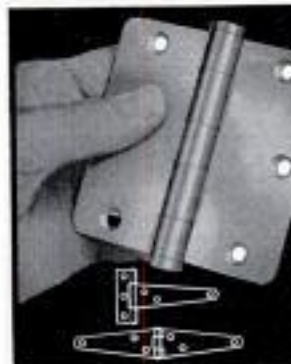


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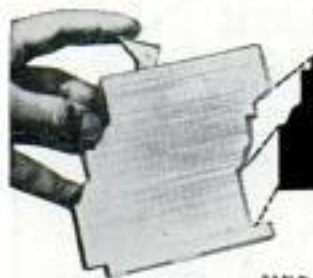


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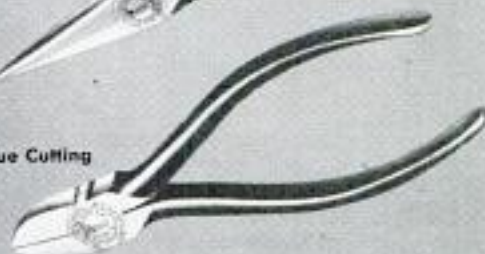
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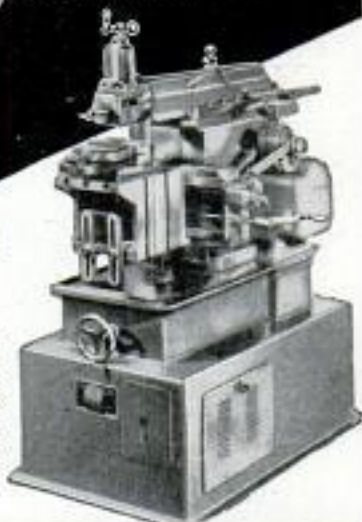
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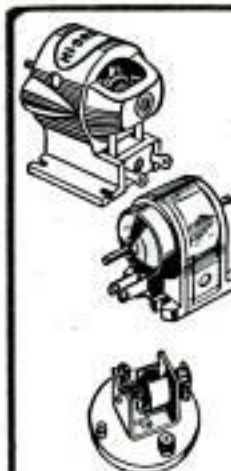
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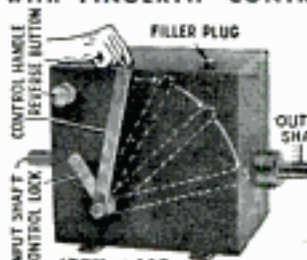
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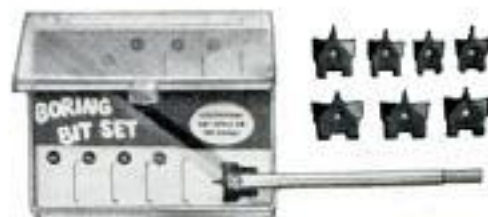
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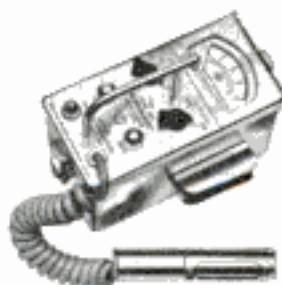
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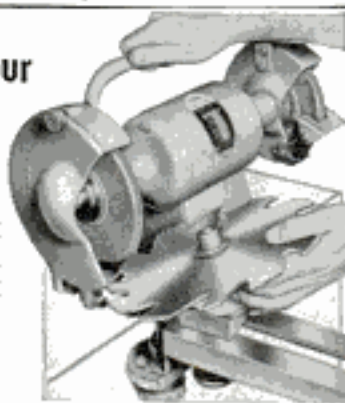
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Lincoln Gets All-New Styling; Ford, Mercury Stress Safety

(Continued from page 104)

from last year, although exact figures are not available for release at this writing. It will probably be 200 horsepower in the Fairlane and Wagon series that have a V8 of 292 cubic inches, the same as last year's Mercury, and a four-barrel carburetor. Mainline and Customline models retain the 272-cubic-inch engine. New on all V8s is an automatic choke, Ford being the only American car to have a hand choke as it still does on its six-cylinder models. The electrical system is 12-volt.

Ford's main emphasis, like Lincoln's, is on safety. Concave steering wheel, safety door locks, shatterproof rear-view mirror are standard. Also standard are strengthened front-seat track systems and securely anchored rear-seat cushions.

Engineers stress that these changes, important as they may be, are not primarily intended to save lives in high-speed crashes (although they will help, of course). They are designed to reduce death and injury in accidents at 40 miles per hour or under. Pennsylvania Turnpike research shows that 50 percent of the actual impacts occur at lower speeds than you might expect because drivers have had time to decelerate before the collision.

Padded areas on dash and sun visors are covered with plastic foam, an energy-absorbing material that does not rebound like foam rubber, an energy-storing material. Favorite demonstration of Ford personnel is to swing lustily at the dashboard with a clenched fist, hitting it sharply without injury to fist or panel. Sun visors are thickly padded because test crashes at Cornell Aeronautical Laboratory (whose recommendations Ford has followed) show that the area above the windshield is a prime target for passengers' heads.

Other Ford features include: Increased compression ratios (8.4:1 for Fordomatic V8; 8.0:1 for hand-shift V8 and all sixes); better breathing and carburetion plus a new spark curve have improved performance; fixed-anchor brakes eliminate the movable cam and simplify adjustment; a new twist in automatic motoring is the self-locking convertible top (simply press a button and the top goes up and locks itself against the windshield header, making it unnecessary for the driver to reach up and lock it by hand); also new is a Parklane station wagon, lushly carpeted from wall to wall; all models have a redesigned dashboard for improved instrument visibility; station wagons have a new front sway bar.

(Continued to page 330)

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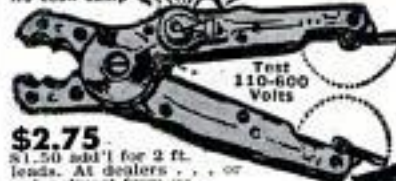
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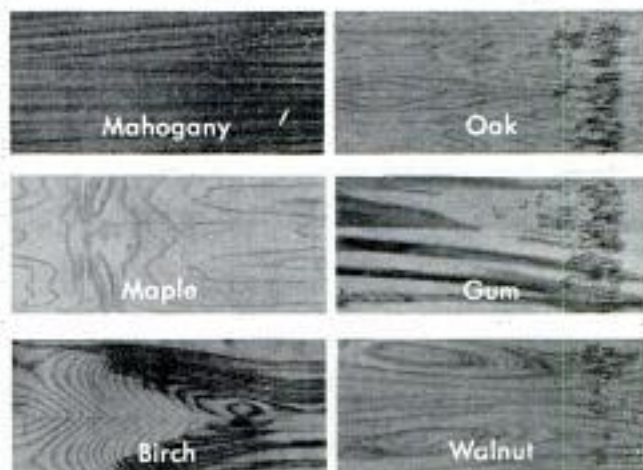
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Mercury for 1956

Big brother of the Ford, Mercury offers all the safety features listed above and additional horsepower also.

Three engine choices are available: A 9.0:1-compression-ratio engine of 225 horsepower on all Montclair and Monterey models equipped with automatic transmission; and 8.4:1 engine of about 215 horsepower (exact figure not available at this writing) on Custom automatics; and an 8.0:1 engine of 210 horsepower on all hand-shift and overdrive models.

All three engines have a 312-cubic-inch displacement (up 20 inches from 1955). All have four-barrel carburetors. The new automatic choke, integral with the carburetor, uses filtered, exhaust-heated air.

Montclairs and Montereys have dual exhausts as standard. The electrical system is 12-volt. Valve lift is increased to give the better breathing that means more power. A new lower-priced car is offered: The Medalist, a two-door austerity model in the Custom series. Also available is a low-silhouette four-door sports sedan in the Monterey series.

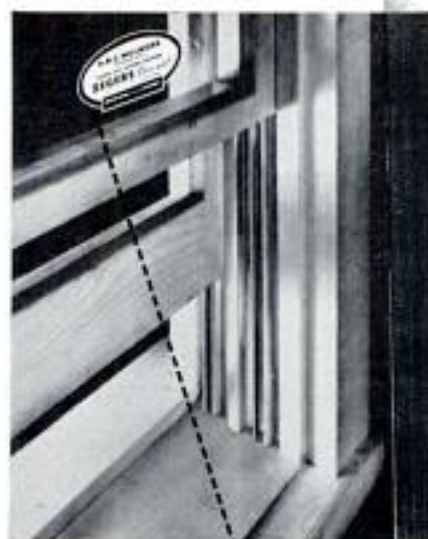
Combustion chambers have been rounded somewhat to reduce preignition. Mercury has the same double-diaphragm spark advance as Lincoln. Suspension is somewhat softer for increased comfort on the boulevard. Exterior styling changes are limited to the front grille, taillights and chrome trim. ★ ★ ★

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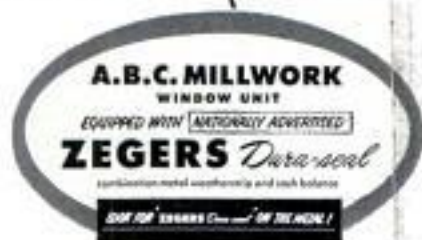
Be wise! Check, poke and peer into the *window construction*. Open and shut the windows. Do they move easily and quietly? Wiggle them. Do they fit snugly? Are they properly weatherstripped? Look for *all* these things because the quality of windows usually reveals the quality of the entire house.

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He Spies on Satellites

(Continued from page 109)

still and produce a heavy photo image. Ordinary stars would trail out into long thin lines of light on the film. This explains the odd streaks of starlight on the telescope photo that accompanies this article.

A telescope with normal sidereal drive turns at a constant 15 degrees per hour. The satellite-seeking instruments are geared to turn at rates that range as high as 1500 degrees per hour.

But the problem isn't quite that simple, explains Professor Tombaugh. "The speed of a satellite depends on its distance from earth," he says. "The closer it is, the faster it must move to maintain an orbit."

To overcome this complication, the astronomer divided the space around the earth into numerous concentric spheres or depth zones. He calculated the average orbital speed for each zone, then explored each zone by adjusting the variable-speed drive of the telescope to suit.

"What we seek on the film are two dots of light, one above the other," he explains. "The two dots would show that we had picked up an object moving at an angular rate corresponding to that of the telescope drive. Short streaks would indicate a suspect that was moving at not quite the calculated speed.

"The double image (one dot above the other) is created by making an offset in telescope declination about halfway through the five-minute exposure. This is done on purpose to avoid spurious images such as might be created by a speck of dust on the film. Dust wouldn't produce the offset image and so can easily be identified as spurious."

Occasionally Professor Tombaugh finds a bright diagonal line on a film, running at an angle to the long star trails. It has been produced by a meteor. Another film may show intermittent dashes of light, possibly with a bright white line alongside them. These are made by an aircraft, the short streaks being created by the winking navigation light on the plane's wing tip.

Just as the moon is visible because it reflects the light of the sun, small satellites can be detected only by the sunlight that they reflect toward the earth. This wouldn't be much at best, and part of the time a satellite would be only partly "full" or would be in the earth's shadow.

So in some procedures, the observing staff deliberately searches in a direction away from the sun. They point their instruments east right after the sun sets in the west, and west just before dawn. This gives

(Continued to page 334)

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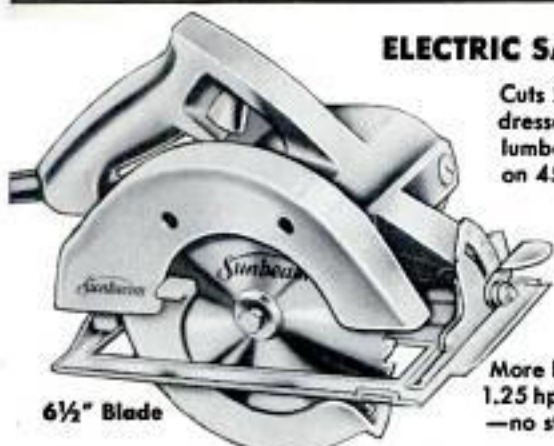
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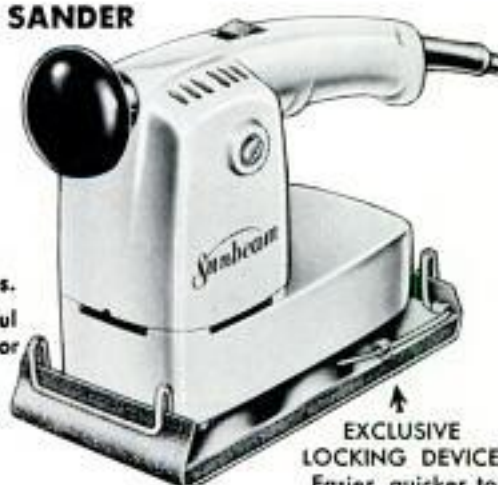
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maximum reflection of sunlight from any object that happens to be out in space.

Why not use radar instead of light-gathering instruments for the search? Because, explains Professor Tombaugh, radar is much less effective than light in detecting small objects at great distances. It's true that radar signals have been reflected back from the moon, but the moon is a large body. It bounced back a signal because of its size.

Professor Tombaugh's method of seeking satellites is so sensitive that not only could it detect a white tennis ball 1000 miles away, it would reveal a white-painted rocket the size of a V-2 at the distance of the moon. It could record a dark meteorite about one foot in diameter 1000 miles out in space.

Professor Tombaugh is closemouthed about his results. He won't say whether or not any small natural satellites have been discovered. He does say, however, that newspaper reports of 18 months ago announcing the discovery of natural satellites at 400 and 600 miles out are not correct. He adds that there is no connection between the search program and the reports of so-called flying saucers.

Aside from seeking satellites, the new technique has several other useful applications in astronomy. It lends itself to systematic searching for small planetoids (asteroids) that occasionally cross the earth's orbit. To date only a dozen of them have been discovered, each time by accident, yet it is thought that there may actually be hundreds of these objects. Too, the rapid-drift technique may reveal a great number of small comets that are not now known to exist.

Another field is the search for the new class of variable stars known as "flare" stars. These suddenly increase in brightness by as much as two magnitudes, then return to normal brilliance within five minutes. It has been suggested that these sudden outbursts of energy represent the detonation of natural equivalents of enormous hydrogen bombs. The processes that cause the outbursts are of very great astrophysical interest.

The best method of seeking flare stars in the past was slow and tedious. It consisted of carefully comparing pairs of photographs of the same region of the sky under a special microscope. The rapid-drift technique gives the same information almost at a glance. A mere bright spot in the long drawn-out trail of a star would indicate that a flare star had been active.

One of Professor Tombaugh's proposals is to use an artificial satellite in measuring

(Continued to page 336)



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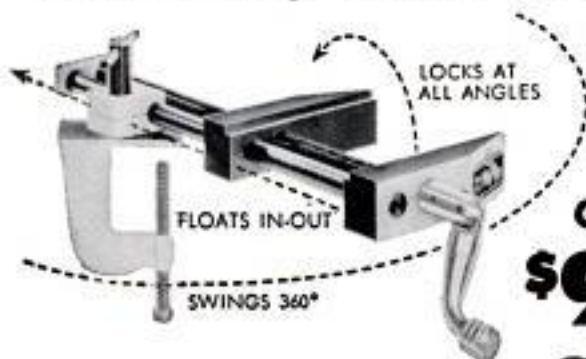


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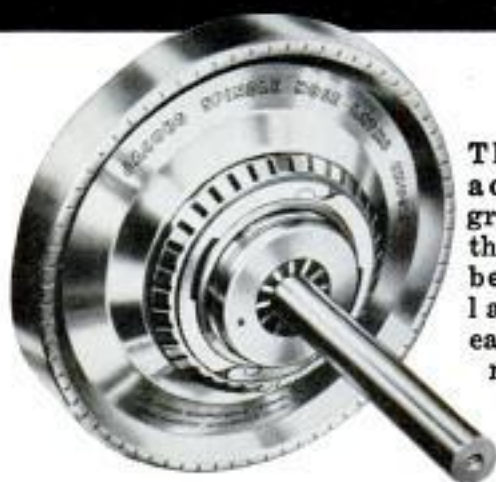
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great distances on earth to within an accuracy of several feet. The oceans never have been spanned by surveyor's instruments, hence no one knows the exact distance and direction from, say, New York City to Rome.

By making simultaneous photographs of an artificial satellite from several locations on earth, accurate azimuth and elevation angles would be obtained for geodetic triangulation over great distances.

"That's one possibility," says Professor Tombaugh, "and there are others. A curious thing about astronomy is that we have explored the universe to a distance of 2,000,000,000 light-years away and yet never before have we made a thorough search of our own immediate neighborhood. Now we are trying to learn what is very close to home for the first time."

And, now that we are launching a program of artificial satellites, Professor Tombaugh's sky-sweeping telescopes will be used to keep track of them. ★ ★ ★

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Hardly bigger than a can of soup, a gas generator capable of producing 850 jet horsepower has been developed for use in guided-missile propulsion systems. The generator converts liquid hydrogen peroxide into a high-pressure, high-temperature gas stream of free oxygen and steam. The gas stream is directed against a turbine wheel to produce power. Development engineers say that jet horsepower from the tiny unit has been varied from as little as 50 to about 1800 by simply adjusting the incoming-liquid flow rate, and that units can be built to operate from a few seconds to a number of hours. Possible industrial applications of the generator include use as a source of energy for rotating machinery, or as a quick, reliable source of steam. Development of the generator took place in the General Electric Company's Aircraft Gas Turbine Development Department.

Leaf Analysis Helps Citrus

Chemical analysis of tree leaves has helped boost the production of Florida citrus groves from 150 to 350 boxes per acre, reports the United States Department of Agriculture. The leaves, reduced to ashes, are tested for their mineral content. Deficiencies of certain elements in the leaves indicate the type of fertilizers and trace elements the trees need for top yields. Tung producers have also been benefited by leaf testing.

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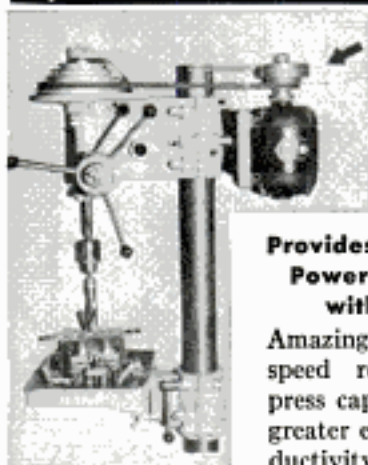
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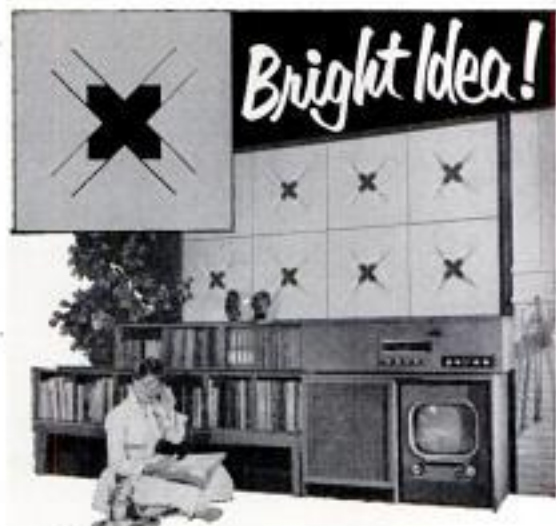
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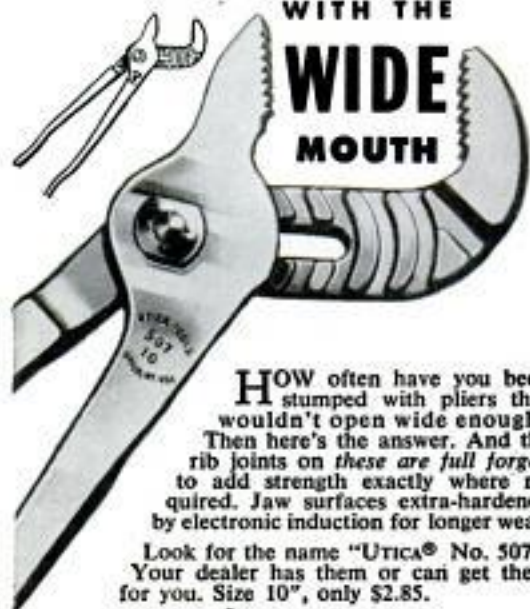
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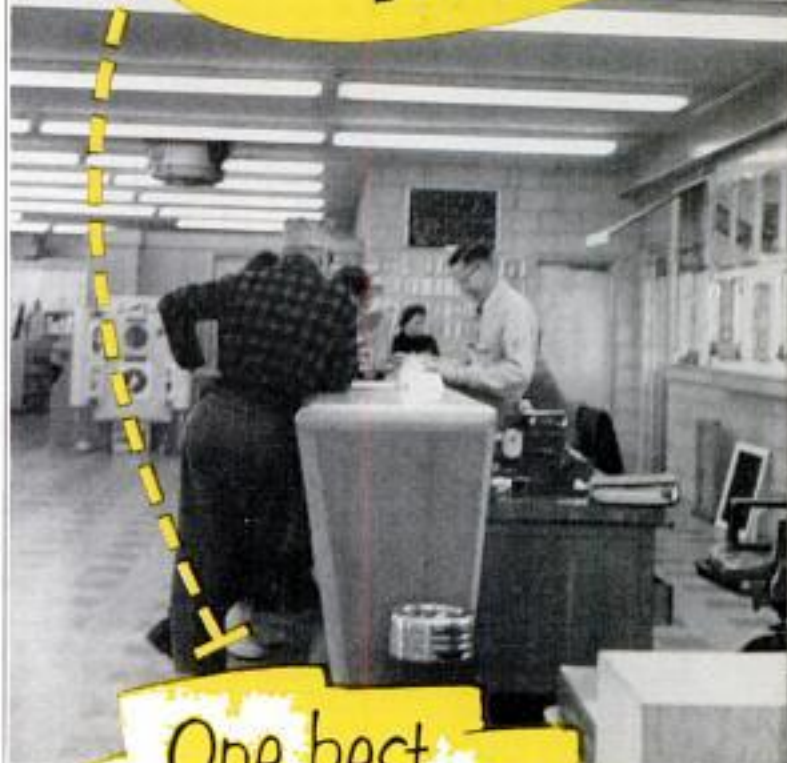
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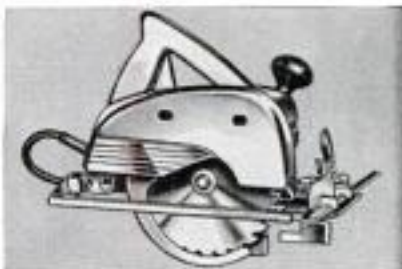
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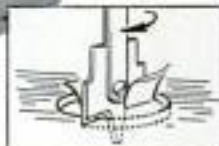
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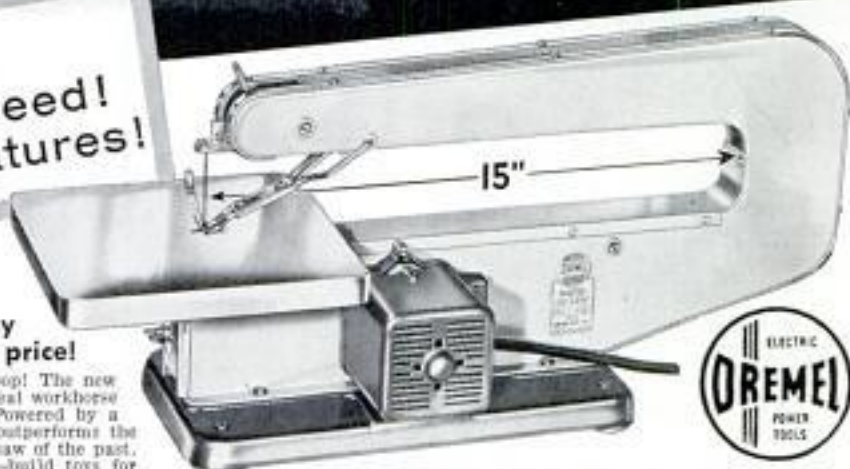
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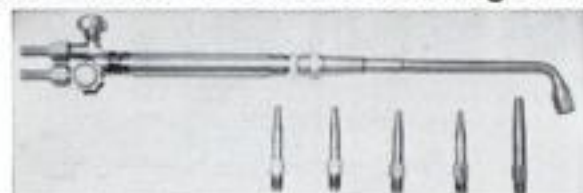
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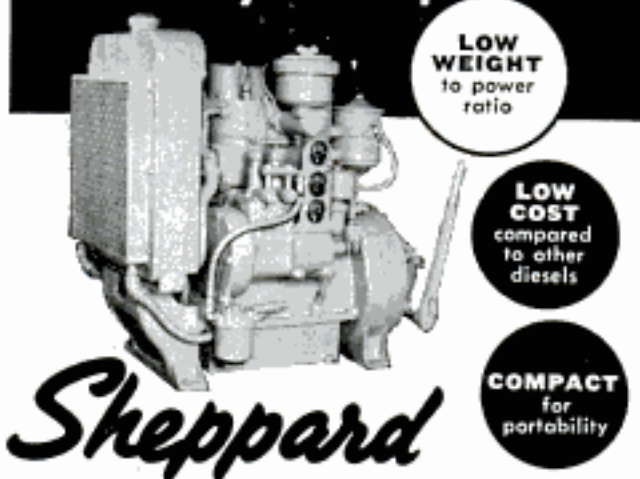
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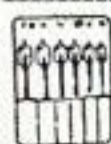
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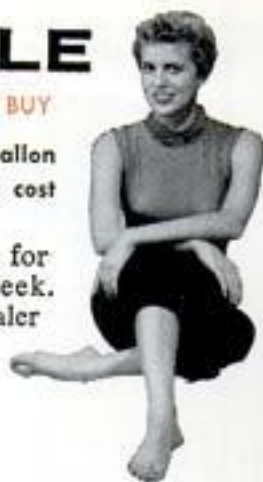
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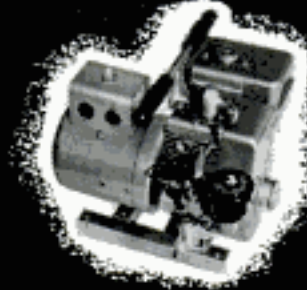
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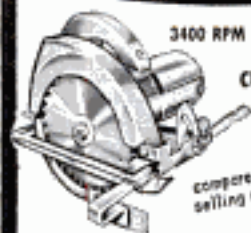
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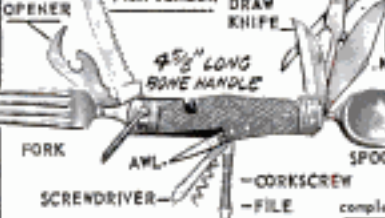
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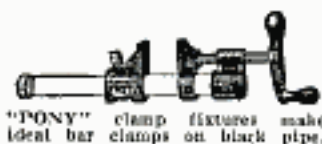
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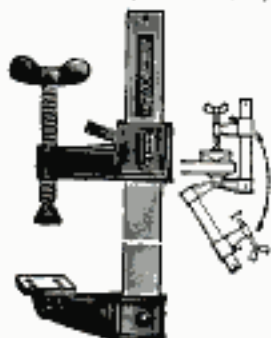
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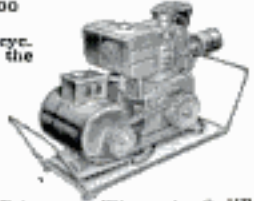
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Never replace this filter, just give it a periodic rinse in gasoline. A permanent, non-clogging filter that protects oil longer, adds years to engine life, reduces friction and increases power. Revolutionary new filter element made of micron size bronze balls formed under tremendous heat and pressure into a far finer screen than can be woven from any metal or cloth. Super-porous, yet non-absorbent. It passes anti-sludging oil additives and detergents, but filters out the tiniest particles of hard carbon metal or water. Assure your engine of a perfect, clear film of oil for 20,000 miles. Only "Perma-Clear" is made with controlled porosity, insuring uniform filtering action. Only "Perma-Clear" can offer 47 different models, each one specifically designed for a certain engine. Unconditional 30 day money back guarantee. Shipped postpaid.
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COMPLETE FILTER for engine 806 equipped with any filter... \$14.95

9 TON HYDRAULIC PRESS
A tremendously powerful hydraulic press, capable of exerting 18,000 lbs. pressure. Pays for itself many times over—straightening bent connecting rods, king pins, crankshafts, axles, link pins and bars or straightening out broken bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvils and dies to straighten any kind of curve or bend. (Item 404) Wt. 110 lb. Actual list price \$365. Our special **\$69.50** close-out price... **\$69.50**

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COMPLETE POWER MASTER (Illustrated above) powered by a 14.6 hp., air cooled Wisconsin engine, Wt. 480 lbs. (Item 280) Compares with welder costing \$1200. **\$449.50** Factory Special...

WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **\$10.50**



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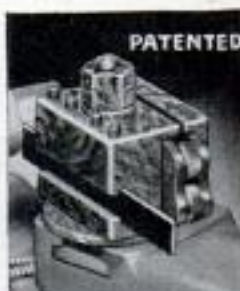
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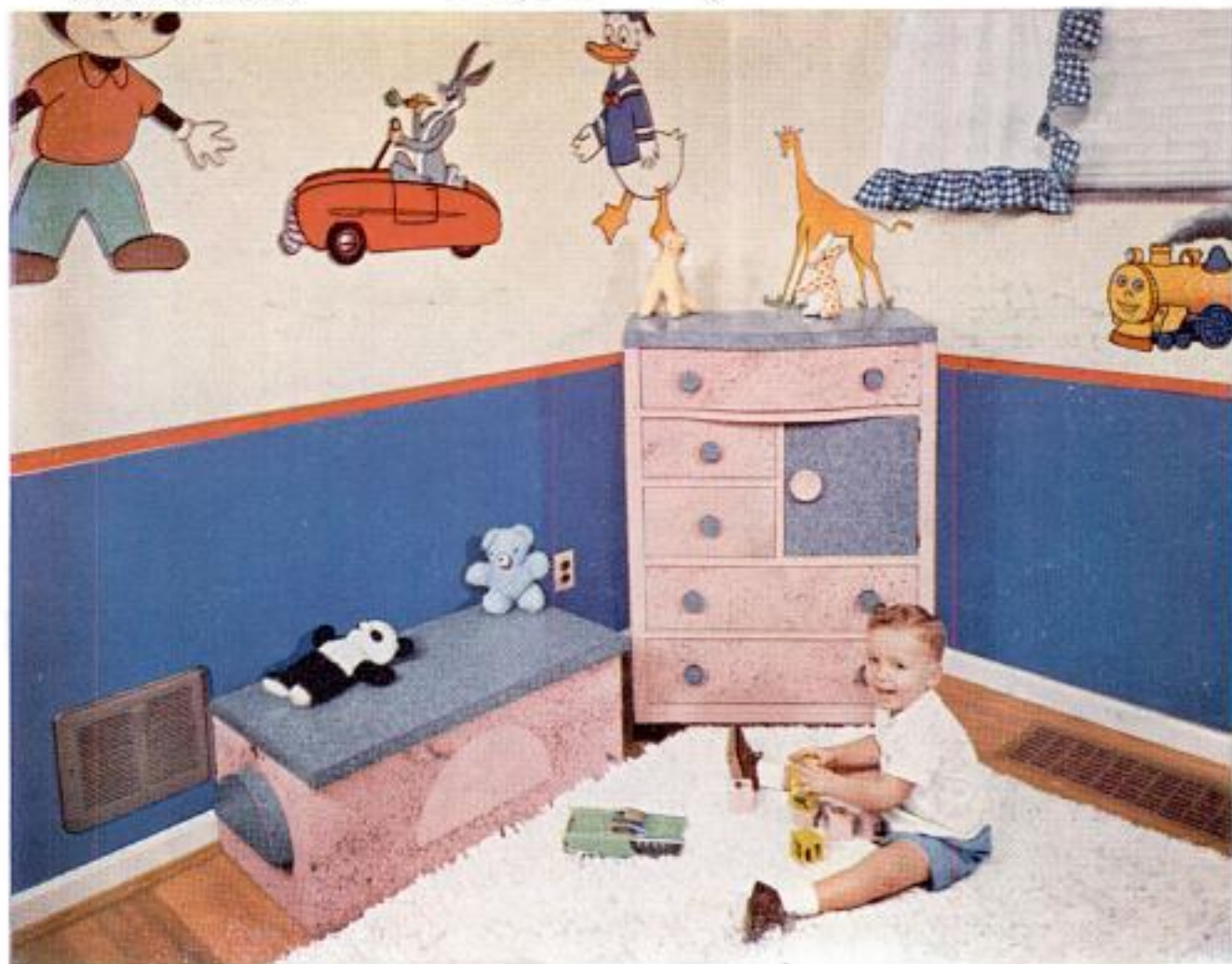
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