

POPULAR MECHANICS

MAGAZINE

WRITTEN SO YOU CAN

U.S. TRADE MARK, G.P. & B. PRINTED IN U.S.A.

OCTOBER 1956

35 CENTS

Our Big Annual Home Section

- PM small home for the big family
- Wood paneling adds that look of luxury
- Fresh ideas for remodeling
- Plus: Facts about costs, soundproofing, storage walls, scores of new ideas

Page 189

Page 187

PM House
for Big Families
Page 161

Out of the blue



... from
Evinrude
comes news to
set your boating
dreams aglow

THEY'RE HERE... nine glorious new Evinrudes for '57! *Right now*—at top boating dealers straight across America—you can see these new '57 models... ride with them... *run them*... and savor the grand new thrills in your boating future!

TALK ABOUT PERFORMANCE... they're *loaded!* Three superb new "35's." A new Lark magnificently styled to complement the finest boats afloat. New, more powerful, high compression engines

that set an entirely new standard of big-load driving ability. Wonderfully smooth and *whisper quiet!* New 12-volt electric starting. A new high-capacity generating system for cruising folks who want abundant current!

GOOD NEWS, too, in the medium power field! A new Fastwin with a great new engine—power increased full 20% for stand-out performance on family runabouts—flashing take-offs for skiers. A new Fastwin Electric with 12-volt starting.

RIGHT DOWN THE LINE—in every popular power range for family boating or fishing fun—these exciting new '57 models are waiting for you now. See your Evinrude dealer—look for his name under "Outboard Motors" in your phone book. If you own a motor, see him now for the most favorable trade-in deal of the year. For catalog of the '57 Evinrude line, write **EVINRUDE MOTORS**, 4333 N. 27th Street, Milwaukee 16, Wisconsin.

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In Canada: Mfd. by Evinrude Motors, Peterborough



Evinrude

quiet outboard motors

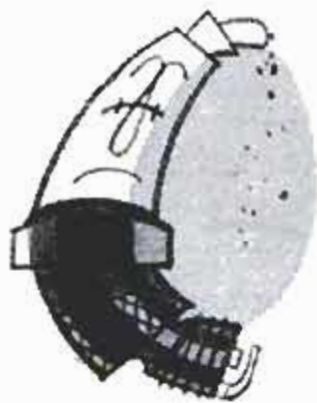
8 reasons why your car needs a **MOPAR** cold-weather checkup now



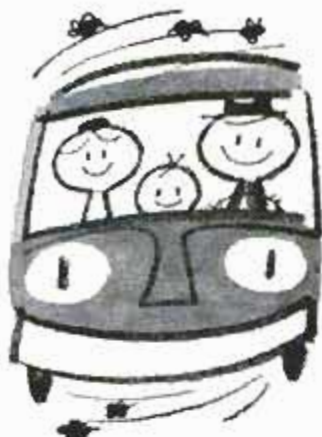
Cold-weather starting demands more from your battery. A MoPar check NOW will avoid danger of getting stranded with a dead battery.



Cooling systems operate under different conditions these chilly days. MoPar Anti-Freeze now will prevent costly freeze-up damage later on.



Cleaned, adjusted or, if needed, new MoPar Spark Plugs will give you faster starts, save your battery, and give better gas mileage.



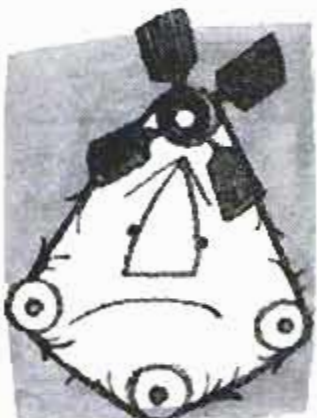
Have the thermostat checked. MoPar Thermostats let your engine and car heater operate at most efficient temperatures during cold weather.



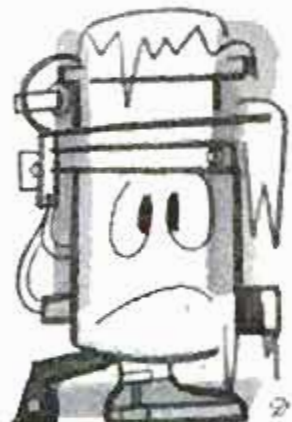
Cold-weather driving loads oil with impurities. Protect your engine with a new MoPar Oil Filter Cartridge when you switch to winter-grade oil.



Leaking mufflers make windows-up driving dangerous. Rust, acids and knocks damage even the best. Give yours a MoPar checkup.



Fan belt turns your generator, keeps battery up. Prepare for winter's heavy demands on your battery by giving fan belt a MoPar checkup.



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Fall's the time to have your car checked. An 8-point MoPar checkup now will take care of every cold-weather need. It'll give you peace of mind—and, in case of sudden autumn freezes, it'll save you costly repair bills. MoPar parts and accessories are the only ones engineered especially for Plymouth, Dodge, De Soto, Chrysler and Imperial cars, and Dodge Trucks. They're guaranteed by Chrysler Corporation. Get your MoPar cold-weather checkup at Plymouth, Dodge, De Soto and Chrysler dealers and better repair shops everywhere.

This One



FJLT-JHL-PCJ5

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



Next Month

Coming right at you is one of the first of the 1957-model automobiles. Big changes are in store and you'd hardly recognize the car shown above in silhouette as the young brother of its '56 counterpart. Sorry we can't tell you more about it, but watch the newsstands for your November *PM*. In it we'll bring you the first photographs and all the details of many of the '57 models. Most of them are coming out earlier than usual this year and some are already in production—but under wraps! Among those you'll see in our next issue are the big three—Chevrolet, Ford and Plymouth. All the Chrysler line will also be shown—Chrysler, DeSoto, Dodge, Imperial as well as Plymouth. Ford, Lincoln and Mercury will make their debut; also Nash, Rambler and Hudson. Studebaker will be ready, too, but Packard and the rest of General Motors' line will be a month later.

Sources of further information not listed in the index, starting on page 106, about articles in this issue, frequently are shown in the Where-to-Find-It List prepared for each issue. A copy may be obtained by readers, without charge, from Bureau of Information, *Popular Mechanics*, 200 East Ontario Street, Chicago 11, Ill.

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In This Issue...

The Plane for the Do-It-Yourselfer	113
Magic Crystals Grown Here	118
Father and Son Build a Sports Car	125
Surplus Power Pumps Water Uphill	129
Nature Puts Men to the Supreme Test	134
Change for a Quarter, Mister?	144
Magic in Bubbles	148
Owners Report on the Volkswagen	154

SPECIAL HOUSING SECTION—

PM's Big-Family House	161
We Saved \$4225 By Finishing It Ourselves	174
More House for Less Money	181
Parade of Homes	185
Old-Fashioned Closets Are Space Robbers	190
Here's Your House of the Near Future	193
Decorate With Hardwood Plywood	197
Paving Your Patio	202
Home Soundproofing	207

For the Craftsman...

Patter's Wheel Built Into a Kitchen Stool	211
Cord Cocktail Table	218
Dry Your Films in Filtered Air	226
Paper Masks	230
Power Shop in a Closet	239
Speed Torque	245
How Would You Do It?	258
Radio, TV and Electronics	261

See pages 106, 108 and 110

for other items and manufacturers of available products

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Get the **FULL** energy of your battery

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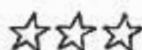
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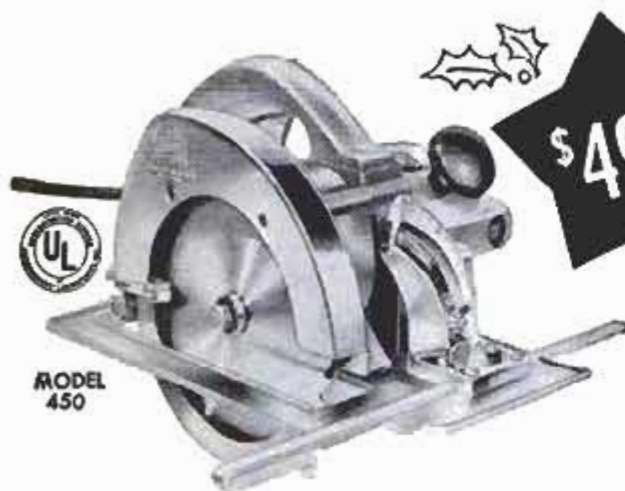


Do your Christmas hinting early!

When the little woman asks for gift ideas, let her know you'd like Thor SpeedTools, the finest tools ever built for home workshop use. Thor is the largest exclusive manufacturer of portable air and electric tools. Every Thor SpeedTool brings the power and precision, the balance and durability you expect from Thor's quality reputation. SpeedWay Manufacturing Co., a division of Thor Power Tool Co.



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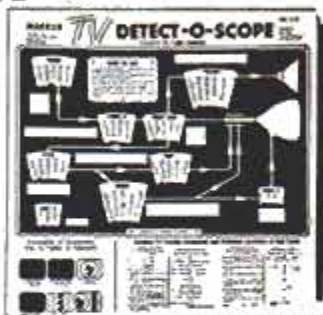
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ON THIS OFFER

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Instantly!



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ACROSS THE DESK



To the Editor:

We confirm receipt of a clipping of an article (PM, June, page 144) illustrating the first prototype of our "Motor-Waterski-Craft." We send you the first photographs of our second type which speeds to 46 miles



per hour. This type is eight feet long and powered by a 30-horsepower engine. Another type we plan will be for outboard motors. The mass production of our waterski towboat could be attempted without any difficulty. The manufacture is possible in glass fiber, light metal or wood.

Helmut Stieger and
Kurt Schachner,
Sackgasse 2,
Klagenfurt-Annabichl, Austria

To the Editor:

I never throw away the back issues of your wonderful magazine. I have received many fine ideas from your magazine and look forward to it each month.

A football fan offered me a free ticket to a game and he almost fainted when I told him I had just received the new issue of *Popular Mechanics* and I would rather read the magazine than go to any football game.

L. O. Gunn,
Jacksonville, Tex.

To the Editor:

Your article in the August issue of *Popular Mechanics*, "Driverless Tractor 'Stunts' for Safety," was interesting. This test was first made by the University of California, Agricultural Engineering Division, at Davis, Calif.

While this test demonstrates the ease of tipping over a high-wheeled tricycle tractor, it does not demonstrate a condition

(Continued to page 8)

Satisfied with my JOB and PAY? **NOT ME!!**

TODAY, you are probably earning enough to get by—enough to provide your family with life's necessities, and perhaps you are depositing a few extra dollars in the bank.

BUT are you content with just earning a living wage? Do you say "Someday I'll really get a break and go right on to the top." **THAT'S WISHFUL THINKING!**

You know that the "breaks" go to the man or woman who is *prepared* to take advantage of them—to the person who can fill the better job and who is worth more money. He makes the "breaks" instead of waiting for them.

DO YOU QUESTION YOUR OWN ABILITY?

There is a field of business which has never been overcrowded—it's the **ACCOUNTING FIELD**. And the demand for skilled accountants—men and women who really know their business—is increasing. State and Federal legislation requires much more efficient accounting from business. Corporations are in constant need of expert counsel in matters relating to Auditing, Cost Accounting, Business Law, and Income Tax Procedure. Men who prove their qualifications in this important branch of business are promoted to responsible executive positions—given an opportunity to earn real salaries. The range is \$4,000 to \$10,000 a year—even to higher income figures.

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(Continued from page 6)

where the driver could be spared injury by means of a safety arch.

Over 40 farm people each year lose their lives in California due to tractor turnover



and upsets. Through the co-operation of the University of California at Davis, the Pacific Equipment Company of Richmond and the Industrial Indemnity Company of San Francisco, a safety arch was constructed to protect the driver of these tractors in case of a roll-over or upset, provided the operator was wearing a seat belt.

Such an arch was built and tested by turning over a Ford tricycle high-wheeled tractor at the Davis campus. The device was given a thorough test and studies were made with strain gauges and examination of a dummy driver. After about eight upsets and roll-overs, it was determined that an operator of a tractor protected by the seat belt and safety arch would survive, probably without injury.

Thos. Soule,
Chief Safety Engineer,
Industrial Indemnity Co.,
San Francisco 4, Calif.

To the Editor:

I was reading the letter by Starr Jenkins (Across the Desk, July). Wow! I can see where he worked only temporary in the P.O. I have too, but I didn't get those ideas. I would suggest going to an outfit

(Continued to page 10)

YOUR MOVE, DAD!



The first frantic months of fatherhood are over. You have time now to really enjoy the new baby—and time to really think ahead.

There's plenty to think about. And lots to plan for. What kind of a Dad will you be? What kind of a provider?

One thing's sure: now you've got to earn more money! About \$500 a year more, to start with. *But how?*

Try doing what some five thousand new fathers did last year. Start preparing yourself for a better job—at home, in your spare time. *Enroll with I.C.S.*

Most of these new fathers already have job promotions, fat pay boosts. One writes, "I've

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- Commercial Art
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- Magazine Illustrating
- Show Card and Sign Lettering
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AUTOMOTIVE

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- Auto Elec. Technician
- Auto-Engine Tune Up
- Automobile Mechanic

AVIATION

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- Aircraft & Engine Mechanic

BUSINESS

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- Bookkeeping and Accounting
- Business Administration
- Business Correspondence
- Public Accounting
- Creative Salesmanship
- Federal Tax
- Letter-writing Improvement
- Office Management
- Professional Secretary
- Retail Business Management
- Sales Management
- Stenographic-Secretarial
- Traffic Management

CHEMISTRY

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- Chemical Engineering
- Chem. Lab. Technician
- General Chemistry
- Natural Gas Prod. & Trans.
- Petroleum Engineering
- Plastics
- Pulp and Paper Making

CIVIL, STRUCTURAL ENGINEERING

- Civil Engineering
- Construction Engineering
- Highway Engineering
- Reading Struct. Blueprints
- Sanitary Engineering
- Structural Engineering
- Surveying and Mapping

DRAFTING

- Aircraft Drafting
- Architectural Drafting
- Electrical Drafting
- Mechanical Drafting
- Mine Surveying and Mapping
- Plumbing Drawing and Estimating
- Structural Drafting

ELECTRICAL

- Electrical Engineering
- Electrical Maintenance
- Electrician Contracting
- Lineman

HIGH SCHOOL

- Commercial Good English
- High School Subjects
- Mathematics

LEADERSHIP

- Foremanship
- Industrial Supervision
- Leadership and Organization
- Personnel-Labor Relations

MECHANICAL AND SHOP

- Gas—Electric Welding
- Heat Treatment Metallurgy
- Industrial Engineering
- Industrial Instrumentation
- Industrial Supervision
- Internal Combustion Engines
- Machine Design-Drafting
- Machine Shop Inspection
- Machine Shop Practice
- Mechanical Engineering
- Quality Control
- Reading Shop Blueprints
- Refrigeration
- Sheet Metal Worker
- Tool Design Toolmaking

RADIO, TELEVISION

- Industrial Electronics
- Practical Radio TV Eng'ng
- Radio and TV Servicing
- Radio Operating

RAILROAD

- Air Brake Equipment
- Car Inspector
- Diesel Engineer & Fireman
- Section Foreman

STEAM AND DIESEL POWER

- Combustion Engineering
- Diesel—Elec. Diesel Eng's
- Electric Light and Power
- Stationary Fireman
- Stationary Steam Engineering

TEXTILE

- Carding and Spinning
- Cotton, Rayon, Woolen Mfg.
- Finishing and Dyeing
- Loom Fix'g Textile Des'ing
- Textile Eng'g Throwing
- Warping and Weaving

MISCELLANEOUS

- Domestic Refrigeration
- Marine Engineering
- Ocean Navigation
- Professional Engineering
- Short Story Writing
- Telephony

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 Occupation _____

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(Continued from page 8)

that installs small tubes in stores and then figure how much it would cost for cross-country tubes, town to town, farm to farm, etc. Then figure which cost is astronomical, the (present) system or the proposed system. Then go to different companies that use meter systems and figure how much cheating, meter jumping, slugs, machines going haywire, etc.

As for code numbers for everyone—a little inquiry to the Army and Navy APO or FPO and service numbers will tell you how confusing it is. As it is now you get your letters pretty quick even with bad addressing. How would you like to get your tax bill, invitations, etc., about a month late?

As for automation of numbers—and people—once that happens you might as well quit writing letters, for everything will be exactly to form, size, length, amount of words, what you do, what time you go to bed, get up, etc. All numbers—if you forget or lose your number you may, as well die, because you won't know what to do without your code number.

A. M. Seppola,
5015 N. Melvina Ave.,
Chicago 30

To the Editor:

Dotted along main roads out of Council Grove, Kans., are farm-direction signs such as this one. Spaced at three or four-mile intervals, they tell the city cousin, or the visitor from the next county, how to reach

(Continued to page 14)



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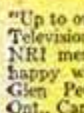
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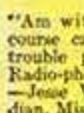
America's Fast Growing Industry Offers You Good Pay—Bright Future—Security


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 "Started to repair sets six months after enrolling. Earned \$12 to \$15 a week in spare time."—Adam Kramlik, Jr., Sunnyside, Pennsylvania.

 "Up to our necks in Radio-Television work. Four other NRI men work here. Am happy with my work."—Glen Peterson, Bradford, Ont., Canada.

 "Am doing Radio and Television Servicing full time. Now have my own shop. I owe my success to N.R.I."—Curtis Stath, Ft. Madison, Iowa.

 "Am with WCOC. NRI course can't be beat. No trouble passing 1st class Radio-phone license exam."—Jesse W. Parker, Meridian, Mississippi.

 "By the time I graduated I had paid for my course, a car and testing equipment. Can service toughest jobs."—E. J. Streitenberger, New Boston, Ohio.

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a given farm once he leaves the main road. The signs at Council Grove, unique in the Plains states, were erected by a 4-H Club as their project. However, any group of residents can do the same thing—particularly if they want their guests to find them easily and simply.

John R. Clawson,
Wichita, Kans.

To the Editor:

I cannot agree that the Empire State Building light source is so very fantastic (1,800,000 candlepower). On the Canadian side of Niagara Falls in 1932 the Canadians built twenty-four 36-in. searchlights operating at 55,000,000 candlepower apiece, to illuminate in color the cataracts at nightfall.

Herluf E. Jorgensen,
Kenosha, Wis.

Thank you, sir; it was our mistake. Three ciphers were omitted in the August report on the Empire State Building searchlights. Total candlepower is 1,800,000,000.

To the Editor:



Adapting old clocks so that blind men may tell time has become a popular form of manual therapy at the Veterans Hospital, Vancouver, Wash.

Old clocks are gathered by service organizations and given to the manual-arts therapy department of the hospital where they are cleaned, oiled and then fitted with a plywood front upon which the dial figures and graduations are marked with roundheaded tacks, easily felt and read by the blind.

Hal Cooley,
Ward 20,
Veterans Hospital,
Vancouver, Wash.

To the Editor:

What's all this "tzimis" about recharging dry cells? When I was a boy we used to reactivate those famous old Red Seal batteries, but good, by making nail holes about an inch apart over the whole skin and then soaking the battery in a rather strong solution of sal ammoniac overnight. Recharge? Why it was the closest approach to perpetual motion ever achieved by man!

Jonas Arnold,
Chicken St.,
Wilton, Conn.



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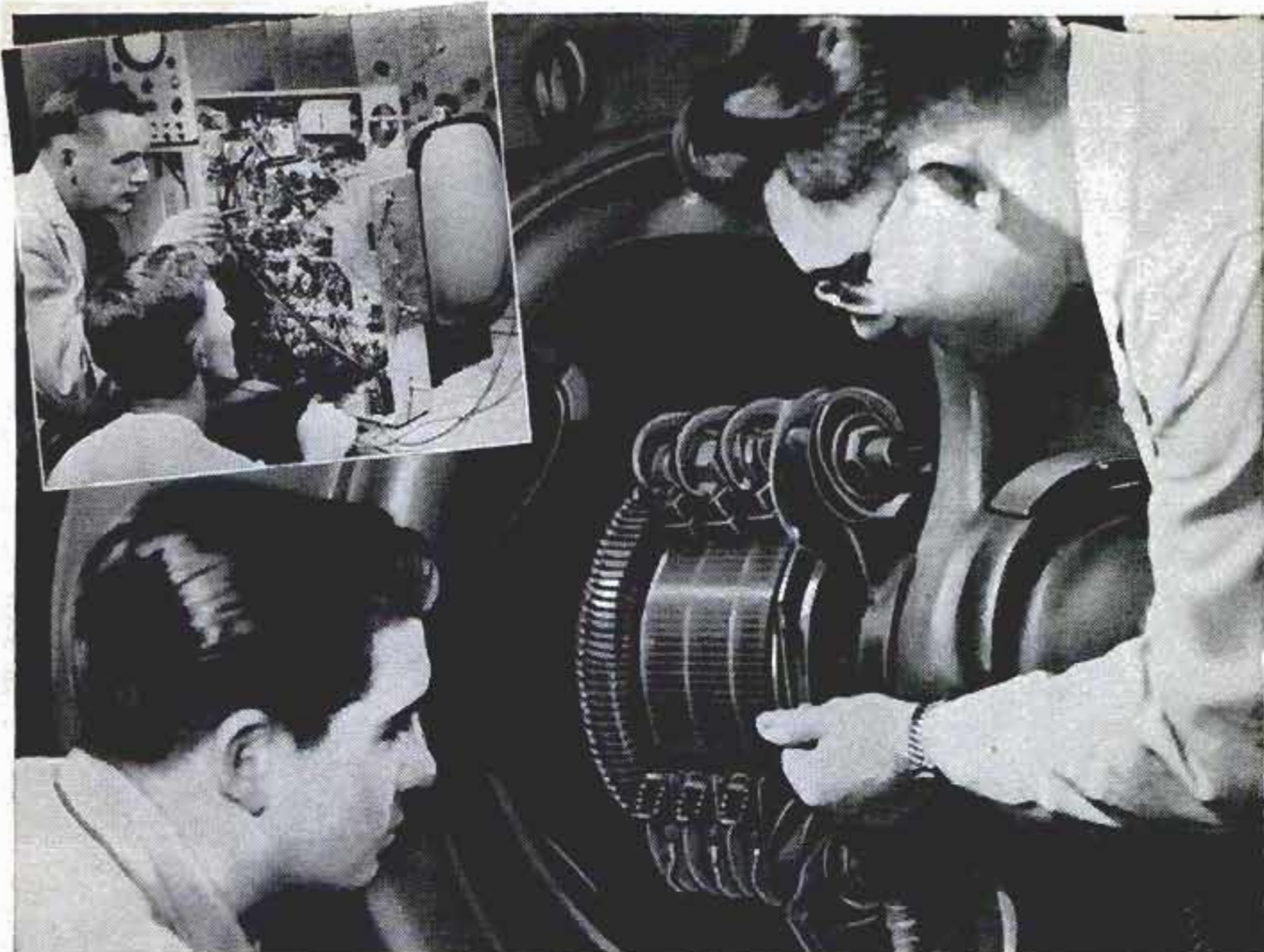
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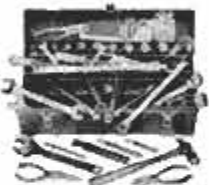


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Harold Gimlen, Flint, Mich. 1/22/54

HAS OWN BUSINESS



I have a shop at home and have been working on radio and TV after working hours of my regular job. I average \$50 a week for this part time work. RTTA training helped me in making extra money and giving me experience in the electronic field.

Richard Hennis, Little Rock, Ark. 1/22/54

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John Fernandez, Fresno, Calif. 1/27/54

"We get excellent pictures..."

I would like to compliment you on an excellent and complete course. We get excellent pictures on my TV set from WSTR (Syracuse, N.Y.), approximately 110 air miles away. The set is working good and I have had to replace only three tubes since I assembled it two years ago.

Larry N. Stafford, Kingston, Ont., Canada 7/1/54

"... very good reception..."

I have really enjoyed the course and have come a long way in TV servicing. I am getting very good reception on my TV station considering that the nearest VHF station is 120 miles.

J. W. Henson, Jr., Henderson, Texas 7/1/54

AIRCRAFT INSPECTOR

With RTTA training and through repairing radios and televisions for the right people at the right price, I was able to make the right contacts. I am now an Inspector for Douglas Aircraft at about \$125 a week.

Hugh Maddox, Los Angeles, Calif. 1/22/54

ELECTRICAL TESTER

RTTA training has helped me understand TV and many variations of simple circuits. The course covers all subjects very clearly. I am now an Electrical Tester for Western Electric Co. at \$83.42 a week.

Raymond Lapan, Burlington, N. C. 1/22/54

SERVICE MANAGER

I manage two radio and television shops, one here and one in Pompano Beach. RTTA training increased my knowledge of TV circuits and showed me new, quicker methods of repairing. Lessons as presented are very concise and clear.

William Phillips, Fort Lauderdale, Fla. 1/22/54

REPAIRED EVERY SET

RTTA training helped me to understand TV more thoroughly. I have repaired every set that I was called on to repair.

Andrew Busi, Jr., Iselin, Pa. 1/27/54

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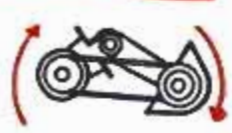
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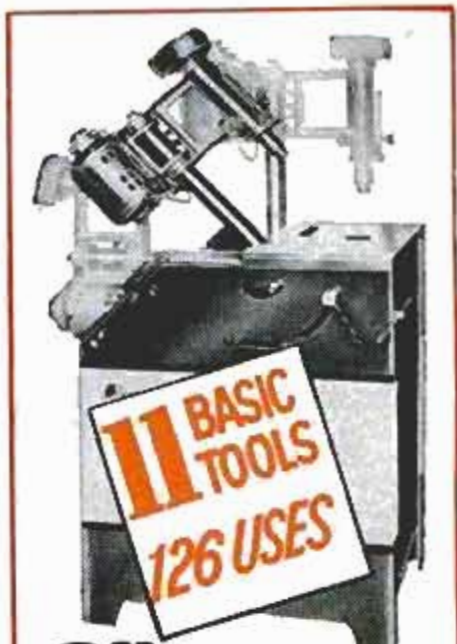
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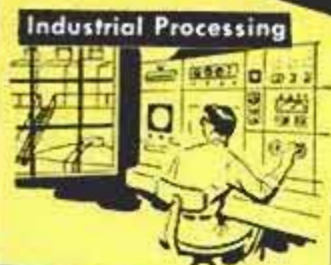
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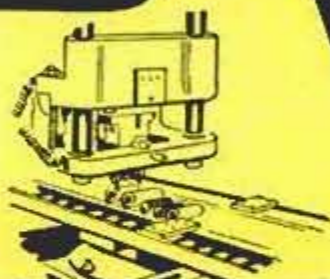
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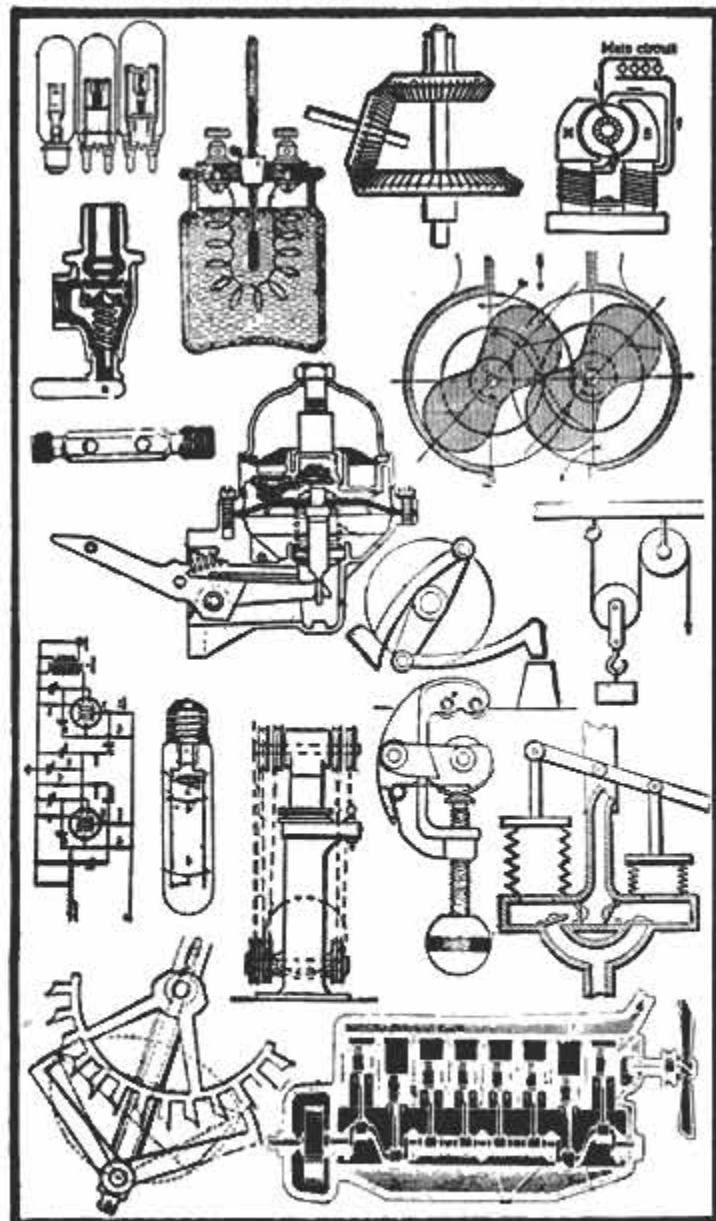
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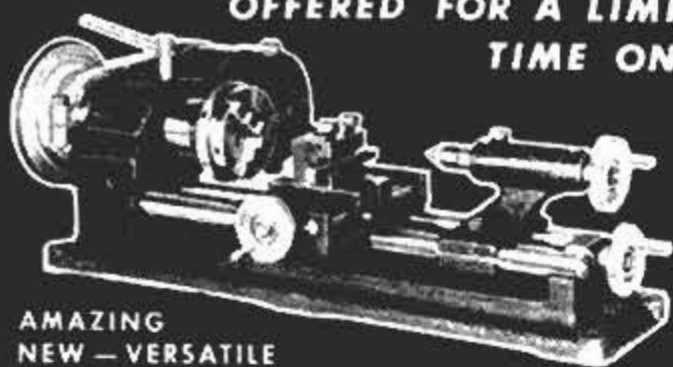
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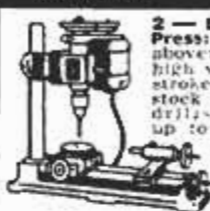
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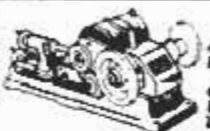
1—Lather Center height 1.42", distance 0.83". Turns between centers and in vertical position using chuck. Base: 1 1/4" x 3 1/2".



2—Drill Press: Chuck above table 5" high with 1" stroke. Headstock drills holes up to 1" at 60° angle.



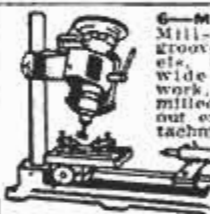
3—Hand Drill: Headstock and motor become hand drill with 11 speeds from 375 R.P.M. to 9200 R.P.M.



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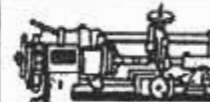


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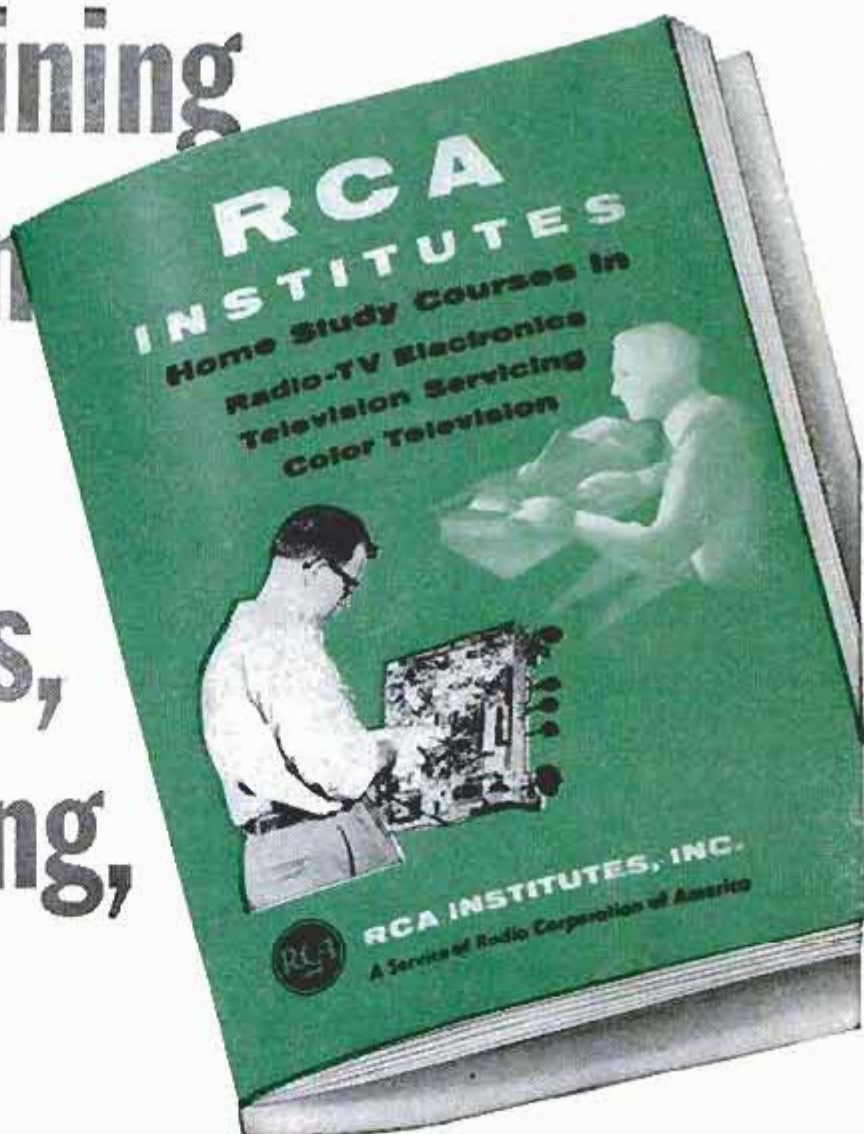


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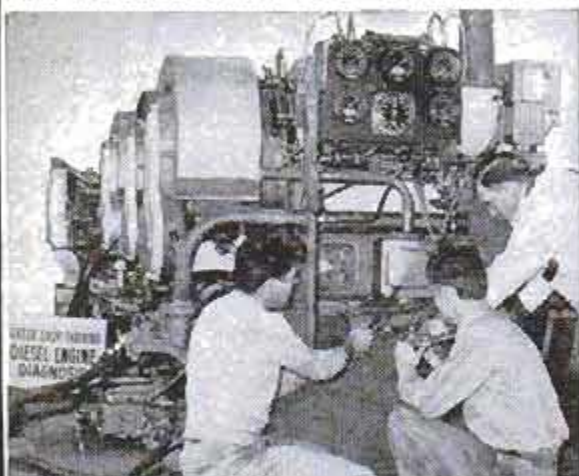
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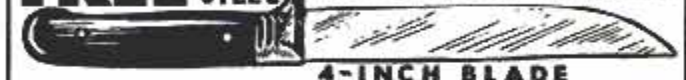
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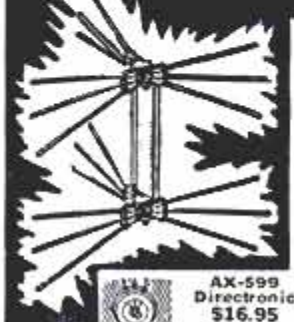
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What a fellow makes in his regular job today is hardly enough to make ends meet. Higher taxes, higher costs of food and rent and almost everything else raise hob with the savings account. And I say that what a fellow puts away is even more important 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.

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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 the work over 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.

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If you'll just put your name and address on the coupon and mail it to me, I'll send you all the information right away by mail. After you have read all this you will know what you want to do. It will be easy to decide whether you would like to have a "Little Money Maker" of your own. Everything I send you now is free. There is no catch to it and nobody will call to try to sell you anything. I'll send everything free and postage paid. All you have to do is mail the coupon, get the facts and then decide. Mail the coupon right away so I can help you get started making money!

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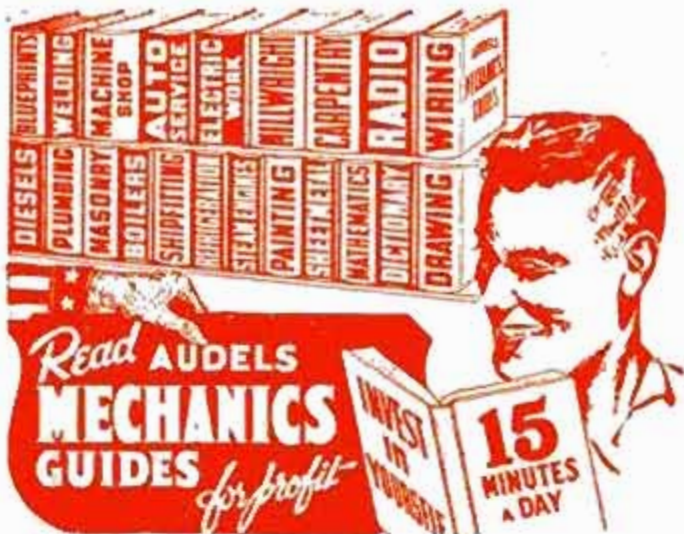
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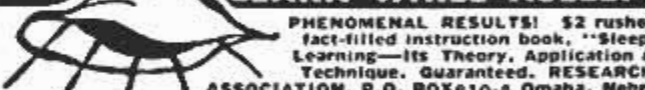
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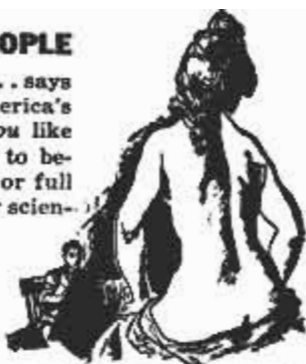


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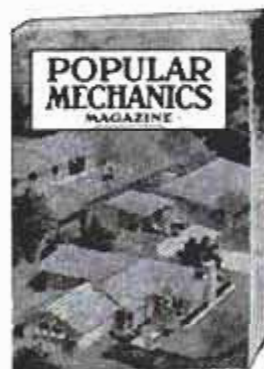
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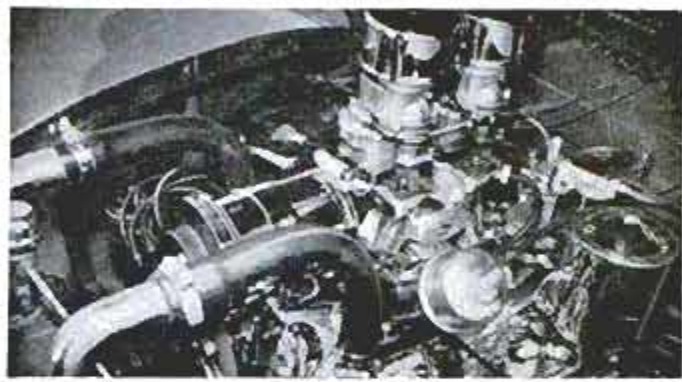
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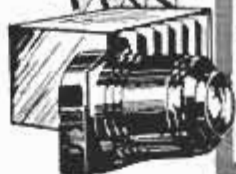
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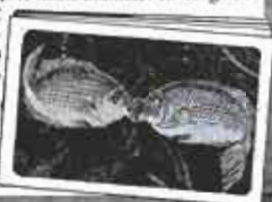


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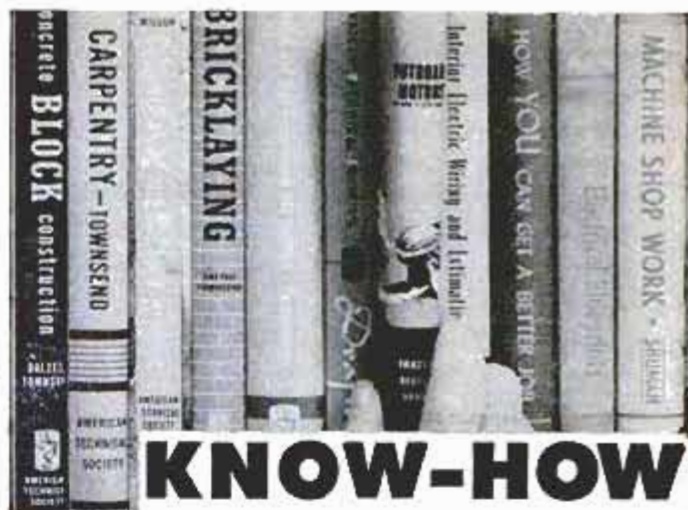
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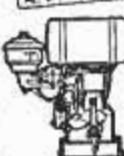
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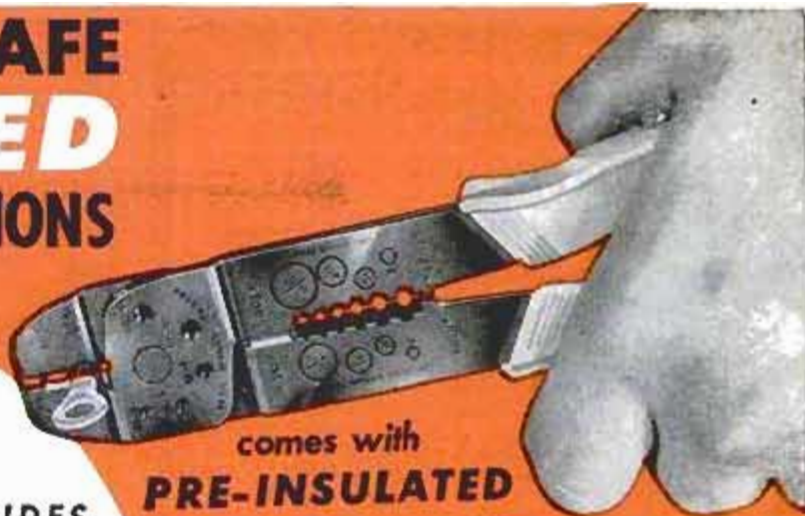
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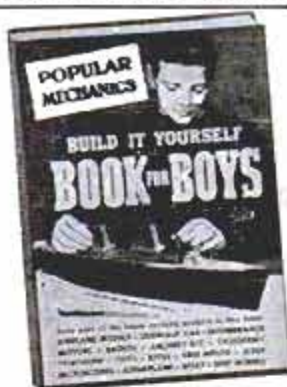
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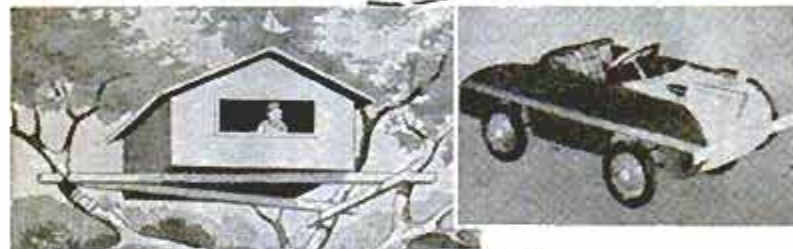
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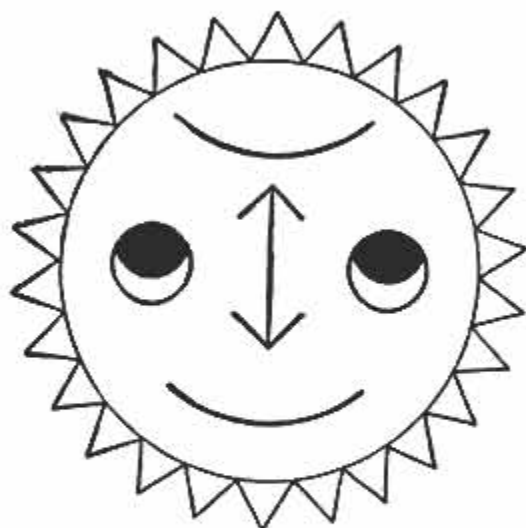
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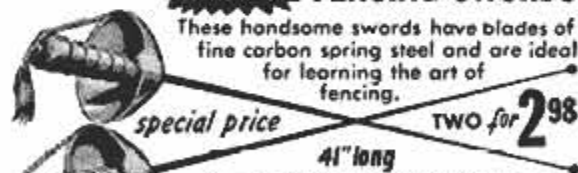
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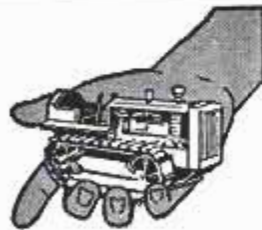
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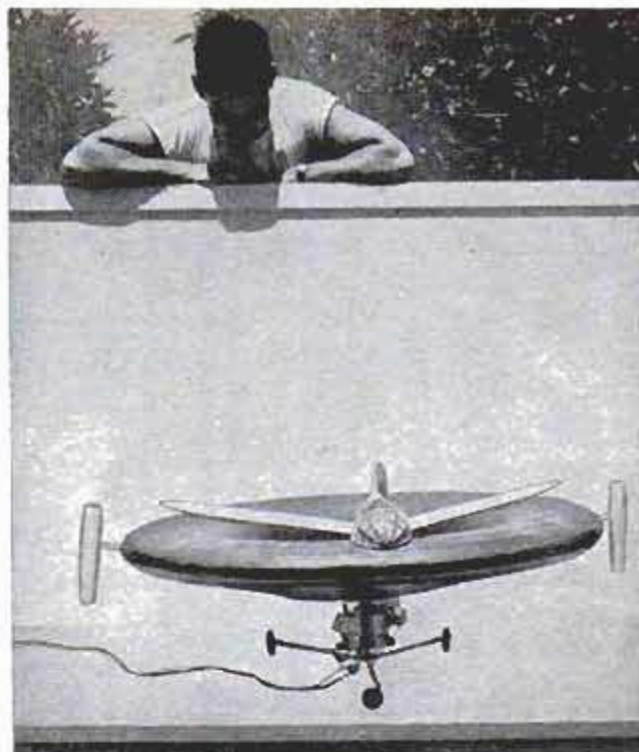
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Doctor Builds Model Of Flying Saucer

Employing a venturi in the center of a circular airfoil, a West Coast doctor has built a working model of a flying saucer. The venturi draws air across the airfoil, which creates lift, causing the saucer to rise vertically and hover. The model is 36 inches in diameter with a 12-inch venturi. Power from a three-quarter-horsepower electric motor drives the coaxial propellers in the venturi. The doctor estimates, after testing the model, that an aircraft 18 feet in diameter powered by an 85-horsepower motor, would carry 700 pounds at 150 miles per hour.

First All-Color TV Station Sets Pace for Industry

Television Station WNBQ, in Chicago, recently started telecasting all of its live studio programs in color—the first station in the world to take this step. Ten hours of daily programs in color are planned. Under the compatible-color system, the programs can also be picked up by black-and-white receivers. Conversion of the station to color cost \$1,300,000.

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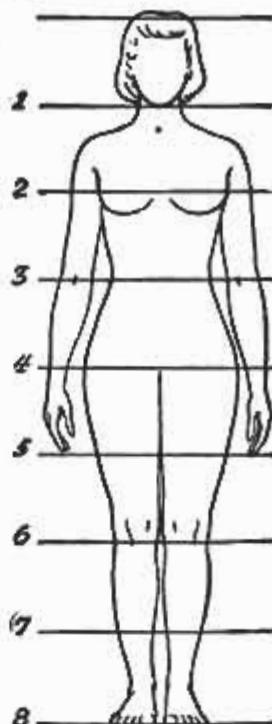
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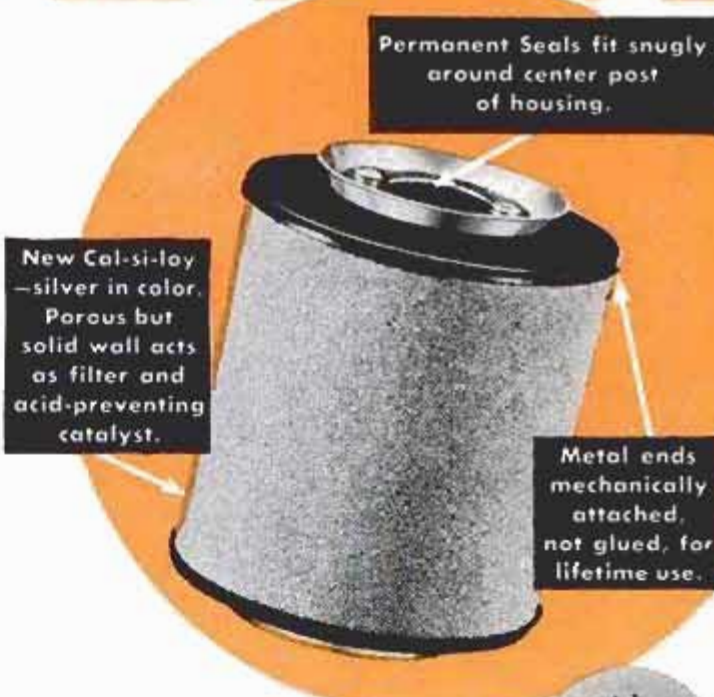
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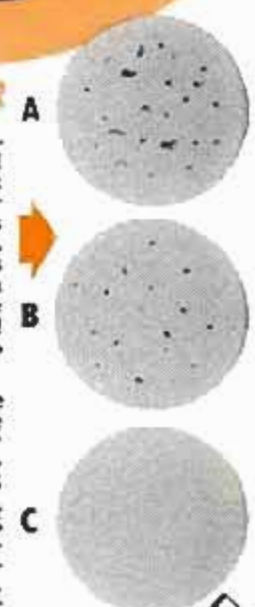
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NAZI Insignia, 12 different \$1.00. Medals, patches, armbands, flags, daggers. Illustrated lists. 10 cents. Medcrafts, Box 532, Victoria, B.C. 2, Canada.

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UNBELIEVABLE Values! Enlargements, finishing, photostats, Reproductions, 417-19 Broadway, Joliet, Illinois.

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BE Your own boss. You can't get anywhere working for someone else. Learn the best business for you, how to get started, how to be successful. Write today for the amazing free details. McFarling, 1601 N. 3rd, Temple, Texas.

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

\$5,000 YEARLY. Spare time at home. Nothing to buy. No local selling. Dignified. Guaranteed. Home Harvest. Rt. 3, Box 3491-A, Albuquerque, New Mexico.

HOW To make money with carnival games. 144 page book. 35 illustrations. Enormous profits possible full or part time. \$2.00 postpaid. Free details. Theron Fox, 1296 1/2 Yosemite, San Jose 28, California.

TO \$100.00 Weekly. Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-W National, Los Angeles 34.

WHOLESALE Buyers! New 1956 "blue book" gives names of over 3000 jobbers, manufacturers who supply anything. Free details. Associated Wholesalers, 1016-D Starr, Burlington, Iowa.

AMAZING Successes through franchises! Become exclusive distributor, agency operator. Nationwide opportunities. Request details. National Franchise Reports, 333 North Michigan, Chicago 1.

WHOLESALE Catalog! 30-80% discounts! Appliances, musical instruments, typewriters, tools, watches, jewelry, cameras, housewares, etc. Consolidated Distributors, 1300-11 Main, Clifton, New Jersey.

REBUILD Batteries; repair dolls; make rubber stamps; "60 Ideas" free. Universal, Box 1076-A, Peoria, Ill.

OPERATE Mailorder folio business! Free details. Ballard's, 425 East Catherine, Louisville 3, Ky.

MAILORDER! Succeed with something new that everyone wants. Free information. MCB, 1221P W. Minnehaha Pkwy., Minneapolis 19, Minn.

GET The real dope on raising needed capital. Write Enterprise Bureau, Syracuse 2, N. Y.

RAISE Nutria—Vegetarian; raise mink, carnivorous. Individually or combined, potential terrific. Voight Farms, Atlanta 2, Texas.

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

BIG Profits, selling, John Raper line guides. Makes any fishing pole a fly rod. Literature free. John T. Raper Mfg. Co., Fairfield, N. C.

EARN \$10,000 Yearly raising Angora rabbit wool for us. Information 25¢ coin. American Angora Company, Malta 12, Montana.

SPECIALIZED Magazines. 5,166 different publications—All businesses, trades, vocations, professions, sports, hobbies, etc. Free list. Write today. Commercial Engraving Publishing Company 34C North Ritter, Indianapolis 19, Indiana.

CASH From sawdust. Seventy methods. Tin-cans, thirty methods. Newspapers, eighteen methods. Instructions 50¢ each. All three \$1.00. Charles Company, 12-DXV, Norwood, Ohio.

INTERESTED Mailorder? Samples leading publications in field 25¢. Palm, Box 1221, Baton Rouge, La.

\$46 FROM Square foot plywood with yourigsaw. Woodart, Bridgewater, Mass.

TO Survive as a salesman—Know the tricks of sales resistance. Free facts. Countersalesmanship, Dept. D, 120 Boylston Street, Boston 16, Massachusetts.

FREE Booklet, earn money at home schemes. D. Reuter, 120 Boylston Street, Boston 16, Massachusetts.

BIG Profits making candies. Particulars free. Raymond Schenck, Butler, Penna.

FREE Catalogs. Each contains hundreds of businesses, farms and income properties throughout the U.S. Specify type and location desired. Deal direct with owners. U. I. Buyers Digest, 1608 Hillhurst Ave., Dept. PM-2, Los Angeles 27, Calif.

MONEYMAKING OPPORTUNITIES

WEAVE Rugs. Make big profits. Send for our free catalog, sample card, and low prices on carpet warp, rug filler, looms, parts, inexpensive beam counter. If you have loom, give make, weaving width please. Or. Rug Company, Dept. 0678, Lima, Ohio.

FREE Catalog! Nationally advertised watches, jewelry, appliances, gifts. Buy wholesale for personal needs or resale. Louis Perloff, Dept. PM, 733 Walnut Street, Philadelphia, Penna.

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-D1, New York.

EASY Work, big profit, seal photographs, cards, etc., in plastic. Home business. Details, complete kit \$1.00. Permafilm, Route 6, Greenville, S.C.

MEN-Women! Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room 710, 1512 Jarvis, Chicago 26, Ill.

MAKE Money writing short paragraphs! No tedious study. I tell you what to write, where and how to sell; and supply list of editors buying from beginners. Many small checks add up quickly. Write to sell, right away. Send for free facts. Benson Barrett, Dept. C-27-X, 7464 Clark, Chicago 26.

EARN Money at home. "Moneygetters Bulletin" tells how. Sample 25¢. Donovan, 79-PM Greenbelt, Levittown, N.Y.

SELL Titania gems. Far more brilliant than diamonds. Catalog 10¢. Diamonite, 2420-M 77th, Oakland 5, California.

SEAL In plastic birth certificates, social security, photos, etc.; 600% profit, no experience needed. Complete kit seals eight, \$1.00 postpaid. Kaple Sales, 14 Oak, Shelby, Ohio.

BUY Wholesale! Save 66 2/3%! Appliances, furniture, jewelry, toys, sporting goods, tools. Free details. National Buyers Service, Box 3338EB, San Francisco.

\$7.00 RETURNS \$90.00. Information, dollar supply 50¢. Feeteze, 474-PM Sinclair, Atlanta 7.

RAISE Rabbits on \$500 month plan. Plenty markets. Free details. White's Rabbitry, Dept. 123, Mount Pleasant, Michigan.

MIMEOGRAPHING Services pay sensational local profits. Exciting secret plans exposed! Rush name. Mozelle Mimeo Shop, Bonham, Texas.

VENDING Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 27, 715 Ensor Street, Baltimore 2, Maryland.

NEED Products? Salesmen? Markets? Details free! Sayer Associates, 1129-C1 Vermont, Washington 5, D.C.

PLASTIC Foam products. Revolutionary brand new line. Box 25, Cudahy, Wis.

PLEASANT Profits—Let us show you how to start your own complete scissors and tool sharpening business. Free details. Serr-Edge Inc., 9729 Lorain, Cleveland 2, Ohio.

MEN And women wanted to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$9.80 an hour without previous experience. Full particulars free by mail. Send postcard to Roberts, 1512 Jarvis, Room 710, Chicago 26, Ill.

IMPORT Opportunities, full details 10¢. Value Imports, 1215 East 93 St., Brooklyn 36, N. Y.

FRAUDS To watch out for. Avoid being swindled. 25¢. Barnes, Box 332, Glens Falls, N. Y.

100 JOBS At home. Free details. Good Will, 12 Montplaisir, Cap Madeleine, P.Q., Canada.

"TEN Years in Mail Order" can save you money. \$1.00 or send for details. Modern Enterprises, 517 Beechtree Dr., Cincinnati 37B, Ohio.

MAKE Money with your camera. Keep your job at same time. \$1.00. Gem Publications, Dept. 16-OC, Linwood, N. J.

START Big-pay business at home in spare time. No experience needed to operate little table-top machine for bronzing baby shoes. Make \$5.46 profit on every pair. Full particulars free. Send postcard to Mason, 1512 Jarvis, Room 710, Chicago 26, Ill.

AMATEUR Artists! Turn your talent into cash! Hamilton, Dept. 4-PMJ, Astoria 5, N.Y.

LEARN Technical Metaphysics and insure your future. Easy, inexpensive correspondence course. Simplest method known. Diploma. Write: Premier College of Technical Metaphysics, 2532 McKenzie St., Vancouver 8, B. C., Canada.

60% PROFIT Cosmetics. \$25 day up. Hire others. Samples, details. Studio Girl Hollywood, Glendale, Calif., Dept. 12610-H.

GROW Mushrooms. Cellar, shed. Spare full time, year round. We pay \$3.50 lb. We paid John Betts \$7,977.76, he started as amateur. Free book. Mushrooms, Dept. 173, 2954 Admiral Way, Seattle, Wash.

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

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.

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-F, Miami 16, Florida.

FREE Folio "\$5,000-\$45,000, Unlimited Vacations." No merchandise, equipment. Unknown! Work home, sparetime! Haylings, Carlsbad, Calif.

FORTUNE Possible raising, fishworms and crickets. Free literature. Carter Hatchery, Plains, Georgia.

ATTENTION: Typewriter owners. Make handsome profits. Write today. Groves Company, 682, Hastings 8, 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 on all subscriptions. Supplies free. Send this ad with your name and address to: Agency Bureau, Dept. PM, Hearst Magazines, 250 West 55th St., New York 19, N. Y.

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.

LOOKING For something informative? Home work, mail order plans, and trade magazine 25¢. Warren Co., P.O. Box 11, Glenview, Ill.

WHOLESALE Catalog! 30-80% discounts! Appliances, musical instruments, typewriters, tools, watches, jewelry, cameras, housewares, etc. Consolidated Distributors, 1300-27 Main, Clifton, New Jersey.

100% PROFIT. No investment. Stamp brings details, samples. Miller, Box 584, Brooklyn 1, New York.

YOU Earn exceptional fees managing money-raising campaigns for churches, hospitals, organizations. Low cost spare time course guaranteed. Backed by 36 years experience. William Arbogast, 229 East Mason Avenue, Alexandria, Virginia.

DOLLARS Every day! Amazing new magic mail plan. Set-up free. Miller, Box 588X, Oshkosh, Wis.

"EARNING Home Profits Preserving Flowers" shows how to make money with this little known hobby method. Inquire: Mountainside, Springwater 1, New York.

TURN Sparetime into extra cash! Write today for free folder, describing interesting, home moneymaking opportunities! Dean Stike, R-2, Chilhowie, Virginia.

PREPARE Income tax returns at home full or spare time. \$5.00-\$10.00 per hour. Practical instructions amazingly simplified. No lessons. Particulars free. Fox Business Publications, Box 1285-A, Peoria, Ill.

GENERAL Contest Bulletin. Lists contests monthly. Sample, 25¢. 1609 1/2 East 5th Duluth, Minn.

FORMULAS. PLANS, ETC.

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

WATERLESS Hand soap, cleaner. Complete formula and materials to make a quantity. Complete \$1.00. Write Grucza Co., Box 215, Station F, Buffalo, N.Y.

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

PRACTICAL Formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

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

LATE, Modern manufacturing formulas. List free. Moon Chemical, Martville, New York.

PLASTICS

LAMINATING Supplies. Free price list. Solomson, 46 Cornhill, Boston 8, Mass.

LEARN Plastics fabrication for spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 13, Ore.

PLEXIGLAS, Fiberglass, polyester, acetate. Instructive wholesale-retail catalog free! Gem-O-Lite, 5529 Cahuenga, North Hollywood, California.

PLEXIGLAS, Lucite. Square foot cost. 1/16", \$1.18; 1/8", \$1.52; 3/16", \$1.86; 1/4", \$2.21; 3/8", \$3.23; 1/2", \$4.36. Colors add 10%. Send 15¢ for postage. Aristocrat Plastics, 23-25 Sussex Avenue, Newark, N. J.

PLASTIC Sheet, rod, tubing. Catalog 10¢. Coleman Sales, 5926 Cornell, Dearborn, Michigan.

REPAIR Kit welds broken or cracked plastic articles. Restores original finish. Complete kit \$3.00. Free information. Rayther, Box 271, Station B, Toledo, Ohio.

PLEXIGLAS Square foot cost 1/8" \$1.20. 5/32" \$1.35, 3/16" \$1.58, add 15% for postage, write for list. Aircraft Plastics, P.O. Box 7924, Mt. Lebanon 16, Penna.

"U-Mix-It" liquid vinyl experimental kit, 20¢. Technicraft, 1156 Commonwealth, Boston 34.

REINFORCED Plastic. Stronger than steel. Hundreds of uses. Information, six samples and wholesale catalog. 25¢. Seifert's, Box 31M, DePere, Wisconsin.

NEW Liquid casting plastic, clear, colors. Embed real flowers, insects, photos, coins. Saw, drill, carve. Send 25¢ for handbook. "How to Cast with Liquid Plastic," and proved success plan showing how to make money at home. Castolite, Dept. L-101, Woodstock, Ill.

PLEXIGLAS Craftsman's Handbook \$1.75 post paid. Free plexiglas bargain price list. M. A. Schoener, 19 Summit Drive, Pittsburgh 9, Penna.

CHEMISTRY

YOUNG Chemists. Experimenter's newspaper 15¢. Experimenter, 713 Second St., Canonsburg, Penna.

CHEMISTRY-Science magazines. Literature free. Lanxon, Box 5126-C, Lansing 6, Mich.

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

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

CHEMICALS, Glassware, catalog 25¢. Refundable. Laboratory Sales, Box 161-E, Brighton, Mass.

BOOKLETS: 60 pages each! "Beginners Chemistry," "Chemistry," "Einstein's Relativity," "Physics," "Atomic Theory," "Electron Theory," "Scientific Oddities," "Light," "Sound," "Heat," "Electricity," "Radio," "Astronomy," "Useful Tables," "Geometry," "Mathematical Oddities," "Scientific Terms." Order by titles. 10¢ each. Franks, 3121 South Racine, Chicago 8.

AGENTS WANTED

EXCLUSIVE Line of personal initialed buckles, belts, cap badges, 3,000 emblems, etc. Hook-Fast, Dept. PM, Roanoke, Va.

BIG Money-making opportunity. Exclusive line work uniforms. Jackets, pants, shirts, coveralls. Advertising embroidered. Every business prospect. Outfit free. Master Co., 422 Water, Ligonier, Ind.

SELL Perfume wholesale or retail. Details free. Sample \$1.00. L. Zonis, Box 6550, Philadelphia 38, Penna.

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

GOOD Man can make \$3,000.00 next 90 days. Every house in town wants amazing NiLite "cats-eye" lawn sign. Automatic selling plan pays profits everyday. Write today for free details. NiLite, 173 W. Madison, Dept. 301A, Chicago.

NEW Home club plan sensation! Style shows, children's, adults' apparel easily earns \$20.00-\$40.00 evenings. Prizes, gifts, fun! Experience unnecessary. Complete outfit furnished. Beeline Fashions, Bensenville 642, Illinois.

MAKE Money selling ties! Square ends, reversibles, round bottoms, feather, kerchief sets. Money-back guarantee. Postage prepaid. Special offer: 2 sample ties \$1.00. Retail value \$3.00. Free catalog. Phillip's Neckwear, 20 W. 22nd St., Dept. 415, New York City 10.

EXTRA Cash in your spare time. No experience needed. Just show superb Elmira Christmas cards, name imprinted. Samples on approval. Bonus: Free box of cards; also 50% profit on first order. Elmira Greeting Card Co., 293 Clinton, Elmira, N. Y.

START Your own business on credit. Your own boss. 1598 dealers sold \$5,000 to \$32,000 in 1955. We supply stocks, equipment on credit. 200 home necessities. Sales experience unnecessary. Pleasant, profitable business backed by world-wide industry. Write Rawleigh's, Dept. J-U-PPM, Freeport, Ill.

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. 640-M, St. Louis 12, Mo.

BIGGEST Christmas card profits. Sensational "Super-36" assortment pays \$1.25 profit on every box—\$50.00 on 40 boxes easy. 200 fast sellers double earnings! Tall cards, novelties, stationery, bargain specials. Assortments on approval. Color catalog, personalized album free. Midwest, 1113 Washington, Dept. 494-T, St. Louis 1, Missouri.

100% PROFIT. Sell stainless steel tableware—Details free. Heyer, 38-11 Raven Street, Levittown 7, New York.

FOG-Stop windshield cloth. Instantly removes blurry mist, frost, sleet, snow. Stops windshield fogging. Samples sent on trial. Kristee Co., Dept. 55, Akron 8, Ohio.

START Greeting card, gift shop at home. Show friends new type Christmas, all occasion assortments, gift wrappings, novelties. Profits to \$1.00 per box. Bonus. Write today for feature boxes on approval. 74 free samples personal Christmas cards, stationery, free catalog. New England Art Publishers, North Abington 1033-B, Mass.

60% PROFIT Cosmetics. \$25 day up. Hire others. Samples, details. Studio Girl Hollywood, Glendale, Calif., Dept. 12610-H.

\$1,000.00 A Month for making dramatic 3-second demonstration of amazing lightweight Presto Fire Extinguisher. New chemical used by airforce snuffs out fires instantly. Only \$4.95. Terrific commissions. Millions want it. Free kit. Merlite, 114 E. 32nd, Dept. P-56M, New York 16.

FREE Box of 20 nationally famous Christmas cards included with other fast selling assortments sent on approval. Earn \$50.00 by selling only 50 boxes of our 900 series Christmas card assortment. Can be done in a few hours of your spare time. Sunshine Art Studios, Inc., Dept. PM19, Springfield 1, Mass. Pasadena 1, Calif.

WAXES Floors without "wax." New invention. No more floor wax to buy. Sensational seller. Samples sent on trial. Kristee Co., Dept. 56, Akron 8, Ohio.

SELL Profitable personalized rugs. For information write Bobby's, Dept. M10, Manitou Springs, Colorado.

BUY Wholesale! 100,000 name brand products! Save 66%!! Big profits selling others spare time! Free details! National Buyers Service, Box 3338EE, San Francisco.

OVER 200% Profit. New, ingenious household item. Retail below \$1.00. Excellent seller. For details write: Atlantic Import, 1302 Cadillac Tower, Detroit 23, Mich.

EXCLUSIVE Distributorships. Top quality low cost English chamois. Babrok, Hudson Falls, N. Y.

FINANCE Your own business! Free literature. Advance, Box 1377-BK, Miami 8, Florida.

NEW Invention, \$4.95 fire alarm, paying up to \$1,100 a month. No wiring. Unlimited market. Dramatic demonstration. Free kit. Merlite (Alarm Div.), 114 E. 32nd St., Dept. F-56M, New York 16, N. Y.

YOU Can make money for Christmas in spare time taking magazine renewal subscriptions. No capital or experience necessary. All supplies furnished. Write today! McGregor Magazine Agency, Dept. 500A, Mount Morris, Illinois.

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

AMAZING New "Touch-Glow" Christmas cards sell swiftly from free samples. \$62.50 profit on 50 boxes easy! Many tall cards, stationery, novelties, album of imprints. Profits to 100% plus gift bonuses. Samples on approval. Creative, 4401 Cermak, Dept. 509-D, Chicago 23.

FREE! Beautiful feather pictures 200% profit! Apartado 9036, Mexico 1, D. F.

YOUR Own business—Used suits \$1.50, overcoats 65¢, mackinaws 35¢, shoes 12½¢, ladies coats 30¢, dresses 15¢. Enormous profits. Catalog free. Nathan Portnoy Associates, 605-AA West 12th Place, Chicago 7.

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

PRINTING, Advertising salesmen—Excellent moneymaking sideline selling decalcomania name plates, small quantities. Automobile initials, sign letters. Free samples. Raico, XL, Boston 19, 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.

USED And new watches \$2 up. Free list. Southern Watches, Gray, Georgia.

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.

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

WANT More business? Here's an amazing opportunity to increase your sales. Talk to thousands of interested readers of "Mechanica Popular." Our Spanish Edition covers the Latin American countries like a blanket. They're real mailorder buyers. Classified rate 75¢ per word. Try an ad in our next issue. Classified Advertising Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

CALIFORNIA Sweet smelling beads. Sensational sellers. Particulars free. Mission, 2328-PM W. Pico, Los Angeles 6, California.

RUN Spare-time greeting card and gift shop at home. Show friends samples of our new 1956 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. 89, Ferndale, Mich.

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

FAST Selling money makers! Metallic ironing board cover; purse-shopping bag; many others including \$1 retailers. Quality Products, Dept. A, Box 748, Passaic, N. J.

REDUCING Machines. Factory agents. 100% profit. Exclusive. Mary-Mac, 1012 Powhattan, Dallas 2, Texas.

WHOLESALE Catalog! 30-80% discounts! Appliances, musical instruments, typewriters, tools, watches, jewelry, cameras, housewares, etc. Consolidated Distributors, 1300-10 Main, Clifton, New Jersey.

COUNTRY Salesmen. Automatic fire extinguisher. Huge profits. Out-O-Matic Co., 1737 E. 31st, Denver, Colorado.

SCHOOL Seniors—Be popular with classmates. Have spending money galore. Details free. Craftcards, Box 235-L, Pittsburgh 19, Pennsylvania.

MEN-Women agents: Sensational new money-makers — Beautifully hand-painted, plastic personalized photo enlargements, compacts, rings, bracelets, lockets, etc. Simply take orders, pocket 40% commission. We deliver and collect. Sales outfit free. Novelco, 3343 North Avenue, Chicago 47.

FANTASTIC New money-making plan. Sell nothing, yet make to \$50 daily! Offer women, personally or by mail, beautiful stainless steel tableware set complete with chest, free for selling just two sets to friends. Exclusive patterns not obtainable elsewhere. Guaranteed 50 years. Can't rust, stain or tarnish. Successor to sterling. Amazing low wholesale cost starting at \$2.70 set. Postcard brings catalog, booklet "How To Make Money in your Own Business," all money-making plans absolutely free. Topval Corp., Lindenhurst 91, N. Y.

NEW Design 7 1/2"x14" signs, Day-Glo Christmas, general, religious, 35¢ to \$2.00 sellers. Samples \$1.00. Free literature. Sho-Card Signs, Prattville, New York.

AMAZING Profits taking orders for nationally-advertised cosmetics, medicines, polishes, soaps, extracts. Advertising giveaways make selling easy. Exclusive territory. Write for free sales aid kit offer! We trust you. Sayman Products (Since 1877), Dept. 304, 2101 Locust, St. Louis, Mo.

BIG Profits selling bargain-priced imported ball pens. Kern Products, 150-07, 77th Ave., Flushing 67, N. Y.

IDEA Catalog 25¢! Makes you the boss in your own money-making independent advertising specialty business. Academy Ideas, Inc., 2046-C Eastchester Road, New York 61, N. Y.

FREE Book for men and women genuinely interested in owning their own business "Where to buy 800,000 articles wholesale!" Free facts. No obligation. Glass Publishing, Ellwood City, Penna.

SELL African wood carvings. Figures, heads, busts, etc. Up to 150% profit. Details free or \$1.00 with sample carving. Kempo, Box 4098, San Diego 4, California.

LIFETIME Repeat business. Agents, salesmen, crew managers, sparetime workers, distribute our discount catalog. Name brands. Receive commission for lifetime. Catalog, instructions \$1.00. Information free. Save yourself up to 80%! Smart Shoppers' Club, 1354 Emory Road, Atlanta 6, Georgia.

BUY Wholesale 750,000 products. Details free. Carter, Box 6011-AW, Chicago 80.

COULD You sell first quality nylon stockings at 39¢? That's all they cost if they run within 3 months because new slashed prices only 79¢ prepaid (including your commission and bonus). If free replacement needed, customer has two pairs for 79¢! Fantastic opportunity for fabulous earnings. Just write orders, spare or full time. We deliver and collect. Postcard brings free sample stocking and outfit. Dept. 23, Kenmart, 108 Lawrence St., Brooklyn 1, N. Y.

AGENTS! Profits unlimited, choice territories available. Sell the industrial trade a new patented machine vise. For full informative circular, Baier and Son, 15820A Pinehurst, Detroit 38, Michigan.

UP To \$10.00 per hour profit. New permanent scent for cards, cloth, wood, etc. Lasts indefinitely. Details and sample. P. Sturling, 5540 Pensacola, Chicago.

AGENTS; 100% Profit. Make \$1000.00 per month selling Dauben sponge mops. Every home, restaurant, beauty parlor a prospect. Send for free information. Dauben Industries, 1784 Pontiac Drive, Pontiac, Michigan.

SELL Negro Christmas cards, exclusive, new styles, full discounts, big profits! Send \$1 for sample kit, applied against first order or refund guaranteed if not satisfied. Colortone Originals, 114 Pearl St., Mount Vernon, N. Y.

BUY IT WHOLESALE

WHOLESALE Catalog! Appliances, cameras, watches. Postcard: Selbyco, Decatur 161, Illinois.

FREE Catalogs by using directory of 500 wholesale sources. \$1.00. K-C Sales, 838 South 12th St., Newark 8, N.J.

NATIONALLY Advertised merchandise at lowest wholesale prices. Catalog 25¢. Name Brand Wholesale Distributors, Box G, Tonawanda, New York.

MEN'S Suits. Nothing like it in America. Year round gabardine. Blue, gray, tan, charcoal, brown sizes 34-44. Regulars, shorts, longs, \$19 each—2 for \$37. Postage prepaid. Money refunded if not satisfactory. Trend Clothing Company, Box 1014, Baltimore 3, Md.

BUY Wholesale! Resell at big profits. Brand name merchandise—Appliances, cookware, housewares, watches, jewelry, dry goods, clothing, sporting goods, toys, gifts, etc. Free 1957 color catalog with confidential cost sheet. Merit Home Products, Dept. FMB, 107 Manhattan Ave., Brooklyn 6, New York.

WHOLESALE Catalog! Appliances, cameras, watches. Distributors, Box 106A, Hudson, New York.

\$1.00 BRINGS Wholesale catalog and \$1.00 merchandise certificate. Radaker, 510 Park Ave., Anderson, Ind.

QUANTITY Buyers: Nationally advertised \$54.75 watch \$14.75; \$49.95 automatic skillet \$10.20. Etc. Colico Distributors, Forsyth, Ga.

BUY Wholesale nationally advertised appliances, radios, watches, etc. Catalog \$1.00 (refundable). D'Auria, Box 355-PM, Jackson, Michigan.

WHOLESALE Catalog! Jewelry; appliances; housewares! Postcard! Midwest, M-156-M, Pontiac, Ill.

VITAMINS: Save 50%. Free catalogue lists all formulas. Mention product now using for free samples. Vitamin Specialties, Philadelphia 40, Penna.

YOUR Cost as little as 30¢ on dollar! Household items needed in every home. Sell direct, by mail or to agents. Postcard brings booklet "How To Make Money in Your Own Business," catalog and money-making plans absolutely free. Topval Corp., Lindenhurst 724, N. Y.

FREE Wholesale catalog. Name brand appliances, furniture, cameras, watches, luggage, tools, toys, sporting goods. Make Christmas savings-profits! Housewares, 924-P West 79th Street, Chicago 20.

BUY Wholesale! Discounts to 80%! Appliances, cameras, sporting goods, tools, watches, housewares, etc. Free catalogs. Buy-Rite, Box 258 D, Hawthorne, New Jersey.

FREE! Illustrated wholesale catalog. Save and earn money on over 1000 most popular, brand-name housewares and appliances. Tremendous discounts. Write: Shop Smart Ltd., Dept. 110, Box 687, Newark 1, N. J.

WHOLESALE Catalog! 30-80% discounts! Appliances, musical instruments, typewriters, tools, watches, jewelry, cameras, housewares, etc. Consolidated Distributors, 1300-20 Main, Clifton, New Jersey.

FREE Gift catalog. Wholesale catalogs, name brands. Edith's, Deep River, Conn.

USED And new watches \$2 up. Free list. Southern Watches, Gray, Georgia.

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

SALESMEN—DISTRIBUTORS

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-82, Chicago 32, Illinois.

CHESTLITE And instant light. No competition. Buyers everywhere. Write for particulars. Substantial profits. Emergency Lights Inc., 620 W. Anaheim St., Long Beach 13, California.

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Fires are always breaking out in one house in Milwaukee, Wis., but alarms are never sent in, because the house is only

a miniature and the fires are started on purpose. The tiny house, called the House of Hazards, belongs to the Milwaukee Fire

Department and is electrically wired so when buttons are pushed, fires are started at 19 different points in the house. Used as a part of the department's fire-prevention campaign, the house demonstrates fire hazards around the home. Before a demonstration, the house is fitted with tissue paper drapes, bedding, upholstery and other items. Only the tissue paper burns during the demonstrations, since the house is completely lined with asbestos.



Tomato plants grow best at a night temperature of 64.6 degrees Fahrenheit, according to research at the California Institute of Technology.

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REQUIRES ONLY 1/5 HP OTHERWISE USED—SAWS NAILS IN WOOD, DULLING ONLY PART OF SAW STAYS SHARP UP TO TEN TIMES LONGER—DIAL FRESH, SHARP SECTION FOR FINE CUTTING



This device uses a STANDARD ROUND SAW BLADE and is to be attached to the conventional saw. The difference in length of the teeth is created only by its off-center positioning on the Dial-A-Sharp Saw Collar. The saw blade is positioned off-center so as to dull only 50% of the teeth at one time thus resharpening the teeth in the other sections for later use.

The section which cuts sharp longer than when using all of the teeth of the same time because it GENERATES LESS HEAT and leaves the uncut portion of the blade an area to which heat can travel and be dissipated. The result is the uncutted BLADE NOT BURNING and softens and dulls at the cutting edges as soon as it would if all teeth were cutting.

To dial to a sharp section of the saw, simply loosen arbor nut and move saw blade until a new number appears in the center of the Counterweight Collar window. The etched numbers on the saw blade are located to dial to the opposite side of blade.

Any round circular saw blade of appropriate diameter and arbor hole size may be used on the Dial-A-Sharp Saw Counterweight Collar by first adjusting the balance of the complete assembly or our balancing cone as follows:

20. Place balancing cone on the point of a nail which extends 1/4 to 2 inches through a block of wood. Nail must have a sharp unsharpened point for accurate balance.

21. Place flanged dialing or balancing cone to provide a support area greater than the saw blade hole. Be sure to replace the balancing cone down on the balancing side to be used to OPERATE SAW ROUND for jointing and avoid interference with the eccentric positioning of saw blade during balancing.

22. Place saw blade and Counterweight on balancing cone. Be certain that the saw hole is lined into the colored bushing and is thus held in the eccentric position at which it will be operated.

23. Place laminated type Counterweight or stamped type Counterweights in a position on flanged dialing or balancing cone to balance exactly level or 5" heavy toward the cutting section. Counterweights should always be on their leading pins in a hole of the same length as the opposite Counterweight. With laminated type Counterweights always add or remove weights to balance exactly level.

24. Place spring clips into grooved positions on pins which hold the Counterweight Collar together when handling.

To install saw blade and Counterweight Collar on your sawing machine for operation, simply remove them from the balancing cone after balancing level and first, place the saw blade against your machine's feed table on the arbor. Second, place Counterweight Collar on arbor and tighten saw blade hole over eccentric bushing. Dial saw to desired position and tighten arbor nut. The saw blade and Dial-A-Sharp Saw Collar are now ready for use and the blade may be dialed to any position or turned over and will operate WITHOUT ADJUSTMENT. If any abnormal vibration is noted in operation, re-read balancing instructions and re-balance saw and Counterweight Collar.

In all cases with the Dial-A-Sharp Saw you should use the same saw tooth design and number of teeth as you would use for round operation for a given material, in other words use metal cut-off saw for non-ferrous metals and plastics, use cut-off saw for cross grain sawing in wood, use rip saw, with no less than 35 teeth, for ripping, use combination or hollow ground saws wherever they would be applicable normally. Flanged bushing is to be used to operate saw blade round on your machine for jointing for sawing cross grain in wood where splinters are unacceptable and where you are willing to dull all the teeth at the same time with enough force.

SPECIAL INSTRUCTIONS TO SAW USER—The saw blades used on the Dial-A-Sharp Saw Collar should be sharpened and set in the conventional manner. The teeth must always have some hook or be pitched to the arbor hole. The faces of the teeth should never be leaning backward. Sharpen predominantly on the faces to obtain maximum service between sharpenings.

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SAW BLADE PRICES WITH DIAL NUMBERS		Prices of Counterweight Collar Sets Without Saw Blade	
Flat Dia.	Saw H.S. Mixture Ground For Price.	#1 for 6" to 8" diam Saws, 1/2 or 3/4" arbor	\$ 5.95
Cut-off	Non-Ferrous	#2 for 8" to 12" diam Saws, 1/2, 3/4, 1 or 1 1/4" arbor	7.95
Combination	Ground Metals	#4 for 12" to 20" diam Saws, 1 or 1 1/4" arbor	16.95
6"	2.50 1.50	Your Saw Diameter	Your Machine Arbor Size
7"	2.75 1.50	Operating R.P.M.	Type of Machine
8"	2.90 1.75 10.25	Manufacturer of Machine	
9"	3.40 1.45	Material Being Sawn	
10"	3.90 12.95 23.90	Use of Material Being Sawn	
12"	5.10 14.55 27.95	Type of Blade Desired	
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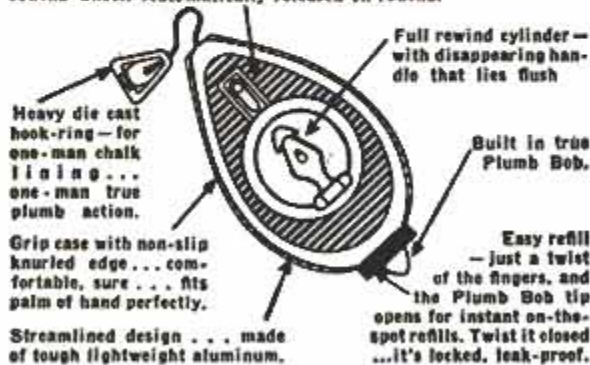
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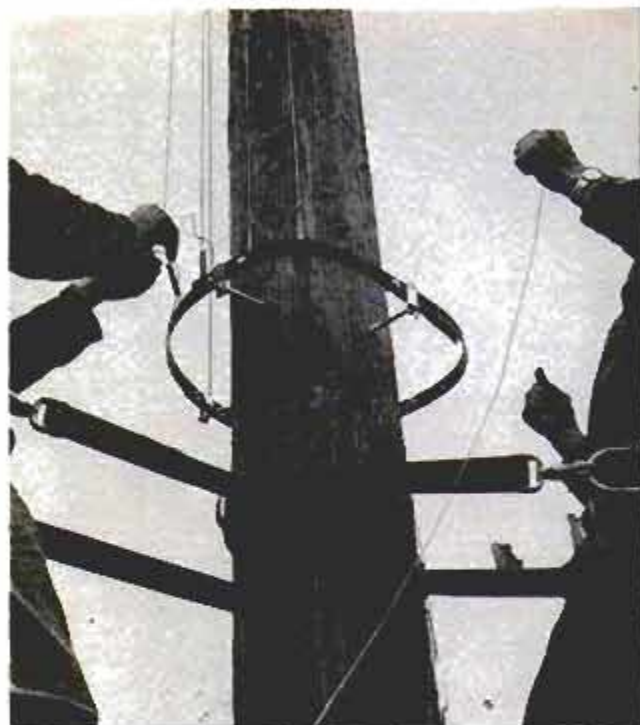


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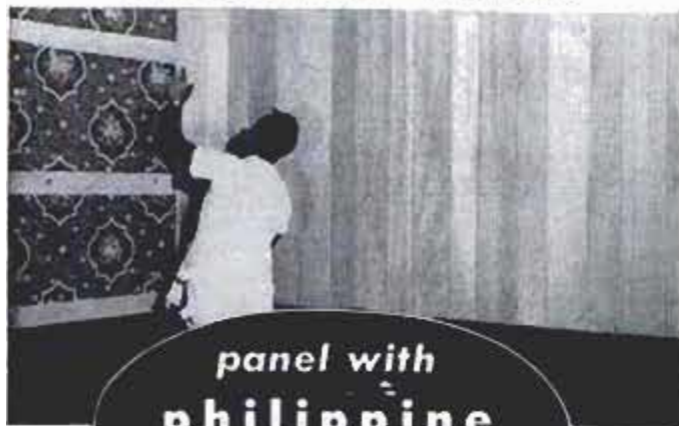
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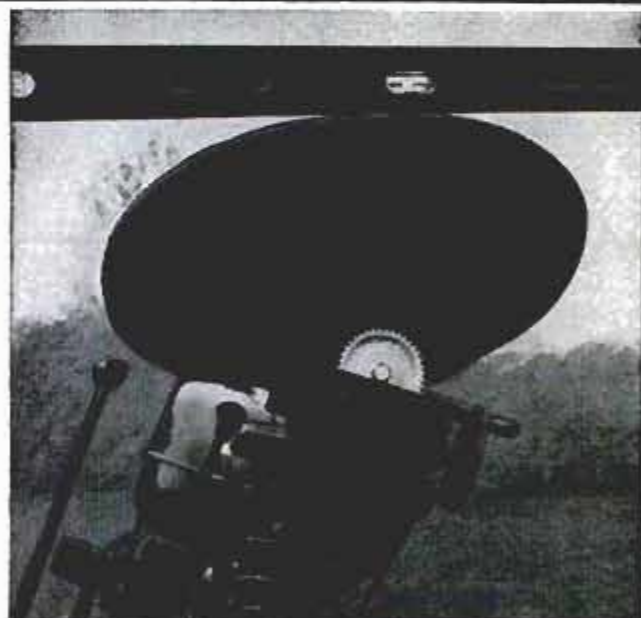
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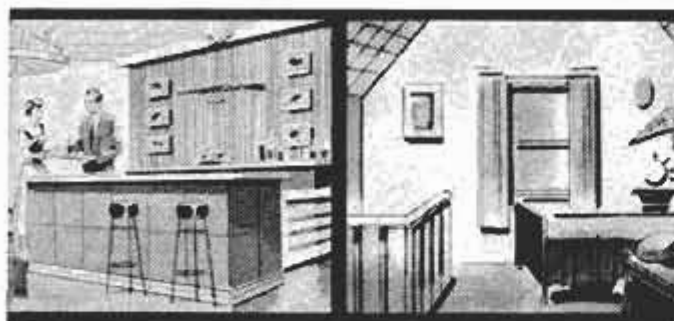
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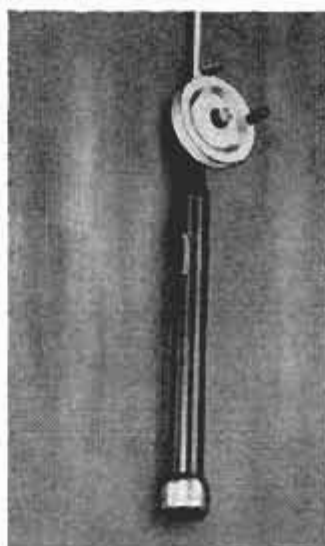
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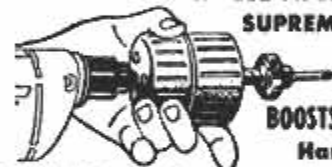
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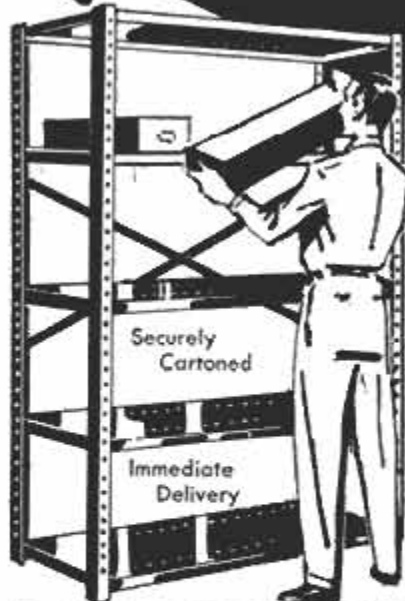
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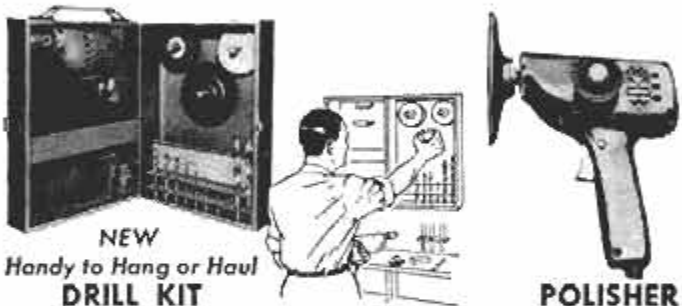
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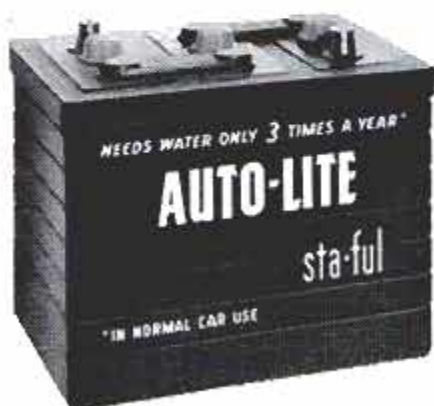
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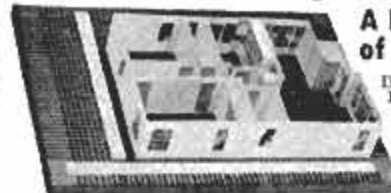
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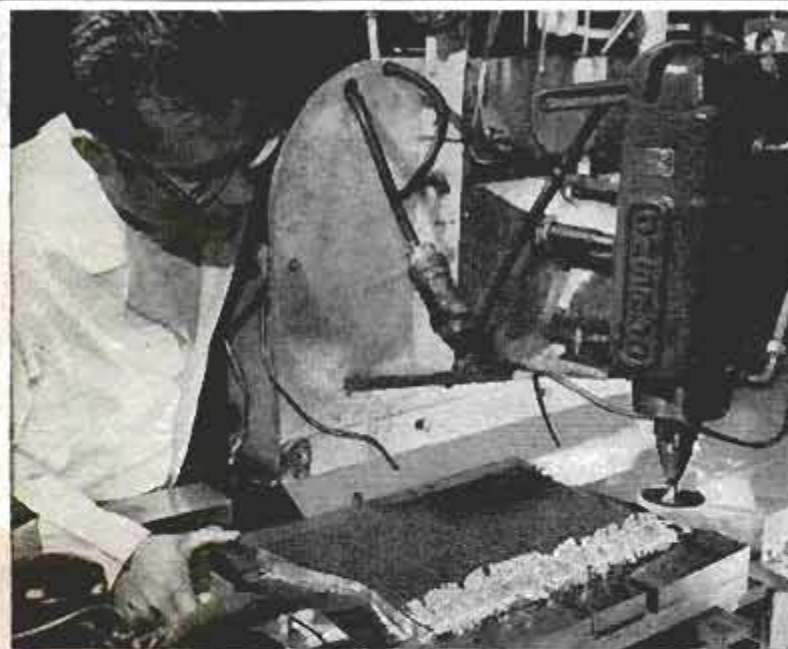
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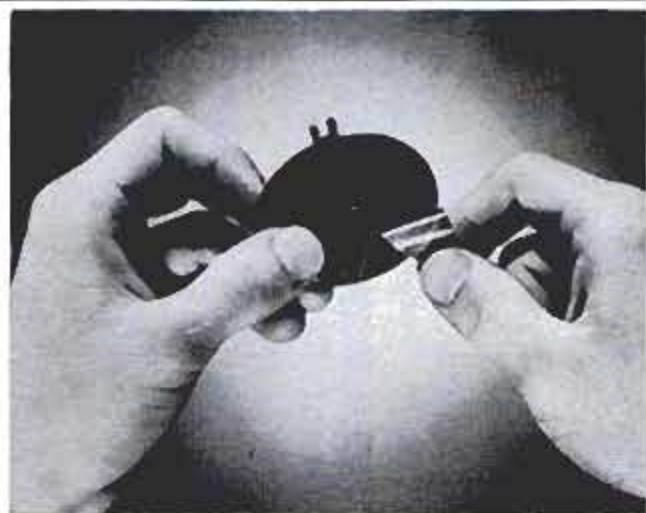
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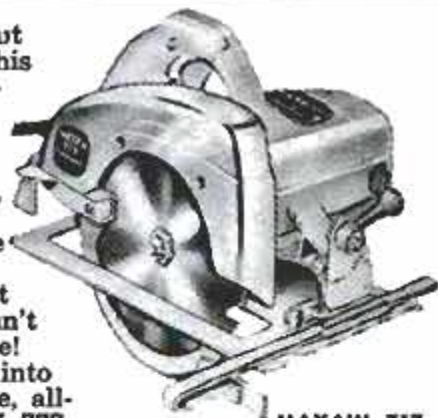


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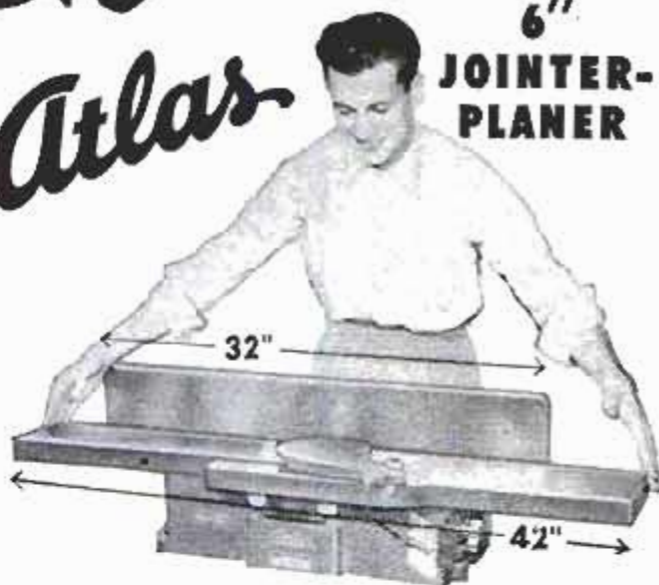
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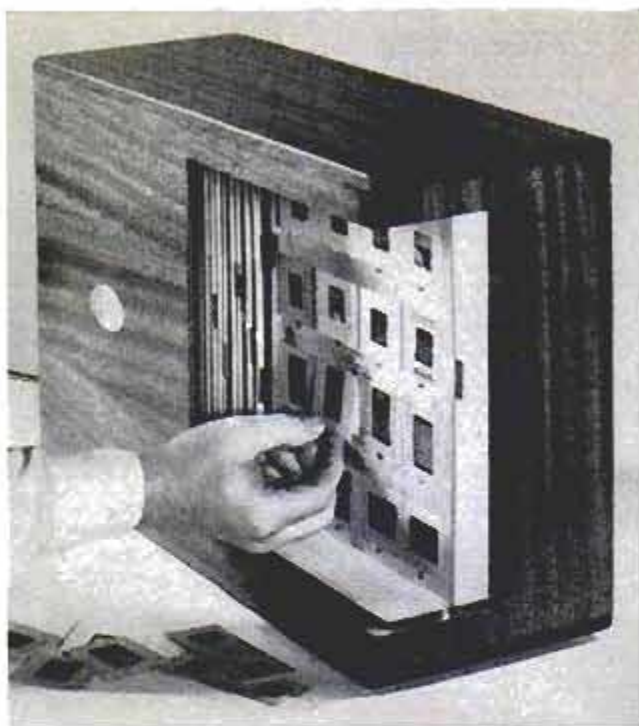
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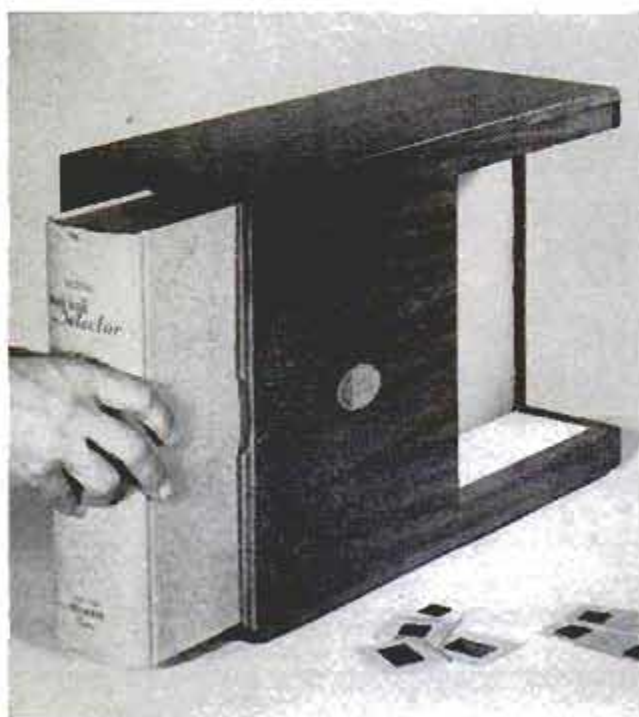
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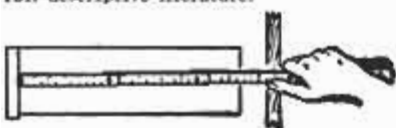
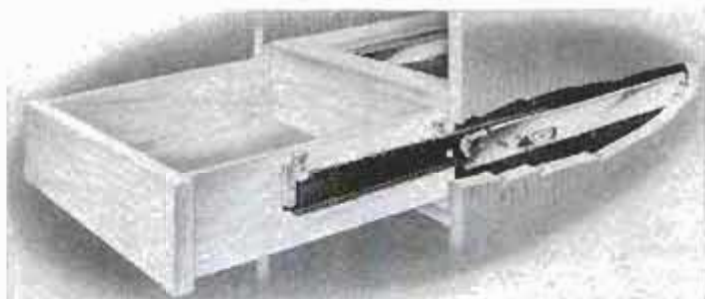
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WHERE-TO-BUY-IT INDEX

Source of supply appears after items commercially available

AUTOMOTIVE

Replacement antenna for car radios (Snyder Mfg. Co., 2218 W. Ontario, Philadelphia, Pa.)..... 94
Valve replacement for tubes is easy to apply (Bridgeport Brass Co., Bridgeport 2, Pa.)..... 97
Preoiler ends dry starts (Pre-Matic Mfg. Co., 4605 N.E. 118th Ave., Portland, Ore.).....100
Collapsible steering column.....102
Six jets atop auto aid test work.....147
Propeller drive powers car.....147
Chain brake keeps car on jack (Kriewaldt Specialty Mfg. Co., 502 Park Ave., Oconto, Wis.).....264
Trailer-car brakes synchronized (Warner Electric Brake and Clutch Co., Beloit, Wis.).....336

AVIATION

Precision altimeter accurate to 18 inches (The Garrett Corp., AirResearch Mfg. Div., Los Angeles, Calif.)..... 3
Automatic inflator (North American Aviation, Inc., International Airport, Los Angeles 45, Calif.)..... 92
New quick-freeze method helps machining (Northrop Aircraft, Inc., 1001 E. Broadway, Hawthorne, Calif.)..... 96
United Air Lines puts DC-6A air freighters into service.....117
"Sky screen" speeds relay of radar-tracking information (Northrop Aircraft Inc., Hawthorne, Calif.).....128
Supersonic parachute tailored for shock.....151
Pilots see in dark with "cat eye" electronic light amplifier...152
Flying tanker refuels three at a time.....160
Airport visitors hear control tower.....322

BOATS AND SPORTS

Hot rod for ice fishermen (Vapor Chemical Co., 3930 Rives-Eaton Rd., Rives Junction, Mich.)..... 90
Live-action decoy looks like feeding duck (Ducking Ducks, Inc., 2201 N.W. Thurman, Portland, Ore.)..... 94
Convertible fishing reel for spinning and bait casting (Alrex Corp., 411 Fourth Ave., New York City)..... 99
Small range finder (Federal Instrument Corp., 12-10 Broadway, Long Island City 6, N. Y.).....100
Rectangular sail moves boat faster.....122

SPECIAL HOUSING SECTION

Ceramic tile now applied with adhesive.....167
This old house is young again.....169
Remodeling tips from the nation's top remodeler.....170
Shutters are back again.....178
Year-round check list for house and yard.....184

MISCELLANEOUS

Miniature scene built inside gallon jug..... 60
Doctor builds model of flying saucer..... 62
First all-color TV station sets pace for industry..... 62
House of hazards has many fires but no alarms are sent..... 86
Glass-fiber wires on poles keep woodpeckers away..... 88
Driver on the level with adjustable seat..... 89
Sand skiers flash down manmade mountain.....116
Here it is: "Picture-Phone" lets you see caller.....122
Feather River dam would feed 600-mile system.....124
Ballast-reclaiming machine saves railroad \$140 per hour (Athey Products Corp., 5631 W. 56th St., Chicago).....128
Propaganda phonograph takes parachute drop.....132
Wheelless cultivator moves on endless steel track (O. W. Shelor, 601 Front Ave., Salem, Va.).....132
Back-yard airplane "flies" on ground.....139
LSM converted for deep-sea oil drilling.....139
Rake on casters levels lawns (Wilson Distributors, 111 Stephen Place, Box 93, North Syracuse, N. Y.).....142
Standard bus rides the rails.....143

(Continued to page 108)

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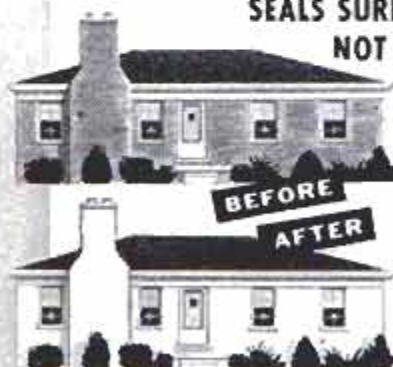
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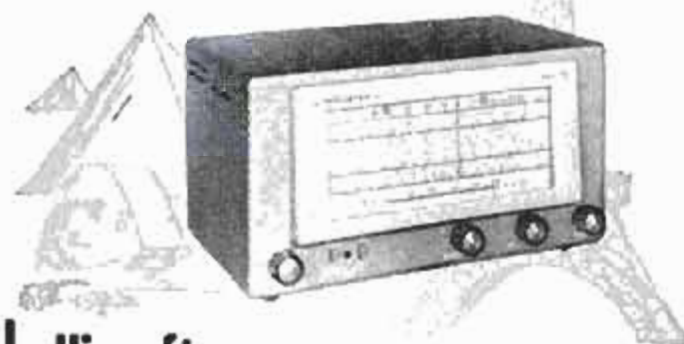
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(Continued from page 106)

Truck hoist built from kit features light weight and simplicity (Hydraulics Unlimited Mfg. Co., P.O. Box 207, Eaton, Colo.)	142
Pocket instrument compares surfaces (Bausch & Lomb Optical Co., 635 St. Paul St., Rochester, N. Y.)	147
Guide for hair clipper assures even cut (Home Trimmer Co., 20 W. Jackson Blvd., Chicago 4)	151
Mobile drill platform rests on stilts (R. G. Le Tourneau, Inc., Longview, Tex.)	151
Police call box	284
Mesquite becomes cattle feed	318
Hospital call system	330
Car drives generator (Kato Engineering Co., Mankato, Minn.)	332
Hearing aid for dogs (Malco Co., 23 N. Third St., Minneapolis, Minn.)	336
Paper cutter has safety roller (The Crusader Co., Dept. 149, P. O. Box 368, Woodland Hills, Calif.)	338

PHOTOGRAPHY

Color-slide frustration ended by previewer and storage unit (Westphal's Handviewer, Box 133, Angwin, Calif.)	104
Camera mounts on helmet	132
Hobbyists can print photographs on metal (Grover Photo Products, 341 Arden Ave., Glendale 3, Calif.)	270

SCIENCE

Mushrooms from sawdust	60
Battle TV	117
Fully automatic communications center	133
Missiles travel 7000 miles per hour	143
Electronic oven uses microwaves to bake cake in six minutes (Tappan Stove Co., Mansfield, Ohio)	152
Low temperature traps energy	152
Remote control for television set employs ultrasonic commands	153
Tiny transducer locates heart defects (Dr. Samuel Bellet, 2021 Spruce St., Philadelphia 3, Pa.)	270
Peat-taconite partnership	282
Rocket fuel becomes rust inhibitor	302

Radio-Television, Electronics

Why buy an oscilloscope?	261
--------------------------	-----

Craftsman and Shop Notes Index

CONSTRUCTION

Shingle platform is self-supporting on double-course walls	216
Reduce crawl-space humidity with adequate ventilation	216
Dam prevents gully erosion	260

HOUSE AND HOME

Covering window helps increase wall space	210
"Air washed" roof keeps porch cool	210
Metal flashing under fascia board prevents water damage to dormer	210
Hamper partitioned to aid in sorting clothes	224
Corner box stores blankets for twin beds	225
Improvised steam-pipe deflectors direct heat into basement	228
Footstool-chest	229
Chain permits proper seating of toilet flush ball	248
Quarter-round prefinished to simplify painting	248
Metal "stirrup" in concrete base extends life of rotted post	250
How to restore piano finish checked by hairline cracks	251

HOUSEHOLD HINTS

Solving Home Problems—	
Bar of soap can be used to lubricate needle	214
Handy spool rack	214
Sandwiches are slipped easily into bags	214
Releasing fountain-pen cap that has become stuck	214
Plastic bottle caps that are difficult to unscrew	214
Serviceable one-pot "greenhouse"	215
Clean silverware with toothpaste	215
Size and style number of shoes kept legible	215
Storing shoes that are not often worn	215
Fishbowl cover that is easily removed	215
Care and use of rubber gloves	222
Handy utility tray keeps house-cleaning materials together	222
Magnet holds cover on automatic washer open	224

(Continued to page 110)

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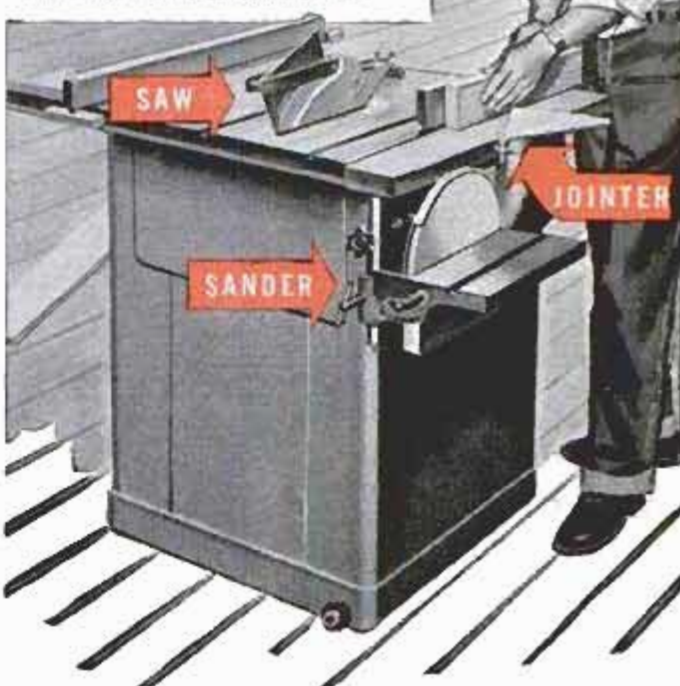
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(Continued from page 108)

Rubber-headed tacks keep breadboard from skidding.....	228
Liquid-soap dispenser	235
Tape protects bottle labels.....	236
Clothespin holds milk order.....	238
Ironing-board cover fastened with safety pins and cord.....	238

MISCELLANEOUS

Sandbox contents stored in milk cartons for winter.....	213
Card-dealing error corrected.....	224
Looped cord on wand "impossible" to remove from buttonhole.....	224
Lawn furniture easily stored between joists of garage ceiling.....	228
Mysterious jumping-match trick.....	228
Film-spool wheels for toys.....	232
Acoustical tile and wooden pegs provide hours of fun.....	234
Invisible writing on paper.....	234
Cork on hard masonry wall receives bulletin thumbtacks.....	244
Compass on tractor saves steps.....	260
Pressure tunnel for hay drier made from compacted bales.....	260
Trailer-mounted fence reel.....	260
Underground location of well found with two pieces of string.....	260

PHOTOGRAPHY

Midget flashbulb case.....	217
Low-voltage light aids in setting photo-enlarger f-stop.....	222
Hinged darkroom paper cutter.....	225
Photoflood clamp "slipproofed" with coat of rosin.....	236
Darkroom timer set without light.....	238

TOOLS

File tang is handy drift for removing drill bits.....	244
Long-nose pliers shaped to remove sanding disks.....	244
Rotary file used as reamer.....	244
Portable vise mounted in concrete.....	248
Two clevises form universal joint.....	250
Shopping for Tools—	
Direct-reading force gauge.....	253
Hold-downs for use on machine tables.....	253
Compact one-motor workshop.....	253
Builder's framing rule.....	254
Router kit.....	254
Ornamental-iron porch columns.....	254
Portable metal shear.....	255
Weld positioner.....	255
Glass cutter.....	255
Precision tapping tool.....	255
Testing device for auto cooling systems.....	255

WORKSHOP HINTS

Drain hole punched in can.....	216
Tightening loose setscrew.....	216
Snap fasteners tightened with locking pliers.....	222
Toolbox drill holder.....	225
Nail driven into saw kerf relieves saw binding.....	228
Hose is round-work sanding block.....	229
Waxed folding rule protected from dust and wear.....	229
Friction clamp holds T-square in position on board.....	232
Glue sizing for wood joints.....	232
Improvised lock washer.....	232
Panel of wood or plate glass carried in rope sling.....	232
Tape skidproofs drill point.....	234
Vacuum cups on tape dispenser permit one-hand operation.....	234
Luminous paint "lights" dead fuse.....	235
Melting stick shellac.....	235
Special force cup clears obstruction from floor drains.....	235
Flowerpot lamp on tripod is novel planter.....	236
Nine uses for eyebolts.....	237
Drawer pulls protect open toggle switch from damage.....	243
Pitted gasket seat smoothed.....	243
Vacuum collects belt-sander dust.....	243
Rack for small parts made from coffee cans.....	244
Keyhole saw more easily filed in conventional vise.....	248
Adjustable lathe center for supporting small work.....	250
Screwdriver blades hardened by heating and quenching.....	250
Threading taps kept sharp.....	250
Bend plastic the easy way.....	251
Felt hat provides disks for buffing wheel.....	252
Fractured plasterboard can be severed with handsaw back.....	252
Increasing vise-jaw capacity.....	252
Petroleum jelly on fiber washers keeps battery-cable nut free.....	252
Setting engine valves.....	252
Aligning circular-saw blades.....	256
Drill-press trays hold stock and finished parts.....	256
Retriever for small parts.....	256
Safe brad and pin driving.....	256
Diameter of cylindrical object measured with two squares.....	257
Sleeve holds square stock in 3-jaw chuck.....	257



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LOOK FOR THE 5 RIBS



New Powerfire electrode stands up better in today's engines. Photo shows how ordinary electrode (left) burns away. Champion's Powerfire electrode (right), after identical use, is still good for miles of powerful, full-firing performance.

THE PLANE FOR THE DO-IT-YOURSELFER

By Bob Gray

BOB NESMITH OF HOUSTON, Tex., hopes his "Cougar I" will do for flying what Henry Ford's Model-T did for driving—put an airplane in reach of all who want one.

All, that is, who want one enough to build it themselves. Unlike Mr. Ford's early creation, this high-speed, low-cost craft won't be sold commercially.

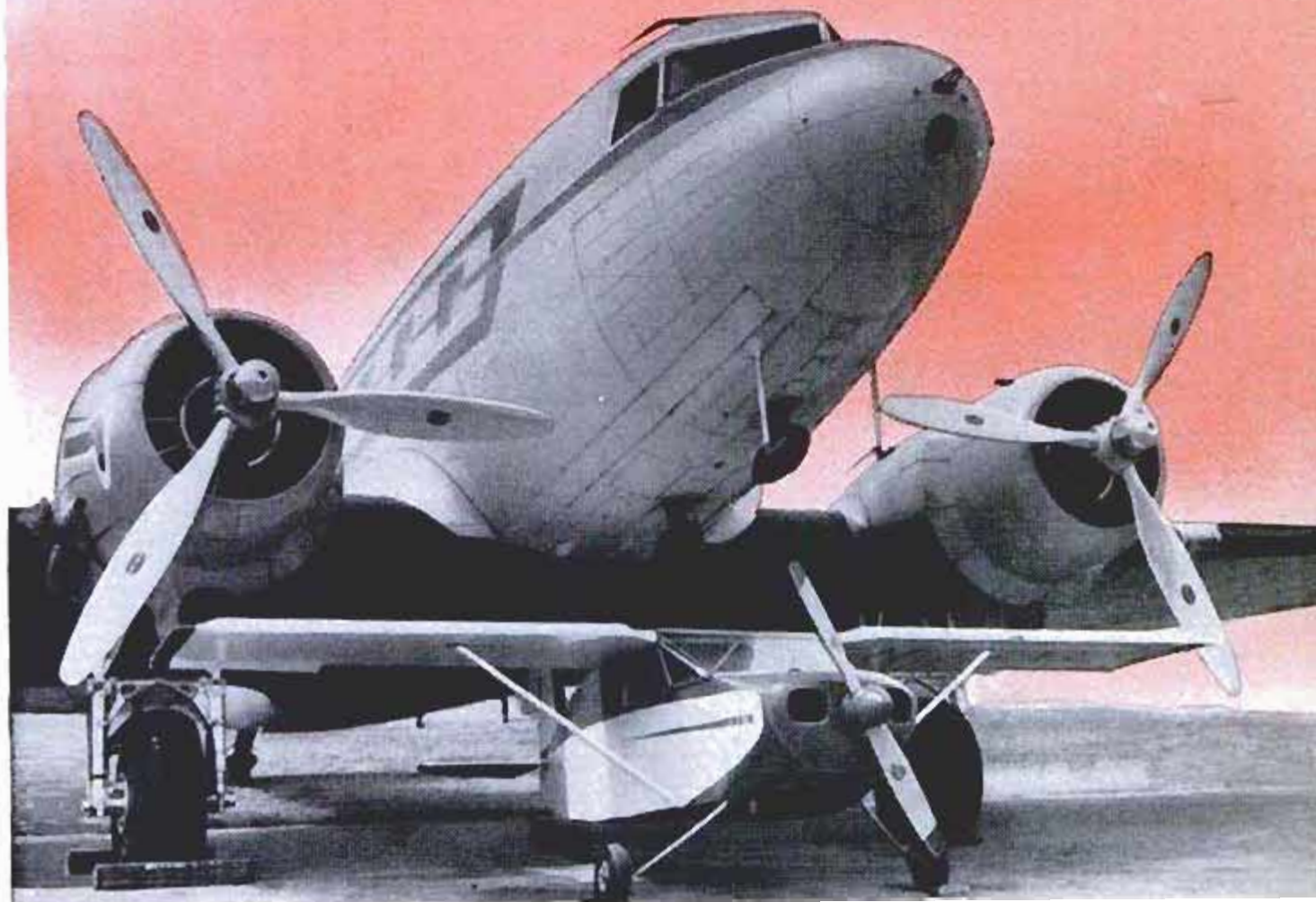
"Any reasonably good mechanic," says Nesmith, "can build this plane in his own garage workshop for \$1400 or less—even if he's never flown before."

That's what ex-Air Force ferry pilot Nesmith, 42, has been doing himself for the past year.

Convinced that sports flying shouldn't be limited to those who can plunk down \$15,000 for a swanky cabin job, he put the Cougar together with a maximum of safety, a minimum of cost.

And the Cougar is a current wonder of Texas aviation circles. In a field where 150 miles per hour is considered fast for even expensive light planes, the Cougar romps along at nearly 200 miles per hour, with only a 105-horsepower Lycoming in the nose. Wingspread is 20 feet; body length, 18 feet. Cruising speed is about 180.

Not only does this little ship have speed, but it also handles easily and has good stability. It is so stable in a power-on stall,





Graceful in flight, and not at all homemade looking, the little Cougar cruises at 180 miles per hour

in fact, that it will not fall off to either side in a spin. Instead, it simply hangs on its nose and moves forward at about 75 miles per hour. And, to complete the picture, the plane is economical to run, since its gas-consumption rate is low considering its speed.

Construction reflects Nesmith's determination for simplicity and low cost. Engine, wheels and instruments are stock items. An 85-horsepower Continental—costing \$200 less than the Lycoming—is adequate power, says Nesmith.

The fuselage is steel tubing with ordinary fabric covering. Wings are of built-up spruce ribs with $\frac{1}{16}$ -inch mahogany-plywood covering. Light sheet metal covers the cabin, while the one-piece windshield is Plexiglas that Nesmith molded over a wooden frame by pouring hot water on it.

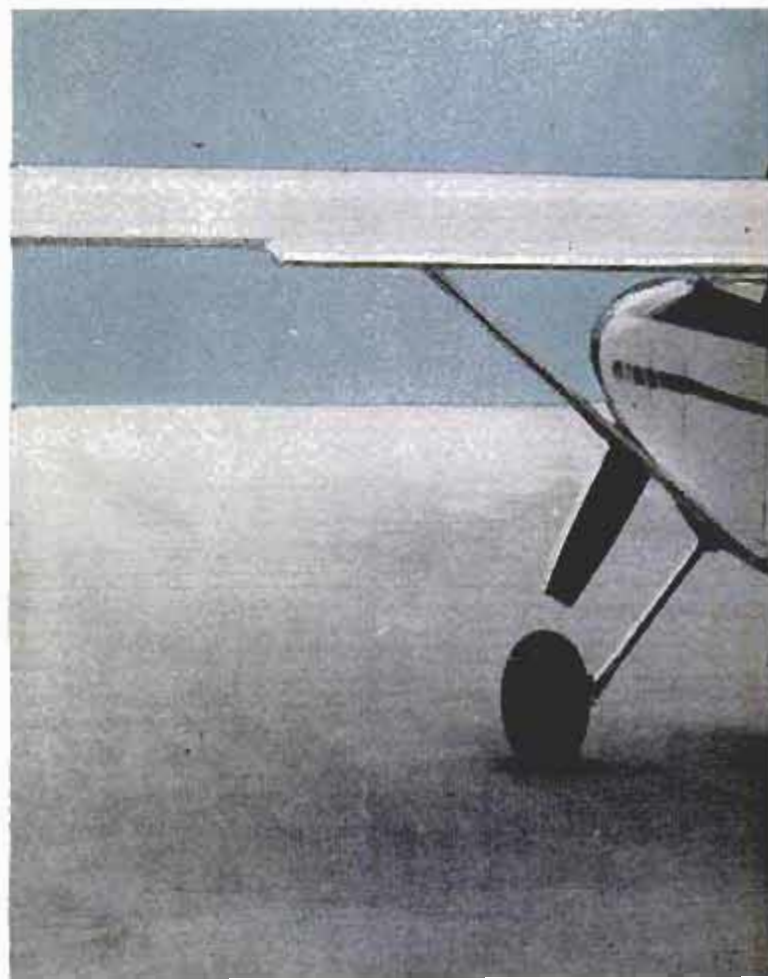
Bob Nesmith, the builder, says final plans show two inches more headroom in cabin for taller pilots

Empty, the Cougar weighs 600 pounds; fully loaded, 1200. It lands at 50 miles per hour without use of its flaps, takes off at 60 within 250 feet of runway.

Nesmith, who's been building and flying planes since he was 13, knew at the outset that most home mechanics aren't aircraft engineers. Neither, technically, is he. That's where the CAA comes in.

What makes building your own plane practical, he says, is readiness of the Civil Aeronautics Administration to provide free advice, supervision and inspection as you go along.

To insure "airworthiness," CAA Safety Agents in Houston checked the Cougar at each stage of construction. They looked over original plans, the materials, power plant, Nesmith's welding, controls and landing gear. That help and supervision is not only gratis, it's necessary before the CAA will give its blessing to the finished homemade plane.



The Cougar's cost, Nesmith says, is related to the builder's ingenuity. It cost him \$1600, but he had little time to look for second-hand parts. "Around most airports," he says, "you can get about 80 per cent of this airplane for nothing."

Junked aircraft will furnish spars, fittings, all sorts of tubing. A bent propeller can be cut down to the Cougar's 64-inch requirements for about \$25. A new one might cost \$150.

In plans he's now preparing, Nesmith says he'll give detailed instructions on materials, their procurement, plus building techniques. And as far as he's concerned, everyone is welcome to the plans.

He'll turn them over to a Houston blue-printing firm where the public can get them for only the cost of the blueprints.

Why the generosity?

Nesmith says he's "made his pile." He runs the Houston firm of Robert E. Nesmith, Inc., a multimillion-dollar contracting firm.

Now that he flies only for a hobby, he says, he'd like to see more people of modest means doing the same thing.

The Cougar implements that desire by stressing safety and economy. It will carry two people and 96 pounds of luggage about 1000 miles without refueling. It got the CAA Certificate of Airworthiness on Dec. 27, 1955.

Those who build it, by CAA rules, will have to fly it within a 25-mile radius of their "home" field and carry no passengers



Professional look is carried into the cabin and instrument panel. Windshield is made of curved plastic

until after the craft has logged 50 hours. Then the horizon and your pocketbook are the limits.

The home craftsman who tackles the job, Nesmith says, should be prepared to spend up to 600 man-hours of work. That's what it took him.

"But that's an asset, too," Nesmith adds. "You can build the plane a little at a time, and buy your materials as you get the money." ★ ★ ★

Cougar maneuvers easily on the ground because of its light weight, requires only one man to hangar it





Sand-skiing match drew 8000 cars and 25,000 spectators. International champions participated in the meet

Sand Skiers Flash Down Manmade Mountain

ONE OF THE biggest sand piles in the world is a 200-foot manmade mountain at Fort Meade, Fla. Its top is 330 feet above sea level, making it the highest point in Florida. The pile, which consists of tailings from a Swift & Co. phosphate mine, grew

during a five-year period to cover 18 acres and contain 3,000,000 tons. Now it serves as a waterless beach for inland Floridians who sunbathe on its slopes. It has even been the site of a sand-skiing match that drew 25,000 spectators.

Sand when dry makes for smooth, fast skiing. Winner of meet made it down 356-foot course in 11 seconds





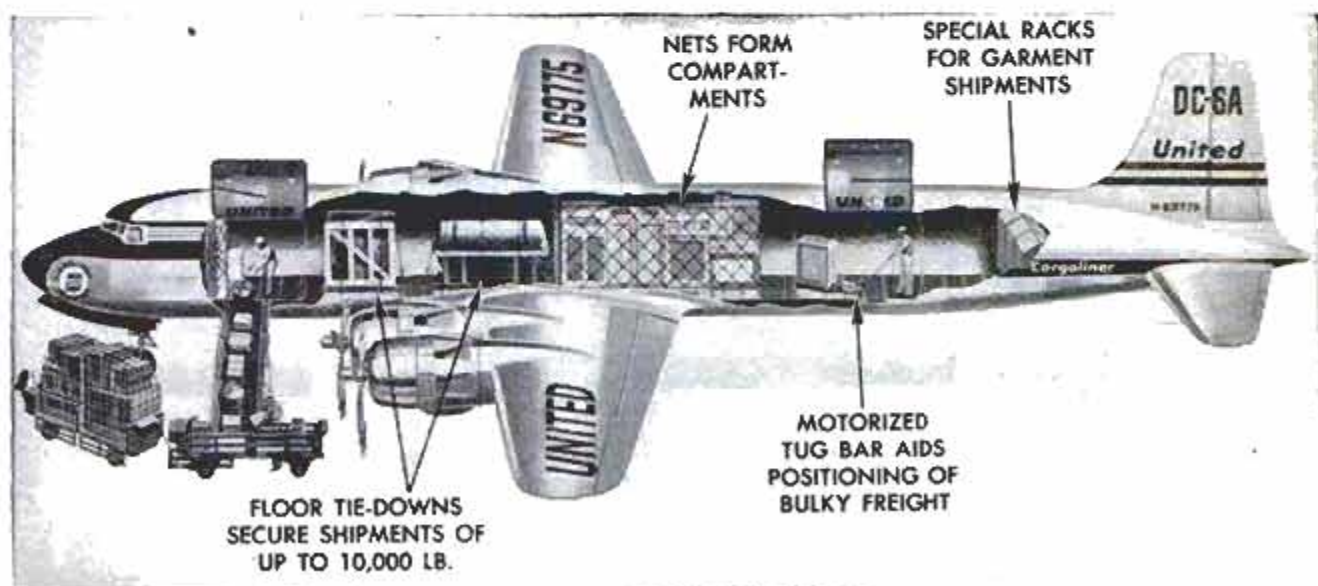
Army scouts will soon be using an eight-pound TV camera and a 47-pound backpack transmitter to send on-the-spot battle-picture reports to command posts. Pictures up to a mile distant can be picked up by the camera and sent to a receiver another half mile away. The camera has four interchangeable lenses, including a wide-angle lens for viewing a broad sector and a telephoto lens for subjects at a great distance.

A tripod replaces the pistol grip for unattended operation in radioactive, exposed or remote positions. The back-pack transmitter can operate continuously for two hours on a five-cell rechargeable silver-zinc battery that can be replaced in two minutes. Push-button controls at a Jeep console permit Army troop leaders to monitor pictures taken by five cameramen and to relay them to higher headquarters.

United Air Lines Puts DC-6A Air Freighters Into Service

Five new DC-6A Cargoliners, capable of carrying payloads of over 30,000 pounds per flight, are going into operation on United Air Lines' coast-to-coast schedule. The planes will carry no passengers, and will nearly double the line's total freight-carrying capacity. With a range of 2400 miles when fully loaded, the DC-6A has

many advances over earlier air freighters. Powerful floodlights have been installed on board to illuminate ramps for night operations. Nets divide the cabin into compartments for destination allocations and fast loading and unloading. Schedules call for overnight flights from Newark to Los Angeles and San Francisco via Chicago.





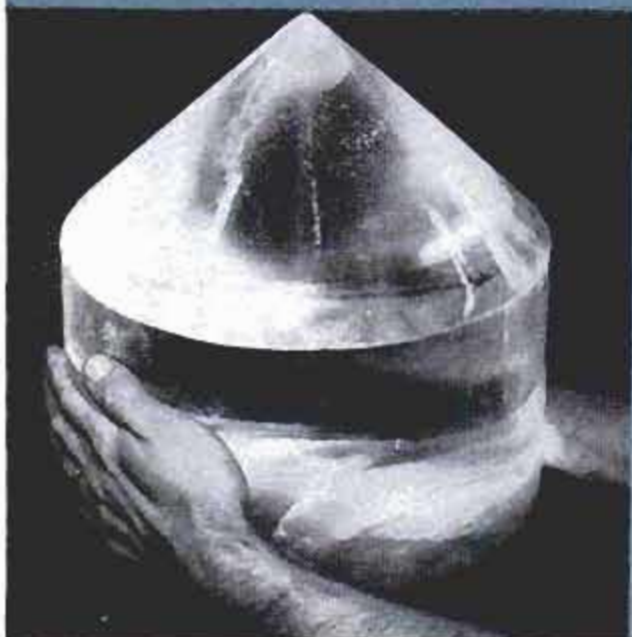
MAGIC CRYSTALS GROWN HERE

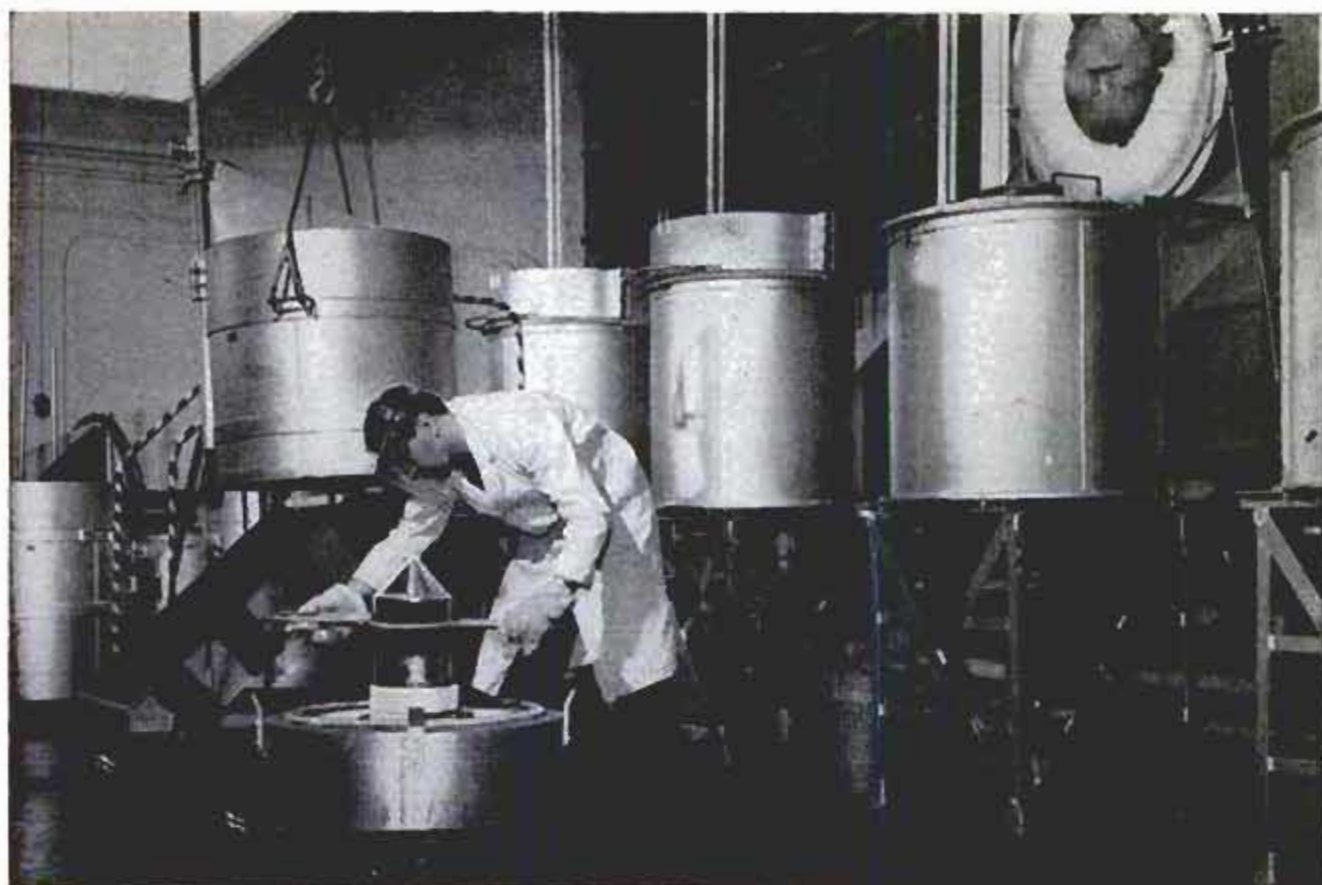
Above, typical prism, lens and window blanks in foreground of picture were cut from synthetic optical crystal ingots like those in background

Large crystal of sodium chloride, below at left. In this form, crystal is called an ingot, and takes its shape from crucible in which it is grown

Platinum crucible shown below at right, worth a small fortune, is reshaped on steel mandrel after having been used in growing a chemical crystal

By
Walter E. Burton





An inverted platinum crucible is removed from a crystal after a quick heating to liquefy the crystal surface

CHEMICAL CRYSTALS that remember things, "smell out" uranium at long range, help identify unknown substances, make infrared and ultraviolet light do tricks; crystals that can be rolled into thin films as if they were so much plastic, and others so hard they must be cut with diamond saws or so dense that they are in a class with lead and gold—these are some of the strange products of a Cleveland, Ohio, laboratory whose technicians often wish they had a fortune teller's crystal ball to guide them in their pioneering work.

This crystal center is at the main laboratory of the Harshaw Chemical Company. Unlike automobiles, the crystals seldom lend themselves to mass-production methods, and the demand for a particular kind often is limited.

MIT Process

About 18 years ago, the need for new sources of large infrared-transmitting crystals became great. Up to that time, crystals capable of passing long-wave radiation (beyond the red end of the visible spectrum) without absorbing some of it had come principally from the Ural Mountain region in Russia. At the Massachusetts Institute of Technology, methods of making infrared-transmitting crystals of substances like potassium bromide and calcium and lithium fluoride were developed, and the Harshaw Chemical Company was asked to produce them under the MIT process. Since

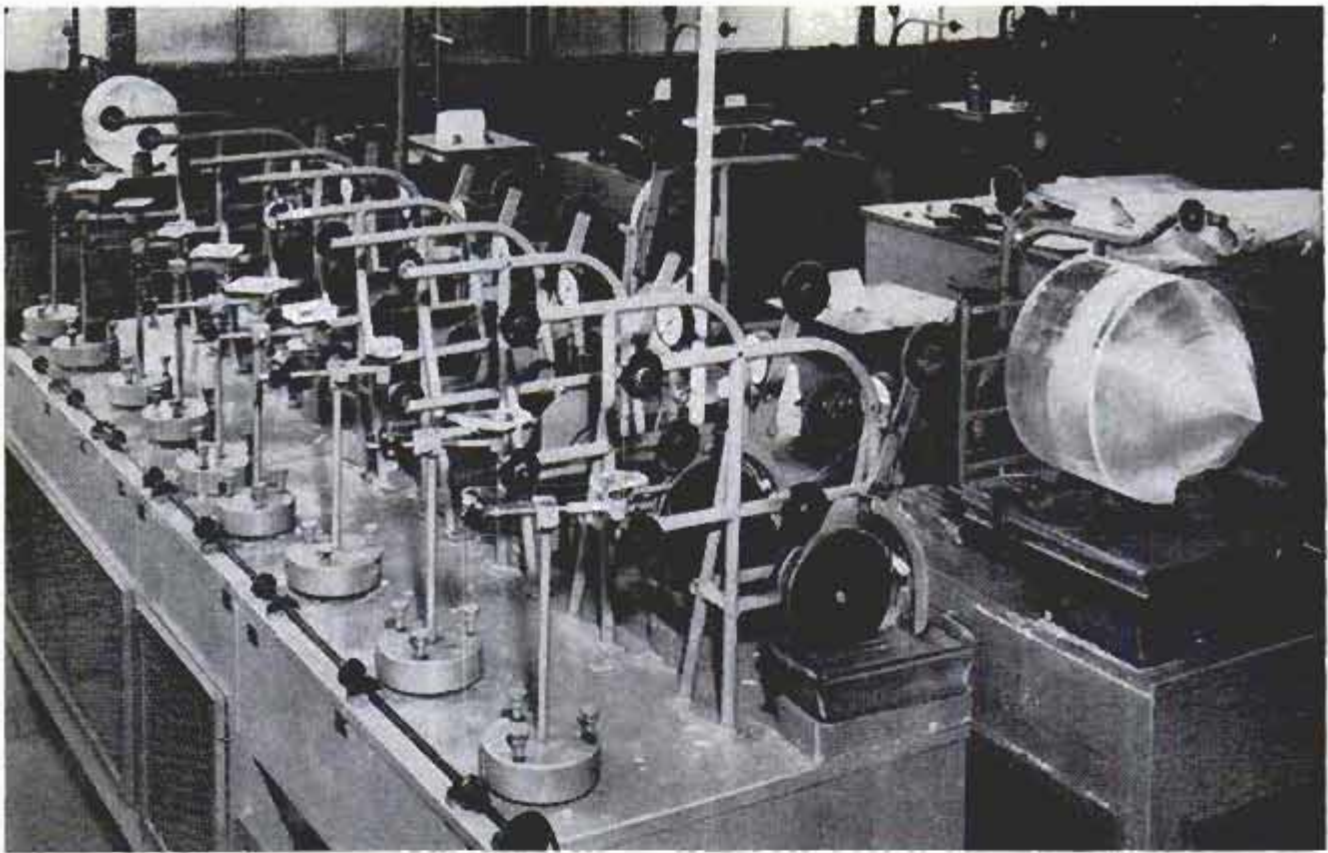
then, the crystal work at the Cleveland laboratory has led into strange byways and involved many chemical substances.

A chemical crystal is composed of a salt or combination of salts and often is soluble in water. Perhaps the most familiar example is sodium chloride, ordinary table salt. In the Harshaw laboratory, table-salt crystals have been grown weighing nearly 100 pounds. Such crystals—in fact, practically all of those made at the Cleveland laboratory—are produced by first melting the chemical and then cooling it under controlled conditions.

Three Groups of Crystals

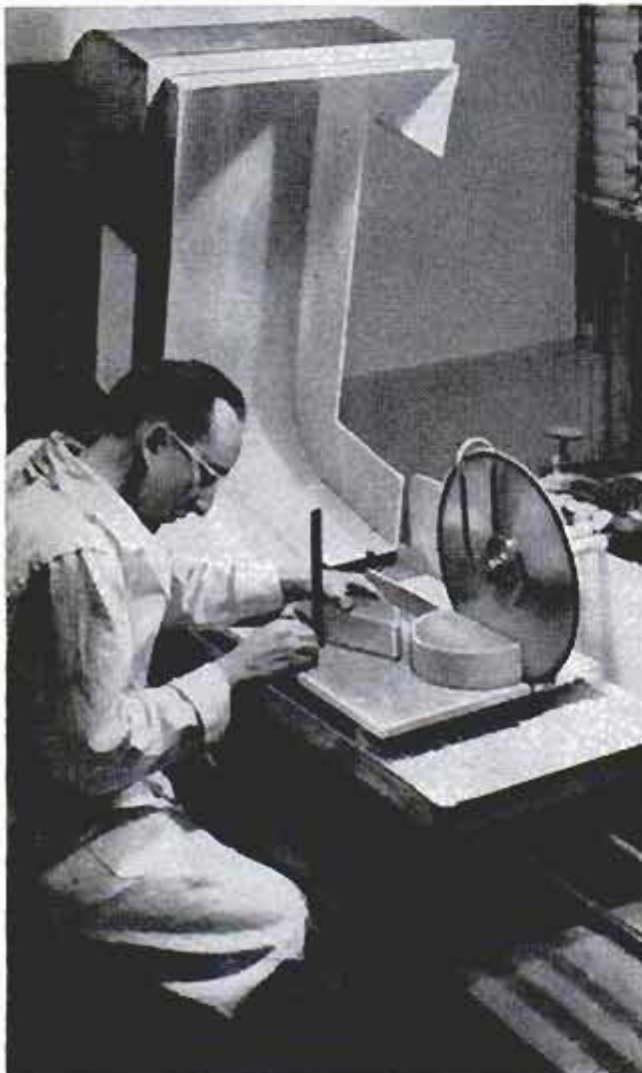
Crystals produced at the laboratory are nearly all of inorganic salts and fall into three main groups: 1. Infrared and ultraviolet-transmitting types; 2. Crystals for scintillation counting, as in uranium detectors; 3. Those suitable for use in electronic memory devices such as computers and automatic telephone equipment.

Ever hear of a string saw? It is one of the special devices developed at the Harshaw laboratory in connection with the crystal work. Although it takes various forms, a typical string saw resembles a bandsaw; but instead of a conventional toothed blade, it uses an endless cotton string that runs through a pan of water. The wet string, rubbing against a crystal made of a water-soluble chemical, gradually dissolves its way along. The crystal is fed to the string



String saws in foreground cut crystals into various shapes. At right, a large ingot is being cut by a saw

Some of the manmade crystals are so hard that they have to be cut with a diamond-charged circular saw



to produce slabs, cylinders, prisms or other forms. The cut surface is composed of a series of small ridges.

Purifying Is Important

In many ways, the process of manufacturing crystals is just as fascinating as the uses to which they eventually are put. Because the presence of even a minute trace of impurities may affect the optical or other performance of a crystal, the first step is the purification of the salt. This can be costly. In the case of cesium iodide, the cost of the raw material may run more than \$200 a pound; then the work of purifying it in preparation for crystal-making may double that cost.

After the chemical has been purified, it may have to be kept at boiling-water temperature in an oven for a week to drive out all traces of moisture. Next it is placed in a platinum crucible—which in itself may represent an investment of \$4000 for a size no bigger than a gallon bucket. A typical crucible of this size is shaped somewhat like a big-gun projectile—cylindrical with the bottom conical. The crucible and its chemical charge are heated in an electric resistance furnace.

After the charge, which is positioned near the top of the furnace chamber, has melted, the crucible is lowered at about $\frac{1}{8}$ inch per hour to the cooler portion of the chamber, so that, starting at the crucible bottom, the charge is gradually cooled below its melting point, and the entire mass becomes

crystallized. The crucible, still perhaps at 1200 degrees Fahrenheit, is transferred to another furnace and inverted, and the temperature raised rapidly. This causes a "skin" of the chemical next to the platinum walls to melt, and the crystal slides out of its costly jacket. Next it is placed in an annealing furnace where it may spend a week cooling to room temperature.

Crystals Can Be Machined

After that, almost anything may happen to the crystal—depending on the job it is to do. It may be mounted in a lathe and machined to precise shape and size, an operation done mostly by lathe bits that scrape rather than cut, and whose "chips" are whisked away by a suction hose. Frequently the crystal is cut with a string saw, ordinary bandsaw or a circular diamond saw, the tool depending on the hardness and other properties. Another way is to split the crystal along natural cleavage planes, much as an expert cuts a diamond. A piece of crystal of the scintillating type may be made into a cylinder and bored to receive a test tube; a radioactive material placed in the tube then will be almost completely surrounded by the crystal whose job is to catch radiation.

Mortality Rate High

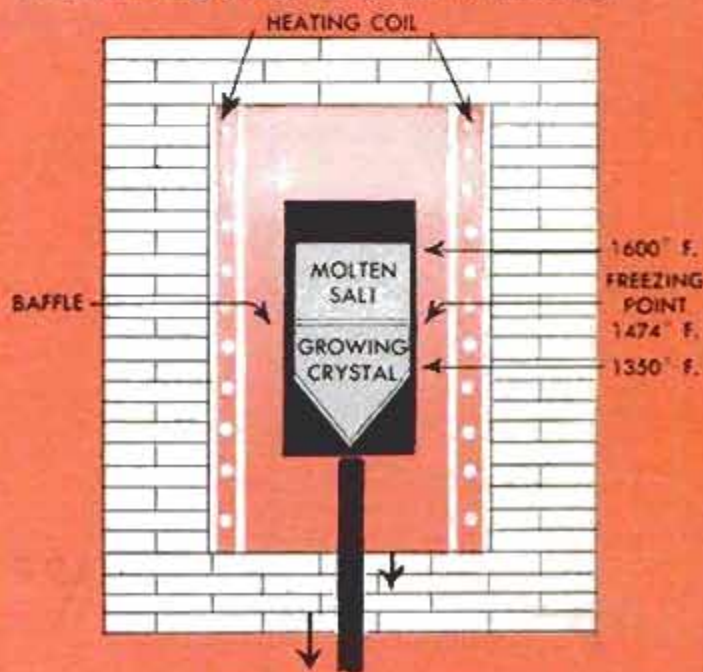
The mortality of crystals between the furnace and the final product may be high. It is not uncommon for a giant crystal the size of a loaf of bread to shatter as the result of a sudden mechanical or thermal shock, and wind up as a bucketful of little crystals. A lot of other things can go wrong. Going back to that cesium iodide whose purified form may represent a cost of hundreds of dollars per pound—a very low yield from the growth process may mean that the final, usable crystals are worth as much as some precious or semi-precious stones of comparable size. John Harshaw, an electrical engineer-chemist turned crystal specialist, who is manager of the crystal division, exhibited a large crystal that was being machined in a lathe to a form required by its future job in a laboratory. Finished and specially shock-mounted, the crystal, the only one of its kind in existence, would be worth the price of a couple of the better automobiles. "Where it is going, it will be handled by remote-control equipment," he said. "If it were not shock-mounted, and someone manipulating the controls should let it drop suddenly, the crystal might shatter into hundreds of pieces."

An outstanding Harshaw development is the making of synthetic optical crystals used chiefly in chemical analysis and other

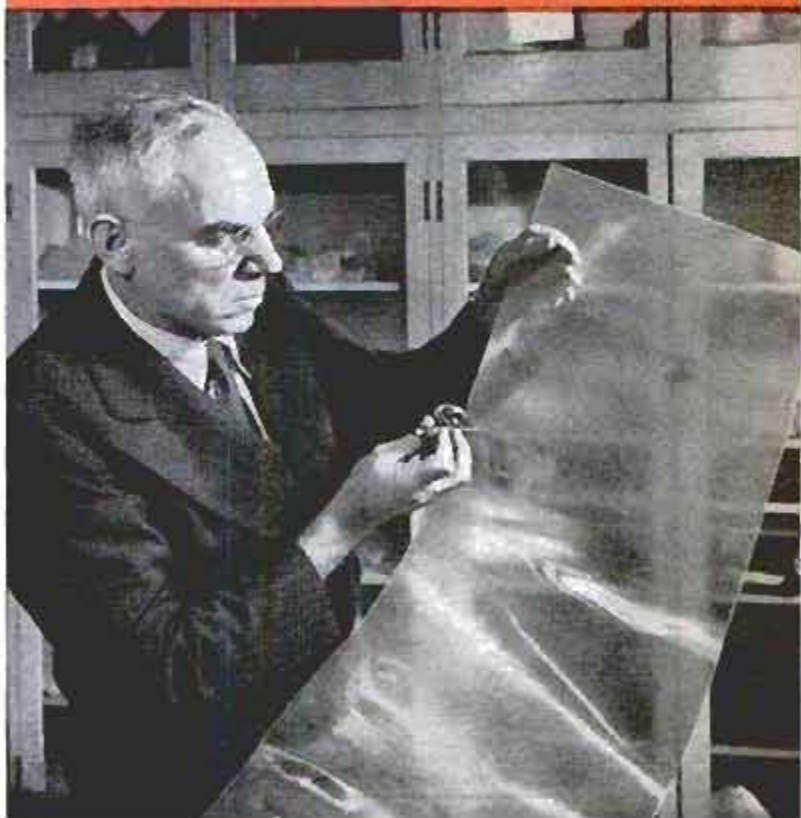
(Continued to page 320)



Laboratory worker splits a rock-salt crystal along natural cleavage planes, using hammer and chisel



Above, diagram of typical resistance furnace in which chemical crystals are grown. Crucible is moved slowly into cooler part of furnace. Below, crystalline silver chloride is rolled thin and flat



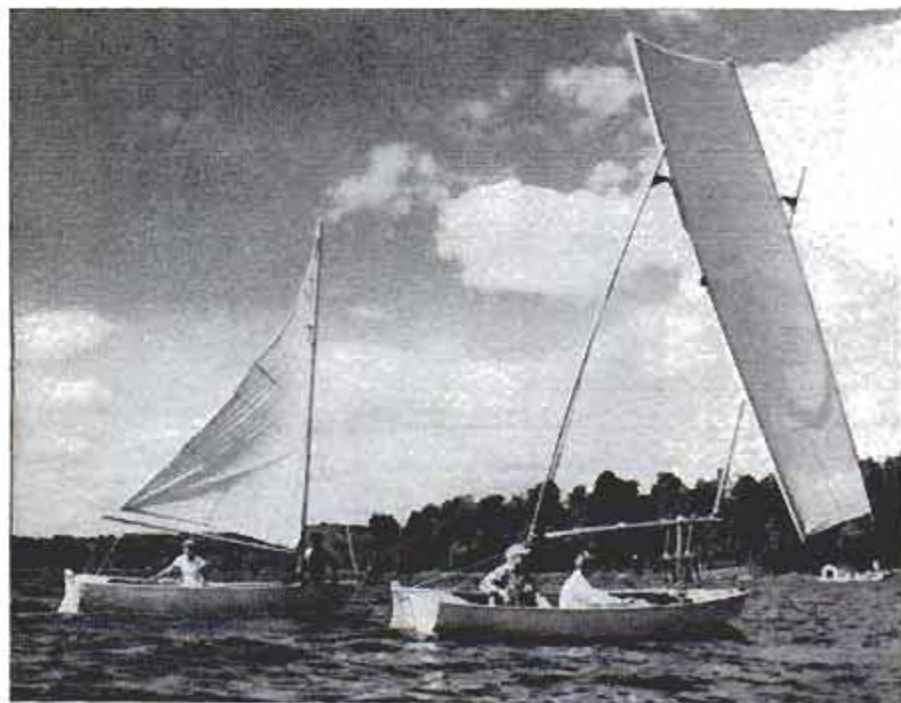


Experimental model at left has camera and screen in same unit. "Desk model" at right has a separate camera

Here It Is: "Picture-Phone" Lets You See Caller

Soon you may be able to see the person you are talking to on the telephone. Bell Laboratories has developed an experimental "Picture-Phone" system which has transmitted pictures over short and long distances, even from New York to Los Angeles. The experimental equipment has pictures varying in size from 1 by 1½ inches to 2 by 3 inches. The system, while somewhat similar to television, differs in several respects. In TV, 30 pictures are transmitted per second; the phone system sends out only one picture every two seconds, and the picture has less detail. It shows promise of being commercially feasible because the picture can be transmitted over a pair of ordinary telephone wires instead of expen-

sive coaxial cables or microwave relays. One new line, consisting of a pair of wires like the regular telephone line, would be installed at your home to carry the picture. With the experimental equipment you can dial the pictures into existence providing a switch is open at both ends of the line. If either switch is closed, the telephone call goes through without the pictures. Thus it would be impossible for a person to be seen by a caller unless he flipped on the switch, and he can flip it off again at will. The "Picture-Phone" requires only natural daylight or moderate artificial light. One model has the miniature camera mounted on a desk. Another incorporates the camera into the same unit as the screen.



Rectangular Sail Moves Boat Faster

One of man's oldest methods of getting from here to there has been revised. Burnice D. Bedford, a General Electric engineer, has come up with a rectangular sail for boats that is outperforming conventional sails. The canvas is stretched across a frame and suspended between two "masts." It swings upward in a breeze, lifting the boat instead of leaning it with the wind. It is said to be safer and faster than a triangular sail, reducing the tendency of a boat to overturn.

NOT REVOLUTIONARY? Months ago, Harlow H. Curtice, GM president, said the 1957 cars would not be revolutionary. You'll see soon.

If they're not revolutionary, they come mighty close to it. To be sure, there will be no rear engines, no gas turbines, no atom power plants—not even fuel injection or air suspension till the Eldorado Brougham.

But there will be revolutionary changes in chassis design to lower the cars from three to five inches.

Your still-new-smelling 1956 car will probably look as tall as a panel truck when you park it alongside your neighbor's 1957 model. And he'll have just as much headroom in his—in fact, some 1957 cars have more. How was the "miracle" accomplished? By a combination of factors: Sunk-en floors, especially in rear; flatter but wider frames; smaller wheels; lower seats; thinner upholstery; flatter roof design; lower driveshafts.

All these (and perhaps other) factors have subtracted enough to make the 1957 car so low that the man of normal height can wash the roof without getting on tip-toes. Each has subtracted only a fraction of an inch, but together the total is great.

Is it good to go so low? Certainly there are advantages. It lowers the center of gravity and improves road holding. It improves appearance, making the car look longer without being any longer (although some are six inches longer as well).

However, it does require that you stoop to enter. But you'll get used to it and you'll love the long, low look. Wait and see.

Tailfins and Headlights

This is the year of tailfins and headlights. Twin-headlight styling is spreading like the wrap-around windshield did a few years back. A battle rages between those who want the double lights to be vertical (like Nash and Lincoln) and those who want them to be horizontal (like Imperial and Mercury). The obvious compromise is to make them diagonal—and don't laugh! Already at least one company admits it is playing with the idea of oblique dual headlights (our first prediction for 1959!).

Such headlights would carry out the motif of the diagonal tailfin that is spreading like crab grass in the suburbs. When the Chrysler family came out well-finned in 1956, some critics thought this was too much. Why make a car like an airplane, they asked? But by this time next year, you'll think fins are as necessary to an automobile as they are to a sailfish.

Hudson and Nash will get minor facelifts for 1957. American Motors had hoped to bring out a pair of all-new cars this year, but by the time the decision was made, it

Detroit Listening Post



By Leo Donovan

was too late to get the tooling schedules set up. If hopes materialize, the 1958 Hudson and Nash will be out real early in 1957 and they will be plenty fancy. But in this business, it's a long time between introductions and anything can happen.

Is It a "Packabaker"?

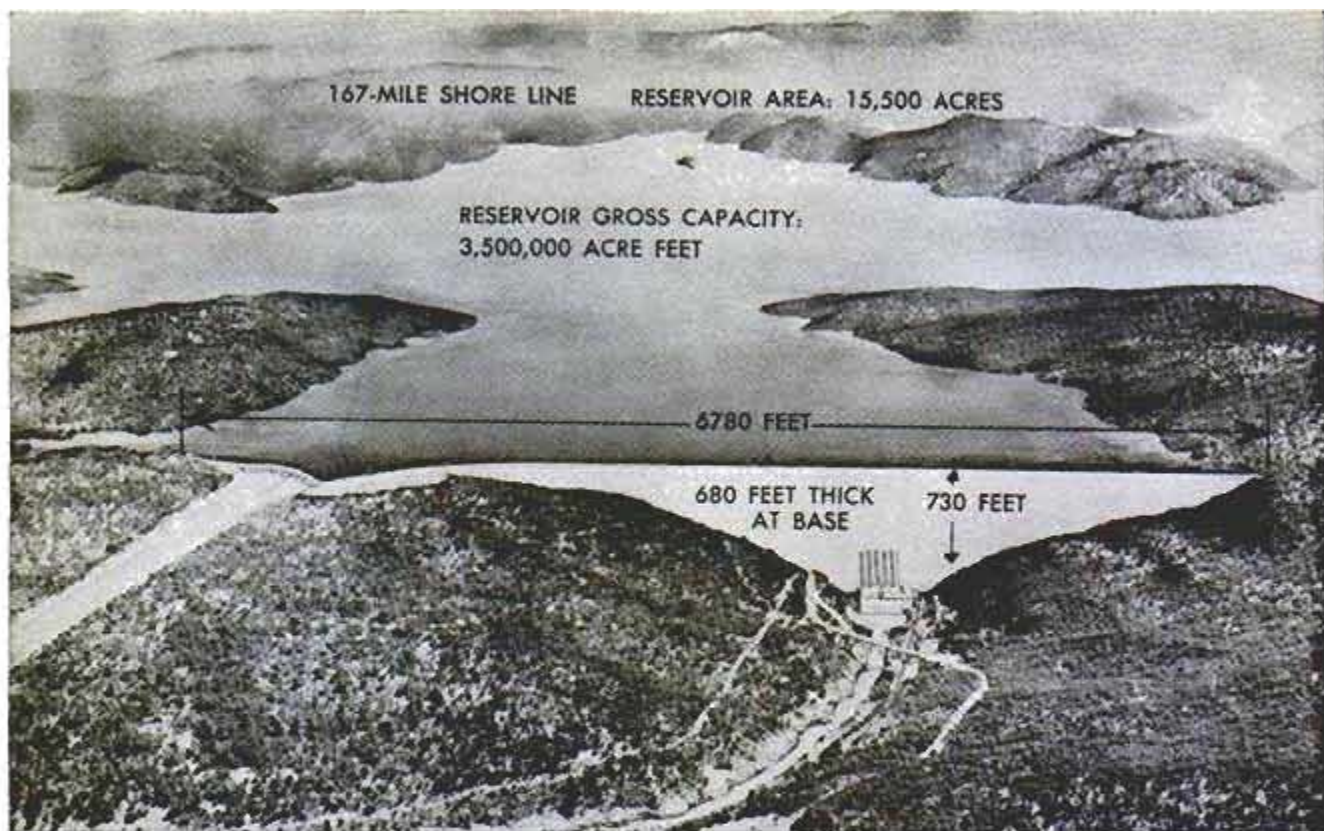
We've seen the end of the Packard as a prestige car, it's sad to report. The decision to build the 1957 Packard in South Bend means, according to insiders, that it will be a Studebaker with Packard name plate.

There just isn't time to move production tools from Detroit to South Bend. There isn't time to set up a new assembly line. The cars will come down the Studebaker line and trim will be added to provide a Packard look. But Packard as a separate, fine car competing with Cadillac, Lincoln and Imperial is gone. It will probably take a crash program to get even the "Packabaker" ready for January as announced.

It is now certain that all except Buick, Cadillac, Lincoln and Studebaker will have 14-inch wheels. And these exceptions will wear a special tire with a narrower white wall to make the wheel look smaller than it actually is.

Because of the possibility (remote though it is) of legislation to tax cars by horsepower in an attempt to reduce traffic deaths, the industry is expected to slow down or at least to play down horsepower increases. Nobody ever says a word about horsepower until introduction day so anything can happen. If one manufacturer ups his power drastically, you can bet that his competition will follow along. Horsepower is the easiest part of a car to redesign! It can be done with the stroke of a pen (within limits).

There will be no Motorama this year and that may mean there will be no futuristic show cars. Chrysler had one on the way from Italy, but it went down with the ill-fated *Andrea Doria*. Photographs of it seem, to some insiders at least, to suggest that Chrysler was lucky—the dream car's styling already looked a bit out of date. That's how fast the industry obsolesces itself!



Feather River Dam at Oroville would create huge reservoir and allow water to be rationed out as needed

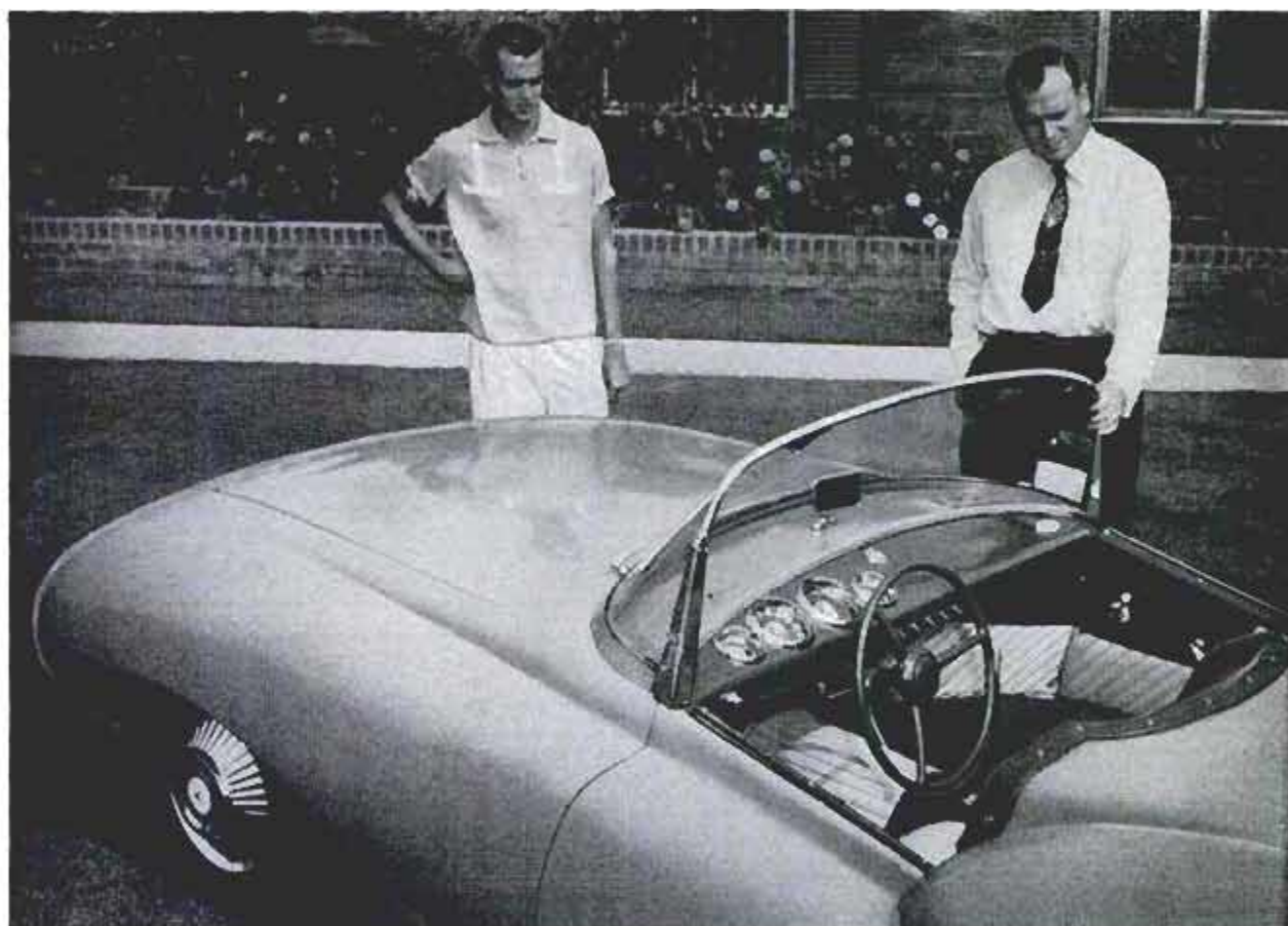


Feather River Dam Would Feed 600-Mile System

CALIFORNIA proposes to transport water almost 600 miles to irrigate rain-deficient areas in the central and southern parts of the state. First step in the project would be construction of a dam across the Feather River. Taller than Hoover Dam and containing more concrete than Grand Coulee Dam, it would release Feather River water into the Sacramento River to compensate for water diverted from the Sacramento by the proposed aqueduct. The dam also would provide flood control to prevent such disasters as last winter's flooding of Yuba City.

As much as four million acre feet of water per year would be carried by the aqueduct down the length of the San Joaquin Valley, under the Tehachapi Mountains, along the desert east of Los Angeles, and finally to reservoirs near San Diego. Various water-deficient areas along the right-of-way would be served. Total pumping lifts would be close to 4000 feet.

It is estimated that the project will cost \$1,500,000,000 over the next 20 years. It is part of California's over-all plan for making full use of its water resources. The plan calls for 260 new dams to provide water for 40 million persons and to triple the present irrigated acreage.



Admiring the fine installation job they did on the windshield frame are the author, right, and his son Bill

Father and Son Build a Sports Car

By Robert W. Berry

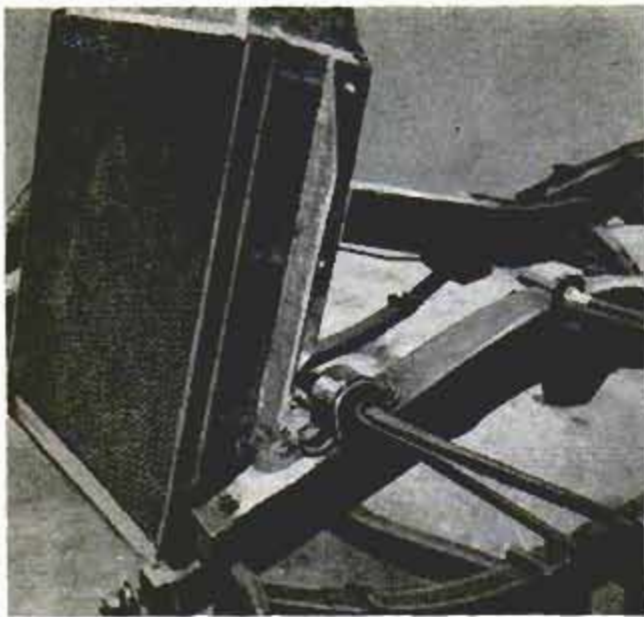
WHEN MY SON and I decided to build ourselves a sports car of our own design we didn't know what we were in for. It is probably just as well, because an awareness of the many, many late nights and long week ends in the garage might

have discouraged us from what has been a most rewarding experience.

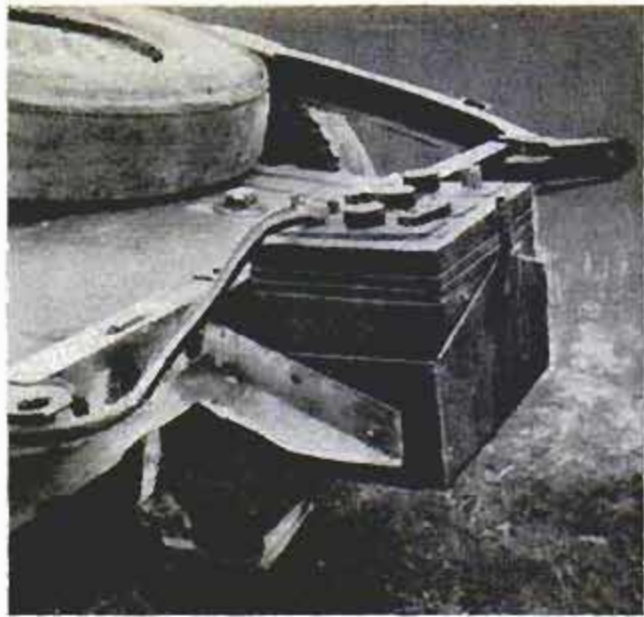
Bill, my 16-year-old son, and I had some experience building hot-rod cars, but to design and build a complete car was something new and challenging.

Completely designed and built by the father-son team, the Falcon is a sleek, handsome sports car with a plastic body





In order to provide the low hood line wanted by the builders, the radiator had to be slanted backward



Weight distribution is improved by putting the battery at extreme rear of frame, behind the gas tank



Wood templates covered with screen were assembled like this to form a frame for the plaster mockup



Plaster is then applied by hand to form the master over which the glass-fiber female mold is created

The car was built from the wheels up in our two-car garage. We used an old frame as raw material for the chassis. Side rails were tailor-made by cutting and splicing them to the 100-inch wheelbase. We boxed the rails by welding an additional channel and used tubing and boxed channel for cross members. We used tubular axles, leaf springs, airplane-type shocks and a fast steering ratio to insure the sports-car feel. Three and a half turns from lock to lock give a turn circle with a diameter of 32 feet. Drive is Hotchkiss and rear-axle ratio is 3.9 to 1.

The engine is a Buick V8 of 322 cubic inches, slightly modified to produce about 250 horsepower. Compression ratio is 9.2 to 1 and a two-inch dual-exhaust system is used.

To obtain fore-and-aft balance, the 12-

volt battery is installed at the rear of the frame. The radiator is slanted to provide the required low hood line. The wheels are 15-inchers. Tires are 5.90 in front and 7.60 in rear to provide easy steering plus good traction. The spare is a compromise of 7.10 for emergency use only.

Styling is our own and expresses a desire to be different without offending. It has a teardrop nose and a relatively high but flat rear deck to move the low-pressure area behind the car instead of above it. Cut-down doors give a sports-car look to the car and the single tailfin adds a little flash. These are individual opinions which you may not agree with but, after all, the real reason for building a car yourself is to create something that you like. You are not trying to appeal to everybody, just to yourself.

The whole project took us 18 months of our spare time. The rest of the family helped at times and, on occasions, some of our friends pitched in.

The biggest part of the project was the construction of the tooling and molds for the plastic body. Standard methods were used. First, we built a full-size master plaster mockup and then made glass-fiber female molds from it.

Originally, of course, we made detailed scale drawings on which we worked out the dimensions. From this drawing, loft lines were laid out to full size on paper and wood templates made from the lofted lines. These were assembled into a frame to form the skeleton for the master plaster mockup. Screening was attached to the templates to support the plaster.

Commercial casting plaster was applied in two coats. We applied it by hand, but worked it with steel scrapers. This is the most difficult operation for a novice and the one we found the hardest to do. The surface of the master must be perfect because it is transferred exactly to the inside of the female mold and then back to the finished part. Successful work depends upon a well-finished master surface. To perfect the surface we did much sanding and polishing. Several months were spent on this operation alone.

In the next step we molded the glass-fiber female mold over the master plaster. This was made in one large layup and it required fast work by two or three men. The entire master was covered with glass-fiber mat and cloth, impregnated with polyester resin. All air bubbles must be worked out as you go along.

The female mold is flexible and requires support. A wooden framework is built to the contours of the master and attached to the outside of the female mold.

With the body tooling complete, we used the hand layup cold-set method to make the plastic body panels and sections. The

parts are about 1/8 inch thick, lightweight and very strong. Within 24 hours, parts could be removed from the molds and the rough edges trimmed with a saw.

The body consists of nine major plastic sections. These parts are carefully trimmed and fitted before being bonded together.

Surfacing of the body prepared it for painting. Careful sanding and filling with body putty were necessary.

The windshield (from a 1955 Pontiac) is held in place by a steel frame which is chrome plated. We sawed, filed and formed it by hand. It is fastened to the steel frame which reinforces the cockpit. We made the instrument panel of steel sheeting and it holds the chrome-circled dials at an angle looking up at the driver. The instruments include a tachometer.

Seats are the bucket type and the driver's seat adjusts fore and aft. We made the frames by cutting down a set of old two-door-sedan seats. Nothing we could buy would fit the troughs in our floor so we had to build the seats. The only job we contracted out was the upholstery.

Dry weight of the car is 2500 pounds and this gives an excellent power-weight ratio of 10 pounds per horsepower. Weight distribution of the unloaded car is exactly 50-50, front and rear. Center of gravity is low. Acceleration is excellent because of the fine traction. The ride is firm, but softer than on some foreign sports cars. Cornering is flat and breakaway speed is high.

The engine is very smooth running and, unlike some sports cars, is very quiet. Being coupled to the Dynaflow transmission, it is a pleasure to drive. Originally, we were devoted to the old stick-shift gearbox, but after driving the torque converter in our family sedans for many miles decided the automatic transmission is here to stay. Under the light weight of our plastic car, the Dynaflow just loafs along. Acceleration in Drive range produces faster acceleration than any stock car we have driven. ★ ★ ★

Extremely dignified yet with a flashy feeling is the front end of the Falcon. Note how headlights are inside grille





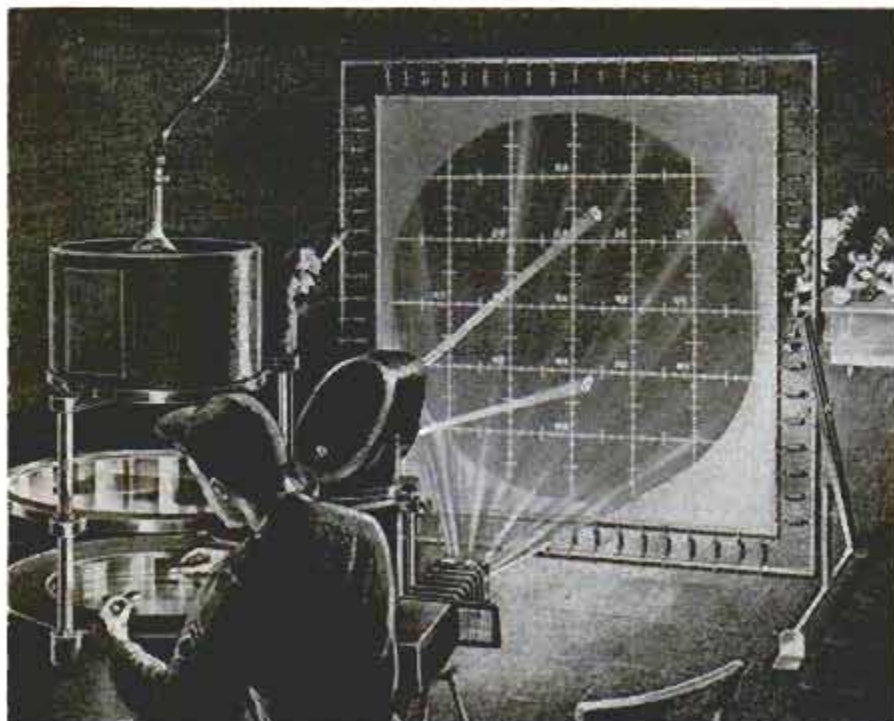
Scrapers on endless track shovel rock onto conveyor. After screening, cleaned rock is dumped into boxcar

Ballast-Reclaiming Machine Saves Railroad \$140 Per Hour

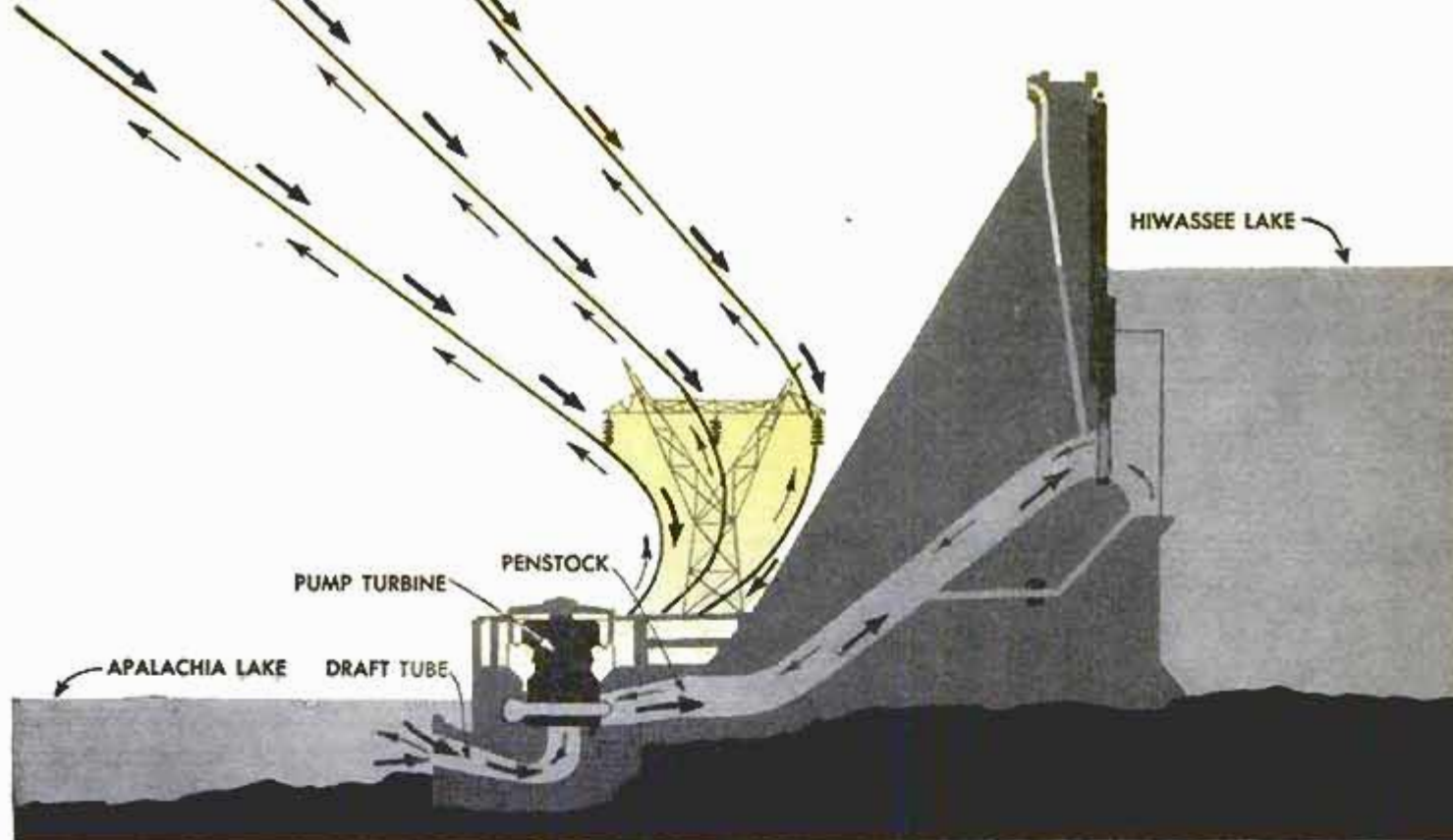
Ballast for railroad beds can be profitably reclaimed with a mobile unit. Reclaiming 140 tons of ballast per hour, the machine saves more than \$1 per ton over the cost of new ballast. Adjustable for cutting depth, the machine travels along railroad tracks and picks up ballast and

deposits it on a shaker screen. Dirt and other fine particles shake out and fall to the road bed. The cleaned ballast is then fed to a conveyor belt that dumps the ballast into railroad cars. Hydraulic controls, operated from the driver's seat, raise or lower conveyor for loading cars.

"Sky Screen" Speeds Relay of Radar-Tracking Information



Tracking of aircraft at air-defense filter centers will be speeded up as the new "Sky Screen" takes over. The Sky Screen is an optical projection device capable of faster and more accurate transmission of radar data on a viewing screen for aircraft control and identification. It is a unique arrangement of mirrors and lenses, and eliminates nearly all human factors in the relay procedure. The Sky Screen has an important potential use for airport-traffic control, harbor control of shipping and aircraft spotting from mobile units.



Arrows show how electricity flow is reversed to pump water uphill for storage in hours of low power demand

Surplus Power Pumps Water Uphill To Store Energy for Peak Loads

By Frank C. Osterland

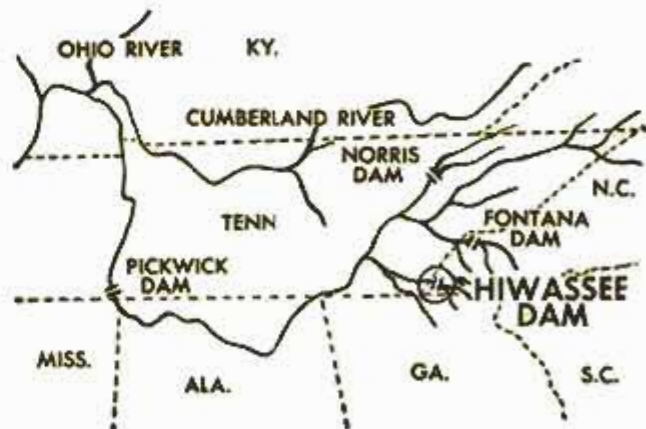
WANT TO SEE a 102,000-horsepower motor—largest in the world? A pump so huge it can lift three times as much water as New York City uses? They're both part of a remarkable machine recently installed at TVA's Hiwassee Dam.

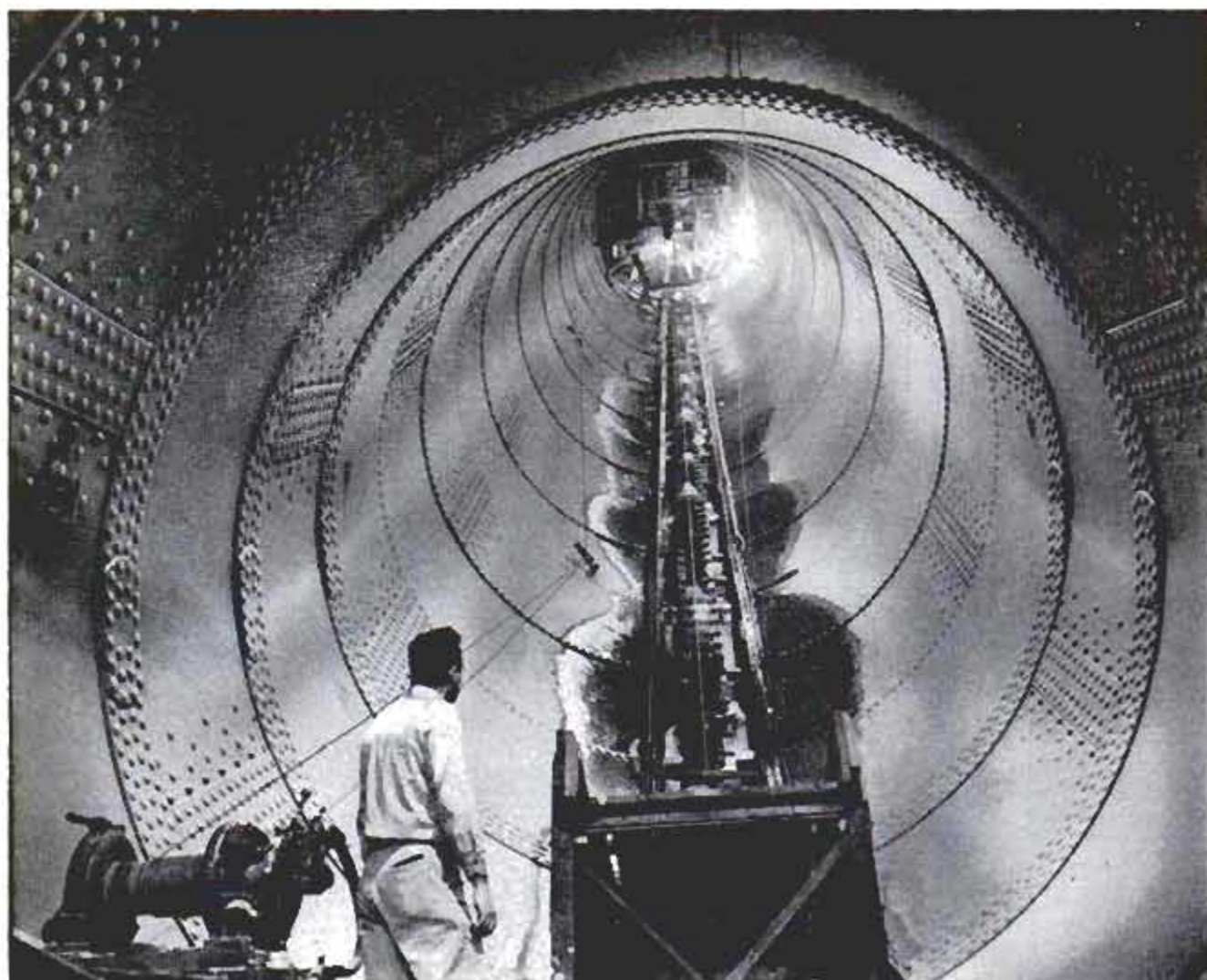
It's something brand new in the power business, a hydroelectric giant that's helping power engineers answer a problem of growing concern to electric power companies like the one that sells you electricity.

The trouble is, people don't use electricity at a constant rate throughout the day. At night, when homes and factories are quiet, very little is used. During daytime hours more than twice as much is needed. Power companies keep track of this daily rise and fall in our use of electricity.

Generators must be kept ready to take care of everyone's needs, even when the use of electricity is at its peak. And

More massive than a locomotive, and too large for rail shipment, world's largest motor had to be assembled in powerhouse at Hiwassee Dam. Motor develops 70,000 kva as a generator





Water is pumped higher than 15-story building through 18-foot pipe. Released, it rushes down to turn turbine

some generators in use when demand is high must be shut down when less power is used.

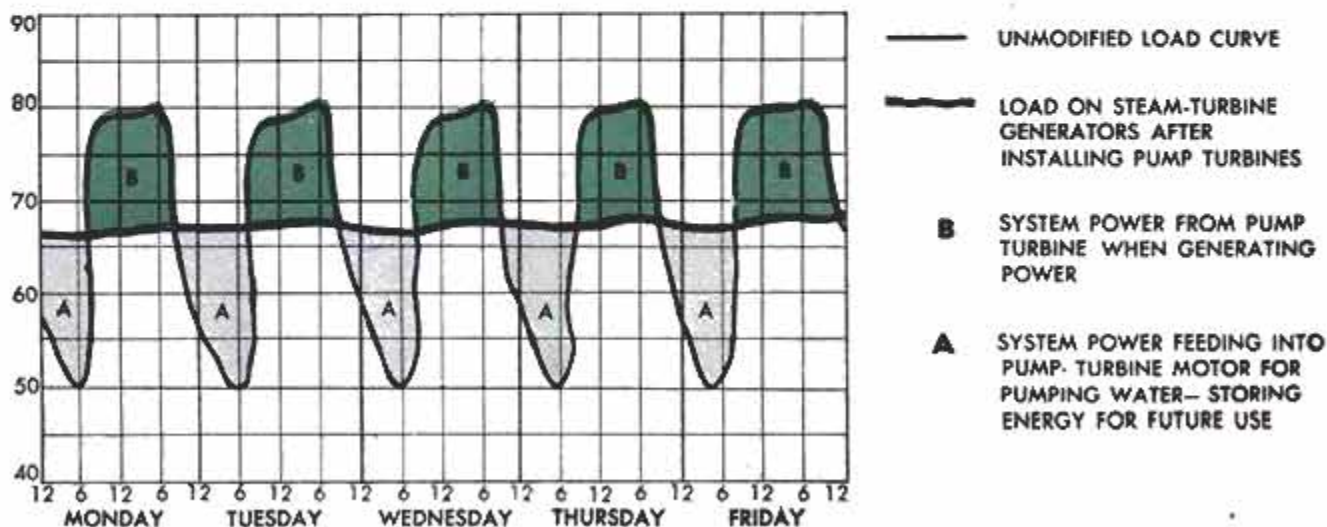
To complicate this problem even more, modern steam-turbine generators operate most economically 'round the clock, 24 hours a day. If they can't operate efficiently, our electric bills go up.

Power producers want to reduce the difference between high and low points on

their daily load curves. They need some means of using enough electricity to keep steam-powered generators in operation when normal demands are low. Otherwise, some generators will have to operate only part time, and the cost of electricity will be greater.

If American power planners are right, the answer to this problem lies in a scheme called pumped storage, in which water can

Chart indicates how use of electricity varies. Center line shows how power use is leveled with pump unit



be used over and over again for power production. And the new machine, called a reversible pump-turbine unit, fits right into this picture. It's a dual-purpose machine, built by Allis-Chalmers, which combines an electric motor and generator with a hydraulic pump and turbine.

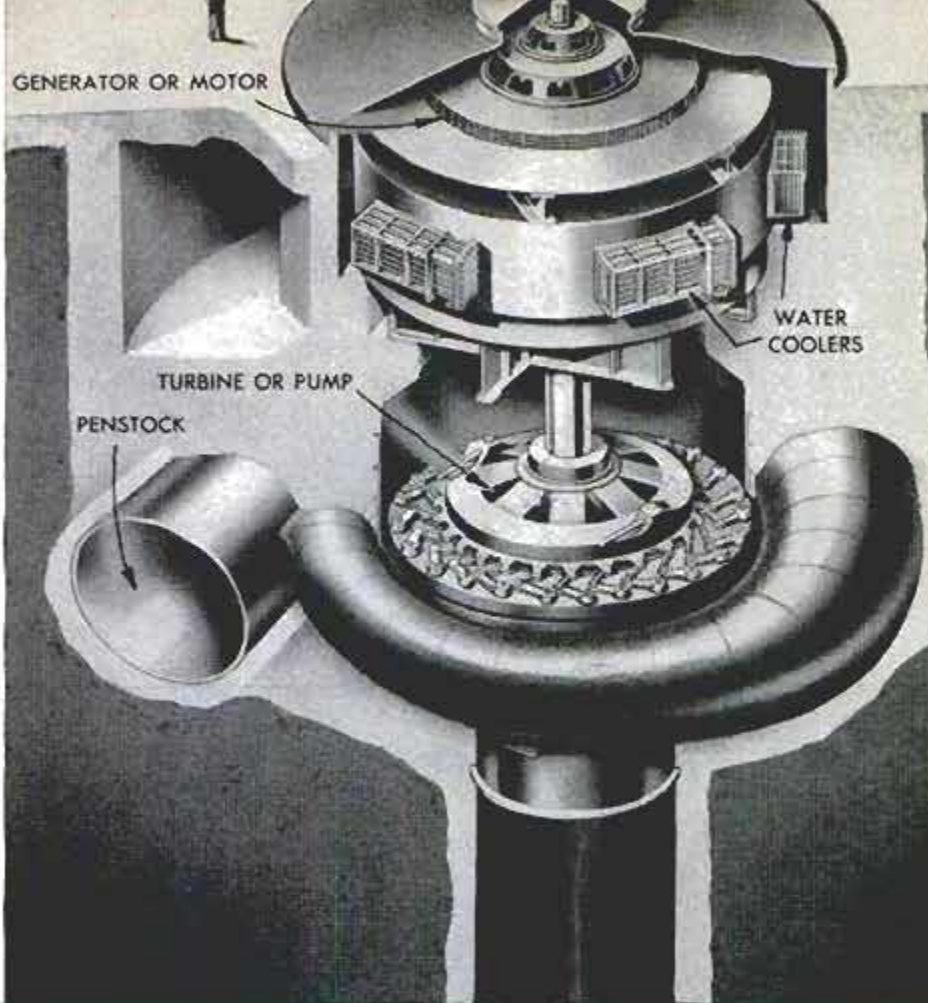
In pumped-storage installations, this reversible machine puts surplus off-peak generating capacity to work and pumps billions of gallons of water from a low-level reservoir into a higher storage reservoir. Then, when more electricity is needed, this stored water power is released through the same machine and converted again to usable electric energy. Pumped storage is like a hydroelectric storage battery for millions of kilowatts.

No, this is not perpetual motion. As much as one-third more surplus power may be needed for pumping than is produced again by water-power generation.

The accompanying chart shows how pumped storage with pump-turbine units operates to level off the peaks and valleys of a power-systems load. The Hiwassee unit is the first in the United States for this purpose, and others are being built.

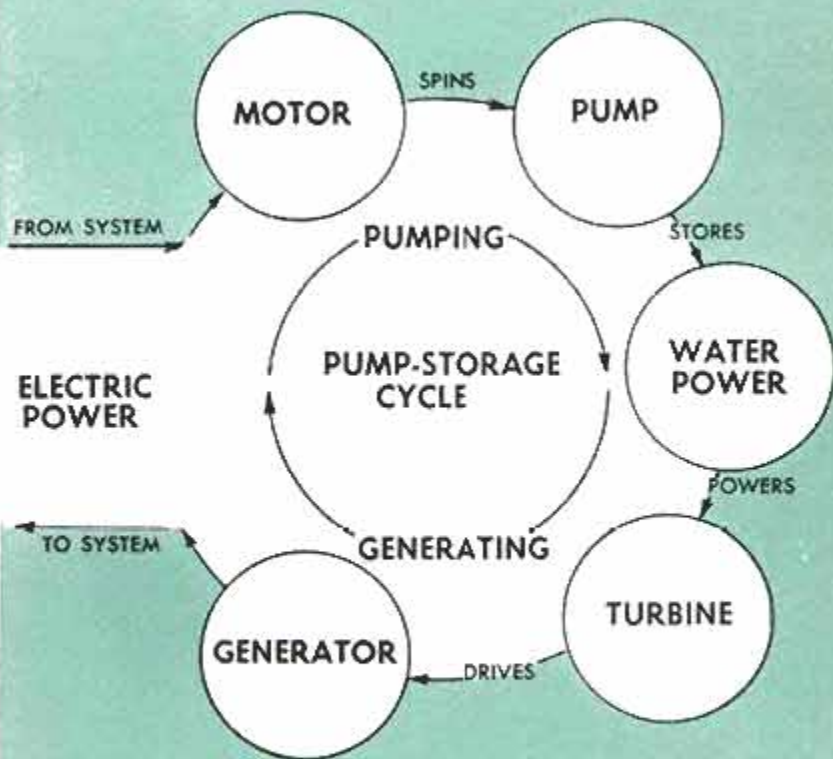
Mississippi River water will supply a pumped-storage project being planned for the St. Louis area in Missouri. Stored in a series of reservoirs formed by dams to be built along a small creek bed, this water will provide as much power as the entire area now produces in conventional generating stations.

Proposals have been made for another pumped-storage scheme in western New York. Water from Lake Erie would be pumped some 4½ miles to fill a storage basin covering almost 11 square miles. Studies have been made for a power plant of 400,000-kilowatt generating capacity below this basin. ★ ★ ★



Artist's drawing of the electric motor and reversible pump at Hiwassee. Rated at 102,000 horsepower as a pump, 80,000 as a turbine

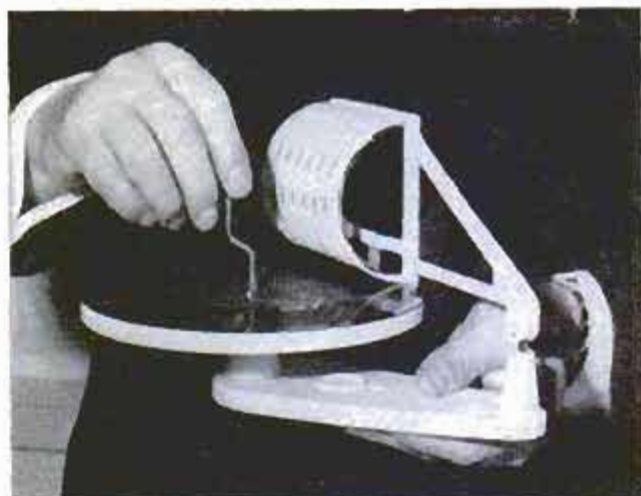
Diagram shows pumping and generating cycles. Current from system operates motor which spins pump, pushing water into reservoir. Returning water turns turbine which drives generator to produce electricity





Camera Mounts on Helmet

Handling a movie camera while flying a jet is risky business, so test pilot Gerald Huelsbeck mounted the electrically operated camera on his crash helmet. Now he doesn't have to remove his hands from the controls of the plane while taking pictures. A piece of lead on the other side compensates for the weight of the camera.



Propaganda Phonograph Takes Parachute Drop

Recordings to combat communist propaganda and a tiny, plastic hand-operated phonograph, rugged enough to be parachuted behind the iron curtain, are offered by Brig. Gen. David Sarnoff, chairman of the board of the Radio Corporation of America. Developed in the RCA laboratories, the little phonograph could be made for 50 cents, with records costing only a nickel apiece. A plastic "radiator" serves as a speaker. The set is designed to reproduce sound frequencies between 500 and 4000 cycles per second, the normal voice range.

Wheelless Cultivator Moves on Endless Steel Track

Home gardeners can cultivate to a depth of 18 inches with a miniature tractor that has a Caterpillar-type tread. The tractor moves on one endless steel-cleated track powered by a 1½-horsepower gasoline engine. The track cultivates the surface with a chopping action that mulches grass and

weeds. Plow blades are attached behind the tractor for deep cultivation. The tractor cultivates right up to fence lines and can be turned in a six-inch circle because of its wheelless design. It can be adjusted so it merely scratches the surface or subsoils the lawn or garden.

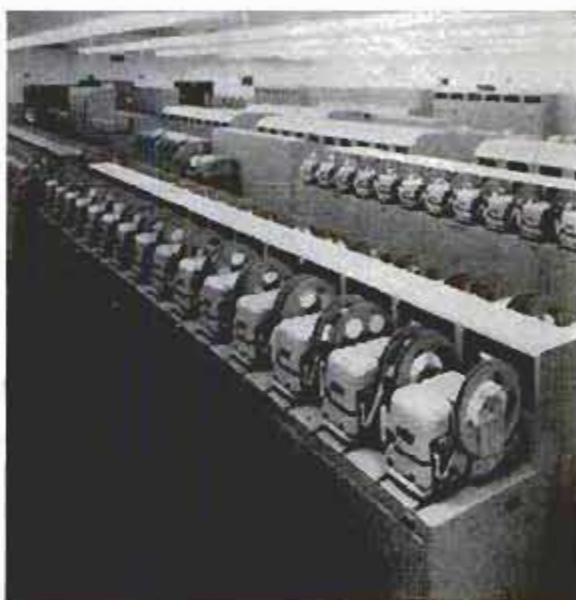




Above, Davis Communications Center from the air. Below, array of automatic teletypewriters at the center

Fully Automatic Communications Center

RISING OUT of the level fields between Davis and Winters, Calif., is a forest of branchless trees—the antenna towers of the Army's new automatic communications center. And in three buildings clustered beside this denuded forest is some of the most complex communications equipment in the world. The station is a relay point for messages from Army bases all over the Pacific, tying these installations with Alaska, Seattle, Los Angeles, Chicago and the Pentagon. A message is received automatically on a punched tape, which is then scanned by a machine that reroutes the message to a transmitter for relay to its destination. All messages are automatically sent on teletypewriter machines at 100 words per minute. Sixteen such circuits are in operation and eventually the station will have a capacity of 7000 words per minute. In older systems messages would be delayed hours at the relay station while operators routed and sent them by hand.



Below, transmitters which send messages from tape. Entire relay process is done automatically





During simulated rescue operation, wounded survivor is lashed into snow boat, which will be towed to base

Survive . . . or perish. Our pioneering men are learning the tough lessons of survival on the bleak, sterile ice of Antarctica, where

NATURE PUTS MEN TO THE SUPREME TEST

By Richard F. Dempewolff

Typical crevasse formation has overhanging walls that make it impossible for a man to climb out without help





Author and Dr. Oliver Austin, USAF, follow trail flags during 10-mile hike in blizzard. Trail is obscured

OUR AERIAL explorers are heading for the South Pole again, but through this Antarctic summer they won't go unprotected as they did a year ago. Last fall the trail blazers of Operation Deepfreeze flew pioneering missions for thousands of uncharted miles over the earth's southern ice-cap with only radio contact to guard their return to base.

Now a rescue and recovery squad with parachuting dog-sled teams is ready in the event of trouble, and practice sessions in emergency procedures have sharpened them into rescue experts. The pioneers weren't so well chaperoned a year ago and sometimes the going was grim.

For two days last February most of us aboard ships of Operation Deepfreeze's Task Force 43, listened glumly to weak SOS signals crackling in from a hand-cranked "Gibson Girl" transmitter. Then—silence. Somewhere out on Antarctica's lifeless waste, seven men returning by plane from a trail-blazing sledge trip into Marie Byrd Land had crashed and were fighting for

survival. Missing were pilot Bob Streich, copilot Glen Lathrop, plane captain John Floyd, a photographer named Chet Stevens and three Seabees—George Moss, Alvah Edwards and Dick Levesque.

Search planes combed the 4000-foot crags that jut from the high snow desert east of Little America. For seven days, while the world waited, they found nothing. Then, Lt. John Sullivan, pilot of a deHavilland Otter search plane skimming jagged peaks of the North Alexandra range, spotted some fluorescent orange wing tips.

"It's surrounded by signs of survival techniques just like in the movies," he radioed excitedly. "But no signs of life." Sullivan circled a camp neatly rigged and braced against the gales. Snow-block houses and walls sheltered material salvaged from the wreck. Parachutes had been used to make additional shelters. A thin line of sled and boot tracks snaked away through the desolate peaks.

An hour later, a helicopter out of Little America homed in on the scene. Hovering



Inside center section of survival tent, Ensign Tuck sets up single-burner stove to cook and heat tent



Steel talons called "crampons" are lashed to boots when crossing smooth glare ice of glaciers and bays



Hot-can rations cook themselves without flame. Drops of water are trickled into chemical which becomes hot

a few feet above the terrain, it followed tracks of men and sleds for 35 miles through the mountains. Twenty-five miles from Okuma Bay on Antarctica's coast, the 'copter crept up on the column of plodding men. They were walking home!

Seven-Day Nightmare

Later, aboard the USS *Glacier* on the day of their rescue, the survivors told us the details of a seven-day nightmare in blizzard-swept mountains, after their plane had crashed into a jagged peak during a storm.

"We cleared the plane of everything—in case of fire," said Lathrop. "We dug a snow cave under the wing tip, walled it with snow blocks and draped a parachute canopy over the outside. We rescued the Gibson Girl transmitter, a primus stove which we fueled with gas from the plane, a theodolite, compass, seven sleeping bags and enough survival rations for two weeks. On half rations, we could go a month."



New polar clothing, developed for testing on Operation Deepfreeze, substitutes sleeve muffs for mittens

A sample of their meals would never make the menu at the Waldorf. The first day each man got two ounces of pemmican, half a honey biscuit, a tiny cube of margarine and a candy bar. Next day, each had an ounce of oatmeal, half a biscuit and one prune. "We alternated that diet for variety," Lathrop recalled sourly.

For four days, a blizzard pinned the men to their camp while temperatures skidded to minus five degrees. But they managed to string an aerial up the hillside and crank out SOS signals on the Gibson Girl.

Numbered Jokes

Finally the sky cleared, and the survivors were able to pinpoint their position by shooting the sun. "We discovered we were only 110 miles from Little America," said Lathrop. "Okuma Bay was 80 miles. There, we could find seals and penguins to supplement our rations, boost morale and give us a closer intermediate goal. We packed 300

Single tent sleeps three men. To enter, zipper canopy is rolled back, exposing fabric tunnel entrance which is closed with drawstring and pulled inside tent. Assembled on A-frames, tents can be joined end to end for larger quarters



Full rescue rig, using 11 dogs in tandem hitch, can draw 1400 pounds. Each dog pulls twice his own weight. Bicycle wheel on back of sledge is the sledgometer for measuring the number of miles traveled as navigation help



pounds of gear on a lightweight plastic sled that Moss and Edwards man-hauled over the mountains. Those men worked like horses, making one mile per hour through hip-deep snow. During blizzards we steered each other by voice because no one could see 10 feet through the blinding drift. We kept up morale by telling jokes until they ran out. Then we numbered them. Someone would shout 'nine,' and everyone would laugh. Someone else would yell '42,' and if nobody laughed he'd pull the old saw about some people being able to tell that one better—which brought down the party."

When the helicopter finally pulled up behind the group on the seventh day, only the last two men in line saw it coming. They waved their arms, too overwhelmed to shout the news to the rest. The whirring blades finally brought the other heads around. "Then," said Lathrop, "we all bawled. There wasn't one dry eye in fourteen."

No More Colds

These men were lucky. They crashed within helicopter range of home base, and close enough to walk out if necessary. In the

Snow crevasses such as this under Little America had to be filled





Four de Havilland Otters were a part of Deepfreeze's air fleet. This one was a victim of bad polar weather



Two polar tents zipped together are raised as a unit on a simulated rescue mission, 20 miles from base



Carcass of sheep left at Captain Scott's cabin in 1902 is still preserved by frigid Antarctic weather

north country, one can find edible lichens, mosses, fish and wildlife when he knows where to look and how to rig snares. But except for a spattering of birds and seals along the costal ice, Antarctica is a dead world—vast, glittering white, punctuated by lunar landscapes of barren, windswept mountains. Not a tree, stick or weed exists to build a fire if you had a match. Even bacteria are inactivated by shuddering cold. Men with sniffles on Deepfreeze ships became well after a day or two on the ice and will not have another cold until they come home. Disease and decomposition are virtually unknown. We saw

the remains of a meal, left by a 1917 British expedition on a table in an old abandoned camp. Bread, cheese, potatoes and biscuits are remarkably preserved after 39 years. So is the carcass of a sheep that lies on the porch of Capt. Robert Scott's 1902 cabin at Hut Point.

Except for Navy air search and rescue techniques, a plane crash 1000 miles out on that desolation probably would mean the end, even for well-provisioned survivors in good physical condition. Every long flight in Antarctica carries rations and survival gear for 30 days. But everyone

(Continued to page 290)

Safest way to travel off marked trails is on skis or snowshoes, with two or more men tied together





Surplus LSM has been converted for use in deep-sea drilling operations to explore for tidelands oil

LSM Converted for Deep-Sea Oil Drilling

Old Navy men would hardly recognize a surplus LSM now sailing the coastal waters off Ventura, Calif., for it has been converted for use in deep-sea drilling operations to explore for oil in the booming California tidelands. The 600-ton craft, now called the *M. V. Rincon*, was converted to a driller at a cost of about \$500,000. Two major changes were made. Both screws were removed, making the vessel a barge, and

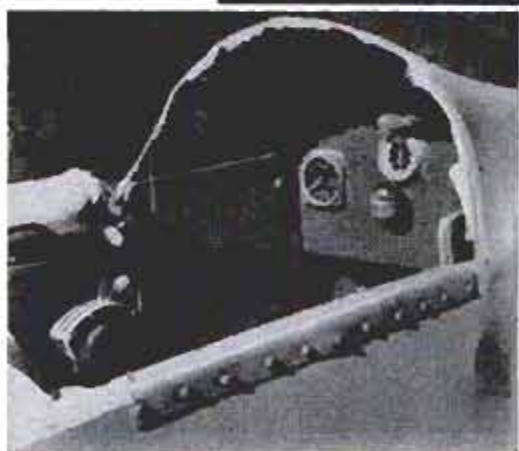
a 10-foot-wide scupper was cut through the middle of the hull to permit drilling operations. A 65-foot folding mast—the sea-going counterpart of an Oklahoma oil rig—towers over the deck. Four winch anchors, with each anchor weighing 7000 pounds, are used to keep the ship from pitching. And a device, similar to the gimbal used to keep a ship's compass level, has been installed to minimize roll.

Back-Yard Airplane "Flies" on Ground

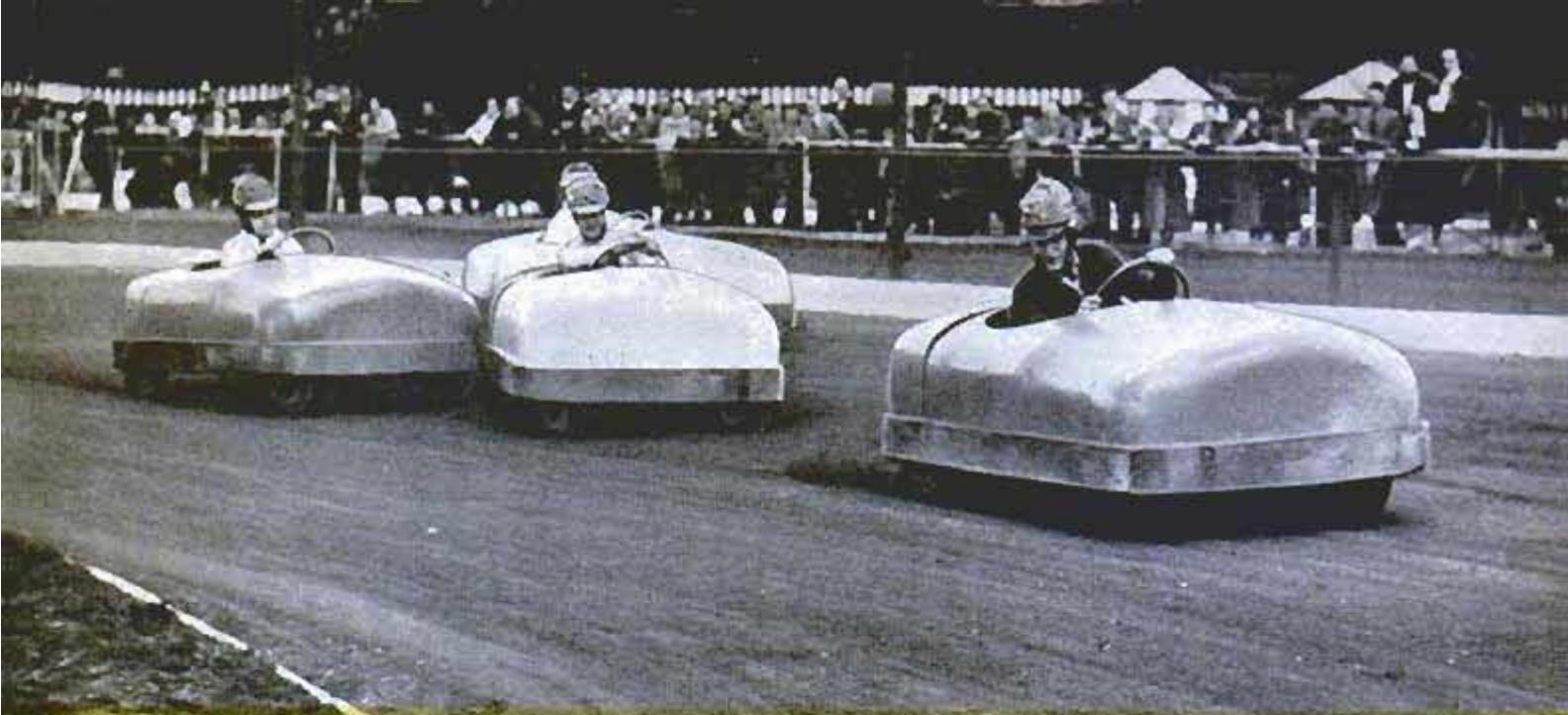
Playing pilot is the standard game for boys in one Phoenix, Ariz., neighborhood, now that Elmer Orgill has built a plane in his back yard for his son. The plane is 10 feet long and is mounted on a universal joint embedded in concrete, which makes it possible for the pilot to climb, dive, bank and turn the craft. A half-horsepower motor drives the 40-inch wooden propeller. The instrument panel features real aircraft instruments and a buzzing device adds realistic flight sounds. Movable controls give children the feeling of flying the plane.



Child's plane is mounted on universal joint that is bedded in concrete



Controls and instrument panel have components taken from real plane



Four feet wide, the cars fill up the corners and drivers have to jostle their way into the straightaway

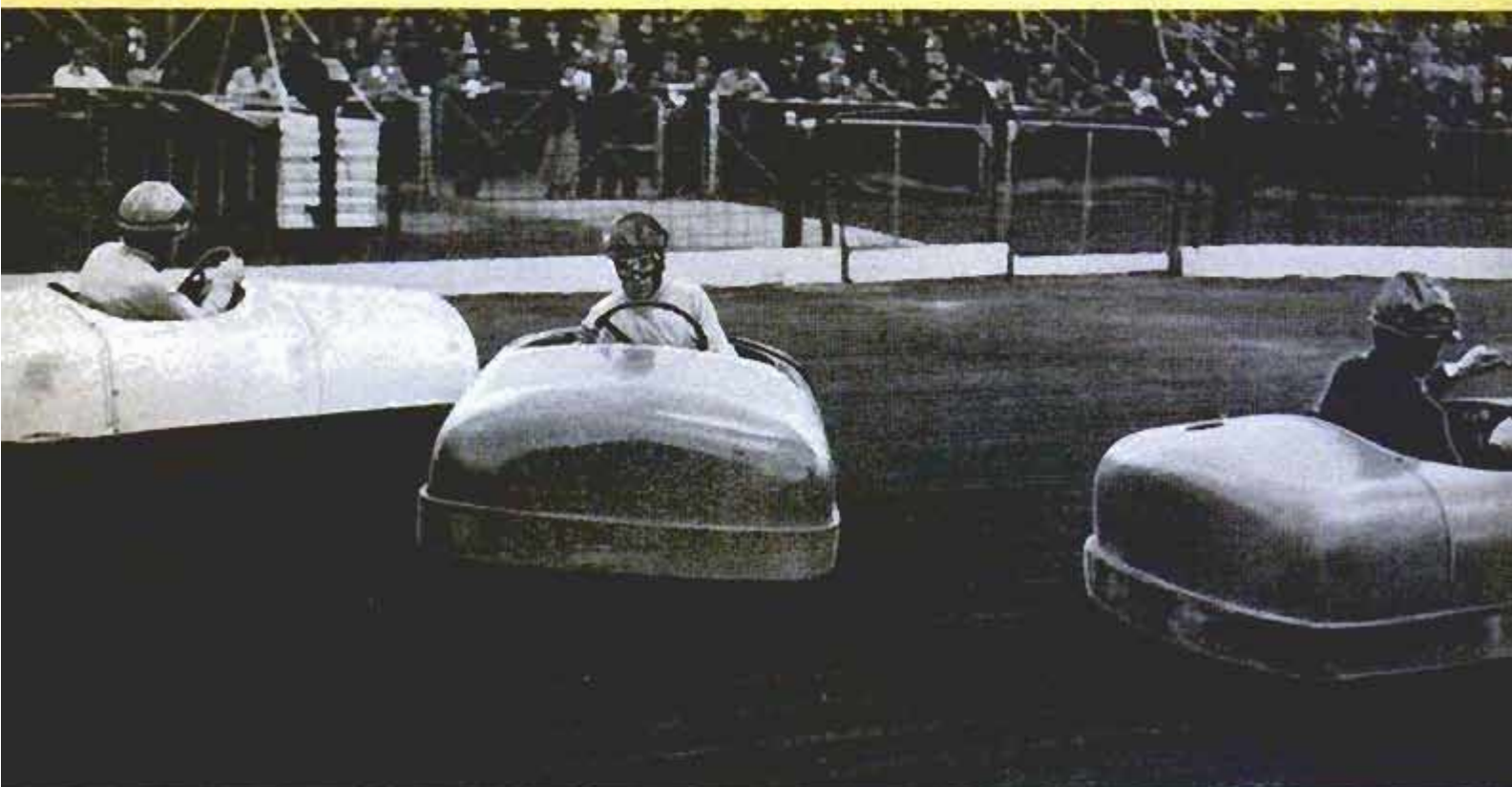
FLYING SOAPBOXES

JUST ABOUT anybody can be a race driver in Southampton, England. In fact, in some races spectators are invited to become contestants. Driving the tiny, seven-foot-long cars looks like so much fun that over 800 persons wanted to drive the first time the invitation was extended.

The cars look like huge soapboxes with a hole in the top for the driver to sit in. The flush sides extend almost to the ground, making the small wheels virtually invisible as the cars scoot around the oval.

Powered by a 190-cubic-centimeter rear engine, the racers have started a craze in

Spins are frequent, but the cars are very stable. This fellow seems to be making a U-turn in traffic!





Sometimes the cars tip over, but not often. This is a lady driver—a novice making like a professional

the British Isles. Officially known as Bantam Speedcars, they are better known to the public as buzz-boxes or soapboxes.

The three-speed transmission gives a top speed of about 45 miles per hour. All four wheels are powered to provide excellent traction and safety as the cars spin dizzily around a small and often slick raceway.

Steel Frame Protects Drivers

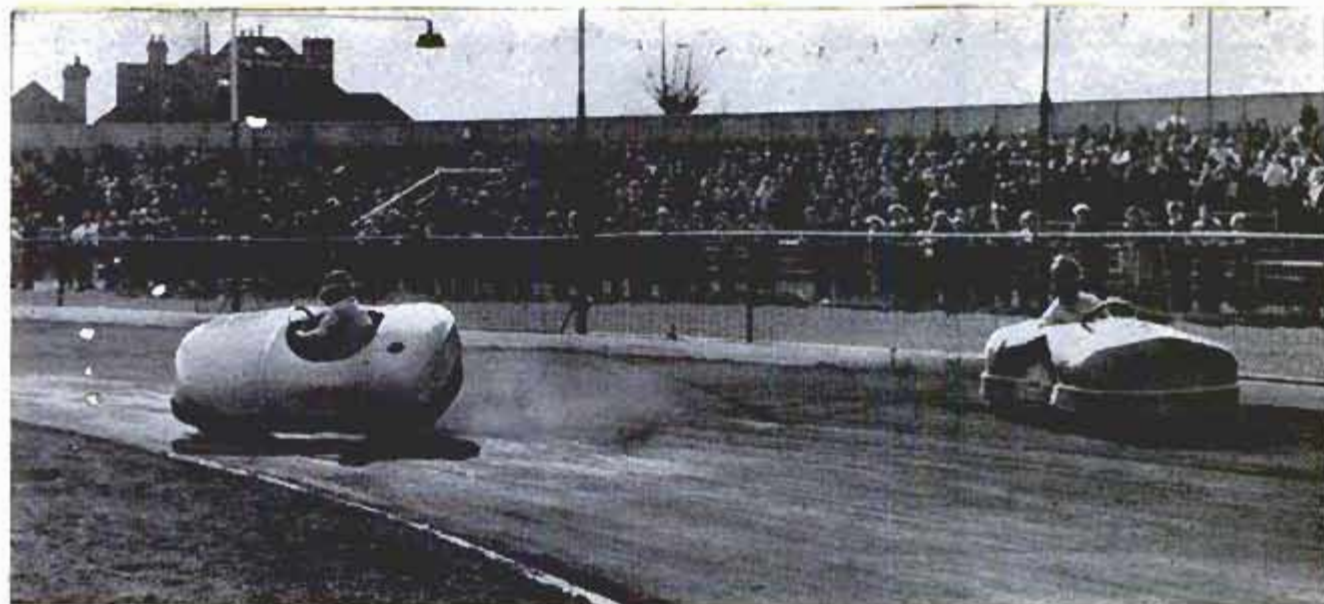
A strong steel framework backs up the all-metal body which is protected by a rubber bumper encircling the car. Despite this, however, the bodies are frequently dented as two or more of the little speedsters come together at odd angles.

A regular event at the track is Ladies' Day when aspiring female drivers (novices to racing, usually) try their skill at bumping and boring their way around. ★ ★ ★



Mounted over the rear axle is the 190-c.c. engine

Dents do result when cars carom off each other (see car at right), but drivers are well protected by the body





Standard Bus Rides the Rails

Carrying passengers on the Island of Sylt, West Germany, is a bus that is unusual in one respect: It rides the rails instead of the roads. No alterations have been made except to replace the wheels with rail wheels. A turntable at one end of the line and a triangular track at the other end permit the vehicle to be turned around for another trip.

Rake on Casters Levels Lawns

Contractors and landscapers can do a fast job of leveling the topsoil around a new home with a tractor-drawn rake. The rake's teeth are mounted on an adjustable bar, permitting windrowing of unwanted stones, weeds, branches and other trash on either side. Regardless of the angle of the bar, the teeth are always in correct alignment with the ground. Adjustable caster wheels regulate the penetration of the teeth.



Truck Hoist Built from Kit Features Light Weight and Simplicity

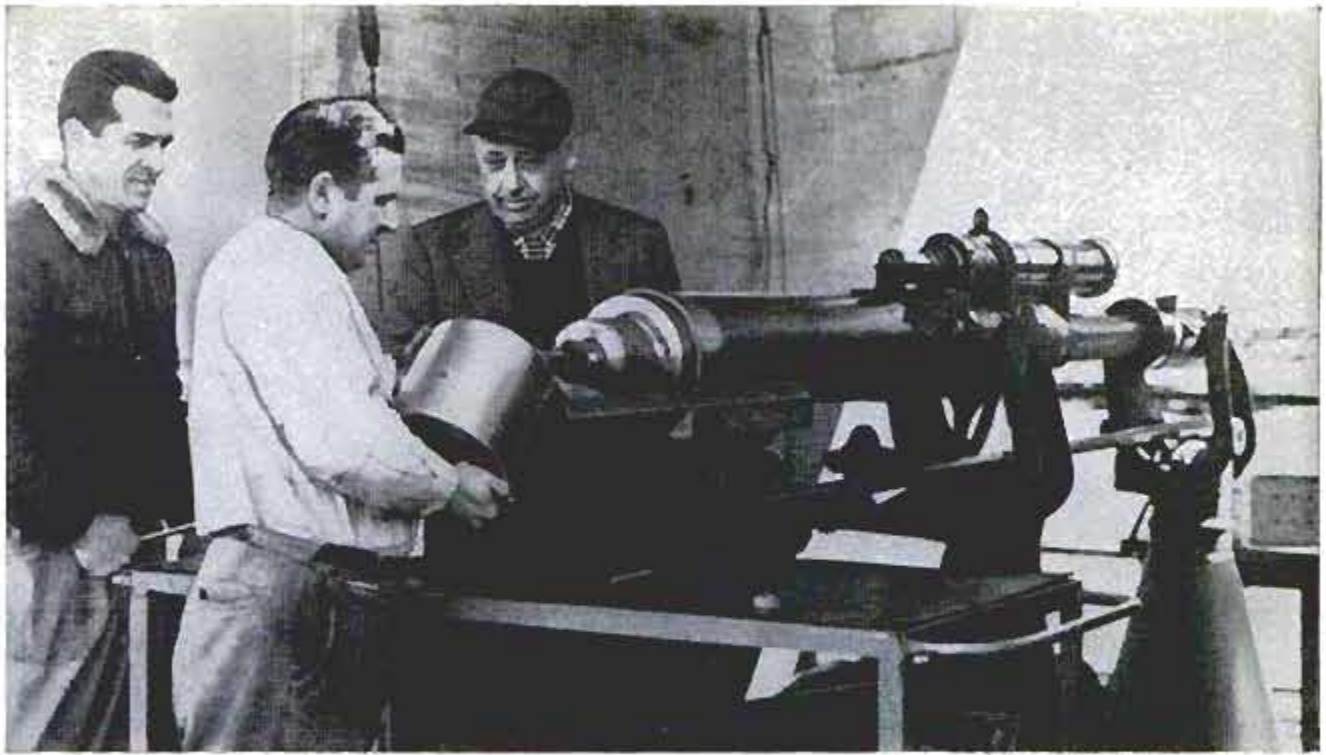
Amateur mechanics can install a hydraulic hoist on their trucks, using a kit that includes all materials. Hoists are made in

32 different models, for both end and side unloading, and for large and small trucks. The two main units of the hoist consist of the hydraulic pump and the telescoping arms which raise the truck bed to dumping position. The pump unit is simple in design and comes in electric, piston, four-piston and gear models. The arms come in three sizes or expandable lengths. The average weight of the entire hoist is only about 273 pounds, compared to 1800 pounds for some standard hoists.



Telescoping arms tilt truck bed to side. Other models dump from end

Ⓞ Radar for the first time is being used to spot cloud-hidden lightning strokes—some of them 100 miles long.



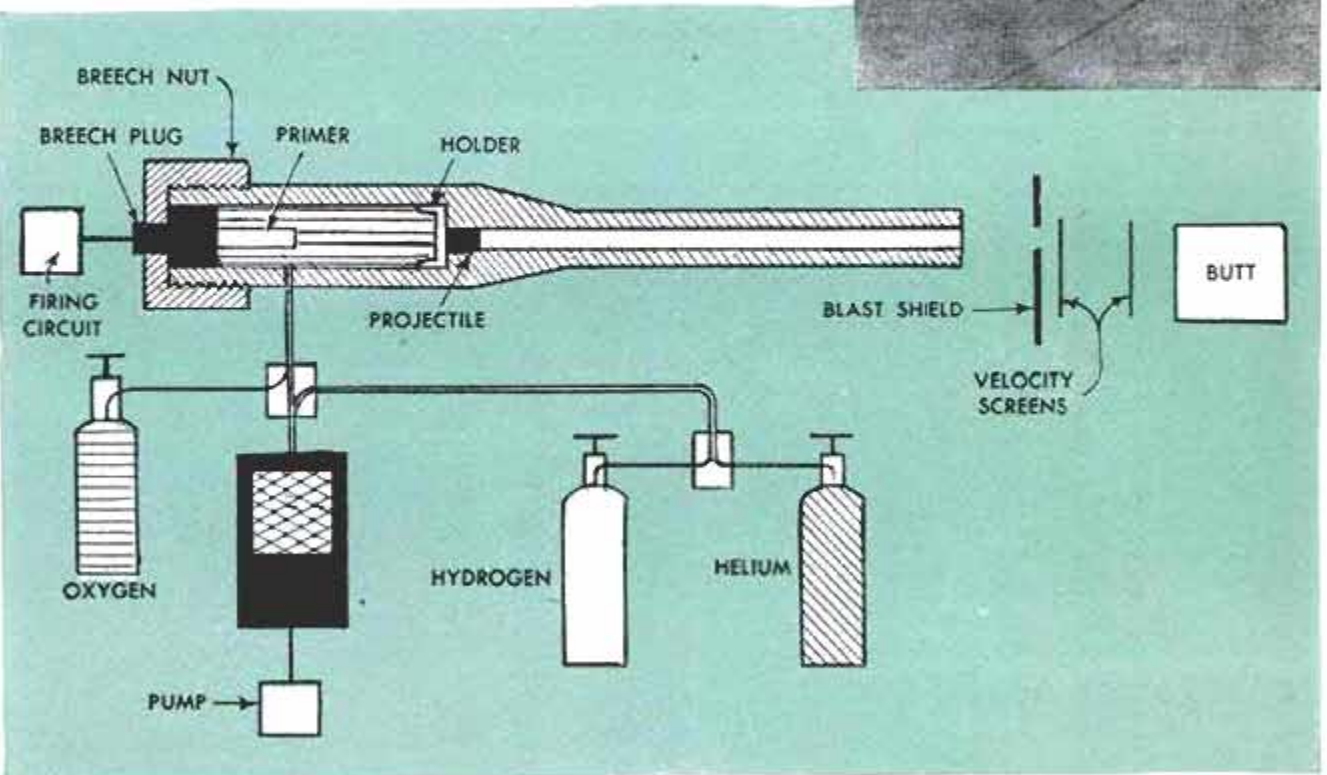
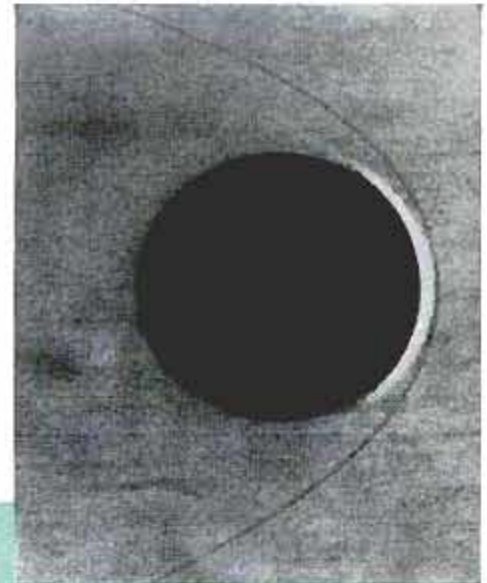
Official United States Navy photos

Breech nut is screwed on over breech plug, last step before firing. At right, nylon sphere fired at 17 times speed of sound creates shock wave (thin curved line) and ionizes the gas in front of it

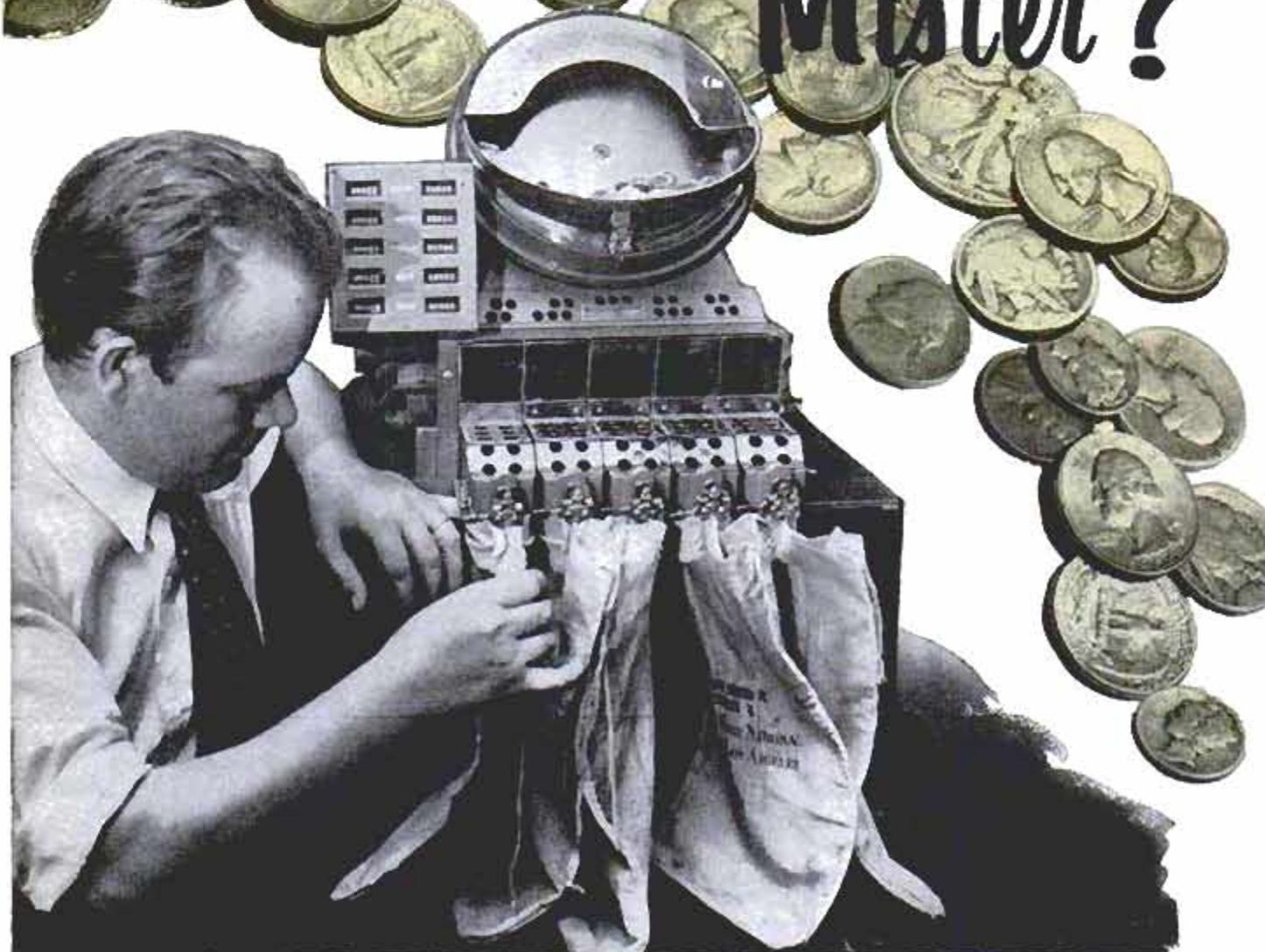
Missiles Travel 7000 Miles Per Hour

MISSILES the size of golf balls are fired at a record 7000 miles per hour by a Naval Ordnance gun powered by compressed helium. Photos and instrument readings taken during tests of model missiles and planes may help reveal ways to overcome the tremendous heating by air friction of high-speed missiles.

Below, hydrogen and oxygen combine to heat helium, which fills gun chamber. When gun is fired, disk in holder ruptures and the projectile shoots out to hit velocity screens, register speed

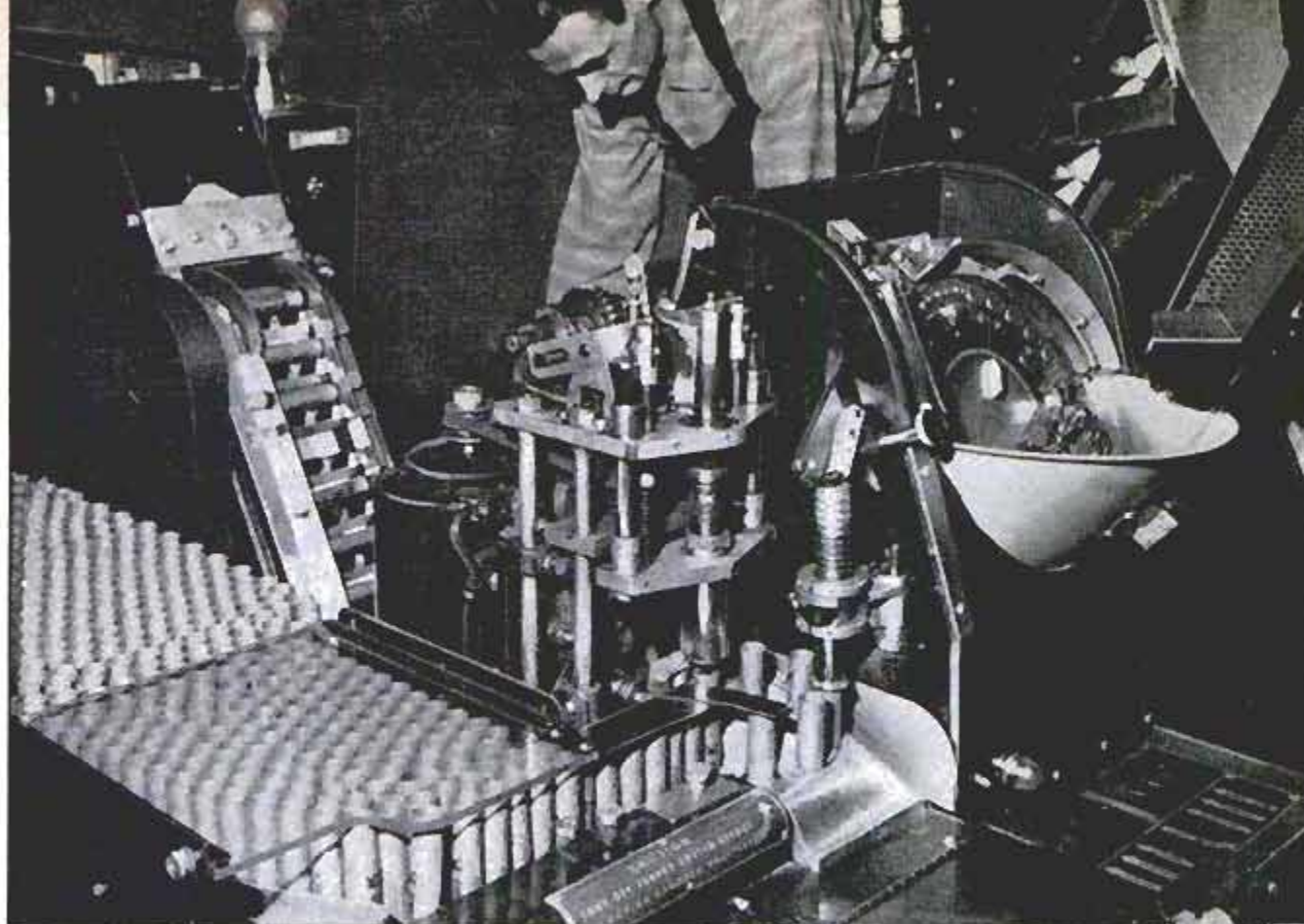


Change for a Quarter, Mister?



High-speed sorter separates and counts coins from pennies to half dollars, rejects slugs and foreign coins
Semiautomatic machine wraps and counts rolls. Armed guard places bags on conveyor for delivery to surface





Machine picks up each coin individually and counts it. Coins then go into prerolled wrappers. Mechanism crimps ends of the wrappers and counts the rolls



By Jack B. Kemmerer



Tremendous increase in vending machines in offices and factories has boosted demand for small coins

EVER WONDER what happens to the millions of pennies, nickels, dimes, and slugs dropped each week into the multitude of vending machines?

Last year we, the people of this country, put \$1,800,000,000 in coins into vending machines, not counting telephones, parking meters and service machines such as coin-operated TV receivers. For these coins we received items ranging from hot coffee, cold drinks, hot soup, cigarettes and fresh fruit to pocket combs, toothbrushes, handkerchiefs, music and hot meals.

There are more coins in use today in the United States than ever before, and the

amount is still on the upswing. The action of private companies and state or local governments has a marked effect on the need for coins in circulation. For example, when the New York subway fare was raised from a nickel to a dime there was a great shortage of dimes in the city. When telephone companies throughout the nation raised the cost of a phone call from a nickel to a dime, many areas were again pinched for dimes. When the state of



Handling pennies through quarters, this machine counts and wraps coins, delivers 1000 rolls per hour

California passed a sales tax several years ago there was an extreme shortage of pennies. The San Francisco mint had only 1.5 million pennies on hand, not nearly enough to meet the need. So great was this need that the mint had to coin a million pennies a day until the shortage was overcome.

One surprising thing about coin usage is the manner in which it varies from area to area. Even local neighborhoods within

Pennies are dumped into a hopper. Covered belt in the background will carry them to counting head



a city vary greatly in the amount of coins used. The need for coins also varies greatly according to the time of year, with Christmas being the heaviest season and requiring the most coins.

Banks Work Overtime

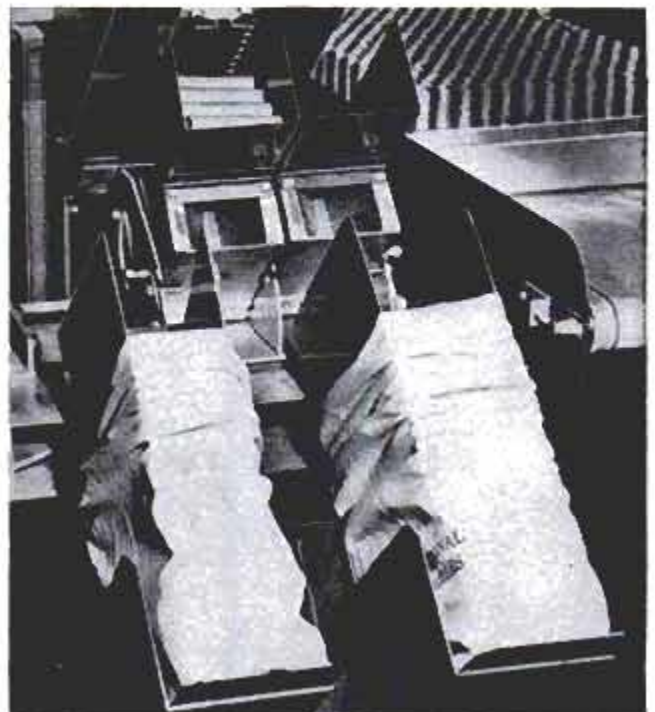
The tremendous population growth in southern California has the banks working overtime to meet the greatly increased demand for pennies, nickels, dimes, quarters and half dollars. Today Los Angeles handles more coins than any other city in the world. To keep ahead of this need, local banks have installed highly mechanized equipment for all phases of the work. One such installation, Security-First National Bank of Los Angeles, is the largest in the world and currently sorts, counts and wraps more than 30 tons of coins in a five-day week. This adds up to approximately one half million rolls of coins per month, varying anywhere from \$300,000 to \$600,000 per week.

Money coming into the vault arrives in armored trucks. An armed guard in a bulletproof, glass-enclosed cupola overlooking the truck delivery area flashes a coded signal to another guard in the vault.

The second guard presses a button and a heavy steel door is raised electrically. The raised door exposes a conveyor belt which carries the money sacks to the underground level.

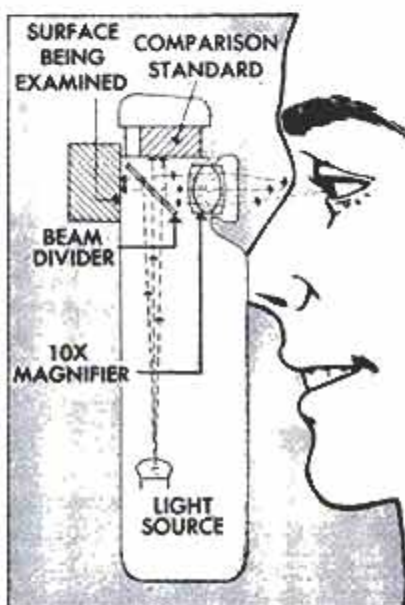
Downstairs, the heavy sacks are unloaded onto hand trucks. Guards then push the trucks through several more steel doors into the vault for sorting, counting and wrapping. ★ ★ ★

Counter releases any number of rolls desired into sacks. Now coins are ready to leave counting house



Propeller Drive Powers Car

Although he had never built a car before, that didn't stop Clifford J. Robins, a grocer in Somerset, England. In about a year, he put together a three-wheeled car that is powered by a pusher propeller. The propeller drive means that no transmission, clutch or differential is needed. The engine is a Ford V8. Top speed is 70 miles per hour. It cost less than \$600 to build.



Pocket Instrument Compares Surfaces

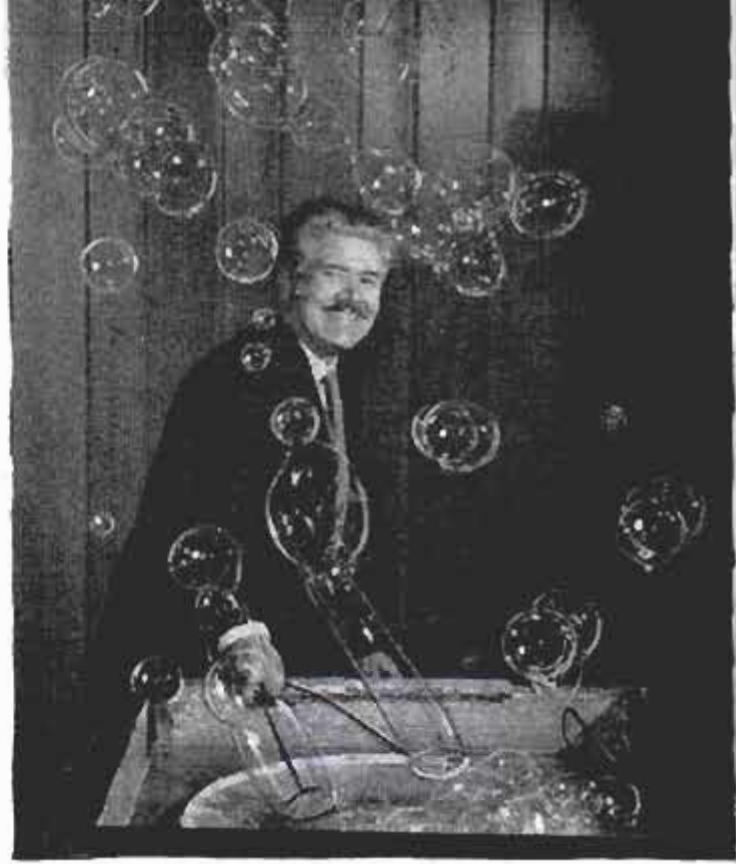
Pocket-sized, held in the hand and inexpensive, a new comparator for judging the smoothness of the surface on machined metal against a selected standard will speed up the work of production and quality-control men. Using a new type of optical system, the comparator illuminates both the known standard and the work under study, and magnifies them 10 times for close study.

Six Jets Atop Auto Aid Test Work

John Shelburne, of Hannibal, Mo., has bolted six jet engines to the top of a 1937 Chevrolet automobile to make what is probably the world's fastest stock car. Shelburne built the jet car in order to do preliminary research on such things as heat exchangers, afterburners, power-booster nozzles and other jet accessories. No performance figures are available as yet.

Stockholm's first motel, opened recently, is one of a chain of Swedish motels that will extend well into Lapland.





MAGIC IN BUBBLES

By Marshall Lincoln

I'M FOREVER Blowing Bubbles" is an appropriate theme song for Eiffel Plasterer of Huntington, Ind. A retired high-school science teacher, he has transformed an interest in surface-tension effects with soap bubbles into a fascinating entertainment feature called "Bubbles Concerto."

"The Bubble Man," as he bills himself, started working with soap bubbles years ago while teaching physics and chemistry at Huntington High School. He was seeking a soap solution that would produce bubbles durable enough to withstand the heat of a projector lamp. His object was to bombard a bubble with sound waves, then project its image to show his pupils "what sound looked like."

Long-Lived Bubbles

After finding a soap solution that would help give this effect, he began using it to make long-lived bubbles and bubbles that were elastic enough to do tricks with.

His first shows were informal affairs for other teachers at the school. Later he developed an evening show for general audiences, and after a few years this show took so much of his time that he quit teaching. Now he divides his time between touring with Bubbles Concerto and operat-

ing his farm a few miles south of Huntington. Not a man to slip into a humdrum existence, Plasterer also collects steam threshing engines.

Science is lively and entertaining—that's the theme of his bubble program.

"These bubbles are liquid—not plastic or rubber bubbles, which are solids," Plasterer emphasizes at the start of his show.

Bubbles Are Easily Broken

"Since they are liquid, they are very delicate and easily broken." With this knowledge, his audience is more able to appreciate the feats Plasterer and his son Bill perform.

Dust and wind are his worst enemies, Plasterer says, for small amounts of either can easily break the fragile bubbles. He uses a solution of soap, water and glycerin, which he sometimes warms on an electric hot plate for greater strength.

"I always save a few bubbles for my next performance just in case I should run short," he tells his audience, producing a jar holding a bubble or two blown at a previous performance.

He once had a bubble that lasted more than 200 days. During his travels, it aged and shrank, until it was barely visible. One day, finally, it shrank out of existence.

"It didn't break, it just passed on," he recalls with a trace of regret in his voice.



On opposite page the "Bubble Man" encases a Boy Scout in a bubble and fills the stage with shower of bubbles. Here he blows a huge bubble with his own "pipe," balances one bubble on three others, makes a bubble "walk uphill," blows a chain of bubbles and plays a tune on a trumpet while he blows a huge bubble



A bubble "balloon," filled with hydrogen, carries aloft tiny flag suspended from a wire loop

Below, Plasterer shows even a newspaper can be used as a bubble pipe when rolled into a cone



For huge bubbles, Plasterer uses a metal "horn" about six inches across. Attached to it is a flexible metal tube about two inches in diameter. This strange-looking device is the pipe with which he can blow a bubble about two feet in diameter.

He also shows his spellbound audience how to blow a bubble from the horn of a trumpet, while playing the trumpet. Of course, "I'm Forever Blowing Bubbles" is the tune.

Many spectators don't realize it unless they are told, but this feat, besides being entertaining, proves that sound waves can pass through the fragile soap film, without either the film or the sound being altered noticeably.

Bubble Cage

Probably his most spectacular bit of "bubble magic" is encasing a person in a huge bubble.

After explaining that the theoretical limit for a closed bubble is about 27 inches in diameter, he explains that unclosed bubbles may be much larger.

For encasing a person, Plasterer uses a large pan, about three feet square, filled an inch or so deep with his soap solution.

While the person, either a child or an adult, stands on a small platform in the pan, Plasterer quickly raises a large metal hoop from the solution up over the person's head. The hoop pulls with it the strong soap solution into a shimmering cylindrical form which surrounds the startled assistant.

Decorating a Christmas Tree

By attaching tiny wire loops to the branches of a Christmas tree, Plasterer can decorate the entire tree with bubbles which, under good conditions, will last through his show.

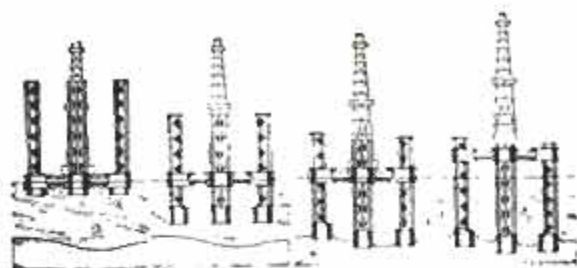
A chain of bubbles several feet long can be fabricated by the scientific showman, and a bubble may be balanced on three others placed upon small stands on his table.

Tricks like the chain and the placing of one bubble upon others are more difficult than they look, Plasterer says, because it is a natural tendency of two soap bubbles in contact to join into a single larger bubble.

Plasterer makes a balloon by inflating a bubble with hydrogen and attaching to it a tiny wire loop. Attached to the loop is a long thread which in turn is attached to a tiny silk flag or paper star.

The flag or star is carried slowly upward by the hydrogen "balloon" until it touches the ceiling, where it remains unless the contact with the ceiling breaks the bubble.

As a finale, Plasterer sometimes uses several small wire loops which he immerses in a pan of soap solution, then waves quickly through the air to produce several bubbles almost simultaneously. By repeating this process rapidly, he fills the stage area with a shower of bubbles that envelops himself, his assistant and his equipment. ★ ★ ★



Mobile Drill Platform Rests on Stilts

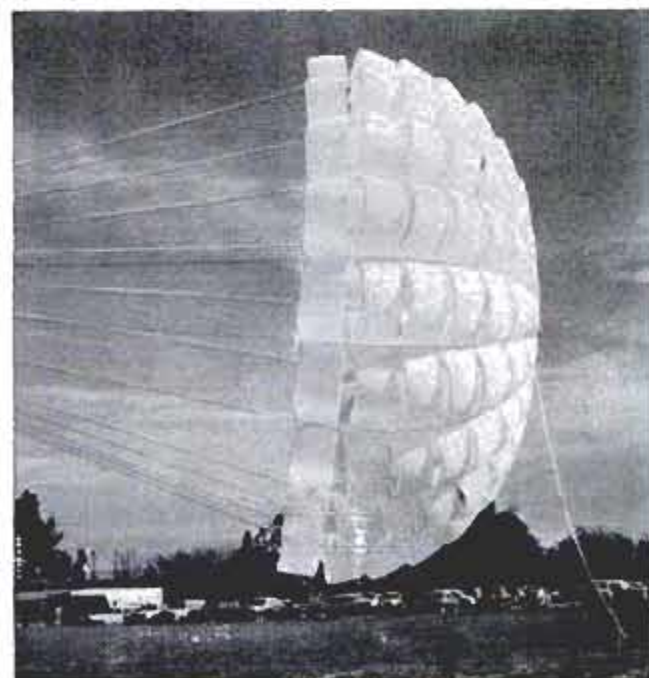
Costing about \$2,000,000, a "portable island" can be towed from one offshore drilling spot to another. Under way, three legs which are 140 feet long, tower above the platform. At the new drilling site, a switch is turned and the legs move down through the platform until they strike the ocean floor. The platform then moves right up the legs until it is well above the water level. An oil-drilling tower will be mounted on the half-acre platform,



which also will have offices and living quarters for 42 men. Powering the stilts are 63 huge electric motors. Electricity is supplied by diesel-driven generators.

Supersonic Parachute Tailored for Shock

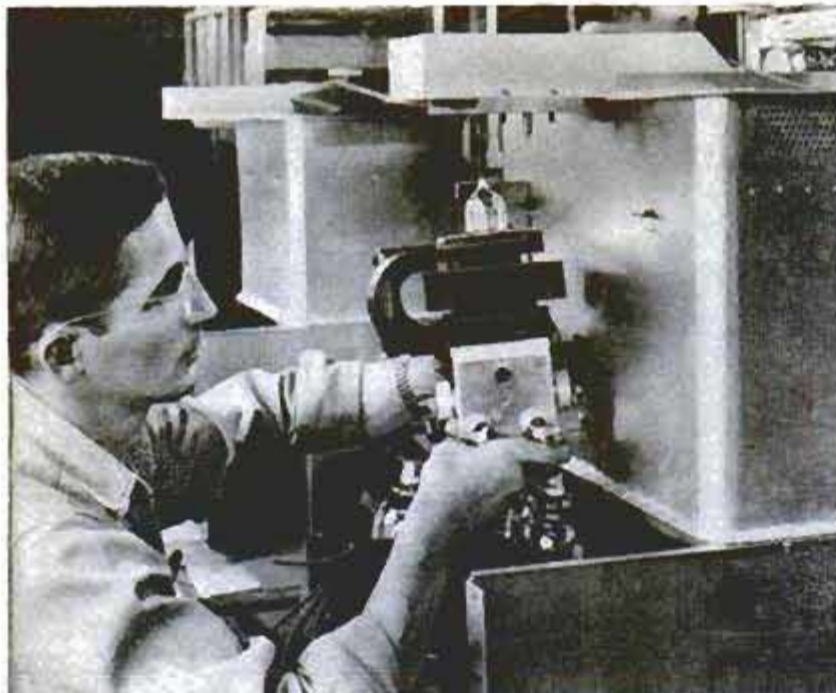
Bailouts at high altitudes and transsonic speeds, a growing problem as today's planes fly higher and faster, may be possible with the "Skysail." This is a parachute made up of concentric cloth rings assembled from specially shaped panel sections which utilize a new type of harness that spreads the area of opening shock on the wearer. The pack is designed to be secure against inadvertent opening by the slipstream at speeds above 450 miles per hour. And to increase comfort and safety, each Skysail is custom fitted to the wearer. The Skysail is now undergoing tests by the Navy.



Guide for Hair Clipper Assures Even Cut

Part of a home hair-cutting kit, a new guide for an electric clipper assures an even tapered hair cut—without danger of taking off too much hair. The guide is placed over the head and the clipper placed in it. When the clipper is run up the guide, it stays just the right distance from the head to make the proper cut. Then the guide is moved on the head and another cut is made. The kit not only includes the guide and an electric clipper, but also regular barber's shears and comb, a crew-cut attachment and easy-to-follow instructions—everything for cutting hair at home.





Magnetron generates microwaves that cook food. Bacon is cooked on napkin and paper plate which remain cool

Electronic Oven Uses Microwaves to Bake Cake in Six Minutes

You can bake a cake in six minutes and a five-pound beef roast in 30 minutes with an electronic oven now available. A magnetron tube heats the food with microwaves. The meat plate and the oven walls

remain cool during cooking; food is cooked in serving dishes and bacon is broiled on a paper napkin. The range has only two cooking speeds. A conventional electric element is used for browning foods.

Pilots See in Dark With "Cat Eye" Electronic Light Amplifier

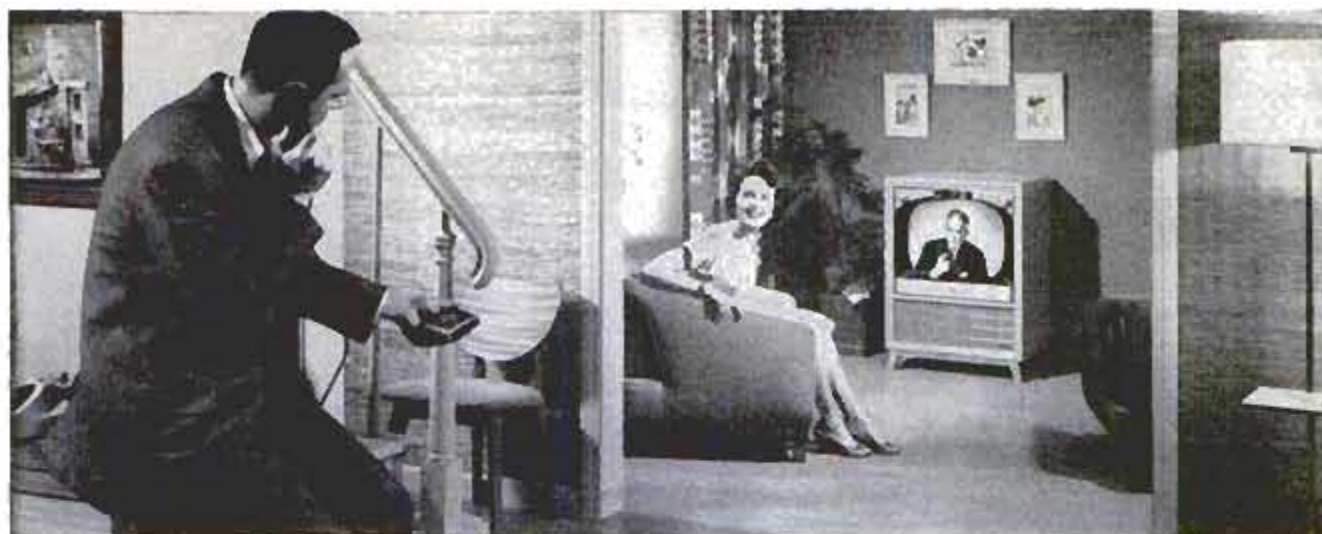
Over a thousand times more sensitive than a standard television camera, the Air Force's new "Cat Eye" system will enable pilots to see in the dark with daylight clarity. Now undergoing further develop-

ment, the tube, during tests, made it possible for observers in a plane to see the ground clearly on a moonless, winter night. Cat Eye senses and amplifies light which is always present but unseen by the human eye, and at the same time it increases the contrast between light and dark. Present work on Cat Eye is toward black-and-white picture presentation, but scientists say it can also be used for color.



Low Temperature Traps Energy

Large amounts of energy may someday be trapped in solids at extremely low temperatures, then released at will. According to Dr. C. M. Herzfeld of the National Bureau of Standards, recent studies show that atoms can be imprisoned in solids at temperatures within 10 degrees of absolute zero. Molecules of certain gases consist of two atoms held together by electric forces. Some molecules break apart into two atoms under an electric discharge. Then these separated atoms are trapped in a solid. The atoms cannot recombine because of the cold. When the solid warms up, energy is produced.



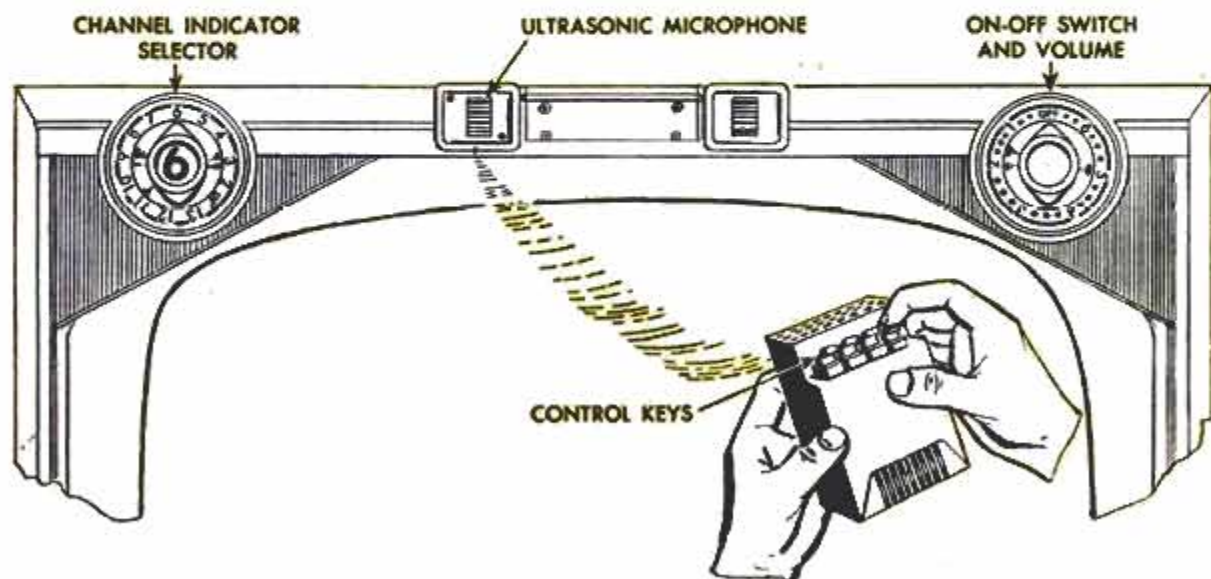
No wires or connections of any kind are required by ultrasonic control box

Remote Control for Television Set Employs Ultrasonic Commands

PREDICTIONS that the wonders of ultrasonics would some day be available in the home are beginning to come true as the Zenith Radio Corporation announces a remote-control device employing ultrasonic waves for its new television sets. Produced by a small four-button box which weighs but eight ounces, the waves are at too high a frequency to be heard or felt. But they are picked up by an ultrasonic microphone built into the television set. With the control, the set can be turned on and off, channels can be changed or the sound can be lowered.

The inaudible signals are effective up to 40 feet from the set. Other ultrasonic waves will not affect the controls, since they will react only to a tone at exactly the right frequency that lasts for an electronically measured period of time. Inside of the control box are four aluminum-alloy rods of slightly different lengths, adjusted to vibrate at the proper frequency. When a control button is pushed, a tiny spring-loaded hammer strikes the end of a rod, producing the signal which actuates the control unit on the set.

Right, front and back views of the control mechanism. Spring-loaded hammers hit aluminum-alloy rods to create ultrasonic waves when buttons are pushed



OWNERS REPORT on the VW

Owning a VW Is Like Being in Love!

"This is the first major love affair of my life."

FLORIDA BUSINESS WOMAN

"Haven't talked to a VW owner yet who wasn't crazy about the little car. Some are madly in love with it. Me too!"

IOWA TOOL AND DIEMAKER

"The VW is to my wife and me what watermelon is to a farm boy -- the only thing that would make it better is more of the same. There's something magnetic about this wonderful little car."

KENTUCKY TEACHER

"Have never been so happy or so completely satisfied with a car. My only real complaint is that I have to fight with my wife to get to drive it."

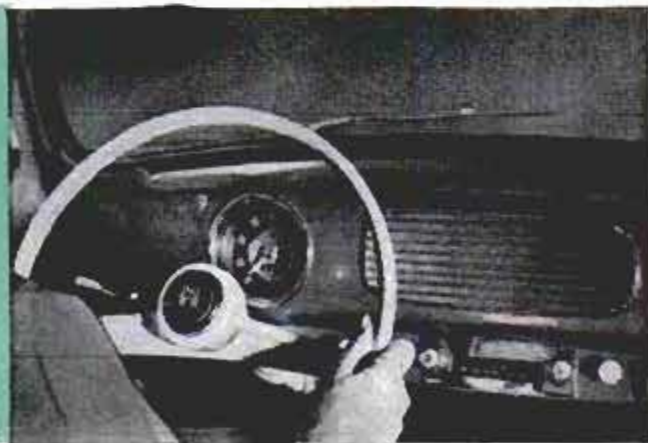
CALIFORNIA AIRCRAFT INSPECTOR

"Words can hardly describe my elation over having come in contact with the VW. It's the most wonderful thing that has happened to me since I've been driving automobiles."

OKLAHOMA AIR FORCE TECHNICIAN

CLYMER DRIVES the VOLKSWAGEN

By Floyd Clymer



THE VOLKSWAGEN test was from Los Angeles to San Diego, across the border to Mexicali, Mexico, and return through the back mountain and desert country for a total of 629 miles, which included some testing in the desert and over winding mountain trails.

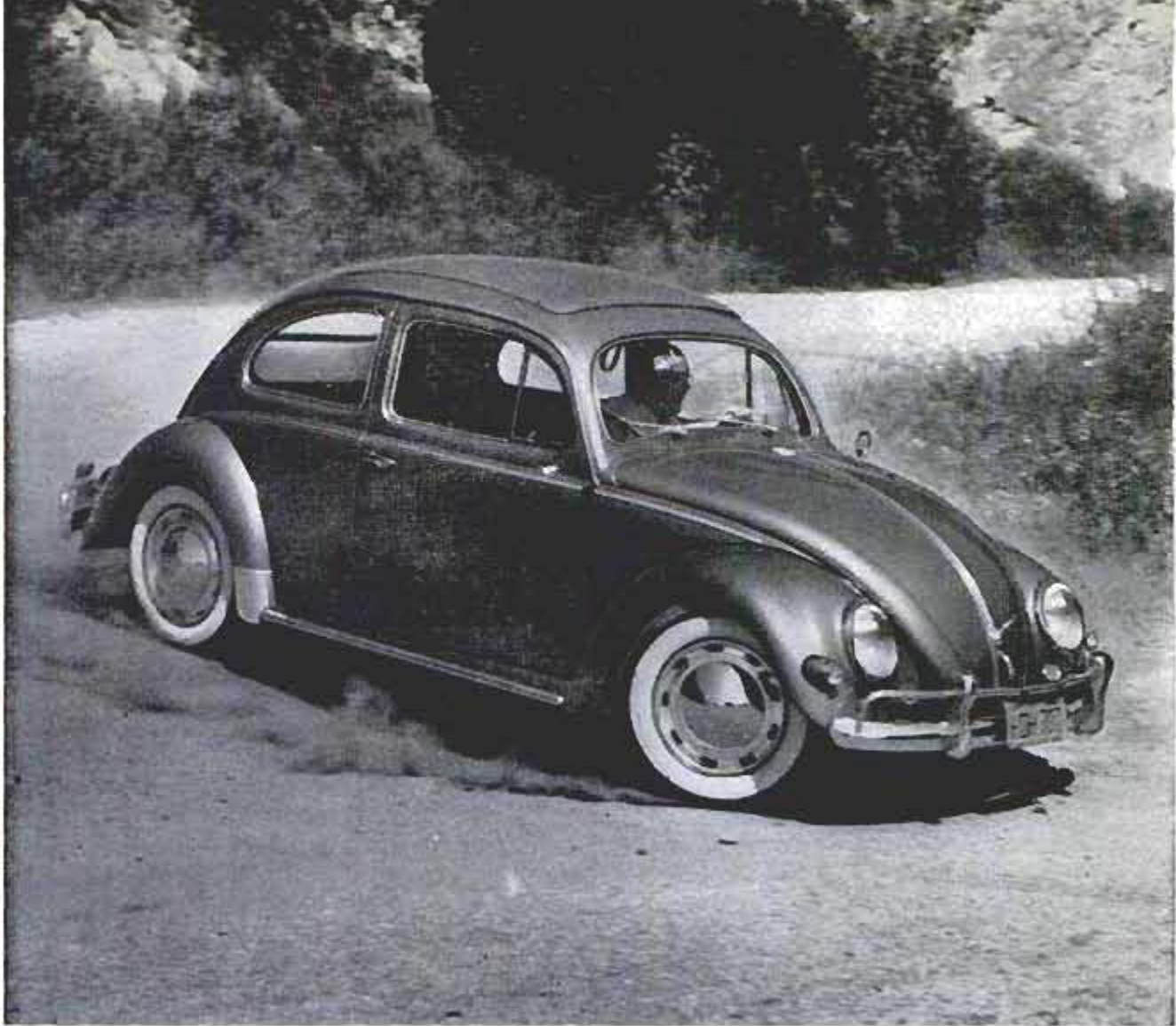
Because the car is small and short, with a wheelbase of only 94½ inches, the handling characteristics, stability and roadability may astound the average American driver. This German car has amazing performance and roadability. For over 100 miles I encountered head and quartering side winds and the car was remarkably

stable, although when a large truck or bus passed there was noticeable, but not alarming, side sway for an instant. Roadability is helped by the fact that the floorboard is about three inches below the top of the frame and two inches below the running board.

The horizontally opposed, four-cylinder, air-cooled engine has a displacement of only 72.74 cubic inches (about the size of some of our high-powered motorcycles).

It cruises easily at 70 miles per hour. Even at this speed the roadability was so good that I removed both hands from the

(Continued to page 314)



Although not a sports car—neither the VW nor its owners admit it—it behaves like one on the corners

VOLKSWAGEN MAY NOT BE A BIG CAR, BUT IT'S A FINE ONE, SAY OWNERS

By Volkswagen Owners

WHAT'S VOLKSWAGEN'S secret? What is there about this small, ugly, low-powered import that excites people all over the world and makes every owner talk like a salesman?

To find out, we asked hundreds of VW owners. Their replies are unbelievable. These owners actually have fallen in love with a car. Not a single owner in the survey rates the VW as "poor." An amazing 95.8 percent say it's "excellent"—many adding a plus sign! And all this on a car that sells for about \$1600.

One owner, an engineer in Texas (an amazingly high percentage of VW owners are engineers and technicians; see table on page 157) sums it up just about as well as it can be done:

"The VW is an engineering masterpiece. It was designed to fit a purpose and a price.

The purpose is to provide reliable transportation for a few (4) persons at a reasonable price. It was not designed to outdrag D-type Jags or haul seven persons at the same time. On several occasions I have spent 10 or 12 hours behind the wheel and arrived in better shape than when I drove a Detroit car—and I had a much better time driving. When the occasion presents itself you can take to the side roads, buzz around corners, shift gears like crazy—in short, have a barrel of fun and still not leave a widow and three orphans. I can afford a bigger car, but I think I shall buy another VW. I would rather have two VWs than one big car. In general, I love it because of what it is—a VW."

That high praise sums up what hundreds of owners report. Obviously, there is more

(Continued to page 157)

An Engineer Analyzes The Volkswagen

By Dale Kelly, SAE

Model tested: Two-door sedan. Rear-axle ratio: 4.4 to 1. (Highest gear in transmission is an over-drive with a ratio of .82, making over-all ratio 3.61 to 1.) Wheelbase: (measured) 95 inches. Tires: 5.60 x 15. Curb weight: 1580 pounds with gas tank

half full (41 percent of weight on front wheels, 59 percent on rear wheels). Barometer: 28.8 inches. Temperature: 92 degrees. Payload: 400 pounds for acceleration tests and 200 pounds for the economy tests.



ACCELERATION TIME IN SECONDS

	0 to 20	0 to 40	0 to 60	1/4 mile
Ignition timed for regular gasoline				
Shifting at 2000 r.p.m.	5.7	20.0	47.5	29.1
Shifting at 2500 r.p.m.	4.7	17.7	42.5	27.4
Shifting at 3000 r.p.m.	5.2	15.3	42.5	26.8
Shifting at 3500 r.p.m.	5.7	15.6	41.0	27.7

TOP SPEED: 65 miles per hour



FUEL ECONOMY IN MILES PER GALLON

	Steady 30 m.p.h.	Steady 50 m.p.h.	Steady 60 m.p.h.	Traffic Route
In third gear	35 m.p.g.	34 m.p.g.	28 m.p.g.	28 m.p.g.
In fourth gear	44 m.p.g.	34 m.p.g.	28 m.p.g.	28 m.p.g.

In the traffic test, the car makes 10 full stops per mile and is driven fast enough to average 15 miles per hour. First, second and third gears only were used. In all tests ignition was timed for regular gasoline.

ESTIMATED ANNUAL GASOLINE BILL: \$83 for 10,000 miles.



SPEEDOMETER ERROR (MILES PER HOUR)

Indicated speed	20	30	40	50	60	70
True speed						
Car No. 1	25.0	32.5	40.0	47.0	56.0	65.0
Car No. 2	21.0	29.5	38.0	47.0	57.0	67.0

(Test was conducted with two different Volkswagens.)

ODOMETER ERROR

The odometer indicated two percent more than the actual distance traveled (102 miles for a true 100 miles).



DRIVER'S VISION

Some portion of the road could be seen 8 feet in front of the car (A in sketch) by an average driver (5 feet 9 inches tall); full width of the road could be seen 12 feet in front of the car (B in sketch).



GROUND CLEARANCE

The bottom corner of the rear overhang would touch the ground if the car were driven through a dip whose profile had a radius of curvature of less than 21 feet (solid line in sketch). The center of the car would drag if the car were driven over a hump with a radius of less than 10 feet (dotted line in sketch). The engine would drag if the car were driven in ruts deeper than 8 inches. The doors would open over a 13-inch curb.

MISCELLANEOUS

OCTANE REQUIREMENT

The best acceleration from 35 to 55 miles per hour in fourth gear was obtained with timing set at 7 degrees before top center. At this setting the engine did not knock on typical regular gasoline. Therefore, it would be impossible to improve performance by using premium gasoline.

STEERING:

From straight ahead, the steering wheel had to be turned only .43 revolution to complete a circle with an outside radius of 50 feet. The steering wheel turned 2.5 turns from lock to lock. Diameter of the turn circle: 37 feet. Diameter of the walled circle in which the car could turn was 38 feet. Steering-wheel diameter: 16 inches.

LUGGAGE CAPACITY:

In addition to the spare tire and the tire-changing tools, the luggage compartment at the front of the car could accommodate one cardboard carton of the size used for 48 tall cans of evaporated milk; two more could be stored behind the back seat.

WATER RESISTANCE:

The body was well sealed against water leaks. In ten trips through the splash pan at 20 miles per hour a few drops of water entered the front luggage compartment, but none got into the body. Ignition and brakes were not affected.

CENTER OF GRAVITY:

The center of gravity of the unloaded car was 21.5 inches above the ground.

Percentages, below, summarize what VW owners from 41 states (in color on map) think about their cars



The Owners Analyze the Volkswagen

Over-All Rating of the Volkswagen

EXCELLENT	AVERAGE	POOR
95.8%	4.2%	0.0%

Had trouble with engine?

No trouble	90.2%
Some trouble	9.3%
Considerable trouble	0.5%

What was engine trouble?

Oil leak	1.4%
Clutch	1.4%
Main bearing	1.0%

Would like faster acceleration?

Yes, would	45.5%
No, would not	54.5%

Would like more top speed?

Yes, would	10.6%
No, would not	89.4%

Would like more room inside?

Yes, would	26.8%
No, would not	73.2%

Would like four doors?

Yes, would	22.3%
No, would not	77.7%

Even if car had to be bigger?

Yes, even if bigger	11.2%
No, not if bigger	11.1%

Rides better than U.S. cars?

Yes, rides better	43.6%
Rides about same	36.1%
No, does not ride better	20.3%

Have taken long trip (over 500 miles)?

Yes	45.6%
No	54.4%

How was the long trip?

Comfortable, pleasant	72.2%
Somewhat tiring	13.4%
Undecided, no answer	14.4%

How was car delivered?

Excellent condition	85.8%
Average condition	12.3%
Poor condition	1.9%

How is dealer service?

Excellent	65.8%
Average	26.7%
Poor	7.5%

Have owned VW before?

Yes, have	7.5%
No, have not	92.5%

Would buy VW again?

Yes, would	93.6%
Might	5.5%
No, would not	0.9%

What was traded on VW?

No trade	51.4%
Traded a Volkswagen	2.8%
Traded another foreign	6.1%
Traded GM make	12.6%
Traded Chrysler make	10.3%
Traded Ford make	8.8%
Traded other U.S. make	8.0%

Who are the VW owners?

Technicians, craftsmen	17.5%
Engineers	10.4%
Businessmen, executives	8.8%
Doctors, dentists, lawyers	7.4%
Salesmen	6.6%
Teachers	5.7%
Scientists	2.6%
Others	41.0%

Best-Liked Features

Cheap to operate	68.9%
Easy to handle	47.6%
Easy to park	32.1%
Comfortable ride	20.8%
Excellent workmanship	16.0%

Small size	13.7%
Roadability	9.0%
Advanced engineering	9.0%

Most-Frequent Complaints

No complaints at all	25.9%
Limited rear vision	10.4%
Engine, transmission noise	10.4%
Cross wind bothers at speed	9.0%
Hard to shift into reverse, low	7.5%
Wipers too slow	7.1%
Needs more power	6.6%
Heater inadequate	5.2%
Bumpers too soft	4.7%

What Should Be Changed?

Nothing at all	25.9%
Increase power slightly	12.3%
Make engine quieter	11.3%
Improve rear vision	9.4%
Increase heater output	9.0%

IS IT THE SECOND CAR?

Is VW second car in family?

Yes, it is	43.7%
No, it is only car	56.3%

What is the other car?

Low-price make	42.4%
Medium-price make	46.7%
High-price make	10.9%

Which car is used most?

VW is used most	73.1%
Other car is used most	10.8%
Both used about same	16.1%

Who drives the VW in family?

Husband drives VW	70.2%
Wife drives the VW	17.0%
Both drive about same	12.8%

to this car than is apparent as it scoots past you in traffic. There is more to it than dollar-saving economy of operation, although this is the most frequently mentioned best-liked feature with 68.9 percent of the owners listing it.

"We fill the car with gas every Friday. It used to cost me \$3.50 to \$4.00 to fill my V8 each week. It costs me from 90 cents to \$1.10 to fill the VW each week despite the fact that the price of gas is up three cents a gallon."—New Jersey retired owner.

"I drive 56 miles a day on a rural news route in the Santa Cruz Mountains. I average 28 miles per gallon in this stop-and-go

driving (60 stops in 56 miles)."—California news carrier.

"On a 3300-mile trip to Florida, the VW used 1/2 cup of oil, averaged 36.5 miles per gallon."—Michigan teacher.

"We traveled from California to Illinois and back, going 4996 miles including side trips. Our entire cost was \$51 for gas, two grease jobs, two oil changes and a wash job."—California cashier.

"We went 612 miles on \$4.79 worth of gas in 11 1/2 hours. Whenever a car passes me (which is seldom), I chuckle because it's costing him at least four times as much to drive his car as it's costing me."—Missouri teacher.



Above, the VW has no gas gauge. If you must know how much gas you have, use a yardstick! Below, some owners dislike the roller accelerator pedal (arrow)



But It's Noisy!

Volkswagen owners may be fanatical in their praise, but they aren't blind to its faults. Only 25.9 percent say they have no complaints at all—a relatively small percentage when compared with previous reports on American cars.

Two complaints are tied for top mention: (1) engine and gear noises; and (2) limited rear and front-quarter vision. Each was mentioned by 10.4 percent of the owners.

"Better noise insulation would help. My 1956 seems noisier than the 1954 model, but a little glass-fiber matting does wonders."—Louisiana Air Force instructor.

"It's noisy, but becoming quieter or am I getting used to it?"—California steno.

"Excessively noisy, especially with the windows open on a windy day. Unable to hear radio then."—California aircraft worker.

"Needs a larger rear window. There are some blind spots at the sides in back."—Massachusetts student.

"Get rid of the blind spot beside the windshield."—California truck driver.

Handling Praised

Second to economy on the best-liked list is ease of handling with 47.6 percent of the owners mentioning it.

"I like the way it handles in traffic. And after a one-day drive of 500 miles with three adults and two children in the car we were actually less fatigued than in our

Below and opposite, some owners say the VW floats across deep puddles! We tried it. Despite a 185-pound driver and a full gas tank, it did float, but water leaked in through the bottom of the doors



previous United States car."—California business man.

"I could write pages about the VW. I'm scared to death to drive our full-size car, but I'll try anything in the 'bug'! It lets me feel I'm the boss when I'm behind the wheel and not as though I'm driving by remote control. When I turn the wheels I know exactly what angle I'm getting. As long as VW is made I'll never drive anything else."

—Ohio housewife.

Today's congestion makes parking a headache, but VW owners don't mind. Ease of parking is the third best-liked feature with 32.1 percent mentioning it.

"Parking in a very small space, I nosed her in and my friend and I picked up the rear end and moved it into the curb, to the amusement of passers-by."—New York carpenter.

"The answer to the second-car problem. Small, easily parked, it is ideal for shopping."—California salesman.

More Complaints

Here are more owners' complaints, listed in order of frequency of mention:

"Car tends to sway at speeds above 55 miles per hour in strong winds when only one or two passengers are in it. Otherwise very well satisfied with the car."—California Air Force sergeant.

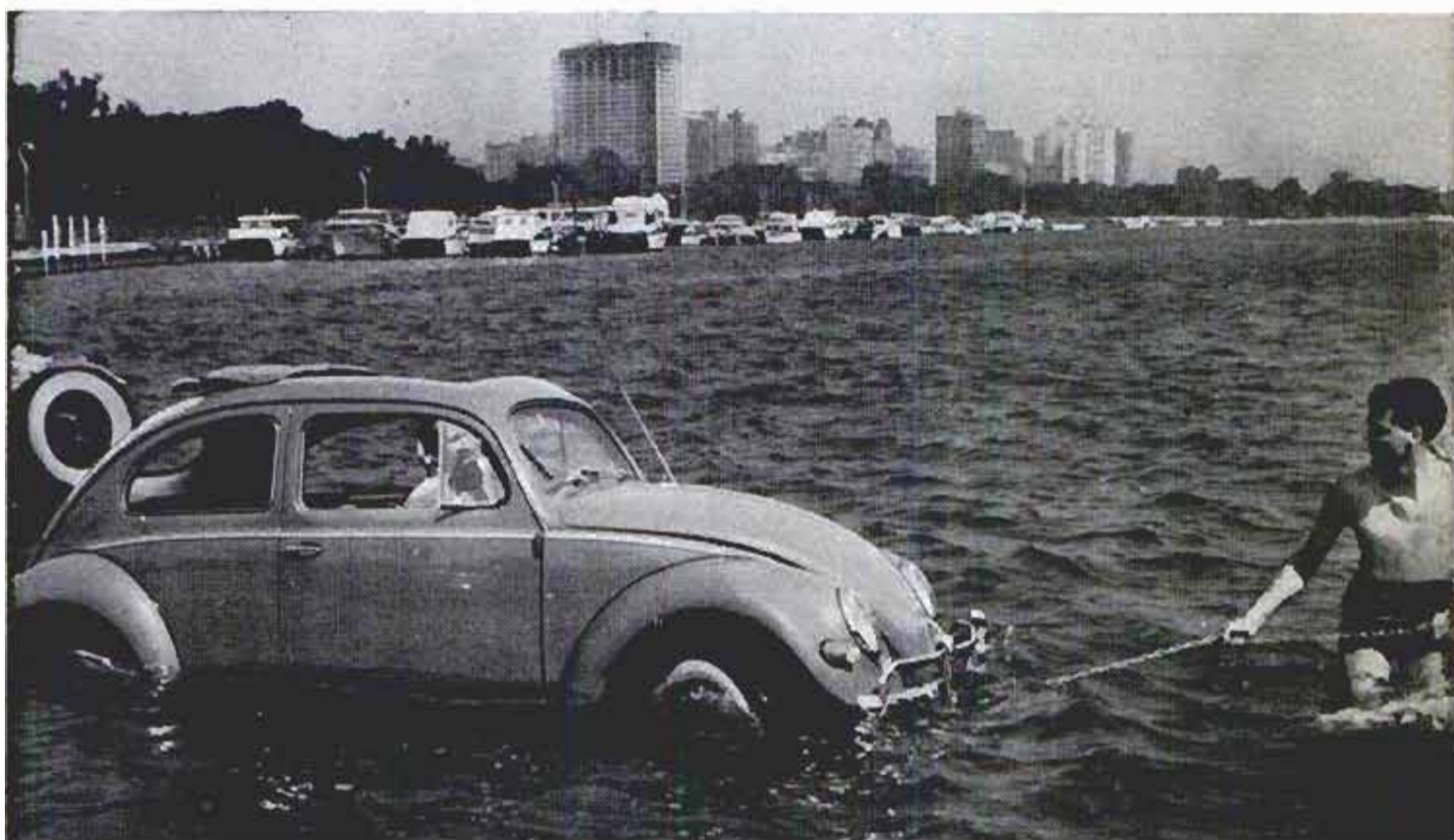
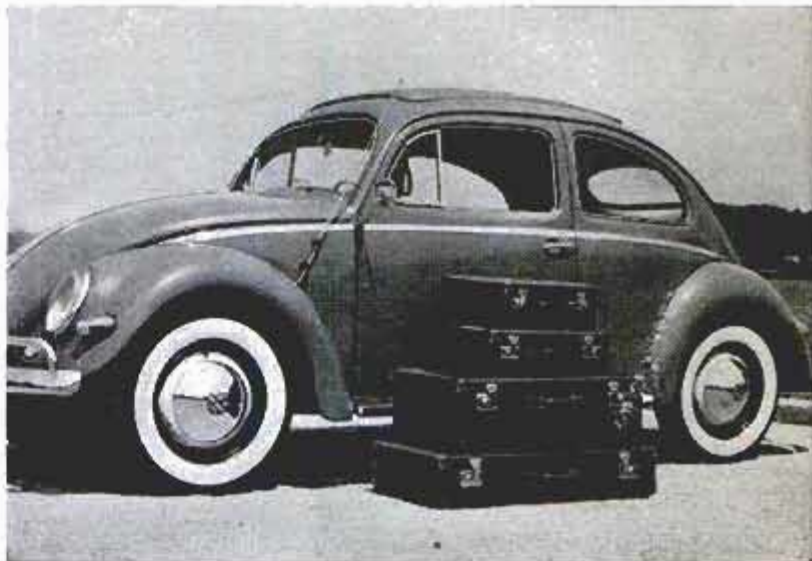
"I have no complaints, but my wife doesn't like pushing down on the gearshift lever to get into reverse. It is difficult for her to do."—Arizona contractor.

"Windshield wipers are too slow."—Florida aircraft mechanic.

(Continued to page 304)



Above, air-cooled rear engine has only one fault, say owners: It's a bit noisy. Below, the four cases fit inside car without infringing on seating space. One goes under hood, others pack behind rear seat





Flying Tanker Refuels Three at a Time

Three F-100 Super Sabers can be refueled at one time in mid-air as the result of further developmental work on the KB-50 Flying Tanker. The KB-50 is a modifi-

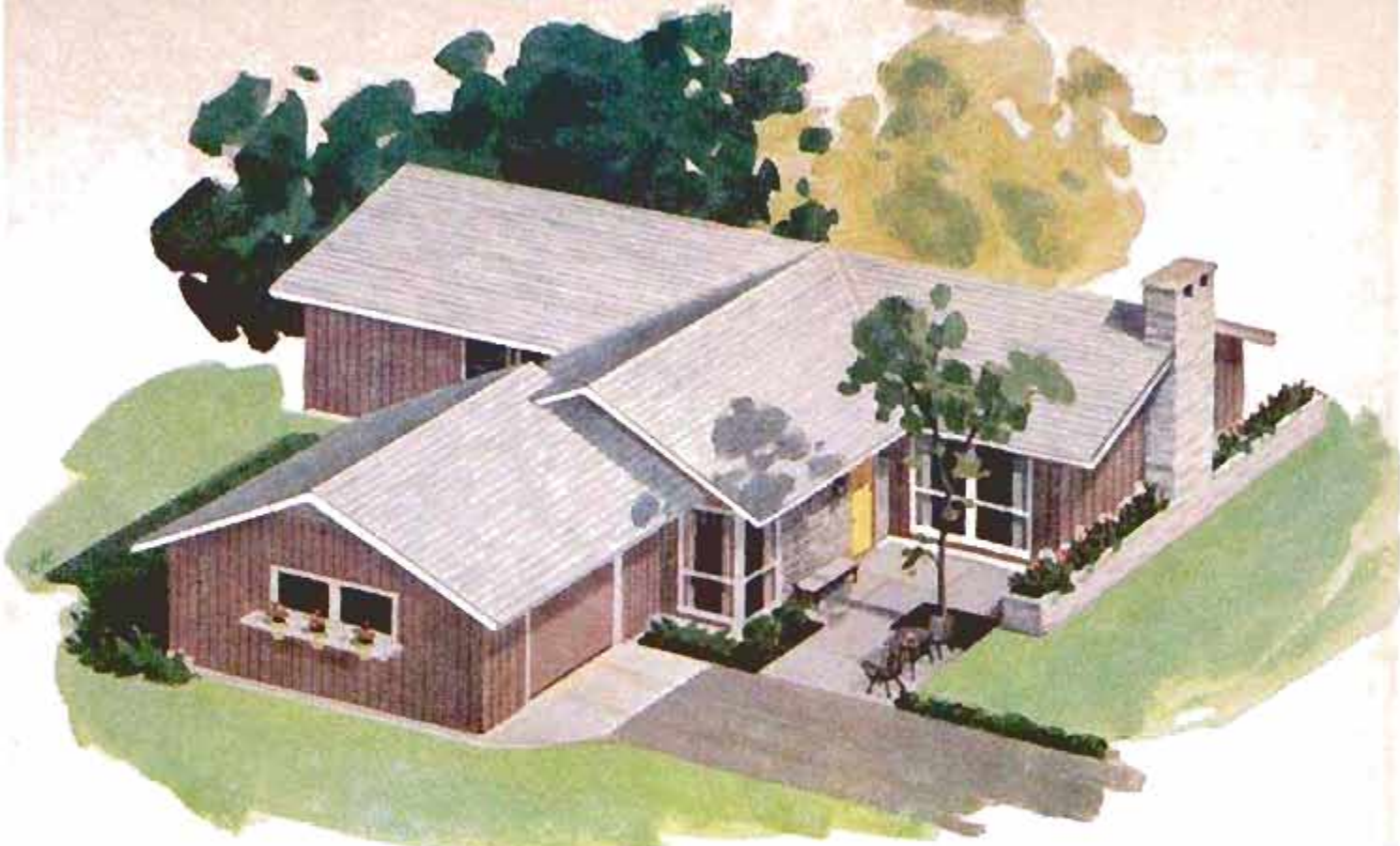
cation of the famous Superfortress of World War II. The Air Force has been giving the new fueling system operational testing at Eglin Air Force Base, Fla.

On the Next 50 Pages We Present

Popular Mechanics Annual

HOME SECTION

It is our belief that a magazine home section should present above all else an answer to a national housing need. The biggest problem today is finding a home of medium cost to accommodate larger families. Our solution is the carefully planned house pictured on the following six pages. Other articles and illustrations offer new and exciting ideas from a coast-to-coast study by our staff of the best in modern housing.



This attractive medium-sized home features four bedrooms and two baths with definite child and adult areas

Introducing The *PM* Big-Family House

By Wayne Whittaker

WHEN THE *PM* HOUSE for 1956 was being planned there were two things uppermost in the minds of the designer and editors who created it:

Rule No. 1—This home should not be “just another ranch-type house.”

Rule No. 2—The house should offer a solution to some national housing need.

The “need” was easy to put a finger on, as any builder or real-estate operator across the country will testify. For the family that can afford only a house of medium size, the vital question of the day is: “Where, oh where, are we going to put the kids?”

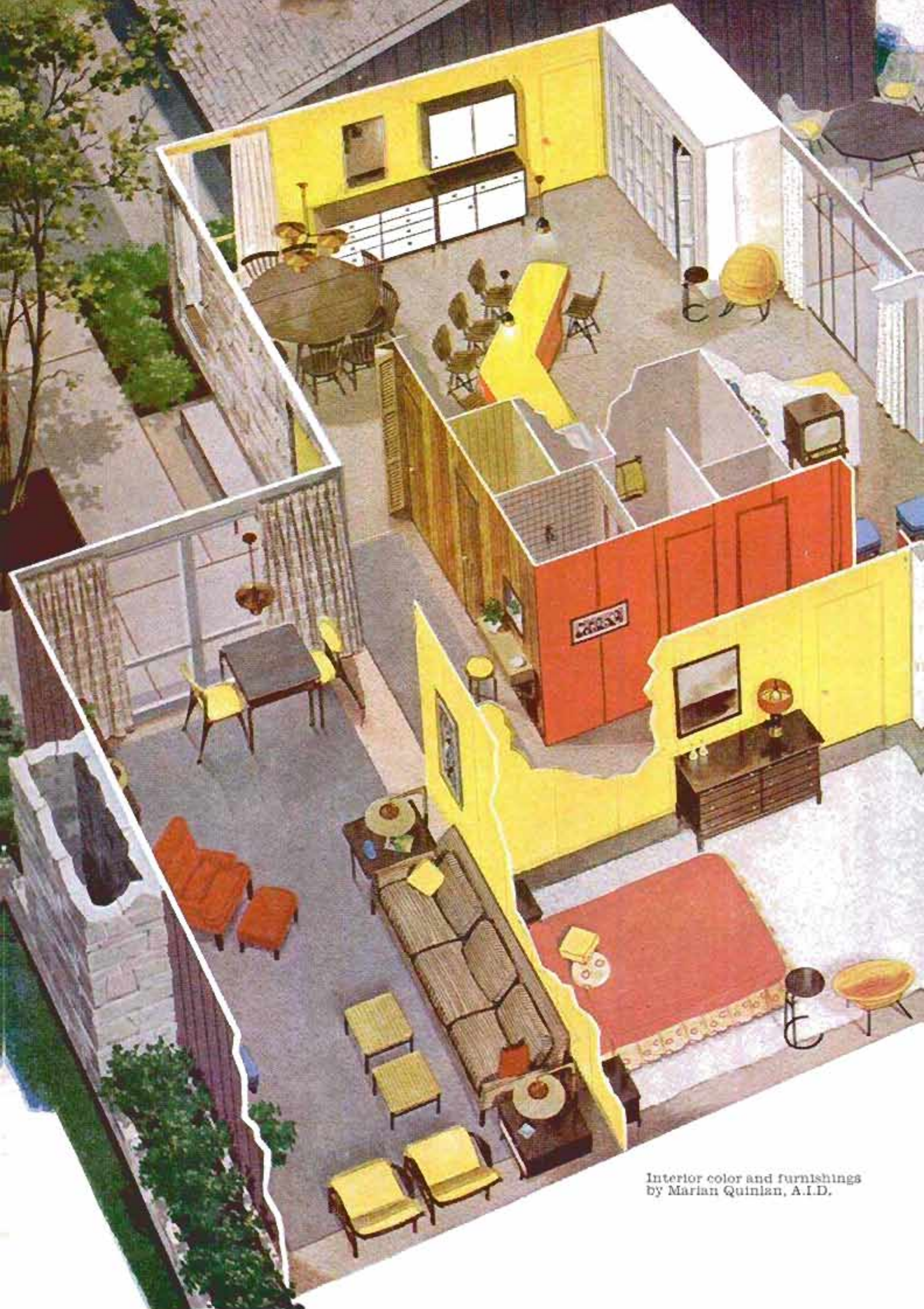
Families of three, four and five children (and there are lots of them these days) have been desperately seeking this answer. Meanwhile, they have been buying or building conventional three-bedroom houses apparently designed to drive parents into padded cells. There has been a great need for a home of moderate size planned with a nice balance of adult and child living areas, for eating and sleeping, for play and entertaining, for outdoor as well

as indoor living, a place where the traffic patterns of children are not always underfoot of the adults. You will find all of these features in the beautiful four-bedroom, two-bath home shown on these pages. The actual living area, not including the garage or the partial basement, is only 1350 square feet.

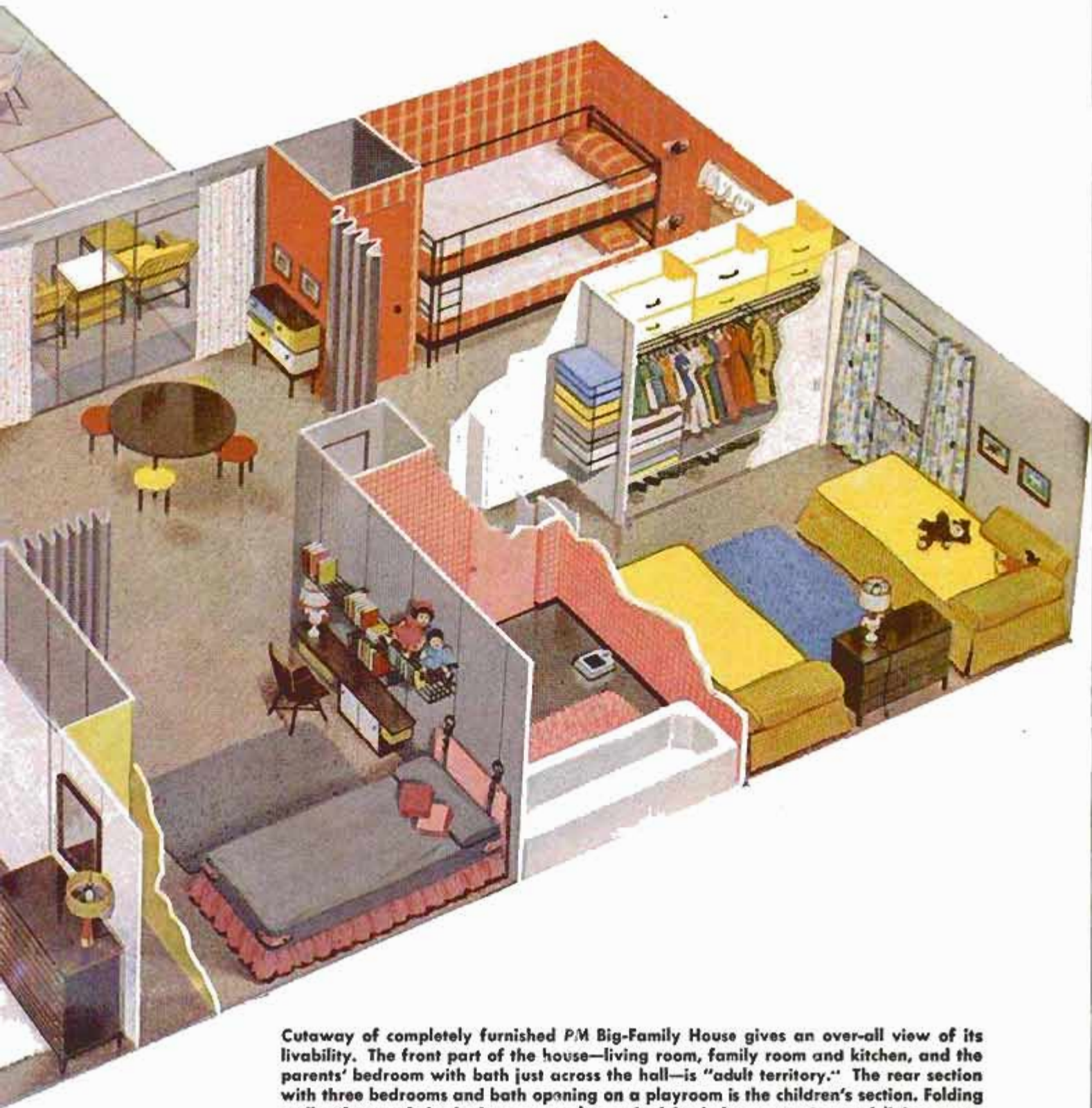
The first big problem for the editors was to find the best architect in the United States for this particular job. He is William H. Weist, a young designer and professional engineer of South Bend, Ind., who is well known for the clean design of his contemporary homes. Weist has won numerous national awards for his houses. A family man himself, Weist was able to tackle the problems of a comparatively small big-family house with some practical first-hand experience. He also had an ear trained toward Washington, D. C., earlier this year during the Women's Congress on Housing. That was a group of housewives

summoned from all over the country by the Housing and Home Finance Agency to air their views on what's wrong with

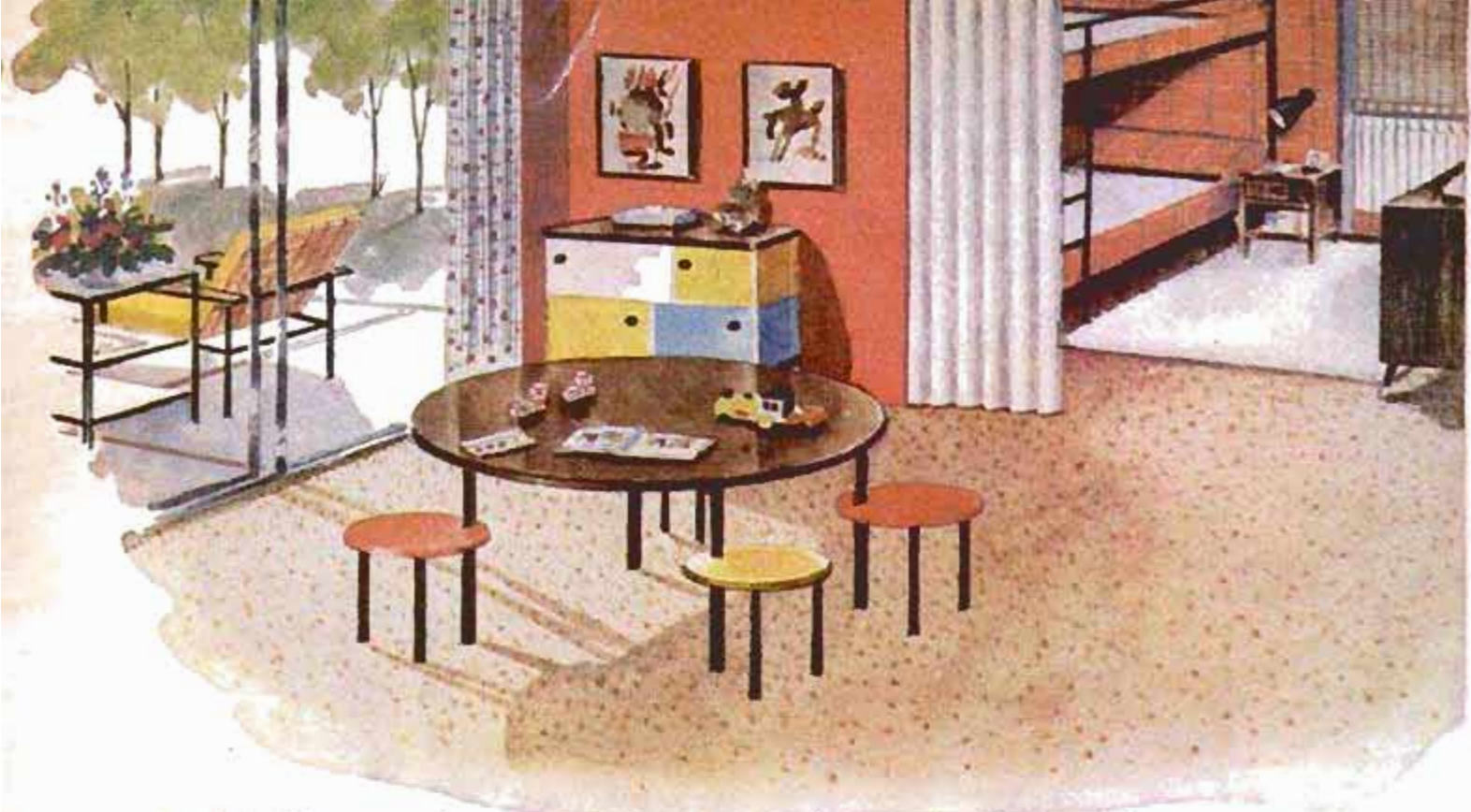
Blueprints for the *PM* Big-Family House are available for \$12.50. Write: Plans Dept., *Popular Mechanics Magazine*, 200 E. Ontario St., Chicago 11.



Interior color and furnishings
by Marian Quinlan, A.I.D.



Cutaway of completely furnished P/M Big-Family House gives an over-all view of its livability. The front part of the house—living room, family room and kitchen, and the parents' bedroom with bath just across the hall—is "adult territory." The rear section with three bedrooms and bath opening on a playroom is the children's section. Folding walls of two of the bedrooms can be pushed back for more play and living space during the day. The rear patio is accessible both from kitchen and playroom. There are five possible dining areas: Round table in the all-purpose room, kitchen counter, playroom, rear patio and end of living room. The shuttered doors at end of kitchen hide laundry equipment and provide extra storage space. Walls of boys' bunk bedroom are covered with fabric. Corner bedroom closet makes good use of splines in interior wall panels for attachment of plastic storage drawers. Pleasant informal living is the keynote of this colorful home. (For detailed information as to furnishings in home, write Bureau of Information, *Popular Mechanics Magazine*, 200 E. Ontario Street, Chicago 11.)



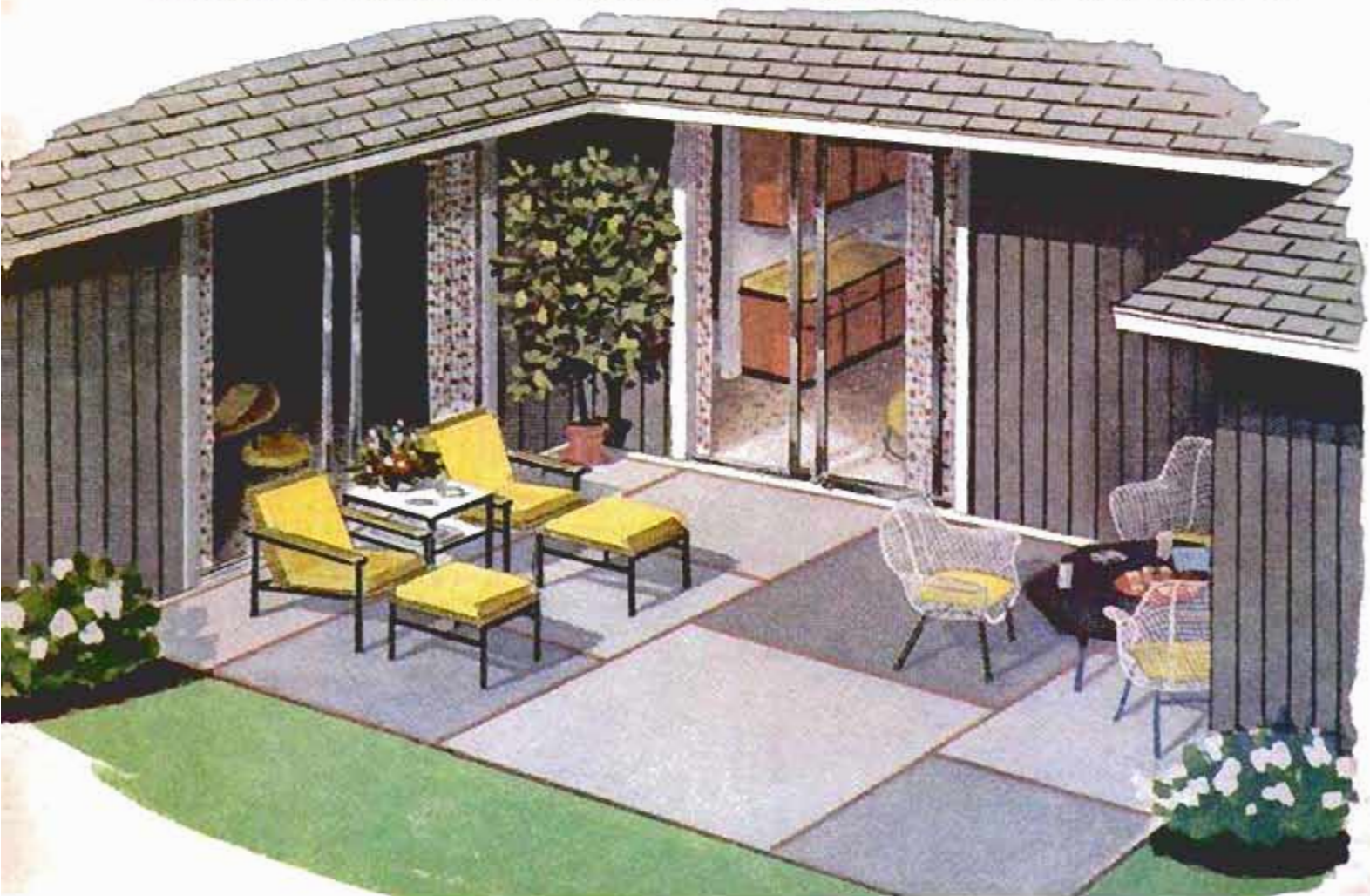
Detail of children's area shows corner of playroom and a glimpse into bunk bedroom. Glass doors lead to patio

today's houses. They had many suggestions.

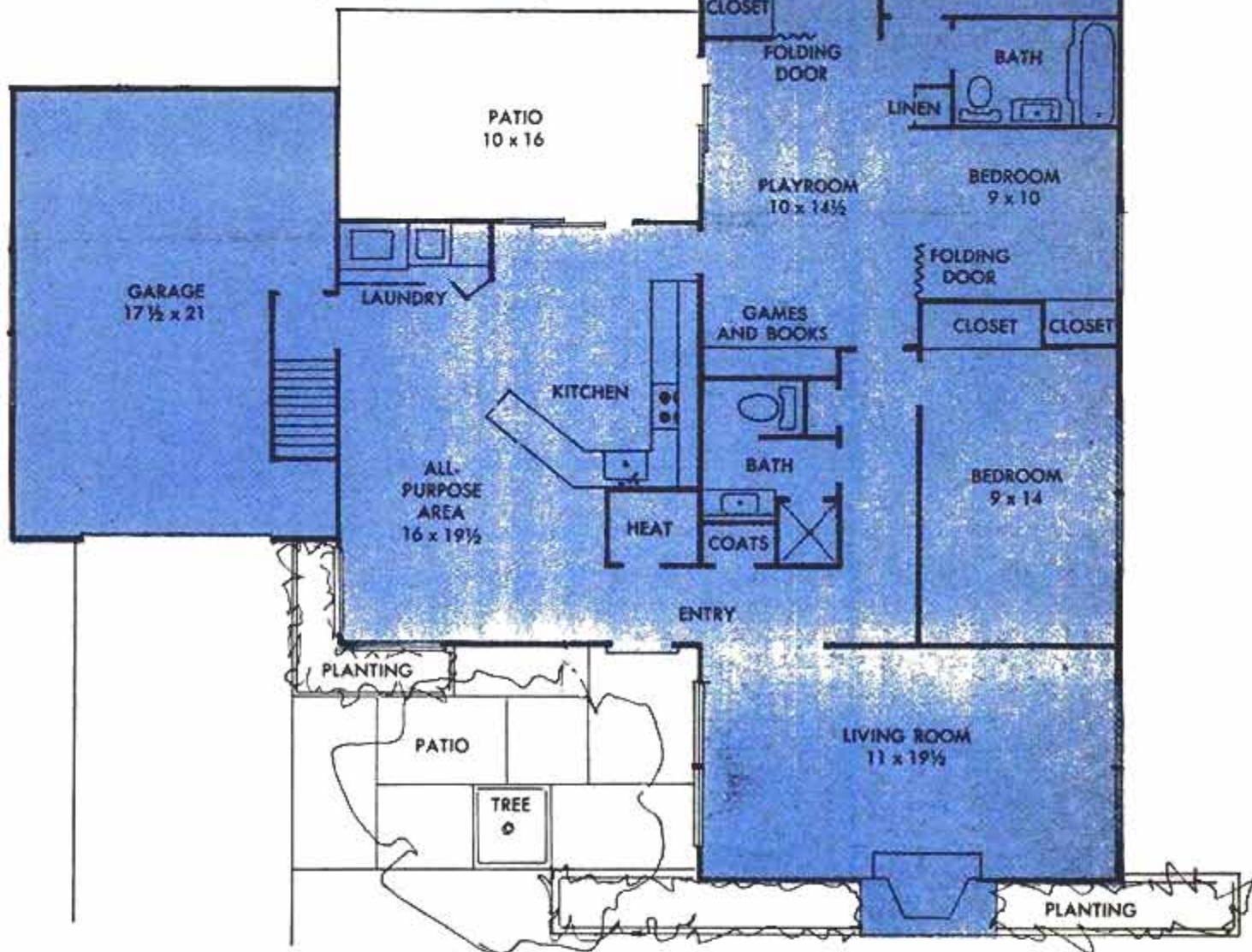
The biggest problem in the new PM house was to devise some means of arranging the children's sleeping area (three bedrooms) so that they would not end up as tiny cubicles. This was accomplished by the use of folding doors and grouping the

bedrooms and children's bathroom around a play area which is 14½ feet long by 10 feet wide. By day, the doors fold back and give a spacious feeling to this section of the house. This feeling of space is increased by the sliding glass doors on one side of the playroom that open out onto the rear patio.

Sheltered rear patio affords easy access from children's area or kitchen. Area could be roofed and screened



This floor plan with stairs in garage is designed for basement under the kitchen and all-purpose area. Laundry as shown or in basement is optional. Furnace and hot-water heater may also be located in the basement. The parents' bath across hall from largest bedroom also serves as powder room for guests. Children's area is remote from living room, and traffic by the children need not pass through any adult territory of house

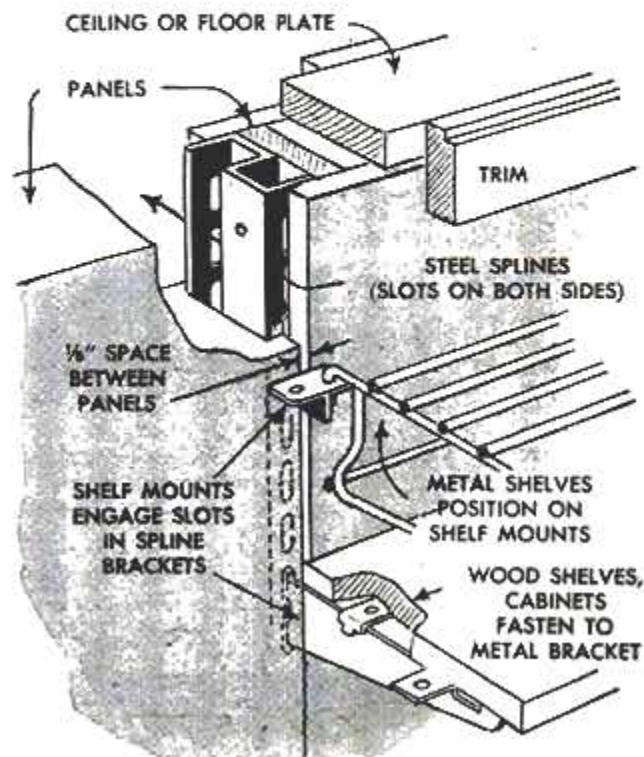


Another excellent feature of this section of the house is that the children can come and go by the patio entrance without disturbing the rest of the house. A door leads from the kitchen into the playroom, allowing for convenient supervision of the smaller children. If desired, children's meals can also be served with ease on a table in the playroom. One end of the playroom has a storage wall for games and books. This room is also a good place for the TV set.

A study of the two-page cutaway painting of the house (pages 162-163) reveals how carefully the designer planned for adult as well as children's areas. The kitchen and all-purpose section, which is 19 1/2 feet by 16 feet, is designed as adult territory except for dining. The living room

Interior walls are formed of Adjust-a-bilt panels which are two feet wide and joined by steel pieces as shown in diagram. Shelves or cabinets can be easily attached to slots in openings between panels

L. A. Darling Co., Bronson, Mich.





Angled counter gives smart touch to kitchen area. Laundry equipment is concealed behind shuttered doors.

is remote from the children's area with the parents' bedroom, a bathroom and closets forming a natural sound barrier.

The kitchen was carefully planned for convenience and accessibility. Here food can be served handily on the snack counter, to the dining table at one end of the all-purpose room, through sliding glass doors to the rear patio or to the playroom. Laundry and additional storage facilities can be located in one corner of this room behind shuttered doors. Space for the hot-water heater and furnace is provided along the cabinet wall. However, the laundry, furnace and water heater may be installed in the basement beneath this room if the builder prefers. The house can be built

either with a partial basement or on a full concrete-slab foundation. Without a basement, the only place available for a workshop is in the garage.

The living room, 19½ by 11 feet, is convenient to the entrance and guest closet. It has windows at either end and a fireplace on the long wall. The size of this room is in balance with the rest of the house, just as is the parents' bedroom which is 9 by 14 feet. Weist refrains from calling this room a master bedroom because the parents' bath is across the hall and also doubles as a powder room for guests. He believes that every part of a small home should be in perfect "balance."

(Continued to page 274)

Variation of the house plan has canted roof with fireplace at end of living room. This view is from the garage side of house. The vertical siding lends height.



Ceramic Tile Now Applied With Adhesive

By Jay W. Hedden

ONCE CONSIDERED a luxury feature to be found only in expensive homes, ceramic tile now has joined other modern materials to be included in houses in the medium-price range. Recently marketed, mastic-type adhesives that permit the tile to be applied to almost any surface, including plasterboard, have brought its installation costs much closer to those of other types of floor and wall coverings.

All three types of ceramic tile — glazed wall tile, unglazed floor tile known as ceramic mosaics, and quarry tile, the latter generally used for terraces and heavy-duty areas—can be applied with adhesives. Although elimination of the cement used in conventional tile application reduces the weight of a tiled wall or floor considerably, structural strength and alignment still are

Special grout is wiped over tiles and forced into joints, then excess is squeegeed off as shown below



Wall tiles are forced against the adhesive with a twisting motion. Projections cast on the tiles space them correctly

important. Only selected studs should be used in a wall to be tiled, and they should be cross-braced midway in height with 2 x 4 bridging. When the walls of a bathroom are to be tiled, the tub should rest on metal hangers fastened solidly to the studs so it will not be affected appreciably if the floor settles. When plasterboard is used as a base for ceramic tile, it should be installed horizontally on studs set on 16-in. centers, using cement-coated nails spaced 4 in. apart. The sealed edges of the plasterboard should be primed and placed next to the tub, allowing a space of $\frac{3}{16}$ in. There are

Damp sponge is used to clean tiles and smooth joints. Dry cloth is used for final dusting and polishing

Photos courtesy Tile Council of America, Inc.





After sheets of tile are aligned they are forced into adhesive and leveled with tile-setter's beating block



Minimum amount of water is used on paper, since moisture on adhesive greatly increases setting time

special primers made for application of ceramic tile with adhesives, but tile adhesive thinned with solvent may be used. The adhesive also is used for calking around pipes and between wall and tub. All joints in a plasterboard wall should be taped and cemented in the usual manner, then painted with primer. One coat of primer is enough for walls enclosing tubs, while shower areas require two coats brushed on at right angles to each other. It is recommended that flashing of 1-in. aluminum angle be installed in corners under the tile to minimize cracking and moisture penetration.

For application of the tile, the adhesive is spread thinly and uniformly on the sur-

Floor tiles do not require soaking with water before application of grout to joints as their absorbency is almost nil



face with a toothed trowel, after which the tiles are forced against it with a slight twisting motion. After all the tiles have been applied to the wall, the adhesive is allowed to dry for about 12 hr. The joints then should be soaked with water if the tiles were not soaked prior to installation. Next, grout is forced into the joints by hand, or with a sponge or squeegee. Grout used for wall tiles is a special kind chosen for its whiteness, low shrinkage and resistance to moisture. After the grout has stiffened somewhat, a damp sponge is used to smooth the joints, then the tiles are cleaned with a damp cloth and finally polished with a dry one to remove the fine cement dust. A final polishing may be done after the grout is dry.

Floor tile is installed in the same manner as wall tile, but with a different adhesive. To provide a firm, true surface for floor tile it is recommended that $\frac{5}{8}$ -in. exterior plywood be nailed every 6 in. directly to joists spaced 16 in. on centers. Even better construction is to nail $\frac{1}{2}$ -in. plywood over 1 x 6 subflooring nailed diagonally to the joists.

Mosaic floor tiles come pasted to 1 x 2-ft. sheets of paper to permit faster installation. The sheets of tile are pressed into the spread adhesive, then the paper is peeled off after being moistened with water. Floor-tile adhesives also require 12 hr. to set. Grout for floor tile is a mixture of waterproof portland cement, one part, and finely screened sand, one part, with enough water to make a workable consistency. ★ ★ ★



THIS OLD HOUSE IS YOUNG AGAIN

NEW HARDBOARD SIDING, modern windows, a cantilevered porch and entrance stoop, in addition to a complete remodeling job inside, have given an old home in Oak Park, Ill., a new lease on life.

When the owner bought it, the house was covered with asbestos shingles over the original narrow beveled-wood siding. It was located on a lot condemned for a new school addition and had to be moved three blocks to the present site. It was placed sideways on the lot and the old-fashioned front porch torn off.

The exterior walls were stripped down to the wood sheathing. Attractive awning-type windows were put in and a screened porch extended cantilever-style from a small concrete foundation. A sun-shield overhang ties in with the porch roof and is supported by wood beams extending across the living-room and entrance-hall ceilings. Adding to the modern effect is a semiattached garage at the rear with a wide overhanging flat roof.

The architect, W. Lockwood Martling,



From the inviting sun deck over the cantilevered screen porch to the modern entrance stoop on the side, remodeled home (top) creates an air of youth. Dormers on the roof are all that give secret away

Jr., renowned in the Chicago area for making new homes out of relics, went all out on the inside. A wall was removed between the old living and dining rooms, making one large room across the front of the house. Sliding glass doors at the dining end of this room lead to the porch. The original large kitchen was torn apart to make room for a powder room and breakfast area. A big entrance hall was provided with space for a closet. Partitions were ripped out on the second floor to make a master bedroom across the front. The remodeling also included all new plumbing. Exterior colors of soft blue siding, coral trim and yellow accents are continued on the inside. The architect even used modern landscaping for a "young" effect.

Peter Turchon of Homes, Inc., in Boston, buys and remodels 500 old houses a year. We asked him and his assistant, Charles Norton, to pass along a few pointers to our readers.

Remodeling Tips From the ROOFS

Roofs seldom need replacing, but nearly all need repairs. Leaks should be stopped, and rotted or worn shingles replaced in patches wherever needed. Any redecorating inside will be ruined if water gets into the house afterward. Flat roofs can be made watertight with an inexpensive coating of tar and gravel; asphalt shingles are best for slopes.

EXTERIOR REPAIRS

Never cover wood siding with any new surface. It's wasteful. Besides, a coat of paint looks better anyway. Masonry should be pointed up and rotten wood replaced. Occasionally, an ancient portico or porch can be torn off economically if sagging, or if the looks of the house will be substantially improved. Any exterior work should be regarded with caution as any major outside building changes are expensive. Do not put in more than you can get out.

STRUCTURAL CHANGES

Go easy here, but keep a careful eye on the essentials. Rotten wood in sills or studs should be replaced. The cause (usually poor outside drainage) should be removed. Masonry foundations should be repaired where necessary. To put a sway-backed house back on an even keel at low cost, set jack-columns on a firm base under the sagging beams and take up only a turn or two each day. If you try to do it all at once you will crack plaster. Disconnect all steam and water pipes so movement of the house won't snap old joints. Homes, Inc., straightened one house that had no firm basement floor for columns. Nine hydraulic jacks were used with nine men working them simultaneously. Two new 12 by 12 beams were placed under the house with the ends seated in prepared niches in the foundation wall. Then the house was lowered into place.

INTERIOR WALLS

Many old houses have crooked walls and plaster that is rough and uneven. Wall surface replacement is expensive. Wallpaper can cover a multitude of flaws. Cracks can be patched and papered over. Where walls are crooked, the effect can be dispelled by intelligent use of wallpaper patterns. Striped paper run horizontally around a warped corner will hide the tilt. Large patterns are best. Where plaster is rough, use a heavy pebble-textured paper.

CEILINGS

When ceilings are bad, a slick new ceiling of dry panels can be fastened to furring strips nailed through the old plaster. If old ceilings are too high they can be lowered a foot or two with a dry panel at reasonable cost. In kitchens or baths, ceilings can be dressed up even more simply and very effectively with one-foot-square dry panels that are simply stapled directly to the old ceiling without any furring. Materials for new ceilings are varied and good.

Nation's Top Remodeler

FLOORS

If floors are made of hardwood they can be sanded. However, floors in most old houses are soft wood and should be cleaned and repainted or covered with linoleum if they are pitted or splintered. Baths and kitchens should almost always get new floor coverings of asphalt tile or linoleum which are not expensive.

KITCHENS

Top priority should be given kitchens when it comes to redecoration. Old stoves should be torn out, also iron sinks and wooden drainboards. These can be replaced with low-cost modern units, many of which are available from mail-order houses. Some modern sink units can be purchased in kit form and are easily assembled. Metal wall-cabinet units (in banks to fit the kitchen layout) can be bought for little. Unpainted wood cabinets of the do-it-yourself variety may also be used. Walls may be covered part way up with plastic or metal tile if the wall surface is even. If not, wavy walls can be furred out and panel-type tileboard used. A simple coat of enamel paint can be used on good walls with excellent effect and for a tenth the cost. You can put a picture window over the sink for \$80 to \$120. Whatever you do make use of what the house has to offer.

BATHROOMS

Plumbing is the most expensive part of any modernization and should not be changed if it works well. If the old bathtub works try to think of some way to dress it up. Remember a new \$75 tub may require \$300 of plumbing revision. With new asphalt tile on the floor, ceiling tile stapled to the overhead, and with paint, paper or tileboard on the walls, even an old-fashioned bath can be made to look pretty good for a little money. Careful window treatment and good use of colors in the accessories are also important factors in the new-old bath.

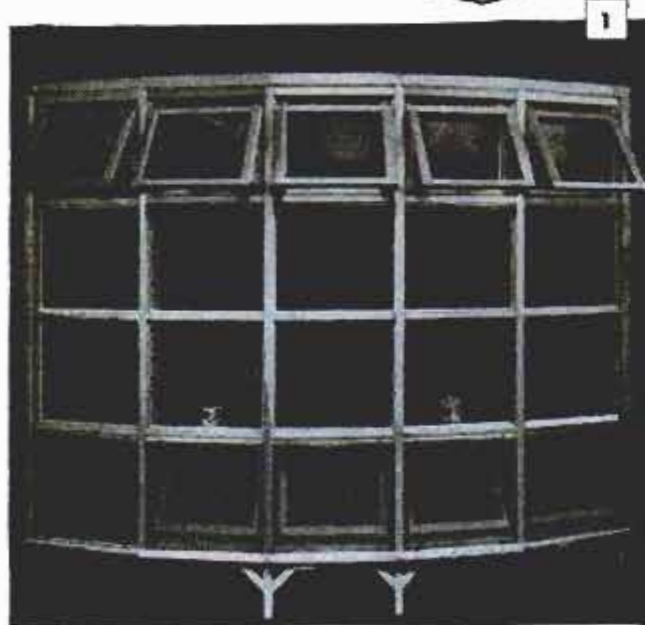
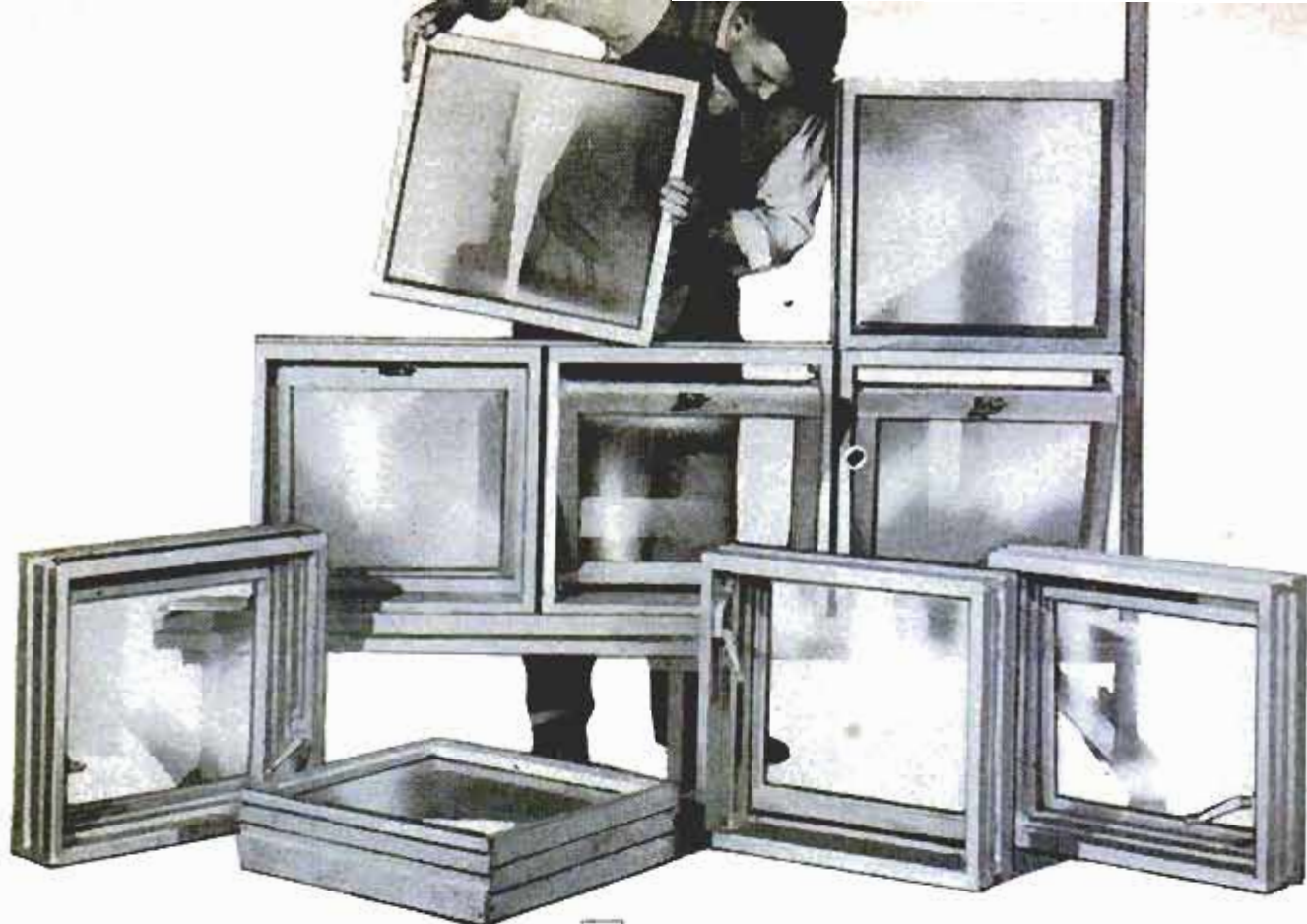
WIRING

New fixtures can be installed in most old houses at slight expenditure and go a long way to minimize the shabby appearance of an old house. All old wiring should be checked carefully for safety and replaced where necessary. Extra outlets should be installed generously to accommodate modern appliances.

HEATING

Most old houses in the northern part of the country have adequate heating. If not, a hot-air floor furnace or oil-burning unit with hot-air outlet into the living room will do a passable job at reasonable cost. As far as the mortgage goes, this will satisfy most banks and insurance companies. Cold floors or walls may be corrected with insulation.





NEW IDEAS

1. SECTIONAL WINDOW UNITS can be set up to suit the builder's taste. The jambs on all sides "nest" into adjacent units. They are supplied in 24 shapes and sizes, awning, hopper or stationary

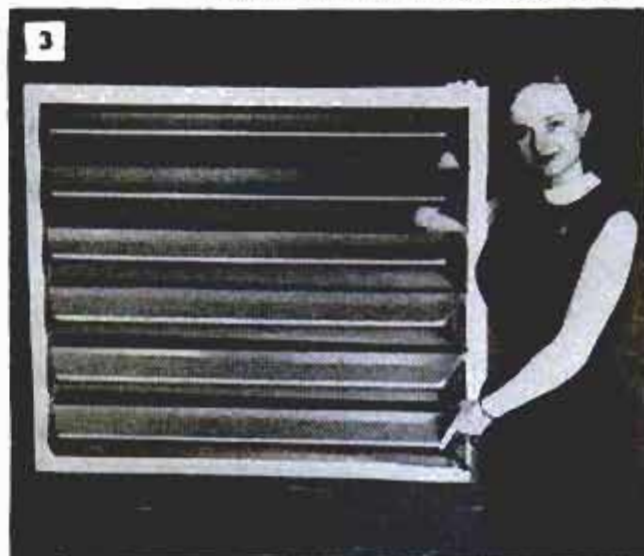
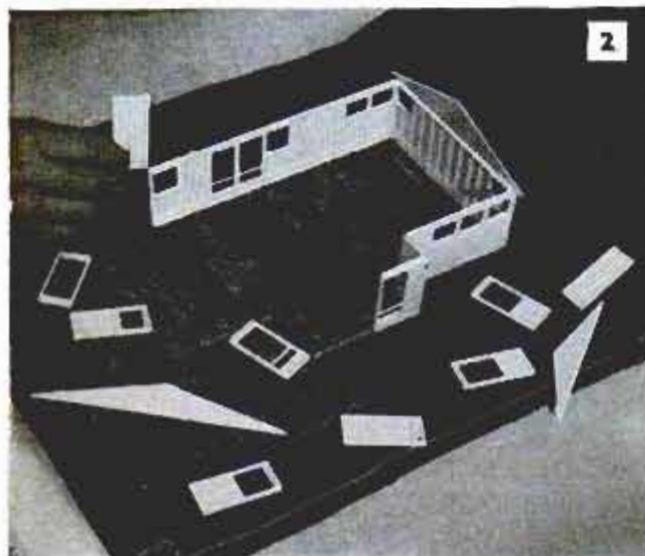
Woodco Corp., North Bergen, N. J.

2. SCALE-MODEL KIT gives home planners a three-dimensional preview. Kit contains 175 parts scaled $\frac{1}{4}$ inch to the foot—the same scale used for blueprints. The parts interlock and require no tools

National Plan Service, Inc., 1700 West Hubbard St., Chicago 22.

3. "WASHBOARD" WINDOW made of Plexiglas is designed in louver style for control of heat and glare. Each section has a transparent and opaque surface to diffuse the light. It does not open

Luria-Cournand, Inc., Havre de Grace, Md.





4. ELECTRICAL OUTLET COVER prevents children from sticking metallic objects into openings which may result in serious shocks. It also prevents pulling out plugs. Plastic cover is easily installed in about two minutes without tools or any rewiring.

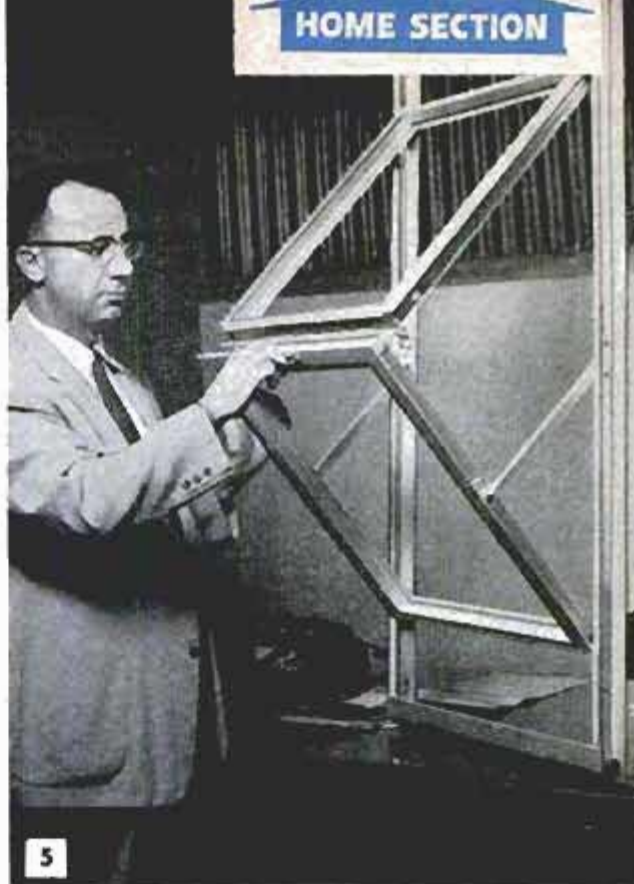
Robert Brody Co., 3 Coenties Slip, New York City 4.

6. PLASTIC PANES prevent passage of ultraviolet light that is harmful to materials in homes or show windows. The panes permit passage of 50 percent of visible light and are almost unbreakable. They are available in a variety of light-fast colors.

Firestone Tire & Rubber Co., Akron, Ohio.



OCTOBER 1956

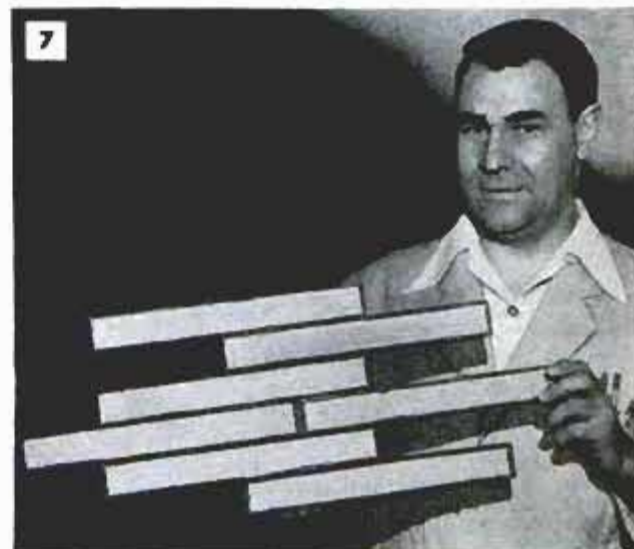


5. JACKKNIFING WINDOW projects into the room when open, making it easy to clean both sides of the panes. When closed, window seals tight and is locked with a key. It was designed for air-conditioned buildings and can be installed horizontally.

Marmet Corp., Wausau, Wis.

7. WOODEN BRICKS can be made of short pieces of 2 by 4 and 2 by 6 lumber for building walls or room dividers. They can be locked together with dowels or glued like regular bricks for non-load-bearing partitions. Bricks can be homemade.

Timber Engineering Co., Washington, D. C.

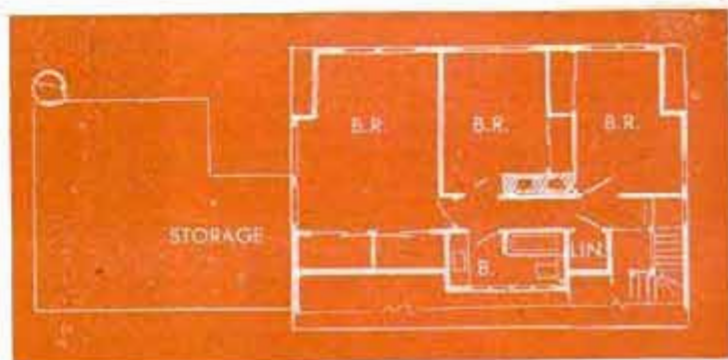


173

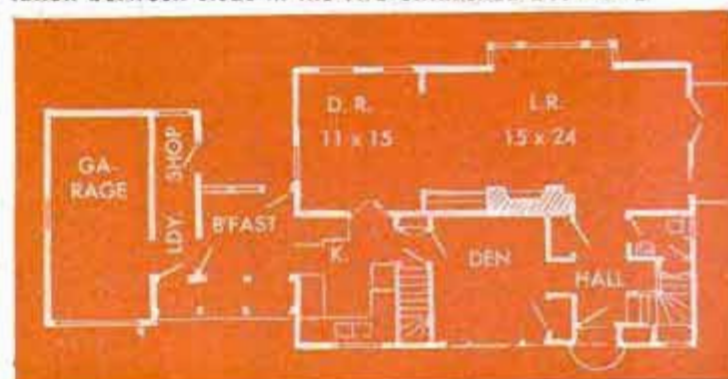


The Murphys at work on their new home—Frank attaches light fixture and Evelyn is busy fitting shutters

WE ARE SAVING \$4225 BY



Not including garage or storage above it, the house plan provides 1985 square feet of living area. The Murphys designed the house themselves and hired an architect to make the working drawings. It has a full basement. Left, Frank at work stapling insulation between studs in the two unfinished bedrooms





Small Julie takes it easy while her busy parents fit shutters to windows under narrow decorative porch

FINISHING THE HOUSE OURSELVES

By Frank and Evelyn Murphy

LIKE EVERYONE ELSE who wants a new home, we talked and planned for several years. Somehow, all of our talks about the house ended at the same dead end: Our needs and plans called for more house than we could afford.

Then we would start cutting back. Out would go the fireplace, the extra den-bedroom, the breakfast room and so on. This would result in the gloomy conclusion that we would be as well off in the old house. So we waited. Eventually we bought a lot in the wooded section of our suburb, Glen Ellyn, which is 25 miles west of downtown Chicago.

"We'll have the money to build the kind of a house we want someday," Frank would say.

And Evelyn would reply: "Yes, but we want it now while the children are growing up—not after they're gone."

Our children are Tommy, age 8, and Julie, 3. We are in our middle thirties with no prospects of getting any younger.

One night Frank, who is a commercial artist, was turning the pages of *Popular Mechanics* when he looked up with a gleam in his eye.

"It says here that 60 percent of the

builders of new homes plan to do part of the work themselves," Frank said. "Do you suppose we could swing our house financially if we can get a contractor to let us do several thousand dollars' worth of finishing on the job?"

"Like what?" Evelyn wanted to know.

"Like painting, staining woodwork, papering, maybe putting on the insulation, finishing the upstairs rooms, bathroom tiling and certainly all the landscaping."

We grew more enthusiastic as we talked far into the night and for the first time our gray-shingled dream house with white trim took on a tinge of reality.

Two nights later we nervously presented our beautiful plans to Harvey Mickelsen, a top-notch contractor who has built many fine homes in our area. Our house was to be colonial, or Cape Cod, in style with modern touches such as a living room to the rear with big windows looking out at the woods in back. The first floor also included dining room, kitchen, breakfast room, a den-guest room and lavatory. We eliminated the central hall of traditional design because of the wasted space. Our staircase goes up under the eaves to three bedrooms and a bath on the second floor. Extra space and light for the second floor are provided by big dormers, both front



Half the battle in hanging wallpaper is having the right tools, Frank reports. His helpers declined to comment. Below, first coat of paint goes on plastered dining-room wall. All woodwork has natural stain



and back. Floor area of the house totals 1985 square feet which, of course, does not include an attached 1½-car garage adjoining the breakfast room. Eventually, the garage will be partitioned for a workshop and laundry.

Mr. Mickelsen liked the plans but reminded us that building costs in the Chicago area are about the highest in the United States. This we knew, and we told him that our only hope of getting a permanent home that would supply all our future needs was to be permitted to do some of the finishing work ourselves. He explained that we were tackling a big job that might take a couple of years out of our lives. Would we be willing to give up all our free time to the task—nights, week ends, vacations? We would. Then, while our hearts leaped with joy, he agreed to let us handle the painting "contract," the application of all insulation, staining of all the natural birch woodwork throughout the house and the kitchen cabinets, finishing of three bedrooms and bath on the second floor and the landscaping. His bid would include full basement and a slab for the screened porch that will someday adjoin the living room.

Blueprints Cost \$250

We got two local architects, Gerald Perkins and Michael Mulloy, to make the blueprints and working drawings from our sketches. This cost \$250. Before Mr. Mickelsen bid on the plans we learned that our loan company demanded that one bedroom and bath be finished on the second floor by the contractor. We were to be allowed to do the floor and wall tiling in the bathroom. Mr. Mickelsen then gave us job estimates on our do-it-yourself projects:

Painting and decorating (including window sash, all outside trim, staining and varnishing woodwork and cabinets, paper hanging).....	\$2000.00
Insulation (labor)	100.00
Tiling bath (floor and tub wall) ..	150.00
Finishing two upstairs bedrooms (including dry walls, woodwork, closets, flooring, decorating).....	975.00
Landscaping	1000.00
Total \$4225.00	

Mr. Mickelsen warned us that there would be extra costs and possibly unforeseen expenses. This was too true, especially in the case of 150 feet of special sewer line we had to put in, not to mention the driveway we had completely overlooked. We also decided to go all out on the fireplace wall, a built-in bookcase, hardwood, multipane windows, a custom-built colonial staircase, and other refinements.

We broke ground on July 11, 1955, and moved in on New Year's Day, 1956. This



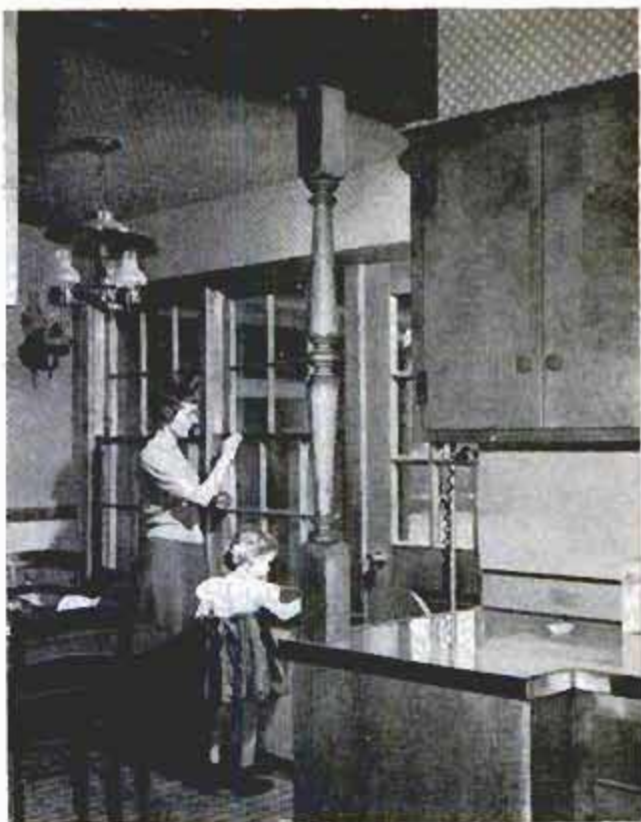
After shellac and varnish came the rubbing. "I rested by thinking of the money saved," says Evelyn

was good timing for our do-it-yourself chores because we got the outside painting and insulation work done in good weather. We painted the window frames as soon as they were delivered to the job to prevent warping. In our enthusiasm we painted them inside and out, forgetting that we were having natural woodwork within. This entailed a later tedious job of paint removal. As soon as the trim went on, one or both of us was there with a paintbrush. The contractor loaned us a hammer-type stapler for the insulation and this job took a couple of months of Frank's spare time.

We have congratulated ourselves from the beginning on our selection of stained shingles for siding. They saved painting.

After the house was closed in and the heat on we tackled the woodwork. This meant staining, a coat of shellac, two coats of varnish and then rubbing. Nail holes were filled after the staining. We learned the hard way that you can't use the same stain on the filler, but must use dry pigment to get the correct shade. We acquired a wallpapering kit which we think is easily worth its weight in gold.

Moving into an unfinished house with your children can be whatever you want to make it—a harrowing experience or an adventure. Two of our upstairs bedrooms have walls of studs and bare insulation. You have to step across the conduit on the unfinished floors. When we first moved in the shingle siding was not yet on and small birds could easily slip through the knotholes

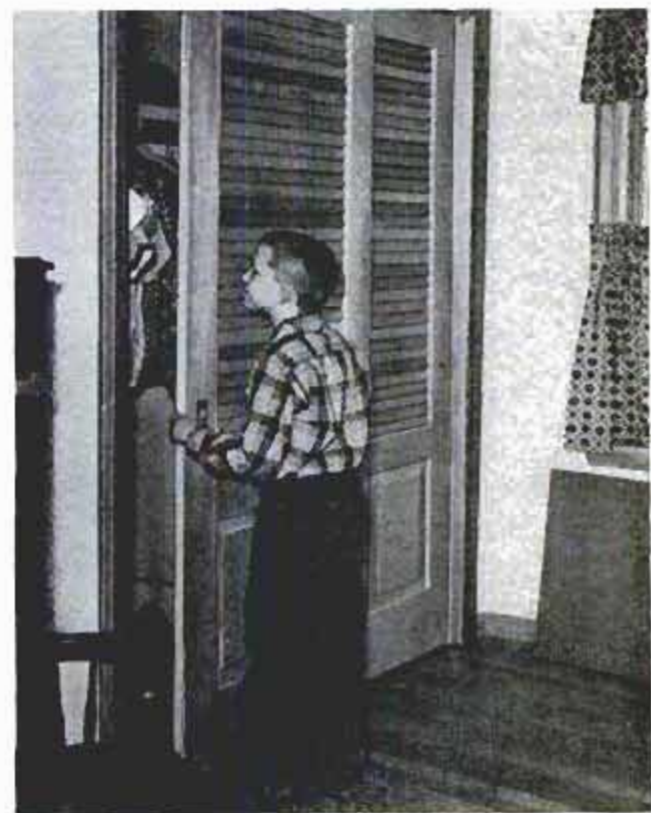


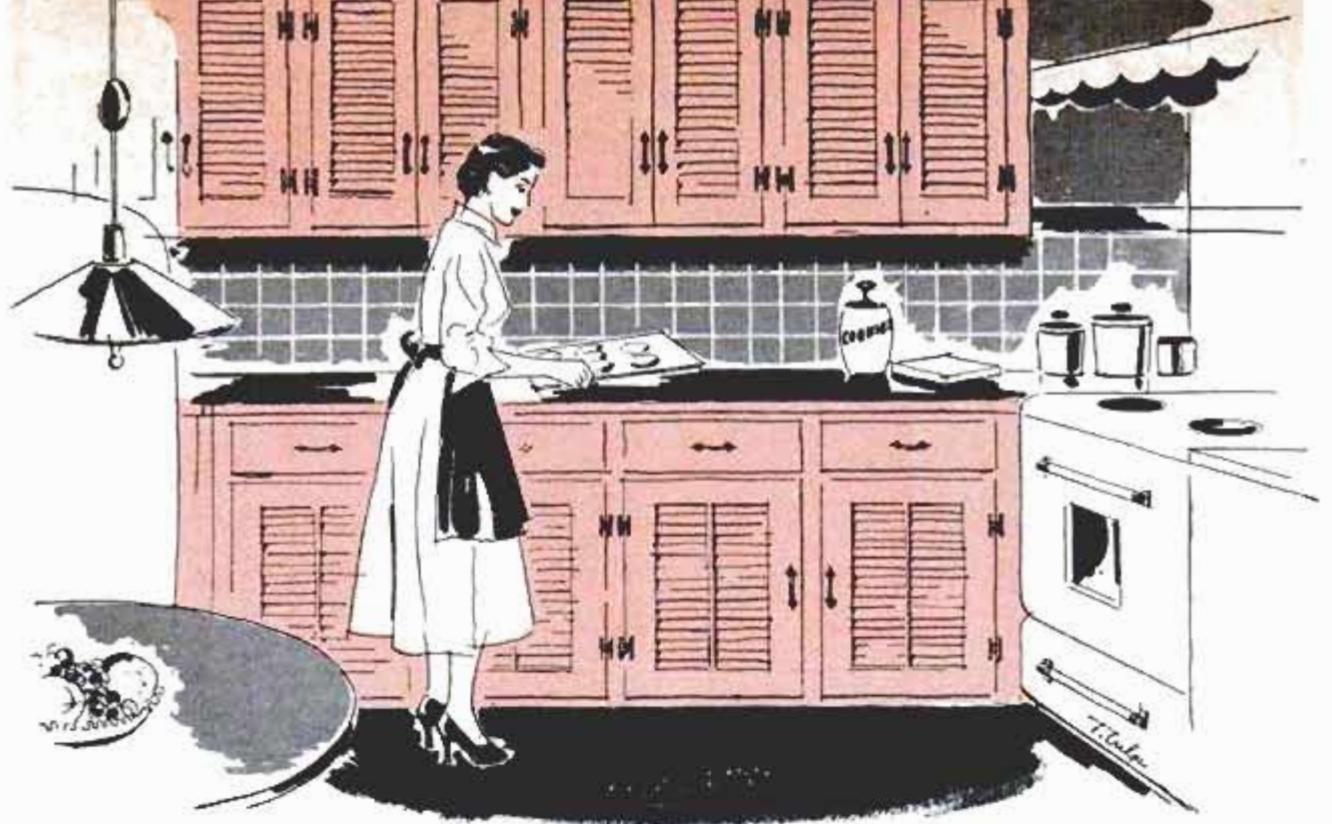
Filling nail holes with putty was a long and tedious job. Dry pigment was used to stain the putty

into the bedrooms. The children loved it.

Sometimes we feel like a couple of mountain climbers trying to scale a peak. We are much too far up the mountain to turn back if we wanted to and from time to time we get a view of that shimmering peak—our finished permanent home. ★ ★ ★

Young Tommy demonstrates how slick sliding doors work on his bedroom closet. All woodwork is birch





When planning a new kitchen keep in mind the decorative value and practical utility of shutter doors. They are always in character, add a touch of the seasoned provincial to modern kitchen decoration

SHUTTERS ARE BACK AGAIN

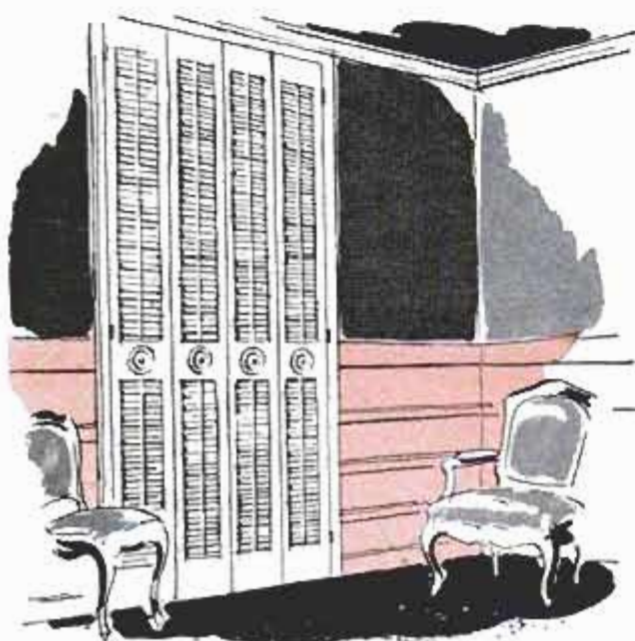
By W. Clyde Lamme

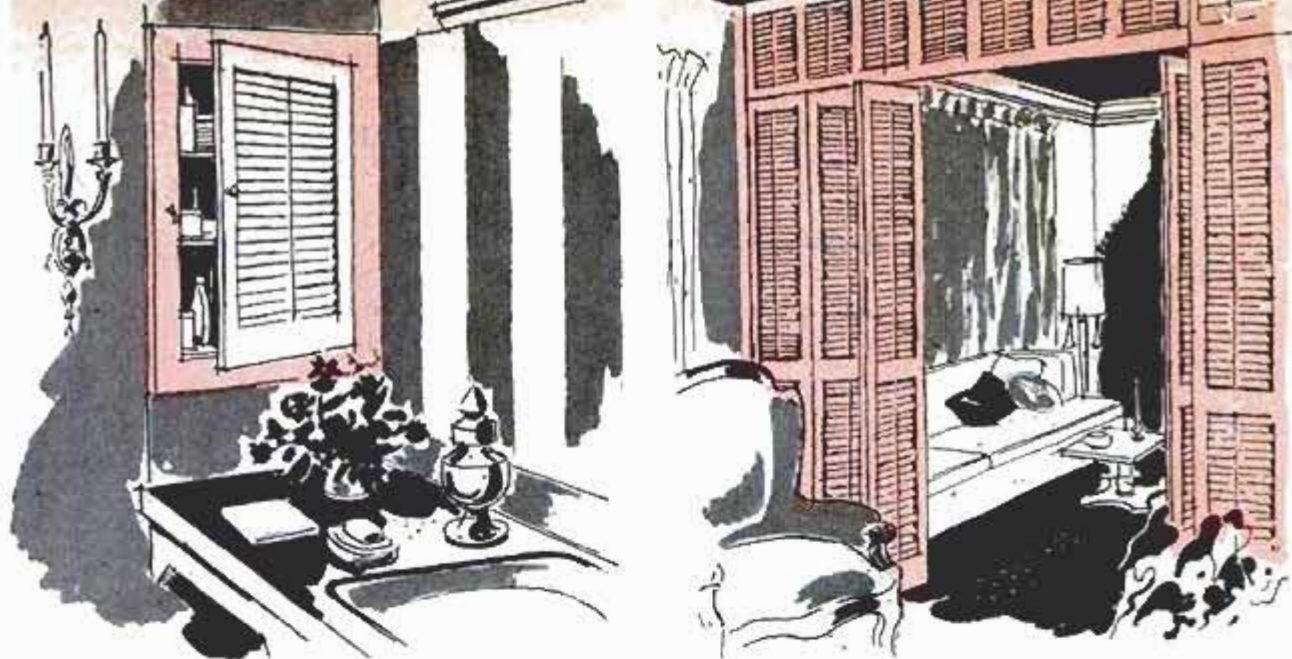
AN INTERESTING TREND in present-day interior decoration is the use of shutters to attain a pleasing and livable harmony of old and new. In modern homes the warmth and distinction of interior shutters have been rediscovered by decorators and homeowners alike. New applications have been worked out for today's larger windows and closet doors, also in multi-

If you have an expanse-of-wall problem or a wide, plain doorway that seems to have no solution decorative, think of tall, folding shutters with medallions

purpose rooms where doorway and window treatments assume new importance. On kitchen cabinets, shutter doors serve a threefold purpose. They are attractive without any out-of-character feeling, conceal contents of cabinets and provide ventilation. Closed, shutters give solid-wall privacy to window walls, make the perfect background for indoor greenery. ★ ★ ★

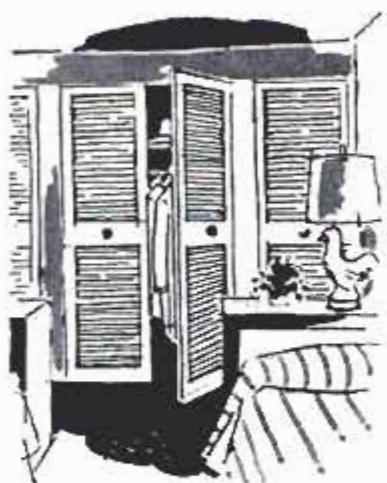
Shuttered windows recall the old, combine it with modern decoration. Shutters can cover only window or run from floor to ceiling for a feeling of height



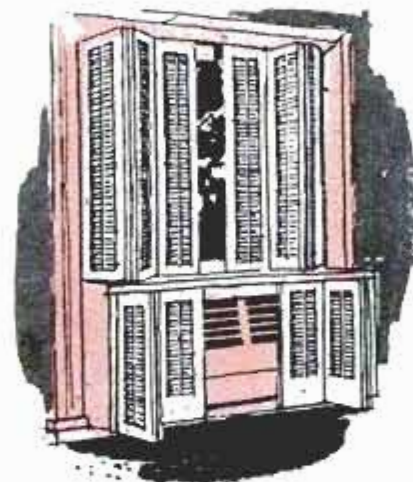


Shutter door solves the problem of what to do with unsightly built-in shelves you often find in older homes. The door makes an attractive closure and contents of shelves need not be selected for appearance

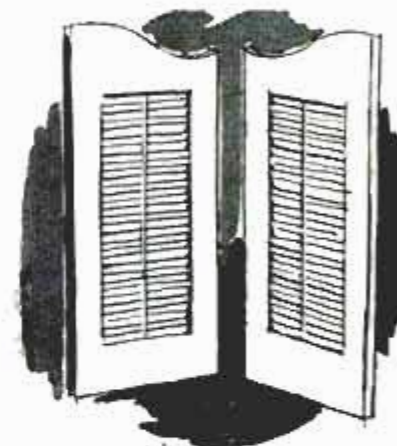
Remember the combinations possible with shutters and you have a solution ready when the problem of room dividers comes up. In this application shutters in upper row are fixed. Those below fold accordion-style



Full-length shutter doors do two things for a clothes closet, hide contents from view and provide adequate air circulation



If the radiator under a window baffles you, try this solution. As you can see, it really works. Both sets of shutters fold flat



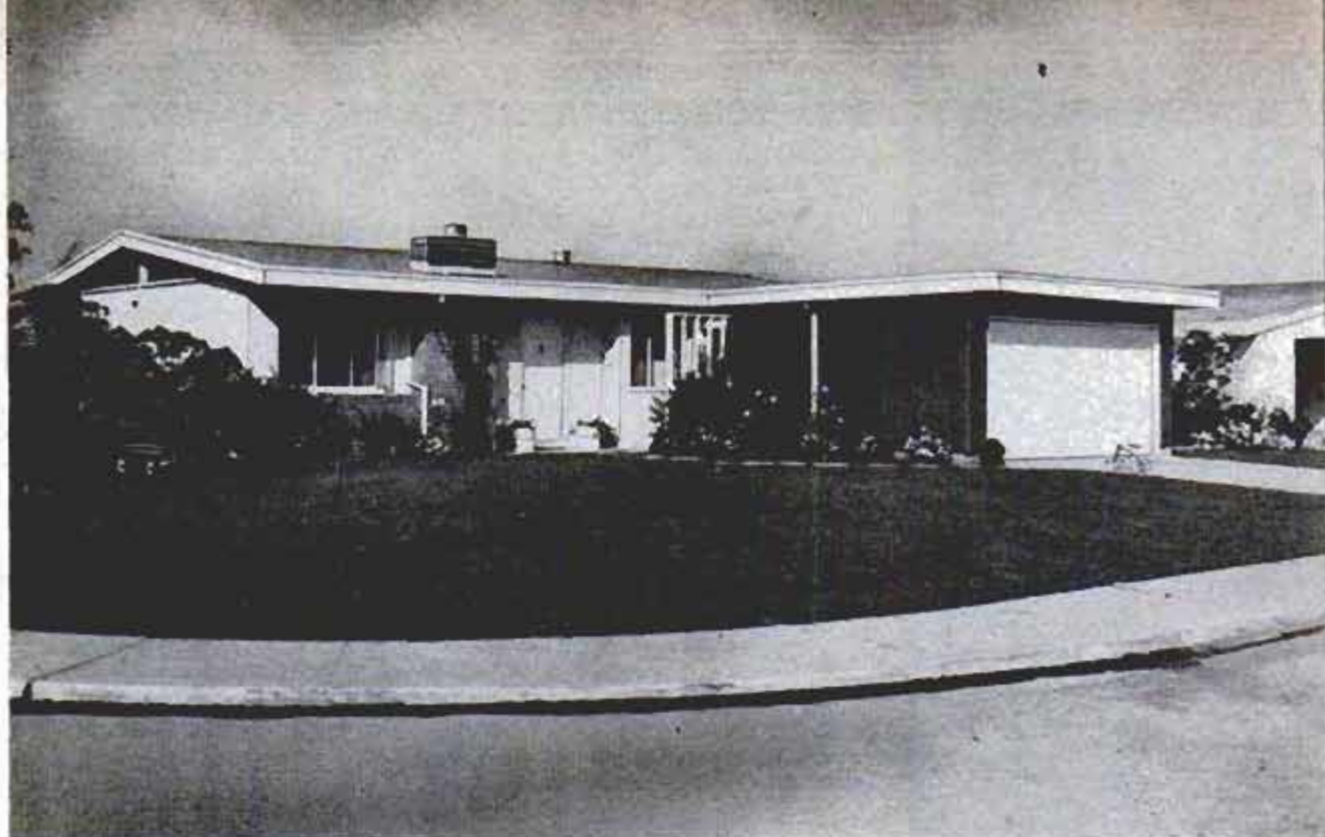
Can you think of anything better to open way to basement recreation room than old-fashioned swinging "saloon" doors?

Reshape a corner effectively with a folding screen of shutters made with movable slats above, solid panels in the lower half



In older homes the classic room divider with its square or round columns and ponderous woodwork is well replaced with shutters and companion planters for real or artificial greenery. The middle shutters can be arranged either to slide on rails or swing out



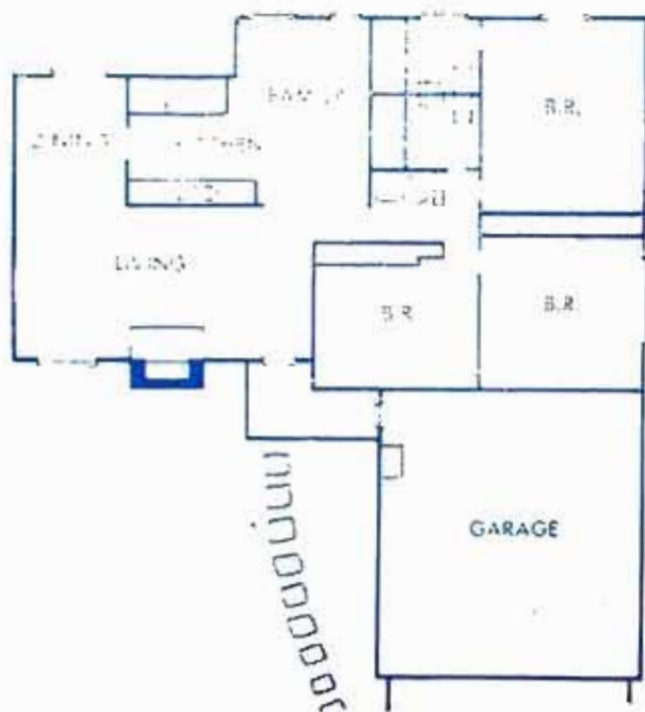


This is one of the attractive low-cost McKellar homes now being constructed in San Francisco and Sacramento

*A three-bedroom, two-bath house for \$12,500—
here's how one West Coast builder offers*

More House for Less Money

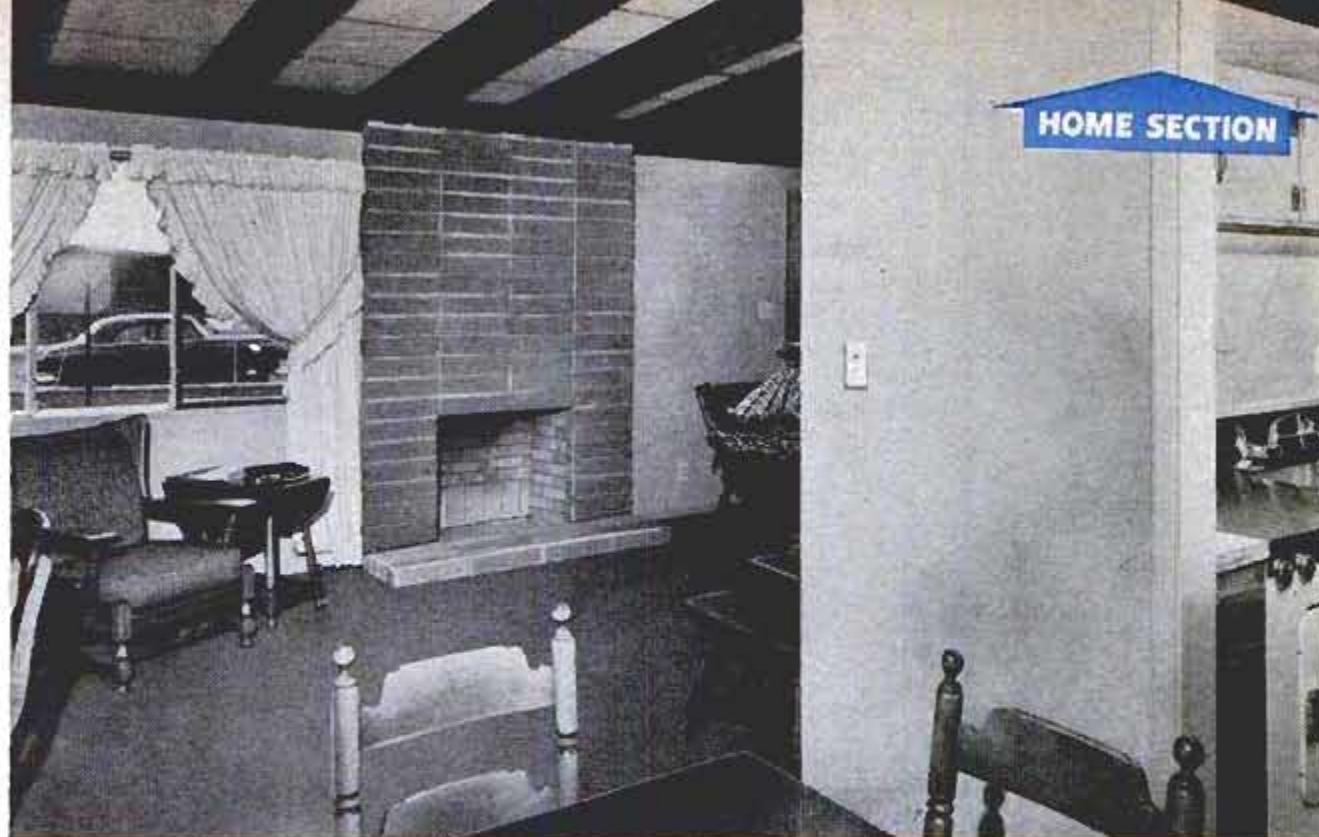
By Tom Riley



THIS IS THE INSIDE STORY of how one large contractor is building houses today. The contractor is McKellar and Associates of Menlo Park, Calif. In these times of high prices, the story is of genuine interest to any homeowner, as well as to professional builders. Why? Because McKellar has been able to produce large numbers of well-built homes around San Francisco, Sacramento, and Las Vegas—three-bedroom, two-bath, double-garage homes with 1200 square feet in the house plus 456 in the garage at \$12,500 to \$13,500.

What really flabbergasts the visitor is that these homes are in neat subdivisions with paved streets and sidewalks, with the sewers in, front lawns and a paved patio in each back yard. Each house is equipped with the latest in dishwasher, disposal unit, range, automatic washer and clothes drier. Everything is included at the price.

How does this contractor do it? These



View of the living room from the dining area shows the fireplace, beamed ceiling and glimpse of kitchen

houses are not just thrown together. They follow standard construction methods and fully pass FHA specifications. In fact, each McKellar house is sold with a full guarantee by the builder against any structural defects for an entire year, even to a sticking door or crack in the ceiling.

One answer is that the firm builds these homes in large tracts of 200 to 500 houses. But that is only a small part of the story. The general manager, Ralph Calcaterra, is a genial but alert man who spends little of his time supervising. He leaves that to able assistants and spends his time on his tracts and elsewhere searching for less costly and better ways to build houses. As a result, he has found a bagfull of proved tricks and simplifications. Many of these can be used by anyone building a house anywhere in this nation.

Cost-Saving Tricks

"You may need to make some modifications for houses in different regions," says Calcaterra. "For instance, steeper roofs in areas of heavy snows, but such things will be in your local codes. What you will not need is special or hard-to-get material."

The how-they-do-it starts right with the foundation. Most of these houses are being built with concrete slab floors. A dozer levels the ground—to the same level for the house and the garage, which is quick and easy to do. Then a rough ditch is dug around the perimeter of house and garage to the depth of the foundation walls needed. Two men quickly set up reusable plank forms with iron stakes and iron braces

around the outside of the house and garage. On the inner side of the house foundation walls, they use steel reinforcing rod for stakes and Steeltex, a wire-mesh reinforcing with a building-paper backing, for the form itself. That form will remain there. While the forms are going in, a small plumbing crew is placing all the waste sewage lines of the house. Sometime in the afternoon, a ready-mix concrete truck roars up. But, instead of concrete splashing from its trough, coarse gravel for the base of the slab rattles out.

Gravel Poured, Too

Calcaterra had noted that the concrete trucks usually are idle in the afternoons (no one wants concrete delivered late) and so he thought of asking the cement companies to deliver gravel in their ready-mix trucks. The trucks spread the gravel out evenly over the house floor with their troughs, saving many man-hours of shoveling gravel from dumped piles. This has proved a boon to the cement companies—carrying the gravel cleans out the ready-mix drums, eliminating periodic chipping of dried cement from the inside.

Another saving enters here. The gravel is laid thick for the slab of the house, thin or not at all for the floor of the garage. Calcaterra finds it less expensive and better construction to place reinforcing wire mesh in the garage-floor slab, rather than to place gravel below an unreinforced slab. And this way the garage floor will be the 4 inches below the house floor that is required by most building codes, without

grading to two levels and without having complicated forms.

Precut Lumber Used

While the concrete is curing, a lumber truck backs into the space between two houses and drops the framing for the walls of both houses in two huge banded bundles. This lumber is fully pre-cut to exact lengths at a lumberyard. Each piece is numbered and stacked so the first piece needed will be at the top of the pile. Practically all a carpenter needs to bring to the job is a hammer, and four carpenters can erect the pre-cut stud walls of a house in one day flat. That isn't just the outside walls, but also the interior partitions and door and window openings throughout. The lumber truck makes a second trip and drops two more bundles, pre-cut roof lumber this time for the two houses. Mainly, this is 4 by 6 ceiling beams that the carpenters simply drop in place in pre-cut notched beams and nail down. The carpenters completely frame the house, roof and everything, in 56 man-hours. A lone painter now appears on the scene with a stepladder and he starts painting the 4 by 6 ceiling beams as they hang there exposed to the sky. He primes and finishes them, brushing on the final color or stain desired in that particular house.

Roof Is Put On

Meanwhile, the carpenters are installing the finished doorframes and metal windows. The window frames arrive at the site complete with metal sills and with the glass already installed. A mason crew has

also appeared and now is erecting a fireplace by the standard method. When the paint on the ceiling beams is dry, a roofing crew bounces onto the lot in a truck with a lifter bed that hoists large 2 by 8-foot sheets of Simpsonboard or Firtex to the roof. This is the roof sheathing, a heavy 2-inch-thick panel of laminated softboard that looks like giant ceiling tiles and has a heavy tongue-and-groove joint around the edges. The roofing crew lays this sheathing in place, saws and fits it around all roof openings with a portable electric saw, and nails it down—all in two hours. The new softboard sheathing is the same as the comparatively weak ceiling tiles we all know, but on the brick laminated layer the roofing crew walks with less care than usual. The material is stronger than ordinary $\frac{3}{4}$ -inch wood sheathing, according to the manufacturer. Over the sheathing, the roofing crew lays a standard three-layer mopped roof, finishing it off with granite screenings, dolomite or colored rock for a top-grade gravel roof.

Odd-Looking Houses

At this point, the McKellar houses have a definitely unusual appearance. The windows are fully completed, seemingly ready for draperies and curtains. The fireplace and doorframes are also finished. But the walls elsewhere are just bare studs. You can step through a wall, almost anywhere, and find to your surprise that the ceilings throughout the house are completed! These are open-beam ceilings in the modern manner. The beams are already painted. Since

(Continued to page 285)





1. Here are some of money-saving features used in construction of these houses. Gravel is poured from ready-mix trucks, saving many man-hours of shoveling

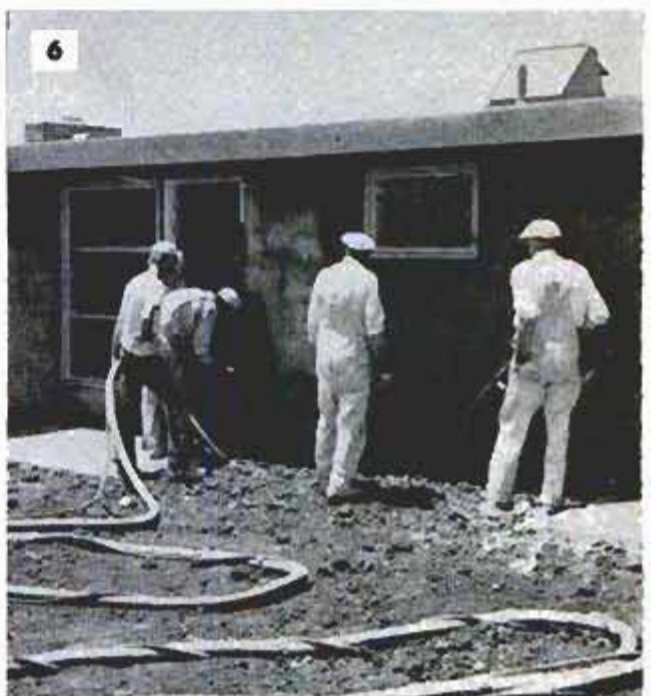
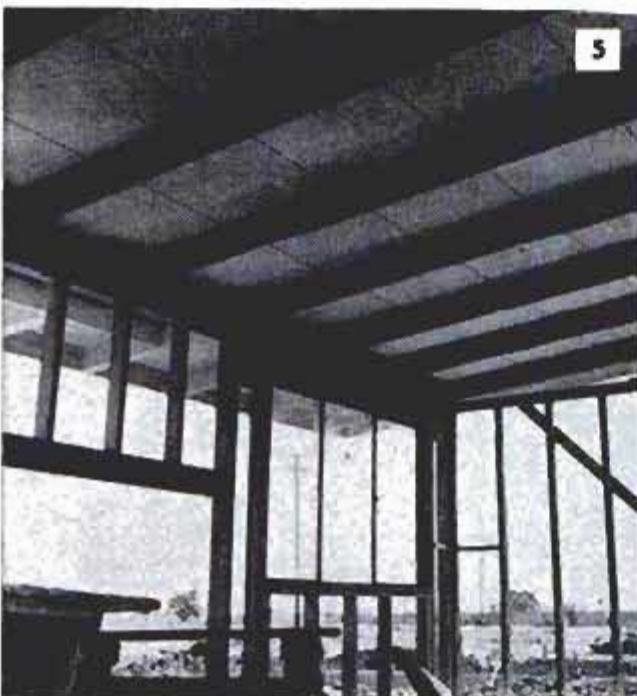
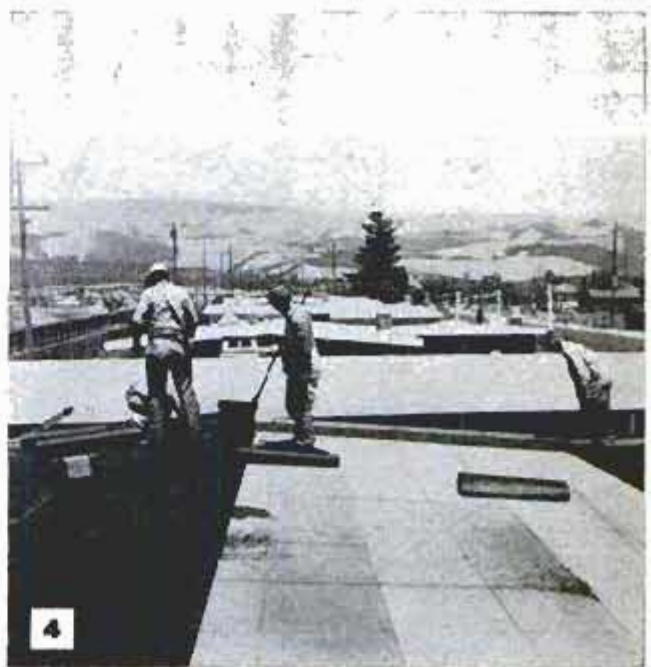
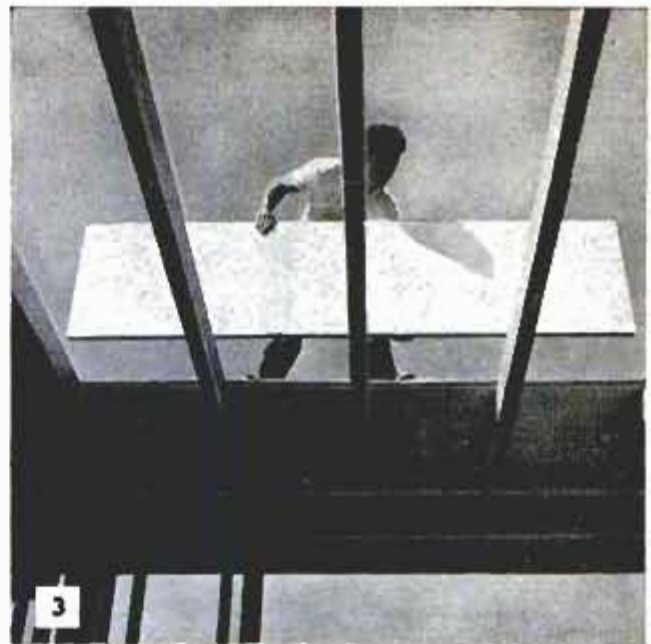
2. Every piece of framing is precut and numbered at mill. Picture shows packages containing lumber for side walls of two houses dropped between two sites

3. Giant ceiling tiles of softboard are roof sheathing and also insulation. Tiles are two inches thick, can be laid in place quickly to cut costs

4. First layer of the three-layer roofing is laid directly over sheathing. Roofs in the background are completed, topped with light-colored rock

5. House is strange looking with windows installed, and ceilings all painted but no walls. Opening at left is for fireplace, which masons will put in shortly

6. Exterior is finished in stucco, applied through a hose by Gunitite process. Two coats are applied by hose. Trowel men follow behind to smooth finish



YEAR-ROUND CHECK LIST

FOR HOUSE AND YARD

JANUARY



Repair furniture.
Fix faucet leaks.
Change furnace filters.
Prune fruit trees.
Inspect plant mulching.
Feed the birds

JULY

Paint trim.
Check flashing.
Tuck-point brick.
Clean chimney.
Fertilize lawn again.
Spray evergreens.
Check extinguishers.
Check basement humidity



FEBRUARY

Build yard furniture.
Repair awnings.
Start plants in flats.
Make root cuttings.
Prepare hotbed.
Prune trees, grapevines.
Fertilize lawn.
Plan garden, flowers.
Order garden seeds



AUGUST



Clean and check furnace (Change filter, oil motor and fan, follow factory instructions).
Finish outside painting.
Water lawn on schedule.
Stock up on fuel.
Fertilize garden

MARCH



Repair screens.
Check yard tools.
Buy grass seed.
Check garden hose.
Repair trellises.
Check electric cords.
Paint and paper

SEPTEMBER

Have TV and radio sets checked (antennas, grounding wires, etc.).
Oil and clean kitchen ventilating fan.
Reseed spots in lawn.
Store electric fans in dustproof bags.
Repair storm windows



APRIL

Check roof for leaks.
Sharpen mower.
Plant trees and shrubs.
Seed, top-dress lawn.
Clean attic, garage.
Hang birdhouses.
Clean planting borders.
Check electric fans.
Paint lawn furniture.
Repair fences



OCTOBER



Turn off and drain outside faucets.
Store garden hose.
Water evergreens.
Prepare shrubs for winter

MAY



Clean fireplace (put wood ashes on garden).
Edge sidewalks and flower borders.
Set out transplants.
Have air conditioner serviced.
Oil all appliances

NOVEMBER

Test weather stripping.
Screen shrubs and young trees from rabbits.
Clean rain gutters



JUNE

Clean yard incinerator.
Spray shrubs.
Treat lawn with weed killer.
Check locks and the operation of windows



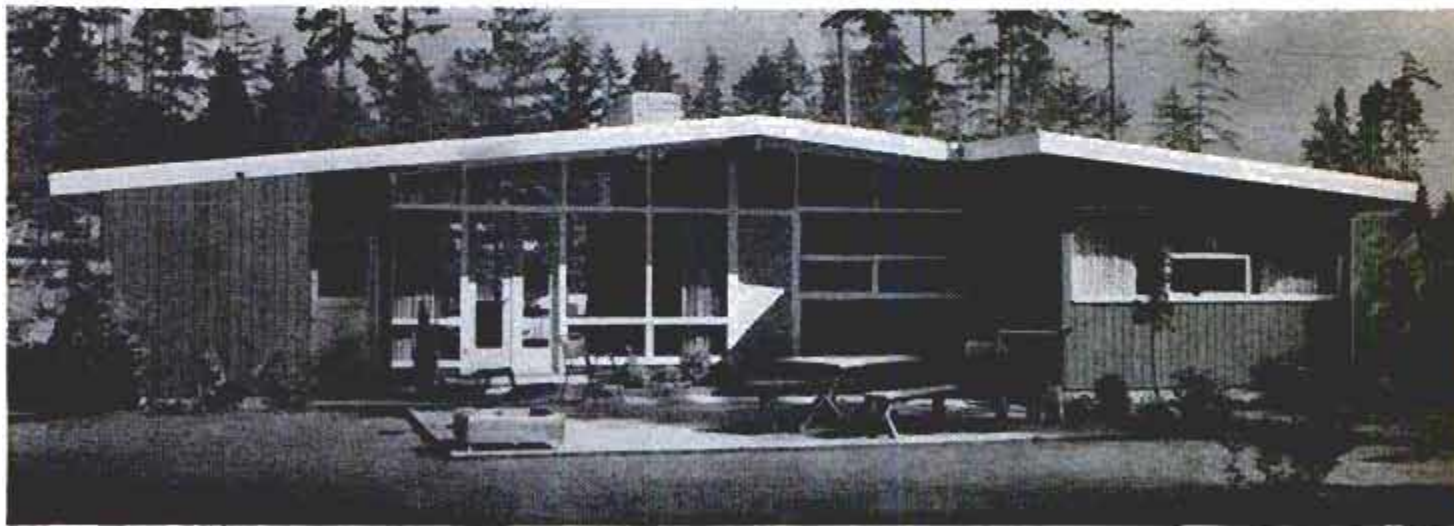
DECEMBER



Prepare for Christmas:
Make outside decorations.
Finish workshop projects early.
Check tree lights, stand, outside lights.
Fireproof tree or have extinguishers handy.
Recheck extinguishers

PARADE OF HOMES

Livability.. Design.. Price

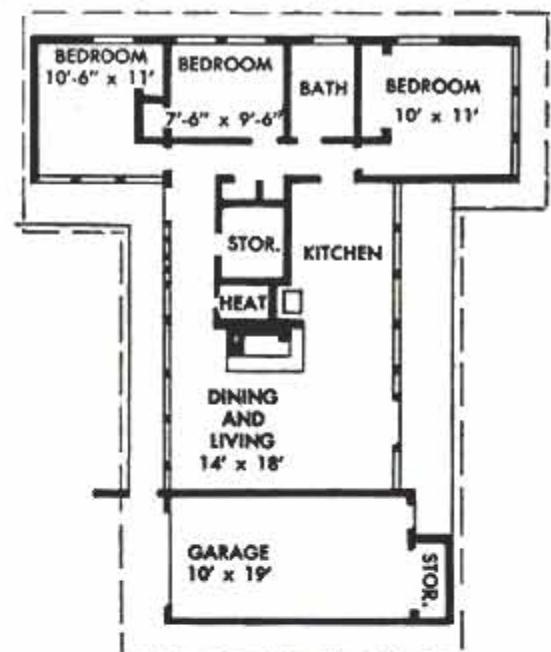


Big windows at rear of this Seattle house face open patio; garage is at left, bedroom wing at the right

WASHINGTON

Three bedrooms, one bath
 Floor area—1067 square feet
 Price—\$13,250 (including lot)

This compact, attractive and livable small home was built by Albert Balch, leading Northwest builder, in a wooded section of his home town—Seattle. The architect is John Ridley. The house stands on a lot 60 by 135 feet. Foundation is concrete slab; exterior walls are vertical cedar siding; interior-wall finish is USG Drywall; insulation is Rock Wool; floors are oak; the framing is post and beam. The living area has a beamed studio ceiling and French doors lead to the patio for indoor-outdoor living. Fireplace is Arizona sandstone



Front of house designed by John Ridley features an interesting window treatment in clean, simple design



TEXAS

Three bedrooms, two baths
Floor area—1438 square feet
Price—\$21,500 (including lot)

The price of this house (also featured on cover) includes not only the lot but an all-weather air-conditioning system, a fully equipped kitchen and the rugs and draperies. It was built by Lawrence O'Donnell of Suburban Homes Lumber and Realty in Houston. The architect is Ursula Oberdieck. Open-plan interior is enhanced by sliding glass doors connecting three rooms with rear porch. Entry under covered front porch leads to bedrooms, living area or kitchen. The house is built on a slab foundation and the low exterior walls are of Holiday Hillstone



NEW YORK

Three bedrooms, two baths
Floor area—1600 square feet
Price—\$30,500 (including one-acre lot)

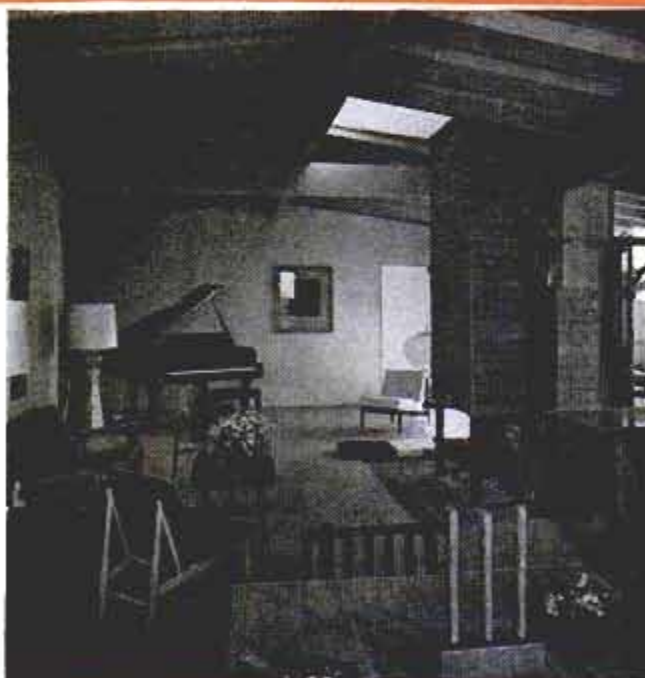
This house provides 600 additional square feet of unfinished space on the second floor for two more bedrooms and a bath. It was built at Huntington, N.Y., by N. A. Piccione. Architect, Herman H. York. Large living-dining area and den open on spacious terrace at rear. Exterior combines brick veneer, redwood paneling and cedar shingles. Foundation is poured concrete with a full basement. All exterior walls and ceilings are fully insulated and the wood-sash windows are double-hung. Extras include a built-in oven, table-top range, dishwasher, refrigerator, freezer and a wall clock. Floors are oak and the flush doors are mahogany stained. An oil furnace supplies heat through baseboard-radiation system

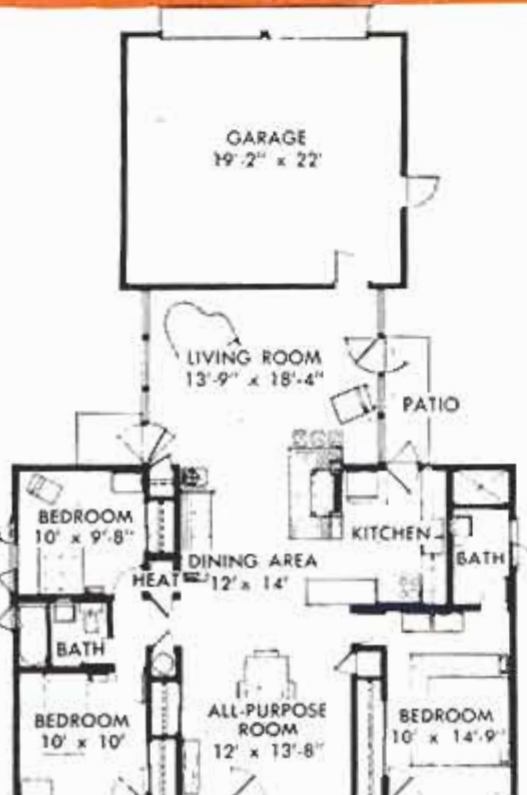


CALIFORNIA

Three bedrooms, two baths
Floor area—1300 square feet
Price—\$16,750 (including lot)

Built on a lot only 53 by 100 feet in a suburb of San Francisco, this informal open-plan house provides three outdoor-living areas. It was built for John C. Mackay & Associates, Menlo Park, by the Palo Alto Development Co. The architects are Anshen and Allen of San Francisco. Foundation has concrete perimeter wall; garage is slab; framing is post and beam with exposed rafters; roof is built up; exterior is redwood siding and cement plaster; the interior is dry wall. Extras include complete G-E kitchen with wall-hung refrigerator, washer-drier, landscaping





COLORADO

Three bedrooms, 1½ baths
 Floor area—1450 square feet
 Price—\$16,646 (including lot)

Unusual in design, this house was built in Colorado Springs by the Gamble Building Co., Denver. Architect is Joseph Marlow. Foundation is slab; roof, low-pitched rafters; siding, redwood. Extras: Gas-fired incinerator, oven, range, all-copper plumbing, built-in TV antenna with three plug-in jacks



ILLINOIS

Four bedrooms, 1 bath
 Floor area—1100 square feet
 Price—\$14,900 (including ½ acre)

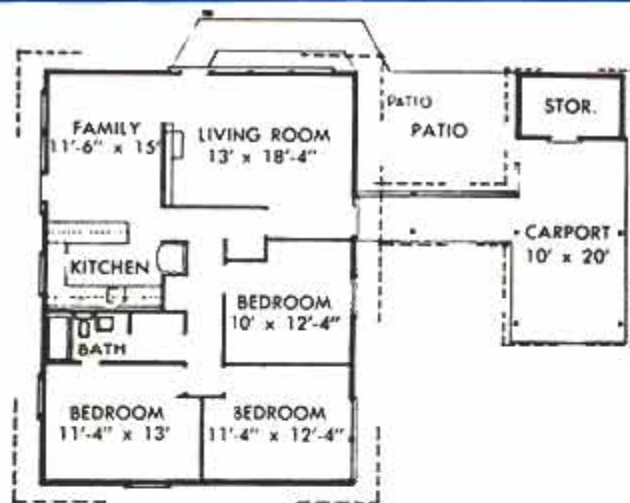
Fold-back partition makes the den of this Chicago house into a fourth bedroom. It was built by J. E. Merrion & Co. and the architect is Emil J. Minx. Foundation is concrete slab; exterior, hardboard; roof, rafters and asphalt shingles; fully insulated; dry-wall interior partitions; cabinets are of birch



TENNESSEE

Three bedrooms, 1 bath
 Floor area—1247 square feet
 Price—\$16,250 (including lot)

Features of this house are the rear living room and large family room off the kitchen. It was built by Martin L. Bartling, Jr., in Knoxville. Architect is William A. Sloan, Jr. Exterior walls are an adaptation of the Lu Re Co. panel system and roof has the new nailed-and-glued trusses. Extras include a G-E Kitchen Center (range, oven, dishwasher, disposal unit, washer-drier). Floors are concrete with wood in living room and family room, others vinyl asbestos. Interior partitions are Adjust-a-Bilt (see page 165). Ceilings have radiant heat by electric Ceil Heat

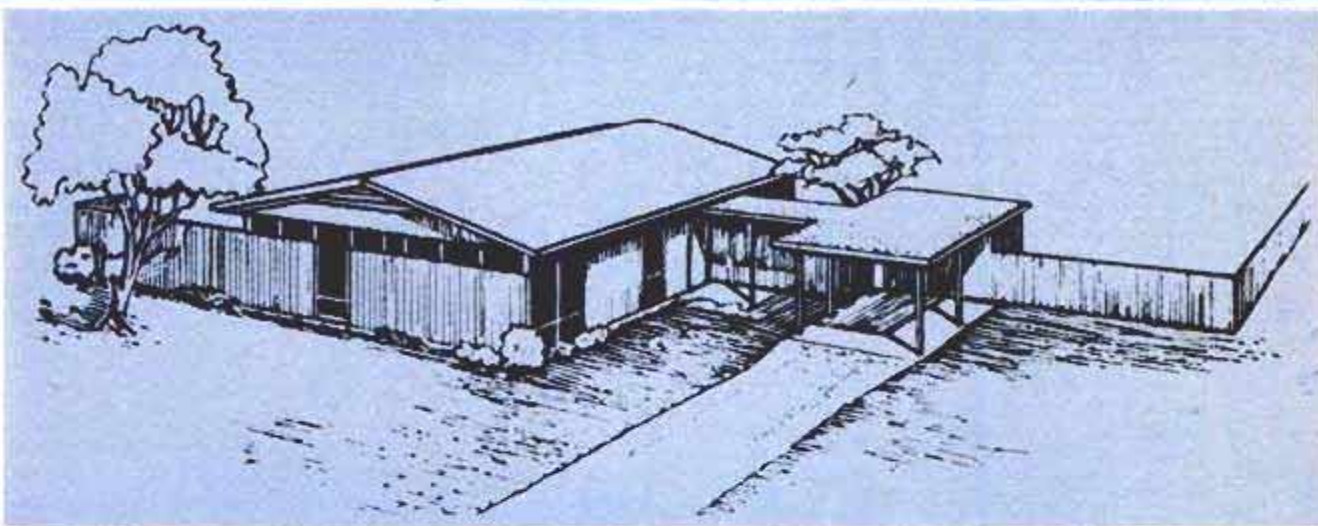
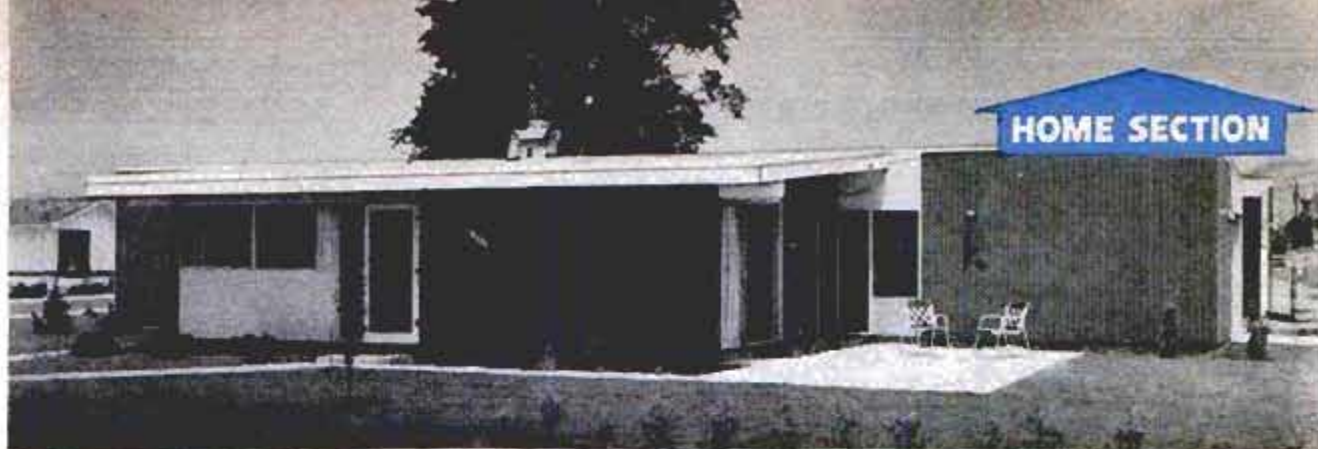


TEXAS

Three bedrooms, 1 bath
 Floor area—1128 square feet
 Price—\$11,500 (including lot)

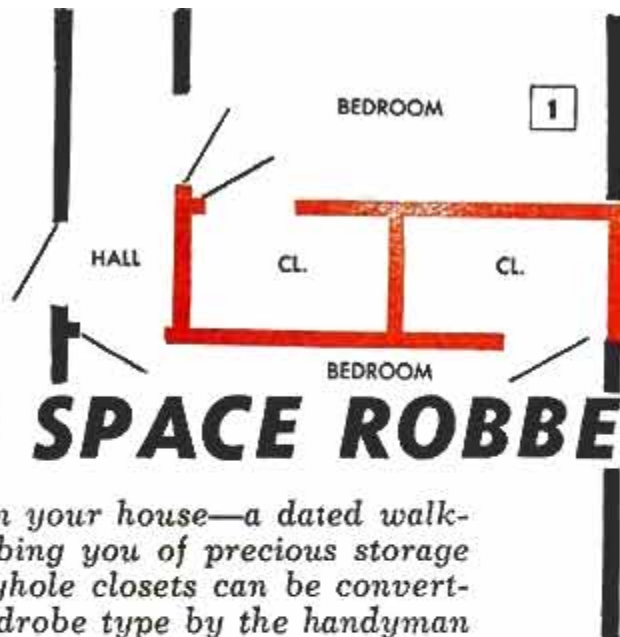
Even competitive builders in Dallas admit this is "a lot of house for the money." Built by Tom Lively of Centex Corp. (world's biggest builder), the house features a large kitchen, attached brick garage and living room opening onto patio (see cover). House is brick veneer on slab foundation. Many extras offered





OLD-FASHIONED WALK-IN CLOSETS

ARE SPACE ROBBERS



Are you harboring a thief in your house—a dated walk-in clothes closet that is robbing you of precious storage space? Many of these cubbyhole closets can be converted to the more efficient wardrobe type by the handyman

By Wayne C. Leckey

ONE THING most homes have in common is the lack of closet space. In the compact modern home the space simply isn't there; in older homes the space is there but it is wasted.

Cubbyhole closets were the thing back in the days when home designers seemed to think it was necessary to walk into a closet to use it. Every home had them but they were anything but efficient. Half of

the area was taken up by floor and they soon became catch-alls where everything could be chucked out of sight. Common arrangement to be found was two closets located end to end, each one fitted with a swinging door and serving an adjacent bedroom as you see in Fig. 1. A short clothes rod, a few hooks and a shelf are all they offered. For the amount of space these closets occupied they hardly earned their keep compared with the modern wardrobe storage-type walls which provide the maximum in usable closet space.

Can Be Converted

Many of these dated closets lend themselves to remodeling and it's something the handy homeowner can do himself. If you have an arrangement similar to

Hinged in pairs to fold to each side this four-section door unit of welded steel comes in baked-on enamel in colors and wood grains

American Welding & Mfg. Co., photos

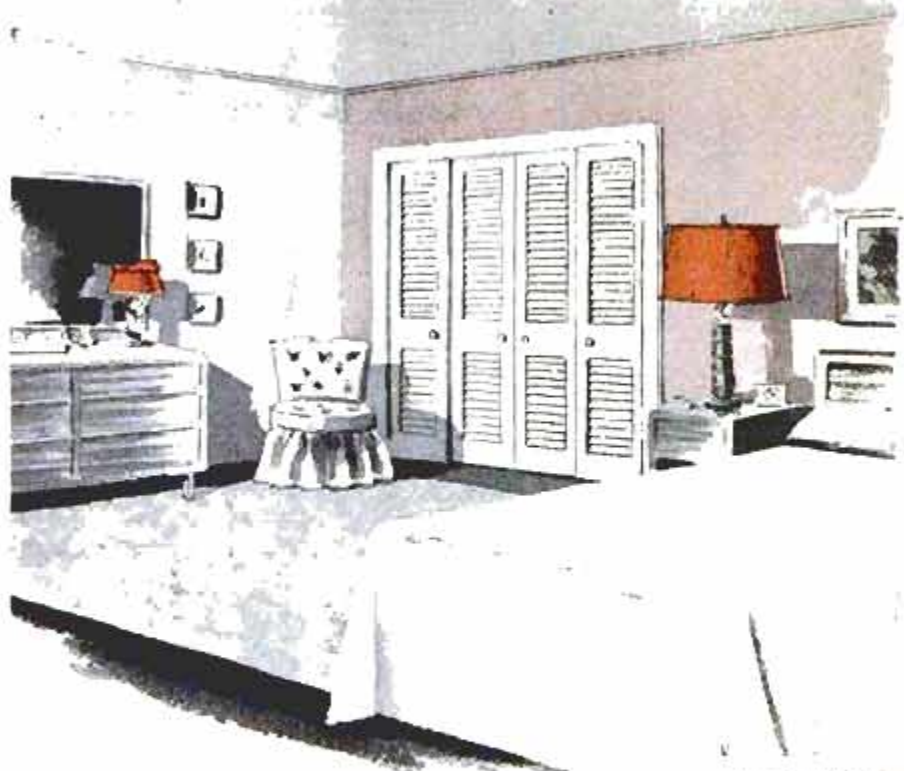


the one shown in Fig. 1, which is typical in older homes, you can make it into the popular wardrobe type without too much expense and gain 50 per cent more usable storage space. Essentially, it means widening the present small door openings, knocking out the cross wall and erecting a dividing wall lengthwise from floor to ceiling as in Fig. 2. This involves knocking off the plaster from part of the present walls after first removing the old trim. In the event you plan to reuse some of the old trim, take care in removing the baseboard and door casings. One of the best ways to do this to avoid splitting or otherwise marring the wood is to remove the nails with a pin punch. It looks something like a nail-set but differs in that it has a straight shank. First locate the nailheads by scraping away the paint or varnish if necessary and then drive the nails all the way through the trim with the pin punch. The trim will lift off without a mar.

Reframing Is No Problem

The typical framing drawing given in Fig. 2 shows what is required in the way of new framing. After you have the plaster off the walls to be removed, rip out the old studs along with the wood lath nailed to them. You'll find these are spiked to 2 x 4 plates at top and bottom and it will be necessary to either withdraw the nails at the bottom or saw off the studs just above the nails to let you wrench the studs free from the top plate. The plates across the floor are pulled up but the top ones are left intact. Most of the material in the old walls can be reused in the new framing. In erecting the

Right, these bypassing-type rolling doors come with hangers attached and consist of hard-board panels in metal frames



Kennatrack Corp.

Bypassing louvered doors have advantage over others since they allow air to circulate inside the closet

center dividing wall, cut two 2 x 4s the same length for the top and bottom plates and nail the bottom one to the floor. The top one is nailed to the ends of 2 x 4 studs which should be cut long enough to wedge in place between the ceiling and the bottom plate. Space the studs 16 in. on centers and toenail the lower ends to the

Woodall Industries, Inc. photo

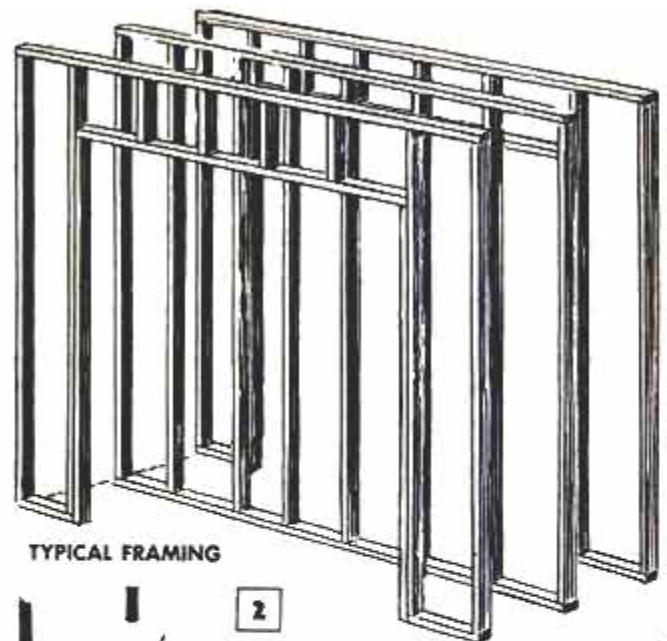




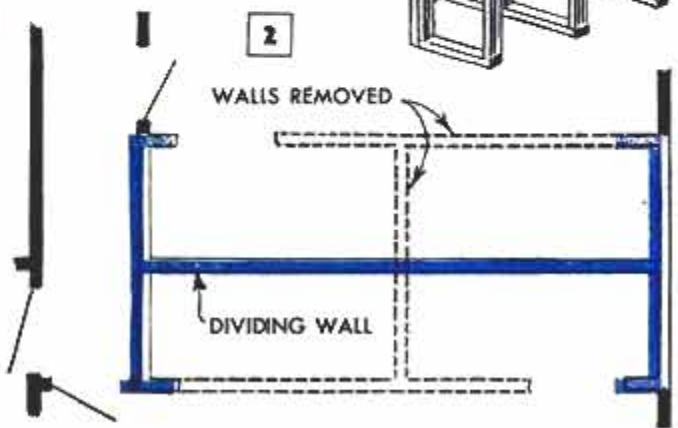
Curtliff Corp. photo

Raised closet floor permits wall-to-wall carpeting and provides "kickboard" for accordion-folding doors. Same doors can be installed from floor to ceiling

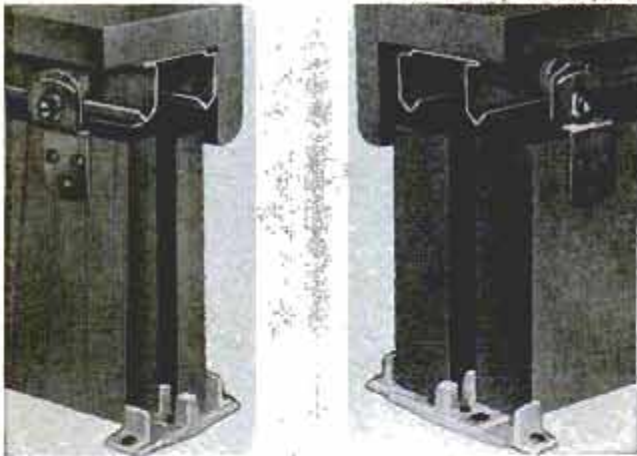
bottom plate. A few nails into the ceiling joists will anchor the top of the wall. Framing each outside wall of the closet is done as in Fig. 2. Actual size of the open-



TYPICAL FRAMING



The Stanley Works photo



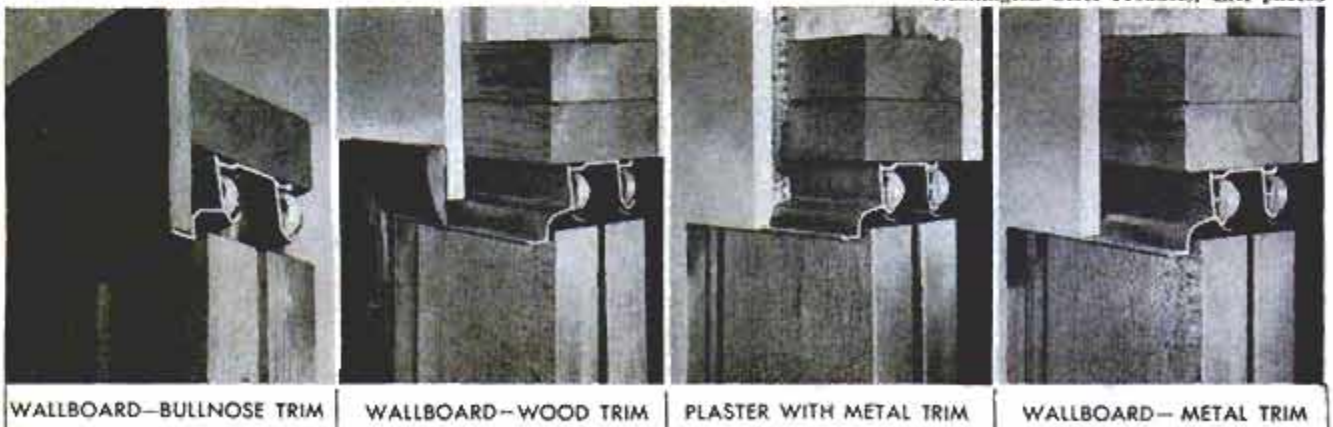
Typical door hardware available. Track below includes plaster ground which can be treated four ways

ing, of course, is determined by the type of doors you select. Plasterboard or wallboard may be used to cover the framework. You may prefer to have at least the face of the walls plastered.

Types of Doors and Track

You have a wide choice of doors and door hardware. There is the bypassing, rolling type that can be had in hardboard or wood, solid or louvered. Another is the four-section-type all-metal doors that fold in pairs to each side. Still another is the so called accordion-type door. Then there are the plain plywood doors that you provide yourself for which you can buy track-and-hanger sets of numerous types, all of which are easily installed by anyone. ★ ★ ★

Washington Steel Products, Inc. photos

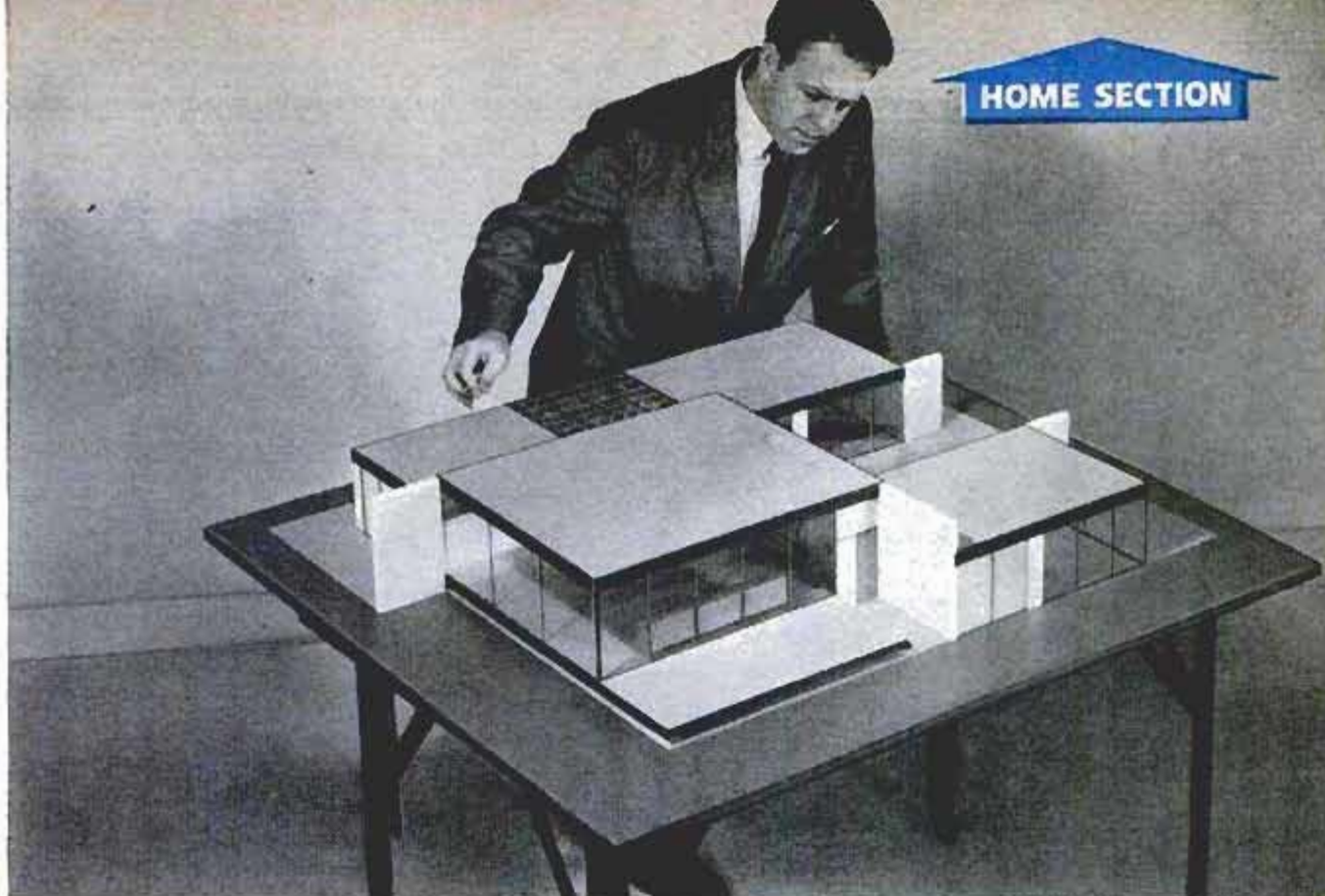


WALLBOARD—BULLNOSE TRIM

WALLBOARD—WOOD TRIM

PLASTER WITH METAL TRIM

WALLBOARD—METAL TRIM



Model by Raymond J. Wisluga

Author-Designer Doblin takes a close look at the home he designed around service "cores" which he says will revolutionize building in the near future. Big living room is in foreground, bedrooms at the right

HERE'S YOUR HOUSE OF THE NEAR FUTURE

By Jay Doblin

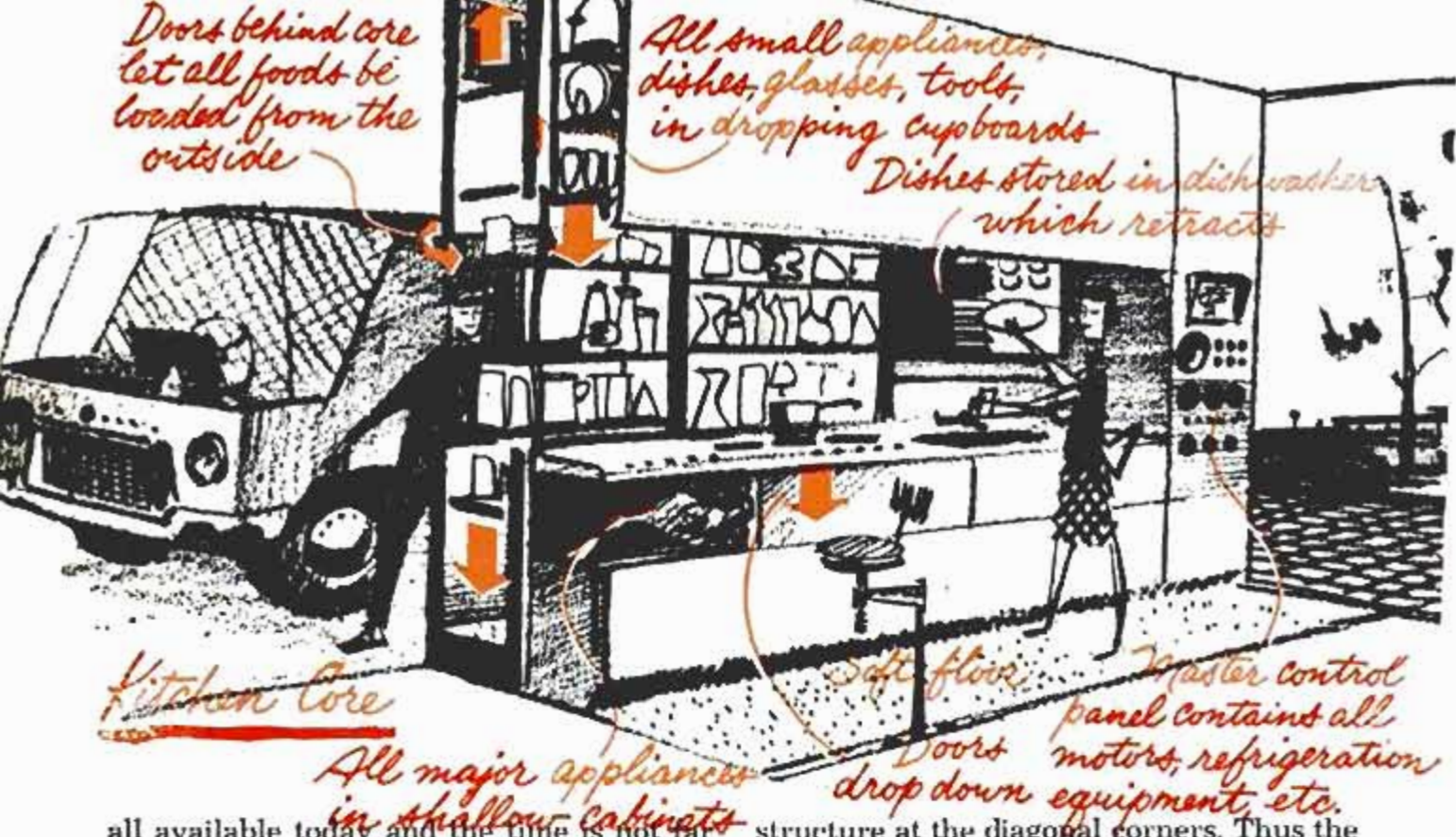
(Director, Illinois Institute of Technology's
Institute of Design)

WHEN I SPEAK of the house of the near future I mean 10 or 15 years from now—not 25 or 30. And I refer not just to what is loosely termed contemporary modern architecture, but to the mechanical centers or "cores" around which every house is built. These are the cores of a home which include the food or kitchen core, power core, bath cores, entertainment core and communications core.

At present most of these mechanical parts are laboriously and expensively assembled at the site. These cores should and will be available as complete units which can be installed easily at reasonable cost. In fact, I have seen some of these cores which have been developed in the research departments of some of the nation's largest appliance manufacturers. These units are not the figments of anyone's imagination. The parts of which they are composed are

Service cores which would be installed as complete units are shown in color. Power core is in ground





all available today and the time is not far off when these units will make their debut to builders and consumers.

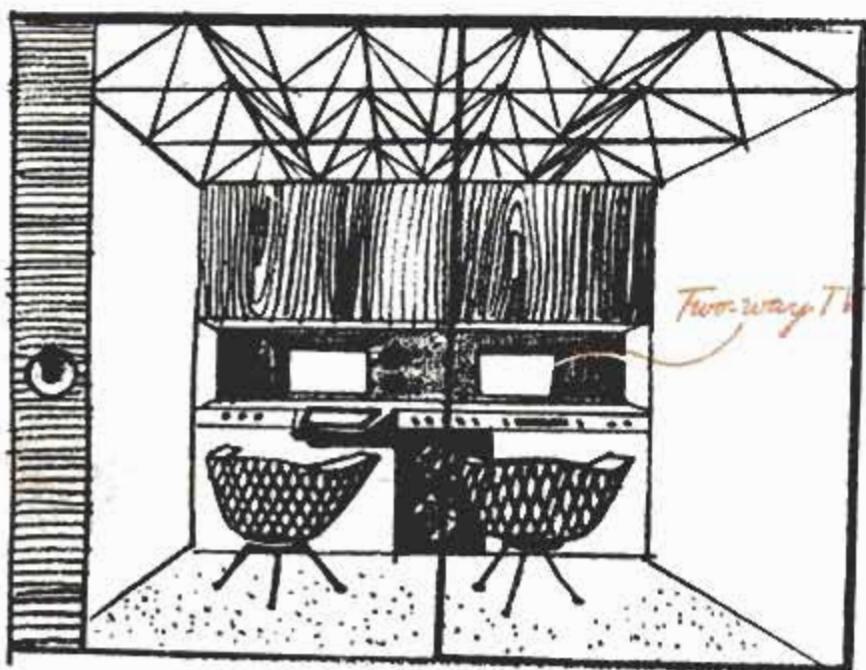
These cores present a new concept of home building and I have designed the house featured on these pages to illustrate their use. This house has 2800 square feet of living space, a 30 by 30-foot living room and a 20 by 20 kitchen. Although it is shown with only two bedrooms, other bedroom units could be added with ease.

The structural design of the house employs the new aesthetic appeal in which windows and doors are not punched through the walls as in most conventional houses today. A simplified design is achieved by the use of a diagonal steel beam across each room, supporting the roof

structure at the diagonal corners. Thus the roof is not supported by exterior or interior walls or columns. This gives an unusual floating quality to the house and the window mullions are combination tension-compression members which balance the roof rather than support it.

This house would have all ducts, conduit, plumbing and the like in a trough around the perimeter. The cores which carry all mechanical equipment would be plugged into them, making an extremely simple mechanical setup.

The purpose of disconnecting the house structure from the electrical, plumbing and conditioning systems is to permit the appliance manufacturer to produce the most efficient arrangement of components. This



Sketches From
The Author's Notebook

Communications Core

Soundproof room for mail, books and magazines (on film), recordings, files, music, reading



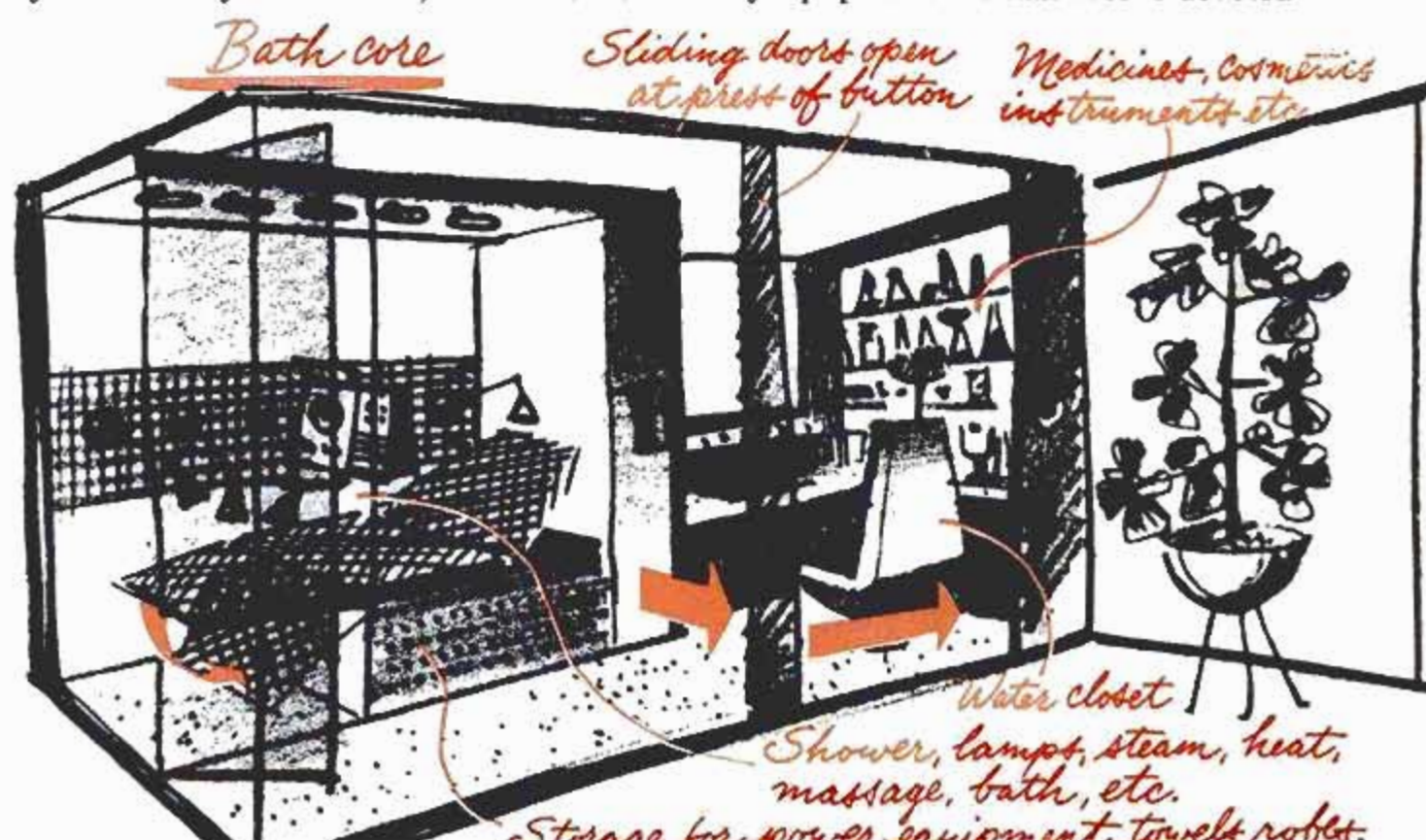
will actually save the consumer money even though the total expense of the core is high. The same equipment bought individually and installed piecemeal would cost more. These cores, as an integral part of the house would, of course, be included in the mortgage. Also, the house structure could be expanded or contracted without affecting the equipment as the house is designed modularly to accommodate the cores.

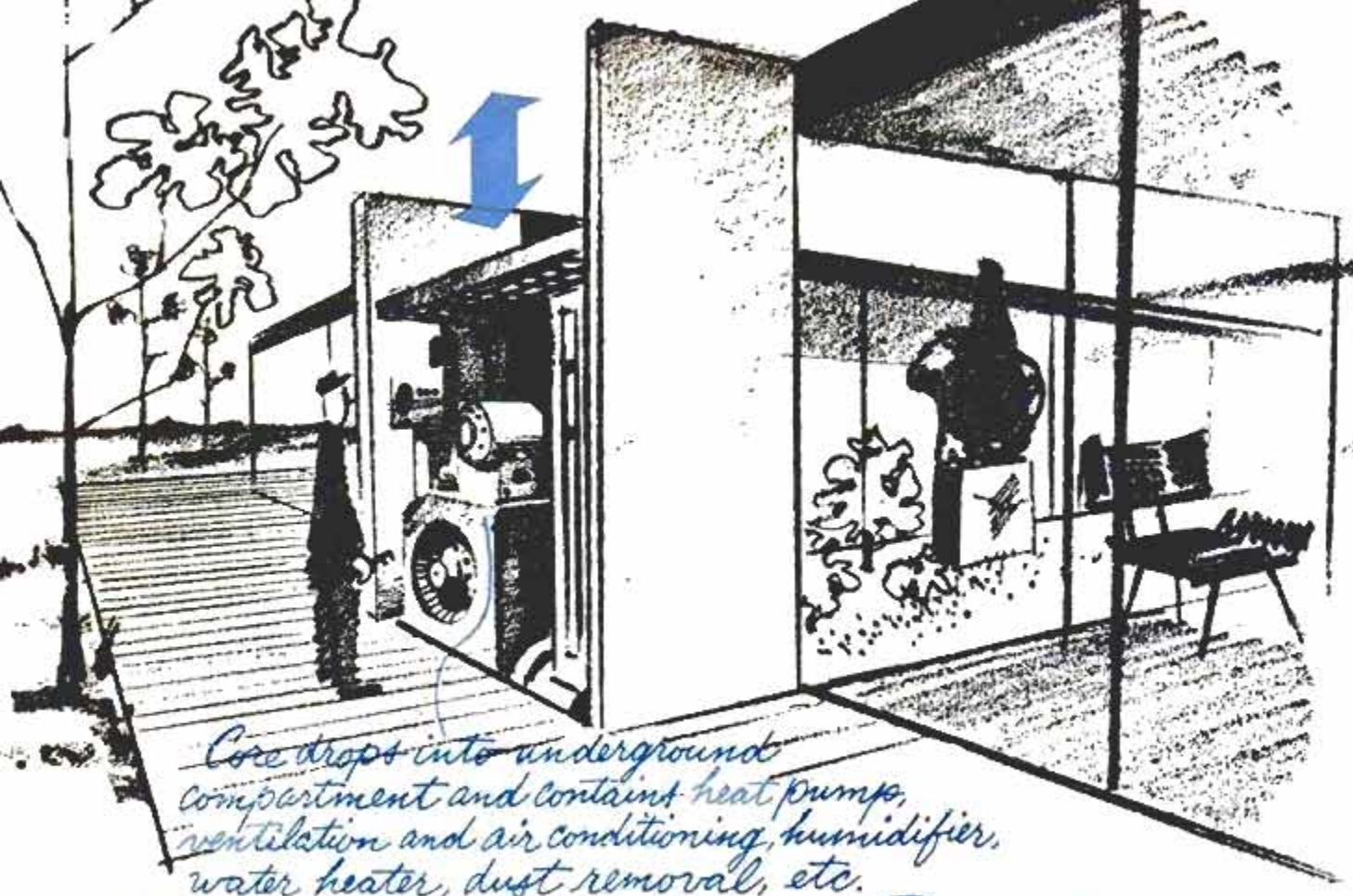
Every effort has been made to make the house as livable as possible. The bedrooms have been isolated from the living quarters by walls and by the corridor, but the house

can still be opened up so that the entire interior can be seen from most areas. The circulation corridor down the center permits entrance into both ends of the house and access to all rooms without going through any other room. Each bedroom contains its own bath core and could contain two cores with a different arrangement. Now let's take a close look at the various cores:

Bath Core

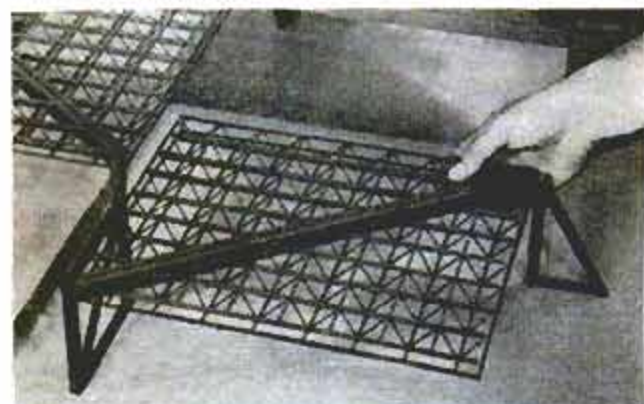
This unit, which is 12 feet long, 8 feet high and 5 feet deep, contains all the necessary equipment. A small area is devoted





Core drops into underground compartment and contains heat pumps, ventilation and air conditioning, humidifier, water heater, dust removal, etc.

Power core



Close-up of structural section shows double steel beam and steel triangles which carry roof weight

to a sink and water closet and the storage of personal items and cosmetics. The largest section is the bathing and health center. This unit would be put into place with only one electrical and one water connection required. The bath core eliminates the necessity of assembling on the site individual pieces of plumbing equipment and connecting them up and would consequently render more service for less cost.

The bathing and health section is entered

(Continued to page 281)

Doblin adjusts roof structure which is cantilevered from diagonal beam supported by protruding piers





Paneling two walls of living room, A, changes its appearance drastically as shown by the color photo below

Decorate with **HARDWOOD PLYWOOD**

PART I

ALL THE SOFT richness and beauty of walls paneled in hardwoods are well within the means of any homeowner, even owners of the lowest-cost homes. The many beautifully grained woods available in the form of large panels of hardwood plywood offer a wide choice, such as mahogany, walnut, oak, birch, cherry, and bring installation well within the ability of the average homeowner.

The advantages of wood paneling are many. It lasts indefinitely, withstands scuffing and is easy to maintain, requiring in most cases only an occasional dusting and an annual waxing. Also, it works well into wall built-ins, the number and kind being limited only by good design and the desires of the owner.

To prove that any homeowner can install hardwood paneling, *Popular Mechanics*, in collaboration with the Hardwood Plywood Institute, commissioned an inexperienced homeowner to panel



Above, sample of Honduras mahogany used in living room and kitchen. It may be finished natural, or it can be given a special finish to produce almost any color desired





Girl's room, B, was paneled in birch and given a gray tone

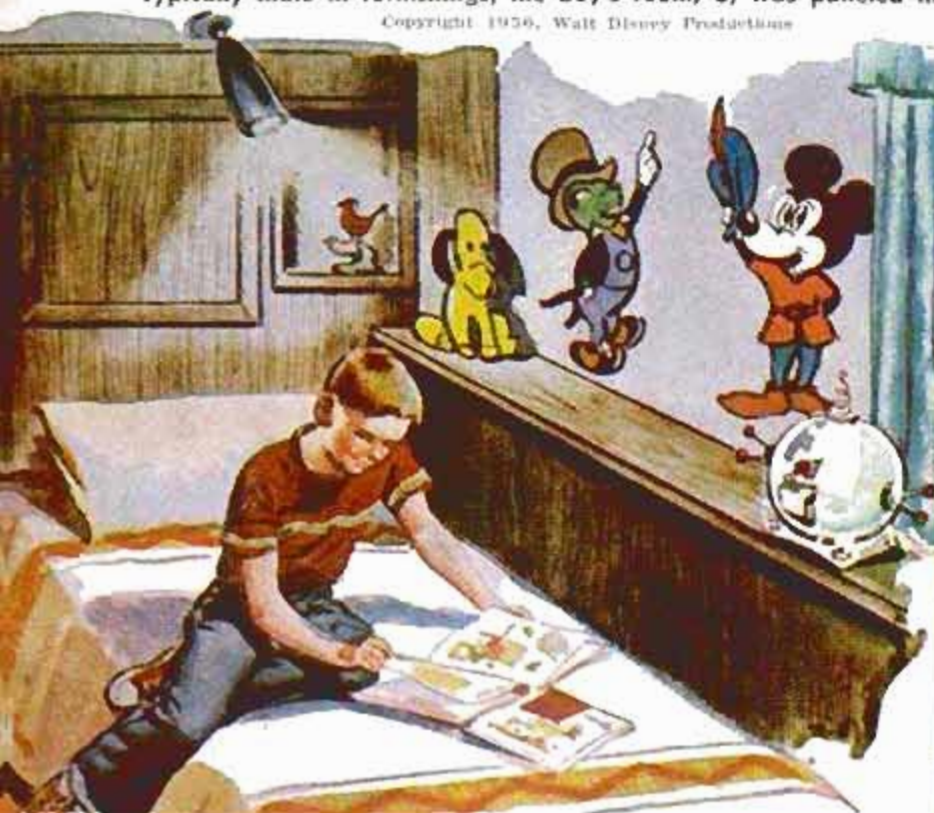
his home. The results are shown on these pages. Referring to the exploded view on pages 198 and 199, the home was a medium-low-cost trilevel comprising a living room, A; kitchen, F; and two bedrooms, D and E, with an unfinished attic. During the paneling operation, the attic was finished to provide two additional bedrooms, B and C, bedroom E being converted to a den.

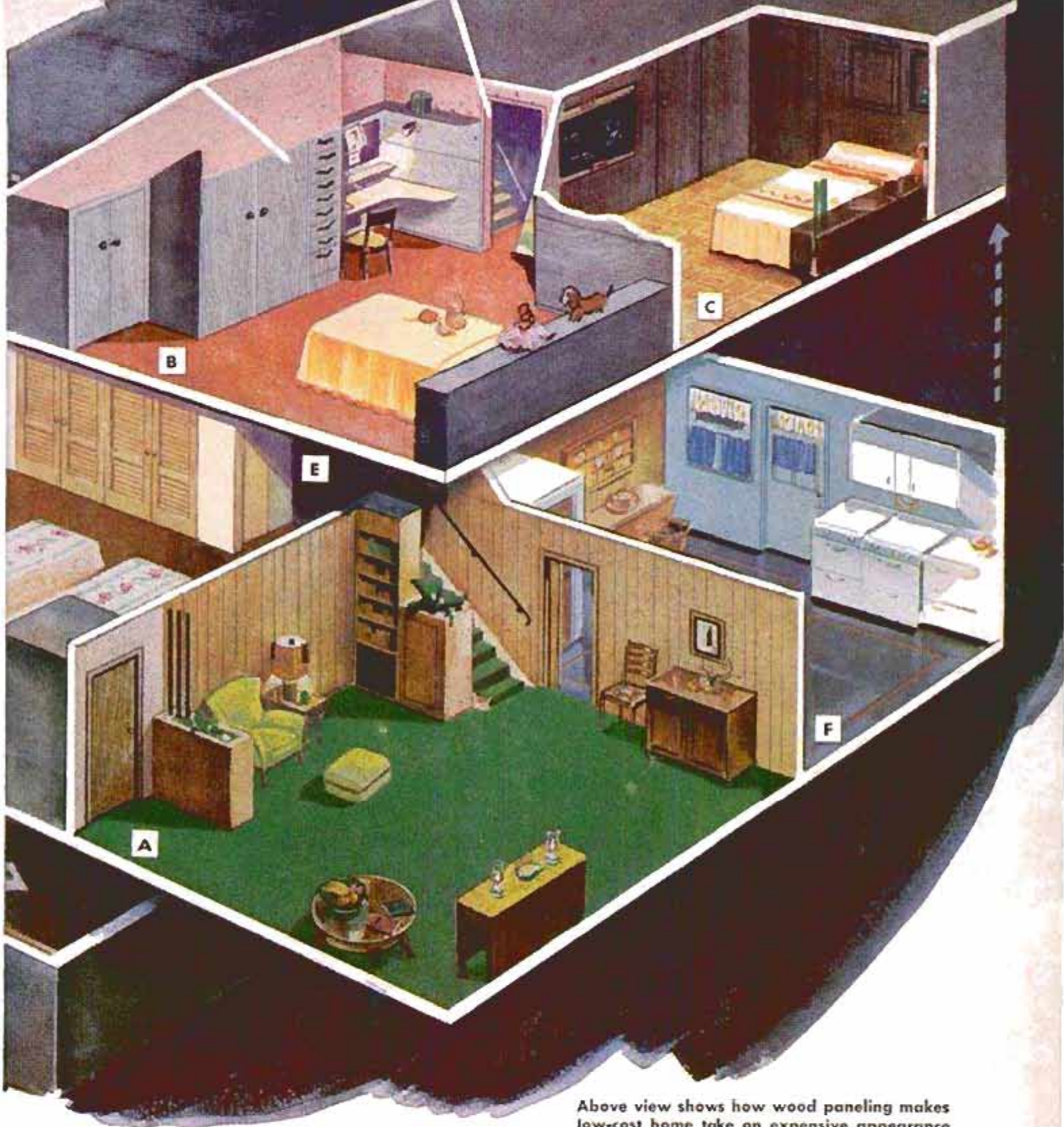
In the living room and in the dining area of the kitchen, Honduras mahogany was used, applying it to one wall on which a plate rack was installed and a door faced with plywood. In the living room, two walls and an open stairwell were paneled, plus a built-in planter-divider island at the front entrance. The original wooden rail on the stairwell gave way to a built-in cabinet with indirect lighting.

The two rooms created in the attic, one for a boy, was paneled in walnut, and one for a girl, was paneled in birch. The converted room that became a den was paneled in oak,

Typically male in furnishings, the boy's room, C, was paneled in walnut

Copyright 1959, Walt Disney Productions





Above view shows how wood paneling makes low-cost home take on expensive appearance

and the master bedroom was done in quilted maple. To complete the house, a "family room" in the basement will be paneled in ash.

The plywood may be used as plain panels or it may be grooved. Grooving serves a three-fold purpose: It relieves the unbroken expanse of wall, simulates random-width planking and, more important, allows unobtrusive joints between sheets.

Grooving is best done with a hand router by placing the plywood face up on a flat

surface. With a pencil mark the locations of the grooves at each end of the sheet. Bear in mind that grooves always run with the grain, never against it.

Then, using a straightedge (an 8-foot length of 1 x 4 will do), align corresponding pencil marks, allowing for the distance between the point of the bit and the outside edge of the router plate. Secure the straightedge and run the groove.

The actual grooves should be about $\frac{1}{20}$ in. deep. This depth will penetrate the



The warmth of maple paneling plus well-designed built-ins give room C an irresistible feminine appeal

veneer to the next layer of wood, but the finishing process will subdue the difference in coloring to the point where the grooves will be properly emphasized.

Grooving Process Simple

While the grooving operation is not difficult, be careful that the straightedge does not lift from the plywood and allow the router to slide under it. Also, when putting a half-groove, or bevel, on the edges of each plywood sheet for joining to the next one, use a special bit or, as was done here, use a plane.

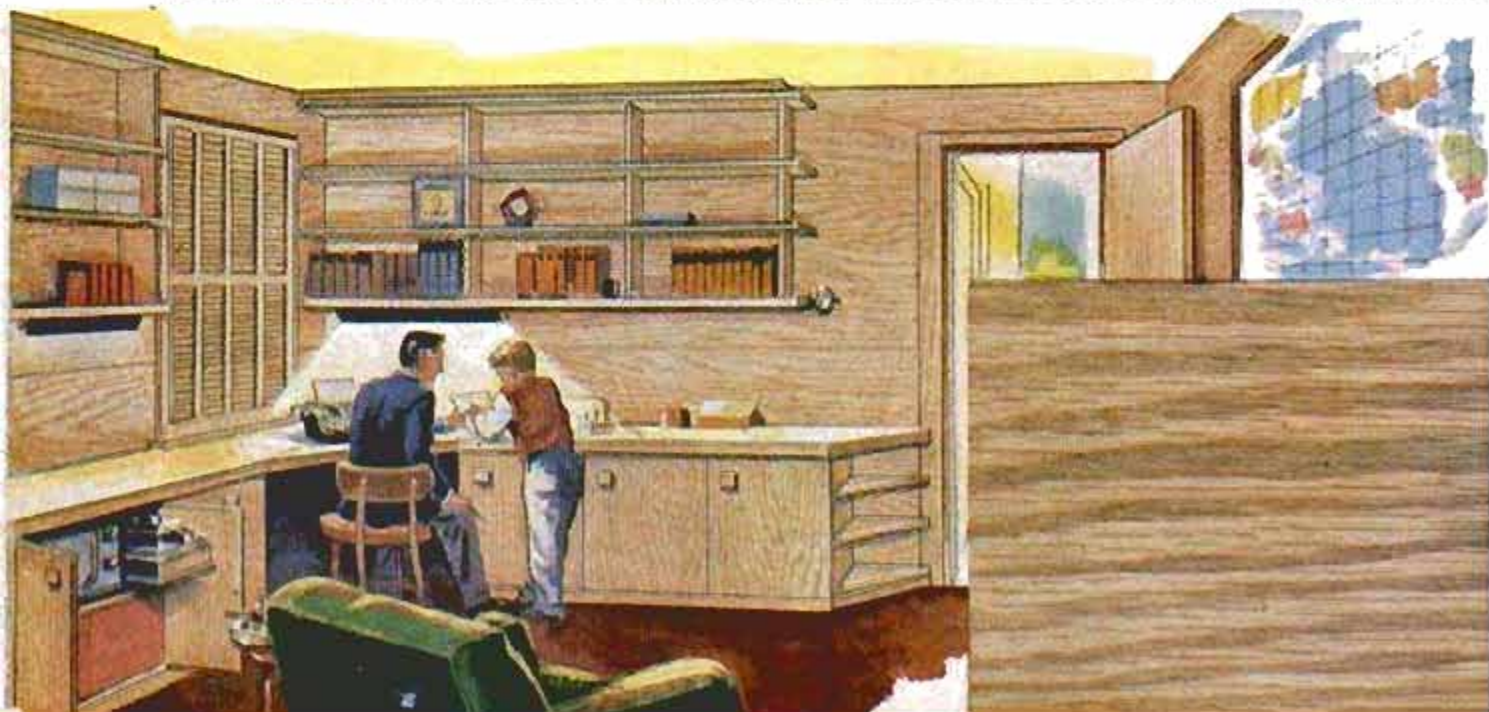
The actual widths for the random-width effect are not critical, but it is best to observe a minimum of 3 in., 4 in. being preferred. If you use the accepted spacing of

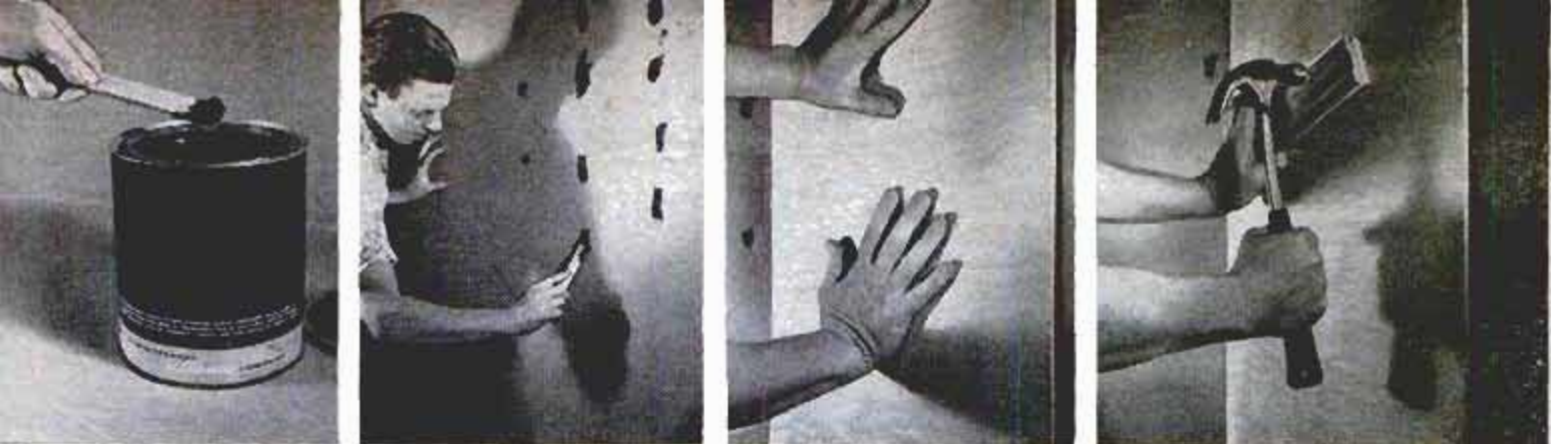
the grooves (6-4-6-10-6-8-8) you will find that a groove will cover a stud for nailing if the studs are 16-in. on center. However, in the method of application used here it was not necessary to consider the studs.

Two Ways of Applying

There are two major methods of application—nailing directly through to the studding, or using one of the new adhesives now available and applying the paneling directly to the plastered walls. For this job Rolltite mastic was used. There are two ways of spreading the adhesive, either by “butterballing,” as shown on page 201, or with a notched trowel furnished with the mastic. Either method is satisfactory. However, care must be taken to provide a firm

Strictly masculine, den E is done in oak and provided with built-ins to suit the desires of almost any man





Plywood applied with adhesive which is put on wall and panel pressed against it and snugged with hammer

bond between the back of the paneling and the adhesive long enough for it to set.

Shore Up When Possible

Setting time can be found on the label and, where not in the way of family activities, it is wise to shore up pressure against the paneling with 2x4s. The method shown, tapping with a hammer and piece of scrap lumber, will be found adequate in most instances.

Fit Panels to Walls First

Fit your panels first, accurately cut, before you spread the mastic. While this type of adhesive allows the home craftsman much more latitude than does the contact type, it still is advisable to press the panels into place as soon after applying the adhesive as possible.

If you install built-ins, such as the planter island and the book shelves shown, plan the wiring and other features, such as the copper planting box. Then, as you build up the unit, these features will fall into the plan easily. Indirect lighting makes a dramatic showing of your plantings, illuminates the shelves below as well as the poles and also serves as a night light.

Use Millwork to Match

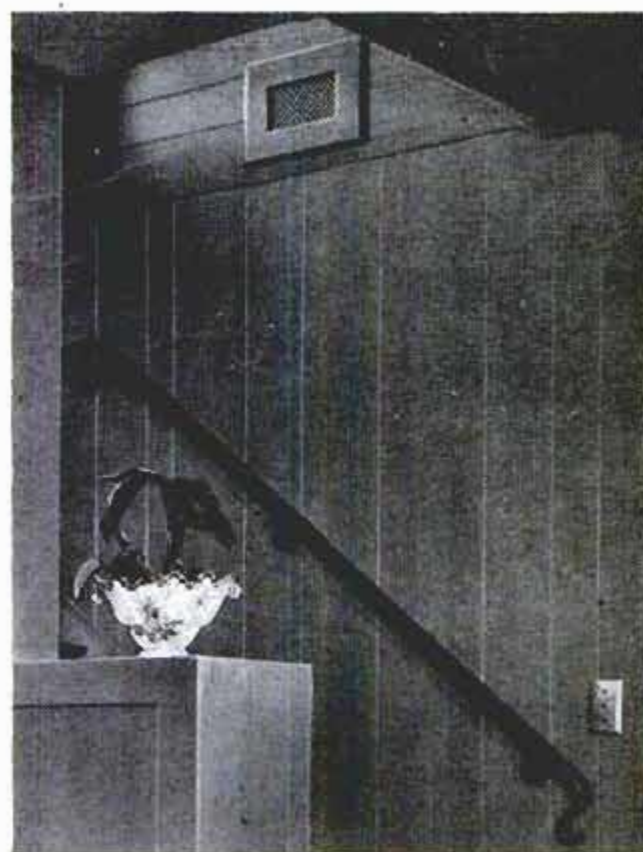
The usual pine molding should be replaced with molding to match the type of wood in the paneling. In paneling the walls of a stairwell, a problem may arise in that it is not easy to replace the portion of the stair stringer. The illustration at the bottom of this page shows one treatment of this problem.

Also, in paneling stairwells, you will find that the standard 4x8 sheet of plywood will not be long enough. As shown in the center illustration on this page, turn the grain for this treatment.

While any of the fine-grain hardwood plywoods makes a vast improvement in any room, there are other touches that emphasize the paneling and also have a very utilitarian purpose. One of these touches is the wrought-iron handrail avail-

able from Tennessee Fabricating Company. It not only steadies footsteps on a stairway, it serves to keep hand marks off the walls.

In next month's installment, learn how to build the planter island and other built-in features. ★ ★ ★



Above, hand rail adds safety factor, plus decor, to stairwell paneling. Grain direction is changed from vertical to horizontal to make use of standard size sheets of plywood. Below, treatment of mahogany molding around painted stringer and wall



PAVING PATIOS FOR YOUR PATIO

By Hi Sibley

HERE ARE SEVERAL WAYS to pave your patio. And by doing the "spade work" yourself the total cost can be kept to a minimum. For small jobs, like stepping stones or precast squares, the concrete can be mixed in a steel wheelbarrow; for larger areas a wooden platform, Fig. 9, is useful. On extensive construction, a power mixer saves time and a lot of hard work. In the latter case, most homeowners will find it more economical to rent the mixer when needed because the comparatively high initial cost, storage problem and infrequent use would not justify owning it.

Concrete Paving

A 1:2:3 mixture (cement, 1 part; sand, 2 parts; gravel, 3 parts) is recommended for patio paving. The proportions can be easily and accurately measured in a bottomless box of 1-cu.-ft. capacity, Fig. 9. First, the ground should be prepared. For large concrete slabs, excavate to a depth of 6 in., moisten the soil and tamp it thoroughly. Next, spread 2 in. of sand or cinders at the bottom of the excavation.

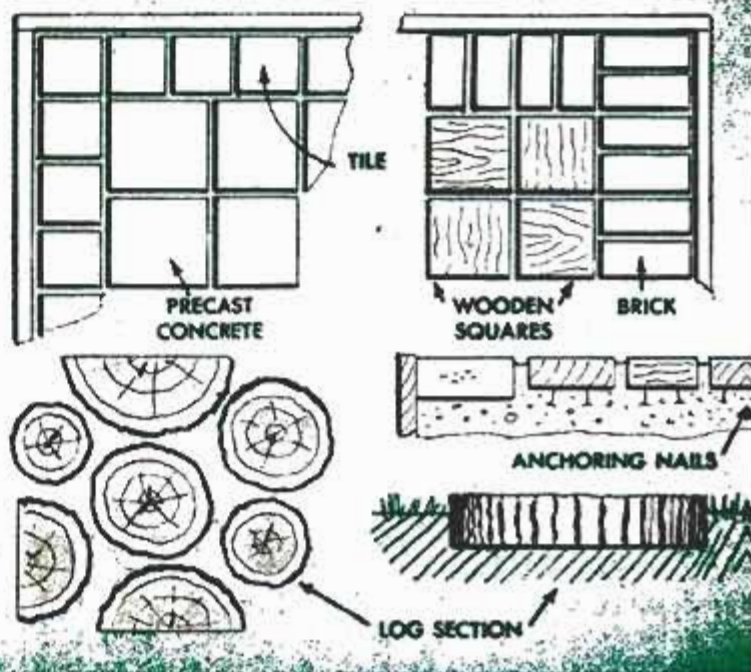
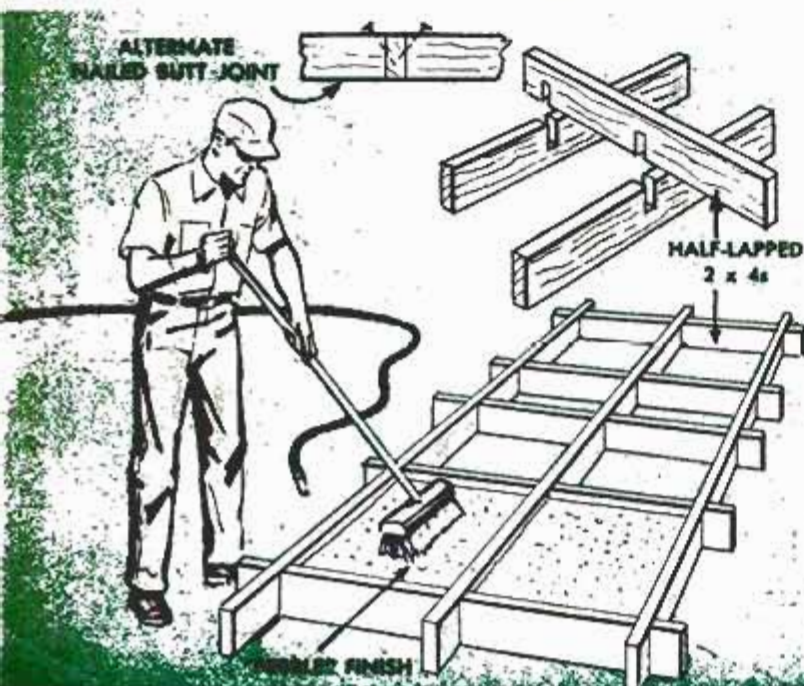
When mixing the concrete, place the measuring box on the wooden platform and fill with sand twice. Follow with three measures of gravel and crushed rock not

1. Above, flagstone is close-laid in random pattern on concrete with concrete-mortar joints. Straight edges of stones form border of small decorative pool



2. For novel treatment of concrete terrace above, expose gravel aggregate by brushing concrete away from small stones immediately after it has set

3. Below, tile or brick borders add touch of color to patio laid with concrete or wooden squares. Wooden borders for concrete squares are treated 2 x 4s





4. Natural flagstone in background is laid on concrete and in foreground directly on soil in informal pattern

larger than walnut size. Mix the mass thoroughly and then add one sack of portland cement. These ingredients should be mixed until a uniform gray color is obtained. Now make a depression in the mound and mix water in it a little at a time, Fig. 12. For dry aggregates (sand and gravel or crushed rock) add 5½ gal. of water, less for moist or wet material. A good

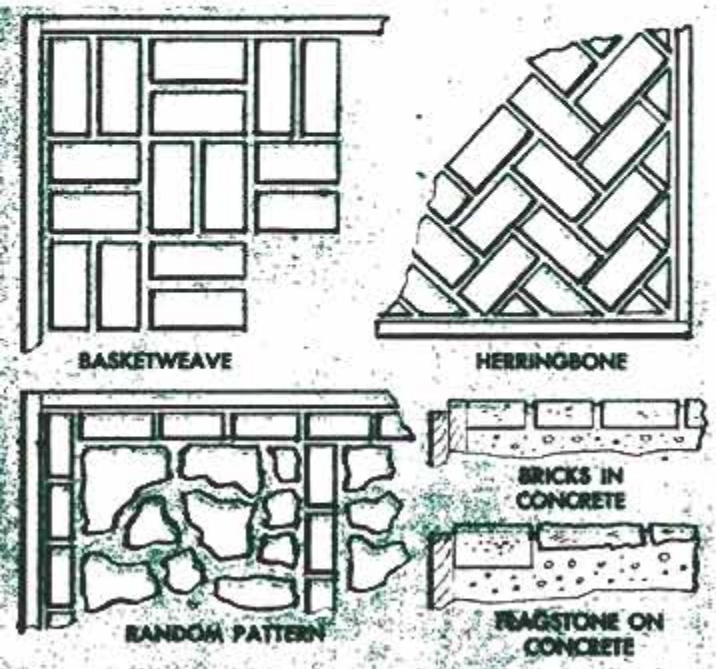
mixture should appear plastic, not "runny."

An entire slab of concrete should be poured in one operation and spaded against the sides of the form. Then with a strike board it is leveled even with the top edge of the form which is sloped ¼ in. to the foot to provide the necessary grade for good drainage.

For precast-concrete squares, make a

5. Bricks laid in herringbone pattern are attractive but require cutting at 45-deg. angle at border

6. Formal treatment of patio overlooking valley is this glazed-tile surface laid on concrete slab





7. Above, precast-concrete squares laid on soil, spaced 1½ in. apart with dichondra planted between



8. Redwood-log sections set flush in ground shown above are creosoted on bottom, stained or left natural on top. Use assorted sizes to avoid monotony

form that will produce several sizes and shapes that can be assembled into a random pattern, Fig. 11. The members of the form should be tapered as shown in the end view for easy removal of castings.

Improve Appearance of Concrete

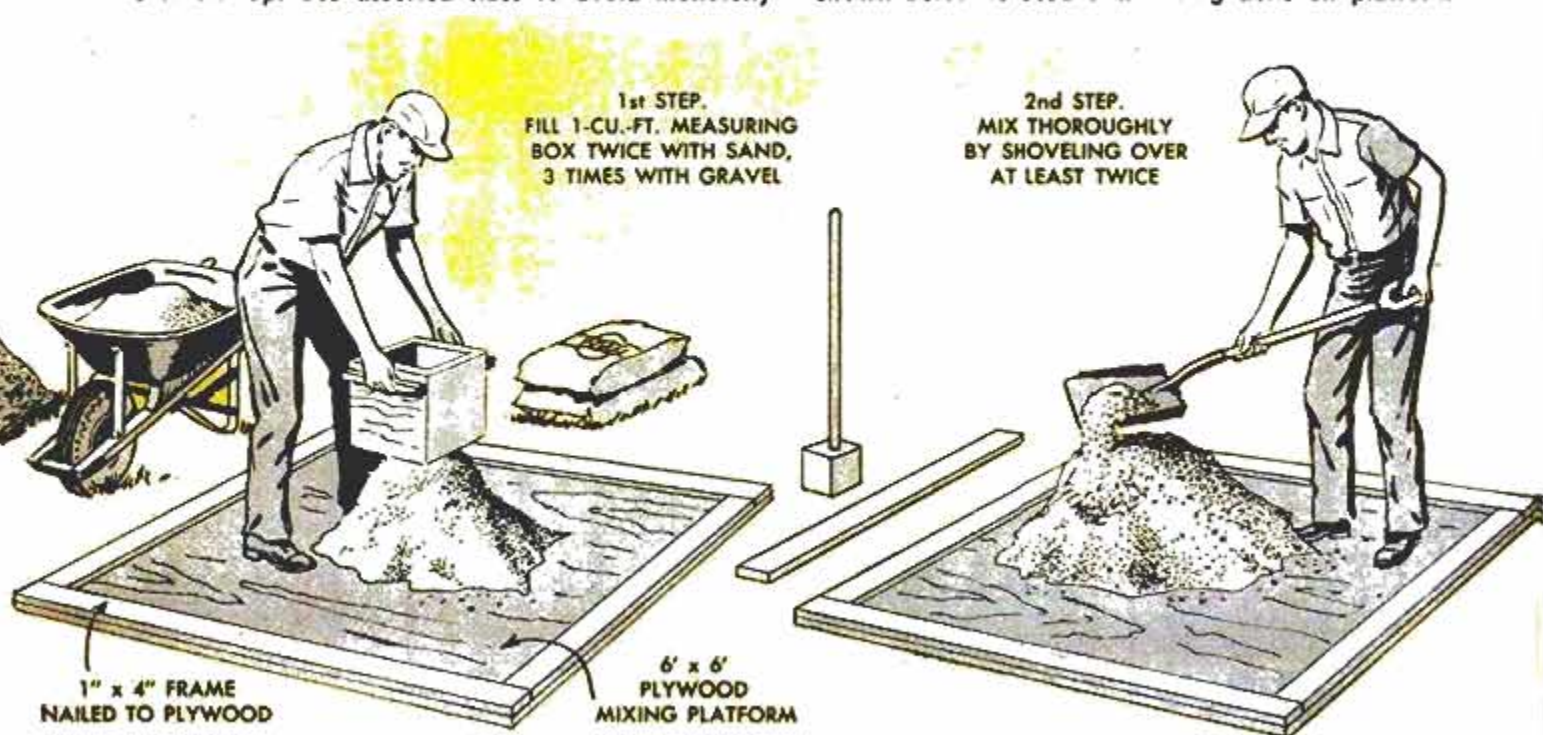
The advantages of paving with concrete are its permanence and low cost. The disadvantages are its harshness of surface, glare and commercial appearance. The latter can be avoided or at least improved upon by staining, adding borders and trim, and modifying the surface.

One way of changing the surface is to expose the aggregate. To do this the mix must be slightly drier than normal. As soon as the cement is poured, level it with a board. Then break the surface by sweeping it with an ordinary push broom to roughen and prevent it from setting, Fig. 3. When the concrete is hard enough to walk on, use a steel brush to expose the larger pebbles. (It will take from 4 to 12 hours to harden sufficiently, depending upon the weather.) During this operation keep water running over the concrete to wash away the loosened particles. When the concrete takes on a "pebbly" finish the job is done.

Concrete exposed to the sun and wind should be kept moist for at least 48 hours after it is laid. Stepping stones cast directly in the ground will not collect water on top when given a slight crown as shown in Fig. 11.

Bricks, laid in basket-weave and nu-

9. Measuring material for small amount of concrete is easy and accurate when 1-cu.-ft. bottomless box shown below is used and mixing done on platform



merous other interesting patterns, Figs. 5, 10, 11, are one of the most popular materials used for paving patios. Bricks may be laid on tamped soil, cinders or on concrete with or without cemented joints. On soil, the bricks can be laid close together, or spaced $\frac{1}{2}$ in. apart if you wish grass to grow between them. The herringbone pattern is interesting but requires cutting the border bricks at 45-deg. angles as shown in Fig. 5.

Miscellaneous Patio Surfaces

When available, 3-in.-thick sections cut from redwood logs make a unique arrangement of stepping blocks, Figs. 3 and 8. These should be creosoted on the bottom, and in a damp climate laid on sand. A novel arrangement is to lay wooden squares between brick borders, using protruding nailheads on the underside to anchor the blocks in the concrete, Fig. 3. The monotony of large areas of flagstone can be broken by adding borders or partitions of rectangular stone or brick.

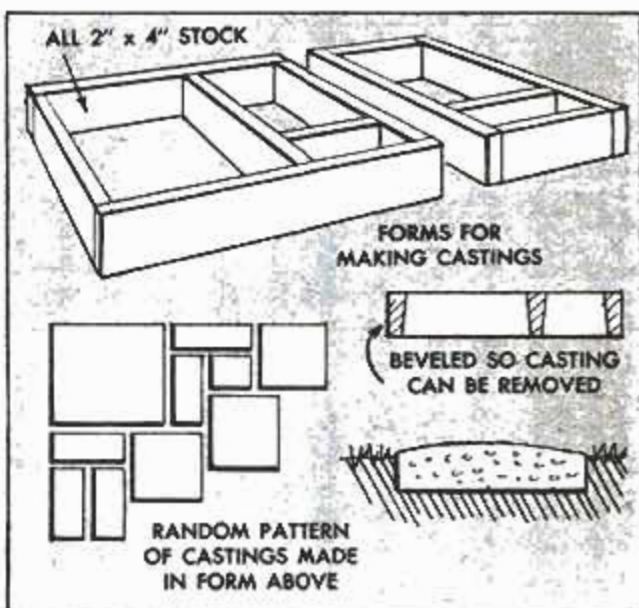
For an unusual effect, pave your patio with concrete blocks set on edge on a concrete slab and with 3-in. asphalt borders around sections containing 24 or more blocks each. After the blocks are laid, fill the border spaces with $2\frac{1}{2}$ in. of crushed rock. Then fill the remaining space flush with cold-mix asphalt. Do not sprinkle cement powder on the asphalt since the black is needed for contrast with the gray blocks. ★ ★ ★

11. Forms used for making concrete castings are beveled as shown at right for easy removal of castings

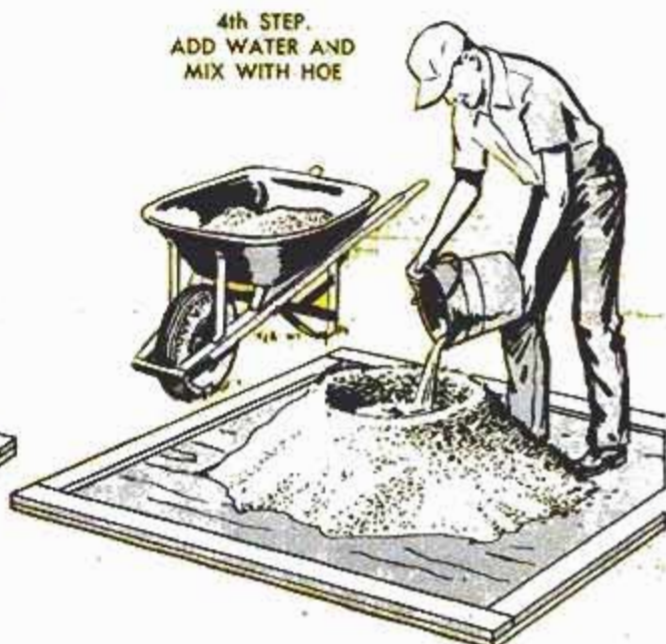
12. Below, mix cement evenly with sand and gravel, then with water until mass is plastic but not "runny"



10. Above, brick laid in basket-weave pattern without use of mortar makes interesting walk around patio



3rd STEP.
ADD 1 SACK OF
CEMENT AND MIX
DRY BY SHOVELING

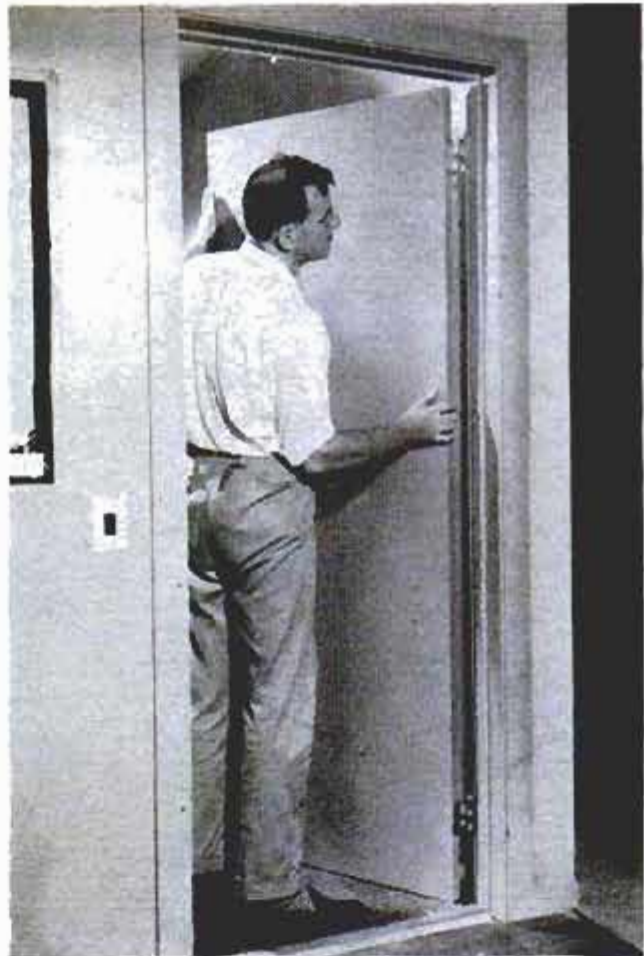


4th STEP.
ADD WATER AND
MIX WITH HOE



Johns Manville photo

Game rooms are soundproofed with acoustical wallboard and tiles stapled to furring strips on joists



Replacing hollow-core doors with solid-core type materially reduces sound transmission between rooms

BUILDING QUIET INTO YOUR HOME

By Stanley Schuler

MODERN LIFE has many advantages not available 25 years ago, but it also has some disadvantages, one of which is noise. We produce it inside our homes, outside our homes, in the air and even underground. Electronic devices and modern home appliances do the job inside, while modern transportation and industry set up a din outside, to say nothing of the noise we humans produce ourselves. All this noise adds up to an almost unbearable situation at times, which makes insulation against noise equally as important as insulation against heat and cold. In new construction, soundproofing should be considered with other modern improvements. In existing homes, soundproofing is a little more difficult, but not impossible.

Eliminating Sound

The first step in soundproofing an existing home is to determine what sounds actually can be eliminated or materially reduced in volume. Check the blowers and motors on the heating plant for worn bear-

ings, noisy mountings and loose fan blades and hubs. Test rubber mountings. If worn or damaged they may be transmitting vibration noises all through the house via the ductwork.

Central air conditioners should be completely insulated from the ductwork by means of flexible sleeves which prevent the transmission of noise and vibration through the ducts.

Automatic washers sometimes are connected to the water supply with rigid piping. Installing short lengths of rubber hose between the washer and pipe will eliminate sounds transmitted throughout the house in this manner.

Vacuum cleaners, food mixers and other small appliances generally can be quieted by cleaning their motors and mechanisms, then oiling or packing with grease as required. Noise emanating from circulating fans usually is a result of one or more blades being bent out of alignment. Improvise a gauge from a block of wood, hold it inside the guard of the fan and then

An excellent method of soundproofing in new construction is to build interior walls so that alternate studs touch only one surface. A blanket of soundproofing material then is woven between the studs as indicated and the alternate sets of studs are covered with $\frac{1}{2}$ -in. insulating lath, which permits using wallpaper, paint or other decorating materials without affecting the acoustical characteristics of the wall

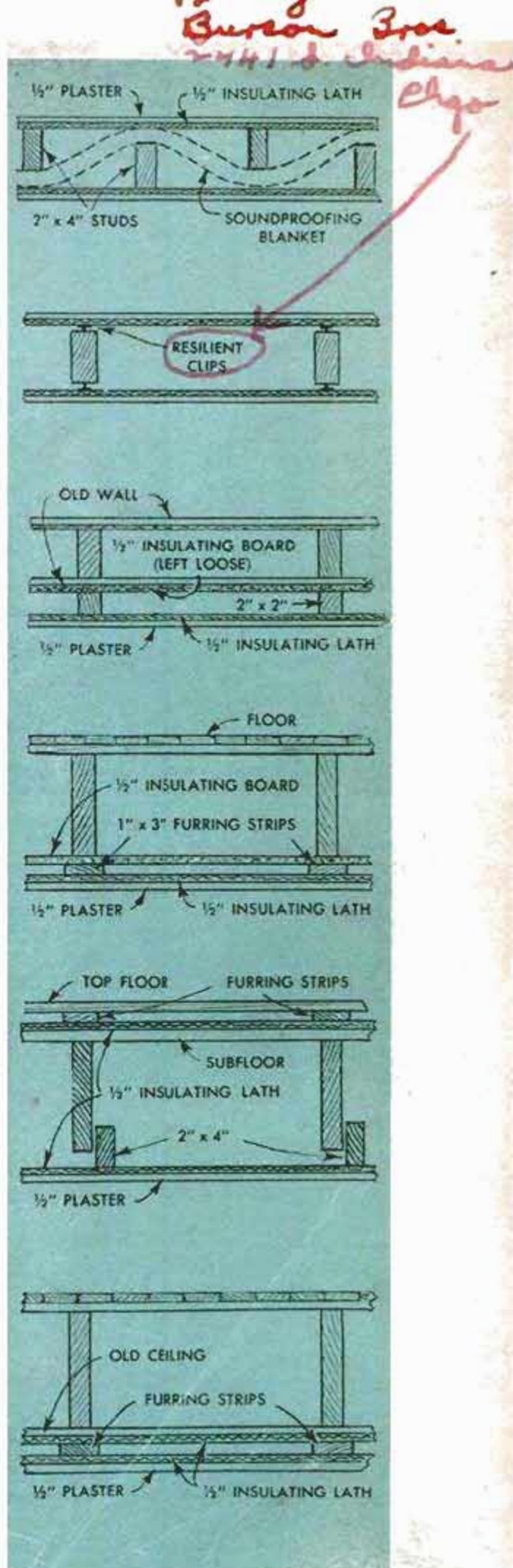
Another method of soundproofing walls in new construction, where space is a major factor, is to use special resilient clips to support the insulating lath. Plaster then is applied to the lath. This type wall actually has slightly better soundproofing characteristics than the one described above

To effectively soundproof an existing wall, first cover it with $\frac{1}{2}$ -in. insulating board, then build an auxiliary wall of 2 x 2 studs against it. The insulating board is to be left loose, so use only enough nails to keep it in position until the studding is fitted against it, then remove the nails. Cover the auxiliary wall with $\frac{1}{2}$ -in. insulating lath and plaster it to provide a finished wall. When required, both sides of an existing wall can be soundproofed in this manner

Basement game rooms are areas that produce a great deal of noise that can become objectionable to persons on the first floor of the house. The solution to such a situation is to soundproof the basement ceiling by covering it with sheets of $\frac{1}{2}$ -in. insulating board. Furring strips then are nailed over the board, being located along the floor joists as indicated. Insulating lath next is nailed to the furring strips and the final step is to apply plaster to the insulating lath

For maximum soundproofing between floors of a house being constructed, the method shown at the right should be employed. The subflooring first is covered with $\frac{1}{2}$ -in. insulating lath, then furring strips are nailed over it along the floor joists and the finished floor is nailed to the furring strips. The ceiling below is made of 2 x 4s running parallel to the ceiling joists, but having no connection with them. Insulating lath then is nailed to the 2 x 4s and is covered with plaster

Another method of soundproofing a ceiling in an existing structure is to first nail $\frac{1}{2}$ -in. insulating lath to the old ceiling, then nail furring strips over the lath. A second layer of insulating lath is nailed to the furring strips, as indicated, and this latter layer is covered with plaster. When a very complete soundproofing is desired, both in the rooms upstairs and those down, acoustical plaster can be applied in place of the usual type that does not soundproof





Draperies are an ideal method of soundproofing a room and will also muffle sounds coming through a window

bend each blade so the tip just touches it.

When all the noisy appliances have been quieted, begin a check of such items as door latches, locks and hinges. Although these sounds are commonplace and generally disregarded, they add to the general din. A few drops of oil usually will quiet a squeaking hinge. Latches and locks that do not catch properly unless a door is slammed sometimes require refitting. Powdered graphite forced into a lock with an applicator often will free the mechanism so it works easily. If a door is slammed often, install a door closer to prevent the noise and assure that the door is closed properly.

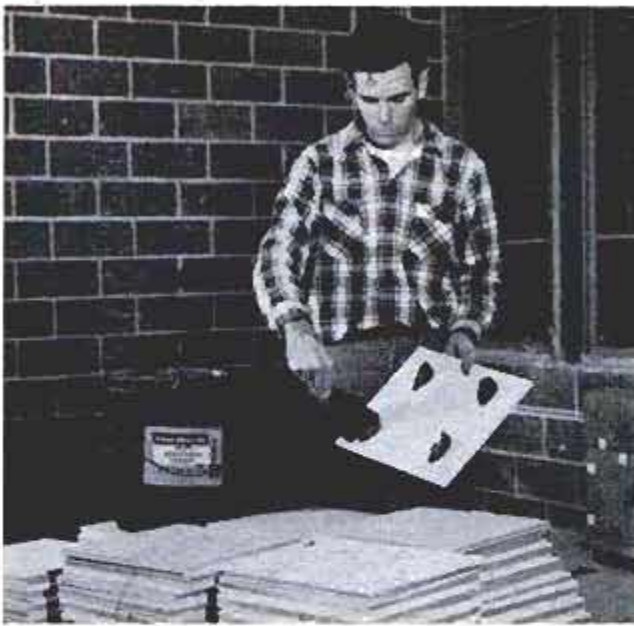
Soundproofing a Home

After all unnecessary noise has been eliminated or reduced to a minimum, structural soundproofing is required to further quiet a house. Generally, exterior walls are sufficiently dense to absorb outside sounds and prevent them from entering the house. Single-paned windows are not, and when they are facing toward a busy street or other source of noise should be double glazed with the two panes about 1½ in. apart. Since this will present a problem of cleaning the inside surfaces of the panes of glass, a better method is to

keep storm windows on the year 'round. Adjustable brackets should be fitted on the storm windows so they can be opened if desired. Combination storm windows also are effective in reducing sound transmission. The simplest way of soundproofing a window is to install draperies.

Inside a house there also is a problem of airborne sound passing from one room to another. Radios and television sets sometimes can be heard in another room even though the door between rooms is closed. Lightweight, hollow-core doors offer little resistance to the passage of sound and must be replaced with heavier, solid-core doors when soundproofing between rooms is necessary. Sound-absorbing materials in the room from which the sounds originate also will reduce the volume of sound transmitted through the air. A rug over a pad will absorb sound that ordinarily would be reflected back from the floor, and upholstered furniture will absorb still more sound.

If you have a laundry or utility room that has masonry walls, it is a simple matter to install acoustical tiles with mastic-type adhesives. The tile will absorb much of the noise resulting from the operation of appliances and make the room a more com-



Acoustical tiles can be applied to masonry with adhesives so that no mechanical fasteners are required



Acoustical tile on ceiling only often is sufficient to reduce noise levels to an acceptable minimum

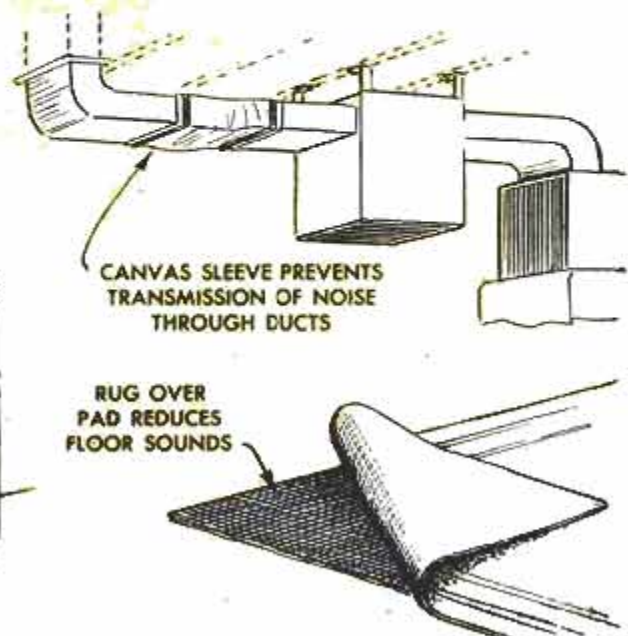
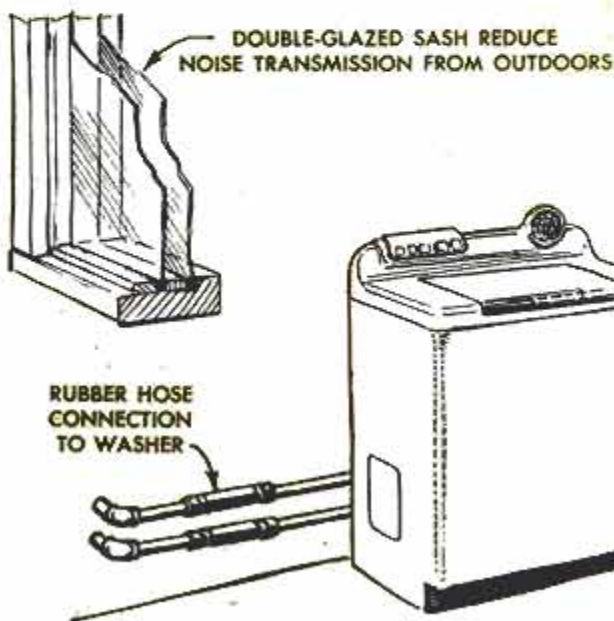
comfortable place in which to work. Acoustical tile also can be applied to plastered walls with adhesive. In the case of a basement room, rough concrete walls may require the installation of furring strips to which the tiles are nailed or attached with clips.

Very often, applying tile only to the ceiling of a noisy room is enough to reduce noise to a comfortable level. It also is possible to install too much soundproofing, so that a room has a "dead" feeling, where voice tones are immediately absorbed and even the sound of a radio seems muffled.

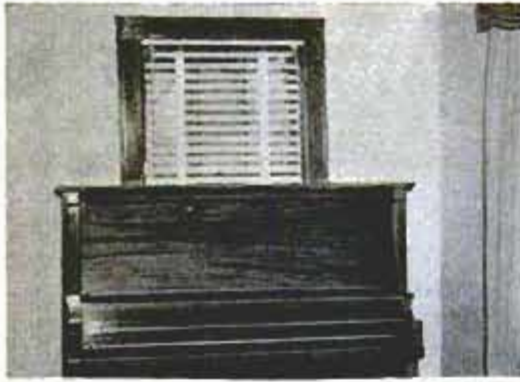
Basement game rooms very often are a source of noise that will penetrate through the first floor. The simplest way to soundproof the floor in this case is to nail furring strips to the floor joists and install a ceiling of acoustical tiles. Where a situation might be extreme—a basement workshop in

which power tools are used would be an example—it would be necessary to use one of the methods shown on page 207 to soundproof the floor. If a game room or workshop is included in the plans of a new home, soundproofing between the first floor and basement ceiling should be specified to assure maximum living comfort in the finished home. For the same reason, in a two-story home where bedrooms are on the second floor, the ceiling between the upper and lower floors should be soundproofed.

In single-story, ranch-type homes it is the walls that are most important in soundproofing. Walls between sleeping and living areas should be soundproofed, and solid-core doors installed so that sleepers are not disturbed by other members of the family who stay up late. ★ ★ ★



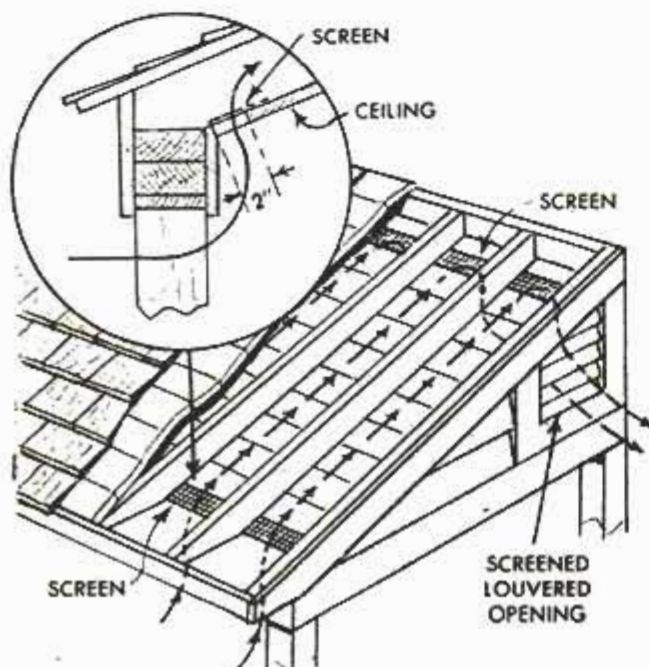
Covering Window Helps Increase Wall Space



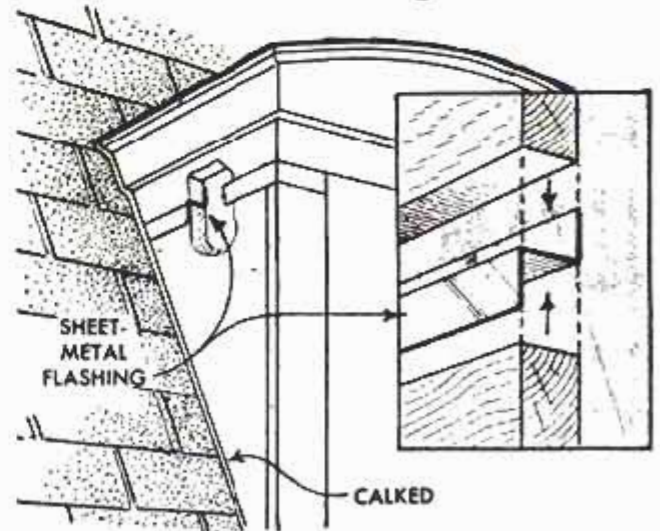
If a window limits the placing of large pieces of furniture such as a piano, the window can be concealed temporarily by covering it with a panel decorated to blend with the adjoining wall. To make the panel, first construct a 3-sided frame of 1-in. stock which will fit around the edge of the window casing. Brace the framework at the corners with right-angle brackets. Then drive two finishing nails into the edge of the top piece of casing and drill matching holes into the top member of the framework. Nail a sheet of hardboard to the framework and slip it over the window.

"Air Washed" Roof Keeps Porch Cool

Space between the ceiling and roof of a shed-type porch stores up considerable heat on a hot sunny day, and this heat radiating downward often makes the porch unbearably hot. One effective method of removing heat is to install screened openings in the ceiling at the lower end of the roof for entrance of air, and louvered openings at the top of the end walls, as exits. As shown in the illustration, the fresh air comes in at the lower edge of the roof and is exhausted out of the louvered openings.



Metal Flashing Under Fascia Board Prevents Water Damage to Dormer



In some types of dormer construction the siding material is butted against the fascia board resulting in a joint which eventually may open and allow water to enter. To avoid this problem, install a metal flashing, bent as indicated, in the joint. Another source of leaks is the corner where the dormer joins the roof. Calk this joint, even though flashing may have been installed under the roofing.

☛ Luminous paint applied to the outer edge of each step on basement stairs will help to eliminate one source of accidents in the home. A coat of white shellac over the paint will protect it from wear.

POTTER'S WHEEL

Built Into a Kitchen Stool

By Ross E. Williams

ALTHOUGH the traditional kick wheel is as old as the art of pottery throwing, modern beginners and advanced artists in clay appreciate the smooth action, and especially the uniform speeds possible with a motor-driven wheel. Power drive enables the pottery worker to give full attention to the throwing processes, makes painstaking jobs less tiring, and eliminates the necessity of making compensations for any irregularities caused by vibration or variations in the speed of the wheel.

Using an ordinary steel kitchen stool, an 8-in. aluminum sanding disk, a 9-to-1 right-angle speed reducer, a rubber-mounted 1/4-hp. motor (with resilient base) and a few other accessory parts, you can build a variable-speed potter's wheel on which you can turn out work of professional quality. The illustration at the right pictures the completed unit, the left-hand photo below shows the reduction drive as-



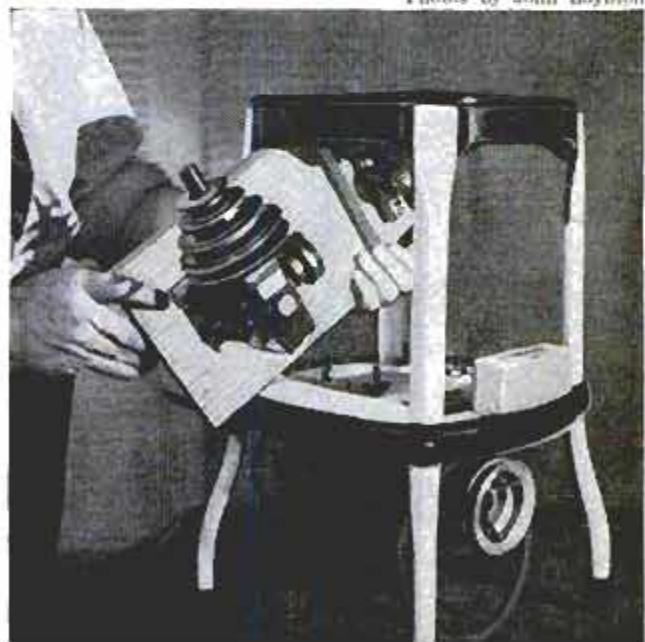
sembled while the right-hand photo pictures the drive unit being mounted vertically between the seat and lower frame of the stool.

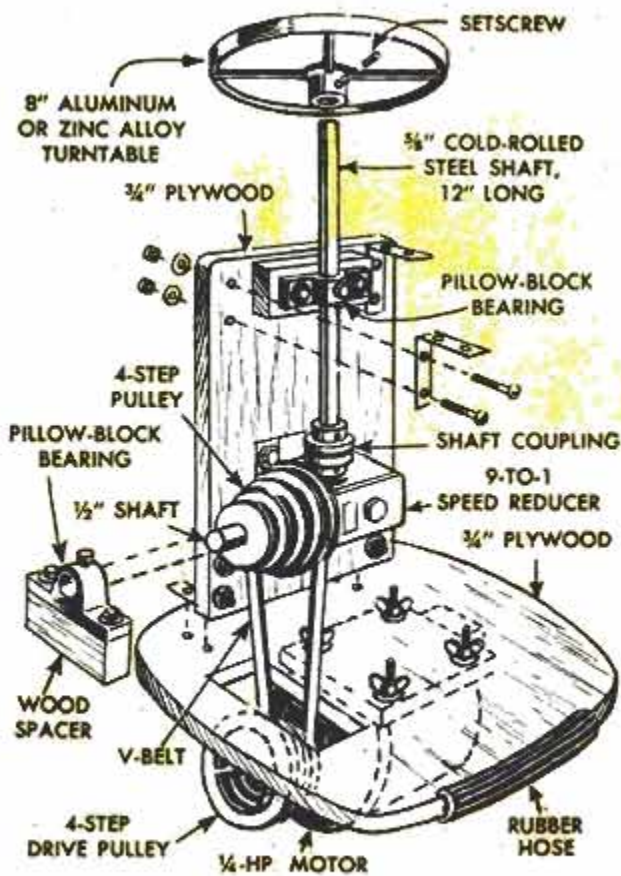
As the first step in construction, remove backrest from the stool. If you purchase

Speed-reducing drive assembled ready for installation in stool. Turntable is on 8-in. aluminum sanding disk

Drive assembly being installed in stool. Stepped V-pulleys gives 4 speeds from motor to reducer

Photos by John Boynton





To make bat of right size pour plaster of paris into an aluminum pie plate. Permit bat to harden fully before removal from form



Plaster-of-paris bat is "glued" to turntable with a thin layer of moist clay. Bat provides base on which potter's clay is centered ready for the first steps in throwing

a stool, buy one without the retractable steps, as neither these nor the backrest is needed. Then remove the lower frame and place it on a piece of $\frac{3}{4}$ -in. plywood as in the left-hand photo below. Hold it securely in position and run a pencil line on the plywood, the pencil point bearing against the inner edge of the frame. Then run a line around the outer edge. Lay the frame aside and mark a pencil line halfway between these two lines. Cut out on the bandsaw or jigsaw (or with a coping saw), the blade cutting just outside the middle line. This should give you a piece of plywood shaped to fit inside the frame with the edges bearing on the lower flange.

Laying out plywood shelf, using lower stool frame as template. This shelf serves as base for motor

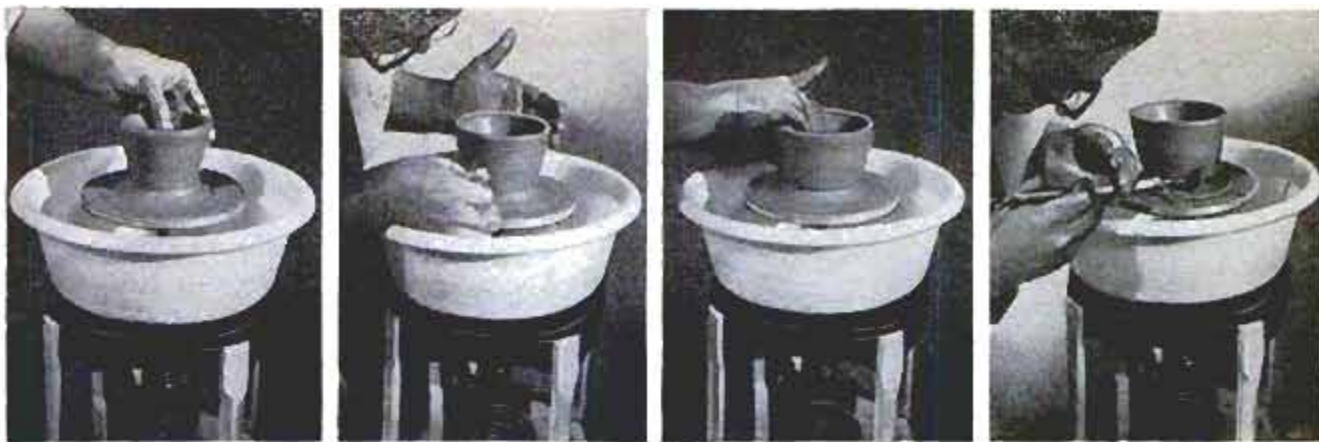


Further cutting will be necessary to obtain a true fit of the plywood shelf around the legs of the stool when assembling. For extreme quietness of operation, the shelf should be rubber-mounted by fitting a length of rubber hose (or rubber tubing) over each of the four curved edges at the time of assembly. A length of hose is shown in position in the detail above at the left.

No locating dimensions are given for the belt opening in the plywood shelf. The location and size of the opening must be determined by trial fitting of the various parts. The vertical shaft carrying the turntable (sanding disk) passes through a hole drilled in the steel top of the stool and through a hole punched in the plastic bowl (a flexible plastic dishpan is just the right size). The bowl is attached to the stool top with four brass bolts so that it can be removed for cleaning. The lower end of the turntable shaft is carried in a flexible coupling, one flanged half of which is fitted to the output shaft on the speed reducer. The vertical shaft is carried in a pillow-block

After marking around inner and outer edges of frame, mark a third line halfway between. Saw outside line





Photos above picture four important steps in the throwing process. Also, they show the purpose of the bowl, adapted from a flexible plastic dishpan, in preventing the wet clay from being thrown on floor

bearing which is mounted on a spacer block to bring it in line with the output shaft on the reducer. A 1/2-in. rigid coupling is fitted onto the end of the input shaft on the reducer. This takes a short length of 1/2-in. shaft on which the 4-step driven pulley is mounted. The outboard end of this shaft extension is carried in a 1/2-in. pillow block as shown. The 4-step driving pulley on the motor gives the drive a selection of 4 speeds. The vertical plywood base carrying the reducer and turntable shaft should be cut to a snug fit between the plywood shelf and the metal stool top. The ends are held in place with steel angle brackets and stove bolts.

One thing to remember before final assembly: If you are right-handed the turn-

table should rotate in a counterclockwise direction. If you are naturally left-handed the turntable should rotate clockwise. If necessary, reverse the motor by interchanging the leads to the starting winding. Wire a 2-pole toggle switch in the power cord to control the motor.

Before throwing on the wheel (turntable) you cast plaster-of-paris disks with tapered edges on which the clay is centered for throwing. These are called bats and are cast in aluminum pie plates as in the upper right-hand details on the opposite page. The individual bat is "glued" to the turntable with a small quantity of wet clay. The four photos above show important steps in throwing work on the wheel. They are, of course, only representative. * * *

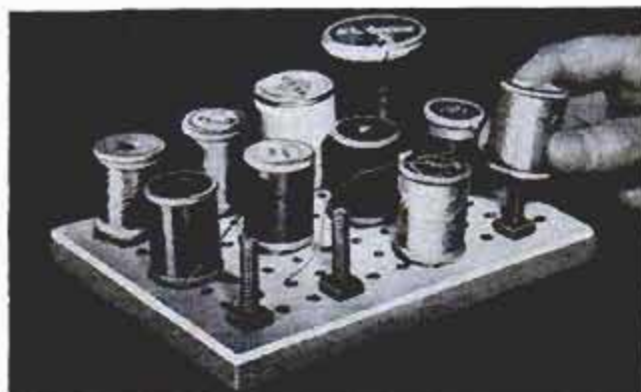
Sandbox Contents Stored in Milk Cartons for Winter

Empty milk cartons provide a handy method of storing the sand removed from a sandbox that is dismantled and stored for the winter months. The flat-topped, 1/2-gal.-size cartons stack compactly and are easier to handle than are large boxes or bags that sometimes are used. Also, the waxed material of which the cartons are made is resistant to moisture which may be in the sand. Before pouring the sand into the cartons, sift it through a screen to remove foreign matter. Other uses for the milk cartons are to store various mixtures of potting soil, and as containers for fertilizers or other materials spilled from a broken bag.



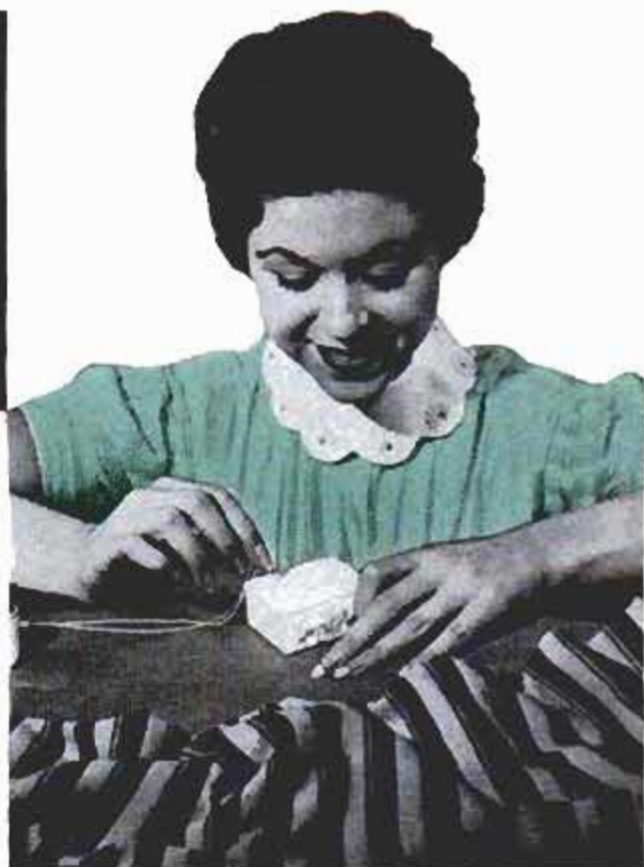
SOLVING Home Problems

BAR OF SOAP can be used to lubricate needle when sewing heavy materials such as canvas. The soap lubrication is especially effective for large needles that have rusted and become roughened. Simply force the needle into the soap frequently during the sewing. The small amount of soap that is deposited will be removed first time the material is washed



SANDWICHES ARE SLIPPED INTO BAGS easily without being crushed or forced apart when a pancake turner is used as a "shoehorn" to slide them into bags as shown in photograph below. Idea is especially useful for sandwiches that have very soft fillings

FOUNTAIN-PEN CAP that becomes stuck on barrel can be released by wrapping adhesive tape around both the barrel and the cap as shown in the lower photograph below so that a good grip is provided on the smooth surfaces of the pen. The cap then can be unscrewed from the barrel with comparative ease



HANDY SPOOL RACK is made in a few minutes from a piece of perforated acoustical tile or perforated hardboard. Cut the tile or hardboard to the desired shape and size, then fit a small stove bolt into every fourth hole. Turn a nut snugly against the tile on each bolt and rack is finished and ready for the spools

PLASTIC BOTTLE CAPS that frequently are difficult to unscrew because the contents have coated the bottle threads with an adhesive substance, can be kept loosened by using wax as a "dry lubricant." Clean the threads on the bottle, then rub them with wax paper as indicated in the photograph below





SERVICEABLE ONE-POT "GREENHOUSE" can be made by slipping a plastic bag over flowerpot and plant. Another use for a plastic bag is as a moisture retainer when a plant must be left untended over a week end



SHOES THAT ARE NOT OFTEN WORN can be stored in the bottom of a garment bag in which are hung clothes that do not reach to the bottom. The shoes are protected and out of the way, yet do not require racks that would occupy valuable closet space

FISHBOWL COVER that is easily removed and replaced is made by stretching a hairnet over a pair of embroidery hoops of a size required to fit the bowl opening. The net prevents the fish from jumping out and also discourages the family cat from fishing



OCTOBER 1956



WHEN SILVERWARE NEEDS CLEANING and there is no polish in the house to do the job, toothpaste can be used as a satisfactory substitute. Apply the paste to the silver with a soft cloth and rub briskly so the mild abrasive in the paste removes the tarnish. Finally, rinse and wipe dry

SIZE AND STYLE NUMBER OF A PAIR OF SHOES you find especially comfortable can be kept legible until they are ready to be discarded in exchange for a similar pair if the numbers are covered with a strip of cellulose tape. The thin, smooth tape will not be felt when the shoes are worn

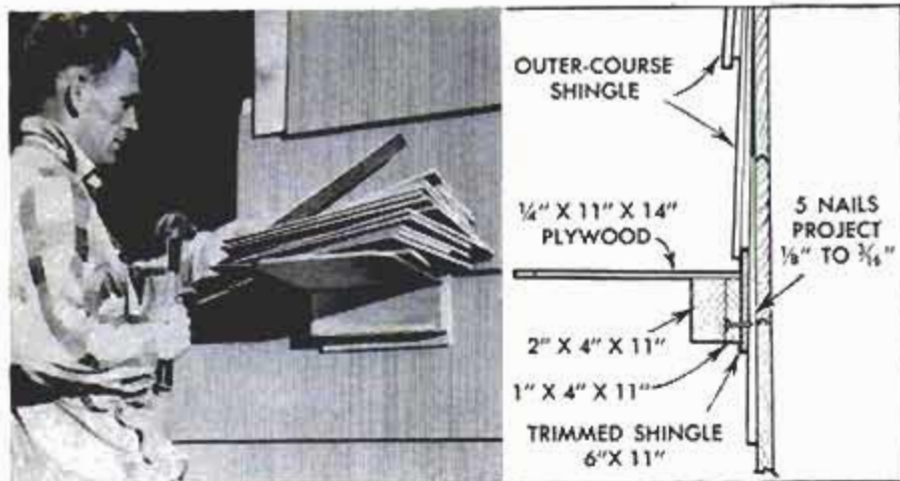


215

Shingle Platform is Self-Supporting on Double-Course Wall

Utilizing the 1/2-in. overhang of the top course of shingles on a double-course wall, this platform holds a supply of shingles

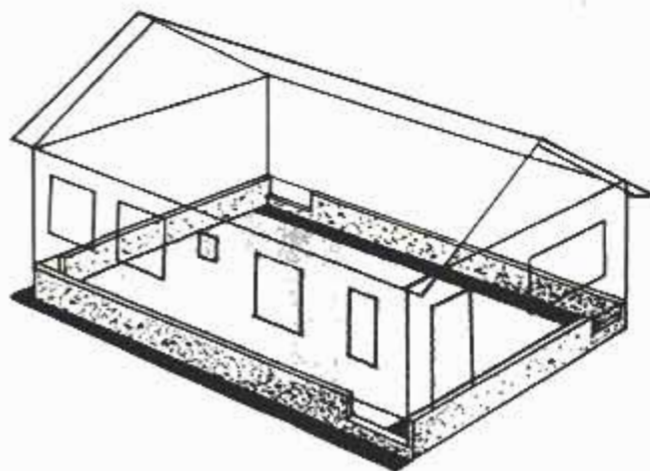
within reach of the workman and is completely portable and self-supporting. As shown in the detail, the platform is made of scrap wood and a trimmed shingle. The projecting nails are forced into the lower course of shingles by the weight on the platform and the trimmed shingle is held by the projecting shingles of the upper course. To move the platform, simply lift up on the shelf to disengage the nails, then lower it so the trimmed shingle clears the overhang of the course.



Red Cedar Shingle Bureau

Reduce Crawl-Space Humidity With Adequate Ventilation

Where no other effective means of condensation control is provided, crawl-space humidity under house floors may be reduced by adequate ventilation. There should be at least one vent opening in each wall of a structure, and preferably located near a corner. Total unobstructed venting area of all openings combined should equal approximately 2 sq. ft. for each 100 lineal ft. of crawl-space perimeter.



Allowances must be made for wire mesh or louver obstructions, placed in the vents to keep out pets and wildlife, quite often requiring twice as much opening. Vents should be placed as high as possible in the wall for greatest effectiveness. Closing the vents over winter eliminates their usefulness, but if they are left open, the floor above the crawl space must be insulated. Crawl space used as a plenum for warm-air heating should not be ventilated. Instead, humidity must be controlled by a suitable ground barrier and good drainage.

Tightening Loose Setscrew

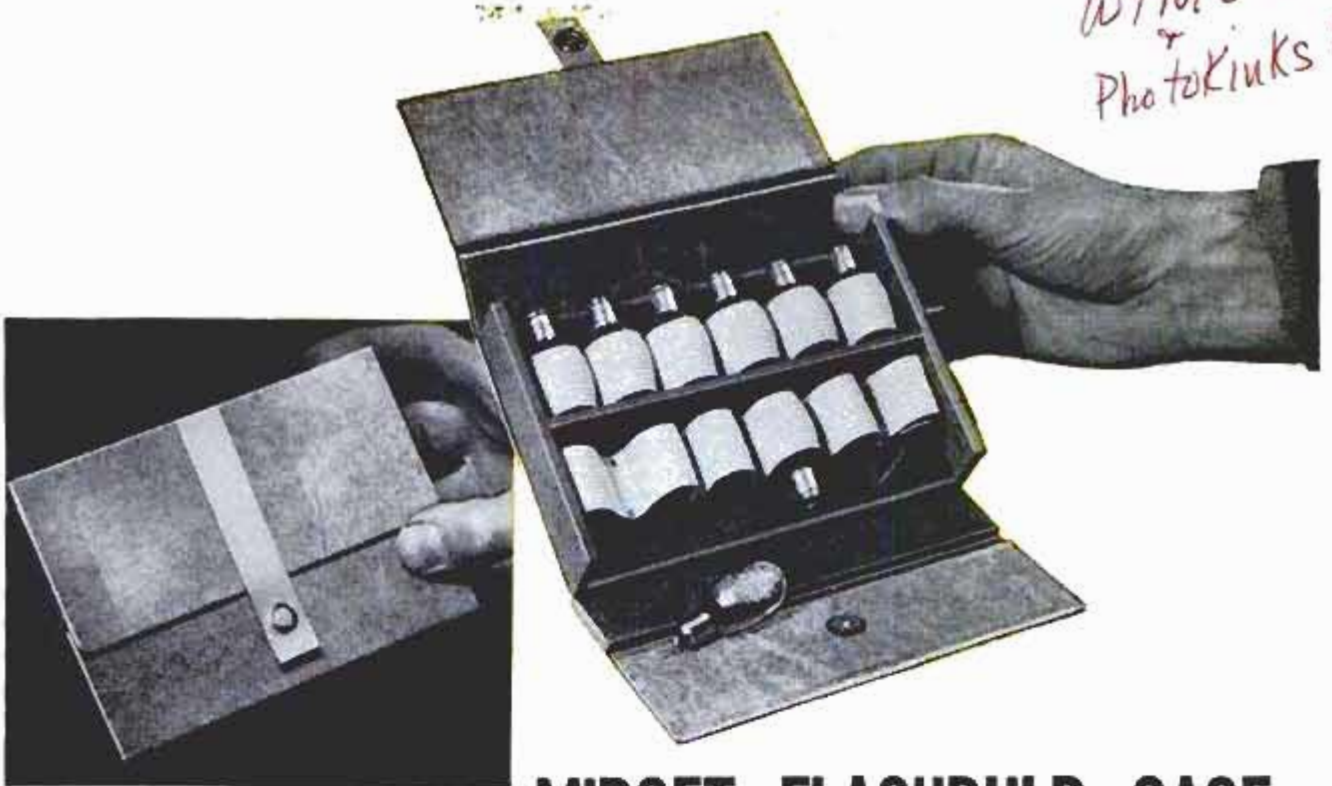
A worn, loose-fitting setscrew on a door-knob, machine or appliance can be made to fit tightly by flattening the threads slightly. Place the screw on a steel block and tap it with a hammer until the threads are burred. This will permit a better grip until the screw can be replaced.

Drain Hole Punched in Can

To get the last drop of solvent, thinner, or other liquid from a can of the type shown, punch a pouring hole in one corner on the top as close to the edge as possible. If the can is to be used later as a container, the hole is easily closed with a drop of liquid solder.

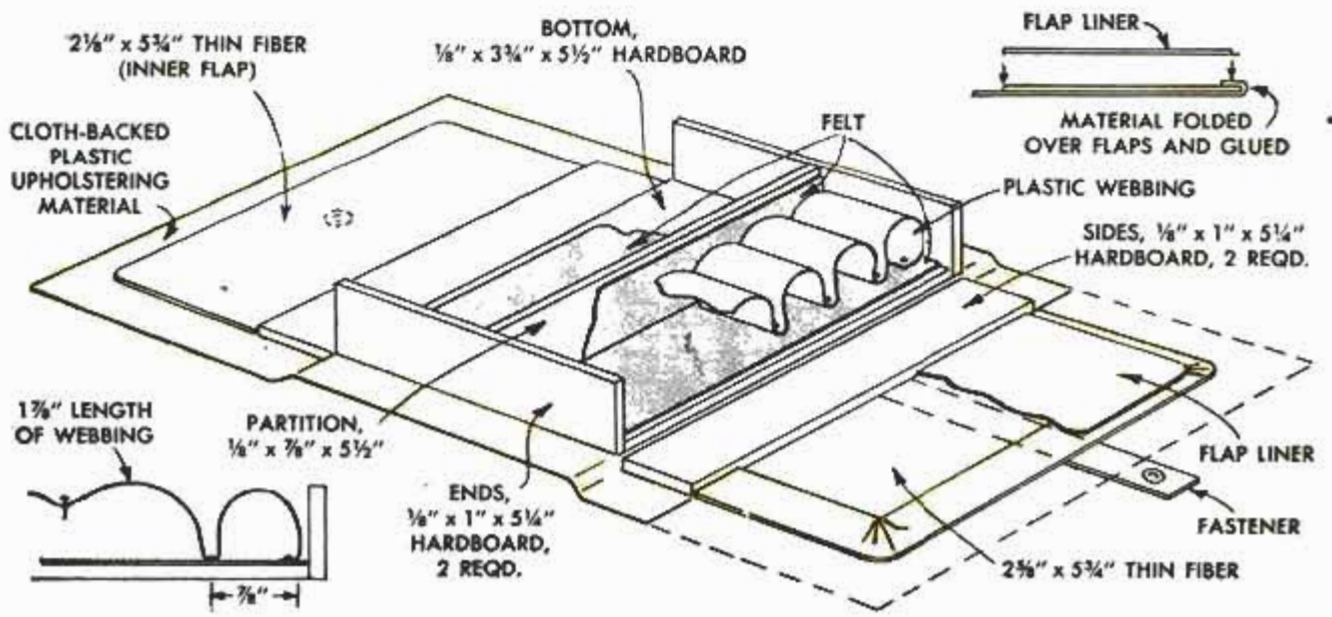
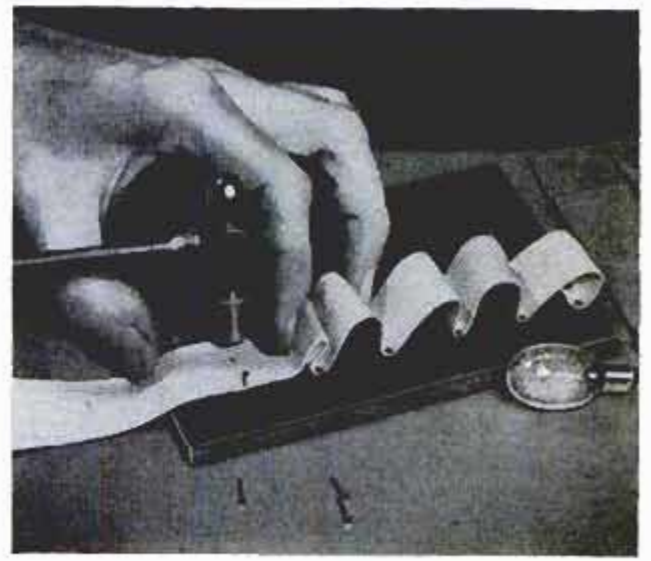


WTM 58
 &
 PhotoKinks 58



MIDGET FLASHBULB CASE

A DOZEN midget M-2 flashbulbs may be carried in this easily made case which fits conveniently in a coat pocket or gadget bag. The case is lined with felt on the bottom and on both sides of the partition to protect the bulbs. Each bulb fits in a separate pocket formed by strips of elastic webbing which are tacked to the bottom, nail points being clinched over on the opposite side. Covering the case is a 9 x 12-in. sheet of cloth-backed plastic which is glued to the bottom so that it extends equally beyond the ends, $3\frac{3}{8}$ in. beyond one side and $4\frac{3}{8}$ in. beyond the other side. Dimensions given are for a case to carry midget, type M-2, flashbulbs, but a similar case can be constructed to carry bulbs of other sizes.



Cord Cocktail Table

Designed and built
by Darrell Huff
and Paul Corey



A unique feature of this cocktail table is the tray in the center which can be used for serving snacks

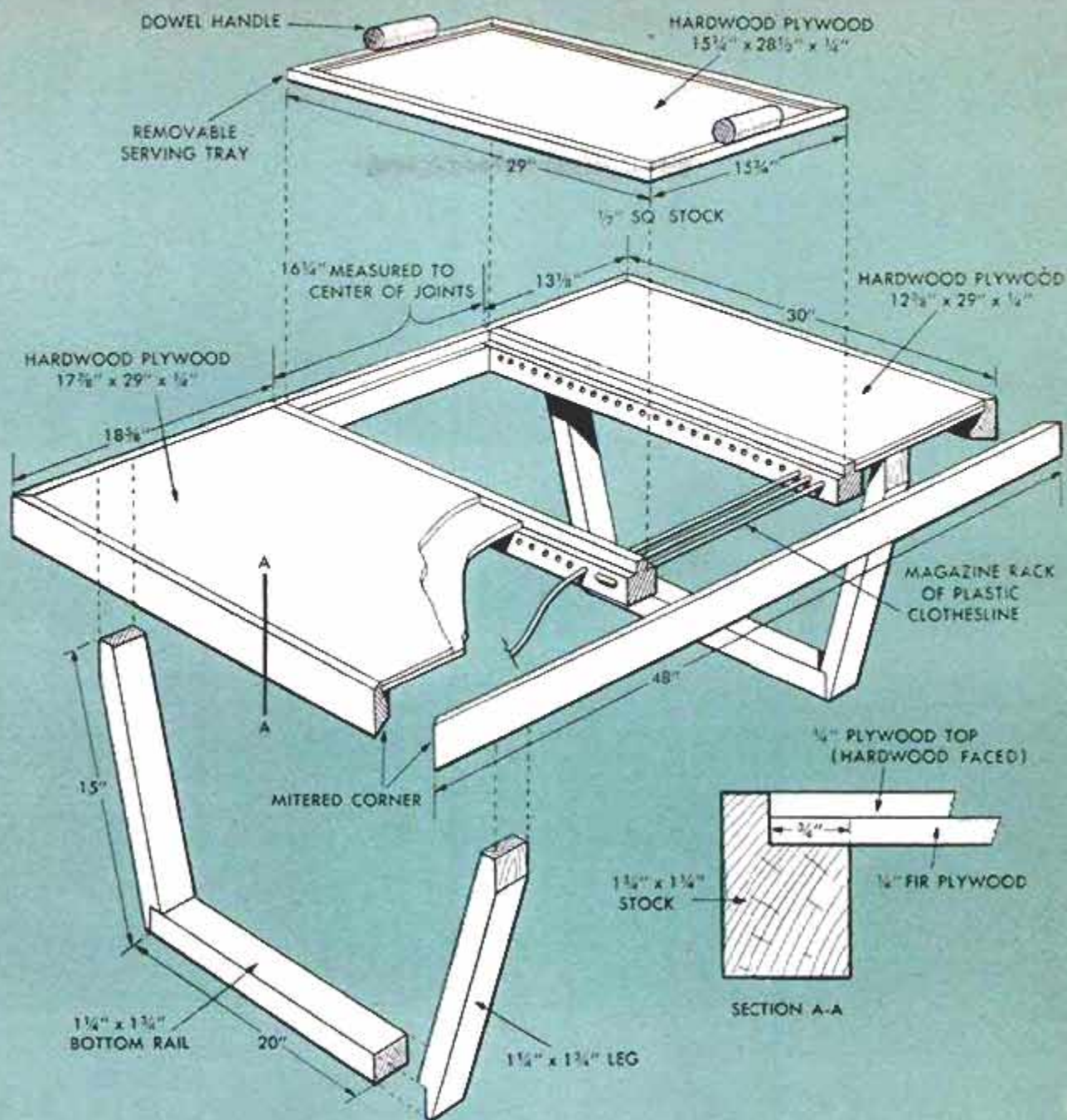
Considerable table space is available with the tray in place, and the magazines are concealed as well

HERE'S A COCKTAIL TABLE that will not seem out of place in a large living room of a modern ranch house. Its massive top (30 x 48 in.) includes a 15 $\frac{3}{4}$ x 29-in. serving tray which, when removed, reveals a cord rack for storing more than two dozen magazines. Whether it's used for coffee or cocktails you'll appreciate the abundance of table space and the convenience of a serving tray which becomes a part of the table. Even the tray is large enough to carry the cups or glasses, food and drinks you must bring in from the kitchen. No need for extra trips back and forth to the living room, and transferring of items from the tray to the table. It's all done in one trip.

Constructing the top is the first step in making the table. Framing members are all cut from 1 $\frac{1}{4}$ x 1 $\frac{3}{4}$ -in. stock. The four outside pieces are rabbeted $\frac{1}{2}$ in. down from the top edge and $\frac{3}{4}$ in. in from the

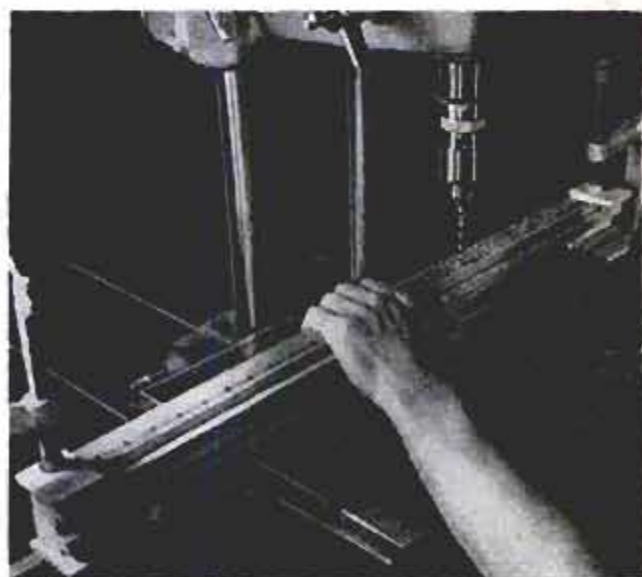
inner side to accommodate the double thickness of $\frac{1}{4}$ -in. plywood which comprises the top surface. Cut a rabbet $\frac{3}{8}$ in. wide by $\frac{1}{2}$ in. deep in both top corners of the two cord stringers as indicated in the detail on page 221. Clamp the stringers together on edge and drill $\frac{1}{4}$ -in. holes through both of them at the same time, for the cord which will be installed later. Drill the holes at 1-in. intervals along a line 1 in. from the bottom of the stock starting 2 in. in from the end. Then cut mortises in the side frame members for the ends of the stringers, centering the slots 18 $\frac{5}{8}$ in. from one end of the table and 13 $\frac{1}{8}$ in. from the other end. Assemble the framework as indicated in the detail on the facing page. Mitered joints at the corners are glued and reinforced with corrugated fasteners which are driven in from the bottom.

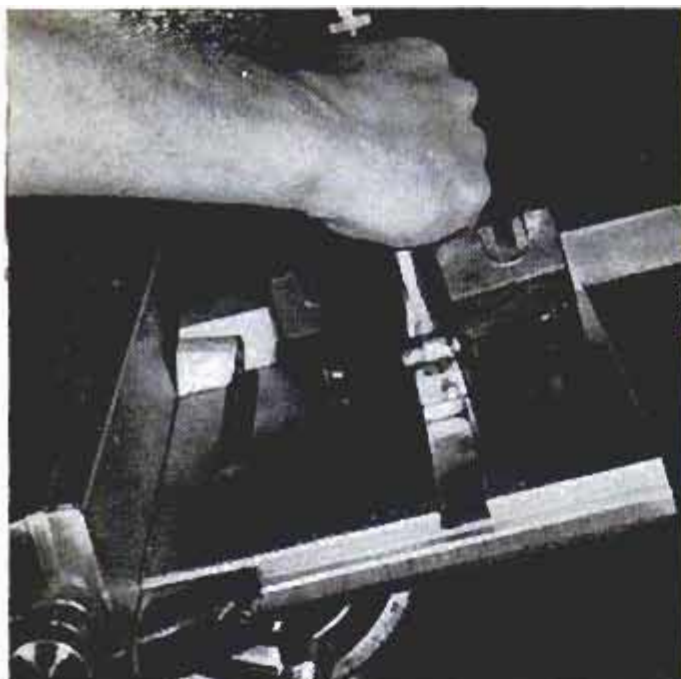
Now cut pieces of $\frac{1}{4}$ -in. fir plywood to



Framing members for the top are mitered together. Joints are glued and then reinforced with corrugated fasteners which are driven in from the bottom side

Holes may be drilled in both stringers at the same time if they are clamped together on edge as shown. Drill holes 1 in. apart starting 2 in. from one end





Each leg is undercut for the bottom rail. Vertical cut is at right angles to end and crosscut as shown

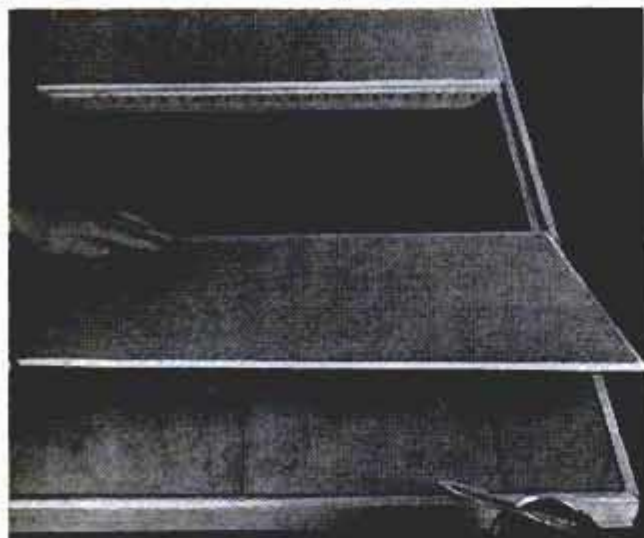
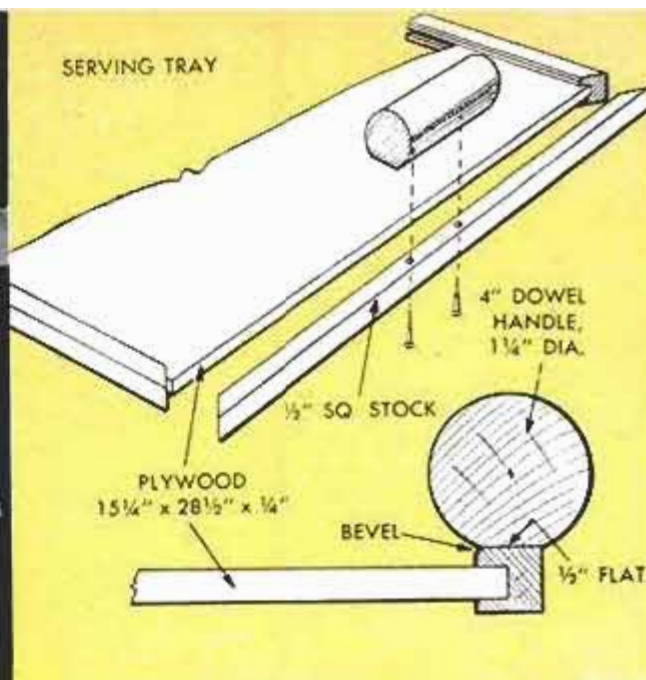
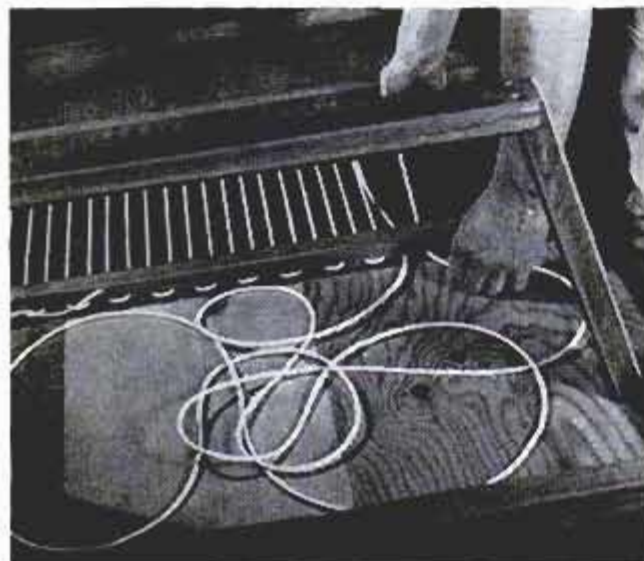


Table top is hardwood plywood glued to sheets of fir plywood. Both panels are recessed in the framing

One hand is used to lace the cord between the two stringers while the other is used to pull it tight

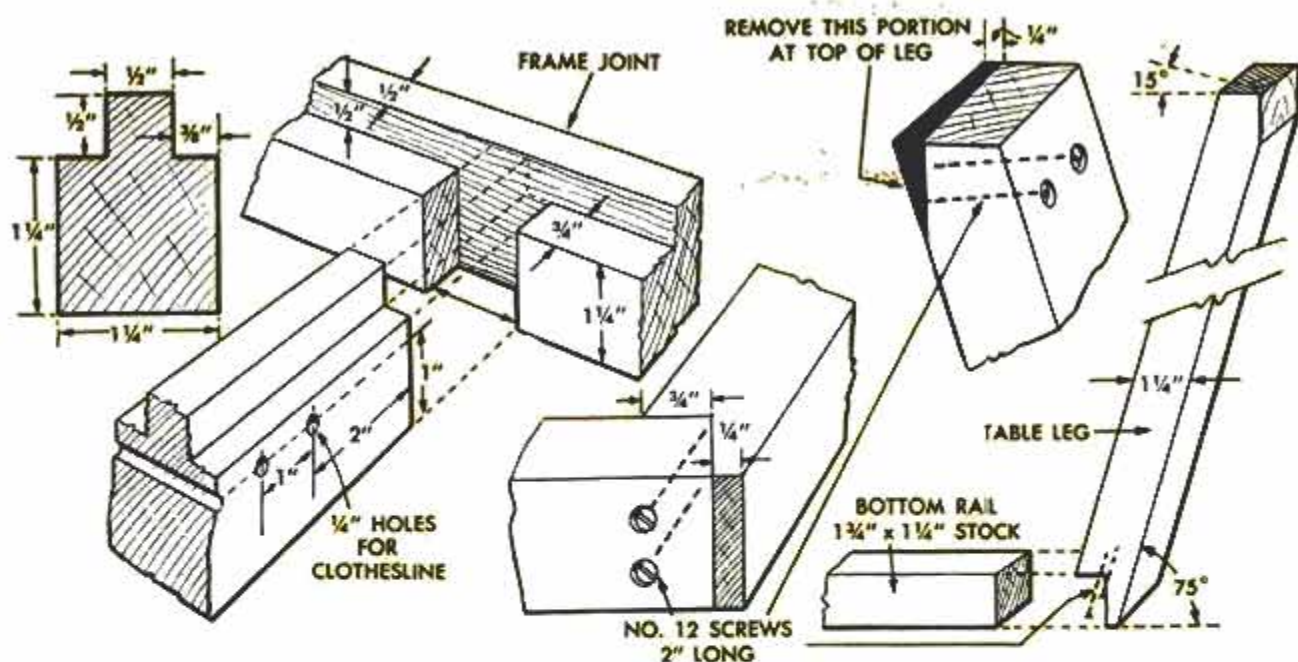


fit in the two end rectangles of the frame. Fasten them in place with glue and brads. Then cut two similar panels of hardwood plywood and laminate them to the fir panels already in place. An alternate method is to use $\frac{1}{2}$ -in. plywood with a finished hardwood surface on one side.

Next in line of construction is the serving tray. Start by cutting a $\frac{1}{4}$ -in. plywood panel $15\frac{1}{4}$ in. wide by $28\frac{1}{2}$ in. long. Frame the panel with $\frac{1}{2}$ -in.-sq. stock which has a $\frac{1}{4} \times \frac{1}{4}$ -in. rabbet in the center of one side. Miter the frame together at the corners and glue the plywood in the rabbet. Install a 4-in.-long handle cut from $1\frac{1}{4}$ -in. round stock on the frame at each end of the tray. Cut a $\frac{1}{2}$ -in. flat surface the full length on each handle before screwing it in place on the tray. This will keep them from working loose. The completed tray should fit into center opening of table.

The end of the cord is fastened by weaving through return loops on the outside of one of the stringers





Plastic clothesline is used to support the magazines. Begin weaving the cord at the center of the stringers running it straight across. Tighten it by working the slack out to the sides, and then secure the ends by slipping the cord through a couple of the return loops on the outside of the stringers.

Legs for the table are cut from $1\frac{1}{4} \times 1\frac{3}{4}$ -in. stock. By making each crosscut at 15 deg. the legs, when installed, will lean out at the top as shown in the detail on page

219. Cut off a $\frac{1}{4}$ -in. wedge from the top outside corner of the legs so they will fit flat against the inside of the table-top framing. Undercut the bottom of each leg to receive the end of one of the two bottom rails which are fastened to the legs with wood screws driven up from underneath. Each rail is $1\frac{1}{4} \times 1\frac{3}{4} \times 20$ in. and is used to steady the legs and to prevent marring of the floor surface. This feature also permits skidding the table across a rug without having to lift it. ★ ★ ★

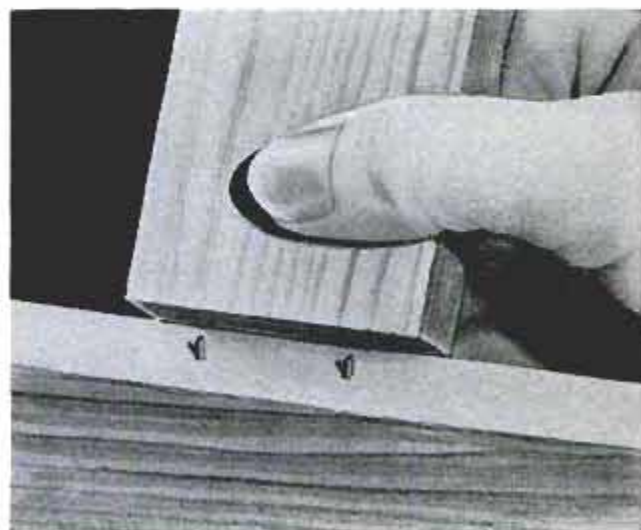
Nontoxic Ink for Children

Food-coloring fluid diluted with an equal quantity of water makes an excellent nontoxic ink for use by children. It's washable, too. If accidentally spilled on hands or clothing, it rinses away immediately with plain water. Various colors can also be used in a child's paint box, mixing them together for other shades.

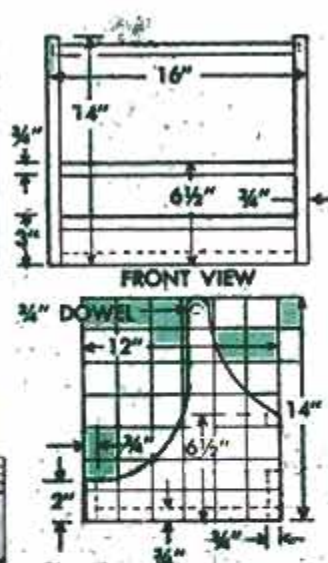


Clipped Brads Are Dowel Centers

When making doweled joints, brads driven into place and clipped short will mark the centers for the holes in the absence of conventional dowel centers. To assure correct positioning, marking should be done with the members laid out on a flat surface, or with a flat surface held against them. The clipped brads are easily removed with a pair of pliers after marking is completed.



Handy Utility Tray Keeps House-Cleaning Materials Together



Many steps will be saved by the busy housewife if she has a tray like this one for all her cleaning materials. To build it, temporarily nail together the two pieces for the sides, trace the pattern on one of them, and cut both out at the same time. Pull apart, drill a mortise on the inside of each piece for the dowel handle. Fit the bottom between the front and rear pieces and nail the $\frac{3}{4}$ -in.-sq. cleat in place.
T. M. Fenn, Chicago.

Care and Use of Rubber Gloves

Rubber gloves will give longer, better service if certain proven procedures for their care and use are followed. To aid in donning the gloves, sprinkle talcum powder on the hands. Talcum sprinkled on inside and outside will protect the gloves against rotting and tackiness. To remove rubber gloves, turn them back from the wrists until completely inside out. Then to reverse them, tuck the fingers inside the wrist band and blow out to the original position. Repair cuts and punctures with tire patches applied on the inside. Never leave rubber gloves partly inverted or folded together in pairs. Always dry them thoroughly inside and out before storing.

Robert L. Hay, St. Petersburg, Fla.

Snap Fasteners Tightened With Locking Pliers

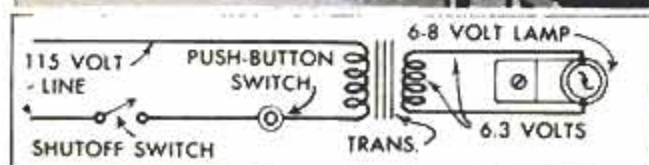
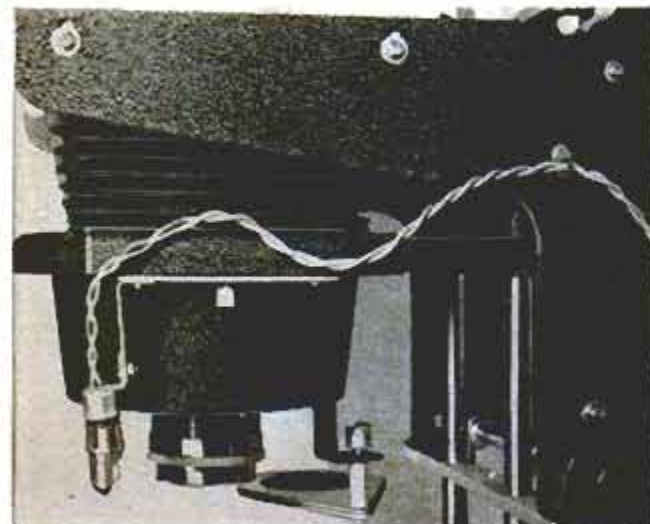
Loose-fitting snap fasteners can be tightened easily by squeezing the male piece slightly with locking pliers. Adjust the jaw opening so that it spreads the round head on the fastener slightly when the jaws are closed. Locking pliers permit the correct amount of pressure to be applied to the fasteners, which is not possible when using conventional pliers.



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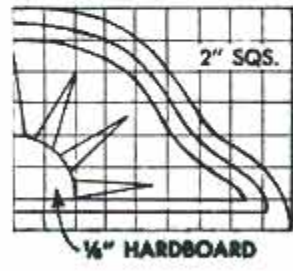
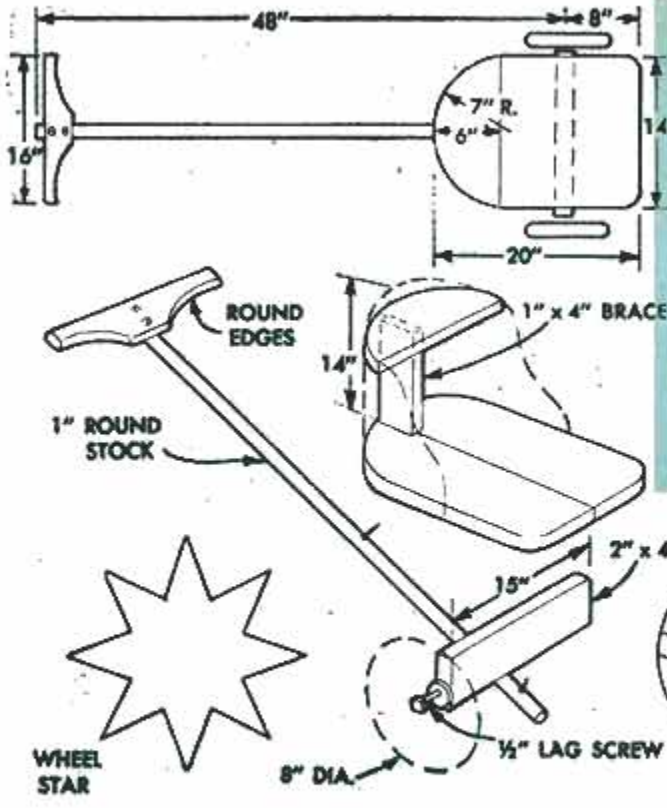
Ken Murray, Colon, Mich.

Low-Voltage Light Aids in Setting Photo-Enlarger F-Stop



Photographers who may have an enlarger not equipped with a lens that locks into each f-stop position, and those more fortunate who occasionally find it necessary to set the lens diaphragm at an intermediate position will find that illuminating the lens markings will aid in proper setting. Current for the lamp is derived from a small transformer that steps down house current to 6 or 8 volts. The transformer can be mounted in a galvanized electrical outlet box which has a toggle switch and a momentary contact button attached to the cover plate. Following the wiring detail, the toggle switch opens and closes the line voltage supply while the push button lights the lamp. The lamp should have a metal shield with a small opening in it to direct the light on the markings without illuminating the work.

Edward J. Rzeppa, West Chicago, Ill.



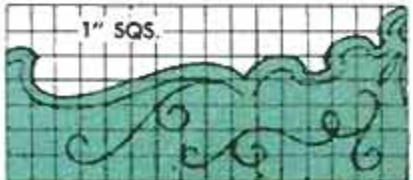
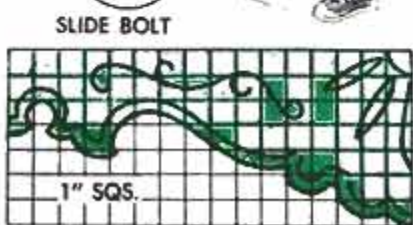
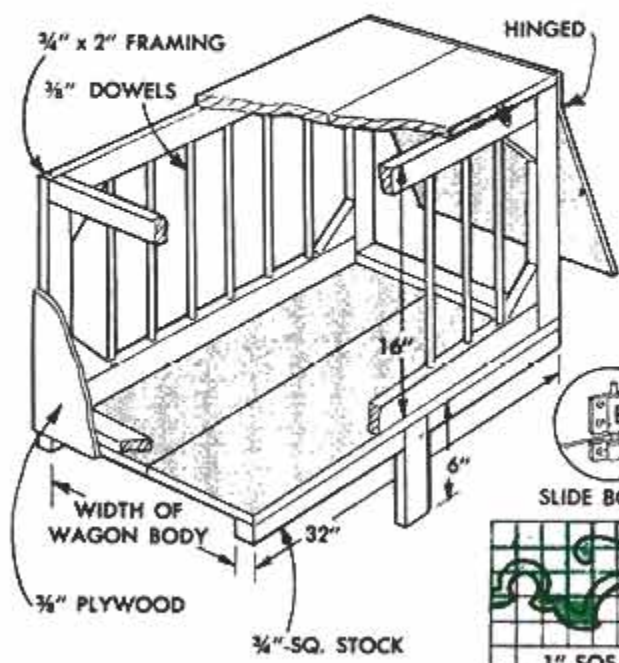
Here Comes the Circus Parade!

THIS CHARIOT and circus wagon will help authenticate the sidewalk parade in which all children love to participate. Two wagon wheels, a sheet of hardboard and some scrap lumber are all you need for the "Roman chariot." Cut the platform, handle and pole from 1-in. lumber, the cross piece for the lag-screw axles from a 2 x 4, and assemble the parts with wood screws and stove bolts. Paint the dashboard before bending it.

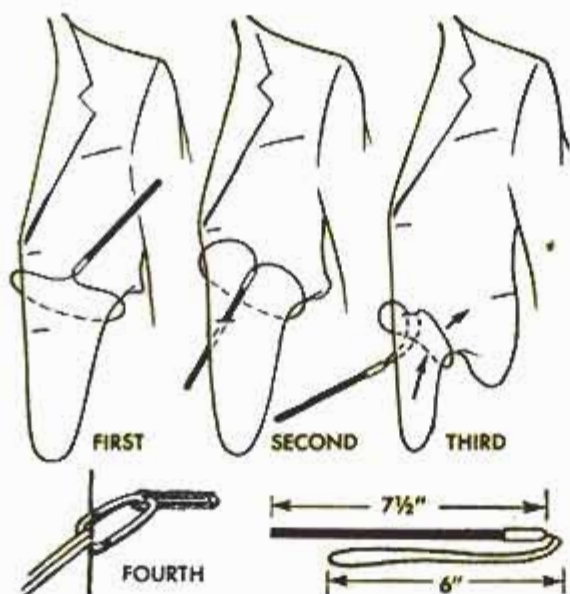
2-in. pine for the framing and wider boards for top and bottom. The ends are 3/8-in. plywood with the rear gate hinged at the top and latched at the bottom with a slide bolt. Drill 1/16-in. holes in the framing for the dowel bars, being sure the top and bottom holes are in alignment. The decorative pieces can be cut from plywood or hardboard and painted bright colors. Change the dimensions where necessary to fit the wagon on which the cage is to be used.

The "wild animal" cage is made of 3/4 x

Hi Sibley, Nuevo, Calif.



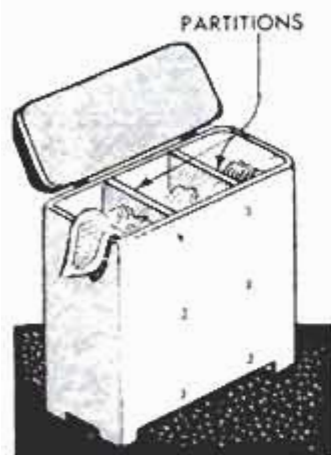
Looped Cord on Wand "Impossible" to Remove From Buttonhole



Dad can baffle the youngsters at their next party with this "magic wand and cord" stunt. Once the cord is looped through a suitcoat buttonhole, its removal becomes doubly mystifying when the discovery is made that the loop of cord is too small to permit the wand to pass through it. To loop the cord through the buttonhole, first roll the corner of the coat and pull it down through the loop until the wand is above the buttonhole. Second, pass the wand down through the button-

hole. Third, pull the rolled corner of the suitcoat back through the loop. The result is shown in the fourth detail. Reverse the procedure to remove the cord. The wand is a 1/4-in. dowel 7 1/2 in. long. The knotted ends of the cord are hidden in a metal or plastic pencil cap cemented to the end of the dowel.

Hamper Partitioned to Aid In Sorting Clothes



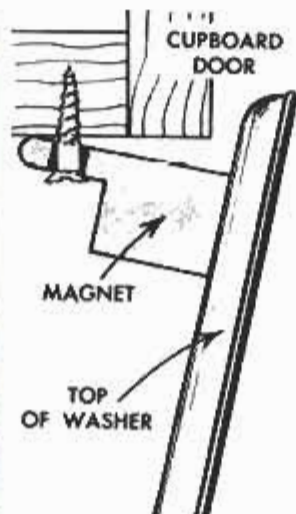
Partitioning the clothes hamper will enable the entire family to help segregate the weekly wash, lessening the task of clothes sorting on washday. Plywood paneling is cut to fit inside the hamper, dividing it into two or more sections. Wooden blocks are glued

to the panels flush with the vertical edges, and then the entire assembly glued inside the hamper. If screws are used to reinforce the blocks, countersink them and cover them with wood putty so they cannot rust and discolor the clothing. Label each section on the cover.—Doris Fenn, Chicago.

Card-Dealing Error Corrected

When the dealer in a friendly card game, where all the cards are distributed, forgets where the next card is to be dealt he may complete the deal satisfactorily without having to count the individual hands. Just resume dealing, starting with the first player originally dealt, and deal until the number of cards remaining is less than the number of players. Then starting with your own hand, deal the remainder counterclockwise, including the "kitty" if it is lacking. This method is especially useful when using several decks at the same time.

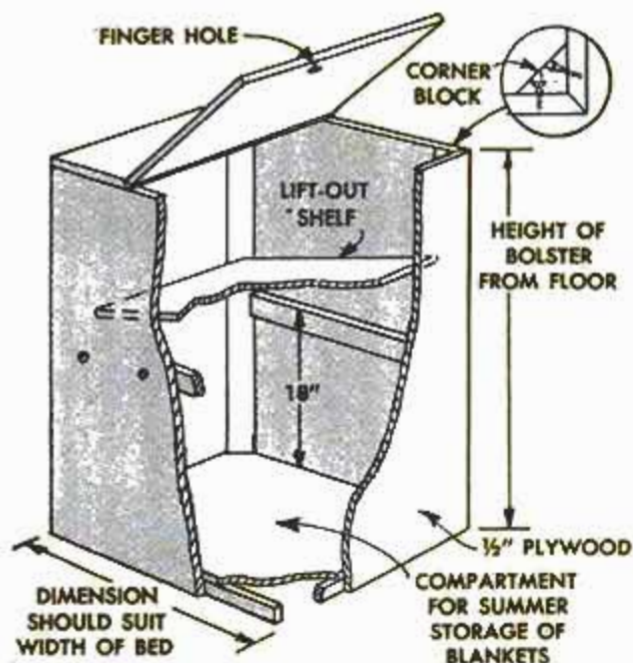
Jack T. Tomlinson, Berkeley, Calif.



Magnet Holds Cover on Automatic Washer Open

When an automatic washer must be placed under a wall cabinet where the cover cannot be opened fully, a magnet mounted on the bottom front edge of the cabinet will hold the cover open while loading or unloading the machine. A cheap bar magnet with holes provided for screws will do the job nicely. Leave the mounting screws a little loose so a flat side of the magnet can engage the cover.—Rex Eidson, Portland, Ore.

Corner Box Stores Blankets for Twin Beds

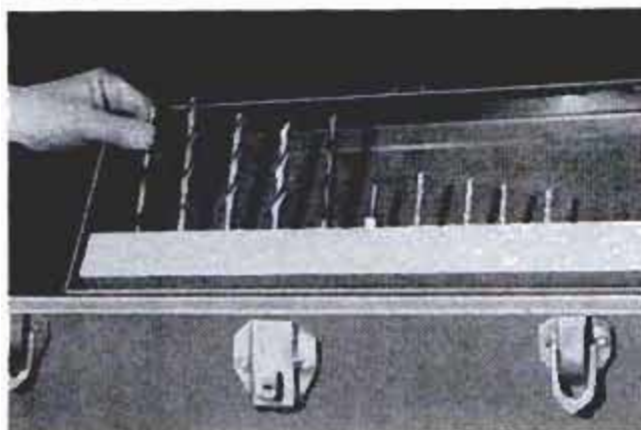


A square box built to fit in a corner formed by twin beds placed at right angles along adjacent walls can be used for summer storage of blankets. Height of the box should be equal to the distance from the floor to the top of the bolsters or pillows on the beds. Width of the beds determines the horizontal dimensions.

First assemble the four sides, which are cut from $\frac{1}{2}$ -in. plywood. Miter them together, reinforcing the corners with trian-

gular cleats, which are glued and screwed in place. Then nail strips to the inside along one edge to support the bottom panel. A second framework of strips is nailed to the inside 18 or more inches up from the bottom to support a removable shelf. This shelf is a snug fit inside the box and is removed by means of a finger hole. Make the top of the box in two pieces, with a wide panel hinged to a narrow strip which is nailed to the edge of the sides.

Toolbox Drill Holder

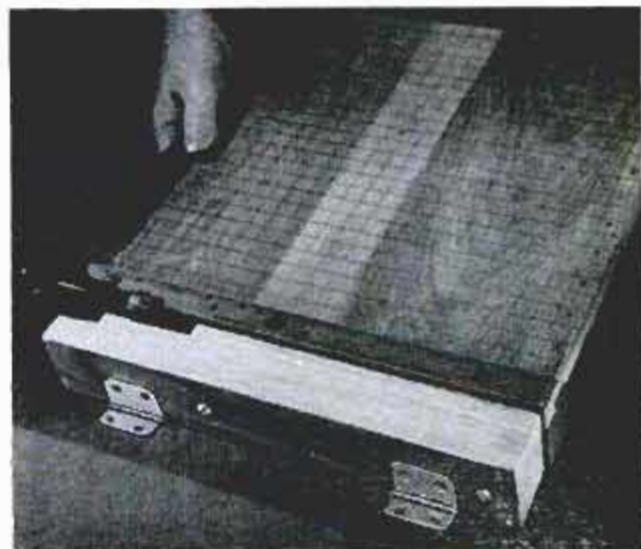


Drill bits scattered at random on the bottom of a toolbox waste time when making a selection of the desired size. To prevent this, fit all the drills in a length of wood fitted to the underside of the toolbox lid. The wood should be $1\frac{1}{4}$ x $1\frac{1}{4}$ in. with enough holes of the right sizes to accommodate the most frequently used drill bits. Make sure the drill holder is positioned properly so that the lid can be closed without any difficulty.

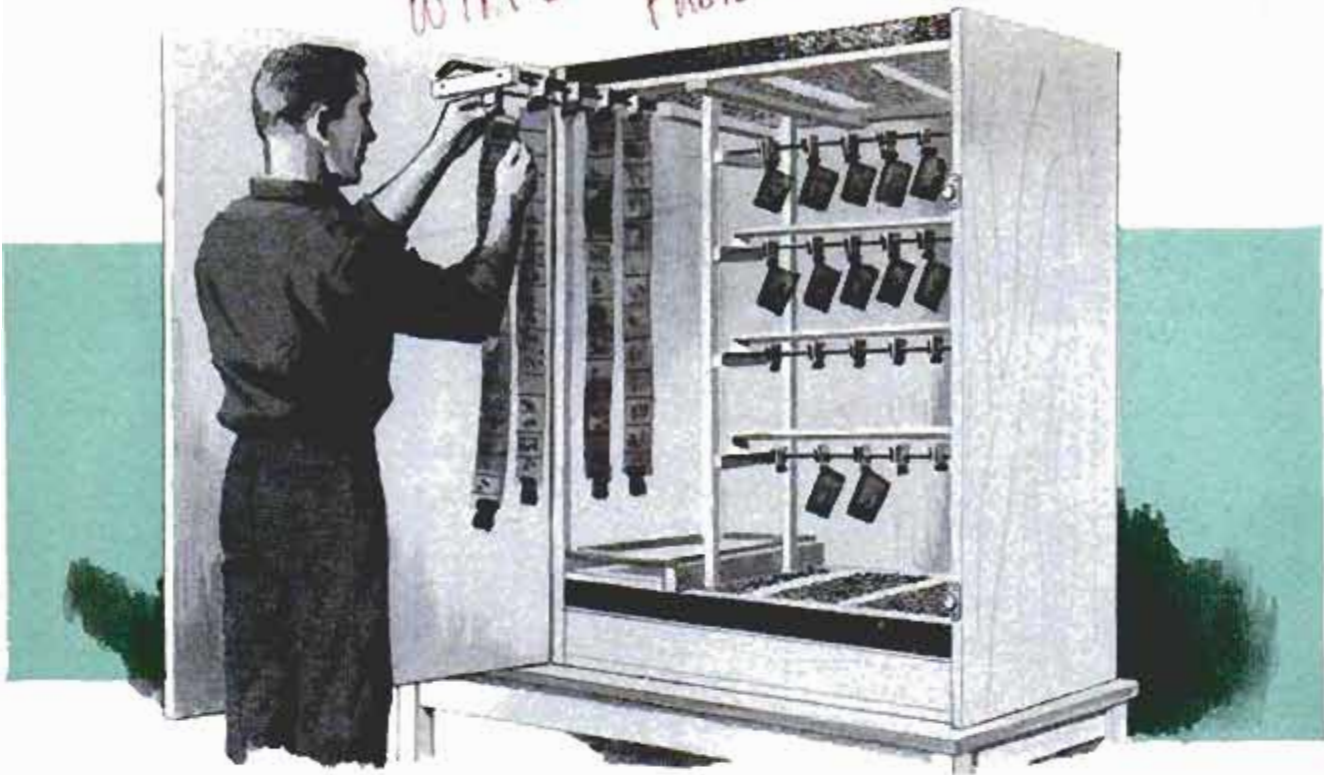
Glen F. Stillwell, Manhattan Beach, Calif.

Hinged Darkroom Paper Cutter

If more usable counter space is needed in a darkroom, hinge the paper cutter so it can be swung up against the wall. It will be necessary to screw a stepped block to the edge of the cutter board, as shown, to provide clearance for the pivot mechanism of the cutter knife. The hinges then are screwed to the block and to the counter top.



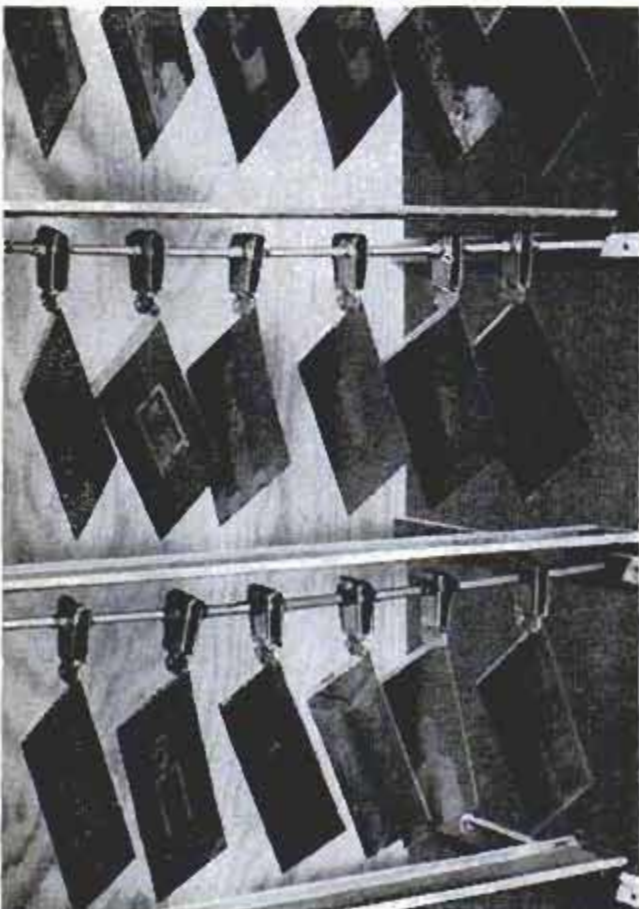
WIM 58 + PhotoKinks



Dry Your Films in Filtered Air

By Hartwell J. Kennard

Cut film is hung from dowels by means of film clips which are spaced apart and held with rubber bands

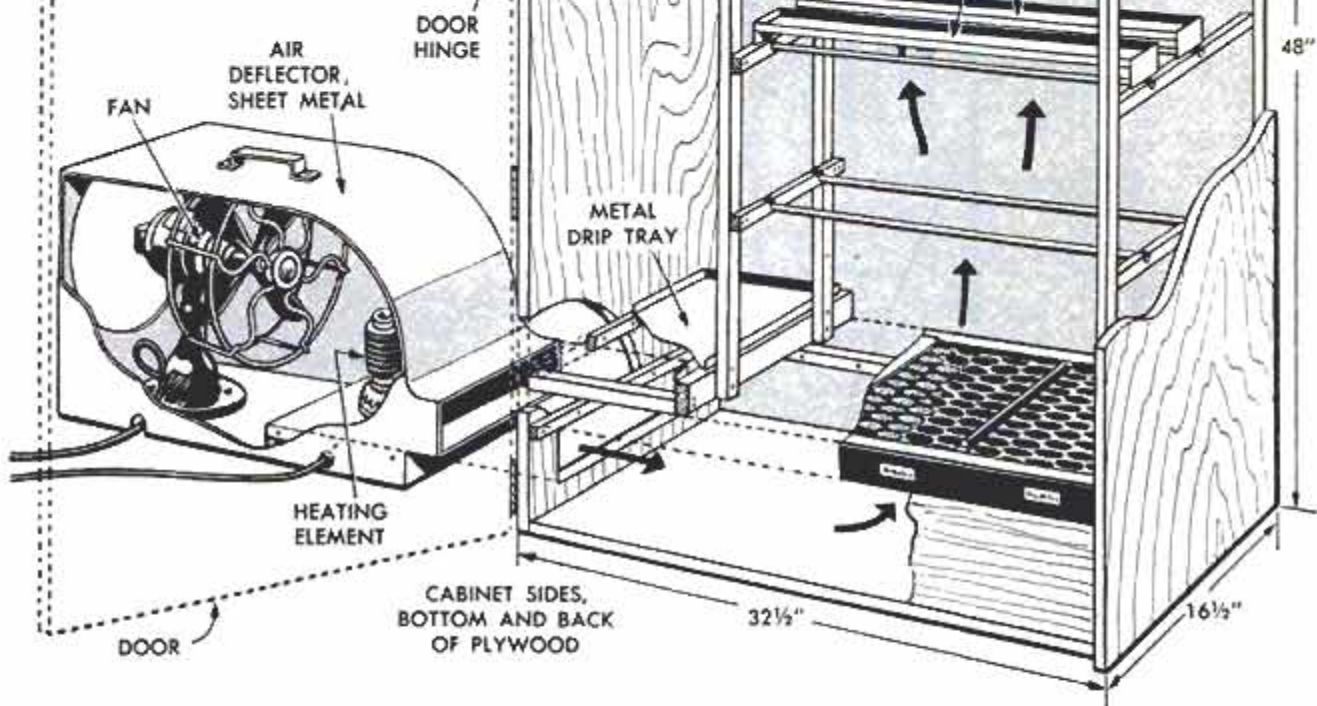
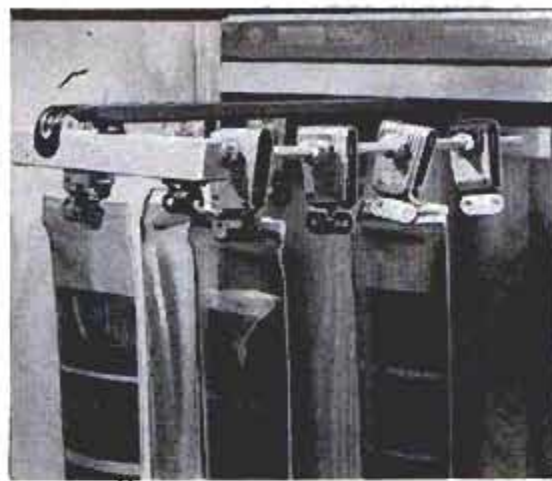


RAPID, UNIFORM DRYING of roll and cut film is possible with this cabinet through which warm air is forced by a fan enclosed in a sheet-metal housing at the base of the cabinet. Air passes over an electric heating element mounted in the fan housing, then through an opening in the side of the cabinet. Inside the cabinet, the air is filtered and moves to the top, drying the film as it rises. The air then escapes through another filter covering the top which is installed to keep dust from settling back into the cabinet. Using filtered air prevents dust from being drawn in through openings or leaks in the cabinet. Too-rapid air current should be avoided as it may pick up loose dust inside the cabinet and deposit it on the film. Periodic wiping of the interior with a damp cloth will minimize this problem.

Dimensions of the cabinet are based on the sizes and quantity of film to be dried. Those given in the illustration on the opposite page are for a cabinet which will accommodate 8 rolls of 120 or 620 film and 64 sheets of 4 x 5-in. cut film at the same time. Height is determined by the length of roll film to be dried while depth and width are based upon intended film capacity and adjusted to a specific size of air filter. Filters used are of the type designed for heating or air-conditioning installations. Insert filters correctly.

Start construction by making a box of $\frac{3}{4}$ -in. plywood to the over-all dimensions of the proposed cabinet. The top is left

AIR FILTER, 15" x 30 1/2", 2 REQD.



open for the exhaust filter, and the door on the front is not installed until the interior is completed. Nail a piece of 3/4-in. plywood about 5 in. wide between the sides at the bottom of the door opening to form a warm-air chamber. Then nail 3/4-in. square cleats to the sides and back panel, at the same height, on which to rest the lower filter. Cut a slot for warm-air intake in one side of the cabinet just below the cleat. Construct the sheet-metal housing which can be slipped down over a conventional circulating fan to direct the air from it into the slot in the cabinet. Mount one or two heating elements inside the housing in front of the fan to warm the air. A round hole of the same diameter as the fan blade is cut in the back of the housing through which air may be drawn by the fan.

Returning to the cabinet, nail a framework of cleats inside a few inches down from the top to support the exhaust filter. Fasten a cross piece between the front and rear cleats and suspend the vertical sup-

ports for the cut-film racks and drip trays as illustrated. Each rack is a length of dowel rod fitted with film clips spaced equally apart by means of rubber bands which are doubled around the rods on both sides of the clips. This system permits changing of the spacing for different sizes of cut film. Cut notches in the horizontal supports at each end of the racks to space the racks properly front to back. Drip trays are made from galvanized sheet metal and placed on the supports below each rack. Cut the ends of the trays extra long so that when they are soldered on they will extend down to form legs. Then the trays will not interfere with the removal of the racks. Since individual racks can be removed for loading, the cabinet door is only open for short periods of time allowing less dust to enter.

A pot-and-pan rack which pulls out for loading is used to hold roll film. Pot hooks are replaced with dowel rods which are fitted with film clips. ★ ★ ★

Lawn Furniture Easily Stored Between Joists of Garage Ceiling



Lawn furniture can be stored between the joists of the garage ceiling. Nail 2 x 4s edgewise to the underside of the joists and then nail a wood or panel ceiling up against these. The resulting space is deep enough to accommodate the furniture which is bulky in size but light in weight. Similar pockets can be formed by nailing boards to the roof rafters.

Improved Steam-Pipe Deflectors Direct Heat Into Basement



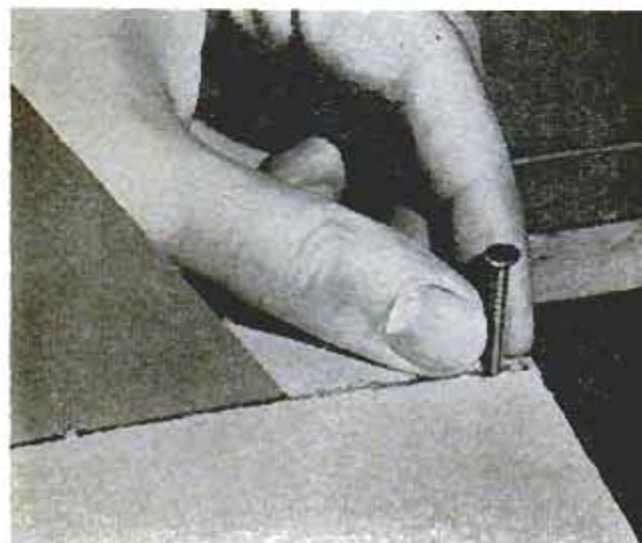
Lengths of aluminum ridge roll placed over hot water or steam pipes direct heat from the pipes into the basement shop or recreation room. The insulation is first re-

moved from the heating pipes in the area to be heated, and the deflectors are then placed over the pipes as indicated. When the heating season is over, the deflectors may be removed and stored.

O. H. Hampsch, Oak Park, Ill.

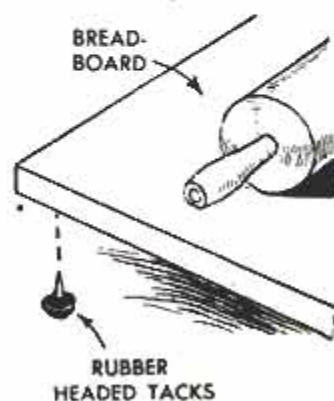
Nail Driven Into Saw Kerf Relieves Saw Binding

If a saw binds when cutting heavy stock, or wet or green lumber, push a nail into the saw kerf to relieve the binding. As the cut progresses, either drive in more nails closer to the saw, or drive a larger-size nail into the end of the cut.



Rubber-Headed Tacks Keep Breadboard From Skidding

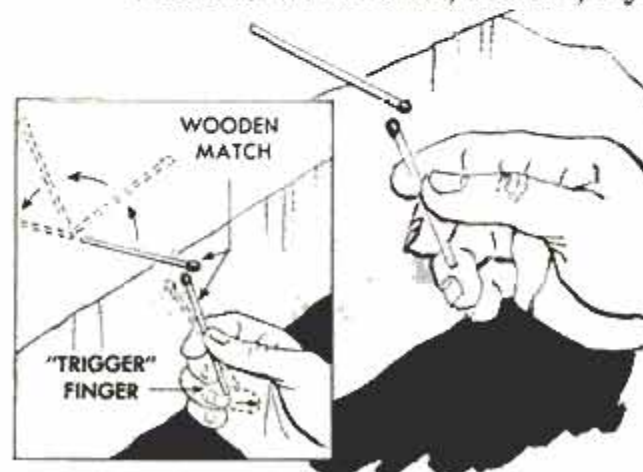
Drive a rubber-headed tack under each corner of a breadboard to keep it from skidding when rolling out dough. The rubber also helps cushion the noise created by the rolling pin. — Victor H. Lamoy, Upper Jay, N. Y.



Mysterious Jumping-Match Trick

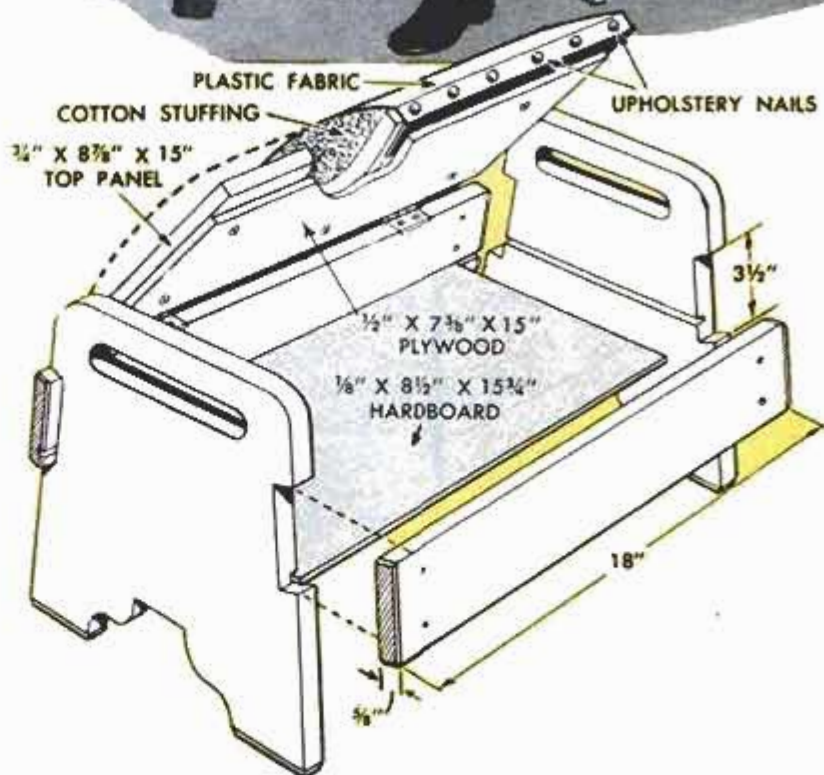
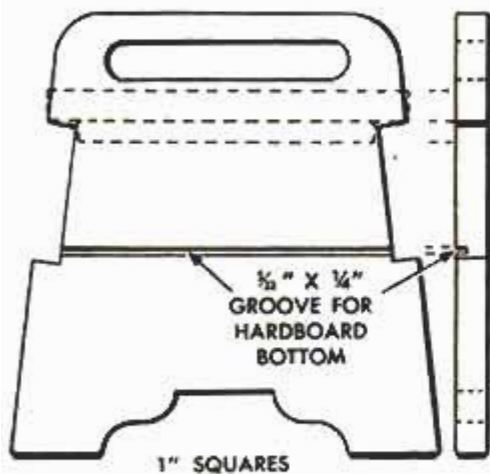
Amaze your audience of friends with the startling and puzzling behavior of a jumping match explained as a mystery of static electricity. Accompany your demonstration with "small talk," explaining that a charge of static electricity can be built up in the match head by rubbing a wooden matchstick through your hair, or against your clothing. Place a second match on a table so that it projects over the edge, and move the "charged" match up to it slowly, with your palm away from the viewers. As the two heads nearly touch, flick the lower end of the match with your "trigger" finger (third finger) so the match rises slightly and flicks the one on the table. Practice it well before demonstrating so that you can cause the reaction with the least amount of motion.

Leonard W. Mitchell, Marion, Ky.



Footstool-Chest

In two or three evenings you can make this comfortable footstool with a compartment for storage of pipes, tobacco and a book or two. The ends and side rails are cut from birch plywood. Plastic fabric, stretched over a thick layer of cotton stuffing and tacked along the edges of the fir-plywood top panel as shown, affords a soft and durable surface on which to rest tired feet. A second fir-plywood panel screwed to the underside of the top panel covers the exposed edges of the plastic. After sanding, apply the desired finish.—Dick Hutchinson, San Gabriel, Calif.



Waxed Folding Rule Protected From Dust and Wear

A wooden folding rule will last longer and be easier to read if it is given a coat of paste wax and then polished. The wax lubricates the joints and provides a slick surface on the rule, which rejects dust and grime. Apply the wax with a clean cloth and be sure that it is worked well into the joints.

Hose Is Round-Work Sanding Block

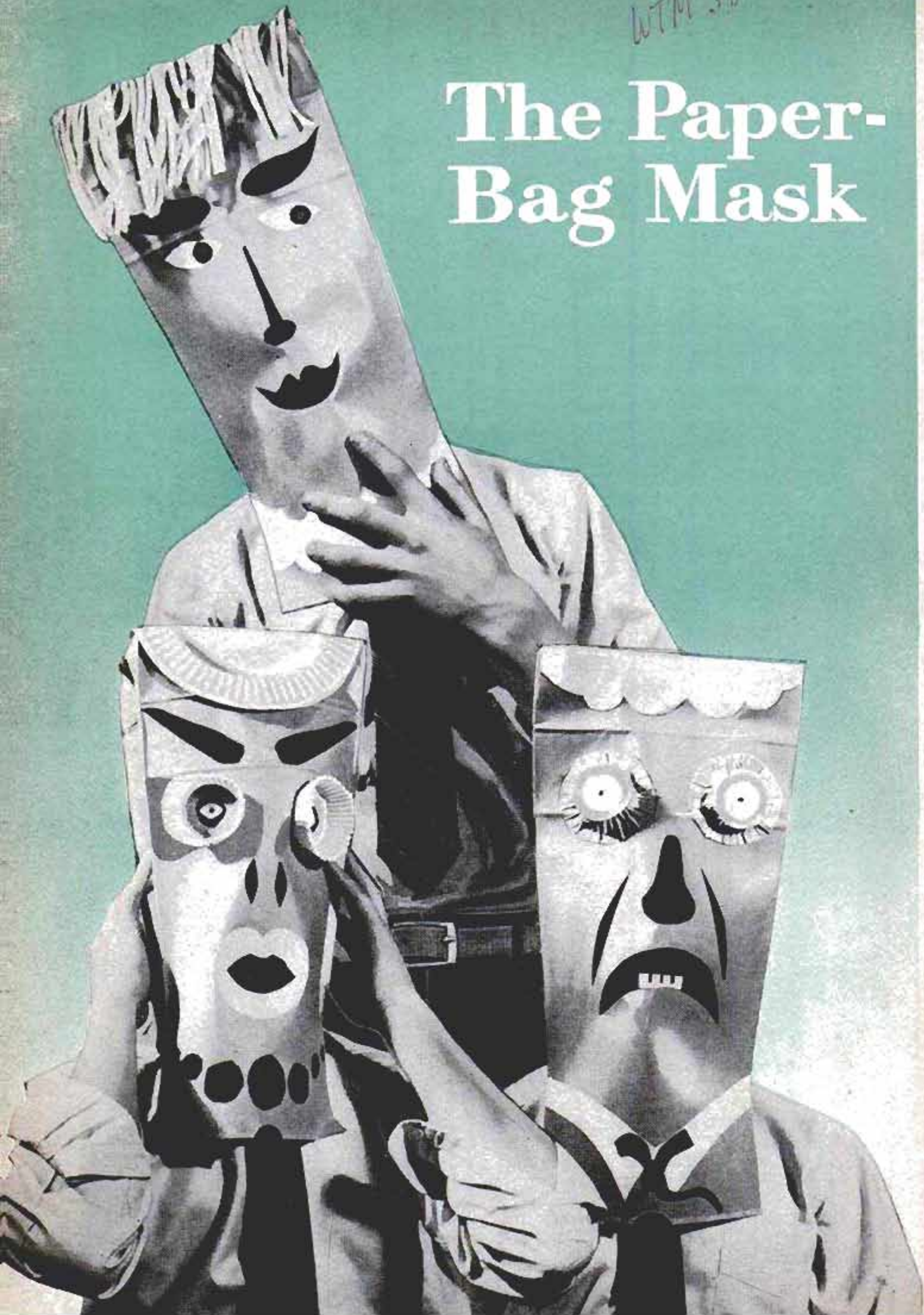
To sand small-diameter round work, slit a short length of garden hose lengthwise and fit a piece of sandpaper inside the hose with the abrasive side in towards the center. For larger-diameter round work, line a short piece of a stiff cardboard mailing tube. Cut the sandpaper large enough so that the edges extend out through the slot to prevent it from snagging on the work.

P. Casperson, El Cajon, Calif.



WTM 55

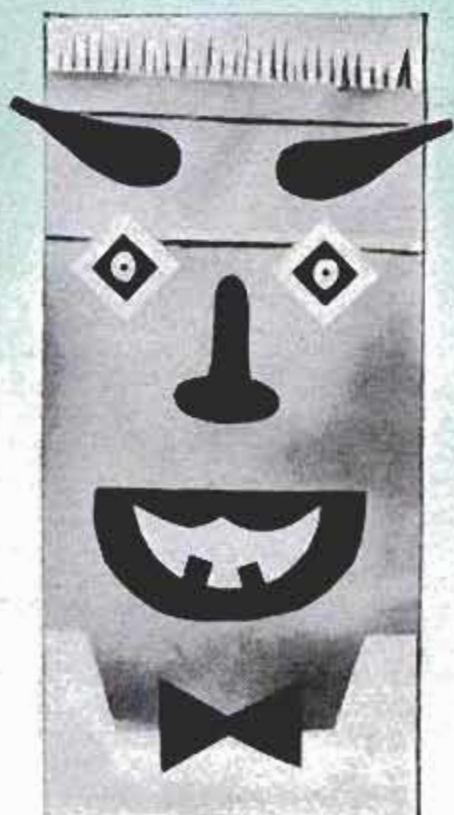
The Paper-Bag Mask



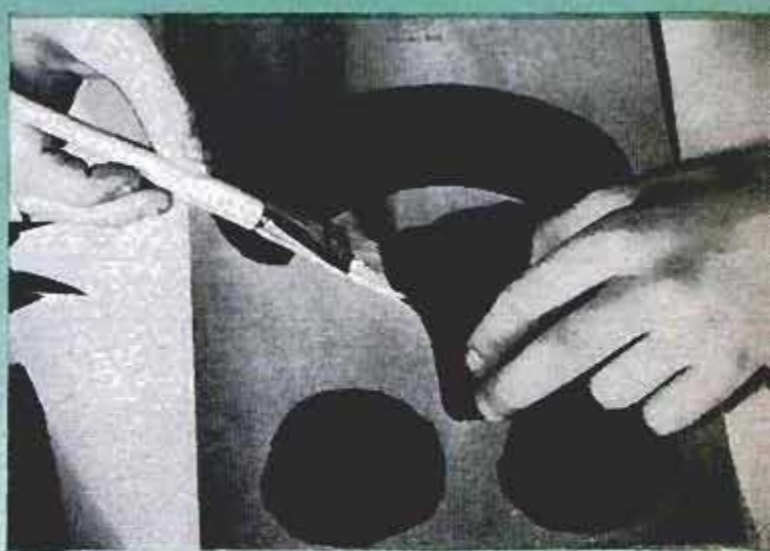


Exaggerated features, such as these eyes, are most effective on paper-bag masks. Hair is strip of paper cut or notched to complement face on mask

MASKS FOR HALLOWEEN or children's parties and other occasions are inexpensive and fun to make when paper bags are decorated similarly to the ones shown on these pages and given to the guests. With only paper bags of an appropriate size, some colored paper, a pair of scissors and a little glue, you can exercise your inventiveness and make masks that will be a source of a lot of laughs. Also, water colors and crayons can be used very effectively on the masks for a variety of grotesque facial features and humorous expressions. Remember to leave holes for the eyes and a hole or two in the top for ventilation. The rest is up to you. Cut and paste as your imagination dictates. ★ ★ ★



Above, standard grocery bag large enough to slip over head is folded flat and, below, eyes, mouth and nose cut from colored paper are glued in place



Below, after whites of eyes are glued in position, cut small hole in each at eye level. Left, large eyebrows, peculiar eyes, other abnormal facial features lend individualistic appearance to mask



Panel of Wood or Plate Glass Carried in Rope Sling



A large sheet of plywood or glass can be carried easily with the aid of a rope sling looped around the lower corners as shown. When a fairly heavy sheet of glass is to be carried, slip pieces of cloth in between the rope and the edges of the glass to keep it from cutting the rope. Be sure both ends of the rope are knotted together securely before using it as a sling.

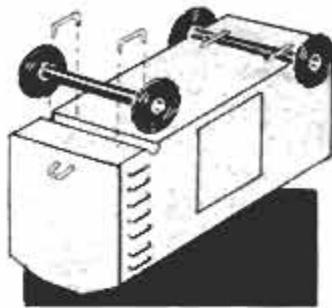
Improvised Lock Washer

When a regular lock washer is not available, an ordinary flat metal washer can be substituted if it first is bent slightly across the middle. When the washer is drawn up tight, the arc provides tension that holds the nut in place and prevents it from turning.



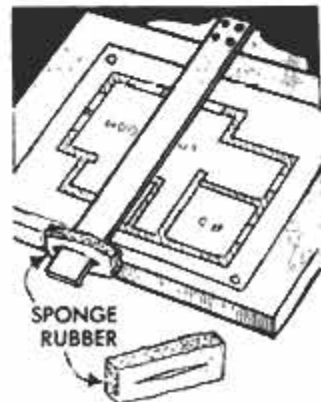
Film-Spool Wheels for Toys

When wooden blocks are employed to construct toy trains, attachment of wheels and axles can be simplified by using film spools fitted into slots cut in the bottom of the blocks. The slots must be wide and deep enough to permit free turning of the axles. Staples driven across the slots after installation of the axles will hold them in place. Sharp edges on the flanges of the spools should be filed smooth.



Friction Clamp Holds T-Square In Position on Board

Accidental slipping of a T-square, when ruling spaced lines, can be prevented by slitting a piece of sponge rubber and slipping it over the blade of the square and against the edge of the drawing board. The friction provided will steady the T-square and yet permit easy movement when necessary. A bath sponge or a section cut from a sponge-rubber kneeling pad will do the trick.



Glue Sizing for Wood Joints

Furniture and picture-frame joints can be made more secure with an application of glue sizing on the surfaces to be joined before actually gluing them together. This practice is especially useful for joints where considerable end grain appears, as the sizing seals the pores against penetration by the glue used in joining the members. The sizing is made from the same glue used in fastening the pieces together but is diluted to a thin solution. Any excess remaining on the surfaces should be removed to permit an open joint.

Glue sizing may also prove useful in treating end-grain paneling, especially plywood. Applied to the bare wood, it limits penetration by the finishing material, creating less contrast between end-grain and cross-grain surfaces. Some finishes, however, will not adhere to glue sizing.

Walter E. Burton, Akron, Ohio.

use your camera AS A TELESCOPE

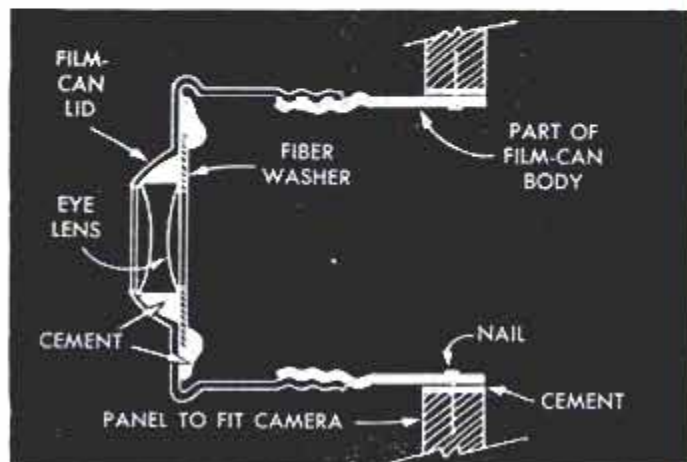
By Walter E. Burton

MAKE YOUR PRESS-TYPE CAMERA double as a telescope simply by replacing the ground glass with an eyepiece assembly mounted on a square of hardboard or plywood of the same dimensions. The lens in the camera serves as an objective lens and a double concave lens (eye lens) is used for the eyepiece lens which magnifies the image of an object produced at the focal plane, like a Galilean-type telescope.

In addition to giving clear, magnified images of distant objects, the telescope can be used to observe insect and small-animal life without distracting them.

To make the conversion, first remove the ground glass at the back of the camera and use it as a pattern to cut the panel on which the eyepiece is mounted. The eyepiece lens shown is a double concave lens with a -37 -mm. focal length and 13-mm. dia. and was used with a 9 x 12-cm. Linhof camera. All parts for the eyepiece are cut from an aluminum film-cartridge can, assembled with glue, and mounted on the panel as shown. Blacken the exposed side of the fiber washer before cementing it on the lens to reduce reflection. This arrangement is designed for use with a camera lens of 203-mm. (8-in.) focal length. Mount the eyepiece in alignment with the axis of the camera's lens.

The most satisfactory magnification obtainable with this telescope is between 3 and 4 power. Always keep the aperture setting at maximum opening when using the camera for this purpose. The diameter of the field of view depends upon the diameter of the camera's lens; and it becomes less at higher magnifications. The camera-focusing knob is used to focus the telescope.



Acoustical Tile and Wooden Pegs Provide Hours of Fun



An inexpensive perforated acoustical tile plus a handful of wooden pegs will keep a youngster occupied for a long period of time. The tile is one of a type applied to ceilings for soundproofing, and the pegs are cut from dowel rods and painted. Golf tees may also be used as pegs. Various patterns and games can be devised for placing the pegs in the holes of the tile.

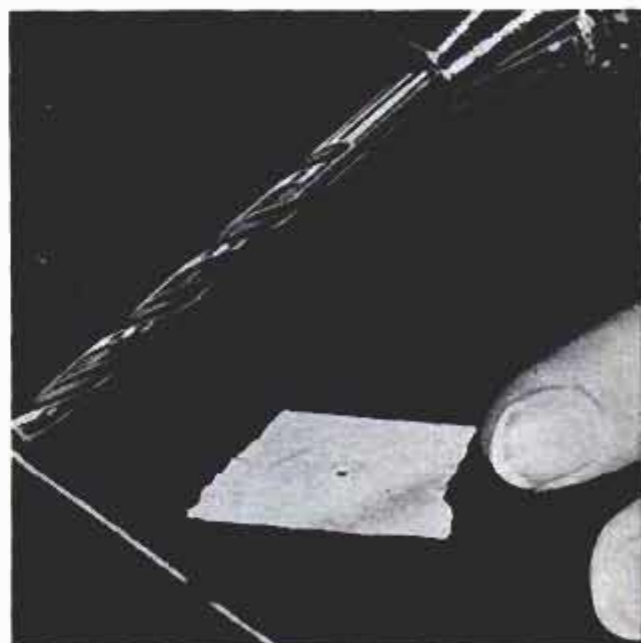
Victor H. Lamoy, Upper Jay, N. Y.

Invisible Writing on Paper

An invisible message can be written on a sheet of white paper by first soaking it in water and placing it on a sheet of glass. Cover the wet paper with a piece of dry paper and write a message on the latter, pressing firmly enough so that the impressions go through onto the wet sheet. When the writing is completed, remove the dry sheet. All traces of writing will disappear when the wet sheet has dried, but will reappear when the sheet again is soaked in water.

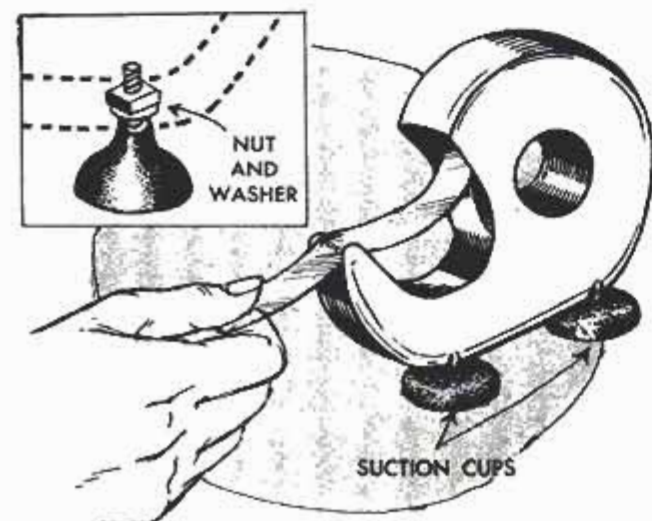
Tape Skidproofs Drill Point

When drilling a polished wood or metal surface the drill point will sometimes skid out of the punch mark and scrape or mar the finish. This can be prevented from happening by placing a piece of masking tape (right) at the desired point and making the punch mark on it.



Keeping Electric Plug in Receptacle

When the contacts of a much-used wall receptacle become worn and will not hold a plug firmly, insert a short piece of wire solder in the hole in each prong of the plug. Crush these with a pair of pliers to form small lead rivets. The extra thickness supplied by the rivets will permit the receptacle contacts to grip the plug prongs firmly.

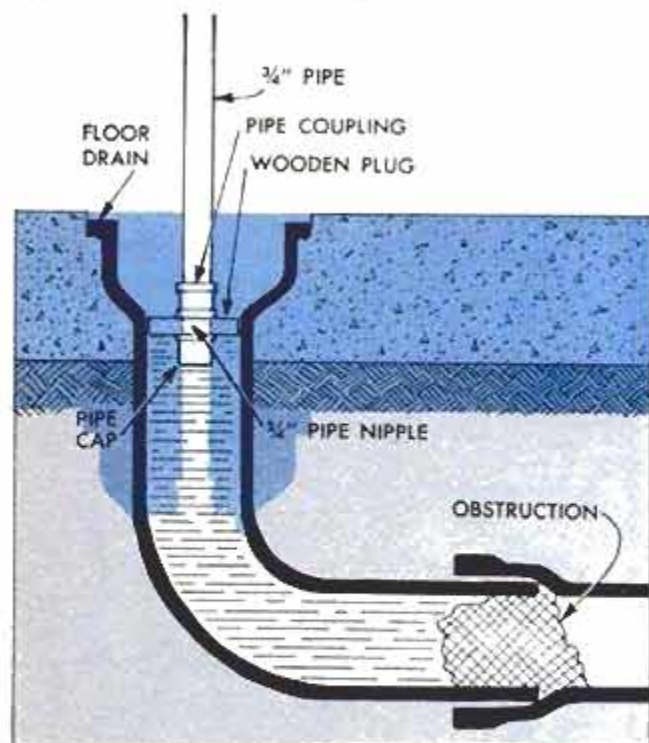


Vacuum Cups on Tape Dispenser Permit One-Hand Operation

Attach two rubber suction cups to the bottom of a plastic, pocket-size cellulose-tape dispenser and it becomes a stationary unit that can be used with one hand. Drill or burn two holes in the bottom of one half of the dispenser and attach the suction cups with nuts and washers as shown. Cut the threaded shafts flush with the top of the nuts so they do not interfere with the tape. Lightweight and portable, compared to cast-iron types, the modified dispenser will adhere to any smooth surface, whether vertical or horizontal.

Andrew Vena, Philadelphia, Pa.

Special Force Cup Clears Obstructions From Floor Drains



Surface drains in floors, driveways and sidewalk areaways can be quickly cleared of obstructions with this homemade plumber's "force cup." It consists of a 3 or 4-ft. length of 3/4-in. pipe and a wooden disk which is held to the lower end of the pipe by means of a pipe coupling, short nipple and cap. The wooden disk is a sliding fit inside the drain. Rounding the edges of the disk will help insert it. A length of beaded

weather stripping, or a piece of inner tube, tacked around the bottom edge of the disk acts as a seal for more efficient use of the tool. To clear a drain, first be sure it is full of water, then insert the tool, forcing it quickly down as far as it will go. Repeated up and down motion will force the water in the drain down against the obstruction to push it free. Be careful that the wooden "piston" doesn't become jammed in the drain.

Liquid-Soap Dispenser



Flexible plastic dispensers used commercially for condiments are ideal as home dispensers for liquid soaps, shampoos and other fluids. They can be purchased empty from hardware stores and may be mounted over sinks with steel strapping.

Melting Stick Shellac

By using a heated putty knife, stick shellac used as a wood filler can be cut more readily. After applying it to the work direct a narrow flame from a torch against the back of the putty knife to indirectly heat the shellac so it can be spread smoothly. Fill the depression slightly above the surface of the work to allow for shrinkage.

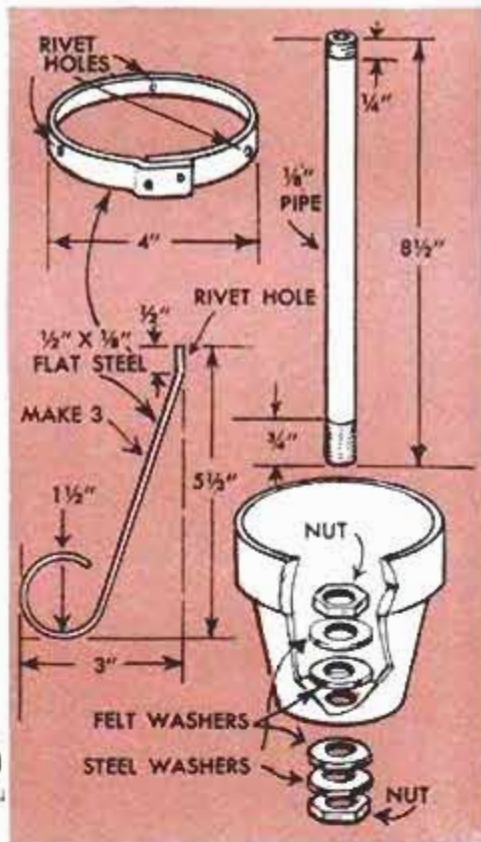
Arthur G. Patterson, Minneapolis, Minn.

Luminous Paint "Lights" Dead Fuse

Luminous paint applied to the edge of the mica or glass window of electric fuses will make it possible to find a blown fuse instantly, even in total darkness. The short burst of light from inside the fuse, when it "blows," is sufficient to activate the paint and make it glow so the defective fuse can be seen at a glance.



Flowerpot Lamp on Tripod Is Novel Planter



An interesting planter lamp can be made easily by mounting a pull-chain socket on a length of pipe fastened through the drain hole of a flowerpot set on a flat-steel tripod. Form the tripod legs by bending equal lengths of flat steel around a large iron shaft. Then rivet them to a steel ring that is dimensioned to fit under the rim of the flowerpot. Fasten a length of 1/8-in. pipe, threaded at both ends, in the drain hole of the pot and screw a pull-chain socket on the other end of the pipe. Wire the socket by running the cord up through the pipe. Add a plant and clip a shade over the bulb. Herbert Y. Moon, Orient, N. Y.

Tape Protects Bottle Labels

Transparent cellulose tape is ideal for protecting bottle labels and is less messy to apply than liquid protectors. For wide labels that cannot be covered with a single strip of tape, several strips are applied, each one slightly overlapping the preceding one as pictured below.



More Power to You

If you own a prewar home, chances are its wiring system doesn't have the power and circuits it should to safely operate modern-day appliances. A two-part story next month explains how your new or old home should be wired for more power

Photoflood Clamp "Slipproofed" With Coat of Rosin

The rubber covering on the jaws of a photoflood clamp will become glazed in time and allow the clamp to slip. This will not happen if the clamp jaws are coated with a mixture of a little rosin dissolved in turpentine. The liquid will dry quickly, leaving a nonslipping rosin coating.



NINE USES FOR EYEBOLTS

By Russell J. Love

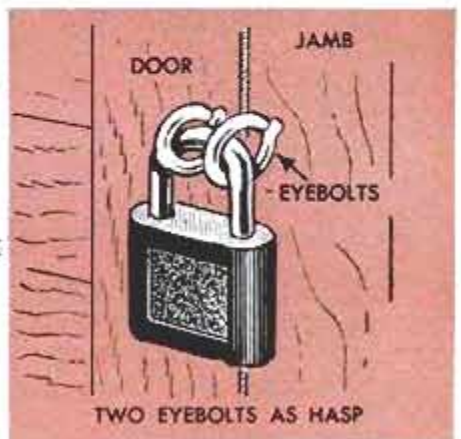
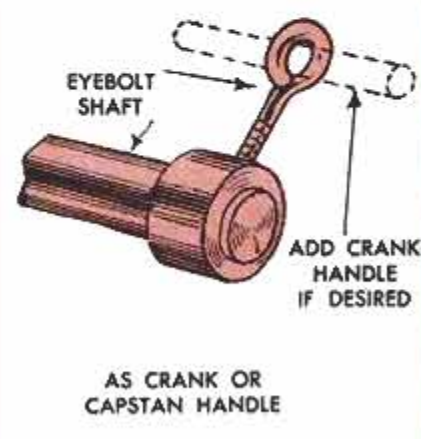
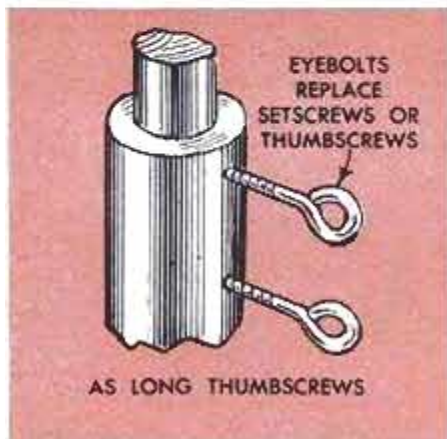
OFTEN CONSIDERED only as fixtures to receive screen-door hooks or for stringing clotheslines, eyebolts actually have many other practical uses. The nine uses shown below very likely will suggest further ap-

plications. One might be to use eyebolts to replace screw eyes or screw hooks that have pulled loose in a wooden surface and cannot be retightened because the holes have become oversized.

Eyebolts used as thumbscrews permit using rod in eye to provide greater leverage for tightening such things as adjustable units on power tools

Make crank for turning shaft by fitting eyebolt in tapped hole in collar so it forms both setscrew and crank arm

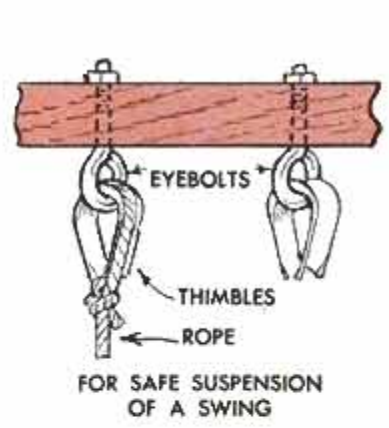
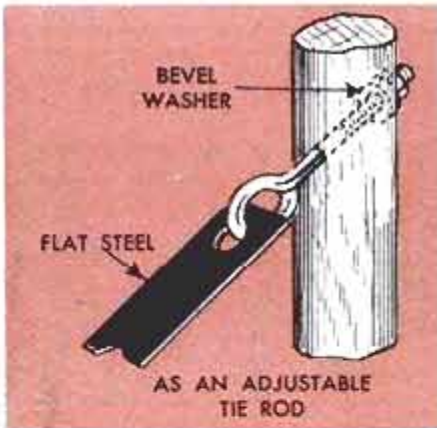
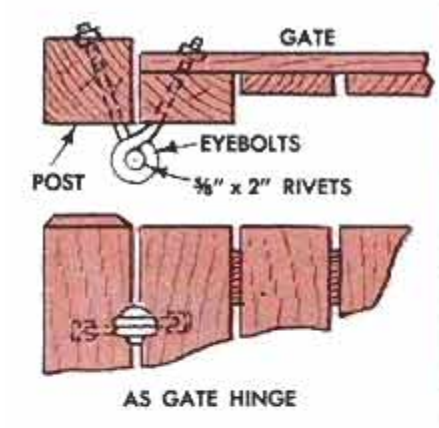
Two eyebolts can be used to provide a strong padlock hasp. One eyebolt is fitted through door or gate, the other through doorjamb or gatepost



Inexpensive substitutes for pin-and-strap hinges are made with eyebolts as shown. Bolts or rivets can be used as hinge pins

Adjustable tie rod for controlling tension of guy wire or brace consists of eyebolt at one or both ends of length of flat steel or chain

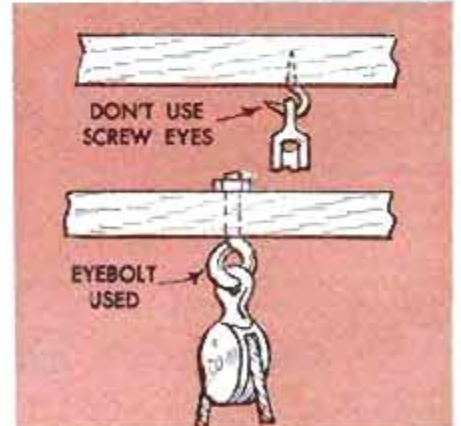
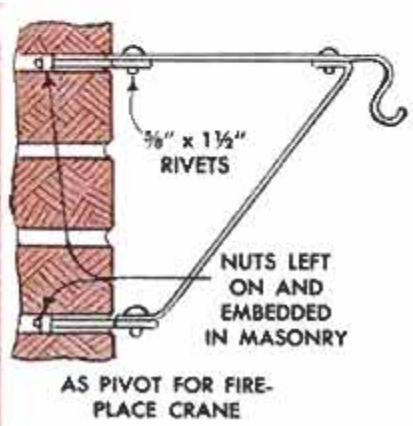
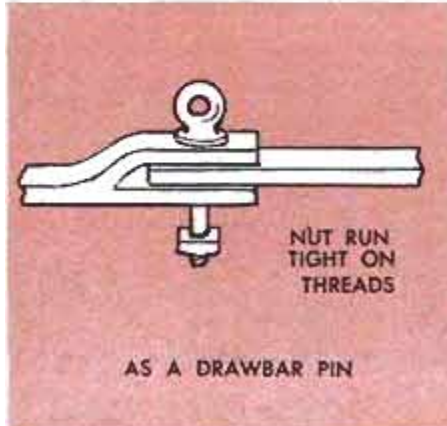
Safe suspension of a youngster's swing is assured by fitting ropes with thimbles and pivoting them in eyebolts in cross piece



Shouldered eyebolt is ideal ready-made drawbar pin. Nut can be turned tightly on threads to prevent pin from bouncing out of hole in drawbar

Nuts embedded in mortar hold eyebolts to provide crane pivots and also permit removing eyebolts if desired

Eyebolt is safer support for hoist or pulley than screw eye which may pull out. Eye of bolt is opened to receive hoist, then closed again



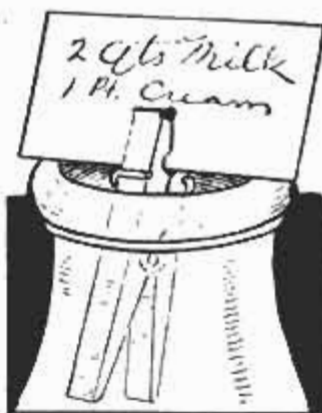
Darkroom Timer Set Without Light



Clipped to the adjusting knob of a darkroom timer clock, a spring-type clothespin permits a photographer to set the clock while working in total darkness. With the clock stopped, the clothespin is clipped on the knob so that it points to 12 o'clock. The photographer then knows that moving the clothespin right until it is horizontal will set the clock for 2½ min., straight down will give 5 min., and so on.

Clothespin Holds Milk Order

Using a card or folded strip of stiff paper, you can display a special order for your dairyman which will not be overlooked or blown away. Simply clip the note in a spring-type clothespin and insert the pin in the mouth of a bottle.



Ironing-Board Cover Fastened With Safety Pins and Cord

An ironing-board cover can be kept smooth and in place by using safety pins and a length of strong cord. Attach the pins to the edge of the cover and lace the cord through them similar to the method used in lacing shoes.



Popular Mechanics Bookshop

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58

POWER SHOP IN A CLOSET

With these folding tool cabinets you can operate your table-top power shop in a minimum of space

LACK OF SPACE in which to arrange individual machines for safe and efficient operation is a major problem in setting up a home shop, especially in basementless homes and apartments. If, for example, you begin with only three basic machines such as a small circular saw, jointer and drill press, there must always be a clear area in front of each machine sufficient to permit the operator freedom of movement in handling stock from 3 to 6 ft. in length. If you add these three separate areas you have a considerable total-space requirement. Later on, if you acquire a lathe, shaper and bandsaw or jigsaw, the requirement is practically doubled. As a rule, such shop plans can be carried out only in a full-size basement, the attic or an addition to the garage. Aside from the basic space requirements the cost of such a shop plan may be prohibitive.

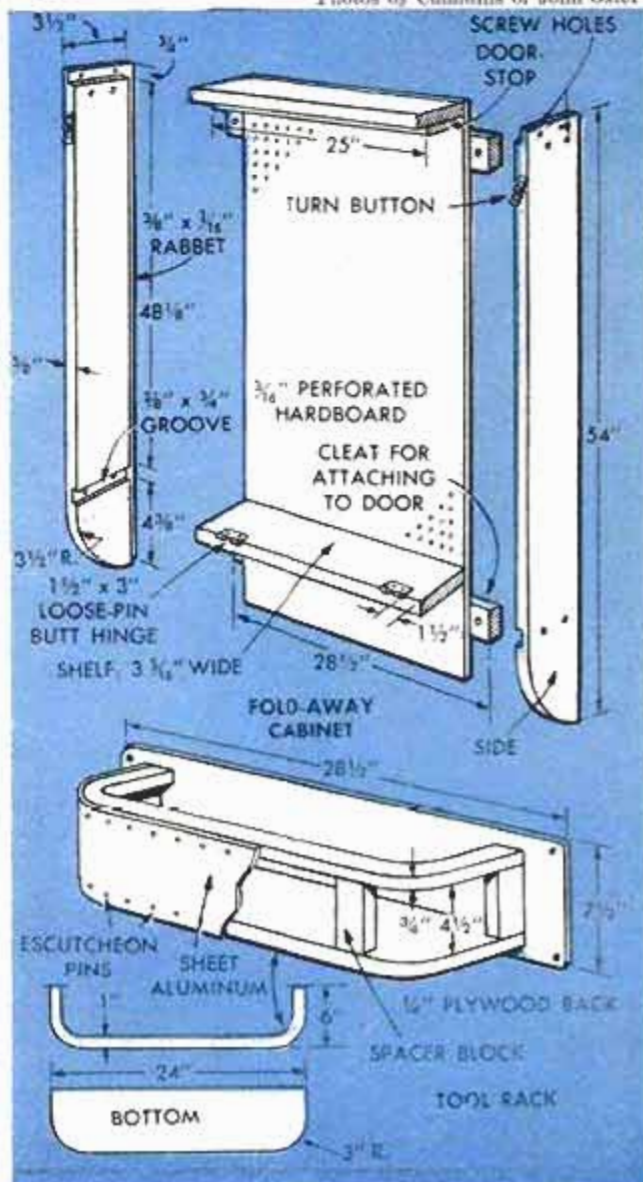
In apartments and some small homes shop space may reduce to closet size and the available work area in front of the closet to little more than the space required for swinging the door fully open. However, there are combination machines, such as the unit made by Cummins of John Oster, which can be fully utilized in a restricted space. These one-motor units are portable, will work on any ordinary table top, and provide circular saw, lathe, vertical and horizontal drill, and with accessories can be converted into a grinder, disk sander, drum sander and shaper.

The photo above and those on the following two pages picture a storage cabinet that fits on the back of a closet door. When lowered, the unit provides a hinged table top in which the power shop is placed for use. When combined with the individual cabinet, which is fitted with a large drawer, you have a separate bench. When not in use, hand tools, accessories and the power shop are stored in the closet. The fold-away cabinet is detailed at the right. It consists of a perforated-hardboard panel, two side pieces, a shelf, top piece and two cleats for attaching to the closet door. A tool rack for miscellaneous hand tools and accessories is



X506

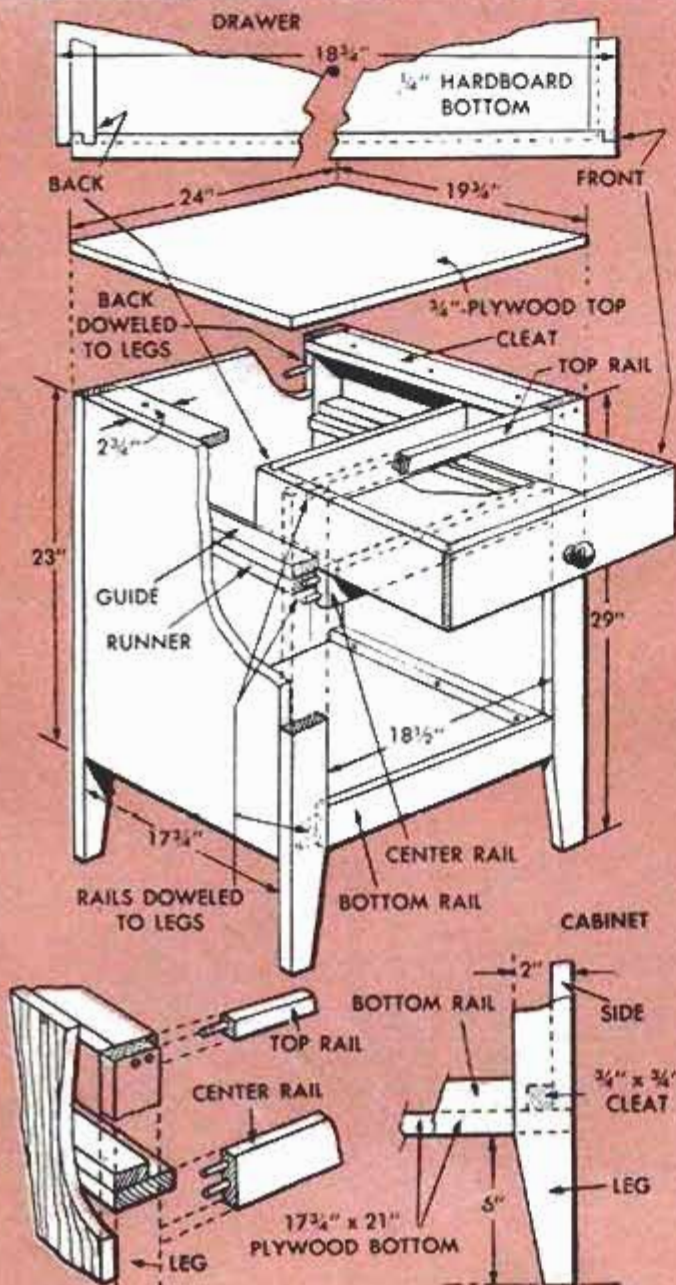
Photos by Cummins of John Oster





Photos by Cummins of John Oster

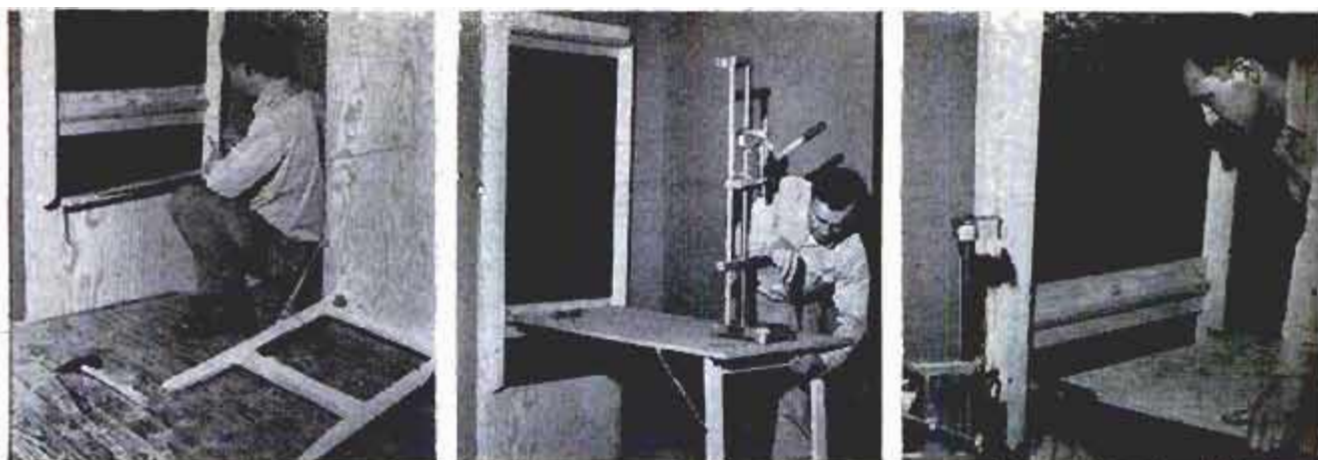
View above pictures the folding table in the down position with power shop in place. At left, table on separate cabinet forming a portable workbench



an optional feature. It is made with rounded corners and is attached to the closet door under the fold-away cabinet. Hand tools most used are arranged on hangers and racks which are especially made for use with perforated-hardboard tool panels.

As detailed, the fold-away cabinet fits a 30-in. door with plenty of room for clearance all around. If fitted to doors of other widths it will be necessary to alter the dimensions of the unit. Usually it's best to begin by building the fold-away, or hanging, cabinet first and attaching it to the door. Then make and fit the hinged table top and you have a place to set up the power shop for use in building the separate cabinet. Note in the detail of the hanging cabinet that a strip is attached to the underside of the top piece. This strip serves as a stop for the folding table when in the raised position. It should be located only after the table top is hinged in place. Note also that the thickness of the side pieces is given as $\frac{3}{8}$ in. This thickness is suitable only if you use hardwood. If pine or other softwood is used the side pieces should be cut from $\frac{3}{4}$ -in. stock. The total height of the table is about $29\frac{3}{4}$ in. Some operators will prefer a table top somewhat higher, especially when using the power shop as a lathe. These changes should be made as the unit is built.

If you desire a higher table top, one way of hinging so that it will close into the



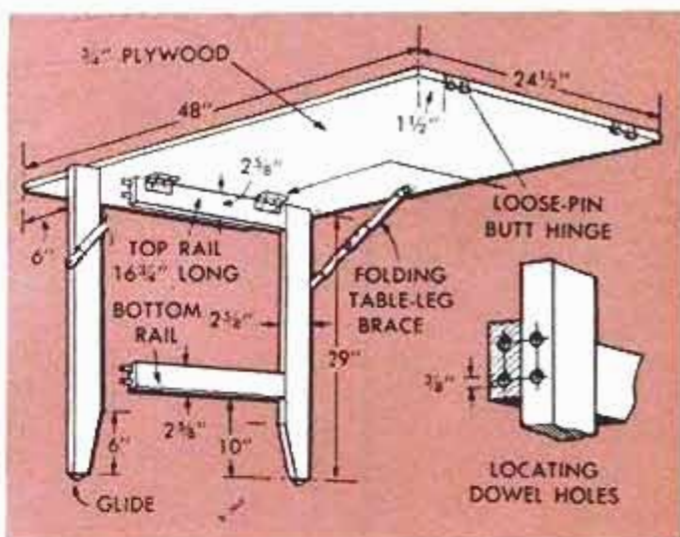
Photos by Cummins of John Oster

In some cases it is necessary to hinge the table top permanently. Photo at left shows fold-away cabinet with narrow shelf to which inner end of table is hinged with flat-iron links as in right-hand photo

same space is pictured in the three upper photos on this page. Here the lower shelf of the fold-away cabinet is replaced by a strip about 1½ to 2 in. wide, photo at the left. The hinges are simply ⅛ by ¾-in. flat-iron links, 4 to 6 in. long and drilled near each end for No. 8 screws. One end of each link is attached to the side pieces of the cabinet with a screw and a washer between the metal and wood. The other ends of the links are attached to the ends of a strip of hardwood screwed to the underside of the table top as in the right-hand photo. When the table top is lowered the inner end is raised and swung back on the links until it rests on the narrow shelf. If the links have been correctly located the table will lock in position and provide a rigid support for the power shop. To fold the top up, it is first lifted and swung outward, then raised to the vertical position. Of course, this method of hinging does not permit easy removal of the top as does the use of butt hinges with loose pins.

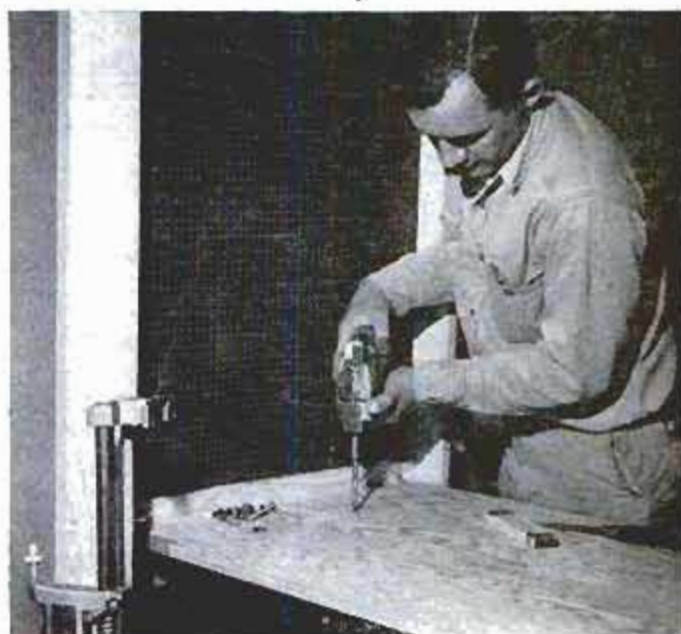
In the construction details of the cabinet, opposite page, the back and sides are of ¾-in. plywood. Legs are solid stock of the same thickness, preferably of hardwood. Rails are doweled to the front legs and both front and back legs are screwed to the side panels. The back panel is doweled to the back legs. However, it is possible to simplify and speed up construction somewhat by using a ¼-in. plywood back panel and attaching it to the back face of the legs with screws.

A tool cabinet should be given a good, durable finish for two reasons. A well-finished cabinet is a pleasure to work with because it is more attractive. It also is easier to keep clean. Fine dust from sanding and grinding operations will not stick to a properly finished surface. Before applying any finishing

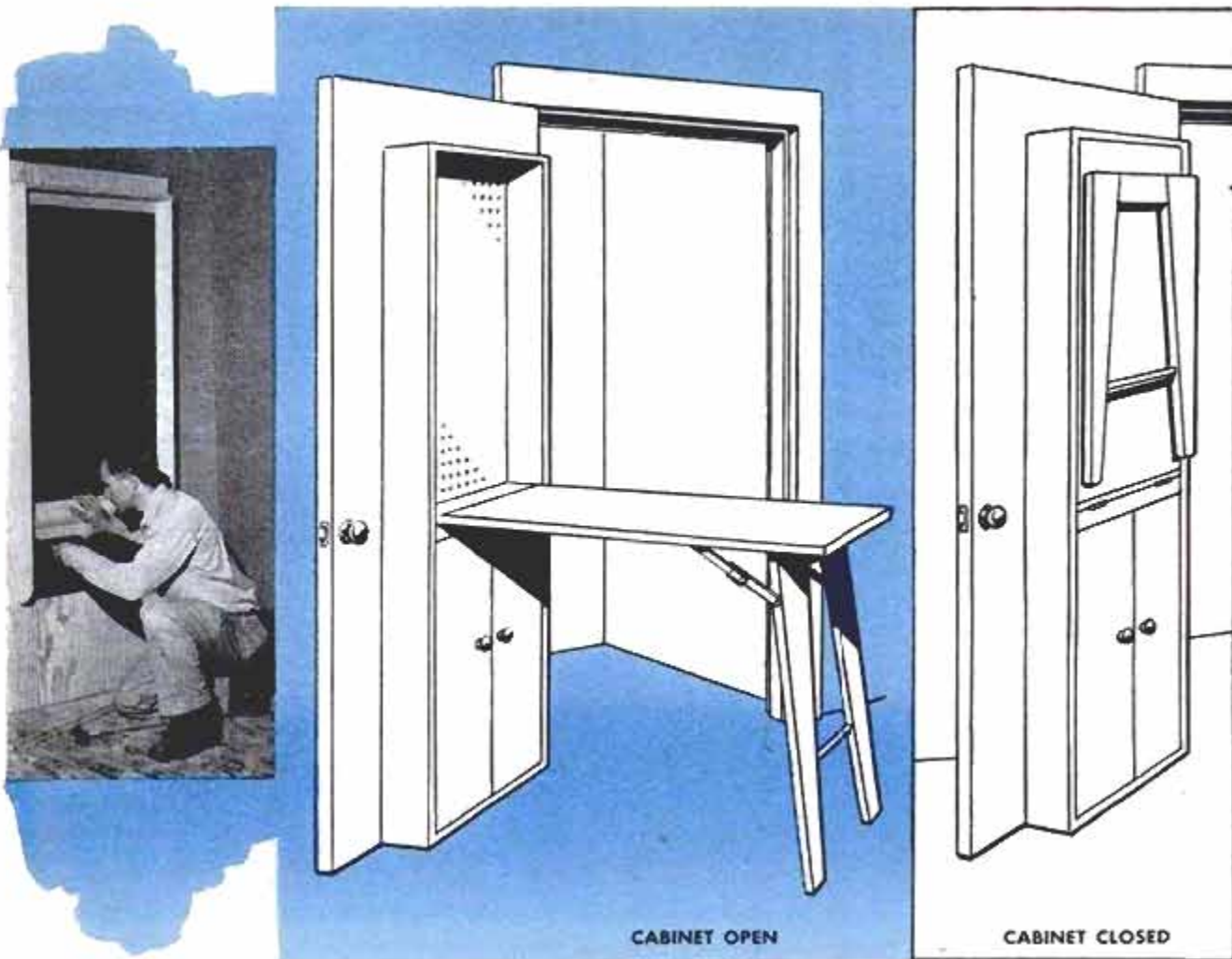


Outer end of table top is supported in the down position on folding legs held rigidly by leg braces. Table top also can be detached and one end supported on the portable cabinet to form a sturdy workbench

While not necessary, it often is desirable to fasten the power shop to the table top. By drilling holes in the table top slightly oversize for 1/4 or 5/16-in. bolts with wing nuts, the shop is easily removed or replaced



ALTERNATE DESIGN FITS DOOR OR WALL



This type cabinet for power shop is designed to be attached to door or wall either in the house or garage

material sand all exposed surfaces, using several grades of sandpaper from coarse to fine. Then, if fir plywood has been used for the table top and other plywood parts, apply a sealer especially made for this wood. For a natural finish, apply one or two coats of clear lacquer of the type made for brush application. If two coats are required, sand the first coat lightly with fine sandpaper. Rub down the second coat with fine steel wool. If you use paint or enamel, it's a good idea to apply an undercoater.

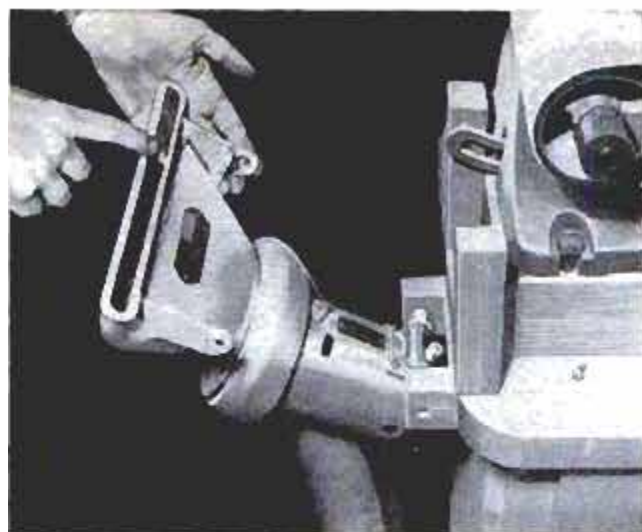
The details above suggest an alternate cabinet with a folding table which can be fastened to a door or to the wall. It is similar in general construction to that already described, except that the lower compartment is fitted with flush plywood doors. The sides extend from the lower edge of the door to a point about 6 in. below the top of the door. The back panel of the upper compartment is cut from perforated hardboard. The lower back panel is $\frac{1}{4}$ -in. plywood. ★ ★ ★

Number of Bit Revolutions Indicates Depth of Bore

You can judge the depth of a hole bored in wood fairly closely if you count the revolutions made by the brace. Chalk a vertical line on the chuck of the tool to use as a gauge, and start counting after the screw point of the bit has entered the work. An average bit takes about 16 revolutions to bore 1 in., but due to the variation of different size bits a table of turns-per-inch for each one should be drawn up.

Ken Murray, Colon, Mich.





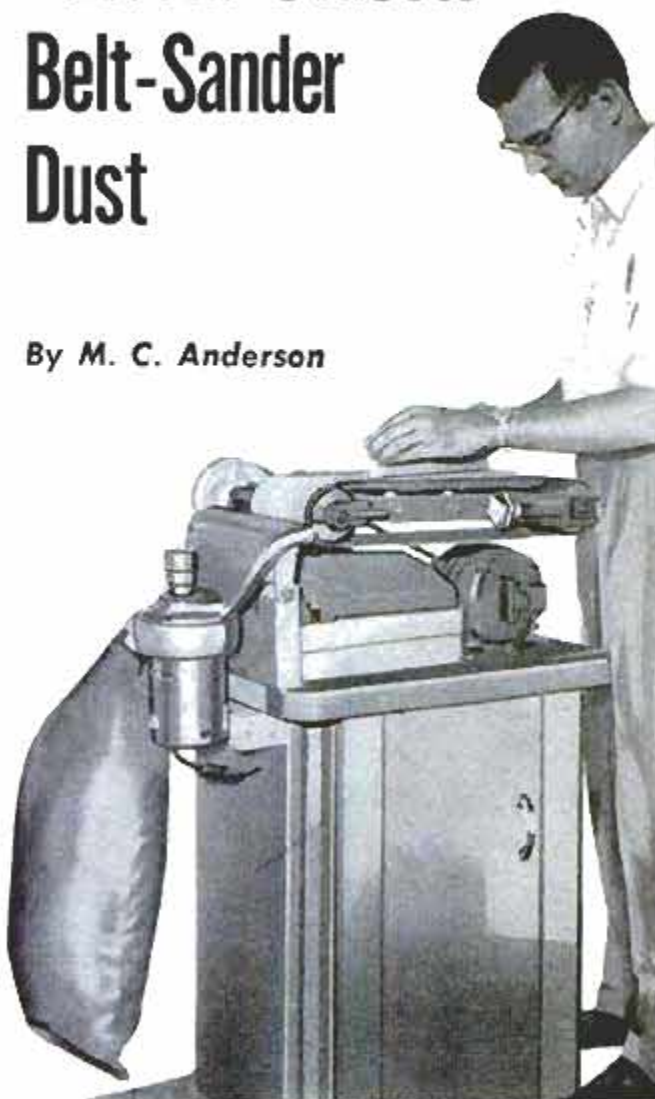
Pivoting on its rear axle, the vacuum is held in the operating position by a pin inserted through one front-wheel bracket. A wooden plug reduces the nozzle opening to the width of the sanding belt



With an attachment hose mounted in the usual manner the vacuum is used for cleaning the shop and power tools. On the model shown it was necessary to cover the wide nozzle to produce maximum suction in hose

Vacuum Collects Belt-Sander Dust

By M. C. Anderson



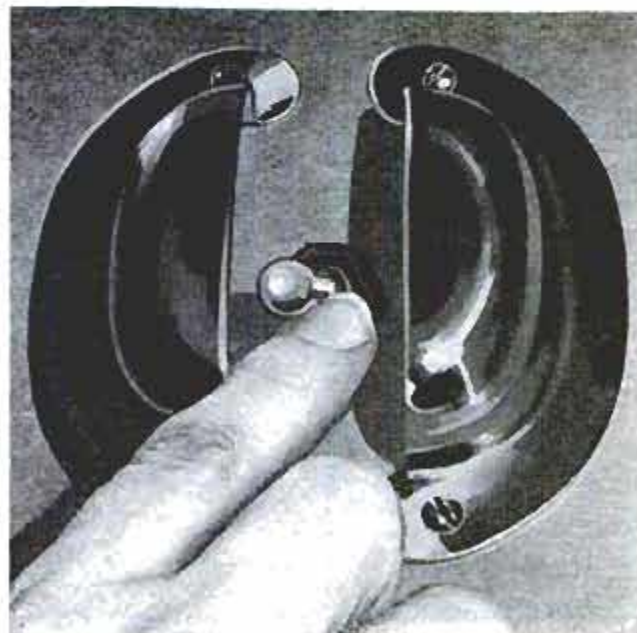
This home-shop belt sander was equipped with a dust collector made from an old upright vacuum cleaner with the handle and wheels removed. A ball-bearing motor was found best suited for vertical mounting

Drawer Pulls Protect Open Toggle Switch From Damage

A pair of drawer pulls, installed one on either side of a toggle switch, will allow it to be operated as usual but will prevent inadvertent throwing of the switch. The protective hood will also shield the switch from accidental damage.

Pitted Gasket Seat Smoothed

Sometimes a compression leak will develop between a spark-plug gasket and the machined gasket seat in an engine cylinder head because the seat is rusted or pitted. To smooth the seat, one mechanic uses a modified spark plug as a tool to "grind" the seat face so the gasket will seat properly. The threads are ground off the plug and an oil-soluble grinding compound is wiped on the gasket face of the plug, which then is rotated in the spark-plug hole.



Rack for Small Parts Made From Coffee Cans



This handy storage rack with swingout bins for small parts was made by one home craftsman from several empty coffee cans, two $\frac{1}{4}$ -in. steel rods threaded on both ends and two boards. A pair of hinges—narrow strips of metal cut from heavy tin or galvanized iron—are riveted to each can. Then, the cans are assembled on the rods with a washer inserted between the cans to permit them to swing free. One board is fastened on the rods at the bottom for the base of the rack and one is fastened at the top to complete the framework and provide a cover for the two top cans.

D. C. Marshall, Manhattan, Kans.

Cork on Hard Masonry Wall Receives Bulletin Thumbtacks

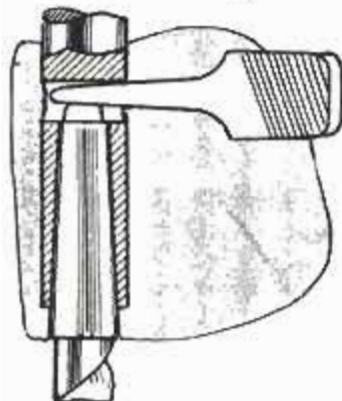
When it is necessary to attach bulletins to a cement or brick wall and no special bulletin board has been mounted for the purpose, the job may be done by cementing sections cut from large corks to the wall. The cork slices, approximately $\frac{1}{4}$ in. thick, provide surfaces easily penetrated by the thumbtacks.

Long-Nose Pliers Shaped To Remove Sanding Disks



Long-nose pliers can be used to remove sanding disks if the jaws are ground to fit the lug holding the disk on the sanding tool. The pliers eliminate the need for a pin type spanner wrench which can be easily lost or mislaid.—Harvey Muller, Danboro, Pa.

File Tang Is Handy Drift For Removing Drill Bits



When you mislay or lose the regular drift, the tang of a large file inserted in the slot of the tapered drill spindle will remove the bit without damage. If the bit is "frozen" in the spindle taper a light tap on the end of the file with

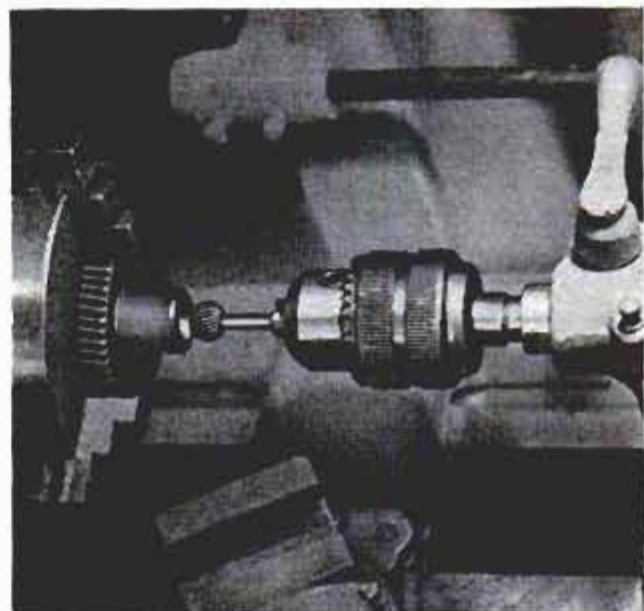
a soft hammer usually will loosen it. Protect the end of the bit with a block of wood.

Frank LaSaracina, New York City.

Rotary File Used as Reamer

Emergency substitution of a rotary file for a reamer to enlarge the hole through a gear proved very successful to one lathe operator. Mount the gear in the lathe chuck and slip the shaft of the rotary file into the tailstock chuck. The original hole in the gear serves as a pilot hole for the file and permits accurate enlarging. The file will not last as long as a bit of the same size, but it is cheaper to use when only a few holes have to be enlarged.

John Tavian, Mentone, Calif.



SPEED TORQUE SN 58

By J. B. Mullen

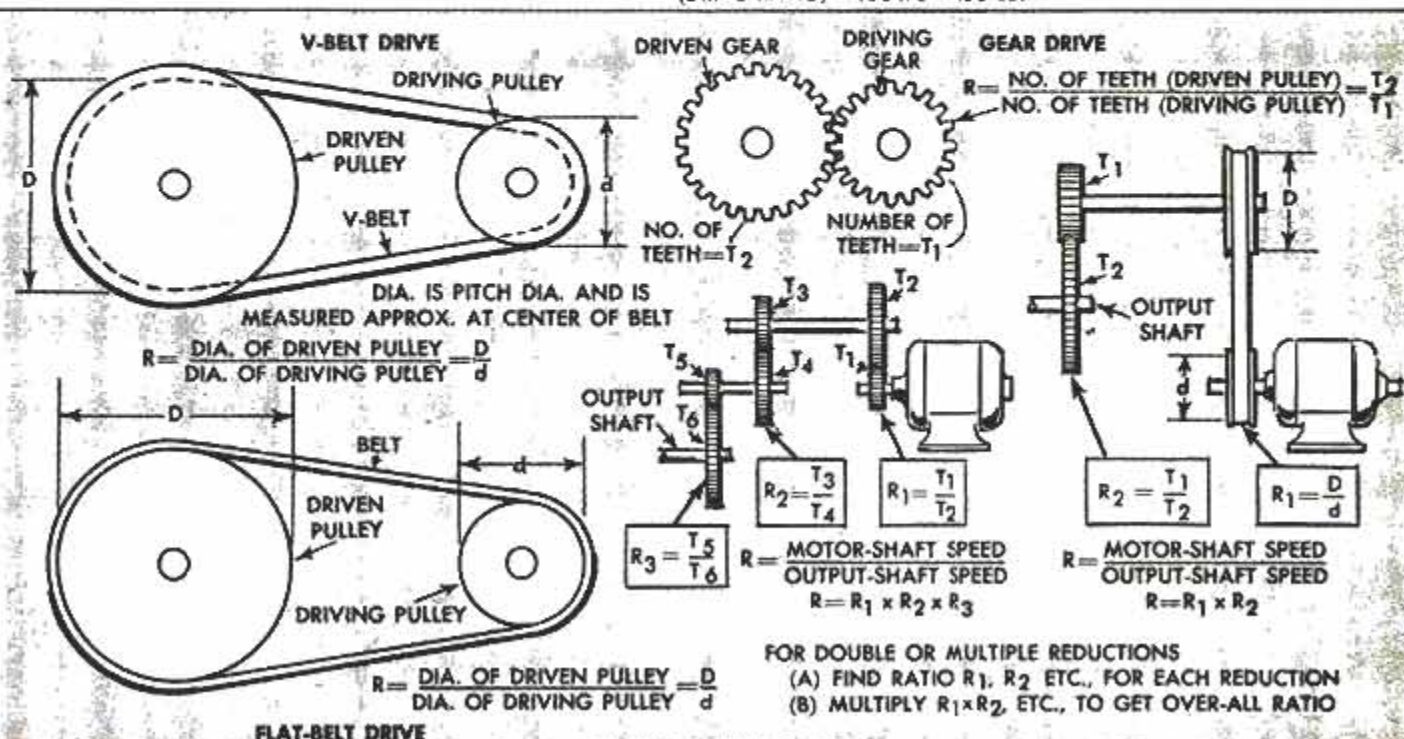
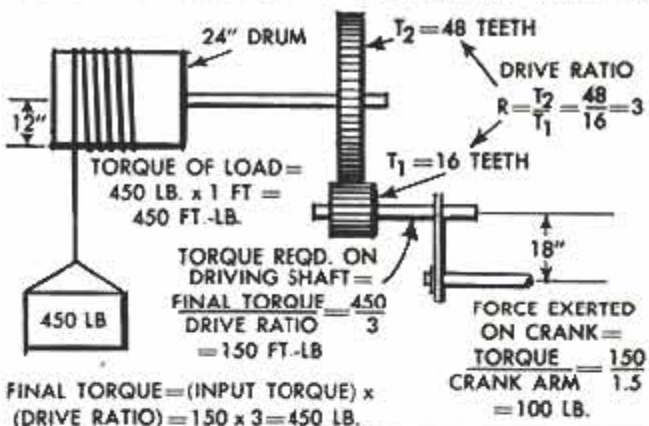
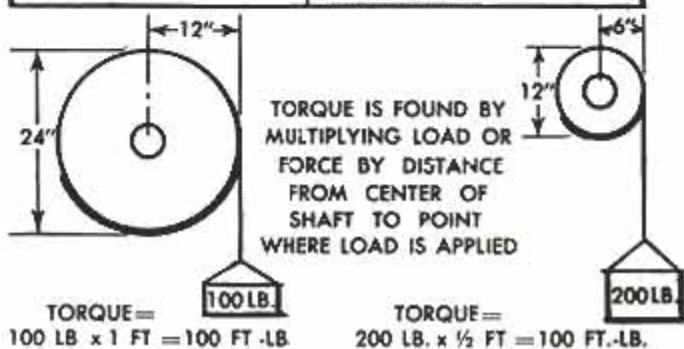


WHEN SETTING UP power-driven machines to do a given job it often is necessary to make quick and reasonably accurate calculations of the power required, speed reductions and other problems having to do with mechanical drives through belts or gears from motor to driven machine. As examples, it may be necessary to determine how much "pull" a motor has and what load it can lift when speed is reduced. If a speed-reducing drive is used between the motor and such equipment as a conveyor belt, it may be important to know how many feet per minute the belt will move. It may be necessary to determine the size of the motor required to drive a machine through an intermediate speed reduction. Usually these problems can be solved by using an alignment chart.

Although the horsepower of a motor is a measure of how much work it can do in a given time, torque is more accurately employed when calculating its output and is more directly applicable to the operation of the machine. Torque is the product of a weight or force acting around a shaft multiplied by the distance from the center of the shaft, as shown diagrammatically in details at the right. Torque usually is expressed in ft.-lb., which is the product of the length of the arm in feet times weight or force in pounds. Torque also may be stated in other units, the conversion table on page 247 showing conversions of torque units to ft.-lb. By reducing speed as shown by the geared windlass at the right, the torque is increased proportionately. In the example, the torque exerted on the crank, 150 ft.-lb.,

APPROX. EFFICIENCIES FOR VARIOUS DRIVES

TYPE OF SPEED REDUCTION	EFFICIENCY
Single reduction:	
V-belt	97 Percent
Flat-leather belt	90 Percent
Spur gear	95 Percent
Worm gear	80 Percent
Multiple reduction:	Find efficiency separately for each stage and multiply them together.





is increased to 450 ft.-lb. applied to the hoisting drum. If distance to the center of rotation is changed, the torque exerted by the weight also is changed. Thus, if the weight is being hoisted on a drum 4 ft. in diameter, it would exert a torque of 900 ft.-lb., and the 3-to-1 reduction gear would require that a torque of 300 lb. be put on the crank arm.

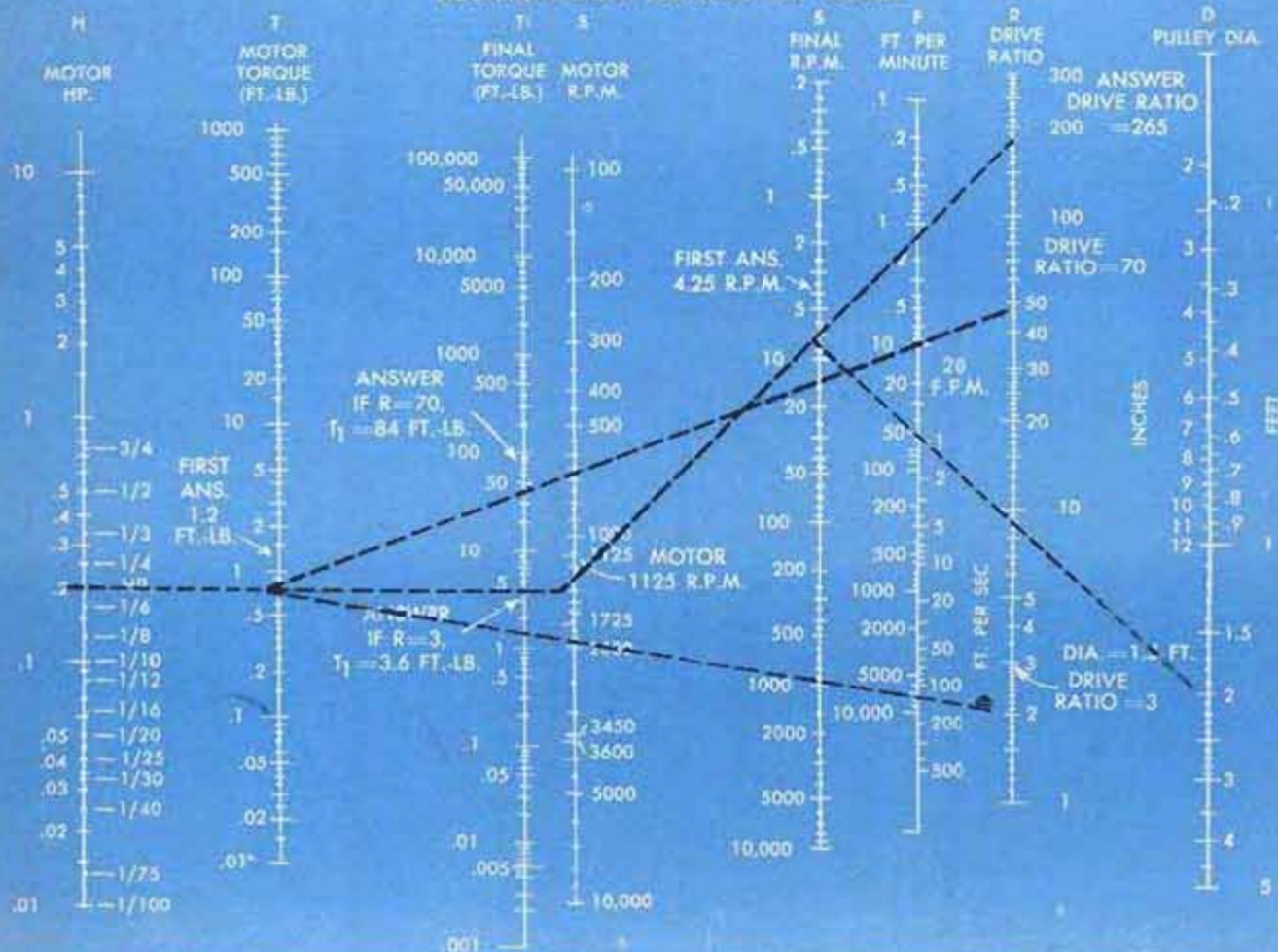
When it is necessary to determine what horsepower is required for a given load at a given speed reduction, the problem usually can be solved with the alignment chart as shown by the dotted lines. Assuming, as an example, a 100-lb. load is to be lifted on a 24-in. drum with a 100-to-1 speed reduction. The torque required on the drum is 100×1 , or 100 ft.-lb. This value is located on the T_1 -scale and the drive ratio, which is the motor-shaft speed divided by output-shaft speed (in this case, 100), is found on the R-scale and a straightedge is

laid on the two points. The answer found on the T-scale, 1 ft.-lb., is the torque that the motor must deliver. From this value, and the motor speed located on the S-scale (1725 r.p.m.) the motor horsepower can be found on the H-scale, in this case, $\frac{1}{3}$ hp.

For comparison, if no speed reduction were used, the motor would have to deliver 100 ft.-lb. directly. A straightedge laid from this point on the T-scale to 1725 r.p.m. on the S-scale will strike far beyond the range of the H-scale. Actually a 35-hp. motor would be required to drive the load without speed reduction.

Alignment-chart scales can be used to solve a number of problems pertaining to mechanical drives, several of which are shown by dotted lines on the charts, the chart on page 247 being a duplicate of that on page 246. As an example, it is required to find the drive ratio to deliver desired output torque from a motor of known speed and power, the desired output torque, 180 ft.-lb., the motor power, $\frac{3}{4}$ hp., and the motor speed, 1725 r.p.m., being the known values. First, lay the straightedge from 1725 on the S-scale to $\frac{3}{4}$ on the H-scale. The first answer, on the T-scale is motor torque, 2.25 ft.-lb. Next, lay the straightedge from this point to 180 on the T_1 -scale. The second answer, on the R-scale will be the required drive ratio, R equals 80, or

ALIGNMENT CHART FOR SPEED AND TORQUE



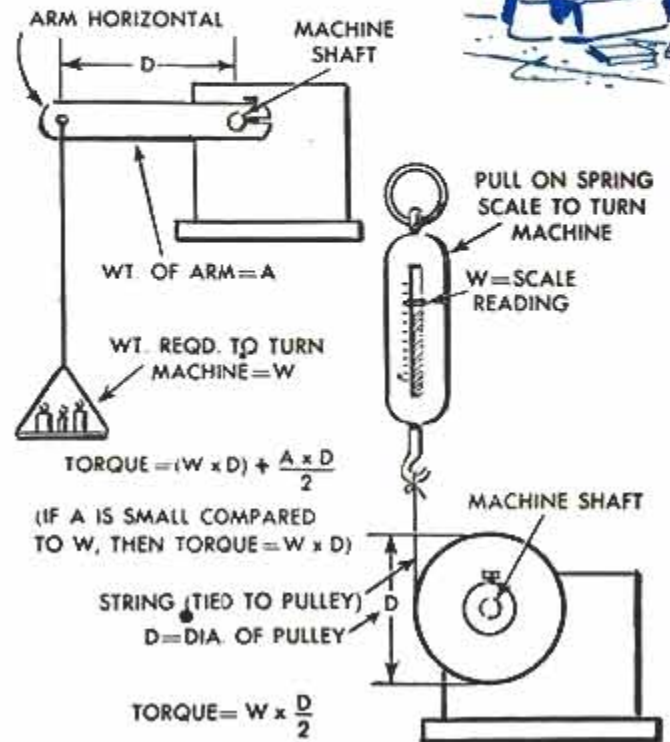
80 to 1. This example is typical procedure.

In another example it is required to find speed of output in r.p.m. and f.p.m. (feet per minute), with the drive ratio, the motor speed and the diameter of the hoist drum being known. Lay the straightedge from 1725 on the S-scale to 100 on the R-scale. The first answer on the S-scale (final r.p.m.) is the output speed, or 17.25 r.p.m. Now lay the straightedge from this point to 2 on the D-scale. The answer, read on the F-scale, will be 108 f.p.m. (feet per minute). It should be noted that the dotted lines on the charts are included merely for illustrative purposes and do not necessarily represent the more precise calculations possible when a straightedge is used.

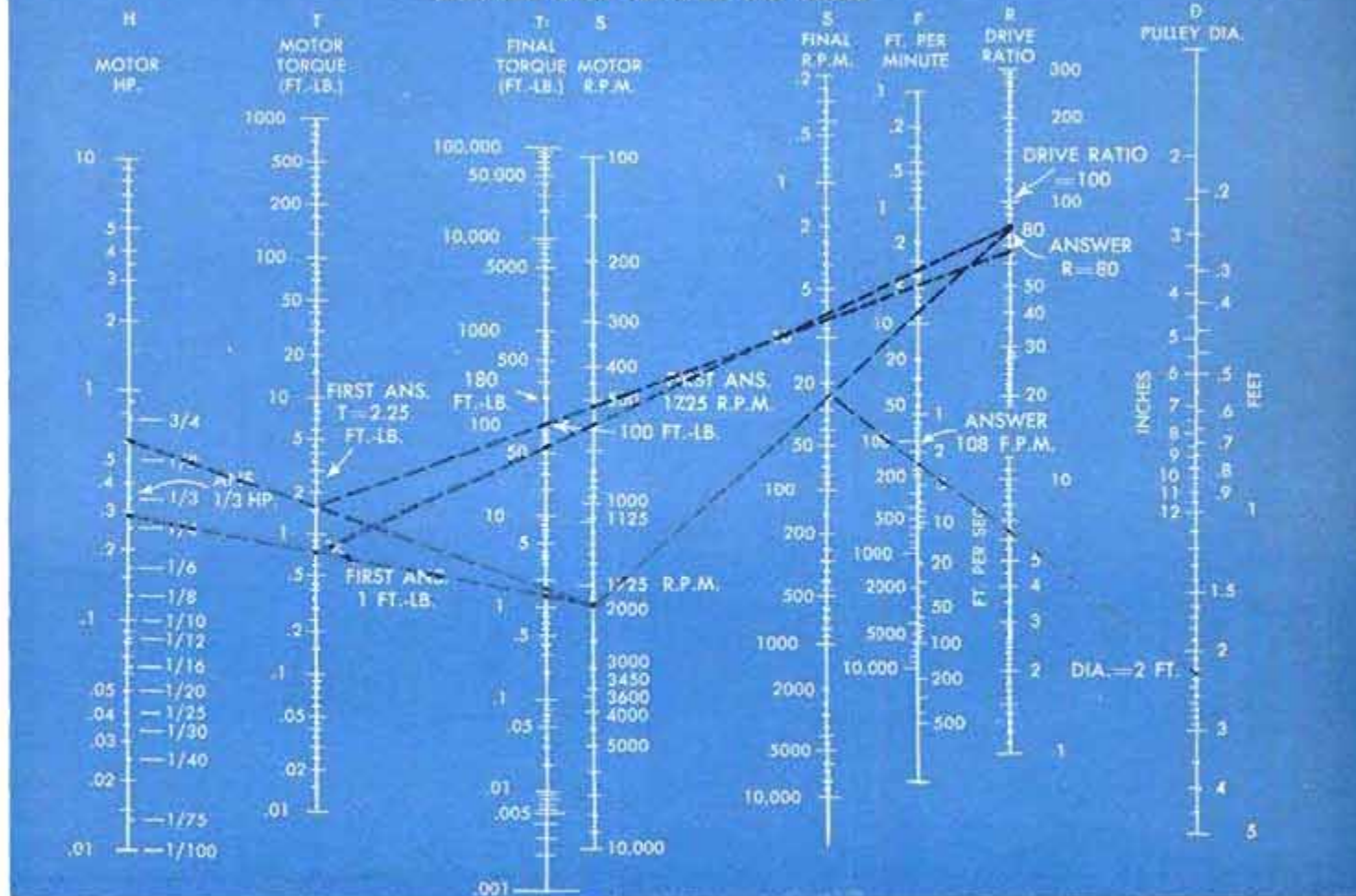
In general the procedure is simply to locate known values on two of the scales. Lay the straightedge on these points. Then find an answer where the straightedge crosses the appropriate scale. This answer can then be used with another known value for further calculations. The chart does not make allowances for friction or other losses in the drive. If these values enter the calculations, they usually are compensated for by using a slightly larger motor, or a slightly higher drive ratio than calculated. Efficiency figures given in the table on page 245 for various types of drives also may be used in this connection. The values given in this table are only close approximations. ★ ★ ★

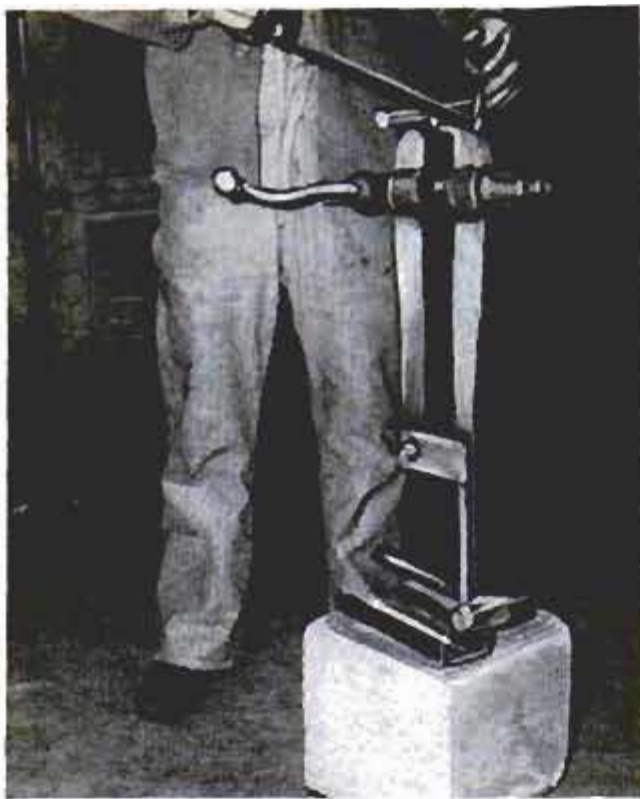
TORQUE UNITS

WEIGHT	LENGTH OF ARM	TORQUE	CONVERSION FACTOR
OZ.	IN.	IN.-OZ.	.0052
OZ.	FT.	FT.-OZ.	.625
LB.	IN.	IN.-LB.	.083
LB.	FT.	FT.-LB.	1



ALIGNMENT CHART FOR SPEED AND TORQUE



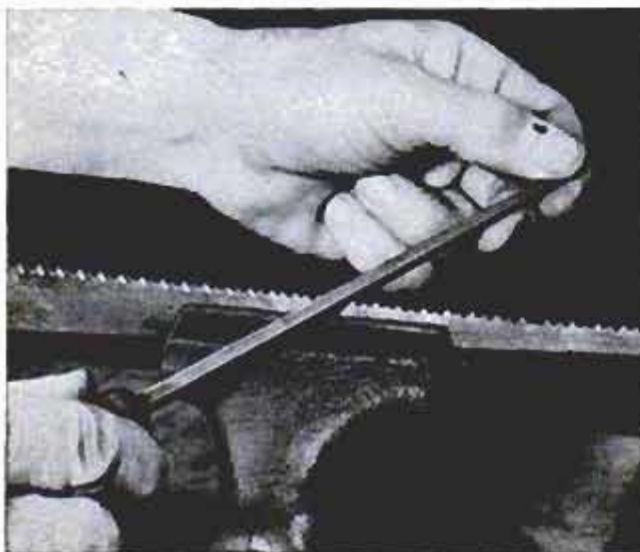


Portable Vise Mounted in Concrete

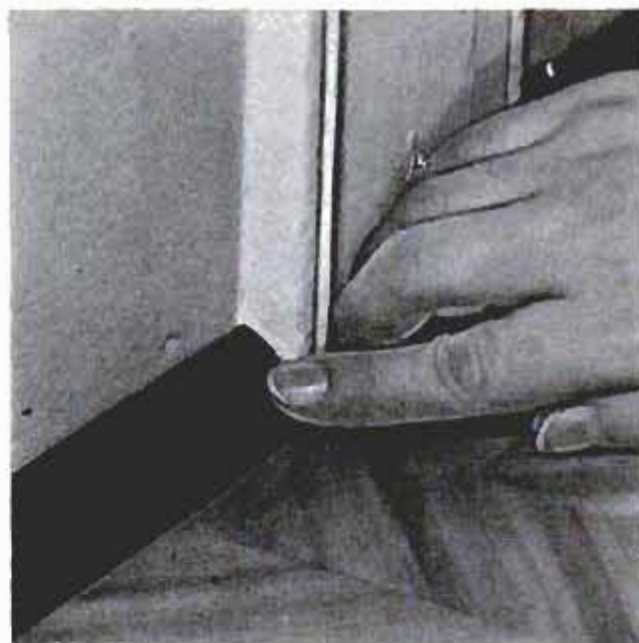
A vise of the type shown, mounted on a block of concrete, is sufficiently portable to be carried to the job away from the shop and yet rigid enough for heavy-duty usage. The base was made by filling a wooden crate with concrete and embedding bolts in the top of the block on which to fasten the vise.—C. F. Marley, Nokomis, Ill.

Keyhole Saw More Easily Filed In Conventional Vise

When a keyhole saw is hand-filed, the job can be done easier in a bench vise than a saw vise. Teeth at the narrow end of the tapered blade require the most filing and the end of the saw can be held more conveniently in the deeper jaws of a conventional vise.—Michael Logocki, Gary, Ind.



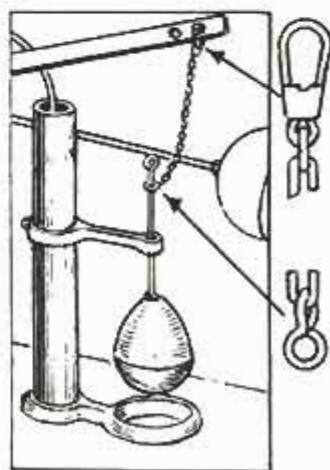
Quarter-Round Prefinished To Simplify Painting



Save time and temper, and protect newly finished floors from paint spatters and runs by painting quarter-round molding before installing it. Installing the prefinished molding requires only driving and counter-sinking a few nails, covering them with putty and touching up with a small paintbrush. The awkward job of crawling along on hands and knees to paint the molding thus is avoided.

Chain Permits Proper Seating Of Toilet Flush Ball

A toilet flush tank that leaks due to an improperly seated flush ball can be repaired by replacing the upper lift wire with a small copper or brass chain. The flexible chain will permit the flush ball to drop squarely into the flush-valve seat without the binding that frequently occurs when a standard lift wire is used. To install the chain cut it to the right length, attach one end to the trip lever and the other end to the lift wire. There should be a slight sag in the chain when the valve is in "closed" position.—Norm Jacky, Fond du Lac, Wis.



Before discarding an old tackle or tool box consider the possibility of salvaging the trays for use in bench drawers to hold small parts.

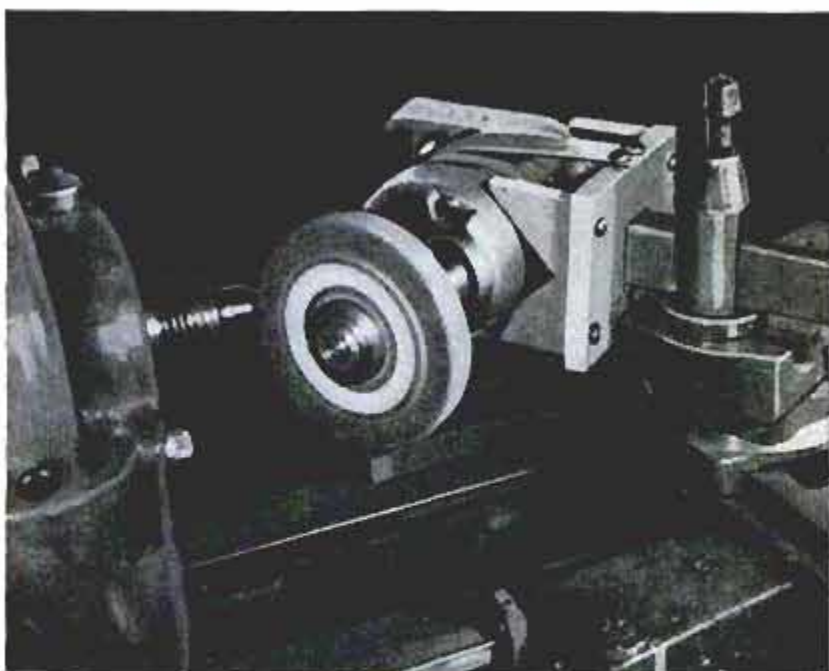
JIG FOR TOOL-POST GRINDER

By Carleton A. Phillips

IT IS EASY to adapt a 1/4-in. electric drill for use as a tool-post grinder with this simple jig consisting of a base, two V-blocks, a band and holder for securing the grinder in cutting position on a lathe, and an arbor for the grinding wheel.

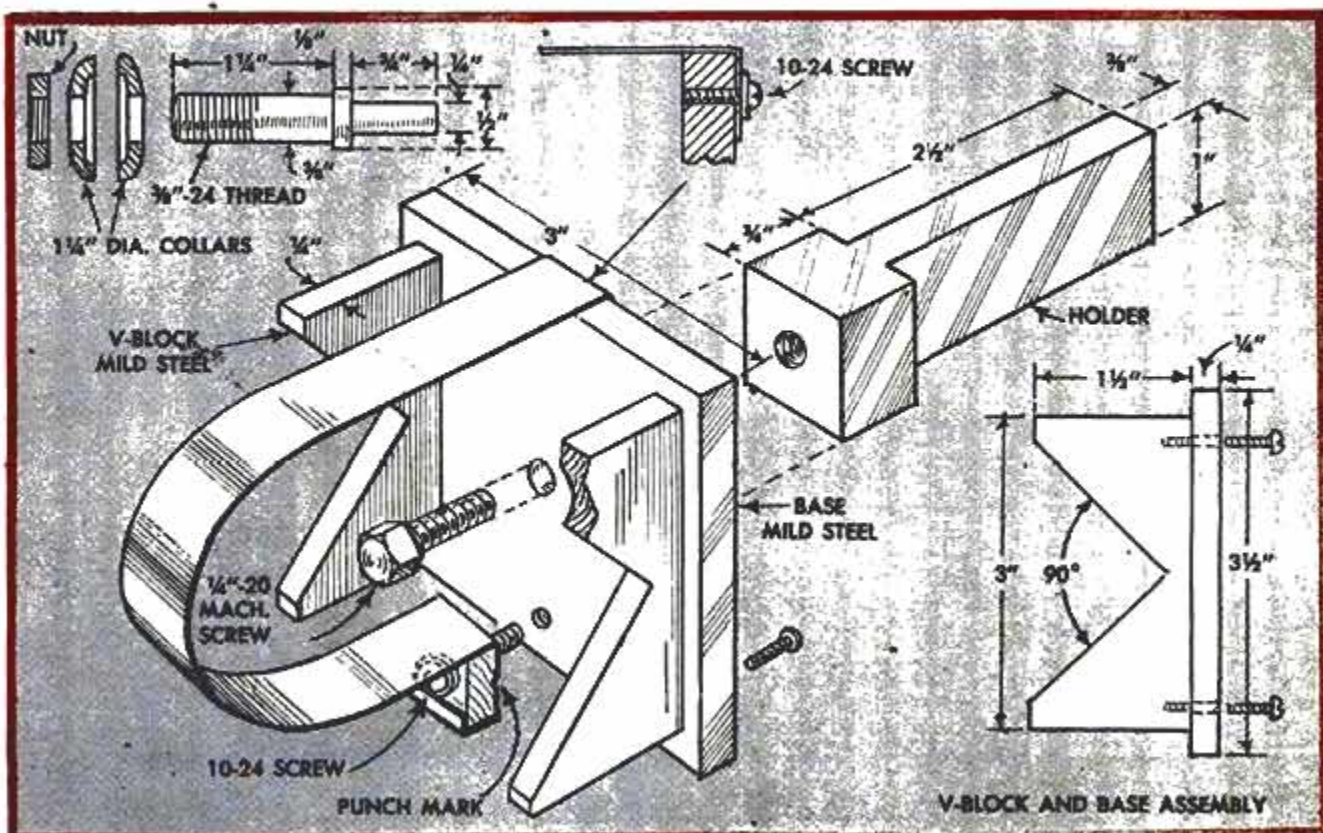
From 1 x 1-in. steel stock make the holder 3 1/4 in. long and remove 3/16 in. of the metal from two opposite sides for a distance of 2 1/2 in. Either a mill or bandsaw can be used for this operation. The unmilled end remaining is then squared off and the end drilled and tapped to take a 1/4-20 machine screw.

The V-block and base assembly is made from 1/4-in. mild steel. First, two 10-24 holes are drilled and tapped about 3/8 in. in from the edges of the base as shown in the end view of the V-block and base assembly. Each V-block is fastened to the base with two 5/8-in. 8-32 roundheaded screws.

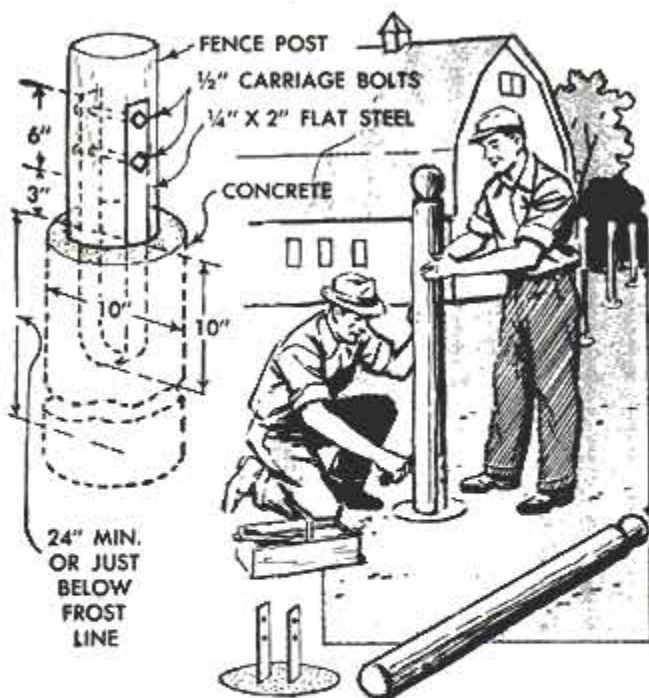


The band is cut from thin sheet metal and screwed to the base as shown. For a tight fit, drill and fasten one end of the band first, and then, with the electric drill in position on the V-blocks, pull the band tight around it and drill a 1/4-in. hole in the band at the point of contact with the base. Notice that this end of the band is fitted with a metal block.

The arbor is turned from 1/2-in.-dia. stock as shown in the detail at the upper left corner of the drawing and the collars are turned from 1 1/4-in.-dia. stock. If the diameter of the hole in the grinding wheel is larger than 3/8 in., turn a bushing to make it fit.



Metal "Stirrup" in Concrete Base Extends Life of Rotted Post



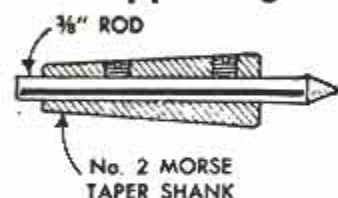
Fence posts that have rotted below ground level but are sound above can be given a new lease on life by replacing the rotted ends with a metal "stirrup" embedded in concrete. Simply saw off the rotted ends making the posts uniform in length. Next, cut and drill the stirrups using two pieces of $\frac{1}{4}$ x 2-in. flat steel 18 in. long, or a single 40-in. length bent to a U-shape. Fill the postholes with concrete and embed the stirrups as shown in the detail, being sure that the top of the concrete slopes away from them. To assure correct width between the projecting ends of flat steel, temporarily bolt a block of wood between them, the same size as the fence posts. The stirrups should be set vertically erect and aligned with the fence line. After the concrete has hardened, the posts are bolted on and all metal parts given a protective coat of red-lead paint.

Screwdriver Blades Hardened By Heating and Quenching

Steel blades of inexpensive screwdrivers can be hardened by heating until red hot and then quenching them quickly in warm water. If not tempered, the blades often prove too soft for the job and tend to bend or chip at the tip.



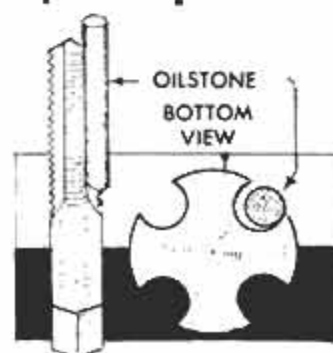
Adjustable Lathe Center For Supporting Small Work



An adjustable lathe center for supporting delicate work can be made from the tapered shank of a discarded twist drill and a short length of drill rod. The tapered shank is drilled lengthwise and reamed to accommodate the drill rod. Two holes are then drilled and tapped for the setscrews that hold the drill rod in place. The assembly is mounted in the headstock spindle and a 60-deg. point turned on the end of the rod. As the point becomes dull it can be moved forward and resharpened so that the point is always at the same distance from the headstock when the taper shank is seated in the spindle.

Threading Taps Kept Sharp

Sharpen taps with a dowel-shaped oilstone, rubbing it back and forth along the cutting edges. When tapping holes use a lubricant of cutting oil and white lead for cleaner threads.



Two Clevises Form Universal Joint

Flexible universals for light-duty motor shafting or wrench drives can be improvised from two clevises joined together as shown in the illustration. The connecting link is an oblong block of wood, metal or plastic with two holes drilled across at right angles to each other. Small bolts are placed through the clevis and link, and capped with a locknut. Back off the nuts just enough to permit free movement.

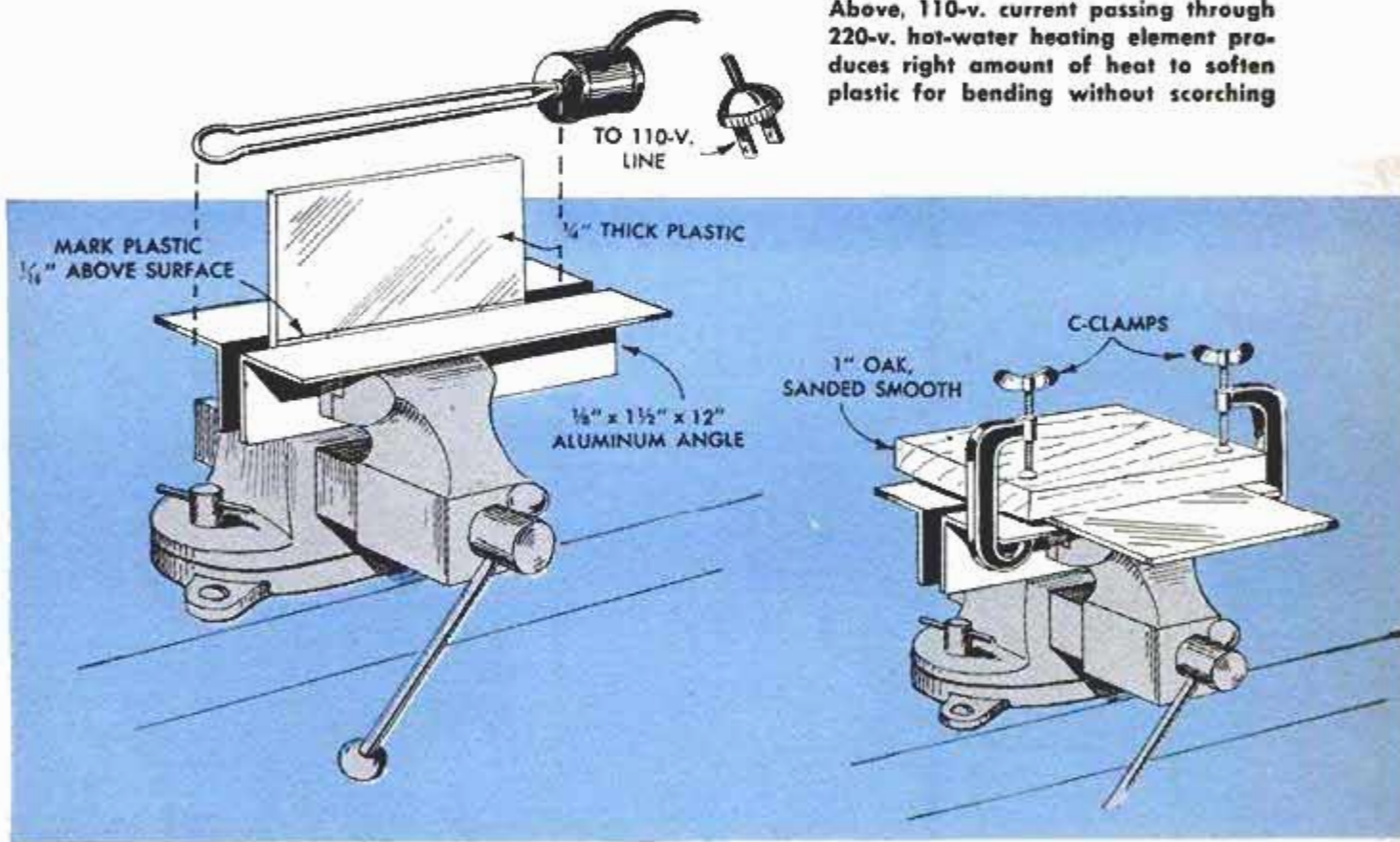


BEND PLASTIC the EASY WAY

Find it difficult to bend thick plastic into right angles without cracking, scorching or leaving bubbles in the material? Then try using the element from a discarded 220-v. hot-water heater to soften the plastic for bending, instead of the usual electric oven or torch which does not heat the plastic evenly along the line of bend. First, reshape the element so it will be about $\frac{1}{2}$ in. away from the plastic when in heating position. Scribe a line across the plastic where the bend is desired, place it in a vise as shown, and hold the heating element over the plastic until it becomes pliable. Make the bend and clamp a hardwood board over it until the plastic cools. Wyatt M. Wayne, Miami, Fla.



Above, 110-v. current passing through 220-v. hot-water heating element produces right amount of heat to soften plastic for bending without scorching



How to Restore Piano Finish Checked by Hairline Cracks

If the finish on your piano has become checked from age it can be restored with a treatment of amalgamate thus eliminating the need for refinishing. First wipe the surface clean of dust and wax, using a cloth saturated in denatured alcohol. Then brush on the amalgamate, applying it sparingly to prevent "sag." Similar results can be had by using denatured alcohol to soften and smooth the varnish, but it has

a greater tendency to "sag" or run. Removable panels should be worked on a table, or other flat surface, to minimize the sagging effect. When dry, sand the surface with waterproof sandpaper, grit 450, dipped in water. A coat of satin varnish will then cover any apparent unevenness. For a softer effect, rub the surface with fine steel wool dipped in linseed or rubbing oil.

Lillian S. Graham, Minneapolis, Minn.

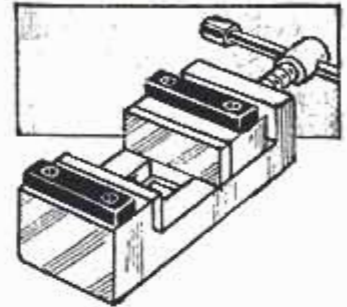
Fractured Plasterboard Can Be Severed With Handsaw Back



After scoring and fracturing a piece of plasterboard, use the back of a handsaw to cut the remaining layer of cardboard. Fold the plasterboard double, as indicated, then slide the saw along between the panel sections, employing it in the manner of a large knife to slice the cardboard.

Increasing Vise-Jaw Capacity

Narrow pieces of steel bolted on top of the jaws of a vise, but spaced farther apart, will increase the capacity of the vise for holding larger lightweight work. Clamp the steel strips to the vise in the desired positions. Then drill and tap two holes through each strip into the vise jaws below.



C. W. Woodson, Chicago.

Setting Engine Valves

When it is necessary to adjust gasoline-engine valves, the piston in the cylinder on which the valves are being adjusted should be on top dead center of the compression stroke. To be sure of this for each cylinder, begin with No. 1, cranking the engine in the normal direction of rotation until the exhaust valve is just closing, while the intake is beginning to open. This obtains top dead center of the exhaust stroke. Then, turn the crankshaft exactly one revolution for the correct positioning of the compression stroke and make the valve adjustment on No. 1. Now, proceed with the valve adjustment through the engine according to its firing order. Or, to bring the next piston to the correct position for setting the valve in its cylinder, turn the crank exactly 180 deg. in a 4-cylinder engine, 120 deg. in a 6-cylinder, and 90 deg. in an 8-cylinder engine.

Felt Hat Provides Disks For Buffing Wheel

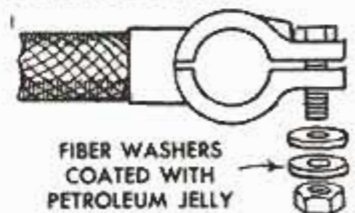
An old felt hat, a $\frac{1}{4}$ -in. bolt and two washers are the only materials needed to make a buffing wheel for use with a $\frac{1}{4}$ -in. drill motor. Cut a number of disks from the hat, using a water tumbler or other round shape as a pattern. Punch a hole in the center of each disk and slip them onto bolt, using a washer on each side of the assembly. Use a lock washer or locknut to insure that the assembly stays tight when rotating at high speed.

Gilbert C. Close, Hawthorne, Calif.



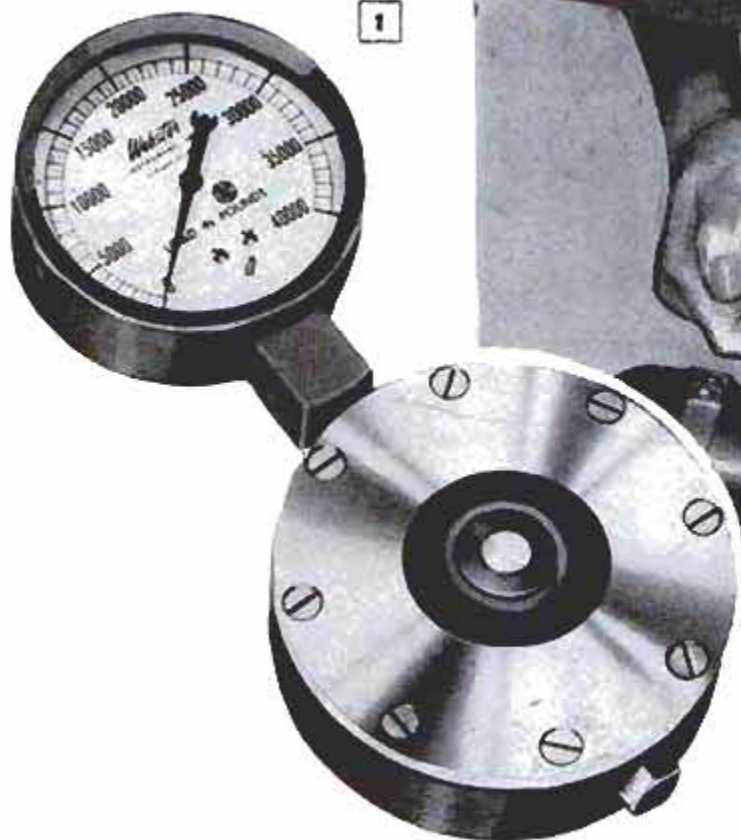
Petroleum Jelly on Fiber Washers Keeps Battery-Cable Nut Free

Corrosion on a battery-cable terminal which often causes the nut to "freeze," can be prevented if two fiber washers are used between the nut and the terminal. Coat the washers with petroleum jelly before installing them.

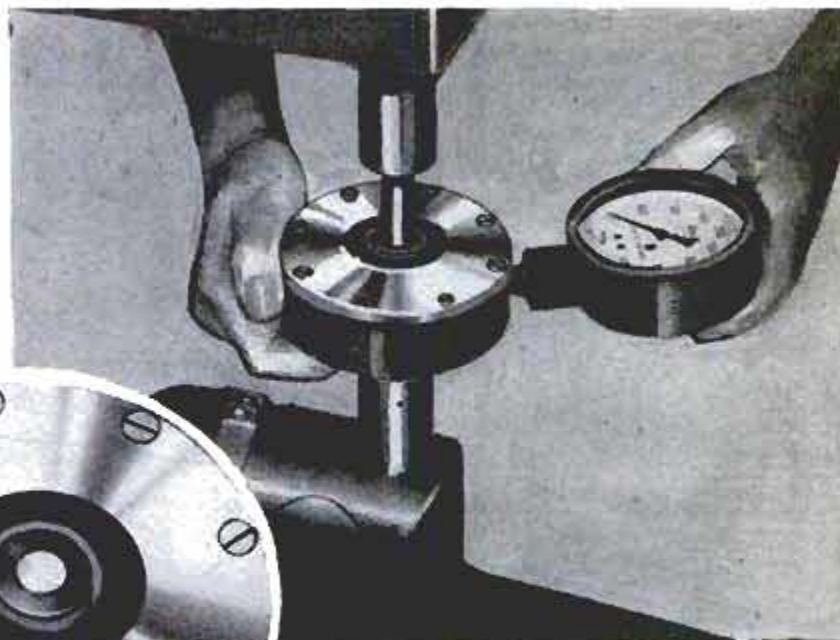


John Krill, North Lima, Ohio.

SHOPPING FOR TOOLS



1

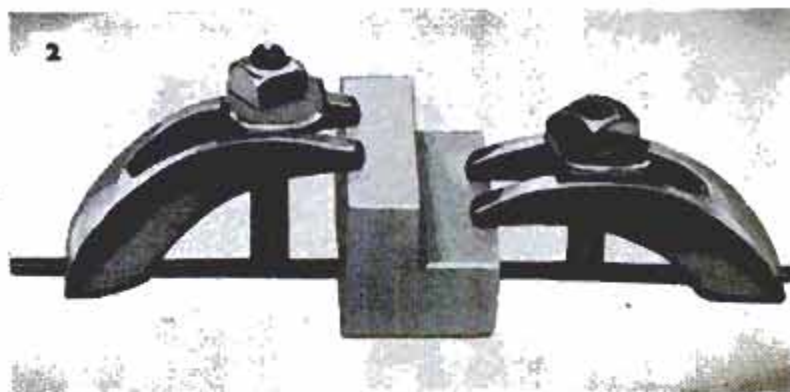


1. DIRECT-READING FORCE GAUGE operates hydraulically and is designed to measure force exerted between electrodes on spot-welding units and between rolls on roll-welding equipment. Insulated contact surfaces prevent damage from accidental firing of welding unit being checked. Registers from 1000 to 40,000 lb.

Webster Instrument Co., 11856 Mississippi Ave.,
Los Angeles 25, Calif.

2. HOLD-DOWNS for use on machine tables do not require blocking or shimming. Adjust quickly to varying heights of work having steps, ledges and offsets, making it difficult to hold with conventional clamping equipment. Each one-piece curved unit is slotted to permit positioning of the clamping bolt at any point along the full length of the slot. Concave washers, supplied with each clamp, distribute the pressure uniformly

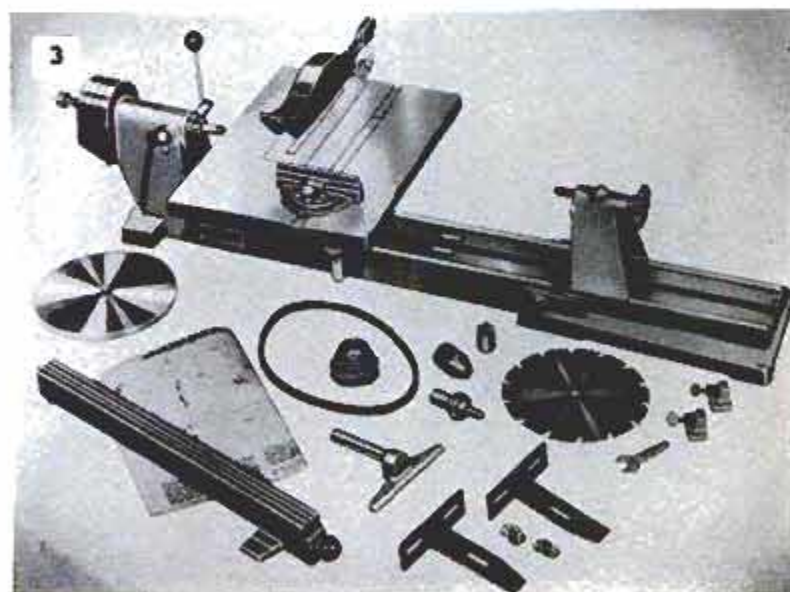
Bausch Products, 18411 W. McNichols,
Detroit 19, Mich.



2

3. COMPACT ONE-MOTOR WORKSHOP for home, farm or school shop combines six machines in one unit only 40 in. long; circular saw with 8-in. blade, lathe, vertical drill press, disk sander, grinder and horizontal drill. Lathe takes 30 in. between centers with spindle speeds variable from 875 to 3500 r.p.m. Any standard 1/4 or 1/2-hp., 1750-r.p.m. motor can be used. Machine is supplied with drill chuck, lathe centers and sanding disk

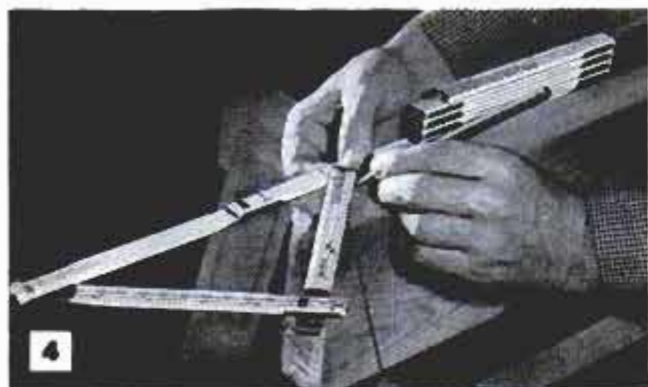
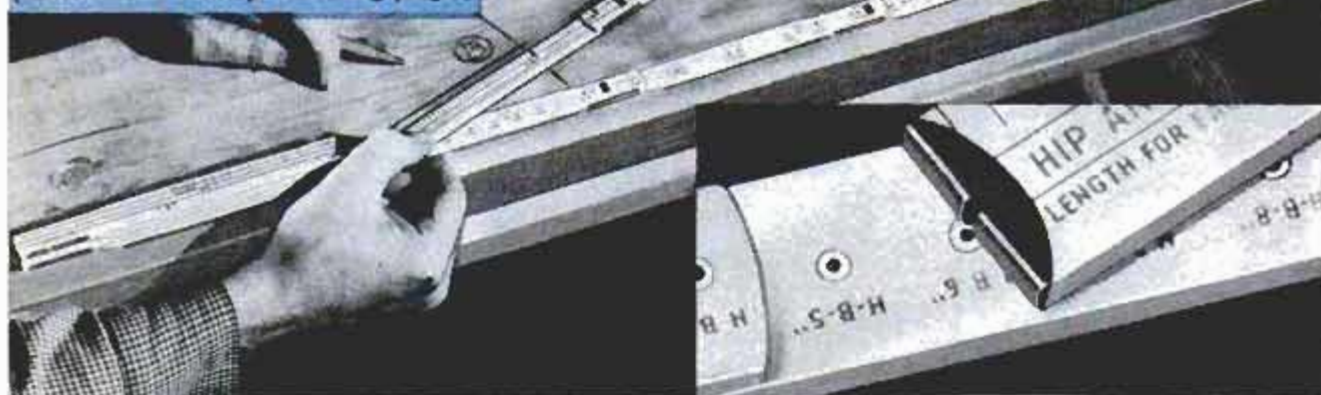
Michael Mfg. Co., 303 Hamilton St.,
Racine, Wis.



3

SHOPPING FOR TOOLS

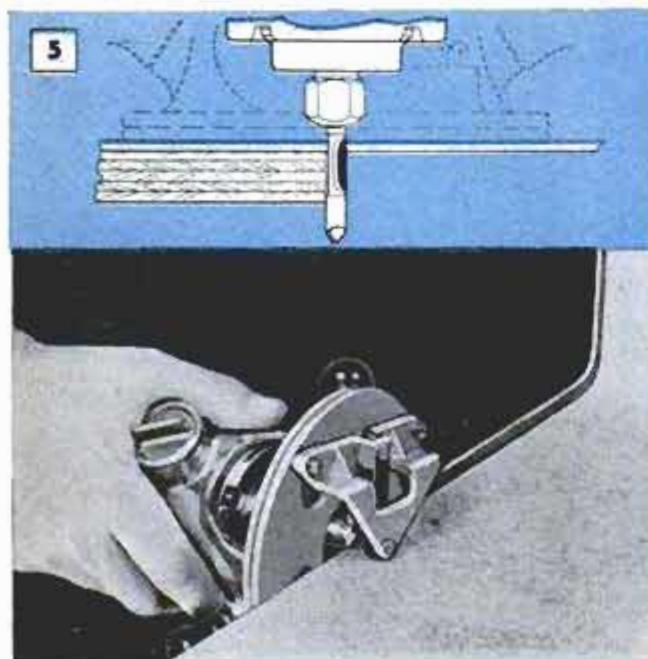
(Continued from preceding page)



4. BUILDER'S FRAMING RULE has all the features of the conventional 6-ft. folding rule and in addition comes with special markings on the reverse side which enable the user to lay out common, hip, valley or jack-rafter cuts without the use of a steel

5. ROUTER KIT consists of carbide bit and guide for trimming veneers and laminates. Bit, shown in photo, is designed for either flush or bevel trimming of hard-plastic surfacing materials. Detail shows panel bit which also is available as a special accessory

Stanley Electric Tools, Div. of Stanley Works, New Britain, Conn.

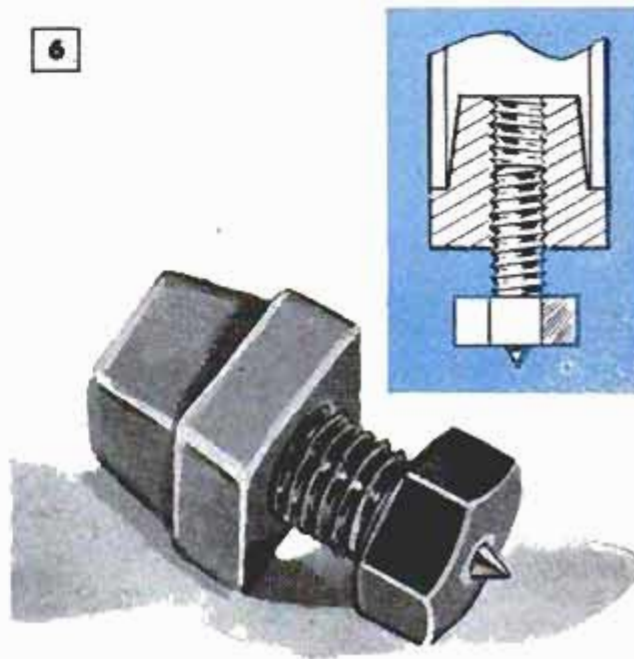


square. Also is used by carpenters for finding the pitch, or rise, of an existing roof. Upper photo shows how rule is folded to make layout for bottom plate cut on low-pitch hip and valley rafters. Left, marking top side cut and right, the top plumb cut

Master Rule Mfg. Co., 40 Mulberry St., Middletown, N. Y.

6. ORNAMENTAL IRON PORCH COLUMNS are set quickly without drilling holes in concrete on either old or new work with this special adjustable lug which fits into the lower end of the square column. Sharp point on lug enters concrete and anchors column

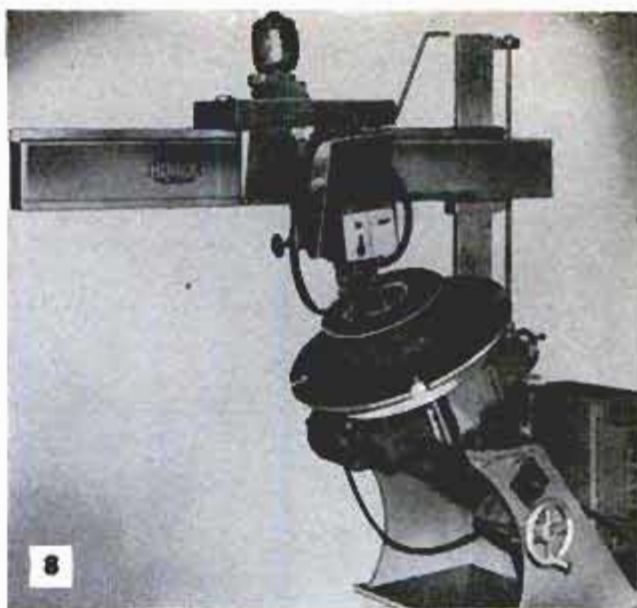
Tennessee Fabricating Co., 1490 Grimes St., Memphis, Tenn.





7. PORTABLE METAL SHEAR is mounted on a rigid tripod that folds for transport or moving from place to place on the job. Weighs only 20½ lb. with a handle length of 22 in. and a cutting capacity of 2½ in. Cuts sheet metal up to 10 ga., notches, trims and makes bevel cuts. Especially handy in auto body shops and also for mass-producing duplicate sheet-metal parts or parts cut from extruded metals. Will also cut hardwood and plastic. Inset pictures compound leverage that gives smooth cut to end of blades

Airborne Sales Co., Metal King Div., 8501 Stellar Drive, Culver City, Calif.



9. GLASS CUTTER has a cutting wheel of carbide precision-mounted on a special bearing which provides exceptionally smooth operation. Carbide cutter requires a minimum of pressure to make a sharp score and a clean break on window glass of any standard thickness. Also cuts ordinary plate glass

Millers Falls Co., Greenfield, Mass.

8. WELD POSITIONER has been designed to simplify the problems of metal-fabricating shops planning setups to handle automatic welding. Adjustments permit positioning both weldment and automatic welding head. This is accomplished by rotating both the column and ram after the work is mounted. Lateral travel of the ram is power-actuated, the carriage travel being 36 in. Over-all height of machine is 6'-6" and the size pictured is rated at 500-lb. capacity. Other sizes are available on special order

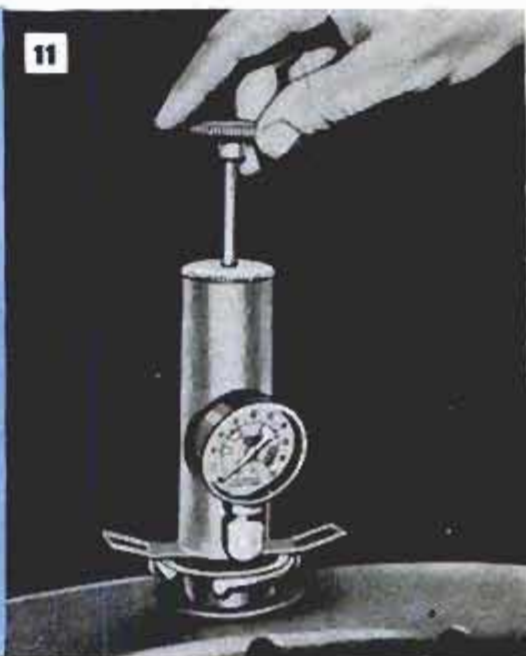
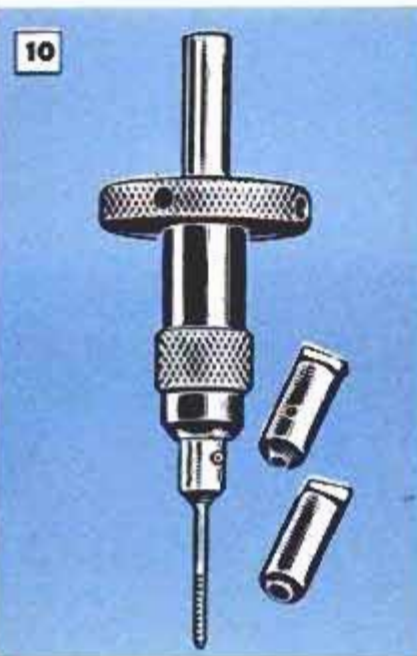
C. B. Horrick Mfg. Corp., 2000 Center St., Cleveland, Ohio.

10. PRECISION TAPPING TOOL for use in drill press or lathe enables the user to cut a true, clean thread and reduces tap breakage to the minimum. Tool is held in drill chuck in either the drill press or lathe and the tap lined up with the hole in which the thread is to be cut. Tap is run in by hand

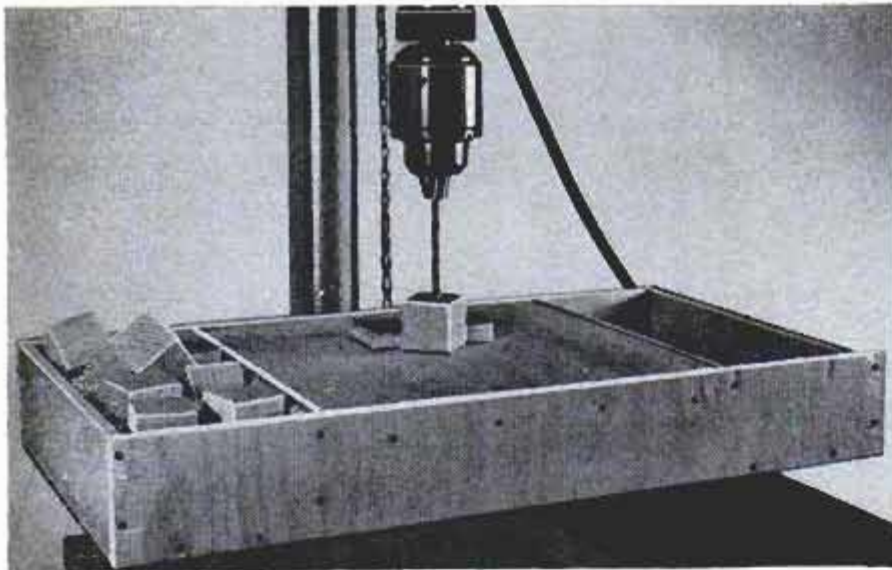
F. & G. Engineering Co., 6004 Grace St., Chicago 34

11. TESTING DEVICE for checking auto cooling systems can detect gasket leaks and other defects in pressurized systems. Prevents loss of expensive anti-freeze solution. Dial indicates correct pressure readings for 4, 7 and 14-lb. systems. Adapter with 2-way rubber bushing fits all radiator-neck openings

E. Edelmann & Co., Chicago



Drill-Press Trays Hold Stock and Finished Parts



When drilling a large quantity of small parts, two boxes, one on each side of the shop drill-press table, are convenient for holding stock and finished parts. Undrilled parts are then taken from one box and deposited in the other after drilling. Make the boxes equal in length to the depth of the drill-press table. Then join them together front and rear with long, narrow pieces of wood, making the assembly a tight fit around the edge of the table. To protect the table top cut a wood panel to fit over it. The top panel is fastened to the boxes at either side.—Bertram Brownold, Cedarhurst, N. Y.

Safe Brad and Pin Driving

Driving small brads and pins for model making, picture framing and other uses can be done safely with the aid of a short piece of small-bore tubing. The driving rod is a finishing nail with the point removed and the end flattened, and may be magnetized to hold the brad while positioning it for driving. The rod should have a friction fit inside the tubing so a pin or brad will not become wedged between it and tubing.

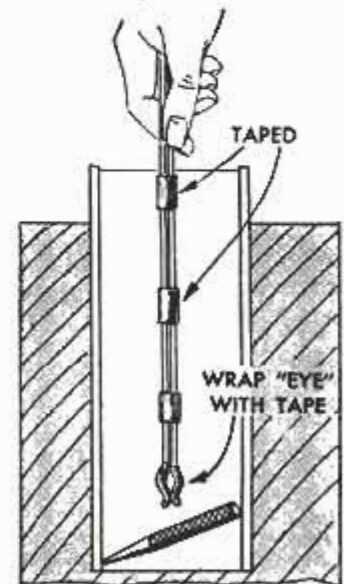
Carl S. Bates, Chicago.



Retriever for Small Parts

Tools and small parts are easily retrieved from blind holes with this tool made from two pieces of stiff wire. Bend one end of each wire to form a jaw, and tape or solder the wires together, allowing space above the jaws for spring action. Then tape the jaws to provide a nonslip grip.—

James P. Marshall, Barrington, R. I.

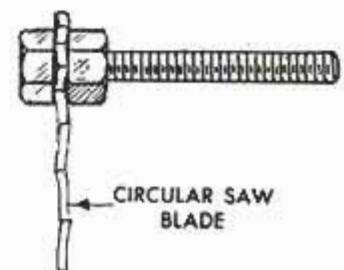


Aligning Circular-Saw Blades

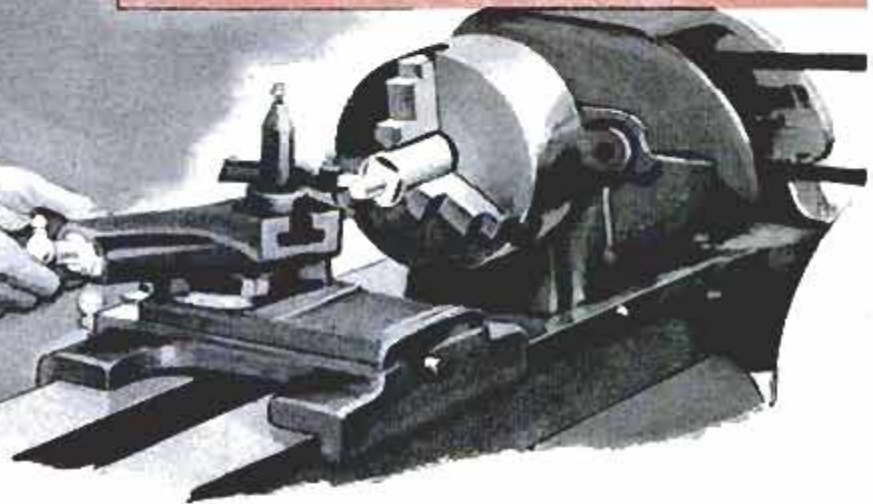
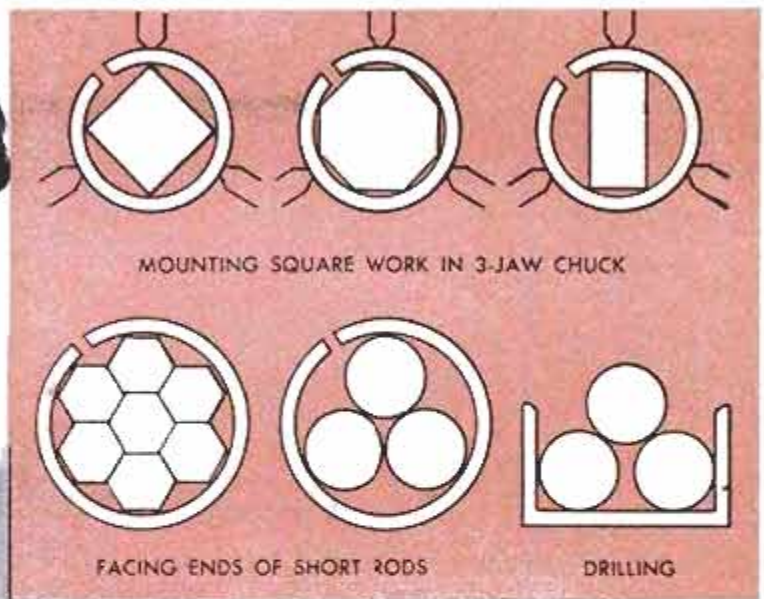
To align the blade on a circular saw, fasten a bolt to the blade, with the shank between two of the teeth, and measure the gap from the bolt to the rip fence.

Check the gap with the bolt resting on the table, then rotate the blade until the bolt again strikes the table and make a similar check. Adjust the saw blade accordingly.

E. P. Graff, Ridgewood, N. J.



Sleeve Holds Square Stock in 3-Jaw Chuck



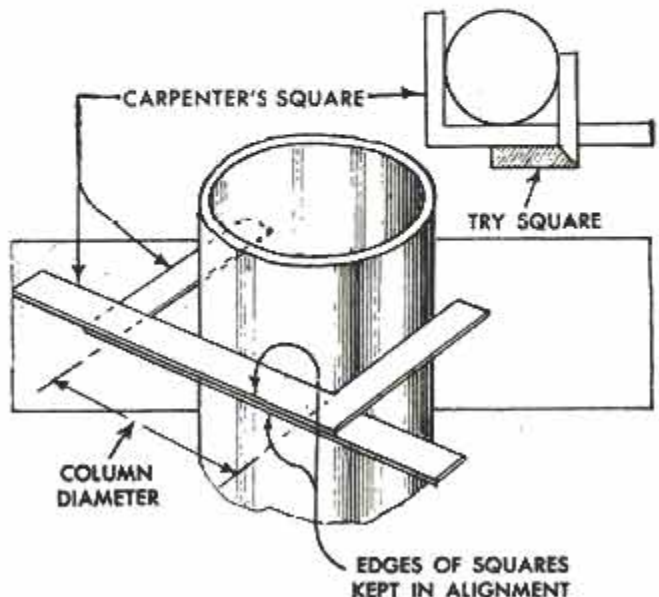
When a 4-jaw lathe chuck is not available, square, rectangular and octagonal bar stock can be held in a 3-jaw chuck if it first is inserted in a sleeve, consisting of a split length of pipe or tubing as shown in the upper details. A similar sleeve can be used to hold a number of pieces of

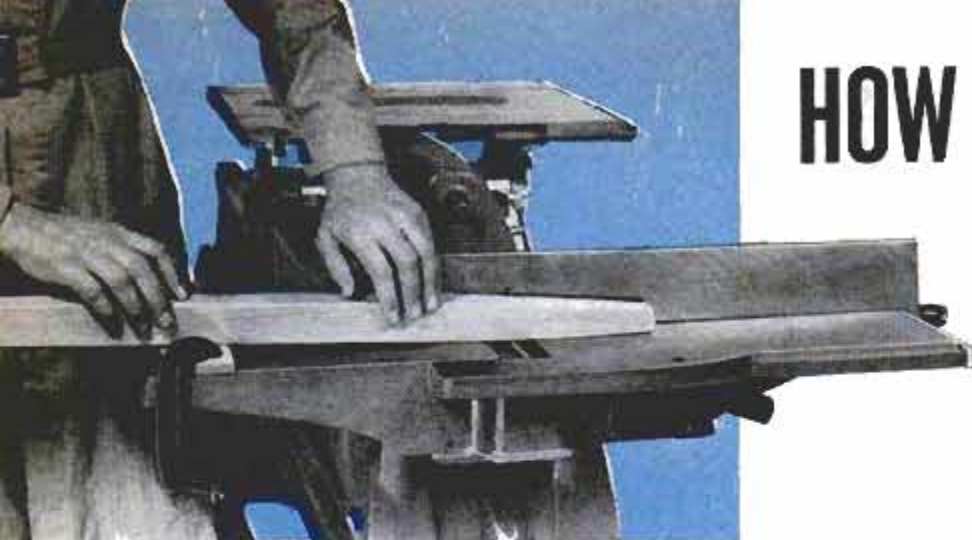
round or hexagonal stock that are to be faced (two lower left-hand details). Several lengths of round stock can be held in a 4-jaw chuck for facing, lower right-hand detail. The same length of channel will provide a "vise" for holding the round stock for cross-drilling in a drill press.

Diameter of Cylindrical Object Measured With Two Squares

With the aid of two squares straddling the object as shown, the diameter of a cylinder can be measured. It is essential, for accuracy, that the legs of the squares that overlap each other be in perfect alignment. If a try square is used in conjunction with a carpenter's square, the handle of the try square is held against the edge of the other square.

When installing spark plugs in recessed holes common to V-8 engines use a short length of garden hose, which fits snugly over the end of the plug, to start the threads. Tighten the plugs with the conventional wrench.





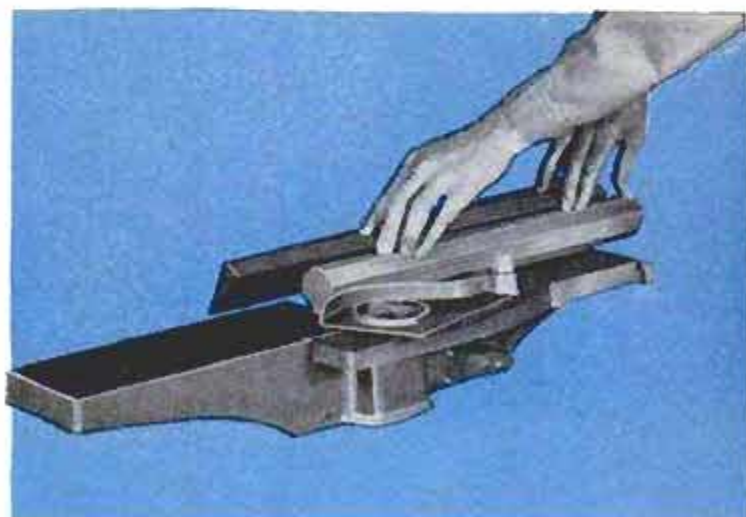
5050

HOW WOULD YOU DO IT?

By Chris Nelson

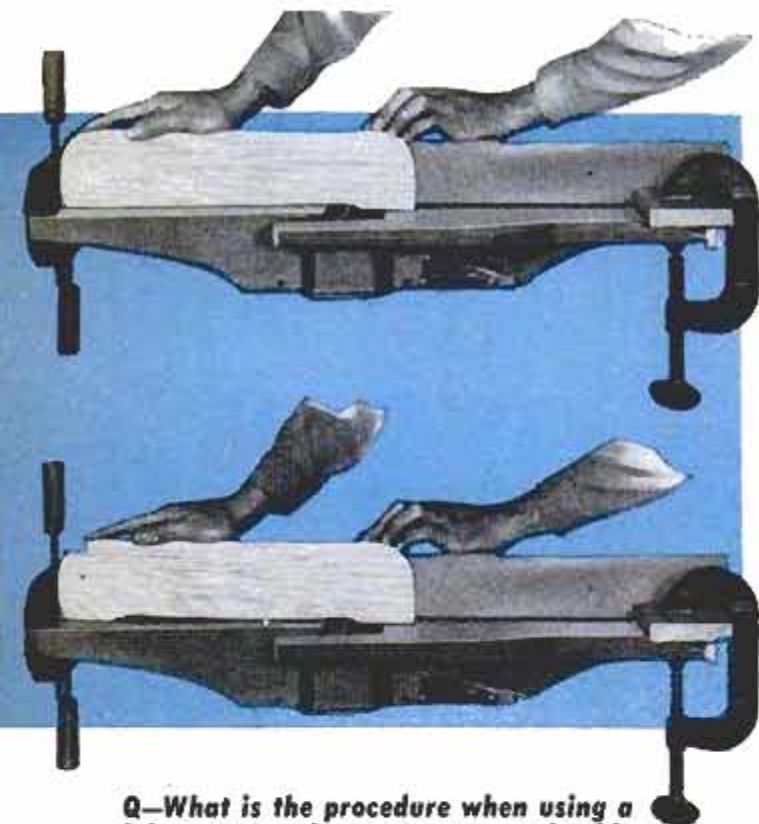
Q—In what manner can a jointer be used to make a gradual taper near the end of a piece of stock that will be used as a table or desk leg?

A—Fasten a block of wood to the outfeed table with a C-clamp, place one end of the stock on the block and pull it over the jointer head. The farther the block is from the jointer head, the more gradual will be the taper, since, in effect, a curve with a very large radius is being cut on the leg. If a perfectly flat, or true, taper is required, fasten the block to the piece of stock. The angle between the stock and the jointer table then will remain constant



Q—How can you cut a piece of stock lumber, such as a 2 x 4, on a jointer so that it will have an octagonal cross section?

A—Set the jointer fence at a 45-deg. angle and remove each of the original corners as shown above. If it is desired to have a cross section that is a regular octagon, first rip the stock so that it has a square cross section, then remove the corners until all eight faces are the same width

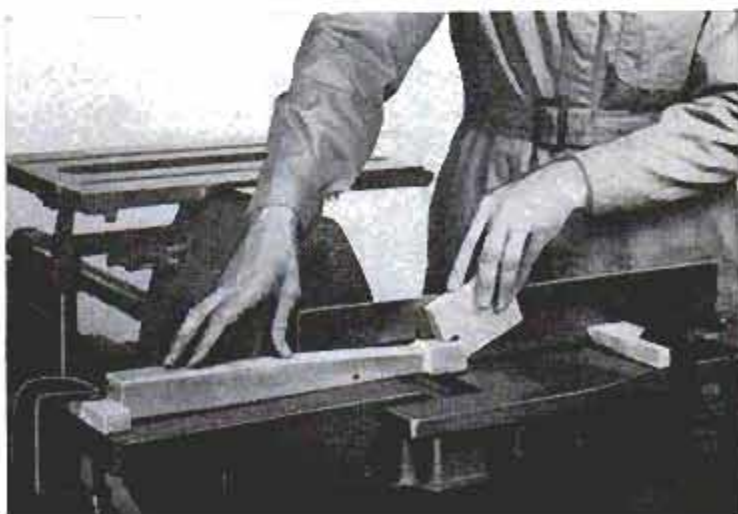


Q—What is the procedure when using a jointer to produce recess-tapered table legs having four sides tapering to a squared end section?

A—First, cut a gradual taper on all four sides of each of the legs, as described in the first item on this page. Next, place a stop block at each end of the jointer table, as shown in the photo at the right, to gauge the beginning and end of a recessing cut that is made on each side of each leg to form the end sections desired. As indicated, a push stick must be used for this operation, as your left hand will be over the jointer head at the end of the cut

Q—What is a recessing cut, and how can it be made on your jointer?

A—Place a stop block or clamp near each end of the jointer as shown in the upper photo at left. Position them so recess will start and stop at the proper distance from the ends of the work. Now, make two cuts, one from each end, so that you will have the result shown in the lower photo. Make a third cut if a straight edge is required on the recess





Q—How do you use a jointer to cut an accurate rabbet across the grain, and what hand tool is needed to aid in making the cut?

A—To cut the rabbet, make the pass as shown in the photograph above. The hand tool is a pusher-hold-down, which must be used, not only to protect fingers, but to keep the stock flat on the table throughout the cut. Assemble the pusher-hold-down from a few blocks of wood. To assure a uniform width of the rabbet, hold the end of the stock firmly against the jointer fence



Q—When a board is warped across its width so that one edge is bowed and the other dished, what procedure should be used to straighten it on a jointer?

A—Start as shown in the photo above by jointing the dished edge. The first pass will produce good bearing surfaces that permit making successive passes until the edge is straight. Hold the straightened edge against the fence of a table saw and rip the board to a uniform width



Q—Bevels can be made on a jointer by tilting the fence either forward or backward. How do you determine which method should be used?

A—It is necessary to use the open angle—fence tilted backward—when beveling large pieces as shown in the photograph at the left. When the size of the stock permits, use the closed angle—fence tilted forward toward the table—as it is the safer of the two methods

Q—A long taper—specifically 10 in. long and 1/4 in. deep—is required on all four sides of four table legs. Where should the stop block be located on a jointer and how should the stock be placed?

A—Clamp the stop block to the infeed table, as shown in the photograph at the right, so that the 10-in. mark on the stock is directly above the jointer head. Set the depth adjustment to 1/4 in. and lower the work with one end butted against the stop block. As soon as the work contacts the outfeed table, advance it to make the cut



Compass on Tractor Saves Steps



Farmers laying out fields for plowing can be assured of straight lines by using an auto compass mounted on the tractor. With a plow attached to the tractor, start on one side of the field and drive across keeping the compass reading constant. This will result in a straight furrow from which to start working the field. The method is especially helpful where terrain demands diagonal planting of fields.

Max Stickelman, Rossburg, Ohio.

Dam Prevents Gully Erosion



To prevent further erosion in a gully through which water ran during every heavy rain, a field dam and draitile inlet were built across its upper end. Concrete wings were poured to retain the banks on each side of the gully and a slab was poured on the uphill side of the draitile. An earthen dam was built on the downhill side. A grating made from steel angles welded to cross braces prevents debris from clogging the tile.



Trailer-Mounted Fence Reel

Unwinding woven-wire fence is no problem when using this trailer-mounted reel. It consists of two 2 x 4s bolted to the trailer bed to support a pipe axle. The axle rests in slots formed between the ends of wooden blocks spiked to the top surface of each 2 x 4. Boards nailed over the ends of the slots keep the axle positioned endwise. Rolls of barbed wire also may be unwound by this method. To unwind more than one roll at a time place a wood or metal disk on the axle between the rolls.

G. E. McVicker, Bethesda, Md.

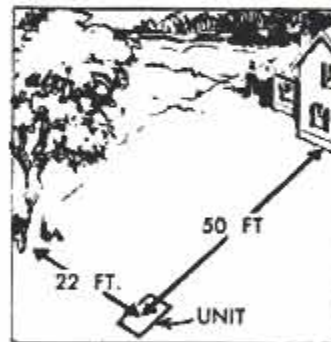
Pressure Tunnel for Hay Drier Made From Compacted Bales

Tightly compacted hay bales instead of expensive wood were used by one farmer to construct a pressure tunnel for directing air from a drying fan through loose hay stored in a haymow. The tunnel sides are three bales high and the tunnel top is formed by placing bales at right angles to the walls, with the ends of the bales resting on the walls. The drying fan has a 36-in. blade that is driven by a 5-hp. electric motor running on 220 volts.

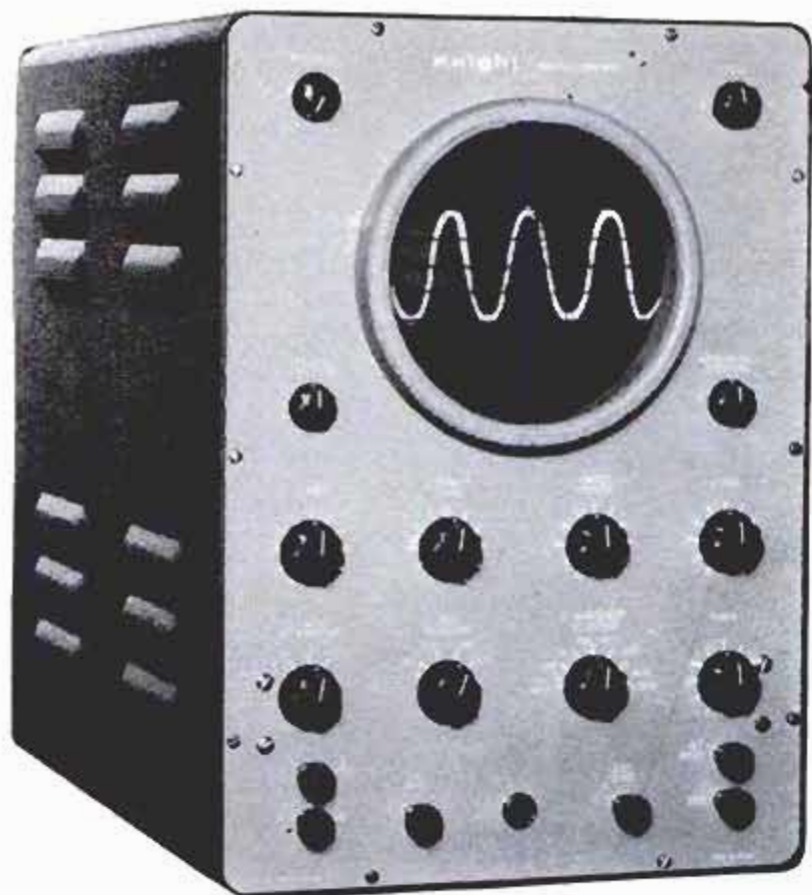
A. E. Holden, Angola, Ind.

Underground Location of Well Found With Two Pieces of String

Keeping a rough sketch, with dimensions, of the exact location of a dry well or septic tank in its relation to two permanent objects will enable you to find it easily when repairs or improvements are necessary. To find the well, cut two pieces of string corresponding to the two specified measurements as shown in the illustration.



Attach them to the respective objects and draw them taut at their fullest extent. Where the ends meet should be the location of the well.—Art Kaser, Niles, Mich.



Why Buy an OSCILLOSCOPE?

SERVICING of modern electronic equipment is big business. Big—and complicated. Gone are the days when almost anyone could repair a radio with little more than a screwdriver and a soldering iron. Today, with television and high fidelity, not to mention the unlimited field of industrial electronics, the technician must be skilled in the use of many test instruments, one of which is the oscilloscope.

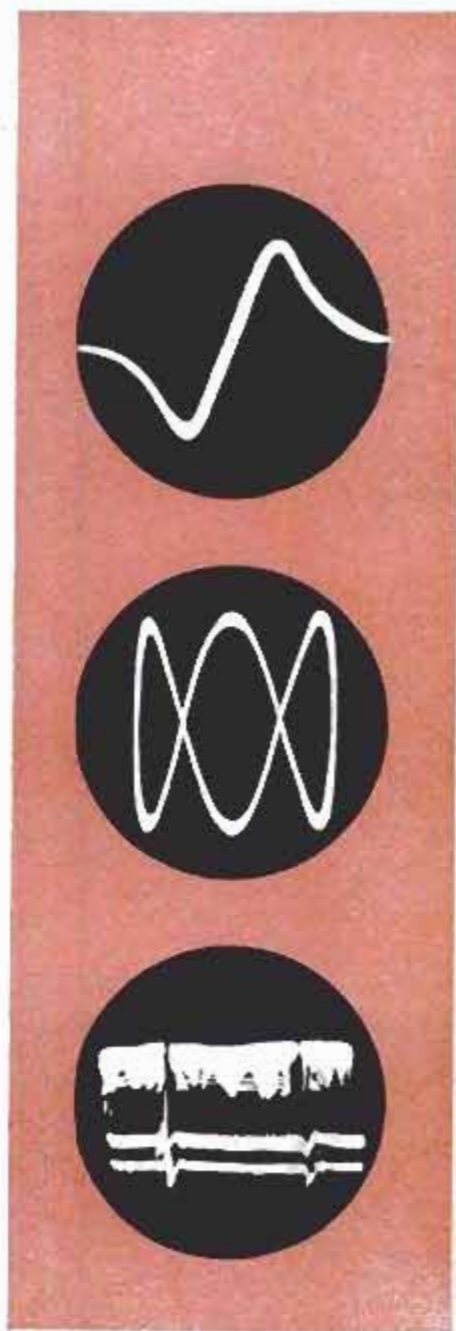
To the experienced serviceman, the oscilloscope needs no introduction. But to the thousands of newcomers who, each year, enter the electronics field as students or experimenters, it is still an object of mystery, to be purchased only after a thorough knowledge of electronics has been acquired. It is seldom realized that the scope is an excellent aid in the study of electronics, as well as being indispensable for more advanced work.

The greatest value of the oscilloscope

By
Otto
Fried

lies in its ability to show an actual picture of the signal at any point in an electronic circuit. This picture, properly interpreted, indicates flaws and defects which are virtually undetectable by any other testing method. In the study of electronics, the observation of the signal wave forms as they actually appear, as well as the effects caused by defective components, is often far more effective than the reading of lengthy texts in demonstrating fundamental theory.

The heart of the oscilloscope is the cathode-ray tube, a unit similar to the picture



tube of a television receiver. The principle of this tube is shown in Fig. 1. The electron gun, mounted in the neck of the tube, creates a stream of electrons, called the electron beam, which is "shot" towards the screen. If the proper voltages are applied to the various elements of the gun, the beam will be focused so that all the electrons strike the screen in a very small area, causing a tiny circle of light to appear in the center of the screen.

In traveling from the gun to the screen, the beam must pass between two sets of deflection plates. These are so arranged that the horizontal plates are to the left and right of the beam, while the vertical plates are above and below. If a voltage is applied to the horizontal plates so that the one on the right is positive with respect to the left one, the beam, in passing, is attracted toward the positive plate. The forward momentum of the beam quickly carries it past the plate, but not before it has been deflected. As a result, the beam will no longer strike the screen in the center, but at some point at the right. The greater the voltage on the plate, the more the beam will be deflected before leaving the field of influence of the plate. Similarly if one of the vertical plates is made positive with respect to the other, the beam will be deflected up or down, depending on which

plate has received the positive voltage.

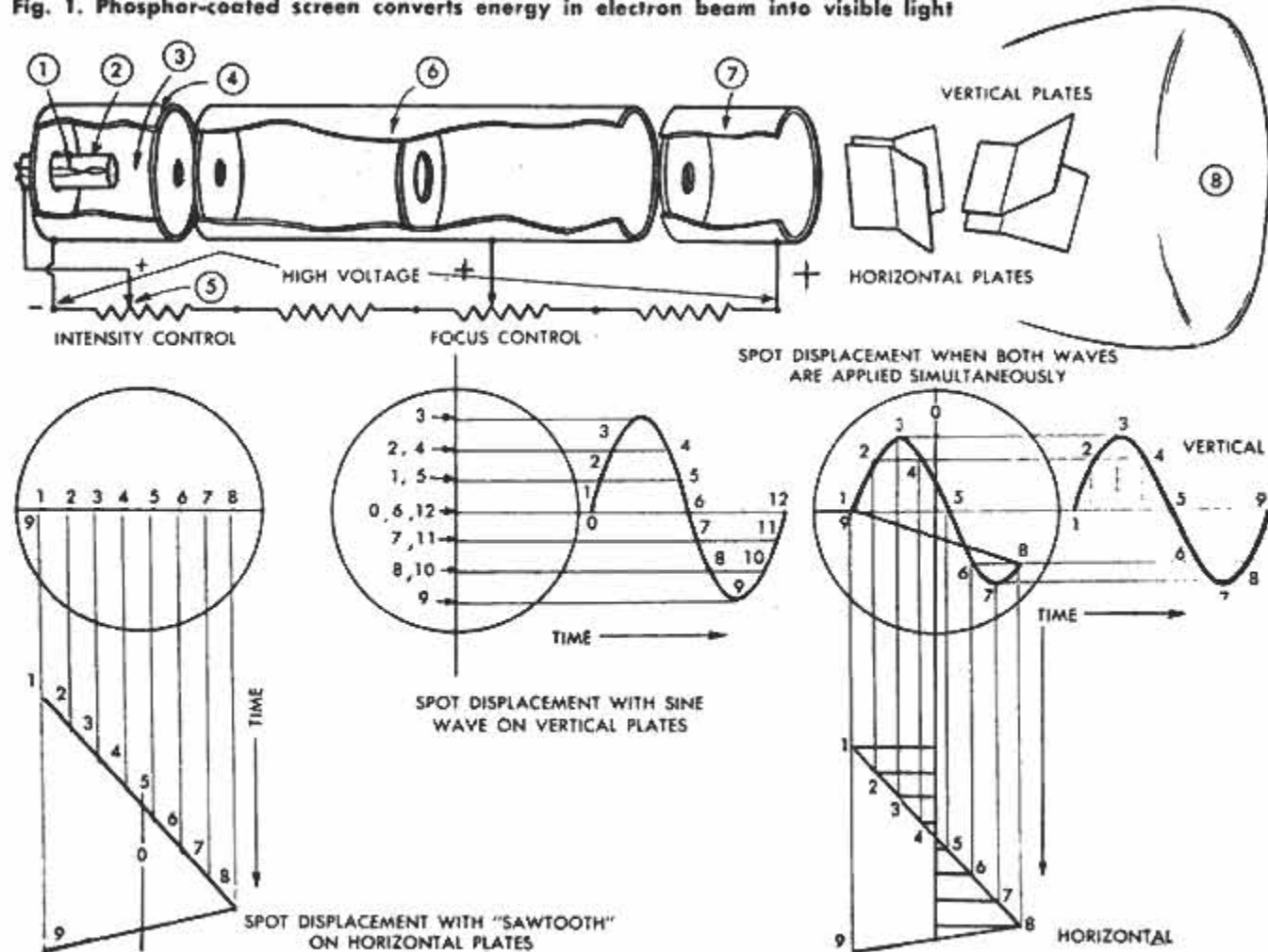
Now, let's see what happens when a "saw tooth" wave of voltage is applied between the two horizontal plates. This wave causes the voltage on the right plate to vary gradually, at a linear rate, from some negative value to a positive value. At the end of the cycle, this voltage will drop very rapidly back to its original negative value. As a result, the beam will first strike the screen at the left edge, travel slowly to the right, and at the end of the cycle, return quickly to its starting position. If this saw-tooth wave is applied at a rate of more than 15 or 20 times per second, the eye cannot follow the rapid movement of the beam, so that a single horizontal line, or trace, will appear on the screen.

If a sine wave of voltage is applied to the vertical plates, the beam will be deflected up and down. But, if a sine wave is applied to the vertical plates at the same time that a saw-tooth wave of the same

HOW ELECTRON GUN WORKS

Filament (1) heats cathode (2) which emits electrons (3). Voltage between cathode and grid (4), as determined by setting of intensity control (5), controls the number of electrons in the beam. Voltage on first anode (6) propels electrons towards screen (8). Correct voltage between first and second anode (7) causes beam to be focused at the screen.

Fig. 1. Phosphor-coated screen converts energy in electron beam into visible light



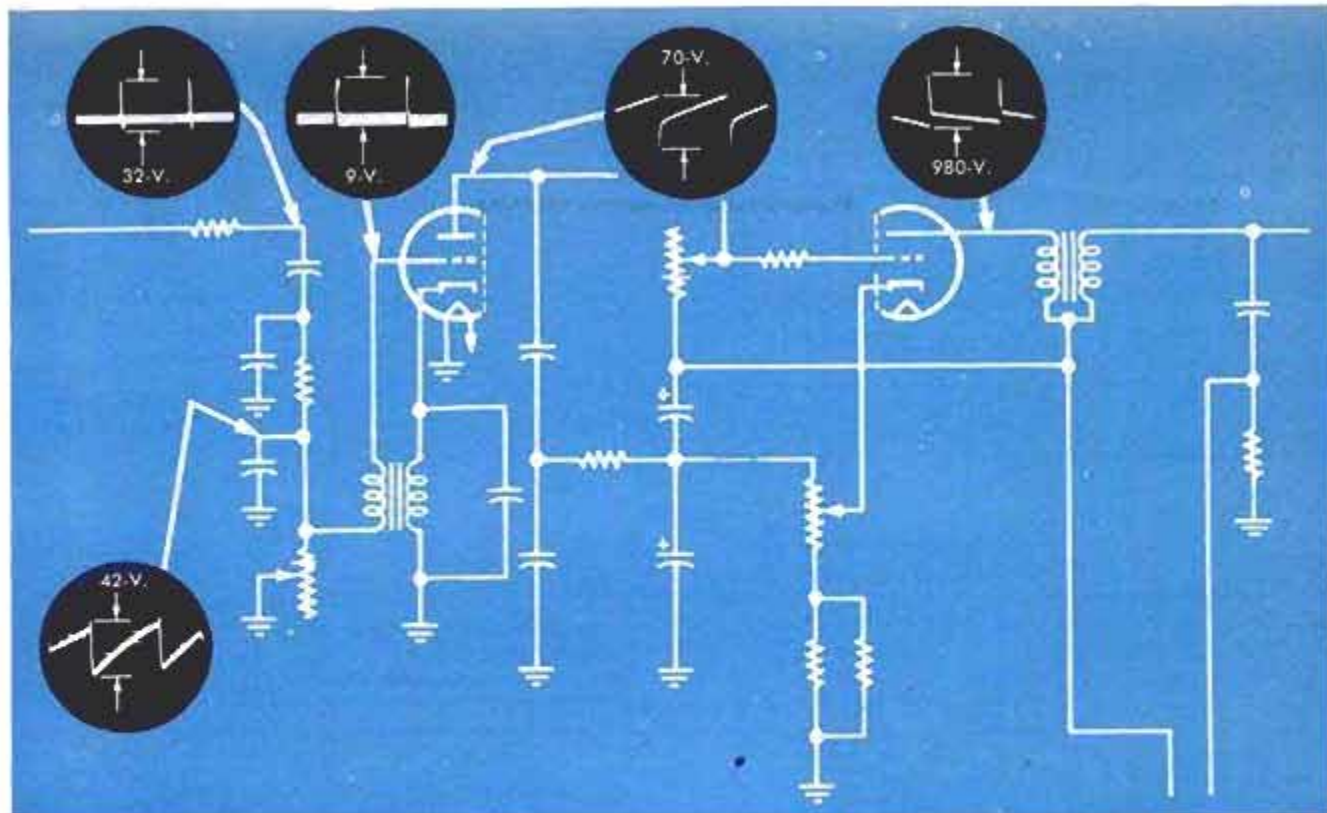


Fig. 2. Information in typical television-service manual simplifies trouble shooting by wave-form comparison

frequency is applied to the horizontal plates, the beam will move in both directions simultaneously. As a result, a replica of the sine wave will appear on the screen.

In the same manner, the trace will faithfully follow any wave applied to the vertical plates, *regardless of its complexity.*

Every oscilloscope contains a saw-tooth "sweep" generator whose output is applied to the horizontal plates. What's more, the frequency of this generator can be varied, so that we can see a part of a cycle, a full cycle, or a number of cycles of any wave applied to the vertical plates.

Oscilloscope Applications

No other single instrument has as many

applications as the oscilloscope. In fact, its uses are so numerous that only a few of the more important ones can be described here.

Wave-Form Analysis: One of the most-important service applications of the oscilloscope is for signal tracing and wave-form analysis in television receivers. So important is this method of trouble shooting that service manuals include the correct wave forms at various test points in schematic diagrams. By comparing the wave form actually appearing on the oscilloscope screen with the one shown on the schematic, you can tell at a glance if the receiver is operating properly at that point.

Fig. 2 shows information given on a

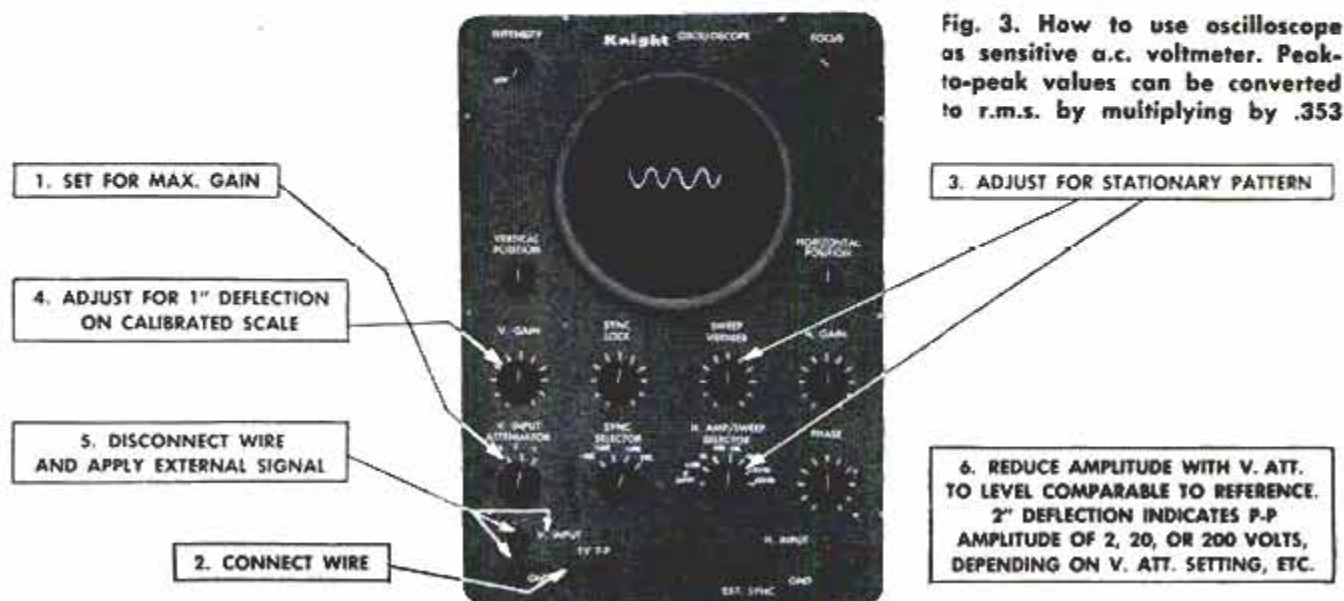


Fig. 3. How to use oscilloscope as sensitive a.c. voltmeter. Peak-to-peak values can be converted to r.m.s. by multiplying by .353

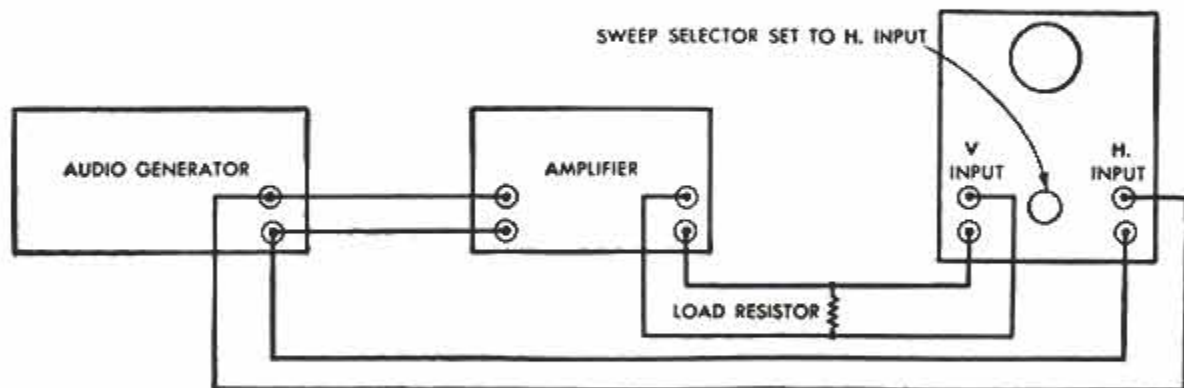


Fig. 4. Oscilloscope shows amplifier distortion. Top, with "saw tooth" sweep. Bottom, with sine-wave sweep

schematic of a typical television set. This information includes not only the correct wave form but also the peak-to-peak voltage of the wave. Normally, voltage readings are taken with a voltmeter, but since such a meter gives no indications of the actual wave shape, its use is severely limited. The oscilloscope itself can provide accurate voltage data.

A.C. Voltage Measurements: The amount of beam deflection is directly proportional to the amplitude of the voltage applied to the deflection plates. Therefore, if a voltage of known amplitude is applied to the vertical plates, to serve as a reference, the amplitude of an unknown voltage can readily be determined by direct comparison. For example, if the reference voltage causes a 1-in. deflection, any voltage causing a 3-in. deflection will have three times the amplitude of the reference. Proper use of the scope controls (see Fig. 3) permits rapid voltage measurements from a fraction of a volt to several hundred volts.

Many modern oscilloscopes have a built-in calibrating voltage source. For those not so equipped, any known voltage can be applied externally to serve as a reference.

Distortion and Phase Shift: Distortion in electronic equipment may be difficult to

detect by ear, but it is readily apparent on the oscilloscope screen.

Distortion is particularly disturbing in high-fidelity amplifiers and similar audio equipment. To detect its presence, merely feed a signal from a good audio generator to the input of the amplifier, and view the amplifier output on the scope screen. Some of the patterns which may be encountered are illustrated at the top of Fig. 4.

Every oscilloscope has provisions for disconnecting the internal saw-tooth sweep so that a sine wave from an external source can be used for the horizontal sweep. This results in a variety of patterns, called Lissajous' figures, on the scope screen which, when properly interpreted, will provide even more information about the performance of an amplifier. The test setup and some typical patterns which may appear are also shown in Fig. 4. Even a slight departure from the normal straight-line pattern indicates some amplifier non-linearity or peak-clipping, while an elliptical or circular pattern shows phase shift in the unit under test.

Frequency Measurements: By means of Lissajous' figures, the frequency of an unknown signal can be measured with a great

(Continued to page 272)

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Door Shrinkage

Q—The front door of my home has six solid-wood panels with beveled edges that fit in grooves cut in the sides and cross members. The door was painted before hanging about a year ago. Now I notice unpainted wood at the edges of the panels and there are slight ridges at the extreme edges of the painted areas. The areas of bare wood are about $\frac{1}{8}$ to $\frac{1}{4}$ in. wide.

—K. L., Mo.

A—Shrinkage of the door panels is the cause of the exposed bare wood. Probably the wood has lost its excess moisture and has now stabilized to the point where no further shrinkage will occur under normal conditions. If we can assume that this is so, then the wood should be repainted to prevent absorption of moisture through the exposed edges of the panels. The slight ridges you refer to are caused by an accumulation, or fillet, of paint at the points where the panels join the stiles and rails. The ridges should be leveled by sanding before repainting. Apply two coats of outside paint in the color desired. Be sure to paint the top, bottom and both vertical edges of the door, thinning the paint somewhat for the first coat so that it will penetrate and give added protection against absorption of moisture. Before painting the edges, it might be well to check the fit of the door as it often happens that the addition of two coats of paint to the total width will cause a door to fit too tightly. If necessary plane the stiles lightly to assure correct fit.



Unstable Floor

Q—My living room is 14 ft. wide and when one walks across the floor the furniture moves perceptibly and the floor boards squeak. Joists are spaced 16 in. on centers and seem to be in good condition, as the basement is quite dry. It has been suggested that I double alternate joists, bolting the new ones to the old. Also I've thought of putting in an extra beam. Which is better?

—L. G., Wis.

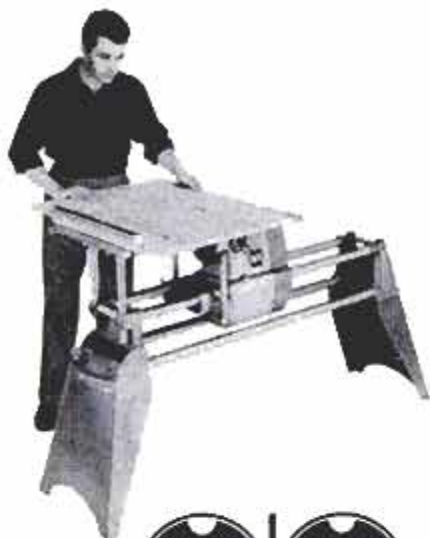
(Continued to page 268)



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(Continued from page 266)

A—The span is rather long, even for 2 x 10 joists spaced 16 in. If the extra posts are no inconvenience in the basement, perhaps the installation of an extra beam is worthwhile. If posts are objectionable, then doubling the joists as you suggest might prove practical. However, before attempting either step, we would try tightening up the original bridging, or perhaps installing two new runs of bridging, spaced equidistantly. To do this properly, it will be necessary to raise the floor with jackscrews just sufficiently to relieve the existing joists of the load. Then either cut new bridging strips, or re nail the original ones, making sure that the mitered ends fit snugly. Replace any that do not fit true. This should stiffen the floor, but for greater rigidity it may be necessary to add two additional lines of bridging. Flooring squeaks usually can be eliminated by drilling a row of holes between the joists and driving screws through the subfloor into the top floor boards.



Heat Loss

Q—What, if any, is the insulating value of ordinary window glass? I have been told that its insulating properties are quite high and that there is a marked difference between single and double-strength glass, the latter having much the greater value so far as insulating properties go. I find this difficult to accept, as my windows seem to admit a lot of cold during the winter months—R. F., N. Y.

A—Glass is not generally regarded as an insulating material, due to its sectional density. The resistance of an ordinary pane of glass to the flow, or passage, of heat is due not so much to the glass itself as to the air films on both sides. There is little difference between single and double-strength glass in the matter of resistance to passage of heat, or heat transmission. Tests made by glass manufacturers have shown that with as much as 100-deg. variation in the temperature, on one side of the pane of glass as compared with the other, there was approximately 2 deg. difference in the actual temperature of the two surfaces of the pane. It also was shown that more than 95 percent of the resistance to passage of heat, or heat transfer, was in the air films. In relatively still air these are quite effective.

Fire Mark

Q—Mine is not a problem having to do with home repairs but rather that of identifying something I found in an old home I recently purchased. It's a metal plate, apparently cast of lead or pewter, oval in shape and about 3 in. long. It was attached to the wall over an upstairs window and had been covered with many layers of wallpaper. In the center of the oval is what appears to be a crude tree. No one I've asked seems to know what it is. Could it be a family coat of arms?—T. P., Vt.

A—No. If we can judge correctly from your description it's what was known as a fire mark and is a rather unusual find. In the American Colonies, beginning about the middle of the 18th century, a fire mark attached to a building was evidence that the structure was insured against loss by fire. Fire marks were of many different designs but the oval shape was common. In some cases the pattern, usually in raised relief, had some special significance. Many marks were painted in bright colors. It is rather unusual to find a fire mark in the location you describe. Generally it was attached to a porch column, a door casing, or in some other prominent location on the exterior of the structure. It could be, of course, that the mark was moved from its original position by some more recent owner of the property, perhaps with the thought of preserving it.

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Defects in the human heart can be located better when doctors can listen to the heart from within rather than through the chest. In order to get inside the heart, a tiny transducer, measuring only $\frac{60}{1000}$ inch in diameter, has been developed. This is inserted in the heart on the tip of a heart catheter, and "broadcasts" the sound of the heart through the catheter to a tape recorder. When played from the tape, the heart sounds are amplified so that heart specialists can hear them easily.

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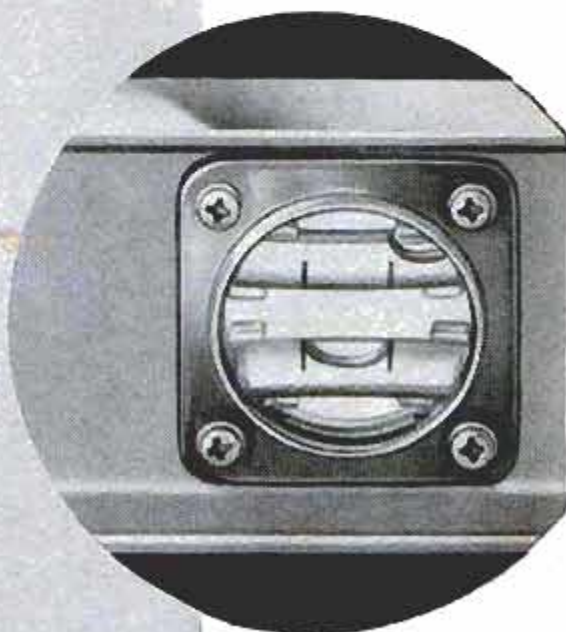
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Why Buy an Oscilloscope?

(Continued from page 264)

degree of accuracy. The test setup is similar to the one shown above, except that the known frequency signal from a generator (either audio or r.f.) is applied to the horizontal input, while the unknown signal is applied to the vertical input. The frequency of the generator is then varied until a pattern like one of those illustrated in Fig. 5 appears. The unknown frequency is then determined by this simple formula:

$$\text{Unknown frequency} = \frac{\text{number of loops touching H. axis}}{\text{number of loops touching V. axis}} \times \text{frequency of known signal}$$

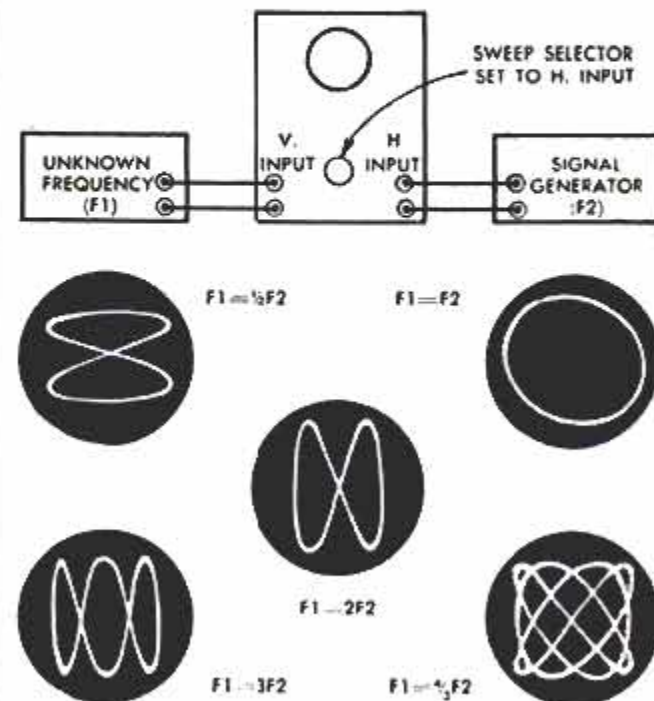
Other Applications: In conjunction with a separate sweep-frequency generator, the oscilloscope represents the quickest, most accurate means of aligning FM and television receivers. Procedures for doing this are included in all service manuals.

The radio amateur will find the scope indispensable for checking transmitter modulation percentages and testing the performance of home-built equipment.

Industrially, it is widely used for armature testing, pressure measurements, resistance welding, motor tune-up and testing photographic shutters, and numerous other applications.

Modern oscilloscopes are available in kit form at prices ranging from about \$30 to \$100. The instructions provided with these kits are so explicit that, if you have done any previous wiring, you should have little difficulty in assembling one of these. ★ ★ ★

Fig. 5. Oscilloscope test setup and patterns for frequency measurements. Calibrated generator is needed



"How do you pick a durable paintbrush that'll do an easy, streak-free job?"

LEO B. SMITH, *Smith Decorating Co., Hammond, Ind.*

"When customers ask my help in choosing paintbrushes, I point out that you judge a brush by its bristles," says Mr. Smith.

"I show my customers that really fine brushes have bristles with long, tapered tips and 'flagged' or split ends. Furthermore, the bristles are of different lengths and are formed to a full head. To demonstrate, I show them a well-made brush with Du Pont TYNEX nylon bristles.

"Brushes with TYNEX nylon bristles come in all sizes, including the handy, narrow widths. What's more, your brush is easy to clean, when it's made with TYNEX, which means you'll be able to use it and re-use it and always get top results.

"When you see the trademark TYNEX on the handle," I tell my customers, "you're sure you're getting the best."

FREE! 8-page booklet full of helpful painting tips. Write Du Pont Company, Polychemicals Dept. PM10, Wilmington 98, Del.

TYNEX is the registered trademark for Du Pont nylon bristles



1. PICK UP MORE PAINT! Actual photo shows how tapered TYNEX nylon bristles are tipped and flagged for better paint pickup—unsurpassed by any other bristles.

2. FLOW IT ON SMOOTH AND EVEN! You can do streak-free work with any paint, varnish or lacquer . . . on any

surface. And TYNEX bristles last 3 to 5 times longer than natural bristles.

3. CLEAN IN ANY SOLVENT! When you're finished, just dip the brush in cleaner recommended by the paint manufacturer. Paint loosens readily, can be thoroughly rinsed out.



BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

TORO



\$169⁵⁰*...*the best you can buy*

Extra-heavy steel castings . . . mirror-polished working surfaces . . . years-ahead design features (like the single out-in-front control that either tilts—accurate to 1/10 degree—or raises the blade) . . . all these are yours in the Toro 10-inch Deluxe Tilt-arbor Saw—the *best* table saw you can buy.

Other professional-quality machines in the Toro home power tool line include: an 8-inch Deluxe and an 8-inch Standard Tilt-arbor saw,

a 12-inch drill press, 10-inch band saw, 18-inch jig saw, 4-inch belt sander, 4 and 6-inch jointer-planers.

You can see them all and get all the specifications in the latest full-color Toro Power Tool Catalog. For your free copy write Toro, 3016 Snelling Ave., Minneapolis 6, Minnesota.

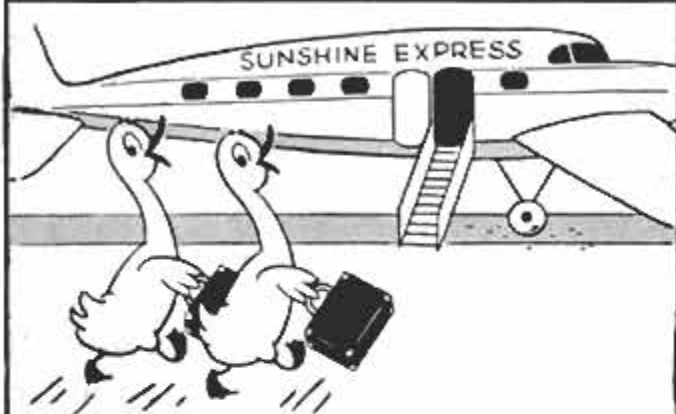
**Table extensions and stand extra. Prices higher in the West and Canada; subject to change.*

TORO



TORO MANUFACTURING CORPORATION • MINNEAPOLIS 6, MINNESOTA

Looking for Something?



**FROM AIRLINES TO
TRAVEL BUREAUS
WHATEVER YOU NEED**



Ads with this emblem make your shopping easier

The PM Big-Family House

(Continued from page 166)

"Balance is a key factor in designing a house of medium size," says Weist. "One thing we have avoided in this house is the look of a Ford with Cadillac fenders."

All interior partitions of the house are formed of dry-wall panels two feet wide and joined by steel splines. An opening of $\frac{1}{8}$ inch between the panels permits a variety of metal or wood shelves, cabinets or other accessories to be suspended from them. The spline panels are especially useful in the closets. The panels can be painted or papered and are also available in wood veneer.

The roof of the house is supported by conventional 20-foot trusses so none of the interior walls is load bearing. Thus, it is possible, as the family grows up, to change the room arrangements with the least bother. The play area can be eliminated and bedrooms enlarged. Also, an addition can be added easily to the children's area.

All materials in the PM Big-Family House are standard and readily obtainable in any lumberyard. The siding is vertical redwood rough boards; the stone can be Indiana limestone, Wisconsin Lannon stone or something similar; windows are made of redwood vertical-grained sash and frames can be double-glazed or not as the builder prefers; aluminum screens fit on the inside for easy maintenance; sliding glass doors to the rear patio have aluminum frames and sash.

The walls of the house are conventionally framed, studs on 16-inch centers with insulation and plywood sheeting between the inside dry wall and the exterior redwood. The attic is fully insulated. Shingles are conventional asphalt.

The big question about any new house is: How much does it cost? Building costs vary by thousands of dollars for various parts of the country. We had this house estimated in South Bend for \$20,000 including the lot. The house can be built for considerably less by omitting the fireplace and partial basement and using a carport instead of the garage. As the house is shown, it will fit on a 65-foot lot.

A variation of the plan is available with the fireplace at the end of the living room (Page 166) and with a canted roof that lends a distinctly modern effect.

The editors of this magazine believe that the PM Big-Family House will rank high among the successful houses we have presented to our readers in the past. We think it is one of the most livable houses we have seen anywhere. Of one thing we are sure: It's not just another house! ★ ★ ★

GLIDDEN GUIDE

to Every Kind of Painting



HOW TO

Protect the beauty, life and value of your home with modern, easy-to-use Glidden paints

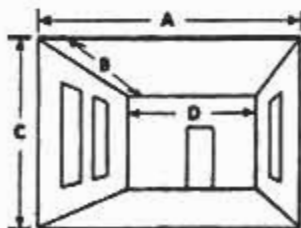


Paints are no longer just lead and oil. Glidden paints...easier and more economical to use...are the result of chemical formulations developed to give the best possible results at lowest cost.

You add value and beauty to your home with the right paints, the right colors. The next 6

pages contain up-to-date information on just about every job you'll want to do around the house, with helpful tips on technique. Use this valuable guide, and the expertly made paints recommended, to protect the beauty, life and value of *your* investment.

HOW MUCH PAINT WILL YOU NEED?

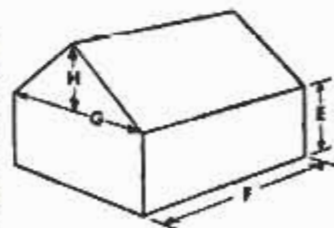


INSIDE

Multiply length (A) by width (B) for ceiling area. Multiply height (C) by length (D) for each wall. Add results for total area, allowing for windows, doors, etc. Divide total square feet by 500 (average sq. ft. coverage per gallon) for total amount of paint needed.

OUTSIDE

Multiply height (E) by length (F) for each side. For gables, multiply (G) by (H) and divide by 2. Add results, making allowances for doors, windows, etc., and divide total by 500 (average sq. ft. coverage per gallon). Allow 20% more paint for very rough surfaces. 50% more for first coat on concrete block.



GLIDDEN GUIDE to every kind of Painting

CUT PAINTING WORK 46% WITH SPRED SATIN

As the photos show, SPRED SATIN, the 100% latex wonder wall paint, goes on twice as fast as ordinary paints with either brush or roller—and with only about half the effort.

Other SPRED SATIN features help you do a better job faster and easier: fast drying, easy touch-up, no streaks, sags or brush marks, no unpleasant odor.



Trace-motion photos show professional painter using 2 different paints. With ordinary paint (left) painter had to do almost twice as much brushing. SPRED SATIN (right) flows on smoothly, quickly, covering same size area, same surface, with 46% less work.



Never paint from full can. To take advantage of SPRED SATIN no-drip feature, dip brush only 1" into paint, slap bristles against inside of can. Surface tension binds paint to brush until applied.

How to do it EASIER, FASTER with SPRED SATIN



CLEAN SURFACE. Fix all nicks and cracks with SPRED PATCH.

Sand, spot prime patched areas. Dull glossy surfaces by sanding, or with SURFACENE.



WITH ROLLER... cut in edges with brush. Overlap each roller stroke 50%, or, use clean 4" brush, apply generously with short strokes. SPRED SATIN leaves no brush, lap, sag marks.



EASY TOUCH UP... by stippling lightly with tip of brush. Touch up anytime with SPRED SATIN, without leaving a mark!



EASY CLEAN-UP... wash roller, pan, brush with warm soapy water. Rinse. That's all there is to it!



Start with ceiling. Arrange platform or ladder for safety and comfort, paint a strip as wide as you can comfortably reach. SPRED SATIN no-drip feature makes ceiling painting much easier.

PAINT AND TEXTURE WALLS IN ONE EASY OPERATION WITH

SPRED STIPPLE-TEXTURE

Here's the newest, easiest way to get beautiful textured effects on exterior or interior walls. New SPRED STIPPLE-TEXTURE gives you all the application advantages of SPRED SATIN, and a durable, washable finish that will stay new-looking for years.



FOR LATEST SOFT LUSTRE EFFECTS ON WOODWORK USE EASY, SMOOTH-FLOWING SPEED-WALL

in colors matching
SPRED SATIN



Use SPEED-WALL on woodwork, cabinets or furniture where a washable, soft lustre enamel finish is desired. SPEED-WALL may be used for both interior and exterior painting.

Good decorating has become more and more important in the home painting field. You can obtain the latest soft lustre decorating effects on woodwork with Glidden SPEED-WALL semi-gloss Alkyd enamel. Colors match or harmonize with SPRED SATIN. Easy to apply, fast drying, durable and washable.



THE GLIDDEN DRAMATONE SYSTEM *Solves all your color problems*

Use color with confidence! The Glidden Dramatone system is the safest, surest way to success with color. Back of each big, 4" chip tells exactly how to mix special colors. Chips are designed for you to take home to see how colors will look in your home . . . contain complete color harmony and decorating information.



You can have brilliant, tile-like beauty in kitchens, bathrooms, on furniture, with **JAPALAC ENAMEL**



JAPALAC looks, wears and washes like baked enamel. Excellent for interior or exterior surfaces, flows on smoothly, dries quickly without brush or lap marks.

JAPALAC colors stay brilliant, making it excellent for furniture and other surfaces that get hard wear. Apply with tip of brush. Does most jobs in one coat.

NOW!
**JAPALAC IN
SPRAY CANS**



Perfect for painting porch furniture, bicycles, etc. An easy touch-up method, too!

The same JAPALAC colors that match those you now get in regular cans.



GLIDDEN GUIDE

to every kind of Painting

SOLVE PEELING, STAINING, FADING PROBLEMS ON STUCCO, MASONRY, ASPHALT AND ASBESTOS SHINGLES WITH SPRED GLIDE-ON!



PAINT A ONE-STORY HOUSE OVER THE WEEK END!

SPRED GLIDE-ON goes on so fast and easy, with brush, roller or spray, that you can paint the average one-story masonry ranch-type home in a single week end. This revolutionary vinyl paint for exterior masonry surfaces dries in minutes to a beautiful suede-like finish.



GLIDE-ON ADDS YEARS TO ROOF LIFE, COOLS YOUR HOME TOO!



PREMATURE PAINT FAILURE? SPRED GLIDE-ON resists the premature paint failure common to other masonry paints because its tough vinyl film resists cracking, peeling, blistering, staining, acid and alkali action.



PAINTING CONCRETE BLOCK? Fill small holes and pores with SPRED STIPPLE-TEXTURE, the ideal filler for interior and exterior masonry block—provides complete water-repellent surface.



SPRED GLIDE-ON resists the most extreme weather conditions. Keeps moisture out, yet surface "breathes" to let vapor escape from inside, prevents blistering.

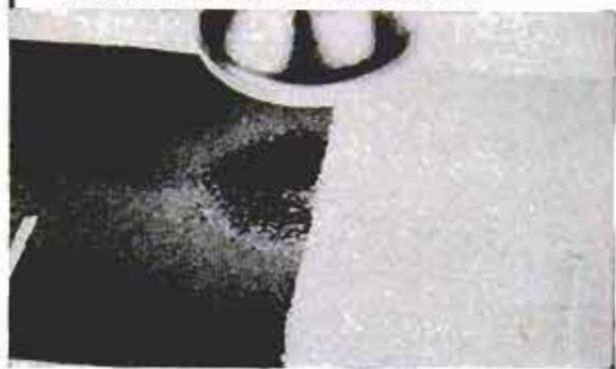


CLEAN UP IN SECONDS! Just rinse brush or roller and other equipment in warm soapy water, and rinse.



Proven by test to be amazingly effective on tile, asbestos and asphalt shingle roofs! Cools by reflecting instead of absorbing heat . . . protects by sealing surface against dirt and weather.

Unretouched photo shows how heat from 375-watt infra-red bulb "boils" unpainted asphalt shingle surface. Area protected by GLIDE-ON is undamaged because intense heat is reflected.





GET MAXIMUM EXTERIOR BEAUTY AND COMPLETE PROTECTION WITH GLIDDEN HOUSE PAINTS



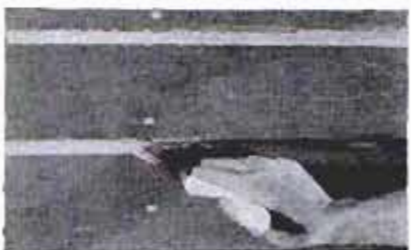
Surface must be clean, smooth and dry. Sand rough spots, dust clean.



Caulk all joints next to windows, etc. Putty all nail heads.



Clean metal surfaces with wire brush. Spot-prime bare spots on old metal.



Cut in bottom edge of each board before painting face.



Apply paint liberally. Brush well into surface. Level with sweeping finishing strokes.

ONE-COAT WHITE SAVES TIME, MONEY!

If you want to do a 2-coat job in one coat, save half the time, nearly half the cost of painting a white house with Glidden ENDURANCE IMPERIAL. Only one coat of this premium quality paint will beautify and protect your home for years! Alkyd fortified and precision balanced for a long life.



SOLVE SHINGLE AND SHAKE PROBLEMS

ENDURANCE Resists Rot, Decay, Warping



ENDURANCE Shingle and Shake Stain preserves and protects shingles, shakes and rough-surfaced lumber. Prevents rot, decay, moisture and insects. Penetrates deeply to retard warping, curling, splitting. Wide selection of attractive colors.

ADD DISTINCTIVE BEAUTY WITH ENDURANCE

If you're looking for "picture book" colors, durability and quality in a house paint—you'll find the ideal combination in Glidden ENDURANCE. Easy to apply, retains color and beauty for years! Ideal for painting shutters and other trim, too!



GLIDDEN GUIDE

to every kind of Painting

FOR FAST, EASY, PROFESSIONAL RESULTS USE GLID-TONE—COMPLETE WOOD FINISHING SYSTEM

GLID-TONE

Complete Line of
Wood Finishing Products

- **GLID-TONE WOOD STAIN**
Furniture, paneling, all exterior and interior wood surfaces.
- **GLID-TONE SATIN-SHEEN VARNISH**
Creates hand-rubbed effects.
- **GLID-TONE GLOSS VARNISH**
For floors, trim, bar and table tops, furniture—the all-purpose interior varnish.
- **GLID-TONE CRYSTALACQ**
Water-clear brushing lacquer.
- **GLID-TONE NATURAL WOOD FILLER**
Fills pores in open-grain woods.
- **GLID-TONE SPAR VARNISH**
The superior spar varnish for all exterior surfaces including boats.
- **GLID-STRIP**
Non-flammable paint, varnish remover.

There isn't a wood finishing job around the house or in your hobby shop that you can't handle like a craftsman with GLID-TONE products. Use on any type of wood, plywood or veneer. Wide range of staining colors, for exterior or interior use.



New wood must be dry, smooth. For light modern finishes, bleach, stain with GLID-TONE Platinum or Blonde—protect with GLID-TONE Varnish.

Clean old wood to bare surface with GLID-STRIP. Sand smooth, then finish as new wood. Restore and refinish antiques the GLID-TONE way!

HOW TO PROTECT EXTERIOR AND INTERIOR FLOORS OF CONCRETE, WOOD OR LINOLEUM

FOR CONCRETE: PLI-NAMEL

Indoors and out, patios, porches, basement floors look better, get more protection when painted with Glidden PLI-NAMEL, synthetic rubber base high-gloss enamel.

FOR WOOD AND LINOLEUM: FLORENAMEL

Porch floors, sun decks, steps—any surface that gets lots of wear will look better, last longer with FLORENAMEL. Dries overnight.

SCUFFING is no problem on floors painted with PLI-NAMEL. Sticks where others fail.

EXTRA WEAR FROM OLD LINOLEUM . . . and a modern stippled finish can be obtained with a sponge and FLORENAMEL.



Glidden *Pacemaker in Paints*

The Glidden Company, Cleveland 2, Ohio. In Canada: The Glidden Company, Ltd., Toronto, Ontario. SPRED products also sold by dealers for the following points: HEATH & MILLIGAN • CLIMATIC • ROYAL • T. L. BLOOD



Here's Your House of the Near Future

(Continued from page 196)

by a watertight sliding glass door. Inside is a reclining chair instead of a tub or vacant shower space. This section can be partially filled with water for a bath or used as a sit-down shower. In the ceiling are various health lamps and oil sprays.

Kitchen Core

For several years I have been taunting the kitchen-appliance manufacturers with the fact that they are continuing to make a kitchen for an obsolete method of preparing food. Preprocessed foods are not only here but are gaining such a tremendous acceptance that soon there will be little else on the market. This eliminates the need for mixing, peeling, blending and other devices used in the preparation of raw foods. The core I have designed takes full advantage of this fact and is, I suppose, a revolutionary unit.

All food, housewares and appliances are contained in the core. This unit would be loaded from the rear outside the house. All power equipment (needed to raise and lower the shelves) would be available from the outside at the end of the core, as well as on the inside. The housewife would do all her work in a narrow band from 25 inches to 66 inches high. This would relieve kitchen fatigue and add to the speed and enjoyment of food preparation.

Refrigerated, frozen, sterilized, dried and canned foods would be contained in a rear elevator, bringing them within easy reach across an 18-inch-deep work area. Glasses, dishes and tools would be stored in the food elevator section since continuous access is not a factor. Soiled implements would be returned to their regular place and would be cleaned at the press of a button. The counter would contain all preparation equipment and cleaning areas for it.

In addition to the food core, the large kitchen affords plenty of space for dining and a laundry area.

Power Core

This would contain all heavy equipment such as ventilating, heating and air conditioning. It is disconnected from the house proper to prevent any transmission of noise or vibration. This prepackaged unit would require only water supply and electricity to keep the house in whatever atmosphere is desired by the family. It would contain a heat pump, ventilating equipment, air purifier, odor and germicidal control. The

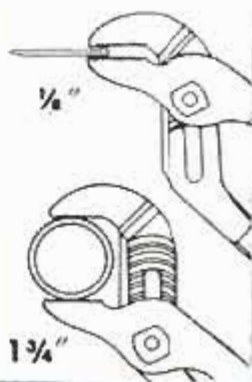
(Continued to page 282)

help yourself
to the
handiest
plier
ever
designed

CHAN NEL LOCK

No. 420

GRIPS LIKE
A PIPE
WRENCH



No other plier does so many jobs so well as a Channellock No. 420. Grips anything from a small cotter pin to a 1 3/4" hex nut. And what a grip! Just like a pipe wrench. What's more, Channellocks are streamlined . . . easy to use in hard-to-get-at places. Ask your hardware man for a Channellock plier. You'll soon agree with thousands of other craftsmen . . . Channellock is the handiest plier of them all.

BE SURE IT'S A GENUINE CHANNELLOCK



CHAMPION DEPARTMENT TOOL CO. MEADVILLE, PA.



Show the world
your

CHRISTMAS SPIRIT...



with these prize-winning,
worthwhile decorations

Colorful, almost life-size — these cheerful figures are completely in the Christmas spirit. Your guests and neighbors admire Santa, the quiet beauty of the Madonna, the Nativity Scene, or any of the other bright outdoor decorations.

You add your personal touch by making your own arrangement. Simply buy the patterns with the coupon below, or the unpainted figures from your lumber dealer. All figures are built with full-size Easi-Bild* Patterns—which specify each material, including 3/8" Homasote Insulating-Building Board.

Your dealer will furnish you with the Homasote Board in the size specified by the pattern. Or you can buy the figure already cut out with the painting pattern attached. To cut out the figure yourself, all you need is a key-hole saw.

Each figure has unique possibilities... a Madonna Greeting Card beside the walk, the Jolly Snowmen Greeters on the front door, or Santa and his five reindeer and sleigh on the front lawn. Your family, club or school group can enjoy a satisfying, creative project. Users of Easi-Bild Patterns tell us every year about the community Christmas competitions and prizes, and the many compliments they receive.

Get your cut-out figures, with Easi-Bild painting pattern and complete instructions attached—or the plain Homasote and pattern—from your local Homasote Dealer. It's real fun making your own Christmas decorations—easy, too—and you always get a professional job. To order patterns alone, or to find the name of your Homasote Dealer, mail us the coupon.

*T.M. Reg. Easi-Bild Pattern Company

MAKE it at home...with HOMASOTE

HOMASOTE COMPANY, Dept. K-7, Trenton 3, N. J.

I enclose..... for which send the following patterns:
 Santa Claus—35¢ Reindeer—35¢ Choir Boys—50¢
 Jolly Snowmen—35¢ Sleigh—50¢ Nativity Scene—\$5.00
 Madonna—50¢ Send name of nearest Homasote Dealer

NAME.....
 ADDRESS.....
 CITY.....ZONE.....STATE.....

power core is located at the end of the garden court below ground level. It can be elevated for servicing.

Entertainment Core

This core, stationed at one end of the living room, would integrate all equipment which has to do with group amusement or education. Home movies, television, radio, recorded music, color slides and so on will be immediately available. Some of this entertainment will be obtained by remote pickup and some would be contained in the unit on film, tape or recordings. The core could afford facilities for audio-visual home education which is becoming increasingly popular, particularly in the languages and arts.

Communications Core

This device would be enclosed in a soundproof area and would be a combination office-at-home and library. It would contain the telephone, of course, and possibly a closed-circuit television to your place of business. Here the mail could be handled. Any business or personal records would be stored here—on film. An entire library could also be stored on film in small space with a convenient viewer for reading or research. Here all types of communications could be received or sent out in complete privacy. For a large family of diverse interests, additional communications cores could be placed back to back. A small core of this type might be located in a bedroom.

Actually, this house could be built today just as it is designed. There are no materials or equipment required which are not on the market. The design of the house has a slight Japanese flavor because certain areas can be opened and closed to suit one's fancy. A basic simplicity of design is the keynote. ★ ★ ★

Peat-Taconite Partnership

Peat—one of Minnesota's most-abundant resources, yet one that is little used—may team up with taconite in the production of iron ore. Taconite is a low-grade ore containing only about 25 percent iron. It is crushed to a fine powder and the magnetic iron removed, yielding a concentrate of about 62 percent iron. The powder, however, is too fine for blast furnaces and must be formed into small balls or pellets. The University of Minnesota has been experimenting with peat as a binder for these balls. Clay, shipped in from outside the state, now is used as a binder, and the new system promises to be lower in cost.

This Coupon

brings you
the most
exciting news
in Power Tools



TOOLKRAFT CORPORATION
400 Plainfield St., Springfield, Mass.

Please send me the following:

Free folder on complete line of Darra-James power tools.

Free folder on Darra-James MotorTools

Name of my nearest dealer.

Power Tool Handbook. I enclose 10c to cover handling and postage.

NAME _____

STREET _____

CITY _____ ZONE _____ STATE _____



At Last!



MoterTools

specially designed to bring you
today's most wanted features in Power Tools!

CONVENIENT: Darra-James *MoterTools* take the guesswork out of choosing the proper motor. They come equipped complete with Timing Belt, Pulley, G.E. Motor with Cord, Plug, and Switch. **ABSOLUTELY NOTHING TO BUY.** Everything is built to the most rigid factory specifications.

TIME-SAVING: Since each tool comes equipped complete with motor and accessories, there's nothing to mount—thus, no time lost.

SIMPLE TO OPERATE: Just plug in, flip the switch and operate . . . as easy as running a toaster.

MOVABLE: Each *MoterTool* is compact and can be carried quickly and easily from one place to another . . . Move the tool to the job—NOT the job to the tool!

RUGGED: Entire tool is constructed of heavy-duty cast iron to assure many years of trouble-free service.

CHOICE OF COLORS: Darra-James *MoterTools* are available in either Woodland Green or Slate Gray to enhance the beauty of your home workshop.

ECONOMICAL: Darra-James *MoterTools* cost less than similar tools and motors purchased separately.

...Power Packed Beauties
with **BUILT--IN--MOTORS**



(Model 825)
8" TILTING ARBOR SAW

A quality tilting arbor saw at a minimum price • Cuts stock 2-9/16" thick • With extensions, rips to center of 33" panel • Motor, guard, and splitter tilt with blade to 45° • Precision-ground cast iron table (16" x 20") stays flat • Lifetime ball-bearing arbor unit • 3/4 H.P. continuous duty G. E. motor

\$114.95
without extensions or guard



All Darra-James Power Tools can now be purchased
for **ONLY 10% DOWN** through
our convenient credit plan



(Model 645)
4 1/2" JOINTER

Uniquely synchronized to maintain constant distance between table and blades at any depth of cut • Rabbits up to 3/8", planes any board up to 4 1/2" wide • Tables adjust individually for perfect alignment • Ball-bearing construction • U. S. Rubber Power-Grip Timing Belt Drive • 1/2 H. P. continuous duty G. E. motor



(Model 815)
8" TILTING ARBOR SAW

An economy saw that will perform all operations of high-priced models • Cuts stock 2 1/2" thick, rips to center of 18" panel • Blade, guard, and motor tilt to 45° • Table and work stay flat • Precision ball-bearing arbor unit • 3/4 H. P. continuous duty G. E. motor

\$89.95
without extensions or guard



ASK YOUR DEALER
ABOUT THE COMPLETE LINE
OF DARRA-JAMES
NON-MOTORIZED POWER TOOLS!



YOU'LL BE AS BUSY AS A BEAVER WITH DARRA-JAMES POWER TOOLS!

SMOOTH!



Finish rooms fast
with smooth,
strong walls of

SHEETROCK

T. M. Reg. U. S. Pat. Off.

The Fireproof Gypsum Wallboard

Walls and ceilings go up *fast* when you use tapered edge SHEETROCK. Joints are easily finished smooth and level with the wall surface. Room-height, 4' x 8' panels are simple to cut, fit and erect. Just nail them to wood framing or over old walls and ceilings. SHEETROCK walls and ceilings are strong, crack-resistant; take any decoration.



PERF-A-TAPE* JOINT SYSTEM —the secret to smoothness

Special perforated tape applied in combination with PERF-A-TAPE cement assures perfectly smooth joints. Use PERF-A-BEAD* metal corner protection to reinforce outside corner angles. For further information and FREE instruction folder, write Dept. PM-63, 300 West Adams Street, Chicago 6, Ill.



UNITED STATES GYPSUM

The Greatest Name in Building

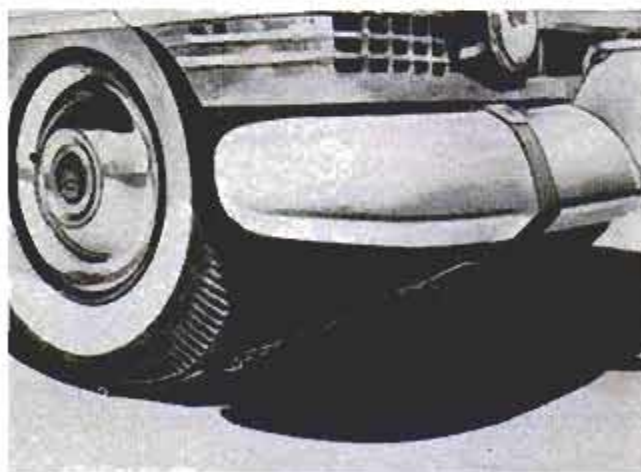


Police Call Box

Citizens of Dusseldorf, Germany, can summon police help in a hurry from a new call box. One of many being installed at strategic spots in the city, it is connected by telephone line to police headquarters. Just press a button and announce your location into the grill and police will come to your rescue.

Chain Brake Keeps Car on Jack

With one wheel locked by a bumper brake, a car cannot roll off a jack during a tire change. The brake consists of a chain that hooks around the bumper and a plate on which the wheel rests. With the wheel in position, the chain pulls tight, locking the wheel from additional movement. It takes only a moment to "set" the brake and it assures stability even when the car is jacked high as with a bumper jack, says the manufacturer.



More House for Less Money

(Continued from page 182)

the underside of the softboard roof sheathing comes prefinished from the factory, the ceilings are completely done. "And you gain free," remarks Calcaterra, "two inches of good insulation overhead." The firm's experience has been that the softboard insulation is the very best, giving no condensation or shrinkage problems, no mice or insect problems and no fire hazard after a period of years.

The seemingly forgotten exterior walls now are enclosed. Part of the exterior is wood siding. Just recently, the firm has changed from using redwood board and batten and redwood lapped siding to using Rusticwood, grooved exterior panels of 5/8-inch redwood plywood that comes wire-brushed on the outer surface. Calcaterra has found that these panels go up faster, are stronger and give less paint and shrinkage problems. The other part of each house exterior is of stucco, applied by standard three-layer practice. When possible, the firm subcontracts to have the scratch and brown coats, the first two layers, applied by the Gunit process. The finish coat is troweled on and the finish color is mixed in the finish coat, eliminating a paint job afterwards and giving a thick permanent finish that does not deteriorate.

Prebuilt Closets Moved In

Now, huge prebuilt closets are slid inside the house. Calcaterra has found he can buy closets ready-made to his specifications by cabinet shops, better closets and at less cost than building them on the job. Of 3/4-inch plywood, these are the hall and bedroom closets. When in place, they form several of the house's interior partitions, as shown by the shaded areas of the floor plan. These closets are standard height, door height, and thus will slide in through the doorways and can be moved about inside the house. The extra space between their tops and the ceiling is closed off with a panel of 3/4-inch plywood, giving an extra storage shelf above.

Most of the other interior walls are finished off with standard 1/2-inch gypsum board. Care is taken in the designing to have as few odd joints to tape as possible. The ceiling beams directly above the gypsum panels are grooved at the lumber mill so the panels can simply slide up into the grooves to finish off their top edges. In this living room, one wall is wood-paneled. The Shadowood plywood is used in most of the houses today, because of its attractiveness and because its "toasted" grooves hide

(Continued to page 286)



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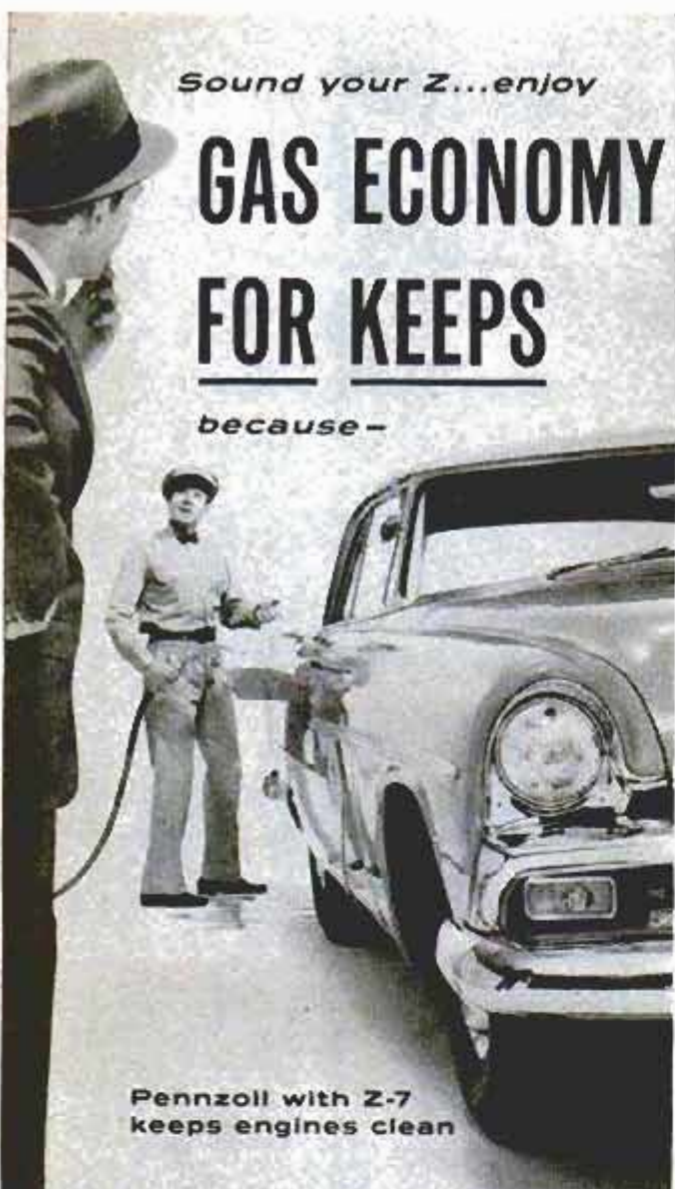
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finish nails without any problems. Kitchen cabinets are of ash, finished natural. These also are prebuilt in a cabinet shop and brought in complete. The G-E Kitchen Center is installed in these houses, complete with sink, drainboard, disposal unit, built-in range, oven, dishwasher, washer and drier. Far from cheap, Calcaterra, nevertheless, has found that it costs less to use this kitchen center than to install separate appliances and build cabinets for them.

More Cost-Cutting Tips

"There are some other things to think of, too," he says. "One is to keep your plumbing in a straight line." By this, he means to eliminate as many branch lines of piping as possible, to have bathrooms back to back and to have the bathrooms and the kitchen on either a straight line or an easy angle toward the sewer.

"Another thing we like," he explains, "is to use Novoply for all sliding closet doors. Before we used that nonwarping panel for sliding doors, we thought nothing of replacing 100 to 200 doors in a tract. Of 700 Novoply doors installed recently, we haven't had one to replace. Still another saving is to continue the brick of the fireplace full width on up to the ceiling. Yes, that costs us a little more, about \$70 more than an ordinary mantel fireplace. But it saves a bit of paneling above the fireplace, probably \$20 worth, and the important thing is that the expanse of brick adds tremendously to the appearance of the room."

McKellar and Associates spend at least a full year developing any new house plan they use. This, of course, is of little help to the individual builder. The firm decides on a certain plan, then everyone concerned spends weeks trying to find fault with it. Then a pilot house is built and, as it being constructed, each piece of lumber is counted and measured and compiled into a cutting list for precutting the lumber.

Scene is Quiet

Most anyone would picture an explosion of activity when this firm starts erecting a tract of 500 houses. No such thing happens. Actually, the McKellar developments move along more leisurely than the construction of an individual home. Only small crews are around. Only a few lots are being graded, a few roofs being finished, a few interiors being painted each day. There is no beehive of activity with men rushing here and there. Each man has a certain job to do on each house and soon he becomes a specialist at it, doing his part easily as well as right. And each day a few more houses are fully completed. ★ ★ ★



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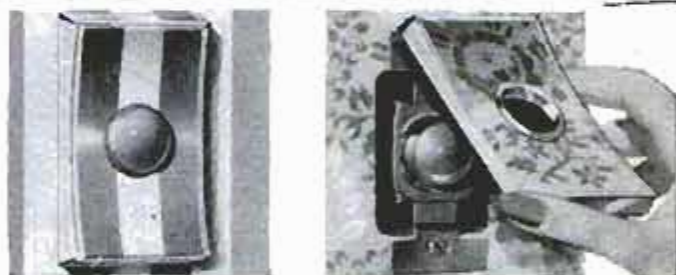
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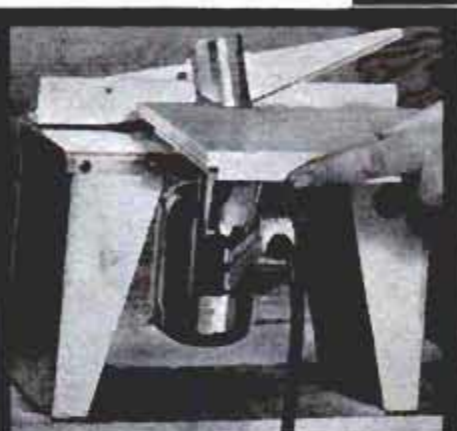
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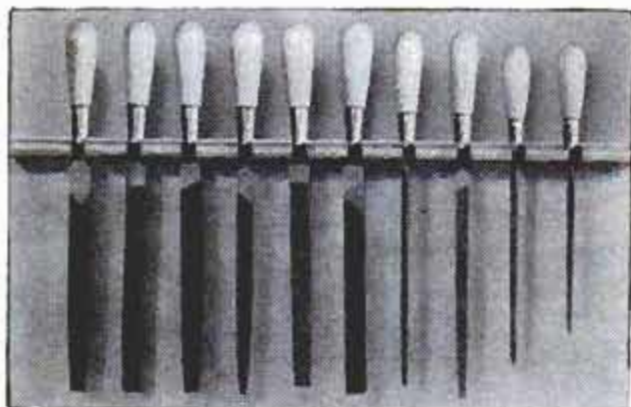
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NICHOLSON FILES
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Nature Puts Men to the Supreme Test

(Continued from page 138)

who's been on the south polar plateau knows this would never guarantee a safe walk home. Yawning crevasses impose endless detours. Formidable blizzards delay progress. A polar blizzard isn't necessarily accompanied by a fall of snow. Howling wind sweeps across the icecap lifting a blinding curtain of snow granules from the ground. Any wind over 20 knots will raise the hissing, stinging barrage of drift high enough to obscure buildings. Men can't see 10 feet, and could walk right off the barrier edge without knowing it. Particles encrust goggles, and the wind has a "knife" in it.

Captain Scott and his party of four returning from the pole in 1912, figured supplies too closely. They'd have made it except for a six-day blizzard that pinned them down only 11 miles from a supply cache they'd left near the Beardmore Glacier. They were found on the icecap nearly a year later, frozen to death in their sleeping bags.

Flying Rescue Teams

So, when Deepfreeze planes head over the polar icecap this month, crews will be protected by a special dog-sled rescue and recovery squad. This outfit will be based in a forward camp at the foot of the Beardmore Glacier, halfway to the pole. The entire unit—dogs and all—is equipped to fly out over a disaster scene and parachute to the rescue.

"The dogs," explains Lt. (jg) John Tuck, one of the officers in charge of the squad, "have 28-foot chutes that accommodate two of them at once. Dogs enjoy parachuting, land easily and sit calmly, waiting to be unhitched, with a 'you got me into this, now get me out' expression. They rarely tangle lines or get excited. If a plane crashes, we're alerted by radio. If the crack-up is inaccessible to snow vehicles or ground units, off we go in our rescue Otter. The team, fresh and well provisioned, will easily bring survivors back across 1000 miles of ice in less than 30 days."

Besides Tuck, Lt. (jg) Dave Baker, Sgt. Henrik "Dutch" Dolleman, Sgt. Tom McEvoy and Seaman Jim Brown comprise the two-legged members of the team. Thirty other members, with names like Petya, Ooloo, Kageluk and Towha, are blue-eyed Huskies and Malamutes. They ran through rehearsals at McMurdo Sound base this year, simulating rescues in blizzards and

(Continued to page 292)

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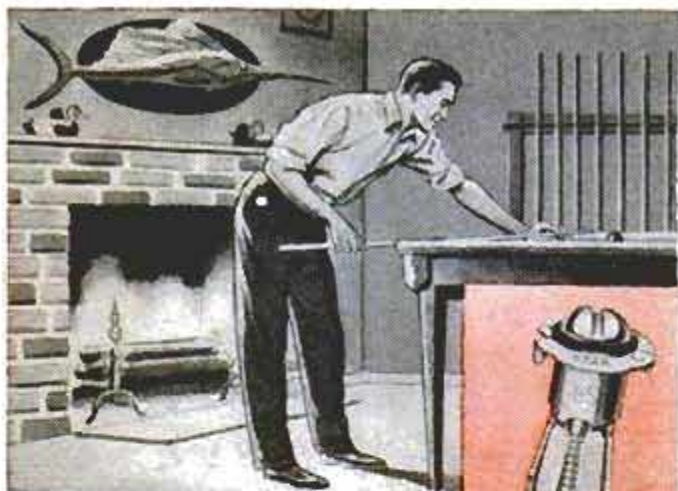
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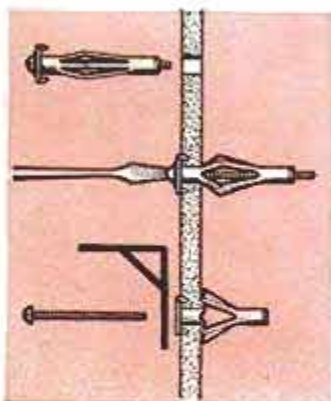
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snowstorms, and trailing a sledgehammer (a "fifth wheel" to measure mileage) behind them over the drifts.

"A working team," explains Tuck, "consists of three men and 11 dogs hauling two loaded sledges. The lead dog is out front, followed by five pairs on opposite sides of a gang line. Over rough ice, we use a fan hitch, with the dogs spread out in front so they can pick their own way. On sharp ice they'll wear boots to protect their pads."

Simulated Rescue Missions

I went with the team on a simulated mission across McMurdo's bay ice one snowy day. Two men rode with the sleds, shouting verbal commands to the animals. The third man, on skis, worked out ahead probing with a pole for hidden snow-bridged cracks.

Half a ton of survival rations and gear made the sledges bulge, but the dogs moved at a four-mile-per-hour clip. "Each dog pulls about twice his weight," Tuck shouted at me over the wind. "They average 65 pounds, so a team can draw about 1400 pounds."

On those sleds were two boxes of medical supplies, a stove, 10 gallons of fuel, two tents, harness repair kits, bundles of trail flags and a 20-pound plastic sled for man-hauling supplies if the dogs gave out. There was a sea bag of polar clothing, one sleeping bag per man, one "Angry 9" radio and a hand-crank transmitter.

"The compass is carried in the trailing sledge," Tuck pointed out. "All the metal is in the lead sledge where it won't have any magnetic influence."

One crate held fancy day-and-night distress gear—cans that belch smoke if ignited at one end, or flare if the other end is lighted. There were signal panels and lamp-black for marking messages on the snow. Rope, ice axes and steel-toothed crampons that fasten to boot bottoms for climbing glacial ice walls were insurance that survivors of a mountain crash could be reached without delay. The rest of the load was food. "Thirty days' worth of survival rations, and pemmican for the dogs," said Tuck. "And if we run out, more can be dropped by air."

Twenty miles down the ice, camp was set up. While snow swirled around us, tricky polar "A frame" tents were hauled from the load. In 10 minutes their double-walled sides of Egyptian cotton, supported by a simple inverted V-frame at each end, were hauled erect by guy lines and staked down. Each has a tunnel entrance that can be tied shut with a drawstring. The tents can be zippered together—end to end—to make a single unit with three weather-tight compartments sleeping six to nine men. Inside,

(Continued to page 294)

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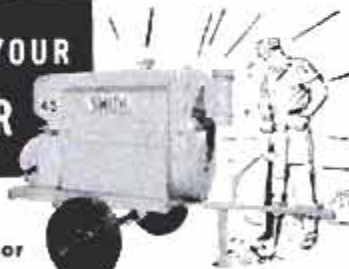
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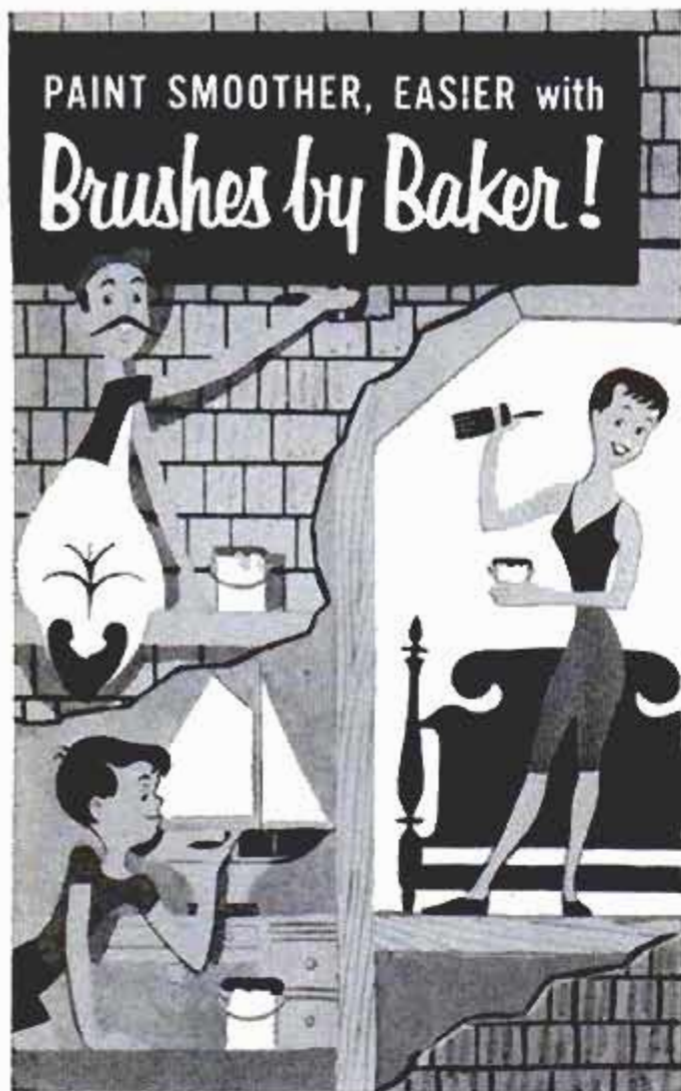
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Dogs Like Flying

How will air delivery of rescue teams work? Great, according to Dutch Dolleman. A veteran of both Greenland and Antarctica, the sergeant is a firm believer in dogs for polar work. "They like flying," he says. "On the ground they move fast and are light enough to cross most snow-bridged crevasses without breaking through."

Dutch should know. In 1942 he was driving dog teams on Greenland's west coast when a B-17 went down on the eastern side of the icecap. "It was a heavily crevassed pressure area," he recalls. "Eastern teams tried to go in overland, ran short of food and tentage and gave up. One motor sledge went down a crevasse. Another went out to rescue it and lost a man in a crevasse. A Grumman that went in cracked up on the take-off. Finally, they turned the job over to us. Col. Bernt Balchen showed up in a PBV. We loaded two 9-dog teams and all our gear, flew over the cap to within 15 miles of the wreck and Colonel Balchen landed the flying boat on its keel in the snow. Next day we went in with the dogs and were trapped by storms that kept us pinned in snow tunnels for 21 days. But we sledged those survivors out through hundreds of crevasses to where a plane could land and pick them up. They flew home. We rode home by dog sled—six days to make 60 miles."

Dogs Disappear

Running dogs through crevassed terrain is touchy unless you know what you're doing. "We probe suspicious spots with a ski pole," Dutch reveals. "If it doesn't poke through, then we ski across using lines. If the bridge doesn't sag, dogs and empty sledges are brought across. The load is pulled across with lines, piece by piece, and re-rigged."

"I was watching a biologist at Little America drive a team over virgin territory when suddenly the whole rig disappeared," says Dutch. "He was lucky. They all landed on a second snow bridge 15 feet below, and we hauled them out." Another time, some of Dolleman's own dogs broke away and fell through a snow bridge while cavorting. "I snagged them out with a meathook on a long pole," he recalls.

Half the battle of being rescued in polar territory is staying alive until help comes. "Your first goof may be your last in Antarctica," warned Maj. Murray Wiener, Air Force advisor on emergency survival

(Continued to page 296)

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procedures. Wiener's job was to brief pilots and ground personnel who would be going out over the ice. He emphasized the dangers of frostbite, snow blindness, and the importance of staying dry. "Antarctica is as safe or dangerous as you make it," he told them. "The water under the bay ice here is 28 degrees, and your life in it is good for about eight minutes. If you should fall in, get out fast and roll in the snow to blot out moisture. Jump around, brush off the snow and roll some more. Shiver all you want. Shivering is the body's way of creating energy and warmth by drumming up circulation. But get home as fast as you can—and don't take off your boots, or your feet may freeze solid."

Orange Immersion Suits

For helicopter pilots flying over water, Deepfreeze sported bright-orange experimental immersion suits this year. The easily spotted insulated "froggy suits" were tested in 29-degree sea water at Cape Evans by three swimmers, who dog-paddled around for 35 minutes in what they claimed was "solid comfort."

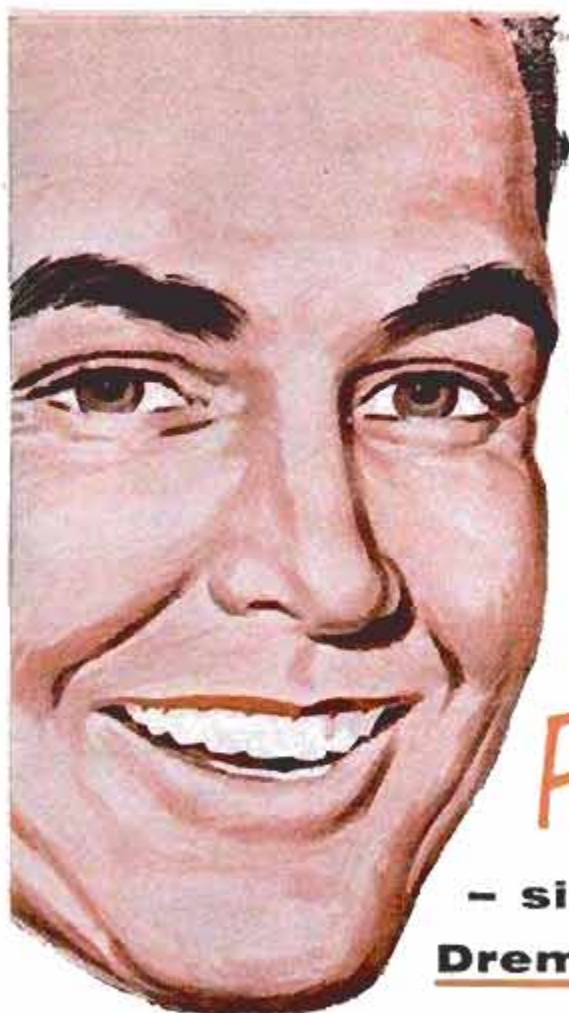
Men were shown how to make cardboard masks with slits, to avoid snow blindness if sunglasses were lost. "You don't need a sunny day to go snow-blind," Wiener informed us. "Some of the worst cases occur under overcast." He drove home the point with a personal experience during a Greenland trek in 1937—without glasses. "In three days I was blind," he said. "The pain was as bad as though hot poker speared my eyeballs. I lay groaning in a dark hut for four days before I could stand daylight again."

Crews were briefed on antarctic phenomena so that by the time they hit the ice they knew what to expect. Mirages, produced by density differential in the air, like desert phenomena, are a common sight on the flat, endless barrier. Odd little fogs created by encampments and people are a polar curiosity. You can spot a group of men below the horizon 10 miles away, by the tiny cloud of condensation their body heat creates above them. Usually it is composed of frost flakes.

The major stressed the wisdom of holing in during blizzards or whiteouts. Whiteout occurs when light bounces between overcast sky and snow, wiping out shadows and horizon. A man can fall off a 10-foot embankment without seeing it. The effect of whiteout on open barrier is like being suspended in space. Pilots were warned to stay on the ground during such conditions.

One of the wildest examples of what can happen to pilots who won't stay put in

(Continued to page 298)



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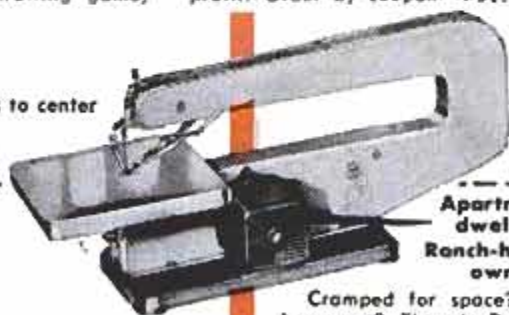
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whiteout occurred in Greenland, when a PBY pilot heading home over the icecap during such a phenomenon, suddenly felt a bump. Nothing seemed wrong outside, but his air speed was dropping. He applied power, but nothing happened. Then he tried to drop the nose. It wouldn't go down. The pilot was "flying" on the ground without even knowing it. So, he and his crew spent 16 days living on tight rations and huddling to keep warm until rescue parties could reach them.

Deepfreeze personnel learned that Antarctica's wildlife is not all friendly, despite the sociable habits of most. Among the lazy seals, sprawling near tidal cracks sunning themselves, are sea leopards that resemble seals. "Poke one with a ski pole and you'll see the difference," Wiener warned. "An ugly reptilian head will open a yawning jaw studded with sharp teeth. He'll lash out in attack and promptly kill you."

Killer Whales

The 35-foot killer whales coasting along the ice edge in schools also have antisocial habits. Diving under the ledge, they heave up in unison to crack the ice and toss tender morsels like seals and people into the sea, where they are quickly torn apart and eaten. "Even the comical Emperor Penguin will fight back if teased," the major revealed. "And he can break a man's leg with his powerful flippers if he's excited. He probably doesn't mean it, but the leg is broken."

"You can listen to lectures forever," Wiener finally concluded. "But it's being on an expedition that teaches you. You'll learn fast on the ice."

We did. Within 24 hours, one correspondent had fallen through a crack in McMurdo's ice and come home dripping icicles. Several cases of snow blindness screamed the darkness away in the depths of the ships, reminding everyone not to forget sunglasses.

Men learned to build snow caves and houses of snow blocks cut with snow knives. The entrance is built lower than living area, so heat generated by human bodies is trapped inside. Three or four men can raise a good igloo's temperature to well above freezing when it's sub-zero outside. Even a single candle can produce surprising warmth. Simplest shelter is a hole in the snow, with peaked or arched roof of snow blocks over the top. More elaborate is the snow house, made of snow-block walls roofed with a parachute canopy.

"Hang on to your parachute," was a point hammered at airmen continually. You get

(Continued to page 300)

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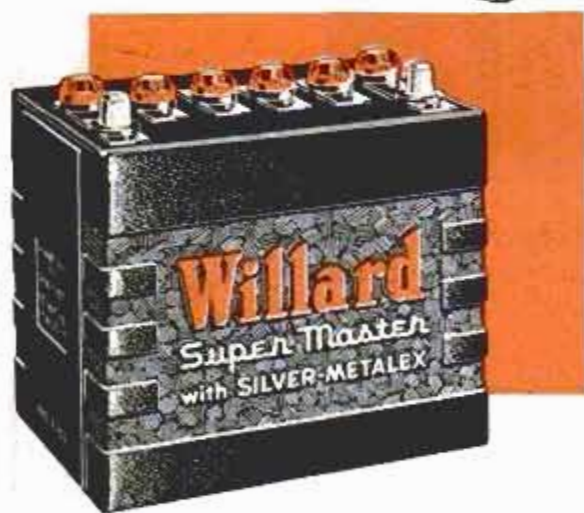
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the idea when you realize the things that its shrouds, webbing, canopy and metal parts can provide in emergency: lean-tos, bedrolls, blankets, slingshots, fishlines and hooks, nets, mukluks, eye shields against snow blindness, scarves, leggings, bandages, splints, packs, sails, snowshoes and signal panels.

It was an abandoned parachute, carelessly tossed in a rescue weasel after a plane crash, that made a tepee for five Deepfreeze Seabees when their vehicle plunged into a crack 20 miles back on McMurdo's ice. Without it, they'd never have survived the two-day blizzard that kept them pinned down.

Wind Makes it Colder

Cold and wind are two primary hazards in Antarctica. "Every knot of wind in sub-zero temperature is equal to an extra degree of cold," according to several old-timers. Antarctica has plenty of both. It freezes skin. Tears turn to icicles. Moisture from breath coats glasses and hoods with white rime. Eyelashes freeze and nostril hairs fuse into a frigid lump of ice.

Frostbite is painless in early stages, so Wiener advised the men to use the "buddy system" on the ice. Each man could watch the other for the telltale yellowish-white blotches. Gentle massage with warm, bare fingers is the antidote, they discovered. The old remedy of rubbing with snow can cause irreparable damage to the injured tissue. This year, the Air Force tried new sleeve muffs, into which hands can be drawn when not needed. Stitched to the outside of each muff is a patch of mouton for rubbing frostbitten noses or cheeks and restoring circulation.

There's another advantage to the buddy system. If one man falls in a crack or crevasse, the other can pull him out. Deepfreeze men soon learned to snowshoe or ski across virgin snow single file, roped together like mountain climbers. More than one man plunged through a snow-roofed crevasse, and hung dangling at the end of a line attached to the waist of his dug-in buddy until he could be hauled out. But there were no casualties from this source.

Out in the open, most Deepfreeze personnel wore Thermosuits and Thermoboots. These garments were developed for production by Salvatore Gianola and Dominic Maglio, two ex-Navy Brooklynites now heading the Techno Efficiency Council. The clothes are based on the refrigerator principle of moisture barrier insulation. Suits have half an inch of nylon fleece sandwiched between two layers of impervious neoprene-coated fabric. Boots are

(Continued to page 302)



SKIL

6 1/2" SAW

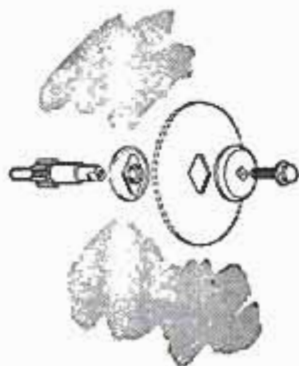
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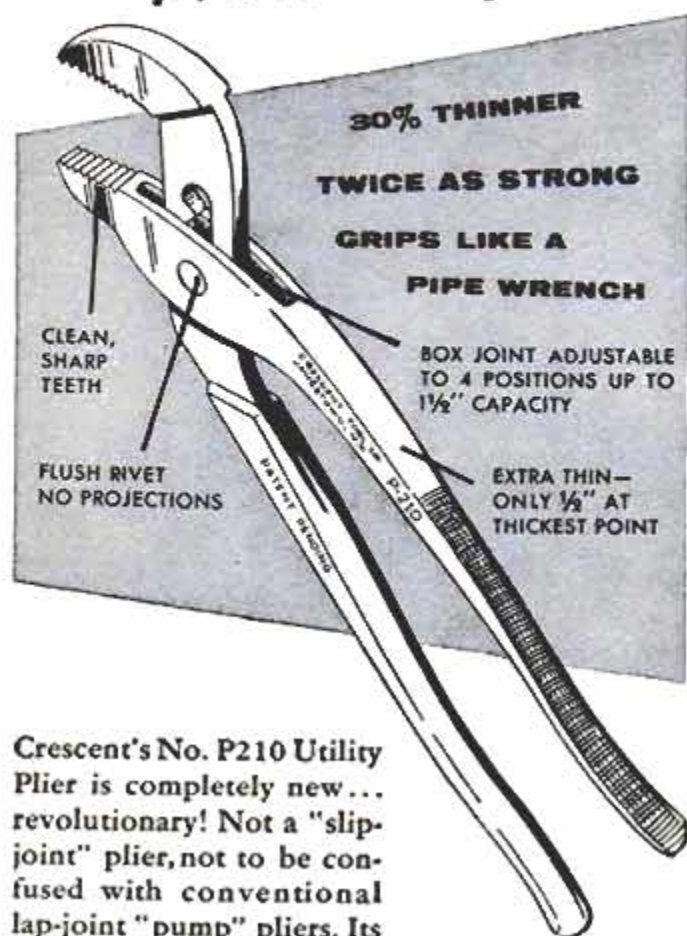
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similarly insulated, with rubber skin outside and in. Wearing this outfit is like being in a Thermos jug. Keep moving and it's good to 60 below zero.

Warned About Perspiration

Ordinarily, perspiration is one of the first things the polar greenhorn is warned about. Body moisture fills air spaces of fabric, freezes and, instead of having clothing to insulate you, a suit of ice conducts the cold right to tender flesh. It's an old polar custom for shirt, pants, mittens and socks to go to bed with a man so his body heat will dry them out. In Thermoclothes, you swim in perspiration because there's no place for it to go. But, since the insulation is sealed and dry, you stay insulated.

To demonstrate these clothes before I went on Deepfreeze, Sal Gianola dressed me in a bright-red civilian outfit, designed for hunters and skiers. He shoved me under a cold shower until I was as wet inside as out. Then he stood me in a cold room where the temperature was minus 50 degrees. A 40-knot synthetic wind whistled around my ears. I stayed there 20 minutes with icicles hanging from my sleeves. When I came out, the water inside was still there, but I had warmed it to body temperature.

Insulated or not, the experienced polar traveler wears just enough to keep him warm without perspiring, shedding as the work grows harder, and buttoning up at the halt.

Probably the most violently controversial subject in polar survival is whether a beard is a help or hindrance. In a blizzard it's a menace. Snow particles cling to it and breath makes icicles in it. A man can wind up not only looking like an ice sculpture for a winter carnival, but can easily sustain severe frostbite. Under Antarctica's dazzling summer sun, however, a beard is a great burn preventive. Besides, shaving with melted snow water each morning leaves something to be desired. Major Wiener refused to discuss the subject. "Anyone can see where I stand," he told us as he stroked three inches of carefully cultivated foliage. ★ ★ ★

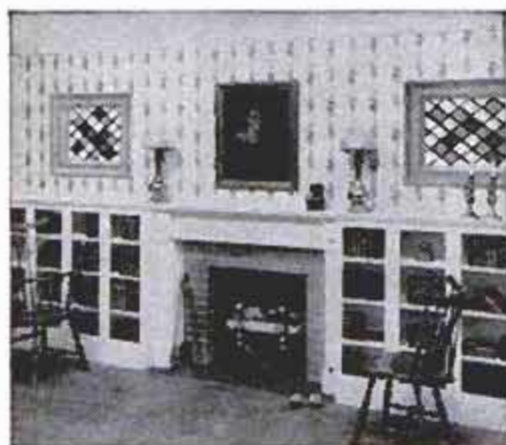
Rocket Fuel

Becomes Rust Inhibitor

Hydrazine, a chemical that was used as a rocket fuel in World War II, now has become a weapon in the war against rust. The chemical is a highly effective agent for the removal of dissolved oxygen from water, a chief cause of rust. A nonflammable form of hydrazine has been developed for use in steam boilers.

IDEAS FROM WELDWOOD

THIS MONTH'S PROJECT—DRESSING UP A FIREPLACE WALL



The Weldwood Question Box

Q. I have a sort of "free form" curved bar in my cellar, and I would like to wood panel it. Is there any way I could bend wood paneling to fit curves?

A. Yes. If the curves are not "too curvy," you can use ordinary Weldwood hardwood plywood paneling. Use $\frac{1}{8}$ " thick paneling—(available in a wide range of woods)—and nail it on or attach with Weldwood Contact Cement. Paneling $\frac{1}{8}$ " thick has enough "give" to bend to some degree. If, on the other hand, the curves are too acute, the only other method is to groove the back of the panels to allow them to bend.

Look what Weldwood paneling and a dash of imagination did for this 1926 living room! Weldwood paneling really makes a remodeling or modernization job a snap. In this room, Cherry V-Plank* paneling was used. The big 4' x 8' panels go up quickly and easily, are grooved to give that random-plank effect. And the grooves are spaced to fall on 16" centers and hide nail holes. (Paneling may be installed *without* nails by using Weldwood Contact Cement.)

Weldwood paneling, you know, ends forever the need of painting or redecorating. It's a one-time investment—and not a very high one, at that. For example, in this room, all that Cherry V-Plank—including that used as facing for radio-phonograph compartment (left) and desk-bookcase unit (right)—costs only \$107. That's the first and the final cost!

Remodeling this room is the featured project in the latest issue of Delta Power Tool's "Deltagram." To get your copy—which even includes step-by-step directions for making all the built-ins—just send coupon.

*Trade Mark

This Month's Hints

1. Your breadbox will do double-duty if you follow this suggestion. A piece of Weldwood plywood attached inside the door of a front-opening breadbox serves as a bread cutting board whenever the door is opened. Attach plywood to door with Contact Cement,

or drill and use nuts and bolts. R. W., Union, N. J.
2. $\frac{1}{4}$ " and $\frac{3}{8}$ " scraps of Weldwood Plywood can be cut into triangular shapes and used as gussets to strengthen the corners of window screens, shipping crates, doors, etc. L. M., Lincoln, Indiana.

This method is tricky and we would recommend it only to experienced woodworkers.

HAVE A QUESTION?

Send it to "The Weldwood Question Box," 55 West 44th Street, New York 36, N. Y.

\$10 for your ideas
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Volkswagen May Not Be Big, But It's Fine

(Continued from page 159)

"Maybe it's just my car, but it takes two hands to shift into reverse."—Connecticut schoolteacher.

"The car is dangerously in need of more torque at moderate speeds for passing."—Pennsylvania anthropologist.

"Underpowered when passing, especially with four passengers."—Ohio body-shop owner.

"Heater could give more heat at city speeds."—Wisconsin TV technician.

"Should have provision for defrost without heat or at least without heat to the lower duct outlets."—Ohio engineer.

"Back bumper is too easily pushed in by American cars. I often find I cannot open the back end of the car to get at the engine after someone has dented the bumper."—California secretary.

Fabulous VW Stories

Every VW owner seems to have an anecdote about his automobile that is worth repeating.

"I climbed a bunch-grass hillside lined with deep cow trails that has even stumped four-wheel-drive vehicles. I had two men in the rear seat. I also ran into a deep puddle of water (about 14 inches deep and 150 feet long) at 40 miles per hour. The car weathered the water and actually floated across the deepest part."—Washington wheat farmer.

"During unusually heavy rains the little Volks negotiated flooded fords and pools that made less hardy breeds hesitate. In one instance, it ran for quite a distance with both exhaust pipes underwater. The interior remained high, dry and comfortable."—California electronic technician.

"The spirit of friendship between VW owners is something not found when driving a domestic car. Recently while on a week-end outing, we stopped to take some pictures. A passing VW from out of state stopped to inquire if we were having any trouble and if he could help."—Illinois machine designer.

"Can go almost any place. Once we could not make it between some trees so we lifted the car around inch by inch to continue on a footpath. We emerged among some hikers who were shocked to see a car come out of the woods at that point."—North Dakota student.

"I use my VW for exploring river-valley country where there are no roads. I get through mud holes and willow thickets fully loaded. I've climbed earth dams

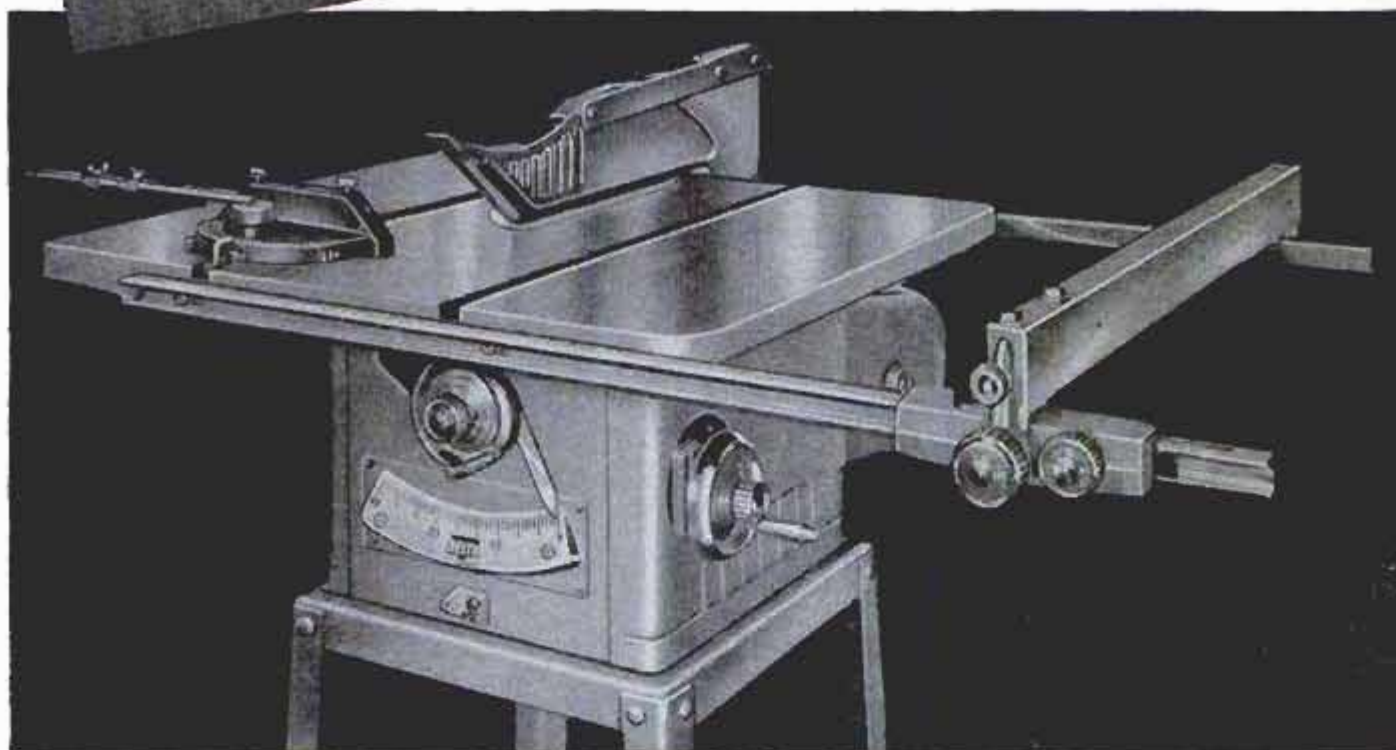
(Continued to page 306)

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where only 'Cats' and bulldozers have been before."—Missouri writer.

"I had my car washed in a three-minute car wash. I jokingly suggested that I should get it washed at half price. So it was!"—Washington insurance inspector.

"Some of my friends, during my absence, put the 'bug' on top of a low stone wall. They later lifted it down with me in it."—Kentucky treasurer.

"When we got the new VW home and in the garage for the first time our dog barked furiously at the car and would not go near it. She ran in circles around the car, barking all the while."—New Jersey owner.

"About once every two weeks people come up to my house, ring the doorbell and ask what is that thing parked in front. They say it's real cute. They ask the price, how I like it, and walk away saying 'You know, we should have a car like that.'—Pennsylvania technician.

"I hit a 10-inch pool of water at 40 miles per hour and scooted across as if on water skis."—California switchman.

"I want to beam every time I look at the VW and have noticed the same expression on most VW owners when they wave or toot their horn as we pass each other."—California homemaker.

"My husband would trade me in before he would his VW."—Louisiana housewife.

"My only real complaint is that I have to fight with my wife to get to drive."—California flight inspector.

And More Complaints

Perhaps after reading the preceding you understand better the VW owner's infatuation with his car.

He still permits himself to complain a bit, however, and here are some more things he would like changed:

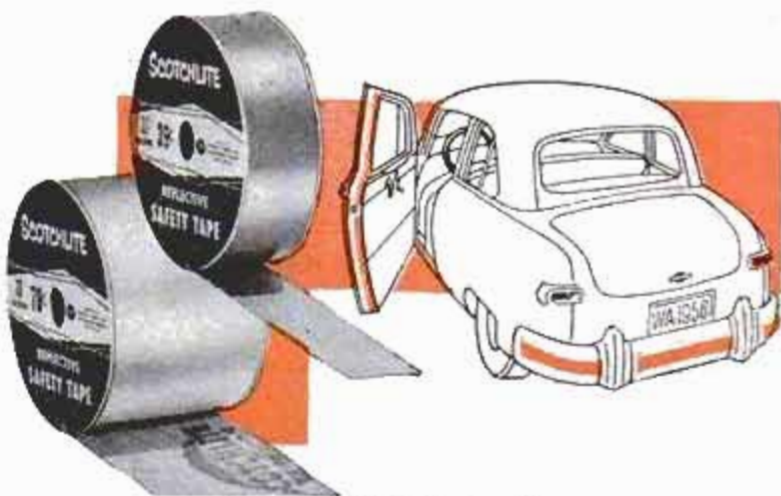
"Gas gauge should be standard equipment."—California information director.

"Should use a dash light to warn of low fuel supply instead of floor lever. At 60 miles per hour on a crowded highway or at low speeds in heavy traffic, the VW will cough, sputter and cease to perform for a frightening 5 to 10 seconds while driver thrashes at the floor lever switching to auxiliary tank. My system now is to buy gas every 300 miles."—Ohio designer.

"My only real complaint is the fact that when windows are open (I have tried every possible combination) a drumming noise is created that seems likely to burst an eardrum."—California conductor.

"Back windows should open. Door should close easier when windows are shut."—New York lawyer.

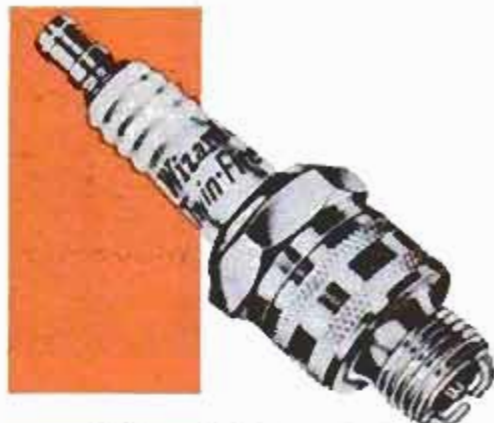
(Continued to page 308)



"Scotchlite" Reflector Tape

More complete night safety. Reflects up to 200 times more light than other parts of car.

Red, 1'x30" (C2599)	394
Red, 2'x30" (C2594)	784
Silver, 1'x30" (C2593)	394
Silver, 2'x30" (C2595)	784



Wizard "Twin-Fire"® Spark Plugs . . . guaranteed 18,000 miles! Give top performance twice as long as single electrode plugs. (Alternate firing twin electrodes stay accurately gapped up to twice as long.) Sets of 4 or more, ea. (11070-95) **75c**



Entirely new kind of wax! Vista, made by Simoniz, is a new turbo-whipped cream wax that cleans and waxes in one easy application . . . yet gives cars the lustre and all-weather durability of a paste-wax job! 10 oz. can (3P722) **\$2.00**



Like a "tune-up"! For better engine performance the year around, add Casite to your motor oil with every oil change. Keeps engine clean. Gives you easier, faster starting... quiet, smooth power. Ideal for new cars. Pint, only (A1329)..... **\$1.00**



Repair your brakes, quickly, easily — with Wizard Master and Wheel Cylinder Kits. Includes live rubber cups, boots, pistons, springs, etc. For most cars, trucks. Master Cyl. Kits, with piston (55750-85)..... from **98c**
Wheel Cyl. Kits (52805-41)..... from **37c**

Non-slip, non-stretch, cool running! Top quality Wizard Fan Belts are guaranteed to fit. Inner core of endless rubber impregnated rayon cords. Tough rubber cushion assures efficient, peak performance. Carry a spare! (79105)..... **\$1.19**

"New-Condition" Your Car Now

Choose from over 4,000 guaranteed top quality parts and accessories at

Western Auto

Stores and Associate Stores



Wizard Tune-Up Kit makes it easy to "tune" ignition system. Complete kit with heavy duty points, condenser, rotor. Saves gas, makes car start easier, run smoother, perform better. Easy instructions. All popular cars. (14815-32) ... From **\$1.10**



Car Top Carriers. Reddi-Rak, all steel—completely assembled. Adjustable. Heavy web straps anchor to rain gutter... vacuum cups support and cushion any load.
Strong steel 45" (65229) Pr. **\$8.55**
Hardwood 48" (65279) Pr. **\$6.50**



Protect floor of your car and help keep trade-in value high with these twin Floor Mats. Cover entire front area, flat and slope. Designed to stay in place. Fit all cars. All new rubber. Black, red, blue, green, yellow, white. (201130-5) Pair **\$4.59**

NOTE: In some areas of the U. S., Hawaii, Alaska, and Mexico, prices slightly higher. Western Auto Associate Dealers own their stores, set their own prices, terms and conditions. (PM106)



WIZARD POWER TOOLS
...built to make it and take it!



WIZARD 6 1/4" PORTABLE SAW: Cuts 2x4 at 45°. Adjustable cut to 2 1/8". Powerful 7 amp. motor. Special slip-clutch prevents motor burn out.

With rip guide and safety guard **\$39.95**

Other models \$29.95 to \$52.95

Team up with WIZARD for a faster, easier job. These rugged tools are compact, easy to handle, yet big enough for any home project. Check the complete line of power-packed WIZARDS at your nearby Western Auto Store before you buy *any* tool . . . then

JOIN THE MILLIONS WHO KNOW THAT YOU GET MORE TOOL PER DOLLAR WITH WIZARD THAN WITH ANY OTHER NATIONAL BRAND!

WIZARD 1/4" DRILL:

Powerful, 2 amp. motor. Gearing chuck. Locking trigger. Accessories and kits are available. **\$19.50**

Others \$12.50 to \$49.95



Wizard



OVER 400 ITEMS FOR THE WORKSHOP

Sold Nationally by

Western Auto

STORES AND ASSOCIATE STORES

NOTE: In some areas of the U. S., Hawaii, Alaska, and Mexico, prices slightly higher. Western Auto Associate Dealers own their stores, set their own prices, terms and conditions.

"Turn circle too large for such a small automobile."—Florida doctor.

"Car must be shifted frequently in city driving."—New Jersey engineer.

"Accelerator pedal is too high from the floor. Makes it hard driving in high heels, besides it wears out the back of my shoe."—Texas secretary.

"Wife doesn't like the roller accelerator pedal."—California underwriter.

"Gas fumes noticeable just after taking on gas."—New Jersey nurse.

"Space behind rear seat difficult to load."—Virginia travel manager.

"Too little legroom in back. In fact, I must sell it for that reason and hate to."—Virginia real-estate saleswoman.

"Battery in inconvenient place."—Oklahoma student.

"Brake and clutch pedal too close together."—New York mechanic.

"No place for left foot while driving, except on top of dimmer."—Maryland engineer.

"Not enough luggage space for such items as golf clubs and carts."—California writer.

Good on Long Trips

Prospective owners may consider the VW fine for around town, but not so good for long vacation trips. Most of the owners disagree with this opinion.

"The thing that amazed our friends is that on our trip to Florida we drove 650 miles on Saturday and the remaining 550 miles the next day. We cleaned up and were sightseeing by 4:30 p.m. that same day. Coming back we drove 1000 miles straight through from Georgia in 24 hours."—Ohio stockbroker.

"Two adults and two children went over 3000 miles on our vacation trip. We drove over 70 miles per hour. Better than 500 miles a day, averaging 35 1/2 miles per gallon."—Florida painting contractor.

"Drove 2000 miles in 37 hours. Had no trouble. 35 miles per gallon. Total trip of 4000 miles cost about \$33. Comfortable."—California switchman.

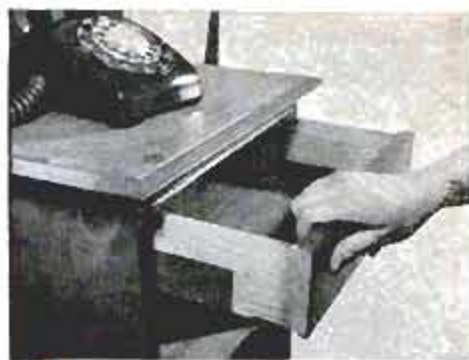
"Just returned from a 1525-mile trip. Used \$15.27 worth of gas. Highway speed was 72 miles per hour. On the trip were my wife and I who rode in the roomy, adjustable, reclining front seats. In the nose or trunk I had two cots, my camp stove and two pillows. In the back-seat area we had our tent, icebox, food and utensil box, six quilts, two small suitcases, minnow bucket, three fishing rods and some odds and ends."—Oklahoma Air Force inspector.

"Well impressed after a 1400-mile trip in two days. No discomfort, stiffness or soreness."—Oklahoma insurance salesman.

(Continued to page 313)

QUICK SANDPAPER SOLUTIONS

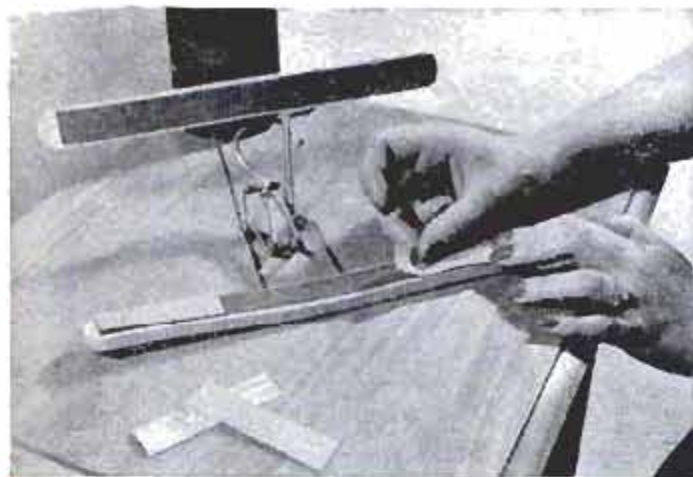
to common household
problems
by
CARBORUNDUM



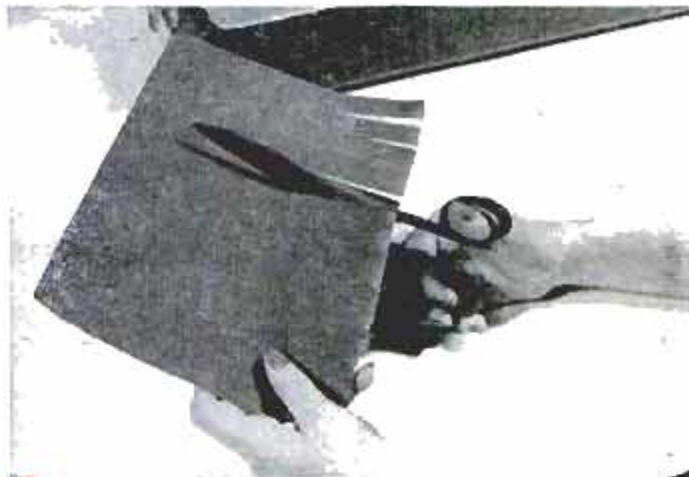
● **Repair Binding Drawers**—Cement a small piece of Fine Garnet Paper by CARBORUNDUM, sand side out, to shiny spot where drawer binds. Work drawer in and out till it's free, and remove paper.



● **Open Stubborn Jar Covers**—SAND SCREEN by CARBORUNDUM is a magic jar opener. Gives you a firm grip to loosen covers quickly without damaging them.



● **Make Non-Slip Hangers**—Glue small strips of Medium Emery Cloth by CARBORUNDUM to the jaws of the hanger—makes a tight non-slip grip for trousers or skirts.



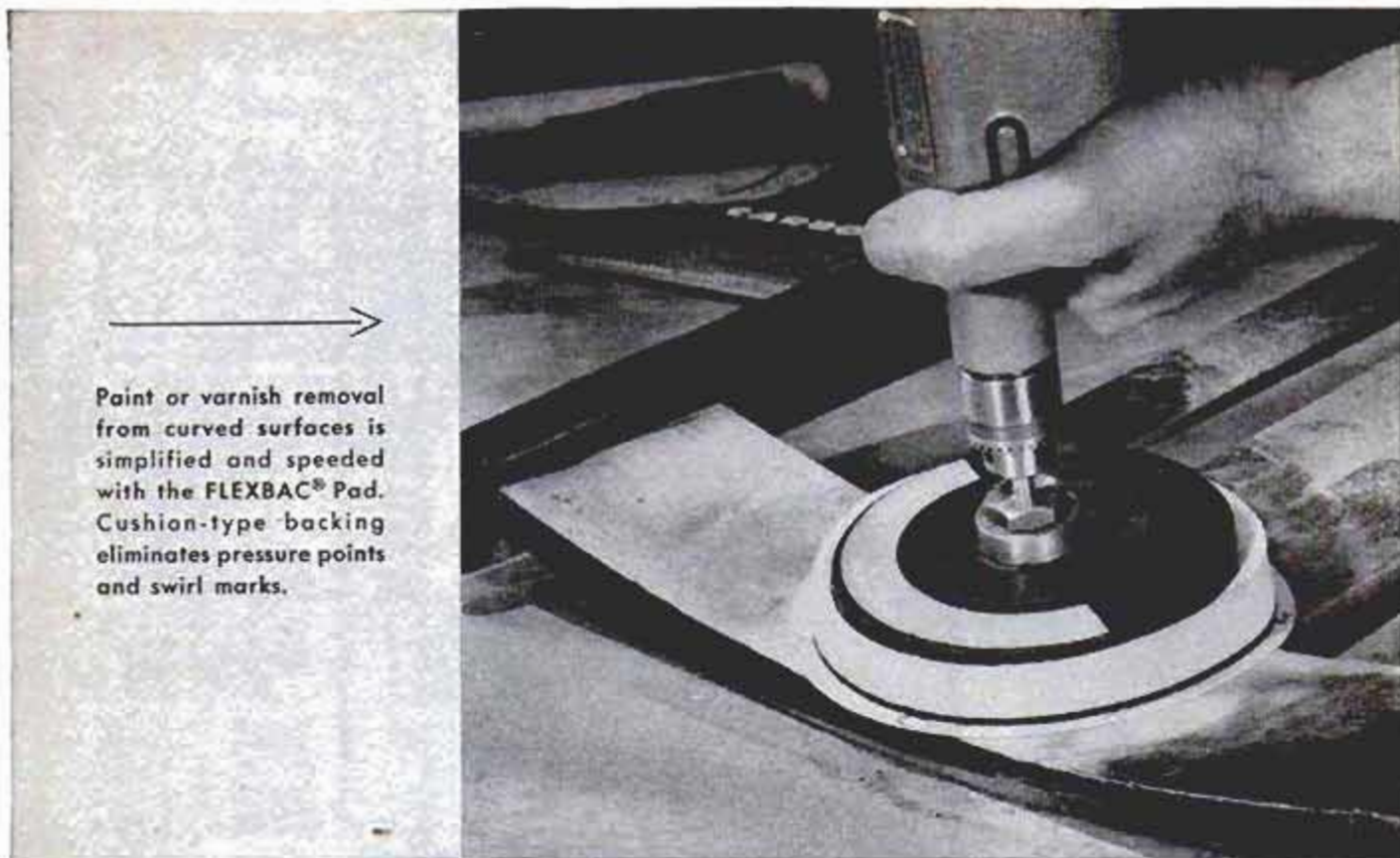
● **Sharpen Scissors**—Scissors can be sharpened quickly and as good as new by taking several cuts through a piece of CARBORUNDUM's Medium Emery Cloth.



● **Fix Sticky Doors**—No need to remove hinges. Just slip a sheet of Medium Garnet Paper by CARBORUNDUM under door. Open and close door till action is free.



● **A good workshop idea**—Glue small strips of emery cloth to your bench. Use to quickly sharpen knives, tools and drawing pencil.



→
 Paint or varnish removal from curved surfaces is simplified and speeded with the FLEXBAC® Pad. Cushion-type backing eliminates pressure points and swirl marks.

How to get **EXTRA WORK** *out of your electric drill*

- **It's easy to Disc-Sand**
 —professionally with
 this **NEW... versatile**
FLEXBAC® Pad

Now you can tackle sanding jobs with your electric drill that used to involve long hours of plain elbow grease. CARBORUNDUM's new FLEXBAC® Pad makes power sanding easy, even for the amateur, because it does away with swirl marks you get with ordinary disc sanding. This cushion-type pad is completely pliable from center to outer edge permitting the sander disc to follow contours and curves smoothly and evenly on either wood, metal or plastic. A natural for contour work on furniture or boats, the FLEXBAC® Pad is also a real time saver on flat surface jobs such as preparing interior or exterior walls for painting.



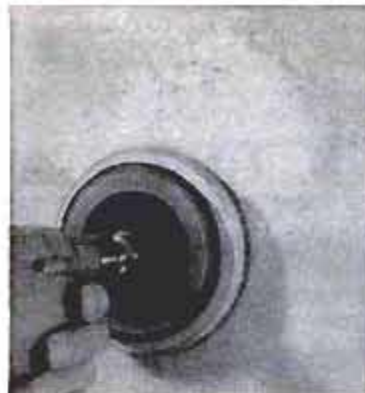
Easy to install adapter spindle to fit all portable electric drills is provided with each FLEXBAC® Kit.



Adhesive surface of pad is protected with special cover when FLEXBAC® is not in use.

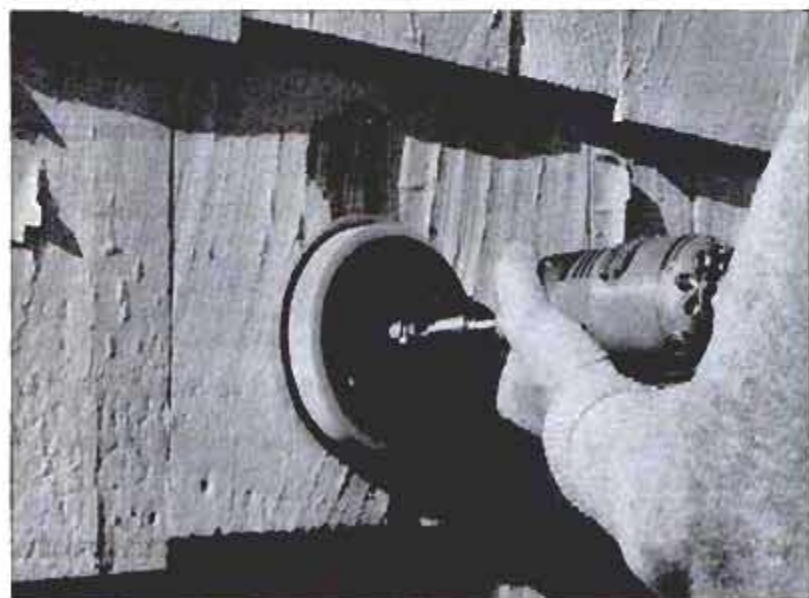


Heat from a light bulb will quickly restore adhesive to normal tackiness, if lost after long periods of storage.



← You can patch plaster professionally even without a steady trowel. Your electric drill and a FLEXBAC® Pad will blend the patched area perfectly, ready for paint.

→ Wallboard joints become invisible in a hurry with FLEXBAC®. The disc rides on a cushion-type pad and you can whisk it lightly over the dry joint cement without leaving a mark.



FLEXBAC® is fast and smooth on flat surfaces too. Excellent for removing old scaly paint before repainting.

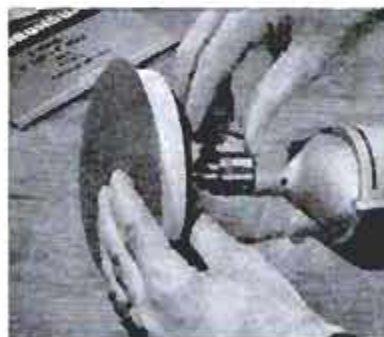


Spades, hoes and other garden tools can be easily polished with a FLEXBAC® Disc Sander. Cleans off even crusted cement, leaving metal sparkling new.

The pad is pre-coated with a pressure-sensitive adhesive which holds the sander disc in place. Discs can be changed in a second by merely "peeling" the old one from the pad and pressing on a new one in its place. The adhesive quality is maintained with an adhesive restorer which can be quickly brushed on the pad occasionally as needed. The FLEXBAC® Pad Kit is available at CARBORUNDUM's hardware and building supply dealers everywhere. HANDY-SANDY Discs by CARBORUNDUM can be bought for the FLEXBAC® Pad in five different grit sizes or in packs of assorted grits.



Merely press on a HANDY-SANDY Disc by CARBORUNDUM on face of pad. To change discs, simply peel off old disc and press on a new one.



Adapter spindle is tightened in drill chuck. Recommended speed of drill for FLEXBAC® is up to 3000 r. p. m.



Periodically, depending on rate of use and type of operation, adhesive on FLEXBAC® Pad should be renewed with adhesive reactivator.

SHARPENING TIPS from CARBORUNDUM

Sharp cutting tools are not only more efficient and faster than dull tools, they're safer. Sharp edges cut as you expect them to—dull edges slip and are most often the cause of cuts and bruised knuckles.

Abrasive stones are inexpensive and there's one designed by CARBORUNDUM for every sharpening purpose. You'll get keener edges and longer tool life by always using the *right* sharpening stone.

PLANE BLADES and CHISELS

Use a CARBORUNDUM Brand Silicon Carbide Combination Stone. Hold the blade against coarse side, take even smooth strokes until a wire edge is produced. On the other side of stone (fine grid) place chisel flat and take a few light strokes. To produce a perfect cutting edge, draw the edge through a piece of wood.



MOWER BLADES

Without removing from machine, a nicked mower blade can be sharpened with a few strokes of a No. 46 Home and Garden Stone by CARBORUNDUM. The shape of this stone permits it to reach every part from bed knife to blades.

FARM TOOLS

The No. 57 File by CARBORUNDUM is excellent for putting keen edges on spades, hoes and other farm implements. It gives better and longer service than metal files.

ABRASIVES TO USE WHEN REFINISHING FURNITURE

REFINISHING STEPS		ABRASIVE MATERIAL BY CARBORUNDUM®	GRIT SIZE	REMARKS
REMOVING OLD FINISH	Roughing off	Flint Paper	Coarse	Until surface of wood is slightly exposed.
PREPARING SURFACE	High spots, scars, etc.	Garnet Cabinet Paper	80—1/0 (Coarse)	Dents can be raised with moist cloth and electric iron.
	Final Wood Finish	Garnet Finishing Paper	120—3/0 (Medium)	Until completely smooth.
	After staining	Garnet Finishing Paper	220—6/0 (Ex. Fine)	Lightly.
FINAL FINISH COATS Penetrating Wood Finish:	After 1st Coat	Garnet Cabinet Paper	220—6/0 (Ex. Fine)	Lightly.
	After 2nd Coat	RED-1-CUT® Waterproof Paper	320 (Fine)	Use dry.
	After 3rd Coat	RED-1-CUT® Waterproof Paper	400 (Ex. Fine)	Use lukewarm mild soap solution to lubricate.
VARNISH	After applying Sealer	Garnet Finishing Paper	220—6/0 (Ex. Fine)	Use filler and sealer first if required.
	After 1st, 2nd Varnish Coats	RED-1-CUT® Waterproof Paper	320 (Fine)	Use dry.
	After final Varnish Coat	RED-1-CUT® Waterproof Paper	400 (Ex. Fine)	Use with soap solution.
SHELLAC	After 1st Coat	Garnet Finishing Paper	220—6/0 (Ex. Fine)	Use filler and sealer if required.
	After 2nd Coat	RED-1-CUT® Waterproof Paper	320 (Fine)	Use dry.
	After Final Coat	RED-1-CUT® Waterproof Paper	400 (Ex. Fine)	Use with soap solution.
ENAMEL	After Primer	Garnet Finishing Paper	220—6/0 (Ex. Fine)	Lightly.
	After 1st Enamel Coat	RED-1-CUT® Waterproof Paper	320 (Fine)	Lightly—do not sand final enamel coat.

In grit-size numbering system, 1/0 is equivalent to 80 grit; 6/0 is 220; 9/0 is 320 and 10/0 is 400.

CARBORUNDUM

REGISTERED TRADE MARK

...**FIRST** with the **BEST** in everything **ABRASIVE**

CARBORUNDUM®, FLEXBAC®, RED-1-CUT®, and SAND SCREEN are trade marks which indicate manufacture by The Carborundum Company.

Here, in order of frequency of mention, are more of the features liked best by the Volkswagen owners:

"Everything about this car is top notch. Those Germans are real craftsmen."—Pennsylvania realtor.

"I like the way it holds the road at 70 miles per hour."—Michigan diemaker.

"I like the peace of mind I have knowing I am driving the finest engineered automobile in the world."—California engineering supervisor.

"I now own two VWs. I discovered the trade-in value of the 1955 VW was \$1700 so I decided to keep it for my son and daughter. Now we have two and I plan to trade one each year. The trade-in value of the two-year-old will be about \$1500."—Delaware underwriter.

"A delightful car. Fun to drive. A car with its own personality."—Florida student.

"Needs no repairs. I drive a motor route for a newspaper seven days a week, making 600 stops in three hours and about 40 miles. The car has held up for 9000 miles and still haven't taken the brakes up. This is the first car on the route that uses no oil. It averages between 21 and 25 miles per gallon on the route."—Nebraska route man.

"Excellent winter car. Did not use chains or snow tires once and passed many cars stuck on hills or in snowbanks."—Massachusetts bank clerk.

"Storage space behind rear seat ideal for pups, cats, birds or small active boys."—California aircraft inspector.

"Less trouble to wash and wax as it has about half the surface of conventional car. My wife likes the absence of engine heat on her feet."—Florida minister.

"Sold on its tight body construction. Bought it for city driving only, but since then the other car just sits and we do all or most all of our driving in the VW."—Nebraska packing-house worker.

"My wife threatened divorce if I bought a VW. But I bought it anyway. Now she wants one."—Washington, D. C., broker.

"The jack is wonderfully simple and efficient. I have changed a flat in my dress suit, it's so simple."—California teacher.

"Toughest little car I've ever been in. You get every ounce of power, gas and speed it has got and never feel sorry for it. If I need more than one car, I'll have two VWs."—Ohio modelmaker.

There it is—the story of the most enthusiastic collection of owners ever to have taken part in a *Popular Mechanics* Owners Report. For the dispassionate view of an analytical engineer turn to Dale Kelly's report on page 156. For the veteran's view of the VW, read what Floyd Clymer writes beginning on page 154. ★ ★ ★



Even
without
this
famous
guarantee

Genuine
RIDGID
would still be
**the World's Most
Popular Pipe Wrench**



Millions of
users know it
out-performs,
out-lasts all others!

It's the "RIDGID" name that guarantees you everything you want in a pipe wrench—instant bite on the pipe or conduit, instant let-go—it can't lock because of patented hookjaw suspension . . . handy pipe scale, easy-spin adjusting nut, comfort-grip I-beam handle and every one factory-tested before shipment! For your work, for your home, it's most for your money—buy it at your Hardware Store!



The Ridge Tool Company, Elyria, Ohio, U.S.A.

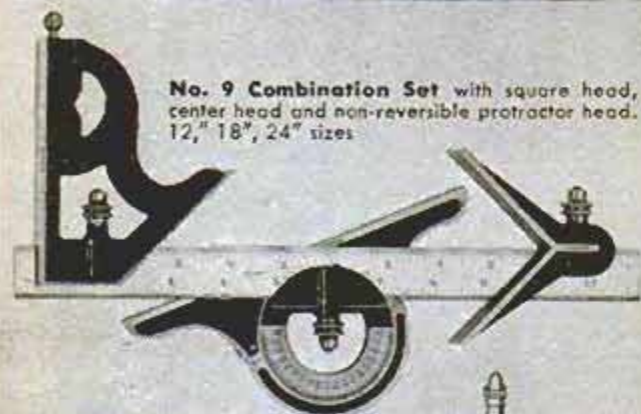
Useful, Dependable, High Quality
Starrett tools

for HOME IMPROVEMENT
HOME WORKSHOP
DO-IT-YOURSELF
CARPENTRY & WOODWORKING

No. 132 Precision Bench Level
4", 6", 9", 12", 18", 24" sizes



No. 9 Combination Set with square head, center head and non-reversible protractor head. 12", 18", 24" sizes



No. 800 Square Head Nail Sets. Five point sizes — 1/32" to 1/2"



Starrett Tool and Instrument Oil has countless uses around the house.

- No. 604-R Steel Rules, 1" to 72" lengths, 8ths, 16ths, Quick Reading 32nds, 64ths
- No. 439 24" Combination Tool—seven useful tools in one
- No. 47 6" Universal Bevel
- No. 92 Dividers 6" to 9"
- No. 85 Improved Extension Dividers, 7" to 12"
- No. 50 Improved Trammels
- No. 59 Precision Trammels and Attachments
- No. 108 Aluminum Line Level
- No. 116 Bevel End Nail Sets
- No. 176A Extra Heavy Nail Sets
- No. 111 Stair Gage Fixtures
- No. 470 Hexagonal Stair Gage Fixtures

- No. 87 Mercury Plumb Bob
- No. 99 Popular Priced Transit
- No. 101C Leveling Instrument
- No. 999 Leveling Rod and Plastic Target
- No. 554 "Eyeglass" Screw Driver
- No. 425 Pocket Slide Caliper
- No. 548 Architect's Pocket Tape
- No. 530 Easy-Read, No-Glare Steel Tape
- No. 129 Bench Block
- No. 819 Lightweight Automatic Centering Punch
- No. BS1214 Bluestripe High Speed Hacksaw Blades
- SAFE-FLEX High Speed Hole Saws

FREE Starrett Catalog displaying all these and many more Starrett precision tools, tapes, hacksaws, band saws and band knives. Write Dept. AP.



THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

Clymer Drives the Volkswagen

(Continued from page 154)

wheel for as long as 10 seconds before directional control was necessary.

Compression ratio is 6.6 to 1, low by our standards, and regular gas is satisfactory. Repair work on the engine can be done easily and, if necessary, the entire engine and transmission can be removed in about 30 minutes. The engine is precisely built and the instruction manual states "no break-in period is necessary and your car may be operated right from the beginning at the full speeds recommended for the gears."

The four-speed transmission shifts easily and silently. Top gear (fourth) should be used for speeds above 35 and for cruising. For moderate inclines and heavy traffic, third is most desirable. My top speed in third gear was 60, although not higher than 45 is recommended. Reverse is engaged by pressing down on the lever and moving it to the left and back.

Because of the suspension system, which uses torsion bars front and rear and independently sprung rear axles, the driver can corner very fast with practically no roll or sway.

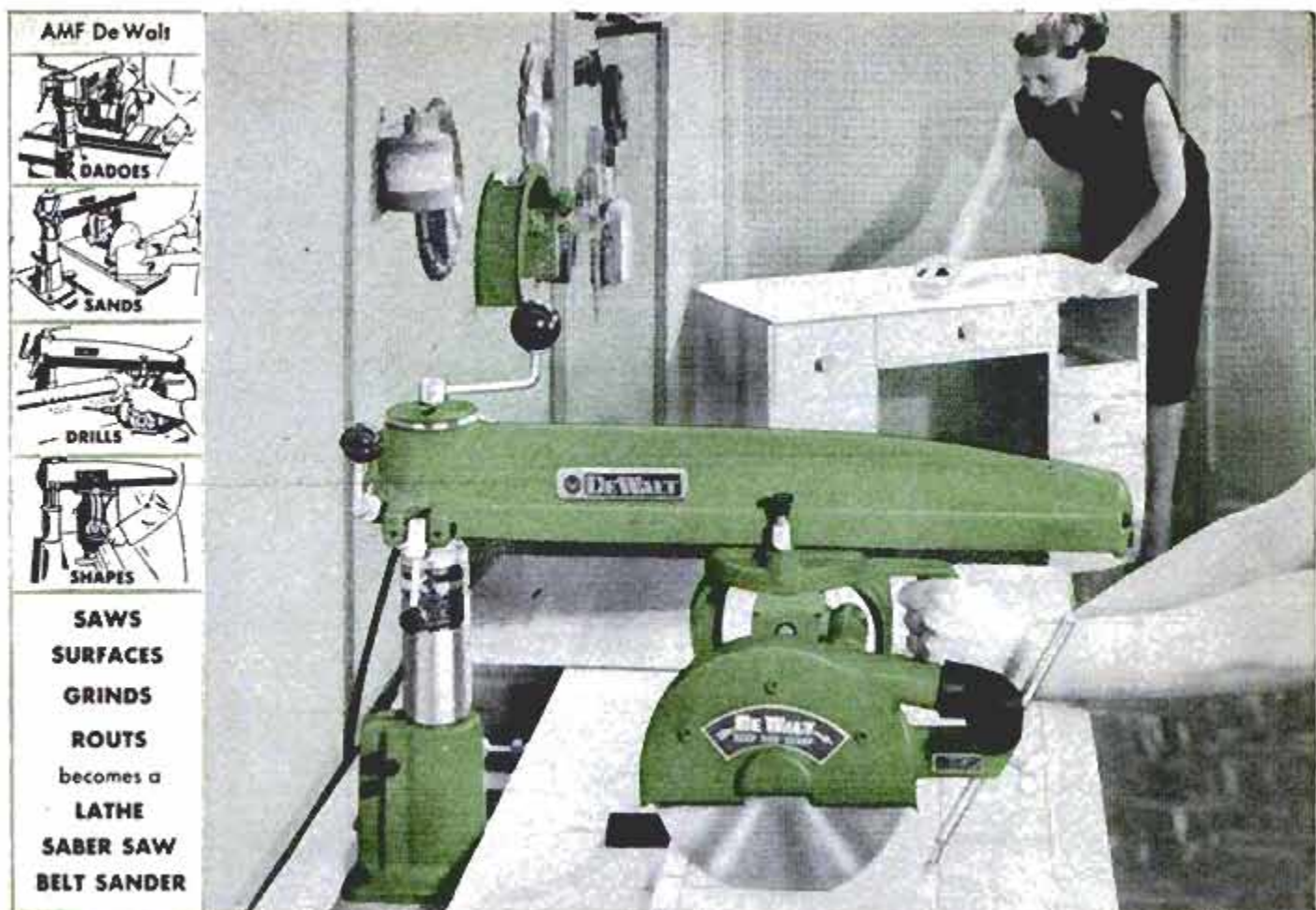
The steering ratio is very fast, requiring only 2.4 turns of the wheel from lock to lock. It feels as though you aim the car rather than steer it. The car is especially easy to park or turn around. Despite the lowness of the car, road clearance is 6.8 inches, almost as much as the average American car.

Gasoline mileage was extremely high, even while driving at quite high speeds. Oil consumption was nil. Crankcase oil capacity is only 5.3 pints. One delightful thing about driving a Volkswagen is that the gas tank, while holding only 10.6 gallons, still enables the operator to drive a long distance without refueling. A reserve gas supply of 1.3 gallons (opened by a lever at the base of the fire wall) is an excellent feature, and is good for 40 additional miles after the main-tank supply is exhausted.

The air-cooling system for the engine works perfectly. I drove the car in 106-degree heat on the Mojave Desert for 10 miles in low gear without overheating. Of course having no water to boil was a real joy.

Brakes are excellent and there was no evidence of fading even while braking at high speed or descending steep grades. The clutch and brake pedals are located too close together—at least, for a man with big feet. Travel between the throttle and the brake pedal should be a little less. Either

(Continued to page 316)



Only \$239 delivered, complete with 9" saw blade and $\frac{3}{4}$ hp motor

Only AMF DE WALT makes making things so easy!

With a versatile AMF DeWalt® Home Power Shop, you can make home repairs, build furniture, handle even major projects like a *professional!*

AMF DeWalt is the *first* all-purpose power tool designed on the modern mechanical arm principle that outmodes all other power tools. It's actually 12 professional power tools in 1—a *complete home workshop!*

- **Arm swings and locks at any position** for miter cuts—gives easier, safer *top-side cutting* that eliminates errors . . . you see your mark *and* your cut.
- **Builds into workbench!** Because entire arm *swings clear* of work area, you can cut and assemble on the same work bench! *Save valuable space* and get *extra convenience too!*
- **Powerful $\frac{3}{4}$ hp motor is U. I. Approved**—guaranteed for full year—tilts and turns to any angle.

Motor carriage rolls smoothly on ball bearings in protected trackways. Simply change circular tool on direct-drive motor shaft and you have another power tool—at *no added cost!*

— **Superior safety and accuracy!** Exclusive DeWalt Safety Key Switch prevents unauthorized use. DeWalt's patented design and rugged precision construction provides safety *and* unmatched accuracy that assures years of superior workmanship.

INSIST ON A DEMONSTRATION. See why, *feature by feature*, AMF DeWalt is the finest home power shop you can buy. A small down payment on DeWalt's Easi-Budget Payment Plan* will put an AMF DeWalt in your workshop *now*.

OWNERS! Valuable new Owner's Manual just off the press, "Easy Ways to Expert Woodworking," \$4.95 postpaid. Order yours today!

*Does not apply in Arkansas or outside U. S. continental limits

SEND COUPON FOR FREE ILLUSTRATED BOOKLET!

AMF DeWalt Inc., Dept. PM-610, Lancaster, Pa., Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY



Please send FREE colorful illustrated 20-page Booklet

Name _____

Address _____

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the throttle lever should be higher or the brake pedal lower. The hand-brake lever is located between the two front seats and operates by an upward pull of the right hand—it is very efficient, easily applied and released.

There is surprising leg and head room in the car. Unlike foreign-built sports cars, entry and exit are easy. The doors are wide, light and easy to open and close. Despite lowness of the car, the doors have more curb clearance than some American cars. The driving position is comfortable. Each front seat can be independently adjusted to suit the driver and passenger. A thumb lever allows selection of three different angles of incline for the seat back.

The interior is beautifully finished and the instrument panel is very plain but functional. High-grade imitation-leather upholstery is used. Gasoline tank and spare tire are under the front hood. This hood is locked from inside and released by a pull knob on the dash. There is also luggage space under the hood in addition to the luggage space behind the rear seat. A small pocket in the left door is for maps, gloves or other small articles. All in all, there is quite a lot of luggage space for the size of the car. There are a small glove compartment and an ash tray in front of the passenger.

There is no fuel gauge. The reserve gas supply provides ample warning time when fuel is needed. There is a direction indicator, a green warning light for oil pressure, and a red warning light for generator and cooling system.

The clutch and brake pedals require moderate operating pressure. There is a roller on top of the accelerator pedal. A good feature is the fact that the throttle lever has long movement, which eliminates any sensitive quick-action operation.

The heating arrangement is satisfactory. Hot air from the engine flows into the body through ducts controlled by a knob at the base of the shift lever. The defroster is also satisfactory.

The body has a solid feel, undoubtedly due to the fact that the frame and body are built as a single welded unit. No squeaks or rattles developed. Three turns of the rather small cranks are required to open the windows. This action should be faster.

Front vision is excellent due to stubby, sloping hood. Side vision is satisfactory. Rear vision would be improved by a larger rear window.

Volkswagen has no automatic transmission available.

In mud, snow or sand the engine weight

(Continued to page 318)

**THE PRIZE IS YOURS!
MAN... YOU'RE IN!**

**NOW, THERE'S A PRIZE
I'D LOVE TO WIN!**

**SMELLS GRAND!
PACKS RIGHT!
SMOKES SWEET!
CAN'T BITE!**

**A PIPE SMOKER,
TOO? mmmm!
YOU'RE FOR
ME**

**IT'S
SIR WALTER
RALEIGH-
NATURALLY!**

**SIR WALTER RALEIGH'S BLEND OF CHOICE
KENTUCKY BURLEYS IS EXTRA-AGED
TO GUARD AGAINST TONGUE BITE.**

FREE!

**24-PAGE BOOKLET ON
PIPE CARE. JUST WRITE
TO: SIR WALTER RALEIGH
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LOUISVILLE, KY.**

ELECTRIC MOTORS—POWER KITS for HOBBY-RESEARCH-INDUSTRY



The Wilson's line offers complete motorizing service—1½ to 12 volt motors—powerful low speed and variable speed gear trains—parts for all types of drives—complete kits—for driving toys, models, research projects and industrial devices. This list may help solve a gift or technical problem for you.

- No. 8-100 Hi-Drive Motor, 3-6V. \$2.50
- No. 9-100 Same for 12V. \$3.00
- No. 3-100 Tiny Atom Motor, 1½-3V. \$2.00
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- Item illustrated. Ask for FREE Cat.

All Wilson's motors have Permanent Alnico Magnets.

Remit with order and we pay postage in U.S.A. No. C.G.D. Add 3% Sales Tax for delivery in Ohio. Write Dept. PM.

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"We did it all in one afternoon, and even I put up part of it."



Two insulations in one, TWINSULATION® combines rock wool (to block heat), aluminum (to reflect heat). Gold Bond wraps an aluminum covering all around thick blankets of rock wool. That's why TWINSULATION cuts winter fuel bills up to 25%, keeps your home up to 15° cooler in summer. Easy to handle, easy to put up. See your nearest Gold Bond® dealer. He's listed in your October 1st issue of Life magazine. Look him up... soon!

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I enclose 10¢ for "Home Insulation" booklet.

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IF IT'S **Borden's** IT'S GOT TO BE GOOD

in rear helps make for good traction. While descending my favorite 32-percent test hill I could stop the VW at the steepest point and then back it up to the top—something that 75 percent of the American cars will not do. The car also topped the 600-yard hill at 15 miles per hour in low gear, which is faster than about half our American cars will do. Noise and fumes are at the rear, although the engine, like most air-cooled engines, is rather noisy.

There is a tendency to over-steer until one becomes accustomed to the car because of the light front end. One disadvantage is that on icy roads or on loose gravel, when cornering at high speeds, there is a tendency for the rear end to break loose and skid. But this need not concern the average conservative driver.

The excellent mechanical jack fits into a socket in the underside of either running board, thus the entire side of the car is quickly raised for tire changes.

I abused the Volkswagen in every way I could think of and punishment seems to have little effect upon the operation or handling of the car. If you drive a VW 100 miles or more, you lose the feeling that you are in a small car. There is no feeling of danger in the car. I do feel, however, that the Volkswagen driver must be more careful when signaling and when turning in traffic than the driver of a larger car.

In my judgment, the Volkswagen is a thoroughly practical, dependable, economical and worthwhile car for anyone interested in low-cost transportation. Nearly every Volkswagen owner is an unpaid salesman. He likes to talk about his car and most owners sing its praises from morning until night. The man who knocks the VW and says he wouldn't have one as a gift is usually the one who has never driven or ridden in one.

Service facilities are usually good, especially in the larger cities. Spare parts are readily available and, fortunately, few models and infrequent changes make it easier than usual for even a small dealer to carry a complete parts stock. ★ ★ ★

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Mesquite, long a plague of the West, may soon aid drought-stricken cattlemen as a livestock feed. The Southwest Foundation for Research and Education has been using mesquite in livestock feed successfully for three years. Only the woody, stem part of the bush is used. It is chipped, then ground into fibers. The fibers are combined with molasses and cottonseed meal. One half or more of the total feed is mesquite fibers.

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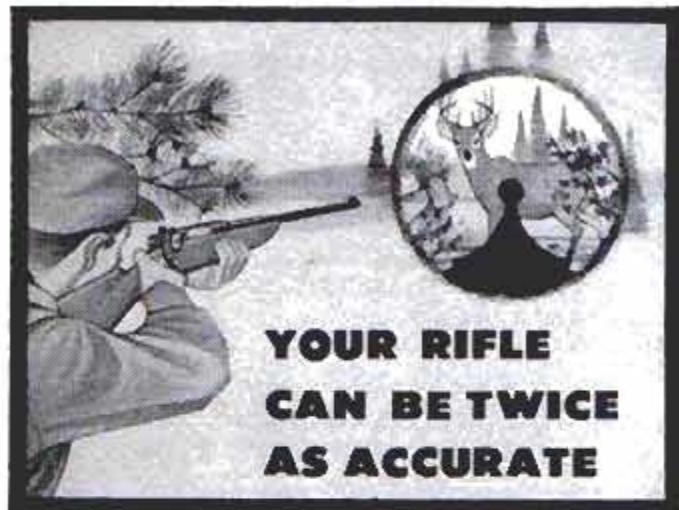
See your tool dealer today—trade in your old hand saw and save \$5! Offer ends Dec. 31, 1956.

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Magic Crystals Grown Here

(Continued from page 121)



A scintillation crystal of sodium iodide is sealed in an aluminum housing to protect it from moisture

work involving infrared and ultraviolet light. Perfect single crystals weighing, in most cases, as much as 35 pounds are produced from molten sodium chloride (table salt, or rock salt), lithium fluoride, potassium bromide, potassium chloride, potassium iodide, thallium bromide iodide, calcium fluoride, barium fluoride, cesium iodide, cesium bromide and optical silver chloride. The crystal ingot, after it emerges from the annealing furnace, is cut into prisms, lenses and windows. Such crystalline lens elements are used in making all sorts of lenses, including achromatic and apochromatic types—microscope objectives, camera lenses, telescope lenses and others. These are principally for infrared and ultraviolet work, but some are used with visible light. A crystal lens may be combined with lenses of other material such as quartz. The windows and prisms are used in such instruments as spectrometers for work with infrared and ultraviolet radiation.

Besides the routine melting of salt in a crucible, other techniques of making crystalline forms sometimes are used. The crystals can be grown in their natural forms by planting tiny crystal seeds in saturated solutions. Sometimes a crystal is formed by a process similar to powder metallurgy. The powdered salt is compressed in a vacuum chamber until it fuses into a uniform mass. This method is used for making potassium bromide pills for the identification of unknown substances. The purified bromide is combined with a quantity of the unknown chemical. When infrared radiation is passed through the pill, none is absorbed by the potassium bromide, and so the precise amount of infrared absorbed by the unknown can be determined. By comparing this absorption with that of known

(Continued to page 322)

Last year's profit \$3,000!

with a FOLEY AUTOMATIC SAW FILER



"Last year's profit amounted to \$3,000. Not so bad for a one-man outfit"—from Chas. C. Hough. James B. Williams wrote us—"I made \$765 last year filing saws, and it sure comes in handy. I do this work in my spare time." Men in communities of all sizes make up to \$3 or \$5 an hour with the Foley Saw Filer working full time or part time.

It's no trick to take care of the saw filing for your neighborhood hardware or lumber dealer — plus looking after the saws for farmers, townspeople, manual training departments and factories. The Foley files all hand saws, also band and cross-cut circular saws. It's a repeat cash business, no canvassing, no eyestrain and no experience needed.

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**"POWER PLANNED"—does all
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New 389 kit does hard jobs in cement, steel and stone as well as in wood. Rugged 3/8" drill has geared chuck and key, 650 RPM, 60 cycle, 115 V. AC-DC motor, cord, switch and plug. U. L. approved. Ideal for masonry, for precision polishing and sanding. Bits, pedestal, pads, discs, handle and steel chest included. Get 50% more practical, more efficient MALL 389 drill kit wherever high quality tools are sold.

\$39⁹⁵

MALL TOOL COMPANY

Division of Remington Arms Company, Inc.
7805 South Chicago Avenue, Chicago 19, Illinois

substances, identity often can be established. The pill can be filed away for future use.

Crystals in Sheet Form

One of the infrared-transmitting materials frequently used for crystals is silver chloride. It happens that this salt is plastic at room temperature and so can be rolled into thin sheets and films. It can be cut into any form desired. Silver chloride has to be coated with silver sulphide (the stuff on tarnished silver) to protect it from ultraviolet radiation; otherwise the silver in it would precipitate out and render it opaque.

In the 1940s, about the end of the war, interest in crystals got a boost from the demand for scintillation devices. Scintillation crystals have the property of transforming short-wave electromagnetic radiation such as gamma rays into visible light. Small light flashes produced when the rays strike the crystal are picked up by a photoelectric tube, amplified and made to serve a useful purpose such as the production of audible clicks in an instrument designed for detecting uranium. Organic crystals such as those of naphthalene, stilbene and anthracene are used. Inorganic crystals suitable for scintillation counters include cesium, sodium and potassium iodides, and cesium bromide, to which small quantities of thallium iodide are added as an activator. Inorganic scintillation crystals are made into devices that are used for measuring energy of radiation.

Used in Locating Oil

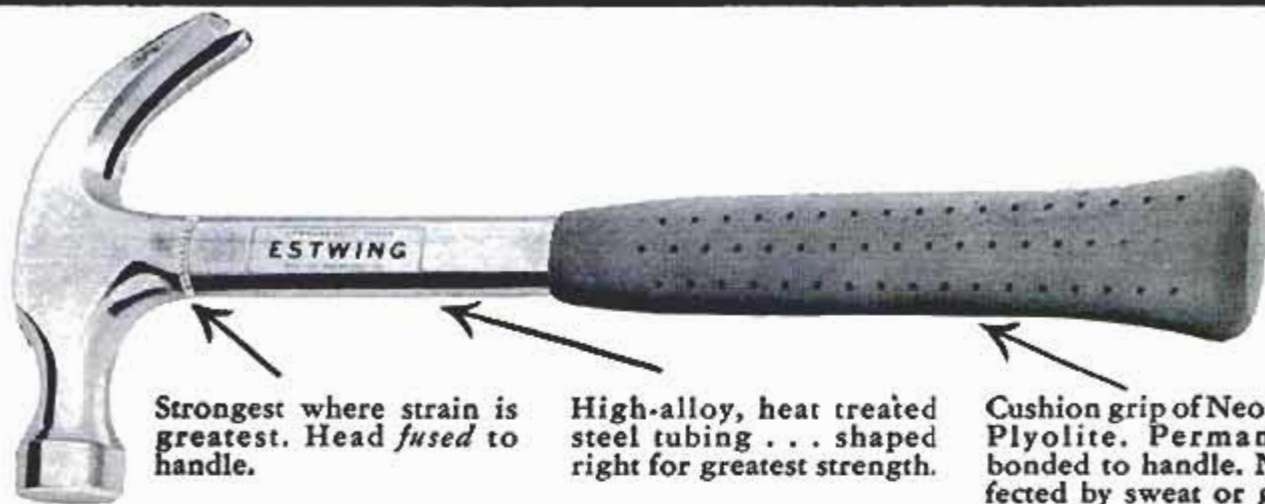
Such scintillation crystals have a variety of uses other than the bloodhounding of uranium. They are valuable in physics and medicine. They are used in gauges for continuously checking the thickness of sheet materials such as plastic film emerging from a machine. They serve as X-ray detectors. One of their important uses is in the logging of oil wells by detecting radiation which may indicate the location of oil.

Scintillation crystals, John Harshaw explained, are being employed in blood studies. In one such application, living animal or human blood is made to circulate in a tube running through the crystal of a scintillation counter. A radioactive material injected into the blood stream passes through the tube and is detected by the crystal. The dilution of the injected material by the blood can thus be determined and the blood volume calculated. The scintillation crystal can also determine the aortal output. Another use for crystals that can "see" gamma rays is in the comparing of blood circulation through the feet or

(Continued to page 326)

NEW... *Estwing* Cushion Grip Hammer

UNMATCHED VALUE!



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High-alloy, heat treated steel tubing . . . shaped right for greatest strength.

Cushion grip of Neoprene-Plyolite. Permanently bonded to handle. Not affected by sweat or grease.

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"TRU-CIRCLE" saw set automatically sets teeth at 10° or more... **\$295 PPD.**



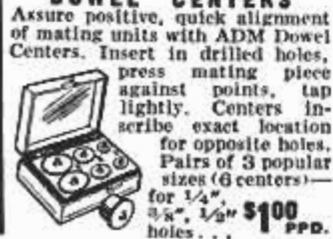
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Sharpens round shank drills from 3/32" to 1/2" in diameter, up to 6" long. Grinds old drills like new in 4 different point angles, using hand or power grinding wheels... **\$295**



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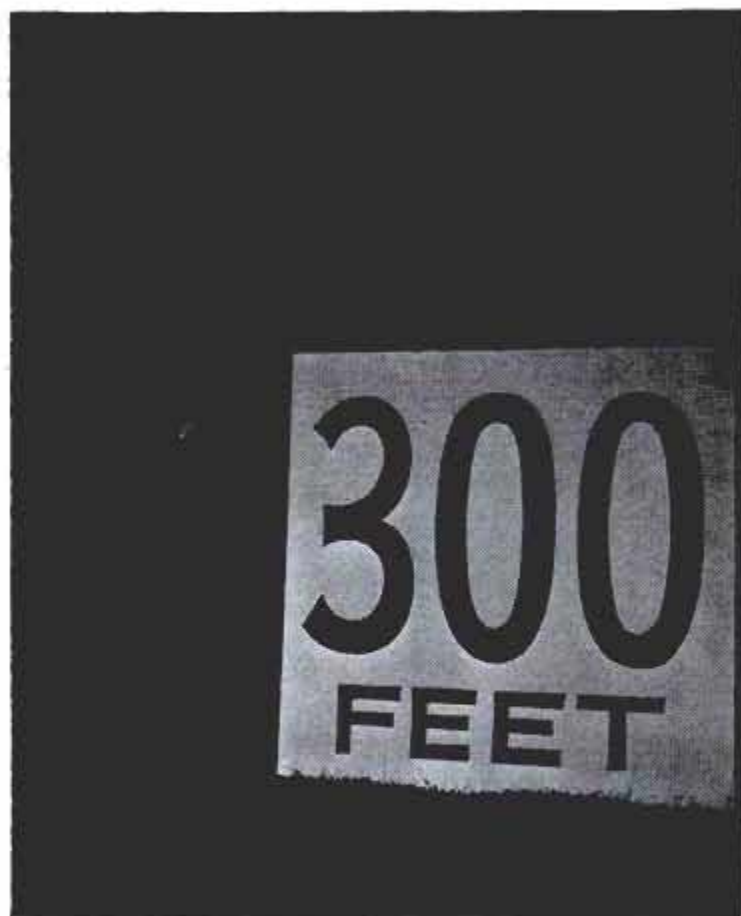
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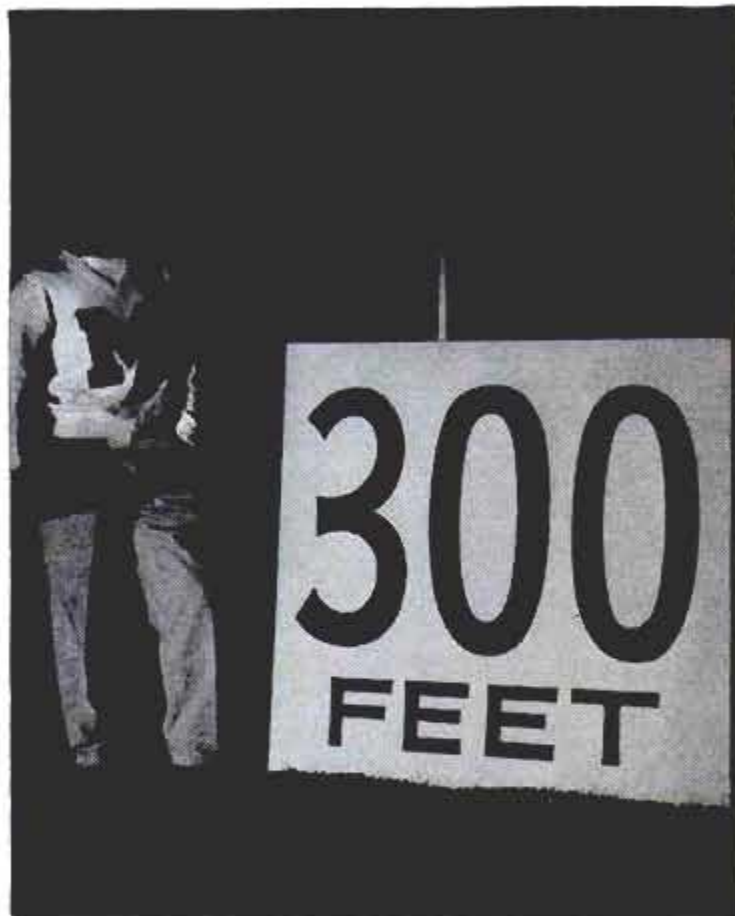


BEFORE-DARK PHOTO OF FOOTBALL FIELD—where the after-dark Headlamp Comparison Test photos,

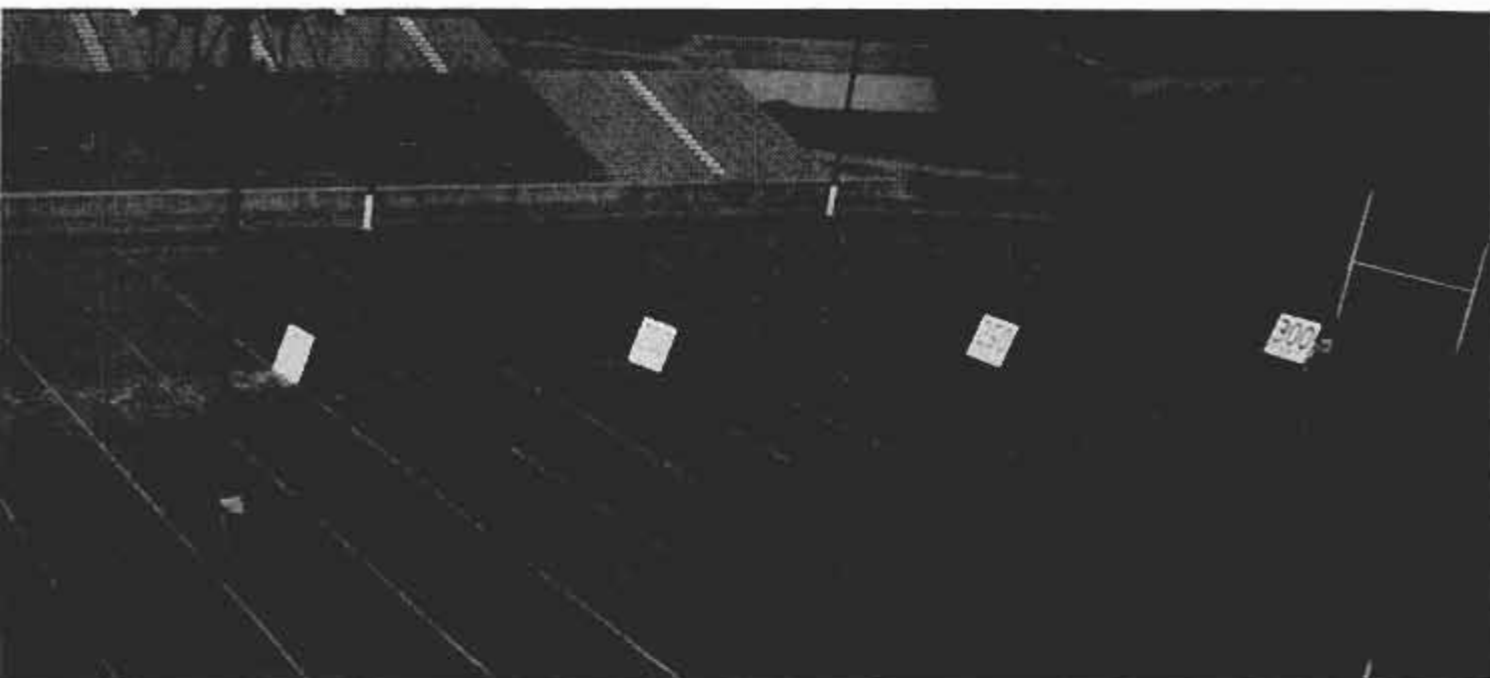
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Student barely visible at 300 feet.



NEW GENERAL ELECTRIC *All-Weather* HEADLAMPS—
Twice as much light at 300 feet and beyond!



below, were made. Student-model stands at the marker, a full 300 feet from the car headlamps.

safer driving at night!

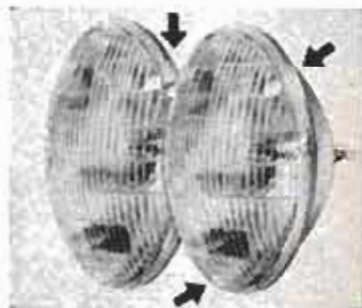
LOWER BEAM OF NEW G-E *All-Weather* HEADLAMPS GIVES TWICE THE LIGHT 300 FEET AHEAD ON YOUR SIDE OF THE ROAD!

Why 300 feet? Because at 300 feet, and at normal speeds, you should see objects *clearly*. Good visibility at that distance is easy with *upper* beams—yet, traffic conditions force you to rely most on the *lower* beam. That's why G. E. redesigned its headlamp lens, upped the wattage, redistributed light in the lower beam. The "Headlamp Comparison Test", pictured at left, shows that you see better at this critical seeing point with G-E *All-Weather* Headlamps — *photographic proof that you can get twice the light for safer driving at night!*

See Better In Fog, Rain, Snow. The special lower beam filament shield in General Electric *All-Weather* Headlamps blocks uncontrolled upward light, reduces kick-back glare, helps you see better in fog, rain and snow.

Is Accurate Aiming REALLY Important? Yes! Road shock and vibration can cause headlamps to become mis-aimed. Aimed high, headlamps glare

into the eyes of oncoming motorists. Aimed low, beams don't project far enough down the road. (If, at a point 25 feet ahead of your car, your headlamps are aimed only 3" low, you get half the light you *should have* at 300 feet!) But G-E *All-Weather* Headlamps have Aim-right Gizmos, (see arrows at right), that help dealers aim them quickly, accurately . . . even in daylight. So, for safer driving, better seeing in all weather, more accurate aiming, replace present headlamps with a pair of G-E *All-Weather* Headlamps today! General Electric Miniature Lamp Dept., Nela Park, Cleveland 12, Ohio.



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Paint removers containing Dow Methylene Chloride get down under paint and lift it right off the surface. Just brush on, wait ten minutes, then wash or wipe loose paint off. Beats hard work a mile! Safer, too, because it's nonflammable. Available in wash-off or scrape-off types at hardware and paint stores. Look for paint removers labeled "nonflammable" or "contains Methylene Chloride".

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hands. A crystal forming part of a scintillation counter is placed against each foot or hand to pick up the radiation from injected material. In thyroid studies, a scintillation crystal can be used to trace the size and shape of a thyroid gland containing radioactive iodine.

Scintillation Counter

Perhaps the most familiar job for scintillation crystals is in detection of uranium deposits. The scintillation counter of which the crystal is a part may be used at ground level or from the air while surveying for radioactive materials. Such counters are being sold even in department stores.

Harshaw scientists have been experimenting with crystals of cadmium sulphide, which can convert the sun's energy into electricity, and some day may be important in solar batteries.

The company makes a crystal form of barium titanate that has a memory. Its use in automatic telephone equipment is being studied, and it has potential applications in computers and other memory devices. A typical barium titanate crystal having a one-track mind is .125 inch or so square and .0025 inch thick. On opposite surfaces, two lines of conducting material a few thousandths inch wide are deposited in a vapor chamber. The lines run at right angles to each other, and the area between their crossed portions determines the current-conducting path through the crystal. The memory characteristic of barium titanate depends on the fact that it can be polarized by passing a current, at low voltage, through it. That is, particles in the crystal are arranged so their positive or negative ends all point in one direction. After the voltage is removed, these particles remain lined up in this direction so they remember what happened to them last. Later it is possible to "read" this information by again applying a voltage to the crystal. If this "reading" voltage is in the same direction, the current will be small because the particles are already lined up in this direction. If the previous voltage was in the opposite direction, the reading voltage will reverse alignment of the particles. Because this represents work, the current flow will be much larger. It is possible to produce, on a single crystal, a hundred or more memory points by depositing a grid of crossed lines on the crystal surface, and each point can operate independently of its neighbors.

The crystal-makers at Cleveland regard their work more as an art than an industry. In the growing and using of crystals, problems of technique and purity can be great. In some cases, getting rid of impurities is

(Continued to page 328)

A. C. ELECTRIC GENERATOR

ITEM #G-75-D 7½ K.W. (7500 single phase) WATTS: 110/220 volt output. 3 wire system. 2 bearing construction. 5 groove 6" V belt pulley included. Self-excited. Foot mounted. Drive generator from tractor or stand by engine. Ample power for 6 room house. Dimensions: 34" x 11½". Shipping Wt. 420 lbs. F.O.B. Chicago. . . . **295.00**

Complete control box for these generators includes A.C. rheostat, automatic voltage regulator, field rheostat, and voltmeter, already wired and ready to connect to generator. List price \$167.00. Our Price **56.45**

300 AMP. D. C. GENERATORS IDEAL FOR WELDING GENERATORS

Type R-1, ITEM #91, rated 300 amps. - 30 volts. Mfg. by Jack & Heintz. Government Acquisition Cost \$380.00. Shpg. wt. 55 lbs. Dimensions: 16" x 10" x 7". Complete with instructions to connect as welder. F.O.B. Chicago. . . . **35.00**

ITEM #90 - When connected as a welder, this unit will deliver 200 amps for a sustained period and 250 amps for intermittent service. This generator is widely used for shop-built portable welders. Rated 200 amps, 28 volts, 2500 R.P.M., using 10 H.P. Dimensions: 15" L. x 6" W. x 8¼" H. Splined drive shaft. Gov't. Acq. cost \$300.00. Shpg. Wt.: **22.50** 51 lbs. F.O.B. Chicago. . . .

ITEM #99 - 12 V. - 50 Amps. - Leeco-Neville generator for autos, trucks, road machinery, boats and battery charges. Precision aircraft quality construction, with life-time grease sealed ball bearings and heavy insulated windings. Standard 4-bolt square mounting flange, spline shaft. Dimensions: 16" L. X 8½" Dia. Wt. 23 lbs. Gov't. Acq. cost - \$92.00. Now. . . . **16.50** F.O.B. Chicago

BERRY - HEAVY DUTY HYDRAULIC PUMP or MOTOR

ITEM #166 - Use on road machinery, vibrators, paper mills, wire reels, hydraulic presses, speed control units. Ball bearing construction, balanced cam design assures high efficiency performance. When used as a pump, delivers 8 G.P.M. at 1000 P.S.I., 8 H.P. At 1200 R.P.M. as a HYDRAULIC MOTOR: Rated up to 12 H.P., up to 2400 R.P.M. Standard ¾" pipe thread ports, ½" shaft with keyway. Dimensions: 14½" x 8" x 7". Weight 63 lbs. Regularly \$212.00. OUR SPECIAL PRICE. . . . **59.50** F.O.B. Chicago

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POWER TO OPERATE:
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1000 WATTS OUTPUT, continuous duty. 115 Volts A.C. 60 cycles, 9 amps. Powered by husky, easy starting Clinton engine. Engine and generator operate at 3600 R.P.M. for maximum efficiency at minimum weight. Both units are mounted on steel base, with heavy sheet metal belt guard. Generator is self regulating, and is equipped with outlet box containing fuse and 2 A.C. convenience receptacles. Cost only 5c an hour to operate. Dimensions: Length 20½", Width 12", Height 16". Shipping wt. 100 lbs. F.O.B. Chicago. . . . **149.50**

700 WATT-GENERATOR SET—same as above, slightly smaller—with Briggs-Stratton Engine—Model 708—F.O.B. Chicago. . . . **129.50**

ITEM #2008—2000 WATTS—115 V. A. C. generator set, powered by husky, fast starting Briggs-Stratton engine. Mounted on portable steel carrying base for easy handling. — Just right for small cottage and cabins needing inexpensive 2000 Watts of electricity. Ship. Wt. 190 lbs. F.O.B. Chicago. . . . **295.00**

U.S. NAVY ALL BRONZE CENTRIFUGAL PUMP



ITEM #384

These all bronze Centrifugal Pumps are ideal for use as marine bilge pumps, circulating pumps, fire protection or irrigation, car-washing, dewatering, basement sump pumping, lawn sprinkling. Will pump water, oil, brine, gasoline, DDT and sulphur compounds. Equipped with 6" adjustable 'V' pulley, 2" dia. inlet and outlet, 180 GPM capacity. Inlet and outlet take hose with 2¼" inside diameter. Dimensions: 11" x 8" x 11".

Total head-feet	Speed	H.P.	GPM
25	3600 RPM	3	180
35	3000 RPM	1¼	90
20	2400 RPM	1½	75

Back plate may be rotated for most convenient inlet position. Gov't acquisition cost \$96.00. Shipping weight 31 lbs. F.O.B. Chicago. . . . **29.50**

HYDRAULIC LIFT CYLINDERS

• For Fork Lift Trucks • For Presses • Loading Ramps • Lifts 12500 lbs. Heavy duty hydraulic cylinders, at big savings.

ITEM #502—4" Bore—30" Stroke—1¾" Piston Rod. Wt. 95 lbs. F.O.B. Chicago. . . . **72.00**

ITEM #503—4" Bore—54" Stroke—1¾" Piston Rod. Wt. 135 lbs. F.O.B. Chicago. . . . **96.00**

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ITEM #126—Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has ¾" pipe thread inlet and outlet. ½" pipe thread cylinder ports. Finger grip handle. Ship. wt. 10½ lbs. AN OUTSTANDING BUY! F.O.B. Chicago. . . . **21.50**

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ITEM #82. Perfect for Hydraulic Presses, Snow Plows, Farm Wagons, Jacks and Farm Plows. A few easy strokes of the 20" handle and you can lift 5000 lbs., using a 2½" bore Hydraulic Cylinder. Blackhawk Model P-151—complete with built-in oil tank and release valve. Rated 1200-8400 lbs. per square inch. Dim.: 9"x7"x6". Ship. wt. 35 lbs. Worth much more. F.O.B. Chicago. . . . **22.50**

ITEM #2784. 1-6 Ft. length double wire braid rubber covered hydraulic hose—tested to 20,000 lbs. . . . **3.95**



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HOBART 2 H.P. 12-24 VOLT ELECTRIC MOTOR

ITEM #315—Rated 24 volts D.C. 90 amps, 4000 R.P.M. Has ½" spline shaft on both ends of motor, ball bearing construction, as specified for use with electric wheelchair design Popular Mechanics March issue, 1953. Convertible for use on 6 to 12 volts. Shipping Wt. 21 lbs. Dimensions: 11" x 5" x 6½". F.O.B. Chicago. . . . **13.00**



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the biggest job, and working methods have to be very clean. The act of growing large crystals requires a highly specialized technique. For instance, the process of getting heat into a large mass of chemical and then getting it out again, at a carefully controlled rate, requires skillful control.

Many of the finished crystals are surprisingly rugged; others, such as some scintillation crystals, are protected by hermetically sealed containers. Because the crystal materials often are soluble in water, humidity may have to be controlled. Instruments in which crystals are mounted are often heated so the crystal temperature remains above the condensation point of atmospheric vapor.

Strange Requests

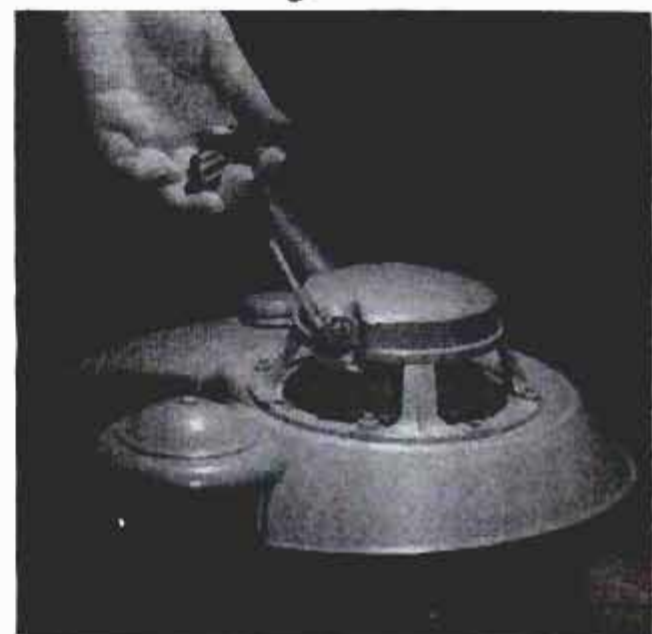
Almost daily, the Harshaw laboratory receives some strange request involving crystals. A university once sent a few grams of a special chemical isotope and asked that a crystal be made from it. Nobody knew how to do this, but a method was worked out without wasting too much of the precious stuff.

So far, no one has asked the Harshaw scientists to make a workable magic crystal ball; but if this project ever is carried out, one of the first tests will be to see what future it predicts for other wonder crystals.

★ ★ ★

Rewind Starter for Power Mowers

Now you can install on your power mower a rewind starter similar to the snap-back reels on outboard motors. The old starting pulley is removed and replaced with the starting unit, which is secured to the engine shaft. If necessary, new holes may be punched or drilled to mount the unit.



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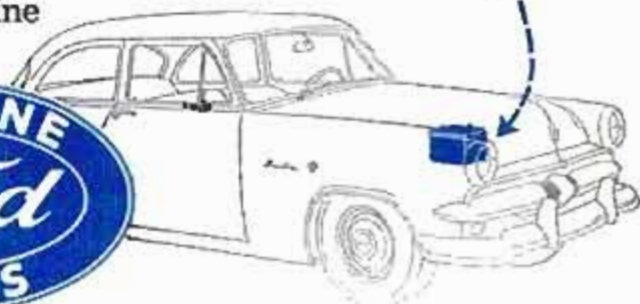
"They're factory fresh, too, for an even longer life. The life-building fluid of the new Genuine Ford dry charge battery is packaged separately and added when you buy it. That means there's no power loss in storage . . . and many extra amp-hours of battery life for your Ford."

All Genuine Ford Parts are made right to last longer in your Ford!

Genuine Ford Batteries, like all Genuine Ford Parts, are made to the exact specifications set by the men who first built your Ford.

In addition, all Genuine Ford Parts have to pass grueling Ford "torture" tests before being approved for manufacture.

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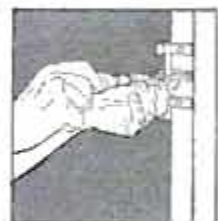
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ARC WELDER KIT \$27.95 — build your own

Complete make-up package consisting of 1 Aircraft DC Generator, Electric Auto-Lite 160-240 Amps, 24 Volt, RPM from 2600 up, 1 Rheostat, 1 Giant Toggle Switch, 1 Ammeter, 1 Shunt, 0 to 240 Amps, 1 Voltmeter, 0 to 30 Volts, 1 Electrode Holder, 1 Welder's Shield, 1 Voltage Regulator. Wiring diagram chart showing conversion of Aircraft Generator to Arc Welder. Shpg. Wt. under 100 lbs. Approx. GOVT. COST \$475. Like new, perfect. \$27.95.



DC Generator (only)—same as above... if purchased separately: \$12.50.

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Designed for heavy-duty use with Air Force heated suits. Ideal for regulating voltage on electric welders, model trains, lights, generators, electric blankets; controls soldering irons, photo flood lamps, etc. Rated 5.75 ohms, 100 watts with double windings & dual female 25 amp, 125 volt receptacles. Size: 7" H x 5 1/4" W x 1 3/4" D. Shpg. Wt. 2 1/2 lbs. Approx. GOVT COST \$25. Brand new, only \$1.65



NEW PUMP AND MOTOR

Pump has 1" connections, built-in relief valve, adjustable up to 1500 lbs. Max capacity 6 GPM. 1 1/2 H.P., 24-volt motor, 4000 RPM. Can be used on 12 or 36 volts. Govt. cost approx. \$350 — our price — NEW — \$9.95.



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Originally intended for govt radio & target planes. Now the perfect "prop" for den, trophy room, game room or boy's bedroom. Clock, barometer or photo can be inserted easily into center (complete with mounting holes). Top grade bird's-eye maple; flawless, smooth, highly varnished; 30" tip to tip. Can be used to operate ice sleds, etc. Approx. GOVT COST \$57. New—\$3.95. (Great Xmas gift.)



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For dionels, ships, farm machinery, trucks, bridges, oil fields, all heavy equipment. Torque leverage, 4" Lowell, safety steel, sockets for 2 3/8", 2 9/16" & 3 1/8" hexagon nuts. Navy surplus. Approx. GOVT. COST \$215 a set, Wt. 50 lbs. NEW! Now \$10.95 per set.



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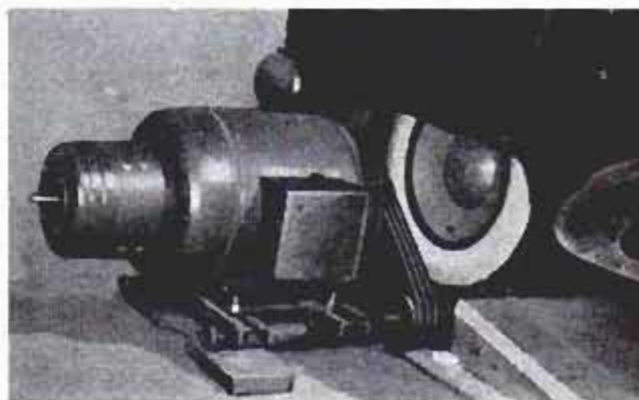


Airport Visitors Hear Control Tower

Newly installed coin-operated "listening posts" at the Oakland, Calif., International Airport enable air travelers and visitors to hear the radio conversations between pilots and the traffic-control tower. The machines are mounted on the railing of the observation deck.

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You can use the spinning rear wheels of a car or tractor to generate electric power for a 30-horsepower 110/220-volt motor. The vehicle's rear wheels rest on two parallel rollers that drive the electric generator through V-belts. A short approach ramp is used to back the car or tractor onto the rollers. The unit, which can be equipped with generators of various sizes, acts as an emergency electricity source during power failures or can be used in construction work as a portable power supply. Without the generator, the unit can be used to drive pumps, circle saws and almost any type of small machinery through a direct drive to a belt pulley.



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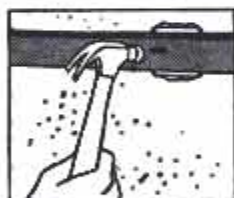
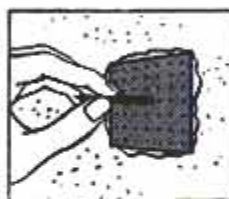
NOW turns the ordinary shop drill into HIGH SPEED DRILL. PRESS at a big saving. When DRILLMASTER is used on a 5,000 rpm drill press its top speed will be 20,000 rpm. Does the work of expensive high speed drill presses on brass, aluminum, plastics and cast iron where high speed drilling is necessary. Available for work of any size runs. Fits any 1/2" chuck, holding drills from 5/32 to 2/80. Shafts are heat treated and ground. Ball bearings and oil impregnated bearings and gear train are housed in cast aluminum. Precision made throughout. **\$62.50** Fob. Wt. MAIL ORDER TODAY only. **ON C.O.D. ORDERS WE REQUIRE A 10% DEPOSIT.** 2% DIRZIUS MACHINE SHOP "E", 1423-25 So. 52nd Ave., Cicero 50, Ill.



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this easy,
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Just attach Gemco Anchor Nails (16" apart) to walls with waterproof Tuff-Bond Adhesive. These will hold furring strips securely in place. Then nail wallboard or wood panels to furring strips... and the job is done. It's that simple! All you need is the Gemco Anchor Nail Kit... at better dealers everywhere. If your dealer cannot supply you, write...



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OCTOBER 1956

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(smaller saws cost that much more!)

NEW! 6 1/2" POWER SAW

with exclusive
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SAFETY CLUTCH**
increases work life
up to 15 times!

says Fred Wiborg,
Master Carpenter
of Chicago



only \$49.95

This new Pet saw is packed with power... a husky 1 horsepower. And Pet's exclusive Automatic Safety Clutch eliminates dangerous kick-back, motor burn-outs from overloads. Increases saw life up to 15 times!

And what a price! This all-new Pet 6 1/2" saw costs \$10 to \$20 less than other top 6 1/4" saws!

Fred Wiborg (above) says, "I job-tested this Pet saw on the roughest, toughest work I could find... and it came through like a thoroughbred. Cuts a 2 x 4 at 45° in one cut! And you should see the report on it by a famous research institute. Proves that this Pet saw equals or excels any other make, regardless of price!"

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- 1 h.p. Universal ac/dc motor develops 4850 r.p.m.!
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- Exclusive Automatic Safety Clutch adds up to 15 times more work life!
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- Retracting lever on automatic blade guard!
- Easy grip knobs adjust all saw positions instantly, effortlessly!

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Now, save money and turn out professional-looking jobs in your own home. Everything you need to know for building handsome furniture, a 12-foot outboard, toys for the children and many other items is contained in these patterns. Trace the patterns on the lumber, saw, smooth the edges and assemble—it's as easy as that. Every nail, screw, dowel and bolt is clearly located for you on the pattern. You can't make a mistake.



Modern Step Table

No. 104. Designed to be a companion piece for No. 103, described in the listing below, this table is 28 x 18 inches, upper step 24 inches high. Complete in one pattern. **50 cents**



Personal Work Bench

No. 108. This compact, sturdy work bench has sliding doors and a drawer. Top is 44 x 20 inches, 35 inches high. Lots of work space in small area. Two patterns in set. . . . **\$1.00**



CRUSETTE

12 Foot Utility Outboard

No. 101. Build this runabout at amazing savings with ordinary hand tools. Length 12 feet, beam 4½ feet. Complete material list and instructions included. Four patterns. . . . **\$2.00**



Trundle Beds

No. 102. These space-saving beds are safer for young people, 90 x 45½ inches. Top bed 40 inches, lower bed 23 inches high. Three patterns in set. . . . **\$1.50**

11 OTHER PATTERNS AVAILABLE

In addition to the 4 full-size patterns illustrated, there are 11 others in stock. If you've been looking for some good projects for your shop, you'll want more than one of them. These patterns have become so popular that the supply may soon be exhausted. It is not surprising that Popular Mechanics readers have responded enthusiastically to the original announcement of these patterns—just think of it, you can't go wrong! Every pattern has been proven for design and correct fit of parts—is guaranteed to please you! So act now, while all patterns are still available.

No. 103. **Modern Cocktail Table.** Matches No. 104 above. 40 x 19 inches, 15½ inches high. Plank top and metal grill inserts in sides. One pattern. . . . **50 cents**
No. 105. **Toys for the Children.** "Giraffe Drawing Board" and "Bucking Bronco" riding toy. Pattern includes painting suggestions. One pattern. . . . **50 cents**
No. 106. **Juvenile Chest Robe.** Has hanging storage space, two drawers and shelf. 30 inches wide, 16 inches deep, 39 inches high. Two patterns in set. . . . **\$1.00**
No. 107. **Cupola and Weathervane.** 24 x 24 inches, 34 inches high, plus height of vane, which is made of metal or tempered hardboard. One pattern. . . . **50 cents**
No. 109. **Valances and Trims.** Twelve designs included. Merely trace patterns on the wood, saw and assemble. Finishing suggestions given. One pattern. . . . **50 cents**
No. 115. **Corner Table.** A new pattern to be used with the cocktail and step tables (Nos. 103 and 104) or alone. 29½ x 29½ inches, 18 inches high, plus an 8 inch diagonal step. One pattern. . . . **50 cents**

No. 110. **Decorative Wall Shelves.** Modern shelf with metal trim is 28 x 16 x 8 inches. Traditional shelf is 29½ x 16 x 8 inches. One pattern. . . . **50 cents**
No. 111. **TV Chair.** Seat 22 inches deep, 24 inches wide. Overall, 27½ x 32½ inches, 26½ inches high. Sagless springs and foam rubber. Two patterns in set. **\$1.00**
No. 112. **Modern Tub Chair.** Seat 22 inches deep, 24 inches wide. Overall, 28 x 27 x 27 inches. Sagless type springs and foam rubber. Two patterns in set. . . . **\$1.00**
No. 113. **Sofa Bed.** 78¾ x 29¾ inches, 33 inches high, with removable bolster. Uses 4½ inch standard foam rubber or other mattress. Two patterns in set. **\$1.00**
No. 114. **Love Seat.** Uses sagless type springs with foam rubber padding. 48 inches between arms, 21 inches deep. Overall, 55½ x 29 inches. Two patterns in set. . . . **\$1.00**

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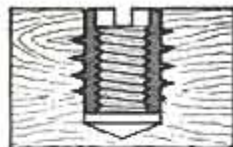
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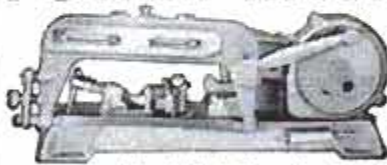
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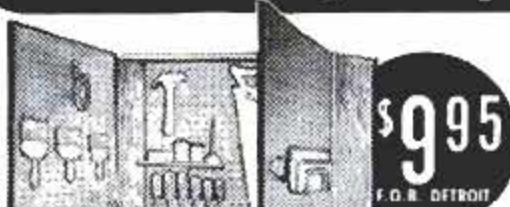
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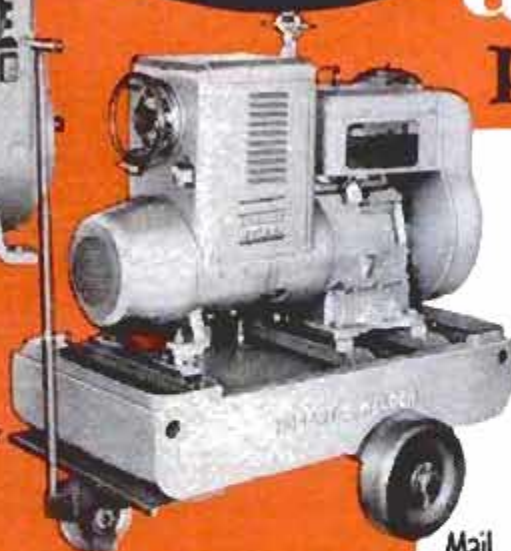
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Author, Inventor.
Pioneer in oil
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Manifold-heated Reclamos now OHSO-
LITE, accepted (new or used) for trade-in.

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Cards, Stationery, Advertising, Circulars, labels, photo and movie titles, church work, tags, etc. Save money. Sold direct from factory only. Raised printing like engraving, too.

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Print for Others, Good Profit. Have home shop. Junior press \$15; Senior \$29 up. We supply everything. Easy rules. Pays for self in short time. Write for free catalog of outfits and all details. **KELSEY PRESSES, C-37 Meriden, Conn.**

New Long Lasting Combination Blade
Roc-Edge 6" SAW \$1.49
BLADE ~~7" \$1.99~~ ~~8" \$2.00~~
Fits any power saw. At all Hardware Stores

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2 Passenger
SPORT & GOLF Cars
Costs small fraction of most other cars.
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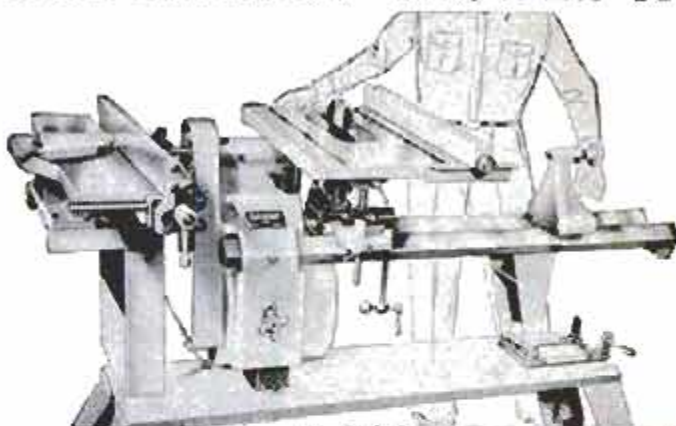


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WE PAY ALL FREIGHT FOR YOUR FREE HOME TRIAL

ONLY \$139.50 EASY PAY PLAN



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As a speed wrench! A squeeze of the hand locks jaws onto nut. Then give it a whirl!

Does More Jobs Easier Than Any Other Tool Made!



No. 10W, 10" \$2.60

A squeeze of the hand locks jaws onto work with ton-pressure! Quickly adjusts for use as All-Purpose Wrench, Super-Pliers, Clamp, Wire Cutter, 7" and 10" cutter optional. \$1.85 to \$2.60 at your dealer.

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VENTILATING HOOD BY TRADE-WIND

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Please send information and prices on the Salem Ventilating Hood.

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For cars and trucks. Front or rear. Gives 2,000 lbs. extra capacity for all 1/2, 3/4, and 1 ton trucks, 500 or 1,000 lbs. extra for all cars. Easily installed. Guaranteed. State make, model, and year.

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GUARANTEED AGAINST JOINT FAILURE FOREVER

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800 ISIS AVENUE • INGLEWOOD, CALIF.

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GENUINE SELECT PHILIPPINE MAHOGANY PLYWOOD DIRECT FROM IMPORTER

For Fine CABINET WORK, FURNITURE, Paneling DENS, OFFICES, HOTELS, etc.

Our prices are LESS THAN DOMESTIC PLYWOOD at WHOLE SALE. This selected LUAN MAHOGANY meets the most rigid specifications. It is WEATHER and WATER RESISTANT. You'll be amazed at the beauty of this fine wood. Its rich golden elegance will thrill you. Rotary cut for beauty of grain. Both sides sanded and ready to use. Bonded with finest resin adhesive. Face side unjointed.

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Available in three thicknesses - 3mm (approx. 1/8"), 4mm and 1/4". ALL orders shipped by special Truck for lowest rates. No order accepted for less than 100 lbs. - equal to (A) 1/4" sheets, (B) 4mm sheets or (C) 3mm.

3MM (1/8") x 3FT. x 6 FT. \$5.00 VALUE PER SHEET

1/4" x 4 FT. x 8 FT. 9.50 VAL. MIN. ORDER 4 SHEETS \$49 PER SHEET

SAVE 50% ON TRANSLUCENT FIBERGLAS PANELS

Use it for patio covers, interior decor, walls, partitions and many other uses. Ideal for the home, office, shop, indoor or outdoor installations. Finest quality. Available in many widths and lengths. Excellent color selection. Write for a FREE Sample and Booklet.

Only 49¢ SQ. FT.



SAVE 40% ON BRASS TIP-WOOD LEGS

Beautifully turned and sanded, fully seasoned. Complete with genuine brushed brass tips and sturdy steel mounting plates. Available finished or unfinished. Finishes are Blonde, Silver Fox, Mahogany or Charcoal Black. Please specify finish. Prices per set of 4

SIZE	FINISHED	UNFINISHED	SIZE	FINISHED	UNFINISHED
4"	\$2.65	\$2.15	12"	\$3.95	\$3.55
6"	\$3.00	\$2.65	14"	\$4.40	\$3.95
8"	\$3.55	\$3.00	18"	\$5.35	\$4.75

NEW NYLON ROPE

Very finest quality. Lustrous white color.

SIZE	Strength	PRICE
1/8" Nylon	300 lbs.	5¢ run ft.
1/4" Nylon	1100 lbs.	9¢ run ft.
3/8" Nylon	2700 lbs.	17¢ run ft.
1/2" NYLON	5000 lbs.	27¢ run ft.
11/16" Nylon	13500 lbs.	39¢ run ft.
15/16" Nylon	17500 lbs.	57¢ run ft.
1" Nylon	18000 lbs.	62¢ run ft.

STAINLESS STEEL CABLE

Finest quality preformed cable. Extra flexible. Rust and corrosion resistant. Aircraft quality. 7 x 19 strand. Breaking strength in chart below.

Dia.	Test lbs.	Price/ft.	Dia.	Test lbs.	Price/ft.
1/16"	480 lbs.	7¢	7/32"	5000 lbs.	29¢
3/32"	1000 lbs.	14¢	1/4"	6600 lbs.	38¢
5/32"	2000 lbs.	21¢	5/16"	9600 lbs.	47¢
3/16"	2900 lbs.	23¢			

3/64" - 1 x 7 strand. Stainless Steel with wire core. 280 lbs. breaking strength - Price/ft. - 5¢

AIR PRESSURE TANKS

G-1 Type. Stainless steel. Shatter-proof and rustless. Has reinforcing ribs and is built to withstand pressures up to 200 PSI. High safety factor. 1/4" pipe ports. Ideal for use in Air Storage in painting, spraying, etc. Can also be used for water storage, as a bunny, etc. Size: 12 1/2" diam. by 24" in length.

NEW & UNUSED 14.95 USED 11.95

SAVE ON UNIVERSAL JOINT

90° to 180° Universal joints. Has a heavy duty, solid cast bronze body. Rotates from 90° to 180° as desired. Has 29/32" dia. steel shafts with a ball & socket joint. In excellent condition, ready for use.

Write TODAY for complete list of many other types of universal joints, hoists, hydraulics, etc.

SAVE ON METAL WORKING CARBON STEEL TWIST DRILLS

Made by Cleveland, Morse, etc. All are unused and in excellent condition. 3/16" Aircraft. Threaded shank. . . . 9¢ ea. 11/16" with Taper Shank. . . . 89¢ ea. 63/64" with Taper Shank. . . . 99¢ ea. 2" diameter with Taper Shank. . . \$2.29 ea.

SAVE on Surplus Drills. Hundreds more in stock. Write for complete list of other sizes and prices.

133 PC. POWER TOOL KIT

Can be used with any electric drill or grinder. Set includes grind, polish, cut-off & buffing wheels, sand discs, cutters, mandrels, burnisher, stones, rubber wheels, etc. 133 pcs. in all. Save 50%.

JUST ARRIVED - SURPLUS

2000 WATT POWER GENERATOR

IDEAL FOR USE ON FARM, IN CAMP, CABIN, MINE AS STANDBY POWER. Delivers 28 V. DC or 70 amps. Rated capacity - 2000 Watts. Driven by a single cylinder, air-cooled, 2 cycle, gasoline engine. Turns 3600 R.P.M. Comes complete with voltage regulator and

voltmeter. Available in rope start or push-button start by battery. Size: 21 1/2" x 18 1/2" x 18 1/2".

89.00

KNIFE BARGAIN FOR SPORTSMEN

AMAZING FOLDING MACHETE WITH LEATHER HOLSTER

2500 COYT VALUE **4.95**

The latest design in battle machetes. A new blade shape that cuts quicker and deeper. Blade is finest, blued steel with ground and honed edge. Folds into the heavy bakelite handle like a giant pocket knife. When open a special safety lock holds blade rigidly in place. Ideal for all chopping, cutting or hacking uses. Complete with Whitstone and rugged, hvy. duty leather belt holster. Overall lgth. 17" open. Blade 8".

NEW NAVY FIGHTING KNIFE

KNIFE 298 LEATHER HOLSTER 1.99

Dagger design with 6-1/2" steel blade and genuine laminated leather handle. Blade is hollow ground on cutting edge and is double-edged 3-1/2" at the point. An excellent knife for the camper, hunter, rancher, woodsman, etc. Comes in leather belt sheath. Overall length 11 inches.

MACHETE NEW 1.98

22" Vanadium steel blade with a 5" curved, hardwood handle. Brand new stock. Comes with a rugged belt sheath. A BUY!

15" BOLO KNIFE 1.98

Top quality Steel blade. 15 inches long. Ideal for chopping, clearing brush, etc. Comes with belt sheath.



3400 RPM - 1/2 HP POWER SAW

RIPS - CROSSCUTS CUTS A FINISHED 2x4 LIKE A KNIFE THROUGH BUTTER

COMPARES TO SAWS SELLING UP TO \$49.50 **19.98** Complete with 5-1/2" Blade

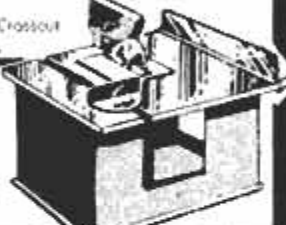
A rugged, professional type, adjustable saw. Will cut any angle from 0 to 45°. Has an adjustable (0 to 6") rip fence. Safety trigger switch on handle. Full 1/2 HP Universal AC-DC, 110-120 Volt, 60 cycle motor. Weighs only 6 1/2 lbs. Thousands already sold. Your satisfaction guaranteed.

EXTRA SAW BLADES - Available in Rip, Crosscut or Combination. Please Specify **2.95 ea.**

NEW POWER SAW BENCH TABLE

This sturdy, precision made bench-saw table converts our famous power saw (above) to a handy bench saw. Permits angle and bevel cuts, rip, crosscut & cones with rip fence and mitre guide. 14" x 16" table, 8" high.

NEW ONLY 9.95



SAVE 40% ON BRASS TIP-WOOD LEGS

Beautifully turned and sanded, fully seasoned. Complete with genuine brushed brass tips and sturdy steel mounting plates. Available finished or unfinished. Finishes are Blonde, Silver Fox, Mahogany or Charcoal Black. Please specify finish. Prices per set of 4

SIZE	FINISHED	UNFINISHED	SIZE	FINISHED	UNFINISHED
4"	\$2.65	\$2.15	12"	\$3.95	\$3.55
6"	\$3.00	\$2.65	14"	\$4.40	\$3.95
8"	\$3.55	\$3.00	18"	\$5.35	\$4.75

NEW IMPORT 25 POWER 30MM TELESCOPE & TRIP OD

ONLY 8.95 2500 VAL.

Objects appear to be 25 TIMES CLOSER to you!

Ideal for spotting "hits" on the target range, stargazing or for fun at the beach, etc. Made of aluminum and chrome plated brass. Field of view: 62 ft. at 1000 yds. Object lens: 1-3/16" dia. Imported.

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Protects your car from all kinds of weather. Converted to give a snug fit and go on easily.

For Dodge, Buick, Chrysler, Cad and other large makes **8.95** For Ford, Chevy, Plymouth, Nash Rambler, etc. **7.95**

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PALLEY 100 - 200 - 300X MICROSCOPE

IDEAL FOR STUDENTS, AMATEURS, SCHOOLS, ETC.

Has fine, ground and polished lenses. Precision, all-metal construction - NOT A TOY!! Triple-revolving objective lens allows selection of 100, 200 or 300X magnification. Right or left hand rack & pinion adjustment. Body inclines 90°. Plano, substage mirror. Comes in sturdy hardwood case. **WAS 12.95 NOW 7.95**

12" ELECTRIC BOAT KIT

Has pre-formed wood hull & deck. Just install elect. motor & spotlight - add windshield, rudder, propeller and paint hull and it's ready to go. **3.95 WITH MOTOR**



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WITH EXCLUSIVE NEW
CIRCLE-
CUTTER
& RIP
GAGE!

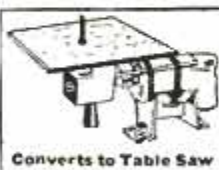


"ARCO JIG-SAW" IS A PORTABLE SAW
AND CAN BE USED AS A TABLE SAW!

(with "Arco Stand" shown at right).
"Arco Jig-Saw" guaranteed to fit any
3/4" drill with Adjustable Circle-Cutter
& Rip Gage saves hours of work—
assures professional results. Cuts perfect
circles up to 20" diam., rips accurately
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plastics, metals—even rips thru 2x4's!
Has same capacity & cutting
speed as \$55 jig saws. "Air-Jet"
blows away saw-dust. Includes blade.

\$10⁹⁵

"ARCO STAND" — Casting &
Clamp \$2.95
6 Extra Assorted Blades \$1.95
At Your Dealer or try it on our 10-day
Unconditional Money Back Guarantee.
Send check, M.O. (add. P.O.D. & post.)



Converts to Table Saw



Ripping with Gage

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ALL WELDED construction. Use any
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SET UP OR knocked down instantly.
Easy to move from job to job, and
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MORE \$ \$ \$ PER HOUR WITH MODERN IMPROVED LAWNMOWER SHARPENER



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NO CHANGE IN PRICE FOR OVER 10 YRS

\$263.00 Complete with 1/2 H.P. Motor

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MODERN MFG. CO.

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ONE-BAG MIXER THAT TRANSPORTS



Universal Transmix® transports, mixes and
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SPYRAL BLADE

SAWS METAL, WOOD, PLASTIC, ETC.
up or down, right or left, even in circles!



Does what no other Blade can Do. Fits Standard Coping
Saw or Hacksaw Frames. NO special adapters needed!
World's safest saw blade.

You'll find hundreds of uses for Tyler Spyral Blades.
There's nothing like them! The first important improve-
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leaves clean smooth edge.

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12 Spyral Coping Saw blades—OR—3 Spyral Hacksaw blades

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PORTABLE LIGHT PLANTS

1500 WATT PLANT

115v. 60 cyc. AC Push Button Start. Powered by a 3 1/2 HP. Clinton engine. Combines big output with easy portability. Provides emergency power for operating any oil burner, sump pump, freezer, television, lights, communications systems, etc. which require up to 1500 watts. (Item 22) Wt. 110 lbs. Reg. price \$417.50. Factory price... **\$239.50**



\$239.50

1750 Watt Plant

Powered by 4.5 Briggs engine. Electric starting & battery charging built-in. Factory price... **\$279.50**

\$279.50

MASTER-LITE 2500 Watt Plant

110/120 v. 60 cyc. AC. A powerful plant, ruggedly constructed and yet designed for easy portability. Can be started by rope or built-in 12 v. electric push button starter. Built-in winding to charge battery. Powered by a big 5.16 HP Briggs engine, complete with all accessories. Includes control box, voltmeter, and handy plug-in power receptacles. An ideal plant for permanent or stand-by service. Wt. 225 lbs. Reg. price \$645.00 (Item 21) Factory Price... **\$329.50**



\$329.50

3500 Watt Plant Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 33% more capacity. Wt. 270 lbs. Reg. \$750. Factory Price... **\$379.50**

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 pushing out frozen bearings and bushings. Developed pressure under precise control and visible at all times on accurate gauge. Complete with both large and small anvil and fits to straighten any kind of curve or bend. (Item 404) Wt. 110 lb. Actual list price \$305. Our special close-out price... **\$69.50**



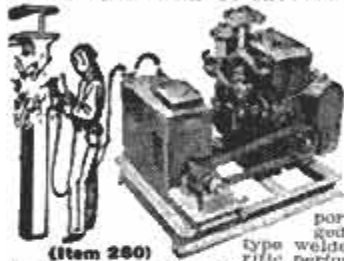
SCREW TYPE PRESS Nine ton capacity. See Sept. Pop. Mech's. ad for details—or write. Complete. Wt. 150 lbs. (Item 797)... **\$49.50**

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Heavy duty and very flexible. Neoprene 14-2 cable. 20 year quality. Wt. 12 lbs. (Item 185) 100 ft. Complete with rubber plug and outlet. A terrific buy at only **\$8.95**



No. 10-2 POWER CABLE. Heavy duty, very flexible, rubber covered, 50 ft. with male and female fittings. Wt. 9 lbs. (Item 592a) **\$10.45**
50 ft. without fittings (Item 592b) **\$9.45**
NO. 12-2 POWER CABLE. Very flexible rubber covered, special outside shield for grounding power tools, etc. 50 ft. (Item 190) Wt. 8 lbs. **\$6.95**. 100 ft. (Item 200)... **\$12.95**
No. 14-8 Conductor Power Cable, heavy duty very flexible, rubber covered, with 8 contact plug & socket. Ideal for tractor-trailer connections (Item 796) 15 ft.... **\$9.95**



MASTER DC ARC WELDERS

Now! a portable rugged, industrial type welder with terrific performance, yet at a price hundreds of dollars less than you'd expect. Senior model made for years of trouble-free, continuous service. High capacity DC welding unit enables you to tackle any job with confidence—easily welds anything up to 2" plate using from 1/16" to 1/4" rods. Built-in stabilizer and cooling system makes arc easy to strike and hold. Dual control rheostat provides low heat soldering, brazing and welding from 30 to 300 amps. Complete with instructions, guarantee and triple V-belt or flat pulley. Easy to hook up and easy to operate. **WELDER ONLY — DUAL CONTROL MODEL.** Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 38a.) Wt. 110 lbs. **\$119.50**
WELDER ONLY—INDUSTRIAL MODEL same as above but with ceramic rotary type rheostat providing 74 different heat settings for all types of welding (Item 38b) **\$139.50**

COMPLETE POWER MASTER (Illustrated above) powered by a 14-hp. air cooled Wisconsin engine. Wt. 480 lbs. (Item 283) Compare with welder costing \$1200. Factory Special... **\$449.50**

WELDING KIT Two 10 ft. leads, welding helmet, electrode holder, ground clamp. Sold only with welder at... **\$10.50**

BUY at **FACTORY PRICES** direct from **MASTER MECHANIC**



700 WATTS PUSH BUTTON START
115 v. 60 cyc. AC. Powered by a rugged 2.2 HP easy starting Briggs engine. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with Voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. He prepared if storm knocks out power lines. Reg. \$275 value... **\$143.50**
1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output... **\$199.50**
We make every type and size of light plants—Write, giving us your requirements!

PORTABLE BOOM HOIST

Here is a big 3000 to 10,000 lb. capacity boom hoist at a fraction of the usual cost (it's Gov'L. surplus)—that can pay for itself on one job! Can be mounted as a stationary crane in yards or on buildings; or as a mobile crane on trucks and tractors. Designed for easy mounting in front or rear of trucks for use as a wrecker or mobile crane. Massive telescoping boom is quickly extended from 10 to 20 ft. with a built-in winch. Ideal for erecting buildings, hoisting materials, loading machinery, unloading RR cars, lifting boats from water, laying in sewer pipe, etc. (Item 801) Wt. 450 lbs. Orig. cost over \$350. Special F.O.B. Shelby, O.)... **\$89.50**



Double Acting Hydraulic Cylinder

A powerful cylinder mfr'd. by Massey Harris which develops both a pushing and a pulling action. Will push 8,100 lbs., with a 1000 PSI pump pressure. Cylinder in 3 5/8" O.D. with 3 1/2" stroke—standard heavy duty clevises on both ends. Has standard 1/2" pipe thread openings. Can be used for tilting buckets or blades, raising or lowering implements, hydraulic presses, etc. Can also be used as an air cylinder. (Item 802) Wt. 17 lbs. Reg. \$68 value, Special... **\$14.95**



GIANT METAL SHEARS

Nine inch cutting blade made of special high carbon alloy steel, perfectly aligned and ground. Easily cuts steel plate up to 12 gauge or 1/4" thick. Overall length 40". Wt. 23 lbs. (Item 156) Reg. \$49.50. While they last... **\$14.95**



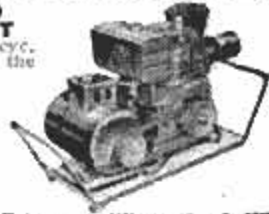
JET FLOW BLOWER

Tremendous air movement (1800 CFM) and quiet operation make this double inlet 10" turbine blower unbeatable for heating, cooling, drying and air conditioning. Ideal for attic or barn ventilation, converting gravity heating to forced air; spray booth exhausts, etc. Operates with any 1/2, 1 1/2 or 3 HP motor. Oversized, long life bearings. Includes variable speed motor pulley and belt. Dimensions 19" hi x 18" x 16 1/2". Outlet opening 13" x 11 3/4". Wt. 45 lbs. (Item 245). Reg. \$54.50. Factory Special... **\$29.50**
HEAVY DUTY 1/4 HP motor for above **\$17.95**.

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110-120 v. 60 cyc. AC. absolutely the best made—exclusive dynamically balanced armature; heavy windings; develops up to 5000 watt overload for motor starting. Skid mounted—portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price \$585. Special at... **\$299.50**
Same plant with electric self starter (Item 31a)... **\$359.50**
Generator only and control box... **\$169.50**
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Push Button Start 115-230 v. 60 cyc. A.C. A brute of a power plant with a rugged 14.6 hp. Wisconsin engine. Plenty of electricity for ranges, water heaters, freezers, pumps, machinery, etc. Affords both 110 and 220 volts. Ideal where heavy current is needed. Wt. 590 lbs. Easily worth \$905. With crank start. Factory price... **\$585.50**
Same plant, but with self-starter, **\$645.00**



JET STEAM MASTER

Now, a super efficient portable steam generator that produces live steam at 100 lbs. pressure in 60 seconds from a cold start! Produces large volume of high pressure steam on 2 pints of fuel oil. Instantly cleans sticky grease, dirt, rust, old paint, etc. oil implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—bulk equipment, etc. Fully automatic—oil fired with new, built-in lifetime bronze water circulating pump. Draws water from faucet or bucket. Simple and safe—anyone can use it; built-in safety valve. Complete with 12 ft. of hi-pressure steam hose and new triple efficiency steam gun that automatically mixes in soap solution if desired. Wt. 250 lbs. (Item 403). Special factory price... **\$349.50**



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(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful, continuous duty motor, 110-120v. AC. Mount in wall or ceiling to ventilate any area. Quiet, super-efficient fan moves one volume of air. (400 to 600 CFM).
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9" Pipe, wt. 6 lb. **\$7.85**
10" Pipe, wt. 7 lb. **\$8.85**
12" Pipe, wt. 8 lb. **\$9.85**
HEAVY DUTY FAN. Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E).... **\$11.95**
12" Fan, wt. 10 lbs. (Item 10D).... **\$12.95**
HIGH SPEED BARN FAN similar to above, but larger, high speed motor moves huge volume of air.
10" Fan (Item 10F).... **\$14.95**
14" Fan (Item 10G).... **\$17.95**



Rugged, ball bearing WINCH

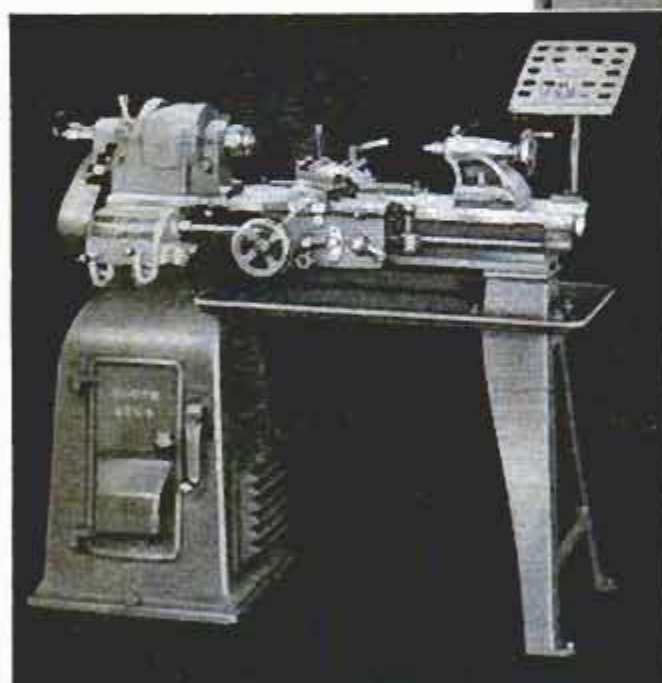
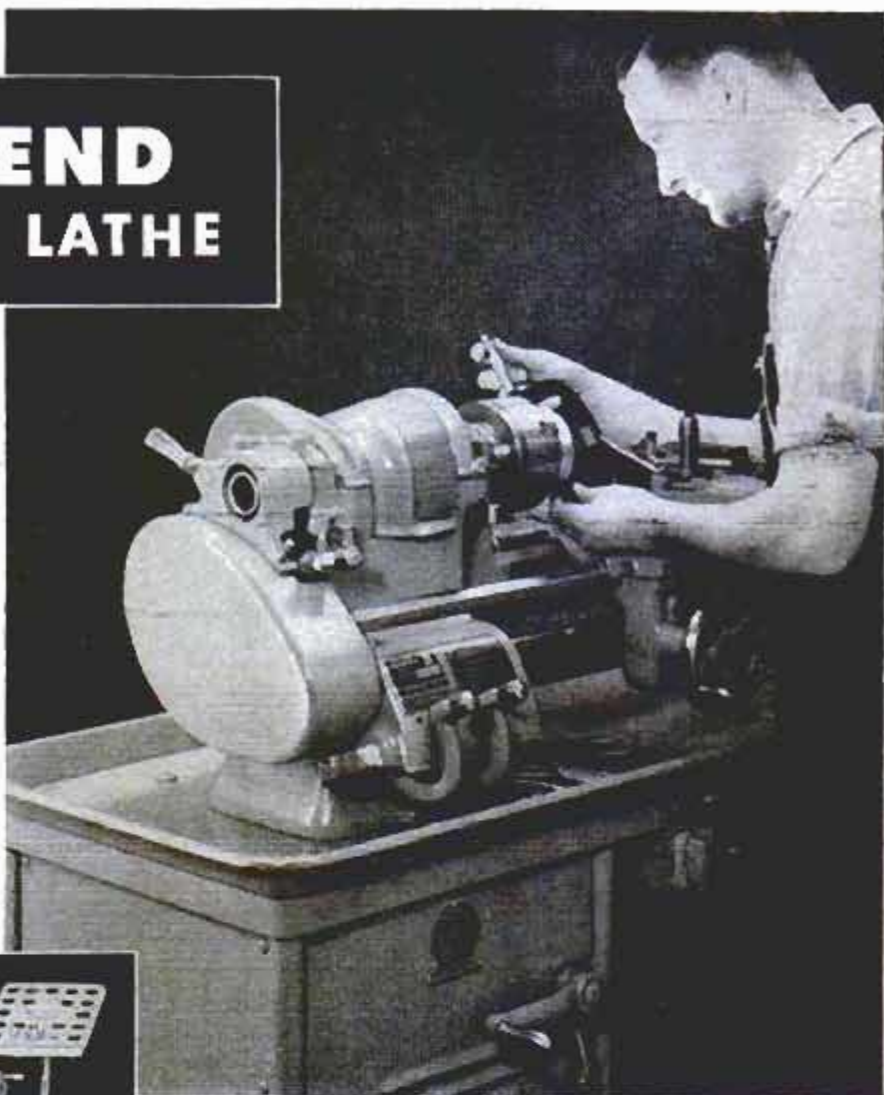
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HAND WINCH—Same winch with large crank handle for extra leverage and 2 speed drive. (Item 794) Wt. 60 lbs. **\$59.50**



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