

# POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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*L.R. Mullinosh/PM*  
**The PM  
 CALIFORNIA HOUSE** — *Page 132*

*Read all about*

**THE CALIFORNIA INFLUENCE**

*by M. A. H. F.*



# ARROW STAPLE GUNS

PRECISION MADE



**T-50**  
All  
Purpose  
Staple  
Gun

The tool no workbench should be without! Nails practically anything: upholstery, insulation, ceiling tile, carpeting, wire fencing, screening, roofing, cornices, electrical wiring, etc. Same gun takes six different staple sizes: 1/4", 5/16", 3/8", 1/2", 9/16" and CEILTILE staples! ..... \$12.50

**Nail it 10 times faster  
... with one hand!**

Anything up to 9/16" thick can be nailed 10 times faster with an Arrow Staple Gun than with hammer and nails. One hand is always free to hold or position the work. Just squeeze pinchproof handle and it's nailed to hold with factory precision. All working parts of Arrow stapling machines made of high carbon steel to insure long life; feature patented jam-proof mechanism. There's an Arrow for every fastening need. Get one today.

## BE SURE! USE ONLY ARROW'S CEILTILE® STAPLES!

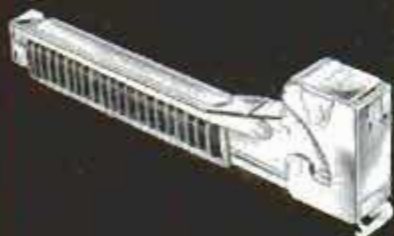
The only one designed for fastening ceiling tile!  
Ends sagging ceilings caused by hidden fractures!

- Unique leg design drives flush, holds tight!
- Flange is never fractured ... CEILTILE penetrates perfectly!
- Special cement coating provides tremendous holding power!

Approved by major ceiling tile manufacturers.



**J7-21** — Junior Tacker for general around-the-house use; shelving, valances, curtains, lining closets, etc. Takes 1/4" and 5/16" staples. Has built-in staple lifter ..... \$4.95



**NT-50M** — Fast nailing! Staples with each blow. Perfect balance permits stapling for hours without strain. Fastens insulation, shingles, roofing felt, linoleum flooring, linings, bulletins, etc. Takes 1/4", 5/16", 3/8", 1/2" staples. \$10.50



**T-32** — Heavy duty staple gun for light nailing jobs. Widely used by professionals for upholstery, TV antenna wiring, screens, window shades, etc. Takes 3/16", 1/4", 5/16" staples .... \$10.50



**T-25** — For wires up to 1/4" in diameter; telephone, intercom, thermostat, etc. Automatic safety stop prevents injury to wire. Shoots round crown staples, 9/32", 3/8", 7/16", 9/16". \$15.00



**T-75** — For non-metallic sheathed cables up to 1/2" in diameter. Automatic safety stop prevents shorts. Uses 9/16", 5/8", 7/8" staples. \$15.00

Many other models including desk staplers, plier staplers and stapling equipment available all leading hardware, building supply and stationery dealers.

# ARROW

ARROW FASTENER CO., INC. • 1 Junius St. • B'klyn 12, N. Y.

**Pioneers and Pacesetters  
for Over a Quarter  
of a Century**

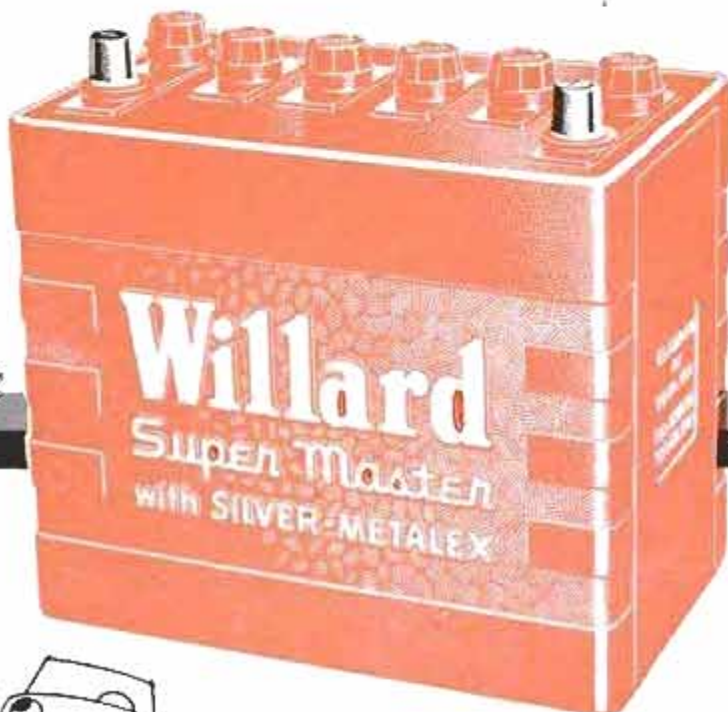


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# BATTERY GUARANTEED FOR THE LIFE OF YOUR CAR!

SPECIAL ONE-MONTH OFFER! • NO INCREASE IN REGULAR PRICES

6-VOLT SIZE  
ONLY \$29<sup>95</sup>



12-VOLT SIZE  
ONLY \$36<sup>95</sup>



**FREE REPLACEMENT**  
if it fails, as long as you keep  
the car for which you buy it.

Never before in Willard history, a battery guarantee like this one! And it's offered only because Willard Super Master Batteries invariably outlast their regular 48-month guarantee. Frankly, our engineers want to find out just how long Super Masters will last in all kinds of driving, nationwide, in passenger car service. That's why—during October only—you can buy the most dependable battery ever built . . . backed by the strongest guarantee ever offered . . . at no increase in price!



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**See your nearby Willard Dealer NOW...or write  
Willard Storage Battery Division • Cleveland 1, Ohio**

This One



UXBH-EWS-ALZU





HO4S-3G Sikorsky, used by U. S. Coast Guard for air-sea rescue, shown here over Long Island Sound.

**Q.** Why do more aircraft the world over use Champions than any other spark plugs?

**A.** In the air dependable power is vital!  
To get that same dependable power in your car, put in new Champions every 10,000 miles. You'll save gasoline, too!



*World's favorite spark plug—engineered for every car built by Ford, General Motors, Chrysler, American Motors, Studebaker-Packard and every major foreign maker*

**CHAMPION**



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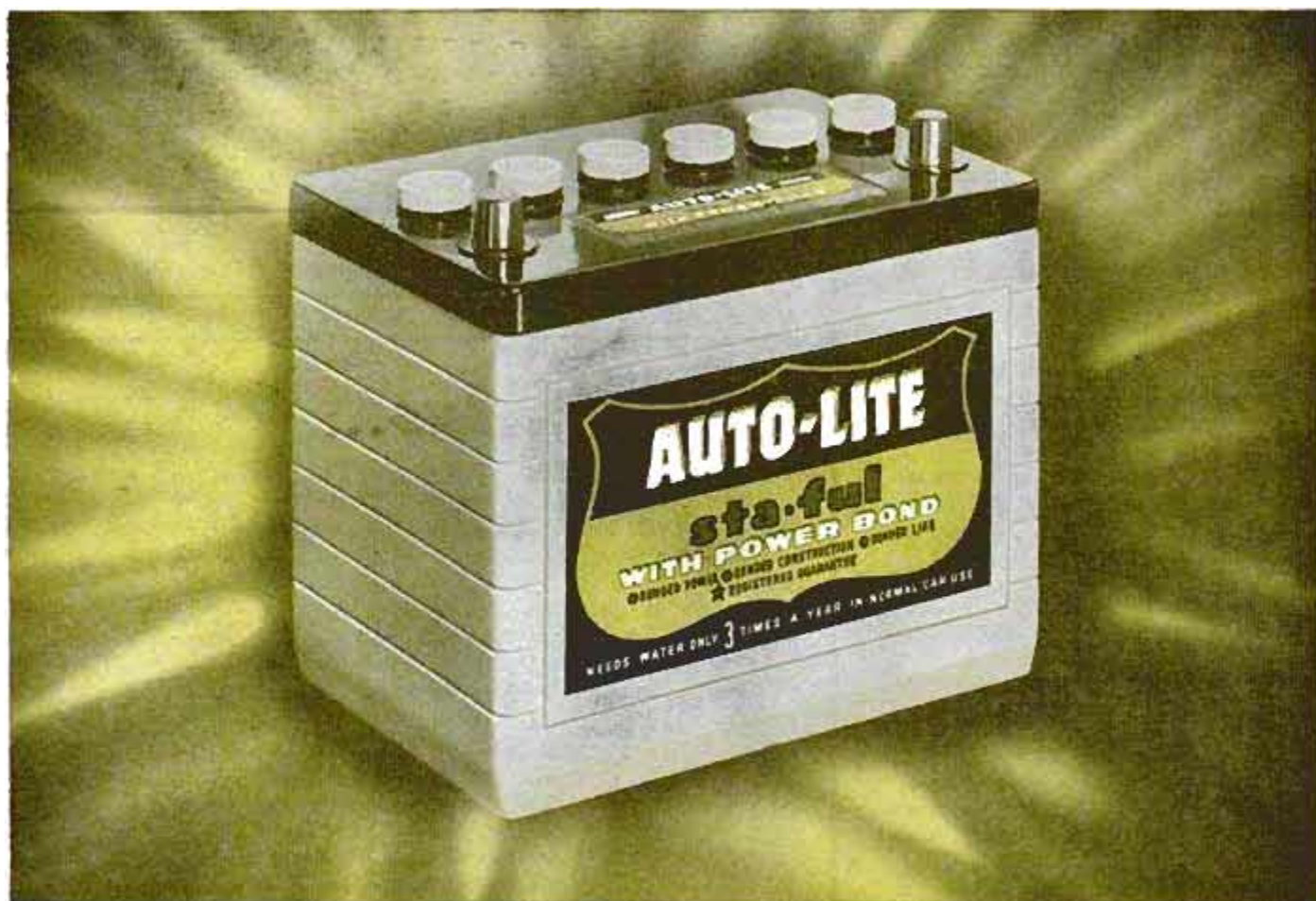
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## Next Month...

LOOKING FOR CHRISTMAS GIFT IDEAS? You'll find six pages of suggestions in the November issue—ideas for the man in the family, for the household, for the youngsters. IN THIS ISSUE you see the first of the 1959 automobiles; NEXT MONTH we bring you many more new models—Chevrolet, Ford, Plymouth and a half dozen others. In the Radio Section we'll present plans for building a two-channel hi-fi stereo amplifier. Watch for November!





## NEW! A battery that eliminates mechanical failure even in the most severe service!



"BREAKDOWN" TEST toughest ever made on batteries! Ordinary battery plates (left) have lost vital power-producing material and failed after only 55 hours of vibration testing. Auto-Lite Sta-ful with Power Bond (right) shows no damage at all after 1000 hours in same test! Plates are still intact and delivering full starting power!



**50-MONTH GUARANTEE!** Owners of Auto-Lite Sta-ful Batteries with Power Bond receive a 50-month wallet-size Guarantee card. Honored by any Auto-Lite Battery Dealer in the world.

### Auto-Lite Sta-ful with Power Bond\*... a great new advancement in battery engineering

Power Bond, an exclusive new Auto-Lite development, eliminates a major cause of battery failure . . . plate-destroying vibration. Here's how Power Bond protects full starting power—

1. Power-producing plates, protected by fibre-glass, are firmly anchored in place by plastic bonding. Even the most severe service can't shake power-producing material loose.
  2. Power Bond construction eliminates leakage points found in ordinary batteries. Permanent resin seal bonds top to battery case, fully covers and protects power-conducting intercell connectors. Battery stays sealed and powerful.
  3. Rigid sealed-box construction gives maximum strength. Overtight hold-down brackets and extreme under-hood temperatures can't distort case and cause corrosive, power-robbing leakage. And new Power Bond incorporates the famous Sta-ful extra liquid reserve . . . needs water only 3 times a year in normal car use!
- Every Auto-Lite Sta-ful with Power Bond is registered at the factory by serial number in the owner's name! Both your Auto-Lite Dealer and the factory stand behind the superior Power Bond Guarantee. Ask for the new Auto-Lite Sta-ful with Power Bond. At Auto-Lite Battery Dealers everywhere.

\*PATENT APPLIED FOR

# AUTO-LITE sta-ful WITH POWER BOND

DRY CHARGED... FRESH WHEN YOU BUY! • FOR MOST 12-VOLT SYSTEMS





This is the time of year when caution and calm judgment pay special dividends in safety. Fast-changing weather conditions can turn roads you know like the palm of your hand into dangerous skid traps.

So keep your eyes peeled for misty-looking pavement, wet leaves, mud slicks and, of course, ice and sleet. They're all dangerous. But you can reduce these hazards by slowing

down cautiously the moment you spot them.

Yet, suppose your car's rear wheels "break loose" anyway . . . here's what to do to regain control: First . . . don't hit the brake! Instead maintain light gas pedal pressure and steer front wheels *in the same direction* as the skid. Once you're tracking again, lift your foot off the gas and pump brakes lightly to slow down.



### Cut down engine friction

Ordinary motor oils stiffen up in a cold engine—thin out in a hot one. Either way, they can't give full protection against wear. But Havoline Special 10W-30 Motor Oil stays free flowing in dead of winter to give you instant lubrication when you start. Its tough film won't break down at highest engine temperatures. And Havoline Special 10W-30 cleans as it lubricates! Result: you get *full protection* against wear, dirt and deposits. Your engine stays young, powerful, smooth running. Change to Havoline Special 10W-30 Motor Oil at your Texaco Dealer.

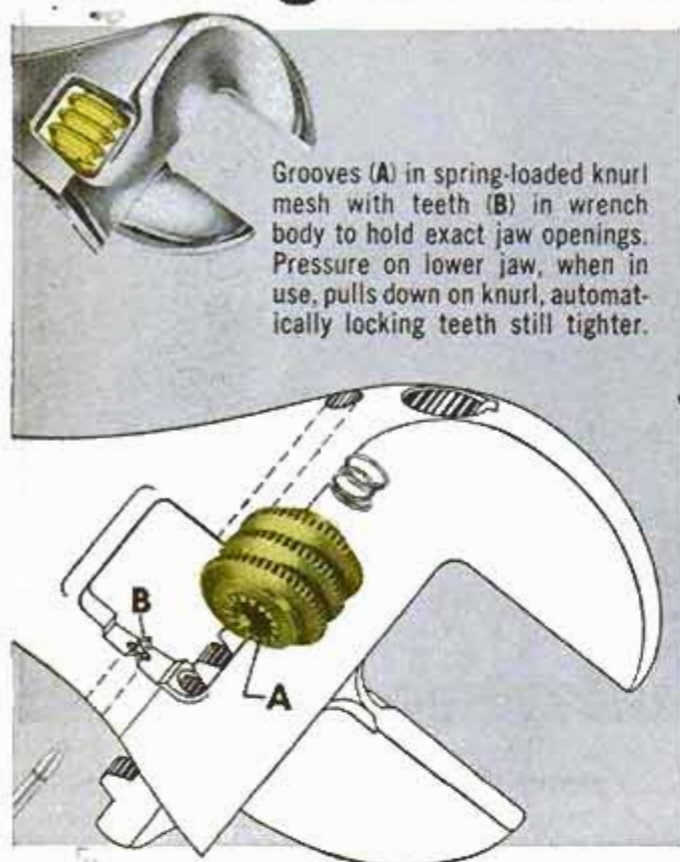
**TEXACO DEALERS**  
IN ALL 48 STATES

Texaco Products are also distributed in Canada, Latin America, and Africa





# New Proto locking feature



Grooves (A) in spring-loaded knurl mesh with teeth (B) in wrench body to hold exact jaw openings. Pressure on lower jaw, when in use, pulls down on knurl, automatically locking teeth still tighter.

**CLIK-STOP**  
ADJUSTABLE WRENCHES  
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No knuckle busting here! With Clik-Stop's automatic locking, you do more work in less time...and your hands are much safer.

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4"	6"	8"	10"	12"	16"	20"

Meets Federal Specifications:  
GGG-W-631A,  
Type 1



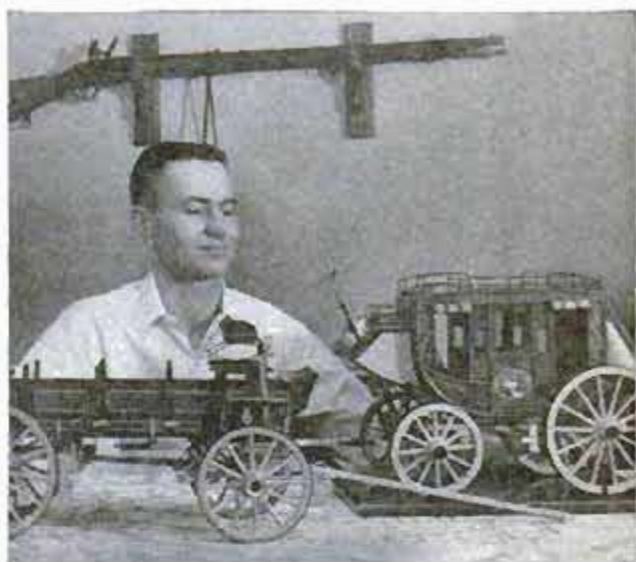
2209 Sante Fe Avenue, Los Angeles 54, Calif.

## ACROSS THE DESK



### To the Editor:

Mr. Ariel Lee, Morris, Ill., is—if I am any judge—a very capable craftsman. The plans for his model of the stage coach were



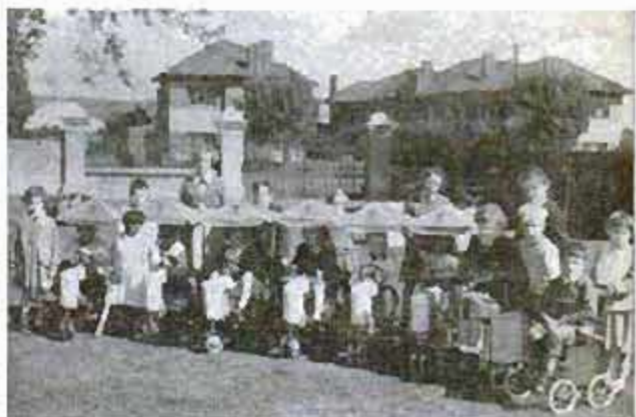
taken from Volume No. 7 of the *Popular Mechanics Do-It-Yourself Encyclopedia*. . . . He has a complete set of the encyclopedias, from which he obtains plans for numerous models.

Frederick Walker,  
Morris, Ill.

☆☆☆

### Tractors for Handicapped Youngsters

Down in South Australia the youngsters living at Ashford and Summerton Spastic Homes are well acquainted with America's Case tractors. They ride 'em — miniature

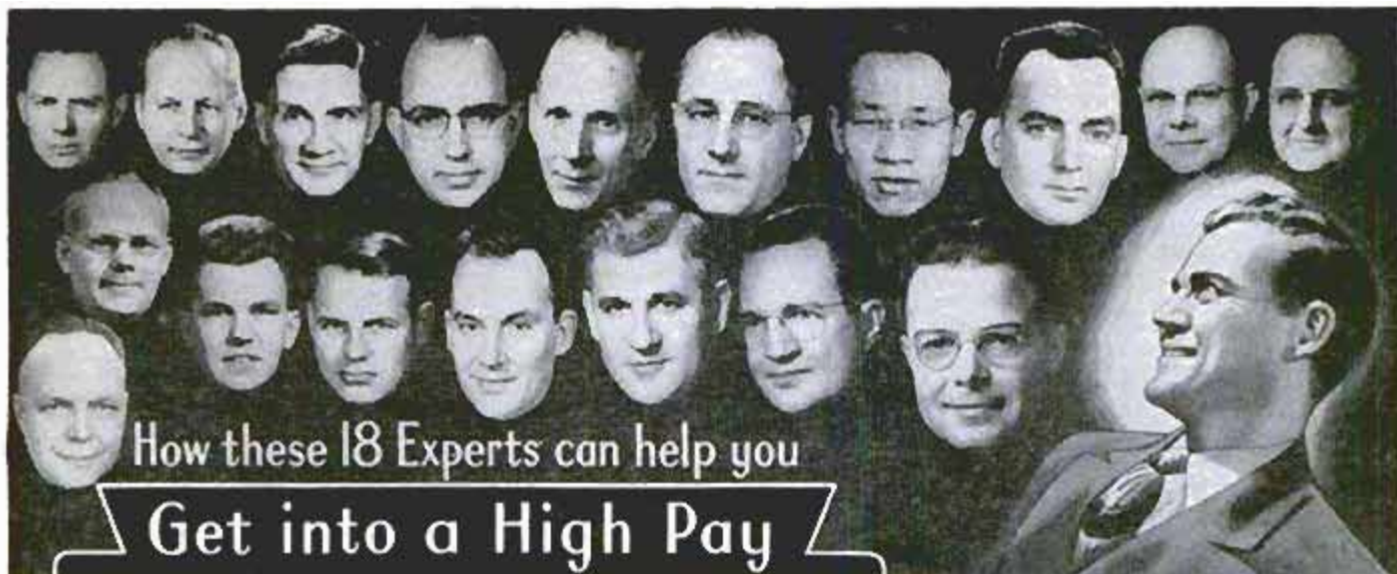


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versions. The employees of Commercial Motors, Ltd., of Adelaide, South Australia, agents for the Case tractor, subscribed funds to import a fleet of pedal-driven

(Continued to page 8)





How these 18 Experts can help you

Get into a High Pay

## ACCOUNTING CAREER

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If that's your ambition and you are really serious about it, then you owe it to yourself to get the REAL FACTS about LaSalle Accounting, and the many good-pay opportunities that can be YOURS through LaSalle's famous Problem Method plan.

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### WHY YOU CAN'T FAIL TO GAIN

You see on this page a panel of experts who know Accounting from A to Z... all the way from Basic Accounting on up through Accounting Systems, Cost Accounting, Auditing, Federal Income Tax, and training for the CPA certificate. These are only part of our instruction staff. But what is most important to you... These CPAs and Expert Accountants know how to impart their knowledge to others... how to help you prepare quickly yet thoroughly for success in this lucrative field.

The proof? What stronger proof could there

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A Correspondence Institution

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Stop worrying because you need a better job—or because you need more pay! Over 100,000 jobs are waiting right now for newly-trained auto mechanics. Here's why: There are 60 million cars and trucks on the road—and one-third need heavy repairs. Over 7 million new vehicles are made annually—also need service. No wonder the demand is big for auto mechanics—why pay is tops, work is steady!

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**Many Students Make Money as They Train**

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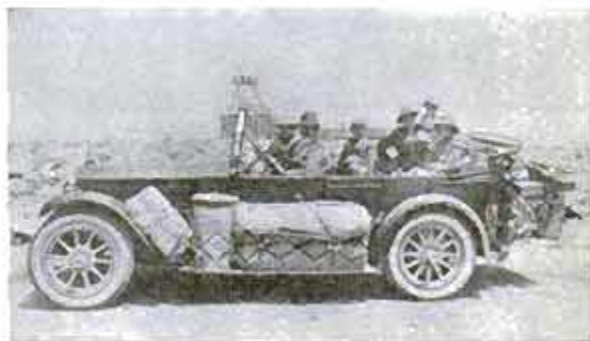
(Continued from page 6)

model tractors to be given to the children's homes. The Australian government contributed its bit by waiving import duties and purchase taxes. Each miniature tractor has a sunshade on a metal support.

☆ ☆ ☆

**To the Editor:**

The answer to your "Old-Timer Quiz" in the August issue is grossly in error. In 1918 Packard did not manufacture a six-cylinder car. The car shown is the final



version of the famous Packard Twin-Six—a V12. It is the car that created a sensation when it was introduced in 1915 as the first production 12-cylinder automobile.

I cannot allow this insult to the "World's Finest Motor Car" to pass unchallenged.  
C. W. Hauck,  
Cincinnati, Ohio

☆

I was pleased to see a picture of the beautiful old Packard seven-passenger touring car atop Pikes Peak in your August issue. But I was more than a little surprised to see it identified as a Packard six-cylinder car.

Most any member of the Horseless Carriage Club, the Antique Motor Club, or the Veteran Motor Car Club could have told you that it is a Packard Twin-Six, a 12-cylinder car. During 1915, Packard introduced this Twin-Six and built only 12-cylinder cars until the Single Six was introduced as a companion line in 1920.

How about printing some more pictures of the old-timers?

Frank Burchard,  
Henryetta, Okla.

We're sorry. The car is, as the readers state, a 1918 Packard Twin-Six. Every antique-car fan should know this, even the editors of PM who correctly described the car when it was selected as one of the 16 most significant cars of American automotive history in the special color section of our February 1958 magazine.

(Continued to page 10)



# FOR REAL JOB SECURITY -GET AN I.C.S. DIPLOMA



"You can stop worrying, Jane. My job's secure now! And here's the insurance policy to prove it—my I.C.S. diploma!"

This feeling of security is probably typical of every I.C.S. graduate. Because—as the job situation gets tighter, the man with I.C.S. training has the advantage.

Why? Your I.C.S. diploma tells your present employer three important things: (1) You want to make the most of your present job.

(2) You have the training you need for advancement. (3) You look for better ways of doing things on your own.

What you do about your future is up to you. Do nothing and stay at your present job at the same old pay. Or earn an I.C.S. diploma in your spare time for security, promotions, more pay! Your first step is to mark the course that interests you in the coupon below, and mail it to us.

### Three Free Books

We'll send you three interesting books. The first, "How to Succeed," is a gold mine of helpful tips. Points out many small things in your personality and behavior that can make the difference between success and failure. The second tells about the opportunities in the field of your choice. The third is a sample lesson (Math).

### Costs pennies a day

Many an I.C.S. student has made up the cost of his course in one month with the salary increase his I.C.S. training earned for him. By studying at home in your spare time, you pay yourself many times an hour more than you're now making. (One student reports—"My I.C.S. course was worth \$95 an hour to me.")

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Remember, your first step to security is to mail this coupon. Take a few minutes and do it now. If you put it off, it can cost you your future.

For Real Job Security—Get an I. C. S. Diploma! I. C. S., Scranton 15, Penna. Accredited Member, National Home Study Council

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To the Editor:

I purchased your February issue (the special Automobile Issue) simply because of the cover, over which I flipped! Being a woman that is not too easy over a man's magazine.

I must explain that we are nuts over vintage cars and own two, one "his," one "hers." You may or may not have heard of the "Model T Ford Club" with national headquarters in Chicago, with chapters all over the United States and some foreign countries.

Naturally hubby does all the hard work restoring the cars but I'm the first one in it ready to go. We are hoping our son will like the touring for his high school days rather than a "hot rod," and being only six now he shows a marked liking for T's.

Mrs. E. C. Bayless, Skokie, Ill.



To the Editor:

I have the March issue of your fine magazine—it is read regularly by our crew here at the Light House.

Especially interesting is the Edsel Report. One fellow says the best cruising speed is about 90 m.p.h. Lovely. Another says he "feels perfectly secure" at 90 m.p.h. Fine! Insurance rates are going up because of such secure feelings by our American drivers (all of us).

It is a false sense of security, to be sure. Causes accidents by the score. I wonder if the same fellow ever tried a "panic stop" at that speed? I doubt it. He wouldn't feel so "secure." We go right on speeding to get nowhere with our 400-hp. motors. We are in such a hurry we need tranquilizers to reduce tension.

I have ridden a 30.50-inch motorcycle for the last four years. I have enjoyed every mile on my machine. I get 55 miles per gallon at 60 m.p.h. When I get to 90 m.p.h. on a motorcycle I have brains enough to shut it off.

W. P. Hayes, Tacoma, Wash.



To the Editor:

May I have the privilege of commending you, your magazine and your staff for the splendid, factual and accurate manner in which you presented an article on bicycle safety.

The article I refer to appeared in the May 1958 issue of your magazine. It is entitled, "Start Something In Your Town:

(Continued to page 12)

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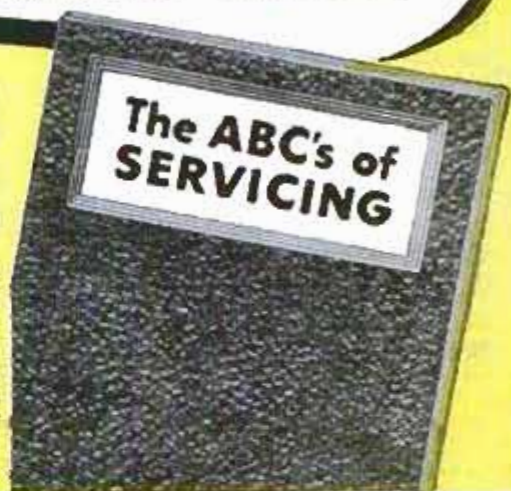
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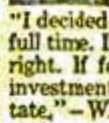
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(Continued from page 10)

Teach Bicyclists How to Live" written by Mr. Richard F. Dempewolff, your Eastern Editor.

As you will note from my signature it was my good fortune to be the one who originated, formulated, developed and put into successful practical operation the program referred to. Needless to say, I do this with all humility, for it takes the enthusiastic combined cooperative efforts of many to make a program be as successful as this one.

My main purpose for writing this is: I have been interviewed by several magazines, some nationally like your own, but this article by Mr. Dempewolff is the most informative, factual and accurate statement of the true picture of the program I have observed. May I commend you and Mr. Dempewolff for the excellent manner in which it was presented.

It is only natural to be grateful and thankful for being a part of such a program that may save lives.

How many lives we may save will never be known, but this article has brought to the attention of everyone who may read it, the need for bicycle safety. I only hope it will stimulate interest, and motivate positive action in many communities in

the protection of bicycle riders. Most bicycle riders are children and need education and guidance in safety habits. It is my firm hope and belief it will carry over into adult life, and make our highways safer on which to operate motor vehicles.

Again, please allow me to congratulate you on this article, for if I may also state in all humility, I am in a very good position to appreciate the value and accuracy of such an article.

John D. Horan,  
White Plains, N. Y.

☆ ☆ ☆

#### Correction

The direction finder for boat skippers shown on page 106 of our July issue weighs seven pounds, not 1½ pounds as stated (that is the weight of its antenna); and its accuracy is within two degrees on 90 percent of "shots."

☆ ☆ ☆

#### To the Editor:

I have found it useful to add an extra sheet to each issue of *Popular Mechanics*. On this sheet I enter the articles and advertisements highly interesting to myself, thus keeping a memorandum for future reference.

Manuel Hidalgo,  
Havana, Cuba

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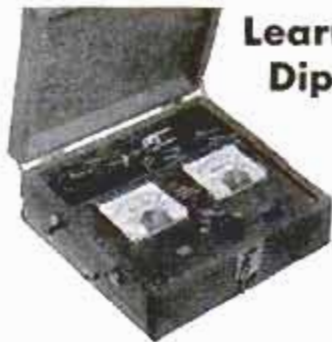
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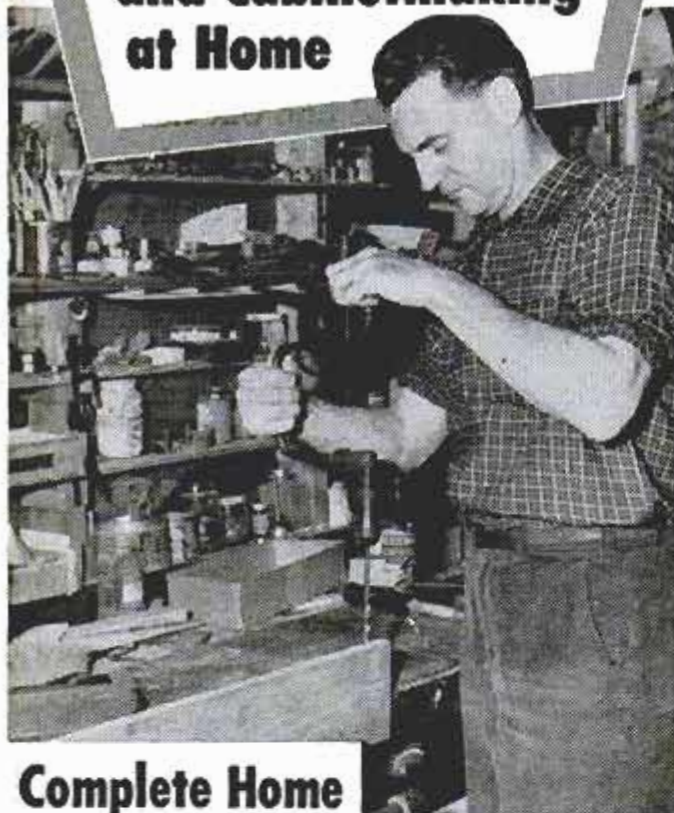
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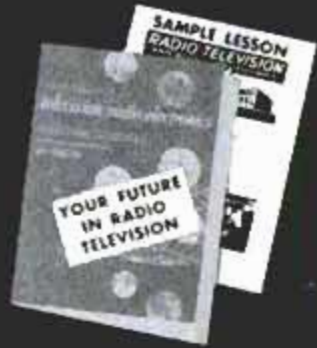
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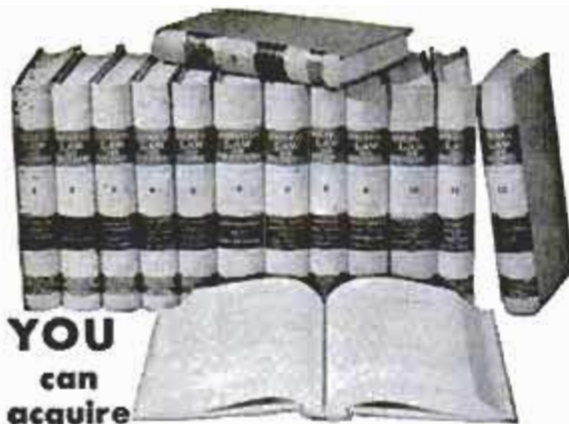
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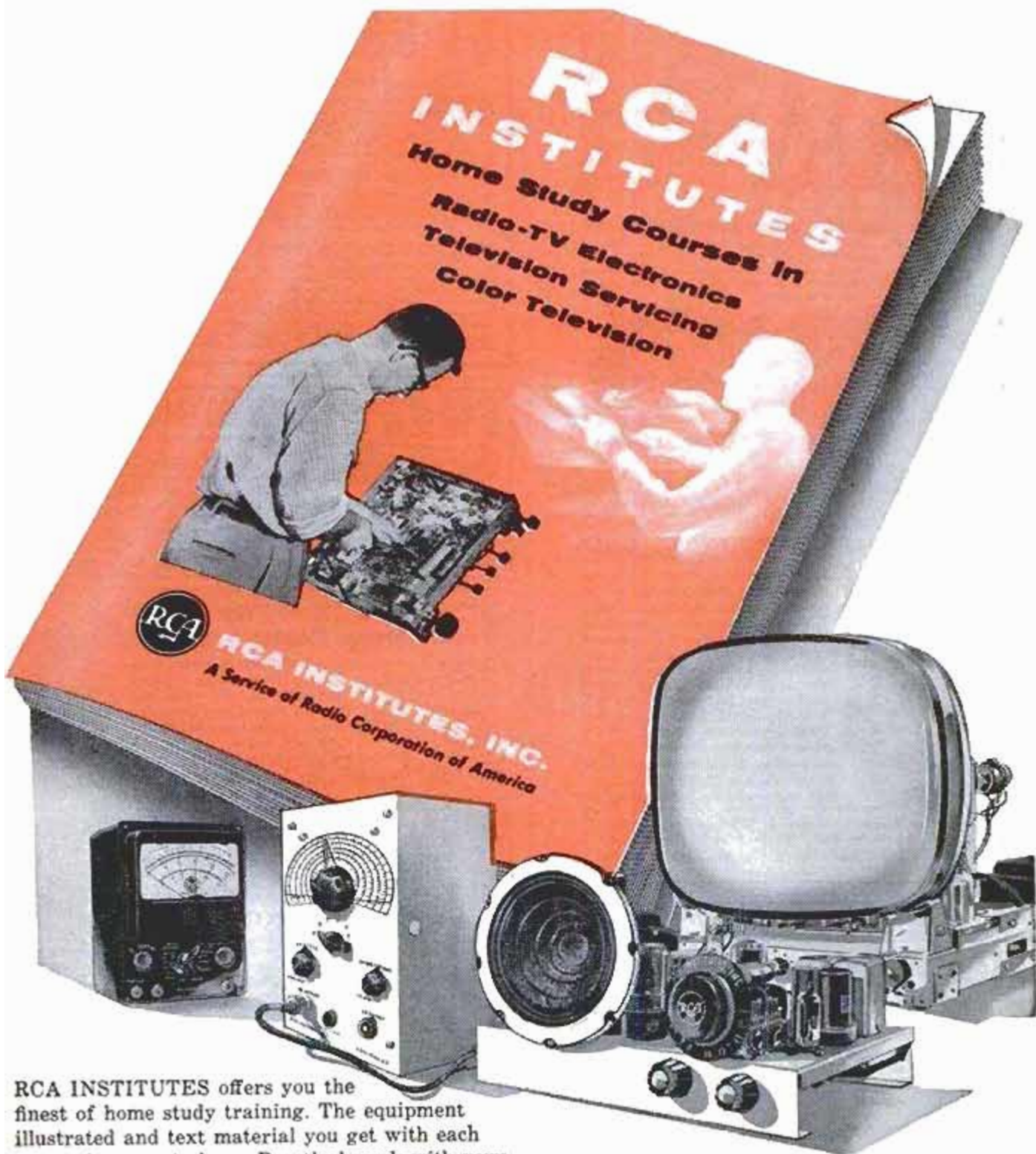
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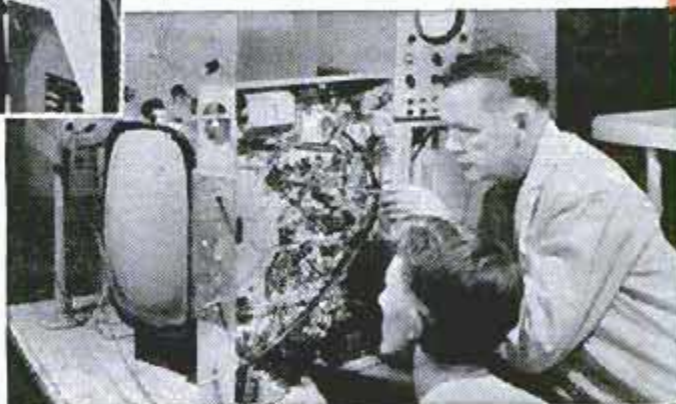
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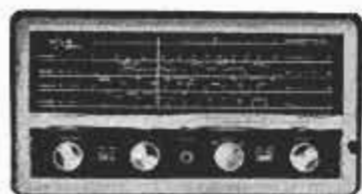
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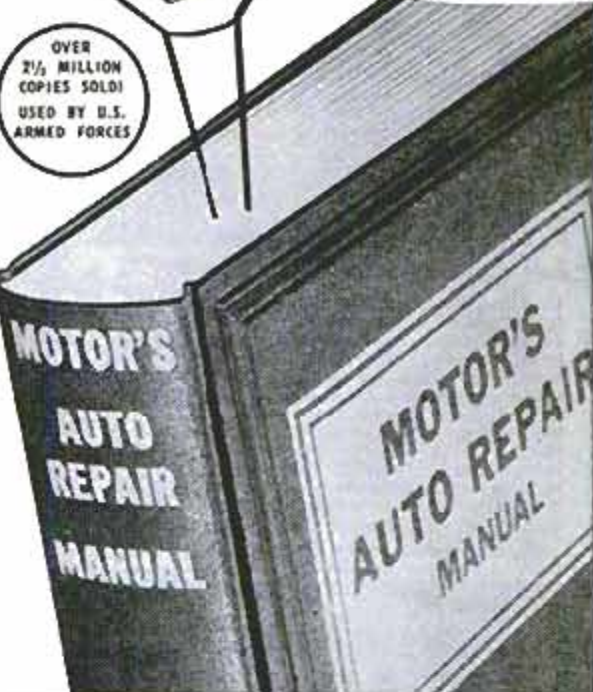
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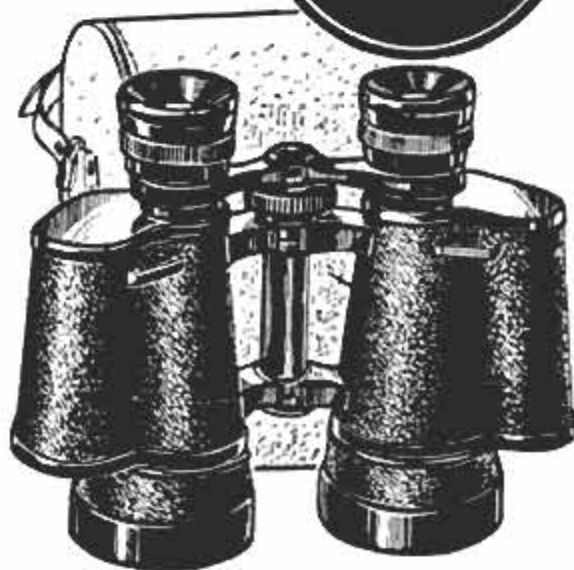
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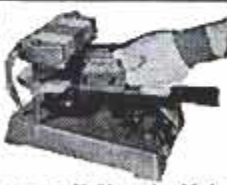
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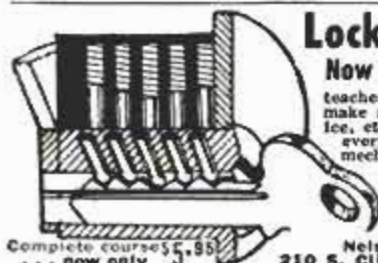
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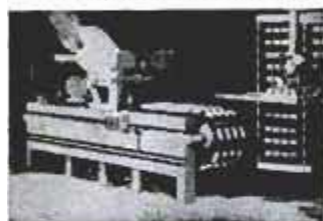
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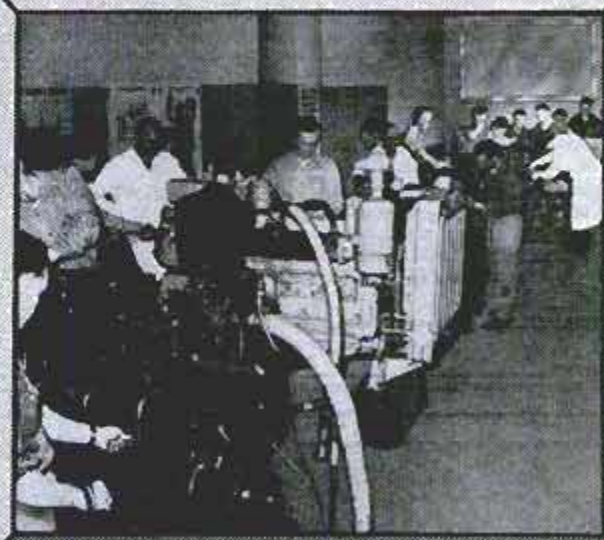
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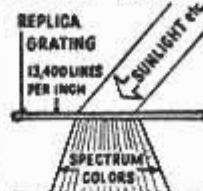
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**16MM** Sound films. Free lists. Crawford, 412 Page St., Ft. Worth 10, Texas.

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**ENTIRE** Life of Christ. 8mm. silent, 16mm. narrated, sacred music for sale or rental. Hemenway Film Co., 424 Little Building, Boston 16, Mass.

**FREE** Catalog. Save dollars. Fresh 8mm., 16mm. b&w and color film. Home processing equipment. Superior Bulk Film Company, 448 No. Wells, Chicago 10.

**16MM**. Sound, projectors, films. Sale, rental, exchange. Visit store or write for catalog. National Cinema, 71 Dey St., New York City.

**FREE!** Blackhawk's big sale catalog 8mm., 16mm. movies, 3"x2" color slides. Biggest selection anywhere! Projectors, cameras, supplies. Big discounts! Get free, every three weeks, 12-page newspaper size bargain list! Blackhawk Films, Davenport 14, Iowa.

**5,000** 8-16MM. Movie films. Free catalogues. International, Greenvale, N. Y.

**MOVIE** Camera film: 8mm. roll \$1.50, 16mm. 100' \$3.00. Free processing. Better Films, 742 New Lots, Brooklyn, N. Y.

**SAVE 50%**! Guaranteed-fresh color, b.&w. movie film! 8mm., 16mm. Free catalog! Eso-R, 47th Holly, Kansas City 12, Missouri.

**BOOKS:** Hundreds of subjects. Big 1958 book catalog — 10¢. Popular Mechanics Press, 200-BC East Ontario St., Chicago 11.

## MUSIC AND MUSICAL INSTRUMENTS

**WANTED!** Poems, lyrics, songs, ideas. Bengol, 93 Jefferson, Chelsea 50, Mass.

**SWISS** Musical movements, \$1.90. Helax, 218 W. 72nd St., New York City 23.

**VIOLIN** Makers supplies. Free catalog. 309 W. Fourth, Los Angeles 13.

**ACCORDIONS**, Wholesale to everyone. Save up to 60%. All national known brands. Free catalogue. Del Principe, 29 South Cicero, Chicago 44.

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

**SONGS** Into dollars. Share \$33 million dollars yearly for new songwriters, song poets. Any subject, songs composed, published, promoted by largest firm. Information appraisal free. Send Nordyke Music Publishers, 6000 Sunset, Hollywood 28 PM, California.

**SONGPOEMS** And lyrics wanted. Mail to: TinPan Alley, Inc., 1650 Broadway, New York 19, N. Y.

**POEMS** Wanted for new songs and recording. Immediate consideration. Send poems. Songcrafters, Box 6145, Acklen Station, Nashville, Tenn.

**YOUR** Songs arranged and recorded for publisher's presentation. For information write: Vance Studios, 3409 Grand Ave., Oakland, Calif.

**POEMS** Wanted for new songs. Send poems. Immediate consideration. Crown Music Company, 49-C West 32 Street, New York City.

**FREE** Demonstration records. Complete music service for songwriters. Jerry Colonna, Box 888M, Burbank, Calif.

**SONGS** Needed for new record label. Olenik Records, Mount Morris, Michigan.

**FREE** Wholesale musical instrument catalog. Complete lines of instruments and accessories. Nationally famous brands Strauss Music Company, Clifton 70, New Jersey.

**POEMS** Wanted for musical setting and recording by America's largest song studio. Send poems. Free examination. Five Star Music Masters, 630 Beacon Building, Boston.

**VIOLINMAKERS**, Repairers. Fine tone wood, and all violin supplies. Send for free wholesale new price list. International Sales, 414-MPM E. Baltimore St., Baltimore 2, Maryland.

**1658** ACCORDIONS Wholesale — 10 day trial. Free catalog. American Accordion Center, 5329 PM-10 Belmont, Chicago.

**SWISS** Musical movements. Mechanical, electrical. Spielman, 131 West 42nd, New York City 36.

**ACCORDIONS** — 1959 Models. Lowest wholesale prices. Save up to 75%. Free home trial. Trades accepted. Big color catalog free. Accordion Manufacturers, 2003-P W. Chicago, Chicago 22.

**ITALIAN** Piano accordions at big savings. Free catalog. Max Carbonari, 227 Harrison, Dept. A, Oak Park, Illinois.

**MUSIC** Printing, complete service. Lowest rates. Auto-Litho, Jensen Beach, Fla.

**TUNEKIT** Composes thousands of new, harmonized tunes; one in five minutes. Musical training unnecessary. Guaranteed. \$3. TuneKit, Box 1813, Abilene, Texas.



## RADIO, TELEVISION AND ELECTRONICS

**RADIO** Course only \$22.95. Includes all tubes, parts, tools, instructions. Write for full information. Progressive "Edu-Kits" Inc., Dept. 559B, 1186 Broadway, Hewlett, New York.

**CRYSTAL** Radio builders. Write to Hulet, 305 Hope, Lakewood, New Jersey.

**BUILD** Your own hi-fidelity kits. Details. Arkay Dist. Co., P.O. Box 581, Church St. Sta., New York, New York.

**TWO** Radio plans, novelty plans, 25¢. Potential Radio, 446 Crown Street, Brooklyn 25, N. Y.

**KITS** \$2.98 Each. Resistance box, capacitance box, tube checker. Special! Order 2, get one free. Includes instructions, new parts, surplus case. Free flyer on request. Alkit, Box 98, Midwood Station, Brooklyn 30, N. Y.

**RECORDERS**, Hi-Fi. Free wholesale catalogue. Carston, 215-PM East 88, New York City 28.

**TAPE** Recorders, hi fi components, tapes. Unusual values. Free catalog. Dressner, 69-02M 174 St., Flushing 65, N. Y.

**SIMPLE** Television repairs. Marvelous booklet or book. Send for 1958 book catalogue—10¢. Popular Mechanics Press, 633 N. St. Clair St., Chicago 11.

**CRYSTAL** Radio kit \$1.00, preassembled \$1.25, phone \$1.75; catalogue. Clearco Crystal Company, 2966 North 4th, Milwaukee 12, Wisconsin.

**GOVERNMENT** Surplus radios, parabolic reflectors, sniperscopes, mine detectors, parts. Catalog 10¢. Meshna, Malden 48, Mass.

**SENSATIONAL** New satellite radio kit. Free circular. Seery, North Conway, N.H.

**SAVE** Money on all types radio and TV tubes! 100% guaranteed! Brand new! Write United Radio, Box 1000, Newark, N. J.

**PAIR** U.S.A.F. ear receivers \$1.50; with chamols earpads \$2.50. Fritz, 7819 Madison, Cleveland 2.

## BUSINESS OPPORTUNITIES

**HARMLESS**, Quarter-acre electric insect control. No gasses. Three daily sales \$300 weekly. Sing Sing Bug Chair, Box P63, Lake Leelanau, Michigan.

**SHINE** Shoes without polish. New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trial. Kristee 102, Akron, Ohio.

**GROW** A living miniature forest or orchard (only inches high, that bears tasty tiny fruit at home. Learn amazing dwarfing secrets! Fascinating hobby. Profitable home-business opportunity. Free seeds and plan. (State your age.) Miniature Nurseries, Dept. OR, Gardena, California.

**INTERNATIONAL** Home import mail-order business! Experience unnecessary. Earnings unlimited. Foreign Traders, Meramec Building, St. Louis 5-PE, Mo.

**INVISIBLE** Reweaving: \$5 in one hour possible reweaving burns, tears, moth-holes. Spare-full time. Free details. Skill-weave, Dept. SC-1610, 335 W. Madison, Chicago 6.

**MADE** \$10,000 Typing at home. Guaranteed proof. Amazing information 15¢. Lenore Felgen, Box 1125-PM, Oak Park, Illinois.

**MAIL** Trade magazine has moneymaking opportunities galore. Sample 25¢. Donovan, 79-PM Greenbelt, Levittown, New York.

**MAIL** Order profits possible using free advertising. Worth thousands. Write for free document "Business Goldmine." Di-Carr Publicity, 1525 S. 48th Ct., Cicero 50, Illinois.

**1200** ITEMS Drop shipped. Wholesale circulars-catalogs supplied. Davenport Distributors, GPO Box 1354-N, New York 1, N. Y.

**PRINTING**, Office supplies wholesale. Save 50%. Royal, Box 368-A, Cleveland 27, Ohio.

**START** In mail order. Steady home income. Free samples order-pulling circulars. We drop-ship. Send 10¢ for details from supply source. Precision Instrument Co., Cliffside Pk. 1, N. J.

**HOME-Import** mail order business—Import profitable items below wholesale. Experience and product investment unnecessary. Full, spare time. Famous world trader guides you. Free list "157 Imports," details. Mellinger P70A, Los Angeles 24.

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

**FORTUNE** Maker. Mail order details 25¢. Straley's, 410 S. Western, Springfield, Ohio.

**SELF-Selling** displayed products. Hundreds! No selling store servicing business. Facts free. Forbes Advertising, P.P. Box 1466-A, East St. Louis, Illinois.

A Big field is ready to harvest for men and women. \$10-\$50 a day possible for full or spare time. This will stand the most rigid investigation. For details send \$2 to Sound Control. Box 2531, Salt Lake City, Utah. Please print name and address.

**FREE** "Franchise profit letter" describes nationwide opportunities. Exclusive distributorships, dealerships, agency operations. Write today. National Franchise Reports, W-528, 333 North Michigan, Chicago 1.

**START** Your own business on credit (U.S. and Canada). Be your own boss. 1425 dealers sold \$5,000 to \$32,000 in 1957. 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.

**MAKE** Extra money. Cash commissions. Everybody buys easy-to-sell advertising book matches. Union label. All sizes. Cuts for all businesses. Powerhouse selling kit free. Steady repeat business. No experience necessary. Superior Match Co., Dept. MX-1058, 7528 S. Greenwood, Chicago 19.

**SENSATIONAL** Profit opportunity. Amazing new device enables any handyman do professional TV repairs without experience or training. Do most \$5, \$10, \$20 service jobs in half hour. Up to \$200 month easily possible. Evenings, weekends. Big demand. Start immediately. Free! Write Electronic Engineering, Dept. BC-17A, 1038 S. LaBrea, Los Angeles 19.

**BIG** Paying, mail operated, collection agency. Start home, privately, sparetime. Consolidated 12-weeks course, operating forms and detailed procedure \$1.00 post-paid. Interstate, 37 Beach, Albany 9, New York.

**TROPICAL** Fish — For fun and profit. Every town of 5000 or over needs a dealer-breeder. Buy supplies at wholesale. Send ten cents for colored pictures of 55 fish, plus free price list and booklet. "Make Money Raising Tropicals." Tropicals, Box 9093, Long Beach, California.

**SELL** By mail profitably. Beginner's manual gives tested methods. 25¢. Alfano, 19 Pine, Closter, New Jersey.

**MAKE** Money sharpening cutters, scissors, saws. Free literature. Treyco Products, N. Tonawanda, N. Y.

**DO** You want a profitable sparetime business? Send one dollar for complete information. Fox, Elgin, Nebr.

**CRUMB** Rubber, 1 1/4 lbs. \$1.00, post-paid. Free sample. Goldwyn Smith Co., P.O. Box 11242, Tampa 10, Florida.

**IMPORT!** Mail order opportunities. Details. Warner, Box 6, Fort Scott, Kansas.

**\$34.70** TWO Hours. Manufacturing concrete products. No selling. Carlayne Castings, 1803 Fremont, Rapid City, South Dakota.

**START** Home mail order business! We supply catalogs, names. Fill your orders. Give personal help. Write: House of Seven, Dept. A, Box 362, Torrance, Calif.

"50 NEW Home-Business Ideas" booklet. Sample free. Spray exotic Velvet-Suede on anything. Flockcraft-OR, Los Angeles 61.

**FORTY** Cents brings sixteen dollars. Big money fast. Wholesale, retail. Formulas for two new products, one dollar. Demonstration amazes. Jacob Heinrich, Box 16, Toledo, Ohio.

**CHRISTMAS** Cards with original water-colors, winter landscapes, 8"x10", make beautiful, everlasting paintings when framed. Best sellers last year. Sample \$3.00; doz. \$30.00 (Retail \$5.00 each.). Exhibition Studio, 45 Christopher, New York 14, N. Y.

**STRIKING** French florals, original oil-paintings, 20/24, on black canvas. Best-sellers at \$69. Send \$19 for sample. Greenwich Village Exhibition Studio, 45 Christopher, New York 14, N. Y.

**TRADE** Or sell your business, farm, other property, anywhere! No sale, no fee. Free catalogue describing hundreds motels, resorts, ranches, businesses throughout America. Also "How To Sell Yours." No obligation. Write, Trade Locators, 712 E. 31st, Kansas City 9, Missouri.

**MONEY** Wants you. Tells 97 ways to "Make a Million." Free details. Woodard, 1221 Edgewood, Havertown 3, Penna.

**TYPISTS**, Make handsome profits. Harwood, 533 South Presa, San Antonio 3, Texas.

**\$125.00** WEEKLY Sparetime! Start first day! Details free! Scott, Box 388, Great Neck, New York.

**WANTED** — Limited number intelligent men and women to work at home on exclusive mail order business proposition. No selling, we furnish everything including literature, names, addresses, stock and ship items for you. Free details. Mail Order Distributors (Franchise Division), OR, Los Angeles 61.

**RAISE** Night crawlers, redworms. Soil-less method. Three Oaks Ranch, Dresden, Tenn.

**MAKE** Your fortune with food specialties. Many have. People must eat. Instructions. Ayner, 4406 Cottage, St. Louis 13, Mo.

**MAKE** Durable building plastic easily. Beautiful. 101 uses. 800% profit. Bays Laboratory, Keams Canyon, Arizona.

**PROFITUNITIES** Unlimited! Engrave-carve trophies, emblems, titleplates with new "DupliScaler" engraving-carving attachments. Details, sample 10¢. Desco Distr's., 5282-C Van Nuys, Van Nuys, Calif.

**TERRIFIC** Game of skill. Anyone handy can make. Write Rossi, 5017 South Kingshighway, St. Louis, Missouri.

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

**START** Home mail order business. Household products. B.C. Company, Box 1, New London, Ohio.

"MAILORDER Laws and Regulations" and "Mailorder Rules for Beginners." Learn about necessary licenses, different taxes, legal requirements, etc. Both books, \$2.00. "Simplified Mailorder Book-keeping System," \$1.00 additional. Tasker, Box 3131, Alexandria, Virginia.

**WANTED:** Home producers, to be subcontractors. Cast plastic products for manufacturers in our clearing house service. Thousands of easily made items required. Cash in at home, without previous experience. Plastic Service Associates, Dept. 10-PM, East Boston 28, Massachusetts.

**YOU'LL** Make money making cases at home because we help you sell. Build luggage and cases for 1001 needs. We supply instructions, supplies, everything! Work full, sparetime. Details free. Abaral, 807-S10 Sunset Blvd., Los Angeles 12, Calif.

**GET** Rich scientifically. Choose your vocation. Amazing proven technique. Guaranteed. Free aptitude test. Frederick Lane Associates, 7912 Curragh, Burnaby 1, British Columbia.

**ESCAPE** Wage slavery! Amazing mail-order business opportunities! Everything supplied. National, 2696 South 10th, Fresno 25, Calif.

**NEW** Idea—Design, make, sell, ornamental water fountains. Idea booklet \$1. Littleford Fountains, Salisbury, Maryland.

**COIN**-Operated laundry. Business that runs itself. Factual report available, only \$1.00. Satisfaction guaranteed. Laundries, Inc., P.O. Box 366, Ardmore, Oklahoma.

**PLEXIBLE** Rubber molds for plaster and Marble figurines. Sample and large illustrated catalog 25¢, refunded on first order. K-C Novelties, Dept. 83, Southampton, Mass.

**MAILORDER**. Free book. Shrager Advertising, 2 W. 46, New York City 36.

**NEW** Business. Sharpen body and fender files. Necessary machinery easily built and assembled. Free details. E & M Service, 657 Lowell, Denver 4, Colo.

**START** Profitable mail order business: Home, office. Complete instruction course shows you how. Free information. Nelson, 210 South Clinton, Dept. 9KS-2, Chicago 6.



**TOOL Rental.** After five years experience operating a rental store, I have written a manual designed to help the man who would like to operate his own tool rental business. 32 pages of proven ideas on how to start a tool rental store. Price \$2.00. E. C. Whisman, P.O. Box 8314, University Park Station, Denver 10, Colo.

**MUSHROOMS** Quicker, easier, cheaper. Newest facts free. Spawn \$1.00. Luxur, 641 South 19th, Newark 3, N. J.

**SEWING** Machine service manual. 579 illustrations. 144 pages. Earn to \$5.00 per hour. Price \$6.25. Lee Robinson, Book Nook Bldg., Walla Walla, Wash.

**MANUFACTURE** At home, shampoo, cleaner, detergent. No special equipment needed. \$1.00 brings you four industrial formulas with suppliers' names. Kemco, Box 22, Hochelaga, Montreal, Canada.

**MONEYMAKING** Vending machines. Catalog. Rake, 607 Spring Garden, Philadelphia 23, Penna.

**NEW Industry** needs men now! Over one million small damages in rugs and carpets never repaired, waiting for local service. We show you how to invisibly repair them and make big money in spare time. Up to \$25.00 for one hour's work. Homes, offices, stores, insurance companies. Prospects unlimited! Quick, easy to do. No selling. Skeptical? Make us prove every word. Details free! Carpeton, 1201 Rosemont, Dept. K-17, Chicago 40, Illinois.

**OPERATE** Profitable mailorder business! Write: Bond, 1637-H West Vernon, Phoenix, Arizona.

**\$400.00 MONTHLY** Raising redworms, mealworms, crickets. Clean soilless method. Free brochure. Charlie Morgan, 116E, Bushnell, Florida.

**CANDIED** Popcorn and potato chip equipment. Eakins, Box 933-A8, Springfield, Ohio.

**"EVERYBODY** Likes candy" — Make professionally home. (Our 47th Year.) Ragsdale Candies, B107, East Orange, New Jersey.

**YOUR** Own high profit business. Sell name brands, full or part time. No inventory, no investment. More than 2,000 name brand items; lowest wholesale prices. Watches, jewelry, cameras, hi-fi radios-phonos, appliances, housewares, hardware, power tools, luggage, musical instruments, garden equipment, sporting goods, toys, many others. 8 floors of name brands. Million dollar inventory. Send for free, beautifully illustrated catalog now! Separate dealer price list. H. B. Davis Corp., Dept. 11, 145 W. 15 St., New York 11, N. Y.

**RAISE** Rabbits on \$500 month plan. Plenty markets. Free details. White's Rabbitry, Delaware, Ohio.

**SALES-By-Mail** could be your opportunity. Valuable food for thought free. Rawson Wood, 3974 Milwaukee, Chicago 41.

**MONEY** Plans! "Secret Journal." Grandpa, two daughters made \$2500 first month! Work home. Publicco, Oceanside, Calif.

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

**LEARN** Real estate by listening to records. Lee Institute, Brookline 46, Mass.

**CAMERA** Owners! Earn \$50.00 week-ends! Instructions \$1.00, information free! Kline, 935-PM North Austin, Chicago 51, Illinois.

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

**PIANO** Tuning learned quickly at home. Tremendous field! Musical knowledge unnecessary. Information free. Empire School of Piano Tuning, Champaign, Ill. (Founded 1935).

**WANT** To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes, disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6234 Broadway, Chicago 40, Illinois.

**\$70 WEEKLY**—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757A, Los Angeles 34.

**MINK** Raising information free. Complete. Lake Superior Mink Farm. Superior, E.E.I., Wisconsin.

**MAKE** Flexible molds. Cast plaques, figurines. Free sample. Tooker, 1045-R Fairview, Hamilton, Ohio.

**NATURAL** Molding rubber, extra thick. Free sample. W. Wooley, 1016-A Donald, Peoria, Illinois.

**TREMENDOUS** Possibilities in mail order. I retired after five years. Write Norris Cole, 217 West 49th, Bradenton, Florida.

**VENDING** Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 26, 715 Ensor Street, Baltimore 2, Maryland.

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

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

**11,000** New Prospects daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitola, California.

**BAKE** New greaseless doughnuts in kitchen. Sell stores. Free recipes. M. Ray, 3605 South 15th, Minneapolis 7, Minnesota.

**FIX** Typewriters. Inexpensive home course teaches factory secrets. Free booklet. Athey, Tarentum, Penna.

**PLATE** Baby shoes, jewelry, gifts, bronze and colored pearl. Free booklet. Platex, 11029 South Vermont, Los Angeles 44.

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

**FREE** Catalog. Contains hundreds of businesses, farms and income properties throughout U.S., Canada. Specify type and location desired. Deal direct with owners. U. I. Buyers Digest, 1608 Hillhurst, Dept. PM-3, Los Angeles 27, Calif.

**WE** Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 25,000 customers. Free book. Washington Mushroom Ind., Dept. 172, 2954 Admiral Way, Seattle, Wash.

**FREE** Book "505 Odd, Successful Businesses." Work home. Pacific, Oceanside, Calif.

**MARKETS** Everywhere. Make artistic concrete birdbaths, pottery. Chemical coloring. Home workshop. Stucco-rock walls. Hundred varieties. Hollywood Cementcraft, 8527-K Wonderland, Hollywood 46, Calif.

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

**MAKE** \$46 From square foot plywood; jigsaw necessary. Free details. Woodart, Bridgewater, Mass.

**GROW** Orchids at home. Profitable, fascinating. Successful home grower explains special light, temperature and humidity conditions orchids need. Free! Full details. Orchids, 100 S. Vermont, Los Angeles 4.

**LEARN** Sewing machine repairing. To \$125 weekly. Sparetime. Supplies. Add to present business. Write today! Taylor Service, Box 2126, San Bernardino, Calif.

**MAKE** Money selling recipes and household hints by mail. Information free. Barrett, Dept. CA-27, 7464 No. Clark, Chicago 26.

**MOTEL** Supplies business and mailorder to institutions. New! High income. Investigate. Hermes Advertising, 152-C West 42, New York City 36.

**BRONZE** Baby shoes; Instructions, equipment and mountings for genuine electroplating process. Largest supplier of all plating equipment, supplies. Free catalog. Hollywood Bronze Supply, Dept. B-3, 1624 East First, Los Angeles 33, Calif.

**EXPORT-Import** business made easy. Complete setup service, not just instructions. Hermes, 152 West 42, New York City 36.

I Got rich in the dry cleaning business with no investment, so can you. Free details. Write: Imperial School of Dry Cleaning, Dept. PMC, 1700 Touhy Avenue, Chicago 26, Illinois.

**BUY Wholesale!** 30-80% discounts! Nationally famous brands. Typewriters, housewares, appliances, watches, furniture, musical instruments, cameras, tools, etc. Consolidated Distributors, Clifton 1, New Jersey.

**QUICK** Profits, with no capital! Take orders for magazines your neighbors like, want. Make cash on the spot! We show how with free kit. Get yours now. Write McGregor Magazine Agency, Dept. 310, Mount Morris, Ill.

**BUY Wholesale!** 100,000 nationally advertised products. Appliances, cameras, sporting goods, housewares, watches, typewriters, tools, clothing, etc. Discounts to 80%. Buy-Rite, Box 258, Hawthorne 1, New Jersey.

**GUARANTEED** Market! Earn ready cash raising fishworms for us! Backyard, garage, basement! We buy your crop! Exciting details free! Oakhaven-38, Cedar Hill, Texas.

**BUY** Direct from factories—Appliances, cameras, watches! Free details! Cam Company, 6810PM—20th Ave., Brooklyn 4, N. Y.

**BIGGEST** Money-makers in the field. Acme saw and lawn mower sharpeners. Write for free literature and terms. Max Mfg. Co., 138 Stockton Ave., San Jose 26, California.

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

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

**LIQUID** Molding rubber, free sample. Shellcraft supplies. Chaney's, 1907-A East Road, Jacksonville 11, Fla.

**WIN** Cadillac bonus, up to \$20,000 year. Amazing new wholesale deal! Strateway, 2114-A, Charlotte 1, North Carolina.

**EXTRAORDINARY** Opportunity! Retire now! Lead leisurely life. Remarkable book shows how. Free details. Belmont, Wyckoff 16, New Jersey.

**SHARPEN** Scissors, pinkers. Inexpensive machine. Sharpening supplies. Blackhaws, Sheldahl, Iowa.

**HOME** Mail order business opportunity! We supply everything. Fill your orders. Guide you. Eastern, Box 142, Boston, 24-C, Massachusetts.

#### MONEYMAKING OPPORTUNITIES

**MEN — Women!** Start money-making plastic laminating business at home in spare time. Material that costs 1¢ brings back \$2.50. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room CL-2-L, 1512 Jarvis, Chicago 26, Ill.

**MAKE** Money at home with French poodle pin kits. 3-D poodles selling in exclusive gift shops for \$2.50. Once you have pattern, materials may be bought locally for pennies. Kit includes materials, pattern, instructions. Send \$1.50 to Edwards Originals, Dept. PM, 29 Marlboro Street, Boston 16, Mass.

**MAKE** Natural looking durable stone for fireplaces, homes, patios. Easy, inexpensive. Complete instructions \$3.00. Wm. Bittner, 533 Manhasset Rd., Pittsburgh 27, Penna.

**SELL** Magic mixing balls (49¢ value) \$3.00 dozen postpaid. BJ&R Sales Company, Box 9206, Tulsa, Oklahoma.

**HUGE** Profits! Manufacture concrete fence posts. Send \$2.00 for plans, instructions. Cretepost, Box 38, Windsor, N. Y.

**POSITIVELY** No selling! Buy junk jewelry for a song. Sell the fine gold in it to Uncle Sam for \$35 an ounce (less a small handling and refining charge). Let me show you how to get started. No charge for information. Write Leslie Patton, 335 W. Madison St., Dept. C-P, Chicago 6.

**MAKE** \$5,000 Yearly sparetime raising mink, chinchillas, nutria, etc. Free booklet reveals proved plans. Write: Furs, 588 Mt. Pleasant Road, Toronto 1, Canada.

**SELL** Books by mail. 400% profit. Royal, Box 368-X, Cleveland 27, Ohio.



**SCHOOL Seniors**—Make money. Sell classmates aptitude testing. Commissions, bonus. Details free. Guidance Associates, 115 Haypath Road, Plainville 1, New York.

**MAKE** Extra money taking orders for Florida oranges, grapefruit, etc. List of 50 shippers \$2.00. Box 8, Cortez, Fla.

**SELL** Information by mail. 10-to-1 profit ratio. Valuable suggestions free. Rawson F. Wood, 3974 Milwaukee, Chicago 41.

**FREE.** Moneymaking plans. Work home. Zinke, Box 39, Savoy, Illinois.

**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.

**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 CM-2-L, Chicago 26, Ill.

**CRAZY** Cards. Two sets 25¢. Catalog free. Dohn-GC-Marks, Broadview, Ill.

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

**MAKE** Big easy profits making costume jewelry at home in spare time! Quick, easy to make; easier to sell! Details free! Don-Bar, 3511 W. Armitage, Dept. K-192, Chicago 47, Ill.

**MAGIC** Towels. Buy 50, \$2.50; 100, \$4.50. Sell 12, \$1.00. Won't stay dirty. DeComer, 7602 Kipling, S.E., Washington 28, D.C.

**MANUFACTURER** Fishing lures, plastic, none better. 20 models pennies. Free circular. Quaker, 3514-24 N. Lawrence, Philadelphia 40, Penna.

**WORK** Only six months, each year. Sell rides to kids in Wonderbird power car. Get details of franchise. Enclose 10¢. RMB Products, 205 S. Wilson, Pasadena, Calif.

**EASY** To start rubber stamp business at home in spare time. Make up to \$9.80 an hour without experience. Facts free. Write to Roberts, 1512 Jarvis, Room CR-2-L, Chicago 26.

**THERE'S** Money in them thar photos! Let your idle photos turn into cash. Send your 8x10 prints and only \$1.00 for complete information and become a member of our world-wide agency. Limited offer. Photo-World, Dept. 20, 538 North Federal, Fort Lauderdale, Florida.

**MAIL** Order plan—Spare time or full time earnings. Details 10¢. Heritage Thrift Foundation, 1400-F Davis Building, Dallas 2, Texas.

**MANAGING** Money-raising campaigns for churches, hospitals, institutions; pays unusual fees. Short spare time course backed by 35 years experience. John Arbogast, 229 East Mason Avenue, Alexandria, Virginia.

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**\$50.00 WEEKLY** Possible mailing merchandise catalogs. Roe, 1657P Gregory, Chicago 40, Ill.

**\$36-\$200 WEEKLY.** Plating baby shoes, making jewelry, novelties, etc. at home. Details free. JO-Ca Electroplater, 7840-D Northwest Sixth Court, Miami 50, Florida.

**LEARN** Soapmaking. Big profits. Artie Barnes, Box 474, St. Louis, Mo.

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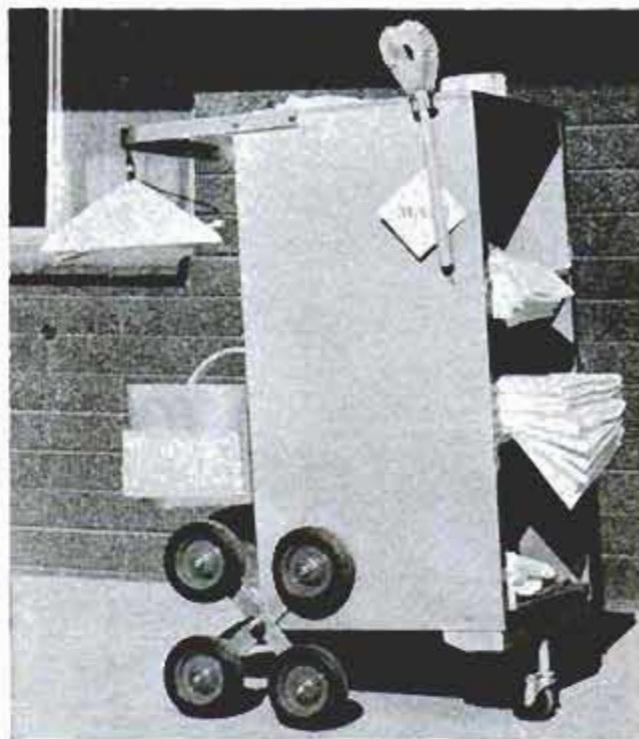
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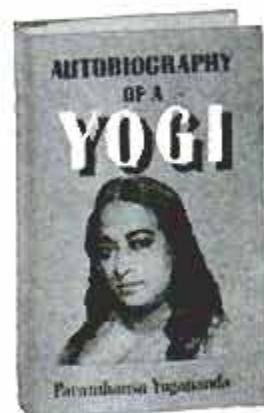
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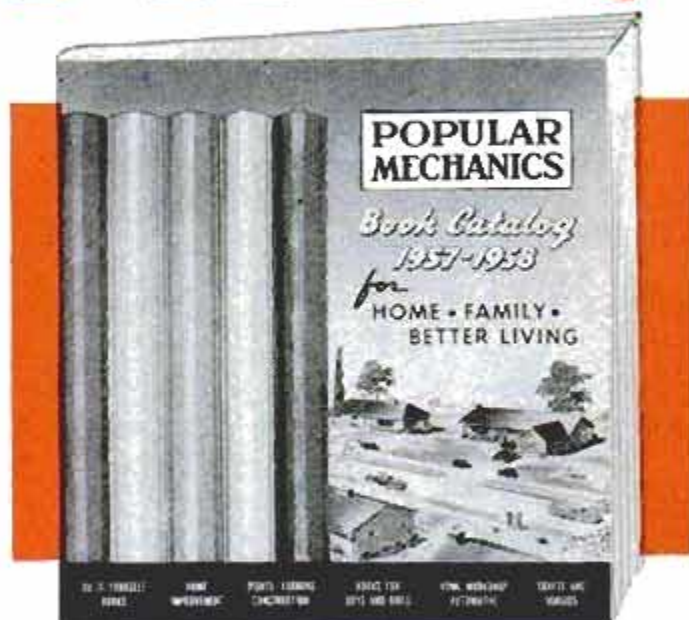
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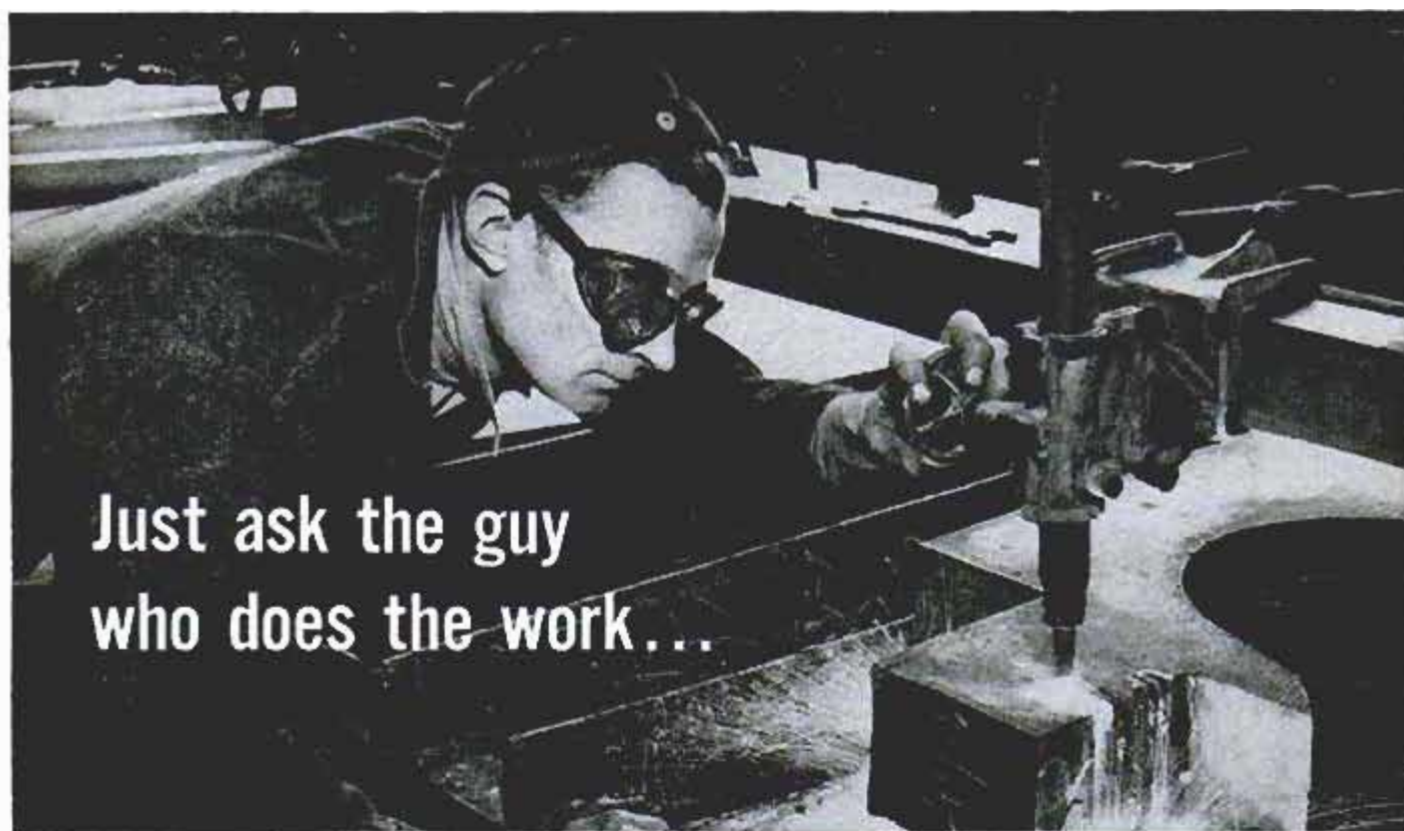
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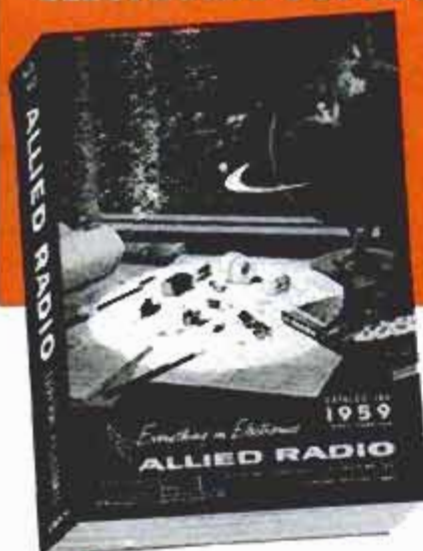


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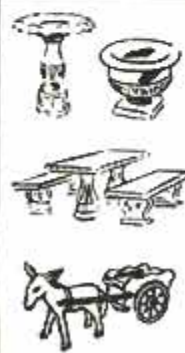
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HOW TO TURN CONCRETE INTO GOLD





U. S. Forest Service photo

## ***Do You Know This Old-Timer?***

**YOU'LL HAVE** no trouble recognizing this place. The Garden of the Gods is still the Garden of the Gods, as it was in July 1919. The roads are paved, now, and the tourists no longer hang a canvas water bag on the trunk

to slake their thirsts on the long trek across the sagebrush country. No wrap-around windshield was necessary in those days, no steel top crowded out the magnificent scenery of the Colorado Rockies. What is it? One tip only: It had an electric starter, even 40-odd years ago. For the answer, turn to page 250.

# **WOLVERINE**

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## WHAT A CHANGE

in this Ohio property after

**COLORED ALUMINUM COATING!**

# Shef-Kote

## OWNER BRUSHED ON A NEW GREEN METALLIC ROOF!

*Shef-Kote* stopped leaks—hid an old, weathered roof—brightened up his whole property, reports a Brecksville, Ohio, homeowner. Best of all, his budget didn't suffer. He did the job himself—literally brushed on a new metallic roof that combines a harmonizing green color and weatherproof protection.

*Shef-Kote* is one of the time-proved, colored aluminum coatings made with ALCOA® Aluminum Pigment. Available in six sunproof hues, *Shef-Kote* is a thick, tough, fibrated coating that protects in any climate—covers approximately 100 to 125 square feet per gallon—stays firm on top, soft and pliable underneath—will not run or crack.

Coatings like *Shef-Kote* literally seal roofs or siding, protect against surface deterioration, extend property life. And reflective aluminum turns back part of the sun's heat, helps keep interiors cooler in summer.

One coat hides any surface—built-up composition roofing, asphalt and asbestos shingles, tar paper, concrete, cinder block,



No job at all, according to the owner, shown brushing on his new *Shef-Kote* roof. *Shef-Kote* is made by Sheffield Bronze Paint Corp., Cleveland, Ohio.

stucco—even well-cleaned, rusty metal. A good colored aluminum coating like *Shef-Kote* is fadeproof, stays new-looking for years. In fact, weathering actually intensifies the colors.

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# Marlin G-108

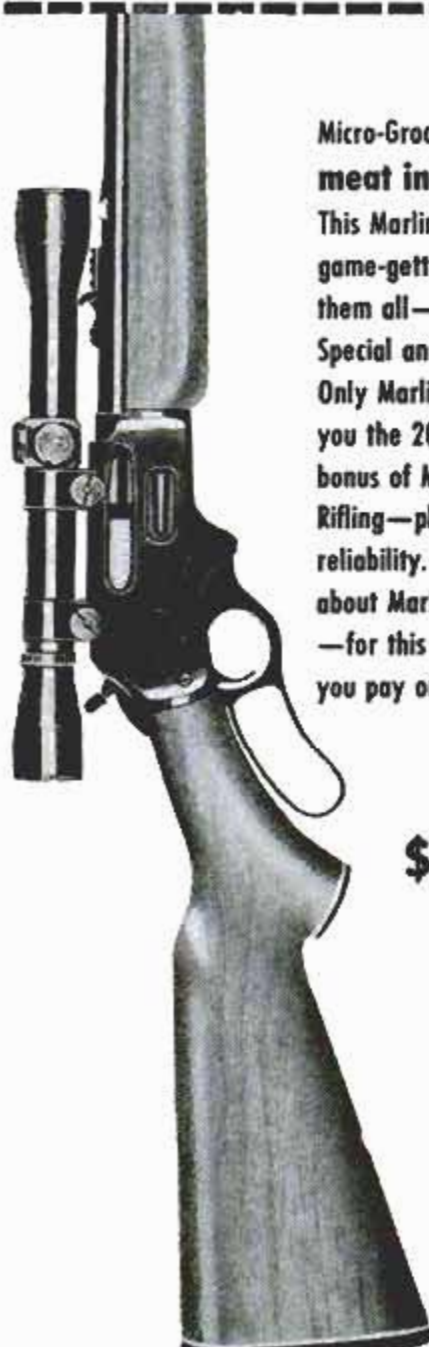
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\* Patent applied for.

\*\*Retail price \$78.95 does not include scope. Prices slightly higher west of the Rockies—subject to change without notice. Also available in Canada.



## High-Altitude Fliers Will Take Food by Tube

Pilots flying at extremely high altitudes will squeeze their food out of a collapsible tube. The tube shown above contains semi-liquefied chicken. Face masks on pressure suits limit food intake to products that can be taken through plastic straws. At higher altitudes, however, differences in pressure make straw-sucking impossible. The tube was developed so that the food could be forced out by hand.

## Synthetic Skunk Juice Repels Rattlesnakes

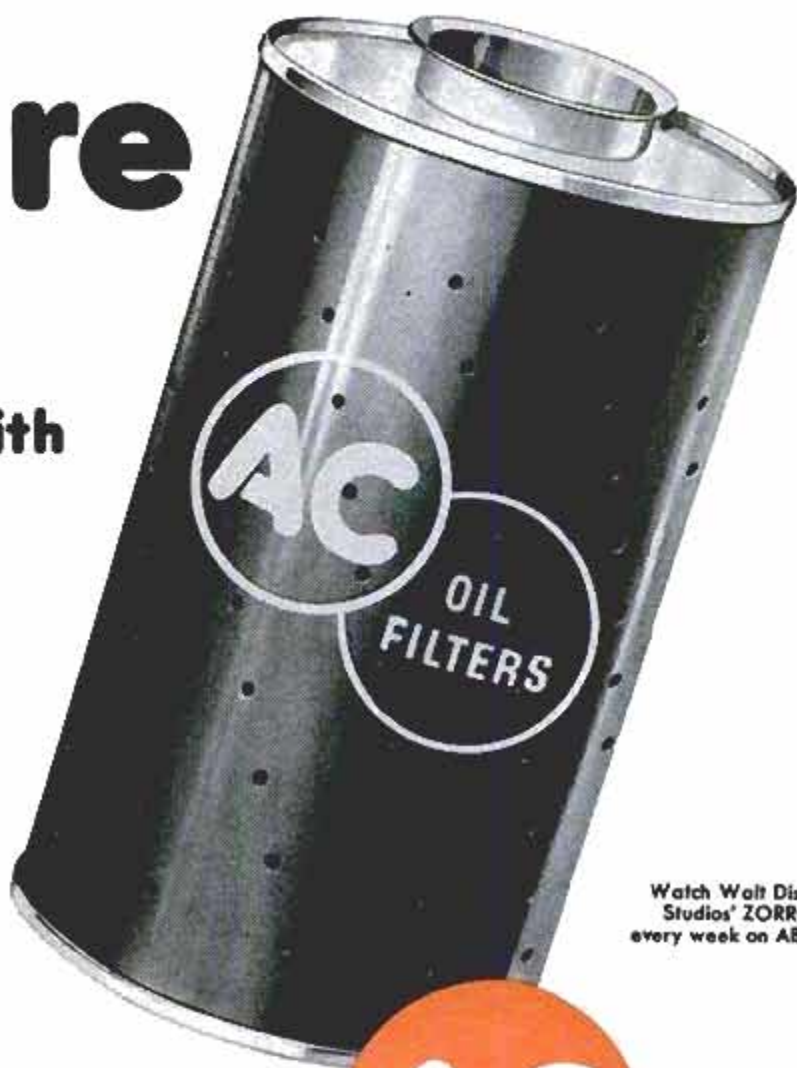
Want to frighten a rattlesnake away? Try scattering charcoal soaked in mercaptan around your campsite. One whiff and the rattlesnakes in the neighborhood will turn tail and head for fresher air. Dr. Raymond B. Cowles, zoologist at the University of California, Los Angeles, came up with this snake-repellent solution in a research project sponsored by Richfield Oil Corporation. Mercaptan, a chemical, has an odor resembling that of the skunk. A protective ring of synthetic skunk juice around a camp or home in snake-infested country will not be strong enough to repel humans, but rattlesnakes just don't care for the aroma.

Greenland Ranch in Death Valley, Calif., holds two unenviable weather records—highest temperature ever recorded in the United States: 134 (July 10, 1913), and lowest annual average rainfall: 1.68 inches.

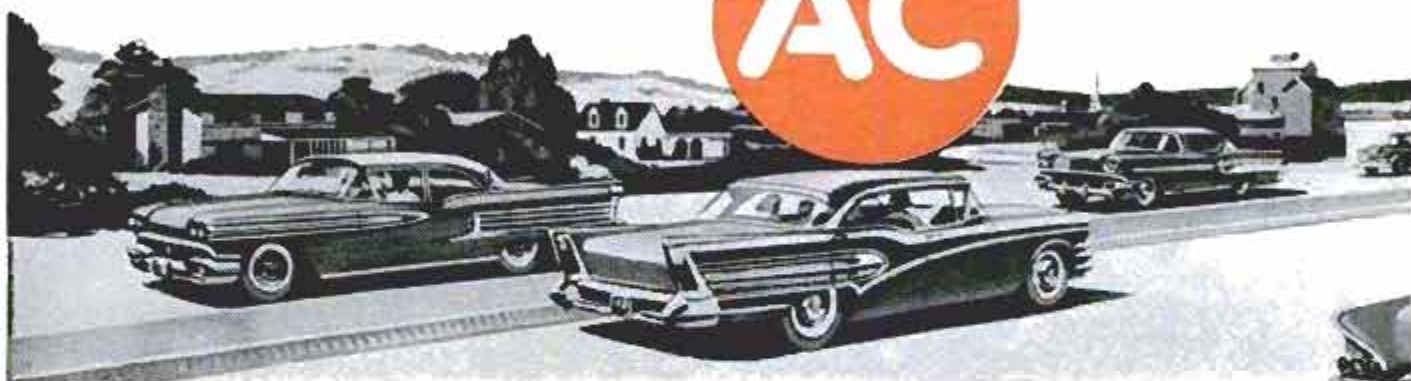


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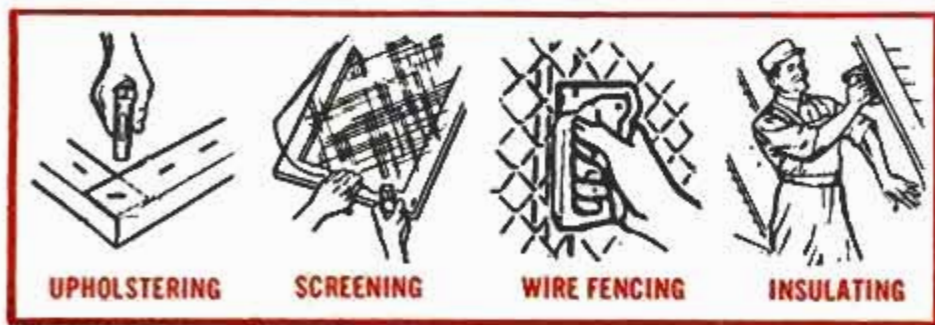
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# THEY LEARN TO FLY IN HIGH SCHOOL

**POPULAR** OCTOBER  
**MECHANICS** 1958

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 110 NO. 4

*By Chris Edwards*

**WOULD-BE PILOTS** at Clover Park High in Tacoma, Wash., get a real head start. And at bargain prices, too. Juniors in the school's aviation program can solo. Before graduation they can pile up the 200 hours needed for a commercial pilot's license—all at the rock-bottom rate of \$3.75 per flight hour—dual or solo. Students in flight training pay only the actual

expenses for operating the school's nine airplanes. If a student wants to stop with the 40 hours required for a private pilot's license, he invests only about \$150. All ground-school courses are a part of Clover Park's aviation science program and cost the student nothing.

Students aiming for an aviation career on the ground can qualify for the Civil

At the end of his first solo flight, a student at Clover High School, Tacoma, Wash., receives a handshake







Preflight courses are taught in the hangar-classroom. Girls in aviation studies often become stewardesses

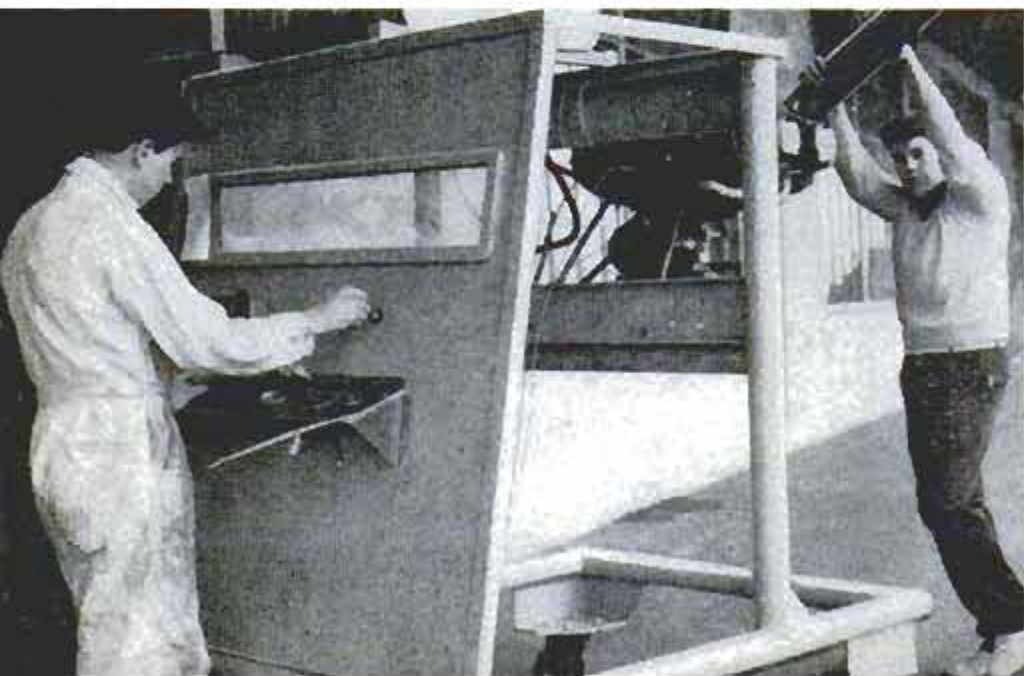
Aeronautics Administration's Airframe and Powerplant Mechanic's license with one year of postgraduate training. (This new title replaces CAA's older Aircraft and Engine Mechanic's license.) But mechanics still call the certificate an A&E license. The mechanic or aviation specialist course at Clover Park is a real bargain — the cost of these courses is nothing!

Well, you might wonder, who struck oil on Clover Park's front lawn? How can a high school afford the kind of advanced aviation training that these students get? Actually, this training costs Clover Park very little more than ordinary vocational courses in other high schools.

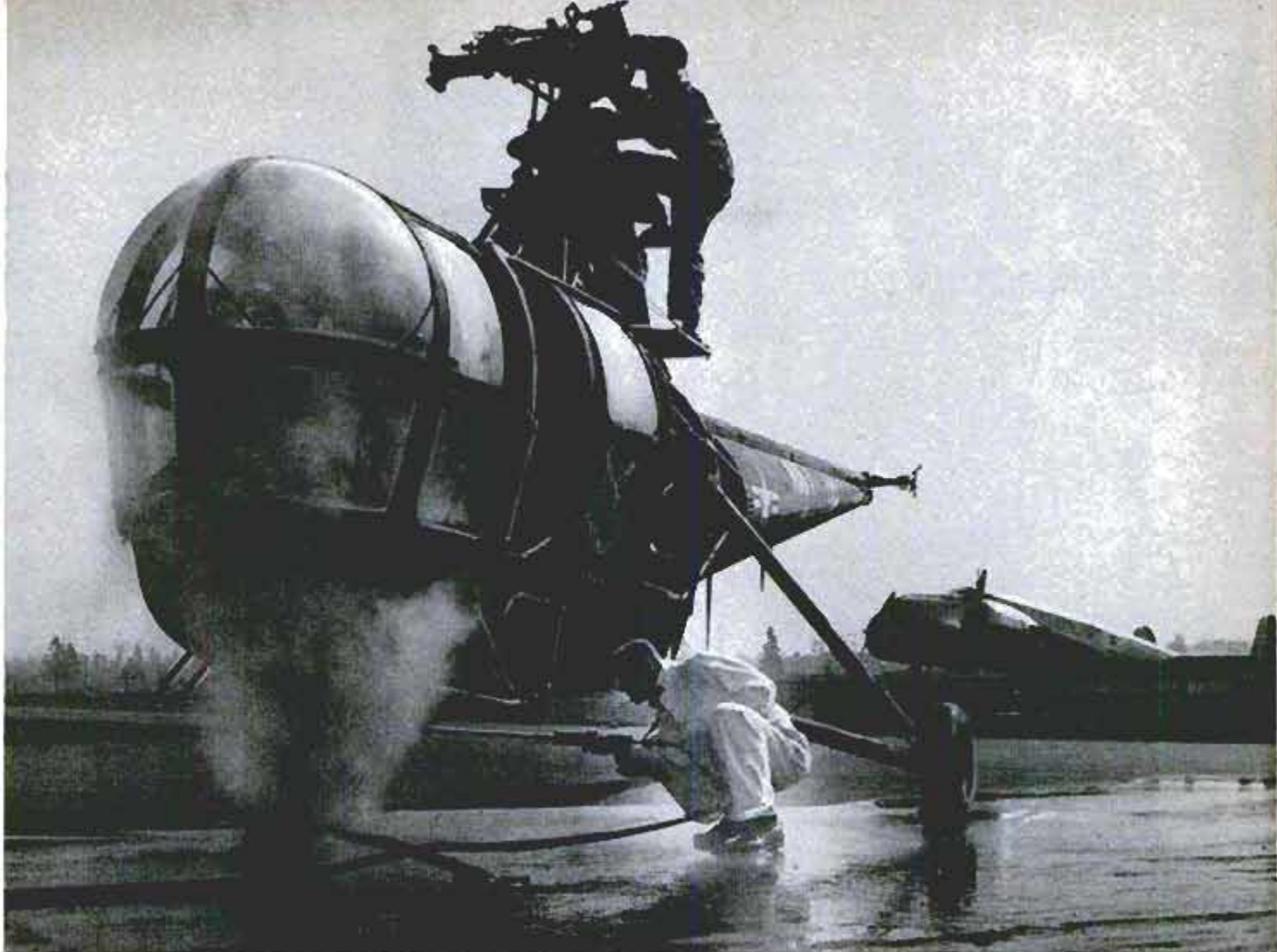
First off, the aviation program started small. Right after World War II, Fred

Miner, Clover Park's supervisor of vocational education, convinced the school board they should provide students with training in a growing field. In the air-minded West, that meant aviation. Starting from scratch and surplus, Miner offered a course in airframe and engine mechanics that fall. The first class worked with a wrecked airplane and surplus parts picked up from nearby airfields and military supply depots. In the spring of 1946, the school's program was approved by the CAA. To meet the

A special test stand aids final ignition-timing before "running in" a rebuilt engine. Students do repair and overhaul jobs for aircraft shops







The school also gives training in helicopter repair. Converted C-45 military transport is in the background

CAA's floor-area-per-student requirement, Miner tore down the wall between the converted bus garage and the school's wood shop so that the shop could be included. "Well, after all, many light planes are built almost entirely with wood frames," Miner explained.

### First-Hand Experience

At first, Miner taught all the classes. A licensed A&E mechanic himself and experienced in airplane maintenance, he believes students learn faster while actually working on airplanes. "Exercises in various kinds of work waste a student's time," Miner says. "In our A&E classes, we rebuild airplanes that will fly." A sign in the laboratory reminds students that "A Life Is in Your Hands."

When the first airplane was completely rebuilt and test flown, the school was ready to offer flight training. All the airplanes used by the students in dual or solo training flights are products of the mechanics' courses.

As the aviation program interested more students, Miner added more instructors—men from industry who were instructor pilots or A&E mechanics, or both. Today, there are five full-time aviation instructors

in addition to Miner. Four of the five are instructor pilots. The school's flight line now includes nine planes, all different kinds. There's even a Beech Model-18 twin-engine transport, converted from an old C-45. But the planes constantly change. Some are sold. Others are added as the mechanics roll out another finished product.

When school officials approved flight training, there was one problem—no field. Since the only level space in the area was the watery surface of nearby lakes, Clover Park began the flying program with float planes. American Lake, three miles from the school, was the "flying field." Only a ramp was needed to get the airplanes into and out of the water. For nine years, all flight training was conducted from the lake with planes equipped with floats. A year ago the school expanded into a part of an old naval supply depot. Students now share a landing strip with a local Civil Air Patrol unit. Soon, all flight training will be off the strip, using planes equipped with wheels instead of floats. School buses, normally not used during the day, carry students to and from classes at the naval depot.

As the A&E mechanic courses attracted more students, materials and parts began





Propeller winding is part of preflight course. Instructors in aviation courses find that students learn more easily when taught with real planes

to strain the operating budget. Miner figured that using the same parts over and over again would cut costs. But it would mean changing to exercises rather than actual work on airplanes. This was contrary to the whole philosophy of the school. Instead, the school went back to buying wrecked airplanes. As the airplanes were torn down to the frames and rebuilt, student mechanics experienced all types of

work, from welding light-weight steel tubing to covering surfaces with fabric and sheet metal. After maybe a year, the wreck was transformed into a practically new airplane. Instead of adding the plane to the school's fleet, it was auctioned off. The difference in price between the wreck plus parts and materials and the finished airworthy product paid back all costs. Any excess was used to purchase materials for the school's airplanes.

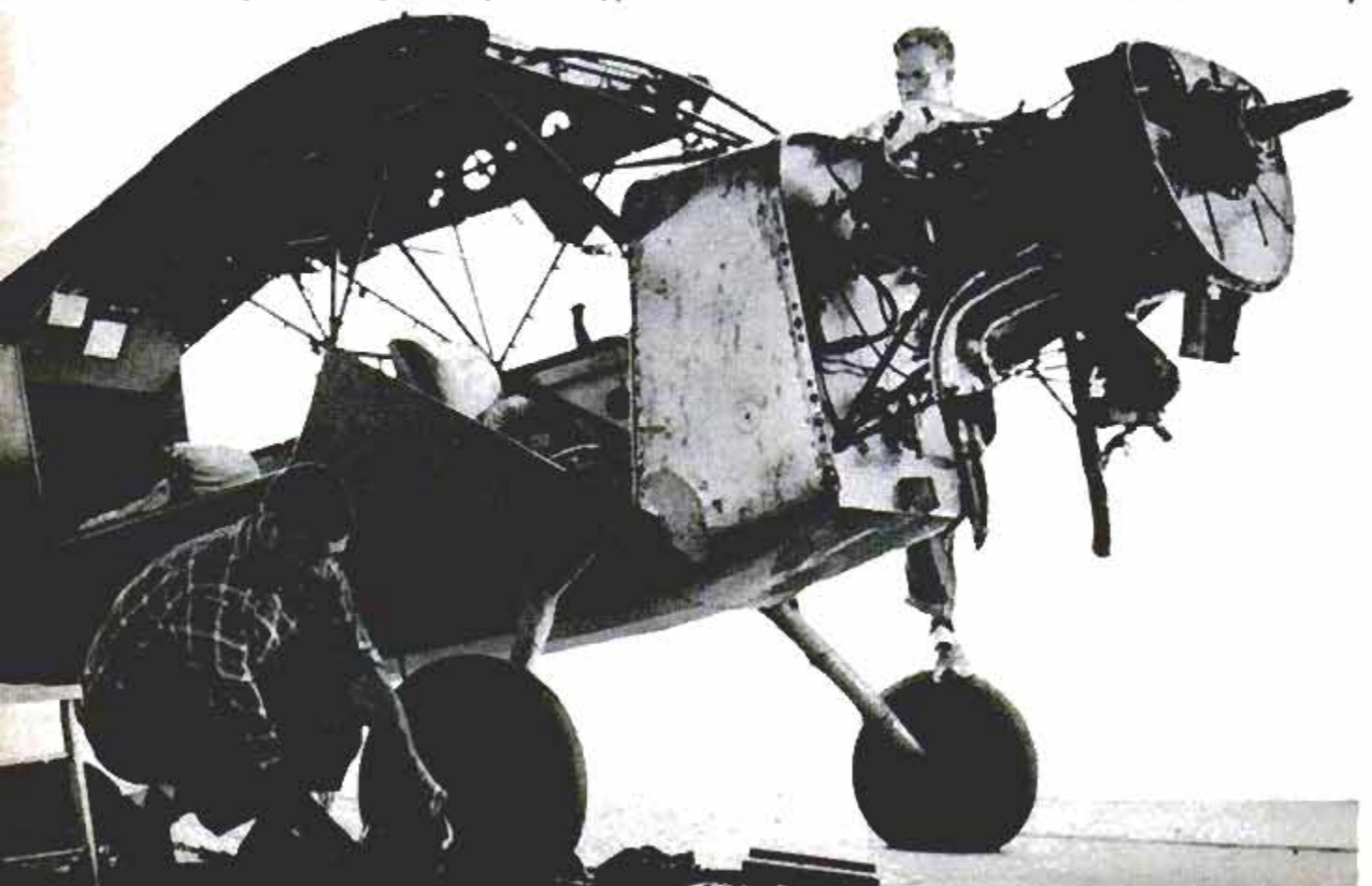
### Overhaul and Repair Jobs

But the supply of wrecked airplanes didn't always meet the school's needs. If all the airplanes

in the shop were small fabric-covered jobs, students couldn't get experience repairing all-metal planes. So, to keep a variety of work in the shop, the school began taking on overhaul and repair jobs for aircraft shops in the Tacoma area. The school would buy parts and materials at a discount and bill out the job at list. The difference helped to pay for the school's

(Continued to page 294)

Wrecked planes, bought locally, are stripped and rebuilt in Clover Park's airframe-mechanics laboratory





# 1959

## A Report on the De Soto, Buick, Cadillac and Oldsmobile

By Arthur R. Railton



BUICK



CADILLAC



OLDSMOBILE



DE SOTO

**D**ETROIT: Let's be frank. 1959 is the stylists' year, not the engineers'. There are many minor engineering changes, of course. These are continuous, they go on all the time. But it is not like 1958, when the engineer was king.

Styling speaks for itself. One look at the pictures on the following pages tells the story better than words. And, on the whole, it's a good story.

Styling is cleaner, more honest, in better taste. The new cars are better looking than their predecessors. They will make better-looking used cars, too, in the years ahead because they are not jazzed up with tiresome decorations that grow ugly when the newness wears off.

Three of the four new cars shown here are in the General Motors family. The lone outsider, De Soto, has important front and rear changes, but it retains the same sleek personality it has had for two years.

The GM cars, however, have new faces, new personalities. This new GM look owes a lot to Chrysler. Notice how the De Soto (despite being in its third year with this styling) doesn't seem out of date surrounded by GM cars. The Olds Scenicoupe's big back window is a lot like the big back window on the De Soto hardtops. And there are some Ford touches, too. The flat roof, for example, was first seen on the Mercury two years ago—not identically, but the motif was there. And there are some who see a lot of the first postwar Studebaker's Starlite Coupe in the big wrap-around window of the GM cars.

### Handsome Designs

But this is not to say that GM should get no credit for a fine styling job. Its new cars (including the upcoming Chevrolet and Pontiac) are as handsome as any cars you would care to see. There is nothing wrong in borrowing ideas. There are no truly new ideas in styling. New ideas are not necessarily successful anyway.

You get no assurance of success by being first in the automobile business. Success comes when you are there with what the public wants at the time it wants it. Being too early is just as bad timing as being too late.

In any case, the 1959 cars give no encouragement to those critics who say cars are too long, too luxurious, too expensive.

Generally, the new cars are just what these critics don't like, only more so. But, strangely enough, they look and feel smaller, less bulky. They have been visually slimmed out so, despite their length, they don't look bigger. Gone are the big, fat, round GM cars which have filled the highways in the post-war years. Now, the GM cars are lean, lithe and muscular.

And they drive better. Steering is easier, cornering is improved by the lower center of gravity.

There is even some talk of better economy despite the fact that these new GM cars are heavier. This added economy is

(Continued to page 300)





Longest Buick is this Electra 225. The flat roof with its wrap-around rear glass is available on all series

## 1959 BUICK

UNLIKE ANY BUICK before it, the 1959 Buick looks as lean, trim and muscular as a racing car. Gone is the well-heeled, middle-aged bank-president look, replaced by the alert, light-on-his-feet, decisive look of a young industrialist.

Its personality has changed, too. The car drives better, thanks to its lower body (three inches lower on hardtop models), higher roll center, wider track and a power-steering unit which requires much less effort than in 1958.

There are only three series for 1959 and all have new names: LeSabre (replacing the Special); Invicta (replacing the Century); and Electra (replacing the Roadmaster). An extended-trunk version of the Electra, called the Electra 225, replaces the 1958 Limited series. The "225" in the name refers to the over-all length of the car in inches. The Super has been dropped.

Engines are the same vertical-valve de-

sign that Buick has used since its first V8. The LeSabre retains the 364-cubic-inch engine with few changes from 1958. These include an increase in compression to 10.5 to 1 with automatic transmission (the 8.5 to 1 ratio with handshift is unchanged), enlarged exhaust valves and manifolding, and a smaller two-barrel carburetor designed to operate on a miserly lean mixture for economy.

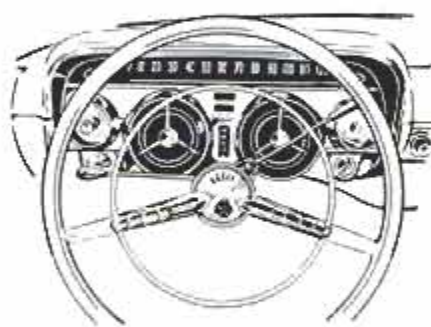
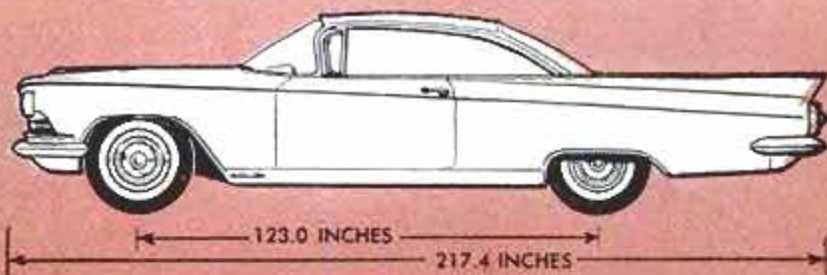
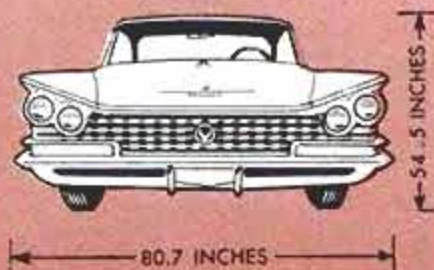
The Invicta and Electra are powered by a 401-cubic-inch engine with a longer stroke and wider bore than in 1958. Virtually all important operating parts of this engine had to be redesigned or modified to handle the larger displacement.

Air suspension is now available only on the rear axle where it serves its principal function of load leveling while providing the desirable variable-rate characteristic of air which eliminates crash-through and bottoming under extreme conditions. ★★★

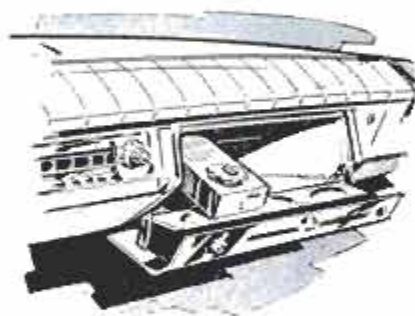
Diagonal headlamps, flared fenders front and rear, and a 54-inch height give Buick a close-to-the-road look







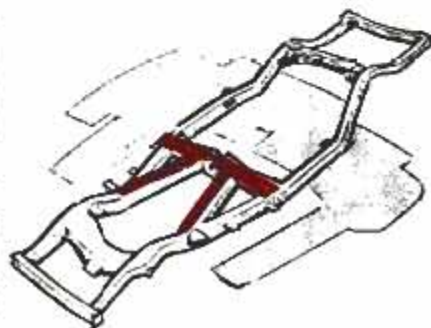
← Buick has a full complement of instruments with needles—no warning lamps for it. Speedometer is horizontal and large. It's as easy to read as any on road



New radio has two parts: One, → a palmsize portable, fits inside glovebox and slips out for portability; two, a push-button tuner that is built into the dashboard



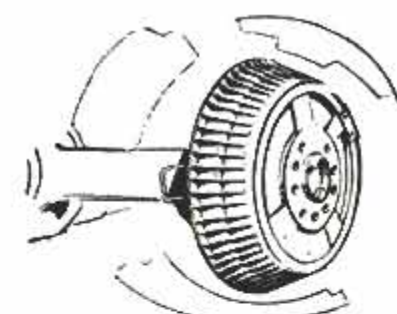
← By hiding the fuel-tank filler pipe behind a hinged license plate, Buick borrowed a trick from Ford. Previously, Buick has hidden fuel pipe inside bumper



Called a K-frame because of → the center section, the frame has been widened amidships to accommodate a lowered rear-floor pan. Rear-axle kick-up is greater



← By a three-point radiator mount (arrows) instead of four, Buick prevents front-end structure from twisting radiator on rough roads, which will reduce solder failures



Ribbed by 60 fins, cast-iron → rear brake drums cool faster and stop quicker. They augment the finned aluminum front drums that Buick introduced on its '58 cars

With almost no chrome on its side, the four-door sedan shows how complete has been Buick's transformation







With its flat-roofed, jet-tube, high-finned styling, the Cadillac 62 has surely moved into the space era

## 1959 CADILLAC

**YOU WON'T BE ABLE** to read the word "Cadillac" on the 1959 models as they drive by, because it is nowhere in sight (it appears only on a tiny plaque on the front fender).

But you won't have trouble identifying them. Waist-high tailfins point the car down the road like a rocket. It is as distinctive as a car can be and yet, despite a touch of the space ship, remains surprisingly dignified.

Previously Cadillacs came in three different wheelbases. This year there are only two. All models except the 75 limousine are the same length: 225 inches, 0.3 inch shorter than almost all 1958 Cadillacs (90 percent had the extended deck and were 225.3 inches long, the others were 216.8 inches long). In fact, Cadillac this year is shorter than the biggest Buick, which is 225.4 inches long over-all).

Heights are drastically lower, some being as much as 5.5 inches under previous designs. However, interior dimensions are retained with only tiny differences in all except for rear-seat headroom which is

down about an inch. Seat heights have suffered in the process.

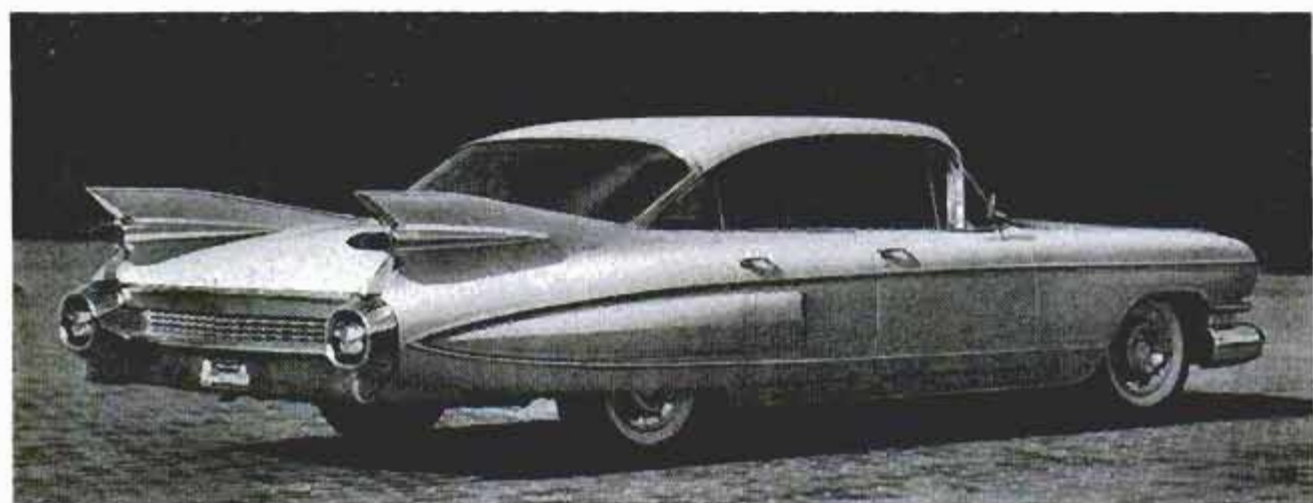
Rancher owners won't like the half inch cut in road clearance, down to 5.9 inches from last year's 6.4 inches. There has been a big increase in turn-circle diameter. It is 47.0 feet on all except the limousine (up from 43.4 and 45.0 in 1958).

Engine changes include a jump in displacement to 390 cubic inches (stroke lengthened to 3.875 inches from 3.625). Compression is now 10.5 to 1, also up, and horsepower is 325 with 345 optional.

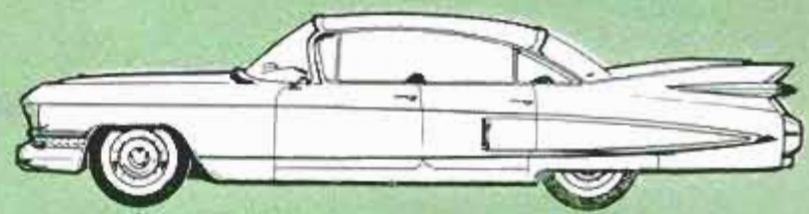
Biggest improvement, say Cadillac engineers, is in handling. Over-all steering ratio is now 18.9 to 1, slightly faster than the 19.5 of last year. The big handling gains come from a lower center of gravity, the new power-steering with less "load" on it and new shocks and suspension. Also, a smaller steering wheel (17 inches instead of 18) adds to the sporty feeling.

Cadillac continues to improve air suspension with 10 minor refinements this year. It is now standard on all Eldorado models. ★ ★ ★

Just a bit less radical, the regular sedan models, like this 60 Special, have a more conventional roofline



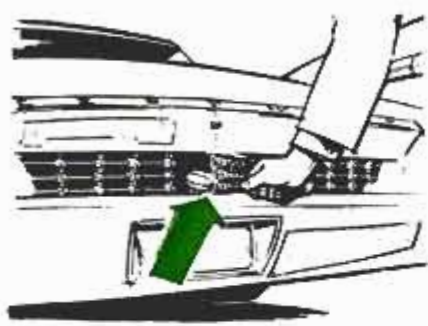




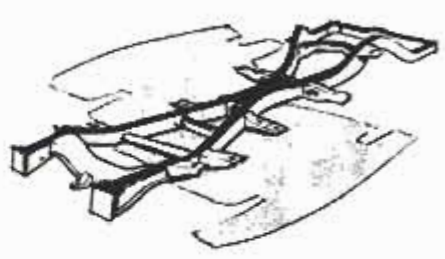
←Out-finning them all, Cadillac mounts its rear lights in jet tubes astride towering tails. All are multipurpose, serving as tail, stop and directional-signal lamps



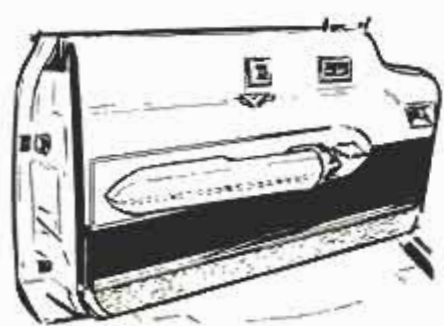
Neatly hidden beside a chrome→ strip atop the front fenders, the hood joints are invisible, making fenders and hood appear to be just one continuous sheet of metal



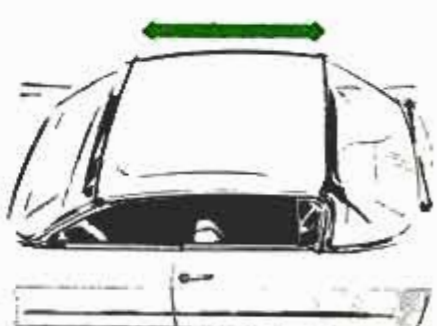
←By repeating its front-grille motif across the rear, Cadillac has made it easy to conceal the gas-filler tube door (arrow). It used to be hidden in a taillight



Unchanged from the '58 design,→ the frame is the tubular X-shape that permits changing wheelbase simply by increasing or decreasing length of the central tunnel



←With flush-mounted knobs and controls, the driver's door panel has none of the usual clutter to crack knees on. Door handle is a paddlelike extension of armrest



Sporting an upward-wrapping→ windshield and a high rear window, roof is scarcely larger than a Japanese parasol. It provides a top-down convertible atmosphere

Cadillac's grille is similar to last year's. The added bulge in the rear panel identifies the 60 Special







Gone is the extravagant use of chrome on the new Olds. Its sleek, taut metal seems to need no added flash

## 1959 OLDSMOBILE

**H**HEAD-ON, THE OLDSMOBILE looks a mile wide. Bold horizontal sheet-metal lines, a low hood and widely spaced headlights exaggerate the car's visual width.

It is wider than before, but not that much. Tread is 61 inches, width is 80 inches. Height of the hardtop is a mere 53.7 inches.

Altogether this wider stance results in improved handling. Power steering has been made more effortless (down to a 1½-pound load on straightaways, half what it was) and its over-all ratio is noticeably faster at 17.5 to 1 (was 19 to 1). Center of gravity is lower by 1½ inches.

The 88 series has the same engine as in 1958 except for a slightly lower compression ratio, 9.75 to 1, down from 10.0 (this

must be some sort of a precedent). Horsepower is up by five to 270 by use of a larger carburetor.

Displacements on the Super 88 and the 98 are up as a result of increasing the bore to 4.13 inches (was 4.00 even). The block is the same one that Oldsmobile introduced in 1949 with a 303-inch displacement. It is now 394 cubic inches and growing.

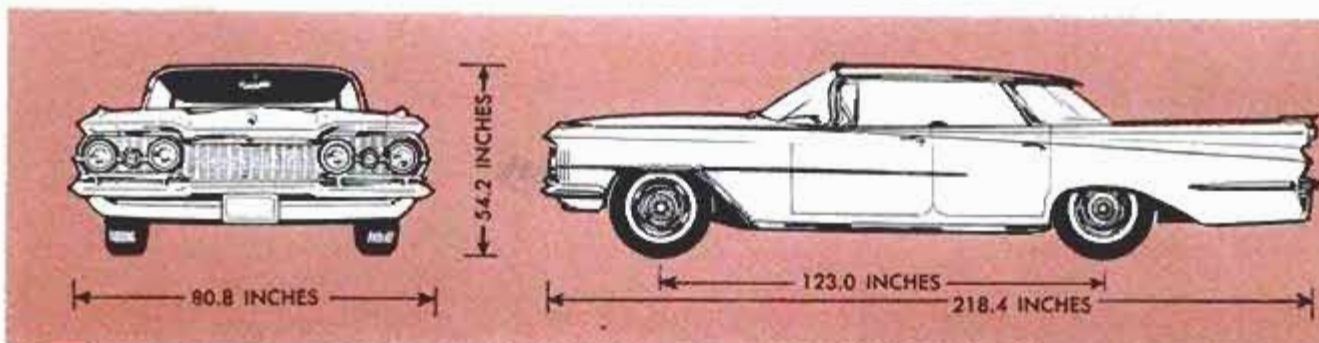
Oldsmobile offers two different body shells for the first time since 1951. Previously, the 98 was no bigger inside, but simply had a stretched outside (rear deck). This year, the 98 has 3.3 inches more rear-seat legroom than other models.

Economy is said to be helped by a fast-acting choke that stays on for only a half mile or so, instead of the usual 2 or 3 miles. ★ ★ ★

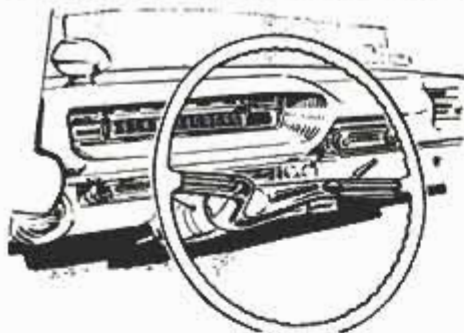
This year's wagon has an easier-to-fold rear-seat design. It still does not have a three-seat model available



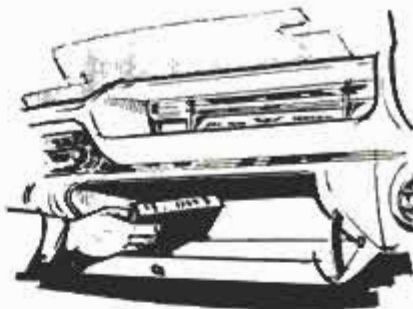




Dimensions are for the 88 and Super 88. The 98 series has a 126.3-inch wheelbase and a 223.0-inch length



←Instrument panel is deeply recessed to prevent glare on the windshield at night. The oblong horn buttons on steering-wheel spokes are continued from 1958



Here's one of the biggest glove→ compartments on the road, being almost half as wide as the dash. Portable radio (not shown) slips into place inside for use in car



←Tailgate window on Olds wagon rolls down this year. Crank is the rear medallion that opens up like a hamburger press. Of course, it's available with power lifts



Reason wins out. Stylists have→ returned the trunk handle to the public after a long absence. Just below it is the door in the bumper that cover the gas filler pipe



←By giving the A-pillar at the corner of the windshield a gentle S-curve (in color), designers have made it easier to get in and out without cracking a knee on steel



Sheet metal of the rear fender→ flows smoothly into the ends of the bumper, giving the effect of no separate bumper at all. Back-up light is recessed in the cavity

New for 1959 is the Holiday Scenicoupe that has a huge rear window that curves high upward into the roof







By extending fenders over the headlamps and thickening bumper, De Soto has added to its massive look

## 1959 DE SOTO

**F**IRST OUT of the Chrysler family, De Soto has a new front end that makes it appear wider and lower. Front fenders are extended forward to eyebrow the twin headlamps.

Engines on all De Sotos are bigger. The Firesweep is powered by the 361-cubic-inch V8 used in the Firedome in 1958. Firedome and Fireflight have increased displacement to 383 cubic inches by boring out cylinders to 4.25 inches. Compression on all remains unchanged at 10 to 1. Fireflite and Firedome engines are identical except that the top line, Fireflight, has a four instead of a two-barrel carburetor.

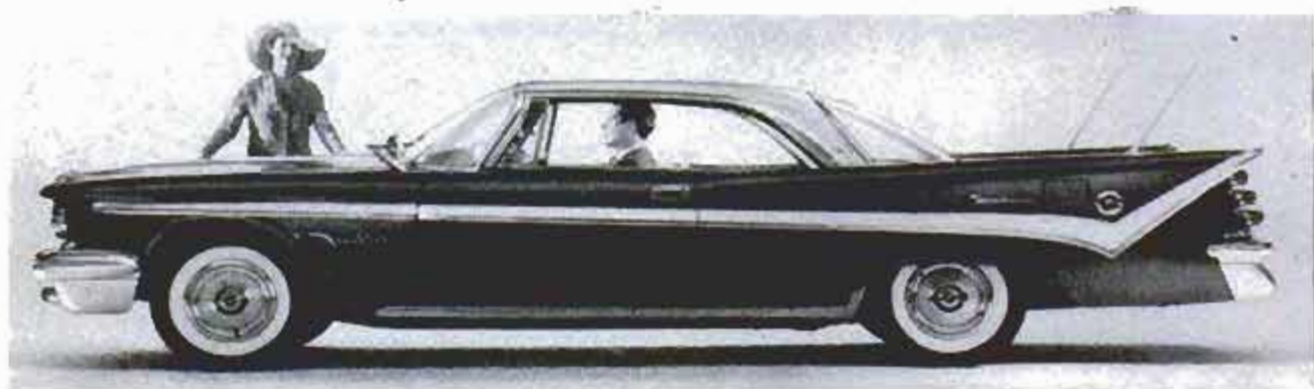
Adventurer models (and any De Soto, if you want to pay extra) are souped up with dual four-barrel carburetors.

In the absence of a complete styling change, De Soto, along with all Chrysler

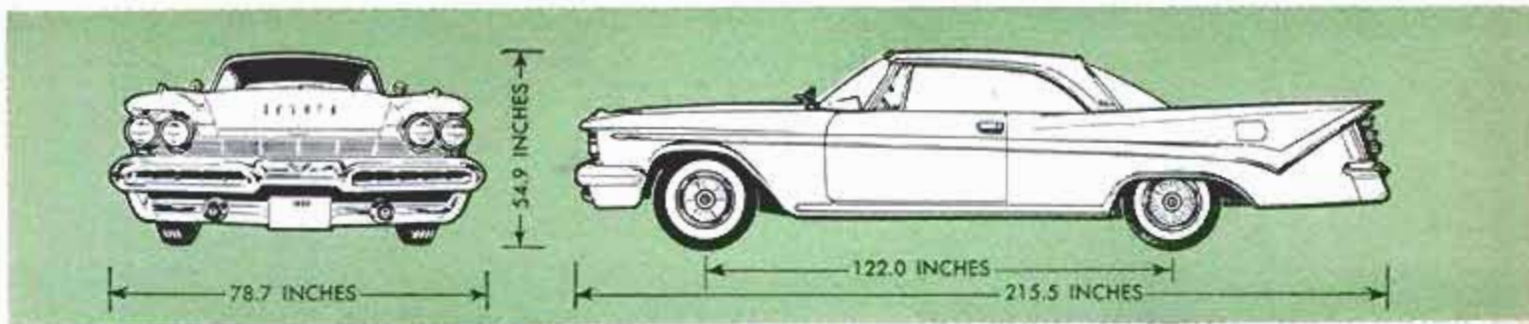
Corporation cars, has a long list of innovations. Included are swiveling front seats for ease of entry and exit, air suspension in the rear only, electronic headlight dimmer which uses a tiny dash-mounted "eyepiece," electronic rear-view mirror that automatically switches to nonglare when the headlamps of a following car shine on it, push-button heater controls, and a station-wagon air conditioner that mounts a second evaporator in the roof to cool the rear area. Rear-seat headroom and height are improved. There's more clearance under the steering wheel due to its slightly elliptical shape, and the stub pillar on four-door hardtops is reshaped to allow easier rear-seat entry and exit.

De Soto continues its torsion-bar front suspension modified by a shortening and thinning of the bars. ★ ★ ★

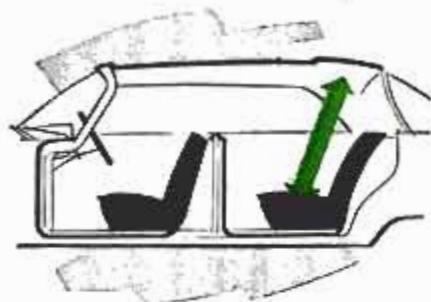
In profile, the principal change is that the taillight area now slants forward instead of backward as before



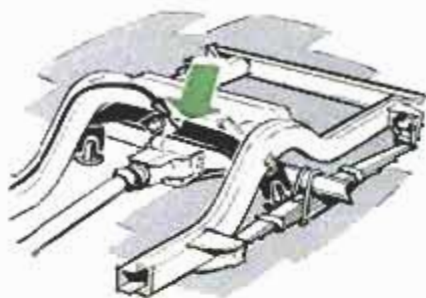




Dimensions are for Firesweep, smallest De Soto. Others: 126-inch wheelbase, 219.5 and 221.1-inch length



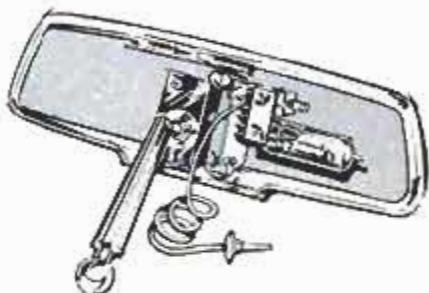
←Rear-seat room is increased by moving seat backward slightly and raising roof at rear. It is now easier to enter and leave due to a redesigned stub pillar on hardtop



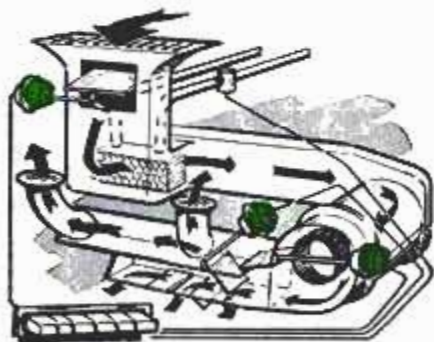
By adding air bags to its rear→ leaf springs, De Soto gets load-leveling without the complications of full air ride. Arrow points to cutaway of transverse air tank



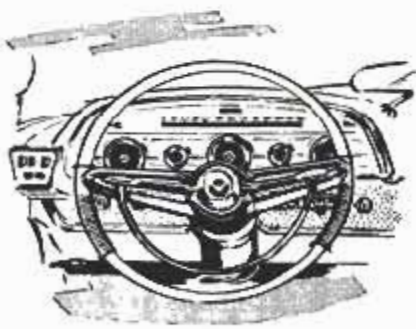
←Extra-cost items are swiveling front seats that make getting in and out easier. Center part folds down to be an armrest or up to act as seat back for third person



Latest aid for lazy drivers is→ the electronic mirror that dims itself when lights from a following car strike it. An electronic headlight dimmer is offered also



←No more levers to struggle with to operate the heater. You merely press a button and three vacuum motors (shown in color) open or close the vents and valves for you

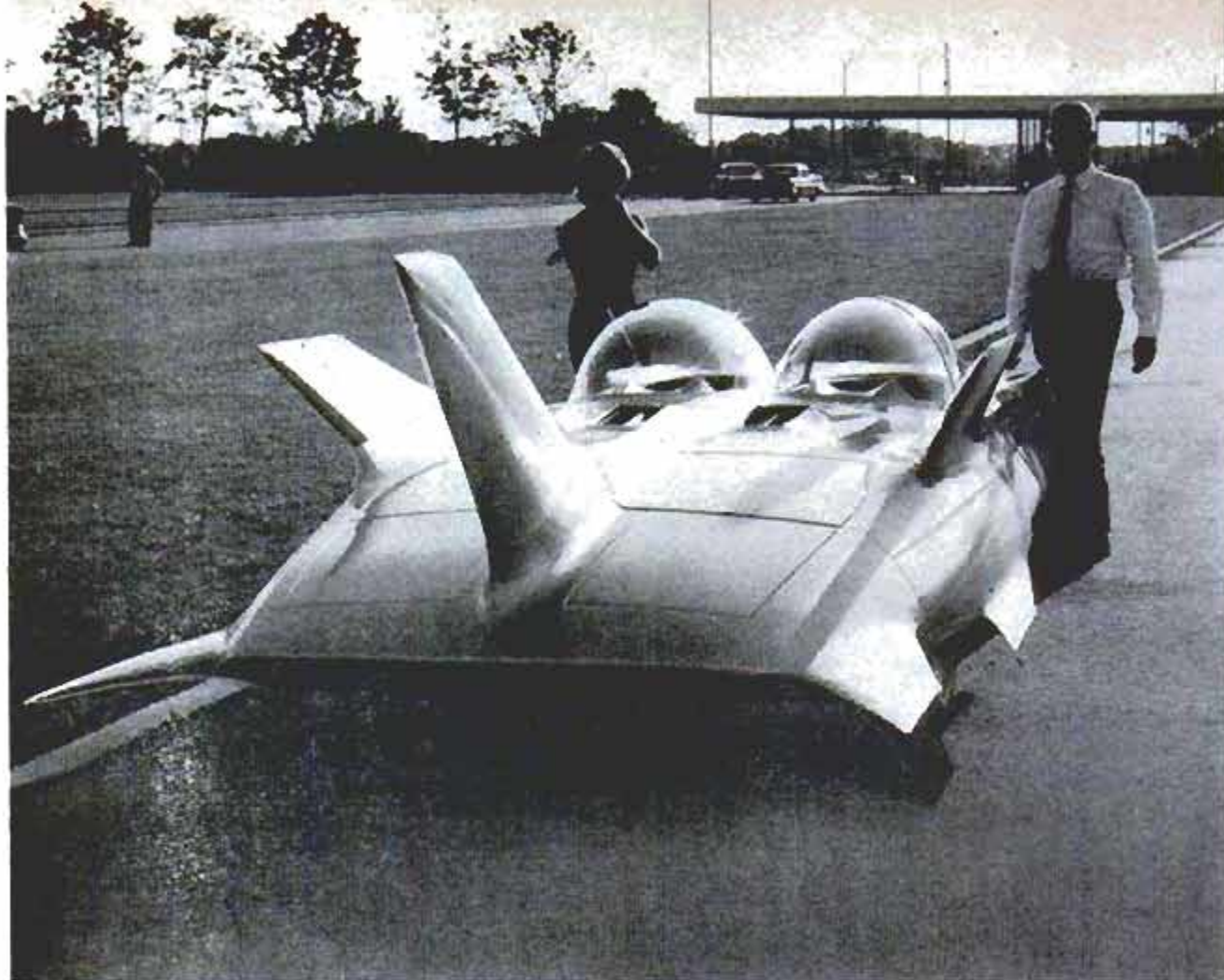


De Soto retains its push-button→ shift (at left) and continues its very legible dash. New horizontal speedometer has tricolor lighting to inform driver of speed levels

Not apparent, but explained in the sketch above, four-door hardtops have a sculptured roof for more room



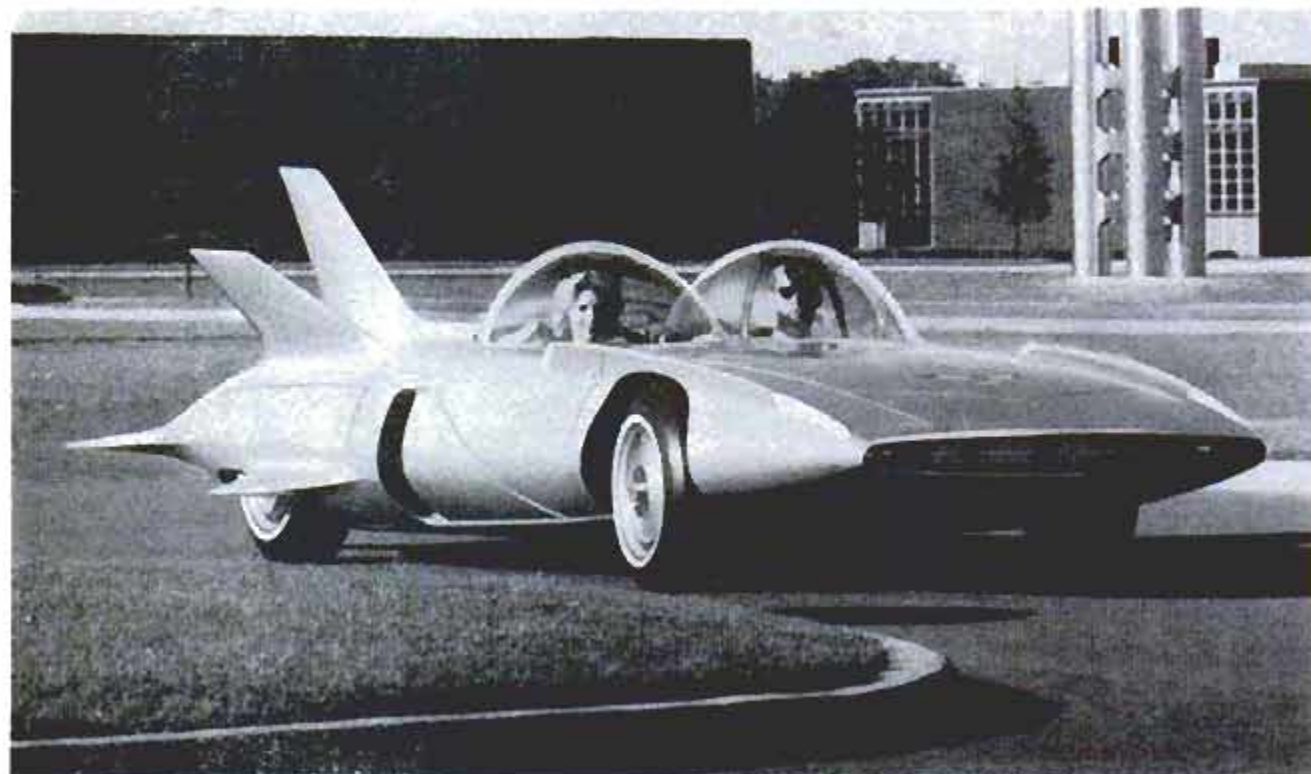




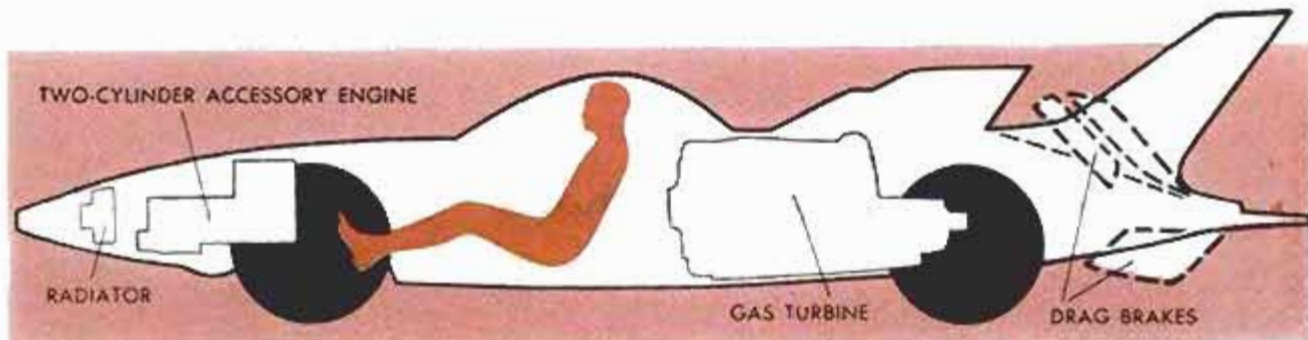
Seven tailfins provide stability at high speed. The "roof" is waist-high, about as low as a car can go

## ***Double Bubble "Firebird III"***

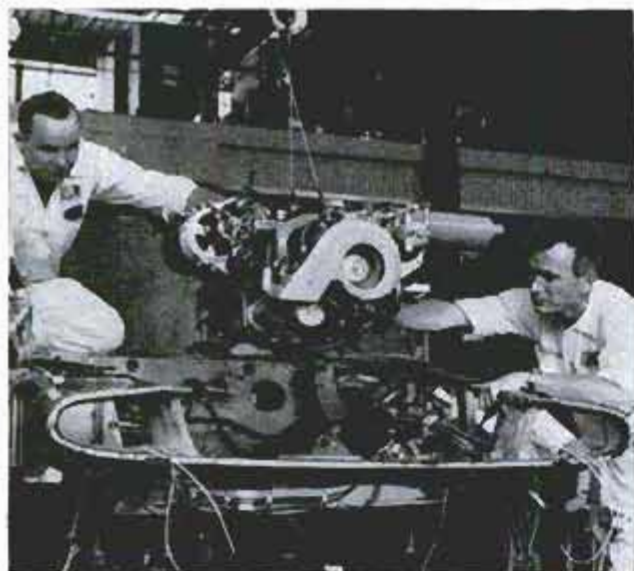
Each rider has his own private bubble. Air conditioning keeps the interior comfortable in any weather







Auxiliary engine is located in nose. Drag brakes open like clamshells to slow car down from high speeds



Lowering the 53-pound front engine into place. Made of aluminum, it's a flat, liquid-cooled, two-cylinder



Big gas-turbine engine mounts in the rear. Actually, this is simply the wooden mockup being tried for size

**YOU CAN'T BUY** the car shown here—it's not for sale. And if it were, its cost would floor you. It is General Motors' multimillion-dollar dream car, Firebird III, and it is about as automatic as a car can be and still have anything to do with people.

Electronic circuits (300 wires run through its central spine) enable the car to drive itself on guidance-equipped roads.

There is no steering wheel. A stubby control stick in the armrest between the two riders does everything: Pull back to go, push forward to stop, tilt right or left for turns. To back up, you twist the handle.

A two-inch movement of the stick equals

2½ turns of a conventional steering wheel. The steering ratio varies with the speed, so you maneuver rapidly in traffic, gradually and safely at high speeds, with the same stick travel. An auxiliary engine in front produces the necessary electricity and hydraulic power.

The car itself is powered by a regenerative gas turbine of 225 horsepower. It weighs under 600 pounds. Suspension is by air-oil springs, interconnected front and rear. Strictly a laboratory experiment, the car is the first designed around such space-age electronic wonders as transistors and computers. But it'll never sell—after all, it doesn't even have a trunk! ★★★

To get into the car, you blow an ultrasonic "key" when about 15 feet away and the doors open automatically







Biologist aims air gun at hindquarters of buck deer. Drug in dart will put a deer to sleep for half an hour

## CATCHING DEER WITH DARTS

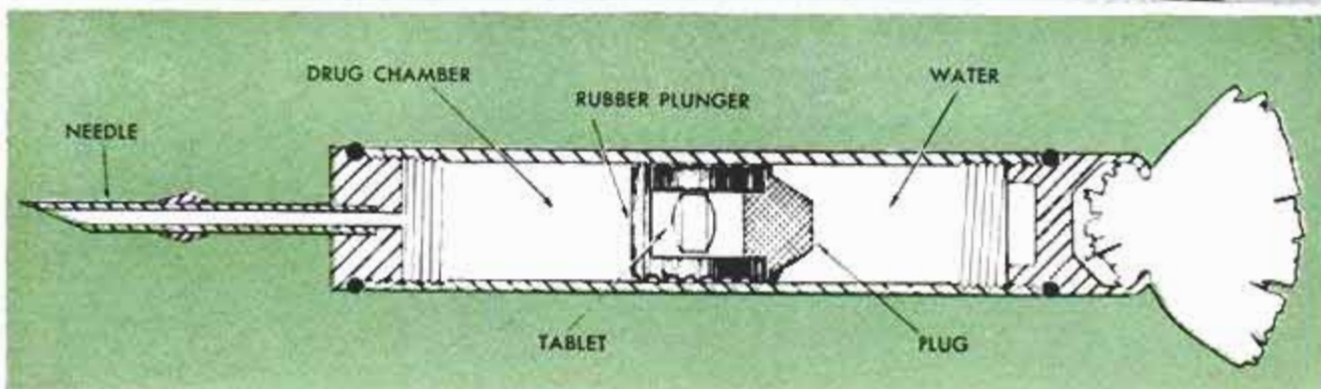
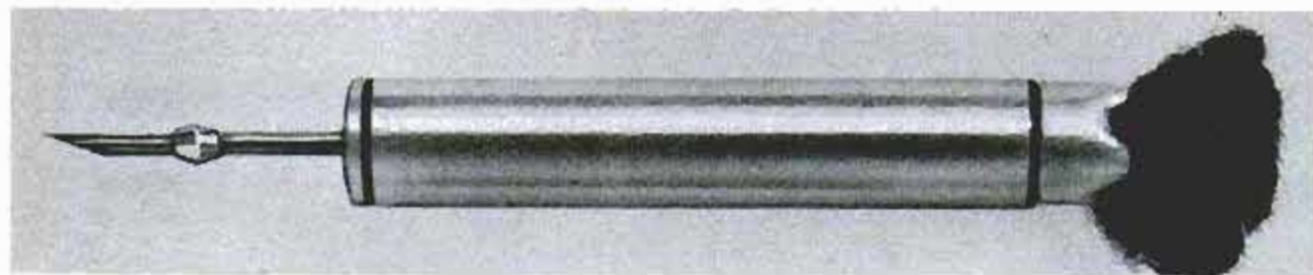
By Erwin A. Bauer

**T**HERE ALWAYS has been an urgent need for a safe and simple device to capture wildlife alive and unharmed. At times and in places, corralling and trapping have been successful, but many animals are too wary to be trapped economically. It wasn't until whitetail deer almost

reached plague proportions on an island off the Georgia coast that an effective technique finally was devised.

While deer were a nuisance on Ossabow Island, the Georgia Fish and Game Commission needed them to restock a region that lacked deer. A four-man team assigned

Close-up of a "flying syringe" used to put tranquilizer in animal's body. When syringe is shot from special gun, tablet dissolves in water, forming a gas which pushes plunger and forces nicotine through needle







While deer is dozing under drug influence, biologists check animal's age and put it in shipping crate

to the problem decided to try the South American Indian technique of hunting game with blowguns and poison darts, except that they would substitute drugged darts for poison darts.

They tested and eliminated many chemicals, including curare, the poison used by the South American Indians. Finally, they settled on a nicotine alkaloid that in small quantities would render animals temporarily unconscious. Experimenting first with goats and later with penned deer, they found that the animals would revive soon and showed no ill effects.

Drug darts are fired from air gun which has steel tubing barrel to fit darts



Completely immobilized, this deer is easy for game wardens to handle. The deer will wake up in a brand-new home miles away



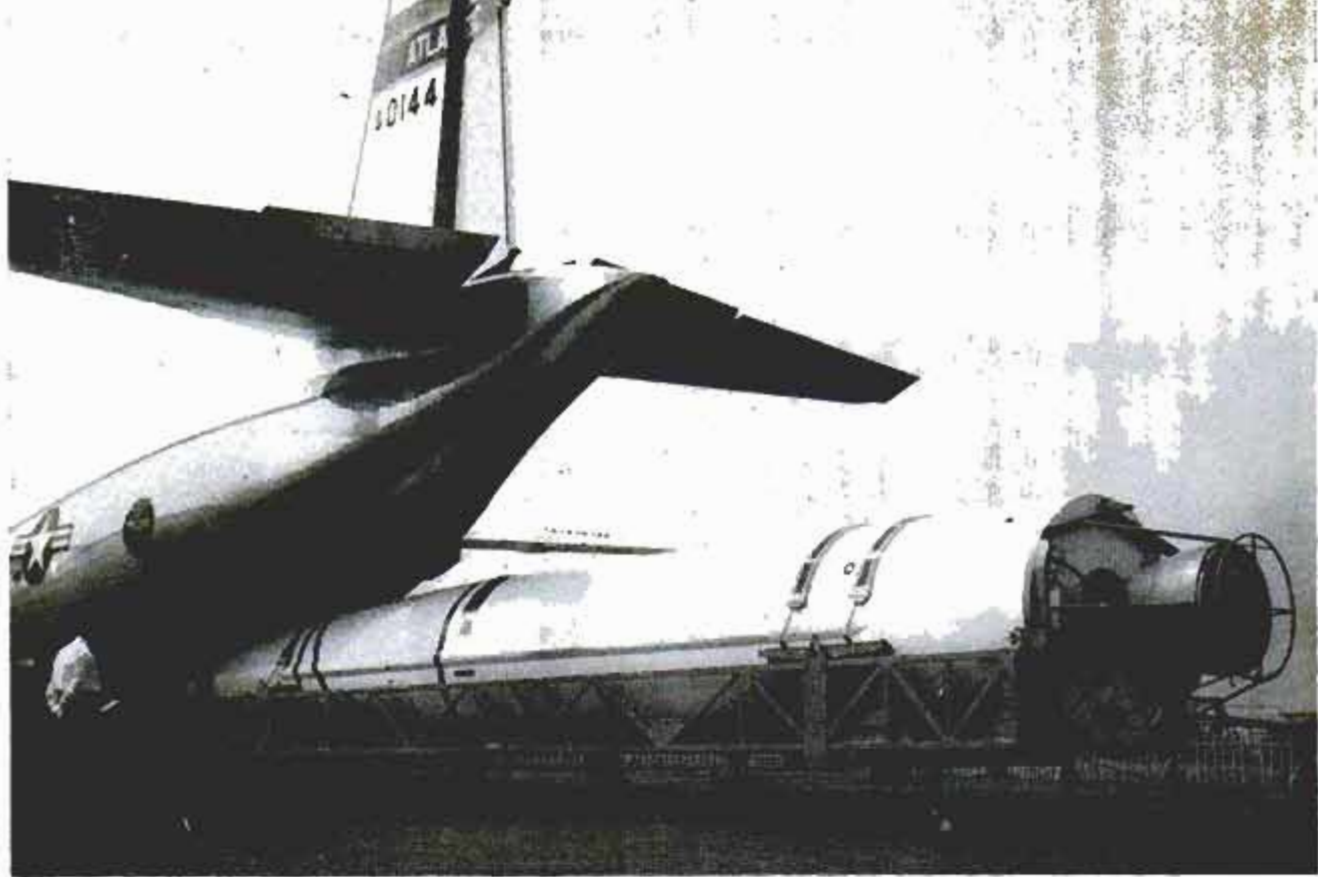
To deliver the drugs at long range, several models of converted air guns were substituted for blowguns. The guns were re-barreled with seamless steel tubing and fitted like factory barrels. The bolt stops were removed so the bolts could be taken out for loading darts from the rear. A few other minor changes were made and a shotgun scope was added for more accurate shooting in poor light.

So many types of darts have been designed that it's hard to find two alike. The first were made from low-carbon drill-bit shanks. Nearly all are coated with a luminous paint because much of the deer drug-ging is done after nightfall.

The idea is to plunk the deer in the hindquarters for the quickest, most positive results. With a typical 300-milligrams dose of nicotine, reaction begins within a few minutes. Initially the animal begins to twitch nervously, perhaps to jump and cavort. Then it sinks to the ground. About 30 minutes later the deer begins to revive. But in that interval, wildlife biologists are busy. They weigh the animal, determine its age, study its general condition, then load it aboard a vehicle for further study or transfer to another locality.

The deer-nicotine dart technique is now in wide use by conservation departments from New Hampshire to British Columbia. The information they obtain from "shooting" deer this way will contribute to healthy and vigorous deer herds and will permit the animals to be restocked in depleted areas. Eventually, biologists and game wardens may use the darts on elk, moose and other game. ★ ★ ★





## No Missile's Too Big for the Douglas Cargomaster to Handle

Ballistic missiles like the Thor IRBM, shown here, fit in Douglas C-133A Cargomasters as neatly as peanuts in a peanut shell. Capable of moving all missile systems and their supporting equipment to

any point in the world, the C-133A has a capacity of 21 tons. A new version, the C-133B, will be able to transport more than 26 tons over a distance of 4000 miles at an average speed of 320 miles per hour.



## Man "Walks" Helicopter With 50-Foot Leash

Now you can walk a helicopter as you walk a dog. An electronic device enables a man on the ground to lead a low-flying copter around on a 50-foot leash. The equipment takes over complete control from the pilot and responds to the tension and motion of the leash, or tether, which hangs down from the side of the cabin. Since a helicopter pilot's visibility is restricted directly beneath the plane, the new equipment is expected to have many military and civilian uses — particularly in hooking loads to the copter's cargo sling. The man on the ground can guide the plane while another loads cargo.

☐ Canada is the world's chief producer of nickel, the platinum metals and asbestos. It ranks second in gold, zinc, cadmium and selenium; third in silver, molybdenum and barite, and fourth in copper and lead.





Tachistoscope flashes row of numbers for fraction of a second, then observer writes down digits he saw

## *The Pentagon Attacks a National Ailment:* **We're "READING CRIPPLES"**

By William McGaffin

**T**HERE'S A LABORATORY in the Pentagon you might not expect to find there.

Officers of various ranks, ranging all the way up to general, come to the laboratory for special instruction in reading.

Each has assigned to him a little cubicle equipped with two mechanical devices. One, called a tachistoscope, is a slide projector with something added. This something is a camera-type shutter. Press the metal plunger, and the shutter flies open to allow a brief glimpse on a screen of a set of numbers.

The officers begin with slides containing five-digit numbers — 39867, for instance. They go on from there to six-digit, then seven-digit numbers, and from them to two-word, then three-word phrases.

They have only  $\frac{1}{100}$  second to read the numbers or phrases. Then they write them

down, take the slide out of the projector, and check to see if they got them right.

The other device in the cubicle is a reading pacer. It paces a person's reading with a bar of light. The light moves from top to bottom of the pages of a book as the officer reads. The speed is increased each day; the object is to keep ahead of the moving light.

The officers who come to this laboratory spend an hour a day for six weeks on a special course that has nothing to do with the usual business of the Pentagon—guns, planes, missiles, ships. The course has a powerful indirect bearing on our nation's defenses, however, for its aim is to make more efficient executives of the officers.

The officers taking this training have reached important rank, but they have a common failing. They are poor readers. Although they spend an average of four





Pattern of pauses and backtracks on film, at right, is traced by the light reflected from reader's eyes as he looks into the ophthalmograph, above

hours a day reading, they are not able to get through the mountain of papers that builds up on their desks daily. Some try to stay on top by packing half of it home at night in bulging briefcases. These victims of "briefcaseitis," as it is called, come back to work the next day groggy from lack of sleep.

Poor reading, however, is by no means an exclusive Pentagon ailment. It is a national ill. Former U. S. Senator William Benton has aptly called us a nation of "reading cripples."

But the astonishing thing about this national complaint is that so little has been done about it. Much help can be given with laboratories such as that in the Pentagon. It is known officially as a "reading improvement laboratory" and is conducted by the Air Force. Since it was opened in May 1949, upwards of 7000 officers—Air Force, Army and Navy—have had the benefit of its training.

#### Big Industry "Picks up the Ball"

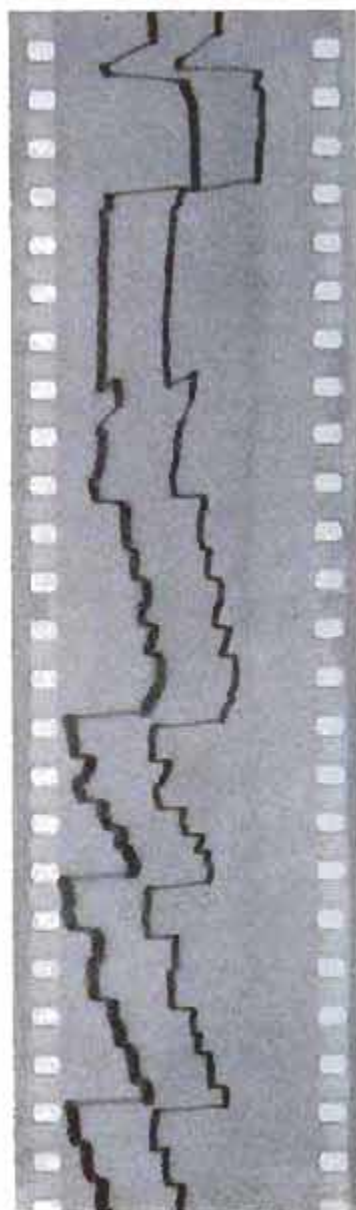
Reading-improvement courses are now offered in some of our schools. And some of our leading industrial firms — General Motors, General Electric and IBM, for instance — are running similar courses for their executives.

But nothing like a start has been made on curing this national ill. Air Force Captain Hugh R. Walker, the reading specialist who teaches this new science in the Pentagon laboratory which he heads, feels that most American adults read badly today because of grade-school training in which much of the reading was oral.

Most of us have not had any formal reading training since the sixth or seventh grade. We are still reading at that level —and, as a result, we are "word for word" readers.

The effectiveness of the Pentagon reading course is something I can vouch for personally. I took the course recently.

I have been a slow reader all my life. But after six weeks







Reading pacer projects a band of light which moves from top to bottom of the page the officer is reading

of training my reading rate had nearly doubled, from 364 to 708 words per minute. At the same time my comprehension of what I was reading went up from 80 to 90 percent.

"One of our biggest problems," says Walker, "is getting people to understand that they will have better comprehension if they read faster."

He explains that if we are feeding the brain at only half its capacity to receive, the mind tends to wander. But if we are feeding it as fast as it can receive, its whole focus is on what it is reading. "The result

of this is better concentration, and better comprehension."

Walker, however, objects to the term "speed-up reading." He says, "The stress we try to give is not on reading speed but on improved comprehension as a result of reading faster."

On the average, the officers who take the course double their speed from 275 to 550 words per minute, Walker says, and increase their comprehension from 70 to 80 percent.

They are not able to hang on to the full

(Continued to page 252)

### WHAT YOU CAN DO TO IMPROVE YOUR READING

Here are some suggestions from Capt. Hugh R. Walker, chief of the Air Force reading improvement laboratory:

1. Practice for 15 or 20 minutes a day reading a light novel at an uncomfortable rate of speed. By reading at a rate that is not comfortable, you can be sure you are reading faster than usual.

2. Do this five days a week for a month and try to increase your speed each day.

3. Keep track of your progress by making a simple chart showing the number of words per minute you achieve on each reading.

4. Divide the number of words you have read by the 15 or 20 minutes you have spent reading to get your words-per-minute rate.

5. Have a member of your family check your comprehension by asking you questions about what you have read.

6. Try to increase your eye span by doing the following:

Get someone to write down a list of 20 two-word phrases culled from a magazine or newspaper you haven't read. The phrases should be written in a column, one under the other.

Cover all 20 phrases with a piece of cardboard. Then move the cardboard down so you get a brief glimpse of the first phrase on the list. Move it back up quickly so the phrase is covered and write down what you think you saw. Then uncover the phrase again to see if you wrote it down correctly.

Do this, phrase by phrase, until you have finished with all 20 on your list.

Use a different list of 20 two-word phrases each day for two weeks. For the following two weeks work on lists of 20 three-word phrases.

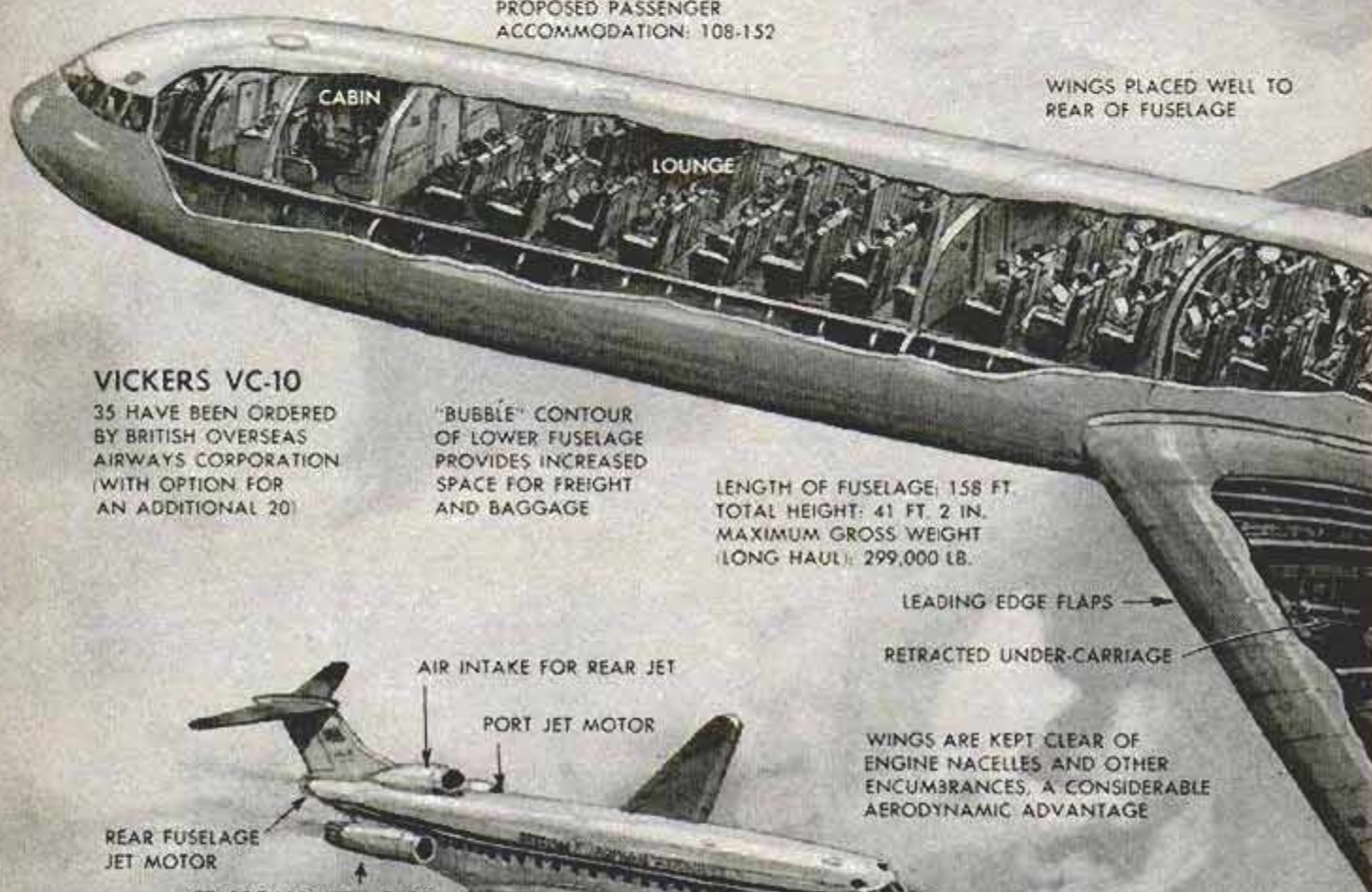


CROSS SECTION OF VC-10



# BRITAIN BUILDS A REAR-ENGINE

PROPOSED PASSENGER ACCOMMODATION: 108-152



CABIN

LOUNGE

WINGS PLACED WELL TO REAR OF FUSELAGE

## VICKERS VC-10

35 HAVE BEEN ORDERED BY BRITISH OVERSEAS AIRWAYS CORPORATION (WITH OPTION FOR AN ADDITIONAL 20)

"BUBBLE" CONTOUR OF LOWER FUSELAGE PROVIDES INCREASED SPACE FOR FREIGHT AND BAGGAGE

LENGTH OF FUSELAGE: 158 FT.  
TOTAL HEIGHT: 41 FT. 2 IN.  
MAXIMUM GROSS WEIGHT (LONG HAUL): 299,000 LB.

LEADING EDGE FLAPS

RETRACTED UNDER-CARRIAGE



AIR INTAKE FOR REAR JET

PORT JET MOTOR

REAR FUSELAGE JET MOTOR

STARBOARD JET MOTOR

WINGS ARE KEPT CLEAR OF ENGINE NACELLES AND OTHER ENCUMBRANCES, A CONSIDERABLE AERODYNAMIC ADVANTAGE

## DE HAVILLAND DH 121

ORDERED BY BRITISH EUROPEAN AIRWAYS FOR SHORT HAUL SERVICES. MAXIMUM PASSENGER ACCOMMODATION 100. SPEED IN EXCESS OF 600 M.P.H.

THE VC-10 IS TO BE USED MAINLY ON AFRICAN AND EASTERN FLIGHTS OF THE B.O.A.C. THE ABSENCE OF WING ENGINES ALLOWS MAXIMUM SPACE FOR LANDING AND TAKE-OFF SURFACES, ENABLING THESE FAST AIRCRAFT TO USE THE HIGH-ALTITUDE AIRFIELDS SITUATED IN TROPICAL CLIMATES.



THOUGH THE VC-10 IS DESIGNED FOR SPEEDS IN EXCESS OF 600 M.P.H., THE AERODYNAMIC ADVANTAGES GAINED FROM REMOVING THE ENGINES FROM THE WINGS WILL FACILITATE TAKE-OFF AND LANDING ON "HIGH AND HOT" AIRFIELDS

TAKE-OFF

LANDING RUN: 400 FT.



# JET LINER

WINGS SWEEPED BACK  
APPROXIMATELY 40 DEGREES



FRENCH AIRLINER "CARAVELLE,"  
WITH REAR-MOUNTED JET MOTORS  
(NOW IN PRODUCTION)

SPAN 140 FT.

HIGH VARIABLE-  
INCIDENCE TAIL-PLANE

STOWED LIFE RAFT

FUEL  
TANK

PORT SIDE TWIN ROLLS-ROYCE  
CONWAY JET MOTORS, EACH  
GIVING APPROXIMATELY 20,000 LB.  
STATIC THRUST AT TAKE-OFF.  
NOISE SUPPRESSORS FITTED ON ALL  
ENGINES. THRUST REVERSERS ALSO USED

TWO JETS MOUNTED  
ON STUB WINGS TO  
PORT AND STARBOARD  
(AFTERBURNERS WILL  
BE FITTED FOR TRANS-  
ATLANTIC RUN).  
PLACING OF ENGINES  
NEAR TAIL AIDS  
PASSENGER COMFORT  
BY DECREASING NOISE

SPOILERS

G. HAVIS  
1958

← RUNWAY: 10,000 FT. →

NAIROBI

TROPICAL  
CLIMATE

↑  
HEIGHT  
ABOVE  
SEA LEVEL:  
5327 FT.  
↓

THE NEW EMBAKASI AIRFIELD,  
NAIROBI (KENYA, EAST AFRICA),  
IS DESIGNED FOR USE BY FAST,  
MODERN AIRLINERS AND AN ANNUAL  
TRAFFIC FLOW OF 30,000 PASSENGERS



10,000-FT. RUNWAY  
(AN ADDITIONAL RUNWAY  
MAY BE LAID DOWN LATER  
IF TRAFFIC DEMANDS IT)

LIGHTS







### Lubricant Resists Radiation

Fluids that are resistant to radiation, composed of benzene and oxygen, have been developed as possible lubricants for the Air Force. The fluids (polyphenyl ethers) reportedly are two to five times more stable under nuclear radiation than previously known organic lubricants. Further tests are planned in full-scale equipment and under conditions of intense nuclear radiation.

### Tripod Uses Three Rubber Suction Cups to Hold Camera Securely

Photographers can now carry a "tripod" in their coat pockets. The tripod consists of three rubber suction cups attached to a triangular metal base that carries the tripod head. Lightweight, it uses aluminum for its metal parts. Total weight is seven

## Camera Support Clips to Belt

Film waste from camera movement can be reduced with the help of a Belt-Pod that clips to the photographer's belt. Additional support is provided by an attached neck strap. These features also leave the hands free for using a light meter or to set the aperture and shutter speed. The unit weighs less than seven ounces.

### Light Concrete From Sugar Cane

Bagasse concrete, using sugar-cane fiber as the aggregate, reportedly can be molded, cast, reinforced, colored, machined or rolled into wallboard.

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**PUT UP OR SHUT UP!** That's what critics of the auto industry may have to do shortly.

A real "sleeper" is developing in Indiana. And this sleeper (the 1959 Studebaker) could prove whether there is any substance to the claims that cars are too big, too high-styled, too space-shippish.

The new Studebaker is a practical, neat, good-looking (some will call it "cute") automobile that must be seen to be believed. It looks like a completely new car (it isn't, of course, although much of its exterior sheet metal is new). It drives and handles better than any car Studebaker ever built.

Details are still confidential, but some facts can be printed without breaking any confidences. The car has a 108.5-inch wheelbase and is 175 inches long, making it three inches shorter than the Rambler American and only 15 inches longer than the Volkswagen.

Yet it has a full-size interior by American standards, will seat six in reasonable comfort, has adequate luggage space and can be bought in a four-door model, plus several two-door models including a station wagon.

Styled with virtually no overhang, it is as maneuverable as a sports car. Simple in design, tastefully trimmed both inside and out, it still has plenty of performance. It will come with either a six or V8 engine, both designed for economy.

**It will beat the GM and Ford small cars to the marketplace by at least a full year and this lead may be enough to bring Studebaker back to its former position.**

The amazing thing is that Studebaker could change so much (both in looks and performance) while changing so little—and could do it in such a short time. It apparently moved right from the clay into the prototype stage to gain months of lead time.

#### **Six Not Dead Yet**

One design that has been counted out several times and yet keeps coming back is the six-cylinder engine. Two years ago, it was virtually given up. Now designers are burning the midnight oil to bring these engines up-to-date. GM is expected to offer a new six in 1960. Ford is redesigning its six. One of them may go to a seven-bearing crankshaft.

If a fraction of the effort that has gone into the V8 development had gone into the six, it would be suitable for virtually all our cars today, say some engineers.

When the new GM and Ford small cars come out, they will have six-cylinder engines. The problem is to make a six small enough for these economy cars yet adapt-



**By Art Railton**

able enough to be used in the regular line. Some say this can be done, others say the gap is too great.

How new is an all-new body? With the trend toward interchangeability of parts, a body can look all new and yet be about 90 percent retained from previous years.

In a complete body line, there are about 350 body stampings for each make of car, ranging from the tremendous roof panels to small braces and hangers that are numerous but invisible. To make the car look completely new (and therefore to be able to claim it is all new) a manufacturer only has to change about 10 percent of those stampings, roughly 30 or 40 of them. By doing that it has changed all you can see while the 300 pieces under the skin are retained.

#### **Advantage of Interchangeability**

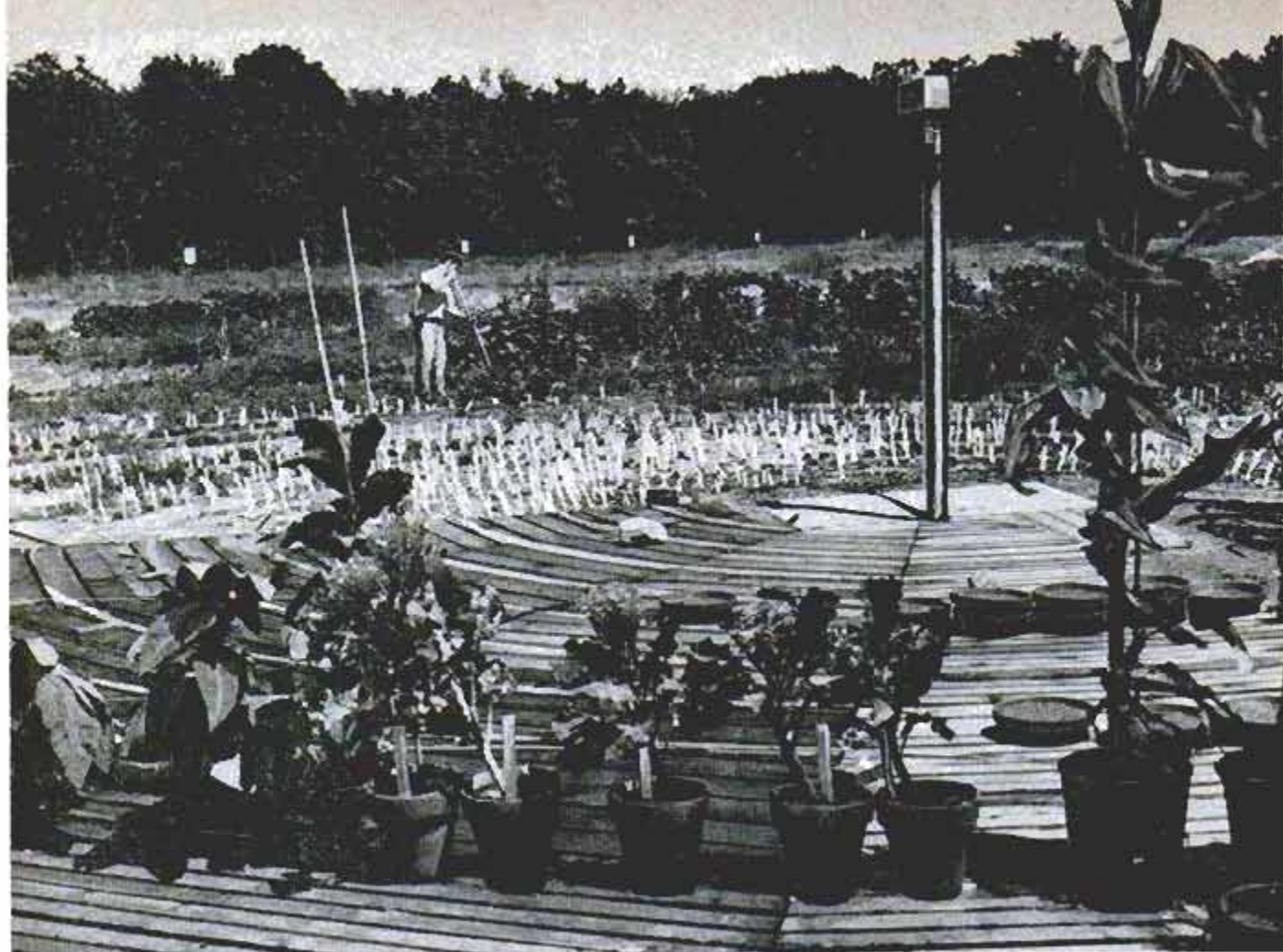
This points up the advantage of interchangeable parts. If you can't see the 300 hidden parts, it makes no difference to you that your expensive car has the same braces, pillars and other structural members as your neighbor's cheaper car. So a big company can use the same stampings across the board and save money—lots and lots of money.

Ford still builds three separate body shells. How long can it keep this up in the competitive auto business? Which way will it go when it moves toward greater interchangeability, as it must to continue to compete? Toward Lincoln's unit construction or away from it? It seems unlikely that Ford will continue both systems indefinitely. Bets are that it will adopt the unit body for all lines.

Chrysler, too, is said to be switching to unit bodies (1960?). GM is the big holdout, but it's moving in that direction even while retaining the frame-body setup. Rocker panels are being built up as are other body parts to become structural members. The two parts, body and frame, are being designed more as a unit, paving the way for an evolutionary changeover.



Reprinted in Readers Digest, Oct. 53



When cobalt slug is hoisted inside pipe at right, this field becomes saturated with potent gamma rays

## The New Age of "ATOMIC CROPS"

By Harland Manchester 50 Commerce St, N.Y. 14

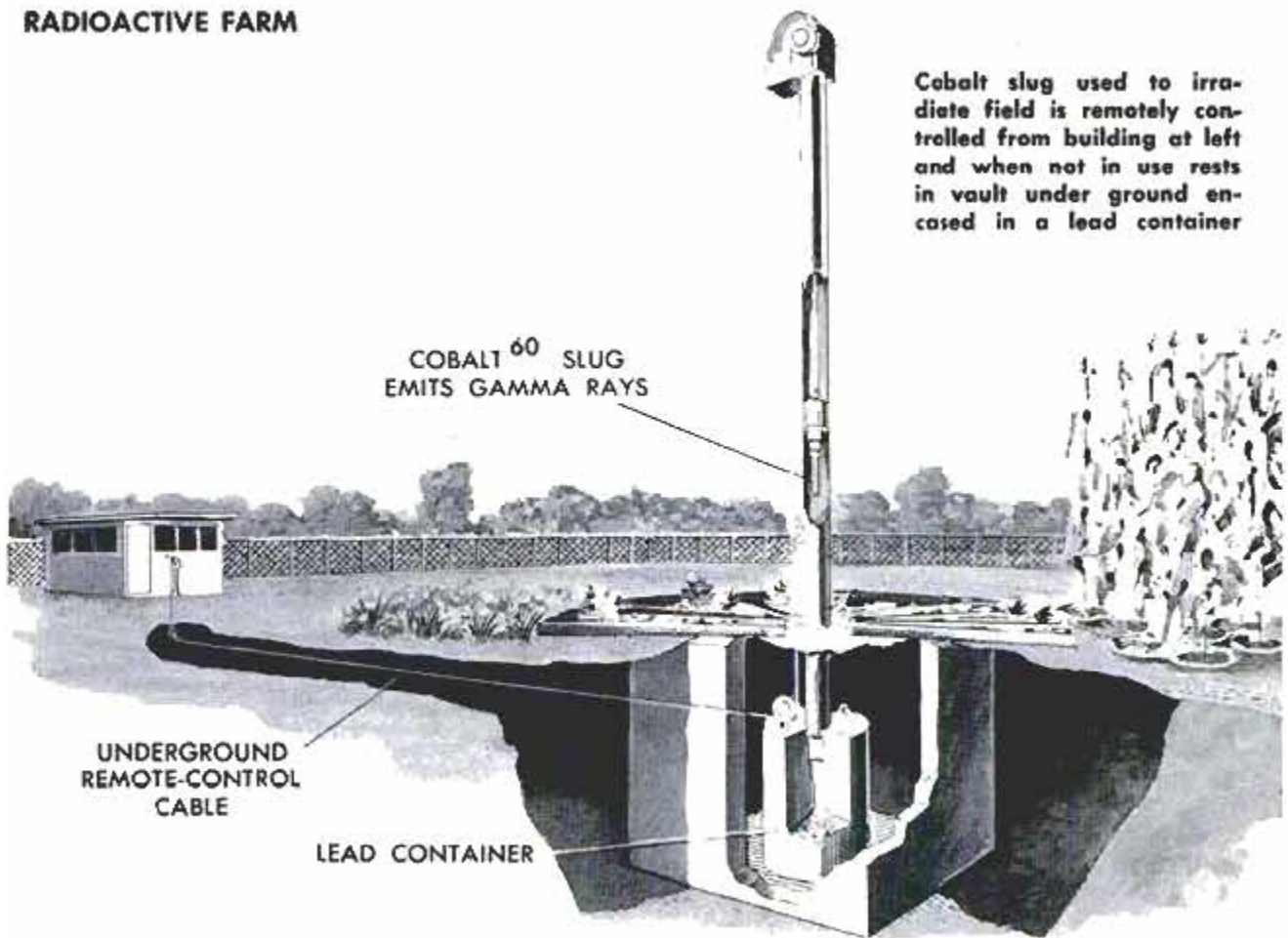
AS WE ENTERED A GATE bristling with warning signs on the grounds of the Brookhaven National Laboratory on Long Island, Dr. Seymour Shapiro, one of a group of scientists which runs the world's first radioactive farm, selected his personal padlock from a rack, locked up a control rod in the guardhouse and put the key in his pocket.

"That's to make sure no one turns on the gamma rays while we're inside," he explained. "That wouldn't do us any good." In the center of the remote 10-acre tract, lowered safely into an underground steel cylinder, was a slug of "hot" cobalt. Its penetrating rays are creating hundreds of new mutations in a search for bigger, better or healthier plants which the world's farmers have dreamed of for centuries. Growing in pie-shaped segments of the circular field are plants of many varieties set in labeled rows—fruit trees, berry

bushes, grape vines, ornamental shrubs, flowers, corn, oats and barley—which have been sent to Brookhaven by about 170 experiment stations and breeders in the United States and abroad.

When the cobalt slug, which is "hotter" than all the radium in the country combined—is lifted from the ground by a remotely controlled cable, it bombards the plantation with gamma rays—similar to X rays. This field is one unit in a worldwide movement among plant geneticists to speed up and control the slow, erratic processes of natural evolution by means of the new tools of the atomic age. Since it was opened nine years ago, other gamma fields have been set up in Virginia, Florida, Wales, Sweden, Norway, Russia and Costa Rica; others are under way in Italy, India and Argentina. At Brookhaven and elsewhere, seeds are also bombarded with neutrons in atomic reactors, or penetrated by





Cobalt slug used to irradiate field is remotely controlled from building at left and when not in use rests in vault under ground encased in a lead container

COBALT <sup>60</sup> SLUG  
EMITS GAMMA RAYS

UNDERGROUND  
REMOTE-CONTROL  
CABLE

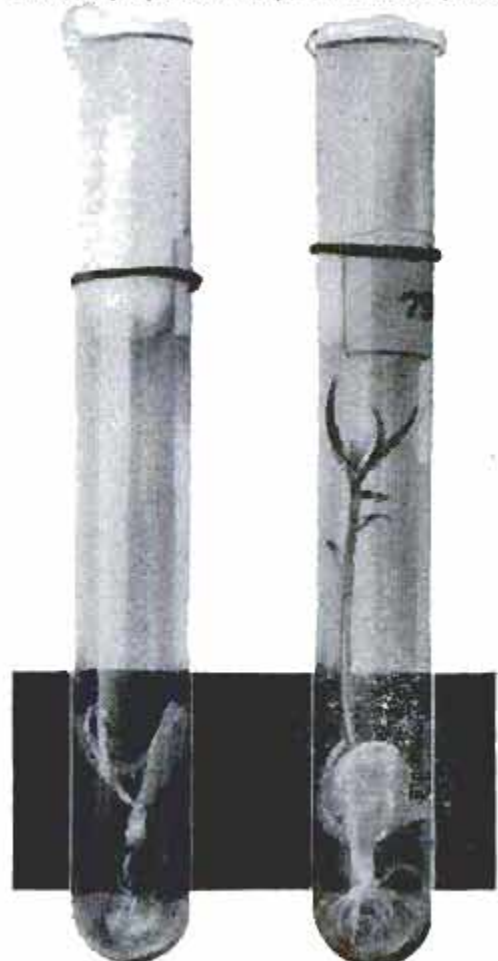
LEAD CONTAINER

X rays, with similar results. Most such changes are harmful and the plants are sacrificed, but a few mutations result in superior strains which Nature, unaided, might not bring forth for millions of years.

To fill in the background, mutations, or "biological sports," have always been occurring now and then in plants and animals. They take place when the impact of some outside force — cosmic rays, earth radiation, ultraviolet rays, extreme heat or cold or certain chemicals—break up and rearrange the tiny ribbonlike chromosomes which are the organism's blueprints for its offspring. Many of these mutations are lethal, preventing the birth of live progeny; others result in dwarfs, monsters and weaklings whose descendants are doomed in the battle for survival and soon disappear; many others, apparently normal, are afflicted with hidden weaknesses which will always handicap their line. In fact, geneticists estimate that not more than one mutation in many thousands brings about an improvement in the progeny. This lucky long shot, however, may be so superior that it takes over from its backward ancestors and crowds them out of the picture. Wasteful and haphazard, this is Nature's method of improving her livestock.

There are many cases of new and desirable strains arising naturally from this continuous shotgun bombardment of all life. In the spring of 1914, Lloyd Stark of Stark Brothers Nurseries, eminent fruit tree growers, opened a box of apples, bit into one and discovered a luscious new taste. The box came from Odessa, W. Va. A representative of the nurseries went there and was shown a hillside tree bearing the apples. Stark Brothers paid \$5000 for exclusive rights to cut scions from the tree, and from this

Sprouting peach seed at right shows effect of radiation compared with the normal growth of nonradiated seed, left  
New Jersey Agricultural Experiment Station photo







Department of Agriculture, North Carolina State College

Each tag in this field of irradiated peanuts represents a mutant plant or sport. Most of them are freaks

spontaneous mutation came the Golden Delicious apple. Many other popular fruit varieties originated in the same manner. Pink dogwood was another chance mutation, and Justin Morgan, sire of the famous breed of horses, is believed to have received his merits from a similar bolt of biological lightning. But the discovery of nature's random gifts depends on sheer luck, and for every known desirable mutation, millions more are "born to blush unseen" in remote fields and forests.

Now the scientists at Brookhaven and a dozen other breeding centers have sped up Nature's program in two ways: They have greatly accelerated the natural mutation rate, for the powerful manmade radiations kick hundreds of times as many mutations out of the plants as would occur normally, and they have collected large numbers of live specimens in laboratory "showcases" where trained observers can spot superior offspring as fast as they are born. Says Pres. Lloyd V. Berkner of Associated Universities, Inc., which operates Brookhaven, "It is as though, for evolutionary purposes, we had collapsed a thousand years into one."

Trees and shrubs near the center of this weird plantation, where the radiation is strongest, are twisted and gnarled as in a landscape by a mad painter, and the farther you walk from the hidden cobalt slug, the more normal the plants appear. In the center is a platform for "portable" crops—

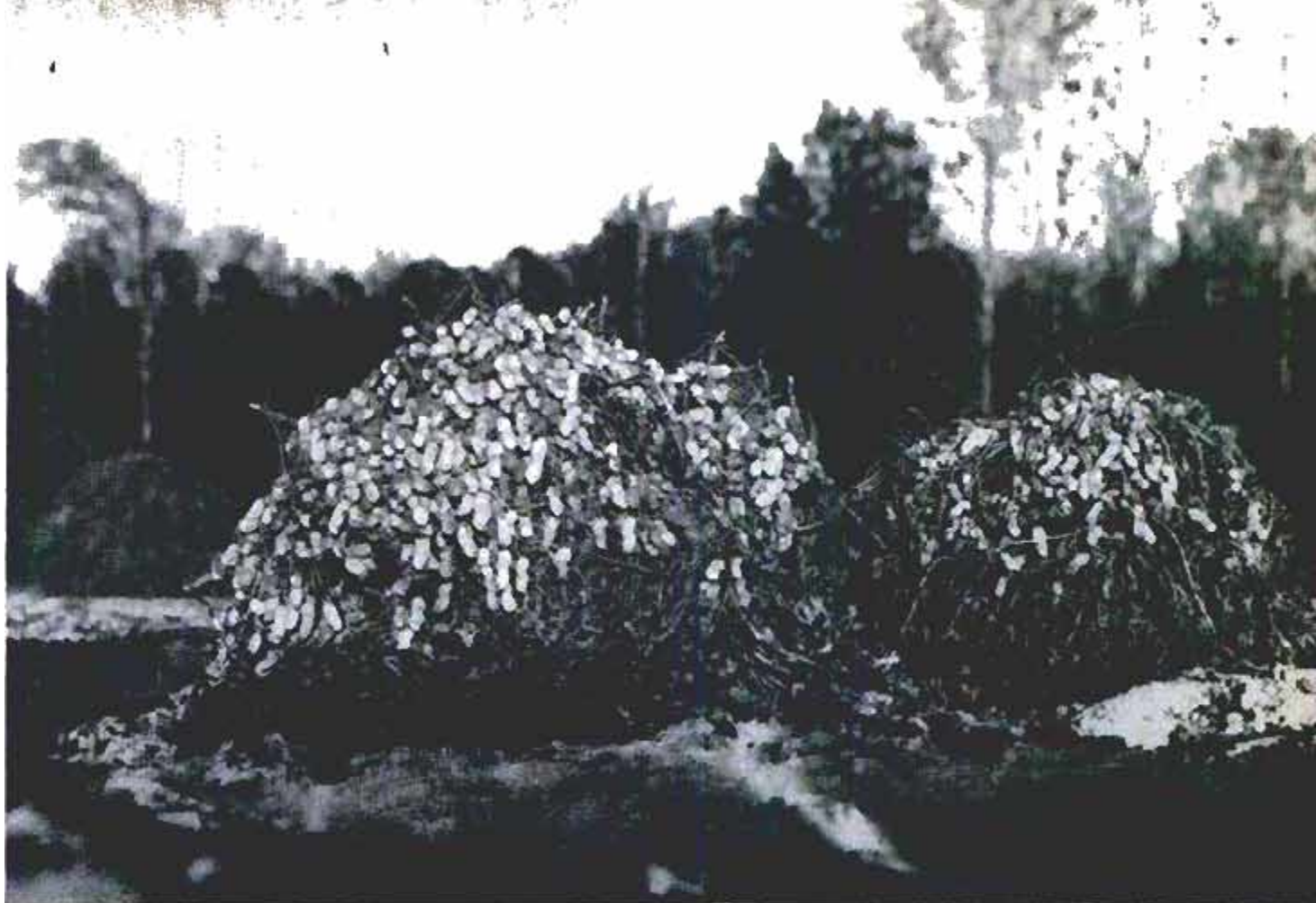
plants set in pots to receive short, strong doses of gamma rays. Corn plants thus exposed briefly during a sensitive period of growth produced 300 times as many mutations as would occur normally, giving breeders a rich variety of new strains to investigate.

Among the most promising offspring of the Brookhaven gamma field are some new peach trees selected by Dr. L. F. Hough of the New Jersey Agricultural Experiment Station at New Brunswick. Five years ago he sent 110 trees to Brookhaven, where they were set out and irradiated. After one full growing season they were moved out of the gamma field. Several branches put forth recognizable sports. He now has some trees on which the fruit ripens nine days earlier than usual, and others on which fruit ripens three weeks later than usual. Since most peaches in a given area now ripen all at once, this staggered ripening may cut losses from market gluts. Dr. Hough also believes that it is a reasonable goal to put New Jersey peaches on the market in June instead of mid-July, when they are now ready.

The gamma rays also altered a branch of a freestone peach tree so that clingstone peaches grew on it. Baby-food producers prefer the clingstone variety, and this technique may some day be useful to growers.

In another experiment, Dr. Hough sent some peach seeds to Brookhaven which were lowered into the reactor and bom-





With radiation, scientists produced heavy-yielding mutant peanut in stack at left; normal peanut, right

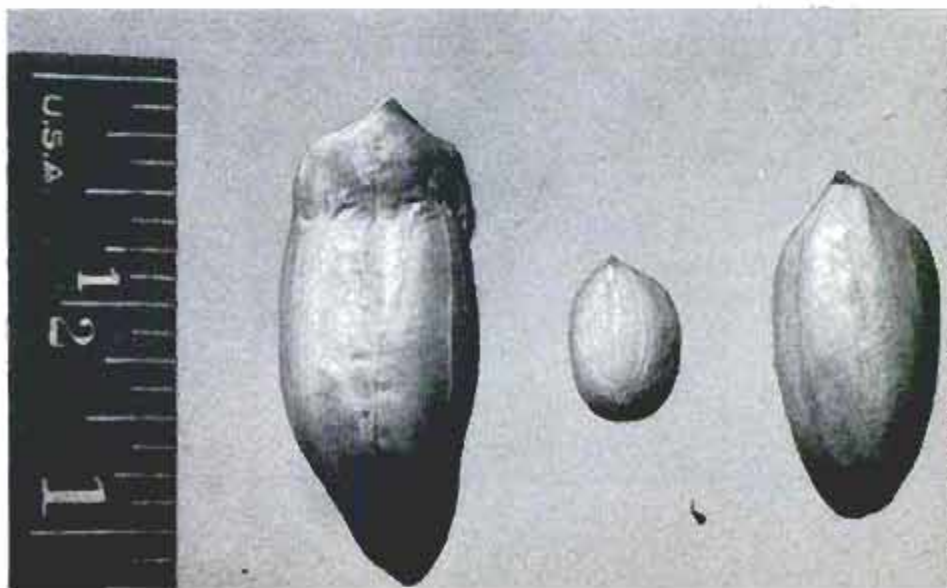
barded with neutrons, then allowed to germinate in the laboratory at New Brunswick. The results were striking. Ten days after irradiation, the seeds had grown shoots several inches long, while untreated seeds had barely started to germinate. Dr. Hough has also irradiated strawberry and blueberry plants, cherry pollen and nectarine seeds in his search for useful biological sports. He has recently developed some late-flowering strawberries, and this season will indicate whether the berries themselves will also ripen late.

Flowers were among the first plants to be rebuilt by radiation. Three years ago at the International Conference on the Peaceful Uses of Atomic Energy at Geneva, visitors to the United States exhibit marveled at a White Sim carnation from which the red streak in the center had been erased to produce a pure-white bloom. This flower has been bred independently at Brookhaven by both Dr. Ralph W. Singleton and Prof. Gustav Mehlquist of the University of Connecticut. Radiation has also sired two appealing new

calendulas, the work of Prof. Ernest Babcock at the University of California. Among the long-term projects are the irradiation of young pine and spruce from the Massachusetts Agricultural Experiment Station, in a quest for mutations that will make timber faster, and the treatment of sugar maple saplings from the University of Vermont, in a search for strains that will grow considerably faster and that will yield sweeter sap.

The cobalt cylinder, which in its stainless-steel jacket is 18 inches long and 2 inches in diameter, beams forth its powerful rays from March to October, and is

Mutants can be large or small. Type of peanut at right produced the big 1¼-inch jumbo at left as well as the miniature mutant in the center







Brookhaven National Laboratory photo

Scientist at work on atom farm has no fear of being irradiated. Each has a key to lock up cobalt slug

returned to the Brookhaven reactor every fall to be recharged during the winter. For a few hours every day it is lowered into its underground lead shield so that scientists and gardeners can safely work in the field. Each man locks the control rod in the guardhouse with his own padlock as he enters, so the cobalt slug must stay caged until the last man has left and removed his lock. Once, Dr. Shapiro recalls, the cable by which the slug is raised and lowered from the safe distance of the guardhouse got snarled with the ray-emitting slug above ground, and no one could enter. Fortunately there was an expert rifleman in the Brookhaven machine shop, and he severed the cable with an armor-piercing bullet so that the slug fell into its cage.

Because of the time needed for testing and proving and for growing a supply of seed for distribution, it may take 10 years from the season of irradiation for a desirable new strain to enter the market, but this is no longer than it takes to bring a new plastic or improved automobile part to the public.

One of the greatest boons to agriculture would be cereal plants resistant to fungus blights, which in the United States alone exact an annual toll of hundreds of millions of dollars. In half a dozen universities geneticists have been irradiating oats, wheat and barley, obtaining strains resistant to various fungus pests. Plant scientists are excited by the complicated pioneer experi-

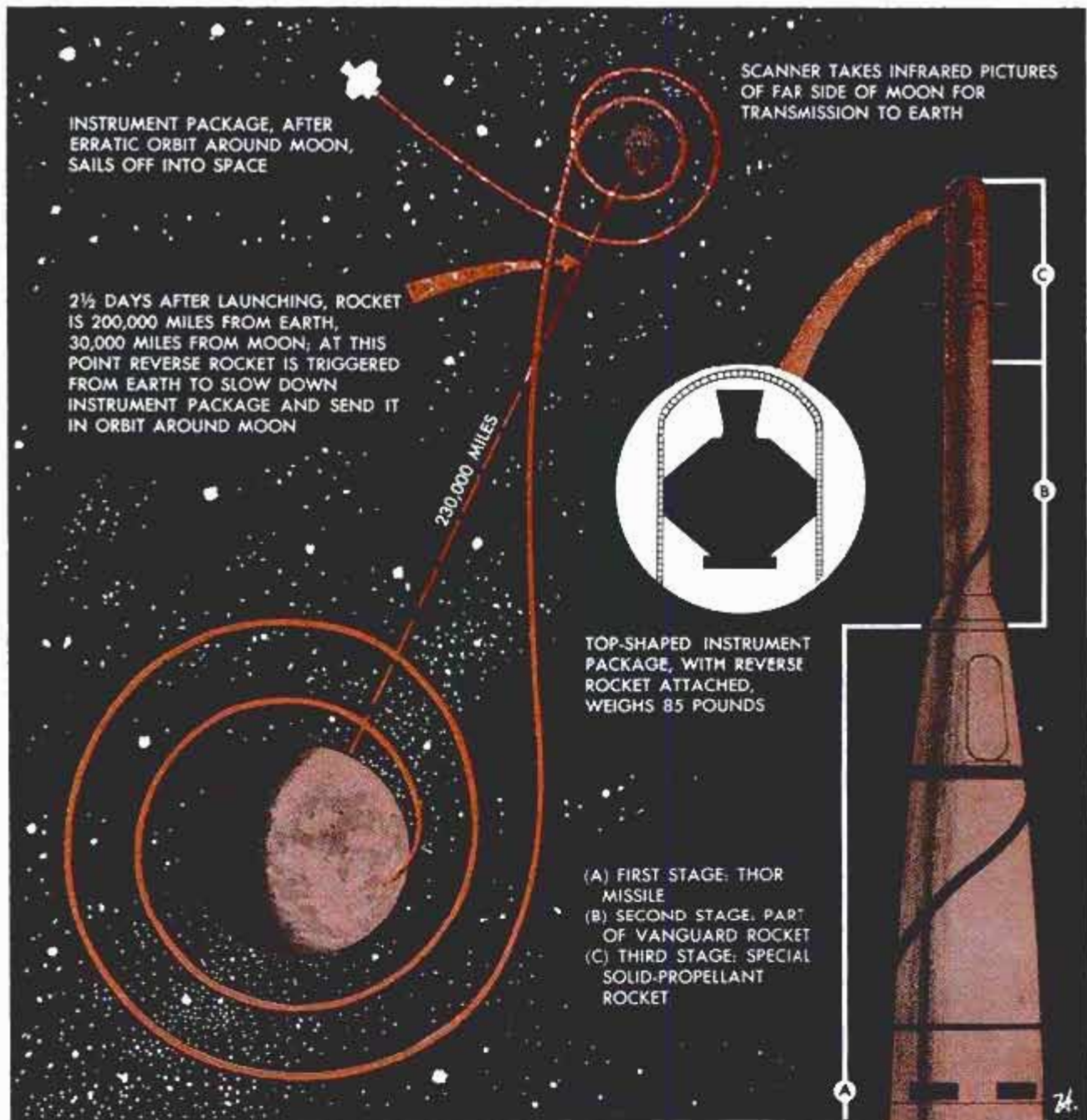
ment of Dr. E. R. Sears of the U. S. Department of Agriculture, who has used radiation to borrow a fungus-fighting feature in grass and breed it into wheat. For several years he had been trying to produce wheat resistant to leaf rust by conventional cross-breeding with a wild grass from the Mediterranean area which is immune to the disease. He grew some rust-resistant hybrids, but their yield was poor and they inherited other bad traits from the grass. So he treated these plants with massive doses of X rays and used the pollen to fertilize normal wheat plants which he had emasculated. When he planted the seed and inoculated the growing plants with the rust, some resisted the disease. They had borrowed only the one desired trait from the wild father, had kept all the good qualities of the domesticated mother, and bred true. Examination of the cells showed that radiation had served as a superfine scalpel, snipping off the tiny bit of chromosome in the grass that fought rust, and swapping it, accurately and delicately, for a bit of chromosome the mother could spare. Nature may possibly get around to the same job in a few million years, but the chances are no one will know about it.

Other scientists, among them Dr. Erwin Schwinghamer of Brookhaven and Dr. E. C. Stakman of the University of Minnesota, point out that even if we breed plants that resist today's pests, Nature has a way of trotting out new menaces for tomorrow. So Dr. Schwinghamer has been bombarding plant fungi to learn in advance what some of the nastiest weapons in the old girl's secret arsenal are and how they are created. "If we learn how many of these virulent races can be produced," says Dr. Stakman, "we may be able to discover what pests are in store for us 25 years from now, and prepare to combat them."

The striking success of Dr. Walton C. Gregory of the North Carolina State College of Agriculture in rebuilding the peanut by radiation has been hailed by plant geneticists throughout the world. Dr. Gregory, who has had long experience in breeding new types of peanuts by conventional methods, found progress slow. "The peanut is a very conservative plant," he told me. "It doesn't like change and the natural mutation rate is extremely small. Corn, dogs or men vary so much that they make peanuts look like a sea of uniformity." So nine years ago he sent several sacks of selected seed goobers to Oak Ridge and had their chromosomes messed up with doses of X rays and gamma rays. When he planted them, their offspring showed a wild variety of changes. In one

(Continued to page 282)





## Moon Shot—Biggest Step to Outer Space

MAN IS TAKING his biggest step toward outer space. If current efforts to launch a "lunar probe" are successful, it will mean that rocket scientists now can pack sufficient punch into their towering missiles to send them beyond the earth's influence and almost anywhere in the solar system.

Though the first Air Force shot failed, it was scheduled to be followed by two others by the Air Force and two by the Army.

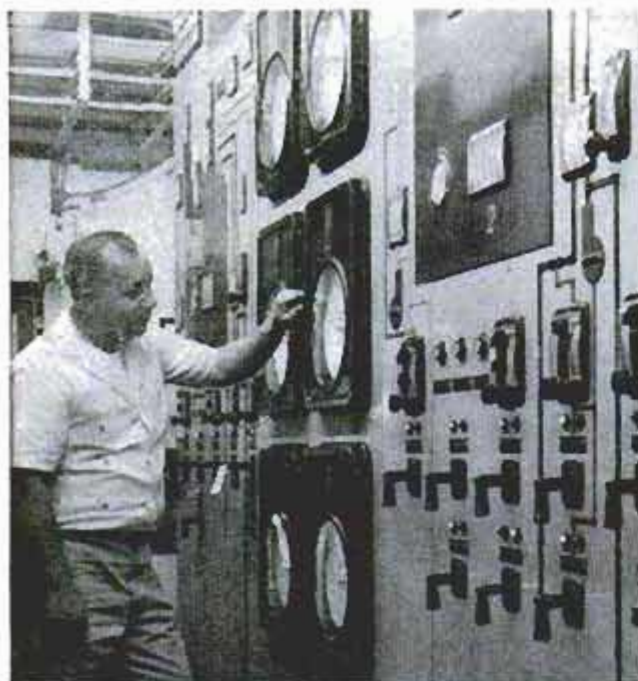
If a successful shot follows the desired pattern, the successive stages of the rocket will accelerate it in a spiral path around the earth until it has reached a velocity of about 35,000 feet per second. This speed enables it to escape the earth's gravitational field and sends it sailing out into space toward the moon. About 2½ days after launching, the payload is 30,000 miles from the moon. At this point scientists fire a small reverse rocket by remote control to slow down the payload in the hope that it will orbit the moon instead of zipping past its target and traveling out into space. Depending upon its orbit, it may circle the moon several times before it sails off into space to revolve around the sun forever.







The YFP-10, a floating power plant, is moored with seven anchor chains to I-beams sunk in coral rock



In the control room, the steam-flow meter is checked. The YFP-10 can generate 36,000 kilowatts per hour

## Floating Power Plant

GETTING adequate generating capacity during construction of a plant in Fort Lauderdale, Fla., was a problem until the company leased a floating power plant from the Navy. The floating plant, only one of its kind in the United States, is the YFP-10, a 338-foot ship that looks like a coastal cargo vessel. Hooking the YFP-10 to a substation on the beach, the company used the ship's generating capacity—36,000 kilowatts per hour—as much as 16 hours a day. The ship has three complete, independent generating plants, and the 13,300-volt current is converted at the substation to 66,000 volts for land-line transmission. The steam boilers that operate the generating machinery consume 1000 barrels of fuel oil a day when running at full capacity. The ship's tanks hold 16,100 barrels. Oil is obtained by pipeline to nearby oil-storage tanks.

A substation, right, was built so the YFP-10's current could be converted for land-line transmission







### Guard Protects Window From Shifting Loads

If you carry shifting loads in your pick-up truck, it's wise to install a window guard in case you should have to "slam on" the brakes. Built of steel rods and T-bars, both welded for extra protection, the guard can resist many times the impact of a barrel of diesel oil. It also was designed to be a load anchor and has proved effective in hauling "shifting cargo" such as lumber.



### Auto Touch-Up Paint Tube Has Its Own Nylon Brush

Containing its own nylon brush, a tube of automobile paint simplifies the chore of touching up small nicks and scratches in the family car. It is available in various colors which were designed to match the somewhat faded tones of the majority of cars in use today. There's no need to clean the brush after each use as it automatically withdraws into the container.

### Mercury Frozen in Supercooled Dies Produces Metal Patterns

Because mercury is the only common metal that is fluid at room temperatures, it's becoming increasingly popular as a pattern-making material. The liquid mercury is poured into a die, which may contain a match plate to produce a core. The

mercury-filled die is then immersed in brine which has been chilled to 100 degrees or more below zero. The mercury castings will stick together after light pressure is applied. The pattern must be used at temperatures around 100 degrees below zero.



1-DIE WITH MATCH PLATE BETWEEN HALVES



2-DIE FILLED WITH MERCURY AT ROOM TEMPERATURE



3-MERCURY FROZEN AND MATCH PLATE REMOVED



4-FROZEN MERCURY PATTERN

Courtesy Morcast Mfg. Corp., LaVerne, Calif.



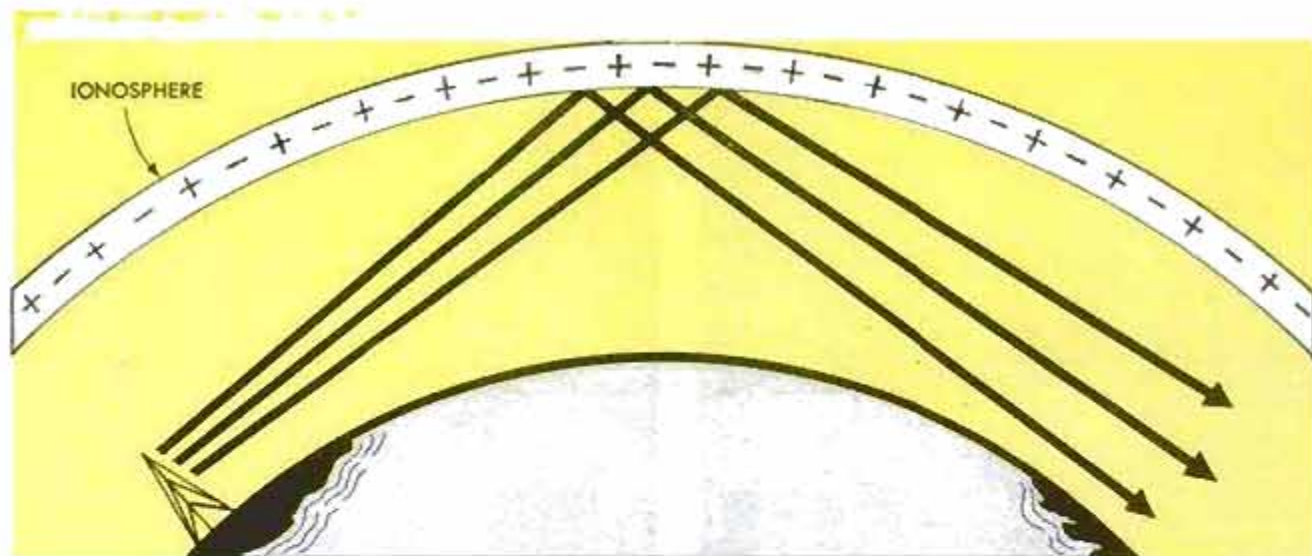


Fig. 1. Ionosphere mirrors low-frequency waves. Below are nose cone and innards of "Smoke Puff" rocket



# OPERATION "SMOKE PUFF"

*The Air Force bounces radio messages off its own private cloud of ions*

By Michael Gladych

bridge Research Center in Bedford, Mass., this jack-of-many-trades works on the radiowave reflecting principle of the earth's ionosphere.

In this electronic age, everybody knows that the ionosphere is an electrified upper-air region that bounces off radiowaves around the globe, making long-distance radio communication possible. The ionosphere is always there at between 60 and 70 miles up. Sunrays on their way down shear off electrons from the atoms of air. These crippled atoms develop an electric charge and become radio-reflecting ions.

However, the earth's ionosphere acts as a built-in mirror only for low-frequency radiowaves. (Fig. 1.) The high-frequency waves go through it like bullets. (Fig. 1A.) Of course, on occasions when the solar-radiation bombardment is particularly severe, the natural ionosphere can develop patches dense enough to bounce off short-wave signals, even with the ultrahigh TV broadcasts. And it was those freak radio bounces that gave the Air Force scientists the idea for the Smoke Puff project.

"Those high-density irregularities of the ionosphere are unpredictable," says Dr. Frederick F. Marmo, the chief of Operation Smoke Puff. "But if we could make a high-density ion patch, we should be able to

**M**MILITARY RADIO, nerve system of our defenses, has been under a serious handicap. The enemy could eavesdrop and jam our broadcasts. Besides, the static-free microwaves used in communications and the guiding of missiles would not go beyond the horizon, thus limiting the range. But recently, a group of Air Force scientists solved the military-radio problem with an ingenious "radio mirror."

Released by rockets at high altitude, that mirror can now give radio the privacy of a telephone line. It can help guide missiles over a very long range and it can act as an electronic camouflage against radar-snooping sputniks. And as a peacetime bonus, the same mirror could improve FM and TV coverage and even illuminate cities with a moonlike glow.

Developed under the Operation "Smoke Puff"—a project of the Air Force Cam-



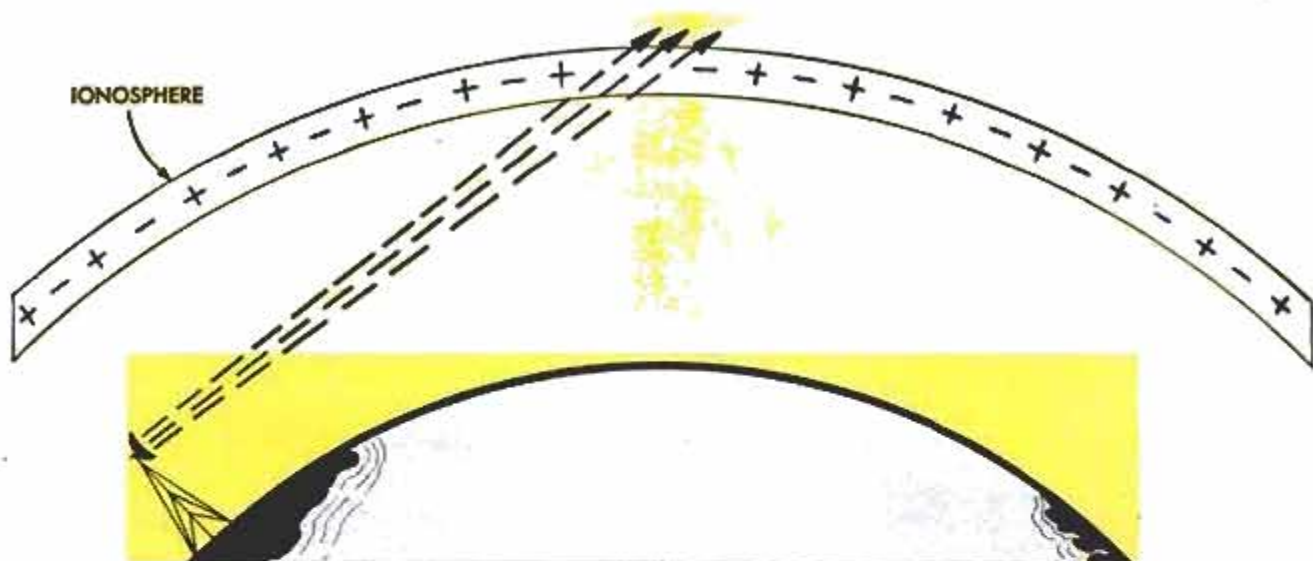


Fig. 1A. Unlike low-frequency radiowaves, high-frequency waves shoot through ionosphere like bullets

reflect even the microwaves at will and literally anywhere."

To make the artificial ionosphere, Dr. Marmo used metallic potassium. "Potassium is especially good for the purpose," he says, "because each potassium atom has an odd electron just begging to be knocked off by solar radiation. That's how we can be sure of getting a high condensation of ions up there." And reaching the upper air was no problem for the proved Aerobee rocket.

The Smoke Puff Aerobee carried some 15 pounds of potassium in a special container, rigged to explode at 60 miles of altitude. The heat of the explosion would vaporize the potassium cargo which would form a cloud—hence the code name: Smoke Puff. Now, the sunrays would shear off the unstable electrons and turn the potassium atoms into ions.

To test the radiomirror properties of that potassium cloud, Dr. Marmo alerted "ham" radio operators within a 700-mile radius of the mid-desert Holloman Air Development

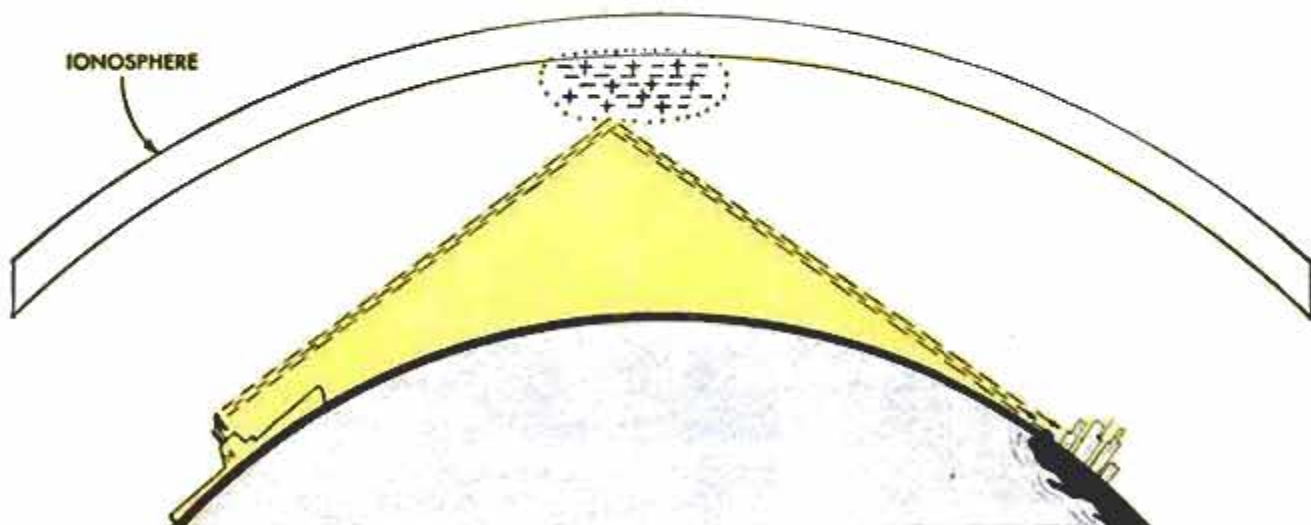
Center in New Mexico where the Smoke Puff rocket launchings took place. They were to send radio signals in the 14 to 144-megacycle range and report on how good the long-distance reception would be.

The first Aerobee misfired its potassium. But the next one created an ion cloud so dense that even Dr. Marmo was amazed. For 45 minutes the cloud mirrored the ham broadcast and gave a next-door-clear reception over several hundred miles (Fig. 2).

Having proved the soundness of the radiomirror idea, Dr. Marmo and his associates, L. Aschenbrand and J. Pressman, are now working on the next step. The experimental Smoke Puff ion cloud had the shape of a thick pancake, the scientists believed. Such a shape bounces off radio signals in all directions, and the problem is to make the cloud reflect radiowaves in a predetermined course. That's why Dr. Marmo's crew is trying to make special oblong clouds that would channel the radio waves into a narrow beam.

(Continued to page 254)

Fig. 2. The ions mirrored a broadcast for 45 minutes and gave clear reception over hundreds of miles

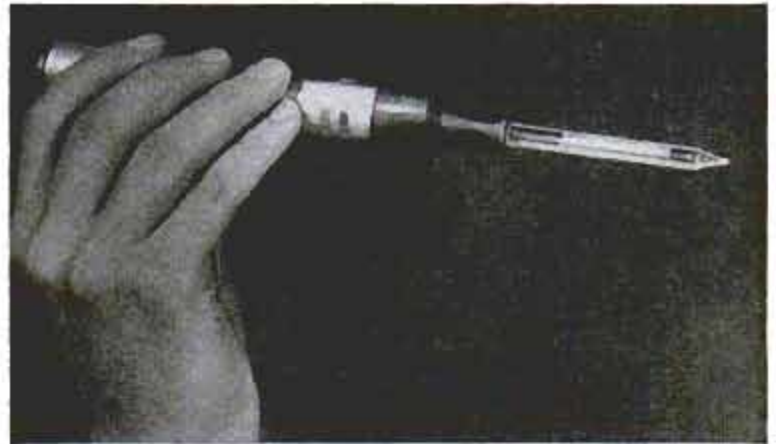






### Water-Powered Chlorinator

Operated solely by water power instead of electricity, an automatic chlorinating unit injects a tiny stream of chlorine bleach into the water supply in the amount and proportion needed to safeguard health. The unit is designed for home, farm and commercial well systems.



### Monoxide Tester Serves Two Purposes

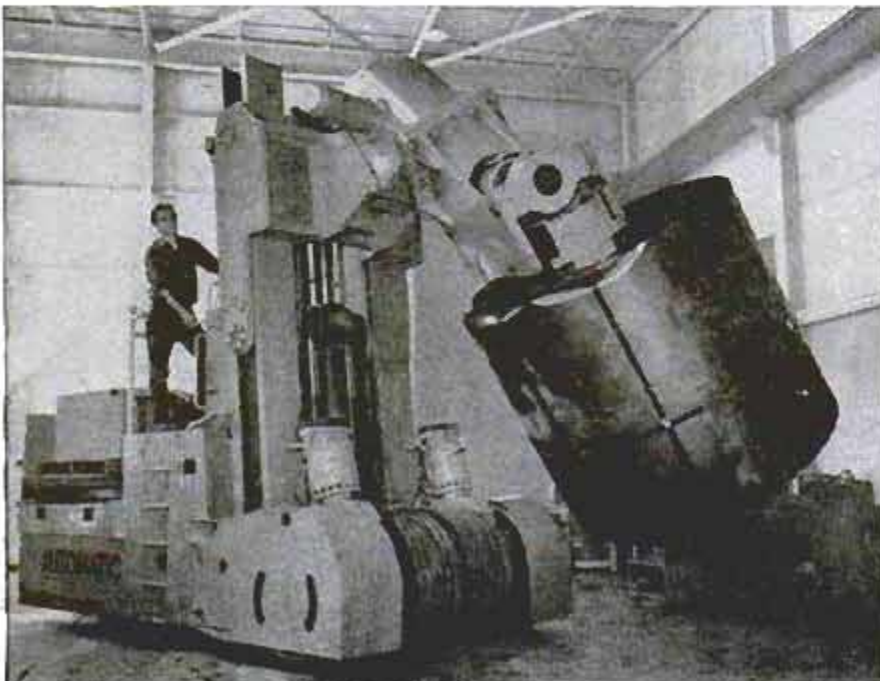
One tester can show how much carbon monoxide is in a car's exhaust stream as well as in a room atmosphere. It indicates whether carbon monoxide is above or below safe concentration levels, and shows the approximate percentage concentration. Reference to comparator scales is not required. The tester detects monoxide in the approximate range of 100 to 1000 parts per 1,000,000.

### Soviet Railroad Traffic Increasing

While United States railway mileage has dropped almost 1000 miles per year since 1928, Russia has gained nearly 1000 miles per year. The United States total of 220,200 miles still is about three times that of the Soviet Union. But Russian rail traffic is heavier, amounting to 739,000,000,000 revenue ton-miles—compared to 647,000,000,000 for United States Class 1 lines. Peak rail traffic for the United States during World War II was almost 747,000,000,000 revenue ton-miles.

### Revolving Truck Lifts 35 Tons

Designed for transportation and storage of huge steel coils in an English rolling mill, a revolving ram truck can lift and carry up to 70,000 pounds. Its capacity can be increased to 100,000 pounds with additional counterweighting.



### Hydrogen Makes Steel Brittle

Brittleness in high-strength cadmium-plated steel may be due to hydrogen which is trapped in the steel during pickling and plating processes. Dr. Alexander R. Troiano of Case Institute of Technology says the trapped hydrogen probably is the culprit behind mysterious fractures of high-strength steel used in jet planes and rockets. Dr. Troiano adds that the hydrogen can be "baked out" during the plating process.

❑ Ice 14,000 feet thick and resting on a rock bed 8200 feet below sea level has been found in Antarctica.





After loading pools at plant, crane accompanies trailers to installation sites

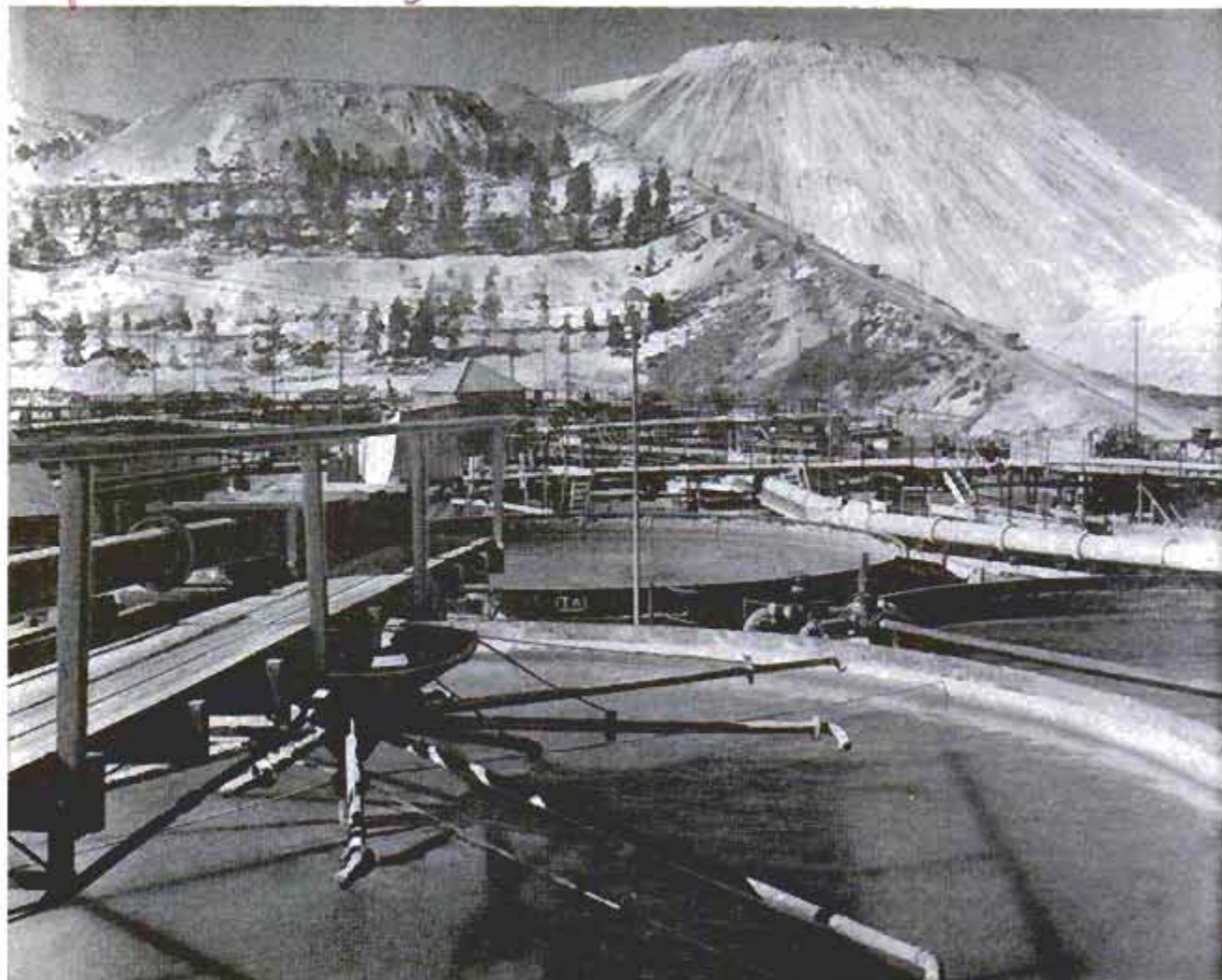
## Precast Swimming Pools Speed Installation

Prefabricated swimming pools—ready to be dropped into holes—are available in Miami, Fla. The precast pools sell for about \$3200 and are made of poured concrete reinforced with steel rods. Mass-produced and stockpiled at the factory, the pools are moved by large flatbed trucks to homesites where they are lifted into place.

Right, crane lowers pool into prepared hole. After pipes are connected, final coat of paint is applied. Pools come in two sizes: 12 by 25 feet and 12 by 29







Huge mountain behind this 64-year-old mine is manmade. It consists of millions of tons of gold-free rock

# ***There's Treasure In Africa's Bank—***

## **FIRST GOLD AND NOW URANIUM**

*By Peter Holz*

**T**HE QUEST FOR GOLD has been one of the great driving forces of mankind for centuries. Interest in gold—that highly prized and most readily exchangeable commodity—was fanned in the 19th century by the great gold rushes of California, the Yukon, Australia and finally South Africa. The discovery of gold on the Witwatersrand—the Ridge of White Water in the mineral-saturated Transvaal—was the glorious climax to all these discoveries.

Today, South Africa is still the world's leading producer of the yellow metal.

Fifty-four mines, stretching in a golden arc of roughly 300 miles from the Transvaal to the arid Orange Free State produce 54 percent of the total world production of gold. From these mines, gold travels to practically every country in the world to fulfill its vital function of standing security behind paper money, and of helping the flow of international commerce.



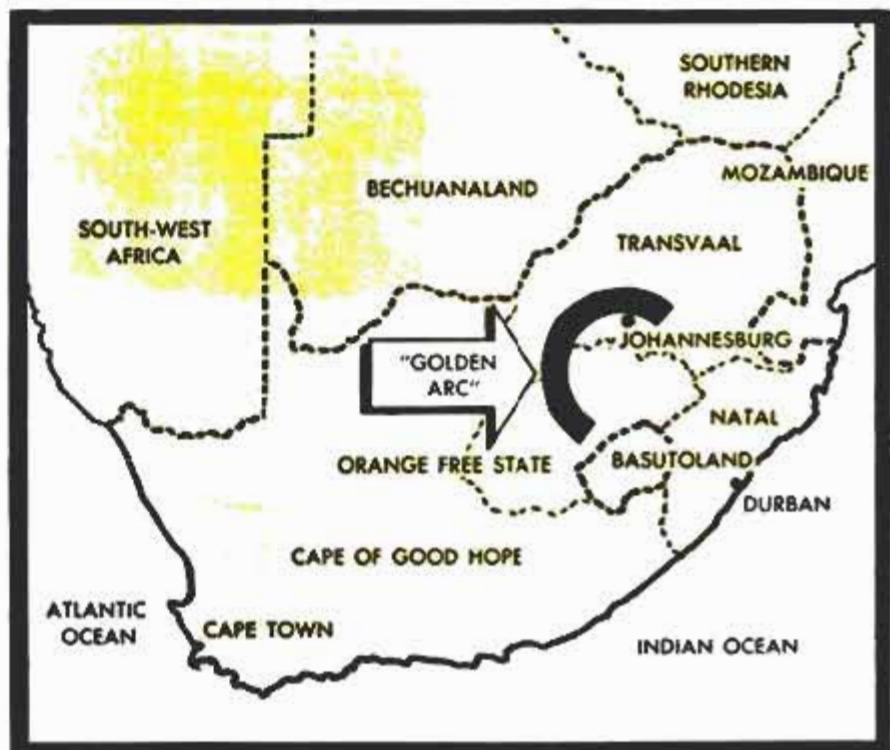


Workers use 115,000 miles of safety fuse annually in driving shafts and tunnels through gold-bearing rock

South Africa is rich in many minerals. Asbestos, chrome, manganese, copper, platinum, tungsten, tin and lead are all mined there. But gold, and lately, uranium, are the important money producers. Some 15,373,680 ounces of gold were produced in 1956, representing a value of \$548,840,375. The mines have certainly come a long way since the '80s, when pioneers from the four corners of the world, including of course the United States, flocked to South Africa to stake their claim in the newly discovered El Dorado. Today 50,000 Europeans and almost seven times that number of Africans are employed in gold-mining operations in the fabulous "golden arc."

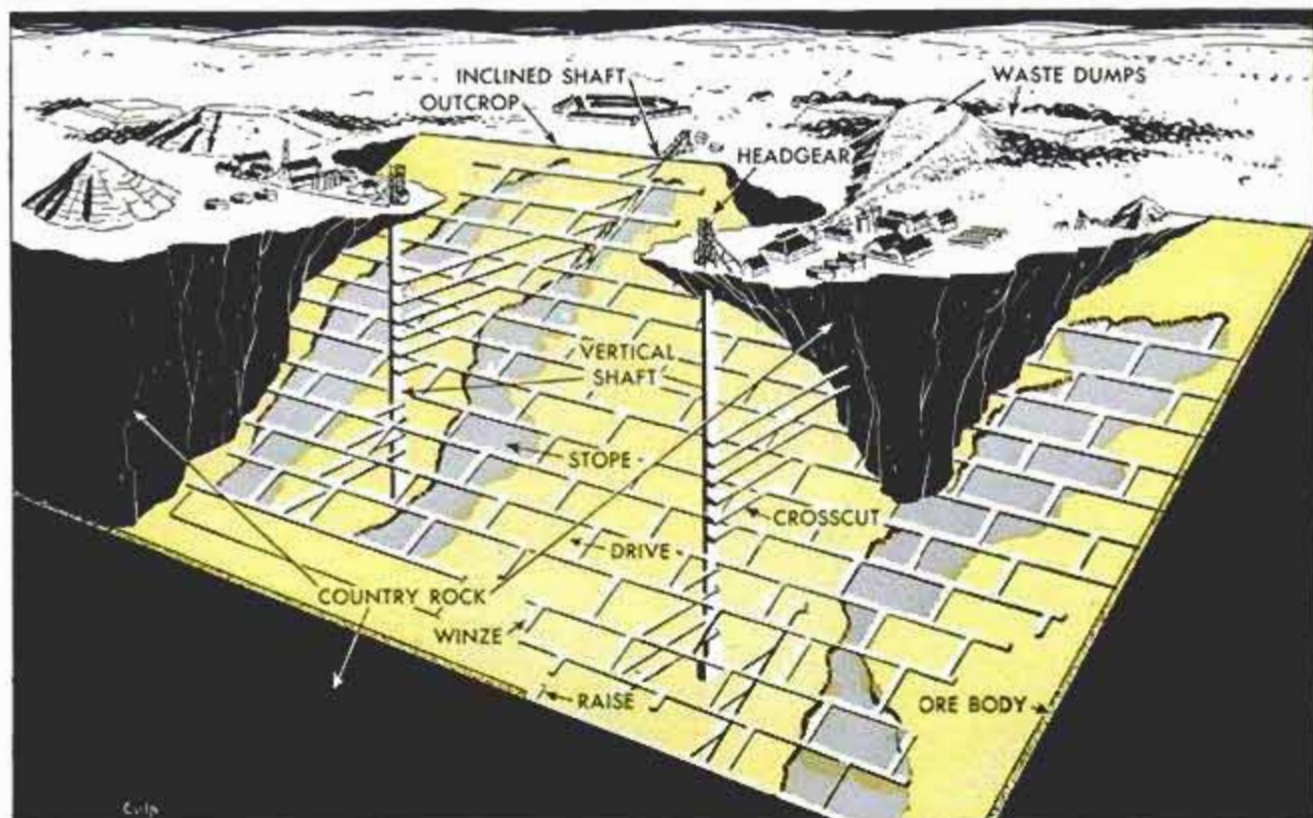
Some of the mines are

almost 10,000 feet deep. Three of the largest of the Union of South Africa's mining-finance companies are at present cooperating in a new mine, where gold-bearing ore



"Golden arc" stretches for 300 miles through two of the Union of South Africa's four provinces

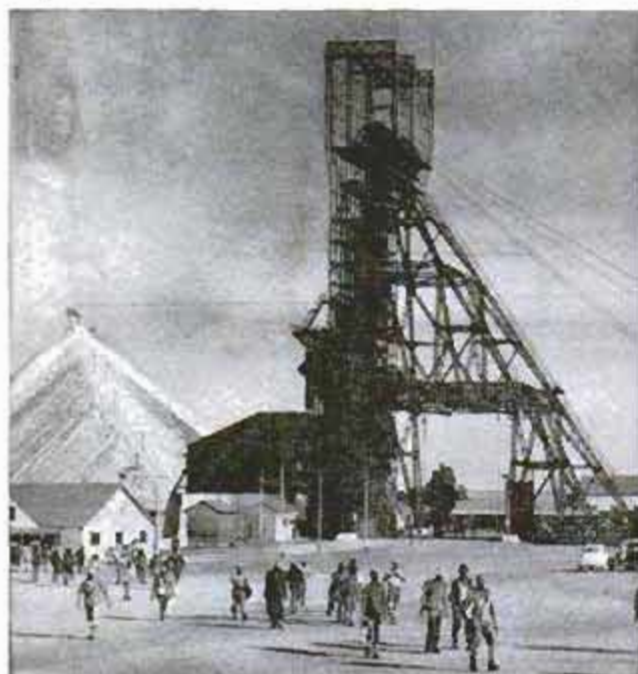




**Gold mining with the lid off:** Three-dimensional drawing shows how vertical shafts connect with crosscut tunnels, which in turn connect with tunnels breaking the ore body into blocks for systematic mining

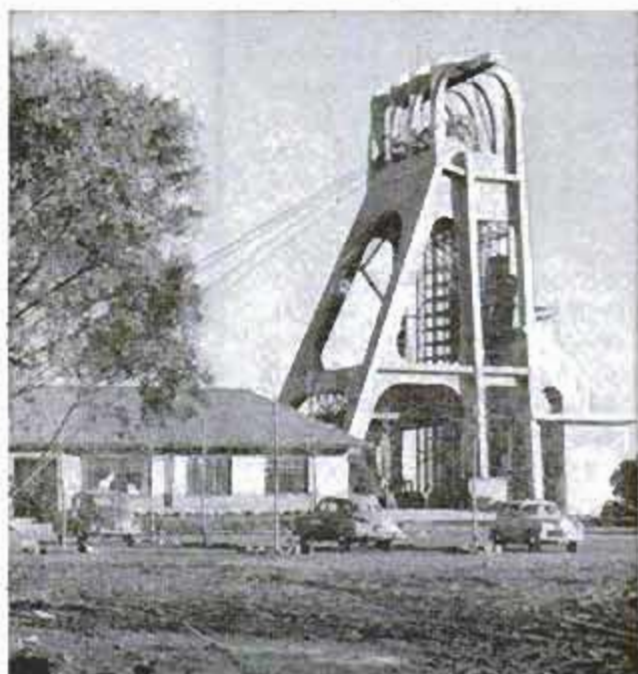
will be brought up from a depth of more than two miles. Planning for this project, which when completed will have cost \$60,000,000, has been going on for the past 15 years. Because of the high temperature at 12,500 feet, a ventilation system capable of pumping 1,500,000 cubic feet of air per minute down the main shafts will be installed. By the time this mine has "died" in about 60 years, it will have produced \$2,400,000,000 worth of gold.

**Characteristic of older South African mines is an expensive headgear made of steel beams and plates**

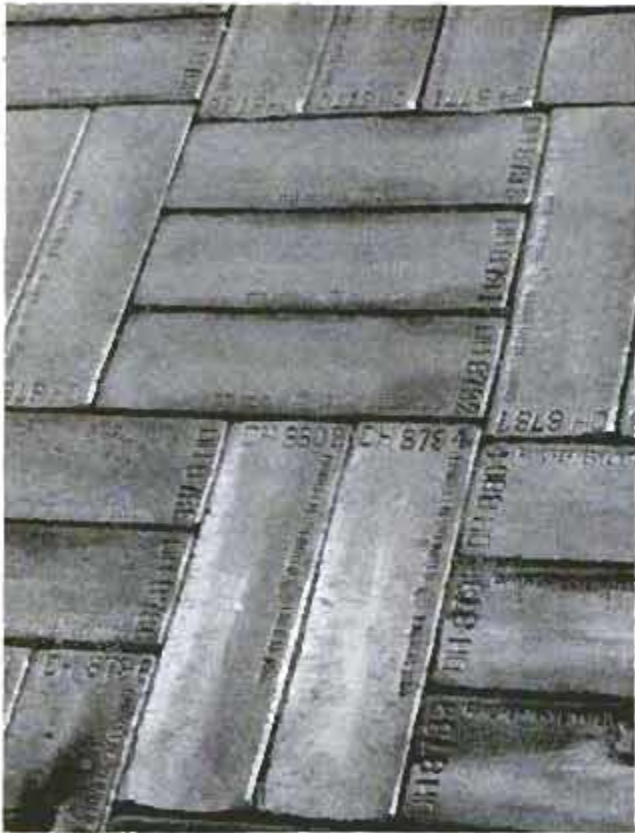


Characteristic of every mine are the tall headgears, the older ones constructed of riveted-steel sections and plates, the more recent ones built of reinforced concrete. Just as familiar to South Africans are the pale-yellow mine dumps which adjoin every mining property. They build up over the years and consist of millions of tons of crushed rock from which the gold has been wrested. Attempts have been made in the past to cover these eyesores with trees and

**Headgear of newer mine is made of reinforced concrete. It is faster and less expensive to construct**







Here's a fortune in virtually pure gold, refined and cast into bars. Each bar is stamped and numbered

grass, but with little success. The barren sand, saturated with cyanide, is poor soil for vegetation. It has also been suggested that worked-out shafts and tunnels be filled with the yellow sand, just to get rid of it, but the cost of doing so would be prohibitive.

Underground, the mines are minor cities with engine rooms, first-aid stations, repair shops and storerooms. There is unceasing activity down there. Men drill holes in the quartz, fill them with dynamite, blast, collect the broken rock and hoist it to the surface at roughly 30 miles per hour. About 67,500,000 tons are brought to the surface annually — enough material there for roughly 425 Empire State buildings!

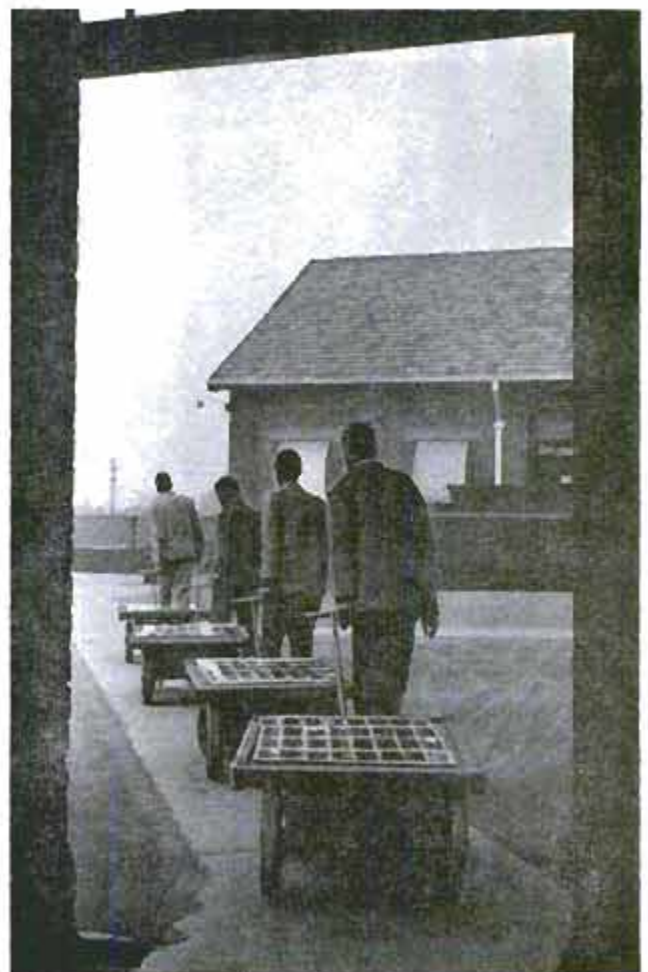
On the surface the ore is collected in huge stockpiles and screened to separate the large from the small pieces of gold-bearing rock. The larger pieces are reduced in rock breakers, and much of the waste rock is picked out by hand at this stage by teams of Africans. For many of these Africans, working in a gold mine is their first clash with civilization. They flock to the mines from the bush to earn a little money. After a while they go back to their ancient way of life, telling their kinsmen of the inexplicable ways of the white man.

In the rows of ball mills, the rock is mixed with water and reduced to a fine pulp or slime. This is pumped to batteries of tanks containing a weak cyanide solution. The cyanide dissolves the gold and

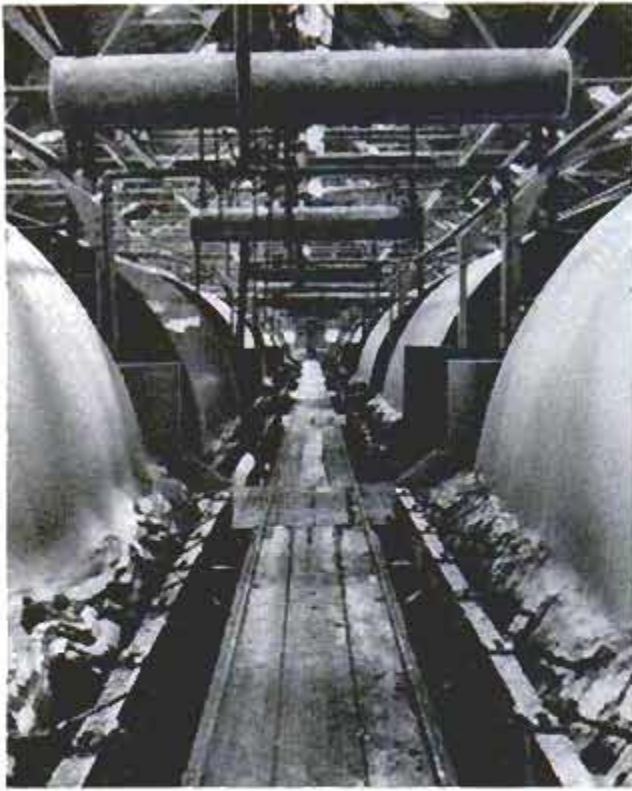


Gold concentrate is cast into rough bars for trip to the refinery, where impurities will be removed

As it leaves the refinery on carts, the gold is 99.6 percent pure. Gold on these four carts is worth about \$1,812,800. It will be precisely weighed, then packed for export to commercial centers throughout world







Rotary filters extract gold from slime. "Waste" material from this process now is yielding uranium oxide

the solution is filtered in rotary filters. Following filtration, the gold-bearing solution is clarified, de-aerated and the gold finally precipitated. The resultant mud is fused with fluxing materials such as borax,

and the gold cast into 1000-ounce bars. It is then sent to the world's largest gold refinery situated near Johannesburg. Each bar contains about 874 ounces of gold, 90 ounces of silver and 36 ounces of base metals. It leaves the refinery 99.6 percent pure gold, cast into bars weighing 400 ounces each. Each year, almost 38,500 such bars are produced.

It takes almost five tons of ore to produce one ounce of gold, roughly the size of a button.

#### Uranium From Slime

In October 1952, South Africa's gold-mining industry began the extraction of uranium oxide. The work of extracting uranium oxide begins when gold has been extracted from the finely crushed ore by filtration. The residual goldfree slime is received in the uranium plants on conveyor belts and fed into tanks containing sulphuric acid. The solution is then filtered and the filtrate, containing the uranium oxide, subjected to a number of further processes until a pure uranium solution is obtained. Uranium oxide is precipitated as a bright-yellow mud, which is dried and exported to the United States and Great Britain for further purification and ultimate use in the nuclear industry.

Some years ago fears were expressed in

(Continued to page 262)

Africans sort rock moving along a conveyor belt. For many, this is their first brush with civilization

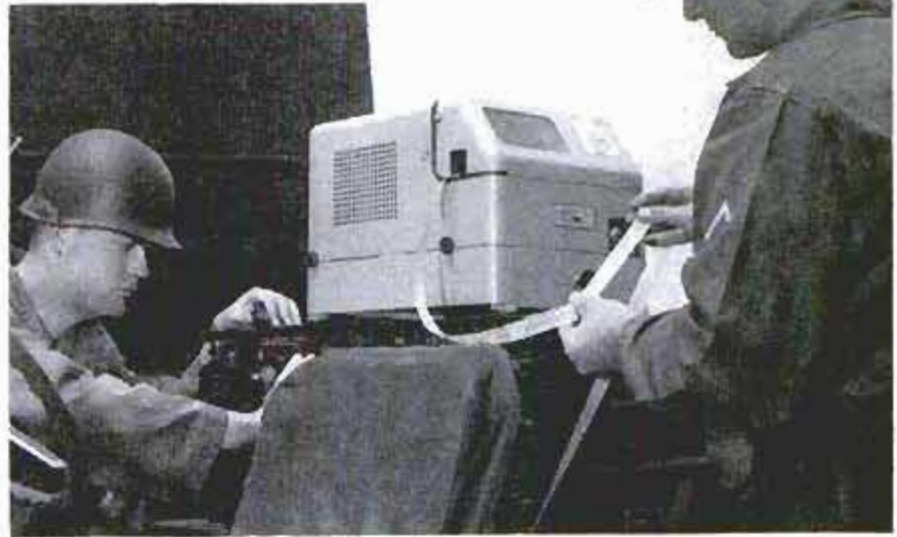




## Machine Types Faster Than People Talk

Developed for Army combat units, a new message printer pounds out words five times faster than normal conversation. The actual rate is 750 words per minute, which is 10 times the speed of a standard teletypewriter.

In addition to printing words, it punches coded holes in a paper tape. The taped messages then can be relayed rapidly to other points. The message printer has no typing keys. Instead, a whirling wheel rimmed with letters spins at 3750 revolutions per minute. At the precise instant the correct letter is in position, a tiny hammer slaps the paper against the type wheel, printing the letter and punching the symbol.



U. S. Army photo

## Casting Bobber Drops Hook After It Hits Water

Here's one solution to an old fishing problem—how to cast a still-fishing line when the bobber is some distance from the bait. The intervening line is wound around a cleat on a new bobber. The angler then casts the bobber from the tip of the pole, as though it were a lure. When the bobber hits the water it flips over and the line unwinds, lowering the bait to the pre-set depth.



## "Robot" Chemical Unit Makes Tests Automatically

Without human help a new system of instruments makes scientific tests, records the findings and even takes corrective action. Made in Great Britain, the instruments are designed for chemical laboratories. The system automatically collects samples of a material, mixes in reagents, heats or agitates the solution, performs and records tests and makes adjustments to the production line.







The boring bucket brings 300 pounds of earth to surface. Cutters on the bucket's side slice the earth and force it inside



A drilling unit hoists a reinforcing assembly for dropping into the bored hole

## Drilling Rig Used to Sink Concrete Piles

ON THE CAMPUS of the University of California, at Berkeley, construction workers are using equipment similar to well-drilling rigs for sinking concrete piling. The rig bores a hole 50 feet deep, with a diameter of  $2\frac{1}{2}$  to 3 feet. Then prefabricated steel reinforcing assembly is lowered into the bore, and a truck loaded with ready-mixed concrete deposits its contents.

Meanwhile the hole borer moves to another spot. The drilling equipment uses a gasoline engine mounted on the rig, and turns the boring bucket by means of a jig used for a locator. The bucket holds about 300 pounds of earth. Enabling a contractor to maintain assembly-line operation, this method is said to be much more stable than the old one of driving wooden piles.

The bores are quickly filled. As soon as the drilling rig is removed, a truck backs up and unloads its ready-mixed concrete

The 50-foot concrete piles make extremely solid foundations for big buildings





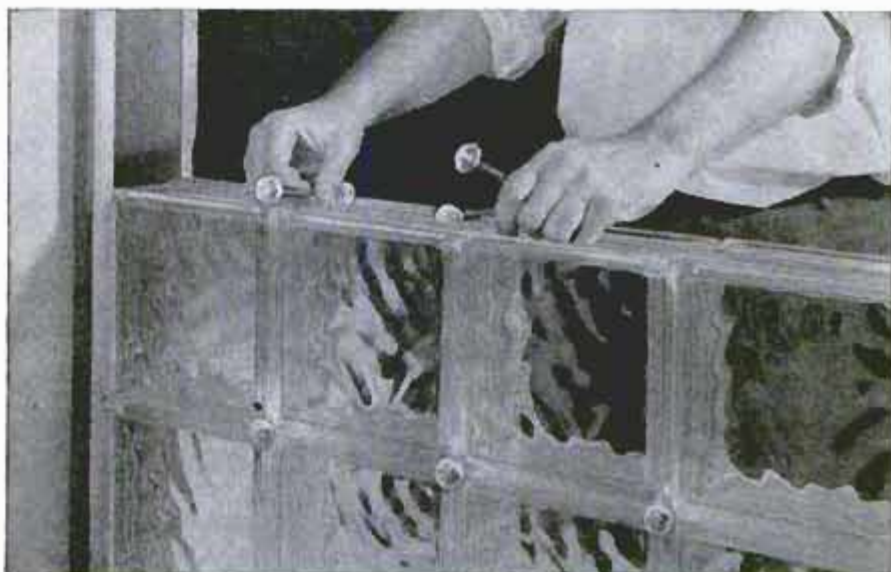
## "Radio" Reservations Made Overseas

Using a data-processing "keyset," it takes four seconds for a person in Estoril, Portugal, to make an inquiry of American Airline's electronic reservations system in New York and receive an answer. The equipment makes possible, for the first time, the automatic sharing of radio-communication channels by a data-processing system and teletypewriter machines. When the reservations are made, the unit transmits information about the passenger.



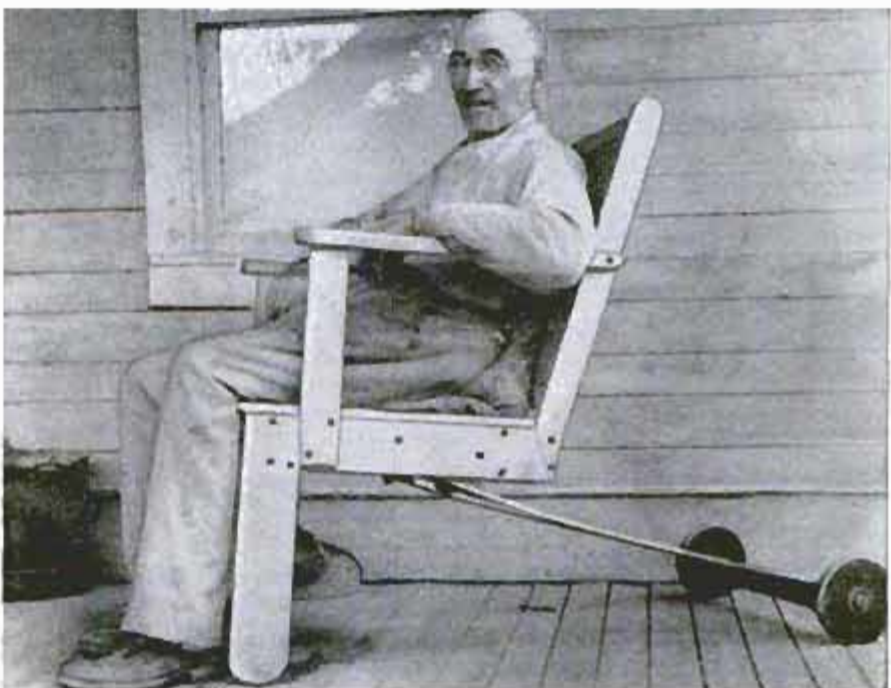
## Glass-Block Panels Without Mortar

With a new type of glass block, anyone can lay up a room divider or other panel without mortar. The glass blocks are held at the corners by aluminum rods and decorative plastic nuts. The fittings are simply tightened into place as each row of blocks is installed. The room divider is built up inside a wood frame. Panels of this type are recommended for interiors only.



## At Last! No-Creep Rocker

Rocking chairs that creep across the floor are a pet peeve of Harry Seawell, of Cats Creek, Ohio. To solve the problem of the creeping rocker, Seawell invented a rocking chair without rockers. In place of the back legs, his chair has two strips of spring metal. Fastened to the strips are two small wheels. The wheels move but the chair stands still. Now Seawell can rock for hours on end, and the chair remains right where it was when he started.





LOUIS RHODA, 8420 ARRINGTON Ave,  
RIVERA, CALIFORNIA



Westinghouse photo

## Ten-Day Job for Patient Man

"GENIUS," said a famous man, "is the capacity for infinite detail." The same might be said for good workmanship. For example, when a U. S. Navy ship's dual 1500-horsepower motor needs repair and cleaning, the job calls not only for dexterity but for extreme patience. Every one of the motor's 1720 commutator risers must be

cleaned separately. Many new techniques have and are being developed to expedite the time required for electric-motor repairing, but there are no short cuts in this job. Using a grinding wheel, an experienced motor winder—with a great deal of patience—can clean the 1720 risers in about 1½ weeks.

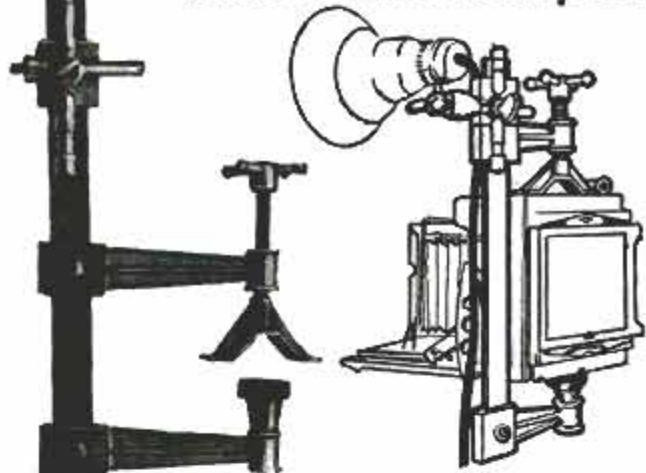


## One-Room Cabin Cut in Log

Carved from a single 14-ton log of spruce is a one-room cabin that serves as the Tourist Information Center at Hoquiam, Wash. A lumber company donated the massive chunk of timber which was hauled to its site on a lowboy trailer. A chainsaw operator carved out the door, two windows and the interior chamber. Approximately 500 cubic feet of wood were removed from the log, which measures 36 feet in circumference. Hand-hewn shakes, split from the interior chunks, were used to cover the roofed areas protecting the door and windows.



## Versatile Photo Clamp Holds Lights or Camera at Proper Angle



Proper angles for lights and cameras are easy to arrange with a new type of photo-equipment clamp. Designed like a carpenter's bar clamp, the device can be used to set up overhead lights or to hold lamps on partitions or furniture. One clamp face has a rubber surface to prevent scratches. A sliding turret on the bar has a revolving set of four studs, each of a different design, to fit into tripods and other equipment.

Ⓢhatterproof mirrors made of plastic are now being used in toys, luggage, motor vehicles and other objects which may be subjected to rough treatment.

## Kit Copies Slides Without Darkroom

Color slides are copied in black-and-white-print form with a kit that does not require the usual darkroom. Previous experience is not required either. The kit contains a small projector, an easel, a safelight, paper and chemicals in bottles. The slide is projected on direct-positive paper which is then inserted in a plastic tube and developed in the various solutions. The kit lets you make low-cost copies of slides for friends.





# annual HOME section

*Millions of new homes have been built in the United States since World War II and nine out of ten reflect some influence from the "California school of architecture." Therefore, this sixth annual home section is launched with*



a salute to  
the California influence

*By Wayne Whittaker*

**M**ORE THAN 10 MILLION homes have been built across the nation since 1946, and nine million of them show the influence of what has become known as "the California style" in architecture. So say the men who have made it their business to know—the leading builders and architects on the West Coast. Prejudiced? Sure, but they have a lot to back up their trail-blazing claims.

Take the case of Joseph L. Eichler of Palo Alto, the biggest builder of homes in the San Francisco area. The hundreds of well-designed contemporary homes he has put up in the sunny valleys around San Francisco have won him national fame. Joe Eichler was one of the first tract builders of medium-cost homes in the United States to hire top-notch architects, such as A. Quincy Jones, Frederick E. Emmons, Robert Anshen and Steven Allen, to design his houses. An avalanche of awards for design and neighborhood planning from the National Association of Home Builders, Housing Research Foundation and the American Institute of Architects, testify to Eichler's success.

"Please don't give the impression that all the houses I build are typical of California architecture," says dynamic Joe Eichler. "There's a lot of claptrap out here in California as there is everywhere. The national magazines feature our houses and everybody





Palmer & Krisel, Los Angeles

# for more livable homes

gets the idea they are typical of this area."

"They are typical of the best in California architecture since World War II," we assured him.

"I'll buy that," he said. "These are the houses that have been imitated across the country and have come to be known as 'California style'."

We asked Edward P. "Ned" Eichler, Joe's energetic son who is also active at Eichler Homes, his definition of a Califor-

nia house—from the standpoint of a builder.

"It's not a house so much as a way of life," said Ned. "We think our architects have come the closest to fitting the design of a house to an informal way of life. This kind of life is affected by a lot of things including the fact that not one tenth of one percent of the people who buy homes costing from \$20,000 to \$25,000 today have a single servant. Builders are gradually waking up to the fact that people are not

Privacy is the keynote of many California homes. At the top of the page, glassed areas open on a secluded patio and pool. The house below, designed by Edward H. Fickett, screens all family activity from passers-by







living today as they did in 1920 when they could afford to maintain a big two-story house. Easy maintenance is one of the many important factors in the design of a good home today.

"Patios with barbecues for informal entertaining and what has generally become known as outdoor living are all part of the California style. We have stressed the relationship of our houses to the outdoors and have used a lot of glass to help tie patios and fenced yards right into the house design. This is what is known as the indoor-outdoor effect. It seems to me very important that houses should have a real feeling of space and that they be

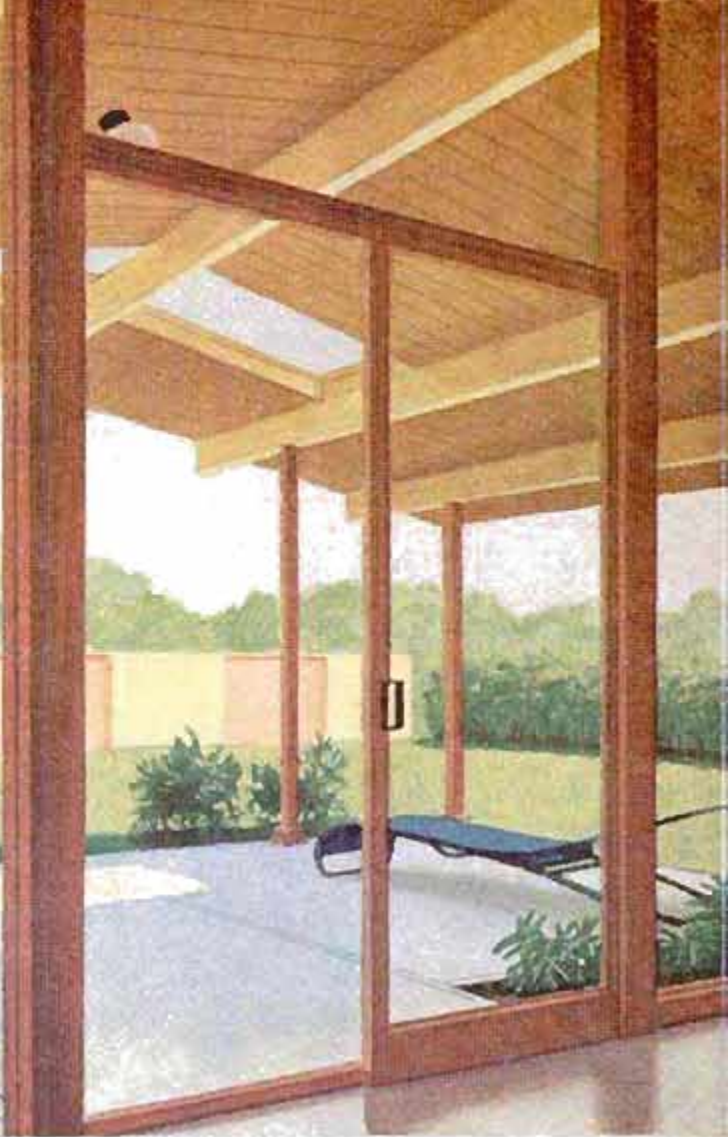
(Continued to page 240)

The home Cliff May designed and built for himself and his family in Sullivan Canyon, Los Angeles, is the last word in indoor-outdoor effects. The living room shown above not only has glassed walls opening on patios but a skylight extending the 53-foot

length of the room. The home has nine terraces, including private patios for each of the six bedrooms. Rough-textured walls, ceilings and open beams lend an atmosphere of the Old West to this contemporary California-style house which occupies 7000 square feet

*Courtesy of the Mosaic Tile Company*





Ehleler Homes, Palo Alto

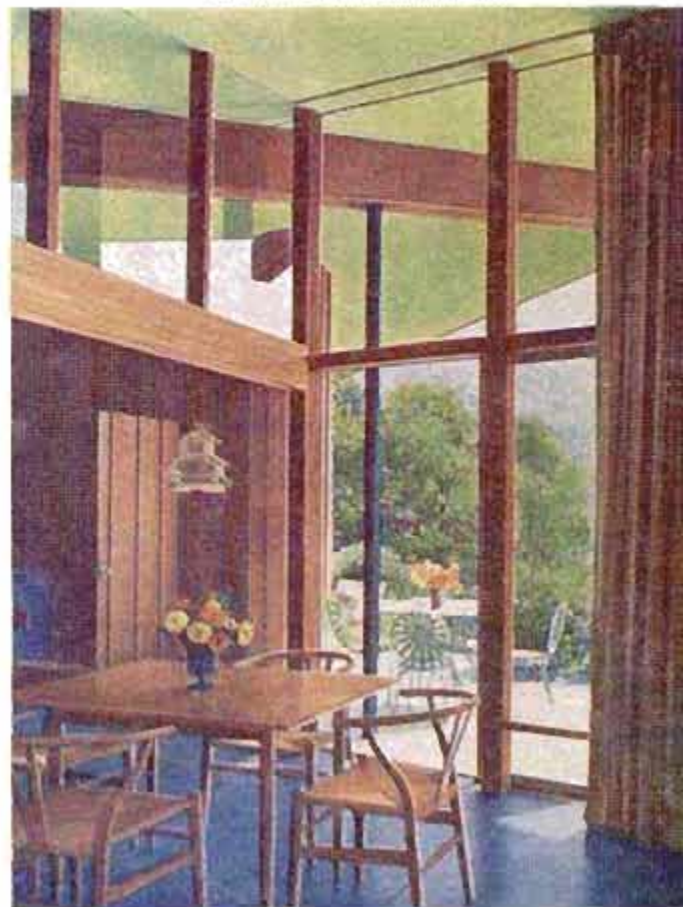
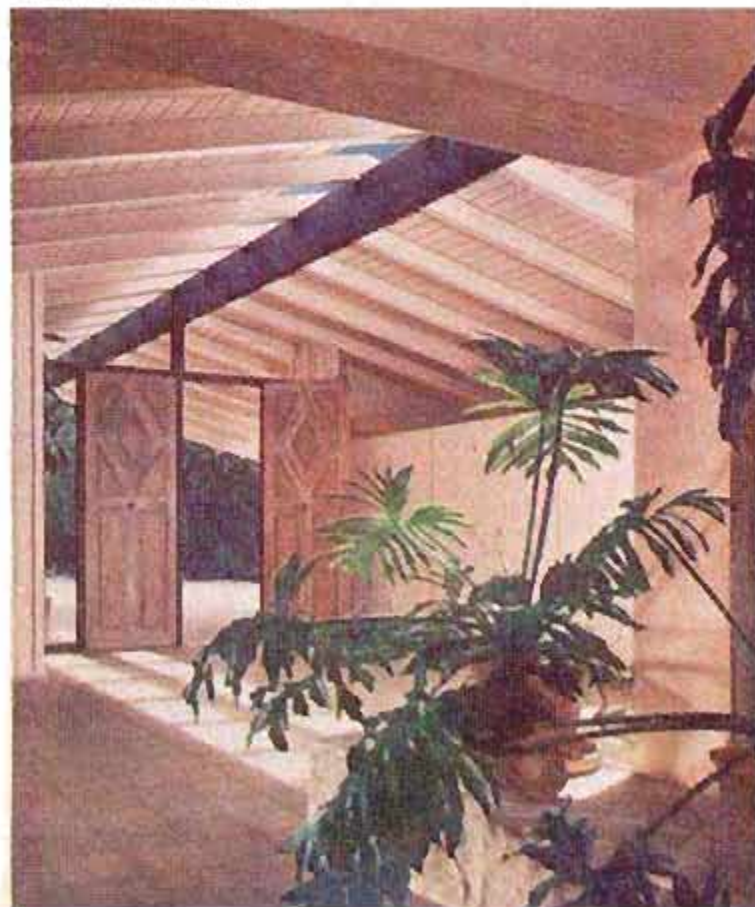
Generous overhang with a partial opening in the roof provides convenient outdoor-living area. Sliding glass doors on two sides of this porch afford easy access to the interior and give desired indoor-outdoor effect

Skylighted entrance to home on opposite page features antique doors along with contemporary design. Tropical plants abound

The Message Tile Company

Floor-to-ceiling glass in small room links it with outside and gives spacious feeling

Anastasi & Allen, San Francisco





The architects, A. Quincy Jones and Frederick E. Emmons have won national fame and countless awards for their California-style homes. They say that "our houses can be built anywhere in the U. S."



introducing-

the **PM**

California House



**T**HIS WAS THE TWO-PART QUESTION the editors of *Popular Mechanics* asked Architect A. Quincy Jones:

"Can you design a house for our readers with all the best features of what has become nationally known as 'California style'? And will this house be adaptable to Maine and Minnesota?"

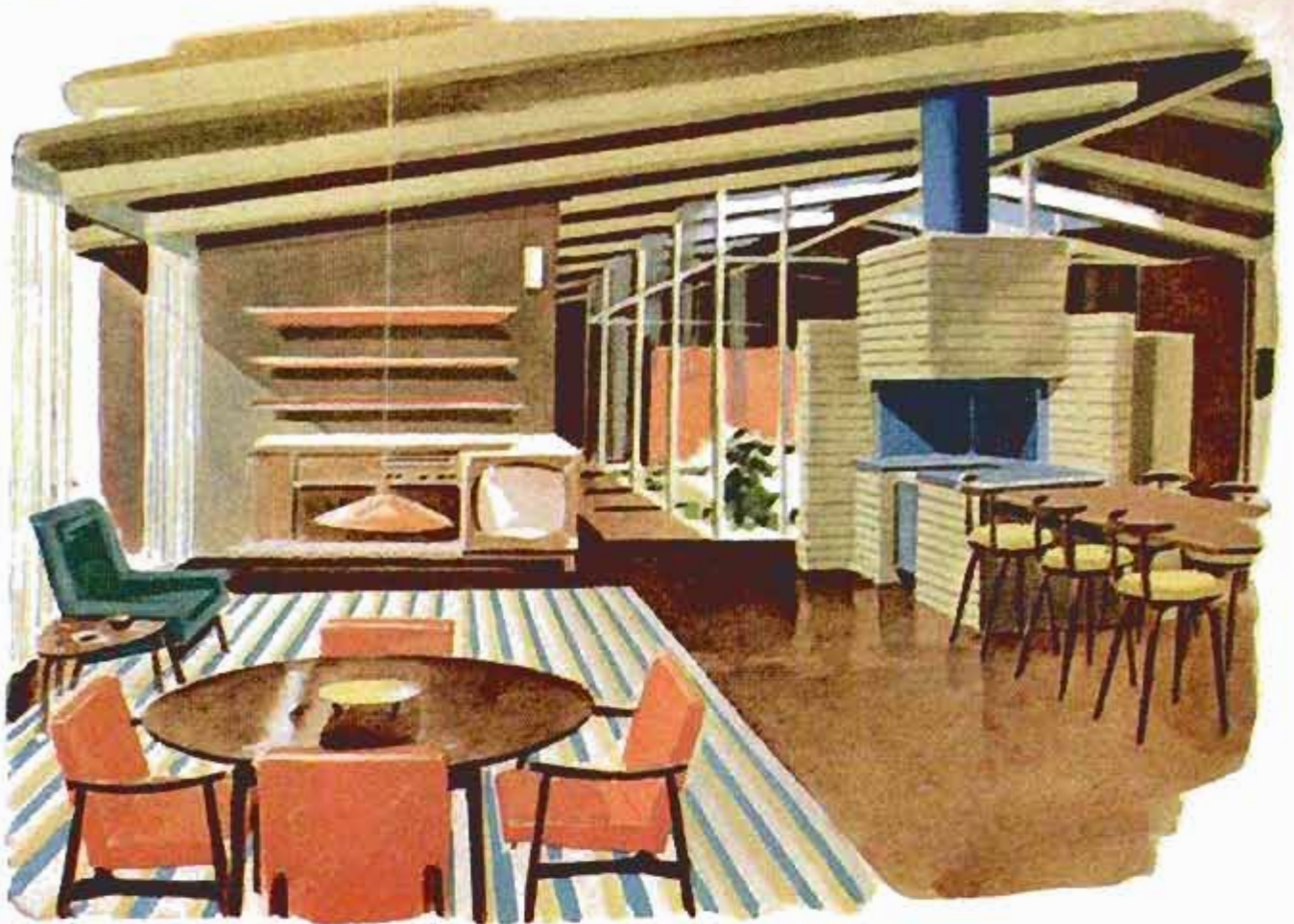
The affirmative answer of Jones and his famous architectural firm, A. Quincy Jones & Frederick E. Emmons, of Los Angeles, appears on the following pages. Several thousand California-style houses designed by Jones and Emmons have been built since World War II, and a list of the architectural awards and citations they have won would fill pages. They have designed both large and small homes and among their happy clients are such celebrities as Gary Cooper (Holmby Hills), Winthrop Rockefeller











## Family Room

Barbecue fireplace in dining area fronts on family all-purpose room. Note view of court

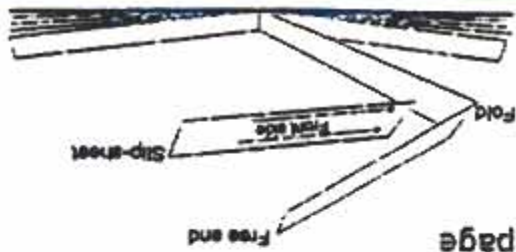
*Interiors by Marshall Field and Company's Home Planning Bureau*

## Interior Court

Glassed-in garden court open to the sky is in center of the house with rooms around it





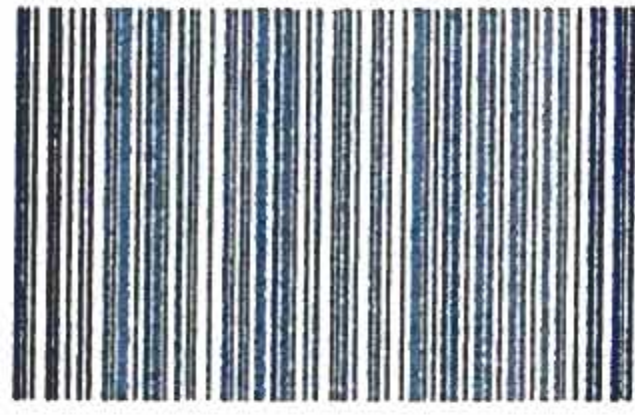


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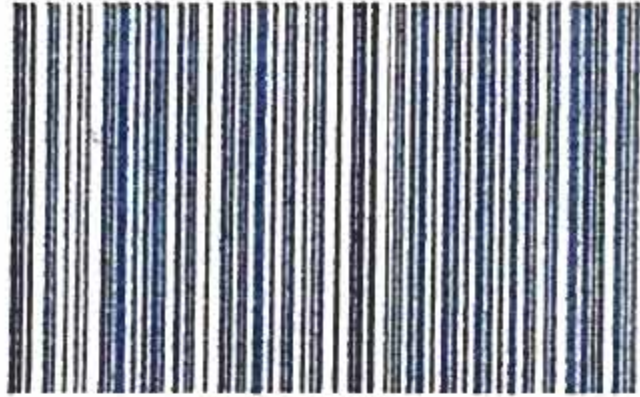
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3. Slice the folded edge
4. Close the page and slip-sheet





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Back

1. Follow instructions on the other side



(Little Rock, Ark.), Michael Romanoff (Beverly Hills), Clint Murchison, Jr., (Dallas) and Uncle Sam—the latter pertains to the now-in-progress United States Consulate in Singapore.

As two of the most-imitated architects in America, Jones and Emmons feel a great responsibility for their kind of architectural style. They maintain that a contemporary California-style house should go all the way and not be a "hodgepodge of New England salt box with a glass wall at the rear facing a terrace."

Sitting around a big table in the conference room of their own contemporary building far out Santa Monica Boulevard in West Los Angeles, Jones explained how they designed the *PM* California House.

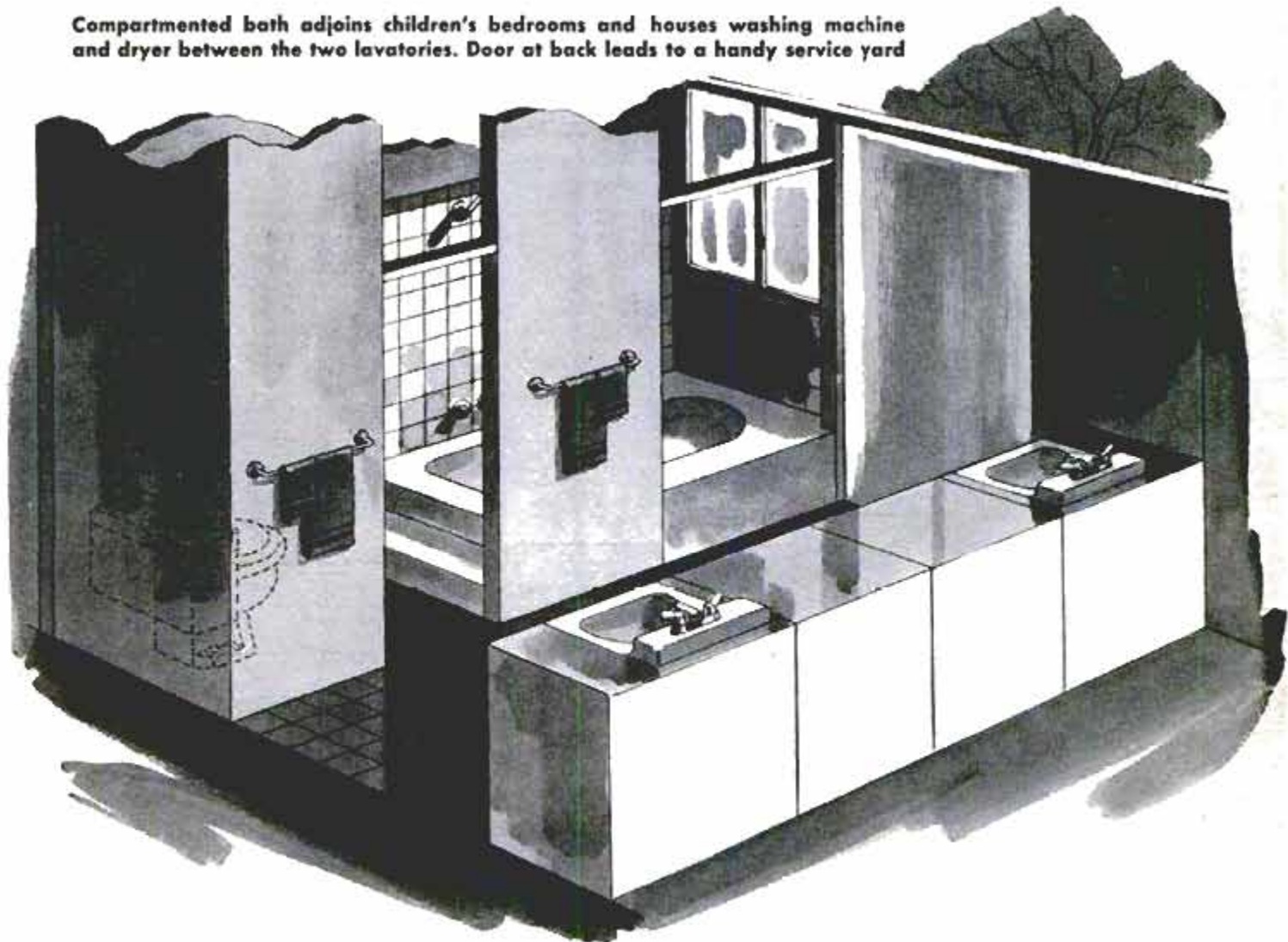
"From our experience across the country we know that the tremendous popularity of outdoor living is not confined to places like California, Arizona and Florida. Neither is the indoor-outdoor effect we strive for in our houses. We sincerely feel that the house we have designed for *PM* readers is sound in its design for any part of the country.

"The basic concept was to provide one room without a roof in the center of the house. As for building the house in Maine

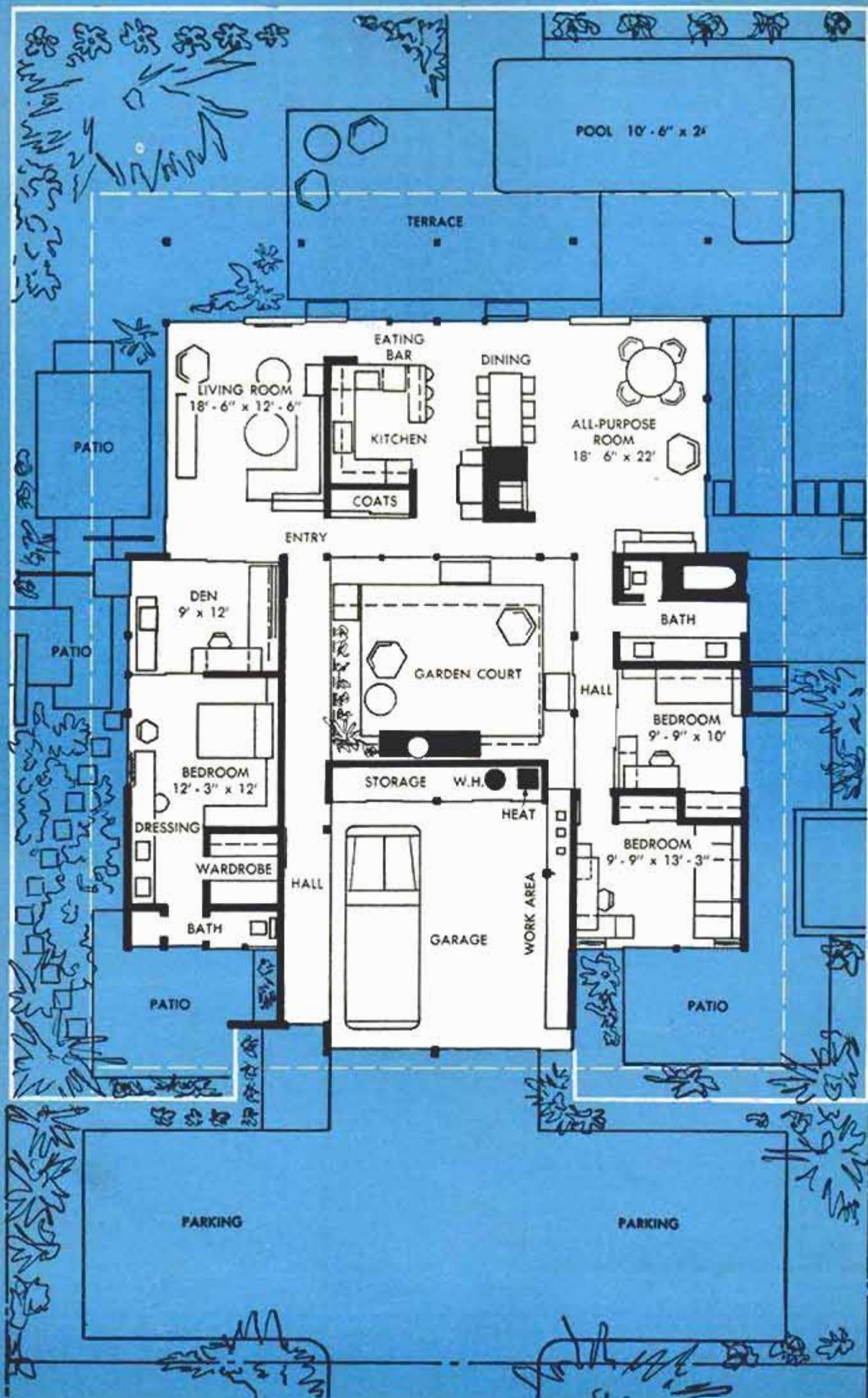
or Minnesota, it might require more insulation, but not much more. The room without a roof, if only slightly heated with radiant pipes in the slab, would keep the snow melted. Also, it seems to me, in defense of the glass areas, there is nothing more beautiful than to live within a glassy house and see it snowing with the standing white blanket on the ground. There would be more heat loss in cold climates, but if double glazing such as Thermopane were used this would be slight. I'm sure the gains in living experience more than justify the cost. The cost of building the *PM* house in California is \$25,000, not including the lot. The price will run higher in the East."

Emmons pointed out that the *PM* house is not only designed around a garden court, but provides access to the outdoors from every room—including the two bathrooms. There are five patios, not including a service yard and the big rear terrace. Also, the desire for privacy on the part of various members of a family has been respected. The bedrooms for both adults and children provide complete privacy, including private patios. Across the back of the house, the living section provides the free flow of an open plan and a feeling of

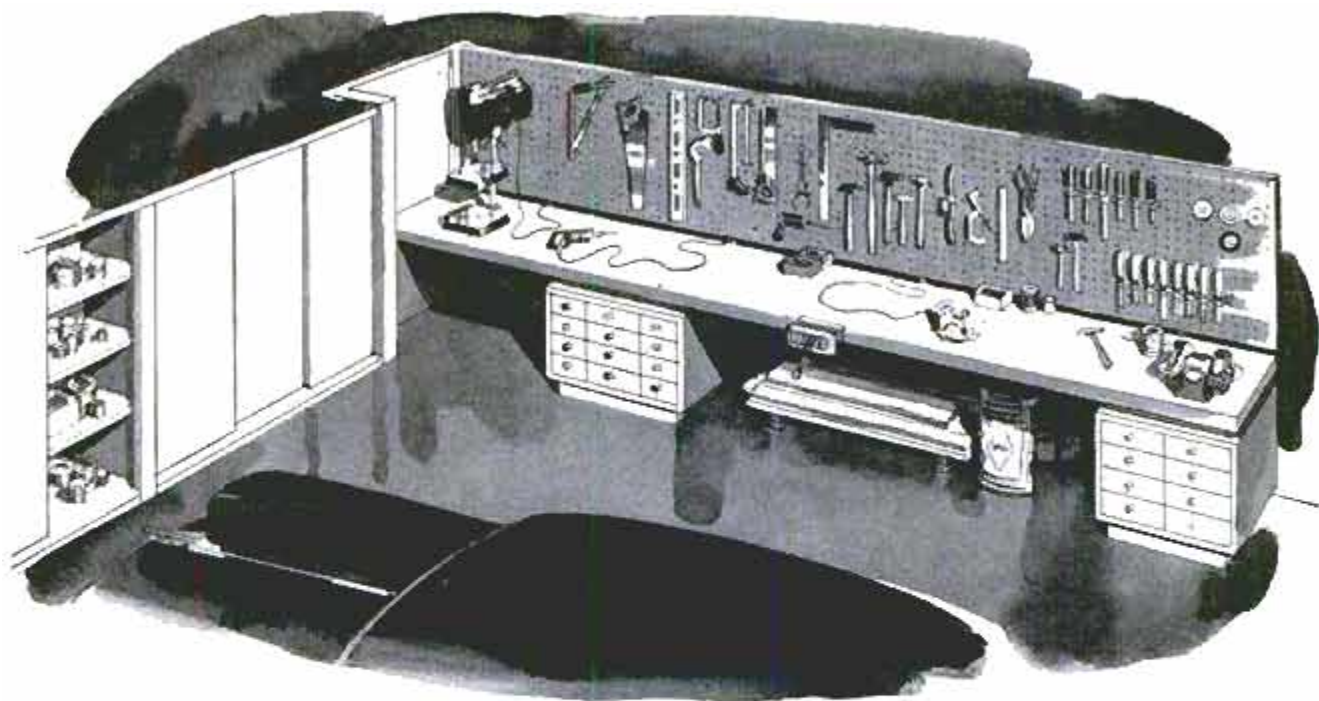
Compartmented bath adjoins children's bedrooms and houses washing machine and dryer between the two lavatories. Door at back leads to a handy service yard











The workshop is located on one side of two-car garage. Furnace and water heater are behind sliding doors

spaciousness—a benefit of open planning.

Let's walk through the house with architects Jones and Emmons, stopping here and there to observe some of its delightful and ingenious features. First of all, when you arrive before the low-slung redwood-and-glass facade of the home you discover that you do not have to park your car in the street. On either side of the wide driveway (that leads to the two-car garage at the center of the front of the house) is parking space for two cars. Thus, the driveway can be left free for the coming and going of six cars without a bottleneck.

"In planning a house today you have to consider that the coming and going of both family and guests is dependent upon the automobile," says Jones.

The garage in this house occupies 460 square feet and the living and sleeping units 1698 square feet. In addition to providing space for two cars, the garage has a storage wall across the back and accommodation for the water heater and furnace. A workshop is on one side with an 18-foot bench and a Peg-Board wall above it.

The entrance walk to the house proper leads past the garden court. No visitor can pass this feature of the house without stopping to admire the plantings and look up at the sky through the roof opening. Except for the planting areas, the floor of this court is textured concrete. The court is mostly surrounded by glass through which you can see inviting vistas of the interior.

"You might call this court the heart of the house," says Emmons. "It has many

uses, including outdoor dining protected from the wind and easily served from the kitchen. It can be a play area for small children, a lounging area for adults or an interesting place to entertain. This court is truly one more room in the house and with radiant heat could be used except for a few months in almost any part of the country."

As you enter the house, the living room is to the left of the entry; to the right a hallway leads to the kitchen "island," dining area and family or all-purpose room. As you step into the attractive living room (color scheme by the architects and furnishings to harmonize by Marshall Field and Company) you know what Jones and Emmons mean by the "indoor-outdoor effect." Except for a five-foot panel of redwood that extends to the studio ceiling, the two outside walls of this room are glass. A

side patio, the rear terrace and even the swimming pool (optional, of course) all seem to be an integral part of this living area.

Since the kitchen is an "island" with low walls around it, a guest may

stroll along the glass wall extending across the entire rear of the house, past the kitchen, built-in dining area and barbecue fireplace and the family room. But let's stop for a look at the unusual kitchen. The wall to the back above the sink and work counter slides back to afford a view of the terrace, pool and back yard. The enclosure provides all the conveniences of a built-in modern kitchen and to one side is an eating

(Continued to page 248)

Blueprints for the PM California House are available for \$15.00. Write: Plans Department, Popular Mechanics Magazine, 200 East Ontario St., Chicago 11, Illinois





Architect-authors of this article are, left to right, Gerald A. Perkins, Charles F. Norris and Miles F. Mulloy

*Three Successful Young Architects, Who Design Both Traditional and Contemporary Homes, Present*

## The Case for the **TRADITIONAL** House

*By Gerald A. Perkins, Charles F. Norris and Miles F. Mulloy  
Designers of the PM Traditional House*

**I**S THE CONTEMPORARY house with its low silhouette and glass walls the only answer? What are we going to do for the millions of people who still find delight in a picturesque "rose covered" cottage?

Before we consider the fate of people with tastes for traditional things, we would like to make one point clear. Our views as presented in this article in defense of the house of traditional design pertain only to homes. We are not talking about industrial, commercial and monumental buildings such as factories, hospitals, schools, municipal and office buildings. We have designed many of these—all functional and modern. When it comes to planning homes, we feel they should be tailored to individual tastes.

Going back into the early history of civilized man, we have learned that the first houses were one-room structures, each

with a fireplace in the center. Gradually, man improved upon this with the addition of other rooms, wings and even a second story. Changes in design through the years have been dictated by the needs of everyday family life.

For example, early settlers in the United States built a garrison-type house for protection from the Indians. There was a loft upstairs where women and children could hide and there were portholes for shooting. Before the days of central heating, people who could afford it had a fireplace in every room. In the ante-bellum South, the kitchen was a separate building.

Today we do not need a garrison-type house as protection from Indians, nor do we need a fireplace in every room or a separate kitchen building. We do, however, need a kind of architecture that will make

(Continued to page 256)

Architectural detail of traditional design is shown in PM Traditional (Popular Mechanics, October 1957)





Author Rudard A. Jones directs research into technical problems of getting most house for your money



*An International Authority on the Architecture of Modern Homes Presents*

## The Case for the **CONTEMPORARY** House

*By Rudard A. Jones, A.I.A.*

*(Director, University of Illinois Small Homes Council and chairman of International Cooperation Administration housing group)*

**WHAT MENTAL PICTURE** do you form when you hear the term "contemporary house"? Probably every one of us has a different response to this descriptive phrase and any discussion of the relative merits of the contemporary house versus the traditional house will be rather aimless until we establish an understanding of the meaning of the term "contemporary" when it is applied to house architecture in this year of 1958.

The term contemporary carries the meaning of "occurring or existing at the same time" and this would seem to indicate that all houses existing today are contemporary houses, but not one of us would agree to this statement. To my way of thinking, a contemporary house is a house of today—that is, a house that is designed and built to meet the needs of today's way of living.

This definition of contemporary is a rather broad one and it can be seen that no specific and detailed pattern can be established for the contemporary house. As a matter of fact, one of the designer's chief advantages of designing with this idea is that he has complete flexibility in developing a house to meet the pattern of today's way of life.

Today's living pattern has changed greatly in a relatively short period of time. Servants who live on the premises are almost nonexistent. This means that our houses have more and more mechanical equipment which, in turn, again changes the living pattern. To cite a classic example, Monday is no longer "washday"—an entire day devoted to the laundry task; rather a little washing is done each day. This is influenced by the automatic washer and its working

*(Continued to page 264)*

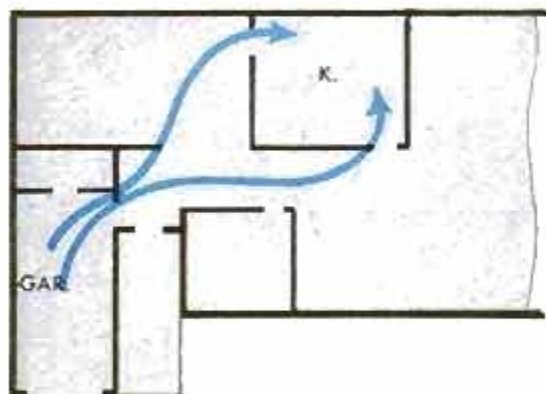
**Exterior of contemporary house reflects interior plan—large living-room windows, small bedroom windows**





# IS IT A GOOD

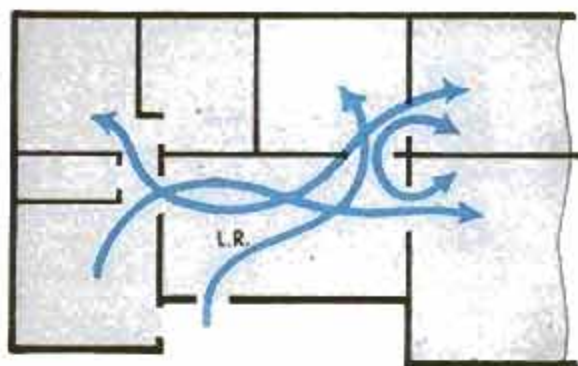
*All home designs should start with a plan that meets the family's needs for good living. The arrangement of space and facilities in a house should be studied carefully before you build or buy*



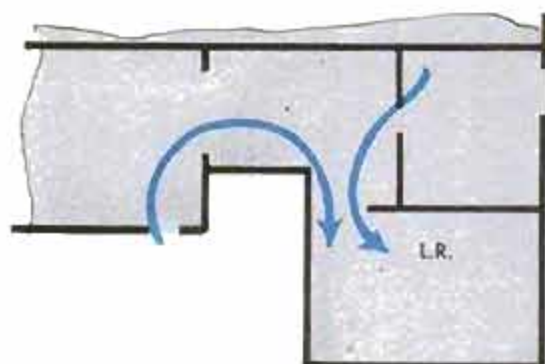
After you drive into the garage with groceries from the supermarket, how far away is the kitchen? If it's on the other side of the house, the plan is poor



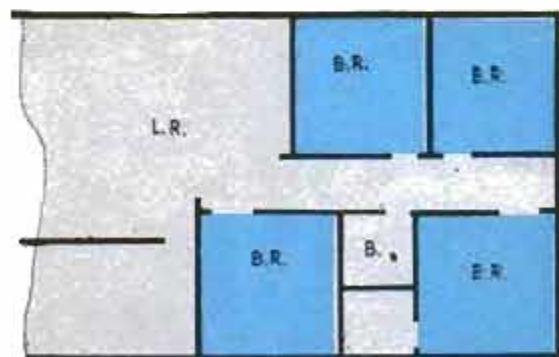
Direct access from the garage or driveway to the kitchen, as illustrated above, can be found in the more efficient and desirable types of floor plans



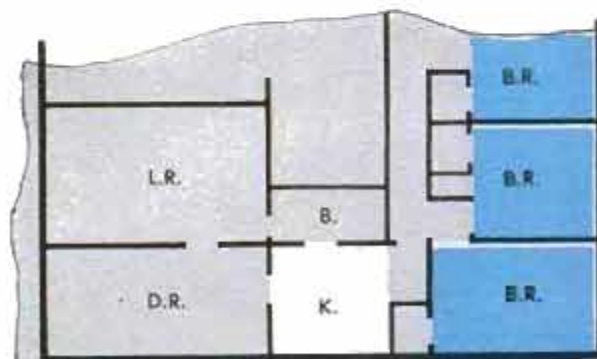
If all paths lead through the living room, it's a case of poor traffic planning. This room arrangement might give you the feeling you live on a freeway



In a better plan, the living-activity zone is in a "dead end" location. Access from the outside is fairly direct but the living room isn't a crossroad



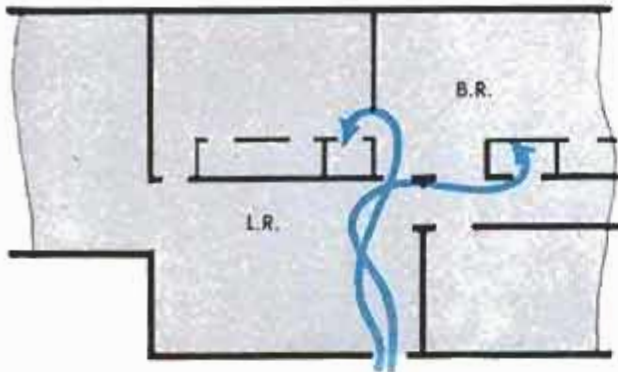
If there are small children in the family, it will be difficult for them to sleep when bedrooms are next to living-activity areas, as in the plan above



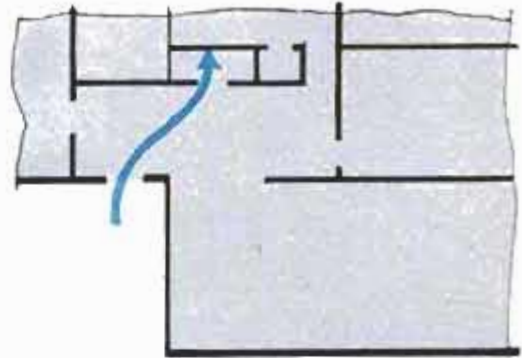
In a good floor plan, the sleeping area is isolated from the living-activity zone of the house. It permits adults to entertain without disturbing children



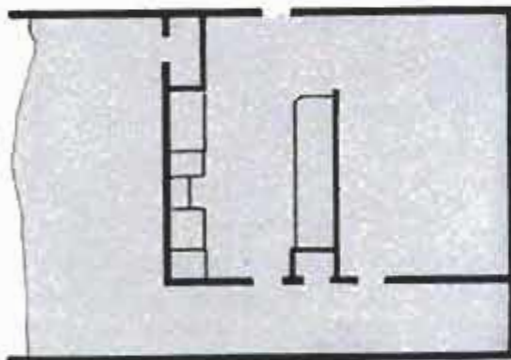
# FLOOR PLAN?



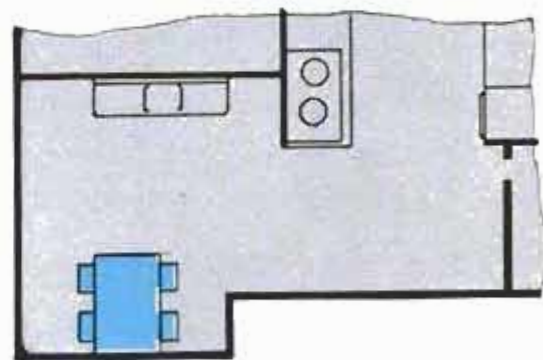
When visitors arrive on a stormy night, how far do you have to carry the dripping wraps before you can find a closet? Plan shown above would flunk this test



Good plan provides an entry closet near the outside door. Ample closet space in convenient locations is part of the secret of efficient space arrangement

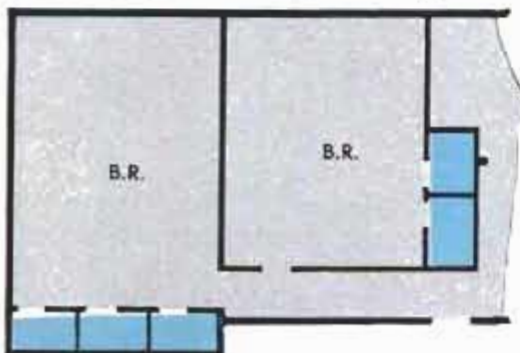


Kitchens should be planned to save steps but they also should provide room for eating facilities. Tiny kitchen above might reduce resale value of house

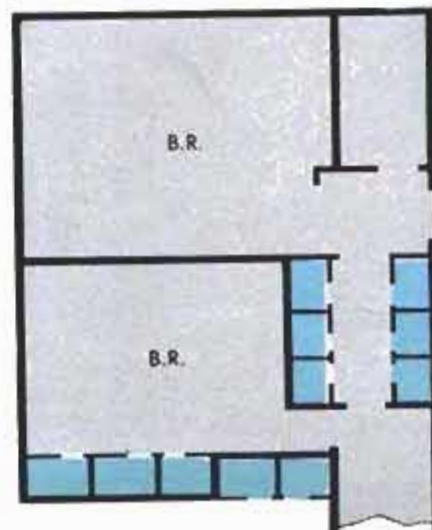


This plan has a larger kitchen and includes family dining space. Many surveys show majority of homeowners eat at least part of their meals in kitchen

Bedroom arrangement below makes poor use of available space for closets and requires long, narrow hallway



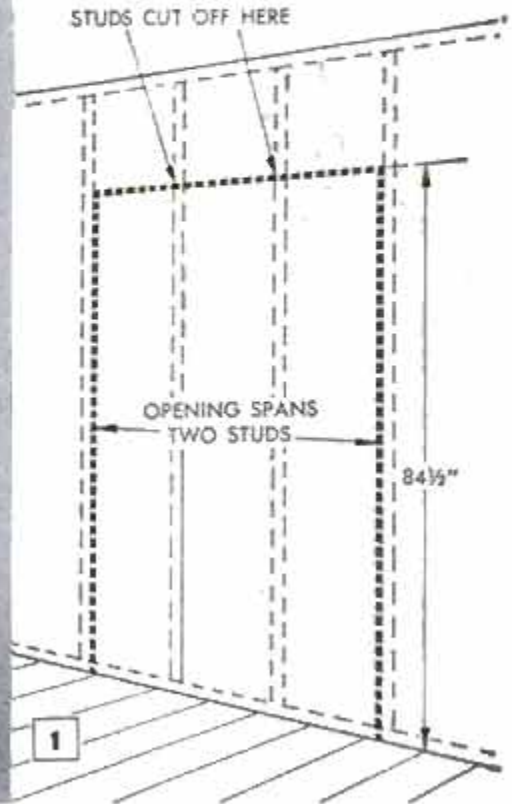
Plan at right shows how closet space can be gained in the bedroom zone by more effective arrangement of the total area. The master bedroom also gains a dressing room





1240

# FRAMING



***It's a job the week-end carpenter can handle. Hardest part is chopping the hole and lugging out the old plaster***

**H**OME REMODELING may bring you face to face with the problem of framing a new doorway between rooms. If it does, here's how to go about it with the least fuss and mess. Where it is not critical that the opening be located in a precise position, less work is required by letting one of the wall studs form one side of the rough opening. Your first step is to locate this starting stud by tapping wall lightly with a hammer. You'll detect a solid sound when you are over a stud. Spot the side of the stud by probing with a nail. Since most studs are spaced 16 in. on centers, you'll have to measure over at least two studs as shown in Fig. 1, to accommodate a standard 2-ft. 8-in. door. As for height, the opening is marked 84½ in. up from the floor to accommodate all standard 6-ft. 8-in. doors.

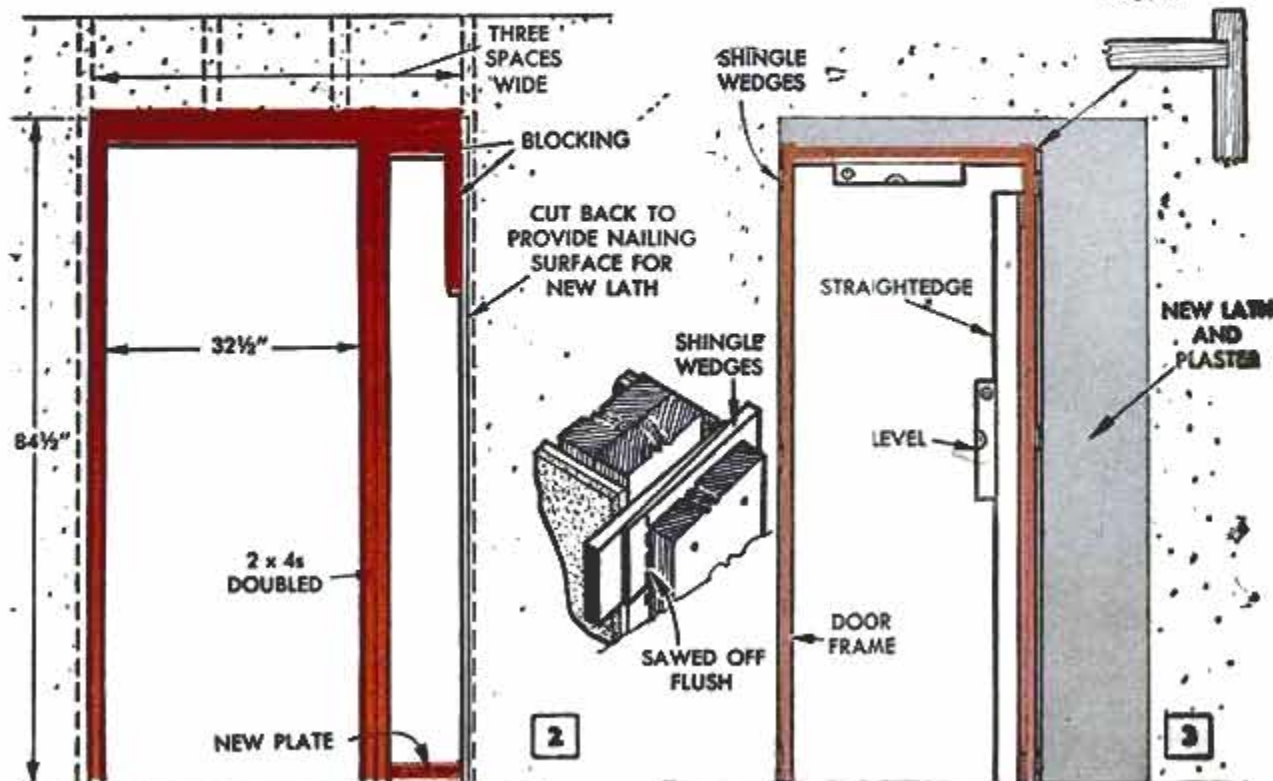
Cutting through plaster will raise havoc with the teeth of a handsaw, so use a saw you don't care much about. An electric handsaw fitted with a cutoff wheel will go through both plaster and lath like butter. Cutting through is done on both sides of the wall before starting the messy job of removing the old plaster and lath. Keeping

the household vacuum sweeper at hand while you're hacking away will help some in keeping up with the plaster dust. With the lath and plaster removed, your next step is to saw off the studs at the top of the opening and the 2 x 4 plate nailed to the floor. Fig. 2 shows how the rough opening is framed with 2 x 4s, headers being first spiked to the severed ends of the overhead studs and then wedged with studs from below. In framing the rough opening, add 2 in. to the width of the door being used. A 2-ft. 6-in. door will require a 32-in. opening; a 2-ft. 8-in. door requires an opening 34 in. wide. This allowance provides a ½-in. space all around for setting the doorframe plumb. Double up on the studs as shown and spike a new plate to the floor.

Now, fill in the space at the top and side with plasterboard or gypsum lath. Here the old plaster is first cut back along the side with a chisel for a distance half the thickness of the stud, to provide a nailing ledge for the new lath. The fill-in strip over the door is merely nailed to the doubled headers. The lath is now plastered. A prepared plaster mix requiring only the



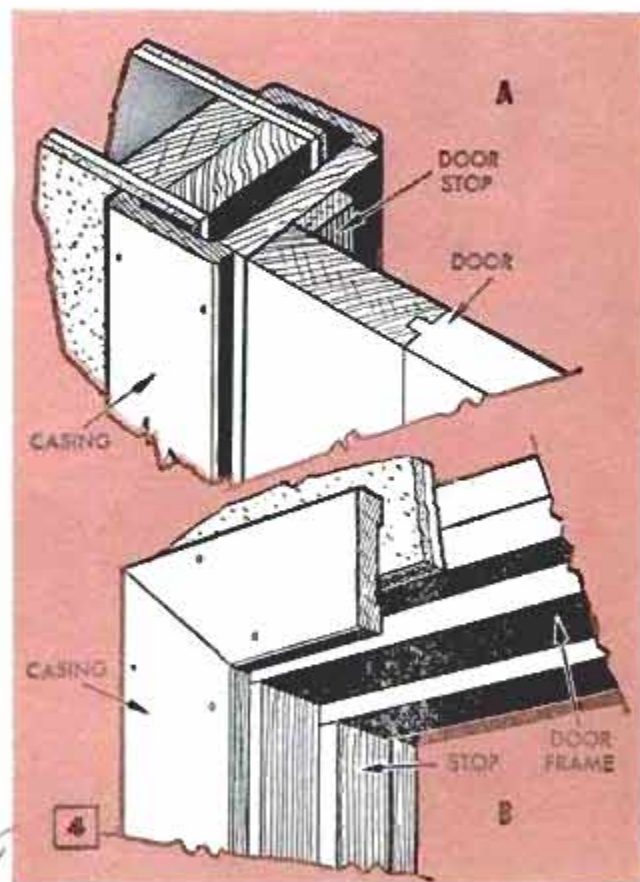
# A NEW DOORWAY



addition of water is available at your building materials dealer. To help you keep the plaster at a uniform thickness,  $\frac{3}{8}$ -in. wooden strips, or scraps of plasterboard, 1 in. wide, are nailed across the top and down the side of the opening. These are called plaster grounds and serve as gauge strips in striking off the new plaster evenly with the old. Wet the edges of the old plaster beforehand so they won't absorb the water too rapidly from the fresh plaster, and feather off new plaster where it joins the old. Where wall is to be papered, you can get by with a less-perfect troweling job.

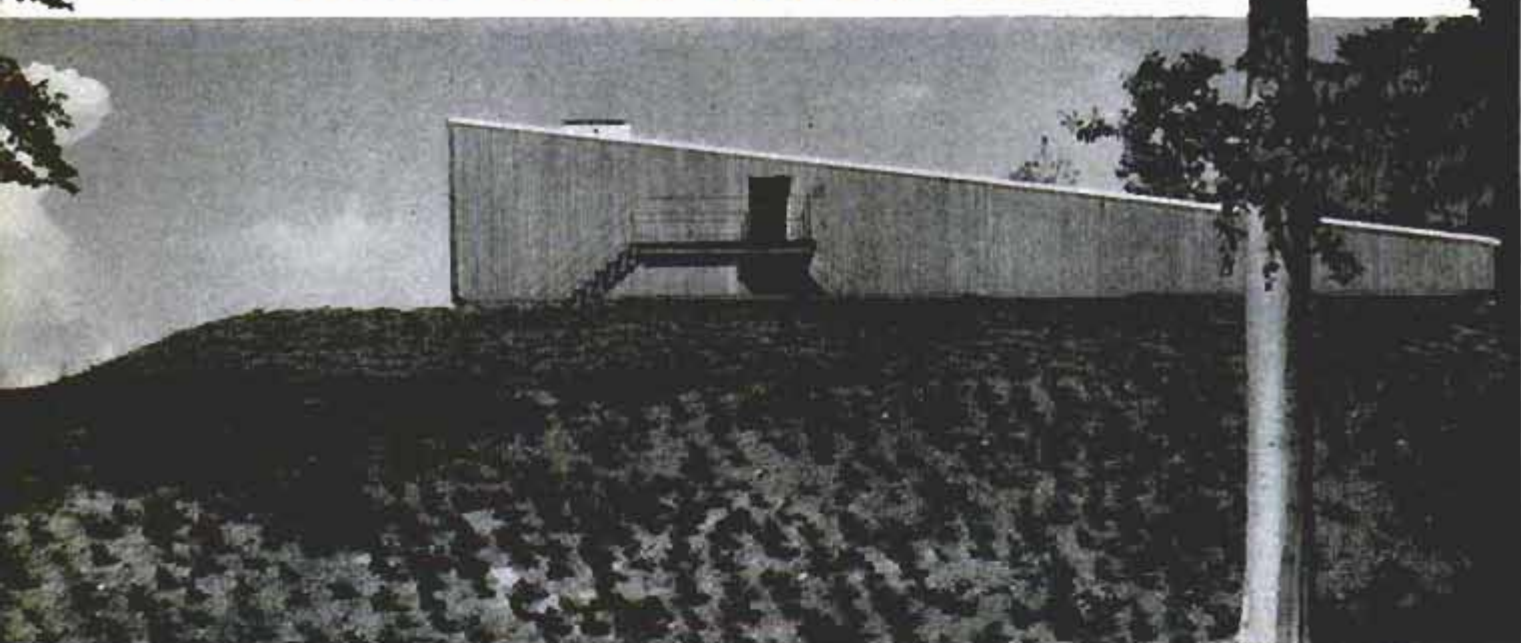
Now comes the doorframe. This you buy with the door, or separately where an old door is used. Fig. 3 shows how you go about plumbing the jamb pieces from top to bottom with a long straightedge and a level. The jamb is kept plumb by wedging at three points. A few wooden shingles make dandy wedges. Two finishing nails are driven through at the wedges to anchor the frame to the studs. Details A and B, Fig. 4, show how a mitered facing trim, called a casing, is applied around both sides of the opening. This is standard-trim stock and is centered on the edges of the jambs and header members of the frame as shown. The baseboard will have to be cut back to let it butt against the casing trim. This leaves hanging the door and applying the door-stop molding.

Cutaway details below show typical framing of door opening. Positioning of door itself is determined by direction of swing, in or out. Regular casing nails are used to fasten the trim as well as the frame





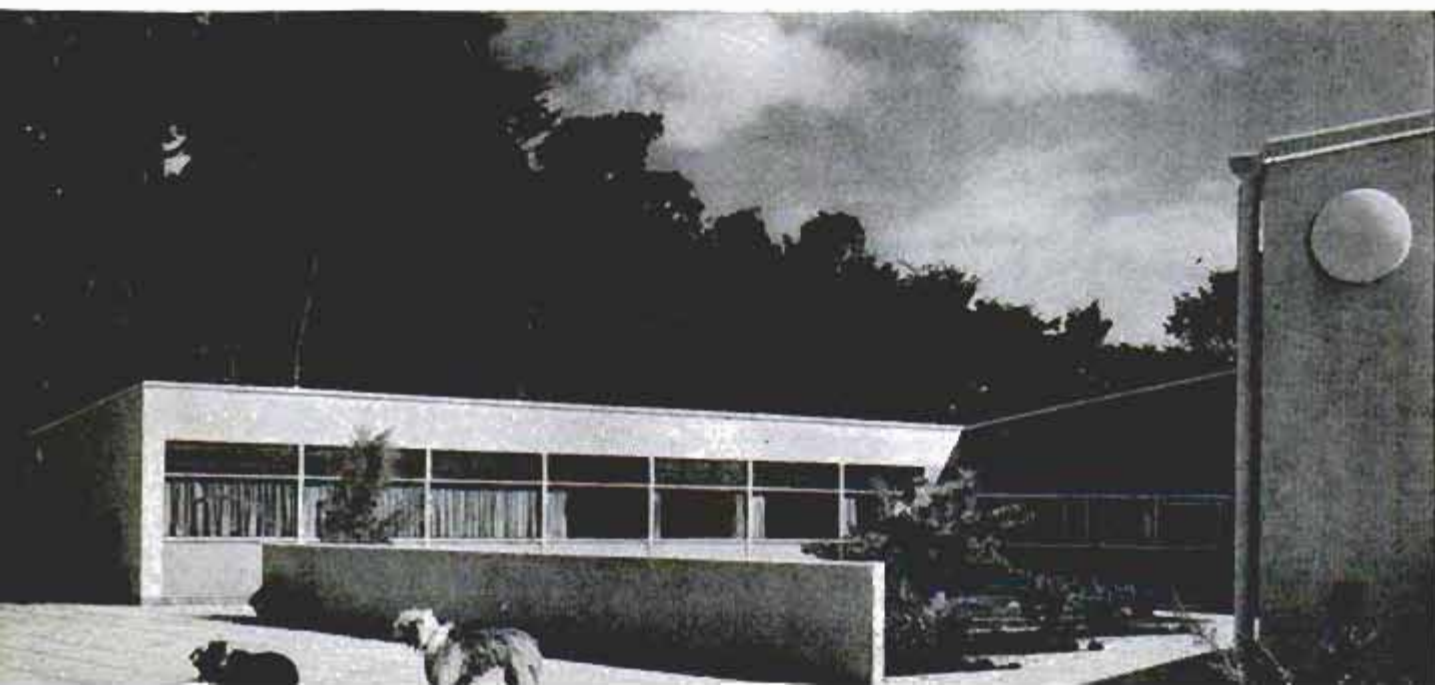
# HOUSES 'ROUND THE WORLD



## DENMARK



Ever wonder what sort of house you might call home if you lived in another part of the world? In many countries you would find attractive modern homes that combine the flavor of their country with fine architectural skill. In Denmark, for example, you would see houses of contemporary design, with vinyl floor covering, double-glazed windows and floor heating systems. The house pictured on this page was built for a family with three children. It was erected on a high site overlooking the Danish coast. Bedrooms for the parents are in separate wings but all the bedroom windows face south. The shed-type roof slopes from front to rear so that the living room has a very high ceiling and the kitchen a low ceiling







In the tropical regions, where ventilation is a more important factor than heating, a house may have "wall to wall" louvers which can be opened or closed like Venetian blinds. New home-building techniques in Puerto Rico place great emphasis on reinforced concrete and stone

In France, for the equivalent of \$30,000, you can buy a four-bedroom home with thick stone walls. Each bedroom has a small dressing room and lavatory. The living room and hallway have marble floors. The roof is covered with antique-style tiles. The house has automatic oil heat



Prefabricated components are used in this British home which costs about \$11,000, including such incidentals as paving and legal fees. Purchasers are given a written guarantee that the materials and methods conform to standards prescribed by the National House Builders Council



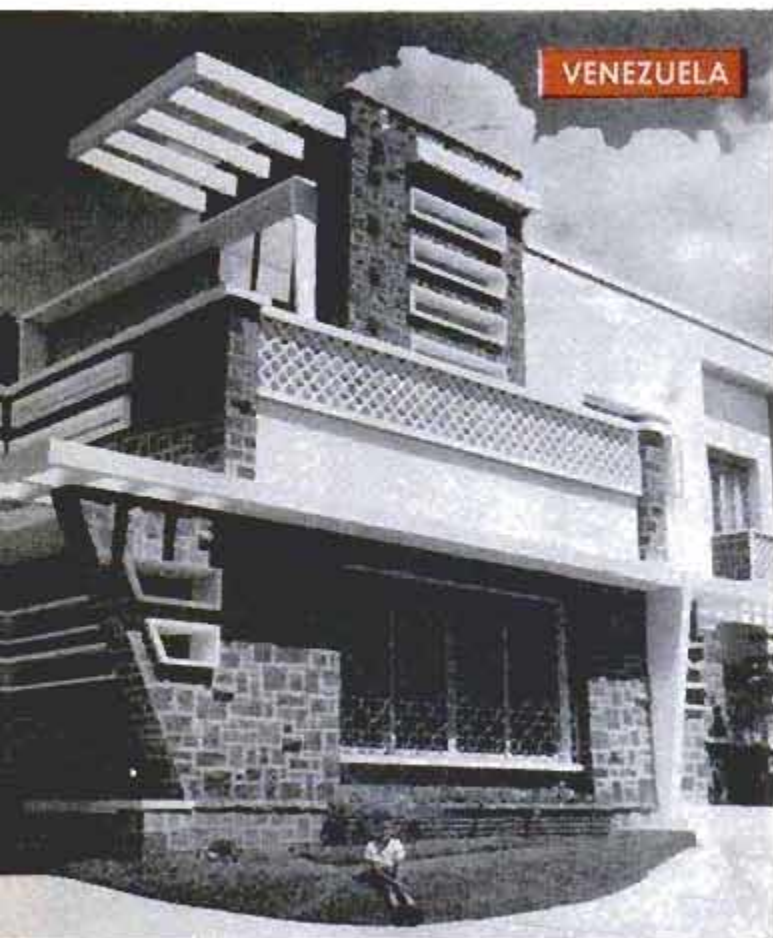


MEXICO

Built of steel and concrete on lava outcropping, this Mexican home has inside walls paneled with mahogany

Modern design but retaining Spanish grillwork, house below has concrete-block walls with stone facing

House design in Quito ranges from Hollywood stucco to North African Moorish, like this small "castle"

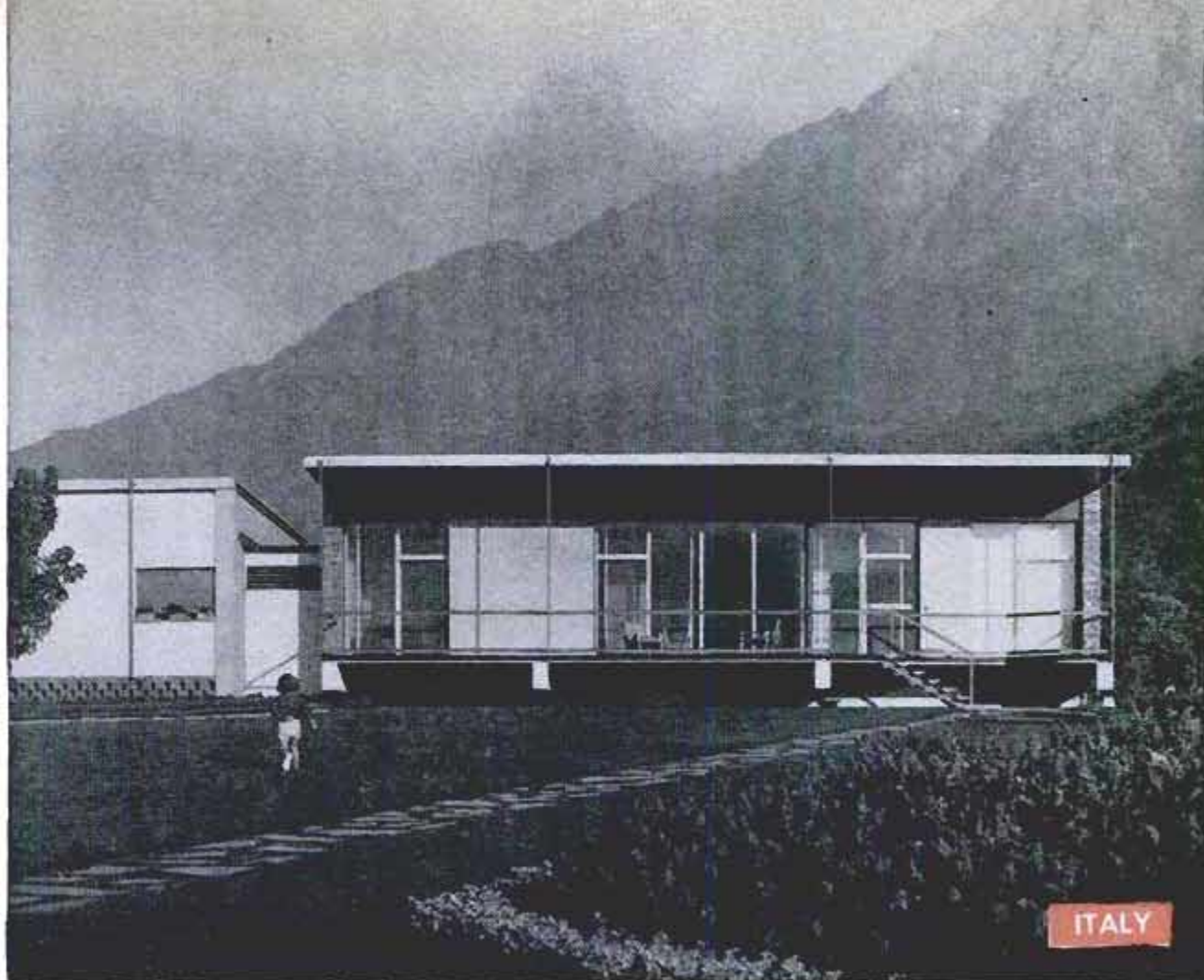


VENEZUELA



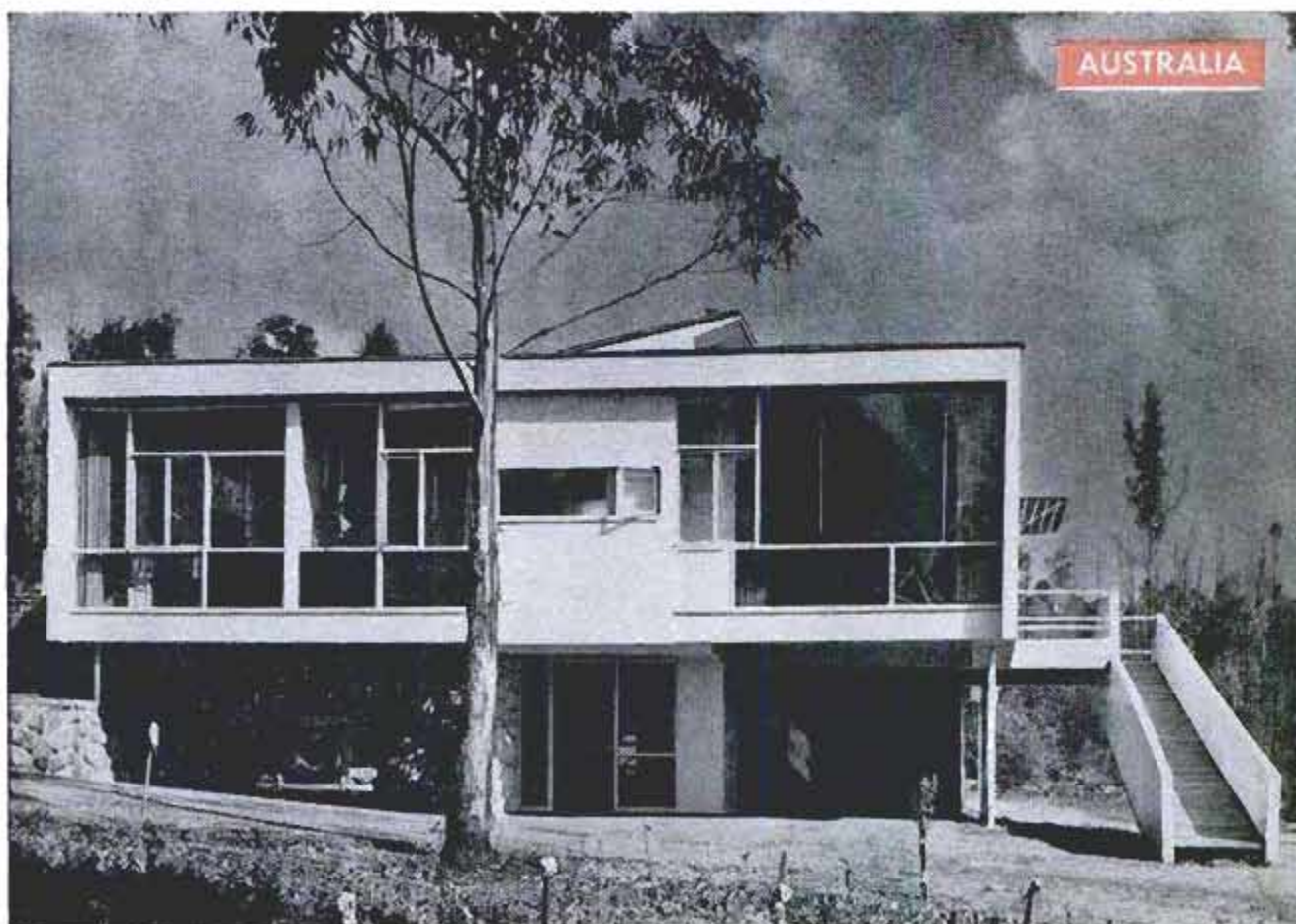
ECUADOR





Stone, glass and varnished-hardboard panels are used in this modern Italian home on the shore of Lake Como

Prize-winning Australian home has double carport, three bedrooms, sun deck. Steel columns support house







BRAZIL

Butterfly roof, long balcony and grillwork are features of a spacious contemporary-style house in Sao Paulo



SWEDEN

Six-room Swedish home has laundry, patio, central heating. Price of \$9000 includes refrigerator and range. Many things are up to date in Boma, including installment-plan financing for purchase of these bungalows



BELGIAN CONGO





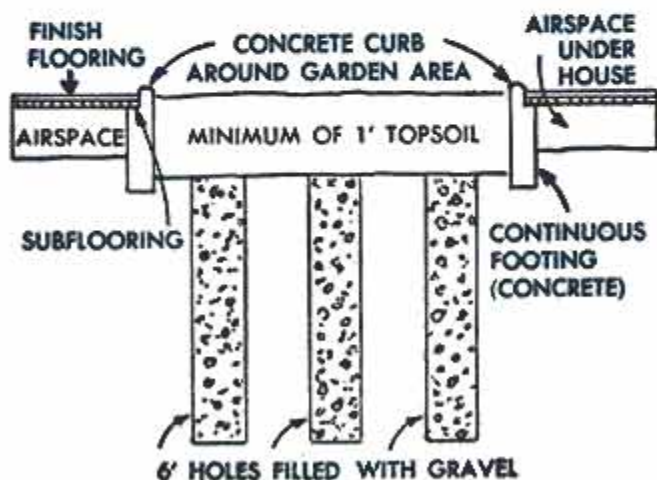
Skylights in ceiling provide adequate source of natural light for this garden planted beside a room divider



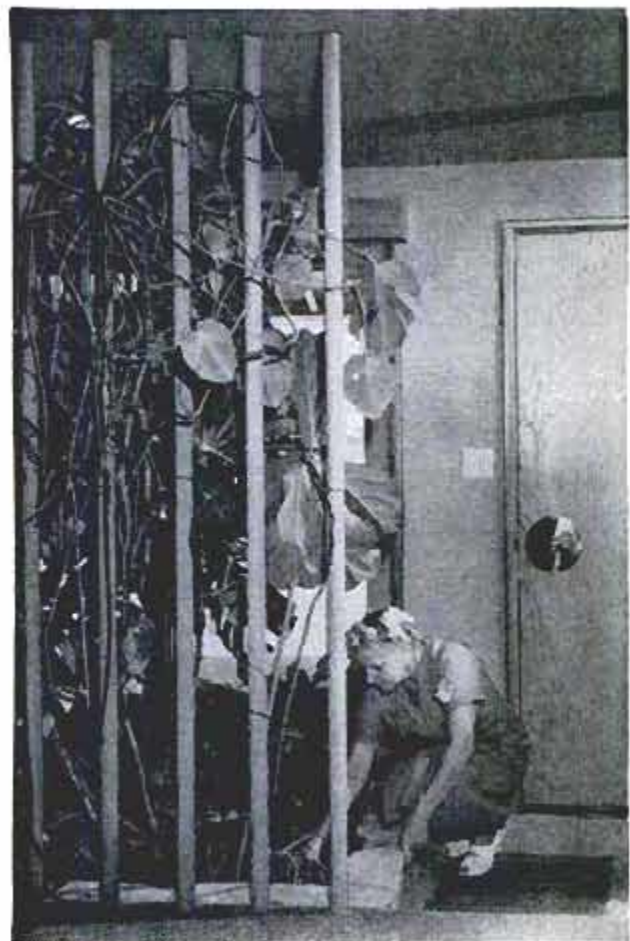
## Bring Your Garden Indoors

**PLANTS**, whether big tropical varieties or small succulents, add a dramatic touch to the interior of any home. And modern building ideas make it easier to have an outdoor-size garden in your living room the year around. Skylights, for example, can provide enough sunlight to grow many kinds of plants along an inside wall or a room divider. And large windows near an outside door will sustain an attractive entryway garden.

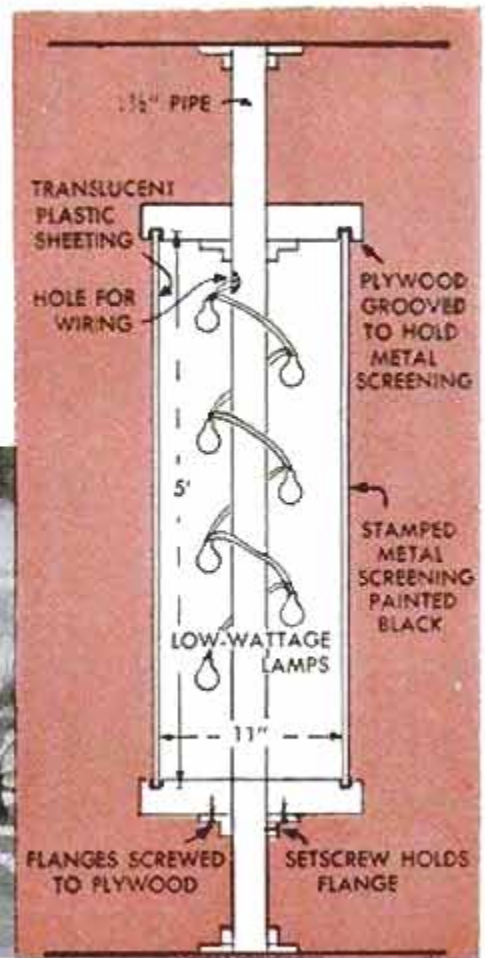
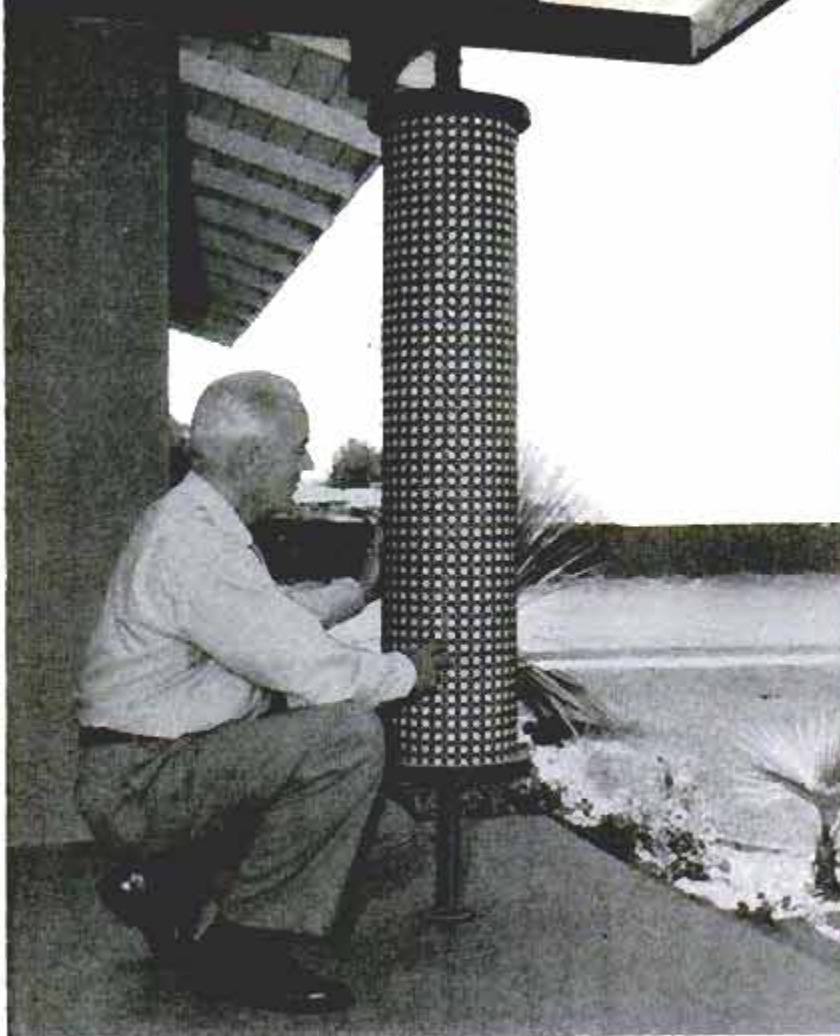
In basementless homes an indoor garden can be built directly upon soil beneath the floor, as shown below



Indoor garden also can be located near the front door. The light source here is an entryway window







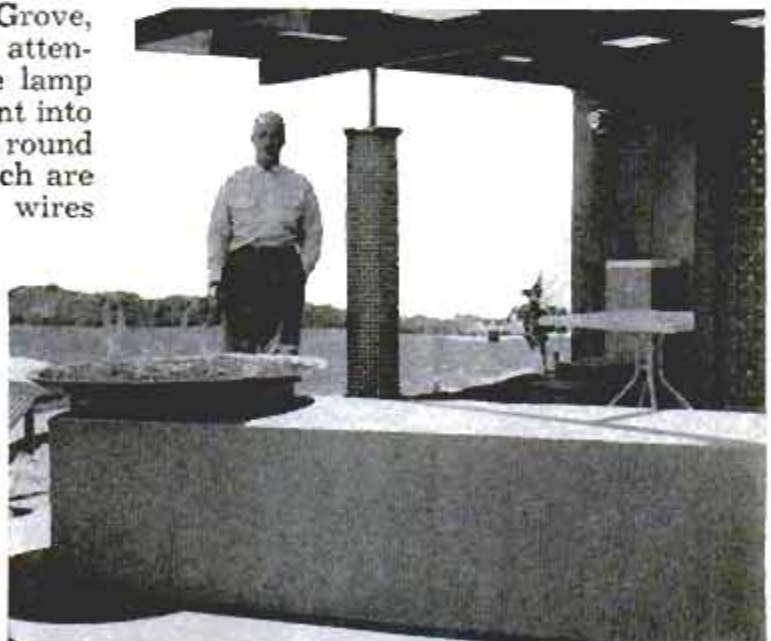
Vertical patio light is made of stamped metal screening over plastic, and casts a soft glow over terrace

# EYE STOPPERS FOR THE PATIO

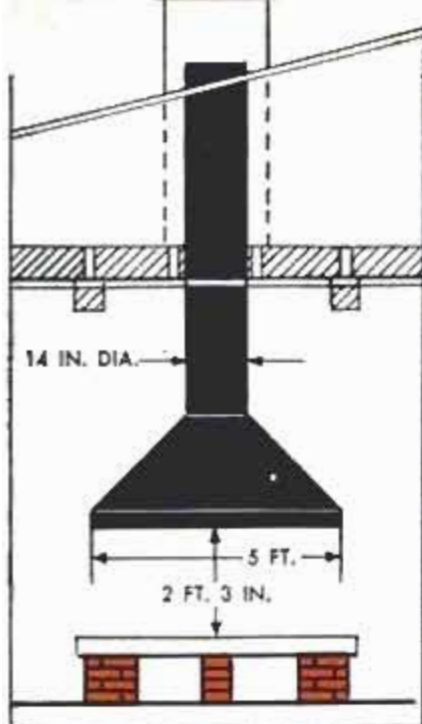


SOMETHING DIFFERENT for the patio in the way of an attractive light fixture was devised by Henry Cox, Garden Grove, Calif., subdivider and builder, as an attention-getter for a display house. The lamp consists of a stamped metal sheet bent into the form of a tube and fitted into round plywood top and bottom pieces which are secured to a central pipe. Electric wires come down inside the pipe. Translucent plastic sheeting fits inside the decorative metal screen. Cox uses seven low-wattage lamps in the fixture. A grill, or fire pit, was made from the end of a metal tank four feet in diameter. It is fitted with a circular gas pipe with holes drilled every few inches for the escape of gas, and covered with lava or pumice gravel. When the gas is turned on, it seeps up through the gravel and is ignited.

Gas-fed grill is a bowl of gravel covered with dancing flames and serves for barbecuing or as fireplace







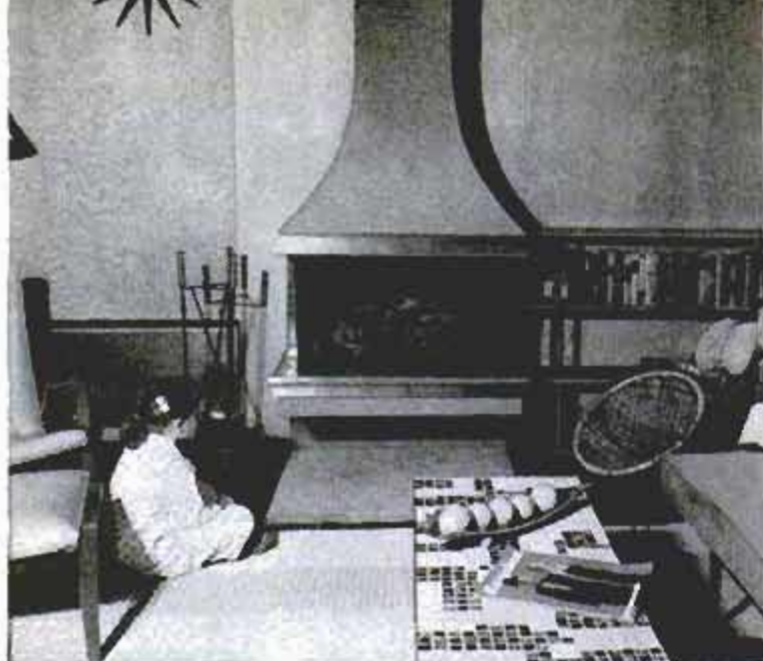
Informality of modern living is accented by this open fireplace on a circular island in the family room

## **FIREPLACES** - *With Imagination*

**W**HEN Mr. and Mrs. Robert Johnson of Glen Ellyn, Ill., added a large family room to their ranch house they wanted something different in the way of a fireplace. They told their architect, Francis W. Allegretti, they wanted a "sociable" fireplace where a dozen people could sit around and talk back and forth. He designed a circular-island fireplace with a metal hood and packaged chimney. The hearth, made of three-inch-thick reinforced concrete, is 5½ feet in diameter. It rests on

five brick piers. The cone-shaped hood is five feet in diameter at its base and tapers to 14 inches at the top, where it is welded to a 16-gauge metal flue. The fireplace is designed to operate without forced draft, but the architect warns that all specifications must be carefully followed or the fireplace may not function properly. Modern fireplaces can be as distinctive as modern homes. Whether you prefer conventional masonry or a prefabricated unit, the right fireplace can be found to suit your taste.





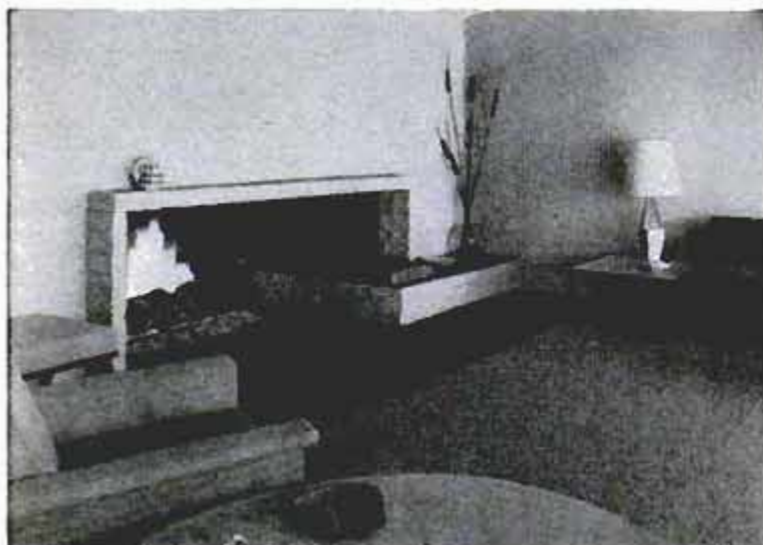
A. C. Welding and Fabricating Co., Phoenix, Ariz.

Packaged fireplaces now on the market range in price from about \$100 to about \$400, a fraction of the cost of adding a conventional fireplace to most houses. The prefab unit above can be installed in approximately six hours, using only simple tools. It has a ceramic firebox and stainless-steel trim



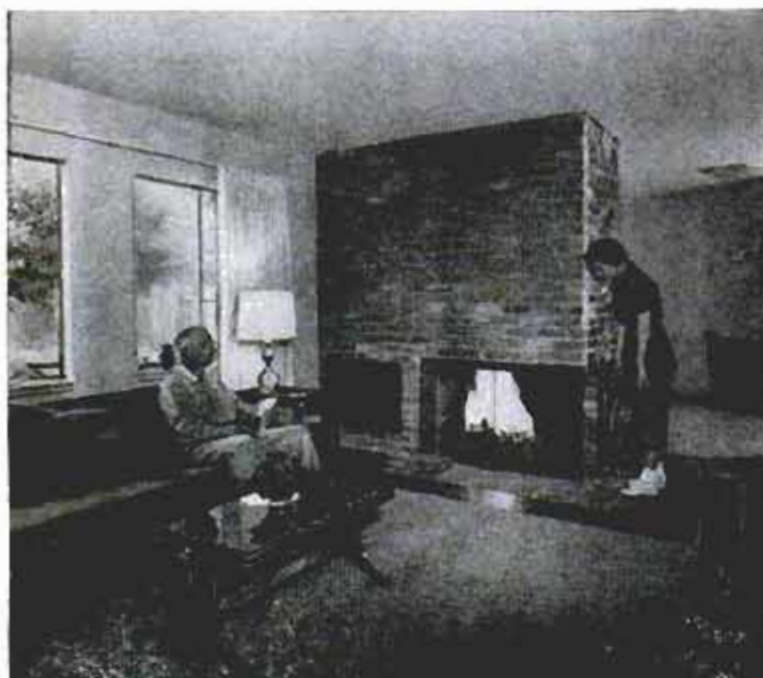
Hoops, Chicago, Ill.

An open-hearth fireplace that can be adapted to either modern or traditional rooms is available in several decorator colors. Conical hood is made of 18-gauge steel. Unit can also be used on a patio



For those who prefer the conventional masonry-type fireplace, there are styles that match the long, low lines of modern ranch-house designs. This fireplace, by Cliff May, features an extra-wide hearth

Another distinctive use of conventional masonry fireplace styling in a contemporary home, lower left, features a wide brick wall that doubles as a room divider. Wood is stored in a cabinet beside the hearth

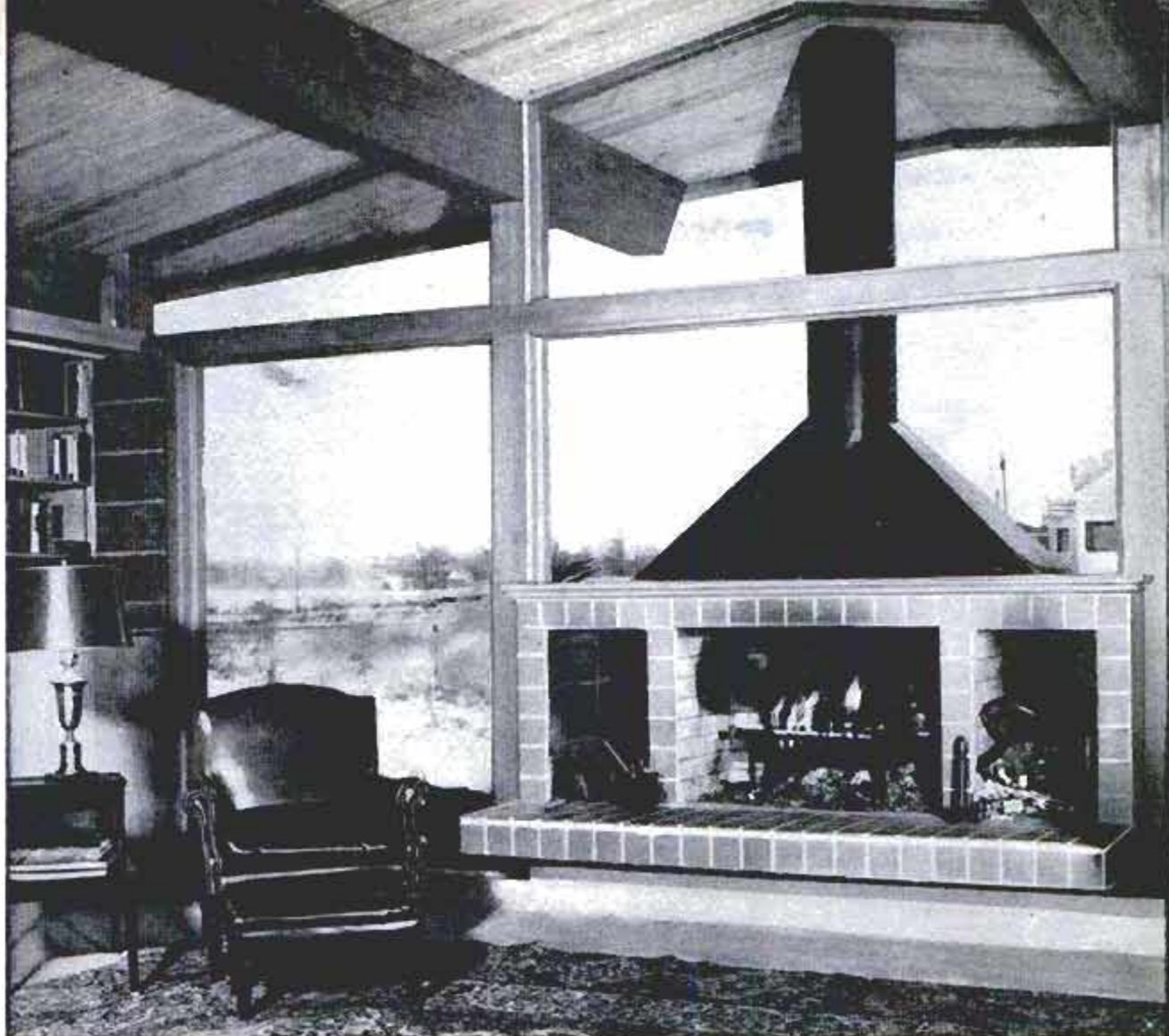


Sears, Roebuck and Co.

POPULAR MECHANICS

*Kenner "Free-Standing"*





National Concrete Masonry Association

Here's one way to work a fireplace in an open-plan house design. If you look closely you'll see that the chimney, hood and most of the hearth are outside house. The wood-storage bins can be filled from the outside. This masonry fireplace is designed to blend with the walls of the house built of concrete block

Prefabricated fireplaces now fit into kitchen-planning schemes. The small unit, right, can be used as an indoor charcoal-cooking grill for rainy-day barbecues. Most prefabricated models are pretested to insure proper operation. They can be installed in summer cabins or in nearly any room of your house

← Although prefabricated fireplaces frequently are located against or within a wall, they also can be used as free-standing units. The lines of the fireplace at left blend with the surrounding decorating scheme. This unit is vented directly through the roof, but it could be connected to an existing chimney



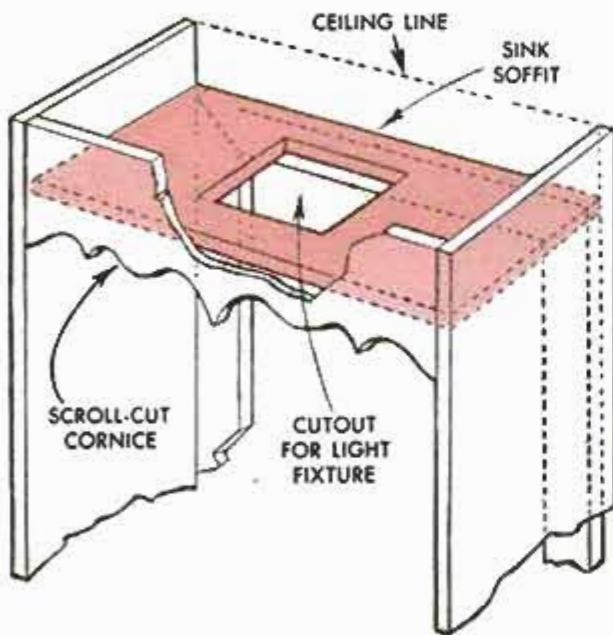
American Slitem Co.





## OVER-THE-SINK KITCHEN LIGHT

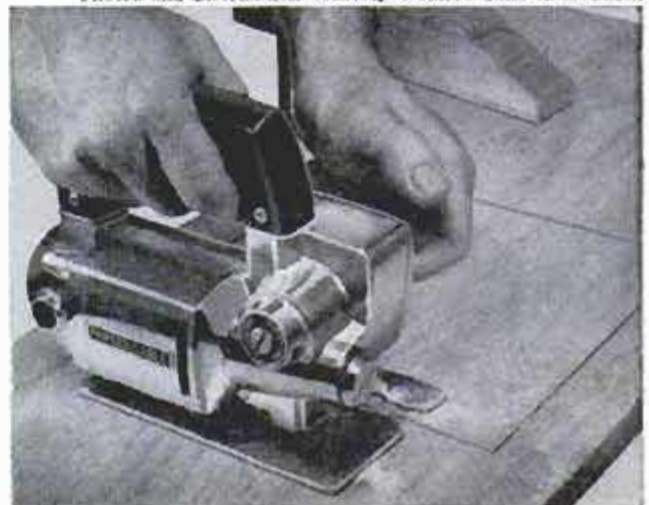
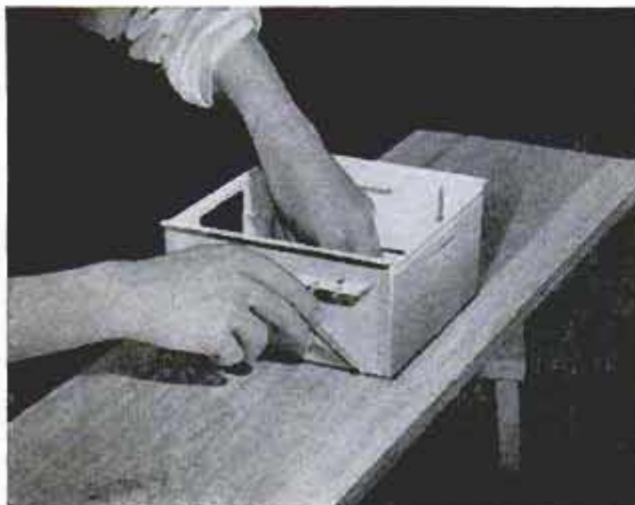
ANY KITCHEN remodeling plan should include adequate lighting over the sink. If an existing scroll-cut cornice under the sink soffit is deep enough, a flush light can be set in simply by installing a false ceiling behind the cornice. An opening is cut in the piece of wood used for the "ceiling" and the light is fitted into it. If the present cornice is too shallow to accept the light, it must be replaced with one of sufficient depth. First step in the operation is to hold the light in place, as in the upper left-hand photo, to determine its position. Measurements taken then are transferred to the ceiling board, and the opening is marked by using the light shell itself as a pattern, lower left-hand photo. A portable power jig or saber saw, speeds up the job of cutting the opening, lower right-hand photo, but it is only a little more work to drill holes in the four corners and cut between them with a keyhole saw. The detail shows how the ceiling board is positioned behind the cornice. Quarter-round molding can be used both to hold the ceiling in place and as a trim.



Detail above shows how false "ceiling" is located behind scrolled cornice to permit installing flush light. Below, light box is used to mark opening

Below, portable power saber saw makes quick work of cutting opening. Without power saw, drill holes in the corners, cut between them with keyhole saw

Photos and information courtesy Western Pine Association

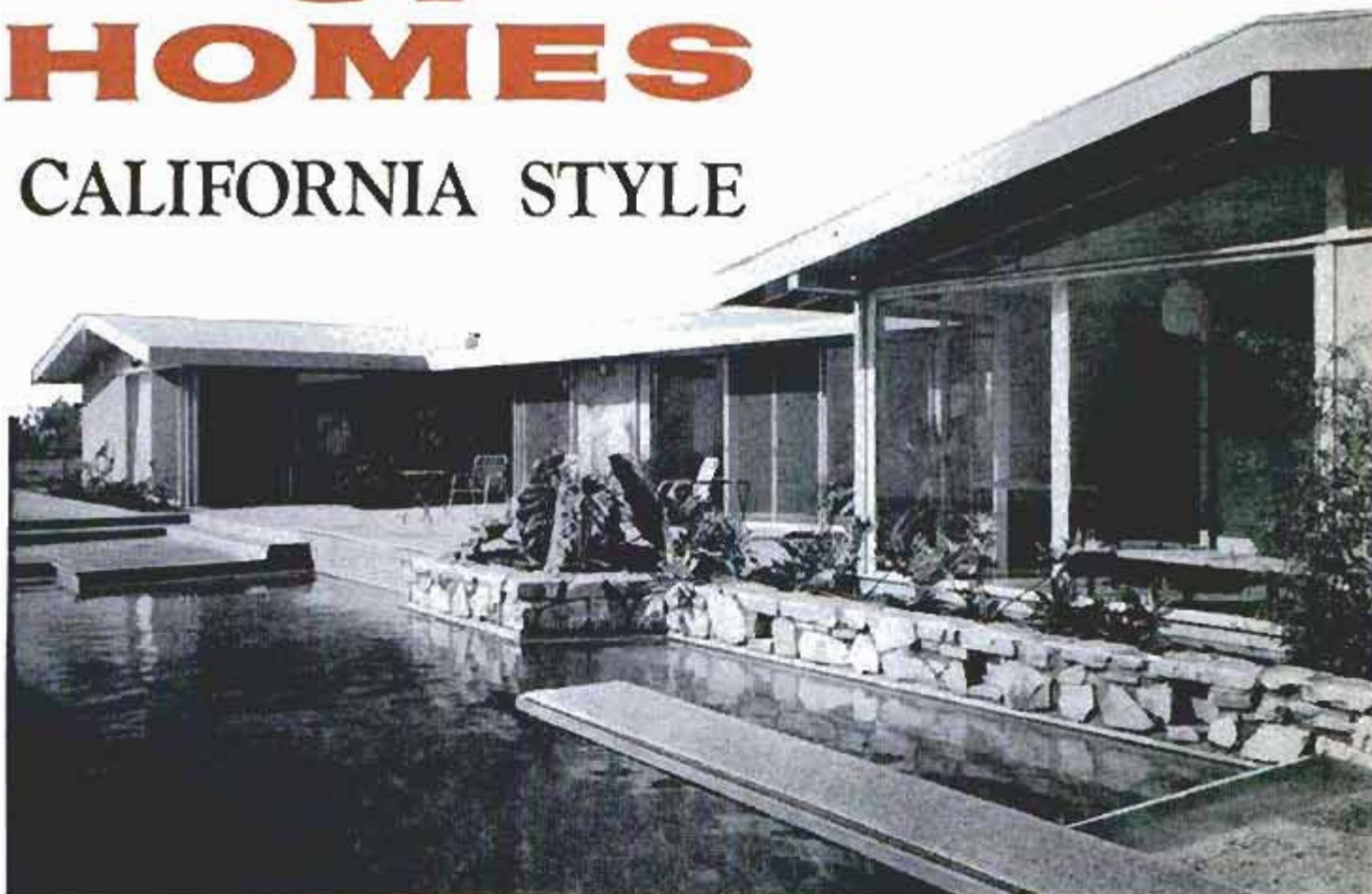




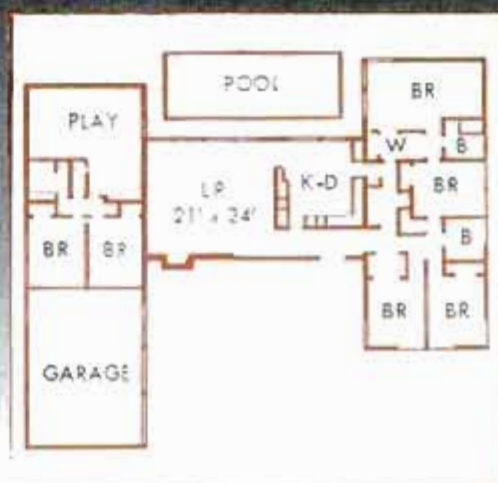
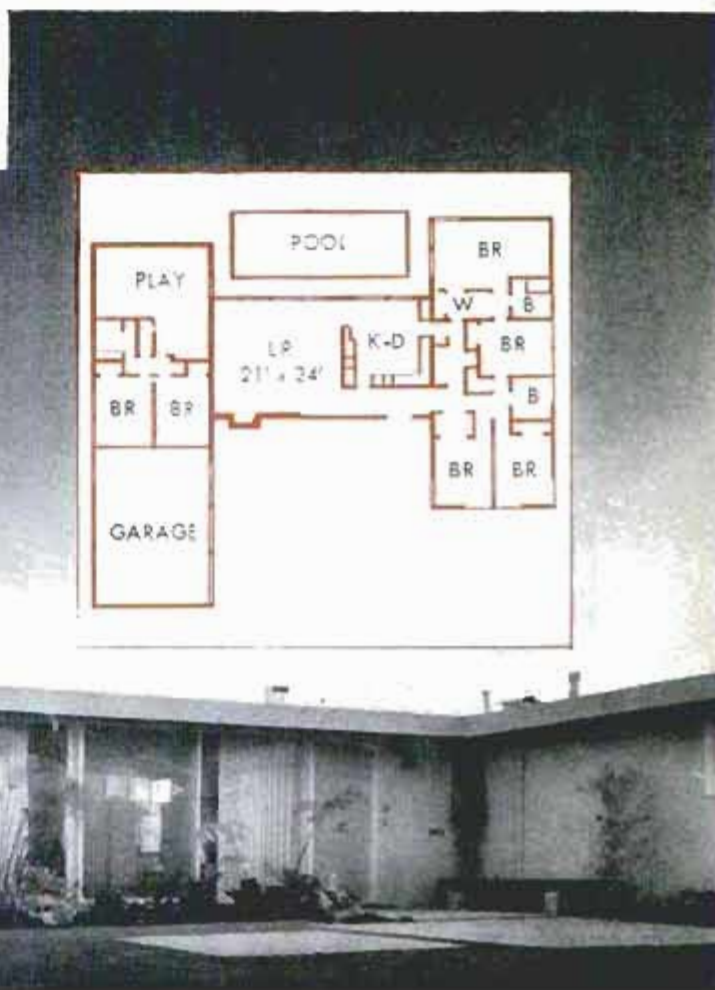
# PARADE OF HOMES



## CALIFORNIA STYLE



Contemporary California ranch style at its best is shown in this large home (2500 square feet) designed by Cliff May and built by George Pardee in Los Angeles. The rear terrace (above) and pool are closely linked to the living areas. Entrance court (below) is flanked by garage







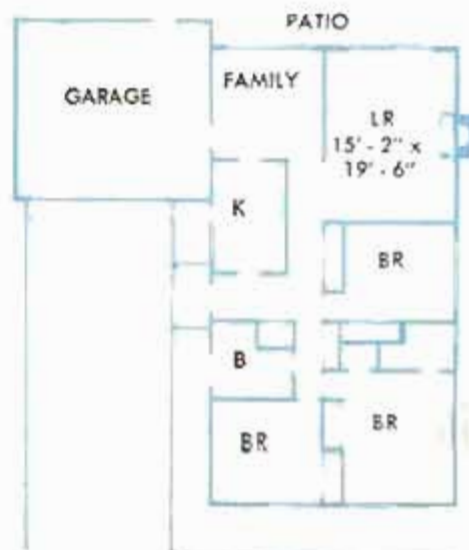
Sliding glass door in the dining and family room opens on garden-patio area for indoor-outdoor effect



Side entrance is handy for both family and guests. The wing wall at front makes house appear larger. Living room (below) is at rear with glass doors opening onto the private garden



THE HOME shown on this page has 1500 square feet of living area and was built near Santa Clara, Calif., by the David D. Bohannon Organization. Features include glass doors at rear and a kitchen with many built-ins. The home sells for \$19,250 including dishwasher, garbage disposer, landscaping and fenced back yard. Foundation is steel-reinforced concrete slab. The architect for the Bohannon "California Colonial" is Mogens Mogensen, A.I.A.



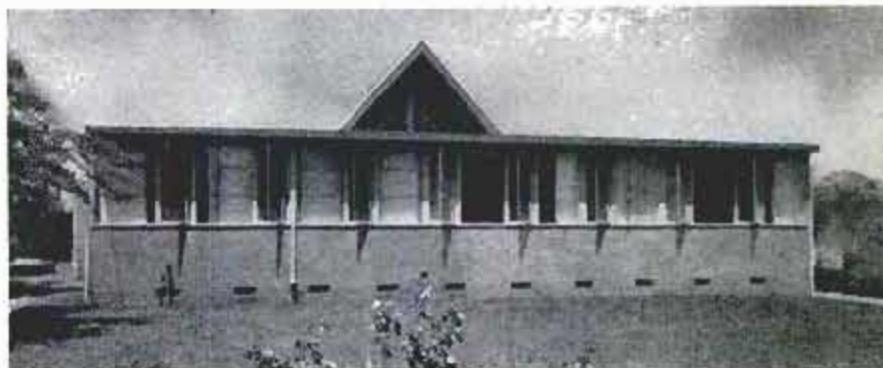




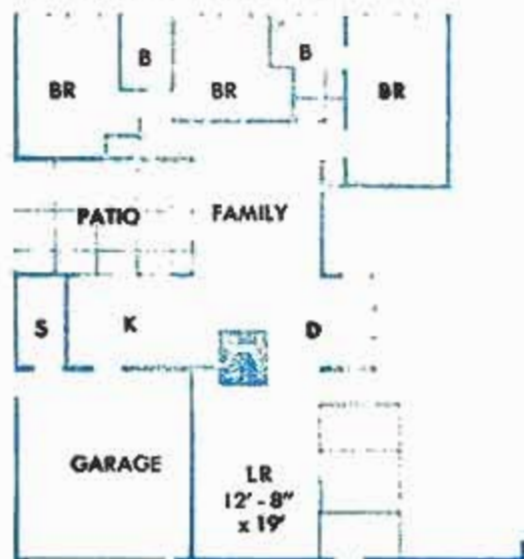
Photos by Roger Sturtevant

The "cathedral" roof lends distinction to open-plan interior with free-standing fireplace serving two rooms

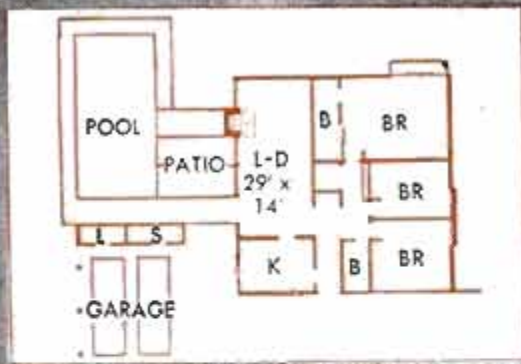
**ORIGINALITY** is the keynote of this home designed by Anshen & Allen of San Francisco, and built by Elmer Gavello in Sunnyvale, Calif. The cathedral-roof section is 40-feet long and flows into flat-roofed wings. Features of the three-bedroom, two-bath home include the free-standing fireplace with barbecue opening on the family room and centrally located patio. The sales price of \$18,700 includes lot, fencing, oven, range and garbage disposer.



Back and front views of the home, above and below, show the originality of design. High gable window at front is in living room and windows across rear are in the three bedrooms







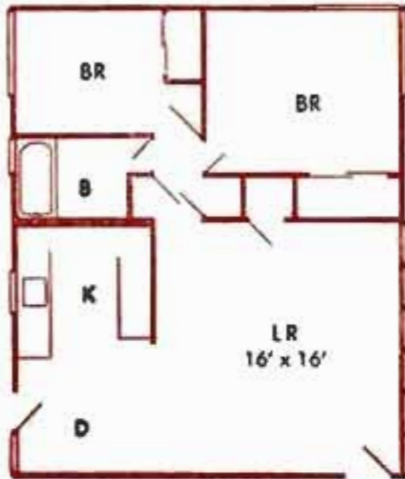
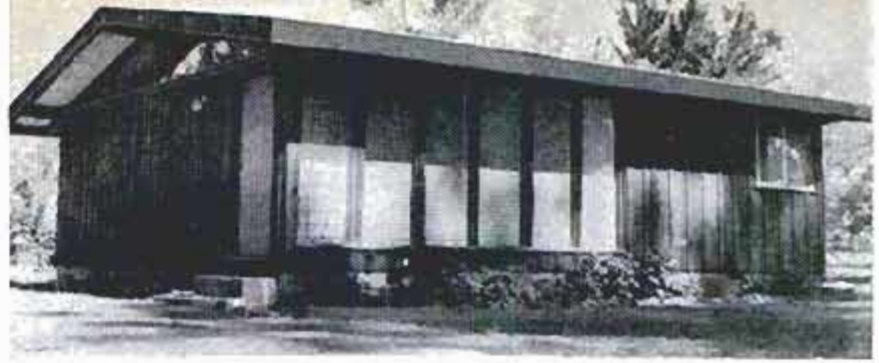
Photos by Julius Shulman

California desert style is depicted in this small (1600 square feet) luxury home designed by Palmer and Krisel of Los Angeles and built by the George Alexander Company in Palm Springs. The foundation is concrete slab and the structural system is post and beam. Fenced area adjoining garage is a service yard. Closeup (below) shows the distinctive "sun flaps" that shade windows from the hot desert sun

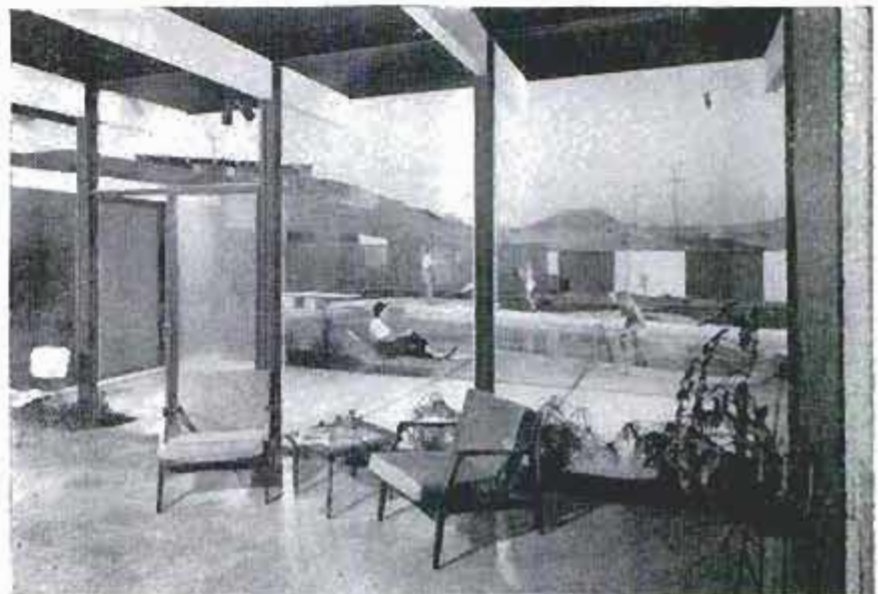
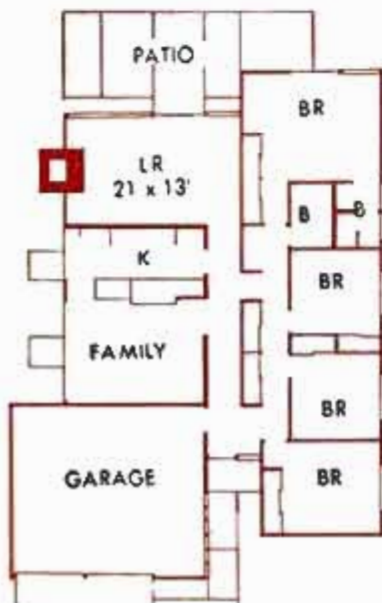




This California prefab is designed for the build-it-yourself market and sells for just \$2922, not including foundation, plumbing, wiring and painting. It is made of Douglas fir or redwood and the framework is assembled in wall sections with siding nailed on. It can be erected by two men in 2½ days. The house is offered by ABC Engineered homes, Richmond, Calif., and is one of several attractive prefab models



Privacy from the street and a glass-walled rear living room facing the terrace and back yard are features of this California-style house designed by A. Quincy Jones and Frederick E. Emmons, of Los Angeles, and built by Eichler Homes in Lucas Valley, near San Rafael, Calif. Size: 1704 square feet. Extras: mahogany paneling, built-in range, oven, dishwasher. The price with lot is \$23,650







1. Up to 80 percent of the sun's heat can be screened from the patio with a new plastic ceiling panel. The panel has an inner layer of perforated aluminum foil between two sheets of translucent glass fiber. It permits light to pass through in a diffused form

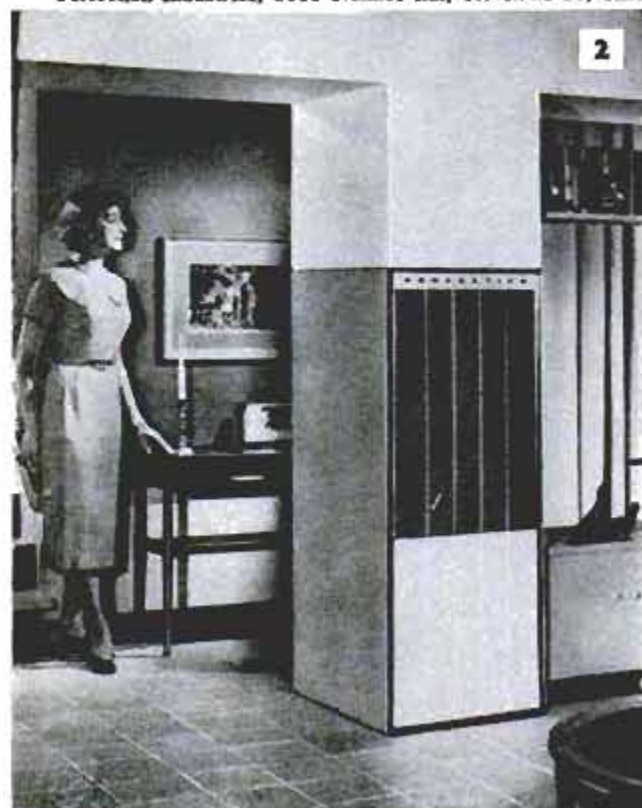
Resalite Corp., Zelienople, Pa.

## IDEAS FOR HOME PLANNERS

*Whether you're planning to build a new house or remodel your present home, you'll find suggestions here to make homeownership more enjoyable and increase the home's value*

2. Furnace that fits anywhere in the house has all duct connections at the top and requires no clearance areas at the sides or back. The unit also is an air conditioner. The furnace can be adapted to either gas or oil fuels. Here it doubles as a room divider

Perfection Industries, 1135 Ivanhoe Rd., Cleveland 10, Ohio



3. Children no longer need to climb on chairs or bathroom fixtures to look into a mirror. When ceramic tile was added to the walls of the bathroom below, a two-by-three foot mirror was mounted 27 inches above floor. Tile was set around mirror

Clarence Leino, 2475 S. 66th St., West Allis, Wis.







4

4. Connecting an inner patio to a sun deck on the roof is a spiral staircase assembled at home from the steel parts. A gate at the bottom can be locked to prevent children from scaling the steps. The cost of the outside staircase was approximately \$475

A. C. Welding and Fabricating Co., Phoenix, Ariz.



5

5. Split-level ovens are now available for kitchens. The two-compartment oven permits the wife to roast, broil and bake at the same time. The bottom oven, which pulls out like a drawer, is for baking. The upper unit can be used for rotisserie cooking

Philco Corp., Philadelphia, Pa.

6. Two functions are served by louvered room dividers. The sections of the divider in the photograph are installed so that the dining and living rooms can be separated. The louvers also can be adjusted to divert flow of air to various areas of the house

Dr. Ralph G. Peterson, 5002 E. Roma, Phoenix, Ariz.

7. Luminous ceiling lights for bathroom or kitchen are available in package units. Six 100-watt bulbs give shadowless illumination through plastic diffusers. Electrical system, in a metal channel, fastens to the ceiling. Diffusers are suspended from channel

John C. Virden Co., Cleveland 3, Ohio

8. Stamped to resemble tile, self-ventilating roof material is fabricated from 28-gauge metal and sold in sheets eight feet long. After installation, it's coated with mastic and ceramic granules. It weighs 120 pounds per 100 square feet, needs fewer rafters

McDowell Mfg. Co., Pittsburgh, Pa.



6



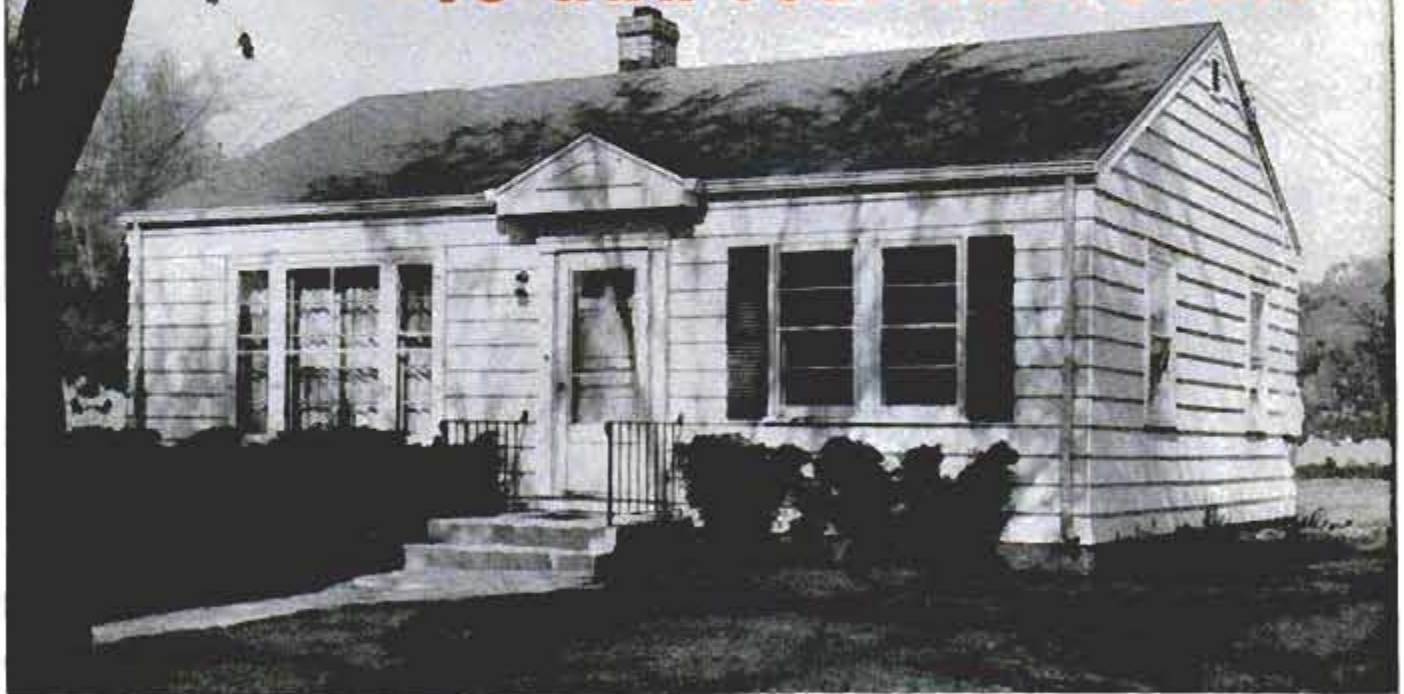
7



8



# HE RAISED THE ROOF —to add four bedrooms



This is how the Schroeder's simple two-bedroom home looked before they decided to add a second story

WHEN CAL SCHROEDER and his family of Lombard, Ill., outgrew their small four-room house, they had two possibilities for expanding their living space. One plan, which Cal favored originally, was the addition of at least two rooms at the back of the house, eventually making it an L-shaped structure. Such an addition would give them the minimum of needed living facilities, but this type of ex-

pansion would just about ruin the playground area in their small back yard. The Schroeders have four young children. The other plan involved the expansion of this small house into a two-story structure, providing four bedrooms on the second floor.

At the outset, there seemed to be numerous problems connected with the idea of adding a second story to an existing one-story house. The family had to live and be



By  
**Donald R. Brooks**

Floor plan of home before remodeling shows how easily it was altered. Former living room became a dining-family room and the new living room is in bedroom area



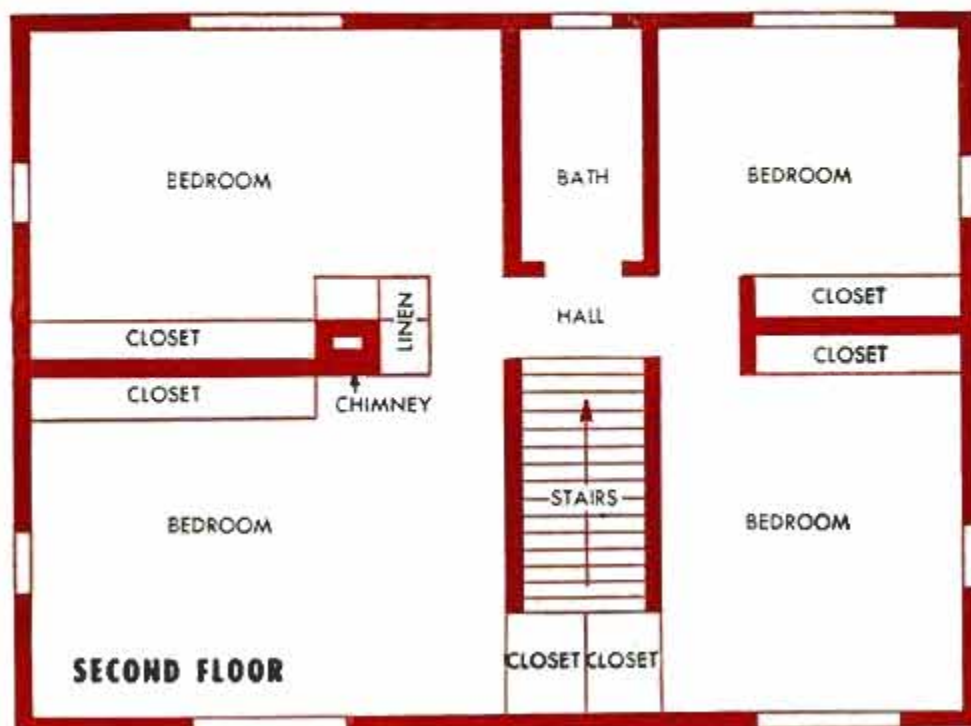


Look close and you'll see the lower part of this house on the opposite page. Second story has four rooms

kept under adequate roof while the remodeling was under way. The work involved, through the eyes of inexperienced builders, seemed considerable and would most certainly stretch through the cold winter months. Normal living for the youngsters could not be interrupted during this rather long ordeal and this was of the utmost importance to Cal. He was determined to accomplish whatever changes

were necessary without moving the family from the premises. This was not only a major factor from the standpoint of the children's well-being—the family finances made it highly advisable to avoid the expense of renting another home in town for the family during the time of remodeling.

The idea of adding a second story would leave their back yard intact and such an expansion would quite likely improve the



Stairs to the new second floor occupy space of former guest and linen closets. Bath was placed directly above first-floor bath to save on the plumbing costs of project





So family could continue living in home during remodeling, old roof was left in place until new one was up

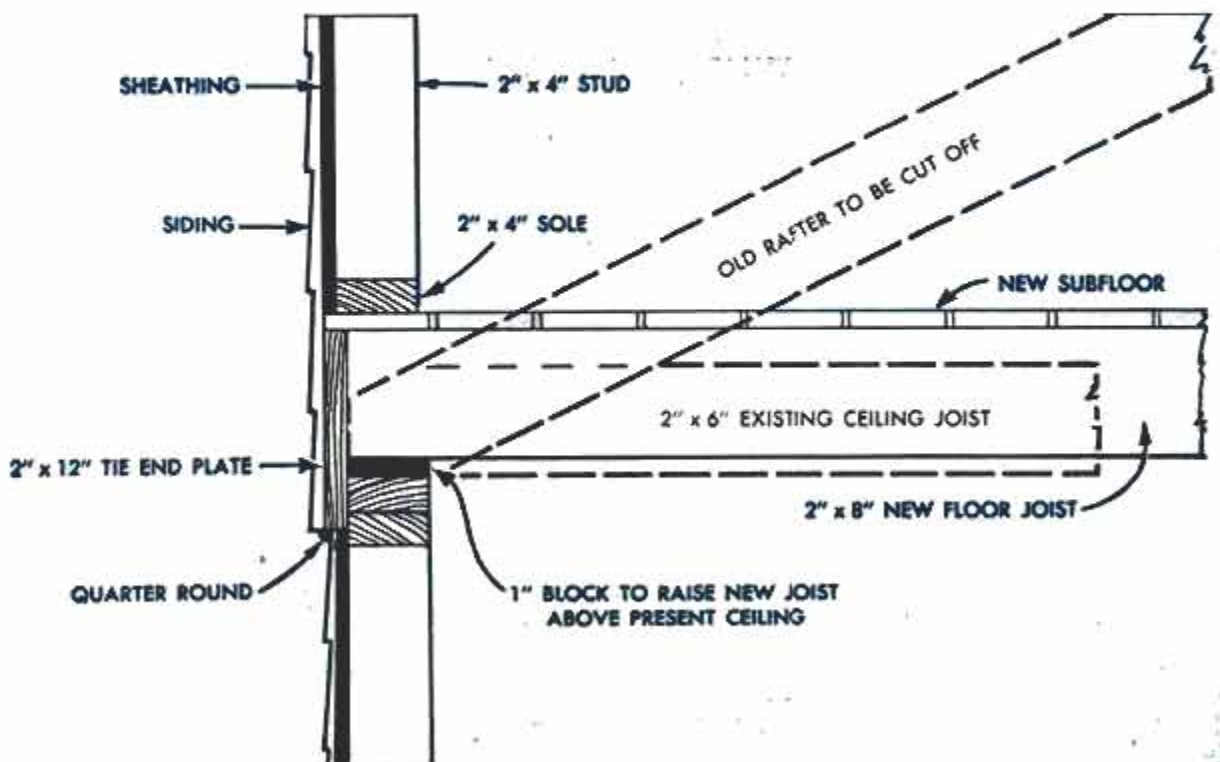
appearance of the house. But, how could such an amount of work be done without "exposing" present living facilities while the roof was raised?"

After much thought and planning, they decided to try adding an upper story and roof before removing the existing roof. There would be a chance of heavy rain while some roof openings existed when putting in additional floor joists to support the second-floor structure, but this risk seemed one with which they could cope.

Cal prepared his own scale plans for the addition and submitted them to the village for approval. His construction experience with a local telephone company was sure to be helpful, but there were many things to learn as he went along. The village approved the plans in a short time and materials were ordered to start construction.

New two by eight floor joists were first installed between the existing two by six ceiling joists. This required the cutting of small roof openings. To be sure of adequate

Floor joists for addition were placed between smaller existing ceiling joists. Old rafters were cut later







Neighbors pitch in to help Cal Schroeder with the sheathing. Big overhang helps appearance of the house

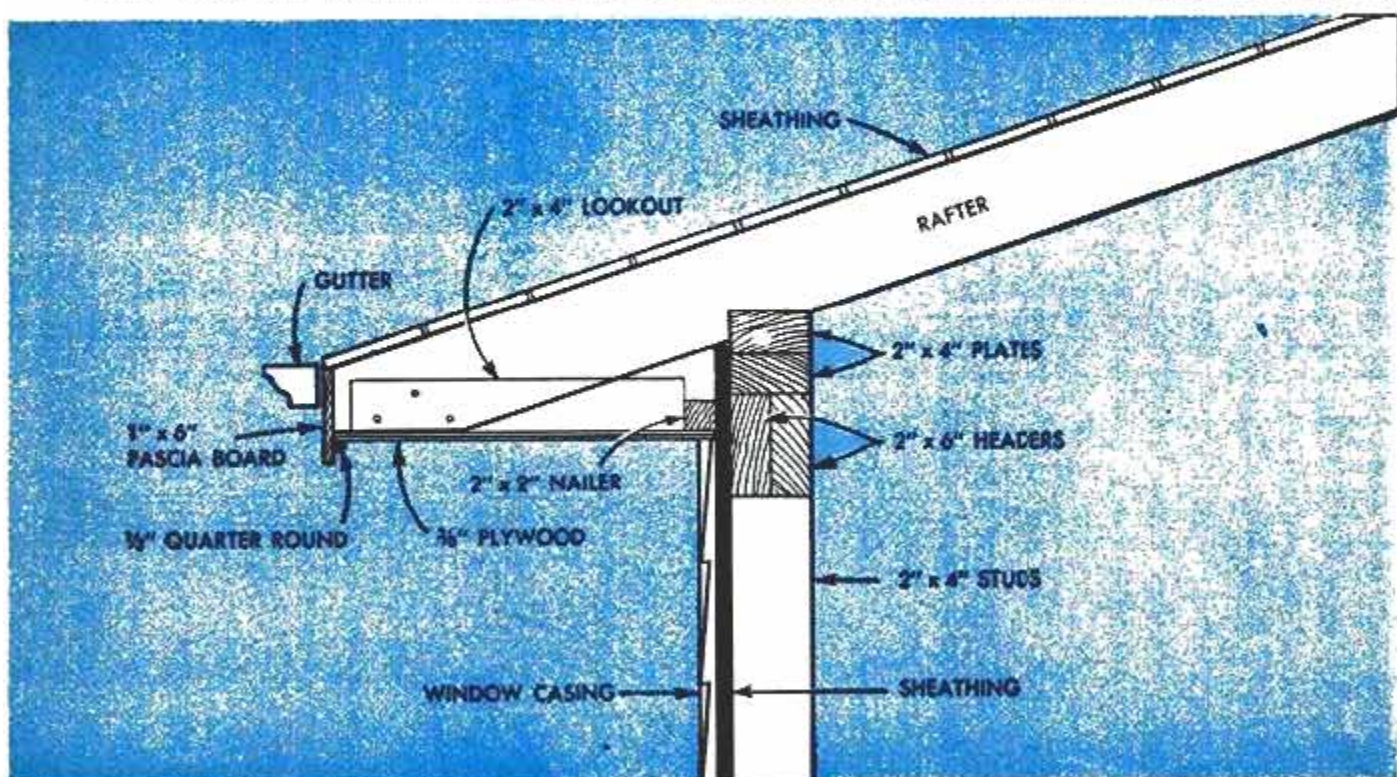
clearance between the first-floor ceiling and the new floor joists, one inch block spacers were set under the new floor joists. A two by twelve tie-end plate was used to tie lower-story framing to the new upper-story structure. To the top of the tie-end plate a strip of new one by eight subflooring was nailed, then a two by four sole was toenailed in place. After this operation, the structure was ready for the second-floor two by four studs. The addition of sheathing gave a flush surface onto which

siding was nailed to cover the second-story section including the tie-plate end. A small quarter round was used to finish off the joint between the lower sheathing and the tie plate.

(The roof-rafter section and method of enclosing overhang is clearly detailed in the rafter illustration, although this method of construction can be varied according to individual preference and styling of the existing house.)

(Continued to page 274)

Detail shows how Schroeder joined the new roof to framing for second story. Roof has two-foot overhang





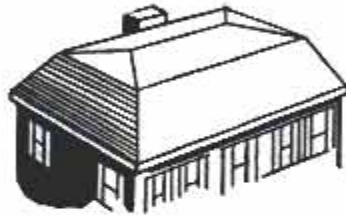
# BUILDING QUIZ

Can you identify the various parts of a house? Write down the proper names of the items sketched below. Then turn to Page 246 for the correct answers.

These six roof types are:



1. \_\_\_\_\_



2. \_\_\_\_\_



3. \_\_\_\_\_



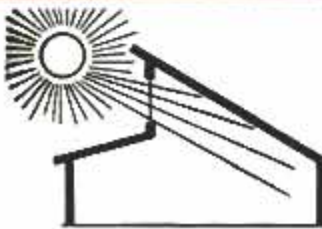
4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_



7. This window is a \_\_\_\_\_



8. Strips between wall and covering material are \_\_\_\_\_ strips



9. The bracing strips between the joints are \_\_\_\_\_



10. That section under the overhang, or ceiling, above a recessed doorway is a \_\_\_\_\_



11. Found over either doors or windows is the \_\_\_\_\_

Five types of siding are:



12. \_\_\_\_\_



13. \_\_\_\_\_



14. \_\_\_\_\_

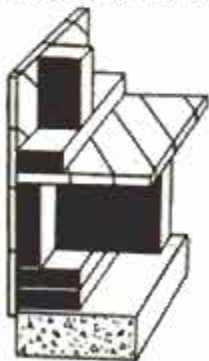


15. \_\_\_\_\_

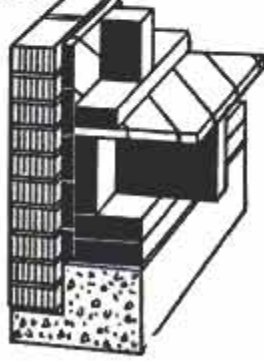


16. \_\_\_\_\_

These two types of wall construction are:



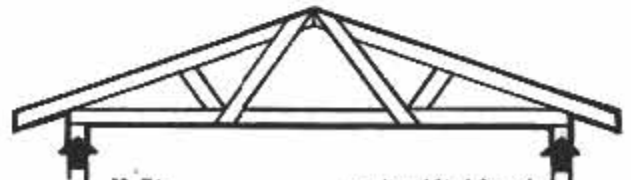
17. \_\_\_\_\_



18. \_\_\_\_\_

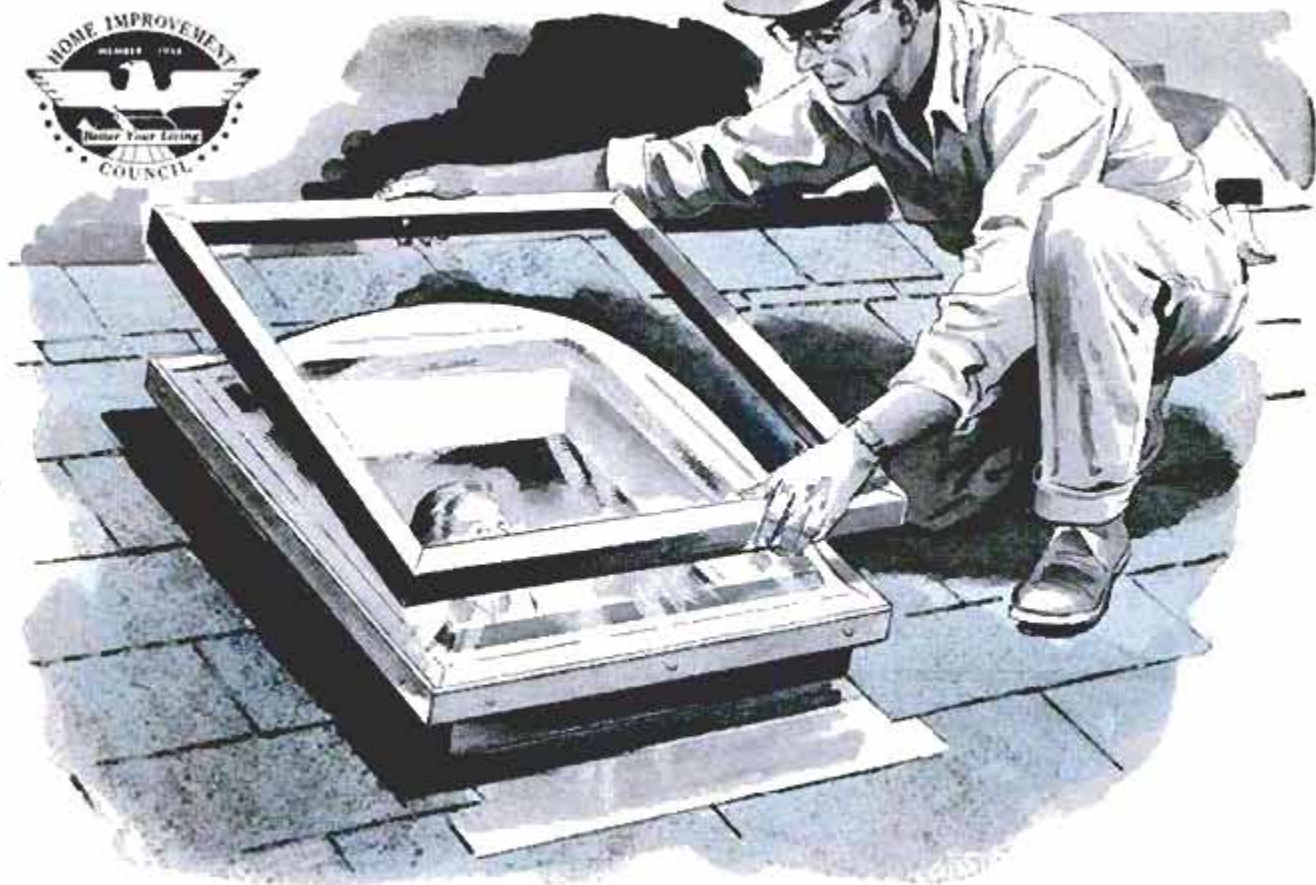


19. Material overlapping into the chimney is \_\_\_\_\_



20. This \_\_\_\_\_ permits weight of the roof to be carried by the exterior walls.





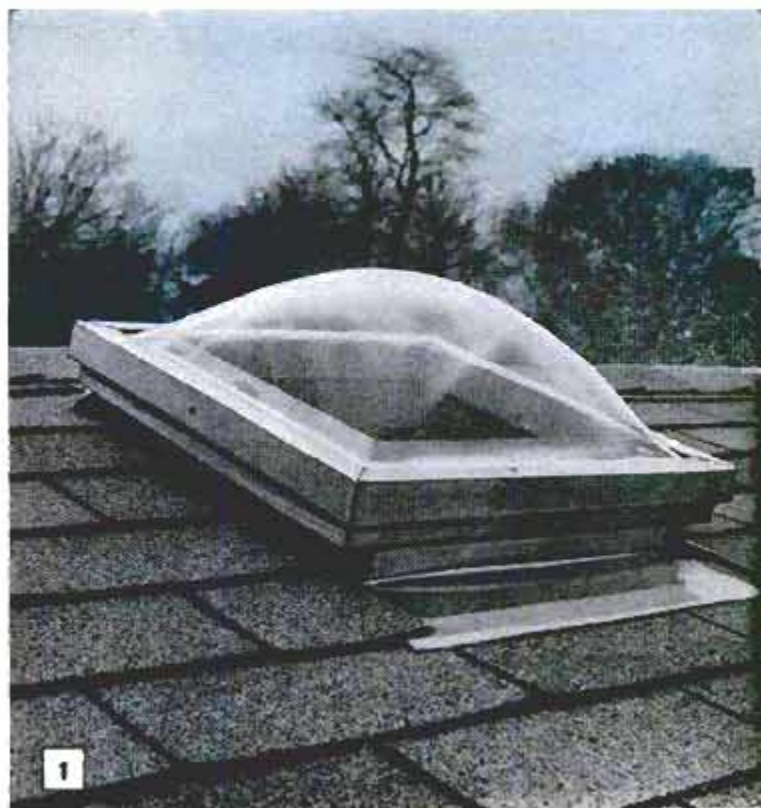
## Open Your Roof to Daylight

By Paul Corey

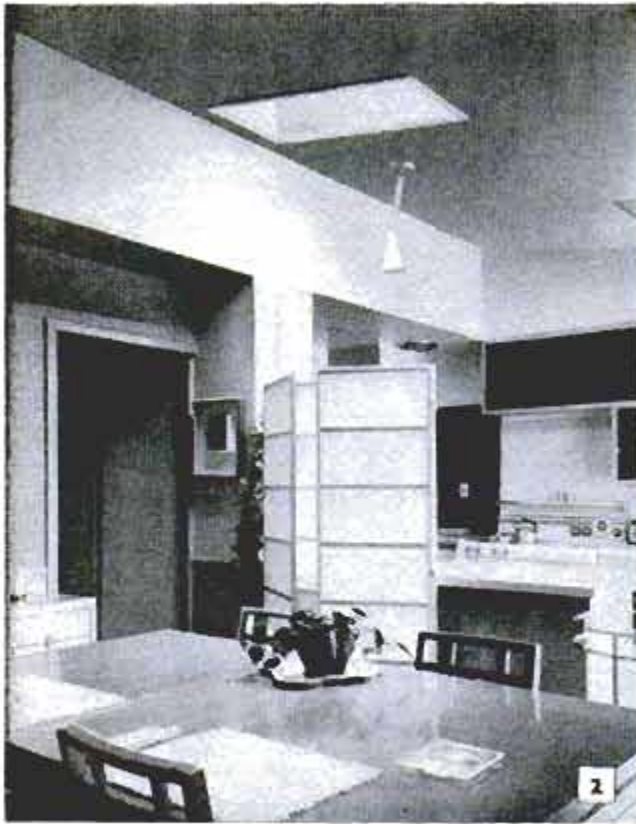
**WOULD YOU PREFER** to have sunlight in every room in the house during the day, but is artificial illumination required because of such circumstances as tall, overhanging trees, wide roof overhangs or closely spaced adjacent buildings? If so, a skylight in the roof might be the answer to your problem.

Note in Fig. 2 how a fairly small skylight illuminates a dining area adjacent to a kitchen. Without the skylight there were periods during the day when artificial light was required. Fig. 3 shows how a skylight brings the cheerful sunlight into what normally is a slim interior hallway. Do you have a problem with your utility room? The large skylight in Fig. 4 provides ample illumination for this area. Some entrance areas, although adjacent to a window and door, are shadowed by a porch roof or roof overhang so that lights are required during most of the day. A skylight was the solution for one such situation, Fig. 5. An

Finished installation of clear-plastic bubble-type skylight is neat and weathertight. Aluminum framing will not rust or rot, and is attached to roof with aluminum nails. Double-walled dome has insulating factor and material is shatter-resistant



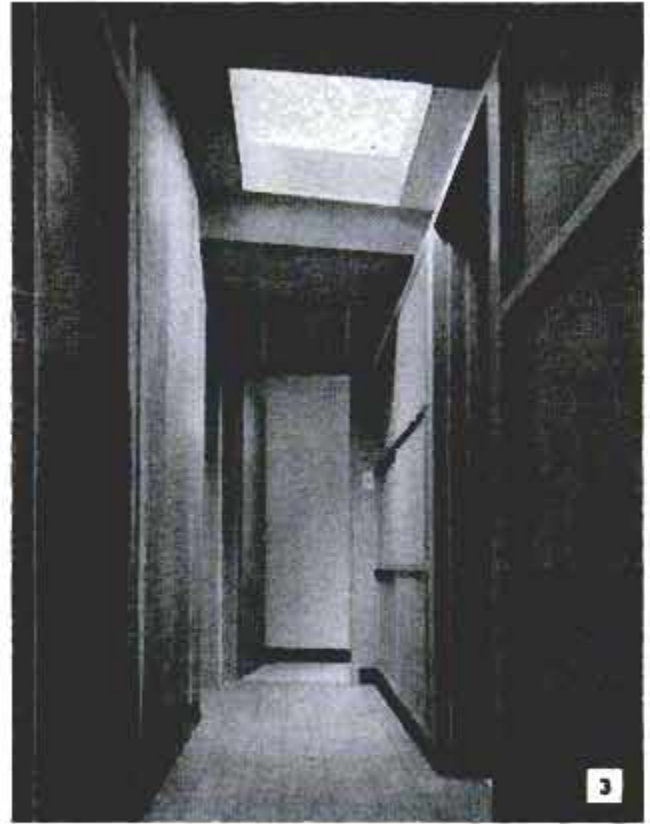
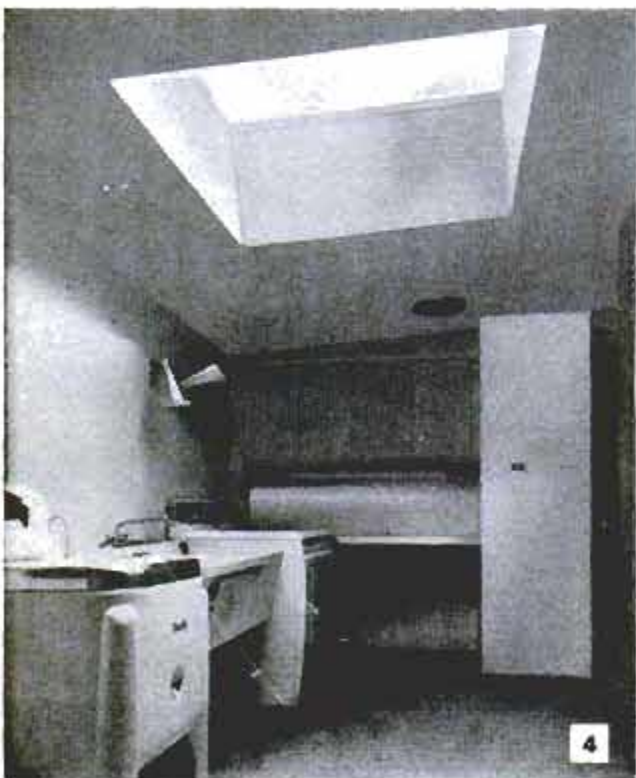




**Skylight illuminates dining area with sunshine, eliminating the need for lights during daylight hours**

added advantage of having a skylight here is that plants growing indoors reach straight up toward the bright sunlight coming through the skylight. Plants beside a window usually bend toward the window, reaching for sunlight. If you have a workshop in a garage, a skylight might make it possible to have more wall space for cabi-

**Artificial light was required in this utility room during daytime until large skylight was installed**



**Skylight installed in ceiling of long, narrow interior hall floods normally dark area with sunlight**

nets and shelves. If the workbench is under a window, the window is boarded up and a skylight installed over the bench, furnishing as much or more light as the window. How about your attic? Is it large enough to be made into living space, but you have neither time nor money to install dormers for windows? Then skylights may be the

**Skylight in this entrance hall not only provides light, but encourages plants to grow straight up**



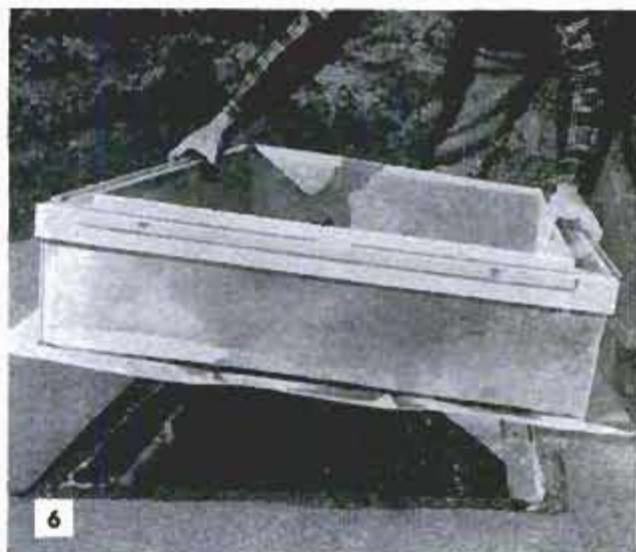


solution to your own particular problem.

The original complaints about skylights—wooden frames rotted, steel frames rusted, rain leaked through around the edges of the glass, and the glass itself was broken easily—no longer are valid. Frames on the new skylights are rustproof and rotproof aluminum, while the light itself is made of shatter-resistant materials such as clear plastic or colored, translucent glass-fiber sheets. And even more important, skylights are in the do-it-yourself category. Any home craftsman handy with tools can install one. If the roof of your home is a flat, shed or shallow-pitched type, installation is fairly simple, although with a shallow-pitched roof a "well" will have to be framed in and covered. Every installation shown in the photographs has a well. A high-pitched roof will of course require a fairly deep well. To avoid the "air shaft" look of such a well, a framed sheet of translucent plastic can be fitted flush with the ceiling. Shallow wells also can be fitted with a ceiling panel and lights installed above it for an added decorator effect at night.

First step in an installation is to make a pattern of the opening to be cut in the ceiling. Mark through the center of the pattern on the ceiling, then drill a small hole. Check in the attic and move the location to align with the rafters. The skylights themselves are built on 16, 24 and 32-in. modules to fit standard rafter spacings. After the ceiling opening has been cut—and the rafters framed and boxed where necessary—cut a hole in the roof directly above the opening. The skylight frame then is positioned, either under the edges of the cutout roofing material, or on top, as on a built-up roof, Fig. 6. Flashing is installed as per the manufacturer's instructions, or asphalt cement is applied around the edges, Fig. 7, and strips of building felt are pressed into it, Fig. 8. Roofing cement then is applied over the final strips. The preceding instructions are general and will vary with different types of skylights, and types of roofs. For example, on a flat roof, cutting through the ceiling and roof would be done in one operation.

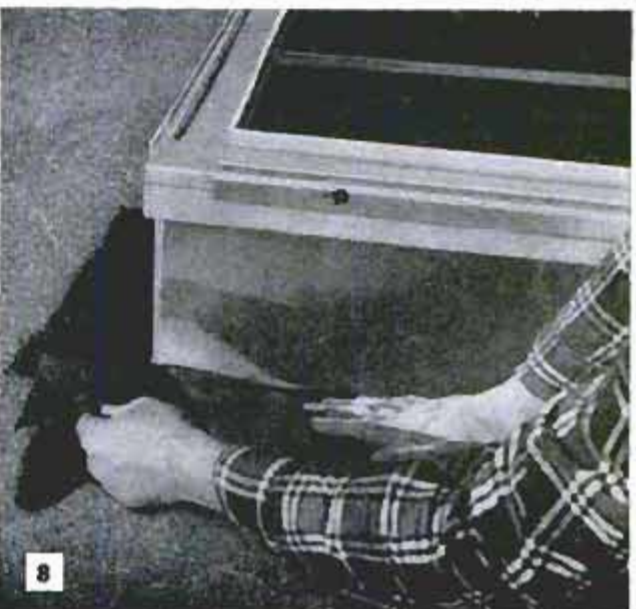
In Fig. 1 is shown one type of clear-plastic skylight that is bubble-shaped. Two layers of plastic are used on this one, being spaced slightly apart. This provides an insulation factor, as well as preventing the formation of condensation. The bubble and its frame slip down over the frame fastened to the roof, and can be opened somewhat like a trap door, for ventilation. On models that have a single layer of plastic in the dome, condensation that forms is caught in an aluminum channel that acts as an "eaves trough." ★ ★ ★



After opening is cut in roof (a built-up, flat roof in this case) skylight frame is nailed in place



Above, roofing cement is spread around frame of skylight to seal joint between frame and roof. Below, strips of roofing felt are pressed into cement. This is repeated until several layers have been applied





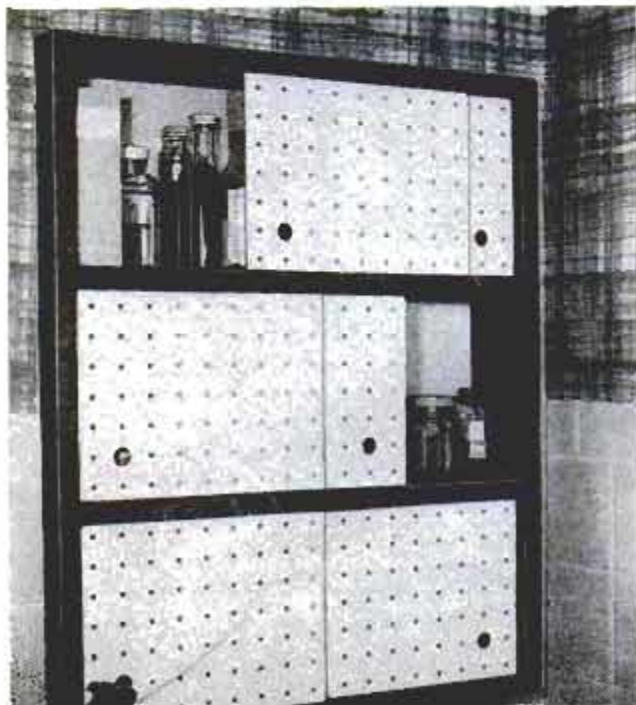


### Wooden Triangle Replaces Level For Vertical Course of Bricks

For the amateur mason, laying a vertical or "soldier" course of bricks is difficult, especially where a level cannot be used conveniently. To overcome this problem, one homeowner uses a triangular "square." The square is a right-angle triangle cut from 2-in. stock, having legs 12 in. long. When one leg is placed on the level course below the soldier course, the other leg positions the bricks vertically.

### Family-Size Medicine Cabinet

Designed as a replacement for the usual overcrowded family medicine cabinet, this built-in has top, bottom, sides and shelves cut from 1-in. stock and a back of tempered hardboard. The doors are perforated hardboard, sliding in grooves cut in the wood.



# Stairway Lift Aids Handicapped

By C. L. Veitch

*AYRSHIRE, Iowa*

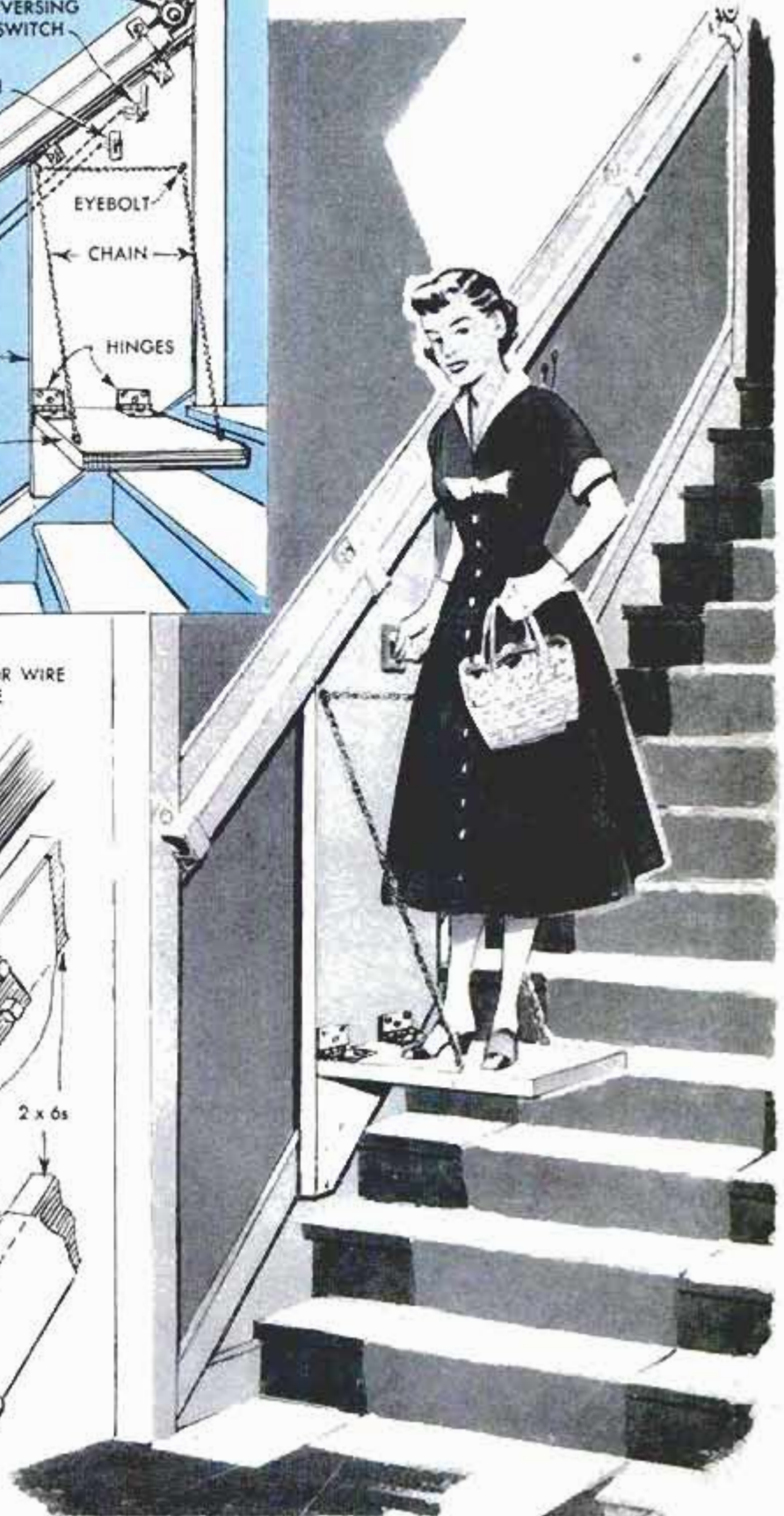
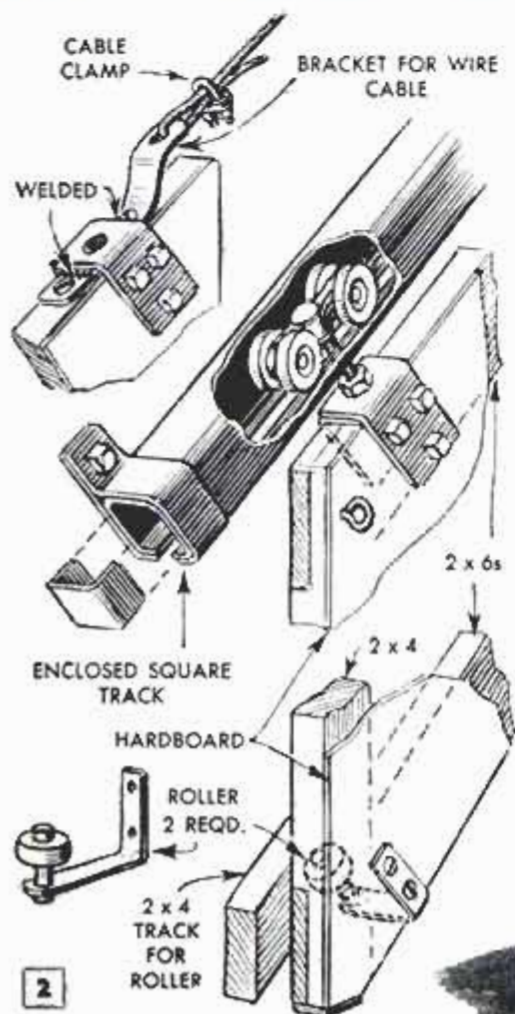
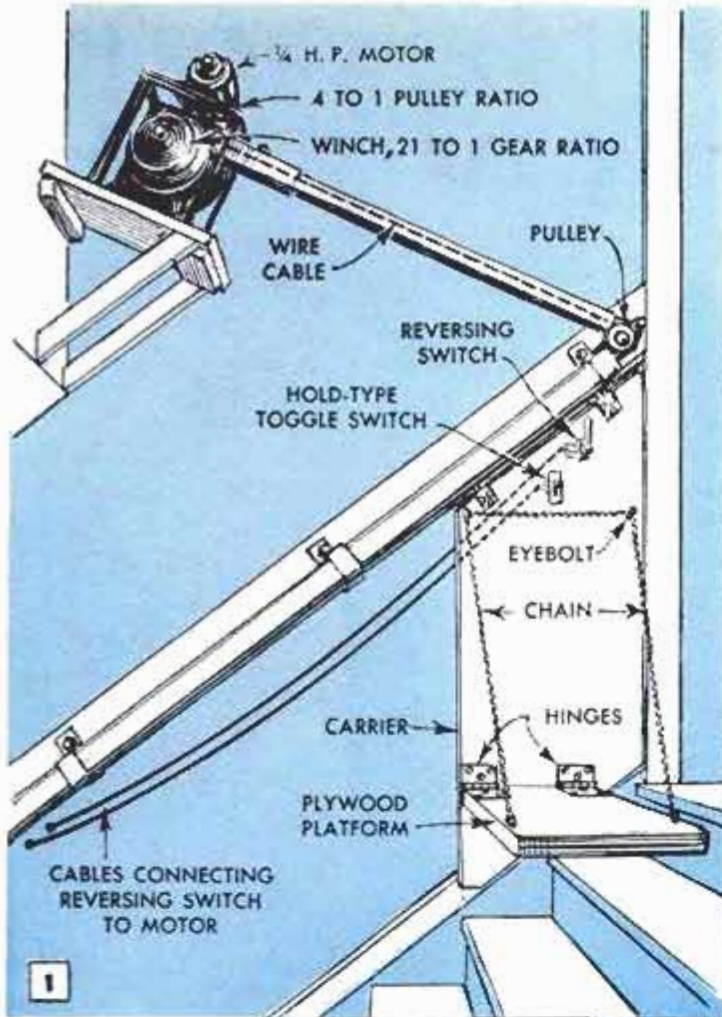
**I**F A MEMBER of your family becomes permanently disabled, making it extremely difficult or impossible for him to climb the stairway unaided to a second floor, here is a track-mounted lift that can be operated at his convenience. The lift consists of a carrier unit that is mounted on enclosed track of the type used for sliding garage doors. The track is lag-bolted to wall studs at the proper height above the steps. Power for operating the lift is provided by a winch and reduction gears driven by a 1/4-hp. motor that is controlled from switches located on the carrier.

In operation, the rider boards the carrier and rotates the reversing switch to select the direction of travel desired. Then the toggle switch is held down to turn on the power. A steel cable clamped to the carrier and anchored on the winch drum is then wound on the drum, or payed out, depending upon the direction the carrier is to travel. A stop switch installed at the upper end of the track automatically stops the carrier when the landing level is reached. To stop the carrier at any point along the stairway, the rider-operator need only release the toggle switch to cut the power.

To build a stairway lift such as the one illustrated, measure the stairway from lower to upper landing to determine the length of track required. When mounting the track on the wall, it is important that all brackets be located to permit driving the lag bolts into wall studs for proper support of the assembly. The carrier is made of hardboard cut to the shape of a parallelogram and screwed to a frame of 2 x 4s and 2 x 6s as in Fig. 2. The top and bottom of the latter is angled to match the incline of the stairway. The platform is held in a horizontal position by means of hinges and chain to permit folding it against the carrier when not in use. Electrical cables connecting the toggle and reversing switches with the winch motor are concealed in the wall as indicated. By inserting the cables in holes drilled midway on the wall, the exposed cable need be only half the length of the track, Fig. 1. The winch used on the model shown, is a hand operated war-surplus portable bomb hoist converted to power drive and mounted on a shelf, out of view from below. ★★★



Don't let a heart condition or other ailment force the sale of your two-story home. Build this electrically powered lift instead to avoid climbing stairs





X367



# REMODELING *the* KITCHEN



BEFORE

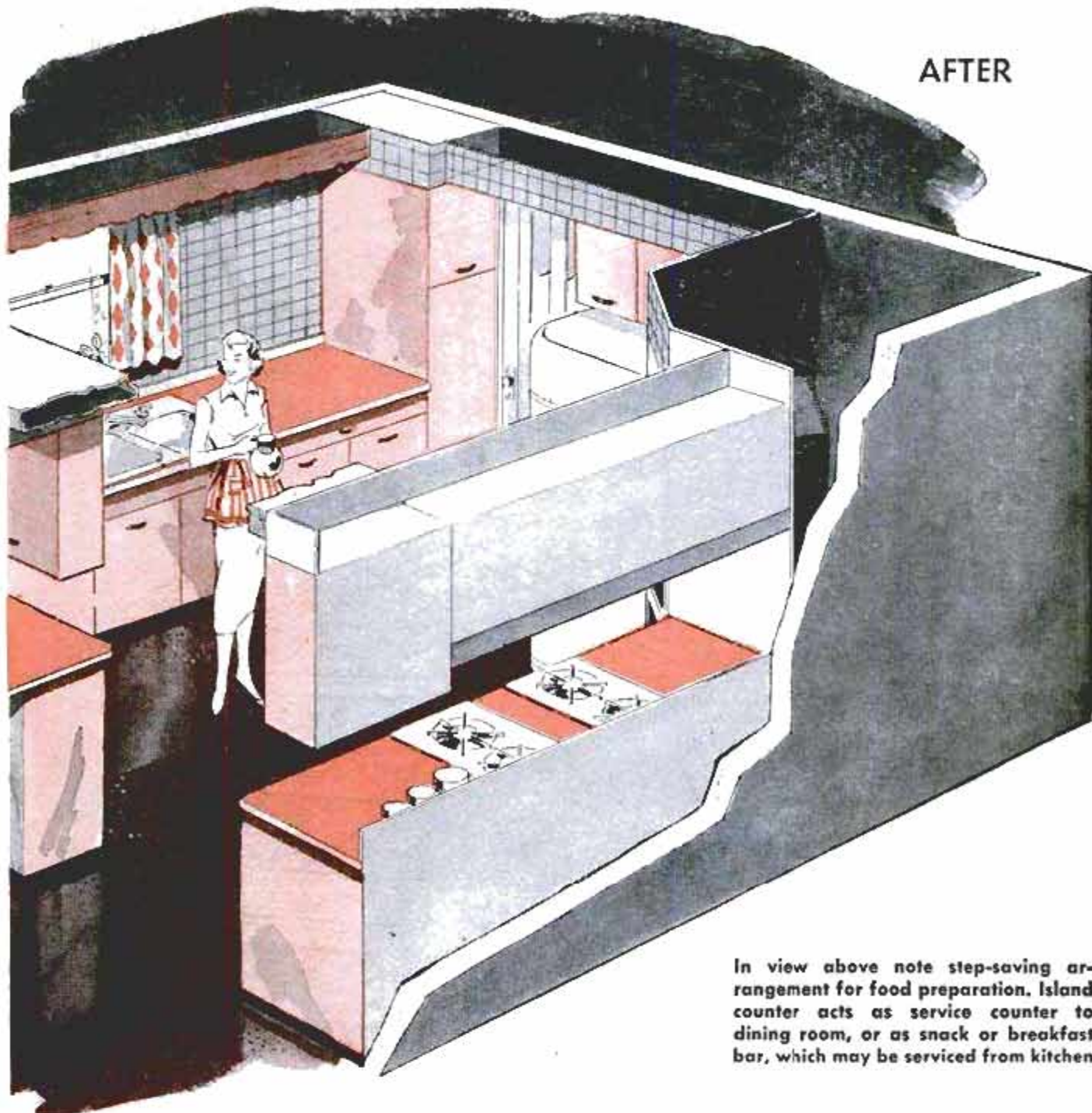
*I*NSTEAD of continuing to walk many tiresome trips between kitchen and dining room to serve her family at mealtime, one young mother did something about it. After poring over scores of pictures of dream kitchens, Mrs. Armando D'Ercole and her husband of Markham, Ill., redesigned their kitchen and dining room to provide a step-saving center for dining and preparing food.

The D'Ercole home, not unlike thousands of others of similar vintage, had a small kitchen and dining room separated by a partition wall with

POPULAR MECHANICS



AFTER



In view above note step-saving arrangement for food preparation. Island counter acts as service counter to dining room, or as snack or breakfast bar, which may be serviced from kitchen

access between through a single, narrow door. The "before" and "after" views show the improvement the new arrangement made, which, with slight changes, can be duplicated by any couple.

In the planning stage, particular attention was given to keep alteration of the house structure to a minimum. That the D'Ercole's succeeded admirably is evidenced by the fact that the only major alteration necessary was removal of the partition wall between the kitchen and dining room.

In the modernized arrangement, the old stove gave way to a modern built-in oven and countertop stoves, and the old sink with its outdated cabinets was replaced with a modern built-in one with spacious base cabinets, topped by counters covered

with plastic laminate. New wall cabinets were added and a ventilating hood was provided over the stoves.

The partition wall between the kitchen and dining room became an island counter, which was a continuation of the sink counter. Directly above the island counter are cabinets having doors on both sides to provide access from either the dining room or the kitchen. The counter acts as a service bar for food and dishes to be placed on the dining table. Or, it may be used as a snack counter or breakfast bar that can be serviced directly from the kitchen.

A band of colorful ceramic tile approximately 1 ft. wide runs around the kitchen at ceiling level. The tile also extends down the walls above the sink counter and part of the wall above the stove counter, as well



$\frac{3}{4}$ " PLYWOOD WITH DURABLE COUNTER COVERING

1

1 x 3 HORIZONTAL CLEAT NAILED OR SCREWED TO STUDS

$\frac{3}{4}$ " PLYWOOD PANEL FOR EXPOSED END ONLY FRAME MEMBERS A, B AND C UNNECESSARY WHEN PANEL IS USED

CLEAT

BASE 1 x 4

BASE CABINET

END STIFFENERS FASTENED TO WALL WITH TOGGLE BOLTS

DRAWER RUNNER

$\frac{3}{4}$ " x 2" x 21 $\frac{1}{2}$ " (CENTERED)

RAIL

HALF-LAPPED

BOTTOM,  $\frac{1}{4}$ " PLYWOOD OR  $\frac{1}{8}$ " TEMPERED HARDBOARD

FRONT FRAMING  $\frac{3}{4}$ " x 1 $\frac{1}{2}$ " STOCK NAILED TO 1 x 4 STIFFENERS

MORTISED

FRAMING FOR DROP CEILING OVER WALL CABINETS

NAILED OR SCREWED TO JOISTS AND STUDS

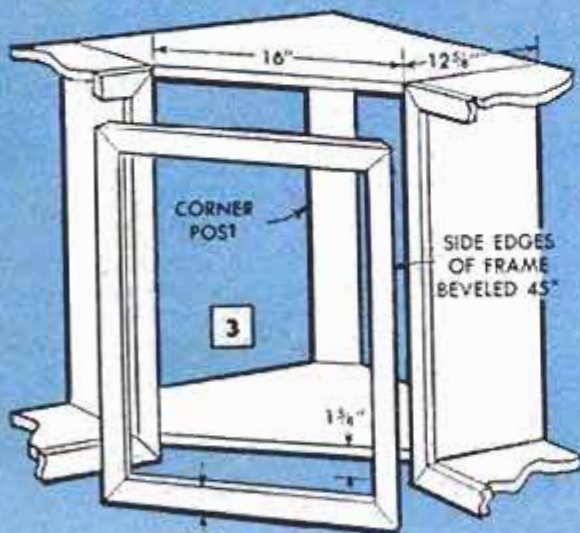
2

2 x 2

1 x 2 CLEAT SCREWED TO STUDS

WALLBOARD

TOP, BOTTOM AND SIDES  $\frac{3}{4}$ " PLYWOOD

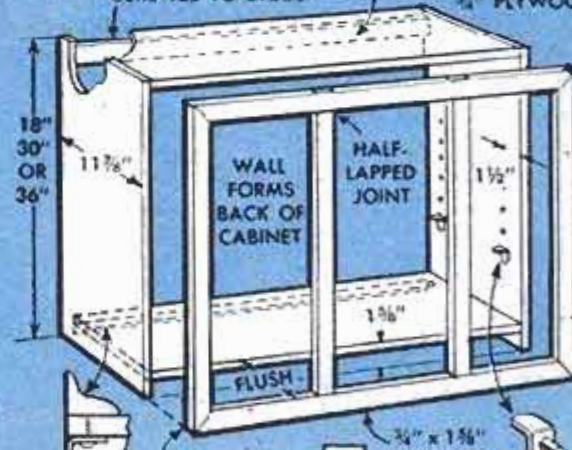


3

CORNER POST

SIDE EDGES OF FRAME BEVELED 45°

CORNER WALL CABINET



WALL FORMS BACK OF CABINET

HALF-LAPPED JOINT

FLUSH

$\frac{3}{4}$ " x 1 $\frac{1}{2}$ " FRAMING

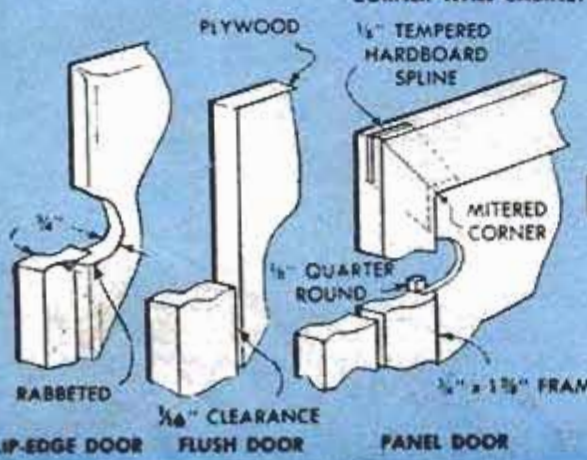
WALL CABINET

SHELF BRACKET

$\frac{1}{8}$ " x  $\frac{3}{4}$ " x  $\frac{3}{4}$ " STEEL ANGLE

MITERED OR HALF-LAPPED

4



RABBETED

$\frac{1}{16}$ " CLEARANCE

PANEL DOOR

LIP-EDGE DOOR

FLUSH DOOR

$\frac{1}{4}$ " x 1 $\frac{1}{2}$ " FRAME

$\frac{1}{8}$ " QUARTER ROUND

$\frac{1}{8}$ " TEMPERED HARDBOARD SPLINE

MITERED CORNER

PLYWOOD

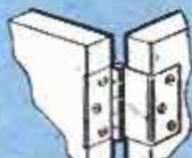
5



HINGE FOR LIP-EDGE DOORS



FULLY CONCEALED HINGE



OVERLAPPING BUTT HINGE

HINGES FOR FLUSH DOORS



as down the wall adjacent to the entrance door.

Studying the views, it can be seen that cabinet space has been more than doubled. Also, you will notice the arrangement is planned for step-saving. Incoming deliveries are through the entrance door between the refrigerator and the sink counter for easy access to storage. From storage, food preparation progresses either to the oven or stoves and on to the island counter. Or, it progresses along the sink counter to the island counter.

The work is well within the ability of the average homeowner. The first step is to get your ideas on paper in the form of a scaled plan. Or, better still, build a small scale model of cardboard. This will enable you to detect errors in sizes and arrangements before construction starts. Next, select appliances, so that you will know the space requirements for them. This couple selected Magic Chef oven and stoves and Textolite covering for the countertops. And, as previously mentioned, ceramic tile was used for most of the exposed wall surfaces, as well as for the window sills.

Adhesives now available make it possible for the homeowner to apply the countertop covering and the ceramic tile, and the manufacturer provides instructions for installing the oven and countertop stoves. In any remodeling job it is necessary to adhere to your local codes, so first check with your authorities.

Cabinets, steel or wood, are a matter of choice. In this case, steel cabinets were used, and were made to suit. However, if you prefer the richness of wooden cabinets, the homeowner can make them at a sound saving in cost. General instructions for making cabinets are given in Figs. 1 to 6 inclusive. Dimensions are changed to suit individual requirements. Standard height for base cabinets is 35 or 36 in., the depth is 20 to 24 in., and the length is variable. Wall cabinets are 12 or 13 in. in depth, and the standard heights are 18, 24, 30 and 36 in. A drop ceiling over wall cabinets often presents a better appearance than a void above them. Spacing between wall cabinet and counter of a base cabinet varies from 15 to 18 in. Countertops project an inch or so beyond front of base.

Fig. 1 gives framing details for base cabinets. Uneven floors may make it necessary to shim the cabinets to level them. The shims should be nailed to the floor. Framing for dropping a ceiling over wall cabinets is shown in Fig. 2. Framing may be assembled and then nailed to the wall studs and ceiling joists. If the ceiling joists run parallel with the framing, toggle bolts should be used.

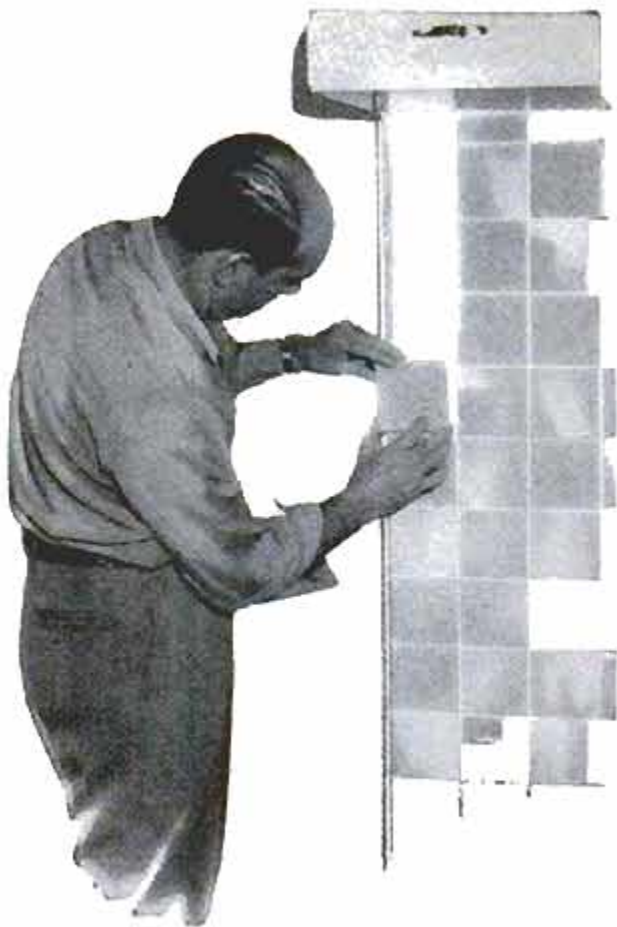


Above, island and sink countertops, which are combined, are covered with Textolite by General Electric. Island counter doubles as a snack bar, breakfast bar, or service counter for table in dining room

Below, note compact arrangement of Magic Chef oven and countertop stoves located conveniently close together. Forced-air ventilating hood carries off heat and cooking fumes and also helps cool kitchen



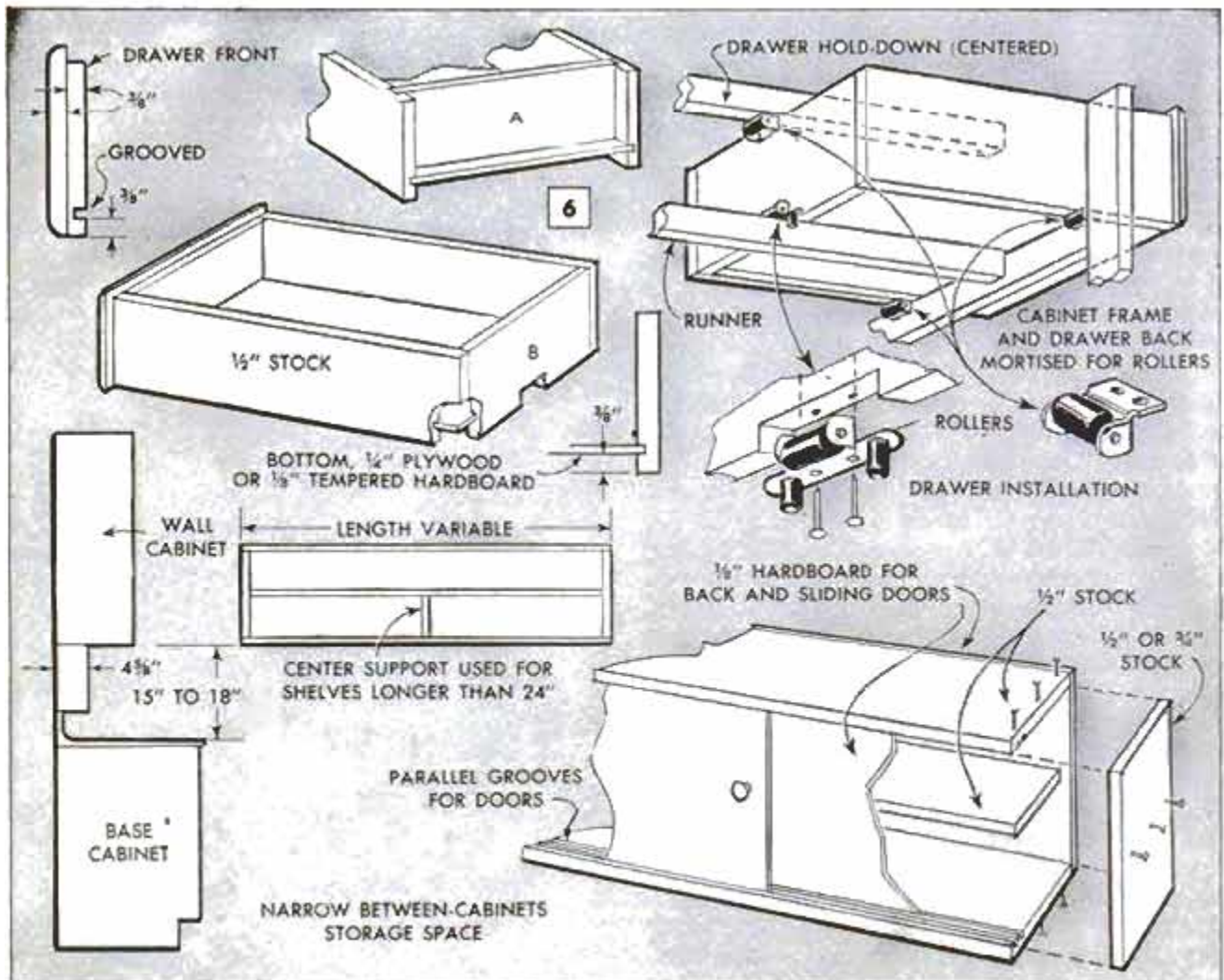




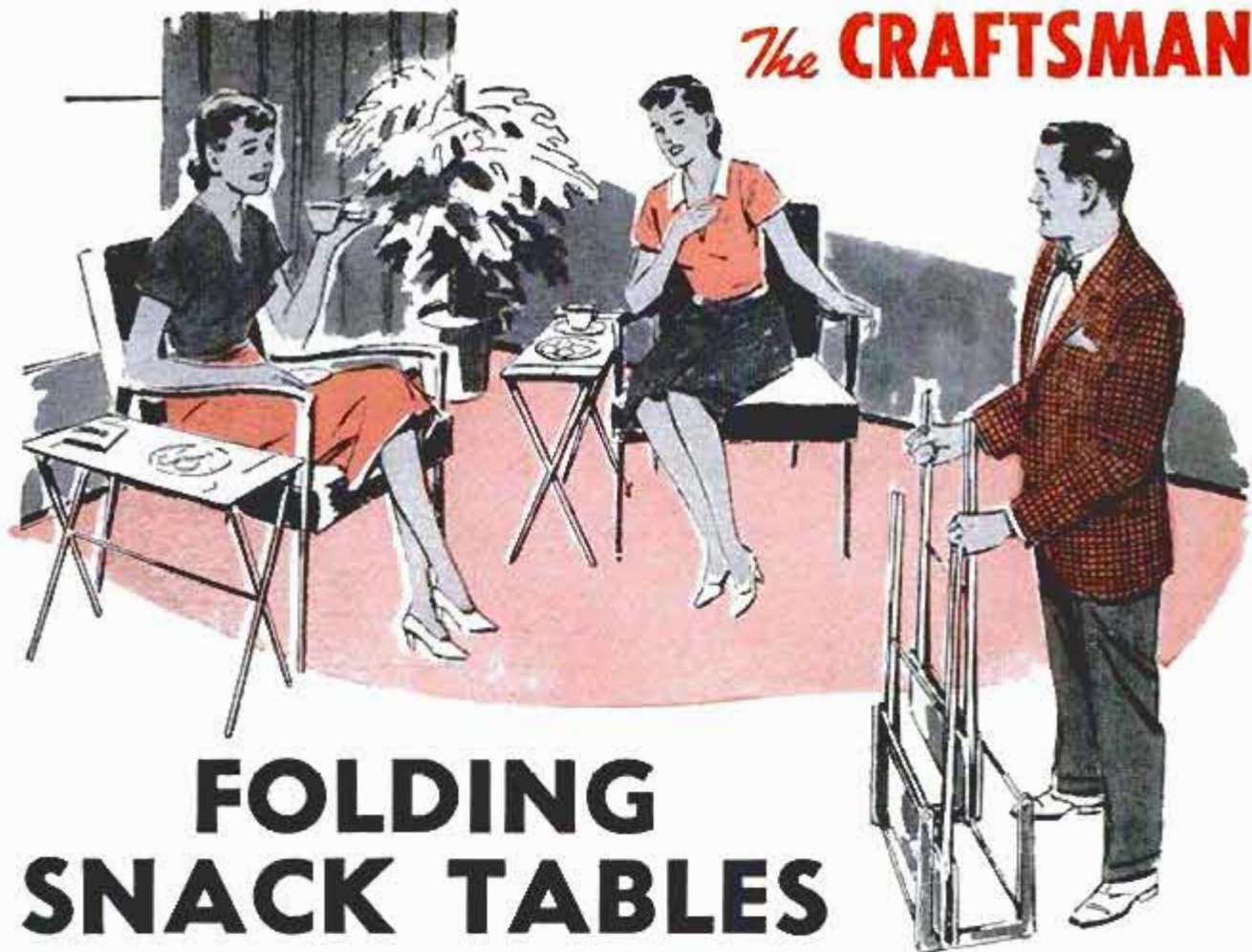
In cases where corner wall cabinets are desired, they can be made as in Fig. 3. The corner post of the unit is screwed to corner wall studs. Wall cabinets are made as indicated in Fig. 4. Sides, top and bottom usually are made of  $\frac{3}{4}$ -in. plywood. Wood cleats at the top and steel angles at the bottom provide a means of screwing the cabinets to the wall studs. Fig. 5 shows three types of hinges that are the least conspicuous when installed. Three types of cabinet doors also are shown in Fig. 5.

Drawer construction is shown in Fig. 6. Two alternate arrangements of the back are possible. One is to fit the back into grooves cut in the sides so it rests on the bottom, detail A. The other is to have the back grooved to accommodate the bottom, detail B, in which case it extends past it. The sides and front also are grooved to take the bottom. Also shown is the installation of inexpensive rollers that make drawers easy to open and close. The narrow between-cabinets storage unit shown uses space normally wasted. These units may have a narrow shelf and doors. ★ ★ ★

Left, installing ceramic tile. With adhesives now available, any homeowner can install this tile



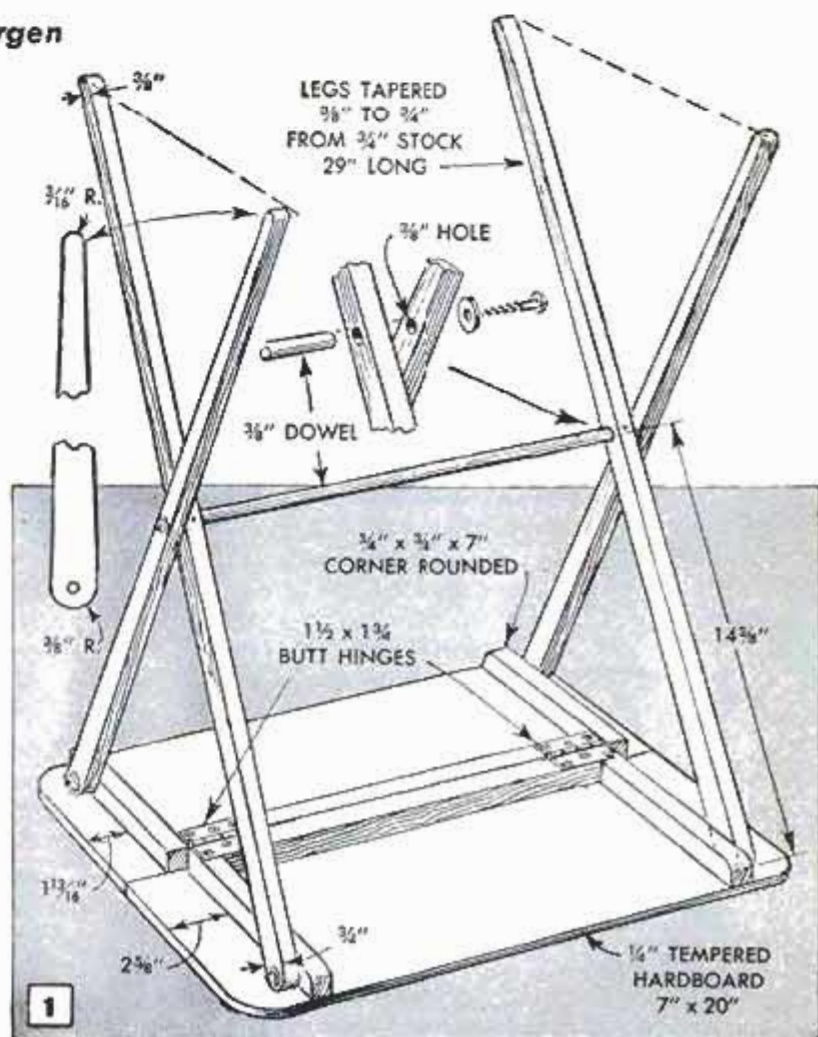




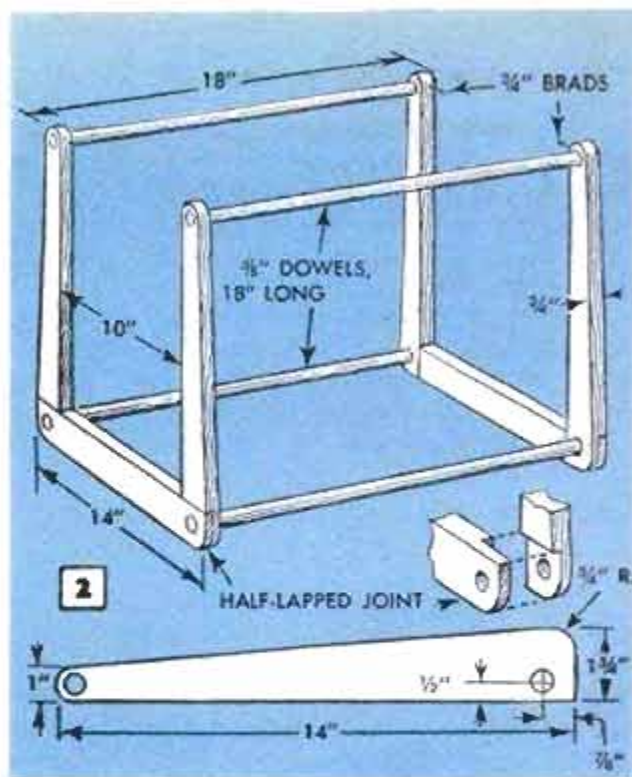
# FOLDING SNACK TABLES

By John Bergen

WHETHER THESE individual tray tables are brought out during the late, late TV movie, or during an afternoon bridge party, they'll make it extra-convenient to serve coffee and snacks. They are designed to fold flat and stack in a set of four in a compact stand which can be tucked away in a closet. In mass-producing four or more of these tables you'll do best to use jigs to assure duplicate parts. This applies mainly to the cutting of the tapered legs since the rest of the parts, other than the hardboard tops, are nothing more than cleats cut to specified lengths. The legs are ripped  $\frac{3}{4}$  in. square and then tapered on one face from  $\frac{3}{4}$  in. at the top to  $\frac{3}{8}$  in. at the bottom. Both ends are rounded and screw holes are drilled at the points indicated. Bore the holes slightly larger than the shank of the screw so they pivot freely. Holes for the dowel rung are bored completely through both







pairs of legs but note that only the inside legs are cross-nailed through the rung to space them. The outer legs pivot on the rung and are held with screws and washers driven in holes bored in the ends.

Fig. 1 shows how the cleats are placed on the underside of the two-part top, the cleats being offset on one leaf to accommodate the lapped legs. The outer edges of the table tops should be rounded, as well as the outer ends of the cleats. Fig. 2 details the stand which consists of half-lapped end assemblies joined at the four corners with dowel rungs. Each stand holds four tables in the manner shown at the left. Stand can be widened to take more if you wish. ★ ★ ★

## Resistor Causes Hard Starting



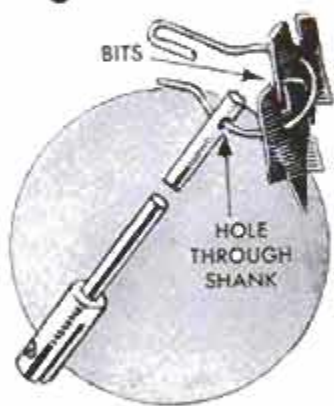
If you have trouble starting an older model car in cold weather, even though the engine has been tuned, a look at the high-tension wire between the coil and distributor may show the reason.

To eliminate ignition noise in the radio, some cars have a resistor fitted in the wire. Age and heat sometimes increase the resistance in the device. Replacing the wire with a single length of high-tension wire usually will eliminate the starting problem. When the weather again warms, the resistor-fitted wire can again be installed.

Robert V. Thompson, Clinton, Iowa.

## Storing Wood-Boring Set

Keeping track of individual cutters of an interchangeable wood-boring set is no problem if you store them on a shower-curtain ring. A hole is drilled in the end of the tool shank so both the shank and the cutters can be strung on the ring for safekeeping. Since the ring opens like a safety pin, it's a snap to remove the cutter you want. During storage, the locking screw is left in the slotted end of the shank. The locking wrench can be taped to the shank.



Andrew Vena, Philadelphia, Pa.



## Putty Knife Adapted to Protect Flooring From Hammer Blows

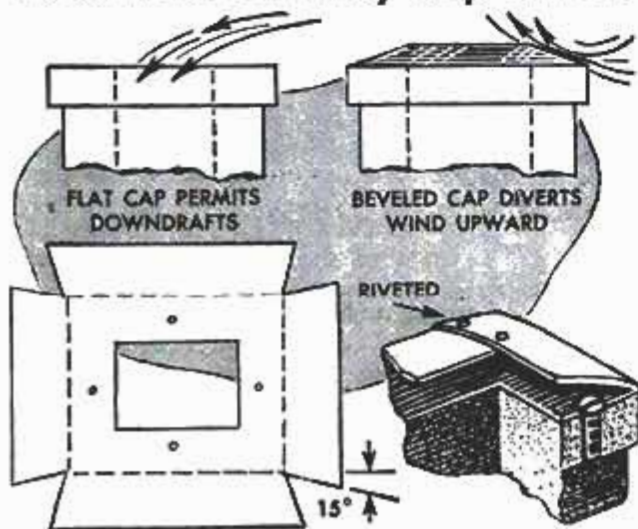
To avoid damaging the edges of tongue-and-groove flooring by misdirected hammer blows, one home craftsman bent a right-angle flange on a putty-knife blade so that it can be placed over the edge of the board at each nailing position as shown. A notch filed in the center of the flange permits driving the nail as required. An inexpensive wide-blade putty knife, which usually is made of comparatively soft, easily shaped metal, is best for this purpose.

## Use BB Shot to Fill Holes In Corrugated Roofing

When corrugated sheet-metal roofing is salvaged and reused, unwanted nail holes can be filled with BB shot to provide a watertight seal. To do this, simply place the corrugation in which the hole appears on a length of steel pipe of similar radius and seat a BB in the hole by lightly tapping it with a hammer. The soft metal is easily worked into the void to completely fill it. After painting the sheet metal, the repair will be completely concealed.



## Sheet-Metal Chimney Cap Diverts Wind to Avoid Downdrafts



An undesirable downdraft condition in a chimney frequently is caused by a flat-surfaced cap on it. To correct this, without incurring the expense of reconstructing the concrete cap, make and attach the sheet-metal cap as shown in the drawing. First, carefully measure the cap and make a pattern as in the lower left detail. Then cut the sheet metal to size and drill a hole in each side of the center cutout. Similarly positioned holes are drilled in the concrete cap to take screw anchors and lag screws that fasten the cap to the chimney. Next, the cap is screwed into position and the corners are overlapped and riveted together, after which it is painted.

## Paper Patch Glued to Back of Paneling Firms Loose Knot

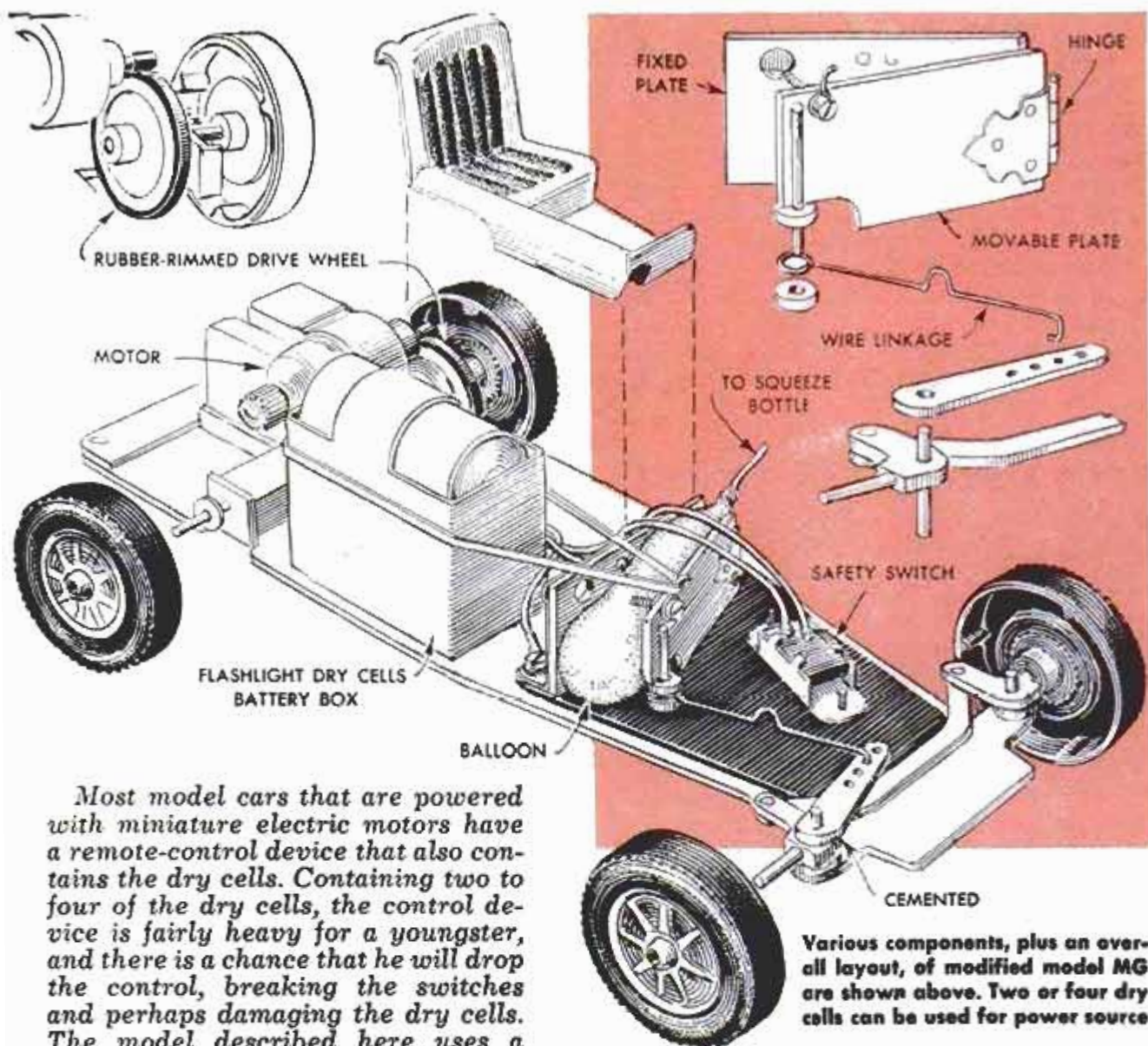
Here is an easy way of keeping a loose knot intact in pine paneling. Before nailing the board in position, cut out a disk from heavy paper and glue it to the back of the knot and board as in the photo.

## Wall-Painting Hint

When preparing a wall for painting, after removal of wallpaper, be sure to wash off all glue and sizing. When the surface is dry, apply a coat of wall primer, allowing it to dry overnight before painting.



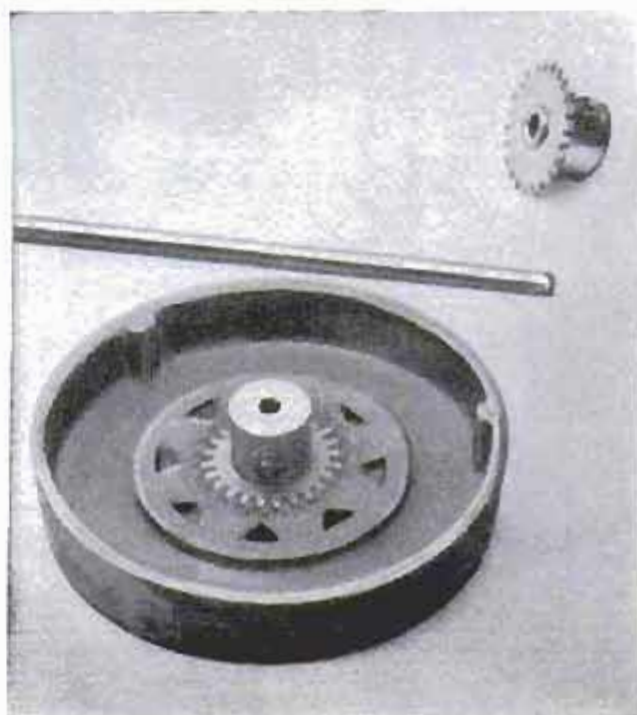
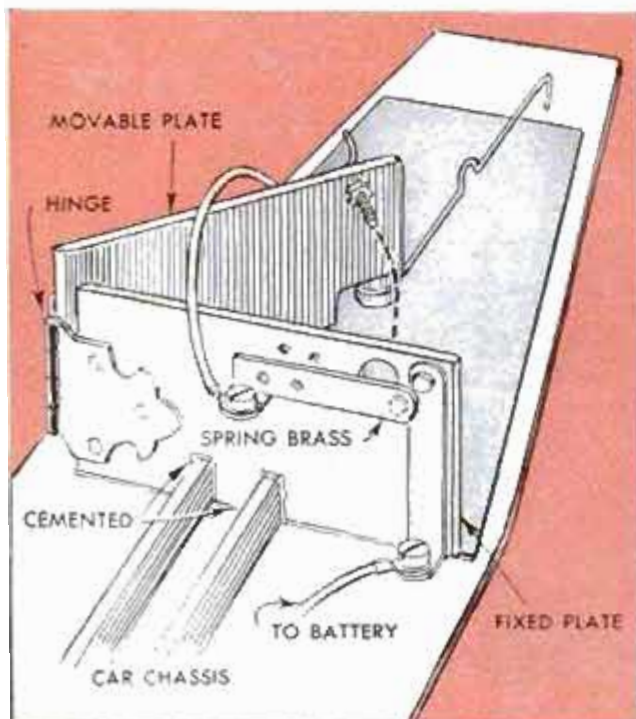




Most model cars that are powered with miniature electric motors have a remote-control device that also contains the dry cells. Containing two to four of the dry cells, the control device is fairly heavy for a youngster, and there is a chance that he will drop the control, breaking the switches and perhaps damaging the dry cells. The model described here uses a plastic squeeze bottle for the remote-control device. The heavy dry cells are inside the body of the car.

Various components, plus an overall layout, of modified model MG are shown above. Two or four dry cells can be used for power source

Below, left, is detailed the hinge mechanism and motor switch. Directly below is shown wheel into which heated brass gear has been pressed and bonded



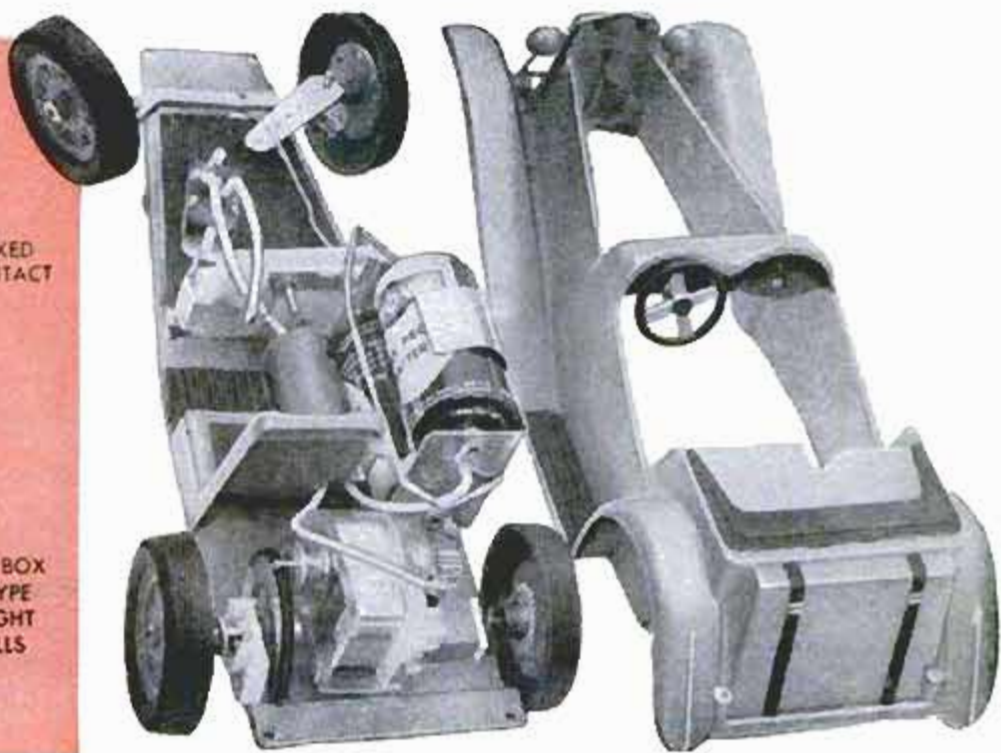
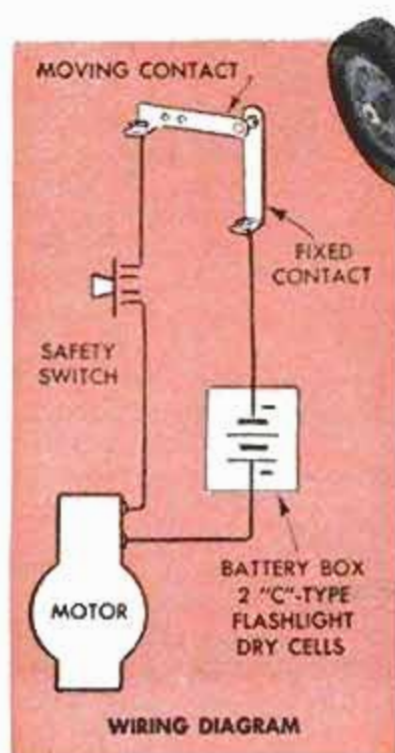




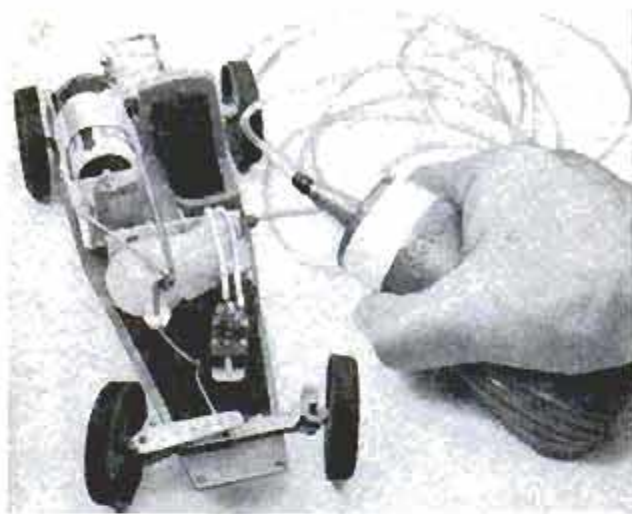
## "Squeeze Bottle" MG

**J**UST A SQUEEZE of the hand permits youthful operators of this model-MG roadster to start, stop and steer the car. A plastic squeeze bottle, of the type used for catchup, is the one-hand, remote-control device. It supplies compressed air to

a simple servomechanism that controls the car. Compressed air inflates a balloon inside the car, forcing open the leaves of a hinge. A spring-loaded switch is released and allowed to close, starting the miniature electric motor that drives the MG. Linkage







When bottle is squeezed tightly, balloon inflates fully, front wheels are pulled to right-turn position

from the moving hinge leaf to the steering mechanism then turns the front wheels. When the balloon is deflated, the hinge leaves are pulled together by a rubber band, and the steering linkage moves the front wheels into a left-turn position. As the hinges are forced open slightly by inflating the balloon, the motor starts and the linkage begins moving the wheels to a straight-ahead position. A further squeeze on the bottle inflates the balloon even more, the hinge leaves open fully and the wheels move to a right-turn position.

Construction of the car starts with a plastic-model kit. The first step is to cut out the dummy-motor block and cover the resulting opening with a piece of plastic tile. Plastic cement is used to fix it in place. Onto this tile is cemented one leaf of the hinge assembly, the details of which are shown on page 182. The assembly consists of two pieces of plastic tile joined by a small hinge cemented to them. A hole is drilled in the fixed hinge leaf and the motor switch is positioned behind it as indicated. Two strips of spring brass are used for the switch, spots of solder being used as contacts. The contacts are adjusted so they are normally closed, and are forced open by an 8-32 screw in the movable hinge leaf when the hinge assembly is closed. A wiring diagram is shown in the lower, left-hand corner of page 183. A safety switch is fitted in the bottom of the car, and is used only to prevent the motor from accidentally starting when the car is not being operated. The miniature electric motor is cemented directly to the chassis of the car, and is located so that its shaft contacts a rubber-rimmed drive wheel fitted on the rear axle. The axle is  $\frac{3}{32}$ -in. piano wire, and it, as well as the motor and drive wheel, is available at hobby shops. This assembly replaces the original rear axle. One rear wheel is locked on the axle, the

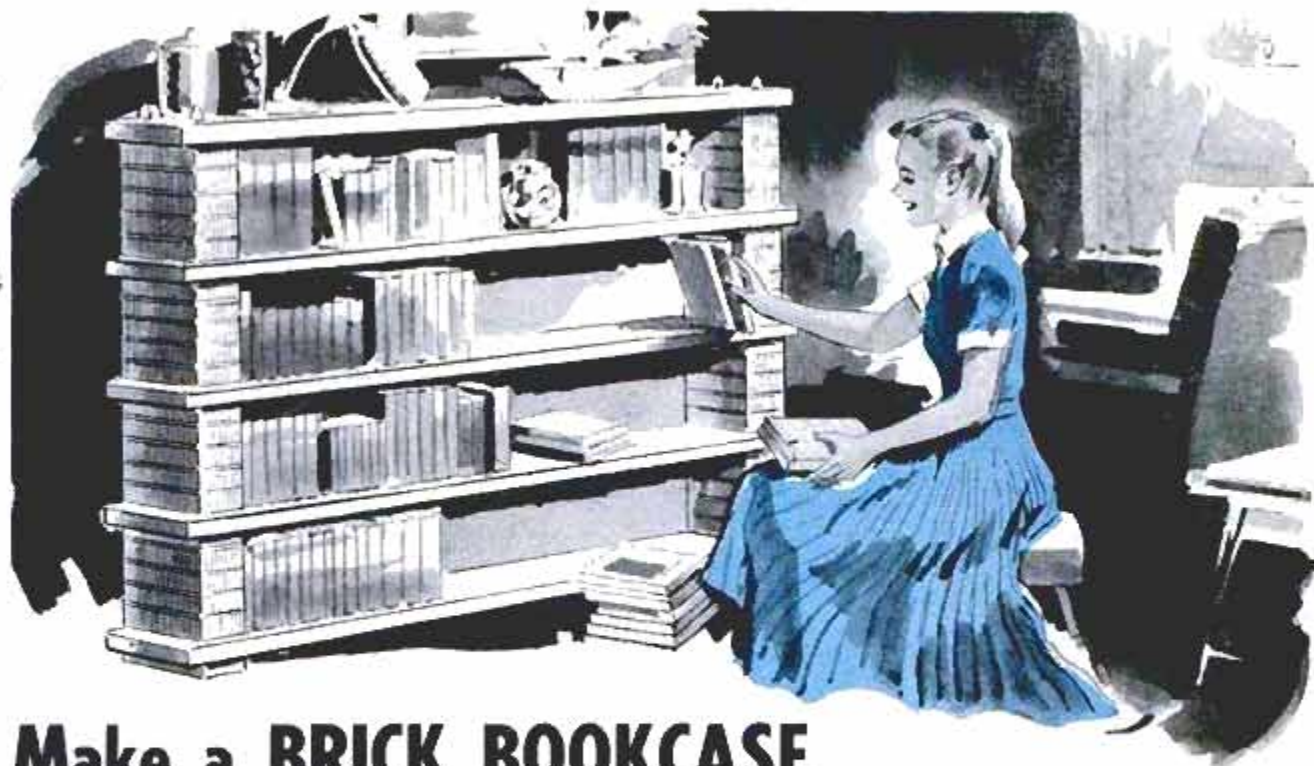
other is allowed to run free. A pair of  $\frac{1}{2}$ -in., 24-tooth spur gears are heated over a flame, then pressed into the rear wheels so they are permanently bonded in place, as shown in the lower, right-hand photo on page 182. Use of the gears permits one wheel to be locked on the axle with the gear setscrew. The setscrew is removed from the gear in the opposite wheel and it is held on the axle by a washer soldered or cemented to the end of the axle. An added advantage of the gears is that they provide an excellent bearing surface for free-turning wheels. For this reason it is advisable to also fit them on the front wheels. When the new rear axle is fitted to the car chassis it is necessary to cement pieces of plastic to it for axle supports.

The steering mechanism of the MG is shown in the details on page 182. This particular model has movable front wheels, which makes the installation of the steering linkage fairly simple. If another type of kit or car is used, it may be necessary to make modifications in the wheel-and-axle assembly. On the MG it is necessary only to fit a short arm, cut from plastic, onto the "kingpin" projecting up through a plastic block on the chassis. Several holes are drilled in the arm, as shown, to allow adjustment. A wire link is hooked into the arm then run to a plastic toothpick that is cemented to the movable hinge leaf. A loop in the end of the wire is fitted over the toothpick and located by using a plastic washer above and below it. To permit further adjustments in the steering, a kink is bent in the steering link, and this is closed or opened, to shorten or lengthen the link as necessary for best steering action. Some slack must be allowed in the steering linkage, so that the motor switch will close before the wheels start to turn. This permits making full left turns.

A battery box, available at hobby shops, is attached to the car chassis on the side opposite the driver. The body of the car is cut away to permit it to fit over the box. For a neater appearance on the finished car, a "tonneau cover" of plastic cloth or tape can be made to fit over the top of the battery box.

Air is delivered from the catchup bottle to the balloon in the car via a 10-ft. length of  $\frac{1}{8}$ -in. rubber tubing, or plastic fuel line such as used for gasoline-engine-powered model airplanes. The tubing is routed through a hole cut in the rear end of the car body. For positive action of the hinge mechanism, a rubber band is passed around the battery box and around a wire tab that is held by the screw in the movable hinge leaf. This closes the hinge assembly when the balloon is deflated. ★ ★ ★

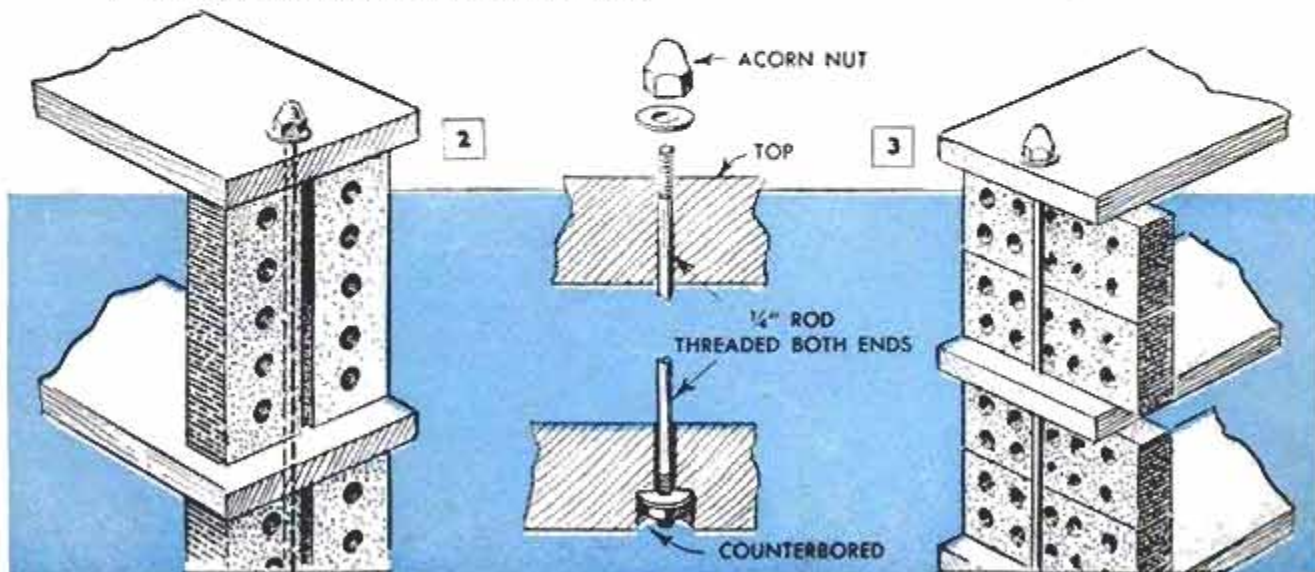
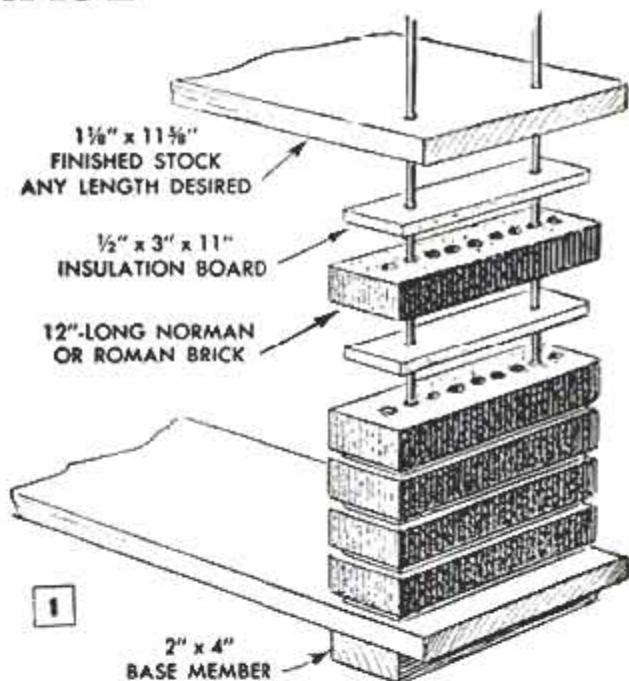




## Make a BRICK BOOKCASE

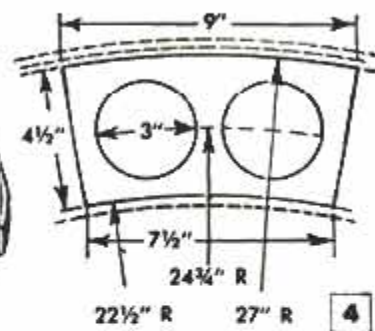
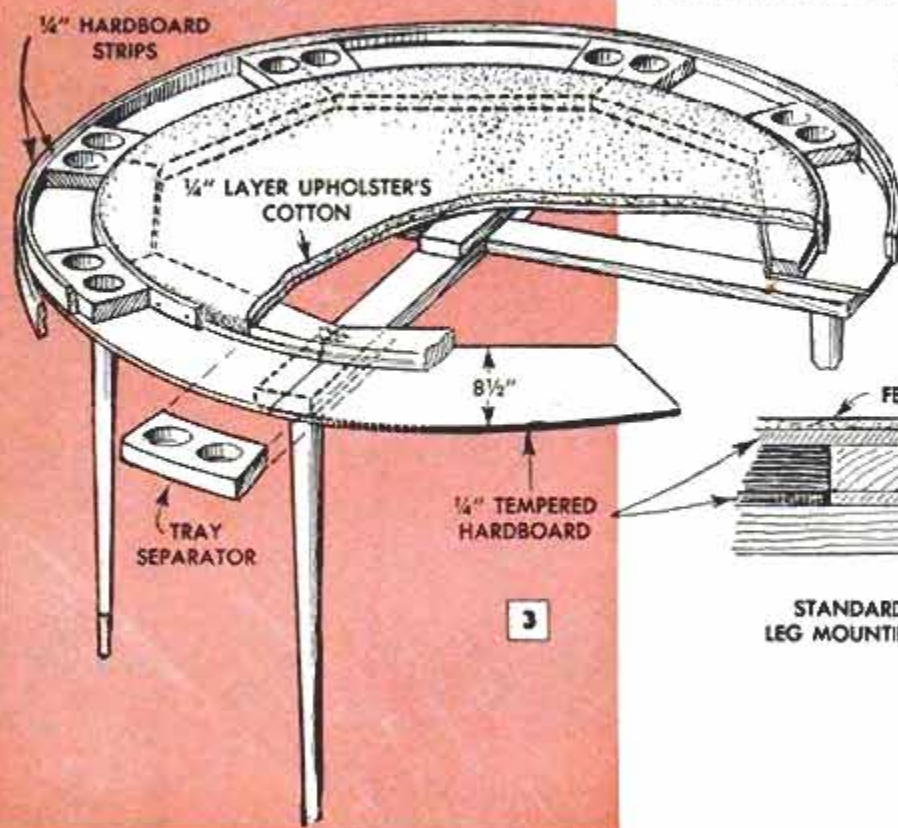
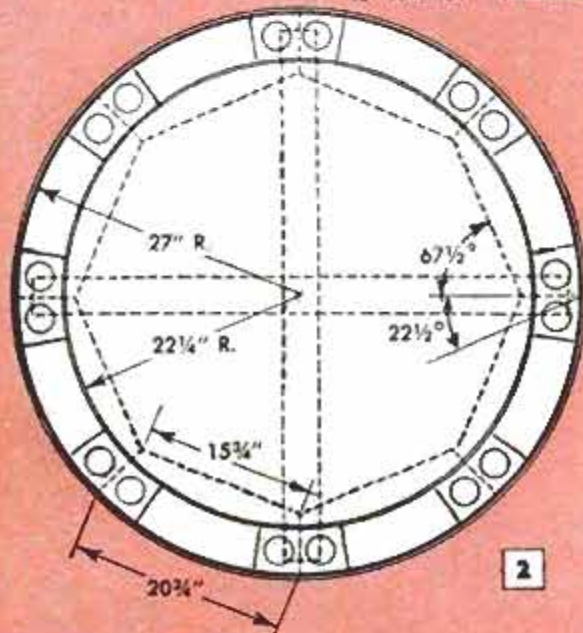
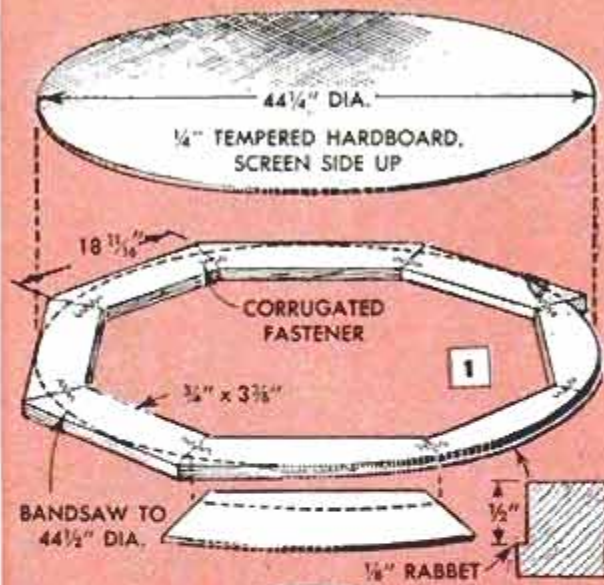
FOR THE NEOPHYTE do-it-yourselfer who would like to start out with an easy project, here are three styles of bookcases from which to choose, featuring brick as the dominant material. Except for drilling a few holes in the shelf stock to take the tie rods, all three bookcases are primarily assembly jobs as shown in the drawings. Fig. 1 shows the brick arranged in the conventional manner with lengths of insulation board sandwiched between them to simulate mortar joints. A stack of five bricks for each shelf provides sufficient vertical clearance for most books. In Fig. 2, the brick are stood on end to space the shelves and in Fig. 3, they are stacked on their sides. Since the bookcases are bolted together, it is easy to disassemble them for convenient moving. Also, shelves may be added or removed with little difficulty.

Information courtesy Structural Clay Products Institute





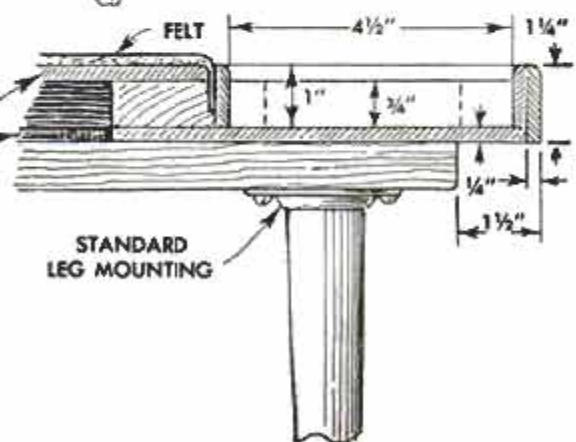
# Game Table



THERE'S NOTHING like a round table when it comes to playing cards, and this king-size family table is something you'll surely want to make for your basement recreation room. Besides being round, it has handy individual trays that encircle the top and convenient holders for glasses and ash trays. Where there is room to leave the table standing, it can be fitted with ready-made wooden legs, or it can be made a piggyback affair to ride the top of a regular folding card table so it can be stowed away.

It's made from both hardboard and pine, the pine being used for the supporting cross members, Fig. 5, and the hexagon rim which supports the felt-covered playing surface. Start by assembling the rim as detailed in Fig. 1. Eight segments, angle-cut 22 1/2 deg., are joined in a hexagon with glue and corrugated fasteners. After this it is bandsawed 44 1/2 in. in diameter, sawing a little outside the line for sanding smooth, and then rabbeted to provide a groove in which to tuck the top covering later. Eight hardboard segments, cut as dimensioned in Fig. 2, form bottoms for the trays that circle the top and these are glued and nailed to the underside of the rabbeted rim as in Fig. 3. Tray separators later cover the butted joints of the segments.

The sectional view in Fig. 4 shows how hardboard strips, 1 in. wide, are wrapped around the top to form inner and outer





# for Your Family Room



rims for the trays. The joints of the strips should fall at the tray joints so the tray-separator blocks will hide them. Note how the inner strip when glued to the rabbeted edge forms the groove for the felt. Both this strip and the inside one of the double-thick outer rim are rounded on the inside edges. The outside facing strip laps the edge of the tray bottom and is rounded on the outside edge. The tray-separator blocks should be in place before the outer strips are applied. ★ ★ ★

## MATERIALS LIST

### HARDBOARD

1 pc.  $\frac{1}{2}$ " x 45" x 45" — Top (Tempered)  
 1 pc.  $\frac{1}{2}$ " x 1" x 70" — Center Rim (Standard)  
 1 pc.  $\frac{1}{2}$ " x 1" x 85" — Outer Rim (Standard)  
 1 pc.  $\frac{1}{4}$ " x 1 $\frac{1}{4}$ " x 86" — Outer Outside Rim (Standard)

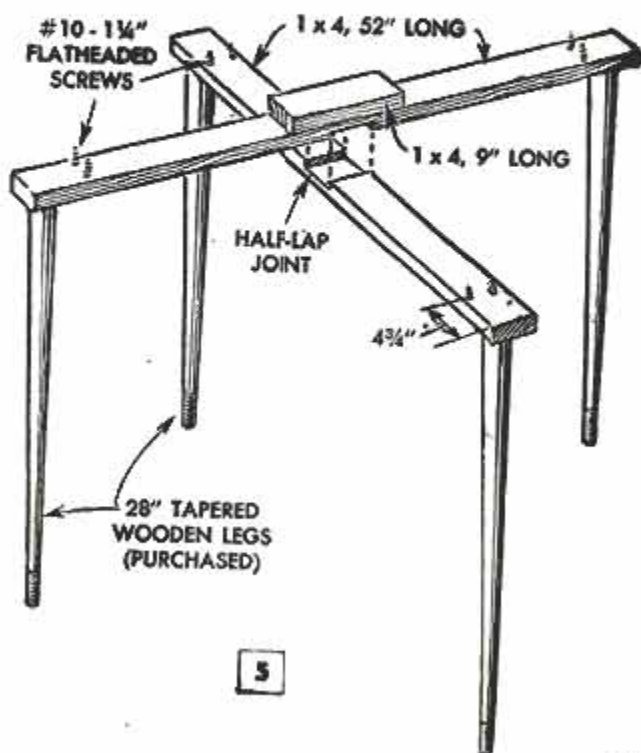
8 pcs.  $\frac{1}{4}$ " x 8 $\frac{1}{2}$ " x 20 $\frac{3}{4}$ " — Tray Bottoms (Standard)

### LUMBER

8 pcs.  $\frac{3}{4}$ " x 3 $\frac{3}{8}$ " x 18 $\frac{3}{4}$ " — Center-Top Frame  
 8 pcs.  $\frac{3}{4}$ " x 4 $\frac{1}{2}$ " x 9" — Tray Separators  
 2 pcs.  $\frac{3}{4}$ " x 3 $\frac{3}{8}$ " x 52" — Cross Cleats  
 1 pc. 1" x 3 $\frac{3}{8}$ " x 9" — Center Block

### MISCELLANEOUS

4 pcs. Standard 28" tapered wooden legs and mounting plates  
 1 $\frac{1}{2}$  yds. felt or plastic sheeting 54"-wide  
 Upholsterer's cotton, glue, screws, 16 corrugated fasteners



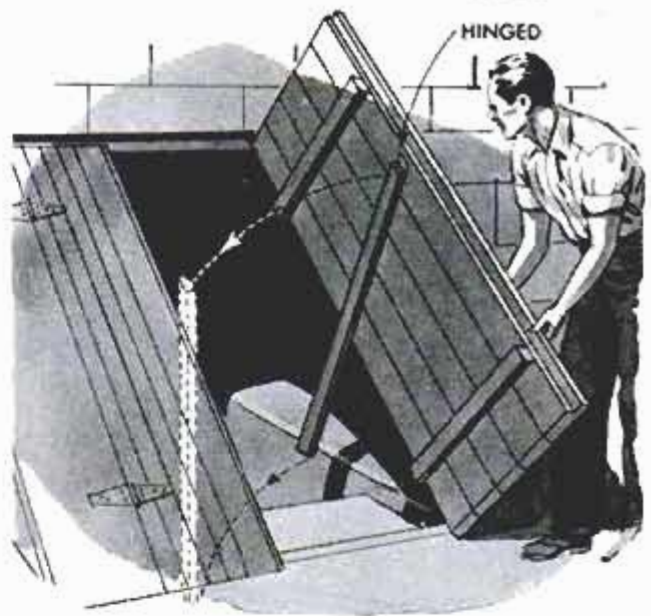
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## Hinged Supports Provide Safety Factor on Basement Doors

It seems almost impossible to prevent youngsters from sliding down a cellar door. If you have a wooden type that might sag or break under the pounding given it by a group of energetic youngsters, here is a simple modification that will give you peace of mind. Hinge a length of 1 x 2 or 2 x 2 on the underside of each door, positioning it so it is vertical. The lower end should be located so it fits firmly against one of the concrete steps. When the doors are opened, the supports swing back against the door out of the way. The supports should be located at about the center of the edge of each door, which will provide the most support, and locate the supports so they will not interfere when someone raises the doors from beneath.

Ben Perry, Chicago.



## Hardwood Floors Silenced With Hot Liquid Soap

Squeaks in hardwood floors sometimes can be quieted by using heated liquid soap. A clean oil can is filled with the hot liquid which then is squirted between the boards making the noise. The soap acts as a lubricant between the rubbing surfaces of the boards and will penetrate the wood fibers. Long-lasting, sometimes permanent, silencing is achieved.

## Metal Surface Spot Finished By Pencil in Drill Press

Aluminum, brass and other soft metals can be given a "swirl" or "engine turned" finish by chucking a pencil stub fitted with an eraser in a drill press. The rotating pencil then is pulled down against the metal until the desired pattern is scribed.



## Prescored Surface of Siding Prevents Ragged Saw Cuts

No matter how sharp the saw is, a ragged edge is produced when cutting soft bevel siding, which makes a neat fit difficult. To overcome this problem, after marking the board to length, score along the mark with a sharp knife or pointed awl. This scoring breaks the surface fibers of the wood so the saw teeth do not catch them and tear them as the teeth cut.

## Reels From Hardware Store Ideal for Holding Cords

Next time you visit your hardware store, ask the owner to save you the empty reels usually discarded when the wire on them is all sold. Small and flat, the reels are ideal for storing extension cords and odd lengths of wire in the shop.







# WAX-PAPER TRANSFERS

By Barbara Nicholson

HERE IS AN interesting pastime that you can teach to children who like to color figures, or make paper dolls and other cutouts. The only materials needed are a well-inked newspaper with the desired figures, a sheet of wax paper and white paper or cardboard to which the figures are to be transferred as shown in the photos.

To make a transfer, place the wax paper on top of the drawing or photograph and rub it slowly but firmly, holding the wax paper in the same position to get a clearly transferred image. Use a fountain-pen cap or other small object with rounded end to rub the ink into the thin coating of wax. When the transferred image becomes well-defined, remove the wax paper and place it face down on the paper or cardboard on which the image is to appear. Then rub the wax paper until the image is transferred, again being careful not to move it. To get good transfers, select only well-inked photos and drawings with well-defined lines. Also, use medium-soft paper, such as typing stock, since it will accept the ink from transfers more readily than hard papers.



Above, when rubbing wax paper to transfer image to wax coating care must be taken to keep it in same position until finished



Above, second step of process is to transfer wax-paper image to location desired on clean white paper by rubbing the wax paper again as in first step. Below, after image is completely transferred to white paper, wax paper is removed from it



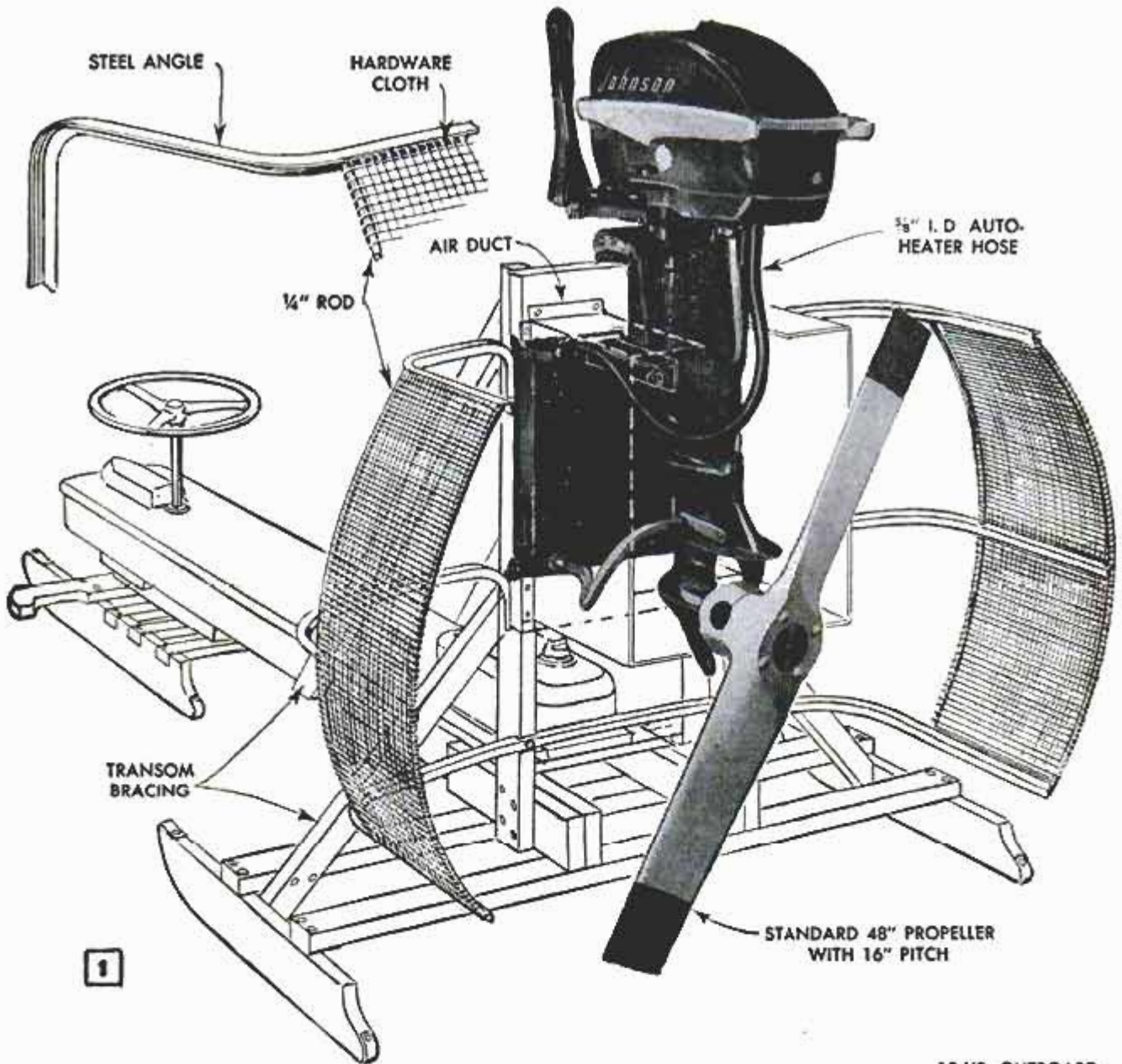
## Radiator Air Valves Cleaned in Boiling Soda and Water Solution

When the air valves on the radiators of your steam heating system do not work properly, try cleaning them in the following manner. First, make certain that the shutoff valve on each radiator is in closed position, if there is steam in the system. Then unscrew the air valves and place them in a soda solution mixed in the

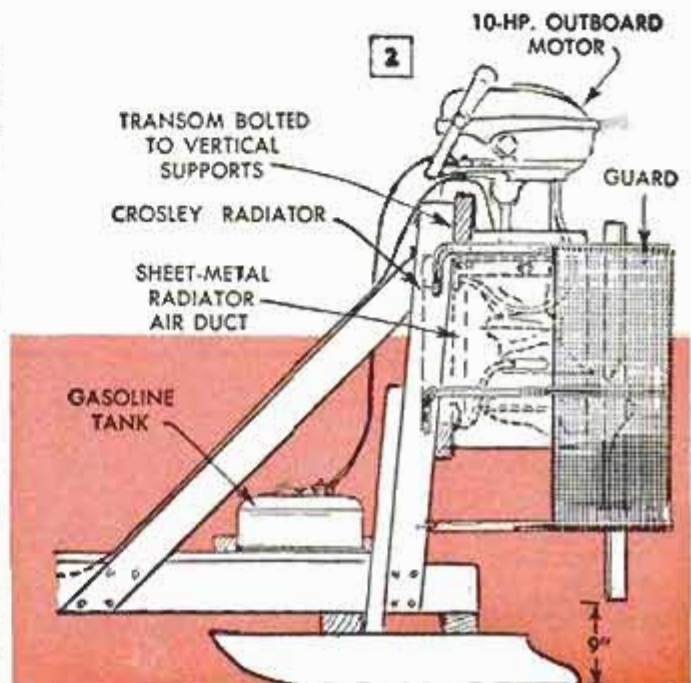
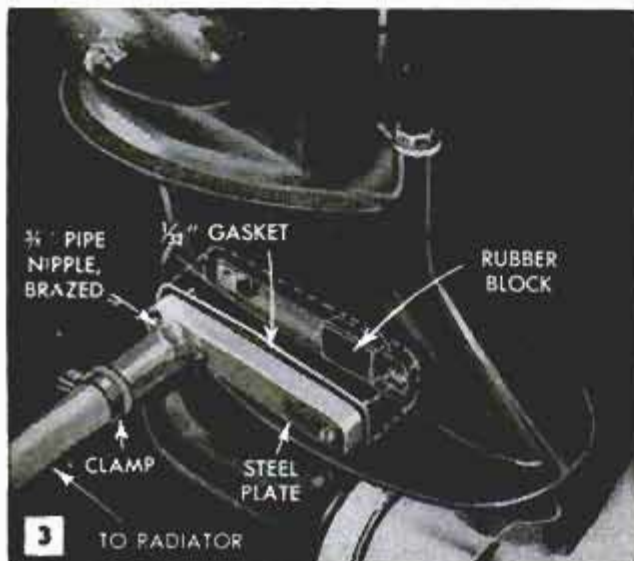
proportions of 1 heaping tablespoon of washing soda to 1 qt. of water that has been brought to a boil. After boiling for several minutes, remove the valves and thoroughly rinse them in clean water. When the clean valves are replaced in the system you may find none, or only one or two need replacing.—John Granger, Wood-Ridge, N. J.



# NO REST FOR YOUR



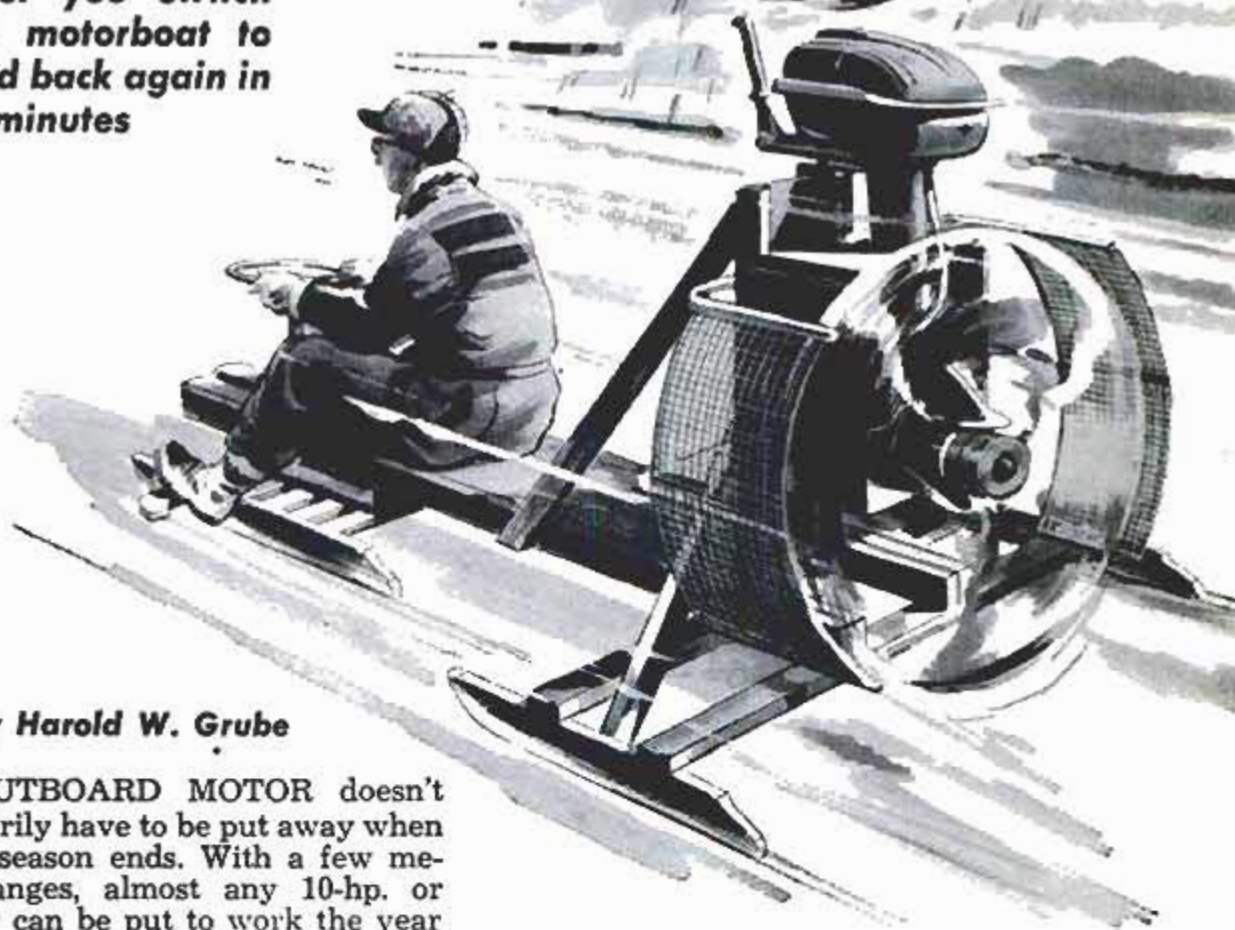
New cover plate with hose connection replaces original. Rubber block under plate closes water passage





# OUTBOARD MOTOR

**Simple mechanical changes let you switch over from motorboat to ice sled and back again in matter of minutes**



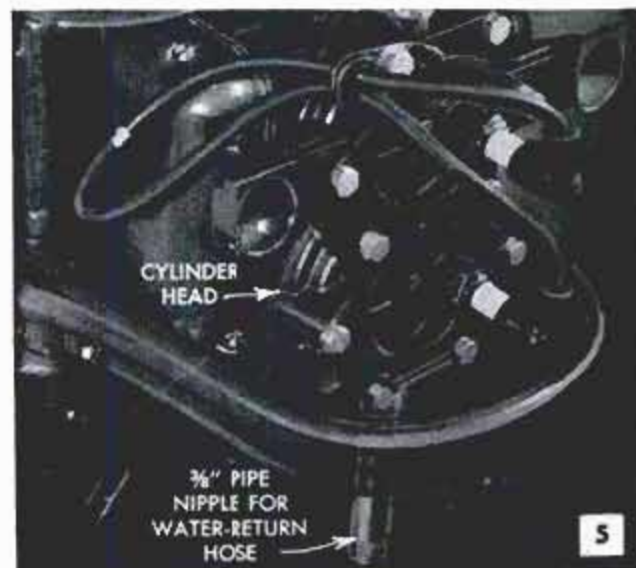
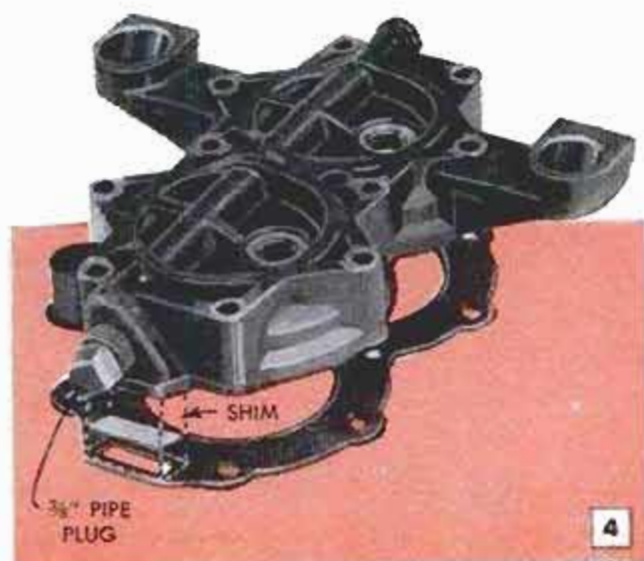
**By Harold W. Grube**

**Y**OUR OUTBOARD MOTOR doesn't necessarily have to be put away when the boating season ends. With a few mechanical changes, almost any 10-hp. or larger motor can be put to work the year 'round and used to propel an ice sled. Speeds up to 35 m.p.h. are possible with a payload of three. The change-over in no way reduces the efficiency of the motor as an outboard motor.

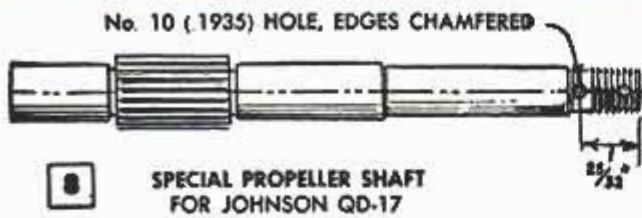
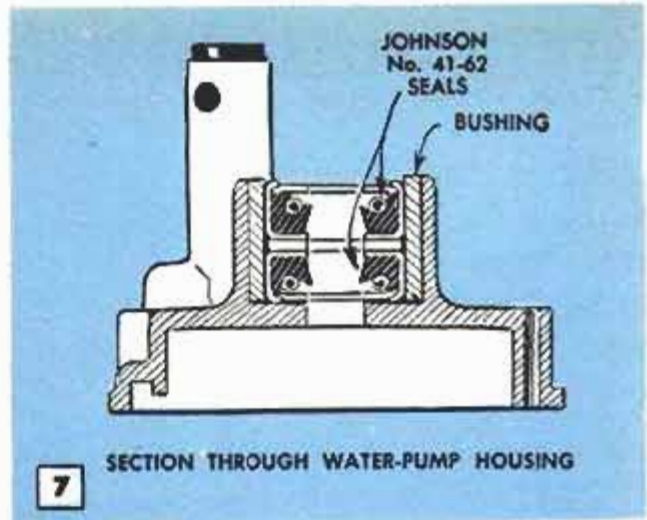
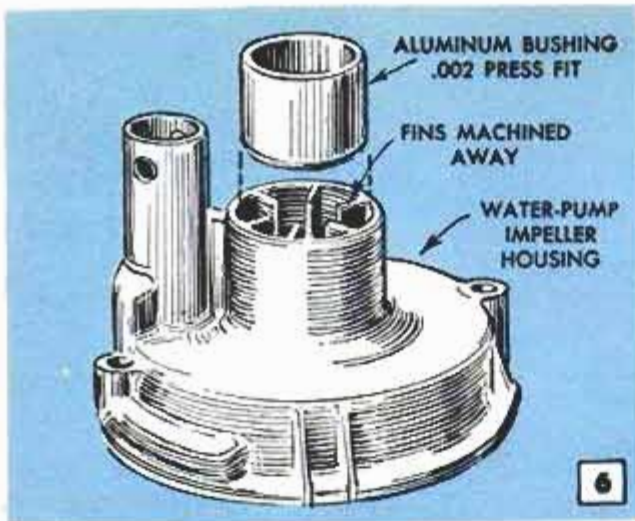
Other than making a propeller hub and replacing the original propeller with a purchased air propeller, the change-over for the most part involves sealing the wa-

ter system so the water pump can be used to cool the motor by circulating water through a radiator. The original conversion was made on a Johnson 10-hp. water-cooled motor. Figs. 1 and 2 show how the motor is clamped securely to a rigid transom

Connection for return-water hose is provided by drilling and tapping hole in cylinder head for nipple





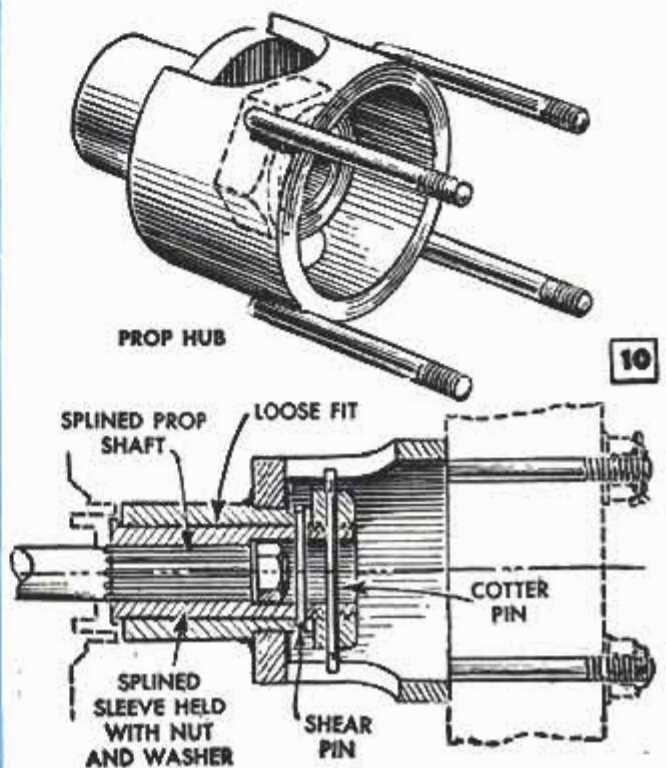
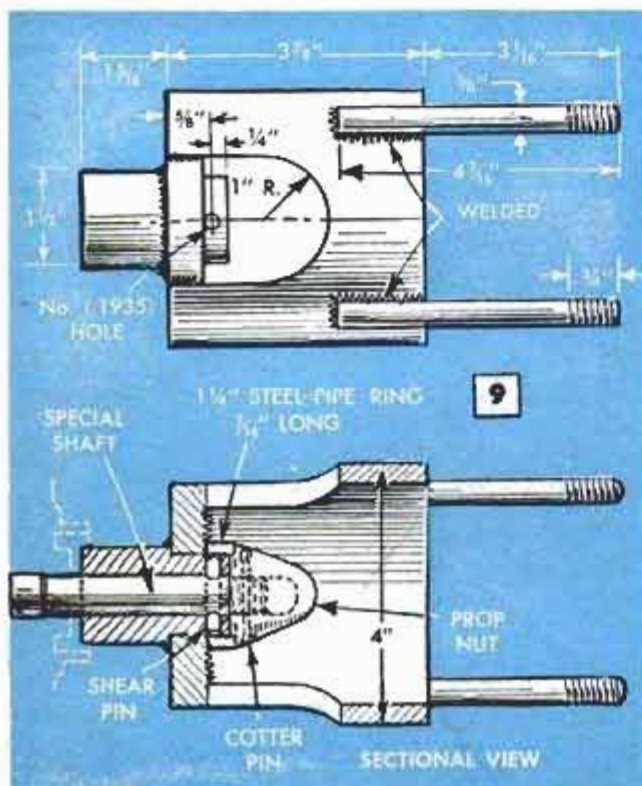


mounted high on supporting members bolted to the rear of the sled. A Crosley or other small-car radiator is mounted between the vertical supports, and a sheet-metal duct is attached directly in front of the radiator to direct the air over the gear case to help cool the gears and water within. You'll notice in Figs. 1 and 2 that two pieces of steel angle are fastened to the transom and to the screws of the lower rubber motor mounts to prevent the motor from swinging from side to side. With the top of the radiator above the point of the water pump, priming is no real problem. The radiator can be drained in the normal

manner through a pet cock at the bottom.

Sealing the water system requires removing the cover plate on the upper gear-case housing and replacing it with a heavier steel plate as shown in Fig. 3. A  $\frac{3}{8}$ -in. pipe nipple is brazed over a hole in one end and then the plate is drilled and tapped to suit the original mounting holes. Passage to the water-intake screen is blocked with a rubber block. To convert back to outboard use, remove the block and replace the cover plate with the original.

To provide a connection for the return-water hose, the cylinder head is removed and a hole is drilled and tapped in the end to take a  $\frac{3}{8}$ -in. pipe nipple, Figs. 4 and 5. A standard  $\frac{3}{8}$ -in. pipe plug is used to close this hole when converting back to outboard use. A hole is required in the lower half of the motor cover to accommodate the hose nipple. Water is kept from entering the exhaust by covering the port in the cylin-





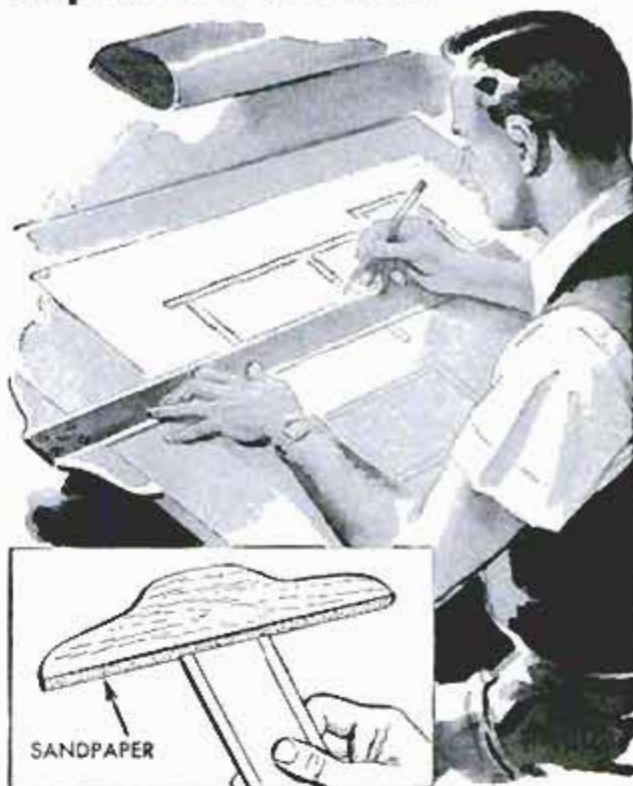
der-head gasket with a shim as in Fig. 4. Regular  $\frac{5}{8}$ -in. auto-heater hose is used from the radiator to the motor. The water outlet at the bottom of the radiator is soldered shut and a new  $\frac{7}{16}$ -in. hole is made in the side of the radiator at the bottom. A short brass tube having a  $\frac{5}{8}$ -in. outside diameter is soldered over it for the lower-hose connection. The upper inlet to the radiator is cut off and replaced by a plate-fitted nipple and gasket.

The conversion requires an extra water-pump housing since this part requires altering to where it cannot be reinstalled. Fig. 6 shows how a portion of the casting is machined to receive a press-fit aluminum bushing which in turn is rebored to receive two lip seals as in Fig. 7. The seals, which prevent water from leaking out the top of the pump, can be purchased from the manufacturer of the particular motor used. Sealing cement is applied to the plate under and above the pump.

If the shear-pin hole in the motor shaft is near the end rather than near the gear case, the original shaft will do. However, this was not the case with the motor used and it was necessary to machine a duplicate shaft and locate the shear-pin hole at the end, Fig. 8, to assure adequate strength. Fig. 9 details the special propeller hub that was made for the Johnson QD-17. If your motor has a splined shaft, it will require a hub like the one detailed in Fig. 10. In each case, the mounting bolts welded around the hub are spaced to correspond with the mounting holes in the propeller. In ordering the 48-in. prop, be sure to specify the rated horsepower at the shaft, maximum r.p.m. of shaft at top horsepower (approximately 2400), direction of rotation, whether pusher or puller type and tipped or untipped. The propeller used was purchased from Banks-Maxwell Propeller Co., Ft. Worth, Tex.

A remote-control cable is used for controlling the throttle. The engine should be started in neutral, allowed to warm up and be shut off before shifting into forward and restarting. Shifting while the motor is running is apt to shear the pin in the shaft due to the very high inertia of the propeller. Likewise, throttling down from a high r.p.m. and shutting off the motor quickly is apt to shear the pin. It is best, therefore, to throttle the motor down slowly before shutting off. Naturally, the propeller must be fitted with a suitable guard and under no circumstances should be driven without being fully protected. Make it a point to see that no one stands near the propeller while it's being revved up. Fig. 1 suggests one type of guard that can be made from steel angle,  $\frac{1}{4}$ -in. rod and hardware cloth. ★ ★ ★

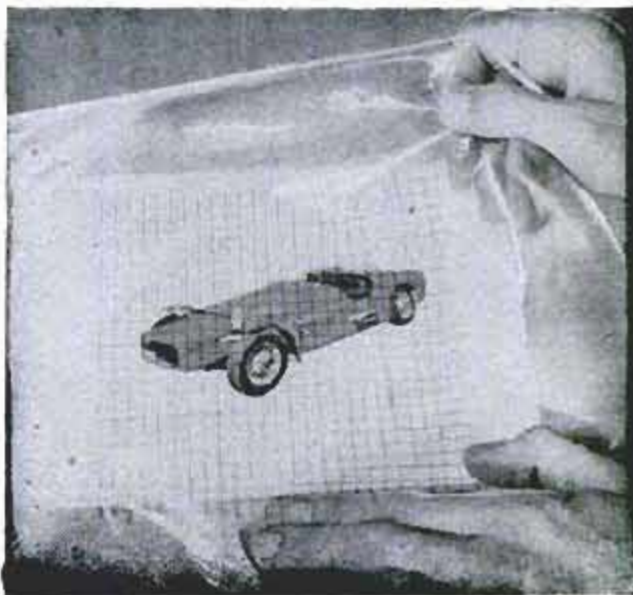
## Sandpaper Facing on T-Square Helps Hold It on Board



The annoyance of having a T-square slip may be practically overcome by cementing a narrow strip of fine sandpaper to the edge of the T-square head. The friction of the abrasive against the edge of the board is enough to hold the square in place.

## Cellophane Grid Over Copy Saves Ruling Original

When it's undesirable to rule squares on the original when copying a drawing by the square method, you can provide the necessary grid pattern by ruling the squares on a sheet of cellophane or plastic food wrapping and placing it over the copy. Richard Hanscom, Elmhurst, Ill.





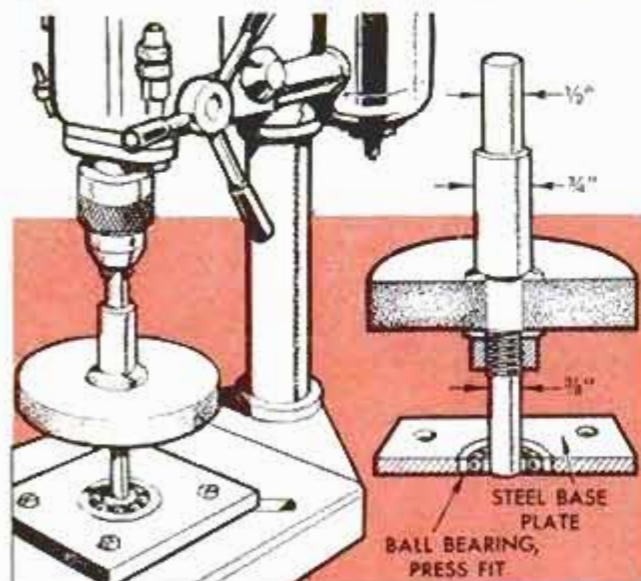


# HOW WOULD YOU DO IT?

**K**EEPING A HOME in top shape involves solving a host of small problems, such as repairing loose sashes and clearing clogged drain lines. Illustrated on these pages to help you with future repair situations, are *PM's* solutions to these and other problems. Clip and file them for handy reference.

**Q. Above left, how can you prevent children from tracking in mud from outdoor play areas?**

**A.** Cover the areas with a thick coating of tanbark, which is much easier to wipe from shoes and clothing than mud and is easier on children's knees and elbows than a gravelled surface. Enclose such areas with a frame of 2 x 4s held by some short stakes

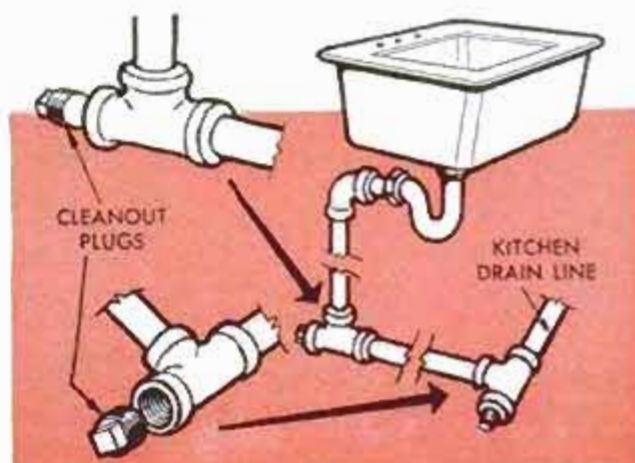


**Q. Left, what is the best setup to use when chucking an emery wheel in a drill press for light grinding?**

**A.** Make up an arbor to take the emery wheel to be used as in the detail. A ball bearing press-fitted in a hole machined in a steel plate that is bolted to the table, holds the lower end of the arbor shaft in line when pressure is applied to the wheel. Not only does this setup assure greater safety and accuracy but it also prevents wear on the spindle bearing

**Q. Lower left, what is the best permanent method of joining two sections of carpeting?**

**A.** Use special cloth tape designed for this purpose that has a paper backing and is fitted with metal points that project upward along each edge to grip the underside of the carpeting. Carpet edges to be joined must be perfectly straight. A soft-drying waterproof cement, applied to facing surfaces of tape and carpet as shown, assures a permanent bond





**Q. Opposite page lower right, how can a clogged kitchen-drain line be freed of debris obstructing it?**

**A.** Remove the cleanout plug, usually found next to basement ceiling directly under the sink, and twist a drain-and-trap auger into the line, first "downstream" and then "upstream." Keep a container handy to catch the flow when the obstruction is released. Then, flush out remaining material with a garden hose. Drainage lines without such cleanout plugs should be provided with them as shown in drawing

**Q. Above right, what can be done to enable you to see callers (unobserved) before opening the door?**

**A.** Replace the lookout window in the door with a transparent mirror of the same size. If the door has no window, make a cutout and frame to take a small mirror. Such mirrors have a thin coating of silver that renders opaque the side facing the most light

**Q. Right center, how do you go about raising sunken sidewalk sections that are next to a wall or curb?**

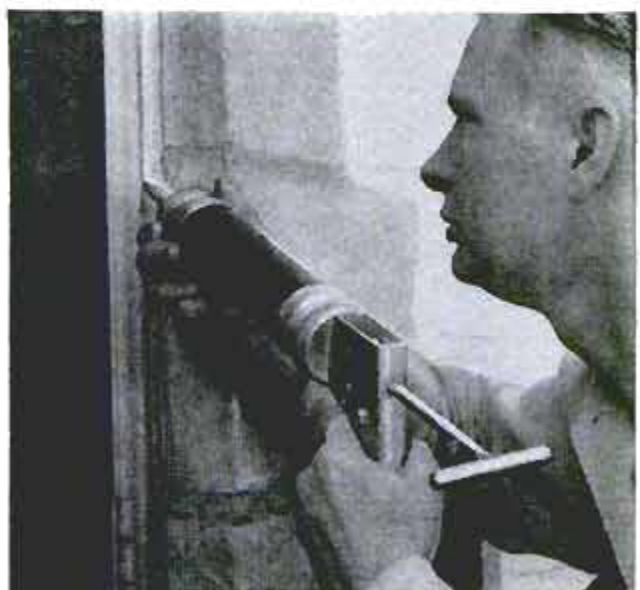
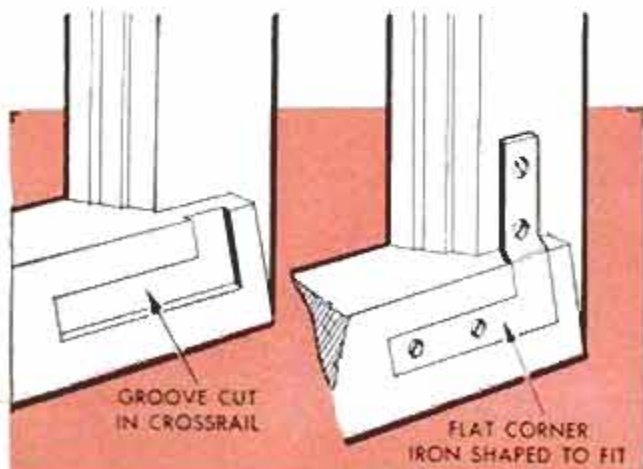
**A.** Since jacks cannot be set under the sidewalk edge next to a wall, use a length of 2 x 4 stock to raise one slab at a time. Hold the slab in a level position while a helper tamps gravel under it as shown

**Q. Below, what is the best way of repairing a loose stile and crossrail joint on an upper window sash?**

**A.** If the wood is in good condition, simply cut a groove in the crossrail to take one leg of a flat corner iron. One leg must be bent to conform to the slight offset at the joint so that the corner iron can be screwed flat to both members of the joint

**Q. Below right, what can be done to prevent calking compound from pulling away from corners when dry?**

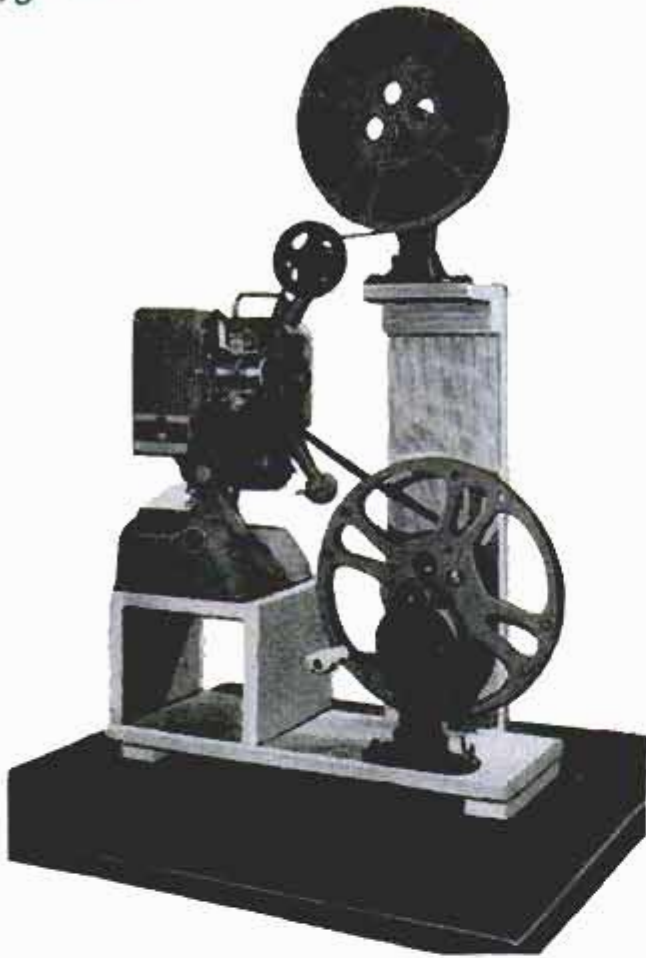
**A.** Be sure that surfaces to which the compound is to adhere are absolutely dry and free of loose material. Then, instead of applying the compound in a thick, round cross section as when filling straight joints around windows, apply a thin layer with a concave surface. For large voids, wipe the compound into firm contact with the joint surfaces with your thumb





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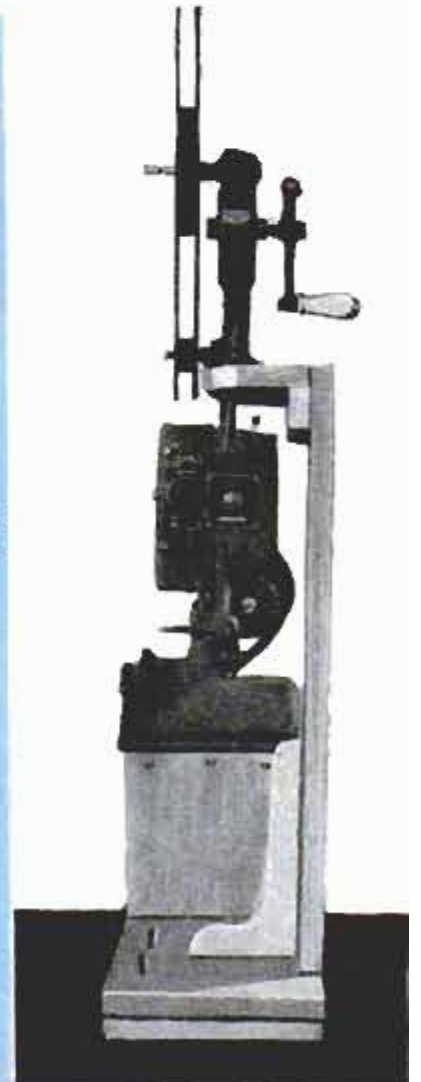
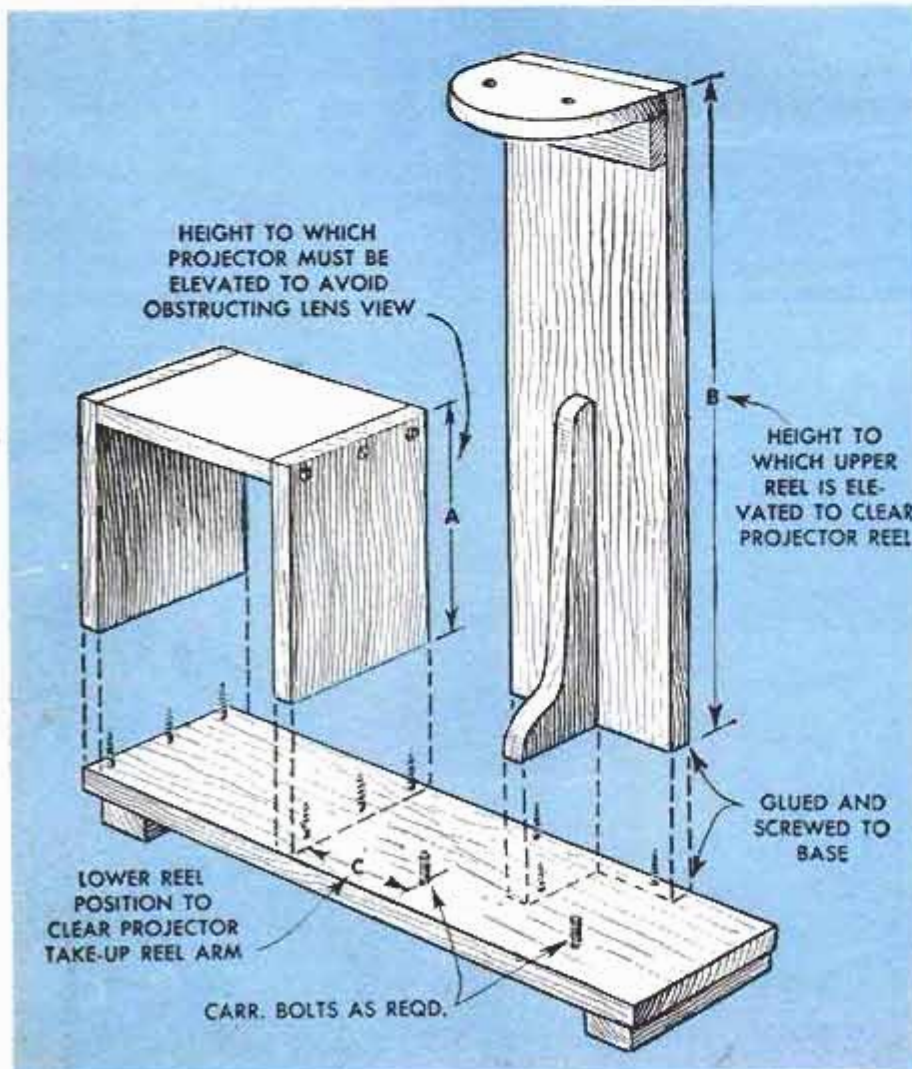
# PROJECTOR PLATFORM INCREASES FILM RUN



TO AVOID frequent stops for reel changes when showing films with runs of 15 to 50 min., one amateur movie producer made the wooden platform shown to permit using large-size reels on his home-movie projector. Most projectors of this type have a reel capacity of only 300 to 400 ft., about 10 min. of running time. Actual dimensions for the platform members are not given because of varying reel positions and sizes of different projectors. Of course it is necessary to hand-crank the lower rewind since it is not coupled to the takeup arm.

Start construction of the platform with the base member. The only critical dimensions are those referred to by the letters A, B and C of the drawing. To find these dimensions, simply block-up the projector on the base and position the lower rewind to provide the required clearances. Do the same for the upper rewind, being sure to mount the largest reels to be used on both rewinds. All reels must be in alignment.

Frank P. Fritz, Bensenville, Ill.







### ← Small Anvil Assembled From Steel Pipe Fittings

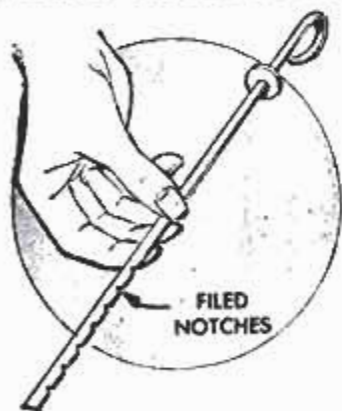
Here is a small anvil that is handy for small metal-shaping jobs and straightening nails. It consists of a pipe nipple and cap flange that is screwed to the bench top off to one corner as shown in the drawing at left.

### Remove Glued Plug With Screw

To remove a wooden plug that has been glued over a countersunk screwhead, simply drive a screw into the center of the plug. The plug will break loose when the point of the screw is turned against the head of the countersunk one. Use a screw of approximately the same diameter as the countersunk screw when doing this.

### Calibrate Oil Dipstick

Calibrating the oil dipstick of your car engine will aid in quickly determining exactly how many quarts of oil are in the crankcase. This can be done the next time the oil is changed. When refilling the crankcase, add the new oil one quart at a time and file a notch on the dipstick at the level attained by each quart.—R. Darling, Endicott, Mass.



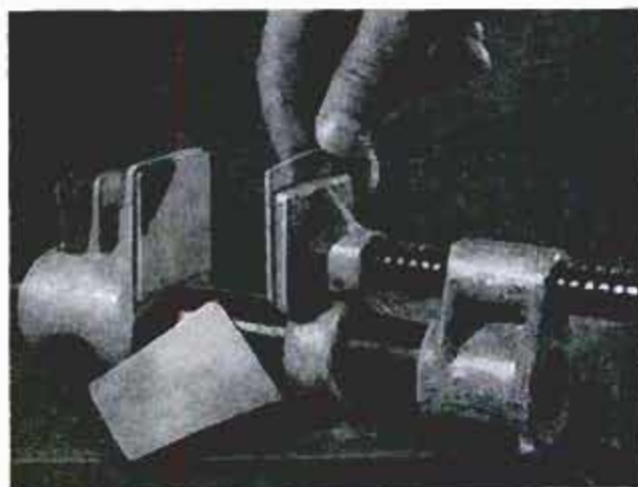
### Kinked Tang Holds File Handle

If the wooden handles on your files frequently come loose, try this method of keeping them in place: Simply bend a small kink in the end of the tang of each file and then drive the tang in place, as indicated in the detail. When doing this, be careful to make only a small kink since file steel is very brittle.—G. E. Hendrickson, Argyle, Wis.



### Rubber Pads on Bar Clamp Protect Work Surfaces

Rubber pads cemented on the clamping surfaces of a bar clamp provide a better means of protecting work surfaces than use of wooden blocks, which must be held by hand until clamped in position. Such pads may be cut from an inner tube.



### Silicone-Coated Ignition Parts Prevent Starting Failure

Ignition failure due to moisture condensation in the distributor cap and on ignition-wire terminals can be prevented by coating these parts with a silicone solution. Silicone solutions sold for treatment of shoes are ideal for this purpose.

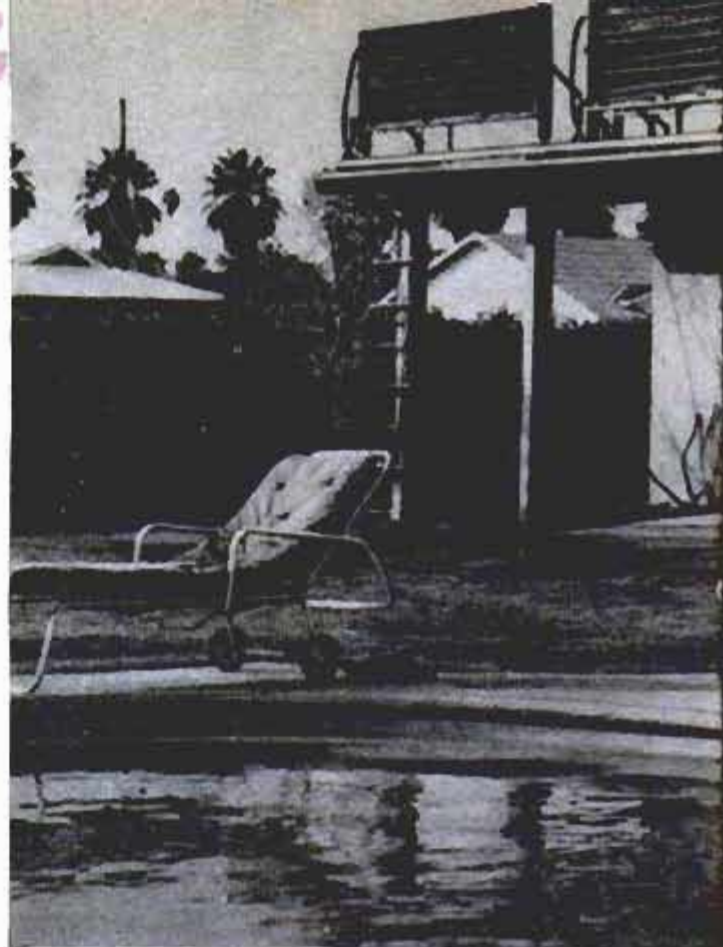




# SOLAR WATER HEATERS

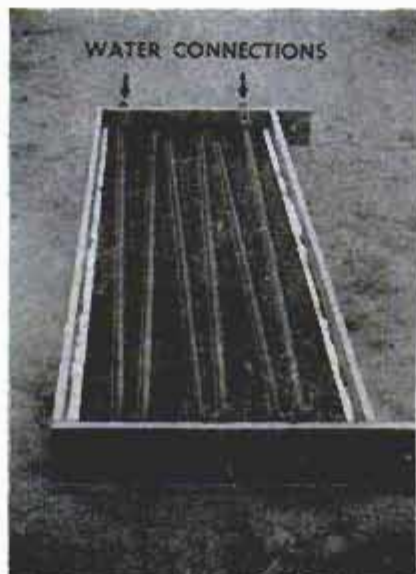
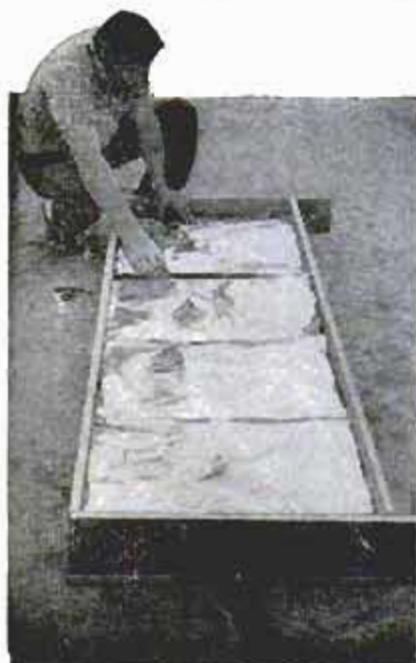
By John Yellot  
CONSULTING ENGINEER

**P**RACTICAL APPLICATION of solar energy no longer is a matter for the future; it now is in the realm of any do-it-yourselfer. Installing a system that heats water with the energy from the sun is no more difficult than installing a conventional-type water heater that uses gas or electricity. Hundreds of homes in Florida and the Southwest use solar energy for heating water all through the year. Farther north, because of cloudy weather and short days in winter, a conventional heater is used as an auxiliary. A solar water heater consists of a heat-absorbing unit and an insulated storage tank, plus the necessary piping and fittings. Cold water is circulated through the absorber where it is heated to about 140 deg. F. by the sun's rays, then is stored in the tank ready for use. A well-insulated tank will hold water overnight with a temperature drop of no more than 5 or 10 deg. Engineers estimate that a modern family requires up to 20 gal. of hot water a day per person. An efficient solar water heater provides 1.5 gal. of hot water

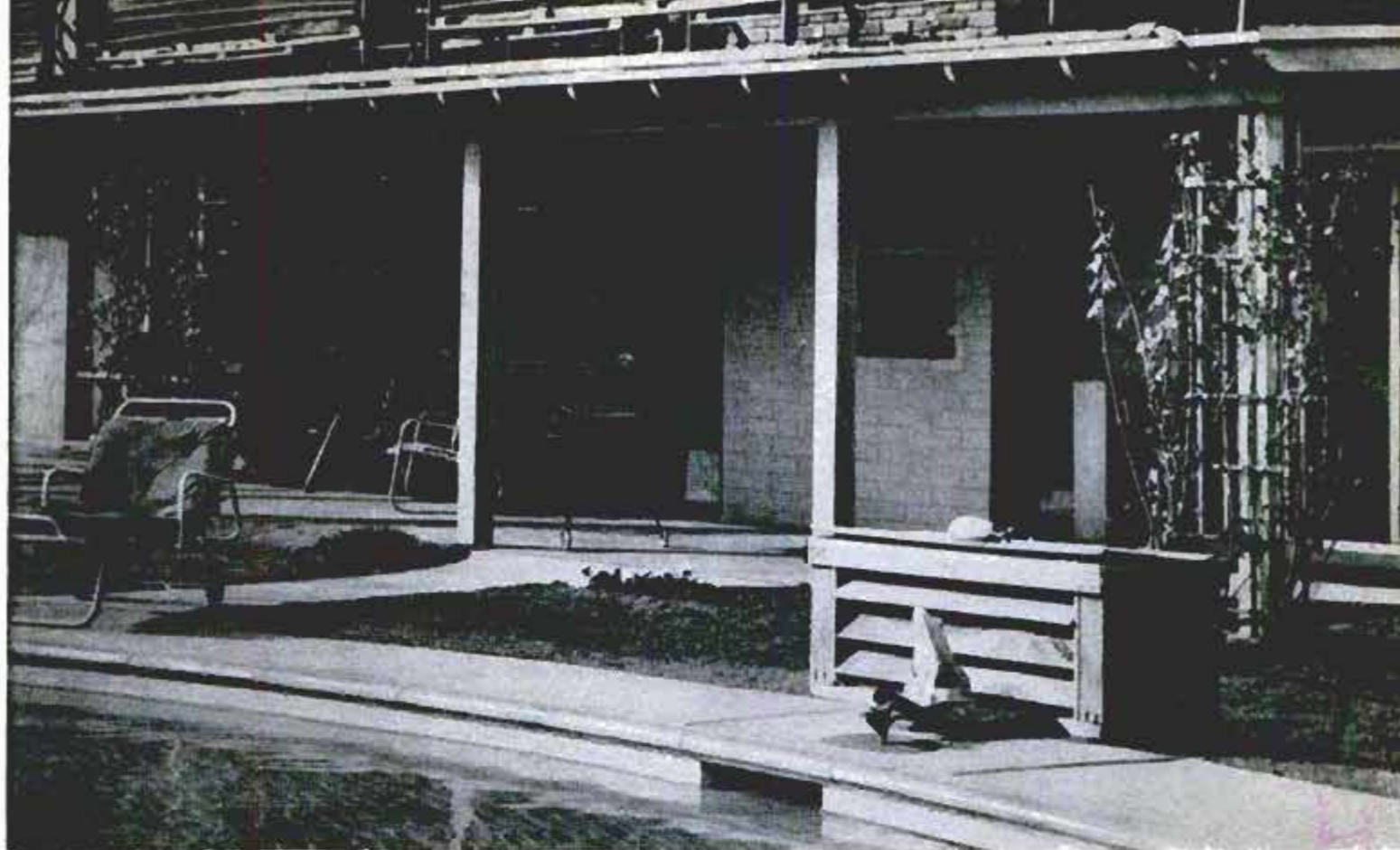


per sq. ft. of absorber per sunny day. This averages higher in the South, lower in the North. A family of four will require an absorber with 54 sq. ft. of surface connected to an 80-gal. storage tank. In practice, an absorber of 48 sq. ft. usually is satisfactory, and permits building the absorbers in 2 x 8-ft. units. Three of these units provide the needed 48 sq. ft. A single absorber of these dimensions is ideal for a vacation cabin occupied by one or two persons.

Each heat absorber consists of a box with a "radiator" inside. The box is a frame of 1 x 6 stock with outside dimensions of 2 x 8 ft. A 4 x 8-ft. sheet of hardboard is ripped

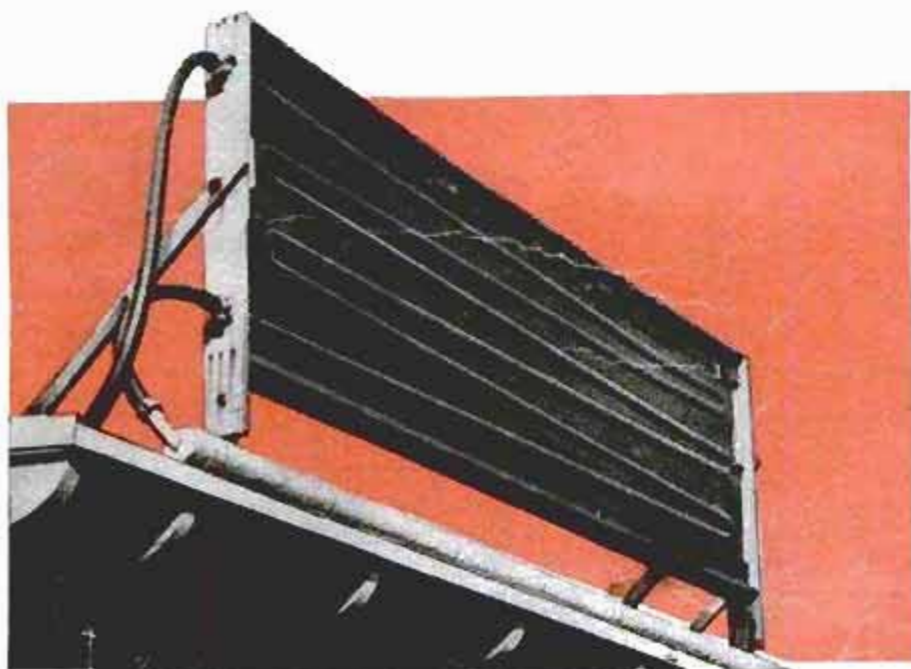






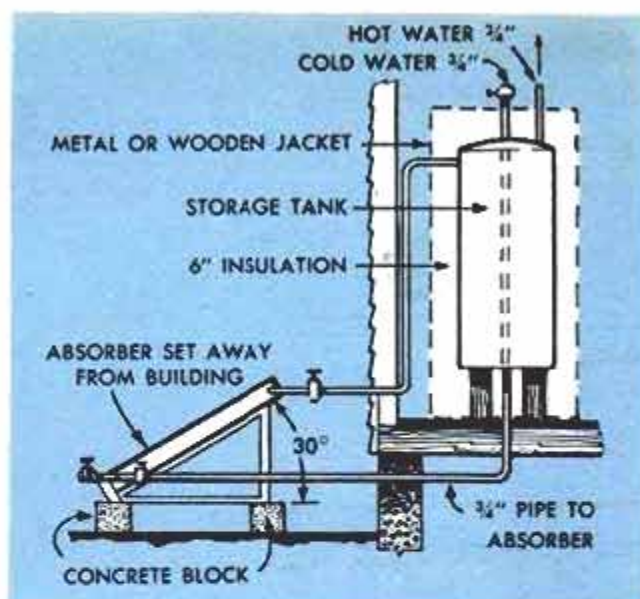
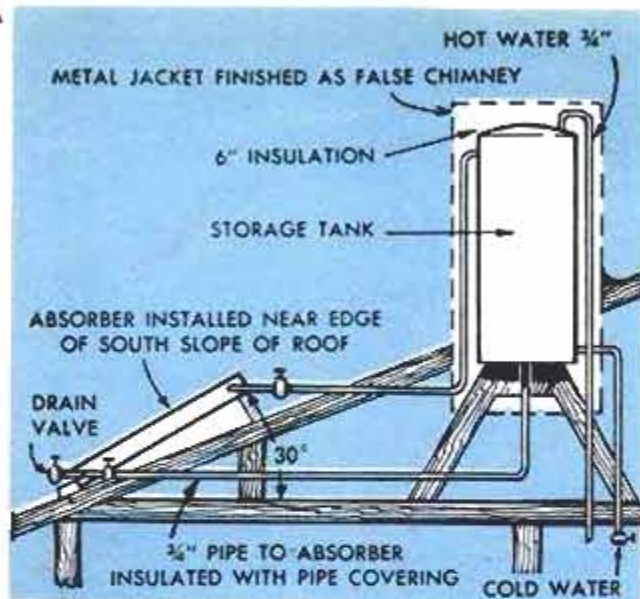
lengthwise to provide a back to the frame, and it is glued and nailed in place. The radiator that fits inside the frame can be made of a sheet of 6 to 10-oz. copper to which a length of  $\frac{5}{8}$  or  $\frac{3}{4}$ -in. copper tubing is soldered its full length, being laid back and forth horizontally. A 36-ft. length of tubing will fit the absorber box if the rows are spaced about 6 to 8 in. apart. The tubing and sheet then are painted with flat-black enamel. Nearly as efficient is aluminum tubing on aluminum sheet bonded together with aluminum solder. Fabricated units known as "tube-in-strips" and "tube-in-sheets" (the latter is shown

in the photos on page 198 and this page can be used. The open ends of the tubes are fitted in holes bored in one end of the heat-absorber frame. Assembly of a heat absorber is shown in the photos on page 198 and the sketch on page 200. Pieces of blanket insulation are placed in the bottom of the frame—the example shown has aluminum foil on one side—and the tube-and-sheet assembly is placed on top of it. The frame then is sealed, either by stapling clear sheet plastic over it, as shown, or by fitting glass over it. The glass must be of low-iron content—no greenish tint at the edges—and sealed with putty, as in a window frame. The completed absorber may be mounted on a roof, attached to the side of a house as an awning, or placed on the ground. It should be located where it never is in the shade and is protected from prevailing winds. It must, of course, face the sun, and directly so at midday. It should be located close to the storage tank, and, when possible, below it. This permits the heated water to rise and cool water to descend to the absorber in a natural flow. If tank and absorber are at the same level, or if the





should read "A storage tank when full weighs about 13 lb. per gal. of capacity." (see DEC 58, 1977)

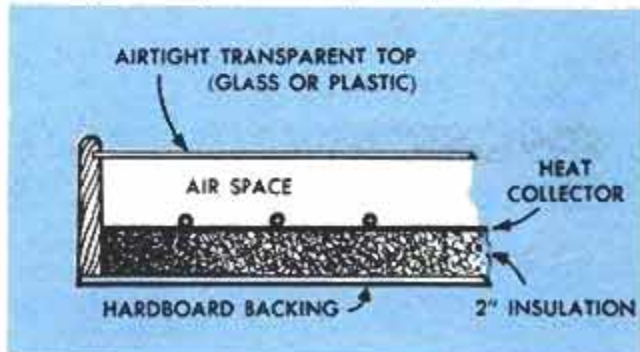


Courtesy University of Florida Engineering Experimental Station

tank is lower than the absorber, a pump in the hot-water line is necessary. A 1/10-hp. centrifugal pump is adequate, being operated only during the daylight hours.

An ordinary hot-water tank can be used as the storage tank. When a regular, operating tank is used as an auxiliary to the solar setup, the thermostat on the tank is set several degrees below the temperature of the solar-heated water, so that when sunlight is not available, gas or electricity can take over the heating job. Where a tank is located in an attic, right-hand sketch, above, it should be above a load-bearing wall, and well-braced. Water weighs about 13 lb. per gal. The solar-heating system is connected directly to the home water-supply system shown in the drawings at the top of this page. The hot-water pipe from the absorber to the top of the storage tank is insulated to reduce heat loss. Minimum pipe diameter is 3/4 in. to keep friction loss low. A check valve in the hot-water line between the absorber and tank is recommended in areas where there are cold nights. The valve prevents back circulation and subsequent cooling. A drain valve should be installed at the lowest point in the system. It is used for periodic draining to clean the system, and to empty the system in areas of cold weather to prevent freezing.

If you have a swimming pool, solar heating can be used to warm the pool early in



the spring and maintain a comfortable temperature well into fall. The pool shown across the tops of the first two pages contains 14,000 gal. of water, and has solar-heat absorbers with an area of 128 sq. ft. These are experimental and have no glass or plastic covers. Even with this fairly inefficient setup, the pool water was raised 1/2 deg. per day for 25 days during February. Located in Phoenix, Ariz., the pool temperature was 65 deg., as compared to nearby pools with temperatures of only 50 deg. A solar heater of at least 200 sq. ft. is recommended for the average pool in the U.S. A pump will be necessary for water circulation, as the heat absorbers must be higher than the pool. The lower photo on page 199 is a close-up of one of the absorber units used for heating the pool shown at the top of the page. Rubber hose is used to connect the piping and the absorbers. ★ ★ ★

## Subzero Engine Starts Assured With "Charger Boosted" Battery

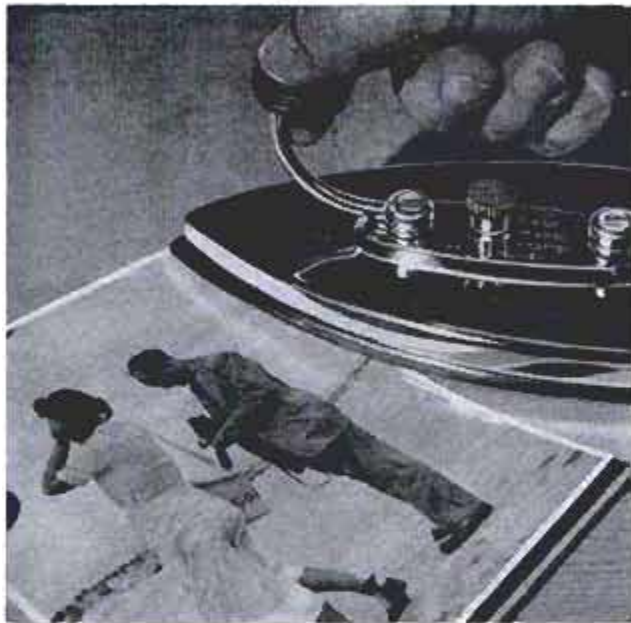
When he had to leave his car outside all night in subzero temperature, one motorist made sure the engine would start every morning by using a small battery charger as a booster. An extension cord was run to the car and the charger plugged into it. Just before starting the engine, the charger

was plugged into the cigarette lighter by means of a special plug. The added current provided by the charger drove the starter at a good speed and furnished ample spark to the ignition. Be sure all wiring is in good condition.

Robert James, Sacramento, Calif.



## Electric Iron Tests Photoprints For Traces of Hypo Deposit



Photoprints can be checked for hypo deposits by pressing one of the borders of a dry print with an electric iron set at "silk" heat. If an orange or brown stain appears after pressing the print edge for 10 sec., it has not been thoroughly rinsed and should be rewashed to remove the remaining chemicals which would eventually cause the print to fade.

## Safety Pins Are Hold-Downs For Photocopy Work

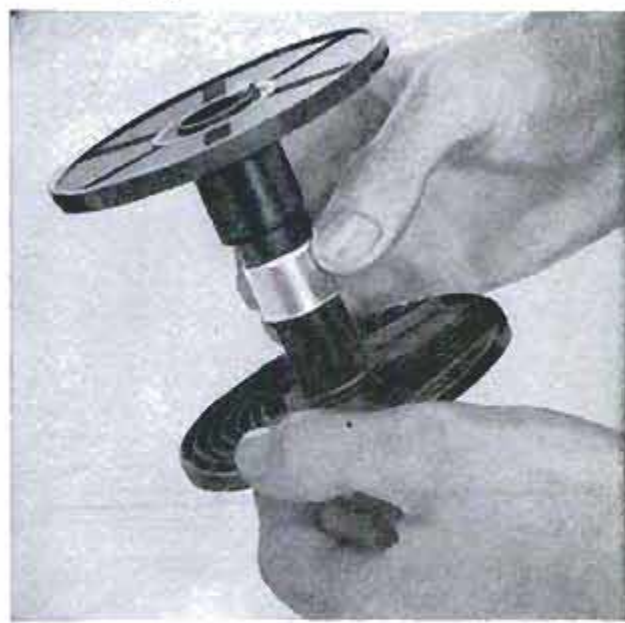


When photocopying pictures, drawings or blueprints, one photographer uses safety pins to hold the original work flat on the copy board as shown in the photo. The pins are inserted in the board so that there is pressure on the heads which clamp the work in place without damaging it, as may happen when thumbtacks or masking tape are used for this purpose.

## Paper Clip Is Pouring Aid

When pouring liquid from one bottle to another, open a paper clip and reshape it to clamp one end on the opening of the bottle containing the liquid. The latter then will tend to follow the clip when poured.

## Spacer Permits Rapid Adjustment Of Daylight-Tank Film Reel



To facilitate resetting the two halves of an adjustable film reel from a daylight developing tank, one amateur photographer uses a spacer on the center column as in the photo. Cut from plastic tubing, the collar provides the exact spacing required for the film to be developed when the reel halves are brought together.

R. Hanscom, Elmhurst, Ill.

## Depress Tripod-Leg Snap Locks With Spring-Type Clothespin



You can avoid pinching your fingers when collapsing the telescoping legs of a tripod of the type that has snap locks for holding the legs in position by using a wooden spring-type clothespin to depress the locks as shown above. To provide a positive grip, the contacting surfaces of the clothespin jaws are sanded flat.

Ken Murray, Colon, Mich.

## Dropper Bulb Links Cord to Pencil

For an easy way of keeping a pencil at the telephone, tie a cord to the phone and knot the other end of it in a hole pierced in the top of a medicine-dropper bulb. Then slip the bulb on the pencil.



# IT'S TIME TO WINTERIZE YOUR OUTBOARD

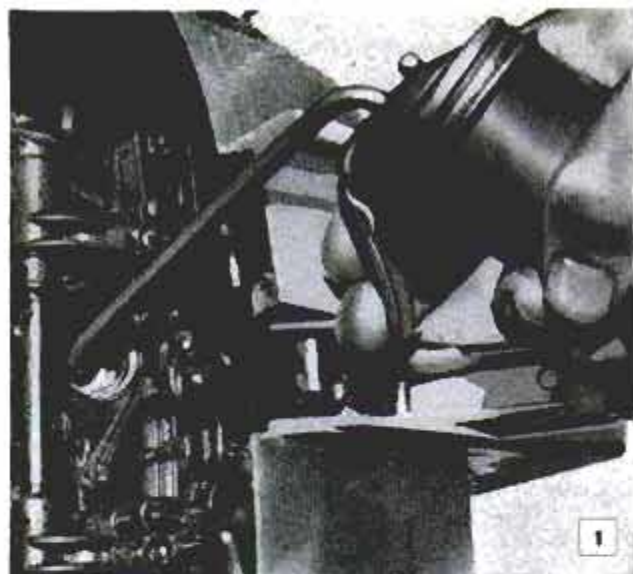
By V. Lee Oertle

AS THE BOATING SEASON nears an end, it is time again to think about preparing your outboard rig for the winter lay-up period. Boat, motor and trailer each deserves careful attention. Accessories and equipment, such as water skis, boat cushions, life preservers, convertible top and ropes should be removed from the craft and given proper storage. Set aside defective equipment for replacement or repair at your leisure during the winter months.

## Outboard Motor

The first step in any winterizing program is to remove the outboard motor from the boat transom (to relieve strain on the latter) and store it in a dry, ventilated place that is not subject to temperature extremes. But before storing the motor, there are a number of things you can do to it to minimize corrosion and other harmful effects. First, give the motor a good flushing by inserting a garden-hose nozzle into the hole in the upper pump body marked "water flush." Since it may be harmful to flush some motors in this manner, check such instructions in the operator's manual. Next, drain the fuel

On electric-starting motor, battery-cable connectors are sanded to assure easy starting next season



Above, few drops of oil are squirted into spark-plug holes to prevent cylinder walls from rusting

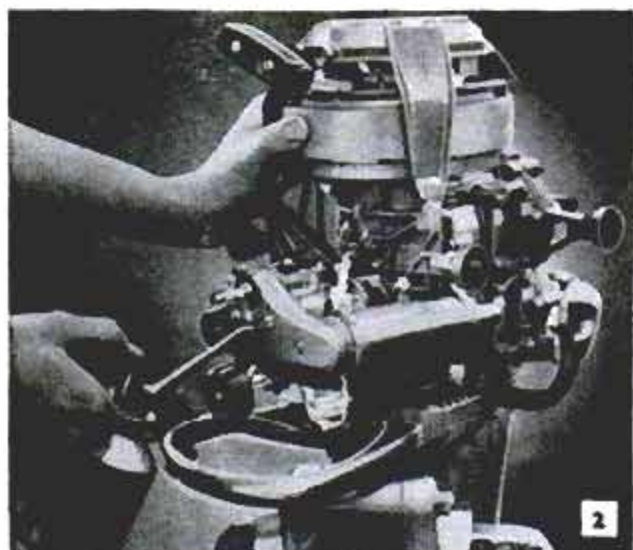
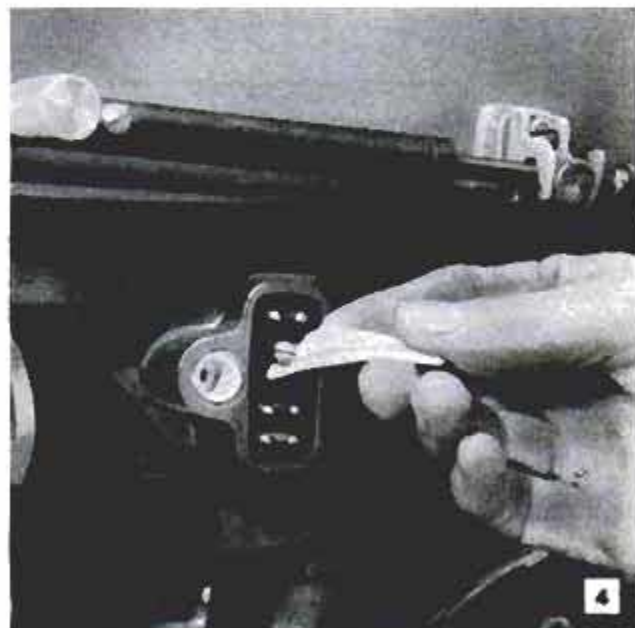
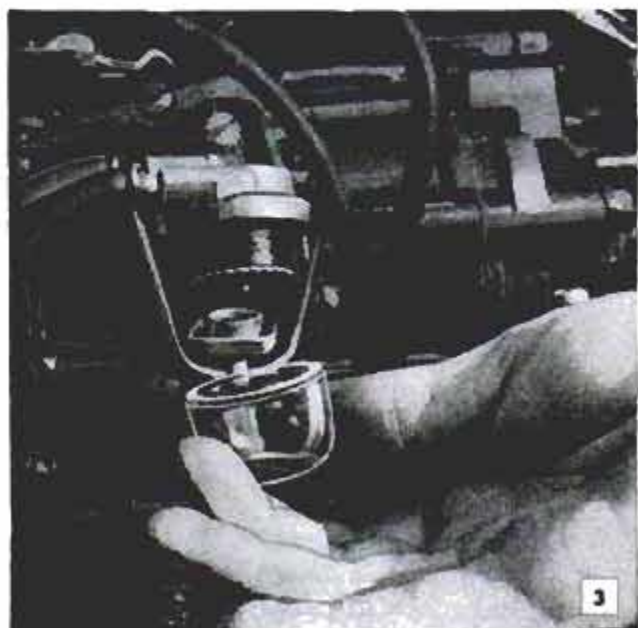


Fig. 2, oil is squirted through hole in air silencer directly into carburetor while rotating flywheel

Below, after running carburetor dry and draining fuel lines, carburetor bowl is cleaned and replaced







from the carburetor to avoid collection of fuel gums. This can be done by running the motor on the boat until all fuel is exhausted. Also, remove and clean the carburetor-sediment bowl, Fig. 3. To avoid cracked cylinder walls or water jackets, force out all water remaining in the cooling system by pulling the rope starter several times. Then remove and clean the spark plugs. With the plugs removed,

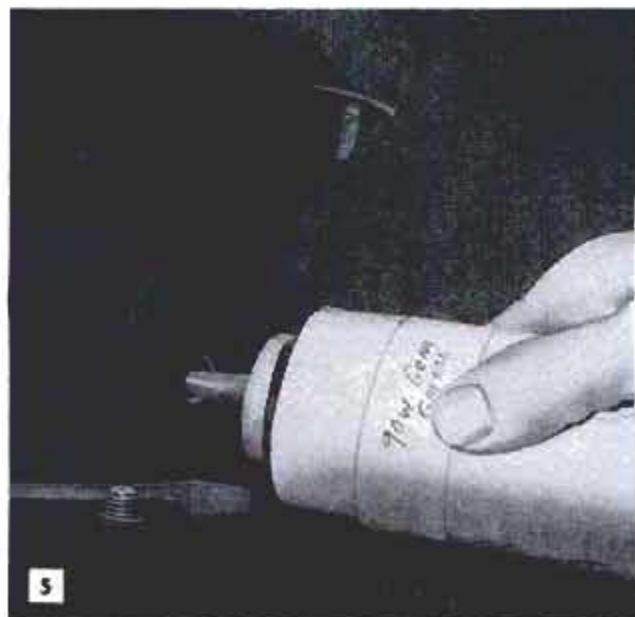
After draining lower unit at bottom plug, it is refilled with fresh grease through filler screw opening

squirt several drops of lubricating oil into the cylinders through the plug holes, Fig. 1. Rotate the flywheel to distribute the oil evenly. Also, squirt oil into the carburetor throat while rotating the flywheel, Fig. 2. Finally, drain and refill the lower unit (gear case), Fig. 5.

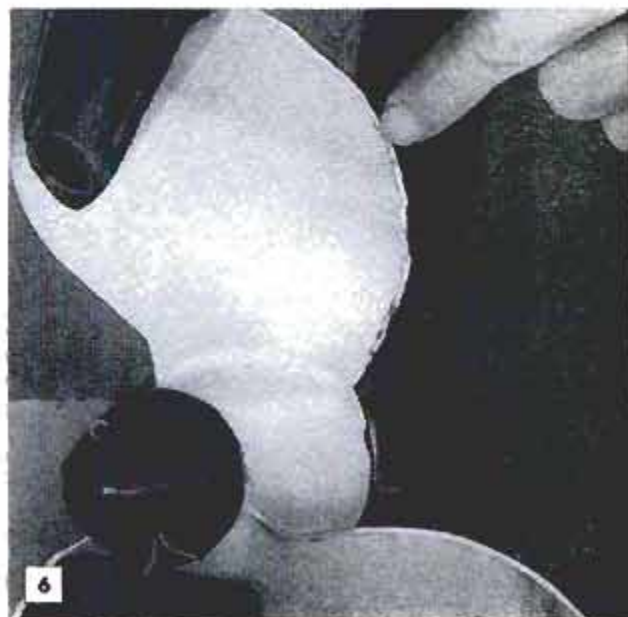
### Boat and Equipment

After the motor is removed from the

Propeller with battered or bent blades causes motor to vibrate, should be sent to factory for reshaping



5



6

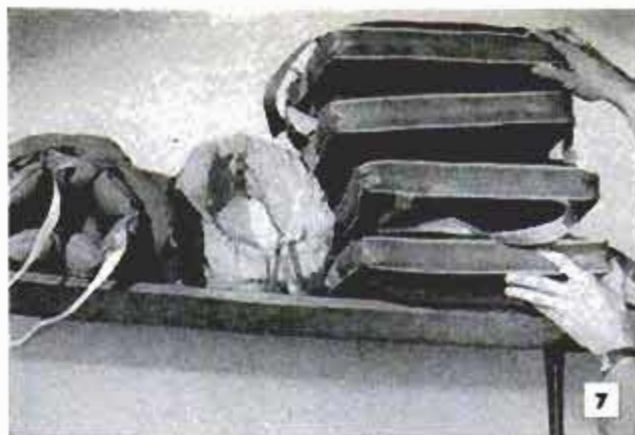


transom and cared for, all removable equipment and gear should be taken from the boat for cleaning, repairing and storing. Place life preservers, boat cushions and other fabric-covered items on a shelf where moisture can't damage them, Fig. 7. Next, give bilges, bulkheads, seats and decks a complete clean-up. A tank-type vacuum cleaner can be used to good advantage for removing loose bits of small debris and sand from bilges and other places that are difficult to sweep out. Scrub the boat interior and topsides with a solution of mild detergent and water, being careful to rinse all surfaces immediately after scrubbing to prevent damage to varnish. After draining the hull, mop up the remaining water with a sponge. When completely dry, apply a light coat of varnish to all brightwork. Save the painting jobs until next spring, except for the bottom which should be sanded and given a light coat of bottom paint shortly after removing the boat from the water.

Now is the time to polish all the ship's hardware, followed by a protective coat of acrylic plastic that will keep it looking bright and prevent corrosion. Inspect upholstery for tears and repair them as necessary. If the boat is to be stored outside, a suitable shelter should be provided. This can be a tarpaulin cover, or a rigid-roof lean-to or other simple structure. When a tarpaulin is used, it is a good idea to provide a light, roof-shaped framework on top of the boat over which the cover can be stretched. This prevents snow from forming depressions in the tarpaulin which would retain water. Also, such a frame permits good ventilation of the boat interior when vents are provided at each end to permit moisture to escape, reducing the chances of dry rot developing.

### Boat Trailer

The best time for repairing and servicing the trailer is just before the last trip of the season, so that full attention can be given to the boat and equipment at haul-out time. Also, you may wish to store your boat on the trailer, in which case it is much easier to completely service and repair the latter without the boat on it. After moving the trailer and boat to the storage location, block up the axles and tongue, Fig. 8. When outside storage is used, wheels should be removed and placed under cover to prevent the rubber from weathering. Next, clean and repack the wheel spindles, bearings and races, using kerosene for cleaning them, Fig. 9. Check the hitch assembly for excessive play that usually causes the trailer to weave. Sand rusted members and prime the exposed metal with zinc chromate for spring painting. ★ ★ ★

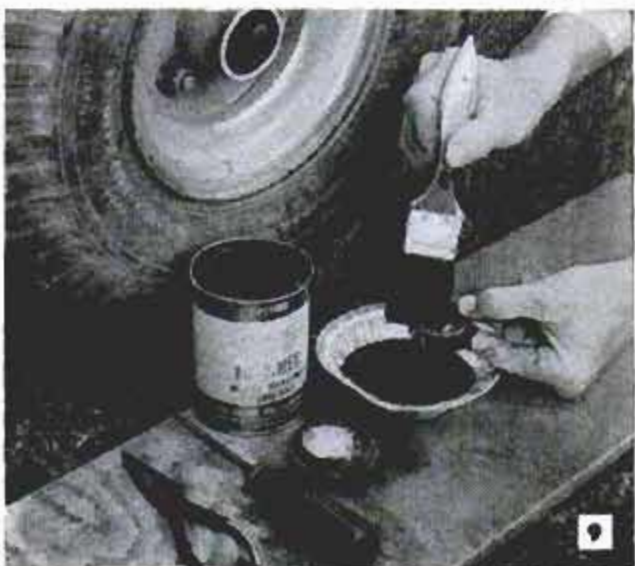


Fabric-covered articles are stored on shelf in light, airy place where mildew is less likely to develop



When boat is stored on trailer, it's a good idea to block up axles and tongue to take weight off tires

Trailer-wheel spindles, bearings and races are cleaned with kerosene and repacked with fresh axle grease





## Cap Protects Steel Fence Post From Sledge

When driving steel fence posts, you can prevent the upper ends from being mushroomed by the sledge if a protective cap is used. The cap consists of a pipe nipple of a size that will slip over the ends of the posts, fitted with a pipe cap.

## Determining Number of Blocks Needed to Construct Building

A simple formula can be used to determine the number of 8 x 8 x 16-in. building blocks that will be required to construct the walls of a building. First, add the length of the building to the width. To this sum add one half the total. For example: A building is 41 ft. long and 23 ft. wide. The sum is 64. Half the sum, 32, added to the figure is 96. Thus, 96 blocks are required for one course around the entire building. Wall height is determined in the same manner. For a wall 8 ft. high, add 8 to 4, to arrive at a sum of 12, which means that 12 courses are required for an 8-ft. wall. For each 100 sq. ft. of opening in a wall, deduct 110 blocks.

Neal Singletary, Jr., Ponca City, Okla.

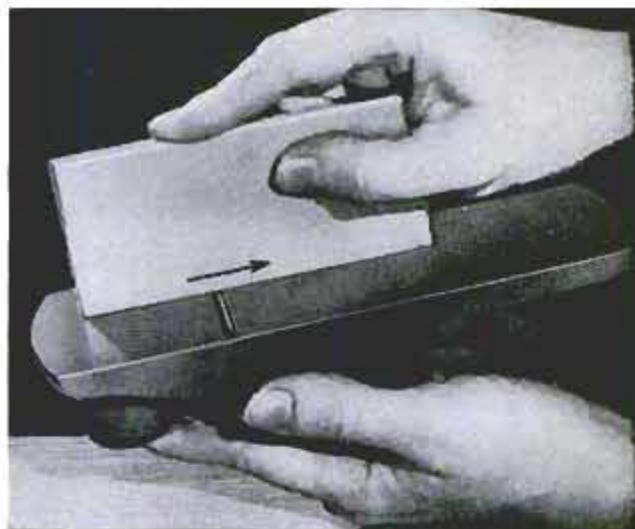


## Plane Trims Plastic Tiles For Precision Fitting

When cutting plastic tiles for the row next to a corner it often is necessary to trim one just a fraction of an inch for a good fit. Trim the tiles on a hand-held plane as shown.

## Marking Mimeograph Stencils

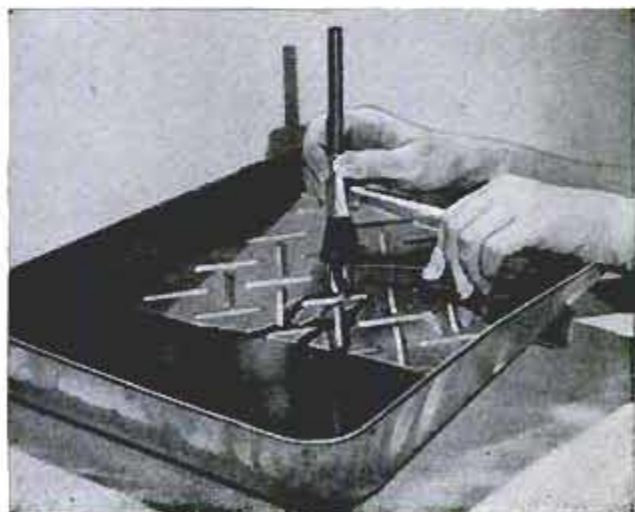
Mimeograph stencils which are cleaned often and filed for future use, are difficult to identify as marks become obscured by ink smears or removed by cleaning fluid. To eliminate this problem, write the key words on the tab of a new stencil and cover it with cellulose tape.



## Small Parts Cleaned and Drained In Paint-Roller Tray

Ideal for cleaning small parts of a disassembled machine is a paint-roller tray. Solvent is poured into the lower end and the parts are immersed in it. When being brushed clean, the parts are held at the high end of the tray as shown, so the solvent drains back into the lower end.

☐ When replacing a worn threshold, remove the old one carefully and use it as a pattern for the new one. Drill small pilot holes for nails in the new one to avoid splitting it.—Sam Fenn, Chicago.





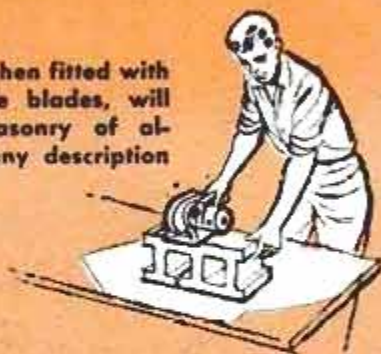
# SHOWCASE OF TOOLS

In this second installment of our Showcase of Tools, we present a number of electric handsaws with their specifications. These tools are shown only as a shopping service to give you an idea of the many sizes and types available



The versatile electric hand-saw is "at home" on plywood sheets and other very wide work . . .

and, when fitted with suitable blades, will cut masonry of almost any description



Angle cuts offer no problem at all; either single or compound angles may be handled easily and accurately



# ELECTRIC HANDSAWS

By E. R. Haan

**H**IGHLY VERSATILE, electric handsaws have their place in any shop—home or commercial. Even if you already have a bench-type circular saw, it is a good idea also to have an electric hand-saw. These saws have the advantage of being light enough to take to the job instead of bringing the work to them.

Stands and accessories are available to convert the saws for precision cutting without improvised setups. Shaping and accurate sanding also are possible. Full sheets of plywood, hardboard and insulating board may be ripped or crosscut easily with these tools.

With an electric handsaw, siding or sheathing can be nailed in place, then trimmed to fit, rather than cutting and fitting each individual piece of material. Flooring is handled similarly.

Various types of blades and abrasive wheels are available so that masonry and light sheet metals can be cut, as well as wood, plywood, hardboard, plastics and many other building materials.

The size of an electric handsaw is designated by its blade diameter. For home use it is usually best to have a saw not smaller than 6½ in. if you cut 2 x 4s occasionally. Nearly all 6½-in. saws can make bevel cuts through 2 x 4 stock. On these pages a representative number of handsaws made by various manufacturers are shown. The quality and durability of these tools vary with their cost. Lower priced saws have bronze bearings, while more expensive ones have ball or roller bearings and other refinements. Some have provisions for blade slippage in case of binding, to prevent motor burnout. A stationary guard covers the upper half of the blade, and a "telescopic," spring-activated guard covers the lower part. The saw runs only when pressure is applied to a trigger-type, momentary-contact switch in the handle. A built-in fan cools the motor and keeps sawdust off the cutting line on the work.

## How to Use

Most electric handsaws are made for right-hand use. There are adjustments for depth of cut and for cutting bevels up to 45 deg. The front edge of the shoe or base plate is notched or stepped to provide sighting points to facilitate cutting accurately along marked lines on the work, for both 90 and 45-deg. cuts. When sighting points pass beyond the work at the end of a cut, a marked line still can be seen in front of the blade on most saws.

Portable saws cut from the bottom upward. Therefore, the finish or exposed side of the work



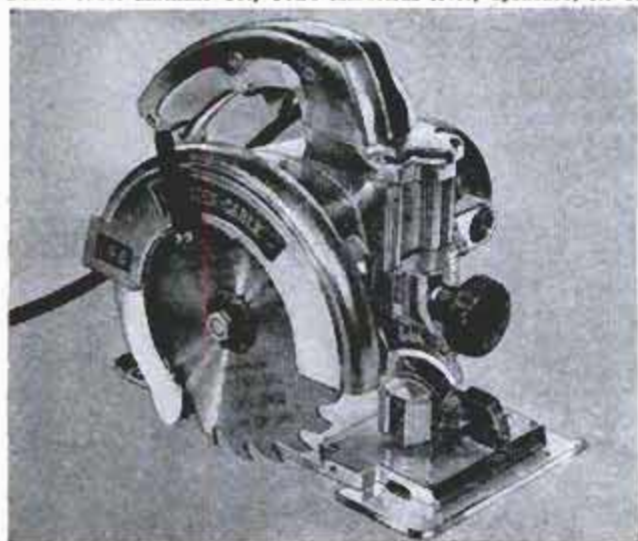


Adjustable for cutting depth and degree of bevel, all portable electric saws can cut compound angles

should face downward to prevent rough edges forming along cuts on the finish surface. Penciled guide lines are marked on the other side. To start a cut, the front edge of the base plate is rested on the work without letting the teeth contact it, and the sighting point is lined up with the marked line of the cut. Then, while holding saw firmly, it is started and guided into the work with light and steady pressure. The wide part of the base plate should rest on the well-supported portion of the work—not on the waste being removed.

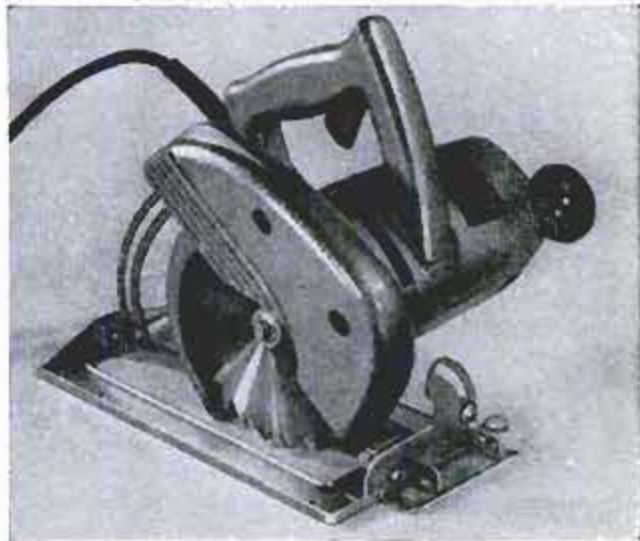
It is extremely important to use sharp blades. Dull blades overload the motor and may damage it, besides producing ragged cuts. Avoid forcing a saw. Forcing reduces blade speed and slows down cutting.

Heavy-duty saw of professional quality, this portable tool is much used in the building industry  
Porter-Cable Machine Co., 1724 Marcellus Ave., Syracuse, N. Y.



When it seems necessary to force a saw to make it cut, it usually indicates that the blade is dull. Insufficient motor speed may be caused by low voltage. This often is due to using an extension cord that has too small a wire size for its length. If an extension cord becomes hot when used with a saw, it quite likely means that the wire size is too small. If the connections in the sockets or plugs are loose, or if a number of strands of wire in an extension cord have broken, these factors also will cause a voltage drop and subsequent slowing of a saw motor. When it is set at maximum cutting depth, an advancing saw slices through average stock of  $\frac{3}{4}$ -in. thickness with an almost-vertical bite, as in Fig. 1, detail A. At lesser cutting depths, the bite has a

Medium-duty tool, designed for the home workshop, this portable saw will save many hours of labor  
Portable Electric Tool Co., 320 W. 84rd St., Chicago

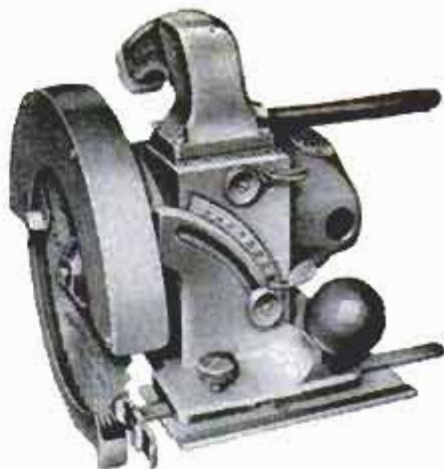






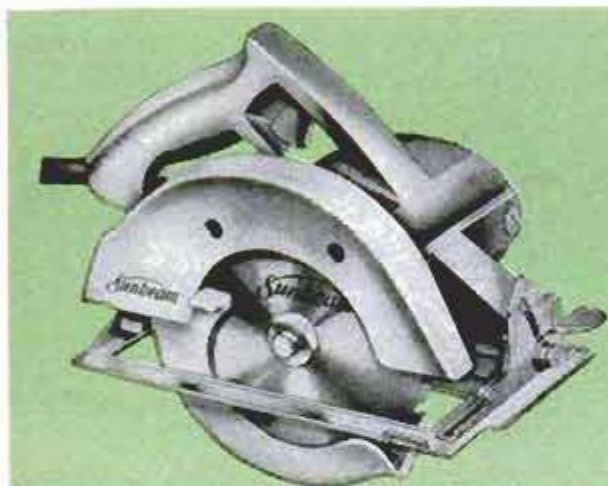
Millers Falls Co., Greenfield, Mass.

Standard-duty 6½ and 7 in., and heavy-duty 6½, 7¼ and 8¼-in. saws weighing 9½ to 13½ lb. Cutting depth at 90 deg. varies from 2 to 2¾ in. At 45-deg. angle depth varies from 1-11/16 to 2-9/32 in. Standard-duty 6½-in. model has self-oiling bronze bearings, other models are fitted with ball-and-needle bearings



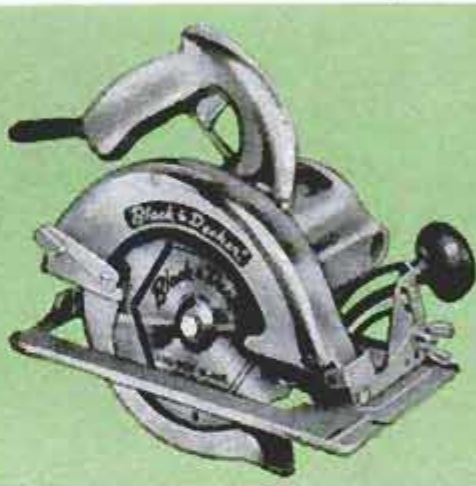
Stouck-Albertson & Co., Inc., 3101 Lowell Ave., Sioux City, Iowa

Saw sizes 6¼, 7½ and 8¼ in. weigh 14, 14½ and 15½ lb. respectively. Respective cutting depths are 1-15/16, 2-7/16 and 2-13/16 in. at 90-deg. angle and 1-13/16, 2 and 2-3/16 in. at 45-deg. angle. Permanently lubricated ball and roller bearings are used in all models. Saw motor has glass insulation



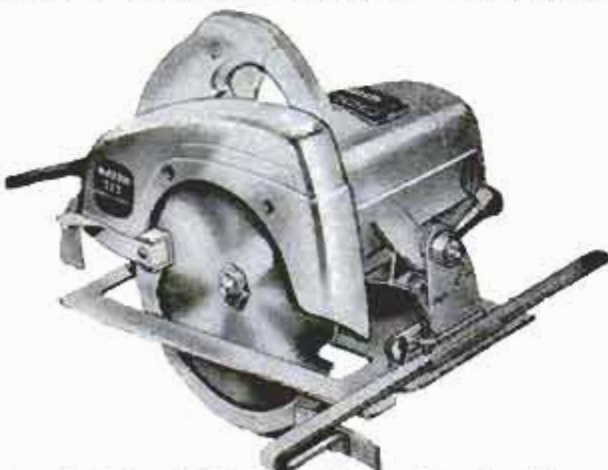
Bunbeam Corp., 5600 W. Roosevelt Rd., Chicago 50

Blade size for this particular saw is 6½ in. only. Saw has capacity to cut dressed 2-in. stock (1¾ in. actual size) at 45-deg. angle. Lightweight construction and fingertip adjustment for depth of cutting. Has a 0 to 45-deg. bevel guide with friction-lock lever. It is designed mainly for light-duty work



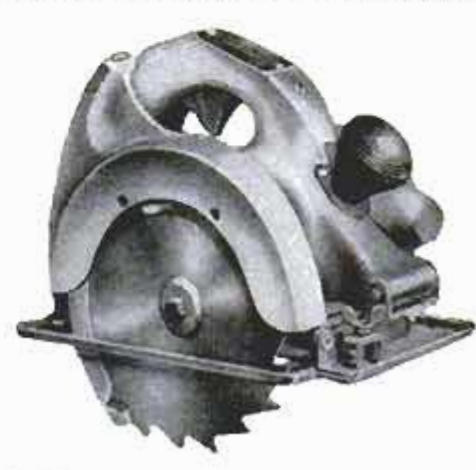
Black and Decker Mfg. Co., Towson 4, Md.

Heavy-duty 6½, 7¼ and 8-in. saws; weight 11, 13¼ and 14¾ lb. respectively. Cutting depths for each are 2-5/32, 2-7/16 and 2-13/16 in. at 90-deg. angle, and 1¾, 2 and 2-9/32 in. at 45-deg. cutting angle. Has permanently lubricated ball bearings. Two larger motor sizes are designed for attachment of chain saw



Cummins "Maxaw"—John Oster Mfg. Co., Milwaukee, Wis.

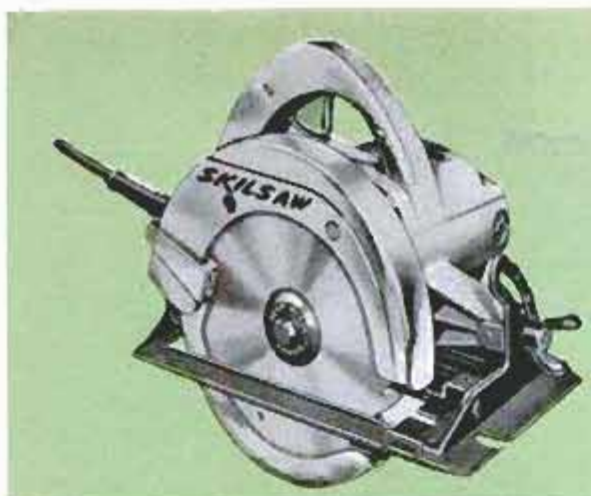
Three 6¾-in. and one 7¼-in. models weighing from 10¼ to 13 lb. Cutting depth of the 6¾-in. sizes is 2½ in. at a 90-deg. angle, and 1¾ in. at 45-deg. angle. Ball and roller bearings and self-oiling bronze bearings are used in various models, depending on quality, size and price of the units



Milwaukee Electric Tool Corp., 5316 N. State St., Milwaukee, Wis.

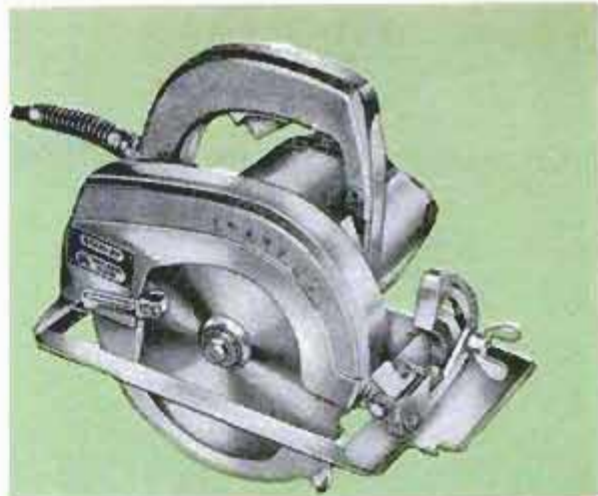
Saw sizes are 6½, 7 and 8¼ in., and weigh 12½, 13 and 14½ lb. respectively. Cutting depths at 90-deg. angle are 2-5/32, 2-13/32 and 3-1/32 in. At 45-deg. angle the cutting depths are reduced to 1¾, 1-15/16 and 2¾ in. A coil-spring mechanism absorbs shocks to protect both the gears and the motor





Skil Corp., 5033 Elston Ave., Chicago 30

Saw sizes of 4¼, 6, 6½, 7 and 8¼ in. weigh 6¼, 9½, 11, 13¼ and 14½ lb. respectively. Cutting depths at 90 deg. are 1-5/32, 1-15/16, 2-3/16, 2¾ and 2¾ in. at a 90-deg. angle, reducing to 1, 1-7/16, 1¾, 1¾ and 2½ in. at 45 deg. Slip clutch prevents overloading motor. Bronze and ball bearings



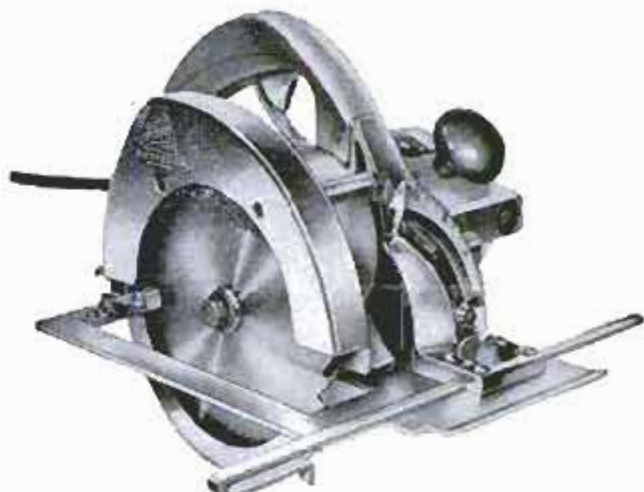
Stanley Electric Tools, 111 Elm Ave., New Britain, Conn.

Saw sizes are 6¼, 6¾, 7 and 8 in., weighing 11¼, 12, 12¼ and 16 lb. Respective cutting depths are 2, 2-3/16, 2¾ and 2¾ in. at 90 deg. At 45 deg. cutting depths are 1½, 1¾, 1¾ and 2½ in. Motor-Saver drive protects motor from sudden impacts. Bearings used are both ball and roller types



Powr-Kraft—Montgomery Ward & Co., 619 W. Chicago, Chicago

Both 6 and 6½-in. models of this saw weigh 11 lb. Cutting depths are 2¾ and 2¾ in. at 90 deg., and 1¾ and 1¾ in. at 45 deg. The 6-in. saw has self-oiling bronze bearings, the 6½-in. size has precision ball and needle bearings. Latter has a clutch to prevent motor burnout when blade binds



Speedsaw—Thor Power Tool Co., Prudential Plaza, Chicago 1

Saw sizes are 6½, 7¼ and 8 in., weighing 10½, 14½ and 14¾ lb. Respective cutting depths are 2-5/16, 2-7/16 and 2-13/16 in. at 90 deg., reducing to 1-11/16, 1¾ and 2 in. at 45 deg. The 6½-in. saw is available with bronze and ball bearings, and with all ball bearings. Other two sizes have ball bearings

## Electric-Drill Saws



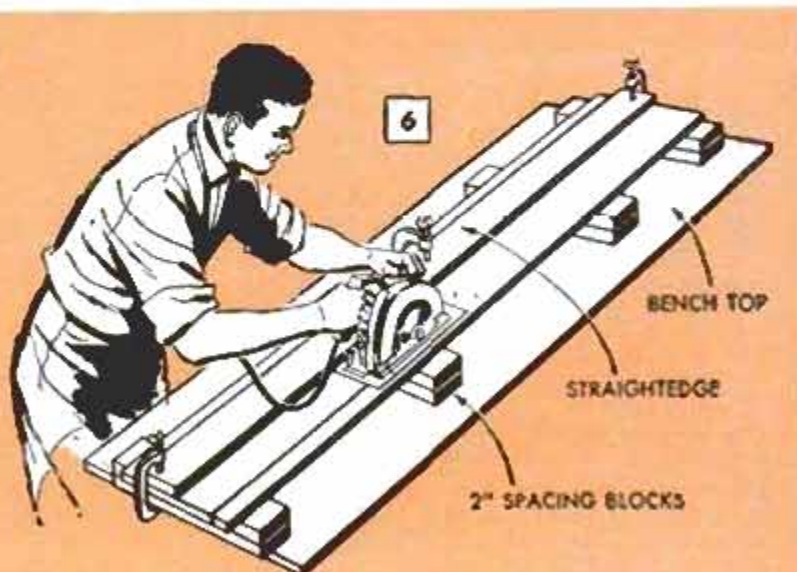
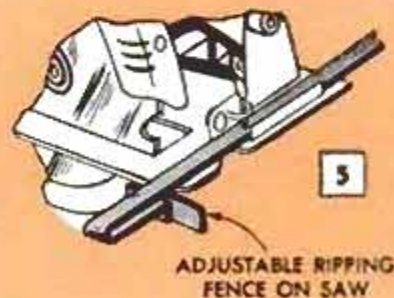
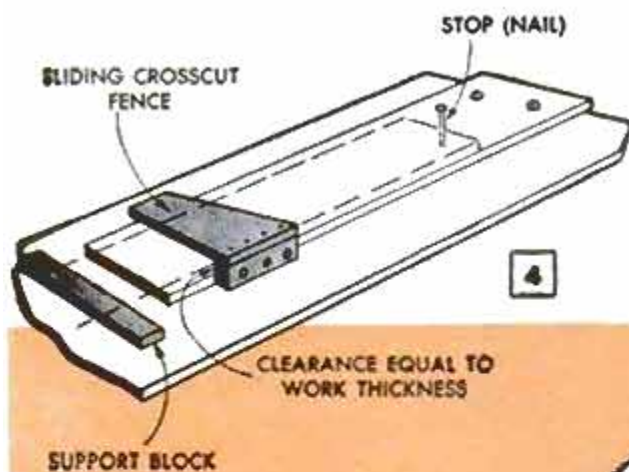
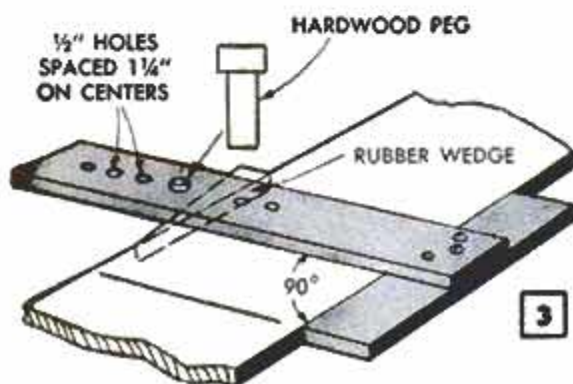
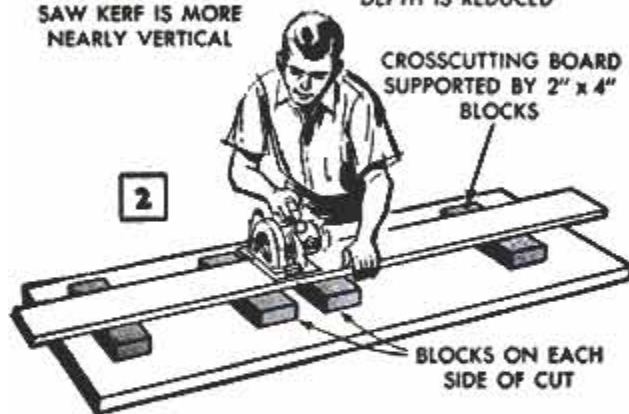
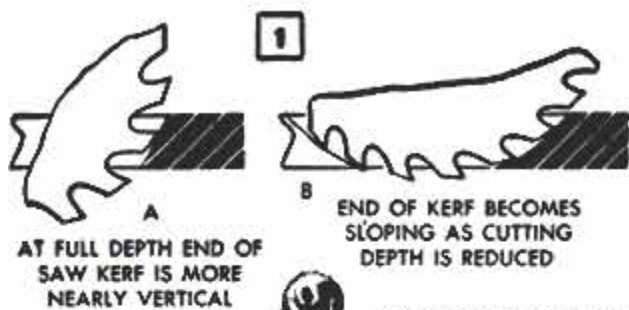
This 6-in. saw attachment fits on ½-hp. drill motor. Rigid 6 x 10½-in. base plate. Cutting depth is 1¾ in. at 90 deg. Bevel cuts up to 45 deg. It is made by Millers-Falls Co.

THESE ACCESSORIES, right and left, are designed for workshop fans who prefer small power tools that are interchangeable on a portable drill. Such units provide light-duty utility at minimum cost. Other attachments for the drill used in the setup at the left are a portable saber saw, a table jig-saw, a small bench saw, a drill-press stand, disk and orbital sanders, buffer, grinder, plane.



This 4¾-in. saw clamps to a small hand drill. Maximum cutting depth is 1¼ in. at 90 deg., and 1-1/16 in. at 45 deg. Retractable lower guard. Manufactured by Sunbeam Corp.





greater angle, as in detail B. To cut work of average thickness set a saw to cut about half its maximum cutting depth.

### Crosscutting

End of stock can be cut off by projecting the waste portion over the edge of a bench top or sawhorse. Crosscutting near the midsection of long stock is best done on a bench, using blocks of 2-in. stock, as in Fig. 2. These prevent the saw blade from cutting into the bench.

For precision 90-deg. crosscuts, you can use an improvised fence, Fig. 3, against which the base plate is held. The crosspiece is left extending at the right so it will be cut off by the saw and will thereafter be in alignment with its left side. A peg fitting holes in the fence permits clamping it to the work edge with a rubber wedge. Similar guides can be made for angle and bevel cutting. A jig to cut a number of duplicate lengths accurately is shown in Fig. 4.

### Ripping

An adjustable rip gauge, provided by most saw manufacturers, extends on the right side of the saw as in Fig. 5. Where such a gauge does not provide the desired accuracy, you can use a straightedge clamped to the work as in Fig. 6. Careful measurements are taken.

### Pocket Cuts

To make pocket cuts, the saw, while running, is lowered into the work carefully, the front edge of the base plate being used as a pivot, Fig. 7. The work must be clamped or held securely to prevent kick-back. A high fence fastened to the work will help to support the saw if extreme accuracy is desired. Short backup cuts should be made only when the work is fastened securely so it cannot kick back. For pocket



cuts the saw blade should be set to maximum cutting depth.

### Grooves and Rabbets

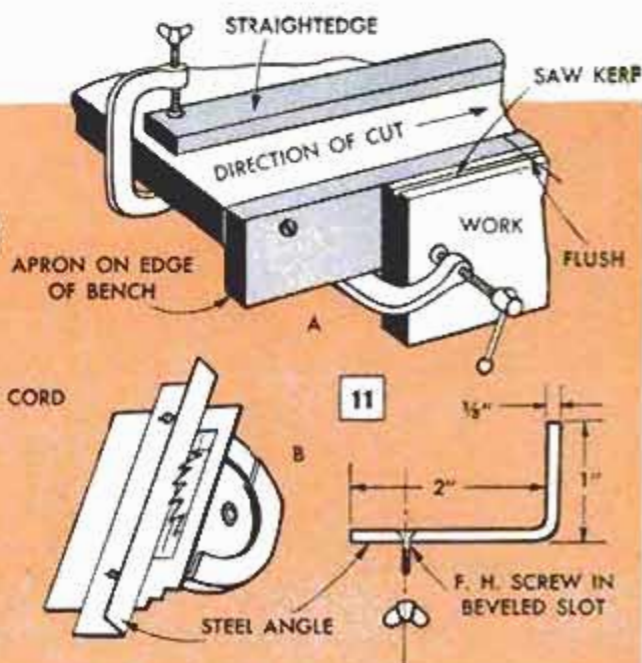
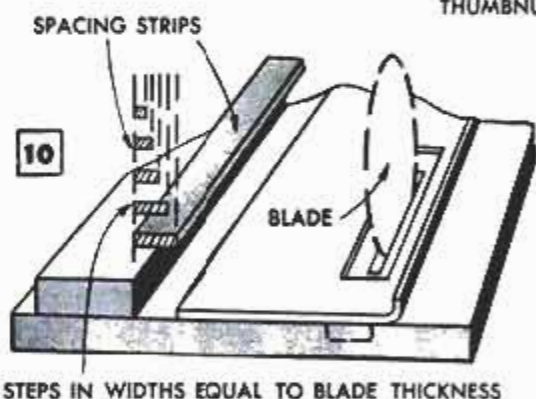
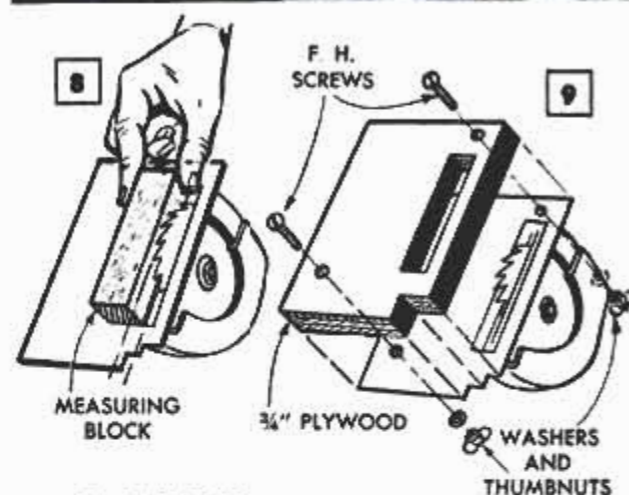
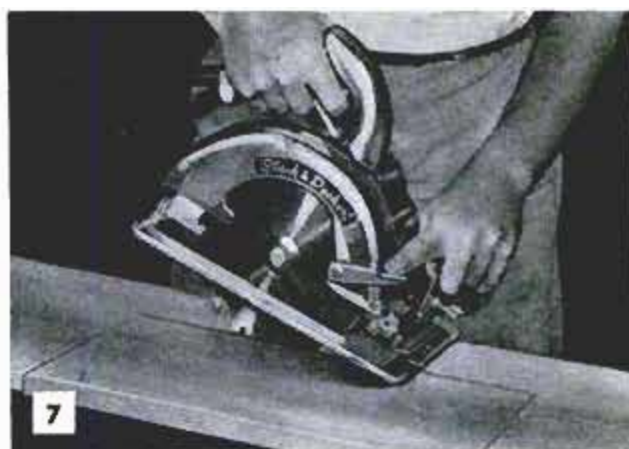
To cut grooves and rabbets, the blade is first set to the correct cutting depth, Fig. 8. Accurate crosscut grooves are made with the aid of a fence, ripping grooves with the aid of a straightedge. Portable saws that do not adjust to zero for depth of cut can be fitted with an auxiliary base plate of plywood, Fig. 9. Fig. 10 shows how a groove can be sawed accurately by using spacing strips kept on hand for this purpose. Starting with the widest strip, it is held between the base plate and a crosscutting fence or ripping straightedge firmly attached to the work so both hands can be used on the saw. Instead of using a saw blade for grooving, dado cutters can be used with portable handsaws as with a regular circular saw.

To cut a kerf in the edge of stock, as is necessary when rabbeting, you can follow the two methods shown in Fig. 11. Detail A shows work clamped to a bench flush with the top. Detail B shows an adjustable angle-steel guide on the base plate.

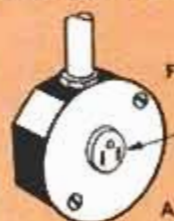
### Electrical Data

For protection against electrical shock, which may occur when some ungrounded electrical devices are used by persons standing on damp earth or concrete, an electric handsaw should have a three-wire extension cord and a three-prong plug. The plug connects to a mating receptacle, properly grounded, Fig. 12 A, or to an adapter which is grounded to a receptacle plate screw, detail B. The third, or ground, wire usually is green. If the outlet to which connection is made is not already grounded, the third wire is grounded to a water pipe.

For full voltage, extension cords must have conductors of suitable size wire as also given in Fig. 12. ★ ★ ★



METAL OUTLET BOX



FOR 3-PRONG PLUG

12

ADAPTER WITH GROUND

3-PRONG PLUG

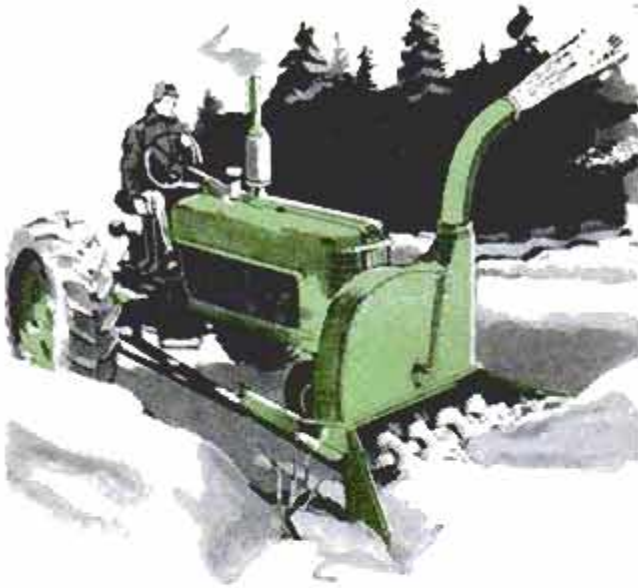


3-WIRE CORD

SIZES OF PORTABLE-SAW EXTENSION CORDS			
Saw Size	0-50 Ft. Length	50-100 Ft. Length	100-150 Ft. Length
6-6½"	No. 16 WIRE	No. 14 WIRE	No. 12 WIRE
7-7½"	No. 14 WIRE	No. 14 WIRE	No. 12 WIRE
8-8½"	No. 14 WIRE	No. 12 WIRE	No. 12 WIRE

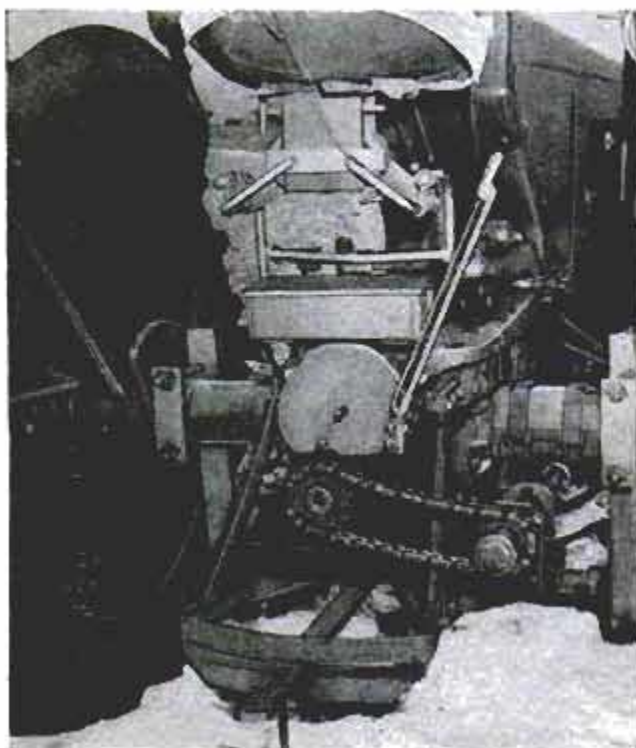


# SNOW



**D**EEP SNOWDRIFTS on the feed lot or on any of the farm lanes no longer present a problem to Myron Hanson of Benton County, Iowa, since he built this snow-blower unit for his tractor. Cost of constructing the unit was low, as he utilized discarded farm machinery for the main components, and all welding and work was done in the farm workshop. No special tools, not found in the average farm shop, were required for the construction. The blower mechanism itself is the fan and housing of a unit originally used to blow hay and silage into the barn and silo. Positioned just in front of the blower, inside the snow scoop, is an auger of the type used in combines. It rotates in bearings bolted to brackets that are welded to the

Power for snow-blower is routed from power take-off at rear of tractor by chain and sprockets through a drive shaft located along one side of the tractor



sides of the scoop. The snow scoop is fabricated from sheet steel, angles and flats, and is bolted to the blower housing. The complete snow-blower unit is bolted to the hydraulic loader, from which the scoop has been removed. For added rigidity, braces are bolted to the blower housing and to steel plates on the loader arms. The braces are lengths of pipe flattened on the end and drilled for bolts. By using the hydraulic system of the loader, the operator can adjust the snow scoop to any desired height. This latter is a practical feature when snow is being removed from an irregular surface or from an area that might contain rocks or other objects that could damage the auger blade or the impeller of the blower. In operation, the tractor is driven forward, shoving the scoop into the snow, so that it is forced into the auger. Short lengths of steel rod welded to the auger blade break up chunks of frozen snow and pieces of ice before they can enter the blower. After being "preconditioned" by the auger, the snow is forced into the whirling impeller of the blower by the continuing forward movement of the tractor, and the "center feeding" effect of the auger blade. The impeller pulverizes the snow completely and it is blown about 40 ft. to one side of the tractor.

Power to rotate the blower and auger is provided by the power take-off of the tractor. Sprockets and chain are used to deliver the power from the take-off at the rear of the tractor to a drive shaft mounted alongside the tractor. A universal joint at the forward end of the drive shaft—necessary to allow for the up-and-down adjustments of the blower assembly—connects to a system of sprockets and chains mounted on the blower housing. This system rotates the blower and a short shaft at one side of the housing. The latter shaft is geared to another shaft positioned at right angles. Sprockets and chain transfer power from this shaft to that of the auger blade. All shaft bearings are greased frequently to offset the rust problem that results when the snow packs around the bearings and melts. A suggested modification that another builder might use would be to provide a swivel action for the blower spout. This would permit blowing the snow to the opposite side in a situation where snow had to be cleared from alongside a building, and deep snow prevented driving in from the other direction. This also would permit allowing for wind direction. ★ ★ ★



# BLOWER

## *Clears Feed Lots and Lanes*

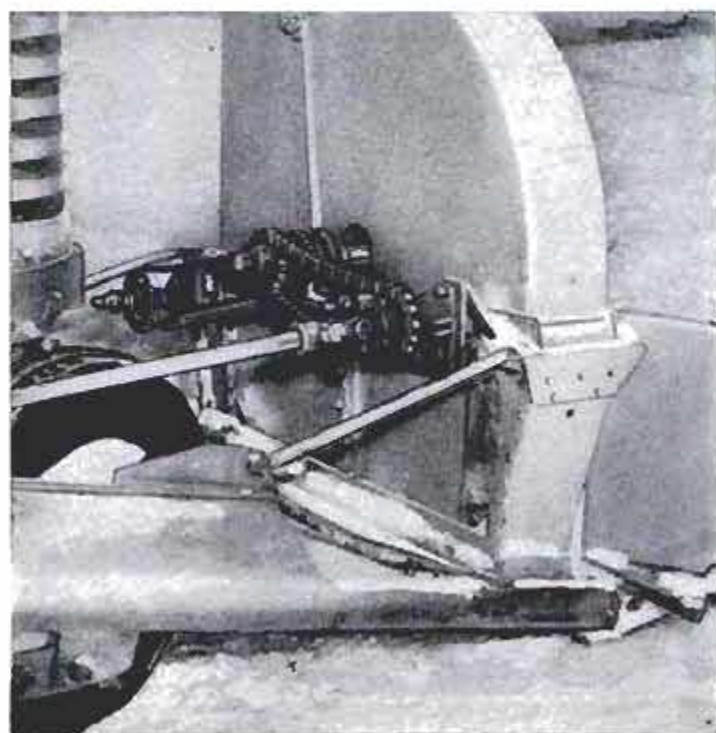
By Paul Andre

Head-on view of snow-blower shows clearly how auger with rods welded to blade is positioned to "condition" all snow that is forced into impeller of blower



Forward end of auxiliary drive shaft is fitted with a universal joint that couples it to a system of chains and sprockets that drive blower impeller and a short jackshaft

Jackshaft is geared at right angles to shaft that drives auger by means of sprockets and chain. Changing sprockets varies auger speed







### ← Angle-Shaped Aluminum "Ruler" Aids Showcard Painting

To simplify ruling border lines on showcards with a brush, one artist designed this angle-shaped "ruler" that is bent from sheet aluminum. One edge of a strip of the metal is bent over 180 deg. to form a smooth, blunted edge along which the brush is moved. The strip is bent to form an angle of slightly more than 90 deg., so when the ferrule of a brush is held vertically against the ruler as shown, the bristle part of the brush does not contact the angle.

### Copperware-Cleaning Hint

When no commercial preparation is available to remove soot and oxidized metal from copperware, use a piece of lemon peel dipped in salt to do the job. Then, thoroughly rinse the utensil in warm water, dry and polish in the usual manner.

To soften leather and make it pliable, apply a thin coat of white petroleum jelly and rub it in with a soft cloth. Remove excess jelly with another clean, soft cloth. Oiled leather should be cleaned with a mild soap-and-water solution, before treating it in this manner.

Blanche Campbell, Las Vegas, Nev.

Inserting a new wick in a cigarette lighter is easy when one end of a short length of cellulose tape is wrapped around the upper end of the wick. The other end of the tape is rolled to form a sharply pointed spiral that is passed through the wick opening. After the wick is pulled into position, the tape is removed.



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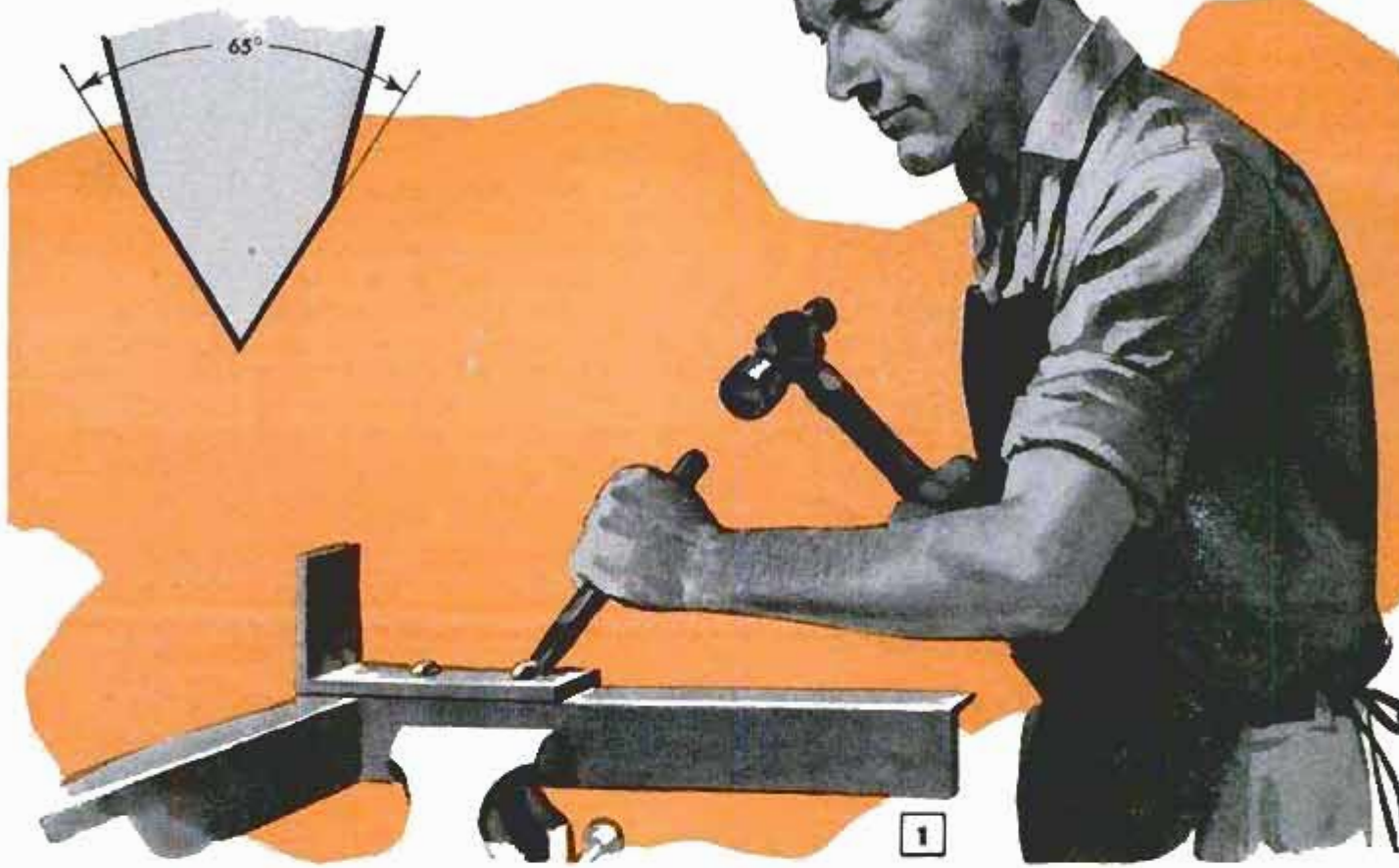
servicing, how to use test instruments and make your own, and how to convert old radios into inter-com systems and other devices. It's fun and easy to build your own electronic equipment with the help of this book which contains numerous do-it-yourself projects. Send for your copy of *Electronics Made Easy*. It's your key to the most fascinating hobby of these times **\$3.50** for just.....

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# SHOP NOTES



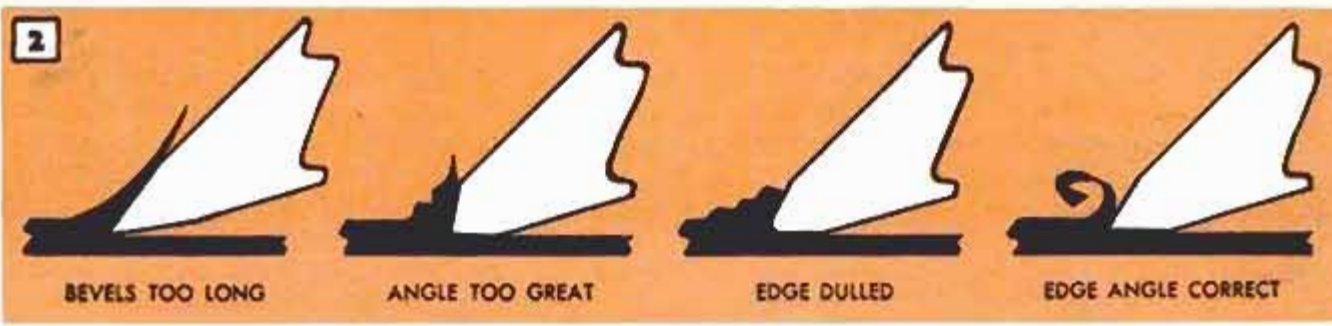
## WORKING *with* COLD CHISELS

By C. W. Woodson

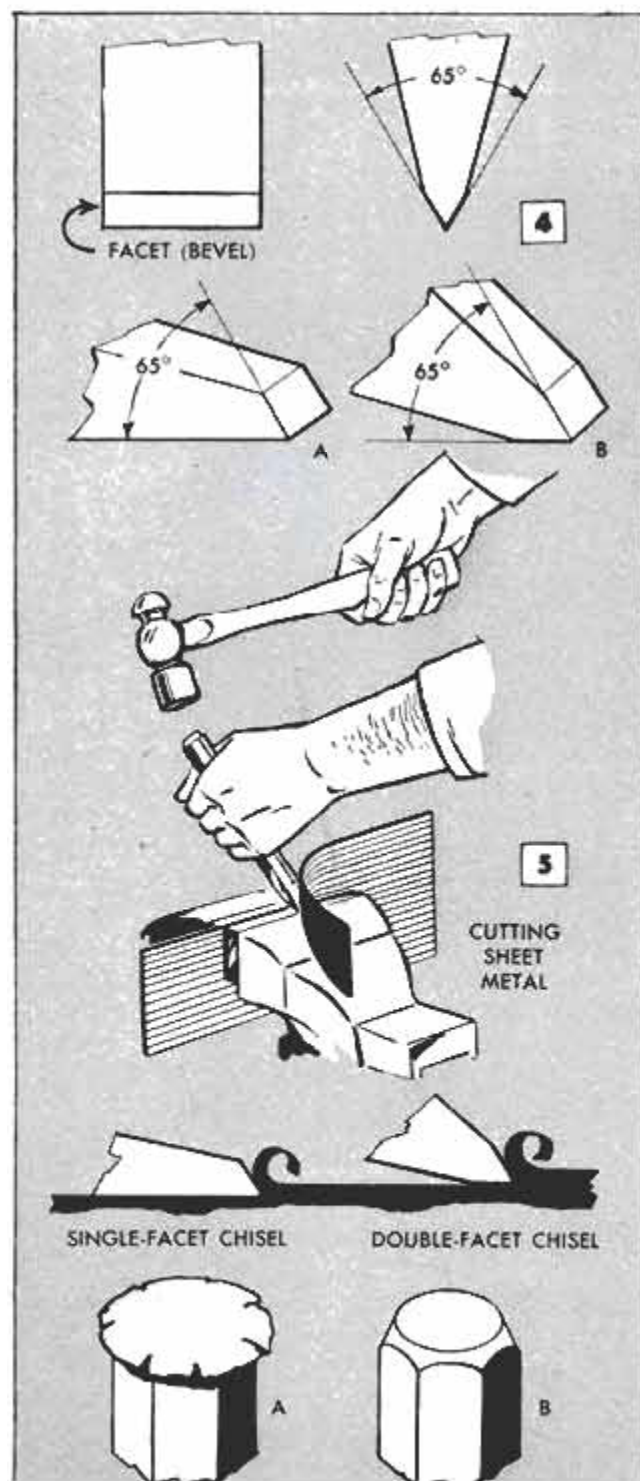
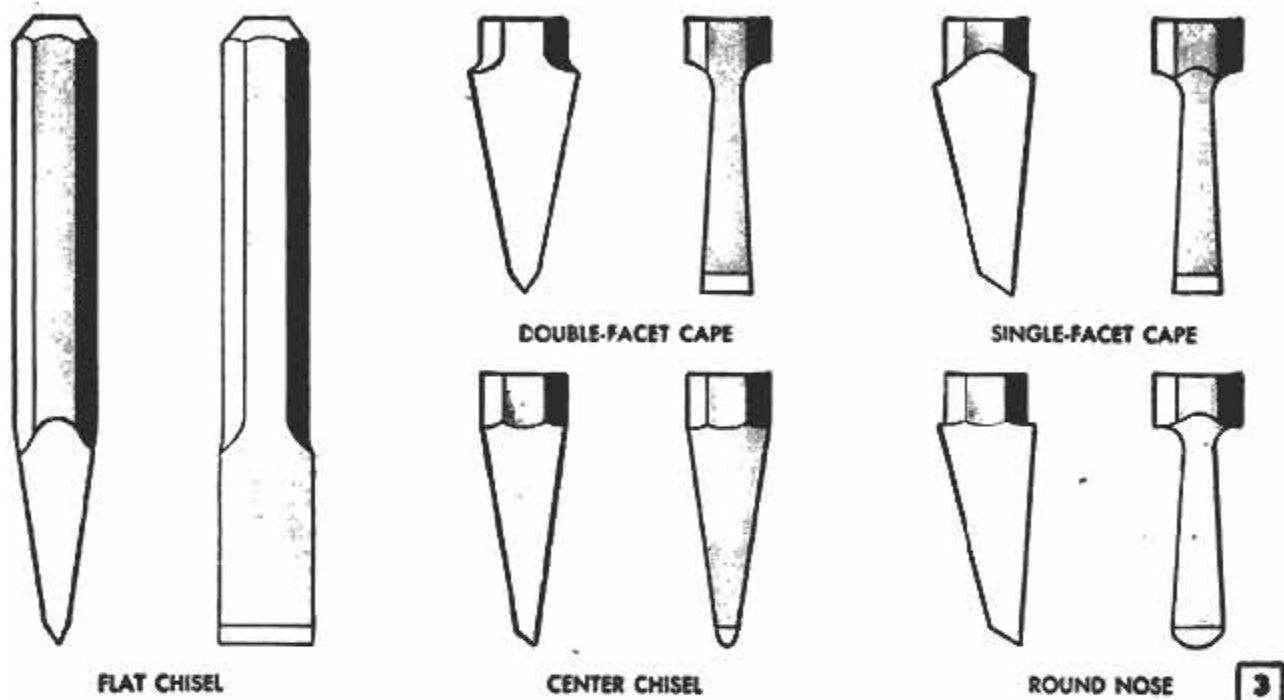
**C**OLD CHISELS are the simplest of metal-cutting tools, are quite similar to wood chisels and are handled in much the same manner. They are made in five basic types, the flat chisel, cape chisel, round-nose chisel and the diamond-point and side chisels. There are variations of these basic types made for special purposes. The flat chisel, Fig. 3, probably has the broadest application of all the types of cold chisels. It is used for chipping recesses, snagging castings (removing parting fins and other defects), shearing heavy sheet metal, cutting rivets and similar operations requiring use of a double-

beveled cutting edge. The flat chisel is made in sizes ranging from 1/8 to 1 in. It differs from the wood chisel in that the cutting edge is formed by two bevels. This double bevel is ground to an included angle of 65 deg. for average work. When necessary to make adjacent cuts some users of the flat cold chisel round the cutting edge slightly when grinding. This prevents any tendency of the cutting edge to dig in at the corners.

For removing narrow, heavy chips, as in cutting keyways, channels and grooves, the cape chisel is used. Note from Fig. 3 that the cape chisel is sharpened with a







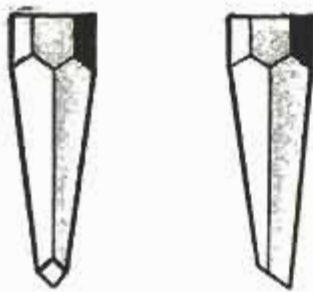
single bevel or a double bevel, or facet, as the nature of the work requires. Usually the cutting angle for both the single and double beveled edge is held to 65 deg., Fig. 4, A and B. Cape chisels come in sizes ranging from  $\frac{1}{8}$  to  $\frac{1}{2}$  in. and, as with other types of cold chisels, the width determines the size. In use, the single-bevel (single-facet) cape chisel is held as in the lower detail in Fig. 5. In this position the user can control the depth of cut very accurately.

You can shear heavy sheet metal easily with a flat chisel, often faster and very nearly as cleanly as with a hacksaw or other means. Small pieces usually are held in a vise and the cut is made against the fixed jaw as in Fig. 5. Lubricate the cutting edge of the chisel with light oil.

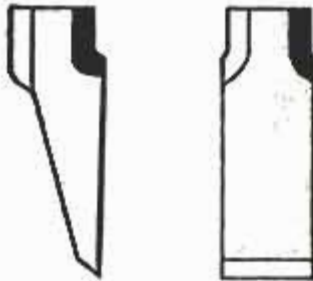
To remove metal from a wide, flat surface, a general practice is to chip a series of grooves across the work with a cape chisel as in Fig. 8, each groove being cut to the approximate depth of the recess. Usually a double-facet cape chisel is used for this work, but in some instances the single-facet chisel is better suited to the job. After the required number of grooves have been cut, the waste between the grooves is removed with a flat chisel as in Fig. 9. With care, very accurate work can be produced by these simple methods.

The diamond-point chisel, Fig. 3, is made with a tapered square section, the end of which is ground at an angle across diagonal corners, forming a diamond shape. The diamond point will cut V-grooves and square up sharp inside corners. Center chisels are small round-nosed tools, usually semi-cylindrical in section, the end being ground at an angle to form a cutting edge. They are not as commonly used as other types, are designed more for special work, such as "drawing" spotted holes when drilling

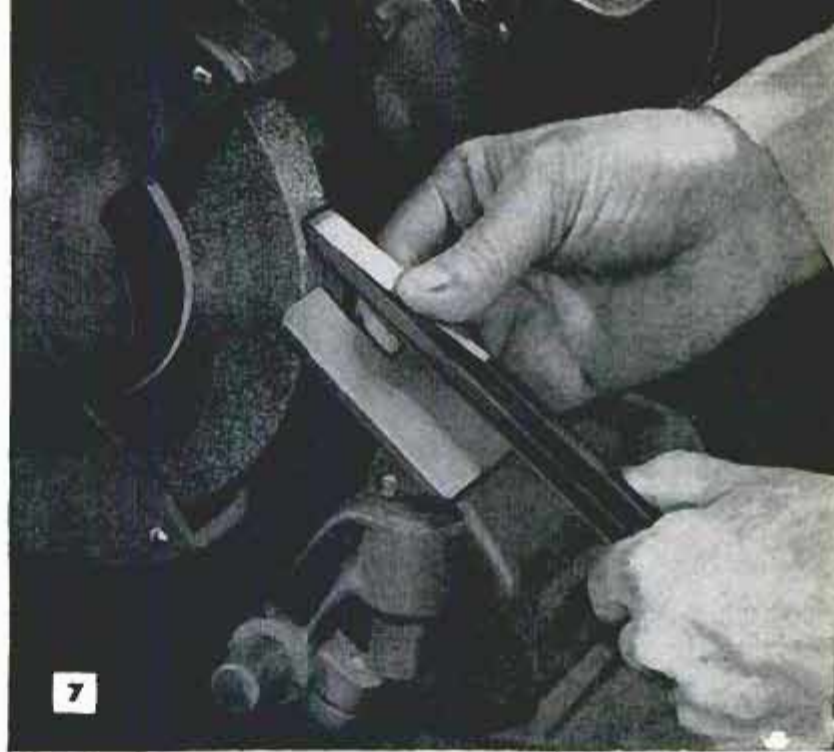




DIAMOND POINT



SIDE CHISEL



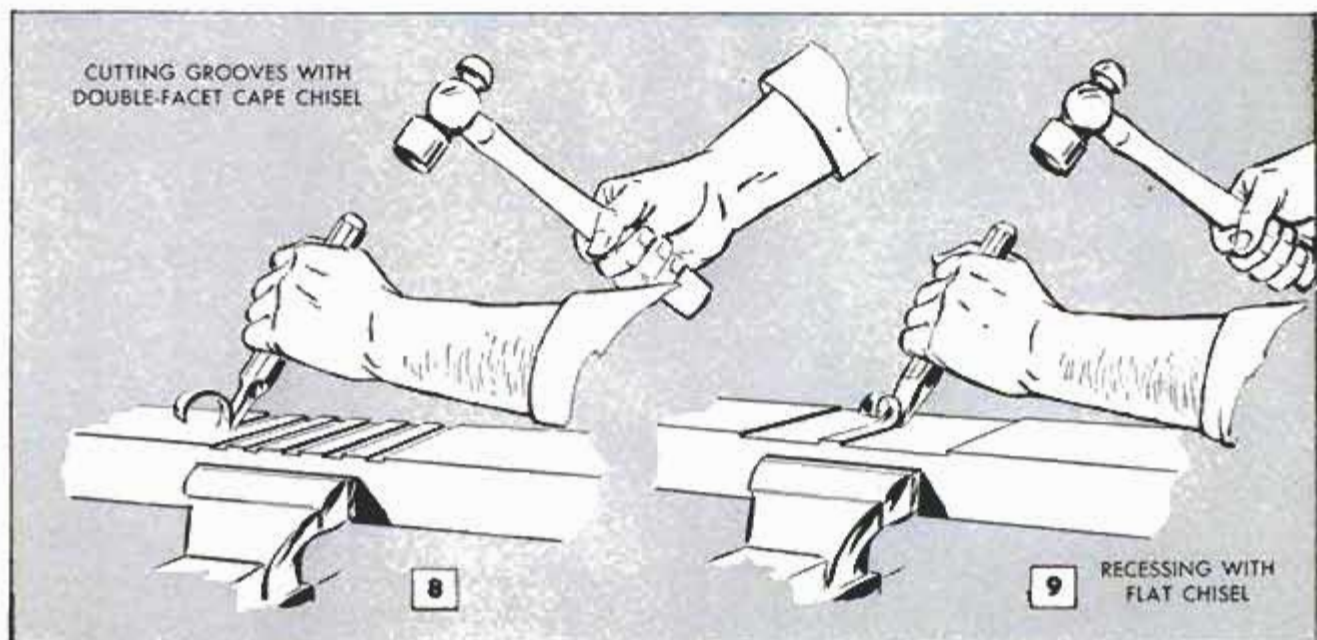
Stanley photo

to a precise layout or pattern. The round-nose chisel has a cutting edge formed by a single bevel and is used for chipping semi-circular grooves, channels and inside corners which require a fillet or radius. Side chisels, usually classed as a special type, have the cutting edge ground with a single bevel and are used for chipping metal from keyways and short slots.

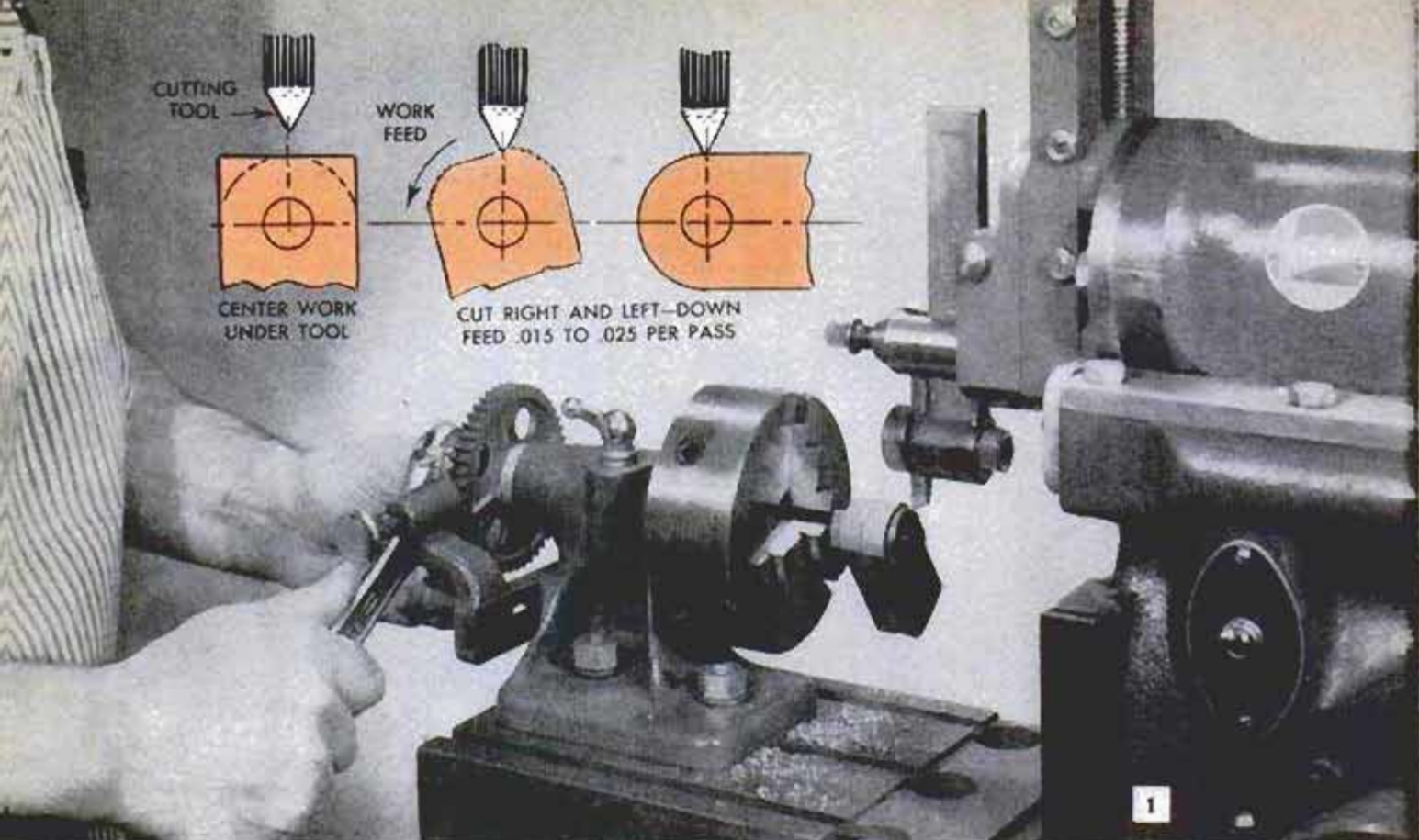
To do good work, a cold chisel must be sharp. It is important to hold the bevels to a given angle when sharpening. Fig. 2 shows the results of variations in the bevel angle, and how a chisel performs when dull. Slight variations are of little importance, but a variation of more than a deg. or so materially affects the cutting characteristics of the edge. Nearly all cold chisels are so tempered that they can be sharpened with a file, and this is an accepted method of sharpening. Of course, grinding, Fig. 7,

is much faster and the degree of the bevels can be controlled more readily, but care must be taken not to draw the temper at the cutting edge. Where possible all edge tools, especially cold chisels, should be sharpened on a vitreous grinding wheel which does not heat the tool unduly.

Some safety precautions should be observed when using a cold chisel in the shop. When cutting, or busting, rivets, Fig. 1, or when chipping, Figs. 8 and 9, rivet heads and small chips may be thrown away from the chisel point with considerable force. When others are working nearby the user of the chisel should turn either the work or the tool so that any chips or rivet heads will be thrown in an opposite direction. Never permit the head of a cold chisel to become mushroomed as in detail A, Fig. 6. Keep it ground as in detail B, to prevent chipping. ★ ★ ★





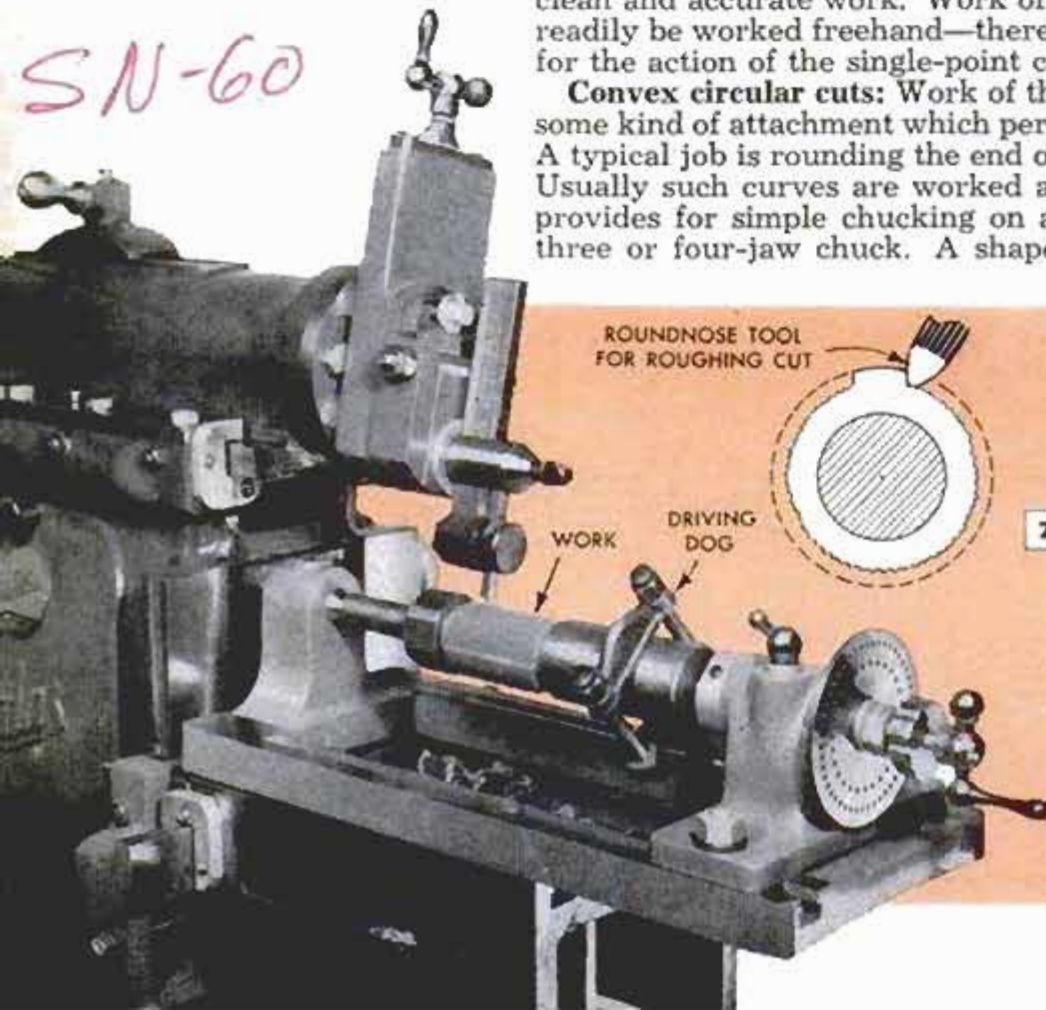


# CONTOUR WORK WITH

By  
Sam Brown

ALTHOUGH primarily a machine for cutting flat surfaces, the metal shaper often gets first call when it comes to machining contours. Many cuts of this kind are circular in shape, permitting the use of mechanical setups which assure clean and accurate work. Work of a more intricate nature can readily be worked freehand—there is no shape too complicated for the action of the single-point cutting tool.

**Convex circular cuts:** Work of this kind must be mounted in some kind of attachment which permits rotation about a center. A typical job is rounding the end of a piece of flat stock, Fig. 1. Usually such curves are worked around a central hole which provides for simple chucking on a bolt or mandrel held in a three or four-jaw chuck. A shaper indexing head completes



ROUNDNOSE TOOL FOR ROUGHING CUT

WORK DRIVING DOG

2

SQUARENOSE TOOL FOR FINISH CUT

RIB OR KEY



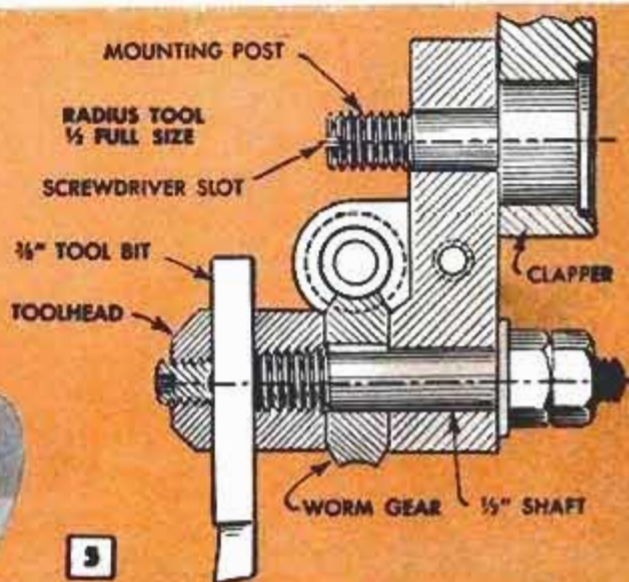
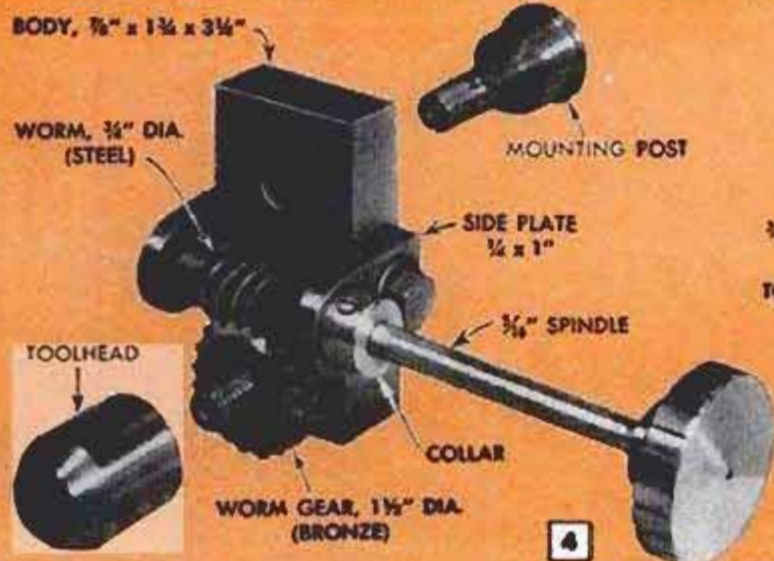




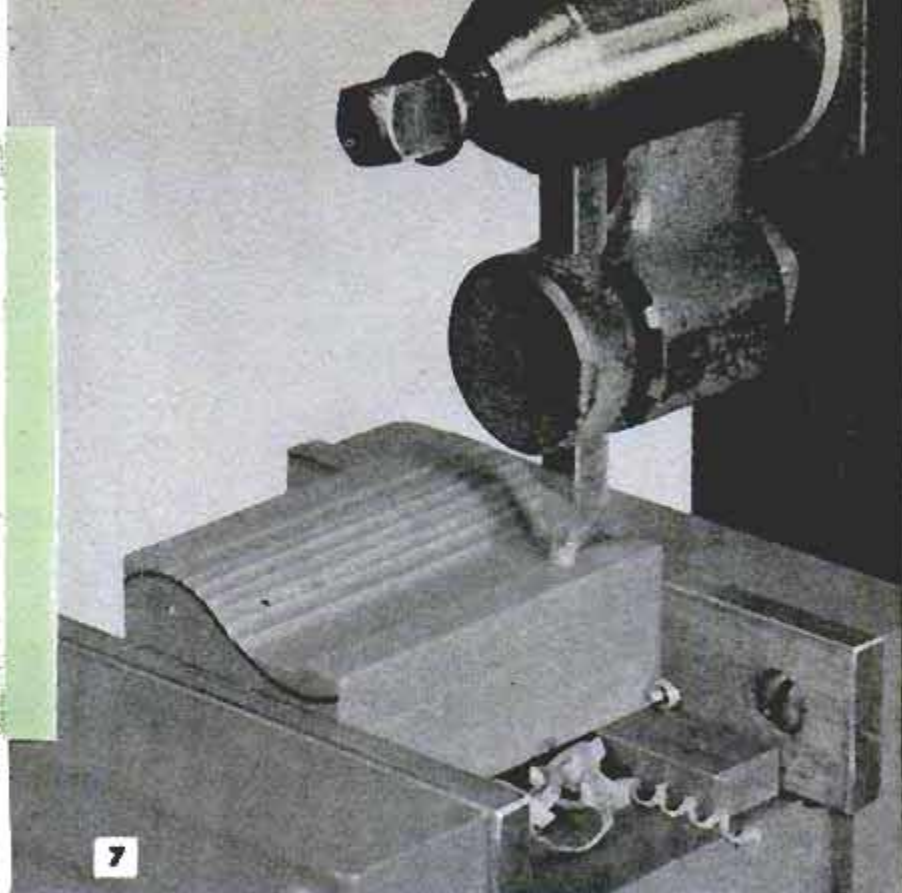
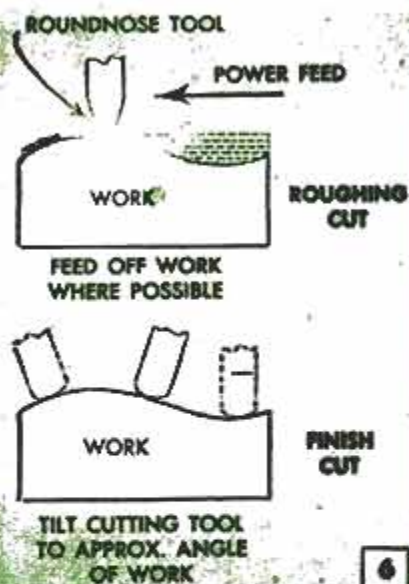
## A METAL SHAPER

the setup. The indexing pin is locked out since it plays no part in the operation. The spindle lock is tightened until the spindle turns with a slight drag when turned with a wrench. Then with the shaper running, feed the work by means of a wrench applied to the end of the spindle, Fig. 1. Cuts can be made both right and left, using a downfeed of about .015 per pass for steel and considerably more for aluminum and plastics. The manual feed with wrench is done on the backstroke and is quite easy to do once you pick up the rhythm of the ram

running at 50 to 80 strokes per minute. Almost perfect work can be done by using a roundnose tool bit for both roughing and finishing. Alternately, you can change to a flatnose cutter; this will form a fairly good surface even when the manual feed with wrench is somewhat irregular. Going over the work twice on the final cut gives extra smoothness. If the work is too long to swing over the shaper table, the index head should be mounted in the left-hand table groove. This will allow the work to hang alongside the shaper table, permitting







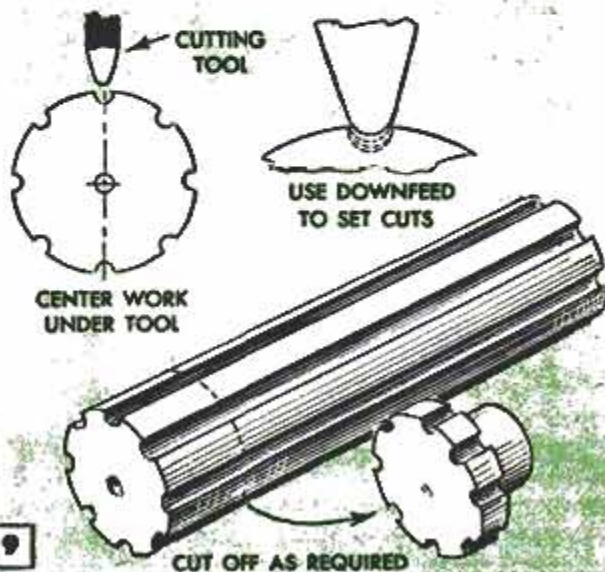
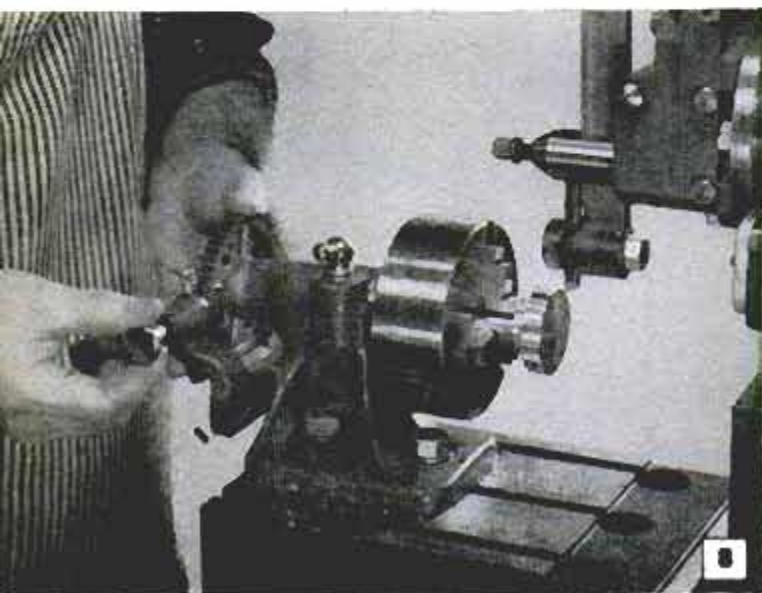
the handling of pieces up to about 3 ft. long. A gain of about 2 in. in work swing can be obtained by mounting the index head on raising blocks or on top of the rotary index table.

Some workpieces may be too long to allow direct chucking, and in this case you mount the work between centers or on a mandrel mounted between centers just as in a lathe. The shaper indexing-center attachment is used for work of this kind, Fig. 2. As before, the manual feed is applied by means of a wrench on the end of the spindle. Initial turning and boring of the work to fit the mandrel is done on the lathe. Odd-shaped work can be mounted on an angle plate or face plate in much the same fashion as for lathe work.

**Radius tool:** An attachment for making concave cuts is commonly called a radius tool. A shop-made tool, Figs. 3, 4 and 5, will handle concave cuts from  $\frac{3}{4}$ -in. to about  $2\frac{1}{2}$ -in. radius. The construction of

the radius tool is a fairly simple machine job. The attachment is bolted to the tool-post clapper as in Fig. 3. The projection of the cutter must be exactly the required radius, Fig. 3, and the work must be centered under the tool head. The traverse feed is made manually by turning the handle of the radius tool; a downfeed of about .015 per pass is used for work in steel.

**Freehand work:** Much of the contour work done on the shaper is a freehand operation, dependent on the eye and skill of the operator. Figs. 6 and 7 picture and detail a typical job. The required shape is plainly marked on the end of the work. Using a roundnose cutter, the excess metal is removed by means of successive stepcuts. In work of this kind the automatic power feed is used for each pass; the operator's part of the job lies in setting the downfeed.





It is always good practice to feed off the work as this eliminates the danger of overcutting. However, the concave portion of the cut (at right-hand end) does not permit this technique. In cases like this where the traverse feed must stop with the cutter within the work, it is best to disengage the power traverse and use only manual cross-feed for better control—it is all too common with power feed engaged to take just one stroke too much and overcut the line.

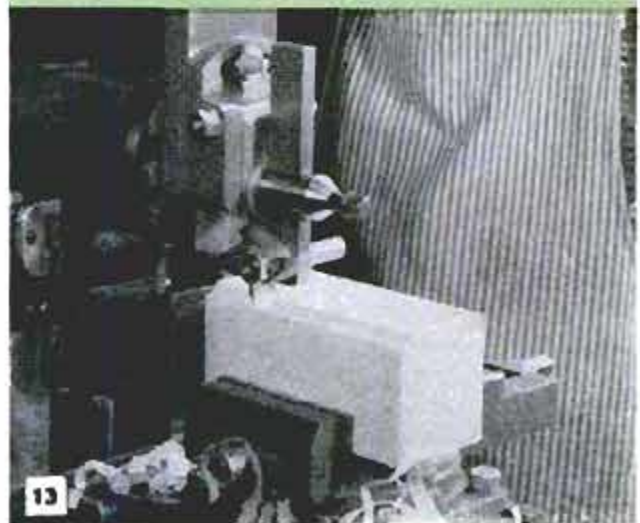
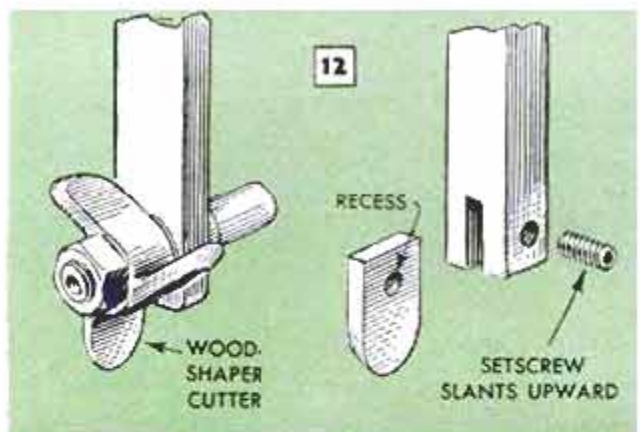
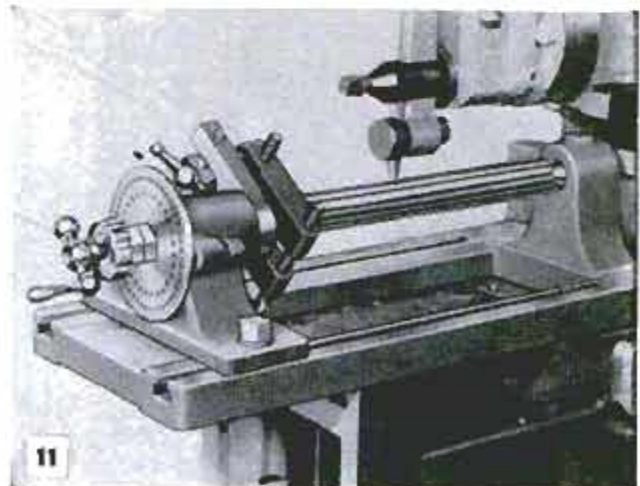
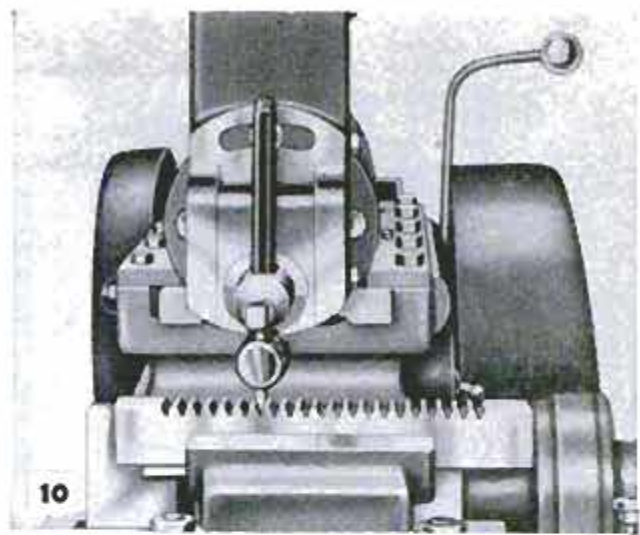
Because freehand cutting is largely a stepcut operation, the work is certain to show tool marks. Better smoothness of cut can be obtained by selecting tool bits which approximate the shape of the work for final cuts. Tilting the cutter bit is often helpful. However, with nothing more than a roundnose bit and a sharp eye, the work can be made smooth enough to clean up with a minimum amount of filing.

**Formed cutters:** The quickest method of producing curved shapes is to use a cutter of the exact shape required. This system has limitations on light-duty machines because the relatively large contact area of the formed cutter often leads to chattering and poor cutting action. If you are working steel you can cut no more than  $\frac{1}{4}$  in. wide with a formed cutter, Figs. 8 and 9. Wider cuts can be made in aluminum, and plastics machine readily with formed cutters up to 1 in. wide. These cutters can be ordinary wood-shaper or molding-head cutters, Figs. 12 and 13. When using the 3-lip cutter, Fig. 12, it should be positioned on the left side of the shank so that any tendency to turn on the threaded spindle will tighten the nut.

Formed cutters are excellent for cutting small rack or gear teeth, Fig. 10. When the teeth are large, excess metal should be roughed out by cutting first on one side of the tooth and then on the other. Spacing for rack teeth is controlled by the micrometer feed on the shaper table. The spacing for gear teeth or handwheel grooves, Fig. 9, is obtained by using the indexing head, Fig. 8. Gear blanks and handle stock can be worked in long lengths to be sawed apart as needed, Fig. 11. Alternately, in short-run production work, many workpieces can be bolted, soldered or clamped together to form a sandwich which is then machined in one operation. ★ ★ ★

### Stop on Bottom Tap Prevents Breakage

The chance of breaking a bottom tap due to jamming in a blind hole can be reduced by running two locknuts on the body of the tap. Adjust the locknuts so that the projection of the tap is slightly less than the depth of the hole to be tapped.

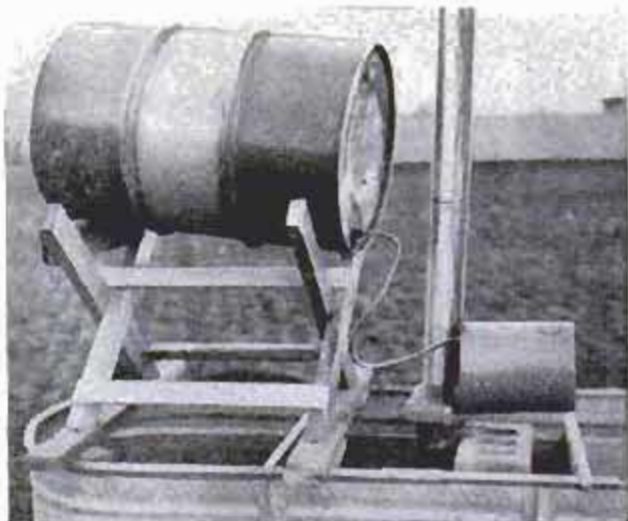






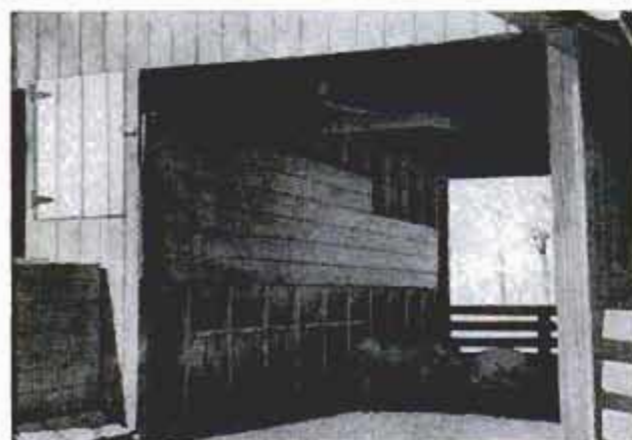
### Hinged Eave Boards on Barn Provide Cross-Ventilation

To aid movement of air in a dairy barn, one farmer installed hinges and hasps on one row of boards on the underside of each boxed-in eave as shown in the photo. Except for very hot days, sufficient ventilation is achieved by opening alternate boards. Air passes directly into the dairy through the spaces between floor joists.



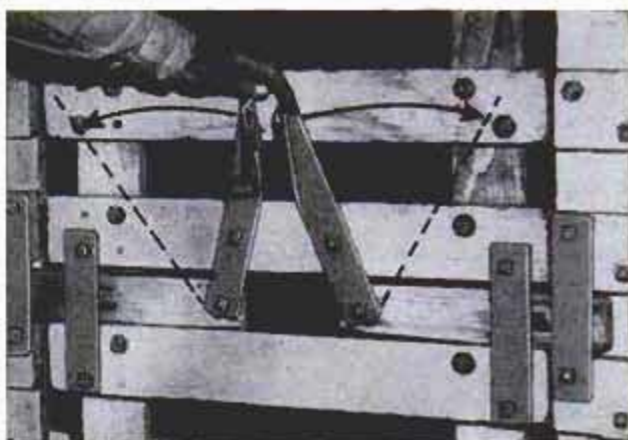
### Hogs Can't Upset Water-Heater Fuel Drums Mounted on Stock Tank

When hogs upset a 55-gal. oil drum used as a fuel tank for a water-tank heater located in a feed lot, one farmer mounted the drum on top of the water tank as illustrated. The drum rests on a framework of 2 x 4s that is held in place by means of cleats nailed to the underside of the framework.—A. M. Wettach, Mt. Pleasant, Iowa.



### Large-Capacity Hog Feeder Made From Unused Granary

Converted from a 16 x 22-ft. granary with a covered driveway on one side, this large-capacity hog feeder has a row of feeding stations or bins on each side of a 3-ft. wide hopper running the entire length of the building at its center. The hopper is nearly as high as the doorway and can be filled from the driveway or one of the doors located on the outside of the building at each end of the hopper. Sides of the hopper are nailed to studs spaced 2 ft. on centers. The latter also serve as partitions from which swinging doors are hung to cover the feeding-bin openings for easy feeding and to prevent feed waste. A separate mineral-feeding station is provided on each side at one end.



### Snap Locks Pivot Arms on Endgate Bar of Stock Truck

For a safe method of keeping the loading gate on a small stock truck closed, one farmer replaced the one-piece sliding bar with this lever arrangement. A large harness snap is clamped in holes which are drilled in flanges bent on the pivot arms to prevent the bar from being jarred open.

### Car-Traction Pads From Wire Mesh

If you travel over back roads or sparsely traveled sections this winter, carry two pieces of chicken wire about 12 x 36 in. in the trunk. If you get stuck in an icy rut, lay the wire up against the back tires and the mesh will provide traction for the wheels.



# On the MARKET

for Do-It-Yourselfers

**1. FABRIC PAINT** renews worn and discolored lamp shades, drapes, awnings, upholstery—practically all fabrics. It remains plastic, does not harden like ordinary paints. It's washable and will withstand boiling water. Comes in green, blue, yellow, red and tan which may be intermixed. Dries in 30 min.

Adhesive Products Corp., 1660 Boone Ave., New York City 60

**2. LOW-TEMPERATURE PIPE COVERING** prevents moisture condensation on cold-water pipes. Comes in various inside diameters to fit different sizes of pipe. Edges of sections are precoated with adhesive making installation easy and fast as no bands are required. Made from foam plastic, the covering is moldproof

Chart-Varl House, P.O. Box 422, Highland Park, Ill.

**3. OIL STAINS ON CONCRETE** driveways and garage floors are removed quickly with this new preparation. Simply pour liquid onto stained area, using a sufficient amount to cover discoloration completely. Allow to remain for a few seconds, then pick up oil and dirt with a dry cloth.

Removes both old and new stains  
The BanZoll Co., 5815 Sheridan Rd., Chicago 40

**4. CHROME PLATING** on faucets and appliances can be restored, without using any plating equipment, by this simple chemical process. Materials come in plastic squeeze bottles and are applied with a pad. Heat, chemically developed, deposits liquid alloy as a solid metal plating. Instructions are included

Albichrome Products, 90 Brookline Ave., Boston 15, Mass.

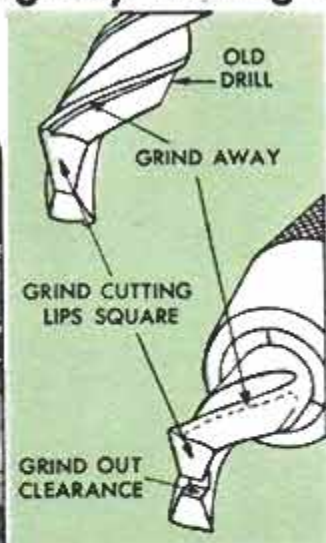
**5. PAINTBRUSH GUIDE** can save hours of time for do-it-yourself painters. Keeps the paint under control when you're painting window and storm sash, moldings, screens—anywhere you need to cut a straight, clean line with brush without smearing paint on adjacent surfaces. Comes with 1½-in. brush, ready for use

H. F. Butler, P.O. Box 1114, Stamford, Conn.



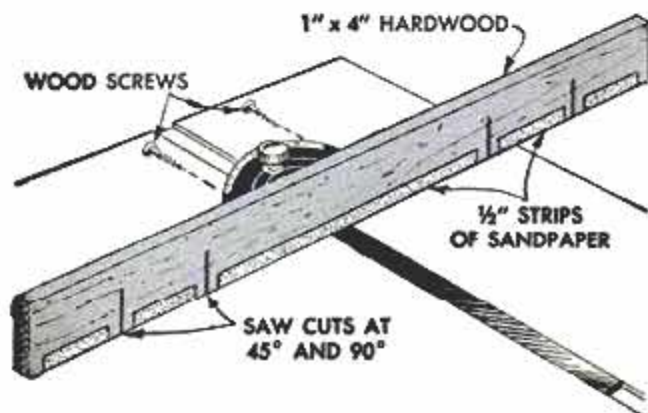


## Emergency Milling Cutter From Drill Bit



With no milling cutter at hand and little time to finish an emergency job, one machinist improvised this cutter. A discarded drill bit is first ground to form straight cutting edges. Then a clearance slot is ground at the center of the bit, leaving the two cutting edges at right angles to the axis of the drill. Leading edges of the flutes are ground back as shown. A slow feed is best for the improvised cutter. — Arthur B. Farwell, Detroit, Mich.

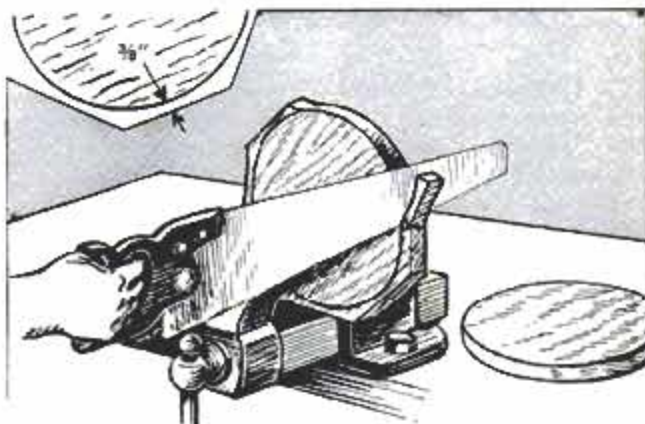
## Miter-Gauge Extension Aids Miter Cutting



For greater accuracy when making miter cuts on a table saw, screw a hardwood extension to the miter gauge as shown. Sandpaper strips, cemented on the side of the extension facing the saw, prevent the stock from creeping when it is sawed.

J. M. Elliott, Jr., Bellaire, Tex.

## Method for Cutting Circular Shapes With Handsaw



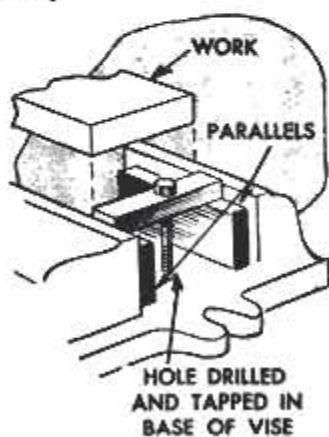
To cut a circle from lumber or plywood when a keyhole saw or jigsaw is not available, first trim excess material to within  $\frac{3}{8}$  in. of the circle. Then saw along the line, breaking the narrow strip away as you proceed to accommodate the handsaw.

G. A. Alexander, El Cajon, Calif.

## Machine Vise Clamp

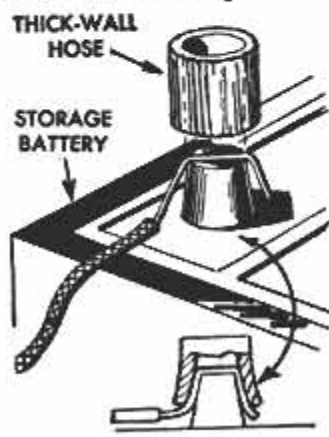
When parallels are required under work held in a milling-machine vise, one machinist drills and taps a hole in the base of the vise so that the parallels can be held in a fixed position by means of a strap clamp. This saves time when shifting the work during the machining procedure.

Frank LaSaracino, New York City.



## Hose Lengths Connect Battery

To make a temporary connection to a wet-cell storage battery, clamp the wires to the negative and positive posts with short lengths of thick-walled rubber hose as shown in the drawing. The hose should be of a diameter that will permit the lengths to press the bared ends of the wires firmly against the posts.





# SHOPPING FOR TOOLS

**1. BLADE SHARPENER** for rotary mowers hollow-grinds the blade to a keen cutting edge. Grinding wheel is adjustable to grind any required degree of bevel. An accessory, supplied with the sharpener, is the blade balancer and tracker, which enables operator to balance blade after grinding to eliminate vibration. A cutlery sharpener also is supplied as an accessory

The Fate-Root-Heath Co., Plymouth, Ohio

**2. HOLE CUTTERS** designed especially for boring holes through thin sheet metals without distortion or burring, are now available in sizes ranging from 3/16 to 1 1/4 in. in diameter. Comes as a single unit of a given size or in sets of 10 cutters in a hinged-top box as pictured. Retracting center point assures accurate positioning. Cutters operate at twist-drill speeds

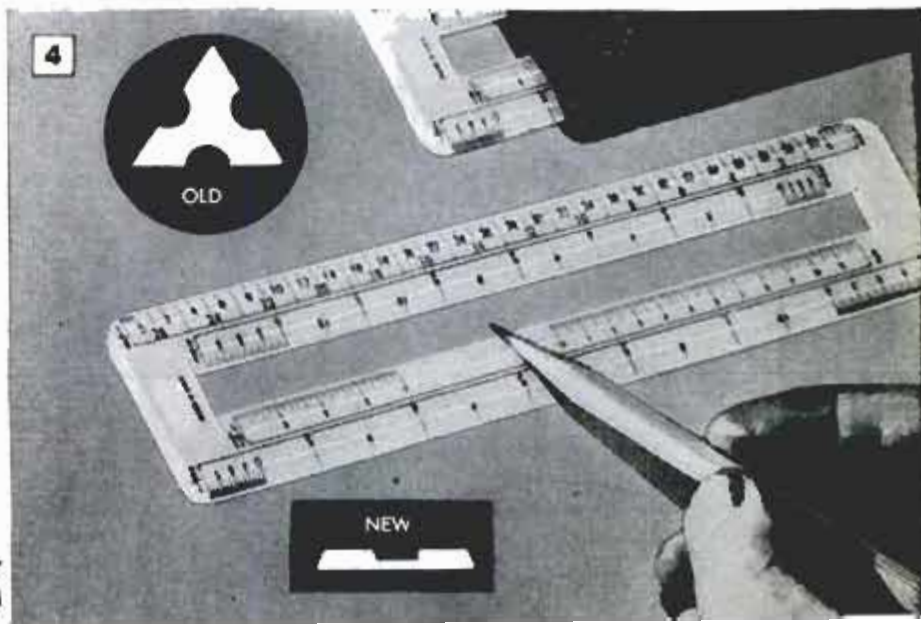
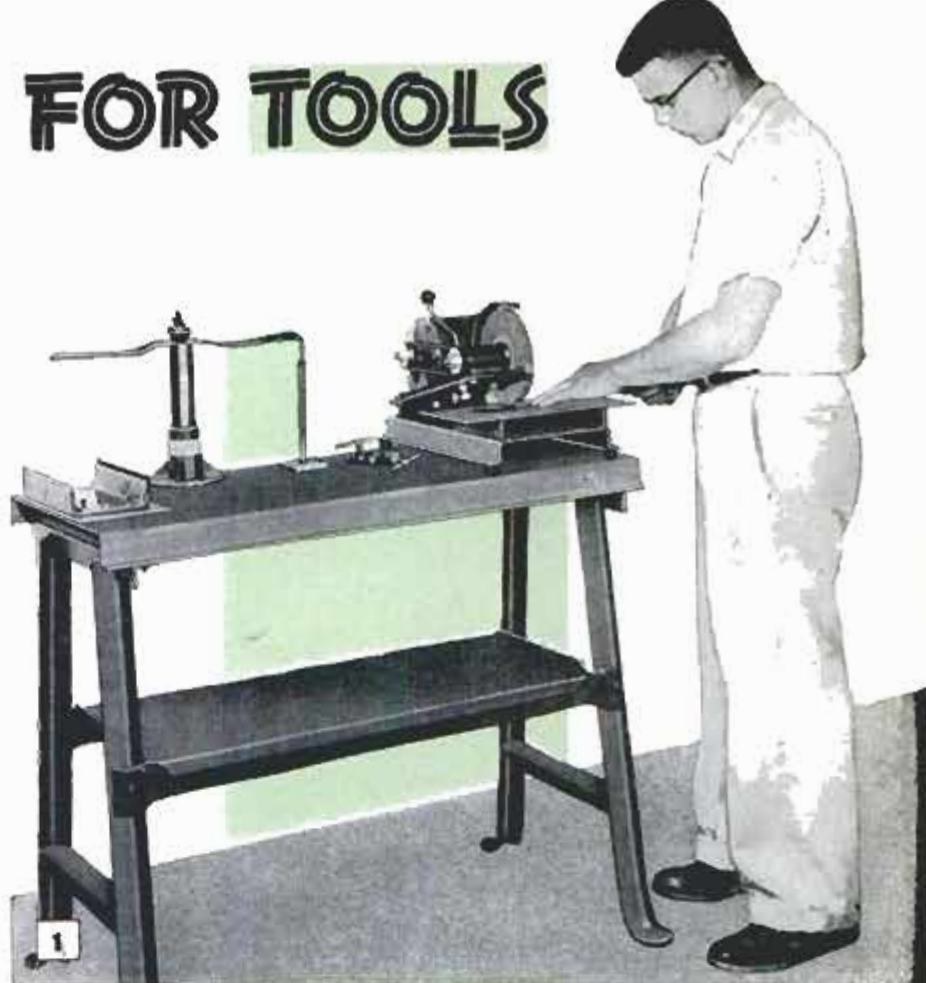
Jancy Engineering Co.,  
508 S. Pine St., Davenport, Iowa

**3. ELECTRICALLY DRIVEN DRAIN AUGER** makes short work of opening clogged drains. Machine is controlled by a foot switch, leaving both hands free to feed the auger into the drain inlet. Auger is a heavy spring-steel cable, spirally wound, and feeds into and out of drum with only light hand pressure. Frame is of cast aluminum for lightness and easy portability

Electro-Drain Mfg. Co.,  
6300 Roland Ave., Cleveland 27, Ohio

**4. DRAFTSMAN'S SCALE** has 8 reductions on one face, all being easily seen at a glance without turning the scale itself. Each scale has its own straightedge calibrated to professional standards. Comes in two lengths, 6 and 12 in., both sizes carrying graduations of 1/8, 1/4, 3/8, 1/2, 1, 1 1/2 and 3 in. to the ft. Made from tough crystal-clear plastic with graduations in black

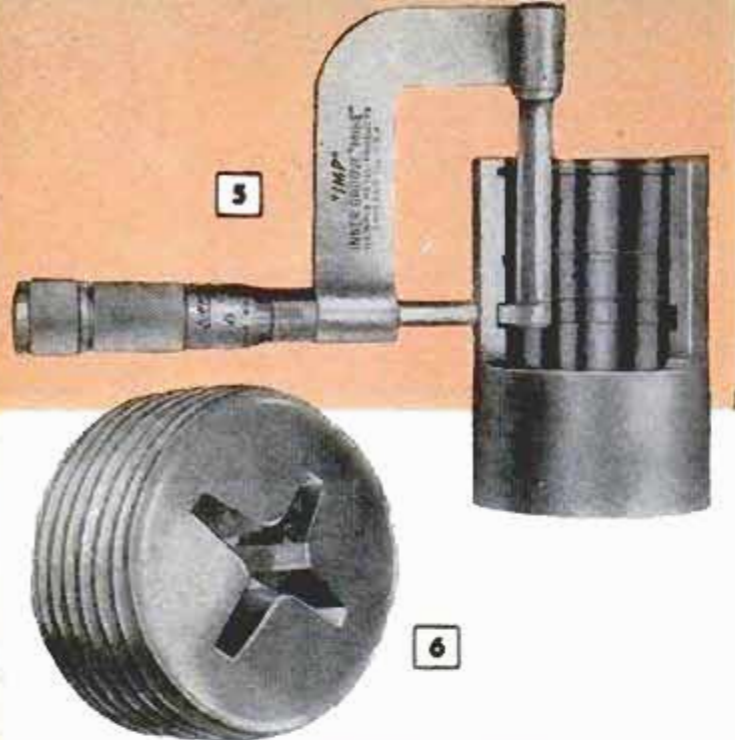
A. Lawrence Karp,  
16 Putnam Park, Greenwich, Conn.





# SHOPPING FOR TOOLS

(Continued from preceding page)

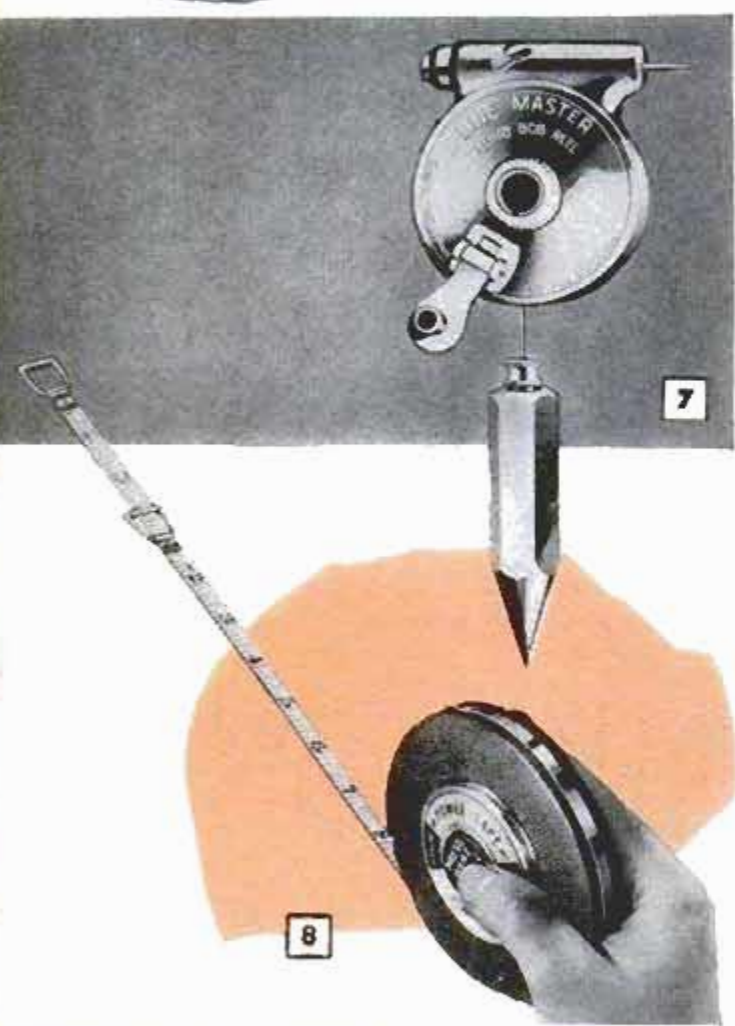


**5. INNER-GROOVE MICROMETER** has been developed for measuring and checking depths of internal O-ring, retaining-ring and recess grooves to engineering specifications. Machinists and inspectors find it useful for controlling quality and accuracy of internal grooves. Two interchangeable anvils are furnished with each instrument, one for narrow retaining-ring grooves, one for the wider O-ring grooves

Illinois Metal Products, 429 W. Superior St., Chicago 10

**6. HEADLESS PIPE PLUGS** are cross slotted to permit installation with a screwdriver, a flat piece of metal, or even a coin. Available in both the short and long standards and in steel, brass and aluminum. Regular sizes are 1/16, 1/8, 1/4, 3/8, 1/2, 3/4 and 1 in. Standard plugs are furnished with dryseal, rolled-type threads and in steel are supplied in black oxide finish. The plugs are oil dipped after finishing

Pipe Plugs, Inc., Wellington, Ohio



**7. LINE REEL** for plumb bob is precision-manufactured with a heavy cast-alloy case, or housing, having a driving point for attaching it securely to a wooden support or framing member of a structure. Case is also slotted so that it can be suspended from a wire or cord. Has adjustable line drag to permit pinpoint setting of the bob. Reel has a line capacity of 100 ft. of 8-lb. line, which is protected by beaded aperture

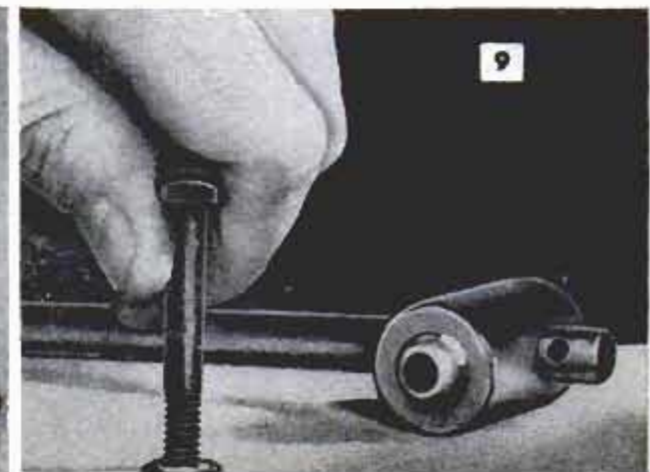
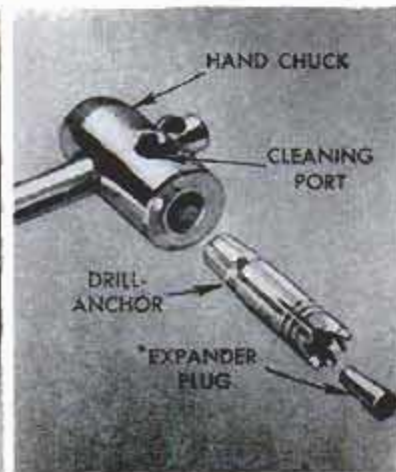
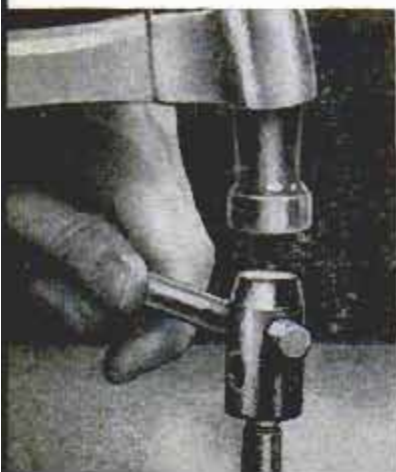
LineMaster Mfg. Co., P.O. Box 3821, Seattle 24, Wash.

**8. STEEL MEASURING TAPE** has a button-controlled spring return which eliminates the tedious hand winding which characterizes conventional tapes. Button control is pressed to rewind the tape. Release pressure on button and tape stops at any point. Tape, or blade, features jet-black markings on a white background, is graduated in eighths throughout length. Damaged tape is easily, quickly replaceable

Evans Rule Co., 400 Trumbull St., Elizabeth, N. J.

**9. HOLLOW-CORE MASONRY DRILL** cuts its way into solid concrete under light hammer blows and once in place becomes a masonry anchor for a 1/4-in. bolt as in the right-hand view below. After drilling to depth as in left-hand photo, anchor (drill) is removed and expander (center photo) is inserted. Anchor is replaced in hole and seated over expander. Blow on side of chuck breaks off end of anchor, exposing threads

Phillips Drill Co., Michigan City, Ind.





**10. ENGINE-POWERED CHAIN SAW** is available in 16, 20 and 24-in. bar lengths. Weighs only 24 lb. without guide bar and chain. Has a recoil starter, an automatic clutch that prevents stalling should chain bind in the cut, and a novel wrap-around handle of tubular steel that assures complete control in difficult work positions. Engine delivers 3.5 hp., is available with either float or diaphragm-type carburetor  
Porter-Cable Machine Co., 104 Exchange St., Syracuse 8, N. Y.

**11. RATCHET DRIVER** consists of a 1/4-in. drive handle, a 1/4-in. ratchet with fingertip control for reversing and slot-type screwdriver bits ranging from 3/16 to 3/8 in. wide, the latter for large screws. Also available are Phillips bits Nos. 1, 2 and 3, and 6 and 8-point wrench sockets in sizes from 3/16 to 9/16 in. Offset handle, universal joint and extensions 2 and 5 1/2 in. long complete this handy ratchet-driver tool kit  
Herbrand Tools, Fremont, Ohio

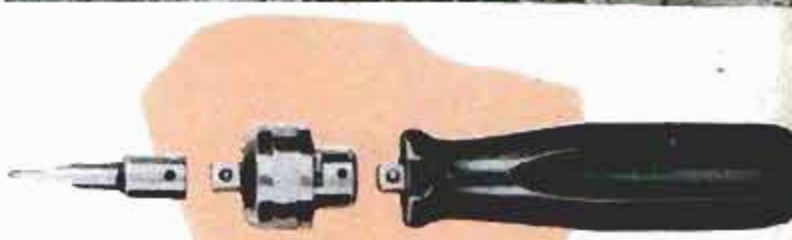
**12. SMOOTH-JAW PLIER** won't mar wood, plastic or chrome-plated surfaces. Compare with the toothed jaws of the type shown in the inset. Extra-long handles provide plenty of gripping power for tightening or loosening plated sink-trap nuts, tube fittings and faucet-packing nuts. Jaws adjust to 5 positions, the capacity ranging from 7/8 to 2 in. Special design of jaws permits them to close parallel. Prevents burring  
Champion DeArment Tool Co., Meadville, Pa.

**13. HAMMER** has special seat for starting a nail in close quarters or at the limit of reach from floor or scaffold. Nail is held securely between the claws with the head bearing against a seat, or pad, forged on the top edge of the steel handle. Starts the nail with a single light blow and disengages without withdrawing or canting the nail sidewise. All-steel handle with cushion grip molded to fit the hand  
Estwing Mfg. Co., Rockford, Ill.

**14. IMPACT WRENCH** has capacity for running and removing nuts on bolts up to 3/8 in. It has a 1/2-in. square drive, produces 2000 impacts per min. and develops 100 ft.-lb. torque. Full power while rotating in either direction is achieved by an automatic brush-shifting mechanism actuated by reversing switch. Although built for nut running, it performs other operations such as tapping, threading, drilling  
Millers Falls Co., Greenfield, Mass.



10



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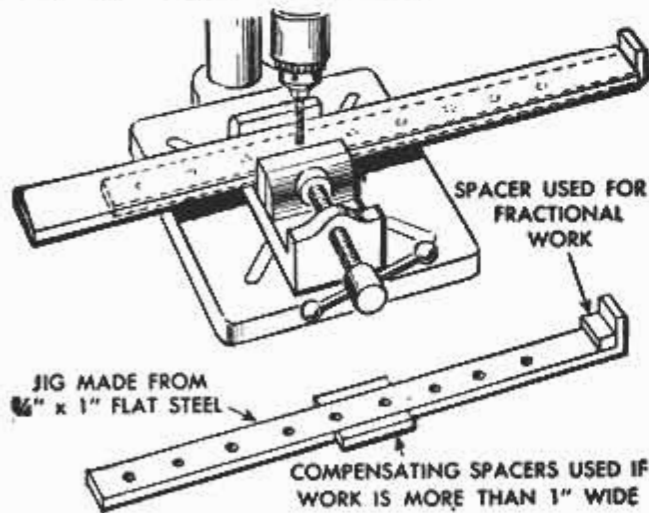


## Bolt Covered by Vertical Hasp Locks Sliding Doors



Neat and practical, this method of padlocking overlapping sliding doors has both the hasp and staple on the outside door, positioned vertically, as indicated. With the doors closed, a hole is drilled through the overlapping portions under the hasp, to accommodate a  $\frac{3}{8}$ -in. bolt. To lock the doors, the bolt is fitted in the hole and the hasp dropped down over the bolt head onto the staple. The hasp covers not only the bolt head, but all the screws in the staple and hasp. Because of its vertical position, the hasp will always fall downward against the door, rather than projecting out from the door where it is a possible hazard.

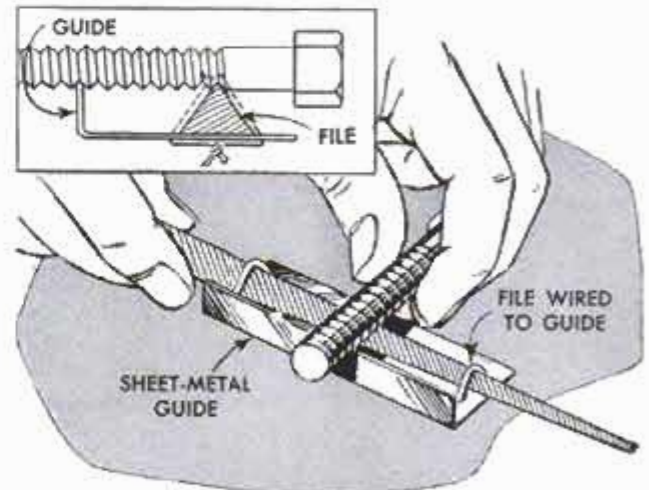
## Accurate Center-Locating Jig For Use With Drill Press



Drilling holes in the same position in any number of lengths of material is possible with this simple jig. Jig consists of a length of  $\frac{1}{4}$  x 1-in. flat steel in which holes are drilled 1 in. apart. A stop is welded or bolted to one end. In use, the jig is clamped in the drill-press vise and the drill pulled down into the correct hole. Then the vise is bolted to the drill-press table. Workpieces are fitted in the jig, held against the end and drilled. For fractional spacing, spacers are fitted between the workpieces and the end stop. Work wider than 1 in. requires spacers between the jig and vise.

B. Stewart, Winder, Ga.

## File Fitted in Sheet-Metal Jig Substitutes for Bolt Die

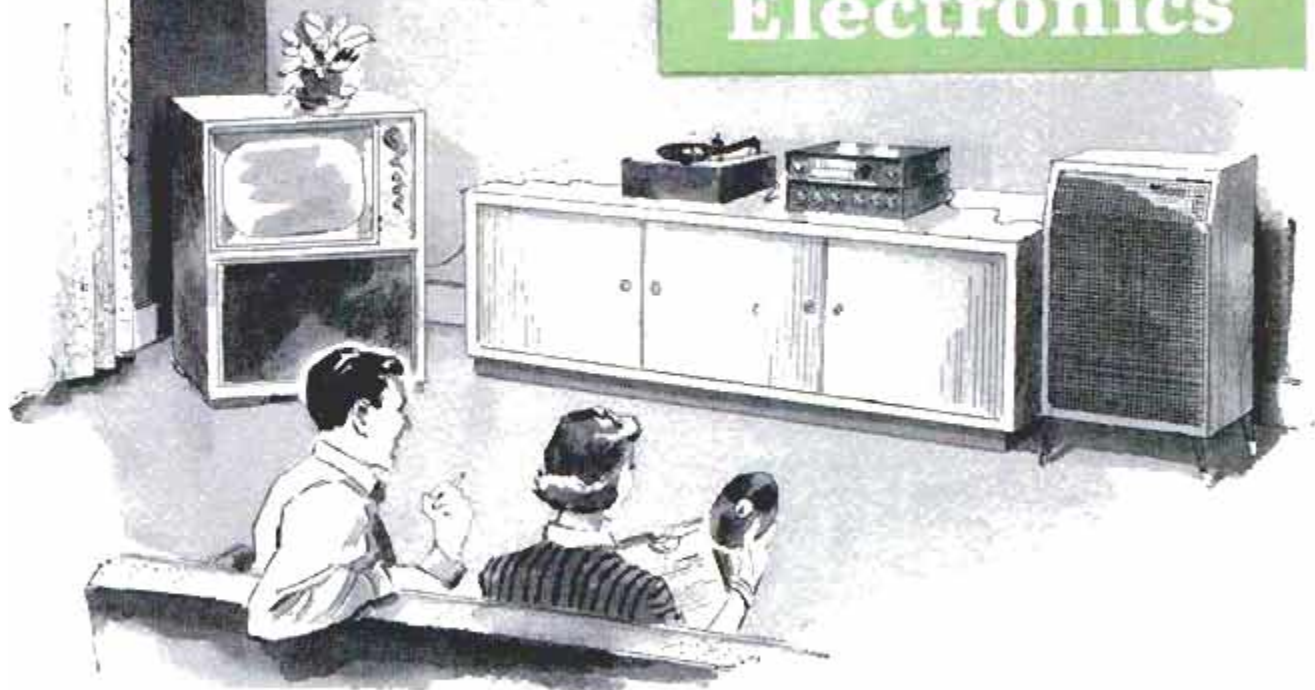


When it is necessary to clean the threads on a bolt or shaft for which you do not have the correct size die, a three-cornered file fitted in a jig can be used. The jig consists of an L-shape bent from sheet metal. The file is positioned on the L-shape so that the upper edge of the jig and file corner fit in threads in the bolt. The position of the file then is marked and file is wired to the jig through holes punched in the metal. It may be necessary to bend the edge of the jig again after the file is wired in place, to align the threads. The guide retraces the thread pitch as the bolt is rotated slowly across the file.

Ed Packer, Pompano, Fla.



# Radio Television Electronics



## STEREO MUSIC AT LOW COST

By Robert Berkovitz,  
AUDIO CONSULTANT, ALLIED RADIO CORP.

**A**MID THE ENTHUSIASM caused by the appearance of stereo records comes the sobering realization that stereo reproduction in the home requires "two of everything." Not only two channels on the record itself, but two elements in the pickup cartridge, two amplifiers and two speaker systems are needed to extract the magic of stereophonic sound from the wiggly grooves of the stereo disc. To record fans who have already spent a good deal of money on their present phono system, this suggests a sizable investment for additional equipment which would prevent stereo from becoming an immediate reality. Fortunately, this is not necessarily true. Many homes already possess most of the required equipment for reproducing stereo records, so that the switch to stereo need not involve a major revision of the family budget.

Fig. 1 illustrates the equipment needed for stereo phono reproduction. Ideally, this would include a high-quality record changer or turntable, a stereo cartridge, two hi-fi amplifiers and two high-fidelity speaker systems. The words "high fidelity,"

however, are used here only to indicate the present ultimate in record reproduction. The stereo effect itself is rather independent of actual sound quality and may be enjoyed even if the equipment does not measure up to high-fidelity standards.\*

In its simplest form, therefore, the advantages of stereo can be obtained by utilizing the amplifier and speaker of a monaural phono system in conjunction with the audio amplifier and speaker of any good radio or television receiver. Since many of these are already equipped with phono-input jacks, the entire conversion consists of replacing the present monaural phono cartridge with a stereo unit and adding a few pieces of wire—a job which can be both simple and inexpensive.

The real hi-fi fan will probably shudder at the mere suggestion of using a radio or TV set for playing high-fidelity records.

\* Proof of this is given by the startling realism of stereo broadcasts involving the simultaneous use of FM and AM transmissions. Certainly, the ordinary AM receiver can not merit hi-fi status by any stretch of the definition. Yet the effects of such broadcasts are so dramatic that these are usually preferred to monaural broadcasts of true high-fidelity quality.



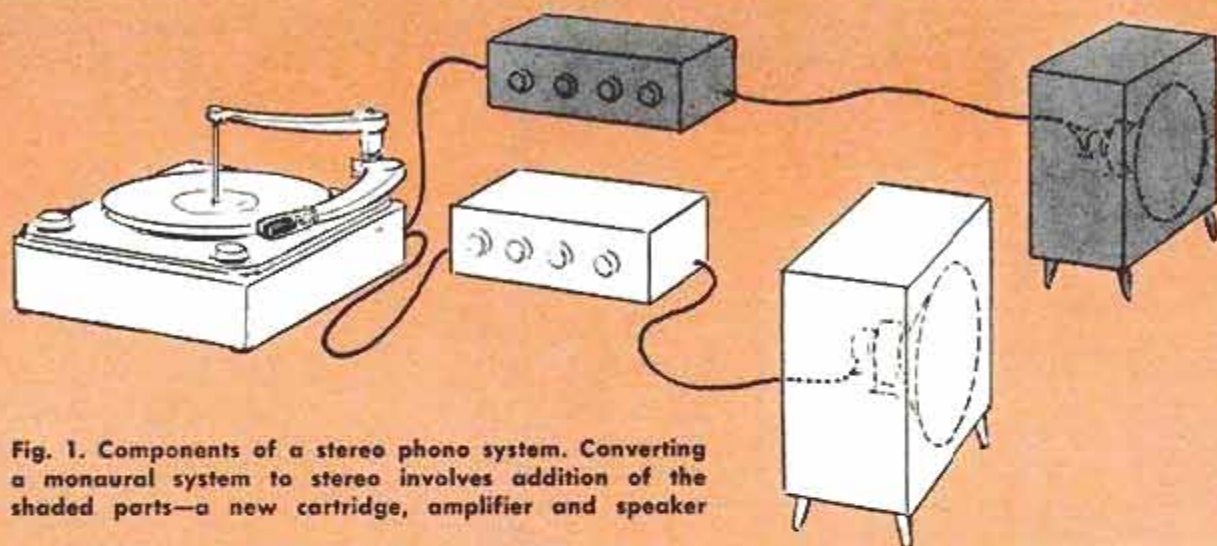


Fig. 1. Components of a stereo phono system. Converting a monaural system to stereo involves addition of the shaded parts—a new cartridge, amplifier and speaker

Such receivers, it is argued, do not have the wide frequency range required for good reproduction. Nor is their undistorted volume output sufficient for reproducing the full dynamic range of an orchestra. These arguments are unquestionably true. Yet while such units may be totally unsuited for monaural high fidelity, they can perform very well when used as the second channel of a stereo system which includes one hi-fi monaural unit. The use of two amplifiers now reduces the power requirements of each, so that both can usually be operated at a level within the capability of the inferior amplifier. Compared with true high-fidelity monaural reproduction, such a composite system may lose some of the extremely high and low frequencies, but the added stereo effect more than compensates for this loss.

When a radio or TV set is used as the second channel with an ordinary (nonhigh-fidelity) phonograph, the quality of reproduction will definitely be improved. This, added to the stereo effect, represents the most spectacular improvement in over-all performance that can be obtained at a relatively low cost.

While the actual conversion to stereo may not be difficult, it must be preceded by careful planning if optimum performance and versatility are to be obtained. Obviously, there would be little advantage in replacing the cartridge of an inexpensive table-model phonograph with a high-priced stereo unit. Conversely, it would be poor economy to replace a really good monaural cartridge with a mediocre stereo unit. Such a cartridge would not only compromise initial listening quality, but would itself have to be replaced during any subsequent improvement of the over-all system. The choice of stereo cartridge, there-

fore, depends primarily on the type of unit it is intended to replace.

### Two Types of Cartridges

Basically, there are two types of phono cartridges; those which produce an output voltage due to the action of a magnetic field, and those which provide a signal voltage due to flexing of a crystal or ceramic element. Of the two, the magnetic units have generally been preferred by hi-fi fans interested in obtaining the best possible reproduction, and are often used in systems built up from individual components.

The ceramic cartridges are normally employed in medium-priced commercial systems. In addition to being slightly less expensive, these have a number of decided advantages. Compared with magnetic units they have a high-output voltage and require no equalization for various record characteristics. As a result, the amplifier with which they are used need not incorporate an equalized preamplifier and is far less expensive and less critical in design without compromising sound quality.

### Replacing the Cartridge

In selecting a suitable replacement stereo cartridge, the above factors must be kept in mind. If the present cartridge is a crystal or ceramic type, it should be replaced with a similar stereo unit. If a magnetic cartridge is presently employed, a magnetic stereo unit, preferably by the same manufacturer, should be used. In such cases, however, the amplifier of the radio or TV set will not have the required gain or equalization for proper reproduction. A separate preamplifier must therefore be connected between the cartridge and the low-gain amplifier. (Some suitable commercial preamplifiers are available for about \$11).



A normal method of mounting a monaural cartridge in a tone arm, and the necessary changes for a typical conversion are shown in Fig. 2. Most cartridges are fastened to the arm with two screws on standard 1/2-in. mounting centers. Since stereo cartridges are designed for this type of mounting, the change-over is easily accomplished. If the stereo cartridge is much thinner than the original one, a couple of spacers can be inserted, as shown, so that the stylus or turnover lever protrudes below the rim of the tone arm. Where the monaural cartridge has been mounted by another method, the changer manufacturer can usually supply a mounting adapter for the stereo cartridge.

### Wiring Changes Are Simple

The necessary wiring changes, though simple, must be made carefully so that the mechanical action of the record player is not impaired. Principally, these consist of running another wire from the new cartridge to a terminal strip underneath the changer base plate, and adding a second output cable for connection to the second amplifier.

Fig. 2 shows the original wiring and the required changes for a typical Webcor changer. In these, a three-lug terminal strip below the base plate is used as a tie point for the cartridge leads and the output cable. Normally the red signal lead is

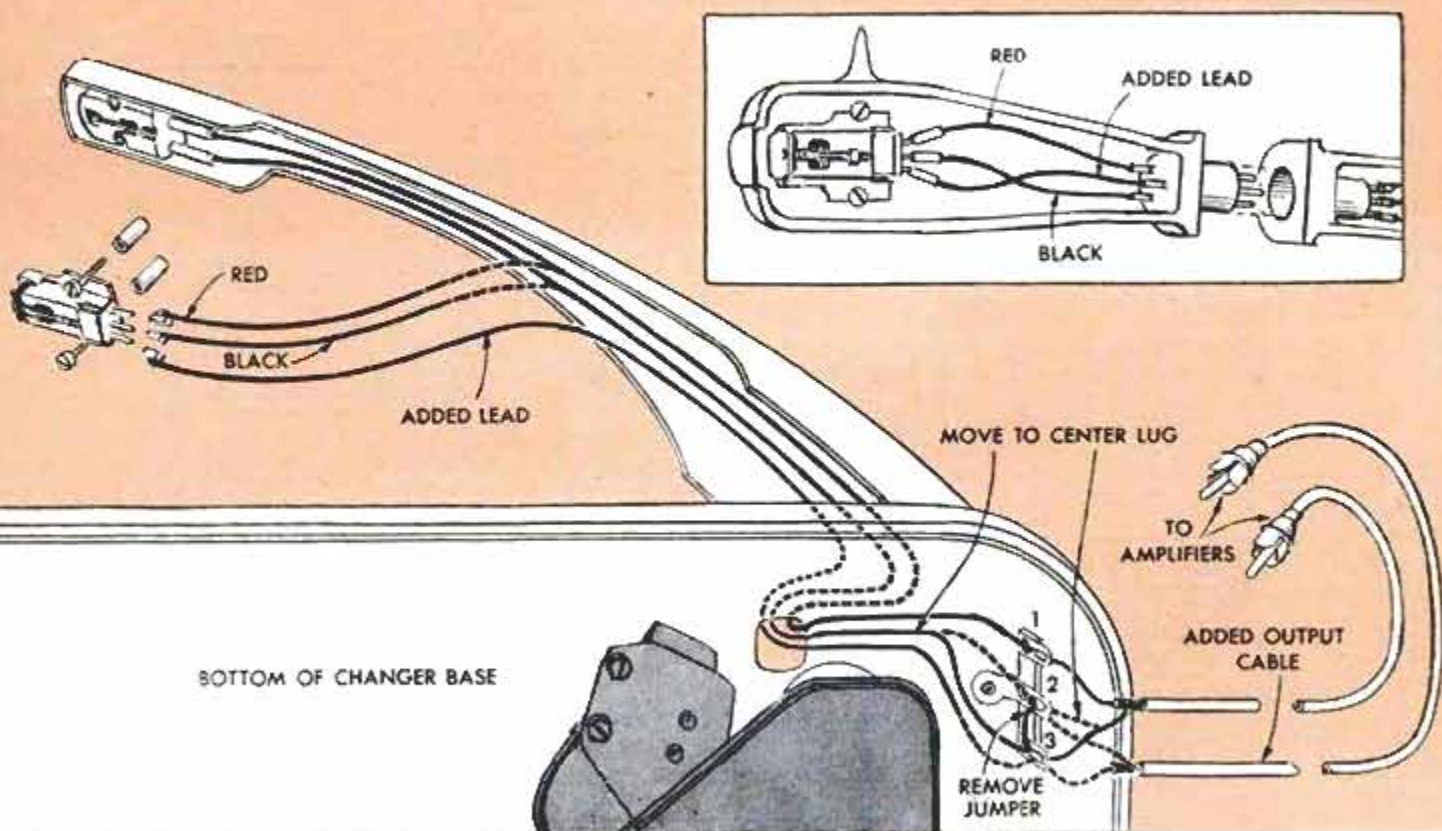
connected to lug 1 and the black ground lead to lug 3. A jumper wire is soldered from lug 3 to ground lug 2. In the conversion, the jumper wire must be removed and the black ground wire, as well as the shield braid of the output cable moved directly to ground lug 2. The added cartridge wire is then routed through the tone arm along the same path and through the same cable clamps as the other two and is soldered to lug 3. The added output cable is soldered to lugs 2 and 3, and leaves the changer base or cabinet through the same hole as the original cable.

The wiring of other types of record changers or players follows the same general pattern. Where the original two wires consist of the center conductor and shield braid of a shielded cable, a similar shielded cable should be used for the added wire. In this case the new shield braid should be connected to the grounded terminal-strip lug. If the new stereo cartridge has four, rather than three, output lugs, the shield braid of the added wire must be connected to the second ground lug of the cartridge.

All connections to the cartridge must be made with clips soldered to the ends of the wire leads. Under no circumstances should any wire be soldered directly to the cartridge terminals.

For best bass response, a ceramic cartridge should be terminated with a high

Fig. 2. Replacing monaural cartridge with stereo unit requires extra cartridge lead and output cable. Four-terminal cartridges need another ground wire. Inset shows stereo cartridge in Garrard plug-in head





resistance, approximating 3 to 5 meg. The terminating resistance for the cartridge is the input resistance of the following amplifier. In radio or TV sets, this is usually a ½ or 1-meg. volume control. Such a control should be replaced, wherever convenient, with a 3-meg. unit. The stereo effect, which depends primarily on frequencies above 300 c. p. s., will not be affected by improper cartridge termination, but too low a value of amplifier input resistance will cause the loss of low audio frequencies which the amplifier and speaker may be capable of reproducing.

### Commercial Conversion Kits

In anticipation of a great demand for stereo conversions, a number of commercial conversion kits are already available. Garrard, for example, offers kits which are tailored specifically for their changers, and "universal" kits, for most other changers or players, are available from major radio-parts distributors. Some manufacturers of complete phonographs provide kits of this type for their units and it is expected that many others will soon follow suit. (Most new changers and manual players, as well as the better phonographs, are factory wired for both stereo and monaural playback so that wiring changes at a later time are unnecessary.)

### Adding a Monaural Switch

All stereo cartridges are compatible to the extent of being able to play both stereo and monaural records. For best monaural

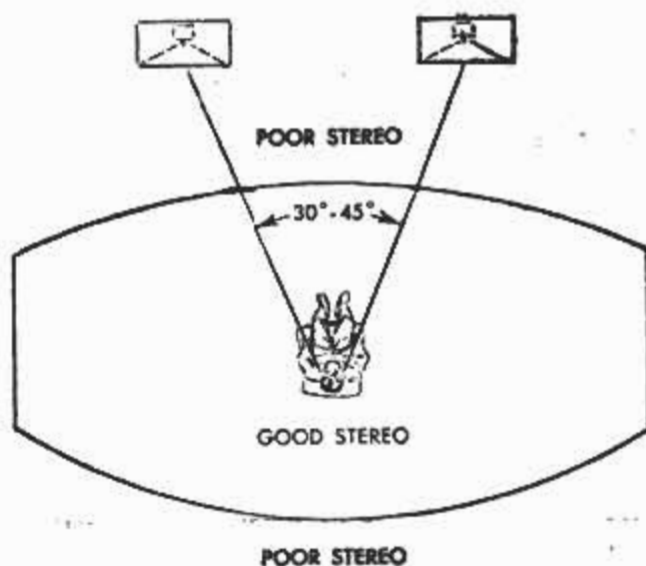


Fig. 3. For best stereo, angle between loudspeakers and listener should be about 30 to 45 deg., but good stereo-listening area is relatively broad

results, however, both elements of the cartridge should be connected together so that the two individual signals are mixed and applied simultaneously to both amplifiers. This is easily accomplished with a s.p.s.t. switch. The switch may be mounted in any convenient location on the changer base or cabinet. One switch-terminal is connected with a wire to lug 1 of the terminal strip beneath the changer mounting plate and the other to terminal 3. With the switch closed, both signals are applied to both amplifiers for monaural reproduction. For

(Continued to page 272)

Table 1. Partial list of currently available stereo cartridges giving characteristics and approximate cost

Manufacturer	Part No.	Type	Output (Volts)	Styli	Stylus * Pressure	Approx. Cost Audiophile Net	Remarks
Acos (Duotone)	71-1	Crystal	1.0	.0007-D	2-6 Grams	\$18.75	
Astatic	13TBX	Ceramic	0.5	.0007-D .003-S	6 Grams	12.00	
CBS-Hytron	SC-1	Ceramic	0.4	.0008-D	5-7 Grams	21.75	Capable of playing all records, regardless of speed, according to manufacturer
Electro-Voice	Power Point	Ceramic	1.0	.0007-D .003-S	6 Grams	11.70	
Electro-Voice	21-D	Ceramic	0.5	.0007-D	6 Grams	19.00	Also Available With Added .003-S Stylus for \$22.50
General Electric	GC-7	Magnetic	0.006	.0007-D	2-7 Grams	23.95	
Grado	- - - -	Magnetic	0.005	.0007-D	4 Grams	49.50	
Pickering	371	Magnetic	0.01	.0007-D	2-4 Grams	30.00	
Recoton	745-3SD	Magnetic	0.005	.0007-D .003-S	4.5 Grams	30.00	
Ronette	Stereo OV	Ceramic	0.5	.00075-D .0025-S	6 Grams	19.50	
Shure	M3D	Magnetic	0.005	.0007-D	3.5 Grams	45.00	
Sonotone	8T4-SD	Ceramic	0.3	.0007-D .003-S	6 Grams	14.70	

\* Stylus pressure of record player should be adjusted to conform with cartridge manufacturer's specifications



# WHAT DO YOU LOOK FOR IN BATTERIES AND ANTI-FREEZE?



If you follow the example of the men at Chrysler Engineering, you'll have a lot of things to look for in specific detail. In MoPar batteries, for example, the extra attention to detail has led to these important developments:

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You can get both dry and wet charge MoPar batteries. Why not ask for a free battery check at your local Plymouth, Dodge, De Soto, Chrysler or Imperial dealer — and, at the same time, ask about the liberal allowance for your old battery.

Equally rigid requirements apply to MoPar anti-freeze. If you list what a good anti-freeze

should do, you'll find that it should do a lot more than just give highest quality cooling system protection at the lowest possible price.

It should also:

1. Protect copper, brass, aluminum, solder, steel and cast iron from corrosion.
2. Resist turning to acid or becoming gummy or rancid.
3. Effectively inhibit rust and water scale.
4. Remain uniform in storage or use.
5. Contain no injurious chemicals such as salt, glucose or petroleum.
6. Mix instantly with hardest water — and with other types of anti-freeze.
7. Have no harmful effects on rubber.

To set up such requirements for MoPar anti-freeze, Chrysler engineers demand a product that surpasses both U.S. Bureau of Standards specifications and S.A.E. standards. When you get MoPar anti-freeze — either permanent or methanol type — you get guaranteed, Chrysler-engineered performance.

You always get guaranteed performance, backed by Chrysler Engineering, when you specify MoPar products — complete bumper-to-bumper parts and accessories for all Chrysler-built cars.

Genuine Chrysler-engineered MoPar products are available at all Plymouth, Dodge, De Soto, Chrysler or Imperial dealers — and at leading independent repair shops.



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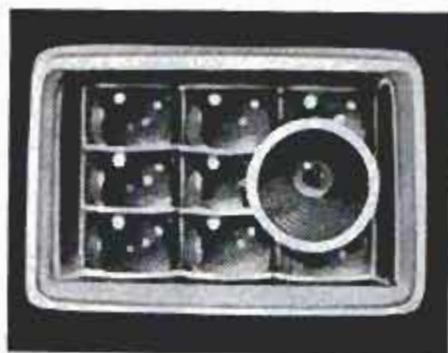
(Prices are list, include Federal Tax, and are subject to change without notice)

**EASTMAN KODAK COMPANY,**





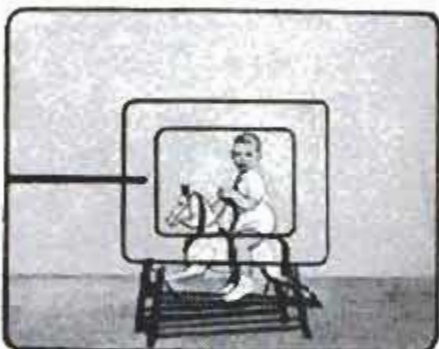
**Coupled photoelectric exposure meter** measures light as you shoot. The meter pointer is visible in the viewfinder.



**Exposure-control knob** lets you adjust meter pointer while you shoot. No need to take camera from your eye.



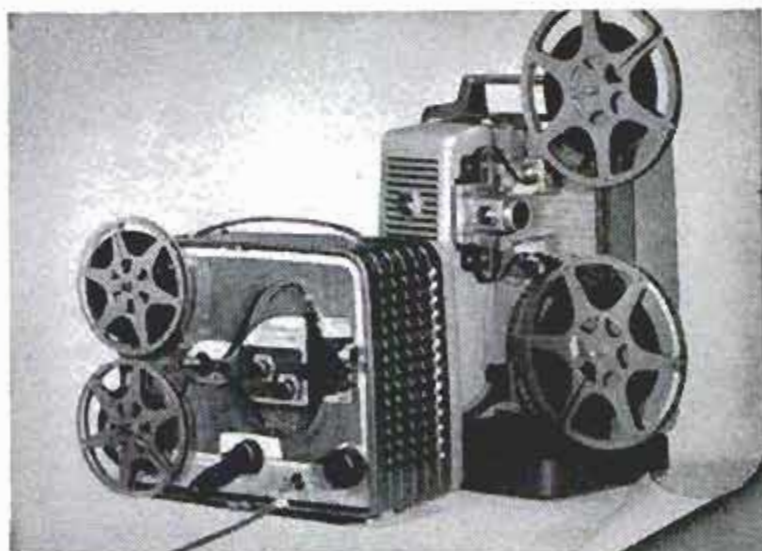
**Perfect exposure** before your eyes—simply by centering pointer in viewfinder. Multi-frames show fields covered in standard, wide-angle, and telephoto views.



## built-in exposure meter

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Brownie 500 Movie Projector for sharp, brilliant, big-screen movies, \$79.50. New Kodak Showtime 8 Movie Projector (right) has 750w lamp for *extra-brilliant* screen image, shows movies 5 feet wide at 20-foot distance. Includes new built-in Presstape Splicer for clean, dry, "weld-strong" splicing without cement. \$174.50



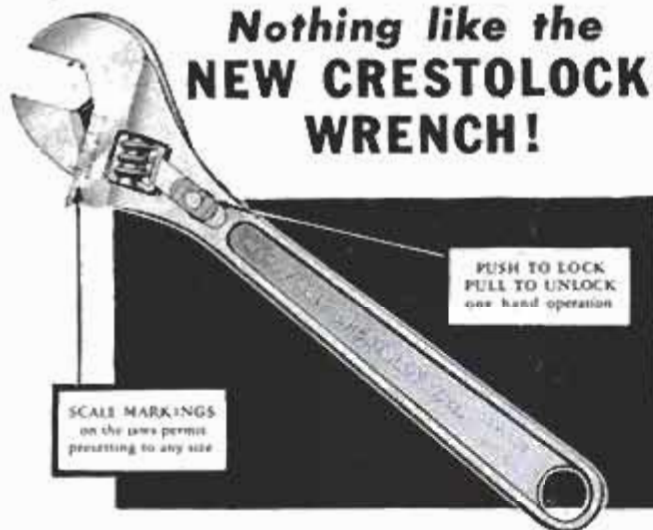
See Kodak's "The Ed Sullivan Show" (CBS-TV) and "The Adventures of Ozzie and Harriet" (ABC-TV)

Rochester 4, N.Y.

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### Dual-Pane Sash



Q—My living-room window is large, about 6 x 8 ft. The center section has single panes and does not open. The glass sweats in winter and I'd like to install double panes. Manufactured double panes are too expensive. Can't I install double panes myself, spaced about  $\frac{1}{8}$  in.?

S. P., N. H.

A—We'd hesitate to recommend the procedure you suggest. It has been carried out, of course, but is not always successful. You did not fully describe the type of sash you have and for this reason we can only assume it is of the type that will permit installation of dual panes. The success or failure of the procedure you suggest depends on establishing and maintaining an air and moistureproof seal between the panes. Either shrinkage or swelling of the sash frame may break the seal and admit air to the space between the panes. Moisture in the air will condense when the temperature varies and cloud the glass. For these reasons we are inclined to recommend that you consider installation of the readymade dual panes. While it is true that the initial cost of this installation will be considerably higher, we think that in the end you will agree it was well worth the difference.

### Leaf Problem



Q — It's time for those leaves to fall again and I'm wondering if there isn't some better way of handling them than burning. I have oak and elm leaves, a few from a crabapple tree, maple and those that come to me on the wind. It seems a waste to burn them, but what to do? I don't

have much space and when dry they accumulate into huge piles when raked.—C. M., Ill.

A—You can purchase a leaf-mulching attachment for your lawnmower, either rotary or reel-type, and reduce the leaves to a fine mulch or you can compromise by mulching part of them and burning the rest. A leaf mulch, or mound, is often used to cover rosebushes and other delicate shrubs that require protection against low temperatures. Perhaps the best procedure is to compost the leaves. This can be done on a level area by building a wire enclosure, but a better method is to dig a

(Continued to page 238)



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**how to store bulky equipment**



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(Continued from page 236)

pit 2 to 2½ ft. deep, about 3 ft. wide and 6 to 8 ft. long, the over-all size depending on the space available and the bulk of the leaves to be disposed of. In this it should be remembered that dry leaves bulk large but when wet with a hose they can be tamped into a comparatively small enclosure or pit. Rake the leaves into piles and wet thoroughly before moving to the pit or enclosure. Place a layer of wet leaves about 6 in. thick, cover with 2 in. or so of earth and sprinkle with a balanced commercial fertilizer. Add another layer of wet leaves, a thin layer of earth and sprinkle with fertilizer. Tamp each layer to compress it into as small a space as possible. Continue the same procedure until the pit or enclosure is full. Leave the top of the pile flat, or slightly depressed.



### Tools in Storage

**Q**—I have a set of hand tools, carpenter's tools, most of which are heirlooms and I need to place these in storage for 8 to 12 months. I want to protect them against damage by rust as they are in good condition. They will be packed in a wooden chest. How should I protect them?

A. N., Okla.

**A**—You do not say where the tools are to be stored, whether in your home or elsewhere. If you place them in public storage, with household furnishings, then it is likely that temperature and humidity in the storage area will be fairly closely controlled. On the other hand, if you store them in a basement, or in a home that is to be closed for a period of time, there is, of course, danger of rusting due to varying temperature and humidity levels. Most of the small tools such as chisels, pliers, screwdrivers and similar small items can be coated with oil or a light grease and wrapped in oiled paper or cellophane. Small planes such as block planes and certain rabbet planes can be protected in the same way, but the irons (cutters) and levers should be removed and wrapped separately. Handsaws should have the handles removed and the blades coated with oil or a light grease and the blades wrapped separately. You say that most of the tools are heirlooms but you did not say whether these are of the older types such as wooden planes, drawshaves, marking gauges, braces or whether the heirloom tools are of more recent manufacture having all principal parts, except the handles, of metal. If the heirloom tools are of the older types, then the metal parts should be removed, oiled and wrapped separately. All wrappings should be secured with several turns of tape.

### Incinerator Smokes

**Q**—I have a gas-fired incinerator vented to the chimney just above the vent from the boiler. The original chimney flue is tile-lined and rectangular in shape. The boiler is vented into a round tile liner placed inside the original tile flue. Both my water heater and the incinerator are vented into the original flue. When the incinerator is turned on smoke and gases are forced into the basement through the water-heater vent. What can I do to correct this?—Y. H., Wis.

**A**—You did not say how high the chimney is, whether there are trees or other buildings nearby which could cause a downdraft, or when this trouble developed. This makes it difficult for us to answer your question with any certainty we are giving you the correct information. One would think first of an obstruction, of course, but there are other possible causes. Keep the possibility of an obstruction in mind but consider other possible causes, such as a tree, or trees, nearby and higher than the chimney top, the house next door which may be higher than the chimney. These are common causes of the trouble you describe. Usually it is possible to locate and remove an obstruction by lowering a length of chain into the flue, in this case that portion of the flue used to vent the incinerator.



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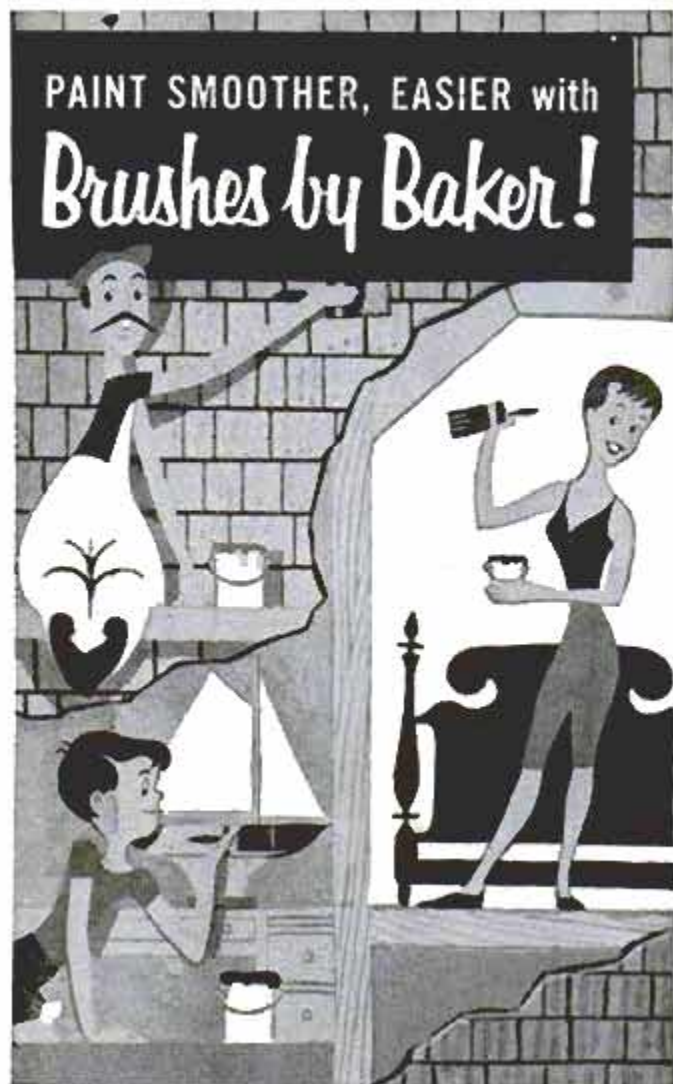
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## The California Influence

(Continued from page 130)

oriented and designed so that the outdoor areas are private and thus become visual parts of the house itself. It is a tremendous pleasure to sit in a room in which you can feel that the garden is really a part of that room. I cannot see why this pleasure should be denied people in Illinois or New York. They may not be able to go outside as often as we do in California, but this is no excuse for 'claustrophobia' houses.

"Privacy, which means high fences, is an important factor here. I realize that in some parts of the country a private yard is looked upon as an insult to the neighbors. We do not feel that way out here because everybody accepts the fact that your yard should be part of your private living area."

### Fences Stop Trespassing

Ned Eichler and others stressed the surprising fact that a private yard makes for better neighbor relations than free-flowing lawns that are always an invitation to trespassing.

The Eichlers also list the use of new materials and new building methods, more readily adapted to contemporary rather than traditional homes, as part of the California trend. Joe Eichler traces his acceptance of contemporary design to the fact that years ago he once resided in a house designed by Frank Lloyd Wright. "That house gave me the idea of what a house could be in the way of design," he says. "I'm a great fan of Wright's."

Robert Anshen, of the San Francisco architectural firm of Anshen and Allen, also gives Wright credit for early influence on what has developed into a California style.

### Spanish Influence

"We also have a strong Spanish tradition out here," he said, "which is reflected today in our private patios and courts. We all owe a lot to pioneering architects like Julia Morgan, Bernard Maybeck and Willis Polk. They hated pinched space—as do most Californians—and were among the first with open-planned interiors. In fact, they give us a good claim to developing the open plan out here. One thing is sure: The people in California like a free and elegant view of life and I think it is reflected in our houses. I also feel house architecture should be regional rather than national."

Steve Allen (not to be confused with the TV personality) pointed out that economics in the way of exorbitant land costs—tract builders have paid as high as \$50,000 an acre around San Francisco—have had

(Continued to page 242)



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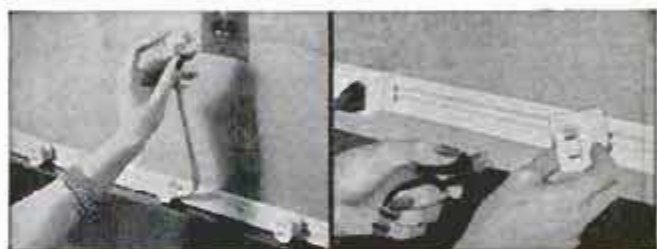
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their effect on design. "When people have to pay \$8000 or \$9000 for a lot, they like to incorporate as much of it as possible into an outdoor-living area."

David D. Bohannon, well-known builder in the Bay Area and a past president of the National Association of Home Builders, stressed this same point. "With properly planned indoor-outdoor living you can entertain a group of 100 or more in a modest home and yard. We make our yards private and use every inch of space. Inside, we keep an eye on easy maintenance with our rule that every floor plan should be a work-saver plan."

## Ranch House Very Popular

Perhaps no other style of home architecture in history has ever received the overwhelming acceptance of what is known as the "ranch house." It has been built with a million variations of design in every city, suburb, hamlet and countryside in the United States. The style has been praised and damned, but its popularity has steadily advanced. Frank Lloyd Wright has this to say about the California ranch house: "It's a style wobbling somewhere between a shanty and a medieval castle. But I think we can make something of it in time."

The man who gets credit for taking the design of the old ground-hugging Western ranch house and creating a modern counterpart that has made a nation of home builders swoon is Cliff May of Los Angeles. We traced May to his hideaway in Sullivan Canyon, one of the most beautiful residential areas on the West Coast, where he both lives and works.

## Opens up the Ranch House

"There is no doubt that the so-called ranch house that has gained such wide popularity got its start out here," he said. "This low house has a universal appeal because it suggests protection from the elements. Actually, that is the fundamental thing every homeowner is looking for. The old Western ranch houses had sprawling wings, inner courts, and wonderful cross-ventilation. What we have done is to take the old design and open it up for modern living."

Edward H. Fickett, A.I.A., winner of many design awards for his houses in the Los Angeles area, pointed out that California contemporary design has flourished because "the people who have pulled up stakes and moved out here have a pioneering spirit and are not hampered by tradition." They accepted glass walls, open planning and indoor-outdoor living as part of the California way of life. He also stressed

(Continued to page 244)





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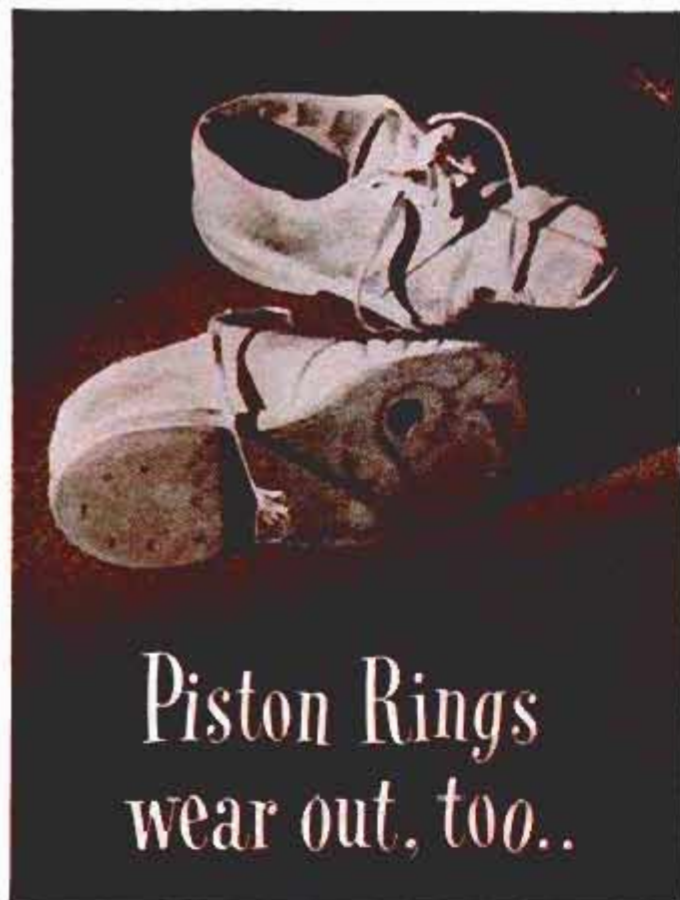
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the high cost of land as a factor in the California style and the dual use of many areas both inside and outside the house. One of the dual-use areas developed on the Coast, he says, is the popular family room that is made to serve for recreation and hobbies during the day and dining at night. Fickett believes that the open-plan interior provides both spaciousness and an impressive home.

### Nationwide Adaptability

A. Quincy Jones and Frederick E. Emmons (designers of the *PM California House*) point out that their houses, designed for outdoor as well as indoor living, are adaptable throughout the nation. "If you will compare weather records for California and many parts of the Middle West," said Jones, "you will find that the actual hours of suitable weather for outdoor living are about the same. Many forget that we have a rainy season in the winter and cold nights in the summer. There is no reason why a house in Kentucky or Illinois should not take advantage of total use of the lot area the same as we do here. A good California house is designed so the living area, both at the rear and side of the house, opens to usable outdoor space."

That is the reason California houses have so many doors; frequently each room, including bedrooms, has sliding glass doors opening on a patio.

Dan Palmer and William Krisel, also of Los Angeles but whose prize-winning houses are found throughout the state of California, are advocates of regional architecture.

"I think every area should develop its own particular style of house," said Palmer. "Some of the California ideas have been imitated too closely across the country. The one-floor house was developed out here so that every room could have access to the outdoors. This may be undesirable in many locations. In some cases it would make no more sense than our imitating houses in the South Pacific islands that are built on stilts. Above all, we should not go overboard for 'museum features' designed primarily for decoration rather than living. Every age should develop a culture of its own and the architecture should reflect it. Contemporary means 'architecture of the day.'"

Here are the regional features for which the California architects and builders take credit:

1. The one-story Western ranch-type house.

2. Open planning — a minimum of

(Continued to page 246)



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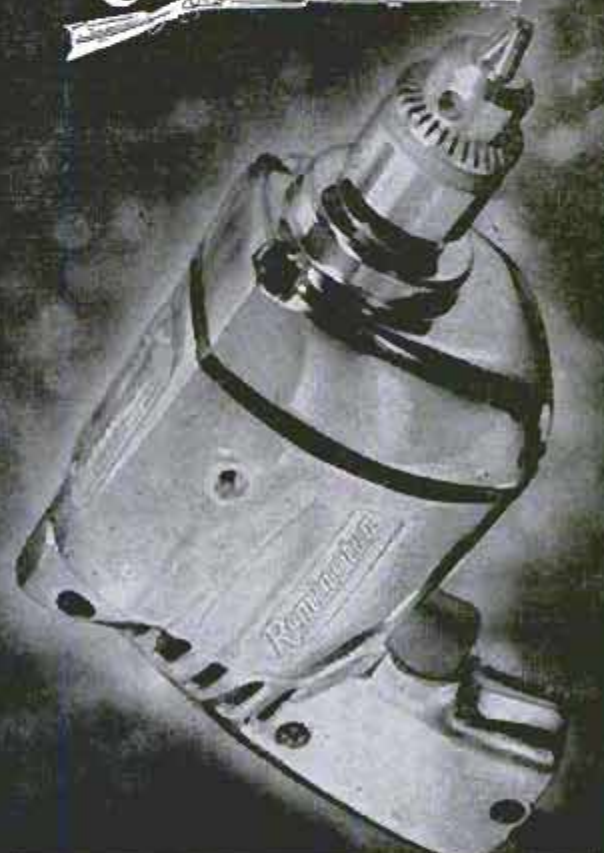
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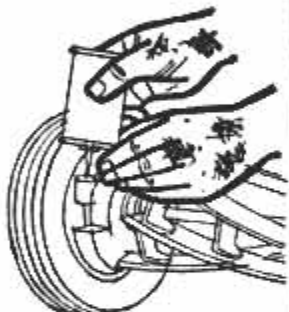
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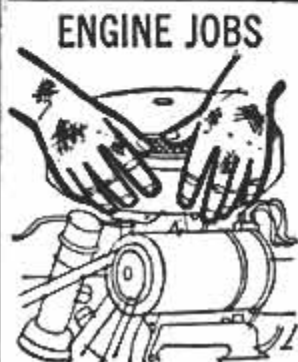
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partitions that give a small home a feeling of spaciousness. (Many give Frank Lloyd Wright credit but add that the refinement of his ideas was actually accomplished in California.)

3. Big glass areas, sliding doors and entire walls. These usually look out upon or open onto a private patio or court screened from street or neighbors.

4. Living room at rear of house. This room frequently opens on a patio or court, and large glass areas across the rear wall provide the indoor-outdoor effect.

5. No basement. The concrete-slab foundation was popularized in California for several reasons, including that fact that California foundations do not have to extend deep into the ground because there is no frost line, also as a step-saver because modern laundry equipment and furnaces have become streamlined and can be accommodated with ease elsewhere. Californians have moved the basement workshop to the garage.

6. Family room-kitchen combination. This is the result of the development of dual-purpose areas.

7. Facilities for outdoor living such as patios, courts, barbecue pits adjoining the homes. The outdoor family room for recreation, hobbies, cooking, eating and entertaining (*Popular Mechanics*, April 1958) is the last word in this line.

California architects and builders like the idea that they are pace setters in style for the nation.

"Many California-styling ideas are completely practical even in the colder sections of the country with the development of new methods of building, new materials and better heating systems," says Nels G. Severin of San Diego, president of the National Association of Home Builders. "The large glass areas which we use in our houses, opening out on gardens, are so pleasant I doubt that any family that had the opportunity to live in such a house would ever want to live any other way."

★ ★ ★

### ANSWERS TO

### BUILDING QUIZ

ON PAGE 168

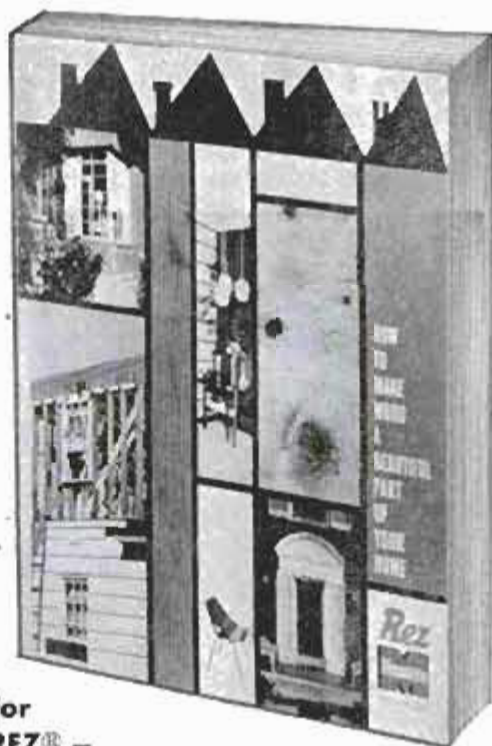
1. Butterfly roof; 2. Mansard roof; 3. Gable roof;
4. Shed roof; 5. Gambrel roof; 6. Hip roof; 7. Clerestory; 8. Furring; 9. Bridging; 10. Soffit; 11. Lintel; 12. Clapboard; 13. Plain bevel siding; 14. Rabbeted bevel siding; 15. Drop siding with ship-lap joint; 16. Board-and-batten siding; 17. Wood frame; 18. Brick veneer; 19. Flashing; 20. Truss roof.



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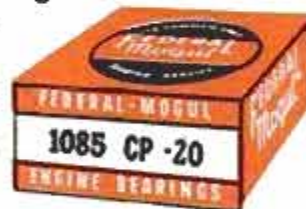
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## Introducing the PM California House

*(Continued from page 139)*

bar. Above this bar is a small folding partition that may be closed to hide a messy kitchen from guests in the dining area just beyond or in the family room. The barbecue fireplace with a round blue chimney faces the family room.

"We had another fireplace in the original plans on the living-room wall at the side of the house," says Jones, "but we left it out because we thought the barbecue fireplace in this room would suffice. However, if anyone wants a living-room fireplace it could be added easily to the plans."

### Built-in TV and Hi-Fi

On one wall of the family room is a built-in TV and hi-fi cabinet. Back of the barbecue-fireplace are storage closets and a refrigerator. This refrigerator serves as the repository for cold drinks, snacks and items of general family interest that do not necessarily have to be stored in the smaller refrigerator in the kitchen. This unit was placed outside the kitchen after a survey showed that family visits to the refrigerator in one day far surpass those of the housewife in her preparation of food.

Returning to the living room along the hall by the garden court, Jones pushes back the sliding doors to a small room in which he takes great pride.

### A "Retreat" for Parents

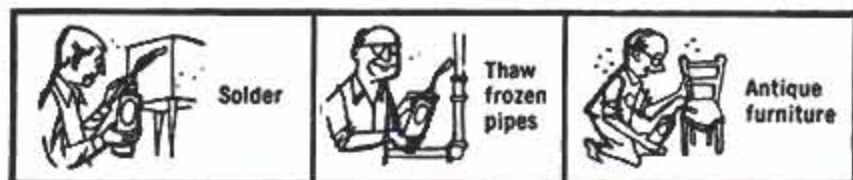
"You may call this room the den, if you like," he says, "but I like to think of it as a 'retreat.' This room may be put to many uses but I like to think of it as a place where parents can have a little privacy and relax while the children are using the family room or the older daughter is entertaining in the living room. This is a good place for that second TV set." He paused and pointed to the sliding doors ahead that open into the master bedroom. "This room can also serve as a nursery, a guest room, or as an extension of the living room for big parties."

Features of the master bedroom include a walk-in wardrobe, many built-in dressers, a dressing area with two lavatories, and a divided bath. From the bath area a door opens into a private patio.

The children's bedrooms and bath are on the opposite side of the house. Jones believes that separate bedroom areas permit more freedom and privacy for both adults and children. The children's compartmented bath houses washing machine and dryer on one wall.

*(Continued to page 250)*





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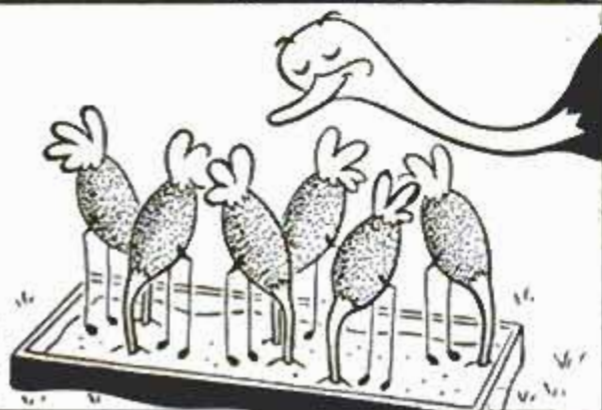
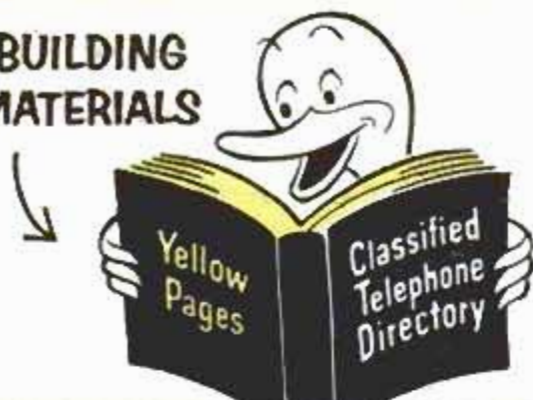
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"The laundry is most logically located in the bath where the moisture problems are already taken care of," explains Jones. "Also, a laundry in the bedroom wing is handy because 90 percent of the laundry originates there and can be handily stored near the point of use. The laundry-bath combination in this house has a direct access to the service yard outside. This area can be used for drying and airing. This outside door permits the children to come from play to a bath without tracking through the house proper. It is also handy for adult gardeners who may want to clean up before going into the living areas of the house."

### Sliding Doors Lead to Patio

Sliding doors from the children's bedrooms lead to their own patio and wading pool. Both private patios at the front of the house are protected by roof overhang, as is the terrace at the rear.

As we retrace our steps through this picturesque, colorful and livable home, the architects explain that the house will fit nicely on a 75 by 100-foot lot and that the plan is laid out on a three-foot-two-inch module. The latter is ideal for post-and-beam construction because there is a stock-size sliding steel door and steel sash that fit between the four-by-four posts.

"If you can't live in California," advises California-boosting A. Quincy Jones, "the next best thing, of course, is a California-style house." ★ ★ ★

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### Do You Know This Old-Timer?

(Answer to quiz, page 76)



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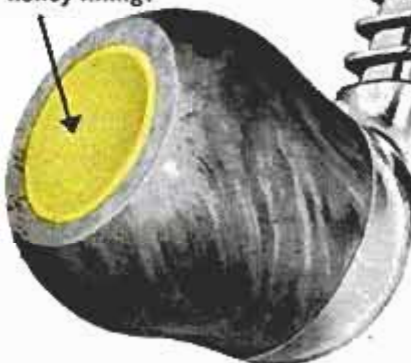
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## We're "Reading Cripples"

(Continued from page 101)

gain achieved in the course for, after all, the bad reading habits of many years cannot be cured overnight. But tests conducted six months to a year after the course indicate that the average student retains between 60 and 70 percent of his improved speed, Walker says.

Before anyone is permitted to take the course, his eyes are examined; the eyes must be in a healthy state because of the stimulation they receive during the course.

The course begins with a photographic diagnosis of the eyes while reading. An eye-motion camera, called an ophthalmograph, records bad reading habits on a strip of film. The film shows, for instance, the number of fixations or stops made by the eyes while reading. It shows, too, the number of regressions or backtrackings of the eyes to reread words or phrases.

At the end of the course, another motion picture is taken to see what improvement has been achieved. In my own case, I had 85 fixations and 20 regressions at the beginning while reading a piece of test material. At the end, my fixations had been reduced to 48, my regressions to two.

### Technique Developed in Wartime

The eye-motion camera must be operated by the instructor. Each member of the class, however, gets to run his own tachistoscope and reading pacer. The experience of my class, I think, was typical. We found the "T-scope" the most mystifying, most difficult instrument to get used to. The numbers we flashed on the little screen in our cubicle were visible for such a short time, a mere  $\frac{1}{100}$  second, that we could not be sure if we actually saw them or were just dreaming. We would write them down on a piece of paper, take the slide out to compare, and then whistle in surprise when we saw we had them right.

After we finally mastered the five-digit numbers, we found fresh problems with six-digit and then seven-digit numbers, and finally two-word and three-word phrases.

The T-scope technique was worked out during the last world war by Dr. Samuel Renshaw of Ohio State University to train our airmen in flash recognition of enemy aircraft.

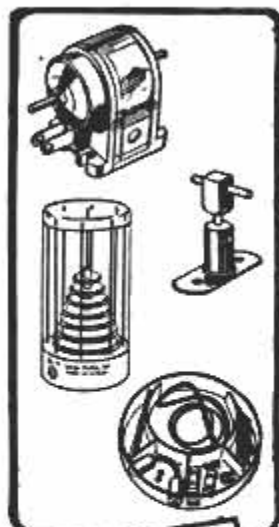
The purpose of the T-scope, as Walker describes it, is to work on one's skill of perceiving in larger units.

"It is used," he explains "to develop a larger span of recognition, to break into

(Continued to page 276)



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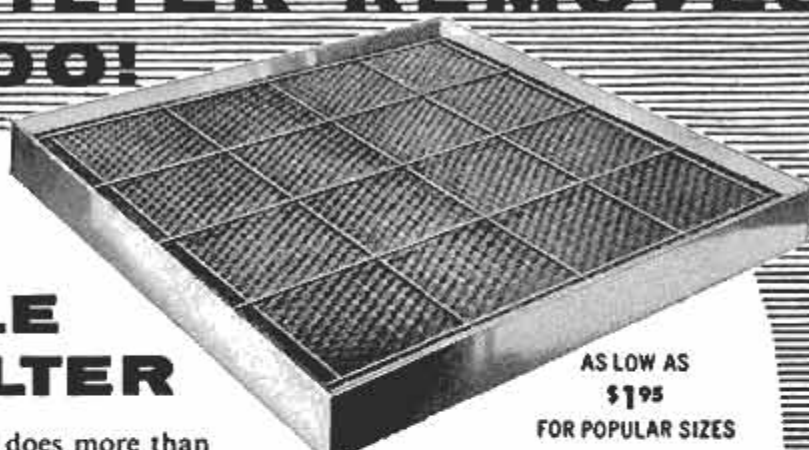


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### Operation "Smoke Puff"

(Continued from page 115)

Now, suppose a submarine at sea is trying to establish radio contact with the home base. It fires a small rocket that pops a potassium cloud pointing to the base. The sub's radio beams its microwave signal at the cloud, and the reflected and narrowly channeled waves are received only in the immediate vicinity of the home base.

Since the enemy radio-monitoring stations don't know where the ion cloud is, and in which direction it points, the sub can talk with its base without fear of being overheard.

A similar trick would work with guiding long-range missiles. At the moment, the microwave guidance is limited by the earth's curvature. But with an ion-potassium cloud placed in a certain spot ahead of the missile's course, the "bird" could be coached by a radio beam all the way to the target. And the enemy radio-jamming stations, unable to detect the narrow beam, would not be able to confuse the missile's electronic brain.

#### Could Also Camouflage

An interesting offshoot of the Smoke Puff ionosphere would be its shielding property. We are already grooming a radar-reconnaissance artificial satellite, and chances are the Russians are doing it, too. But since radar works on very high frequency radiowaves, those waves could be reflected by a large Smoke Puff cloud placed over a military target or a city. The result: The sputnik's radar eye could not see through the ion camouflage.

At the moment, the Smoke Puff cloud can be ionized only during daylight hours. However, Dr. Marmo is planning an improved version that would work equally well at night. From the military point of view, that nocturnal manmade ionosphere might have a drawback—it would emit a glow. This would be a dead giveaway. But for peacetime application, the glow of a large and longer-lasting ion cloud could be used to illuminate a city better than the street lamps.

And to the FM enthusiasts and the ever-growing number of TV viewers, Dr. Marmo's ion cloud would be a boon. Strategically placed ion clouds could easily cover the entire country, eliminating the eye-and-ear strain of fringe areas.

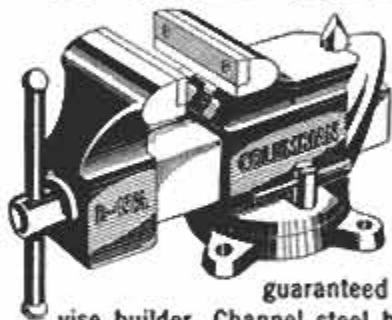
Naturally, the rockets are expensive, but mass production and improved methods would, in time, bring the cost down. And as for the potassium, Dr. Marmo says it costs no more than ordinary, run-of-the-mill baking flour. ★★★





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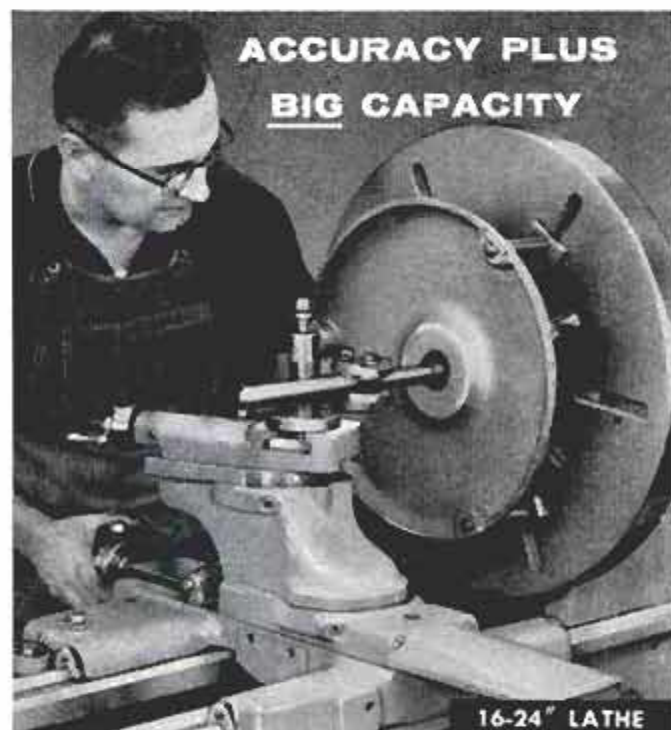
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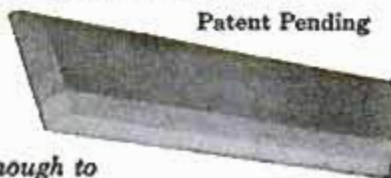
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## The Case for the Traditional House

(Continued from page 140)

people feel at home. This has always been true. In early colonial days, the settlers made every effort to reproduce the architecture of the homes in the countries from which they came. They built crude English cottages and Tudor-style homes. Why? Because the house made them feel more at home, a vital factor in their spiritual well-being. Imitating the traditional architecture of the old country gave the settlers a feeling of security.

Americans today are not faced with the problems of living in a strange and hostile land, but there remains a certain nostalgia when it comes to planning a home. This



"A good traditional house should retain fine details  
of the days when houses were built with loving care"

nostalgia is concerned with architectural details of the past. However, the person with traditional tastes does not want an old-fashioned kitchen with a fireplace big enough to cook in, nor is he ready to abandon inside plumbing. This is the impression that some all-out contemporary architects like to give of the people who favor traditional architecture. What these people are really seeking is traditional facades and traditional details in their homes. It is our belief that if all traditional houses were destroyed and replaced by contemporary houses, a great mass of people would not feel at home. Homes of traditional design have their largest stronghold on the East Coast where the people are more conscious of tradition and less transient.



In the old days, you could look at a floor plan and tell almost exactly what the exterior of a house would look like. In traditional architecture, form does not necessarily have to follow function. If the facade of a colonial building called for a window to be located in a certain position, for symmetry, the window was so located even if it opened into a closet or beneath a stairs. Windows in contemporary buildings are placed only where they will benefit the interior with light and ventilation.

Fortunately, for the lovers of the traditional, the good architectural detail of



**"What some home buyers are really seeking is traditional facades and traditional details in their houses"**

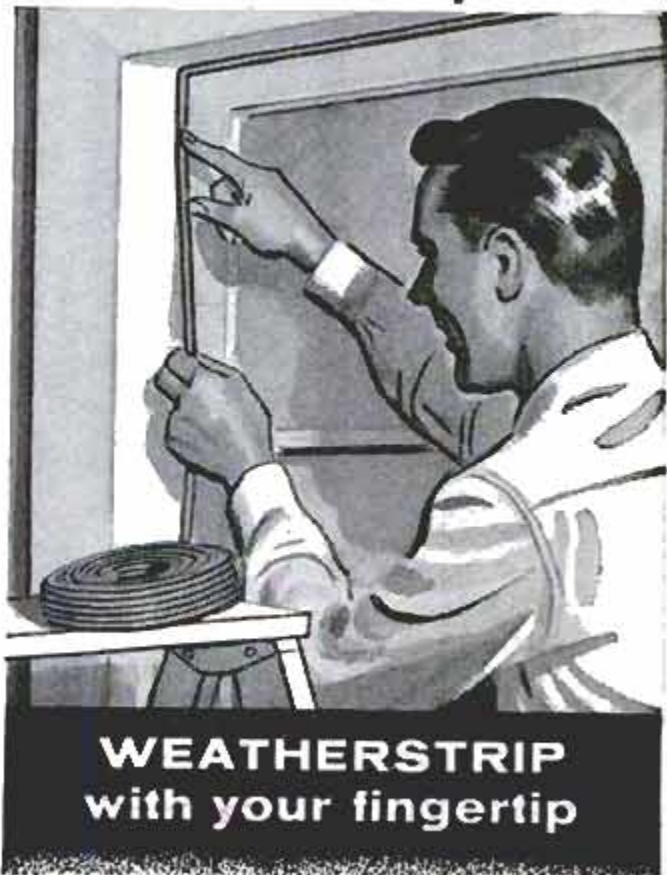
traditional design can be combined with a functional floor plan. When people think of a traditional house their minds turn to such details as shutters, window boxes, brackets, diamond-shaped window panes, mantels. Few of these details, of course, are functional today.

What is a home, anyway? It is a place that provides shelter, security and delight. If the latter comes from a love of traditional style, that is what the family should have. If they prefer modern—and their tastes and manner of living indicate a prescription for modern—it would be a mistake not to advise them accordingly.

Much of our architecture is a composite of many lands. For example, the New Orleans houses with their lacy iron grillwork are a combination of French and Spanish influence. The original building was French and the grillwork was the Spanish contribution. The good traditional

(Continued to page 258)

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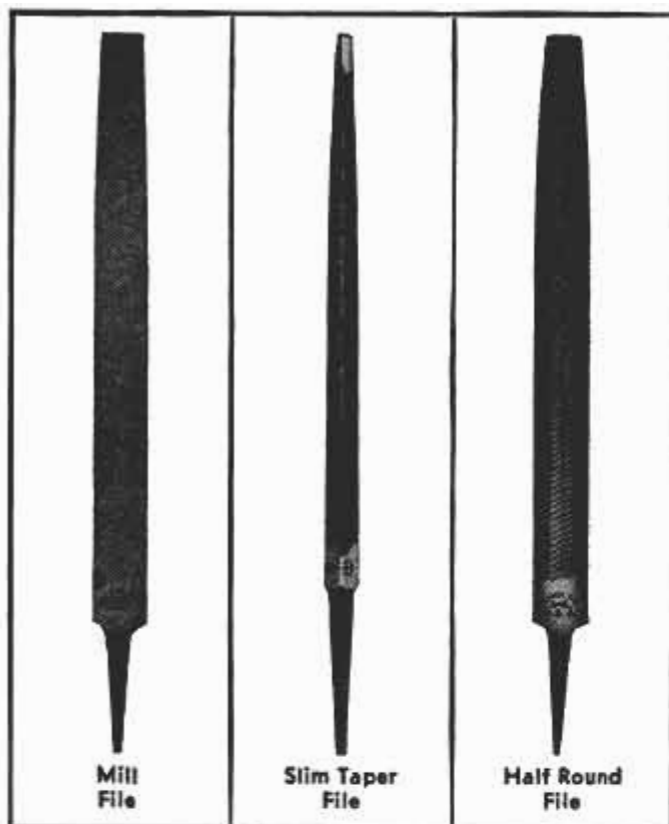
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house of today should reflect portions of houses built in the past—whether the style be New Orleans, Cape Cod, Southern Colonial or Georgian. A good traditional house should retain the fine details of the days when houses were built with loving care. For economic reasons, many traditional details have been omitted or neglected in recent years. We don't think the traditional house of today has to follow the old floor plans. Symmetry was a must in colonial homes, partly due to the limitations of construction techniques. For example, all the walls had to be load-bearing. Today we have steel beams, concrete, better brick and mortar, good nails, while in the old days they had to depend on local materials such as hand-hewn lumber, stone and rubble, wood pegs. Actually, glass and solder were about the only materials they imported for the building of homes.

Although we do not have to hold to the floor plans in today's traditional homes, we should conform with the general lines of the house facade and such details as the frieze, entrance and pediments, shutters and window treatment. For example, we should not use a big picture window in the facade of a traditional house. Incidentally, the popular front picture window of the 1940s is already losing favor with the best modern architects who sensibly prefer to use such windows at the back of a house.

We feel that certain liberties can be taken with traditional style provided they are in good taste and reflect the flavor of the rest of the architecture. We see no reason we cannot use a sliding glass door if it is handled so that it will conform with the other openings. Also, there is no reason for not using an overhead garage door along with traditional design as well as other improvements that include central heating, electric lights, cylinder locks and air conditioning.

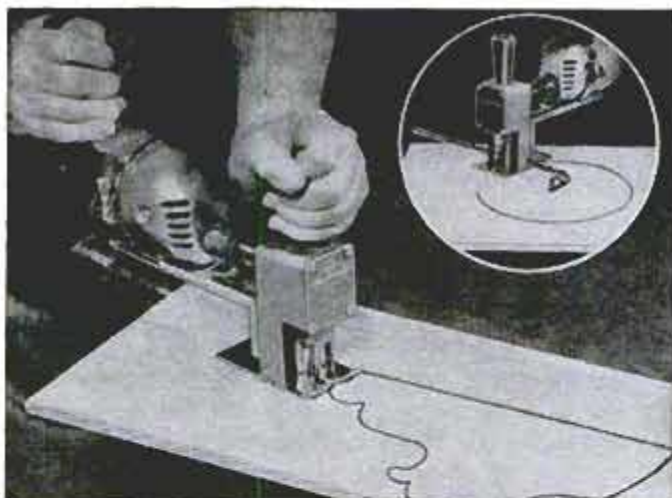
Recently, a client came to us with a request for a home of Early American design incorporating a split-level plan. We agreed to try it and it worked out fine, proving again that traditional elements can be adapted to conform with current trends in planning. Our client is delighted with his home which has a genuine Early American flavor.

We feel strongly that the design of homes right now is at a "fork in the road". Since World War II, this road has been a three-lane highway composed of three basic trends: (1) The so-called one-story ranch-style house of the 1940s, (2) The severe modern with its informal open planning and big glass areas and (3) The modified traditional.

The ranch house now appears to have

(Continued to page 260)





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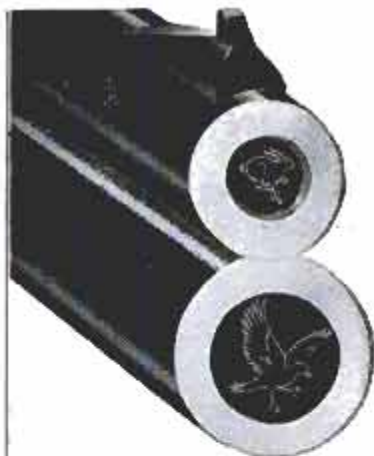
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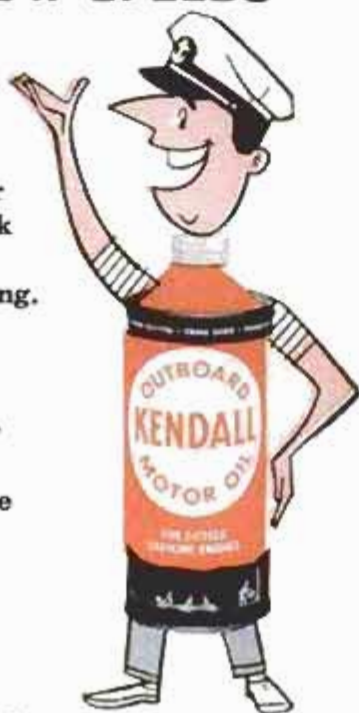
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been something of a cliché that is fading fast. We feel that the so-called ranch house suffered from rapid postwar building and there were too few trained architects to give the homes the individual attention a house should have. At the present time we detect a great urge for individualism in home styling. Our prediction is that future development in home design will be along two clear-cut trends: The severe modern and the modified traditional.

Contemporary, or severe modern, architects have a tendency to rule out everything traditional. They will not admit there is any value at all in the elements of traditional design. These architects, in effect, indicate that millions of Americans do not know what they are supposed to really like. We answer this with a question: Do we all have to pretend we like modern art and be-bop just because an influential minority likes these things? Isn't it conceivable that the Four Freedoms should be extended to include the right to individual taste? ★ ★ ★



## Slip-on Lid Changes Drum Into Waste Receptacle

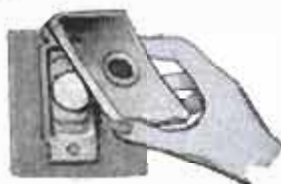
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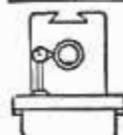
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## There's Treasure in Africa's Bank

(Continued from page 122)

mining circles that the gold mines, some of them more than 60 years old, would die one by one, leading ultimately to a great wave of depression. These fears appear to be without foundation, for as one mine is worked out and closed down, another new mining venture takes its place. After World War II, nine new mines were built in the Orange Free State.

In all mining operations there is a certain amount of uncertainty and an element of risk, and so it was with the new gold mines. While sinking the shafts, friable and fissured ground was encountered and sometimes water under terrific pressure would burst into the shafts at a rate of tens of thousands of gallons per hour. Diamond drills were subsequently used to penetrate in advance of shaft-sinking. As soon as water was struck, cement was injected at high pressure into the fissures to seal them.

### Salty Water Is Problem

By the end of 1957, millions of gallons of salty water had been pumped to the surface. Although the whole of the Orange Free State province suffers from a perpetual water shortage, both mines and the farming community were unable to make use of it because of its brackishness. It could not be pumped into the few existing rivers either, and means of disposing of it created a major problem. As natural evaporation can dispose of only about 4000 gallons per acre per day, some of the mines resorted to sprinkler systems to increase the evaporation process. Large evaporation dams dot the scene, but the solution as to what to do with the water lay in desalting it. Experiments were conducted on a huge scale until a satisfactory process was discovered. This process depends on the use of electric current which causes mineral impurities in the water to pass through so-called ion-selective membranes. These form the walls of cells through which the brackish water is pumped, thus reducing its mineral content. At present the world's first large-scale electrolysis desalting plant is under construction at a cost of \$1,080,000.

South Africa is, of course, not the only country in Africa which mines gold. Ghana, Southern Rhodesia, the Belgian Congo and Tanganyika are all producers of the yellow metal. But it is in the Union of South Africa that the supply of gold seems almost inexhaustible, so with its gold and uranium sources, it has little to fear for its future, which promises to be as prosperous as its past. ★ ★ ★



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## The Case for the Contemporary House

(Continued from page 141)

pattern. The mechanical clothes dryer occupies little space and allows drying to be done independently of the weather. These two compact pieces of equipment, along with the newer compact heating systems, have done much to lessen the need or demand for a basement in a house. Lack of servants is also one of the factors tending to make our way of life more informal. Buffet dinners are common. This type of entertaining makes differences in the design requirements for a house.

The increasing use of the automobile is another major factor which has changed our way of life. The most traveled entrance



In the design of a contemporary house, the indoor and outdoor-living areas may complement each other

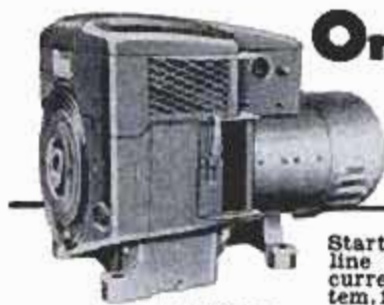
to the house will be the one most closely related to the driveway and garage. A contemporary plan takes this into consideration and arranges the house and garage placement so that there is proper traffic control.

Modern food-preparation techniques affect our kitchen design. More space is required for newer appliances which are being developed from day to day. No homemaker today would accept the kitchen as constructed at the turn of the century, with its basic sink and cookstove or range plus an icebox on the back porch. Today's house may have, in addition to the modern counterparts of this older equipment, a dishwasher, a freezer, a garbage grinder, a ventilating unit, perhaps even an electronic oven. This equipment is designed to fit with today's pattern of living.

In the contemporary house, the plan adjusts to the need, and the designer has complete freedom to devise the best plan for living—he is not bound by tradition to follow a pattern established years ago. Is an area needed for entertaining large

(Continued to page 266)





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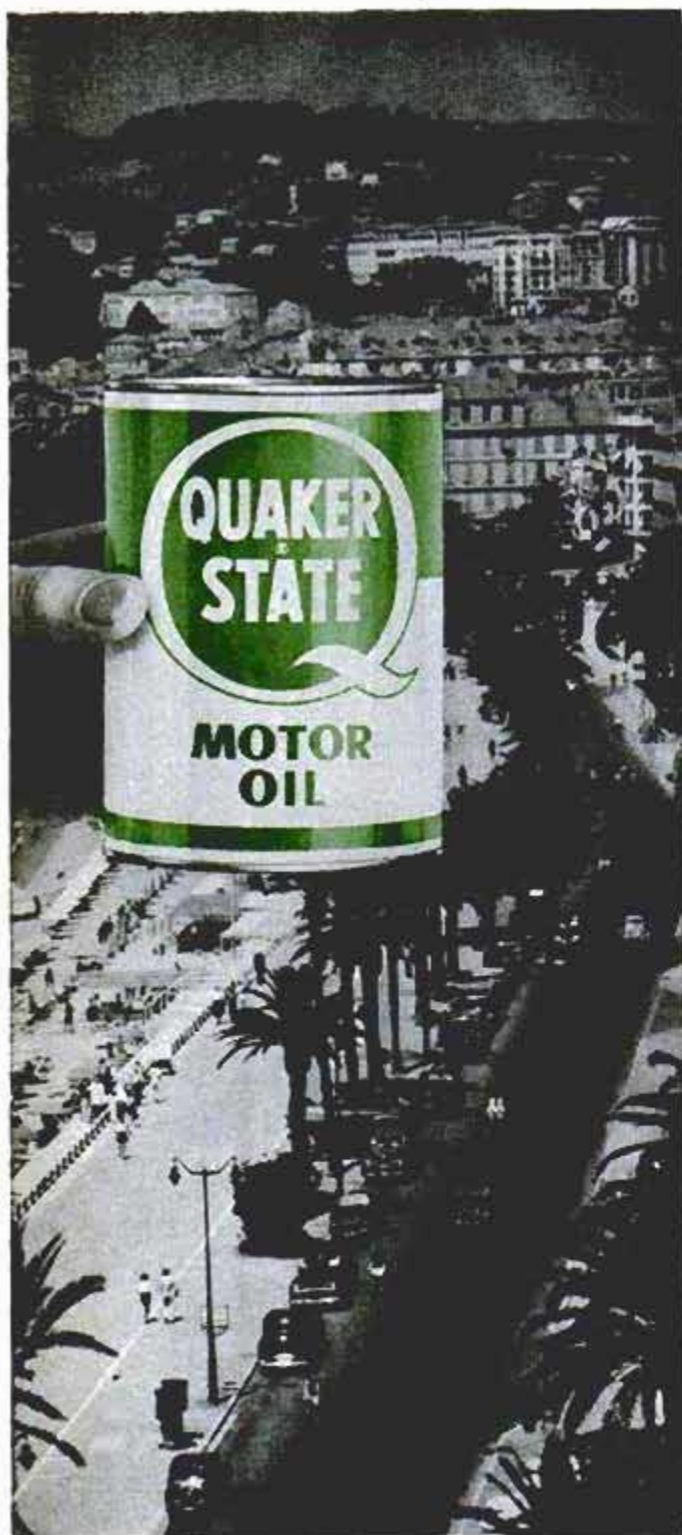


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groups of people? An open plan allowing the possibility of joining the living, dining and family-room areas as a unit can solve this problem.

Is a large room for family activities desirable? The contemporary house can provide it.

Obviously when houses can be designed to meet the many special conditions of living in today's world, the result is not going to be a uniform, stereotyped product. The house may be one level or several levels; it may have a flat or sloping roof; it may or may not have a basement; it may be finished in brick, stone or wood.

Good architecture grows from inside out; changes in our mode of living are reflected in our house plans, and are in turn reflected in the exterior appearance of the house. Although there is no set pattern for the contemporary house, there are a number of unifying characteristics. The contemporary house may not always put its best face forward. Very often the contemporary house is a "turned around" house. The garage and some of the utility rooms may be located at the front of the house while the living areas face the private garden to the rear of the lot. Such an arrangement leads to a closer relationship between the interior spaces of the house and the outdoor-living space.

More and better-planned outdoor-living space is a second characteristic of the contemporary house. Houses are planned so that indoor and outdoor-living spaces may complement each other. Porches, terraces and walled or fenced gardens form an extension of the space within the house. This leads us to a third characteristic. In the good contemporary house, the house and lot are treated as a whole; the house and lot together form a unit rather than two separate entities. Some architects prefer to anchor the house closely to the ground to give the feeling that the house grew in its site; others suspend the structure delicately above the terrain allowing the line of ground to flow without interruption under and around the house. Whatever the design, it is characteristic that the contemporary house is designed in connection with the surroundings.

The contemporary house is also characterized by much larger glass areas than were common in houses following the traditional pattern. This reflects technical developments in the glass industry as well as a general trend in design. Large pieces of glass are now manufactured at a relatively small cost when compared to the prices of a half century ago. Techniques have also made it possible for the manufacturer

(Continued to page 268)



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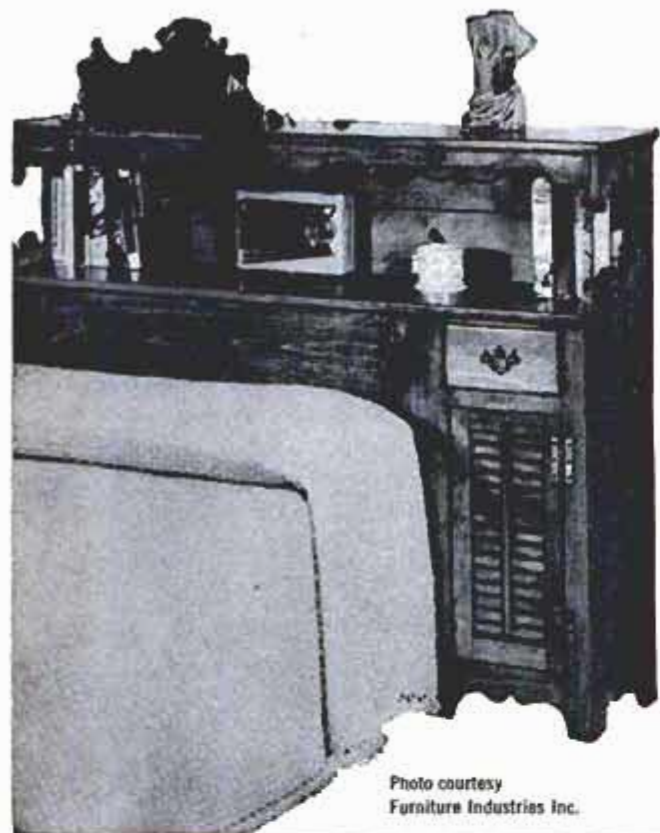


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**Idaho White Pine • Ponderosa Pine • Sugar Pine  
 White Fir • Incense Cedar • Douglas Fir • Larch  
 Red Cedar • Lodgepole Pine • Engelmann Spruce**

Today's Western Pine Tree Farming Guarantees Lumber Tomorrow

pull the trigger...

## spray paint

7 times faster than brushing!



**Speedy Sprayer** ONLY \$32.00 less motor

Paints anything from a house to a toy. Saves its cost on the first major job! Speedy Sprayer does in minutes what brushing takes hours. Finish is smooth, flawless. Uses any 1/4 h.p. motor with 1/2" shaft. No. 780 Outfit—10 ft. air hose, tire chuck, quart gun, less motor, only \$32.00. Every workshop should have it. At leading stores.

Free! Write for "How To Spray" Booklet and folder.

### W. R. BROWN CORPORATION

Specialists in Portable Paint Sprayers for Over 37 Years  
 2635 N. NORMANDY AVENUE, CHICAGO 35, ILL.

**HANG FIXTURES SECURELY... USE MOLLY Screw Anchors and JACK NUTS**  
 PERFECT FASTENERS to hold anything on walls, floors, ceilings

With Molly you can install fixtures exactly where you want... not just where studs are. Won't pull through. Spider backing reinforces area in which used. Fixtures can be removed and replaced in same anchor. Easy to install without disfiguring wall. Inexpensive, guaranteed. Ask your hardware dealer for genuine Molly the name is stamped on the cap.

**New JACK NUTS HOLD IN HOLLOW-CORE FLUSH DOORS**  
 Now you can fasten fixtures securely to flush doors! Jack Nuts need only 1/8" expansion space, grip any material up to 1/2" thick.

SEND \$1.00 FOR SAMPLE BOX OF 12

EXPANDS BEHIND WALL  
**MOLLY** Corp. • 200 N. 5th St. • Reading, Pa.

Enclosed is \$1.00 for sample box of (check one)  Mollys  Jack Nuts

NAME \_\_\_\_\_  
 ADDRESS \_\_\_\_\_  
 CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_



to produce double glazing which aids in reducing the amount of heat loss which occurs through the window. Other additives have been placed in glass to reduce glare, cut down heat transmission and the like. These new developments have given us a wider palette of materials for glazing our houses and with comparative cost reductions have made it possible for us to use more glass where we wished.

### Use Glass Extensively

Why is more glass desirable in the home? A number of influencing factors may be cited. For example, the use of large glass areas helps extend the inner space in the house and also allows a visual joining of the interior spaces with the gardens outside. This creates a feeling of openness between the interior and exterior which is very pleasant indeed. Large glass areas are also useful when a view is to be admired and to obtain ample natural light. Studies have shown that a considerable amount of heat may be gained during the winter months if large glass areas are faced to the south. Often when it is quite cold yet sunny outside, a house with a large glass area facing the south will not require any additional heat during the period when the sun is shining.

The use of large glass areas has not been

entirely successful. The fad of the "picture window" is slowly drawing to a close, but for a number of years this window was placed in the house without regard to whether it framed a picture of a view or a garden outside or, as in the majority of cases, it simply made public the activities being carried on in the house. Indiscriminate use of glass has also caused problems with excessive heat gain in the summer where the glass is not placed with due respect to the orientation and shading of the house.

### Simplicity Is Keynote

In general, the exterior of the contemporary house reflects the arrangement of the interior of the house and the activities carried on therein. Window sizes are not uniform—larger windows usually appear in the living-dining areas with relatively smaller windows in the bedroom section of the house. Doors are not placed with a view to symmetry but in the locations in which they will serve best. Exterior materials are selected with regard to ease of maintenance and simplicity of installation; the general effect is one of simplicity.

The interior of the house also reflects the "in-tune-with-the-times" thinking of the designer. The contemporary house does not

(Continued to page 270)

## Compare its low price with any other leading import!

Thanks to its compact size, this lively car is fun to drive, frugal of fuel. Yet there's plenty of room inside for four people. Easy service everywhere. For further information and name of nearest

dealer, write: Imported Car Sales, Ford Motor Company, 34 Exchange Place, Jersey City 2, N. J.

Made in England for Ford Motor Co., Dearborn, Michigan, and sold and serviced in the U. S. by its selected dealers.





## SAVE 1/2! Protect Your Doorways

from winter rain, sleet, snow, PRE-FAB lifetime

## Aluminum DOOR CANOPY

Order direct from factory. Save retail profit. Beautiful 2-tone pressure-coat finish. — can't crack, chip or peel.

Model	Proj.	Door	Width	Price
3748	37"	32"	48"	\$22.75
3760	37"	32"	60"	\$27.95
4748	47"	36"	48"	\$28.95
4760	47"	36"	60"	\$30.40

Sh. Wt. App. 9 lbs. PRICES DO NOT INCLUDE DELUXE FEATURES\*

Green or Terra Cotta with white feature stripes, or solid color. Send \$5 deposit. Shipped COD plus Xpress chg. or Send full amt. We ship Xpress prepaid. Specify model and color.

**PRE-FAB SPECIALTY CO.** \* SHOWN: Deluxe model with extruded rain gutter & ornamentation. 1092 Livingston, Columbus 15, O. tal scrolls, 88 extra, any model Ohio residents include 3% sales tax Window awnings to match. Write for prices.



FROM  
**\$22.75**

with instructions for easy assembly and installation

## POWER HACKSAW \$59.85



Send for full details and name of nearest dealer.

**EXCEL MACHINE TOOLS**

LESS MOTOR  
F.O.B. Benton Harbor

\* Rugged cast iron construction. Wt. 56 lbs., bronze bearings. Draw cut. Auto return lift. Auto. shut-off. Vise swivels 45°. Cap. 4"x4".

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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.**

## ON WINTER ROADS...

HE WHO NEVER HESITATES  
IS NEVER LOST  
DRIVE ASSUREDLY WITH  
**HULL AUTO COMPASS**

At your dealer's or write for literature. \$5.50 and \$6.95



**HULL MFG. CO. P.O. Box 246-D-10, Warren, Ohio**

## VENCO ELECTRIC TRUCK WINCH

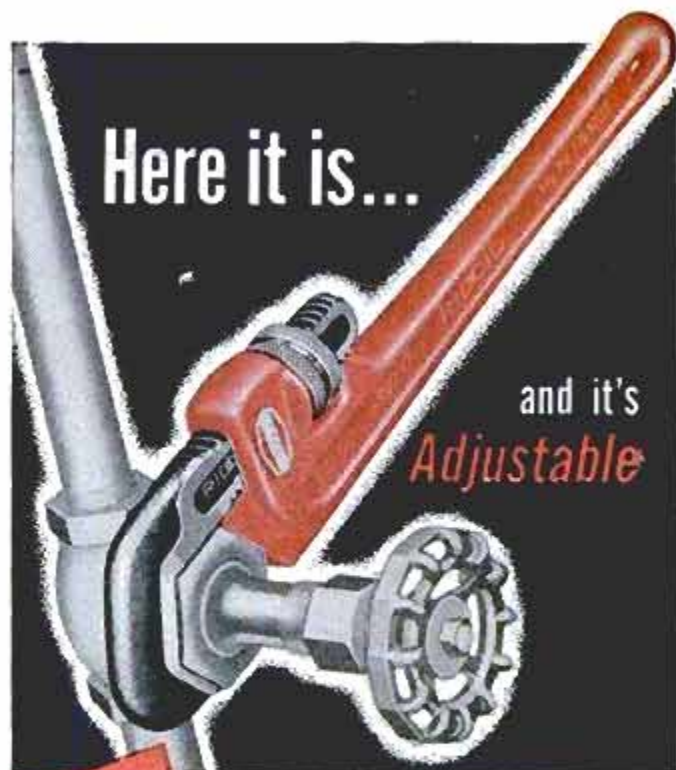


**Heavy duty.**  
For many uses —  
farmers,  
sportsmen, contractors

Easily installed, no power take-off, no drive lines. Front or rear cab mount. Complete with dash panel switch, cable, wire rope and hook. Reversible motor with automatic brake. 3000 lbs. cap. Low price—no costly installation.

Send for catalog and nearest dealer.

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LOS ANGELES 39, CALIF.



Here it is...

and it's  
*Adjustable*

New

Pat. Applied For

## RIGGID Hex Wrench

gives you Time-Saving, Positive, 4-Sided Grip on Hex Nuts, Square Nuts, Valve Packing Nuts, Unions, Gas Cocks

Here's the adjustable wrench you've always needed for hexes, squares and flatheads. Ideal for toy, mower, tractor and implement, car and home repairs. No more barked knuckles or rounded nut shoulders. New wide-open jaw goes on easy... won't slip off. 4-sided grip gives extra leverage.

Famous RIGGID heavy-duty construction with guaranteed housing. Narrow jaw design makes work easy in tight places. Comfort grip I-beam handle has handy hang-up-hole.

### Most Wrench For Your Money!

The new RIGGID Hex Wrench gives you more for your money than wrenches costing twice as much. See, try and buy it at your Hardware Dealer's.



Available in 3 Sizes

3/8" to 3/4", 3/8" to 1 1/4" and 1" to 2".

The Ridge Tool Company • Elyria, Ohio, U.S.A.



# FIVE FEET OUT

but the **LUFKIN**  
doesn't buckle



3/4" Super Mezurall®

**Here's how professionals** rate a steel tape rule. They make this buckling test before they buy . . . and so should you.

Do it, and you'll join the "pros" who insist on Lufkin quality—yet you'll pay no more for it. Because Lufkin is *the* quality tape rule at a popular price.

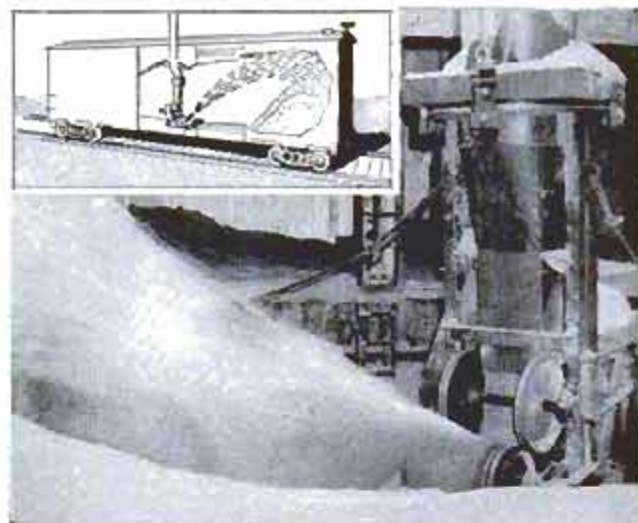
You'll find dozens of uses for it in your house and workshop. Look for the yellow and green box at your hardware store.

THE **LUFKIN**  
RULE COMPANY  
TAPES • RULES • PRECISION TOOLS

have large areas of complicated moldings and special ornamentation which serve only to catch dust. Rather the surfaces are clean and simple and a maximum effort is made to make the maintenance of the house an easy problem.

Even the most ardent supporter of traditional-home architecture will not accept the idea of living in a truly traditional house; that is, he will not accept the heating system, the plumbing facilities and the mechanical equipment that were used at the time of the development of the traditional design. This essentially means that this individual wishes to have a house that is contemporary in its planning, arrangement and conveniences but is covered with a traditional icing. This, of course, is perfectly possible, but the same person who demands this type of house would not likely approach his automobile dealer with the specification that he would like to have a 1920 body placed on the 1959 chassis that he had just purchased. Why then should we continue building houses that are out of date as they are completed?

Fundamentally, the key to the value of the contemporary house lies in the fact that it is built for today's living pattern using today's best materials and most advanced construction methods. ★ ★ ★



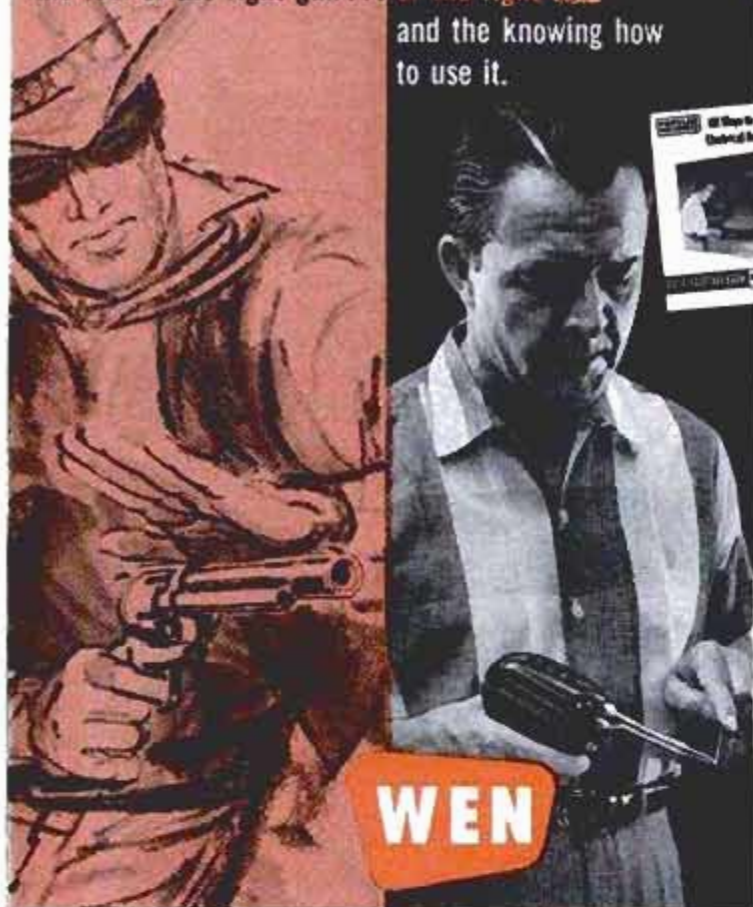
### Loader Sprays Sugar

Sugar is sprayed into ships' holds and boxcars by a new loading machine. The machine, using centrifugal force to spray the sugar, can be aimed so all areas of the carrier are filled evenly and quickly. It can also be used to handle other free-flowing bulk materials such as salt, grain, feed, fertilizer and sand.

☐ Tablets containing the basic ingredients of cream may soon be served at coffeetime along with sugar cubes.



There is nothing like the feel of the right gun... **or the right tool** and the knowing how to use it.



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Especially prepared by the Editors of POPULAR MECHANICS, this book "shows" you all the simple tricks of how to get the most out of your power tools... A 50¢ value, simply send this coupon plus 25¢ in Coin only (no stamps, checks, M.O.'s) to:

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Department Number 21

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**THE RIGHT POWER SAW**  
—Cuts 2x4's in seconds—cuts ½" steel. Does work of rip, jig, cross cut, scroll, coping, hack, band, keyhole saw. Cuts any shape; straight lines, curves, circles, designs. Makes own starting hole. Saw Kit with saw, rip guide, circle cutting attachment, metal carry-box, 5 blades \$32.95.



\$9.95

**THE RIGHT ELECTRONIC SOLDERING GUNS**—Ideal for practically all home soldering jobs. Working hot in 2½ to 5 seconds. Long reach, long life tips. Automatic spotlight. Sturdy plastic housings, all perfectly balanced. 6 models—leather-light 100 watt to 250 watt heavy duty. Other guns and kits \$5.95 to \$15.95.



\$29.95

**THE RIGHT 2-SPEED, ½" POWER DRILL**—Changes from 1000 to 3000 r.p.m.—change is quick, positive. AC/DC motor delivers maximum torque under load. 35 piece Accessory and Toler Kit \$9.95.



\$13.95 to \$19.95

**THE RIGHT SANDER-POLISHERS and KITS**—Sand, polish any surface—wood, metal, paint, plaster. Gives scratch-free surface. 3 types—fine finishing, general utility, heavy duty.

## 16" DIRT DEMON

*The Kind of Brush Every Home Needs and the Best of its kind you can Buy!*

THE DOUBLE DUTY SWEEP THAT

*Bull Doges*

BOTH LIGHT DUST AND HEAVY WET DIRT

Has center row of Tampico fibers for bulldozing light dirt and fine dust. Outside rows are heavy, durable Palmyra fibers for heavy dirt, wet or dry. Rubber gasket at handle base prevents twisting. Lightens work! Does the job better! Best sweep value of its kind on the market!

MODEL 700 ... \$3.45

Available at Hardware Auto Specialty & Dept. Stores. If dealer cannot supply, send check or M. O. to factory. We pay shipping cost.



LAITNER BRUSH CO.

2000 Brooklyn Ave., Detroit 26, Mich.



NOW YOU CAN SEAL AND FINISH WOOD IN A MATTER OF HOURS WITH ...

## BEHR-LAC

(Clear Gloss or Satin Finish)

- DRIES MIRROR SMOOTH, FAST
- PROTECTS WOOD FROM ALCOHOL, STAINS & ABUSE
- RESIN-FREE (100% OIL BASE)



For a professional looking job, here is an interior finish that is terrific for protecting and beautifying furniture, paneling, cabinets, etc. Brushes on beautifully. Dries fast, but not so fast that you can't brush out missed areas. Choice of 2 finishes: specify Clear Gloss or dull Satin Finish. Pint \$1.25, Qt. \$2.10, Gal. \$6.60. Ask for Behr-Lac at your dealer or order direct. We pay postage. Free literature on request.

LINSEED OIL PRODUCTS CORP., 1614 Talbert Ave., Santa Ana, Calif.



## Stereo Music at Low Cost

(Continued from page 232)

stereo, the switch is opened so that each amplifier receives only the signal from one cartridge element.

### Avoid "Hot" Chassis

Most modern radios as well as some TV receivers are of the a.c.-d.c. variety. These, if not properly isolated, could present a serious shock hazard (See "Make Your TV Set Safe!" *Popular Mechanics*, Nov. 1957). Where such sets are used as the second channel for stereo, they should first be carefully investigated.

Normally, manufacturers are very particular in providing sufficient line-voltage isolation to eliminate such dangers, but some hazardous sets are in daily use. A qualified service technician can quickly determine if a particular set is safe, and any system incorporating one or more electronic components without power transformers should be "safety inspected" before being used.

### Speaker Placement

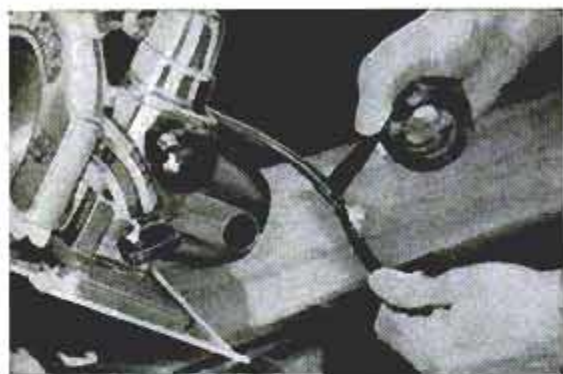
Speaker placement for stereo perception has been the subject of much discussion. Despite recommendations regarding

"phantom" speakers, third channels and a fearful list of prohibitions which suggest that no room is really ideal for stereo without much interior redecorating, good results are really quite easy to obtain.

Fig. 3 shows one possible arrangement where the two speakers are placed flat against the wall. Other arrangements, such as two corner speakers or one corner speaker and one "against the wall" baffle are also suitable. The important consideration is the placement of the two speakers so that their sound waves intersect the preferred-listening area at an angle of approximately 30 to 45 deg. This is the position which retains some unity of sound between the two halves of the orchestra, while preserving the directional effects that lend "life" and perspective to the real performance. Actually, the area for satisfactory stereo, as shown in Fig. 3, is quite broad. In fact, by adjusting the relative volume of the two channels, the apparent position of the orchestra can be shifted so that almost any section of the normal living room can simulate the best seat in the house.

Once the speaker locations and volume levels are fixed, changing your position with respect to the speakers is much like changing your seat in the auditorium. Sitting too close to one speaker produces the

## HOME REPAIR TIP NO. 46



Wrap worn appliance cords with tough "SCOTCH" 33 Brand Plastic Electrical Tape. Stretchy, all-plastic tape is waterproof, insulates and protects cords against rough usage, wear, oil and corrosion. Sticks tight as skin, makes a neat repair. UL approved for electrical use. Handy for dozens of heavy duty repair jobs. Get "SCOTCH" 33 Plastic Electrical Tape in 39¢ or 75¢ rolls at stores everywhere.

**BETTER BUY TWO!**

Made by  
Minnesota Mining & Mfg. Co.  
St. Paul 6, Minn. ©3M Co., 1958



now's the time for

# DAP

**CAULKING COMPOUND**

Stop leaks now with DAP CAULKING Compound. Apply around windows, door frames, flashings, for a waterproof, weather-tight seal. Get cartridges, cans or new collapsible tubes at hardware, paint and building supply dealers. DAP makes a caulk, glaze or seal for every home need.



**DICKS-ARMSTRONG-PONTIUS, inc.**  
Dayton 3, Ohio



predictable result of hearing one side of the orchestra almost to the exclusion of the other; sitting too far away from the "stage" reduces the angle between the listener and the two speakers to the point where the stereo effect may be lost—much like sitting in the last row of a large auditorium.

If the angle between the listener and the speakers is too large, the directional effect is increased excessively. This may be highly effective for demonstrating such novelty recordings as ping-pong games and trains running through the living room, but can be very disconcerting when listening to a musical selection. An orchestra, after all, is an integrated unit and should not consist of two separate groups playing at opposite ends of the stage. And so, while speaker placement is not particularly critical, it can not be entirely disregarded.

#### Relative Volume Important

Good results can almost always be obtained by considering the speakers as the outer extremities of the stage, with the orchestra spread out between them, and facing the preferred listening area. Some experimentation with the relative volume of the two channels will result in best possible stereo perception for any specific lo-

cation in front of the two loudspeakers.

Although reference was made earlier to "ordinary" (nonhigh-fidelity) phonographs, there is obviously a limit below which stereo conversion is neither practical nor desirable. The small, inexpensive portables, for example, just aren't suited for any kind of serious listening. There are, however, a host of larger table models and consoles which do deliver excellent sound quality. The performance of these, as well as that of the large number of monaural hi-fi systems in current use, can be greatly improved by dual-channel reproduction of stereo records.

Finally, it must be emphasized that the use of a radio or TV set as a second channel merely provides the means for an inexpensive transition from monaural to stereo sound. The physical separations between the two amplifiers introduces inconveniences when trying to obtain a balanced, over-all volume level from the two loudspeakers. Further, as the ear becomes accustomed to the magic of stereo, the true music lover will soon become aware of further improvements available through the use of a dual high-fidelity sound system. But it is doubtful that any subsequent change, regardless of cost, will equal the dramatic difference in sound caused by the low-cost, initial switch to stereo. ★ ★ ★

## DELTA SAVINGS REMINDER COUPON

SAVE  
**\$21<sup>00</sup>**

# SAVE **\$21<sup>00</sup>**

SAVE  
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CELEBRATING DELTA'S 30th YEAR OF MANUFACTURING  
THE WORLD'S FINEST CIRCULAR SAWS



REG. PRICE.... **\$138<sup>00</sup>**

SPECIAL PRICE **\$117<sup>00</sup>**

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YOU SAVE .... **\$21<sup>00</sup>**

LOW DOWN PAYMENT—EASY TERMS

(Prices and savings slightly higher west of the Rockies)

### CLIP THIS ENTIRE COUPON!

Save \$21.00 on the purchase of this famous Delta circular saw. See your Delta dealer—listed under "TOOLS" in the Yellow Pages—or leading department, hardware, or building supply stores. Rockwell Mfg. Co., Delta Power Tool Div., 502K N. Lexington Ave., Pittsburgh 8, Pa.

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another fine product by

**ROCKWELL**



SAVE  
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Delta new advanced design 9" tilting arbor circular saw with extension wings and steel stand. (Cat. No. 34-003)

SAVE  
**\$21<sup>00</sup>**



Remove old

# PAINT



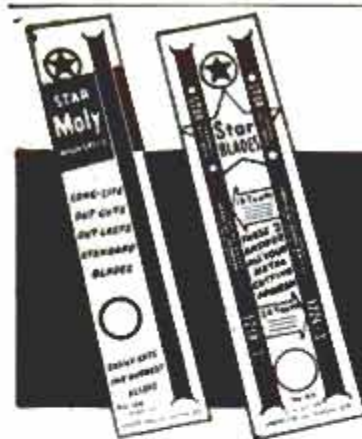
Wash it off! Scrape it off!  
It's easy either way with

## HEAVY-BODIED KLEAN-STRIP



One application of Heavy-Bodied Klean-Strip will easily and quickly peel off several layers of paint or any other finish. Semi-paste consistency makes it ideal for use on overhead or vertical surfaces. Non-inflammable, needs no neutralizer or afterwash.

**THE KLEAN-STRIP CO., INC.**  
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## STAR

**HACK SAW  
BLADES  
with New  
"Handy-Pak"  
convenience**

Now precision-made STAR Blades are mounted on special "Handy-Pak" cards. Makes storing and handling easier and safer. Cards also give helpful working tips... show the best blade for each job.

### STAR "LEVER-LOCK" FRAMES



- Patented "Lever-Lock" positions and tensions blade automatically.
- Handle molded for comfort.
- High-strength tempered steel back, perfectly balanced.

AT ALL LEADING HARDWARE STORES

For fact-filled booklet on metal cutting, send 10¢ in coin. Ⓜ 4608

**CLEMSON BROS., INC.** MIDDLETOWN, N. Y., U.S.A.

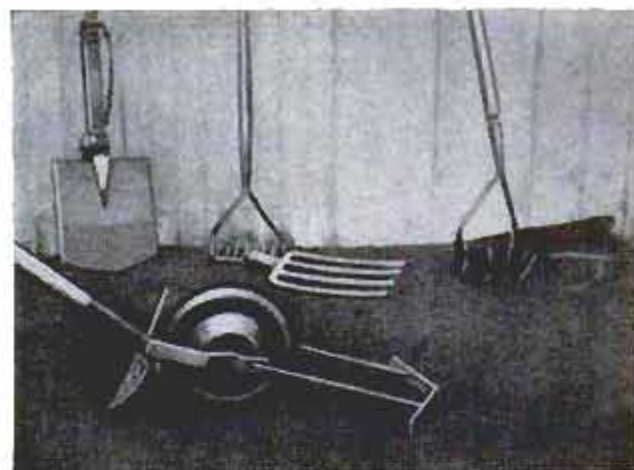
## He Raised the Roof

(Continued from page 167)

After completely enclosing the upper story, the old roof was dismantled. While the old rafters were not available for the new roof, they will become part of a small screened-in porch to be added to the back of the house at a later date. Sheathing taken off the old roof was conveniently nailed down as subflooring. Old rafters were cut off with a portable electric saw just below the level of the new two by eight floor joists.

The old guest closet (see floor plans) was eliminated completely and the space used for a stairway to the second floor. This did not disturb the first-floor walls. The old living room became a dining-and-family room while the lower-floor bedrooms were made into one large living room across the end of the house.

With such carefully planned details, it was possible to raise the roof and complete the addition of four necessary bedrooms without interrupting family living. Important, too, is the economy realized as no foundation work was required and no major interior changes were necessary in order to acquire this completely new and valuable living area. ★ ★ ★



### Planter Does Five Jobs In Single Operation

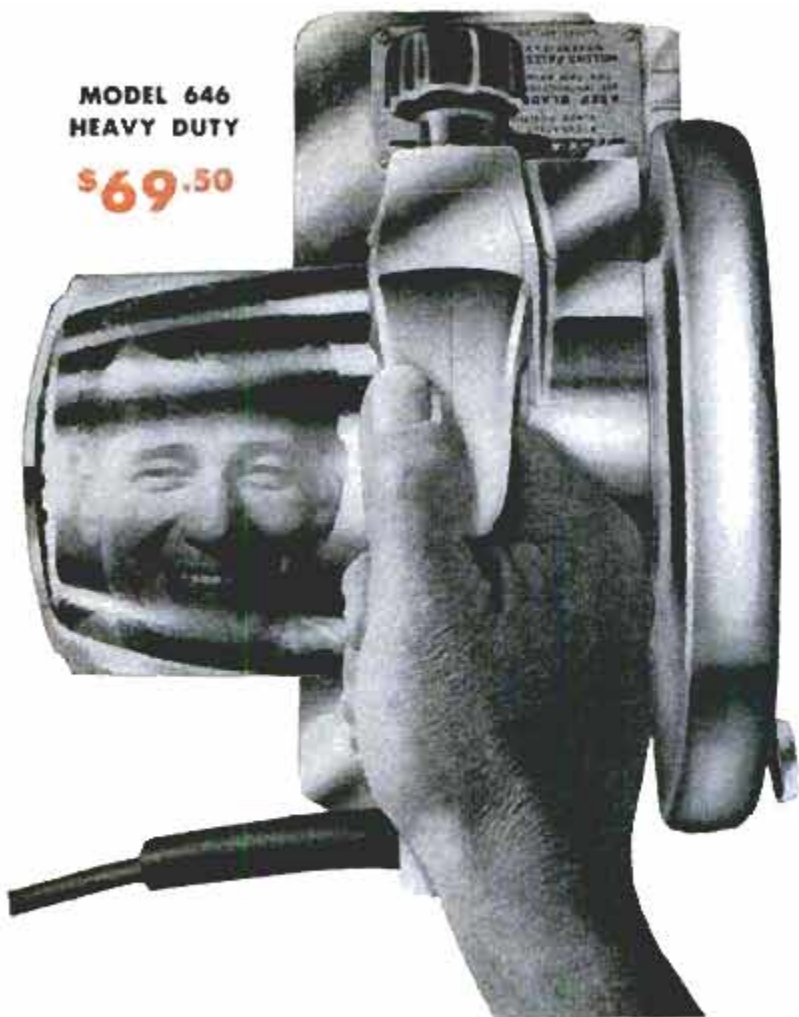
Capable of doing five jobs in one operation, a hand planter opens seed furrows, sows, covers seeds and marks out the next parallel row. An auxiliary pressure roller firms the loose soil covering the seeds. The planter sows flower, vegetable, farm and forest seeds up to the size of dwarf beans.

☐ Missile procurement in the United States has risen from \$21,000,000 in 1951 to \$2,955,000,000 in 1958. The figure is expected to rise to \$3,444,000,000 in fiscal 1959.



MODEL 646  
HEAVY DUTY

**\$69.50**



# MIGHTY MITT-FULL

Here's the newest in  
Miller's Falls all-new line  
of full-power saws

There's power to spare in this heavy duty 6½" saw! Ideal for active home craftsmen who want professional quality. Rugged 1½ H.P. motor. Exclusive Micro-Guide for accurate cuts at every angle. Extra deep cuts at both 45° and 90°. Quick change angle and depth adjustments. Lightweight. Perfect balance.

Send for free literature on complete saw line or see your dealer. 5 models — 4 sizes: 6½", 7", 7¼", 8¼" — prices as low as \$54.50. Write Miller's Falls Co., Dept. PM-25, Greenfield, Mass.

**MILLERS FALLS  
TOOLS**

SINCE  
1868



**MOTOR CURE**

**stops  
...oil burning!**  
**SAFE, PURE PETROLEUM  
BASE SEALANT**

Just pour in motor oil, MOTOR CURE, with exclusive "Cushion Plating Action" oil plates, fills in and seals in and around the rings and cylinder bores—and all internal engine parts. Oil cannot bypass rings and OIL BURNING STOPS! MOTOR CURE'S lasting oil film seal raises compression • increases oil pressure • quiets tappets, valves and lifters • ends cold, dry starts • seals out friction • improves oil viscosity • assures 100% lubrication at all times. **MONEY BACK GUARANTEE** \$1.95 16 fl. oz.

**TRANS-CURE**

**stops transmission leaks!**



• Prevents seals from drying, hardening or shrinking . . . Keeps seals soft and pliable . . . Swells and coats around seals and gaskets. TRANS-CURE improves performance and smoothness. One can in transmission oil assures **NO SLIP — NO JERK — NO HOWL — NO GRIND!**

**BOTH MOTOR CURE and TRANS-CURE** are backed by \$250,000 Products Liability Policies with one of the world's largest insurance companies.

**MONEY BACK  
GUARANTEE**  
\$2.45 16 fl.  
OZ.

Get MOTOR CURE and TRANS-CURE at your nearest service station, garage or auto accessory store. Or write to

Kapre Corp., 2329 S. Michigan, Chicago 16, Ill.

OCTOBER 1958

**WINTER-PROOF  
YOUR HOME**



**Nu-GARD AUTOMATIC  
DOOR BOTTOM**

RAISES AUTOMATICALLY  
WHEN DOOR OPENS!

**INSTALL IT YOURSELF!**

Ideal for all doors, inside or out. This silent, automatic door bottom makes your home more comfortable. Designed especially to clear carpet.

Puts an end to under-door drafts. Shuts out winter's cold (and summer's heat). Keeps out dust, noise, odors, bugs and insects. Simple to install. Do it yourself.

At Hardware and Lumber Dealers

**MACKLANBURG-DUNCAN CO.**  
OKLAHOMA CITY, OKLA.




WHEN DOOR  
OPENS . . . thick  
felt bottom raises  
automatically!



WHEN DOOR  
CLOSES . . . thick  
felt bottom lowers  
automatically!





## Now you can push points in

Glaziers' Points are tiny flat pieces of metal driven into window sash to hold panes in place. Fine for framing pictures and mirrors, too. Red Devil makes 3 kinds, including new "push points" made with a lip to take end of putty knife or screwdriver. Box of about 100 for 15¢.



**One-piece Rube Goldberg** is "Li'l Jimmie," unique tool designed for prying off molding and baseboard without marring wood—but best thing yet for loosening stuck windows, wedging doors to proper height for hanging. Also pulls nails, drives points, and all for \$1.98.



**108 different putty knives** are made by Red Devil because professionals know the right knife speeds the job. Your Red Devil dealer has them wide, narrow, stiff, flexible, thick, thin, straight, bent, costly, and cheap (20¢ to \$2.35). He'll help you choose.



**Who wants a \$4.95 scraper** when some cost but 40¢? The man who wants this Red Devil carbide tipped scraper that stays sharp 100 times longer—or the woman who'd treat him to a "luxury tool" he wouldn't buy for himself. We sell thousands.

*It's always best to buy where Red Devil Tools are sold, for wider choice, top quality, correct "how-to" advice.*

4553

Free booklet,  
"How To Fix Broken Windows."  
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Union, N. J., U. S. A.

World's largest manufacturer of painters' and glaziers' tools.

**REMODELING?  
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use  
**Southern  
FASTENERS**



**USA-MADE** to highest standards of quality. Available in all good hardware, building supply and marine stores.

**SOUTHERN** • Wood Screws • Tapping Screws • Machine Screws • Steel Bolts • Drive Screws • Dowel Screws • Carriage Bolts • Hanger Bolts

**REMEMBER: ONLY A SCREW HOLDS LIKE A SCREW**

phrase reading from the old word-for-word habit."

The numbers and phrases are limited to  $\frac{1}{100}$  second on the screen because it is felt that the eyes only have time for one fixation in that time. And seeing them only once, with no chance for a second look to verify what we saw the first time, "builds up your confidence that you can see things accurately the first time in large units."

For the reading pacers, we all used light novels or detective stories. We started the pacers at the fastest comfortable speed, then increased it 30 words per minute a day. I began my pacer at about 500 words per minute, was reading at about 1,200 words per minute at the end and still managing to get a fair idea of what the story was about.

The value of the pacer, says Walker, is that you can't go back and reread, thus it breaks the regressive habit. At the same time it gets you moving faster. None of us was ever able to read as fast without the pacer's beam of light chasing us down the pages. In my own case, I hit 1,200 words per minute on the pacer compared to a maximum of 708 words per minute in a free-reading test—that is, a test in which I was reading against time, clocked by a stop watch, but without the benefit of the pacer's goading light. But the 708 words per minute, on the other hand, represented nearly double the rate I came into the course with.

### Homework Too

We had frequent progress checks during the course and while we were constantly striving to gain speed, the emphasis was always on comprehension. This was shown by the written questions we had to answer after each test.

In addition to our daily sessions in the laboratory, we were assigned homework reading and exercises in books designed to teach a variety of techniques that make for better reading, ranging from a larger vocabulary to the ability to spot quickly the main or topic sentence in each paragraph.

The common characteristic of problem readers is that they read everything at the same pace. Some lawyers and engineers, for instance, never have developed the ability to "shift gears" and race through light fiction and newspapers. Instead they read everything word-for-word at the same crawling pace they use in reading legal briefs or scientific monographs.

Once a Pentagon lawyer or engineer has taken the reading improvement course, however, he comes out with a variety of new techniques. He knows, for instance,

(Continued to page 278)



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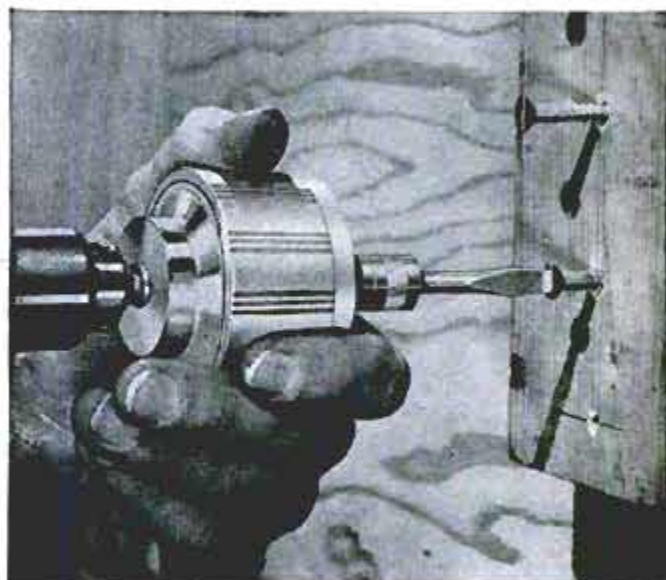
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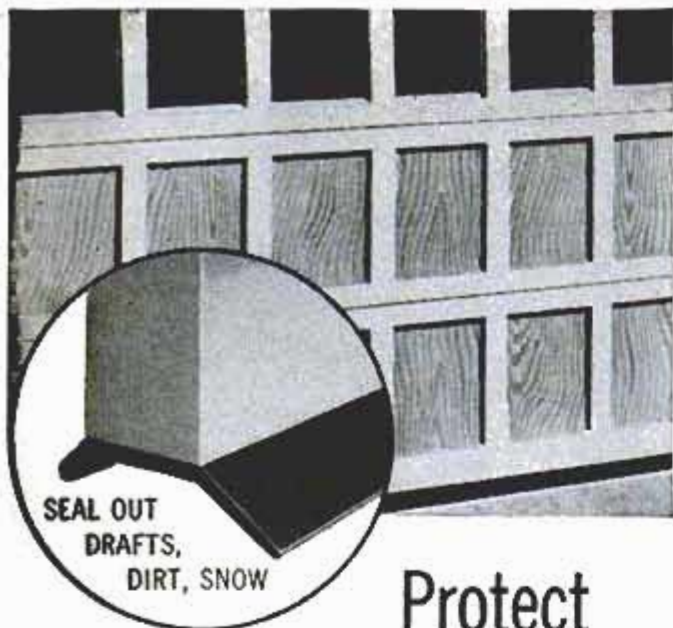
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how to "preread" an article, how to skip and scan, how to survey a page for its meat. And all these techniques contribute to his goal of cutting his reading time while increasing his comprehension.

One day a colonel came to an instructor with a problem. "I can't help muttering to myself while I read," he said. "Now that I'm reading faster, it makes me hoarse. The faster I read, the faster I mutter and the hoarser I get. I can hardly talk after our daily lesson. Something's got to be done." His problem was solved by having him chew bubble gum while he read.

After I finished the course and saw the benefits to be gained from improved reading, I had two big unanswered questions in my mind.

I wondered: What could be done for other adults, like myself, who have grown up to be reading cripples, and, what could be done about today's youngsters.

The problem of the grownups is much tougher, says Captain Walker. He thinks an adult would have to attend a course such as that given in the Pentagon if he hopes to make a complete break with his bad reading habits.

### How Teachers Can Help

This is a great problem for today's adults but it need not be for tomorrow's.

"Reading training should be an integrated program all the way through school," Walker says. "All teachers, in elementary and secondary schools and colleges should be familiar with the problems of reading.

"What a teacher in high school and college should do in the first week of any new course is to orient his students in how to read and study for that course. There are different problems in different fields—history, literature, geography. One of our biggest problems in school is that the students don't know how to study." ★ ★ ★

### Science Makes Metals "Collide" To Produce New Missile Alloys

Air Force scientists hope to make new metal alloys for missile and space-vehicle skins by a technique called micrometeorite bombardment. Simulating the intense heat and speed of meteorites colliding in space, the scientists shoot particles of one metal at speeds of over 50,000 miles per hour into the crystalline lattice of another material. This may result in a new material with the best properties of the component metals. For example, shooting particles of iridium into aluminum could produce a heat-resistant but lightweight alloy.





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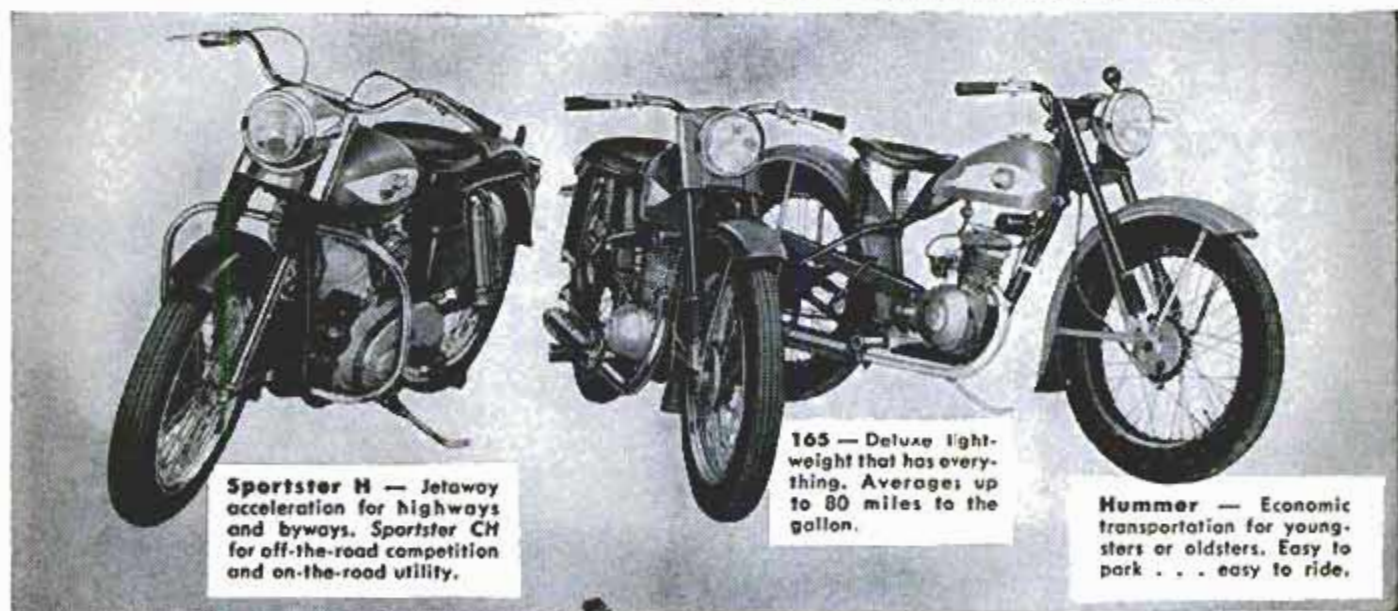
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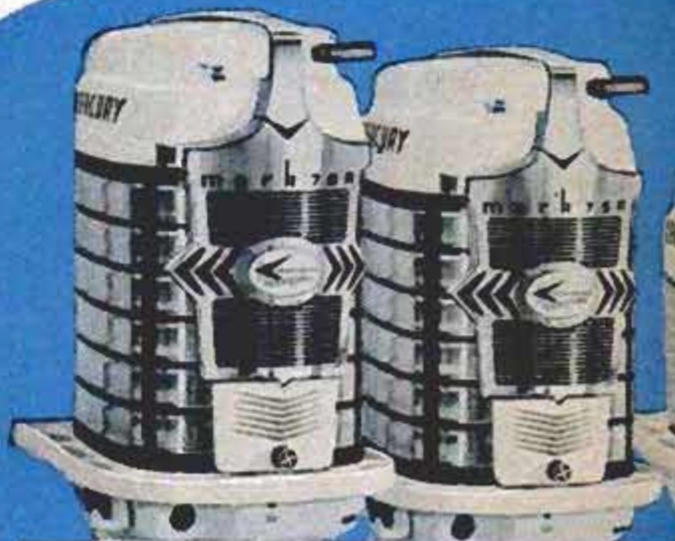
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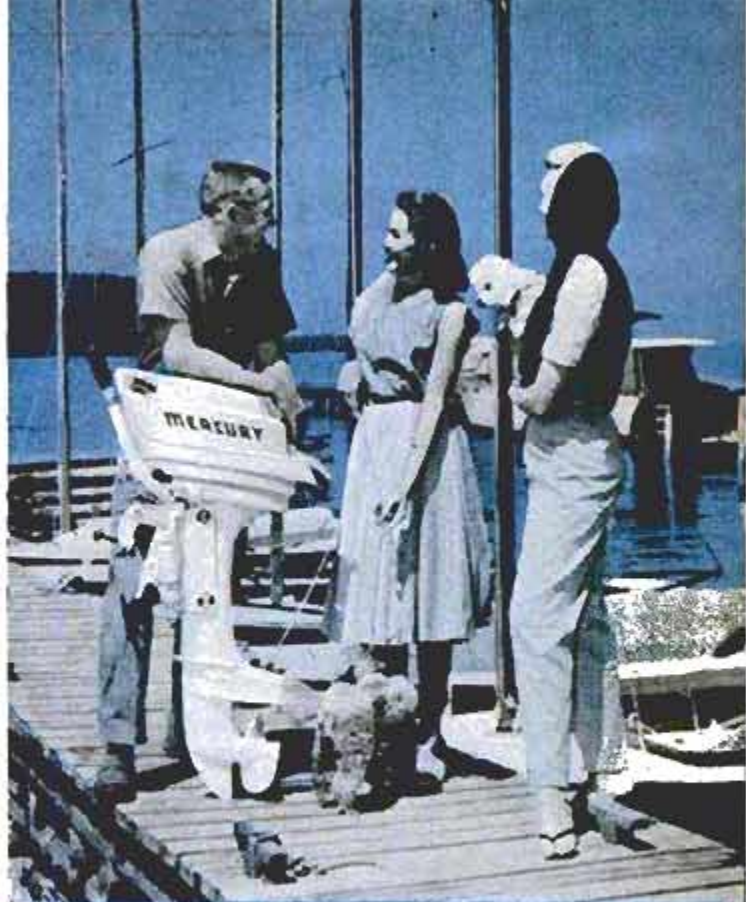
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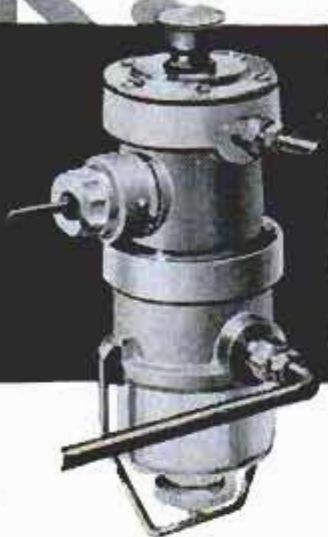
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## The New Age of "Atomic Crops"

(Continued from page 110)

field of 84,000 plants he found over 11,000 easily recognizable mutants, and later discovered so many hidden changes in the apparently normal plants that he concluded that some characteristics of almost all of them had been altered. Many of the new plants were of no possible commercial value; others exhibited a rich variety of potentially useful traits, and it became apparent that peanuts could be rebuilt to produce all manner of desirable strains.

He showed me a handful of the parent peanuts—all identical descendants from a single plant. Then he showed me some of their variegated offspring. In size they ran all the way from useless little runts to giants twice as large as the biggest jumbo peanut on the market. These huge peanuts are breeding true after 10 generations of planting. It would take a sizable investment and several years to raise enough seed for large commercial use, but if anyone wants to grow a giant cocktail peanut, Dr. Gregory has it.

One problem of growers is that the high-yield roasting peanuts often have such thin shells that they are easily broken in the roaster, causing spoilage and waste. By irradiation Dr. Gregory has developed a variety with thick shells which has a 12 percent higher yield than its unirradiated brother. Eight hundred pounds of these peanuts are now in the hands of the North Carolina Foundation Seed Producers, Inc., and the new strain should be in the hands of certified seed growers in two years.

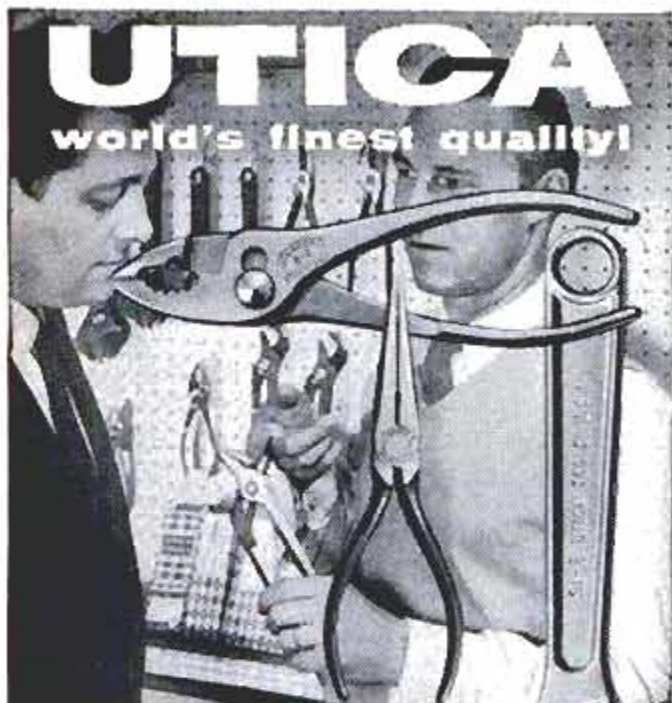
Today's peanut plants grow so low that they are usually stacked by hand. Dr. Gregory has developed a plant which stands two feet high or more and which he thinks will make mechanical harvesting easier. Meanwhile, his colleague, William Mills, of the Agricultural Engineering Department, is working on a harvesting machine to match the taller plants. The high-protein peanut tops are used as forage for livestock and the new tall plants have the added advantage of providing more feed.

"The creation of a new crop plant does not necessarily mean that growers will raise it," he says. "If the plant or the fruit is bigger or of a different shape, it may mean that a whole line of new machines will have to be designed for harvesting, shelling, grading and the like."

Another important goal is the development of a peanut plant which will resist leaf-spot, a fungus disease which is one of the worst problems of the grower. Such a peanut would eliminate the expense of

(Continued to page 284)





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spraying. Complete immunity may take years to accomplish, but highly resistant mutants have already been produced.

Radiation has also brightened the Gregory garden. When Mrs. Gregory was nostalgic for the hibiscus of her Florida childhood, Dr. Gregory planted some but found that they didn't bloom until October, a few weeks before the frost killed them. By irradiating a few hundred plants, he produced a hibiscus that blooms in the late summer, thus moving the plant's habitat a few hundred miles north.

One of the most fascinating observations of geneticists in their radiation work is the evidence they turn up of the tremendous number of distant, dissimilar relatives which may lurk inactive for many generations in the chromosomes of the most orderly, stable plant. When Dr. Gregory irradiated some North Carolina peanuts, he got some mutations which are found only in primitive peanuts of South America. Two years ago the German geneticist Martin Zacharias irradiated black German soybeans, and got offspring which were white, yellow, mottled blue and brown — all the soybean colors known throughout the world. "There's a streak of Man o' War in every plowhorse, and vice versa," Dr. Gregory explains. "The genes of both came from common Asiatic ancestors. It's the same with plants. With radiation we can shake the family tree and bring down almost anything we are looking for.

"This does not mean that other methods of plant breeding will be abandoned. Radiation breeding is no magic wand, but if you have plenty of patience and are willing to put in a lot of tedious work, it holds great promise of improving agricultural crops."

Perhaps the most successful radiation-bred plant in the country is the Sanilac bean of Michigan, which owes its chief virtue to a runty bushy sport created by X rays before the dawn of the atomic age. Michigan raises about half a million acres of beans, most of them of the vine-bearing Michelite variety. Ten years ago Dr. E. E. Down of Michigan State University and Dr. Axel L. Andersen of the U. S. Department of Agriculture set out to breed an upright bush-type bean which would lend itself better to mechanical harvesting and resist certain bean diseases. So they crossed and recrossed descendants of the scrawny bush with commercial bean plants and produced the superior Sanilac, which retains the upright posture kicked into its ancestor by radiation. The new plant has built-in resistance to the bean anthracnose disease which attacks other navy beans, and its high-growing pods, well off the ground, re-

(Continued to page 286)





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sist mold during wet spells. Also it matures about a week earlier than the Michelite. Seed was released to all bean growers last spring, and an estimated 100,000 Michigan acres are now planted to the Sanilac.

Since the effects of radiation on animal and vegetable chromosomes are identical, it would be scientifically possible to improve animals and people by the same method, but thousands of living organisms must be sacrificed to obtain a single desirable change, so in most species the experimental material could not be made available. The only farm-animal radiation program on record is that of Dr. Everett R. Dempster and Dr. I. Michael Lerner of the University of California, who are irradiating chicken sperm and recording the egg production and other traits of the offspring.

The first discovery that mutations could be obtained by means of manmade radiations was made by two American scientists, but two Swedish scientists were the first to put the idea to practical use in crop breeding. In the late '20s, Dr. H. J. Muller, then at the University of Texas and now at Indiana University, X-rayed male fruit flies and obtained a wide variety of sports. For this work he was later awarded the Nobel Prize. Then Dr. L. J. Stadler of the University of Missouri got the same results with barley and corn. Since most of his new plants were distorted and inferior, Dr. Stadler concluded that no radiation-spurred mutant could be of practical value, and most geneticists agreed with him. But when the radiating force of Stadler's discovery hit the fertile brain of Ake Gustafsson, a student at Lund University, Sweden, it knocked out a mutant theory. He talked with his teacher, the late Dr. Herman Nilsson-Ehle, Sweden's leading geneticist, who agreed with him that if nature produces commercially useful sports now and then, man should be able to breed them a lot faster by the Muller-Stadler method, and it didn't matter much if most of the experimental crop were wasted. So they began shooting X rays at barley seeds in almost lethal doses, and in a few years found that they could step up nature's mutation rate as much as a thousandfold. Some of the new barley plants had very stiff straw, a virtue of great interest because a serious drawback of many high-yielding Swedish barley varieties is a weak stem which in some years causes great losses by lodging. The seed will soon be distributed to growers.

Another radiation success is the Primex white mustard, an important Swedish source of vegetable oil. The newest man-made plants yield as much as 10 percent

(Continued to page 288)





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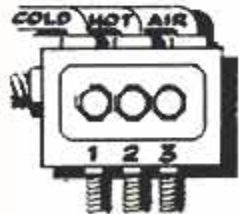
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more oil per acre than the best natural varieties, and have virtually supplanted the previous Swedish types. Five years ago the robust and high-yielding Ray Pea—so named because of its origin—was released to growers. A giant pea with pods 30 percent larger than its parents has also been developed by radiation.

Many other plant mutants with superior or different qualities are now on the Swedish assembly line. Red apples have been forced out of trees which bore yellow fruit, and russet pears from trees that bore smooth ones. Many of these discoveries may not interest commercial growers, but they are important to scientists because they demonstrate the wide versatility of the new tool.

Since the death of Dr. Nilsson-Ehle 10 years ago, Dr. Gustafsson has carried on the work, and is now head of a group of 30 scientists and plant breeders which is supported by a large foundation and by the government. A member of this group, Dr. Diter von Wettstein of the Institute of Genetics at Stockholm, outlined to me the great promise of the radiation-genetics program.

"We have only made a start in creating useful new plant varieties," he said. "Now we are trying to learn how to control the mutation process—to discover the conditions under which we can produce at will the plants the world needs. We get the widest variety of mutations from some plants by irradiating them for short periods at certain times; others seem to do better if exposed for a whole season. If you are looking for certain new traits, it is more efficient to expose the seeds to neutrons in an atomic reactor; to get other types of mutants you might choose a gamma field or X rays. Many new practical developments are on the way. For instance, we expect to develop grains that will mature earlier, which will be very important, not only in Sweden, but in all northern countries. Even a few days' earliness will make a great difference in world production by anticipating frost and storm. We already have the early strains, but their yield is not high enough. We are confident that we can get both qualities.

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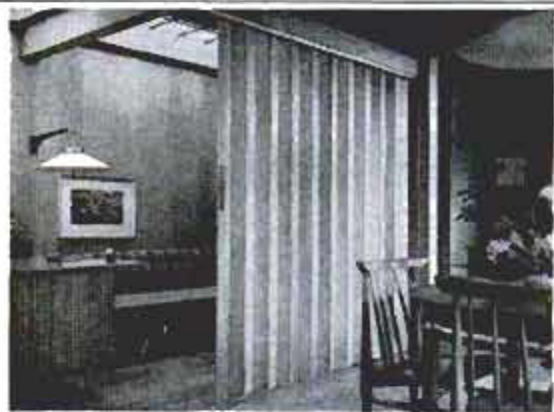
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## They Learn to Fly in High School

(Continued from page 84)

materials. Altogether, parts and materials cost between \$8,000 and \$10,000 every year, mostly paid for by selling rebuilt airframes and overhauled engines.

Miner has been able to get a variety of airplanes and engines so students will be experienced in any work they might tackle after graduation. Twin-engine airplanes and the helicopter are not used in the school's flight-training program, for example; but putting these planes in flying condition is a necessary part of the mechanics' training program. Engine mechanics are instructed in turbine-engine maintenance, too, although there are no jets in the school fleet.

Facilities at Clover Park have been expanding year by year until they now include a complete Link trainer for instrument-flight instruction. When Ed Link, inventor of the Link Trainer, heard that Clover Park was using a trainer for high school students, he visited the school to see for himself how it was being used. He was so impressed by the school's aviation program that he awarded the school a \$2500 fellowship to start a new technical library.

When the school expanded from the converted bus-garage laboratory into quarters nearly four times as big at the naval depot, a mechanical "degreaser" was added in the engine lab. Now, when aircraft "mills" are torn down to parts, they are fed into the degreaser on baskets. After treatment, the parts are clean, ready for wear inspection and reassembly. There's no more washing of greasy parts in solvent by hand. The new quarters also include a full-size paint spray and dope booth big enough to handle complete wing sections.

Not all students at Clover Park participate in the aviation courses beyond the ninth grade. But all male students are required to take a nine-week aviation-familiarization course in the ninth grade. Plane rides in the school's fleet are a treat for everyone in this course. Three other nine-week familiarization courses, in electronics, engineering and workshop, complete the year normally spent in industrial arts.

Vocational courses begin in the 10th grade and are elective. Students interested in aviation sciences can elect courses in meteorology, navigation and CAA regulations, among others. These courses satisfy Washington State requirements for science credit. Students in these courses may go on to become tower operators, meteorologists, or ground-operations specialists.

Actual vocational training in aviation

(Continued to page 296)





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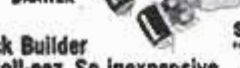
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Nail two Roll-eez "N" to rail at drawer opening. If drawer has center guides, nail third Roll-eez "N" on top of back in middle, and Roll-eez "M" on bottom of back, straddling guide.

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SET FOR ONE DRAWER



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Now anyone can cut glass easily, accurately. Just run cutter down slotted guide board. Glass slices itself or separates at a slight bend of the spring base. Complete with cutter.

22" long \$3.95

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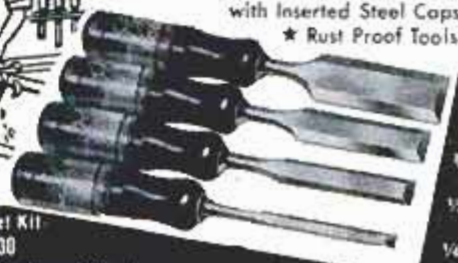
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4 Sizes \$10.30

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### SOLDER, CUT

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WITHOUT  
a drill!**



**PHILLIPS  
RED HEAD**

A concrete anchor that cuts its own hole, then expands to become threaded anchor for any standard 1/4" bolt. Holds hundreds of pounds. Can't come out. Install by hand in 2 minutes or with impact hammer in 22 seconds.

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Corrulux® Partition  
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or for profit**

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Send 5 cents for complete construction details (Plan 3A) and/or 10 cents for our booklet "30 Ways to Build" showing new, practical Corrulux uses. Write Dept. 43.



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P. O. Box 20026, Houston, Texas

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DOUBLE DOME SKYLIGHTS

begins at the 11th grade. Students in flight training spend three hours a day during the 11th and 12th grades in ground school. Two of the three hours are laboratory or classwork. During the third hour, instructors fly with students in dual-flight instruction, or students fly solo. Students who are not flying use the time for study. The three-hour vocational training is half of the student's school day.

Instead of electing aviation-science courses in the 10th grade, students aiming at the aviation-mechanics course start their three-hour laboratory classes that year. They continue to spend three hours a day in the 11th and 12th grades. After high school graduation they return for full-day classes as postgraduates for another year. At the end of this program, students take written and practical work examinations to earn CAA's A&E license. This certificate allows them to "pull" inspections on civilian airplanes and aircraft power plants, sign off on repair work and qualify an airplane as airworthy. All aircraft maintenance in the United States, whether on a single-engine Cub or a multiengine airliner, must be done by, or under the direction of, an A&E mechanic. When students with A&E licenses begin work, they start at substantially higher pay rates than normal trades mechanics. Students in the mechanics course can also take flight training by paying the \$3.75 hourly cost. Since all planes used in the flight-training program are a product of the mechanics courses, those mechanics who do fly develop a personal responsibility for their work.

When students from Clover Park enter military service after receiving their A&E licenses, the Air Force snaps them up. Many of the students end up as instructors and advance rapidly in grade. The Air Force often sends them to specialist schools, where they learn even more about their trade.

When it comes to talking of budgets for the aviation-sciences program, Clover Park figures the mechanics course costs about \$600 per student per year. The school's costs for the flight-training course is somewhat less, because students pay the \$3.75 hourly cost for operating the planes. Part of the money to support the aviation program comes from the State of Washington and part comes from the Federal Government through the Smith-Hughes Act. This act was passed in 1917 to aid vocational training.

"Our courses in aviation mechanics, flight training and ground school cost very little more than vocational training in auto mechanics, woodworking or any of the

(Continued to page 298)



a model for every use... all with  
**Quality,  
 Performance,  
 Long Life!**

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 ELECTRIC TOOLS



**ELECTRIC HAND SAW**  
 Rips, crosscuts, cuts circles and scrolls. With rip guide and blade.  
**\$45.00**

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**CIRCULAR SAW**  
 1 1/4 H.P. motor. 6 1/2" blade cuts faster, easier—even 45° bevels. **\$58.95**; 3-conductor cord. **\$59.95**

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 Lightweight, well balanced. Fast, easy abrasive change—no tools needed. **\$39.50**

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 Fast, lightweight... easy grip handle. With sensational Quick Sander Abrasive. **\$2.95**



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**1/4" DRILL KITS**  
 Highest quality accessories. You can drill, sand, grind, polish, sharpen, etc. from **\$29.95**

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 Electric Tools, The Modern Gift for Men.

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**DRILLMASTER**

**1/4" DRILL** gives you

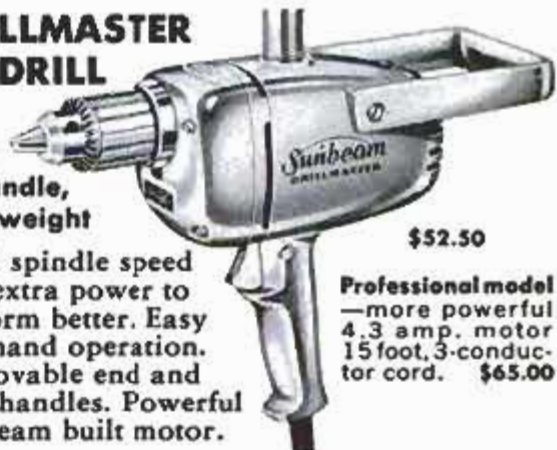
ALL these advantages

- More power, faster drilling
  - Lightweight, cooler running
  - Higher torque, greater efficiency
  - Powerful Sunbeam built motor with geared chuck **\$25.95**, with key chuck **\$27.95**
- Pro. model—25% more power; 15 foot, 3-conductor cord. **\$42.50**

**DRILLMASTER**  
**1/2" DRILL**

Easy to handle, Lightweight

Ideal spindle speed and extra power to perform better. Easy one-hand operation. Removable end and pipe handles. Powerful Sunbeam built motor.



**\$52.50**

Professional model—more powerful 4.3 amp. motor 15 foot, 3-conductor cord. **\$65.00**

**HUNT UP HUNTER** **MAKES HARD JOBS EASY!**

**Magic-Tip Screwholding Screwdriver**  
 Starts & Drives  
 IT'S PROVEN 2 MILLION IN USE!!!  
 Put the driver in the slot—press forward on the handle—Presto—It grips the screw tight—no buttons to push—no fumbling to get in the way.  
 Shockproof Chromoly Steel Tip Chrome Plated

Stubby	Medium	Long
M2 (1/4") ..... \$1.80	M5 (1/2") ..... \$2.00	M12 (3/4") ..... \$2.05
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 Swings into any compound angle and locks in position. 360° round, 90° up and down. Ideal for gluing, sanding, sawing, drilling, filing, etc.  
 Height 6 1/2" — Opening 2 1/2" ..... **\$14.95**

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 A Complete Electrical Testing Lab  
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 Any Angle Handy Compact Steel Frame Super Hard Blades  
 P6—050 thru 1/2 6 blades **\$1.55**  
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 Steel Sparkling Green  
 6" x 9 1/2" x 14"

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 No Hammer Just Press Zip—It's Gone **\$2.00**

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Tone-arm wired for stereo cartridge. \$50 (Slightly higher in the West.) V-M Corporation, Benton Harbor, Michigan.

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other vocational skills taught at the high school level," Fred Miner says.

### Adults Accepted

During the last few years, adults have been accepted in the aviation-mechanics course. GIs can enter the course and qualify for veteran's benefits. Seriously interested adults can also take the course. The fee for GIs or other adults is \$5 for the entire course running two nine-month terms. The only other costs are a \$10 fee for welding materials and about \$5 in other laboratory fees to cover special materials.

In 1954, the Ford Foundation awarded Fred Miner a one-year scholarship for a thorough study of aviation education. During the year Miner traveled throughout the United States, Canada and Europe. After this extensive research into operating aviation-training programs, Miner feels that high schools offering vocational education are failing only because they don't give it the attention it deserves. "To present a successful aviation course," Miner states, "high schools must include first-hand experience with actual flying. Also, the teachers must have extensive aviation-experience backgrounds."

When Miner speaks of Clover Park's program, one of the first questions is, "How about accidents?" Clover Park's safety

record since 1945 has been impressive — one incident and one accident. The incident involved an airplane that was delayed in a takeoff. Its tail wheel struck a weed-covered pipe railing protecting a fire hydrant as the plane left a taxi strip.

The school carries a \$500,000 insurance policy covering any possible liability for the flight training. When the flight-training program began in 1947, there was no similar program to use as a guide for establishing rates. The school finally insured the program with Lloyds of London, and Lloyds still carries part of the insurance. In addition, individual students must take out a \$1000 hospitalization and \$2000 death-benefit policy on themselves at their own expense. This requirement serves two purposes: 1) Students get a significant warning of the risk in the flight-training program; 2) The policy implies that the student is fully insured and does not depend on the school for coverage. Students may take out insurance for higher amounts if they wish. The premium cost of the school's liability insurance is included in the cost of \$3.75 per hour of flight training. The insurance cost is, therefore, not a part of the school's budget. Individual student insurance coverage is not included in the rate.

As for the one accident—it involved the school's driver training car! ★ ★ ★

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FEATURES: powerful 2.8 amp. universal AC/DC fan-cooled motor • electro-mechanical transmission changes speed instantly, electrically • interlocking speed range selector switch • precision geared chuck and key • spindle lock for easy chuck removal • multiple ball thrust bearing • weighs under 6 lbs., perfectly balanced • silver luster finish



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THE RIGHT SPEED  
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**AT THE FLICK OF A SWITCH!**

Here's the world's most revolutionary new drill... the drill that will handle every drilling job! Two separate speed ranges! 2000 rpm for drilling wood, plaster, plastic, and other "light" materials, and 1000 rpm for heavy-duty drilling applications. To change speeds instantly, you merely touch the interlocking electro-mechanical speed range selector switch. And, both speed ranges develop full power for fast, efficient drilling under any conditions!

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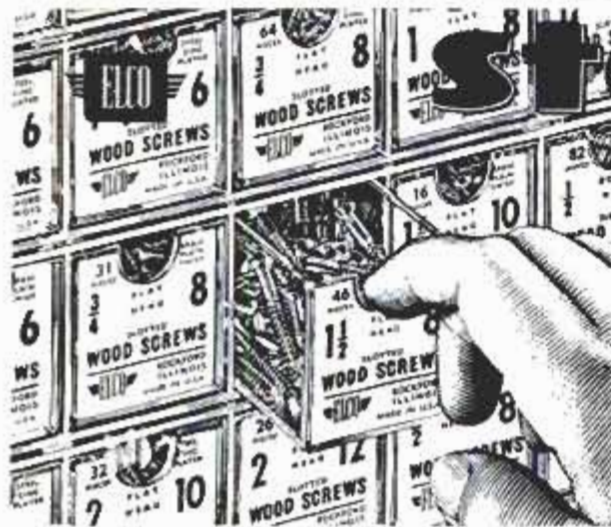
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## A Report on the De Soto, Buick, Cadillac and Oldsmobile

(Continued from page 85)

expected to come from lower rear-axle ratios which also will cut acceleration speeds. Nobody seems to care much about acceleration and pickup these days. The high point was reached about two years ago. Since then cars have been getting more sluggish, but nobody seems to complain about it.

Now the big kick is economy and engineers are working out kinks in automatic chokes to reduce fuel consumption during warmup. GM has a quick-acting choke that opens in about a half mile instead of the usual two miles, thus saving gasoline.

Compression ratios are moving up very slowly this year as the industry waits for the oil industry to catch up with it. Last year, the gasoline companies promised higher octanes than they were able to deliver and as a result most automakers quietly backed off on compressions in the middle of the production run. This year they are playing it safer. Some have reduced compression ratios.

Paints are in for a lot of publicity this year. General Motors is using its Lucite-based lacquer on all models and is claiming that there is no need to wax or polish it. De Soto (and other Chrysler cars) now has a new high-metallic enamel that uses aluminum particles for 100 percent of the pigment. This super-quality enamel will make polishing sessions "few and far between," say Chrysler engineers.

Most GM cars for 1959 will have electric windshield wipers, something that Chrysler Corporation cars have had for many years. GM's new power steering is lighter, has less artificial "feel of the road" and in some cases is faster to bring it closer to the Chrysler full-time power steering. Chrysler has added some "feel" to its unit so that these two companies have about come to a point of agreement on the subject, a point that is much closer to Chrysler's original stand than GM's.

Chrysler has decided to add air bags to its rear suspension (as an extra-cost option) at a time when Buick, for example, is moving away from air suspension. Like De Soto, Buick now offers air bags only in the rear instead of all around as last year.

Chrysler follows GM's lead in the development of the automatic headlight dimmer. The new Chrysler unit is more compact and, it is claimed, more reliable than the GM Autronic Eye.

There you have it, the opening round in a campaign that, it is hoped, will bring prosperity back to the industry. ★ ★ ★



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COMPLETE

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On the "Perma-Grit" Hand Sander, one Tungsten Carbide sheet outlasts hundreds of paper sheets. Sands twice as fast...always ready to use when you need it. Comes in kit with fine grit sheet, but other types also available.

For sanding doors, windows, cabinets, try the "Perma-Grit" Sander-Plane with its convenient handle and front grip. Extremely handy in every workshop—files, sands, planes, shapes or notches. Removes material in half the time as it works forwards and backwards. Reversible blade for fine and coarse work.

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### NEW! "Perma-Grit" Files

Cut working time in half. Remove material on both forward and backward stroke or in circles. For shaping, filing and notching on flat or curved surfaces of wood, compositions, plastics.

Flat File (Medium 80 grit one side; coarse 46 grit other side).....\$2.25  
Contour Files (Coarse or Fine)...\$1.95

### "Perma-Grit" 5-in-1 Wheel For table and radial saws

Saws, sands, shapes, ploughs, dadoses with complete safety. Unlike tooth-type blades, it can't snag or pull—eliminates "kickback." Wide selection of grit types on edge and sides.

8" Diameter.....\$9.95 and \$10.95  
10" Diameter.....\$14.95 and \$15.95  
"Perma-Grit" Blades also available for portable saws.



# Cut it with WISS

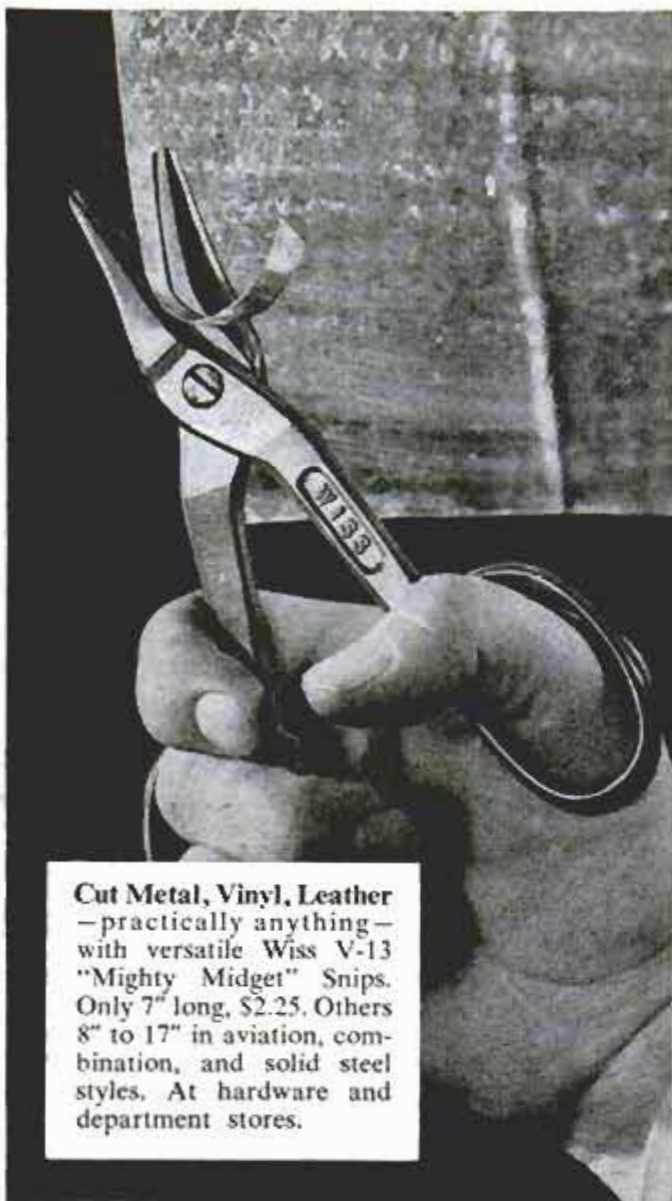
## ...so right in the middle of Yuma I had to know—

There he was as big as life going through our circulation files for the past year, checking every name, every address, every expiration date. He was so intense in his search that by the time he got to Yuma my curiosity had the best of me — I had to know what he was doing.

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Well, I had learned a lot for my first day on the job as a new secretary. After all, our readers would probably consider the man from ABC as a pretty important guy, and consequently look for that ABC symbol on all magazines they buy.



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"AVIATION"  
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• Powerful fully reversible, ball-bearing gear reduction winch, 1000-2000 lb. pull. Use on 6 or 12-v battery. Holds 40' of 1/2" cable. For trucks, docks, boats. Govt. cost \$280.....\$46.75 FOB



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• Variable hydraulic speed reducer. Any speed from 0 to 750 rpm by simply throwing a lever. Handle up to 1 1/2 h.p. Use for midget cars, shop hand saws, etc. Govt. cost \$400. SPECIAL...\$47.81 FOB



## SPEED REDUCER

• 80-to-1 gear reduction unit. 8 roller bearings, multiple gears. Reduces standard motor to 21 rpm - increases torque. Shafts 3/8" input, 1 1/2" output. Power winches, revolving signs, door openings, etc. Govt. cost \$66. SALE.....\$8.49 Ppd.



## GEAR REDUCTION POWER MULTIPLIER

• The most versatile and useful power device we have ever handled. Has tremendous torque.  
• Drive with any fractional horsepower AC or DC motor. Consists of gear unit and motor mtg. base. Output speed 3 to 10 RPM depending on size motor pulley.  
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• Tractor Pump, 1000 psi; 12 gpm 45.50 Ppd.  
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• 2-Way Cyl, 1 1/2" bore 6" stroke 4.89 Ppd.  
Other types, sizes and items. Free catalog

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• Modern hi-efficiency attractive dial phone. Use for extension to main line on private system. Use several for complete private system, etc. Complete with ringer, dial, etc. Work on any system. Govt. cost \$25.50. SALE.....\$9.95 Ppd.



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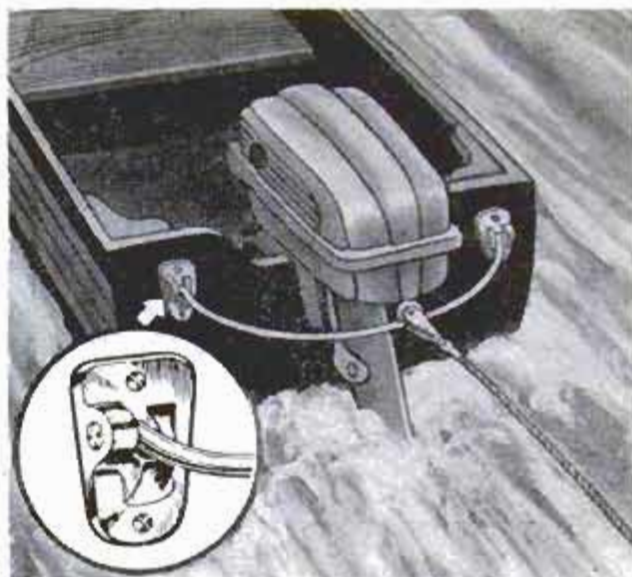
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Super Filer No. 11 joints and sharpens hand and circular saws 6" to 10" with all teeth correct in height, depth, pitch, bevel. When file hits steel roller, teeth are finished. Saw runs true with no side pull. **\$9.95** PPD.



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saw set automatically sets teeth at 10° or more. **\$2.95** PPD.



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Automatically controls depth, angle, pitch for all saws. Precision made and calibrated. Use in any vise or clamp. Includes file. **\$6.50** PPD.



**DOWEL CENTERS**  
Centers inscribe exact location for opposite holes. Pairs for 1/4", 3/8", 1/2" holes. **\$1.00** PPD.



**MONEY BACK GUARANTEE**

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You'll be less likely to run out of gasoline if your car has a buzzer that sounds an alarm when the fuel level gets down to three gallons. The buzzer is a simple device that connects to the wire from the fuel tank to the gasoline gauge. At first, the buzzing is intermittent, but when the fuel level drops below two gallons, the noise is intensified and continuous. The unit draws no current except when buzzing. Installation takes only a few minutes.

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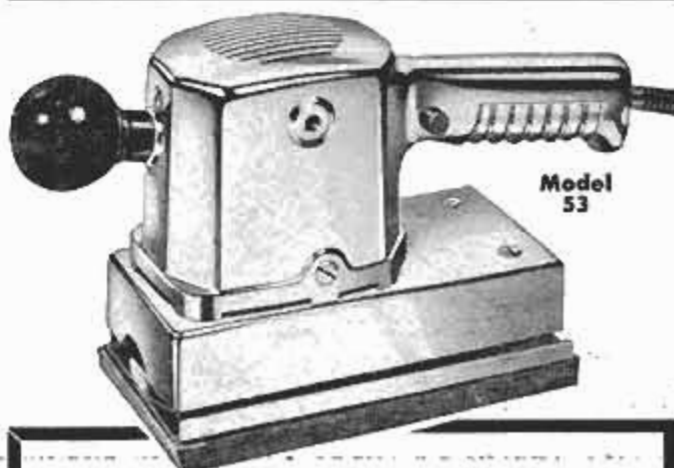
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 Fits all electric drills & hand power tools. 35 3/4" long. Oilite bearings. Core of specially wound, high carbon steel wire in flexible steel casing. Will accommodate tool shafts up to 1/8" dia. For lathes, electric drills, etc.

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 Fits in the palm of the hand and has an air-cooled motor that runs at 20,000 rpm AC or DC at 110 volts. Comes complete with both 3/32 and 1/8 inch Collets. cord and plug.



United Specialties Co., 9705 Cottage Grove, Chicago 28

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Butane gas blow torch gives intense 3500° flame. Solders, brazes, fixes leaks. Perfect for wiring, plumbing, loosening frozen nuts and bolts, 1001 odd jobs. Carry in your pocket. Each charger lasts 1/2 hour, turns on or off. Extra chargers, 49¢ per box of 2. Get Jet King Butane Blow Torch at hardware stores. Or, send check or money order, we pay postage. For \$1 more (total \$2.95), get Soldering Kit; torch, tip, 3 feet cored solder, extra charger. Good for TV, radio, jewelry.

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MONEY BACK GUARANTEE

### Middle East's Population Rises Four Million Yearly

Population in the Middle East is growing by four million people per year, according to the Population Reference Bureau, Washington, D. C. Any plan for raising the area's level of living will be difficult, says the bureau, unless this population growth is brought under control. With the Middle East already facing acute and chronic poverty, the task of feeding and educating an additional four million people a year is staggering. The area's 95,700,000 people have increased by 15 percent in five years, a rate of growth exceeded only by that of tropical South America. One of the causes of the high birth rate in the Middle East, says the bureau, is a Moslem tradition of pride in large families.

In Egypt, 23,400,000 people are squeezed into the slender strip of land along the Nile valley. In this sector, which is surrounded by some of the world's most barren deserts, the bureau reports that more than 2000 people per square mile try to scratch a living from the already over-taxed soil. Egypt's birth rate is 48 per thousand; its death rate, 20. This is a growth of close to three percent a year—about double that of the United States.



## SAVE UP TO 85% ON HYDRAULIC BUYS

No. H-84 - Dbl. Action Hydraulic Cylinder  
1500 PSI. Has 1-1/2" Bore, 9/16"  
Shaft, adjustable stroke of 1-3/16" to 4-3/8". Lgth. 14-1/2"  
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Cost Gov't approx. \$140  
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1500 PSI DOUBLE ACTION HYDRAULIC CYLINDER  
Has a long stroke of 21-1/2" with a bore of 2", shaft  
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H-77A-1 **SPECIAL 4-WAY HYD. VALVE**  
Made to rigid government specifications. A Surplus  
Bargain. Spring loaded, poppet type valve. Pressure  
balanced. Closed in neutral. 1/4" int. pipe ports.  
Cost Gov't approximately \$30.00  
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## 85 TO 1 GEAR BOX BARGAIN!

For use where a tremendous power at a low  
take-off speed is desired. Drives through a  
train of 6 gears rotating on self-lubricating  
high speed roller bearings. Take-off shafts  
are 1-1/4" and 3/8" diam. Overall size 6" x  
4" x 2-1/2". Has 180° offset drive. **SAVE-**

**5.95  
USED  
8.95  
NEW**



### GOOSE NECK HOIST

Lifts 1000 lbs. with ease  
through a 21 to 1 gear ratio.  
Has automatic ratchet brake.  
The 40" long arm has a 3"  
pulley at the end. Ideal for  
"swing-about", truck or plat-  
form hoist. Comes with  
12 ft. of high tensile  
strength cable. . . . .

### HYDRAULIC REMOTE CONTROL MASTER & SLAVE



When connected  
with 1/4" tubing and  
filled with oil they  
act as a precision  
remote power trans-  
mission unit. Moving  
Master handle causes  
Slave arm to respond  
in exact motion from  
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Both units used No. H-EX-1SU **27.50**

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Spray GARDENS - LAWNS - ORCHARDS  
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Also use for water Fire Extinguisher. Has a  
3 GALLON capacity with 32" hi-pressure  
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metal body with built-in pressure pump on  
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**PALLEY PRICE 7.88**



### SPECIAL

16" x 13" x 8" **1.49**  
21" x 16" x 12" **2.49**

### RUBBER ICE PAK

Made of extra heavy duty  
Neoprene rubber with an  
insulated inner lining.  
Keep food or drink ice cold. Ideal  
for icing down game, fish, etc. 100%  
waterproof, salt and rot resistant.



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A professional type, drafting  
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in brief case. Ideal for use  
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6" x 3" scale. Designed to  
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4 inch IMPORTED SLIDE RULE  
Non-warping bamboo with scales on a  
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has S, L & T scales. In Case. **2.95**

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10 inch LOG-LOG DECIMAL TRIG  
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Professional Log-Log, Decimal Trig  
Slide Rule. Non-warping top quality  
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FITS ALL U.S. RIFLES

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**2 POWER . . . 14.95**  
25 ft. field at 100 yds.  
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Superb for both Big and Small Game

Make EVERY shot count! Here is a rugged, precision made scope  
to fit your every need. It is the larger, more precise companion to  
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- 1-WINDAGE and ELEVATION ADJUSTMENTS are positive internal type with direct reading, click type knobs
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\$29.95  
VALUE

### NEW 20 Power 40mm SPOTTING SCOPE with TRIPOD and CARRYING CASE

Special import! Watch the blond across the street,  
boats on the river, spot hits on the target, etc.  
Lenses are precision ground & polished with the  
objective lens fully coated. Adjustable focus eye  
piece. With tripod & case. Lgth. 8-3/8". Wt. 1.5 ozs.

HAS 60, 120,  
150, 180, 300  
and 450 POWER  
MAGNIFICATION

### SPECIAL 60 to 450 Power MICROSCOPE

With NEWLY DEVELOPED SUB-STAGE  
LIGHT which ELIMINATES NEED for  
ANY EXTERNAL LIGHT SOURCE.

Another Palley Optical Bargain. Ideal for scientific inclined  
Boys & Girls, Adults, Home Labs, etc. Has precision ground  
and polished lenses. Two interchangeable eyepieces of 6X  
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mirror for use with external light source when desired - All  
metal body which inclines through 90° - Fitted wood case  
and 3 glass slides. Order WHILE STOCKS are COMPLETE!

FREE with MICROSCOPE  
8-PIECE DISSECT SET. Has Scalpel, Scissors, 6  
Slides, Tweezers, Magnifying Glass, etc. . . . . **12.95**

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Here's an Amazing Surplus Bargain! A huge chest  
full of precision Electronic Parts and Equipment.  
Contains meter, tubes, tube sockets, rotary and  
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extension cable & jack, plus other small parts.  
17" x 16 1/2" x 10" tempered oak  
case has precision hinges and  
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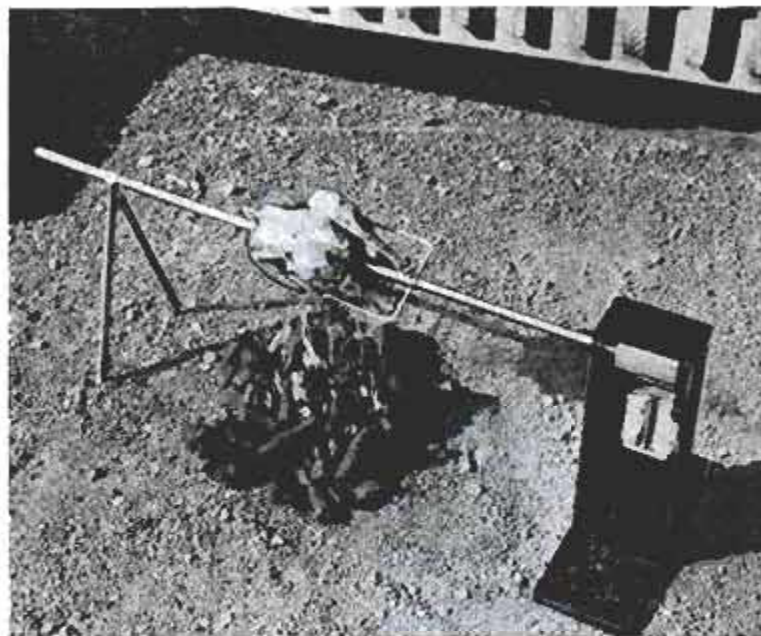
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## Lightweight Barbecue Spit Can Go Traveling With Family



When you go on that sight-seeing or hunting trip, you can take your barbecue spit along. The lightweight, portable unit, which comes in two models, operates on two ordinary flashlight batteries that afford up to 15 hours of intermittent service. The metal box model, shown in the photo, holds its own batteries and has a permanently lubricated gear motor mounted in the unit. It weighs  $3\frac{3}{4}$  pounds. The other model weighs  $2\frac{1}{4}$  pounds and has a flashlight attached as a source of electric power. The unit measures 36 inches in length and is 10 inches high. Its recommended maximum cooking weight is seven pounds. An accessory is available to handle fish or steak.

## Aircraft Antiradar "Paint" Helps Planes Elude Detection

Airplane coatings have been developed that would allow bombers to fly past radar-warning systems with only a slight chance of detection. The Air Force has not announced what is in the coatings, but it is known that some coatings used in radar tests consist of rubber bonded to ceramics,

and horse hair impregnated with carbon. Thick and heavy, the coatings are composed of radar-absorbent materials and they are similar to paint only insofar as they can be spread on a surface. Only certain parts of an aircraft need to be coated to cut down radar detection.

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Factory To You — \$79.95

Think of the fun you'll have and the money you'll save with your own big capacity workshop. Picture yourself sawing with the 8" ball bearing saw. Or drilling in steel with the vertical drill press. You bore with the horizontal drill—exclusive with SUPERSHOP. You sand with the 8" disc sander. You turn with the 30" lathe. You sharpen tools on the 5" grinder.



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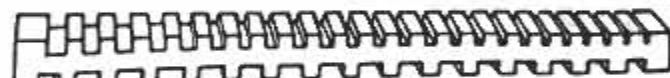
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Warren Washers—engineered to cut clean, accurate, parallel grooves with your present power saw. 40 micromatic adjustments—just dial the desired width. Actually strengthens blade, eliminates vibration—leave on saw for straight cuts. No burning or chewing. Over 250,000 satisfied users in 48 States and many foreign lands. Be sure to get genuine Warren Washers... they're guaranteed!

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## AMERICA'S BEST 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. off implements and road machinery. Pays for itself in a few weeks. Sterilizes soil. Sterilizes as it cleans—milk 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 463. Special factory price..... **\$349.50**



## ELECTRIC HOIST

**2000 lb. CAPACITY.** A fortunate purchase from the Air Force enables us to offer these powerful 2000 lb. electric cable hoists at a fraction of their value. Perfect for material handling, boat hoists, elevators, lifts on assembly lines, etc. Two separate 22 ft. lift cables with independent controls permit leveling the load and controlling it perfectly. Rugged ball bearing motors of geared down design 110 volts. Available for A.C. or D.C. Please specify. Makes a terrific portable hoist with our #273 D.C. light plant at \$99.75. Offered at less than 33% of regular coat (hook not included). Wt. 145 lbs. A.C. Model, item 847A..... **\$149.50**  
D.C. Model, item 847..... **\$129.50**



## Rugged, ball bearing WINCH

Sturdy ball bearing winch—super tough aluminum alloy construction. Powered by an easy starting 2 1/2 HP Briggs gas engine thru gear reduction drive—11 exerts up to 3000 lbs. of terrific force for hoisting materials or pulling. Combination gear and pulley reduction results in tremendous multiplication of engine power. Idler pulley clutch arrangement and built-in drum brake with ratchet hand lever enables operator to ease loads down gently and lock at any point desired. Drum handles 400 ft. of 3/8" cable or 600 ft. of 1/2" cable. Ideal for contractors, farm implement trailers and unlimited other uses! (Item 795) Wt. 125 lbs. Only..... **\$149.50**  
**HEAVY DUTY** model same as above but with big Industrial Clutch..... **\$169.50**  
**HAND WINCH**—Same winch with large crank handle for extra leverage and 2 speed drive. (Item 704) Wt. 60 lbs..... **\$59.50**



## SPECIAL DEALS

**MINE DETECTOR** for detecting buried pipes, wires, sewers, etc. Carrying case and fresh batteries included..... **\$49.50**  
**AIR HAMMER** for hammering dents out of auto bodies. Complete with 2 different shaped arms and 3 bumping dollies. Hammer can also be used without arm for chiseling and drilling, etc. Uses 4 cfm at 60 psi..... **\$39.50**  
**SCREW JACK**—16 ton Simplex Jack, 1 3/4" screw, 16" lift. Reg. price \$29.50..... **\$9.50**  
**Special Price**  
**HYDRAULIC PRESS**, 9 ton press for pushing, bending, straightening, etc..... **\$69.50**  
**\$365 List Special Price**  
**SCREW PRESS**, 9 ton capacity with 21" throat. Complete with adjustable table..... **\$49.50**  
**EXTENSION CORD**, 2 cond. #14, Neoprene..... **\$6.95**  
2 cond. #12, Neoprene covered..... **\$7.95**  
3 cond. #10, Neoprene covered..... **\$13.95**  
**INTERCOM SET**, Powerful loud talking intercom set powered by 4 flash light batteries which last for 6 months. Good up to 1,000 ft. Complete with 2 stations—250 ft. of wire and batteries..... **\$11.95**  
**PORTABLE BLOWER** powered by 2.2 Briggs Gas engine. Used for ventilating man holes, tanks, or any ventilating purpose. Complete with 20 ft. of 4 in. flexible pipe..... **\$99.50**  
**EXHAUST FANS** powered by sturdy motors and built in welded steel frames which are easy to install: 16 in. fan (1/10 HP)..... **\$27.95**  
18 in. fan (1/6 HP)..... **\$31.95**  
20 in. fan (1/4 HP)..... **\$39.95**  
**FURNACE BLOWER**, 1/2 in. wheel, handles 1800 CFM. Requires 10 HP motor. Outlet size is 1 1/4" by 1 3/4"..... **\$29.50**

Send check or M.O. Prices f.o.b. Factory. 10 day Money back guarantee. SEND 10c for **MASTER MECHANIC MFG. CO.,** DEPT. A100 Burlington, Wis.

## GET MASTER MECHANIC'S BEDROCK FACTORY PRICES



(Item 24)  
**700 WATT LIGHT PLANT**  
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. Be prepared if storm knocks out power lines..... **\$143.50**  
Regular \$275.00 value..... **\$199.50**  
**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 plant. — Write giving us your requirements!

## Double Acting Hydraulic Cylinder



A powerful cylinder built by Massey Harris which develops both a pushing and a pulling action. Will push 8,100 lbs. with a 1000 PSI pump pressure. Cylinder is 3 3/8" O.D. with 4 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**

**OTHER DOUBLE ACTING CYLINDERS**  
6" stroke — 1 1/2" bore..... **\$ 8.95**  
8" stroke — 3" bore..... **34.00**  
10" stroke — 3" bore..... **34.80**  
16" stroke — 3" bore..... **43.00**  
24" stroke — 3" bore..... **47.50**  
42" stroke — 5" bore..... **75.00**  
60" stroke — 5" bore..... **125.00**  
We have all sizes of cylinders available.  
**HYDRAULIC CONTROL VALVE**—4 way open center valve with built-in adjustable relief. Controls 1 double, or 2 single acting cylinders. Equalizing feature permits easy control even under heavy loads. 3/4" pipe thread on inlet & outlet, 1/2" on cylinder outlets. Easily 1/2" mounted, finger tip control. Wt. 16 lbs. (Item 822)..... **\$21.95**



**HYDRAULIC KIT**  
Complete Hydraulic Kit consists of hydraulic hand pump with built-in 2 gal. reservoir and item 802 hydraulic cylinder described above. Pump has a built in relief valve and is rated at 10 tons. Kit is ideal for presses, jacks, snow-plows, etc. Pump is 29" long—8" diam. with 3/8" ports. A terrific value! (Item 836) Wt. 50 lbs..... **\$39.50**  
Pump only (Item 836a) only..... **\$23.50**  
**HYDRAULIC HOSE COUPLERS** Connect or disconnect hydraulic lines without loss of oil. 1/2" pipe threads. (Item 819) per set **\$3.95**

**SPEED SELECTOR**, Heavy duty made by B. F. Goodrich for industrial use. Provides instant speed selection. Employs reliable planetary system—no power losses..... **\$89.50**  
**SPEED REDUCER**, gear type with ball bearing drive provides speed reduction or increase as great as 100 to 1. Suitable for 1/2 HP..... **\$19.95**  
**BATTERY CHARGING GENERATOR SET**, 750 watt, charges 12 or 24 volt batteries, made by DELCO. Engine runs at 1800 RPM. Makes a potent cold weather motor starting unit as well as a fast charger..... **\$119.50**  
**WATER PUMP**, self-priming pump coupled to a 2.2 HP Briggs engine. Delivers 600 GPH. Pump has both garden hose thread & 1" pipe thread..... **\$79.50**

## EXCLUSIVE! NEW! LIGHTWEIGHT WATER COOLED DIESEL GENERATOR PLANT

Never before available! Now offered exclusively by Master Mechanic. A low priced, lightweight, continuous duty, diesel generator set. Powered by a super rugged, exceptionally smooth running, one cylinder Diesel engine. Operates at conservative 1750 r.p.m. and delivers full 1750-2000 watts of power. Operates on low cost fuel oil. Wt. only 240 lbs. representing a triumph of Diesel Engineering. Complete with fuel filter, oil pressure gauge, control box with duplex receptacle and voltmeter. (Item 830) Special factory price..... **\$429.50**  
**3500 WATT Diesel Generator**. Powered by big 9 HP water cooled diesel, 115/230 volt..... **\$795.00**



## HEATING & VENTILATING FAN

(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 huge volume of air. (400 to 600 CFM.)  
8" Pipe, wt. 5 lb..... **\$6.95**  
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.  
12" Fan (Item 10F)..... **\$14.95**  
14" Fan (Item 10G)..... **\$17.95**



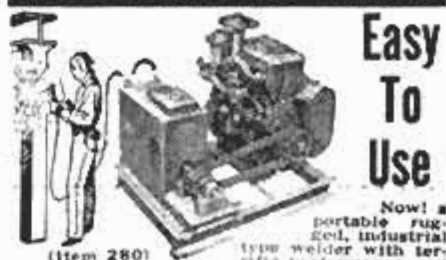
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Genuine Neoprene Hose—outlasts ordinary rubber 3 to 1. Reinforced with super tough cotton cord plies—yet completely flexible. Equipped with standard thread male and female fittings. Pump water for irrigation, stock tanks, home, barn, fire fighting, etc.—or pump gas and fuel oil. Volume factory prices—save more than 40%!



Size	Price	Size	Price
1 1/2" x 10'	9.95	1 1/2" x 50'	29.50
1 1/2" x 20'	7.95	2" x 10'	16.50
1 1/2" x 20'	10.95	2" x 10'	9.50*
1 1/2" x 25'	13.95	2" x 14'	21.50
1 1/2" x 50'	24.95	2" x 50'	47.50
1 1/2" x 100'	49.95	2 1/2" x 10'	21.75*
1 1/2" x 10'	10.95	2 1/2" x 17'	37.50*
1 1/2" x 25'	14.75	3" x 10'	25.50*
*Discharge Hose		4" x 15'	44.95

## MASTER D.C. ARC WELDER



Easy To Use  
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. \$450 value..... **\$119.50**  
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**COMPLETE POWER MASTER** (Illustrated above) powered by a 16 hp., air cooled Wisconsin engine. Wt. 480 lbs. (Item 280) Compares 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**



# BIG JOB BOOM FORECAST!

## Can You Get Ready in Time?

Right now job opportunities are tight all along the line. Economists now predict a period of mild ups and downs. Look for the "big break" to come in the next three years, they say. That's when good jobs will open up as never before. And men who are preparing themselves *now* will ride the crest of the boom.

### DARK OUTLOOK FOR UNSKILLED WORKERS

Those with little or no training will find the going tough. Fewer openings. More competition for existing jobs. The tide is against the unskilled worker. It's getting stronger. Nor will the boom help. The new opportunities will go first to the skilled, next to the semi-skilled.

### BIGGEST DEMAND IN THESE FIELDS

What's ahead? According to the best estimates, here are the industries due for the sharpest employment rise: Heavy transportation equipment. Mechanical, electrical, chemical, aeronautical and highway engineering. Industrial electronics.

All metals. Business services. Natural gas and oil. Paper products. On the other end of the scale, employment may lag in agriculture and leather. Check the trends in *your* field. Are you prepared to switch, if necessary?

### GETTING YOURSELF READY—NOW

All the experts agree: Education, skill, specialized training will net the greatest rewards in the coming boom. The time you spend improving yourself is perhaps the wisest investment you can make *right now*. Your future success and happiness could hinge on your mastering a certain subject or acquiring a special skill. But there are obstacles. You may have a family to support. Or a job to hold down. You may feel you're too old to learn.

### HOW I.C.S. CAN HELP YOU

For the man who can take his training hard and fast—without time off from his job or heavy expense—I.C.S. offers real advantages. A total of 259 courses to choose from (see partial list below). A spare-time

method that lets you progress as rapidly as you're able. Up-to-date, authoritative text material. Thorough, personalized instruction. Industry-recognized diploma to graduates. I.C.S. is the oldest and largest school accredited by the Accrediting Commission of the National Home Study Council. Its long list of successful graduates reads like "Who's Who."

Can you be ready for the next job boom? You can if you act quickly. Your first step: mark and mail the coupon below. What you do right this minute may determine how you make out in the coming boom!

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Get the details on the fields that offer the best jobs in the immediate future. Get these three valuable books free—(1) "How to Succeed"—pocket-size guide to advancement. (2) Sample lesson (Math.) demonstrating the I.C.S. method. (3) Opportunity catalog on the subject you check in the coupon. Just mail the coupon.

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|--|--|--|--|---|
| <p><b>ARCHITECTURE and BUILDING CONSTRUCTION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Conditioning</li> <li><input type="checkbox"/> Architecture</li> <li><input type="checkbox"/> Arch. Drawing and Designing</li> <li><input type="checkbox"/> Building Contractor</li> <li><input type="checkbox"/> Building Estimator</li> <li><input type="checkbox"/> Carpentry and Millwork</li> <li><input type="checkbox"/> Carpenter Foreman</li> <li><input type="checkbox"/> Heating</li> <li><input type="checkbox"/> Interior Decoration</li> <li><input type="checkbox"/> Painting Contractor</li> <li><input type="checkbox"/> Plumbing</li> <li><input type="checkbox"/> Reading Arch. Blueprints</li> </ul> <p><b>ART</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial Art</li> <li><input type="checkbox"/> Magazine &amp; Book Illus.</li> <li><input type="checkbox"/> Show Card and Sign Lettering</li> <li><input type="checkbox"/> Sketching and Painting</li> </ul> <p><b>AUTOMOTIVE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Automobiles</li> <li><input type="checkbox"/> Auto Body Rebuilding and Refinishing</li> <li><input type="checkbox"/> Auto Engine Tuneup</li> <li><input type="checkbox"/> Auto Technician</li> </ul> | <p><b>AVIATION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aero-Engineering Technology</li> <li><input type="checkbox"/> Aircraft &amp; Engine Mechanic</li> </ul> <p><b>BUSINESS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Accounting</li> <li><input type="checkbox"/> Advertising</li> <li><input type="checkbox"/> Business Administration</li> <li><input type="checkbox"/> Business Management</li> <li><input type="checkbox"/> Cost Accounting</li> <li><input type="checkbox"/> Creative Salesmanship</li> <li><input type="checkbox"/> Managing a Small Business</li> <li><input type="checkbox"/> Professional Secretary</li> <li><input type="checkbox"/> Public Accounting</li> <li><input type="checkbox"/> Purchasing Agent</li> <li><input type="checkbox"/> Salesmanship</li> <li><input type="checkbox"/> Salesmanship and Management</li> <li><input type="checkbox"/> Traffic Management</li> </ul> <p><b>CHEMICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Analytical Chemistry</li> <li><input type="checkbox"/> Chemical Engineering</li> <li><input type="checkbox"/> Chem. Lab. Technician</li> <li><input type="checkbox"/> Elements of Nuclear Energy</li> <li><input type="checkbox"/> General Chemistry</li> <li><input type="checkbox"/> Natural Gas Prod. and Trans.</li> <li><input type="checkbox"/> Petroleum Prod. and Engr.</li> <li><input type="checkbox"/> Professional Engineer (Chem)</li> <li><input type="checkbox"/> Pulp and Paper Making</li> </ul> | <p><b>CIVIL ENGINEERING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Civil Engineering</li> <li><input type="checkbox"/> Construction Engineering</li> <li><input type="checkbox"/> Highway Engineering</li> <li><input type="checkbox"/> Professional Engineer (Civil)</li> <li><input type="checkbox"/> Reading Struc. Blueprints</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Drafting Machine Design</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Sheet Metal Drafting</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Elec. Engr. Technician</li> <li><input type="checkbox"/> Elec. Light and Power</li> <li><input type="checkbox"/> Practical Electrician</li> <li><input type="checkbox"/> Practical Lineman</li> <li><input type="checkbox"/> Professional Engineer (Elec)</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> High School Diploma</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Mathematics</li> <li><input type="checkbox"/> Short Story Writing</li> </ul> <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> <li><input type="checkbox"/> Supervision</li> </ul> <p><b>MECHANICAL and SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Diesel Engines</li> <li><input type="checkbox"/> Gas-Elec. Welding</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Metallurgy</li> <li><input type="checkbox"/> Industrial Safety</li> <li><input type="checkbox"/> Machine Design</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Professional Engineer (Mech)</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration and Air Conditioning</li> <li><input type="checkbox"/> Tool Design</li> <li><input type="checkbox"/> Tool Making</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> General Electronics Tech.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio-TV Eng'g</li> <li><input type="checkbox"/> Practical Telephony</li> <li><input type="checkbox"/> Radio-TV Servicing</li> </ul> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Car Inspector and Air Brake</li> <li><input type="checkbox"/> Diesel Electrician</li> <li><input type="checkbox"/> Diesel Engr. and Fireman</li> <li><input type="checkbox"/> Diesel Locomotive</li> </ul> <p><b>STEAM and DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Power Plant Engineer</li> <li><input type="checkbox"/> Stationary Diesel Engr.</li> <li><input type="checkbox"/> Stationary Fireman</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton Manufacture</li> <li><input type="checkbox"/> Cotton Warming and Weaving</li> <li><input type="checkbox"/> Loom Fixing Technician</li> <li><input type="checkbox"/> Textile Designing</li> <li><input type="checkbox"/> Textile Finishing &amp; Dyeing</li> <li><input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warming and Weaving</li> <li><input type="checkbox"/> Worsted Manufacturing</li> </ul> |
|--|--|--|--|---|

Name \_\_\_\_\_ Age \_\_\_\_\_ Home Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to P.M. \_\_\_\_\_

Occupation \_\_\_\_\_

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THESE FIVE OR ANY FIVE OF THE  
24 ALBUMS LISTED BELOW FOR  
ONLY \$3.98 [RETAIL VALUE AS HIGH AS \$24.90]

... if you agree to buy five albums from the Club during  
the next twelve months from at least 100 available

THIS exciting new plan, under the direction  
of the Book-of-the-Month Club, enables you  
to have on tap a variety of popular music for  
family fun and happier parties . . . and at an  
immense saving. Moreover, once and for all, it  
takes bewilderment out of building such a well-  
balanced collection. **You pay far less for albums  
this way** than if you buy them haphazardly.  
For example, the extraordinary introductory  
offer described above can represent as much as a  
40% saving in your first year of membership.  
**Thereafter you can save almost 33 1/3%.** After  
buying the five albums called for in this offer, you  
will receive a *free* 12-inch 33 1/3 R.P.M. album,  
with a nationally advertised price of at least \$3.98,  
for every two albums purchased from the Club.  
**A wide choice of RCA VICTOR albums** will be  
described each month. One will be singled out as  
the *album-of-the-month*. If you want it, you do  
nothing; it will come to you automatically. If you  
prefer one of the alternates—or *nothing at all in  
any month*—you can make your wishes known on  
a simple form always provided. You pay the  
nationally advertised price—usually \$3.98, at  
times \$4.98 (plus a small charge for postage  
and handling).

**SINGING STARS • BROADWAY MUSICALS • JAZZ  
DANCE MUSIC • MOOD MUSIC • COLLECTOR'S ITEMS**

RCA VICTOR  
PERRY COMO: WE GET LETTERS



ALL ALBUMS ARE  
12-INCH 33 1/3 R.P.M.  
LONG-PLAYING



**CHECK THE FIVE ALBUMS YOU WANT  
DO NOT DETACH FROM THE COUPON**

- |  |   |
|--|---|
| <input type="checkbox"/> WE GET LETTERS.....Perry Como             | <input type="checkbox"/> FAMILY ALL TOGETHER<br>Buster Pops       |
| <input type="checkbox"/> BELAFONTE                                 | <input type="checkbox"/> PORGY AND BESS, Merrill & Stevens        |
| <input type="checkbox"/> FRANKIE CARLE'S SWEETHEARTS               | <input type="checkbox"/> MUSIC FOR DINING<br>Melachrino Orchestra |
| <input type="checkbox"/> NEW GLENN MILLER ORCH. IN HI FI           | <input type="checkbox"/> BOUQUET OF BLUES...Dinah Shore           |
| <input type="checkbox"/> BRASS & PERCUSSION<br>Morton Gould        | <input type="checkbox"/> SWEET 17...Aimee Brothers                |
| <input type="checkbox"/> JAMAICA,.....Original Cast                | <input type="checkbox"/> LET'S CHA CHA WITH PUENTE                |
| <input type="checkbox"/> STUDENT PRINCE.....Mario Lanza            | <input type="checkbox"/> EYES OF LOVE...Hugo Winterhalter         |
| <input type="checkbox"/> BING WITH A BEAT...Bing Crosby            | <input type="checkbox"/> THINKING OF YOU...Eddie Fisher           |
| <input type="checkbox"/> TOWN HALL CONCERT PLUS<br>Louis Armstrong | <input type="checkbox"/> MOONGLOW.....Artie Shaw                  |
| <input type="checkbox"/> LET'S DANCE with the THREE SUNS           | <input type="checkbox"/> IN A MELLOTONE...Duke Ellington          |
| <input type="checkbox"/> SOUTH PACIFIC<br>Original Sound Track     | <input type="checkbox"/> VICTORY AT SEA...Rodgers' TV Score       |
|  | <input type="checkbox"/> YES INDEED!.....Tommy Dorsey             |
|  | <input type="checkbox"/> BLUE STARR.....Kay Starr                 |

**THE RCA VICTOR POPULAR ALBUM CLUB P149-10**  
c/o Book-of-the-Month Club, Inc., 345 Hudson St., N.Y. 14, N.Y.  
Please register me as a member of The RCA VICTOR Popular Album Club and  
send me the five albums I have checked at left, for which I will pay \$3.98, plus a  
small postage and handling charge. I agree to buy five other albums offered by the  
Club within the next twelve months, for each of which I will be billed at the nation-  
ally advertised price: usually \$3.98; at times \$4.98 (plus a small postage and  
handling charge). Thereafter, I need buy only four such albums in any twelve-  
month period to maintain membership. I may cancel my membership any time  
after buying five albums from the Club (in addition to those included in this  
introductory offer). After my fifth purchase, if I continue, for every two albums I  
buy I may choose a third album free.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

NOTE: If you wish to enroll through an authorized RCA VICTOR dealer, fill in here:

Dealer's Name \_\_\_\_\_

Address \_\_\_\_\_

PLEASE NOTE: Send no money. A bill will be sent. Albums can be sent  
only to residents of the U. S., its territories and Canada. Albums for Can-  
adian members are made in Canada and shipped duty free from Ontario.



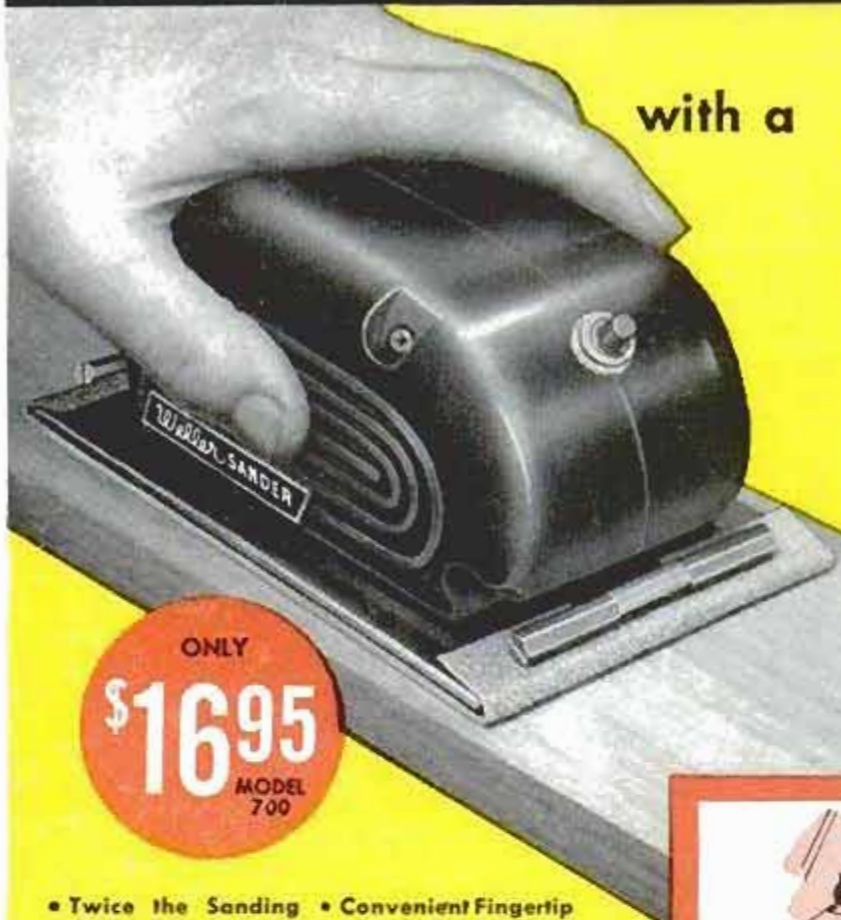
# STOP TIRESOME HAND SANDING

with a

*Weller*

## POWER SANDER

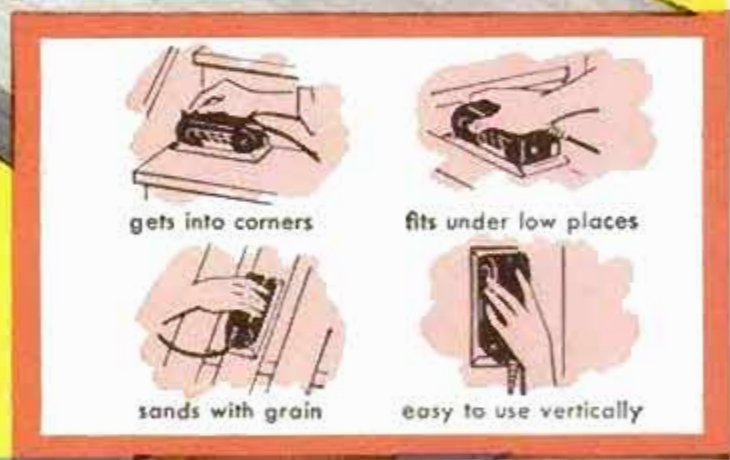
Gives a satin smooth finish to new or painted wood in a jiffy. Easy to use . . . fits snugly in the palm of one hand . . . leaves other hand free to hold work in place. And sandpaper replacement is easy, too . . . no special tools needed. Assorted sandpaper and polishing cloth included.



ONLY  
**\$1695**  
MODEL  
700

- Twice the Sanding Area of any sander in its price class
- Power Packed—14,400 strokes a minute
- UL Approved
- Convenient Fingertip On-Off Control
- Positive Straight Line Action—never bucks or twists
- Guaranteed for 1 Year

Also available: Weller Electric Power Sanding Kit with Sturdy Metal Case (MODEL 700K) **\$1895**



gets into corners

fits under low places

sands with grain

easy to use vertically

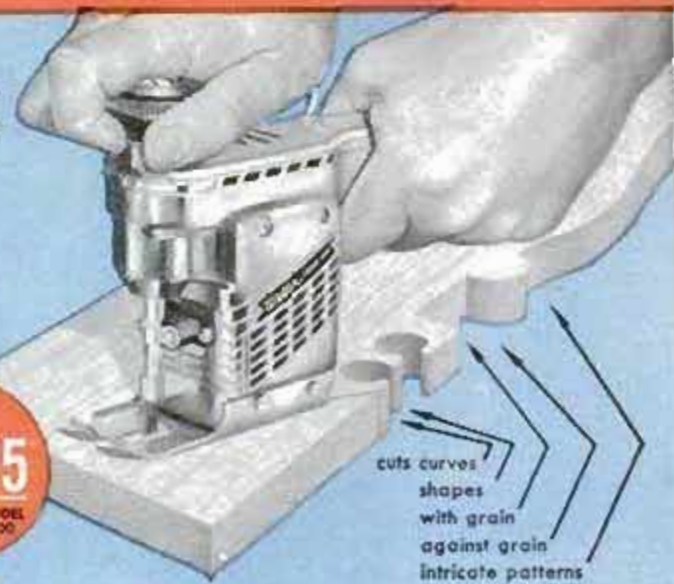
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makes starting hole for inside cuts

Makes every kind of cut in many kinds of material. Cuts plywood, do-it-yourself aluminum, composition board, plastics, etc. Guaranteed for 1 year. Fine and regular wood blades and metal cutting blade included.

ONLY  
**\$1995**  
MODEL  
800



cuts curves  
shapes  
with grain  
against grain  
intricate patterns

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