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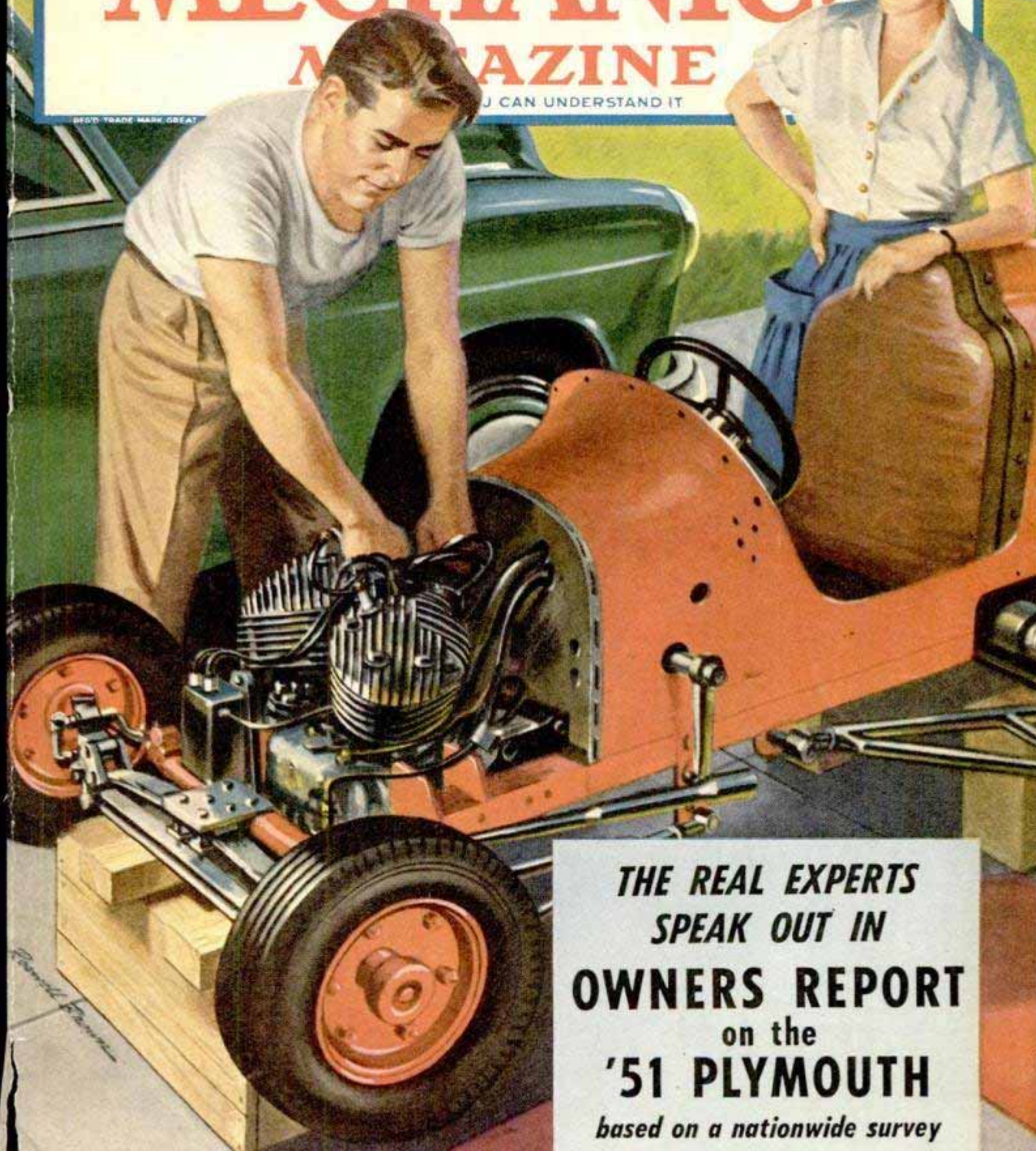


# POPULAR MECHANICS

## MAGAZINE

YOU CAN UNDERSTAND IT

REG'D TRADE MARK GREAT



**THE REAL EXPERTS  
SPEAK OUT IN  
OWNERS REPORT**  
on the  
**'51 PLYMOUTH**  
*based on a nationwide survey*

ALSO

**How to Build This Midget Racer**

**A rust-clogged radiator overheats,  
causes trouble and expense**

**CLEAN  
OUT  
RUST**

with

**DU PONT Cooling System CLEANSER**



You can prevent engine overheating by cleaning out rust, scale and scum in the cooling system. Just pour in a can of DU PONT CLEANSER, run

the engine for 30 minutes or more, then drain. It's easy to do, cleans thoroughly and safely. No reverse flushing is required.



**KEEP OUT RUST WITH**

**DU PONT  
Acid and Rust  
INHIBITOR**



After cleaning, you can keep your radiator free from rust all season by pouring in DU PONT ACID AND RUST INHIBITOR. It retards rust and keeps out acid.

**PREVENT LEAKS WITH**

**DU PONT  
Cooling System  
SEALER**

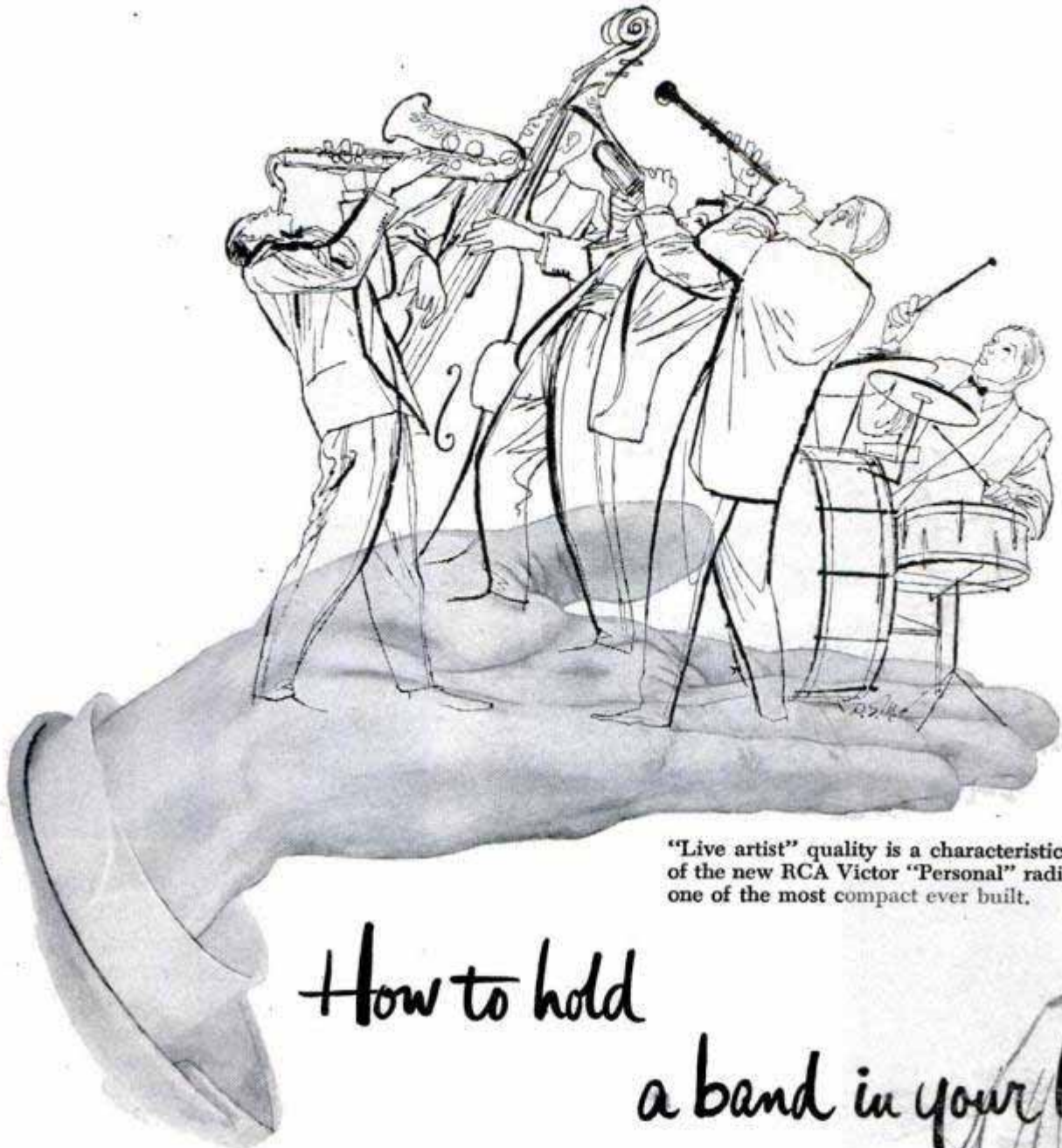


You can stop leaks quickly and securely—and help prevent leaks in the future—by pouring in DU PONT COOLING SYSTEM SEALER. It won't clog the radiator.

**DU PONT**

REG. U. S. PAT. OFF.

**BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY**



"Live artist" quality is a characteristic of the new RCA Victor "Personal" radio, one of the most compact ever built.

# How to hold a band in your hand!

Tune in this new RCA Victor "Personal" radio—no bigger than a book. From it pour the full tones of any orchestra—so full of "living presence"—that it's like holding a band in your hand.

This instrument grows directly from research at RCA Laboratories. Scientists and engineers here perfected highly efficient circuits and electron tubes—powered by miniature RCA Batteries. Its built-in antenna gives peak per-

formance at home or "on the road." Its miniature loudspeaker offers fine acoustical performance in minimum space.

Development of this handsome portable radio, weighing less than 4 pounds, is another example of RCA research and engineering at work for you. Result: a totally new satisfaction from a small "Personal" radio.

\* \* \*

See the latest wonders of radio, television and electronics at RCA Exhibition Hall, 36 West 49th Street, N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, N. Y.



For another example of how RCA Research works for you, see the new RCA Victor "Personal" radio today. Model B411—at your local RCA Victor dealer's.

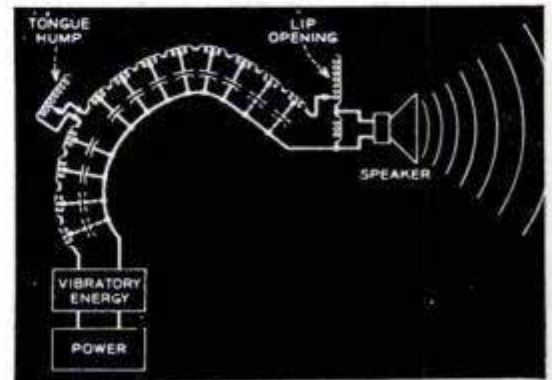
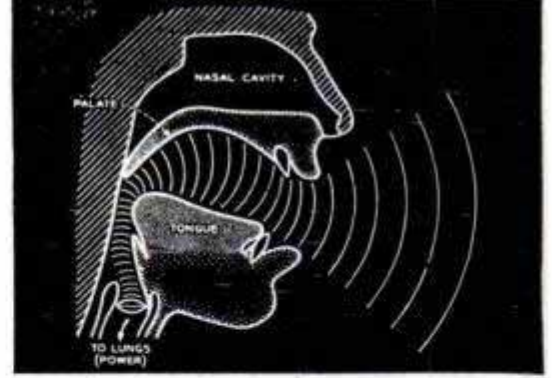


**RADIO CORPORATION of AMERICA**  
*World Leader in Radio — First in Television*





# It tells how you talk



*The machine at the left is saying "Ah!" It's the new electrical vocal system developed at Bell Laboratories. Top sketch shows human vocal system also saying "Ah!" The electrical model is sketched below it. Energy source at bottom of "tract" can emit a buzz sound, like vocal cord tone, or the hiss sound of a whisper.*

No one else speaks exactly like you. Each of us uses different tones to say the same words. To study and measure *how* we make speech, acoustic scientists of Bell Telephone Laboratories built a model of the vocal system.

Electric waves copy those of the vocal cords, electric elements simulate the vocal tract, and, by adjustments, vowels and consonants are produced at pitches imitating a man's or woman's voice.

Using this electrical system, telephone scientists will be able the better to measure the properties of people's voices. Knowing more about speech they can find better and cheaper ways to transmit it.

This is another step in the research at Bell Telephone Laboratories which pioneered the exact knowledge of speech. Past work in the field is important in today's fine telephone service. Still deeper understanding is essential in planning for tomorrow.

**BELL TELEPHONE LABORATORIES**

Exploring and inventing, devising and perfecting, for continued improvements and economies in telephone service

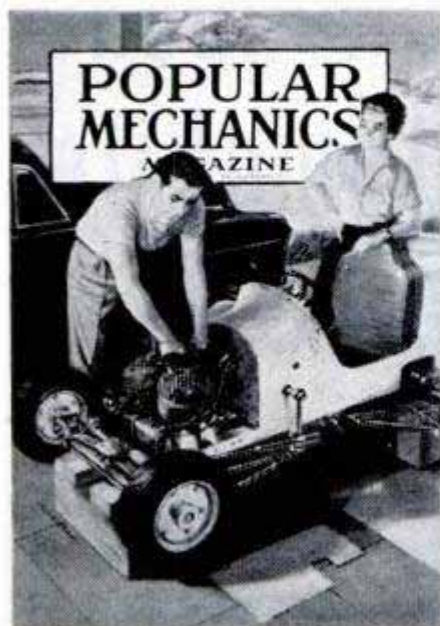


# Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, *Founder*

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



## this month's cover

JUST FINISHED and ready to zip around a "popcorn bowl" is this "TQ" midget racer. In our June 1950 issue, we published a feature on the little racers, which were inspired by kids' sidewalk autos. Three months after the article appeared, the Three-Quarter Midget Racing Association was bogged down with more than 3000 inquiries, most of them requesting plans for building one of the little cars. A reply starts on page 201, where you'll find step-by-step instructions complete with photos and exploded diagrams. Our TQ was designed for back-yard machinists. It's easy to build and most of the parts are standard—you can find them at an auto cemetery. A motorcycle engine serves as power plant. TQ races first were held on the West Coast but the sport is migrating east at top speed. Don't underestimate the midgets—a well-built TQ racer, after delicate tuneup, will snarl around the track at 100 miles an hour

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Eastern Editor.....Richard F. Dempewolff  
 Empire State Bldg., Room 2906, New York 1, N. Y.

Western Editor.....Thomas E. Stimson, Jr.  
 302 23rd St., Santa Monica, Calif.

Representative in Great Britain.....Douglas W. Wedderspoon  
 77 Baker St., London W. 1, England

Director, Bureau of Information.....Allan Carpenter  
 200 E. Ontario St., Chicago 11

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# Here is something you don't know about your own automobile

Let's say you're driving your car on a level road at 40 miles per hour. Do you know that *half* the power generated by your motor never reaches the rear wheels; doesn't help your car go farther or faster or climb a steeper hill?

And do you know why? Because automotive engineers have proved that 50% of that motor's power is used to overcome *engine friction*.

Therefore any lubricating oil which further *reduces* this engine friction can't help but deliver the same power with *less* gasoline.

That's exactly what Macmillan Ring-Free Motor Oil does. And we don't just think it's true—we *know* it's true. Here's how we proved it beyond question:

There is a machine called the Dynamometer. It is a scientific way to measure the power an engine delivers to the rear wheels. Cars of all makes, models and ages—cars that had been using *every* nationally known brand of motor oil—were used in this nation-wide test. Hundreds and hundreds of them. And what was the result?

After the oil in these cars had been changed to Macmillan, *the same power was developed with an average of 8% less gasoline*.

The minute you change to Macmillan, you'll get an increase in power and gasoline mileage. You cut down on "drag"—your gasoline "pushes" easier than before. After the second or third drain, the average motorist gets an increase in gasoline mileage of 8%! That's because Macmillan


has not only reduced engine friction but also has reduced carbon and gum deposits in the combustion chamber, on rings, valves, and valve stems. This results in higher compression because of better piston seal—smoother operation, and less tendency for the motor to ping.

That means, at an average price of 25¢ per gallon, you can save 2¢ on every gallon of *gas*—simply by changing your motor *oil*.

That's a big saving— isn't it? Yet it's small when you realize *how much more* you save in repair bills. Because: The less friction, the less wear and tear on your car. New motors stay newer longer.

You can't laugh off proof like that—proof that makes dollars-and-sense! Especially when, on top of all this, Macmillan Oil actually *removes carbon from your motor*—cleans your motor as you drive.

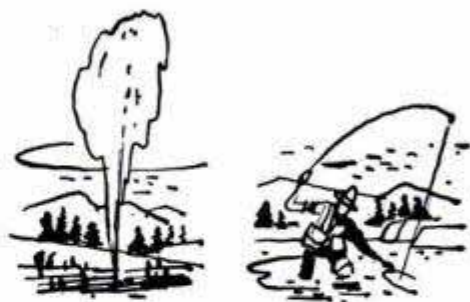
Ask for this fine motor oil at any one of the independent service stations, garages and car dealers where you see the sign of the big red "M." It means Money in your pocket, Mileage in your car. Try the *OIL* that makes your *GAS* go farther.

  
President

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P.S. If you are unable to locate a Macmillan dealer, write to me and I'll be glad to direct you to the *one* nearest you. R.S.M.

# You'll see more, go farther, spend less riding a HARLEY-DAVIDSON *HYDRA-GLIDE*®



IT'S like nothing else in this world . . . that "out in the open" feeling you get on a Harley-Davidson Hydra-Glide. Nothing to obstruct your view; nothing but the great outdoors all around you . . . and the feel of the wind, song of birds, fragrance of roadside flowers blending with the soft purr of surging power beneath you! You get around easier, too . . . see out-of-way places, hidden scenic splendors, vacation regions so hard to reach by train or bus. You travel comfortably, too, go miles farther in a day without tiring. At trip's end you've seen more, spent less, had more fun! This year give yourself a new vacation treat . . . a thrill-packed tour on a Harley-Davidson Hydra-Glide! See your dealer today.

HARLEY-DAVIDSON MOTOR CO., Dept. P, Milwaukee 1, Wisconsin

Name.....

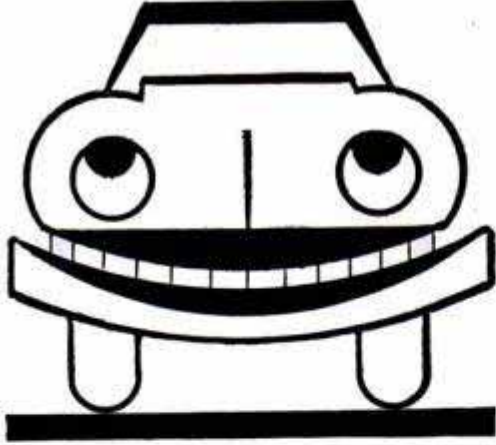
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for



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If your motor could talk it would say, "Thanks, Mister for giving me Pyroil. It makes me feel so good inside. It keeps my vital parts so slick, smooth and friction-free.\* Best of all, it keeps me young, alive and full of 'go'. And that means that you and I, Mister, will be driving around together a lot longer—a lot better.

"So when you hear me 'hum' inside, you know it's just my way of saying, Thanks, Mister for Pyroil — for adding miles to *your* car."

\*Because Pyroil gives oil the property of clinging to metal surfaces, assuring minimum wear due to friction.

### Pyroil for Aircraft Engines

Use Aircraft Pyroil B for lubricating oil, Aircraft Pyroil A for gasoline.

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An attractive Pyroil metal savings bank — takes coins up to 50¢ pieces. **MOTORISTS**, it's yours for the asking — sent postage paid.



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in this corner.....

## THE EDITORS



LT. CMDR. ARTHUR L. SCHOENI, author of "Fire Bombs Blaze a Trail of War" on page 108, is the globe-trotting editor of Naval Aviation News—"official bullhorn," he says, "of Navy men who wear wings." Schoeni was born in Illinois 38 years ago but lived in Oregon and Washington from the time he was seven, and was bureau manager for the United Press at Salem, Portland, Olympia and Seattle for a number of years. His career with Naval Aviation News began at the outset of World War II. Since then he has flown a crisscross pattern across all the Naval districts in just about every type of plane the Navy uses, digging up stories about everything from nuts and bolts to the latest carrier jets. A tall, blond, Viking type with a nose for news, he may be found in Guantanamo, Cuba, one week, Pearl Harbor the next, and back in the Pentagon a few days later, grinding out a sheaf of reports for his magazine. He's also a photographic expert. His gripping story in this issue on the effective use of napalm bombs in Korea is his second for *Popular Mechanics*.

### Letter to the Editor

While the undersigned was going through the August 1950 issue of your esteemed magazine he was very much pleased to find

(Continued to page 8)





To the man who wants to enjoy  
**an ACCOUNTANT'S CAREER**



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

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

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

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

An accountant's duties are interesting, varied and of real worth to his employers. He has *standing!*

Do you feel that such things aren't for you? Well, don't be too sure. Very possibly they *can* be!

Why not, like so many before you, investigate LaSalle's modern Problem Method of training for an accountancy position?

Just suppose you were permitted to work in a large accounting house under the personal supervision of an expert accountant. Suppose, with his aid, you studied accounting principles and solved problems day by day—easy ones at first—then more difficult ones. If you could do this—and could turn to him for advice as the problems became complex—soon you'd master them all.

That's the training you follow in principle under the LaSalle Problem Method.

You cover accountancy from the basic Principles right up through Accountancy Systems and Income Tax Procedure. Then you add C. P. A. Training and prepare for the C. P. A. examinations.

As you go along, you absorb the principles of Auditing, Cost Accounting, Business Law, Statistical Control, Organization, Management and Finance.

Your progress is as speedy as you care to make it—depending on your own eagerness to learn and the time you spend in study.

Will recognition come? The only answer, as you know, is that success *does* come to the man who is really *trained*. It's possible your employers will notice your improvement in a very few weeks or months. Indeed, many LaSalle graduates have paid for their training—with increased earnings—before they have completed it! For accountants, who are trained in organization and management, are the executives of the future.

**Write For This Free Book**

For your own good, don't put off investigation of *all* the facts. Write for our free 48-page book, "Accountancy, The Profession That Pays." It'll prove that accountancy offers brilliant futures to those who aren't afraid of serious home study. We'll also include "Ten Years' Promotion in One"—a book which has helped many men. Send us the coupon *now*.

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  - Stenotypy  
 (Machine Shorthand)

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I want to be an accountant. Send me without obligation, "Accountancy, the Profession that Pays"—also "Ten Years' Promotion in One."

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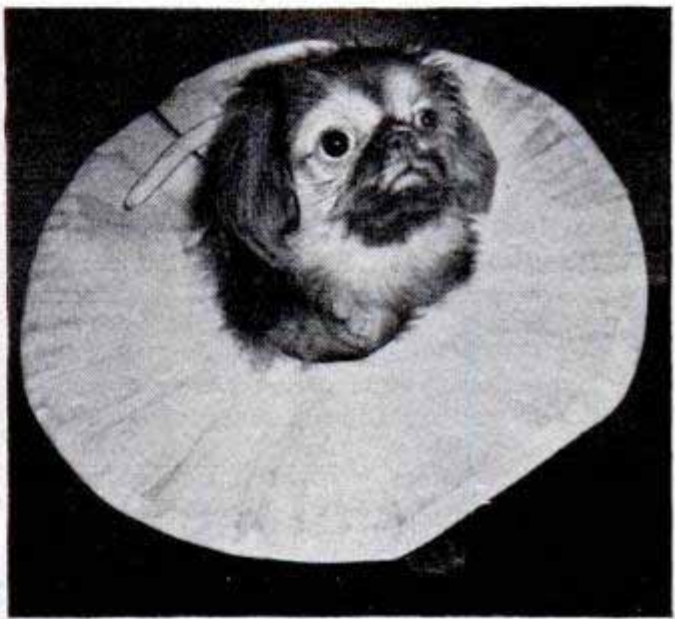
TRAIN IN MIAMI--AIR CAPITAL OF THE WORLD

that it contained a big treasure of useful information about easy spare-time cottage industries.

The one that attracted us most is a handloom on page 70 . . . Being producers of cotton, we are keenly interested and would like to know if you can arrange its export on a commercial scale . . . Our government is encouraging such cottage industries.

We are also keenly interested in a similar machine which could produce 20 single, and 40 single cotton yarns. If any of your readers can help us in this, we shall be very grateful.

Saiyid Hadi Husain Rizvi,  
Shirkat-Ul-Kasibin, Importers,  
Wood Street, P.O. Box 1006,  
Karachi 2, Pakistan.



### Prima Donna in an Elizabethan Ruff?

No, this is somebody's darling, a Pekingese on sick leave—one of the principals in the story next month of New York's Speyer Hospital for Animals, where every year are treated some 25,000 pets and strays, monkeys with city jitters, alligators with the itch, movie stars like the Yearling and cats with an appetite for glass. If you like animals, don't miss it!

### Letter to the Editor

Just picked up my monthly copy of *Popular Mechanics* at the newsstand. May I congratulate you on the fine article on the *Popular Mechanics* Ranch House.

It is certainly a beauty, and very well arranged.

Yours very truly,  
Robert L. Moulton,  
Ottawa, Ill.

(Continued to page 10)

# NOW!



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You can, if you start preparing yourself immediately. And the International Correspondence Schools can help you.

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Through a typographical error the manufacturer of a nonjamming zipper with a release mechanism was shown in our May issue, page 104, as "Zee Zipper." The correct name is Kee Zipper Co., 350 Fifth Ave., New York City 1.

### Letter to the Editor

Inasmuch as I am a constant reader of your magazine I, obviously, like it. However, the automobile articles by Floyd Clymer are the best ever. We "lay people" need such data and information as he gives out and will look forward each month to the car covered therein. Thanks.

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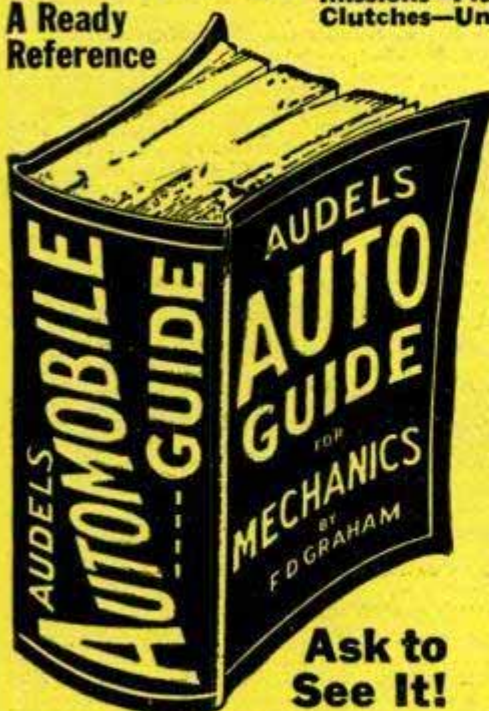
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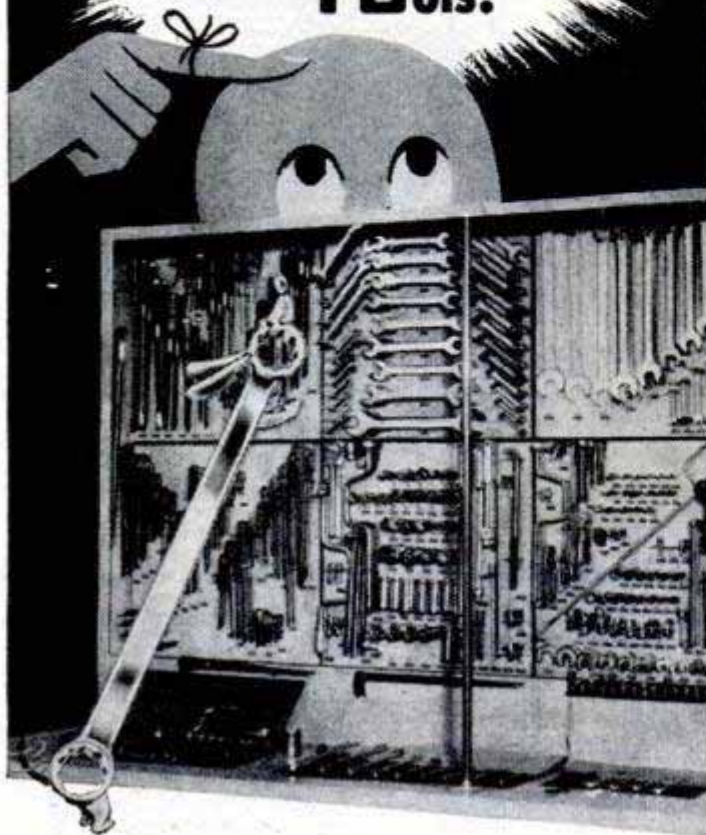
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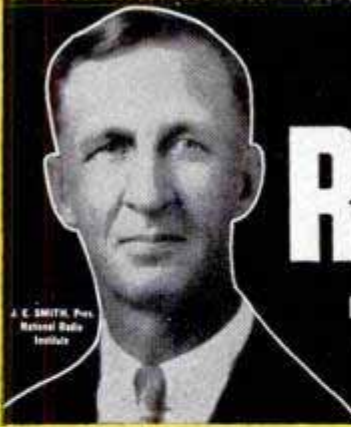
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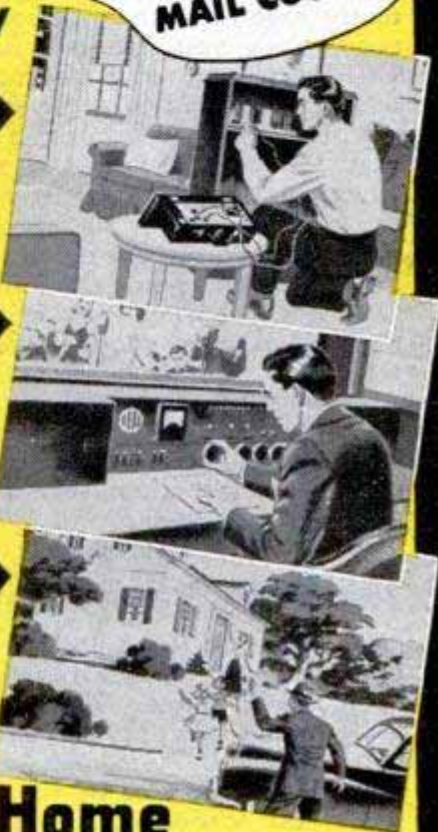
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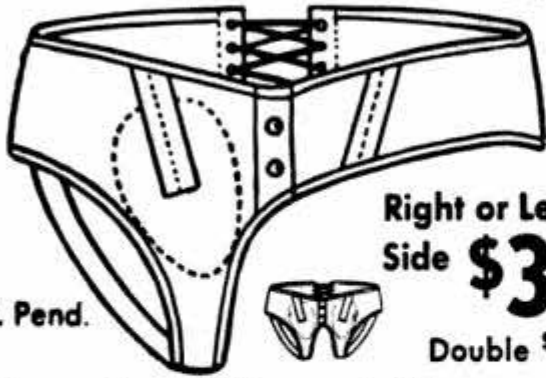
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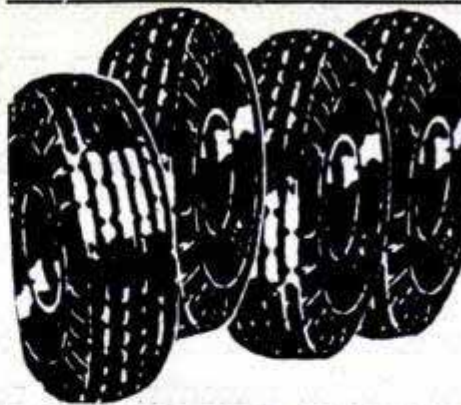


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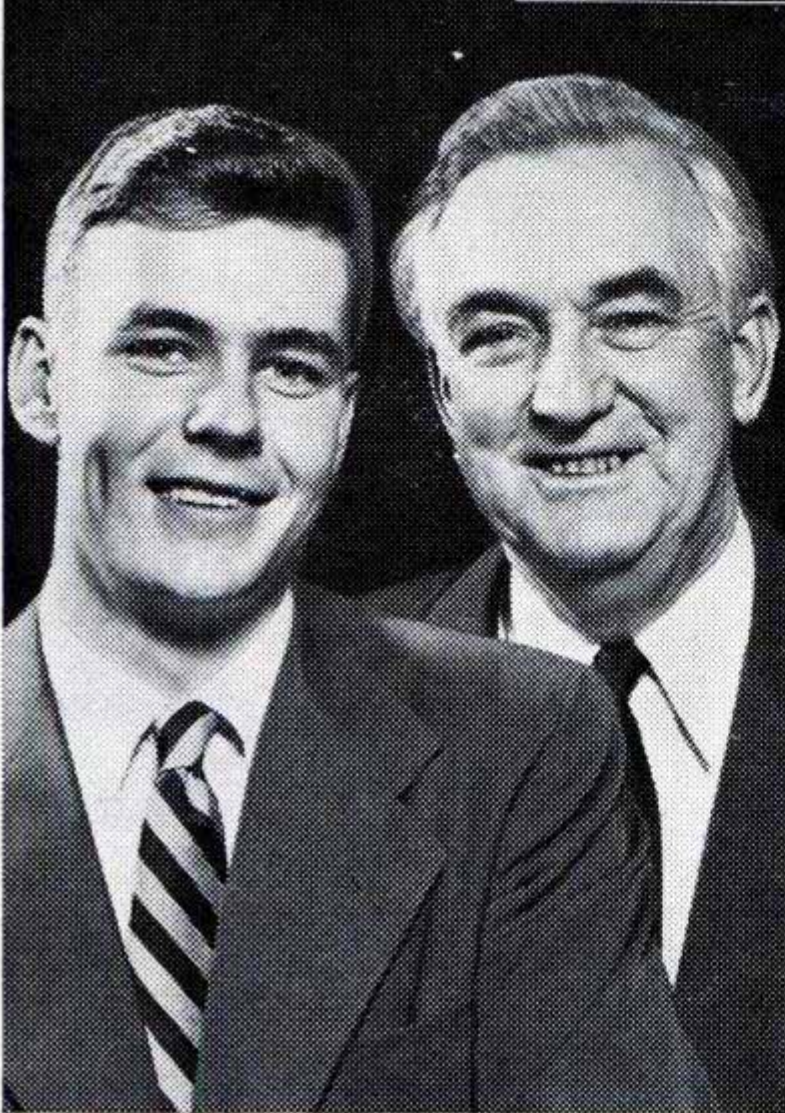


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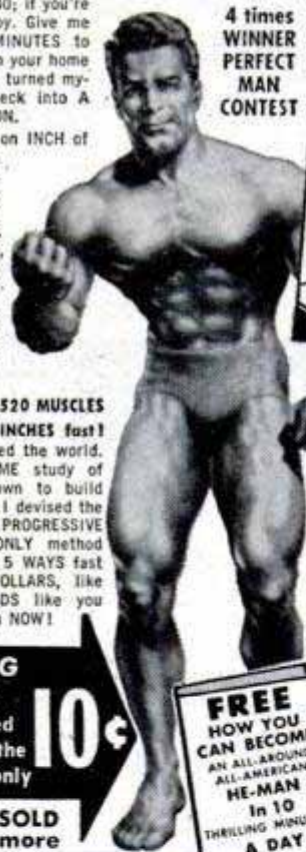
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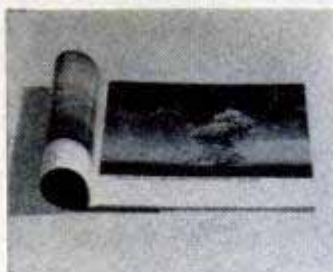
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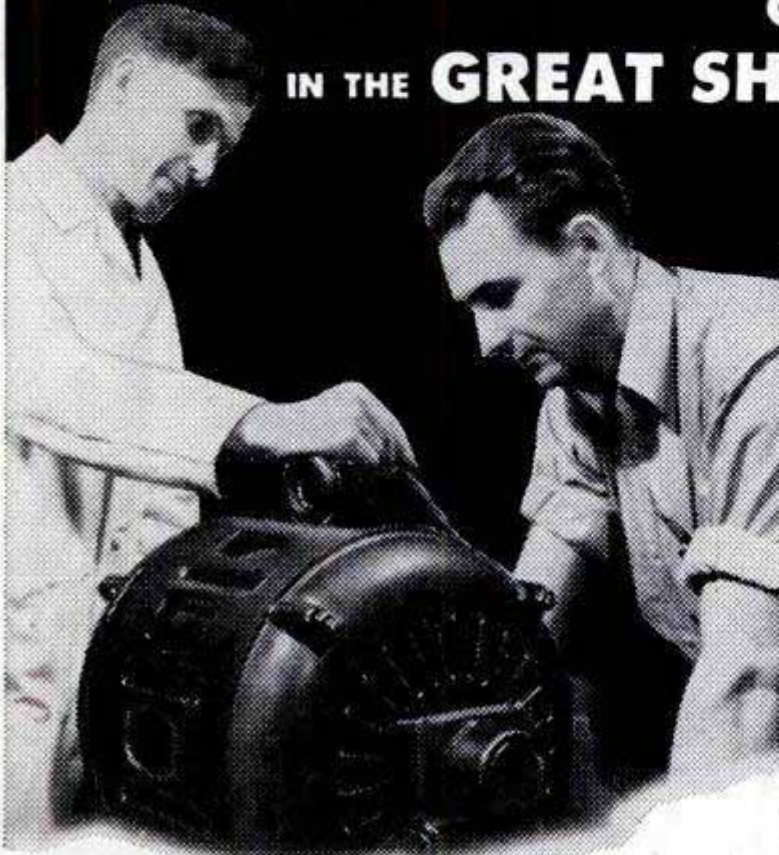
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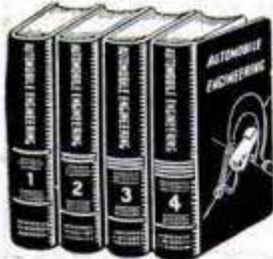


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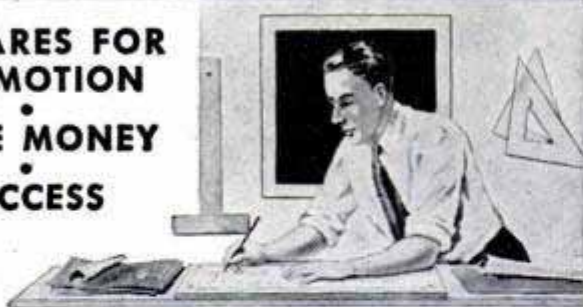
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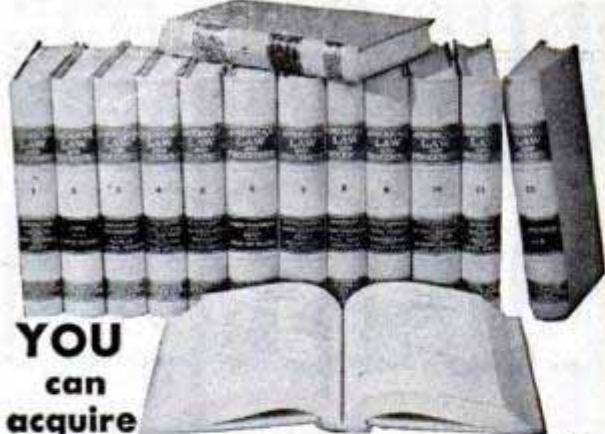
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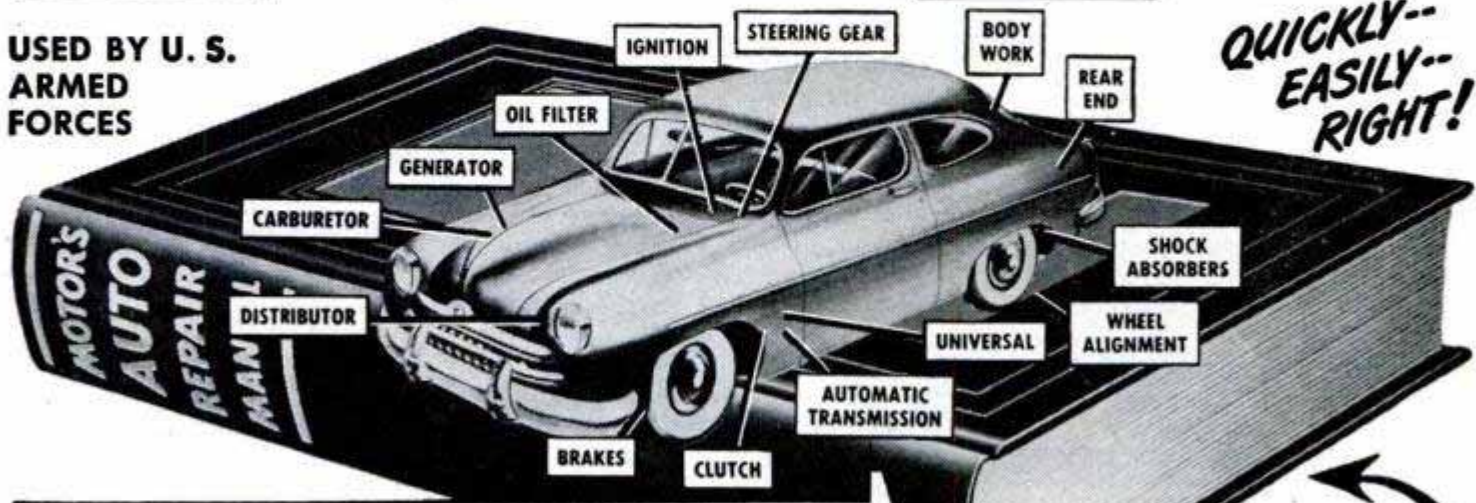
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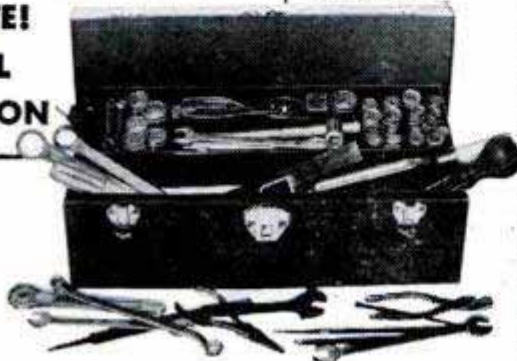
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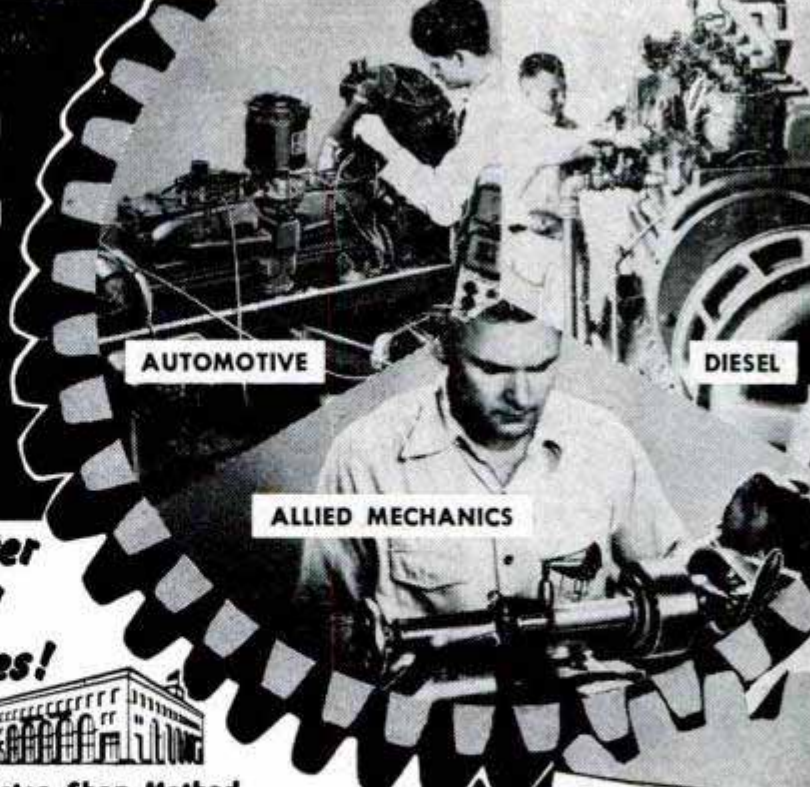
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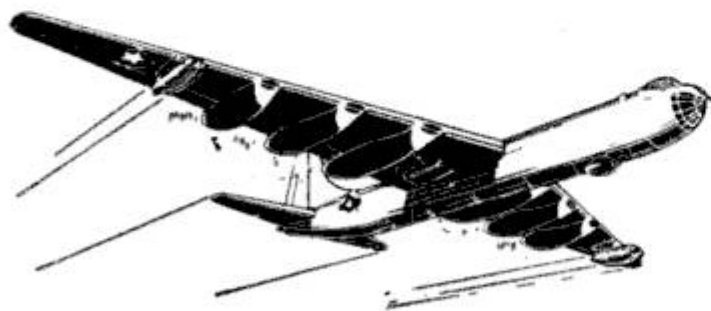
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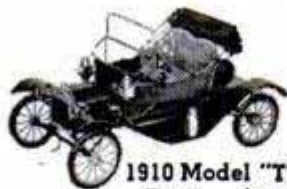
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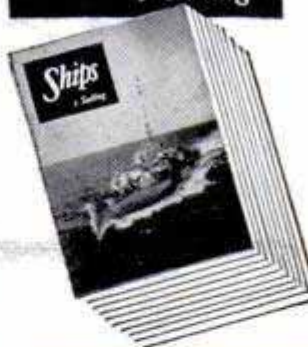
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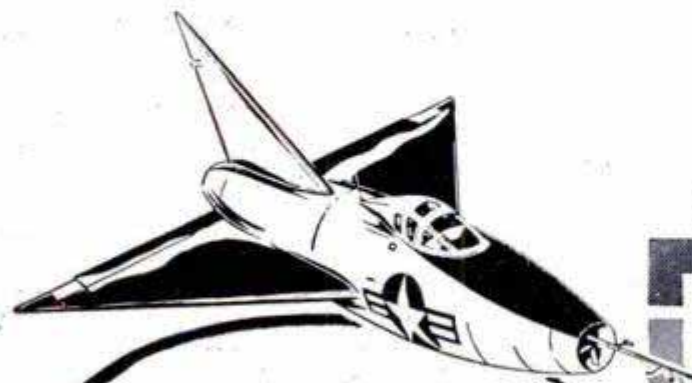
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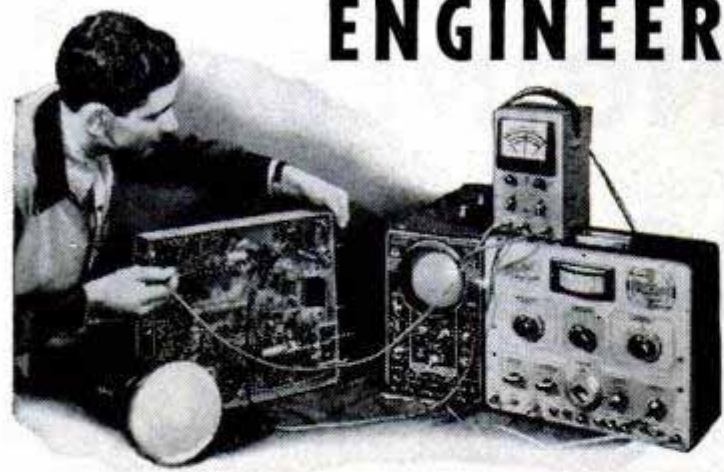


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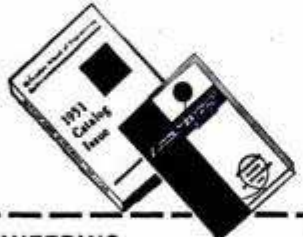
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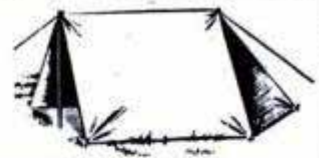
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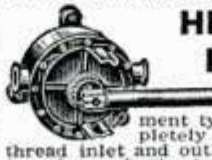
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**BIG Money!** Spare or full time in your home. No selling! Spray new miracle finishes, plush and suede, on signs, radios, automobiles, figurines, lamps, toys, etc. Our business is booming. Help us fill huge demand. New easy Plok-Kraft methods. Material costs few pennies. You get dollars. Free samples, complete powerful money-making plan free. Write now! Coast, 1002K S. Los Angeles St., Los Angeles 15, Calif.

**MORE** Money in closeouts. Pricelist free. Metro, 60 South Street, Boston 11, Mass.

**MIRROR** Resilvering. Wonderful home business. Complete formula 50c. Magic two-way mirrors. You can see out—no one can look in. Formula 50c. How to make coppered mirrors, vases, glasses. Formula 50c. All three \$1.00. Nelko Chemical Service, Box 3462-MG, Chicago 54, Ill.

**\$46 FROM** Square foot plywood; jigsaw necessary. Literature free, write today. Woodarts, Bridgewater, Mass.

**MAKE** Perfumes, write, "Carey Laboratories," 1914 Chouteau PM-7, St. Louis 3, Missouri.

**TRADE** Magazines help you to success. Get latest copies through our easy-to-get-acquainted service. Nearly 1200 business, professional, agricultural, automotive, educational, sport, hobby, music, writer, television, etc. List free. Commercial Engraving Publishing Co., 34C North Ritter, Indianapolis 19, Indiana.

**MAKE** Tough, durable plastic—1c pound. Makes attractive floors, walls, built-ins, roofs. Build good home, \$150.00 room. Bays Laboratory, Oklahoma City 9.

**MAN!** These are hot! Make \$6.35 on every sale. Sales are really easy. New adding machines in original factory cartons you can sell for only \$12.95 and you make over 45%. They're executive model portables, precision built, fully guaranteed. Send for life-size color photo with full details. Write today to Lightning Adding Machine Co., Inc., Dept. P-7, 1260 West Second St., Los Angeles 26, Calif.

**SPECIAL** Rubber for making molds. Literature and sample free. Universal, Box 1076-A, Peoria, Ill.

**\$10 HOUR!** Complete invisible reweaving course, including everlasting equipment and supplies \$3. Details free. Walsh, 894 Main, Buffalo 2, N. Y.

**AMAZING** New, formulas. Dr. Hertzstein, 511 Thomas, Grand Rapids, Mich.

**PROFITABLE** New sawing method. Zapart, 586-PM Manhattan Avenue, Brooklyn 22, New York.

**MAIL** Order strictly co-operative, unusual opportunity. Items of merit. Sample details \$1.00. Manager, P.O. Box 757, Newark, N. J.

**EARN** Up to \$400 monthly raising Angora or New Zealand rabbits. Plenty markets. Particulars free. White's Rabbitry, Newark 92, Ohio.

**BOOKKEEPERS.** Keep books, small firms spare time. Manual latest technique by C.P.A., \$3.00. Modern Business, Box 406, Youngstown 1, Ohio.

**BE** Your own boss. 137 successful business plans. Full, spare time. No capital, experience or canvassing. Free details. Stanko, 6215 Woodhaven, Rego Park, New York.

**LEARN** Invisible reweaving, repair dolls, make rubber stamps, repair sewing machines. Catalogue of "40 Ideas" free. Universal, Box 1076-A, Peoria, Ill.

**FIX** Typewriters—Home study course quickly trains you for own business. Factory methods taught. Write: Typewriter Repair, 7915 Corbet, Tarentum, Penna.

**FREE** Book "372 Unusual Worldwide Businesses." Work home (U.S.A.)! Publisher, Carlsbad, Calif.

**WHITE'S** Comb vendor. Real money-maker. Buy one. Convince yourself. 865 Grace Street, Elgin, Illinois.

**DOLLARS** Daily in mail. All profit plan. Free details. Veejay, Box 14707-M, Cimarron Sta., Los Angeles 18, Calif.

**EARN** Money at home with your typewriter! Spare time! Details free. Edwards, Publisher, 3915-PM, 12th, Des Moines 13, Iowa.

**ESTABLISH** Your own business. Free information. Arrow Press, Box 933, Buffalo, N. Y.

**MAKE** Money spare or full time casting metal toys and novelties. Big wholesale and chain store demand for autos, soldiers, ashtrays, banks, etc., keeps manufacturers busy. Production moulds furnished for up to 100 and more castings per hour. No experience or special place necessary. "Cash-in" on holiday orders now being placed. Write for information and illustrations of patterns needed. Metal Cast Products Co., Dept. A, 1696 Boston Road, New York 60, N. Y.

**TIN-Cans.** Turn them into cash. Nine methods. Instructions 50c. Charles Co., 12-BWP, Norwood, Ohio.

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

**GROW** Mushrooms. Cellar, shed, and outdoors. Spare, full time. Spawn replaced free. We pay \$3.00 pound. We paid O. Babbitt \$4,165.00. Send \$2.00 for general information book. Washington Mushroom Ind., Dept. 125, 2954 Admiral Way, Seattle, Wash.

**\$250 WEEK** Reported! Free book, "505 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

**INDIAN** Carpets; arts, crafts; postage stamps; etc., available. Viegas, Post Box 1477, Bombay, (India).

**MAKE** Sell perfume. Home business opportunity. 2 popular fragrances, blender, base, bottles, labels, instruction folio. \$18 retail value—\$2.00. Genmerco, Box 142-P, Dorchester 24, Mass.

**SEWING** Machine spare and full time repairmen wanted. We train you. Income unlimited. Motors, new machines, supplies furnished. Write Taylor Service Co., Hamilton PM7, Ohio.

**PRINT** Without a printing press. Big profits! See page 20.

**PROFITABLE** Mailorder business. Free details. Paley, 3519-M Charles, Cincinnati 8, Ohio.

**MAKE** Perfume and cosmetics—Instructions free. "International," 6347 Parnell-PM-7, Chicago 21, Illinois.

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**NEW** Exceptionally profitable plans—ideas for home operated mail business. Rush name. Miller, 1772-P Carlyon Road, East Cleveland 12, Ohio.

**FREE** Illustrated instructions, casting novelties. Genuine latex for molds. Major Latex & Chemical Co., 25 Allerton St., Boston 19, Mass.

**ESTABLISH** Profitable home mail business. Exclusive built-to-order proposition service. Everything handled for you. Booklet free. NMD Agency, Box 88-W, Dorchester 22, Mass.

**ELECTROPLATE** Metals, mirrors, non-metals. Inexpensive, profitable home process. Free booklet. Tyco Metals, Box 13231-T, Houston 19, Texas.

**START** A venetian blind laundry. Profit opportunity for lifetime business. New machine method. Free booklet on request. F. C. Co., 442 N. Seneca St., Wichita 12, Kansas.

**MAKE** Money at home as renewal headquarters for all magazines. Liberal commissions. No experience, no capital needed. Supplies furnished. Write for free catalog. McGregor Magazine Agency, Dept. 500B, Mount Morris, Ill.

**SELL** By mail, free details. Instructive booklet 25c. Manhattan House, Box 50-M, New York 28, N. Y.

**INCOME** From local information. No selling. Write Neherco, La Verne, Calif.

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

**QUICK** Sign painting. Use letter patterns, avoid sloppy work, wasted time. Write for folder. John Rahn, A1330 Central, Chicago 51.

**BOOKKEEPERS** Earn \$100.00 weekly operating simplified "Bookkeeping-Tax Service." Details free. Universal, Box 664-M, Springfield, Mo.

**BIG** Time earnings selling popular repeat-order merchandise by mail from your home. Everything furnished. Spalding, 254-P Taylor Blvd., Millbrae, Calif.

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

**A** Business in your own home! Our chemicals, plus free water and cheap "grocery store" materials can bring you over \$500 monthly earnings. Plans and formulas free. Western B Aircraft, Los Angeles 19.

**BUY** Wholesale—Million articles. Supply source directory, dime. Nelko, Box 3462-DR, Chicago 54, Ill.

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

**NEED** Money? Stop wishing! Do something! Free information. E. L. Glodfelter, Box 23, Loganville, Penna.

**NEW** Profitable home business repairing zippers. Thousands of customers waiting. No experience required. We furnish everything. Write Texas Specialty Company, 204-B Texas, Texarkana, Texas.

**UNPAINTED** Bookends, plaques, statues, figurines. List. Haverly Products, 822-17th St., Altoona, Penna.

**EARTHWORM** Breeding. Valuable bulletins on successful methods mailed free. Earthmaster System, Dept. 14, El Monte, Calif.

**YOUR** Own profitable home business. Preserve live flowers to last for years. New simple discovery. Enormous demand all year 'round. Tremendous profits! Light fascinating work. Send \$2.00 for working equipment, instructions, and valuable sales plans. Satisfaction guaranteed or money promptly refunded. Alfred Hermansen, 210 Fifth Ave., Suite 1102A, New York 10, N. Y.

**WANTED!** Home producers by manufacturers in our clearing house service. Become a sub-contractor, casting plastic products for these companies. Thousands of easy to make items required. Cash in at home without previous experience. For details write Plastic Service Guild, Dept. PM, 233 Condon St., E. Boston 28, Mass.

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

**THOUSAND** Articles wholesale. "Supply Source Directory" 10c. Ideal Service, Park Ridge 30, Illinois.

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

OF EARLY Profitable man or business. Write Walter Service, 4159-A East 112th, Cleveland 5, Ohio.

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

**FABULOUS Earnings**—Fascinating pastime. Growing genuine, living miniature (ming) tree. New sensational business or hobby. Astounding information free. Dwarf Gardens, Box 355B, Briggs Station, Los Angeles 48, Calif.

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

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

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

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

**MADE** \$24,500 Using money making plans from Schemer Magazine, world's oldest mailorder publication. Box 275M, Canfield, Ohio. Year \$2.00. Sample 20c.

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

**POPCORN** And potato chip equipment. Long Eakins Company, 5160 High, Springfield 99, Ohio.

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

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

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

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

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

**MEN**—Women. Everybody likes candy. Learn to make professionally. Our 40th year. Ragsdale Candies, D5, East Orange, New Jersey.

**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.

**MONEY** In new greaseless doughnuts. Start in kitchen. No smoke. Sell stores. Free recipes. M. Ray Company, 3605 South 15 Ave., Minneapolis 7, Minnesota.

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**FREE!** Moneymaking plans galore. Wilbur Erickson, Box 141, Englishtown, New Jersey.

**ONE** Way mirror, picture transfer, other profitable formulas. List free. Bruce, Box 341-PM, Palo Alto, Calif.

**\$35 WEEKLY!** Home! Two hours daily! 27 amazingly unusual ways! Walsh, 894 Main, Buffalo 2, N. Y.

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

**CONVERT** Burnt out light bulbs into an item needed and wanted in every home. Nearly all profit. Copyrighted instructions \$1.00. Or write for details. Fred A. Lewis, Box 104, Kensington Sta., Brooklyn, N. Y.

**100,000 MONEY-Making** ideas. World's greatest collection. Catalog 25c. Cummings, 1321 Arch, Philadelphia 7M, Penna.

**ACTIVE** The making is fascinating, profitable! Detailed manual explains everything: casting, dipping, scenting, coloring, marketing! Price only \$1.00. Full return privileges. Candle Craft, Sylvan Lake, Mundelein, Illinois.

**\$250 WEEK** Reported! Free book. "505 Odd, Successful Businesses." Work home. Expect something odd! Pacific, Oceanside, Calif.

**GROW** Mushrooms. Cellar, shed, and outdoors. Spare, full time. Spawn replaced free. We pay \$3.00 pound. We paid O. Babbitt \$4,165.00. Send \$2.00 for general information book. Washington Mushroom Ind., Dept. 108, 2954 Admiral Way, Seattle, Wash.

**"HOW Rich Men Get That Way."** Secrets to great wealth revealed in book. \$1.00. Morley Publishing Co., 425-43rd St., Sarasota, Florida.

**CONTEST** Fortunes! How and where to win your share! Stamp. National Contest Bulletin, Box 2685-P, Miami 16, Fla.

**MAKE** Backyard profits! Unusual opportunities! Details free. Pickett's, Florence, Kentucky.

**MEXICAN** Jumping beans 150% profit. Details. Mann's, 5330 No. Natoma, Chicago 31.

**WANT** To sail merchant ships? Outstanding wages to \$400.00. Beginners \$220.00 monthly. Only \$3.00 delivers bargain. American Seamans Guide, 545 5th Ave., New York City.

**MAKE** Money at home. 101 ideas for full or spare time earnings. Proven winners. All for 25c. Thomas F. Patrick, c/o State Farm, Pikeville, Tennessee.

**"WATERLESS** (Lanolin) Hand Cleaner." (Oil base.) Make, sell. No machinery. Build profitable business. Complete formula \$1.00. Ideal Service, Park Ridge 3, Ill.

**DOLLARS** Three ways with "Kitty-Kat" ready-cut baby shoes. Complete local and mail order plans. Write No-Co-Ro, Oakland 6-K, California.

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

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

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

**LEARN** How others earn money at home! Write—A. Sizemore, 4917 Kostner, Chicago 30, Ill.

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

### **FORMULAS, PLANS, ETC.**

**10,000** FORMULAS, Processes, trade secrets, etc. 900 pages, \$3.98 postpaid. K. Paulin, Loudonville, Ohio.

**ANY** Formula \$1 or refund. Dr. Paul, 11559 Kling Street, North Hollywood, Calif.

**FREE** Formula literature. Popular fast-selling products. Flashy label designs. Majestic, 530½ S. Main, Elkhart, Indiana.

**FORMULAS.** Latest, best. Catalog and chemical instruction sheet 10c, (refundable). Nelko Chemical Service, 3462-F Merchandise Mart Sta., Chicago 54, Ill.

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

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

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

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**NEW** Liquid plastic. Clear, colors. Cast without heat. Embed flowers, insects, coins. Saw, drill, carve. Free folder, "Liquid Magic," shows fine things you can make and sell. Write today. Castolite, Dept. H-101, Woodstock, Illinois.

**PLASTIC** Consulting services to small businesses. 65 East Rich Street, Columbus 15, Ohio.

**MAKED** Square root (12 x 12) cost, 1/16", \$1.20; 1/8", \$1.40; 3/16", \$1.75; 1/4", \$2.08. Include 10% postage. Almac Plastics, 230 Fifth Ave., New York 1, N. Y.

**PLASTICS**—This catalog is your bible. Wholesale, retail quantities. Lucite, plexiglas, acetate, sheets, rods, tubes. Casting, molding plastics. Dye manufacturer. Internal carving supplies. Findings, supplies. Catalog, 10c. 25c airmail. Gem-O-Lite, Box 6862, North Hollywood, Calif.

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

### **CHEMISTRY**

**CHEMICALS.** Materials. List 10c. Welch Laboratories, Box 1831, Long Beach, Calif.

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

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### **AGENTS WANTED**

**MAKE** Extra money quickly! Take easy orders from friends for outstanding Christmas, all-occasion greeting cards, gift wrappings, novelties. Big profits. Bonus. Experience unnecessary. Request feature assortments on approval, free samples name imprinted Christmas cards, stationery, napkins and free catalog. New England Art Publishers, North Abington 503-C, Mass.

**EVERYBODY** Uses handkerchiefs; buy from leading manufacturer. Write Stan-chief, 1 Bond St., New York 12, N. Y.

**DO** You need money? \$35.00 is yours for selling only 50 boxes of our 300 Christmas card line. This can be done in a single day. Free samples. Other leading boxes on approval. Many surprise items. Experience unnecessary. Free samples personalized Christmas cards, stationery, napkins. Write today. It costs nothing to try. Cheerful Card Co., 255 White Plains, N. Y.

**SHINE** Shoes without "polish." New invention. Lightning seller. Shoes gleam like mirror. Samples sent on trial. Kristee 128, Akron, Ohio.

**JUST** Out! New, thrilling sensation in Christmas cards. Make big money! Show lustre foils, satins, brilliants. Amazing values bring easy orders! Christmas cards with name 50 for \$1.25 up. Also imprinted book matches, stationery, many gifts. Get 30 free samples with name; several \$1 boxes on approval. Joy Greetings, 507 N. Cardinal, Dept. J-60, St. Louis 3, Mo.

**FREE** Samples, and amazing plan, giving you gorgeous dress without penny cost. Rush name today, with dress size. Harford, Dept. E-135, Cincinnati 25, Ohio.

**BRAND** New! Amazingly different and smart Christmas cards bring you big money! Take easy orders fast. Pays up to 100% cash profit. Christmas cards with name 50 for \$1.25, up. Big line. Personal stationery and book matches. Get sample assortments on approval, imprints free. Write today. North Star, 31 Glenwood, Dept. T-18, Minneapolis, Minn.

**DISTRIBUTORS!** Automotive product! Tremendous profits! Needed by millions! Northlaker, Peoria 4, Illinois.

**AT** Last! Something new and sensational in Christmas cards. Make extra money fast! Show gorgeous satins, velours, metallics never before offered. Gets easy orders! Pays up to 100% cash profit. Free samples 30 Christmas cards with name, 50 for \$1.25 up. 80 assortments. Personalized book matches and stationery, gifts. Several \$1.00 boxes on approval. Write Puro Co., 2801 Locust, Dept. 140-J, St. Louis, Mo.

**NYLON** Uniforms. Immediate delivery. Immediate profits. Sell to doctors, dentists, nurses, waitresses, beauticians, housewives. Free sales kit. Superior Fabrics, Dept. P-7, 3936 Market, Philadelphia 4, Penna.

**BIG Profits** selling Sunshine's famous exclusive Christmas cards. Tremendous values! 21 for \$1.00, holly assortment. All lined envelopes. Snow scenes, religious, gift wraps, stationery, super value imprints, 50 for \$1.25. Many more! Write for samples on approval, free imprint folders. Act now! Sunshine Art Studios, Dept. PM-7, 115 Fulton St., New York 38, N. Y.

**BUY Direct.** Extra profit. Power mowers—\$46.00 (delivered). Rotacut-PM, Excelsior Springs, Mo.

**ABSOLUTELY Free!** Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 6135, Cincinnati 25, Ohio.

**BUY Wholesale** thousands nationally advertised products at big discount. Sent free "The Wholesale Plan." American Buyers' Service, 629-P Linden, Buffalo, New York.

**MAKE Money fast.** Sell big value Christmas and everyday card assortments to friends, others. 7 leading 21 card \$1.00 boxes. Religious, metallic, comic, secret pal cards. Gift wrappings, ribbons, scented stationery. Many gifts—rain sandals, automatic telephone pencils, totebrushes, napkins. Over 100 items. Amazing profits. Bonus plan. No experience necessary. Write today for samples on approval and special "get started" offer. Hedenkamp, 361 Broadway, Dept. PM-13, New York.

**CALL** On friends with sensational Christmas cards in handy assortments. Exclusive designs. Sell for \$1.00. Profit up to 50c. Also popular-priced personal Christmas cards, everyday assortments, stationery, gift items. Samples on approval. Wallace Brown, Dept. A-4, New York 10, N. Y.

**ANYONE** Can sell Hoover DuPont Nylon uniforms for beauty shops, waitresses, doctors, nurses, others. In white and colors. Exclusive styles. Top quality. Low priced. Exceptional income. Real future. Equipment free. Write fully. Hoover, Dept. N-100, New York 11, N. Y.

**CALENDARS,** Advertising novelties, matches. All styles, including religious, varnished, 12 sheet, girls. Hundreds of advertising novelties, book matches, etc. Fleming Calendar Co., 6539 Cottage Grove, Chicago 37, Ill.

**MAKE** Wedding profits. Sell invitations, napkins, matches. Samples free. Dunbar's, Middlebush 3, N. J.

**IS \$210** A week worth a penny postcard to you? Then rush card with name and address for special free trial plan that sells amazing new automatic refrigerator defroster "like hot cakes!" Write to Mr. Lewis, D-Frost-O-Matic Corp., Dept. PMC-7, 6 N. Michigan, Chicago 2, Illinois.

**CASH** In on spare time. Sell wonderful Regal Christmas cards exclusive with us. 25 sell for \$1.00. Also 50 for \$1.25. Over 150 other boxes. Free samples. Kit on approval. Regal Greetings, Dept. 29, Ferndale, Michigan.

**NEW Bathroom** deodorizer. Hangs on wall. Banishes odors bathroom, kitchen. Lightning seller. Samples sent on trial. Kristee 129, Akron, Ohio.

**SPANISH** Wonderful novelties, cigarette, matches, vanity, cases with typical bull-fight drawings, etc. From one to thirty dollars each. Big profits selling. Write: Jove, Lista 3, Madrid, Spain.

**EXTRA Cash—quick, easy!** Sell friends newest greeting cards. Profits to 50c per \$1.00 box. 21-card \$1.00, comic, Christmas, all-occasion assortments, gift wrap ensembles, exclusive items. Experience unnecessary. Special offers. Bonus. Prompt service. Write for free samples name imprinted Christmas cards, stationery, napkins, book matches, feature assortments on approval. Free catalog. Elmira Greeting Card Co., C-2109 Elmira, New York.

**EXTRA Money!** Big profits selling Christmas cards in spare time. Extraordinary variety name imprinted items, all-occasion assortments, gift wraps, novelties. Experience unnecessary. Free samples personalized Christmas cards, stationery, napkins, matches, etc. Write today. Senrab Co., 129 No. Warren St., Syracuse, N. Y.

**YOU** Can easily make \$27.50 a day selling 50 outstanding Christmas boxes. Up to 100% profit. 40 for \$1.00. Imprinted cards, napkins, stationery; also deluxe lines. Write for free Christmas gift cards, and big money-making catalog. Best-selling assortments on approval. Fannour Corp., 200 Fifth Ave., Dept. JX6, New York 10.

**FREE Sample** nylon stocking of world's only nationally advertised hosiery line actually guaranteed against runs and snags or replaced free within guarantee period to three months! Complete line from sheerest 15 denier to heavy 70 denier service weight. All gauges. Also complete line men's fine hosiery guaranteed for one full year! Not sold in stores. Good Housekeeping Guarantee Seal. No money or experience needed. Nothing to pay now or later. Easiest and quickest sales. Just show free outfits and write orders. We deliver and collect. Advance cash plus huge bonus to 40%. Big money spare or full time. Become manager—appoint others to sell for you. Man or woman, young or old, beginner or veteran, you can earn more money than you thought possible. Everything needed given free. Rush name and address to Kendex Corp., Babylon 73, N. Y.

**HUNDRED Blades** 50c. Thousand English needles \$1.20. Free cutrate wholesale catalogue. Mills Sales, 901 Broadway, New York.

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

**PAINTS—All kinds.** 65c gallon up. Private label. Big profits. Certified Products, Louisville, Ky.

**MAKE Money** easy. Sell Christmas cards. 21 for \$1.00 and others, children's books, personalized cards and stationery, note paper, wrappings and novelties. Send for samples. Howard P. Ellis, Dept. PM-7, Pitman, N. J.

**YOUR Personal** lingerie free as bonus—extra cash besides—introducing sensational Curve-Tailored idea to friends. Outfit free. World's Star, Dept. C-36, Grand Rapids, Michigan.

**DRESSES, 18c;** Coats \$2.00, blouses 35c. Free catalog. Crown, 164-P Monroe Street, New York.

**MEXICAN Feather** pictures. High profit selling gift shops, etc. Adelphi, Box 57-B, Bellerose 6, N. Y.

**BRUSHES** And plastics. Direct factory prices. Large profits. Send for catalogue. Concord, 635 E. 137th St., New York City 54.

**LADIES' Garters, hankies.** Samples 10c. P. Holday, 85-06 96 St., Woodhaven, N. Y.

**ULTRA-Blue** stock signs—6c, sell 35c. 1000 slogans, 7" x 11", comedy, religious, general. 15 samples, \$1.00. Lowy, 812-ML Broadway, New York 3.

**TWENTY** Comical illustrated signs, \$1.00. Sebastian, 5138 Cahuenga, North Hollywood, Calif.

**GORGEOUS** Christmas cards. \$50 yours selling 100 boxes. 40 with name, \$1. Personal napkins, stationery. Wrappings, novelties, gifts. Free samples. Approval box. Torres, 373 Fulton St., Brooklyn 1, N. Y.

**FERTO-Pot,** plant eats pot, and lawn-seeded Ferto-Soil, for patching or building new lawns. Commission 33 $\frac{1}{3}$ %. Allen Co., Pittstown 2, N. J.

**EASY Sales—Big profits!** Miracle advertising signs, re-usable. Sticks like magic to smooth surfaces without glue, tape; leaves no marks. Free samples, details. The Ad-Stik Co., Dept. PM-2, 5850 Centre Ave., Pittsburgh 6, Penna.

**\$50 YOURS.** Sell only 100 boxes new Xmas cards; other amazing offers. Free samples imprinted cards. Feature box assortments on approval; over 100 profitable items. Work with a national leader. Pen-'N-Brush, PM-7, 139 Duane St., New York City 13.

**IF Your town** has parking meters you can sell 39c auto dash coinholder by the thousands. 120% profit. Coinholder Products, Evanston, Illinois.

**\$50 WEEKLY** Selling finest razor blades, other items. Free details. Edison, Department 274, Far Rockaway, N. Y.

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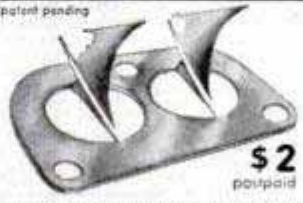
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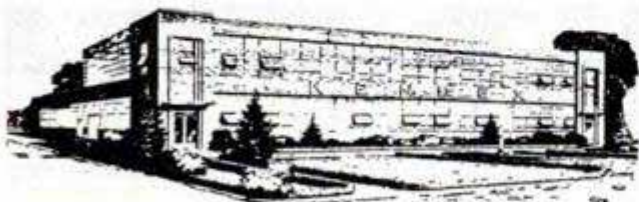
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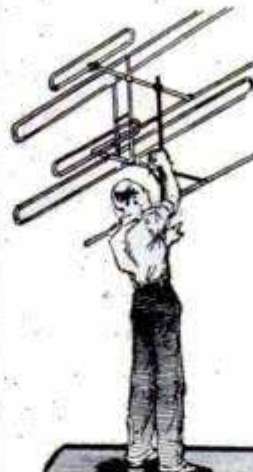
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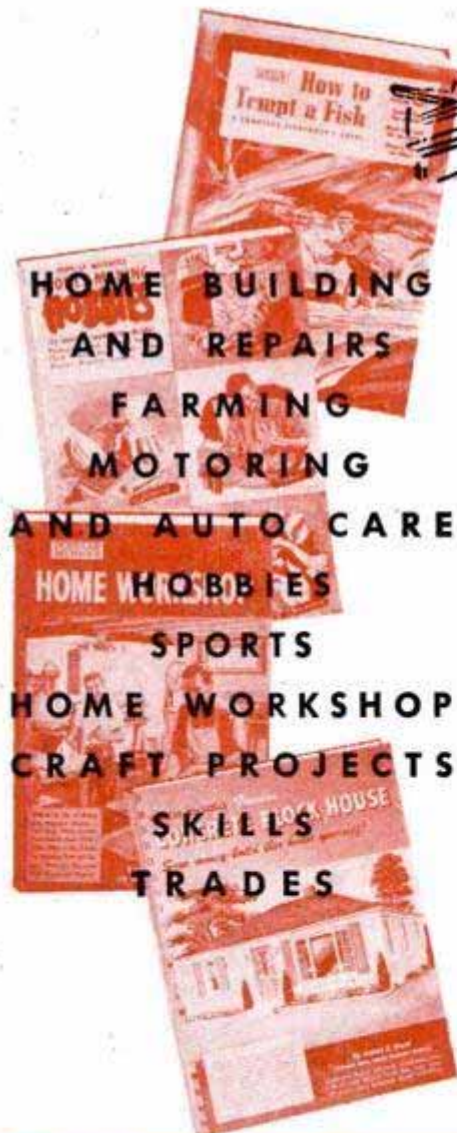
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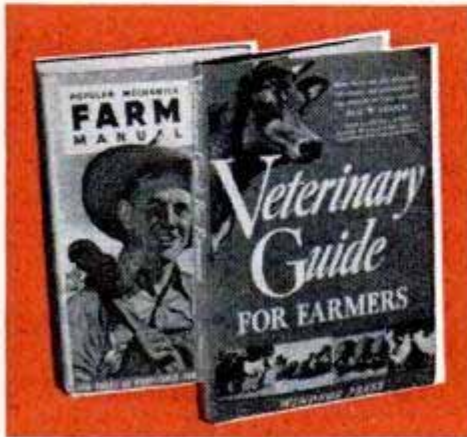


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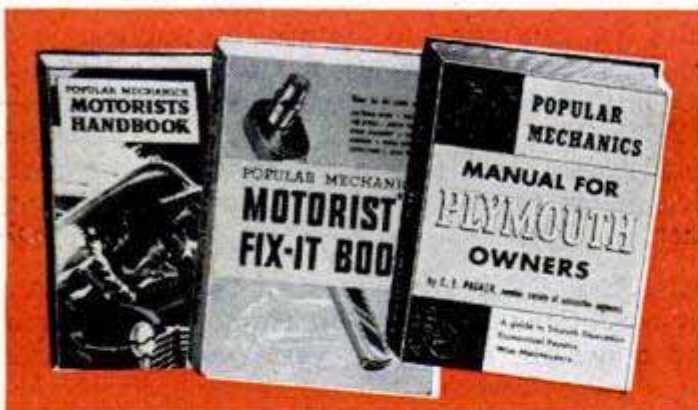
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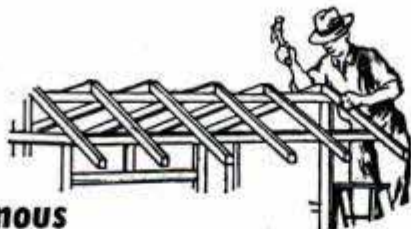


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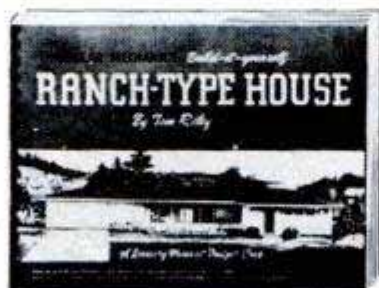


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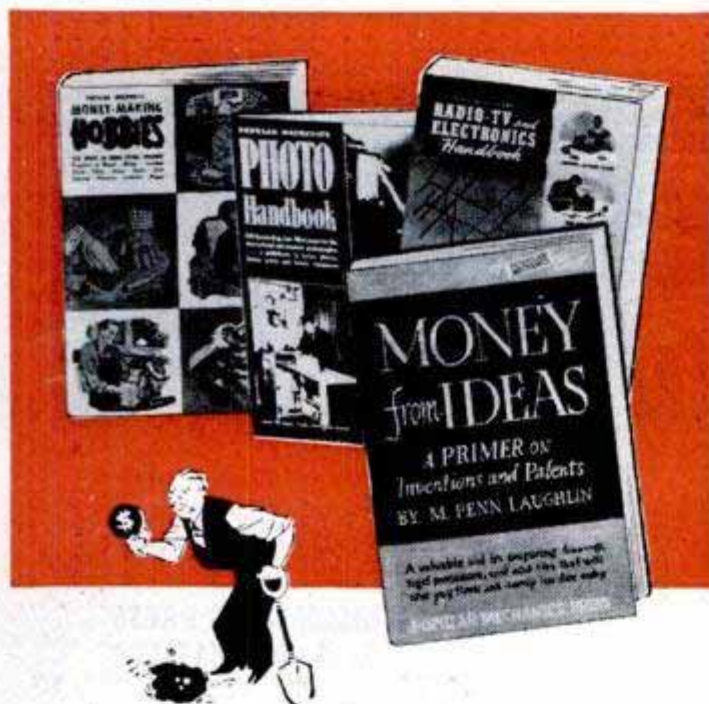
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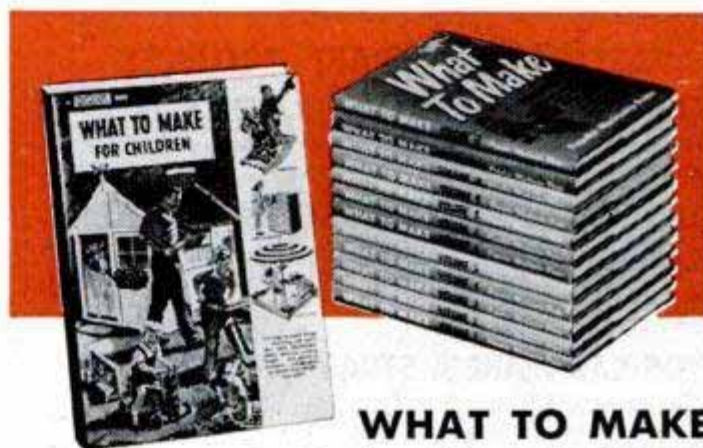
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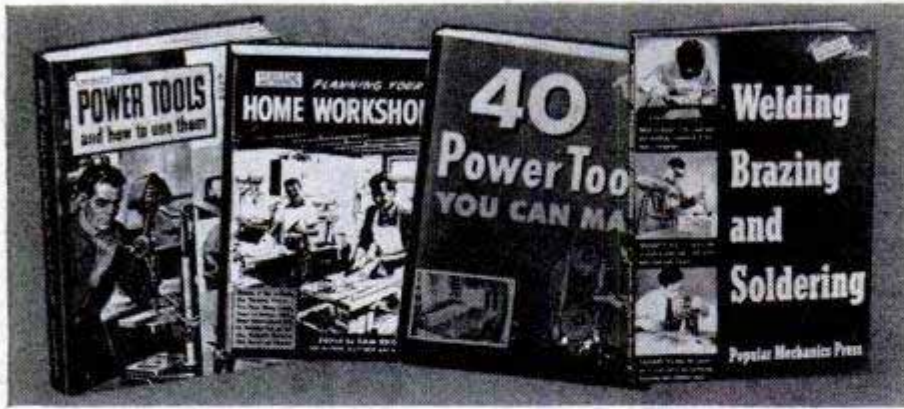
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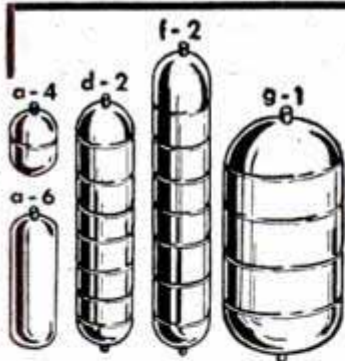
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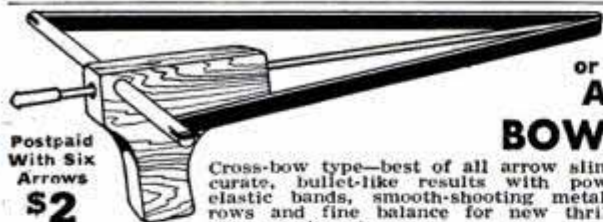
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## *Slo-Mo-Shun* LEADS THE PACK

*By Thomas E. Stinson, Jr.*

*Photos by Kent Hitchcock*

**I**F SOME steel-nerved power-boat driver has the courage to hold his throttle wide open for a full 30 seconds this year, there's a chance that a brand new world record for speed across the water will be made.

Today, half a dozen of America's blue-chip sportsmen have their eyes fixed on the terrific speed of 200 miles per hour, a figure that was fantastically out of reach a few years ago. No one expects to drive a boat that fast in 1951 but several men are building boats that, on paper at least, can be driven at 175 miles per hour. They hope to prove it this summer.

Ostensibly, the boats are being groomed for the Gold Cup race that is scheduled for August 4 on Lake Washington, Seattle. Actually, if a challenger finds in trial runs that his boat is capable of 175 miles per hour, he'll burn up the wires arranging for an official crack at the record.

The reason for this sudden competition is that an almost unknown boat of unique design, Slo-Mo-Shun IV, last year set a new world record of 160.32 miles per hour. It added almost 20 miles per hour to the record 141.74 miles per hour Sir Malcolm Campbell made in his Blue Bird II in England in 1939.

Blue Bird was a costly creation, designed

and built solely to capture the world speed record. Slo-Mo-Shun, on the other hand, is suitable for closed-course racing as well as for speed dashes. Stanley S. Sayres of Seattle, its owner, uses it almost like a family runabout. All of the new contenders for the world championship are being designed along the same general lines of Slo-Mo-Shun's hull.

One of the secrets of Slo-Mo-Shun's speed is that Sayres and his designer, Ted O. Jones, found a way to prevent the hull from rising completely out of water at high speed and becoming unmanageable.

Most modern racing hulls are of the so-called three-point hydroplane design. At high speed they rise up out of the water and rest on only three points: the two outboard sponsons and the stern. The trouble is that three-point hulls are too perfect, aerodynamically. There's a tendency for the bow to swing up and flip the boat over on its back. Too, rudder control is almost completely lost when the boat is literally flying through the air.

These drawbacks were avoided in Slo-Mo-Shun by providing an inverted pyramidal step under the bow, to serve as a fourth point of suspension. It acts partly like an air spoiler in the tunnel between the two

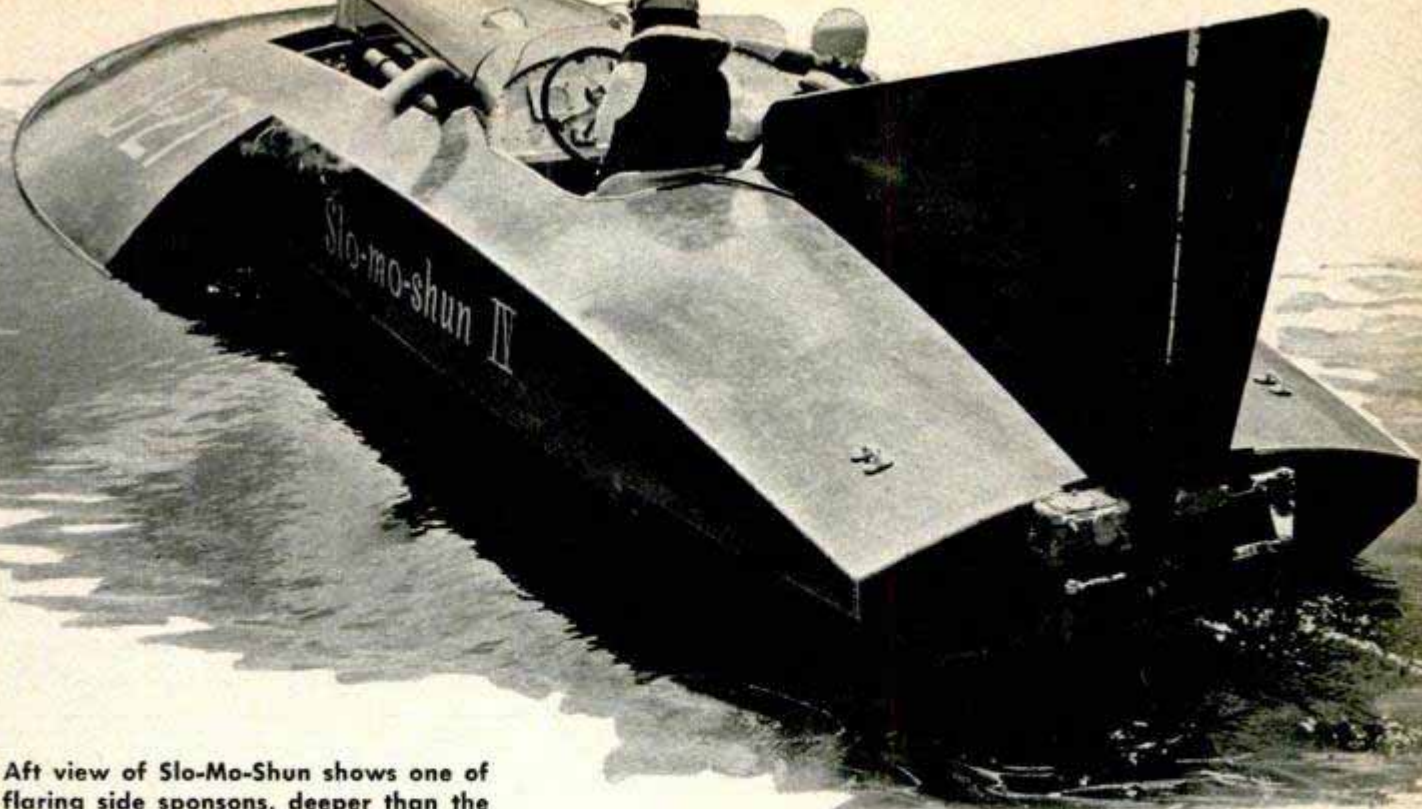


Hurricane IV of Hollywood, one of the fastest, will have a flatter, skinnier hull in next month's competition



Slo-Mo-Shun, foreground above, lost this race to My Sweetie when terrific pounding of water broke her shaft  
Guy Lombardo's Tempo VI "flying" on her propeller. She was one of the first big boats to copy smaller hydros





Aft view of Slo-Mo-Shun shows one of flaring side sponsons, deeper than the main portion of the hull, on which the boat rests when moving at high speed

sponsons. The resulting drag holds down the bow and there's no tendency for the boat to do a backward somersault. In rough water, the pyramidal bow plane flattens and spreads the water surface so that the boat is safe at speeds at which the ordinary hydroplane would run wild or pound itself to pieces.

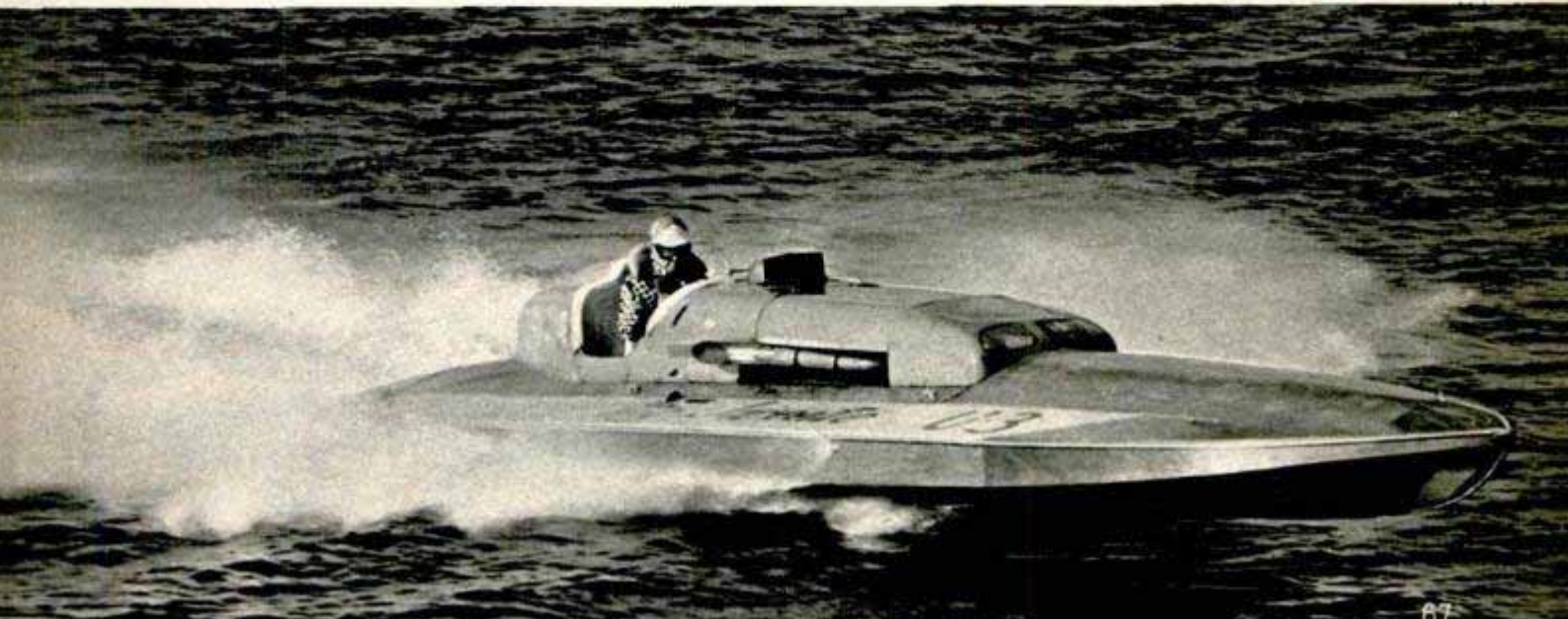
Slo-Mo-Shun rides so high that only one of the blades of its special \$500 two-bladed propeller is in the water at a time. The boat leaves behind it a "rooster tail" of spray that is thrown high in the air and hangs for a quarter of a mile behind the boat. Slo-Mo-Shun's 1500-horsepower Allison aircraft engine drives the propeller, through gears, at about 10,000 revolutions per minute. The step-up gearbox is bolted directly to the rear of the engine, permit-

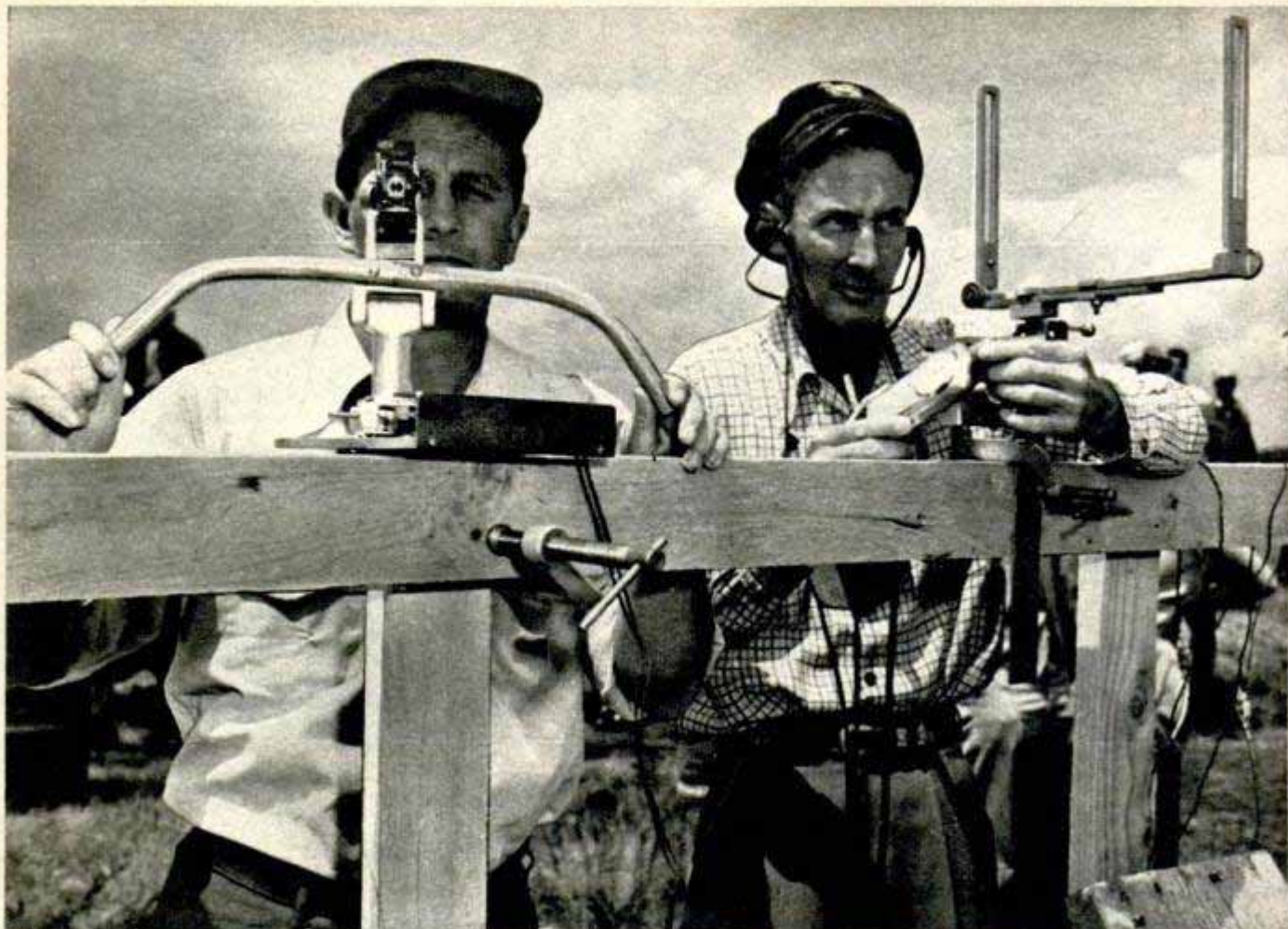
ting the use of a short, straight, drive shaft instead of the customary transfer drive from the bow. The deep steel rudder is mounted off center so that it moves in undisturbed water instead of in the frothy wake of the propeller.

The fastest boat in the world is 28 feet long and has a beam of 11 feet 5 inches. The plywood hull has a ½-inch-thick bottom that is sheathed in part with thin dural plating as a protection against floating debris. Unused portions of the hull are packed with foam plastic for flotation in case of a smash-up. The boat weighs 4300 pounds. To stabilize the hull and offset the effect of engine torque, Slo-Mo-Shun uses a large air fin at the stern. The fin is simply a stabilizer and isn't used for steering.

Most of the boats being built or modified

Horace Dodge is rebuilding My Sweetie's hull to make her a more dangerous challenger for 1951 Gold Cup





Special long-distance instruments on the beach clock the racing boats over the measured-mile lake course

this year will use a spoiler system, but there are several other ways to prevent a hull from becoming completely airborne.

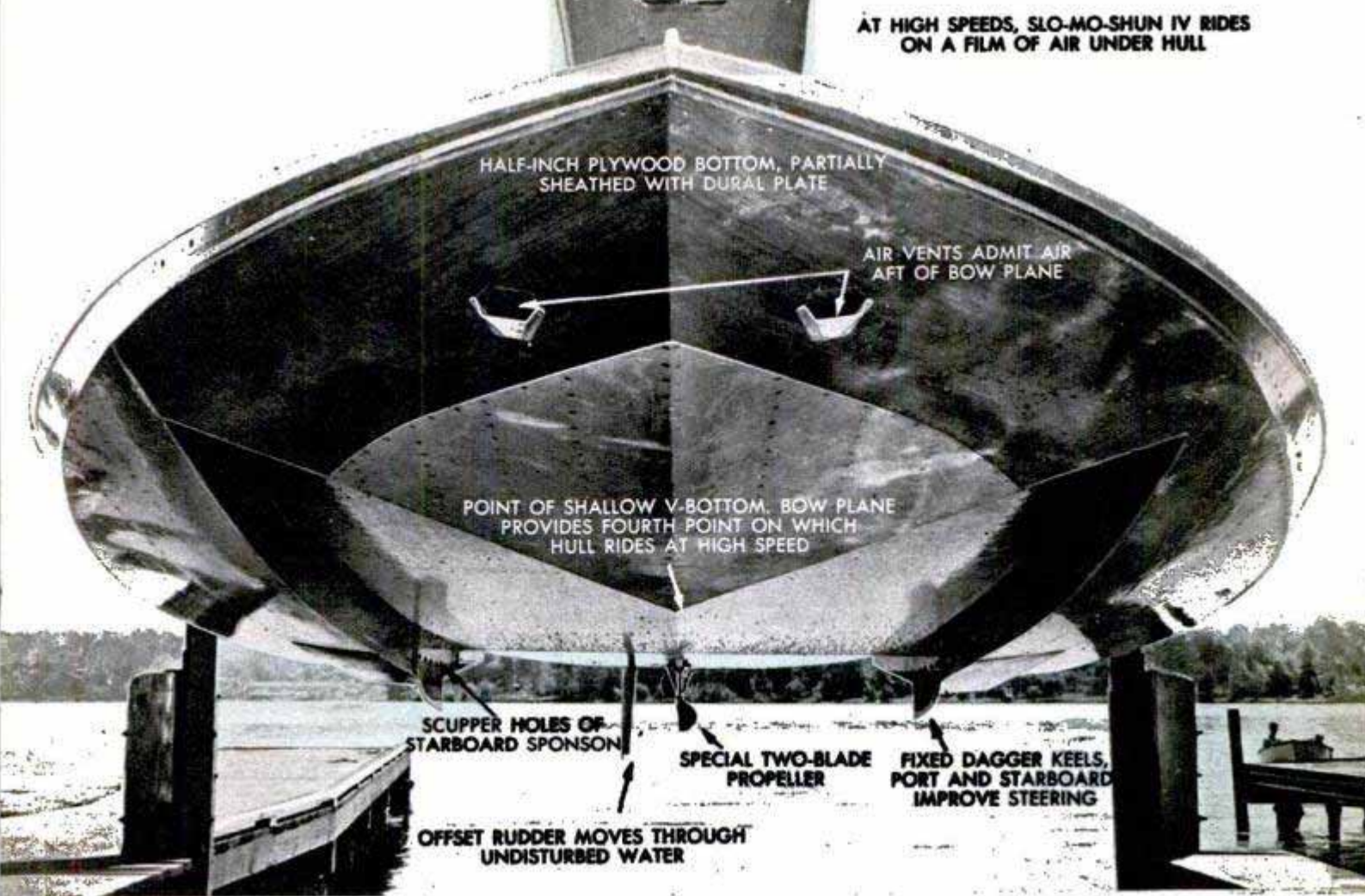
Morlan Visel of Hollywood, whose Hurricane IV has been held back by control difficulties, plans to use a hinged airfoil attached to the forward deck. Adjusted from the cockpit, it is expected to hold the nose down to any degree desired, allowing the souped-up Allison power plant to deliver full power to the propeller.

Some such balancing arrangement is to be incorporated in the boats Dan Arena of

Mount Clemens, Mich., is building for various owners. Each boat will have the entire mechanical installation mounted on a pair of side rails secured to the hull with several sturdy, quick-change fasteners. The whole assembly can be lifted from the hull as a unit and replaced with a similar package in a matter of minutes. Two or more power plants for the same hull are expensive but the idea will save valuable time when testing different combinations of power and gear ratios.

The Arena-built boats are 30 feet long,





Looking up under the bow reveals shallow pyramid that provides Slo-Mo-Shun's vital fourth suspension point

have amidship sponsons, are planked with mahogany plywood, weigh 4200 pounds and are powered with single Allison 1710s.

Any boats that prove fast enough in the trial runs can be expected to try for a new world record. Others that will be in the race for a record include Such Crust II of Detroit, whose Allison engine has been replaced with a Rolls Royce of greater power, and Horace Dodge's My Sweetie, powered with an Allison and sporting a rebuilt hull for greater speed.

One dark horse in the race for a new

record is Henry Kaiser, whose engineers have been working for two years on Aluminum I, an unlimited hydroplane of Gold Cup capabilities. Also in the background is Kaiser's Hot Metal, a gigantic all-metal racing creation powered with a double Allison. This boat was built with the hope of setting a new world record at such a high speed that the mark wouldn't be threatened for years.

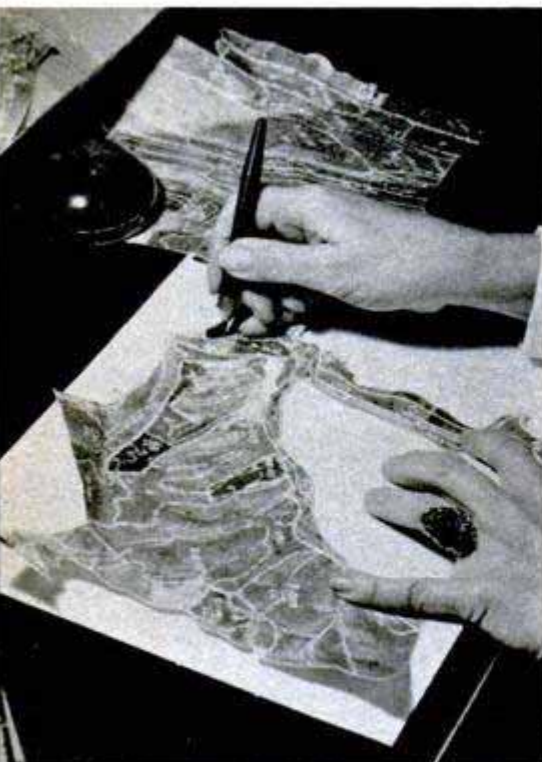
Meanwhile, Stan Sayres is ready to try again if Slo-Mo-Shun's present record is beaten. He had some throttle left when he was clocked at an average of 160 miles per hour and the belief is that the boat is capable of 20 more miles per hour.

The final factor for more speed on the water is the strength of drive shafts and propellers. Slo-Mo-Shun has already thrown several propellers and even after only two passes along a mile-long course at record speed a brand new propeller usually shows fracture lines close to the hub. When propellers are built that can withstand the terrific impact of slamming into the water at high speed, and when drive shafts can be beefed up so that they don't twist off, speeds up to 200 miles per hour on the water may be attained.

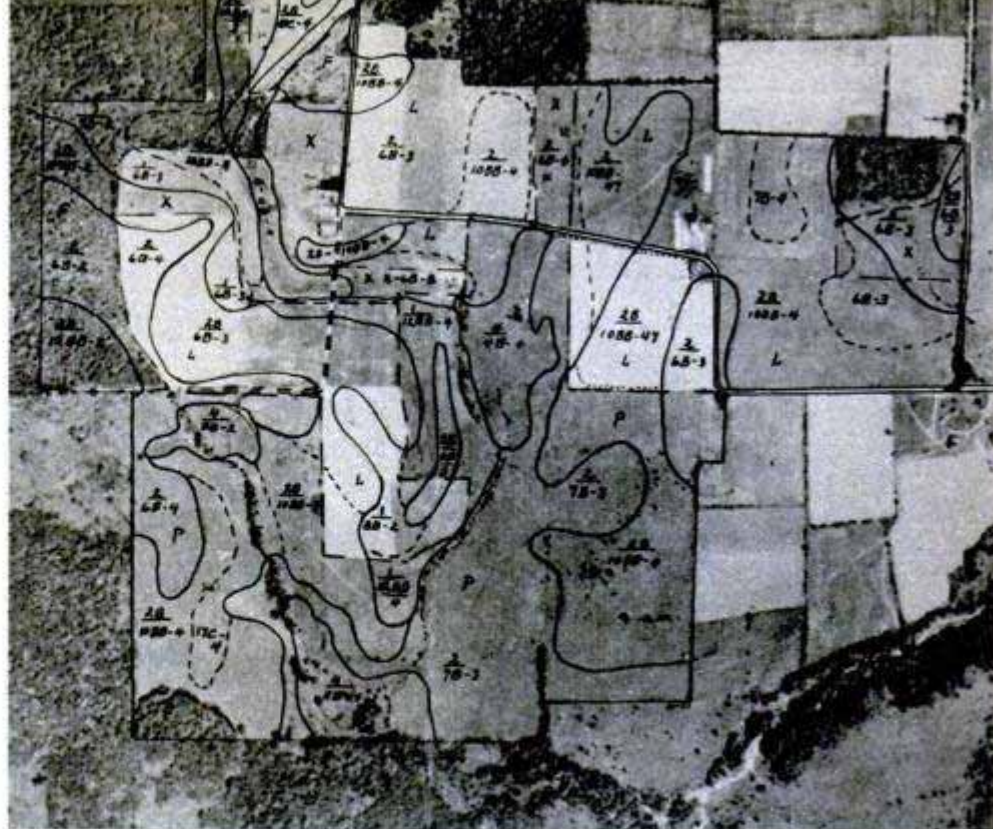
With a "rooster tail" spray of water rising 50 feet in her wake, Slo-Mo-Shun churns along to a new world record of 160.325 miles an hour—240 feet a second!



*power  
Gold Cup class*



U. S. Department of Agriculture photos  
**Dozens of land parcels, varying in shape and classification, are cut from each small area-survey map**



### LAND USE CAPABILITY MAP

This map prepared by		Owner <u>Willard Spicer</u> Phone _____
<b>U. S. DEPARTMENT OF AGRICULTURE          SOIL CONSERVATION SERVICE</b> M. H. Bennett Chief Austin L. Patrick Regional Conservator		Address <u>Apalachin, New York</u> Township <u>Omega</u>
		Operator <u>Same</u> Phone _____
cooperating with		Address _____ Township _____
<b>SOIL CONSERVATION DISTRICT</b>		Plan No. <u>301</u> Acres <u>300</u> Scale, App. 1"=660'
Omega, New York		Photo No. <u>AJ-51-28</u> Surveyor _____
Region I - Northeastern Region		Location of farm <u>1 1/2 mi. So. of Hiawatha Cabins</u> <u>on Route 17 between Omega &amp; Apalachin</u>

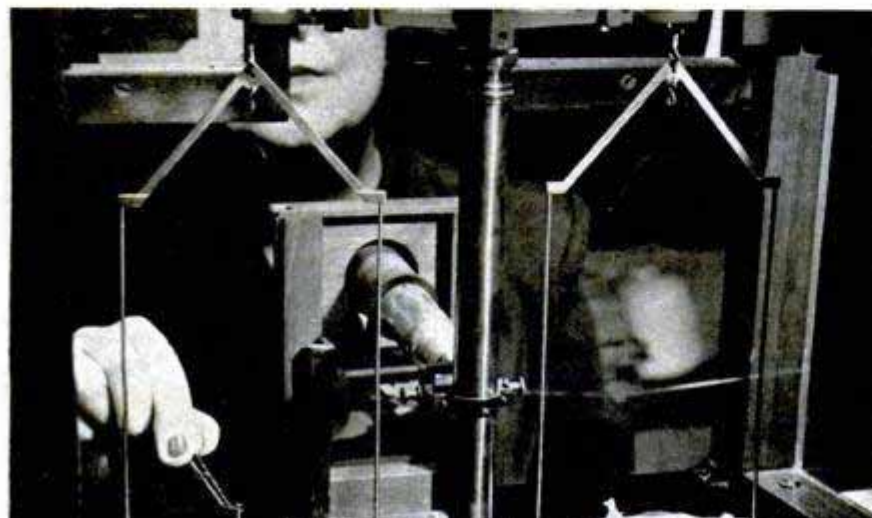
Right, as step one in "weighing" land, a soil-survey chart is superimposed on map of same area

# AMERICA "WEIGHS" ITS LAND RESOURCES

TO PLAN FOOD and fiber production, the United States can now literally "weigh" its basic stock in trade—a billion and a quarter acres of farm land. To do it the Soil Conservation Service has devised a new, faster way to inventory the hundreds of soil types, varying degrees of erosion and slope, and the many climatic and human factors involved. The method's basic principle is that an acre of land on one map should weigh the same as an acre on another map. After soil surveys are plotted on

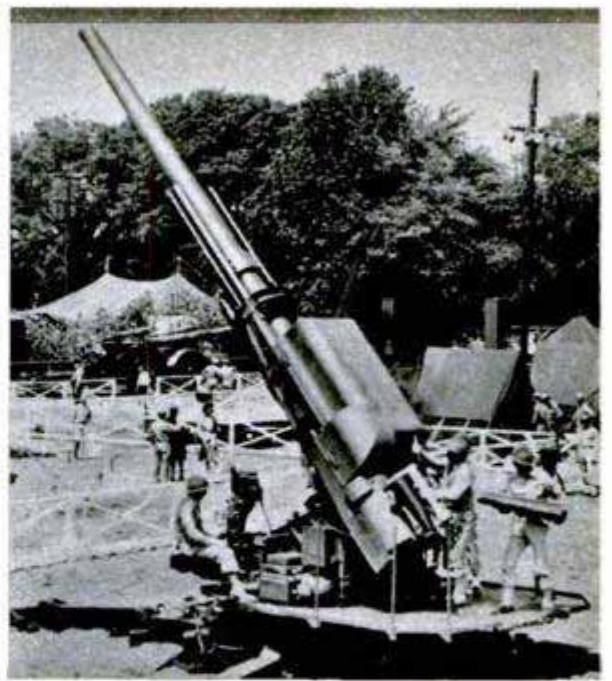
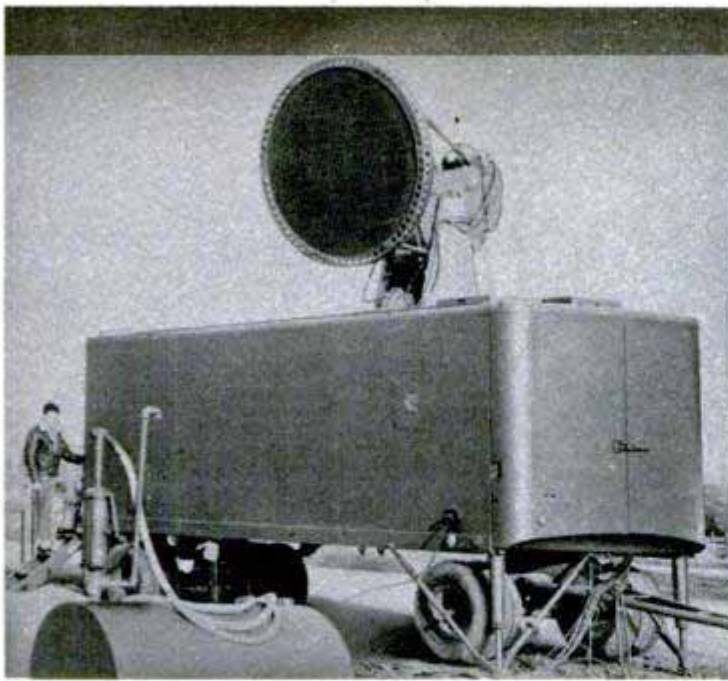
standard-scale photo maps, cartographers using sharp instruments cut out the land parcels, jigsaw-puzzle fashion, and segregate similar kinds in separate envelopes. Each envelope's contents are weighed on fine analytical balances and, from the known weight per unit, the total area of similar land is calculated. Adjustments are made for variations in paper manufacture and weight, for differences in topography and minor scale deviations in aerial photo maps. In one of the two techniques now

used most commonly for land inventory, a transparent grid is laid over the map and the area of the parcels computed by counting squares and by interpolation. In the other, a stylus is moved completely around the perimeter of each plot and the area read from an indicator. Comparisons indicate the new method is never less than 99 percent accurate.



Analytical balances weigh the tiny cut-out map pieces, each classified as to its possible agricultural usage

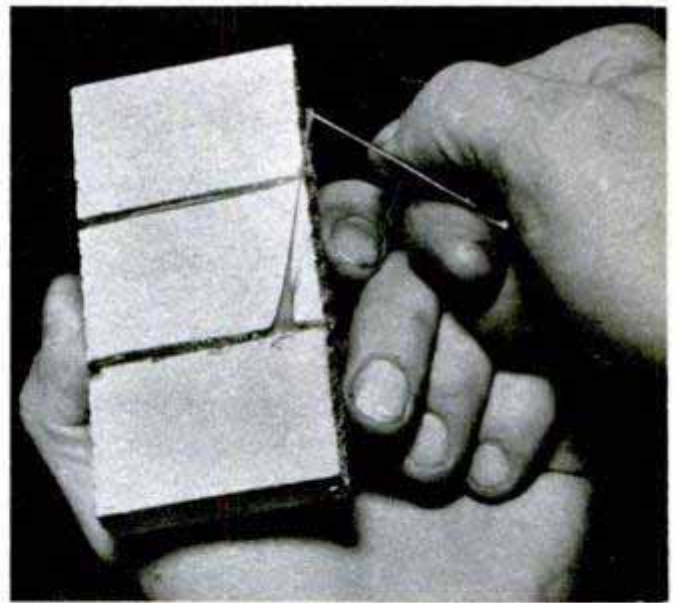




## Robot Antiaircraft Gunner

Antiaircraft guns are automatically aimed by a new fire-control system far more effective than the method used during World War II. The system, developed by Bell Telephone Laboratories, is a maze of wires, resistances, switches and vacuum tubes. It is an outgrowth of the earlier

computer, which tracked a hostile plane, calculated the wind velocity, muzzle velocity of the shells, temperature and similar factors, and then aimed the guns. The new fire-control system, adaptable to firing either 90-mm. or 120-mm. batteries, operates on the same general principle but assembles more information about the hostile craft and works more quickly and accurately.



Marine Products, Inc., 166 N. Main St., Oshkosh, Wis.

## Rubber Compound Seals Boats

Boat seams can be sealed against leaks with a new compound made by homogenizing cured-synthetic rubber into a water suspension. The sealer is a heavy white

liquid, applied either by painting it on the surface with a brush or by flowing it from the spout of an oilcan. It adheres to wood, metal, glass and clean painted surfaces. The rubber compound also can be thinned and used to cement down canvas decks.

## Pilot Will See Own Plane and Others Near Airport on Television

Using a device invented by Douglas H. Ewing of Westmont, N. J., pilots will see on television whatever is on the screen of the ground-based, sky-scanning radar of the nearest airport. A pilot's own plane

and others in the area will appear as "pips," or light points, on the screen. The radar system will also include distance-measuring equipment to indicate a plane's proximity to the ground station.



Plot plan shows how roads wind around the circular lots in Usonia. Right, famed architect Wright laid out plot plan with a compass, passes judgment on each home to be built

Fugitives from the city, these suburbanites put their piggy banks together to build a . . .



Cosmo Sileo photo

**"CO-OP"**

# VILLAGE in

*By Clifford B. Hicks*

WHEN ARCHITECT Frank Lloyd Wright was a young man he had, as you might guess, an unconventional idea. It was his own conception of a modern community, which he called Usonia.

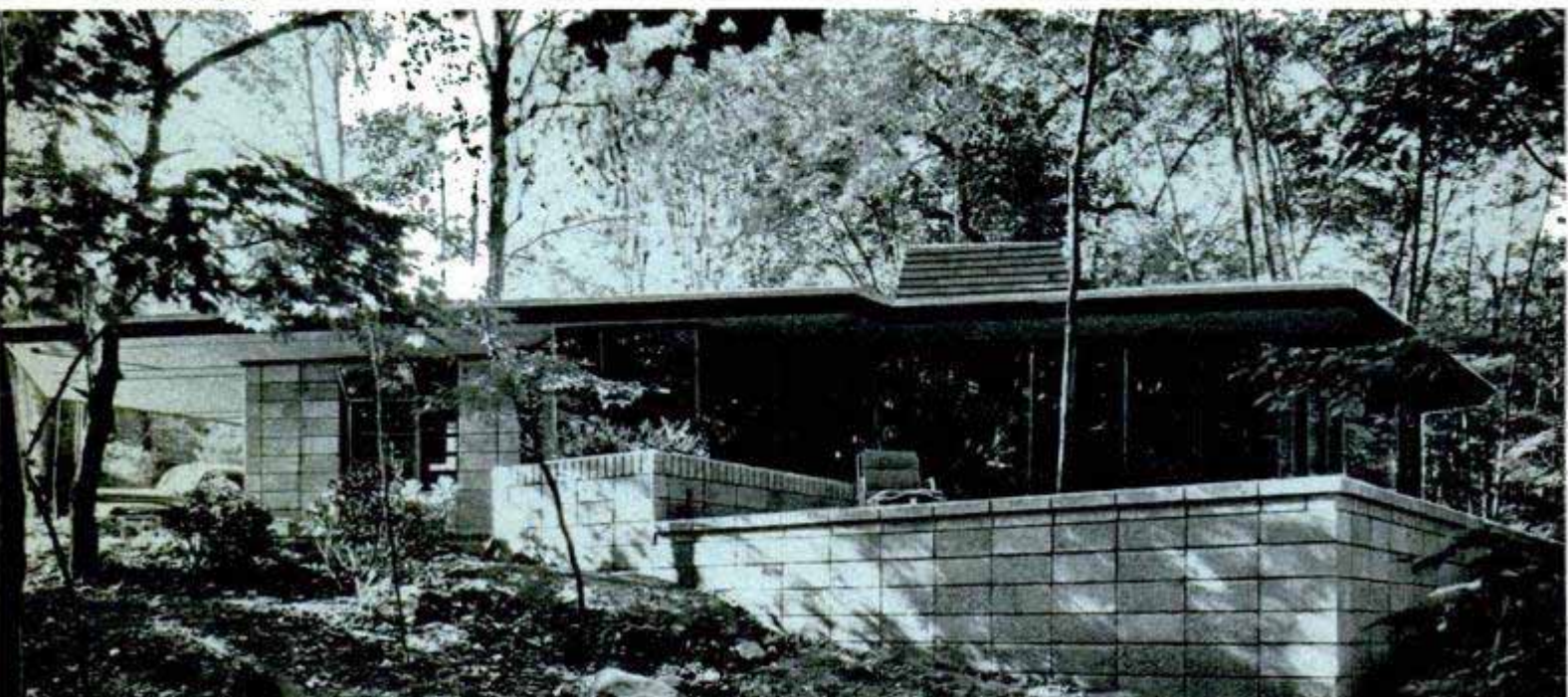
Many years later, a successful young engineer named David Henken also had an idea. His was quite conventional. He wanted to build a home for his family.

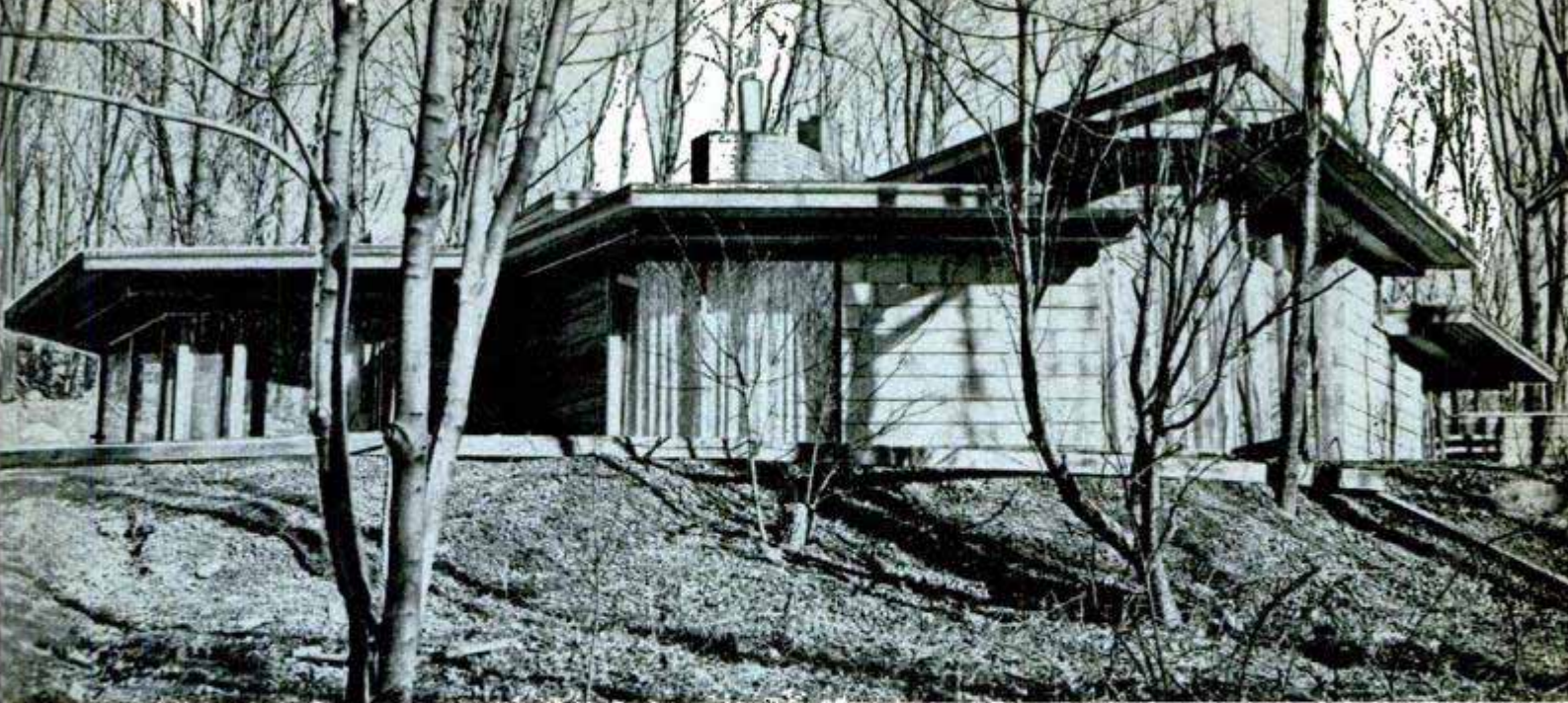
Through a fortunate accident, Henken's idea smacked head-on into Wright's. The collision produced, not just a home for Henken, but perhaps the most unusual community in America.

It's a village that meanders all over a wooded, hilly tract near New York City. Its modern homes boast

Inexpensive concrete blocks form a pleasing pattern on one of the Usonia homes designed by Theodore Bower

Jack Holmes photo





Walter A. Slattery photo

Most of the homes are low and solar-oriented. Roof trellises on this home by Henken will be covered with vines

# the WOODS

such unconventional features as circular lots, round and triangular rooms, flower gardens that creep through the walls and roofs so low that the kids use them as playgrounds.

In translating the two ideas into reality, the bearded young Henken has, at various times, found himself working as a butcher, serving an apprenticeship under Wright, pleading with mortgage companies, tracing lost persons, laboring as a stonemason and persuading an assortment of businessmen and office workers to forsake their cash registers and typewriters in order to do palm-blistering work on their own homes.

Henken says he wouldn't do it again for a million dollars. On the other hand, he wouldn't take a million dollars for his experience in helping build the community, which soon will have assets listed at just about that figure.

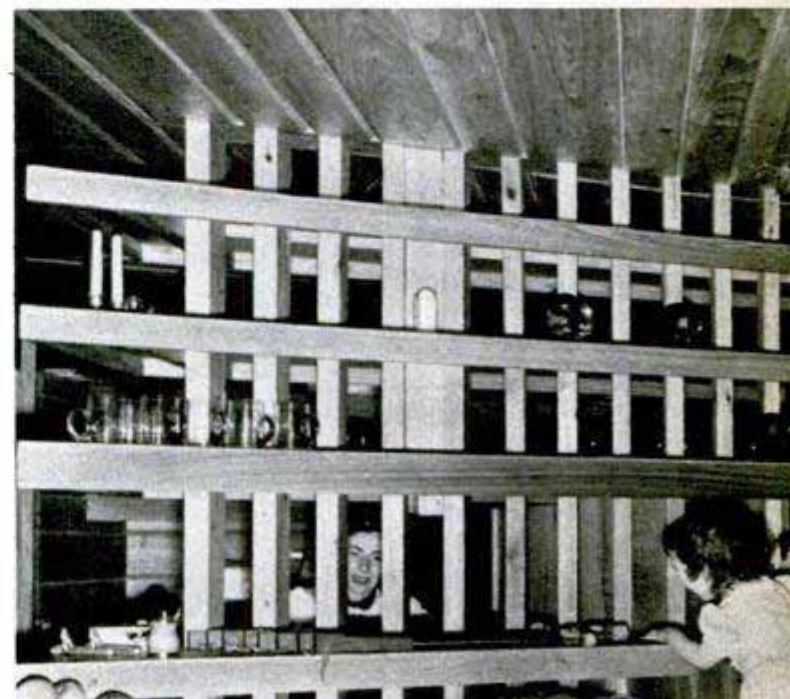
The homes are so unusual that a conventional contractor would throw up his hands at sight of the first elevation. If you visited Usonia today you'd probably find Henken on one of the building sites showing the workmen how to pour a concrete bathtub right into the foundation, or build a fireplace that will draw with an almighty roar.

Each home has a personality of its own that seems to wrap itself right around its family. There are some features, though, that are common to virtually all the buildings. The first is a minus factor—you won't find a basement, attic, dormer or guillotine window in Usonia. All the homes are built on a concrete slab, with radiant-heating pipes buried in the floor. The houses are solar-oriented to welcome the warmth of

the sun in the winter and lock it out in the summer. (In zero weather, on a sunny day, Henken can work in his shirt sleeves at his drawing board with the door standing wide open less than five feet away.) The houses are designed with as few solid partitions as possible, massive fireplaces, cantilever roofs, broad terraces and sweeping expanses of glass.

Henken's own home is nestled against the side of a hill, partially buried so the winter winds swirl across the roof instead of blowing against the house. So far, the designer has completed one level of an eventual three-unit home. Above the present unit, higher up on the hill, will be his studio,

Heavy vertical slats permit Mrs. Henken to see the play area, yet they close off kitchen from living area





Two full walls of the living room are plate glass. Overhang passes sunlight in winter but not in the summer

connected with the central unit by a covered corridor. Below the present home he'll build a bedroom unit with the roof just the level of today's floor. Henken plans to sod the roof of the bedroom unit; then from the living room, his family can walk straight out onto a broad green terrace. Actually, they'll be standing over the bedroom ceiling.

Inside the present house you can't find a rectangular room anywhere. In fact, you can't seem to find a room at all, for partitions are so subtle they don't appear to be walls. As you walk through the living area, you suddenly find yourself in a little play area for children. Standing there, you are on the edge of the dining area, which apparently melts into the kitchen. Yet from the living room, the kitchen is screened from your view by thick vertical slats, set at an angle like a huge Venetian blind tipped on end. The slats form a strangely efficient wall, for they deny guests the sight

of the kitchen, yet they permit Mrs. Henken in the kitchen to hear clearly anything said in the living area and thus to participate in what's going on. She can peer right through the slats, though, at the children's play area a few feet away.

The Henken house is its own furniture and conversely the furniture forms part of the house. Bookcases are partitions, and the back of the sofa is a slanted wall. The attractive sofas in the living area roll out on wheels and convert into spare beds. A long table stretches along the living area, then turns at an abrupt angle around the corner and into the dining space, where it serves as the dining table. But—watch, now—where it turns the corner the two parts are joined by a V-shaped slot. If Mrs. Henken is entertaining quite a number of guests, she merely shoves the dining section of the table out so it joins the other section to form a long straight table which closes off the kitchen. From here she can

Some roofs are so low children can play on them. Tricky foundation lines call for new construction techniques





serve a full meal to guests buffet-style.

The roof is cut into "butterfly" sections, one on top of another, to shed light into the heart of the house. When he designed the kitchen as the core of the building, Henken thought he'd have to install a mechanical ventilating system. As soon as he moved in he discovered that the clerestory windows above the kitchen effectively carry out the heat and cooking odors. As he says—and he's modest about it—"the whole house seems to breath."

Shelves are built into closet doors, the bathtub is poured into the concrete floor slab and a flower garden flows from the terrace outside, through the plate-glass doors, and into the living area. The garden is watered by a perforated tube buried in the soil.

This wasn't at all the house Henken had in mind when he decided to build. At that time, in 1940, he was doodling with a pencil and discussing his ideas with several friends who wanted their own homes, too. Very few had enough money even to walk through the door of a real-estate office. Eventually, the men and their wives formed a cooperative, pooled their piggy-bank savings and started tossing \$10 per family into a cooperative kitty each week.

One day quite by accident Henken strolled through the Museum of Modern Art, which was sponsoring a Frank Lloyd Wright exhibit. The show included a model of Wright's "Broadacre City," his still-imaginary Usonia. The young engineer was so impressed that he wrote the famous architect of the cooperative's plans. Would Wright be willing to help? Yes, Wright would be willing to help.

Not long afterward a slightly dazed Henken suddenly discovered that he had given up his job, sold all his belongings and moved with his family to Taliesin, Wright's home at Spring Green, Wis., where he now was an apprentice-architect to Wright. For two

Cantilever concrete terrace is ideal for summer living. Tilted roof yields extra light inside the home



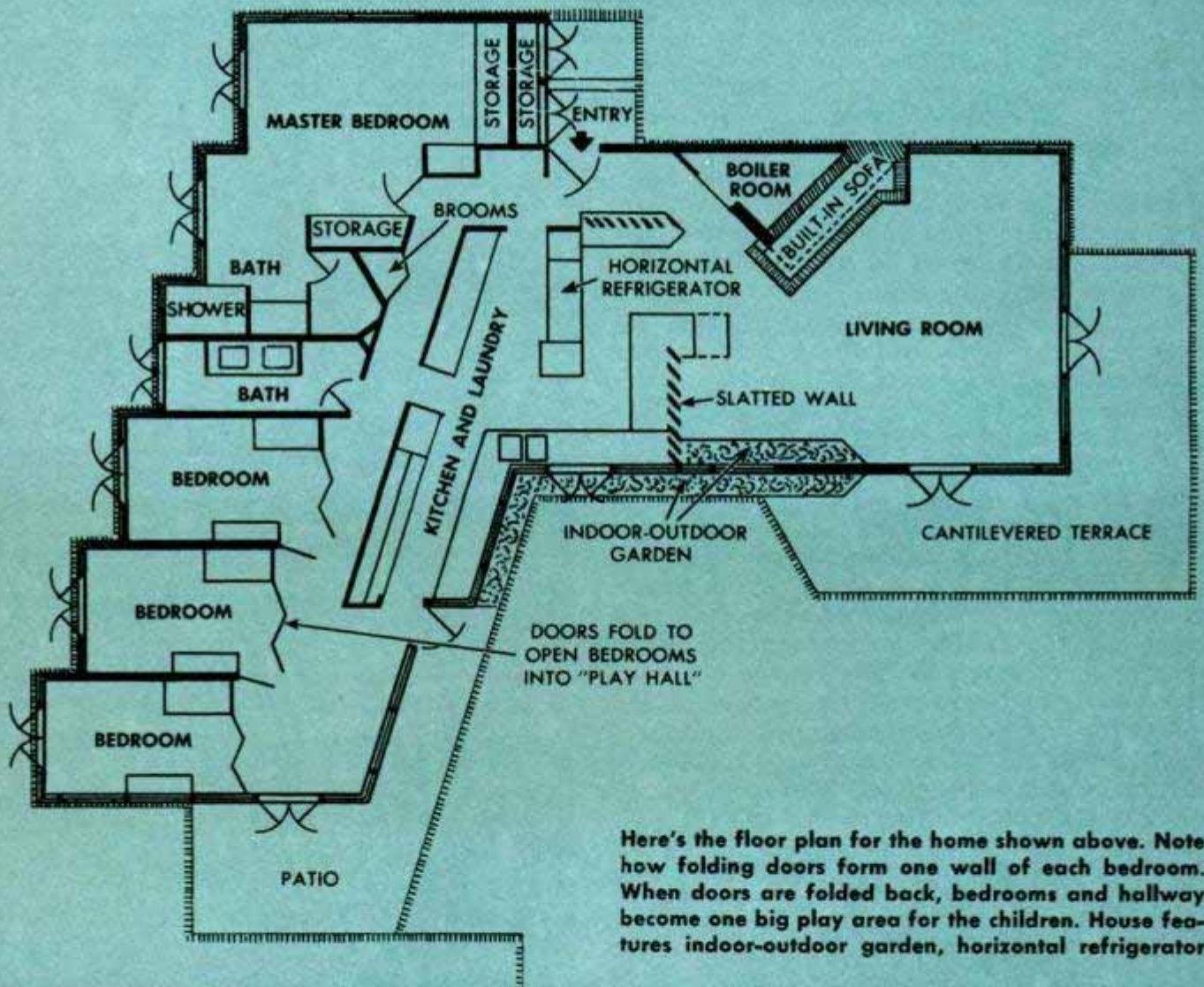
Odd two-part table in Henken's house can be angled either way or set in a straight line as buffet table

Henken shows how wall of concrete-block house tilts in at base. Rain drips off, won't penetrate mortar





Sawtooth wall gives each bedroom a door leading out to patio, double window for view in two directions



Here's the floor plan for the home shown above. Note how folding doors form one wall of each bedroom. When doors are folded back, bedrooms and hallway become one big play area for the children. House features indoor-outdoor garden, horizontal refrigerator

years he studied under the master. At the apprentice school he served as chief electrician and assistant butcher. During this period he and Wright made broad plans for bringing Usonia to fruition. Wright agreed to design five of the proposed 50 homes himself, to approve plans for the others and to design several community buildings.

By the time Henken returned to New York, the cooperative had accumulated

enough capital to search for a site. The members finally settled like homing pigeons on a tract in Westchester County, 29 miles north of New York. The title to the tract wasn't clear, and the Usonians ran up against one woman who didn't want to be served a court order. She just plain disappeared. Finally with the aid of detectives, Henken found her, oddly enough, in the maid's linen closet of a distant hotel, and



Built-in faucet waters a living-room garden that flows through glass wall from a garden outside



L-shaped living-dining area has fireplace at inside corner of ell. You can visit right through the fireplace

served her the court order. "Mysterious as a movie thriller," says Henken. Eventually, the title was cleared, and the cooperative had possession of a 93-acre tract.

Wright visited the site, then laid out the plot plan with a simplicity typical of the man. He merely picked up a compass and, on a map of the plot, drew perfect circles, tangent to each other. A Usonian's lot consists of a circle 217½ feet in diameter. Each homeowner has, touching his property, three neighbors and three community lots. All the land wedges between the circles are held by the community, too—perfect spots for playgrounds.

Usonia's winding roads skirt right around the edges of these circles or traverse the community lots. The roads are purposely laid out to foil the speed demon. Try to drive through Usonia at more than 15 miles per hour and you'll find yourself wrapped around one of the huge trees.

Just next door to Henken — if you can consider several hundred feet of wooded hillside next door — is the house he built for his father. Its principal feature is a roughly L-shaped living and dining area, with a huge fireplace at the inside corner of the ell. The fireplace has no lower support — it's suspended from above. A guest seated at one end of the ell can "look around the corner" at everyone seated in the other section. Actually, he's looking directly through the fireplace.

Most of the Henken-designed houses are built of oiled cypress. There's no expensive decoration or maintenance — all the homeowner needs for upkeep and appearance is a can of wax.

Another Usonia home is made of inexpensive concrete block. One difficulty sometimes attributed to concrete block is water

penetration. This problem was solved by overhanging each course of block slightly, so the whole exterior wall "tips" slightly outward at the top. Rain striking a block runs down it, then drips off the edge instead of penetrating the mortar.

The most unusual home in Usonia is one that Wright designed. It's a round house set on a circular lot, and it seems to grow right out of the highest ridge in Usonia. Each element of the house is a circle or arc, from the big disk-slab roof to the carport that resembles a gigantic modernistic mushroom.

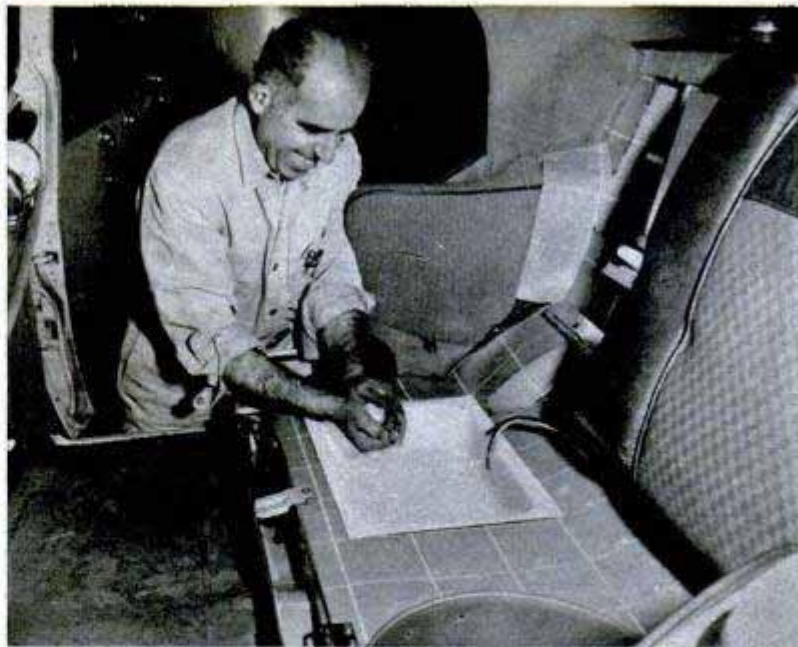
Most of the homes in Usonia fall in the \$15,000 to \$30,000 bracket, though Wright's circular house was tagged at \$75,000. Henken has designed 10 homes for the community. Aaron Resnick, another member of the group, has designed seven. Usonia now has 15 houses completed, another 15 underway and eventually there will be 50 homes scattered across the wooded hills, leaving nearly half of the 93-acre tract for community use.

Five years ago, after they acquired title to the tract, the Usonians unsuccessfully sought an investment company that would grant them a cooperative mortgage. Finally, they decided to build what they could with the funds at hand and provide much of the labor themselves. Savings accounts were withdrawn, piggy banks robbed. Fifteen homes have been built in Usonia by scraping up the pennies.

But Henken and his associates finally have come to terms with a progressive investment company. Homes now going up in Usonia have outside financial backing. Here's the way the plan works:

You decide to build a home. Perhaps you

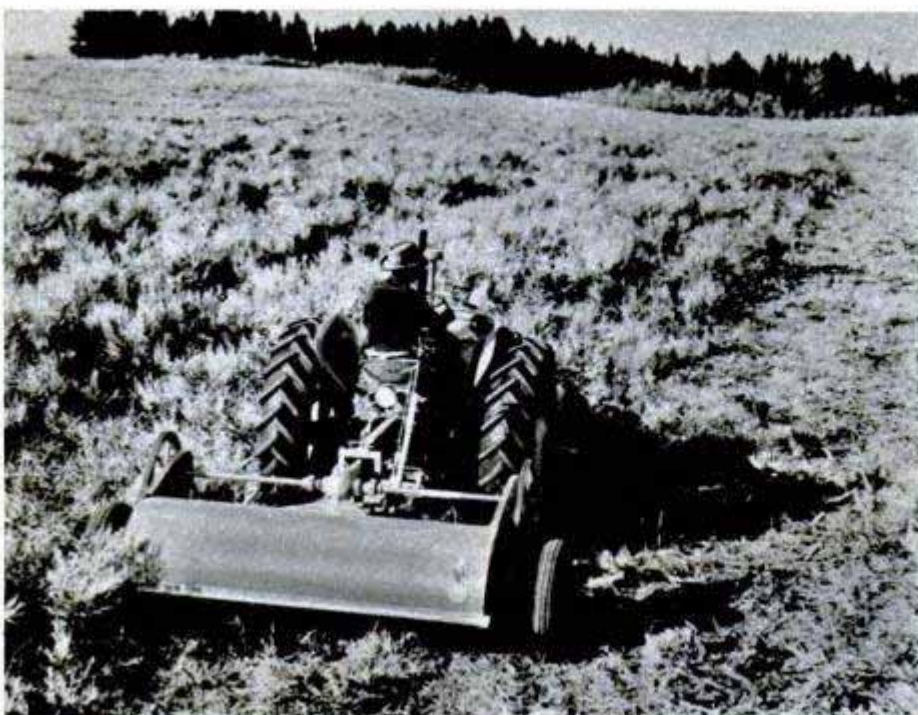
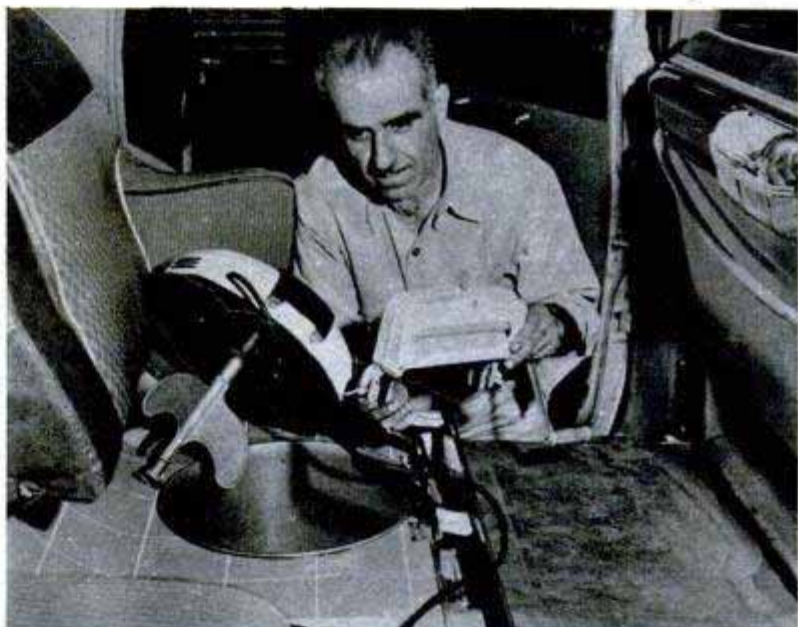
(Continued to page 226)



## What, No Electric Iron?

Remember the San Diego automobile equipped with shower bath, barbecue and soda fountain that was described in the January 1951 issue of *Popular Mechanics*? Louis Mattar, the owner, is still busy adding more fixtures to his rolling home. Now he has an electric washing machine and wringer, lavatory, mirror, electric shaving outlet and medicine cabinet all concealed behind and under the rear seat cushions. The lavatory has hot and cold running water, and the washing machine has a special overhead motor and head. A converter provides 110-volt alternating current from the car battery for the equipment.

Left, Mattar has a shave in "bathroom" section of his auto. Above, lavatory is concealed under rear cushion. Below, there's even an electric washing machine and wringer in the palatial car



## Sagebrush Shredder

Western ranchers expect big things of a stalk shredder that was designed to chop down cornstalks, but has proved it can tear apart bothersome sagebrush. Some 12,000,000 acres of sageland in the West could be turned into grassland if the brush could be kept down. The shredder has an 80-inch rotor shaft that whirls 42 chains around 1400 times a minute. Attached to each chain are two steel hammers. The 84 hammers deliver a total of 18,000 blows a minute per foot of ground.

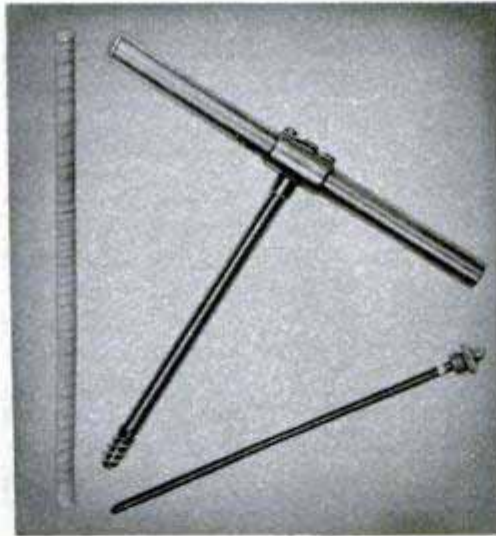




## Plastic Plants

Real enough in appearance to fool the eye of any but the most discerning, plastic plants provide attractive floral decorations that require no attention other than an occasional dusting. These plants, made of Ameran plastisol, are not affected by heat

Plastic Plants Co., 210 St. Clair Ave., N.W., Cleveland, Ohio up to 175 degrees Fahrenheit and are fire repellent and completely washable. Available in a wide color range, the plastic eliminates the fire hazard of previous artificial foliages. Leaf and stem structure of such decorative plants as Chinese evergreen, Philodendron and Caladium are reproduced by the manufacturer.



## Borings From Trunk Reveal Tree's Age

Using a special borer, foresters can extract a core of wood whose annual rings indicate the tree's age. Essentially a hollow auger, it bores to the trunk's center and forces the wood into a tube from which it is removed by an extractor rod. The hole either fills with pitch or it can be plugged with tar, leaving the tree unaffected.

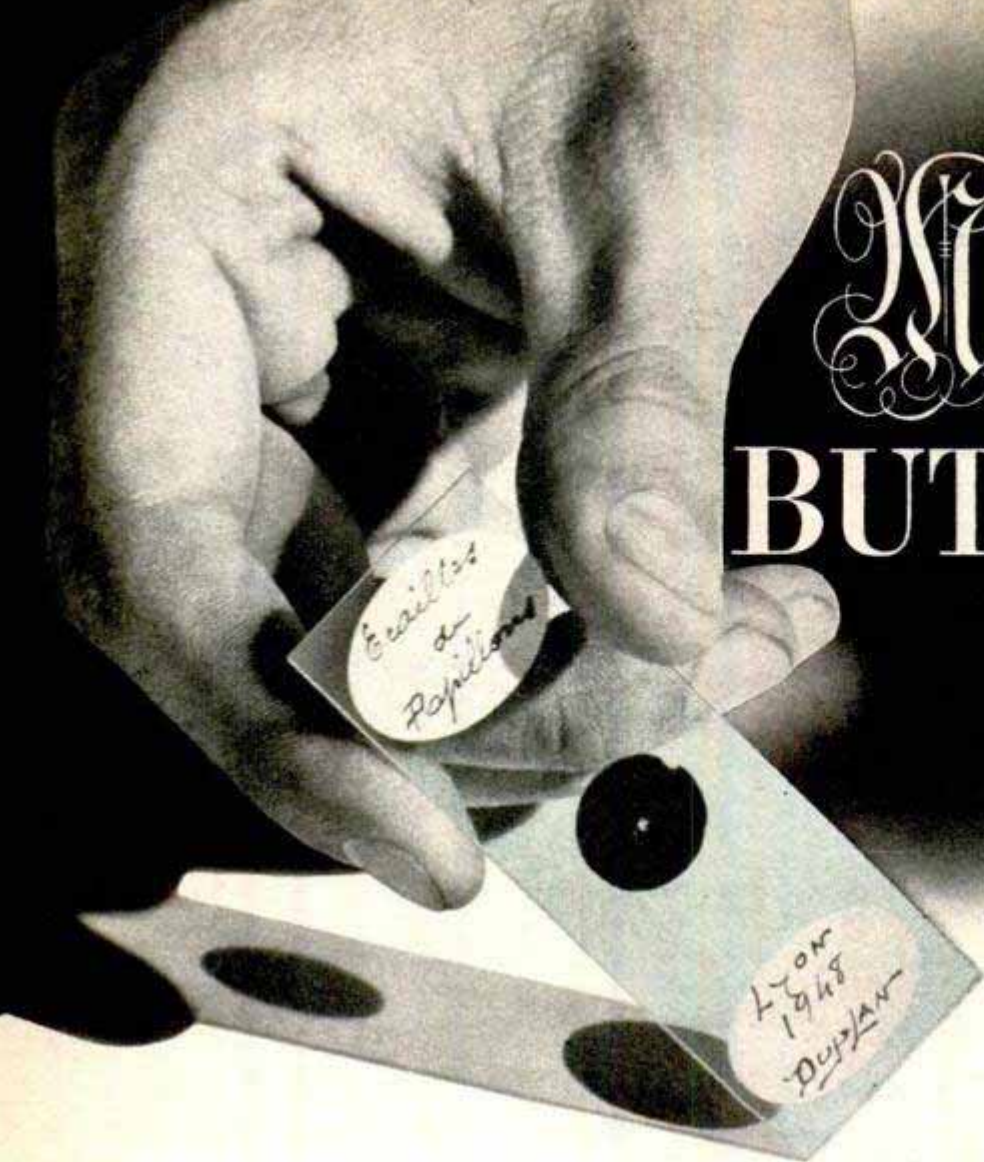
## Rubber-Tape Wrapping Gives Handles Nonslip Surface

Wound around the handles of golf clubs, tennis rackets and tools, a new rubber tape provides a nonslip gripping surface. The strip of rubber can be installed without the aid of tools. It simply is wrapped around the handle and sealed in place. An overlapping flange prevents the grip from working loose. The rubber strip will be manufactured in various styles for sports equipment and hand tools.

Ⓞ Diesel-electric locomotives sometimes are operated a half million miles between major overhauls.



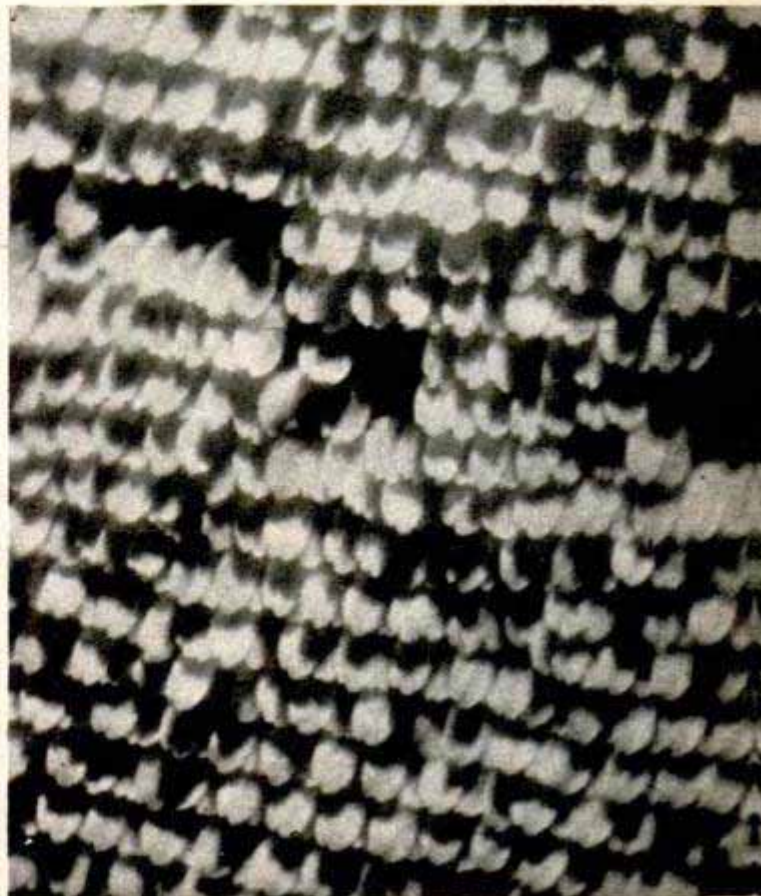
# Miniatures BUTTERFLY



See the tiny spot on the microscope slide? It's about  $\frac{4}{100}$  inch in diameter and it's a complete painting, shimmering with breathtaking colors

Duplan's micromanipulator "gears down" the movements of his hands. The "brush" is a pig's eyelash!

Viewed under a microscope, butterfly scales look much like the scales of a fish. They are Duplan's "paint!"



# From WINGS



Photos by Edouard Mouriquand

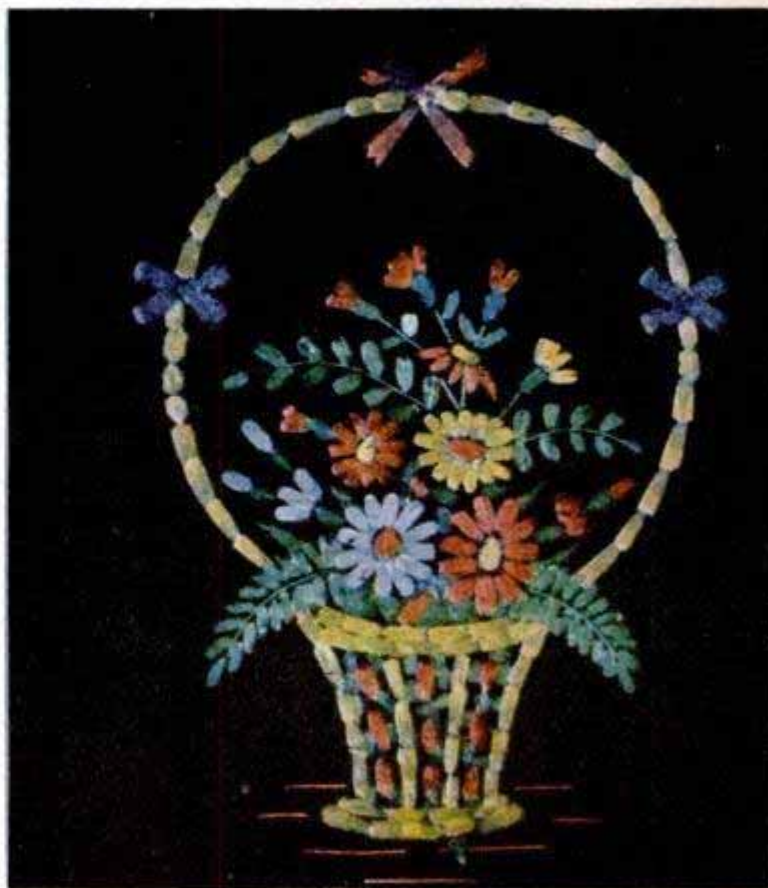
**N**OT MANY PEOPLE know that butterfly wings have scales almost identical with those on a fish. Even fewer ever bothered to examine these scales under a microscope. And Anatole Duplan probably is the only living artist who uses the tiny scales as "paint" in drawing his pictures.

You can't see one of Duplan's works of art with the naked eye—it's only a spot on a glass slide. But put the slide under a microscope and the picture comes to life in shimmering colors that can be duplicated only by the sun glowing on a butterfly wing.

That fine dust you may have noticed on your fingers after handling a butterfly or moth actually is the scales from the wings. Duplan, 75 years old and a resident of Lyons, France, sorts these scales according to shape, color and size and keeps them in small glass bottles for convenience. Ready for a new painting, he puts a drop of transparent glue on a microscope slide and starts mounting each scale in place.

The best instrument he has found for handling the scales is—no kidding—a pig's eyelash. It is the finest yet strongest manipulator he has discovered. Duplan has designed a micromanipulator which "gears down" the movements of his hands. He

Here are two of Duplan's colorful paintings. Actually they are the size of the spot shown on opposite page





Most of Duplan's masterpieces show flowers or birds. Each petal, leaf or wing feather is an individual butterfly scale. Antennae from the butterfly form stems and other lines in the paintings. A drop of glue holds the particles together

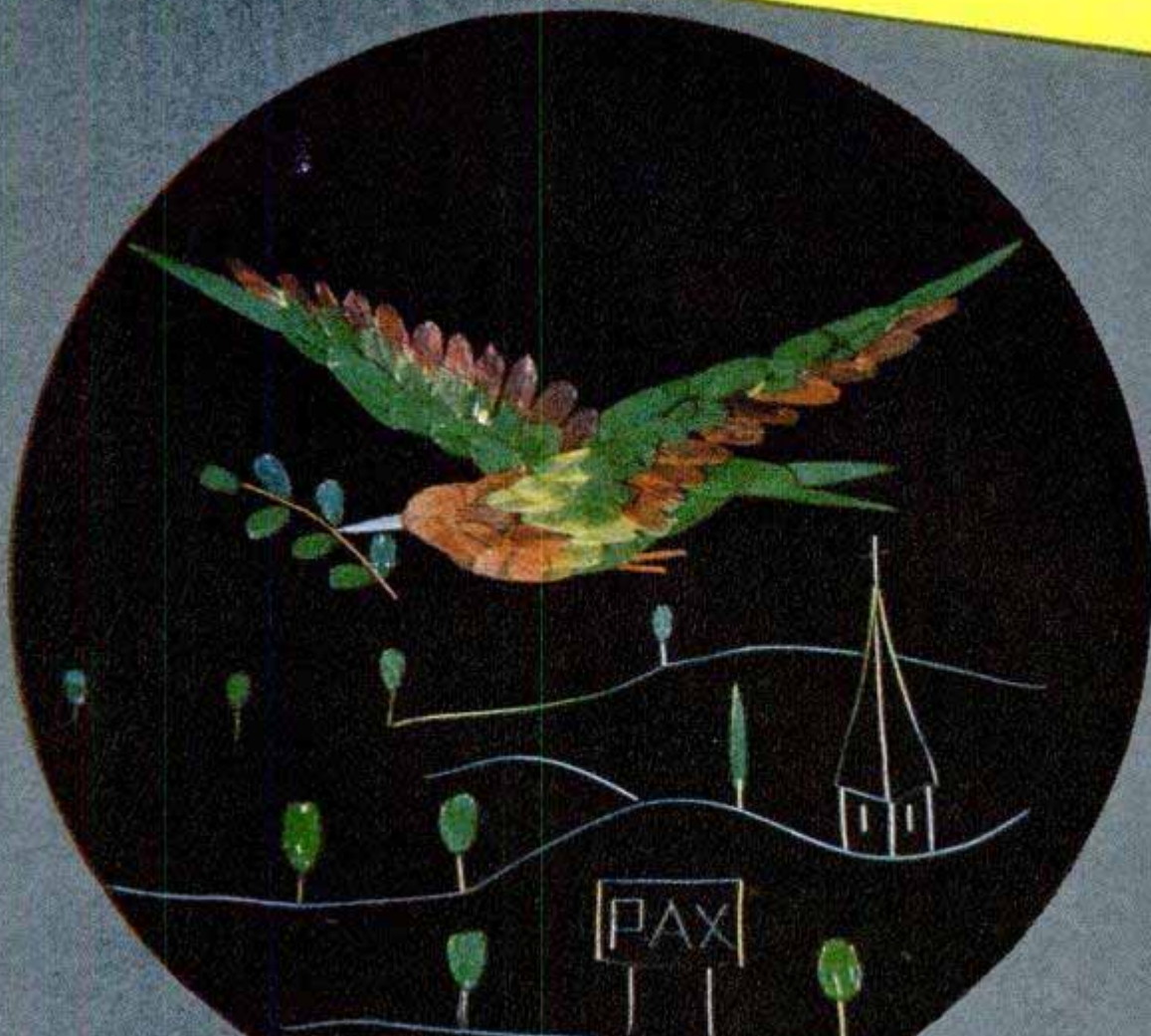
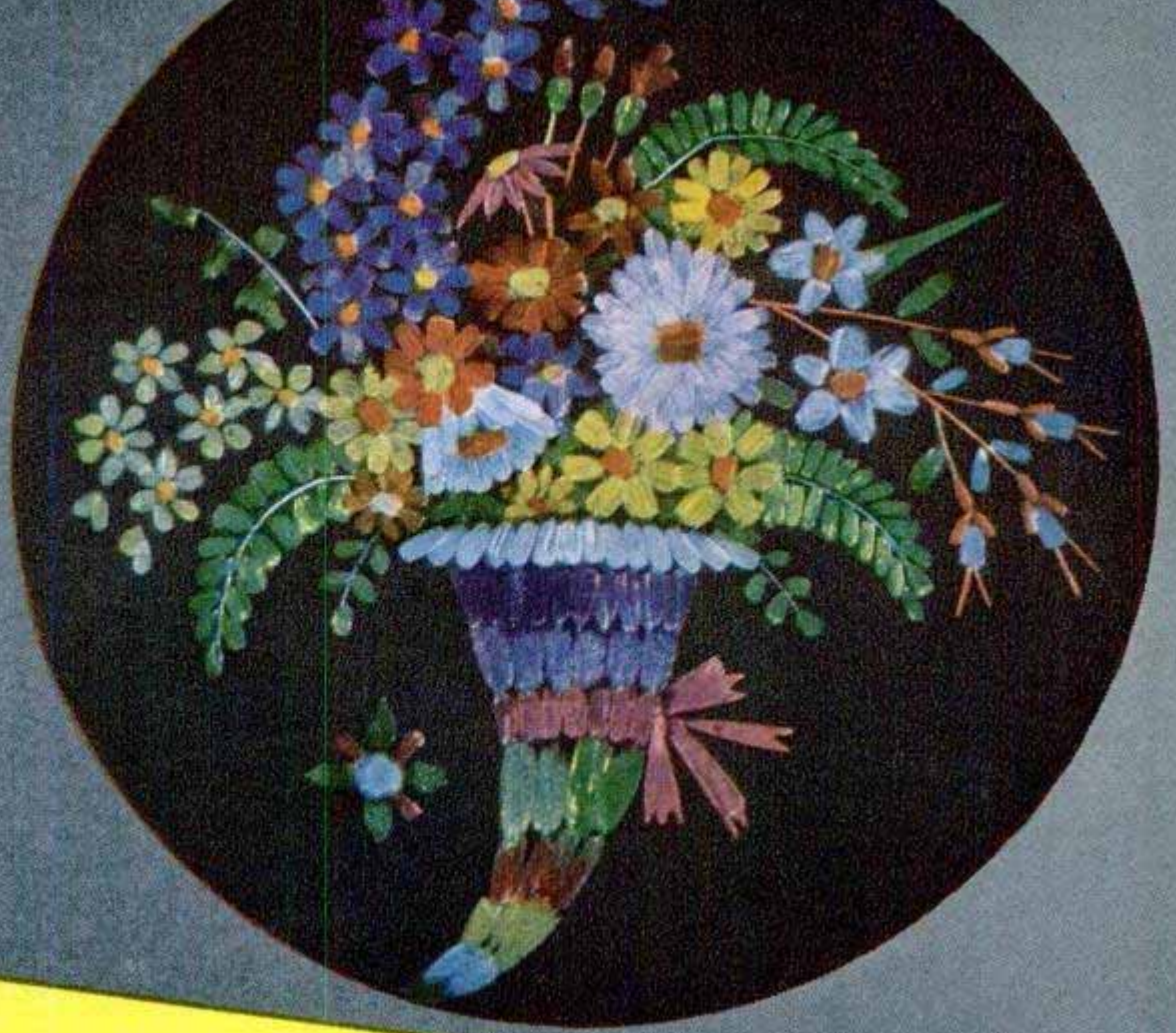


looks through a microscope at the glass slide, moving a handle to which the pig's eyelash is fastened. A major movement of his hand produces only a tiny movement of the bristle. With the other hand Duplan manipulates a lever which moves the glass slide.

Each scale is picked up by the pig's eyelash and placed dull side upward on the glass according to the planned design. It takes Duplan 12 to 15 hours to complete a painting, which must be done at one sitting.

A finished painting is warmed in an oven to dry the glue, then mounted on a black background which brings out the brilliant colors of the scales. The completed picture measures about  $\frac{1}{100}$  inch in diameter.

Duplan also uses butterfly antennae to form lines in his paintings—flower stalks and background details. Most of his pictures show flowers, birds and insects.





Twenty men can float to safety in a new Air Force life raft. It has survived 60-mile-an-hour winds in tests



Air Materiel Command photos

In bad weather the canopy's sides can be pulled down for protection. A drain on top traps water for drinking

## 20-Man Umbrella Raft

**W**EIGHING only 49 pounds, but capable of supporting 5000, the Air Force's new 20-man life raft looks like a floating circus tent. It can be tossed from a plane and inflated in one minute. A 25-foot lanyard attached to the raft packet is hooked inside the ditched plane before the packet is thrown overboard. After 10 feet of line has played out, the raft automatically inflates and can be pulled over to the plane's door. To simplify boarding, three feet of the perimeter remain uninflated until all are aboard, when a crewman blows up that section with a hand pump. The basic raft is made from two rubberized-nylon flotation tubes with a floor in between. There is no danger that it can inflate upside down in the water since both sides are identical. Each tube can independently support 20 men and if one is damaged an equalizer valve can be shut off, saving the remaining tube. An inflatable center bubble under the raft supports its floor eight inches above the water. The protective canopy, which is held up by a mast and side supports, is dyed a high-visibility color on one side and the other is sea-blue to aid downed airmen in camouflaging their craft in unfriendly waters. A drain in the canopy helps trap rainwater for drinking. A container attached to the raft holds the hand pump, repair tools, pliers, oars, bailing buckets, anchor, day and night distress signals, rations, first-aid kits, sea-water desalting and distilling equipment, fishing gear, sun-protective ointment and other emergency supplies. A new-type mattress floor, still in the experimental stage, is expected to give the craft

rigidity and better insulation. Four hundred of the rafts, which were developed by the Aero Medical Laboratory at Wright-Patterson Air Force Base, are being built for the Military Air Transport Service. The complete unit makes a compact 18 by 36-inch bundle.

Weighing 49 pounds, the entire 20-man raft unit folds into a compact 18 by 36-inch bundle





# Detroit Listening Post

*By Siler Freeman*

**N**OW THAT the auto manufacturers have definitely established the V-8 high-compression engine in a permanent niche, attention is being focused on the combustion chamber as offering possibilities for research and development towards the ultimate aim of more miles per gallon of gasoline. In other words, the "mechanical octanes" the designers are able to build into power plants to compensate for chemical octanes that the defense program is taking out of the present-day fuels center around the shape of the combustion chambers.

Chrysler, proud of its new V-8 engine which uses regular rather than premium fuel, has talked freely about its oddly shaped combustion chamber which enables it to get 180 horsepower with a 7.5-to-1 compression ratio. The chamber is hemispherical, with a lateral overhead-valve arrangement. The old Liberty engine used a hemispherical combustion chamber, too.

Now, General Motors has come out with what it calls the 19XX experimental engine. It is designed primarily for the Cadillac, has a displacement of only 287 cubic inches against Chrysler's 331.1, and a compression ratio of 12 to 1.

Being an experimental engine, it is not being shown as a rival to Chrysler's Firepower. However, it offers possibilities which C. L. McCuen, director of General Motors' Research Laboratories, believes are limitless. It can be enlarged slightly in

British-built Consul imported by Ford for sale in the U. S. saves scarce materials as well as gasoline



displacement to give as much as 207 horsepower or trimmed down to a smaller, compact unit that could avail itself of fuels of 95-octane rating, only recently available around the country, at 10-to-1 compression ratio with tremendous saving in fuel. The horsepower at 10 to 1 could be around 180.

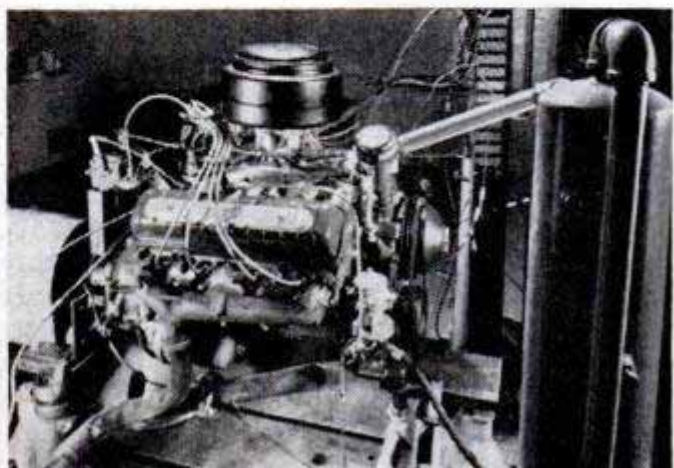
What is the secret of this new engine which follows the lead set back in 1947 by C. F. (Boss) Kettering's six-in-line, 12-to-1 engine? It is in the combustion chamber—but McCuen is not ready to reveal it.

Although Cadillac has its eye on the new power plant, it will not change its present V-8 160-horsepower, 7.5-to-1 engine for 1952. It doesn't need to, says Don E. Ahrens, general manager of the division. It is still the most economical engine in its price class and weight. The combustion chamber might have been adapted to the present engine were it not for the tooling situation in the defense picture. Now it is a long-range possibility, perhaps for the 1953 models which Ahrens hopes to build. He is the only one in the industry with optimism enough even to mention 1953 possibilities.

But, there is something much nearer to the motoring public than the 19XX engine. That is a new Hydra-Matic transmission which is almost as much a part of the new power plant as the combustion chamber. It's "teamed" with the engine.

It is called a "dual range" Hydra-Matic. By changing the valving but without add-

General Motors' experimental 19XX engine is a V-8 with 12-to-1 compression and designed for Cadillac





ing any gears, the Detroit Transmission division of GM has put a "third" driving range into the transmission for city or mountain driving. It gives more positive control, added power and economy at the disposal of the driver, without disturbing the smoothness and ease of handling. The new driving range takes the place of the "low" which penalizes in economy for added power it gives.

The dual-range Hydra-Matic is headed for the 1952 Cadillac, combined with the present 7.5-to-1 engine. It is not the rumored combination of Hydra-Matic and torque converter. That development is still some time off, according to Fred Arnold, chief engineer of Cadillac.

The new DeSoto engine is well on its way, too. This is a modification of the Chrysler V-8 Firepower. It will have about 130 horsepower instead of the 180, because of reduced bore and some minor changes in valving.

Plymouth is reported testing a new engine for future use. Probably not for its 1952 models. Plymouth, now the heaviest of the Big Three lower-priced cars, can reduce many pounds if it decides to get some new components. Dodge also has a new engine in the works, but the confusion about tooling may delay it.

Meanwhile, this month should show the start of the expected drop in car production, and the rest of the year will show a much lower level than the first six months. The Controlled Materials Plan, which is expected to corner at least 50 percent of available materials, will leave the automobile companies in the position of hunters, each seeking its own game.

Two new hardtops should be making their appearance this month. Nash's long-awaited Rambler "convertible convertible" will be out later and Hudson will have its entry ready for the dealers, too. This will just about round out the list of passenger-car manufacturers in that field.

Ford's announcement that it is importing the British-built Consul for sale in this country has revived some thinking that dwindling materials can be stretched by concentrating on lighter and smaller cars. Ford and Chevrolet are reported taking another look at the postwar light cars which they finally rejected because the cost factor didn't leave too much of a margin between present models and the new ones.

Inquiries by customers on mileage are causing some concern. Many believe gas rationing may still be imposed with other controls. Traditionally, the small car has not found favor with American motorists. But they would rather drive a small car than have a big one in the garage for lack of gas coupons.



Precision Building System, Inc., Canton, Ohio

### Canal Fulton, Ohio

## Interlocking Construction Block

Strong, plumb walls can be built without skilled labor with new construction blocks which interlock. The blocks can be made from a variety of aggregates including slag, pumice and cinders. Each block has a tapered shoulder on the top surface and a recessed section on the bottom. Steel reinforcing rods can be installed in the wall, depending upon the strength required. Grout is injected through holes in the block, forming a seal around each unit. On the outer surface of the wall, only the thin line between blocks can be seen, but on the inside the proper grooves are filled with grout to bind the blocks together.

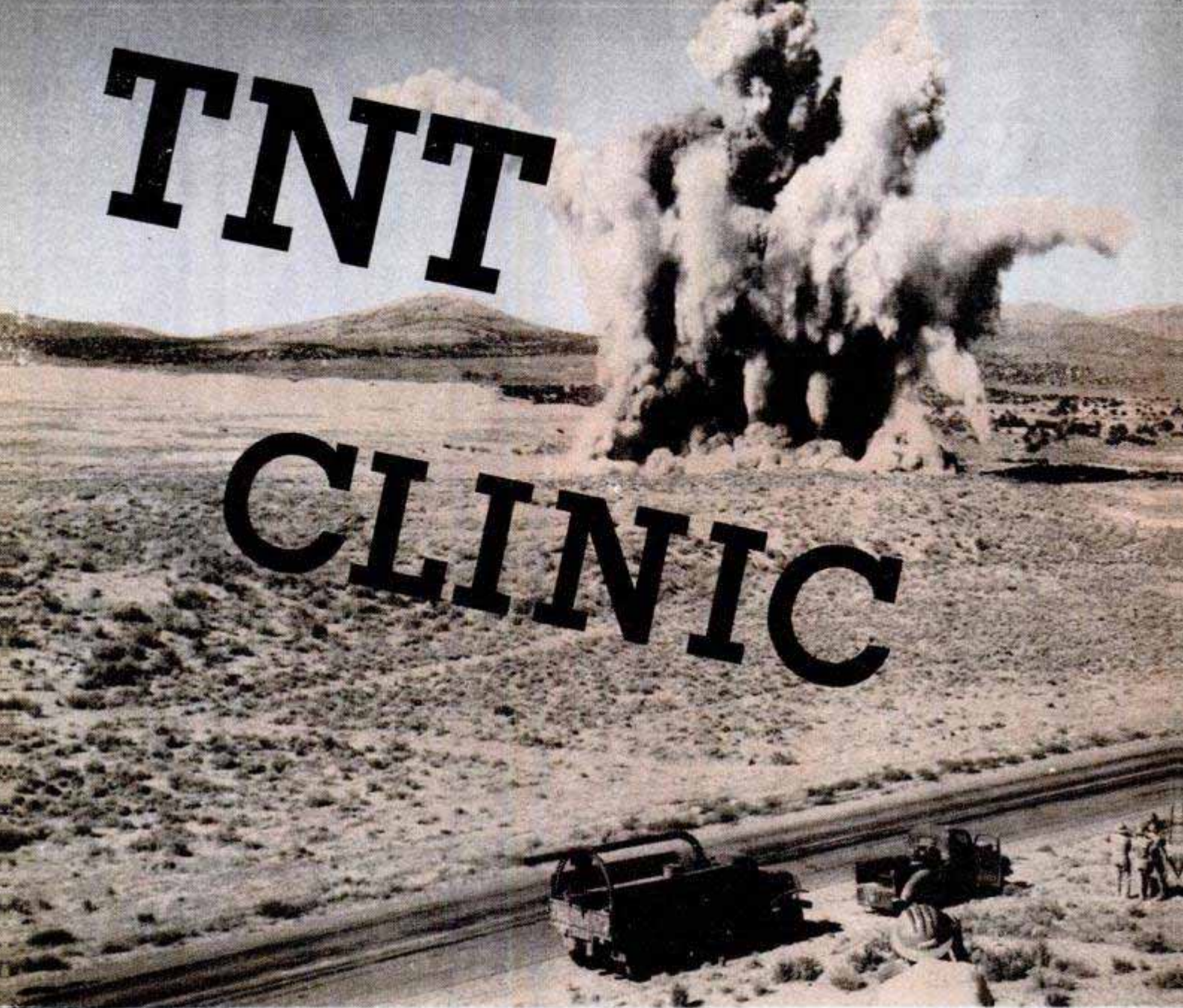
## Farm Wastes Grow Wonder Drugs

Farm waste products are valuable sources of materials in which to grow antibiotic molds, the lifesaving wonder drugs. Farmers can feed the antibiotics to poultry and swine, making them grow faster and reach the market sooner. These wonder drugs can also be used in farm-related operations. Citrus fruit is protected from molding, lumber from fungi and milk from spoiling caused by microorganisms.

☐ According to Einstein's theory that a body radiating light is losing mass, General Electric scientists say the sun loses about 4,620,000 tons per second. However, its mass being over two billion billion billion tons, it would take 150,000,000,000 years at the present rate for the sun to be reduced by one percent of its mass.

# TNT

# CLINIC



Army engineers explode huge charge of TNT in Utah, duplicating in miniature the explosion of an atom bomb. Below, these instruments will check the shock



**By Ewart Thomas**

A THICK COLUMN of earth erupts from the desert floor five miles from your observation point, shoots straight up for hundreds of feet, then blossoms into a giant mushroom cloud. From its base, a low fog of dust rolls out in all directions.

Some 25 seconds later the single heavy report of the explosion reaches your ears.

What you've just witnessed was a scale

RECORDING TRAILER  
UNDER HEAVY TIMBERS

CABLES CARRY INFORMATION TO TRAILERS



REINFORCED-CONCRETE  
TARGET STRUCTURES



model of the underground explosion of an atom bomb.

The blast was caused by 160 tons of buried TNT and was the largest deliberate detonation of an ordinary high explosive ever attempted. It was part of the Underground Explosion Tests being conducted by the U. S. Army Corps of Engineers on a portion of Dugway Proving Grounds near Salt Lake City.

By mathematical formula, the blast rep-

resented a certain small percentage of the full power of one of America's newest atomic weapons.

The explosion cloud was still high in the air when the pilot of a DC-3, that had been cruising near by, whipped his plane around in a tight turn and flew directly into the dust and smoke. Automatic samplers on the plane's wing collected samples of the airborne dust, and other instruments measured different conditions in the cloud.

Meanwhile, half a dozen Jeeps were racing toward the smoking crater so scientists could attend to the numerous instruments that had automatically recorded the effects of the blast on the buried targets.

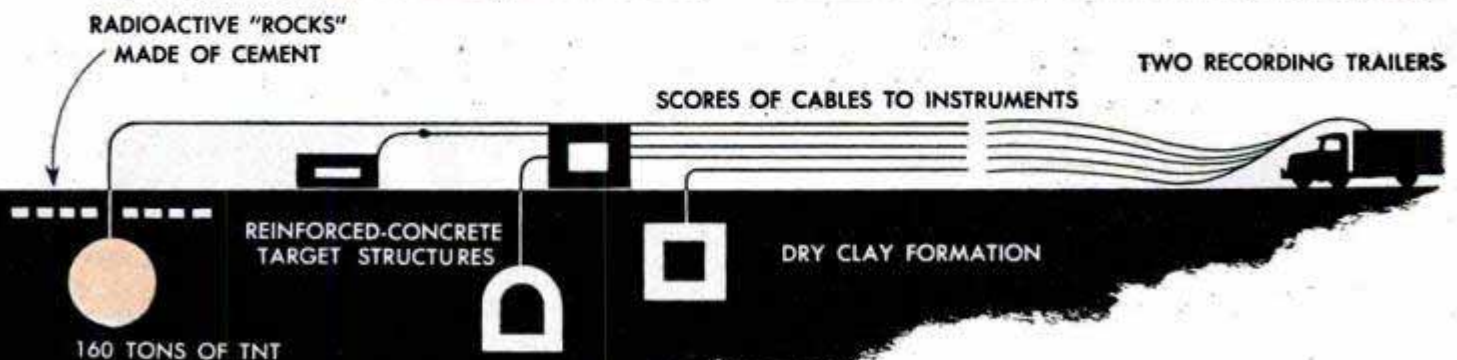
Unlike a true atomic explosion there was no radiation effect, and yet radioactivity had played a certain small part in the test. To simulate flying debris, the scientists had buried a number of artificial rocks in the earth above the charge of trinitrotoluene. These rocks, consisting of concrete shapes, would hurtle through the air when the explosion occurred and most of them would bury themselves when they landed. Each block contained a small amount of radioactive tracer element so scientists carrying Geiger counters would be able to find them.

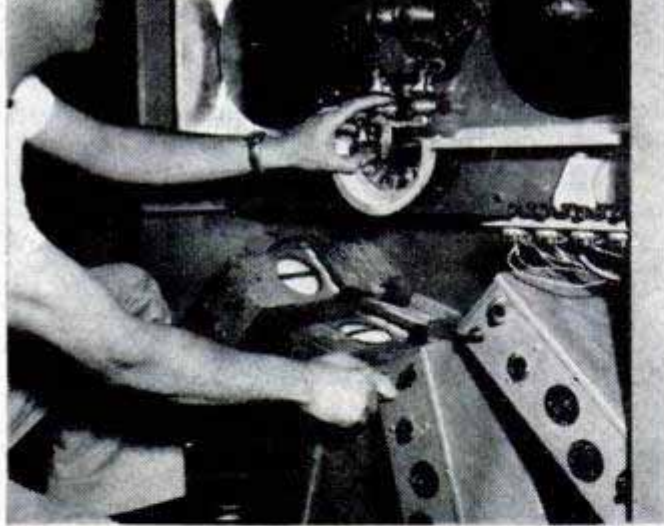
The United States knows exactly what happens when an A-bomb explodes in the air, and scientists have measured the shock and contamination from an underwater atomic burst. Today, we need to know the effect of an underground explosion such as would occur if a big guided missile with an atomic war head plunged into a target area.

We need to know how deeply a vital communications center or a military headquarters needs to be buried to survive such a blast. Contrariwise, it is important to know what damage an atom bomb that plunges to earth would do to the buried water and sewage pipes and other public utility lines of an enemy city.

To find out, at least one atom bomb is being exploded underground at a site unannounced. At the same time, the Corps of

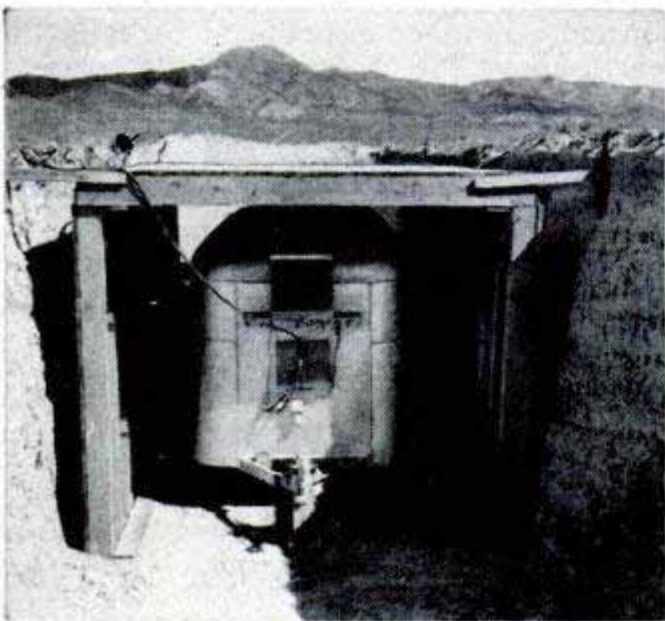
Diagram shows how various target structures were clustered around 160 tons of TNT for man's largest deliberate detonation of an ordinary high explosive





**Apparatus records readings from the test instruments, which measure various forces imposed on the targets**

**Cables run from buried instruments to the recording trailer which is dug in and covered with heavy beams**



Engineers is making scores of laboratory-size tests that involve enormous amounts of TNT.

From their tremendous but, by comparison, pygmy explosions, the engineers will be able to calculate just what destruction an A-bomb would do to a certain target, of a certain strength, at a certain depth, at a certain distance from the impact point, in a certain kind of earth or rock. This wide array of information will have both offensive and defensive value.

It's a multimillion dollar program that was started in 1947, dropped for a time, then resumed in a hurry when world conditions deteriorated. The whole study is so complex that various agencies are participating in it under the liaison of the Corps of Engineers, including the Coast & Geodetic Survey, U. S. Bureau of Mines, the Air Force Weather Service, Colorado School of Mines, Stanford Research Institute, Engineering Research Institute and heavy-construction contractors.

The scientific staff includes Dr. Arthur Casagrande, soil mechanics specialist; Prof. John B. Wilbur of M.I.T., structural designer; and Dr. C. W. Lampson of Aberdeen Proving Grounds, who made the blast measurements at Bikini. The tests are being conducted under the supervision of Lieut. Col. C. C. Haug, District Engineer for the Corps of Engineers, and C. W. McGregor, project engineer at the Corps' Salt Lake City office.

To obtain data on damage to structures

**Numerous cameras record the explosions. One at left rotates to follow and photograph the huge dust cloud**





**Bulldozer excavates a huge cave which will be one "target" of a mammoth TNT charge exploded above it**

in dry sand, dry clay and wet clay, the Corps is using portions of White Sage Flats at Dugway, where these soils occur. To measure the transmission of shock in sandstone, the engineers will fire enormous charges in that medium near Castle Dale, Utah. To learn damage-distance ratios in granite, the engineers are to set off blasts in a granite mountain near Grand Junction, Colo. Locations of the experiments were determined after test holes had been drilled at many locations in a search for suitable sites.

Some of the explosions involve only 320 pounds of TNT and the effects are measured only by instruments. The so-called half-scale shots in which 40,000 pounds of TNT are detonated, and the full-scale shots involving 320,000 pounds of TNT (the scale is a geometrical progression) involve months of preparation.

In sandstone or granite, the "targets" may be the rooms and passageways of a tunnel system that is excavated out of the rock. In soil, reinforced-concrete target structures are built both above and below the surface to a scale in relation to each other and the size of the blast.

A major job all in itself is to excavate the big charge hole so that the 100-pound blocks of TNT that make up the charge can be placed at the correct distance from the surface. The hole is backfilled with earth after the loading.

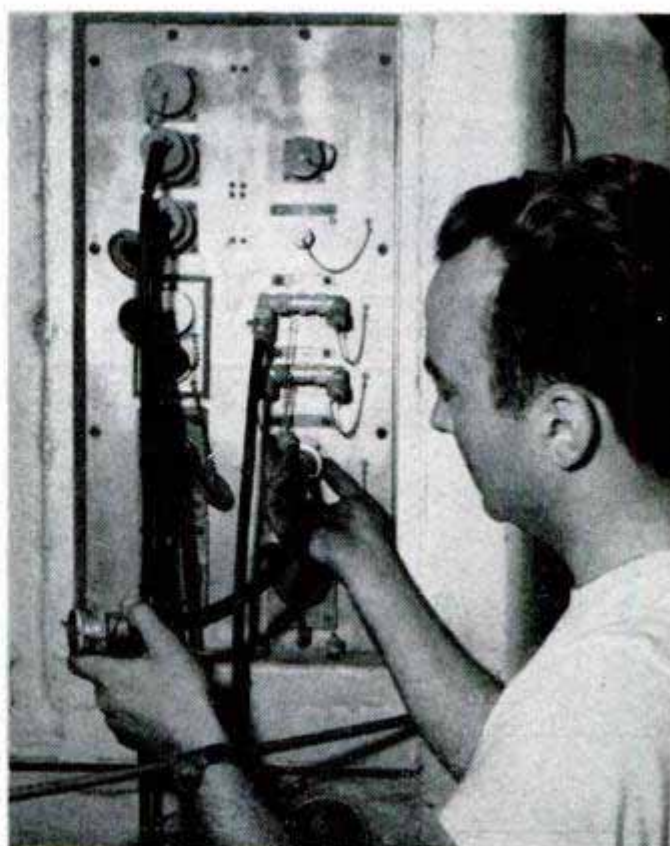
Meanwhile, the targets are being built at measured distances from the charge hole. Some are small concrete shelters and shapes, some may be as large as a two-story building. If one of the latter is to be

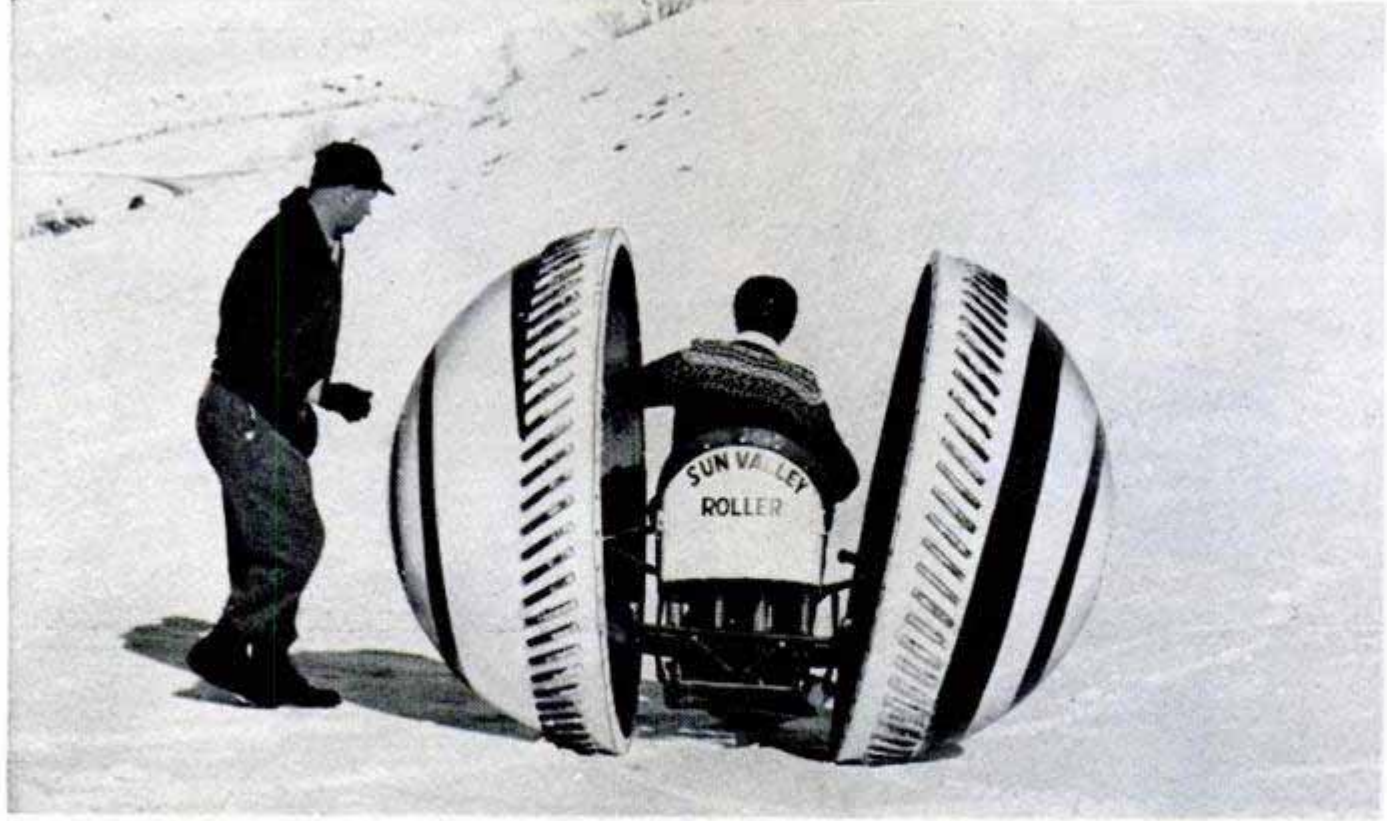
a buried target, it's first necessary to excavate the hole that will contain the structure, set up the wooden forms and install the reinforcing steel, then pour the concrete. Various mixes of concrete are used for different targets, and all aggregates are measured twice to insure perfect mixes.

Instruments are attached to each target and other devices are buried in the earth

(Continued to page 240)

**TNT can't be exploded until the powder expert plugs in this "safety link" which he carries in his pocket**

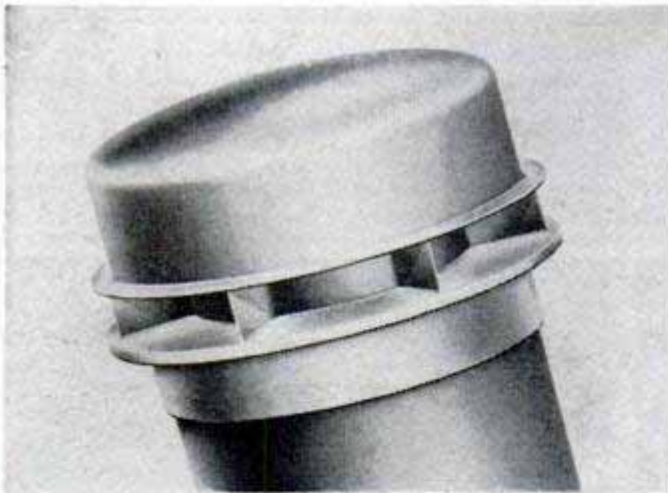




## "Snowball" Ride

Flanked by two semispherical wheels, a nonskier can have fun rushing down wintry slopes in a new "mechanical snowball." The rider's seat between the five-foot aluminum

wheels is stabilized by a skid-pan in front. Individual wheel brakes on the handle bars control the steering. The complete vehicle weighs 400 pounds. According to the inventor, the vehicle has a counterpart which may be suitable for military use.

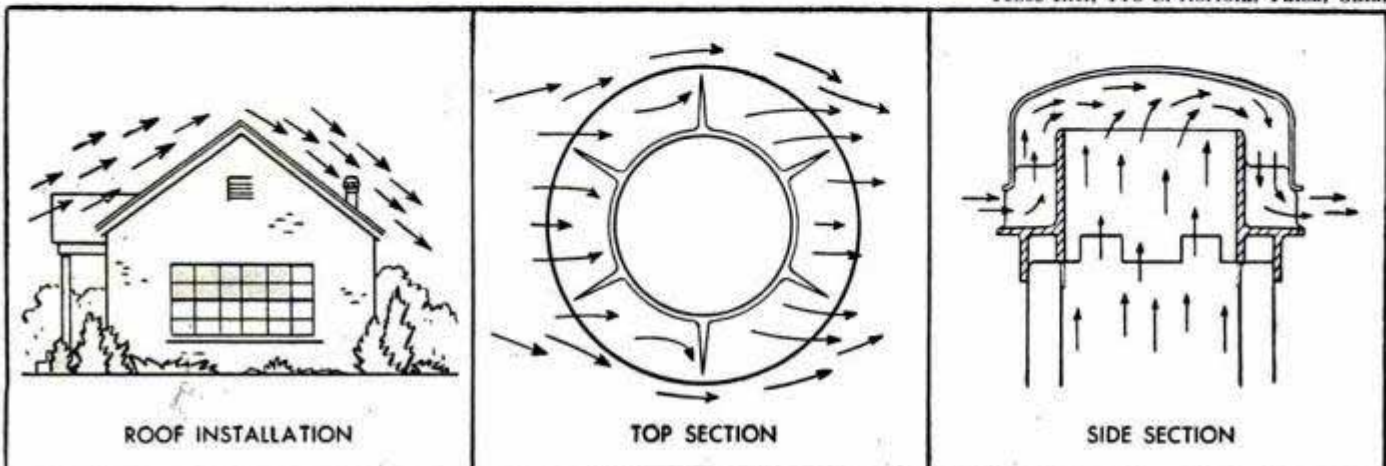


## Wind Controls Chimney Vent Cap

Regardless of wind speed, a new chimney vent cap maintains a balanced furnace draft. Made of aluminum, the vent cap is press fitted into the round vent pipe. The wind builds up pressure between vanes on one side of the cap, while creating a low-pressure zone on the opposite side. The draft through the chimney is channeled up and under the cap, where the high and low-pressure zones balance each other to maintain a normal draft. The cap is designed to give only a slight draft increase with any greatly increased wind velocity.

Below, left, vent operates with only eight inches of clearance above chimney. Center, wind creates high-pressure zone on one side of vent, balancing suction on opposite side. Right, cap makes the vent rainproof

Tesco Inc., 110 S. Norfolk, Tulsa, Okla.





Spray stirred up by the "wings" hides the evidence, but the hull of this boat is almost entirely out of water

## Fast Ferry "Wings" Along at 35 Knots

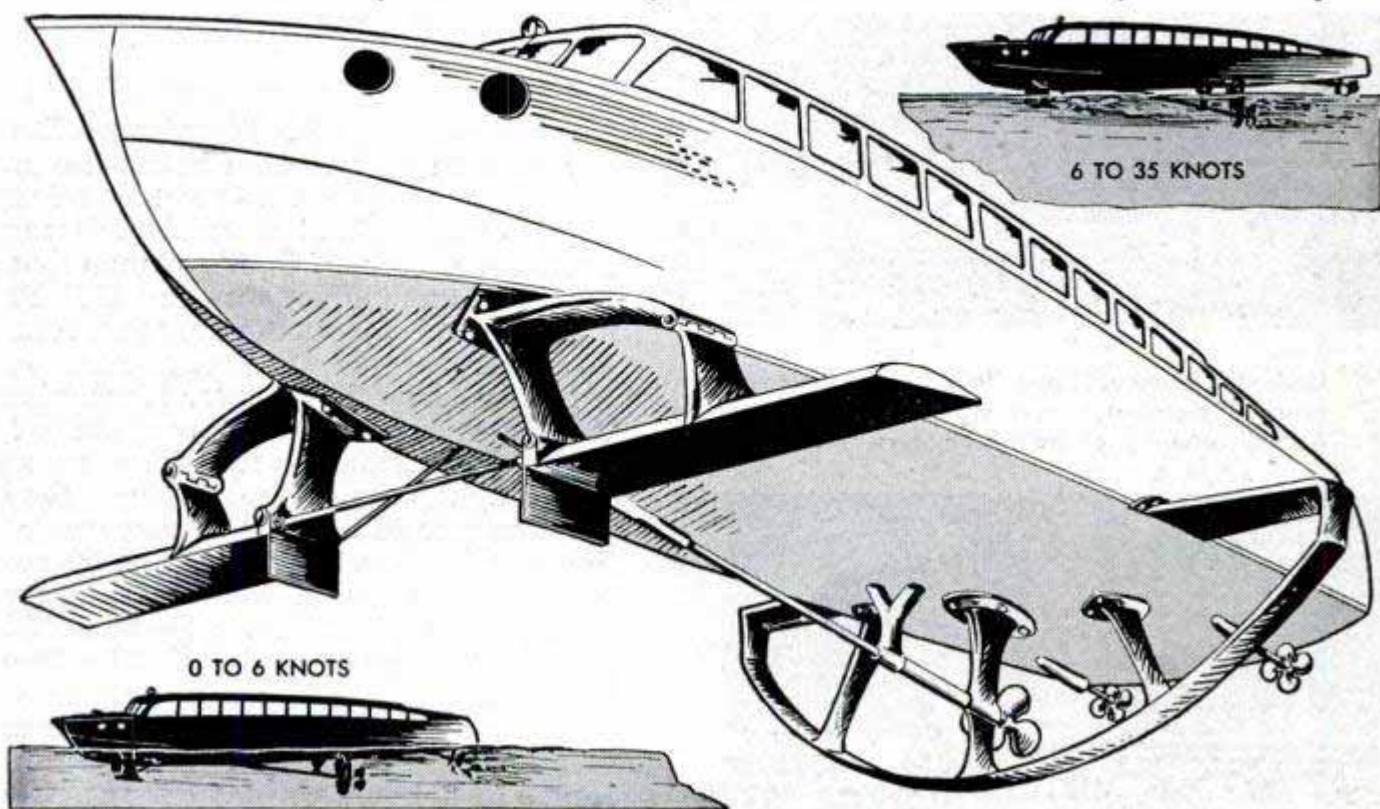
WITH 80 passengers aboard, a 56-foot Swedish ferry boat literally takes wings to skim along at 35 knots or 40 miles an hour. Built of light metal, the craft is said to be the fastest passenger boat in the world.

Stopped or moving slowly, the boat looks like any luxurious cabin cruiser. But when its 600-horsepower Junkers diesel engine opens up, the boat is lifted out of the water by a curved bear-plane amidships and a pair of horizontal gliding planes located under the bow.

The semicircular bear-plane acts like an

airplane wing. A higher pressure develops on the underside than on the topside, forcing it upward until the hull is out of water. With its greatly decreased resistance, the boat makes 35 knots and does it economically — fuel cost being about 10 cents a mile. Maneuverability is good even in rough seas and the boat leaves little wake. It hits top speed in seven seconds. Two 60-horsepower marine engines drive it at slow speeds. The Junkers takes over at six knots, driving the ferry through a single propeller mounted in the center of the bear-plane.

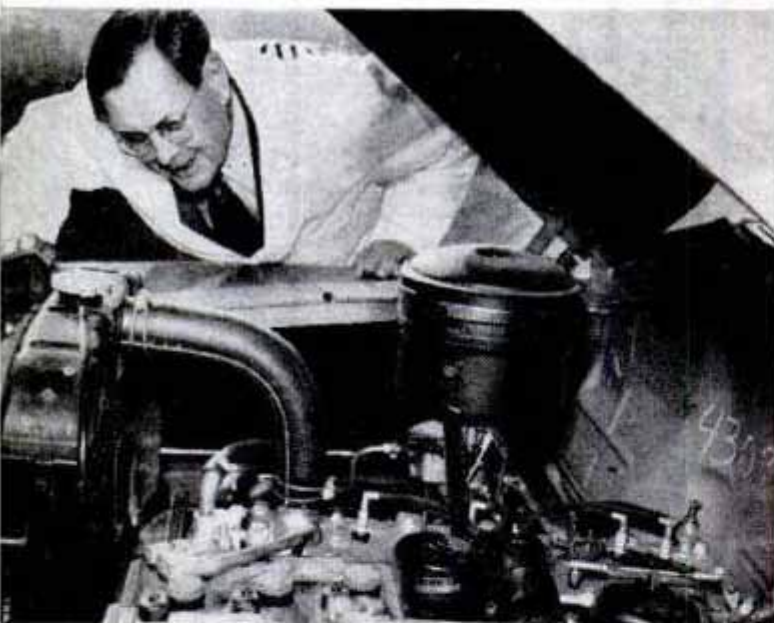
Ocean-bottom view of the speedster and its wings. Smaller sketches show how boat planes at fast speeds



# THE OWNERS REPORT ON

*I practically live in my car*

*Comfortable as a chair*



Under the Plymouth hood Floyd Clymer finds weather-proofed distributor and wires, accessible battery. Below, cutaway of built-in by-pass cooling system



**The true test of an automobile begins when the owner takes the wheel. This is another report from owners of 1951 cars who answered questionnaires sent by Popular Mechanics to 1000 Plymouth owners from coast to coast**

*By Floyd Clymer*

**W**HEN a boulevard cowboy (did you ever ride a taxi in Washington, D. C.?) agrees with an Alabama housewife and a busy Denver doctor, a traveling salesman from Nashville and a rural mail carrier from Charleston, S. C., it's a cinch that the object of their affections—the 1951 Plymouth—must have outstanding and versatile characteristics.

In answering the *Popular Mechanics* national survey of 1000 owners of 1951 Plymouths, the Washington taxi driver says that for his dough the Plymouth gives "the best performance of any car in taxi use." The Selma, Ala., housewife likes the Plymouth because "it is so easy to drive and very smart looking for a low-priced car. I love that large rear-view glass." The Denver doctor says: "What this doctor orders is a Plymouth." The Nashville salesman says: "I practically live in my car, spending at least 5 to 12 hours per day driving. Conse-



# THE '51 PLYMOUTH

*Noisy windshield wipers*

## THE POPULAR MECHANICS MOTOR SURVEY AS CONDUCTED BY FLOYD CLYMER

I am the owner of a 1951 Plymouth. Model: Club 216 Cranbrook P23  
I have owned it about 3 months. Speedometer mileage is now 3000  
I use only regular gasoline  - I use premium (high test) gasoline  BOTH  
I GET THE SAME PERFORMANCE - HI TEST ELIMINATES KNOCK.  
My approximate gas mileage in the city is 18 MPG; in country, 23 MPG.  
AT 55 MPH  
I CHANGE OIL  every 1500 miles; I ADD OIL  - one quart every \_\_\_\_\_ miles.  
FILTER 8000 miles

How does the car handle on the road? THE '51 PLYMOUTH IS BETTER THAN ANY  
Maneuverability seems to be: Excellent  Average  Unsatisfactory   
Acceleration is: Outstanding  Very Good  Fair  Poor   
Curb and road clearance is: Satisfactory  Too high  Too low

Why did you buy a Plymouth? ECONOMY, COMFORT, BETTER DRIVING QUALITIES, AMPLE  
What features about the car do you especially like? AUTOMATIC CHOKE, GOOD VISIBILITY, POWER  
ORIFLOW SHOCKS, SEATS (JUST LIKE A COMFORTABLE CHAIR AT HOME) BRAKES

Do you like Plymouth's Safety-Flow Ride? YES; electric windshield wipers? NO  
New-type brakes? YES; New interior? YES; Visibility? YES  
What is your opinion of the new body styling? ALRIGHT - LOW HOOD IS EXCELLENT  
REAR COULD STAND IMPROVING -  
If you own the 111-inch wheelbase model, how do you like it? SEE OTHER MODEL!

What do you dislike about the car? ONLY ONE - KEEPING DOWN RATTLES AROUND STEERING  
Have you ever owned a Plymouth before? YES If so, how many? FIVE  
RADIO HEATER, GLOVE COMPARTMENT - I'VE HAD THIS TROUBLE WITH ALL PLYMOUTHS

Would you buy another Plymouth? Yes  Possibly  No   
Do you secure good dealer service? Yes  Fair  No   
SUBAR MOTOR CO, WHITMIRE SC, IS THE BEST IN THIS AREA.  
How would you rate your new Plymouth? Excellent  Good  Average  Poor   
AFTER OWNING ONE PLYMOUTH - OTHER CARS DRIVE LIKE EARLY MODELS.

### GENERAL INFORMATION

What type of engine would you prefer in your car of the future? In-line  V-type   
Cylinders: 6  8  Valves: Side  Overhead   
Based on my present experience, I want my next car equipped with: Standard Trans.   
Overdrive  Chrysler Fluid Drive  Other type of automatic transmission   
Please state reasons: ELIMINATES LEAK AND GEAR SHIFTING - SEE OTHER SHUT #2  
Do you like the new low-pressure, super-cushion tires? YES How much more? 28 lbs.  
Do you carry recommended pressure? Yes  No  THIS PRACTICE PRODUCES MUCH LONGER TIRE LIFE.

Please check answer boxes (  ). Your reply will be held in strict confidence.  
Please mail promptly to:  
FLOYD CLYMER  
1268 SO. ALVARADO ST.  
LOS ANGELES 6, CALIF.  
My Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City & State: WHITMIRE, S.C.

Typical questionnaire shows owner's enthusiastic response to the survey

quently, I want the most comfortable and maneuverable car for the money. I found that Plymouth far exceeded my expectations and I would advise anyone spending less than \$2500 for a car to buy a Plymouth." The Charlestonian mail carrier reports: "I've owned seven Plymouths in 23 years and covered a rural route for many years under adverse road and weather conditions. The Plymouth always was my choice and that's why I bought a '51."

Don't rush to the conclusion that the entire survey was just one big fat orchid for the '51 Plymouth. There were complaints

about that new single-speed electric windshield wiper, lack of overdrive, body styling and occasional rattles. Nobody kicked about Plymouth not having an automatic transmission and one owner seemed to speak for a majority when he wrote: "I like to shift gears rather than to pay the difference." Seventy-seven percent either preferred standard transmission or standard with overdrive.

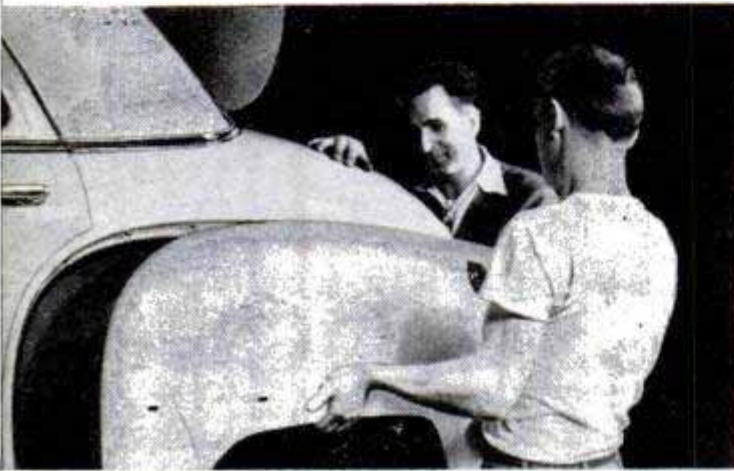
Visibility and Plymouth's new Safti-Flow ride carried off the honors. (I heartily approve; those new Oriflow shock absorbers really do a job of smoothing out the

bumps.) Economy is another factor frequently mentioned in various answers throughout the questionnaires. The owners like the mileage they get on regular gasoline (used by 71 percent) and they like the oil economy and low maintenance costs in general.

Maneuverability was rated excellent by 86 percent. The most popular model is the Cranbrook, which showed an ownership in our survey of 78 percent.

"Maneuverability appeals to me," wrote one Alabama owner, "the foam-rubber cushions give floating ride; electric windshield wipers are very good." And from

**Plymouth owners like these bolted-on fenders which definitely reduce repair costs in case of accident**



Omaha: "My Plymouth handles perfectly with little strain or effort required in driving. Appearance is now good, and the new hood design broke the former boxy look." A Grand Island, Nebr., owner says: "By far more for your money than 8 out of 10 cars on the road regardless of price. The engine is certainly powerful enough to handle overdrive easily and give more economy. The heater is no good in traffic." (He did not elaborate on the latter.)

One owner said his car is tops in "invisibility." (Too bad Houdini is not around!)

A woman from Jackson, Miss., praised her Plymouth's smooth gearshift and the chair-height seats. (By my tape measure the vertical distance from seat to roof, measured at a point 18 inches from car center line, is 36 inches for both front and rear seats on the four-door sedan.)

Although a great majority of the owners drive the 118½-inch wheelbase Cranbrook and Cambridge models, the 111-inch Concorde and Suburbans also have their fans. A Concord owner from Birmingham writes: "It takes to the road like the bigger cars, and I like the new body styling and much improved visibility." The owner of a Suburban in Greensboro, N. C., reports: "Design is far superior to any station wagon, and I like the 111-inch wheelbase which makes it easy to park." This opinion

## Percentages from P. M. Poll

Owners of Cranbrook models.....	78%
Owners of Cambridge models.....	15%
Owners of Concord models.....	7%
Average gasoline mileage (in country).....	20.1 m.p.g.
Average gasoline mileage (in city).....	16.9 m.p.g.
Use regular gas.....	71%
Use premium gas.....	29%
Change oil.....	98%
Average mileage for change of oil.....	1405
Add oil (also change periodically).....	11%
Average mileage for adding oil.....	916
Maneuverability excellent.....	86%
average.....	13%
unsatisfactory.....	1%
Acceleration outstanding.....	19%
very good.....	72%
average.....	8%
poor.....	1%
Road clearance satisfactory.....	89%
too high.....	0
too low.....	11%

### BEST-LIKED FEATURES

Safty-Flow ride.....	97%
Body styling excellent.....	84%
average.....	12%
poor.....	4%
Interior finish.....	94%
New brakes.....	95%
Visibility.....	98%

Electric windshield wipers.....	79%
---------------------------------	-----

(These percentages are based on the fact that some owners mentioned more than one feature.)

### OWNERS RATING OF CAR

Excellent or good.....	88%
Average.....	11%
Poor.....	1%

### GENERAL INFORMATION

Prefer in-line engine.....	66%
Prefer V-type engine.....	34%
Prefer six cylinders.....	63%
Prefer eight cylinders.....	37%
Prefer side-valve arrangement.....	57%
Prefer overhead-valve system.....	43%
Prefer standard transmission with overdrive.....	40%
standard transmission only.....	37%
automatic transmission.....	23%
Prefer Fluid-Matic Drive (Chrysler).....	55%
(55% of the 23% preferring automatic transmission.)	
Prefer makes other than Fluid-Matic Drive.....	45%
Like low-pressure tires.....	84%
Previous Plymouth owners.....	68%
Will or might buy another Plymouth.....	98%
Will not buy another Plymouth.....	2%
Dealer service good.....	70%
average.....	21%
poor.....	9%

### Most frequent objections:

Single-speed windshield wipers, no overdrive unit available, body styling.

is echoed by a major at Robbins Air Force Base, Ga., who adds that he likes "the lack of expensive and unnecessary gadgets."

The minority that "voted" against the electric windshield wipers did not pull any punches. "I think the Plymouth's new windshield wipers are terrible," wrote a man from New Jersey. "They're noisy." Several suggested that the windshield wiper should have at least two speeds.

The owner of a Cranbrook club coupe from Whitmire, S. C., says: "I like the automatic choke, good visibility, Oriflow shocks, the seats which are as comfortable as a chair at home and the wonderful brakes . . . Having owned five Plymouths, I think Plymouth is the best buy for the money, but think that overdrive should be offered as optional equipment for better gas economy. I witnessed the 500-mile Darlington stockcar race and the boy from Long Beach, Calif., really did burn up the track averaging 76 miles per hour, beating all other stockcars entered—that test should prove that Plymouth is the best buy for anybody's money." (During the last few years Plymouth cars have won many important stockcar races.)

A Kentucky owner says: "My Plymouth handles better than any car I have ever owned, regardless of weight. I like the comfort for the passengers . . . My dealer



Over rough back roads the '51 Plymouth's new Ori-flow shock absorbers got high rating from Clymer

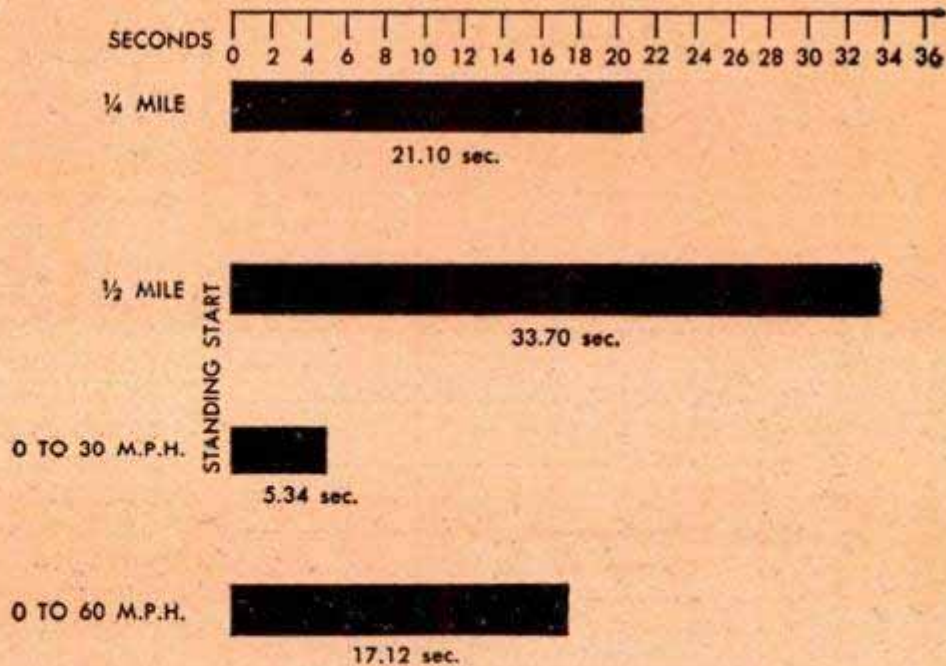
REBOUND STROKE



COMPRESSION STROKE



### Acceleration Chart



Top Speed (by speedometer)..... 93-94 m.p.h.  
Actual Top Speed, about 4% less (speedometer variation).

Oriflow shock absorber — as piston travels upward fluid passes to lower end through passages in cylinder. Also, check valve in base lifts off its seat to permit fluid in reservoir to flow into lower end

Acceleration tests made by Floyd Clymer show excellent performance of the '51 Plymouth and back up the high rating of 91 percent (outstanding or very good) given the car's acceleration in the owners' survey

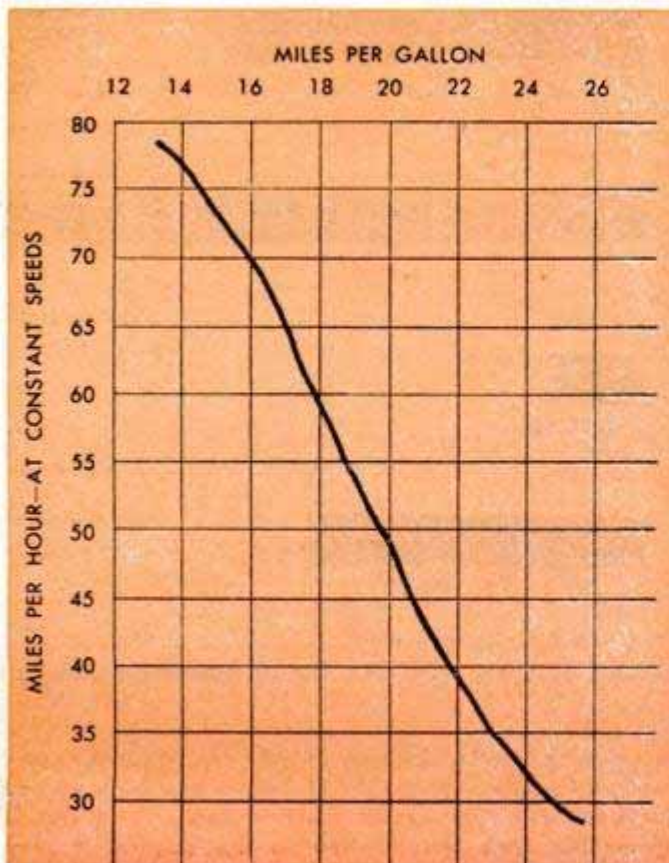


High and wide windshield gives fine visibility which pleased 98 percent of owners in the nation-wide survey

is long on promises and short on performance when it comes to service."

A glance at the percentage chart will show that a great majority approve of Plymouth's styling. There were remarks, however, from an articulate minority such as: "Don't like it, but is a definite improvement over 1949 and 1950 models." "I do not care for the boxy rear end." "Too-conservative boxlike construction . . . but an improvement over old models." A Navy lieutenant from Gainesville, Fla., wrote: "Plymouth has a square appearance that gives the interior room, which I like."

### Economy Test



A traveling salesman from Orangeburg, S. C., thinks that the low-pressure tires on his Plymouth are fine for ordinary driving, but for a traveling salesman, the tread wears out much faster than the standard-size tires. (It's the same story on all cars.) He thinks the 1951 model has more vibration and rattles than the other two previous Plymouth cars he has owned.

A Massachusetts owner thinks the car is beautiful and has a modern look without going to extremes, is very comfortable and retains all the fine qualities for which Plymouth cars are famous. A Ft. Smith, Ark., doctor says the car is easy to handle in traffic and not too tiresome on the road. He bought a Plymouth because his father has driven his 1941 Plymouth more than 150,000 miles and still is driving it everyday. He thinks the new shock absorbers make too much noise.

A Columbia, S. C., owner likes the body styling, but thinks the rear deck and rear-deck lock could be improved. He said he went back to Plymouth with the conventional transmission after owning other makes of cars with automatic transmissions. A Fayetteville, Ark., owner says the Plymouth has big-car features and is the neatest looking car on the road, but overdrive would be desirable as it saves fuel with less strain on the engine. An enthusiastic Jackson, Miss., owner wrote that he drove one Plymouth 75,000 miles in 11 years under various conditions and it gave maximum service at minimum cost, plus the fact that it was easy to handle when it was old and worn. "It is a pleasure to recommend Plymouth and naturally, when I bought a 1951 car, it was a Plymouth," he said.

A Jackson, Tenn., owner, writes: "I was  
(Continued to page 242)

**\$5,000****American  
Way of Life  
PHOTO CONTEST****What does America mean to you?****Answer that question with a photograph  
and win one of these big prizes!****prizes**

	<b>Black and White</b>	<b>Color</b>
<b>1st Prize</b> .....	<b>\$1,000</b>	<b>\$1,000</b>
<b>2nd Prize</b> .....	<b>\$ 500</b>	<b>\$ 500</b>
<b>3rd Prize</b> .....	<b>\$ 300</b>	<b>\$ 300</b>
<b>4th Prize</b> .....	<b>\$ 100</b>	<b>\$ 100</b>
<b>5th Prize</b> .....	<b>\$ 100</b>	<b>\$ 100</b>
<b>6th Prize</b> .....	<b>\$ 100</b>	<b>\$ 100</b>
<b>7th Prize</b> .....	<b>\$ 100</b>	<b>\$ 100</b>
<b>8th Prize</b> .....	<b>\$ 100</b>	<b>\$ 100</b>
<b>16 Prizes—Black and White Only</b> .....	<b>\$ 25 each</b>	

**rules**

1. The "American Way of Life" photo contest is open to all persons except employees of Popular Mechanics Company and their families.

2. There will be a Black-and-White Competition and a Color Competition with separate prizes in each. Hand-tinted prints are not eligible.

3. Photographs must illustrate your own conception of the "American Way of Life," but the subject you pick can be in any field — industry, agriculture, government or any other. You may see it in a country store, a view, a man at work, a city street or a thousand places. Winners will be selected on (a) how well the picture illustrates the "American Way of Life" and (b) its all-around photographic excellence.

4. All entries must be postmarked not later than midnight, September 1, 1951, and must have been taken between April 1, 1951, and September 1, 1951. No entry fee is required and there is no limitation on the number of entries you may submit. Data sheet, giving information listed at the bottom of this page, must be attached securely to the back of each entry. When submitting transparencies, attach data sheet to the top of the transparent sleeve.

5. All prints and transparencies will be held until after winners are announced in the 50th Anniversary Issue of Popular Mechanics, January 1952. Non-winning prints and transparencies will be returned as soon as possible thereafter, provided that a self-addressed and stamped envelope is enclosed with the entries.

6. Black-and-white prints must be no smaller than 8 by 10 inches and no larger than 11 by 14 inches and must be mailed flat and unmounted. Color prints submitted must be 5 by 7 inches or larger. Color transparencies must be 2¼ by 2¼ inches or larger.

7. All prize-winning photographs become the exclusive property of Popular Mechanics Company. Original negatives of prize-winning prints must be submitted upon request.

8. Judges will be selected by the editors of Popular Mechanics Magazine. Their decisions will be final. In case of ties, duplicate prizes will be awarded.

9. Mail all entries to PHOTO CONTEST, POPULAR MECHANICS, 210 East Ontario St., Chicago 11, Ill.

10. Popular Mechanics Company will use all reasonable care in handling entries, but it can assume no responsibility for loss or damage of any entry.

**Attach to each photograph  
the following information:**

- |                   |               |                  |                |
|-------------------|---------------|------------------|----------------|
| 1. Your name      | 4. Subject    | 7. Shutter speed | 10. Film       |
| 2. Street         | 5. When taken | 8. Lighting      | 11. Lens stop  |
| 3. Town and state | 6. Camera     | 9. Where taken   | 12. Other data |

# VOLUNTEER LIFE GUARDS PATROL AUSSIE BEACHES



Unsinkable surfboat, above, plows through a stormy sea on a rescue attempt. Loudspeaker system, right, directs surfers into safe zones. While other crew members man the reel and pay out the line, below, a guard dons rescue belt and rushes to enter surf

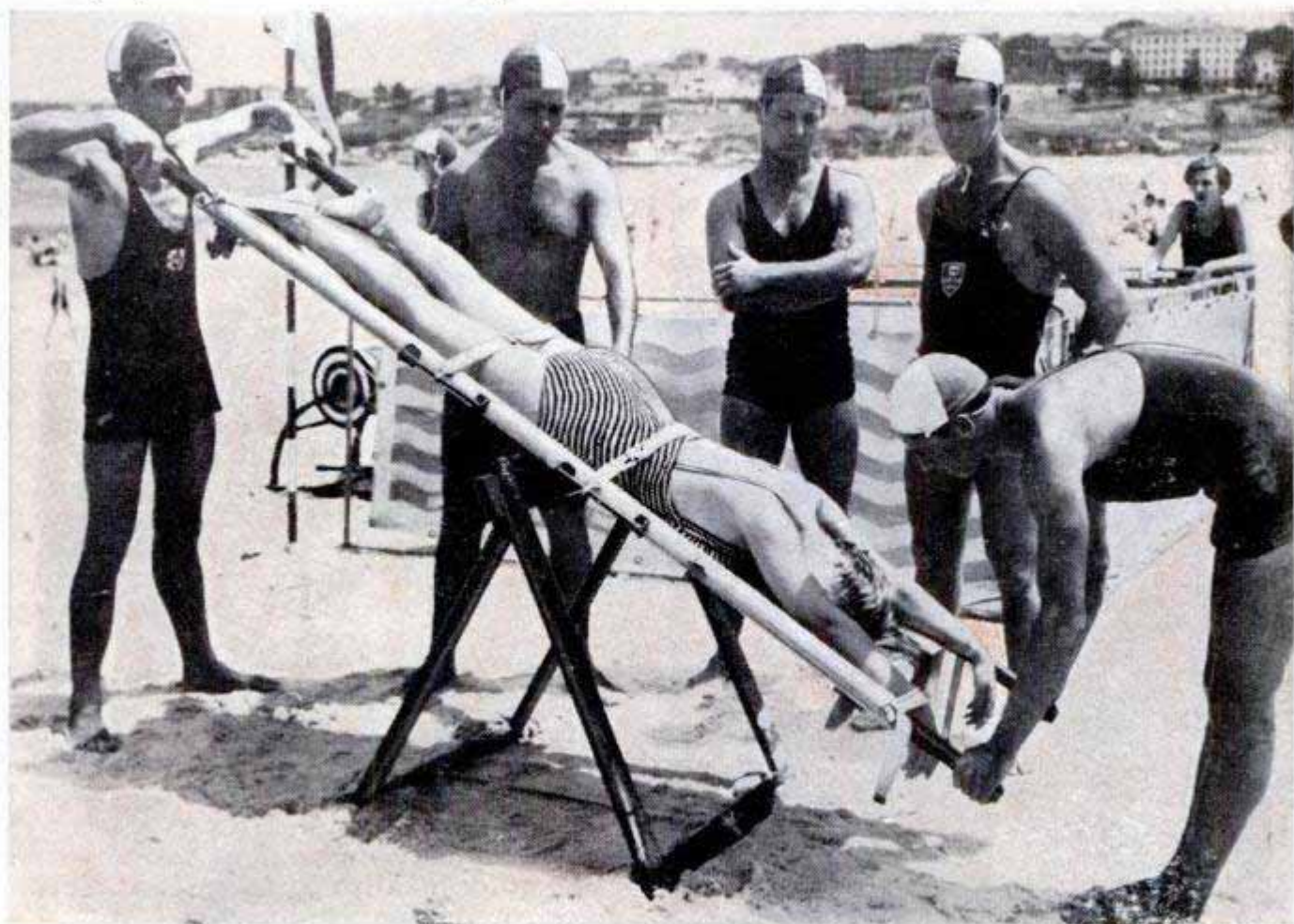
SAVING LIVES along the beaches of Australia's 12,000 miles of coastline is no job for weaklings. It is a rugged combination of sport, arduous training and humanitarian — often hazardous — effort that pays off only in satisfaction. The beach patrols are handled by 8000 active

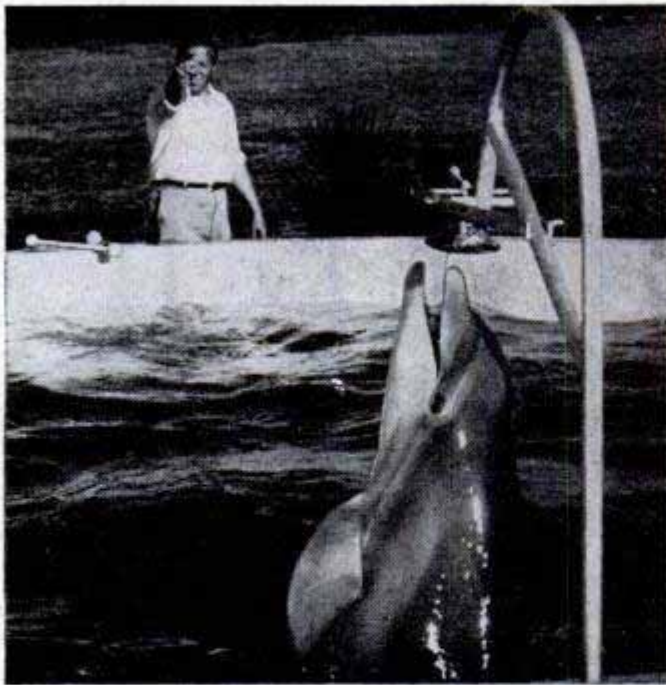


members of the Surf Life Saving Association of Australia, assigned to protect bathers at some 160 clubs. Five thousand additional reserve members, no longer fit to battle with the currents and breakers of the raging Pacific Ocean, handle administrative work at the clubs. Australian beaches are not unusually dangerous, but storms or very heavy gales sometimes shift sand bars, causing strong cross-currents ready to sweep the unwary bather seaward. It is then that volunteer lifeguards, who save nearly 4000 swimmers yearly, have their hands full. Recruits for the patrols must first swim a quarter of a mile in under 7½ minutes, then take instruction in physiology and the signals that are used between surfboats and swimmers. After passing an examination on the classwork, the recruit has to take his place on a six-man rescue squad and demonstrate his ability to handle each place in turn. Mock rescues by the patrols are a big feature of Australian surf carnivals.

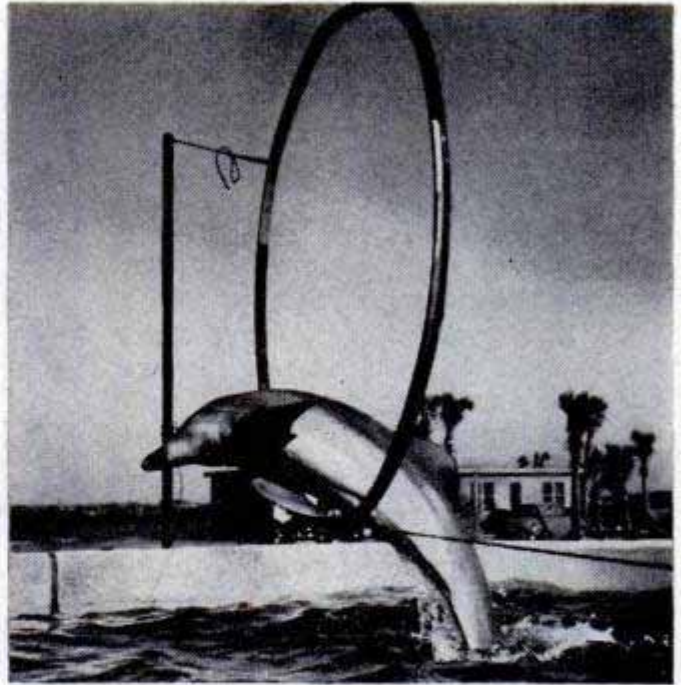


With a line attached to his body, top, guard moves through line of breakers toward distressed swimmer. Holding victim, right, guard is slowly hauled in by crew on shore. Below, resuscitation rocker gently but effectively expels water from swimmer's lungs





Reaching high out of the water to ring a bell, above, is Skippy's "I'm hungry" signal to his trainer. Leaping through a hoop and retrieving sticks, right, earns the six-foot dolphin extra between-meal delicacies



## Flippy Trains for "I.Q." Test

In experiments to test the intelligence of porpoises, a six-foot-long deep-water thinker at Marine Studios, St. Augustine, Fla., has been taught to roll over at his trainer's command, retrieve sticks, catch balls and leap three feet out of the water and through a hoop. As a reward for scholarly achievements, Flippy, a bottlenosed gray dolphin, gets between-meal snacks from trainer Adolf Frohn. Flippy has also been taught to ring a bell suspended over the side of the tank when he decides it is time for a regular feeding of his favorite "brain food"—fish.



U. S. Rubber Co., 7300 Keystone St., Tacony, Philadelphia 35, Pa.

## Rubber "Chain" Drive

Precision timing and nonslip power transmission are provided by a rubber and fabric belt that has regularly spaced rubber teeth around its inner surface. The pulleys have grooves in which the teeth engage, providing a positive, nonslip transmission of power. The belt will attain speeds up to 16,000 feet a minute and is said to operate more quietly than precision gears running in an oil bath. Another advantage of the new belt is that it won't stretch. Thus it operates on fixed centers without takeup adjustments. It has already replaced flat belts, V-belts, chain drives and gears in many applications ranging from automobile fans to electric typewriters.

☐ In an emergency not long ago a trawler came into a Scottish port with its diesel engines running on fish-liver oil.



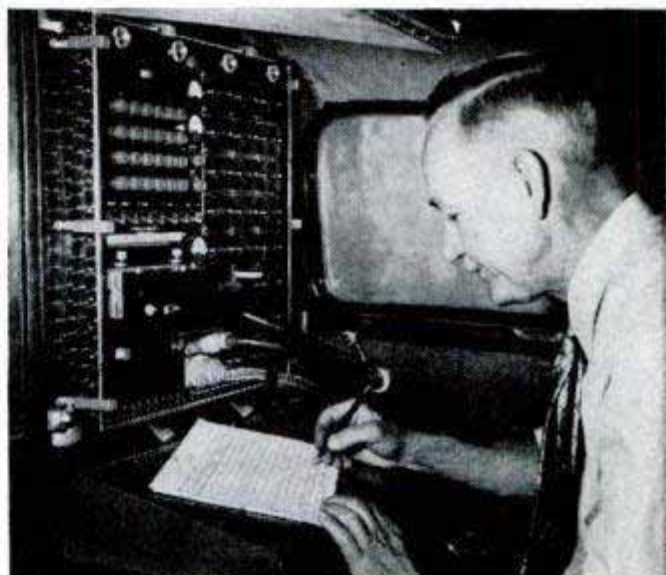


Rear car is the laboratory, interior details shown below. Other car carries geophones, stakes and explosives

## Seismic Lab on Wheels

MORE THAN divining rods are needed to spot oil fields and so scientists at Stanford Research Institute take their laboratory with them when they go a hunting oil. Two cars are packed with equipment ranging from a 24-channel amplifier-recorder and dynamite charges for seismic mapping to built-in wastebaskets emptied through an exterior slot. Both front doors in one car contain tanks of distilled water, complete with faucets. The car serves as a photo darkroom. With a crew of seven men, the two cars can complete four line miles of seismic study a day, more than twice that accomplished by four standard trucks and nine men using conventional methods.

Also in the rear seat of the lab car are tanks for developing seismic records. Windows are blacked out



In rear of lab car is amplifier panel that records the echoes of explosions from the underground strata

Water is stored in door (note faucet at bottom). Rear body panel is wastebasket with emptying door at left

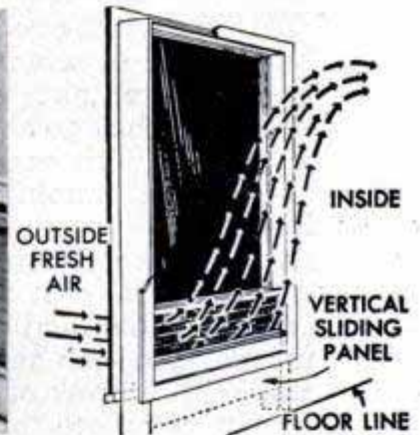
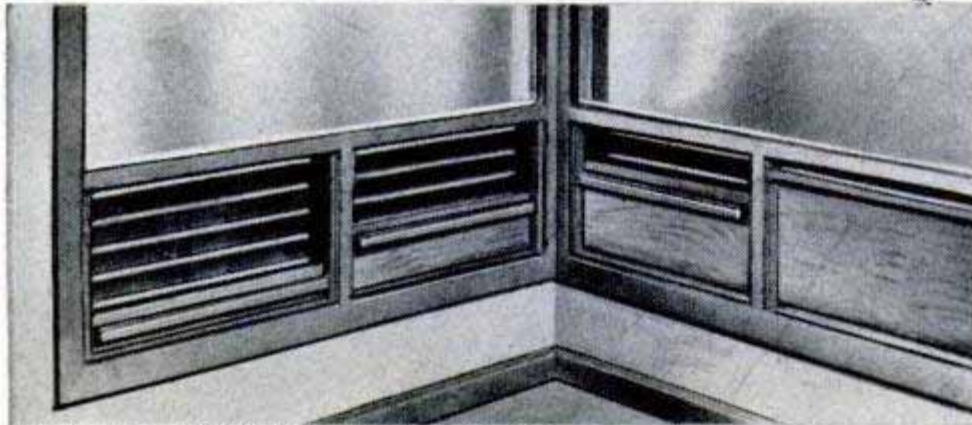




Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Calif.

**PICTURE HEATER** is actually a radiant-heating panel that provides extra heat where needed as in the nursery or office. The whole surface radiates heat

# WHAT'S NEW *For Your Home*

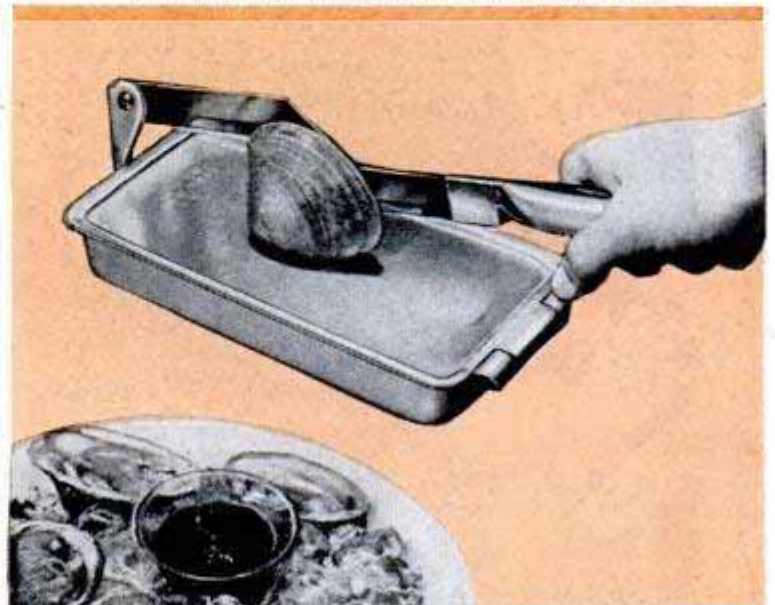
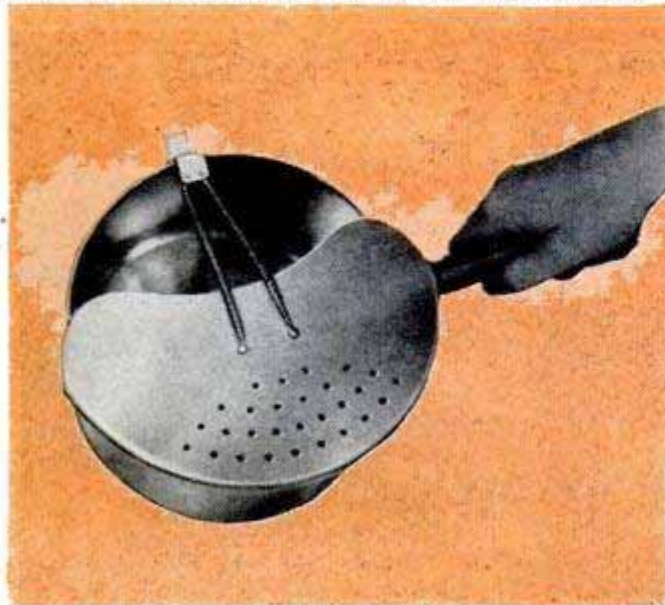


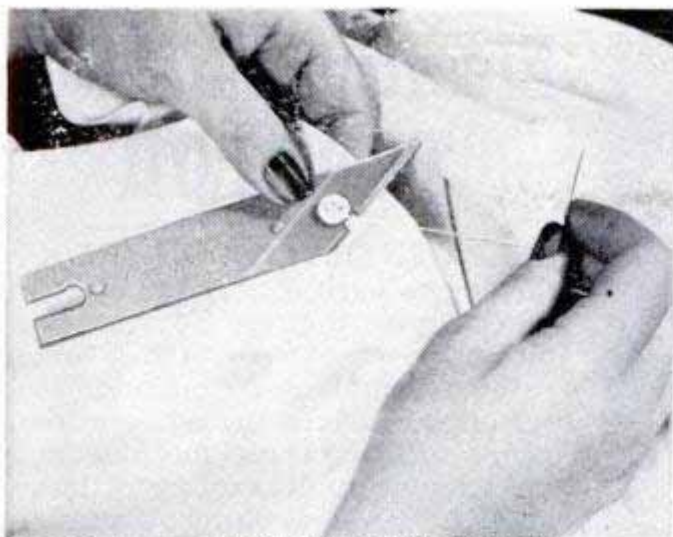
Lilly-Vent, Inc., 7962 S.E. Powell Blvd., Portland, Ore.

**VENTILATING WINDOW** can be sealed tightly with double sash yet its sliding panels below glass allow full, draft-free ventilation. Panels slide vertically and do not interfere with the draperies or furniture placement

**HOOK-ON STRAINER**, held on pan with a spring, lets you drain contents with no danger of scalding  
Sunset Sales Corp., 1001 North Vermont, Hollywood 29, Calif.

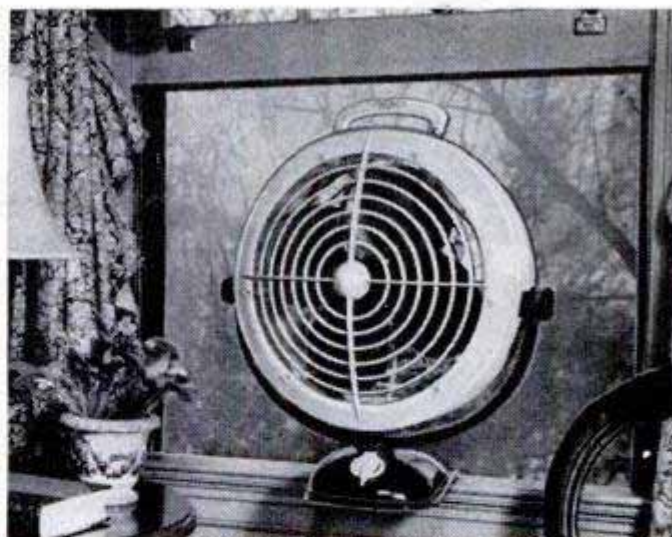
**CLAM SHUCKER** opens the most stubborn clams yet doesn't cut meat. Healthful juice is caught in tray  
Hoffritz for Cutlery, 551 Fifth Ave., New York City 17





John Dritz & Sons, 1115 Broadway, New York City 10

**BUTTON GAUGE** holds button away from fabric to form correct shank on either large or small buttons



W. W. Welch Co., 439 Race St., Cincinnati, Ohio

**AIR CIRCULATOR** has nonslip base plate to mount on any window for use as intake or exhaust fan



Rowe Industries, Inc., Sag Harbor, Long Island, N. Y.

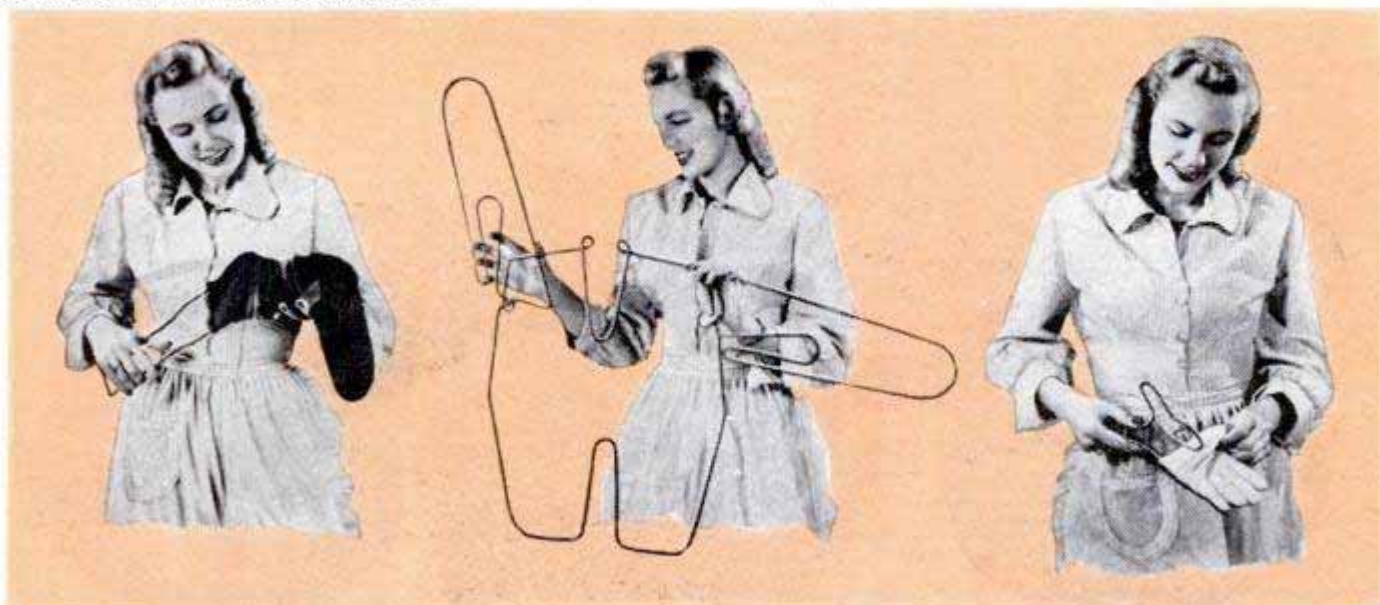
**PORTABLE MIXER** is electric, but it uses flashlight batteries. Made of plastic, it weighs only 12 ounces



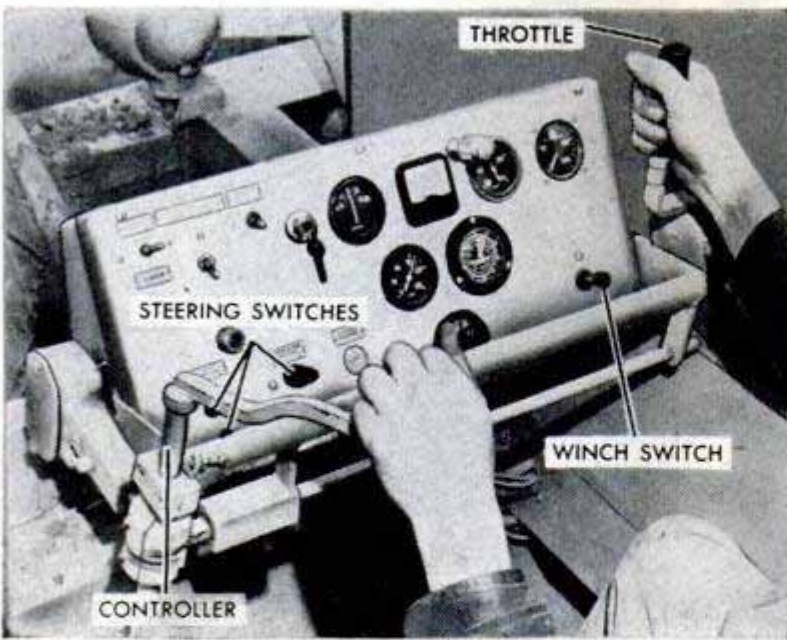
David Traum Co., Inc., 11 East 26th St., New York City 10

**PRESSING SPONGE** dampens fabric evenly without mess. Water from the top reservoir moistens sponge

**DRYING FRAMES** that prevent shrinkage of socks, sweaters and gloves are nonrusting because their steel cores are coated with a smooth, nonsnagging Vinylite plastic. Being adjustable, they will fit various sizes  
Queen Mfg. Co., 4227 Lake St., Chicago 24



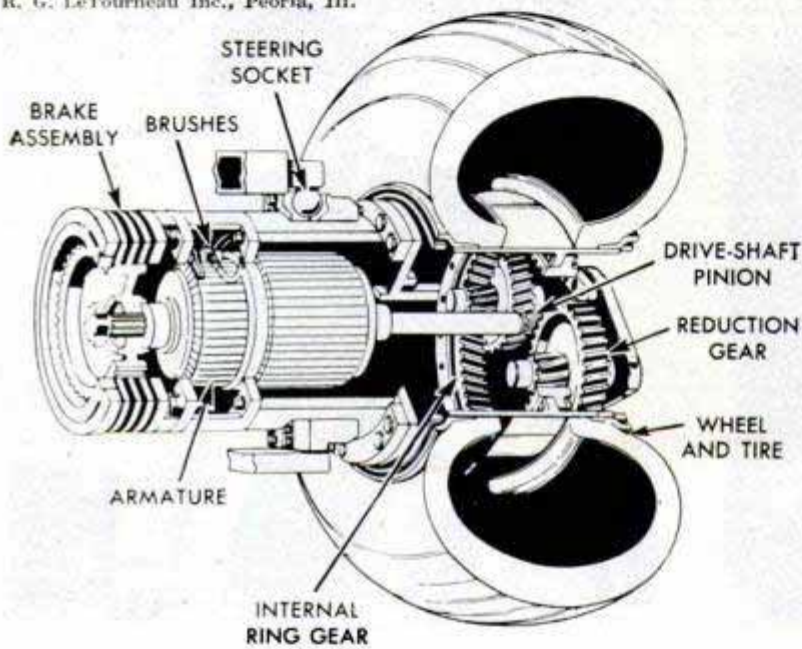
# Electric-Wheeled TRACTOR



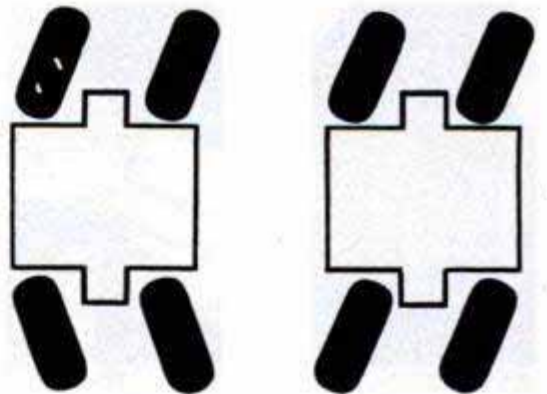
R. G. LeTourneau Inc., Peoria, Ill.

SELF-GENERATED CURRENT flowing to each of its four electric wheels gives the new Tournatow a pulling power of more than 16 times its own weight. A six-cylinder diesel engine drives the a.c. and d.c. generators powering the machine, built for ground-handling of large aircraft. It has no clutch, transmission or differential. The current goes through flexible wires directly to motors in the wheels, eliminating the need for the customary final drive gears and shafts, universal joints, hydraulic-braking system and other mechanical gearing and linkages.

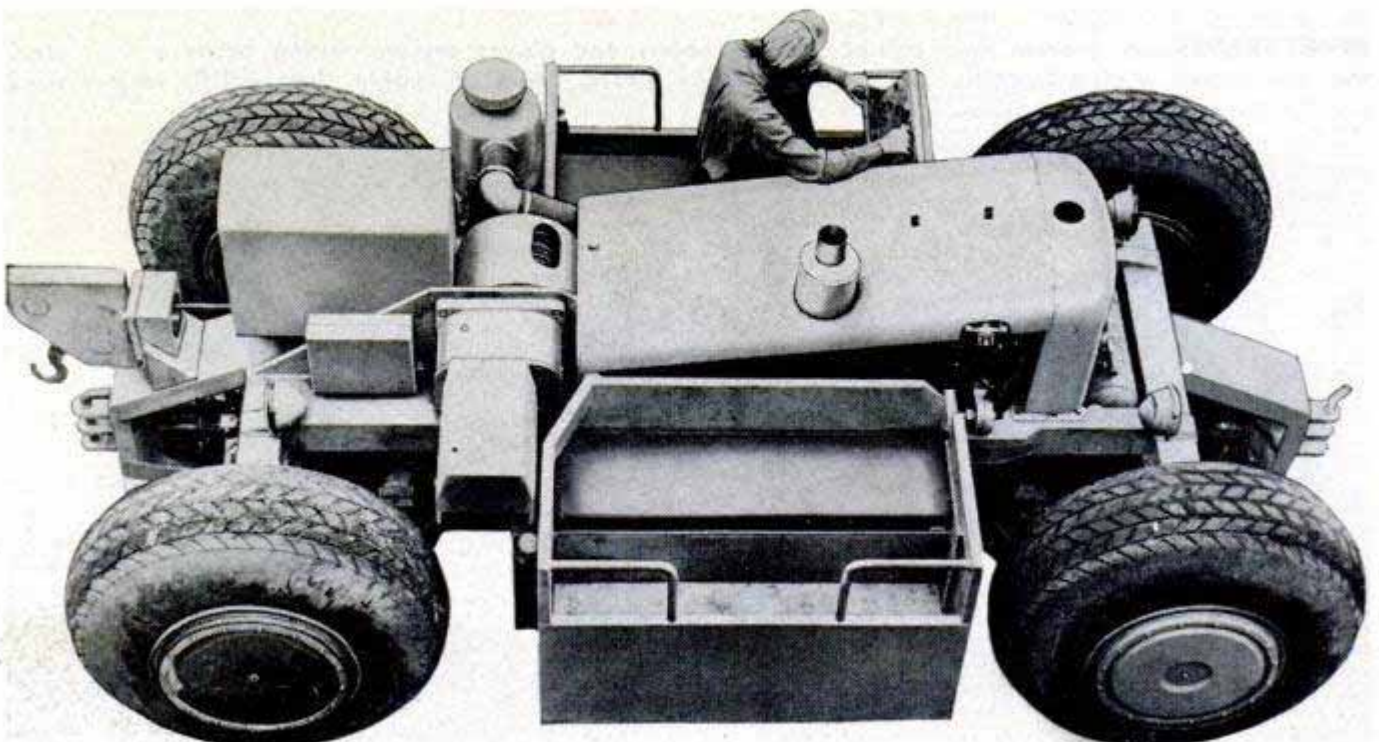
Steering switches, upper left, guide the Tournatow. For short turns, below left, front and rear wheels steer in opposite directions. For oblique movement all turn same way



CUTAWAY DRAWING OF ELECTRIC WHEEL



Each wheel of the Tournatow, below, has a gear arrangement in its assembly. Machine can pull 40,000 lbs.





R. Krasberg & Sons Mfg. Co., 2501 Homer Street, Chicago 47

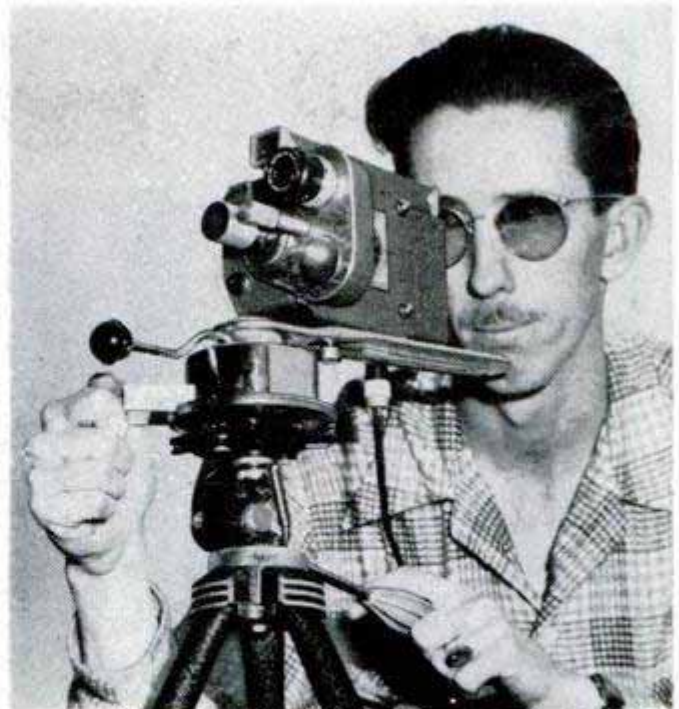
### Lawn Seeder

Lawns are seeded uniformly by a hand-held tool resembling a flour sifter. The seed is stored in a cylindrical hopper and the seeder is held in one hand with the thumb on a release lever. When the lever is pressed, the seeds pass through an opening into a fan mechanism which is operated by turning a crank with the other hand. The seed sprays out in front of the operator in a semicircular pattern. The tool also can be used to spread dry fertilizer and dry weed killer. The hopper holds a full pound of grass seed.

### "Strait Jacket" for Liquid Ozone

Scientists of Armour Research Foundation have succeeded in "taming" liquid ozone, a beautiful dark-blue substance that previously has been dangerous to handle. Liquid ozone can be used as a fuel to power rockets. It also can be decomposed directly into oxygen for submarines and high-altitude airplanes. In industrial applications it is used to purify water and air, and as a bleach. Ozone is made by bombarding oxygen with high-speed electrons. The scientists found that they could make the liquid behave by removing various thermal, mechanical, electrical and chemical influences. When these influences are present, the material is highly explosive.

Sources of available products described in this issue are listed on pages 12, 14 and 16. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. Just send a postcard to Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Illinois



Grover Photo Co., 2011½ E. Broadway, Glendale, Calif.

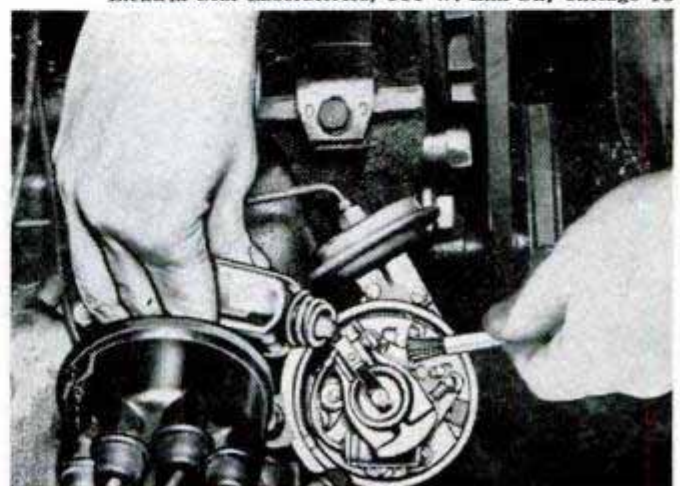
### Pneumatic Panning Of Movie Scenes

Smooth panning of scenery or groups is done automatically by a movie-camera tripod head that operates on air pressure and can be adjusted to various speeds. Air is stored in a cylinder by turning the head mechanism in the direction opposite to the desired panning. The camera automatically swings back when a release valve is opened.

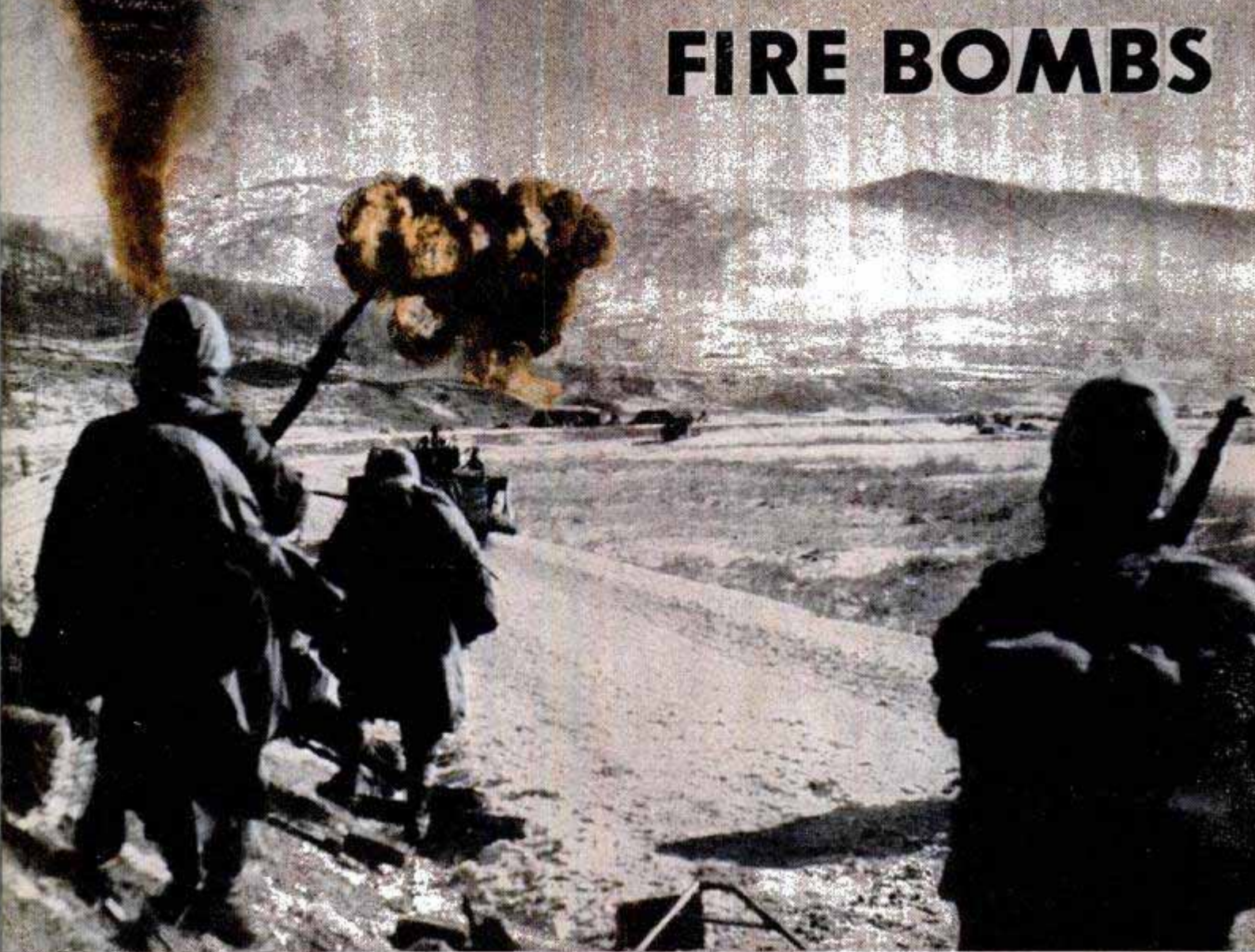
### Liquid Seals Engine Parts

Moisture is prevented from reaching the ignition system of a car by a heavy liquid which is brushed on all electrical contacts. It is available in a kit which also contains a brush and two treated washers for the battery posts. After the compound is applied, a stream of water can be played over the distributor, coil, spark plugs or battery without affecting the starting of the engine. In industrial applications it is applied to electric motors which in tests have successfully been run under water.

Elektrik Seal Laboratories, 161 W. Elm St., Chicago 10



# FIRE BOMBS



U. S. Marine Corps photo

Billowing smoke reveals where flyers flushed enemy from hillsides with napalm during advance in Korea

South Korean funnels napalm powder into gasoline. It takes from 9 to 21 pounds to fill a belly tank

U. S. Air Force photo



By Lt. Comdr. Arthur L. Schoeni

**M**ARINE fighter planes, sweeping a Korean battlefield for targets, saw a large number of Communist troops rush into a short railroad tunnel to escape their strafing.

Swooping down almost to the mouth of the tunnel, one deadeye pilot dropped a 150-gallon tankful of napalm right into it. Huge flames swept the length of the tunnel and burst out the other end, instantly killing every man inside.

Fighter-bombers in another area were trying to knock out a Communist tank. Their 20-mm. cannon shells bounced ineffectually off the thick armor plate. Another plane loosed a string of five-inch "Holy Moses" rockets against the speeding tank. Hitting a 25-mile-an-hour target going at right angles to a 400-mile-an-hour plane calls for expert marksmanship and these rockets missed.

Another pilot dived to the attack. Pulling out of his dive a few hundred feet above and ahead of the tank, he dropped his napalm-filled belly tank. Though not a direct hit, the huge burst of flaming gasoline

# BLAZE A TRAIL OF WAR



Six 110-gallon tanks of jellied gasoline add a destructive note to the appearance of this Air Force F-80

swallowed up the tank, searing its occupants and exploding their ammunition.

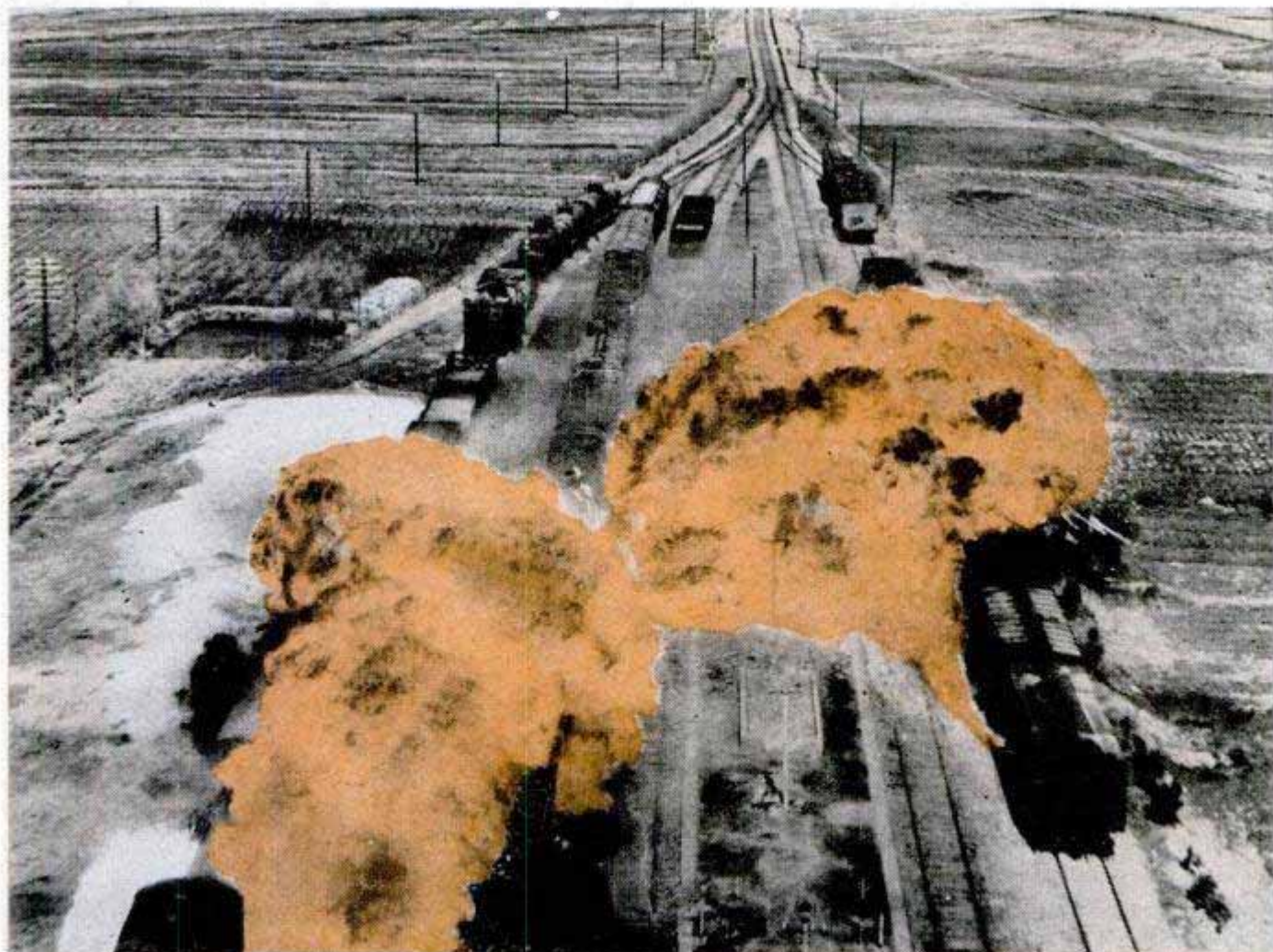
It is small wonder that the Communists call them "hell bombs." Pilot after pilot returning from the war zone has sworn that he would rather have a couple of droppable belly tanks filled with jellied gasoline than any other weapons—bombs, rockets or cannon.

Fire bombs have really come into their own in the Korean war. Every kind of target has fallen prey to them—troops, tanks, buildings, railroads, ammunition

dumps and even snipers in foxholes. Enemy troops fear napalm more than anything else thrown at them. One out of every four bombs dropped by Navy and Marine flyers was a napalm fire bomb. The Air Force reportedly used up 2,000,000 pounds of napalm powder the first five months of the Korean war.

Every war sees new weapons come to the fore and new uses discovered for old ones. Napalm is one of the old weapons that has risen to its highest popularity. It was used with good success against the Japanese on

With the "Y" of the tracks as an aiming point, a pilot skipbombed fiery blossoms on three enemy trains





Losing no time between strikes, two Marines mix jellied gasoline while men in background change a tire

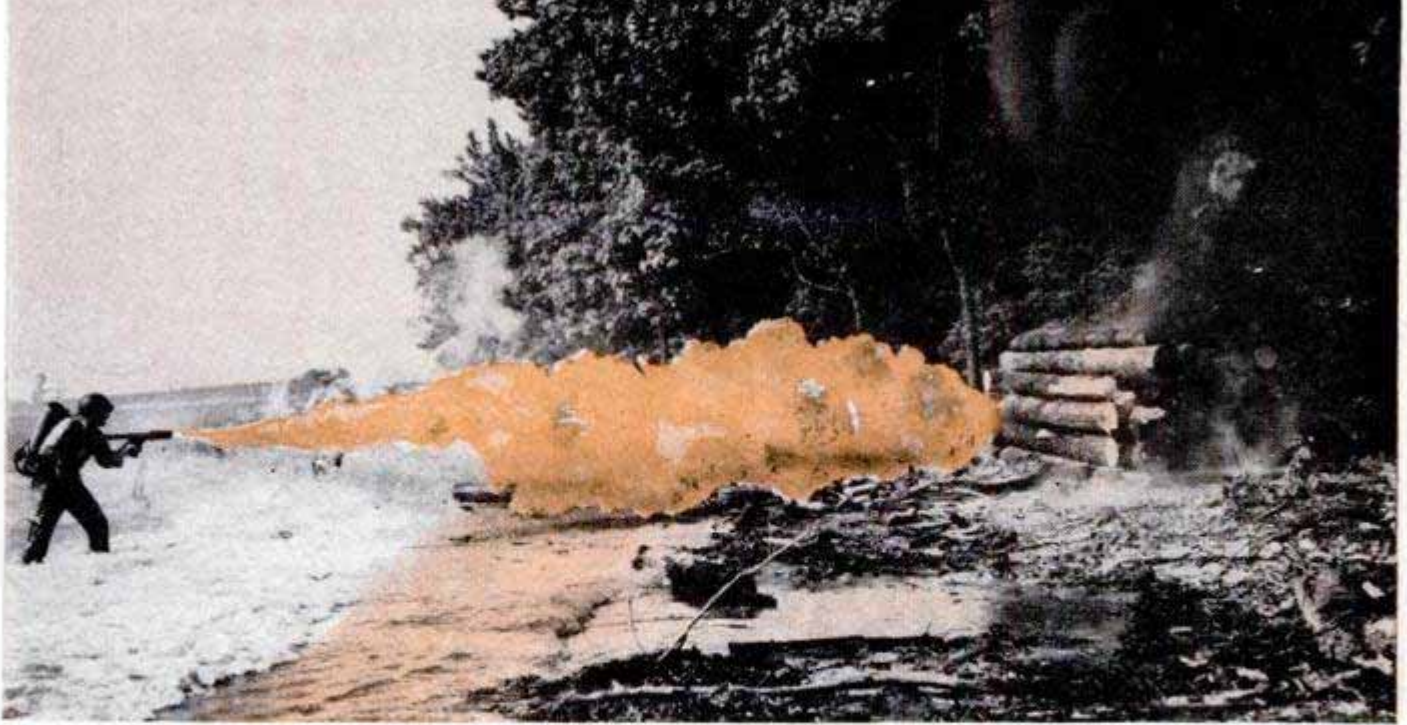
Peleliu, Iwo Jima and Okinawa. Thousands of napalm fire bombs were dropped on Japanese cities, burning many of them almost to the ground. Thinned versions of napalm are used in flame throwers that are employed by U. S. ground troops

against dug-in troops in caves and bunkers. Despite its widespread use, few persons know just what napalm is. Early in World War II scientists tried mixing gasoline with rubber. The Japanese captured all rubber supplies, so other substances were tried to

Just prior to "delivery," an ordnanceman on a U. S. carrier installs the igniter in a napalm belly tank  
U. S. Navy photo







**At a rehearsal for combat, a Marine at the Quantico, Va., training base, sprays napalm from a flame thrower**

slow down the flash explosion of gasoline and make it cling. They hit the jackpot by combining aluminum naphthenate with aluminum soaps of coconut fatty acids.

What they got was a thick, gooey liquid that exploded with an atom-bomb-like swoosh, spreading fire over an area half as big as a football field when a 150-gallon belly tankful was dropped. An off-white granular powder, newest formulas for napalm include about 65 percent oleic acid,

30 percent coconut fatty acids and 5 percent naphthenic acid.

On the day before a fire-bomb raid, ground crewmen or ordnancemen on an aircraft carrier mix the gasoline and napalm powder in big drums or sometimes directly into the plane's tanks. Standing overnight, it forms the gel so feared by any troops who have seen its fearful effects. Contact detonation fuses in the mouth of the tank set it on fire when it hits a target.

**Fire-filled smoke roars from a North Korean barracks, devastated by napalm dropped at its rear entrance**





One-hundred-pounder dropped by Air Force plane, in circle, shoots a tongue of flame to its target—the tank

Near-misses are as good as a hit. Jet pilots with their tremendous speed try to drop the tanks of napalm 50 yards or more short of the target, skipbombing it so the flames spew forward and envelop the tank or enemy troops. This 1500 pounds of liquid fire death will cover an area about 250 feet long and 80 feet wide. You don't have to get hits with that kind of weapon. Personnel within 30 feet of the flames usually are suffocated by the burst.

North Korean tankmen at first ignored attacking United Nations planes until napalm bombs began destroying them right and left. Man has always feared fire and the huge mushrooms of fiery gasoline soon took their toll of tanks, thatched villages, railroad trains and columns of trucks.

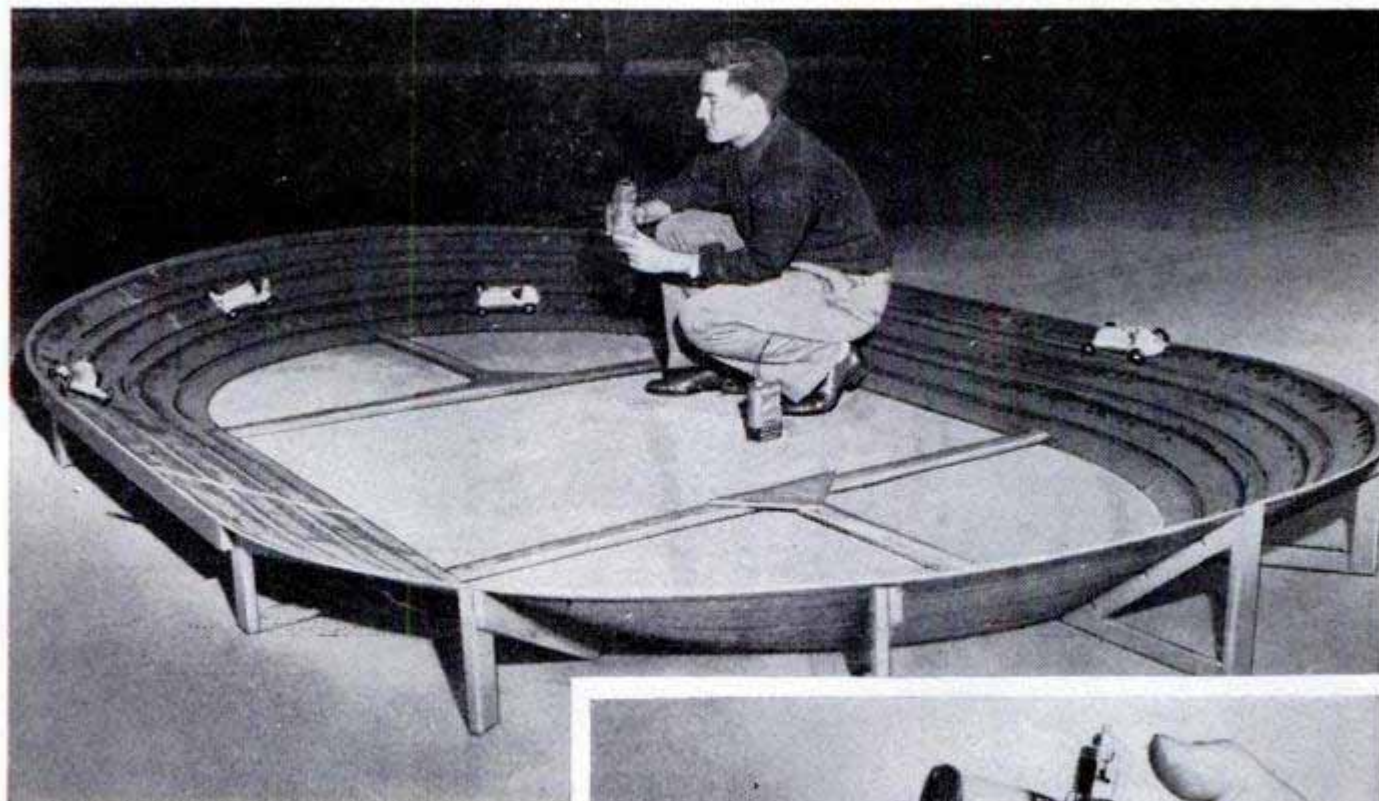
Skyraiders and Corsairs from a Navy carrier caught 280 trucks racing reinforcements to beleaguered Communist troops.

(Continued to page 236)



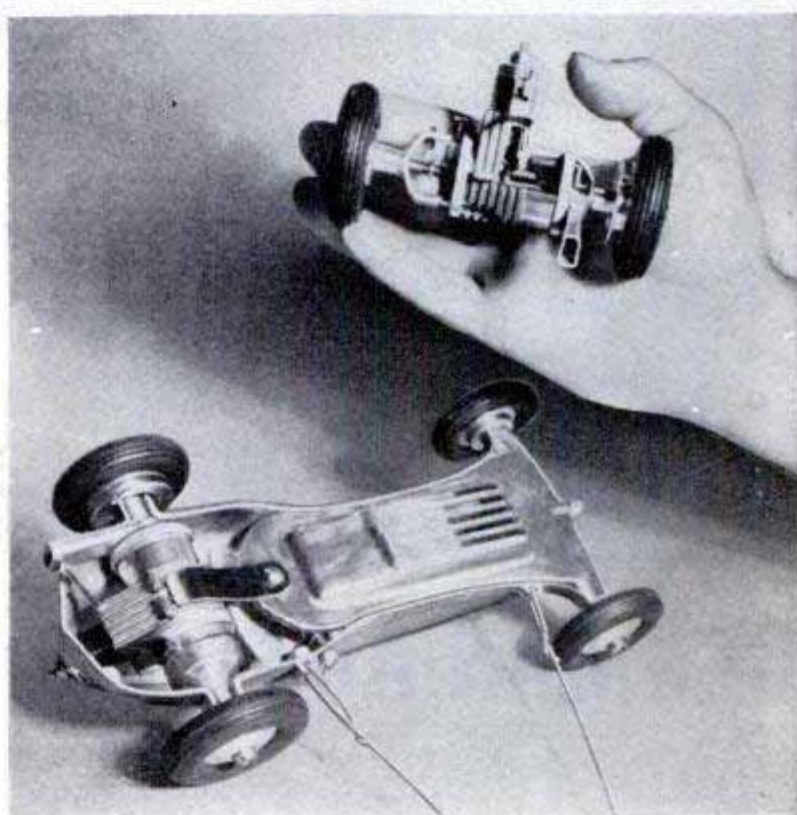
Above, following drop shown at the top of the page, the fire catches and black smoke boils up from the target. The smoke clears and reveals, below, a tank completely gutted by fire and the 1500-degree heat





L. M. Cox Mfg. Co., Box 476, Santa Ana, Calif.

Racers whine around the back-yard track. Right, power unit has 39 tiny parts. Cable instead of guide pin in track holds one car



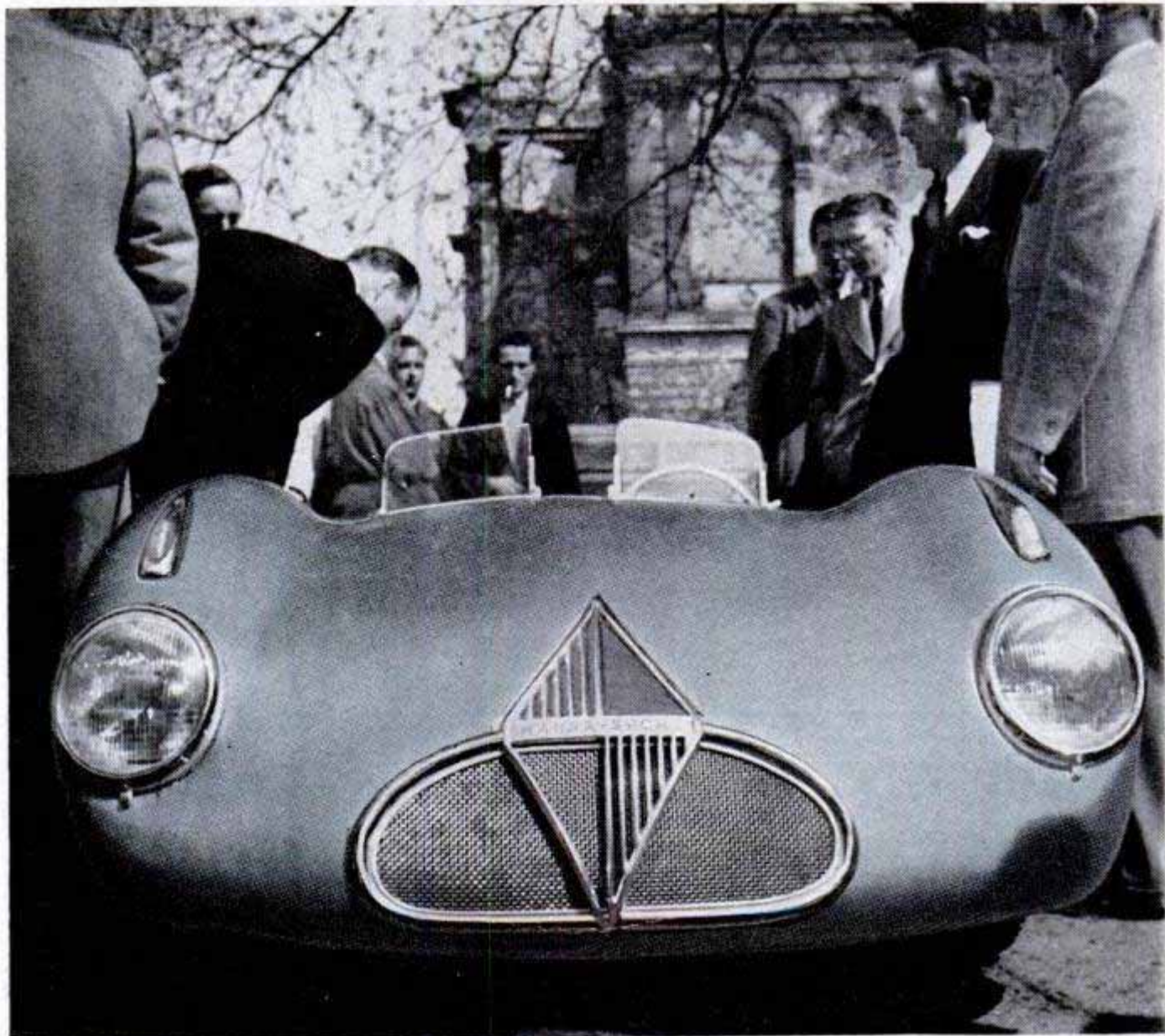
## Thimble Drome

For model racing-car fans, miniature racers now zip around a pint-size track small enough to be erected in a garage or back yard. The muffler design on the little cars cuts the whine of the racing motor down to a minimum. The six-piece prefabricated track has a hardboard surface. A guide pin on the car is inserted through one of four slots on the track to keep the midget racing along its own lane. Speeds up to 75 miles an hour are possible.

## Vertical Table Holds Book for Bedridden Patients



Patients who are unable to sit up in bed entertain themselves more easily with an overhead table that clamps to the head of the bed. The table is supported by an arm that has a counterbalancing spring to assist the patient in raising the table out of the way. Between the two legs of the table is a reversible panel that serves as the table surface. One side has clamps for holding a book or magazine. The opposite side has a mirror and plastic pockets for toilet articles. If desired, the panel can be replaced with an art board, weaving frame or some other recreational article.



## GERMAN AUTO SALON

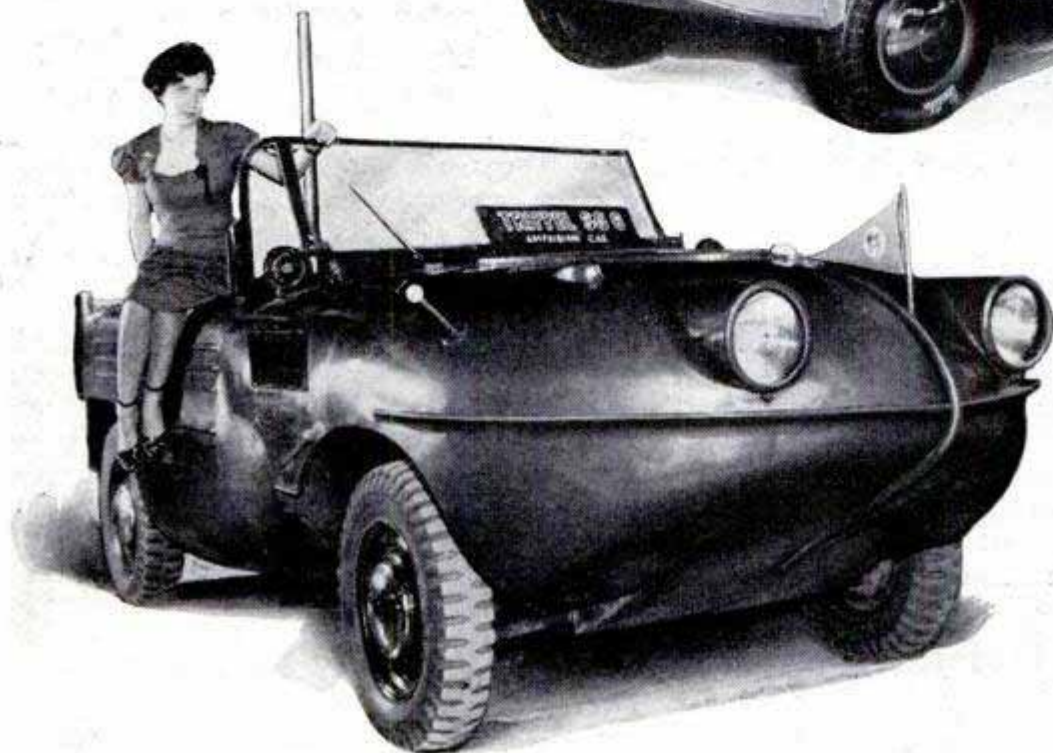
Popular at the first German auto show in 13 years was a Hansa Sport. A two-seater, it can go 140 m.p.h.

Selling for about \$4000, the BMW 501 sedan, right, is the first car designed by a new plant at Munich. It has a 60-horsepower, six-cylinder engine and is scheduled for production early in '52



Among famous makes on display at the exhibit was Mercedes, with the sleek cabriolet shown at left

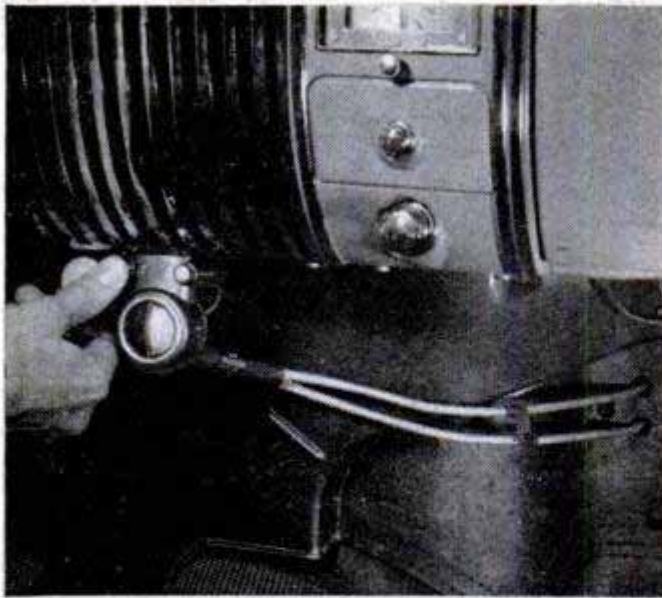
Powered by a one-cylinder engine over its single rear wheel, the Fulda Mobile sells for \$593



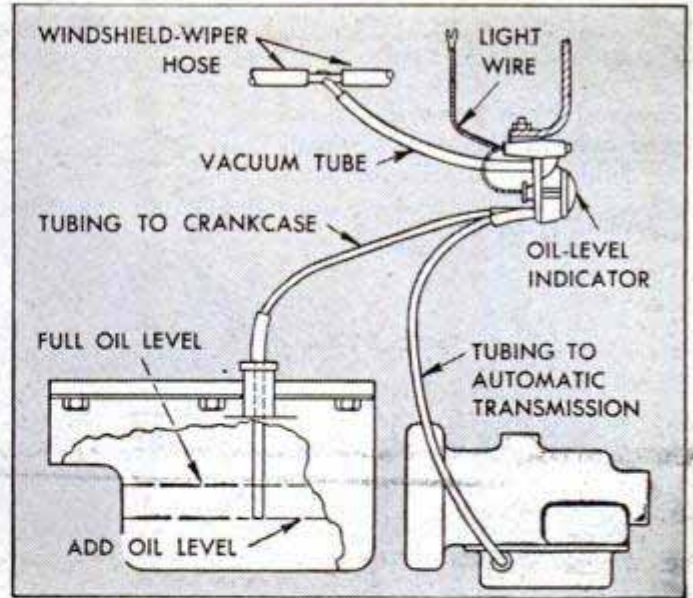
Land or water travel is possible with the Trippel SG 6. A lever alongside the driver switches the power to a propeller in rear

Small-car enthusiasts were drawn to the Partner. A front-wheel-drive sedan, it is priced at \$1375





Oil from transmission flows through left half of the transparent bubble when dashboard button is pressed



Oil-Eye Corp., Winona, Minn.

Diagram of installation. Dash indicator shows amount and condition of both crankcase and transmission oil

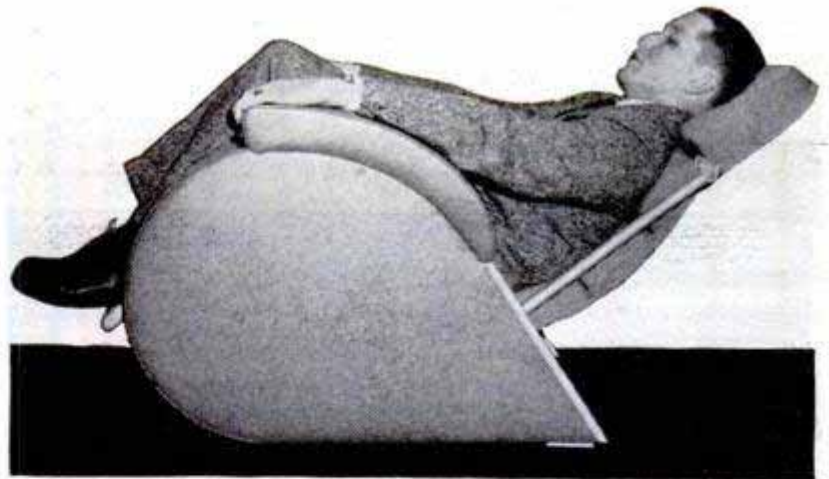
## Oil Gauge and Viewer Show Motorist Oil Sample

Mounted on the dashboard, an oil-level indicator shows the motorist when his oil is low and when it is dirty enough to require changing. Suction from the intake manifold draws a sample of the oil from the crankcase into a round plastic bubble behind which a small light burns. For cars with automatic transmissions, the bubble

is divided into two sections to permit checking levels of both crankcase and transmission oils. The installation is permanent and eliminates the need for the dip stick. By inspecting the oil with the light behind it, the motorist can tell when his oil-filter cartridge and oil should be changed. The indicator can be installed on marine engines.

## Back-Tilting Seat Protects Passenger in Crash

Airplane passengers are tilted safely backward by a new hammock-type seat if a crash occurs. In straight-in crashes at low speeds deaths are sometimes caused by the upper part of the body jack-knifing forward on impact and striking the seat ahead. The seat designed by Jess B. Bennett, a Braniff Airways executive, uses the inertia of the plane to put the passenger in a crouched, feet-first position in the line of crash. Springs beneath the seat further cushion the shock. Rests folding down and supporting the head also help to make passengers more comfortable.



Resting position, above, of Bennett hammock-type seat. Sketches show how an impact tilts passenger backward, since his center of gravity is always lower than the front part of the seat



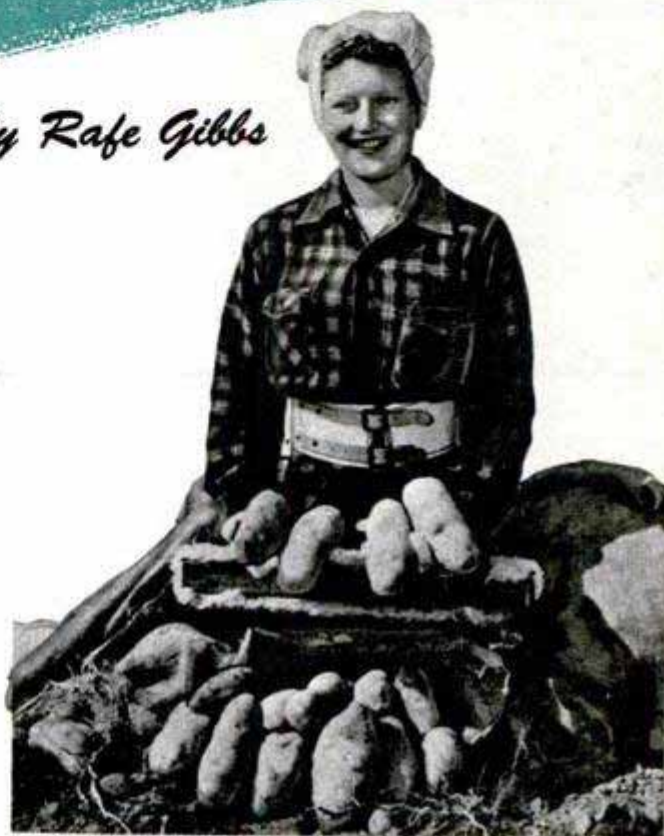
# THE LOST RIVERS RETURN

*By Rafe Gibbs*

**T**HE INDIANS were wrong when they lamented years ago: "Evil spirits deep in ground. They hold waters that have disappeared captive. Never return them to let the desert bloom."

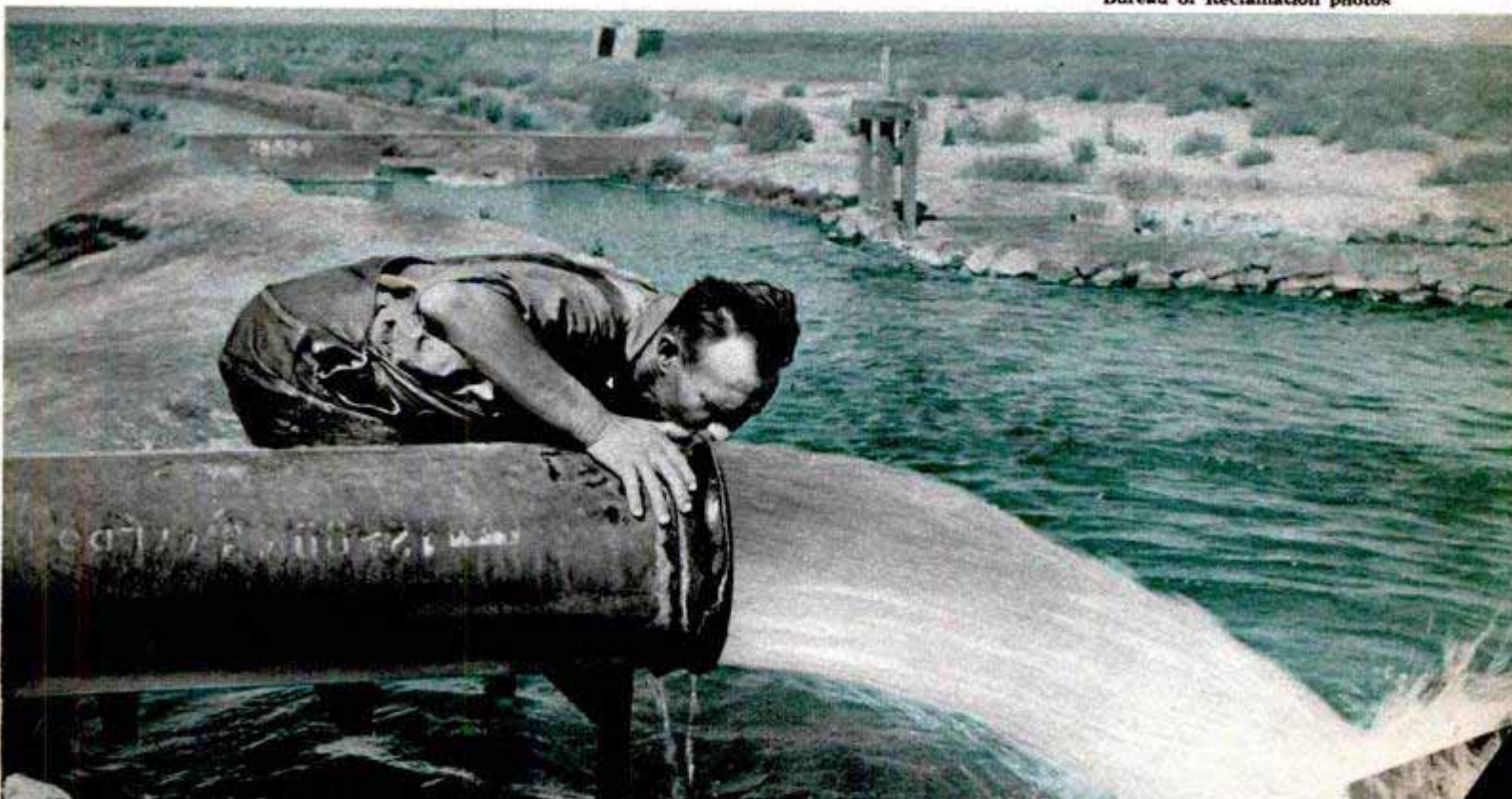
The red men referred to four major streams that tumble out of Idaho's mountains with much promise, then gradually vanish among the sands. But disappearing Big Lost River, Little Lost River, Beaver Creek and Birch Creek—collectively known as the Lost Rivers—are now being released from their underground prisons through the ingenuity of the white man. And the dusty, gray desert lands are being made green with rich crops of beans, potatoes, sugar beets, wheat, barley and clover.

Already, about 13,000 acres north of Rupert, Idaho, are being irrigated by the underground water. Eventually, more than 100,000 acres will come under the system.



Big smiles reflect big harvests in the Lost Rivers area. So far, huge potatoes are the principal crop. Below, water pumped from the wells is cool and clear

Bureau of Reclamation photos

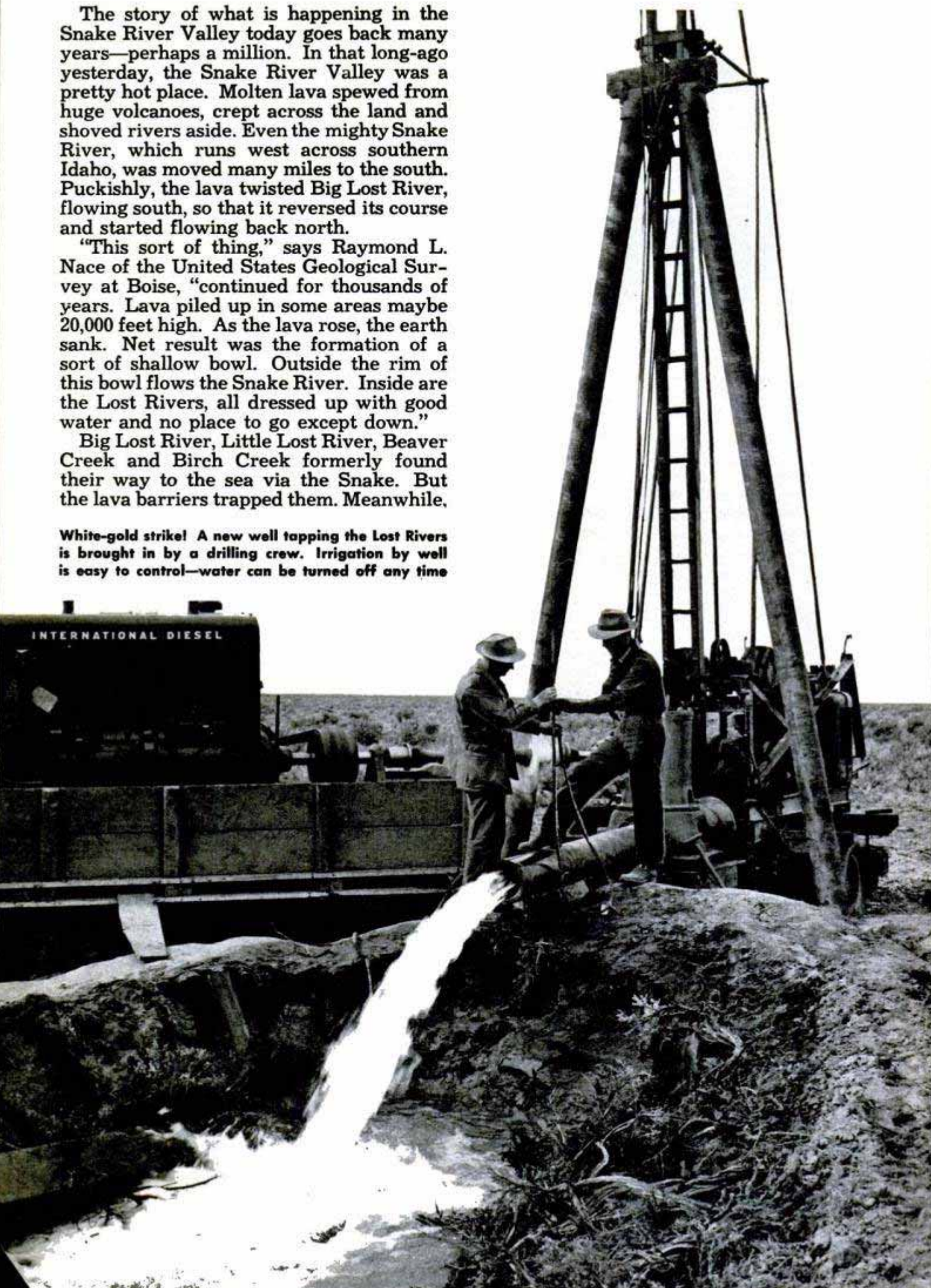


The story of what is happening in the Snake River Valley today goes back many years—perhaps a million. In that long-ago yesterday, the Snake River Valley was a pretty hot place. Molten lava spewed from huge volcanoes, crept across the land and shoved rivers aside. Even the mighty Snake River, which runs west across southern Idaho, was moved many miles to the south. Puckishly, the lava twisted Big Lost River, flowing south, so that it reversed its course and started flowing back north.

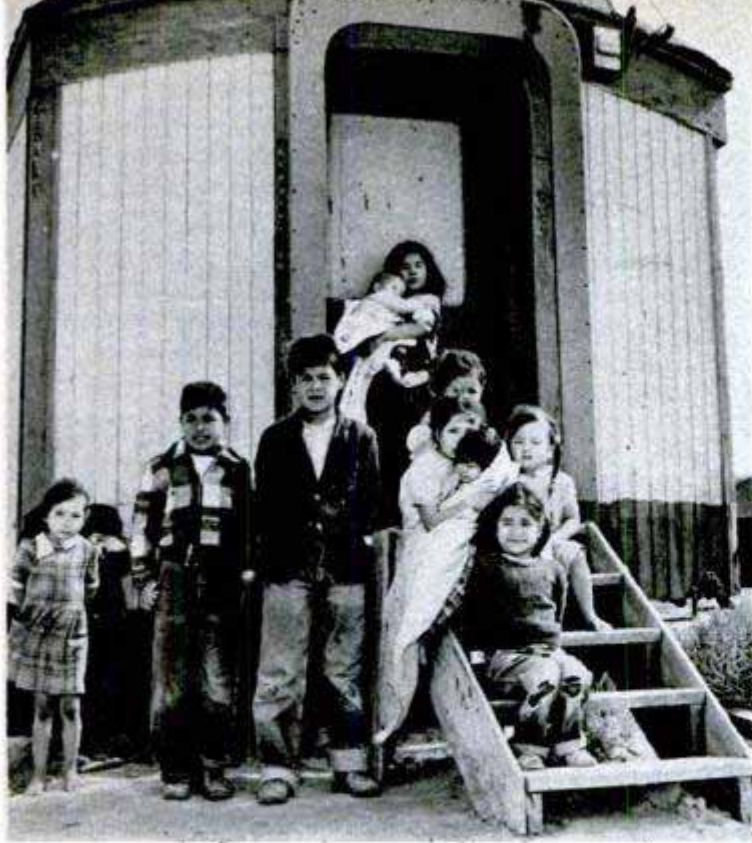
“This sort of thing,” says Raymond L. Nace of the United States Geological Survey at Boise, “continued for thousands of years. Lava piled up in some areas maybe 20,000 feet high. As the lava rose, the earth sank. Net result was the formation of a sort of shallow bowl. Outside the rim of this bowl flows the Snake River. Inside are the Lost Rivers, all dressed up with good water and no place to go except down.”

Big Lost River, Little Lost River, Beaver Creek and Birch Creek formerly found their way to the sea via the Snake. But the lava barriers trapped them. Meanwhile,

**White-gold strike!** A new well tapping the Lost Rivers is brought in by a drilling crew. Irrigation by well is easy to control—water can be turned off any time







Water is brought in faster than homes. Harvesters live in rail cars and tents until houses can be built

as the lava cooled, cracks formed. And the Lost Rivers, fed by melting glaciers, carried down from the mountains great deposits of sand and gravel. Then into the lava cracks, into the sand and gravel, the Lost Rivers began to disappear.

The Indians thought there was no outlet at all for the Lost Rivers, but, explains Nace, geologists of recent times found that some of the waters from the vanished streams were actually getting to the Snake by gushing out with other waters in the Thousand Springs of the Hagerman Valley near Twin Falls. The Indians, however, are not to be discredited entirely, for a large share of the water that sinks into the earth each year just stays sunk.

"Many people today have the idea that big rivers are flowing underground," says Nace. "This is not true. There is a lot of water, but it is in a vast webwork of small channels formed by cracks and extinct volcanoes."

Pioneers suffered from thirst in pushing wagon trains over the interwoven reservoirs of water. The crackling dry sagebrush gave no indication of water below.

It was only a few years ago that serious thought was given to tapping the Lost Rivers for irrigation. One day in 1947 Julian Clawson, owner of several thousand acres of sagebrush and jackrabbits, got to wondering about the Lost Rivers. Would wells gush forth big enough flows to irrigate the land? The soil itself was good.

Clawson sank a well. The drill went down 200 feet . . . 300 . . . 400 . . . then water.



Instruments at observation wells keep a close check on water level. So far it hasn't fallen appreciably

More water than Clawson had dared dream there would be—a flow of 4000 gallons a minute. Sinking the hole cost about \$5600, and the pump and 300-horsepower motor \$12,000. Just getting a good look at that first water cost about \$17,600, but already the gamble is paying big dividends.

Recently, 160 farmers, bankers and businessmen toured the area and stopped to drink from Clawson's "pioneer" well. The water was soft, cold and sparkling clear.

The Bureau of Reclamation saw in the return of the Lost Rivers a possible answer to the query that never ceases to come in the mail: "Where can a man get homestead land?"

Detailed surveys were made and test wells sunk. Findings looked good. Then the wheels, from offices in Washington to sagebrush land in Idaho, began to turn fast. An \$11,395,000 project designed to pay out over a long period of years through water-service charges was established. The development area, known officially as the North Side Pumping Division of the Minidoka Project, covers 77,650 acres, and will in the years to come bring under irrigation 600 new farms. Thirteen thousand of the acres will be irrigated by water channeled from the Snake, but the major share—64,000 acres—will be brought into production with wells reaching down to find the waters of the Lost Rivers.

"As soon as major blocks of land have water, they will be opened to homesteaders," says Boyd Walters, bureau engineer at the project. "The homesteads will be



Farmer, who leases the land, siphons water from an irrigation pool. Area will be opened to homesteaders

plotted to average about 100 acres each."

Several bureau irrigation wells were put into operation during 1950, but the land they serve was leased for two years, with options for three more. At the end of the five years, the leased land goes back into the homestead pools together with all of the developments.

Meanwhile, private landowners are busy drilling wells. The activity smacks of an oil boom, with white gold replacing the

black. Today, there are more than 34 bureaus and private wells in operation.

Says Larry Robinson, editor of the Minidoka County News at Rupert: "Business is good and getting better by the well."

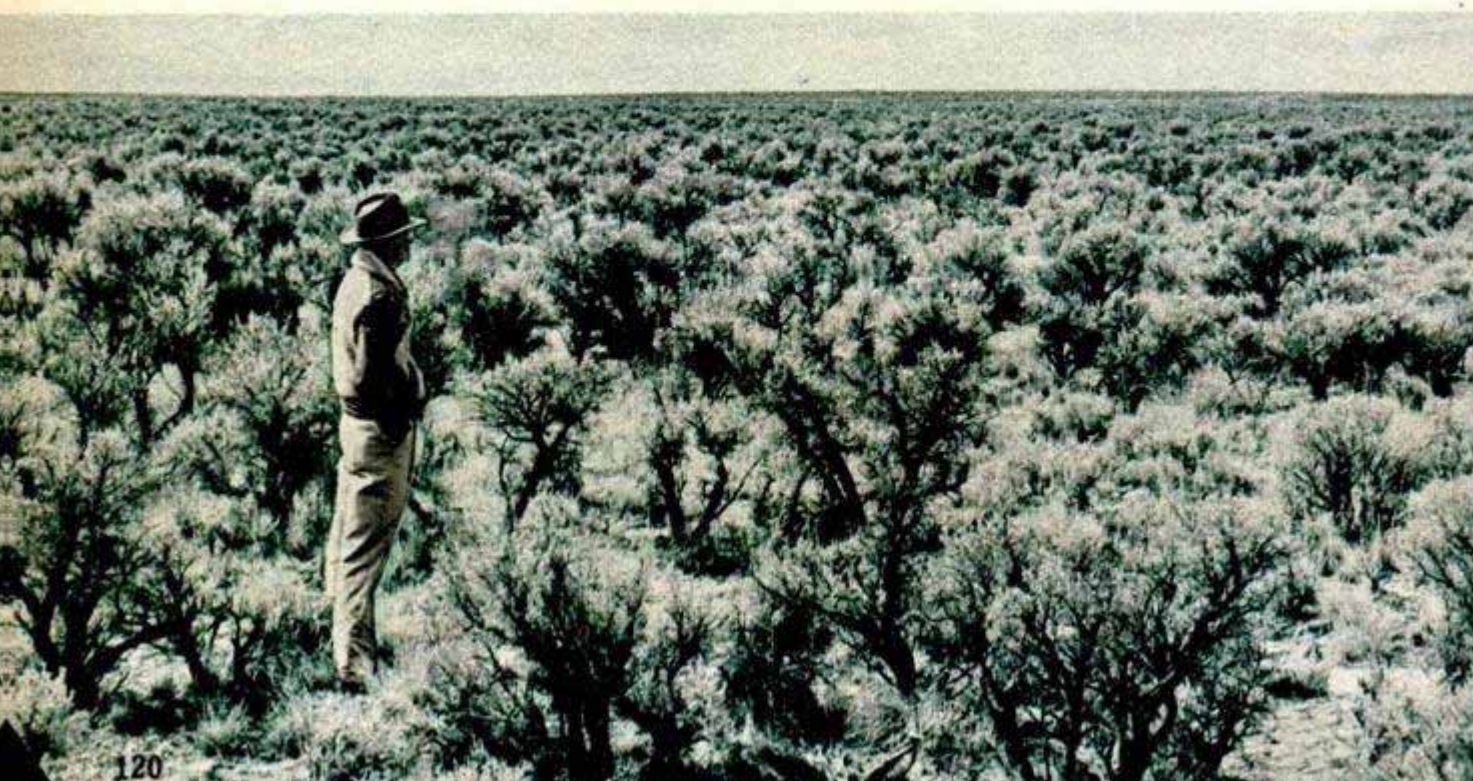
Word of the project traveled with the speed of its disturbed jackrabbits, and up from Shafter, Calif., came James Camp, son of the founder of S.A. Camp Farms, Inc., one of the biggest agriculture firms in California. Camp promptly bought for the corporation at \$106,000 a total of 6000 acres—land that only a few years ago could hardly raise an eyebrow of interest.

"We expect to have 20 wells pumping water in 1951 and a large share of the land under sprinkler irrigation," says Camp. He adds that the firm plans to spend \$400,000 in improvements. Eventually, it will erect storage cellars, warehouses and processing plants in Rupert.

Convinced of the soundness of the project, the Idaho Power Company has invested more than \$500,000 in supplying the necessary electricity. This includes a huge new substation.

But how long can the sinking of wells go on? The Bureau of Reclamation is keeping a close watch on the water level. Scattered over the project, the bureau has four wells merely for observation of the water supply, and will soon add a fifth observation well. No water is pumped out of the observation wells, but there is a copper float on the water surface of each. A copper wire from the float reaches up to the wheel of a recording device. Any drop in the water level is shown on a graph, but so far there has been no appreciable decline in the water supply. A close check is also being kept

Here's sagebrush as far as a man can see, but soon this land, too, will be irrigated by the Lost Rivers



on the Thousand Springs flow at Twin Falls. The effect on the water supply there has also been negligible.

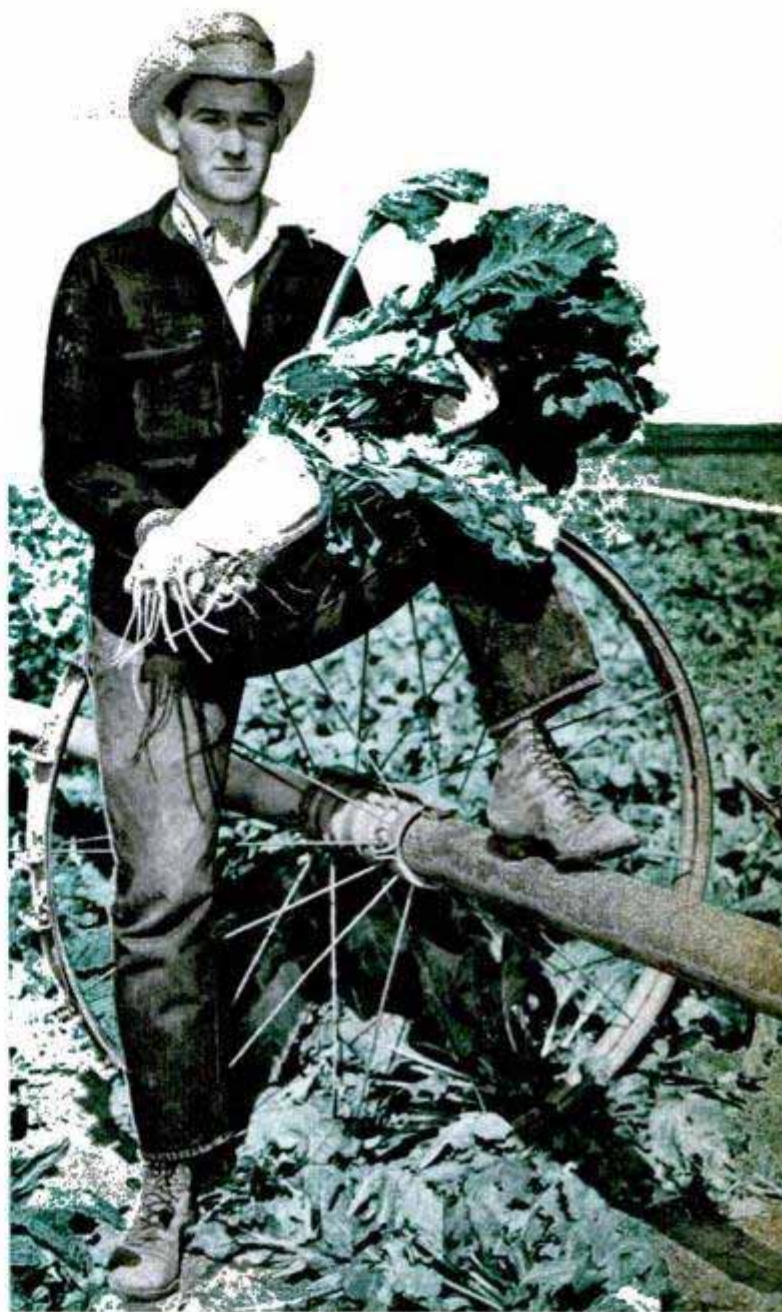
"Besides the water from the Lost Rivers, the underground reservoirs are getting considerable water from the Snake — secondhand," says geologist Nace. "Vast amounts of water are taken from the Snake to irrigate other areas. Only about 50 percent of this water is used up by plants and evaporation. The other 50 percent goes into the ground, and a considerable amount works its way to the hidden reservoirs. Some of the unused irrigation water also comes back out through the Thousand Springs. Much of the water pumped out by the new wells will go back into the ground to be pumped out again, or to gush from the springs."

The wells in the North Side area average only about 190 feet in depth, making for reasonably cheap pumping. Electric pumps, from 100 to 450 horsepower, bring water to the surface in varying amounts up to 5000 gallons a minute. The wells are spaced about  $\frac{3}{4}$  mile apart.

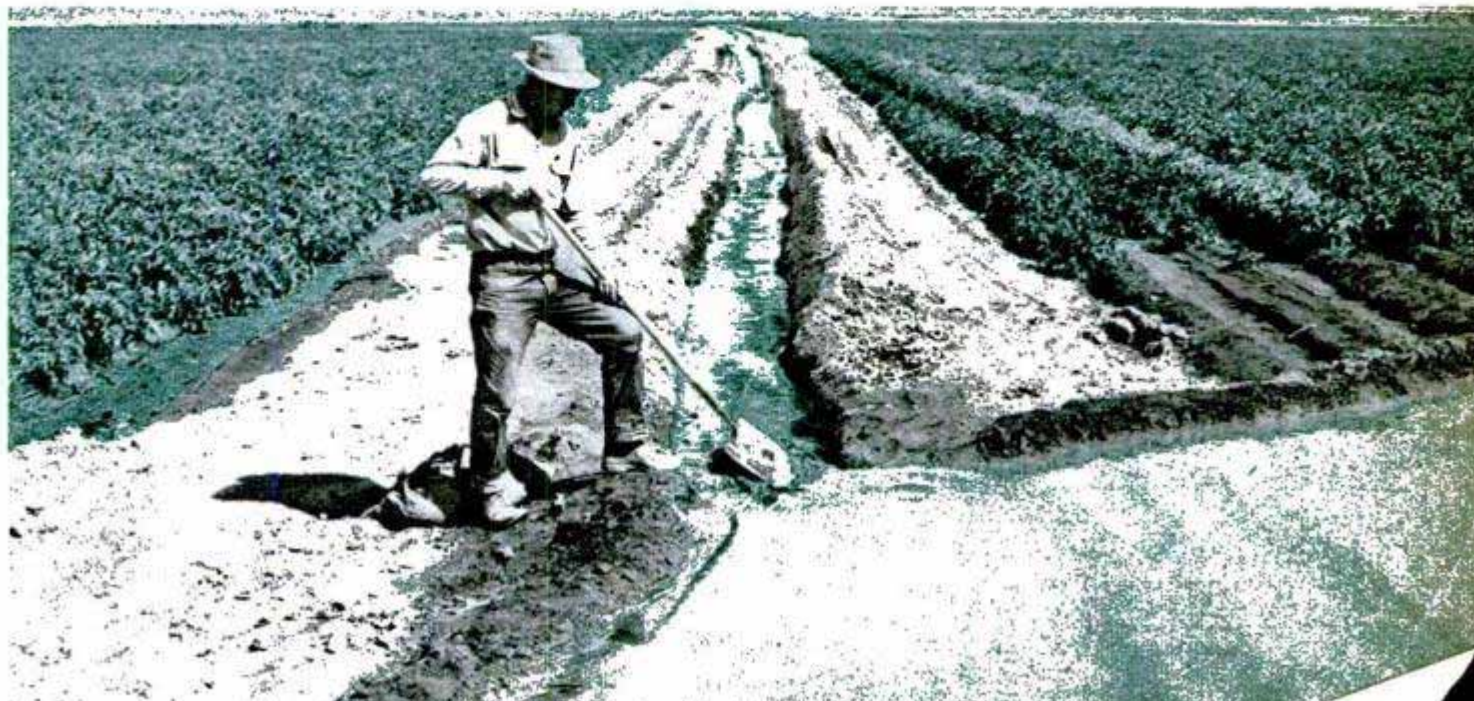
Right now the area is a lonesome-looking land because the farms are ahead of the homes. On bureau-developed land leased to farmers there is no inclination to erect substantial buildings because the land will soon have to go back into the homesteading pools. The private owners generally haven't gotten around to building, either. Too busy clearing and working the land. Some farmers are living in tents. Ancient railroad cars have been parked out in the wide-open spaces to provide shelter for harvest workers.

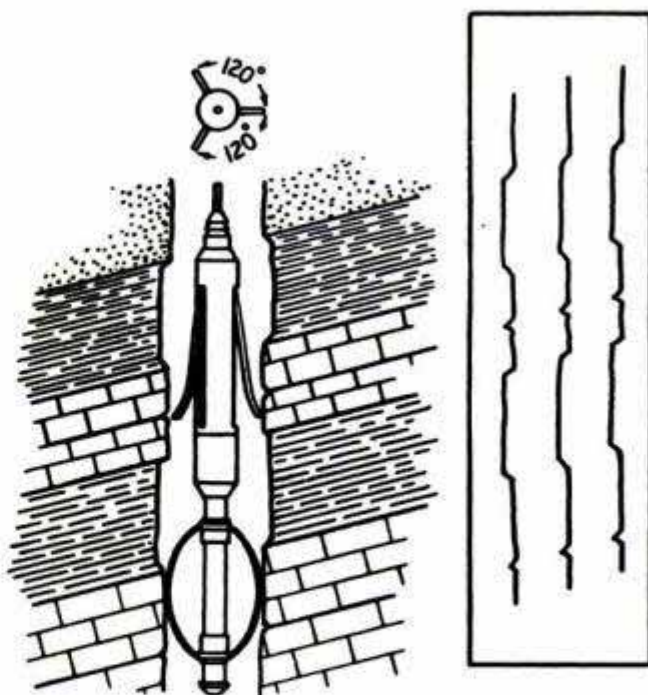
Typical of the new settlers is 27-year-old Blaine Hodges. A former infantry staff

(Continued to page 218)



Irrigated land is fertile, produces fine crops. Farmer holds a typical sugar beet. Below, opening a dike, a farmer releases water that once flowed underground





Carter Oil Company, Tulsa, Okla.

Three prongs project from instrument. Diagram shows how they "map" sides of hole to draw three profiles

## Oil-Well Instrument Charts Slant of Underground Formations

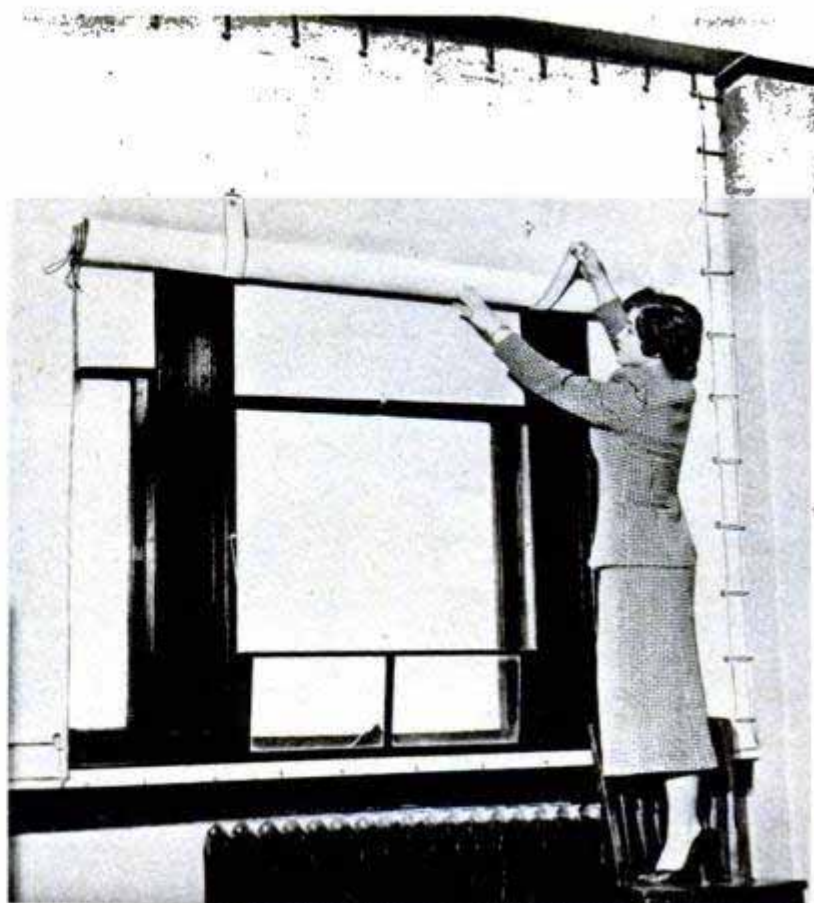
Just a few years ago the oil-well driller who had nothing to show for his work but a dry hole was faced with a problem: in which direction should he move to drill the next hole? What he really wanted to know was which way the underground earth and rock formations slanted, so he could strike the oil closer to the surface. An instrument developed by the Carter Oil Company probes the dry hole to tell him

which way to move. The instrument is dropped to the bottom of the hole, then pulled back up. Three prongs press against the sides of the hole, probing the rock and earth grooves and projections. An automatic instrument records the "feel" of each prong, drawing a profile of that side of the hole. By comparing the three profiles, a trained man can determine the slant of the underground formations.

## Metalized Window Curtain Aids in A-Bomb Protection

Heavy canvas window curtains, specially treated, are designed to give partial protection from the effects of an A-bomb blast. The curtains are metalized with aluminum and lead. They will help protect persons inside a building from flying glass, radioactive dust and flash burns, according to the manufacturer. They are said to be effective at distances beyond 2600 feet of the explosion. When not in use, the curtain rolls against the upper part of the casement like a window shade.

☐ If all the known supplies of coal, oil and wood in the world were burned at a rate liberating heat equal to that received from the sun, it would take a little more than three days to exhaust all this fuel, and less than an hour to exhaust all known nuclear fuel.



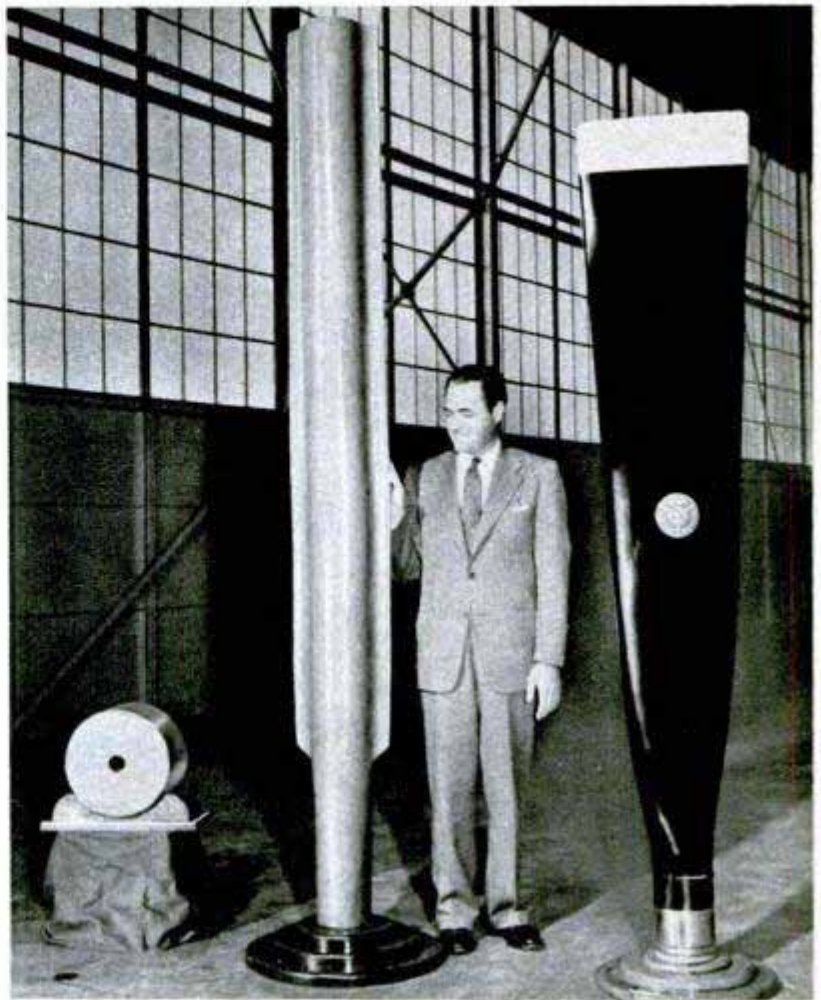
Strategic Products, Inc., 600 S. Michigan Blvd., Chicago 11

## Macaroni-Making Process Shapes Hollow Propellers

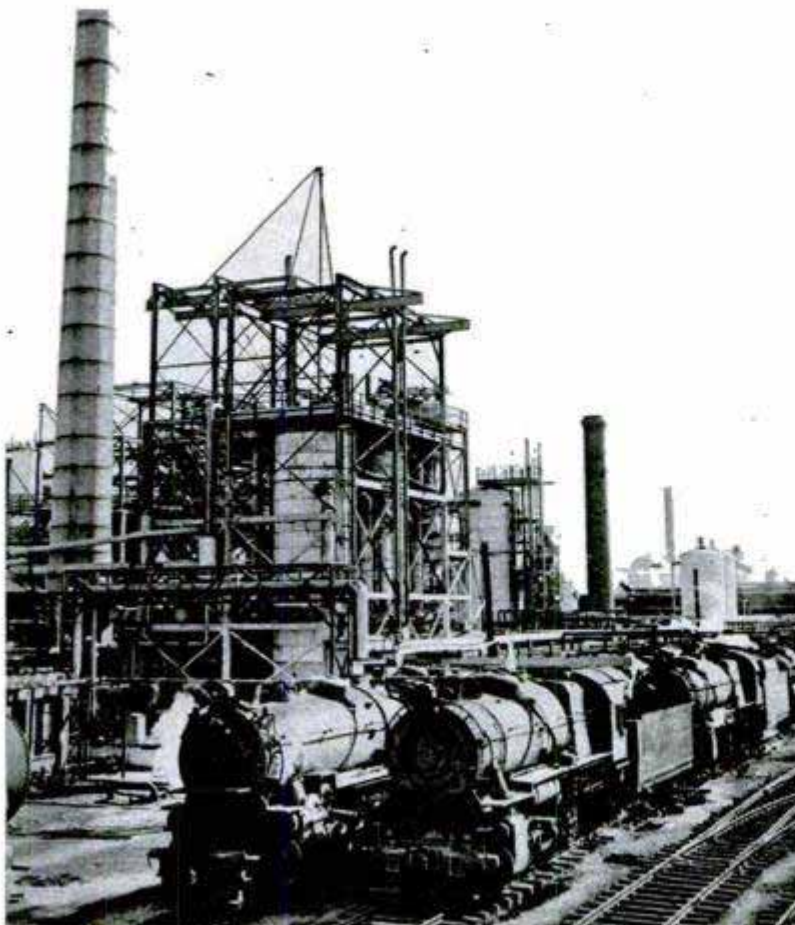
Materials and time are saved by a new extrusion process for forming hollow-steel propeller blades. Though much more complex, it resembles the method used in making macaroni. A squat, solid cylinder of steel, weighing 400 pounds, is heated in a bath of molten salt until it is glowing red. The billet is then shaped by a press into a 10-foot-long, 200-pound hollow tube with tapered walls. Another press flattens it out and the propeller is finished. The Curtiss-Wright Corporation developed the new technique with the U. S. Air Force. Forty percent more man hours and nearly twice as much steel was required to make the same propeller in two parts.

## Helium-3 Solidified For the First Time

Helium-3, a rare form, has been solidified for the first time by a combination of extreme cooling and high pressure. Liquid helium-3, unlike all other liquids except helium-4, cannot be frozen simply by cooling it. Pressure is also required. In order to solidify the helium-3, scientists at the Argonne National Laboratory cooled it to 457 degrees



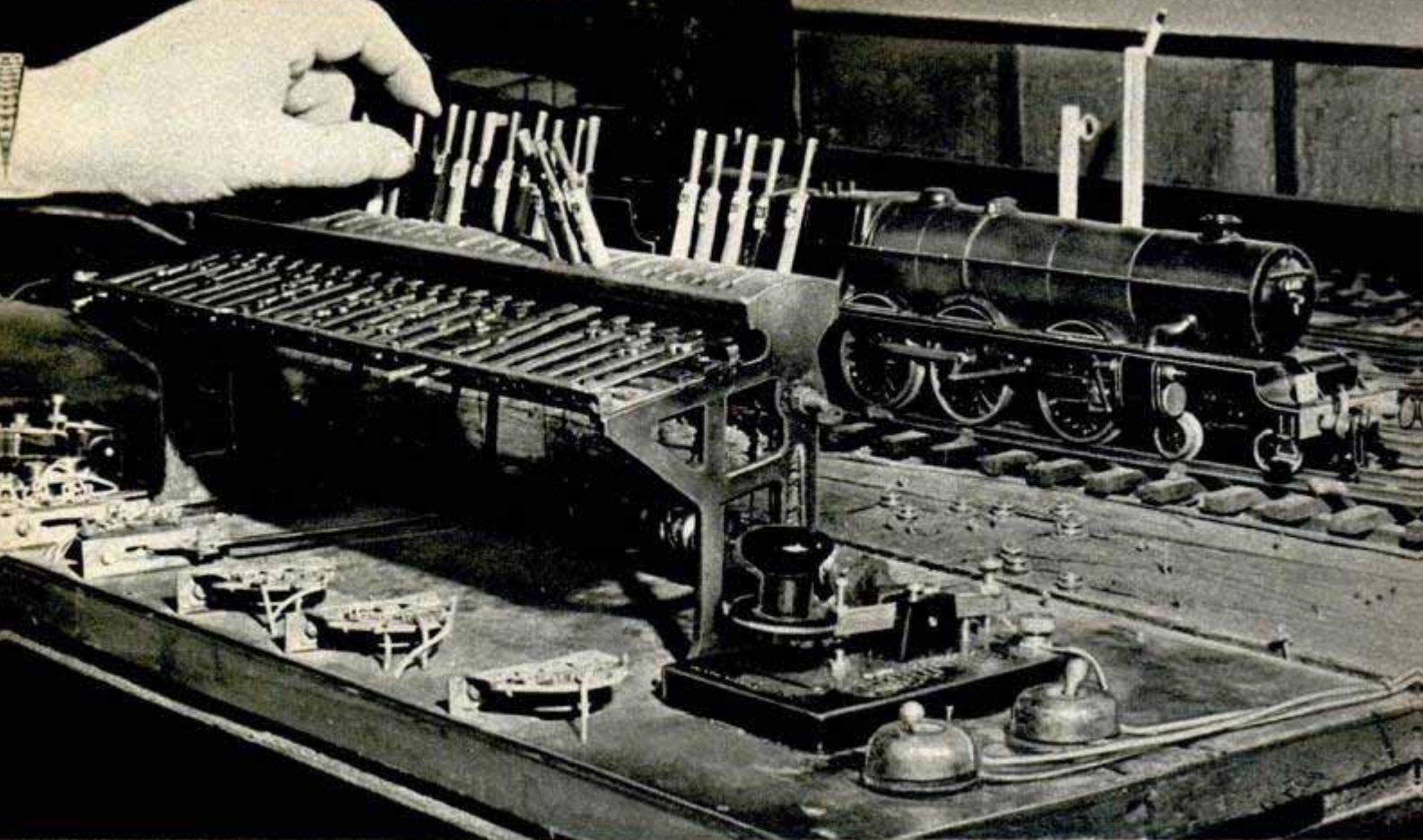
below zero and then subjected it to a pressure of 600 pounds per square inch. The quantity of helium-3, an extremely rare material, used in this experiment weighed less than one thousandth of an ounce.



## Locomotives Stop Rolling But Don't Stop Working

When the Sun Oil Company needed thousands of pounds of additional steam to produce a rush order of high-octane gasoline, it turned to the railroads for help. Twelve retired locomotives from the Pennsylvania and the Reading railroads were rushed to the refinery and fired up. Steam from the locomotive boilers was piped into the main line of the refinery steam system. Appropriately enough, the locomotives were adapted to burn a gas which is a waste product of the refinery.

Sources of available products described in this issue are indexed on pages 12, 14 and 16. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11

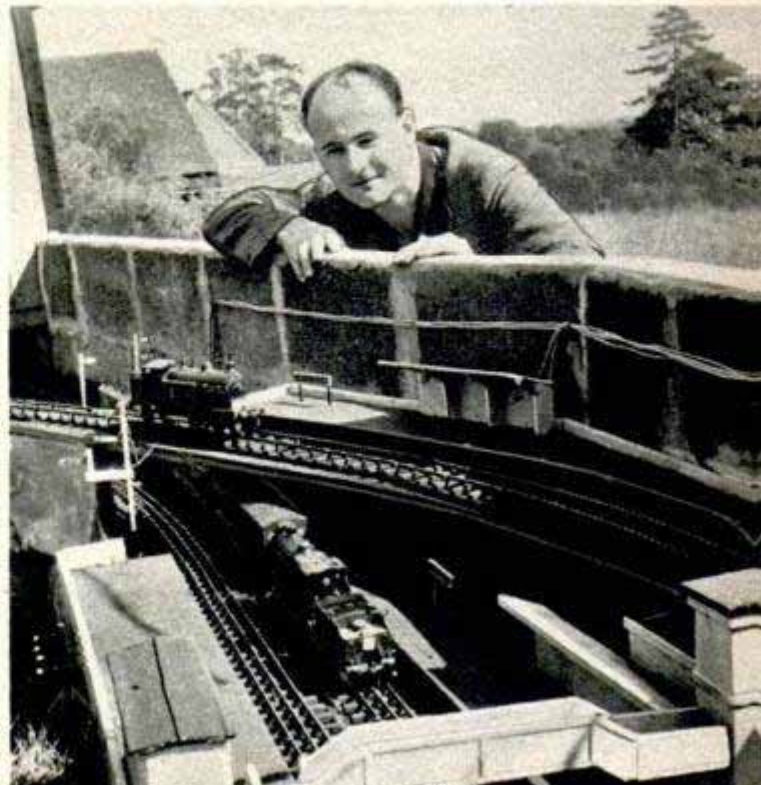
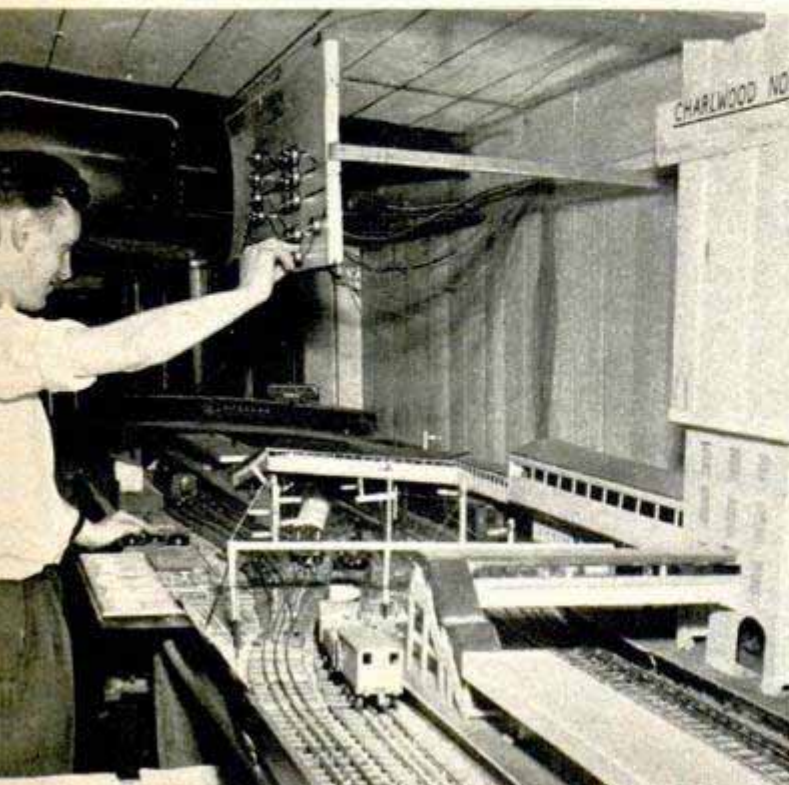


At Glovers Lane Signal Box, the lever frame and interlocking signals are operated exactly like the real thing

# *Railroad* IN AN ENGLISH GARDEN

All stations are named after villages in Sussex. A club member operates the signals at Charlwood North

Michael Sellars is a railroader by trade, but he still devotes his leisure to operations at Rusper



**M**OST KIDS want to be locomotive engineers when they grow up and British youngsters are no exception. Christopher Morgan of Sussex, England, was one lad whose occupation seemed certain to be railroading. At 12, he knew as much about the old London, Brighton and South Coast Railway as a British Casey Jones. But, as with most of us, somewhere along life's right-of-way, he was sidetracked, becoming a stock broker.

Unable to separate himself completely from his boyhood ambition, Morgan has, for the past 30 years, been devoting his spare time to railroading—scaled down to fit his three-acre garden. His model layout is so complicated it requires a staff of 20 to operate it!

These rail fans are members of the Ruser Railway Club, formed in 1935 to operate Morgan's equipment realistically. Trains run on a strict schedule in compliance with the rules of the British National Railways. All regulations, including safety requirements, are obeyed. The Ruser Railway consists of 100 controls, 250 signals, 45 locomotives, 240 coaches and freight cars, 15 stations, 5 freight yards and 10 marshalling yards.

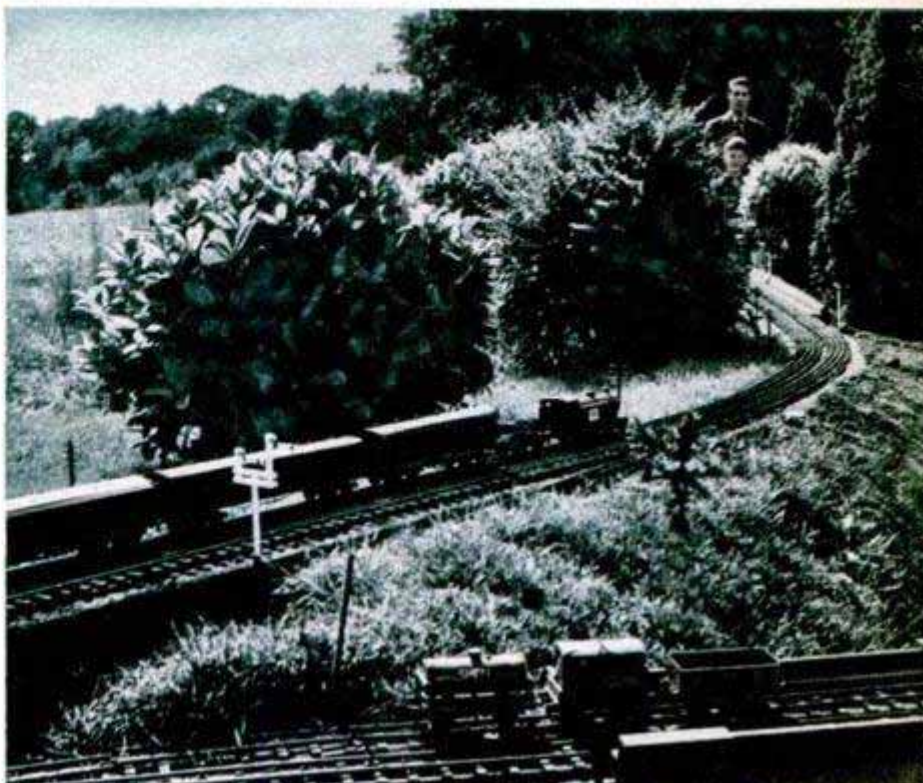
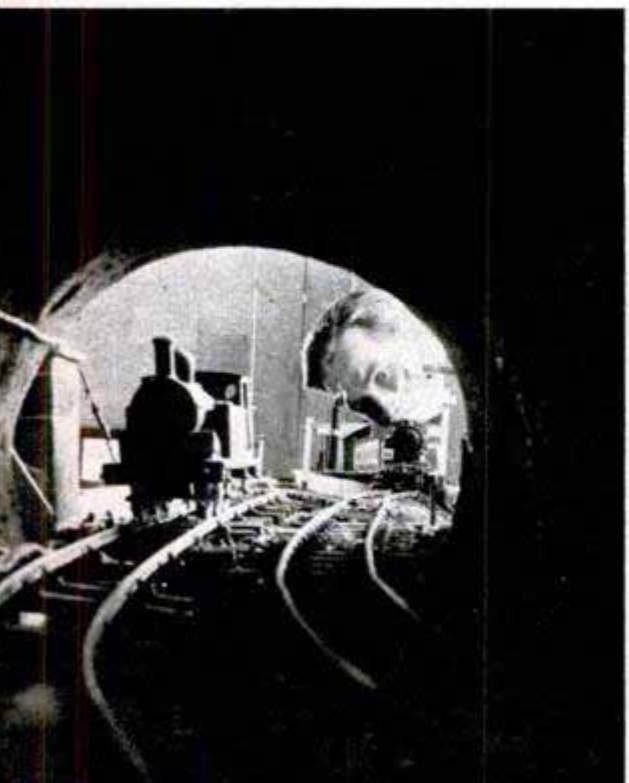
About 25 fans belong to the club. A third of them are professionals, being employees of the British Railways. The others are "laymen," whose boyhood dreams like Morgan's somehow had been shunted onto a siding.



Christopher Morgan, namesake and grandson of the founder of the club, helps his father check a train through a station

Below, left, a member of the club looks through the five-foot Tilgate Tunnel along the branch-line approach to Glovers Wood

If it were not for the figure in the background, it would be easy to think this a stretch of track on the British Railways





## High-Speed Facsimile

As many as 180,000 words of printed matter can be transmitted and recorded within one hour through a new high-speed facsimile system. Photos and diagrams also can be transmitted to any distant point and recorded without photographic, chemical or drying equipment. The system, developed by Western Union, uses either radio beams or communications wires as a means of transmission. The sending operator slips the printed material into a transparent cylinder and closes the endgate of the cylinder. This starts the cylinder spinning at 1800 revolutions per minute, and a photocell acting with a pin point of light scans the material. At the receiving end, needlelike instruments "print" a copy of the material on a dry recording paper. At the conclusion

Above, right, printed material is slipped into cylinder to start the transmission. Left, at receiver, image is printed on paper and ejected from machine. Below, equipment for transmission



of the message an automatic signal causes a knife to cut the facsimile copy from the roll of dry recording paper.



## Gasoline-Tank Sealer

Leaks in automobile gasoline tanks and radiators can be plugged by a new sealing compound without draining or removing them from the car. The sealer, a thick liquid that is nearly transparent, is held against the leak with an applicator for two or three minutes, or until it sets sufficiently to withstand the pressure of liquid in the tank or radiator. It also can be used to repair leaks in flexible lines, water pipes, battery cases and around windshields and windows in cars and homes.

Ⓞ Scrap metals are vital to defense as about one fifth of the tin used in the United States annually is salvaged from scrap.



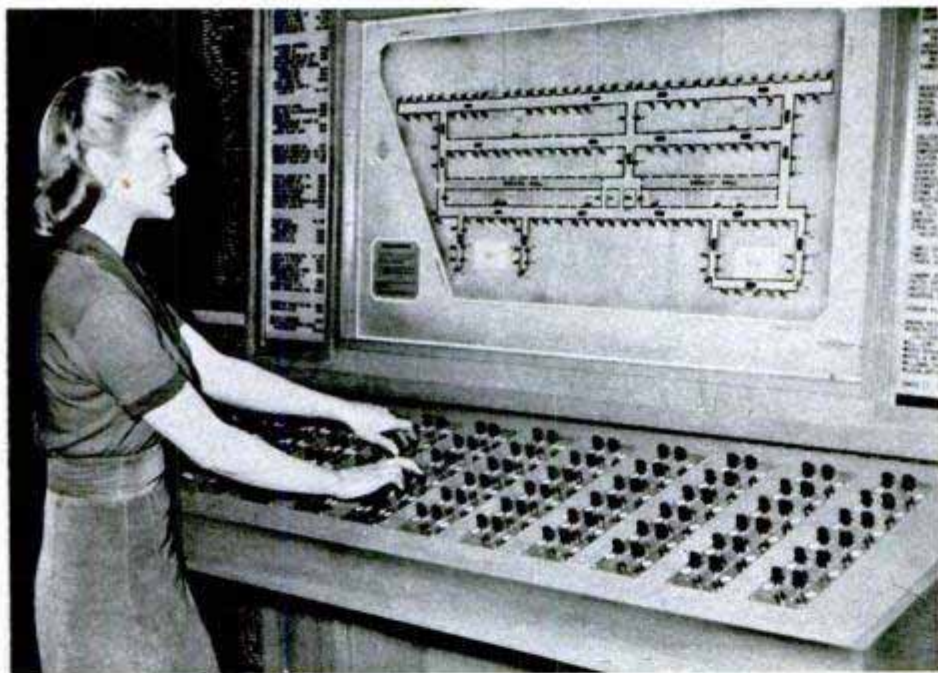


## Fish-Food Fisherman

In Chicago, there is a fisherman who fishes so other fish can eat. His catch consists of tiny organisms, actually fresh-water crustaceans, he calls "fleas," and hairlike worms, known as Tubifex. The fisherman,



Leo Zetek, sells these marine animals to tropical-fish fanciers, who feed them to their pampered pets. To keep the worms and fleas alive during the time they are in captivity, Zetek has a small air compressor in his station wagon that aerates the water as he drives.



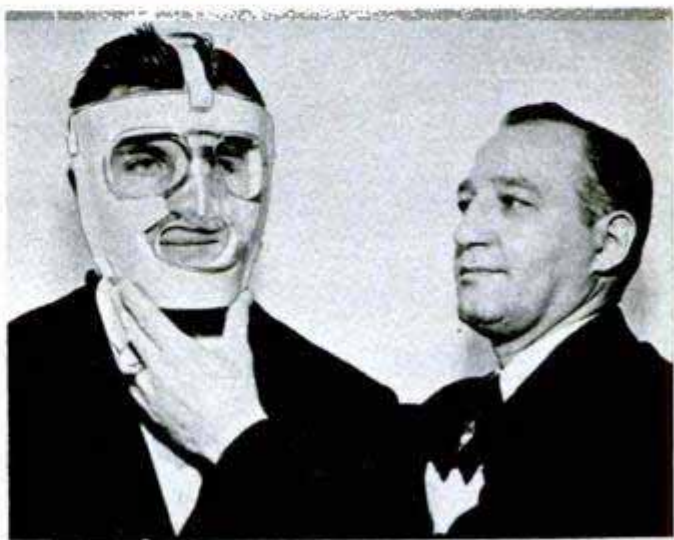
## Lighted "Road Map" In Office Building

Strangers trying to find a showroom in Chicago's Merchandise Mart quickly learn the shortest route by "inquiring" at an illuminated floor plan. There are 150 lights on the floor plan, each representing a showroom. Lighted arrows point the most direct route to the desired showroom. This device, called the Magic Board, is now being tested on the 15th floor of the building, which has 93 acres of floor space.

## Plastic Mask for Gridders

Football players are protected against facial injury, or the aggravation of old injuries, by a new plastic mask. Use of a transparent material instead of metal to guard the nose permits increased vision. A resilient padding on the inside of the protective mask cushions the player's face against impact.

¶If you don't bind or store your back issues of *Popular Mechanics*, do you burn them? America's defense effort requires a vast number of paper products. Call your local Boy Scouts or veterans organization to pick up your wastepaper.



# FRANCE



Weighing under nine pounds, the French-designed bazooka can penetrate 11 inches and is effective up to 300 yards

STARTING with almost nothing at the close of World War II, France has worked steadily to restore an armament industry that is now beginning to produce some of the world's finest military equipment. Outstanding are her SE 2410 Grognard, a jet fighter-bomber of near sonic speed not yet in volume production, an armored reconnaissance vehicle with tractor treads that are lowered for cross-country travel and an antitank grenade fired from a rifle. They are pictured and described with other key French developments on these four pages



Nine miles is the maximum firing range of a self-propelled howitzer, below, which has a 20-degree firing angle. Most of the new weapons went through field testing at the military proving grounds near Bourges



Infantrymen will soon be working with an antitank grenade, above, that is fired from an ordinary rifle

# REARMS



Swept-back wings and a bullet-shaped fuselage identify the SE 2410 Grognard. Direction of the plane is controlled by moving handgrips on the pilot's armrests



Ground view of fighter-bomber shows large air intake for jet engines to rear of canopy. It is slowed down after landing by a ribbon-type parachute



Maneuverability has been emphasized in the 50-ton tank. It has a 3.9-inch gun, two machine guns and travels 30 m.p.h.



Resembling its American counterpart, the 75-mm. recoilless weapon for airborne troops weighs 150 pounds



Answering demands for greater speed in armored equipment, the 13-ton Panhard, left, has a high of 70 m.p.h. The tractor-tread wheels in middle are lowered for cross-country travel

Sturdy and fast, the one-ton Hotchkiss ammunition carrier can be parachuted down with airborne soldiers





For light, multipurpose uses, the Delahaye automobile firm is making a French version of the famous Jeep



Firing a 28-pound projectile, the Brandt mortar at left has a firing rate of 10 rounds per minute. It is capable of lobbing shells (below) 4½ miles



Armored reconnaissance model of Hotchkiss carrier operates effectively over rough ground and through water

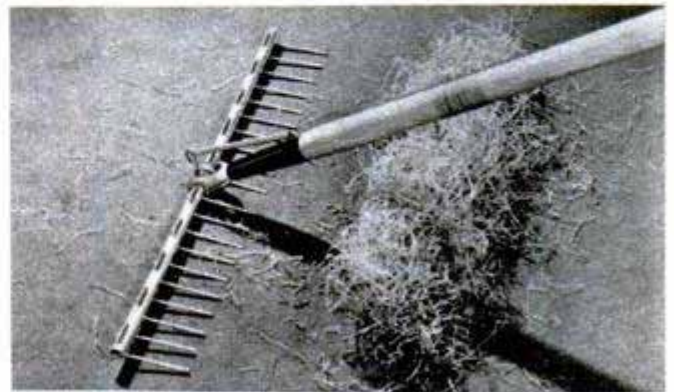
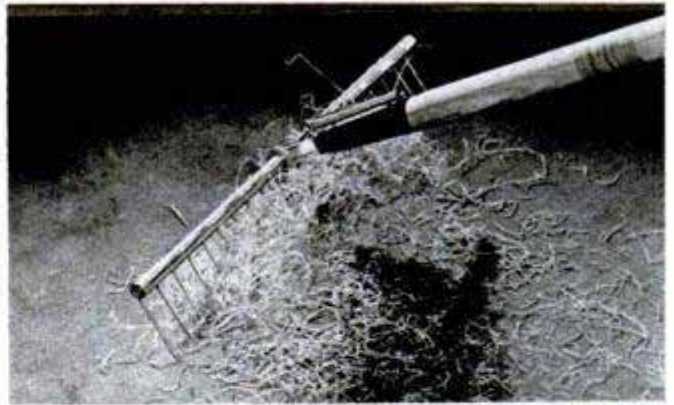




Air Materiel Command photo

## Pilot Escape Simplified

One disconnect assembly will free fighter pilots in the future from the maze of wires that joins him to his plane and its equipment. Previously, there were four separate leads—to the G-suit hose, ear-phone and microphone wires for the radio headset and an oxygen-supply lead — to disconnect before the pilot could trigger his ejection seat for escape. The four leads are now combined in a 30-inch-long rubber cable that is separated from the plane when the seat lever is triggered.



Arthur Paul Sales, Box 495, Green Bay, Wis.

## Self-Cleaning Rake

Leaves and grass slip off the tines of a self-cleaning rake when the handle is pushed forward. The head of the rake, which can move in one direction, is held in place by a spring. When the rake is pushed forward, overcoming the pull of the spring, the tines swing down parallel with the ground and the leaves or grass slide off. The rake is 20 inches wide.

## White Leather Stays White

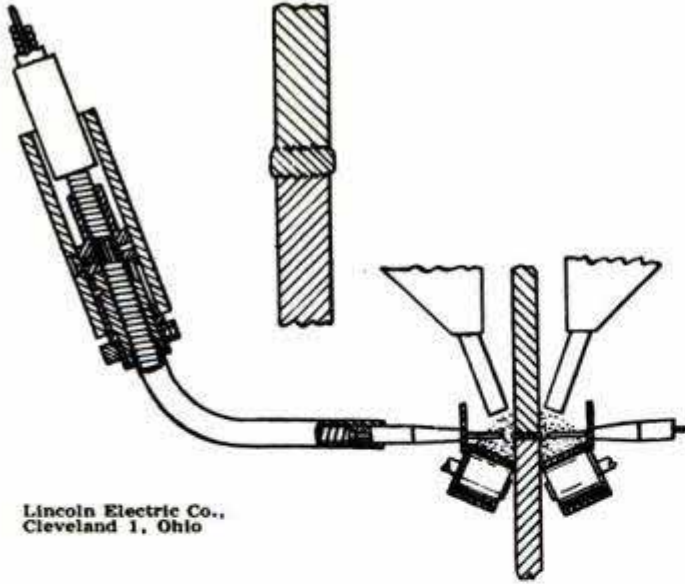
White leather that will never darken with age or exposure to sunlight is produced with plastic tanning agents called melamine resins. Leathers so tanned are white all the way through and, therefore, remain white. Conventional chrome-tanned leathers tend to have a bluish color which has to be bleached on the surface.



## Pavement Saw

Three times as fast as the pneumatic drill and many times quieter, a pavement power saw slices through concrete or asphalt at speeds up to four feet a minute. Its two large blades carry tungsten-carbide-tipped bits. They cut slits 18 to 54 inches apart, depending on the width of the trench desired. They cut 15 inches deep in almost any pavement.

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.



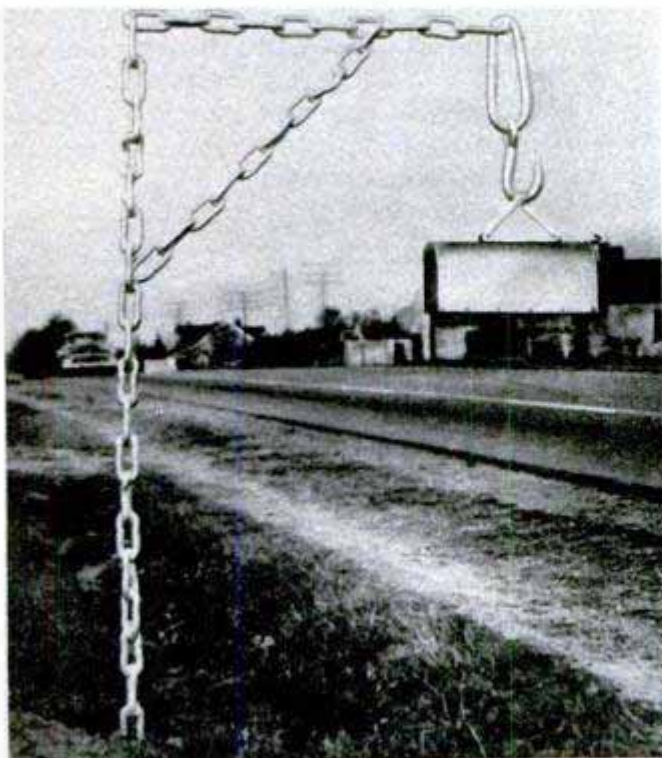
Lincoln Electric Co.,  
Cleveland 1, Ohio

### "Three O'Clock" Welding Process

Automatic arc welding on both sides of the joint can be made simultaneously with a new process that cuts actual arc time by about 50 percent. Eliminating the necessity for down-hand welding, the process permits welding in any position from flat to vertical, the joint being horizontal. Called "three o'clock" welding, the process reduces costs by cutting the amount of current required, by using less flux and electrode and by cutting labor costs.

### Mailbox "Hangs" on a Chain

As strong as a solid iron pipe, a novel mailbox support seen along Route 21, north of Charlotte, N.C., is formed by a welded link chain. The chain, shaped at a right angle, holds the mailbox from above. A short length of chain serves as a brace across the angle.



JULY 1951



### Miniature Bagpipe

One quarter the size of the Scotch instrument and weighing only nine ounces, an all-plastic bagpipe is being made by the Magnus Harmonica Corp., Newark, N. J. A simplified "chanter" — the eight-hole, oboelike part of the bagpipe which produces the melody—makes the miniature instrument easier to learn to play. The bag is made from Vinylite sheeting and the other parts are molded from Bakelite styrene plastics. It can be kept clean with a damp cloth and soap and water will not harm the reeds.

### Self-Tightening Hose Clamp

Exerting uniform pressure all the way around, a ring-type hose clamp tightens itself automatically by spring action. The clamp, formed from a piece of round stock, is installed by squeezing the ends with pliers. When the clamp is in place, it is released and the ends spread apart, tightening the ring around the hose. It can be disconnected quickly and reused.

Corbin Hose Clamp Div., American Hardware Corp.,  
New Britain, Conn.



133



# *Pioneering the* **HELLS CANYON DAM**

Drilling into the river bed from this barge anchored in midstream, engineers measure the depth of bedrock

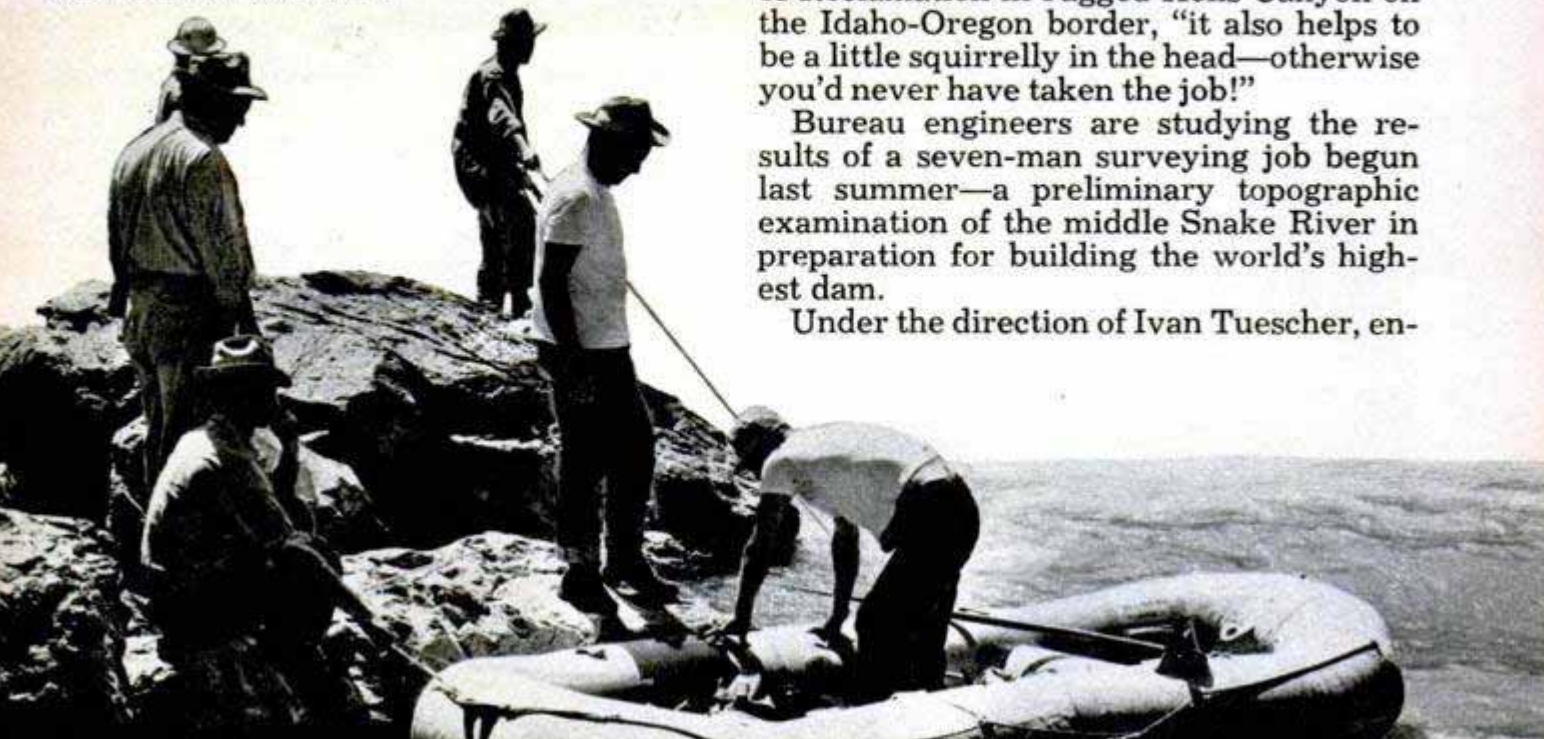
You can't drive to the dam site. One way to get to it is by rubber boat down the swift-flowing stream  
U. S. Bureau of Reclamation photos

*By Andrew Hamilton*

**T**HEY SAY a surveyor has to be part monkey, part mountain goat, part pack mule. But if you're working for the Bureau of Reclamation in rugged Hells Canyon on the Idaho-Oregon border, "it also helps to be a little squirrely in the head—otherwise you'd never have taken the job!"

Bureau engineers are studying the results of a seven-man surveying job begun last summer—a preliminary topographic examination of the middle Snake River in preparation for building the world's highest dam.

Under the direction of Ivan Tuescher, en-





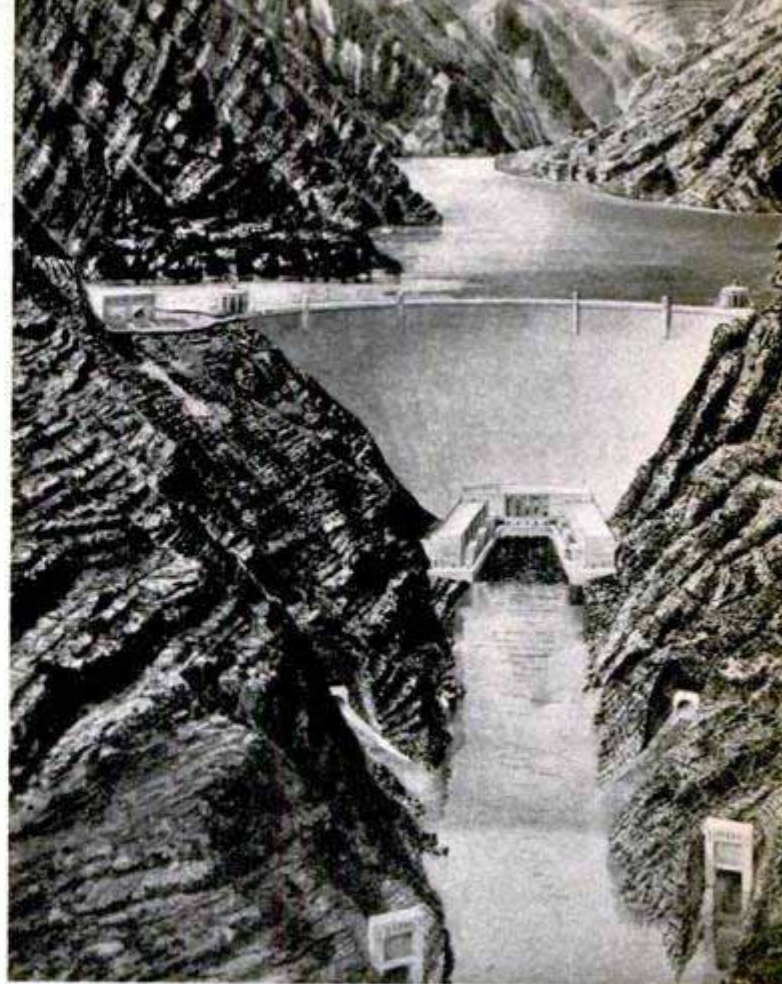
gineer-in-charge, the Bureau of Reclamation surveyors risked their lives daily to explore what is probably America's greatest remaining dam site.

The proposed concrete giant in Hells Canyon will be 742 feet tall, 16 feet higher than the Hoover Dam. It will create a lake 93 miles long and generate 1,400,000 kilowatts, some 688,000 kilowatts being generated at the dam and the remainder downstream. The dam will provide flood control, improve navigation and make accessible some good hunting and fishing territory.

What makes the job so tough is that Hells Canyon lies in one of our most primitive wilderness areas. Between the Seven Devils Mountains of Idaho and the Wallowa Mountains of Oregon, the river entrenches itself in the Grand Canyon of the Snake. It is a region of wild, breathtaking beauty.

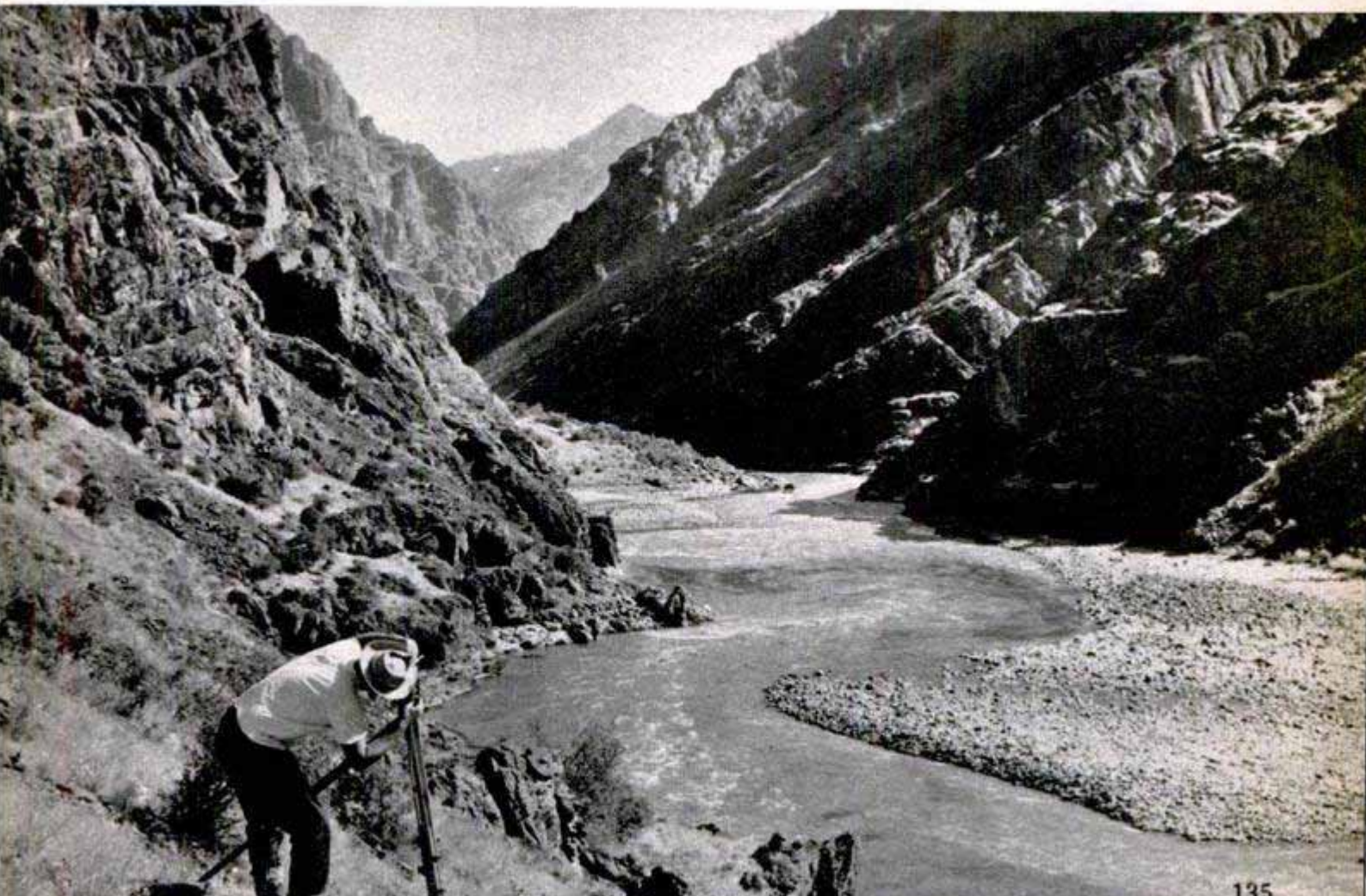
At present there is only a single route into this area of primitive splendor and isolation. It's a one-way, 20-mile road from Homestead, Ore. to Eagle Bar. Strewn with boulders, jagged with basalt fragments and filled with chuck holes, it represents tortuous travel for even the most experienced driver. Eagle Bar is the jumping-off place for the Bureau of Reclamation surveyors—from there on, it's travel by horseback, boat or foot. Transits, stadia rods and other equipment have to be raised and lowered by ropes in many places.

To date no serious injuries have been suffered by the surveying party. Once,



Here is what Hells Canyon Dam will look like if and when it is completed, according to the present plan

Hells Canyon is one of our finest undeveloped dam sites with volcanic-rock slopes that would serve as walls to retain about 4,400,000 acre-feet of water



however, Phil Merritt of the Bureau of Reclamation's Regional Office was pinned to the canyon wall by a two-ton rock while on a photo assignment.

"If I'd been alone, it would have been curtains," he says. "I was really stuck."

Surveyors on the scene lifted the rock away.

In this well-named Hells Canyon, slithering rattlesnakes are an ever-present danger. Last summer 19 deadly brutes were killed and scores of others were seen and

heard by the crew. Not quite so lethal but plenty annoying is the poison oak which is liberally sprinkled throughout the area.

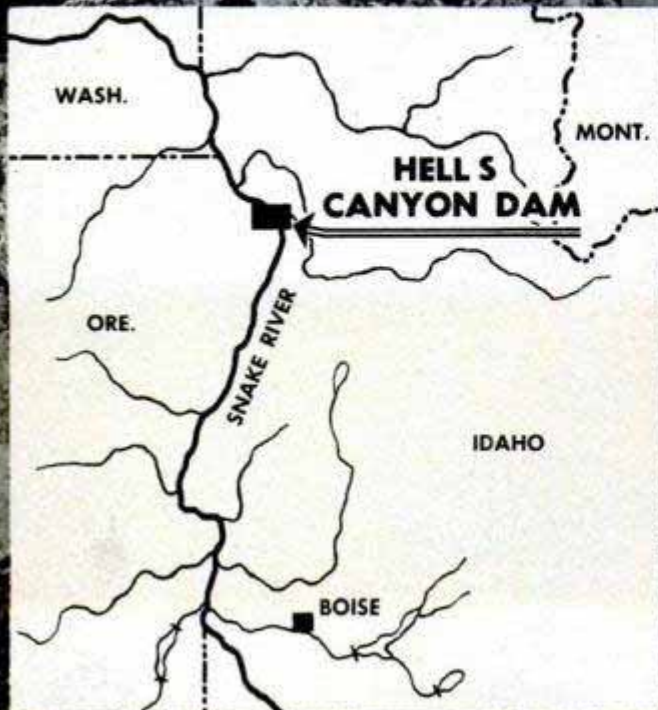
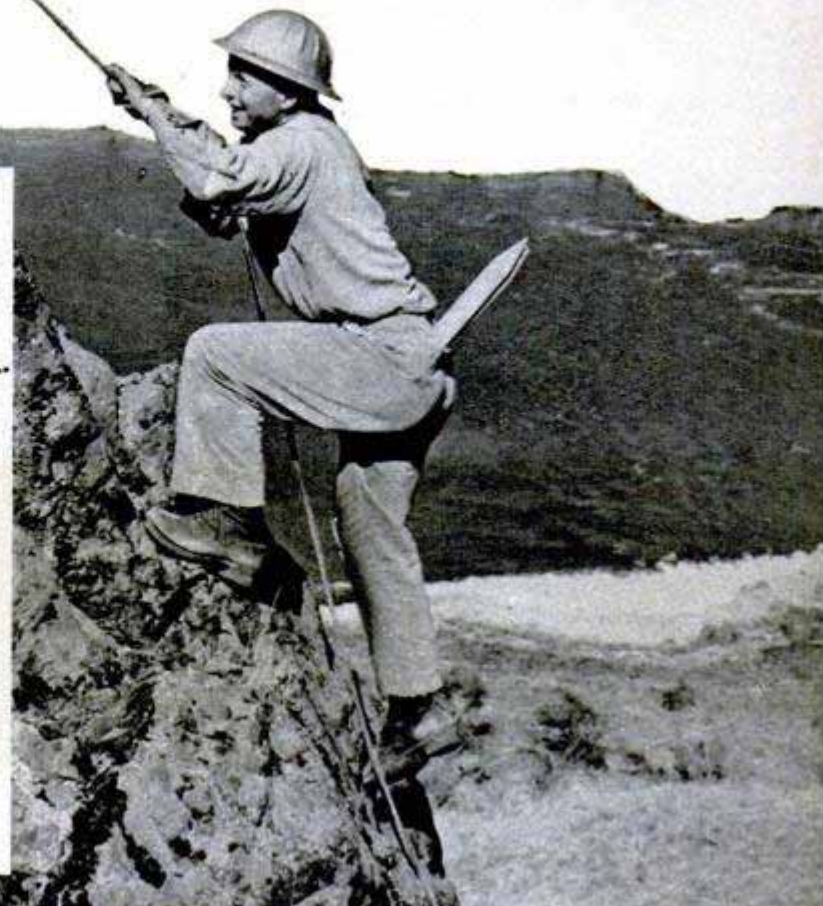
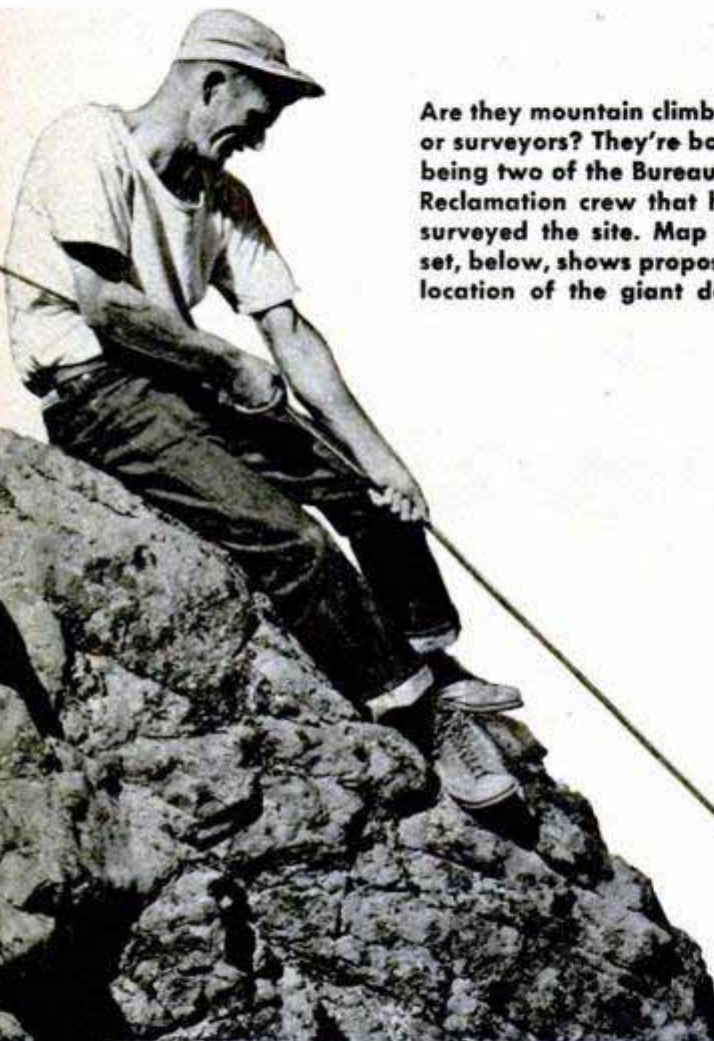
"And if that weren't enough, there's the midday heat," said Tuescher, who said the thermometer in summer months averages 110 degrees, sometimes hits 117.

Hells Canyon—a 7900-foot gorge, deeper than the Grand Canyon of the Colorado—has long baffled explorers. It thwarted an attempt by Lewis and Clark to pass through its turbulent and churning waters. The John Jacob Astor expedition lost three men and a fourth went mad trying to ride the rough Snake through this gorge.

Since then, one of the few persons who have attempted to master the man-killing canyon is Kyle McGrady, better known as "The Mailman of Hells Canyon." Twice a week he pilots his flat-bottom, 60-foot boat 100 miles upstream from Lewiston. Even he doesn't go all the way, stopping at Johnson's Bar. Bureau of Reclamation surveyors have been among the few ever to lick the terrain of Hells Canyon. To do it, they've had to operate like an expedition pushing into unexplored country. Their camps are similar to hunting or fishing camps in the deep woods. The surveyors cook their own food over wood fires and sleep in sleeping bags. All supplies are brought in by horseback or boat.

During off-hours, says Tuescher, there's some of the best fishing in the United States: sturgeon fishing. Largest taken so far is a 200-pounder. And on hot summer days, the cool, green water of the Snake makes an unbeatable swimming hole.

Are they mountain climbers or surveyors? They're both, being two of the Bureau of Reclamation crew that has surveyed the site. Map inset, below, shows proposed location of the giant dam





Hells Canyon may be rough, but it does provide fine sports facilities, as proved by a 100-pound sturgeon

If Congress authorizes the dam in Hells Canyon gorge, it will require six or seven years to complete and the labor of some 5000 men at peak of construction.

According to H. T. Nelson, Regional Director of the Bureau of Reclamation, the dam will be a concrete arch-gravity type structure, depending upon its weight and the support of its abutments to resist the pressure of impounded water. As lofty as a 70-story building, it will be 674 feet thick at its base, tapering to 45 feet at the crest.

Hells Canyon Dam will be the tallest dam in the world and third largest. In height, it will surpass Hoover Dam (726 feet), Shasta Dam (602 feet), Hungry Horse Dam (564 feet) and Grand Coulee Dam (550 feet). In size, (6,200,000 cubic yards) it will be exceeded only by the Grand Coulee Dam in Washington and by the Shasta Dam located in California.

Preliminary surveys have shown that the physical quality of rock at the dam site is excellent and suitable for a dam of any height. It is of volcanic origin—dense, hard, fine-grained, resistant to weathering and of high crushing strength.

Test drilling has disclosed that the thickness of the overburden in the river channel will not exceed 100 feet. Test holes are drilled through a hole in the bottom of a

barge anchored by cables in midstream.

During construction, two tunnels—each 50 feet in diameter—must be driven through the rock walls on either side of the river to divert the flow. These tunnels will be 4275 feet long on the Oregon side and 4720 feet long on the Idaho side.

Approximately 813,000 cubic yards of earth, gravel and sand will have to be excavated to expose bedrock and abutments. Another 1,611,000 cubic yards of hard rock will have to be gouged out of the tunnels and sides.

Surveyors are laying out possible routes for a heavy-duty highway and a railroad—to deliver cement, lumber, construction machinery to the site—as well as secondary roads to keep traffic circulating. Access from both the Oregon and Idaho side will be provided.

Hells Canyon Dam will create a long, narrow reservoir 93 miles along the Oregon-Idaho boundary. Maximum depth of this lake will be 627 feet. It will cover an area of 39 square miles and hold in storage some 4,400,000 acre-feet of water.

“Cost of building the dam, exclusive of electric-transmission systems, would be \$357,000,000,” according to Regional Director Nelson. “The entire investment, however, including interest, would be returned through the sale of power except allocations to power and flood control.”

He listed these ways in which it would benefit the Northwest:

(1) Increased electric power is vital to this part of the country.

(2) In the upper Snake River basin and adjacent areas lie the greatest phosphate resources in the United States. The combination of electric power and phosphate minerals will mean cheap fertilizer for the West.

(3) Although irrigation by diversion from Hells Canyon reservoir is not possible, it will reduce floods in the lower reaches of the Snake and the Columbia.

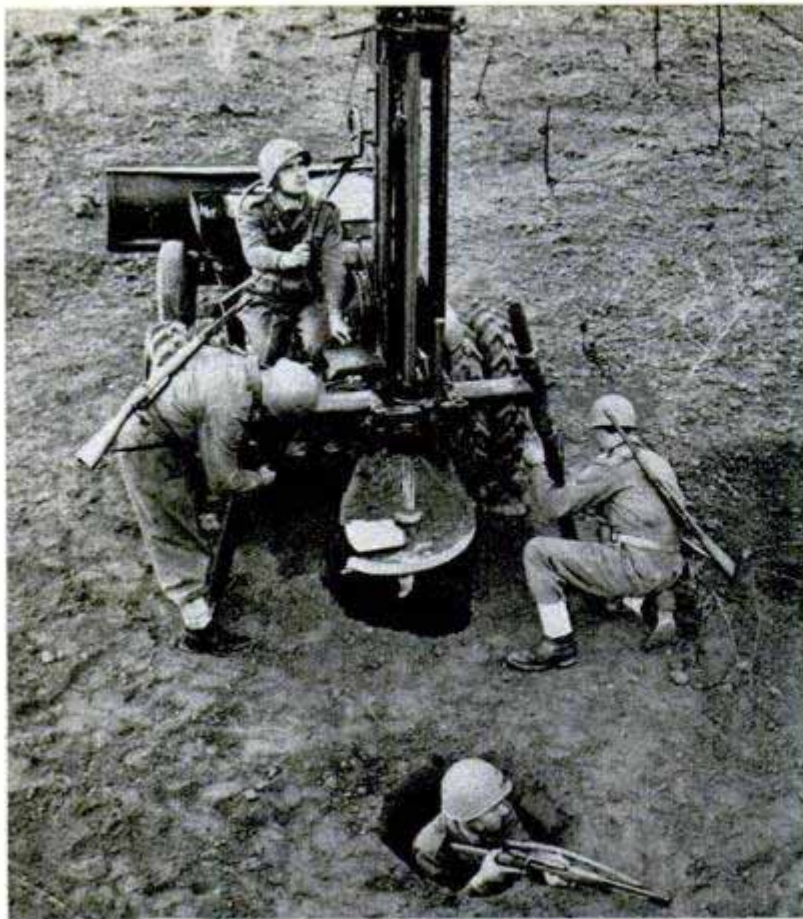
(4) Power revenues will make possible the building of valuable irrigation projects.

(5) The Hells Canyon reservoir will improve navigation on the Columbia and the Snake.

(6) The presence of a large body of water in an area of wild, rugged beauty will afford recreational opportunities, expected to attract 300,000 to 500,000 vacationists annually.

“When the Hells Canyon Dam is built, the undertaking will rank as one of our greatest engineering feats,” Nelson said.

But there will be seven surveyors and a handful of engineers who will be able to tell their grandchildren: “Shucks, I was in there in '50 and '51—Hells Canyon was really 'hell' in those days!”



### Foxhole Digger

Life is easier for the Italian soldier these days. His army has developed a mechanical foxhole digger. The machine's big auger can drill a neat foxhole as deep as eight feet within two minutes. The digger was developed to aid in quick construction of strong defensive positions.

### Cedar-Chest Scent Can Be Painted on Walls

You can now paint the fresh, clean odor of cedar on the walls of any closet. A new chemical compound made with pulverized red cedar, concentrated oils and various other chemicals does the trick. Sold in powder form, it is mixed with water and painted or sprayed on any surface. It dries to a coat three times as hard as plaster and is mothproof and fireproof, according to its distributor, Thrifty Products Co., Box 371, Brooklyn 1, N.Y.

### Dimmers for Night Driving

Small shades, worn like spectacles, protect the eyes of a motorist from glare while driving at night. The shades are offset to the left, and are designed to shield only the pupils of the eyes from bright lights without obstructing the field of vision. When glare bothers the motorist, he merely lowers his head slightly to move the shields between his eyes and the light.

Bruce Industries, Plantsville, Conn.



### Water "Sanitizer"

Sluggish, contaminated water is purified by a new 12-pound "sanitizer," which turns out 50 quarts of crystal-clear liquid per hour. The purifier, which looks like a small pump, draws impure water through a circular filter and then passes it through a special earth powder. This renders the bacteria in the water harmless, according to the manufacturer.





"Timber!" Working in boats, these lumberjacks cut timber, but it doesn't fall — it's hauled up by crane

## ***New York's WATERFRONT LUMBERJACK***

Going over the side of the barge, the diver picks up the pneumatic saw with which he'll cut off the piling underwater. It has two reciprocating blades

**By Richard F. Dempewolff**

**M**OST OF US don't think of lower New York City's waterfront in terms of valuable stands of potential saw timber. But lumberman Richard J. Power does. Driving down the West Side overhead highway, he waves a mackinawed arm in the general direction of Wall Street.

"Some nice 90-foot pine timber waiting to be plucked down there," he says. "And west of the Empire State Building, we'll pass about a half-million board feet of real good oak. There's some first-rate yellow pine over near Hoboken, too."

Meanwhile, he points out a huge "catamaran" laden with 85-foot pine logs, slowly weaving through ferries, freighters and barges across the North River. It's on its way to his Burma Road Lumber Company sawmill on the Jersey side right behind the Statue of Liberty.





Salvaged piling is dragged off the ungainly "catamaran" by a winch and hauled up on the beach at the sawmill

Power, of course, isn't talking about beautiful stands of green timber such as you'd find in the Northwest. His is a salvage operation. Eight years ago while working at various shipping points for the War Production Board, Power, a graduate forester of Syracuse University, noticed stacks of discarded piling from waterfront piers, which New York continually dismantles to make room for new ones. The logs, ranging from 65 to 85 feet long, were either hauled off and burned, or left to rot in some out-of-the-way place.

"I did some investigating and learned a few things," Power says. "In spite of what you've heard, salt water doesn't rot wood. It preserves it. Only the section of the piling exposed to air by the rise and fall of the tide rots away. The rest is almost invariably first-rate timber."

The average pier has about 1000 piles, running 14 to 20 inches across at the butt. An 85-foot log of such dimension will yield about 500 feet of saw timber. The average New York pier has a life of approximately 40 years, so there's a steady dismantling process going on around the harbor.

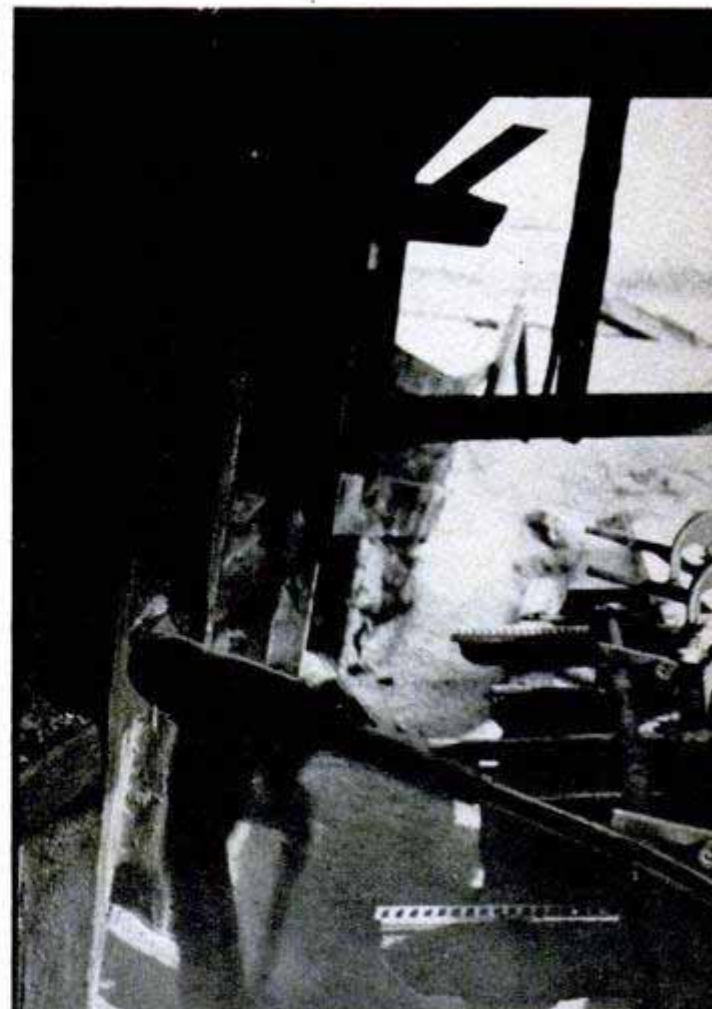
Power estimates a potential of 650,500,000 feet of big timber (multiply by 500 to get saw timber) in the North River alone. That doesn't count the endless piers that stretch around the other side of Manhattan and along the shores of Brooklyn, Staten Island and New Jersey.

Convinced that the wood was good and that there was enough to supply a sawmill, Power talked pier owners into letting him take their worn-out piling. He would save them expense by hauling it away.

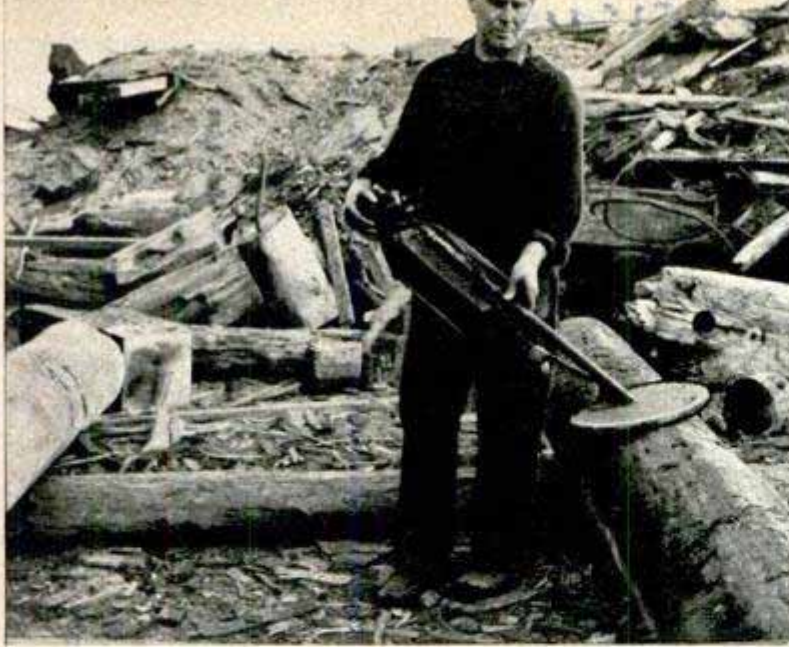
Handling the monster logs is a man-size

job. The tops of the piling, about 8 feet long, jut from the water like pins in a cushion. What you see is splintered, water-logged and rotted. But the 65 or 75 feet underwater is good timber, sound as a nut.

The cable from a floating crane is lashed to a pile. Sometimes the piles pop right out of the bottom, but occasionally they refuse to budge. Then they have to be sawed off at the base. A diver is lowered to the river floor, carrying an air-powered underwater power saw. About four feet long and weighing 15 pounds, it is operated by pneumatic cylinders that pump two parallel blades back and forth with an opposing motion.



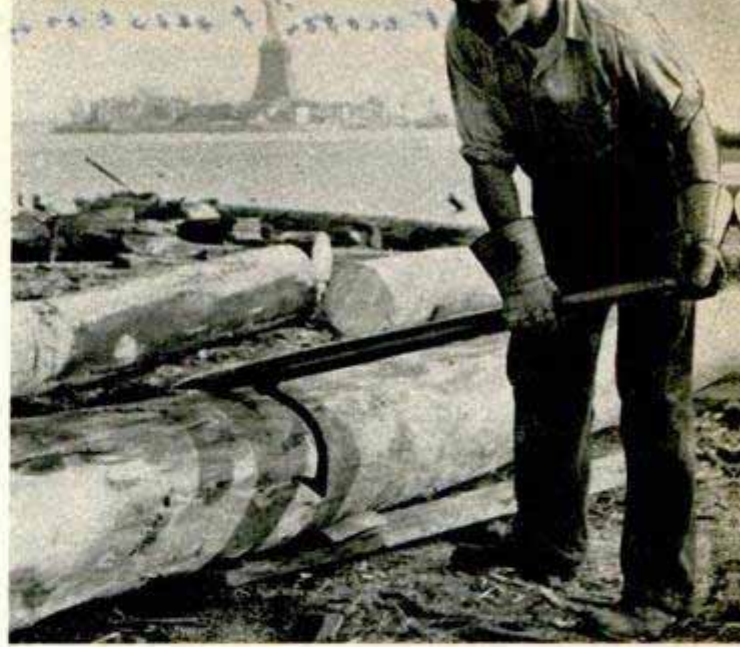
After a few months of drying out, the logs are run through the sawmill. The first step is edging as the round pilings are trimmed square on all four sides



War-surplus mine detectors spot spikes in the logs. If not removed, these spikes can ruin the saw blade

The saw chews through a 20-inch pile in seconds.

The diver has to move slowly through the knee-deep harbor muck to the stubborn pile, avoiding deep pockets of silt that might suck him down. Recently, one diver sank up to his shoulders in this muck. Suction was so great that no amount of tugging from above would free him. Lines and hooks were lowered, but he couldn't be budged. Rescue divers went down with shovels and were nearly trapped themselves. Finally, the problem was solved when a diver took a fire hose below, opened

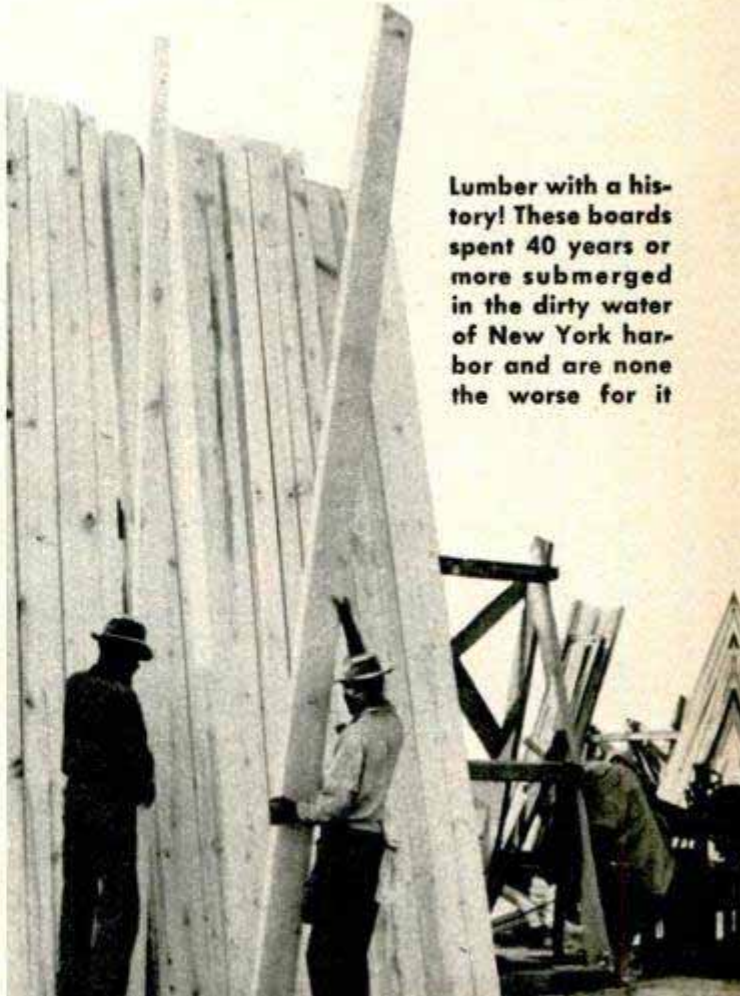
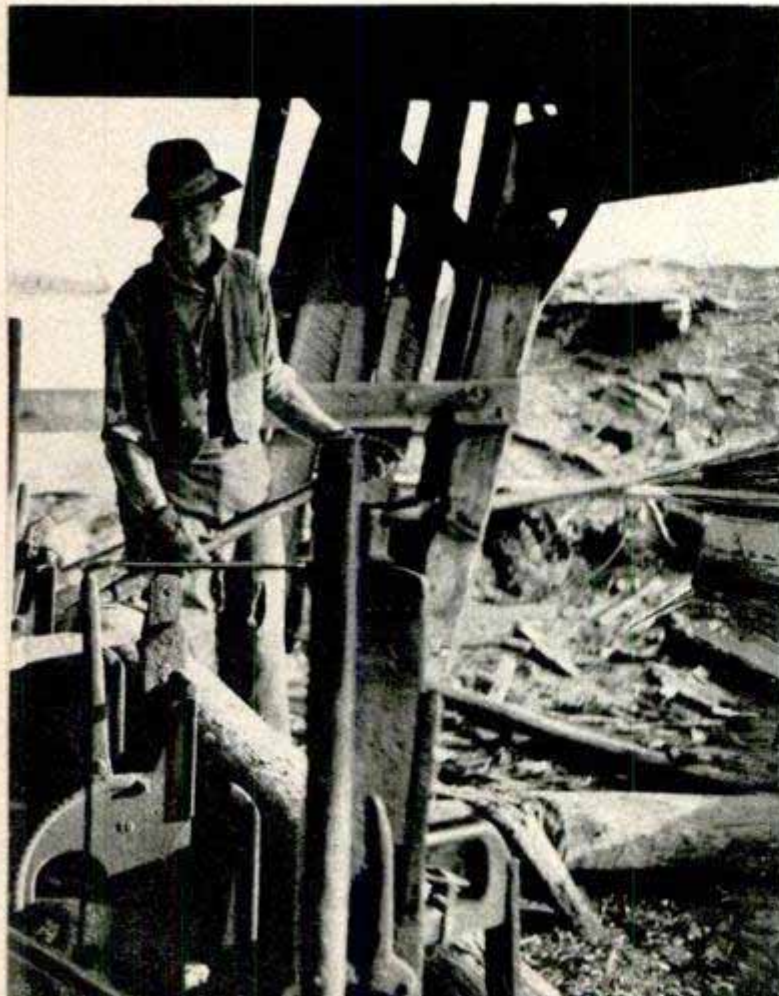


Yes, that's the Statue of Liberty! And that's not a model posing. He's a real, city-dwelling lumberjack

up the high-pressure stream and blasted the muck away from the trapped man. In a few minutes, the diver popped to the surface none the worse for his experience.

When the crane lifts the pile, it is swung around and stacked on a waiting catamaran, or "cat." How this odd craft got its name no one seems to know. It is not a catamaran at all, but merely a large raft made of heavy timbers lashed together. A strong rail along each side holds in the load. It looks like a country bridge that broke loose from its moorings and was swept down the river.

(Continued to page 218)



Lumber with a history! These boards spent 40 years or more submerged in the dirty water of New York harbor and are none the worse for it



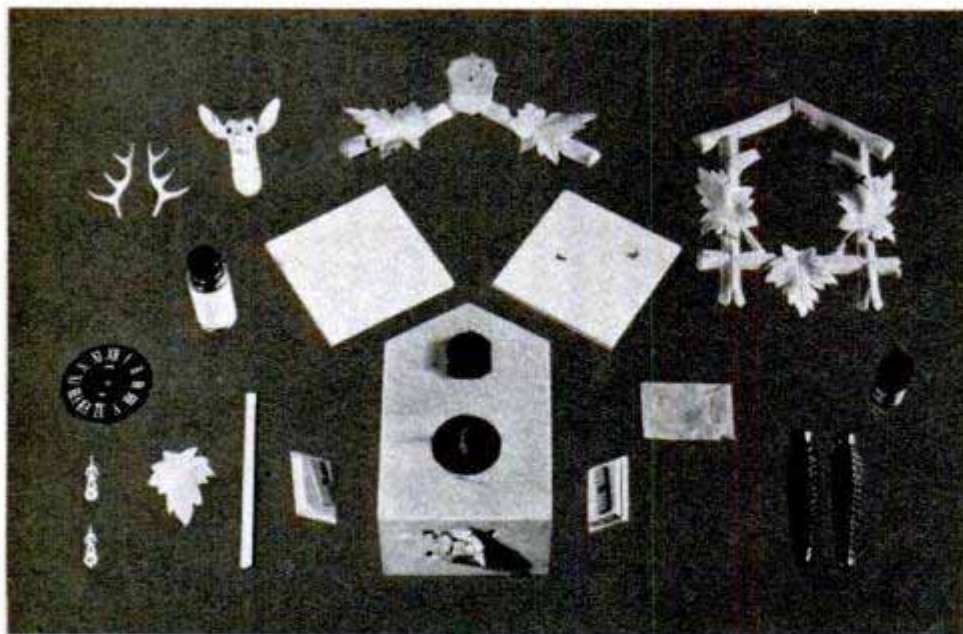
### Budget Protector Helps Shoppers

Shoppers are protected from the embarrassment of having more groceries in the shopping cart than money in the pocket-book by an adding machine that is attached to the cart handle. As the shopper dials the price of each item on the machine, a running total is displayed, keeping her aware of the exact value of the items she has selected in the store.



### Midget Fluid-Drive Tractor

Young Dwight Lohrenz of Long Beach, Calif., is the proud owner of a tractor strong enough to pull several wagonloads of small-fry passengers. Built by Dwight's father, the vehicle is slow and safe. The steering wheel, soft-rubber tires and several other parts came from a plane. Power is supplied by a four-cycle gasoline engine, which spins a shaft under the chassis. A fluid drive taken from the gun turret of an airplane connects the shaft with another chain which turns the rear wheels. When Dwight pushes down the little accelerator, the fluid drive eases the vehicle into motion.



J. F. Reich, Quivira Lake, Kansas City 3, Kans.

### Cuckoo Clocks in Kit Form Imported From Germany

You can assemble your own cuckoo clock in one evening from a kit, imported from Germany, at considerable saving over the assembled cost. This saving is possible

mostly because of lowered import duties and luxury taxes. The brass works comes mounted in place ready to run. Assembly is limited to the case and its decorations.



## File-Card Conveyor Operated by Pedals

Card files are carried directly to the operator by a chain-driven office filing system. The operator sits behind the unit, which looks like a large desk. She moves trays of file cards across the unit in either direction by operating two foot pedals. In one office, where three of the units were installed, a single operator was able to handle over half a million cards.



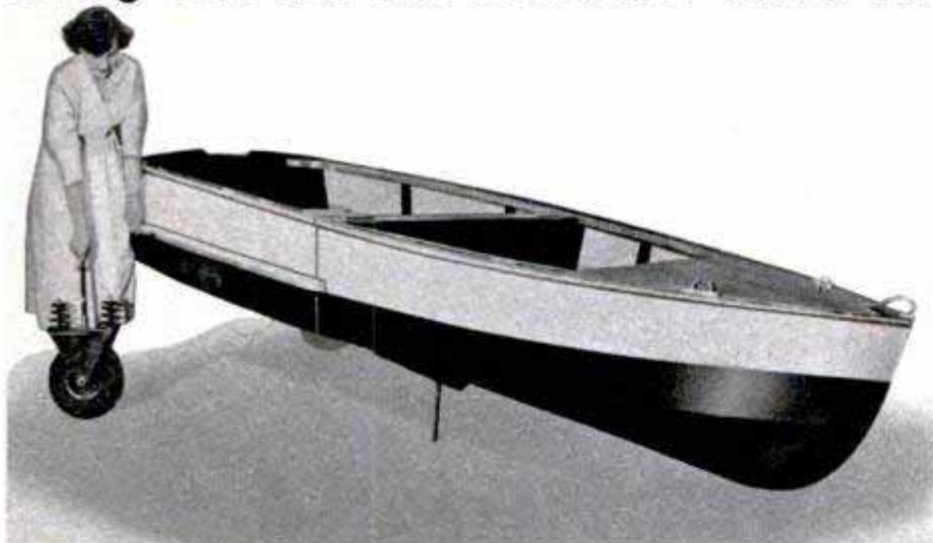
Remington Rand, Inc., 315 Fourth Ave., New York City 10

## "Breathing" Package

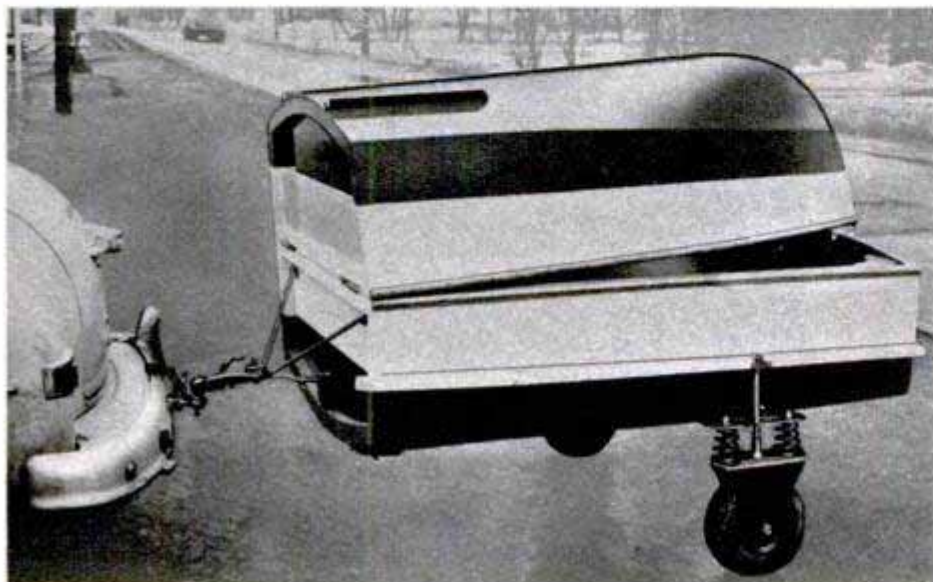
Shipment of live lobsters to any part of the country can be done economically by lining the packages with a transparent plastic film, according to scientists of the Goodyear Tire & Rubber Co. The plastic film allows just the right

amount of oxygen to enter the package to keep the lobsters alive. The shellfish are packed in layers of seaweed and the whole container is refrigerated.

## Folding Boat Has Two Detachable Wheels for Highway Travel



Two easily removable wheels form the running gear for a folding boat that requires no trailer for over-the-road hauling. The wheels can be put on or taken off while the boat is in the water. Hinged amidships, the 12-foot boat consists of two separate watertight sections, bow and stern. An added feature is ease of storage. The hinge comes apart to allow you to separate the boat in two sections for storing.



Above, a dry-run demonstration of how wheels are removed with the boat floating in the water. Left, folded for highway travel

Sources of available products described in this issue are indexed on pages 12, 14 and 16. Sources of further information are listed in the WHERE-TO-FIND-IT LIST, which is available from the Bureau of Information, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11

# MYSTERY of the SPINNING DUST

**T**HERE'S a new riddle for the world of science to solve—the mystery of why tiny particles of dust begin dancing along definite paths when they are exposed to the sunlight.

A Viennese physicist, Felix Ehrenhaft, discovered the new phenomenon of physics when he placed dust particles in a glass flask, created a vacuum in the flask and then placed it in the sun's rays. The particles began revolving along regular paths—particular planes in relation to the light. They continued to move as long as they were in the sunlight; a cloud crossing the sun immediately stopped the gyrations. Each particle seemed to follow not only an elliptical path, but also to revolve around its own axis. An obvious comparison is the earth itself, which moves around the sun while spinning on its axis.

How can this motion be explained? Not by air currents created by the heat of the sun, for the particles move in a vacuum. The movement so far has not been related to known physical laws, and suggests that a new force may have been discovered.

Ehrenhaft has his own theory. He believes the motion is due to a force possibly purely magnetic and existing separately from the electrical forces of the universe. So far, most other physicists won't accept this theory on the scanty evidence, but admit that the discovery is of importance.

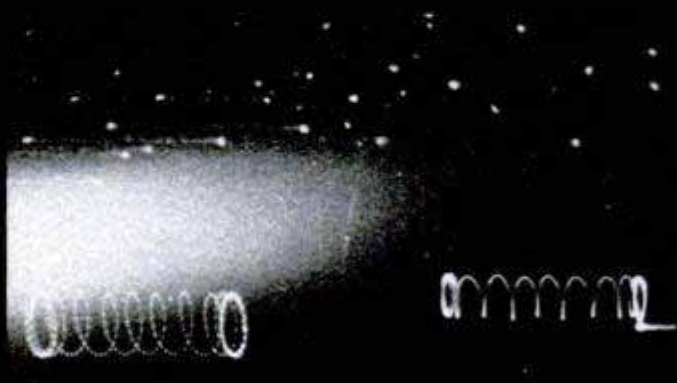
The scientist now is photographing the patterns made by the dust in the hope of accumulating new information.

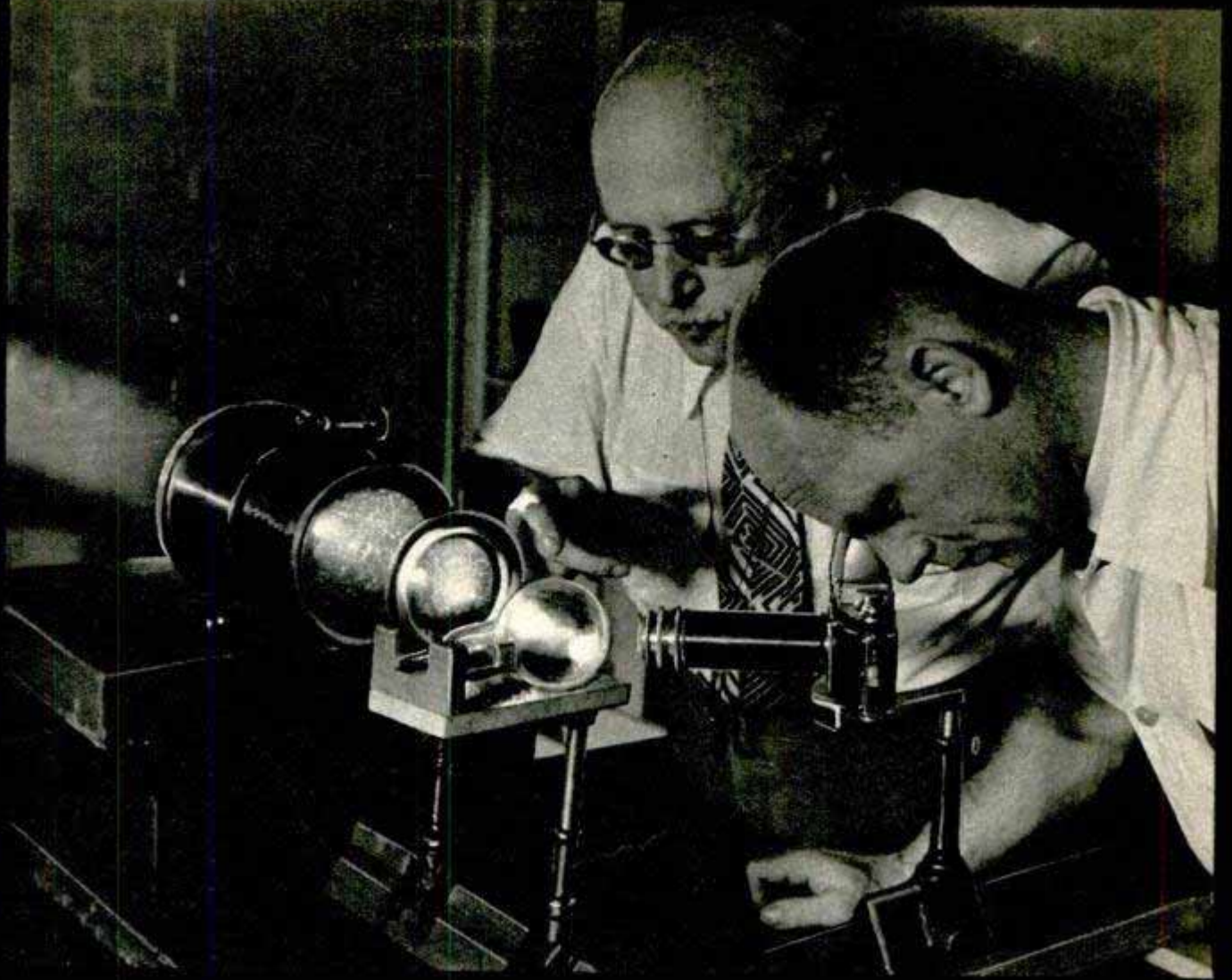


What makes them spin? Graphite particles, exposed to sunlight, make beautiful spiral rotations in vacuum

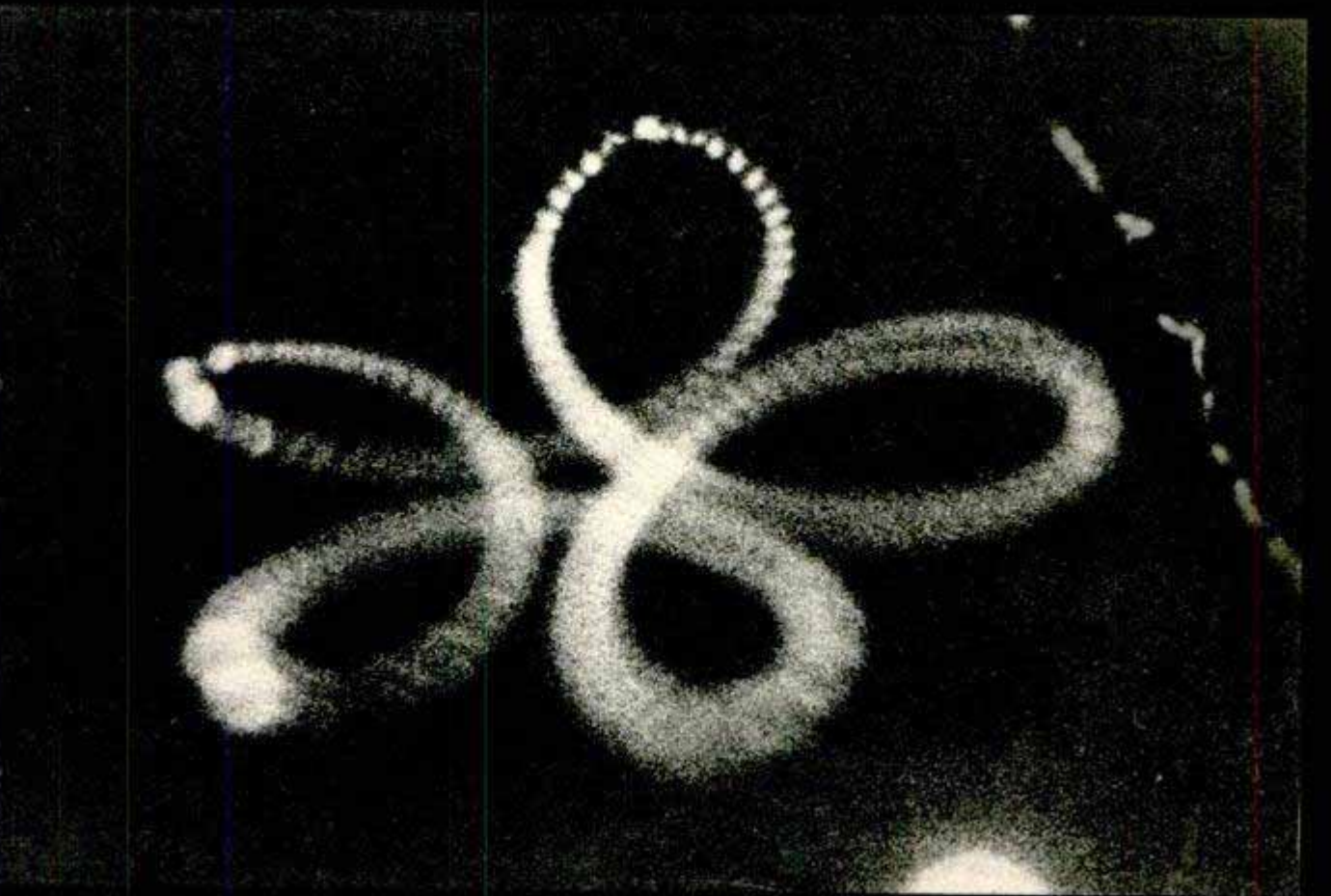


Weird patterns are made by various particles of dust. Some remain on single plane, others follow elliptical, rotating courses. Below, two dust specks, rotating in opposite directions, also revolve on their own axes





To make the photographs, sunlight is focused through lenses into the vacuum flask which holds the dust particles. Almost immediately the dust begins to spin, and a camera with an enlarging lens takes pictures at  $1/5$  to  $1/10$  second. Below, "pearly" appearance proves dust spins on own axis as it makes a larger pattern

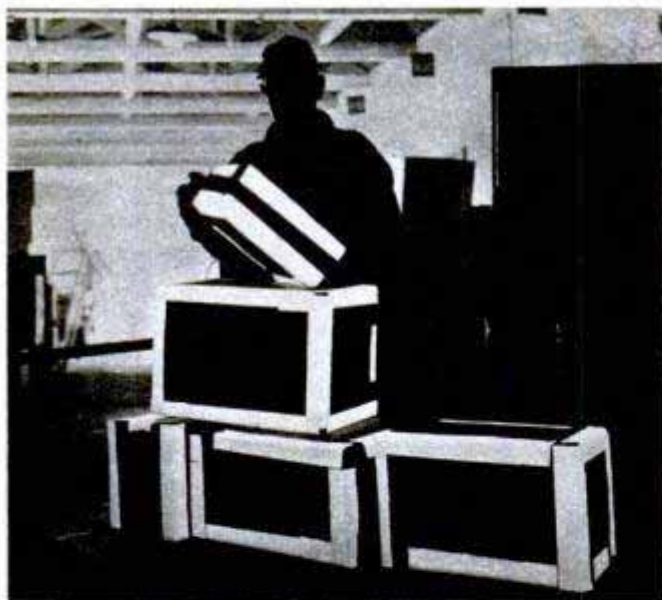




## Inflated Rubber Bags Lift Damaged Airplane

In aircraft accidents where the undercarriage has been damaged or completely sheared away, inflatable rubber bags are being used to lift the airplane for salvage

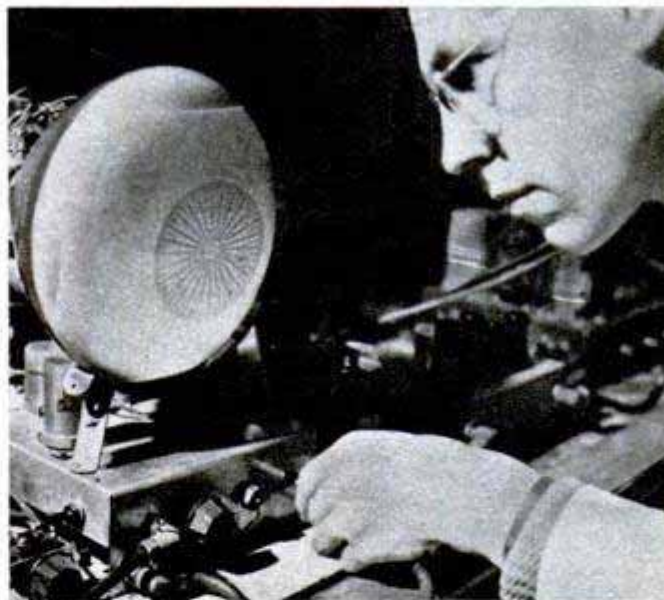
operations. The strong rubber bags distribute the lifting force and prevent further damage to wings or fuselage. Some lifting devices add to the damage.



Century Coating Co., Whitestone, Long Island, N.Y.

## Blackout Tape

Easily seen in the dark from a distance of several feet, a luminescent packaging tape is being tested for possible use by the armed services. The tape not only seals the containers, but also outlines the shapes, preventing accidents in dimly lit warehouses. The Army is testing it for use as identification markers for equipment and material that will be handled under blackout conditions.



## TV Microscope Magnifies Up to 25,000 Times

Dr. Frank Roberts, a Scots electronics engineer in Britain, is doing microscopic work with the help of television. He has designed a television microscope that is said to magnify up to 25,000 times, and is especially suitable for observation of living tissues. British sources report that the microscope is being used to count and sort the number of cells in the human brain.



## Portable Greenhouse

Gardeners can grow their favorite plants or flowers the year 'round in a miniature greenhouse that can be moved even when it is in use. The greenhouse has a thermo-



Old Copper Mine Farms, Inc., Dept. P1, Warrenton, N.J.

statically controlled heating system, underground irrigation, electric lights and automatic ventilation. It is 16 inches wide and 32 inches long. Spring flowers can be grown in the greenhouse even when the little structure is surrounded by snow.



Asa D. Scott Industries Inc., 1028 E. 63rd St., Chicago 37

## Drive-In Metal Clip Holds Shelves

To make a shelf, all you have to do is pound a few metal clips into the vertical support, slip a piece of plywood into the clips and the shelf is up. The clips, made of hardened steel, are driven like a nail and are designed to take  $\frac{1}{4}$ -inch plywood. Other uses for the clips include supports for drawer dividers and no-draft window ventilators.

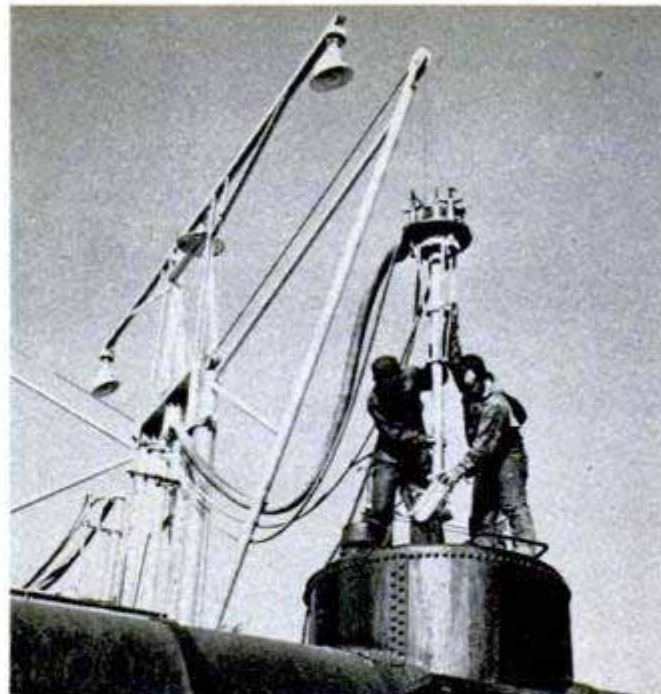
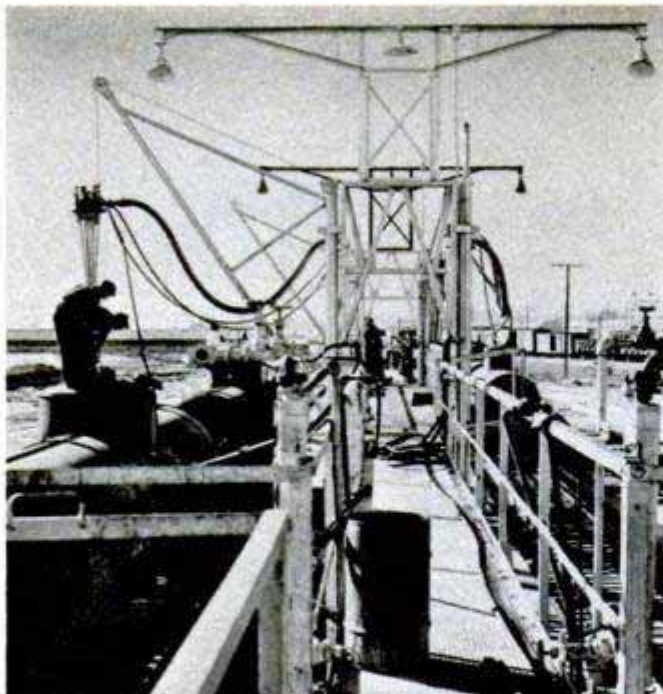
Two regions in the interior of western Java have been completely freed of malaria by treatment of the population with Aralen, a new antimalarial synthetic drug.



U. S. Dept. of Agriculture photo

## Frozen Pollen

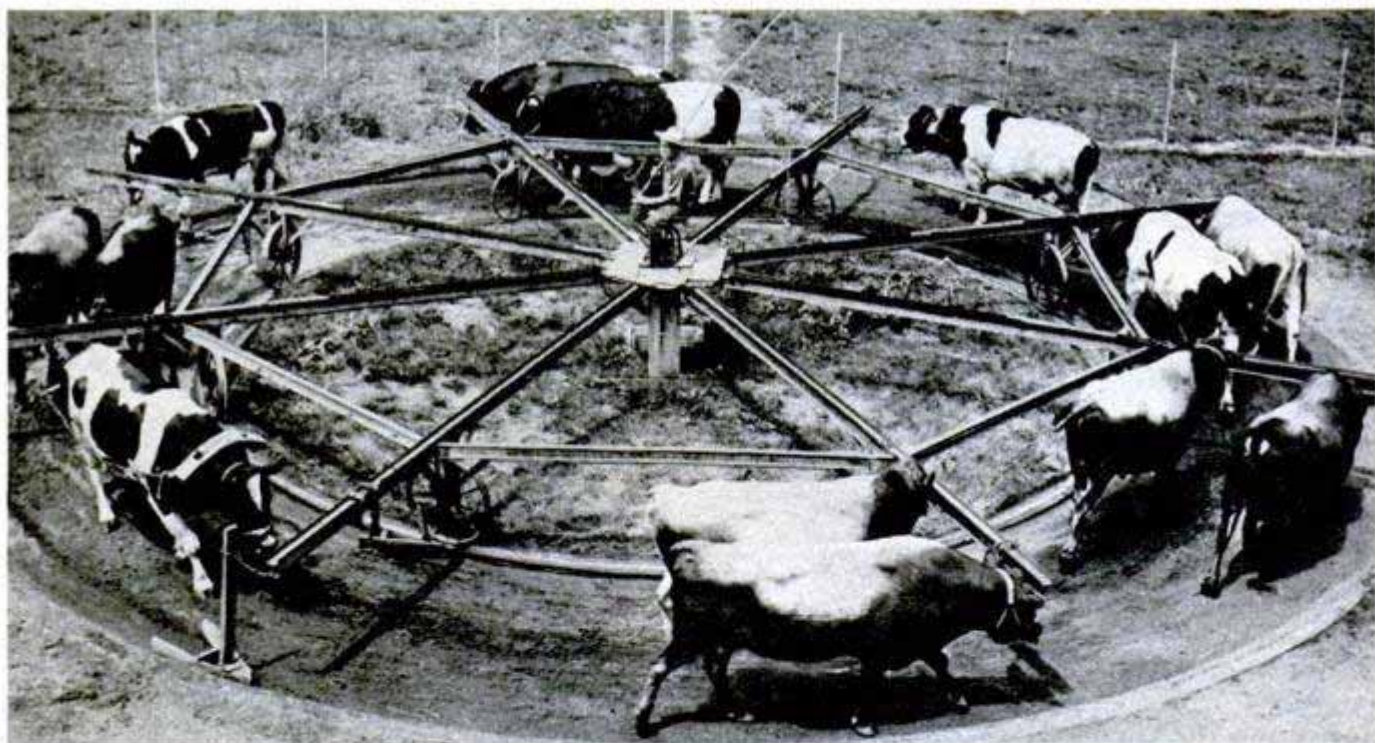
Bee-collected apple pollen can be quick-frozen, stored for a year and used successfully for artificial pollination of blossoms during the next season. Such pollen has not been used extensively in artificial pollination because it loses its viability. However, it now can be stored for a year if necessary. Pollen is collected by a screen trap that scrapes the pellets from the legs of the bees as they pass through the screen into the hive. As much as two pounds of pollen are collected in a day from one colony by this trap. The process was developed by scientists of the University of California at Davis.



## Tank-Car Laundry

Molasses and gasoline don't mix—at least, not without spoiling each of them—and that's why the Santa Fe Railway's new car-cleaning plant is so important. An average of 12 cars per eight-hour shift can be cleaned internally so thoroughly that they can be loaded with any type of load without contamination from previous cargo. This laundry reduces the need for using certain

cars for one type of load exclusively. The cleaning plant consists of four machines, each equipped with a high-velocity nozzle that turns as it operates. All cars are given a preliminary rinse of about 1500 gallons of clean hot water. Then 1500 gallons of a hot detergent solution are forced into the car through rotating nozzles at 190 pounds pressure. A final rinse of cold water completes the operation. The laundry is located at Vernon, Calif., a suburb of Los Angeles.



## Merry-Go-Round for Bulls

Bulls "play" on a merry-go-round of their own at the research center of the U. S. Department of Agriculture in Beltsville, Md. The merry-go-round was built to exercise the bulls daily. The bulls are hitched to metal beams which are connected with

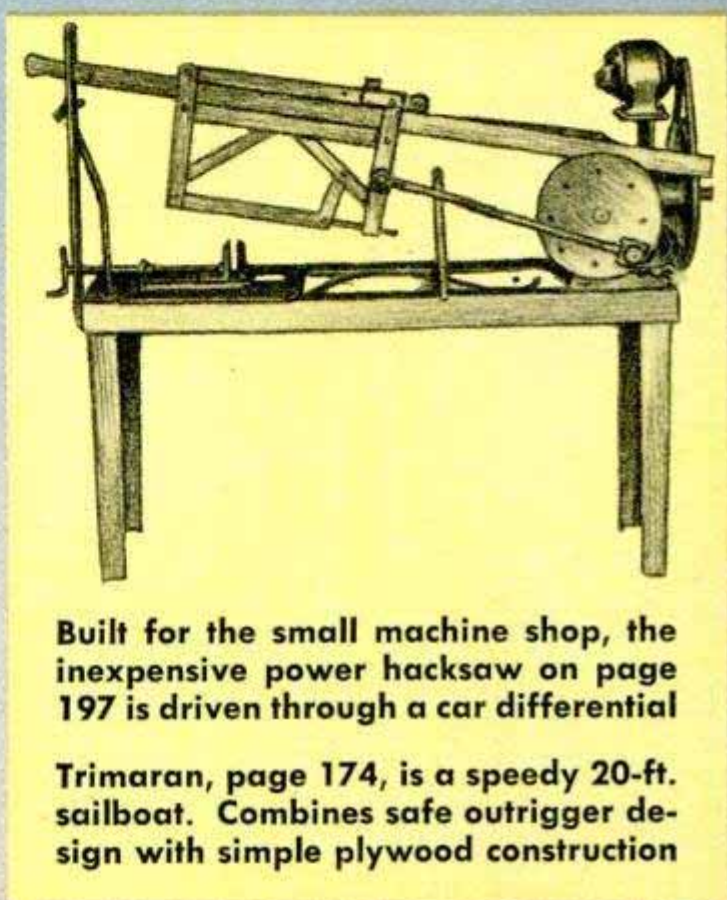
each other and with a post in the center. Eight wheels attached to the beams ride a circular track beneath the merry-go-round.

☐ Automobile-accident deaths and injuries in the nation took a sharp jump last year over 1949, according to figures released by The Travelers Insurance Companies.

the

POPULAR  
MECHANICS

# CRAFTSMAN



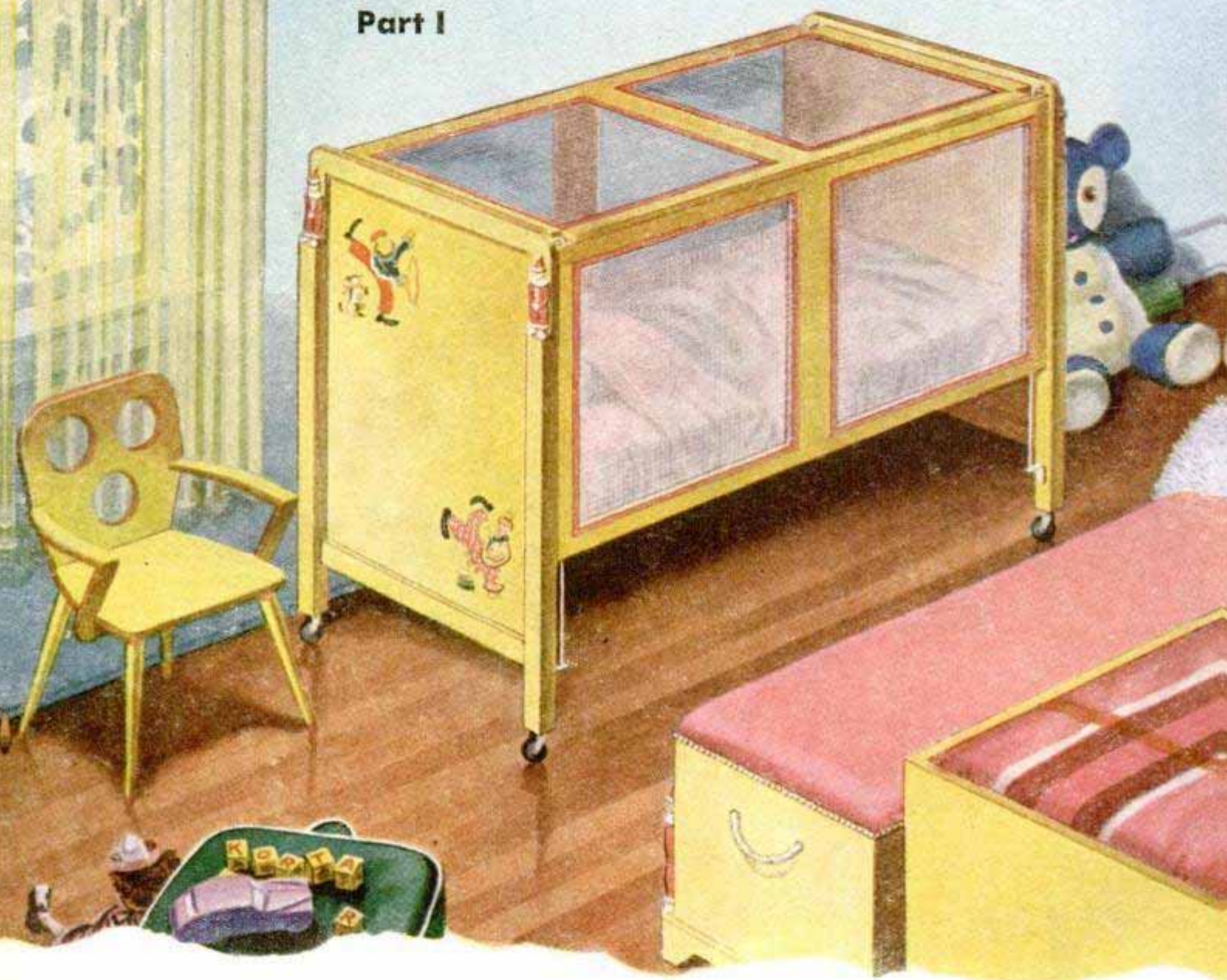
Built for the small machine shop, the inexpensive power hacksaw on page 197 is driven through a car differential

Trimaran, page 174, is a speedy 20-ft. sailboat. Combines safe outrigger design with simple plywood construction



# Build your own NURSERY FURNITURE

## Part I

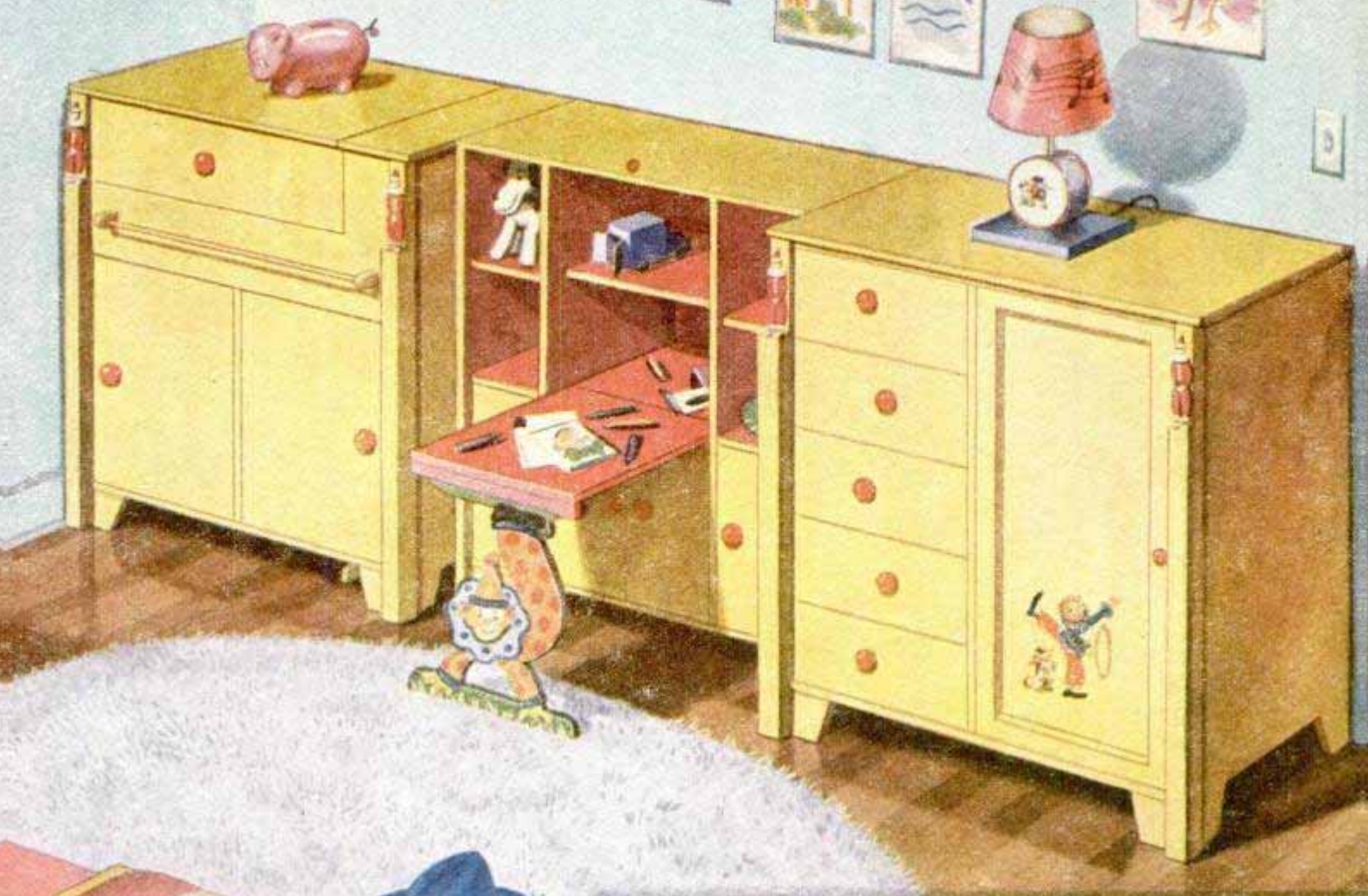


**F**EELING a need for functional improvement in run-of-the-mill nursery furniture, the editors of *Popular Mechanics* commissioned furniture-designer John Bergen to work up something new and different, stressing comfort, safety and maximum utility. At first glance, this attractive nursery ensemble looks much like other matching sets of juvenile furniture. But a second glance will reveal its many practical features—ideas that simplify baby care and provide extra storage space for clothes and toys. These features are incorporated in a gay circus design with plain lines that make cleaning a pleasure and construction easy. Take the baby bath, for instance. Standing in the corner, it blends right in with the

other two pieces of the sectional unit—the desk-toy cabinet and the wardrobe chest. However, when opened, the bath becomes an efficient unit with towel bars, generous diaper storage and a built-in electric heater to remove the chill from the vicinity of the bathtub and dressing table. Note that the three sectional pieces are made the same height for easy rearrangement to suit the room in which they are used.

You don't have to build all the pieces pictured, as each has its own individual merits and will be a welcome addition to any nursery. For example, you can start with the crib and bath. Then add the wardrobe chest and playpen next. As toys accumulate, you'll want the toy chest, and later the





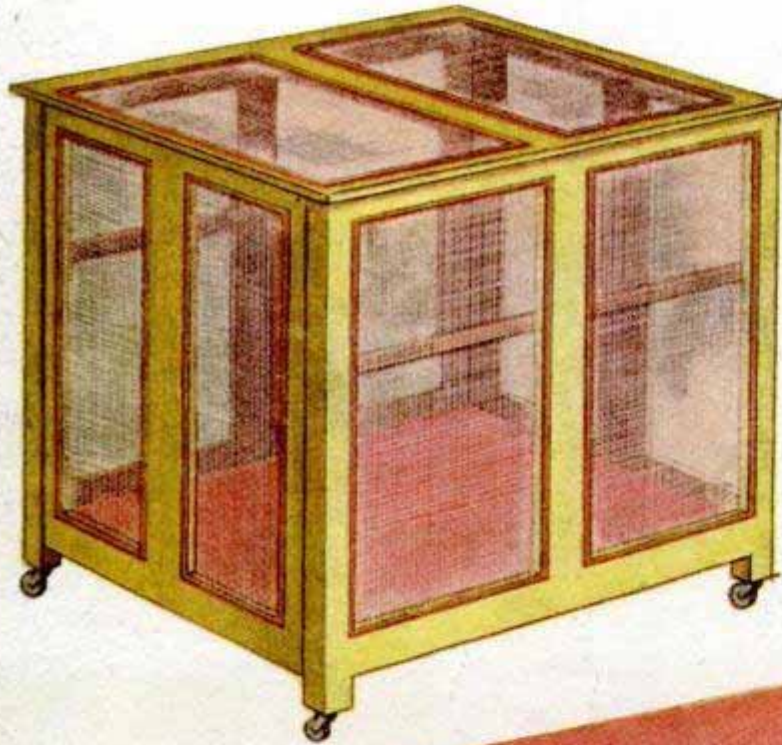
Featuring built-in design with a circus motif, this handsome 10-piece nursery set attains new heights in practical juvenile furniture



desk-toy cabinet and chair, followed in a few years by the youth bed with additional built-in drawer space. With the youth bed for the first baby, the complete nursery will handle a second addition to the family without even changing the arrangement of the room.

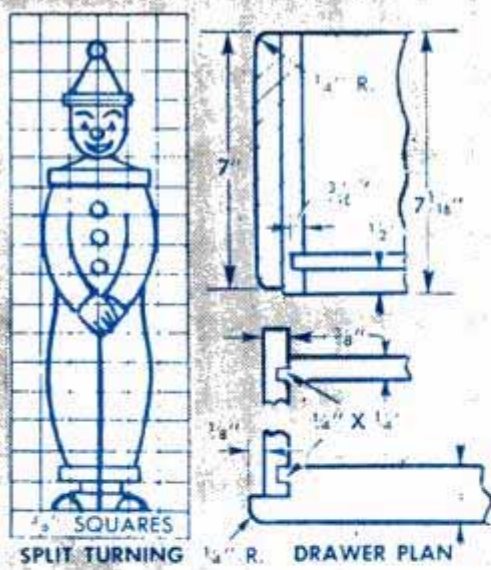
Both the crib and the collapsible playpen are completely enclosed with plastic screen wire to afford maximum protection. On warm summer days, the playpen can be set up on the porch or in the yard without fear of insect bites, the raised floor keeping baby well off the ground. The plastic-upholstered



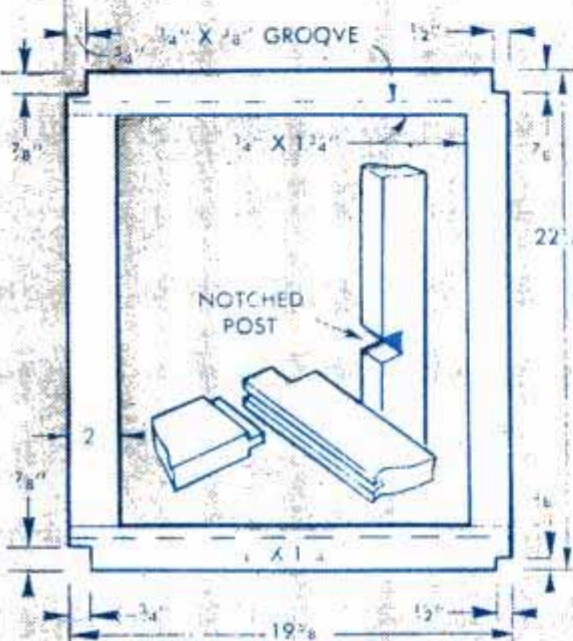
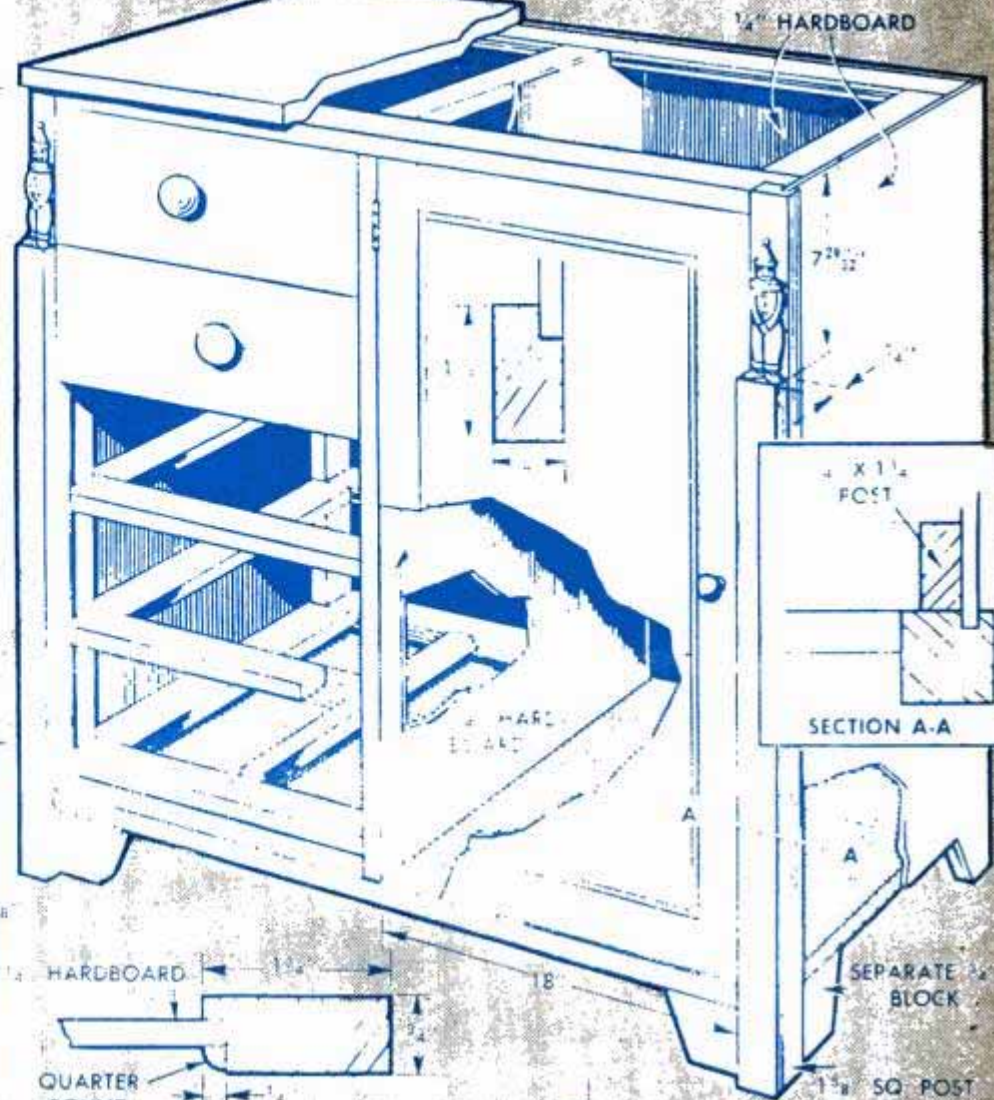


toy chest, the baby bath and the wardrobe chest are all decorated with lively decals and "carved" clowns made from split turnings. The fold-away desk is hinged to the toy cabinet. The jigsawed clown, which serves as the pedestal for the top, becomes an attractive frontpiece for the cabinet when the desk is closed. A modern splayed-leg chair forms a companion piece for the desk. The set of furniture is rounded out with the novel little drum lamp and a combination floor lamp-bench-costumer made to look like a pair of giraffes. The desk-toy cabinet and chair, toy chest, playpen

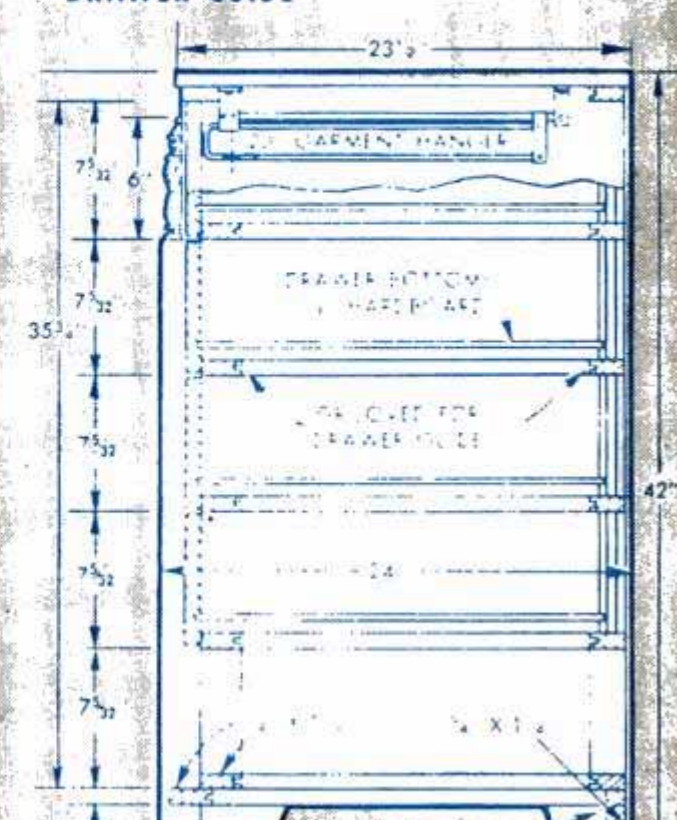
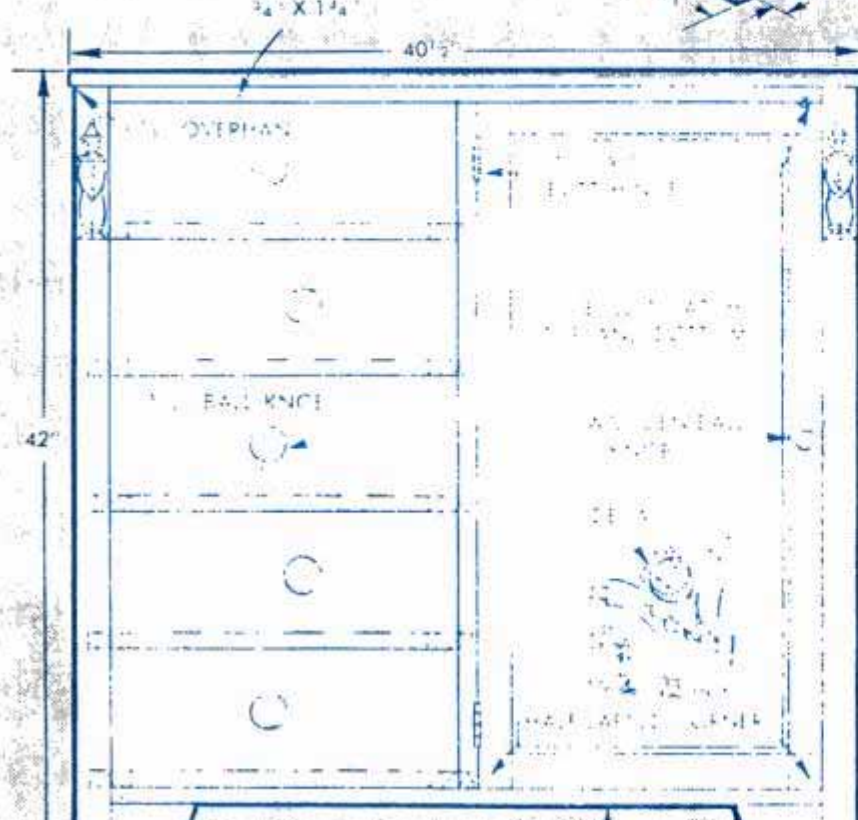
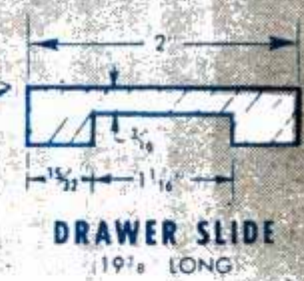
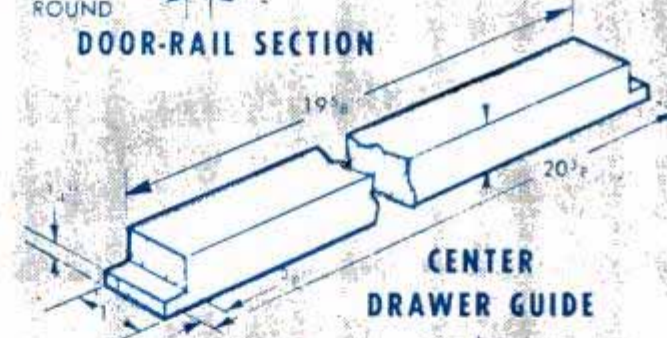
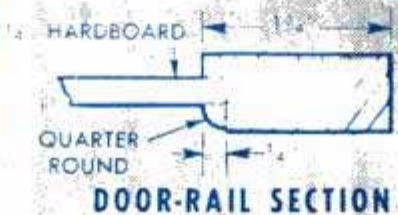


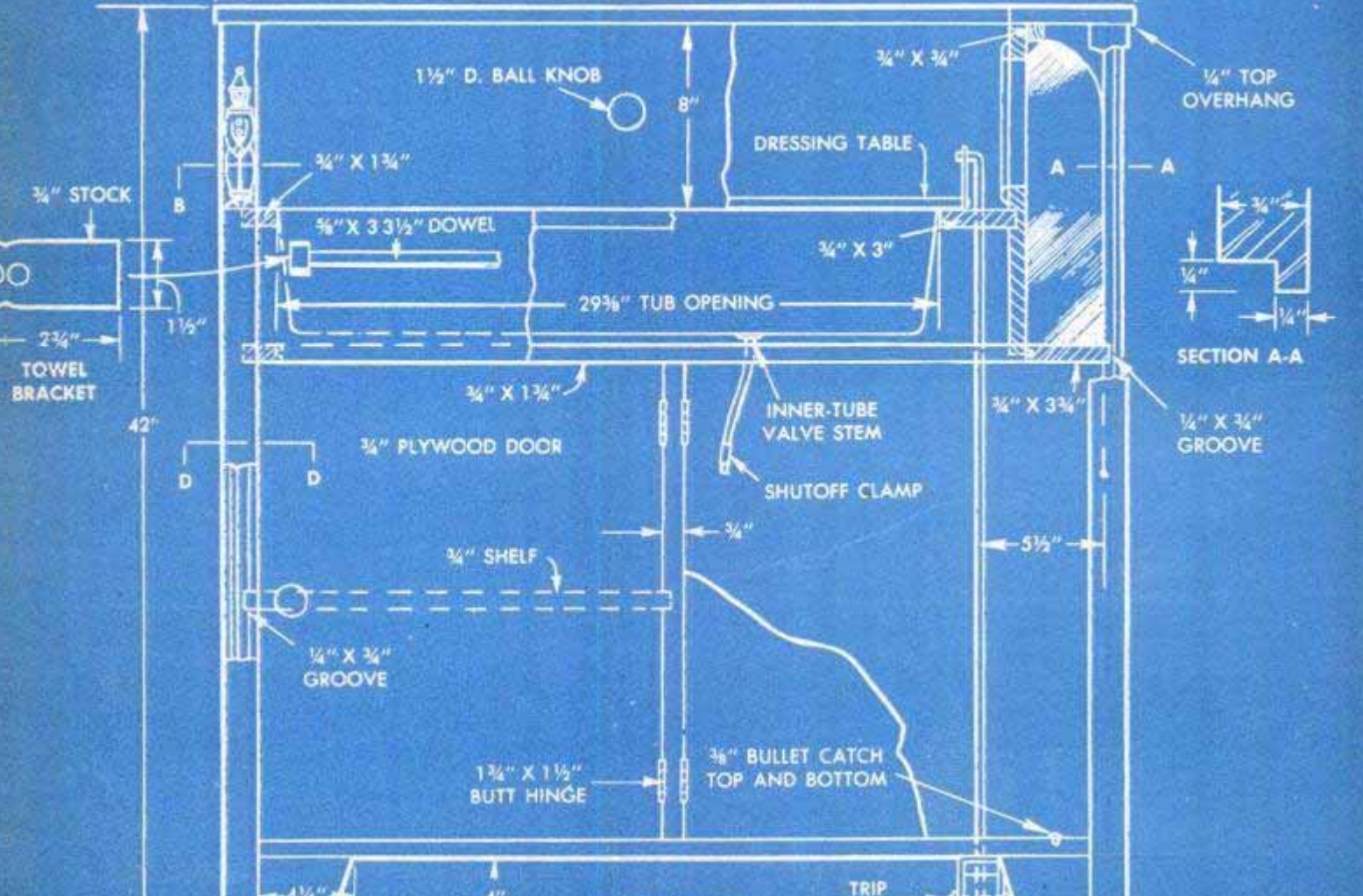
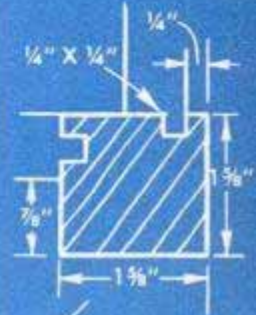
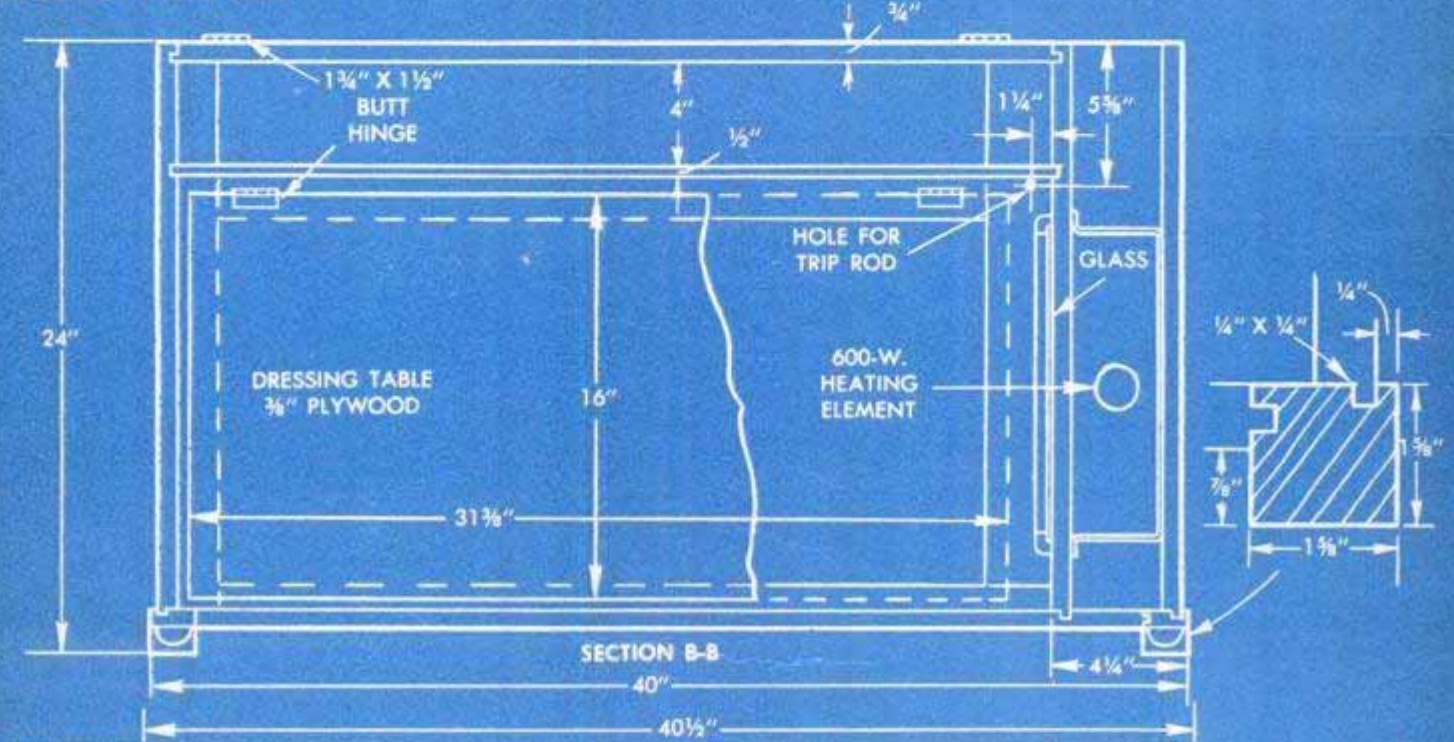
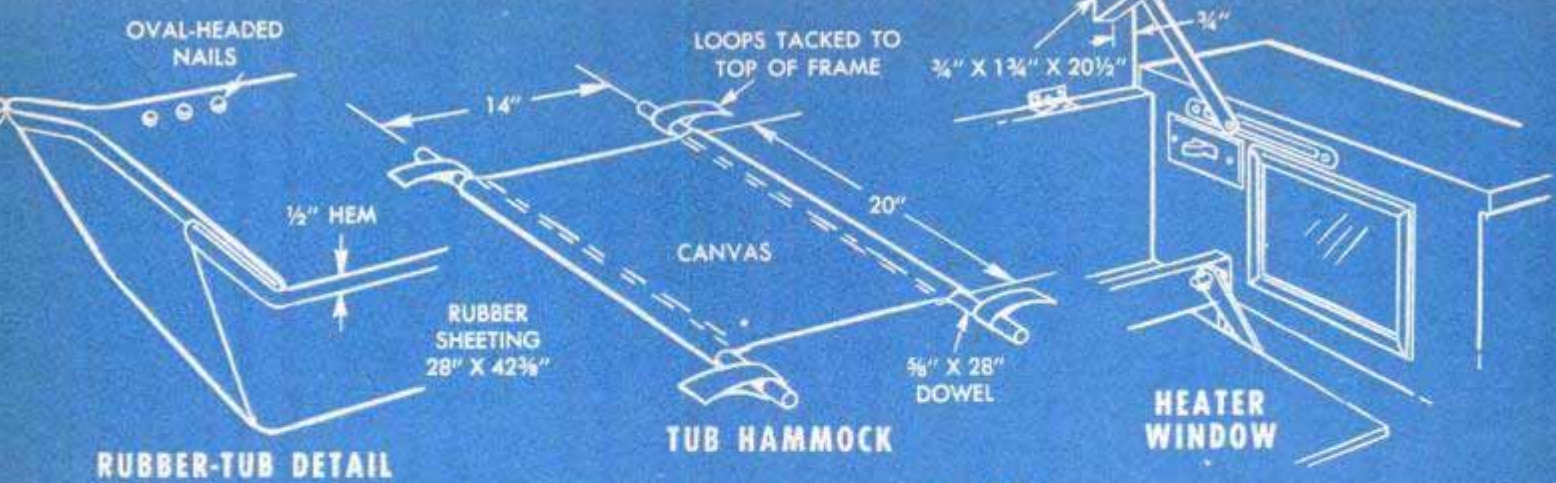


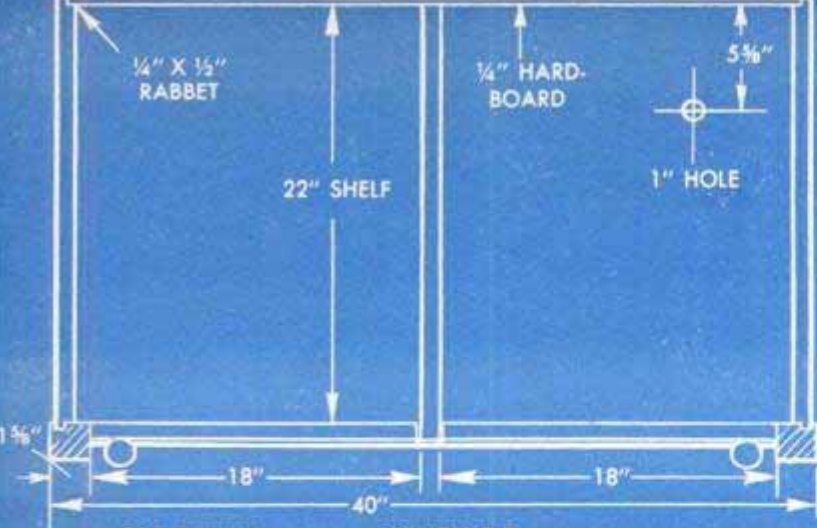
*Wardrobe chest*



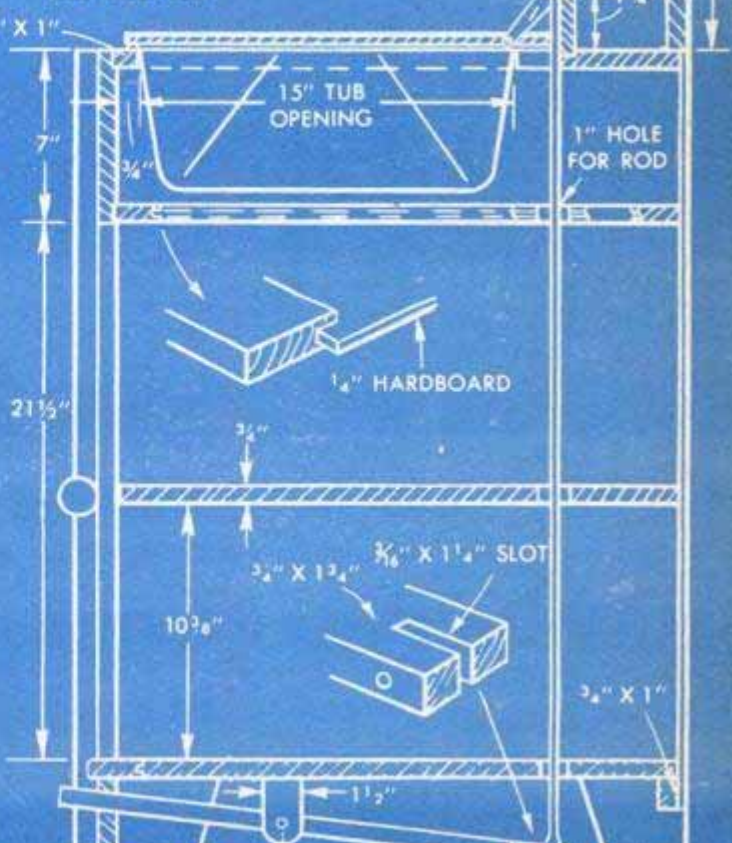
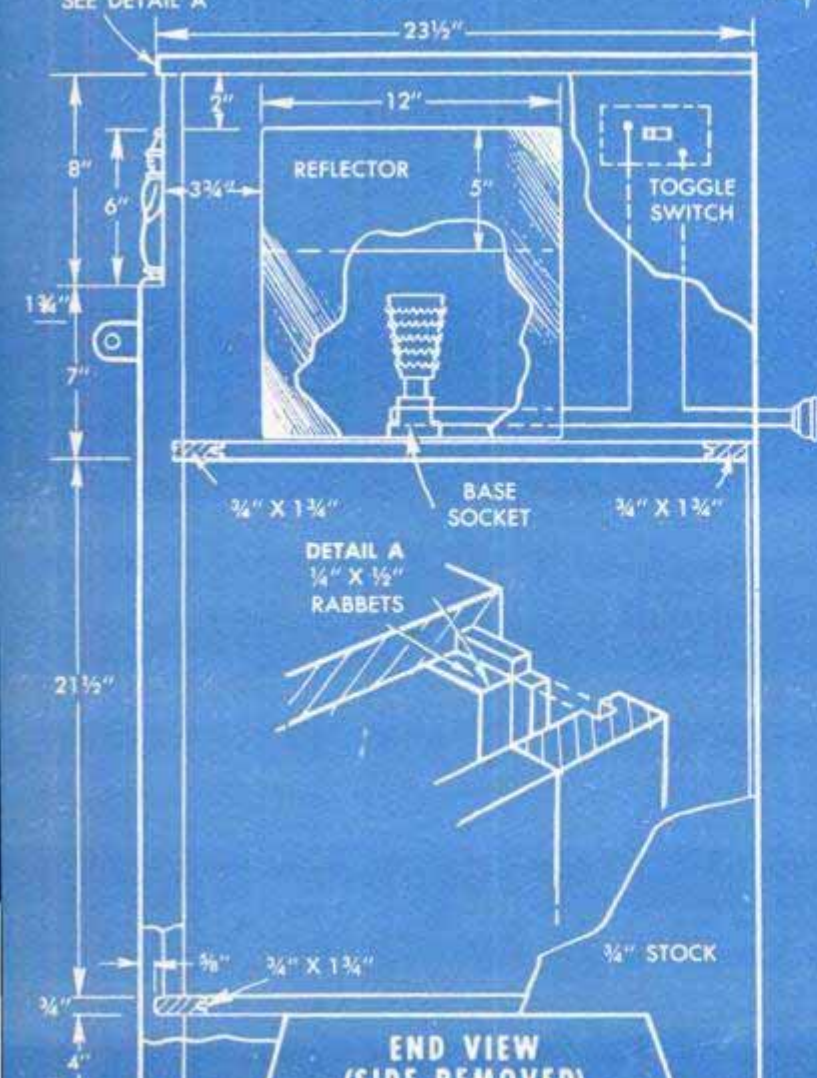
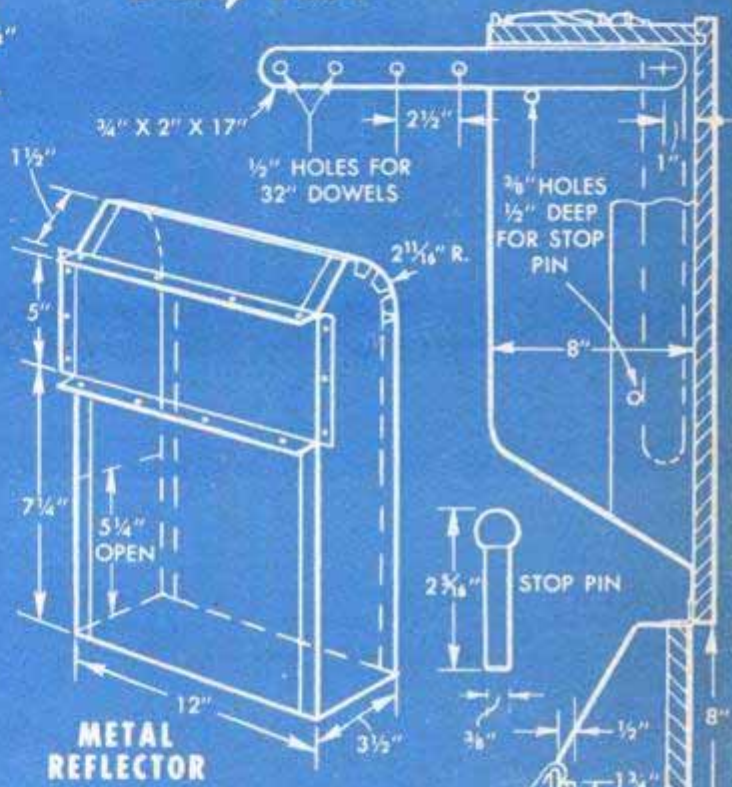
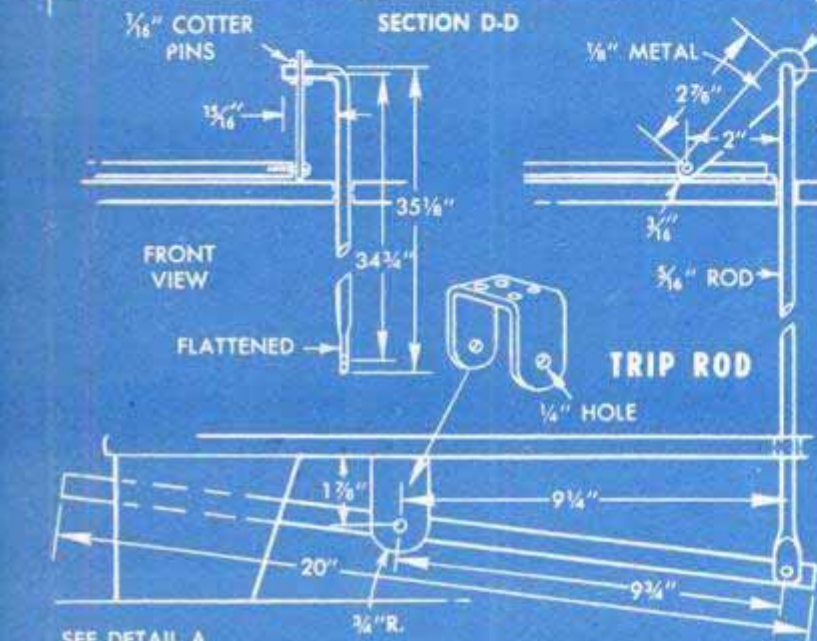
**DRAWER-RAIL FRAME**  
16 REQD.

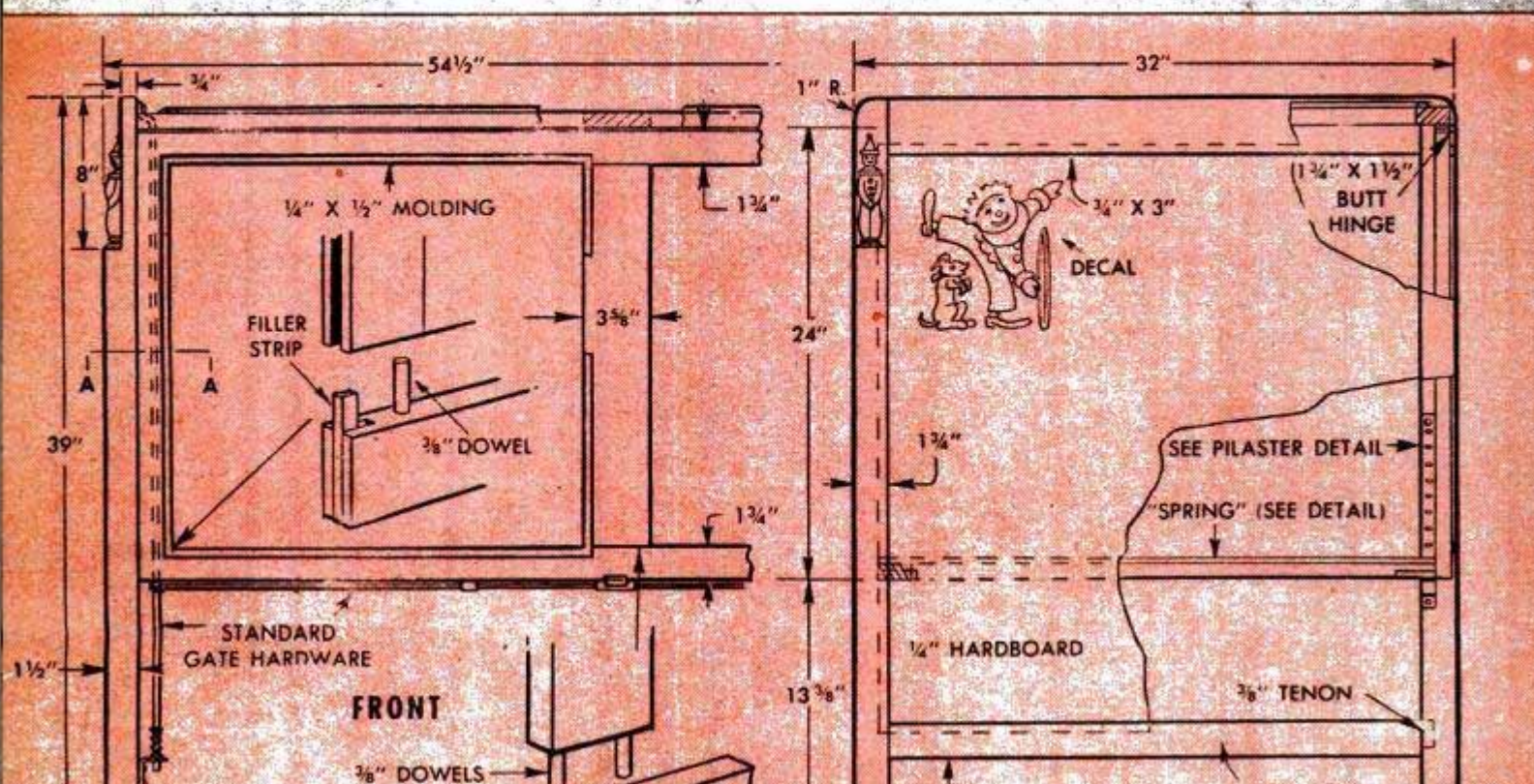
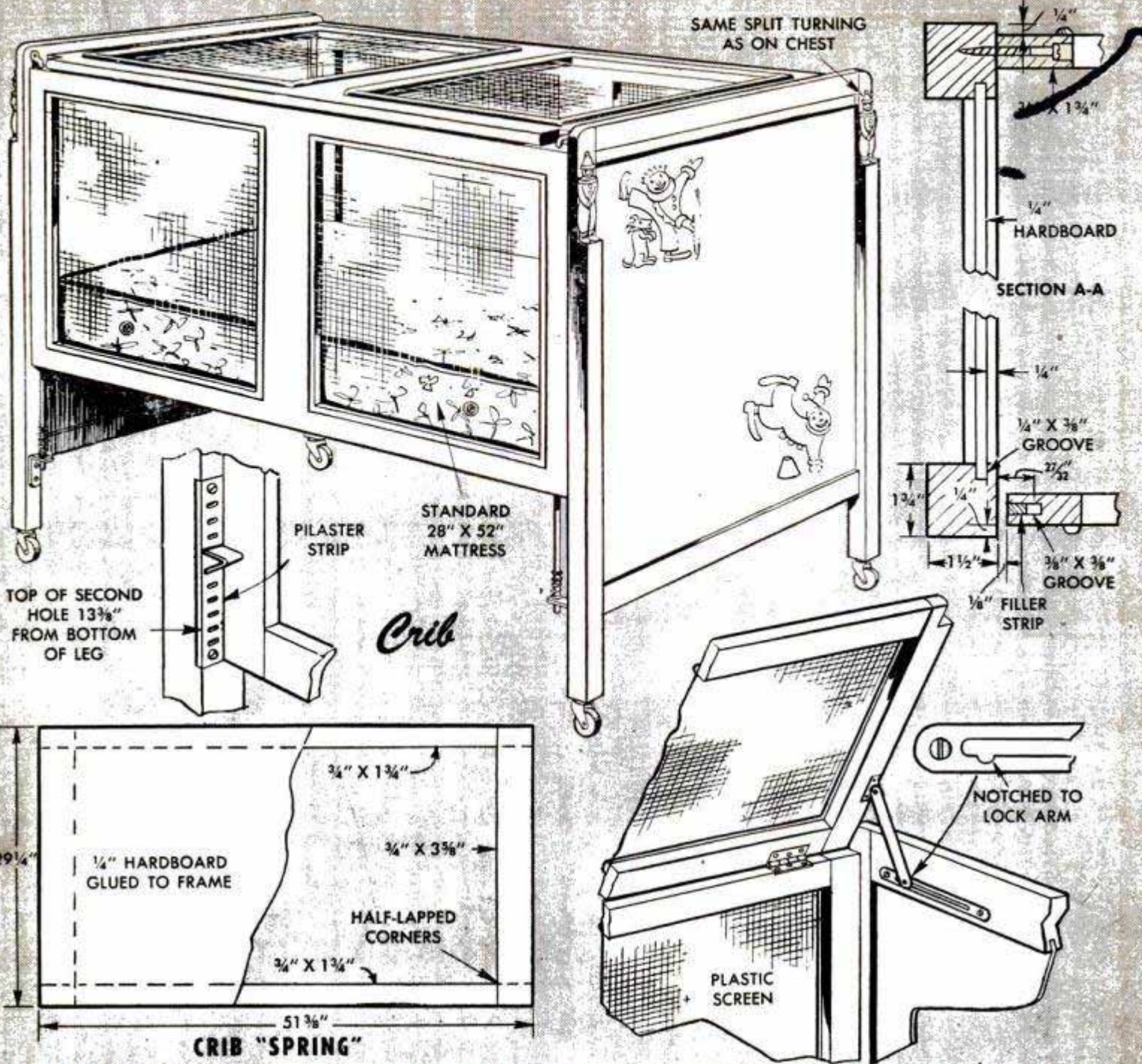






*Baby bath*



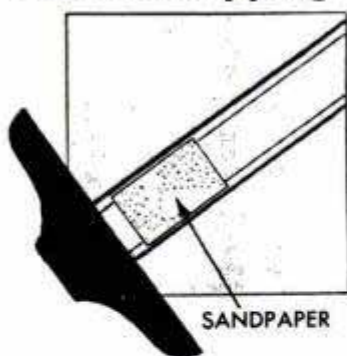


and drum lamp will be described in Part II, while the youth bed and the giraffe lamp-costumer will be detailed in Part III.

Construction of the pieces is evident from the details, pine frame members, 1/4-in.-hardboard panels and 3/4-in. plywood being used throughout. Hardwood is used for the drawer guides and slides. Note in the baby-bath details that the right-hand section of the cabinet houses an electric heating element. Heat from the coil is reflected against a glass panel at the foot of the bathtub. As the sheet-metal reflector will become quite hot, it is advisable to cement sheet asbestos to the outer surfaces of the reflector to insulate it from the wooden cabinet. A canvas tub hammock, stretched between dowels, is supported over the tub by canvas loops. A foot-operated trip lever is used to raise the plywood dressing table. A hardboard panel separates the tub from the diaper-storage compartment. Except for the ball-type door and drawer pulls, which are wood turnings, standard hardware is used throughout. If desired, stay arms for the bath and crib tops can be improvised from sheet steel as shown in the crib detail, and a crib "spring" can be made by gluing a hardboard panel to a wooden frame. A pilaster strip of the type used for adjustable shelves is mounted on each post of the crib to allow the mattress and spring to be raised or lowered for convenience in handling the baby. Finish all the furniture with nontoxic paints and be sure to use plastic rather than copper screen wire on the crib and playpen.

(To be continued)

## Abrasive Strip on T-Square Prevents Slipping

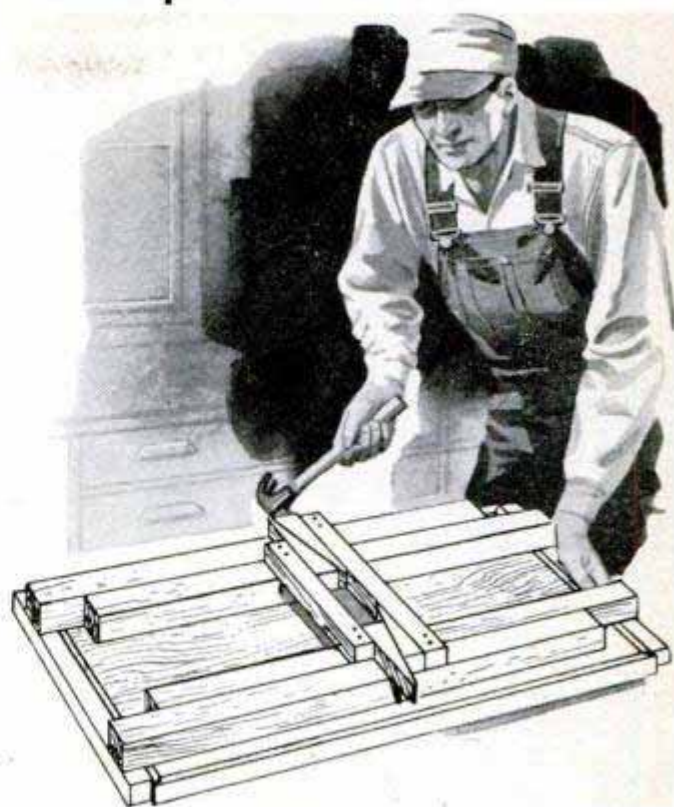


Anyone who has considerable use for a T-square in his work will find this kink very helpful. It consists of merely cementing a strip of fine sandpaper to the underside of the square, just below the head as shown. The paper should be applied with the sanded surface outward. In use, the abrasive surface helps prevent the square from slipping on the drawing board. You will find that it will require considerably less pressure, or gripping, to keep your square in position.

Benj. Nielsen, Aurora, Neb.

☞ To remove onion odor from your hands, rub them thoroughly with dry mustard and then wash with soap and water.

## Molding Clamped to Edge Grain With Improved Fixture



Recently I wanted to edge-glue molding to the ends of a plywood table top to cover the laminations. But not having any bar clamps, I was at a loss for a means of clamping the strips in place. To solve the problem, I built this wooden clamping fixture, consisting of two U-shaped units, one being made to slide inside the other. It is fitted with jaws of 1 x 2-in. stock, which overhang the edges of the table top, and a pair of cleats. Clamping pressure is brought to bear against the molding by merely driving four wedges between the cleats at the center of the fixture. I spaced the cleats to allow for the thickness of the molding plus about one half the width of the wedges, so that a positive wedging action would be had. As only a light clamping pressure was required to hold the strips, the cleats were simply nailed in place, making it easy to shift them to suit work of various sizes. While I used pieces of 1 x 2 and 2 x 2-in. stock, the fixture can be made of any available stock.—Evan Wright, Topeka, Kans.

## Oilcan Doubles as Glue Applicator

The usual trouble involved in applying glue in deep holes and grooves can be avoided by means of an ordinary oilcan. Warmed glue is poured into the can and applied to the work through the spout in the same manner as oil. Between applications, the can should be kept in a pan of hot water in order to keep the glue workable. The can should be washed out with hot water immediately after each gluing job, with particular care being taken to clean the spout.

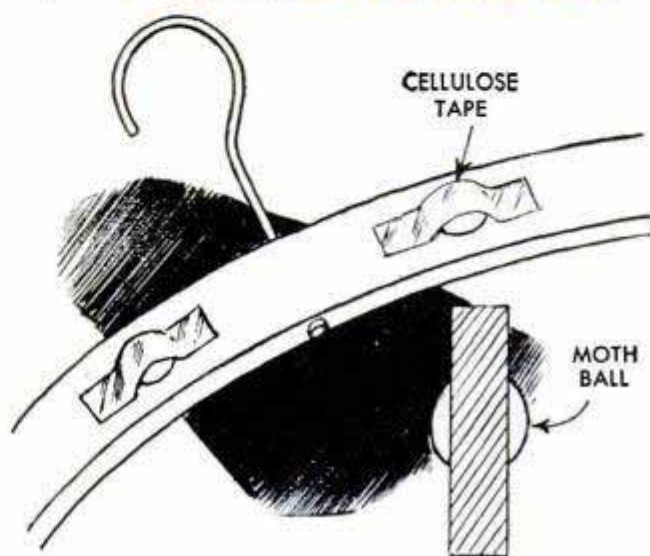


**PICNIC SUGAR** is kept dry and is easily dispensed if it is carried in a cardboard container of the type in which table salt is packaged. Folding metal spout on top of container permits pouring sugar without spilling

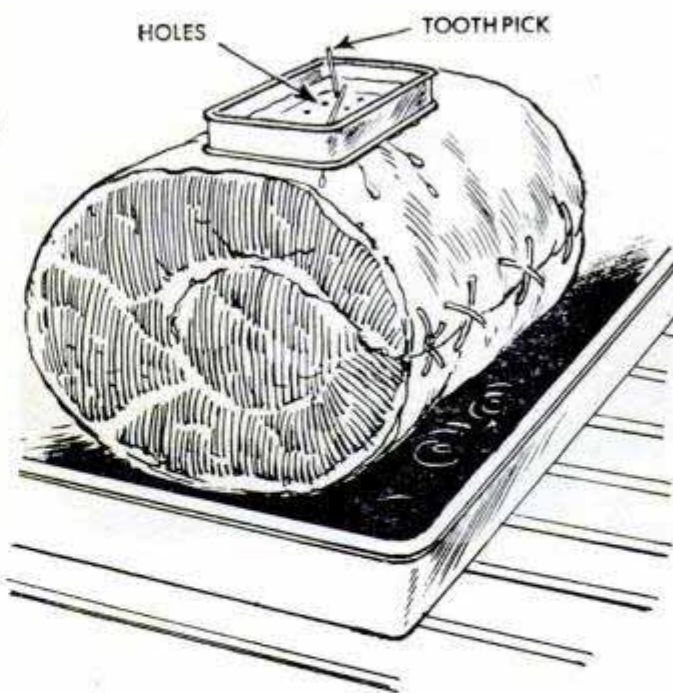
**NET BAGS**, in which potatoes, onions or oranges are sold, are just the thing for storing children's bath toys. Bag can be hung from a clothesline or bathroom hook where it is out of the way, and toys will air-dry quickly



# Solving HOME PROBLEMS



**MOTH BALLS** will stay right with a wooden coat hanger if they are pressed in two or three holes drilled near the top of the hanger. Hold moth balls in place with strips of tape so they will not fall from holes when their size decreases



**AUTOMATIC MEAT BASTER** is improvised from empty sardine can. Several holes punched in bottom of the can allow meat juices to trickle slowly over the roast. It may be necessary to anchor the can to the roast with a couple of toothpicks





**WRISTWATCH HOLDER** for desk or bedside table is had by placing the watch in a cellulose-tape dispenser. Insert the watch between the sides of the dispenser, as shown above, and adjust to the angle at which the face is most readily seen

**GILT PICTURE FRAMES** can be cleaned quickly by "painting" with a half-and-half mixture of household ammonia and alcohol. After 15 to 20 min., brush with water and stand frame on edge to dry. Don't use solution on gold-leaf frames



**IRONING TIME** is shortened by placing a sheet of aluminum foil over ironing-board pad. As top of garment is ironed, foil smooths out wrinkles on underside, thus eliminating need for ironing both sides

**TO REPLACE** a Venetian-blind cord, just tape the new cord to the end of the old one. In this way, the cord can be pulled through the holes in the slats and over the pulleys as the old cord is removed

**APPLYING DDT** solution to screens can be done without getting the chemical on your hands. Fill bottle with the insecticide, and press a piece of sponge in the neck of the bottle to serve as an applicator

**PROTECT DRESSING-TABLE** top from spilled perfume and cologne by placing a sheet of aluminum foil under dresser scarf. Foil keeps spilled liquids from soaking through to finish and simplifies wiping them up

**USE A SUN LAMP** to "bleach" the darkened areas from scorched fabric. Moisten the damaged portion with water and hold under lamp until fabric regains normal appearance. Repeat moistening if necessary

**WORN PORTIONS** of linoleum can be renewed by painting to form a simulated throw rug. Cover a rectangular area with base color of linoleum to conceal worn spots and finish with a dark-colored border

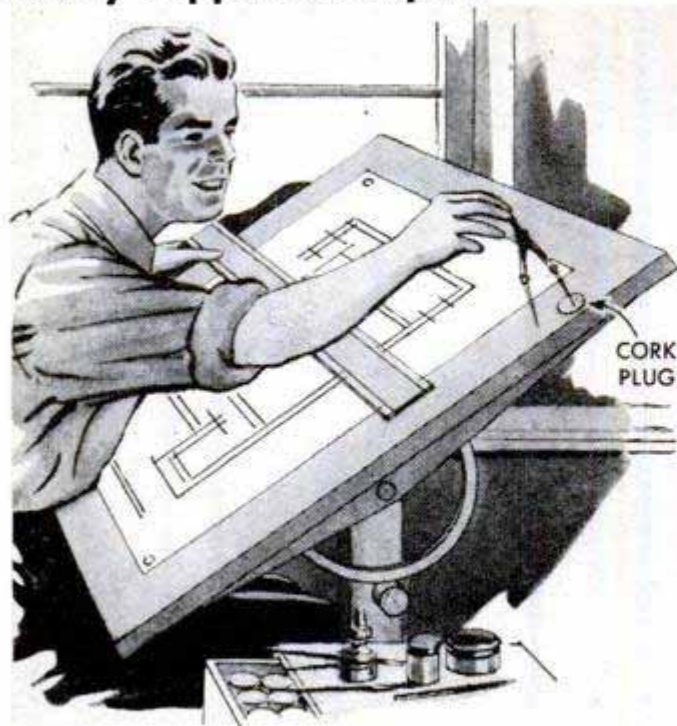
**CORNSTARCH** removes grease spots from clothing. Make a paste by mixing starch and cleaning fluid, spread thickly over spot, feathering the edges, and allow to dry. Then brush off with clean, soft cloth

**WHEN HANGING CURTAINS** or draperies, cover end of curtain rod with a finger cut from worn rubber glove. The rubber guard will prevent the end of the rod from snagging and possibly tearing the material

**CLEANING VENETIAN BLINDS** with a soft chamois results in a fast, lint-free job. The chamois should be soaked in a solution of household detergent and warm water, and wrung nearly dry before using

**A NEW POWDER PUFF** provides an excellent "brush" for applying plastic-base linoleum varnish. The puff will spread the varnish smoothly, or can be used to pat the surface for attaining a matte finish

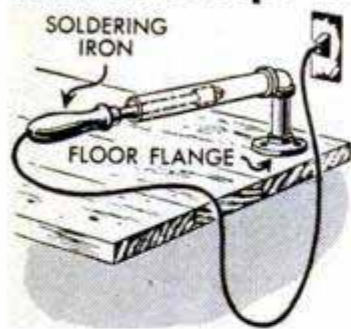
## Cork Insert in Drawing Board Safely Supports Compass



Although a compass used at a drafting, or drawing, table can be kept readily at hand by sticking it upright in the board, such a practice usually results in roughening the surface of the board and often bending the point of the compass. However, by boring a hole in the drawing board and plugging it with an ordinary cork, a place can be provided in which a compass can be stuck and held without danger of damage either to the board or the compass.

G. E. Hendrickson, Argyle, Wis.

## Soldering-Iron Heat Conserved With Steel-Pipe Holder



A soldering-iron holder made from pipe and fittings will retain the heat of the iron while holding it safely above the top of the workbench. A short nipple is screwed loosely into a floor flange

so that a length of pipe, connected to the nipple with an elbow, may be swung out of the way when not in use. The pipe should be just large enough to receive the tip of the soldering iron.

## Electric Motors Started Manually

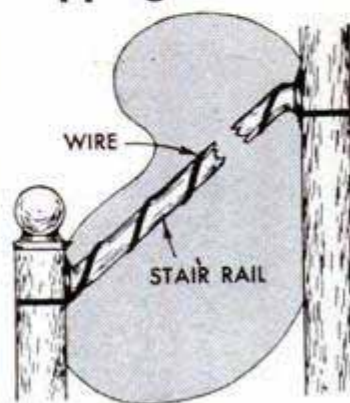
Even though the starting winding of a repulsion-induction motor has burned out, the motor still can be used if it is started by spinning the shaft manually and turning on the switch while the shaft is rotating.

A motor in this condition often can be purchased at a considerable saving, and is satisfactory for driving a disk sander, grinder or other tool which allows the shaft to be spun by hand. The motor will run in the direction in which the shaft is rotated. It is best to mount a switch on or near the motor so it can be turned on quickly. However, the switch should not be turned on until the shaft is rotating.

Alfred D. Beavin, Fair Haven, Vt.

## Stair Rail Made Slideproof By Spiral Wire Wrapping

Wrapping outside stair rails with lengths of wire will discourage children from the dangerous practice of sliding down such rails. Ordinary stovepipe wire or baling wire is wrapped spirally around the entire length of the rail, allowing 3 or 4 inches between the turns. The wire is then fastened to the posts at both ends of the rail.

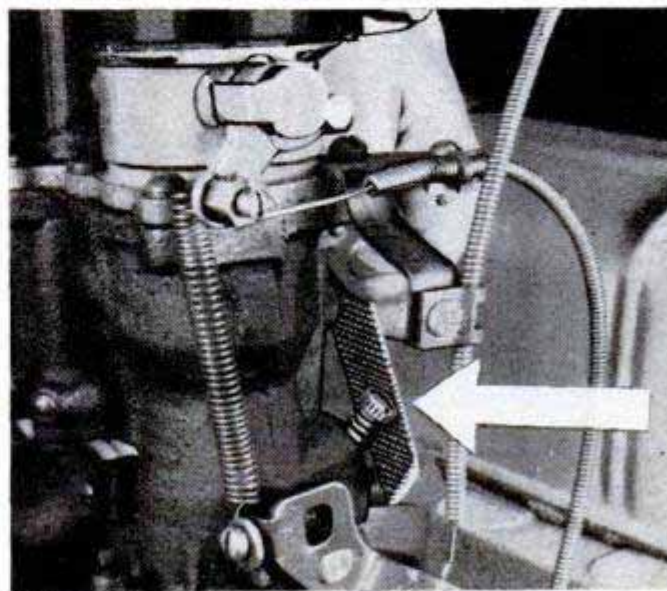


Harry Wandrus, Milwaukee, Wis.

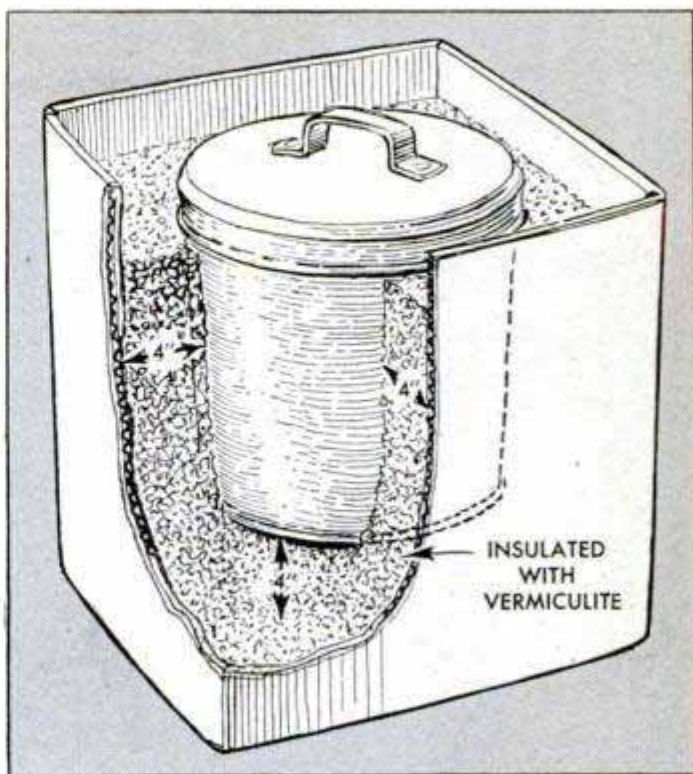
## File Aids Adjusting Carburetor On Engine Too Hot to Handle

Surrounded by hot surfaces as well as a maze of control wires and rods, the adjusting screw of a carburetor is not always easy to reach. This is especially true on some power lawn mowers. However, a coarse file, held against the knurl of the adjusting screw and used in the manner of a rack and pinion, can be used to get the job done without burning the fingers.

Ed Packer, Chicago.



# Fish Kept Fresh in This Homemade Cold Box

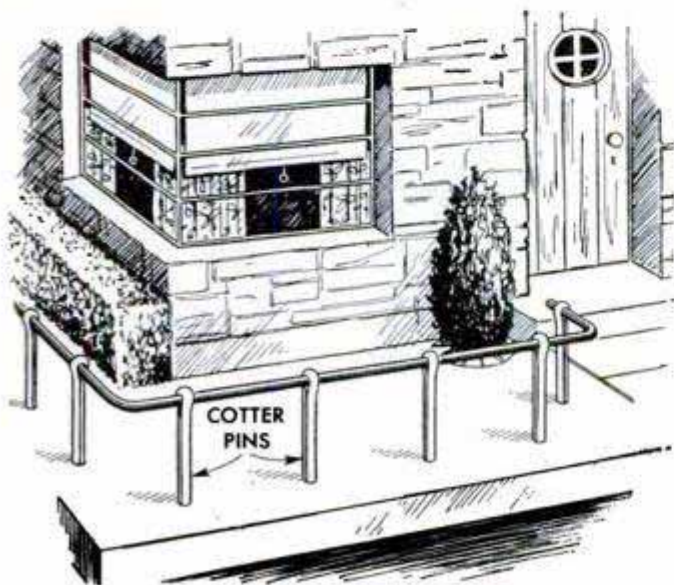


Here's something to remember when you go on your next fishing trip. According to the Zonolite Company, processors of Vermiculite, a mica-like insulation, newly caught fish will keep fresh for three days when packed in ice and stored in a box filled with this insulating material. Just pack the fish in a covered container with ice chips or cubes. Then pour Vermiculite into a cardboard box to a depth of about 4 in., set the container in the center and pour the insulating material into the area around it. Vermiculite will maintain a

freezing temperature for at least three full days. You also can accomplish the same thing by using Dry-Ice instead of natural or artificial ice. Wrap Dry-Ice in a cloth folded once or twice and place the bundle in the bottom of the container. Then pack the fish in the container with moss or other similar material and insulate in the same way. Use a box that will fit in your car trunk in case you wish to transport the catch. *Caution:* Do not handle Dry-Ice with bare hands and be careful not to inhale the fumes when ventilation is poor.

## Railings for Model Buildings From Cotter Pins and Solder

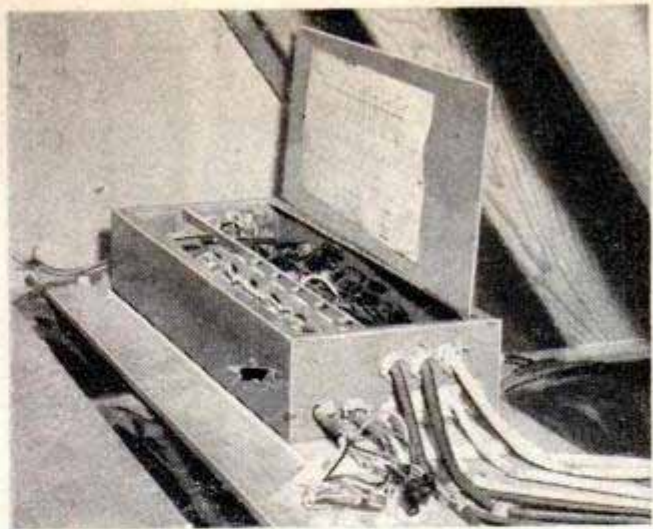
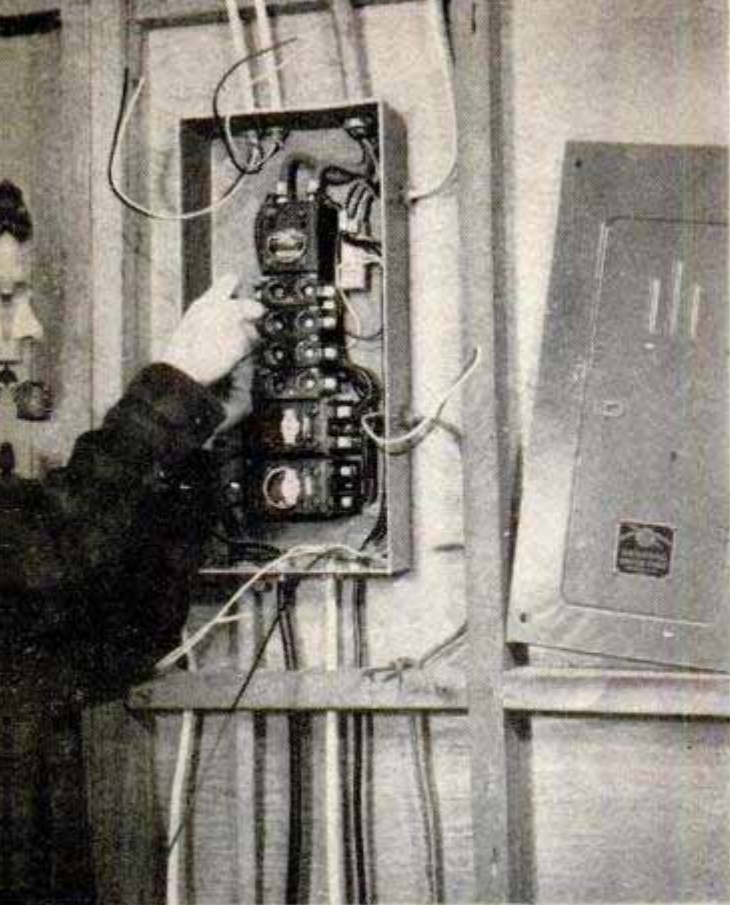
When making railings for use around model-railroad stations and for other model work where true scale is not important, cotter pins and wire solder are ideal for



the job. The cotter pins are used for the posts and the solder is used for the railing itself. Holes drilled in the base, which supports the railings, take the cotter pins. In assembling, spring the cotter pins before putting them into the holes so that they will fit tightly. The solder should be bent and inserted through the heads of the pins before the latter are put in place. However, if you have fairly long runs of posts in a straight line, the solder can be inserted after the posts have been put into position.

## Helpful Hints on Varnishing

Before starting to varnish floors or woodwork, be sure there is no dust either on the wood or in the air. It is best to do the job when the furnace is not in operation. Varnish should be applied with smooth, light strokes and plenty of time should be allowed for it to dry.



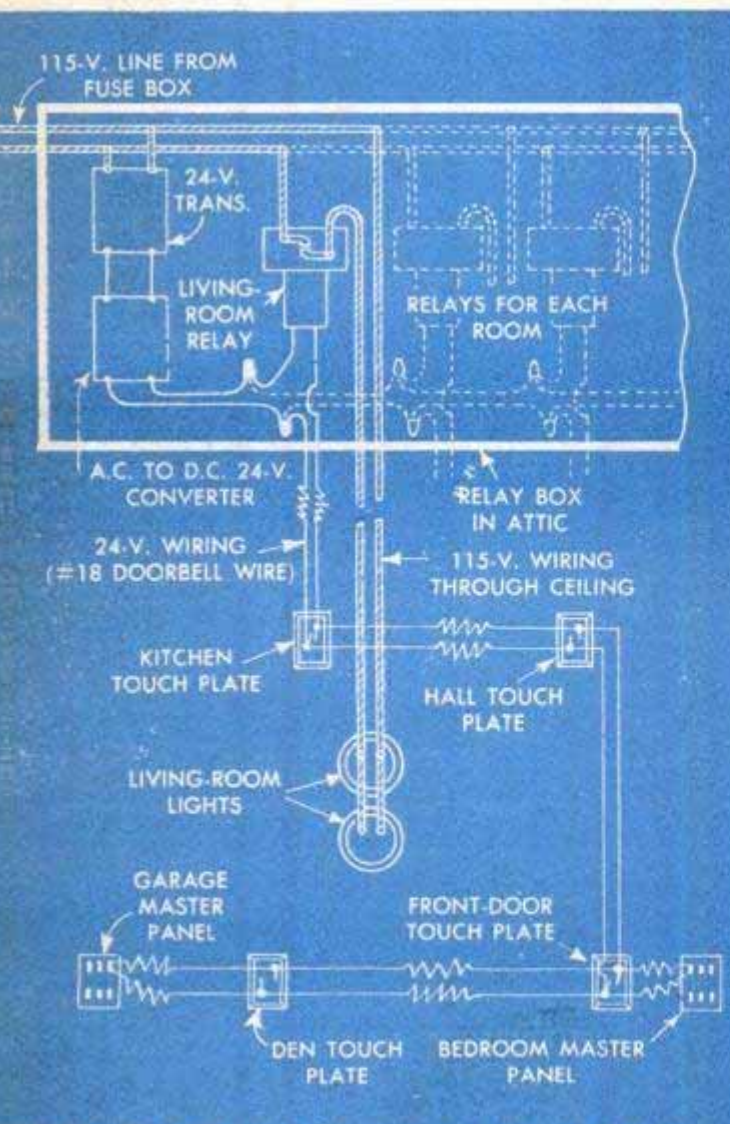
The box which houses the relays used in low-voltage wiring system is located in a central spot in the attic where it is easily accessible. Control box can be purchased assembled or you can wire it yourself

## How I Built

### PART III

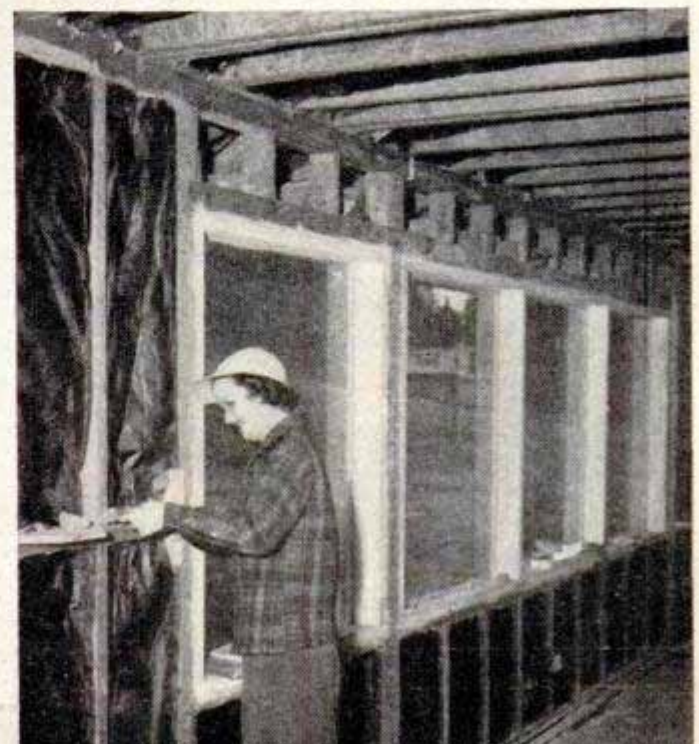
By Tom Riley

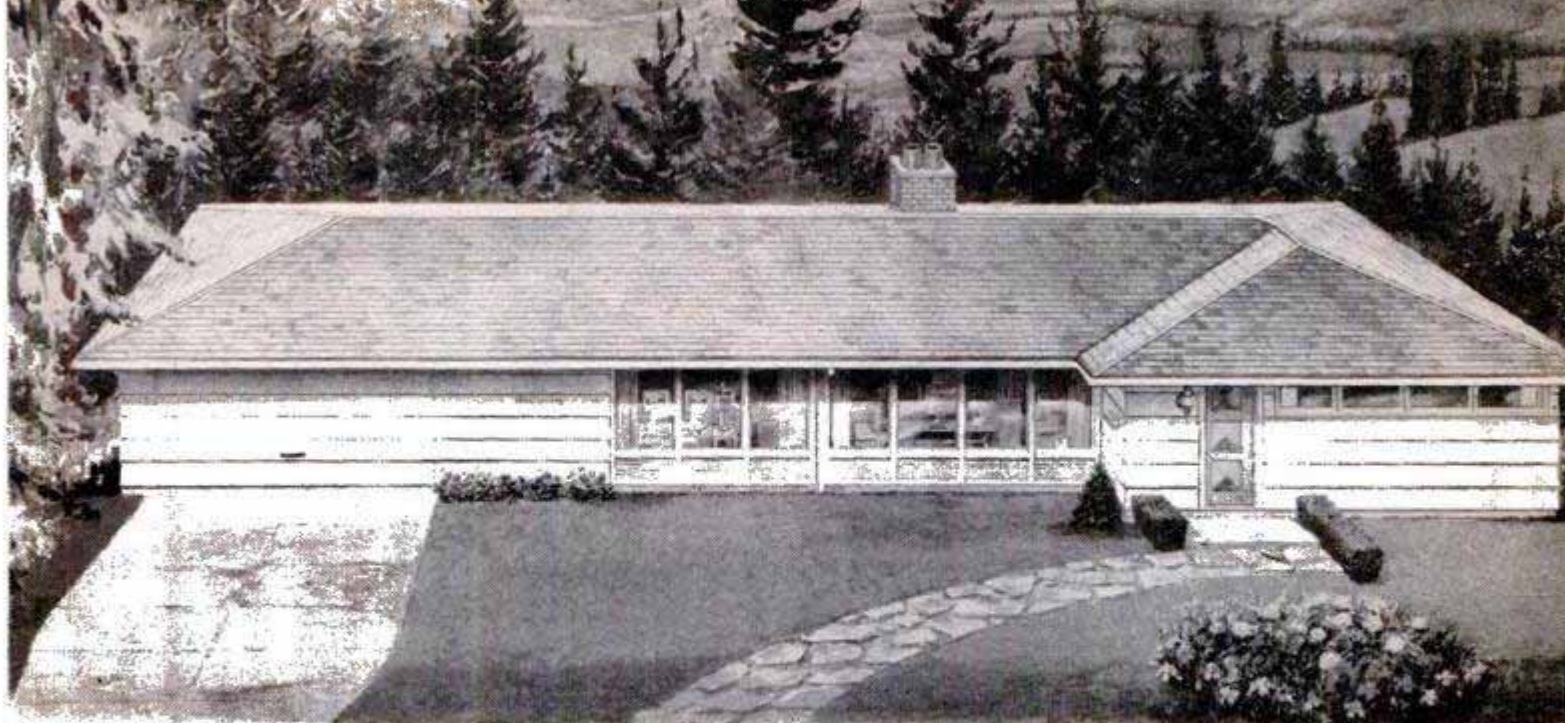
I used a new-type service-entrance box which has three "pull outs" and eight ordinary fuses to handle the electric range, automatic washer, clothes drier, dishwasher, etc. The diagram below shows a typical wiring example of low-voltage, touch-plate system



WITH MY ranch house fully enclosed and the heating and plumbing installed, as described last month, I next tackled the wiring. If your local building code authorizes installation of the new touch-plate or low-voltage system, I highly recommend using it. Not only is it far less

Using a stapler, which we rented, Vinita found that installing blanket insulation actually was fun, and one of the jobs that she could easily take over completely

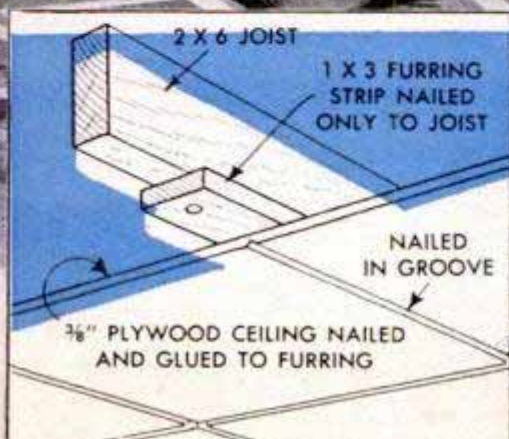
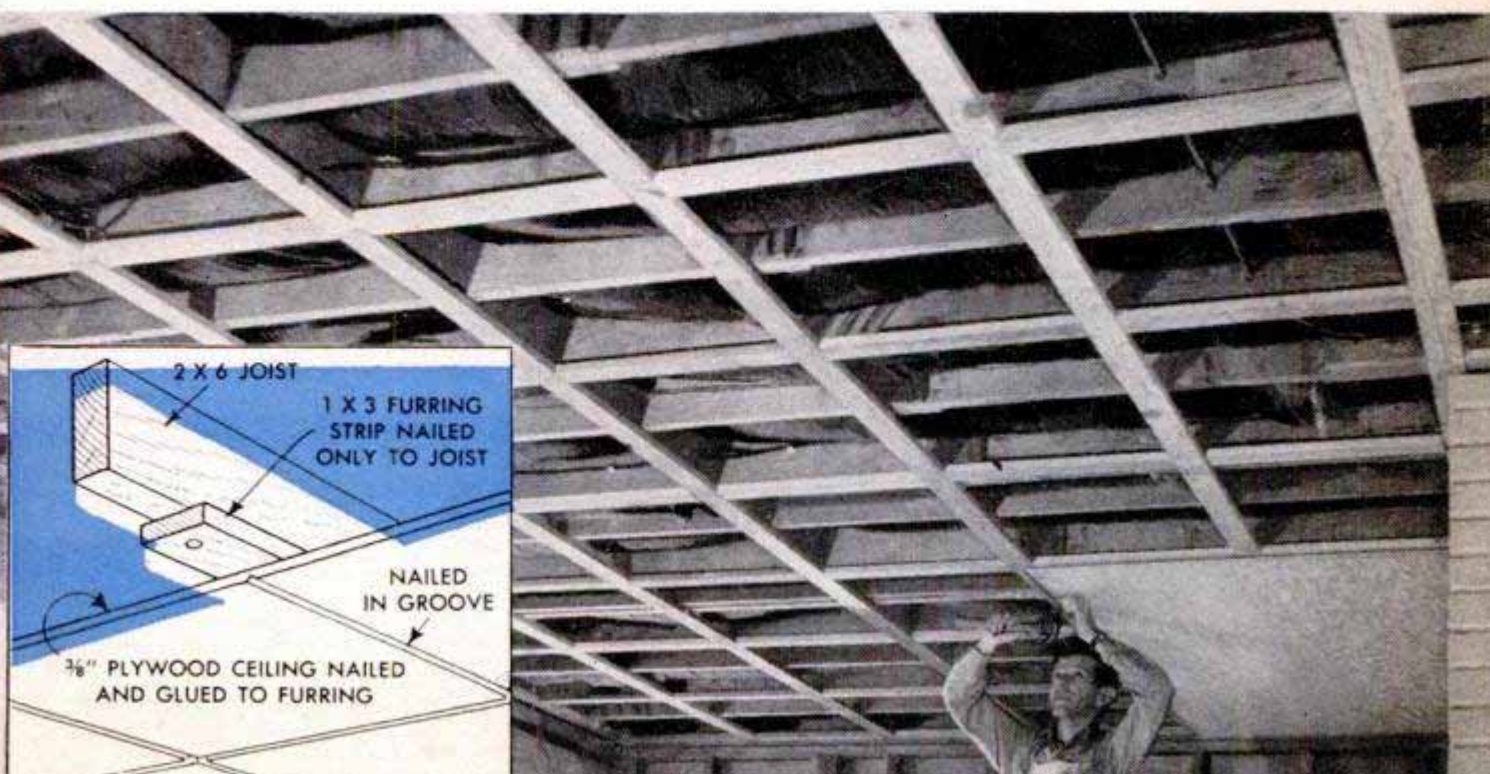
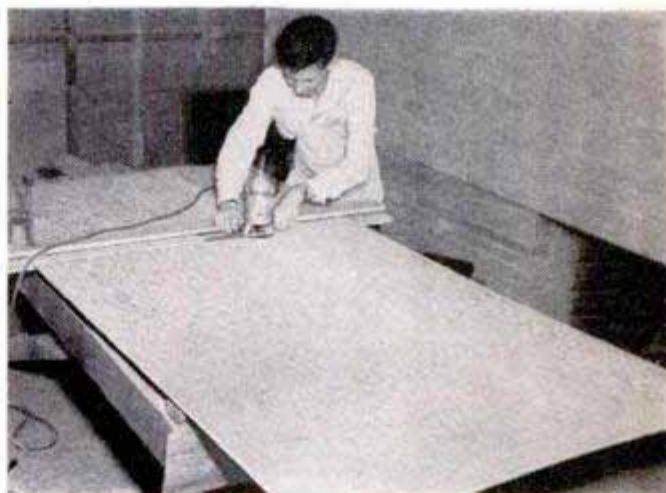




# *the* **POPULAR MECHANICS** *Ranch House*

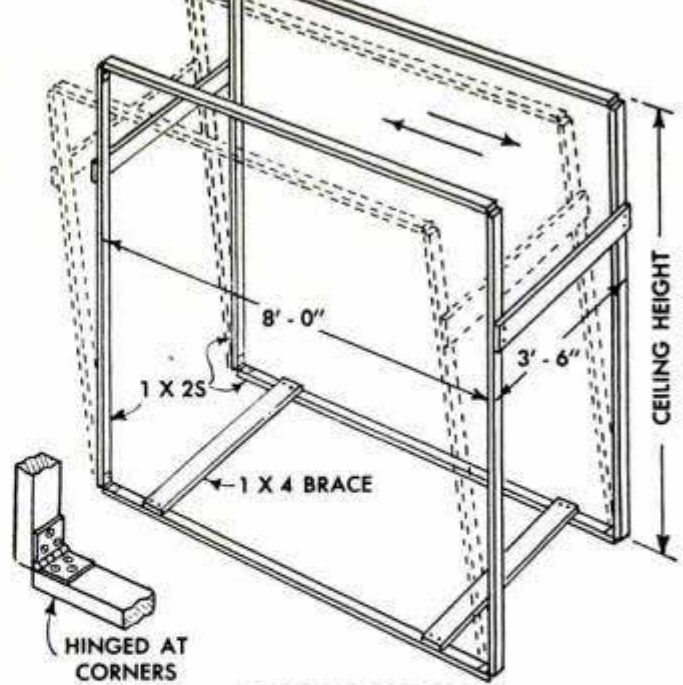
expensive than the common 115-volt a.c. system, but it is made to order for the amateur electrician. The touch-plate system is the modern way of switching the lights in your home by means of relays which are housed in a metal box in the attic. One relay is provided for each room and the touch plates are merely push-button switches, a type similar to your doorbell button. Briefly, to wire the low-voltage system, you run ordinary 115-volt wiring to all base and

Right, the work of "tiling" the plywood for the ceilings went fast with a portable router. Below, furring strips nailed to the joists carry the plywood sheets

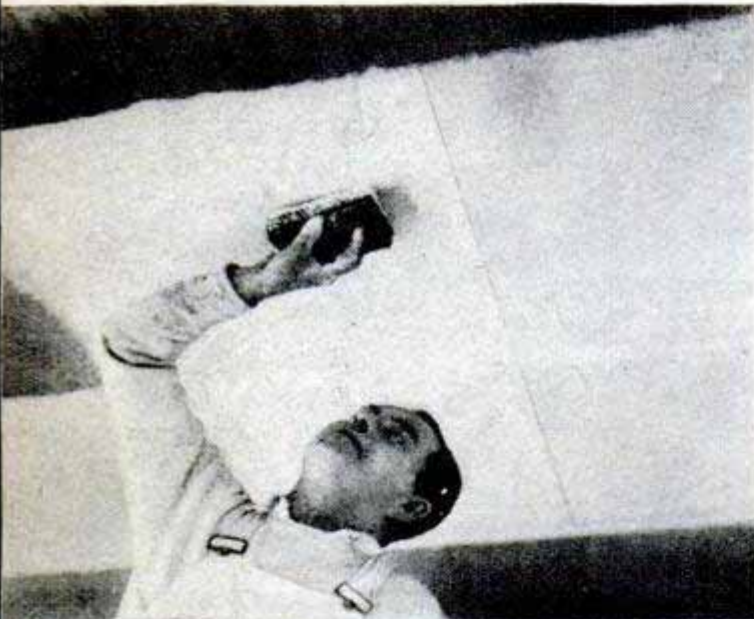




Norman Chapman, my helper, found that a ceiling horse to support the plywood let him concentrate on nailing. Detail at the right shows how to make one



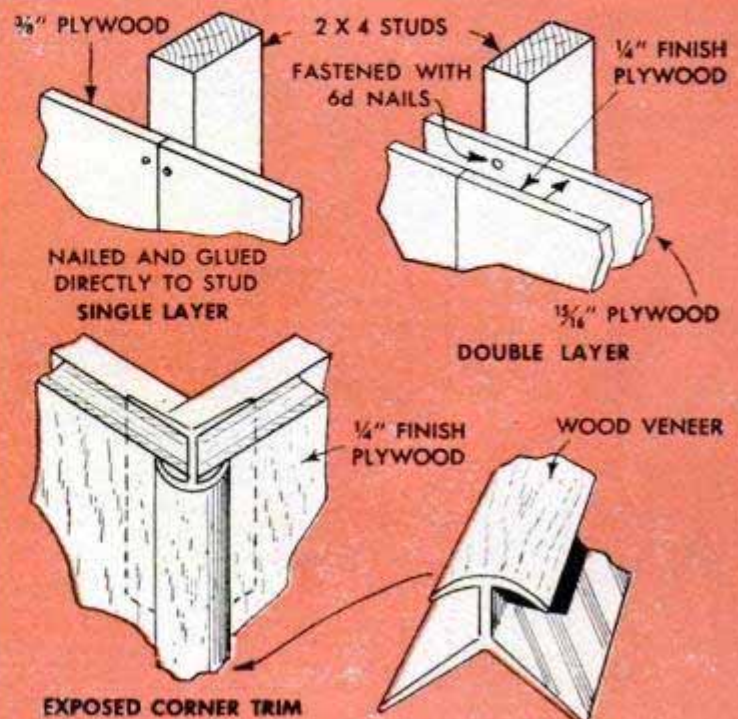
**CEILING HORSE**

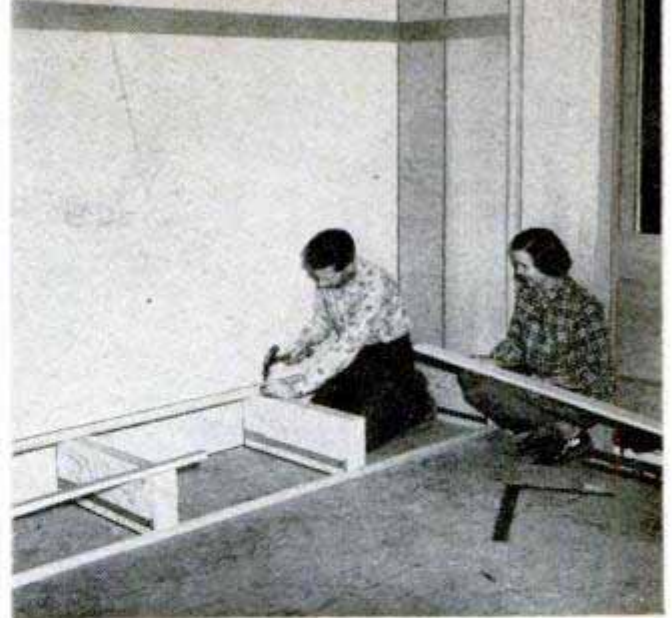
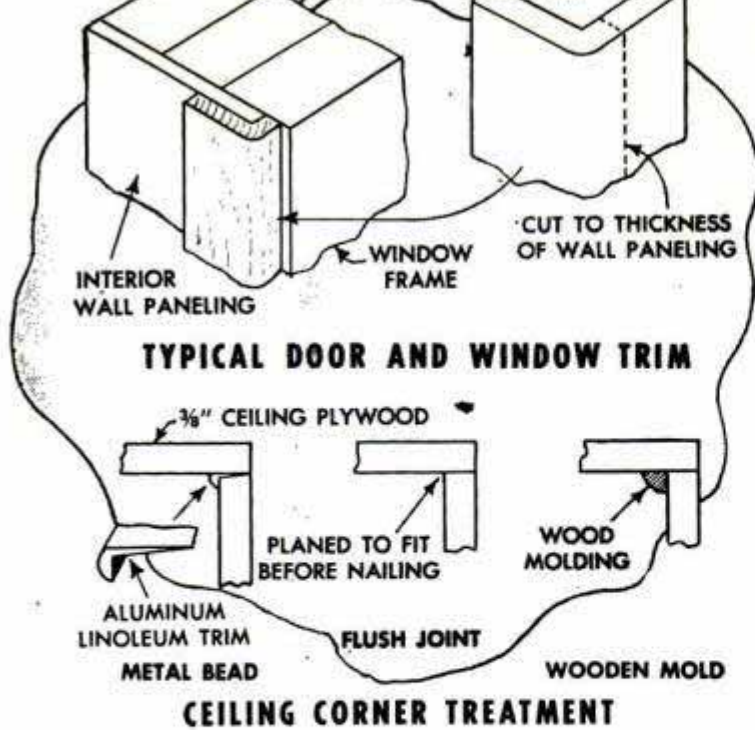


Above, the ceilings were finished with a thick coat of texture paint, stippled with a flat sponge. Below, walnut-faced plywood on one wall of the living room gives pleasing contrast to vertical-grain fir paneling



ceiling outlets in the usual way. However, from the ceiling outlets to the wall switches light bell wire is used, requiring only two wires instead of three or four-wire cables as in ordinary wiring. Thus, you can see what a saving is had by eliminating long runs of armored cable or conduit as well as the extra cost of metal switch boxes. In addition, there's a safety factor that makes the low-voltage system especially desirable in the bathroom and laundry. With only 24 volts at the switch, the chance of getting a shock is remote. A double touch plate at the entrance to each room permits you to light your way from one room to another by merely touching both buttons, which simultaneously turns on the light ahead and turns off the one behind you. Limited magazine space does not permit explaining the wiring in detail but it will be fully explained in the book that I am preparing.



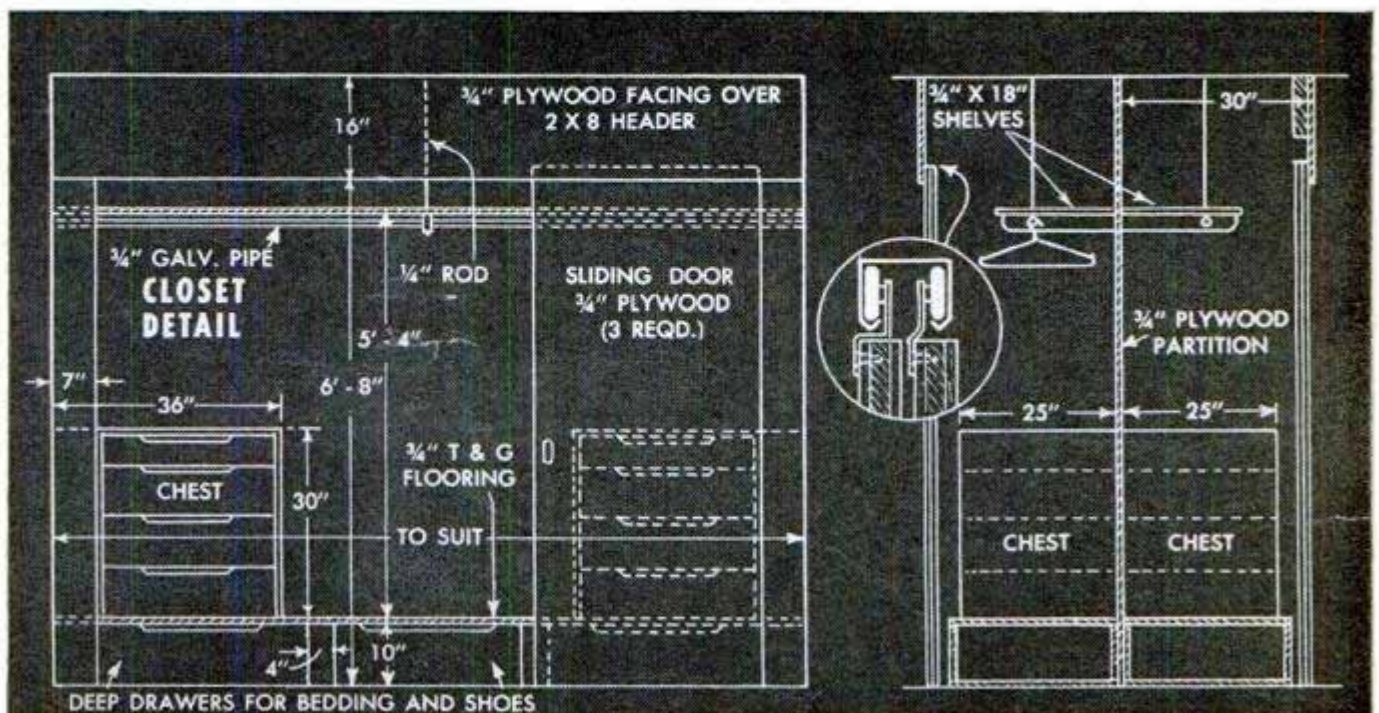


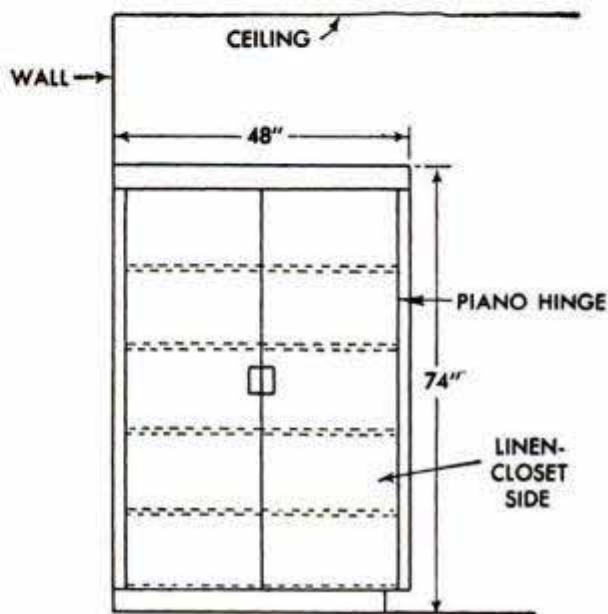
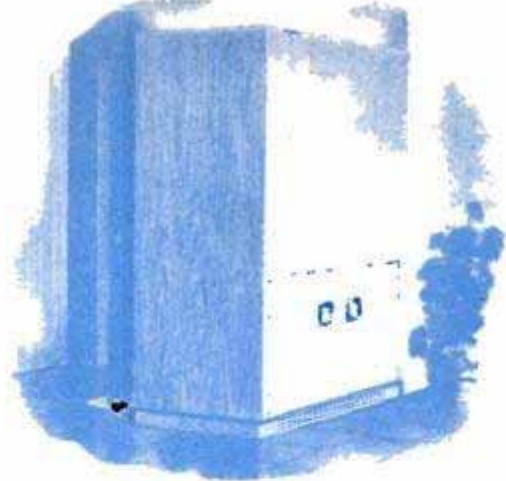
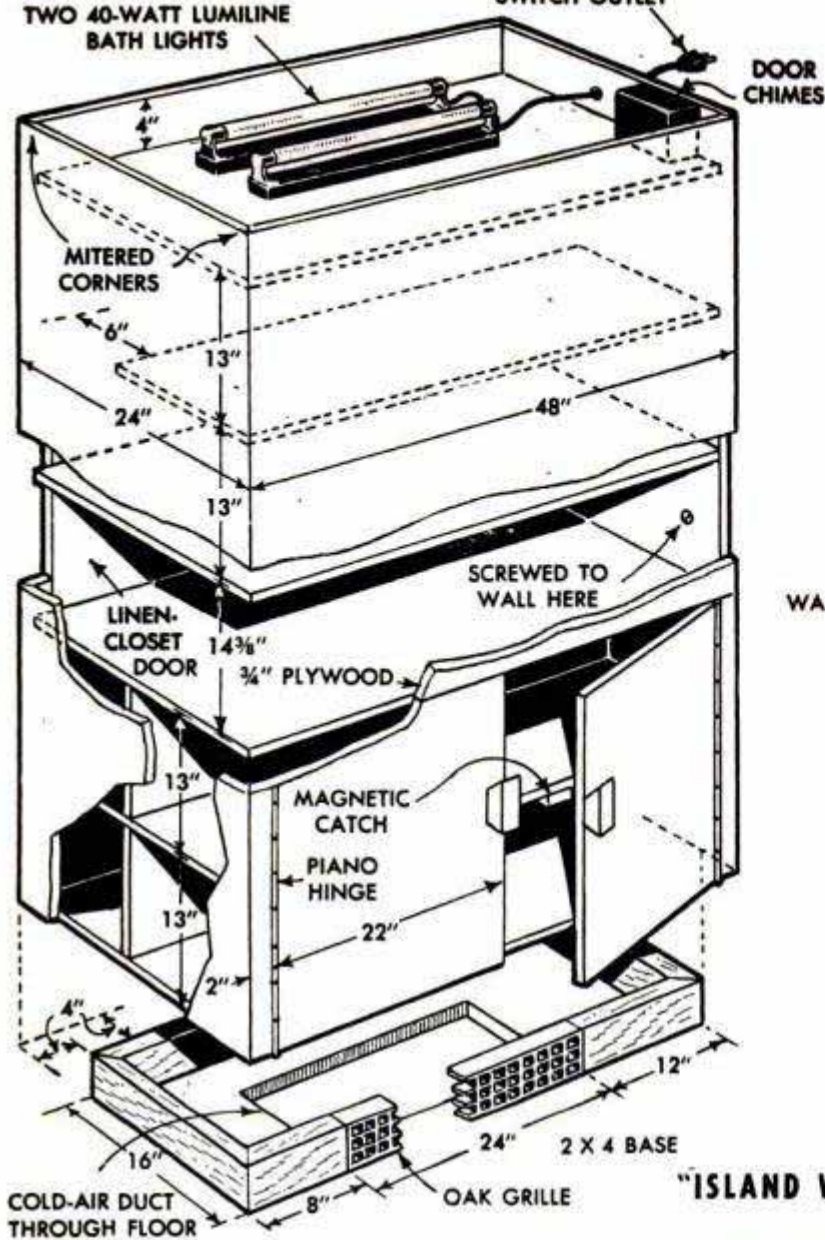
Here I'm starting the framework for the built-in wardrobe closets which divide the two bedrooms. Two chests plus three drawers provide spacious storage

With the wiring in place, I was ready to begin paneling the ceilings with plywood. While there are many ways of treating them, I followed architect Whelan's suggestion of installing a "quiet" ceiling in which ordinary 4 x 8-ft. sheets of 3/8-in.-thick fir plywood are scored in a 24 x 32-in. tile pattern. Clamping a straightedge to the work permitted cutting the shallow "mortar" grooves with a portable electric router. However, they also can be cut on a bench saw. To attach the sheets, I first nailed 1 x 3-in. furring strips to the ceiling joists, both crosswise and lengthwise, following the same 24 x 32-in. tile spacing. Then I coated the furring strips for each panel with casein glue, raised the sheets in place with the aid of a homemade "horse," and nailed through the grooves in the plywood and into the furring. Thus, when completed, the ceiling becomes one solid panel of glued plywood, with little

chance of the joints opening, as any possible contraction in the house framing takes place between the furring strips and the joists. The ceilings were finished with a thick coat of texture paint. This was applied to one panel at a time and immediately stippled with a flat cellulose sponge, after which a matchstick was used to clean out the mortar grooves. The result looks like a plastered job.

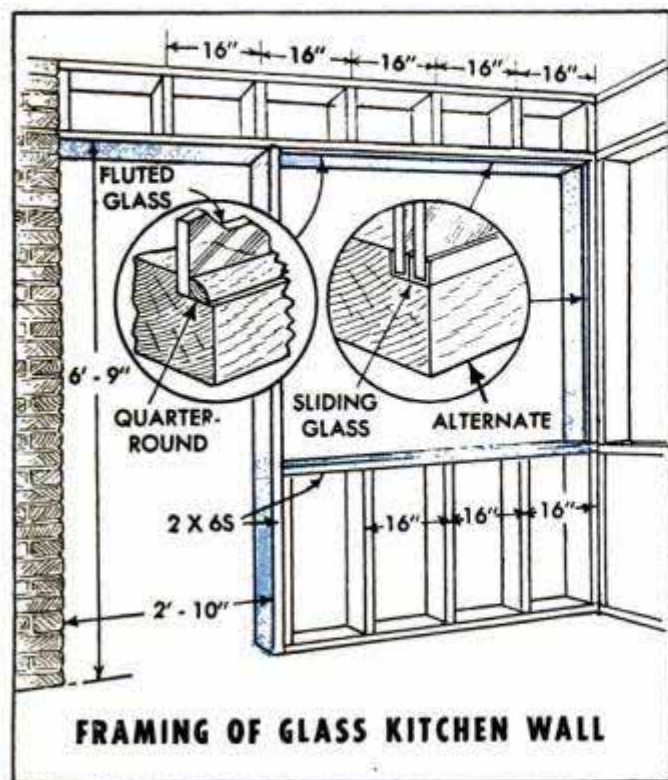
Although the interior walls can be treated in a number of ways and with a variety of different materials, I used plywood throughout. In covering the walls of the living room, bath and kitchen, I used the double-layer method, first nailing 5/16-in. unsanded sheathing plywood (Plyscord) to the studs and then gluing and nailing a finish layer of 1/4-in. plywood to the sub-layer. Besides providing an exceptionally strong wall, this method is an economical





**"ISLAND WALL" LINEN CLOSET**

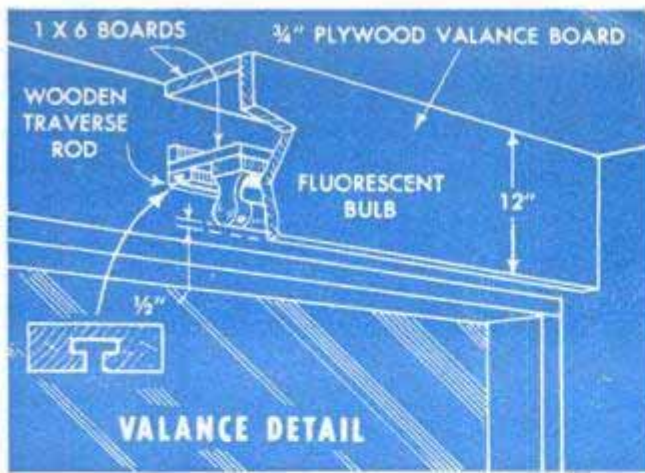
This drawing shows how the island-wall linen closet is built of plywood. Note that front side provides miscellaneous storage and recessed top hides indirect lighting fixture. Cabinet sets over a cold-air duct



one as well because only a 1/4-in. thickness of the more expensive plywoods is needed. In the bathroom and kitchen I used vertical-grain fir plywood for the facing layer as it provides a smooth, excellent painting surface. Architect Whelan suggested paneling one wall of the living room with walnut plywood, finished natural, to contrast with the walls of vertical-grain fir, stained a warm brown. As the bedroom walls were to be papered with grass cloth, only one layer of plywood was used, this being common 3/8-in. fir glued and nailed directly to the studs. After setting the nailheads, Vinita filled them as well as the joints with Swedish putty. I selected a new embossed-type plywood, called Plyweave, for three walls of the den. This attractive plywood is produced by rolling ordinary fir plywood under heat and pressure to give a wavy leather-like texture. I finished these walls with a gray glazing paint, while facing the remaining wall of common 3/8-in. fir plywood with 1/16-in. cork tile glued in place. Common 3/8-in. plywood was used in the utility room and painted.

With the walls completed, I next went to work building the wardrobe closets which form the wall between the bedrooms, the





One of the final steps is the dual-purpose valance boards over the large windows in the living room and dining area. Here, Vinita gives me a hand in nailing the shelf which supports fluorescent bulbs



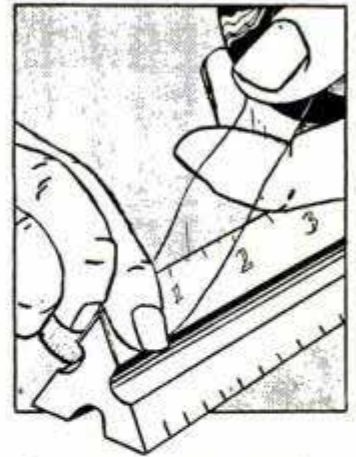
island linen cabinet and the glass partition between the kitchen-dining area. Then I concentrated on the cabinets for the kitchen. I used standard metal drawer units and simply faced the fronts with  $\frac{3}{4}$ -in. oak plywood. The metal units make an exceptionally neat job and are ideal for the amateur carpenter who lacks the ability to do finished cabinetwork. Except for two accordion doors which are suggested for the doorways of the den and kitchen, all others are standard flush-type doors,  $1\frac{3}{8}$  in. thick. The type of floor to use is a matter of choice. I used cork tile throughout the house. Vinita helped me install the drapery valances across the living-room and dining-area windows. As shown, they serve a dual purpose of concealing the traverse drapery rod and housing fluorescent fixtures which flood the drapes with soft indirect light.

Next month, a concluding article will explain how you can "bench build" the walls and roof trusses of this ranch house indoors during the winter, and have them ready to truck to your building site the following spring.

## Calibration/ on Wooden Scale Kept Clean With Tape

Artists, and others who use a wooden scale, can keep the calibration marks and figures clean and legible by covering them with tape when the scale is new. Cellulose tape should be used for this purpose, and will last indefinitely if it is carefully applied and its entire surface pressed firmly in contact with the scale. When it is necessary to renew the tape, be sure all adhesive has been removed from the scale before applying new tape.

H. Drouyn, Montreal, Can.

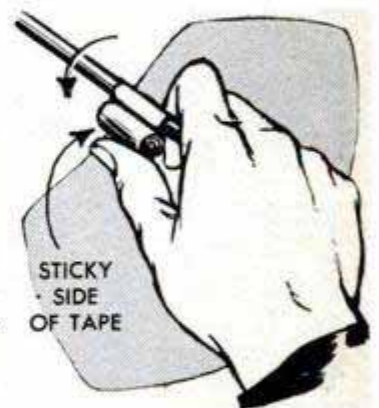


## Coating of Insulating Material Restores Old Vacuum Jug

A quart or gallon vacuum jug that has seen many camping trips and picnics is likely to lose much of its insulating effectiveness as a result of rusting of the outer container or dampening of the original insulation. In either case, the jug can be restored to usefulness by painting the outside with insulating material of the type generally used to keep cold-water pipes from sweating. After thoroughly cleaning the outside of the jug and removing all traces of rust, apply several coats of the insulating material, being careful to keep the material away from the cap threads and the spigot.

## Applying Friction Tape In Restricted Places

The next time you have to wrap a wire or some other object with friction tape, where only one hand can be used for the job, try the following: Unroll the necessary length of tape and reroll it tightly in reverse upon itself, that is, with the sticky side out. With the tape rolled in this manner, you can apply it in a restricted place by using the thumb and fingers in the way indicated in the sketch.



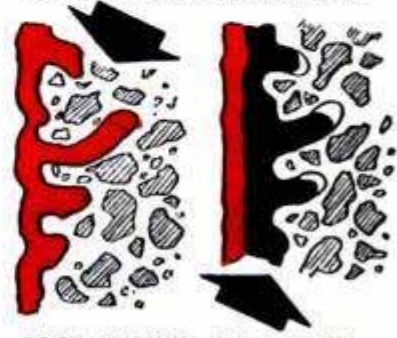
John M. White, State College, N. Mex.



## Cement Paint

IS LEAST EXPENSIVE WALL FINISH BUT TAKES MORE TIME TO APPLY AND CAN ONLY BE USED FOR WORK NEVER BEFORE PAINTED. NOT SUITED FOR FLOORS. APPLY WITH A BRISTLE WALL BRUSH AND WORK IT INTO PORES OF CEMENT WITH A SCRUB BRUSH IF NECESSARY. PATCH CRACKS WITH STIFF PASTE MADE FROM THE MASONRY PAINT ITSELF

GOOD ANCHOR IS OBTAINED ON BARE CONCRETE SURFACE



POOR ANCHOR IS OBTAINED ON SURFACE PAINTED BEFORE



1 WATER-MIX TO STIFF PASTE



2 MORE WATER AND HAND MIXING



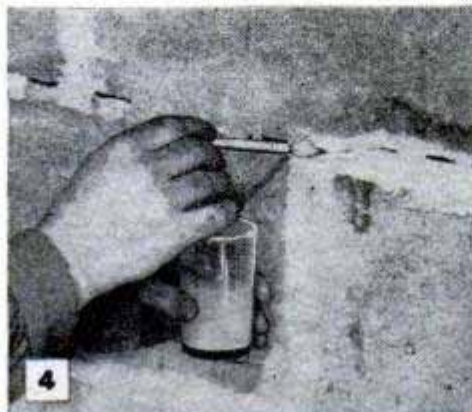
3 STRAIN THROUGH SCREENING

# A Good Paint

By Sam Brown

PERFECTLY dry concrete above grade can be coated with almost any type of oil-base or water-soluble paint. Below grade where the material is in contact with moist earth, the moisture absorbed by ordinary concrete releases lime, which is destructive to common oil-base paints. All good concrete paints, properly applied, resist the action of water and chemicals activated in the presence of moisture. No special skills are required for correct application of masonry paints. You can do the job yourself from start to finish.

**Cement paint:** Cement paint, as it is commonly called, consists of approximately 85 percent cement and 15 percent pigments, which make it flow smoothly and spread uniformly. Finely ground cement paints brush and cover better than those which are coarsely ground



4 SLUSH CRACKS WITH PAINT



5 FILL CRACKS WITH PASTE



# Job on CONCRETE

**Rubber Base**  
IS IDEAL FINISH FOR ALL CON-  
CRETE JOBS INSIDE OR OUT

and, of course, are much more expensive. However, the cheaper, coarser grades are just as serviceable on rough walls. Nearly all cement paints depend on mechanical anchorage and bond best to an unpainted surface. For this reason, they are not generally recommended for use over surfaces which have been previously painted. Nor are they suitable for use on concrete floors, as the film is far too brittle for application over a troweled surface. See the data on masonry paints in Fig. 14.

**Patching cracks:** Cement paint is just the thing for patching masonry walls. First, mix the paint powder to a stiff paste as in Fig. 1. Then place a small quantity in a tumbler and thin with water to the consistency of milk. Brush this thin mixture into the cracks with a small brush to form a bonding coat, Fig. 4. Follow immediately with the stiff paste,



ROOF BRUSH IS HANDY FOR OUTDOOR PAINT APPLICATION



CURE PATCHES WITH WATER



KEEP THE PAINT WET



GIVE CURE THE RUB TEST



applying with a putty knife or a small trowel as in Fig. 5. For filling large cracks or patches over  $\frac{1}{4}$  in. wide, mix sand, 2 parts, and cement-paint powder, 2 parts, with just enough water to form a putty. After applying, allow the patch to surface-dry until it no longer appears wet at any point. Then spray or brush with water, Fig. 6, keeping the area of the patch wet for a couple of hours. When particles will no longer rub off the surface, the patch is sufficiently cured to permit drying without further wetting.

**Mixing cement paint:** Begin by making a stiff paste, and then add small quantities of water by stages, working out the lumps as in Fig. 2. Wear rubber gloves to prevent paint materials from coming in contact with the bare skin. A somewhat smoother paint can be made by straining the mixture through fine screen wire as in Fig. 3.

**Application:** After patching the walls wherever necessary, allow the surfaces 24 hrs. to dry. Then spray water on the entire surface to be painted, Fig. 9, and let it soak in before spraying a second time. Continue spraying until the wall is uniformly wet, then allow it to dry until no wetness shows on the surface. While the wall is drying mix the paint to the proper consistency for application. Use a shallow container so that you can dip the brush to the bottom each time. Have a paddle handy for stirring the mixture because the pigment settles fast. On the average porous-masonry wall, application should be done with a scrub brush, scrubbed in immediately with a scrub brush, and then tipped off with the bristle brush. In some cases the scrubbing operation will be unnecessary. On walls of cinder block, apply a first coat consisting of equal parts of clean, sharp sand and paint powder mixed with water to the consistency of thick cream. Brush out with a scrub brush to leave a rough surface for the second coat.



**Curing cement paint:** The paint will reach its initial set in  $1\frac{1}{2}$  to 2 hrs. after application. After it loses surface wetness and appears flat, wet the surface with a spray gun, Fig. 7, or a fine spray from the garden hose. Keep the surface wet for at least two hours to assure complete curing. When the wet coat finally resists rubbing off with the finger, it will be safe to allow it to dry.

REMOVE WHITWASH AND CALCIMINE WITH HOT WATER. USE 20-PERCENT SOLUTION MURIATIC ACID FOR WATER-RESIN PAINT



**What to do about old paint:** Although manufacturers do not recommend the application of cement paints over surfaces which have been previously painted, it is possible to remove old finishes such as whitewash and calcimine and provide a surface to which the new coating will bond. Scrubbing the surface with hot water, Fig. 10, will remove calcimine and common whitewash and most of the resin paints will yield to a 20-percent solution of muriatic acid. **Caution:** Handle muriatic-acid solutions with extreme care. The acid, either whole or in solution, is a violent poison, the fumes are toxic and its action is caustic. Wear rubber gloves and protect your eyes from spatters. Destroy all unused portions of both acid and solution. In addition to removing certain paints, the muri-

A CAN OF LYE (13 OZ.) WITH 1-GAL. HOT WATER WILL REMOVE OIL PAINT, WEAR RUBBER GLOVES. RINSE JOB WELL

## Rubber-Base Masonry Paint

DRIES FLAT AND IS INTENDED FOR WALL USE, NOT FOR FLOORS. CAN BE USED INSIDE OR OUT, ON BARE CONCRETE OR OVER OLD PAINT. GOOD FOR ASBESTOS SHINGLES. THE BRUSHES MUST BE CLEANED WITH SPECIAL THINNER PROVIDED

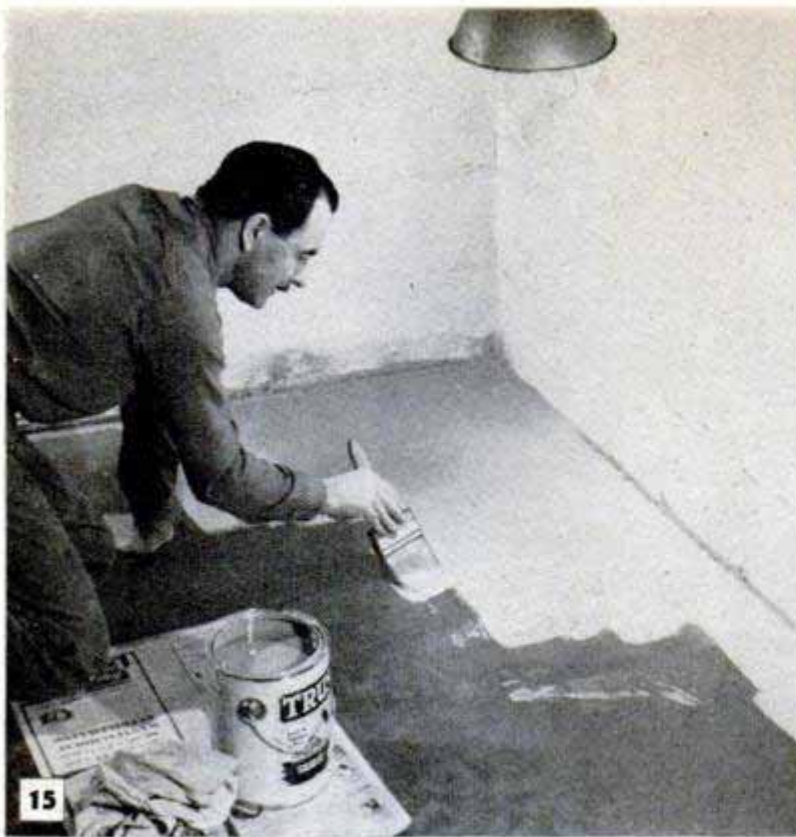
atic-acid solution will etch the wall surface slightly, making a good base for new cement paint. After using the acid, hose the wall to remove residues. Removing oil-base paints from any masonry surface is a tedious job, and at best it will take a lot of elbow grease to get the paint off the rough surface after softening with a remover. A good remover for paint on a masonry surface can be made by dissolving a 13-oz. can of lye in 1 gal. of hot water, Fig. 11. Use the same precautions in handling a lye solution as outlined for muriatic-acid solutions. Apply the lye solution to the wall with a large cloth swab and remove the softened paint film with a wire brush. If old oil-base paints are in good condition, it is recommended that the wall be repainted with this same type of paint. Neither the muriatic-acid nor lye solutions will touch rubber-base paints. When the walls are coated with this kind of paint, the best thing to do is smooth the rough spots with sandpaper and apply a fresh coat.

**Rubber-base wall paints:** Apply rubber-base masonry paints to walls with a brush, Fig. 12, as most of them are too heavy to spray successfully. A second coat of rubber-base paint will soften the first coat so, if a second coat is required,



## Quick Data ON 5 CONCRETE PAINTS

14 KIND OF PAINT	WHERE USED	APPLICATION	COVERAGE		GENERAL FEATURES
			FIRST COAT	SECOND COAT	
<b>CEMENT PAINT</b> Powder form for mixing with water. Tints and white	Any porous masonry wall surface not previously painted: brick, concrete, cement stucco, cinder block. Not for floors	Stiff-bristle brush. Wall must be damp and paint sprayed with water after obtaining its initial set. Sand is added for cinder block	10 to 15 sq. ft. per lb. 75 to 125 sq. ft. per gal. (8 lbs. powder makes 1 gal. of paint)	15 to 25 sq. ft. per lb. 125-200 sq. ft. per gal.	Inexpensive. Excellent for cinder block and very porous concrete. Dries flat. Too brittle for floors. Can be sprayed only with agitating equipment. Suitable for new work after 10 days
<b>RUBBER-BASE FLOOR PAINT</b> Ready-mixed. Several colors, black, white	Especially for concrete floors. Works best on bare concrete but can be used over old paint	Brush or spray. Dries in 2-4 hrs. to touch but needs 24-hr. dry for second coat or service	About 300 sq. ft. per gal. on average surface	About 400 sq. ft. per gal.	Most expensive of concrete paints. Hardens dusty floors. Dries semi-gloss. Also suitable for wood. Free flowing, easy to brush. Second coat will pick up first coat unless thoroughly dry
<b>RUBBER-BASE MASONRY PAINT</b> Ready-mixed. Tints and black, white	Especially for walls, inside or out, on bare concrete or over old paint	Heavier than R.B. floor paint and needs thinning for spray application. Wall must be dry. One coat covers	About 250 sq. ft. per gal.	About 350 sq. ft. per gal.	Too expensive as first coat for cinder block. Needs 24 hrs. to dry for recoat, although dry to touch in 2 hrs. Flat finish. Good for asbestos shingles
<b>OIL-BASE MASONRY PAINT</b> Ready-mixed. Several colors, black and white	All masonry surfaces. Also is good general paint wherever flat finish is suitable	Brush or spray. Some products require primer coat	About 250 sq. ft. per gal.	350 to 600 sq. ft. per gal.	Has tung-oil base which resists lime better than linseed oil but not as good as rubber base. May be flat or gloss depending on make. House paint with tung oil is equivalent
<b>EXTERIOR RESIN EMULSION</b> Paste form mixes with water. Tints and white	Bare or painted masonry inside or out except floors. Do not use where mildew is present	Brush or spray. Second coat should be applied 8-12 hrs. after first. Not proof against rain for 12 hrs.	About 300 sq. ft. per gal. of paste	400 to 450 sq. ft. per gal. of paste	Inexpensive. This is a breather-type paint and does not water-proof nor resist passage of water. Becomes translucent when wet. OK for new work after 30 days. Dries flat



### *Rubber-Base Paint*

IS TOPS FOR FLOORS. IT HARDENS SOFT CONCRETE. ALL SOAPY OR SLICK FLOORS SHOULD BE ETCHED WITH A 10 PERCENT SOLUTION OF MURIATIC ACID. RINSE WITH WATER



EXTEND FLOOR COLOR UP WALL



WATCH OUT FOR DAMP PATCHES

allow the first coat to dry at least 24 hrs. Even then it may pick up here and there if it is brushed too much. There's no need to worry about laps, or precise, uniform brushing technique, as rubber-base masonry paints work easily and dry without showing any minor irregularities. Clean the brush in the paint thinner, Fig. 13.

**Rubber-base concrete-floor paints:** If the floor is troweled very smooth, or if there are embedded soap residues around the laundry tubs, the surface should be cleaned and then etched with a 10 to 20-percent solution of muriatic acid. Remember the precautions already outlined. Handle acid solutions with care! A gallon of the solution will cover about 100 sq. ft. Apply with an old broom, scrubbing it on to get a uniform caustic action. Permit the solution to "work" for 10 to 15 minutes, then hose it off thoroughly. After etching the floor, allow it to dry at least 48 hrs. Drying of lingering wet spots can be hastened with a heat lamp, Fig. 17. Rubber-base floor paint is somewhat thinner and can be sprayed successfully, Fig. 16, although you will find it works well with a brush, Fig. 15. On two-coat work allow plenty of drying time between coats as the second coat will soften the first if it is applied too soon. Brush as little as possible when applying one coat over another. A simple and attractive trim is obtained by running the floor color about 6 in. up on the wall, Fig. 16. If you are us-

ing a spray gun, cut the colors to a sharp line by means of masking tape as shown. Using a brush, you can cut to a pencil line quite easily by carefully stroking the brush tip to the line freehand.

**Oil-base masonry paint:** This is similar to ordinary exterior house paint except that it usually is a flat paint and contains a high percentage of tung oil or other liquid vehicle which will resist the action of lime and other water-soluble salts often contained in masonry and activated in the presence of moisture. It is suitable for outdoor use, and comes in attractive colors. Recommendations for applications vary, so be sure to follow the manufacturer's instructions in detail.

**Exterior resin-emulsion paints:** An excellent, inexpensive, exterior finish for masonry, this type of paint comes generally in paste form. It is mixed with water and applied with brush or spray.

**Hardeners and waterproofer:** If your basement floor is "dusting" and you don't want to paint it, a penetrating liquid hardener is available which is simple to apply and very durable. Just follow the instructions on the container. It also is available in crystal form to be dissolved in water. A waterproofer made especially for concrete floors also is available as a clear, penetrating liquid which does not change the original color of the floor. When applying it, follow instructions in detail.

## Saw-Blade Armature Tool



Ground from a piece of hacksaw blade, this handy tool can be used to do four different jobs when working on armatures. Note that one end is sharpened for cutting paper and notched for cleaning slots, while the other end is curved

for tucking. A fairly deep notch for scraping wire is cut in one edge.

Charles Wesley Shutt, Alma, Mich.

## Sponge Cuts Down Soap Waste

Wasteful accumulation of soap in soap dishes, which do not drain properly, can be prevented by using a pad of cellulose sponge to catch the drainage from wet bars of soap. Cut from a larger sponge to fit the bottom of the soap dish, the little pads keep the dishes clean and the bars dry at all times. The drainage of soap caught in a sponge can be utilized by moistening the sponge and using it to wash the sink or bathtub. — P. Tallerico, Bethlehem, Pa.

## Driving Tacks in Tight Places

Did you ever try to drive a tack in a corner or recess where it is difficult to reach with two fingers? It's a neat trick—if you can do it—but here's a simpler and easier way: Place a drop of glue on the head of a large nail and stick the tack firmly to the nailhead. You also can use a small steel rod in the same manner. With either method, the tack can be placed exactly where you want it

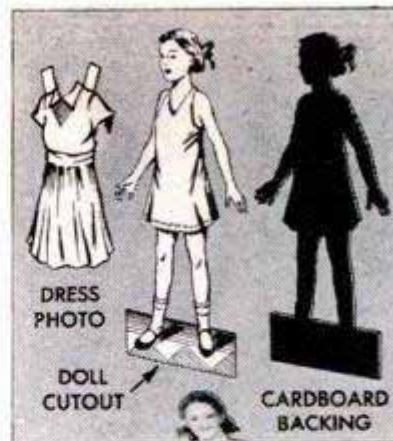


and driven into the work by tapping the pointed end of the nail, or the end of the rod, lightly with a hammer.

Harry W. Poor, Tamworth, N. H.

## Nail Polish "Mix" Fills Cracks

To repair a nick or crack in painted furniture, mix a small quantity of talcum powder with colorless fingernail polish to a spreading consistency. Fill the crack and smooth evenly. This will harden and form a plastic which makes a very neat mending job. Stain with aniline dye.



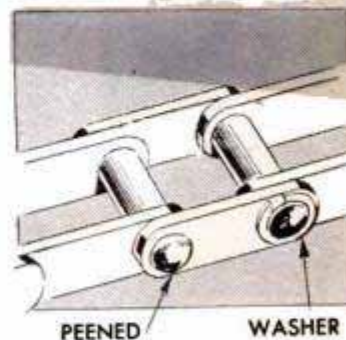
## Personalized Paper Doll From Child's Own Photo

Almost any little girl is sure to enjoy playing with paper dolls which are actually miniature cutouts of herself. Giving this personal touch to such toys and making them himself was the idea of one photographer who, of course, used his own daughter as the model. The actual job was easy. He photographed the girl several times in the same pose, but dressed differently each time. One of the prints was then cemented to a piece of fairly heavy cardboard and the figure was cut out to serve as the doll. The other photos were cemented to lighter cardboard and only the clothes were cut out. Note that small tabs, which fold and hook onto the doll, were left protruding from the dress, and that stock was left around the doll's feet to serve as a base.

Elma Waltner, Hurley, S. D.

## Improved Repair of Bicycle Chain

The link pins of most bicycle chains are held in place by small washers which fit into grooves at each end of the pins. However, when one of these washers is lost, it need not be replaced in order to repair the chain. Instead, just peen the end of the pin as shown, being careful to avoid bending it.



Ross S. Neureuther, Buffalo, N. Y.

# Build this 20-ft. <sup>8</sup>

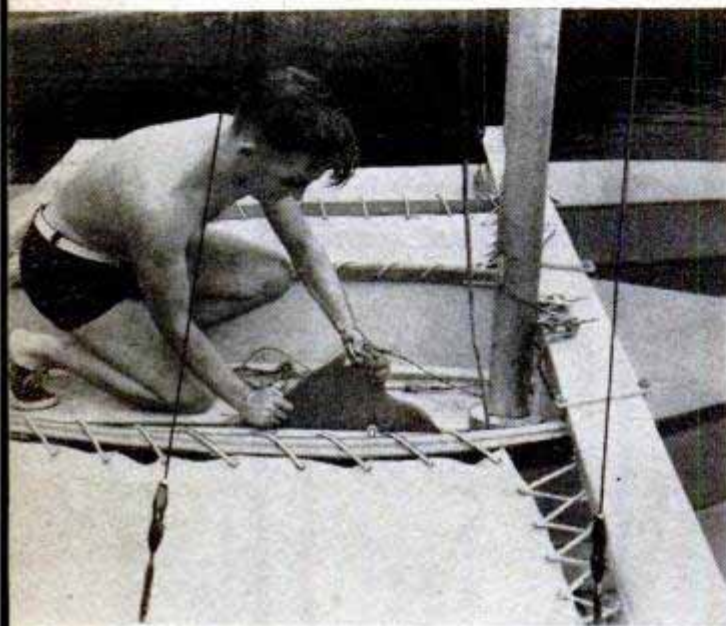
By J. Julius Fanta

DESIGNED by Commodore Victor Tchetchet of the International Multihulled Boat Racing Association, Trimaran combines the thrills of a conventional sailboat with an exceptional rate of speed, maximum safety and unusual ease of handling. In a spanking wind, the sleek hull with its outriggers skims over the water at speeds as high as 22 m.p.h., and in a hardly perceptible breeze, when other sailboats are without steerageway, she moves along at a surprising speed. Capsizing is next to impossible because of the buoyancy of the outrigger pontoons. Even a wind approaching gale force would be more likely to blow out the sail or snap the mast than capsize the craft. But, while the rugged construction and "3 hull" design permit Trimaran to withstand high winds and heavy seas in an emergency, it must be remembered that she still is a small boat and sailing should be confined to protected waters.

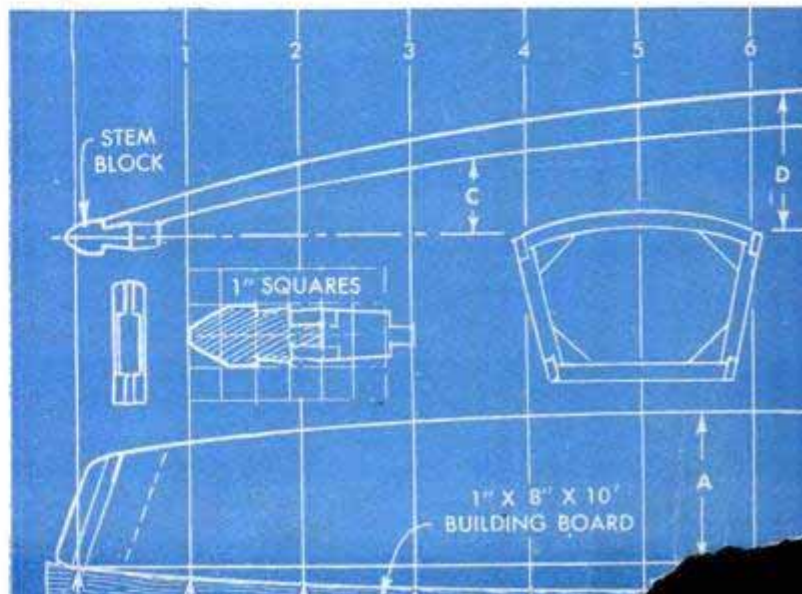
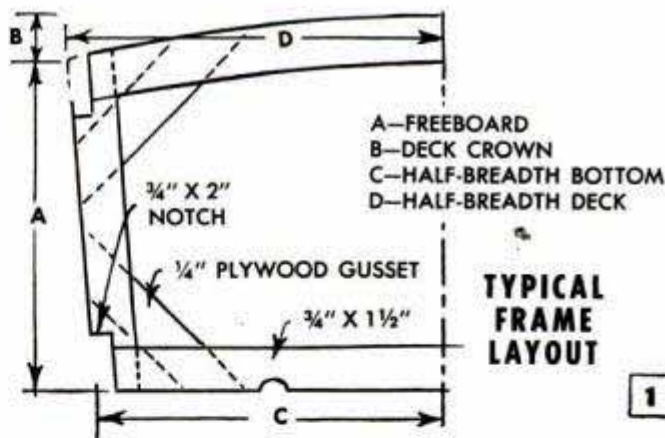
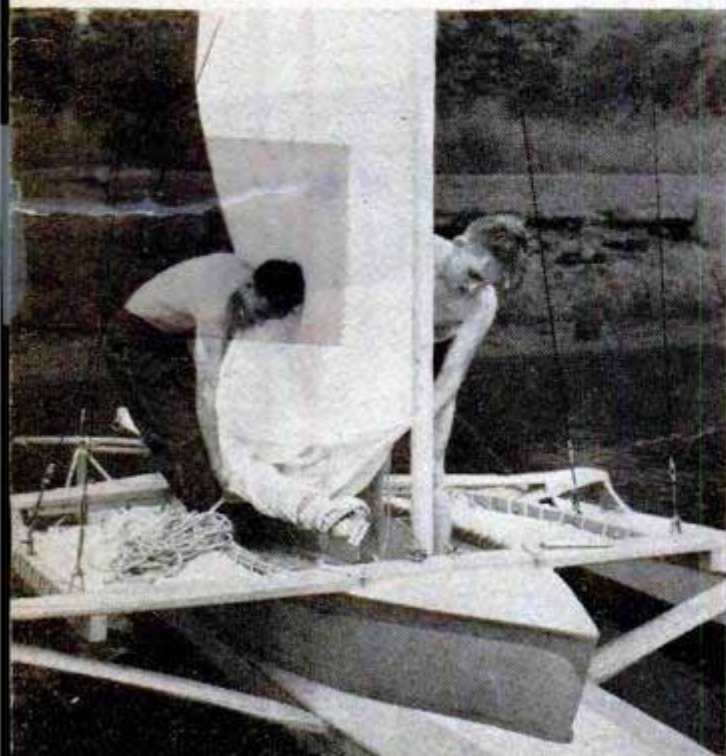
The main hull and pontoons are built by covering wooden frames, spaced 12 in. apart, with  $\frac{1}{4}$ -in. waterproof plywood. First, make the 20 frames for the hull to the dimensions given in the table of offsets, Fig. 2. Join the frame members with waterproof glue and



Above, stern view of Trimaran shows wooden bracket just aft of cockpit. This permits emergency mounting of outboard motor on starboard side of center hull



Raising the plywood centerboard, above, cuts draft of main hull to a few inches. Below, lightweight aluminum boom is easy to handle when hoisting mainsail. Note cable stays anchored to cockpit supports





# TRIMARAN

reinforce them with plywood gussets, which are glued and nailed to the faces of adjacent members, as in Fig. 1. When building Trimaran, use monel-metal screw-type nails throughout. Note that five frames, stations 8 to 12, must be made in two parts to permit installing the centerboard trunk. Fig. 4 shows how these particular frames are put together.

After assembling all the hull frames, make a building board from 1 x 8-in. stock, cutting the contour of the top edge of the board to conform with the profile view, Fig. 3. Support the building board on sawhorses, Fig. 4, and temporarily nail the frames in position on the board, spacing them 1 ft. apart on centers. Assemble and install the centerboard trunk, as in the upper details. Then glue and nail the chine and sheer battens in the notches cut in the corners of the frames. Fair the chines and sheers into the stem and stern blocks, planing the battens flush with the frame surfaces. The centerboard trunk is made up of two pieces of 1/4-in. plywood mounted on two oak up-rights. A 1-in.-sq. cleat along each side of the trunk 1/2 in. from the bottom edge provides a surface for bolting and gluing the plywood bottom around the trunk. Cotton calking laid in glue on adjacent sides of the cleat between the bottom and the trunk assures a watertight joint.

To plank the hull, cut the plywood for

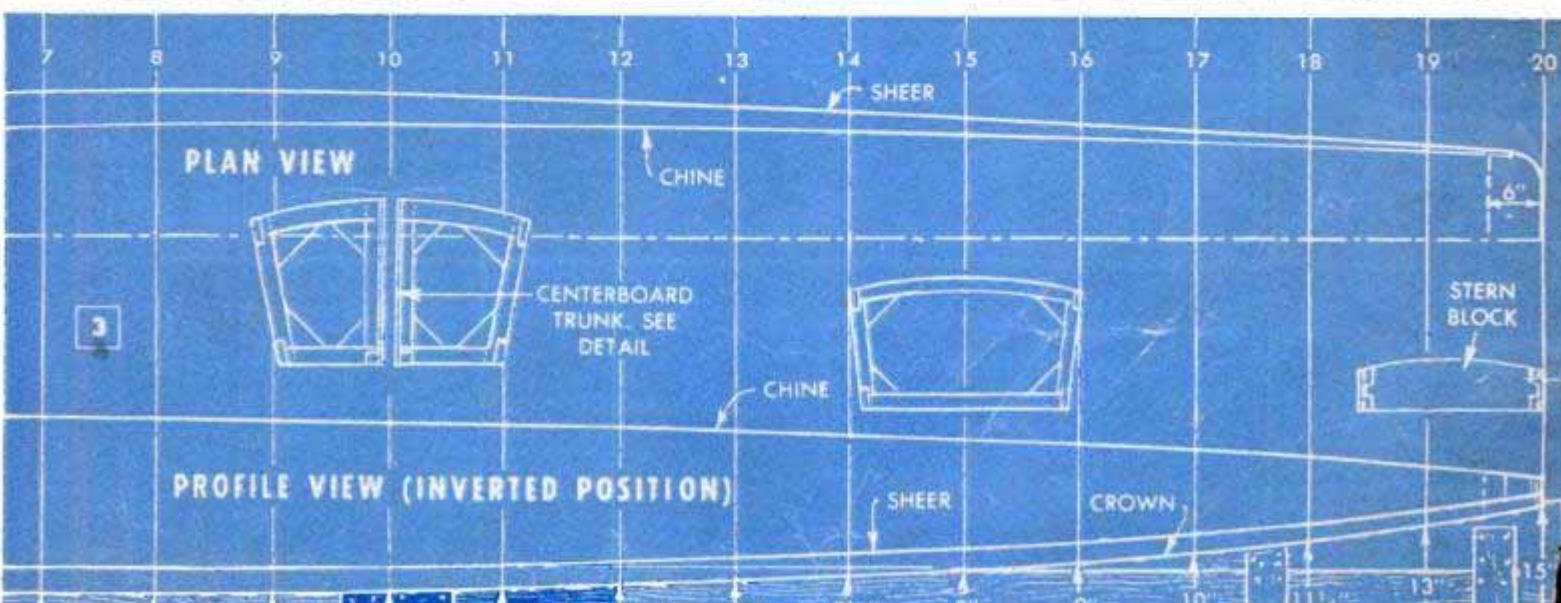


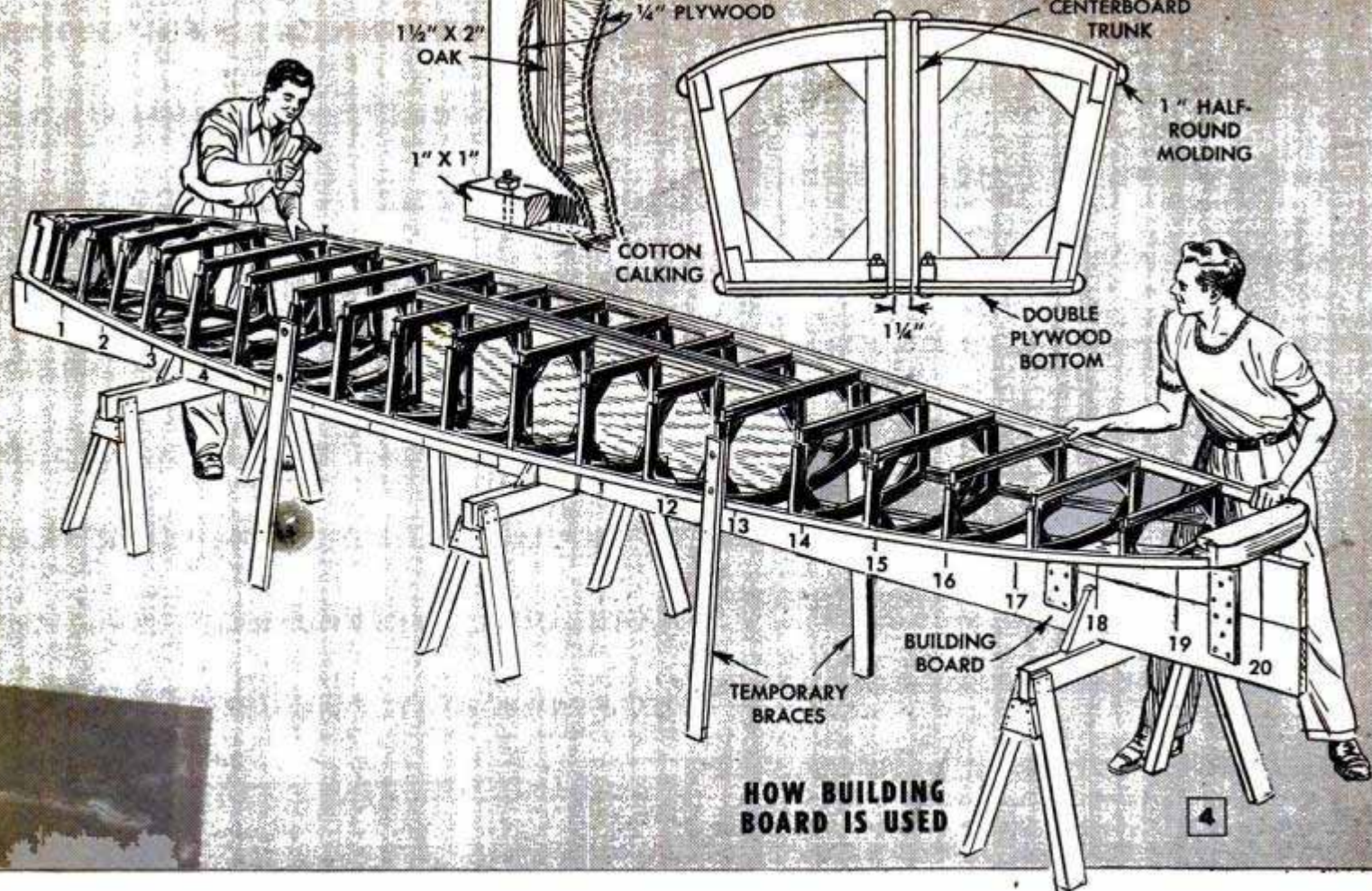
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**TABLE OF OFFSETS**

MAIN HULL (DIMENSIONS IN INCHES)

STATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
HALF BREADTHS FOR BOTTOM	2 1/4	4 3/4	6 3/4	8 3/4	9 3/4	10 3/4	11 1/2	11 1/2	12	12	12	12	12	11 1/2	11 1/2	11 1/2	10 3/4	10	9 3/4	8 3/4
HALF BREADTHS FOR DECK	4	7 1/4	10	12 1/2	13 1/2	14 1/4	14 3/4	15	15	14 3/4	14 1/2	14 1/4	13 3/4	13 3/4	12 1/2	11 3/4	11	10	9 3/4	8 3/4
FREEBOARD	13 1/4	14 3/8	15	15 1/2	15 3/4	15 3/4	15 3/4	15 1/2	15 1/4	15	14 7/8	14 1/2	14	13 3/4	12 3/4	11 1/4	9 3/4	7 3/4	5 3/4	2 1/2
DECK CROWN	1	1 3/4	2 3/8	2 3/4	3	3	3	3	2 3/4	2 3/4	2 1/2	2 1/4	2	1 3/4	1 3/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2



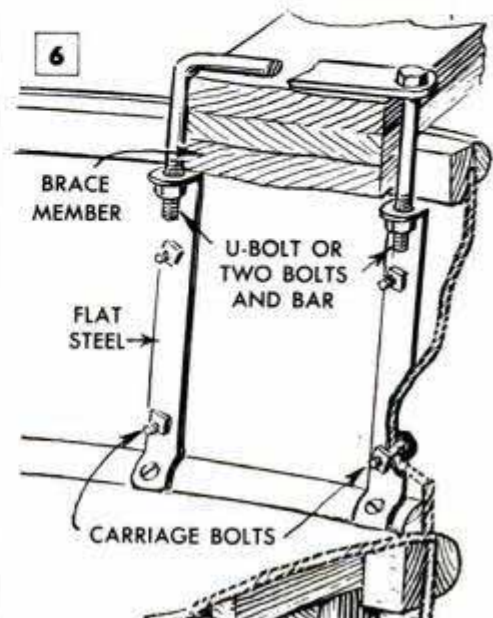
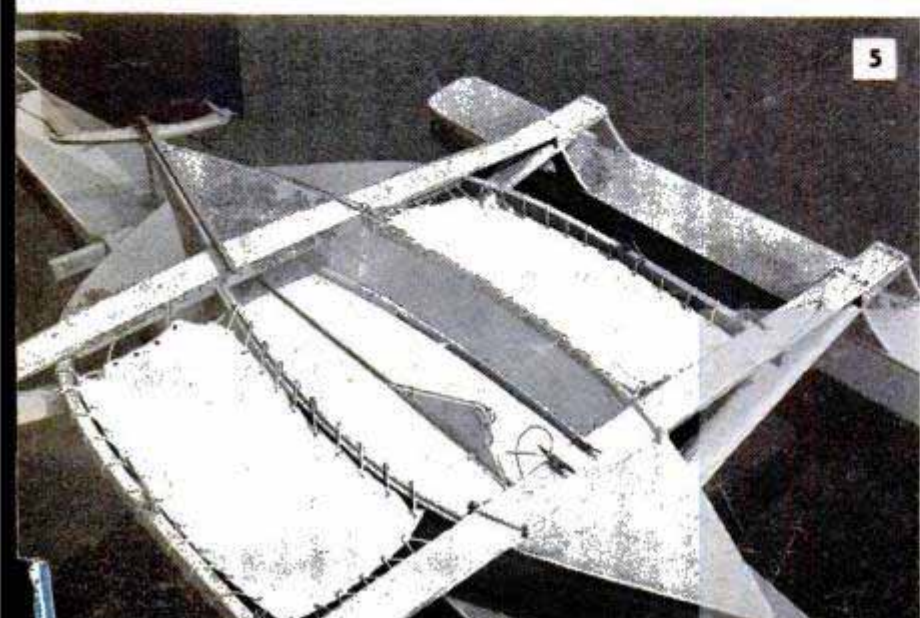


**HOW BUILDING BOARD IS USED**

the sides slightly oversize. Coat contacting surfaces of the chines and frames with waterproof (marine) glue and fasten the plywood in place with monel nails spaced 2 in. apart. Then clamp the plywood to the chines and frames. When the glue has dried, cut off the overhanging edges of the plywood and plane flush with the battens. The bottom is covered with two layers of 1/4-in. plywood, the pieces being cut a little oversize and slotted where they fit over the centerboard trunk. To assure watertight joints along the chines and around the trunk opening, cotton tape is laid in a thick coating of marine glue which is applied to all contacting surfaces. Then the plywood is laid in the glue and nailed as before. The second layer of plywood is merely glued to

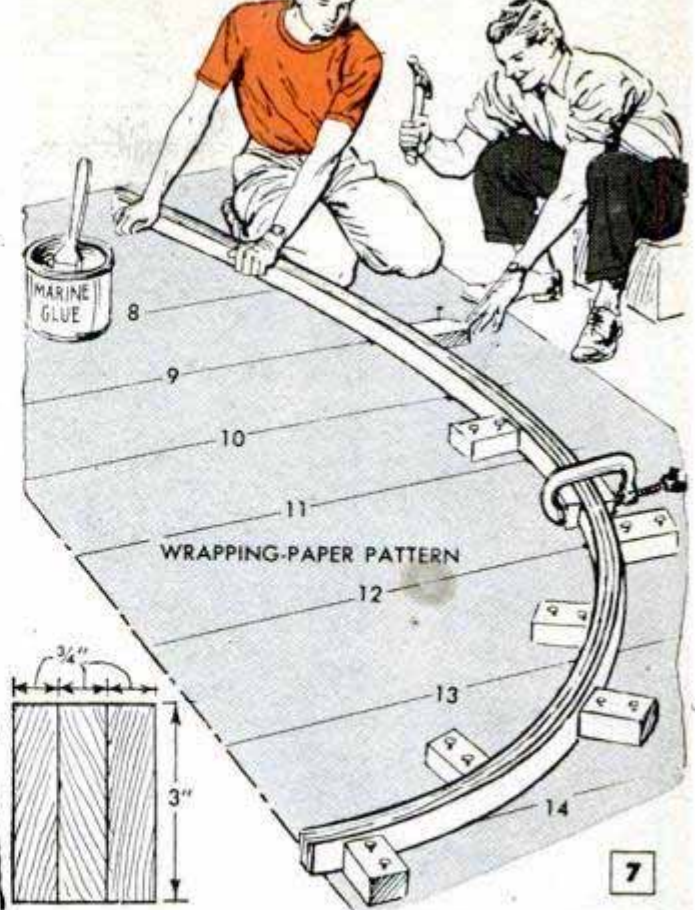
the first one. When planking the boat, you can add strength by making sure that the plywood joints on opposite sides of the hull fall on different frames. The deck is covered with one layer of 1/4-in. plywood bent over the crown. After the deck is in place, the edges of the plywood are trimmed flush with the sides and the joints are covered with 1-in. half-round molding.

Construction of the main hull is completed by adding the cockpit, the sides of which are glued and nailed to a curved chine fastened directly to the plywood deck, Figs. 8 and 9. A series of holes, drilled near the deck line in the aft portions of the cockpit sides, provides a self-bailing feature to drain off spray. Both fore and aft sections of the cockpit are covered with plywood.

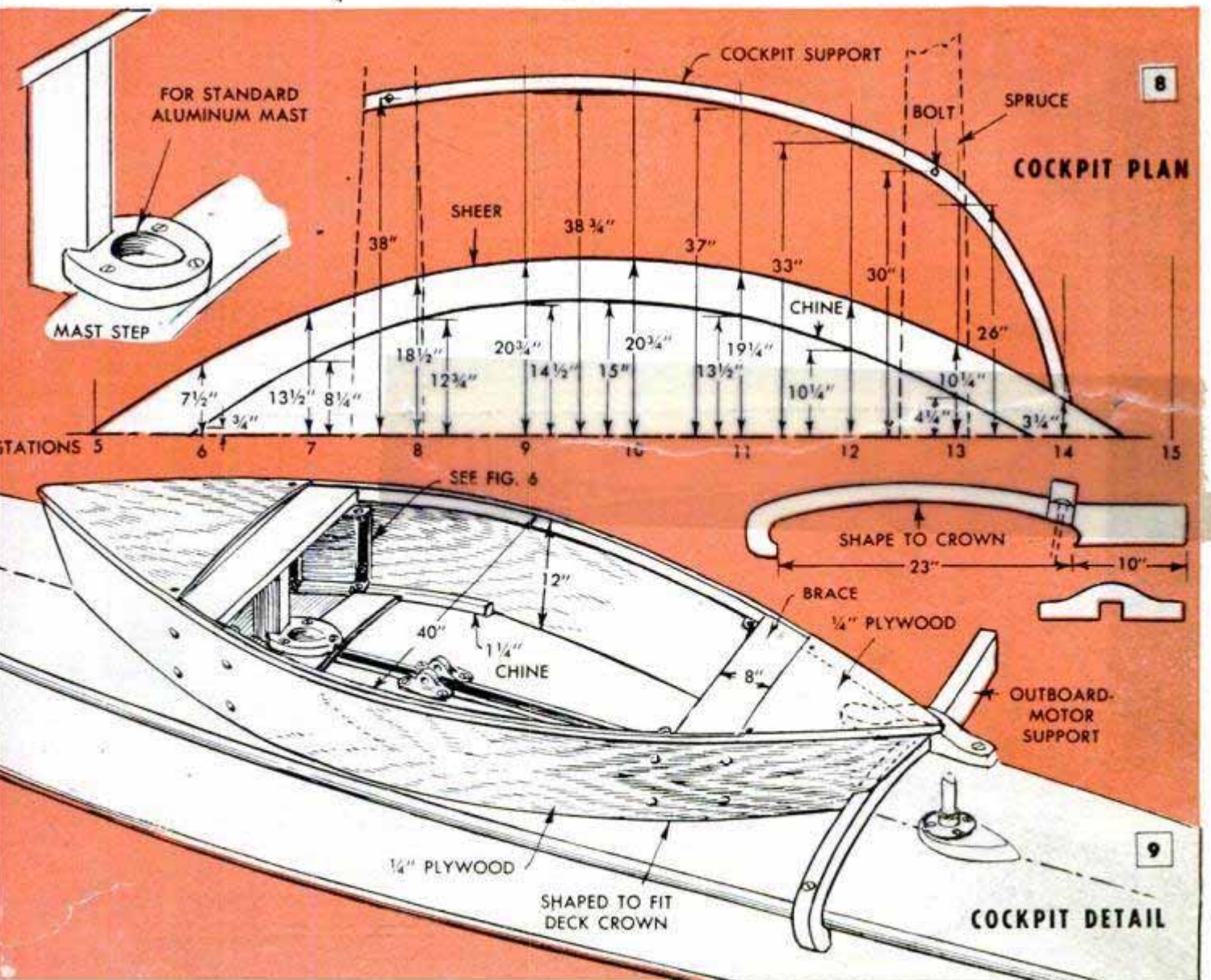


Construction of the two pontoons is similar to that of the main hull. See the table of offsets, Fig. 10, for the dimensions and Figs. 11 and 17 for the plan and profile views. As the corners of the pontoon frames are square, they can be assembled quickly in a jig made by nailing two boards to the floor or bench top at right angles to each other. Note in Fig. 21 how the pontoons are reinforced at the points where the crossbeam hangers are attached. The frames are left open at the corners for  $\frac{3}{4}$ -in.-sq. chines, parts being joined only by the plywood gussets. The frames are assembled on a building board which is cut to dimensions given in the table of offsets opposite the heading, "rise of chine floor to bottom." The  $\frac{1}{4}$ -in.-plywood sides can be beveled and glued and nailed together at the stem, or stem blocks can be used. Install one deck plate amidships in each pontoon and two deck plates in the main hull.

The curved cockpit-seat supports are laminated by gluing together three strips of  $\frac{3}{4} \times 3$ -in. spruce. Make a full-sized pattern from dimensions given in Fig. 8 and bend supports in a jig formed by wood.

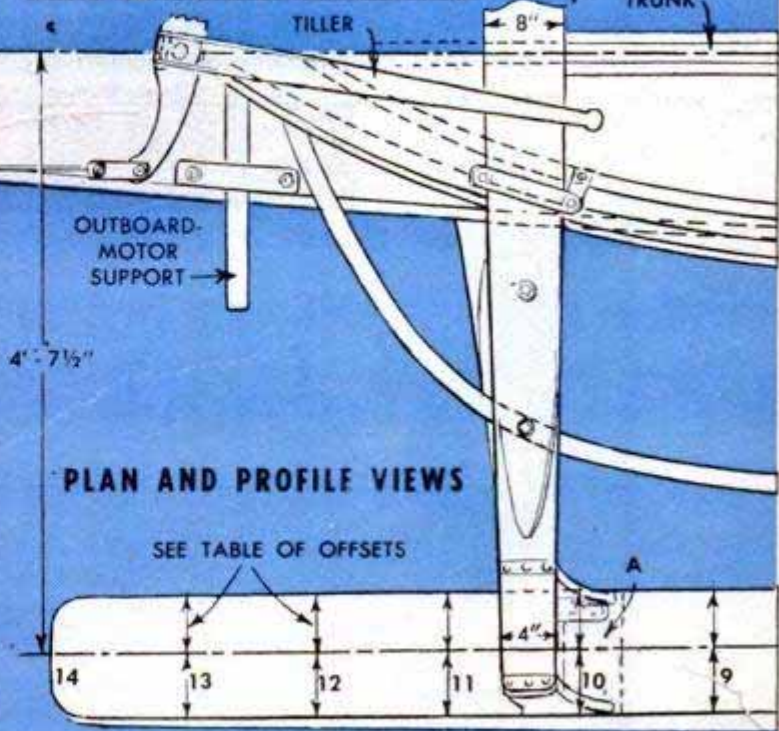
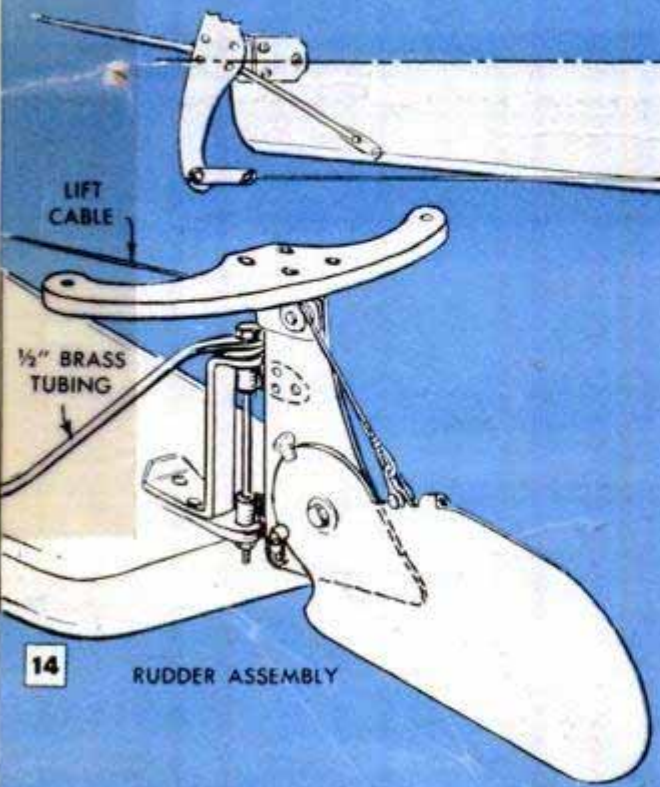
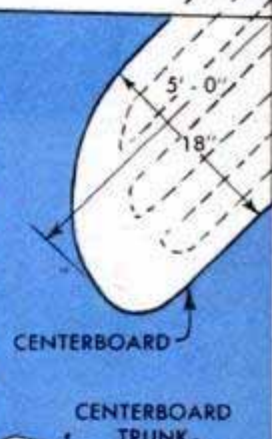
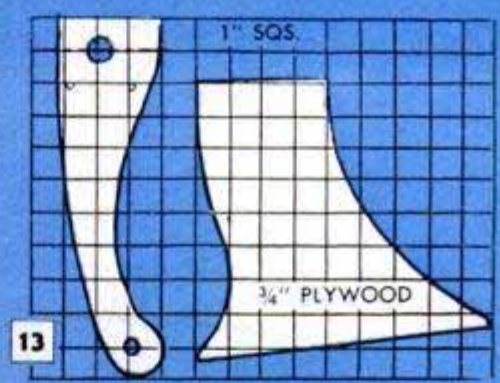
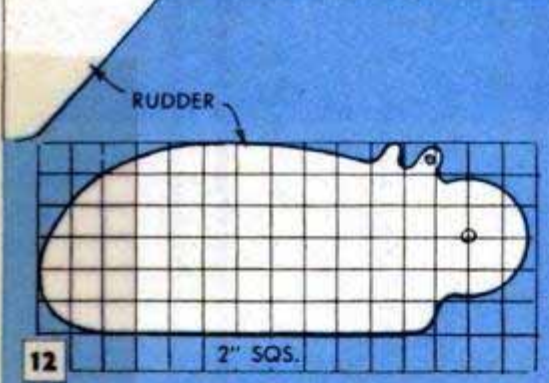
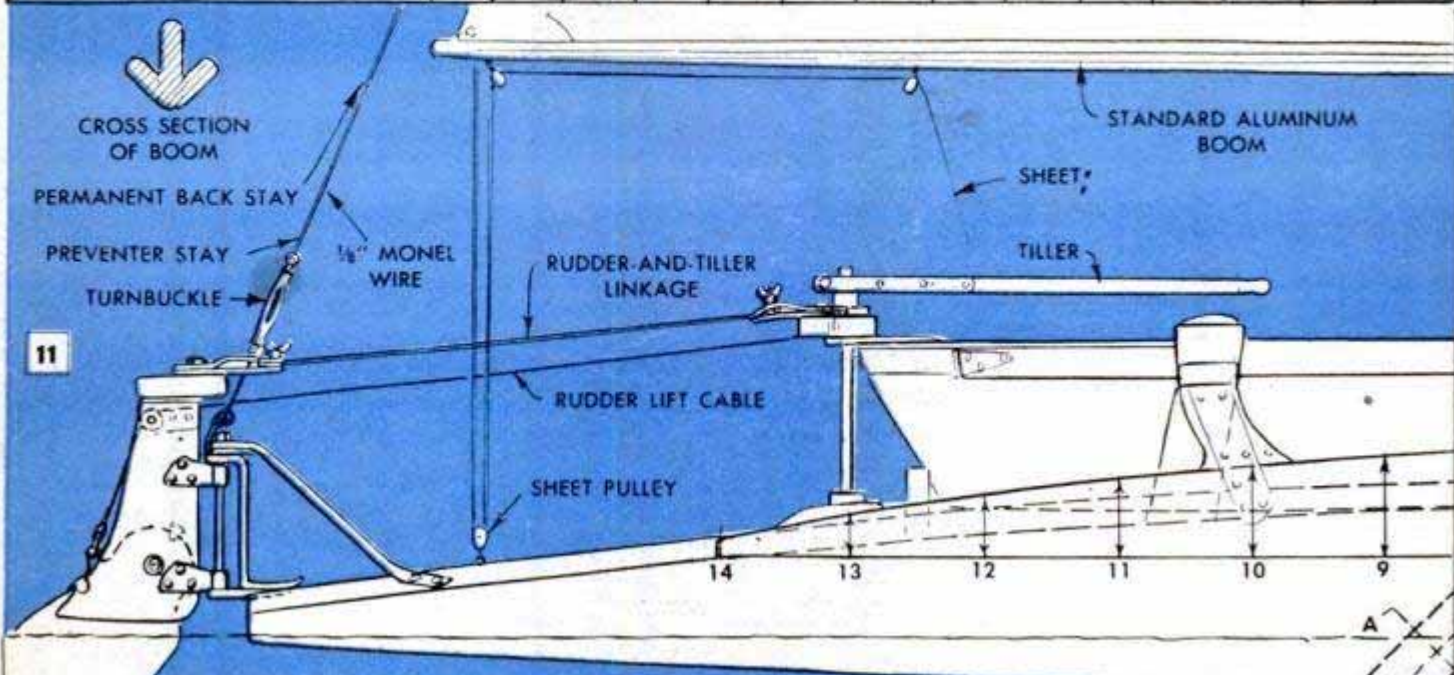


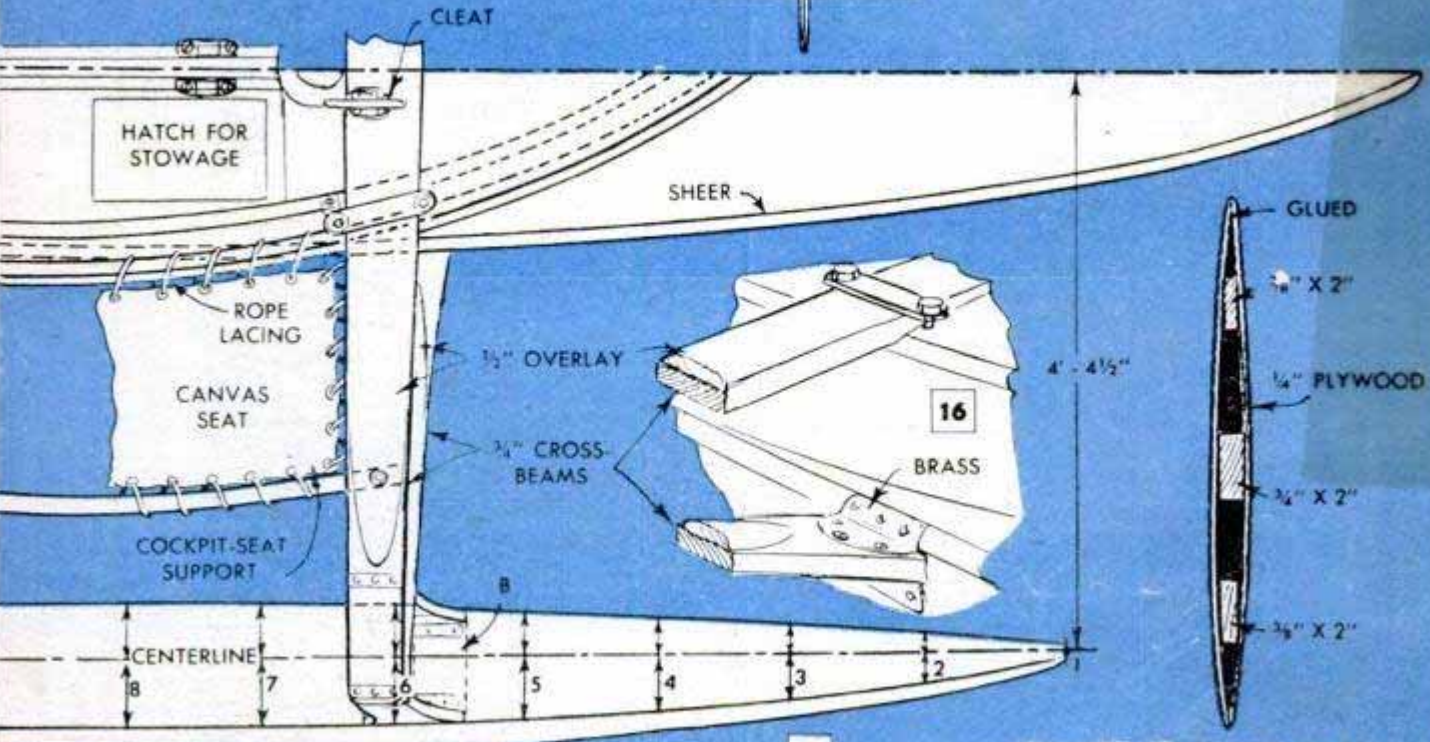
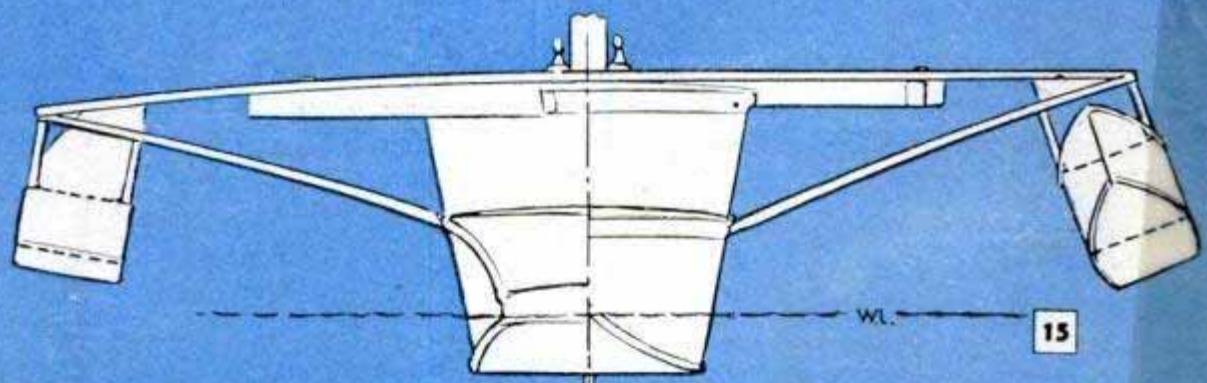
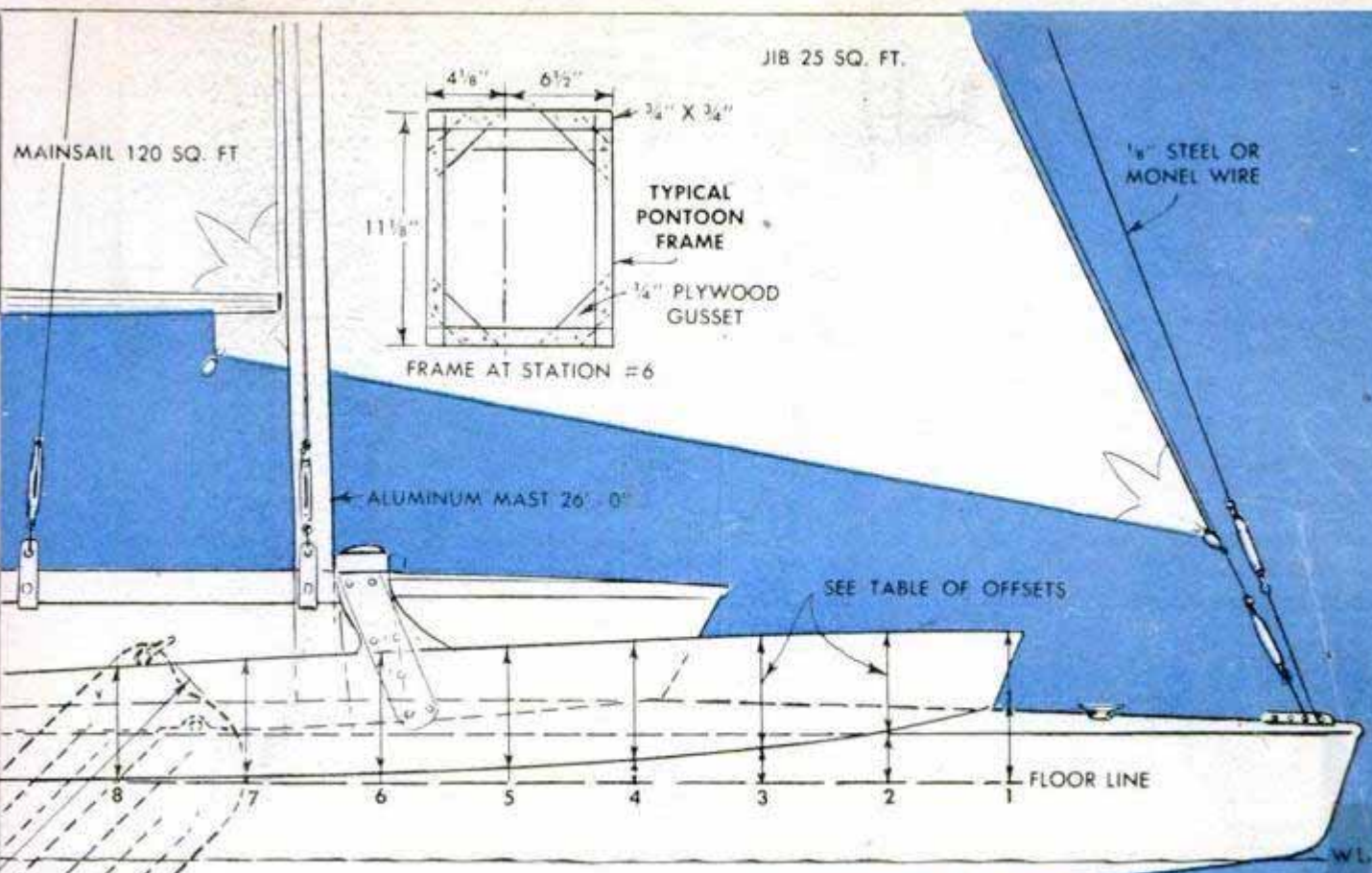
LAMINATING COCKPIT SUPPORT



10 TABLE OF OFFSETS FOR PONTOONS (DIMENSIONS IN INCHES)

STATION	1	2	3	4	5	6	7	8	9	10	11	12	13	14
TO INNER SIDE BOTTOM AND DECK	1 1/8	1 7/8	2 5/8	3 3/8	3 3/4	4 1/4	4 1/2	4 7/8	4 7/8	4 7/8	4 7/8	4 7/8	4 7/8	4 7/8
TO OUTER SIDE BOTTOM AND DECK	2 1/4	4 1/8	5 1/4	6	6 1/4	6 1/2	6 1/2	6 1/2	6 1/4	6 1/4	6	6	6	6
FREEBOARD	6 7/8	9 1/4	11 1/8	11 1/4	11 1/4	11 1/8	10 1/2	9 3/4	8 3/8	6 7/8	4 3/8	4 1/8	2 1/4	3/4
RISE OF CHINE FLOOR TO BOTTOM	6 1/2	4 1/4	2 1/2	1 3/4	3/4	1/2	1/4	0						





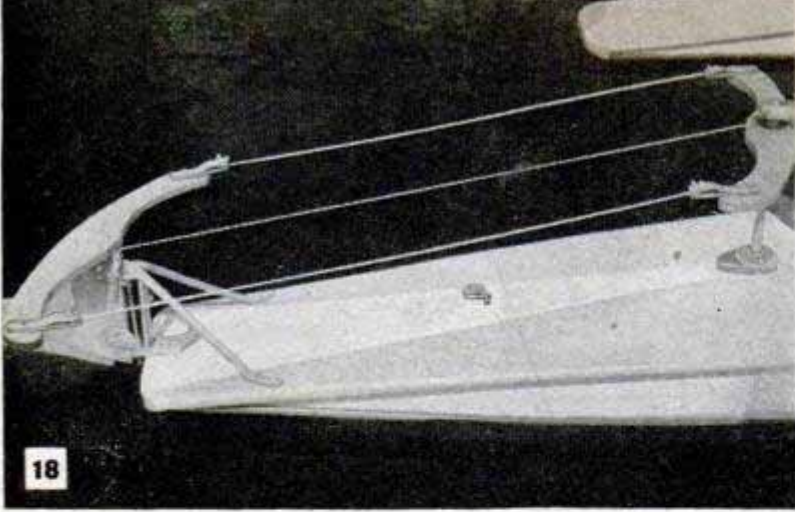
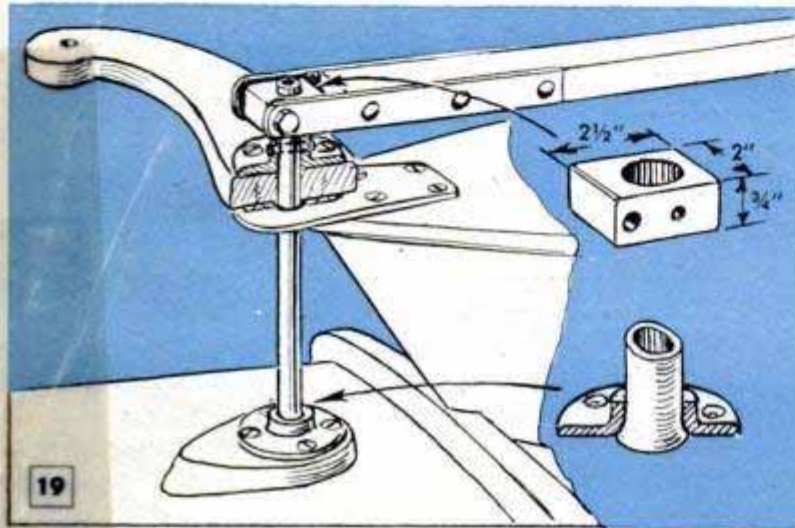


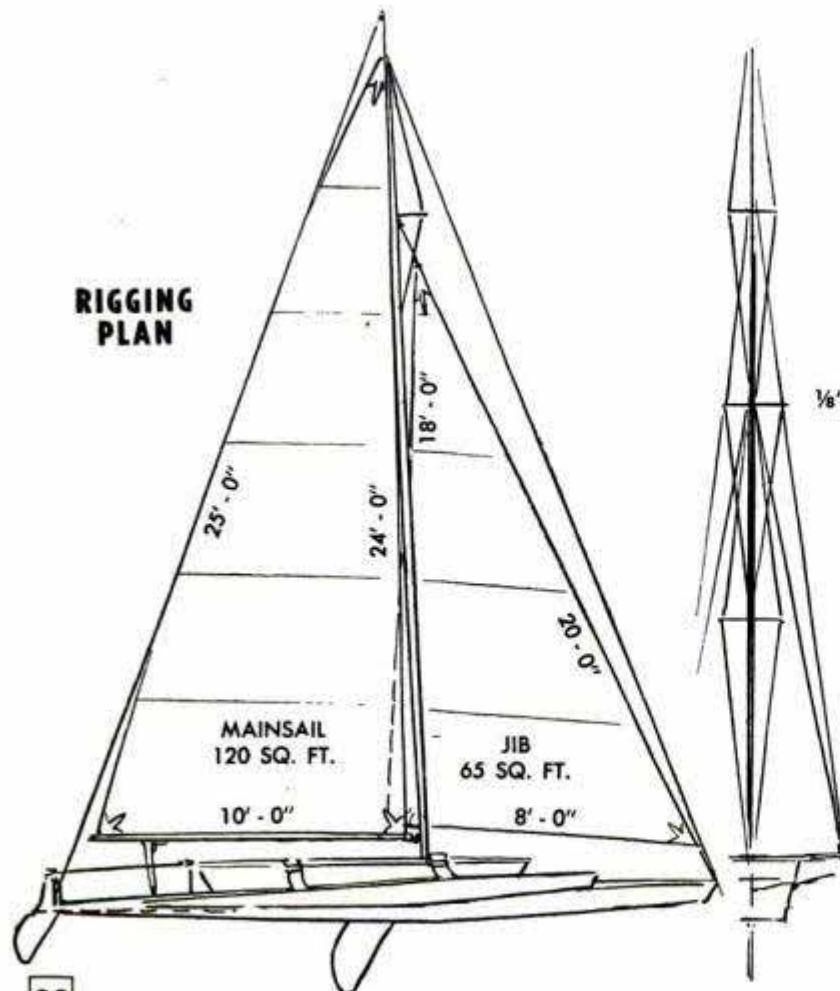
Photo above illustrates a typical steering assembly. Folding rudder is raised or lowered from the cockpit with the cable which is visible midway between the rudder-and-tiller linkage



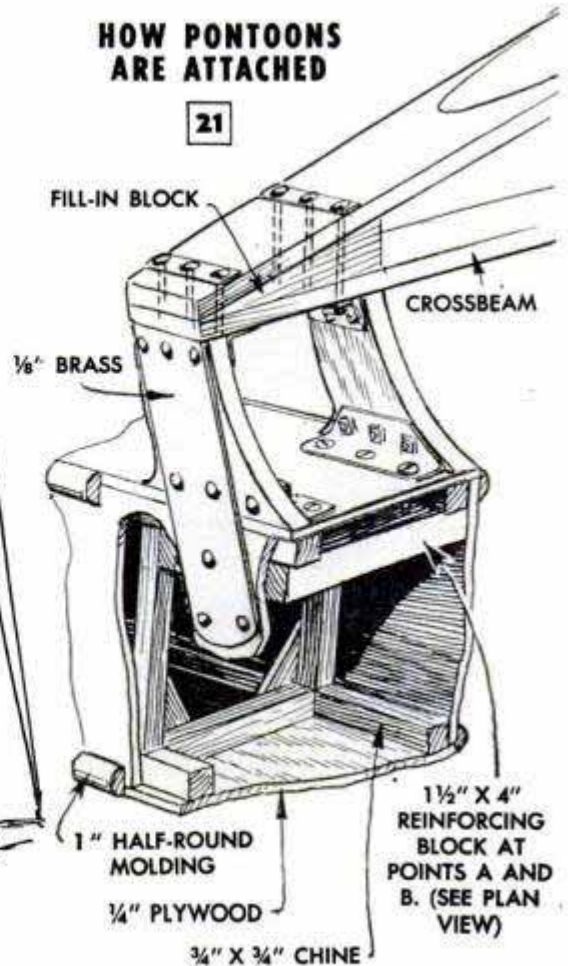
tacking wooden blocks to the floor as in Fig. 7. Install the pontoon crossbeams as shown in Figs. 6, 15, 16 and 17, and bolt each cockpit-seat support to the underside of the upper crossbeam members, fastening the inner end of the support to the side of the cockpit with screws and glue. Fig. 5 pictures the pontoons and cockpit completely assembled with the canvas seats laced in place. The rope lacing is passed over the cockpit gunwales and through holes drilled in the sides. At the crossbeams, the rope is passed through notched cleats which are screwed to the undersides of the beams.

The centerboard is made as shown in Fig. 11 and the right-hand detail of Fig. 17. Edges of the plywood sides are glued and nailed together all around. After assembly, the upper end of the centerboard is drilled for a pivot bolt and hoisting shackle. The mast step is installed directly over a frame fore of the centerboard trunk, as in Figs. 8 and 9.

The folding rudder can be cut from galvanized steel or 1/2-in. plywood as in the squared pattern, Fig. 12. The steering arms for both rudder and tiller ends of the link-



### HOW PONTOONS ARE ATTACHED

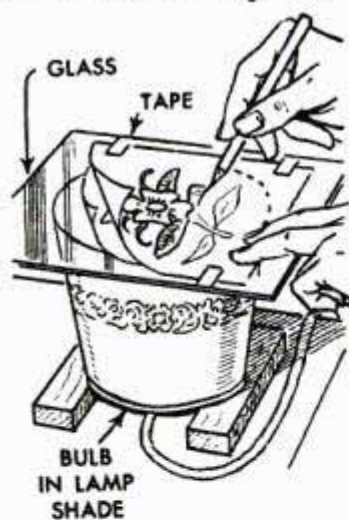


age are cut as in Fig. 13, which also gives the pattern for the 3/4-in.-plywood pontoon hangers. The rudder is assembled and then mounted on the hull with a brass bracket braced with tubing, Figs. 11 and 14. The rudder-and-tiller assembly is pictured in Fig. 18. The tiller arm is pivoted on a length of brass tubing as in Fig. 19, the lower end of the tubing being flared to lock it in a brass flange. Note that the tubing is pinned to a pivot block at the top and to a brass flange just below the block. The tiller itself is bolted to the pivot block and the flange is screwed to the top of the tiller arm, as indicated.

All wooden surfaces of Trimaran should be sanded smooth before painting, and then a copper-base wood preservative applied. Follow the preservative with two or three coats of marine paint in the desired color and apply antifouling bottom paint to the area below the waterline.

Fig. 20 shows the general rigging plan and sail sizes. A standard 26-ft. aluminum mast may be used, or one can be made of Sitka spruce. A pear-shaped cross section is recommended for the wooden mast, tapering from 3 in. at the top to 5 in. at the middle and then to 4 in. at the step.

### Lamp Shade and Glass Pane Provide Setup for Tracing



A small lamp shade and a pane of glass can be used to good advantage in tracing drawings or photos. Invert the shade and place it over a light bulb, resting the edges of the shade on blocks as shown. Place the glass on top of the shade. In use, the drawing to be traced is

taped to the glass and transparent or ordinary bond paper is placed over it. With the light on, the lines of the pattern can easily be seen through the paper.

### Trailer Lights Made Dependable by Improving Contacts of Ground Circuit

Trailer owners, who are unable to get dependable operation of the running lights and taillights, will find that the cause is often a loose contact in the ground circuit. The trailer hitch should be kept free of excess grease and rust if it is the only circuit contact between the chassis of the car and that of the trailer. However, a more positive contact can be provided by means

### Roofing-Paper Seams Sealed With Caster "Roller"



Needing a tool to press down the edges of newly laid roofing paper to insure waterproof seams, one homeowner improvised a roller from a furniture caster and a broom handle. The shank of the caster was simply fitted in a hole drilled in the end of the handle, the latter being long enough to permit rolling the seams from a standing position.

### Slip Poured Through Paper Spout

If you get things all messy while trying to pour slip from a container into a mold when making ceramics, use a simple pouring spout cut from heavy paper. Make the spout 2 or 3 in. wide and clamp it to the jar with a strong rubber band. When the pouring is done, just remove and discard the spout.



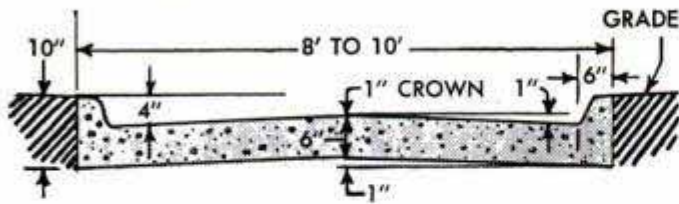
Hallie H. Holt, Springfield, Ill.

of two heavy wires, one attached to each chassis. A plug on one wire and a socket on the other provides for connecting the wires at the time the trailer is hitched to the car. Each running light, instead of being grounded to the body of the trailer, as is usual, should be connected directly to the trailer chassis by a heavy wire.

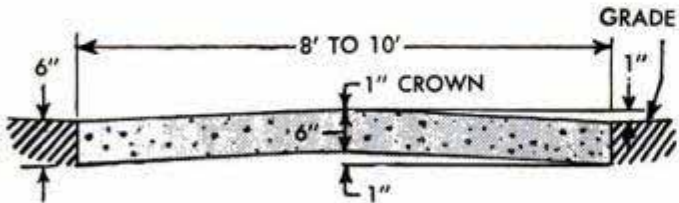
Frank H. Tooker, Lakehurst, N. J.

# POUR YOUR OWN

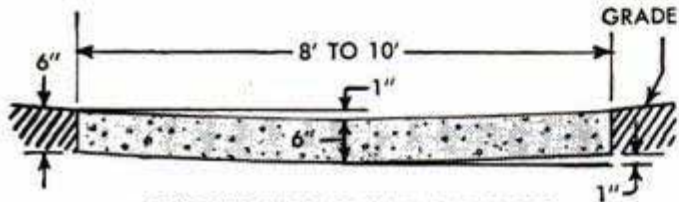
## TYPICAL FULL-WIDTH DRIVEWAYS



CONVEX SURFACE WITH CURBS

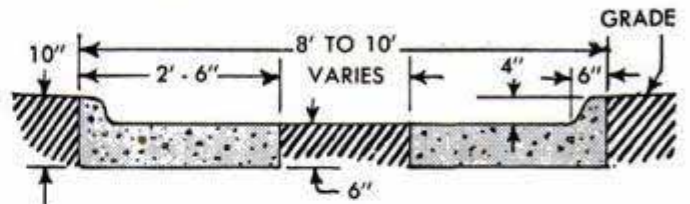


CONVEX SURFACE WITHOUT CURBS

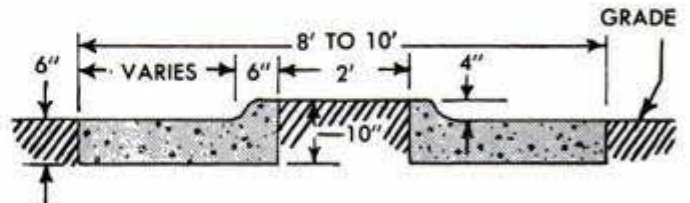


CONCAVE SURFACE WITHOUT CURBS

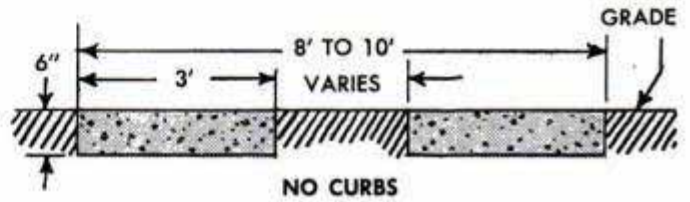
## TYPICAL TWO-STRIP DRIVEWAYS



CURBS ON OUTSIDE

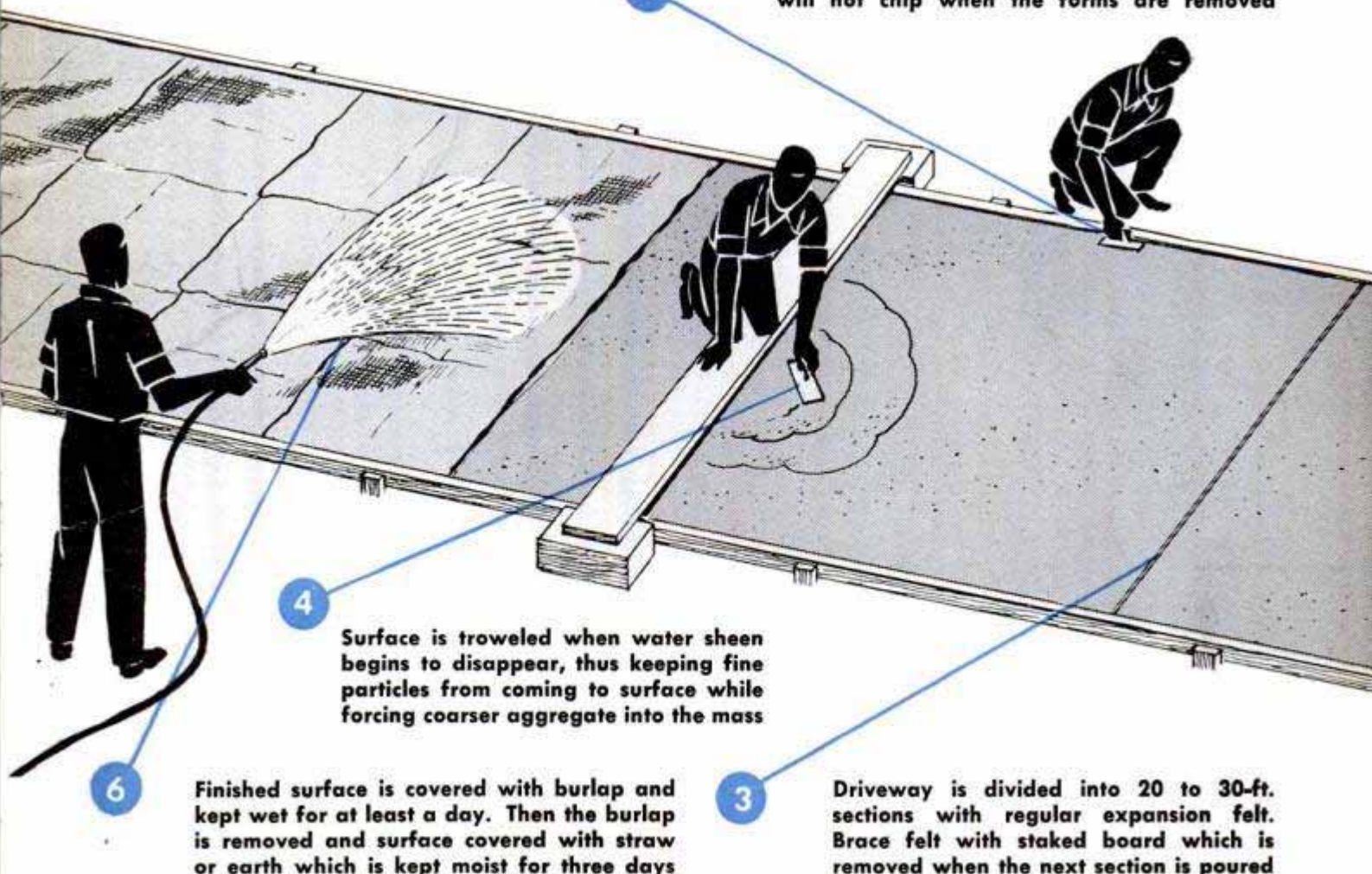


CURBS ON INSIDE



NO CURBS

An edging tool is used in the joints between the concrete and the side forms. The tool rounds the corners of the concrete so they will not chip when the forms are removed



5

4

Surface is troweled when water sheen begins to disappear, thus keeping fine particles from coming to surface while forcing coarser aggregate into the mass

6

Finished surface is covered with burlap and kept wet for at least a day. Then the burlap is removed and surface covered with straw or earth which is kept moist for three days

3

Driveway is divided into 20 to 30-ft. sections with regular expansion felt. Brace felt with staked board which is removed when the next section is poured



# DRIVEWAY

By Raymond Schuessler

**N**OW THAT ready-mixed concrete is available in many communities, pouring a concrete driveway is no longer the herculean job that only a work horse would try. The backbreaking labor of feeding a mixer, wheeling the heavy grout and cleaning up the ensuing mess has been eliminated, thus bringing the job easily within the capabilities of the average homeowner. A ready-mix truck will back into the excavation and pour the concrete right into the forms. Because of the controlled methods of mixing, ready-mixed concrete also is likely to give you a far better job than if you had mixed it yourself.

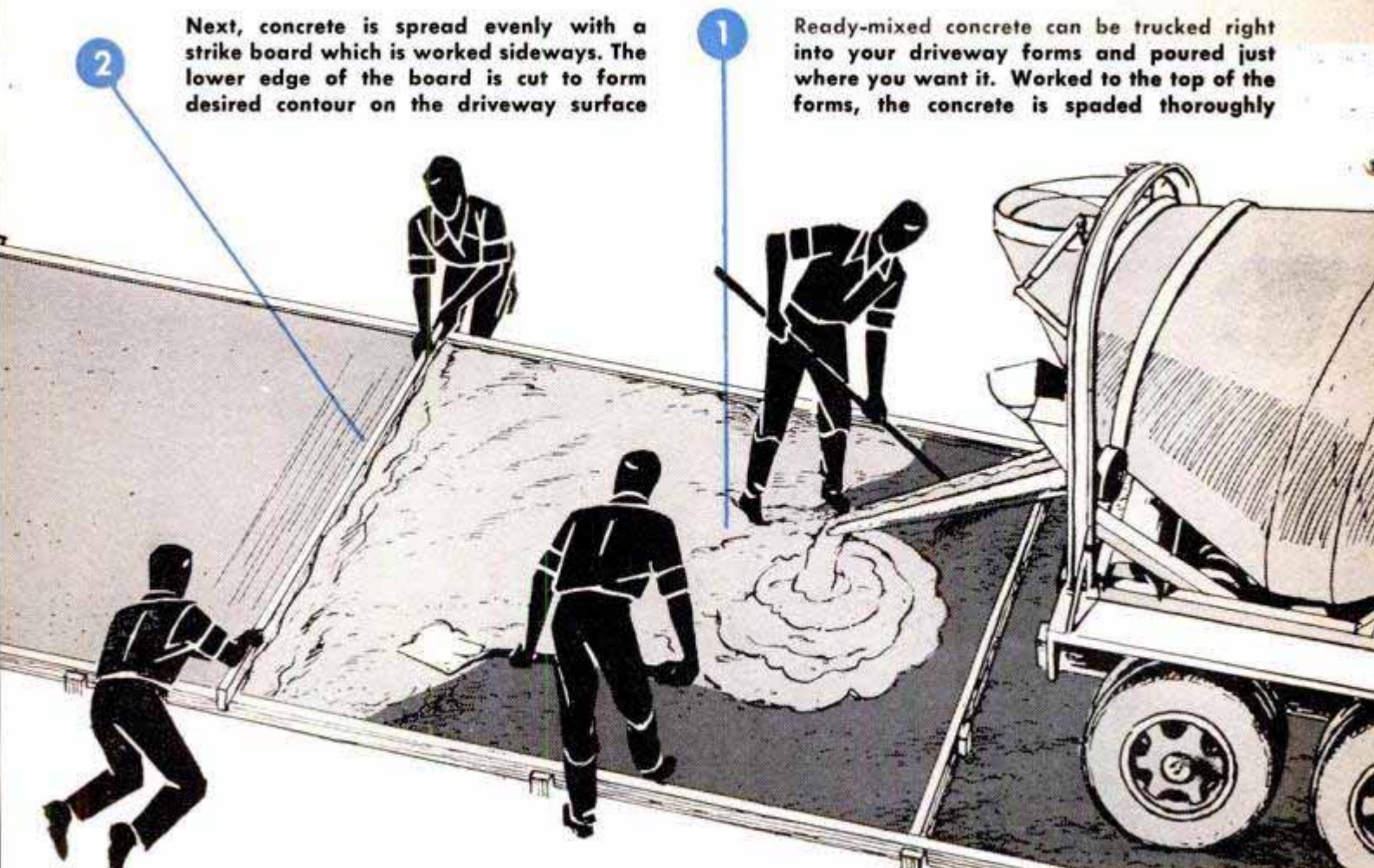
The details at the left show typical full-width and two-strip driveways with convex or concave surfaces to assure proper drainage. The one selected should be determined by the load carried, drainage requirements and your personal preferences. If the drive is subjected to fairly heavy traffic, the full-width pavement will stand up longer. However, the two-strip drive will prove satisfactory where only occasional usage is involved. Note that a 6-in. layer of concrete is recommended on all types. Although this thickness is not necessary for passenger cars, it is required to



If ready-mixed service is not available in your community, your next best bet is a rented mixer. With the aid of a friend or two to keep the job moving, you won't be caught short when it comes to troweling

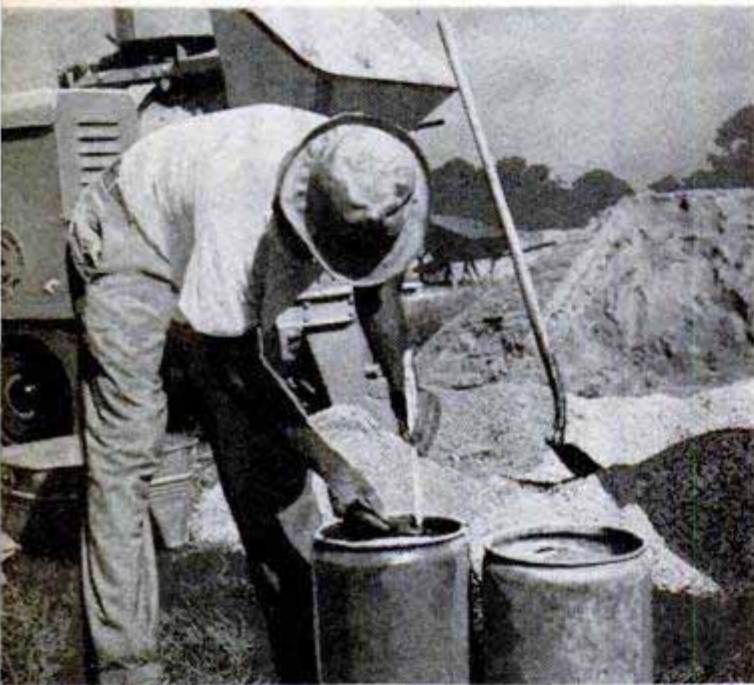
**2** Next, concrete is spread evenly with a strike board which is worked sideways. The lower edge of the board is cut to form desired contour on the driveway surface

**1** Ready-mixed concrete can be trucked right into your driveway forms and poured just where you want it. Worked to the top of the forms, the concrete is spaded thoroughly





In making  $\frac{1}{2}$ -bag batch of 1 :  $2\frac{1}{4}$  : 3 mix, measure  $2\frac{1}{2}$  gal. of water into pail and mark level on inside. Then pail can be refilled with garden hose, as above, for adding just the right amount of water to the mix



For  $\frac{1}{2}$ -bag mixes, a bag of portland cement can be divided equally by using two pails of the same size. With a ruler, measure from the rim to the top of the cement to be sure that the level is the same in both pails. Then mark one for use as a measure

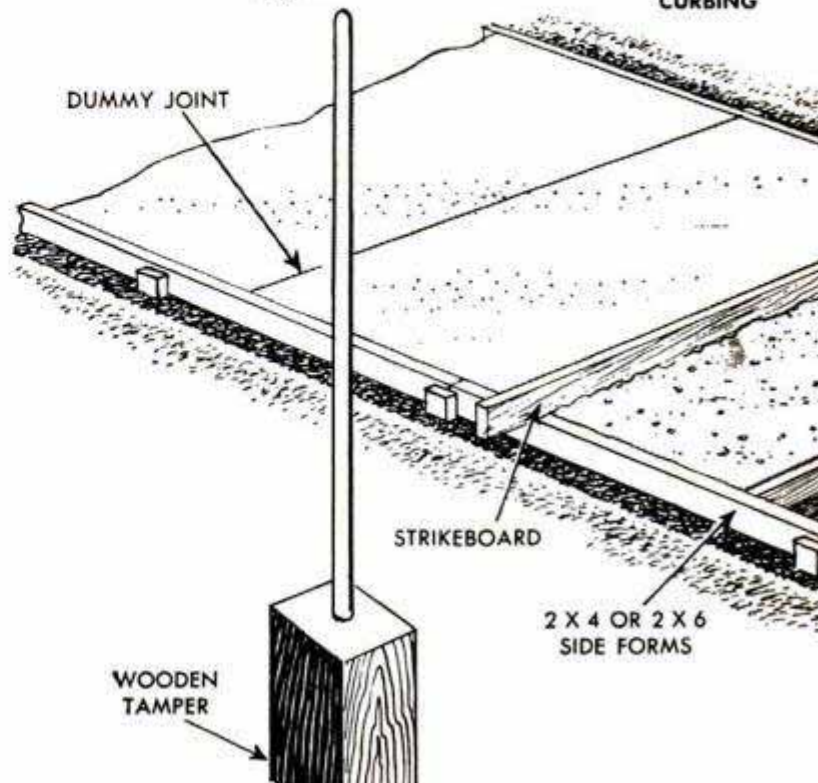
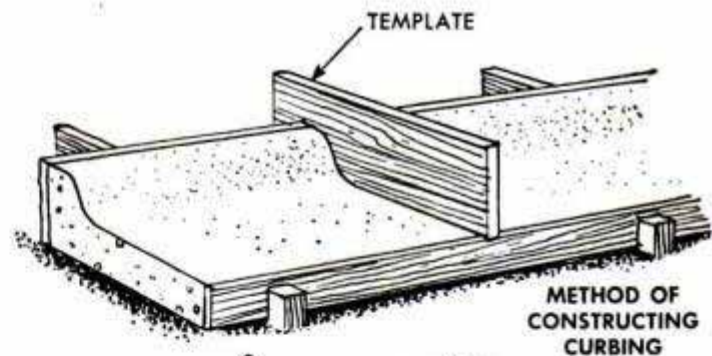


carry safely the weight of coal and other delivery trucks.

The first step in building the driveway is to stake out the proposed boundaries. Connect the stakes with string and drive the car over the route, just as you would after the driveway is poured, making any necessary adjustments in width and radius of curves. Sometimes it is easier to lay out curved driveways by driving the car over the desired path and then placing the stakes to conform with the route which was taken by the car.

The grade should be as slight as possible, as steep grades tend to be slippery and, in some cases, contribute to obstructing the driver's view of the sidewalk and street. Grades of more than 25 percent offer two additional problems. The underside of the car is likely to scrape the pavement at the top of the grade, while either the front or rear bumper of the car may scrape at the bottom of the grade. Sloping drives should be built straight, as it is difficult to handle a car down a curved incline, especially when backing.

After laying out the driveway, excavate deep enough to retain a depth of at least 6 in. after tamping. To assure uniform bearing power, remove all soft, yielding material, loose rocks and boulders from the

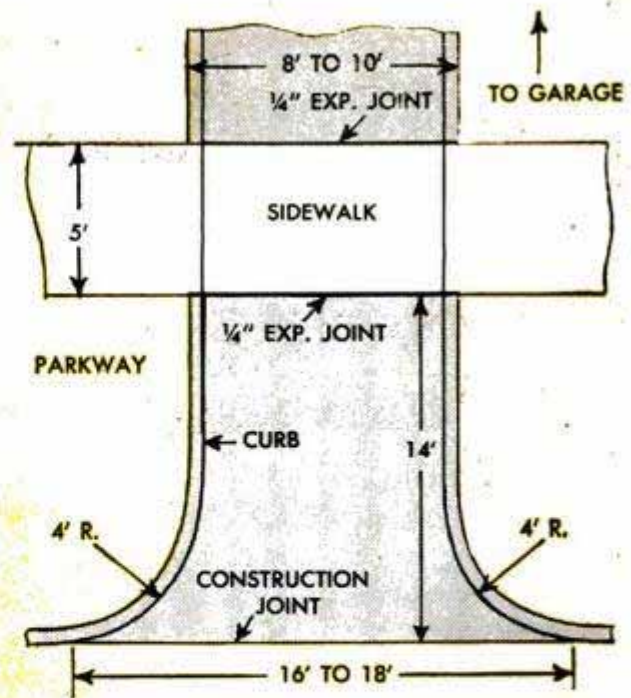
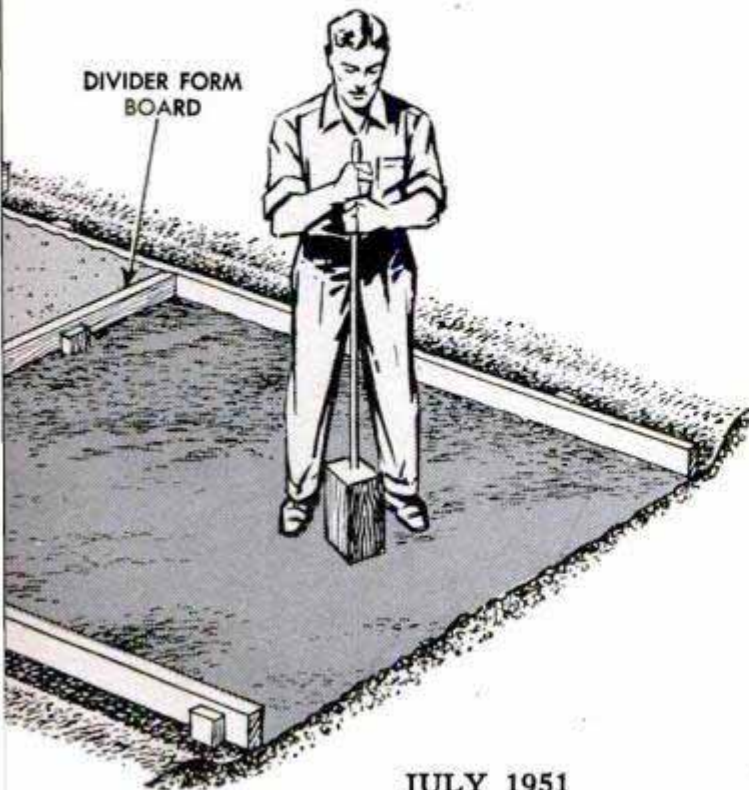
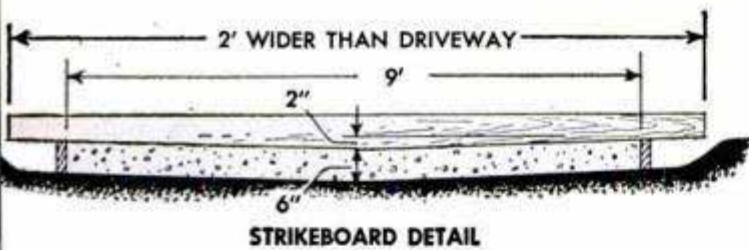


bottom of the excavation. Be sure that the bottom, or subgrade, is well compacted by tamping thoroughly before pouring the concrete, as settling will result in cracking of the driveway. On ground that has recently been filled, it is best to postpone pouring the driveway for a year or more.

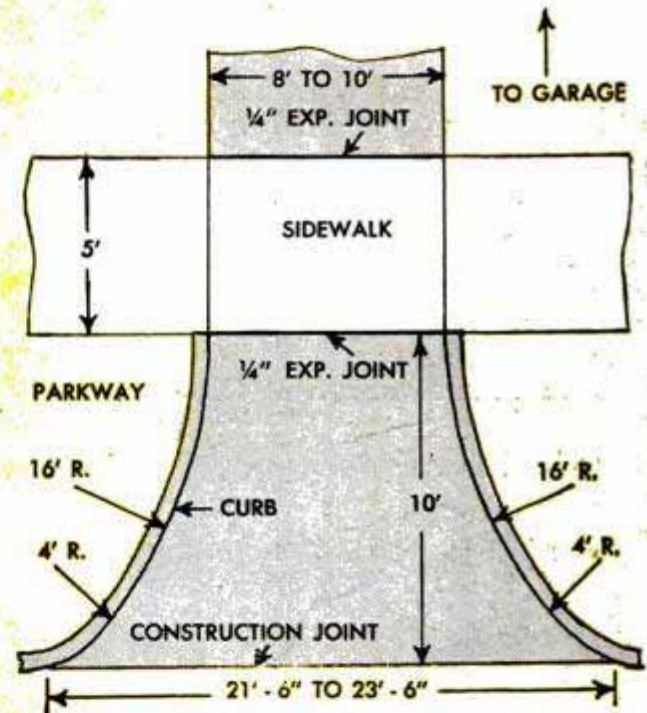
If you are unable to buy expansion felt, a similar joint can be made by placing greased boards crosswise between the side forms at 20 to 30-ft. intervals to form expansion joints. The boards are removed as soon as the concrete hardens sufficiently to retain its shape, and the openings are filled with roofing asphalt, or tar. Sand is sprinkled over the tops of the joints.

When the concrete is poured, it is spaded or tamped to assure consolidation and prevent honeycombing. As concrete usually must be poured and compacted within 30 min. after mixing in order to obtain maximum strength, it is a good idea to have two or more workers present to handle a truckload of ready-mixed concrete.

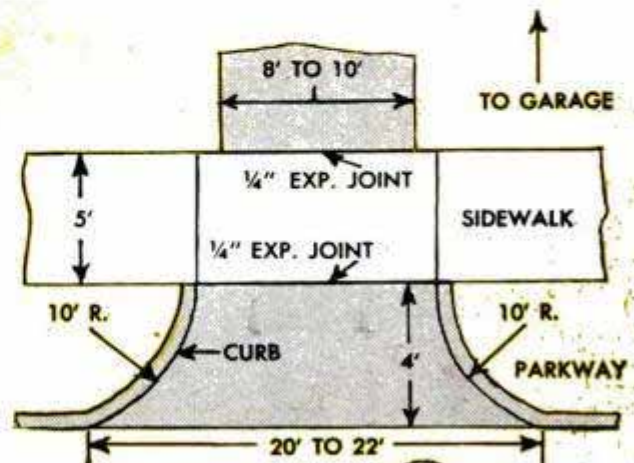
If ready-mixed service is not available and you must mix the concrete with a rented mixer, use a 1:2¼:3 mix; that is, cement, 1 part, sand, 2¼ parts, and gravel, 3 parts. To estimate the quantities of material needed, figure that 1 bag of cement contains 1 cu. ft., and that 1 ton of aggregate (gravel or sand) contains roughly 22 cu. ft. This, of course, will vary, and more accurate data can be obtained from your dealer.



TYPICAL DRIVEWAY FOR NARROW LOT, 30' STREET AND 14' PARKWAY

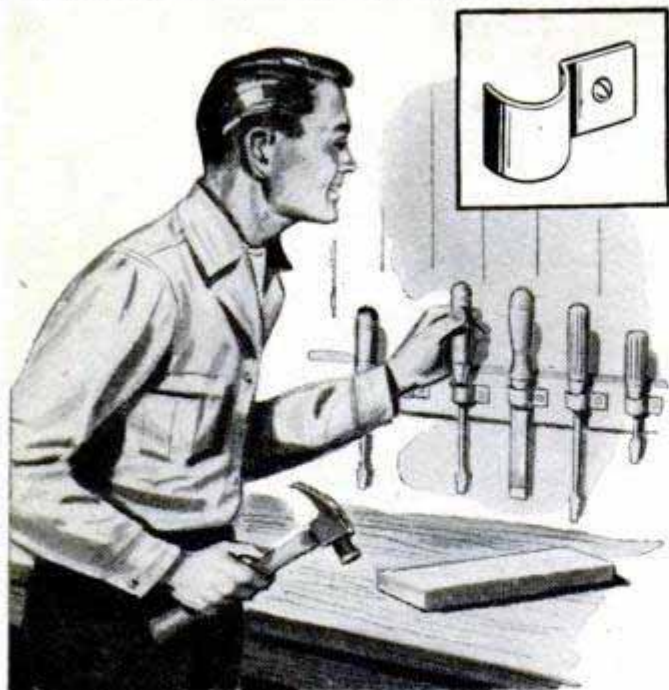


TYPICAL DRIVEWAY FOR 24' STREET AND 10' PARKWAY



TYPICAL DRIVEWAY FOR 28' STREET AND 4' PARKWAY

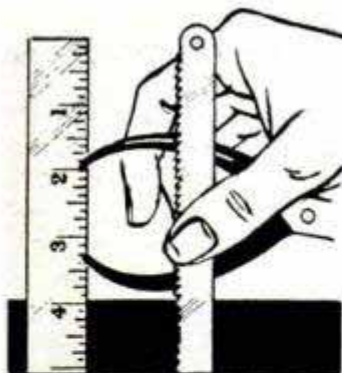
## Conduit-Clamp Toolholders



Craftsmen, wishing to arrange a group of small hand tools in neat rows on a wall panel, will find that metal conduit clamps, or cable straps, make excellent individual holders for the tools. Before attaching the clamps, the positions of the tools in each row should be determined by laying them out on a strip of  $\frac{3}{4}$ -in. stock, spacing them as desired and marking the locations of the clamps. Then screw the clamps to the strip and screw or nail the strip horizontally to the panel, as shown.

Arthur Trauffer, McClelland, Iowa.

## Pliers Used as Emergency Calipers



Where measurements are not too critical, a pair of ordinary pliers and a hacksaw blade can be used as emergency calipers. To use them, space the ends of the plier handles by means of a scale and then hold the hacksaw blade across them as indicated to aid in holding the set. The teeth of the blade when held firmly against the handles will help keep the handles in position.

B. F. Borsody, Arlington, Va.

## Tips on Cutting Glass

Don't attempt to use a thin, metal straightedge, such as a carpenter's square, when cutting glass. Instead, use a wooden yardstick that is thick enough to provide a substantial edge against which the glass cutter can be held. However, before using

it, check the yardstick to make sure that it is straight, and cover the underside with masking tape to prevent its slipping on the glass. In cutting the glass, lay it on a flat surface which has been padded with a piece of carpeting material or several thicknesses of burlap. Guides for cutting curved lines can be made from wallboard or  $\frac{1}{4}$ -in. stock. The pattern to be cut can best be seen if it is first drawn on paper and then placed under the glass. Cutting lines should end about  $\frac{1}{16}$  in. from the edge of the glass, as running the cutter off the glass will usually chip the edge. Don't go over a line, with the cutter, once it has been cut. Professional glass cutters will tell you that this is the quickest way to dull the cutter.

## Small Mechanisms Lubricated By "Hypodermic" Grease Gun

The difficult problem of getting lubricant into the bearings of small mechanisms, such as fishing reels, can be solved by using a hypodermic needle to apply the lubricant. These needles are available in various sizes and are ideal for the job as they apply the lubricant with considerable force, thus assuring that all surfaces of the bearing will be covered. In filling the "gun" remove the needle and slip a piece of spaghetti tubing over the nipple of the syringe. After filling the syringe, replace the needle. Use of the spaghetti tubing is necessary because the opening in the needle is too small to permit drawing the lubricant into the syringe. After use, the syringe should be cleaned with gasoline.

C. Thomas, Joplin, Mo.

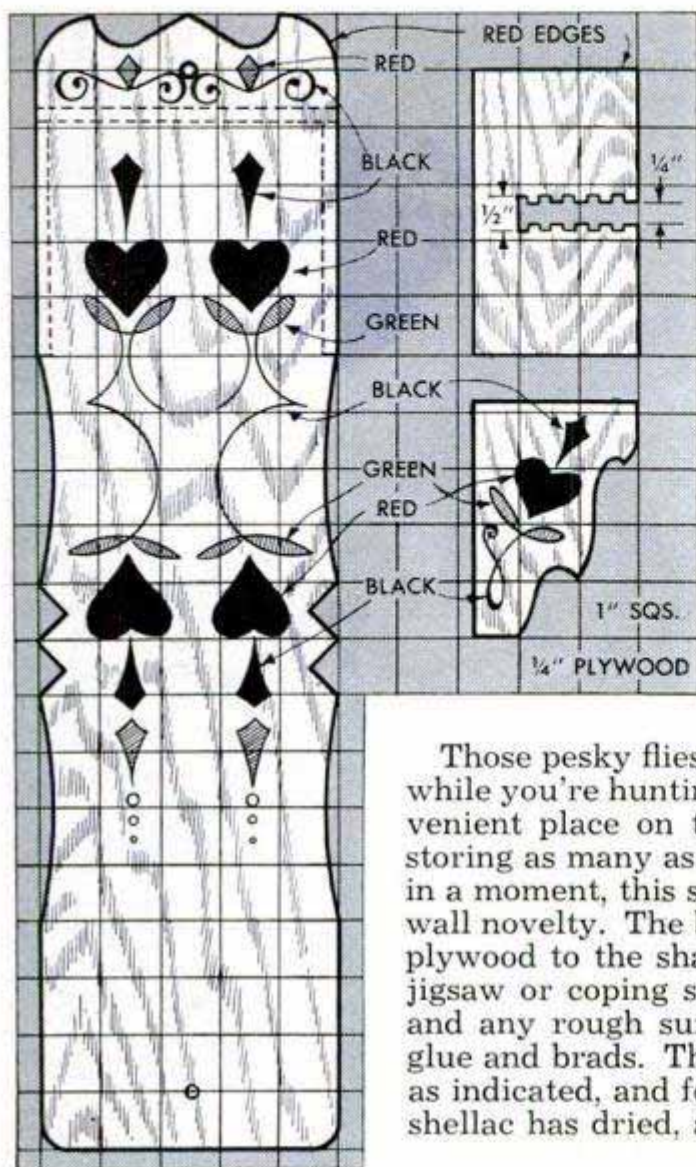


## Newly Painted Chairs "Shod" To Protect Floors

Newly painted chairs, although they seem to be dry, will sometimes leave marks on floors. This is caused by extra thicknesses of paint which have collected on the bottom edges of the legs. To avoid these marks, attach a wax-paper "shoe" to each of the legs. Simply fashion small cups from wax paper and place them over the ends of the legs. Then wrap the upper portion of the paper with string or rubber bands to hold the shoes tightly to the legs.

Sid Corlin, Chicago.

# Decorative Plywood Rack Holds Fly Swatters



Those pesky flies won't have time to hide among the curtains while you're hunting for the fly swatter, if you keep it in a convenient place on the kitchen or pantry wall. In addition to storing as many as five fly swatters where they can be reached in a moment, this scrolled plywood rack provides an attractive wall novelty. The back, side braces and top are cut from  $\frac{1}{4}$ -in. plywood to the shapes shown on the squared patterns. Use a jigsaw or coping saw to cut out the members, sand all edges and any rough surfaces smooth, and assemble the rack with glue and brads. Then paint the designs with show-card colors, as indicated, and follow with a coat of clear shellac. When the shellac has dried, apply a coat of clear varnish to the rack.

Roberta L. Fairall, La Crescenta, Calif.

## Valuable Advice From Master Craftsman on Refinishing Antiques

A master craftsman, wise in the ways of refinishing antiques to the smoothness of old ivory and with a gleaming, rich luster, gave me the following tips: First, clean the work with a good paint and varnish remover, using a cheap brush to apply a generous coat over a small area. Let the remover stand about 15 min. and, without wiping it off, apply a second coat. Then mix a gallon of warm water with a cup of household ammonia and use the mixture with a stiff-bristled brush to scour the treated surface. Dip a rough cloth (an old towel is excellent) into the ammonia water and wipe the area. Rinse at once with clear water, removing all traces of ammonia and the work should be good and clean. Remember to clean only a small area at a time, for if varnish remover is applied over too large an area, it will harden into a cement-like finish. Should that happen, apply more remover—several coats, 15 min. apart—until you can wipe the surface clean. Before further refinishing is done, make any nec-

essary repairs to the work. Then sand with 1/0 or 2/0 garnet or sandpaper until very smooth. Wipe clean and apply the first coat of shellac, using a 4-lb. cut. Thin a pint of shellac with a pint of denatured alcohol. Use orange shellac on dark woods, such as mahogany, cherry and walnut, and white shellac on the lighter woods. Using a pure bristle brush, apply two coats of shellac with the grain of the wood, allowing 4 or 5 hrs. between coats. Between succeeding coats, allow 24 to 48 hrs. drying time. Sand after each coat using 6/0 or 7/0 garnet paper. Never apply shellac in damp or humid weather, and if the shellac gums up on the sandpaper, allow more drying time. When you have built up the desired number of coats, mix 3 heaping tablespoonfuls of fine pumice with paraffin oil to attain a creamy mixture. Then dip a pad of 000 steel wool in the mixture and rub the work briskly with the grain. When finished, wipe the surface with a soft cloth. Repeat this process twice.—Ray Wilkie, Lexington, Ky.



## Support for Long Gutter Lengths Permits Installation by One Man

This adjustable support holds one end of a new length of gutter while you fasten the hanger at the opposite end. It's just the thing for bungalow and ranch-type homes where the gutters are at a uniform height. Use 1 x 4s for the upright and the angle bracket at the top end. Nail a crosspiece to the lower end of the upright and brace it as shown. If you require height adjustment, drill a row of equally spaced holes near the top end of the upright as well as in the angle-brace member, joining these parts with bolts and wing nuts. In use, the horizontal brace rests against the house.

Arthur W. Nelson, Kansas City, Mo.

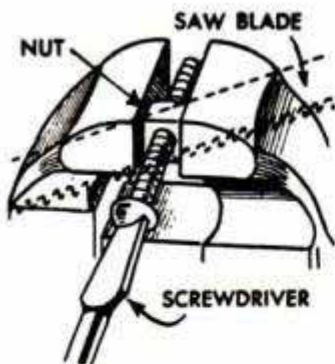
## Bobby Pin Taped to Paste Bottle Serves as Brush Holder

Occasional use of library paste usually necessitates looking for the paste brush which easily becomes misplaced. One user solved this problem by taping a bobby pin to the bottle so that the hollow metal handle of the brush could be slipped over the pin as indicated. There is sufficient grip in the pin to prevent the brush from becoming dislodged.—John J. Rea, Urbana, Ill.



## Holding Machine Screws in Vise When Cutting With Hacksaw

When it is necessary to shorten a small machine screw or stove bolt, or make a stud by cutting off the head of the screw, turn a nut on the threaded end so that the screw can be gripped in the vise without damaging the threads. Run the nut back close to the point where the screw is to be cut, lock in the vise as in the detail and then insert a screwdriver



in the slot as shown to prevent the screw from turning while sawing.

Frederico Strasser, Santiago, Chile.

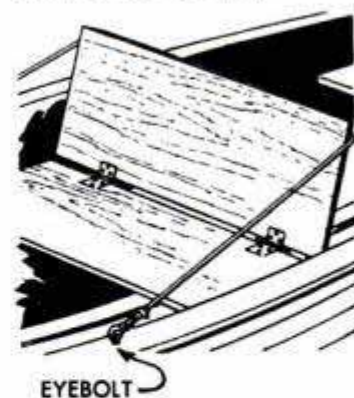
## Removing Calcimine From Walls

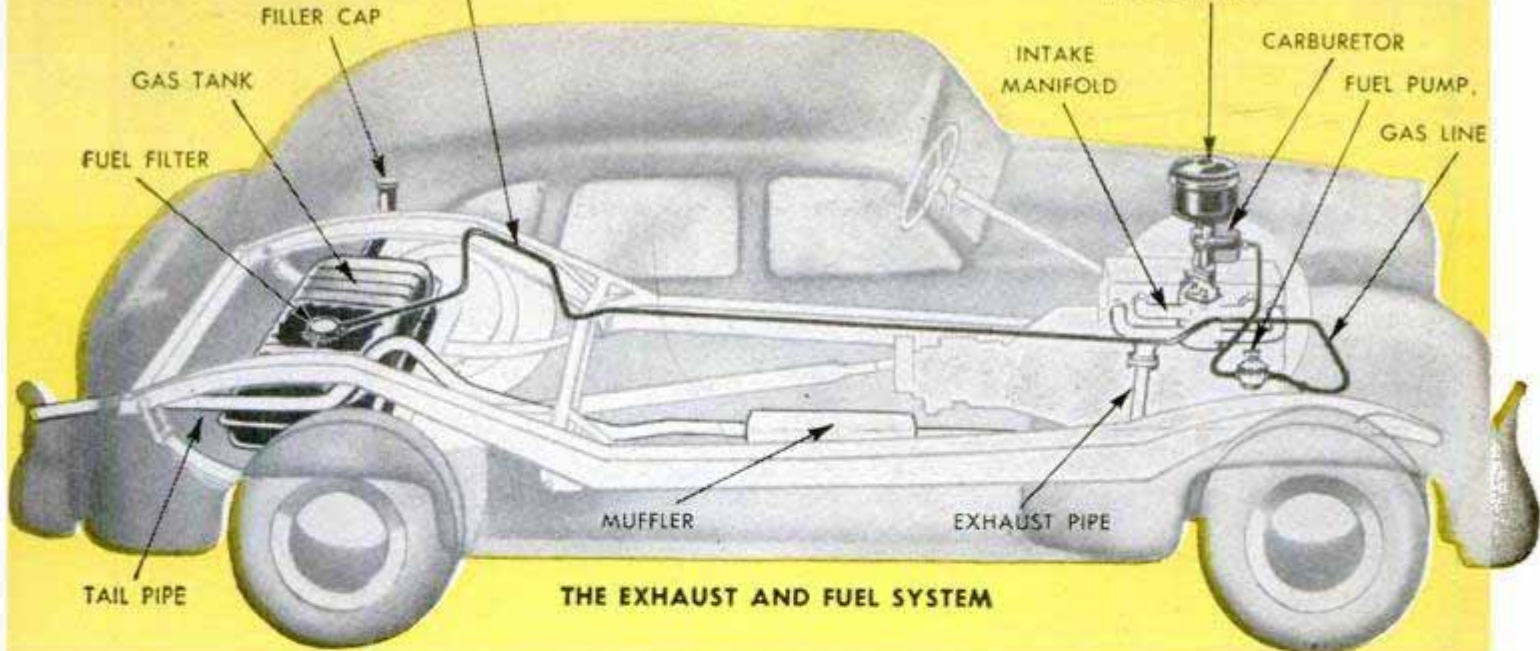
To remove calcimine, soak it thoroughly with a wet brush, or pat it with a very wet cloth. Usually, a thorough soaking will permit the calcimine to be rubbed off with a cloth or sponge. It is best to clean only a small area at a time. If a hardener has been used in the calcimine, such as alum, you may have to use a putty knife to scrape it off after soaking it.

Colorless fingernail polish is a good substitute for lacquer on small jobs.

## Folding Backrest on Boat Seats

Mindful of the comfort of his guests, one boatman fitted the seats of his boat with folding backs, which were supported by ropes equipped to snap into eyebolts attached to the gunwales. The backs were cut from  $\frac{3}{8}$ -in. marine plywood, rounded at the upper corners and strengthened by two strips of hardwood screwed near the top and bottom edges. Loose-pin butt hinges were used to attach the back to the seats. In this way the backs were easily removed by un-snapping the support rope and pulling the hinge pins. The backs were finished in the natural color of the wood with a special primer and two coats of spar varnish.



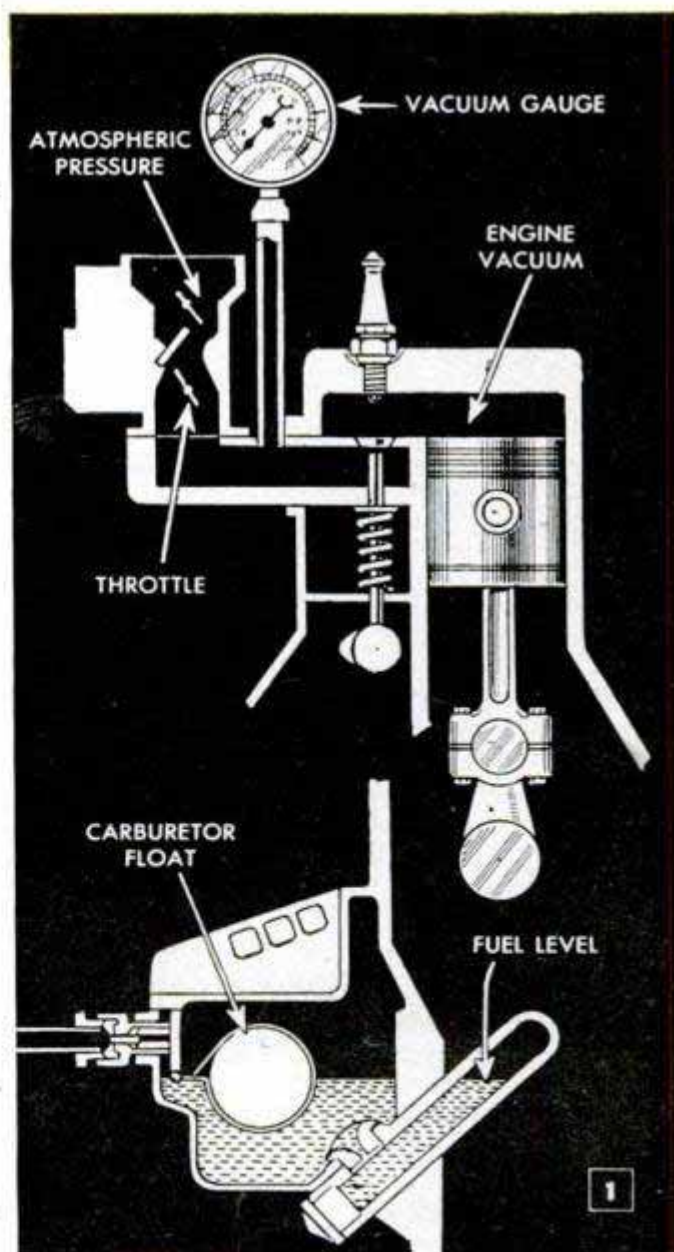


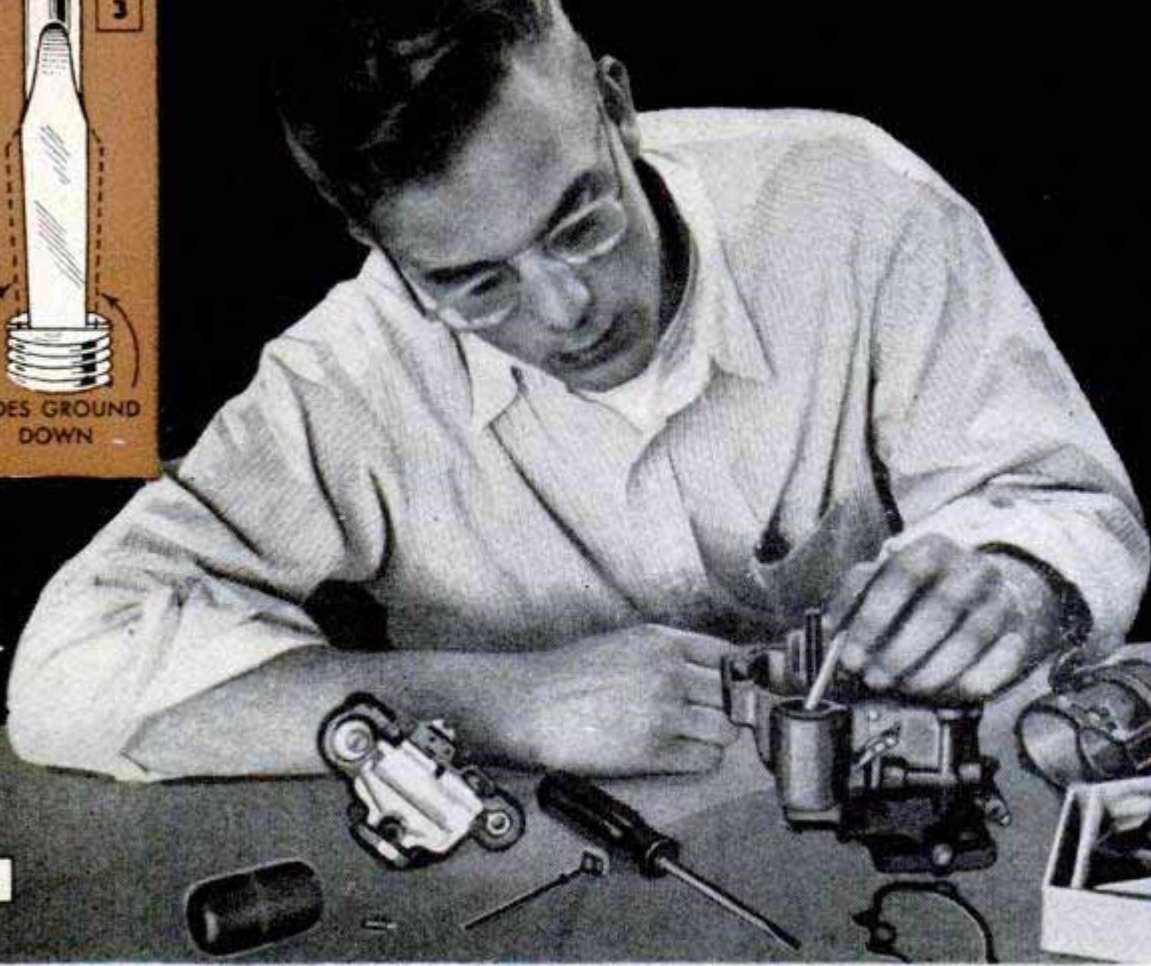
# Serviceing the CARBURETOR

By Ed Packer

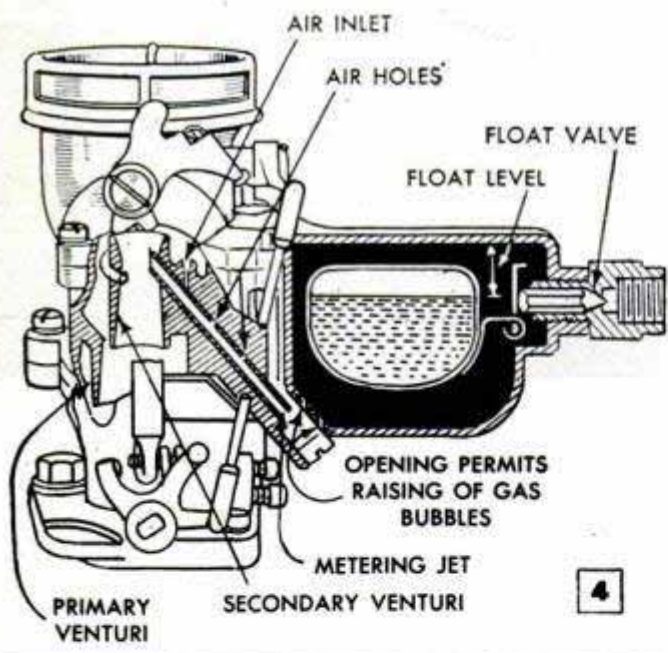
**F**REQUENTLY a thorough cleaning of the carburetor alone will make an old car run like new. Accumulations of dirt and gum probably result in more carburetor troubles than any other single cause, and periodic cleaning and adjusting of the unit will give you easier starting, snappier acceleration and greatly improved gas mileage for both summer and winter driving. Anyone can take apart, clean and reassemble a carburetor, but to avoid damaging certain of the delicate parts of the unit, you should acquire the "mechanic's touch" and handle everything as if it were made of glass.

A reliable check of carburetor performance before and after servicing can be had by the use of a vacuum gauge, Fig. 1. When the engine is idling, the vacuum gauge, which is installed between the carburetor and the engine as in Fig. 1, will give its highest reading, normally between 18 and 21 divisions on the dial. This reading will be lower at high altitudes. The uniformity of the reading is the important thing in this test. Anything that causes the engine speed to vary will cause the gauge pointer to swing back and forth with the variation in speed. Although this variation in the gauge reading can indicate other mechanical faults, one of the most common causes is a rich fuel mixture. When a mechanic sees the wavering pointer on the vacuum gauge, he immediately thinks of the most likely causes. In a new car there's



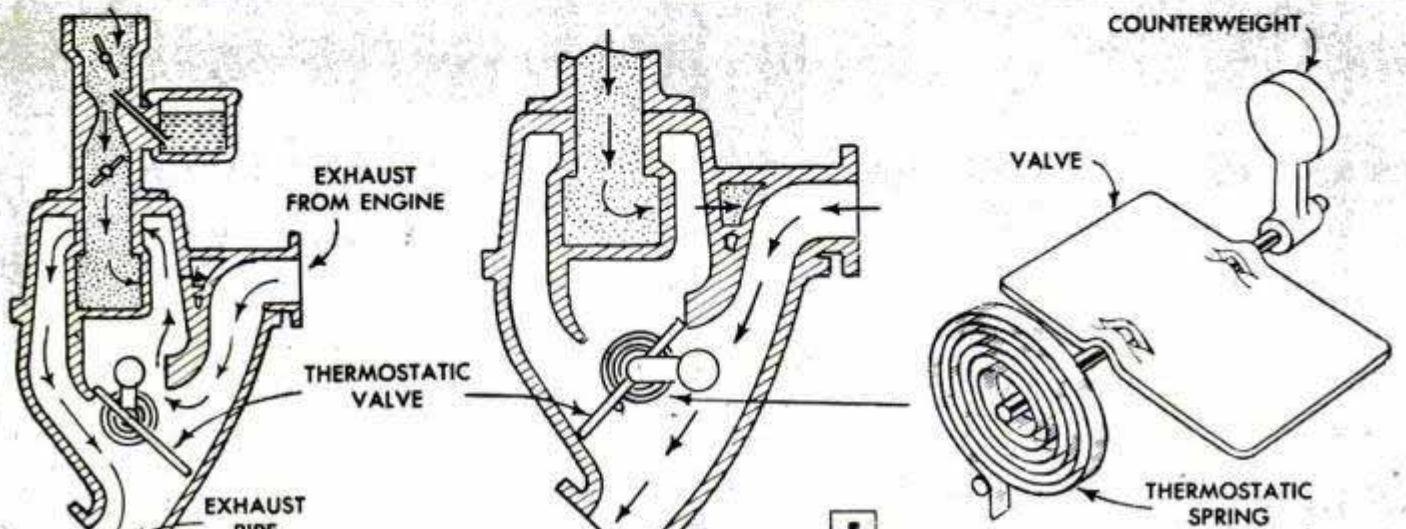


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a good chance that the trouble is due to a clogged air cleaner. In an older car the mechanic thinks of a bit of dirt or gum in carburetor jets, and, more rarely, the float sticking, or not properly adjusted. Perhaps a needle valve has been damaged by turning it in too tightly. Sometimes the air holes in the metering jet are clogged with gum and dirt, Fig. 4. These are among the more common causes of a rich fuel mixture and a rough engine.

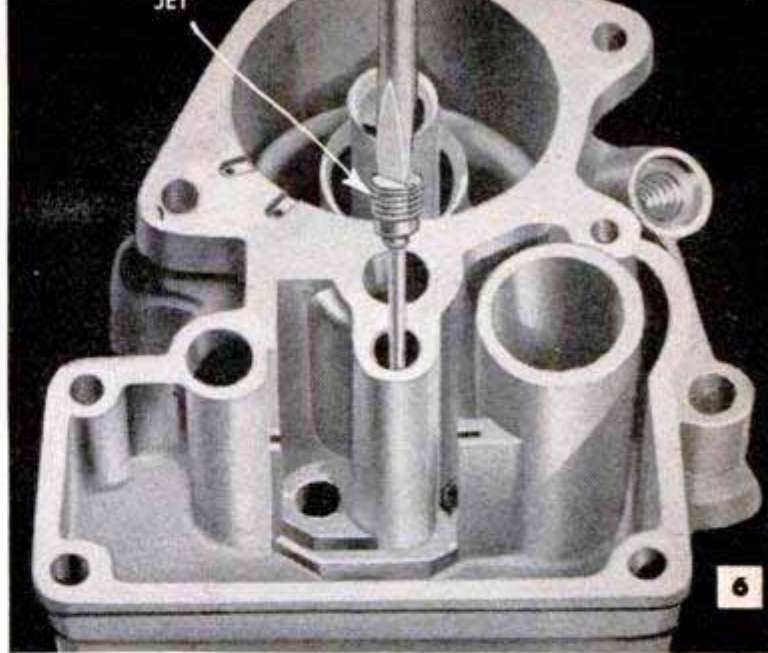
In carburetor diagnosis, one thing to keep in mind is the age of the car, both in years and miles. In older cars the float level will change gradually because of wear in the parts and, in time, looseness reaches a point where raw fuel is discharged into the air stream in ever increasing quantities. The lower detail in Fig. 1 and detail A in Fig. 8 show more clearly what happens. While



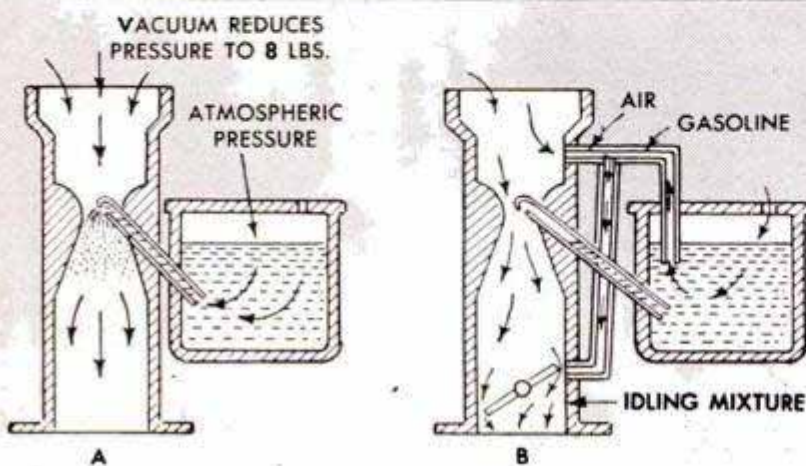
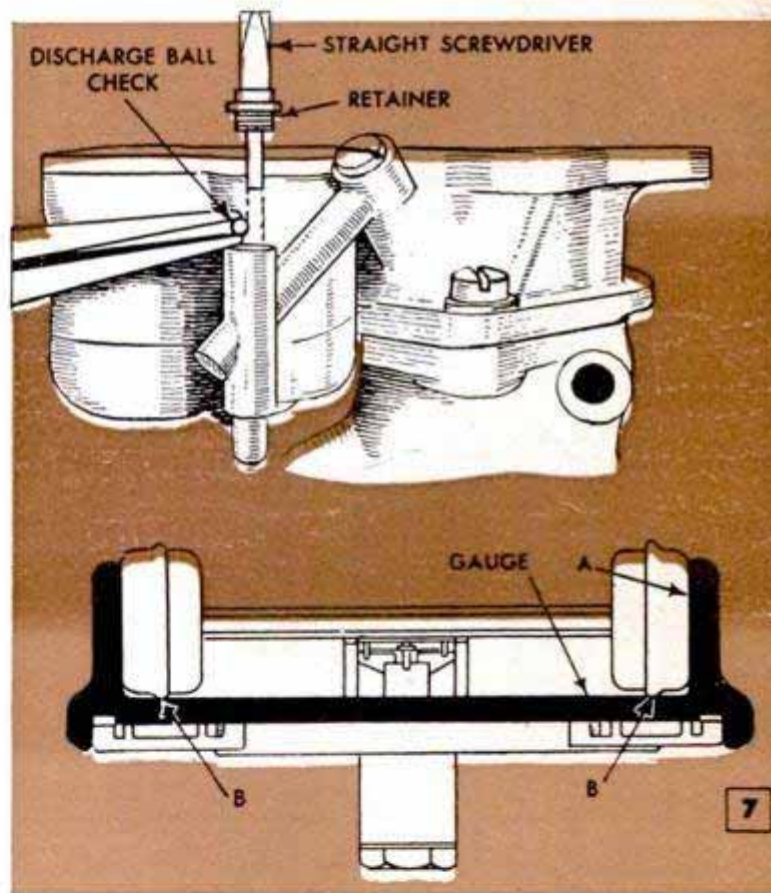


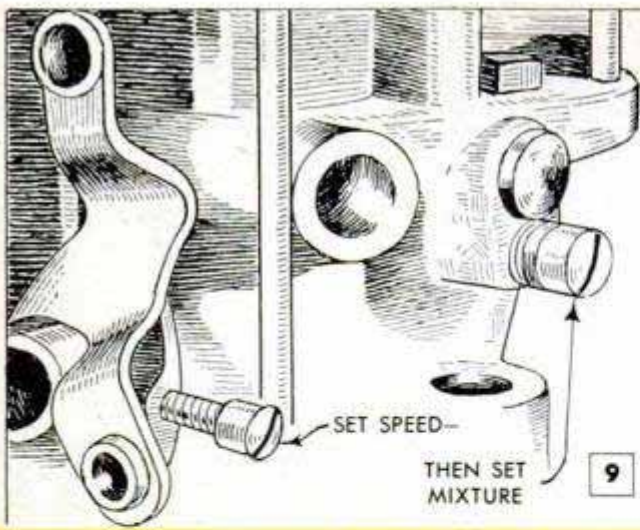
atmospheric pressure pushes down on the gasoline in the float chamber, detail A in Fig. 8, manifold vacuum drops the pressure at the restriction of the air horn, or venturi, to about 8 lbs. Difference in pressure forces the fuel through the main jet and into the air stream. As the fuel level rises as a result of wear in the float, more and more fuel is discharged into the main jet. When the throttle is closed, another set of fuel passages provides the idling mixture. These are shown in the simplified detail B, Fig. 8. Fuel is drawn from the bowl through the idle tube, or jet, and is mixed with air which enters through a small bleed opening. The air-fuel mixture then passes into the idle discharge ports, one of which is provided with an idle-adjusting screw, as shown in Fig. 9.

When the engine and carburetor are in good operating condition, adjusting idling speed and fuel mixture is simple, even though some engines are more sensitive to changes in the adjustments than others. First, turn the speed screw inward to speed up the engine, or outward to slow it, until the desired idling speed is obtained. Next, the mixture screw is turned in very slowly and by stages until the engine begins to roll and lose power. Then back the screw (counterclockwise) until the engine smooths out and idles steadily. If the carburetor is clean and otherwise in good condition, the engine will respond almost instantly to sudden, hard acceleration and will return to idling speed smoothly when the throttle is closed. However, if the float is high, or if dirt and gum have restricted passageways, turning the idling screw in or out may make little difference in the performance of the engine. Under sudden acceleration it is likely to lag through a "flat spot" and pop back violently through the carburetor. When idling, the speed generally varies and the engine rolls from side to side on its mountings. Under these conditions it also is likely that the accelerator pump, detail C in Fig. 8, is defective. This generally is the case if there is a flat spot

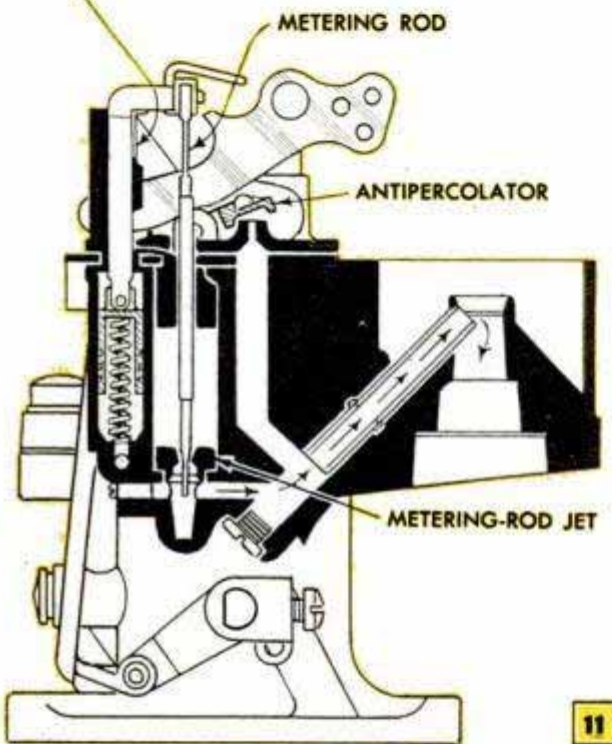
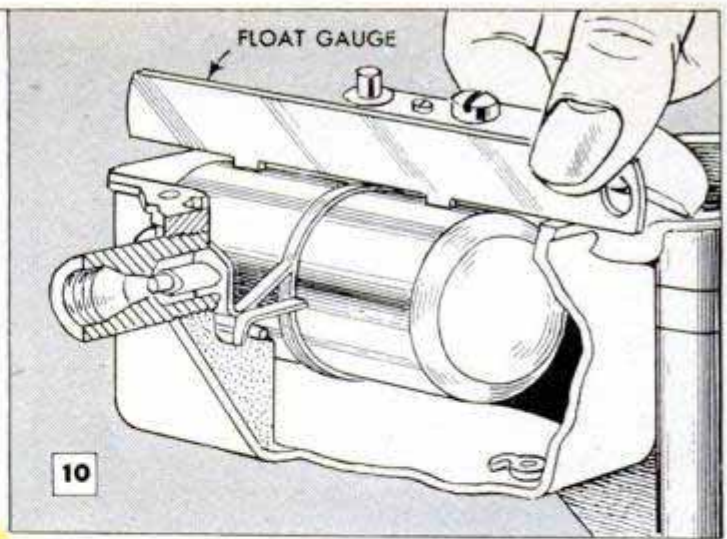


If examination of parts of the low-speed jet turns up evidence of undue wear or corrosion, they should be replaced. Be careful when installing the jet not to turn the retainer down too tightly and damage threads





VACUUM PISTON AND LINK ASSEMBLY



in the acceleration cycle above idling speed.

To remove the carburetor, first disconnect the ground cable from the battery. Then wash away accumulated oil and dirt from the choke and throttle controls and also the mounting flange, using white gasoline or other suitable solvent. Remove the air cleaner and, if it is of the oil-bath type, be sure to place it upright on a table top or other level surface until you are ready to clean it. Disconnect the throttle and choke rods and remove the cap screws holding the carburetor on the mounting flange. Remove the gasket carefully so that no part of it falls into the intake manifold. Fold a cloth and press it tightly into the open end of the manifold to prevent the entrance of dirt and other particles. Place the carburetor on a large clean sheet of paper on a table top as in Fig. 2, and then grind down a screwdriver blade, as in Fig. 3, so that you can reach into tapped holes and remove

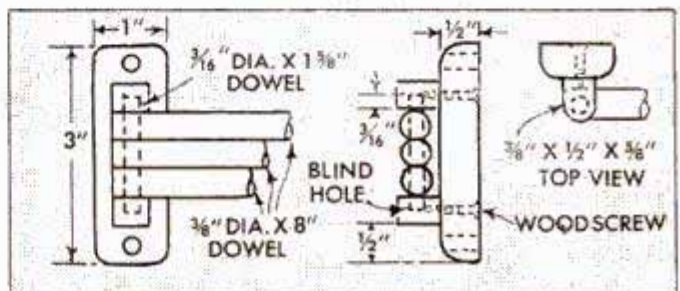
retainers and other small parts without damaging the threads. As parts are removed, place them in order so that they are easily reassembled. Apply penetrating oil, or better still, lacquer thinner, to parts that refuse to loosen under moderate pressure of the screwdriver. To make an accurate check of the float level, Fig. 4, it is best to use a float gauge. Check the floats in twin-bowl carburetors with a gauge of the type shown in the lower detail in Fig. 7. This gauge usually has two arms, A, which indicate the recommended heights of the floats, B. For single-bowl carburetors, the gauge usually is of the type shown in Fig. 10. In any case, use a gauge specifically designed for the carburetor at hand. Often it is possible to adjust the float by bending the float arm slightly but, before doing this, remove the valve and examine it carefully for defects. If the valve seat is corroded or if the point of the plunger is ringed, the parts should be replaced. The same is true of the low-speed jet, Fig. 6, and the discharge ball check, upper detail in Fig. 7. Many manufacturers supply replacement kits which include retainers, jets, accelerator pump, gaskets, and parts of the throttle and choke controls. It is recommended that in carburetor servicing these units be installed to replace parts that have become worn or damaged. After removing all the parts, the carburetor body should be given a thorough cleaning with lacquer solvent (thinner), which will remove the accumulated gums and dirt. Pour the solvent into a container and place the carburetor body in the liquid, allowing it to remain immersed for about one hour. Cover the container during this time to prevent rapid evaporation of the contents. *Caution:* Lacquer solvent is highly flammable and volatile. Remember the fire hazard, and also avoid inhaling the fumes. After cleaning with solvent, remove the carburetor body and blow out all the passages with compressed air. A bicycle pump will provide sufficient air pressure for this job. Clean

small parts by placing them in a fine-mesh wire strainer and shaking them lightly in the solvent. Never use a sharp-pointed tool or a wire to clean the passages in the carburetor or jets. The jets are calibrated to precise dimensions and any enlargement of the openings or scoring of the seats will affect the operation of the carburetor. Be especially careful when assembling jets and ball valves to make certain that dust and fine abrasive particles do not find their way into the seats and openings. Be sure that all retainers are installed with the proper gaskets. After installing the float, check the level to be sure that it agrees with the float level specified for that particular carburetor. Likewise, carburetor manufacturers provide specific recommendations for setting the metering rod and the antipercolator mechanisms, Fig. 11, as well as the automatic choke. These recommendations will vary for different makes and types of carburetors, so it's a good idea to have this information at hand for the carburetor you are servicing.

After the carburetor has been cleaned, checked and reassembled, replace it on the manifold, using the proper gasket, and drawing the mounting screws down uniformly. Connect choke and throttle controls and the fuel line. Then disassemble the air cleaner and clean it thoroughly before replacing.

Start the engine and while it is warming up, note carefully the action of the heat-control mechanism, Fig. 5. When the engine is cold, the valve is closed as in the left-hand detail and the hot exhaust gases are deflected upward and around the intake manifold. As the engine manifold warms to operating temperature, the thermostatic spring gradually loses tension, permitting the valve to open as in the center detail. Proper operation of the valve mechanism is essential as it provides a means of shortening the warm-up period and thereby reduces fuel consumption and crankcase dilution. Other points to check at the time of servicing the carburetor are the tension of the foot accelerator spring and the setting of the fast idle. On some carburetors, the fast-idle mechanism requires no adjustment, but on others there is a recommended clearance between the throttle-lever adjusting screw and its bearing point, usually a dimple on the carburetor casting. A weak spring on the accelerator permits movement of the pedal when driving over rough roads or pavement and causes the accelerator to discharge excess fuel into the air stream at the carburetor venturi. This defect should be eliminated by renewal of the spring. Occasionally, this defect alone accounts for unusually low gas mileage and unsatisfactory operation of the engine.

## Convenient Rack for Kitchen Towels Has Three Swinging Arms

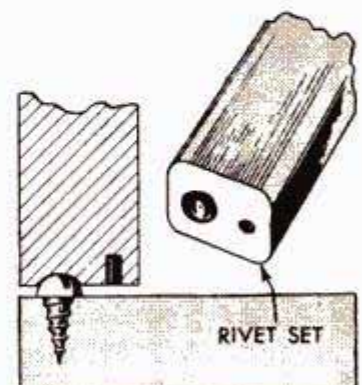


This small towel rack, the arms of which can be swung out of the way when not in use, serves as a convenient kitchen rack for drying dishcloths and towels. It can be constructed from a few scraps of 1/2-in. stock, three 8-in. lengths of 3/8-in. dowel, and a short length of 3/16-in. dowel. The corners of the base piece are rounded with sandpaper and 1/8-in. holes are drilled at the indicated positions. Blind holes in the hinge arms receive the ends of the 3/16-in. pivot pin. The holes in the 3/8-in. dowels are drilled 1/4 in. from the ends. All joints should be glued and the hinge arms fastened with flat-headed screws.

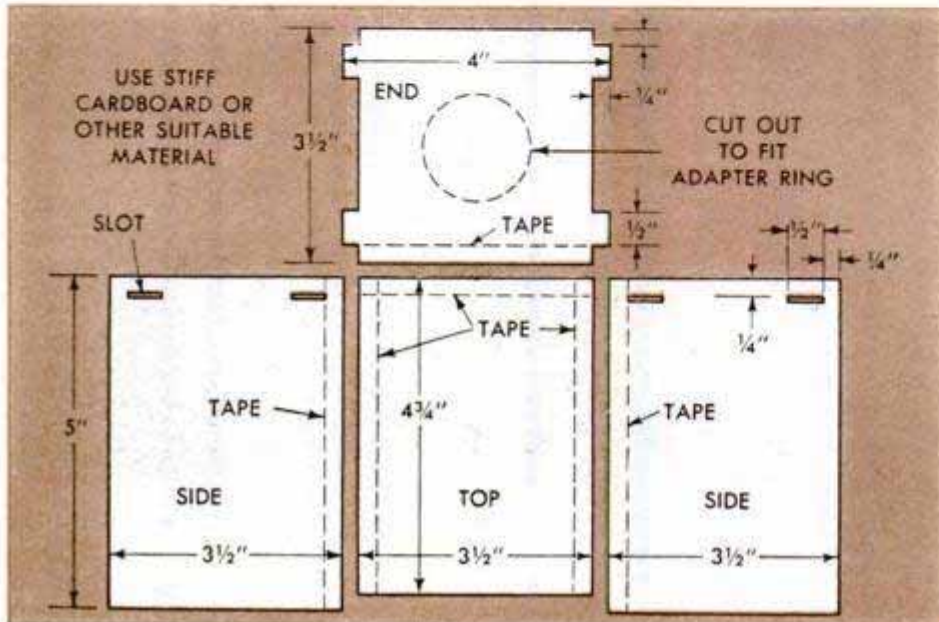
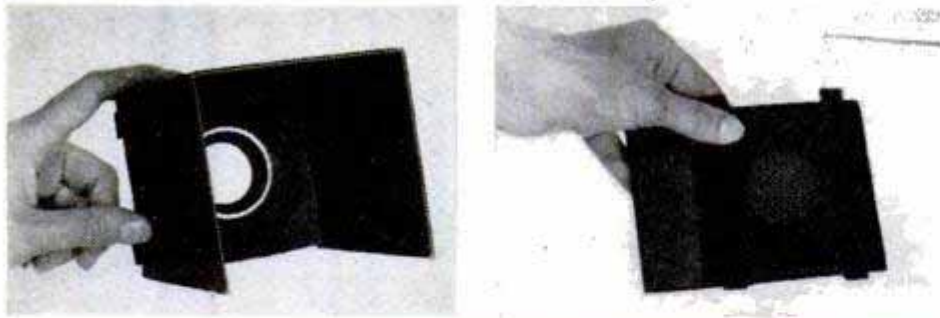
## Rivet Set Smooths Screwheads

In using a file to remove burrs from round headed screws, which have been damaged in setting, scratches from the file are often accidentally made on the work. This damage can be avoided by flattening the burrs with an ordinary rivet set instead of removing them with a file.

Simply place the set over the head of the screw as illustrated in the drawing and then tap the set lightly with a hammer.



## Economically Constructed Camera-Lens Shade Specially Designed for Indoor Photography



Made from heavy cardboard, such as salon mountboard, this shade is designed for the particular purpose of protecting the camera lens from floodlights placed in unusual positions. The dimensions of the shade in the detail were taken from a Kodak 620 but, of course, can be altered to fit any camera. Bear in mind that the sides and top of the shade must be out of range of the lens. The hole in the endpiece should be just large enough to admit the retaining piece of a lens adapter, as the shade is held to the camera by the two parts of the ring which grip the cardboard between them. When assembling the pieces, leave a slight space between the taped edges so they will not bind when the shade is folded. Finish the shade in dull black, using opaque water color.

## "Quick-Rinse" Solution Saves Time When Removing Hypo

When you need prints or negatives in a hurry, use a quick-rinse solution to wash away the hypo. With this solution, the work can be done in about 10 minutes instead of the hour usually necessary to do a thorough job of washing in a running-water bath. To make the solution, drop a few potassium-permanganate crystals in a container of water—just enough crystals to bring the solution to a light pink color. After pouring some of the solution in a tray, remove the prints or negatives from the hypo,

rinse them briefly in fresh water and place them in the solution. As soon as the pink color disappears from the solution, remove the contents from the tray. Then repeat with fresh trayfuls of solution until the pink color no longer disappears, and finish by rinsing the prints or negatives in fresh water. Care should be taken to keep the solution weak, as potassium permanganate is a powerful reducing agent in strong concentration.

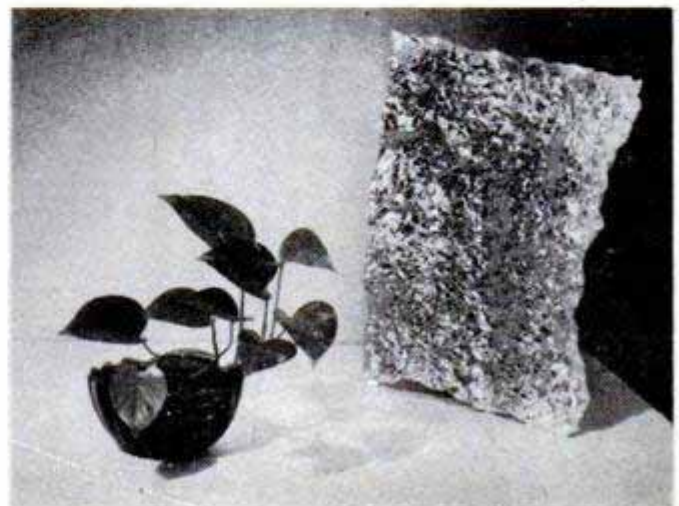
Martin S. Dworkin, New York City.

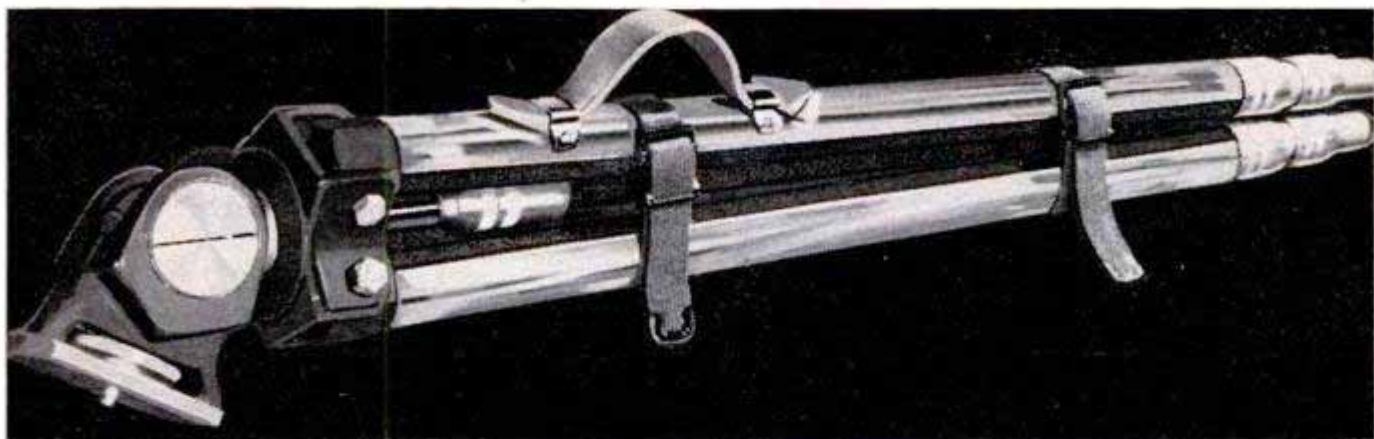
## Crinkled Section of Metal-Foil Paper Softens Harsh Shadows on Subject

A sheet of metal foil, which has been crumpled into a ball and unfolded again, can be used as a reflector to soften harsh shadows on a subject. Hang or prop the foil in an upright position as close as possible to the subject but still out of camera range. For portraits, use several widths of foil pinned to a large piece of cardboard.

Hugh Lineback, Stillwater, Okla.

☐ A useful stand for holding a magnifying glass when doing retouching work can be made from a gooseneck-type desk lamp. Simply remove the light fixture and tape the magnifying glass in its place.





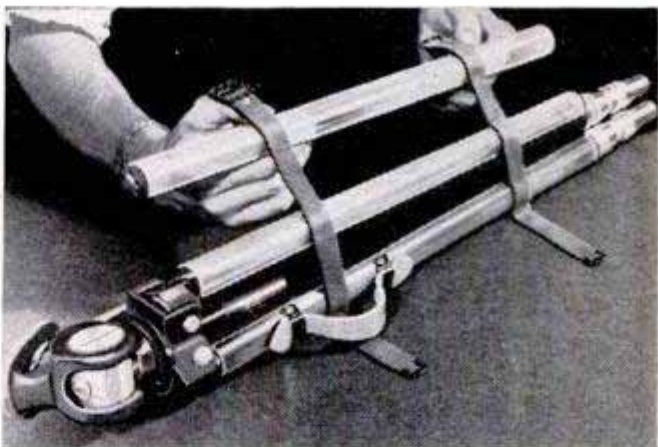
# TRIPOD CARRIER

By M. G. Winterton

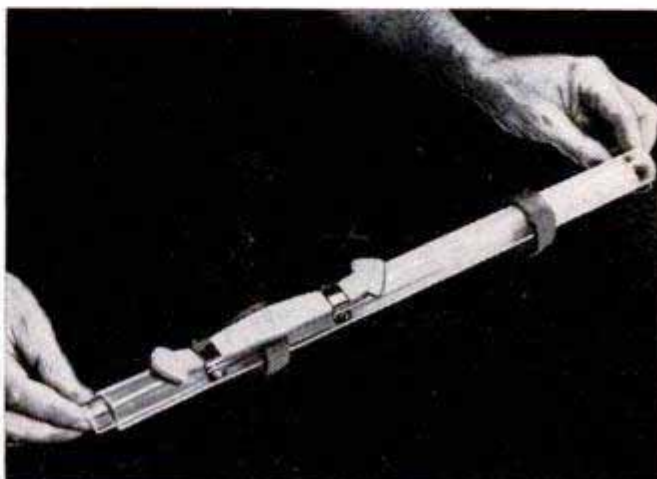
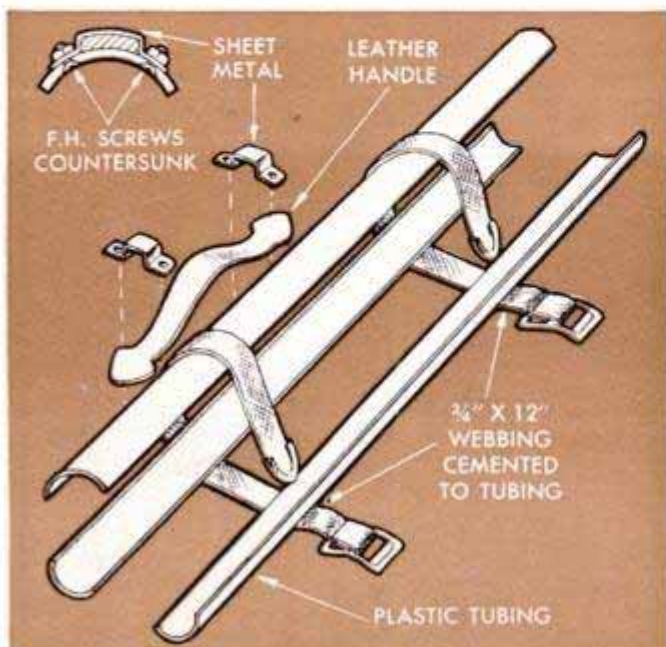
AMATEUR and professional photographers will see at once the advantages of this carrier for camera tripods of the type having tubular telescoping legs. It's been specially designed to protect the tripod legs from being dented and is quickly placed in carrying position on the tripod or folded into a compact bundle when not in use. As will be seen in the two photos at the right, the carrier consists of three semicircular members attached to 12-in. lengths of cotton webbing (luggage straps) fitted with friction buckles. The semicircular members, which serve as guards, are made by cutting two pieces of plastic or aluminum tubing in half lengthwise. Measure the tripod and cut the pieces to exact length. Then space the pieces and cement or rivet the straps in place. Two sheet-metal strap guides of the type sold by luggage dealers are attached to one member with countersunk screws to hold the leather carrying handle in place. The handle can be purchased ready-made or cut from a piece of sole leather.

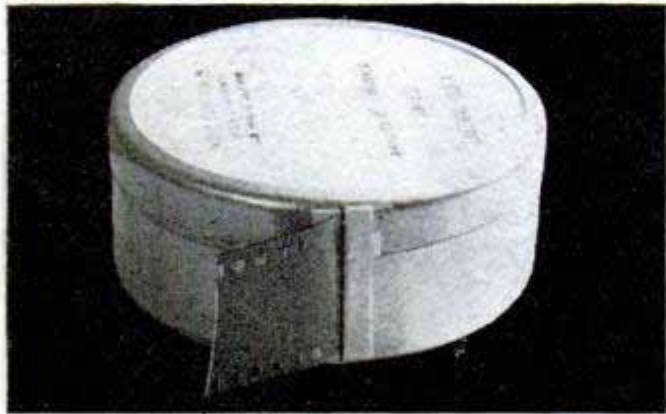
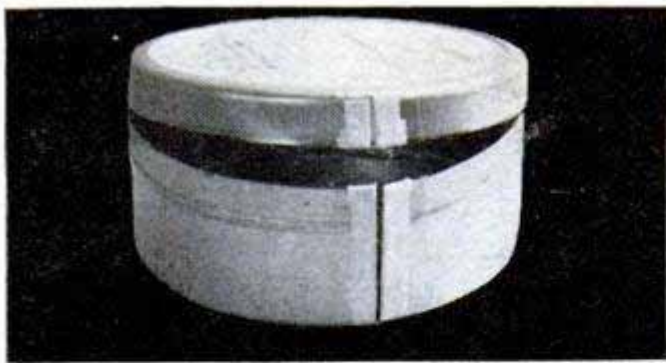


Plastic or aluminum tubes cut in half lengthwise fit over the tripod legs and protect the thin metal from being dented or otherwise damaged when tripod is carried folded or placed in car with other equipment



Above, cotton-webbing straps of the type used on luggage are cemented or riveted to the guards. Below, carrier folds into a small, neat bundle when not in use. Note that it is provided with a leather handle





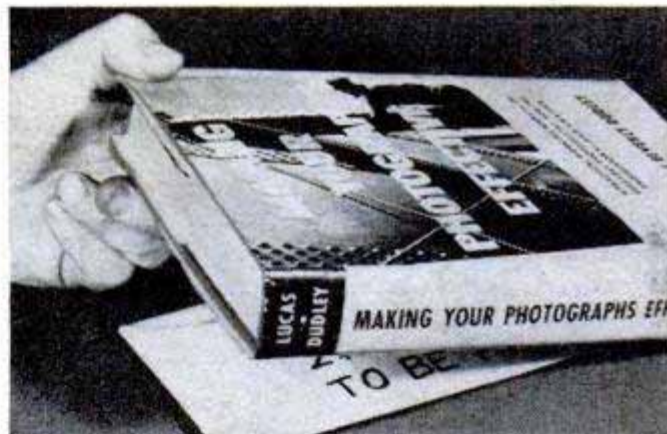
## Bulk-Film Can Serves as Dispenser For Loading 35-mm. Cartridges

If you are one of the many camera fans who buy 35-mm. bulk film and load their own cartridges, you can make the job a lot easier by converting the metal container into a light-tight dispenser. Resembling the cartridge itself, the dispenser permits attaching the film to the cartridge spool in daylight and offers the added advantage of allowing the actual loading operation, which is done in total darkness, to be accomplished without touching the film. The dispenser is made by cutting a  $\frac{1}{8}$ -in. slot in the rim of the lid and side of the can. The edges of the metal are covered with adhesive tape, after which felt or plush material is cemented over the tape. With the film placed in the can and the end protruding through the slot, the lid is sealed with adhesive tape and the dispenser stored in a lightproof drawer or box.—Virginia M. Schwarting, Oak Terrace, Minn.

## Negatives Placed in Business Envelope Are Pressed Flat With Heavy Book

Preferring to work with flat negatives, one photographer presses roll film before printing. As soon as the negatives have dried after developing, the film is cut into strips to fit an ordinary business envelope. Then the strips are placed in the envelope and weighted with a book. The film is left in the envelope and under continuous pressure until needed for printing. Thus the negatives are protected from scratches and kept free of dust and at the same time are flattened for easier handling.

Robert Hertzberg, Jackson Heights, N.Y.



## Popular Mechanics Book Shop

### Veterinary Guide for Farmers

Every person who owns livestock, or who is interested in animal husbandry, should have this book. It will not only enable you to save the lives of high-priced animals and reduce veterinary bills, but it also will provide a vast source of self-instruction for the student veterinarian. Although the first edition contained 288 pages of almost priceless information, the second edition, now available, has two additional chapters on diagnosis and injection, plus an expanded chapter on hog cholera. Its price of \$3.50 is, in most cases, less than the cost of one visit of a veterinarian.

### What to Make With Concrete

If you own your home, live on a farm, or do construction work, this book will enable you to do many concrete jobs yourself and save cost of labor. For example, there is a long

article telling how to use, mix and pour concrete; another on repairing a leaky basement; one on making a concrete-block machine and one describing how to put in a sewage-disposal system for rural homes. In addition to these, there are hundreds of projects on making sidewalks, driveways, etc. The saving on just one simple concrete job will more than equal the price of \$2.00 for this book.

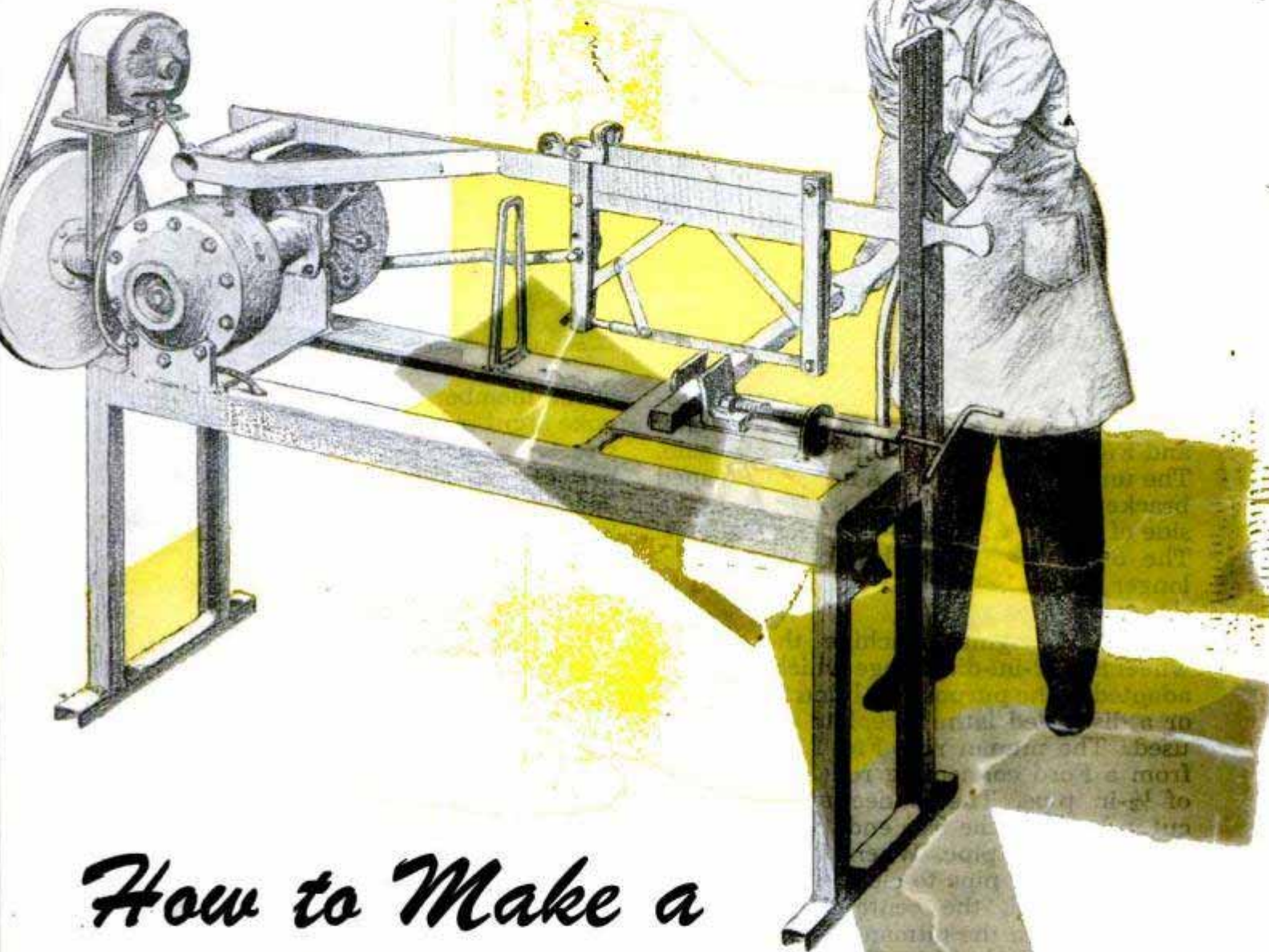
### Welding, Brazing and Soldering

Packed from cover to cover with information helpful to the welder, as well as to the inexperienced man, this book will enable you to do many jobs that often prove to be puzzlers. For the beginner, it shows how to do welding, brazing and soldering jobs, and even how to build some of the equipment. It is a must for anyone having this kind of work to do. Home-owners will find it ideal for those odd jobs of repairing. The book is priced at only \$1.75.

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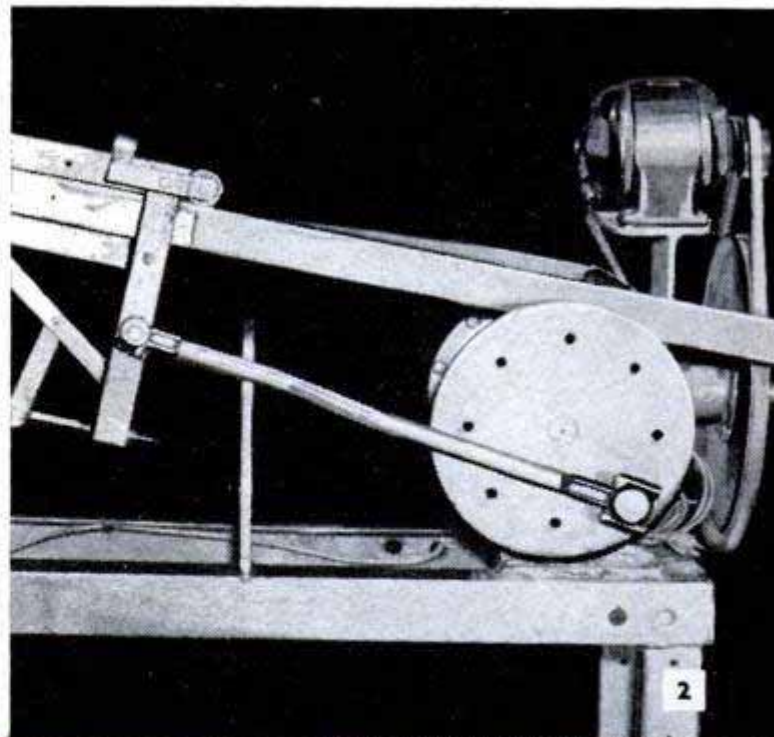
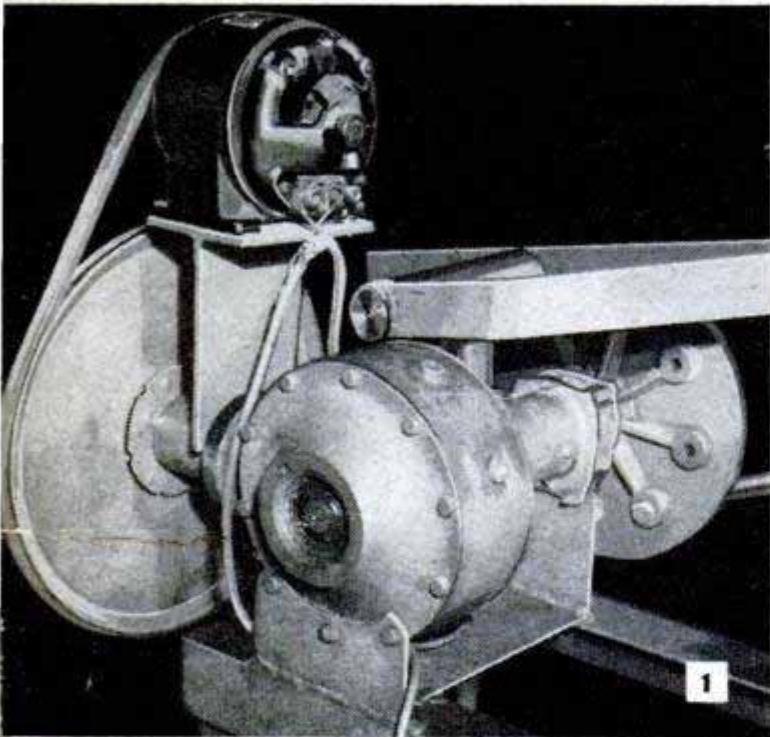
## How to Make a **POWER HACKSAW**

By **L. H. Houck**

**B**Y UTILIZING stock materials, a car differential and other odds and ends, you can easily duplicate this heavy-duty power hacksaw. It's a big, husky machine capable of handling heavy shop work, as well as light jobs where accuracy is required. It uses standard 14-in. power-hacksaw blades and operates with a 10-in. stroke at a speed of 100 strokes per minute. The sturdy floor-type base is of all-welded construction and is 14 in. wide, 28½ in. high and 54 in. long. The top rails of the base are cut from 3-in. steel angles, mitered at the ends

and welded to form a rectangular frame. Legs and foot pieces are of 2½-in. steel channel.

The right-angle reduction drive utilizes a Model-A Ford differential and a part of one axle housing. The opposite housing is cut off at the bell, or flare. If desired, a steel plate can be welded over the opening. The differential spider is locked by welding. Both the drive shaft and the housing are shortened, but the exact length is not given as it is determined to some extent by the type of motor used and the size of the



Photos courtesy Lincoln Electric Co.

motor stand required. Fig. 1 shows the completed drive unit from the differential end, and Fig. 2 shows it from the opposite side. The unit is supported in a heavy U-shaped bracket, one leg of which is bolted to the side of the differential housing as in Fig. 1. The other leg of the bracket is a little longer and is bolted to a flange welded to the axle housing.

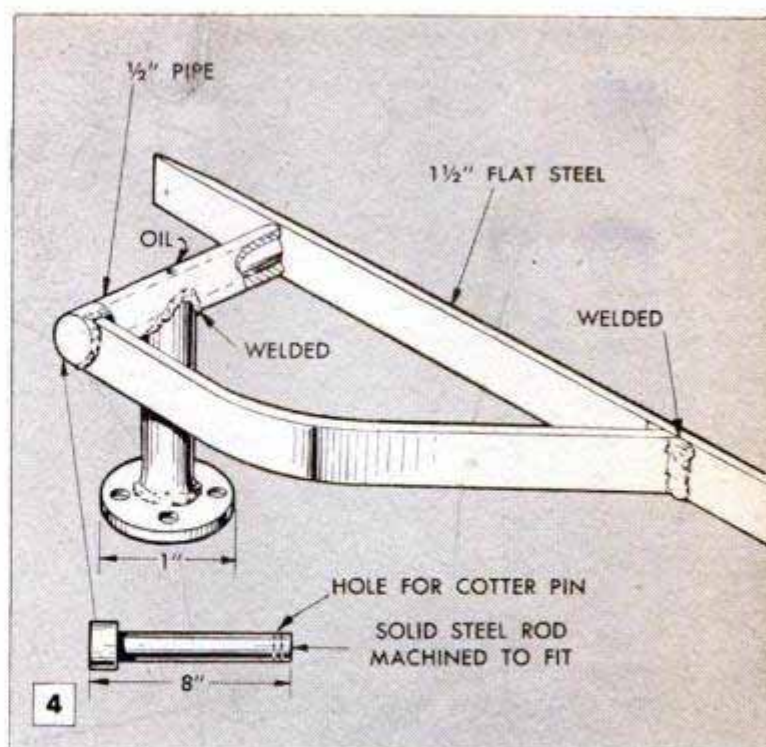
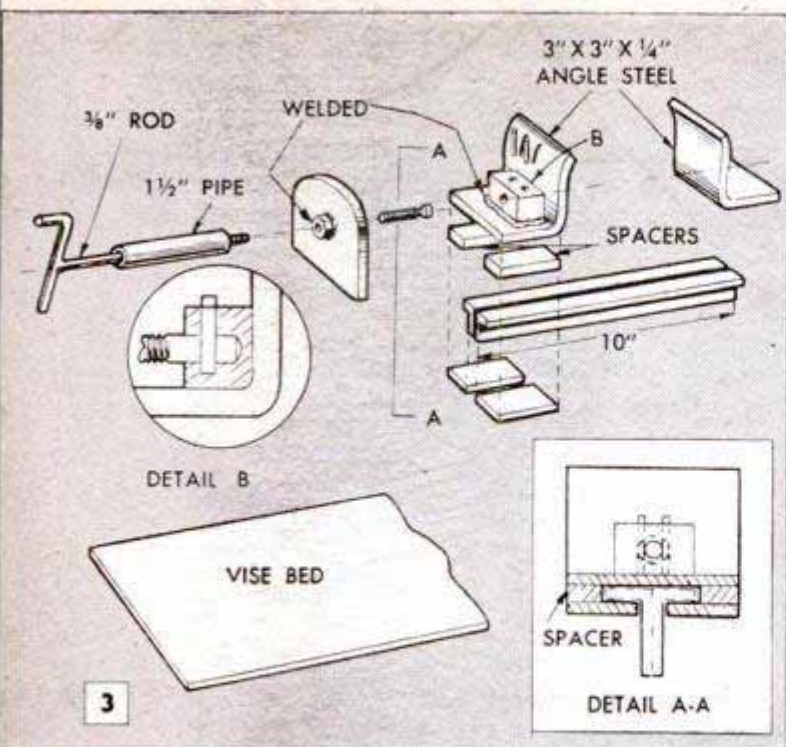
On the original machine the pitman wheel is a 12-in.-dia. flange which has been adapted to the purpose. A blind pipe flange or a discarded lathe faceplate also can be used. The pitman rod, Fig. 2, is built up from a Ford connecting rod and a length of  $\frac{1}{2}$ -in. pipe. The connecting rod is first cut in half and the free ends are welded to the ends of the pipe. When the offset bend is made in the pipe to clear the rim of the pitman wheel, the center-to-center distance between the pitman bearings should be approximately 25 in. The crank pin for the large end of the pitman is made by turning and shouldering a short piece of cold-rolled steel shafting. The small end of the crank pin is threaded and the large end is center-drilled and tapped for a machine screw. In assembling, the shouldered end of the pin is inserted in a hole drilled in the pitman wheel and a nut is tightened on the threaded end to hold the pin permanently in place. The pitman bearing is held on the pin by means of a flange cut from  $\frac{1}{8}$ -in. flat steel and center-drilled to take the machine screw which is turned into the tapped end of the pin. On the original machine, the small end of the pitman pivots on a wrist pin (Ford) which is welded to the saw frame. The arrangement detailed in Fig. 5 also can be used.

The slide, Fig. 5, is 63 in. long and is cut from  $\frac{7}{16}$  x  $1\frac{1}{2}$ -in. cold-rolled stock. The

offset member which forms the pivoted yoke is cut from stock of the same sectional size. A 6-in. length of  $\frac{1}{2}$ -in. pipe welded between the arms of the yoke forms the bearing. The pivot pin is made by shouldering an 8-in. length of  $\frac{3}{4}$ -in. steel shafting and drilling the small end transversely for a cotter pin, as in the lower detail, Fig. 4. The free end of the slide is held in alignment by means of a guide which is shown in the illustration on page 197. This consists of two 30-in. lengths of  $\frac{1}{4}$  x 2-in. flat steel spaced  $\frac{5}{16}$  in. apart and having the lower ends welded to the frame as shown. The top ends are joined by welding a cross-bar of  $\frac{1}{2}$  x  $\frac{1}{2}$ -in. stock to both members.

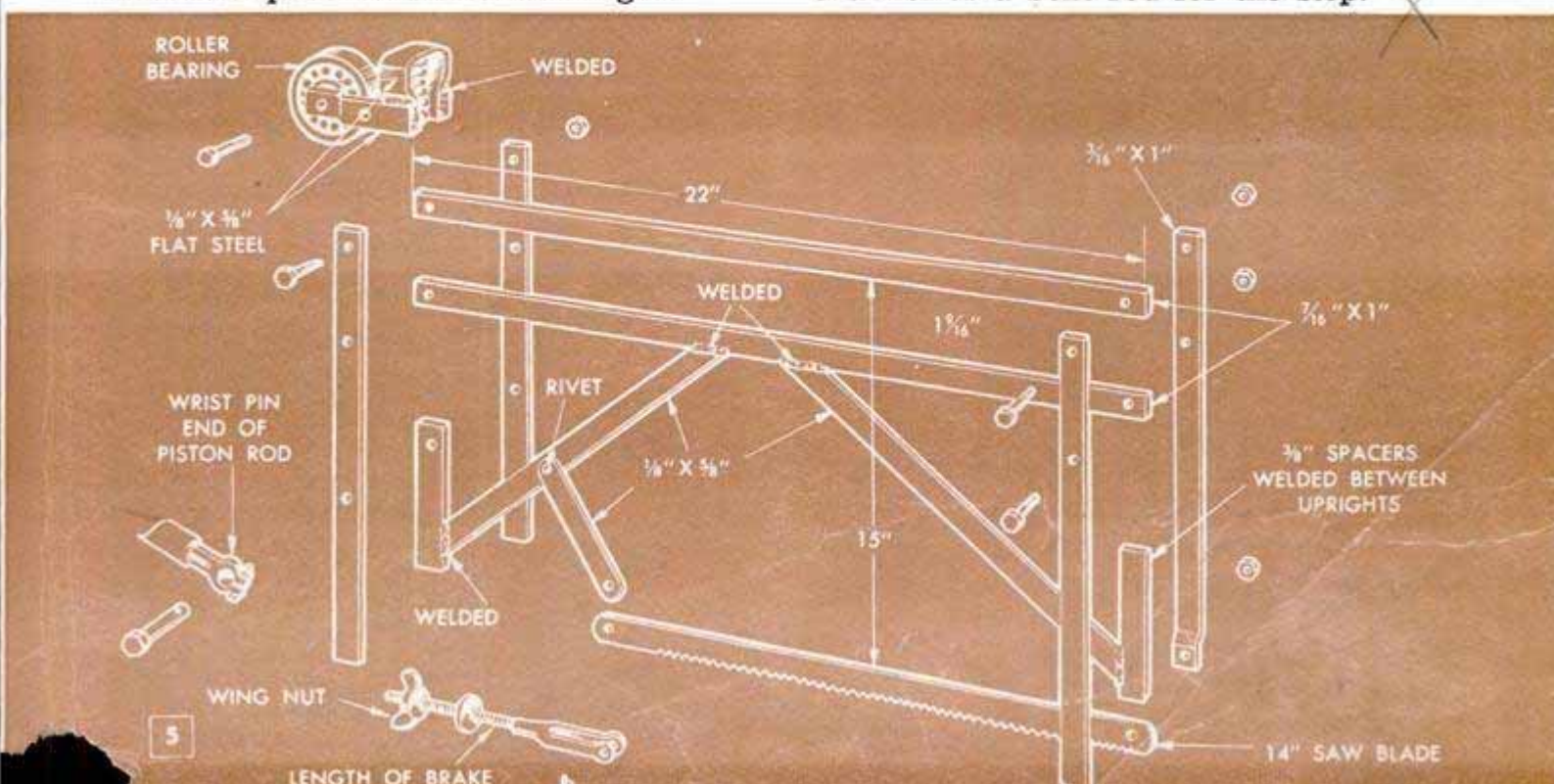
The saw frame, Fig. 5, has two unique features. One is the use of a spring-loaded roller at the rear end of the saw frame which helps to equalize the strain on the blade as the frame changes direction at the end of the stroke. The other is the variable distance between the parallel guides indicated by the dimension  $1\frac{1}{16}$  in Fig. 5. This dimension refers to the variable space between the guides and has no dimension lines. Variability is achieved simply by drilling the holes in the top ends of the uprights slightly oversize, so that the bolts can be loosened and the guides adjusted to compensate for wear. Although identified as a roller bearing in Fig. 5, the roller can be any suitable ball bearing mounted in a simple fixture consisting of two flat-steel yokes welded together at right angles. The vertical yoke is fitted with a short coil spring which bears on the upper guide, Fig. 2. Note in Fig. 5 that the front uprights of the frame have offset bends at the lower ends, but that the rear uprights are straight. When the frame is assembled the space between the offset bends is just sufficient to





permit insertion of the saw blade. The rear end of the blade is supported by a yoke attached to a threaded rod fitted with a wing nut and washer. After attaching the forward end of the blade to the frame, the opposite end is raised so that the hole in the end registers with a hole in the angle support which is riveted to one of the braces. Then the arms of the yoke are placed over the blade and support and a pin is inserted through the holes in the three members. Finally, the yoke is pulled upward until the threaded rod fits between the straight ends of the frame uprights. Then the wing nut is tightened onto the washer to bring the blade under tension. The rear end of the frame with the blade locked in position is shown in Fig. 2.

Construction of the vise is detailed in Fig. 3. Sectional details A and B show clearly how the slide and the movable jaw are assembled from small pieces of angle and flat steel. Note that in Fig. 3 the vise screw, which is built up from  $\frac{3}{8}$ -in. steel rod, is shown broken for clarity. The finished vise is welded to a bed plate. This, in turn, is welded to the base of the machine. Drive with a  $\frac{1}{4}$ -hp., 1725-r.p.m. motor, using a 3-in. motor pulley and a 15-in. pulley on the reduction gear. As the final finishing step, weld a stop to the horizontal member of the base about midway between the vise and the gear to prevent the slide and saw frame from dropping when the blade cuts through the work. Use a length of steel channel or a bent rod for the stop.

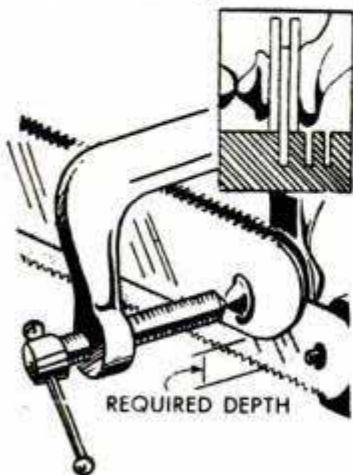


## "Rocker" Mount for Oil Drum Permits Easy Pouring



Pouring oil or gasoline from a large drum into a small vessel is no trouble at all with the aid of a "rocker" mount such as the one illustrated. Mounted on the rocker, the drum can be tilted easily to any position. In an upright position, the drum takes up little space and prevents the possibility of leakage from the spout. The rocker is built in the fashion of a sled with the runners being made of 2 x 12-in. planks, each cut at an angle from one corner to a point near the center. These are bridged by a 1 x 4-in. crosspiece at the top and a 1 x 12-in. board at the bottom. The stop, a 2 x 4 nailed on edge across the bottom of the rocker, is braced by lengths of 1 x 3. A length of heavy wire is used to lash the drum to the rocker.—E. V. Reyner, Townsend, Mont.

## Stops Clamped to Hacksaw Blade Control Depth of Cut



With no milling machine available, the job of removing material from a 1/2-in.-square bar of steel to a depth of 1/8 in. to form a shoulder can be a real poser, especially if the job must be done accurately. One mechanic turned the trick by clamping two hacksaw

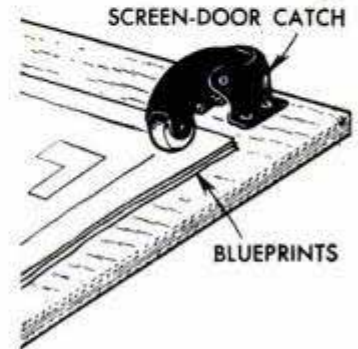
blades to the blade in the hacksaw frame with the teeth up as shown. The inverted blades were adjusted to serve as stops so that the regular blade would cut to a uni-

form depth of 1/8 in. as required. Then a series of cuts were made in the waste, the cuts being spaced 1/8 in. apart from the end of the bar to the shoulder. This operation removed almost half of the waste to a uniform depth, making it easy to finish up accurately with a file without rounding the flat surface even slightly.

Arthur F. Hird, Worcester, Mass.

## Builder's Blueprints Held Flat With Screen-Door Catches

Builder's large blueprints are always troublesome to hold when unrolled for study on a table top. Dispensing with the usual weights, tacks and strips, one builder attached screen-door

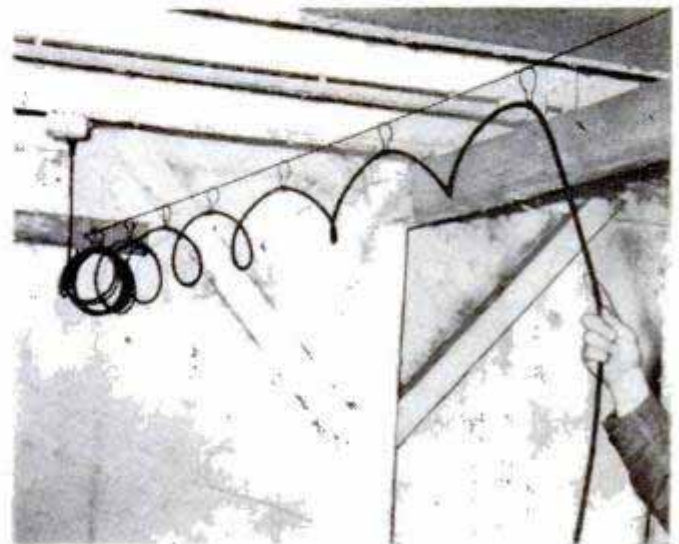


catches of the spring type to the corners of the blueprint study table. When unrolled, the corners of the blueprints are placed under the catches, which hold them flat and smooth for convenient reading.

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

## Milking-Machine Extension Cord Travels on Overhead Line

A long extension cord, run through shower-curtain hooks that are hung on an overhead wire, can be extended the entire length of a milk barn to supply constant power to a milking machine. At equally spaced intervals, the cord is pressed into the narrow part of the hooks where it is gripped and held securely. When not in use, the cord is easily slid to one end of the line. The overhead wire, about No. 9, is strung from eyebolts at each end of the barn and is equipped with turnbuckles for taking up slack when necessary.





X517

# "TQ"—A SPEEDY MIDGET RACER

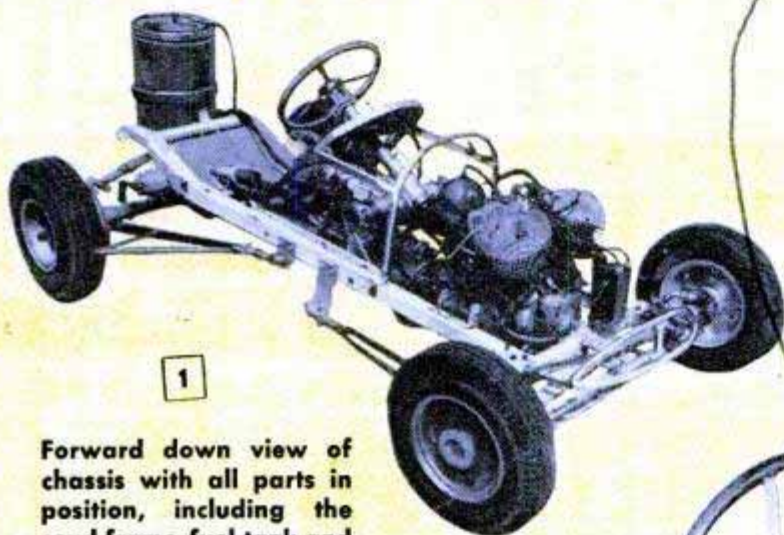
By Thomas E. Stinson, Jr.

WTM 53

Powered by a two-cylinder motorcycle engine, pint-sized "TQ" performs spectacularly on one-sixth and one-eighth mile dirt tracks

ACCORDING to Jerry Wright, President of TQMRA, the Three-Quarter Midget Racing Association, this little Three-Quarter racer has been purposely chosen from among several similar types because it is the easiest to build from parts which are readily available. The specifications meet all TQMRA track requirements for maximum engine displacement, wheelbase, tread and weight. Engine classifications, based on stock-motorcycle engines are: flathead, 45 cu. in.; two-cam, 30.50 cu. in.; single, 34 cu. in. and two-cycle, 30.50 cu. in.

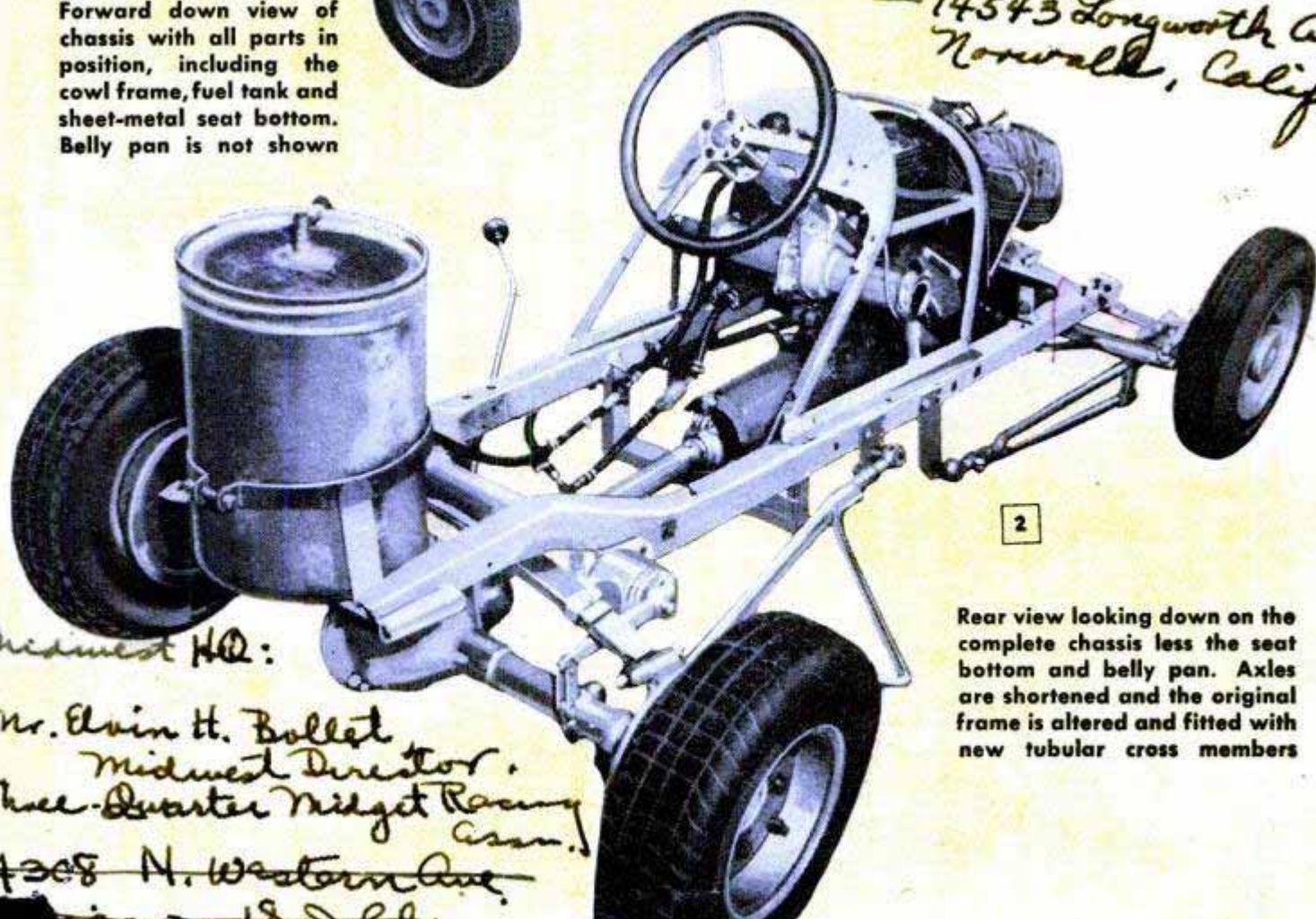
Building "TQ" is mostly a cut-and-try job from start to finish, but it's



1

Forward down view of chassis with all parts in position, including the cowl frame, fuel tank and sheet-metal seat bottom. Belly pan is not shown

14543 Longworth Ave.  
Norwalk, Calif

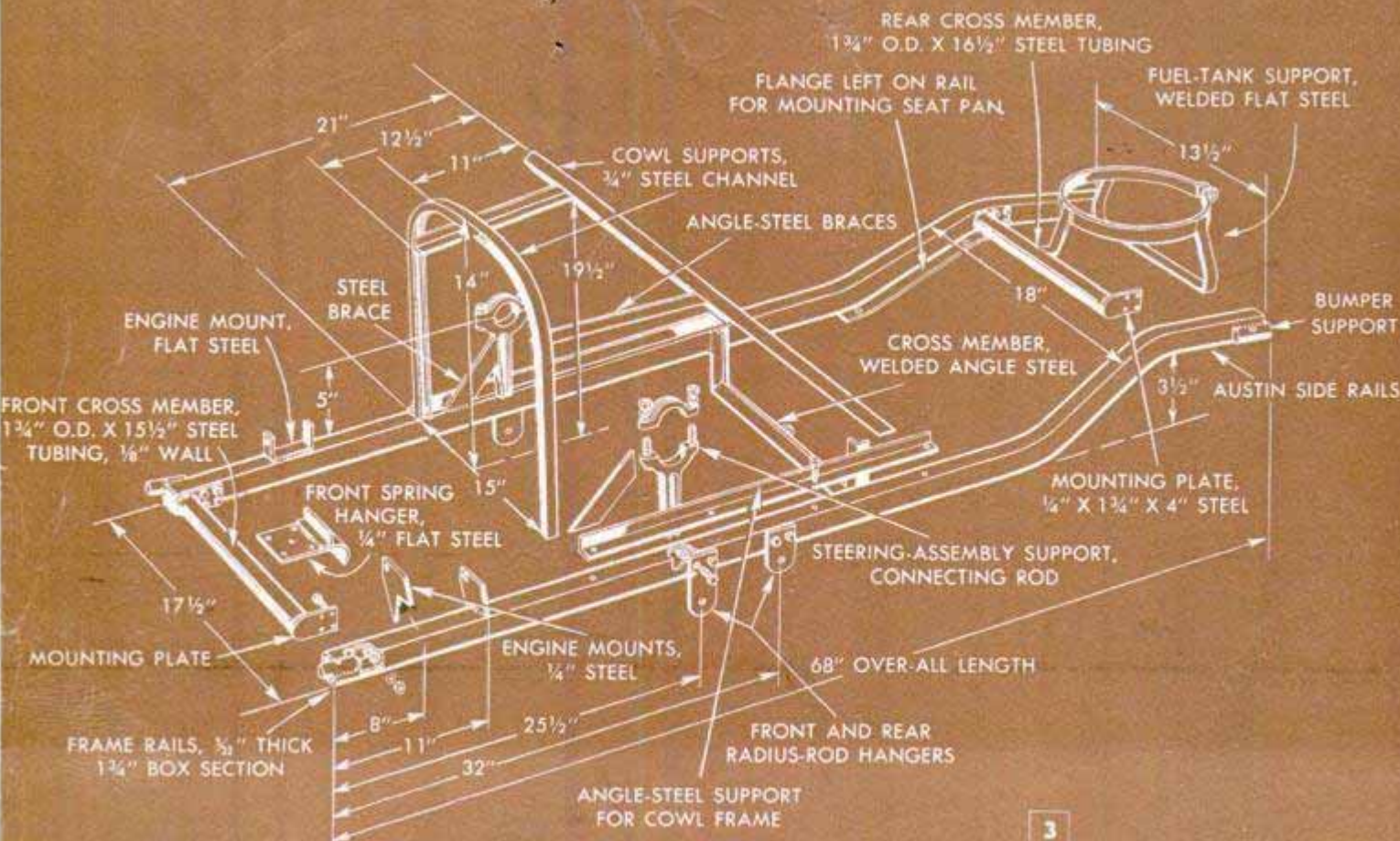


2

Rear view looking down on the complete chassis less the seat bottom and belly pan. Axles are shortened and the original frame is altered and fitted with new tubular cross members

Midwest HQ:

Mr. Elvin H. Bollet  
Midwest Director,  
Three-Quarter Midget Racing  
Assn.  
4308 N. Western Ave.  
Chicago, Ill.



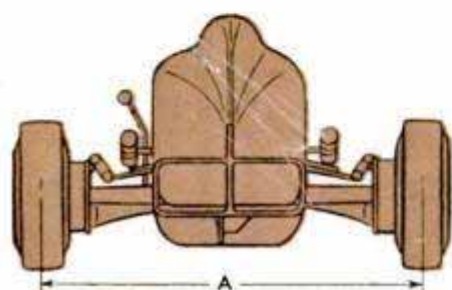
made somewhat easier by the latitude allowed in the tread and wheelbase, and also in the permissible weight variation. The wheelbase, Fig. 4, B, may range from 54 to 60 in. and the tread, Fig. 4, A, from 32 to 40 in. The total weight of the car ready for the track must not be less than 350 lbs., or more than 650 lbs. These are the specifications for the TQ-class racer and the allowable variations must not be exceeded.

The chassis, Figs. 1 and 2, is assembled mostly from American Austin car parts, but a number of parts from the Crosley car may be employed, including the frame. However, parts of the Austin car are somewhat more adaptable. You'll require the car frame, springs, radius rods, rear axle, transmission, drive shaft, drag link and wheel hubs, all in good condition. Only the side members of the Austin frame are used. Cross members and bolt lugs are removed and new, shorter cross members of steel tubing are substituted, Fig. 3. Note that

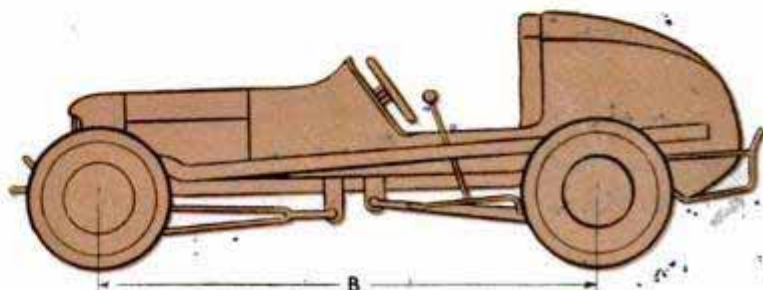
steel mounting pads, or plates, are welded to both ends of each cross member. Fig. 3 also shows a center cross member of angle steel in place. Neither this member, nor the rear tubular cross member is installed until the work on the chassis has progressed further. In all construction details, dimensions of the parts, which indicate length and sectional size, are only approximate. Because of the nature of the assembly, and the fact that even stock parts must be altered to suit, considerable hand fitting will be necessary at the time of installation.

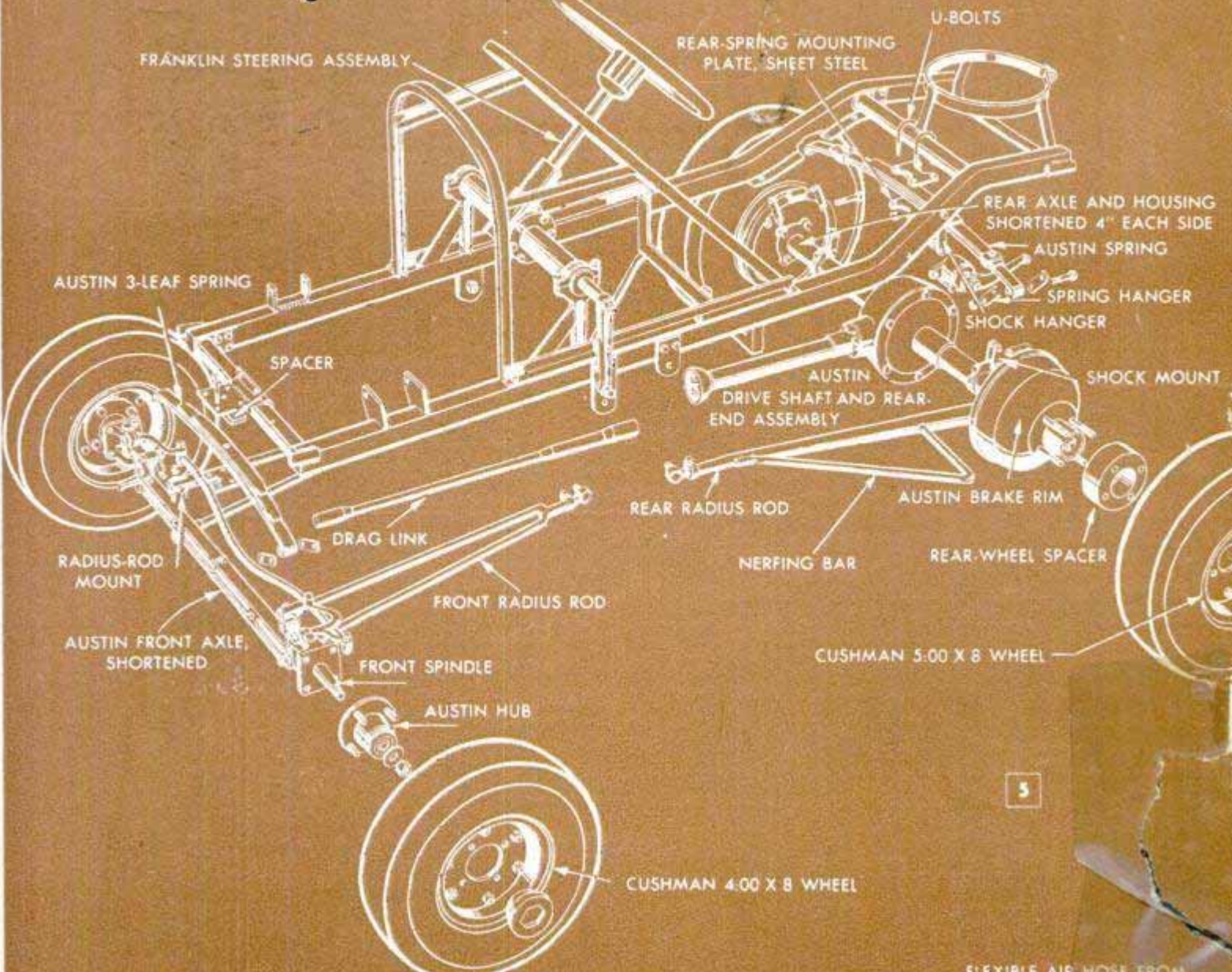
Now, with the rear cross member temporarily bolted in place, make and fit the cowl frame, Figs. 3, 5 and 6. The vertical member, or bow, is made by heating and bending 3/4-in. steel channel to a radius of approximately 7 1/2 in. Cut off the legs to give the bow a height of 14 in. The slanting bow, which forms the forward edge of the cockpit, is bent to a radius of about 9 1/2 in., and the lower ends of the bows are welded

The tread, dimension A, can range from 32 to 40 in., measured from center to center of the tires. Wheelbase, dimension B, can be varied from 54 to 60 in. Total weight not less than 350, nor more than 650 lbs.



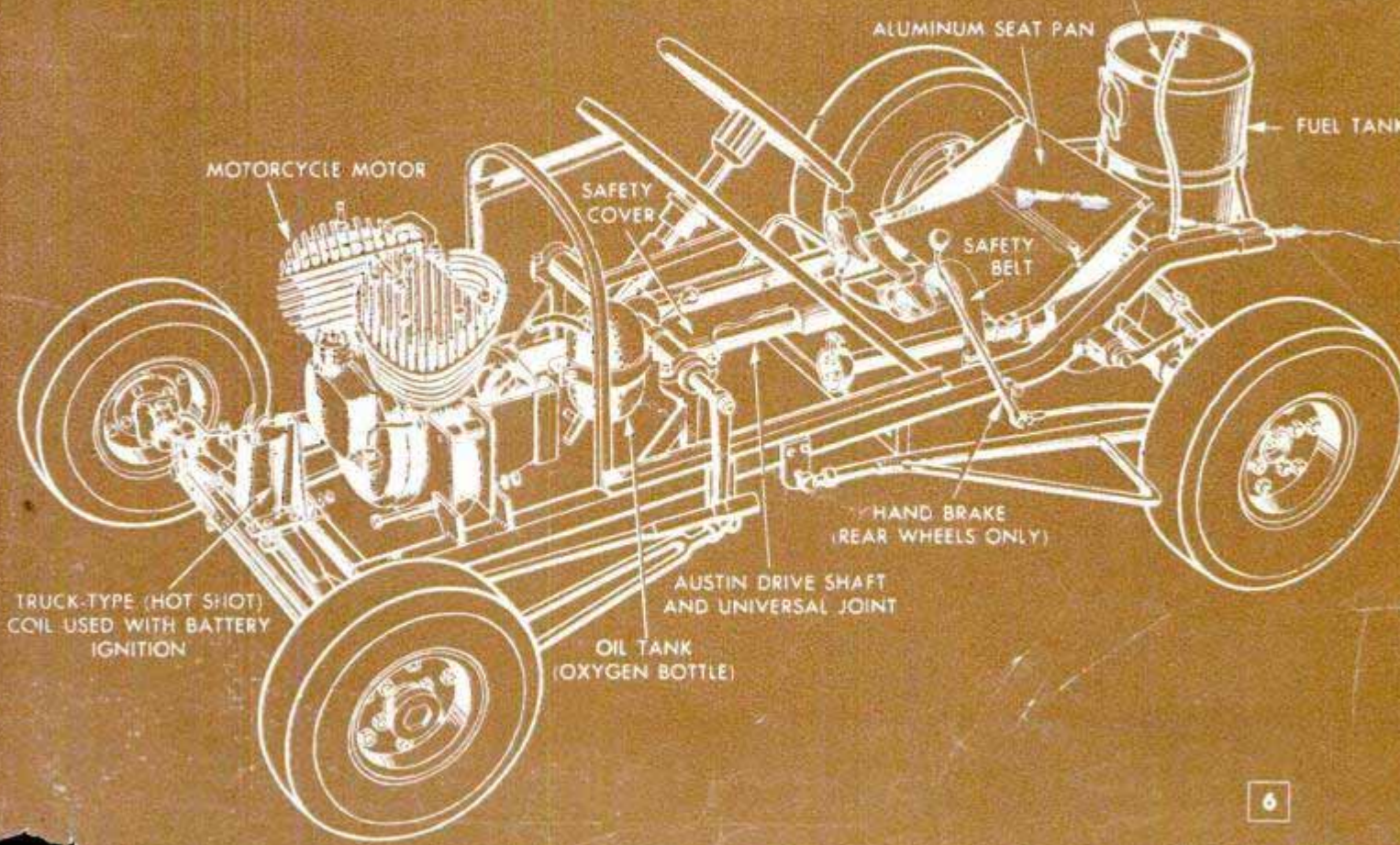
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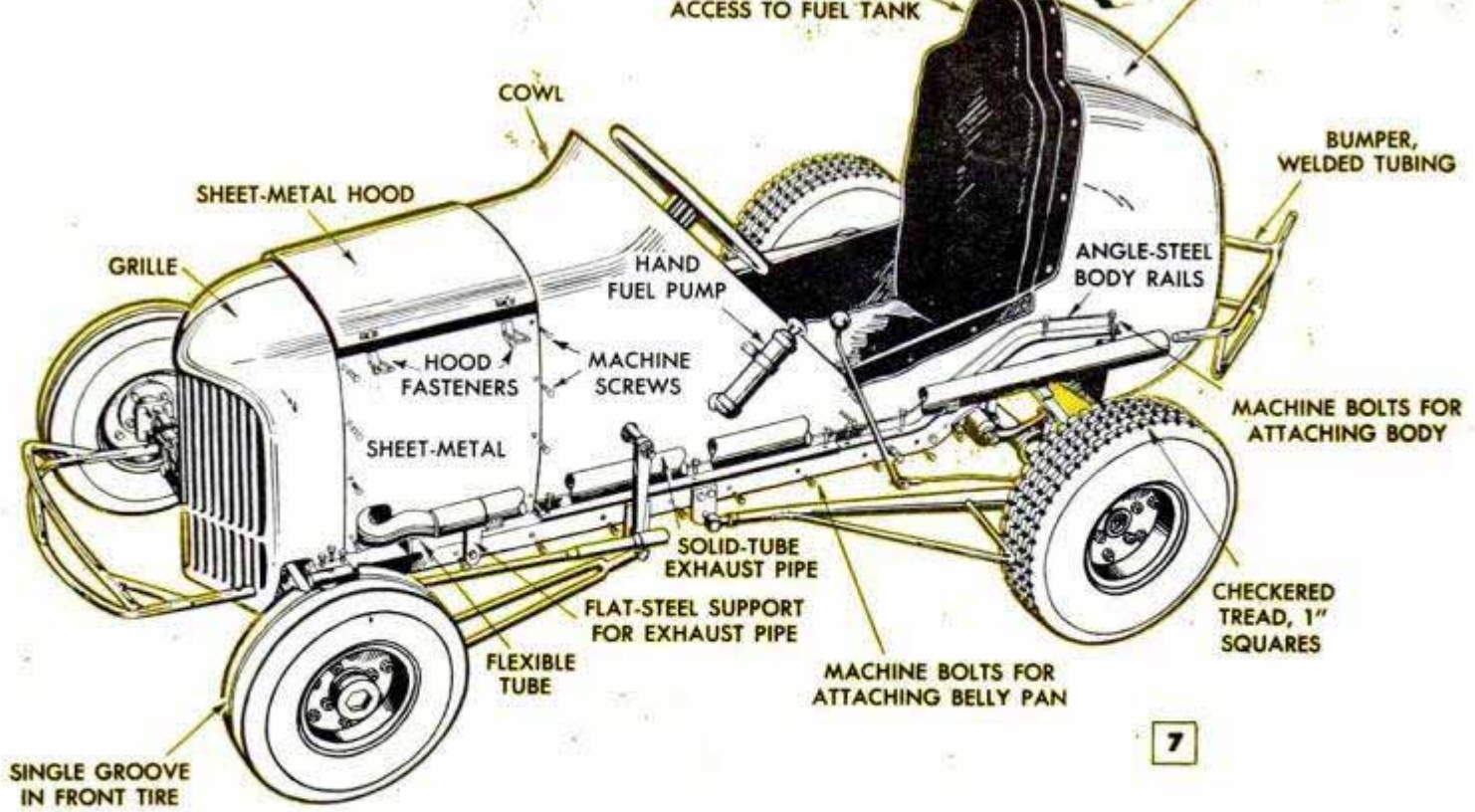


5

FLEXIBLE AIR HOSE FROM HAND PUMP, NOT REQUIRED IF FUEL PUMP IS USED



6

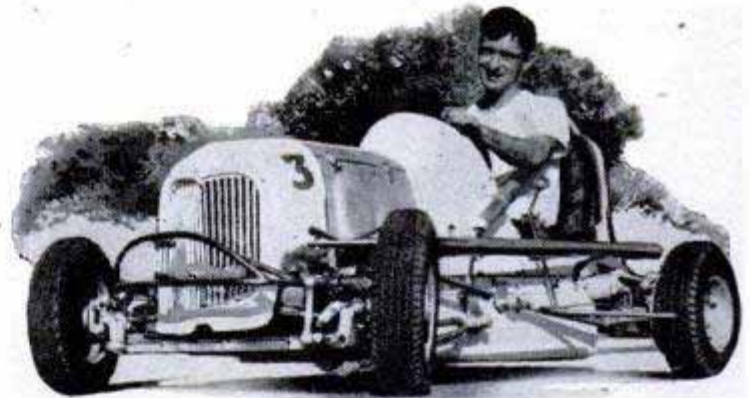


7

to the angle-steel supports which are bolted to the frame. Angle-steel braces are welded in to join the two bows near the top. Don't bolt the cowl frame in place until the steering gear has been installed and the engine located in the frame.

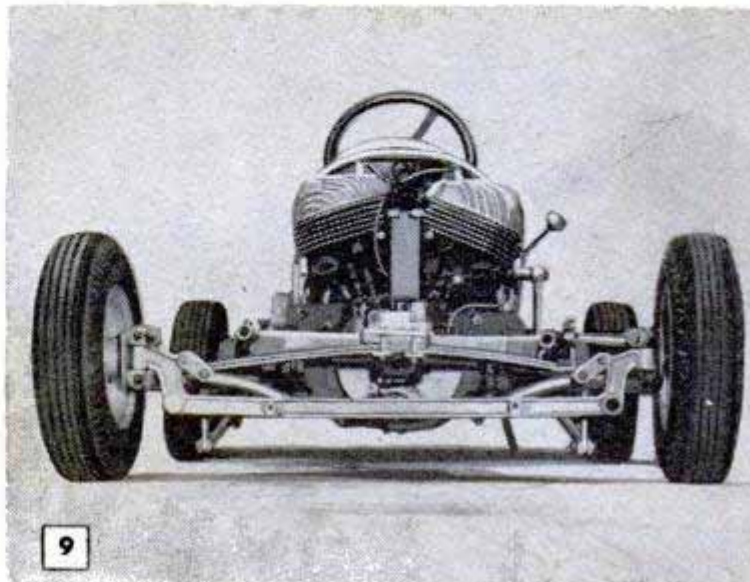
The Cushman 5:00 x 8 wheels won't fit over the brake drum of the Austin axle, nor will the mounting holes in the wheels fit the studs of the axle hub. Because of this, it will be necessary to run welds over the original holes and drill new ones. Steel spacers, 1 in. thick, are turned down to fit inside the wheel rims and are bored and drilled to fit over the mounting studs and the hub, Fig. 5. After these parts have been made and fitted, disassemble the axle, cut out a 4-in. section from each housing between the brake-drum mounting flange and the bell end and reweld. This step should reduce the tread to the 40-in. maximum allowed by the racing rules. Next, cut each axle to the required length, retaper, key and thread the end. Then weld the differential gears together to provide a locked rear end. Assemble the axle ready for mounting on the frame. Next, assemble the front wheels on the hubs and measure the amount to be cut from the front axle. After cutting out a section and rewelding, reinforce the axle by welding a piece of  $\frac{1}{2}$  x 1-in. steel, 6 in. long, to the axle web.

The front-spring hanger, or perhaps more properly, mounting pad, is made from  $\frac{1}{4}$ -in. flat steel with one end heated and bent to the same radius as that of the tubular cross member to which it is welded. The short length of steel angle welded to the top of the pad serves as a mounting lug for the hot-shot-coil holder, Fig. 6. Four clearance holes for  $\frac{5}{16}$ -in. machine bolts are drilled near the corners of the



8

Above, low, racy lines of the finished car. Below, minimum ground clearance is essential



9

mounting pad and the clamping plate, and a fifth hole large enough to admit the hex nut on the spring-assembly bolt is center-drilled through the clamping plate, and also through the spacer, Figs. 5 and 9, to admit the head of the bolt. The rear spring is mounted between a pair of  $\frac{1}{4}$  x  $3\frac{1}{2}$  x 4-in. steel plates shaped and drilled for U-bolts which clamp over the rear tubular cross member, Fig. 5. The upper plate is welded to the tubular cross member. It will be necessary to shorten the main leaves of the front and rear springs and form new eyes. Use three leaves in the front spring and four or five in the rear spring. The original spring perches on the front axle are used but, because of the manner of mounting the rear spring, it will be necessary to provide new perches. Generally, the original spring hangers, or shackles, can be used. Shock absorbers from a 1940 Ford car are mounted on steel brackets welded to the frame approximately at the center of the kickup, or bend, near the rear of the frame. The shock arms are shackled to special lugs fitted to the rear-axle housings, Fig. 5.

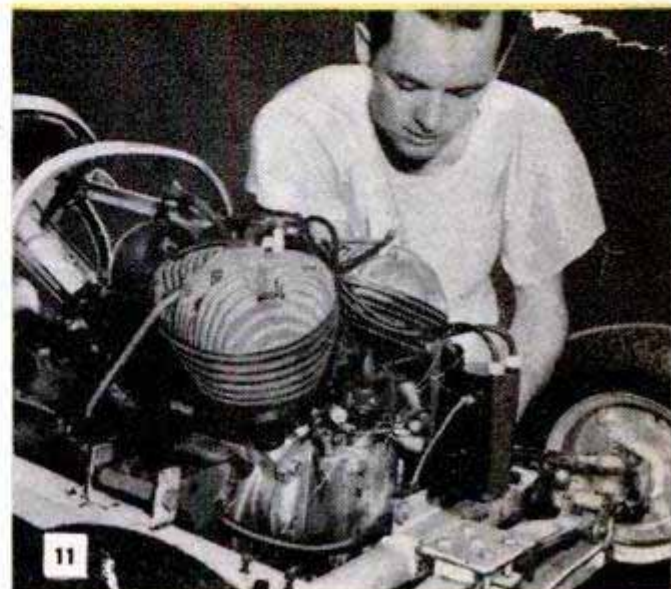
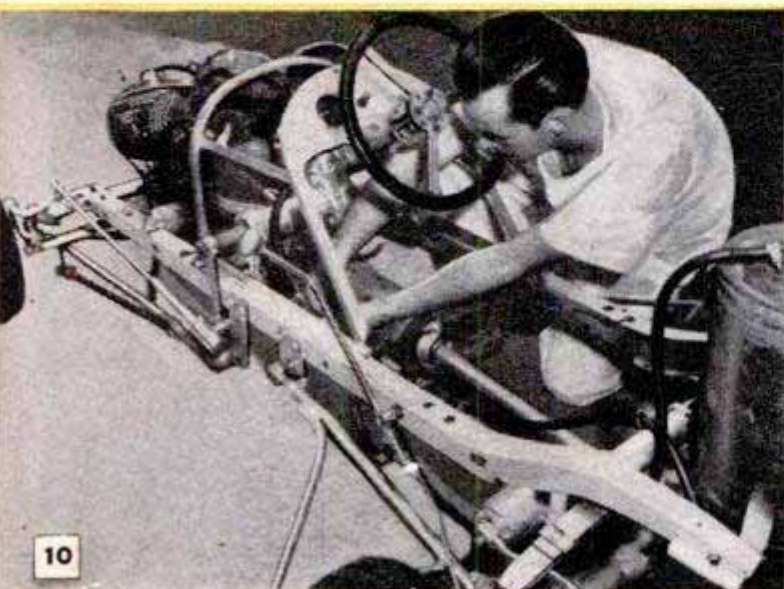
At this stage the front and rear radius rods and the steering gear can be fitted in place. Dimensions in Fig. 3 locate the mounting lugs for the radius rods. Flat-steel mounts for the yoke ends of the front radius rods are welded to the front axle and nerfing bars are welded to the rear rods before assembly. Although you can use either an Austin or Crosley steering gear, the Franklin gear specified in Fig. 5 is preferred because of its quick action. The gear is fitted with housings cut from  $1\frac{1}{2}$ -in. O.D. steel tubing and brazed to each side of the gear case, Fig. 5. The steering unit is supported by a pair of Ford connecting rods. The pin end of each rod is cut off and the

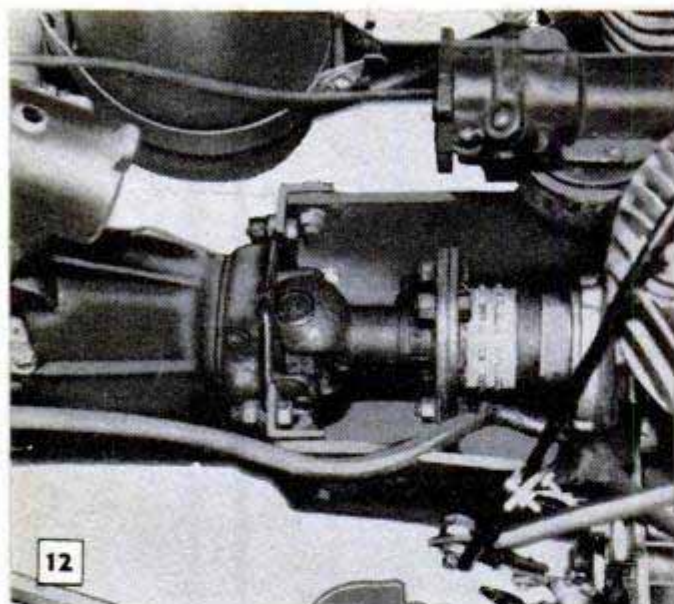
rod is then welded and braced to the chassis frame as in Fig. 3, with the big end up. The type of steering wheel used is optional with the builder. Both the steering tie rod and drag link must be shortened.

The engine mounting brackets, Figs. 3, 5 and 6, must be adapted to the type of engine used. Because of this, neither the size nor the location of the brackets on the frame is given. Usually, it is best to install the drive shaft and transmission before locating the engine. Remove intermediate gears from the transmission, but leave the jackshaft and its sliding gear in place. A simple in-and-out gearbox is all that is required for racing, as no clutch is used. Cut down the Austin drive shaft and fit the shaft and universal to the rear of the transmission. The rear end of the transmission and drive shaft are supported on a U-shaped bracket made from several short lengths of steel angle welded together to form the required shape. This bracket will be seen in Figs. 2, 3, 5 and 10. Where the engine is rigidly connected to the transmission, Fig. 13, a supporting bracket for the forward end is not necessary. However, if a universal is used between the engine and transmission as in Fig. 12, then it will be necessary to provide a U-shaped bracket which can be bolted to the engine crankcase and to the forward end of the transmission. Some experienced drivers prefer the rigid connection between the engine and transmission as they say it reduces frictional losses. In either case, the connection between the engine crankshaft and the transmission shaft is made in the same way. The drive sprocket supplied with the engine is removed and welded to a  $\frac{1}{4}$ -in. steel disk which has been centerbored to clear the nut that holds the sprocket on the crankshaft.

**Fuel and air lines are made from copper tubing and encased in rubber hose to prevent vibration and leaks**

**Although magneto ignition can be used, battery ignition is recommended by nearly all good drivers**



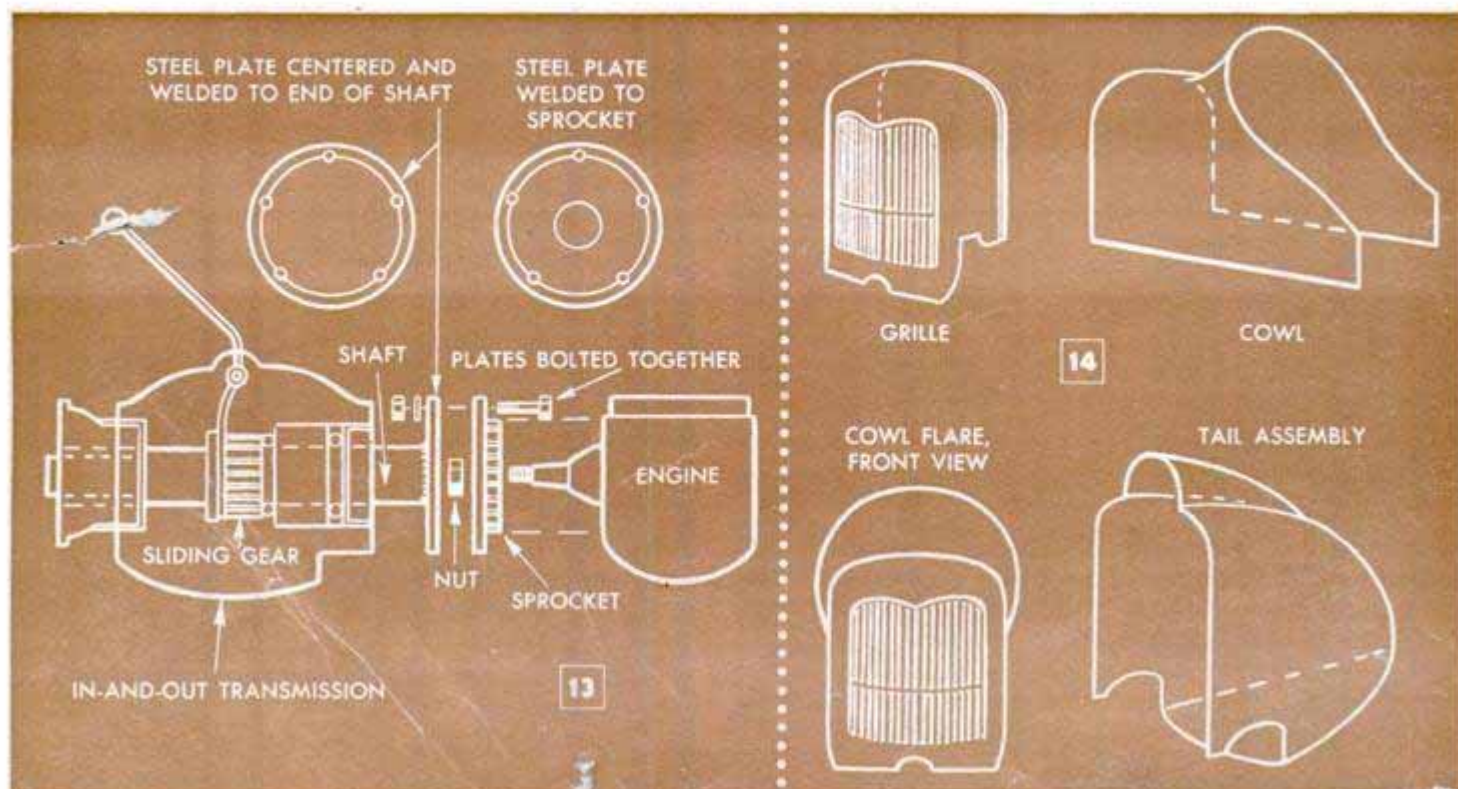


Equally spaced holes for machine screws are drilled concentrically near the edge of the disk as in Fig. 13. This disk is now used as a jig to drill holes through a second disk on the same spacing. The latter is then welded to the squared end of the transmission shaft. To assure that it is centered on the shaft, turn a recess into one side of the disk to a depth of  $\frac{1}{16}$  in. The diameter of the recess should be slightly oversize to admit the shaft in an easy fit. Then run a fillet weld all the way around the shaft. Final alignment of the parts should be carefully checked before the engine is bolted permanently in place on its mounting brackets.

At this stage the chassis is practically complete. There remain only the fuel tank, hand brake, bumpers, engine oil tank and the cowl frame, which is not yet bolted in place. The fuel tank should be of three-

gallon capacity with the filler cap located on the side, near the top, as in Fig. 6. It can be made from 18-ga. sheet metal, or, in some cases, a suitable tank can be improvised from an existing container, such as an oxygen tank. An air hose, Fig. 6, is connected to the top of the tank when a hand pump, Fig. 7, is used. Install a baffle plate vertically in the fuel tank to assure that fuel will reach the outlet when the car is making a high-speed turn. The lower edge of the baffle should be at least 2 in. above the bottom of the tank. A pattern of  $\frac{1}{8}$ -in. holes is punched in the baffle, the hole pattern covering approximately half its area. The fuel line from the tank to the carburetor is  $\frac{3}{8}$ -in. copper tubing which is encased in snug-fitting rubber hose to dampen vibration and protect the metal at points where it is attached to the frame.

Although many drivers may prefer to use the magneto ignition with which the engine comes equipped, battery ignition generally is recommended by experienced TQ drivers. A Willard Austin battery is just the right size to fit under the driver's seat where it is supported on brackets attached to the frame. Remove the magneto from the engine and close the opening with a steel plate bolted to the magneto mounting flange. With battery ignition you use a truck-type coil, and an Autopulse fuel pump can be substituted for the hand pump shown in Fig. 7. The pump should be adjusted to provide 3 lbs. of pressure. Motorcycle engines of the types classified are of the dry-sump type and require an external oil-supply tank. Although any oiltight, 2-qt. container may be used, a 2-qt. oxygen bottle fitted with flex-type oil lines is just





the thing for this purpose. It is mounted in a bracket attached to the fire wall as in Figs. 6, 10 and 11. Bumpers designed as in Figs. 7 and 8, are made from 1-in. steel tubing, welded for strength and rigidity. The rear bumper is especially designed with a vertical member which makes it easy to push the car with another when starting. If desired, the front and rear bumpers and the nerfing bars may be chrome plated. The free ends of the bumpers are inserted in sleeves welded to the frame members at the front and rear. They are held in place with setscrews to permit removal in case of damage. As the final step on the chassis, note that the treads of the rear wheels are checkered to give a lug-type tread, Fig. 7. This work should be done by a tire-repair shop. The hand brake, Figs. 2, 6 and 10, operates on only one rear wheel.

Construction details of the sheet-metal body have been left almost entirely to the builder. Figs. 7 and 14 will give a good idea of the shape and proportional size of the various sheet-metal parts. The grille is taken from a 1936 Plymouth car and cut down to the required size. A removable hood and side panels are cut from 16-ga. sheet metal and bent to the required shape. The curve of the cowl and the flare at the top edge are formed by cutting six equally spaced V-notches in the edge of the metal to a depth of about 2½ in. After bending, triangular pieces cut from metal of the same gauge are welded into the notches. After welding and forming the cowl, the welds are ground flush. The cowl is attached to the cowl frame with machine screws. An instrument panel, Fig. 10, is cut from ⅛-in. aluminum to fit the curve of the cowl frame. It is fitted with an oil-pressure gauge, temperature gauge, ignition switch (battery ignition), tachometer and an air-pressure gauge calibrated to 40 lbs., if a hand-operated fuel pump is used. Before the tail assembly is installed, a roll-over bar of 2-in. steel tubing is bolted to the chassis frame just back of the driver's seat. It is enclosed by the tail assembly. The rounded side panels of the tail are made from the right and left rear-fender skirts of a 1940 Buick car. The rear ends of the skirts are welded together and the open vee at the top is rounded over with two halves of a Willys headlamp fairing. The seat pan and belly pan are simple sheet-metal jobs. Have the seat upholstered by a professional workman. Extend the exhaust manifold, if necessary, and fit a solid-tube exhaust pipe leading all the way to the rear of the car.

☐ To prevent your airbrush hose from tangling, wrap it with a wire coil of the type used on telephone and clothes-iron cords.



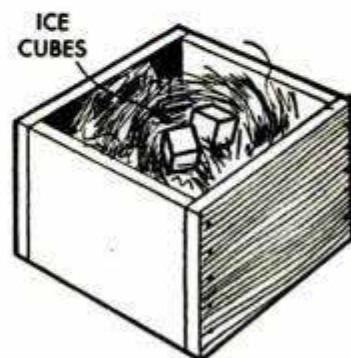
### Welding Table Has Open-Grid Top

Because of the open-grid construction of the top, this welding table is easily kept clean and small parts are more readily held in position for welding. The light weight of the table makes it easy to move about and the telescoping column provides an adjustment for height. The top is made by welding the ends of ½-in. steel rods to 1¼-in. steel angles. The table top is then welded to a pipe flange which screws onto the upper end of the telescoping column. The lower half of the column is welded to three pieces of steel angle, arranged at the time of welding to form an X-shaped base. The base is then braced to the column by steel rods welded to the column and separate angles as pictured.

L. H. Houck, Jefferson City, Mo.

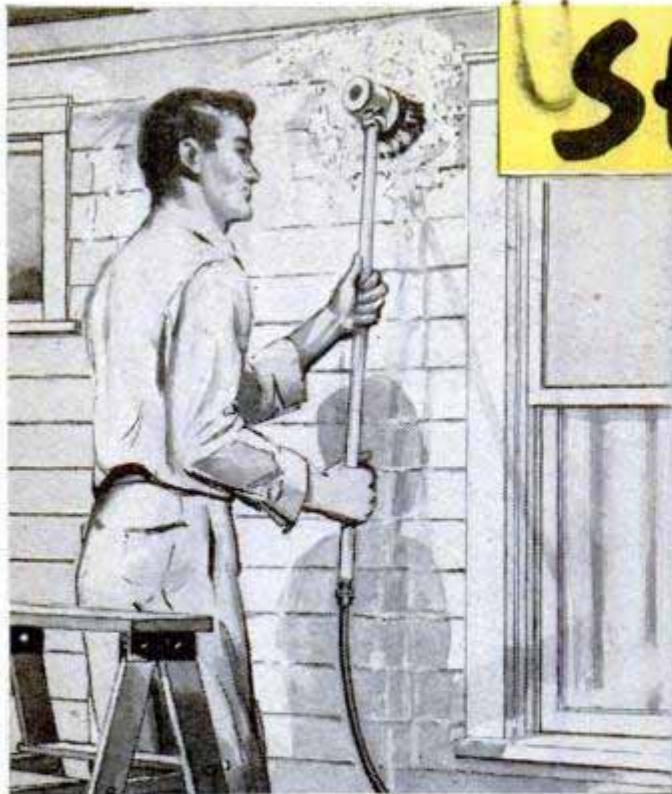
### Ice Discourages Broody Hens

Here is a novel trick that one poultry raiser claims is the quickest and easiest way to discourage a hen from brooding. Simply place several ice cubes under her while she is sitting on the nest. Usually, a couple of treatments are sufficient to discourage even the most stubborn bird from brooding.



John Krill, North Lima, Ohio.

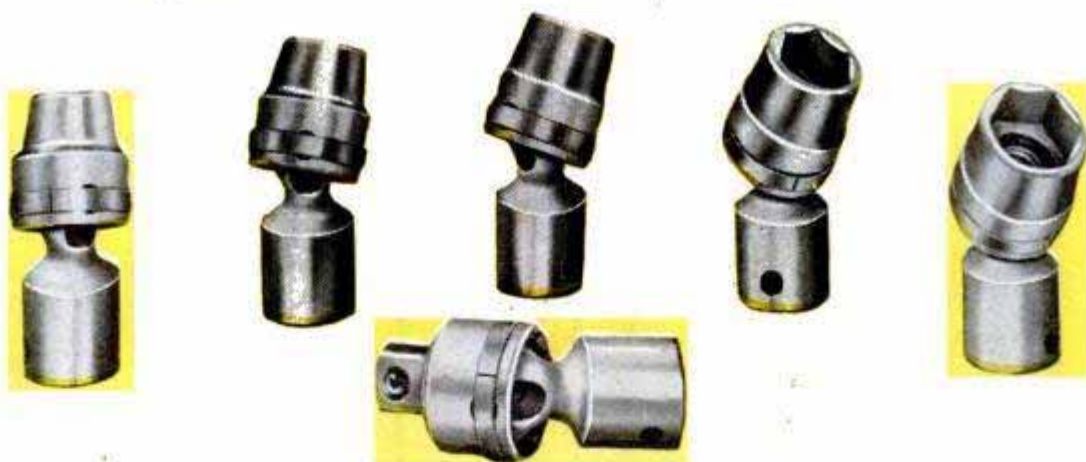
# SHOPPING



Tucker Mfg. Co., 305 First St., S.W., Cedar Rapids, Iowa



**JET-SPRAY BRUSH** offers a new idea in house and car washers. Designed with a screw-top cup to hold a supply of concentrated detergent tablets, a sudsing action is provided to dislodge embedded dirt. Opening a shut-off lever directs water into the detergent cup where it enters as a fine jet spray and slowly dissolves and feeds the solution to the brush. With the lever turned to the left, the water flows directly to the brush to flush or rinse the suds-covered surface. Washer comes equipped with a telescoping handle that is fitted with a 7-ft. length of lightweight rubber hose for connecting to any conventional garden hose



Plomb Tool Co., Los Angeles 54, Calif.

**BALL-TYPE UNIVERSAL WRENCH SOCKETS** employ a new ball coupling superior in action and wearing qualities to ordinary block-type universal. Sockets operate smoothly at all angles, have no "dead spots" common to the ordinary universal. Designed for impact wrench

◀ **VEST-POCKET TACHOMETER** not much larger than a fountain pen is handy for checking speed of rotating machine parts. Reads up to 15,000 r.p.m. directly on body of instrument. Can be used in spots wholly inaccessible to larger units

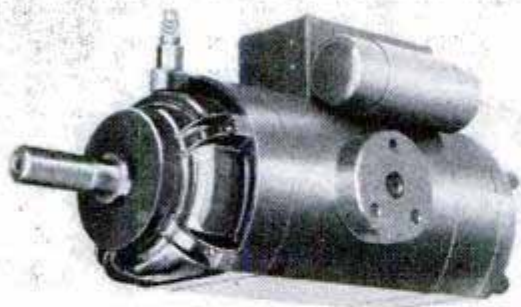
Verdell Instrument Sales Co.,  
P. O. Box 212, Burbank, Calif.

**PERIPHERY PRESS HOLDER** is custom-made for each job, the radius, size and number of type characters being determined by piece to be stamped. Made with shank size for any press, the holder is designed to use straight-sided type



M. E. Cunningham Co., 83 E. Carson St., Pittsburgh 19, Pa.

# FOR TOOLS



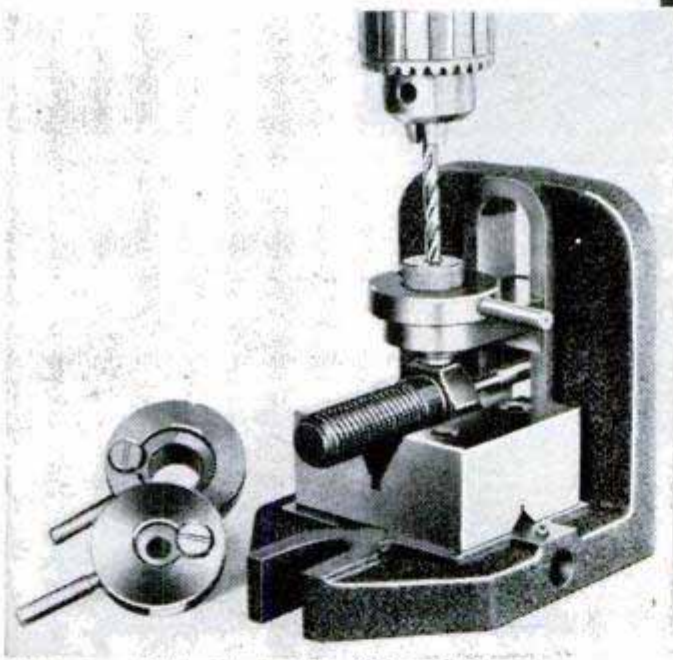
DeWalt, Inc., Lancaster, Pa.

**RADIAL SAW MOTOR** is now designed with special frame which permits full utilization of cutting capacity of blades. The new motor frame is flat across the bottom, increasing the cutting capacity of the standard saw blade about 40 percent. Motor is totally enclosed, fan-cooled and is of direct-drive design with no gears



Kenco Mfg. Co., 5211 Anaheim-Telegraph Blvd., Los Angeles, Calif.

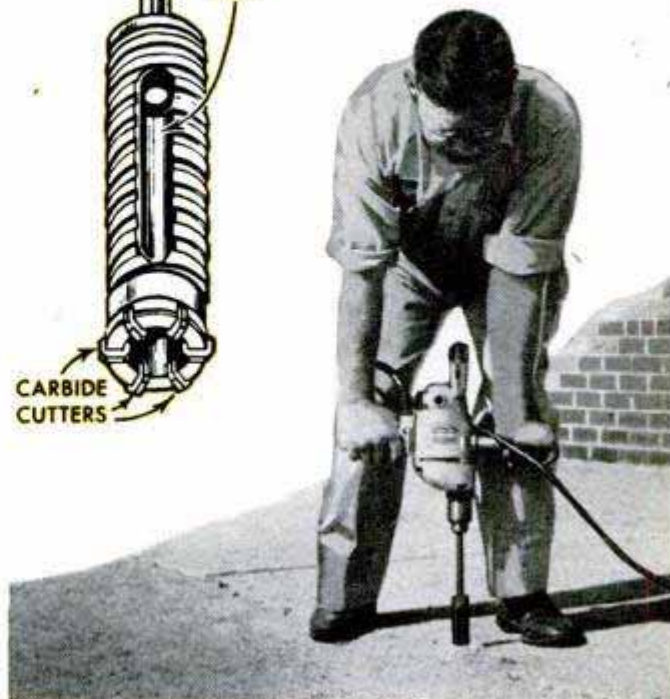
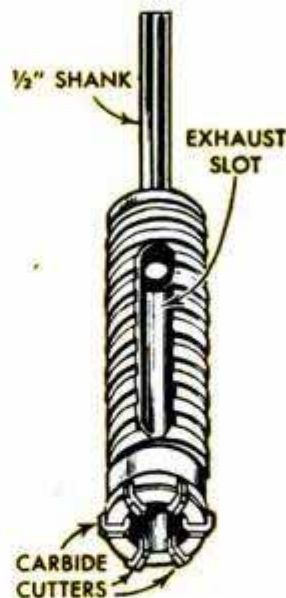
**PUNCH PRESS** of four-ton capacity has several features new to punch presses of this size. The throat is deeper than average, 12¾ in., and the frame weighs 400 lbs. A specially engineered clutch drive replaces the regular slot in the crankshaft. This feature was worked out with the purpose of strengthening the one-piece shaft by eliminating a deep milling cut. Press is adjustable for single or continuous ramming



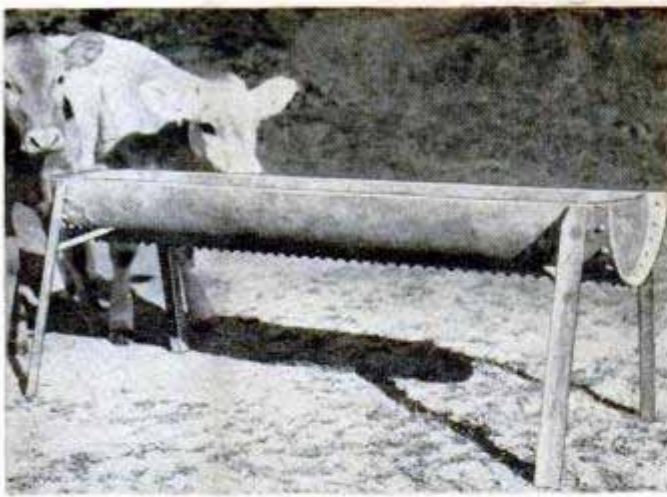
Mathewson Machine Works, Inc., 2 Hancock St., North Quincy 71, Mass.

**ADJUSTABLE DRILL JIG** reduces layout and drilling time on small lots of round stock from ¼ to 2 in. in diameter and on hex stock and cap screws from ¼ to 1 in. Hardened V-block has 90-deg. vee on one face for round stock and 60-deg. vee on other face for hex stock and cap screws. Supplied with sleeves for slip bushings of standard outside diameters. Drilling holes for cotter pins, setscrews, drive pins are typical jobs

**HOLLOW MASONRY DRILL** has carbide cutters in the perimeter of the drill head to cut reinforcing rods, glass or stones embedded in the concrete. Drills in poured concrete as fast as 6 in. per minute. Spiral grooves, or flutes, on the body of the drill carry dust out of the hole. Cuts only on the perimeter of the circle, like a plug cutter for wood. Small and medium sizes can be operated by portable electric drill. Operates quietly and with a minimum of vibration. Available from stock in sizes from 3/16 to 4-in. dia.



Tilden Tool Mfg. Co., 1144 W. Washington Blvd., Chicago



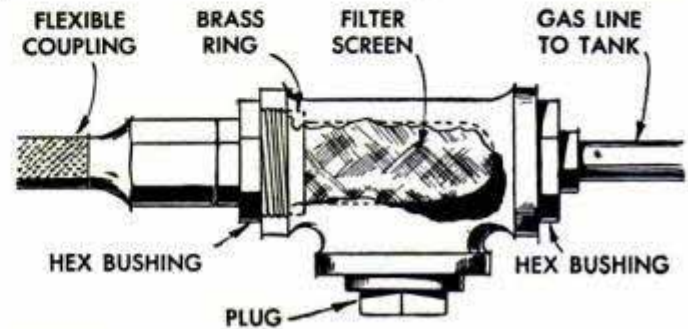
## Water Troughs for Young Calves

One discarded hot-water tank, cut in half, makes two watering troughs for calves, or other young livestock having access to a creep. Angle-steel legs are welded at the corners of the trough and braces to each leg are welded in place as shown. Troughs also may be used for feeding dry feeds without waste. Welding the tank halves together end to end and attaching shorter skids makes an excellent nontip feeder for sheep or hogs which is easily transported from place to place.

A. M. Wettach, Mt. Pleasant, Iowa.

## Sediment Filter on Auto Fuel Line Improvised From T-Fitting and Screen

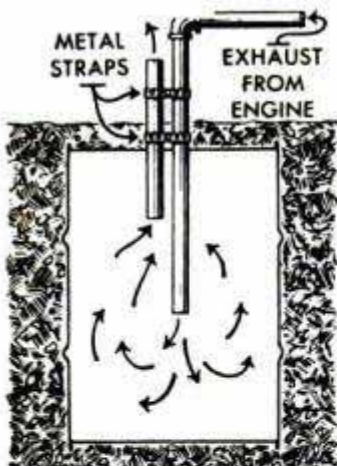
Often needed on autos not having filter screens at the fuel-pump inlet or carburetor, a gas-line filter can be made from a  $\frac{3}{8}$ -in. pipe tee. The bottom opening of the tee is fitted with an ordinary plug. Then, a piece of filter screen is soldered into the shape of a finger and inserted in the tee where the edges of the open end are wedged against the inner surface of the tee with a brass ring. The ring is backed into the opening by a brass bushing to which is attached a flexible coupling. The coupling leads to the carburetor. A second bushing at the other end of the tee connects the line leading to the fuel tank. In some instances, the fitting on the fuel line is a female type, un-



like the one shown. If so, a coupling must be added to the connection. In use, sediment from the gasoline is caught in front of the "finger" filter and can be removed by unscrewing the plug at the bottom of the tee.

George J. Link, Centerville, Ind.

## Stationary-Engine Muffler



A competent muffler for the small engine of an electric light plant, or other stationary engine, can be made from an oil drum, or length of a large-diameter cement pipe buried in the ground a few inches below the surface as shown. When tile is used, the upper

end must be capped. The exhaust pipe from the engine is run into the top of the barrel, or tile, to extend several inches into it. A second pipe is placed next to this one and held with metal strips as indicated. When an oil drum is used, it may be possible to screw the pipes into a couple of end bungs instead of strapping them together.

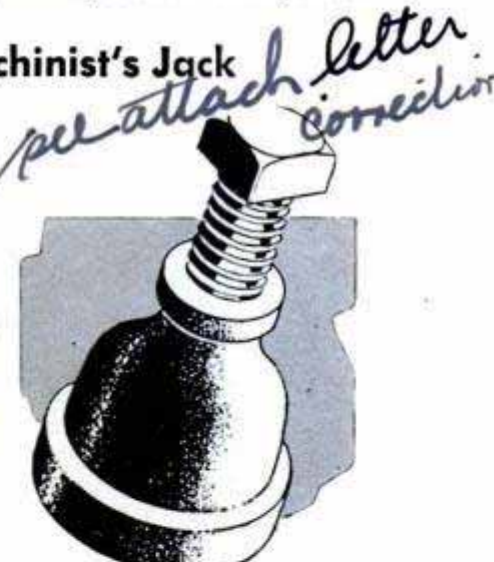
Clinton R. Hull, Costa Mesa, Calif.

☐ Artists or writers who illustrate their articles will find dictionaries a source of inspiration for picture material.

## Easily Made Machinist's Jack

An ordinary pipe reducer and a bolt can easily be converted to use as a machinist's jack. All that is necessary is to rethread the bolt to screw into the small end of the reducer. Jacks of various sizes can be made by simply using bolts of different lengths. For accuracy, it may be necessary to true up the large end of a reducer so that it will rest squarely on a machine table.

Warren L. Miles, Providence, R.I.



## Renewing Bolt Threads

The threads on bolts can be quickly and efficiently renewed by use of a thread die and a wrench. Clamp the die in a vise and turn the bolt into it, using a speed wrench. If the bolt head is slotted, turn it with a screwdriver bit in a brace.

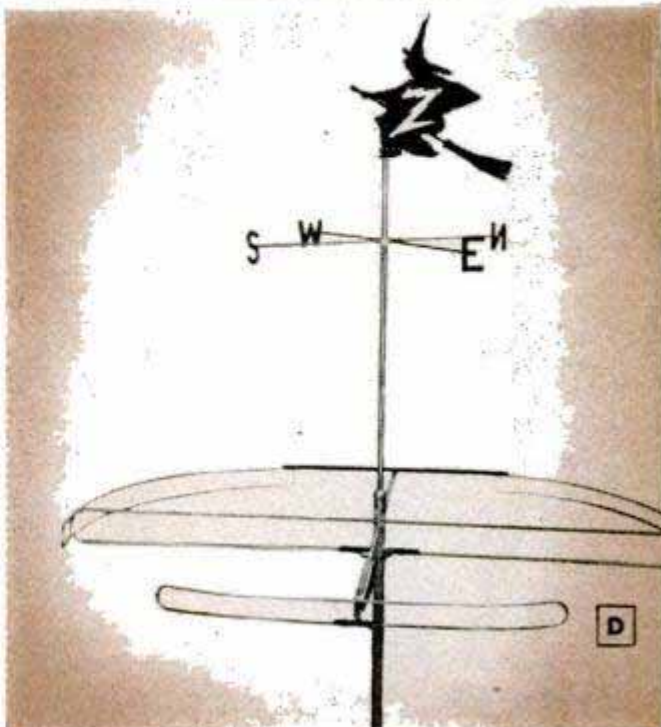
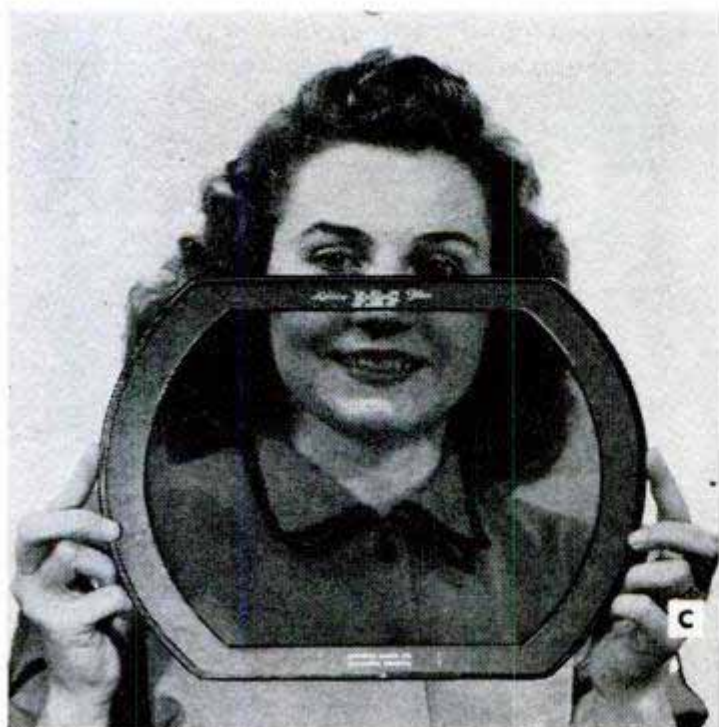
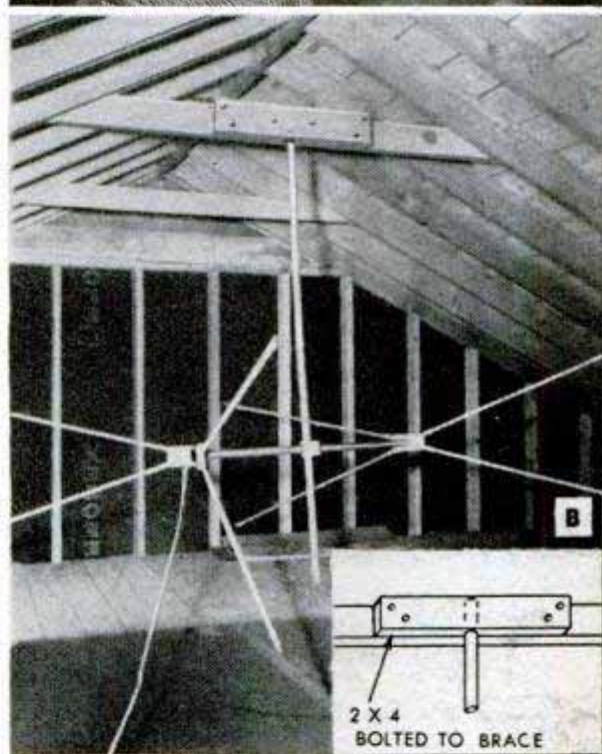
## Television in the Home

WHY MISS interesting TV programs when you have work to do in other parts of the house? One set owner solved this problem in his own home workshop by building an attractive cart to house his table-model TV receiver, as illustrated in photo A. The cart was constructed from ordinary pine lumber and finished in silver gray to blend with general furnishings. Realizing that the outside TV antenna gives the best reception, he installed plug-in outlets to the roof antenna in various rooms. Several types of suitable twin-lead connectors are available.

If you do not live too far from TV-broadcasting stations, you can make an efficient attic antenna installation by suspending the TV antenna upside-down from a cross brace as illustrated in photo B. The 2 x 4 clamp detailed in the inset sketch permits proper rotation to orient the antenna for the stations.

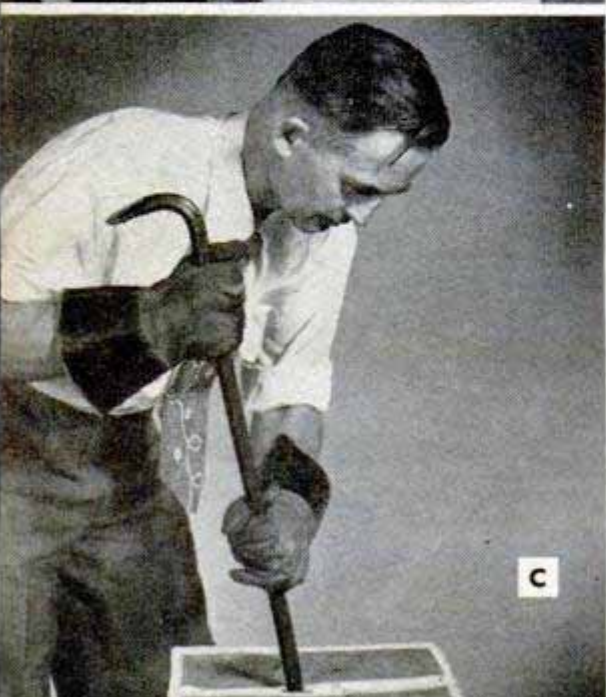
Various types of TV-picture filters have been designed to remove glare and relieve eyestrain, but the one shown in photo C is unique in that a special variety of nylon cloth, or gauze, is employed as the filtering element.

The combination weather vane and TV antenna illustrated in photo D is both artistic and effective. It consists of the vane which is topped with a "witch" on a broomstick. Below is an inline type of TV antenna designed for both the high and low bands.



# SAFETY-FIRST SERVICE

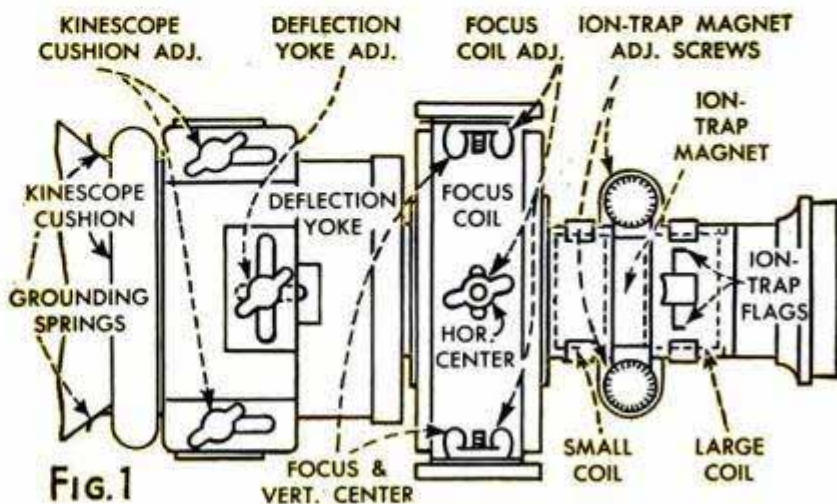
By Frank L. Brittin



THERE ARE a number of good common-sense reasons why you should call your television serviceman if you know nothing about the inside of your TV receiver. However, many unnecessary calls are made by television servicemen every day. This is becoming a problem, as trained TV service personnel are rapidly being absorbed by the war effort. A surprising number of service calls are actually made for a reason that is always embarrassing to the set owner. The serviceman arrives after several unavoidable delays, and frantic phone calls, to find that the power cord of the receiver is not plugged into the wall socket. When the owner tried to turn the set on it was "dead." Perhaps the wife or maid accidentally disconnected it when cleaning the room or rearranging the furniture.

These unnecessary service calls cost money because no busy serviceman can make them for nothing. The serious angle involved is the plight of the TV set owner who really needs service. He has to wait and miss important programs while the serviceman is plugging in your set, or hooking up the lead-in from the antenna that came loose because the children knocked it off while chasing the dog. You can do this safely yourself and save money by making a simple inspection around the cabinet or console before calling the serviceman.

It is quite possible that we may even have to help ourselves further in the near future if we wish to avoid missing our favorite TV programs. Of course, many television set owners have had no experience with TV circuits and would not understand a block, or schematic circuit diagram, if they had one. On the other hand, a large number of TV set owners have frequently replaced tubes successfully in their AM and FM receivers by means of the simple tube-substitution method, first carefully marking the tube-socket locations to identify each tube type. There is no reason why these owners cannot replace defective tubes in their TV receivers safely if they take a little time to learn a few very important safety-first rules that apply to all television sets. If

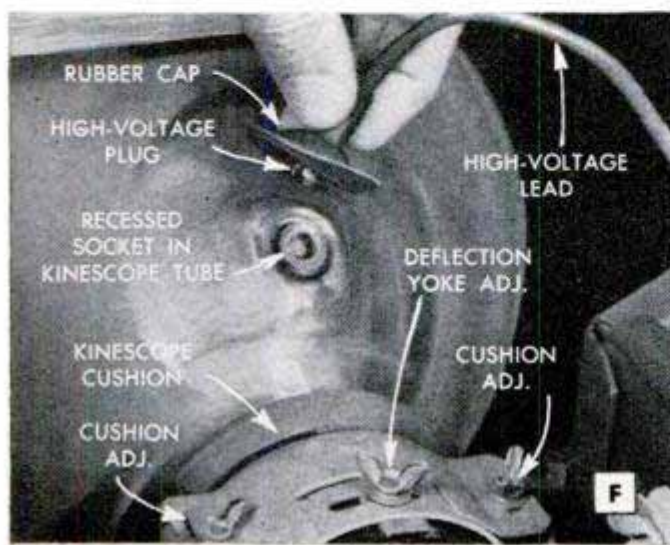


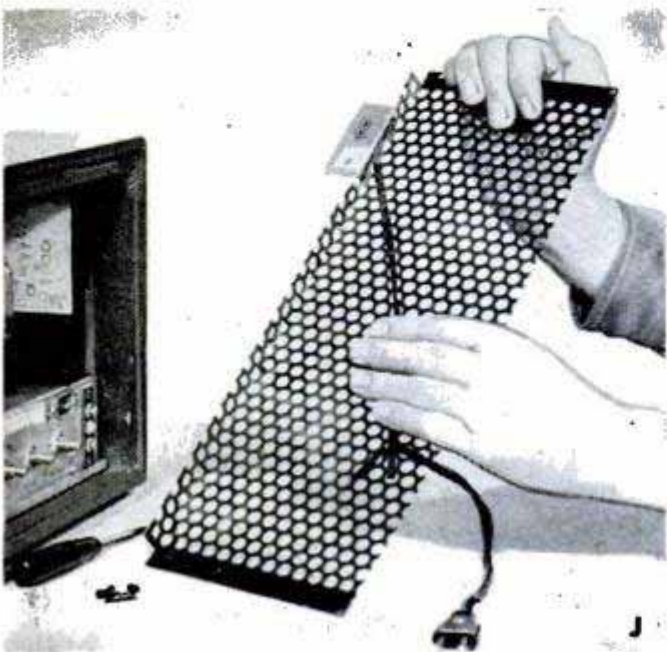
# HINTS FOR TV SET OWNERS .....

you do not have a service manual that gives the tube-layout chart for your TV set, you can obtain one from the dealer or manufacturer, or you can get one of the Howard W. Sams Television-Tube Location Guides for \$1.50 from any of the large radio-parts houses. This tube-replacement guide contains 218 charts covering the various tube locations, and their functions, in TV receivers produced by 56 manufacturers. These charts provide a means for quickly locating all tube positions in any of their television sets. Become familiar with the tube layout and controls of your particular TV set before attempting to make any tube replacements.

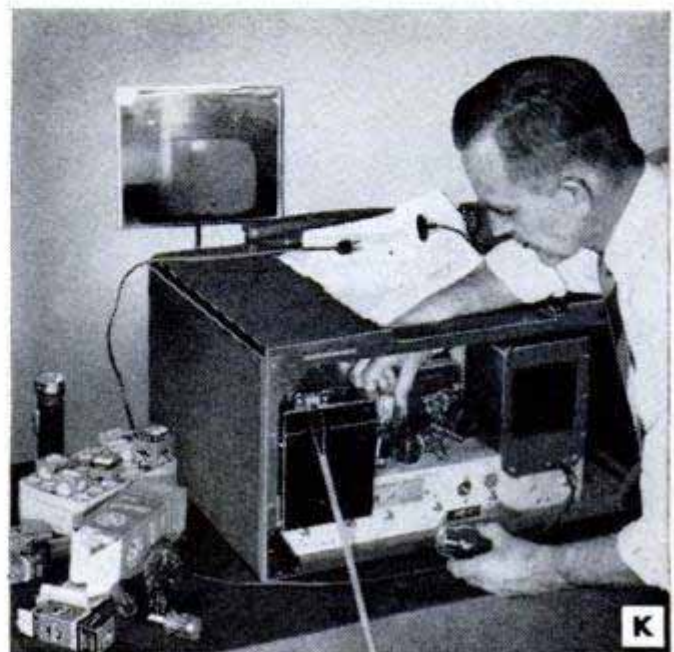
A television receiver is really two receivers in one. It has four or five times as many tubes as your radio receiver and, in addition, it employs a large picture tube. Replacement TV tubes and parts will continue to be available in limited supply to set owners from the large radio-parts houses just as radio-receiver tubes and parts were during the last war.

There are certain safety-first precautions that must be taken when working with any type of AM, FM or television receiver, or, in fact, with any electrical device operated from power lines. This is especially true with television receivers that employ two power supplies. One is a special high-voltage supply used for accelerating the electron beam in the picture tube. This may be any voltage from 5000 up to 20,000 volts, or more. Luckily the amperage is quite low, but it can give you a dangerous shock. The other power supply is the low-voltage B-supply, which is usually only about 350 volts. But it is really more vicious than the high-voltage supply as it normally delivers a considerably higher current. Knowing this, you can realize why the manufacturer and serviceman warn you about removing

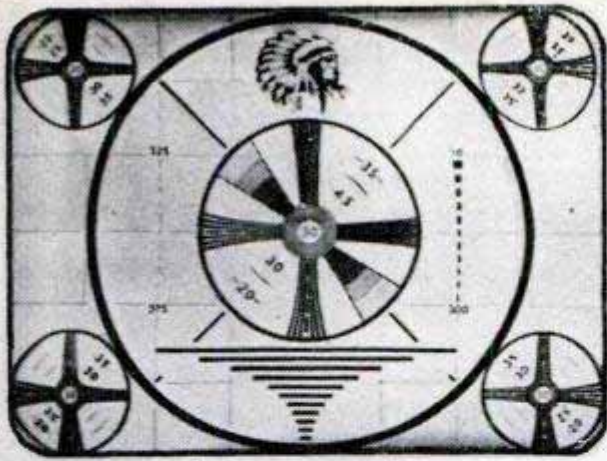




the back from your TV set even though they provide it with interlocking switches. However, you can do this if you turn off the set first, and then disconnect the power cord and wait several minutes for the condensers in the power-supply section to discharge. After removing the top cover, there are two other precautions that must be taken before you can safely handle the interior components of the TV receiver. First remove the high-voltage plug from its recessed socket in the picture tube, as illustrated in photo F, and discharge it against the metal chassis as shown in photo G. This will bleed off any charge that might still be in the condensers. The second precaution is to use a short insulated test lead between the black outer coating on the picture tube and the high-voltage plug, or chassis, to remove any possible surface charge. This is especially necessary if your picture tube is one of the glass electromagnetic types that have an outer and inner coating of conducting material which acts as a condenser for the high-voltage supply. A shock from this coating might be slight, but enough to make you drop the tube when you are removing it from the set. The socket is disconnected as shown in photo E. The picture tube is a large mass of glass that must be handled with extreme care. A high vacuum exists within the tube. Therefore, if the tube should be broken, it will collapse upon itself, causing an "implosion" (instead of an explosion). The glass will fly all over the room and could possibly damage your eyes. This is a dangerous feature that you did not have to contend with in replacing tubes in your old radio receivers. The obvious safety-first measure is always to wear protective goggles of the ordinary plastic type used in workshops and a pair of heavy gloves when handling your TV picture tube, as illustrated in pho-







L

tos A, B and D. Always seal up the old tube in the carton that the new picture tube came in. Then take it out in the backyard and, for safety reasons, destroy the old tube with a crowbar, as illustrated in photo C. When handling TV picture tubes take great care not to scratch or knock them against any hard surface. Do your TV tube replacing in a room by yourself when there are no "small fry" around who might get hurt.

All TV picture tubes become defective and useless in time and must be replaced. As this tube is expensive, and the most difficult one to handle in making replacements, we will deal with it first. You will know that your picture tube is becoming defective when it acts as follows: When you turn the set on, the picture is dim and then gradually brightens; dimness becomes progressive as the tube loses emission; when advancing the contrast control, the picture goes negative (like a photo negative), and when restored to normal it is still dim, and nothing can be done with the controls to make the picture brighter. Under these conditions it is quite possible that you need a new "kinnie," as the picture tube is called in the serviceman's vernacular. A yellow spot on the face of the tube does not necessarily indicate that the tube is going bad. In about 50 percent of all TV sets now in use, the picture tube can be removed without taking the chassis out of the cabinet. This is done with a short Phillips screwdriver by removing the front panel that holds the protective glass plate, photo H. While you have the front off, clean this glass plate with a preparation sold by TV supply houses. Always handle the picture tube by the front end, as shown, never by the fragile neck. When removing the socket as illustrated in photo E, check the position of the tube as related to the recessed high-voltage socket and the ion-trap

(Continued to page 228)



M

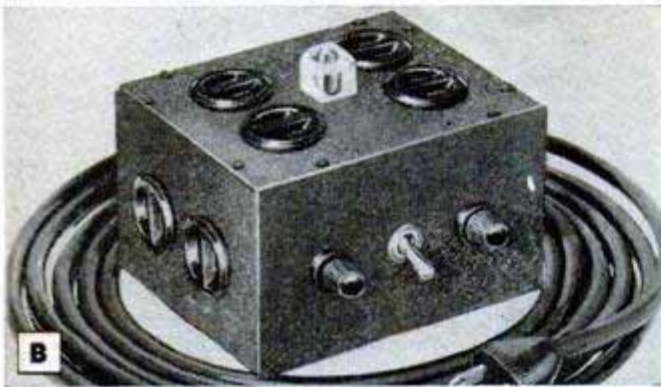
## More Trouble-Shooting Hints

- 1**—A normal picture test pattern should look like the one in photo L. It should be in sharp focus with good contrast between the black and white picture elements with intermediate shades of gray. The steady image should completely fill the raster
- 2**—If the pattern, or picture, disappears and there are horizontal bars across the screen, adjust horizontal hold control, or look for defective tubes in the horizontal synchronizing section. For their location, check the tube-replacement guide sheet
- 3**—If screen is blank and sound is normal, check the horizontal amplifier tubes and high-voltage oscillator tubes. May indicate short in H.V. supply
- 4**—If there is only a vertical line on the screen, check the tubes in the horizontal sweep circuit
- 5**—If the picture folds over horizontally, always look for a defective damper tube 5V4, or 6W4
- 6**—If a picture is long and narrow, adjust width control, or look for a defective horizontal osc. and discharge tube; or horizontal output tube
- 7**—If there is only a white horizontal line in the center of the screen, look for a defective vertical oscillator or amplifier tube, 12AU7 or 6AQ5
- 8**—If picture is of improper height, reset vertical size control, or check for a defective vertical oscillator or amplifier tube, as is indicated above
- 9**—If the picture is unevenly proportioned, look for a defective vertical amplifier tube (6AQ5)
- 10**—If there is no picture, but the raster is bright and the sound is distorted and weak, the antenna is either disconnected or the lead-in is shorted
- 11**—If the picture is weak and sound is normal, the antenna is not oriented in the proper direction. The same holds true if picture is snowy or hazy
- 12**—If ghost in picture, but sound is normal, the antenna is improperly located or badly oriented. Although there is no remedy for signal reflections from near-by obstructions or buildings, the effect can be minimized by changing the location of the antenna on the roof until the best position is found. In crowded localities keep the antenna close to the roof; a resistor in the lead-in at the antenna sometimes helps to reduce strength of the unwanted reflected signals as a last resort
- 13**—If the picture jumps, and the sound is noisy, a loose connection in the antenna system is indicated. The lead-in may be shorting against house

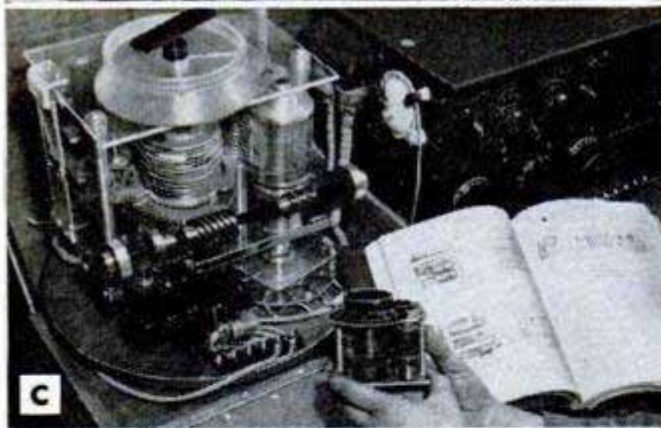
# Radio and Electronics Today



**A**—Weighing only 12 pounds, this portable public-address amplifier enables the operator to speak in a normal voice to a large group in the field, factory or auditorium. The director or coach is no longer tied down to a platform mike or limited to areas where electric current is available. The unit measures  $5\frac{7}{8} \times 8\frac{1}{2} \times 11\frac{3}{4}$  in., and it is powered with a 2-volt rechargeable 25-amp. battery. The output from a class-B amplifier is 2 watts.



**B**—Perhaps one of the handiest units in any radio shop, laboratory, photo studio or home workshop is a multiple-outlet box. The compact unit illustrated makes possible the plugging in of eight standard Edison line-cord plugs from one outlet. A neon pilot light indicates power is on.



**C**—One of the most interesting training aids at the Air Force's Training Aids Wing, located at the Chanute Air Force Base, is a working model of an automatic transmitter tuning head 10 times the size of the actual unit in the student's hand. The unit automatically tunes 11 separate radio frequencies and is standard equipment on all large bombers and cargo planes. Having students watch the large model in operation saves technicians hundreds of words of instruction.



**D**—Electronic metal detector, used by a nationally known advertising service organization, screens mail received in box-top and soap-wrapper premium promotions to be sure that no coin has escaped the sorters, and that no sender will be disappointed.

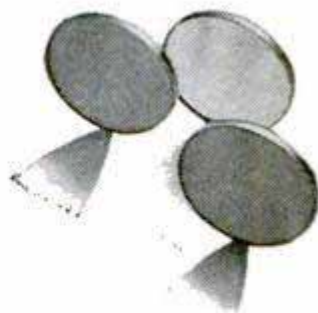


**E**—One of the new portable radio receivers that weighs only about 5 pounds operates on a.c.-d.c. or AB dry-cell battery, and is small enough to pack in a suitcase. Other features include "sunburst" dial for easy tuning, built-in antenna, large speaker and a dry-plate selenium rectifier.



**GET DRAMATIC SKIES  
WITHOUT CHANGING OTHER TONES**

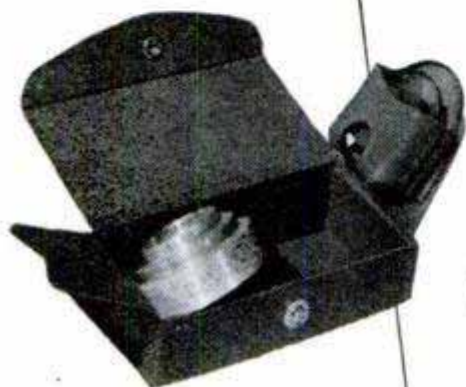
A Kodak Pola-Screen can change a vacation snapshot into a prize-winning photograph. Fit one on *your* camera. For color and black-and-white. Accessory Pola-Screen Viewer slips over handle—"previews" the varying sky tones you can obtain. Pola-Screens, from \$6.50. Viewer, \$6.50.



**KODAK FILTERS  
ADD LIFE...**

**SPARKLE... EMPHASIS**

Kodak Wratten Filters utilize dyes of great purity, for accurately controlled light transmission. More than 100 varieties—such as *X1*, a green filter for natural flesh tones... *A*, a red for striking landscapes... *K2*, yellow, to emphasize clouds. And to warm up *color* shots, use a Kodak Skylight Filter for mountain and marine scenes and pictures taken in open-shade. In series sizes, to fit most cameras, from \$1.60.



**KEEP YOUR FILTERS  
PROTECTED AND READY  
FOR ACTION**

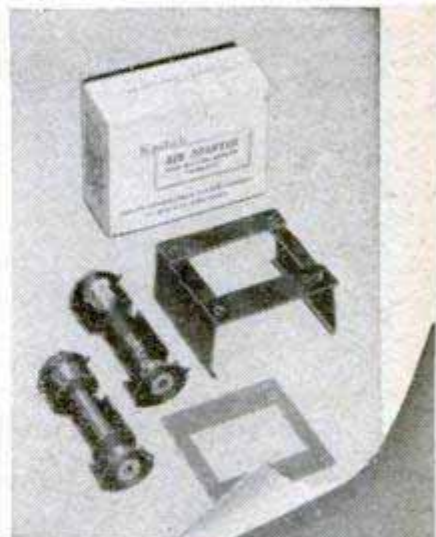
Kodak Combination Filter Case has two compartments. Kodak Adapter Ring, filter, and Lens Hood fit in one compartment—3 filters in the second. From \$4.

**GIVE YOUR  
VACATION  
"SNAPS" THAT  
EXPERT TOUCH**

**ADAPTER KITS PERMIT KODAK TOURIST AND REFLEX  
CAMERAS TO USE KODACHROME FILM**



The Kodak Tourist Adapter Kit, (\$14.50—left) for Tourist Cameras with *f/4.5* and *f/6.3* lenses, offers a variety of picture sizes— $2\frac{1}{4} \times 3\frac{1}{4}$ ;  $2\frac{1}{4} \times 2\frac{1}{4}$ ;  $1\frac{5}{8} \times 2\frac{1}{4}$ . Also adapts cameras for 2 x 2-inch Kodachrome slides. The Kodak 828 Adapter for Kodak Reflex Cameras (\$5—right) permits use of 828-size films, including Kodachrome. Each kit consists of back-frame masks, view-finder masks, and special spool baskets.

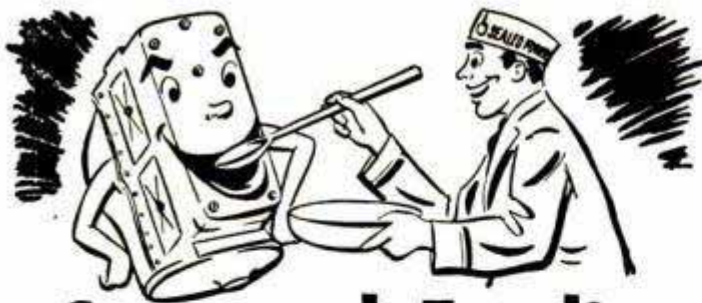


*Prices are subject to change without notice  
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Be sure to see all these Kodak accessories at your Kodak dealer's

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EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.



# Care and Feeding of Engines

BY S. P. CORP

## HOW TO EVALUATE VALVES

When compression reading shows faulty valves, inspect valve stem for peening. If bottom is peened, remove burrs with a fine file before attempting to pull stem through guide. Always identify valve with its own guide, for convenience in replacing.



PITTED VALVE FACE

card valve if it is warped or between head and stem, or if stem is bent.

Pitted or grooved valves are caused by blow-by at the exhaust valve. Reface them with a wet refacer after checking manufacturer's manual for correct angle. Be sure resurfacers is O. K., and that you have enough metal for resurfacing. Otherwise you are wasting your time!

Clean valve by buffing on electric brush if possible, or scrape carbon off with knife, then brush with a soft wire brush.

Look for pitting, grooving, cracking, burning, and guttering on valve head. Dis-



GROOVED VALVE FACE

## SHOCKING SUGGESTION

If your car is hard to steer at high speeds, if it pitches excessively on turns, or if it just plain rides hard, take a look at your shock absorbers. This is one item of car maintenance that is likely to be neglected.

Take hold alternately of each end of each bumper and try to bounce the car up and down rapidly. Then watch movement of car as you let go. If it keeps on bouncing before coming to rest, your shock absorber on that corner is not controlling spring movement. Repeat this on all four corners.

To remove shock absorber for testing, remove upper and lower holding nut from the rubber bushing on the studs. Now clamp the shock absorber in a vise by lower end, with upper end straight up. Pump it up and down for full length of travel. If it sticks or is hard to pull or if there is no resistance, it is leaking by the valves and should be replaced.

## WHEN YOU RE-RING...

Don't use less than the best! Use Sealed Power Piston Rings—the best rings built! MD-50 Steel Oil Ring, the only ring with the Full-Flow Spring, controls oil even in badly tapered and out-of-round bores. Sealed Power rings are used as original equipment by manufacturers of more than 80% of all passenger cars! For triple wear, use Sealed Power Chrome-Faced Rings. Write for free booklet, "7 Ways to Save Oil." It may save you real money. Just address a postal card to Sealed Power, Dept. G-7, Muskegon, Michigan.

## New York's Waterfront Lumberjack

(Continued from page 141)

When it has 100 or so logs on its back, the cat sinks into the water with only a few inches of its rails showing. Towed by a tug, it crawls across the harbor. As the cat nears the Jersey shore where Power's sawmill is located, men in calked boots pole her in until she runs aground.

The logs are rolled across the shore by lumberjacks with peavies and piled up to spend a few months drying out after their 40-year bath. Then, well-seasoned, they are ready for the mill. Unlike timber fresh from the forests, pier pilings have acquired a few souvenirs of civilization like foot-long steel spikes buried deep in the grain.

When the big saw hits one of these hidden spikes, the air is full of saw-tooth shrapnel in a split second.

After this had happened a few times, Power decided he'd had enough. Now, before a log enters the mill, lumberjacks scoot over it with war-surplus mine detectors. Any metal in the pile is located and extracted before processing begins.

There's not much of the old pier piling left when the boys at Burma Road get through with it. First, big framing timbers are cut. Softwood piling becomes boards. Hardwood makes truck-body stakes. The mill also turns out pallets for warehouses and docks. Waste pieces of lumber are fashioned into surveyors' stakes and wedges for chocking freight on railroad flatcars. Short butts are split into cordwood. Even the trimmed slabs are sold for kindling.

## The Lost Rivers Return

(Continued from page 121)

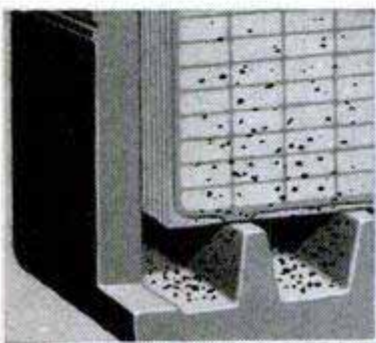
sergeant, he had been farming his grandfather's land over Preston way, but thought he would like a crack at the rich new land being opened up. He put in a bid to rent 153 acres of bureau land—\$5.05 an acre the first year and \$12.18 the second year, with an option to rent the land for three more years.

With plow and tractor, Hodges tore into the sagebrush on the rented land. He raked the cut brush into windrows, burned it, and then replowed the land, harrowed and leveled it. Seven hundred pounds of commercial fertilizer per acre were added as an assist to nature.

"I invested about \$18 an acre before I planted the first seed, but I'm coming out all right despite the current low price of potatoes," reports Hodges. "I will hate to leave the land in five years. Hope I get a homestead."

(Continued to page 224)

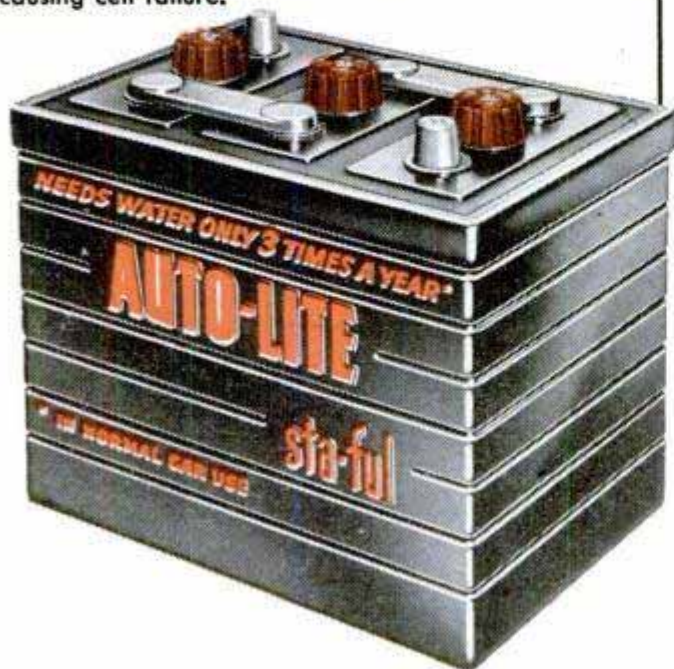
# The inside story of your battery- See how it works!



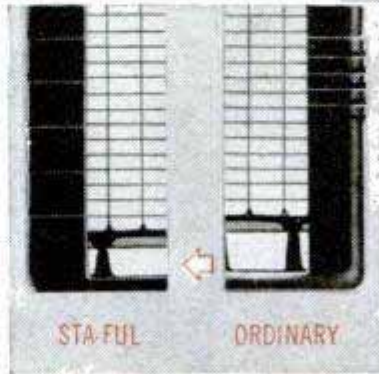
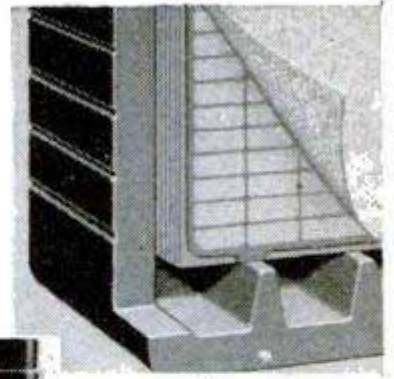
1 In ordinary batteries, small particles keep flaking off positive plates, so ordinary design batteries must have large sediment wells at bottom of case to hold these particles.



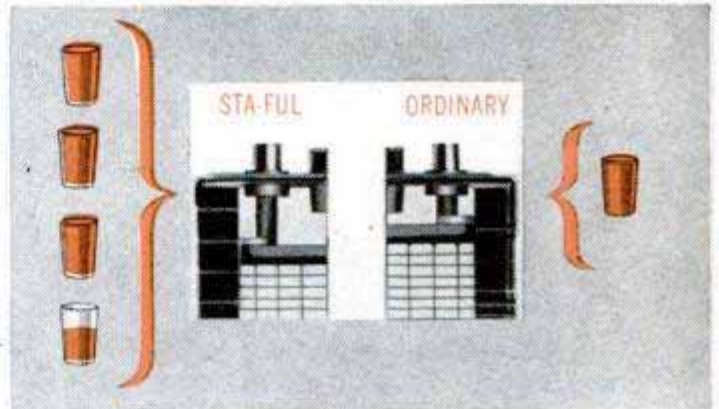
2 If sediment wells in ordinary design batteries aren't big enough to hold flaking particles from positive cells, particles pile up and short circuit cells, causing cell failure.



3 In the Auto-Lite "Sta-ful" Battery, every positive plate has a Fibre-glass retaining mat protecting it and holding the active materials in place to reduce shedding and flaking.



4 Side-by-side view shows that the "Sta-ful" Battery doesn't need all the extra space at bottom as ordinary design batteries do. So extra space in "Sta-ful" Battery is moved to top where . . .



5 . . . extra space can be used to hold more battery electrolyte, giving room for over 3 times the liquid reserve in the "Sta-ful" as in ordinary batteries. That's why the "Sta-ful" needs water only 3 times a year in normal car use. "Sta-ful" Batteries give longer life, too, in tests conducted according to minimum life cycle standards.

**AUTO-LITE BATTERY CORPORATION**

Toledo 1

Ohio

*Auto-lite sta-ful*  
*...needs water*  
*only 3 times a year*

IN NORMAL CAR USE

**YOU CAN TELL  
A GOOD  
ELECTRIC DRILL  
BY ITS CHUCK**



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It bears the name... look for it!**

**Jacobs Plain Bearing Key Chuck...** the most widely used drill chuck in the world. You can trust the tool that has one.

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**IF IT'S A**

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**IT HOLDS**

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*Clinic for*



*Homemakers*

**Water-White Lacquer**

**Q** — What is the meaning of the term "water white" which often is used in describing certain types, or grades, of lacquer and varnish? In other words, if I'm directed to use water-white lacquer, what kind of finish is produced? Does it contain a pigment or a color? Also, what is a nonraising lacquer and for what purpose is it commonly used?—G.S., S.C.



**A**—In general, the term "water white" describes extreme paleness in either varnish or lacquer. If a water-white lacquer is applied to bare wood the change in reflective properties (color) of the wood will be hardly noticeable after the finish is dry. However, in ordinary practice, this finish is applied over surfaces which have been stained, filled and sealed, and it is desirable that the stain colors be changed as little as possible by the top (final) coat. It often is specified as a top coat over light finishes such as blond and the new light-gray stain colors. Metal lacquers which are used as a protective coating on brass and copper are sometimes described as water-white. The term is more generally applied to lacquer than to varnish. Nonraising lacquers contain slow-acting solvents which permit them to be applied over paints, varnishes and enamels.

**Choosing Wall Tile**

**Q**—I'm trying to decide what type of wall tile to use in my kitchen above and in back of a cabinet sink. The color I want comes only in the plastic tile but I'm a little doubtful about the durability of this material as the tiles are light and thin. Which should I use, plastic or aluminum tile or a hardboard scored to represent tile? Also, I want the tile to extend to the floor back of the sink. Is it advisable to move the sink out from the wall? — A.T., Calif.

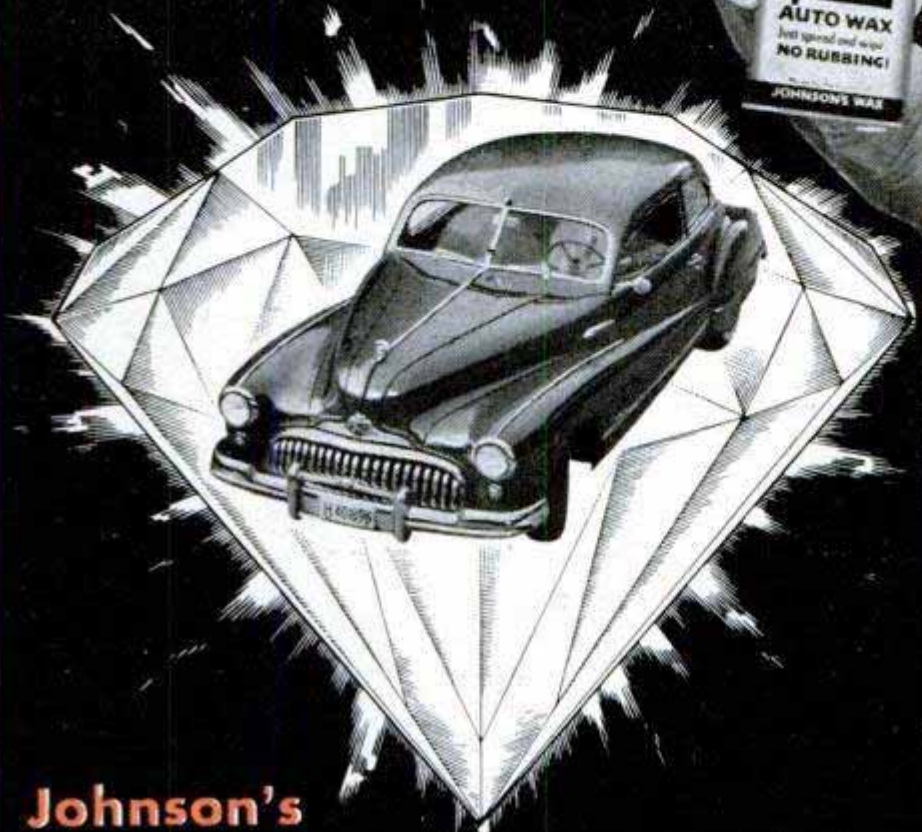


**A**—So far as durability and attractiveness are concerned, there is little choice between the three types of tile. All are good quality, easy to clean, and placement is comparatively simple if the manufacturer's instructions are followed in detail. On some walls the scored hardboards may be a little more difficult to handle, especially for the individual. However, this disadvantage is offset by the large size of the scored sheet, making it unnecessary to locate each tile individually. Where it is

(Continued to page 222)

# Proved better

on 5,000,000 cars!



Johnson's

# Car-Plate

gives a lasting "diamond shine" in 20 minutes!

**New no-rub way to wax!** Waxing a car used to mean hours of the hardest kind of rubbing. Now it's a 20-minute take-it-easy job!

And Johnson's Car-Plate not only saves you time and work . . . it actually gives your car a tougher, brighter, longer-lasting wax protection!

More than 5 million car owners have proved it since Reader's Digest published an article describing this sensational chemical discovery.

Get Johnson's Car-Plate at your service station or regular wax dealer's. Just spread it on the clean finish of your car...let it dry...and wipe lightly. That's all it takes to wax your car to a "diamond shine"!

A 10-oz. can of Car-Plate does any car twice . . . and costs only \$1.00. Today's the day to try it.

"Johnson's", "Car-Plate" and "Carnu" are the trademarks of S. C. Johnson & Son, Inc. © S. C. Johnson & Son, Inc., Racine, Wis., 1951

### How to clean before you wax

Wax should always be applied to a CLEAN car. The finish should be free of road film and decomposed paint. For this reason it is important that you clean your car thoroughly before applying Car-Plate. For quick, easy cleaning, Johnson's Carnu is recommended. It does the job fast and safely — leaves a perfect surface for a sparkling Car-Plate finish.



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Klean-Strip is brand new . . . not like any paint remover you've ever used. Takes all the danger and drudgery out of refinishing. Buy Klean-Strip whenever you buy paint. Available at better paint, hardware and department stores, everywhere.

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save you \$300**



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Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

(Continued from page 220)

necessary to cut the sheet, just make sure that it is cut with square corners so that the scorings will register. Then spread the cement, level the top edge of the sheet, press it tightly into contact with the cement and there you are. The individual tiles require a little more care when starting the first course. Once this has been accomplished properly, the rest is easy. The problem is to keep the succeeding courses level and the joints in register vertically and horizontally. If you move your sink outward from the wall a distance equal to the thickness of the tile plus the cement, the plumbing will have to be moved an equal distance so that all pipe joints will be in line in the new location. Unless you are experienced in this job, better consult your plumber. However, we do not ordinarily recommend running tile to the floor back of a cabinet sink which has already been installed, as usually the cabinet is attached to the wall in some manner. This makes it a rather costly and difficult job to change the position of the pipes and pipe connections both above and below the floor. We think you will find the job satisfactory if you simply bring the tile down to the sink drainboard.

### Garage Floor

*Q—I'm planning to build my own two-car garage but I'm undecided whether to use a slab floor and bolt the sills of the building to it, or pour foundation footings and walls and then pour the floor separately over a cinder fill. The slab floor is cheaper and easier to pour. Which should I use? — B.T., Tenn.*



*A—You can use either type of floor, the choice depending to some extent on the type of building and also on the provisions of the local municipal building codes. Some building codes do not permit two-car garages to be built on slab-type concrete floors. Specifications will vary, of course, but in general the slab-type floor should be at least 4 in., and preferably 5 in. thick, consisting of a grout coat and finish coat totaling 5 or 6 in. in thickness. The slab is poured over a 5-in. tamped-gravel fill. Never use cinders under a concrete floor, as they disintegrate in time when exposed to dampness and cause the floor to crack as a result of unequal stresses. The above brief specifications assume that the building is of average frame construction and that the slab floor will be located where there is adequate drainage. Sills of the building should be attached to bolts embedded in the concrete not more than 36 in. apart.*

### Dry Cleaning

*Q—I would like to dry-clean work clothing such as overalls, coveralls, shop coats, etc., as these garments are difficult to handle in a washing machine of the type having a wringer. What kind of a cleaner should I use for this purpose, benzine, naphtha, or what? — R.M., Neb.*

*A—Ordinarily, we do not recommend the use of benzine, naphtha, carbon tetrachloride or similar solvents for household purposes because of fire or health hazards, or both. With the exception of carbon tet, which is nonflammable, nearly all other common solvents, such as benzine and naphtha, are highly flammable, hazardous to use as household cleaners or solvents and are definitely dangerous to use for dry-cleaning fabrics because of the possibility of ignition from static electricity. Although nonflammable under these conditions, carbon tet gives off heavy fumes which are dangerously toxic, even in moderate concentrations such as might occur in a room or basement where there is inadequate ventilation. However, you can use the carbon tet if you do the cleaning outdoors and when there is a moderate breeze to prevent concentration of the fumes. It's a good idea to protect the hands with rubber gloves. Carbon tet which is kept for reuse should be stored in a tightly closed container.*

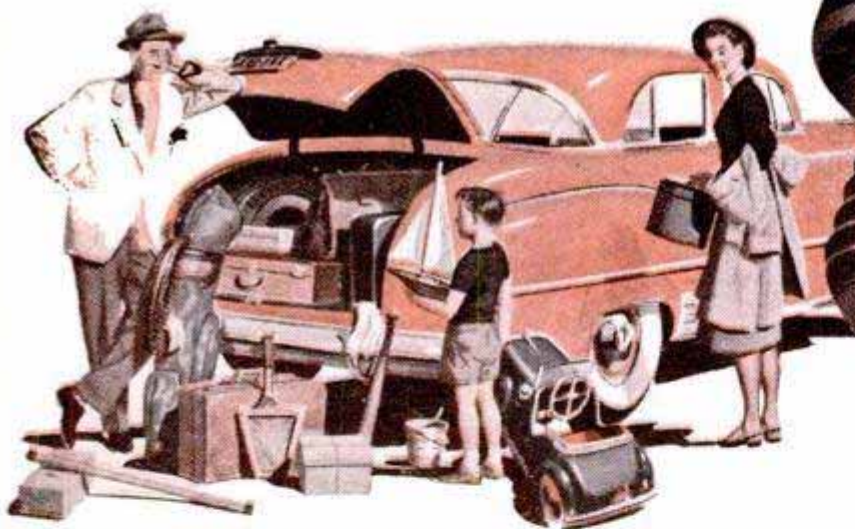
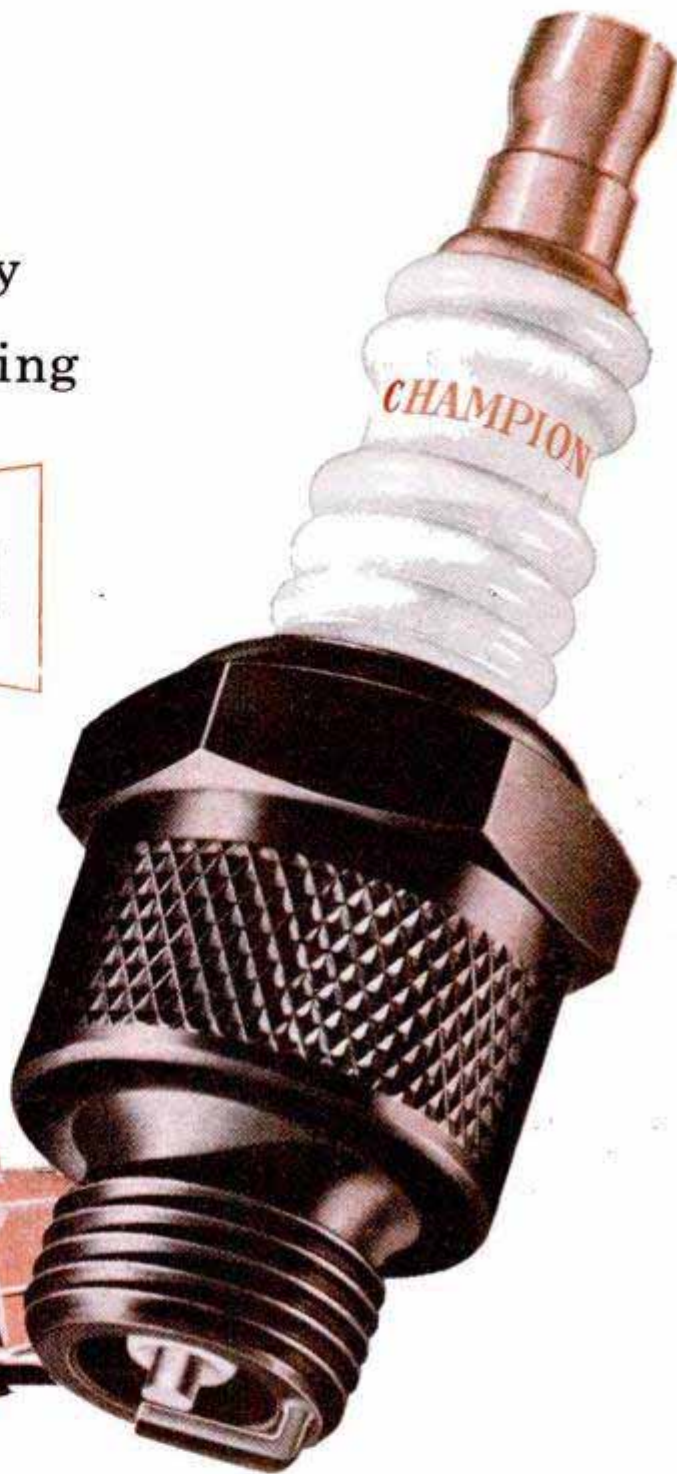


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Most practical tool a man can own—more powerful than any similar tool you can buy. Works well in wood, plastics, and metal. For home maintenance jobs you'll wonder how you got along without it. For model making it's a must. And for general shop operations it saves time and money. Compare it, try it, buy it. You be the judge!

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- Oilless sealed bearings • Dynamically balanced armature • Shockproof, Bakelite housing • Dust-filtered air cooling system • Sturdy 110-120 V., A.C.-D.C. motor • Wt. only 13 oz. • A precision tool widely used in industry for many years.



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(with 1 emery wheel point)

\$16.50



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With 23 Accessories  
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\*TRADE MARK REG. U. S. PAT. OFF. — Easi-Build Pattern Co.

The lava soil on Hodges' rented acres did itself proud during 1950 — produced 310 sacks of potatoes to the acre. The average in near-by areas that have long been under irrigation is about 200 sacks to the acre.

Hodges adds that his potatoes were "running 42 percent to 10-ounce bakers and above." Any potato man will tell you that's mighty good.

"Potatoes need controlled water, and you really get it with the well system," says Hodges. "Besides potatoes, barley and wheat, I raised 14 acres of seed peas this year, and got 45 bushels to the acre."

Afton Isom is another veteran—a former AAF major—who has rented bureau land complete with well. Like Hodges, he thinks the well system is excellent for potatoes.

"Cool growing conditions are required, and the well water helps supply them," explains Isom. "The water comes out of the ground at about 55 degrees Fahrenheit, and does a good job of cooling the surface soil." Isom also reports he's been able to irrigate more acres with less water than he'd use under the natural-flow system, because he can stop the water when not needed. With natural flow, a man has to use the water when he can get it—not necessarily when he needs it.

"In irrigating 39 acres with natural flow over by Bear River I used an average of four cubic feet of water per second," says Isom. "Here I irrigate 70 acres with an average of only 2 1/2 cubic feet per second."

It isn't all roses blooming on the project, however. Newel Baker started clearing sagebrush from 640 acres of new private land in the fall of 1949. In working out the brush, he got the soil too fine. Then the next year, with the crops in, the wind blew — no trees to stop it.

"Blew 50 acres of beet seed out of the ground," says Baker. "A lot of my fertilizer was gone with the wind, too."

Baker reseeded the 50 acres to potatoes. Then 90 of 110 acres of beans froze. More reseeded to potatoes. Ten acres of peas also froze. Potatoes again. About that time the price of potatoes went way down.

"But the potatoes yielded 340 sacks to the acre, and prospects for the future look brighter," says Baker. "I have two wells with connecting pumps on them, four miles of aluminum pipe and 2 1/2 miles of black pipe for my sprinkler system. I can turn the water off and on just when I want it. Farming with a wrench has farming with a shovel beat all hollow. I don't have large ditches all over the place, and machinery is easily moved. I can plant my crops in mile-long rows. This makes for efficient harvesting as well as planting. The first year was the hardest—I hope!"



## MARFAK MADE HIS CAR RIDE SO CUSHIONY HE'S SPOILED



Want "cushiony" driving for 1,000 miles or more? Get *Marfak* chassis lubrication! *Marfak* is specially compounded to resist squeeze-out and jar-out when the going's rough. It resists wash-out when road water splashes. That's why that "cushiony" ride lasts and lasts! For *Marfak* lubrication, see your Texaco Dealer, *the best friend your car ever had.*



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**CAULK THOSE CRACKS**

**WITH Nu-CAULK**

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Seal out drafts, dust, around windows and doors

Here's the easy way to caulk your home. Just slip a handy Speed Load into the caulk gun and you're ready. It's the fastest, most economical way to apply the world's finest caulk compound.



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Leaflet shows how to use No. 7B. Handbook shows time-saving, money-saving home repairs you can make with other Smooth-On Cements—leaks stopped, cracks sealed, loose parts made tight. 40 pages. 170 pictures. Write us for both—FREE—today.

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Do it with **SMOOTH-ON** QUICK FLOOR PATCH CEMENT

## "Co-op" Village in the Woods

(Continued from page 77)

are attracted to Usonia, and finally apply for membership. You then discover that you must have 40 percent of the estimated value of your completed home in cash. (Usonians, remember, had been building up their own kitty for years.) The Usonians take a vote on admitting you to membership, and each family has one vote regardless of its investment. Only one factor is considered in the vote: Will the personalities in your family be congenial with those in the rest of the community?

If you are accepted, you are shown the plot plan, and you have your choice of any of the remaining lots which have not been set aside as community property. You then choose an architect from a panel of nine men approved by the cooperative. By the time the architect sits down to his drawing board he's as close to you as a shadow, for he wants to come up with a functional home, tailor-made to the exact needs of your family. The completed plans are shipped off to Wright for approval. From then on, you're probably in for a lot of blood, sweat and blisters, for you'll likely want to do some of the work yourself to cut down building costs.

The title of the completed home remains with the cooperative because the mortgage was granted to the corporation. You are granted unconditional right-of-occupancy for 99 years. If you should ever desire to move, you "sell" your home and withdraw a sum from the corporation scaled to your total investment.

Usonians claim a good many advantages for their cooperative living. In the first place, every Usonian pitches in to help fellow members build their homes. The cooperative has assembled innumerable facts on the members — all for the purpose of making life more enjoyable. For example, the Usonian historian knows that five persons are interested in handball, 15 play chess, and that Lucy Resnick was born November 1, 1941. Incidentally, when November 1 rolls around, Lucy will receive a nice gift from the entire cooperative. Each family chips into a birthday fund, believing that such projects foster the community feeling among the children.

The kids themselves are tickled pink. They frequently chase deer off their front "lawns," and every young Usonian has a pet of some kind. Most of the children show a basic interest in architecture, piling up boards or sticks into houses of their own, in shapes no city-bred child could imagine. The biggest problem, parents find, is getting

(Continued to page 228)



**GRAVELLY**  
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jobs **EASY!**



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**EVEREST & JENNINGS WHEEL CHAIRS**  
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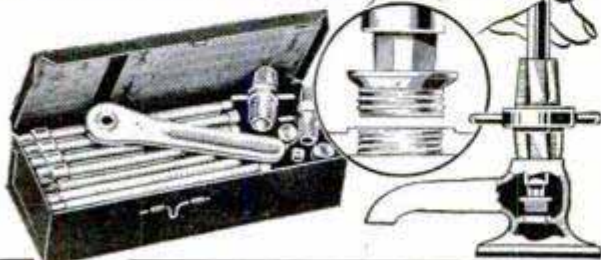
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Say You Saw It in Popular Mechanics

**STOPS LEAKS PERMANENTLY**

Cut your fixture replacement, water and fuel bills with Economy Renewable Seats. Make economical, permanent repairs quickly and easily with the Junior Kit (illus.). Repair bathroom, kitchen and laundry fixtures. Everything you need included in steel box. This is a natural for the "Fixit" shops—get extra income from making permanent repairs on your customers' faucets.

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QUICK STARTS**

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*Corrodeless*  
**TERMINAL**

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Most battery cable trouble starts at the terminal because of corrosion or bad fit. Bowes "Seal Fast" battery cable terminals positively will not corrode. They are specially engineered, tailored to fit the posts snugly, assuring longer cable life and full power from your battery. Stop battery cable trouble before it begins. For sure, positive starts insist on Bowes "Corrodeless Terminal" Battery Cables—then you'll get all the power your battery is designed to give you.

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**SPARK PLUGS**

*Assure*

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MOTORING**

There is a Bowes Spark Plug specially designed for your car! Oversize Special Alloy Electrode—with welded construction for positive connection assures longer life. One-piece, leakproof construction.

Every Bowes Plug is individually tested to assure complete motoring efficiency. **INSIST on BOWES SPARK PLUGS FOR SMOOTHER MOTORING.**



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The **COASTER BRAKE**  
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**SELF-ALIGNING  
BRAKE SHOES**



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Fun!**

Self-aligning brake shoes give quicker stops, longer life, easier pedaling. It's another Bendix feature that makes the Bendix\* Coaster Brake the outstanding performer in its field. Your dealer will put on the brake you want—so just say "Bendix Coaster Brake." \*REG. U.S. PAT. OFF.

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**General Concrete Vibrator  
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CAPACITY 1000 BLOCKS A DAY

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SHIPPING WEIGHT 400 LBS.



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CONCRETE  
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HOME**  
Only 7 Prepaid

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Includes floor plans for 6 beautiful, easy to build concrete block bungalows. Shows ways to save money. How to lay blocks, lay out building lines, mix concrete, build steps, porches and concrete floors. Mail coupon at once with \$1.

Name.....  
Address.....  
City..... Zone... State.....

the children to school—the kids frequently are waylaid by some wonder of nature more fascinating than multiplication tables.

The cooperative owns major power tools which any member may use. It buys oil for the oil burners in large quantities, thereby obtaining lower rates. It will carry a member for a while if he has had a streak of bad luck financially.

Eventually, the cooperative hopes to have a hobby shop, a theater, community food lockers, a demonstration farm with live animals for the children, a community house, a ski slope and a swimming pool. Though these projects will require money, much of the work will be done by the Usonians, whose hands already are calloused by work on their own homes.

Visitors are flocking to Usonia, and it has become a mecca for architectural students. Occasionally, a very irate young couple will show up on the winding roads. Seems that a few years ago, before the cooperative bought the land, the wooded hillside was a widely known lovers' lane. One young man, accompanied by his lady-love, was especially indignant because he couldn't even find the popcorn vendor, a peddler who once did a rushing business where Usonia's unique homes now stand.

**Safety-First Service Hints  
For TV Set Owners**

(Continued from page 215)

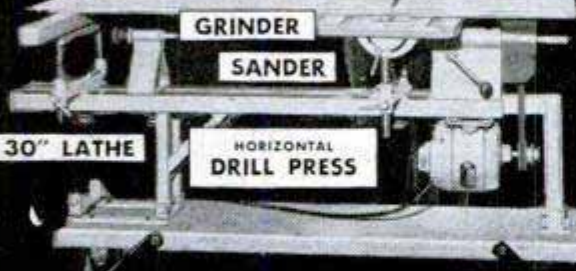
magnet. Refer to the pictorial diagram, Fig. 1, to identify the components that fit over the neck of the picture tube. The deflection yoke and focus coil remain in position, but the ion-trap magnet must be loosened and removed before the tube is withdrawn. Before removing the ion-trap, note its position and mark it with a pencil or crayon, with an arrow pointing towards the front end of the tube. This is important as it must go back on the new tube in the same position.

To install the new tube, insert it so that the neck goes through the deflection yoke and the focus coil easily without forcing. You have, of course, purchased a tube of the same type as the old one and it should go in easily. If it sticks do not force it, merely re-align the focus coil and deflection yoke to remove the trouble. Do not put any pressure on the fragile neck; support the weight of the tube entirely by the front end and then slide it into position, and slip on the ion-trap magnet. Keep your hands off the coated portion on the sloping neck of the tube, as moisture of the hands may cause the tube to arc internally. When the

(Continued to page 230)

**MAKE MONEY  
SAVE MONEY  
BUY  
SUPERSHOP**

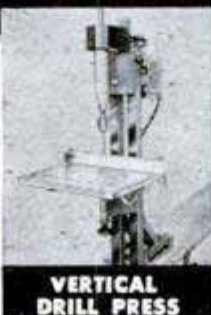
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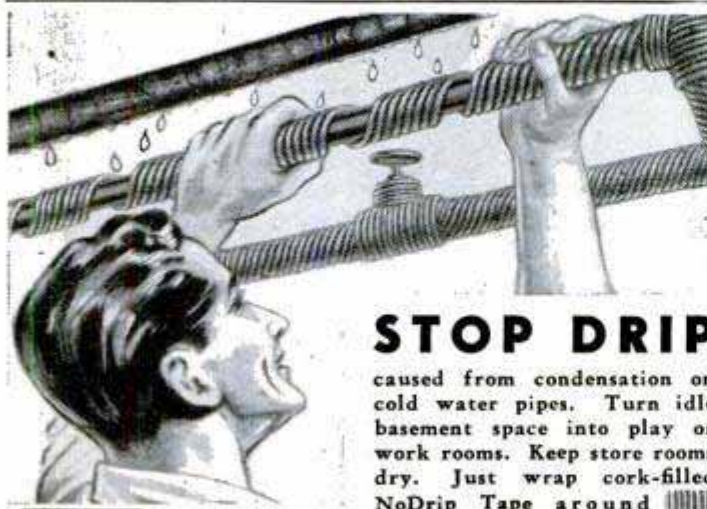
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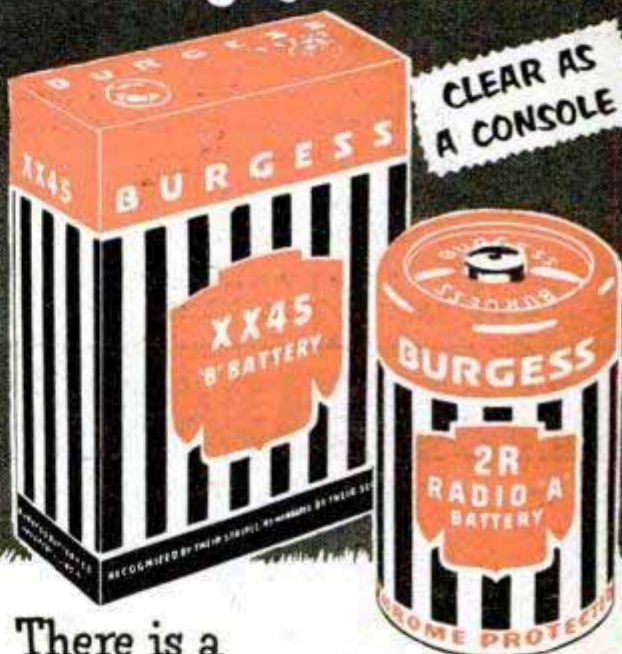
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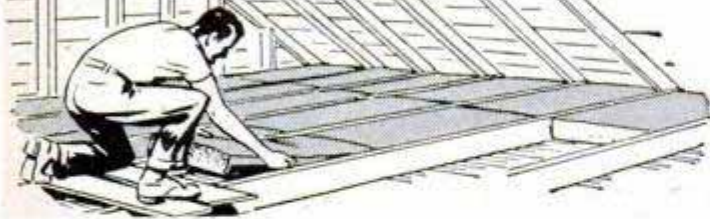
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tube is in position connect the socket, and insert the high-voltage plug in the recessed socket in the top side of the tube. The final position of the tube will be determined by means of the ion-trap flags. As you look at the electronic-gun structure in the neck of the tube, you will see that the second cylinder from the base inside the glass neck is provided with two small metal flags. The tube must be installed so that the two flags can be viewed from above when looking down on the tube neck. When the tube is pushed into place, the base of the tube should protrude about 2 in. beyond the focus coil, in most installations.

Next, adjust the ion-trap magnet on the neck of the tube. In some early models, the ion-trap magnet was an electromagnet containing two coils. If this is the type you have, place it on the tube with the large coil directly over the ion-trap flags. If you have an ion-trap employing permanent magnets, it goes on in the same way with the larger magnet directly over the ion-trap flags. Clean off any finger marks on the tube face and front safety glass, and re-install the cabinet front carefully. When properly adjusted, no force should be necessary. The centering slides should hold the tube face securely. With the front panel in place, slip the tube forward against the front panel. Next, slide the picture-tube cushion firmly against the flare of the tube and tighten the adjustment wing screws, shown in Fig. 1.

If it is necessary to remove the chassis from the cabinet in order to replace the picture tube, it is a simple matter. You merely pull off the control knobs on the front and remove several bolts on the underside of the cabinet and slide the chassis out. The picture tube in this case will usually be supported by a frame fastened to the chassis base. Use all of the same safety-first precautions in exactly the same order as previously outlined. In some cases the picture tube will be mounted in a separate frame independent of the chassis.

Now that you have installed the new picture tube, and have the set in the cabinet, you are ready to carry out the final adjustment of the ion-trap magnet. Although you may think that you have placed the ion-trap in the proper position, it probably will require a further adjustment. To find out, replace the back on the cabinet and connect the power cord and the antenna. You may get no picture, or it may not completely fill the raster (pattern of scanning lines on the face of the picture tube) in all corners. This means that you must either call a serviceman, or adjust the ion-trap yourself through the top of the cabinet

(Continued to page 232)



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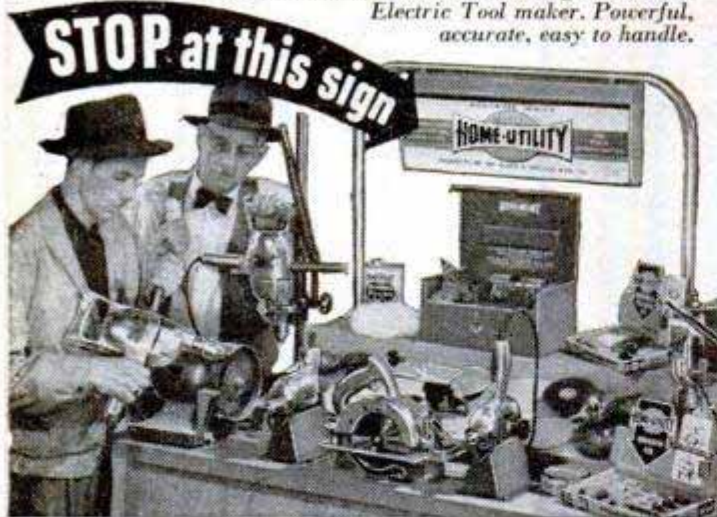
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with the current on, so that you can see the picture in order to determine the proper adjustment of the trap. This is attained when you obtain maximum pattern or picture brilliancy and have the raster completely filled. The writer does not wish to imply that this is a safe thing for all TV set owners to do. However, there is no danger if the ion-trap adjustment is made without touching any other internal part of the set. A good safety-first precaution is to keep one hand behind you, and never stand on a basement floor or on any other damp floor when making adjustments in any high-voltage apparatus. Also never do it near cold-water pipes, or any grounded metal. The writer has followed these safety-first rules in handling high-voltage power supplies in radio transmitters for years. To make the final adjustment of the ion-trap, turn the brightness control fully on, and the contrast control completely off. Loosen the trap and move it forward and backward and, at the same time, rotate it slightly around the neck of the picture tube until you see the brightest full raster on the tube. Then tighten the ion-trap adjustment screws to hold it in place. When working behind the set, use a mirror in front, as illustrated in photo M, to view the picture, or tuning pattern, photo L. A further ion-trap adjustment may be made by reducing the brilliance of the brightness control until the raster is just slightly above average brilliancy. Then adjust the focus control on the rear of the set chassis until the trace lines on the raster are clearly shown. Now readjust the ion trap for maximum raster brilliancy. Final adjustment can be made with the brightness control set at the brightest level of brilliancy so that the best line focus can be maintained. Finally, fasten the trap in position and replace the top on the cabinet. Now you are all set to tune in programs.

The safest way for the owner to replace smaller defective tubes in his TV receiver is to disconnect it from the wall socket, go through the safety steps previously outlined, and then remove the tubes one by one, marking the identifying tube numbers clearly on the chassis base near each socket. Some tubes pull out easily and others may have a retainer flange that must be pressed together to release the tube. Be careful not to bend the prongs when removing and inserting the tubes, especially the miniature types. Wrap the tubes individually and take them to the nearest tube dealer for checking. The experienced set owner will do what most servicemen do—provide duplicate tubes for testing by the substitution method as illustrated in photos

(Continued to page 234)

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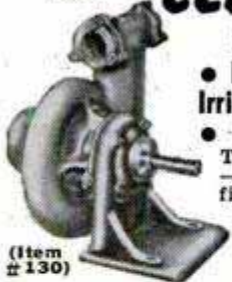
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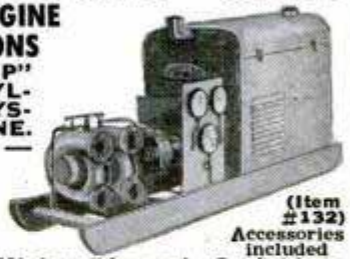
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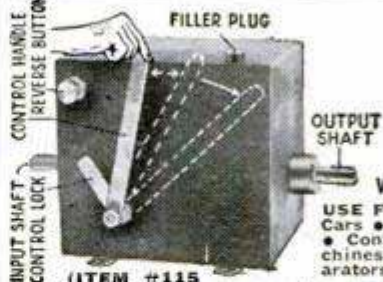
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K and M. The first tubes to suspect are the rectifiers in the separate metal "doghouse" on the chassis. This has a removable cover. Never be tempted to make coil-slug adjustments or any other screwdriver adjustments while working inside your set. Such adjustments require the use of expensive test instruments that you will find nowhere except in the serviceman's shop or manufacturer's laboratory. The tube-location chart for your TV set will indicate the functions of the various tubes employed in your particular receiver. The high-voltage rectifiers may be 1X2 or 1B3; the 5U4 and 6W4 are commonly used low-voltage rectifiers. Always check these power tubes. The 5V4, or 6W4-GT, is a damper tube and one to suspect. Other tubes to suspect are the 6BG6-G, or a 6BQ6, 6SN7, or, in fact, any of the many tubes in your set, the locations of which are identified on your tube-location chart. When changing these tubes in your TV set keep the picture tube covered with a small blanket or heavy towel as shown in photo K. Note that the high-voltage plug has been removed from the tube and that the power-line cord is also temporarily disconnected. This is safety-first in action. Also provide a flashlight. Do not poke around in dark corners and disturb other tubes.

Photo I illustrates a simple method of marking the original adjusting-screw positions of the various nonoperating controls on the back of the TV set chassis. This can be done with a soft crayon and it is important as any adjustment of these controls should be very slight, and the controls should be immediately returned to their original positions if not effective. Many TV sets have perforated metal back covers which, when removed as illustrated in photo J, automatically disconnect the line cord from the set chassis. These covers are often bent or otherwise damaged. If bent, straighten and make sure that the line-plug mounted on the cover makes good contact in its chassis socket when replaced.

**FIND OUT** how to select, install and maintain the most efficient TV antenna system for your particular location. Learn the importance of installing TV lightning arrestors, and how you can do it yourself. TV set owners, and prospective owners, will find this information together with pictorial TV set-tuning instructions giving picture defects and corrections, using both test patterns and picture images, in Popular Mechanics RADIO-TV and ELECTRONICS HANDBOOK. This "written so you can understand it" book is today's guide for millions of radio and television set owners, students and experimenters. Now available from your bookstore, or direct from Popular Mechanics Press, 200 East Ontario St., Chicago 11, Ill. Price \$2.50

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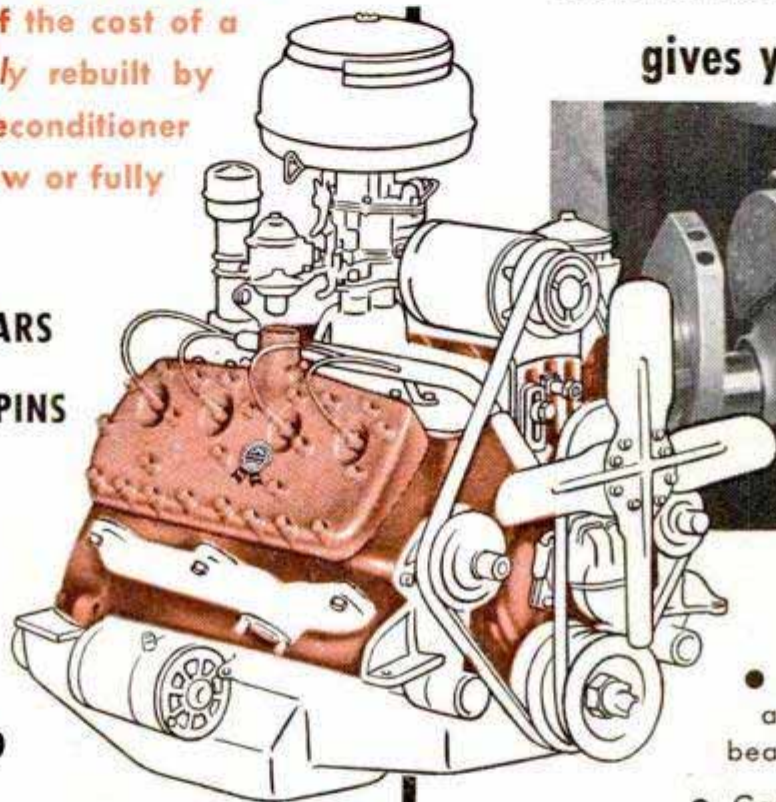
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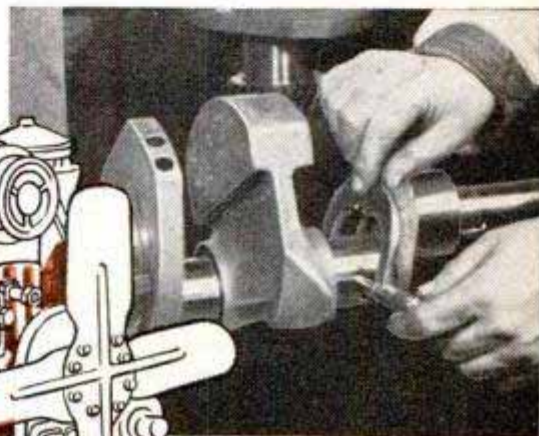
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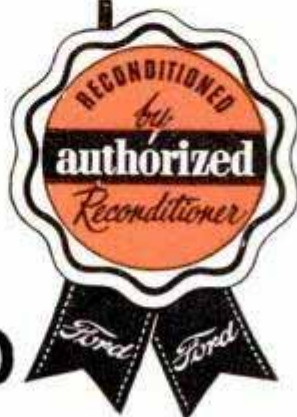
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Look for this emblem—it's your guarantee that you're getting an **Authorized Reconditioned Ford Engine** with **Genuine Ford Parts**.

Keep your **FORD** all **FORD**

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**YOU, TOO, CAN  
START A  
\$40 A DAY  
BUSINESS  
IN YOUR  
SPARE TIME!**



Andy Phillips says, "My BELSAW CIRCULAR SAW SHOP gives me BIG PROFITS at LOW expense... I can run 35 to 40 saws in an 8-hour day... That makes me \$40 cash."



You can start this REPEAT CASH business in your own home or garage, while you are working at your regular job. Easy to operate, no experience needed. "Pays for itself from just 65 saw jobs." — Harvey Jensen.

For as little as \$15 down payment, you can get your BELSAW CIRCULAR SAW SHOP rushed to you.

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GET NEW CAR PERFORMANCE WITH  
**PISTON SEAL**  
WITHOUT COSTLY OVERHAULING

Piston Seal—the amazing compound that forms a self expanding, pliable lubricating seal around pistons that compensates for wear. Eliminates oil burning, restores power and compression. Can be applied in a few minutes.

**GOOD FOR 10,000 MILES**



**SIMPLY REMOVE  
SPARK PLUG AND SQUEEZE**

SEND FOR  
A TUBE TODAY

**\$4.95** No C.O.D.'s

Postpaid

OR WRITE FOR FURTHER INFORMATION

**RICHIE DISTRIBUTING CO.** 1628-M Cohasset Avenue  
Lakewood 7, Ohio

## Fire Bombs Blaze a Trail of War

(Continued from page 112)

So much napalm and high explosives were dumped on their heads that only 50 escaped when darkness came.

Marines of the Blacksheep squadron saw enemy troops hiding in caves in a deep canyon. Maj. Kenneth Ruesser, the strike leader, got permission to give them the napalm treatment but it took some expert piloting to hit the target. He and Capt. Charles Graber flew in so low Ruesser's napalm bomb would not arm (the fuse isn't supposed to operate unless the bomb has traveled 150 feet through the air after release). Graber made another sweep of the canyon and ignited the spewed napalm gel with tracer bullets.

The planes made life so dangerous for Communist troops in many areas that they took to moving their troops and convoys at night. They would push their tanks and trucks right into thatched huts during the day for camouflage. Soon orders went out to Navy planes to burn down villages known to harbor these vehicles. Ammunition dumps make prime targets for napalm's far-flung damage, the shells going up in one huge explosion. Pilots have to keep their distance to escape the flying shrapnel.

Another favorite tactic against North Korean rolling stock was used by pilots who were lucky enough to catch a train on a curve. Dropping their napalm bombs on the inside of the curve, they could splatter the whole train. A couple of Marine pilots played a cat-and-mouse game with one Korean trainman near Wonsan. The engineer pulled his train into a tunnel before the planes could napalm it.

Each time he would try to pull out, they would dive in and strafe it. Finally, they hid behind a hill and the train pulled completely out of the tunnel. The harrassing planes zipped in, one pilot hitting the front end and the other the rear with their "hell bombs." The train was hors de combat.

Marine Lt. James McCleery destroyed four enemy tanks with one napalm bomb. He had to. It was the only weapon he had left. Unexpectedly coming upon a cluster of four tanks, McCleery put his Corsair into a dive and released the napalm tank. It landed right in the middle of his target. Infantrymen moving in two days later reported all four tanks were completely burned out.

Communists who could withstand artillery shelling, rockets and machine gunning would leave their entrenchments and flee when fire bombs were dropped in their

(Continued to page 238)

# REMOVE PAINT THE PAINTER'S WAY



Take the painter's short-cut—avoid hard scraping and sanding. Apply Wonder-Paste to the toughest paint, enamel, varnish, etc., and it soon becomes a soggy mass, easily stripped off with a putty knife! Leaves surface smooth and clean, ready for a new coat. America's largest selling remover—find out why! At better dealers everywhere.

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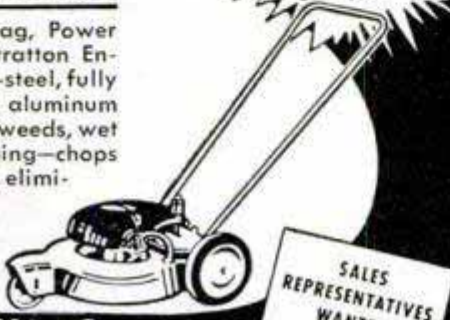
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Complete with Maytag, Power Products or Briggs-Stratton Engine—18" rotary tool-steel, fully guarded blades—cast aluminum body. Cuts grass and weeds, wet or dry—does all trimming—chops grass into fine mulch, eliminating raking. Send check with order, or specify C.O.D.

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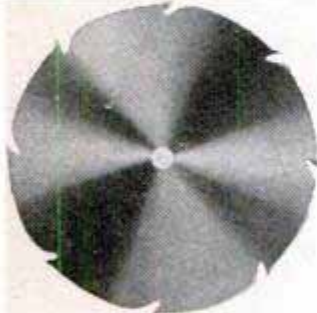
\* T. M. REG.

## LOW COST EASY APPLICATION

Give your boat a permanent all-weather surface in just 4 hours! Easy to apply. Once on, lasts for years, cuts upkeep cost to minimum.

WRITE TODAY for free literature and low prices

**THALCO** Dept. K, 3417 W. 8th St., L. A., Calif.



# NEW - SAFETY - CUT - SAW - BLADES DIRECT - FROM - MANUFACTURER - BY - MAIL

These sensational new blades with only 8 TEETH are made of first quality nickel chrome steel. Will crosscut and rip with NO KICK-BACK! Greater safety. Smoother cutting. Longer life. TAKES LESS POWER. Less danger of cracking.

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6 inch \$3.60	7 inch \$4.69
8 inch 4.89	10 inch 6.09

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1/2 - 5/8 - 3/4 arbor holes  
Also for portable saws

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JULY 1951

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ON THESE BRAND NEW  
WAR SURPLUS POWER UNITS



BE PREPARED  
for any emergency!

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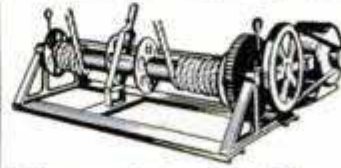
in emergency telephone collect—unit shipped same day!  
5 KW Plant, 120 volts, 60 cycle AC. List today \$1910.00. Used \$675.00 NEW. Your price only **\$895.00**

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NEW 2 1/2 HP Briggs & Stratton AP Lists at \$103... \$69	1000 Watt AC... \$248.00
	3000 Watt DC Contractor's PORTABLE, Rubber tired wheels, 5 to 7 HP gas engine. Used like new \$220.; New... \$279.00
	7500 Watt 4 cyl. engine; New... \$995.00
	10,000 Watt Used \$1195.00; New... \$1495.00
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Multiply your pulling, hoisting power tenfold. Can be driven by hand, gas, electric, or tractor take off, 10 to 1 ratio; double drum for reverse. Manufactured by Brenner. Wgt. 280 lbs. List price \$119.95. Our price... **\$49.50**

Below are just a few of the many items we have in stock at sensationally low prices:

Pumps	Air Tanks	Fire Pumps	Gear Reducer
Grinders	Drop Cords	Saws	Clutches
Air Compressors	Generators	Winches	Motors

Write today for free catalog. Thousands of \$8 saving buys.

## C & H ELECTRIC Co.

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# MODERN LAWN MOWER SHARPENER

## FOR LAWN MOWER SHOPS FIX-IT SHOPS

GOLF COURSES • PARKS  
101 OTHER JOBS

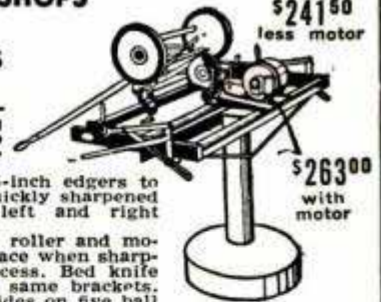
Sharpens All Reel Type Mowers • Hand, Power or Gang • 10 to 20 Minutes • No Dismantling • No Extra Attachments Needed.

All reel type mowers, from 5-inch edgers to 36-inch power mowers, are quickly sharpened to extreme ends of both left and right twist blades.

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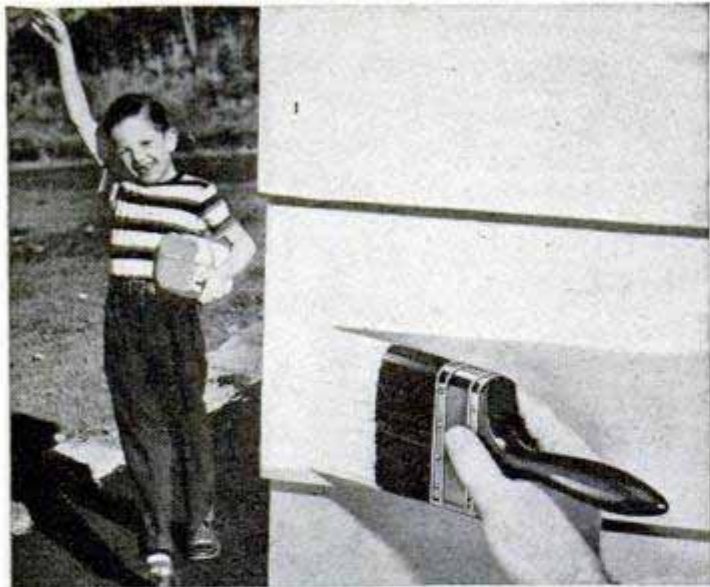


PRICE \$241.50 less motor

\$263.00 with motor

**MODERN MFG. CO.** 160 N. FAIR OAKS AVE.  
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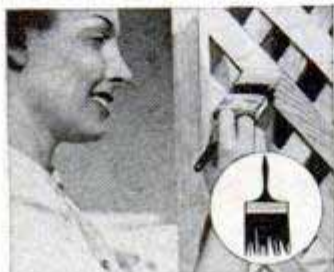
## POINTERS FOR HOME PAINTERS



### How you can get smoother painting ... longer life from your brushes



In painting wood surfaces, work with the grain and paint last strokes of each brushful back into the portion of surface previously coated.



Painting edgewise on narrow surfaces with large brush causes "fingering" (inset), ruins brush. Use small brush, one designed for the job.



For overnight cleaning, pour thinner on brush and work out paint on newspaper. Then use stick or paint scraper to squeeze out paint, suspend brush in thinner.



For storage, clean brush thoroughly with thinner, then scrub bristles with warm water and cleanser. Rinse in clear water, comb bristles and wrap in paper and store.

### For best results use NYLON PAINT BRUSHES

Job after job, you'll get best results with a nylon paint brush. Durable Du Pont nylon bristles don't break off, even on roughest surfaces. They last 3 to 5 times longer than ordinary bristles... paint smoother... are clean and sanitary. Nylon paint brushes are made by leading manufacturers in all types and sizes. Look for the word NYLON on the handle.



Better Things for Better Living  
... through Chemistry

The best brushes have  
**DU PONT NYLON  
BRISTLES**

vicinity. Four F-51s spotted several groups of 50 or more North Koreans along a ridge. A couple of napalm bombs chased them into near-by buildings. When they came in for another run on the "sitting duck" targets, white flags were flying.

The planes radioed to ground troops and the Koreans were captured, while planes buzzed overhead to see that things went all right. Another pilot reported he captured 12 North Koreans by threatening them with napalm while flying past them at 250 miles per hour, without firing a shot.

Although napalm bombs are extremely cheap to make and easy to use, they have their weaker points, too. Napalm powder has a great thirst for moisture and storage is difficult in humid climates. Temperature affects the rate of jelling—during the winter months the Navy had to add other chemicals so the powder would mix faster with the gasoline. Percentage of napalm varies from 6 to 13 percent and from 9 to 21 pounds go into a tankful.

Flame throwers have been used to some extent, although probably not so much as against the Japanese, who had a habit of holing up in caves and knocking off our troops. During World War II, the U. S. tried to develop an airborne flame thrower. It mounted a 200-gallon tank of napalm in the bomb bay of a light bomber which was to swoop down and spray troops. It was felt that the plane was too vulnerable to ground fire and the idea was abandoned.

Because the jar of a carrier landing might set off the napalm fuse or knock the tank off its pylons, Navy and Marine pilots were ordered either to drop their napalm before landing back aboard or else land at some shore air strip and have it removed.

Although thousands of planes have flown over battle areas with napalm tanks slung under them, only one report of a tank being hit by gunfire has been reported generally. An F-51 Mustang took a hit in its napalm tank but the pilot jettisoned it before the plane was destroyed.

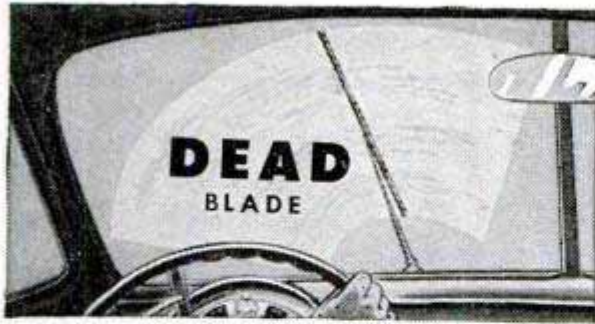
In the frozen Chosin reservoir area, where Marine ground troops fought their way out of a Chinese trap, a couple of Marine fighter pilots, Capt. W. W. Hazlett and 1st Lt. W. E. Jennings, were circling the freezing Leathernecks below. They noticed a spurt of flame and then another on the hillside below them.

Getting in radio contact with the ground leader, they asked if there was any trouble and whether they could help straighten out any little things.

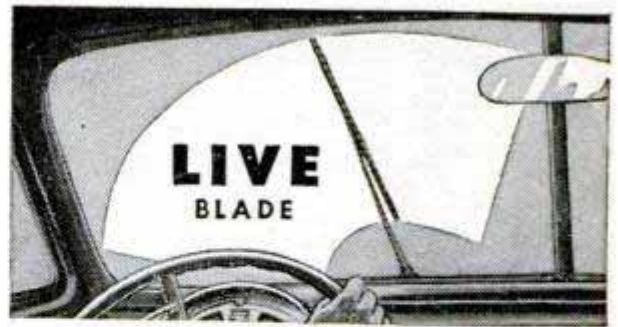
"Naw," came the laconic reply. "A couple of the boys are having trouble building a fire. They're trying to light it with their flame throwers."



# WHAT LASTS FOREVER?



**THIS DEAD BLADE** still looks new but it blurs rain, smears muck, streaks glass. DEAD blades make dead drivers!



**THIS LIVE ANCO BLADE** wipes clean, clears rain, clears road muck . . . lets you SEE. Protects your loved ones.

**WHAT LASTS FOREVER?** Nothing does. This is especially true with Windshield Wiper Blades—even though made of finest natural rubber. Corrosive windshield film, wind burn and hot sun BAKE the life out of wiper blades, often in six months or less. DEAD blades cause dangerous windshield smear. DEAD blades make dead drivers. Make sure your car has live, new windshield wipers.

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Next time you buy gas, change to LIVE,

**NEW ANCO BLADES . . . RAIN-MASTER** for Flat windshields . . . **CLEAR-FLEX** for Flat or Curved windshields. They fit all cars—wipe quicker and cleaner than any other blades.

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5" . . . . .45c	7" . . . . .75c
(Semi-pneumatic tire, ball bearing)	
8 x 1.25 . . .1.85	10 x 1.25 . .2.20
8 x 1.75 . . .1.95	10 x 1.75 . .2.30
8 x 2 . . . . .2.20	10 x 2.00 . .2.65
12 x 1.75 . .3.45	
INDUSTRIAL WHEELS	
Lug Base, Semi-Pneumatic tire	
5 x 1.75 . . .3.65	10 x 2.00 . .6.10
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8 x 2.00 . .5.20	12 x 3.00 . .9.20
8 x 2.50 . .5.40	16 x 4.00 .15.15
Smooth Base, Pneumatic tire and tube	
8 x 3.00 . .11.00	12 x 4.00 .12.10
10 x 2.75 . .6.80	4.00 x 8 . .13.10
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for HAND SAWS

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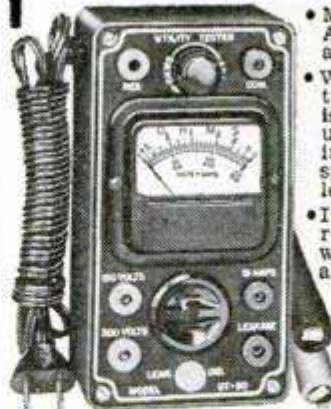
**25¢**

VALUABLE BOOK

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## The NEW Model 50 UTILITY TESTER FOR REPAIRING ALL ELECTRICAL APPLIANCES-MOTORS

an all-around electrical trouble shooter



- Measures A.C. and D.C. Voltages, A.C. and D.C. Current, Resistances, etc.
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Handsome round cornered molded bakelite case 3 1/8" x 5 7/8" x 2 1/4". Complete with all test leads and instructions.

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Complete . . . designed for every hobbyist and mechanic! Grind, drill, polish, carve, sand, saw, etc. Packs plenty of power in the 25,000 r.p.m. motor, with approved 7-segment commutator. Handsome fitted steel carrying case.

Complete, with liberal 10-day money back trial offer . . . . . **\$27.50**

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## THE MIDLAND CO.

1200 Rawson Avenue • South Milwaukee, Wis.  
Builders of Farm and Garden Implements Since 1911

## TNT Clinic

(Continued from page 91)

itself at various distances from the charge hole. Often a buried target is re-excavated after a blast has been set off so the damage and movement indicated by the instruments can be confirmed by actual inspection and measurements.

The effects that are measured include acceleration of the shock wave, pressure, velocity and strain and displacement. This information is recorded automatically by cathode-ray cameras and magnetic gauges located in three instrument trailers that are parked in the explosion area.

One trailer, close to the charge hole, is practically buried in the earth for protection. It is left untended during the time of the blast. Two other trailers nearly a mile away are protected by overhead structures of heavy timbers and sheet metal. Technicians who are stationed inside this pair of trailers are rocked as if they were in a heavy earthquake when a big blast goes off.

Firing a half-scale or full-scale shot is no casual affair. In addition to the danger there's too much work involved to permit a chance of error at the last minute. Thus, formal radio warnings and a backward count precede the blast to alert everyone concerned, just as a large experimental rocket is launched or a true atom bomb is exploded experimentally.

An hour ahead of time the technical crew stages a dry run to rehearse the sequence of events and to make sure that all electrical circuits are operating. Then a 30-minute warning is issued by radio and shortly a parade of cars streams off across the desert from the blast area to the observation point. A red flag goes up when the last person outside of the firing crew has left.

The powder expert in charge of the blast descends by a manhole into the charge hole, attaches his blasting caps to the wires that will fire them, and then hurries by Jeep to the distant trailer from which the TNT will be exploded. His last task before entering the trailer is to plug in a "safety link" of cable that he carries with him and that helps to complete the firing circuit.

A two-minute warning goes out by radio to alert the distant camera stations and the aircraft pilot, and other warnings are issued at one-minute and at 30-second periods. At 15 seconds the backward radio count begins: "Fifteen, fourteen, thirteen, twelve . . ." At "six" the firing button inside the trailer is pushed.

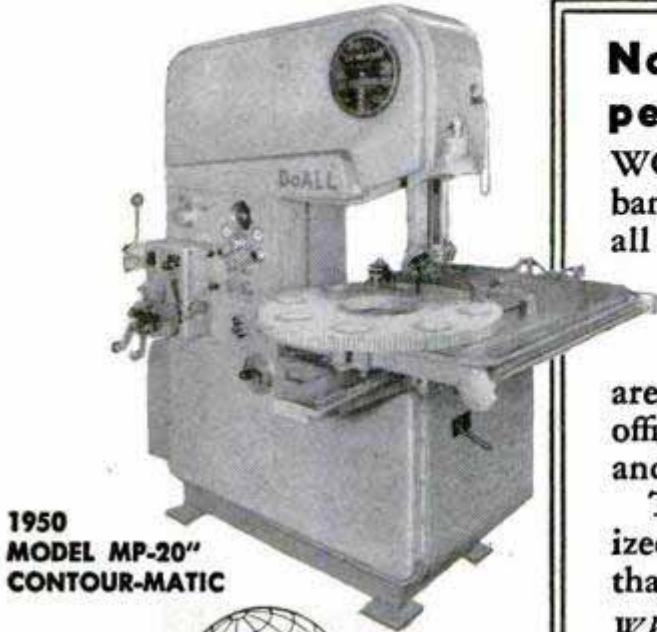
The firing button operates a rotary switch that automatically turns on the film drive motors of the recording apparatus,

(Continued to page 242)

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for Shop Men  
with Sales Ability

## BE A CUTTING TOOL SPECIALIST!



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**SET** 10 Different Size H. S. Straight Shank Jobber Length Drills, 1/4" to 5/8". \$25 Value. Priced at only. . . . . **\$4.49**

**HIGH SPEED DRILLS**  
1/2" to 1" with 1/2" Shanks

**SET** 5 Different Size H.S. Drills, 1/2" to 1", all with 1/2" Shanks. . . . . **\$6.95**

**SET** 10 Different Size H. S. Drills, 1/2" to 1" all with 1/2" Shanks. . . . . **\$12.95**

These H. S. precision drills can be used in a 1/2" electric drill or a 1/2" capacity lathe or drill press.

Money-Back Guarantee — All Mdse. Mixture of New and Reconditioned Tools Unless Specified Brand New — All Orders (Except Those Specified F.O.B. Tulsa) Are Shipped Post Paid, saving you up to 25% on total delivered cost. Write for Free Catalog Describing Thousands of Bargain Cutting Tools.



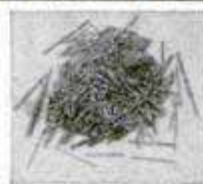
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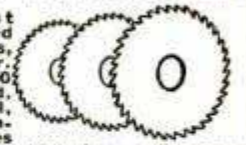
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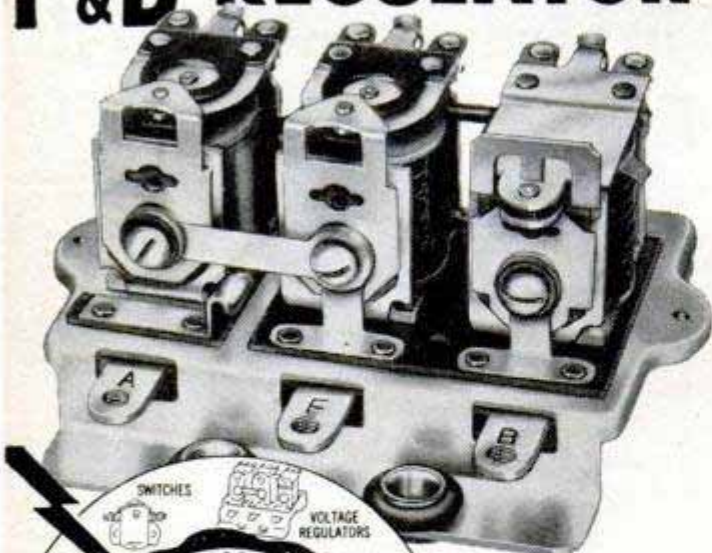
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switches on the cathode-ray oscilloscopes, starts up the high-speed cameras that will record the ground rise and the movement of aboveground targets, and makes a calibration signal that is recorded on the films. Its last job is to trip a mercury switch, and the switch completes the circuit that detonates the caps in the charge hole and explodes the TNT.

The tests aren't being made to learn the effects of atomic weapons alone; the information being acquired can be related to any size of detonation. In World War II, the Air Force sometimes pulverized a target with many times the amount of explosives needed to do the job, and sometimes they had to return to a very strong target again and again with increasingly heavier bomb loads. Data obtained from the Underground Explosion Tests should make it possible for an aerial task force to carry the precise amount of explosives needed to demolish a particular target.

The same information will be useful in building strong defensive structures, particularly those that are buried under the ground.

In the words of one Corps of Engineers spokesman, the tests are being conducted "to establish criteria for the design of sub-surface structures and tunnels to resist underground explosions produced by known or projected types of bombs and missiles."

## The Owners Report On the '51 Plymouth

(Continued from page 98)

tired of other low-priced cars. My car has a poor paint job, otherwise it is O.K."

Of all the owners reporting, there seems to be universal agreement that Plymouth is an easy-handling, economical, practical car with good vision, maneuverability and excellent brakes. Apparently, the single-speed windshield wipers and the fact that no overdrive is available as optional equipment seem to cause the most criticism. A few complained of squeaky brakes. A very small percentage complained of poor assembly and minor rattles.

Sixty-eight percent of those reporting were previous Plymouth owners, which goes to show that Plymouth owners repeat time and again.

I drove our Plymouth test car approximately 1000 miles from Los Angeles to San Diego and across to Phoenix, Ariz., and returned to Los Angeles through the heat of the Imperial Valley and the Salton Sea route through Riverside. The trip covered all kinds of roads, some mountainous and

(Continued to page 244)

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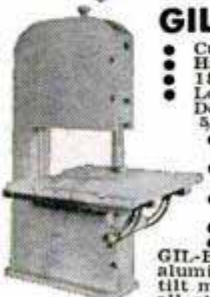


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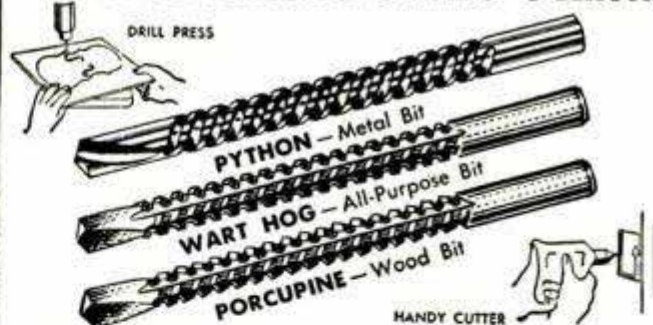
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winding, others long and smooth. I went into the back-roads country for about 100 miles over rough, sandy and winding roads that were little more than trails in some places.

The ride is excellent and Plymouth's new shock absorbers, which they call Oriflow, do a good job. They give excellent stability on corners, and the pitching effect seems to be practically eliminated. It is surprising how you can drop off a smooth paved section into a rough detour at high speed and find that the new Plymouth hugs the road and takes the bumps and chuckholes with little required change in driving technique. This is a tremendous safety factor.

The car has good power and the acceleration is excellent. Personally, I would like



Combination ignition key and starter on Plymouth is handily placed to the right of steering column

to see an overdrive as optional equipment. I like the steering of the new Plymouth better than most cars. It is fairly quick and positive. The driving position in the new Plymouth is very good. The seat is high enough and there is no cramping in the legs. Indeed, there is a lot of headroom for both driver and passengers.

Plymouth's hydraulic brakes in the 1951 models are up to par as usual. Plymouth brakes have consistently been good throughout the years. The operation of the brake pedal is soft and there was no tendency for the brakes to fade even when used at high speeds. A couple of squeaks developed for short distances and then went away; otherwise, I'd give the brakes a 100-percent rating.

The electric windshield wipers definitely have some advantages. Regardless of the

(Continued to page 246)



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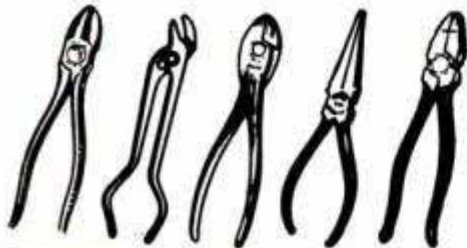
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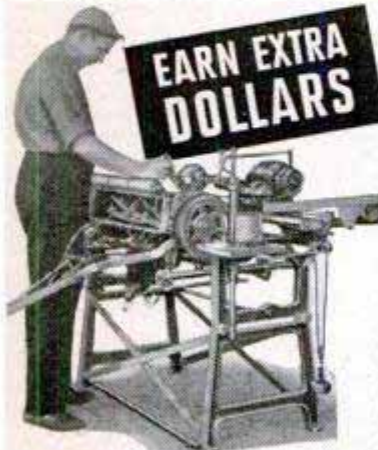


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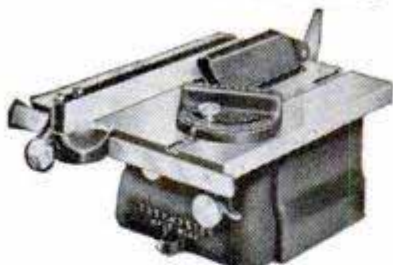
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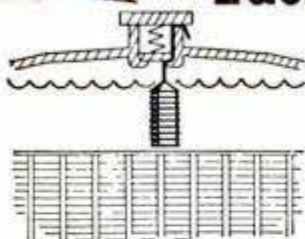
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steepness of the hill or the throttle opening, the wipers operate at a constant speed. My only objection is that at times I'd like to have the wipers operate at a slower speed. Certainly, the new electric wipers are positive and sure. They are a bit noisy in operation.

The instrument panel, I think, is attractive and the various gauges and indicators are easy to read.

The choke is automatic. The shifting of

### 1951 PLYMOUTH SPECIFICATIONS

#### ENGINE

Type.....6-cyl. L-head, in-line  
Bore and stroke.....3¼ in. x 4¾ in.  
Piston displacement.....217.8 cu. in.  
Brake horsepower.....97  
Compression ratio.....7.0 to 1  
Transmission.....3-speed conventional

#### GENERAL

	Cranbrook and Cambridge 4-dr.	Concord 2-dr.
Weight—		
Cranbrook.....	3109 lbs.	2969 lbs.
Cambridge.....	3104 lbs.	
Wheelbase.....	118½ in.	111 in.
Tread, front.....	55½ in.	55½ in.
Tread, rear.....	58⅞ in.	58⅞ in.
Height.....	64¾ in.	62¾ in.
Over-all width.....	73¾ in.	73 in.
Over-all length.....	193¾ in.	188¾ in.
<i>Inside Dimensions</i>		
Front-seat width.....	55 in.	54¾ in.
Rear-seat width.....	57 in.	49 in.
Legroom, front.....	40¾ in.	40¾ in.
Legroom, rear.....	42½ in.	37¾ in.
Headroom, front.....	36 in.	35½ in.
Headroom, rear.....	36 in.	36½ in.
Tire size.....	6.70 x 15	6.40 x 15
Recommended		
tire pressure.....	24 lbs.	24 lbs.
Road clearance.....	8 in.	7½ in.
Turning radius.....	Left—19 ft. 4 in. Right—19 ft. 8 in.	18 ft. 6 in. (R & L)
Steering wheel,		
lock to lock.....	4¼ turns	4¼ turns
Steering ratio.....	18.2 to 1	18.2 to 1

#### CAPACITIES

Oil.....5 qts.  
Water.....13 qts.  
Gasoline.....17 gal.

gears is easy, as the lever is quite long and there is, of course, good leverage.

The clutch pedal operates with very light pressure. Visibility is excellent and I especially like the quick-action windup of the windows.

The shortness and forward slope of the 1951 Plymouth hood gives excellent road vision within a few feet of the driver's seat. This undoubtedly is a safety feature and is good when parking.

There is ample space in the trunk, and the lid is counterbalanced. The operation of the lever and the locking arrangement, I think, could be improved.

The body has a solid feel and the assembly is above average. Plymouth has removable fenders, and they are not integral

(Continued to page 250)



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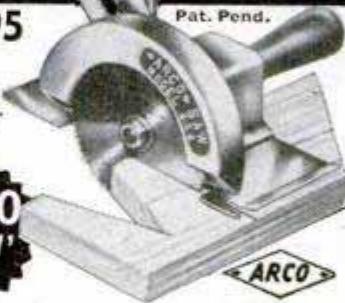
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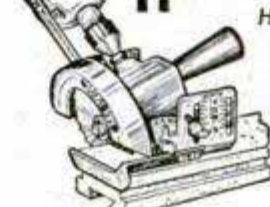
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Amazing New

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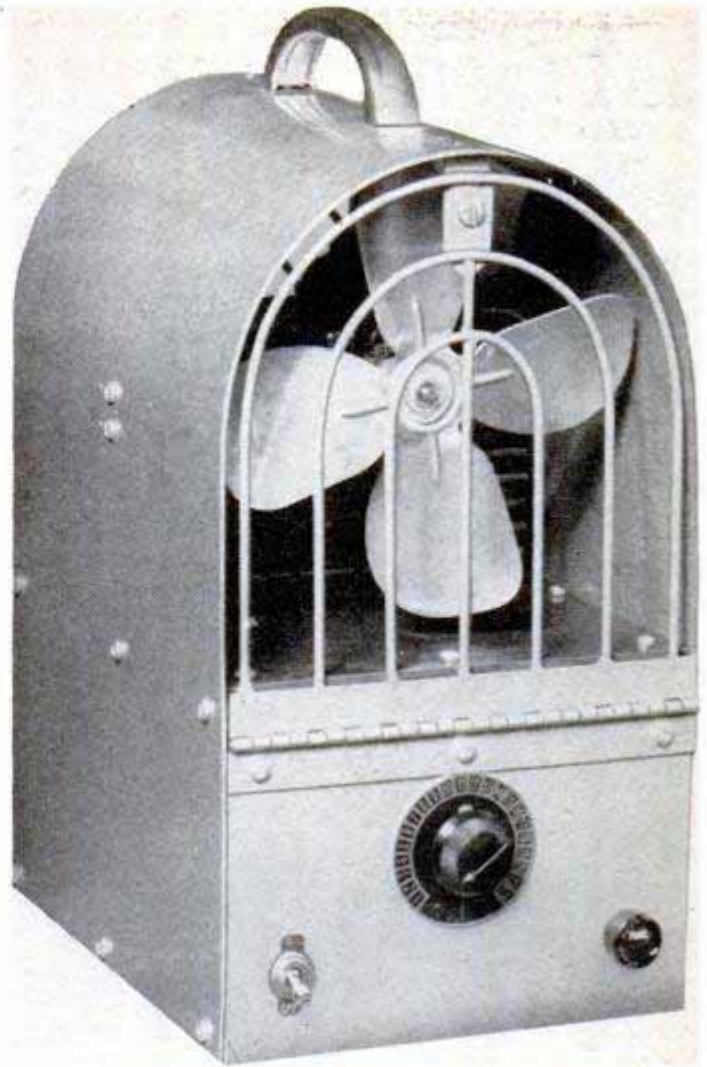
For hand and band saws

A perfect set on 26" hand saw in 32 seconds

The new Foley Automatic Power Setter with exclusive "Twin Hammer" action has two hammers (one for each side of saw) operating from a single spring, insuring utmost accuracy. ONCE through turns out a perfectly set, true-cutting saw. Relieves eye-strain, no tooth breakage. Sets all hand saws (with handles left on) and band saws from 4 to 16 points per inch. 1-year Guarantee.

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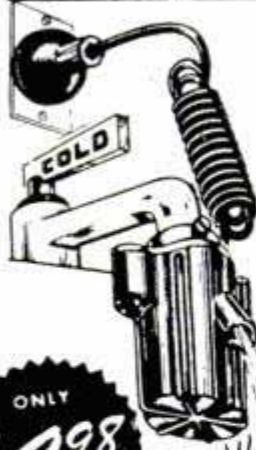
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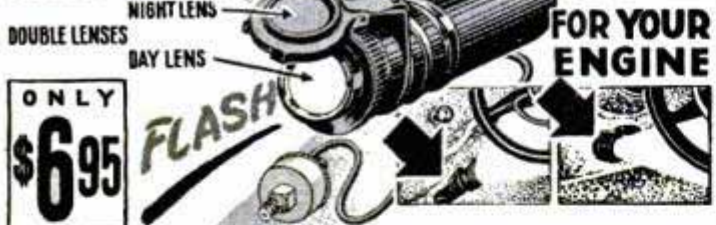
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parts of the body. They are bolted on and in the event of damage the fenders can be removed easily for repair or replacement. This is a desirable feature which has saved owners a lot of money.

The Plymouth engine is mounted in rubber, of course. Plymouth's design called "Floating Power" pioneered rubber engine mountings. The engine is balanced on its center of weight and rests on live rubber cushions which undoubtedly does cut vibration and prolong the life of the chassis and body.

The ignition switch is conveniently operated by the right hand. You simply turn the key and the engine starts. No button to push or pull. It's a clever idea and I like it.

This year, Plymouth has a waterproof distributor. The neoprene ignition cables are water and oil-resistant. This eliminates missing or ignition failure if you are in a bad rainstorm, run through deep water on the highway or go through puddles.

Another improvement is the greater output of the new generator. The increased capacity gives a reserve charging rate far beyond normal needs. This is an improvement that will be appreciated by Plymouth car owners who reside in regions where cold weather presents a starting problem.

In my test, I found the Plymouth to be easy on gasoline. My economy report appears elsewhere in this article. I found regular gasoline to be satisfactory for use in the '51 Plymouth. (And so did 78 percent of the owners reporting.)

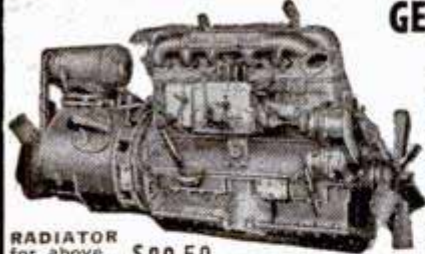
On long stretches the car cruised nicely at 75 to 80 miles an hour. It would do 85 miles per hour easily. Top speed by speedometer was around 93 miles per hour. Like most speedometers on all cars I've tested, the reading was fast, but the variation was not so much as in some other makes. I found the speedometer to be about four percent fast.

Plymouth engineers have incorporated some worth-while improvements in their latest, and to my mind this is the finest Plymouth ever offered by the Chrysler Corporation.

## Blood-Vessel Bank

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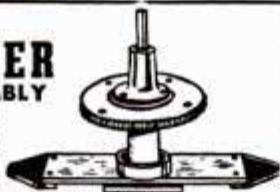
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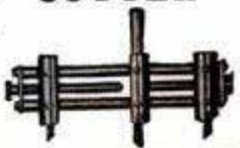
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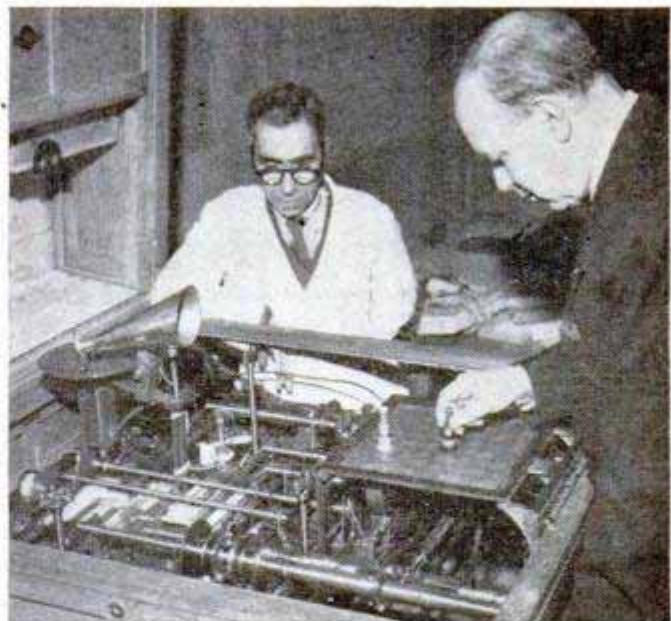
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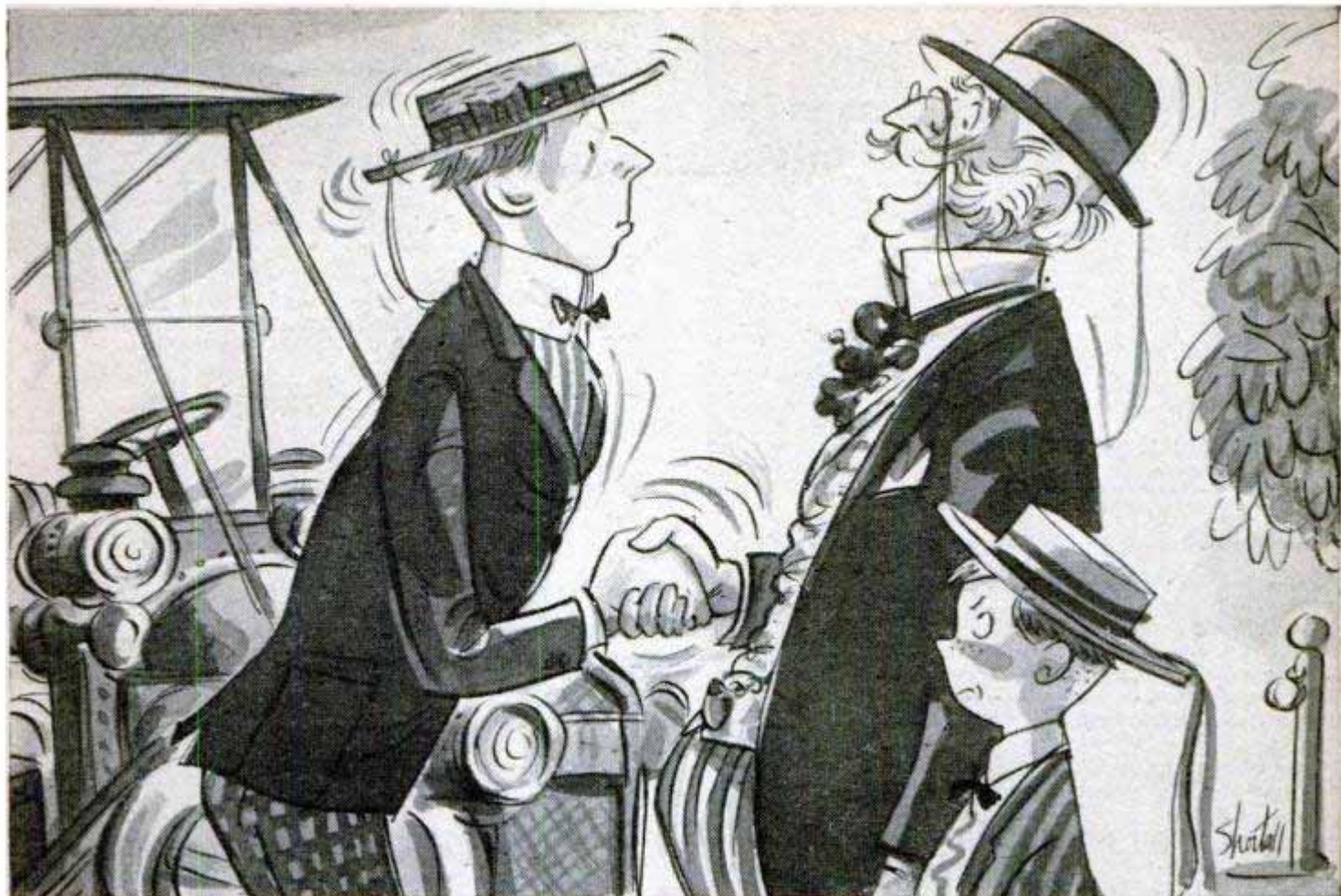
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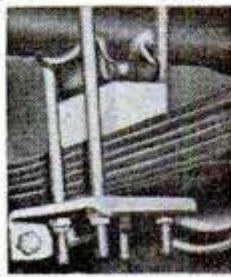
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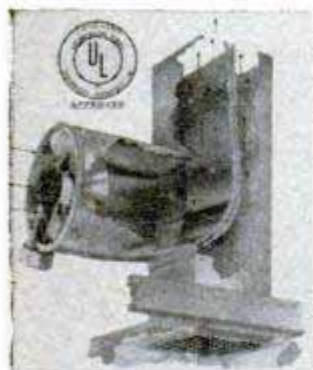
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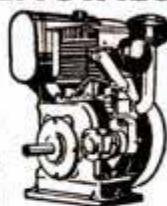
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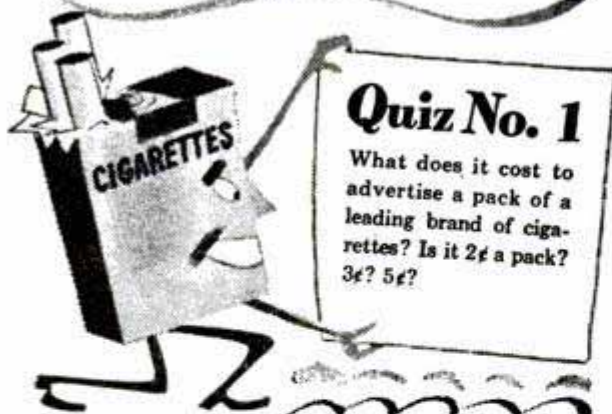
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