

APRIL 1957

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THE ATOMIC AIRPLANE
—page 100

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APRIL 1957

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Next Month...

THERE'S A bonanza for boaters in the May issue—27 pages on nautical subjects from taking your vacation in a boat to the world's toughest outboard race. At right is the Sea Knight, a 17-foot cabin cruiser designed especially for PM craftsmen. A series of articles on building the craft begins in May



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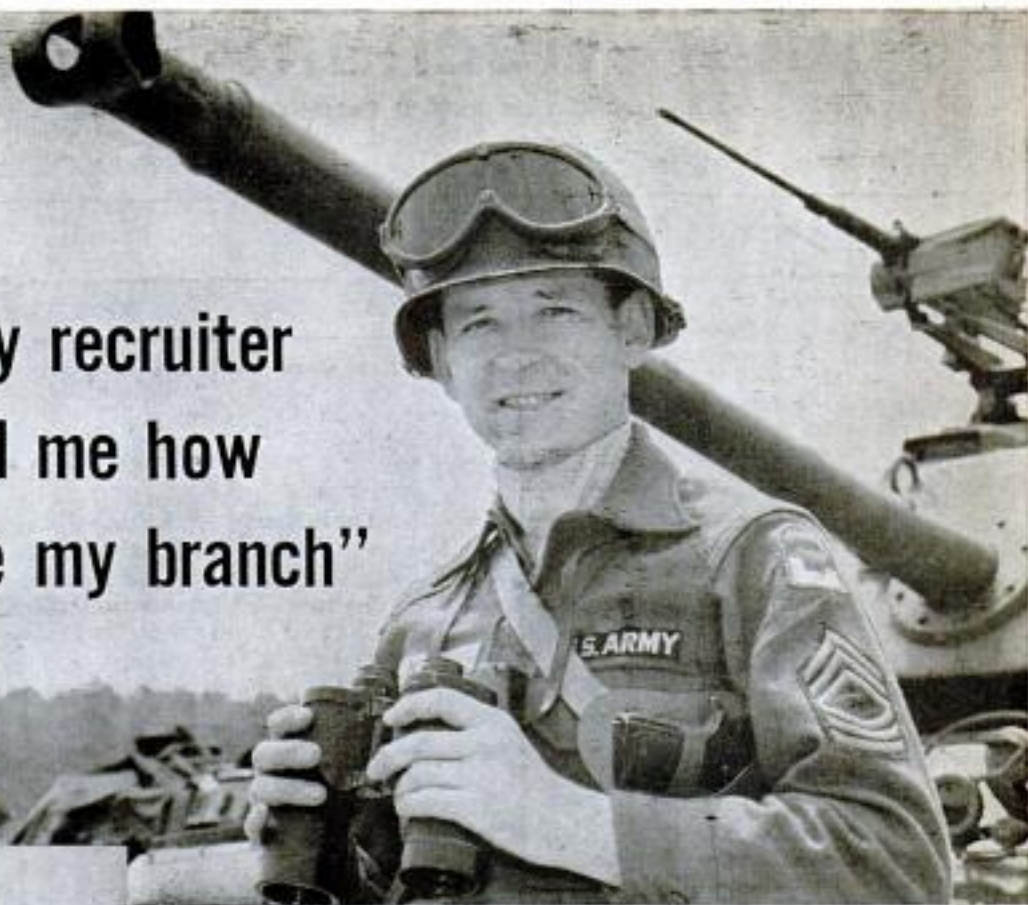
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Thomas R. Cogar
M/Sgt. Thomas Cogar
Gassaway, West Virginia
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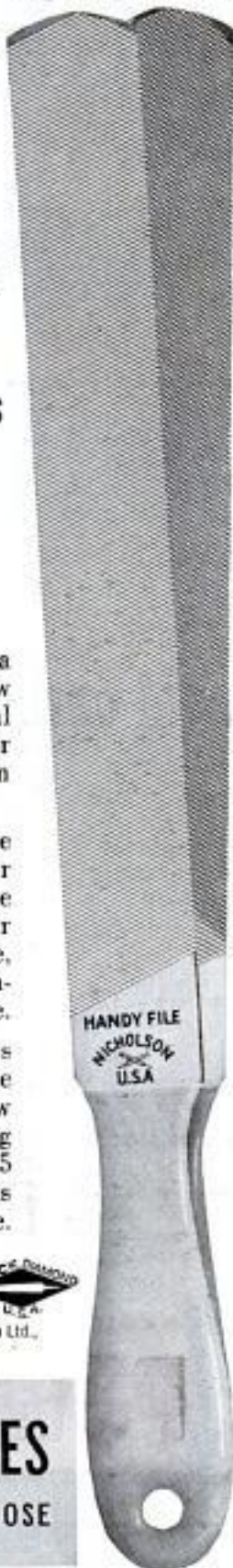
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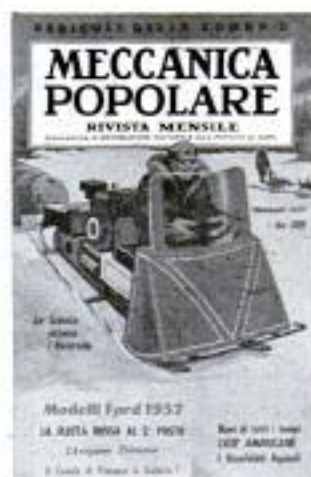
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ACROSS THE DESK



Italians are now reading *Popular Mechanics Magazine* in their own language. The new Italian edition, *Meccanica Popolare*, is the sixth foreign-language edition in the *Popular Mechanics* family and, like the other five, is a direct translation of the American parent magazine.



Already in circulation in Europe, Latin-America and Canada are *Mecanica Popular*, Spanish; *Mecanique Populaire*, French; *Popular Mekanik*, Swedish;

Populaer Mekanik, Danish and *Populare Mechanik*, German. The Italian edition is published at Milan under the direction of two well-known figures in Italian publishing circles, Dr. Gianni Mazzocchi and Enrico Amante and its first-issue sales are estimated at 50,000. Among the advertisers in the inaugural issue are Ford, Fiat, Ficep, Ducetone (Du Pont), Lambretta, Didone and Lips-Vago.

To the Editor:

I was very much interested by the article "They Sail on Sand" in the January number. The writer places the origin (of sand yachting) in 1895 to 1900.

May I call your attention to the name of Simon Stevin (1548-1620), mathematician and physician who, as far as known, invented and constructed the first sand yacht. He actually sailed with it on the beaches of the North Sea, Holland, often in the presence of Prince Maurits of the Netherlands, whose tutor he was.

He introduced calculating with tenth-part fractions (arithmetic) and in 1608 wrote a book on "Mathematic Thoughts." Stevin had the rare combination of a very theoretical and very practical mind. [Recently] a new hall was put into use at the Technical University of Delft, Holland, the "Stevin Laboratories," named after the above-mentioned physician.

B. J. M. Veth,
Roermond, Holland

(Continued to page 10)

WHAT HAPPENS WHEN A MAN DECIDES TO DO SOMETHING! ABOUT HIS FUTURE!

The proven rule of "learn more to earn more" took M.E.F. (name on request) from a position of truck driver to that of an accounting executive in sixteen months. Listen to what M.E.F. says:

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3 IN THE HOSPITAL, I HAD PLENTY OF TIME TO THINK

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5 SIGNING UP FOR THAT I.C.S. COURSE WAS THE SMARTEST THING I EVER DID

6 ONE MONTH LATER...

GOOD TO SEE YOU BACK ON YOUR FEET, JIM. IT'LL BE AWHILE BEFORE YOU'RE BACK IN THE FIELD. SO WE'LL FIX A TEMPORARY DESK FOR YOU IN THE OFFICE WHEN YOU'RE READY

I'M READY NOW, MR. WALSH

7 THEY GAVE ME SOME SIMPLE ASSIGNMENTS... AND I SURE SURPRISED THEM!

SAY, WHERE DID YOU LEARN ABOUT PUMPS?

SAME PLACE YOU DID, JOE... I. C. S.

8 THEN A FEW DAYS LATER, MR. WALSH CALLED ME IN...

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9 THAT EVENING, JANE AND I WENT HOUSE HUNTING

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(Continued from page 6)

Speed: Half Mile Per Hour

H. L. Bolton of Reese, Kans., writes us that his model of the 65-horsepower Case steam engine really runs—at a speed of



about a half mile per hour. He built it on a scale of two inches to the foot, and says it weighs 175 pounds, burns coal and "has every gadget that the 65 Case had."

To the Editor:

Your report on the 1957 cars (February) was very good and told many interesting facts. There is one very important measurement, however, that you never gave us. Next time you have three men in the front seat look and see how much hiproom you are using. I think you will find that you are three to four inches from the door on each side. Now look where your shoulders are. That's where the room really means something. Why not a report on shoulder room?

Howard Sauder,
Roanoke, Ill.

To the Editor:

In the January *Popular Mechanics* I was quite interested in the article on center-line steering. This was incorporated in the Marmon "48" in 1913 and 1914. Similar claims were made for it then, and they worked out okay in practice as road shocks and flat tires did not affect the steering as they did in other cars. It was only used in the large "48," an expensive, heavy car selling for \$5000 and weighing in excess of 5000 pounds. The smaller "32" of the same years did not incorporate it. Marmon dropped this feature in 1915. I have often wondered why.

Carl R. Foster,
Port Tampa, Fla.

To the Editor:

In the January '57 PM, a channel-wing plane is expected to be tested for take-off

(Continued to page 14)

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(Continued from page 10)

and landing at five miles per hour. If a sturdy small plane of this type proves successful, that alone would make every other light plane obsolete. Making an automobile-convertible out of it, too, seems to be too much of an improvement, if any. The highway patrolman could really cite the driver for "flying low," if the driver-pilot could be stopped before taking off again.

Maurice Akre,
Kennewick, Wash.

To the Editor:

I am one of a number of ship modelers throughout the world who are, due to geographical situation, lone modelers who have no access to modeling clubs.

To overcome this I have a few friends with whom I correspond regularly on our mutual interest, ship models. As this has been so successful we have decided to start a correspondence club for ship modelers on a world-wide basis. In this way all the lone modelers can get together and discuss their mutual interests to their benefit and the benefit of ship modeling in general.

Popular Mechanics Magazine is so widely read throughout the world that we are hoping you will be able to help us bring our idea before the public.

I am prepared to receive letters from anyone interested. All correspondence received will be acknowledged and persons with mutual interests will be put in touch with one another.

Frederick W. Bishop,
P.O. Box 648,
Windhoek,
S.W. Africa

To the Editor:

On page 179 of the February issue you state that the maximum horsepower for a Buick Special is 210. Actually it is 250 horsepower. I know this to be true. I just wonder how many other mistakes there are in this issue? It's a shame your magazine doesn't represent the true facts, especially when they are so hard to find. An ex-reader,

J. O. Wikstrom,
San Francisco, Calif.

Editor's Note:

The horsepower ratings referred to are for standard-equipment models only, as mentioned in the notes on page 179. The Buick Special has a handshift transmission and 210-horsepower engine as standard equipment. Dynaflo-equipped Specials (extra-cost equipment) have the 250-horsepower engine. We assure ex-reader Wikstrom that the statement was correct as published.

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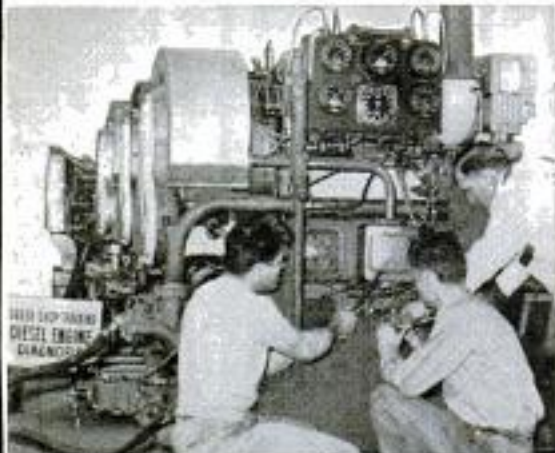
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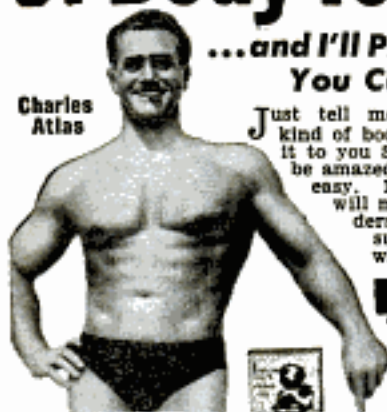
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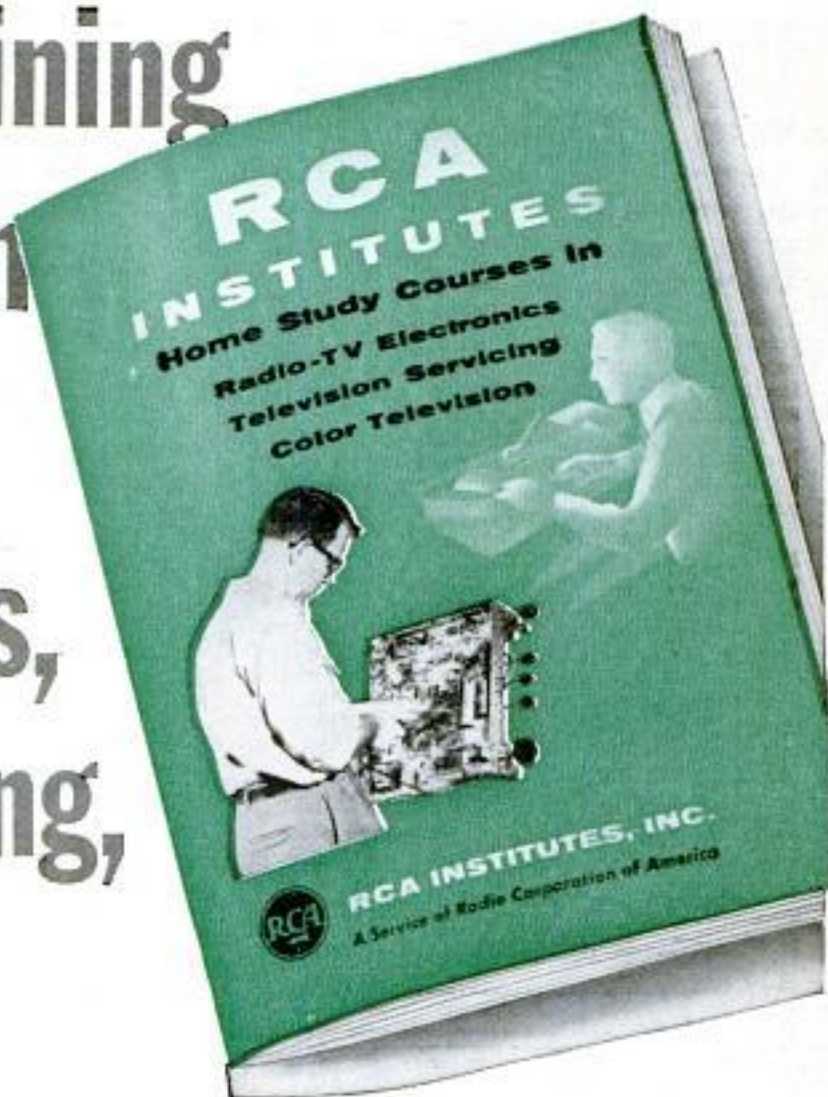
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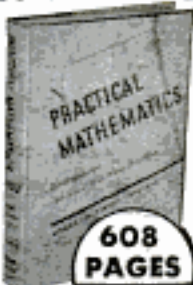
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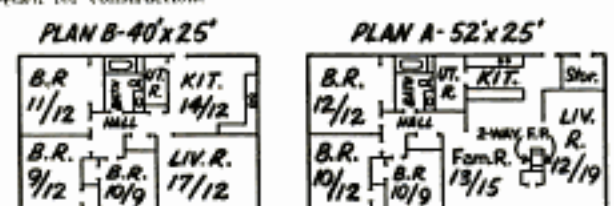
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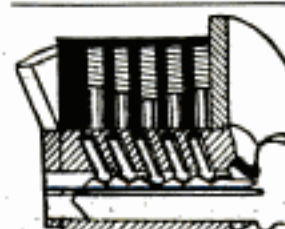
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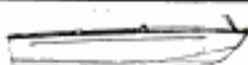
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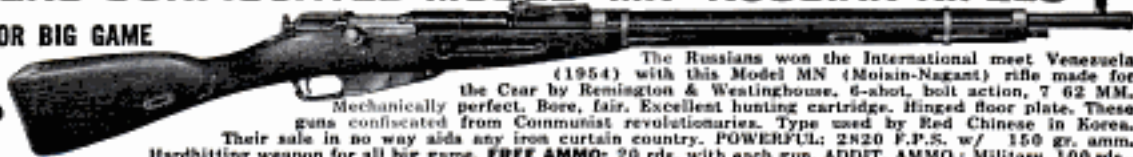
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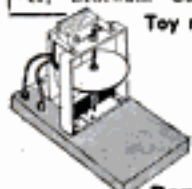
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START Your own business, local or mail order, folders describe 137 money-making plans free. Write R. Taylor & Co., 4834 N. Lincoln, Chicago 25, Ill.

EARTHWORM Growers needed! Send for free booklet "How You Can Make Money Raising Earthworms!" National Worm Co-Op, 4163 Pedley Avenue, Norco, California.

GROW Orchids at home. Profitable, fascinating. Year 'round, Maine to California. No greenhouse. Successful home grower shows you how to provide proper temperature and air conditions in any well lighted room. Full details and real orchid seeds free. Orchidland, 100 So. Vermont, Los Angeles 4.

PLATE Baby shoes, jewelry, gifts, bronze and colored pearl. Free booklet. Platex, 11629 South Vermont, Los Angeles 44.

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NEW Way to make money in automotive service! A wanted service, needed by one out of every three cars on the road. Minimum capital investment—equipment pays for itself out of profits. Our accredited school will train you and issue diploma. No prior automotive experience necessary. Write for profit facts today—no obligation. Bear Manufacturing Co., Rock Island, Illinois.

REFLECTIVE Sign letters, ornaments. Free samples. E-Z-On Sign Letters, Pell Lake, Wis.

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OPERATE Your own merchandise mail-order business! Everything furnished. Wm. Mann, Woodcliff Lake, New Jersey.

MEN—Women! Start money-making plastic laminating business at home in spare time. Material that costs 11¢ brings back \$2.58. No canvassing or selling but mail orders bring in \$20 a day. Write for full particulars free. Rush name on postcard to Warner, Room 7-D, 1512 Jarvis, Chicago 26, Ill.

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

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EARN Money repairing Ronson lighters. Free parts price list. Mary's Trading Post, 420 Willis Ave., New York 54, N. Y.

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60% PROFIT Cosmetics \$25 day up. Hire others. Samples, details. Studio Girl-Hollywood, Glendale, Calif., Dent. 1274H.

MEN And women wanted to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$9.80 an hour without previous experience. Full particulars free by mail. Send postcard to Roberts, 1512 Jarvis, Room 7-D, Chicago 26, Ill.

ATTENTION! Big profits! Learn making new, famous beautiful wood-fiber flowers using Magic Maker! Correspondence course free! Enclose \$1.00 for details today! Loneta's Flower Arts School, Rt. 1, Box 15-B, Belmont, N. C.

WEAVE Rugs—Make big profits! No experience necessary! Free catalog, sample card, and low prices on carpet warp, rug filler, looms, parts, inexpensive beam counter. If you have loom—give make, weaving width please. Or. Rug Company, Dept. 4746, Lima, Ohio.

BUY Wholesale! 30-80% discounts! Appliances, gifts, typewriters, tools, watches, sporting goods, jewelry, cameras, housewares, etc. Consolidated Distributors, Clifton 28, New Jersey.

PROFIT Raising worms. \$1.00 tells how! 1,000—\$4.00. Hybrids, Henderson, Tenn.

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WHOLESALE! Sell yourself, sell neighbors aluminum awnings; beautiful baked enamel finish. Write: Jack, Box 16254, Tampa, Fla.

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"HOME Business Digest" has money-making opportunities galore. Sample 25¢. Donovan, 79-PM Greenbelt, Levittown, New York.

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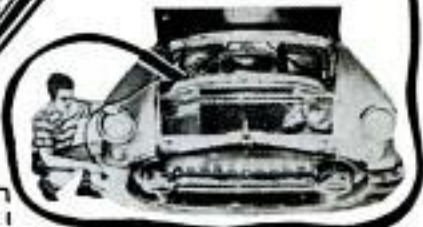


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Lashed to a house mover's trailer, the *Sirius*' hull is hauled to a site near Lake Champlain, 24 miles away

The *SIRIUS* Follows the *SPRAY*

Below, Carr and brother hoist mainsail. Bottom, the *Sirius* at the fitting-out dock near Vergennes, Vt.



THIS SPRING, Vermont farmer and ex-sailor Bob Carr will take to sea the yawl *Sirius* that he built alone in 6½ years with nothing but hand tools. The craft is a replica of the nine-ton *Spray*, sailed singlehanded around the world in 1898 by Capt. Joshua Slocum of Massachusetts (see *Popular Mechanics*, June 1956).

Trial runs by the *Sirius* last fall in Lake Champlain have shown the two-master to be the equal of the *Spray* in watertightness and sailability. And when waterways open between the lake and ocean, Carr will be ready to navigate his boat to the salt-water sailing lanes, where she belongs.

Built 24 miles overland from the lake, the hull of the *Sirius* was loaded one day many months ago on the trailer of a local house mover. Carr and volunteer helpers transported the hull to a quiet stream called Otter Creek at a point near Vergennes, Vt., seven miles upriver from Lake Champlain. In these calm waters, the 36-foot *Sirius* was outfitted with masts and necessary gear.

One hitch almost made Carr and his boat miss the trial runs. When he was ready to



lower the mainmast into the new craft, he discovered the mast was too small at the top to take strains which would be put on it. The mast tapered in too quickly at its tip, making a weak spot four feet below the top. This vital flaw induced Carr to get a new mainmast and cost him two weeks' extra work, in addition to delaying transfer of the *Sirius* downstream to Lake Champlain so long that the boat barely missed being frozen into Otter Creek for the winter.

Traveling into the hills in search of a straight spruce tree with ample diameter to its top, Carr found one, felled it and then discovered at the dock that the log had a twist in it. He returned to the woods, cut another spruce and, with a horse, dragged it to the ship. Adz, ax, "slick" and sweat produced a serviceable mast, to which Carr transferred the original hardware and fittings. In setting the mast in place on the boat, the amateur shipbuilder didn't forget to slip a silver coin under the foot of the mast for luck.

Takes to the Water

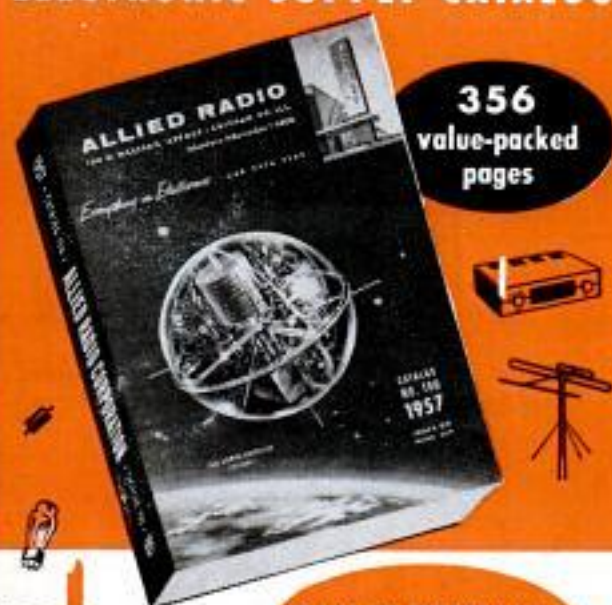
Just before winter closed in on Otter Creek, Carr arranged to have the craft towed the seven miles to Lake Champlain. Under sail the vessel handled like a dream and was so tight in the planking that Carr has "thrown a little water in her just to keep her bilges wet." Although he could sail the *Sirius* safely across three-mile-wide Lake Champlain, Carr hadn't actually completed all interior details of his boat. He decided not to take leave of the lake until spring. Guiding the *Sirius* to Shelburne Harbor, famous for sidewheel steamers built there, he put her into wet storage for the winter. He has been living aboard the *Sirius* since the launching. ★ ★ ★



Above and below, with all canvas on main and jigger masts, *Sirius* is ready for trial run



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*T. M. Reg. Easi-Bild Pattern Co., Inc.



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IF IT'S **Borden's** IT'S GOT TO BE GOOD!

The Borden Company, Chemical Division

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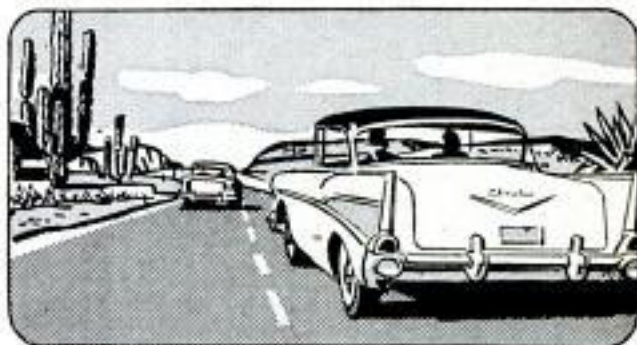
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"You have more to say about gas mileage than you think!"

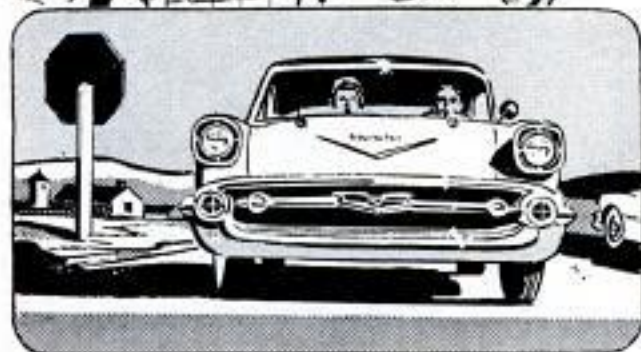


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"Speed plays an important part in your car's gas consumption. Stock cars are built for peak efficiency at cruising speed, not top speed. Speeders not only take unnecessary chances, but also waste gas."



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STREET _____
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that commercial use is to be made of any of the developments reported herein, it is suggested that legal counsel be consulted to avoid liability for patent infringement. It is not the purpose of this magazine to encourage patent infringement but, as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.

How to select a paintbrush




A good brush performs better . . . wears longer . . . saves you money

 There are several qualities to look for when selecting a good paintbrush. First, see if there is (1) a full head of bristles in a firm setting. Then look closely at several individual bristles. They should be (2) finely tapered with slightly curled tips. Make sure a generous portion of the bristles have (3) tips that are split or "flagged." Finally, look for a brush that

 has (4) bristles varying in length. A brush with these qualities will give you excellent performance. It has a greater working and paint-holding capacity — eliminates excessive dipping. The brush will (5) release a finish smoothly and evenly on any surface. You save time, paint with ease, do a professional-looking job.

Now, better performance with improved TYNEX® nylon bristles

 When buying a paintbrush, look for (6) the trademark TYNEX on the handle. Quality paintbrushes made with bristles of TYNEX nylon give you better performance. They pick up a full load of paint at every dip and lay on a smooth, streak-free coat. And brushes bristled with TYNEX have durable bristles that (7) clean easily . . . rinse thoroughly . . . dry quickly — are always ready for re-use.

FREE — additional facts everyone should have on choosing and using a paintbrush. Tips on painting unusual surfaces, holding a brush, the correct painting stroke.



Learn how professional painters dip their brushes, how they clean them.

You can have this valuable information without cost or obligation. Just send your name and address to E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room 65-4, Du Pont Bldg., Wilmington 98, Delaware.

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... quick starts, full power with humidity ranging between 90 and 100%!

Bayou country, Louisiana. Altitude: sea level or less. Humidity: nearly 100%. General conditions: wet and muggy.

It's hard to imagine a more humid atmosphere than the Louisiana bayou country, selected for the latest—and in many ways, the most trying—spark plug test AC has conducted.

In such an area, hard starting and spark plug flash-over are to be expected, yet this AC test proves that AC Hot Tips operate at full efficiency throughout recommended service life. Even under conditions such as these, you can expect full acceleration with no measurable loss of power . . . full economy with no measurable loss of efficiency!

Install a set of climate-engineered AC Spark Plugs in your car now.

- **BUTTRESS TOP**—Extra long "electrical length" of AC's buttress top insulator reduces chance of moisture-caused flash-over.
- **HOT TIP**—Exclusive AC Hot Tip design cuts spark plug fouling, which can be caused by excess moisture, to a minimum.
- **CONDUCTASEAL**—Only AC uses positive metal-ceramic seal to prevent compression leakage and power loss under the most extreme driving conditions.



KEEP IN TUNE

with a new set of

hot tip
spark plugs



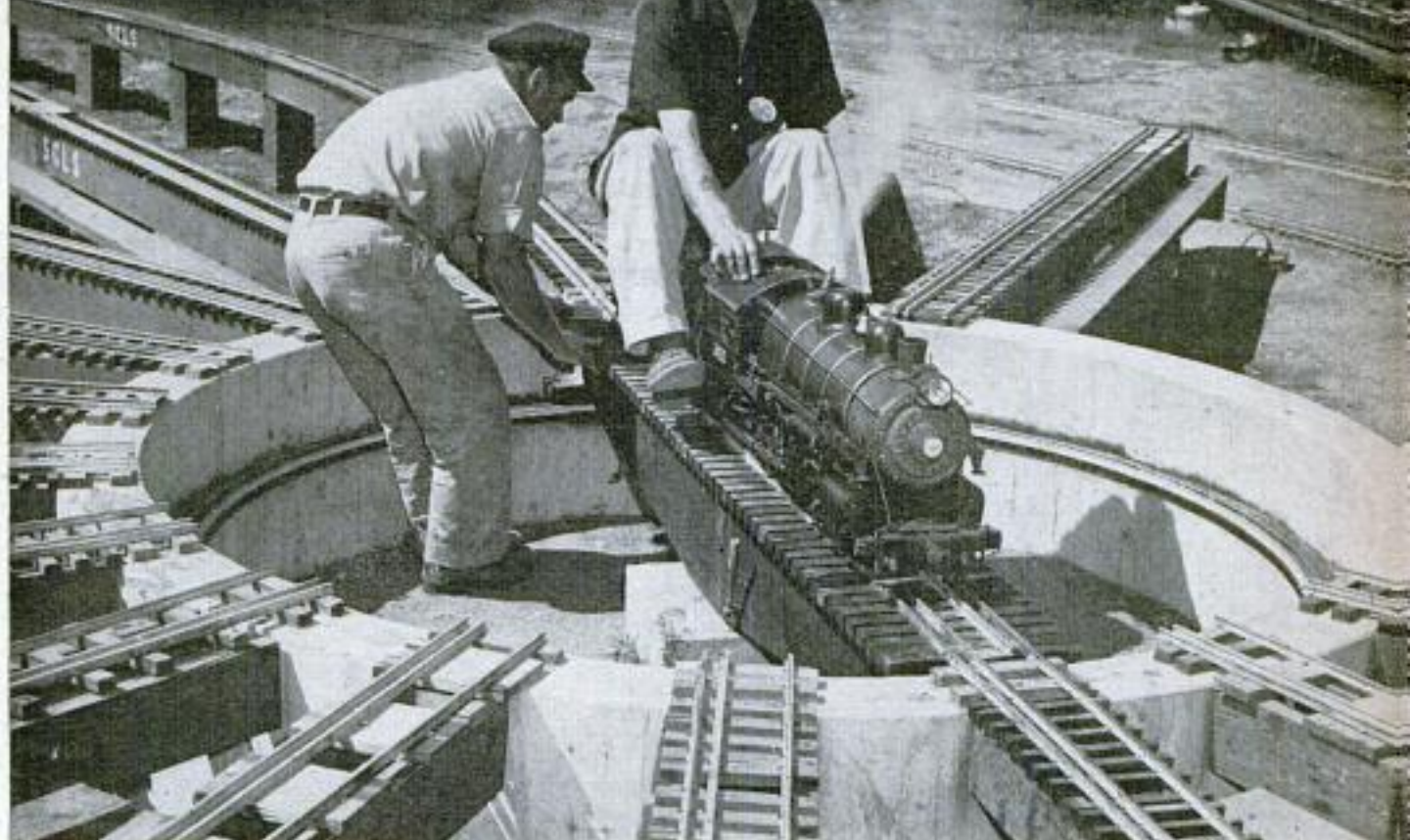
Be sure to change every 10,000 miles or in accordance with engine manufacturer's recommendations.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

POPULAR MECHANICS

APRIL
1957

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 107 NO. 4



Three-rail tracks radiate from "steaming rack" with 10-wheeler on deck. Tracks fit $\frac{3}{16}$ -inch and 1-inches

Who Ever Heard of a Diesel Engine?

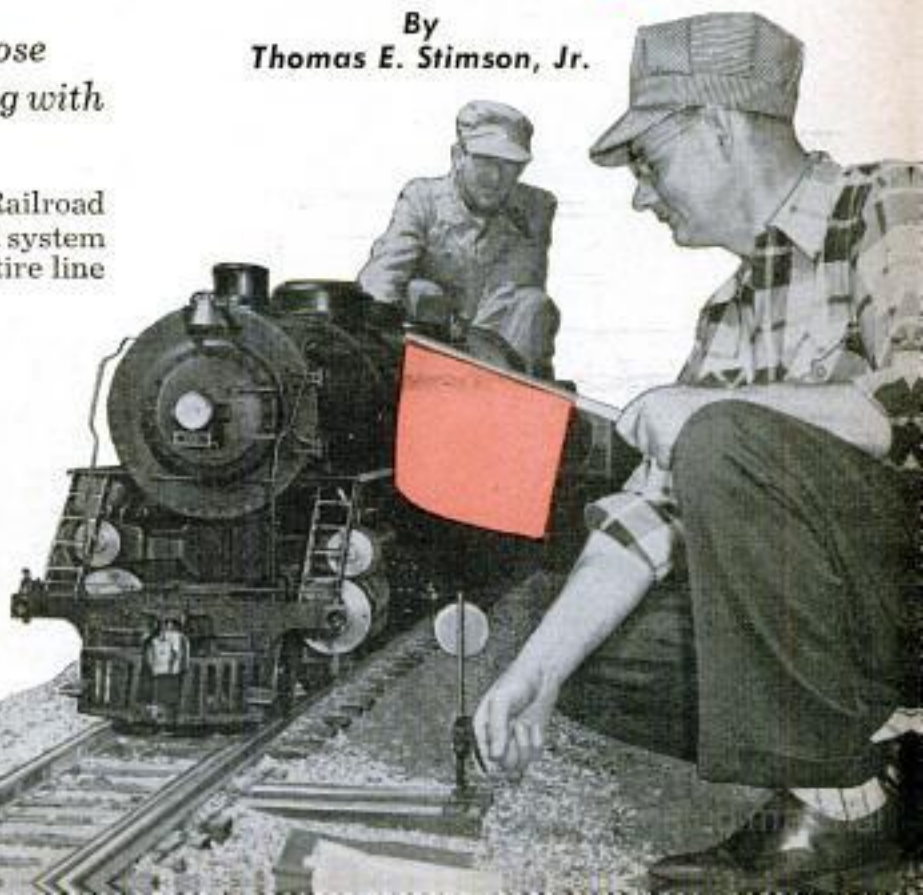
—Not the railroad fans, whose back-yard lines are burgeoning with snorting steam locomotives.

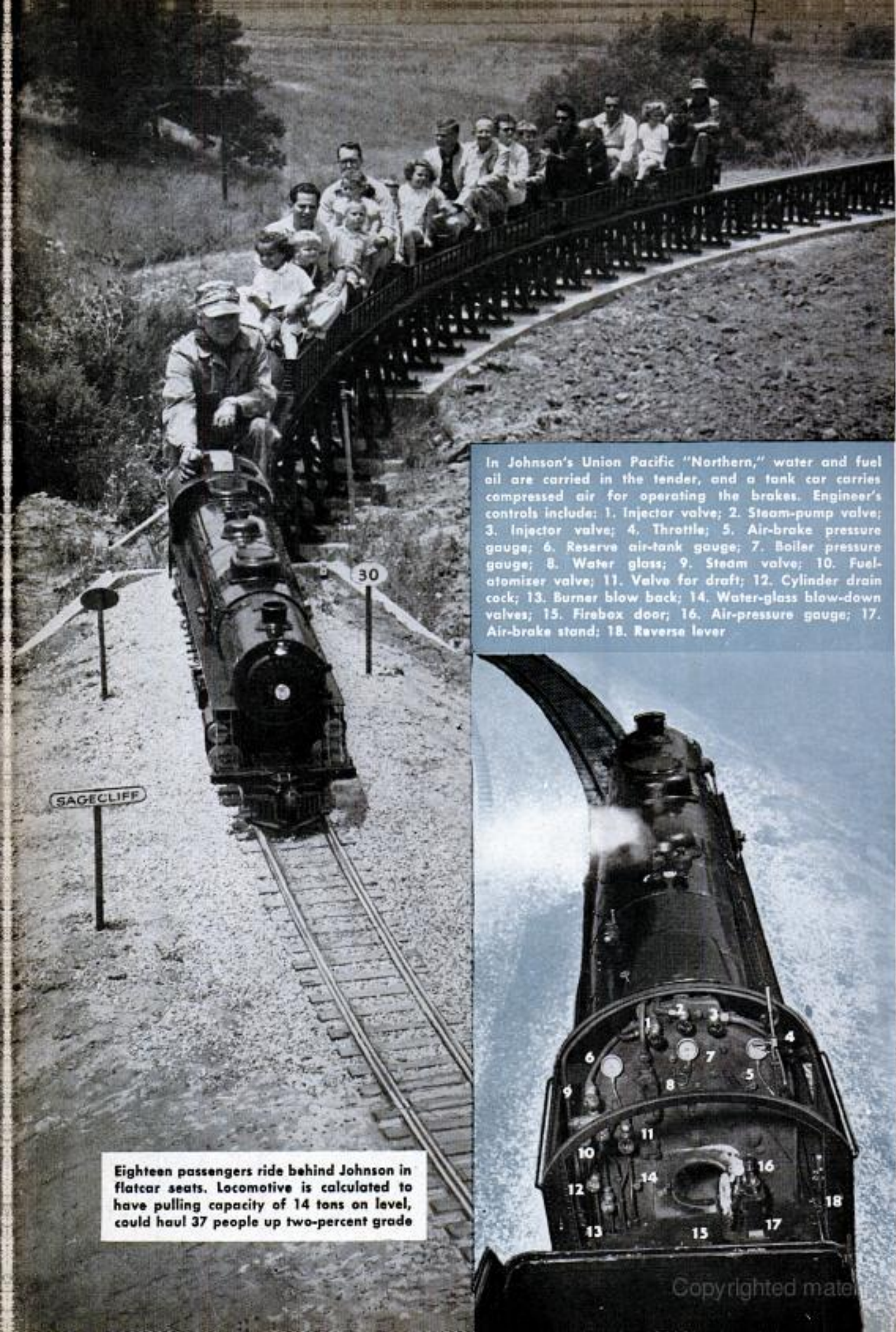
BIG NEWS at the Goleta Valley Railroad is that an automatic block-signal system is going to be installed along the entire line and that a tunnel is to be driven through a mountain. Seymour F. Johnson, president of the railroad, says the improvement program also includes installing a river under an existing trestle.

Instead of being a multi-million-dollar program, total costs will only

Switchman throws switch and displays flag to bring Goleta locomotive onto passing track

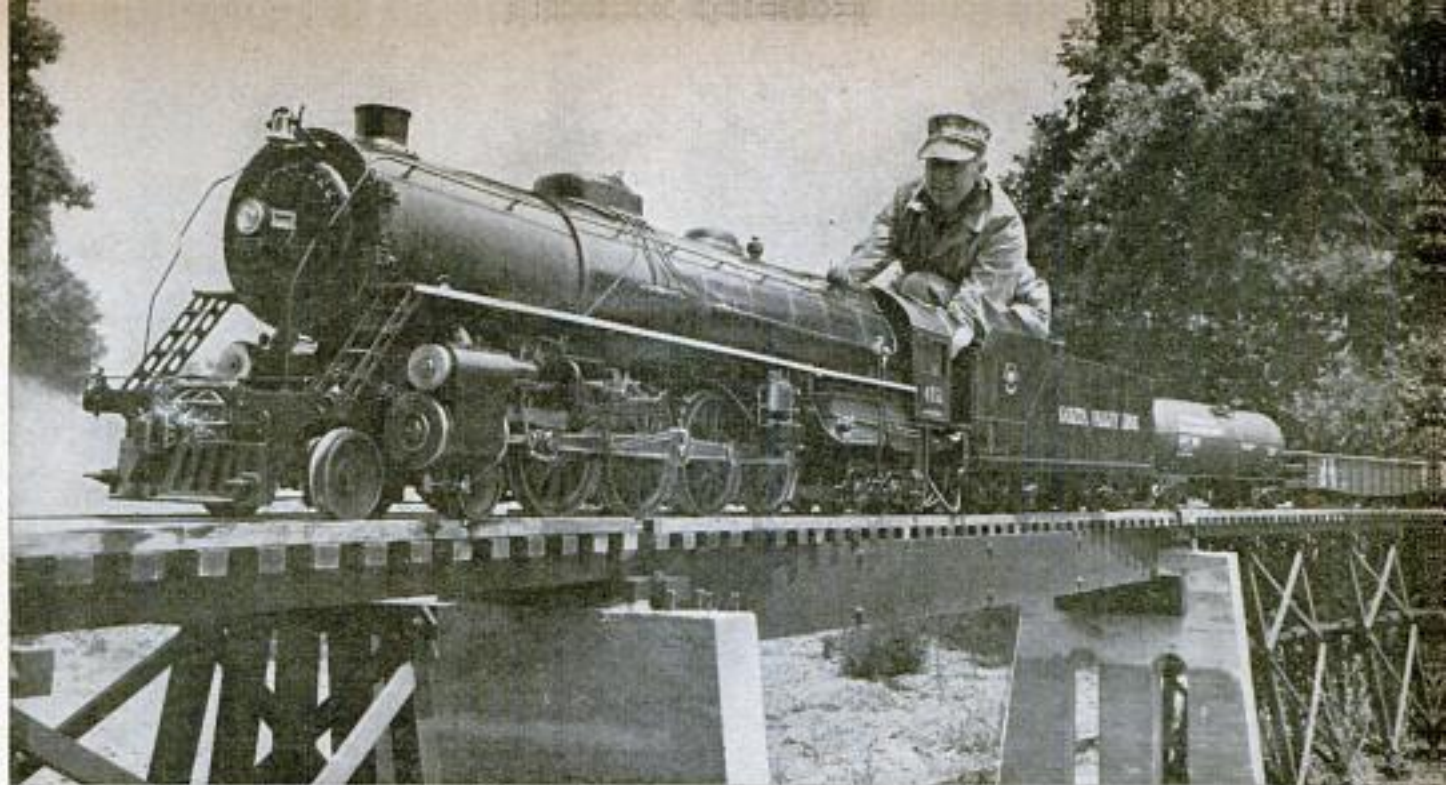
By
Thomas E. Stimson, Jr.





In Johnson's Union Pacific "Northern," water and fuel oil are carried in the tender, and a tank car carries compressed air for operating the brakes. Engineer's controls include: 1. Injector valve; 2. Steam-pump valve; 3. Injector valve; 4. Throttle; 5. Air-brake pressure gauge; 6. Reserve air-tank gauge; 7. Boiler pressure gauge; 8. Water glass; 9. Steam valve; 10. Fuel-atomizer valve; 11. Valve for draft; 12. Cylinder drain cock; 13. Burner blow back; 14. Water-glass blow-down valves; 15. Firebox door; 16. Air-pressure gauge; 17. Air-brake stand; 18. Reverse lever

Eighteen passengers ride behind Johnson in flatcar seats. Locomotive is calculated to have pulling capacity of 14 tons on level, could haul 37 people up two-percent grade



Well-built trestle carries Johnson and his big-model live steamer over picturesque section of his railroad

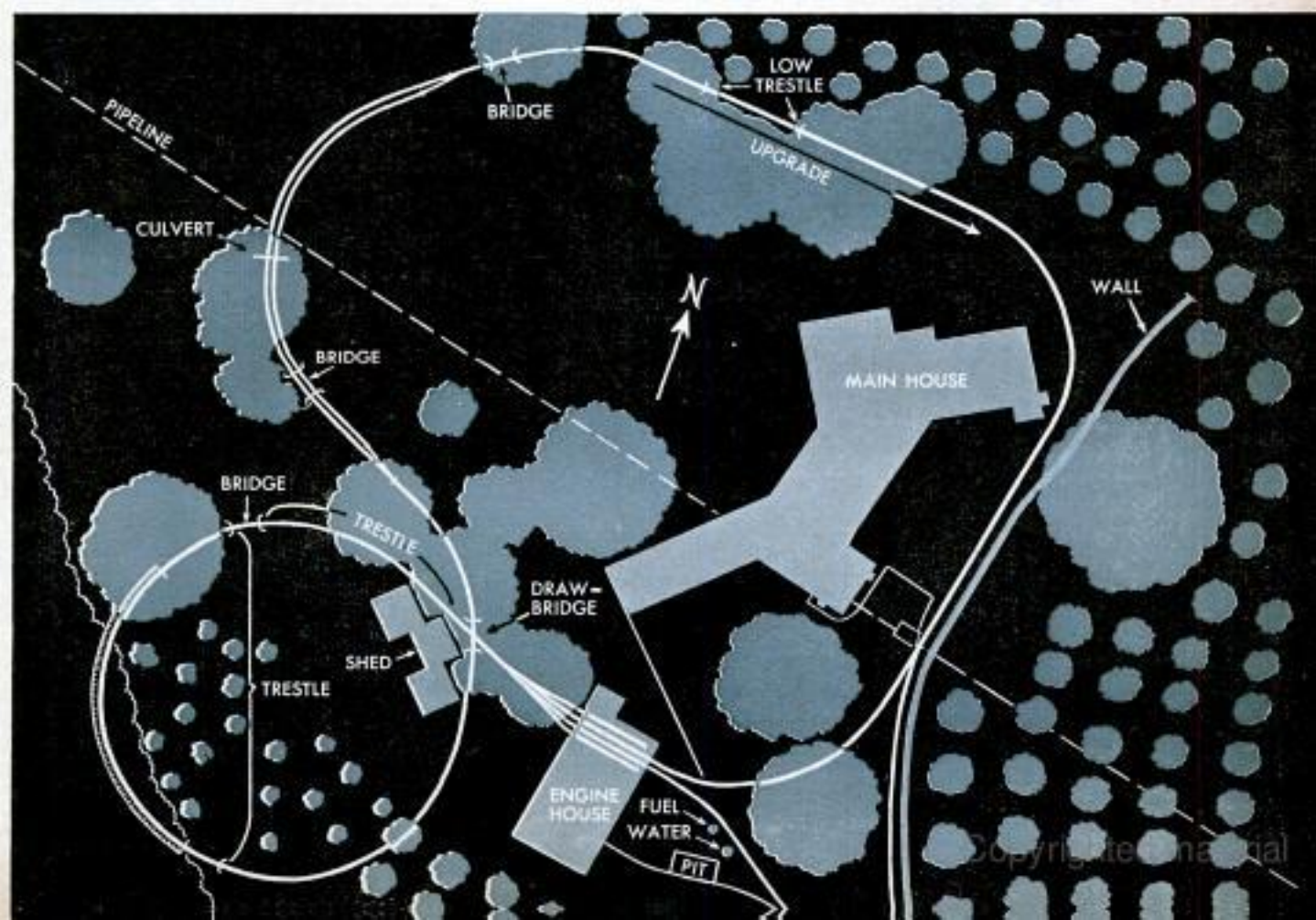
amount to a mere hundred dollars or so.

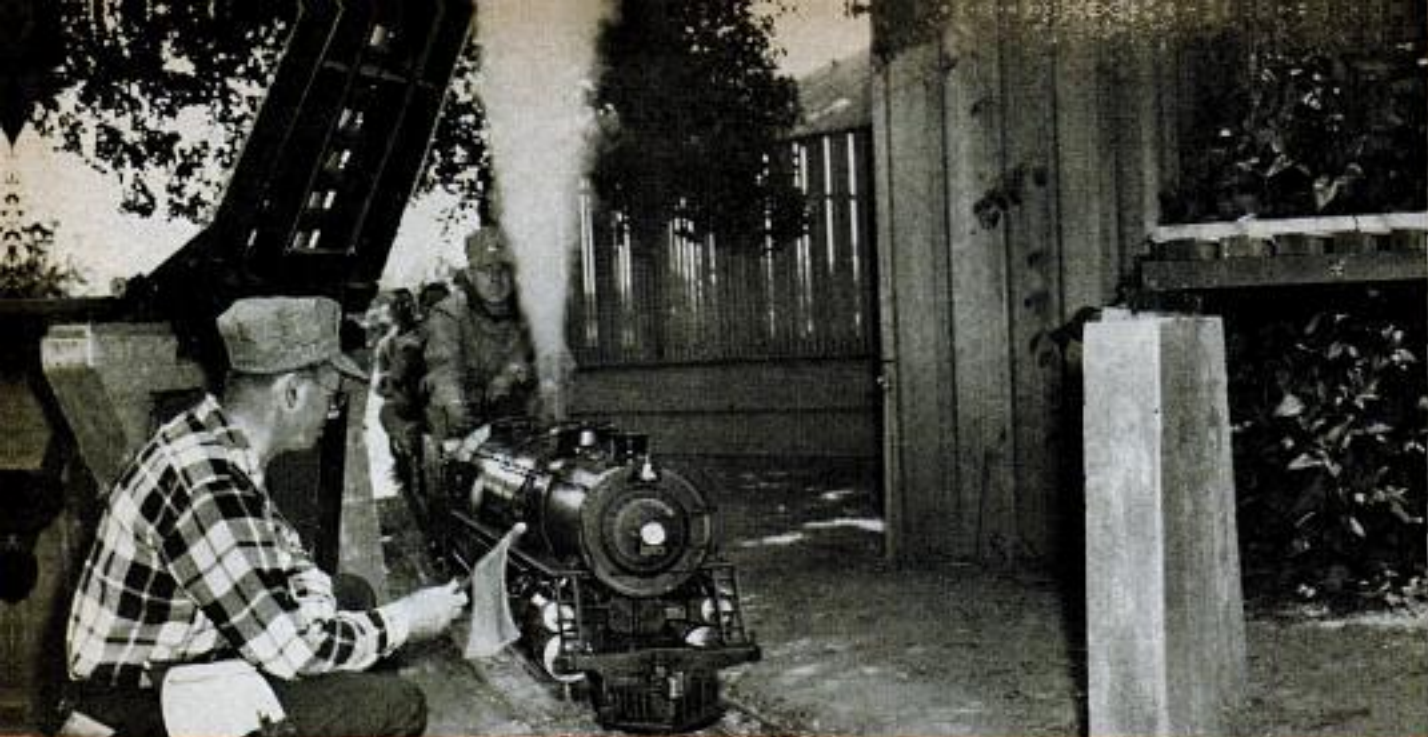
This railroad has only one locomotive, an oil burner of the Union Pacific 825 class, and when traffic is heavy the presidents of other nearby railroads bring over their own engines. That's why the automatic block signals are wanted. An engineer feels safer if he has a green board in front of him when several trains are operating on the half mile of track. Goleta Valley is proud of its safety record. It hasn't hurt a

passenger from the time operations began.

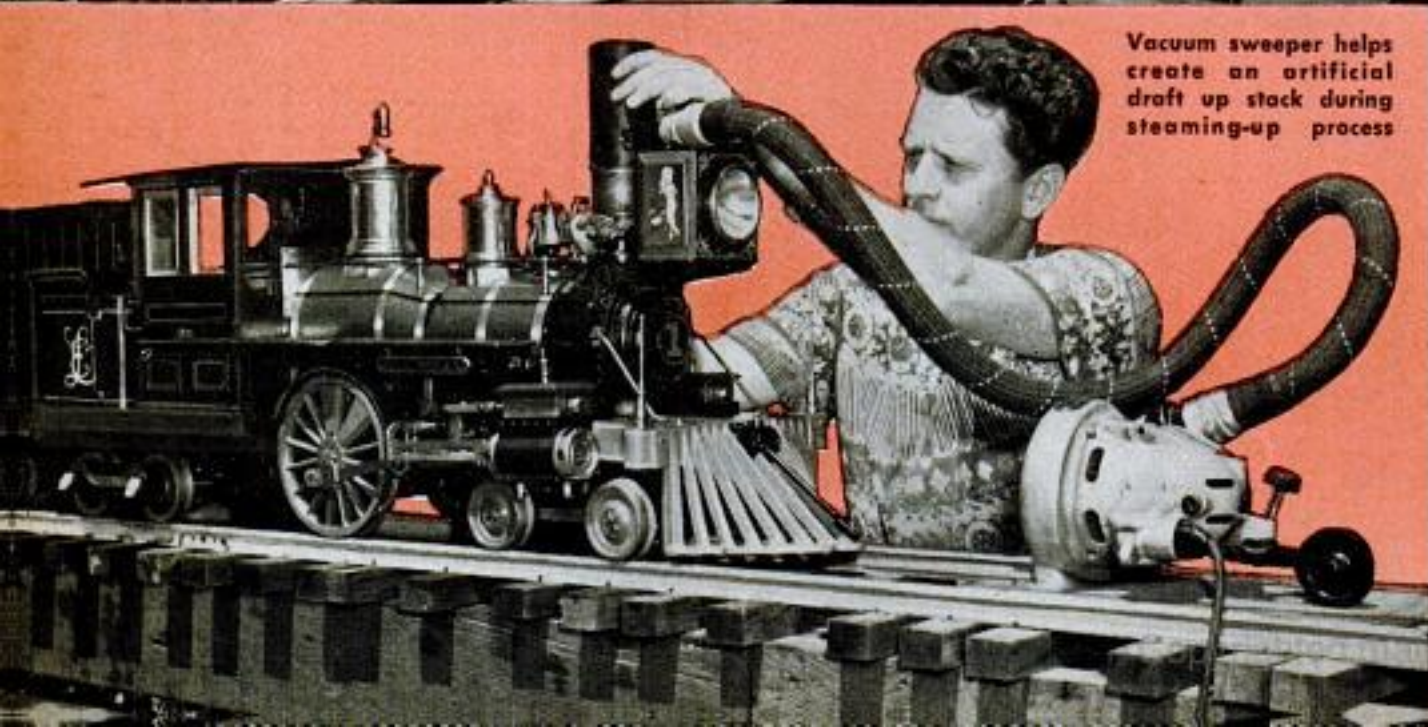
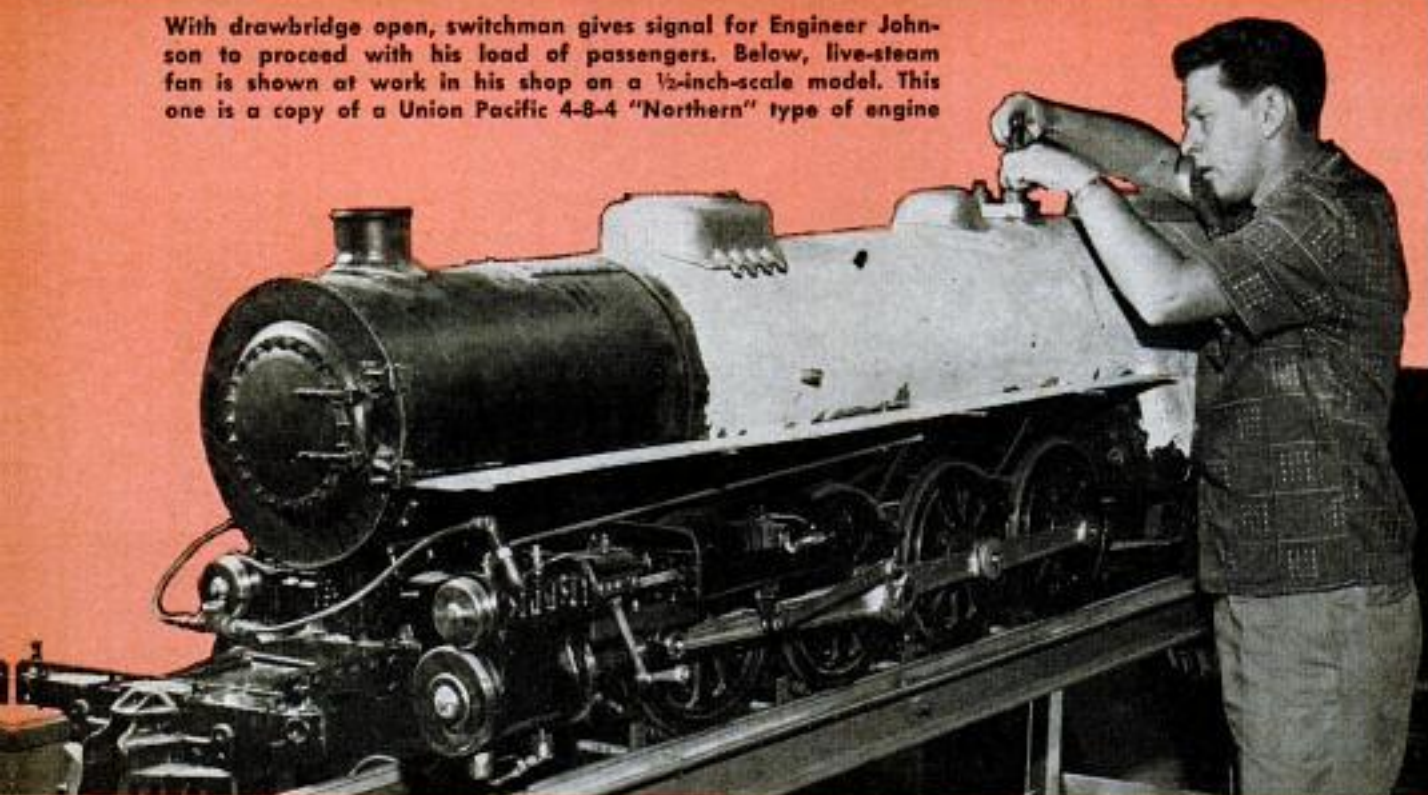
And it isn't likely to. Located near Santa Barbara, Calif., the railroad is a 1½-inch-scale model of a full-sized system. Its "live steam" locomotive operates at scale speeds of up to 85 miles per hour but actually this amounts to only 10 miles per hour. The engine develops 10 horsepower and is calculated to be able to pull 14 tons on level track. It can haul 37 people up a two-percent grade.

Goleta Valley Railroad meanders around Johnson's home, complete with trestles, bridges and engine house





With drawbridge open, switchman gives signal for Engineer Johnson to proceed with his load of passengers. Below, live-steam fan is shown at work in his shop on a 1/2-inch-scale model. This one is a copy of a Union Pacific 4-8-4 "Northern" type of engine



Vacuum sweeper helps create an artificial draft up stack during steaming-up process



Walt Disney hauls passengers with his scale-model live steamer *Lilly Belle* over railroad on his estate

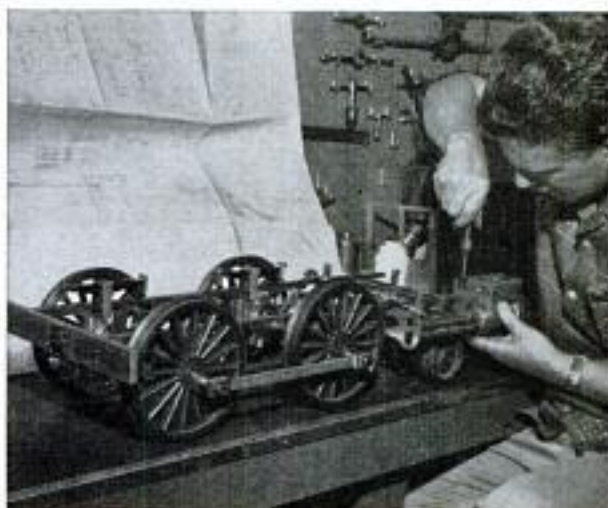
Johnson started work on his engine in 1947 and finished it in 1951, thus by live-steam tradition the engine bears the number 4751. Building the engine was only the start, however. Next he needed a track on which to operate the live steamer and some cars for it to pull. Today he has 2500 feet of track consisting of Duralumin rails spaced $7\frac{1}{2}$ inches apart and attached by 30,000 tiny aluminum spikes to the 7500 small wooden ties in the ballasted road bed.

This track starts out by making a big loop, partly on a curved trestle and partly through a cut, returning under itself by means of a drawbridge, and continuing on across garden areas to make a big sweep around Johnson's residence.

The engine shed consists of a garage built across the tracks, with an overhead door at each end. Typical railroad water-and-fuel tanks scaled down to size are located alongside the track for servicing the engine. The track system includes a long passing track, various short trestles and bridges, and the usual railroad warning signs, informational signs and signboards that announce the approach to towns. There is a "Y" track that permits turning the engine or a train around.

A spur track runs down Johnson's entrance driveway and this is handy on those afternoons when he holds open house. While Johnson is hauling one trainload of visitors around the system, Dr. J. W. Newton and his $1\frac{1}{2}$ -inch-scale diesel switcher (powered by a storage battery at present) are making up a new train and loading

(Continued to page 248)



Above, assembling running gear of "American" type engine. Below, cleaning flues of an old-time engine



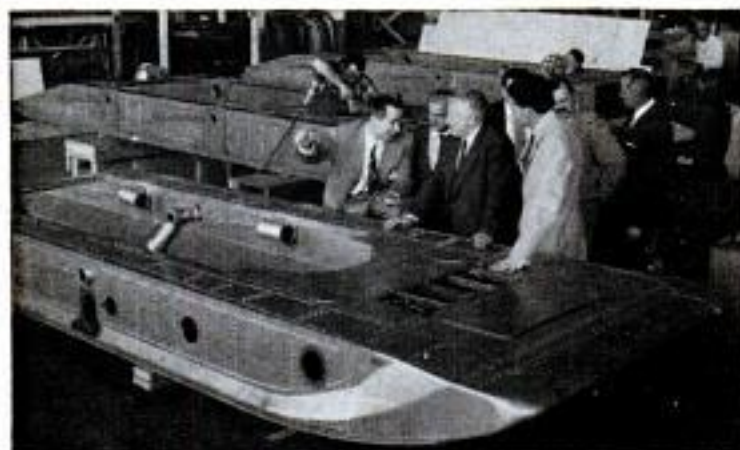


Wide-angle lens in TV camera shows crew how the skis are operating. Below, at left, is the boatlike ski

Combat Transport Plane Tries Out Giant Skis With Help of TV

Closed-circuit TV has helped the crew of a 62-ton Hercules propjet transport plane watch in-flight behavior of the largest skis yet fitted to a military aircraft. A TV camera mounted in a pod under a wing

transmits pictures of the skis via coaxial cable along the wing's trailing edge to a 10-inch monitor screen inside the plane. Weighing 1700 pounds each, the craft's main skis are 19½ feet long and nearly 5½ feet wide. The nose ski, turning in a 60-degree arc like a nose wheel, is 9½ feet long and 5½ feet wide. By flicking a switch, the pilot can use conventional wheels or skis for landing, depending on terrain. Individual spring suspension of forward and aft supporting arms of the skis gives both ends of the ski 18 inches of upward or downward pitch to adapt to landing surfaces; the nose ski can deflect 15 percent up or down. Wheels or skis retract without impairing the plane's 370-mile-per-hour speed or 20-ton load.



Norway's First Production Car Is Hardtop Plastic Sports Model

Norway's first production car is a sports model named "Troll," which slightly resembles the Porsche and Citroen DS-19 vehicles. To be built for export to Germany, this car eventually will be exported to other countries. The Troll has a hardtop plastic body made in Norway. Its 30-horsepower, direct-fuel-injection, two-stroke engine and chassis are shipped from Germany to Norway where the body is added. Then the completed car is returned to Germany for sale.





"Taxi Service" to a Mountaintop Furnished by Venezuelan Hotel

Resembling a huge hurricane lamp, a six-passenger cable car carries guests to a mountaintop hotel in Caracas, Vene-

zuela. The cable to the hotel is a spur of a five-mile cable-car system, one of the longest in the world.

Pressure Suit for Pilot

Wearing one "omnienvironment suit" instead of several superimposed garments, today's high-altitude pilot achieves at least five lifesaving functions. He breathes 100 percent oxygen during flight; this saves him from the "bends" in rapid climbs. The suit gives him protection against sudden low pressures and guards against heavy gravitational forces during maneuvers. When high speeds heat the cockpit, the suit provides cooling ventilation. And, if bailing out over water is necessary, the suit shields him from the cold while floating.

Concrete-Winged Aircraft

Aircraft wings of concrete reinforced with prestressed wire have been patented in this country under the name of Louis Breguet, French engineer and inventor who died two years ago. Breguet stated that a fighter-plane wing configuration of this construction differed only slightly in weight from that of a conventional light-metal wing.





Artist's conception shows the mighty C-132 as it would appear in flight with a pay load of 200,000 pounds

Huge C-132 Air Transport May Never Leave the Ground

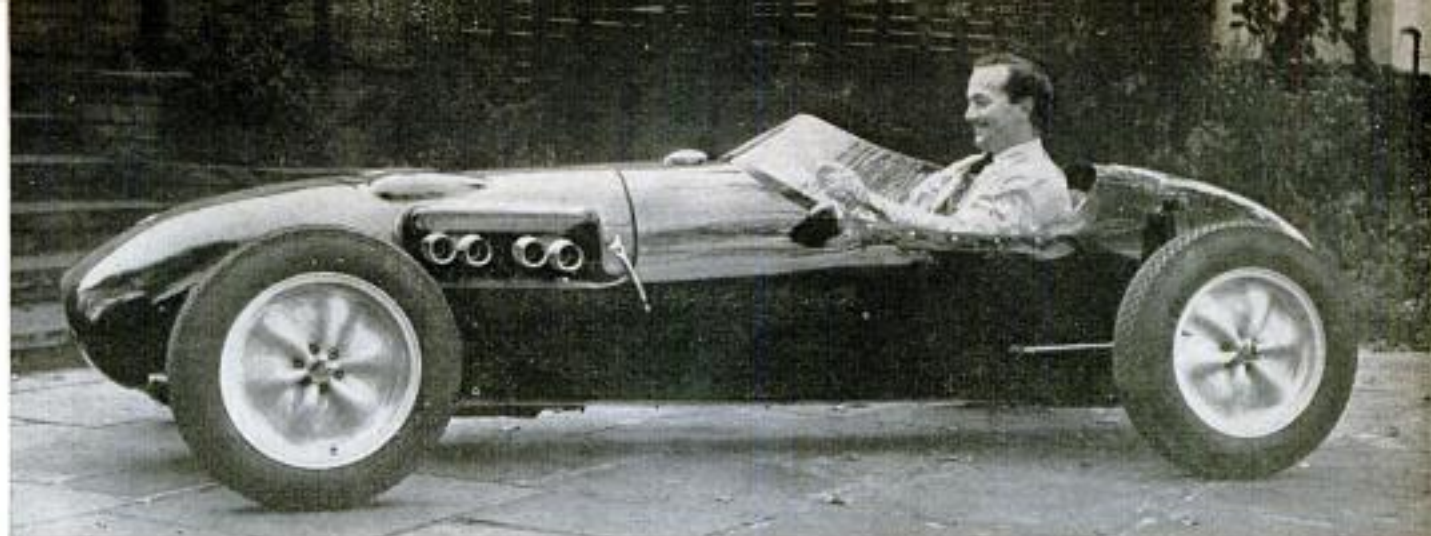
Plans for production of a huge air transport, the C-132, able to carry 50 tons for 3500 miles at more than 460 miles per hour have diminished to the making of a wooden mockup with an uncertain future, U.S. Air Force announcements revealed. Speed, range and cargo capacity reportedly might have shortened aerial-supply pipelines to insignificance and eliminated supply storage problems at the "using end" of the line. The C-132 is said to double cargo-carrying potential of its nearest rival, the C-133, which has a wingspan of 180 feet, length of 153 feet and diameter of 16 feet. As con-

ceived, maximum take-off weight of the C-132 would have been 500,000 pounds and maximum pay load nearly 200,000 pounds. A representative pay load of 100,000 pounds theoretically would have enabled the plane to reach maximum range. Main landing gear was to have included 16 wheels arranged as two coaxial quadruple wheel units in tandem on each side of the fuselage, plus a dual nose-wheel assembly. The giant transport, using four engines with 15,000 horsepower each, was to have tremendous range without refueling. Use of current runways and ramps had been anticipated.



Radio-Phonograph Powered by Sun

Sunlight powers a new radio-phonograph unit that plays records at 16, 33 $\frac{1}{3}$, and 45 revolutions per minute. A 48-cell solar battery in the combination is activated by direct sunlight or, on cloudy days, by two floodlights held three feet from the cells. Lacking sun or incandescent light, the set is powered by six rechargeable flashlight-size stand-by batteries, which operate the phonograph for two hours or the radio for 10 hours. This sun-operated device contains a printed-circuit radio and phonograph amplifier with seven transistors. The solar battery delivers 200 milliwatts of audio-power output. Also included in the unit is a switch for adjusting the turntable motor speed to compensate for variations in the intensity of the light.



Aluminum and Magnesium Keep Lotus' Weight Down

Britain's newest Formula II racing car, Lotus Eleven, has a lightweight tubular frame, combined torsion bar and coil-spring suspension and cast magnesium wheels. The 91-cubic-inch, four-cylinder, 141-horsepower engine is aluminum and has twin overhead camshafts.

Infrared Heating Unit Creates "Sunshine" Outdoors

Outdoor enthusiasts who won't give in to cold weather will find a German-made infrared heating unit their source of "sunshine." This device operates with butane gas stored in the basketlike base of the lamp. The heater also can be used effectively indoors in the conventional sun-lamp method.



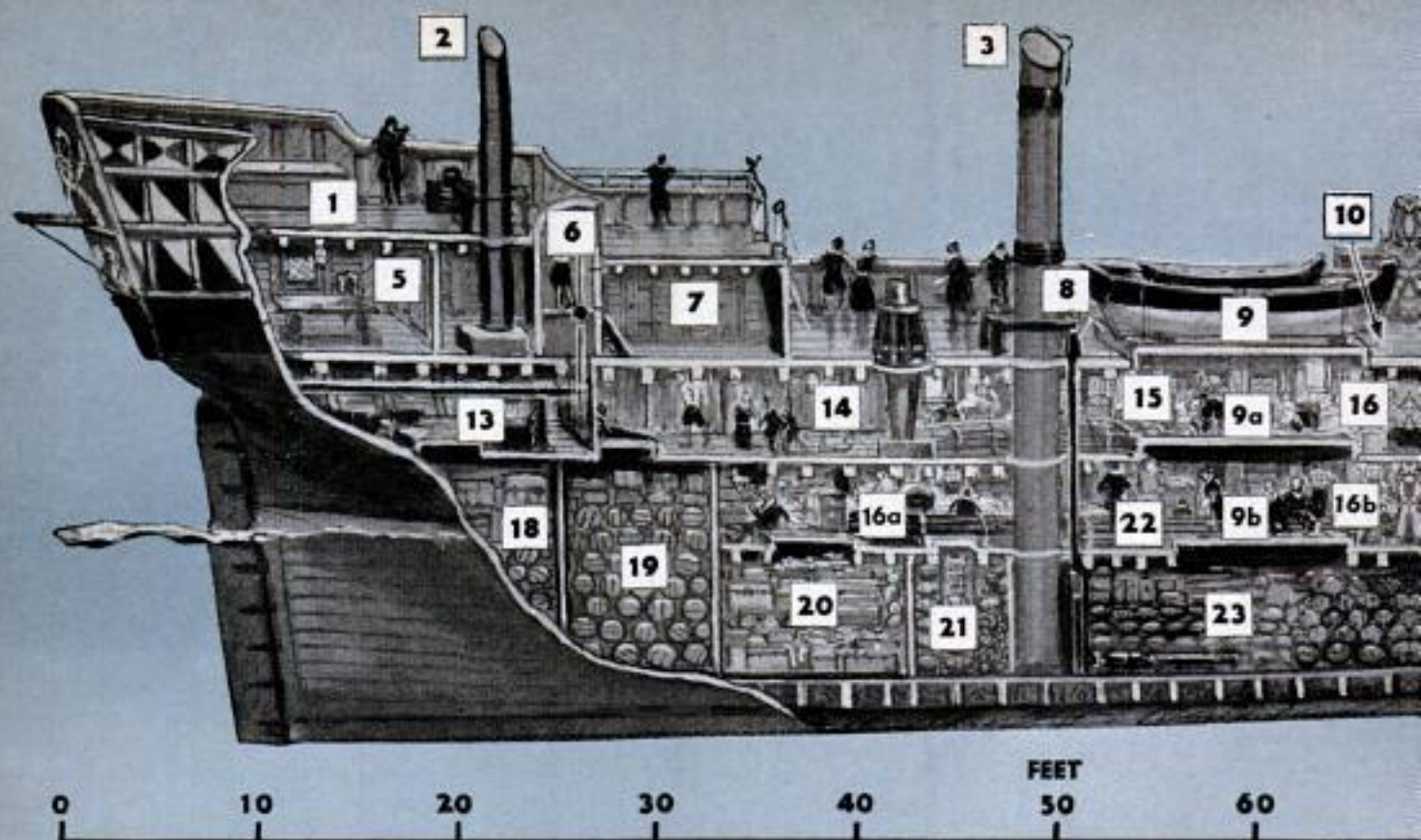
Inflatable Skiers' Belt Also an Aid to Fishermen

Water skiers who ski better than they swim can use a new inflatable plastic belt to buoy up their body and their confidence. Helpful in deep-water skiing starts, the yellow belt cushions falls and serves as a marker for the pick-up boat. The belt ties on, can be inflated by blowing and does not shrink, rot, mildew or become waterlogged. It also can be used as a seat cushion and folds into a pocket-size package.

Silicone Rubbers Versatile

Silicone rubber, once a laboratory oddity, may soon be applied to a wide variety of uses. One advantage of the material is that it is electrically conductive. It retains this characteristic after repeated flexing. Applications suggested for silicone rubber include heater pads for aircraft cameras, completely flexible heating blankets and heated rolls to warm the inks on printing presses. Because silicone rubber also dissipates static electricity, it may be used in tubing for hospital operating rooms.



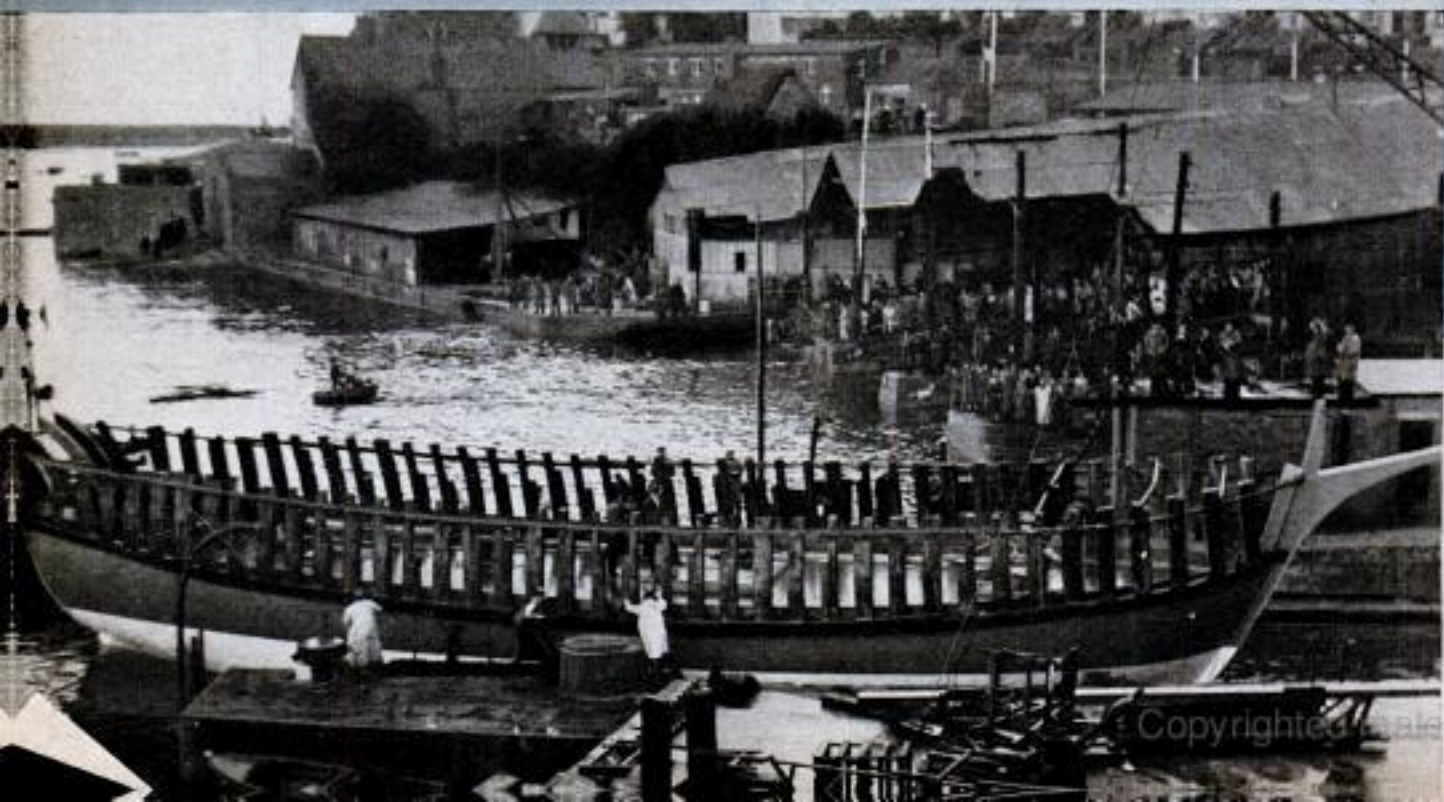


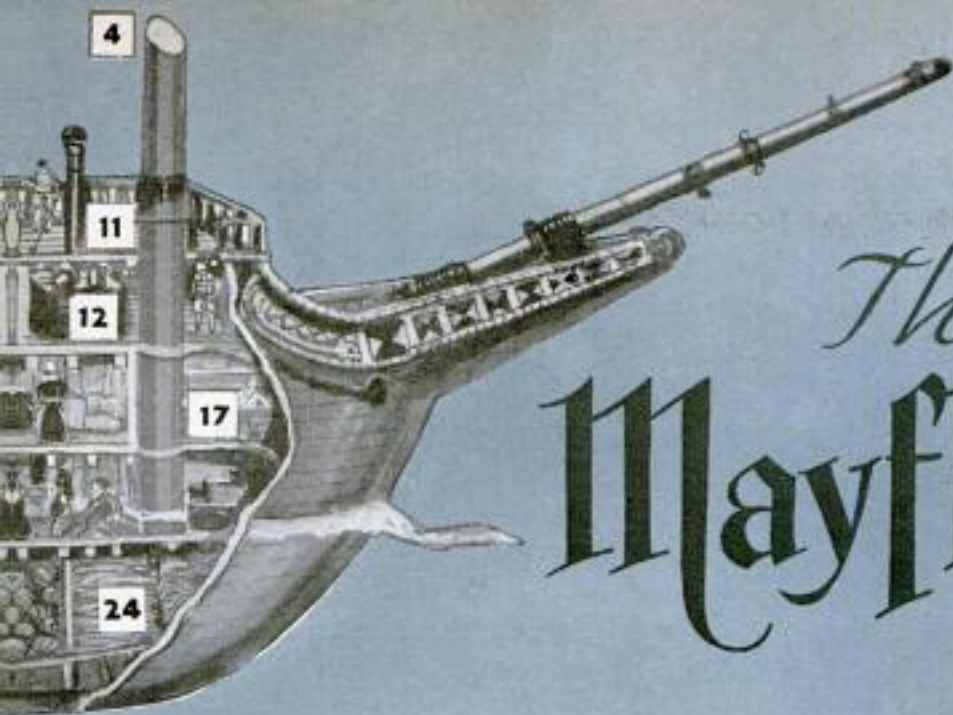
1. Poop deck; 2. Mizzenmast; 3. Mainmast; 4. Foremast; 5. Great cabin; 6. Helmsman; 7. Private cabins; 8. Pumps; 9., 9a., 9b. Main hatches; 10. Waist deck; 11. Forecastle; 12. Galley; 13. Tiller room; 14. Semiprivate cabins; 15. First hold; 16., 16a., 16b. Steerage quarters; 17. Crew's quarters; 18. Biscuit; 19. Fresh water; 20. General stores; 21. Powder magazine; 22. Repair parts; 23. Main hold; 24. Sail locker

ONCE AGAIN a *Mayflower* is braving the stormy Atlantic. If all goes well, a modern replica of the little sailing ship that brought the first Pilgrim settlers from England to America will be heading into the port of Plymouth, Mass., in late May after a two months' voyage from England.

Manned by a twentieth-century skipper and crew, the new *Mayflower* is following the same historic route traveled 337 years ago by the original *Mayflower*. In salute

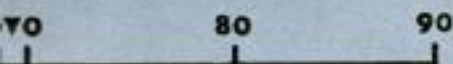
Built of English oak, this 90-foot hull of the *Mayflower* will weigh 180 tons when it sails the Atlantic "again"





The Mayflower

Text and drawings by George H. Davis,
noted English artist

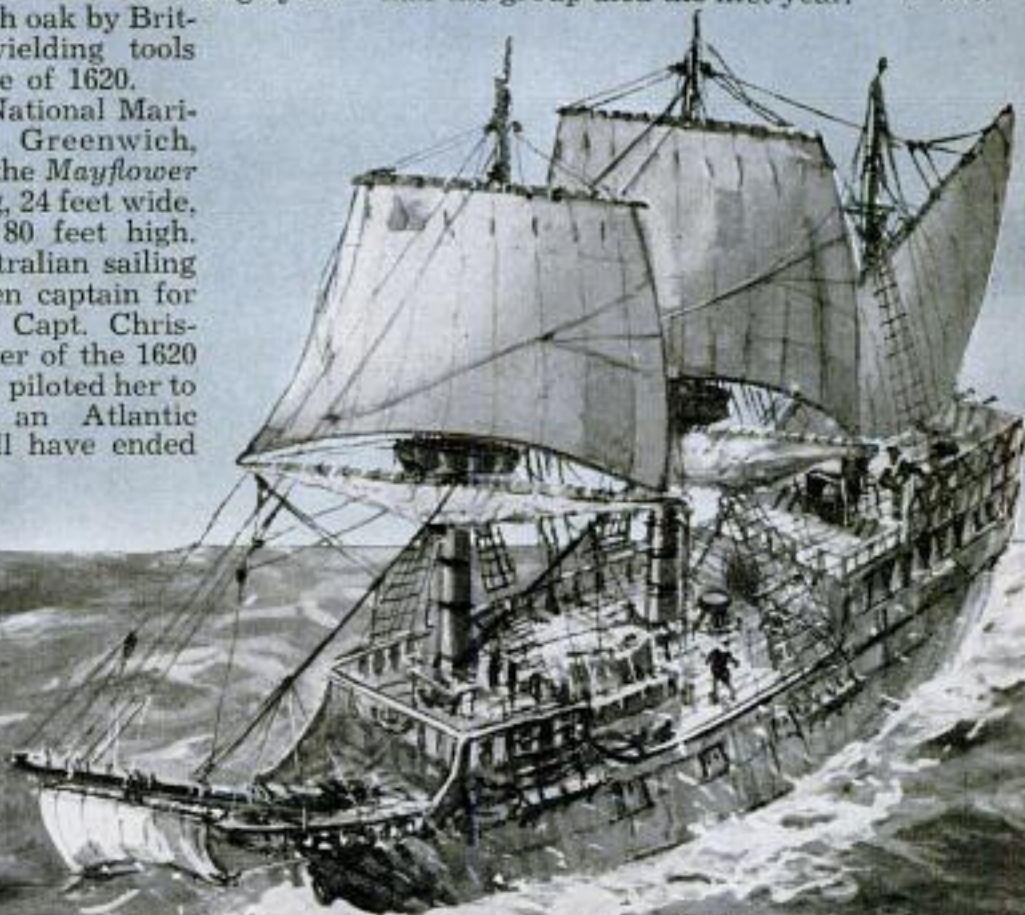


to the 70 men, 20 women and 33 children who made that historic voyage, the people of Britain are presenting the ship to the people of the United States as a goodwill gesture.

W. A. Baker, naval architect of Hingham, Mass., designed the replica from ancient records, and it was built largely of 250-year-old English oak by British shipwrights wielding tools identical with those of 1620.

Records at the National Maritime Museum in Greenwich, England, describe the *Mayflower* as 80 to 90 feet long, 24 feet wide, with a mainmast 80 feet high. Alan Villiers, Australian sailing skipper, was chosen captain for the 1957 voyage. Capt. Christopher Jones, master of the 1620 *Mayflower*, usually piloted her to European ports; an Atlantic crossing could well have ended in disaster.

Captain Jones occupied the "great cabin." There were four other private cabins, several canvas-walled cubicles, no privacy at all for most. Open gun ports, hatches and ladder passageways offered inadequate ventilation; "sealed" for storms, the ship was a hothouse. Tuberculosis spread, and half the group died the first year. ★ ★ ★





Elevator Carries Fireman up Ladder

If a fireman in Barcelona, Spain, wants to climb the department's giant extension ladder during a blaze, he waits for the elevator. Then, he stands on the platform and is taken to the desired height on the ladder.

"Growth" Spray Kills

Water lilies, strangling Florida's inland navigation and fishing waterways, are now made to "grow themselves to death" by a new spray. To supplement efforts of trucks, aircraft and airboat spraying in open lakes and streams, helicopters are laying the 2,4-D and diesel-fuel mixture in inaccessible swampy breeding pockets surrounded by high tree barriers. The new spray causes tremendous cellular growth in water lilies, ending in death and disintegration of the plants.

Fifty-Man GI Cooker Weighs Only 114 Pounds

Even the Army's field range, unchanged since the 1937 model, has been given a new design. It is a 114-pound unit that will cook a meal for 50 soldiers anywhere, anytime. Enough of the features of the old unit are retained to make it look familiar to nostalgic veterans of World War II.



Safety Valve for Gas Supply

Your home is protected from the hazard of gas explosions by an automatic safety valve. The device not only shuts off the gas in case of fire in the house, but also sets off an alarm. If pressure in the main drops dangerously low or if the basement becomes flooded enough to endanger furnace operation, the valve also shuts off the gas.

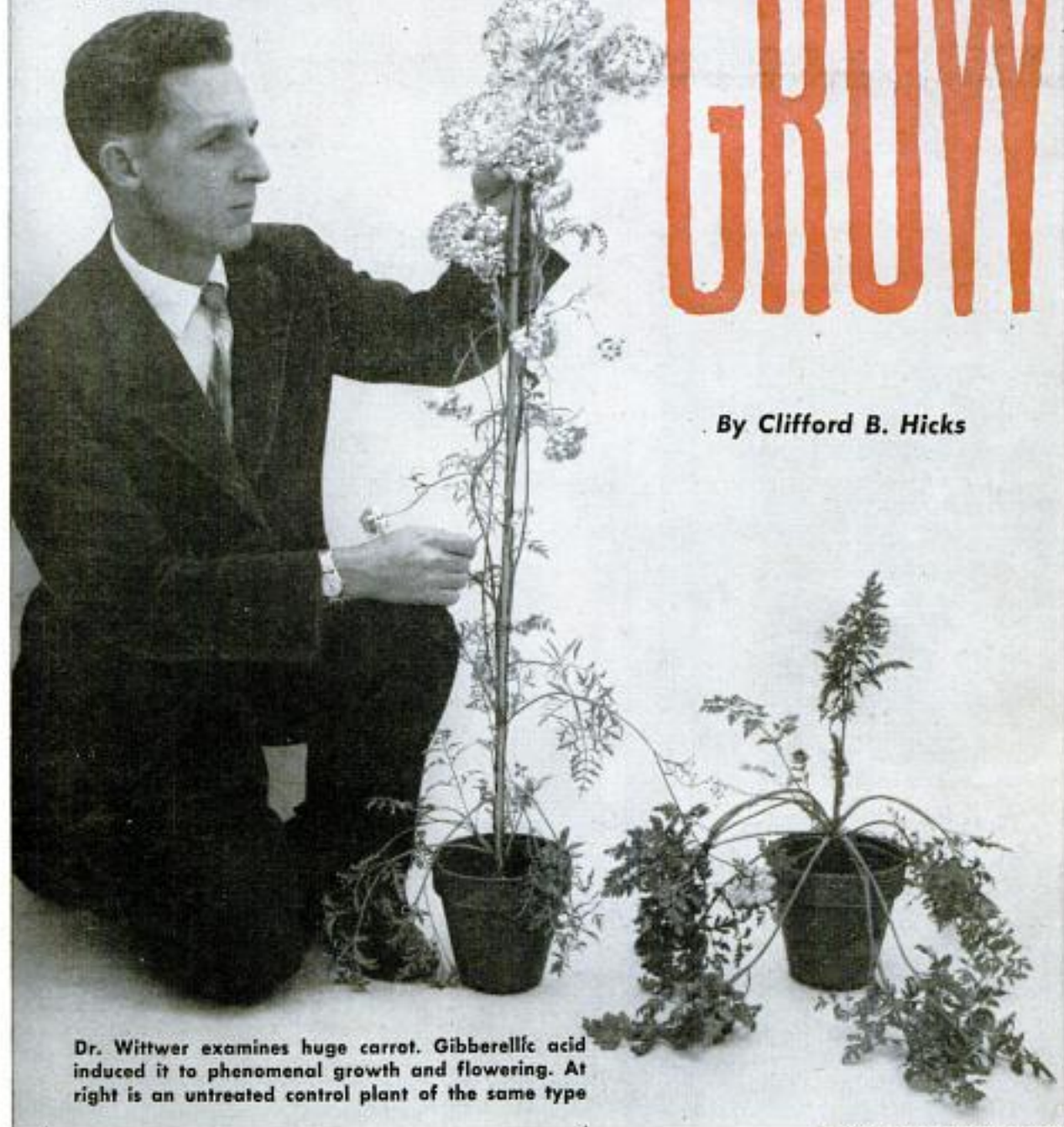


Jack's famous beanstalk must have had a shot of this fantastic chemical.

GIBBERELIC ACID MAKES PLANTS

GROW

By Clifford B. Hicks



Dr. Wittwer examines huge carrot. Gibberellic acid induced it to phenomenal growth and flowering. At right is an untreated control plant of the same type

Michigan State University photo

SURPRISED BOTANISTS suddenly find themselves spang in the middle of what may prove to be the tallest science tale of the decade—and the most significant. They have discovered the magic chemical that must have spurred on Jack's famous beanstalk. It makes plants grow, and how!

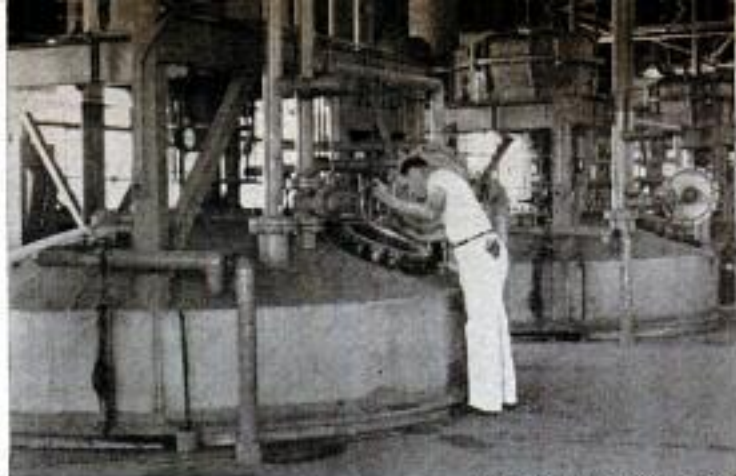
The weird stuff has stimulated growth beyond belief in virtually all the plants on which it has been tried. Here are just a few examples:

Low-growing bush beans shoot up as high as the tallest pole beans.

Rose bushes and sunflowers climb up to



Michigan State University photo
Head lettuce bypassed head, shot up and formed seed. Untreated lettuce at right



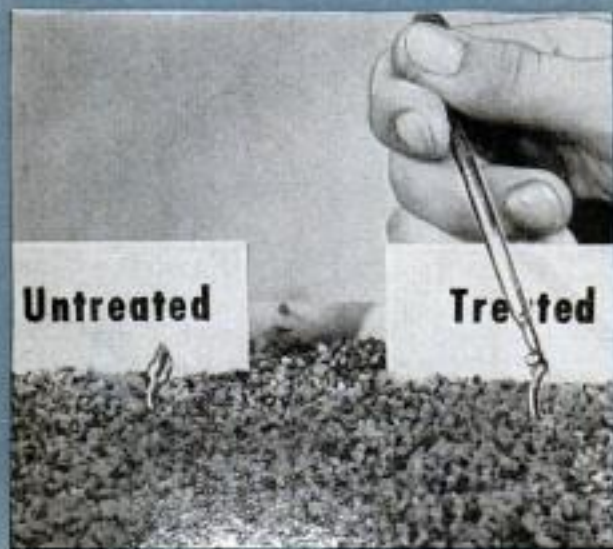
Eli Lilly & Company photo
"Ga" is produced in tanks similar to those used for penicillin



Paste containing Ga was smeared around stem of pepper plant at left four days before photo was taken
 U.S. Department of Agriculture photo

Pea seedling touched with gibberellic acid shoots up to twice the height of untreated seedling in four days

Eli Lilly & Company photos



more than three times their normal height.

Geraniums grow into giants.

Soybeans grow 100 percent in a single week.

Dwarf corn, which normally grows only a foot or two high, shoots up to eight or nine feet.

Celery doubles its stalk and leaf growth.

The growth of young trees may double or triple in three weeks.

An unbelievably small amount of the chemical—a dose as small as a *millionth* of a gram—can cause a plant to grow to four or five times its normal height. Less than an ounce of the stuff would treat an entire acre of vegetables. And it works fast. Within 10 hours treated plants may start shooting up above their untreated neighbors.

To the botanist, other effects of the chemical are still more amazing. It induces some plants to flower far out of season, slashes the time required for others to produce seed, and forces dormant seeds to germinate pronto. It can persuade a "long day" plant to bloom when the days are short and a "short day" plant to blossom when they are long.

Sound like gibberish? Well, gibberellic acid is such strange stuff it has even the cautious botanists excited. So excited, in fact, that they are having trouble making up their minds what experiments to tackle next.

The story of gibberellic acid—or "Ga" as it has been tagged—starts with a diseased rice plant. For many years, Japanese farmers have been plagued with a disease that attacks their rice. The disease is called "Bakanae," which means "foolish seedling." The name was given the disease because Japanese scientists observed that diseased plants far outgrew healthy ones, shooting up to unusual and spindly heights before they succumbed. Research over a period of years showed that the disease



Michigan State University photo

Dr. Wittwer checks growth of a bean plant two weeks after treatment with only 10 millionths gram of gibberellic acid. At lower left is untreated plant



Michigan State University photo

Gibberellic acid induced tomato plants to flower in this experiment. At left is an untreated plant. The center plant received 10 micrograms of Ga. Plant at right had a 20-microgram dose and began flowering

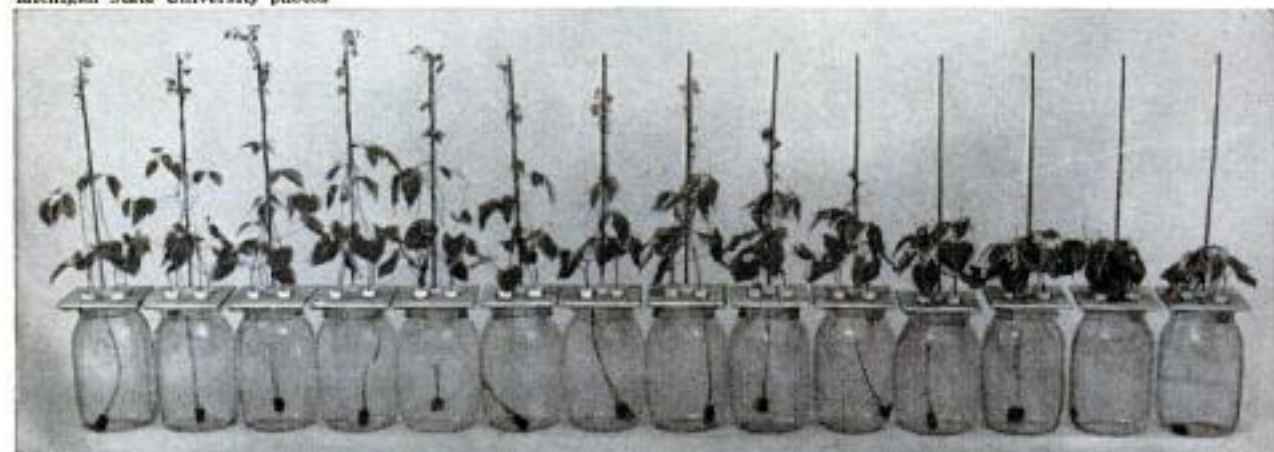




Growth is particularly great in dwarf varieties. Dwarf corn at left shot up above untreated corn



Alternate pea plants were treated with gibberellins, and this photo was taken three weeks later. Below, this was the response 120 hours after bean plants were given varying amounts of gibberellin solution
Michigan State University photos



occurred only in plants infected by a soil-borne fungus called *Gibberella fujikuroi*.

By 1926 the Japanese discovered they could induce rice to grow much taller—and without disease—by applying the liquid culture in which the fungus had grown. Finally in 1938 they isolated the particular growth-stimulating substance and found it to be a colorless crystalline acid. Potent? It was amazing. One part in a million would touch off towering growth in rice, wheat, barley, cucumbers, tobacco and other plants. They named the substance gibberellin A.

Despite the steady research of the Japanese, their scientific papers went relatively unobserved in this country. Then World War II cut off all reports of their progress. Shortly after the war, British scientists began experimenting with Ga, and not long ago a few botanists in this country took up the chase.

Ups-a-Daisy Chemical

What the botanists discovered may, as a spokesman has stated, "create a plant revolution." Today hundreds of researchers in this country are trying to run down the strange and spectacular properties of the ups-a-daisy chemical.

Actually scientists have been able to pin down several different growth-stimulating substances from cultures of the fungus. Among them are gibberellin A, gibberellin B and gibberellin X (gibberellic acid). Scientists are testing all three, but Ga is receiving the most attention.

Scientists of the U.S. Department of Agriculture—among the first in this country to experiment—found that Ga would spur the growth of virtually all the ornamental plants on which it was tried. These included many of the housewife's old friends: Asters, petunias, geraniums, poinsettias, roses, salvia, sunflowers and dwarf dahlias. More important, they also discovered that Ga would double or triple the height of snap beans, soybeans, peanut and

(Continued to page 266)

Jet Racer "Eats" Gas Like Glutton

Two gallons of fuel per minute are consumed by a new jet racing car. Owned by J. L. M. Meikle of Bangor, Ireland, the vehicle has only two operating controls, the brake and the accelerator. Jet power is said to provide smooth, instantaneous acceleration to maximum speed for racing cars, plus a minimum of control devices.



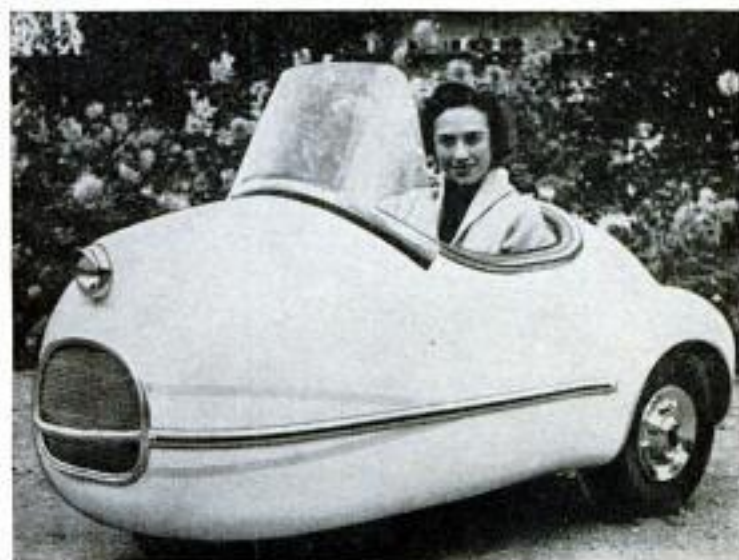
British "Fill 'Er Up" With Methane Gas

Methane "marsh gas," recovered from sludge by English workers at the Isleworth, Middlesex, sewage plant, furnishes fuel for company and private cars. The gas, obtained from sludge in huge tanks heated by hot-water pipes, is drawn off and stored under pressure. Cost of converting an auto to use methane gas is reported at about \$225. The gas also provides the sewage works with power, heat and light, saving the firm 85,000 gallons of fuel yearly.



Three-Wheeled Car Guided by Handle Bar

Bruetsch Mopetta, a three-wheeler, is now in the midget-car line-up. Made in Germany, it has a 2.5-horsepower, three-gear engine, plus front-wheel drive and spring suspension. The car is guided by a handle bar in the driver's cockpit. The gearshift, brake pedal (for rear wheels), and hand brake (for front wheel) are also in the cockpit. Weighing about 130 pounds, the tiny vehicle is five feet, eight inches long, three feet wide and three feet, four inches high. The auto's chassis is only seven inches off the ground.





Above left, highway official shows how links fit together. Above right, Jeep driver switches lane divider

Jeep Shifts Lane Divider to Meet Demands of Traffic

Like water flowing under a bridge, a flexible traffic divider flows from one lane to another under a Jeep as it moves slowly along the street. The divider is made up of separate links that fit together to form a long, easily seen marker. As the Jeep drives alongside the divider, a two-wheeled

dolly scoops up the links and feeds them under the vehicle and deposits them neatly on the other side. With the device, four-lane streets can be made to handle three lanes in one direction during rush-hour periods. It was developed in Chicago by a county highway official.

Kerosene Lamp Powers Batteryless Radio for Dutch Engineers

Dutch engineers have mounted thermocouples on top of a burning kerosene lamp to convert heat into electricity for a batteryless radio. These thermocouples form a stack of open-centered disks made of a series of wires of two electrical conductors with different resistances. Welded end-to-

end alternately, these conductors discharge a small electric current when one end of the joint is heated and the other end is cooled. With the 2.2 volts created, seven transistors and a loudspeaker enable the radio to produce adequate room volume. The lamp burns $\frac{1}{8}$ pint of fuel hourly.



King-Size Paper Bags Contain Earthmovers

Nine paper bags concealed huge earthmoving units from curious eyes and the weather while the machinery was being shipped to a display area in Chicago. Largest of the bags was 15 by 15 by 43 feet and weighed 113 pounds; the smallest bag was 8 by 8 by 14 feet. The nine bags contained nearly a mile of 10-foot-wide glass-fiber-reinforced laminated paper. An overhead crane placed the bags on the earthmovers, which had been put on railroad flatcars. Bemis Brothers Bag Co. made the bags.

THE HEATS ON, but the corn's not popping—at least it's not popping the way it was expected it would.

Already industry leaders are revising their predictions downward as sales drag. It had been hoped that 1957 styling would hop up the market sharply. It had some effect, but not a great one.

Instead of a 6,800,000-car year, it is now expected to be a 6,250,000-car year. Some say as low as 6,000,000.

What's the reason? It is possible that dealers are finding it more to their liking to sell 10 cars at a decent profit than 15 cars by cutthroat discounts. Last year's circus may have taught them something.

Maybe warm weather will stimulate sales. That's the industry's hope.

Biggest drop seems to be in the middle-price models although Dodge and De Soto are doing well, they say. Imperial is in good demand as are big Chryslers. Cadillac and Chevrolet are doing best at GM, then Pontiac, followed by Olds and Buick. Mercury is not setting records as of this writing.

One explanation of the drop-off is that low-price cars are so lush, marginal buyers are moving down from middle-price lines.

If there is a big drop in this field, it will bring furrows to foreheads at Edsel Division, out to sell over 200,000 cars in that price class next year.

More Air Springs?

Don't expect the Edsel to look like a Ford or a Mercury, although it will have interchangeability of some under-the-skin parts. Richard E. Krafve, Edsel's top man and a former Mercury executive, remembers well when Mercury was just a "big" Ford and he's supersensitive to look-alikes.

Edsel may have air suspension in limited models, but it is not expected to be ready across-the-board by announcement time. Edsel needs a bombshell to start off its sales campaign and air suspension may be it. Look for spectacular styling of such parts as bumpers and grille.

L. H. Middleton, top engineer for Auto-Lite, states there will be no radical electrical changes in 1958. But, he says, by 1960 all accessories may be electrically operated. This would require a generator output several times greater than today's. Perhaps the automatic transmission (which, after all, rotates like a big generator) may supply alternating current of high voltage. Or an auxiliary electrical supply like those used on buses might be the answer.

A central hydraulic system, he predicts, will be introduced by some American maker in 1958 (is this Edsel's bombshell?).

Somebody's thinking fast at American Motors. After gloomy speculation about

Detroit Listening Post



By Art Railton

Hudson and Nash at the stockholders' meeting it is reassuring to learn that the big cars will have station wagons in 1958.

Hudson-Nash volume is not enough to pay for the all-new tooling this would require. It could be that the Rambler shell will be adapted to the longer cars. Doing this would solve a big AM problem: Its parts inventory for three cars would be reduced sharply, bringing promised economies in production costs.

If this is true (and it's only a guess), it means that Hudson-Nash will be all-new for 1958 at a bargain price to the company. Look for tailfins (sedate not spectacular) and four headlights on all AM cars—the in-a-grille-headlight idea seems dead.

More Small-Car Talk

A financial paper said Studebaker-Packard may make a small car retailing for under \$1800. Don't expect anything like that out of South Bend for years. At this time there are no prototypes of such a car and from prototype to production is a long way in fact if not in the dictionary.

Another rumor is that Volkswagen is going to restyle for 1958. It can be said with certainty that this is not true. With buyers standing in line for the little car in 114 countries, VW feels it would be foolish to step onto an expensive restyling treadmill. It will not restyle for 1960 either. ★ ★ ★

DAYTONA NASCAR SPEED RUNS

You've heard many claims about Daytona. Here, for the record, are the fastest two-way averages (miles per hour) by each make:

Chrysler 300C...134.108	Oldsmobile127.074
Pontiac131.747	Plymouth126.205
Chevrolet131.076	Mercury125.567
Buick130.766	Ford
Ford (super-charged)130.058	(not blown)...125.239
Cadillac113.780	
Dodge D500129.753	Lincoln110.565

Many, if not all, of the above cars had special high-speed equipment. Here are top speeds of three sedans without modifications. They had automatic transmissions, single carburetors, standard cams and suspensions:

Chevrolet118.460
Ford111.836
Plymouth110.328

A Round Table Conference Looks at THE ATOMIC AIRPLANE

Taking part on this panel are three of our country's leading experts in the fields of nuclear physics and aircraft design:

Dr. Lyle B. Borst, chairman of the physics department, New York University; Mr. Frederick K. Teichmann, assistant dean of NYU's College of Engineering; and Mr. Lee A. Ohlinger, radiation expert and head of the computer center, Northrop Aircraft, Inc.

QUESTION: Recently we've been hearing about nuclear-powered planes that will fly 80 times around the world without refueling, carry hordes of passengers to remote places at supersonic speeds, pull trains of gliders all over the skies. In your opinion, will the atom plane be capable of these things?

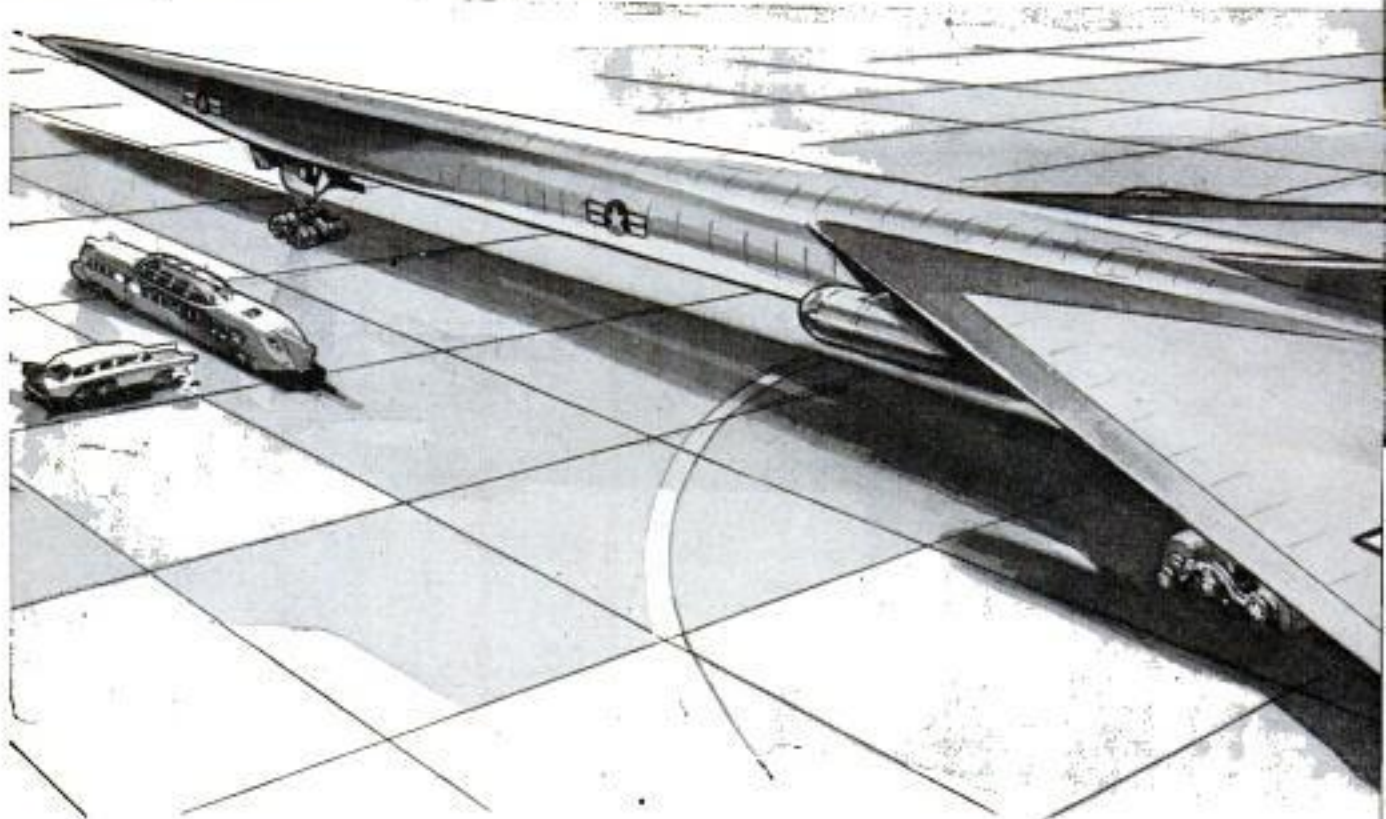
Dr. Borst: Some recent guesses are plausible, but they'll hardly be combined in one package. Certainly not in the first nuclear aircraft. The first problem will be to get one off the ground.

Question: What is your best estimate of when we'll see A-planes flying?

Dr. Borst: Ten years is a realistic estimate of the time it might take to put the first atom-powered plane in the air. That plane probably will be a long-range bomber. At best, it may be the prototype for a cargo ship that could ferry supplies to some far-off, roomy place, like Antarctica. But it will be a long time—maybe 20 years after that, as a grab-bag guess—before any kind of commercial nuclear aircraft will be economical and safe enough to fly passengers.

Mr. Ohlinger: I would estimate from 3 to 10 years for the first atomic plane. Technically, it should be possible to build a

Artist's conception of a delta-wing atomic plane places two reactors near center and crew atop tailfin



safe nuclear-powered commercial plane in 10 years, if the economics were favorable.

Question: Can you give us a general description of what the first nuclear-powered plane might look like?

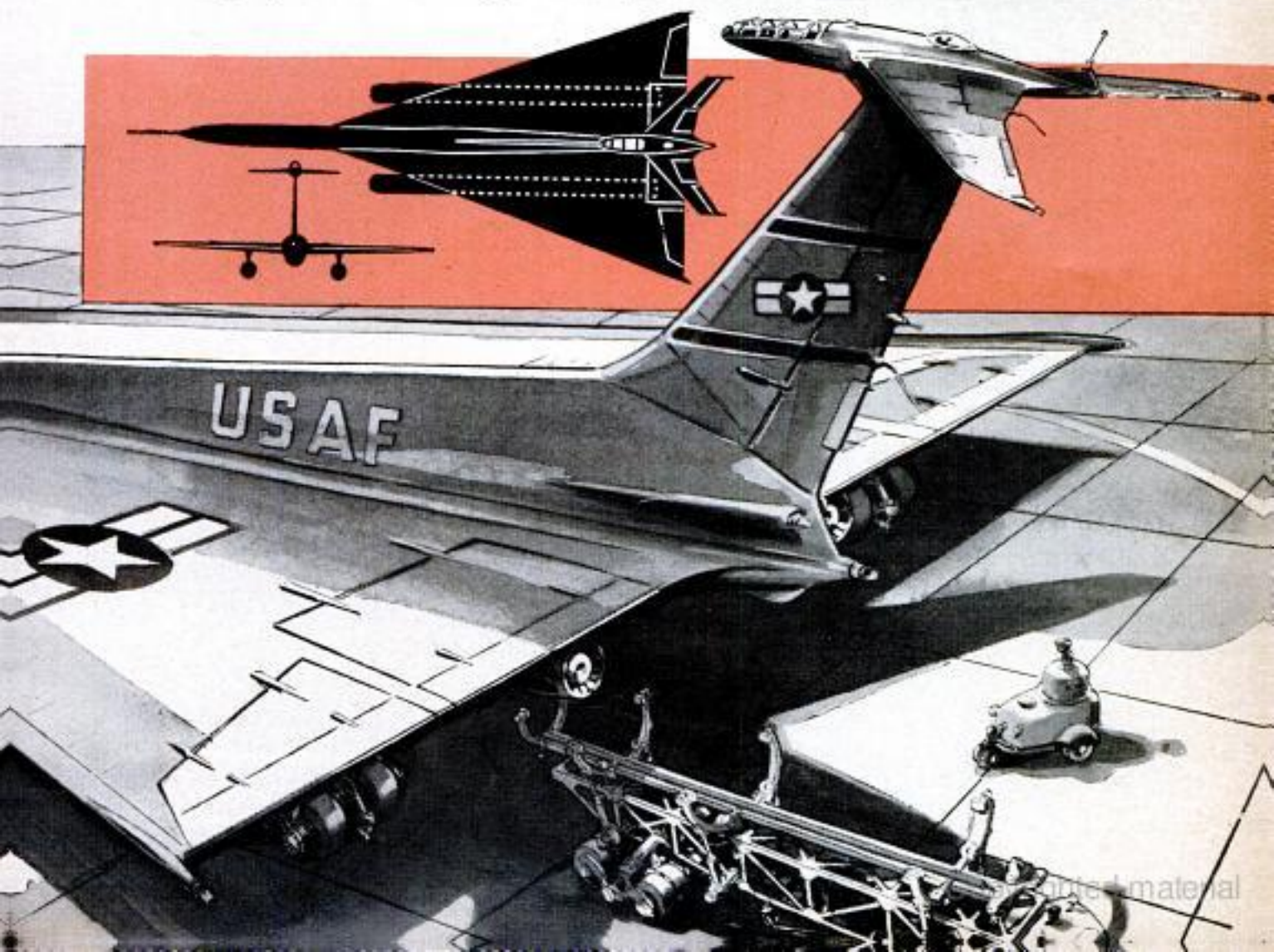
Mr. Ohlinger: From outside, it probably will not look vastly different from a conventional plane. The most desirable place for the crew is in the nose and, since the crew should be as far away from the reactor as possible, the nose may be exceptionally long. It can be offset by "heavying up" the shielding. The reactor and shielding will be heavy enough to bring the plane into the 250,000 to 500,000-pound gross-weight class. So, the size of a normal fuselage (such as in the XB36H, where the fuselage is around 13 feet in diameter) will be plenty large enough to hide the reactor and shielding without special bulges.

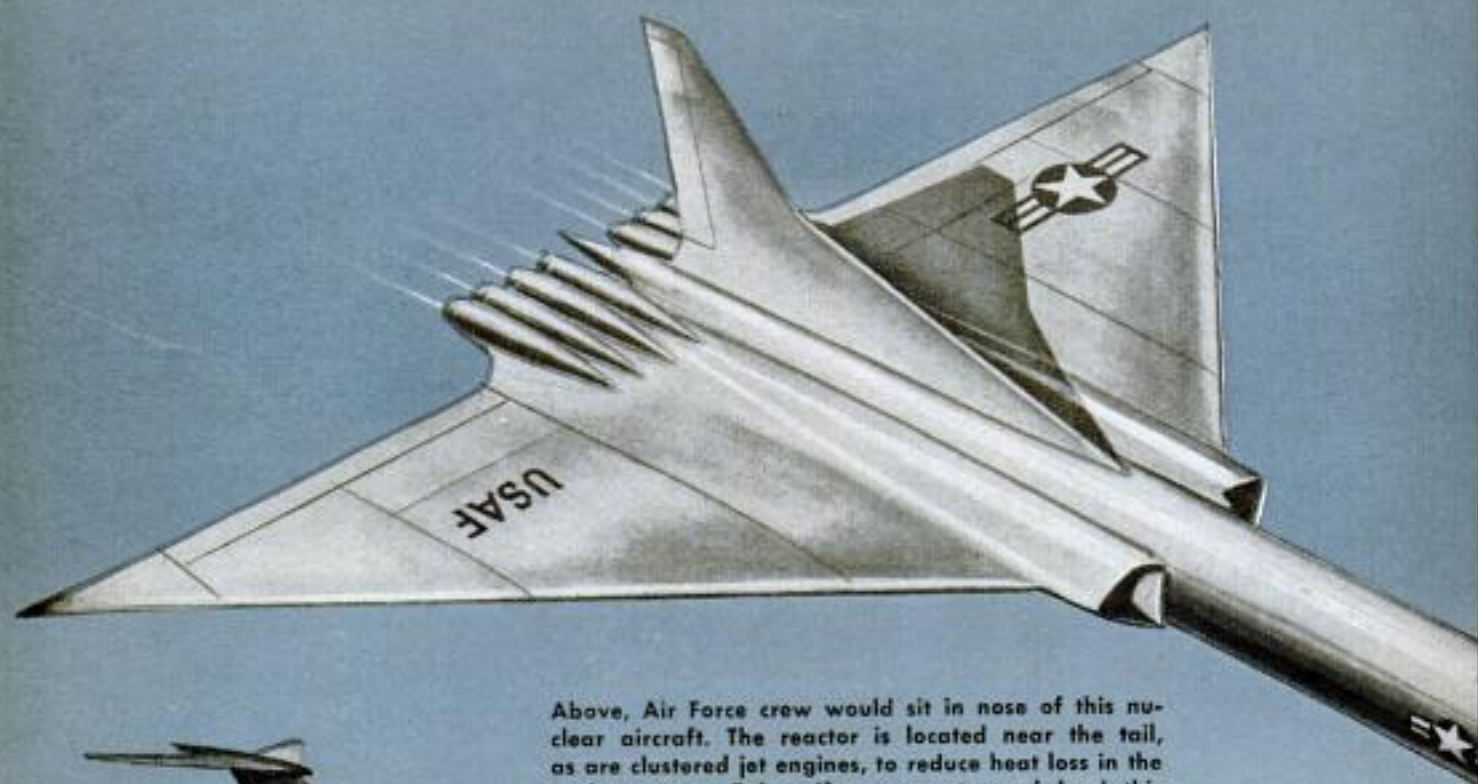
Hot gases from the reactor to the jet engines must pass through ducts where heat loss can occur, so it will be desirable to keep the power plants close to the reactor. Therefore, all of the power plants will be clustered close to the fuselage and not out on wing pods.

Finally, if we are to take advantage of the unusual "endurance" and high-speed characteristics of the nuclear-powered plane, we can expect the same problems we face in high-speed combustion-powered



Above, F. K. Teichmann's work includes research on landing gear, high-lift devices and hulls. Below, Dr. Lyle B. Borst adjusts his "pickle-barrel reactor"





Above, Air Force crew would sit in nose of this nuclear aircraft. The reactor is located near the tail, as are clustered jet engines, to reduce heat loss in the nuclear system. Below, if necessary to crash land, this flying boat could "bury" radiation hazard in water



planes—aerodynamic heating and protection of such vulnerable parts as, for example, the windshield.

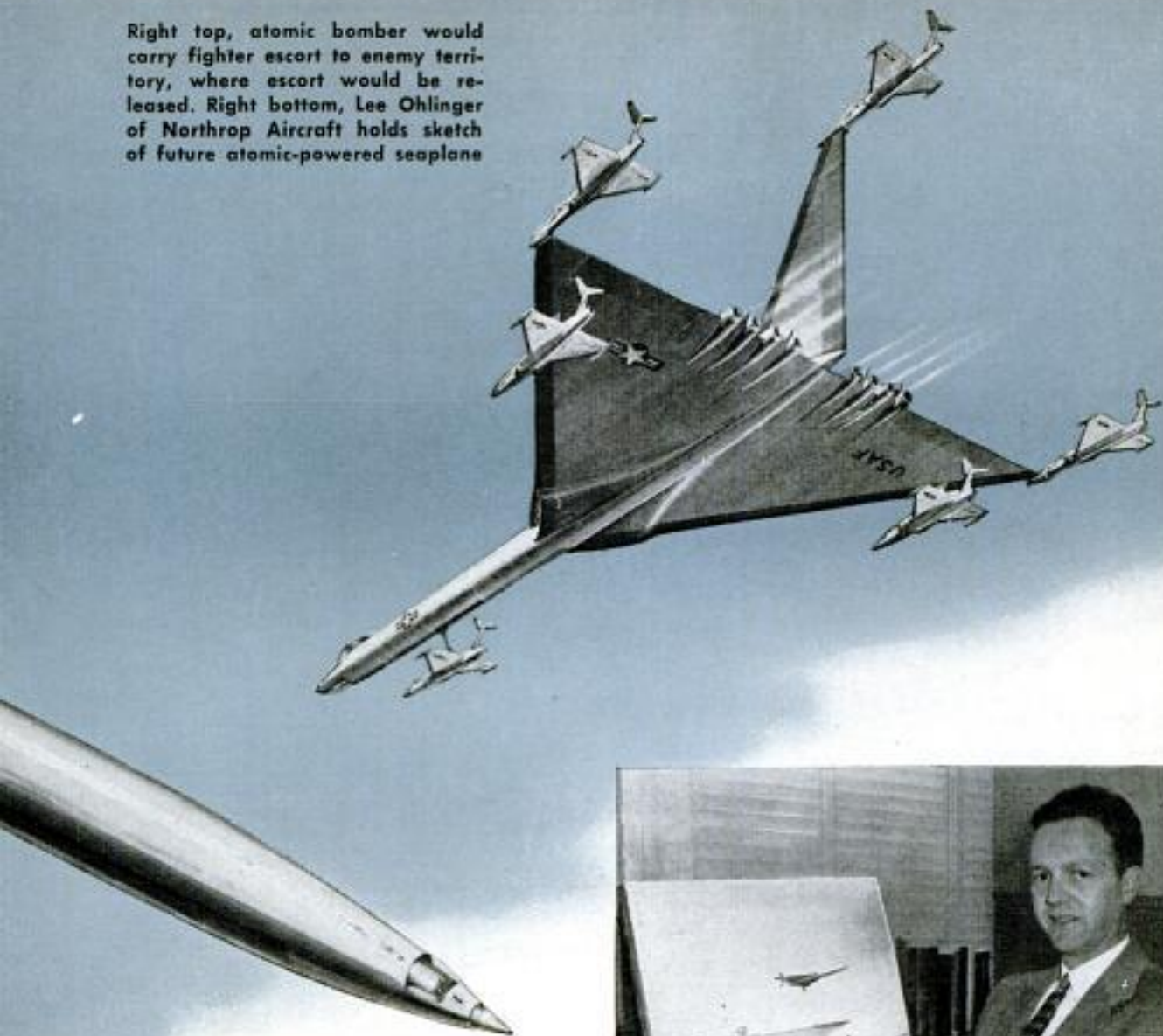
Question: What is the biggest problem in the development of the plane?

Dr. Borst: Shielding is the paramount problem. One can build jet planes that will work; one can build a reactor that will provide the heat and the power. But whether one can put a suitable shield around the reactor is the big question. Research reactors generally have shields between 5 and 10 feet thick. They are all made of concrete with special ingredients, which makes the concrete both very strong and very heavy. But these massive shields run up to 200 tons, which is much too heavy for an aircraft. So newer and more dense materials will be used.

Question: Can you give estimates on the size and weight of an airborne reactor?

Dr. Borst: The reactor could be a three or four-foot sphere. It would contain uranium, probably a moderator to slow down the neutrons, and would require a cooling system which would have to be large and elaborate. Taking that much heat out of a three-foot sphere is a difficult job. That combination would perhaps weigh a few tons. Then we would need pumps to circulate the cooling material between the reactor and the jet engines. That would take a few tons. Then, if you put a shield around the reactor, the total power package runs close to 50 tons, and would probably have a diameter of something between 10 and 15 feet. There might be a little more shielding in the direction of the crew.

Right top, atomic bomber would carry fighter escort to enemy territory, where escort would be released. Right bottom, Lee Ohlinger of Northrop Aircraft holds sketch of future atomic-powered seaplane



Mr. Ohlinger: I would bet it's more likely to be cylindrical, to facilitate getting out the heat.

Question: Will the shielding problem dictate any unusual features in the crew's quarters of a nuclear airplane?

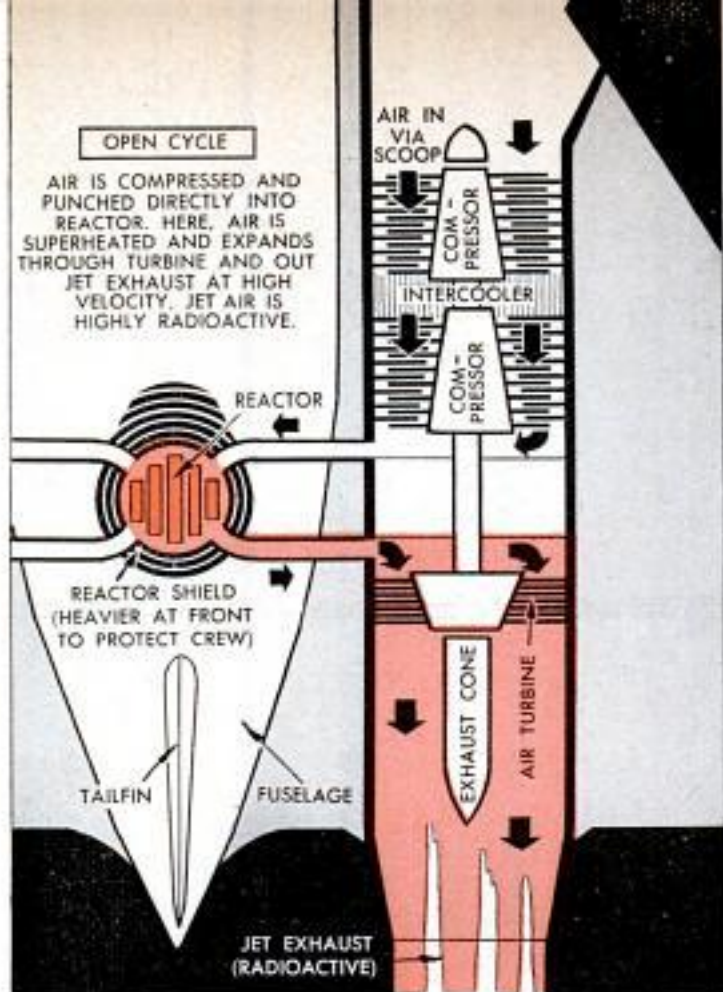
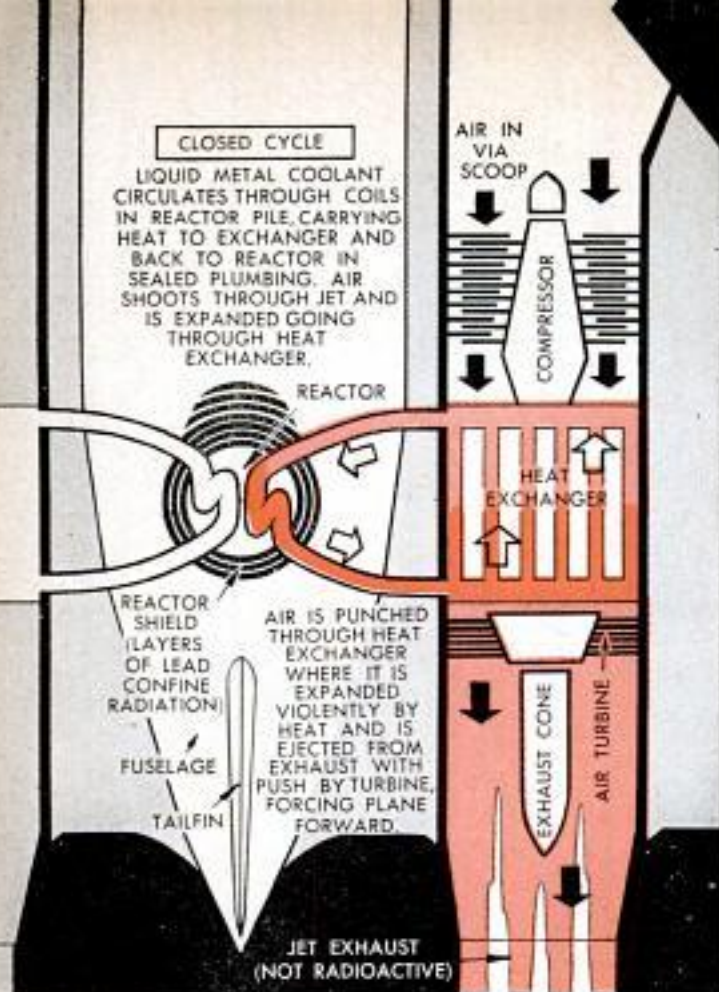
Dr. Borst: To minimize shield weight, there would probably be an advantage to putting part of the shielding at the reactor, and part around the crew. Since the crew wants to be as far from the reactor as they can get, the plane would be built to get them far away. And crew quarters would have to be as small as possible to minimize the weight of the crew shield. So, one thinks sometimes about what is practically a flying arrow, with the reactor near the tail feathers and the crew near the arrow head. One would probably not want to use a crew of more than three and they would be very confined; they would not have walkways, galleys, bunks or anything like that. We may be going back to the very

old planes, where you had tandem cockpits.

Question: How far from the reactor will the crew have to be?

Mr. Ohlinger: This is related to the amount of shielding around crew and reactor. The farther away we put the crew, the more fuselage is required. Therefore, we must balance the additional weight of fuselage against the weight of shielding required if the fuselage were shortened, and make some compromise. Reaching out into the blue, one might guess the separation distance at not less than 20 feet nor more than 100 feet.

Question: Is there any advantage in having the crew's cabin in a wing tip, or the tail fin as you have proposed, Mr. Ohlinger?



Diagrams compare the closed-cycle and open-cycle reactor systems. Open-cycle system has radioactive exhaust

Mr. Ohlinger: Wing-tip pod locations for crews are not practical except in straight, level flight. The only practical locations are in the extended nose of the fuselage or in an elevated, extended position in the tail.

Question: How long would crewmen be in their compartment on a 14,000-mile round trip?

Dr. Borst: At the speed of sound, that works out about 18 hours.

Question: What will it be like for a crew flying the first atomic plane?

Mr. Ohlinger: Flying the A-plane should be simpler because we have power to spare and can operate our plant more leisurely.

Question: Will the crew be completely shielded from all radiation, or will they take doses of radiation within allowable tolerances?

Dr. Borst: They can't possibly be shielded from all radiation. The next part to the question involves a military judgment as to how much radiation you permit the crew to take in order to improve the performance of the plane. If you want to improve crew protection, then the weight of the plane rises, maneuverability diminishes and it is a less-good fighting weapon. So military engineers must define their objectives and their permissible radiation levels. The radiation that a crew can take is a design factor, like range, speed and bomb load.

Question: How much radiation can a man take safely?

Dr. Borst: The National Academy of Sciences has determined that the average person reaching maturity has taken between 5 and 10 roentgens of radiation. Ten roentgens per trip by A-plane would seem to be acceptable. Generally speaking, 400-R is considered deadly. Half of those who receive 400-R will die, half will live.

Question: Will radiation impose any problems on the mechanical structure of the airplane?

Dr. Borst: It is true that lubricating oils turn to tar under reactor radiation, and in some cases metals deform and lose their original strength. You keep the materials which deteriorate in a place where the radiation level is low. This means that no lubricant can be used inside the reactor itself. All bearings must be outside, unless a solid lubricant, such as a graphite slideway, were used. Glass and ceramics cannot be used. Plastics are not a possibility for permanent parts. So one has to build the structure primarily out of good metals. But the technology that is being developed for the power industry is directly convertible, and the information serves just as well for this plant.

Question: Will any unusual configurations be imposed by the power source on things such as shape of airfoils, landing gear and the fact that there is no weight loss in flight due to fuel consumption?

Mr. Ohlinger: The power source will have

little or no effect upon airfoil shape, which is dictated by the performance of the overall airplane. There is no reason to believe that the first nuclear-powered plane will be exclusively powered by atomic energy. It is possible that take-off and landing would be by conventional combustion power to reduce the nuclear-power-plant size and the danger of ground contamination or ground-crew irradiation. Since the landing weight is as great as the take-off weight, the landing field probably will be large—as indicated by the special strip for nuclear-powered planes in Idaho.

Mr. Teichmann: If you are going into high speed, you need an airfoil designed for high-speed considerations. You would have a sharper leading edge than the normal. The wing would probably incorporate devices to reduce speed for landing purposes, such as boundary-layer control, or flaps or other high-lift-increase devices. This airplane has to land at a speed the pilot can handle, so the wing must be large, or have unusually high lift capacity. And since there is no loss of fuel weight in flight, we will need a more rugged landing gear, with perhaps many additional wheels to distribute the load on runways.

Question: Might this be so difficult that this would become a seaplane?

Mr. Teichmann: Yes. In a seaplane we would distribute the load over a larger area, which would permit a slightly lighter structural weight for the aircraft itself. And we wouldn't have to worry about

Artist's sketch of an A-plane conceived by Ohlinger of Northrop Aircraft (also on cover in full color) shows one solution for replacing the atomic reactor

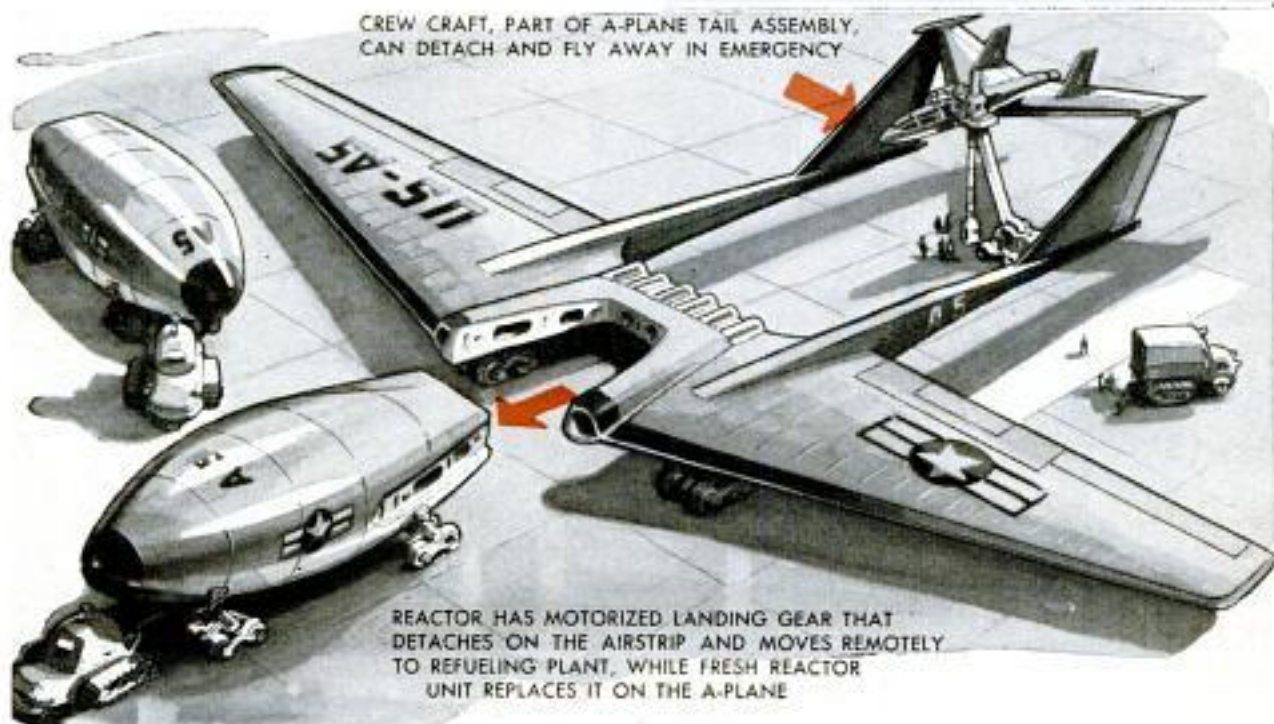
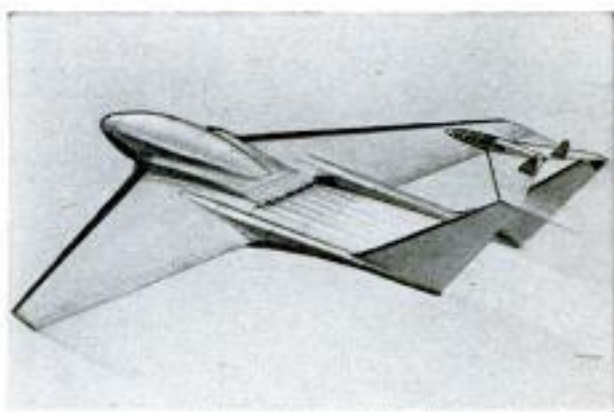
the thickness or the length of the runway.

Question: What do some proposed A-plane designs look like, and how do they work?

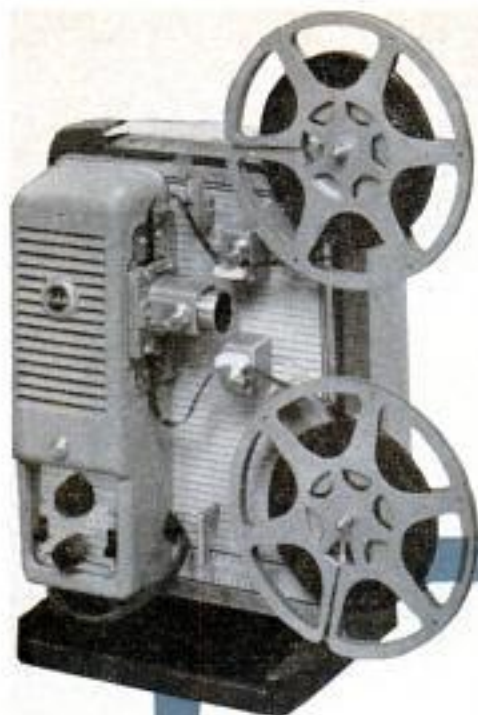
Mr. Teichmann: Grover Loening has suggested a huge seaplane. It might be compared to a flying aircraft carrier with a flat deck for the smaller airplanes to land. It has disappearing elevators, to carry planes up from and down to the storage hold.

Mr. Ohlinger: A nuclear-powered towing plane could perform the function of a sky locomotive circling the globe. It would ferry freight, with parachute-drop unloading. It could tow passenger planes with large pay loads and only enough fuel to take off and cruise, until they hooked on to the big atomic plane for a ride. At destination the small planes would cut loose and land. You might even transfer crews, using shuttle planes and retractable locks. This same concept can be extended to an aerial tanker that carries a group of jet fighters to a combat theater and then stays aloft to refuel the fighters.

(Continued to page 258)



For the Photo Fan—



Showtime eight-millimeter projector can be reversed or stopped for showing a single frame. Permitting fast or slow-motion presentation of home movies, this projector has a shutter that transmits up to 60 percent more light than do current models

Magazine-loading rotary flash holder lets photographer shoot six pictures in rapid succession without reloading bulbs. With extra disk and one change of magazine, the holder permits taking of 12 shots quickly. Carrier disk holds six midget bulbs



Kodak 300 projector has on-the-top controls. Projector has two slide-changer systems: One rotating each slide to projection position; the other using an automatic magazine-changer for storage

Medallion eight-millimeter movie camera has a three-lens turret, giving telephoto, wide-angle and standard lens coverage. Camera has a prefocused f:1.9 lens and takes a 25-foot film magazine



Florida Scrub Palmetto Yields Tannin, Gum

Fifteen million acres of worthless scrub palmetto in Florida may prove to be a new domestic source of tannin and gum, now imported at great expense into the United States. Tannin is used primarily for tanning leather. Gum serves as an emulsifying agent in cosmetics, paints and inks; in processing silks, textiles and latex, and in treatment of paper products. Parts of the palmetto trunk are put in boiling water. The resulting liquor is drawn off and filtered. The water is evaporated or spray dried, leaving gum and tannin.

Measure Nerve-Cell Voltage

Manipulating a probe $\frac{1}{25,000}$ inch in diameter, a modern scientist can measure the voltage generated by an individual nerve cell. Detailed observation of nerve-cell behavior in normal and diseased situations may result in the solution of neurological and mental disorders. Dr. Ernest B. Wright, associate research professor at the University of Florida, is conducting these nerve-cell investigations.

☞ Scientists have found that pencillin destroys bacteria by stopping the formation of the hard wall around bacterial cells.

Willys Truck Has Cab Forward

"Jeep FC-150" is the designation of a four-wheel-drive utility truck that has an 81-inch wheel-base and a cab forward of the engine. Powered by a Willys F-head Hurricane engine, this truck is 147½ inches long and 58¾ inches wide. The FC-150 can turn in a radius of 18 feet and nets about 19 miles per gallon for highway travel. Spare tire and fuel tank are mounted on the cargo box, which has a six-foot payload bed 24 inches from the ground. Up-front visibility is said to be 200 percent greater than in other vehicles. The brake-fluid



tank access cover is on the instrument panel for checking and filling. Power-take-off points can be installed at front, center and rear locations on the truck.



Portable Hoist For Hunters

Made to solve the hunter's problem of dressing out deer and elk, a portable hoist no longer than a pistol has a capacity of 750 pounds. The hoist can be used also for pitching a tent, as a bumper "jack," lifting a boat or doing other heavy lifting chores around camp. It features a rotproof nylon rope and a lock which enables a load to be lowered or lifted a few inches at a time and which can be locked at any height to hold the load without tying the rope. The hoist weighs 12 ounces and has brass bearings, sturdy pulleys, aluminum plates, steel hooks and folds into a pocket-sized unit.

Pusher Propeller Fits in Plane's Tail

Powered by a 65 or 100-horsepower engine with a pusher-type propeller connected to the plane's vertical tailfin is a new German-made aircraft, the Fischer RW-3. This model can be fitted with long-span wings as a powered glider or with short-span wings as a conventional light aircraft. The RW-3 cruises at 124 miles per hour, has a ceiling of 13,000 feet and a range of 1180 miles. It seats two persons. Landing gear is retractable tricycle. A 55-horsepower modified Porsche automobile engine powered the prototype.



OWNERS REPORT:



We sent questionnaires to '57 Chevrolet owners in these 31 states from coast to coast. Here's what they told us about their cars:

39.7% DON'T KNOW HORSEPOWER OF THEIR CARS

POPULAR MECHANICS OWNERS REPORT (8-1183)

Mark an in the square after the most accurate answer. Write as many comments as you wish.

1. I own a 1957 Chevrolet V8 Six . Its horsepower is 270. I don't know .

2. It has been driven 3284 miles to date. It has handshift overdrive Powerglide Turboglide .

3. It averages 15 miles per gallon in city driving 17 1/2 miles per gallon on long trips. How much?

4. It uses no oil one quart or less per 1000 miles more than that .

5. Here's what I like most about the car: Has the most terrific kick-up standing start. It is longer ahead of any other from a motor cut back. Has too much gas. Had the best it still.

6. Here are my specific complaints: Has too much gas. Had the best it still.

7. The pop... convince me to buy a Chevrolet California actress

BEST-LIKED FEATURE: PERFORMANCE, POWER SAY 44.4%

MOST-FREQUENT COMPLAINT: POOR GAS MILEAGE SAY 15.9%

SHOULD IT BE LOWER? LONGER? 63.6% SAY NO LOWER 76.2% SAY NO LONGER

15. Here YOU HAVE TO LEAN OVER TO SEE PAST IT

16. My dealer service is Excellent Average Poor . I would would not buy from him again W MIRROR

17. I traded a 1954 CHEV (year and make) to buy this car. The trade-in allowance was Above average Average Below average .

18. Right now, I think my next car will be a CHEV.

19. Overall, I rate this Chevrolet as Excellent Average Poor . Why? I'VE NEVER HAD A BAD ONE

20. The 1957 Chevrolet is not as low as its competitors. I object to this Do not object . Why? Garage will be too small and it's harder to park.

Write additional comments on reverse side. Your name will be held in confidence.

MAIL PROMPTLY IN ENCLOSED POSTPAID ENVELOPE TO:
 Popular Mechanics Owners Poll, 200 East Ontario St., Chicago 11, Illinois

Name [REDACTED] City [REDACTED] State ILLINOIS
 Street [REDACTED] Occupation PAINTER

CHEVROLET OWNERS PRAISE ITS POWER AND SAY IT IS STILL THE "HOT" ONE

By Chevrolet Owners

DOES A CAR have to be the longest, lowest and widest in its field to sell?

Chevrolet is out to prove it does not. And owners seem to agree, although there are some dissenters.

We asked owners if they object to the fact that the 1957 Chevrolet is not as low as competitive makes. A big majority (63.6 percent) say they do not; another 13.9 percent have no opinion; 22.5 percent do object to this fact.

We asked if they would like their Chevrolets longer (competitive makes are longer by as much as eight inches). Here the opinion is even more definite: 76.2 percent say they do not want the car any longer; 9.9 percent have no opinion; 13.9 percent would prefer it longer.

Among the reasons given are that if longer it would be harder to park, too long for their garage, more awkward to handle in traffic. Those who want it longer say it would therefore ride better, look better and have more road stability.

"Nothing to be gained by adding length. Hard enough to park now."—Tennessee traveling salesman.

"Parking spaces have not grown."—Illinois printing estimator.

"Would have to add on to garage."—North Carolina textile worker.

"Would be too awkward to park. I am emphatic about this!"—Florida housewife.

"If longer it would ride better."—North Carolina farmer.

"It should be longer—that's the style of tomorrow."—Colorado truck driver.

"Being longer it would have more inside room."—Louisiana sales engineer.

Best-Liked Features

It looks as though Chevrolet is still a "hot one," at least in the judgment of the folks who should know—the owners.

Chevrolet owners from coast to coast give top billing to the car's performance and acceleration:

"Has the most terrific pickup I've ever seen on a car. It's lengths ahead of any other from a standing start. Goes up hills like a mountain goat."—California actress.

"I like its smooth effortless performance and terrific getaway. If it had wings, it would take off."—New York farmer.

(For road-test data on the 1957 Chevrolet V8 see page 106 of the January 1957 issue of *Popular Mechanics*.)

Second on the best-liked list is Chevy's ease of handling:

"It does not have power steering but handles like it does."—New Jersey machine operator.

"Handles nice in traffic. Also on any type of road."—Tennessee mechanic.

Third of the best-liked features is exterior styling:

"I think the best feature is the exterior lines. It is the best-looking car in the low-price field."—New York electrician.

"Has low appearance yet it has good

Chevrolet is still "hot," say the owners, who rate performance and acceleration as the best-liked feature



The OWNERS' OPINION of the CHEVROLET

Had trouble with engine?

No trouble.....79.2%
Some trouble.....20.1%
Considerable trouble... 0.7%

What was engine trouble?

Valves, valve system... 9.4%
Carburetor, choke..... 8.1%
All others.....4.7%

Performance

Would like faster acceleration?

Yes, would.....15.9%
No, would not.....73.5%
Undecided, no answer...10.6%

Would like more top speed?

Yes, would..... 6.6%
No, would not.....70.9%
Undecided, no answer...22.5%

What is car's horsepower?

Knew correct horse-
power.....60.3%
Did not know.....39.7%

Styling

Best-liked exterior feature?

Grille.....22.5%
Tailfins.....11.9%
Hood.....9.9%
Conservative style..... 9.3%

Least-liked exterior feature?

Dual hood ornaments...11.9%
Tailfins.....11.3%
Rear bumper..... 6.0%
Taillights..... 4.0%

Best-liked interior feature?

Dashboard design.....24.5%
Upholstery.....18.5%
Colors..... 9.9%
Roominess..... 5.3%

Least-liked interior feature?

Floor mats..... 6.6%
Ash tray..... 6.6%

OVER-ALL RATING

Excellent Average Poor
72.4% 24.8% 2.8%

Dashboard design..... 5.3%
Headlining quality..... 3.3%

Fuel Injection

Would like fuel injection?

Yes, would.....34.4%
No, would not.....43.0%
Don't know, no answer...22.6%

Did dealer have demonstrator equipped with fuel injection?

Yes, did..... 6.0%
No, did not.....80.1%
Don't know, no answer...13.9%

Miscellaneous

Will buy a Chevy next time?

Yes, will.....71.5%
No, will not.....13.9%
Undecided, no answer...14.6%

How is dealer service

Excellent.....61.1%
Average.....29.5%
Poor..... 9.4%

Would buy from him again?

Yes, would.....51.7%
No, would not..... 8.6%
Undecided, no answer...39.7%

What make of car was traded?

Chevrolet.....74.2%
Other GM makes..... 6.0%
Ford Motor product.... 6.0%
Chrysler Corp. product.. 2.6%
All others..... 2.0%
No trade, no answer.... 9.2%

Why did they pick Chevrolet?

Previous ownership....24.5%
Exterior styling.....16.6%
Workmanship..... 6.0%
Economy, price..... 6.0%

What should be changed?

Nothing at all.....35.8%
More room inside..... 6.6%
More economy..... 6.0%
Lower body..... 4.6%
Improve seats..... 3.3%

Best-Liked Features

Performance, acceleration...44.4%
Handling ease.....39.1%
Exterior styling.....25.8%
Riding comfort.....19.9%
Economy.....12.6%
Visibility.....11.9%
Roadability..... 6.0%

Most-Frequent Complaints

No complaints at all....41.7%
Poor gas mileage.....15.9%
Poor body assembly.....10.6%
Rattles..... 7.3%
Too big, too low, too fast.. 6.0%
Poor paint job..... 5.2%
Tubeless tires..... 4.6%

Chevy is not as low as competitors

Object to this.....22.5%
Do not object.....63.6%
No opinion.....13.9%

Would like Chevy to be longer?

Yes, would.....13.9%
No, would not.....76.2%
No opinion..... 9.9%

headroom."—Colorado parts man for a Chevrolet dealer.

"Smart lines, yet not extreme."—North Dakota office worker.

They Complain, Too

Chevrolet owners are, in the main, more satisfied with their new cars this year than they were in 1956: 41.7 percent state that they have no complaints at all compared with 30.1 percent on the 1956 Chevrolet.

But there are those who complain and they most frequently mention poor gasoline mileage:

"Gas mileage is low. I have had it back to the garage three times and they can't seem to help it. I get about the same mile-

age (14.5) in city driving as on trips."—Tennessee engineer.

"Getting only 10 miles per gallon in town. Had it in for checkup four times. They changed the needle valves and installed new float system but hasn't done any good."—New Mexico radio announcer.

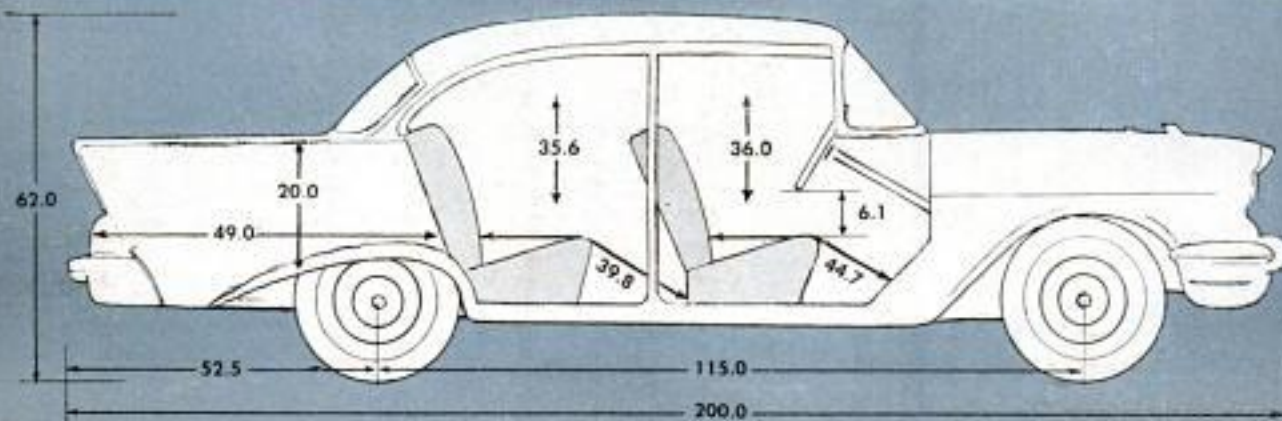
"I went from automatic to standard shift to get more mileage, but so far haven't received it. I miss the automatic and next time shall go back to it."—Kentucky owner.

Second on the complaint list is poor assembly work:

"Thrown together. Things not aligned right."—Massachusetts clerk.

"Poor assembly. Doors had to be reset. Paint scratches."—New Jersey machinist.

Although it's the shortest of the Big Three, Chevrolet has more inches of room in many interior dimensions



Third most-frequent complaint is the presence of body noises.

"Certain body rattles. They were corrected at 1000-mile checkup."—Colorado housewife.

Fourth complaint is that the car is too long, or too low, or too fast. This is a new complaint among car owners and it is especially interesting in the case of the Chevrolet which is the shortest and the highest car of the Big Three.

"In order to get into this car it is necessary to take off my hat. The roof is too low. Once I am seated, it's okay. All new cars are too difficult to enter and too low to the ground."—Nebraska conductor.

"Not enough road clearance. I can't drive off the highway."—California barber.

"All manufacturers are putting too much engine in these cars. Absolutely unnecessary. Instead of a pleasure car, they become a death-dealing instrument. People are not educated to such power."—North Dakota farmer.

What Should Be Changed?

Each month we ask the owners what they think should be changed in their new cars. Chevrolet owners want increased gasoline mileage more than any other change.

Here are some other changes they would like in order of frequency of mention:

"Should have two ash trays on dashboard."—Illinois salesman.

"Would like more room inside, especially in the back seat. Not enough legroom."—California minister.

"Make the body lower."—Colorado sales executive.

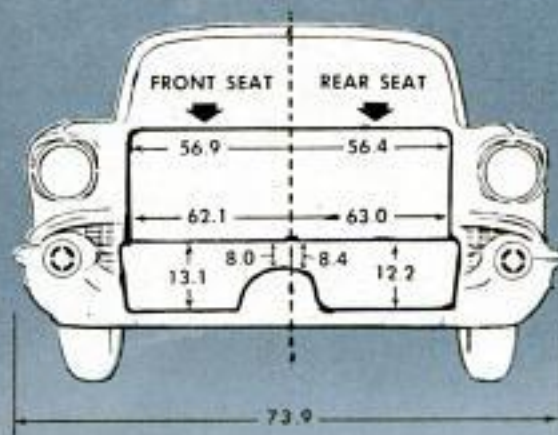
"Seats should be more comfortable. No support under your legs and no comfort to back."—Missouri zone manager.

What About Chevy Styling?

We asked the owners what they don't like about this year's styling, interior and exterior. Here are their dislikes in order of frequency of mention:

"Do not like the two hood ornaments."—West Virginia bus driver.

(Continued to page 254)



What do owners say about styling?



Instruments with well-marked dials are practical, say owners, but thick, luxurious carpeting is not



Owners like the integral grille-bumper, but dual hood ornaments top the list of least-liked features

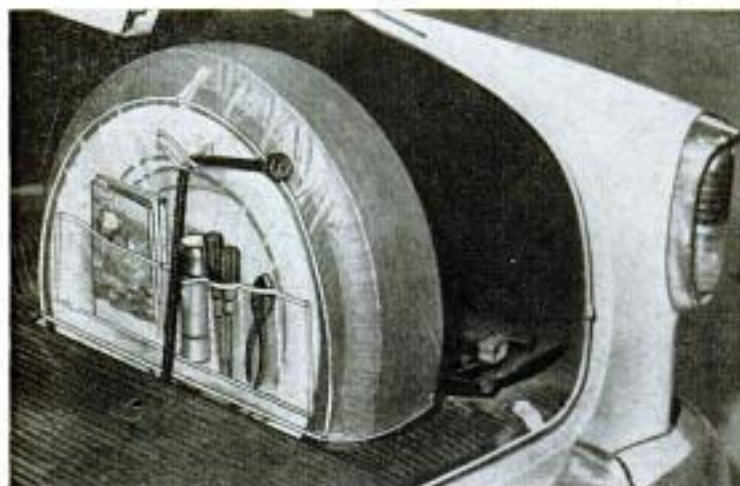
In this, the year of the tailfin, Chevy owners are evenly divided in their opinion of the current fad





Trailer Hitch is Easily Removed

In seconds you can remove the drawbar from a trailer hitch so there is no unattractive projection when the trailer is not being pulled. The drawbar is held in its carrier by a safety catch that tightens itself as the load increases. When the drawbar is not in use it is replaced by a neat chrome cap.



You Can Add "Feelers" to Front and Rear of Your Automobile

Drivers who are not certain where their fenders are as they maneuver in tight spaces can protect their cars from damage by mounting light-transmitting "feelers"

front and rear. The front-fender rod is made of plastic and it glows as it picks up light from the headlights. The rear-mounted feeler has its own base-mounted bulb.



New Products for The Family Car



Headrest for Car Seat

Clamped to the back of the front seat, a foam-rubber cushion provides relaxed rest for the passenger on long drives. It can be swung to various positions from straight up to straight down.

Tire Cover Has Pockets

Pulled over the spare like a stocking cap, a plastic cover has compartments for tools, flashlight, maps and other items. It stretches to accommodate all wheel sizes. It will also prevent luggage from being soiled by a dirty spare tire.



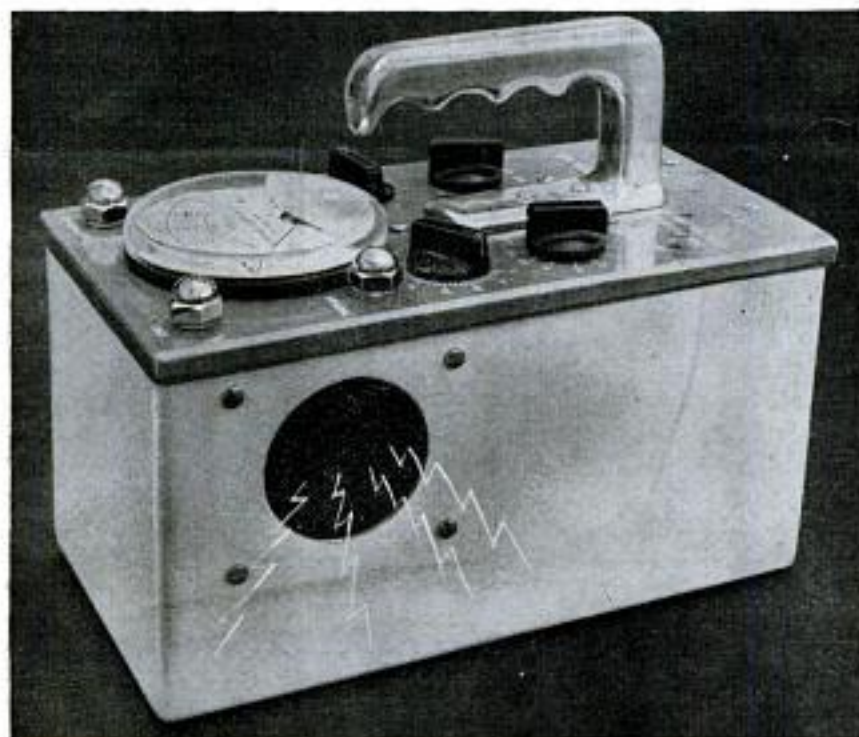


Inflatable Tube Floats Angler

Sportsmen can float into hunting or fishing spots in a new inflatable tube. The tube is held in place around the waist by a special harness. It supports the body high enough that water will not enter chest-high waders. If desired, the sportsman can use swim fins to help maneuver himself to a particular spot. The harness leaves his arms free to manipulate a fishing rod or a gun. Additional equipment can be strapped to the float.

Triangular Steel Beam Has Notches for Joists

Floor joists are held securely in notches in a new steel beam for residential or commercial construction. The beam is triangular in cross section. The notches tend to increase the rigidity of the floor as the load builds up. According to the manufacturer, the beam can be used over longer spans than a conventional I-beam with a minimum number of posts to support it.



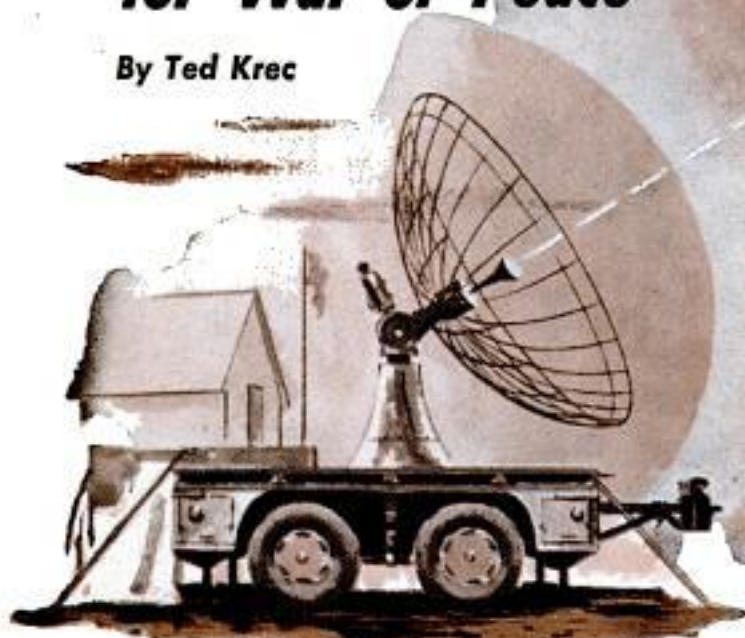
Uranium Detector Sets Off Alarm

You can search for uranium while driving or flying by taking along a detector that sounds an alarm when radiation hits a preset level. Continuous watch of the meter is unnecessary. Silent until a given intensity of radiation is reached, the instrument sounds at an increasing pitch as the gamma intensity mounts. Headphones permit use of this convenient apparatus in planes and noisy surroundings. The instrument has a built-in battery tester and also is equipped with standard radio tubes.

The Voice of EMERGENCY

for War or Peace

By Ted Krec



RADAR OUTPOSTS



COMMANDING GENERAL

THEY'RE BUYING a new kind of radio receiver on the West Coast today. It receives no disk-jockey broadcasts or soap operas, for the receiver isn't intended for entertainment—it's "life insurance."

This new kind of radio is a Sigalert receiver—"the voice of emergency."

The Sigalert system of instantaneous emergency alerting was developed by Loyd C. Sigmon, vice-president and assistant general manager of radio station KMPC in Los Angeles. "Sig" is his nickname, so it was given to his brainchild.

Sigalert was developed to fill a great need in southern California. For years the law-enforcement agencies had maintained radio communication with each other, but there was no rapid contact with the public for emergency situations—such as the big fires of last December.

The director of the Technical Service Bureau of Los Angeles Police Department, Deputy Chief Arthur C. Hohmann, had an idea that commercial radio could be utilized, so he consulted the Southern California Broadcasters Association. The president of that group vowed cooperation, but said that at the time no technical equipment had been developed which could do

the particular job. However, he turned it over to Sigmon for research, for Sigmon is recognized as a wizard by many of his colleagues.

Sigmon demonstrated for Civil Defense and military officials a system for breaking into a broadcast by pressing a button at a given location, taking away control of radio stations and turning on radio receivers—for use in Civil Defense emergencies. The problem of direct, rapid public contact was solved and from this demonstration Sigalert was born.

A few months later, Sigalert was put into operation as a public service in Southern California. The savings in time, money and human life effected by Sigalert would be a staggering figure if it could be completely calculated.

Here's how the alerting system works: On the spectrum of radio frequencies there are not enough frequencies for radio stations, police and military use; yet there are unused or wasted portions. Radio engineers always have known about them but did not know what to do with them, for they are subaudible to the human ear.

Sigalert for the first time takes part of this unused, subaudible portion—the area

ALL CIVIL DEFENSE
CONTROL CENTERS

RADIO STATIONS

SIRENS

CIVIL DEFENSE
PERSONNEL

EMERGENCY SERVICE

HOME

MOTORIST


HIGHWAY PATROL

PLANT PROTECTION


SHIPS

SIGALERT





Dispatcher in police department reaches for Sigalert switch to activate receivers in all TV and radio stations



Lives are saved at scene of disaster because Sigalert helped speed ambulance and doctors when minutes count

from 0 cycles to 40—and puts it to work, using an extremely low percentage of modulation. These subaudible frequencies are superimposed on a radio-frequency carrier when a Sigalert bulletin is to be given, activating special Sigalert receivers.

The entire Sigalert procedure takes place without interfering with the normal operation of the radio station. Because it is subaudible, listeners are unaware of it until it is broadcast to them directly. In other words, the Sigalert bulletin gets a “free ride” on standard-broadcast facilities.

Forty-eight southern California communities and some in Nevada and Arizona are hooked up by land lines, teletypewriter and radio. Authority to originate a Sigalert bulletin rests in any responsible officer who is on duty in an area at the time of an emergency. However, the situation must constitute a hazard to or otherwise affect a large number of persons for a significant amount of time.

The officer on the scene contacts the Los Angeles Police Department and orders a Sigalert. At the LAPD control center, there is not a moment's hesitation. The chief dispatcher flips a switch marked Sigalert on his control board and at the same time cuts into all lines. Flipping of the switch applies the subaudible tone to the carrier of the broadcasting station. The subaudible tone is applied at a very low percentage of modulation so as not to interfere with the normal program content.

The result is instantaneous, for radio waves travel at the speed of light—186,000 miles per second. In each of the radio and TV stations equipped with Sigalert receivers a buzzer sounds and a light flashes on. In addition, a tape recorder also is activated and the message is recorded. Then a bulletin can be prepared for broadcast or the program is interrupted at once (if the situation is critical enough) and the tape is played right over the air.

The original demonstration showed how, by merely pressing a button, program control could be taken away from broadcast stations automatically, in event of grave emergency. This, of course, does not apply at the present time on the police Sigalert, but it could be done easily.

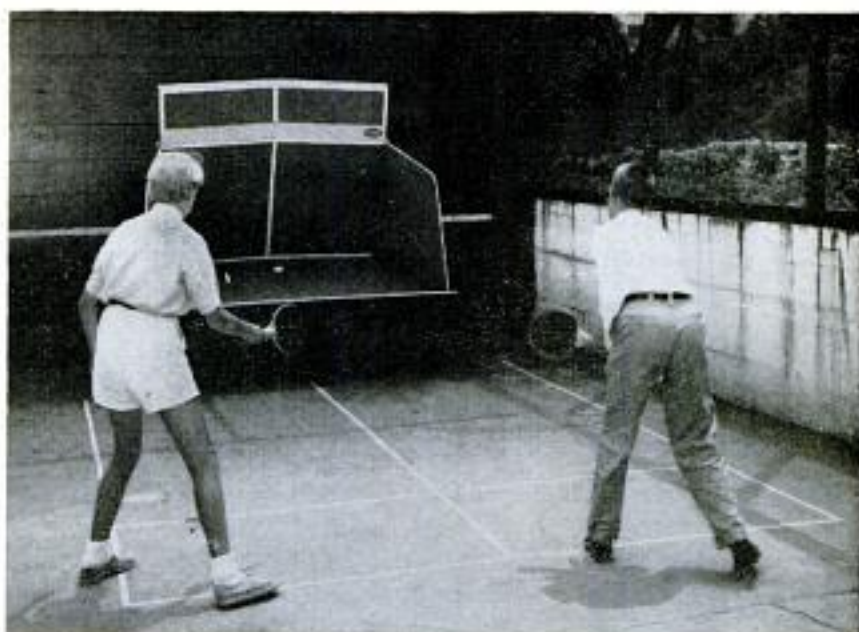
The fact that radio stations broadcast the bulletins to the public would appear to obviate the need for special receivers or, at best, to limit the need for them—but not so.

Consider this—a trucking firm would be very interested in obtaining all information about emergencies along the routes its trucks travel. A special receiver would give the firm this information without the

(Continued to page 234)

Angled Backboard Challenges Players

Elements of table tennis, handball and squash are combined in a fast-paced game that can be played indoors or out. The court has a backboard built of several pieces set at different angles, giving the plastic ball unusual rebounds. Two to four persons can play the game. The paddles are slightly larger than table-tennis paddles. The plywood backboard can be dismantled and stored flat.

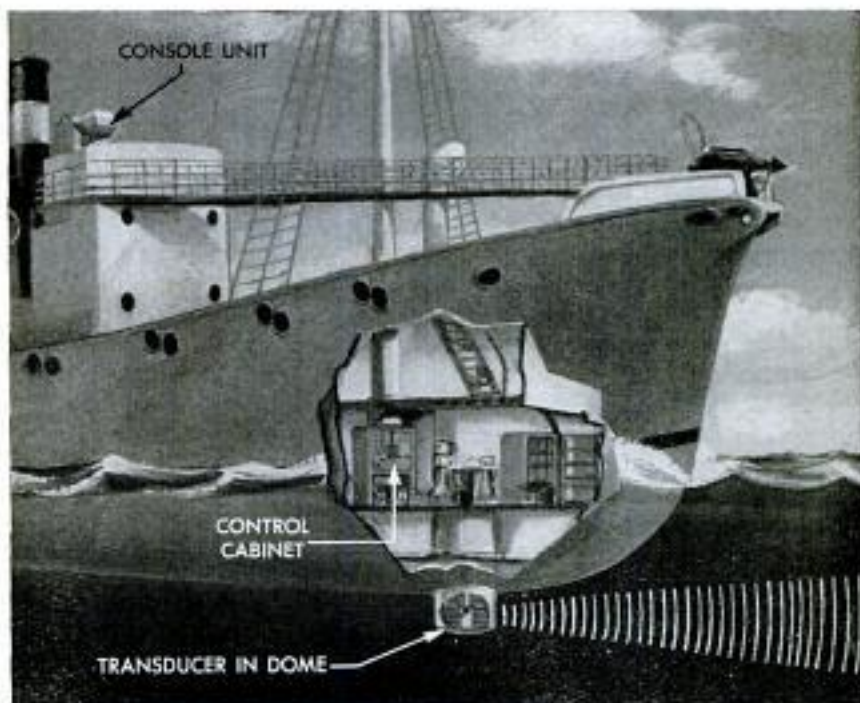


Car Vacuum Cleaner Uses Exhaust Pipe

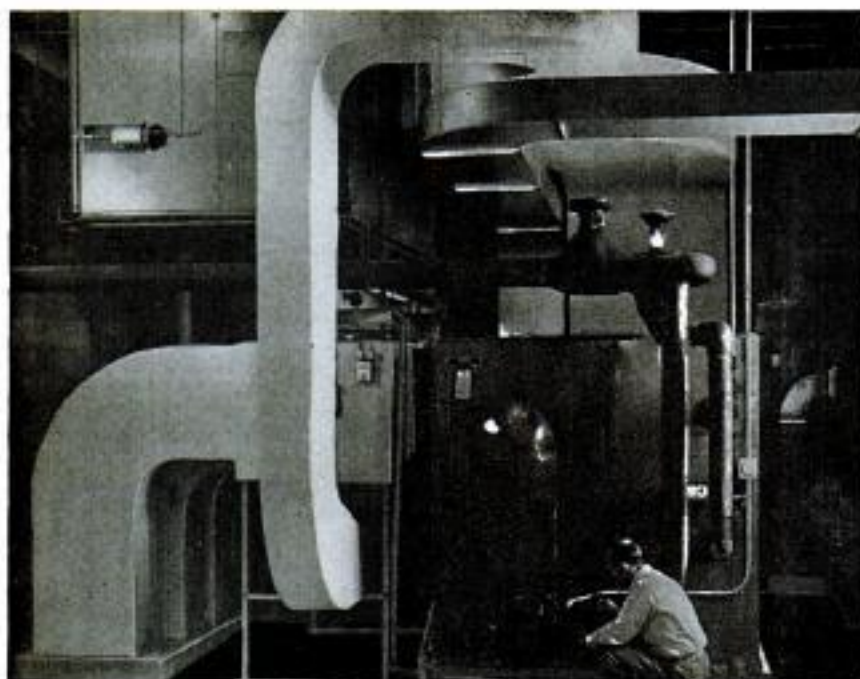
Operating at the exhaust pipe while the automobile's engine idles, a vacuum-cleaning device can rid vehicle interiors of dust, dirt and gravel. The venturi effect provides the necessary suction. This cleaning unit includes an aluminum housing with a tapered rubber plug which fits into the exhaust pipe, 12 feet of flexible wire-wound hose and an aluminum nozzle.

Underwater Beam Tracks Whales

Electronic gear now assists hunter-killer ships to follow their prey during whaling season in Antarctic waters. Ultrasonic sound pulses are sent from an electro-acoustic transducer mounted in a retractable, sound-transparent dome projecting below the ship's keel. A one-man console gives constant bearings of the pulse beam. Range of whales, interrupting the beam, is found by translating into distance the time interval between pulse transmission and reception of the echo.



Air Conditioner in Basement Ventilates 25-Room Building



Individual rooms in a 2 to 25-room building can receive year-round cooling or heating from a centralized unit in the basement. The conditioning system consists of cold-producing and heat-making mechanisms and blowers, with dampers controlling flow of hot or cold air in ducts going to each room. Air leaves through "decks" of dampers, one deck directing hot air, another deck guiding cold air, with hot or cold air mixed, if needed. Combinations involve cooling, heating, ventilating or humidifying elements in nine sizes.

Quick-Start Fuel Made From Ether

Blended low ether, a special fuel mixed with air and injected as a fine spray into the engine intake manifold, provides quick starting at low temperatures for gasoline and diesel motors. This fuel sustains the engine until regular fuel becomes operative. The starting device can be installed on the dashboard, and hermetically sealed fuel can be stored indefinitely in its special capsule. Corrosion inhibitor and lubricating qualities are in this blended fuel.



Rebuilt Buick Becomes Housecar

With \$400 worth of junk-yard parts, Paul Hagenbuch of Arlington, Va., remade his 1949 Buick automobile into a "housecar" that sleeps two persons. His vehicle has a double bed, bath with shower, hot and cold running water, a kitchen sink, hot plate, dining space and small dining chairs. Hagenbuch rebuilt his car in six months.





Portable Concrete Mixer

Concrete can be mixed in a portable unit built on a wheelbarrow-type frame to operate from a $\frac{1}{4}$ -horsepower electric motor with V-belt drive. This mixer has $1\frac{3}{4}$ -cubic-foot capacity. It also has curved tubular steel handles for easier pouring of concrete through a "nonsplash" chute. Ten-inch semi-pneumatic wheels support the 82-pound mixer, which will fit into most passenger-car trunks and can be wheeled through the standard doorway of a home. Accessories include a slip-on gravel screen, blade for mixing mortar or plaster, drum

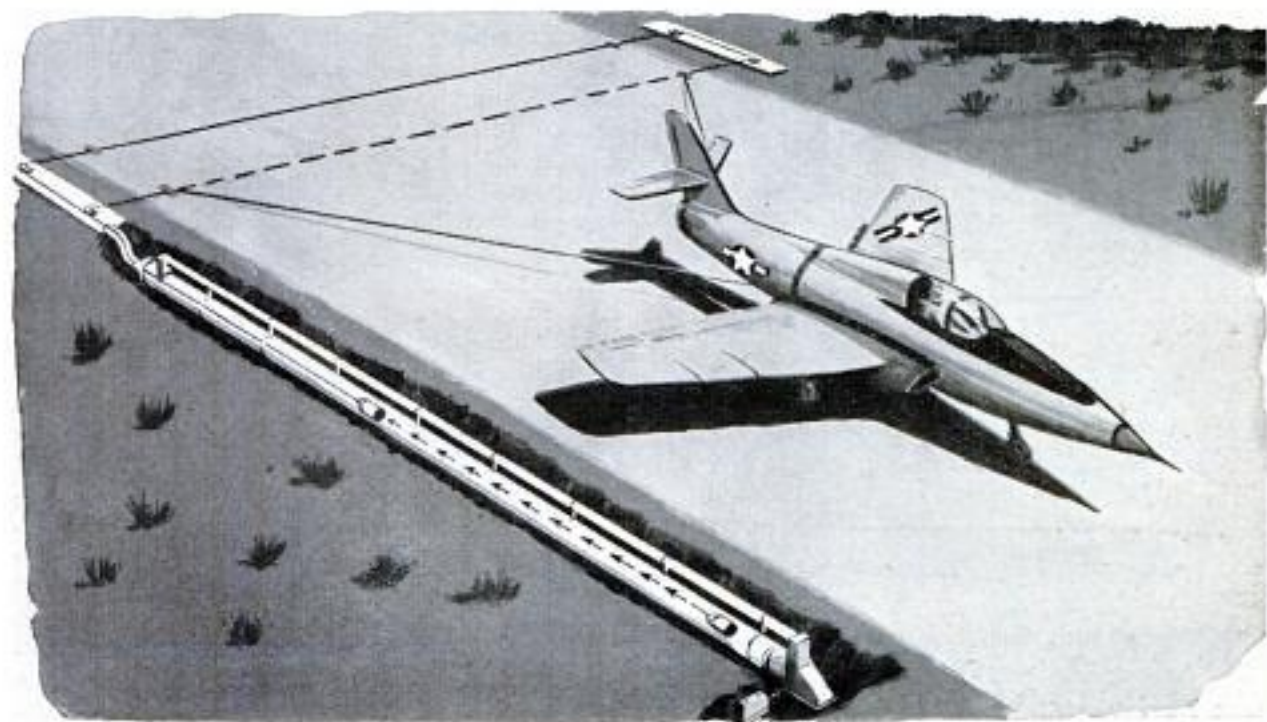


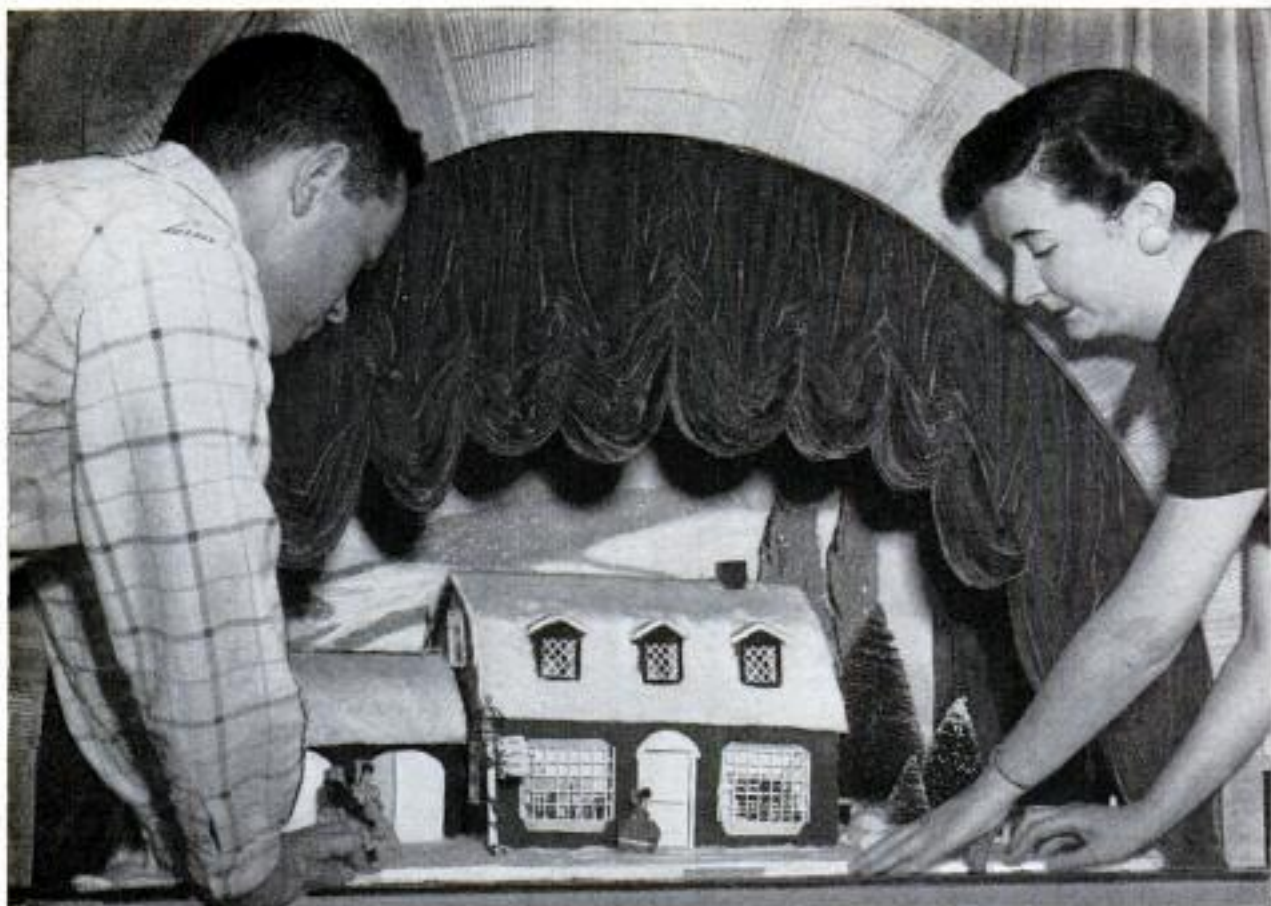
cover, wheelbarrow pan attachment and an adapter bracket for powering the mixer with a $\frac{1}{4}$ -inch electric drill. Larger wheels are optional.

New Jet-Landing Method Permits Aircraft to Stop Within 100 Yards

Jet fighters landing on airstrips of 1000 to 2500 feet can be stopped within 100 yards without damage or injury, if the jet uses one of two arresting cables connected to a tapered, water-filled pipe in a ditch alongside the runway. A landing jet engages

one of the arresting cables, which pulls a piston through the water-filled pipe to absorb landing energy of the aircraft. The plane stops and is disengaged from the cables which snap back into place. No adjustment is necessary for speeds or weights.





Producer Robert Eagle of The Little Music Hall oversees shifting of scene for popular Holly Time show

Radio City Music Hall In Miniature

Eagle and helper, Clare Murphy, clean up steamboat as important scenery for the Showboat production



By Leslie H. Horn

BIG SATISFACTIONS come in miniature packages for 21-year-old Robert Eagle, of Waltham, Mass.

Eagle is the builder of the Little Music Hall, a scale model of the famed Radio City Music Hall in New York City. He is also the producer of a dozen shows throughout the year—miniature, of course—on his six-foot-wide stage.

His shows usually play to a full house of 11 persons, a capacity crowd for the small basement room in his home which he has turned into a pint-sized theater. At Christmastime for the last two years people have traveled from all over Boston to see his Holly Time shows.

Eagle, a newly graduated elementary-school teacher, has been arranging miniature shows since he began with an orange-crate stage some 10 years ago. He visited the Radio City Music Hall three years ago and was so impressed he came home and planned his scale-model copy.

"I wrote the management," he recalls,



Backstage of the Little Music Hall is a jumble of scenery and "actors" designed and built by young Eagle

"and they sent me a 60-page detailed manuscript of the Music Hall's construction. I followed it closely."

He took the elaborate measurements of the curtain, stage and proscenium arch and reduced them to the present over-all six-foot front width. To build the wood portions of the arch and stage floor he hand-cut, sandpapered and finished 571 balsa-wood sticks, each about six inches long, half an inch wide and a quarter inch thick, and used 49 tubes of glue.

Dolls Become Actors

Eagle's actors are dolls which he either buys or makes and outfits with costumes. As assistants he has a staff of nine close friends and interested neighbors. Shows run about an hour and are presented as tableaux. Each has a number of different sets which are changed in total darkness. Scripts are written by the producer and recorded music is edited on a tape from one or more records. The result is finally copied on Eagle's standard record player.

In Holly Time, 64 pieces of scenery, 25 scenes and backdrops plus 77 hand-dressed dolls are used. This extravaganza took 350 hours to produce. Backdrops are painted in oils. Scenes in this elaborate show include "In the Sleigh," "Grandma's House," "Country Store," "Gristmill," "Decorating the Tree" and the "Little White Church."

The final act, "The Nativity," has a dozen set changes and was copied from a Radio City Music Hall production. Props, scenery and furniture are made from odd materials including tin cans, cardboard and lots of glue. ★ ★ ★

Curtain going up! Helper Murphy operates lights and sound while Eagle raises curtain and manages sets





Etrusco was tossed high and dry in front of summer cottages. "Fan Club" cheered slightest movement of ship

REPRIEVE

FOR A FREIGHTER

By Calvin Campbell

THE FREIGHTER *Etrusco* had a last-minute reprieve from death on the scrap pile because a newly organized company dared to make a million-dollar business gamble. That gamble paid off and made maritime salvage history as well as an additional bonus estimated at several hundred thousand dollars.

The 7000-ton ship was hurled on a rocky shelf at Cedar Point, Scituate, Mass., 20 miles south of Boston, after she lost her rudder during a raging northeaster.

The Coast Guard had to battle through man-high snowdrifts with a snowplow to reach the scene in the middle of the night, and the 30-man crew was dramatically

One of the jubilant owners congratulates Admiral Curtis as the freighter finally floats free again



rescued by breeches buoy at daybreak.

The *Etrusco* was on its way from Emden, Germany, to take on a cargo of grain at East Boston for shipment to Yugoslavia. Already seven days overdue because of rough weather, she was riding high in the water and was no match for the torrential seas as she was tossed ashore only a few hundred yards from some summer cottages. She ended up completely high and dry at low tide.

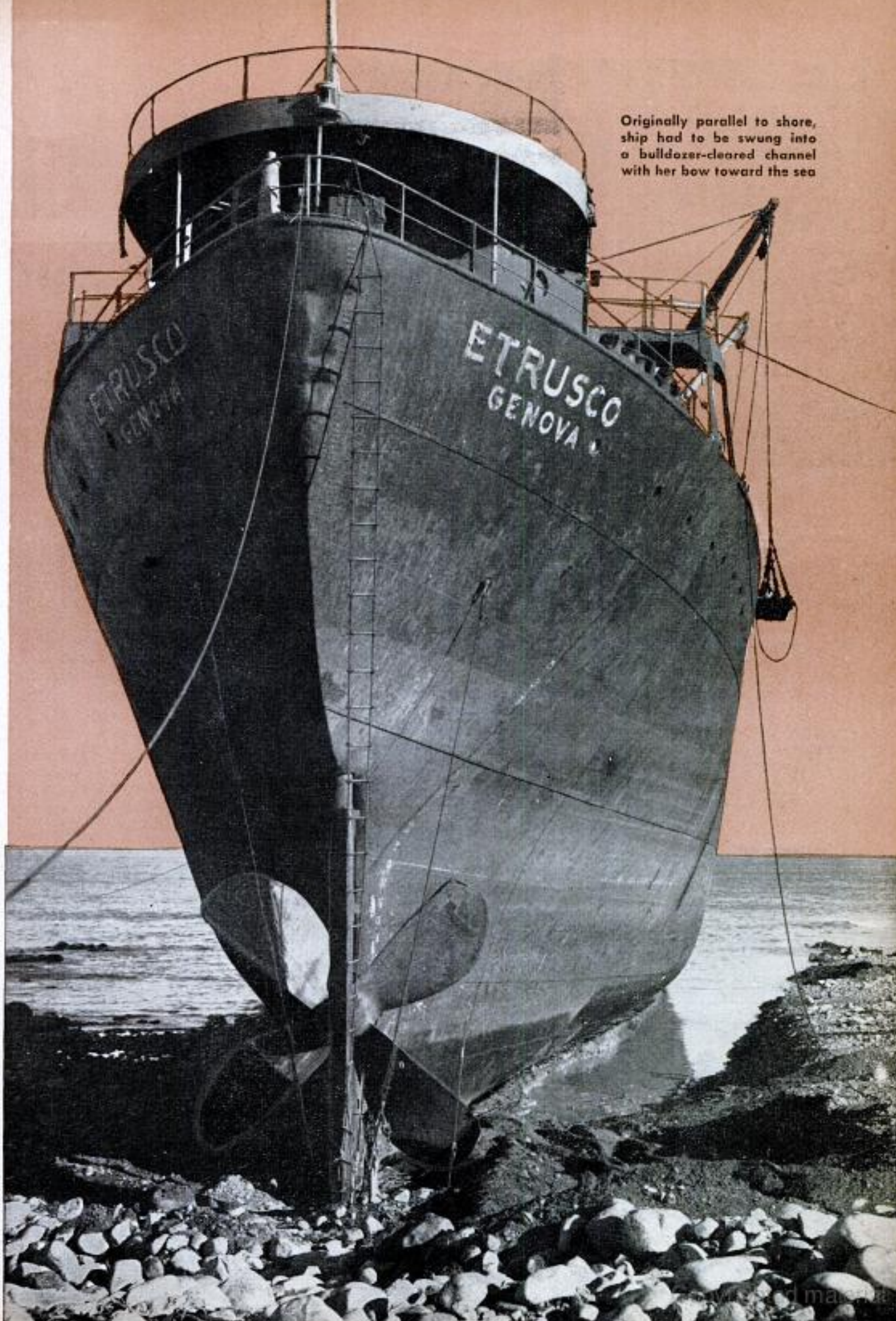
The \$1,250,000 ship was declared a total loss. Eighty percent of the 441-foot double-hulled bottom was damaged and ripped open. Four gaping holes were torn in the inner hull. Top marine salvage concerns decided that refloating was impossible. The insurance underwriters declared that any attempt would cost more than the ship could possibly be expected to make in its lifetime. It was just a scrap heap and the only solution seemed complete demolition.

Tourist Attraction

Rust and weather bored into the plate as the ship rested majestically as a tourist attraction all summer.

Agents for the General Insurance Company of Italy advertised for bids. Highest bidder was the newly created Ocean Shipping Company, formed by a group of New York brokers, agents, captains and promoters, headed by Gordon Mosvold as

Originally parallel to shore,
ship had to be swung into
a bulldozer-cleared channel
with her bow toward the sea





Kedge anchors were laid in deep water offshore. Heavy cables then were attached to the ship's winches so the freighter could pull herself free

president. They paid \$121,211 for the stranded freighter and surprised the maritime industry by announcing their intention of refloating the hulk. They called in a 70-year-old retired admiral, Lebbeus Curtis, director of the Pacific Trailer Ships Company, to head the operation. He was

Three five-ton kedge anchors and one weighing eight tons were laid in deep water 300 yards offshore. Cables, $1\frac{3}{8}$ inches in diameter were attached from them to the ship's winches through an intricate block-and-tackle system. Their pulling power was more than 400 tons, more than enough, the admiral figured, for the ship to pull itself free.

Salvage workers had to crawl under the ship to clear away boulders. Logs and sheets of steel were placed in the bulldozed channel to ease the movement of the ship. Much of the salvage work had to be done in rain



Bulldozers cleared the rocky bottom at low tide and huge boulders were blasted. It took three weeks of intensive work, testing equipment, tightening cables and patching leaks before the first pulling attempt was made.

Plans were to swing the freighter a full 80 degrees from its parallel position with the shore line. By working the vessel's bow into 15 feet of water, Admiral Curtis reasoned that he could then flood the bow, and thus lighten the stern for the final pull.

With the fall tide at its peak and a west wind to give the ship an added lift, the first tugging resulted in the almost unnoticeable movement of $1\frac{1}{2}$ degrees.

They worked every high tide, morning and

(Continued to page 244)



Robot whistles, produces music and directs traffic under the control of two university engineering students

Robot Policeman Directs Traffic on Busy Mexican Street

Remotely controlled, an 8½-foot robot policeman directed traffic for one week in Guadalajara, Mexico. The robot also whistled and produced music and advertisements for a University of Guadalajara dance. Made in 100 hours from parts scavenged by two engineering students, the internal workings of the robot included a built-in loudspeaker connected to a turntable, microphone and amplifier. Power

originated from two ⅛-horsepower motors operating on alternating current from a nearby house. The turntable motor was geared 450-to-1, using a tricycle wheel, bicycle sprocket and chain and the gears from a hand-powered tool grinder. To raise the robot's arms the motor from an electric drill rotated a mechanism similar to a centrifugal governor, actuating cords and levers connected to the robot's arms.

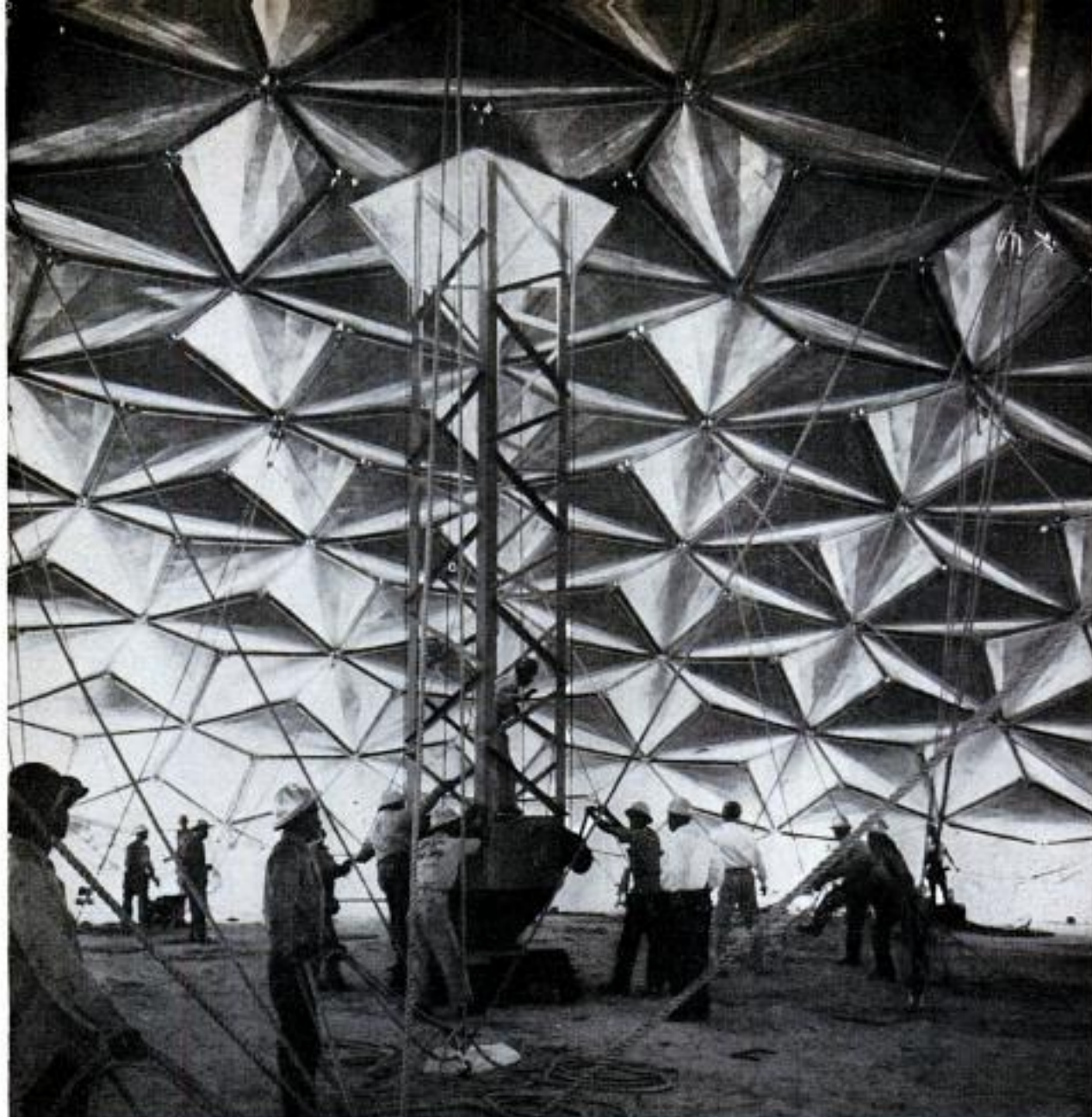
World's Fastest Typewriter

Typing 12 characters per second, a French electric typewriter has keys for alphabet letters, syllables, common phrases and salutations, such as "Dear Sir" and "Sincerely Yours." One-eighth-second touch will strike an individual key. Electronic components of the machine include 57 valves, 12 relays and 45 cells joined by 40 miles of wiring.

Kansas Turnpike Uses UHF

Ultra-high-frequency, multichannel radio communications will control administrative, maintenance and police operations along the 236-mile Kansas Turnpike. This microwave system includes two terminal stations and nine repeater stations located 20 miles apart on the toll road, in addition to fixed and mobile transmitting and receiving equipment. Four separate circuits will handle two-way communications.



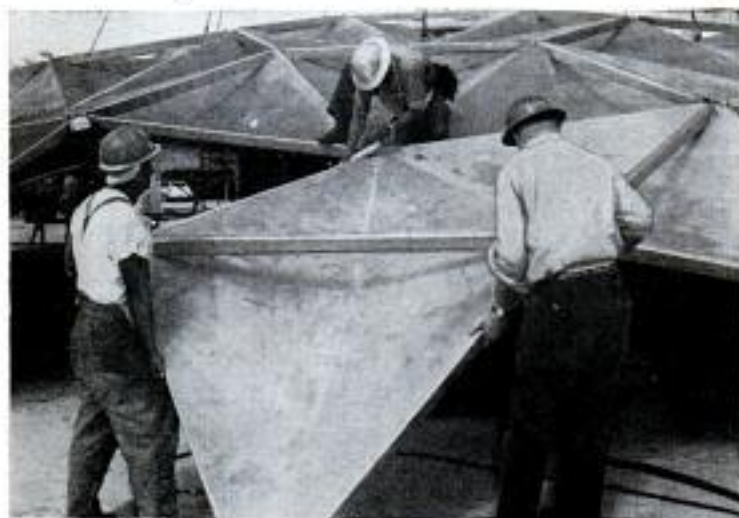


Kaiser Aluminum photos

Aluminum-domed auditorium was built around a portable mast which lifted dome as sections were bolted on

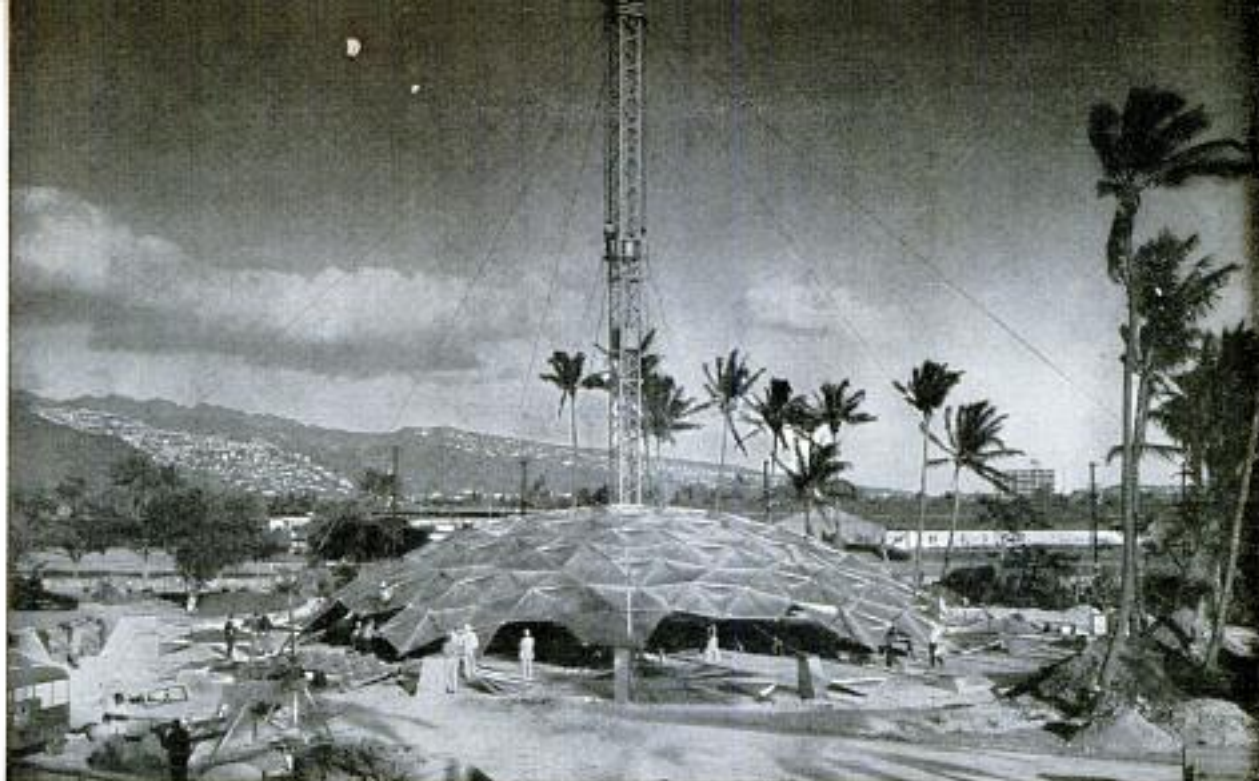
Patchwork Dome

Diamond-shaped panels are bolted together at edges and later calked. Each panel curves in and has a strut for strength



MADE of diamond-shaped aluminum panels, geometrically arranged and bolted together at their edges, a revolutionary domed auditorium looks like a silver patchwork quilt tossed over a giant mushroom. It was recently built—in just 20 hours by 38 workmen—near the site of Henry J. Kaiser's Hawaiian Village Hotel in Honolulu.

The huge aluminum shell is 49½ feet high and 145 feet in diameter. It has a seating capacity of 1800 to 2000. The unusual design eliminates pillars or any other interior support. Its diamond-shaped panels vary in length from 9 to 11½ feet and each panel is curved inward and strengthened with an aluminum strut. The dome was designed by the product development department of Kaiser Aluminum & Chemical Corporation.



The 96-foot construction mast towers above uncompleted dome which took 38 men just 20 hours to erect

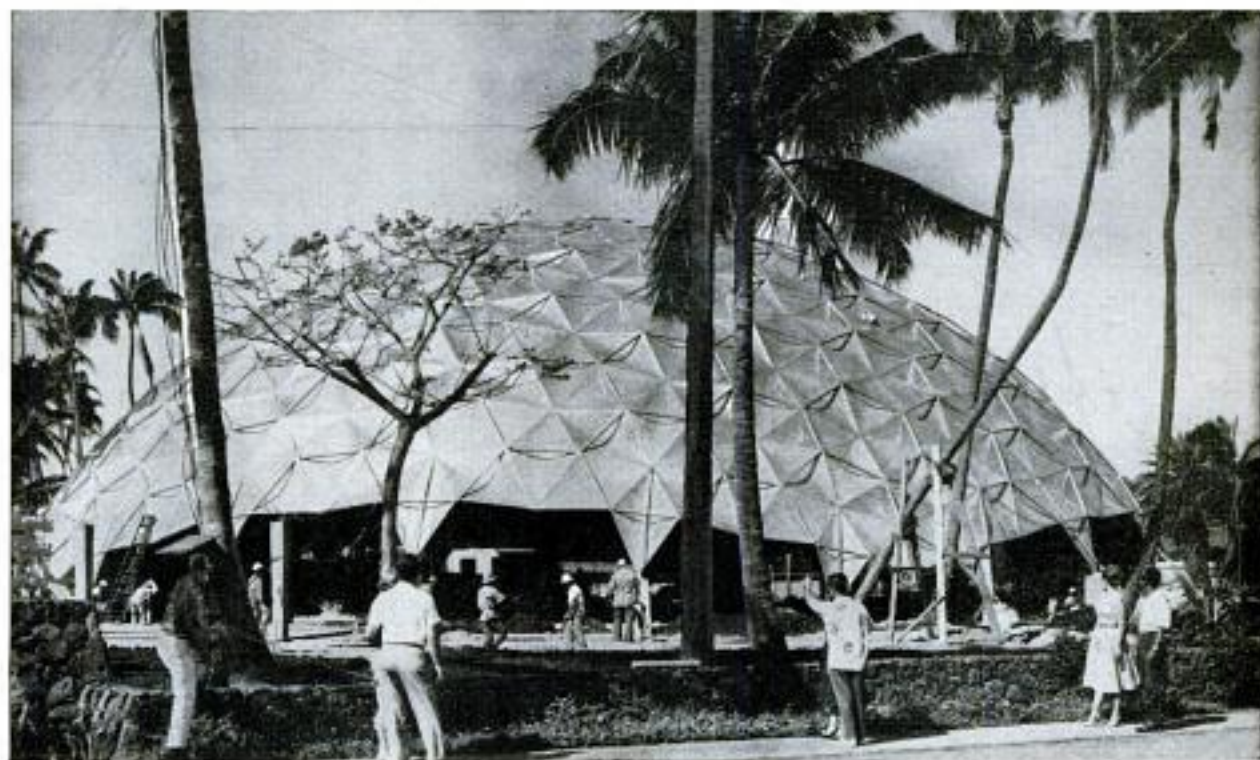
The panels were fabricated at the Kaiser plant in Permanente, Calif., shipped to Hawaii and preassembled at the site. The dome was erected around a 96-foot-high portable mast equipped with rigging. The top ring of aluminum panels was assembled around the mast and then lifted a sufficient height off the concrete floor to allow another perimeter of panels to be installed. This process was repeated until the entire dome was completed. The panels are held together by special aluminum bolts.

The dome is anchored to 25 concrete piers spaced around the floor. An opening

was left at the bottom of the dome to provide for landscaping.

A sealing material was used to calk the dome and make it waterproof. An opening 50 feet square at the top of the dome aids ventilation. The opening is fitted with a specially designed cover. Advantages of the dome stressed by the Kaiser engineers include low cost (\$4 or less per square foot), speed of erection, high strength (structural tests show the dome can support loads of over 100 pounds per square foot), and extra space due to the elimination of pillars. ★ ★ ★

Panels at lower edge of dome are anchored to concrete piers. Gaps will be filled with shrubs and flowers





"Pillow Tire" Mobile Missile Launcher

Two new "pillow tire" vehicles permit the U. S. Air Force to carry rocket-launching equipment over terrain previously impassable to standard military transportation. Each tire on these vehicles has from 3 to 15 pounds' pressure, which can be altered by the driver to adapt to changing terrain. The Teracruz, an eight-wheel-drive truck, tows behind it the semitrailer Translauncher, which carries Matador missile-launching apparatus. The Teracruz has eight tires and the Translauncher four,

each about 3½ feet in diameter. Connected, the entire unit can travel 40 miles per hour over smooth country and 25 miles per hour on rough terrain. The Teracruz has a 250-horsepower, air-cooled engine, weighs 15,000 pounds, and is 30 feet long and 9 feet wide. The Translauncher weighs 15,000 pounds, and is 34 feet long and 9 feet wide. Both vehicles can be carried by air and will operate in temperatures from 125 degrees F. to minus 65 degrees F. on tundra, snow, sand, swamp, mud and rocky areas.

Portable Power Auger Aids Posthole Digger

Most of the arm-wrenching labor is taken out of posthole digging by a portable power auger. A two-cycle air-cooled engine carried on the operator's back provides the power. The operator has instant control over starting and stopping through a remote throttle and centrifugal clutch. Additional augers are available for drilling stumps and sampling soils.

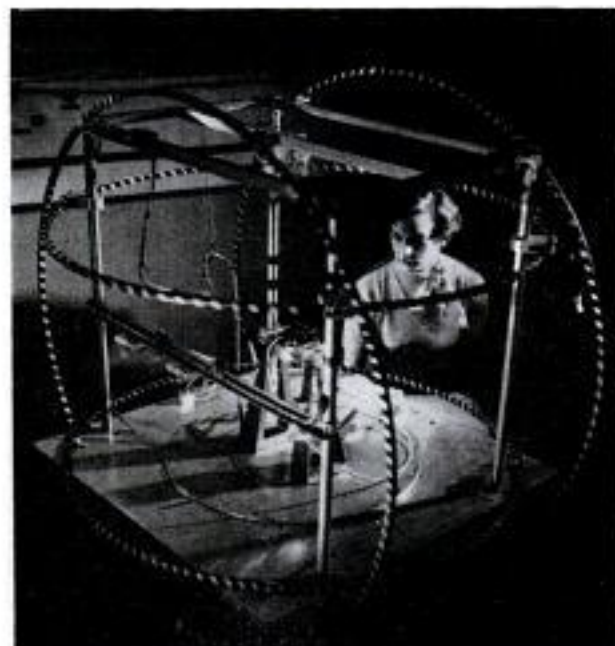


Electronic Computers

More than 10,000 electronic computers will be operating in the United States in the next 10 years, according to International Business Machines Corp. experts.

Aviation-Compass Tester

Tester of aviation compasses is a device, perfected by General Electric, that twists and turns like an aircraft while duplicating the magnetic pull of any point on earth. Banking, pitching and turning are among gyrations possible with the apparatus.

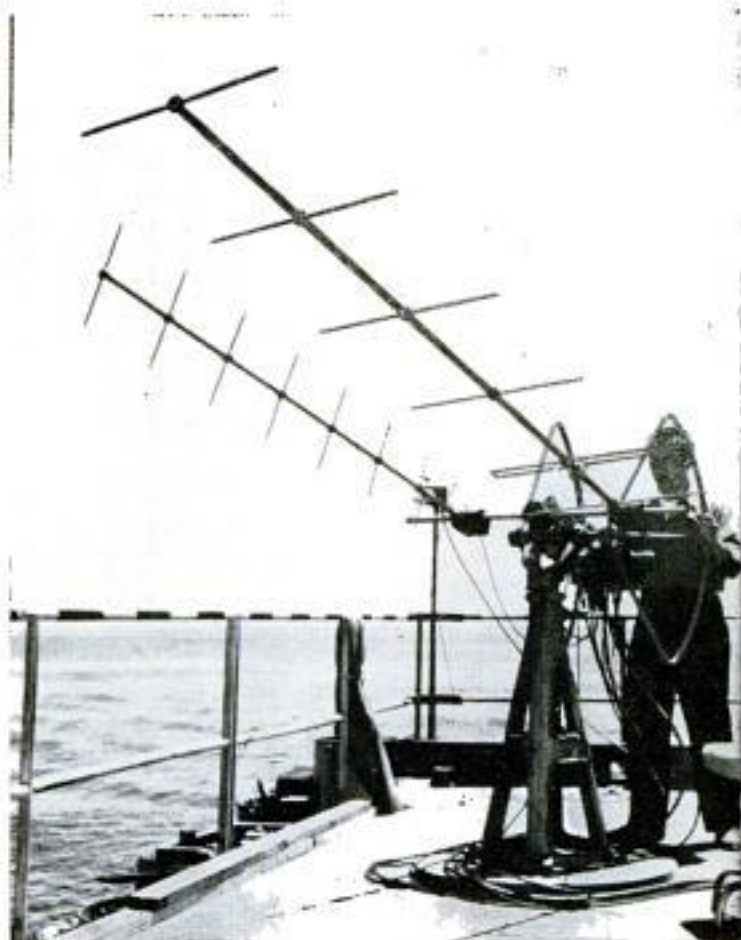


Tracker for Rockets → Mounted on Warship

Combining features of a step-ladder and TV antenna, an apparatus will track rockets that are borne aloft via balloon and released by radio signal to gather scientific data. Plastic balloons, 69 feet in diameter and supporting 12-foot-long rockets with 20 pounds of instruments enclosed, are to be sent far above the earth. Released, the rockets will radio or telemeter information to tracking gear on a Navy vessel at sea.

Electrical Device For Breathing

When cerebral-palsied children breathe so rapidly that continuous speech is impossible, an "electro lung" apparatus can be applied to stimulate and regulate their breathing muscles in forming correct speech habits. Termed a "movable respiratory brace," this machine has bands with electrodes. One band is strapped around the child's chest. Another band is strapped around the child's abdomen. An electrical charge makes these muscles contract, pushing internal organs up against the diaphragm, causing the patient to exhale. Rate and depth of breathing can be slowed down so that speech habits improve.



Copter Flight-Control System

Rotary aircraft now have a miniaturized flight-control system that automatically stabilizes them during normal take-off, flight, hovering and landing maneuvers regardless of weather.

Lawn Mower Without Wheels Skids Across Turf

There are no wheels on a new reel-type power mower. A large-diameter driving roller moves the mower and at the same time smooths the lawn behind the cutting reel. The roller is built in three sections to avoid scuffing the lawn on turns. The 21-inch reel slides along on two skids in front of the roller. Power from the gasoline engine goes to the traction roller and the reel independently, making it possible to vary the speed of one without changing the speed of the other. Available as an attachment is a sulky to convert the mower into a riding model.



WHAT'S NEW FOR Your Home

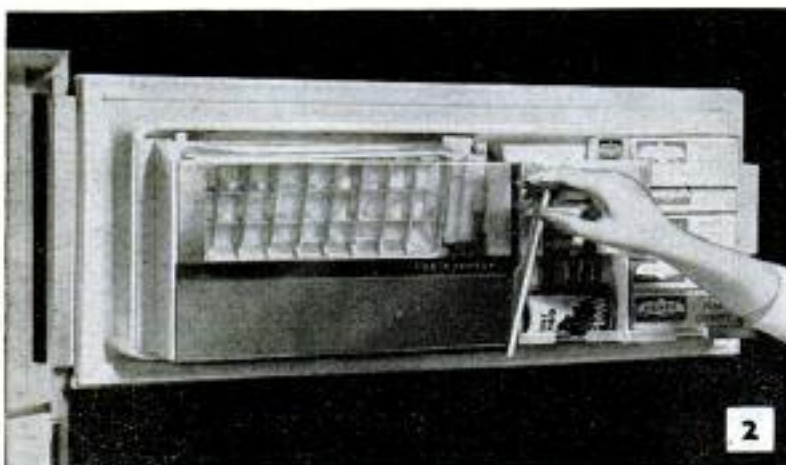


1. LAWN MOWER STARTER works by downward pressure of the foot on a long lever. Controls to start, stop, choke and idle are on the mower handle. Mulcher plate locks in grass until grass is chewed in fine bits for ejection. Safety guard protects the operator from debris struck by blade

Propulsion Engine Corp.,
South Milwaukee, Wis.

2. LEVER-OPERATED ICE EJECTOR permits a homemaker to slide an ice-cube tray into ejector, pull a lever and watch an entire tray of cubes fall into a storage or serving bin. The ice-ejector unit is built into the freezer door of the refrigeration appliance. One operation gives one pound of ice

Frigidaire Div., General Motors Corp.,
Dayton, Ohio

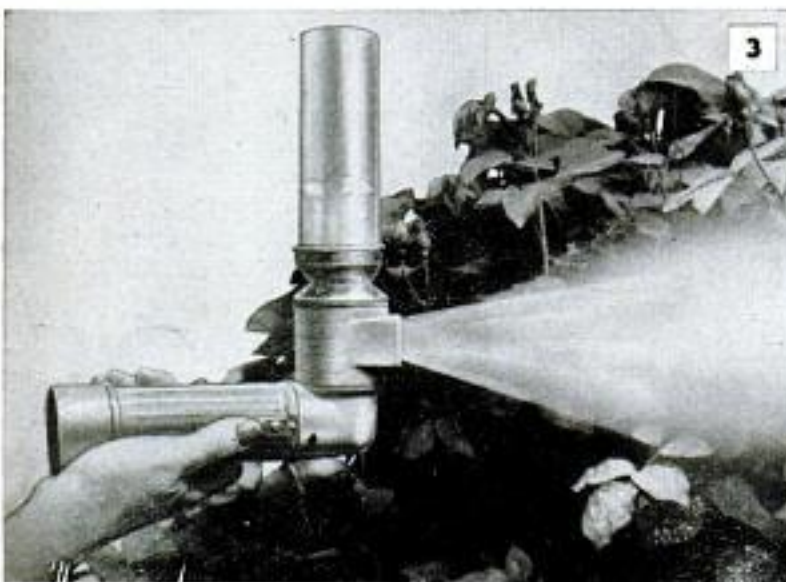


3. PUSH-BUTTON GARDEN DUSTER; motor receives power from two flashlight batteries which work for one summer's operation. High-speed blower spreads insecticide and other dusts. Mechanical agitator controls the feeding of dust to the blower. The dust chamber holds eight ounces of material

The E. C. Brown Co.,
10 Chapin St., Canandaigua, N. Y.

4. SASH FASTENER can lock window and fix it in one of three ventilating positions at the same time. The ventilating arm is 5 inches long and 2½ inches wide across the top sash fastener and lies flat when the window is locked closed. The top sash fastener will fit average-size locks

Slaymaker Lock Co., Lancaster, Pa.





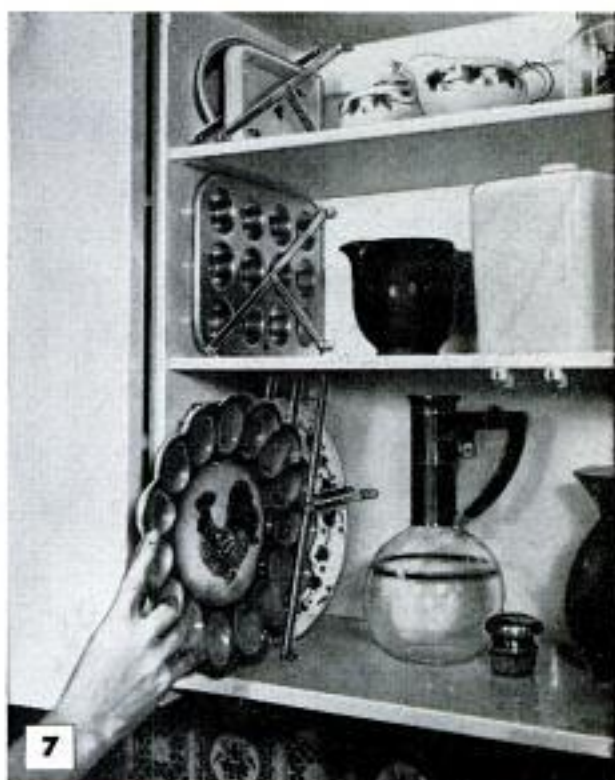
5. FOLDING TUB-SHOWER DOOR works like a conventional rigid bypass door at shower time or folds out of the way when tub is in use. Made of dylene plastic, the door fits any standard recessed tub with a 4-foot 6-inch to 5-foot 6-inch opening. Doors will not break, shatter, splinter or chip and come in five colors

Newcastle Products, Newcastle, Ind.



6. FLEXIBLE SUSPENSION ROD for electric-light fixtures hanging from the ceiling consists of four-inch sections. Rod can be made longer or shorter, as needed. This rod does away with dust-collecting chains and visible wires, facilitates cleaning and minimizes harmful blows. Rod is polished brass

Globe Lighting Products Inc., 16 E. 40th St., New York City



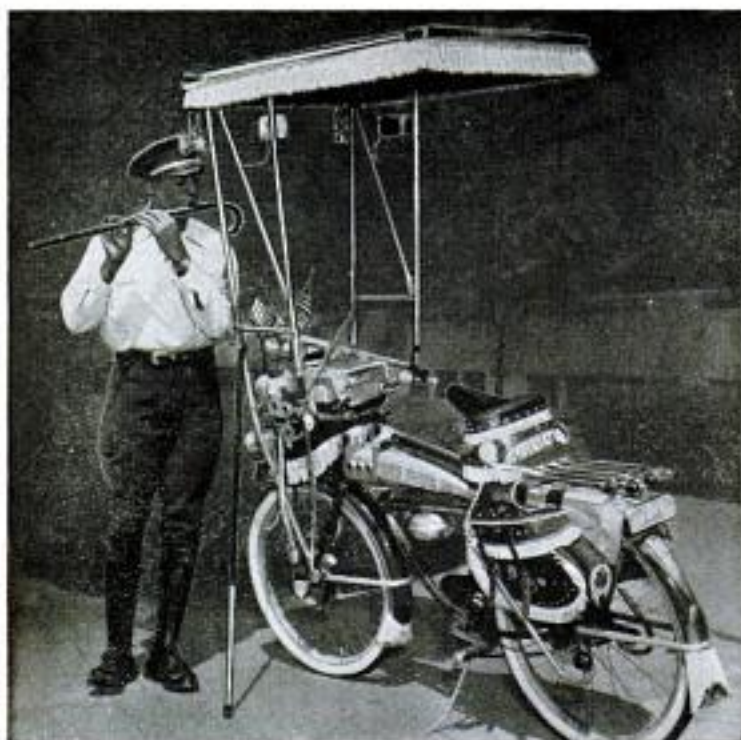
7. T-BRACKETS make storage space more usable in shelf and cabinet areas. The brackets are made of rust-resistant strap steel and are installed at 45-degree angle on wood or metal shelves. The "T" fastens to the front edge, and top and bottom backboard of shelf. Spacing can be varied according to item stored

The Bee Bracket Co., 5312 Westminister Ave., Philadelphia, Pa.

8. TRAVEL IRON serves as automatic steam or dry iron. For steam, water-reservoir bulb is filled and attached to iron. Steam stops when iron is placed upright on heel rest. For dry ironing, the bulb reservoir is removed. Operating on alternating or direct current, this 27-ounce iron has folding handle and fabric controls

General Electric Co., 1285 Boston Ave., Bridgeport, Conn.





Superbike Has a Lot Of Special Equipment

Perhaps the fanciest bicycle in existence belongs to Charles E. Adams of Chicago. Three years ago Adams bought a bicycle and started adding his own special equipment to it. Now it has an overhead canopy for shade, a car radio, 15 lights, built-in holder for cigarettes, an ash tray, a cigar lighter, three bells with five different tones, direction signals, two rear-view mirrors and a tool kit. Two motorcycle batteries provide electricity for the radio and lights. An accomplished musician, Adams also carries along a flute he made from a length of bamboo and an umbrella handle. He rides the bike to work each day and a meter on the front wheel shows he has pedaled 9532 miles in three years.

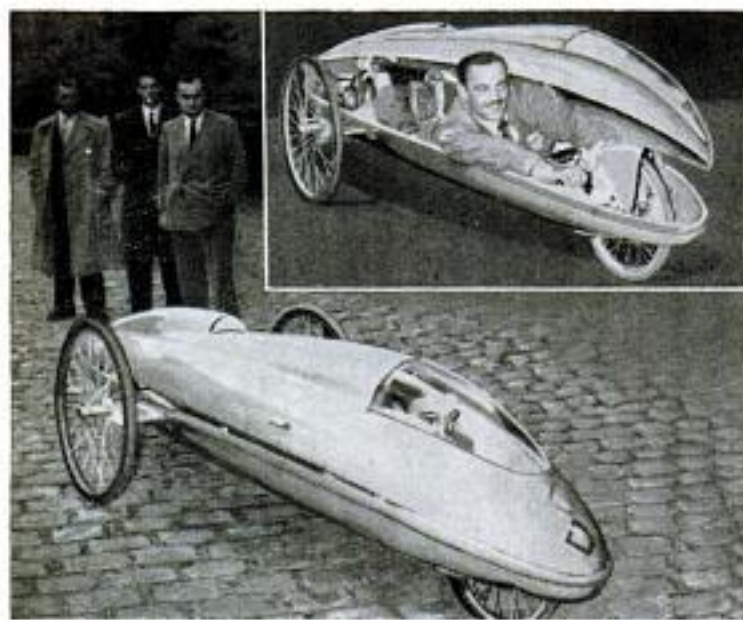
Electric Mousetrap →

Rodents kill themselves in an electric mousetrap that can be connected to any house outlet. Electricity flows through the cage's zinc-coated walls and floor. When a mouse crawls into a hole in the top of the trap, he completes the circuit and is electrocuted. Up to five rodents can be killed before resetting the trap.



Person Generates Heat

Even when sitting still, a person generates enough heat (100 watts) to bring a quart of water to a boil in one hour.

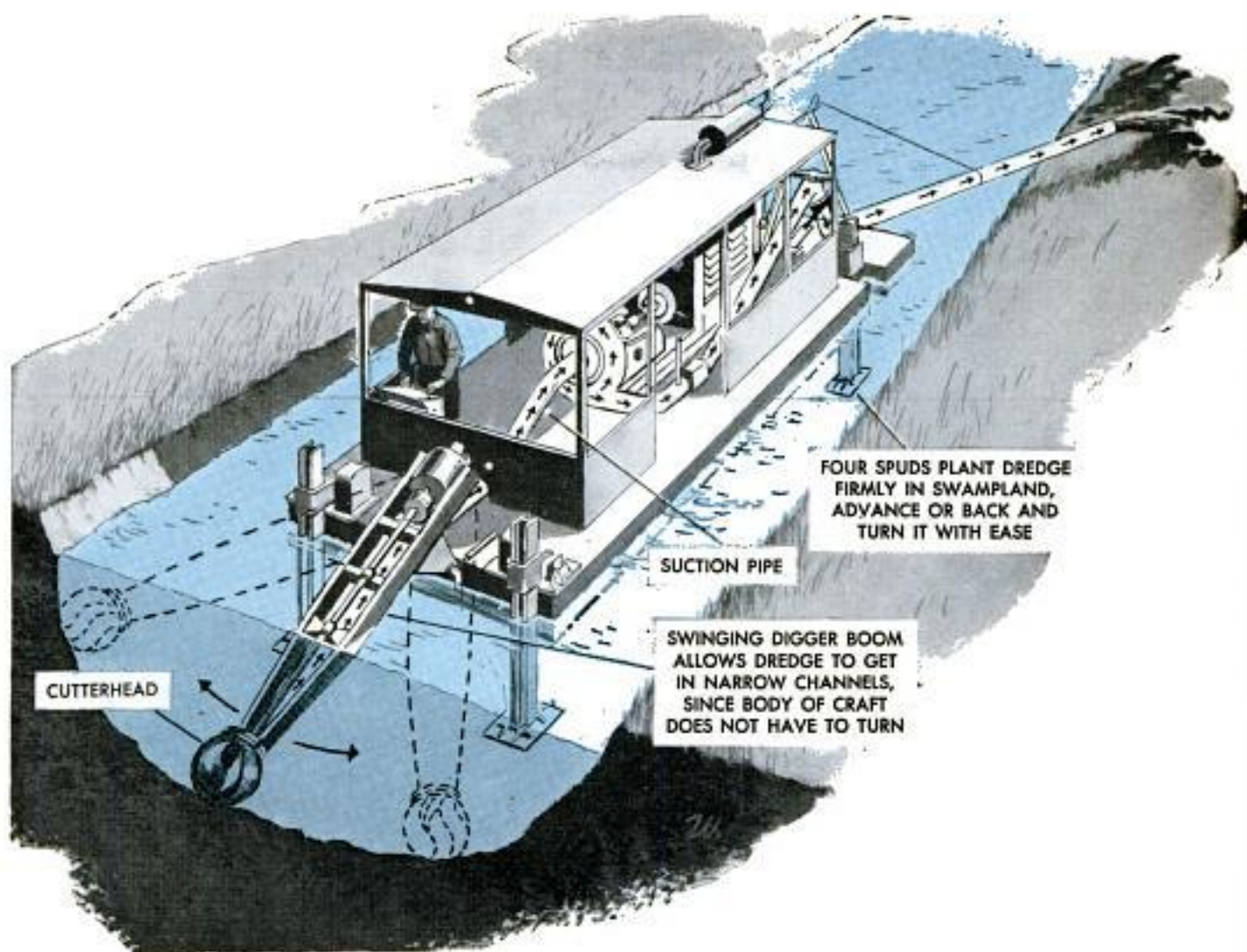


Horizontal Cyclist Rests While He Rides

Motor-bicyclists preferring to drive in a horizontal position look with envy at a three-wheel, rocket-shaped vehicle recently unveiled in Paris. Power-wise, this speedster is about equal to its motor-bike counterpart.

Gold-Coated Windshields

Gold coating insulates automobile windshields against summer heat rays. Ford scientists find that glass, covered with a gold film 30,000 times thinner than a human hair, filters the heat rays.



"Walking" Dredge Cuts Drainage Canal

ONE MAN operates a dredge built to carve a drainage canal extending eight feet deep and 16 to 17 feet wide through a swamp. Mounted on its bow is a boom that not only swings up and down, but sidewise as a cutterhead chews away the mud and a suction pipe carries the sludge to the rear of the boom, through a pump and out a discharge pipe at the stern. Four adjustable steel spuds (legs) brace the dredge during

digging, and advance or back and turn it. Every movable part of the machine is operated hydraulically by one man from a central control panel. The craft is 11 feet wide, three feet deep and 28 feet long, and can cruise under its own power by using the jet thrust and steering action of the discharge pipe floating in the water. It digs 100 cubic yards per hour of silt or 80 cubic yards hourly of sand.

First dredge of this design went to work cutting a drainage canal through a swamp near Baltimore airport





Fire Cart Protects Ranch

Fire protection on a ranch near Merced, Calif., is assured with a home-made cart to carry the hose. When the roof of the cart is removed, the sides fall and expose the sides for attachment to a hydrant. The hose can be fastened to a hydrant and then unwound, as the cart is pulled to the fire. The cart has four square feet of tongue-and-groove flooring, in addition to a handle and two legs at the front and two small rubber-tired wheels at the rear. Mounted on the floor is a revolving platform. A shaft in the center rides in a bearing in the floor. The shaft extends upward and is used as a base around which to coil the hose on the platform.

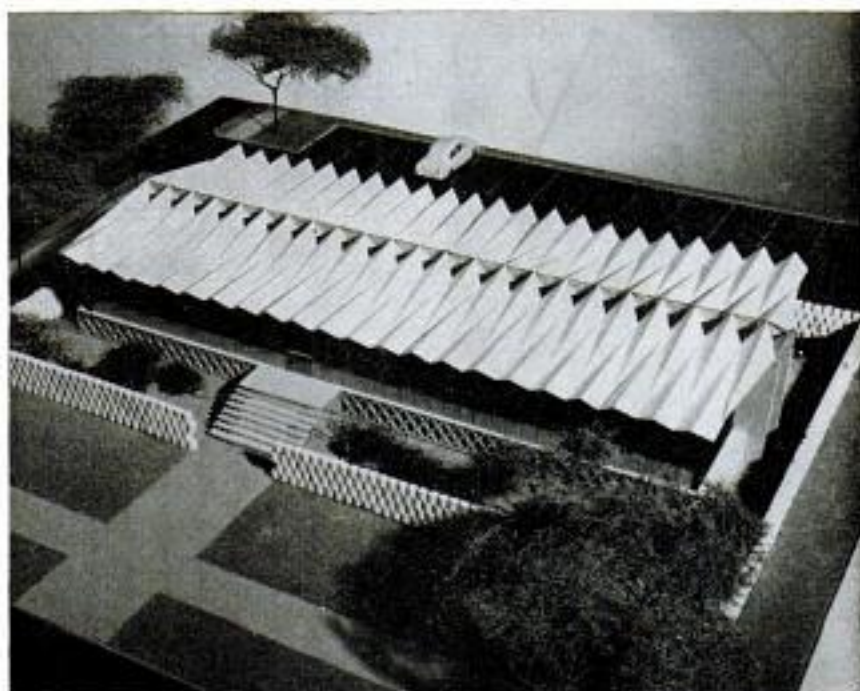


Thin Skin For Wire

Copper wire is being coated with an aluminum skin $\frac{1}{40}$ as thick as human skin to prevent oxidation. The process, developed by Westinghouse, will increase the life of electrical equipment.

Concrete Roof

Even the roof of the building planned to house the American Concrete Institute near Detroit will be made of concrete. Thin, folded plates of reinforced concrete, cantilevered front and rear from the concrete interior walls, will cover the building. A system of triangular skylights down the middle of the roof will light up the corridor below. A perforated screen of colored pipe sections, backed up by glass, make up the end walls while concrete panels and glass form the side walls.



Ministry of Works
Geothermal Investigations

The PUBLIC are WARNED
that ALL PITS may contain
TOXIC GASES
and should
KEEP CLEAR of ALL
PIPES and EQUIPMENT

BY OFFER



New Zealand's Ministry of Works posts signs to keep public aware of toxic steam

Tapping the Devil's Cauldron for Power

*Reprinted
in PM HIGHLIGHTS*

By Richard F. Dempewolf

Photos by Richard Harrington

YOU HEAR AND SMELL Wairakei long before you get to it. The sulphurous breath of Hades hangs in the picturesque valleys of northern New Zealand's uplands—fuming from hundreds of boiling mudholes, steaming pits and fissures in the earth's crust on the Waikato River plain. Here, more than 40 shrieking manmade geysers are sending white jets of steam billowing hundreds of feet up and across the scalded valley floor. The ground trembles and the noise is deafening. The landscape is dusted with





Steam from a "cleaned" well is deflected into horizontal pipes and shoots 100 yards across countryside

pumice and crusted with heavy white deposits of silica. Trees kissed by those infernal jets glitter like white-sprayed Christmas decorations. They soon become

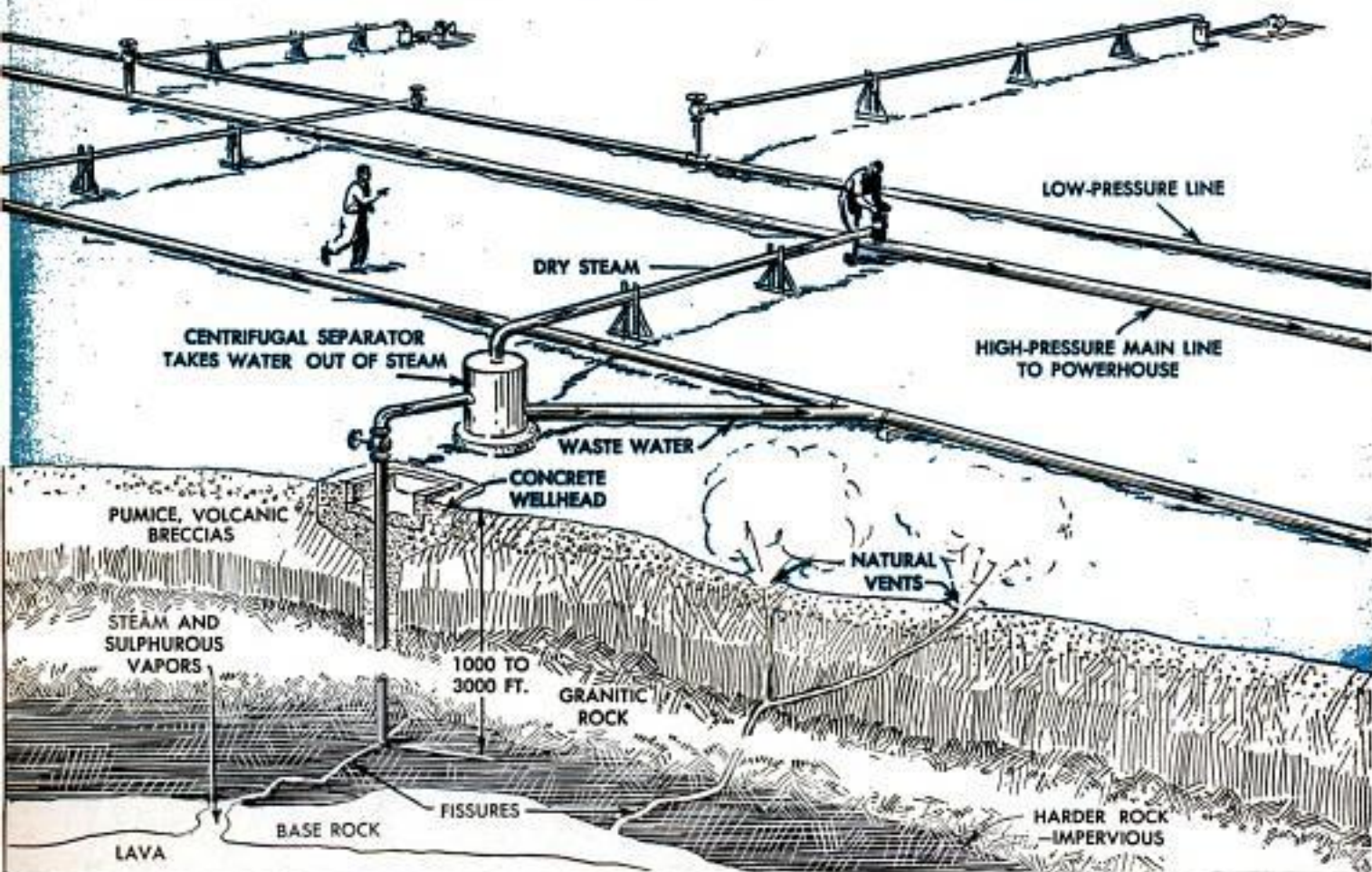
dead snags under the heat and the fumes.

Wairakei lies in the center of a vast thermal region stretching 170 miles north-eastward through villages with colorful Maori names like Tongariro, Waiotapu, Rotorua and Tikitere. In Rotorua, boiling geysers have ripped through the floors of stores and sent hot mud 25 feet into the air, steam puffs from gutter drains, asphalt streets develop hot patches and the golf course boasts unique natural hazards—small open steam vents that grunt puffs of vapor and are known as "grunting pigs." Homes and public buildings get their hot water and heat from shallow wells. One resident grows orchids in a greenhouse heated with geothermal steam.

None of this is new to the Maoris, who have been using the subterranean steam since A.D. 1500 to cook their food, wash clothing and bathe. But neither Maoris nor British colonials who followed them were aware, until recently, of the full potential of the forces beneath them.

At Wairakei, hard-hatted crews are drilling through the earth's crust to tap nature's boiler for the high-pressure, superheated steam. Already it is turning generators to produce electrical power for northern New Zealand's growing domestic and industrial

Diagram shows how Wairakei volcanic steam will help generators create 100,000 kilowatts of electric power



needs. Mr. L. Fooks, energetic superintendent of the Wairakei Geothermal Project, explains that the \$12,000,000 job of turning volcanoes into volts is not just a frightening experiment. "We've about reached the end of North Island's hydroelectric potential," he points out, "and coal-fired power stations are impossibly expensive here. But now we've got ready-made steam power without any fuel cost. Right here in Wairakei there's a proven potential of 250,000 kilowatts—and it may even go to 500,000."

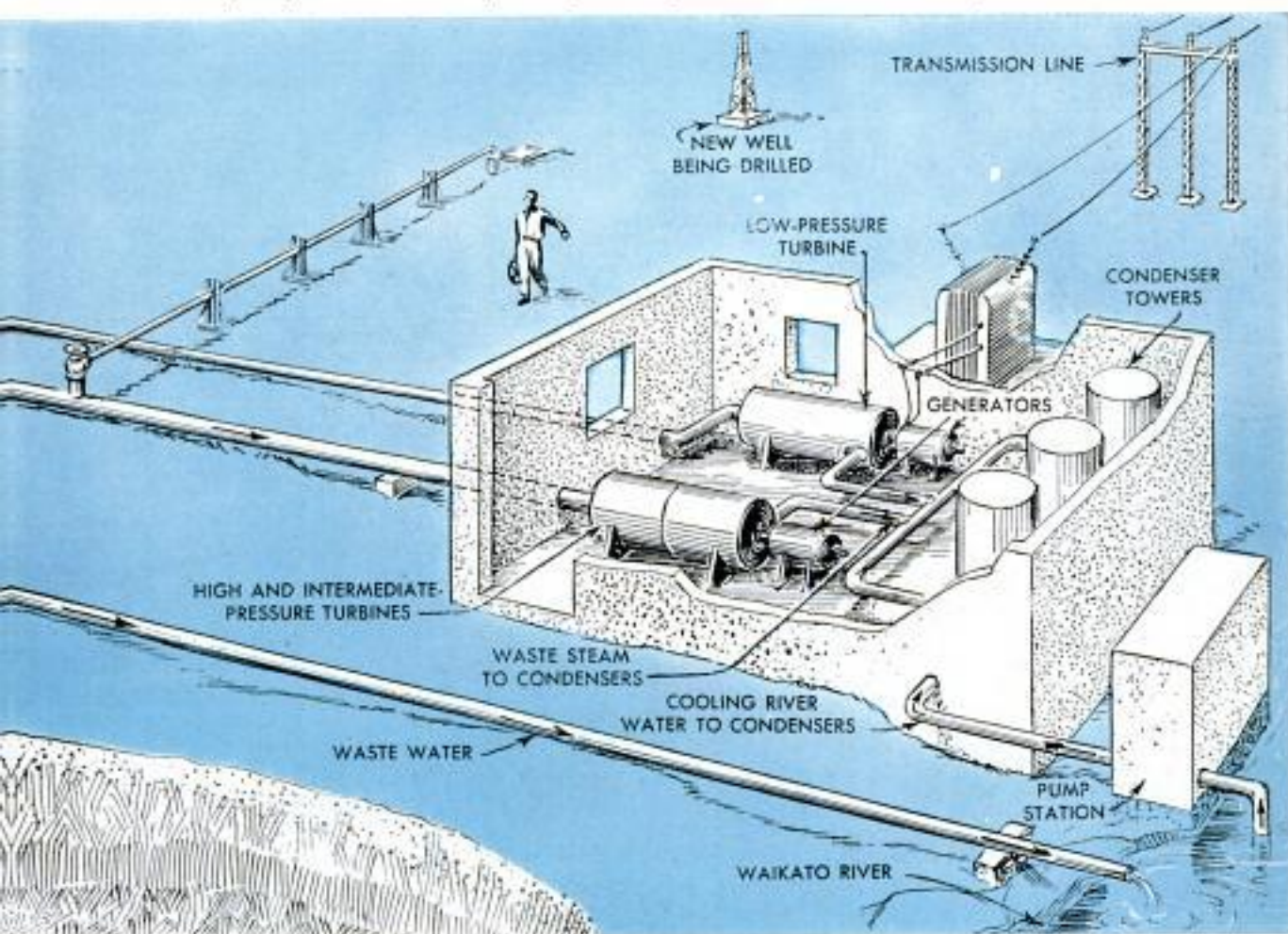
As you drive down the valley of roaring smokes, Fooks passes you a pair of ear plugs. Without them, you may bleed from the ears, as you move close to the mammoth uncapped jets. The shriek of steam at a freshly blown well opening has been clocked at 150 decibels—10 more than you'd get from the tail pipe of a jet plane. Close beside one of the openings, the earth shudders and the smell of sulphur is everywhere. Most of the pipes lie flat on the ground, with big cylindrical openings at the end—some of them five feet in diameter. These are "mufflers." "The smaller ones," Fooks explains in shouts and sign language, "have baffles inside. The big ones of concrete are a series of pipes increasing



Huge mud lakes near Wairakei steam, boil and bubble leaving tremendous steaming potholes and craters

in size—like the barrel of an extended telescope." The latter have no baffles, and are buried under piles of earth to hold them steady. Both types cut down the

Eventual capacity of this electric-power generating station at Wairakei may run to 500,000 kilowatts





Maori Indians of Rotorua in Geothermal Valley guide the warm water into pools for laundry and bathing

high frequencies which are the most unpleasant, but the actual noise level is only cut about 15 decibels—"from unbearable to uncomfortable," says Fooks.

No one on the project knew what he'd be getting into when the first bores were drilled at Wairakei in 1949. Sulphurated hydrogen is combined with the steam rising from vents in the Tongariro and Rotorua areas. Last year two ditch diggers in Wairakei village collapsed and died from

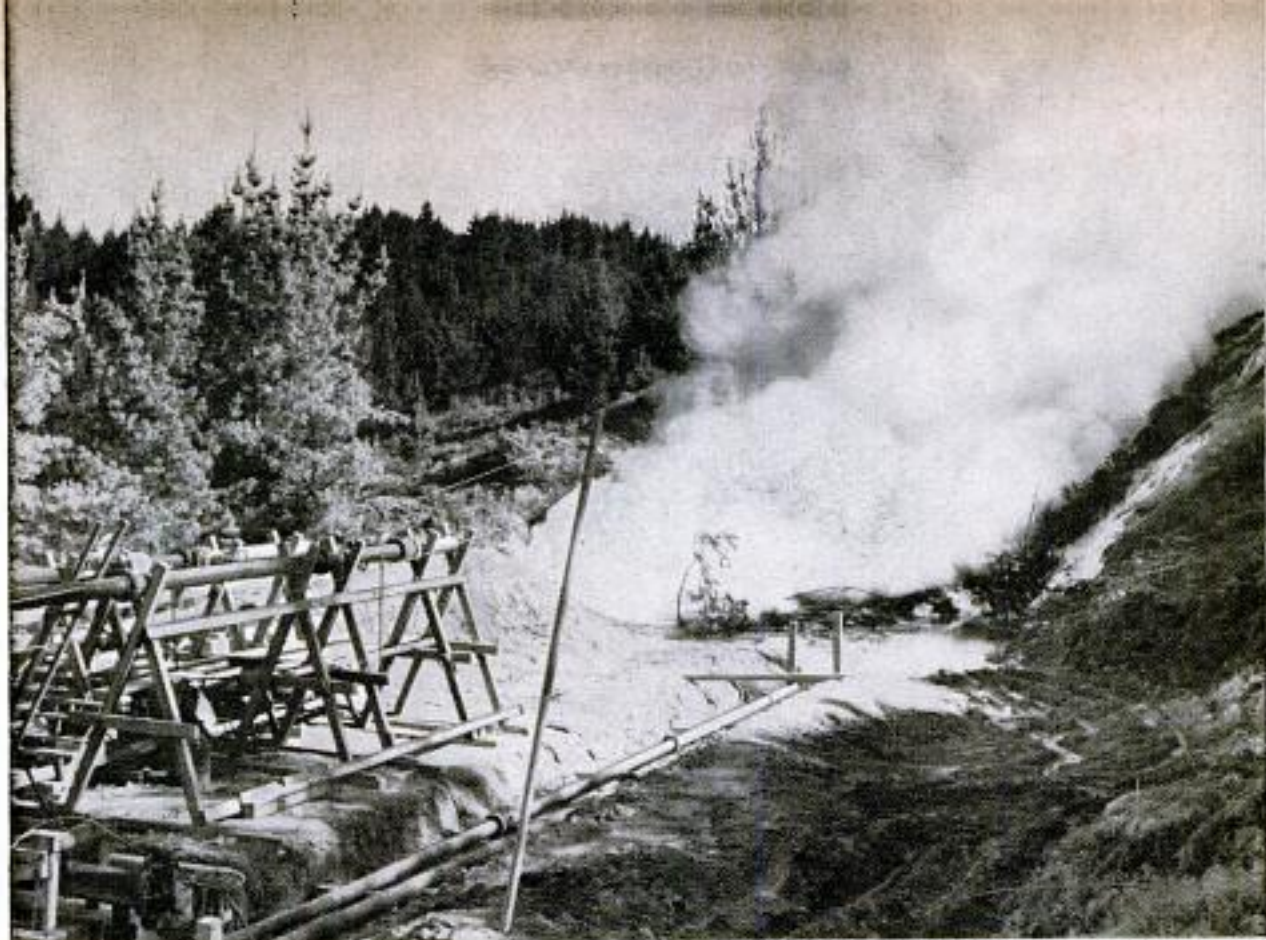
fumes. "We could and did take precautions against fumes," says Fooks. "But our biggest hazard was from blowouts—and still is. Underground vapors are still forced up through fissures in new places. They turn the country to scalding mud that undermines buildings and drill rigs. So far we've been lucky." The first 4-inch test hole struck hot water at 200 feet. Thirteen others were sunk to depths reaching 1100 feet. One produced a steam jet capable of spin-

Vegetables are cooked by a Maori housewife who ties them in a woven bag and suspends them in hot spring



Steam from man-drilled geysers shoots hundreds of feet into air in Valley of 40 Smokes, New Zealand





Deep-well geyser shows how sulphurous steam roars through vegetation of a valley to stunt and kill plants

ning a 1000-kilowatt generator, and the engineers went on to deeper, wider holes. The largest hole, a 10-incher, came in with enough steam for 6000 kilowatts. But the granddaddy of them all was an 8-inch bore that geysered in to the tune of a potential 20,000 kilowatts of power.

Drilling is accomplished much the same way an oil-drilling crew brings in black gold in Texas or Oklahoma. In fact, the drilling rigs came from Oklahoma. Water and mud are poured into the hole as the drill grinds down, and pulverized rock is washed out periodically. No one knows exactly when the hole will "blow." "Any bore more than 200 feet deep may suddenly send everything sky-high," Fooks reports. "We control them by pouring cold water down the hole while drilling. An 8-inch column of water in a 1000-foot stand of pipe exerts enough

(Continued to page 238)

Sulphurous steam fumes, issuing from caves and cracks in the side of a cliff, created this tremendous sulphur deposit in Geothermal Valley





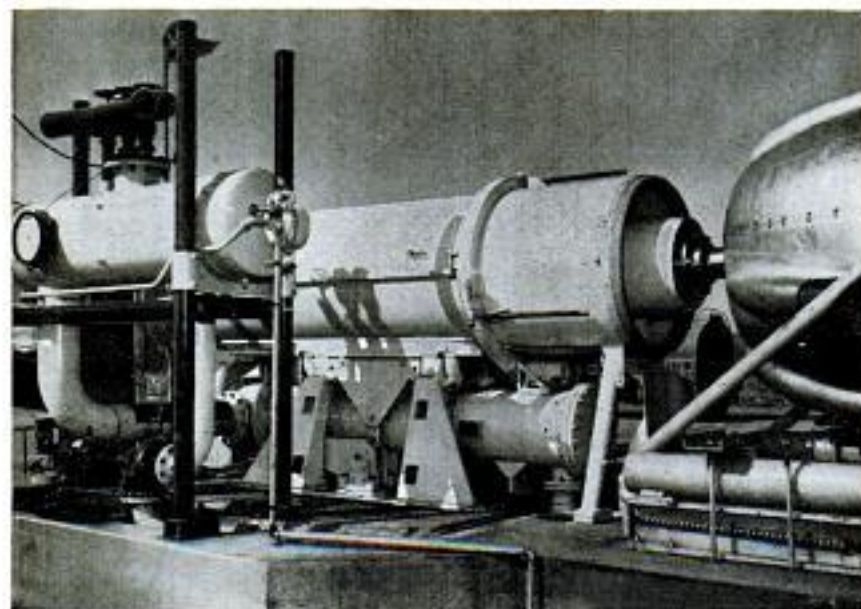
Ointment-Bandage Lasts Two Weeks

Purdue University has announced a new development which will be a boon to burn and poison-ivy sufferers and to those who take care of them. A plastic bandage and an ointment have been perfected, either of which will release a constant level of medication to the skin for as long as two weeks, and work by an ion-exchange process. Through this new treatment, persons suffering burns, poison ivy and similar ailments need not undergo the pain connected with frequent changes of bandages.

Two-Way Iron

Remove the heating plate from a new flatiron device, and the plate can be used as an immersion heater for boiling water. Reinstalled in the flatiron, the plate performs conventionally. Consumption of current is small. This heater is available for 110 and 220 volts.

☐ Radio signals from Venus, possibly electrical storms on the planet, have been picked up by Ohio State's radio observatory.



Aircraft-Engine Test Cell

After overhaul, aircraft engines at the TWA Overhaul Base at Kansas City, Mo., are dollyed into the test hangar and attached to a monstrous test cell recently put into operation. The cell is a hydraulic dynamometer in which the propeller shaft is fastened to a series of turbine wheels spinning in oil which absorb all power of the tested unit. All engine-performance data concerning the engine are automatically recorded.

KEEPING UP WITH THE ATOM

BEHIND THE HEADLINES: The Suez crisis, according to one report, has forced oil-hungry Britain to accelerate its nuclear-energy program. As each power reactor goes critical in England, that nation becomes slightly less dependent upon oil as a power source. It is believed that the British will build three nuclear-power stations which have not been previously announced, two in England and one in Scotland.

Britain already leads all nations in expenditures for nuclear-power plants.

☆ ☆ ☆

A FOURTH KIND of nuclear reaction is possible, according to Dr. L. W. Alvarez of the University of California. The three types previously known are the bombardment of atoms with atomic particles in giant accelerators; fission, in which atomic particles split apart other atoms (the A-bomb); and fusion, the thermonuclear reaction of the hydrogen bomb.

The new kind of reaction, called a "catalyzed nuclear reaction," somewhat resembles fusion but occurs at much lower temperatures than those required to touch off the H-bomb. An atomic particle, the negative mu meson, is the heart of the reaction. It is not affected itself, but it helps along a reaction that releases 5,400,000 electron volts of energy.

Trouble is, the mu meson has such a short lifetime that the reaction isn't very likely to occur. The discovery is of considerable interest to physicists but will not be of any practical importance unless other sub-nuclear catalysts with longer lifetimes can be found.

☆ ☆ ☆

ONE OF THE MOST IMPORTANT fields for peacetime use of the atom has been largely overlooked, according to S. L. Nelson of General Electric.

While scientists have been trying to wrest electric power and motive power from the atom, they have done little to use raw energy from the atomic nucleus for space heating.

Nelson points out that heating with atomic energy is relatively simple compared to obtaining electrical power from the atom. To drive a steam turbine effectively you need high temperatures and pressures, but many materials which meet these requirements become highly radio-

active in a reactor. On the other hand, low pressures and temperatures suffice nicely for space heating.

A good example of this is at the Hanford atomic plant. For years, hot water (carrying heat from the reactor) has been dumped into the river, while coal was being burned to heat the plant. A new heat-exchanger system now is stealing heat from the reactor to heat several of the buildings.

Nelson foresees no reactor inside your home to replace your furnace, but he does see the possibility of atomic energy heating large hotels, office buildings, city centers and factories. And, as he points out, such buildings "may be heated without a speck of soot, an ounce of ash or a cubic foot of smog."

☆ ☆ ☆

WANTED: Cans of food at least 11 years old.

The Food and Drug Administration is making a survey to determine how much radioactivity gets into the foods we eat. As one part of the survey, the FDA is collecting samples of food that have been canned recently. However, the year 1945 is the "year one" of the atomic age, points out Commissioner George P. Larrick, and samples of canned food packed prior to 1945 are needed for comparison.

The goals of the program are to determine the background radioactivity of foods from various parts of the country, and to learn whether the radioactivity has been increased by the testing of nuclear weapons and other applications of atomic energy.

☆ ☆ ☆

THE ATOM-POWERED CAR is a plain impossibility unless some basic new scientific principle is discovered.

This belief, long held by the scientists, has been given new expression by C. R. Lewis of the Chrysler Corporation's engineering division. He points out that according to one estimate a 3000-pound automobile would require a nuclear-power plant weighing 80,000 pounds to move it along the highway.

The only hope for an atom-powered car or "atomobile," Lewis states, is the possibility that an efficient means of storing energy might be developed. Then stored nuclear energy could power our cars.



German Phono Bar

Here's a new way of promoting records which may eliminate the disk jockey. It's a music bar at a German fair where a record firm introduces its latest recordings to the public via this ingenious earphone method. Patrons can use either one or two earphones for listening.

TV in Nicaragua

Nicaragua is the latest of the Latin American nations to introduce television programs.

Maintenance Machine

Retractable wheels permit a track-maintenance machine to ride along the rails, on a highway or cross-country. The operator, if he chooses, can take a highway to the maintenance site, riding along on huge rubber tires. Flanged guide wheels lift the front tires clear of the ground and rails and carry 40 percent of the weight normally on the rear traction wheels. The rubber tires ride up and over crossings.



All-Weather Tractor

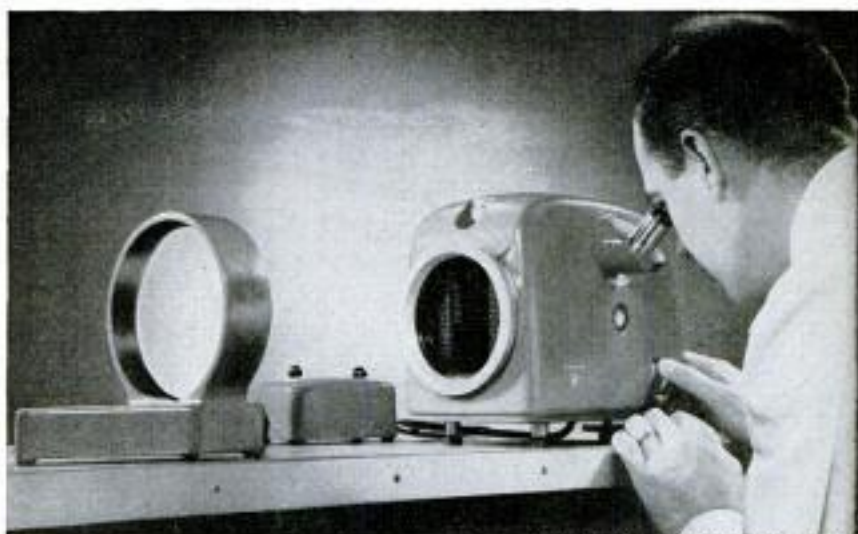
Comfortably encased in the steel and glass cabin of his tractor, today's farmer flicks a switch for air conditioning in summer or warmth in winter. Push-button radio is another advantage enjoyed by atomic-age tractor toilers.

Busy Airport

Chicago Midway airport, the world's busiest, handles more traffic in a year than Amsterdam, Copenhagen, London, Paris and Zurich combined.

Instrument Measures the "Bend" in 400-Pound Granite Plate

"Bending" in such flat, solid surfaces as a 400-pound granite plate can be measured to $\frac{3}{4},000,000$ inch by the alignment interferometer. This device has a main body (light source) and a mirror. A ray of light shoots from the main body and is reflected by the mirror, which may be set 14 feet away. Light waves act as "rulers" by which minute variations are measured. Through the machine's eyepiece the operator sees three dark parallel lines at zero setting. As mirror position alters, the field of view is crowded with lines. This change in basic line pattern indicates a change in angle of light reflected from the mirror to the main body. Readjustment of the instrument returns the original three lines to the field. Total departure from zero is read from the graduated control dial.



Bausch & Lomb Optical Co. photos

Reflected light waves act as rulers by which minute variations in surface are measured. Below right, three dark parallel lines show zero setting. Below left, crowded lines show change in light and surface



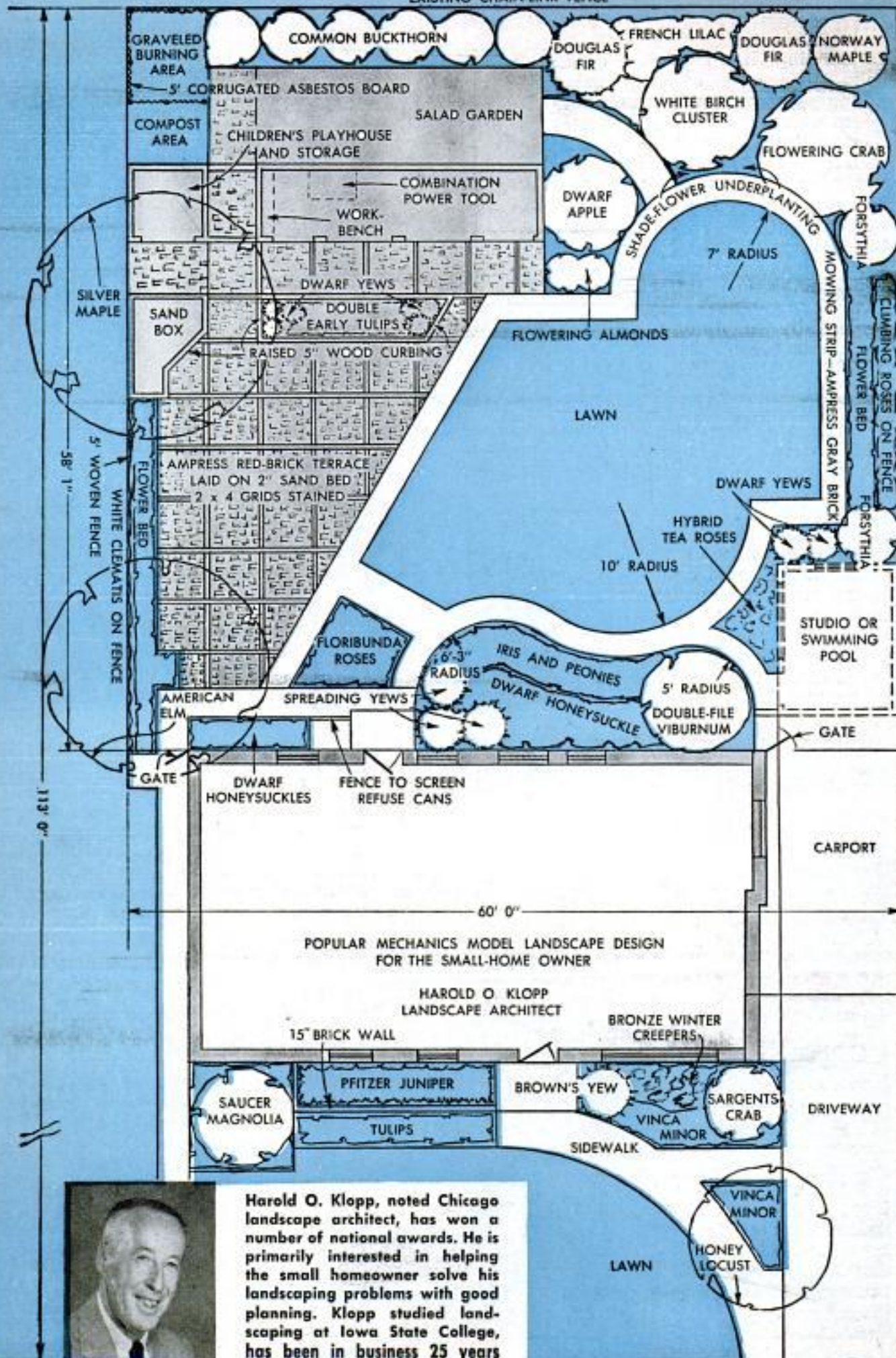
Standard Spinning Reel Fits Bow

Sportsmen who like to fish with archery equipment now can mount a standard spinning reel on a bow. A special mounting holds the reel at the center of the bow just above the archer's hand. The end of the line goes back to the feathered tip of the arrow, and the line pays out easily behind the arrow. All the archer has to do to retrieve the arrow—or fish—is reel in the line.

Highest Simulated Height

Simulated altitude of 198,770 feet—about 38 miles—has been reached by a U.S. Air Force major in an aero-medical test chamber at Wright Air Development Center, Dayton, Ohio. Maj. Arnold I. Beck, wearing a partial pressure suit and pressure helmet, attained record height in near-vacuum atmosphere. Pressure at ascent peak was .0048 pounds per square inch, compared to 14.7 pounds per square inch at ground level.

EXISTING CHAIN-LINK FENCE



Harold O. Klopp, noted Chicago landscape architect, has won a number of national awards. He is primarily interested in helping the small homeowner solve his landscaping problems with good planning. Klopp studied landscaping at Iowa State College, has been in business 25 years



Color photo and black-and-white inset were taken from same corner of Hedden yard—two years apart

*A 60-foot lot can be transformed into a place
for outdoor living on a grand scale with*

PM's Landscaping Plan for the Small Yard

By Jay W. Hedden

MIRACLES are not a part of this modern world, but a near-miracle can happen in a couple of years when it comes to landscaping. I know, because we worked one in our yard to transform it from a mudhole to a showplace in just 24 months. Like most worthwhile projects it took a lot of time and hard work, but we could not have obtained the results we did without the most important ingredient—a good plan.

When we moved into our new home in a Chicago suburb, no landscaping had been





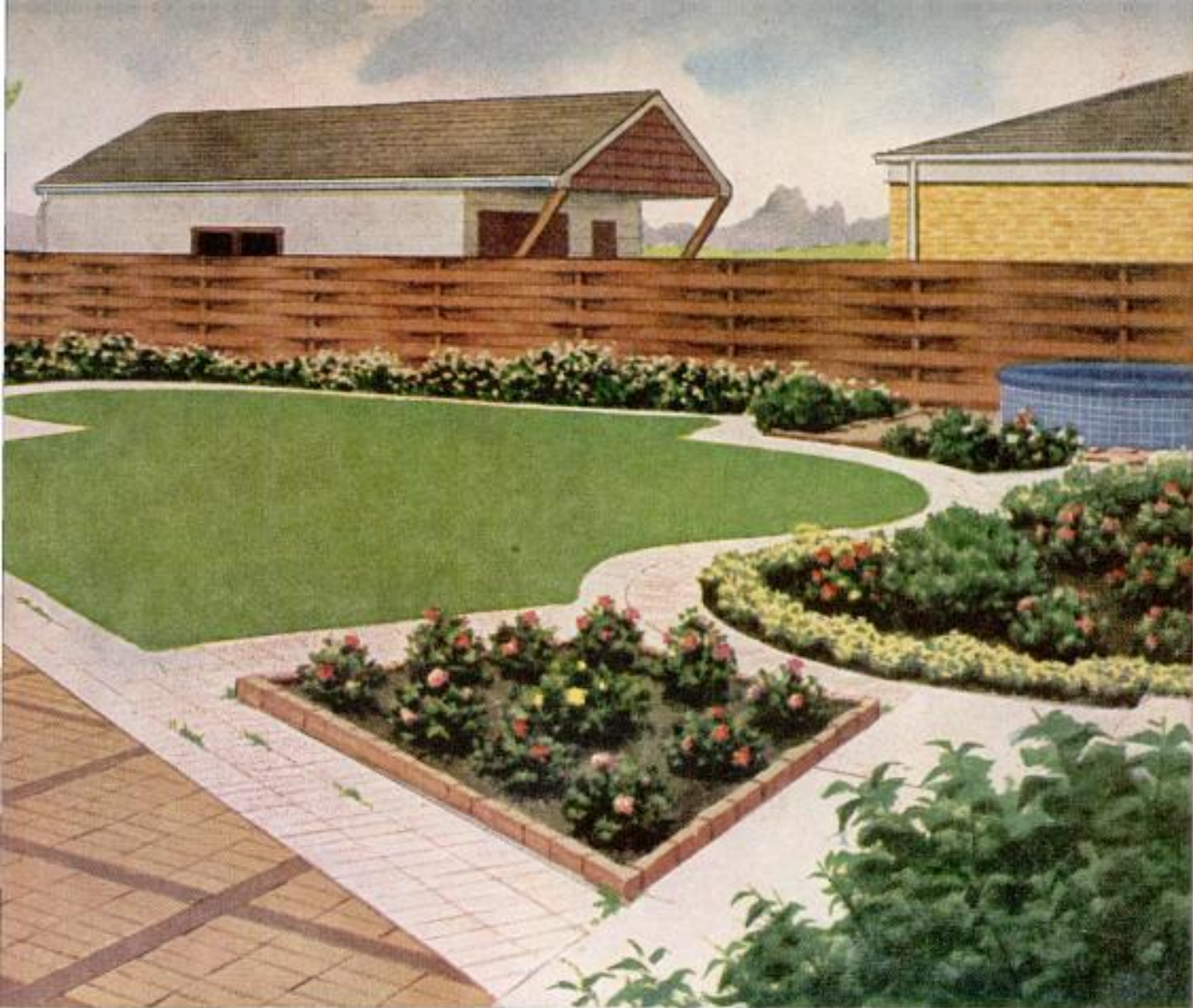
This plastic pool set in a sand pile in one corner of the yard proved to the Hedden children and their young friends that good landscaping provides for kids, too



Mrs. Hedden admires spring tulips before new planting box at front of house. Below, this same bed became a showplace in the summer with a riot of colorful blooms



done on our lot which measures 60 by 113 feet. This is a typical situation; like the average family, my wife and I figured on doing the work ourselves. As soon as spring had thawed the ground we planted grass in the front yard. You can't go wrong planting grass; it's green and keeps down the mud when it rains and prevents blowing dust when it's fair.



Brick patio, walks and general "framing" of landscaping are designed to give small yard a spacious look

Landscaping the back yard presented more of a problem than the front, since we wanted a patio for outdoor parties and a place for our 10-year-old son, Dick, and 6-year-old daughter, Dana, to play. Also, we needed storage space for garden tools, patio furniture and the children's bicycles because the house had neither basement nor attic.

Since the back yard was to be an "outdoor living room" it needed a wall, which we provided by building a five-foot basket-weave fence. This required the friendly cooperation of our neighbors, since their properties also would be affected.

At this point in our landscaping program we had a fenced-in area of sun-baked clay. I took photographs of this desolation and showed them around the *Popular Mechanics* office where I work to demonstrate what a new homeowner has to face. This was when ideas started germinating for a landscaping story.

We started with questions and answers:

"How many families have this same problem every year?" Thousands.

"How do you determine what to plant so your yard is largely self-maintaining and permits you leisure time to enjoy it?" We didn't know.

"How can you be sure that toolhouses, storage walls and the like are compatible with the house architecture, and that they are arranged for greatest convenience and will add to, rather than detract from, the over-all appearance of the yard?" We didn't know this, either.

When the questions and answers were boiled down we came up with these facts: Most homeowner landscaping jobs are a combination of advice from well-meaning friends and over-enthusiasm when looking through seed catalogues. Since the results seldom are satisfactory, we knew there must be a better way. Our ranch-type home with its small yard is typical of thousands of others across the country. It occurred to the *Popular Mechanics* staff



This picture and the one on the opposite page show tremendous contrast created by a good landscape plan

that the landscaping of my yard might serve as a model or guide for others.

There are experts — professionals — in every field. In landscaping, it's the landscape architect. Few homes are built without the aid of an architect. His knowledge and experience make it possible for him to design a structure for a particular need so that it can be built with a minimum of wasted time and material. The savings thus gained outweigh the cost of his fee. We were to discover this also was true with a landscape architect.

Popular Mechanics contacted the Chicago Horticultural Society which recommended Harold O. Klopp. When I contacted

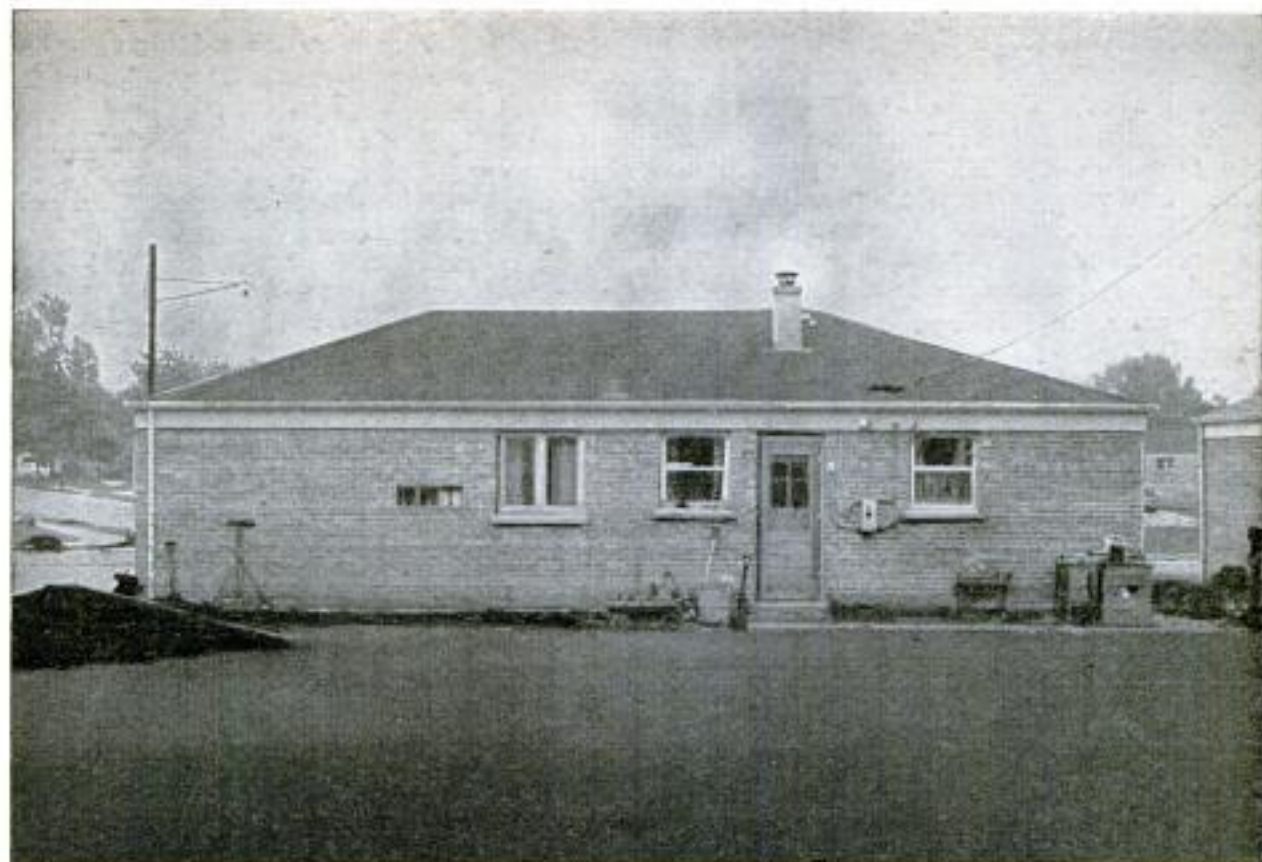
Children's salad garden delighted them all summer



Klopp I told him that we wanted a landscape design for a small yard and asked what the fee would be. For large estates and developments Klopp said that he charged a percentage of the over-all cost of home and grounds. For the small yard of a suburban home his flat rate was \$65.

My wife and I had a list of requirements for the yard and Klopp carefully noted them. He made suggestions for arranging the storage area so that a workshop and the children's playhouse-storage area could be consolidated, saving both space and materials. At the end of our talk he knew what we wanted and that my wife and I would do most of the work ourselves. This latter fact determines, in some cases, the type of materials to be used. For example, it would not be feasible for one man to pour a large area of concrete unaided. Materials that can be handled easily by one man are a requisite in a situation such as mine.

The major differences between modern landscaping and the older, formal landscaping, Klopp told us, is that modern landscaping integrates the house and yard. Formal landscaping treated house and yard as separate entities, so that the house and landscaping had little or no relation to each other. Also, today's landscaping first considers the "frame," which consists of the walks, fences, walls,



Before landscaping, rear view of house and yard was nondescript and depressing. Klopp changed all that

planting beds and the like, and finally the "picture," which includes the flowers, shrubs and other plantings. The eyes follow the frame more quickly than the picture, so optical illusions can be designed into the frame to make a yard appear larger, longer or wider as desired.

Following Klopp's instructions, I carefully measured the yard and house, noting the position of the house in relation to the yard. Next, I measured all windows and doors and sketched their locations on a rough drawing. Finally, I drew an elevation of each side of the house and drew in the windows with their dimensions and heights from the ground. From the house and yard dimensions, and the direction in which the house faces, Klopp determined where to locate shade trees and plantings. The height of the windows above ground determined the height of plantings under them. Since there is a railroad track running behind the yard, planting at the rear of the yard was designed to act as a sound baffle in conjunction with the storage wall that runs parallel to the planting. This type of planting also could be used to screen and muffle the sound emanating from a busy street, highway or even a dusty alley.

A few days after Klopp received my sketches he returned the finished plan, pretty much as it appears on the first page of this article. We now had the first step in the landscaping. As noted on the plan,

ground cover such as *Vinca minor* is used under trees and between low-growing shrubs. The *Vinca* keeps down the weeds, thus minimizing the need for weeding. *Ajuca genevensis* does the same job under the saucer magnolia tree in front. The magnolia tree is used to balance the planting at the front of the house, which tapers down from the magnolia, through the junipers in the planting box and down to the winter creepers which are a ground-hugging evergreen. The latter plants are directly under a large picture window that is only a few inches above the ground. The umbrella-shaped honey locust provides shade and shelter for people entering and leaving automobiles parked on the drive at that point. Tulips and crocuses in the bed in front of the planting box provide color in early spring, then are replaced by white annuals, such as peonies, white geraniums and petunias.

In the back yard, roses are grouped in clusters, both to provide large splashes of color and to discourage weed growth beneath them. The "forest" in the far corner of the yard serves to screen sound from the railroad and to act as a windbreak in winter. Shade-flower underplantings of lily of the valley and violets, and ground-covering rose moss aid in minimizing the need for weeding in this area. White clematis is used on one fence and climbing roses on the other to add color to the solid-tone

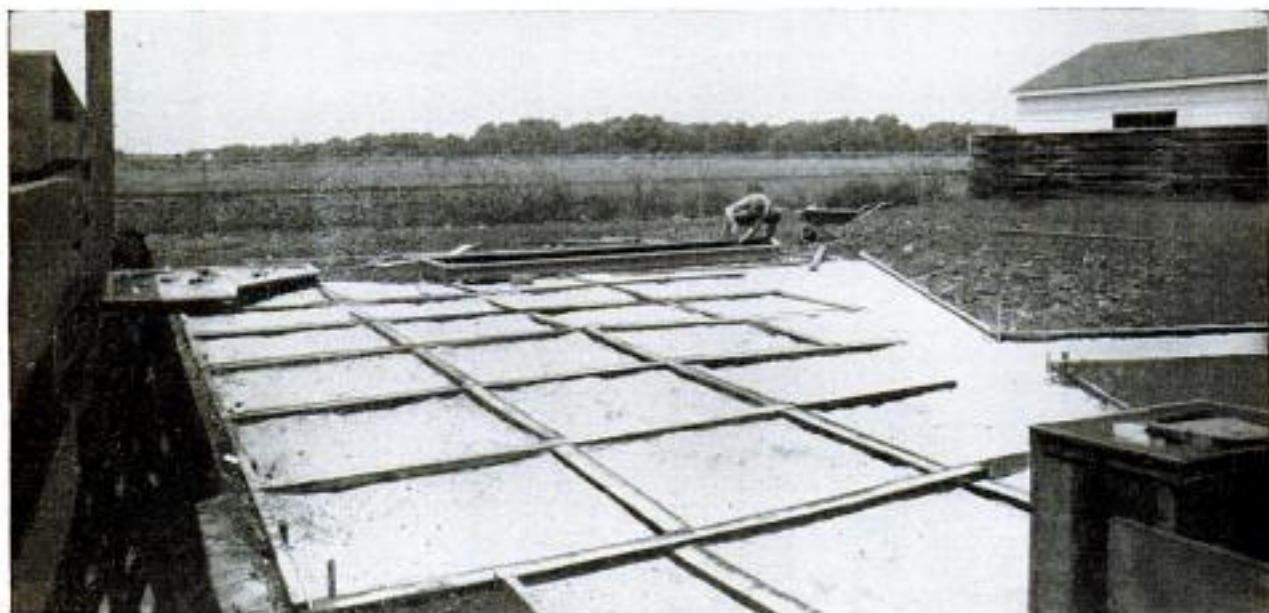
stained wood. Flower beds and planting boxes in the back yard also have tulips for early spring color and are replaced by colorful annuals.

Since the soil in the yard was heavy clay, sand was mixed with it to make a workable loam, and all flower beds were enriched with Vigoro. Instant Vigoro was used in several instances where newly planted shrubs showed signs of wilting.

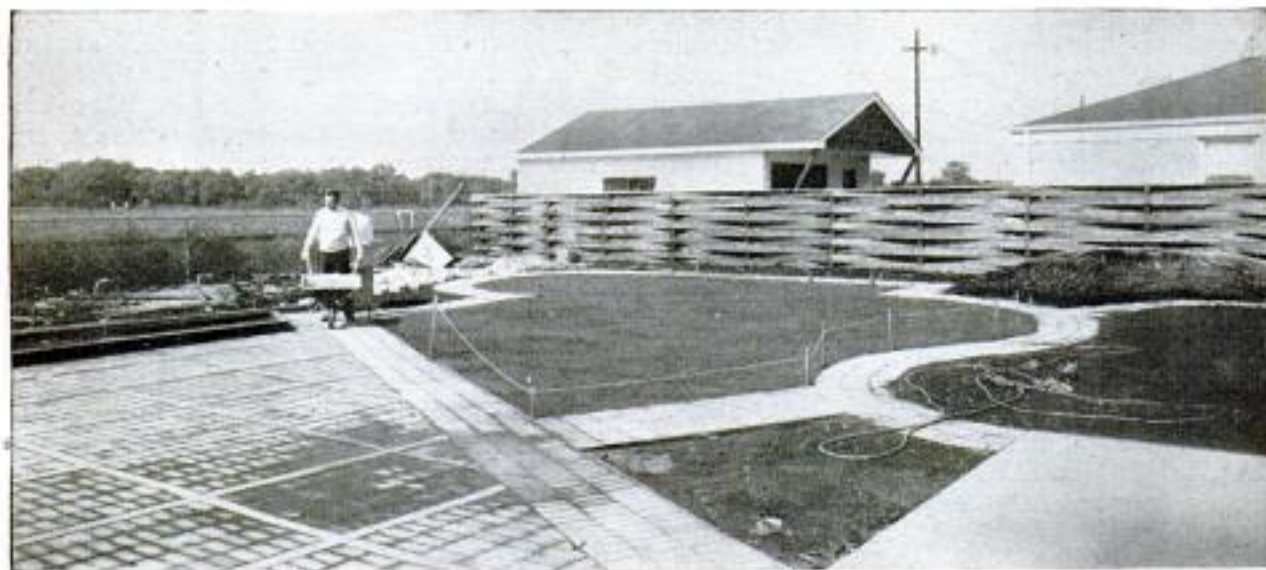
The plan indicates specific materials for the patio and walks, as well as the planting. Concrete bricks from the Ampress Brick Co. of Des Plaines, Ill., were chosen for the walks and patio because the standard brick size, two by four by eight inches is handled easily. The bricks are available in a variety of attractive colors and are held to fairly close tolerances which makes them ideal for setting without mortar for a patio. For my yard, Klopp chose coral red for the patio and gray-white for the mowing strip or walk. The mowing strip is impor-

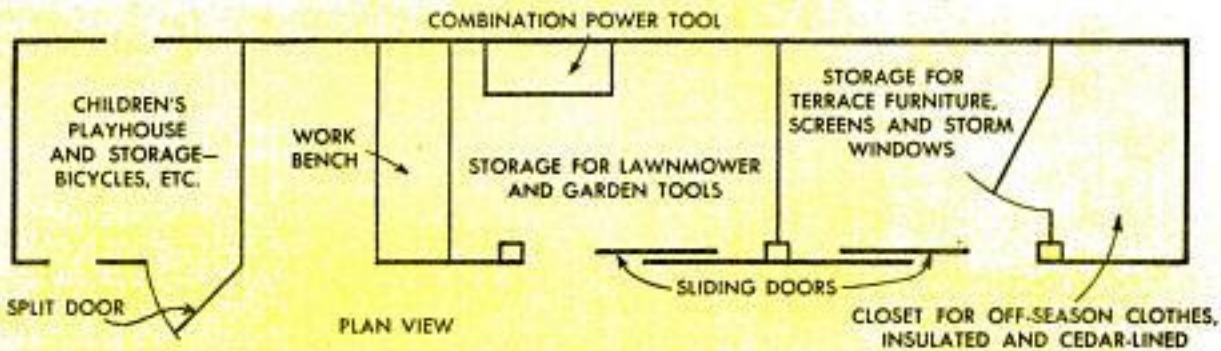
tant in that it keeps the grass and plants separated and permits one wheel of a lawn mower to run on it so that no grass need be cut with hand clippers.

Our first job was to lay out the patio and excavate to a depth of four inches. Fine sand then was leveled in the area to a depth of two inches. Bricks were fitted tightly together on top of the sand and leveled by adding or removing sand beneath them. After some experimenting, a pattern of bricks was decided on to be five bricks lengthwise on one side and 12 bricks the narrow way on the other, which produced an almost square grid. Redwood two by fours were cut and fitted to hold tightly against the bricks in this pattern. Dry sand then was swept across the bricks until all crevices between them were filled. The main advantage of using grids, other than for appearance, is that each new square provides a fresh chance to realign the rows of bricks. Along the edge of the patio



These are progress photos showing how the patio, walks and planting boxes carefully followed Klopp plan





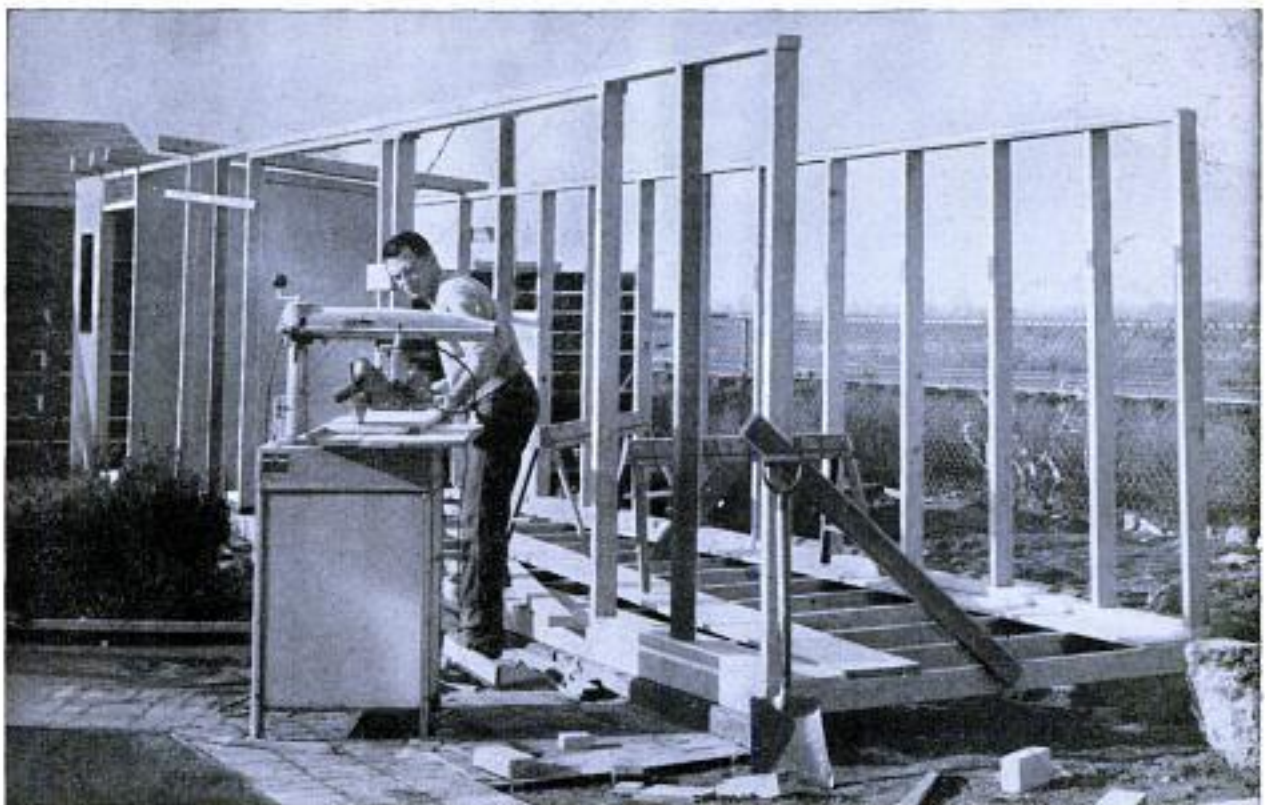
Finished storage wall provides playhouse, workshop and convenient storage for garden tools and supplies

bricks had to be cut to meet the mowing strip. The bricks were cut by using an abrasive cut-off wheel in a radial saw. Because the work is held stationary and the blade passed through it, the radial saw is ideal for the job. Despite the unorthodox method of laying the bricks in the patio and

walks two Midwestern winters have produced very little heaving or buckling. Along the edges of the patio, one-inch strips of lumber four inches wide were used to hold the fine sand. Curved portions of the mowing strips required four-inch-wide

(Continued to page 228)

As storage wall takes shape behind him, Hedden operates radial saw which is helping build its own home



GARDEN OF ROCK

By Grover Brinkman

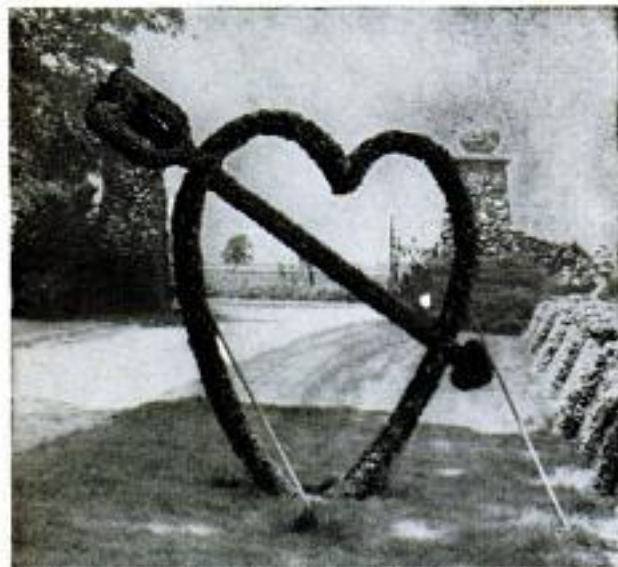
TONS OF FIST-SIZED ROCKS, creek-bed pebbles and field boulders might add up to just a pile of rocks for some people—but not to Mr. and Mrs. Arthur Martin, who live on a farm near Arcola, Ill. They have gathered rocks of every size and shape to decorate their seven-acre garden. They call their place Rockome. Last year several thousand visitors came to inspect their unusual gardens.

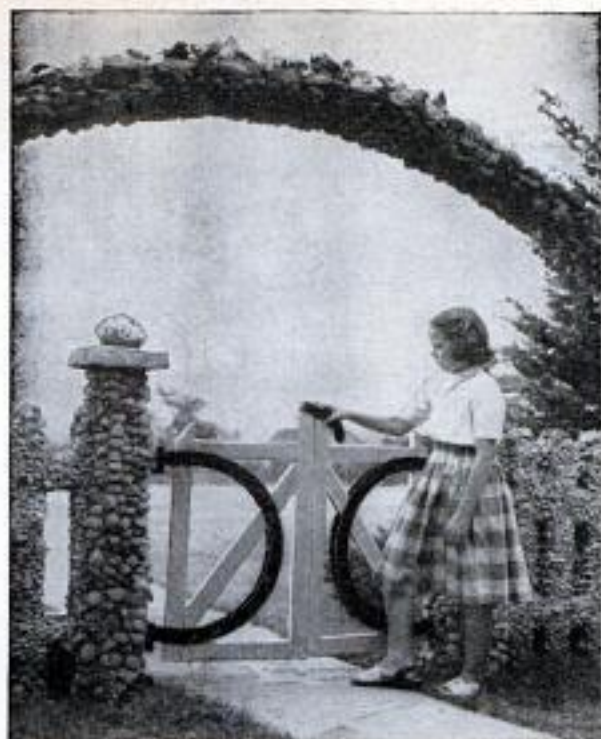
Here you will find 35 lily pools, an inviting swimming pool and more than 1000 different kinds of roses—all enclosed in rock fences of intricate design. For 20 years, the Martins have worked at beautifying this tract. They have built fences galore, unique garden enclosures, a "mission" garden, wishing wells, birdhouses on towering pedestals, huge ornamental baskets, gateways, a barbecue grill, arches, benches and pathways—all from rocks found on the farm.

Literally tons and tons of rocks have been broken into bits to make the displays. Usually this work was done in the winter when there was time to spare from farm chores. The Martins sometimes have to remind their friends that their principal job is raising broomcorn. The rocks are embedded in concrete and cast in molds. Each fence at Rockome is of a different design including inverted hearts, scrolls, diamonds



Rock settee has a chicken-wire skeleton. Below, the 10-foot Cupid's heart with arrow has served as altar for many weddings. Bottom, sample of stone fences





Swinging gate at one of the entrances to the Martin gardens has impressive arch overhead. Iron frame of the arch was covered with concrete and then carefully embedded with rocks of many sizes, colors and shapes

and many others. Some of the fences were made by applying concrete over iron frames bent in the proper shape. Rocks were then embedded, like mosaic, before the concrete hardened, a time-consuming task that had to be done quickly.

A prize ornament in the garden is a huge Cupid's heart, 10 feet tall. It is so symbolic of romance that dozens of local couples have been married before this

Rock fences of odd and intricate design weave in and out among the seven acres of gardens on the Martin farm. Arthur Martin is at work here in one of the gardens near the house. He started project back in '37

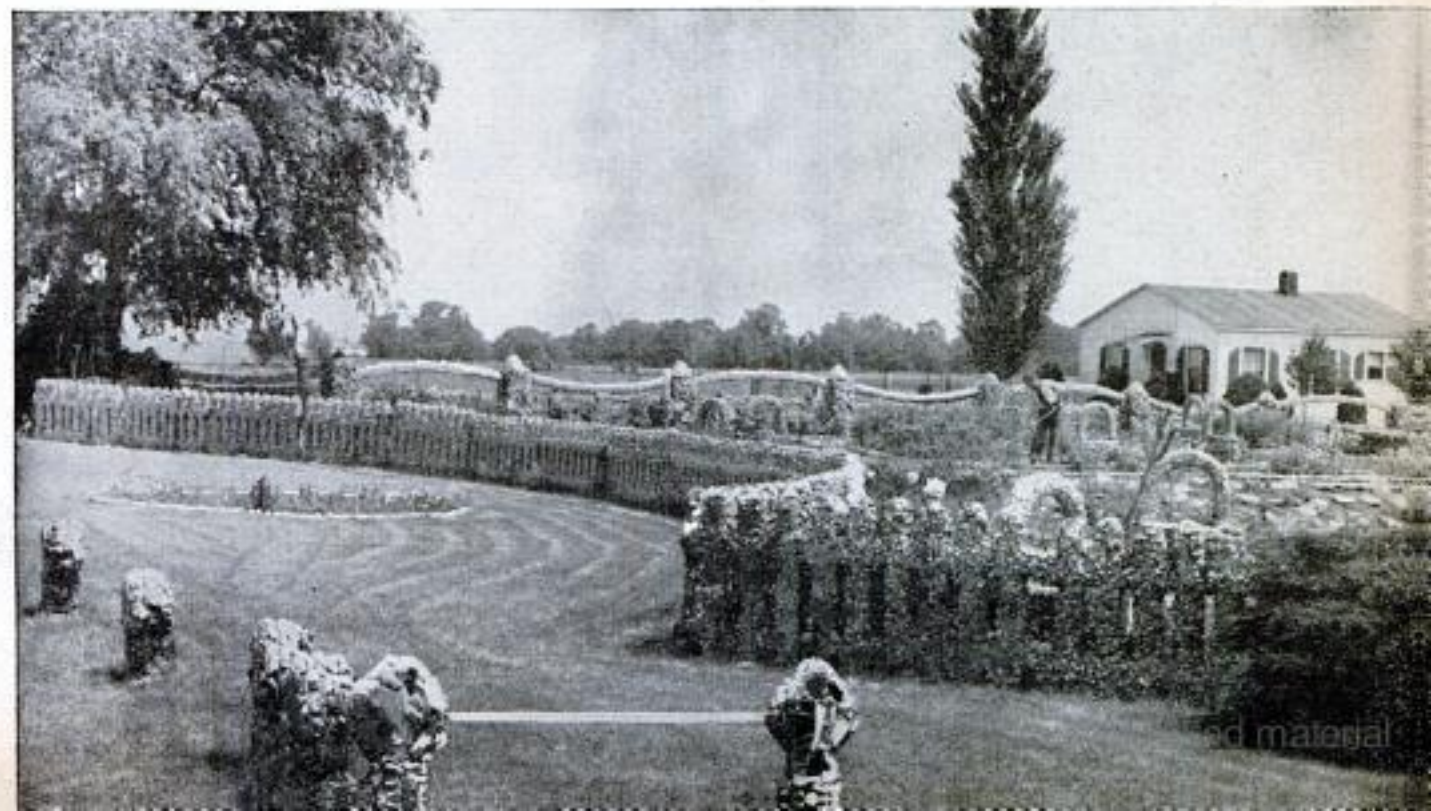


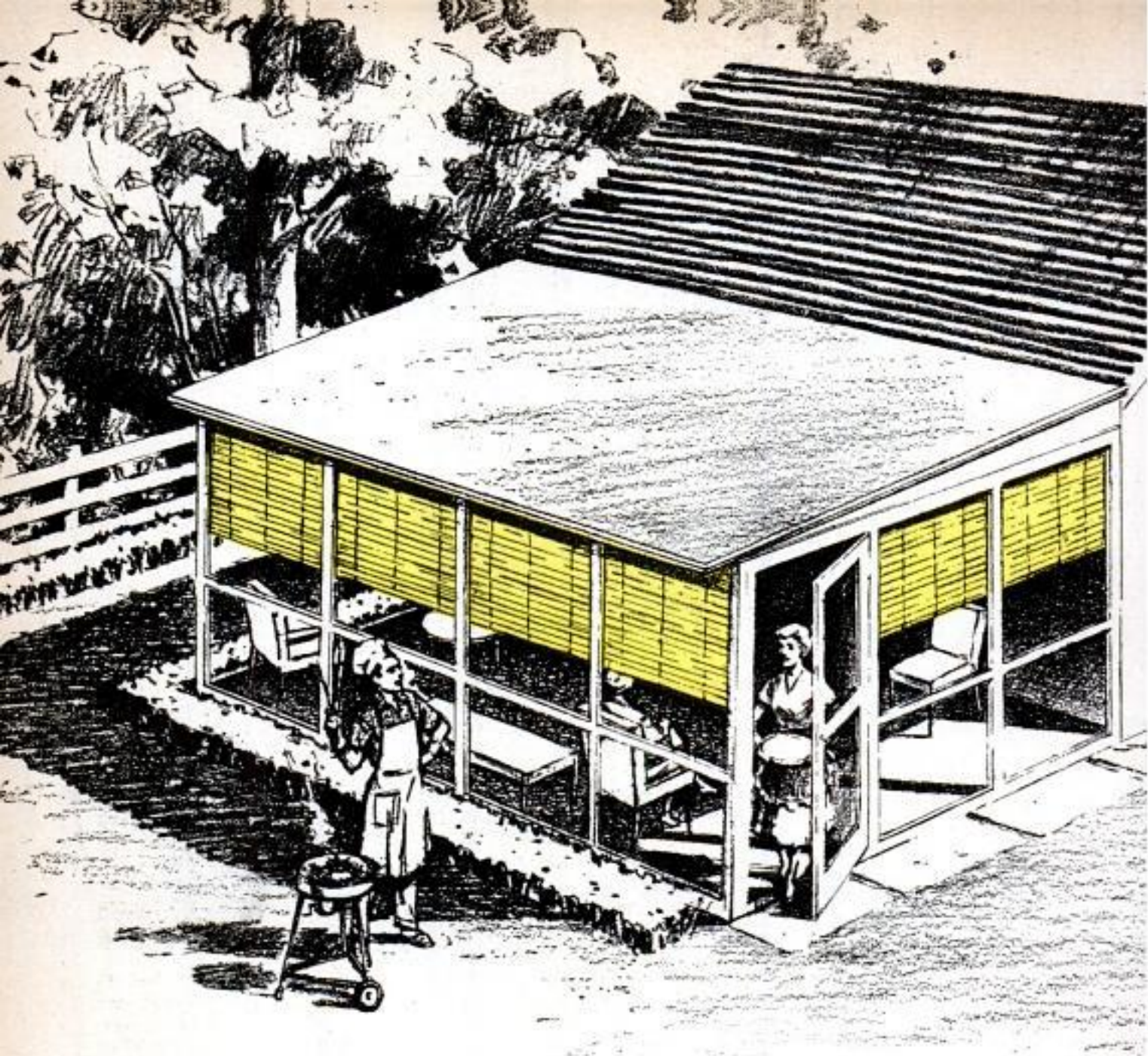
Picturesque barbecue grill and oven in one corner of the garden was made entirely of rocks picked up on the Martins' Illinois farm. Nowadays they have so many visitors there is little time for barbecues

stonework altar since it was erected.

The Martins view life through humorous glasses, as is attested by the many tongue-in-cheek placards that line the pathways in their gardens. One reads: "Growing old is no more than a bad habit, which a busy person has no time for."

If that prediction holds true, the Martins will never grow old because hands are never idle at Rockome. ★ ★ ★





ADAPT YOUR GARAGE FOR SUMMER

By Wayne C. Leckey

REMEMBER WHEN every home had a front porch? Such dated porches are gradually giving way to a new trend in living—outdoor living. The old-fashioned porch has been taken off the front of the house, so to speak, and hitched to the garage where, in the privacy of the back yard, summer entertaining and dining can be enjoyed by the entire family.

This exodus to the back yard is a natural one, stemming from the popularity of barbecue cookouts, and the need for shelter

and protection from insects has resulted in a screened lean-to, a sort of covered patio, hitched to the side of the garage.

You can buy a garage today with a screened enclosure built right in it, half being devoted to car space and the other to summer living. But if you have the yard space, one of these popular screened patios can be attached to your present garage in the form of a simple lean-to structure and screened on three sides. Such an enclosure need not be too difficult or costly to build as the garage already provides one side.

Fig. 1 details an enclosure in its simplest

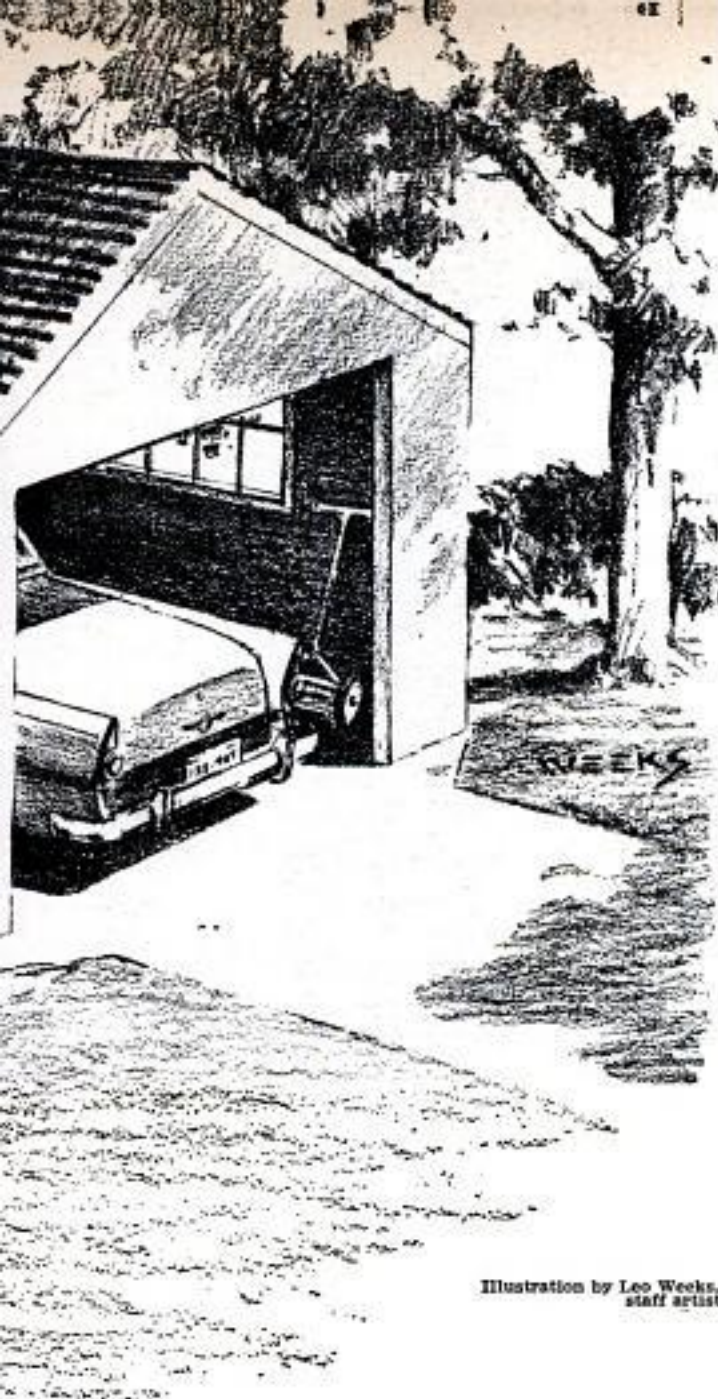


Illustration by Leo Weeks, staff artist

LIVING

form in which the screen wire is tacked directly to the framing members rather than to separate removable frames. The latter may still be preferred by some, but with the new plastic screening, and other nonrusting kinds, the wire will last indefinitely even if left exposed the year 'round. For obvious reasons, it is advisable to erect the framing over a slab floor rather than a wooden one. This can be from 8 to 10 ft. wide, depending upon yard space, and the length of the garage. Dig down about 18 in. around the outside to assure a good footing for the 4-in. slab. Readymix concrete

APRIL 1957



Popular in new garage design is this one which devotes a portion of a conventional two-car model to include a screened enclosure with a door at the end. Entrance to some is gained through the garage itself

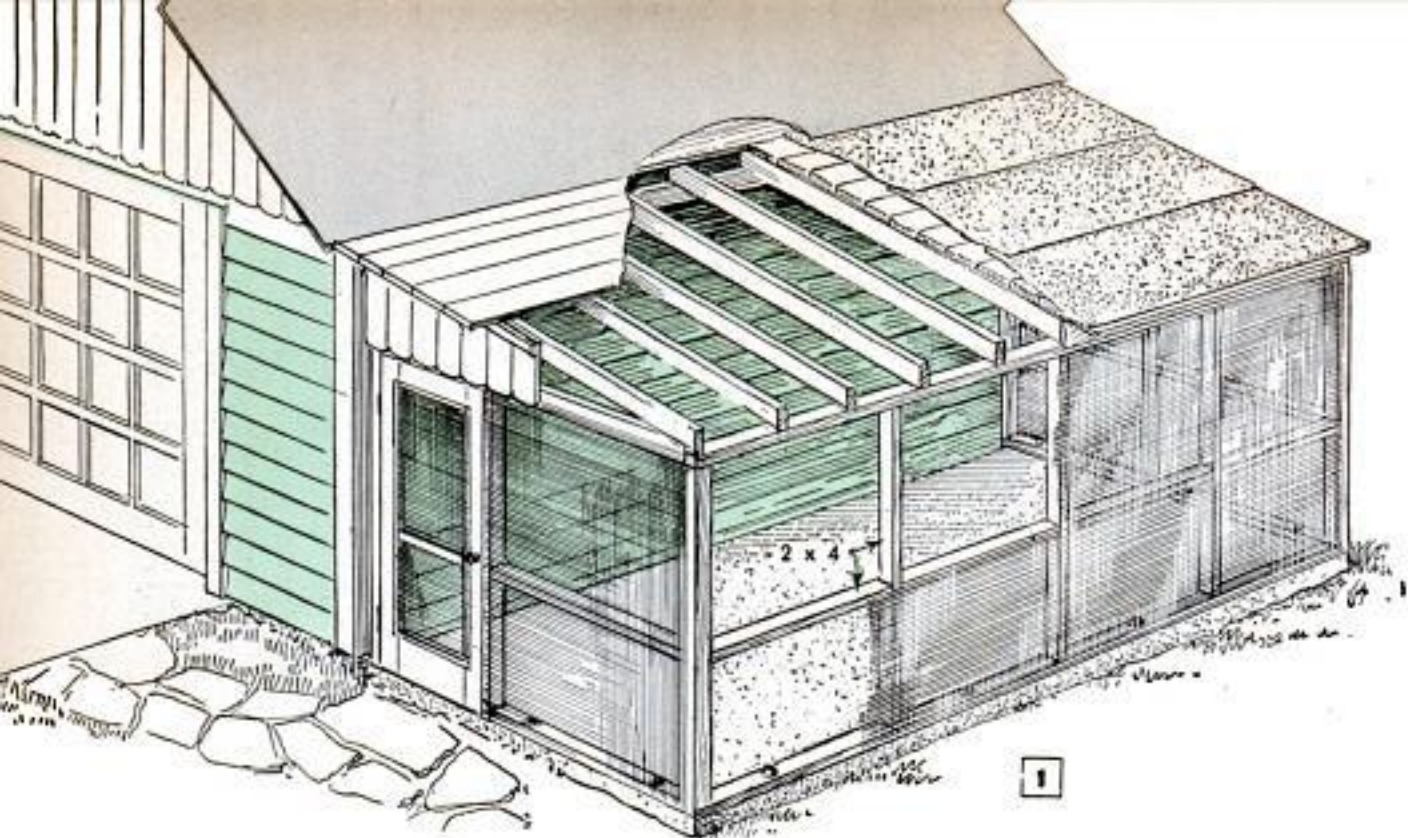


Similar in treatment, the screened-porch area in this garage also has been fitted with window sash to make the space usable the year 'round for storage. Note how lower part has been boxed-in with siding



The garage itself can be converted to an extra summer room by leaving the car parked outside, rolling up the overhead door and fitting the opening with removable screens. Screens are so fitted as to allow door to be lowered in the event of driving rain

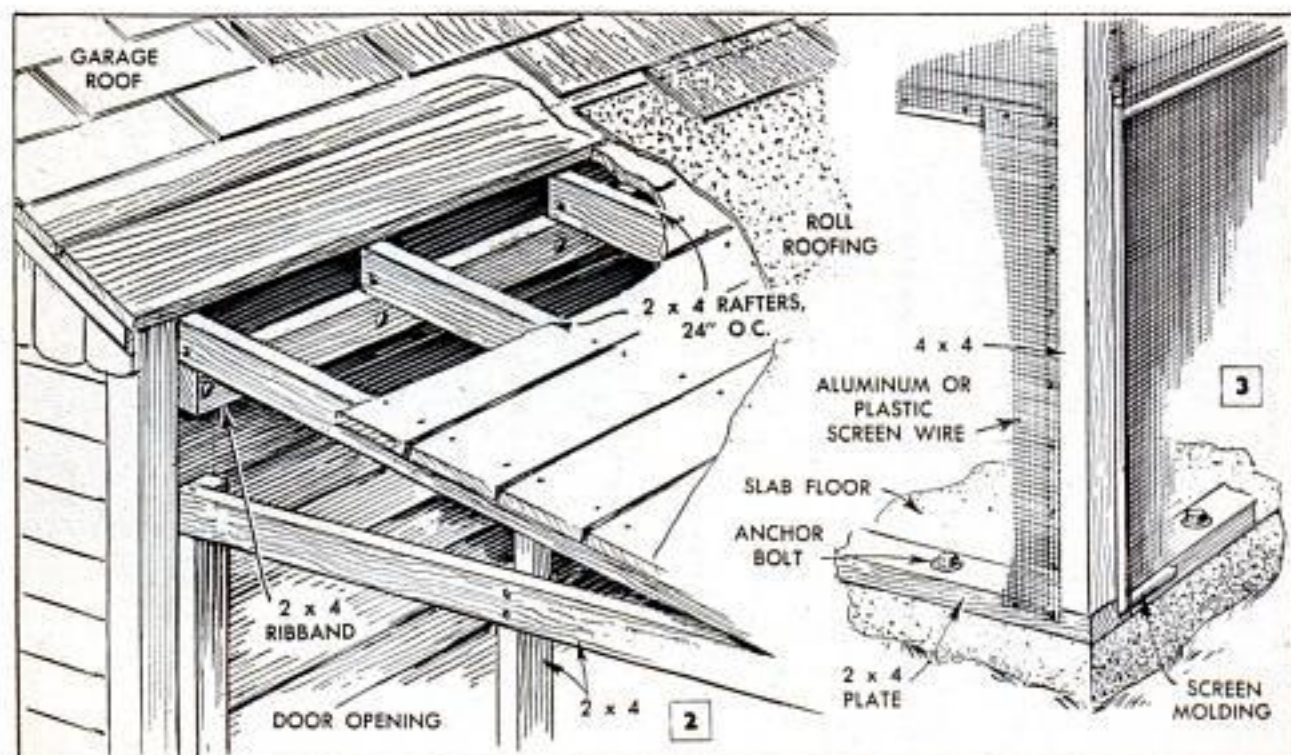
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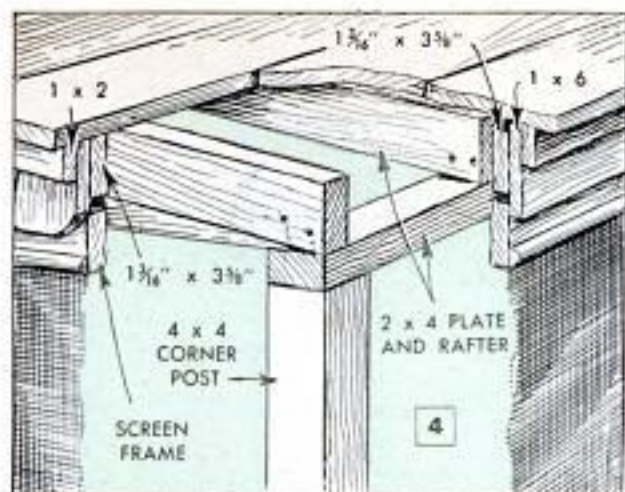


simplifies this part of the job to the point where the homeowner can pour the slab himself, or this part can be left to the professional. In either case, $\frac{1}{2}$ -in. anchor bolts, 10 in. long, should be embedded in the concrete along the outside, $1\frac{3}{4}$ in. from the edge to anchor the framing.

How the rafters are attached to the garage is an individual problem, dependent upon the amount of garage-roof overhang. If there is little or none, the rafters can be supported by a 2 x 4 ribband, a ledger strip, as shown in Fig. 2. Here, as you can see, the 2 x 4 is lag-screwed to the garage wall

and into the wall studs. Where the overhang is 12 in. or more, the 2 x 4 rafters can be tied to the garage rafters by nailing securely to the faces of the extending members. The roof should have some pitch rather than be perfectly flat, 2 in. of rise in each foot of run being adequate. Avoid sloping it too much, otherwise you'll have low headroom at the outside. The slope of the roof governs the height of the wall studs and corner posts. These rest on a 2 x 4 plate which is bolted to the slab around the edge on three sides. The corner posts are 4 x 4s and the intermediate ones are 2 x 4s,





toenailed to the plate at the bottom and to a similar plate at the top. Crossrails, 24 in. up, are used to brace the 2 x 4 studs. The doorway is framed in the manner shown in Fig. 2.

The 2 x 4 rafters are placed 24 in. o.c. and then decked over with 1 x 6 roof boards. Since it is not practical to apply asphalt shingles to a roof with so little pitch, the roof should be covered with regular roll-type roofing, sealing the lapped edges with cement and working it up under the shingles on the garage. The screen wire is applied horizontally, lapping it on the crossrails and covering the edges with common screen mold, Fig. 3. This, of course,

Typical lean-to structure added to side of garage. Wide full-length screens admit maximum air. Stone fireplace at end makes cookouts highly convenient

should be done after painting the framing with two coats of house paint. Where separate screens are preferred, Fig. 4 shows how a track can be formed for the screens at the top, using a 1 x 2, a 1 x 6 and a 1 3/4-in. member in the order shown. Here the screens go around the corner posts and, where they center on the intermediate posts, battens are provided to cover the joints at the butting edges. At the corners, the screen frames lap the edges of the adjacent ones and are fastened with three or four screws, top to bottom. ★★★

Hammered Wooden Knobs Have Handwrought Look



Plain wooden knobs can be given a handwrought appearance by denting the knob face with a ball-peen hammer. To do this, drill a hole in a block of scrap wood to secure the shank of the knob and tap the face lightly to dent the wood fibers. Paint the knob a dull "iron" black or apply stain for an antique finish.

Plastic Strip Protects Hatband Against Perspiration Stains



Thin kitchen plastic cut in a 2-in. strip and placed in back of the leather sweatband of a hat, as shown, will prevent staining the hatband and exterior of the hat. The strip is easily removed when the hat is sent out for cleaning and blocking.



Courtesy of Kaiser Aluminum & Chemical Sales, Inc.

Sheet-aluminum roof of this attractive patio in Hawaii has embossed finish that reflects sun's rays

*For more enjoyable outdoor living—
here's shade for yard or patio when you want to*

GET OUT OF THE MIDDAY SUN

Blue-green-glass roof on this suburban patio cuts glare of the midsummer sun and absorbs heat rays

Libbey-Owens-Ford Glass Company





Sketch from *Canvas Products Review*

Lace-on shades are made of ordinary canvas laced to vertical metal frames. These are made to rotate



Lace-on canvas canopy extends from overhang on side of garage. It is neat in appearance and easy to make

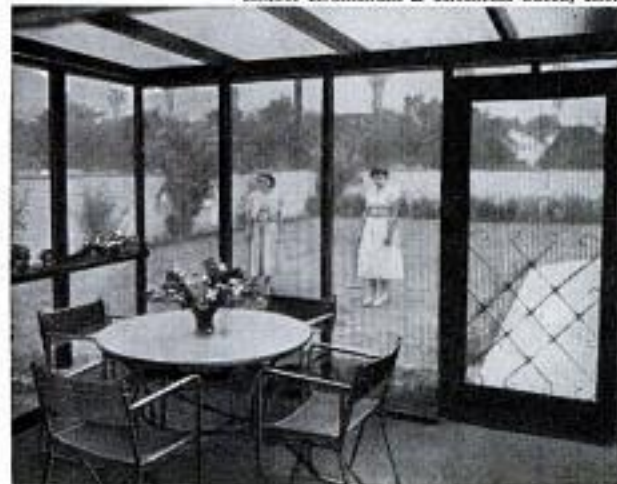
DEVOTEES OF OUTDOOR LIVING may argue about the best way to lay a patio or cook a steak, but there is one subject on which there is unanimous approval: The need for some kind of shelter from rain, wind and, above all—the scorching midday sun.

Alert to this need are scores of manufacturers, architects and decorators who have come up with an amazing array of shelter devices for the home. Materials range from canvas and synthetic fabrics to redwood, glass, aluminum, steel, glass fiber or plastics and special shade screens.

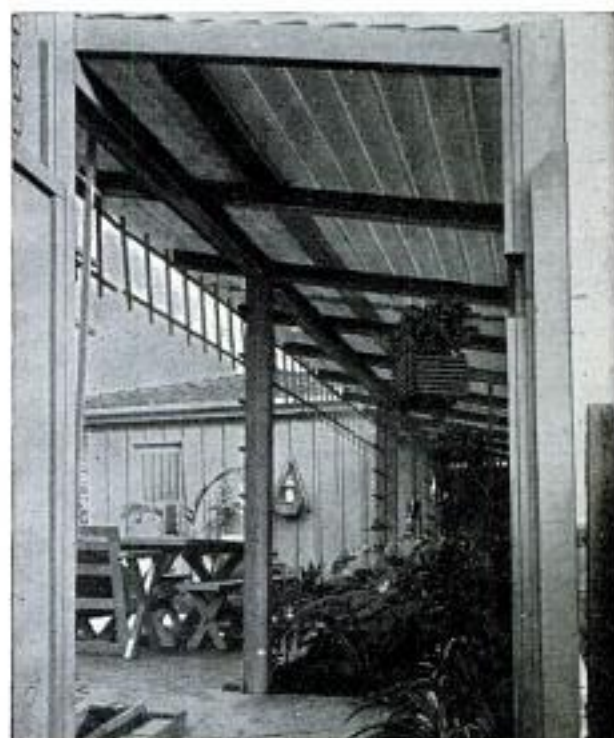
One of the simplest and most effective of shelters is the canvas lace-on awning or shade. The canvas is laced to a metal frame and is easy to put up or take down. This type of shelter can be used to extend the overhang of a house or as a vertical awning at one end of a patio.

Architects are making good use of metal coverings for patios. One popular new product is crimped sheet aluminum with an embossed finish which is said to reflect the sun's rays. Another interesting product is

Aluminum shade screen on this porch keeps out direct rays of sun, also insects, and gives some privacy
Kaiser Aluminum & Chemical Sales, Inc.



APRIL 1957



Alsynite Company of America

Steplap glass-fiber panels are used here as overhead protection for the plants bordering on patio

Parts for the patio below are available in kit form. They include glass-fiber panels and steel tubing



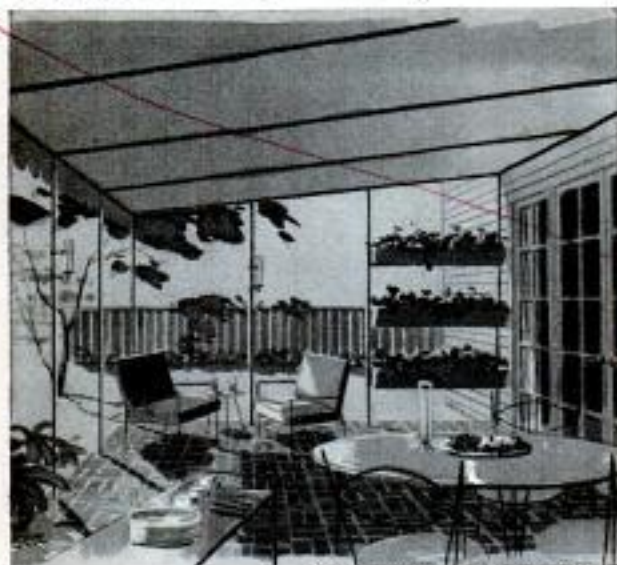
159

*Mafer Steel Co.
San Diego, Calif*



Alsynite Company of America

Glass-fiber roof over patio is easy to build with panels supported on a framework made of two by fours



Courtesy of Canvas Products Review

Patio above is shaded in summer by canvas which is removed in winter to admit sun to home. Below, overhead canvas canopy slides back and forth on wire and can be adjusted for total or partial shading of area

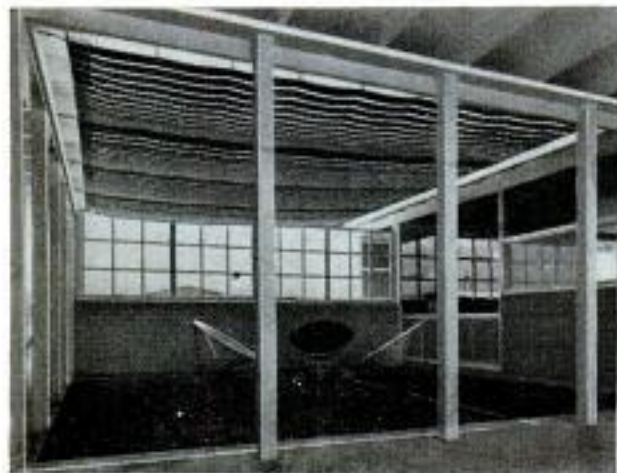
the shade screen that not only keeps out insects but deflects the sun's rays and definitely cools a porch. This screen provides the perfect solution for the people who like to do their outdoor living in a screened area.

One manufacturer of translucent glass-fiber panels is offering a shelter kit for do-it-yourselfers. The kit includes corrosion-resistant steel tubing, metal wall brackets and an assortment of hardware. The panels, available in a variety of colors, are nailed in position and sealed with mastic.

Another patio covering that lets in the light but keeps out the heat-bearing infrared rays of the sun, is blue-green frosted glass that is wired for extra strength.

With the variety of shading devices available, every homeowner should be able to find the right one for his house. ★ ★ ★

Even the car gets out of the midday sun! This portable carport is made of metal supports and canvas



Convertible Settee-Lounge Has Plastic "Upholstery"

By Willard Allphin

IDEAL FOR USE on a porch or lawn, at a summer cottage or camp, this attractive settee converts to a comfortable chaise longue when the end "cushion" is raised and positioned at one of several angles by means of a wooden bracket. Because the bright, colorful plastic webbing used on the cushions is waterproof and the wooden frame of the settee is weatherproofed, rainstorms will not require that this piece of furniture be covered or taken indoors.

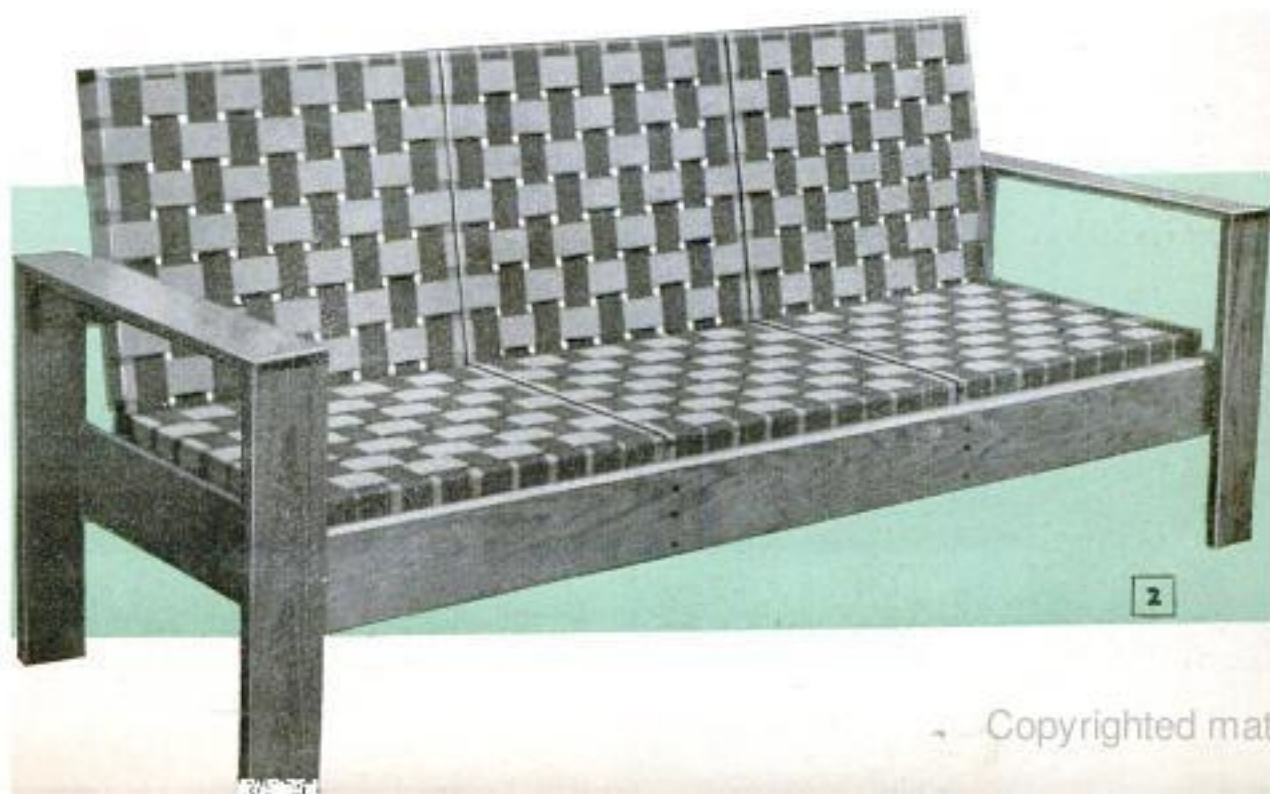
Although the finished settee is extremely strong, its construction involves no mortised or doweled joints. Hand tools are adequate if power tools are not available. To avoid stretching the plastic webbing over too great a span, which might permit it to sag excessively, six individual cushions are built and fitted together. Three cushions form the seat and three the back. This also makes attachment of the webbing easier. Hard pine was used in making the original settee, but any hard or semihard wood can be used. Plastic webbing 2 in. wide, of the type shown, is available in many solid and mixed colors. In this particular case, solid ivory and red were the colors chosen. For the long way of the cushions, 36 yards of 2-in. webbing are required, for the short way, 42 yards. The seeming discrepancy in lengths results from the fact that there are more strips running the short way than the long. Screws and hinges used in the settee can be galvanized,

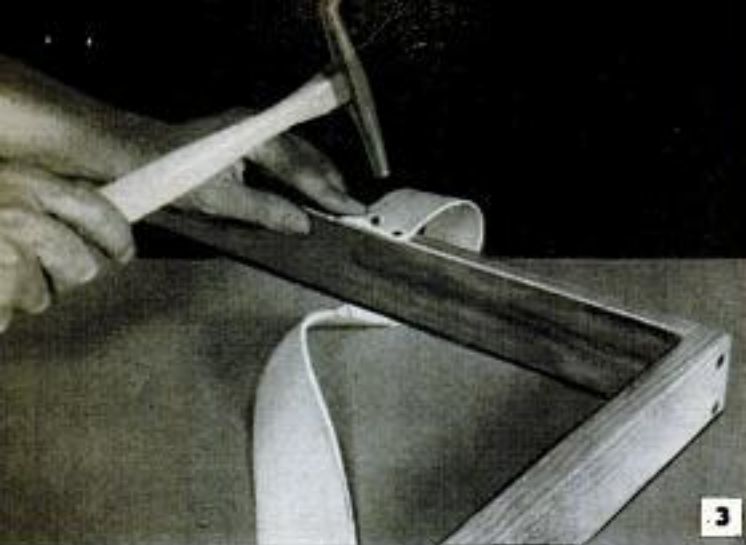


but brass fittings will prove longer-lasting if the settee is located near a seashore where salt air causes rapid corrosion.

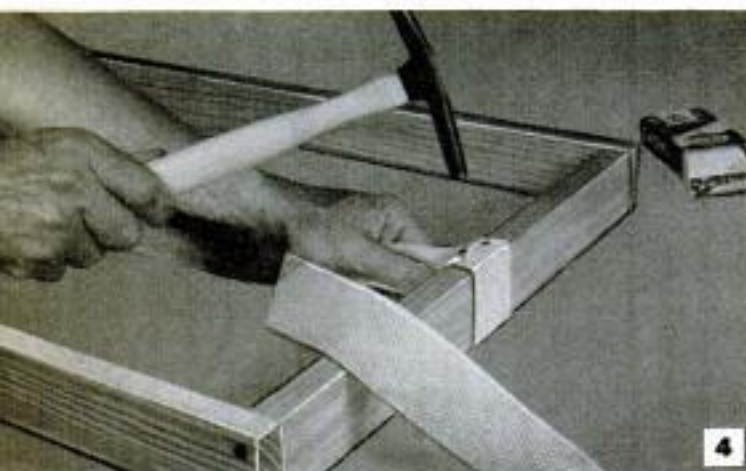
Construction details for the settee in Fig. 7 show that mostly stock lumber sizes are used. Although the arms and legs are shown to be 4½ in. wide, either 1 x 4 or 1 x 6 stock can be substituted. If this is done, the space between the arms and legs must be kept the same as shown on the detail, to permit fitting the back cushions in place.

Cut diagonal half-laps on the ends of the back-support strip, as shown in the detail in Fig. 7, so the back cushions slant properly, then assemble the main frame with glue and wood screws. Next, make the six cushion frames with outside dimensions of 20 x 24 x 2¼ in. Mortise the edges of the

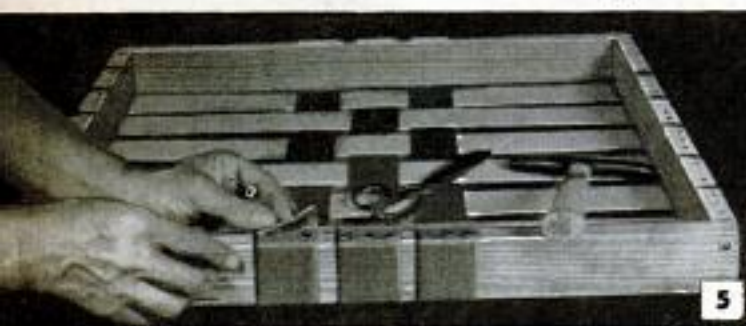




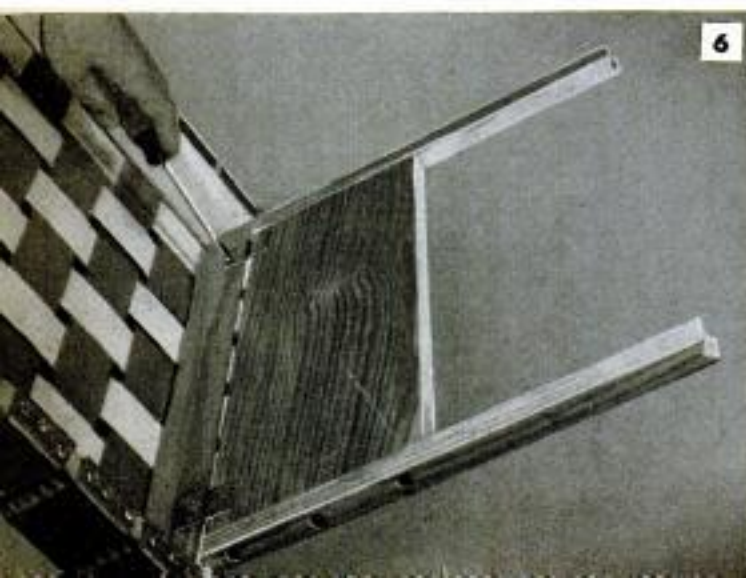
3
Above, end of webbing strip is doubled and tacked to lower edge of cushion frame with five tacks



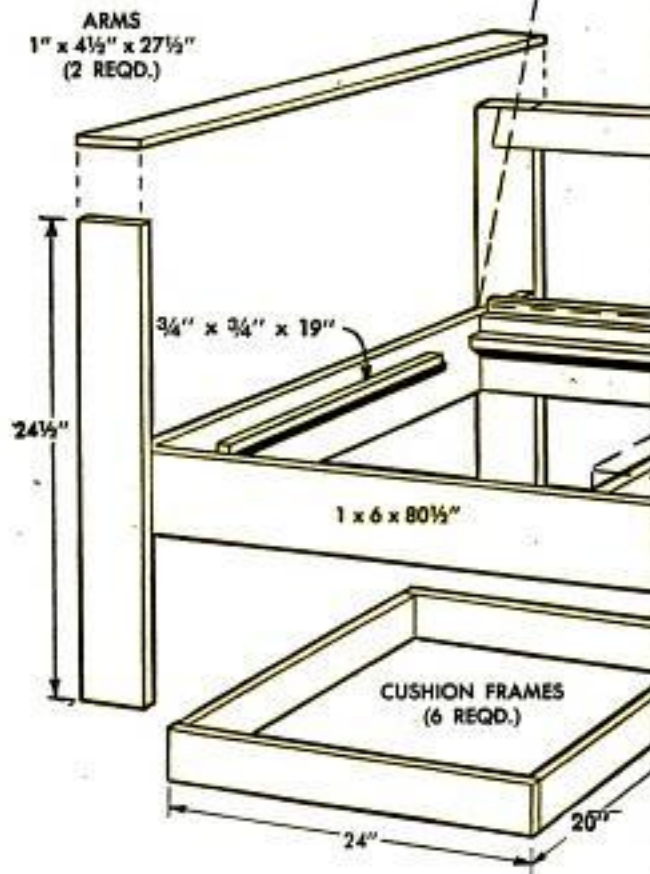
4
Above, free end of webbing strip then is stretched across cushion frame and tacked to opposite side



5
Above, after cutting off webbing strip, it is folded double and three more tacks are driven through it. Pivoting support bracket for end cushion is hinged to the inside of the cushion frame as shown below

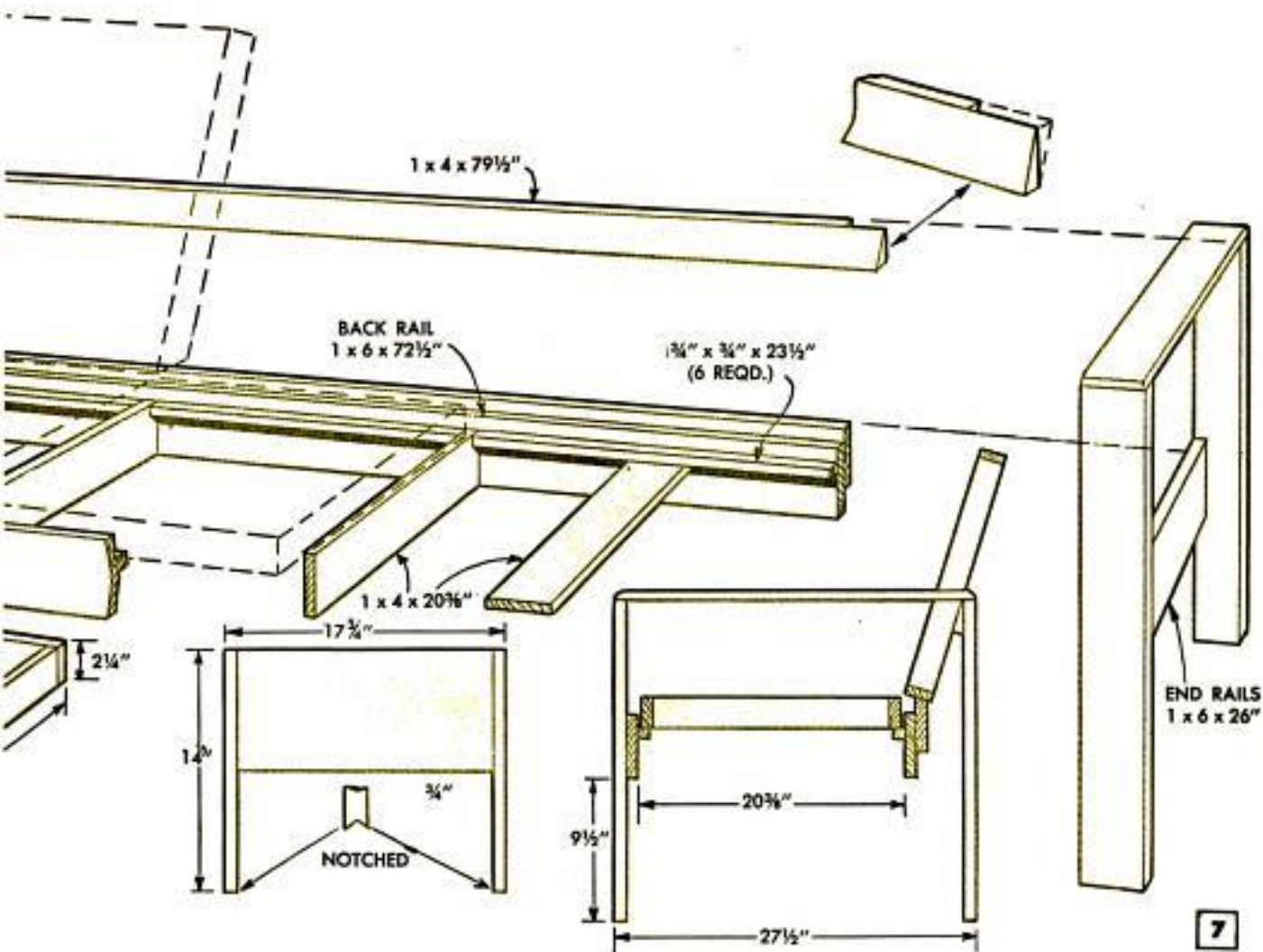


6



two cushions on which the hinges will be fastened slightly deeper than the thickness of the hinges. The webbing then will pull into the mortises under the hinges and permit the cushions to fit tightly together. Also bevel the end of the end cushion so it will clear the arm when it is pivoted upward. With assembly of the settee and cushions at this stage, weatherproof all wood surfaces, so areas covered by the webbing will be protected. One coat of spar oil, plus two coats of spar varnish should be applied, each coat being sanded lightly before applying the next.

When "upholstering" the seat frames, start with the middle strip and work each way, alternately, to the edges. There are seven strips going the long way, spaced $\frac{3}{4}$ in. apart, and nine strips going the short way, with $\frac{1}{16}$ in. between strips. Double the end of each strip of webbing and tack it to the lower edge of each cushion frame with five No. 6 copper tacks, Fig. 3. Stretch the strip over the top of the cushion and tack it to the lower edge of the opposite cushion frame with two tacks, Fig. 4. Cut the webbing, fold it over and drive in three more tacks, Fig. 5. When the cushions all are finished, hinge the wooden bracket, Fig. 7, to the end cushion, Fig. 6. Now install all cushions, driving screws up through the settee frame into the seat cushions, and through the back rail and



back-support strip into the back cushions. Also, screw the back cushions to each other near the tops. When installing the hinged seat cushion, be sure it has clearance for swinging upward.

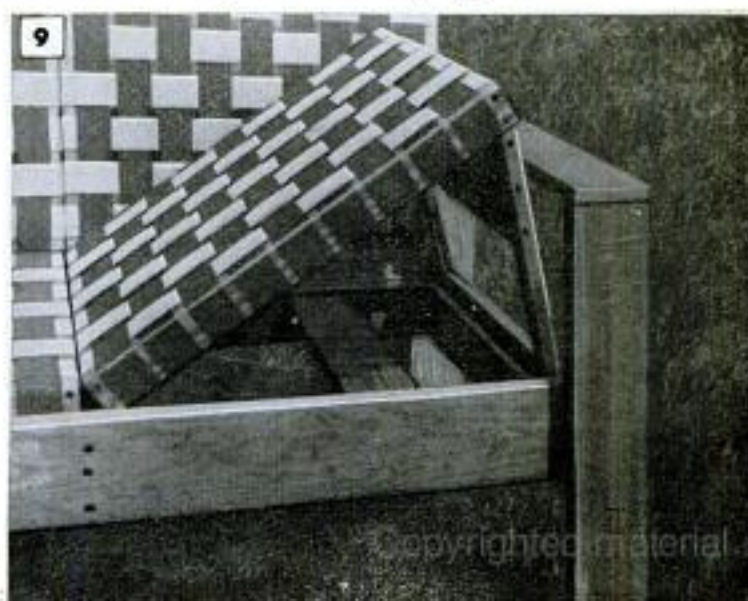
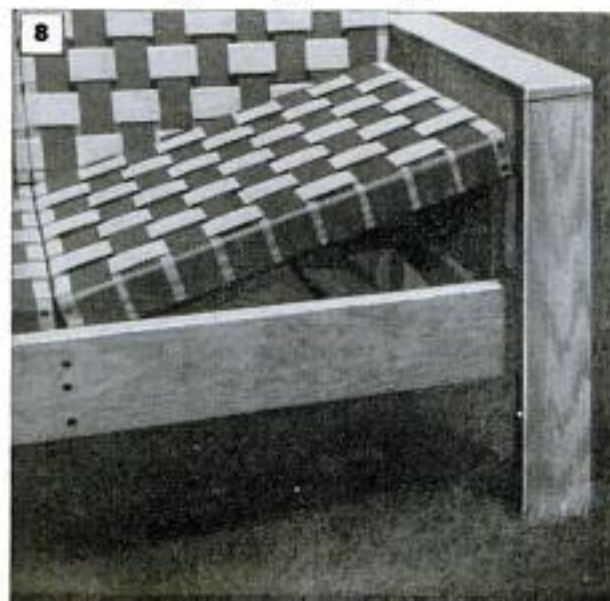
When the hinged cushion bracket is folded flat against the cushion, the settee will appear as in Fig. 2. When the bracket is swung upward and the cross brace rested on the cushion support on the end rail, the settee appears as in Fig. 8. Raising the bracket to the next position requires that

When cross piece of cushion-support bracket is rested on cushion-support strip, settee appears as shown

the ends of the bracket legs be fitted on the end rail as in Fig. 9. The young lady in Fig. 1 has adjusted the bracket so the notched ends are located on the edge of the arm, positioning the cushion at the highest angle.

When finishing the settee, cover the countersunk screwheads that are located on horizontal surfaces with putty, to prevent rain from collecting on them. All other screwheads can be left uncovered, but brushed heavily with varnish. ★ ★ ★

End cushion assumes angle shown when ends of notched bracket legs are fitted on top edge of end rail



BLITZ THOSE SKEETERS!



FOG GUN, right, attaches to any four-cycle power mower. You blitz the mosquitoes while you are mowing the lawn. Average lawn can be fogged in about 20 minutes in preparation for a lawn party.



←**MOSQUITO BULB** screws into a standard socket, is yellow to drive away cowardly insects. Tablets placed in cup in top generate vapor to eliminate brave ones.



←**CANNED FOG** kills mosquitoes and other insects. You pry off lid and ignite chemicals with a match. Fog spreads downwind, settles, does its job, disperses within 10 minutes.



BLITZ CANDLES, right, are made in a variety of forms. Some fit candle holders, others are marketed in bowls. They say "Stay away!" to mosquitoes but won't kill.



←**REPELLENTS** are for individual use and are periodically improved to eliminate odor and increase the time they are effective. Repellents are available in liquids, rub-on sticks and in pressurized spray cans.

VAPOR GENERATOR, right, is another repellent, not a killer. A candle in the bowl provides heat to convert the can of chemicals into long-lasting vapor.



←**SMOKE GENERATOR** burns small wick tablets, produces pine-scented smoke that drives away insects. Can be hung in boat.





THE **POPULAR MECHANICS** WTM 58
CRAFTSMAN



SWING-APART HEADBOARD

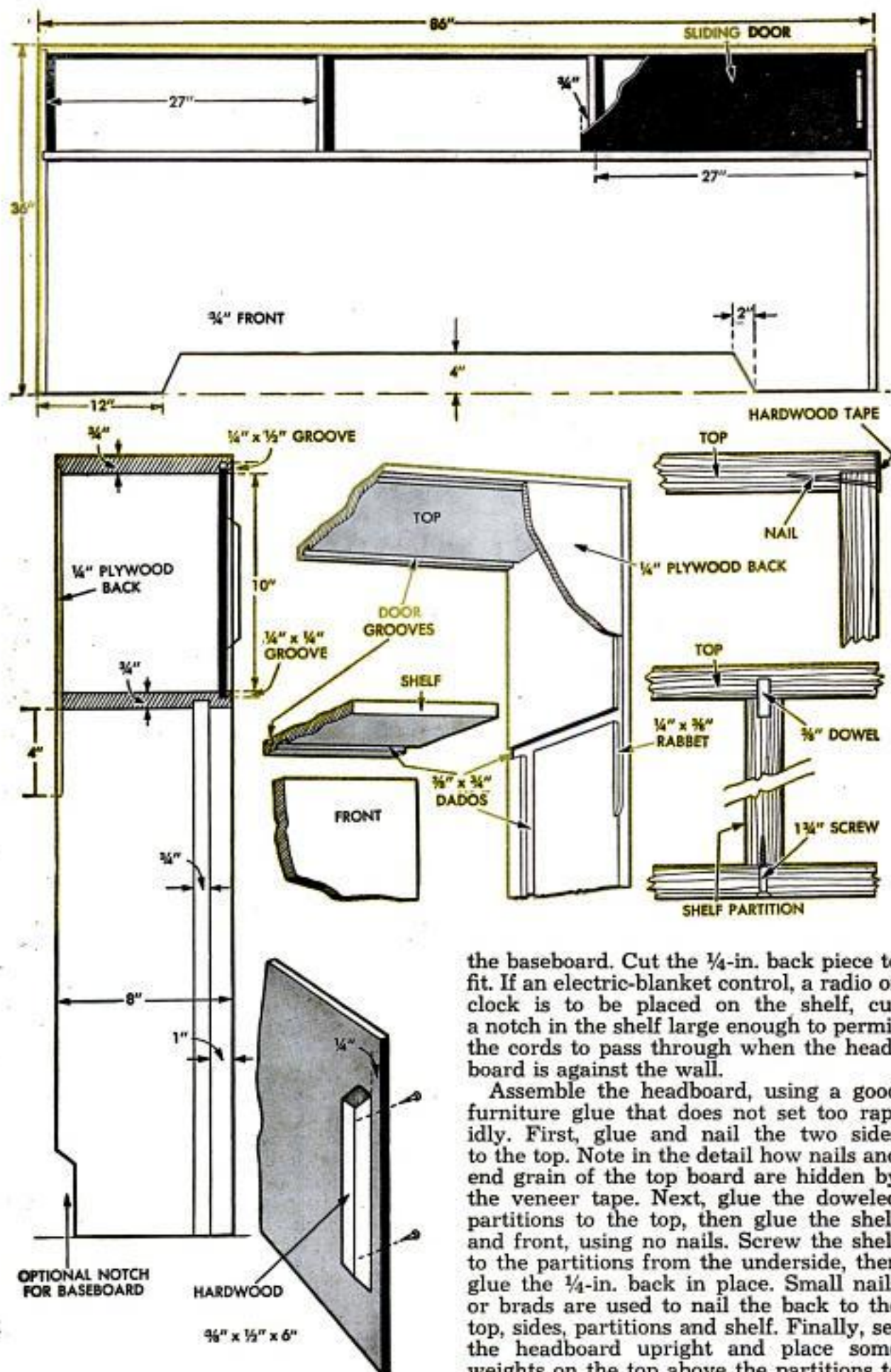
By Tom Riley

IF YOU HAVE twin beds, hinging them to the headboard shown will convert them to the popular swing-apart type. Attractive and practical, they provide the individual sleeping comfort of twin beds, require less floor space, are made up easily and, if desired, one double-size spread can be used to cover both beds.

Except for the sliding doors and back panel, $\frac{3}{4}$ -in. hardwood-faced plywood is used throughout, with the exposed front edges of the plywood covered with veneer tape of matching grain. Construction of the headboard is simple, but does require the use of a circular saw with a dado blade.

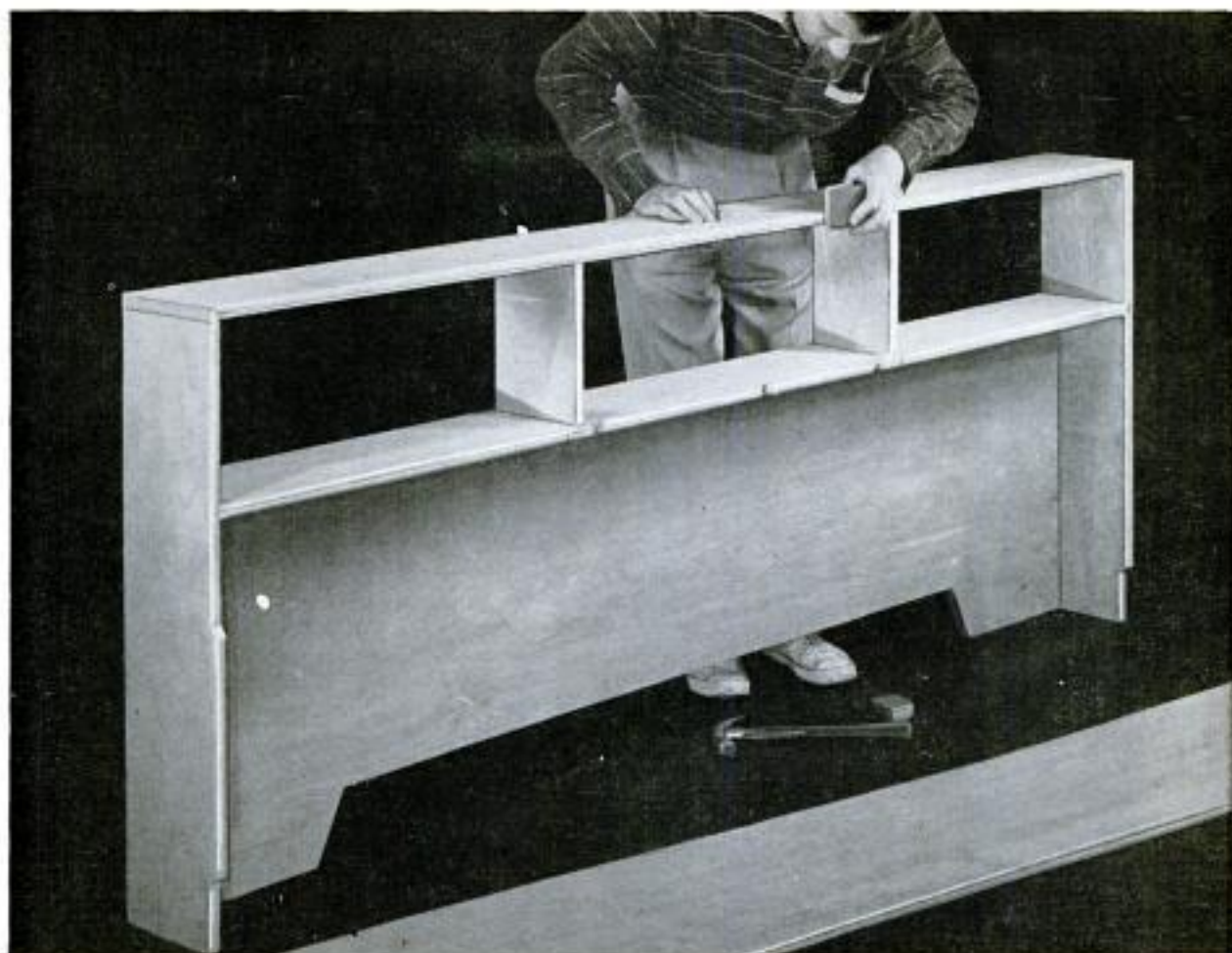
First, rip the top and two sides to an 8-

in. width, then rip the shelf to a width of $7\frac{3}{4}$ in. Now, with a $\frac{3}{4}$ -in. dado blade, cut the rabbets at the ends of the top and also dado the sides and shelf as shown in the details. Next, rabbet the rear edges of the top and sides to receive the $\frac{1}{4}$ -in. back, which can be plywood or hardboard. Note that this back should extend about 4 in. below the shelf. For the sliding doors, use a $\frac{1}{4}$ -in. dado and cut a $\frac{1}{4}$ -in.-deep groove in the shelf and a $\frac{1}{2}$ -in.-deep groove in the underside of the top. The doors then can be installed or removed by lifting them up into the top groove to clear the shelf. If the headboard is to fit flush against a wall, notch the two sides at the bottom to clear



the baseboard. Cut the 1/4-in. back piece to fit. If an electric-blanket control, a radio or clock is to be placed on the shelf, cut a notch in the shelf large enough to permit the cords to pass through when the headboard is against the wall.

Assemble the headboard, using a good furniture glue that does not set too rapidly. First, glue and nail the two sides to the top. Note in the detail how nails and end grain of the top board are hidden by the veneer tape. Next, glue the doweled partitions to the top, then glue the shelf and front, using no nails. Screw the shelf to the partitions from the underside, then glue the 1/4-in. back in place. Small nails or brads are used to nail the back to the top, sides, partitions and shelf. Finally, set the headboard upright and place some weights on the top above the partitions to press it down on the dowels. If the sides



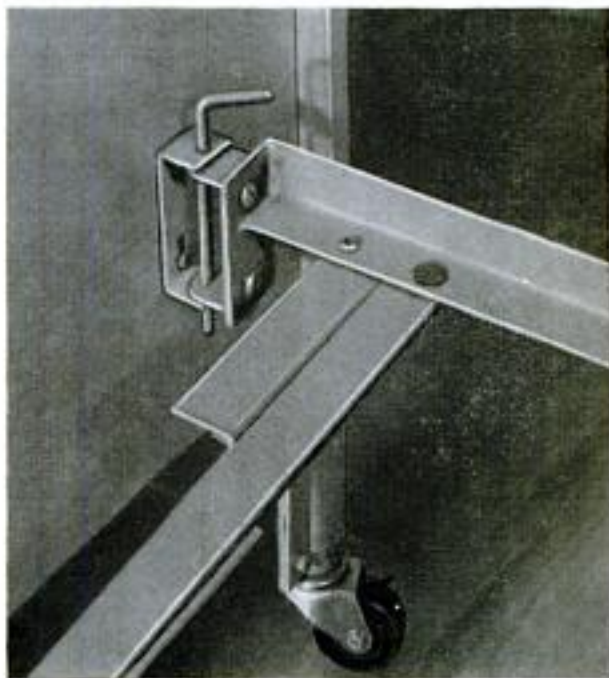
After veneer tape has been applied over end grain, finished headboard is sanded lightly, then varnished

tend to bow away from the front, wrap clothesline around the assembly and pull it tight. Let the assembly dry overnight, then cement the veneer tape along the front edges of the plywood. The two sliding doors can be $\frac{1}{4}$ -in. hardwood-faced plywood or $\frac{1}{4}$ -in. hardboard. If the latter is used, cover it with paint, wallpaper, plastic sheeting or other decorative material. Because these materials may increase the thickness of the hardboard so that the doors bind in the dado grooves, either taper the upper and lower edges of the doors, or cut a shallow rabbet along the front edges to reduce the thickness. Also, wax the portions of the doors that fit in the grooves to assure easy operation.

If your twin-bed frames did not come equipped with special hinges for use as a swing-apart assembly, two of the hinges can be obtained from most furniture stores. If necessary, loose-pin strap hinges can also be used. It is important that the bed-frames have easy-rolling ball-bearing casters. Replace them when necessary. Now make up the two beds, blankets and all. With the beds centered on the headboard and quite close together, mark the headboard for the hinge-bolt holes. Drill them and attach the hinges with $\frac{1}{4}$ -in. bolts,

using washers on the back of the headboard. If desired, the headboard can be located against the wall and screwed in place so that it will not move when the beds are swung apart. ★ ★ ★

Special hinge on outside corner of each twin bed is screwed to headboard so beds can be swung apart





Patio-Table Cover Stored On Window-Shade Roller

This housewife keeps a table cloth for her patio table rolled on a window-shade roller when it is not in use. Fittings for mounting the roller are screwed to the underside of the table as shown in the detail, while the cover is installed on a roller of the required length in the same manner as a shade.

A. L. Most, Los Angeles, Calif.

Chalk Is Substitute Metal Polish

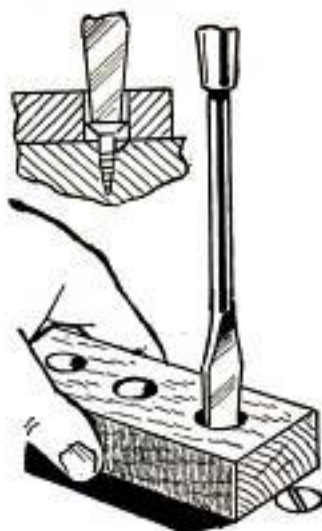
When regular metal polish is not at hand, a stick of blackboard chalk will prove to be a good substitute. Just rub a little soft-grade chalk onto a dry or damp cloth and apply it to the surface that needs polishing. The chalk dust is sufficiently abrasive to remove dirt and grease and does so without scratching, leaving a good gloss finish on the surface being polished.



Guide Block Prevents Screwdriver From Marring Work Surface

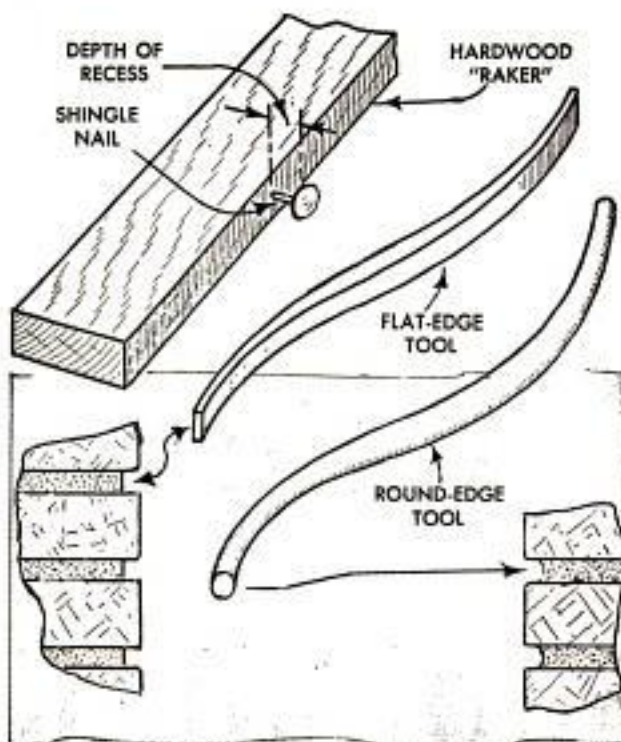
This guide block will help you to avoid marring work surfaces when a screwdriver slips off a screw-head. Several holes of graduated sizes are drilled through the block to accommodate screwdrivers of various sizes. In use, the block is held with one hand while the screwdriver is manipulated with the other.

Being confined in the hole in the block, the screwdriver cannot get beyond the screwhead even if it slips out of the slot.

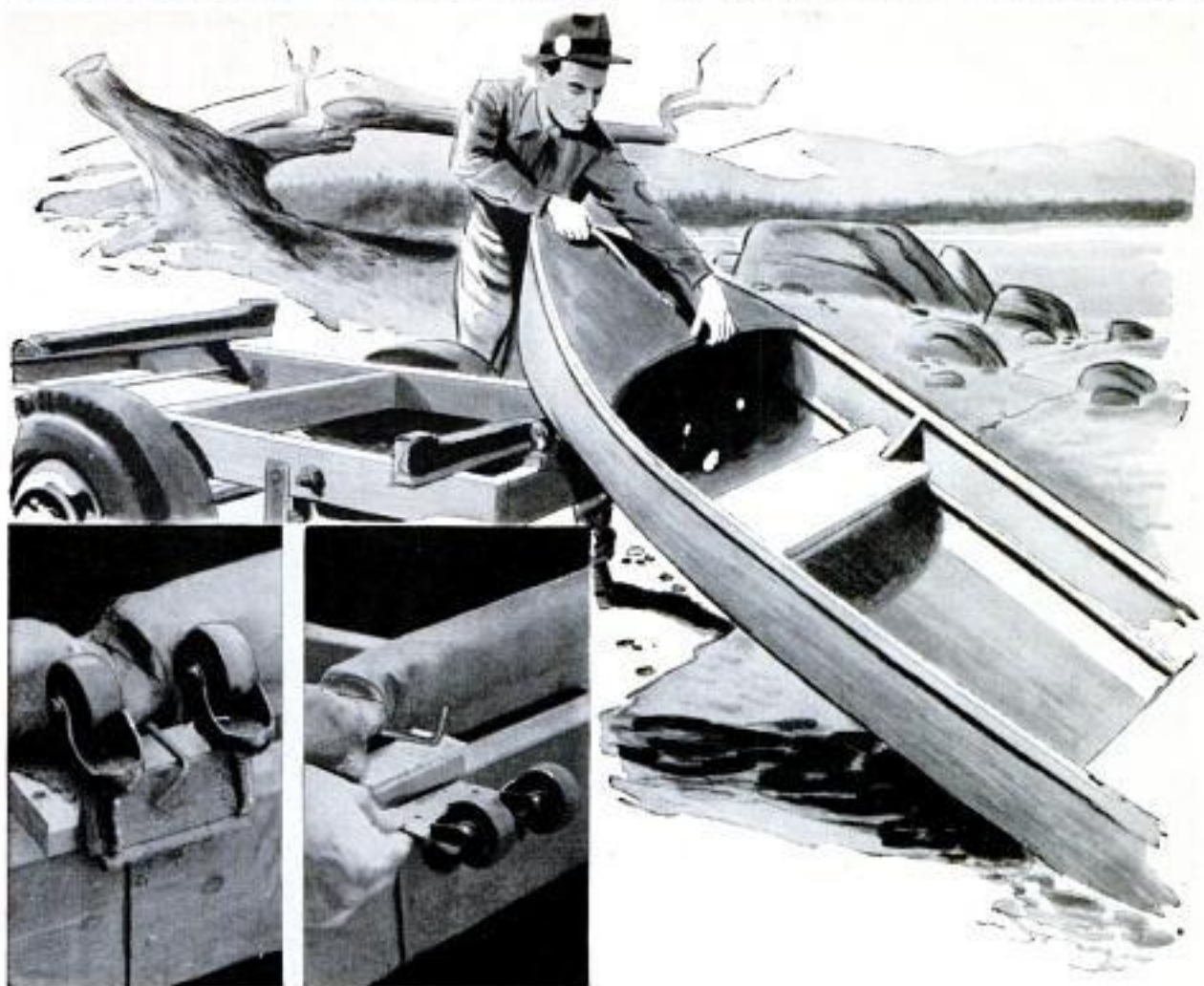


Raking and Finishing Tools For Mortared Joints

A raking tool to remove loose mortar, can be improvised by driving a roofing or shingle nail into a short length of hardwood so the head projects a distance equal to the desired depth of the joint. For compacting freshly mortared joints, small troweling tools called "slickers" can be made from lengths of wood or steel as shown in the detail. Wider at one end for broader recesses, these tools are used to finish fresh joints before the mortar sets.



Casters Are "Retractable" Rollers on Boat Trailer



Many boat trailers, especially the home-built types, are not equipped with rollers, and loading a boat on these trailers is a two-man job, even when the outboard motor first is removed. To modify such a trailer for one-man loading, fit two large casters at the rear, attached so they can be pivoted down out of the way when not in use. Casters used on the installation shown are 1½ in. in diameter. The caster sleeves were discarded and the caster stems welded solidly to a large T-hinge, which then was screwed to the center of the rear cross member of the trailer as indicated. A "lock rod" to hold the hinge up is formed

from a length of ¼-in. steel rod, threaded at one end and bent to an L-shape. The rod is fitted through a hole drilled in the rear of the trailer as shown and held with a nut and washer. The end of the rod is peened slightly to prevent the nut from turning off due to vibration. When the lock rod is turned downward, it holds the hinge up, which positions the casters for loading the boat, left-hand photo. When the rod is turned upward, it permits the hinge and casters to pivot down out of the way, right-hand photo. The boat hull then rests solidly on the trailer pads for hauling.

James E. Gray, Savannah, Tenn.

Checking Engine-Oil Level In Hot Weather

In extremely hot weather it sometimes is difficult to detect the thin layer of oil on a hot dip stick. To overcome this, remove the stick from the engine, wipe it clean and then immerse it in cold water. When thus cooled, the stick will show a definite film of oil that readily can be seen.

Perry W. Trout, Kansas City, Mo.

Rubber Bands Combine Yardsticks For Long Measurements

To simplify measuring dimensions longer than a single yardstick but less than 5 ft., wrap a few rubber bands around two of the sticks, with the calibrations on both facing upward and the ends reversed. The sticks are easy to adjust and remain in position for later reading of the measurement if desired.

W.T.M. 58

X596 Lightweight Seeder-Spreader

By Clarence A. Martin

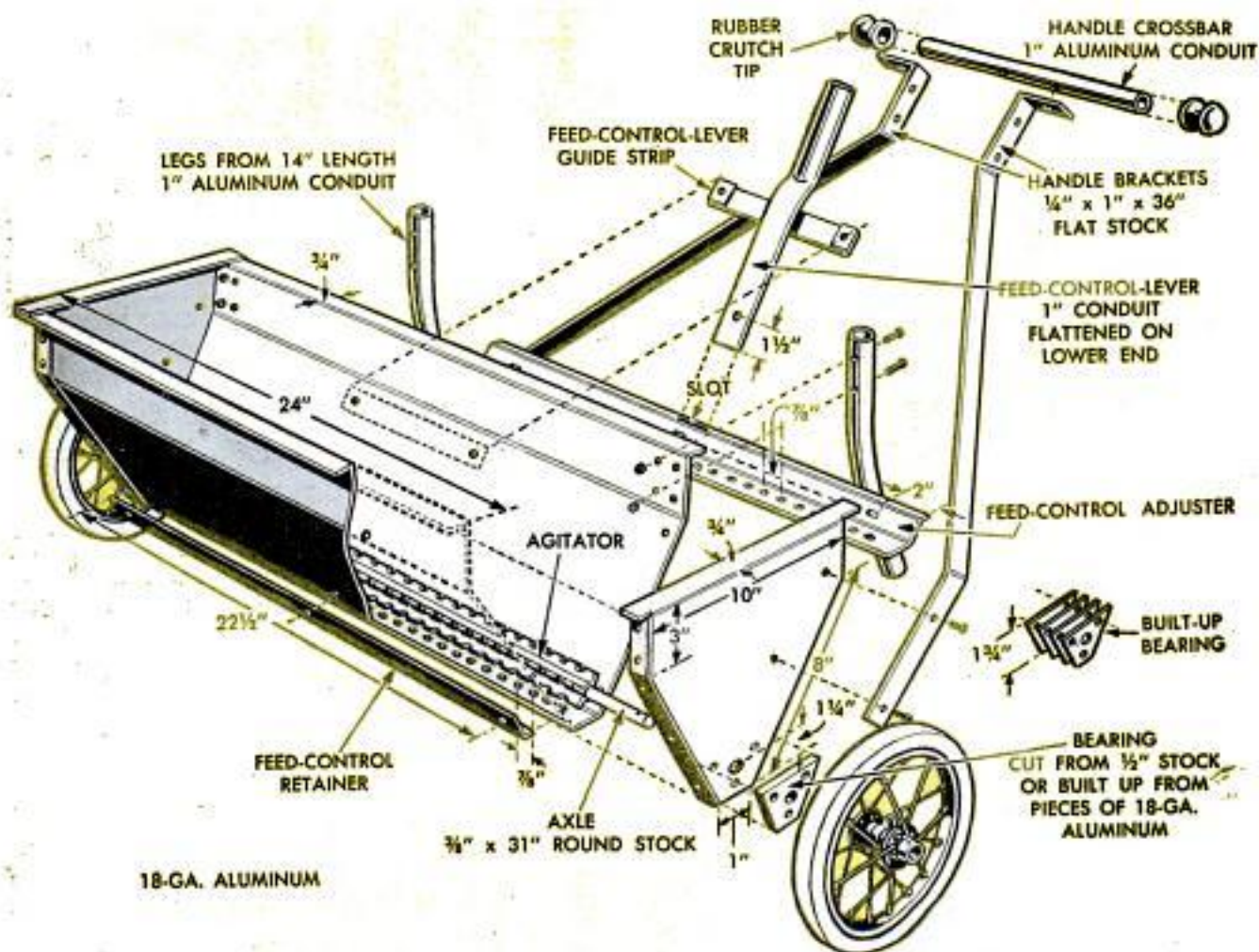
MADE MOSTLY of aluminum, this lawn seeder and fertilizer spreader is lightweight, rugged and has fairly large capacity. Wheels for the seeder can be from a discarded baby buggy, tricycle or other small-wheeled vehicle. An axle of $\frac{3}{8}$ -in. dia. is shown in the detail, but this dimension can be changed to suit the wheels.

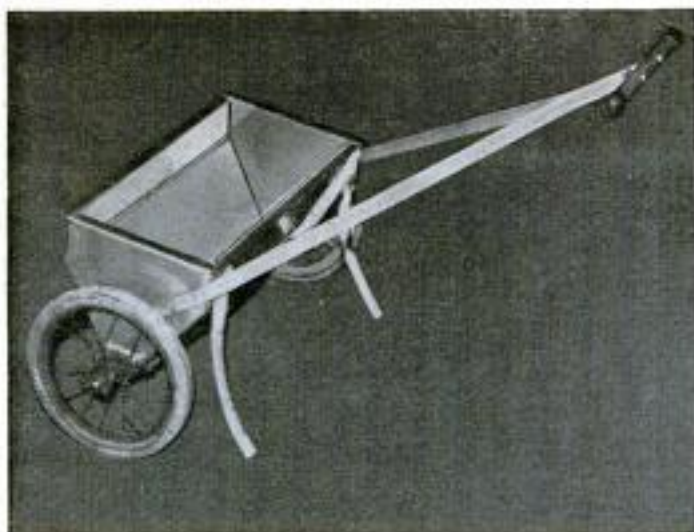
Two ends and the body of the seeder are cut and bent from 18-ga. sheet aluminum, with a $\frac{3}{4}$ -in. flange being bent on the edges of the end pieces and along the long edges of the body as shown in the details. The feed-control adjustment consists of an aluminum strip $2\frac{1}{2} \times 22\frac{1}{2}$ in. long. Holes are drilled in this strip $\frac{3}{8}$ in. in dia. and spaced $\frac{7}{8}$ in. apart, $\frac{7}{16}$ in. from one edge. A bend then is made in this strip $\frac{7}{8}$ in. from the same edge, the angle matching that of the bottom of the feeder body. The opposite edge is bent in the opposite direction to provide a $\frac{1}{2}$ -in. flange, in which a slot is cut to accommodate the end of the feed-control lever. Three slots, $\frac{1}{4} \times \frac{3}{4}$ in., are cut in the bent strip so it can be moved

back and forth on three machine screws on the seeder body as indicated in the right-hand detail. After attaching the feed-control adjuster strip to the seeder body, move it to the "open" position and drill through the holes to provide corresponding holes in the bottom of the seeder body. An L-shaped strip now is bent and attached to the lower edge of the body front so that it supports the edge of the feeder control.

The agitator for the seeder is made from two 3×23 -in. strips of 18-ga. aluminum, drilled and folded as indicated in the detail, then bent to a W-shape and screwed to the axle. Bearings for the axle are cut from $\frac{1}{2}$ -in. stock or built up from pieces of 18-ga. aluminum. The feed-control adjustment lever is a 12-in. length of 1-in. aluminum tubing that is hammered flat for all but 5 in. of its length. The $\frac{1}{4}$ -in. lever guide strip is shimmed at the ends.

Hold a metal scriber against the lever and swing it so the feed-adjustment goes from full-open to closed, and scribe an arc on the feeder body. Divide this arc into five





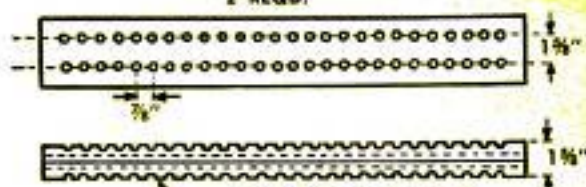
sections so that the feed-control table included in this article can be used to adjust the seeder to discharge the correct amount of material, whether it be seed, fertilizer or top dressing. When attaching the handle, which is shaped from aluminum flats, first drill the top holes in the body for the handle, then try various angles to determine a comfortable height before drilling the lower holes. ★ ★ ★

FEED-CONTROL TABLE

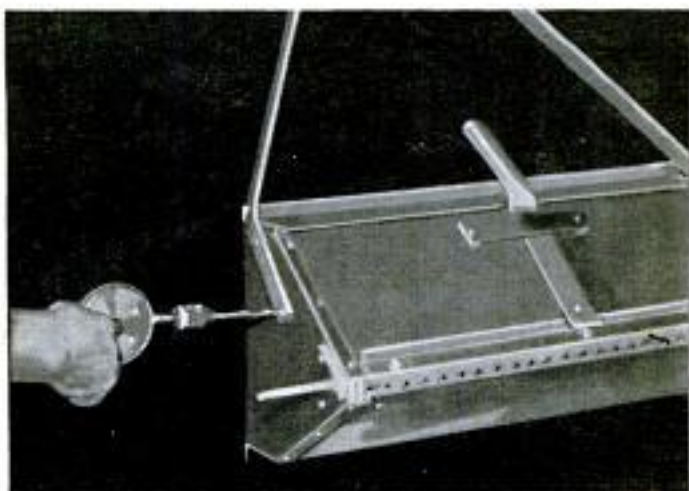
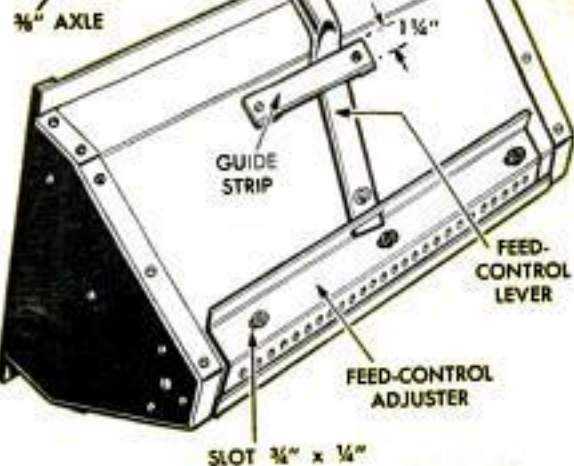
HOLE OPENING	GRASS SEED 1000 SQ. FT.	COMMERCIAL FERTILIZER 100 SQ. FT.	SALT, TOP DRESSING, LIME, ETC.
$\frac{1}{8}$	2 LB.	1 LB.	USE WIDE OPEN
$\frac{3}{8}$	2½	2	
$\frac{7}{8}$	3	3	
$\frac{4}{8}$	5	4	
$\frac{5}{8}$	10	5	

Feed-control table above shows different feed adjustments to be made for distributing various types of materials with the spreader. Below, upper hole for attaching handle is drilled first, then handle position is checked for height before drilling the lower holes in the seeder ends

AGITATOR
3" x 23" 18-GA. STOCK
2 REQD.



BEND INTO "W" SHAPE
AND FASTEN TO AXLE
WITH 10-24 $\frac{3}{4}$ " M. SCREWS





Dustpan Keeps Brush Clean When Painting Picket Fence

When painting a picket fence you can avoid having the brush pick up dirt or grass and also save much of the paint that may drip from the lower ends of the pickets by slipping a dustpan under each picket as it is painted. Excess paint easily is picked up from the dustpan with the paint brush, and cleaning with solvent allows the pan to be used for its normal job.

G. E. Hendrickson, Argyle, Wis.

Lawn Chair Fitted With Wheels Eases Shade-Hunting Task

Lawn chairs fitted with wheels are easy to move around the yard when shade-hunting, or when cutting the grass. Wheels for the chair shown in the illustration came from an old hand mower, but extra wheel sets may be purchased at a hardware store. The axle for the wheels was made from a metal rod with a hole drilled across each end to accommodate a cotter pin.

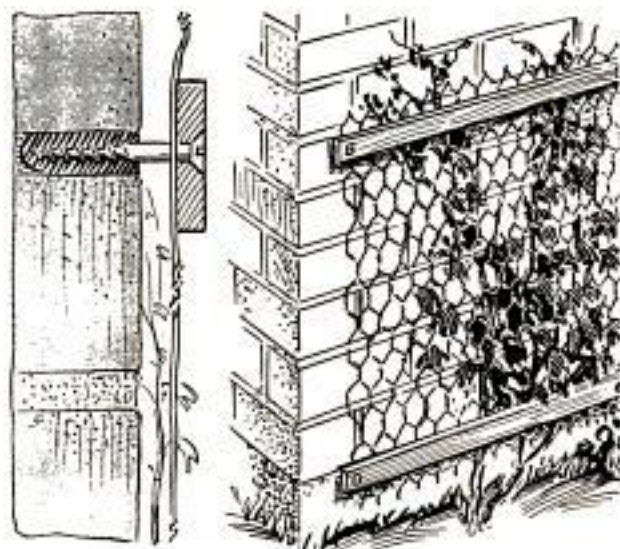
C. F. Marley, Nokomis, Ill.



Torch Supplies Gas for Burner

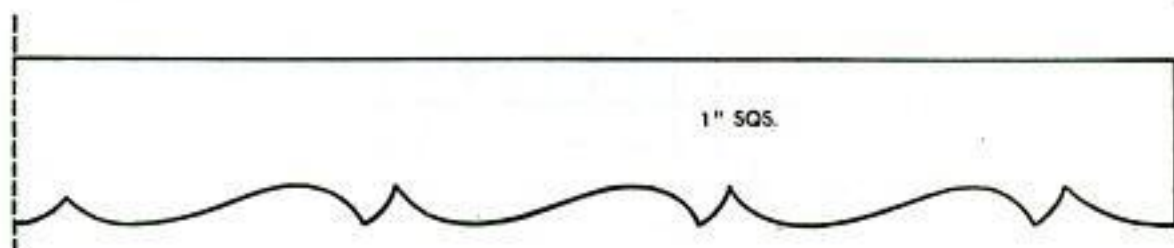
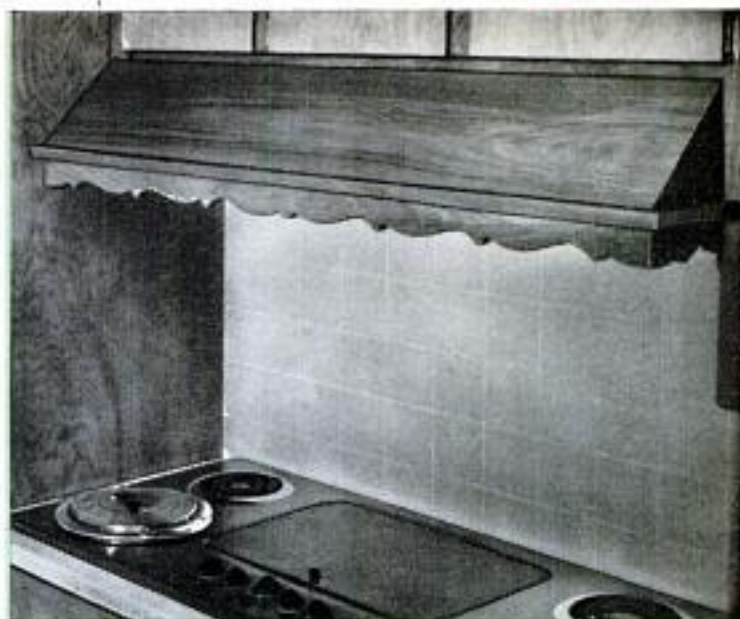
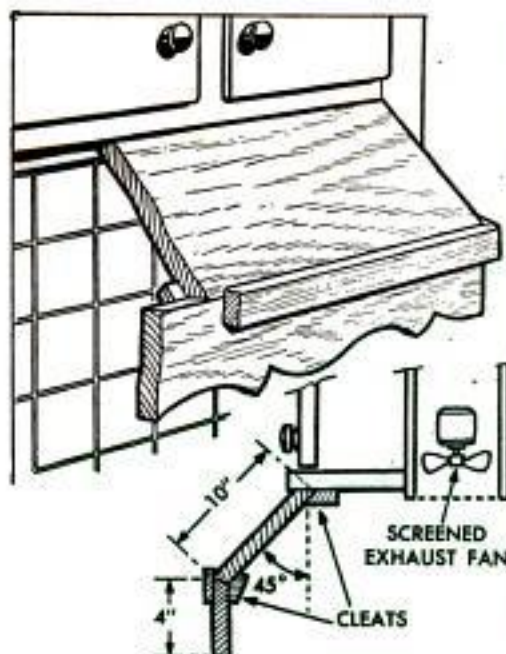
When you need a Bunsen burner or a gas plate at a distance from the gas outlet, a portable propane torch may easily be adapted as a fuel supply. Just unscrew the torch tip and fit the tube inside the end of the hose from the Bunsen burner. The method has proved practical for special, heavy-duty burners, which are designed for heating larger pieces of laboratory equipment and for which the smaller concentrated flame of the propane torch is not always satisfactory.

Ken Murray, Colon, Mich.



Starting Vines on Masonry Walls

Certain vines, such as Boston ivy, Virginia creeper, woodbine and similar vines have difficulty in clinging to masonry walls, but once started will stay and spread. To help them take hold, clamp the vine to the wall with poultry netting stretched between strips of wood that are screwed to the masonry. The screws may be anchored in lead sleeves or wooden plugs driven into the masonry joints.



Vent Hood for Modern Kitchens

Here is a really efficient vent hood installed under a kitchen cabinet through the back of which is carried a flue with a screened exhaust fan as shown in the detail. The material used for construction of the hood is 1-in. stock redwood but any other material matching the kitchen woodwork will be suitable. The vertical trim

strip or valance is scrollsawed as shown in the squared pattern, or it can be purchased in a number of stock patterns at most building-supply stores. For use over a gas stove, the hood should be located as high as possible above the burners and the inside lined with sheet asbestos.

Hi Sibley, Nuevo, Calif.

Blocks Under Nailheads Permit Easy Removal

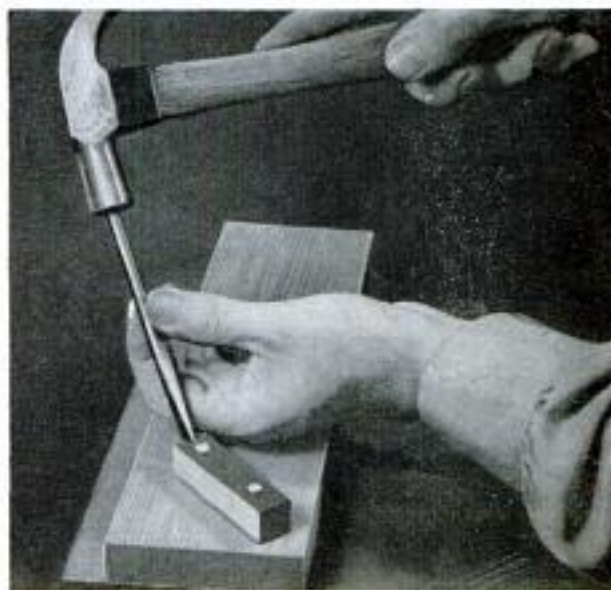
When nails are used to fasten frame members together temporarily, first drive the nails through thin wooden blocks and then into the framing. The nails are then easily removed with a claw hammer after splitting away the blocks.

Walter E. Burton, Akron, Ohio.

Draining Window Sills

If paint peels from an exterior window sill because the screen fits so tight that rain blown through it cannot run off, drive two upholstery nails into the lower edge of the screen to raise it up off the sill. The opening provided by the nails will enable the water to drain off and yet is small enough so that most insects are kept out.

Leslie K. Schultz, Cicero, Ill.



WTA 58 # 84

Paddle Boat for Summer Fun

By Bill Kersey

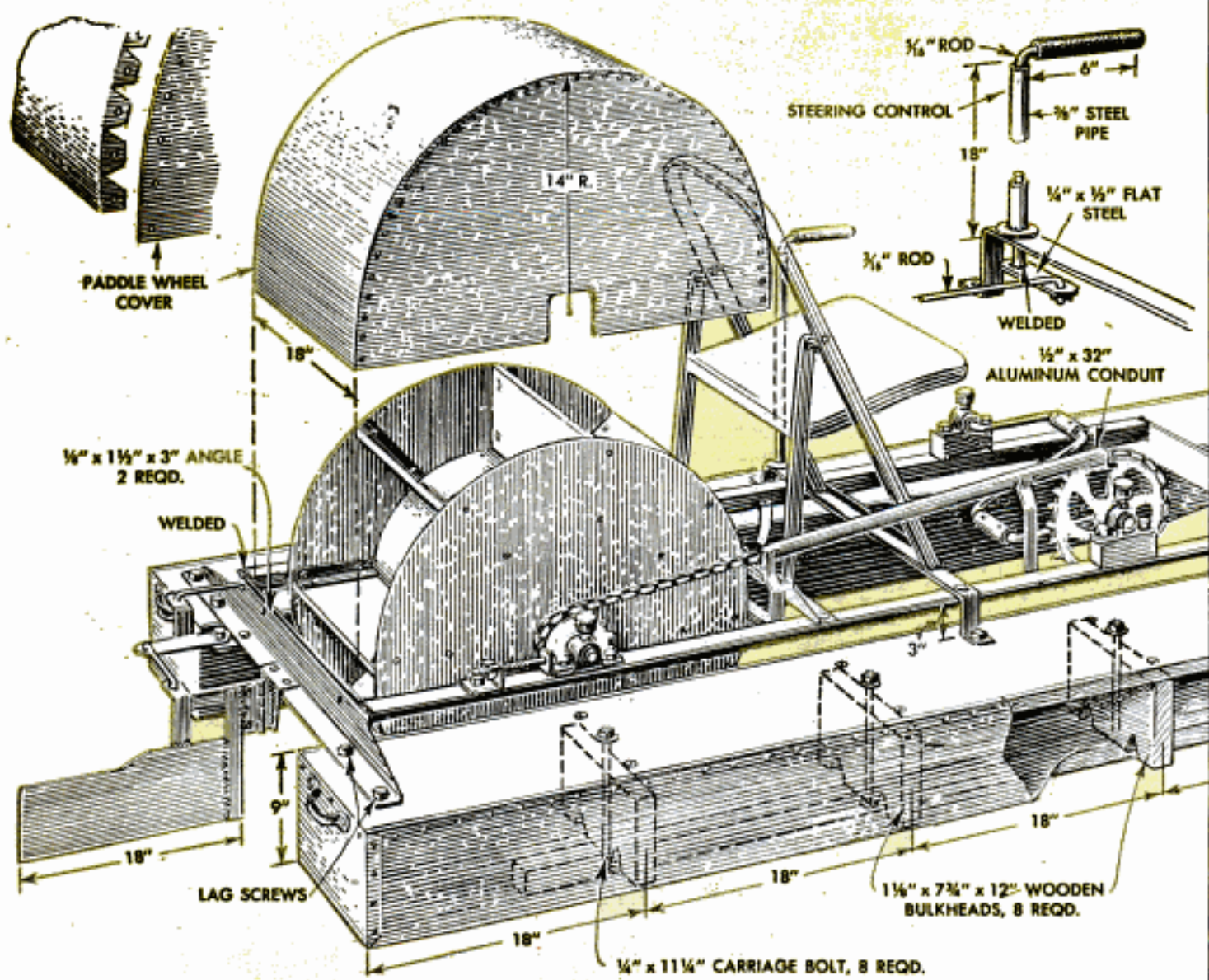
DO YOU WANT something different in a water sport at your lake cottage this summer? Then build this twin-hull paddle-wheel boat that will provide hours of safe fun and healthful exercise for children and adults alike. Constructed almost entirely of metal, the durable craft will retain its initial buoyancy all season and withstand unusually rough treatment.

The pontoons are made of 24-ga. galvanized steel, cut, bent and nailed to 1 1/8 x 12 x 96-in. pine lumber as shown in the detail below. Four wooden bulkheads in each pontoon and a 5-ft. length of 2 x 2 bolted to the bottom act as reinforcement, while riveted and soldered seams at the bow and stern make the pontoons watertight. A drainage plug is fitted in the forward end

of each pontoon as shown, so that water can be removed in the event a leak develops. Heavy-duty drawer pulls screwed to the bow and stern of each pontoon facilitate tying up at a dock and carrying of the craft. All wooden parts are prepainted on all surfaces before assembly to reduce water absorption.

Chassis, Steering, Pedal Assemblies

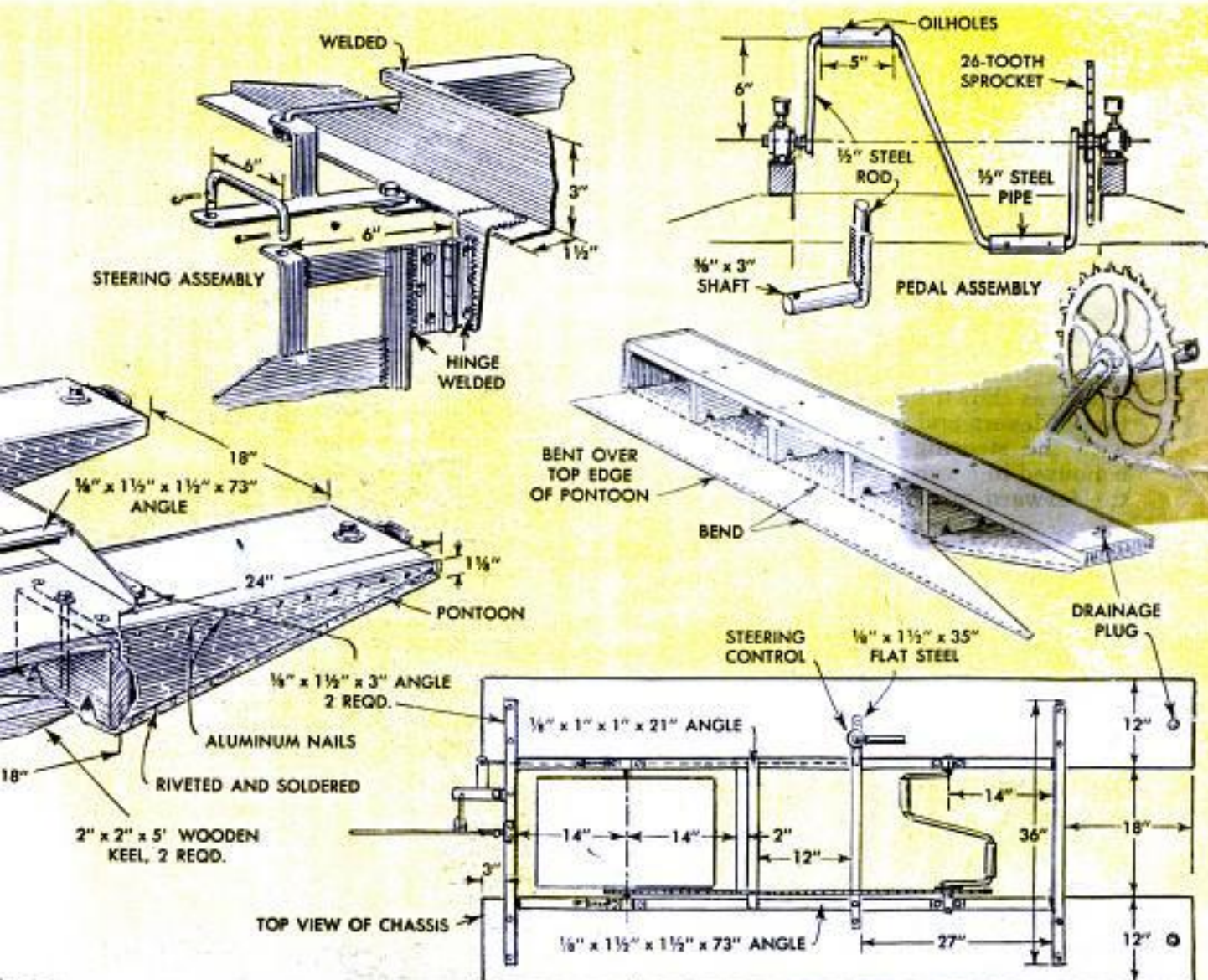
The chassis is made of welded steel angles fastened to the pontoons with lag screws. The metal folding chair is held rigidly in place by welding the legs to two crosspieces, the after crosspiece of which is welded to the chassis and the forward one bolted to the chassis and pontoons. The latter crosspiece also supports the chassis.

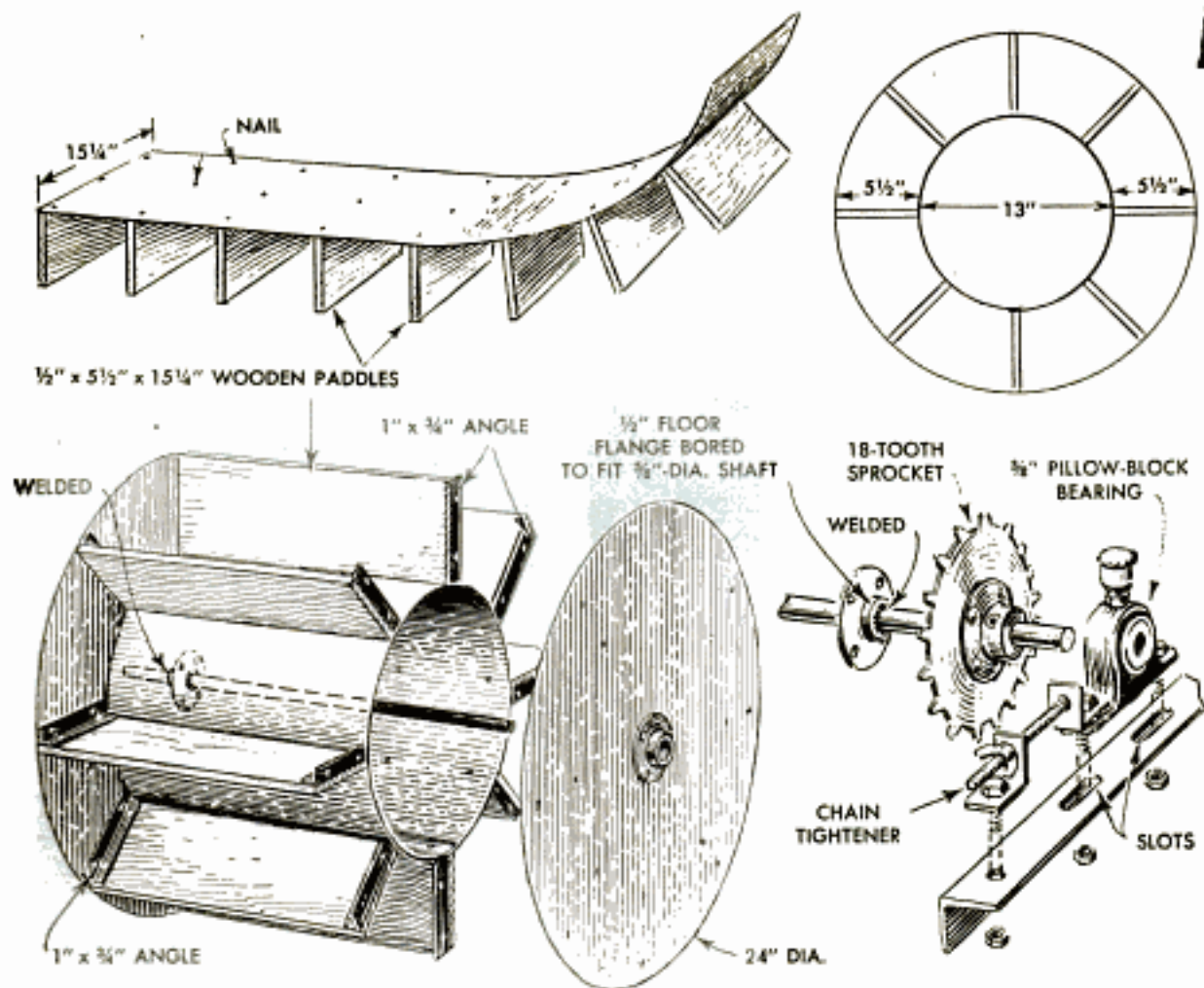




CHAIR ON BOAT MADE BY
 LYON METAL PRODUCTS INC.
 535 MOUND AVE.
 AURORA, ILL.

Considerable overhang at the bow ends of the pontoons, and shoal draft of this stable paddle boat permit navigating shallow streams and lakes and easy launching and bearding whether from beach or dock





When mounting paddle wheel on chassis, assemble sprocket and pillow blocks on shaft before securing blocks

The rudder is made of four pieces of 18-ga. sheet steel and a T-hinge welded into a unit as shown in the detail. A combination of levers and rods connect the rudder with the steering-control rod. The latter is housed in a vertical steel pipe welded to the forward crosspiece.

Two sprockets, one with 18 teeth and the other with 26 teeth, taken from an old bicycle, provide a favorable ratio for easy pedaling and sufficient speed. Before bending the steel rod for the pedal crank, it is necessary to drill oil holes in the lengths of steel pipe used for pedals and slide the latter into position on the rod. Then, the $\frac{5}{8}$ x 3-in. shafts are welded on the ends of the crank and the joints reinforced by welding a U-shaped rod over the first weld of each as shown in the detail. After the pedal assembly is completed, it is mounted on pillow-block bearings, top view of the chassis.

Paddle Wheel

Constructing the paddle wheel is easy. Simply nail the eight wooden paddles to the strip of galvanized steel that forms the

hub as shown in the detail. The strip should be long enough to provide a diameter of 13 in. when it is formed into a circle and the ends overlapped $\frac{1}{2}$ in. and nailed to the appropriate paddle. All the sheet metal for the paddle wheel and cover is 24-ga. galvanized steel, including the 1 x 4-in. angles that secure the paddles to the end pieces. The top of the paddle-wheel cover is screwed to the side pieces as shown in the detail. When the paddle wheel is completely assembled, the floor flanges are riveted to the ends and welded to the shaft as shown. Then, the small sprocket is slipped on the shaft for later positioning and securing, and the entire paddle-wheel unit is mounted on the pillow blocks. After the chain is installed, the chain tightener is bolted in place and given proper adjustment for efficient operation of the chain.

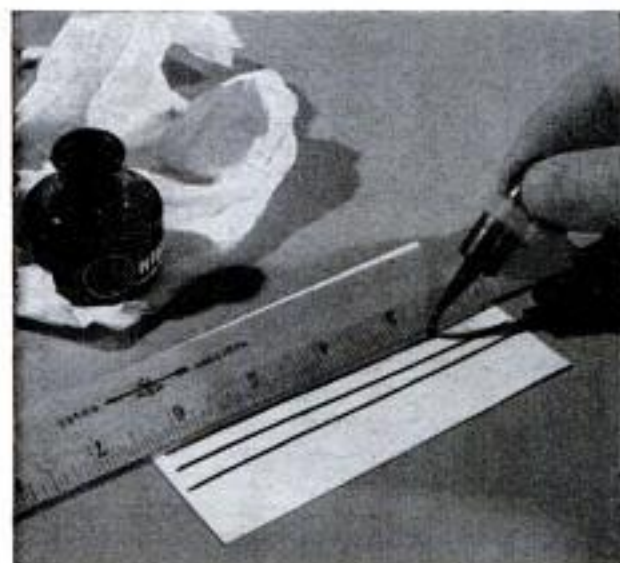
A chain guard made from $\frac{1}{2}$ -in. thin-wall aluminum conduit, is welded to the chassis for protection of the rider's leg. Removal of the 10 lag screws that secure the chassis to the pontoons permits quick disassembly into three major parts for easy transport to and from the place of use. ★★★

Corrugated "Platform" Protects Merchandise Stored on Basement Floor

To protect boxes and barrels of merchandise stored in a basement against moisture from damp floors, set them on sheets of corrugated metal or plastic. The corrugations permit air circulation between the floor and the sheets and under the boxes and barrels.

Smaller Propeller Restores Outboard Power on Hot Days

An outboard engine that runs at reduced efficiency because of high atmospheric temperature and humidity and low barometric pressure can be made to run properly by switching to a smaller propeller when these conditions prevail. Assuming that at the beginning of the season the engine was equipped with a propeller that would permit it to turn at its rated r.p.m. at full throttle, the smaller propeller will offset this weather-inspired power loss and permit the engine to run at its rated r.p.m. for maximum boat speed. If the propeller change fails to restore the engine's efficiency, servicing or a complete overhaul may be needed.



Quill From India-Ink Bottle Is Emergency Ruling Pen

The quill stopper from a bottle of India ink serves as an emergency ruling pen when drawing heavy lines. Similar to a medicine dropper in construction, the stopper holds a large quantity of ink that flows in an unbroken line of uniform width when the opening in the quill is held flat against the paper and drawn along the edge of a ruler as shown.

Spring Improves Operation Of Worn Bench Vise

The tendency of a worn bench vise to remain closed during the first three or four turns of the handle can be eliminated by slipping a heavy compression spring on one of the guide rods, as shown, to take up the slack caused by a loose-fitting vise screw and movable jaw. If the vise has a square guide or beam, a similar type spring can be wound from heavy spring wire.

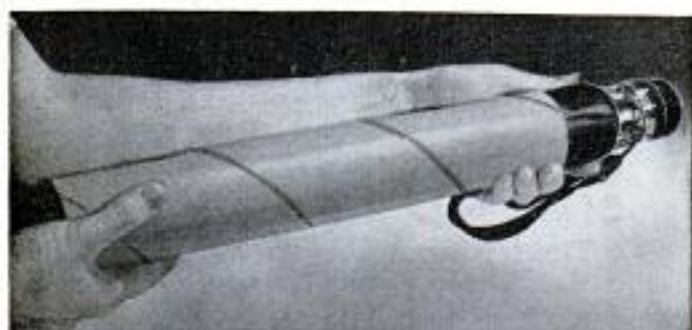


SOLVING Home Problems



BATTERY FILLER is just the thing to water small plants, also succulents and rooted cuttings, where only a few drops under or over is either too little or too much for the plant. With the filler you also do the job without splashing water over window seat or on table

ICE-CREAM BAR won't be a total loss on a hot day if you have a paper baking cup handy to catch drippings and flakes of chocolate coating that break away from the bar before you get to them. Cut a short slit in bottom of cup and slide over stick to provide drip cup



CARDBOARD MAILING TUBE provides protection against wear and damage for that umbrella you carry in the car or store in a crowded clothes closet. Select a tube that will take the umbrella in a snug fit. Then cut to length required

SALT SOLUTION, made by adding two teaspoonfuls of salt to a cup filled with water, makes a fairly accurate test solution for checking freshness of eggs. Fresh egg will sink to bottom of the cup but a doubtful egg will float



ADHESIVE-TAPE CONTAINER, the kind with a friction cover, keeps postage stamps always under control in the desk or on a trip where storage space must be reduced to the minimum. Tear stamps into strips and wind on tape spool





SAFE SCISSORS CASE is made by slipping a length of rubber tubing over the blades. Protects both you and the scissors. You won't get a hand pricked by the sharp blade points and scissors are not likely to be damaged if they are accidentally dropped

CANDLES that gather dust over a period of time can be cleaned by wiping lightly with a cloth dipped in alcohol. The latter softens the surface of the wax and removes the accumulation of dust without impairing the usefulness of the candle in any way



PAINT that collects in the mesh of fly screen when painting is easily blown out with a syringe. Clogging of the mesh most frequently occurs when you apply a fresh dip of paint from the brush or when working near screen frame. That's when syringe is handy



CORNER IRONS, also referred to as mending plates, make sturdy hinges for cover of a toy box or tool chest. To attach, locate cover and clamp in place so it cannot shift. Then attach irons to cover with two screws and to box with one screw each

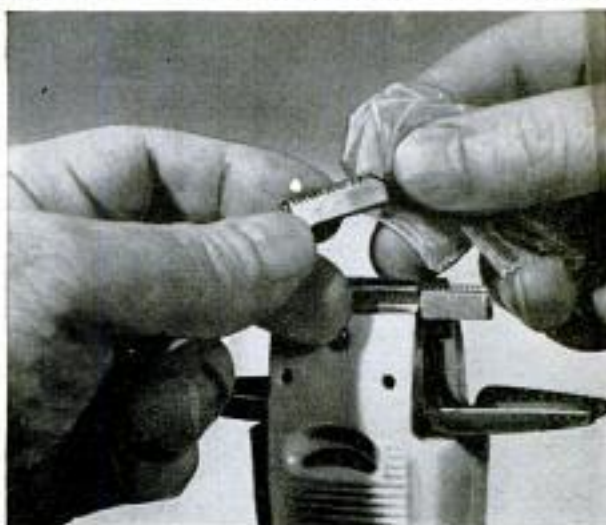


DRY MUSTARD is a good deodorizer for glass tumblers, vases and bottles. First, wash container in soapy water, then fill about half full with clean water. Add a teaspoonful of dry mustard and stir thoroughly. After an hour or so, rinse with clear water



REPLACEMENT SHOE-LACE TIPS are easily made with cellulose tape and nail polish. Wind several turns of tape around end of lace, two to three turns will usually do it, and then seal with an application of nail polish. Will last nearly as long as regular tip

WAX PAPER can supply a good emergency lubricant for an electric-shaver head, that is, until there's time to have the shaver properly serviced. Disassemble the head and lightly wipe the inside shearing cutter with a small piece of wax paper





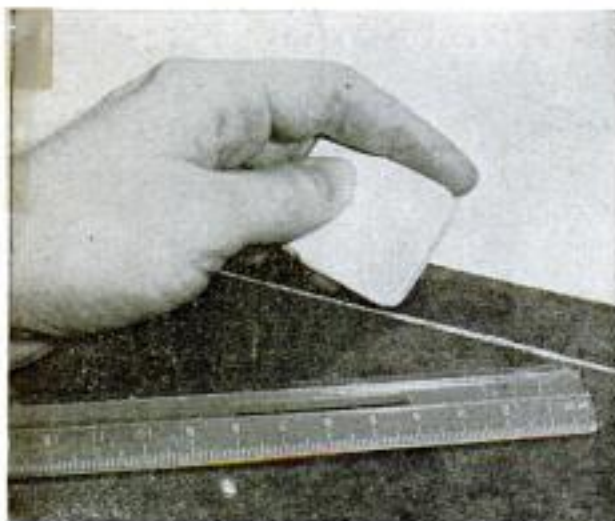
Barbecue Pit Made From Tank For Emergency Use

This portable barbecue pit was made by one farmer from an old stock tank, with heavy chicken wire stretched over the top for a grill. The bottom of the tank is lined with rocks, which hold the heat and raise the charcoal bed to within 18 in. of the grill. The barbecue is easily moved to any desired location when the rocks are taken out.—Ben Brown, Collinsville, Ill.

Chalk Better Than Pencil For Marking Hardboard

When marking hardboard for cutting or layout work, lines drawn with a piece of tailor's chalk are easier to see than pencil marks because of the slickness and dark color of the material. Also, light-colored crayons are a good marking medium for use on material of this type.

Frank A. Javor, Newark, N. J.



180

Row Markers From Coat Hangers

Markers for newly planted rows of vegetables or flowers can be made by bending a number of wire garment hangers to the shape indicated. The empty seed packets may be slipped over the tops of the markers to identify the seeds planted. The markers are forced into the ground.



Tire Bead Broken Loose With Aid of Brake Drum

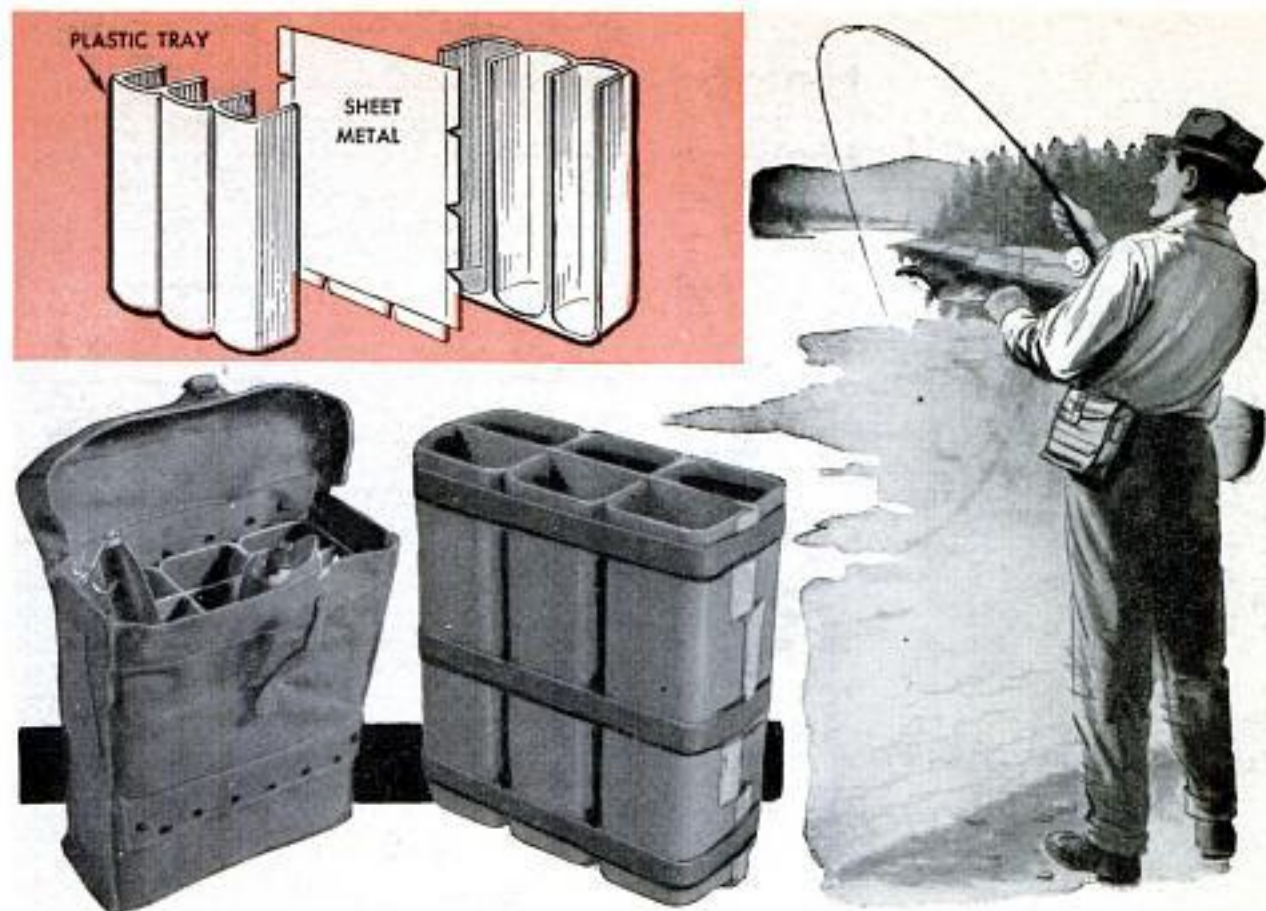
When a second flat tire leaves you with no spare, and it is necessary to remove the tire from the wheel to patch the tube, here is a quick, easy way of breaking the tire bead loose from the rim. Place the tire in position under the brake drum as indicated, then gradually lower the jack until the bead is broken loose. If the brake drum is quite high, place a piece of lumber or other object suitable for this purpose between it and the tire.

A. C. West, Chula Vista, Calif.



Disposable, heatproof ash trays can be made for a party by shaping pieces of aluminum foil over a regular ash tray. When through using, fold the edges in to the center and discard them with the ashes and butts still inside.

Mrs. Rose Mayover, Sarasota, Fla.



Fishing-Lure Bag Carried on Trouser Belt

Ideal for carrying large-size lures, such as are used for salt-water fishing and surf casting, this compartmented canvas bag also can be modified and used for carrying the smaller-type lures used in fresh-water fishing. The bag itself is the type sold in war-surplus stores and measures 8½ in. wide and 10½ in. high. It also could be cut and sewn from light-weight canvas. Compartments in the bag are formed by using two plastic silverware trays that can be purchased in a ten-cent store. They measure about 8 x 13 in. and have three long, parallel compartments with a shorter one across the end. This latter compartment is cut off when the trays are shortened to fit the canvas bag. A piece of light sheet metal then is cut to fit between the shortened trays as indicated in

the detail, allowing a ½-in. flange on the bottom and two sides. Notches are cut in the flange and the sections are bent alternately at right angles to the partition so the plastic trays are held in alignment. A few turns of tape are used to hold the trays and sheet metal together as a unit. The unit then simply is slipped into the bag. If smaller lures are to be carried, the purchased bag is designed so the lower end can be rolled and laced to make the bag only about 6 in. deep. The plastic trays and sheet metal then are cut to fit. If the shoulder strap with which the bag is fitted does not permit comfortable carrying, a short strap can be sewed to the bag so that it may be worn on a belt in the manner shown in the illustration.

Vlad Evanoff, Brooklyn, N. Y.

Fire Extinguisher Improvised From Insecticide Duster

For an inexpensive but quite effective household or automobile fire extinguisher, fill an insecticide duster with a charge of chemical of the type used in dry-chemical extinguishers. Since the chemical is pumped on the fire by hand as needed, there is no costly expelling charge to be replaced at each filling of the extinguisher.

Replacing Tire on Rim

Whenever you replace a tire on a rim be sure the balance mark, usually a red dot, is in line with the valve stem. Also, when wheel-balancing weights are installed, mark their position on the tire. Check the marks occasionally to see that the weights do not shift. One oz. of unbalance becomes 12 lb. of pounding force at 60 m.p.h.—Roger Darling, Revere, Mass.

X196



Keep It From CRACKING

Reinforcing concrete driveways, sidewalks, patios and basement floors with welded-wire fabric adds 30 percent greater strength

TO ASSURE yourself a concrete job that will take years of the hardest wear without cracking or breaking up, reinforce it with welded-wire fabric at the time of pouring. This is true not only of flat work in contact with the ground such as basement and grade-level floor slabs, walks, patios and driveways, but also of walls and other vertical structures either above or below grade.

As concrete cures after the initial set, slight shrinkage often develops stresses which, under certain conditions, may crack concrete alone. A steel fabric made especially for the purpose and placed at the center of the slab or vertical member, tends to absorb and distribute these stresses and thus control the formation of cracks which not only are unsightly and damaging, but may admit water, dirt and such insects as



On flat work such as the driveway pictured above, welded-wire fabric is placed at the center of the slab with the meeting edges lapped as in the inset

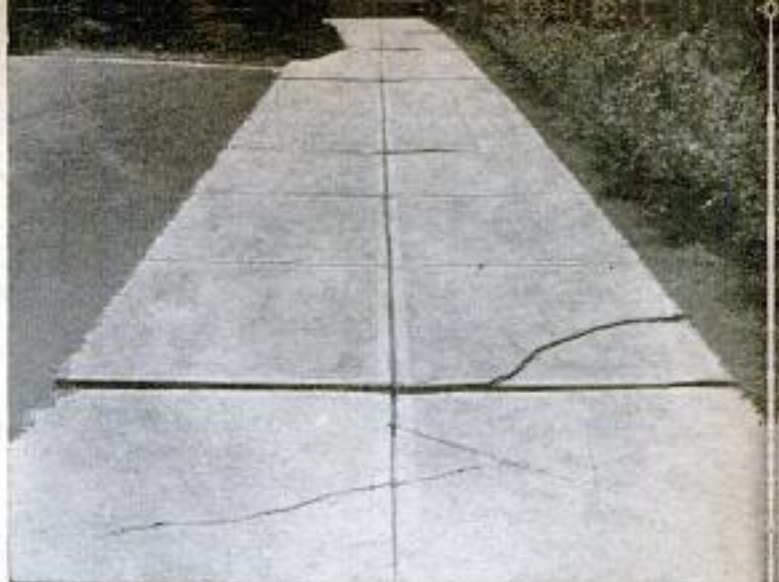
termites. Nonreinforced slabs and foundation walls of concrete in contact with the ground or fill, also are subjected to the action of frost in the colder climates and to expansion and contraction due to temperature and moisture variations of the air and the ground throughout the seasons. Exposed flat work such as driveways, walks and patios may warp and crack due to temperature variations between the top and bottom surfaces of the slab itself, or to structural stresses which develop due to settling of the soil or fill under the slab. Wire reinforcement adds the tensile strength necessary to control cracking of the slab under such conditions.

The table on page 184 lists commonly recommended types of welded-wire fabric for home projects in poured concrete. For average purposes the fabric regularly

comes in rolls 60 and 72 in. wide. Note in the table under the heading "Recommended Styles" that there are two pairs of figures in the various designations. These refer to the gauge and spacing of the longitudinal and transverse wires that form the mesh. As an example, 6x6-10/10 indicates fabric having 10-ga. longitudinal and transverse wires spaced 6 in. in each direction, the first of each pair of figures referring to the longitudinal wire.

The fabric is easily cut to the required size by using wire cutters (or small bolt nippers on the larger sizes) as in the photo, page 184. When placing, pictured on the opposite page, it's common practice to cut the fabric with $1\frac{1}{2}$ to 3-in. clearance between the edges of the fabric and the inside face of the form. Where more than one width of fabric must be used to span the slab, it's regular practice to lap the meeting edges 6 in., or one wire spacing, as in the inset photo on the opposite page. Some masons wire the meeting edges together at the lap to keep both widths at the same level at the joint.

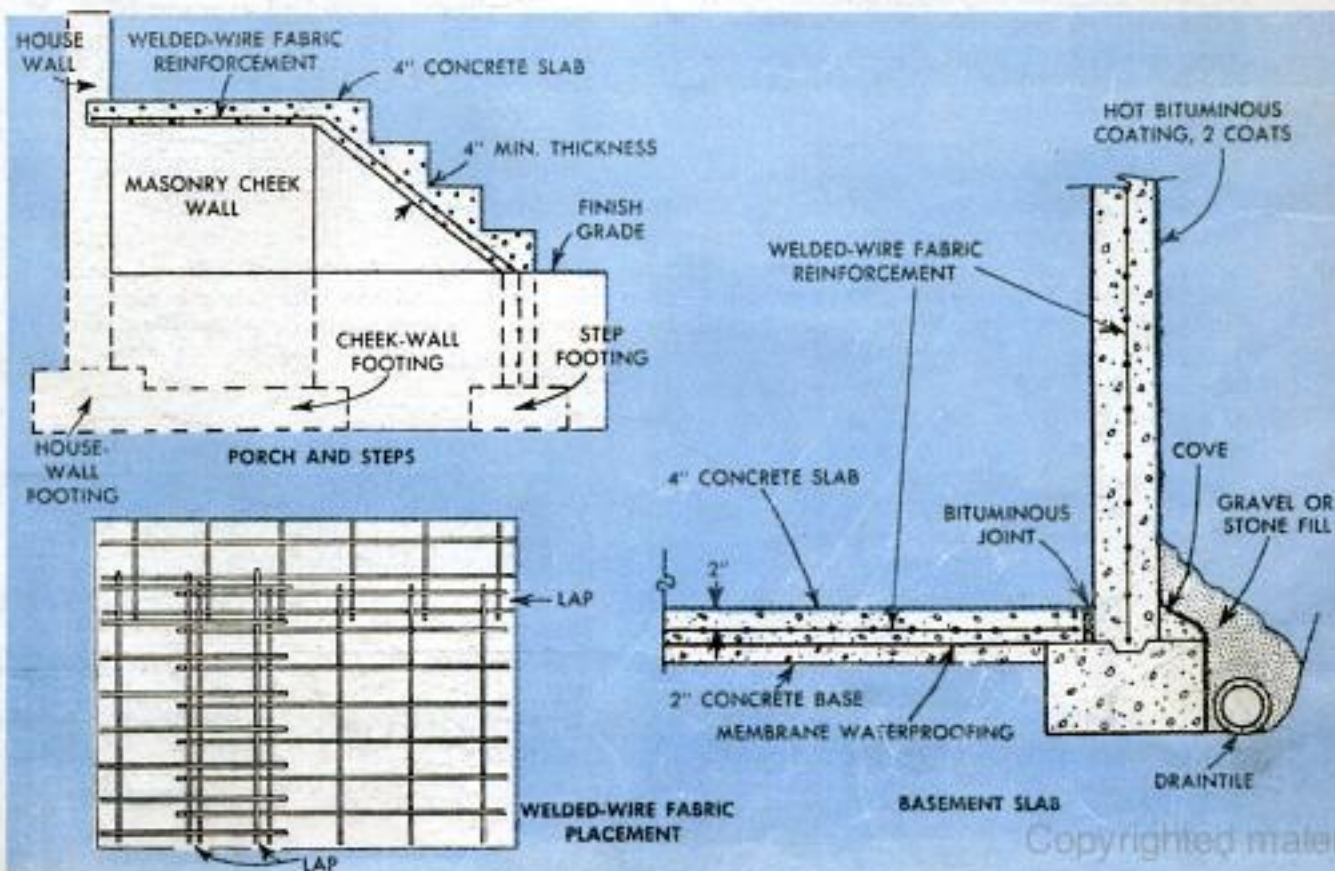
Placing the fabric reinforcement in position in the freshly poured concrete usually is done in one of two ways. By the first procedure concrete is poured to about one half the finished thickness of the slab and struck off level. Then the wire fabric is placed as in the upper photo on the opposite page and the final batch of concrete is poured without delay. A second method, often used for home projects involving slabs of considerable size, such as driveway sections, eliminates the need for two pours, an important consideration when



Note the cracks in this concrete driveway. These result from pouring concrete slabs on subgrade without reinforcing to control cracking and warping



This wire-reinforced driveway has withstood wear and erosion for many years and is still intact, no cracks or frost damage visible throughout the length





RECOMMENDED STYLES OF WELDED WIRE FABRIC FOR VARIOUS REINFORCED CONCRETE PROJECTS AROUND THE HOME

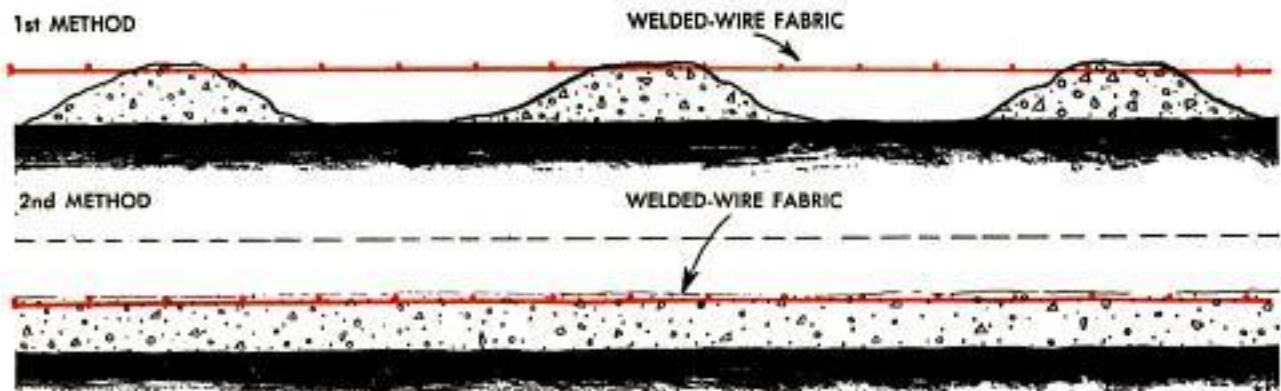
Type of Construction	Recommended Style	Remarks
Barbecue foundation slab	6x6-6/6 to 4x4-6/6	Use heavier style fabric for heavier, more massive fireplaces or barbecue pits.
Basement floors	6x6-10/10 or 6x6-6/6	For small areas (15' maximum dimension) use 6x6-10/10. As a rule of thumb, the larger the area, the poorer the subsoil, the heavier the gauge. Fabric must not pass through joints.
Driveways	6x6-6/6	Continuous reinforcement between 25 to 30' contraction joints, 1 1/2-3" clearance at sides and joints.
Foundation slabs (Residential only)	6x6-10/10	Use heavier gauge over poorly drained subsoil, when maximum dimension is greater than 15', or when heating ducts are embedded.
Garage floors	6x6-6/6	Fabric must not pass through joints.
Patios and terraces	6x6-10/10	Use 6x6-6/6 if subsoil is poorly drained.
Porch floor a. 6" thick slab up to 6' span b. 6" thick slab up to 8' span	6x6-6/6 4x4-4/4	Position on nails or blocks one inch from bottom form to resist tensile stresses.
Sidewalks	6x6-10/10 6x6-6/6	Use heavier gauge over poorly drained subsoil. Construct 25 to 30' slabs as for driveways, but form "dummy" joints for appearance. For narrow walk, cut lengths of fabric in half longitudinally.
Steps (Free span)	6x6-6/6	Use heavier style if more than 5 risers. Position fabric 1" from bottom form.
Steps (On the ground)	6x6-6/6	Use 6x6-6/6 for unstable subsoil.

Wire fabric comes in rolls in convenient lengths and widths, 60 and 72 in. being average widths

handling ready-mixed concrete. As the material comes from the ready-mix truck, a quantity of it is placed in small piles about 3 ft. apart and equally spaced over the subgrade. These are leveled so that the height is about one half the slab thickness. Then the wire fabric is placed and the slab poured to full thickness. The piles of ready-mixed concrete will keep the wire fabric in the correct position at the center of the slab. The details below show how the two methods are carried out.

Sketches on preceding page show recommendations for wire-reinforcement of concrete steps with a free span, the horizontal slab of the stoop being carried on a cheek wall. It is recommended that on free-span steps the wire fabric be placed only 1 in. from the bottom of the form. The lower detail shows correct placement of the wire fabric when the size of the slab makes it necessary to lap-join the fabric in two directions. The detail below shows recommended procedures in wire-reinforcing basement floor slabs and foundations. ★ ★ ★
Photos and information courtesy Wire Reinforcement Institute, Inc.

When placing wire fabric at the center of slab two methods are used. In the first, piles of concrete are placed on the subgrade and leveled to one half the thickness of slab. Then wire fabric is placed on piles and slab is poured to full thickness. Second method requires two pourings, is shown in lower detail



Ladder Transported on Wheelbarrow

Finding a long, wooden ladder was too heavy to carry singlehanded for a great distance, one homeowner transported it with a wheelbarrow. The ladder is centered on the wheelbarrow and tied securely to the handles and wheel frame. For best maneuverability, the person wheeling it should stand between the rungs behind the handles of the wheelbarrow. However, it is easier to walk at the back end of the ladder, using the ladder rails as handles. From this position you can keep the front end from striking the ground.

Broken Pin From Outboard Reinstalled for Emergency

If the shear pin on your outboard motor breaks while far from shore and no other replacement or substitute is available, the three pieces of the broken pin can be reinstalled to allow slow-speed operation of the motor. To do so, fit the pieces back into the hole placing the longest piece in last so it bridges the gap between the propeller hub and shaft on one side. Then remount the propeller and start the engine. By running at no more than half the normal cruising speed, the repair should last until you reach shore.—Henry Josephs, Gardenville, Pa.



Small Glass Holds Egg In Position for Painting

When decorating an egg with a painted design, such as those used at Easter time, place the egg in the top of a small glass similar to the type shown. As a result, both hands will be free to work with the paint and decorative material, and drying of the paint will be possible without any possible damage from rolling on a flat work surface.



Brush Wrapped in Wax Paper Need Not Be Cleaned

It is not necessary to clean a paintbrush that is to be set aside for a few hours or overnight if the bristles are protected from the air. To do this, wrap them tightly in wax paper or aluminum foil, twisting and taping the ends of the sheet around the brush handle. The paper will prevent paint in the bristles from hardening. Aluminum foil can be used in the same manner, eliminates the need for taping in place and will do an even better job.

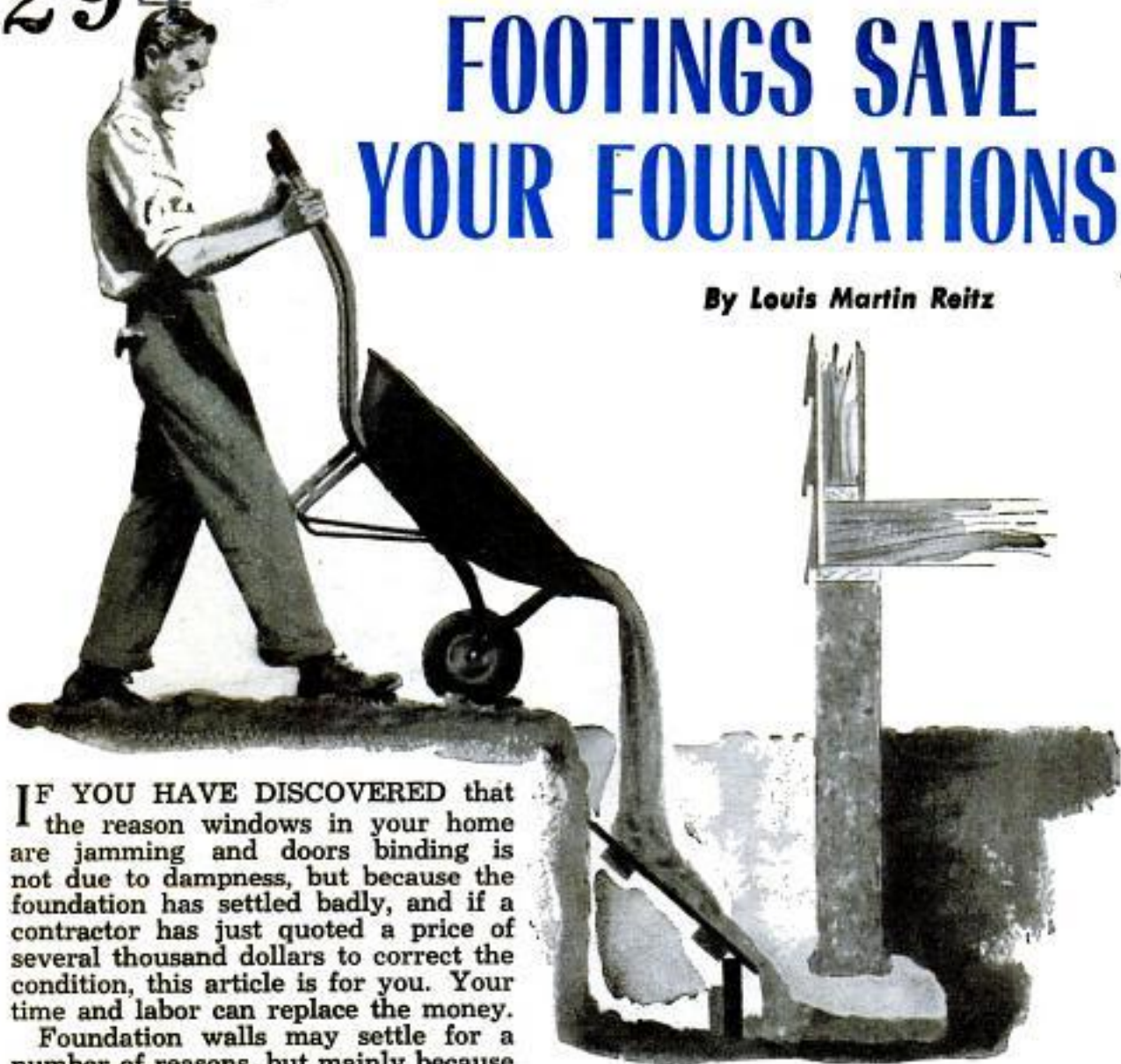


☞ A ladder should not be painted. Give it two or three coats of boiled linseed oil to preserve the wood.

X294

FOOTINGS SAVE YOUR FOUNDATIONS

By Louis Martin Reitz



IF YOU HAVE DISCOVERED that the reason windows in your home are jamming and doors binding is not due to dampness, but because the foundation has settled badly, and if a contractor has just quoted a price of several thousand dollars to correct the condition, this article is for you. Your time and labor can replace the money.

Foundation walls may settle for a number of reasons, but mainly because there are no footings under the walls or because they are not of adequate size. If the footings are too small, a period of extremely heavy rains may soften the ground enough to permit the foundation walls to settle, even though the house has been standing several years and no previous trouble has been encountered. This latter condition is more likely to occur in areas where a large amount of fill has been used to level the ground, and not allowed sufficient time to compact before building on it.

You, the homeowner, can install the necessary footings by undermining the foundation walls and pouring the footings in short sections, so that only a small portion of a wall is unsupported at any one time. To minimize the possibility of the wall collapsing or cracking when it is undermined, do not dig under the walls when the ground is wet.

Crawl-Space Foundations

If the building has a crawl space, as indicated in Figs. 1 and 2, the footings are

installed from outside the walls. First, a narrow ditch is dug down alongside the foundation, just wide enough to permit a man to work. If the foundation is poured concrete and the building resting on it is of frame construction, the wall can be undermined at one point for a distance of about 4 ft. However, if the building or foundation wall is masonry construction, undermine the wall for a distance of no more than 2 ft. at one time. The undermined sections should be no closer than 6 to 8 ft. apart. To provide good forms for the footing sections, keep the bottoms of the excavated areas as flat as possible. Also, keep the side of the excavation that is on the opposite of the foundation wall straight, since it is difficult to position a form board in the restricted space available. A hand ax can be used to loosen the dirt and cut the sides and bottom straight, while a hoe with a shortened handle or a small flat-bottom coal shovel can be used to remove the loosened dirt. Be sure to dig

past the opposite side of the wall and up, so that the poured concrete will form a footing slightly higher than the lower surface of the foundation wall. This will assure that the footing will bear solidly against the wall. A sawed-off baseball bat or similar-sized piece of wood should be used to tamp the poured concrete so that it will be compacted firmly in the form. The new footing should be from 18 to 24 in. wide and from 8 to 12 in. thick, depending on the load to be carried. The higher figures will provide a footing sufficient to support the foundation under a 2-story brick house. If the soil under a foundation appears damp or loose, the high figures also should be used for a 1-story house to assure positive support for the foundation.

Wherever possible, center the footing sections or "pads" under cracks or faults in the foundation walls, Fig. 4. In all cases, avoid aligning a joint in the footings with a crack in the walls. After the dirt has been scraped out of the hole under the wall, stake a board in the ditch, Figs. 1 and 2, to provide a side to the footing form. This will save concrete and make a neater job.

If the bottom of the hole is rough or rocky, level it with some fine sand over which is placed a strip of building paper. The paper will help prevent the water and cement from draining out of the concrete and making it weak. For added strength, place a $\frac{3}{8}$ -in.-steel reinforcing rod at the front and back corners of the footing pad, Fig. 1. Allow them to extend about 6 in. beyond the pad so the pad will be "keyed" to the next one by the rods. Make a pocket in the soil at each end of the hole for each rod and pack crumpled newspapers around the ends of the rods, Fig. 3, to prevent the concrete from filling the cavity. The ir-

regular surface caused by the newspapers also will provide a rough surface that will aid in making a good bond when the adjacent pads are poured.

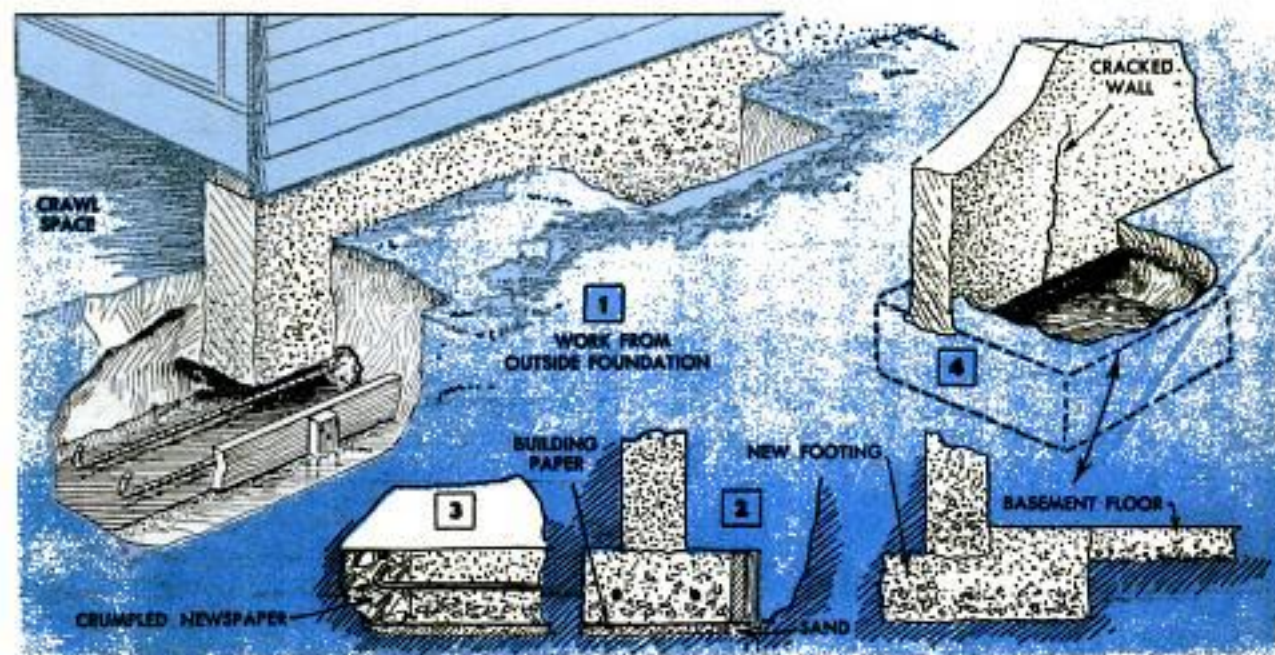
Basement Foundations

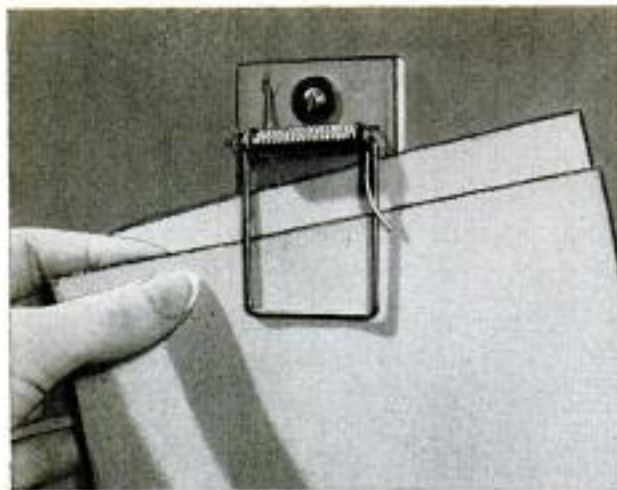
When a basement is located under the part of the house that has settling foundations, the footings can be installed from inside the wall, and during cold weather, if necessary. The basement floor must be broken up along the edges to permit undermining the foundation walls, Fig. 4. The concrete is poured under the walls in the same manner as previously described.

After a footing pad has been poured, it should not be disturbed for one or two months so that the concrete is well seasoned. Pads adjacent to it then can be installed. Concrete used for the pads should be a rich mixture and a minimum of water should be used to assure that when compacted it will completely fill the space under the foundation wall.

When working from the outside of a foundation wall, where piled-up dirt will damage the lawn or landscaping, dispose of the dirt removed from the first hole, or store the dirt in some corner of the yard out of the way. When the second hole is dug, drop the dirt from it into the first hole. This can be repeated all the way around the house so that the mess can be kept to a minimum.

In some cases, where part of a foundation is in firm or rocky soil and has not settled, that part will require no new footing. If a wall is strong, footing pads spaced a few feet apart may be sufficient. However, footings should be located under each corner of the foundation and under cracks or faults in the foundation walls. ★ ★ ★





Mousetrap Dispenses Sandpaper

A mousetrap of the type shown, screwed to the wall next to a workbench, provides an excellent means of keeping sheets of sandpaper in various grades within easy reach. Also, valuable drawer space is saved and the desired grade of sandpaper can be selected quickly.

"Twinned" Containers Store Nuts and Bolts

No more looking for a nut to fit the bolt if you keep these used-together items in screw-top containers joined top to top as pictured. Place the nuts in one container, the bolts in the other and join the tops with a single wrapping of cellulose tape. Small clear-plastic containers of the type in which screw-and-bolt assortments are sold are just the thing for keeping short stove bolts and nuts handy. Large containers, such as peanut-butter jars, with metal or plastic screw tops should be joined top to top with short stove bolts.



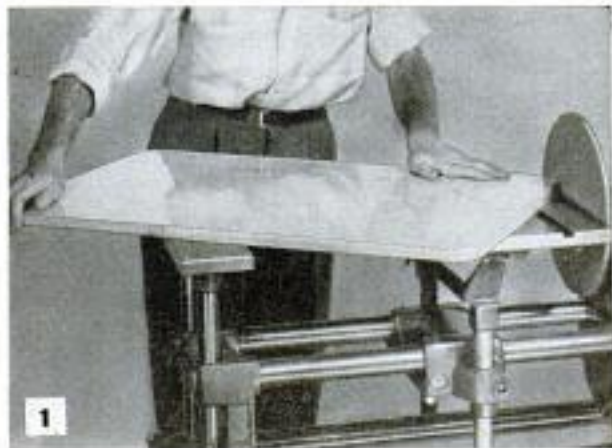
Coffee Tables From

By Tom Riley

SINK-TOP CUTOUTS make smart-looking and serviceable coffee tables when wrought-iron legs are screwed to them and the edges trimmed. Available at most building-supply stores at very low cost, the cutouts are waste pieces resulting when openings are cut in sink tops made from panels of colorful plastic laminate bonded to plywood. Rectangular pieces can be used as is or the edges can be sanded smooth and the corners rounded as shown in Fig. 1, followed by application of the desired finish. The two longer sides are trimmed with 1 x 3-in. hardwood which is beveled and grooved, Fig. 2, and glued to the table as shown in the drawing.

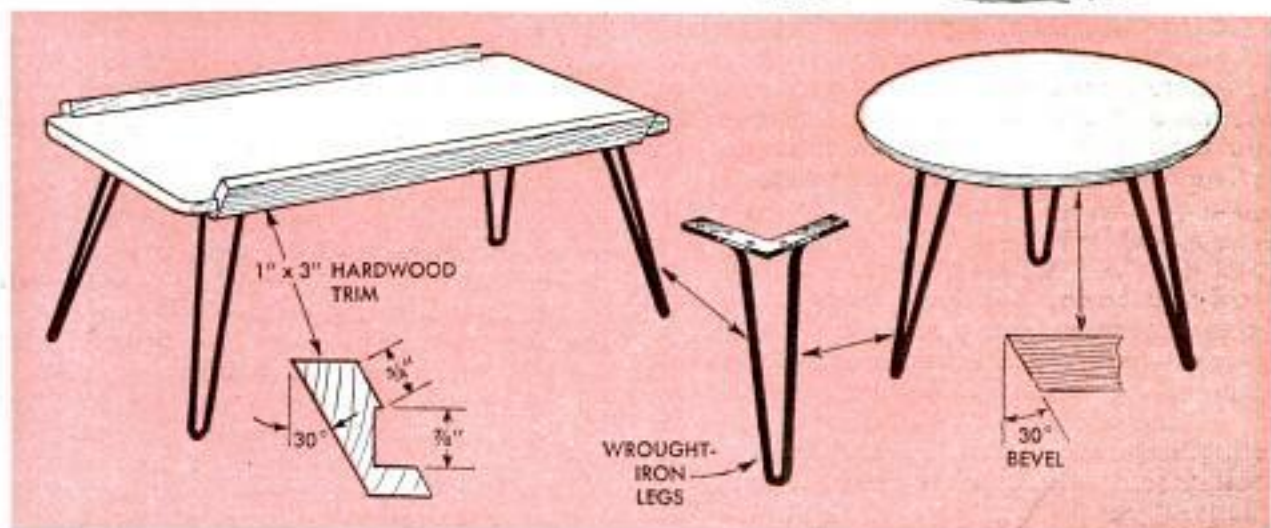
The round table is rough-cut on a jig-saw, using a very fine-toothed blade to prevent chipping the plastic top. Then the 30-deg. bevel is cut on the edge and sanded smooth, Fig. 3. The latter operation, "pivot sanding," involves drilling a shallow $\frac{3}{8}$ -in. hole in the center of the underside of the table top to accept a pivot pin, a short $\frac{3}{8}$ -in. bolt turned into a threaded hole near the end of the miter-gauge bar. The bolt serves as the pivot point when the miter-gauge bar is locked in place in its table slot. With some disk sanders it may be necessary to build a jig to permit sanding at a 30-deg. angle. When using the sander for this purpose, first make several light passes around the edge of the table, revolving the work slowly as it is being sanded. Use coarse or medium-grit sandpaper and finish it by running the sander at a higher speed. If the table is to be used outdoors, give the underside a sealer coat to prevent entry of moisture. Finally, installation of the wrought-iron legs is easy and requires no bulky supports. ★ ★ ★

Sanding edges and corners of rectangular sink-top cutout on disk sander assures squared edges



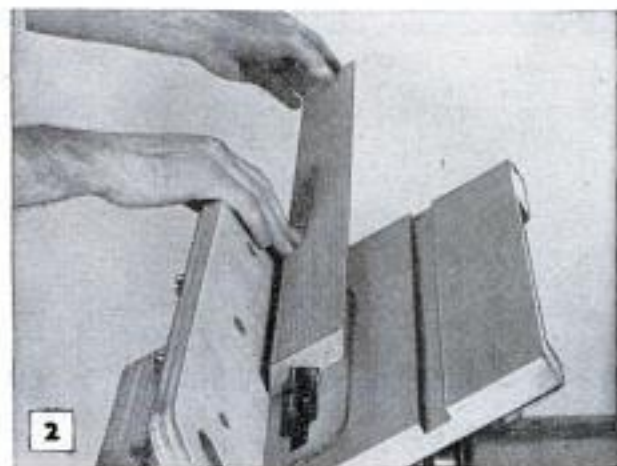
WTM 58

Sink Cutouts



Groove is cut in hardwood-trim pieces by making several passes with combination blade or using dado

Accurate sanding of 30-deg. bevel on round top is accomplished by "pivot sanding" it on disk sander



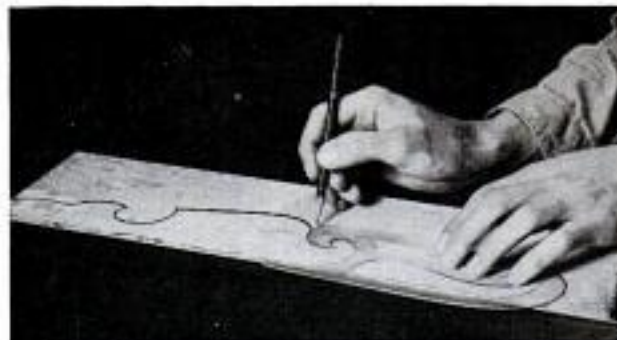


Detachable Cords on Reflectors Save Setup Time

Photo reflectors without long cords are a lot easier to pack and carry since the cords can be coiled separately and stored in much less space. A staff photographer shortened the 10-ft. cords by cutting them off about 4 in. from the reflector sockets and then fitting plugs on one end and sockets on the other of the severed cords.

Block Helps in Planing Edge

If you have trouble planing a narrow edge square with the sides try holding a square wooden block under the plane and against the work. Held firmly in place, the block will prevent the plane from wobbling. If the idea is to be used frequently, bolt or screw the block to the bottom of the plane.



French Curve Is Timesaver On Scrollwork Layout

Homecraftsmen who have occasion to work out their own scroll designs will find a draftsman's French curve a great help in drawing graceful curves accurately and quickly. Even when enlarging magazine patterns by the square method, a French curve will come in handy to correct any irregularities in the freehand lines.

Darrell Huff, Sonoma, Calif.

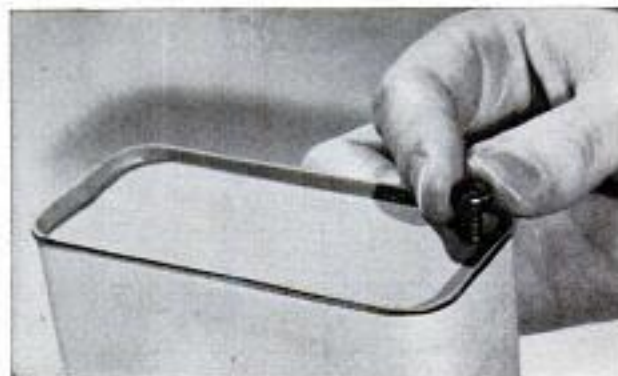
Eye-Catching Sign Rocks In Slightest Breeze

Because a moving object always is more eye-catching than a stationary one, the owner of a tire shop mounted a curbside sign on rockers. A slight breeze causes the sign to move. The rockers are bandsawed from $\frac{3}{4}$ -in. stock.



Punched Hole Is Sealed With Sheet-Metal Screw

Instead of using a wooden plug or wad of paper to seal a can of solvent or other liquid that has been "punch opened," turn a sheet-metal screw into the hole. The screw will not deteriorate as will wood or paper and cannot be removed without being turned.



Easy to Make MOVIE TITLES



When filming title superimposed on projected scene, avoid direct glare from projector into camera lens

By E. R. Haan

PART II

THERE'S PRACTICALLY no limit to the number of novel and ingenious titles that you can make to improve your home movies. In addition to arranging simple titles on artificial backgrounds, as explained in Part I, attractive titles also can be superimposed on real scenery backgrounds, either still or moving. Then, for an added touch of professionalism, you can make the titles appear and disappear by "fade" and "wipe" effects.

Title Superimposed on Scenery

If you own a camera of the universal-focusing type, both a close-up title and background scenery can be filmed at the same time. To do this, cement a title to a pane of transparent glass having no imperfections. Rubber cement should be used for easy removal of letters later. Set the glass vertically in front of the camera at a suitable distance so that the background scenery seen through the glass can be brought into good focus. The glass should not be closer than 4 ft. from the camera for satisfactory definition of the title. It is essential to have both camera and title centered and aligned on a rigid holder. The holder can be mounted on a tripod or held "free" with a special support for "panning." An excellent holder for this purpose is the titling stand shown in Part I. The glass simply slips into the grooves. It is advisable

to have the background scenery illuminated more than the title on the glass to avoid reflections.

Titles and scenery cannot be photographed simultaneously in the manner explained when a focusing-type camera is used, since the latter can be focused on either the title or background but not on both. If a small background, such as a corsage of flowers, is mounted immediately behind the glass, both title and corsage can be given sharp definition by reducing the lens aperture and increasing the exposure time to obtain a suitable depth of field.

Double-Exposure Method

You can superimpose a white title on a scene already filmed but not processed, if a roll-loading type of movie camera that permits turning back the film in a dark-room is used. This procedure does not apply to a magazine-loading camera since an amateur should not attempt rewinding the film in a magazine.

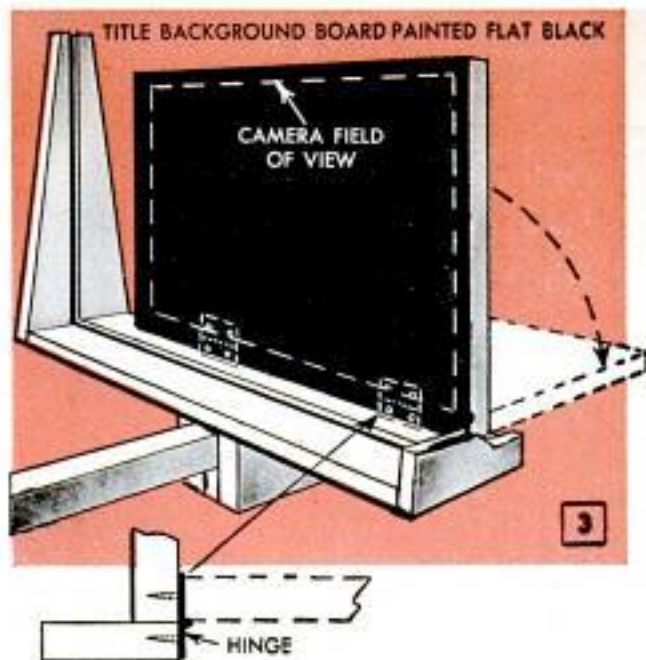
To shoot titles on real scenery by the double-exposure method, it is essential to first note the exact film footage before you start to shoot the background scenery. Select a dark or medium-dark background that will contrast with white letters. Next, in total darkness turn back the film to the beginning and then reload the film into the camera with the film-footage indicator



pointing to zero. With the lens capped to prevent exposure, run the film slightly beyond the point where the footage was first noted. Now remove the lens cap, align the camera with the title, focus and shoot.

Title on Projected Scene

A black or dark-colored title can be superimposed on a still picture projected on a sheet of ground glass placed between



Above, hinged, black background board permits swinging attached title in or out of focus of camera. Fig. 2, cigarette smoke gently blown across camera's field of view simulates clouds floating over title

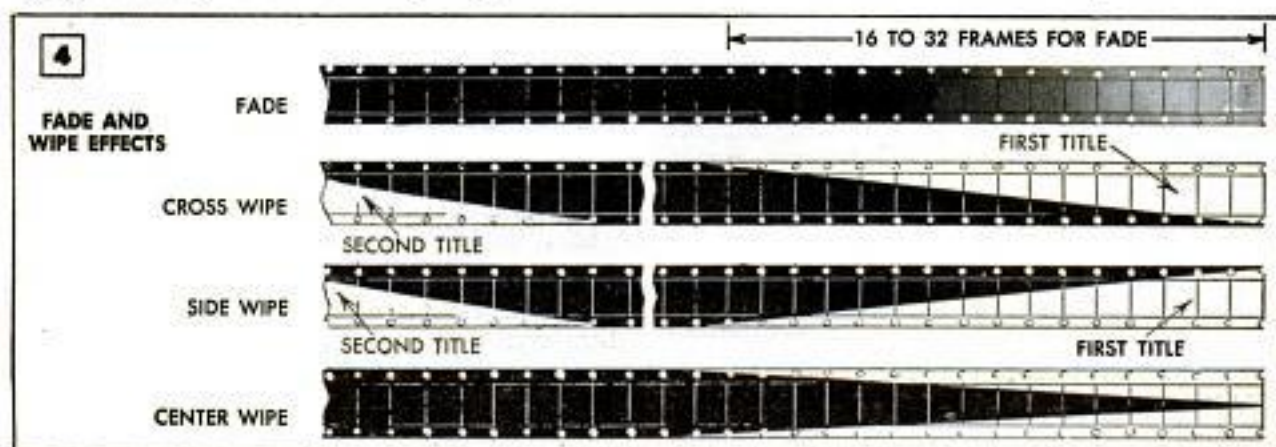
the camera and the projector as shown in Fig. 1. The film or transparency should be reversed if it is desired to duplicate the original scene. Thin letters of paper, cardboard or plastic are much better than block letters for this type of titling. The letters are cemented to the smooth side of the ground glass, which should face the camera, while the projector is tilted at a slight angle to the glass to prevent direct glare from the projector into the camera lens.

The title should be located in the lighter portion of a picture to produce adequate contrast. Tracing paper taped to a pane of transparent glass provides an inexpensive substitute for ground glass.

Title Fading

Titles can be made to appear or disappear gradually in scenery backgrounds.

Dye produces gradual fade at beginning and end of film and titles when the latter are spliced into film



Also, this type of fading can be used when one scene follows another without a title between the scenes. One of the simplest ways to produce a title fade-in is to open the camera-lens aperture very slowly from a completely closed position to the point of proper exposure, while shooting the title. To make a fade-out, the procedure is reversed. Fade effects should be done in about 2 sec. To be sure of proper timing and sequence, it's a good idea to rehearse the steps before making the actual exposure. Time needed for reading a title is about 1 sec. per word.

To produce fades on film already processed, you can use a dye which is made especially for this purpose. This process will darken both a title and the scene on which it is superimposed. Some examples of using this method, where a title is spliced between two scenes, are illustrated in Fig. 4. The end of the first scene is made entirely opaque for about 8 frames, and then the film is gradually lightened for about 16 to 32 frames. The same is done at both ends of the title strip and also at the beginning of the following scene strip, after which the title is spliced between the two scenes.

Another method of fading a title into a white rather than a black background consists of gently blowing a cloud of cigarette smoke in front of the title which is adequately illuminated by front lighting, Fig. 2. This will obliterate the title and the background for several frames. Also, you can use such a fade for changing from one title to another, simply by stopping the camera when the full fade-out is reached, after which the next title is arranged for filming. The camera is not started again until after a similar dense cloud of smoke completely conceals the new title. Then, with the camera running, this cloud is gently blown aside to expose the new title.

If your camera has a focusing-type lens, a title of white letters on a flat-black background can be faded by swinging it in or out of focus as shown in Fig. 3. The title background board is hinged so that it can be swung out of view completely. A second, larger black background placed immediately behind the title background (not shown in Fig. 3) provides a black background even after the title background swings out of the camera's field of view.

An alternate technique to fading, similar to the fade and wipe effects shown in Fig. 4, utilizes a sheet of dull-black cardboard that is placed vertically in front of the title to conceal it. Removing the cardboard slowly while the title is being filmed gradually reveals the title in an effect of professional quality. ★ ★ ★



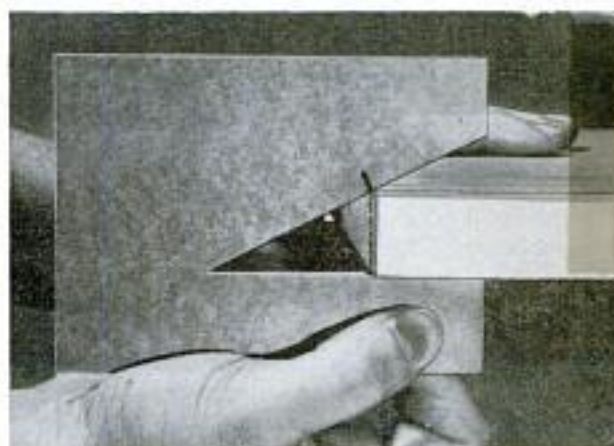
Gardening Accessories Stored In Discarded Shoe Bag

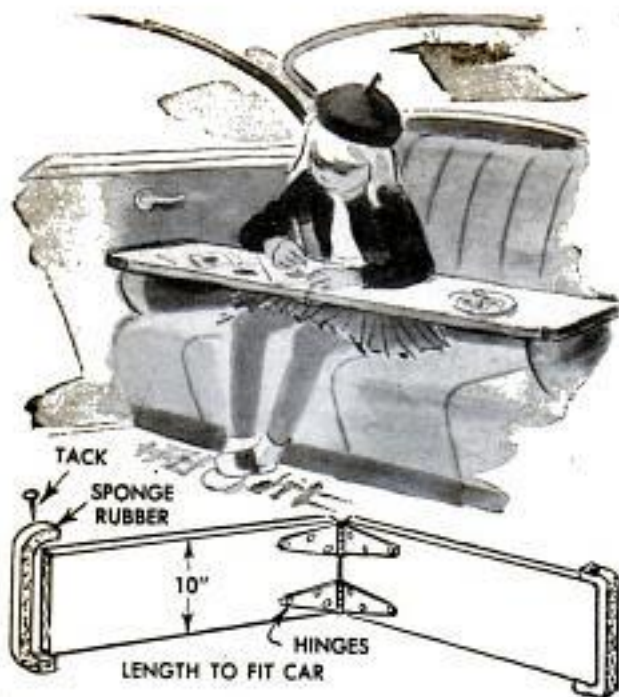
An old shoe bag attached to a wall in your garage or tool shed will provide convenient storage for small garden tools, seed packets, plant markers, gloves and other gardening accessories. All these things can be kept together in the shoe bag, which can be carried to the garden and hung on a fence or placed on the ground.

Mrs. Michael Fey, New York City.

Hardboard Gauge Measures Wood Thickness

For a handy gauge to quickly and accurately check and compare wood thicknesses when matching or planing to size, cut a half-V-shaped slot in a scrap of hardboard or plywood, place a mark on the upper edge of the slot for the desired thickness and slip it over one edge of the board as shown. The bottom cut should be parallel with the bottom edge of the gauge and the top cut about 35 deg. from the horizontal.



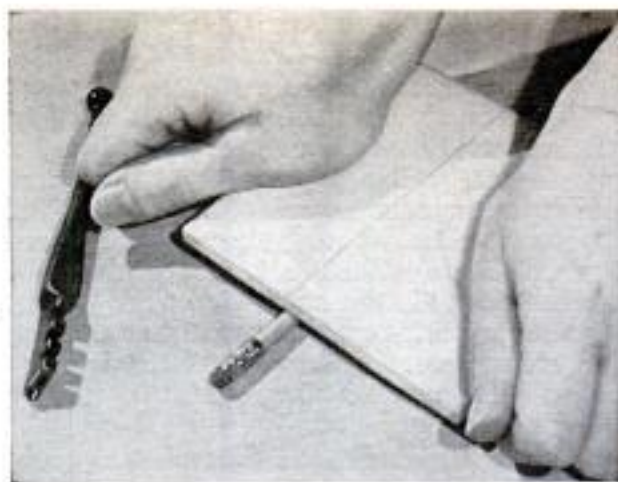


Folding Snack Table Spans Car Seat

Originally designed as a snack table, it also doubles as a play table to keep the small fry occupied during long auto trips. Placed across the rear-seat armrests it's just the right height for paper and coloring crayons, or games. The board is cut at the center and hinged, using two heavy strap hinges, mounted with $\frac{3}{4}$ -in. screws. The hinges must be positioned so that when the board is opened (hinges down) the cut ends of the board will meet to make a straight, level table top. Tack sponge rubber strips over the outer ends to protect the upholstery.—Karl Greif, Vestal, N. Y.

Tape "Skidproofs" Paper Cutter

To keep narrow strips of paper from slipping on a paper cutter when the knife is brought down against them, use a strip of adhesive tape along the edge of the lower cutting bar. The tape provides enough friction to prevent the paper from being pulled from beneath your fingers.

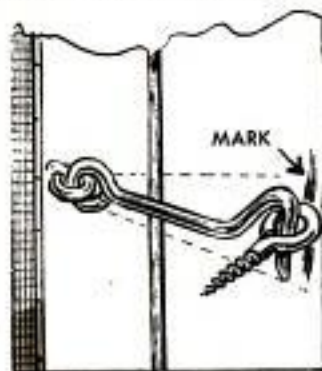


Glass Cutter Scores Ceramic Tile

Next time you have ceramic tile to fit, try using an ordinary glass cutter. With the cutter held against a straightedge, score the tile heavily through the glaze on the face side. Place the tile, score line up, over a pencil or large nail and press down on both sides with the hands.

Latch Eye Marks Its Own Location

When installing a hook-and-eye latch on a door, let the screw eye mark its own location by slipping it on the hook as shown and rubbing it against the doorframe. Install the eye at the center of the arc line.



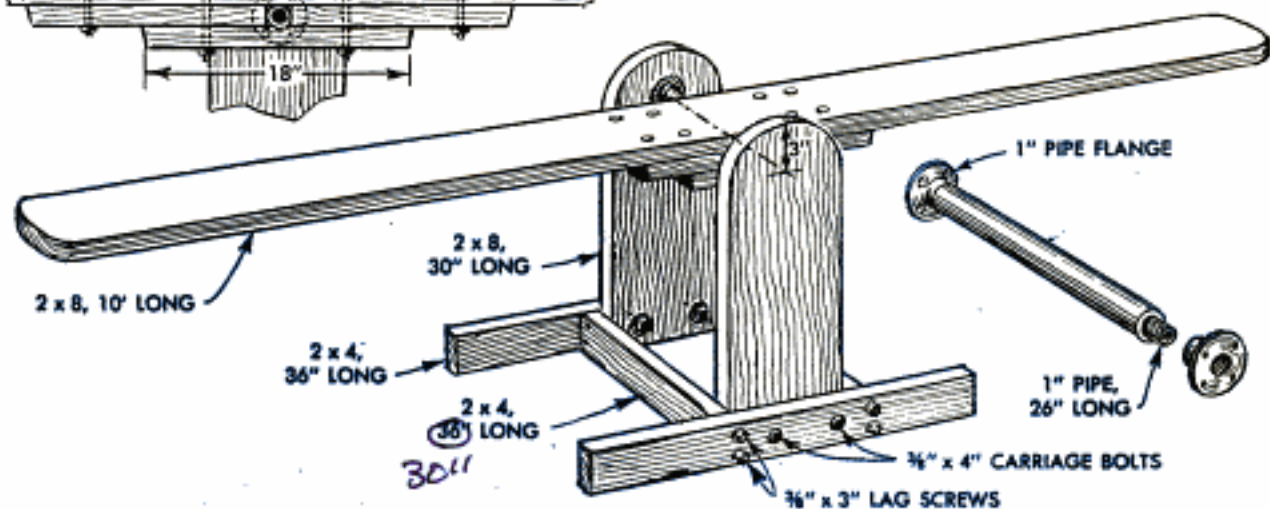
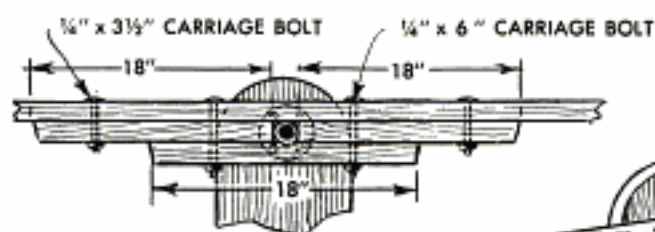
Sandpaper Restores Squeegee Edge

You can give a rubber squeegee a new lease on life by rubbing the worn edge over a sheet of fine-grit sandpaper. Sanding restores the squareness of its edges and exposes a fresh surface of rubber. The sandpaper must lie perfectly flat.



Sturdy Seesaw Has Grease-Lubricated "Axle"

Stock 2-in. lumber is used to construct this seesaw that is sturdy enough to withstand years of abuse by active youngsters. The main board is a 10-ft. length of 2 x 8 and the two uprights are 30-in. lengths of 2 x 8. Lag bolts are used to assemble the 2 x 4 base on the uprights. A 24-in. length of 1½-in. pipe is clamped to the lower surface of the seesaw board as indicated in the detail, then a 26-in. length of 1-in. pipe is fitted inside this and the assembly packed with grease. A flange then is screwed to each end of the 1-in. pipe and the flanges lag-screwed to the seesaw uprights.



Rope Handles on Stepladder Make It Easier to Tote

Two rope handles located at the balancing point of a stepladder make it a lot more convenient to carry singlehanded. One handle is fastened to each part of the ladder so that when both are gripped, the ladder cannot spread apart. Sash cord is used as a handle in the step portion and inserted through holes and knotted at the ends. The other handle is of lighter drapery cord and held with two staples. The sash-cord handle actually carries nearly all the weight while the smaller one serves mainly to keep the legs of the ladder together. A screen-door hook also could be used to hold the legs together.

☐ If a large quantity of India ink is to be used, it is cheaper to purchase it in dry stick form. The sticks are broken into small pieces and dissolved in a weak ammonia-and-water solution, a process which takes several days.





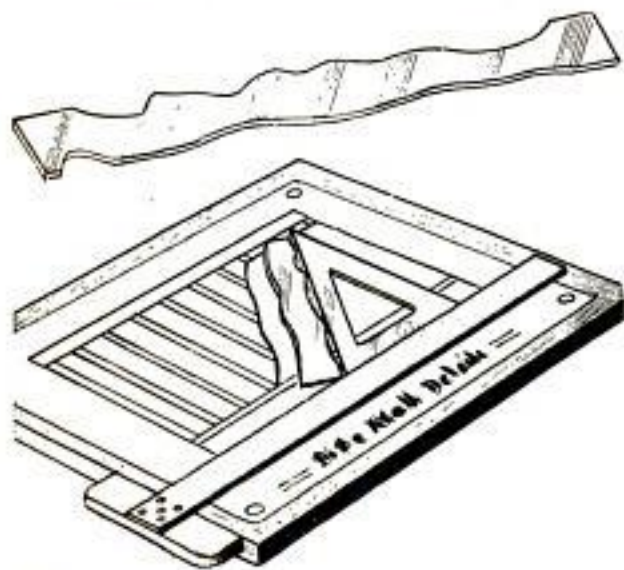
Rubber-Bulb Windshield Washer

If your car is not equipped with an automatic windshield-washer attachment, why not carry a rubber bulb in the glove compartment as an inexpensive substitute? In the summer fill the bulb with clear water, and in the winter use an ice-dissolving solvent. A few squirts on the windshield while the wipers are going and you too can have a clear view of the road ahead. Keep a bottle of water or solvent handy for refilling the bulb.

Edward L. Fisher, Milwaukee, Wis.

Parallel Wavy Lines Drawn With Aid of Celluloid Guide

By using a celluloid guide, one draftsman draws parallel wavy lines to indicate broken sections in a perspective drawing in a fraction of the time previously necessary with the two lines indicating the broken sections matching each other perfectly. One edge is cut wavy as shown and the other edge has an irregular contour. After using it to draw the first line, the strip is moved the desired distance and a matching second line drawn. The celluloid should be thin enough to be cut with a pair of scissors.



Oil Can Primes Space Heater

Before starting an oil-burning space heater, prime the burner pot with a few squirts of fuel from an oil can. The heater will then ignite immediately, and the pot will be heated by the time oil reaches it from the supply tank.

Holes in Plastic Pool Sealed With Bandage

Small punctures in a plastic beach ball or wading pool can be repaired by using a patch cut from a plastic adhesive bandage. Larger holes or tears can be similarly repaired but generally require an additional patch applied to the inner surface to provide extra strength.—Samuel B. Rentsch, Jr., Glastonbury, Conn.

Tubing Modifies Rake Teeth For Cleaning Lawn Surface

Grass clippings and surface trash are easily removed from the lawn without having the rake teeth entangle in the grass when short lengths of copper tubing are fitted over the end teeth as shown. Bend the tubing as indicated so the rake teeth ride slightly above the surface of the ground while being pulled through the grass.—E. V. Reyner, Townsend, Mont.



Tricycle Power Mower Carries Rider

IF POOR HEALTH prevents you from cutting your lawn even with the aid of a power mower, or if you want to rest while cutting a big lawn, this seat-over-mower tricycle assembly may be the answer to your problem. Construction details will vary with different makes of power mowers, but the over-all design will remain basically the same. Also, various types of tricycles will require minor modification in the forward portion of the frame.

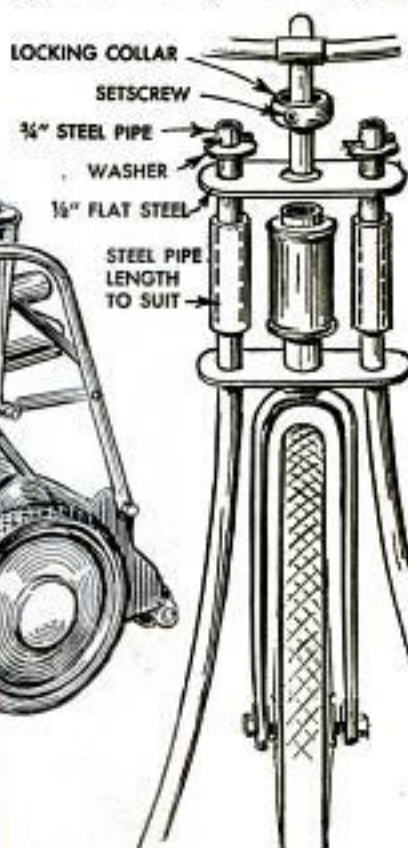
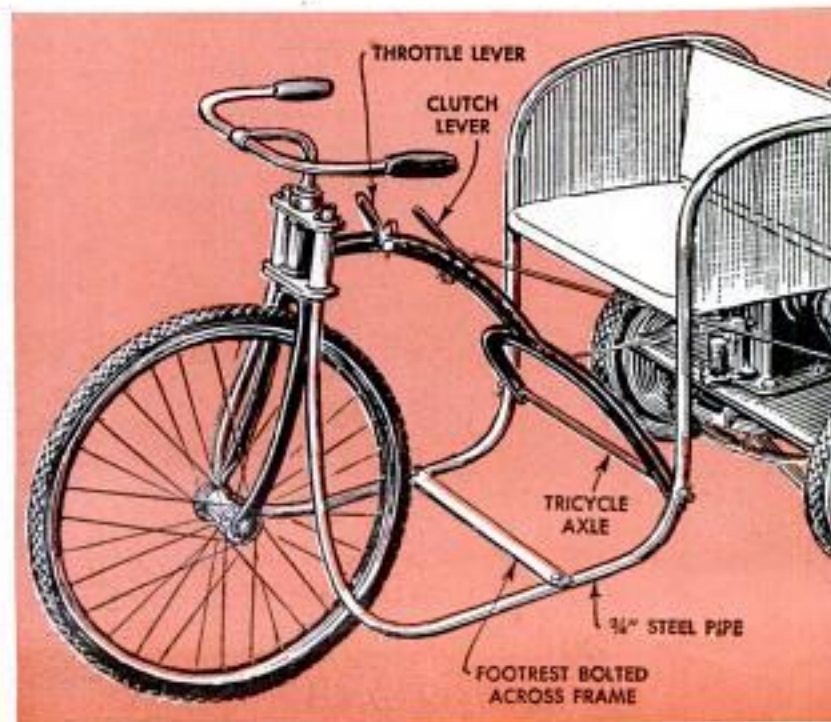
The mower used for the original assembly shown was a 20-in. model about 8 years old. Before starting assembly of the riding frame, the gasoline engine was torn down and completely overhauled to assure dependable operation and sufficient power to pull the additional weight of the riding frame and the rider. Any mower that is more than a couple of years old should be rebuilt for the same reasons. If you cannot do this work yourself, there are shops that specialize in servicing small gasoline engines.

Modification of the tricycle consists of cutting off the pedal cranks and removal of the rear wheels and seat. Also, an auxiliary frame of flat steel and pipe or tubing spacers is assembled on the fork as indicated in the detail, to accommodate the forward ends of the frame tubes. The main frame is bent from 1-in. or $\frac{3}{4}$ -in. electrical conduit or $\frac{3}{4}$ -in. steel pipe. At the rear of the frame, the tube ends are



flattened and drilled so they can be bolted to the mower in place of the handle which is removed. The clutch and throttle controls are brought forward and fastened to the tricycle frame in a location convenient for the rider. Plywood or hardboard is used to make the seat. Flat-steel cross braces at the back of the frame provide rigidity for the frame members above the mower, and will have to be installed to clear the engine for normal operation. When the engine is to be worked on, the riding frame is removed.

Amy F. Gilmore, Metairie, La.



HOW TO PROCESS

START WITH

By Robert Hertzberg



For the advanced amateur photographer considering purchase of a professional-type "press" camera, here is a method of processing sheet film that will help to produce good negatives

Fig. 1. Before unloading exposed film, organize work area in darkroom. Stack film holders at center of table, place film hangers on pegs with retainers flipped open, be sure developing solution is at 68 deg. F.



Fig. 2. Before turning off lights, turn locking pins on holders to center position so slides can be readily withdrawn in dark. Room must be totally dark from now until film is removed from hypo

Fig. 3. When removing film, anchor holder to table by pressing along bottom edge with right hand. Draw out slide about 2 in. with left hand and remove film, being careful not to touch emulsion with fingers

Fig. 4. Hold film hanger upright with left hand, slide film into channels and close loading flap. If film doesn't fit loosely in guide channels, open flap and remove and reinsert film properly

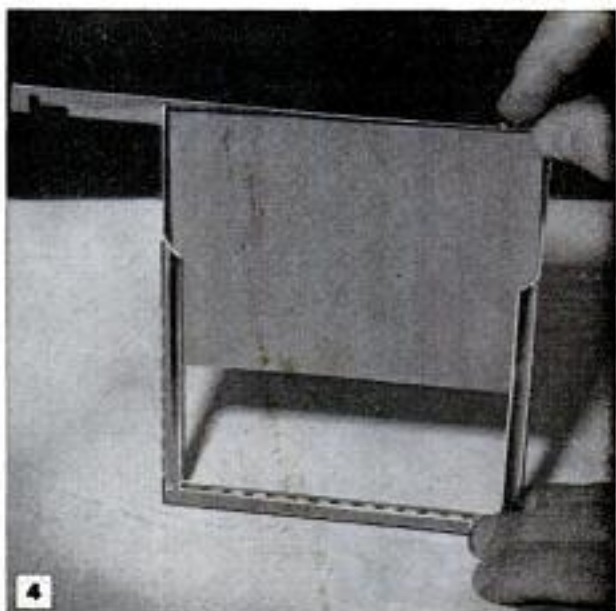




Fig. 5. Place loaded film hanger in empty tank. Repeat with successive hangers, using hand as spacer to prevent scratching film. Later, transfer entire group to developing tank at once. If fast-acting developer (3 to 5 min.) is used, stay with films until timer rings, immerse them in water 2 min., hardener-hypo bath 10 min., and water wash 30 min.

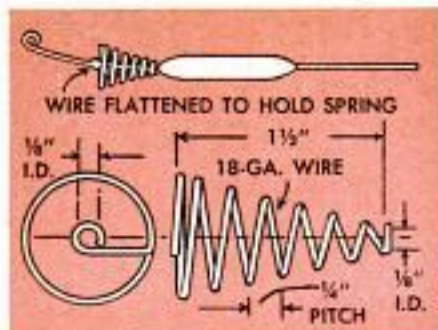
Fig. 6. Daylight tank permits processing sheet film outside of darkroom. After loading grooved reel with exposed film in total darkness, place reel in tank, secure lid, fill with developer and agitate with rod



Fig. 7. Before loading film, insert slides $\frac{1}{2}$ in. into holder. In darkroom open bottom flap and slide film in guides with notches in upper-right corner, emulsion side up. **Fig. 8,** after film is inserted, press end flap down and push slide in until flap is engaged. Then turn locking pin to closed position to prevent slide from being pulled out of flap accidentally



Cone Coil Spring "Snagproofs" Trolling Sinker



When fitted with a conical coil spring of the dimensions given, a trolling sinker will be almost snagproof. The spring causes the sinker to bounce when it contacts most small obstacles. Should the spring become snagged, a heavy pull on the line will compress it, and when the line suddenly is slackened, the spring recoil, plus the weight of the sinker, generally will free the sinker. —Donald Fox, Bucyrus, Ohio.

Pour Hole in Screw-Top Can



Pouring liquid from a screw-top metal can is much simpler if a small hole is punched in the screw top. This permits pouring the liquid into a container without the need for a funnel. Plug the hole with a wooden match. —Carl S. Bates, Chicago.

Shower-Curtain Ring on Belt Loop Used to Carry Hammer

A loop for carrying a hammer on a pair of work trousers not fitted with one can be improvised by using a shower-curtain hook slipped through a belt loop as indicated. When working on a scaffold attach hook to a key-ring holder.



Pen-Light Battery Fires Flash Bulbs

When using the "open shutter-flash-close shutter" method of taking nighttime shots outdoors, a flash bulb often is used in a regular photoflood reflector and is fired by using 110-v. house current. To eliminate the bother and potential hazard of running an extension cord from the house, use a pen-light battery to fire the flash bulb. Set the shutter for a time exposure and turn the lamp-socket switch to the "on" position. Then tear off a bit of paper on the side of the battery and place it across the plug contacts as in the detail. This will fire the bulb.



SN 5-5

THE

**POPULAR
MECHANICS**

SHOP NOTES

This Motor Drives Four Machines

By Dick Hutchinson

BY MOUNTING one double-shaft motor on a swiveling base, or turntable, you can arrange a complete power shop—drill press, jigsaw, circular saw and wood lathe—in a minimum of space. With careful planning, individual machines can be arranged so that long stock can be handled on the circular saw and drill press without interference from the jigsaw and lathe.

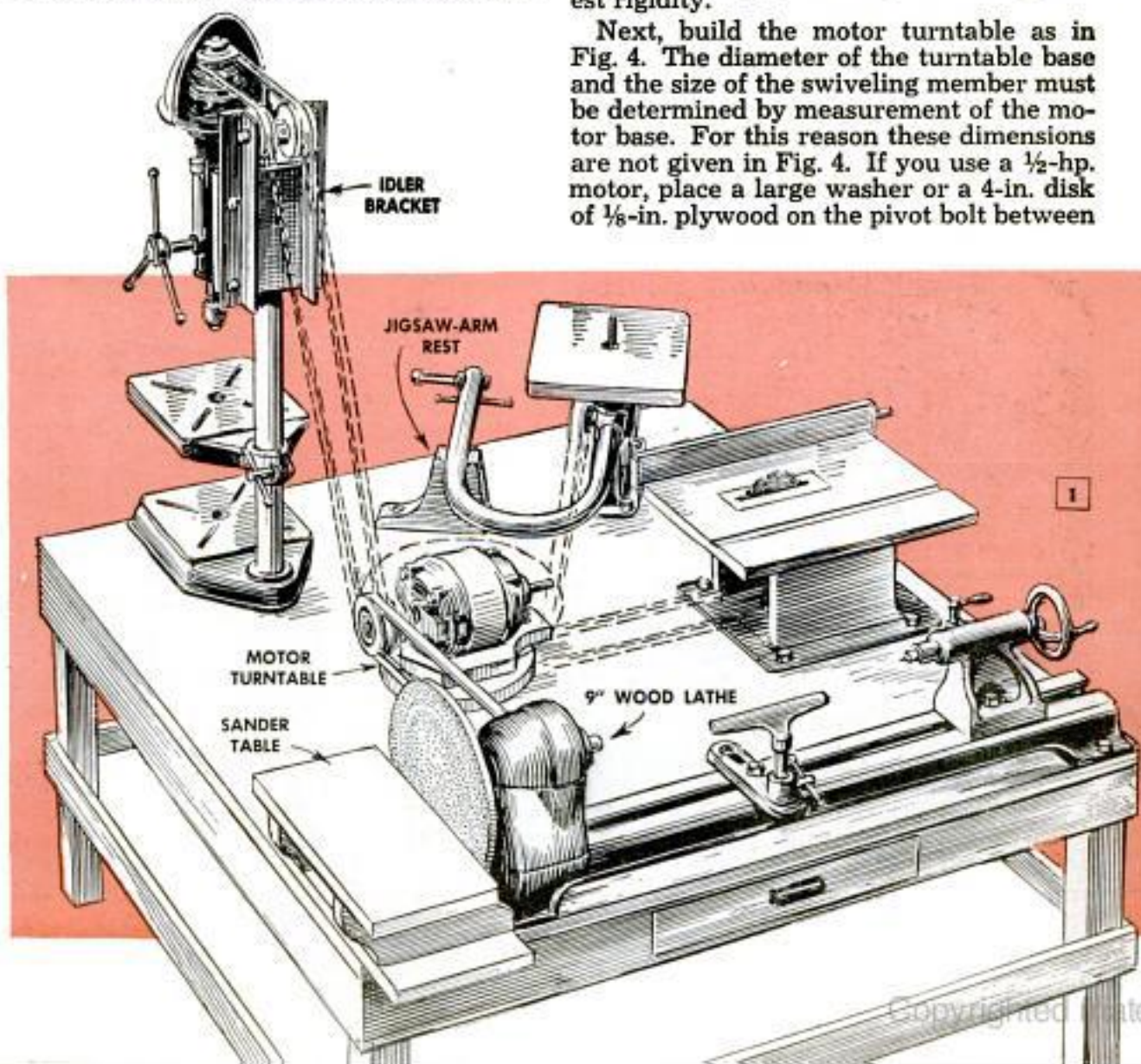
First, place the machines on the floor, using the general arrangement shown in Fig. 1. By locating the machines in this manner, you can determine the three requirements: Size of the bench top, length of the belts and the necessary clearances. Build a bench to these specifications, using



Swiveling base, or turntable, permits the motor to be positioned to drive any one of the four machines

4 x 4s for the legs and two pieces of 5/8-in. plywood for the top. Glue and screw the two pieces of plywood together for greatest rigidity.

Next, build the motor turntable as in Fig. 4. The diameter of the turntable base and the size of the swiveling member must be determined by measurement of the motor base. For this reason these dimensions are not given in Fig. 4. If you use a 1/2-hp. motor, place a large washer or a 4-in. disk of 1/8-in. plywood on the pivot bolt between



1



Jigsaw of the type having a swiveling arm, or gooseneck, requires an arm support attached to bench top

the two members of the turntable. Round the squared portion of the head of the carriage bolt so that it will permit the swiveling member to turn easily when the motor is shifted. The locking pin, Fig. 4, should fit the holes snugly, as otherwise the pull of the belts may tend to shift the motor.

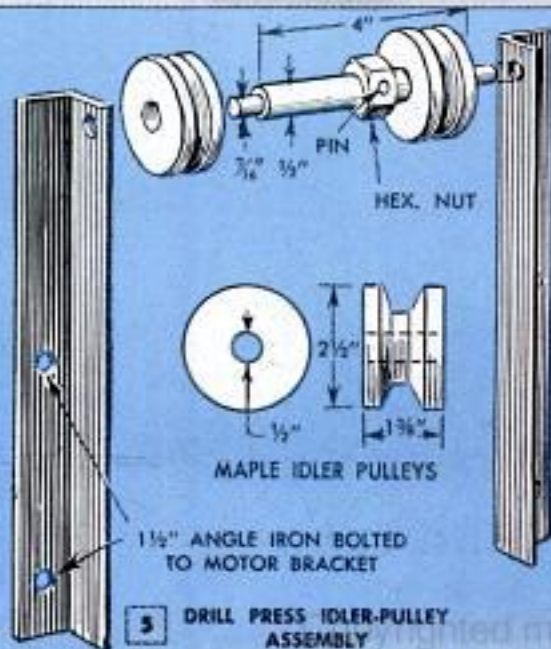
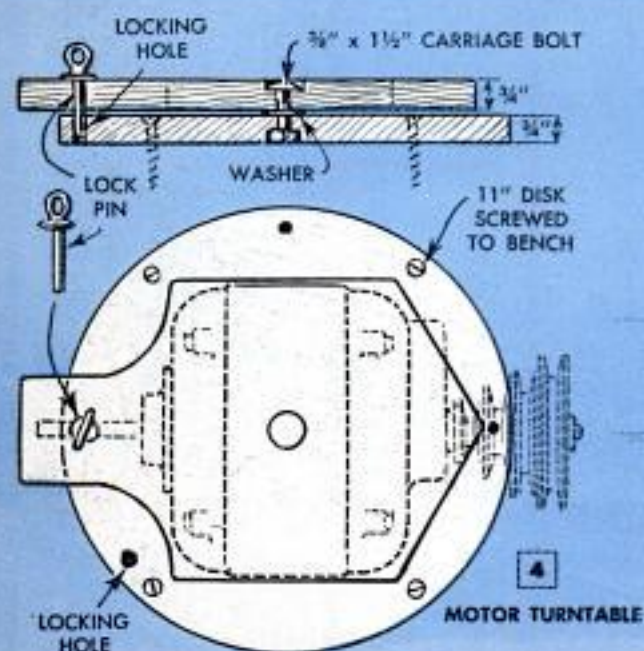
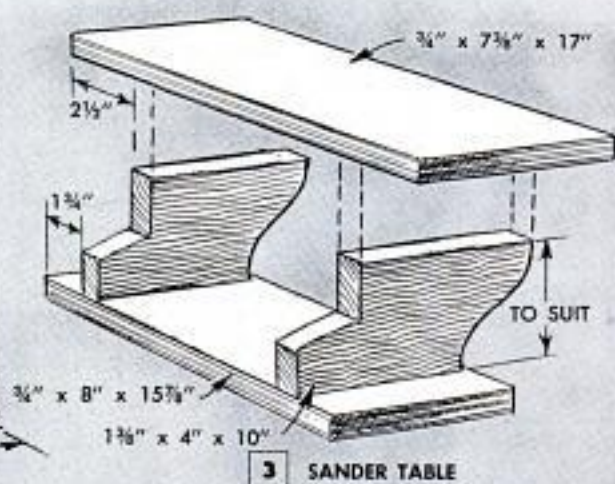
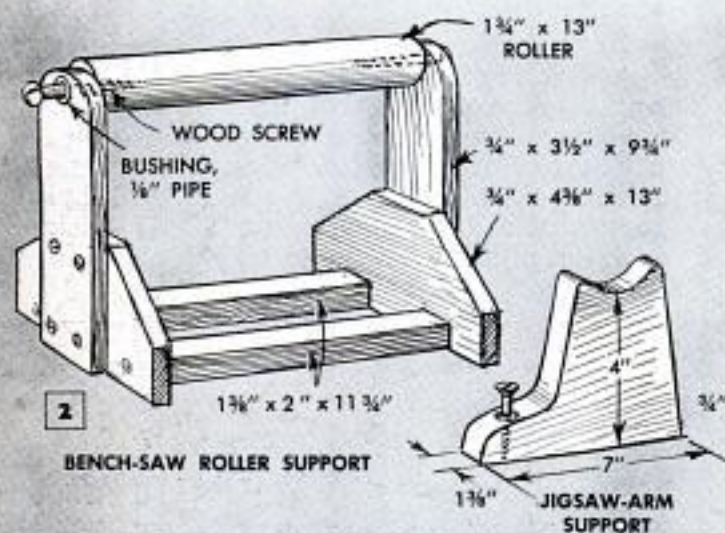
A drill press of the type pictured will require an idler bracket and two idler pulleys. This unit can be made as detailed



Stock support for the circular saw permits ripping long boards. Need not be removed after attaching

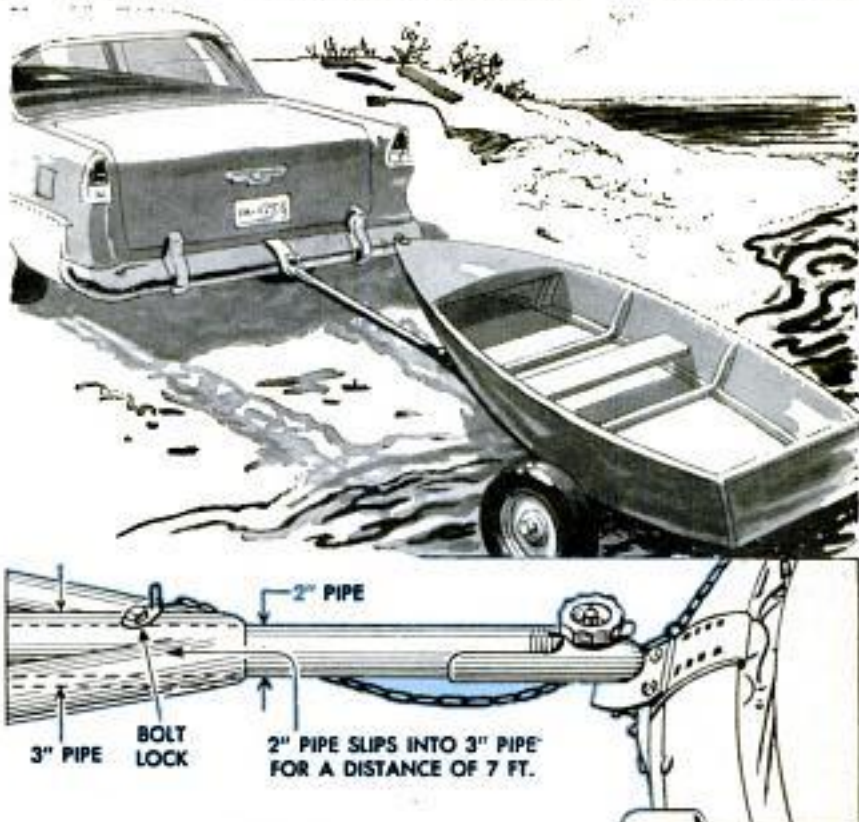
in Fig. 5, using two lengths of steel angle, a shouldered $\frac{1}{2}$ -in. steel spindle, hex nut and two pulleys turned from hardwood. The unit is bolted to the motor base supplied with the drill press.

Figs. 2 and 3 detail a backrest for supporting long stock when ripping on the circular saw and a sanding table for the lathe, also a jigsaw-arm support which is necessary on some machines. ★ ★ ★



Trailer Fitted With Telescoping Drawbar

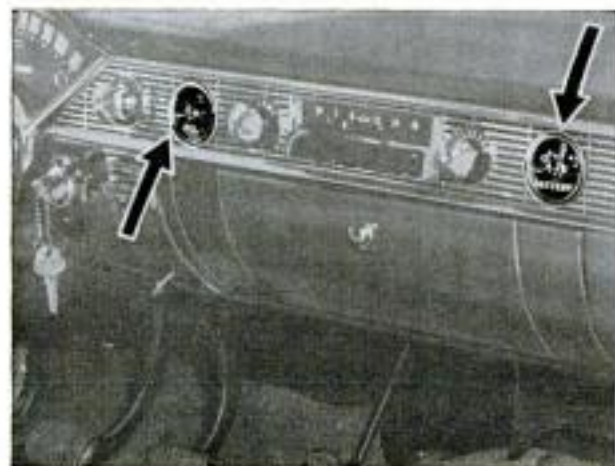
When launching his boat from a trailer, one boating enthusiast no longer has to worry about his car being bogged down in the sandy beach at the water's edge. A telescoping drawbar on his home-built trailer extends to 7 ft. from the car. The drawbar, which is the center member of the trailer frame, consists of a 2-in. pipe sliding in a length of 3-in. pipe. Holes drilled through both pipes permit them to be locked in the desired position with a bolt and lock nuts. As an added safety feature it may be advisable to drill holes for two locking bolts, or a cross pin held in place with a cotter key that can be removed quickly.



Gauges on Instrument Panel Supplement Indicator Lights

Because he felt that the red indicator lights on the instrument panel of his car were not accurate enough, one motorist installed an oil-pressure gauge and an ammeter. Both gauges were purchased at an auto-wrecking yard and came from a late-model car. The oil-pressure gauge was connected by installing a T-fitting in the oil-pressure line, and the ammeter was wired by using a wiring diagram from an earlier model of the car in which it was installed. The indicator lights were not removed from the instrument panel, as they would leave holes.

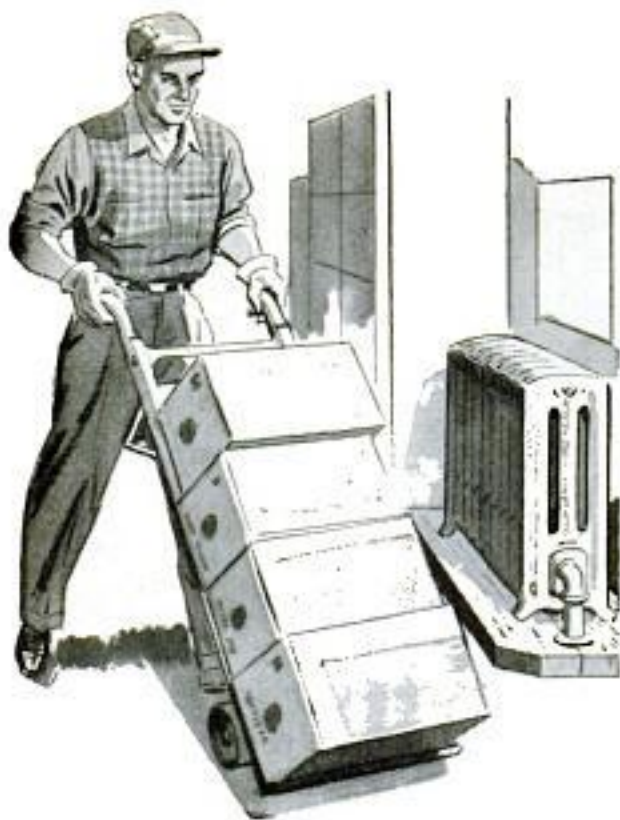
Leon R. Mann, Delta, Ohio.



Guards on Heat-Lamp Reflectors Add Safety in Farrowing Pens

As a safety measure, flat-steel guards are bolted to the reflectors of heat lamps used in the farrowing pens of one farm. The upper ends of each of the U-shaped guards are welded to a large washer that is attached to the suspension chain. This latter attachment takes the strain off the light cord which is passed through the washer.





Radiator Elevated to Protect It From Passing Wheel-Trucks

To prevent steam radiators from being damaged by heavy wheel-trucks, one shop foreman had them elevated on planks. Cut to project several inches beyond the ends and sides of the radiators, the planks deflect the truck wheels.

Corn Sped to Cribs From Picker By "Four-Wagon" Hauling System

Hauling corn between the picker and distant cribs is speeded up by using four wagons, with two at a time being pulled behind the picker. When one wagon is loaded, it is uncoupled from the picker and left standing until the second wagon is filled. One man and a tractor shuttles between the picker and cribs, hauling away two filled wagons that are unloaded by conveyor and quickly returned to the picker.



Safety Goggles Stored in Jar Kept Free of Shop Dust

Safety goggles remain free of shop dust and grime, and there will be less chance of having them damaged, if they are stored in a glass jar when not in use. Punch a few holes in the jar lid with a nail to provide adequate ventilation.

Emery Board Is Feather-Edger For Touching Up Auto Finish

Touched-up spots on the finish of an automobile will be much less noticeable if the areas to be painted first are feather-edged. An emery board, such as is used for manicuring, is an ideal tool for this job. The coarse side of the board will remove the paint quickly, while the fine side is used to smooth the edges.

Ed Packer, Oak Park, Ill.

Magnetic Retriever on Handle

A small magnet fitted to the end of a hammer handle will prove handy for picking up brads, staples and small parts from narrow-mouthed containers. The magnet also is useful in retrieving a nail which has been dropped into a crack or corner.



SAFE BRAKES FOR YOUR TRAILER

By Clinton R. Hull

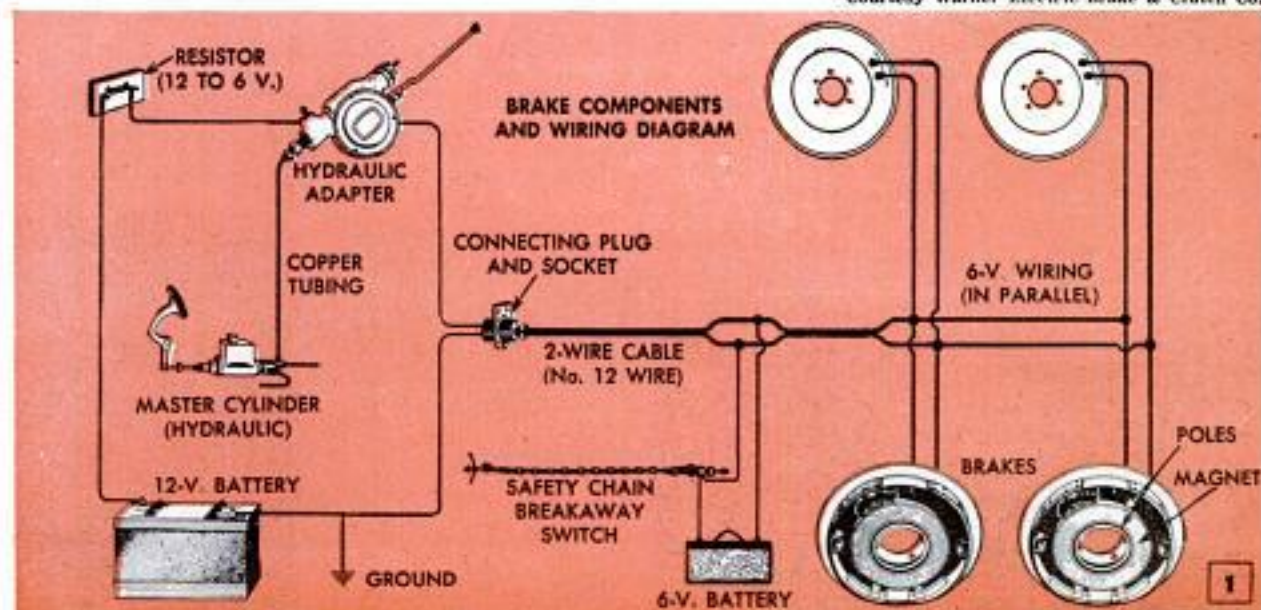


TESTS HAVE SHOWN that synchronized braking systems on a car and trailer enable you to stop faster and smoother than with the car alone. Of course, before such peak performance can be expected it's essential that the trailer be equipped with a load-equalizing hitch, the car with helper springs (overloads) and that both braking systems be properly adjusted mechanically and timed to "wrap in" simultaneously when you hit the pedal. If the trailer brakes come in too early or

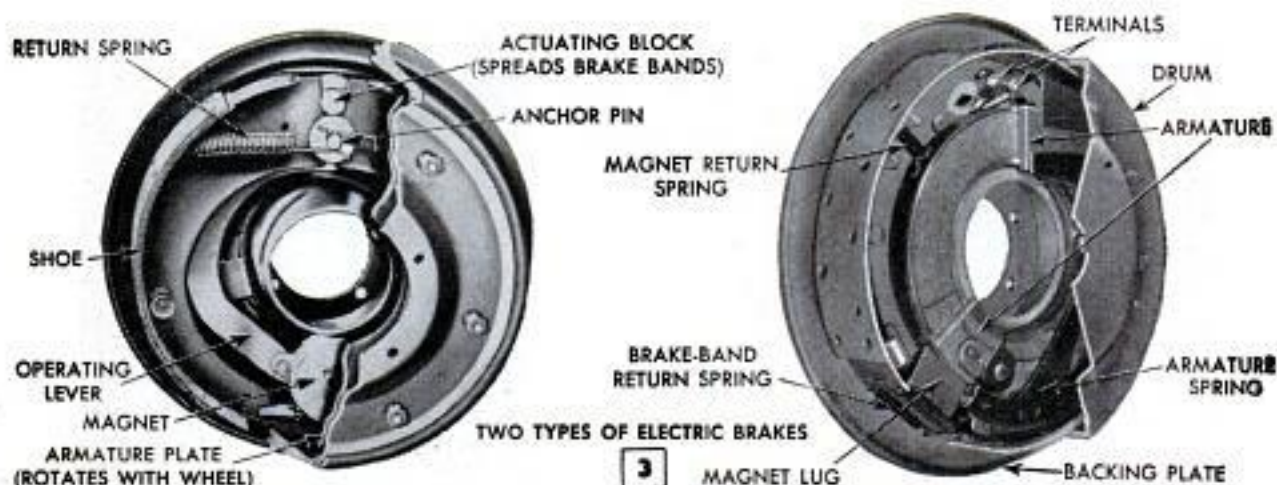
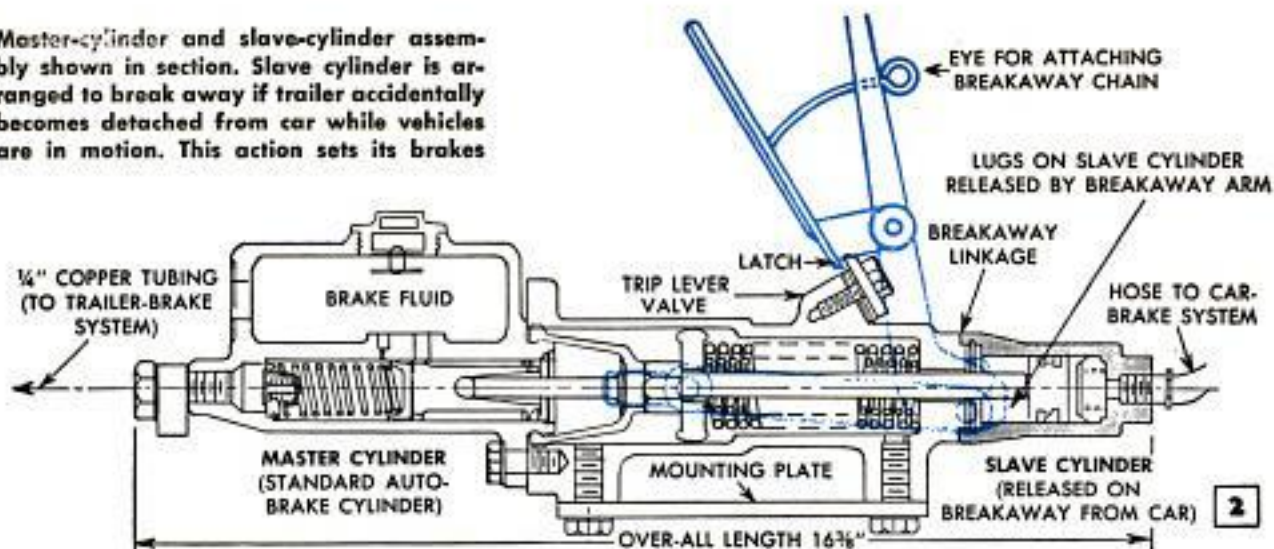
too late you are in for a rough stop, if nothing worse. Jackknifing, even ditching, of the two vehicles is always a possibility on slippery roads, and in mountain driving uneven brakes are a definite hazard on every turn and grade.

Uneven or inadequate braking systems subject both vehicles to undue stresses and greatly accelerate wear of brake parts and tires. Most state laws require that any trailer coach weighing 1500 lb. or more must be equipped with its own braking

Typical electrically actuated trailer brake system diagrammed to show position of parts and the wiring
Courtesy Warner Electric Brake & Clutch Co.



Master-cylinder and slave-cylinder assembly shown in section. Slave cylinder is arranged to break away if trailer accidentally becomes detached from car while vehicles are in motion. This action sets its brakes



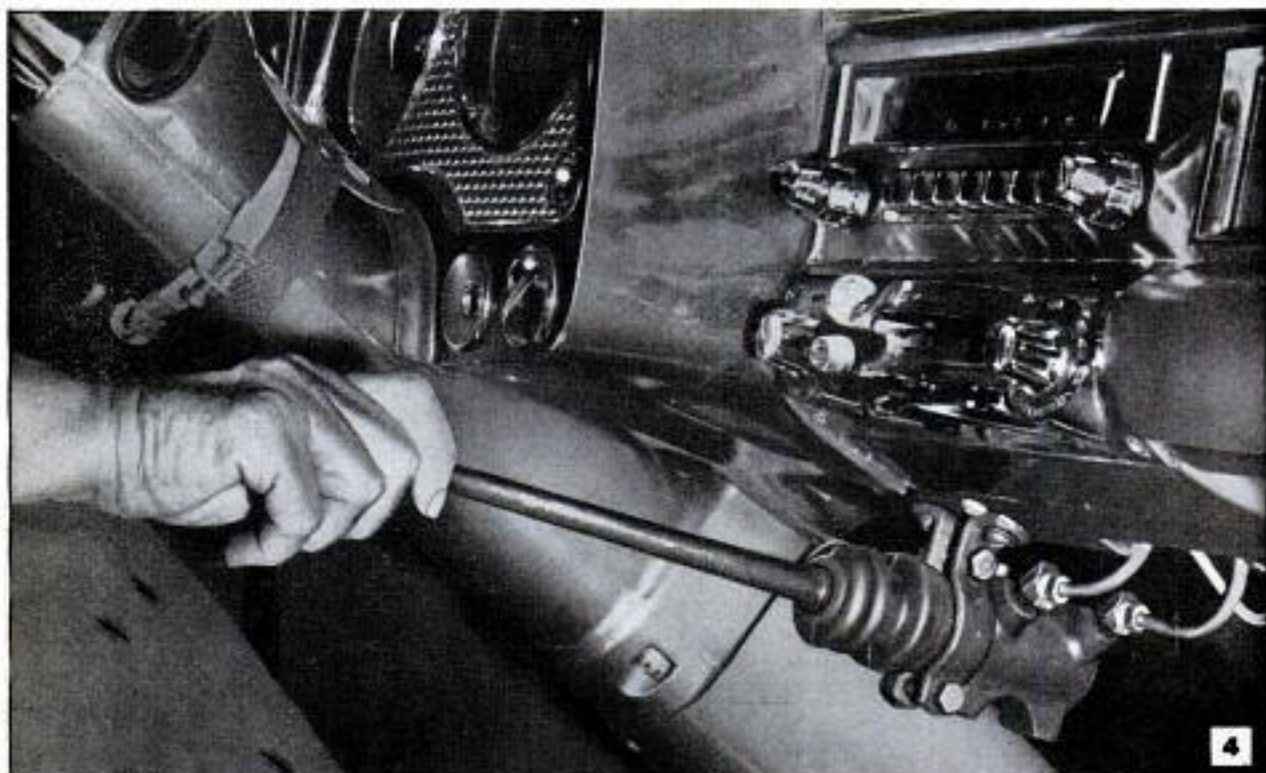
Courtesy Kelsey-Hayes Wheel Co.

Courtesy Warner Electric Brake & Clutch Co.

Electric-brake magnet is carried on operating lever. Latter moves on pivot, forces shoes against drums

In this brake, construction differs only in minor details. Both types are especially designed for trailers

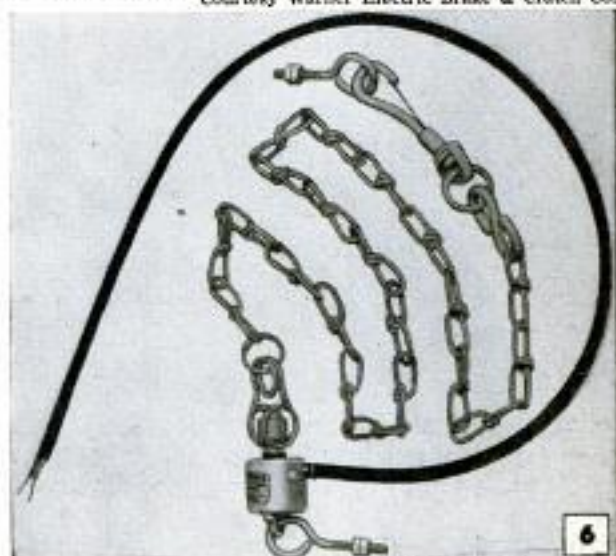
Manual-control unit is mounted either on steering column or dash so that it is within easy reach of driver



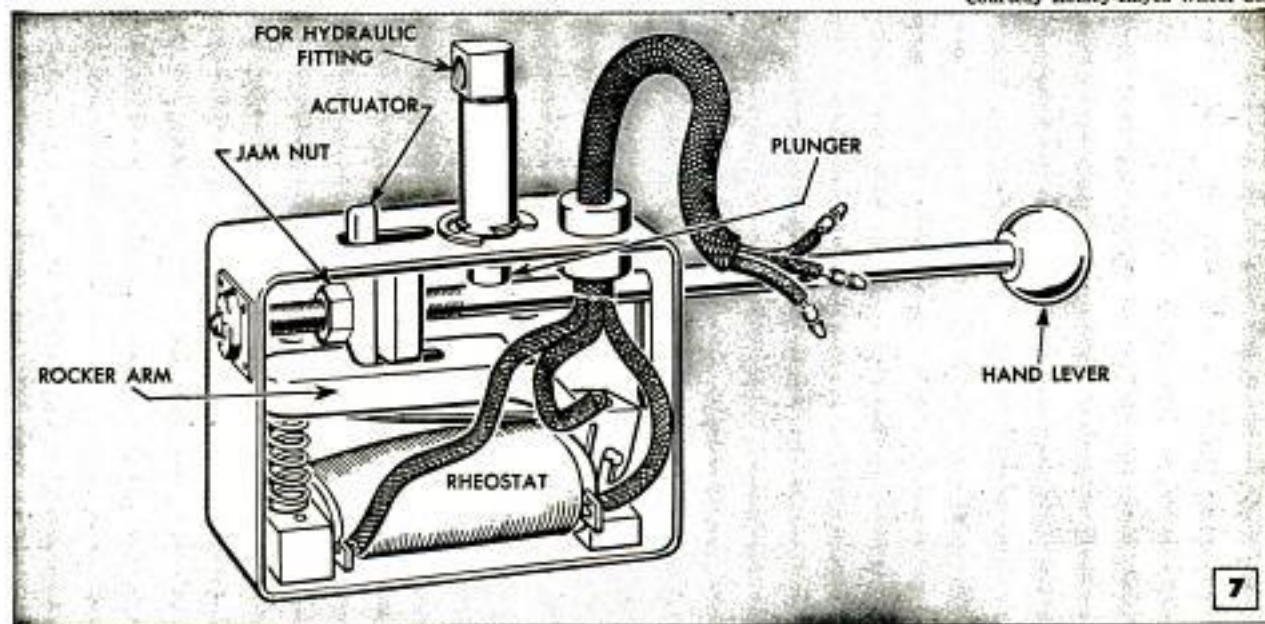
system so arranged that it can be controlled positively by the driver of the towing vehicle. Also, in some states any conventional trailer coach must be equipped with a device for applying trailer brakes automatically should the vehicle break away from the towing car. A breakaway system is shown diagrammatically in Fig. 1. In this system, having electrically operated brakes, a separate 6-v. battery carried in the trailer is cut into the line by a breakaway switch and energizes the brakes to stop the trailer automatically should it accidentally break away from the towing car. Another system, hydraulically operated, is provided with a slave cylinder, Fig. 2, which is released from the master cylinder on breakaway from the car. This arrangement also is designed to set the brakes on the towed vehicle should it accidentally become detached from the towing car. A cylinder of this type is shown in position on the trailer in Fig. 5. One common type of breakaway switch and control chain is shown in Figs. 1 and 6. Other types of switches and controls are shown in Figs. 7, 10 and 14. Fig. 14, detail A, shows a switch which incorporates both turn and tail-light wiring in one unit. Such a switch requires little space for installation and has the advantage of concentrating wiring and terminals in an easy-to-get-at location. Fig. 14, detail B, shows a weatherproof car-to-trailer receptacle of the breakaway type while Fig. 7 details a single-unit control for both manual and automatic operation. It is connected to the car's hydraulic-brake system and is actuated by the brake pedal in normal use. Another type, similar in construction and purpose, is shown in Figs. 1 and 8. It also permits manual control of the trailer braking system in an emergency. Controls of



Above, hydraulic cylinder mounted on trailer drawbar. Below, breakaway switch sets brakes on trailer
 Courtesy Warner Electric Brake & Clutch Co.



Courtesy Kelsey-Hayes Wheel Co.

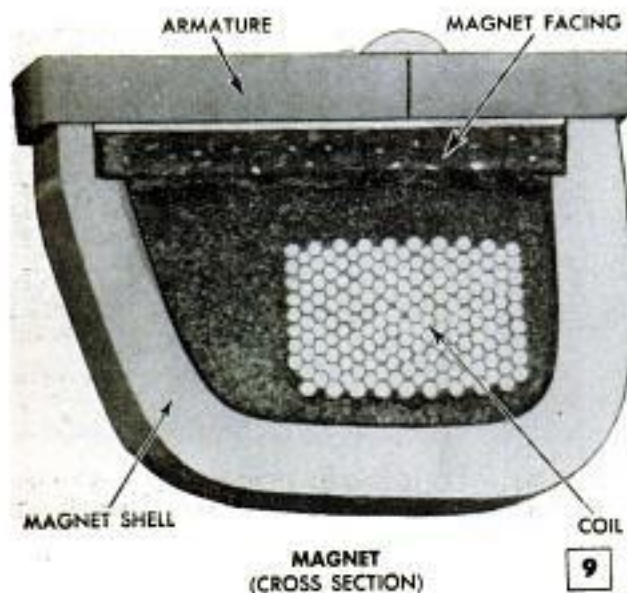




HYDRAULIC ADAPTER
(TO ELEC. BRAKE CONTROLLER)

8

This hydraulic adapter for manual control of trailer brakes is also shown in the diagram of brake parts and wiring in Fig. 1. These units are connected into the brake system for emergency use should the braking system of car fail due to accident or other cause

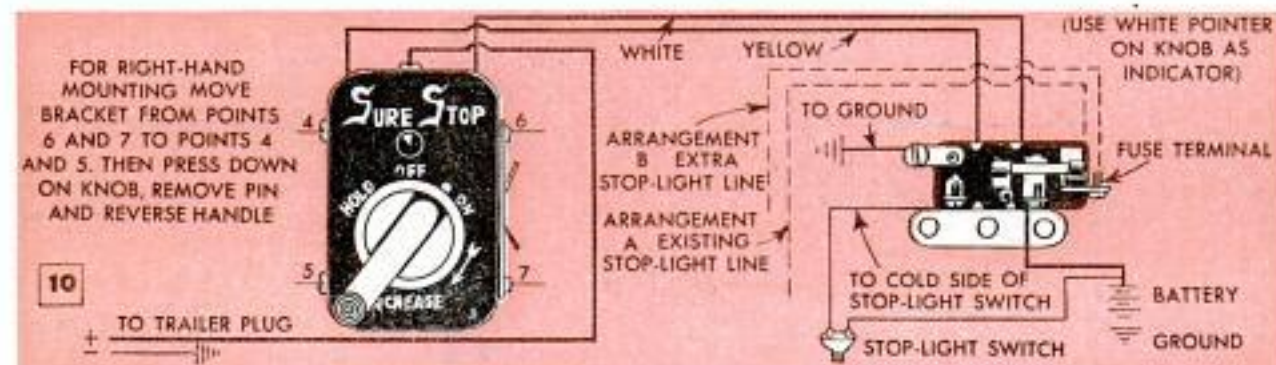


MAGNET
(CROSS SECTION)

9

This sectional view shows construction of an electric-brake magnet and consists of the magnet shell, coil, magnet facing and armature. This is the unit built into the brake in the right-hand view in Fig. 3

This type of electric control unit requires a minimum of space and is easily synchronized with car brakes



10

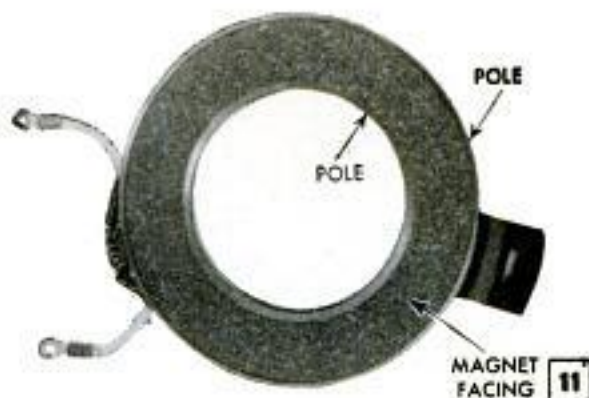
these types are commonly designed to be mounted on the steering column or dash as in Fig. 4, the manual-control lever being located so that it is within easy reach of the driver. On late-model cars equipped with 12-v. electrical systems a simple resistor, Fig. 13, is placed in the wiring between the battery and hand control to reduce 12-v. current to 6 v. It should be kept in mind that these controls are safety equipment, the manual control being intended for use only in emergency.

Two types of electric-brake mechanisms are pictured in Fig. 3. These, it will be noted, are quite similar mechanically to the conventional hydraulically operated brake, except that the parts are actuated electrically. Main electrical parts are pictured in Figs. 9 and 11. Some owners of tandem-axle trailers prefer to use hydraulic-brake units on one axle and electric brakes on the other. The three braking systems, the one on the car and the two on the trailer, are arranged to work together as the brake pedal is depressed. Should one system fail, the heaviest trailer still can be brought to a safe stop within a reasonable distance, even under difficult conditions. It's a general recommendation among experienced owners and servicemen alike that tandem-axle trailers be equipped with brakes on both axles. Manufacturers of trailer brakes, both electric and hydraulic, say that brakes on all four wheels of a tandem-axle job are essential under present traffic and road-speed conditions, and that they provide the highest safety factor in emergency stops. To make certain that the trailer brakes do not lag behind those of the towing car, some manufacturers preset the brake controls. In addition, they generally provide specific instructions for adjusting the controls to suit load, driving conditions and preferences of individual drivers, along with the complete installation instructions.

Individual preferences provide perhaps the only reason for choosing between hydraulic and electric trailer-brake systems. Both types provide safe, smooth stops when

installed correctly and regularly serviced. Both are equally reliable. When installing, the important thing is to follow installation instructions in all details and to take special note of manufacturer's recommendations on gross trailer weight, the type of hitch to be used, and tire types and sizes. Most cars used for towing are equipped with hydraulic brakes and for this reason many trailerists prefer hydraulic brakes on the trailer. Others obtain equally satisfactory service from the use of electric brakes on the trailer working in synchronization with hydraulics on the towing car.

There are other factors which directly or indirectly affect peak performance of trailer braking systems. Improper load distribution, use of a hitch inadequate for the load requirement, trailer axles out of alignment, a soft tire on either of the two vehicles are some of the common defects that can materially reduce efficiency of braking systems. Failure to check the brakes periodically for wear of the shoes can result in a gradual lowering of efficiency to the danger point. If the brake shoes show any variations in wear at the time of relining, reline or replace all shoes rather than only those which show the greatest wear. On tandem-axle trailers it's important to check axle alignment occasionally. Axles out of line can cause rapid tire wear and a lateral thrust on the hitch which may develop into a tendency to sway. Misalignment of the axles can seriously affect the braking systems of both vehicles. One other point sometimes overlooked in a routine check is the condition of the trailer wheel bearings. Properly conditioned wheel bearings, Fig. 12, are especially important when the trailer is equipped with electrically actuated brakes. This is due to close fitting individual members and to the low tolerances between moving and stationary parts of the mechanisms. Wheel bearings must be kept tight and properly lubricated to prevent undue wear and possible damage to brake parts. And while you're servicing the trailer wheels don't forget to include the front wheels of the towing car. Also check wheel alignment periodically. ★ ★ ★



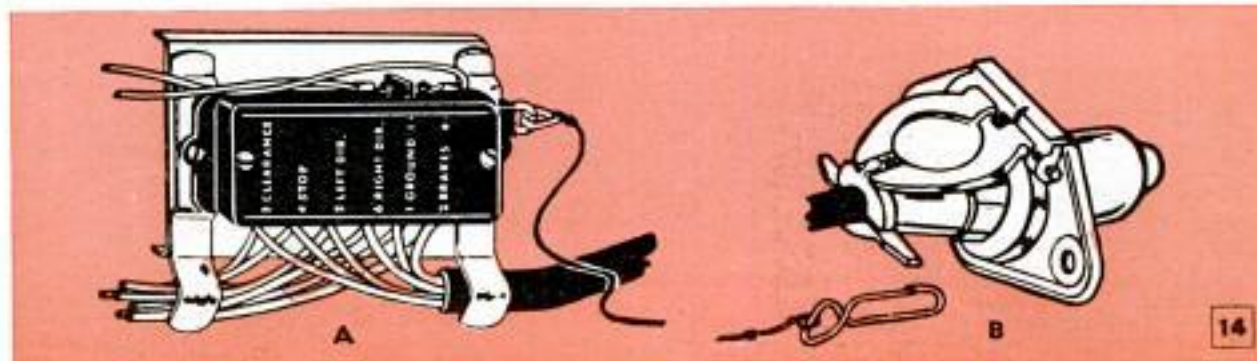
This is a view of the complete magnet shown in section in Fig. 9 and in the brake assembly at the right in Fig. 3. Current from car battery energizes this unit



Above, tight wheel bearings are essential on trailer equipped with electric brakes. Below, resistor in circuit between battery and hand control reduces voltage



Courtesy Sure-Stop Brake Control, Inc.



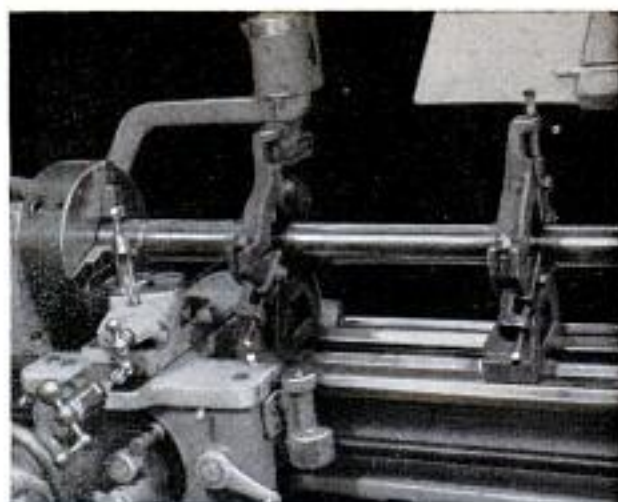
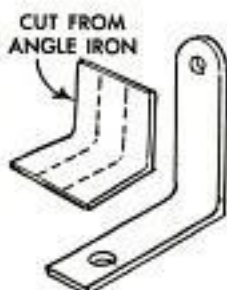
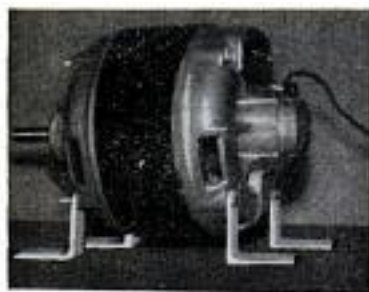


Hinge-Mounted Tray Keeps Tools Handy

A portable tool tray is kept within convenient reach in the shop of one home-craftsman by attaching one half of a hinge to one corner of the tray and the other half to a leg of the workbench and inserting the hinge pin as shown. When the tray is removed for outdoor use, the pin is removed and inserted in the part of the hinge on the bench. With this accommodation, tools need not be returned to the drawer or cabinet each time they are used.

Angle-Bracket "Legs" on Motor Permit Universal Mounting

Electric motors salvaged from machinery in which they have been held in special mountings can be adapted for universal mounting by adding angle-iron "legs." As indicated, sections of angle are drilled to permit fastening them to the end-housing bolts of the motor. Holes in the opposite legs of the angles allow the assembly to be bolted to bench or power tool.



Tubes Supported in Steady Rests

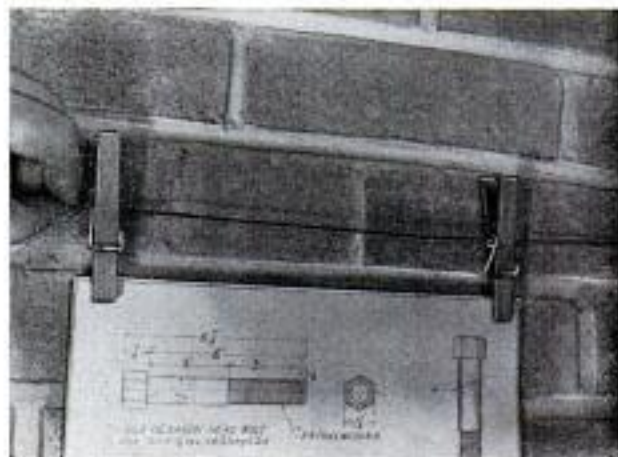
Occasionally it is necessary to use a lathe to cut off short lengths from a long piece of tubing or pipe. When the tube is too large in diameter to pass through the headstock spindle the setup illustrated is a practical solution. The tailstock is removed from the lathe and two steady rests are set up to support the stock. The tube is gripped in the jaws of the chuck with the left end against the face of the chuck. The cutoff tool is positioned by measuring the correct distance from the side of the tool to the chuck face. The carriage is then locked and is left in this position for gauging each succeeding piece of work to identical length.

H. J. Gerber, Stillwater, Okla.

Clothespins Hold Shop Drawings

Spring clothespins strung on a length of furnace wire nailed or screwed to the wall are used by one small machine shop to hold working drawings. The wire should be fastened to the wall at a height that will bring the center of the prints at eye level or slightly below. This method is especially handy where the prints have to be changed frequently as in a school shop or job shop.

C. C. Cooley, New Buffalo, Mich.



ARBOR PRESS

For Small Shop

By C. W. Woodson

WHEN THERE IS NEED for an arbor press in the small shop it is not always practical or advisable to improvise a substitute using the lathe or drill press, especially when the work to be done calls for press-fitting bushings and other parts which require considerable pressure. That's where this shop-built arbor press comes in handy. You won't have much money invested in material, about the only outlay being in the time required to build the press from steel flats, squares and rounds.

The ram of this press is of the threaded type. It is somewhat more sensitive on certain types of work than the regular rack-and-pinion ram and is equally positive in action. On the original press the end of the ram was simply faced off as detailed. If desired, a nonrotating, ball-bearing pad can be fitted. When this is done the end of the ram is shouldered and grooved $\frac{1}{16}$ by $\frac{1}{16}$ in. and the pad turned and drilled to fit easily over the shouldered end, a single steel ball being placed between the pad and the end of the ram at the time of assembly. Drill a $\frac{1}{16}$ -in. hole through the pad sleeve to register with the groove in the ram. Drive in a $\frac{1}{16}$ -in. pin to serve as a keeper.

The two arms, which are duplicates, can be ordered flame-cut from $\frac{1}{2}$ -in. stock to the shape indicated. Then the edges are cleaned up and the corners rounded slightly with a file. The table can be ordered

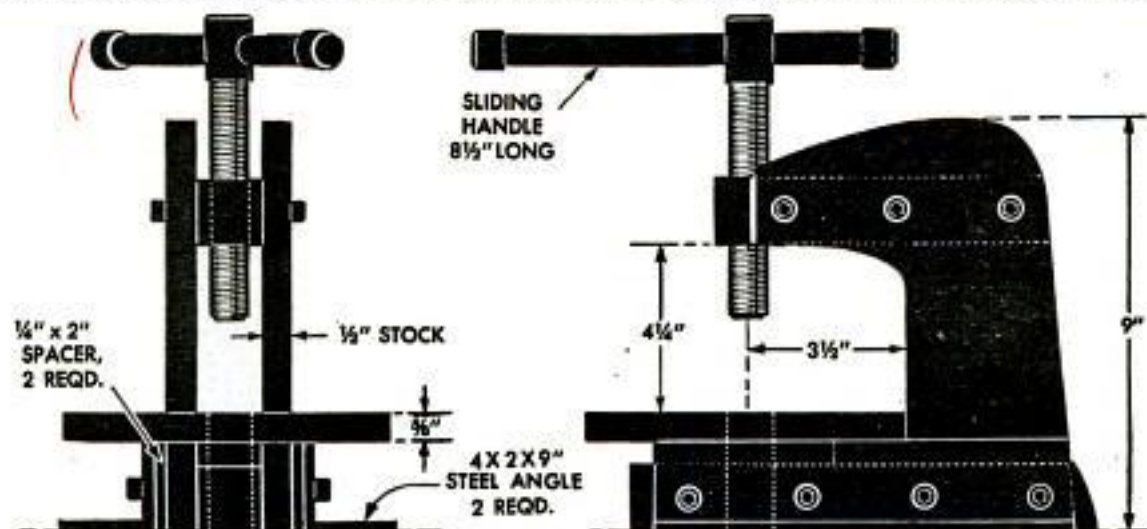


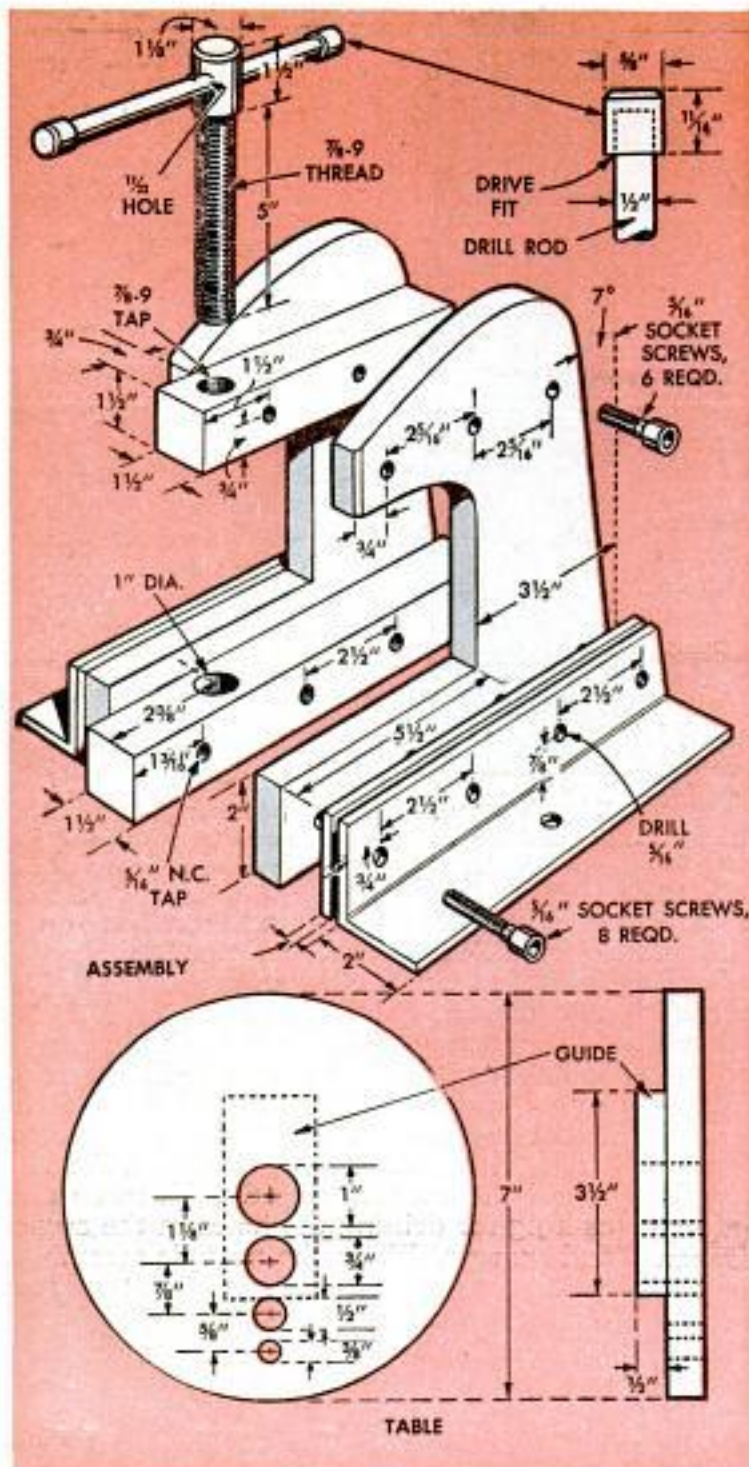
This arbor press is what would rate as small bench size and has a screw-type ram. Although slower than rack-and-pinion type, ram is more sensitive to pressure

from your supplier cut in the same manner. As detailed, it is round, 7 in. in diameter, but it also can be cut square if desired. The hole pattern detailed for the table is, of course, optional. Lay out the hole pattern on one arm, drill and use as a jig for drilling a duplicate pattern of holes in the remaining arm. Cut two lengths of steel angle, clean the cut ends with a file and round the corners slightly. Use one arm as a jig for drilling the holes in the angles and spacers. When the press is assembled the steel angles serve as mounting pads for bolting the press to the bench.

The length of the $1\frac{1}{2}$ x $1\frac{1}{2}$ -in. steel spacers need not be precise. The lower one

When built according to dimensions, press frame has a throat opening about $3\frac{1}{2}$ x 4 in. No castings are used





Screw-type ram, as detailed at left, should be shouldered from $\frac{5}{8}$ -in. stock and threads cut in lathe to assure accuracy

can be cut approximately 10 in. long and the upper one approximately 6 in. long. Lay out and drill the tap holes, using one of the arms as a drilling jig. Drill and tap the hole for the arbor screw and drill the 1-in. clearance hole in the lower spacer. Note that in the assembly the variation in dimensions between the lower spacer and the arm extensions leaves a groove $\frac{1}{2}$ in. deep and $1\frac{1}{2}$ in. wide. The guide, which is screwed or welded to the bottom of the table, rides in this groove formed by the three members. This permits the table to be adjusted in or out to bring any one of the four clearance holes into the desired position. In assembling it may be necessary to file the lower face of the guide so that it clears the spacer, as otherwise the table may tend to tilt slightly. This could result in burring or deformation of bushings or other parts being press-fitted into place.

The screw should be shouldered and the thread cut in a lathe to assure accuracy. When cutting the thread use special care in the lathe setup so that you finish with a tight, smooth-running thread. If the threaded screw takes the tapped hole loosely, it may tend to cant sidewise when pressure is applied and thus destroy the accuracy of the press. Cross-drill the big end of the screw, shoulder the handle to $\frac{1}{2}$ in. from $\frac{5}{8}$ -in. stock and turn, drill and ream a cap to a drive fit as indicated in the detail. ★ ★ ★

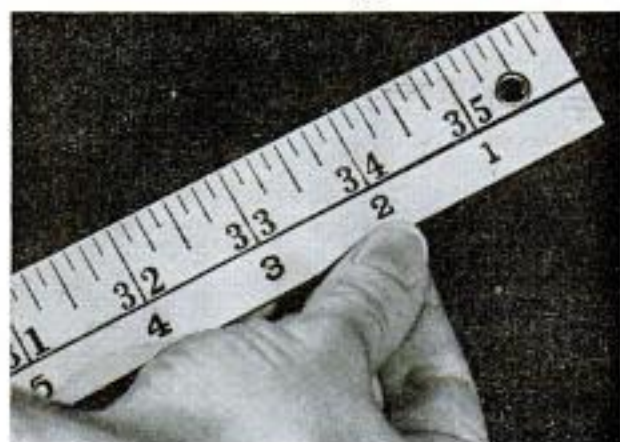
Double-Marked Yardstick Cuts End-for-End Turning

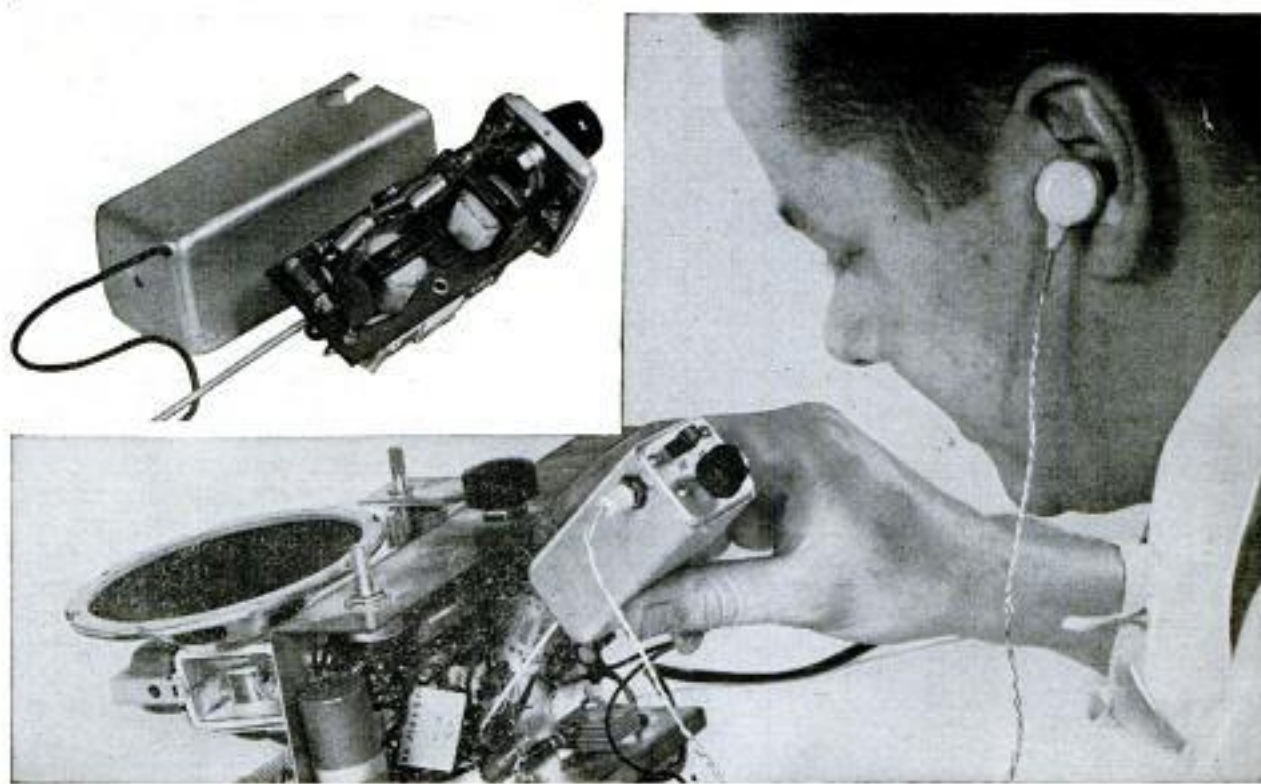
A second row of numbers added below the original numbers on a yardstick, but in reverse order, will eliminate end-for-end turning or counting the numbers backward. The extra set of numbers permits reading measurements directly without the chance of making an error.

Frank A. Javor, Newark, N. J.

When framed, glass-covered pictures are to be transported, pack them in pairs, face to face, placing bottle corks between them at the corners of the glass fronts.

Blanche Campbell, Los Angeles, Calif.





"LITTLE HANDY" SIGNAL TRACER SIMPLIFIES SERVICING

By Samuel Sosenko,

Transistor Components Eng. Dept., Thordarson Meissner Mfg. Div.

FOR YEARS the signal tracer has been a favorite test instrument with many radio servicemen and electronics technicians. Its simplicity and relatively low cost coupled with its ability to locate in minutes the defective section of multistage electronic devices have earned it a commanding niche on most service benches. But because of its large size the ordinary signal tracer is generally considered a shop instrument and remains tied to the bench. The "Little Handy," however, is a completely self-contained and portable unit which, taking advantage of transistors and other miniature components, can be carried easily in a tube caddy for home service calls and frees valuable bench space in the already overcrowded shop.

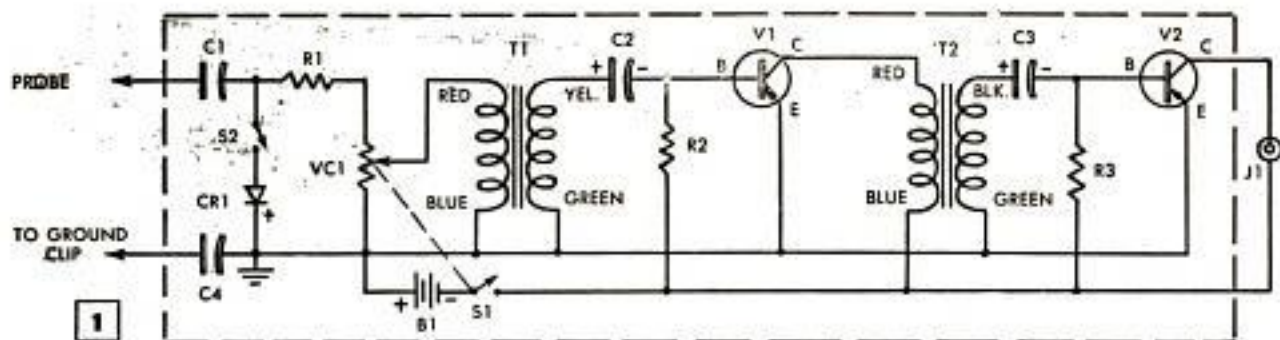
Despite its small size, the Little Handy has adequate sensitivity for servicing all types of radios, amplifiers, television sets and other electronic circuits. Its power re-

quirements are so low (about 2 ma.) that two ordinary penlight batteries will provide months of reliable service.

How It Works

Like all signal tracers, the Little Handy consists of an untuned radio detector followed by an audio amplifier. When the tracer probe contacts a point in a radio where a signal is present, either modulated r. f. or audio, the signal is amplified in the tracer and can be heard in a headset plugged into the output jack.

The schematic diagram of the Little Handy is shown in Fig. 1. Any signal appearing at the tracer probe is coupled to the volume control, VC1, through coupling capacitor C1 and isolation resistor R1. If the signal at the probe is modulated r. f., switch S2 should be closed, permitting the diode, CR1, to "detect" the signal. For audio-signal tracing the switch should be



open so that the diode is disconnected.

Transformer T1 matches the relatively low input resistance of the transistor V1 to the high-resistance volume control for maximum signal transfer. Bias resistor R2 establishes the correct operating point for V1 and coupling capacitor C2 prevents the bias current from being shorted out.

After being amplified by V1, the signal is applied to a second amplifier stage, V2, before being applied to the output jack. Components associated with V2 serve the same functions as their V1 counterparts.

Isolation capacitor C4 eliminates any serious shock hazard when the tracer is used for servicing a.c.-d.c. equipment.

Construction

A prepunched and drilled can-and-cover set for housing the Little Handy, as well as all other required parts, are readily available from leading radio-parts distributors, and the unit can be built in a few hours.

Begin the construction by cutting and drilling the required holes in a piece of $3\frac{3}{8} \times 1\frac{1}{16} \times \frac{1}{16}$ Bakelite or polystyrene material as illustrated in Fig. 2. The illustration is full-sized and may be used as a template. The rectangular cutouts can be made with a flat needle file after as much as possible of the unwanted material has been drilled out. Drill sizes for the round holes are given in the legend.

The two No. 31 holes near the center (lengthwise) of the board are used for fastening the battery holder to the board. Small rivets should be used for this pur-

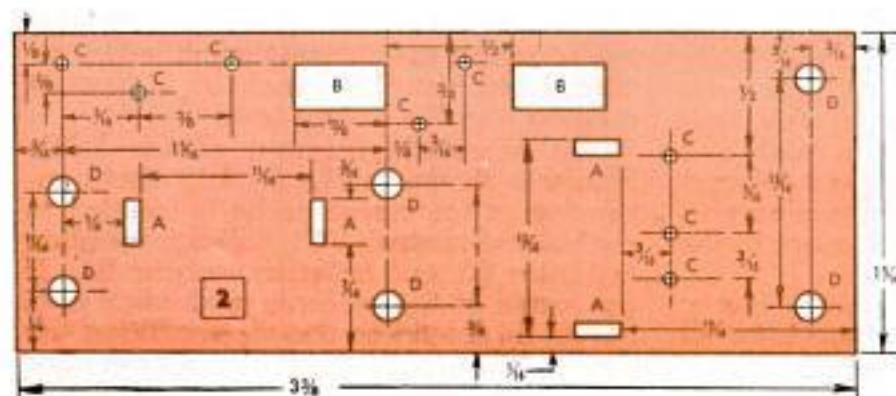
pose and the size of the holes may be changed to fit any rivets you may have on hand. Similar considerations apply to the two No. 31 holes near the left-hand edge of the board. These holes are used for mounting small metal eyelets to which the probe and ground lead will be soldered. (Rivets and eyelets are usually supplied with inexpensive radio hardware kits.)

The transformers are mounted first, by inserting their mounting tabs through the narrow rectangular slots and bending these inward below the chassis board. Study Fig. 4A to determine correct positioning of these units for shortest possible lead lengths. Then, rivet the battery holder in place. (You will have to drill two small holes, corresponding to the aforementioned rivet holes, in the center of the holder. The original mounting holes cannot be used since they are located directly beneath the transformers.)

The transistor sockets are inserted in the larger slots and held in place by retainer clips supplied with these units. Insert sockets so that the pin spacing corresponds with that shown in Fig. 4A.

Now study Fig. 3 and mount the indicated parts in the predrilled can-cover as shown. Be sure to place a ground lug under one of the angle-bracket mounting screws. Then fasten the chassis board to the angle brackets with 4-36 x $\frac{3}{16}$ screws and nuts. Another ground lug is placed under one of these nuts, as shown in 4A.

A unique wiring method is used here for firmly joining two wires without the use



LEGEND	
A	$\frac{3}{16} \times \frac{3}{16}$ " SLOTS
B	$\frac{1}{4} \times \frac{3}{16}$ " SLOTS
C	USE NO. 54 DRILL
D	USE NO. 31 DRILL

LIST OF MATERIALS

R1=100,000-ohm, 1/2-watt resistor; R2=150,000-ohm, 1/2-watt; R3=270,000-ohm, 1/2-watt.
C1=1500-mmfd. ceramic capacitor; C2, C3=2-mfd., 6-v. electrolytic, Sprague No. 1081; C4=.005-mfd. disk ceramic.

VC1, S1=miniature 1/2-megohm volume control with switch, Stackpole No. FD-16 or equiv.

V1, V2=Raytheon CK722 transistors. CR1=crystal diode, type 1N34 or 1N64.

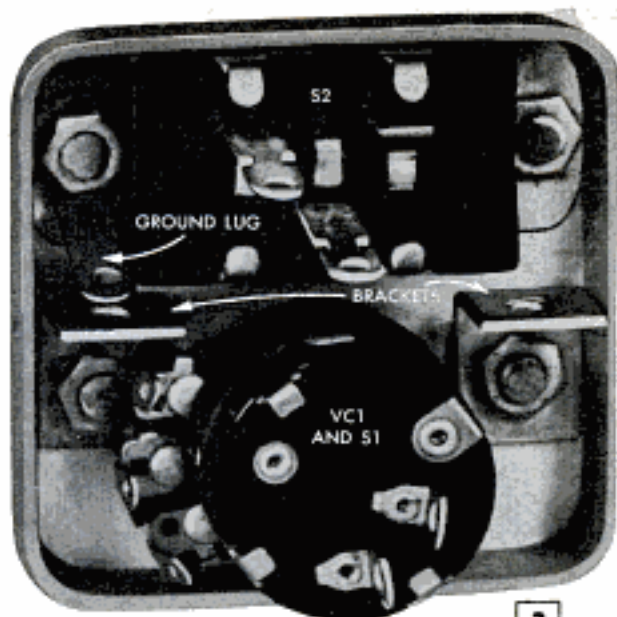
T1=50,000:500-ohm matching transformer, Thor-darson TR-26 (cut off black CT lead).

T2=20,000:1200-ohm matching transformer, Thor-darson TR-14.

S2=8-p.s.t. slide switch; J1=midget phone jack with insulating washers, Telex 9240.

B1=penlight cells, 1 1/2-v. (2 required), Burgess No. 7 or equiv.

MISCELLANEOUS: 1—magnetic, high impedance (1000-ohm or more) headset or earpiece with phone plug to match J1; 1—battery holder for two penlight cells; 1—j.f. can and cover, prepunched, Meissner Nos. 25-8282 and 25-8283 respectively; 2—transistor sockets with retainer clips; 1—knob for 1/8-in. shaft; 6—4-36x3/16 screws and matching nuts; 2—angle brackets, 1/2-in. wide, 3/8-in. long (each leg); 2—solder (ground) lugs; 4—eyelet rivets; material for chassis board and probe (see text); 1—alligator clip; 1—ground lead (see text); hook-up wire (No. 22 solid).

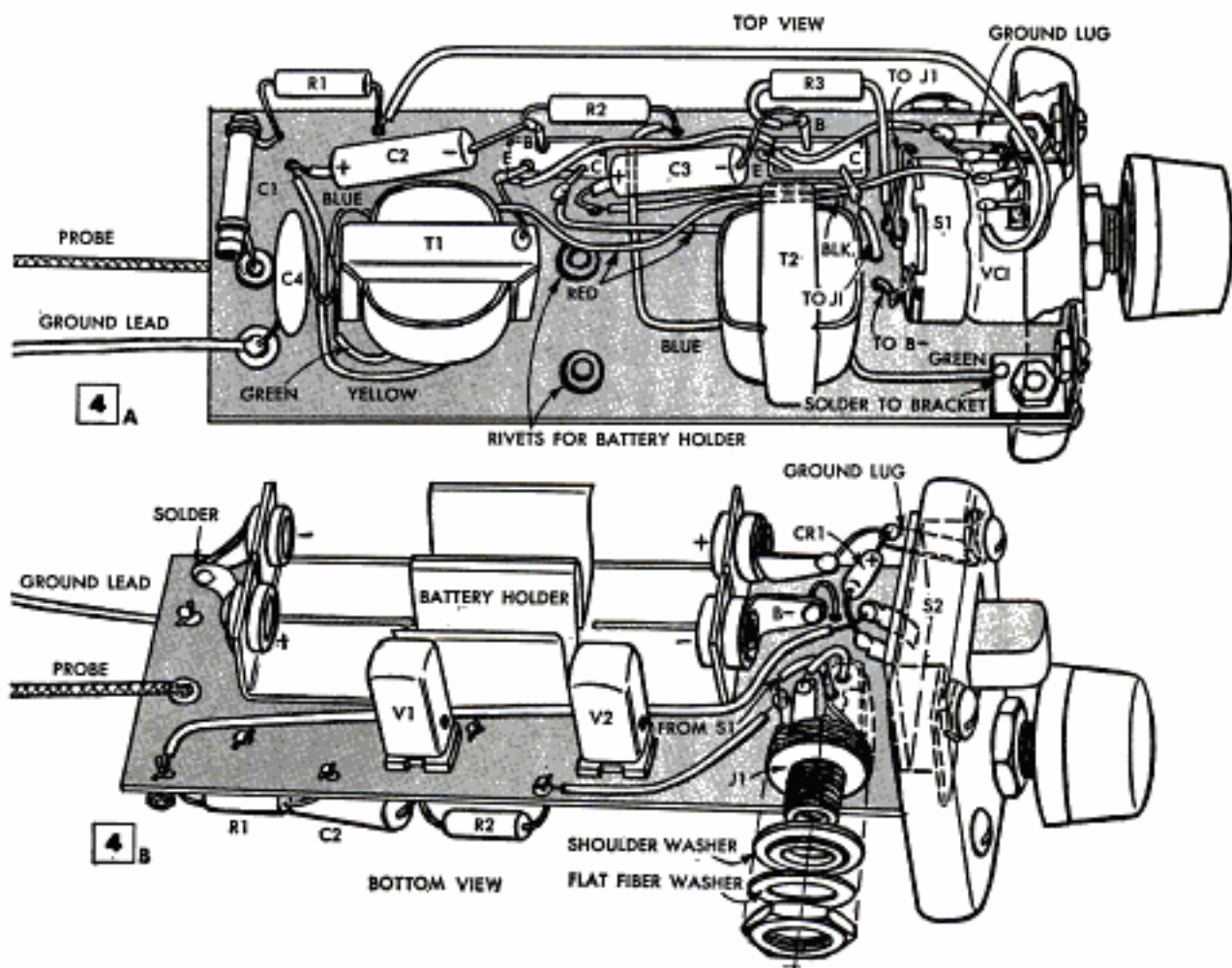


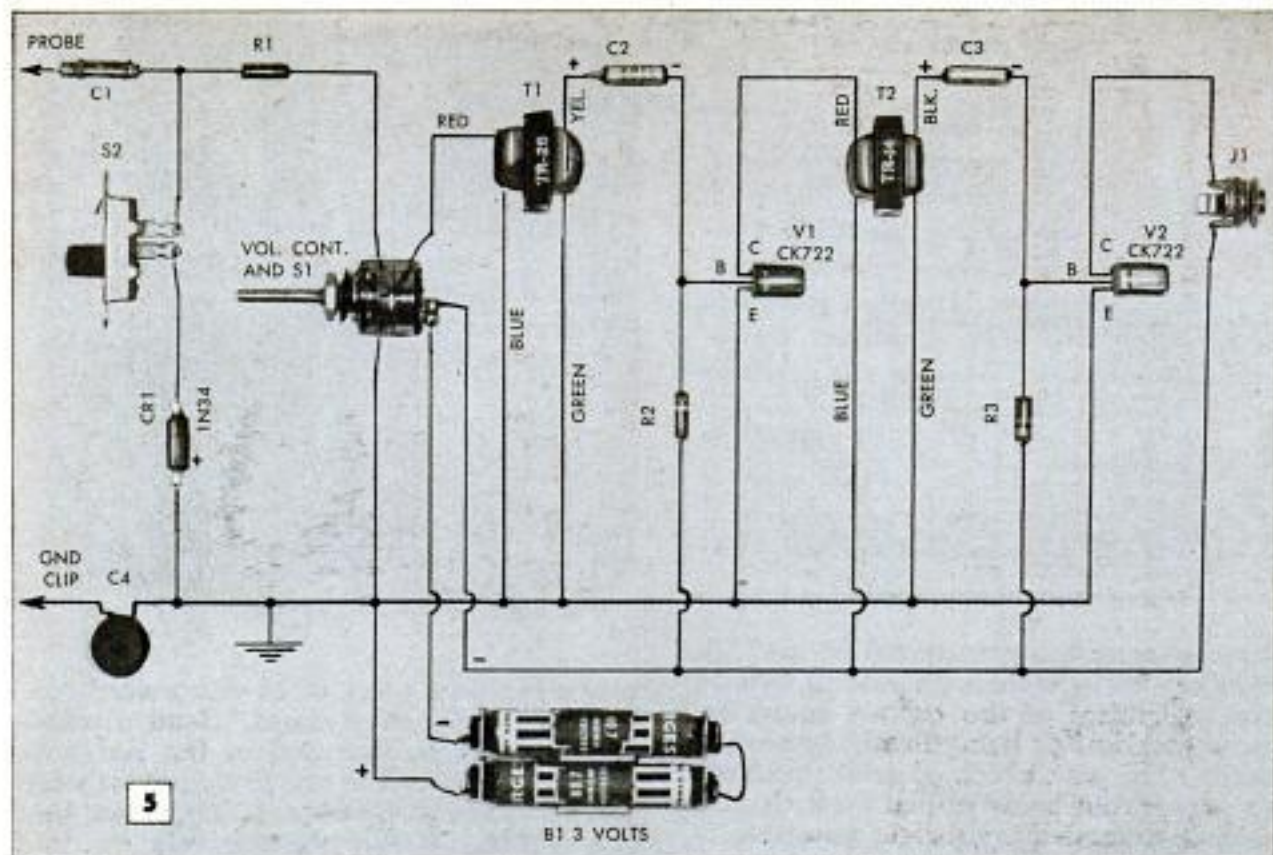
of space-consuming terminal strips. The wires are brought through a small (No. 54) hole to bottom of the chassis board and are soldered after being firmly twisted together. The small blob of solder prevents the wires from being pulled back through the hole, thus making a rigid assembly.

Great care should be used in soldering and the use of a small-point 20 or 40-watt pencil iron, or solder gun, is recommended.

Start the wiring at the probe eyelet. The

probe is a 5-in. piece of 18-gauge steel rod obtainable at hobby shops. Bend a small 90-deg. hook in one end of the rod and insert this, as well as one lead from capacitor C1, through the eyelet and solder the connection. Work progressively to the right making certain that all wires leading to a particular junction have been connected before soldering. The pictorial of Fig. 5 can be used to check your work.





Transformer T1 is statically shielded and its frame must be grounded. This is done by soldering a wire from the transformer frame to the emitter lugs of the transistor sockets and, from there, to a ground lug, see Fig. 4A. The frame of T1 is then used as a ground point for the green and blue transformer leads and C4.

Output jack, J1, is supported only by the leads connected to its terminals and can be positioned easily to fit the cutout in the can housing. The jack must be insulated from the can with a shouldered and a flat fiber washer.

The ground lead consists of about two feet of flexible, insulated ground wire, which should be threaded through the pre-drilled hole in the front of the can before having an alligator clip connected to its free end. The probe must be covered with a tight-fitting piece of spaghetti tubing to prevent its shorting to the can.

Insert the transistors and batteries after all wiring is complete. Carefully observe battery polarity and insert the transistors correctly by observing the position of the dot on the transistor bodies in Fig. 4B.

Using the Little Handy

To get acquainted with the characteristics of the signal tracer it is suggested that you first try the unit on a normally operating radio. Tune the receiver to a strong local station, and then unsolder one of the speaker leads so that there is no

sound output from the receiver. Now, connect the ground lead of the tracer to the B-point of the radio, set switch S2 to the r. f. (closed) position, and touch the grid of the first radio stage with the tracer probe. A very weak signal will be heard through the phones at this point with the tracer volume control set nearly to maximum. Move the tracer probe to the grid and plate of the second stage respectively and note the volume increase at each point.

Now, set S2 to the a. f. (open) position and touch the hot side of the volume control, the grid and plate pins of the audio voltage amplifier and the grid and plate pins of the power amplifier with the probe. Note the volume difference at each point.

Remember that the signal strength at the tracer probe increases with progressive advances from the antenna through the final audio stage. If the input signal to the Little Handy is too great the output will sound garbled, or distorted. The volume control of the tracer should be turned down when the probe is touched to the plate of each successive stage.

The procedure for testing a defective receiver is identical to that outlined above, except that you will reach a point in the radio where there is no signal, or the signal is distorted. It is evident that the defective part in the radio must be between that point and the preceding one where a good signal was obtained. The troublesome part can then be located with a test meter. ★ ★ ★

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NEW BROWNIE STAR CAMERAS take color slides, too! First Brownie Cameras ever designed to take gorgeous color slides (use "Daylight Type" Ektachrome Film in bright sunlight, "Type F" with flash)... as well as lifelike color and black-and-white

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Brownie Starflash Camera—Eye-level finder makes it easy to aim each shot just right. Built-in flashholder for M2 bulbs. Only \$8.50.



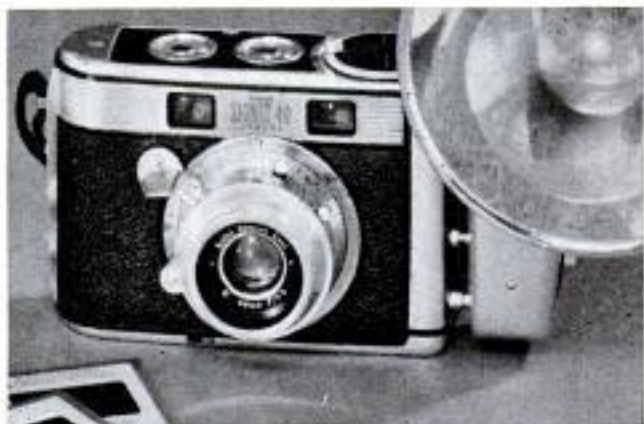
NEW KODAK ROTARY FLASHHOLDER lets you take 6 flash shots without reloading! Accepts six M2 bulbs at a single loading, changes bulbs instantly by rotating the turret, ejects all spent bulbs simultaneously—and can be reloaded in split seconds! Equipped for B-C battery power. New, simplified flash calculator. Available in two

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loading. Only \$9.95 or \$11.95, depending upon the model required for your camera. (Batteries extra.)

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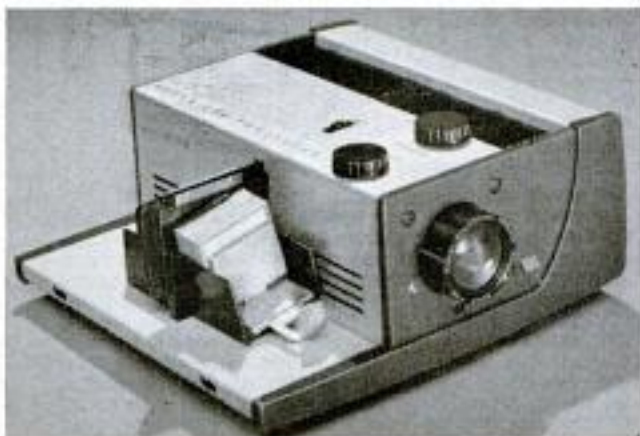


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flashbulbs. Ask your Kodak dealer to show you how easy it is to sight, focus, shoot, and advance the film in a Signet 40—with *all controls* at your finger tips! Superb Ektanon $f/3.5$ Lens . . . 1/5 to 1/400 Synchro Shutter . . . combined rangefinder-viewfinder. Kodak Signet 40 Camera complete with flashholder, dual reflectors, only \$69 . . . or as little as \$7 down.

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French Polishing

Q—I have an old tool chest, an heirloom, which I would like to refinish. Structurally it seems to be sound but the finish is in very bad condition. I scraped off a small area and the wood appears to be walnut, but I am not certain about this. I'm told that many old pieces were finished by a process known as French polishing. What type of finish is this and is it easy to apply? — Y. E., Conn.



A—French polishing is a very old method of finishing wood and, as originally practiced, involves several steps. Properly carried out this method produces a very fine finish of exceptional beauty and durability, especially when used on quality cabinet woods. However, its application requires both time and labor to produce a top-quality job. The finish is laid on the bare wood with a pad made from a ball of cotton and a square of lintless cloth. The cotton, carrying a small quantity of the finishing material is placed in the center of the square of cloth, the corners of which are then gathered and held in the hand. A few drops of linseed oil are applied to the surface of the pad thus formed to prevent it from sticking. Then the pad is stroked over the surface of the wood, first in a rotary motion, using considerable pressure. Then before the finishing material contained in the pad is used up completely, the area covered is gone over with long, sweeping strokes of the pad. This completes the first application. Several are generally necessary to build a suitable finish. No filler is used on open-grained woods. There is now available a newly developed padding finish which is said to simplify the old process. All old finish must be removed and the wood thoroughly sanded before applying a padding finish. Space does not permit a complete step-by-step description of the procedure in French polishing, or padding as it is now often referred to, but full directions for application are available with the finishing material.

Training Grapevine

Q—A grapevine is now growing at the corner of our back porch. I would guess that the vine is very old and it is now spread over most of one side of the porch and is working up onto the roof. The trellis in which the vine is intertwined is rotting and I fear the vine will damage the roof if not removed. Is it possible to train the vine to grow on an arbor as grapevines do in a commercial vineyard?—F. R., Ohio.

(Continued to page 226)



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DAVENPORT, IOWA



(Continued from page 224)

A—You cannot safely prune the vine, that is, cut away excess canes during the period of seasonal growth. It will "bleed" badly. Wait until it is dormant, which is during the winter months. Then it will be possible to cut away whatever is necessary in order to remove it from the trellis and train the canes and shoots to grow on the new arbor. In this we are assuming that you wish to train the vine for ornamental growth rather than for maximum fruit production. Because of this it generally is best to remove only the canes necessary to release the vine from the existing trellis, rather than cut it back to the four-cane systems which are a common practice in commercial vineyards.

Planting Dormant Shrubs

Q—I sold my home last fall and at the time I dug and stored several choice shrubs. I was careful when digging to remove as much of the root systems as possible and succeeded with a minimum of damage to each shrub. They were, of course, stored when dormant and now both bark and root systems appear to be in good condition. Now I'm wondering when is the best time to plant them. Is there a special time in the spring months when soil and temperature conditions are just right for planting? — E. N., Wis.



A—You did not say what kind of shrubs you refer to, but in general most dormant shrubs of the common ornamental varieties can be planted in the spring with a good chance of success. As a rule they should be planted as soon as the soil can be worked readily and special care must be taken to prevent the newly worked soil from drying out and thus injuring the root system. Usually it's a good idea to cover the freshly dug earth over the roots with 1½ to 2 in. of peat moss. In replanting shrubs in this manner it usually is best to set the trunk slightly lower than it was originally. Fill the hole with clean soil, pack it lightly, then water and after settling, fill the depression flush with the level of undisturbed soil with peat moss. Keep this damp until growth starts, and water as required.

Top-Dressing Lawn

Q—My lawn is rather rough, low spots here and there, and I suspect the soil is not too good. The grass is poor, a thin stand and lots of weeds. The weeds I can eliminate but I'm wondering about the turf. I had thought of top-dressing with black soil as a first step in rebuilding. But should I reseed before top-dressing, or after? How do I prevent the top-dressing from smothering the existing grass? When does one apply fertilizer? — M. E., Ind.



A—Top-dressing a poor lawn is a good first step in improving it. Usually it's best to wait until after growth starts in the spring (top-dressing also can be done in the fall) and at the first mowing, cut the grass shorter than usual, about 1 in. Then rake and seed and apply a fertilizer especially compounded for lawn grasses. Sprinkle lightly to assure that both seed and fertilizer reach the soil, then wheel the top-dressing material onto the lawn and dump in small piles equally spaced over the whole area to be treated. Then use the back of the rake to spread the material to a uniform thickness over the lawn.

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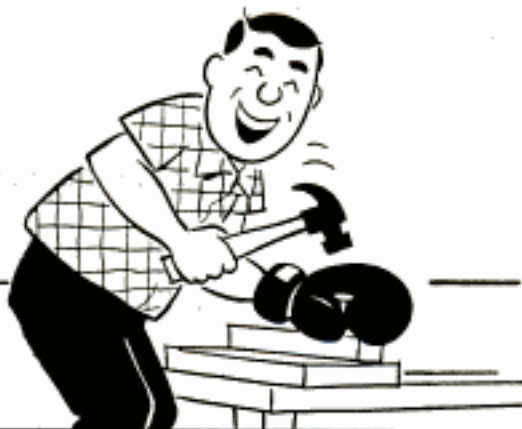
air conditioning for the home

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PM's Landscaping Plan For the Small Yard

(Continued from page 151)

strips of $\frac{1}{4}$ -inch hardboard to keep the sand in place. After several seasons the lumber and hardboard will rot away and the earth will be packed firmly enough so the sand will stay.

Planting boxes and sand boxes shown on the plan are made by using two by sixes or two by eights on edge. The inside and bottom edges are coated with liquid asphalt to protect the wood. Creosoted or pressure-treated lumber would be even better.

When the patio was finished we planted grass in the "frame" of the yard. Golden Vigoro assured a healthy lawn with a high-quality grass seed that was a Merion-blue combination. Fast-growing grasses in the mixture gave us a fairly quick lawn and protection for the slower-growing Merion varieties. Depending on the area of the country, the correct grass seed could be any one of a number of varieties. The Vaughan Seed Company provided the seed, as well as all trees, shrubs and plants for the yard.

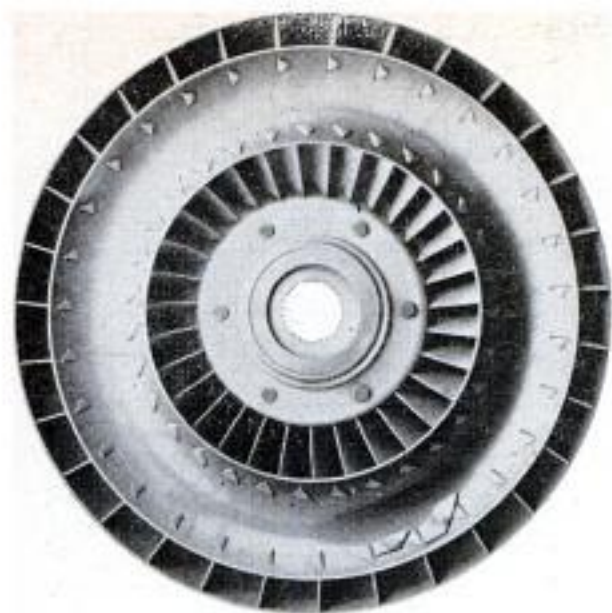
When working with any landscape architect in any part of the country you will find that he probably insists on working with a nursery such as Vaughan's for a number of reasons: The large variety of plants and stock available, assurance of healthy stock that will grow in a particular area and a guarantee of replacement of stock.

Building the fences, installing the patio and planting the grass required a full summer. Trees and evergreens were planted in the fall. Here another advantage of working by a plan became apparent. Time and money can be budgeted so that a certain portion of the landscaping can be done each year for a number of years. The yard is attractive at all stages, and you have the knowledge that the finished yard will be an integrated whole.

My wife started planting flowers and bulbs the first year, so that the following spring tulips and crocuses came up almost as soon as the last snow melted, filling the planting boxes and flower beds with color early in the year.

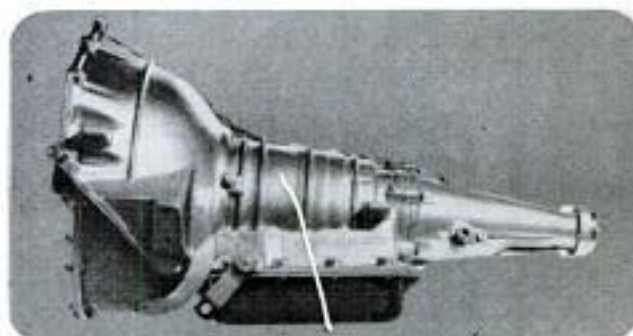
The next step was to build the storage wall. The same radial saw that had cut all the bricks now had a change of blades and the storage wall was constructed quickly. I used standard building procedures: Wall studs and roof joists on 16-in. centers, as were the floor joists. Because the wall was only six feet wide, two by fours were used

(Continued to page 230)



X-RAY ON CHEVROLET

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throughout. The building is placed on railroad ties for a foundation. To simplify construction and assure strength, four by four-foot sheets of 1/4-inch hardboard were nailed directly to the studs and all joints covered with wood battens. The battens provide a pleasing pattern and the few joints resulting from the use of hardboard sheets offered little trouble. Sliding doors were used in the storage wall to avoid the problem of a swinging door clearing the planting box. Also the doors were made larger for easier entrance with bulky items such as chairs and tables. Old roller skates were screwed to the tops of the doors and run on two wooden tracks. The doors themselves are frames of one by two stock on edge covered with sheets of hardboard. The roof of the storage wall first was covered with asphalt-impregnated sheathing, then sealed with graveled roll roofing of a pleasing shade of green. Lime yellow was the color chosen for the wall itself. Bright colors are another feature of modern landscaping, and definitely add to its beauty and cheerfulness. While I was building the storage wall, and my wife was putting the "pictures into the frames" by planting flowers, Dick and Dana did their share of landscaping by planting and tending the salad garden behind the storage wall. The yard is designed to be enjoyed by the family, and the more each member can participate in its construction and maintenance, the more it fulfills its most important objective: Being a place for the family to have fun.

Dick and Dana take turns having friends over to play in the playhouse end of the storage wall. The six-foot-square room can be anything from a palace for the queen to the control room of a moon-bound rocket. Cutting the playhouse door in half horizontally solved a number of problems. The lower half opens out and is beneath the window. The upper half opens in, and is high enough to clear the tops of bicycles stored here. The door could not be hinged to open outward, since it then would project into the passageway. Lights for the playhouse, as well as the workshop and the rest of the storage wall are provided by an underground cable from the house to a fuse box in the workshop. Lights are wired from the fuse box.

More trees, evergreens and shrubs were planted as time and money were available. The studio—which could be a home office or workshop, depending on circumstances—was delayed a year when the children's swimming pool was found to fit its location so neatly.

When the back yard was well along the

(Continued to page 232)

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way we moved operations to the front yard. The original S-shaped sidewalk that had split the yard in two was torn up and replaced by a walk as designed by Klopp. The new walk gave the yard the appearance of greater size, and is dimensioned so that people entering or leaving an automobile step directly onto the walk no matter where the car is parked. Note also that the end of the drive touching the back yard has a walk so that groceries carried from a car can be delivered directly to the back door of the house.

The planting box in the front of the house required a concrete foundation, formed simply by digging a ditch below the frost line and pouring it full of concrete. Ampress red bricks were used for the planting box, being mortared together. For an added touch of color, the lower part of the wall was painted a bright coral red to match the front door. Gray Ampress brick used for a cap on the planting box were left natural color.

After two years of hard work we have a beautiful yard with a patio that is ideal for outdoor parties in the summer. In winter we bank the edge with snow, flood it and have our own ice-skating pond. Our children have a playhouse and readily accessible storage for their bicycles. Because ground cover is used in many areas of the

yard, very little weeding is required. The mowing strips keep grass maintenance to a minimum, and my wife has fun with her flowers from early spring to early winter. I have a workshop and soon will have an office of my own. Later will come the carport; a few two by fours and some hard-board sheets will make it an easily built, inexpensive and attractive structure. The value of our home has been increased considerably. But most important, my family had fun doing the job and we continue to have fun using the yard for what it was designed to do—bring pleasure to the whole family the year 'round. ★ ★ ★

Scientist Is "Guinea Pig"

To see how much ozone a man could stand, Dr. Hans-Georg Clamann, U.S. Air Force physiologist, breathed eight parts of ozone to one million of air for one hour in a controlled-ozone chamber. His lungs became irritated and began to fill with fluid. His breathing was cut to 50 percent capacity. His sense of smell was impaired. But he survived. Safety level for humans working with ozone in industrial applications is considered to be $\frac{1}{10}$ part ozone per million parts air. The Air Force is interested because future pilots will encounter ozone layers.

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Please send more information on my opportunities for enlisting in the U. S. Air Force. I am between the ages of 17-34 and reside in U.S.A. or possessions.

NAME _____

ADDRESS _____ AGE _____

CITY _____ ZONE _____ STATE _____



Can you match the HARLEY-DAVIDSON **HUMMER?**

This is the season you'll want to go more places, do more things. On a Hummer travel to work or play is fast, safe, fun — and so inexpensive!

100 miles to a gallon

One gallon of fuel takes you up to 100 miles . . . tire wear, service costs are negligible. Depreciation is unusually low.

So easy to own

After a small down payment, you can own a Hummer for only \$17 per month — and that includes fire, theft and collision insurance; local taxes; freight and carrying charges. Hummer owners everywhere hail this economical fun-filled way to avoid that daily traffic struggle.

Call now for details

Call the dealer listed in the classified section of the phone book or write direct. No obligation, of course.

HARLEY-DAVIDSON MOTOR COMPANY
Dept. P, Milwaukee 1, Wis.

The Voice of Emergency For War or Peace

(Continued from page 116)

necessity of having a standard radio playing constantly in the office. When the Sig-alert sounds off, it is an emergency.

The same is true with taxi fleets. And many big industrial and utility firms are installing Sigalerts as a service for the workers and as selective-calling systems.

Consider, also, what a Sigalert receiver means to newspapers and newsreels. And let's not forget old John Q. Citizen—he's the one who installs short-wave radio sets in his home and listens to police calls. Sigalert gives John Q. a new set to listen to—one that speaks with authority and really says something when it does speak. John Q. can get the news first.

The broadcasters' cooperation in the airing of bulletins has been amazing. Network shows have been cut into without a moment's hesitation—and the average time for broadcast of a bulletin is two minutes from the instant it is first flashed until it has been delivered to the public.

Another feature of Sigalert which makes it so valuable in event of emergency is that while it is designed to operate from regular electric current, in the event of power failure it can switch automatically to battery. Thus, it is not dependent on any ground lines. This feature has endeared it to Civil Defense authorities.

Sigalert is in daily use on the crowded highways and freeways in and around Los Angeles. Motorists are kept informed of any serious accidents or other traffic pile-ups on their way to or from work, thus enabling them to take evasive action and skirt the snarled and congested area.

And now many big corporations are installing Sigalert receivers as a service to their employees. The bulletins are monitored and played over the plant public-address system, thus saving workers a lot of headaches commuting through difficult areas.

In addition to his radio-station duties, Sigmon is president of Federal Electronics Corporation, Los Angeles, which makes the Sigalert receivers. This set is in a metal case about nine by seven by eight inches. It is plugged into an ordinary light socket to operate and a window screen can be used for antenna.

The set is fix-tuned and left on, so it is next to impossible to miss a bulletin—especially in view of the fact that it is a simple matter to attach a tape recorder to the little receiver. Plans are in the works for a smaller set in a plastic case, especially

(Continued to page 236)



introducing the new
**CRAFTSMAN JET ACTION
 PROPANE TORCH**
 with **PUSH-BUTTON
 Flame Control**

**FROM
 THIS**

**TO
 THIS**

**AT THE TOUCH
 OF THE BUTTON**
 Instant Flame Control
 for maximum fuel economy
 and greater safety.

TILE SETTING



Jet Action Torch and Accessories

Now only 995
COMPLETE

The new Craftsman Jet Action Propane Torch Kit with the disposable fuel cylinder, pencil burner head, and soldering tip plus push button control is just the ticket for hundreds of jobs around home or shop from soldering to lighting your charcoal broiler. Items sold separately total over \$13.50. It's a real savings during this sale.



**Press Button -
 LARGE FLAME**
**Release Button -
 PILOT FLAME**

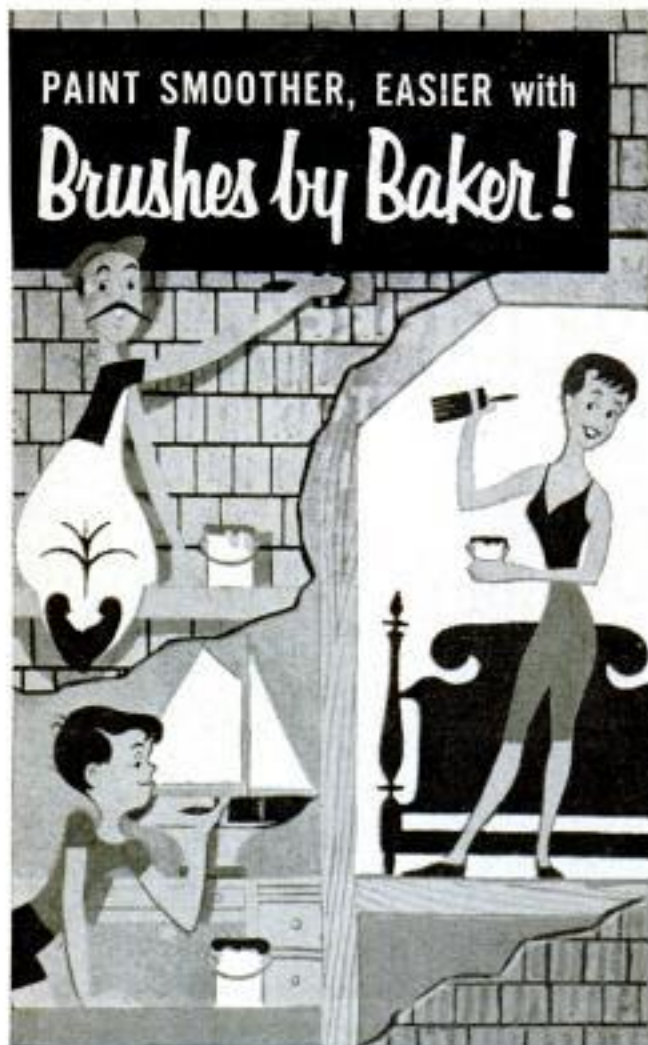


includes:
 Pencil Burner Head for
 Fine Work and Handy
 Soldering Tip

S-377



CRAFTSMAN Hand and Power Tools by **SEARS, ROEBUCK and CO.**
 Famous for fine quality . . . precision performance . . . low price!



PAINT SMOOTHER, EASIER with
Brushes by Baker!

Use Baker Brushes and paint easier, faster, better! Enjoy smoother painting, use fewer strokes, get more coverage. Next time you paint choose the right Baker Brush size most practical for the job.



learn
to paint
like an
expert . . .

Free booklet tells "HOW TO DO A GOOD PAINT JOB." Today, send card to Baker Brush Co., Inc., 83 Grand Street, New York 13.



**BRUSHES BY
BAKER**

AMERICA'S FINEST PAINTING TOOLS

for use at home by the private citizen. Within a few years it is conceivable that every home may be equipped with a Sigalert receiver—particularly if Civil Defense regulations are tightened up.

Another phase of the Sigalert operation which is attracting the notice of industry and utility-service facilities is its adaptability to a selective-calling system.

A crew of trouble shooters could be assembled simply by flipping a switch and giving the message—instead of making dozens of phone calls with the familiar delays of busy signals and wrong numbers. Sigalert gets the right number every time.

Although Sigalert is a radically new electronic development, it now is taken for granted by southern Californians. They have grown used to the Sigalert operation; they expect and depend upon the service it renders just as much as they expect a dial tone when they pick up their phones.

This has come about because Sigalert, utilizing for the most part existing facilities, has proved its worth time and time again in fire, flood and disaster and in the humdrum but vital daily jobs of traffic control and smog warnings.

And, best of all, it hasn't cost the taxpayers a dime!

★ ★ ★

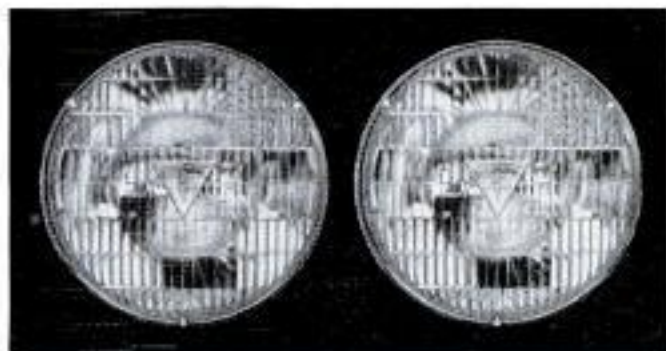
Electronic Typewriter

Electronic tabulation on electric typewriters is making the filling-in of forms much easier. Eliminating tabulation-stop adjustment, an electronic "reading" unit automatically halts the typewriter carriage at the correct typing point in response to electrically sensitive ink lines printed on the form. The reading unit is three by six inches and is mounted under the typewriter keyboard. To change from straight typing to form typing, the secretary flicks a lever activating the reading device.



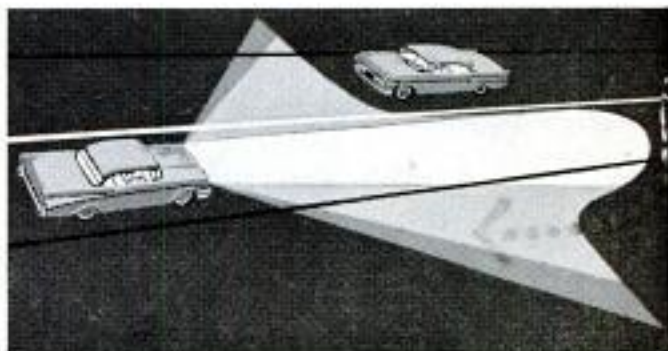
Here's the **BIG** **DIFFERENCE**

in HEADLAMPS today!



NOT THE POWER!

All headlamps built today "see" farther down the road, because the power has been increased by a full 10% on the high beam. Objects that formerly blended with the background should now stand out in bold relief. STILL, POWER IS NOT THE BIG DIFFERENCE!



NOT THE LIGHT PATTERN!

More "seeing distance" along the right side of the road is another big industry advance. On the lower beam, you see farther (eighty feet farther) than was ever possible before. This means, of course, more light on the right. YET, PATTERN IS NOT THE BIG DIFFERENCE EITHER!



BUT, THE AIM!

Power and pattern are unimportant unless headlamps are properly aimed. Only Guide gem-grinds three reference points, or "Guide Points", into each lens, providing positive aiming accurate within a few thousandths of an inch. TODAY, PERFECT AIM IS THE BIG DIFFERENCE IN HEADLAMPS!

Standard equipment on all General Motors cars and trucks.

GM **GUIDE**

Buy In Pairs

Where You See



AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

APRIL 1957

T-3

Safety-Aim

HEADLAMPS

237

At Last!

**A "TOOTHLESS" PLIER
THAT GRIPS
WITHOUT GOUGING**



CHANNELLOCK

No. 415 Smoothjaw PLIER

Just
The Thing
For Chrome
Fixtures and
Fittings



One of the handiest tools you'll ever use . . . the new "toothless", smooth-jaw plier that grips without gouging. Just the ticket for gripping chrome-plated fittings, plastic, wood and other smooth surfaces. Especially handy on chrome sink-fixtures and other hard-to-handle jobs. Jaws quickly adjustable to full 2" opening. Get yourself a Channellock No. 415 Smoothjaw Plier. You'll find it's "the right tool" on scores of jobs in home and shop.

**Ask Your Hardware Man For A
CHANNELLOCK Smoothjaw PLIER**

MADE ONLY BY

**CHAMPION DEARMENT TOOL CO.
MEADVILLE, PENNSYLVANIA**

Tapping the Devil's Cauldron for Power

(Continued from page 139)

pressure to hold the steam down for a while." These holes must have much more substantial wellheads and valving than oil wells. No less than 100 tons of concrete are poured at the wellhead to hold the pipe steady when nearly one million pounds of steam and water per hour come gushing through it.

Ground Shakes and Thunders

Drillers know that things are about to happen when the bottom temperature begins to soar and the mud coming out of the hole is boiling. Even when drenched with cold water, bits come up searing hot from bores that log temperatures from 300 to 500 degrees F. Underlying "base" rock is estimated to run between 1300 and 1800 degrees F. The ground for miles around thunders and shakes when a bore comes in. First out is a towering cascade of water—and everyone runs for cover. Steam mixed with mud spews from the hole to heights of 500 feet or more. With an explosion like the boom of heavy artillery, the fireworks begin. A roaring cascade of red-hot rocks is fired skyward like a small volcano. The rocks explode in mid-air with a high-pitched crackling noise as they emerge to atmospheric pressure. The eruption may last for days. "When our first 6-inch bore was uncapped in March 1951," recalls Fooks, "she spewed rocks and debris 600 feet high for more than 2 days, kicking 500 cubic yards of material out of the earth's innards."

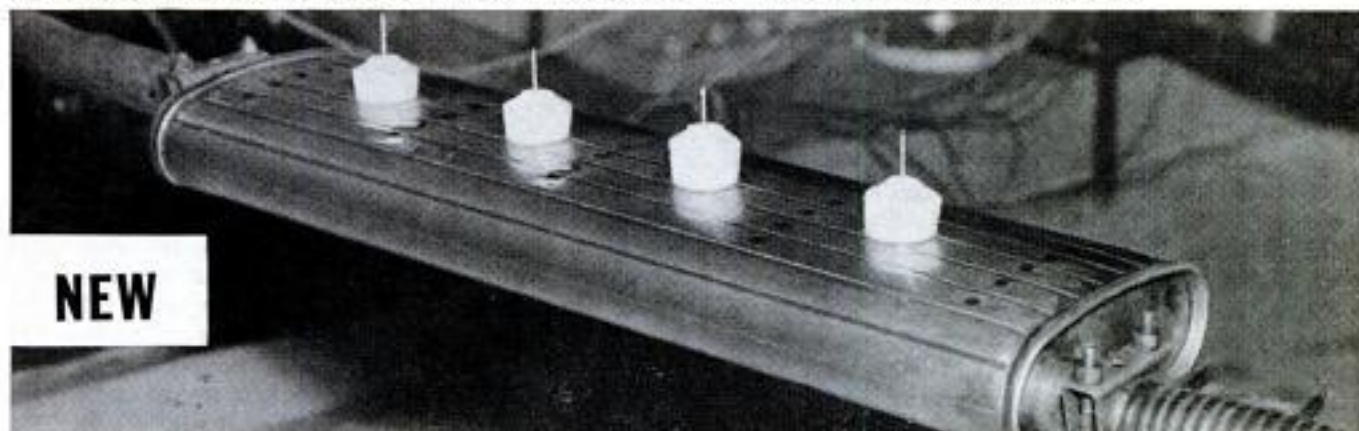
Pressure Flings Pebbles Skyward

More recently, a 3000-foot bore shot hot pebbles and pumice skyward for three days. The temperature at the bottom of the hole, just before the drill train was pulled, measured 512 degrees F. The steam came at a pressure of 400 pounds per square inch. Most of the bores at Wairakei go down 2000 or 3000 feet, with wellhead pressures of about 300 pounds per square inch wide open. Wellheads are capped with massive valves that are opened when a bore comes in. The hole is permitted to spew vertically until it has blown itself clean; then the top valve is shut and the steam is diverted to a horizontal pipe with a muffler on the end. After tests are made, it is shut down to await connection with the 20-inch insulated main line that will feed it to the generators. "One 8-inch bore," says Fooks, "came in with such tremendous pressure we couldn't shut the valve. It may have

(Continued to page 240)

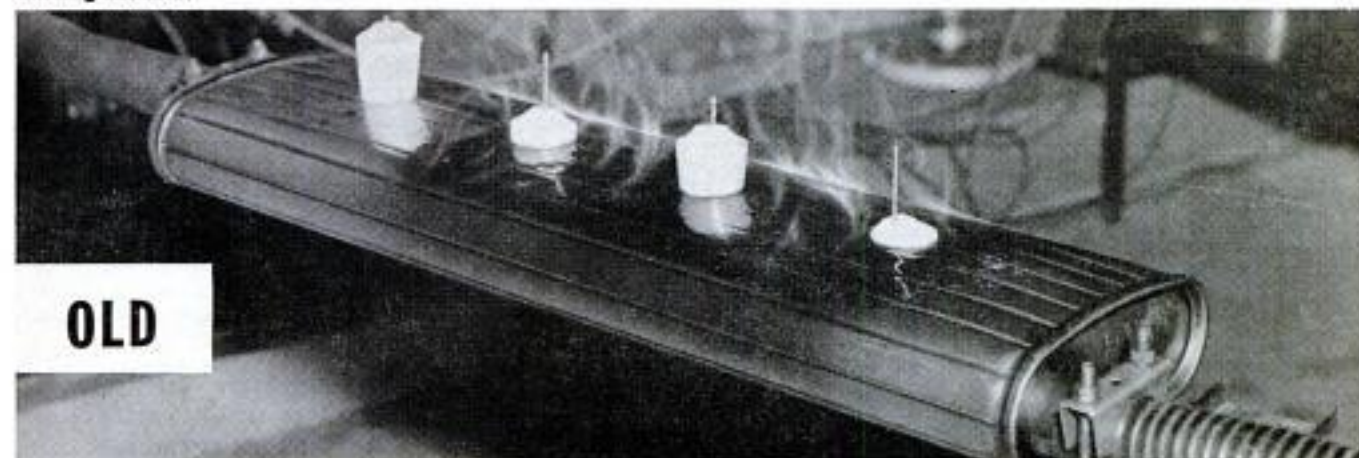
NEW AP "DRI-FLOW" MUFFLER DESIGN SLOWS RUST-OUT AND CORROSION, LASTS LONGER

In this test the new AP "Dri-Flow" model and a muffler of earlier design were installed on an engine dynamometer. Four candles were placed on the mufflers, and the engine was run at a driving speed of 25 mph for a period of 10 minutes. The melting candles show heat distribution.



NEW

New AP "Dri-Flow" Design has uniform heat over its entire area, as shown by the evenly melted candles. Keeping all chambers at the same heat eliminates cold spots where excessive corrosive moisture collects. This new design, latest example of AP leadership, insures a much drier muffler. And with AP's heavier steels, this means an even longer-lasting muffler.



OLD

Hot-spot, cold-spot design of most mufflers, including this earlier AP model, is shown by the unevenly melted candles and the heat-darkened areas. Corrosive moisture from the exhaust fumes condenses in the cold spots, while the hot spots tend to burn out metal. This combination attacks mufflers from the inside, results in short life. The new AP design greatly increases muffler life.

Short muffler life has become a major problem on millions of late-model cars. To solve this problem, AP makes a much stronger muffler. For years, AP mufflers have had up to $\frac{2}{3}$ heavier heads, $\frac{1}{3}$ thicker shells. And many have asbestos liners or corrosion-resistant aluminized and zinc coated steels. Now the new "Dri-Flow" Design, which cuts down rust-out and internal corrosion, is on more than 50 popular numbers, and is being added to others as fast as production permits. Insist on AP mufflers for this unbeatable combination: longer-lasting inside, longer-lasting outside.

You can depend on AP mufflers for longer life, more power, better gas mileage, surer protection from carbon monoxide. And remember, *they cost no more!*



Look for the sign of the AP Muffler Specialist in your neighborhood today. You'll find him a good friend to your car.

THE AP PARTS CORPORATION

14-Q AP Building, Toledo 1, Ohio

Mufflers and Pipes • Miracle Power • dgt 123

AP Longer-Lasting Mufflers—Designed for Today's High-Compression Engines

been damaged by rocks during the blowout. Men, working with ears plugged and muffed, had to go into the wellhead pit and weld a new 10-inch section with a heavier valve over the open hole."

Magma Pushes Upward

Backgroundwise, our planet's core is believed to be a white-hot mass of matter called magma, with temperatures soaring above 7000 degrees F. In most places an impervious crust of rock and sediments 50 miles thick insulates us from this furnace. In a few places, however, the crust is weak and still "settling." Great cracks form. Through these cleavages, magmatic masses are squeezed upward. As pressures lessen, the magma liquefies into lava, which may burst through to the surface. If so, a volcano is born. More often it is trapped deep in the crust, and the proof of its presence is seen in volcanic steam, geysers and hot springs. Steam also may come from surface water seeping down through fissures until it reaches the lava, where it is superheated and driven up by its own pressure. Many scientists believe there is also a "magmatic steam" from water in molecular form which is present in rocks and actually may be part of the magma itself.

No two wells are likely to produce exactly the same type of steam. Nor is it

"pure." Wairakei's steam is laden with hydrogen sulfide, carbon dioxide, silica, salt and "wetness." Wet steam with impurities will corrode turbines quickly, so New Zealand engineers have had to pipe their steam through "U" turns that whip off some of the water, then feed it through centrifugal driers to remove the rest. "It's an expensive, complicated process," Fooks reveals, "but it still gives us power at about one cent per kilowatt, about the same as hydropower and half the cost of using coal."

Steam Develops Power

Already steam enough to develop 100,000 kilowatts of power is roaring away in Wairakei's smoky valley. Two rigs are working around the clock, each putting down an eight-inch bore every six weeks. Each bore is producing steam capable of turning up another 5000 kilowatts of electricity. Next year, the initial powerhouse will start pumping 140,000 kilowatts into northern New Zealand's power lines. What makes New Zealanders happiest is the "continuous load" factor. Unlike hydroplants that drop to 60-percent capacity in dry seasons, or coal plants affected by strikes, volcanic steam goes screaming along at 100 percent of capacity year in and year out. Furthermore, Wairakei is

(Continued to page 242)



Built-in of Western Pine combines beauty, convenience

You can build this handsome cabinet easily, economically with Western Pine woods.

Soft-textured, even-grained, carefully dried, these fine woods fit any décor, modern or traditional. They are easy to work, take any paint, stain or enamel, or can be left natural, then waxed and rubbed to a satiny glow.

You'll find the Western Pines ideal for practically every building and remodeling project to *better your living*. See your lumber dealer for complete details.



FREE! New edition of bright ideas!

"FRIENDLY HOME IDEAS"—85 photographs, many in color, feature traditional and contemporary ideas for building, decorating and remodeling using cheerful Western Pines. Also new modern finishes. Write for your FREE copy to WESTERN PINE ASSOCIATION, Dept. 202-N, Yeon Building, Portland 4, Oregon.

The Western Pines

Idaho White Pine

Ponderosa Pine

Sugar Pine

and these woods from the Western Pine mills

WHITE FIR • INCENSE CEDAR
RED CEDAR • DOUGLAS FIR
ENGELMANN SPRUCE
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are manufactured to high standards of seasoning, grading, measurement

TODAY'S WESTERN PINE TREE FARMING GUARANTEES LUMBER TOMORROW

NEW!

MAGNA SAW-JOINTER gives you PROFESSIONAL CAPACITY!



ANOTHER
CREATIVELY
ENGINEERED
MAGNA-LINE
TOOL

THE NEW MAGNA Saw-Jointer combination gives you the finest 9-in. Saw and 4-in. Jointer ever made! It's the *only* tilt arbor saw with a built-in extension ("The Helping Hand") at no extra cost, giving you the largest (32" x 24") effective table on the market! Single-knob control — push for blade height, pull for tilt • Speed-gear control gives you 45° tilt with only 10 turns of knob (40 to 60 turns on other saws!) • Many other completely new, *creatively engineered* features! The big, heavy-duty MAGNA 4-in. Jointer operates at *any height* of saw blade! It has the longest (28") table, largest (21 $\frac{3}{4}$ " x 3") fence in its class • 3 high-speed,

safety-tapered knives are micro-adjustable • One-piece fence casting is far more rigid, larger!

You can even buy the Saw now and add the Jointer later, with the MAGNA Saw-Jointer Adaptor Kit!

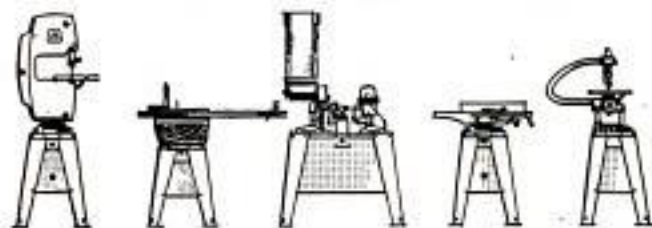
\$199²⁰

(less motor)
Panels, Pistol-Grip,
Casters optional.

**YOU CAN OWN IT FOR
ONLY \$2.07 A WEEK!**



MAGNA POWER TOOL CORPORATION
America's Finest Power Tools



See these other all-new MAGNA-LINE tools: (l to r) 11" Band Saw, 9" Saw, 6" Belt Sander, Compressor-Sprayer, 4" Jointer, 18" Jigsaw.

MAGNA POWER TOOL CORPORATION

Dept. 807-M, at factory nearest you:
Menlo Park, Calif., OR Box 2808, Ft. Wayne, Ind.
*Please send me a free 16-page catalog describing the
Magna Saw-Jointer and the complete Magna-Line.*

NAME _____
ADDRESS _____
CITY _____
ZONE _____ STATE _____



... the world's most popular pipe wrench is the best one in your tool kit. At your nearest Hardware Store.



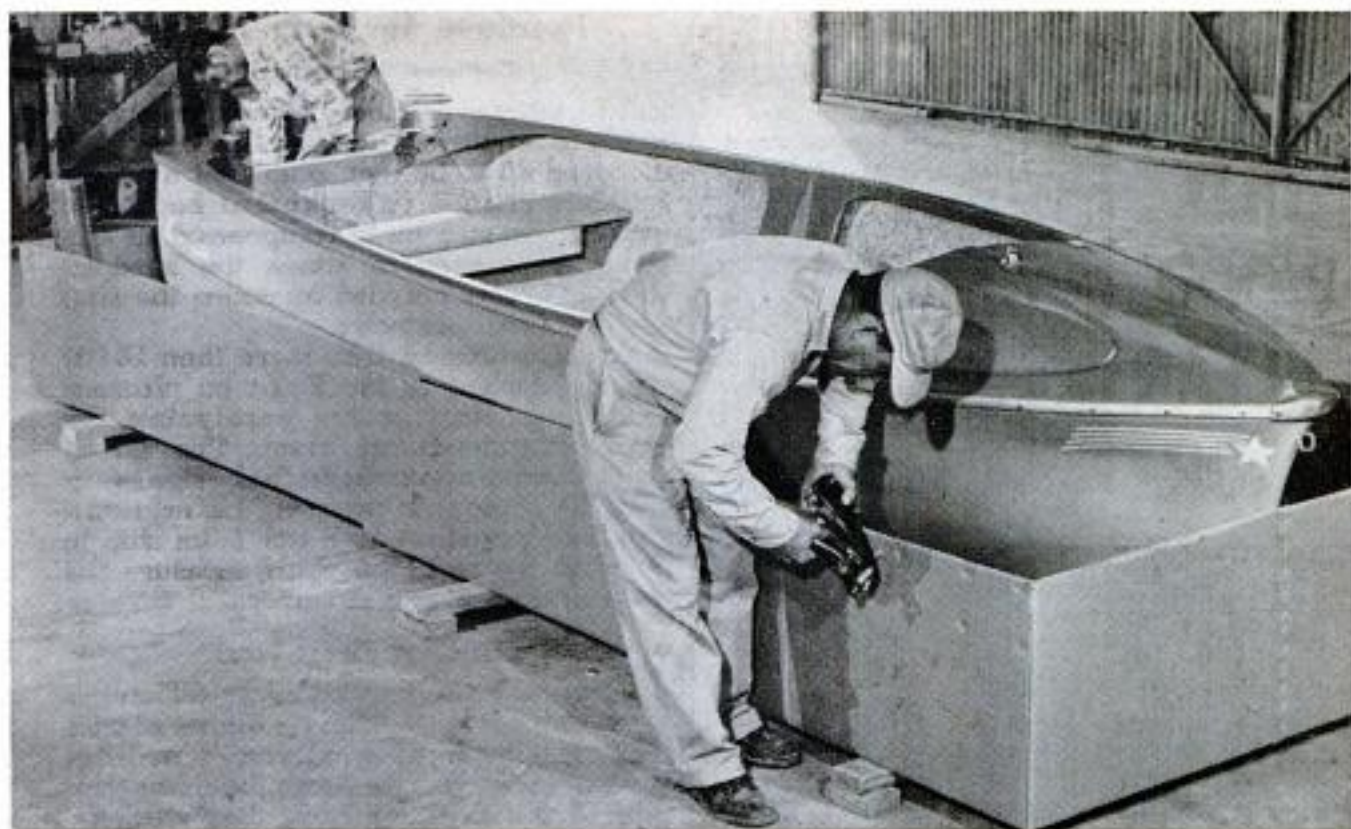
only one little 2-square-mile area in that 170-mile-long volcanic trough. Engineers know that dozens of other hot spots will prove equally suitable for power production. "We don't believe from what we've seen so far that the supply is exhaustible," says Fooks.

New Zealand is not the first country to use volcanic-steam power. Right after World War II, engineers developed a tremendous volcanic-power project at Larderello, Italy. Today, some 150 wells produce enough dry steam to develop more than 15 percent of all Italy's electrical power needs. Engineers at Larderello have found it necessary to keep drilling new wells, since the volume of steam does decrease, not because the infernal steam is giving out, but because fissures in the earth become caked with deposits from the steam and gradually choke off. New wells drilled within 100 yards of old ones come in with original force and volume, and have no effect on the volume of the old well nearby. With the supply of volcanic steam available, the electric station can generate 260,000 kilowatts of power. Also, in an effort to conserve chemical products in the steam, Italian engineers have recovered about 30 tons of sulphur daily. The steam is passed through dry boxes to remove carbon dioxide and hydrogen sulfide. The sulfide is reduced to elemental sulphur with iron oxide, and sulphur is extracted with carbon disulfide.

UN Assists in Drilling

Mexico already has parties in the field, investigating hot springs on the high central plateau under the shadow of Popocatepetl. Exploratory drilling with the cooperation of a United Nations technical-assistance program has resulted in a successful bore in Hidalgo, 80 miles north of Mexico City, and plans are proposed for a 25,000-kilowatt generating plant. Volcanic energy programs are gaining headway in the tiny Central American republic of El Salvador and on Britain's Caribbean island of St. Lucia. In Iceland—volcanic isle of fire, ice and virtually no fuel—subterranean steam has been used by inhabitants for 25 years to heat most of Reykjavik's homes, buildings and swimming pools.

Last February, the Magma Power Company announced that a test bore had been drilled by them in the Big Geyser area of California, 85 miles south of San Francisco. What came out of that hole set Magma to work on the first such power plant in the United States. If everything goes as planned, California soon will have a 100,000-kilowatt generating plant, operating wholly on volcanic steam. ★ ★ ★



Lone Star boat travels shipshape in corrugated cartons fastened with Bostitch staples

Huge stapled carton cuts boat packing time 50%

Even in Texas, where you expect things on a grand scale, a corrugated carton big enough to hold a boat is big.

A Texas boat builder wanted to replace heavy wood crates for packaging 14-foot boats. He preferred the smooth surface of paperboard, so the boats' finish wouldn't be marred. But he had to have strength enough to support the boat's ¼-ton weight. Rugged Bostitch staples solved the problem.

The carton—biggest the box manufacturer makes—arrives flat with its center seam already securely stitched with a Bostitch stitcher. Then using Bostitch staples, boat packers form the corners and join the telescoped sections.

Finally, corrugated cushions are installed and bottom and top sections stapled together—all in *half* the time needed to nail a wood crate.

The boat company likes the Texas-size assembly and freight savings of stapled cartons. Dealers like the way stapled cartons protect the boats. Of 3000 shipments, 2998 arrived in perfect condition. The other two were only slightly marred.

Your fastening problem needn't be *this* big for big savings. 800 Bostitch models save time and money in home, factory and office.

A call from you will bring one of 375 Bostitch Economy Men located in 123 U.S. and Canadian cities, who will be glad to show you how.

**Fasten it better
and faster with**

BOSTITCH®
STAPLERS AND STAPLES

Bostitch, 544 Mechanic Street, Westerly, R. I.

- Please send me information on ways stapling helps shippers.
 Please send free bulletins that show how stapling cuts other costs.

I fasten: cartons leather wood rubber
 fabric plastic bags roofing light metals

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

REPLACE YOUR

OLD WOOD CELLAR DOOR



WITH A MODERN ALL-STEEL BILCO DOOR

DO IT YOURSELF

IN JUST 3 TO 4 HOURS

Think of it! Only a few hours of pleasant work to replace your unsightly, troublesome wood hatchway with a lifetime, weathertight BILCO . . . the door installed on tens of thousands of new homes.

PAYS FOR ITSELF! Cost so little, yet never needs repair or replacement. Operates at a touch. Smooth, trim appearance adds amazing new beauty to your home.

Rush coupon TODAY for free folder "How to replace your wornout wood hatchway" showing sizes and prices.

Bilco®

**AMERICA'S FINEST
BASEMENT DOOR**

THE BILCO CO.
DEPT. 931C
NEW HAVEN, CONN.

Gentlemen: Please send me free folder and name of nearest dealer.

Name _____

Street _____

City _____ State _____

Reprieve for a Freighter

(Continued from page 124)

night, whenever there were favorable winds to create a ground swell. Some days it moved 40 to 50 feet, often not an inch.

Cables snarled or broke and had to be welded. Jet streams of compressed air and water were used to attack the hardpan clay. Workers crawled in under the ship to clear away obstacles.

Police estimated that more than 50,000 persons flocked to the Point on pleasant week ends, completely paralyzing the small, summer-resort town. The crowd cheered Admiral Curtis on the bridge every time the ship made progress. He acknowledged and even set up a line from ship to shore so his audience could measure the movement by white streamers.

Boulders Pierce Hull

Progress was slow and many difficulties were encountered. After a number of tries with no movement whatever, it was discovered that several huge boulders had pierced the *Etrusco's* hull; they stuck up through the bottom in number-two hold. Dynamiting was impossible, but frogmen eventually chained the rocks and they were pulled out by the ship's winches. Steel sheets and logs were placed underneath to give it more skid and roll. The giant kedge anchors had to be picked up and moved to different positions for more leverage.

The ship overshot the channel during one Sunday northeast storm and had to be jockeyed back on course.

Curtis did not have his customary audience the day the ship was finally set free. It was Thanksgiving Day and he munched on cold turkey sandwiches as the ship gave a polite curtsy on the first pull at high tide. Then she started sliding with ease. The ropes to the shore were sliced off and the *Etrusco* kept on going until she finally reached deep water.

Within an hour the "*Etrusco* Fan Club" arrived by the thousands and there was jubilation at Cedar Point.

At dusk tugboats took her in tow. The *Etrusco's* lights were turned on. She gave three blasts on her whistle and a course was set for Boston. She was nine months late in making port.

With the shortage of ships, the Suez crisis and the international situation, the value of the *Etrusco* has increased considerably since salvage operations began, and the owners expect to clear even more than \$1,000,000 for their efforts.

When the *Etrusco* again sails on the high seas she will proudly carry the new name of the SS *Scituate*. ★★★

New Feature-Loaded Power Mower Cuts Mowing Time in Half!



The
"RIVIERA"
Self-Propelled
Rotary

MOTO-MOWER®

Made by a famous producer of automotive components, Moto-Mower is mechanically the finest power mower ever built! Styled and engineered with the same care and precision as a fine sports car, these distinguished Moto-Mower power mowers include a long list of exclusive advancements which cut normal lawn mowing time in half, assure years of dependable, trouble-free service. There are 16 ultra-modern Moto-Mower reel and rotary models priced as low as \$59.95*—one tailored to fit your mowing needs exactly. Available at your Moto-Mower dealer's on easy payment terms. Send for full-color descriptive literature.



DIAL-A-MATIC® CUTTING-HEIGHT ADJUSTORS

Just press the Dial-A-Matic lever and change mowing heights in one second! No tools are required.

ENCLOSED TRANSMISSION DRIVE



In Moto-Mower self-propelled rotaries, modern silent worm-gear drive provides a variety of mowing speeds. No slippage; delivers full power to the driving wheels. Completely enclosed; no exposed moving parts.



ANTI-BENDING CRANKSHAFT CONSTRUCTION

On most models special cone construction at the blade end of the crankshaft guards against bending in case blade strikes large stones or other obstructions.

STAGGERED WHEEL DESIGN



New wheel arrangement prevents lawn scalping. High speed front discharge sprays cuttings evenly over a wide area; prevents "clumping", eliminates raking.



VACU-MOW BLADE DESIGN

Exclusive blade design and high blade speed provide an upward air current which lifts each grass blade erect for clean, even mowing. Gives lawns that "vacuum cleaned" appearance.



See the Sensational New "LAWNMASTER"

Not just a lawn mower but a precision mowing instrument—a professional, trimmer-type mower that mows lawns as smooth as a golf course putting green! Yet it's priced for the average home.

Find Your
Nearest Dealer
In The
Yellow Pages

*Fed. tax incl. Slightly higher in Far West and Canada.

Send for FREE Lawn Care Brochure

Moto-Mower Division, Detroit Harvester Co. (PM)
Richmond, Indiana

Please send, without charge, your new brochure on developing new lawns, caring for established lawns, with special tips on mowing, watering, types of grass—and a complete description of the 1957 Moto-Mower line.

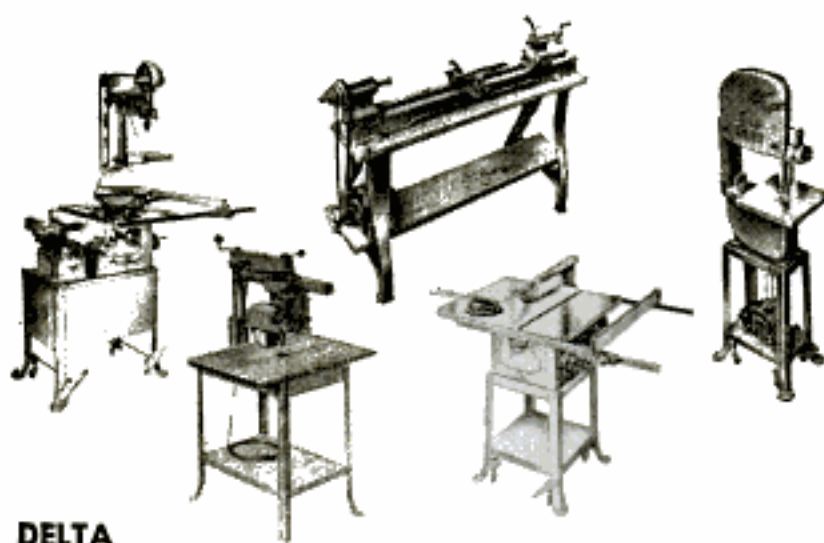
NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

\$10,000

NOTHING TO BUY! ENTER AT YOUR



DELTA



BLACK & DECKER

1ST PRIZE

Your Dream Workshop!

Almost \$1300 in top quality merchandise! Winner gets (1) a Delta 11" lathe, 10" bandsaw and a complete "Deltashop"; (2) Black & Decker Orbital Sander, Jig Saw, Heavy-Duty Saw and $\frac{1}{4}$ " Drill; (3) your choice of \$100 worth of Stanley hand tools—saws, hammers, planes, etc; (4) your choice of \$350 worth of Weldwood plywoods, paneling, glues and finishing materials.

SECOND PRIZE—worth over \$700! Winner gets (1) a complete Delta "900" Radial Saw Workshop; (2) Black & Decker Orbital Sander, Jig Saw, and Utility Drill; (3) your choice of \$50 worth of any Stanley hand tools; (4)

your choice of \$250 worth of Weldwood products.

5 THIRD PRIZES—each worth more than \$330! Winners get (1) complete Delta 9" Tilting Arbor Circular Saw; (2) Black & Decker Heavy-Duty Saw; (3) your choice of \$50 worth of Weldwood products.

60 FOURTH PRIZES—each worth more than \$70! Winners get (1) Black & Decker Utility $\frac{1}{4}$ " Drill; (2) your choice of \$30 worth of Stanley hand tools; (3) your choice of \$25 worth of Weldwood products.

80 FIFTH PRIZES—each winner to get his choice of \$25 worth of Weldwood products.

(All prizes approximate retail value.)

ACT NOW! CONTEST CLOSSES MAY 31ST!

Weldwood® Old Craftsman

in Prizes!

LUMBER DEALER'S! 147 CHANCES TO WIN!



STANLEY

HERE'S ALL YOU HAVE TO DO:

Weldwood is offering \$10,000 in prizes—quality power tools, hand tools and Weldwood products—to introduce Weldwood Old Craftsman Pine Plywood. We want you to get to know this easiest working, easiest painting plywood ever! And all you have to do is go to your lumber dealer's—take a look at Old Craftsman Pine Plywood—pick up an Official Entry Blank—and, in 25 words or less, tell us "I like Weldwood Old Craftsman Pine Plywood because—"

If you buy Old Craftsman Pine Plywood, you'll discover plenty to like about it—for it combines all the advantages of pine lumber, with all of the advantages of rugged plywood construction. So don't delay! Get to your lumber dealer's now and see and try Weldwood Old Craftsman Pine Plywood. (If your dealer does not have entry blanks available, write to Old Craftsman, c/o United States Plywood Corp., 55 West 44th Street, N. Y. 36, N. Y.)



To tell you even more about Old Craftsman—and to make your next project easy to build—leading lumber dealers are offering this special book: "Projects You Can Build With Old Craftsman Pine Plywood." 96 pages. Full of hints and ideas; 18 projects with complete instructions. Build furniture, cabinets, built-ins, toys—easily!

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GET FULL RULES AT YOUR LUMBER DEALER'S!

Pine Plywood Contest

Now! Cover plywood edges with real wood



New Flexible **Weldwood Wood-Trim**

Avoid unsightly edges in building any plywood project—tables, desks, cabinets, etc. Give them a "pro" finish with Weldwood Wood-Trim. So flexible you can beautify any edge—straight, curved, angled. In handy rolls. Wood-Trim is a cinch to apply. No clamps, nails, hot iron, etc. Just use Weldwood Contact Cement or Presto-Set® Glue.

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CADILLAC MARINE & BOAT CO.
388 Seventh Avenue • Cadillac, Michigan

Who Ever Heard of a Diesel Engine?

(Continued from page 85)

passengers on the spur, ready for the next trip.

"Running a live steamer is fun," says Johnson, "but don't think for a minute that the engine is a toy. Far from it. The locomotive alone weighs 1250 pounds, the tender another 500 pounds. Drive wheels on the locomotive are 10 inches in diameter. Just like its prototype, the miniature engine has all the standard controls for the engineer to operate. These include throttle, reverse lever and air brake. There are gauges in the locomotive cab that show boiler pressure, air-brake pressure and the pressure in the reserve air tank. The reserve air supply is carried in a tank car behind the tender."

Rolling stock on the Goleta Valley Railroad includes half-a-dozen steel gondolas, a wooden gondola, a "beet" car and three flats. All have ball-bearing trucks; each is fully sprung; all have standard automatic couplers. Except for size they are true duplicates of actual railroad cars.

The Goleta Valley line is an outstanding example of a mechanical hobby that once had few enthusiasts but that is now growing rapidly in many parts of the world. Once it took special skills and know-how to build a small engine that would actually steam under its own power along a track; today almost anyone with mechanical ability and access to a few tools can build a live steamer.

The hobby is actually a kind of double-barreled pastime. First there's the satisfaction of building an intricate piece of machinery that works just like its prototype; then there's the thrill of operating the engine and listening to the "chuff chuff" of the exhaust and the roar of steam when the safety valve pops.

The smallest practical live steamers are built to 1/4-inch scale and operate on ordinary O-gauge track. Next is the 1/2-inch-scale class, using a 2 1/2-inch track, then the 3/4-inch-scale on 3 1/2-inch track, the 1-inch scale on 4 1/4-inch track, and finally the big 1 1/2-inch-scale models. The 1-inch scale is the most popular. An engine built one inch to the foot is large enough for easy construction and for riding on the tender comfortably, yet small enough to transport in an average automobile.

Down around Los Angeles the 120 members of the Southern California Live Steamers have built nearly 100 different engines and have some 60 more under construction. The club maintains its own layout with two main tracks, each with three

(Continued to page 250)

Glue-It-Yourself

with one of these

4 Weldwood® Wizards



Make sure you use the right glue for the job. Weldwood has developed four different types of adhesives to help you on any gluing job. Keep all 4 of these Weldwood Wizards handy at your workbench. They'll solve your gluing problems speedily, easily, successfully!

For gluing that boat of yours, use **WELDWOOD WATERPROOF RESORCINOL GLUE**



100% waterproof! Defies the elements! Use it for every gluing job that needs *complete protection* from climate, weather, water (even boiling, freezing or salt!), mold, fungus, etc. On boats, in damp basements, for outdoor furniture, or fixing golf clubs, etc., you can always depend on Weldwood Waterproof Glue.

¼ pts., \$1.00. Also available in pts., qts., gals.

Ready to use, for fast, all-around gluing — **WELDWOOD PRESTO-SET® GLUE**

Yes, ready to use; sets fast and glues like magic. Presto-Set is the Weldwood-perfected white glue that bonds any combination of wood, cloth, paper, fabrics, leather, etc. Odorless — and so clean to work with. New, easy-to-use plastic dispensers. 19¢, 29¢, 49¢ and larger.



For applying plastic surfaces without clamps — use **WELDWOOD CONTACT CEMENT**



Bonds instantly, permanently, on contact — without clamps or presses. Easy new way to surface table tops, kitchen counters, etc., with Micarta and other plastic laminates. Easy new nail-less way to install plywood panels. Scores of other uses in home, hobby, garage. 29¢, 40¢, 70¢ and larger.

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Powerful powder — easy to mix. Actually makes glued joints stronger than the wood itself. Favorite of top furniture-makers. America's most popular glue. Highly water-resistant, stain and rot-proof. 15¢, 35¢, 65¢ and larger.



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all the family
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FAIRBANKS-MORSE '57 RIDING MOWER

Everybody in the family will want to mow the lawn if you own a '57 F-M rotary riding mower! It's fun! All you do is steer. Mower does the work. Gets you out of the sun sooner.

A 2 $\frac{3}{4}$ hp. engine drives 21" lift-type bar cutter through high grass with ease. Has 3 forward speeds and reverse. Cutting height adjustable. Cuts within $\frac{1}{2}$ " of walls, walks, etc. Equipped with silencer. Tires, 3" x 10" and foam rubber seat provide a comfortable ride. Finished in blue and chrome trimmed.



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MOWERS • MAGNETOS • MOTORS • SCALES
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Fairbanks, Morse & Co., Dept. PM-4, Chicago 5, Ill.
Gentlemen: Mail me your free junior power mower catalog, and name of nearest F-M dealer.

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City..... State.....

rails so that the various gauges can be accommodated. The system includes a turntable from which radiate a number of steaming tracks that take the place of a roundhouse. On the steaming tracks the individual engines are fueled and watered and fired up before moving out onto the main lines. Sometimes it's hard to get a good fire going in a diminutive engine and often a vacuum cleaner is used to create a forced draft through the firebox. Coal is the favorite fuel, though fuel oil or butane gas may be used with special installations.

Like other live-steamer clubs in other parts of the country, the Southern California Live Steamers consists of members from a dozen or so different trades and professions, all drawn together by their love for the little engines. Bob Furlong, the president, is a diesel engineer. He started out by building a $\frac{1}{2}$ -inch B & O steamer, now has completed a 1-inch Atlantic type. Member Walt Disney has his own Carolwood Pacific Railroad, a half mile long, at his home. On this he operates his 1 $\frac{1}{2}$ -inch-scale model *Lilly Belle*, a copy of the old Central Pacific's engine No. 173 that was built in the Sacramento shops in 1872. David Rose, the composer, has a 1-inch-scale model; Ward Kimball, cartoonist who also maintains a full-sized old-time locomotive at home, has a $\frac{3}{4}$ -inch-scale model live steamer.

Makes Own Drawings

Few enthusiasts start from scratch these days the way Ray Gifford, a Los Angeles toolmaker, built his engine. Gifford started out with nothing more than a few ancient shop prints of a 10-wheeler once built for the Denver & Rio Grande line. From these drawings Gifford made his own drawings scaled down to 1 $\frac{1}{2}$ inches to the foot, then designed and built his own patterns, made his own castings and, bit by bit, made all the rest of the parts.

In the past, anyone who wanted to build a live steamer had to do it that way. Sometimes you could borrow the patterns from someone else who had built a small engine but usually you had to start in at the beginning. Often an engine took years of part-time work to complete.

It's a lot easier today. A number of concerns, notably Little Engines of Lomita, Calif., will supply you with individual parts or will make up a kit from which you can build an entire locomotive. You can build as many parts as you like, buy the rest. You can buy the entire engine in the form of rough castings and do your own machine work. For this you need a lathe, drill press, grinder and miscellaneous hand

(Continued to page 252)

SALESMEN

GET IN ON THIS BONANZA ...aluminum asphalt roof coating is new industrial money-maker

Aluminum asphalt roof coating is today's sales sensation in the field of industrial maintenance. On factories, mills, schools, public buildings—all over the country—the swing is to this weather-defying combination of high-grade aluminum pigment and processed asphalt.

Aluminum asphalt roof coating provides *all-weather* protection. The secret is in the addition of pure aluminum flakes to a tough asphalt base. These minute particles form a metal shield that protects the vital oils from the sun, keeps the coating pliable and waterproof, prolongs roof life. As a reflective agent, aluminum asphalt coating turns back 70 per cent of the sun's heat, reduces inside temperatures as much as 15 degrees.

Aluminum asphalt coatings can be applied with an ordinary roofing brush or spray gun . . . come ready mixed . . . require no thinning or heating. Once applied, the coating remains firm on top, but soft and pliable beneath its reflective, protective shield of aluminum. It will not sag or run under tropic sun, or crack under frigid cold.

Today, hundreds of salesmen report aluminum asphalt roof coating a booming full-time business, or a highly profitable side line. But, actually, the potential has been barely touched. Acres and acres of roofs need this protection, now! Join this promising new industry while it's young—while sales can go only one way—up.

ALCOA does not make roof coating or hire salesmen to sell roof coating.

Write for more information. Use the coupon.



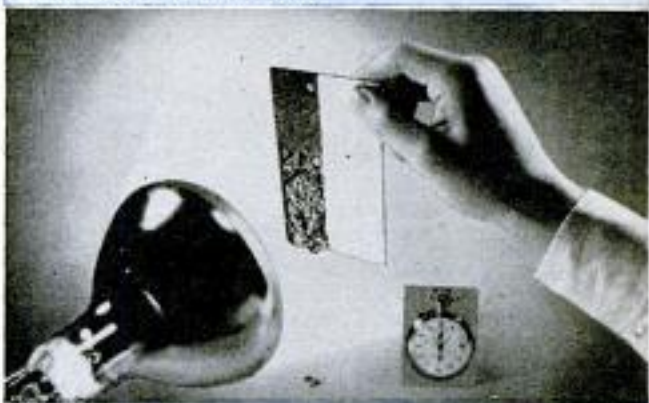
THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS



HEAT TEST SHOWS HOW ALUMINUM ASPHALT COATING PROTECTS ROOFS



Unprotected heavy roofing paper softens after 30 seconds of simulated sunlight from lamp. Right side of sample has been protected with aluminum asbestos roof coating. Summer sun often raises roof temperatures above the melting point of asphalt, draws out the oils, shortens roof life.



Asphalt becomes fluid, drips to table after 120 seconds. On roofs, this means leaks, leads to costly repairs. Aluminum pigment prevents this, enables coating to be used over any previous roof paint or coating without bleeding through. And aluminum asbestos coatings assure cooler under-roof temperature.

Aluminum Company of America, Paint Service Bureau
1718-D Alcoa Building, Pittsburgh 19, Pennsylvania

- I am interested in selling aluminum roof coatings.
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Please send me your free booklets:

- Painting With Aluminum*
 Aluminum Asphalt Roof Coatings Make Time Stand Still

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See how it pays with the new low cost Hobart welder. One of these easy to use models can become your key tool, in fact, the very method of putting you in business and more money in your pocket.

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200 amp. "HUSKY BOY" welds anywhere. It's light, rugged, compact—easily mounts on your tractor or trailer for traveling to emergency repair jobs. Portable mountings also available.

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tools. Or you can buy most of the parts already machined and put them together with nothing more than hand tools and a 1/4-inch power drill. A few engines such as the 1 1/2-inch model of the old C. P. Huntington can be purchased on a virtual bolt-together basis.

Little Engines stocks the parts for a score of different models ranging from a 4-8-4 Hudson in 1/4-inch scale to the big 1 1/2-inch-scale 4-8-4 Northern and 4-8-2 Pacific types. Depending on size and on how much of the work you plan to do yourself, a live steamer will cost you anywhere from around \$120 to as much as \$800. Most enthusiasts buy a few parts, do the machine work that is called for in the drawings that are furnished with the parts, then order the parts that they need next. That way, they space out the costs all the time the engine is under construction.

Frames Cost \$14

As examples, here are a few prices for parts for a 1-inch-scale 4-6-2 Pacific-type engine that weighs 225 pounds when completed: Main frames, \$14 per set with no machining required; drive wheels, \$15 per set as rough castings, an additional \$3.25 per wheel if completely machined for you. Steam-boiler parts ready for assembly by brazing the parts together are available as a package for \$33. Cylinder heads cost \$3 each; cylinder-head covers are priced at \$5.

Counting all the castings, sheet-metal shapes and small parts including bolts and nuts, there are some 500 parts in an average live steamer. On an average, a year's spare-time work is needed to put one of them together.

In a few respects a miniature live steamer is not a precise scale model of a big engine. If a boiler were fully scaled down, for instance, its walls would be too thin for safety. So the boiler shell is always built thicker and stronger than scale. Too, the valve gear is usually oversize so that the engine can pull heavy loads without breaking down. And some of the boiler fittings and piping are a little oversize because otherwise they would not be practical.

These details can hardly be detected, even by an old locomotive engineer who has spent years operating the same engine, full size. The more one of these veterans studies a scale model of a type that he used to drive, the more he marvels at the skill and patience of the enthusiast who put the little engine together. ★ ★ ★

German motorists may be summoned to the nearest telephone by a bell ringing in their car. The Federal Post Office of West Germany is planning to install this system.



Now's the time to
trade-in
that
old saw!

**Get an extra big trade-in allowance
on a famous Porter-Cable quality saw!**

Here's a wonderful opportunity to get any famous Porter-Cable saw illustrated here, at a saving! Trade-in your old saw and get a liberal allowance toward the purchase of a Porter-Cable saw that best fits your cutting needs and requirements. No matter what model you choose, you're getting Porter-Cable quality that can't be beaten for design, construction, versatility and solid value. Check the yellow pages of the telephone book and see these professional quality saws at your Porter-Cable dealer—or use coupon to get complete information. (Offer expires May 31, 1957.)



SAVE \$5 ON MODEL 125 SAW!
A standard duty 6" saw featuring Kickproof Clutch, instant depth and bevel adjustments and a safe telescoping guard. List Price \$49.50—**with any saw trade-in, \$44.50.**



SAVE \$20 ON MODEL 528 SPEEDMATIC!
World's finest professional saw. Big capacity 8 3/4" blade with new telescoping guard, Kickproof Clutch and many more features. List Price \$135—**with electric saw trade-in, \$115.**



SAVE \$15 ON MODEL 521 SAW!
Famous Speedmatic saw with 7 1/2" blade, Kickproof Clutch, depth and bevel adjustments, and other professional features. List Price \$117.50—**with electric saw trade-in \$102.50.**



SAVE \$15 ON MODEL 108 SAW!
Rugged 8 3/4" saw for the builder who needs extra speed and power on all cutting jobs. Features Kickproof Clutch. List Price \$99.50—**with electric saw trade-in, \$84.50.**



SAVE \$15 ON MODEL 157 SAW!
Heavy duty 7 1/4" saw with blade on left. Weighs only 13 lbs. Professional features throughout include exclusive Kickproof Clutch. List Price \$95—**with electric saw trade-in \$80.**

SEE YOUR DEALER — OR MAIL COUPON TODAY!

PORTER-CABLE MACHINE CO.
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Please send me complete information on your Saw trade-in offer and name of my nearest dealer.

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Canadian prices slightly higher.

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CRESCENT and CRESTOLOY outsell all other Adjustable Wrenches for good reason. Crescent Wrenches, forged from selected carbon steel, have been the world's favorite for 50 years and sell at popular prices. The thinner, trimmer Crestoloy Wrenches, forged from special alloy steel and chrome-plated, cost only slightly more. There is no finer or stronger adjustable wrench made. Both patterns are available in all popular sizes and are fully guaranteed. Ask your hardware dealer.



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

Chevrolet Owners Praise Its Power And Say It Is Still the "Hot" One

(Continued from page 111)

"Don't let the fins go any higher."—California housewife.

"Would prefer larger taillights and higher too. They are difficult to see sometimes."—Colorado farmer.

"Don't like way the backup lights protrude beyond bumper."—West Virginia lampman.

"Would rather have rubber mats on the floor."—Ohio pottery worker.

More Best-Liked Features

Here are the rest of the best-liked features, in order of frequency of mention:

"Like the way it glides up and down the streets."—Illinois chef.

"Cheapest upkeep."—North Dakota owner.

"High seats give plenty of visibility."—Idaho rancher.

"Good on mountain curves."—Colorado carpenter.

"Dependable."—California lumberman.

"Started right off at 20 below zero."—South Dakota county worker.

"Good headroom and other interior room."—Maine owner.

And More Complaints

"Tires freeze in flat position after running warm."—New Jersey inspector.

"Several paint flaws around rear fenders. Crack in fender seam."—Florida salesman.

"Have Bel Air sport coupe. Not enough legroom in back. Can't even put luggage on back floor."—Idaho insurance agent.

"Heater of 1937 vintage. Burns the driver's foot while back-seat occupants are cold. Where are the under-seat heaters?"—Illinois heating contractor.

"Ash tray can't be seen at night. It is too small."—Illinois bartender.

"Rear springs too soft for six persons in car."—Vermont salesman.

"Why 14-inch wheels? I had to buy some 1956 wheels to use my snow tires."—New Jersey engineering manager.

"Windshield wipers stop at least acceleration."—Arkansas welder.

"Gas-filler pipe overflows too easily."—New York engineering aide.

"Why do all cars have so much trunk space and so little room in the back seat? You will find that 90 percent of the people don't use the trunk as often as the companies seem to think they do."—New York landscaper.

There you have it—the good and the bad as told by the owners. For a summary of this report see page 110. ★ ★ ★

**Why users expect
(and get!) more
from
Eclipse mowers**



IT CAN BE assumed that almost any mower will cut grass. But folks who buy an Eclipse expect more than this minimum performance. They expect — and get — low cost, trouble-free mowing year after year. That's why Eclipse is recognized as the standard of comparison . . . the brand most mower users plan to buy "the next time" for sure. User experience quickly points up the need for the kind of built-in quality only Eclipse offers.

The Eclipse extras

Feature for feature and dollar for dollar, you get more value from Eclipse. This is a direct result of the factory policy of building up to performance standards instead of paring quality down to meet a price. It stands to reason that skilled craftsmen — specializing in quality mowers — can provide a master touch not possible in factories where mowers are only a "sideline" product.

Easy Terms! Low as

\$12 *per month*

(Based on average dealer finance plan — 10% down.)

Lowest "per year" cost

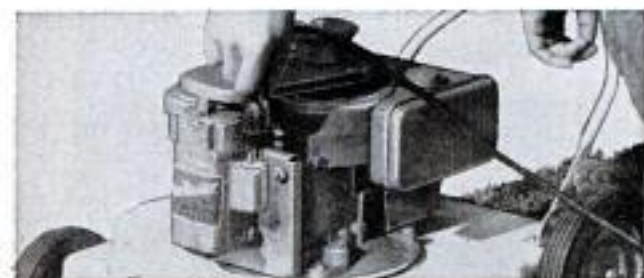
It may cost just a few dollars more when you first buy an Eclipse. But user reports prove conclusively that the total cost of owning an Eclipse is less than for ordinary mowers. Eclipse mowers are built to last years longer and it's not at all uncommon for families to use an Eclipse for 15, 20 or even 30 years with very little maintenance expense. The rugged

construction, the craftsmanship that is acquired only by half a century of specialized manufacture pays off for the user.

A typical letter reported a total expense of 87¢ for maintenance of an Eclipse power mower over a period of 5 years. When you consider ALL your costs, you see why we say, "Eclipse costs you less to own per year."

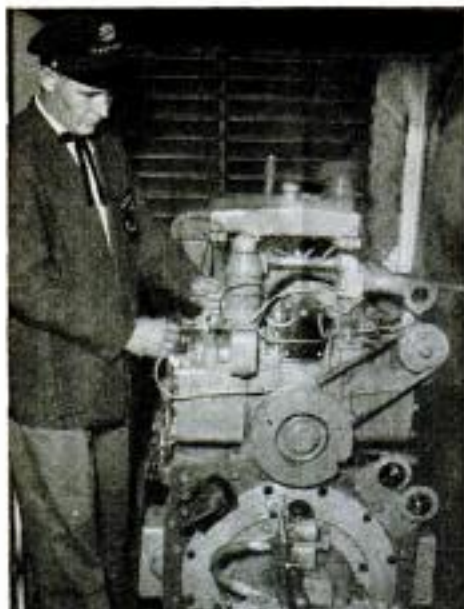
Free check list to help you choose your power mower

Many families have been confused by mower claims and are not certain as to what type of mower they should buy. Some people insist that a rotary mower is best, while others just as emphatically say the reel type can't be beat. Eclipse makes *both* kinds — has no special "ax to grind." A check list of 8 easily answered questions will indicate the type of mower that's best for you. Write for your free copy of the folder, "How to select your power mower." The Eclipse Lawn Mower Co., Div. of Buffalo-Eclipse Corporation, 4714-C Railroad St., Prophetstown, Ill.



Easiest starting

Most people prefer the rope or recoil starter. But for those who prefer (or for health reasons require) completely effortless starting, an electric starter is available on many models. A gentle touch of the plug starts the engine: no work, no strain!



Left, the main engine. Right, the jet unit permits turning the boat around in such narrow inlets as this

It May Look Old But It's Jet Powered!

BUILT TO RESEMBLE an old-time stern-wheeler, the all-steel *Mark Twain* is as new as jet propulsion.

Mounted under the bow is an 1100-gallon-per-minute hydrojet that can spin the boat around in its own length and, if necessary, can propel the boat unassisted. Normal forward propulsion is provided by the huge, slow-turning paddle wheel at the stern with the jet reserved for emergencies and for maneuvering.

The boat has a draft of only two feet and a cruising speed of about 10 miles per hour. Its hull is made of surplus military pon-

toons built with many airtight compartments filled with foam plastic so they are unsinkable even if ruptured.

It was built as a sight-seeing boat on Indian Lake, Ohio, and can accommodate 175 passengers on its two decks.

The stern wheel is powered by a D-4400 Caterpillar tractor engine. A Chrysler marine engine powers the jet unit.

Island residents on Indian Lake have developed a fondness for the *Mark Twain*. Its jet unit is also designed to provide fire-boat protection for their homes—the first such protection they have had.

Drawing only two feet of water, the *Mark Twain* moves along the Ohio lake scarcely rippling its surface



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CAR CARE KIT




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Here's just what you need to spruce up your car for spring! It's all in one handy carrying kit, and at a special new low price. Included in this MoPar

Car Care Kit are: (1) Fast-acting MoPar Automobile Polish. Apply . . . let dry . . . wipe clean, (2) MoPar Liquid Chrome Polish. Quickly removes tarnish . . . restores original brilliance, (3) MoPar Glass Cleaner. Spray on . . . wipe off . . . leaves no streaks or blurs, (4) MoPar Lint-free Polishing Cloth.

Buy a kit, and other easy-to-use MoPar Car Care materials, from your local Plymouth, Dodge, De Soto, Chrysler, or Imperial dealer, or better repair shops today! MoPar means highest quality!

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DETROIT 31, MICHIGAN



Touch up scratches in seconds with new MoPar Paint Applicator — \$1
Comes complete with self-storing brush and built-in paint supply. Stops rust before it starts. Dries evenly and quickly to a sparkling finish.

your best buy...



- stretches the years between painting ...
- right paint for every type of surface ...
- endorsed by leading painters ...



FREE! Beautiful 44-page "Home Decorator" book. At your dealer, or write The Sherwin-Williams Co., 1235 Midland Building, Cleveland 1, Ohio.

SHERWIN-WILLIAMS
HOUSE PAINT

The Atomic Airplane

(Continued from page 105)

Under my "Project Opossum" a nuclear-powered bomber could carry half a dozen swift fighters on its missions. This huge bomber would travel to its target at high subsonic speeds unless alerted by its own radar to imminent enemy attack, when it would cut loose its escort and "shift into high." The supersonic fighters would then set up a fighter screen to take the mother ship through heavily defended areas.

The tow-plane concept solves the shielding problem of the atomic engine for passengers. A comparatively small crew working in shifts could man the tow plane while amply shielded from radiation. The atomic craft need land only when necessary to change crews.

Other usages of atom-powered airplanes of the future include: Search and patrol missions in which the ability to stay aloft for indefinite periods of time is important; special missions of plane groups that must rendezvous but must be capable of meeting delayed elements of the rendezvous.

Question: What performance characteristics will probably be featured in our first atomic plane?

Mr. Teichmann: Its top speed could compare favorably with more conventional planes. Its altitude, or ceiling, could also compare. It would have the advantage of a far longer range or endurance than existing aircraft.

Question: Can you give us an estimate of the maximum range possibility for an atom plane?

Dr. Borst: Maximum range has nothing to do with the power plant. It has only to do with the endurance of the crew. We can build a power plant that will go around the world three or four times, if you want. But what is the point if the crew can't take it? You are limited by the endurance of the crew, which probably is between 15 and 20 hours.

Question: Do you think it unlikely that we will ever try to achieve an atomic plane that can fly for days or weeks?

Dr. Borst: If it is an observation ship, you must either transfer a crew, or keep two or three crews aboard. The crew quarters in this ship are going to be very confined, and I don't think you can carry a change in crew. Changing crews in midair, as Mr. Ohlinger suggests, is a possibility. But for our first planes it may be a little on the glamorous side, especially at 700 miles per hour.

Question: What type engine will most likely be used with the nuclear plant?

(Continued to page 260)



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Mr. Teichmann: Probably the turbojet. Ramjet, in which air is compressed by forward speed of the craft, would require a terrific rocket-launching device or some secondary power system to get going. Prop-jet, in which heated air or steam operates a turbine geared to a propeller shaft, adds additional weight problems.

Mr. Ohlinger: Granted, such a system weighs more. But it has the advantage of avoiding radioactive-contamination hazards.

Question: How will the reactor tie in to the system?

Dr. Borst: There are two ways of doing it. One is to take the air into the reactor and heat it so it will expand and shoot out through the engine, spinning the turbines and pushing the plane. That's an "open" system. The other way is to use an intermediate heat-transfer loop. This is similar to an automobile radiator. In the atomic plane, liquid metal would circulate through the uranium pile, pick up heat, carry it to heat exchangers that would heat and expand the air through jet turbines, spinning them. This is a "closed" system.

Question: Could the reactor generate electricity for propulsive power?

Dr. Borst: It's possible, but you take power losses in the conversion of heat to electric current. Besides, motor and generator would make the power plant excessively heavy.

Question: Is there any problem disposing of heat in the reactor when shutting off power to land?

Dr. Borst: No. In $\frac{1}{10}$ second, shutdown power, or heat, drops to $\frac{1}{10}$ operating power in a reactor, then dribbles off. It's relatively easy to handle five percent power. You must keep some heat to prevent your liquid-metal coolant from "freezing."

Question: If we had a nuclear-powered bomber of about 250,000 pounds with a 14,000 mile range, traveling at the speed of sound, how much nuclear fuel would it burn on a round trip, carrying its pay load of a nuclear bomb?

Dr. Borst: It would probably consume about half a pound of nuclear fuel. But in a reactor, one cannot burn fuel as one burns coal in a furnace, so that there is very little ash left. Ash is generated with the nuclear fuel and contaminates the fuel. So it is rare that one can burn more than 10 percent of the fuel in the reactor. That means you require at least 5 pounds, and perhaps 20 to 30 pounds, in order to use up half a pound.

Question: Does that mean, after every 14,000-mile mission it would be necessary to refuel?

(Continued to page 262)

All automobile parts wear out. When the brake linings, carburetor, battery, tires, muffler, spark plugs, or other such parts fail, you know immediately that they should be replaced. However, the suspension parts (springs and shock absorbers) wear out more gradually and the need for replacement, in many instances, is unnoticed—even beyond the point of efficiency and safety.

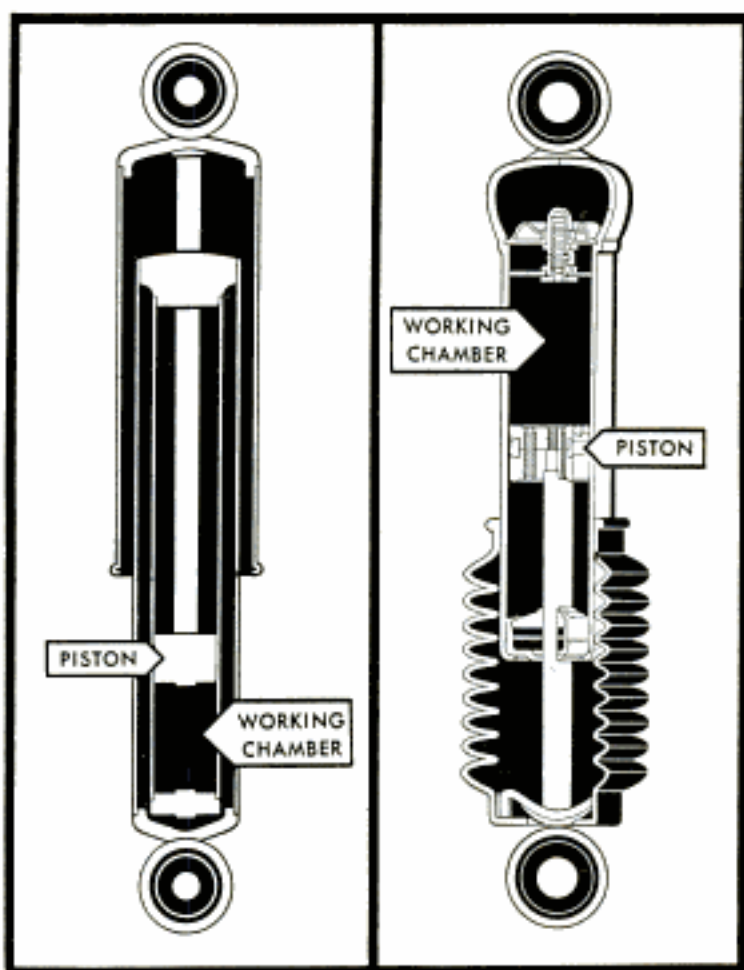
As springs grow weaker, more burden is placed upon the shocks to maintain stability and to compensate for road, load, and steering requirements. Naturally, if the shocks are too worn to perform this function, car comfort and control are impaired. Tires wear quicker, front end alignment is a problem, riding is uncomfortable, steering is harder, wheel fight increases... every bump and rut seems bigger and deeper. Yes, driving with worn shocks is more work, more dangerous, more costly.

Why do shocks wear out? Ordinary direct-acting shock absorbers like those currently being supplied as original equipment on practically all American cars operate on the suction principle. A small piston acts as a friction plunger within the working chamber, sucking in fluid from the reservoir as the piston moves up and being cushioned by the fluid on the downstroke. Piston and working chamber wall soon wear. Frictional contact—and holding power—are lost.

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Dr. Borst: Without question. It is possible that they would simply replace the reactor each trip. A fresh unit could be adjusted, and checked out without the radiation problem.

Question: Something like taking the fire-box out of a locomotive and fixing it up in a special place somewhere, and then putting the unit back after it is fixed? Or would you destroy the reactor?

Dr. Borst: That is a question of economics. I personally would put in a completely new unit. If the reactor breaks down, the plane is lost. Besides, it is difficult to work on a reactor which is highly radioactive. The best thing to do is start with a new one, so you would probably use one reactor for one trip. The shield would be usable again. The interior of the reactor would be sent to a chemical-processing plant, all the uranium recovered and re-fabricated into new fuel.

Mr. Ohlinger: Using a remote-controlled robot it would also be possible to extract the old uranium slugs and recharge the reactor with fresh fuel. An odd design is a separable power plant with its own independent landing gear that can be wheeled away from the plane and replaced by another such unit.

Then there's the piggyback concept in which the landing gear is on a separate plane which takes off from the landing field to meet the nuclear-powered plane in mid-air, hooks on to the big plane underneath so that the nuclear-powered plane rides the "flyable landing gear" in piggyback fashion. The big plane would use the flyable landing gear for take-off and landing but would cruise under nuclear power, detached.

Question: Isn't it going to be a tough job to service a nuclear aircraft?

Dr. Borst: It is the kind of problem one has in servicing any reactor. It is very difficult and costly to replace a bolt, or a nut. The aircraft will require a complete maintenance operation and base such as the industry has never dreamed of.

For this reason, it seems to me, the best procedure would be to remove the reactor and maintain the plane in normal fashion. The removal of a reactor would have to be done, either by having the reactor integrated with its own remote powered dolly or by a remote-control crane. Everybody would be hiding behind five-foot walls of concrete, using TV sets to see what is going on, or using mirrors or periscopes.

Once the reactor is out of the way, the rest of the plane becomes a normal-maintenance problem. When you are ready for the next trip, you put in a new reactor that

(Continued to page 264)



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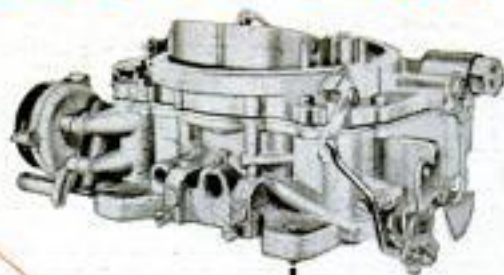
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is all checked out and ready to go and couple it up under normal conditions, because the reactor will not be radioactive. Then you start the plane up. From then on, you have a radioactive object. Everything has to be maintained and manipulated by remote control. Even though the reactor has been in operation for only 5 or 10 seconds, it will be hot enough that you can no longer do direct maintenance.

Question: While we are on the subject of radiation, is there likely to be any danger to people underneath the plane when it is flying? Won't the exhaust from the jet be radioactive?

Dr. Borst: If we use the open cycle and push the air through the reactor so it is heated in the reactor, then the air would become radioactive. If, however, we use liquid metal as a heat-transfer medium, then the liquid metal becomes radioactive; but since it is never mixed with the air, the air does not become radioactive. Using the closed-cycle heat-exchange system, there would be no significant radioactivity produced in the air surrounding the plane and no danger to people who are far enough away so that they don't get the radiation coming out of the reactor directly.

One would have to investigate very carefully the open-cycle system to determine what the radioactive wake would be like from an airplane, and whether it would be a hazard, and under what circumstances.

Question: If a nuclear plane should crash, would it create a hazard?

Dr. Borst: It would create a tremendous contamination problem, depending on the way in which the plane crashed. If the fission products were all released, the area around the crash would be seriously contaminated and would not be accessible for a long time.

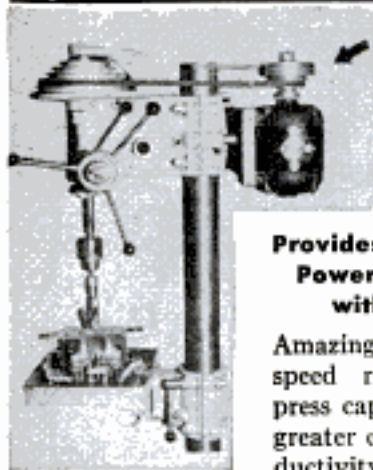
Question: Would there be a radiation problem during take-off and landing?

Dr. Borst: If somebody stands alongside the reactor, he is going to get a lot of radiation. Certainly during the take-off, with fresh power plant and little ash, people would have to be kept perhaps a quarter of a mile away. One would evacuate the region around the runway.

Question: Is there any question, in expert circles, about whether or not this plane is going to have enough performance to be worth all the trouble?

Mr. Teichmann: There is some feeling that you can't get enough performance out of it to make it worthwhile. If your cruising range or endurance were short, there would be no advantage, because you could have a conventional power plant with its fuel that would be far lighter. If it is long range, you have some advantage. ★ ★ ★

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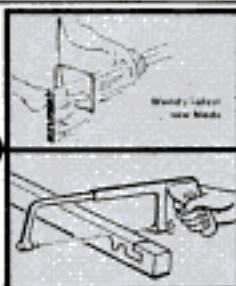
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Gibberellic Acid Makes Plants GROW

(Continued from page 96)

pepper plants, eggplants, corn and barley. And perhaps still more important, they learned that the strange stuff would greatly increase the growth of many trees including willow oak, tulip poplar and maple.

Despite this intensive research, botanists aren't even sure of what they're working with. There are some doubts as to the exact chemical composition of gibberellic acid. Dr. F. H. Stodola of the USDA, who has done more work in this field than other scientists, at last feels he has pinned down the precise nature of the stuff, and most authorities believe his formula to be correct. If so, it is such a complicated one it might be difficult to produce synthetically. But manmade Ga may not be necessary, as the stuff can readily be produced in culture.

"Commercial production would present no problems," says Doctor Stodola.

Because the fungus mold grows in a culture similar to that used in the production of penicillin, drug manufacturers have become intensely interested in Ga. Three different houses, Eli Lilly & Company, Merck & Company and the Charles Pfizer Company are now turning out the stuff in big fermentation vats identical to those

used in the production of penicillin. Each 160-gallon batch of cultivated liquor yields a bare 12 grams of the stuff in three days. This is turned over to research workers for experiments. In addition, just within the past few weeks quantities of the gibberellins have been turned over to formulators, who will incorporate them into products which will be available to you this spring and summer.

Twelve grams—less than half an ounce—may seem a very small yield from a single batch. Actually it represents a tremendous amount of potential growth because a little goes—and grows—a mighty long way. Doctor Stodola, for example, prepared a gram of pure gibberellin A and pure gibberellic acid. He sent out 100 samples to other scientists and still had some left over.

Several Ways to Apply Ga

These scientists have tried applying Ga to plants in several different ways. Rubbed onto the plant stems in a lanolin paste, it makes the plants grow like fury. Dr. Bernard Phinney and Dr. Anton Lang of UCLA tried spraying the leaves with a solution of one part of Ga to several million parts of water. It worked. Ga has been fed to the plants in nutrient solutions, dropped

(Continued to page 267)

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onto seedlings, injected into plant stems and applied to seeds. In virtually all cases it makes plants grow. There are some differences, though, in the effects of the various methods of application. On some plants, one big dose is more than successful, it's phenomenal. On others, as Doctor Lang and Doctor Phinney have discovered, repeated small doses are best.

In any case, the effects are amazing. Dr. S. H. Wittwer, one of the top authorities in the field, found that Ga would make beans grow six to eight inches per day, reach a mature height four times that of untreated plants, and produce edible pods two to five days earlier. Lilly scientists have found that when pea seedlings are treated with the stuff, the growth rate in some cases is multiplied five times.

R. G. Fuller of Battelle Memorial Institute, investigating gibberellic acid for Lilly, recently discussed Ga's characteristics and what is known about its effects.

"Several of its properties will have an important bearing on its potential usefulness in horticulture," he reports. "It should be simple to formulate and apply. It is readily absorbed by the roots, stems and leaves, and moves rapidly through the entire plant. At very low dosages it evokes useful plant-growth responses, yet it ap-

pears to be relatively nontoxic to plants at much higher dosages."

What makes Ga work? What happens inside the plant?

Plant Cells Stretch

Fuller points out that we still have little to go on in trying to answer these important questions. Evidence indicates that plants shoot up under the spell of Ga mainly through the stretching of existing cells, rather than a boost in the number of cells. This suggests that Ga makes the cell walls more elastic—or keeps them elastic for a longer period. Usually, though not always, an increase in dry weight goes hand in hand with the increase in height. A large part of this added weight comes from a boost in the plant's assimilation of carbon. There is also an increase in the proportion of soluble carbohydrates, which could be an important factor in several commercial crops.

Does Ga's effect carry over to succeeding generations of a plant? So far there is no evidence that there is any genetic effect. Dwarf varieties of some plants have been treated with Ga and have grown to phenomenal heights. Yet seeds from these tall plants have produced the original dwarf varieties, the same as untreated plants.

Doctor Wittwer and his associates at
Continued to page 268)



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Michigan State University have become authorities on some of the other odd effects of gibberellic acid. In many cases, they've found, plants not only grow much taller but mature ahead of schedule. Broccoli, for example, matures several weeks ahead of untreated plants. Beans will flower and produce edible pods several days earlier.

This ability to push a plant into flowering is apparently one of the strongest effects of Ga. When Doctor Wittwer tried treating head lettuce, the seedstalks pushed right up through the heads and produced seed 31 days earlier than could be expected.

Other plants that bloom rarely—and sometimes never—have been made to flower consistently under the spell of gibberellic acid. And flowers tend to be converted into fruit much more readily. At Michigan State, Doctor Wittwer tried spraying the flowers of tomato plants and found that the number of tomatoes was strikingly increased. In this experiment, one part of Ga per million parts of water was as effective as 500 parts per million.

Still stranger is gibberellic acid's effect on biennials, those plants such as carrots, sugar beets and most other root crops that flower and produce seed only in alternate years. Doctor Wittwer has discovered that Ga persuades biennials to flower soon after treatment, regardless of their normal life cycle. To the producer of vegetable seed, this could be highly important.

Seeds Germinate Early

The seed itself falls under the spell. When Doctor Wittwer and his associates treated pea and bean seeds with Ga, the seeds germinated considerably earlier than untreated ones. Furthermore, the seedlings pushed up with astonishing speed.

Dormancy is affected, too. Lettuce seed normally requires a short exposure to light in the red band of the spectrum before it will germinate; a touch of gibberellic acid will substitute for the light. In another experiment, several toothpicks were soaked in water, others in a solution of Ga. They then were inserted in potatoes held at room temperature. In four weeks the treated potatoes developed active sprouts. Five more weeks passed before sprouts appeared on the untreated ones.

"Gibberellic acid seems to affect more diverse plant processes than any other known chemical," says Fuller. "We can only guess at the potential uses of this unique substance. Gibberellic acid eventually may boost the production of food and fiber crops significantly. We may be able to increase the dry weight of forage crops substantially. We may be able to extend

(Continued to page 270)

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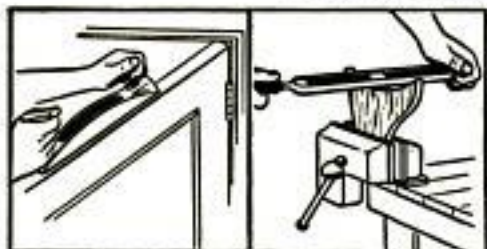


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the range of many plants by cutting the time required to bring them to maturity.

"We may be able to raise ornamental trees to shade size on our lawns in a much shorter time. The yield of pulpwood and lumber may be boosted. Seed production of some crops such as sugar beets could, in effect, be doubled if the plants can be made to produce seed in a single season, as evidence indicates.

"Keep in mind, though, that these are only possibilities on the basis of present research. We need to answer a lot of questions about gibberellic acid before we'll be able to predict with any accuracy its ultimate worth."

Here are a few of those questions:

How much Ga should be administered to each species, in what manner and how frequently? (Over-application produces elongated spindly plants, which is the effect the Japanese observed.) Precisely what happens to the cell structure of a plant, and what is the effect on the sugar content? Can we be certain there is no genetic influence which will be carried through to future plant generations?

Why does Ga affect, in different ways, different varieties of the same plant? Is gibberellic acid naturally present in some plants? (Young bean seed has yielded a substance which, so far, is indistinguishable from the gibberellins.)

Will a touch of the stuff in a glass of milk make Junior grow? (Certainly not!) But other remotely possible effects on humans must be investigated. As far as evidence goes, all authorities believe it to be completely harmless, but where edible crops are concerned this must be pinned down beyond question.

So far, gibberellic acid seems too good to be true. The strangest part of this tall tale from the world of science is that the botanists themselves are the most optimistic about the future of Ga. ★ ★ ★

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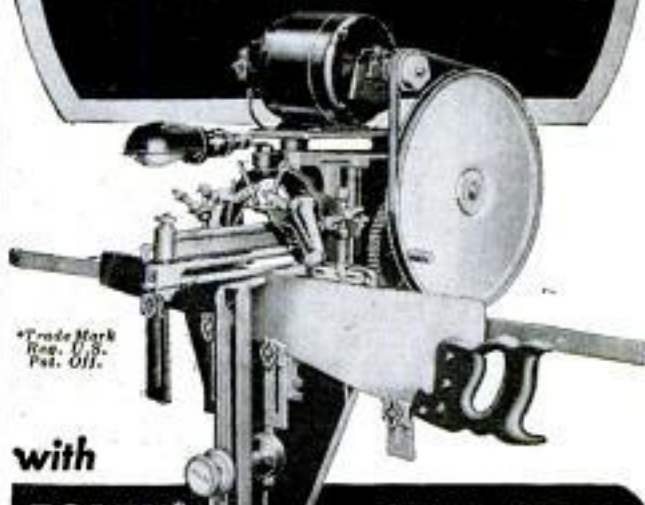
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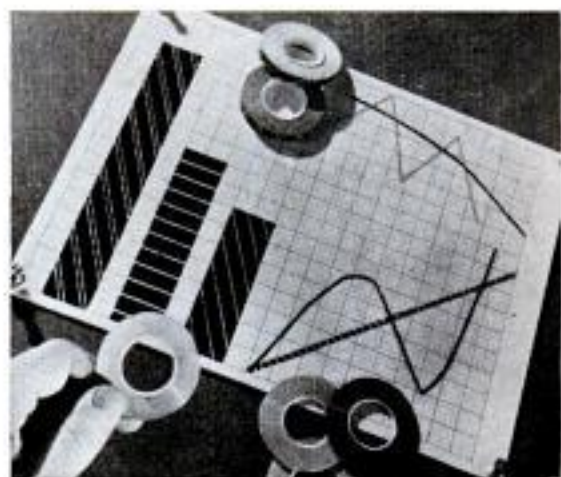


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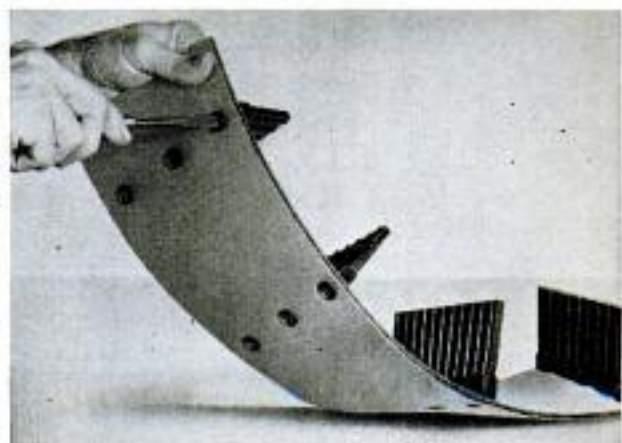


Power-Driven Roller Skates

Power-driven roller skates have been made by Bernie Schmidt of Ecorse Township near Detroit. He mounted a gasoline engine on a padded metal plate and fitted straps to hold the rig on his back. The engine and one skate are connected by a flexible drive shaft.

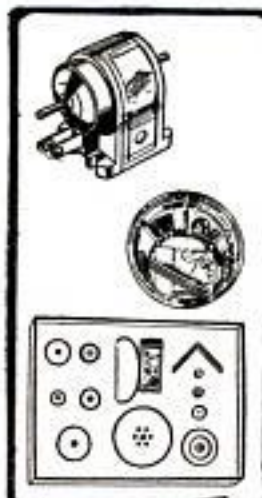
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Any conveyor or elevator belt can be converted into a cleated belt by attaching new Neoprene cleats. A punch and a screwdriver are the only tools needed to install the cleats. Originally designed for the food industry, the cleats are also being used in grain mills, rendering plants and clay-processing plants. They are available in a variety of sizes.



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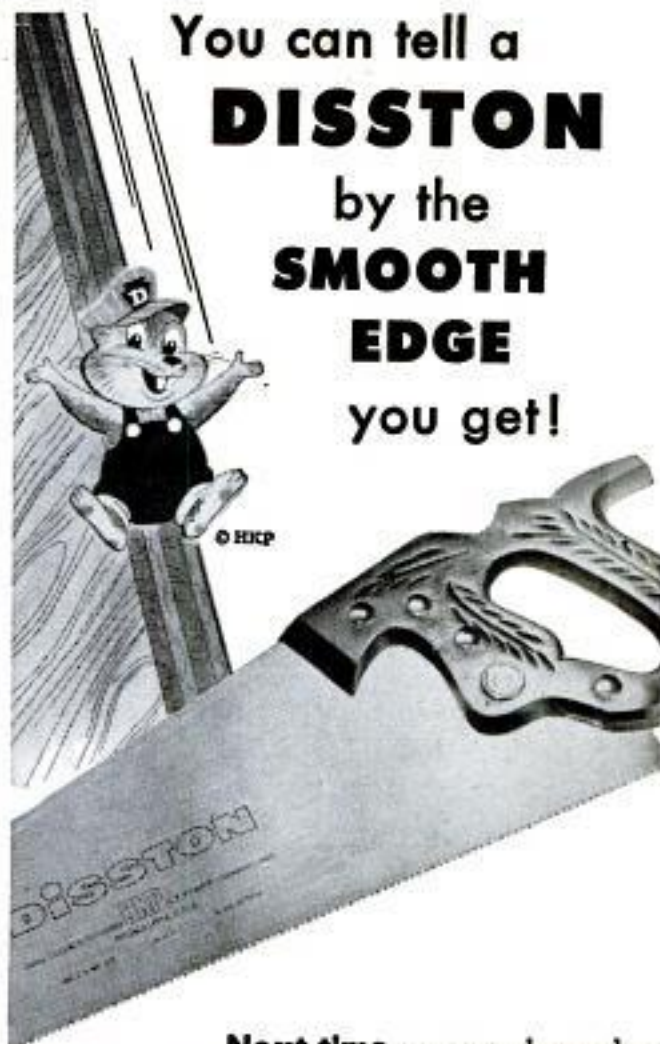
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There were television sets in 37,410,000 American homes in late 1956, or 76.2 percent of all households, up from 32,000,000 homes in 1955.

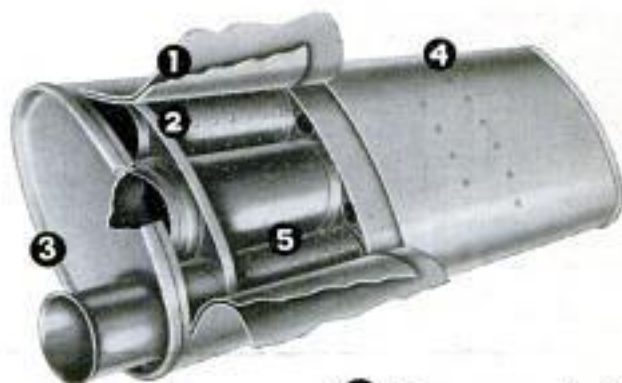
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4000-Year-Old Pine Tree

Three bristlecone pine trees in California are revealing facts on the climate of that state as it existed 4000 years ago. This information goes back 800 years further into the past than data gleaned from California's giant sequoia trees. A cross section from one of these bristlecone pines, measuring 42 inches in its largest diameter, will go on display at The American Museum of Natural History in New York City late this year. A specimen will be taken from the ancient trio of trees at the 10,000 to 11,000-foot level of the White Mountains in eastern California. A 20-inch-diameter hunk of a 20-year-old slash pine will be compared in the display with the older piece of timber. Where the bristlecone pine, as shown by its annual rings, grew a little more than an inch per century in diameter, the slash pine averaged an inch per year in diameter growth. Dr. Edmund Schulman of the University of Arizona Laboratory of Tree-Ring Research discovered the aged bristlecone pines.

When you buy a power workshop— make sure you get everything you need to complete the job!

Some important facts you should know about power tools!

FACT: You need more than a saw to have a complete home workshop. True, there are many operations you perform on a saw that are important to every project—ripping, crosscutting, dadoing, beveling, etc.—but, you cannot *complete* your average home project from beginning to end with just a saw.

FACT: To complete your projects (building furniture or built-ins, remodeling a kitchen, or even adding a room) you need: a saw, disc sander, vertical drill press, lathe and a horizontal drill. To see why, take even the simplest project you might want to build—a coffee table:



You Need A Saw, for ripping and crosscutting. You might also use a molding head for making decorative edges.

You Need A Disc Sander for sanding to length, or edge-sanding. For rounded corners (or a round table), set up a pivot jig and sand the workpiece to a perfect circle.

You Need A Vertical Drill Press for making angular leg sockets in the bottom of the

table, peg holes, or as a "V" block jig for drilling into the round table legs for cross supports.

You Need A Lathe to turn the legs of the coffee table. For modern design, offset tail stock center to turn perfect tapered legs; for antique or period legs, turn any design to suit your taste.

You Need A Horizontal Drill for doweling the two or more-boards that form the table top, if you want professional results. And, if you make a drawer for the table, use the horizontal drill for making extra-strong pegged joints.

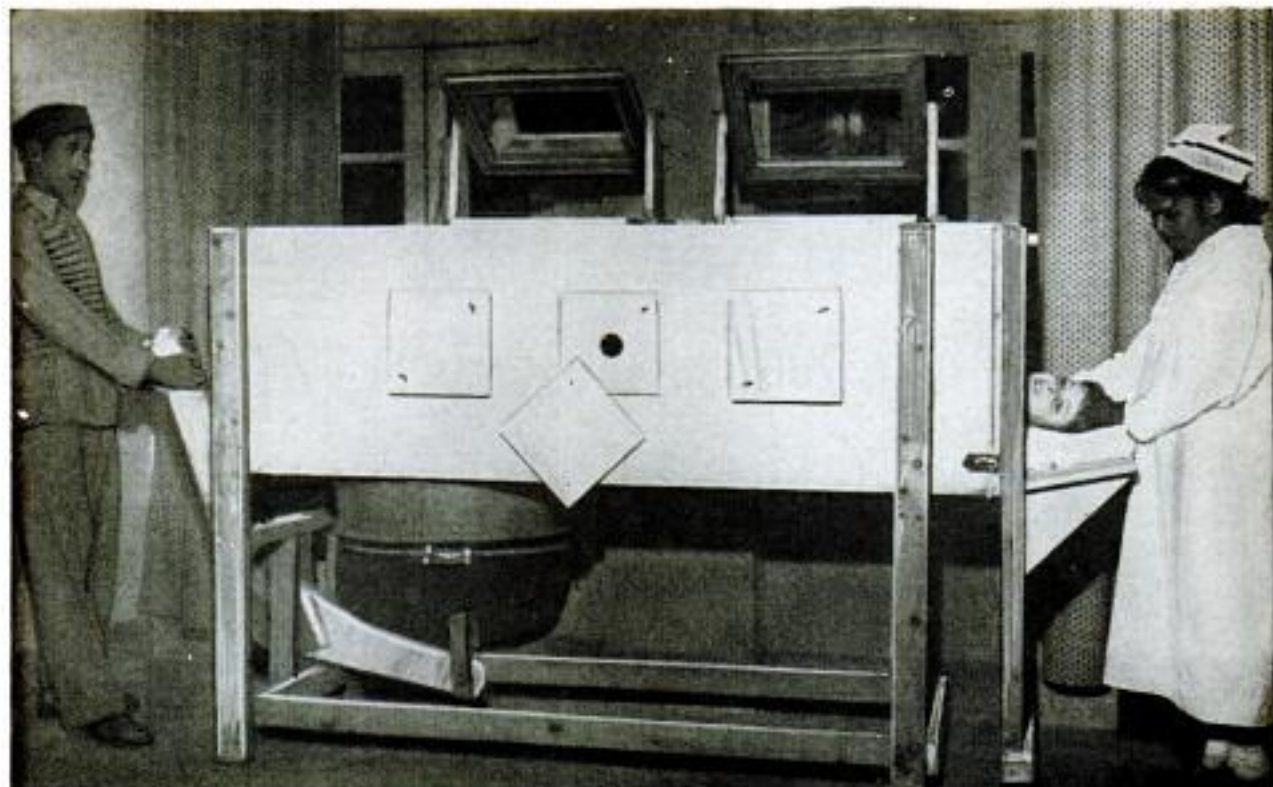
FACT: All the woodworking operations cannot be performed safely at the same motor speed. In fact, you need different speeds just for sawing—slower speeds for green or tough wood. In drilling, too, you need different speeds for different operations—3800 rpm for 1/4" drills, but you should change to 700 rpm for a 1" drill.

SUMMARY: To complete the average job, you need the above five basic tools and different speeds for different operations. The advantage of a true multi-purpose tool is having all the tools you need in one compact unit, for one price. If you do not get *all* the tools you need to complete the job, or if these tools are available only as extra-cost attachments, you are not getting a complete power workshop.

IMPORTANT FACTS YOU SHOULD KNOW ABOUT SHOPSMITH: Only Shopsmith is specifically designed as a multi-purpose power workshop. It is not a one-speed saw that requires extra-cost attachments to convert it to other uses. Everything you need to use Shopsmith as a 9" saw, 12" disc sander, 16 1/2" drill press, 34" lathe and horizontal drill, including built-in 3/4 hp motor, variable speed selector and bench, is included in the one low price—\$298.50. You can own SHOPSMITH for as little as \$3 a week on Magna Tool-Time Plan.



Before you buy any power tool—single or multi-purpose—get all the facts and a demonstration at your nearest SHOPSMITH dealer (you'll find SHOPSMITH on display at leading hardware and department stores, lumber yards, or at any Montgomery Ward Store). Or—send your name and address to department 506-M, MAGNA POWER TOOL CORP., at office nearest you: Menlo Park, Calif., OR Box 2808, Ft. Wayne, Ind.



PM "WOODEN LUNG" SAVES LIVES IN INDIA

By Jean Thompson

A HOMEMADE "LUNG," improvised from a steel packing drum, two inner tubes, some lumber and other common materials, is helping save lives of polio patients at Landour Community Hospital on the Tibetan frontier.

Dr. Zerne Chapman, who built the wooden lung, flew to the United States recently with a Presbyterian missionary whose life was saved by the respirator.

When this patient was admitted last August, the hospital borrowed a professional chest respirator from the U. S. embassy in Karachi, Pakistan, a thousand miles away. One day the respirator suddenly stopped, and an Indian nurse excitedly called to Doctor Chapman: "The patient's stopped breathing!"

Doctor Chapman rushed to the room and began artificial respiration while others made the wooden lung ready. The patient was transferred to it and the 12-hour ordeal of hand pumping the improvised respirator began. Meanwhile, Doctor Chapman and others were repairing the commercial respirator.

"If we hadn't had that wooden lung, the patient would have died," said Chapman.

The wooden lung was first built at Landour in 1954. Three polio patients were admitted that summer.

"When I saw one boy, I knew we'd need a respirator to save him, and there wasn't one," said Doctor Chapman.

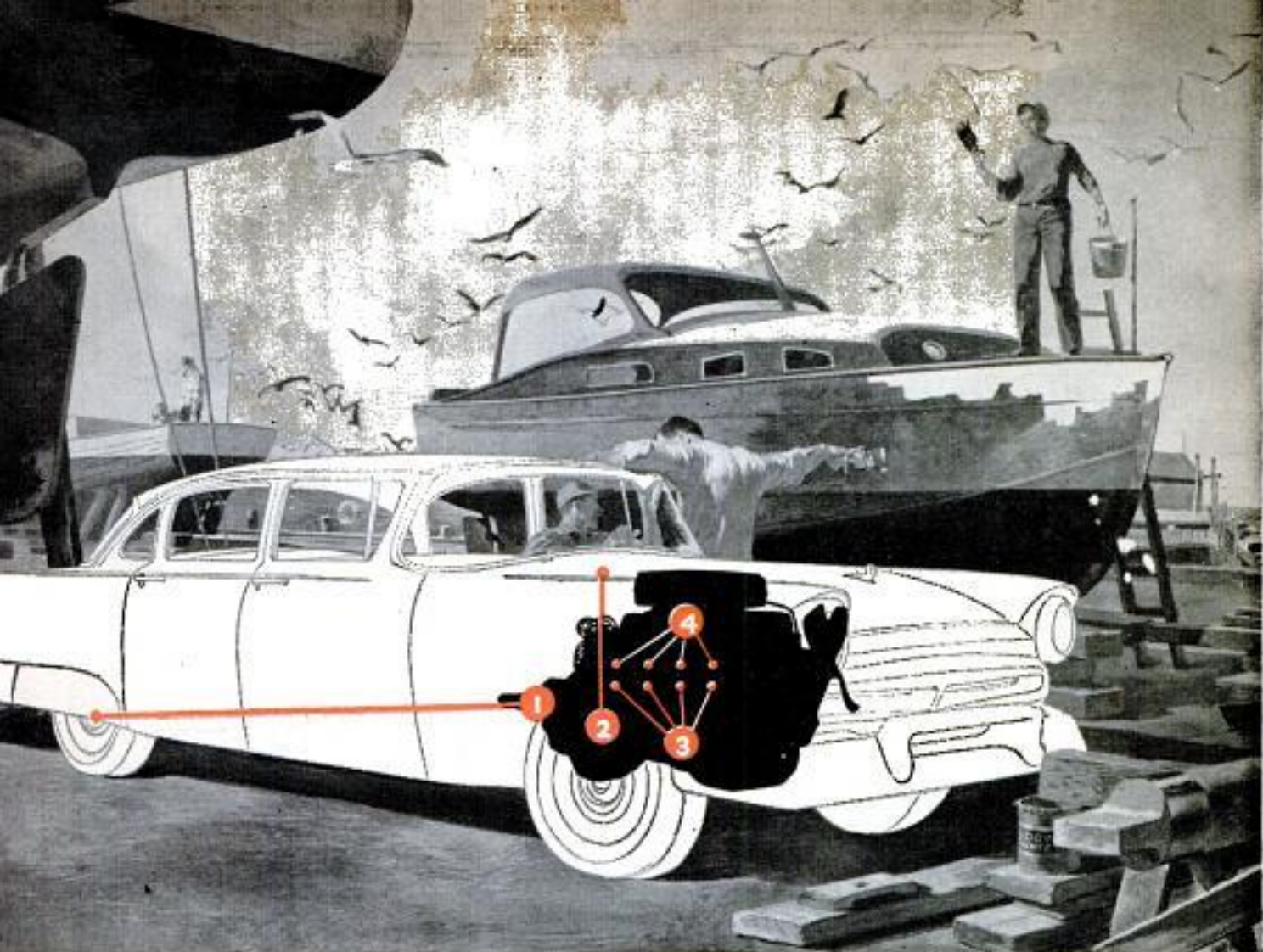
Confronted with this emergency, he remembered reading a short article in a medical journal which gave brief instructions for building a wooden lung. Fortunately he had saved that journal and found that complete plans had been published in the January 1952 *Popular Mechanics*.

The doctor recruited the help of two other missionaries, a former cabinetmaker and a college physics professor. The three men worked day and night on the machine. Plans called for a large tractor inner tube. None was available, so they vulcanized two small inner tubes together. They couldn't buy sponge-rubber gaskets, so they used crepe soles from shoes. Three-quarter-inch plywood isn't made in India, so they sawed planks for lumber.

"For five hours before we put the boy in the lung, we worked frantically putting up cracks so the air wouldn't escape," Doctor Chapman recalls.

The improvised wooden lung has been pressed into service many times to save lives. It was designed only for emergency situations, according to *Popular Mechanics*, but the hospital has not yet been able to buy its own respirator.

"I hope to take back a commercial respirator with me," Doctor Chapman says, "but we're going to keep improving our wooden one. We never know when we may have two polio patients at once."



More road horsepower—You get all the engine power you paid for when you replace old plugs with 5-rib Champions! Independent

ent tests proved new Champions give cars of all makes an *immediate* boost in the real power actually delivered at rear wheels.

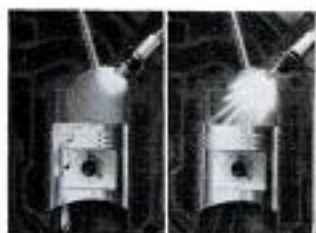
Most cars gained 6% to 31%—for better hill climb and safer passing. No wonder 9 out of 10 racing drivers insist on Champions!

How Champion spark plugs can make your car 4 ways newer

If you haven't changed your plugs in about 10,000 miles, read why Champions will make a big difference in your car's performance



Quicker starts—You'll get quicker starts, . . . save wear and tear on your battery. Tests with major makes cars showed new 5-rib Champions cut starting time as much as 71%—with an average of 39%!



3 Less engine wear—You avoid costly repairs. Misfiring plugs (left) dilute your oil with raw gasoline. New full-firing Champions (right) protect the oil. *When changing oil—check your spark plugs!*



4 Lower cost per mile—You get top power and gas economy for life of the plug. Photo shows that Champion's great new Powerfire electrode stands up better than ordinary types. *Insist on Champions!*



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\$49.95** without scope



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Solar Cooker Folds Like Umbrella

Steak can be cooked in less than 20 minutes on a "750-watt," solar-heated unit that folds and unfolds like an umbrella. Actually a parabolic reflector, the device is a four-foot curved "mirror" made of a new plastic film covered with a reflecting finish almost as effective as the finish in a real mirror. Built as a series of ribs sliding on a collar along shafts, the cooker works by zipping it open, thrusting its pointed end into the ground and tilting it to collect solar rays. The stove focuses rays into a 10-inch circle to generate about 450 degrees of heat. On a bright day the 10 square feet of reflecting space available gathers 1000 watts of sun power with about 25 percent of the rays reflected or absorbed.

Automatic Rememberer Turns Lights Out for You

It would take a lot of conniving to fool a memory switch that makes it impossible for you to drain your car battery by leaving the headlights on. A wire from the generator keeps the lights burning as long as the engine runs. A thermostat keeps the lights burning as long as the engine is hot. A switch under the driver's seat keeps the lights on as long as somebody's sitting at the wheel. When none of these conditions exists, the headlights are turned off automatically. The thermostat switch provides the added convenience of permitting you to leave the car lights on while you enter the house—the switch turns them off when the engine cools.



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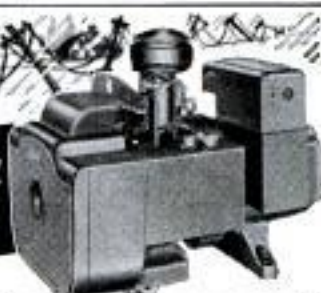


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Self-Service Hospital Facilities Pamper Patients

Self-service, push-button pampering is available to patients at the Boulder Colorado Sanitarium. A partially prefabricated hospital room has a compact unit that includes a fold-away washbasin, personal ice-water spigot, coffee pot, toaster and a miniature refrigerator.

Bark Converted Into New Soil Builder

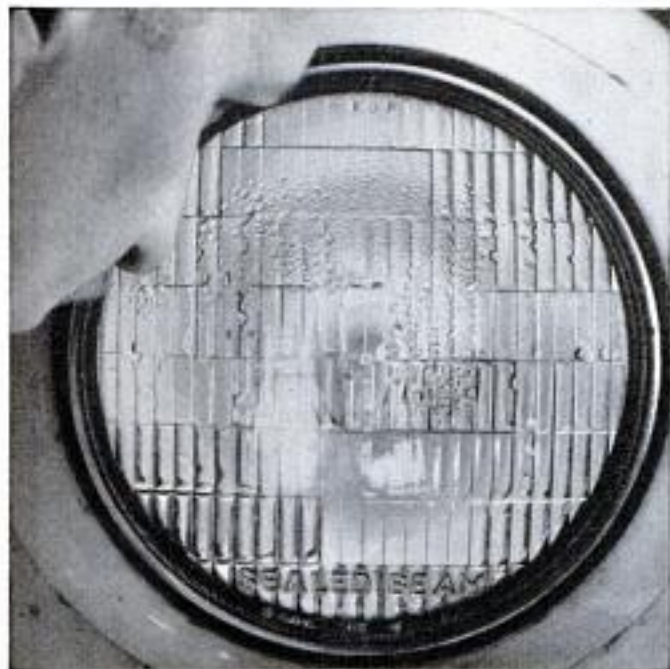
Tree bark, formerly an inexpensive fuel or waste product, is now combined with fertilizer to turn clay or sand into rich loamy soil in which plants thrive. This bark soil builder loosens soil and improves its moisture-holding capacity; it serves as a base for fertilizer and controls the rate at which plants obtain soil food. The average lifetime for this soil builder in the soil is five years. Home gardeners and professional growers will use this substance, according to Armour Research Foundation of Illinois Institute of Technology, Chicago. The bark is ground up, the tannin condensed from it, and water and excess chemicals removed before the material is washed and dried for inclusion with fertilizer.

Tractor Wheel Warms Hands

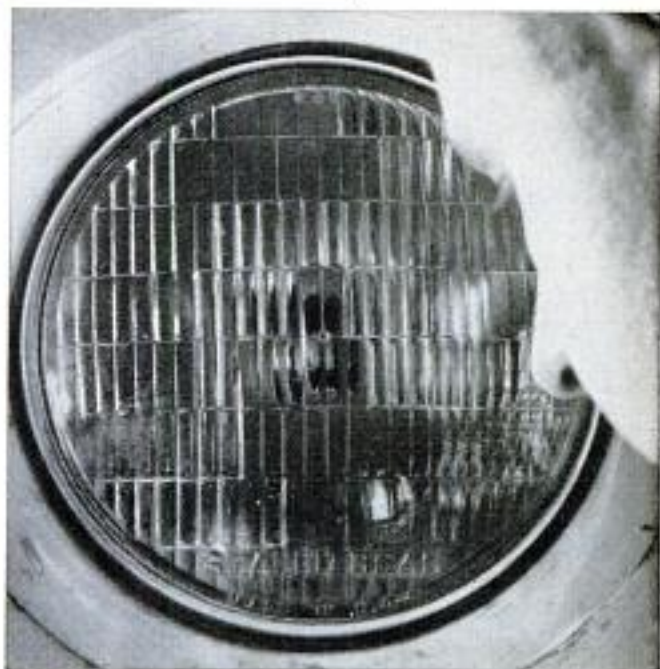
Tractor drivers can keep their hands warm by holding tightly to a steering wheel with a built-in heating element which, the British inventor says, can be added to existing wheels as well.

If your headlamps look like these—

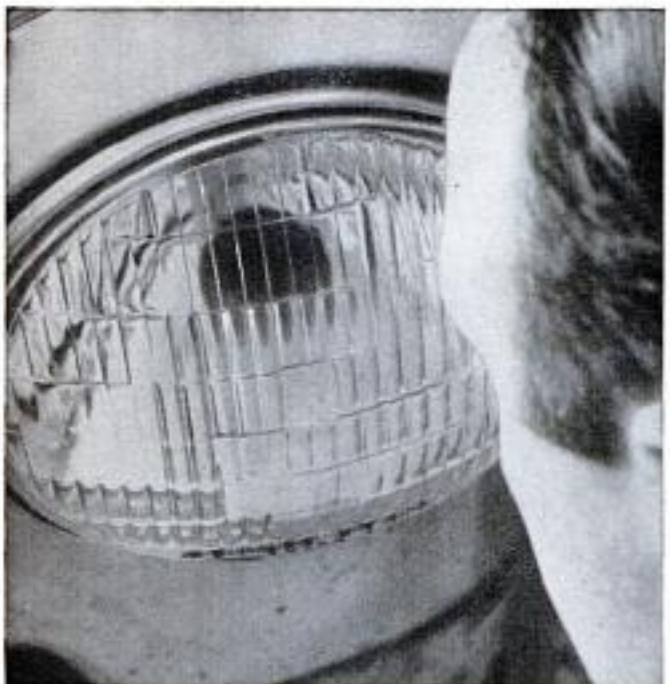
**YOU NEED A PAIR OF NEW G-E *All-Weather* HEADLAMPS
YOU'LL GET LOTS MORE LIGHT!**



WATER DROPLETS inside the lens not only scatter the light, but they also help discolor metal reflectors. This can't happen with G-E *All-Weather* Headlamps—moisture can't possibly get inside.



DISCOLORED REFLECTORS absorb light rather than reflect it, causing a loss of up to 50% of the original light output. Dirt and moisture can never enter G-E *All-Weather* Headlamps so the reflectors always stay shiny.



BLACKENED BULBS in old-style headlamps block out the light from the filament and cause a dangerous drop in light output. This can't happen with G-E *All-Weather* Headlamps because *there are no inner bulbs!*

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So, for safer night driving, get a pair of new G-E *All-Weather* Headlamps today — and have your dealer aim them when he puts them in. You'll see the difference tonight. General Electric Co., Miniature Lamp Dept., Nela Park, Cleveland 12, Ohio.



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Disposable flashlights with sealed-in bulbs and batteries can be used up to 1½ years without replacement. Resembling a woman's compact, this flashlight does not open. Bulb, lens and switch are set into its edge. The operator directs the lens at the target and presses the switch for illumination, which is comparable to that of the standard flashlight.



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He Fashions Lamps From Cores of Ancient Rock



CANADIAN MACHINIST Rudy Carlson makes modern lamps out of billion-year-old rock cores extracted from gold miners' diamond drills. When he made his first lamp, he was working in the machine shop of the Wright-Hargraves Mine at Kirkland Lake, gold-mining community 380 miles north of Toronto. With an emery stone and a square to pit against the tough rocks the drillers had taken from the rich pre-Cambrian rock strata, he struggled two months before finishing the project.

Carlson sought to cut down labor time and effort. Answering an ad in *PM*, he sent a \$14 money order to a firm in the United States and ordered a diamond-impregnated circular-saw blade. Although to the layman the blade might look too dull to cut butter, it helped Carlson manufacture his second lamp in four hours. Powered by a half-horsepower motor, the circular saw chews smoothly through a core in about one minute, cutting it into required lengths varying from one inch to two feet.

Canadian girls admire rock lamp made by Carlson





Diamond-impregnated blade works off 1/2-hp. motor

When he is cutting rock, the machinist often dons rubber coat and boots, for the saw blade creates havoc in Carlson's basement by throwing water on ceiling, floor and walls. The spray comes from a water-filled can hanging from the ceiling and dripping friction-lessening liquid on the cutting point.

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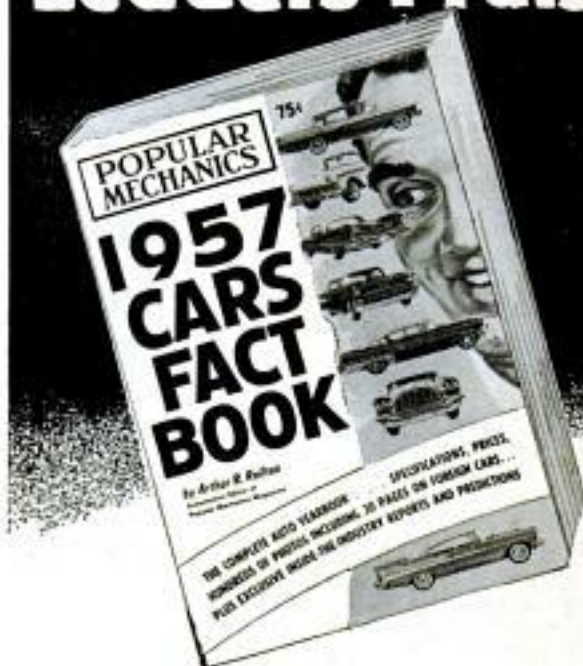
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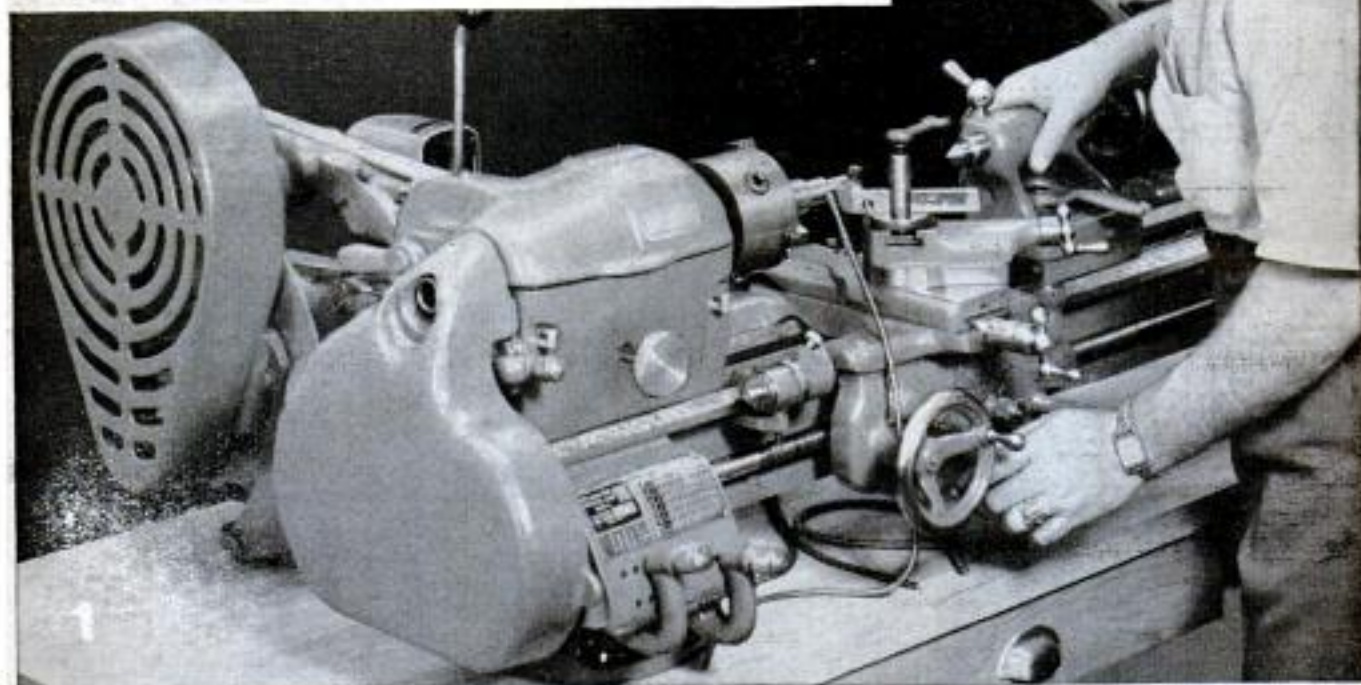
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