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# POPULAR MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT

JUNE, 1960

35 CENTS



**THE MAN WHO OWNS A TANK CORPS**  
*What Owners Think of the '60 FORD*  
**GARDENS TO FEED OUR SPACEMEN**

**WATERPROOF YOUR BASEMENT**

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Volume 113

JUNE 1960

Number 6

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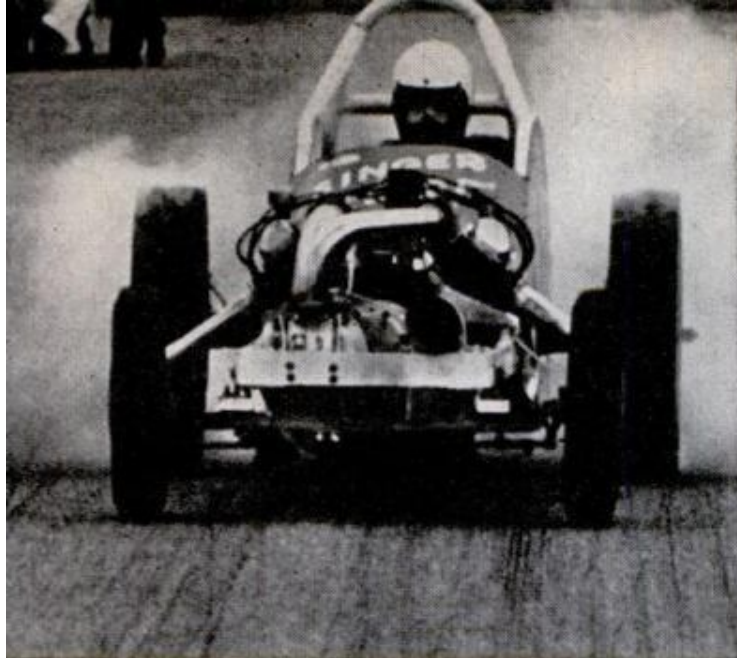
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## Next Month...

TALK ABOUT LUXURY! Now the mobile home has joined the Country Club. A feature next month tells how the old-fashioned "trailer" has become part of a luxurious semipermanent home, complete with swimming pool and golf course. Also in July, the owners report on the Plymouth. . . Complete instructions on how to deaden sounds throughout your home. . . And a survey of top-of-the-car boat carriers, along with lifts for loading them

POPULAR MECHANICS



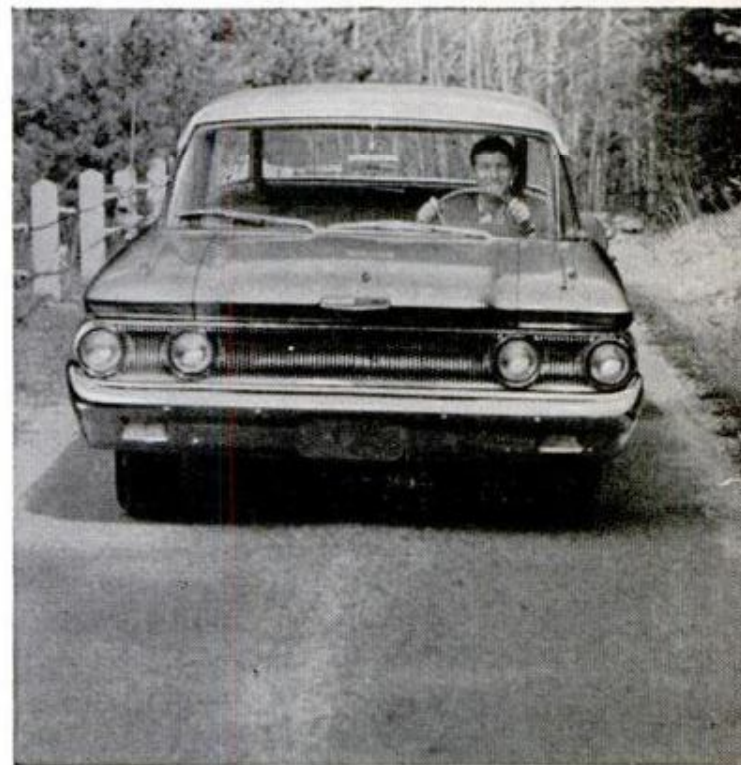
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*Every major U. S. outboard maker uses Champions.*



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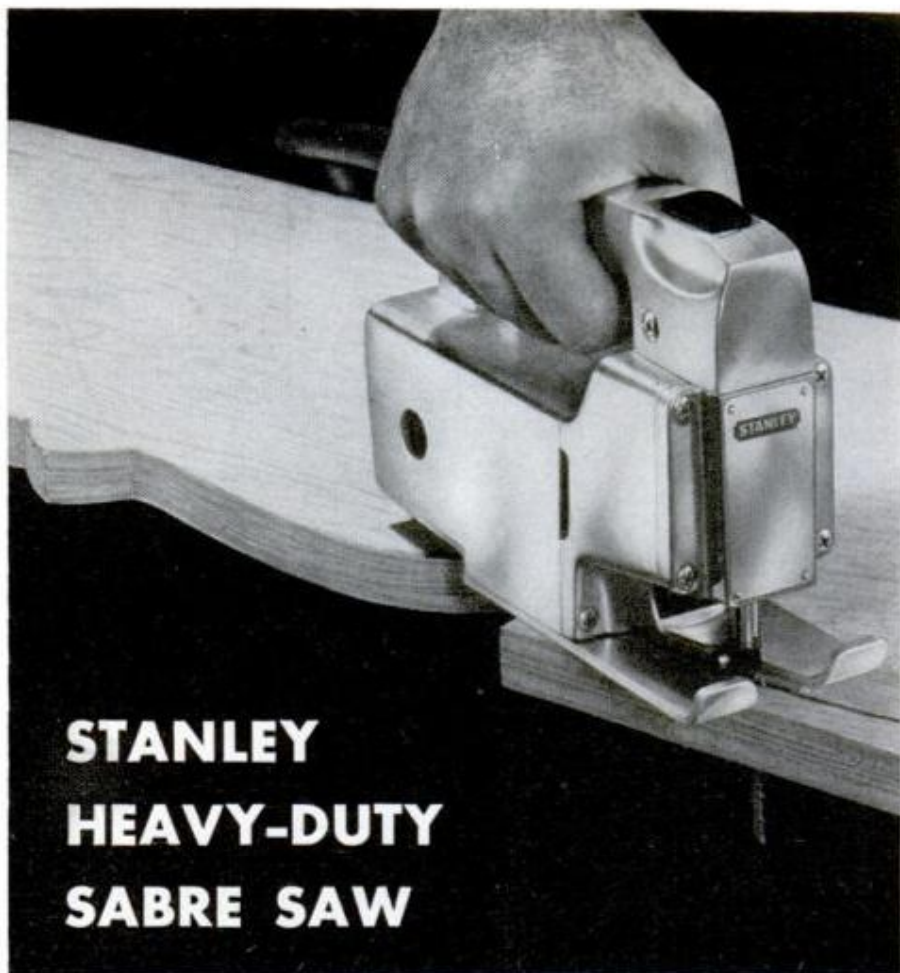
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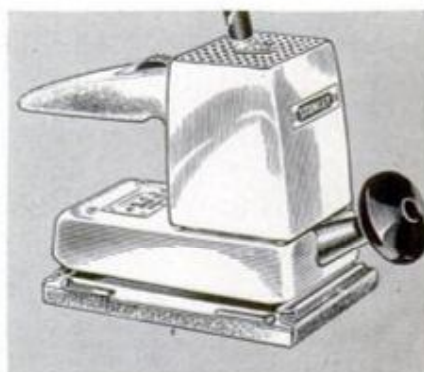
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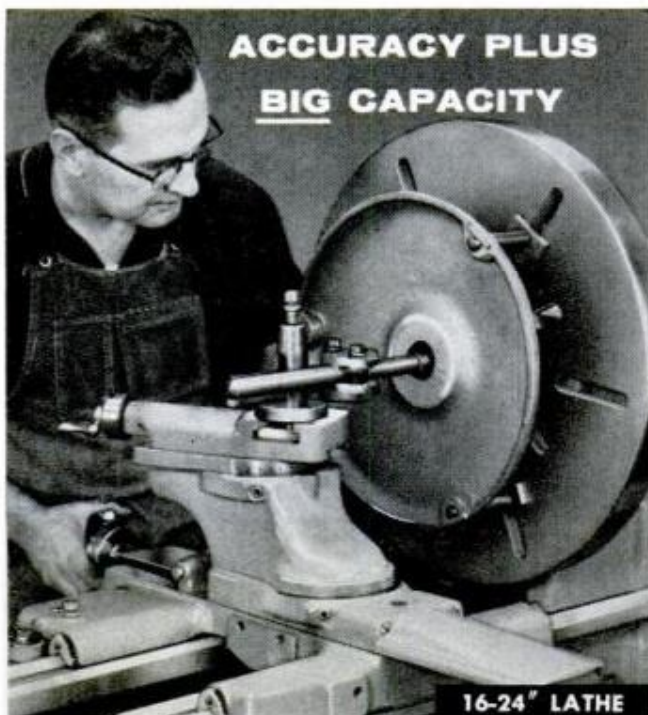




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3490

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

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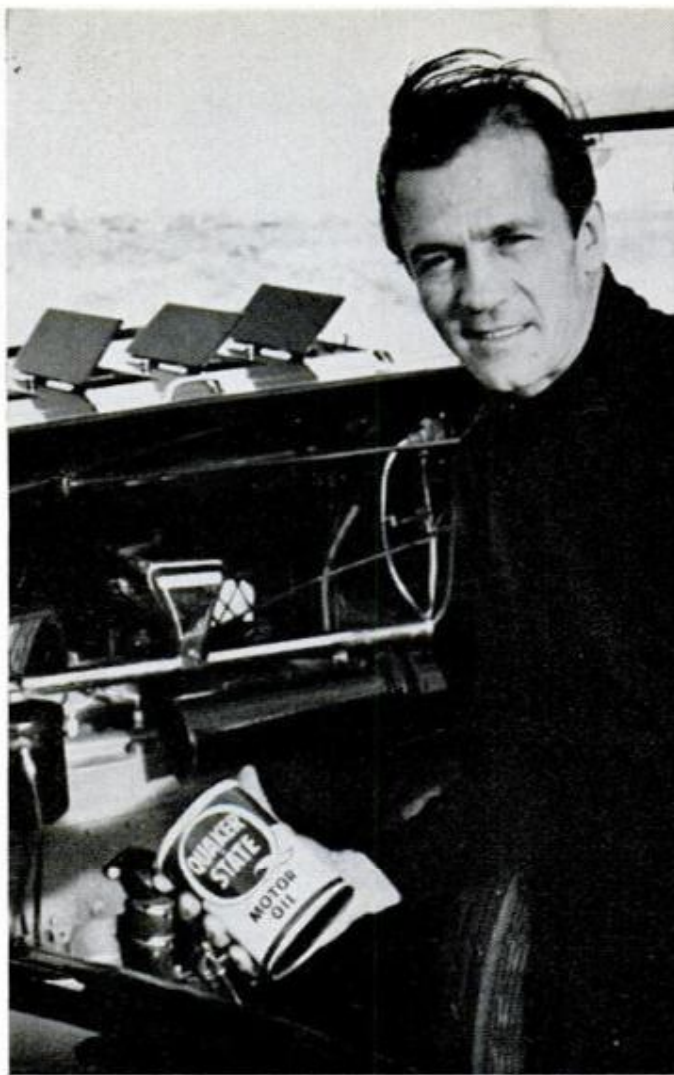
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Light and Power</li> <li><input type="checkbox"/> Practical Electrician</li> <li><input type="checkbox"/> Practical Lineman</li> <li><input type="checkbox"/> Professional Engineer (Elec)</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> High School Diploma</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Mathematics</li> <li><input type="checkbox"/> High School Science</li> <li><input type="checkbox"/> Short Story Writing</li> </ul> <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Personnel-Labor Relations Supervision</li> </ul> <p><b>MECHANICAL and SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Diesel Engines</li> <li><input type="checkbox"/> Gas-Elec. Welding</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Metallurgy</li> <li><input type="checkbox"/> Industrial Safety</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Professional Engineer (Mech)</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration and Air Conditioning</li> <li><input type="checkbox"/> Tool Design <input type="checkbox"/> Tool Making</li> </ul> <p><b>RADIO TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> General Electronics Tech.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio-TV Eng'g</li> <li><input type="checkbox"/> Practical Telephony</li> <li><input type="checkbox"/> Radio-TV Servicing</li> </ul> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Car Inspector and Air Brake</li> <li><input type="checkbox"/> Diesel Electrician</li> <li><input type="checkbox"/> Diesel Engr. and Fireman</li> <li><input type="checkbox"/> Diesel Locomotive</li> </ul> <p><b>STEAM and DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Power Plant Engineer</li> <li><input type="checkbox"/> Stationary Diesel Engr.</li> <li><input type="checkbox"/> Stationary Fireman</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton Manufacture</li> <li><input type="checkbox"/> Cotton Warping and Weaving</li> <li><input type="checkbox"/> Loom Fixing Technician</li> <li><input type="checkbox"/> Textile Designing</li> <li><input type="checkbox"/> Textile Finishing &amp; Dyeing</li> <li><input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warping and Weaving</li> <li><input type="checkbox"/> Worsted Manufacturing</li> </ul> |
|--|--|--|---|---|

Name \_\_\_\_\_ Age \_\_\_\_\_ Home Address \_\_\_\_\_  
 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_ Working Hours \_\_\_\_\_ A.M. to P.M. \_\_\_\_\_  
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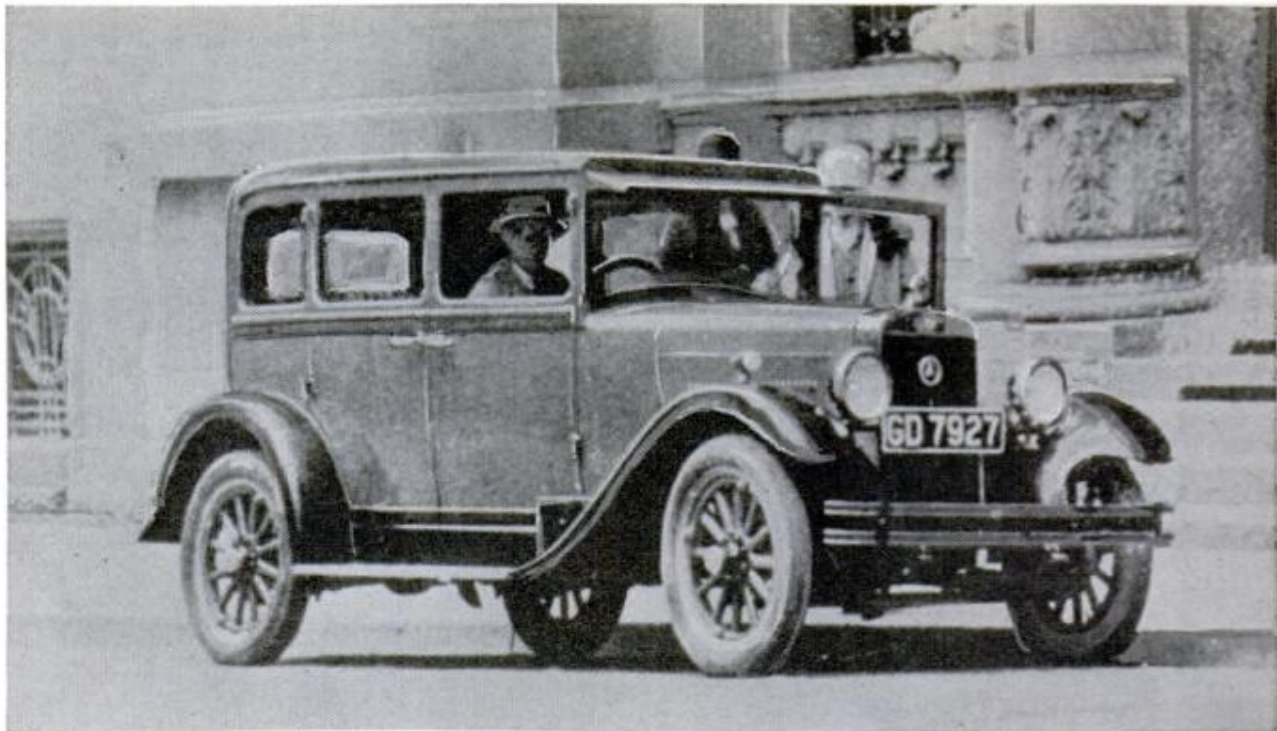
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You gain experience as you train, because you learn by practicing. You get mechanic's tools and special equipment (left), as well as all parts to assemble a heavy-duty, commercial-type, 1/4 h.p. condensing unit (above). Then you can build a refrigerator, air conditioner, freezer or milk cooler.

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## New auto air conditioning field is loaded with business opportunities

Each year over 500,000 autos are equipped with air conditioners. Experts say the figure should double in a few years. There's a severe shortage of technicians. Strong need in many areas for repair shops, too. Sell, install and service auto air conditioners for top profit! Go in business for yourself.



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# Over the Editor's Desk



## To the Editor:



Dropping you a line and picture of a camping trailer built from your magazine plans (PM March 1959), just to let you know someone is building the things you print. I am about to start on the outboard boat "Swish."

Casimir Porowski  
Cincinnati, Ohio

☆☆☆

## To the Editor:

I read with interest nearly every month your magazine. I especially like the letters to the editor. Have just finished reading the letters in the January 1960 issue, what people say about foreign cars and American cars. Before I cool off, I would like to add my two cents worth.

To begin with let me say that I love my country the United States. I think it is the grandest place on this earth. I think it's the grandest place this side of heaven. I also think the United States is also the prettiest place there is this side of heaven.

And when it comes to automobiles I feel the same way. I'm not throwing off on the foreign cars, but I must say I like the American cars much better.

I own a 1957 Imperial and I love it. Considering all the nice things the car has and its size and looks, I do not think it is too costly to run. It will get 15 MPG of gasoline with ease. I think it is the best looking car there is. I feel like, a foreign car equipped like my Imperial would cost \$20,000.00 and still would not be equal to it.

Let the folks buy their little "Beetles" if they want them. I'll stay with the American car. I also think Detroit does a splendid job in building their cars.

Gentlemen of Detroit, keep up the good work.

Hubert E. Self,  
Auburn, Alabama

(Continued to page 16)



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place where Tamatea, the man with the big knees, who slid, climbed and swallowed mountains, known as Landeater, played on his flute to his loved one.

☆☆☆

### To the Editor:

Recently I was rereading a very interesting article from the June 1958 issue of *PM*, entitled "Think Fast!" One of the many unusual incidents recorded there concerned an Australian cattleman who, having been bitten by a deadly snake, had no knife with which to open the wound. He then loaded his rifle, pressed the muzzle against the bite and pulled the trigger. When other cattlemen found him and took him to medical aid, physicians praised him for his quick thinking and refusal to be panicked by pain.

A (Toronto) newspaper clipping describes the identical procedure recently taken by a duck hunter in New South Wales when bitten by a snake—but with quite a different outcome. Upon being taken to a hospital, this hunter was met by police and promptly fined for carrying firearms on a Sunday!

Stephen Solway  
Toronto, Ont.

(Continued to page 18)

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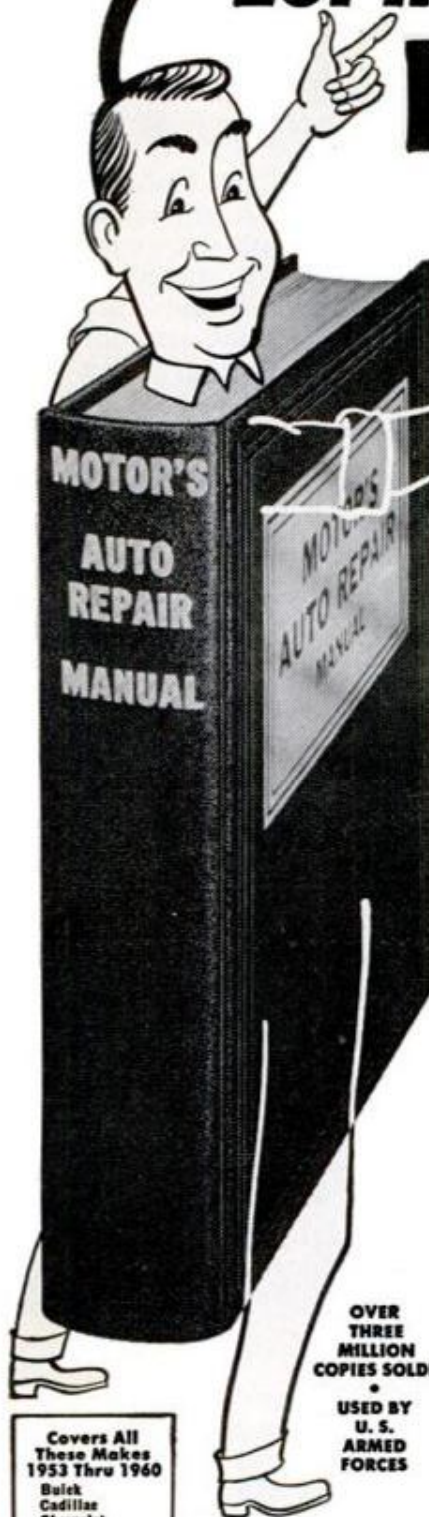


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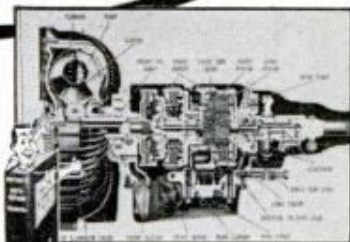
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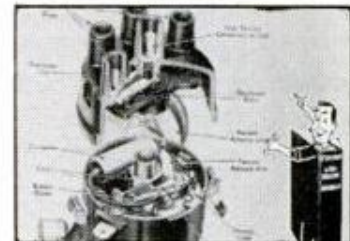
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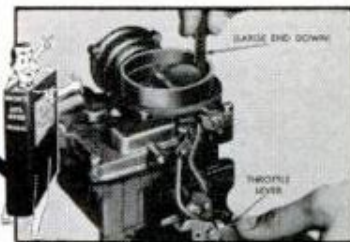
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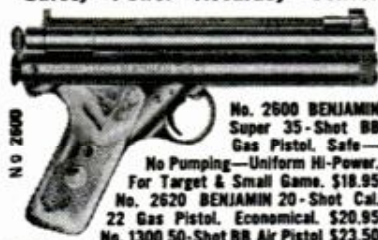
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### To the Editor:

Your lead item in *Sidelights from the Pentagon* in the February 1960 issue of *PM* brings back fond memories. During World War II the Special Weapons branch of the Signal Corps worked with the Navy on a pigeon-guided bomb. Pigeons were then a Signal Corps responsibility.

Test models were successful and several production models were actually dropped on Jap carriers with good results. However, the Japs quickly thought of a countermeasure. On the approach of our bombers they would release a flock of female pigeons. From then on we ruined a lot of female Jap pigeons but we never got another hit on a carrier. So we abandoned the project. How odd the Navy should revive the idea.

Another item we worked on was shooting enemy subs with anti-aircraft guns. We put a flock of small boats out in range of our guns, each carrying two men and a can of green paint. As the German submarines came to the surface we would lasso their periscope, draw up close to it, and paint the glass 'scope. The U-boat commander, thinking he was still below water, kept coming up and up. When high enough we would shoot him down with AA guns. This idea worked well for a while. But the U-boat commanders caught on and would open a hatch. Then when the ocean stopped pouring in they knew, if they were still alive, they had surfaced.

There were many other projects I could tell you about but I suspect they are still classified.

The Army must have changed too, since I was last on active duty. In my day we did not need radar sets to tell the difference between a walking man and a woman at any range, let alone 10,000 yards.

Colonel R. R. Velie  
Signal Corps, USAR  
Charleston, West Virginia

☆☆☆

### To the Editor:

Dick Kirkpatrick's report on the Buehler Turbocraft (March *PM*) includes an error. . . . He states that the "jet unit works under Newton's First Law of Motion, which says that for every action there is an equal and opposite reaction."

Obviously Mr. Kirkpatrick has in mind Newton's Third Law. The First Law, if I recall my elementary physics, says that an object in motion or at rest will continue so unless acted upon by another force.

A small point, of course, in an otherwise fascinating report.

Charles B. Gillet, Jr.,  
Boating Editor  
The Baltimore News-Post,  
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## Sidelights from the PENTAGON

By William R. Kreh

DID YOU KNOW that diving to a depth of 100 feet is equal to drinking three martinis? At least that's what Navy deep-sea divers claim. It's all because of a weird phenomenon called "rapture of the deep" that's now being studied by the Navy. The condition is caused, tests show, by breathing compressed air in which there is an excess of nitrogen. There have been cases where divers, working at great depths, have got riotously drunk in a few minutes. The further down a diver goes the more intoxicated he gets, and sooner. It's not altogether an unpleasant experience, divers say, but they just don't know what they're doing after it hits them—and this makes it dangerous.

THE ARMY's studying an idea which may take the guesswork out of diagnosing engine and electrical troubles in motor vehicles. The new method involves the use of electronic equipment to pinpoint sources of actual or potential breakdowns in engines and electrical systems. The method uses a digital computer to receive information from transducers—small microphones or stethoscopes—attached to various components. Information recorded would be matched against predetermined standards and tolerances to give an accurate basis for judging the condition of a vehicle.

THE NAVY, by the way, reports that two of its computers "talked" to each other at the David Taylor Model Basin. A new electronic link lets an IBM and UNIVAC machine carry on a conversation in mathematical terms.

COAST GUARDSMEN are warning mariners against relying too heavily on radar for spotting icebergs. They say tests show radar is about  $\frac{1}{100}$  as good as spotting ice as it is at spotting ships. Further, a wave is a slightly better radar reflector than a piece of ice the same weight. Officials say the chance of seeing a big, skyscraper iceberg on radar are excellent,

but the chance diminishes very rapidly with the size of the berg. Hunks of ice big enough to sink a ship could be altogether invisible on an ordinary radar set in waves four feet high.

FOGHORNS are another subject that's caught Coast Guard interest, and it's been carrying out some interesting tests with the warning device on Great Duck Island, off the coast of Maine. Essence of the tests was to make a noise of known strength on the island while instruments aboard a boat measured its strength at different distances. This was done in all kinds of weather, as the Coast Guard wants to find out how much power to put into a signal to make it reliably effective at all times at given distances. The fog was measured carefully. A sample of it would be caught on a piece of glass and magnified to measure the size of water droplets. Then all the water would be wrung out of a sample to find how thick it was. The object was to find whether some kinds of fog carry sound better than others.

Wind conditions also were measured. A 30-foot mast had instruments to measure speed and temperature of wind at various intervals up to 30 feet. Minute differences between wind speeds and temperatures of different layers of air are believed to affect carrying power of sound over water. By studying results of tests, the Coast Guard hopes to learn why there are occasional dead spots in the field of a foghorn—spots of silence surrounded by areas in which the horn can be heard—and why the signal can be heard clearly at one time but not heard at all at the same spot at another time.

A COUPLE of odd uses were recently made of Air Force planes and Navy men. The Air Force sent two F-106 jets from Geiger Field, Wash., zooming over Glacier National Park, Mont. The F-106s made nine Mach-busting, low-level passes over the park and started a dozen snow avalanches. The project, called "Operation Safe Slide," was made to get the overhanging snow down under controlled conditions.

Also in the state of Washington, the residents of Bremerton beheld a strange sight recently. The carrier *Coral Sea*, just finished with reconversion work at the Naval Shipyard there, presented a perplexing scene with members of her crew running full speed from side to side on her flight deck. Strange as it looked, it was all part of a serious test. The ship's engineers had to know the period of roll of the ship—the time it takes to travel from maximum port inclination to maximum starboard inclination. And the only way to get the ship rolling enough to take a measurement was to have the crew run wind-sprints back and forth on the deck. ★ ★ ★

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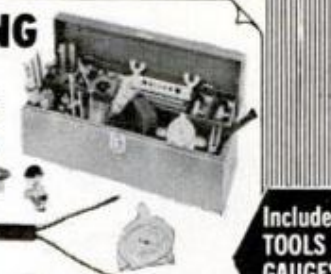


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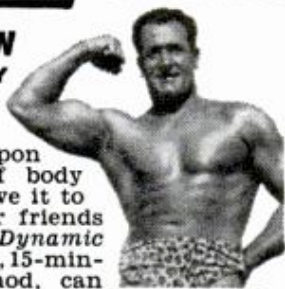
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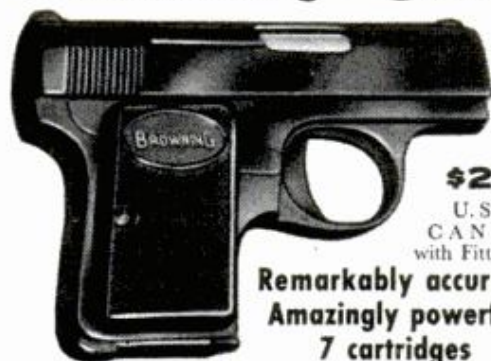
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# WHAT'S UP IN THE AIR



By James Biery

THE CONVAIR 600, scheduled for completion next month, sports four odd-looking pods on the trailing edge of its wing. Engineers say the canoe-shaped "speed capsules" will help the plane fly faster: When the 600 flies just under the speed of sound, air is moving over the upper surface of the wing at a supersonic rate. Shock waves tend to form along the trailing edge, creating drag. The speed capsules straighten the air flow, postpone formation of the shock waves. The jet-powered 600 thus will be able to fly at 635 miles an hour and at 91 percent the speed of sound (Mach .91).

WILLIAMS RESEARCH Co., of Walled Lake, Mich., has developed a 23-pound jet engine that develops 70 pounds of thrust—power at the rate approaching the thrust-per-pound ratings of jet engines which power commercial aircraft. Company president Sam Williams not only suggests the engine for light aircraft, he's urging trials of the engine on helicopter rotors.

LIGHT PLANE pilots now have a lifesaving device that warns of ice build-up on wings. Developed at the Illinois Institute of Technology, the alarm consists of two translucent plastic rods placed parallel and a fraction of an inch apart on the wing. A light is beamed into one rod, an electric eye monitors the other. When ice forms between the rods, light refracts out of the first rod, through the ice, and onto the second rod. This activates the electric eye, triggering an alarm warning the pilot to maneuver into warmer air.

THE Air Transport Association says some 300 turbine-powered transport aircraft are being operated by U.S. airlines. Of this number, 68 are pure jet. The Association says approximately 230 new pure jets and 80 turboprops will be added by 1962.

A JET-AGE pioneer—the F-86 Sabre Jet—retires this month after 12 years' service in the Air Defense Command. The F-86 won fame during the Korean War for its success against the Russian MIG-15 and at one time held the world's speed record. Its normal speed, 650 miles per hour, is too slow today, so many of the craft are being turned over to National Guard units. ★ ★ ★



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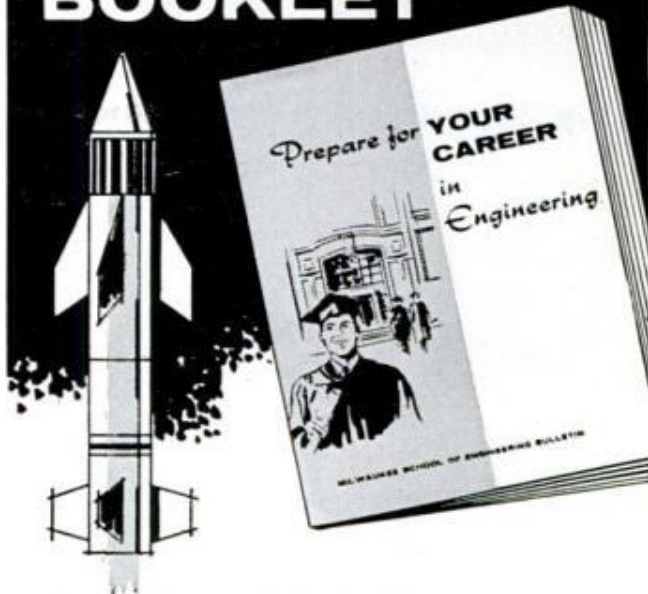


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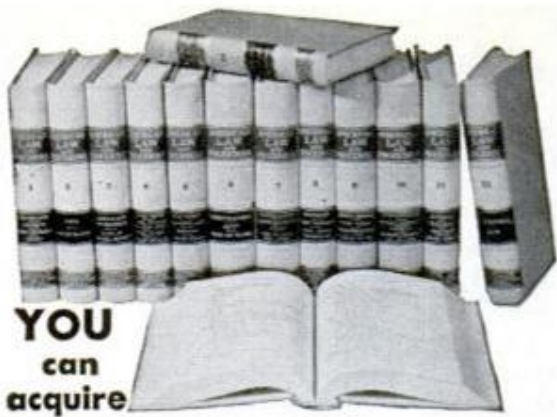
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By Clifford B. Hicks

"CEMETERIES" for radioactive wastes will be established on federal and state-owned lands. This is the new policy of the Atomic Energy Commission.

Selecting sites on government-owned lands will permit long-term government control to protect public health and safety. The sites will be chosen after detailed studies to assure that the land will retain the buried materials without "leakage."

Actually such a cemetery requires very little land. All the low-level wastes at Oak Ridge have been buried in a 60-acre area. Authorities estimate that all the wastes produced in the next 20 years in the 16 states of the Northeast area could be safely handled in a 200 to 300-acre site.

But the AEC policy does point up the waste-disposal problem. Daily, in our reactors we are creating monsters that must be buried and then watched for centuries.

— • —

OTHER RADIOACTIVE monsters are contaminating the atmosphere. Now that fallout exists, a great deal of research is being done, not on how to eliminate the problem, but on how to live with it.

Scientists at the Georgia Institute of Technology, for example, report that they can cut the radioactive cesium content of milk about 38 percent by feeding cows grass grown indoors. Radioactive cesium is one of the principal isotopes in fallout.

In the experiment, various grains were grown in grass incubators to provide a substitute for fresh pasturage. The cereals grew in nutrient solutions without soil.

Ten cows were fed the special feed while a similar group was pastured normally. The reduction in the content of cesium 137 in the milk was striking.

Does this research hint at a day when we'll have to live and raise our food under roof, to protect us from the invisible monsters we've created?

— • —

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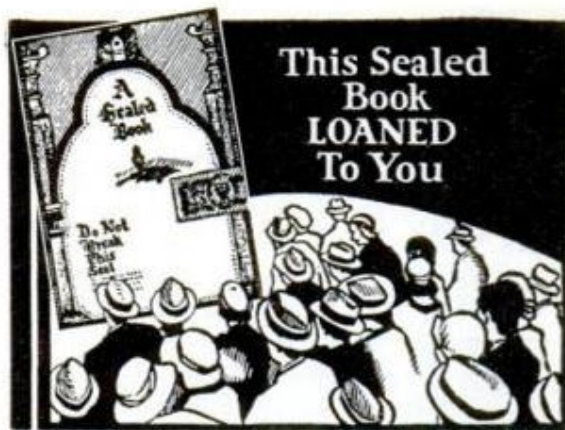


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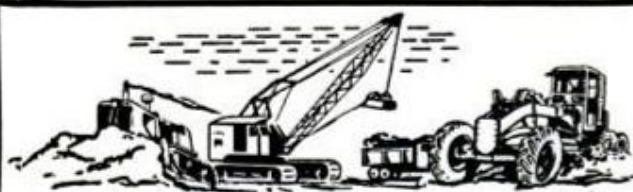
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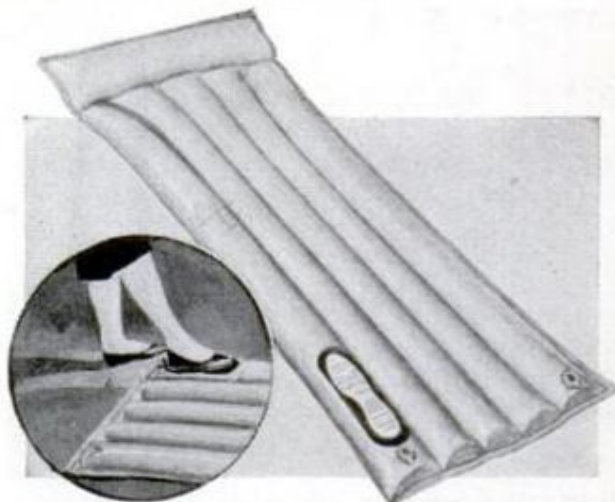
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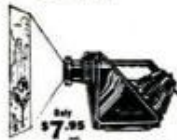
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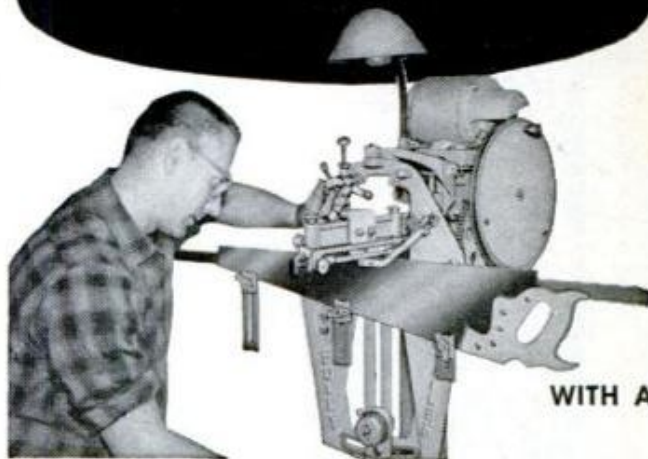
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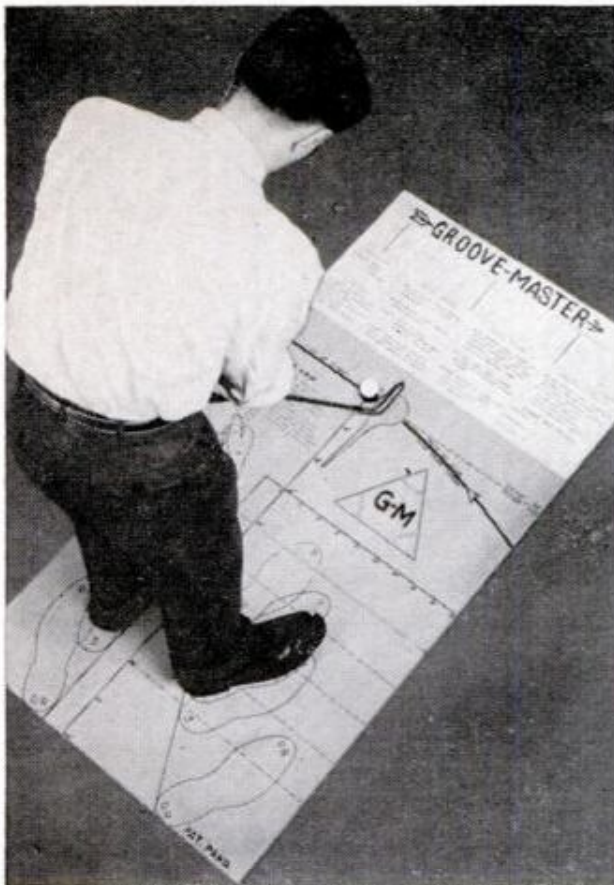


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# TUNE IN ON THE INVENTORS

By John Linkletter

PEOPLE who need an occasional boost for the ego will find great comfort in a wind-up gadget that features a pair of sculptured hands which applaud. Inventor Albert M. Zalkind of Arlington, Va., received patent No. 2,931,135 for it.

IT TOOK 17 years for two well-known scientists to be granted a patent on a radio-sonde for projectiles. Developed in 1943, the instrument was then used to radio data from shells fired by Navy guns; later, it went into satellites and space vehicles. Granting of patent No. 2,931,897 occurred in April after information was declassified. The inventors, Drs. M. A. Tuve and J. Van Allen, assigned rights to the government.

TWO NEW PATENTS apply to small boats. One, a retractable landing gear (No. 2,929,079) aids in beaching or transporting a boat. Inventor is Robert Totten of Toronto. The other is a self-bailing boat (No. 2,929,347), the brain child of Preston L. Veltman of Severna Park, Md.

DAVID GUTMAN of Philadelphia has come up with a real break for pedestrians who tangle with cars. Not that a tete-a-tete with a moving bumper is ever pleasant, but the device makes it a little less damaging by sending out extensions to hold the pedestrian against a cushion on the car's hood. This action prevents him from falling backward to the pavement. The patent number is 2,928,691.

PULL WEEDS from the yard by the foot! A device that a lazy (or stiff-backed) gardener wears like a sandal has a forked tip which is used to uproot weeds. Patent No. 2,928,655 was granted to Richard W. Armstrong of Potomac, Md., for the idea.

BLACK AND WHITE motion-picture films can be made into color with a process invented by Wadsworth E. Pohl of Los Angeles and granted patent No. 2,927,857. A black and white image is projected on a sheet of material that can be colored. After it's colored, the sheet is photographed on color film with the monochrome original in contact with the color film. Both color and detail are on the resulting film. ★★★



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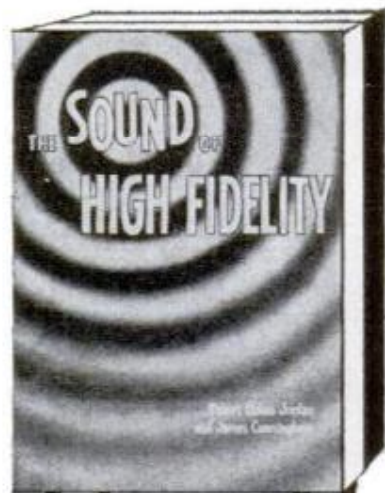


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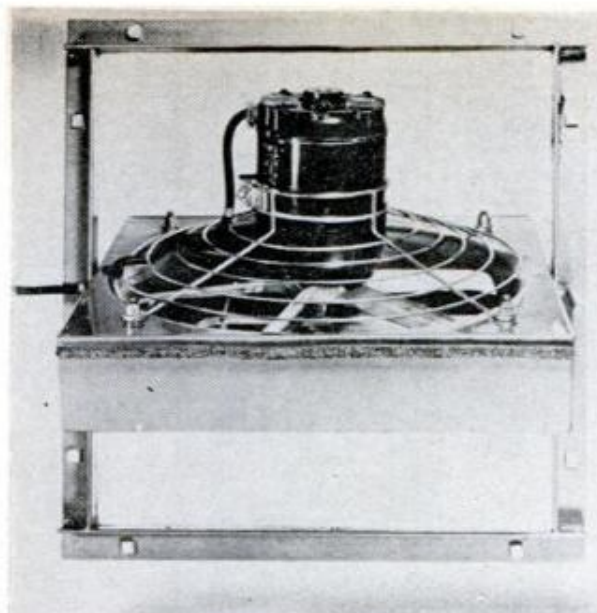
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It will be possible to build helicopters capable of flying 345 miles an hour and to build helicopter cranes capable of lifting 50 tons within the next decade, says Philip L. Michel, chief of advanced research for Sikorsky Aircraft Division of United Aircraft Corporation.

"Research results indicate that the helicopter can be designed to achieve speeds from 200 to 230 miles an hour by various means," he says. "These include greatly increasing negative blade twist to delay blade stall on the helicopter's retreating blade, increasing rotor solidity by adding more blades, and using such auxiliary forward propulsion as turbine engines with conventional airplane propellers." He says the installation of fixed wings on a helicopter provides added lift and thus reduces the load supported by the rotor blades, giving the possibility of further increasing speeds to as high as 345 miles an hour.

Predicting that the crane helicopter—a type under development by his company for transporting heavy objects—will carry payloads of 50 tons by 1970, Michel says, "Design work has been active on a crane helicopter which can carry a 20-ton payload over a distance of 50 miles or can fly as far as 1000 miles with no payload for ferry purposes."

He says that while such performance increases are within the helicopter industry's capabilities, their achievement will require greatly expanded research and development by both private industry and the military services.

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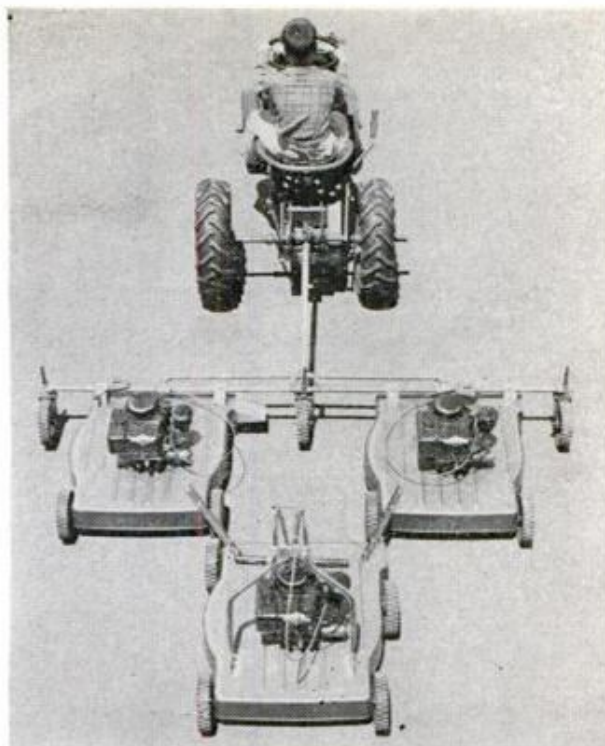
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## Undersea Mountain Higher Than Mt. Whitney

Rising 15,980 feet from the ocean floor to within 120 feet of the surface is a huge undersea mountain—higher than California's Mt. Whitney—recently discovered in the South Atlantic. The formation, termed a seamount by geologists, has a platform top located 210 feet below the surface; one isolated knob extends upward another 90 feet.

Discovered by Columbia University scientists aboard the university research vessel *Vema* about 550 miles west of the Cape of Good Hope, South Africa, the cone-shaped seamount is some 35 miles across at the base and five miles across at the top. Columbia geologists said that the formation probably existed as an island, protruding well above the surface, during the last glacial period 8000 to 10,000 years ago. After that period, melting ice changed the worldwide sea level and the waters of the Atlantic rose about 180 to 240 feet, submerging the island.

Associated with the seamount is a large anomaly in the earth's magnetic field, indicating it is composed of highly magnetic volcanic rock. A blanket of manganese-coated sand and gravel is spread around the base of the seamount at a depth of 15,600 feet.



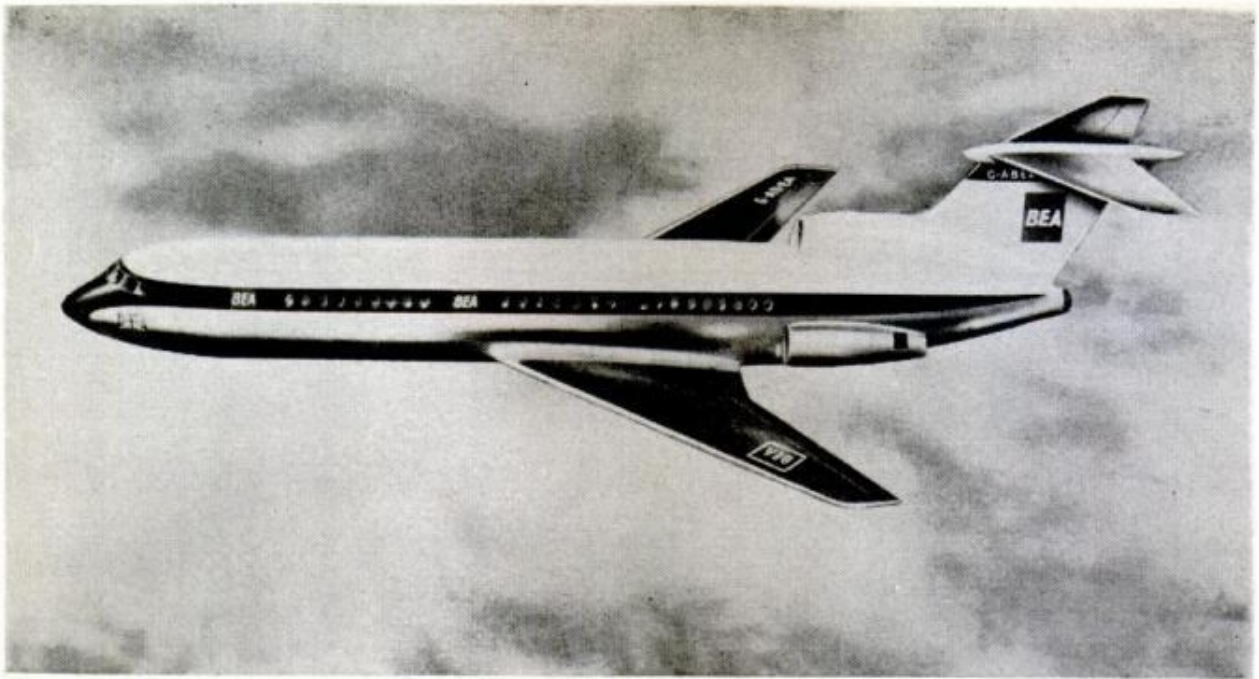
Karl J. Krausse, 11748 Gainsborough Rd., Rockville, Md.

## Quick Way to Mow the Lawn!

Karl J. Krausse of Rockville, Md., cuts his grass three times as fast as before by arranging three mowers so that they cut one six-foot strip. He pulls them with his tractor and cuts two acres of grass an hour.



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### Subsonic Jet Plane Has Three Engines

Designed to be a subsonic stagecoach, the British-made Airco D.H. 121 is scheduled to begin carrying loads of 30 to 100 passengers next year. It is a three-engine jet airliner — one engine is mounted atop the rear of the fuselage — and will cruise at 600 m.p.h. in hops of some 1200 miles.



### He Reproduces Eggs On Shells of Wood

Artist-naturalist Johannes Paulsen has painted 1400 proper-sized wooden blanks with colors and designs of eggs of some 300 species of birds. He exhibits them, and facsimiles of tortoise, crocodile, snake and shark eggs, in a museum on the North Sea island of Sylt, a nature preserve off the coast of Germany. He copies eggs while they are lying in their nests and he has traveled the world over seeking out different species. Some 60,000 people visited Paulsen's museum in 1959. He plans to start another such collection in the United States.



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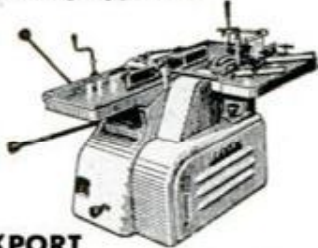
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## Got Your Boat Stamp Yet?

After April 1, 1960, any boat with more than 10 horsepower operated on the navigable waters of the United States must be numbered under the Federal Boating Act of 1958. On that date the Coast Guard began accepting applications for numbers for boats in states which haven't yet adopted their own numbering systems. The states are: Alaska, Connecticut, Georgia, Hawaii, Idaho, Maine, Massachusetts, Iowa, Nevada, New Hampshire, New Jersey, Pennsylvania, Tennessee, Wyoming, Washington and the District of Columbia.

Applications for a "Federal Certificate of Number" can be obtained at local post offices. The completed application, with the \$3.00 fee, is returned to the post office. Postal clerks issue a temporary certificate and file the application with the Coast Guard, which eventually supplies the boat owner with a pocket-size certificate of number on an embossed plastic card, which must be aboard any time the boat is in use. Five states, New York, Oklahoma, Missouri, Colorado and New Mexico, have adopted new numbering laws, which should be accepted by the Coast Guard, and five others, Maryland, Kentucky, Louisiana, Mississippi and Virginia, may enact laws by July 1. The Coast Guard Commandant has authority to delay numbering in those states until July 1 to give them time to work out their own numbering system.

## Biological Warfare on Insects

Scientists are beginning to plot a full-scale biological war against disease-bearing insects that are resisting the effects of chemical insecticides. An international group recently reviewed previous campaigns, and discussed future strategy.

As a weapon, biological control has had a limited use for some time. The Japanese beetle, for example, is now largely controlled by a white spore dusted on lawns. This causes milky spore disease, resulting in the death of beetles. In general, however, biological control had, until recently, been abandoned in favor of effective insecticides such as DDT. These chemicals now seem to be losing their power to knock out toughened insects. Also, large-scale use of some insecticides has killed off many organisms that normally feed on these insect pests. These two factors have revived interest in biological, or natural, control.

The scientists report that biological control is checking insect growth by use of such natural parasites or predators as viruses, bacteria, fungi, worms, protozoa, and other, larger organisms.



Stanley A. Jacques, 7009 Kittyhawk Ave., Los Angeles 21, Calif.

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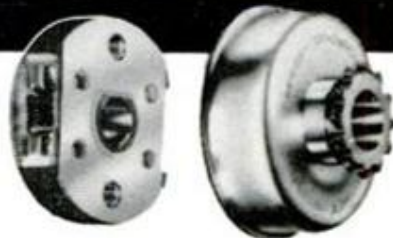
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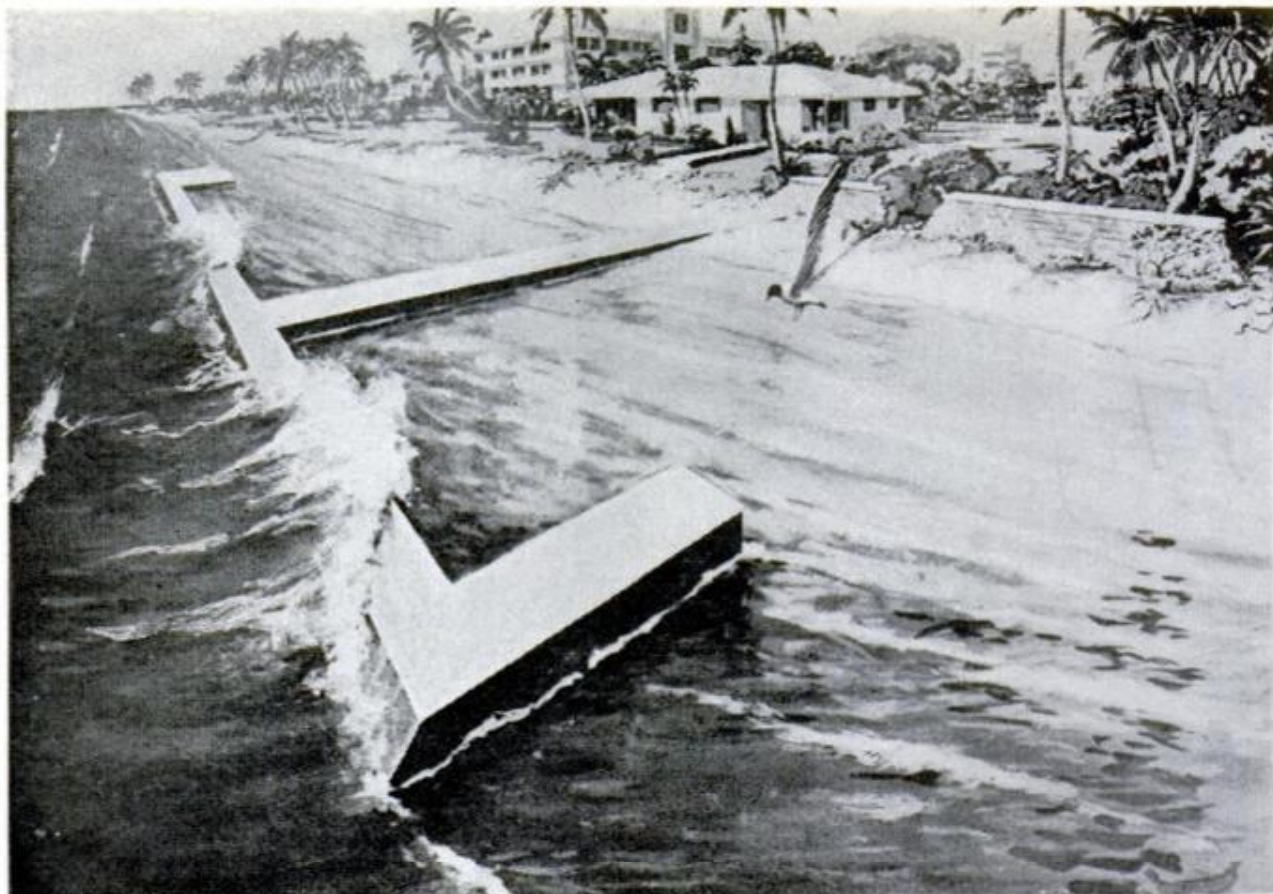


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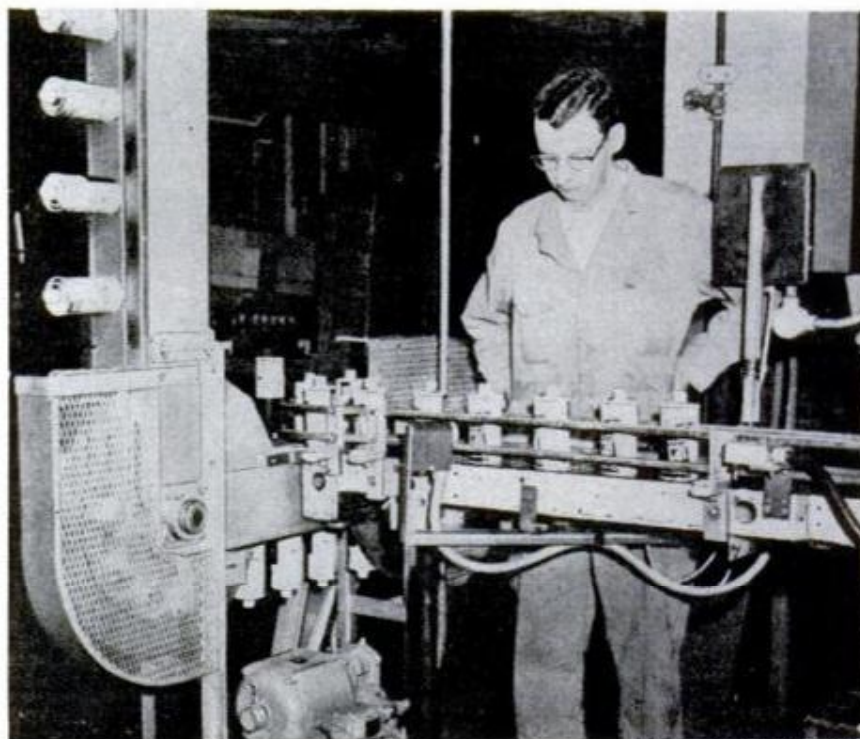
## T-Shaped Wall Traps Sand to Build Beaches

Sand beaches can be saved and new beaches created at the same time, by a unique T-shaped concrete wall designed by John L. Schmeller of Fort Lauderdale, Fla. The sand accumulator breaks the force of incoming waves, forcing them to drop their loads of sand inside the cross-

bar. At the same time the inside surface of the crossbar keeps sand from being swept away by receding breakers. One 100-foot crossarm will build up to 500 feet of beach; the inventor estimates that whole sections of shoreline could be built up and protected by the T-shaped walls.

## Please Take Note, Sir Isaac Newton

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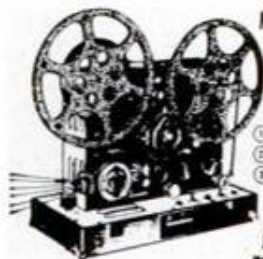
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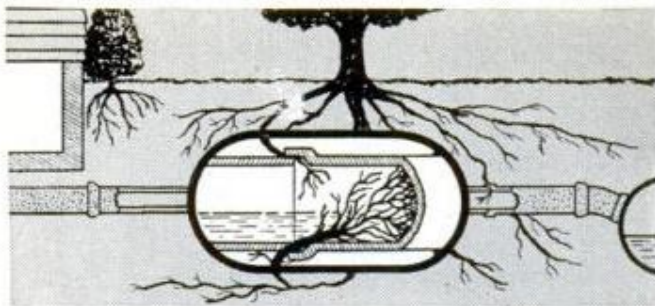
from the world of

By James Biery

EARTH'S INTERIOR may be different from what has been imagined. From studying orbits of manmade satellites, Dr. John A. O'Keefe of the National Aeronautics and Space Administration concludes the earth consists of rigid materials—as strong as a brick wall—down to a hot fluid core 2000 miles below the surface. This density would give the satellite orbits their particular shapes. Formerly it was believed that the earth had a warm, molasses-like mantle of rock under a hard crust 20 to 30 miles thick. It was thought this mantle, in which convection currents rose to bring up heat, extended to the core. If O'Keefe is right, convection currents could not occur this way. This casts doubt on the theory that earthquakes happen when such currents push on the underside of the crust.

DR. M. L. KOPAC of New York University has been removing the nucleolus—a particle 1/5000 of an inch in diameter—from frog cells and transplanting them to other cells by using a mechanical device with electronic controls. His manipulations are scaled down in sequence until at last a needle a quarter-millionth of an inch wide enters the cell and sucks out the nucleolus. The technique and device allow cancer researchers to change conditions of cells at will. They also forecast the day when man may be able to wrench genes—the heredity controls—that cause human defects from cells and replace them with healthy genes.

REBUILDING CELLS has its equal in another scientific field called "Molecular Engineering." Scientists at the National Bureau of Standards, Washington, D. C., are now testing to find how different elements and other materials behave under a variety of conditions. The hope is that scientists will be able to alter the molecular behavior of materials so they can create materials to handle special problems. The transistor, the tiny chunk of germanium that has replaced the vacuum tube for many jobs, is an example of such property change. Pure germanium is a poor conductor. By adding a few atoms per million of indium, scientists free electrons in the germanium so they can move when voltage is applied. ★ ★ ★



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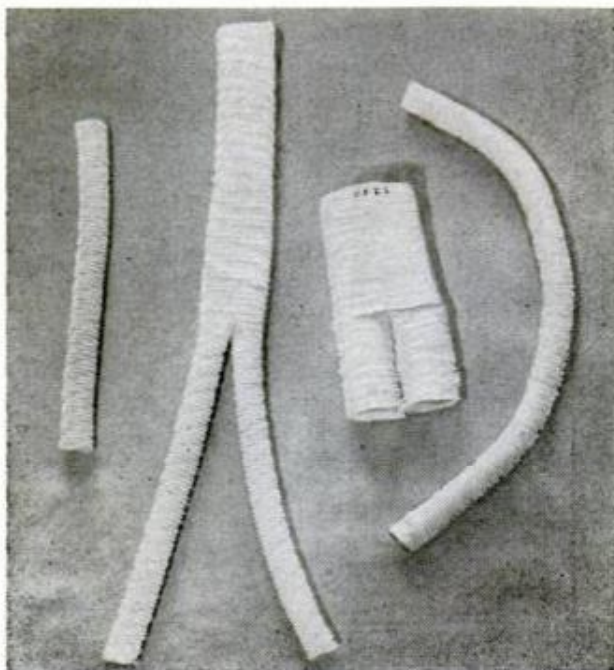
## Noisemaker on Gun Saves Soldiers' Ears

Adding noise to a gun can actually make the report easier on the user's ears, according to the Army Medical Research Laboratory at Fort Knox, Ky. Tests there showed that if a harmless "beep" noise is sounded one-fifth of a second before the gun is fired, two tiny muscles in the inner ear will con-

tract in an automatic protective mechanism and deaden the sound. PFCs Edward A. Schmidt and Ira Rubin are shown testing a .30 caliber machine gun equipped with an electronic noisemaker. Researchers believe that future weapons can be designed to produce a protective noise automatically.

## Fabric Arteries Save Lives

Synthetic arteries of Vinyon, Dacron and Nylon now help the body rebuild parts of itself. After an operation, blood fills pores of the fabric tube. Tissue cells invade the clots in a few days, coating the fabric, and in a month the artery is reformed.



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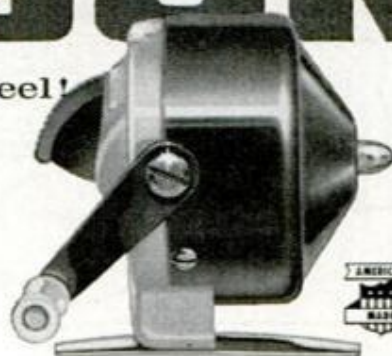
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Model No. 25PJ-DA on Sled Base

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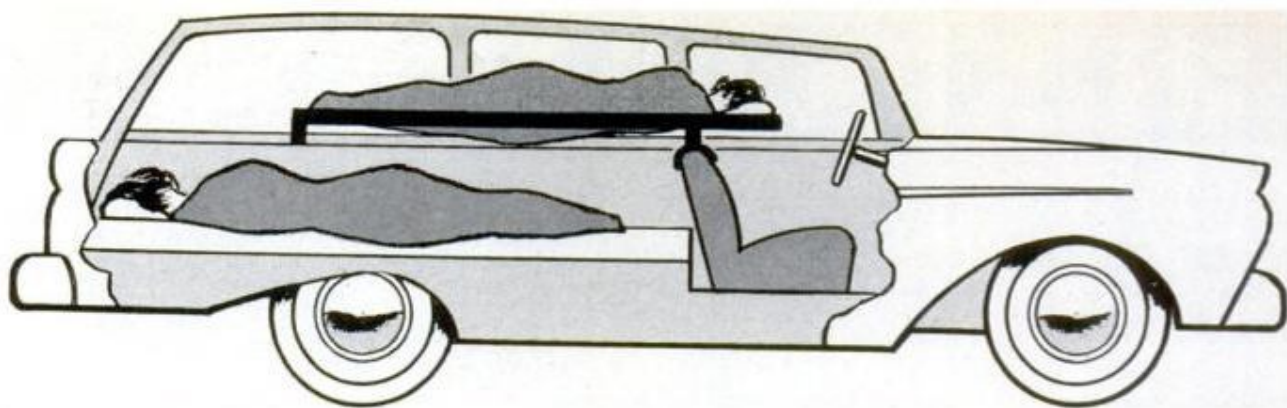
Here is the greatest advance in lawn sprinklers since Rain Bird introduced the part circle sprinkler. New, exclusive Rain Bird arm enables the Precision Jet to confine water to desired areas while walks, driveways and patios stay beautifully dry. There's no puddling, no water waste with Precision Jet . . . There's just the even precipitation of water *where it's needed!*

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Precision Jet can be used alone or in combination with other fine Rain Bird sprinklers. See your local dealer, or write for PJ literature.



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## Upper Berth Doubles Wagon Sleeping Space

Taking advantage of the space under the roof in a station wagon, a new wagon camping accessory adds an "upper berth" to any standard-size wagon and makes sleeping room for two more. Made of steel tubing and heavy canvas, the bunk can be assembled in five minutes without tools; installs solidly without marring the interior and folds into a compact 30-pound package.

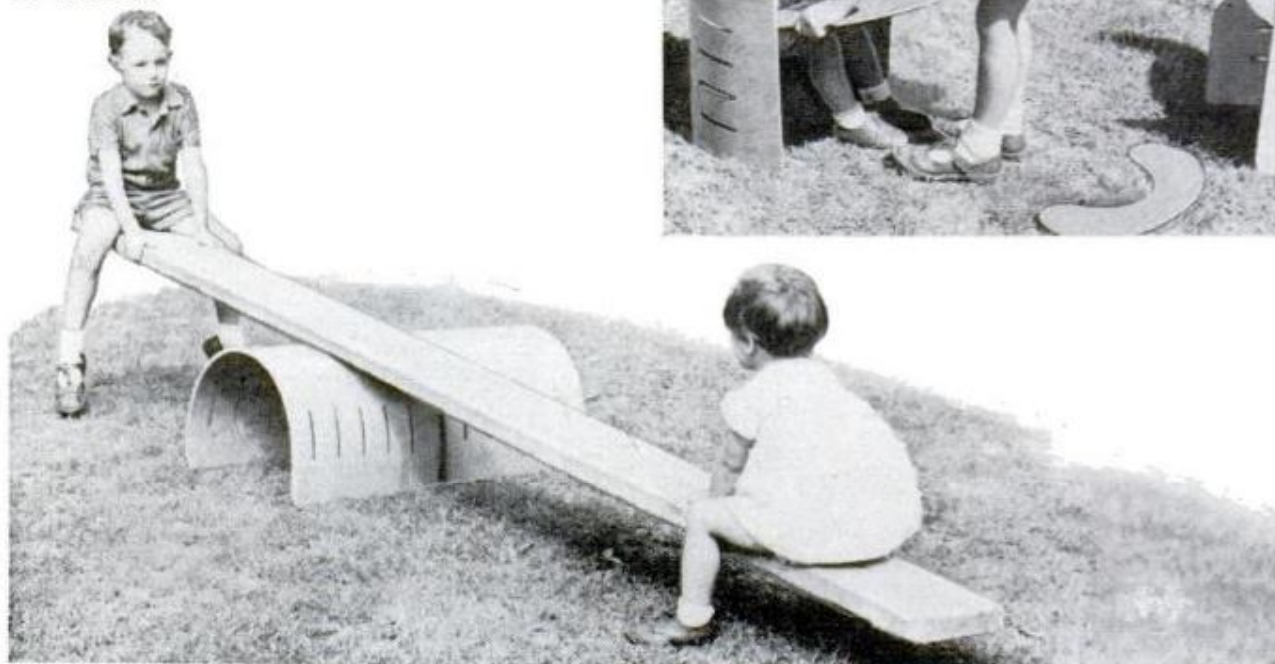
## Hose Buttons to Sole

There's no top on this shoe, but it stays securely attached to the wearer's foot. Secret is a special sole, molded to fit, which is held in place with a gold-colored stocking. The sole then attaches to a high-heeled platform, which can easily be detached.



## Versatile Play Chair

Challenging to a child's imagination is a Danish-designed play chair that can be put to a variety of uses. Its primary element is a slotted shell into which seats and eating trays may be slipped. Two or more shells may be linked to form a seesaw rest or tunnel.

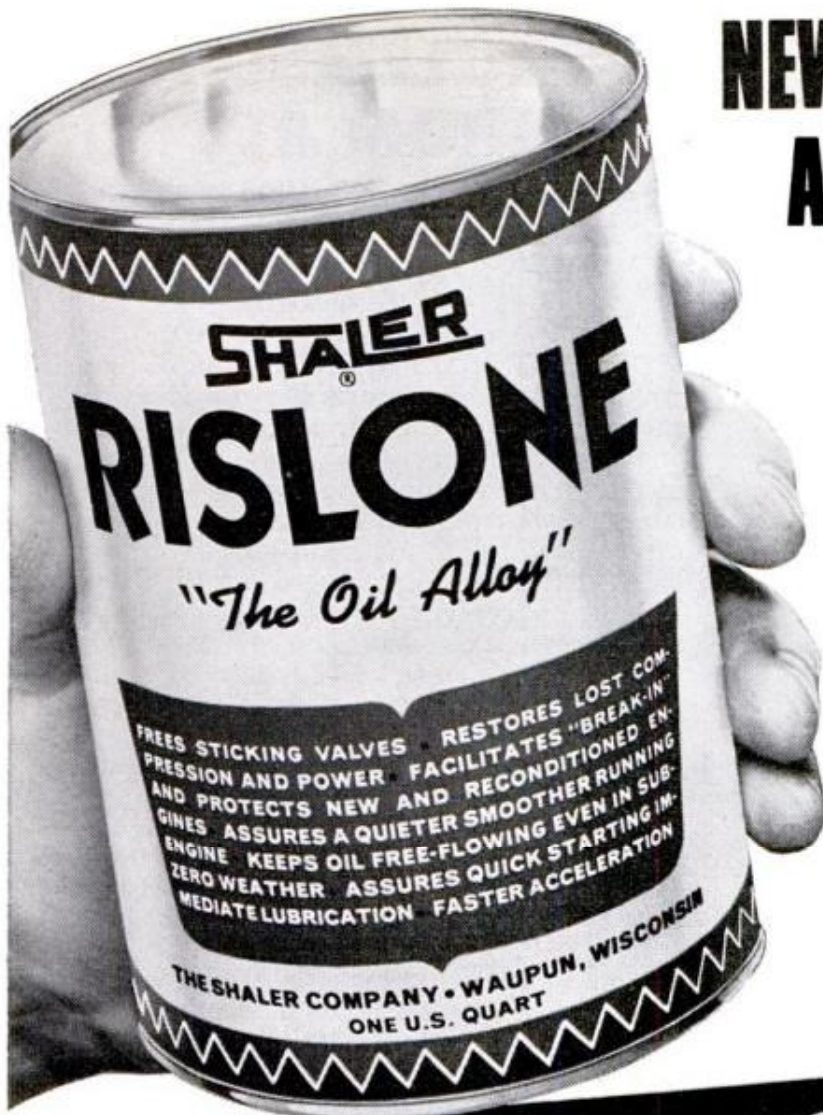


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306



## Tom McCahill Reports on: Longer-Lasting Mufflers

The No. One feature the average car owner looks for in a muffler is longer life. The big question is, What makes mufflers wear out so fast? and the answer is—condensation and its corrosive effect.

Modern high-compression engines and high-octane fuels create corrosive acids and fumes, and this deadly stuff has to go through the muffler. If the heated acid gases find any cold spots, condensation forms immediately. This mixture eats away like a rat in a cheese barrel. Soon most ordinary mufflers look like lace curtains.

The AP Parts Corporation, world's largest manufacturer of replacement mufflers, has developed "Dri-Flow" design—a way to beat the condensation bugaboos. This design (exclusive with AP) spreads the flow of exhaust gases evenly so that there are no cold spots to create condensation—cuts corrosive wear to a minimum.

Pictured below are two mufflers with clear plastic shells. You don't have to be Sherlock Holmes to see condensation developing in the ordinary muffler. The AP "Dri-Flow" design, without cold spots, is clear as a brush peddler's objective. As if this weren't enough for your buck, AP gives you much thicker steel, plus rust-resistant coatings . . . all at no extra cost.



Ordinary Muffler



AP "Dri-Flow" Muffler

The next time you need a muffler, take Uncle Tom's advice: see your AP dealer. More than 100,000 experts from coast to coast install APs—the longer-lasting mufflers. Look for the big red and white "Free Muffler Check" sign.



## THE AP PARTS CORPORATION

14-S AP BUILDING, TOLEDO 1, OHIO

# ITEMS FROM ALL OUTDOORS

By Dick Kirkpatrick

WORMS, WORMS, WORMS—the fishing-tackle trade shows, sports shows and tackle shops are full of them this season, and the "newest" thing in fishing is the oldest bait in the memory of most fishermen—worms. Anglers all over the country are buying ultra-soft vinyl plastic imitations of natural baits, and they're catching fish with them. Though not really new, they're just gaining wide acceptance, and they're the hottest thing in fishing since the big spinning boom.

And they *do* work. Fishermen and manufacturers report catches of nearly every game fish in fresh and salt water—even such unlikely species as carp and catfish. The best theory is that the fish don't necessarily mistake the phonies for the real thing—they just think it's something to eat and taste it to be sure. And they're hooked.

Why do they work? It's the plastic, which is flexible enough to wiggle nicely, and is translucent as nature's own. But the big secret is that it feels good to a fish. When he latches onto one to see what it is, he's fooled by the texture and stands around chewing the thing until (1) he swallows it, not at all unusual, (2) he finds your hook and spits it out, or (3) you hook him.

You can buy vinyl imitations of almost any form of natural fish food, from worms to spiders to foot-long eels; they all seem to be catching fish, but the most popular and apparently most effective are the imitation night crawlers. They cost from 10 cents for a plain bulk-style worm to 75 cents for a full-rigged job with built-in hooks, jig head, spinner, or wobbling head. It only takes a minute to rig the plain worms, and at that price you can fish around the rocks and snags where the fish hang out without losing much if you hang up. They come in a bewildering range of colors in endless combinations, but the most popular are black, white, orange and natural shades.

There are floating and sinking models; one with a gold band around its shoulders, and you can even get built-in fish-attracting scents such as oil of anise, maybe even essence of night crawler or pistachio nut.

Fished right—deep and slow—or even fished wrong, they catch fish. At the price, they're certainly worth a try. ★ ★ ★





*How to create a neighborhood stir*

## COOK & DUNN'S colored aluminum paint starts trend in home improvement

This roof created a neighborhood stir in a New Jersey suburb. One recent Saturday, the owner applied Cook & Dunn's *New-Roof* Colored Aluminum Paint in Colonial Gray. Neighbors commented, asked questions. Owner told them Cook & Dunn's *New-Roof* was his smartest home improvement buy in years, that it would seal hairline cracks and nail holes, that the heat-reflecting surface would mean a more comfortable summer ahead. Neighbors could see the fresh new beauty. Several bee-lined it to their nearest Cook & Dunn dealer. Others mentally set aside future Saturdays.

This sort of reaction is not confined to New Jersey—it's nationwide. Colored aluminum coatings made with ALCOA® Pigments have caught on everywhere. Customers recognize a new, easy way to weatherproof *and* beautify any property. There's a choice of colors (Colonial Gray, Windsor Blue, Ranch Green, Modern Red) for every taste and style. Coatings like Cook & Dunn's *New-Roof* are ideal for composition, shingle, tar paper, concrete, cinder block, stucco and metal surface. One coat covers and seals.

**Alcoa does not make colored aluminum paints or coatings,** but we will be happy to refer you to reputable manufacturers who do. Send coupon today for our free booklets.



This owner chose Cook & Dunn's *New-Roof* Aluminum Coating in a gleaming Colonial Gray that transformed the whole house. *New-Roof* is made by Cook & Dunn Paint Corp., Newark, New Jersey.

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BRADFORD, PENNA.

## Spotlight on the

# AUSTIN 850

By Art Railton

LOVE AT FIRST sight? Probably not. It's no dream car—dreams are too impractical. But this squat, squeezed, square Austin 850 is the most exciting piece of automobile to come out of England in a generation.

Lift the hood and in five minutes you'll have a crowd around. Under it is the most surprising engine layout you've ever seen. It is crossways, transversely mounted between the wheels.

Looking under the hood is exciting, but driving it is more so. It's a machine you enjoy driving right from the start. There's a lot of fun built into its stubby chassis.

You won't be tempted to give up the family car for it, but you may begin refiguring your budget to work it in as a second-car "scootabout." After all, it costs under \$1500.

Why is it exciting? Describe it quickly and it sounds prosaic. It is only 10 feet long, has a conventional overhead-valve, water-cooled inline four-cylinder engine. It's a two-door sedan (how prosaic can you get?). And it has tiny 10-inch wheels that make it look like a shoebox on casters.

But it is exciting and in a thorough, non-nonsense way. Only 10 feet long, it has almost the same amount of headroom and legroom as the average American car (of course, it doesn't have the hiproom—but who's so fat anyway?).

Space has been so budgeted that two-thirds of its over-all length is "people room." Yet its wheelbase is only 80 inches.

(Continued to page 74)

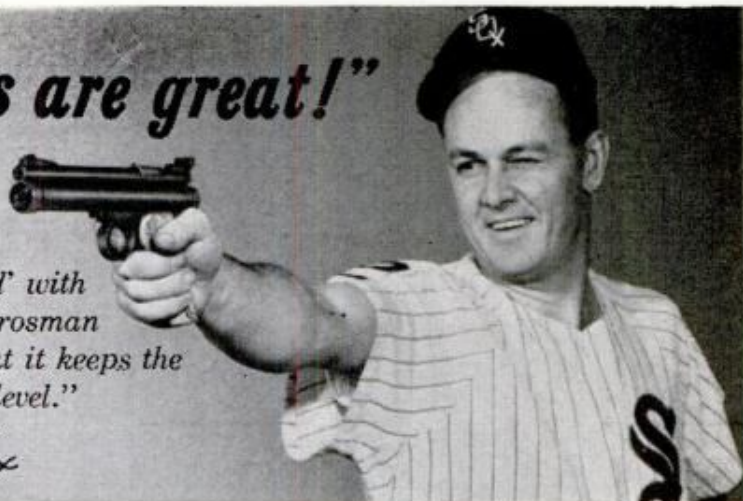


**"I think these guns are great!"**

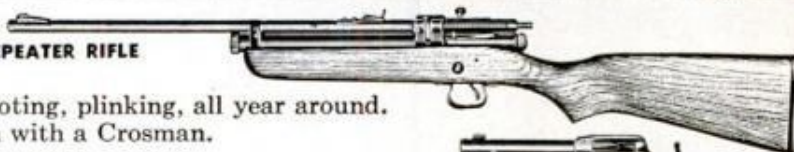
...says **NELLIE FOX**, Chicago White Sox star and American League Most Valuable Player

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*Nelson Fox*



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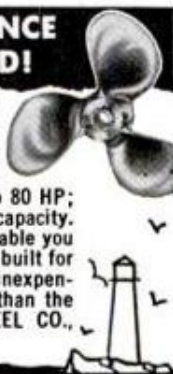
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With its tiny wheels on the corners, it has the roadability of a race car. It goes where you aim it, and willingly, eagerly.

On ice and snow it is as stable as an anvil. There's no need for concern, the front-wheel drive pulls the machine along in a straight line.

This new front-wheel drive (so bold that the British still scratch their heads about it in the pubs) has transmission and differential built right into the enlarged crankcase. All share the same lubricant. And the whole thing, engine, transmission, differential, is mounted sideways between the front wheels with the radiator on the left-hand side (as you face forward).

Air comes in the front grille as usual, passes over the engine (ignition is completely waterproofed) and then is pushed by the fan through the back of the radiator and discharged under the wheel housing.

With the engine weight all on the front driving wheels, the car walks away on the slickest pavement with a smugness that makes big-car drivers snort, their wheels a-spinning. If you pour the coal to it, the wheels will lose traction and spin, but without affecting directional stability. The car continues forward in a straight line with no side slip. Even a fool can drive this car on ice without danger.

And on corners! You won't believe it until you drive it. It pivots as flat and as confidently as a race car. Understeering is noticeable on fast corners, but not enough to cause any concern (anyway this is a standard American-car characteristic which you are used to).

Ride is not the best, but it's far from the worst. Considering the 10-inch wheels, it's amazing. All wheels are independently suspended on rubber springs—that's right, rubber springs.

What about economy? Fast driving over 40 miles of rural roads with an average of one stop every three miles resulted in a gas consumption of 31.7 miles per gallon. Most of the time the car was traveling 65 miles per hour.

In a city-driving test, never exceeding 30 miles per hour and with careful throttle usage, the car averaged an amazing 49.1 miles per gallon for 20 miles. This, no doubt, is somewhat sanguine and not typical, but surely 40 miles per gallon can be expected.

Acceleration tests showed the car going from 0 to 30 in 7.5 seconds, from 0 to 60 in 36.0 seconds. (All tests with driver alone in the car.) With a full load of four adults, the car is more sluggish, of course. It is also somewhat crowded, but no more so than some foreign cars several feet longer.

(Continued to page 78)

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But **NEVER**—when you use a Hayes garden hose sprayer!

The Hayes enables garden

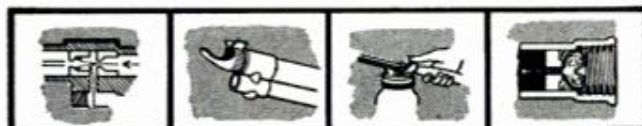
and lawn chemicals to positively do the job they were designed for. Because—it has patented, built-in *balanced, metering jets* that are precision-made and control-tested. These jets produce a thoroughly mixed, accurately proportioned spray—the correct mixture as specified by the chemical manufacturer.

This is important because tests by independent research laboratories show that many garden hose sprayers are woefully inaccurate in proportioning the water and chemical. These sprayers deliver a mixture that is either *far too weak* to do any good—or *so strong* it can burn the plants.

Along with its exceptional accuracy, the Hayes is so easy to use... lightweight, compact—automatic in operation. It has been tested and approved by leading manufacturers of garden chemicals for use with their products... the only sprayer ever to be awarded this remarkable endorsement.

Hayes garden sprayers are available in models priced from \$3.25. At nursery and hardware dealers everywhere. Write for *free* booklet on garden and lawn care.

**NOTE THESE EXCLUSIVE FEATURES:**



**Patented internal metering jets** for thorough mixing and accurate proportioning.  
**Adjustable nozzle deflector.** Sprays up, down, sideways and to tall foliage.  
**Positive on-and-off control valve** for instant shut-off at any stage of spray application.  
**Patented back-flow valve**—for safety. Positively prevents back siphoning of chemical into water line.

**SINCE 1934**—Hayes spray guns have been tested and proved by 26 years' usage... millions are in operation today.



**Hayes** Spray Gun Company

World's largest manufacturer of garden hose sprayers  
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Producer of Hayes and Ortho spray guns • Look for the same Hayes on the sprayer you buy

# REVOLUTIONARY BREAK-

World's FIRST And ONLY Tire  
Made With Action Traction  
In The CENTER Of The Tread,  
Where You Need It Most!

# NEW

# FIRESTONE

SPEEDWAY-PROVED  
FOR YOUR  
TURNPIKE SAFETY

# THROUGH IN TIRE MANUFACTURE

Gives you Action Traction in the center of the tread... Puts up to 83% more working elements on the road at all times... Increases tire mileage up to 35%... Assures safer stops and faster starts... Provides an extra margin of safety at high speeds... Sets new standards of protection against blowouts, punctures and skidding.

## NYLON "500"<sup>WITH</sup> POWER TREAD

Now... for the FIRST time in tire history... comes a break-through in tire manufacture that gives you ACTION Traction in the center of the tread, where you need it most! First from Firestone, and *only* from Firestone, comes the amazing new POWER TREAD that gives you safety and performance advantages never before possible with conventional treads with non-action centers.

The new Firestone Nylon "500" combines this new Power Tread with Firestone Rubber-X-101, the squeal-less "hush-hush" rubber, and Firestone Safety-Fortified Nylon Cord, made in Firestone's own factories, to give you:

1. Action Traction in the center of the tread...

2. Up to 83% more working elements on the road at all times...
3. Increased tire mileage up to 35%...
4. Safer stops and faster starts...
5. An extra margin of safety at high speeds...
6. New standards of protection against blowouts, punctures and skidding.

Like all Firestone tires, the new Firestone Nylon "500" is speedway-proved for your turnpike safety... a true champion in EVERY test of tire safety. Isn't this the kind of tire you want and need to protect your life and the lives of your loved ones? You can buy it on convenient budget terms, if you desire, at your nearby Firestone Dealer or Store.



Here's how...for the FIRST TIME in tire history... Firestone gives you ACTION Traction in the CENTER of the tread and up to 83% more working elements on the road at all times.

Diagram at left shows how the new Power Tread of the new Firestone Nylon "500" tire is precision cast in a single-unit tread mold to give you ACTION Traction in the CENTER of the tread where you need it most, with 83% more working elements in contact with the road at all times. ■ Diagram at right shows conventional tread cast in two-piece mold with rigid, non-action riding rib in the center of the tread.



# Firestone

BETTER RUBBER FROM START TO FINISH / copyright 1960, The Firestone Tire & Rubber Co.

# Stop ugly lawn weeds fast with **WEEDONE**

...the back saving chemical that  
can tell the weeds from the grass!



This strong,  
healthy (and  
ugly!)  
dandelion  
has been  
Weedone-  
treated—  
it's days are  
numbered!

The dandelion  
is dead,  
from leaf top  
to root tip.  
The fast,  
selective  
action of  
Weedone  
did it!



**WEEDONE** actually *selects* dandelion, plantain and more than 100 lawn-scarring weeds, kills them—fast! Yet, **WEEDONE** won't kill fine lawn grasses.

**WEEDONE** enters the system of the weed, kills the whole plant! No chemical weed killer is more effective or safer to use. Get **WEEDONE**, it's been compounded specially for home lawns!



Easy to apply  
... Liquid or Dry  
(still at the same  
low price!)  
8-oz. can (liquid)  
for sprayer \$1.00  
5-lb. bag (dry) for  
spreader \$2.25  
Larger sizes  
available.

(Dry form slightly higher west of Rockies)



## WEEDONE

Amchem and Weedone are registered trademarks of  
**AMCHEM PRODUCTS, INC.** (Formerly American Chemical  
Paint Co.) **AMBLER, PA.** • St. Joseph, Mo. • Niles, Calif.

The defroster is inadequate, there being not enough air flow to remove even interior steam quickly. The heater is a recirculating type, not a fresh-air design. Its fan is annoyingly loud. At zero temperatures, the heater is excellent for front-seat riders, much less so for those in rear.

Windows don't roll up and down, but slide sideways. Rear side windows open outward at the rear edges. Visibility is excellent, front and rear, although the rear-view mirror is about as big as those in ladies' purses.

Shifting is labored. The floor lever extends far forward almost horizontally and requires an upward motion to get into third gear. This is tiring in traffic. The test car had only 2500 miles on it so perhaps the stiffness of the shift was due to newness. Clutch operation is light and effortless, being hydraulic. All pedals are narrow, but light to use.

Neutral slot on the shift pattern is not easy to find or to identify. The synchromesh can be beaten although this does not prevent fast shifts, but simply adds a slight grinding to it.

Gas fumes are very annoying when the tank is completely filled.

The steering-wheel angle is more horizontal than customary, but not uncomfortably so. The car handles so well, steering is so precise, so quick, that the flat steering wheel doesn't detract at all from the gazelle-ishness of the machine. It is very alert and responsive at normal traffic speeds.

The trunk is small, but after all you don't plan to carry a boat in the trunk of a 10-foot-long automobile.

Anyway, everywhere you look there are bins to store things. A dashboard shelf runs the full width. Each door has a roomy package bin and there are two more alongside the rear seat. On the dash there is a handy maplight and two other small lights are located in the rear-seat bins. There is no dome light. Ashtrays are everywhere. The British are chain smokers.

Altogether this car has so much built-in interest that you should see it yourself. At first glance you may be tempted to walk away, convinced that this writer is irrational. But this is transportation, not luxury. It is transportation that makes you feel it wants to take you wherever you wish to go. It doesn't go reluctantly, but eagerly.

Sure it looks plain, ordinary, but so do fish and chips—and if you haven't ever eaten well-vinegared British fish and chips you've missed a delicacy that comes wrapped in yesterday's newspaper. ★ ★ ★



**It's up to you!** The Army's new "Choose-it-Yourself" System lets you pick valuable training before you enlist. Here's how it works: **1. Choose** before enlistment. Choose your training from fields like Auto Mechanics, Missiles, Aircraft Maintenance, Meteorology, Surveying—and many more. **2. Qualify** before enlistment. Take aptitude and physical exams to qualify for the training you've chosen. **3. Know** before enlistment. If you qualify, you know you'll get the training you want. Your choice is written into your future Army record—guaranteed before you enlist. **Choose, qualify, know—this week!** Ask your Army recruiter to show you his complete list of available training fields.

**Want training in Auto Mechanics? Construction? Electronics?**

**choose-it-yourself**  
before enlistment



*Auto Mechanic and Instructor*

**CHOOSE IT**



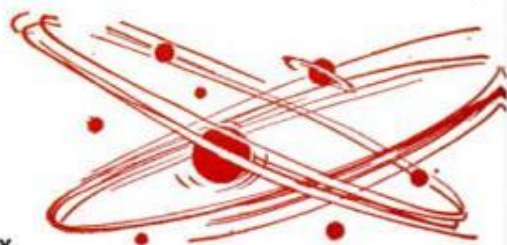
**YOURSELF VOCATIONAL TRAINING SYSTEM**

**US ARMY**

# AN EYE ON SPACE

By Dr. Dan Q. Posin

PROFESSOR OF PHYSICS, DE PAUL UNIVERSITY  
SCIENTIFIC CONSULTANT AND ADVISOR, COLUMBIA BROADCASTING SYSTEM



AN EYE from space is gazing down on us.

We have reached that degree of development which permits a very clear scrutiny of planet Earth from a distant vantage point. Soon we shall have pictures showing the entire Earth, alone, majestic, sailing through the heavens like a giant spaceship amply equipped with waters, lands, vegetation, multitudinous astronauts and huge covers of clouds.

Now it becomes possible for Earth-people to understand the full scope of the swirling clouds which reach mightily over the full round face of the planet. Prediction of Earth-weather has been haphazard until now, because the full cloud distribution has not been known. How can Earthlings make adequate predictions about anything when the full cause is not known? Now, thanks to weather satellites, meteorologists will see before them the entire image of the clouds and which way they are headed, bringing the promise or threat of waters from the heavens, or snows, or a sunlit filminess of beauty. Already hundreds of views have been televised to Earth from the orbiting camera eyes, and these views show parts of the Americas, portions

of Europe and Asia, the Gulf of St. Lawrence, the boot which is Italy, the Red Sea and the Nile. Once upon a time an Earth-warrior named Napoleon gazed upward at the Sphinx and meditated upon its eternity. Now, Earth-eyes can gaze downward upon that enduring monument, and downward, too, upon many Earth deeds, and see them in perspective. Are they enduring? Are they worthwhile? Or is it well that they are hidden by the clouds?

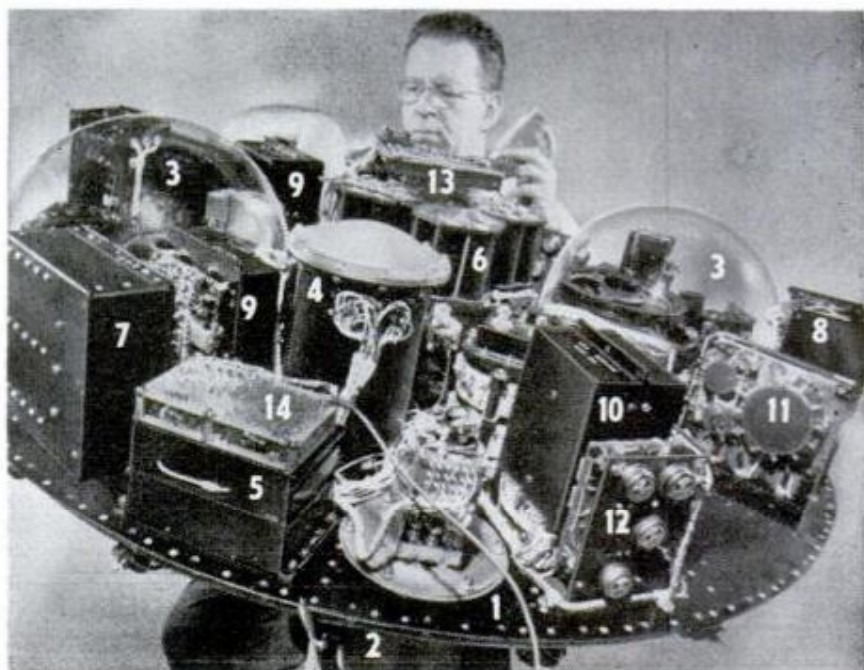
The TIROS satellite, the first meteorological satellite, though very effective, is limited in its picture-taking ability in two ways: its cameras do not see enough detail (in the first TIROS the close-up camera failed; however, its pictures at best would leave much to be desired as to detail-viewing and magnification); and the satellite was stabilized in such a way that its cameras point to Earth only during a portion of the orbit.

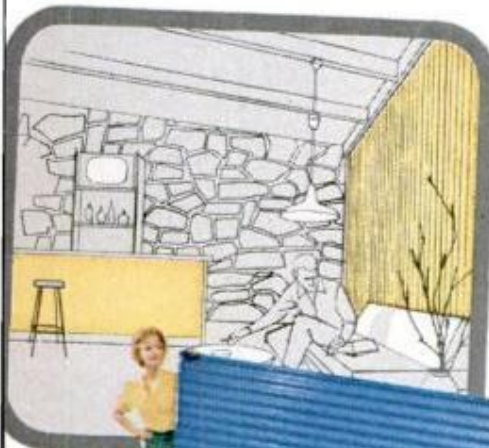
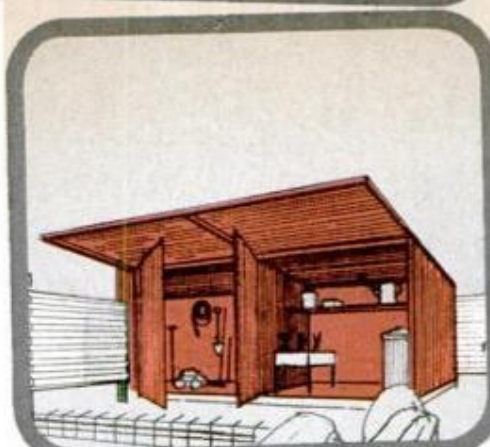
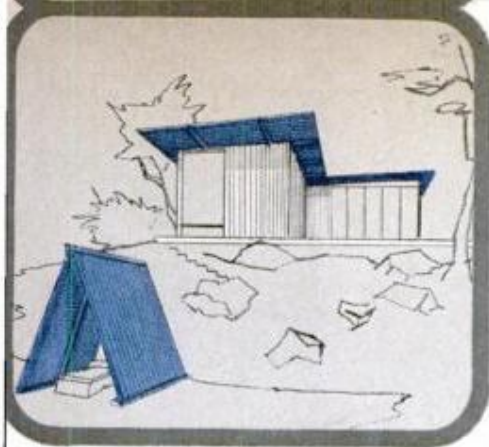
Other weather satellites are designed so that their cameras will always point toward Earth.

Earthlings, then, will soon see a great deal of their weather, and also of Earth deeds. Will it be good, what they see? ★★★

## TIROS PAYLOAD

1. Half-inch TV camera
2. Camera lens
3. Tape recorders
4. Timer
5. TV transmitter
6. Batteries
7. Camera electronics
8. Recorder electronics
9. Control circuits
10. Auxiliary controls
11. Power converter for tape motor
12. Voltage regulator
13. Battery-charging regulator
14. Auxiliary TV generator





# NEW!

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### PANELS Made By ALCOA

*Surround Any Home with Beauty . . . in 7 Exciting Colors!*

Create a cool, colorful oasis on your patio . . . shield your backyard play area from annoying winds, prying eyes, roving pets . . . protect your auto's finish from weather . . . make all the areas on your lot accessible for Care-free living—for pleasure and privacy—by surrounding your home with the beauty of Alcoa® COLORIB Panels. Choose from seven exciting colors, developed especially for Alcoa, and add the durable protection of aluminum to your patio, yard, game room and workshop.

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Aluminum Company of America  
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Send me a free copy of Alcoa's idea folder showing how to use Alcoa COLORIB Panels for my home.

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# Get satisfying flavor...so friendly to your taste!

NO FLAT "FILTERED-OUT" FLAVOR!

NO DRY "SMOKED-OUT" TASTE!



*You can light either end!*

**See how** Pall Mall's famous length of fine, rich-tasting tobacco travels and gentles the smoke—makes it mild—but does not filter out that satisfying flavor!

**HERE'S WHY SMOKE "TRAVELED" THROUGH FINE TOBACCO TASTES BEST**



**1** You get Pall Mall's famous length of the finest tobaccos money can buy.



**2** Pall Mall's famous length travels and gentles the smoke naturally . . .



**3** Travels it over, under, around and through Pall Mall's fine tobaccos . . . and makes it mild!

**OUTSTANDING...and they are MILD!**

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# POPULAR JUNE 1960 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 113 NO. 6

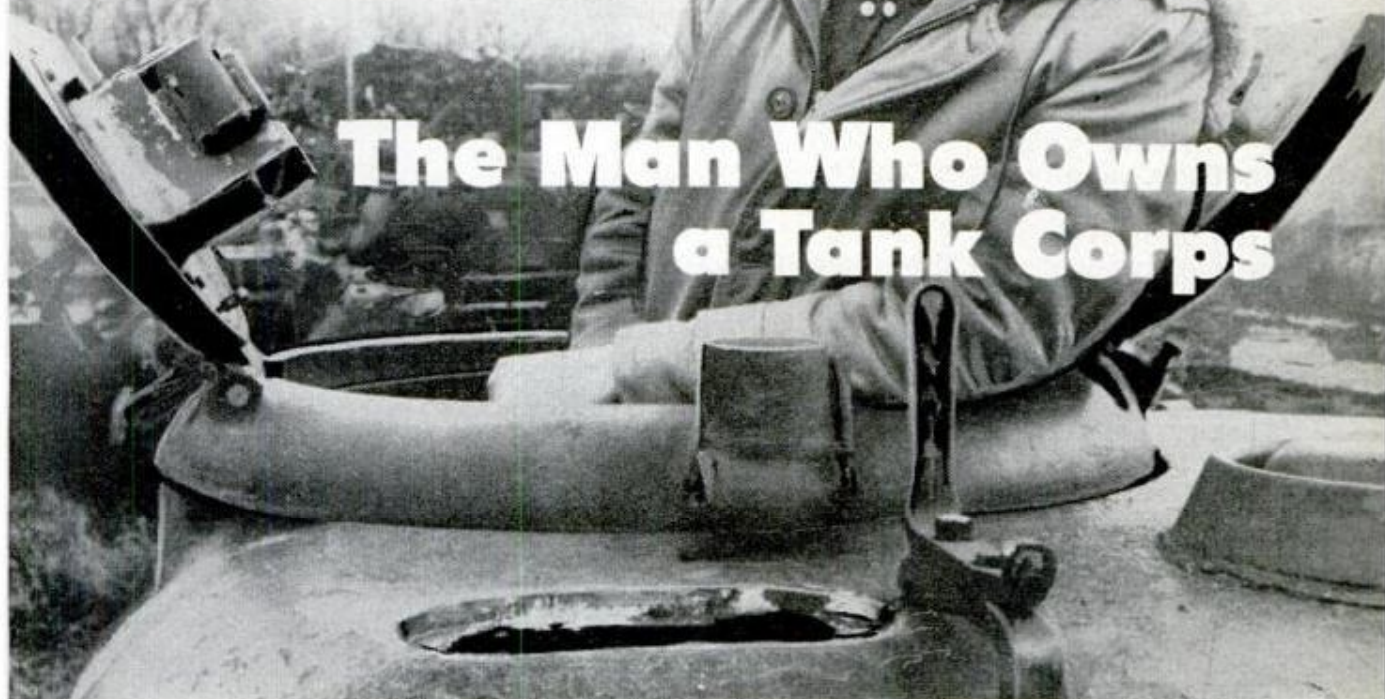


Photo by Joe Fletcher

This smiling man owns more tanks than Rommel ever had under his command during the biggest battles in Africa

By Alfred Balk

**A**T FIRST GLANCE, Walter Ising appears quite ordinary. He's a fortyish, somewhat thin man who speaks with a trace of a German accent. He has a thriving medium-size business in steel warehousing, and a home in the Chicago suburbs. Only one thing is unusual—he owns 500 General Sherman tanks.

Probably no other individual ever has owned that many tanks before. Certainly, says the U. S. Army, Gen. George Patton in the Battle of the Bulge couldn't muster that many. Nor could General Rommel in Africa, or MacArthur in Korea. Not many nations, in fact, ever had a corps of medium tanks at their command at one time.

Tanks are lined up at the arsenal for loading aboard flatcars. It cost \$17,000 just to load the monsters



Ising bought his as government surplus, 536 in all. His wife immediately commented, "What in God's green earth do you want with 536 tanks?" And certainly, since then, life for Ising has seldom been the same.

He has had adventures with the government, railroads, reporters, former tank drivers, present ones, and would-be ones. He's had unusual worries, and unique rewards.

Actually, he didn't buy the tanks for purposes of invading anyone. Like most others who have negotiated for surplus items, he only wanted to turn a profit on what looked to be a promising deal.

A friend started it all in 1958. "Here's a notice of sale of three batches of World War II tanks," he told Ising. "Why don't you bid on them?"

As president of Laube Steel Company and two smaller firms, Ising thought he was equipped to handle the project. So he bid. As in bridge, however, this required some preparation.

First off, 21 pages of specifications had to be deciphered, with such items as: "Tank, Combat, Med., 76 M/M Gun, M4A3, Horizontal Suspension, with engine, track and gun." (Some, it was noted, had a few things missing, such as engine, track or gun.)

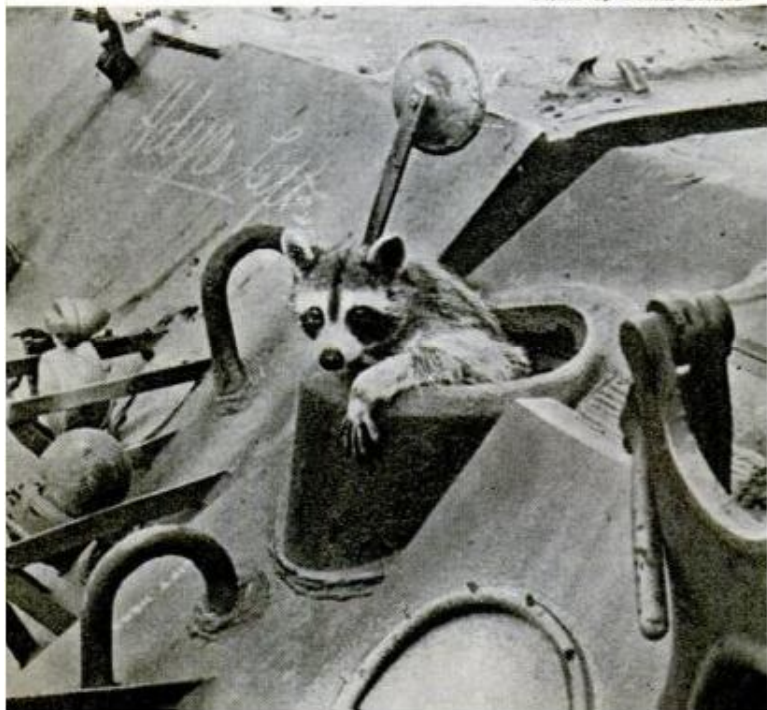
Next came a personal inspection. Ising, a former Army medical corpsman, knew a Sherman tank when he saw one. "What else," he says, "looks like that and weighs 35 tons empty?"

But 536 tanks originally worth \$47 million are hardly something one buys by mail. So he headed for the Rock Island Arsenal, 180 miles west of Chicago, and trooped the tanks' ranks.

Bidding is done by sealing an offer in an envelope, accompanied by a certified check

**Right, today's "General Patton" troops the ranks, inspecting each of his tanks. Below, raccoon found himself without a home when the tanks were moved**

Photo by Frank Stokes



as deposit. Five others bid. Ising was high with \$305,388.21 for the lot. So 44 dozen tanks were his.

That is, after a bit more paperwork.

For one thing, since the Shermans' original value exceeded a \$1 million limit, the Justice Department required papers showing the deal wouldn't "tend to create or maintain a situation inconsistent with the antitrust laws."

The State Department had to be satisfied the tanks wouldn't be used in somebody's revolution.

The Defense Department, not wanting any complications at home, required disarming of every vehicle before it went



Photo by Joe Fletcher

through the arsenal's gates for shipment.

Also, all vehicles had to await a Defense Department cameraman, who photographed every serial number to make it official.

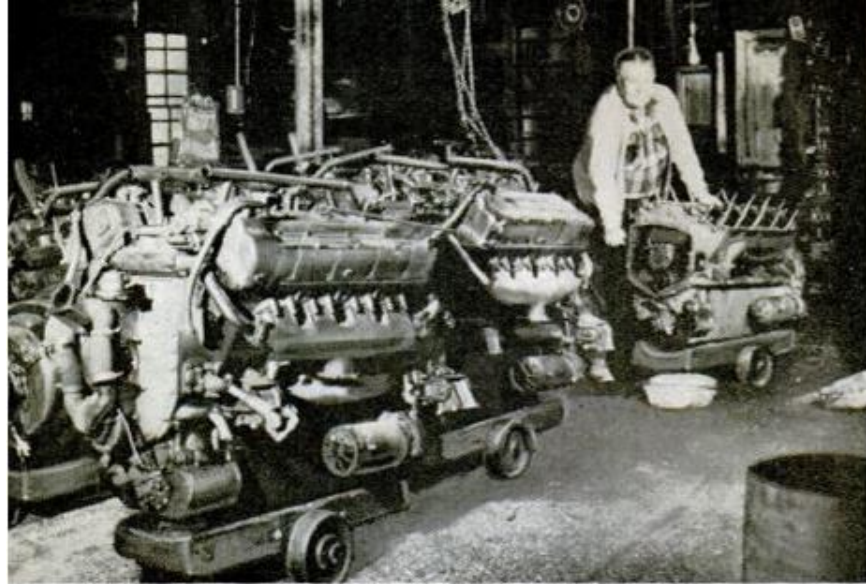
Then Ising had to get them moved. If they weren't off government property within 90 days of purchase, there was a four-cents-a-day penalty per gross ton. This totaled some \$700 daily, until the sixth delinquent day, when it would double. After 30 days it was all or nothing: The government could resell the Shermans.

To a man more accustomed to such dealings as buying steel from one mill and warehousing it for resale, or importing

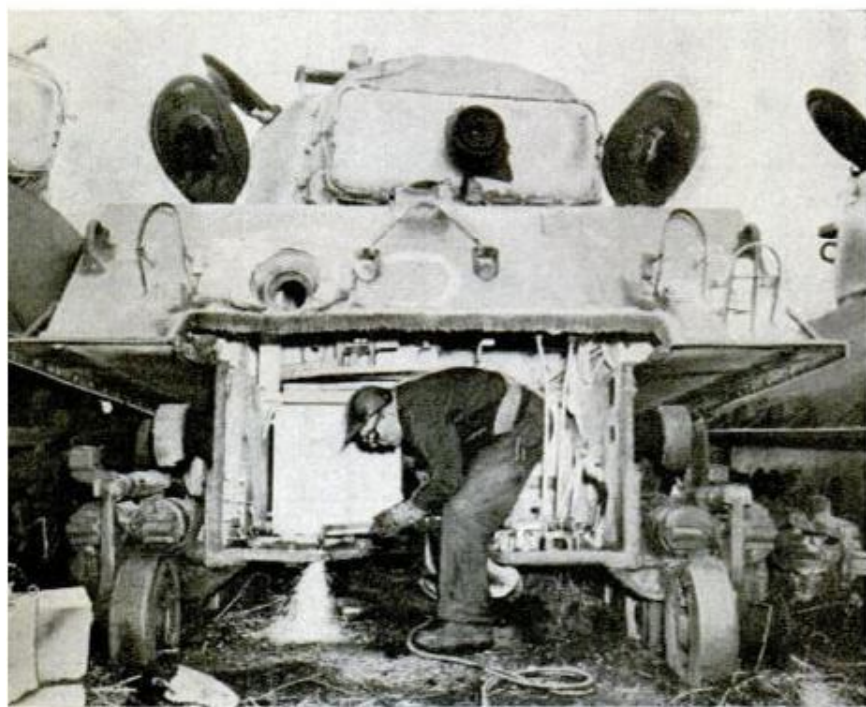
ship's plate from Japan to be sold here, this began to look a bit complicated.

The disarming, for instance, consisted not only of removing gun barrels, trunnion block bodies, recoil and firing mechanisms, and other items Ising never had heard of, but cutting them up as well. Also, he was told, live ammunition might be lying around, a blowtorch might explode the 62 gallons of oil and antifreeze inside each Sherman, or a carelessly handled recoil spring might launch a cannon barrel across someone's stern.

Nor were arsenal veterans to handle all this. Ising had to recruit his own squad, subject to security officers' approval. But



In the machine shop, diesel and gasoline-powered engines are cleaned and reconditioned, then sold for boats, oil rigs and pumps



Entire section of several tanks was cut away and sold to a foreign government according to precise specifications. Below, highway bridges wouldn't bear the weight, so tanks went by rail



soon he had 14 men, bought a special liability insurance policy covering all, and put them to work. Almost the first day a raccoon which had moved into a gun turret was flushed — but otherwise disarming went routinely.

Moving was the next obstacle. A medium tank is not a Volkswagen. It's 12 feet high and 8 feet wide. It can climb a two-foot vertical barrier; but on the straightaway, while cruising at 26 miles an hour it averages only 7/10 of a mile per gallon. More than one has cracked a highway. Driving away 536 Sherman tanks obviously was out of the question.

Trucking them did not look promising, either. Rock Island Arsenal is on an island in the Mississippi River. On three highway bridges that lead out, the heaviest permissible load is 20 tons. Hauling by truck would have required slicing each Sherman in half, costing time, extra men, and making it impossible to sell any of them whole later.

Rail was the only way. Luckily, the Rock Island Lines crosses the island. If Ising built a spur (costing \$2000) he could connect to the tank yard. But on the other end, 55 miles northeast of Sterling, Ill., he planned to park the tanks in a pasture near a mill. For that there was no direct rail connection. In any case, there was no freight rate for tanks.

If the Rock Island took the tanks to Clinton, Iowa, though, they could be switched to the Chicago & North Western Ry., and move regally to within a few feet of their home pasture.

But this meant crossing a state line. So when a freight rate was arrived at, the Interstate Commerce Commission had to approve it.

A clerk's \$15,000 error in calculation bounced the first petition. But finally the ICC came through, and Ising's corps was ready to make its move.

He ordered his men to start a tank. Including tune-up, it cost him \$90. Soon enough Shermans were operating to get the cripples moving. Loading (cost, \$17,000) went smoothly, except for rain and mud. Within a month the tanks were on flatcars, out of the arsenal and in Ising's pasture (where unloading cost \$5600).



All the tanks had to be disarmed before they could leave arsenal. Ising had to recruit his own squad for this purpose, and was warned that live ammunition might still be found in the tanks



"I don't know whether to congratulate you or feel sorry for you," one of his neighbors told Ising.

Indeed, many headaches remained. The scrap market, for one had just skidded \$10 a ton. With \$450,000 committed at that point, Ising was losing \$100,000—on paper.

Still, he was enjoying it. In his 21st-floor office in downtown Chicago, he willingly joked with tongue in cheek about his armed power—even without guns, enough to frighten Monaco, Liechtenstein or Disneyland. Speaking with a touch of German from his native land (he came to America in 1938), he once replied to an inquiry about a tank part with a wink and, "Maybe we shouldn't give the enemy information."

His 10-year-old son, a hero to classmates, in turn ranked his father at least the equal of actor John Wayne. Newspapers phoned for interviews. Trade magazines wrote about him, and a newsreel crew asked to put his corps on film.

Ising did spend a day reviewing the corps, saluting, and ordering the smashing of trees and dislodging of fences for the cameraman. "The gas cost me \$200," he recalls, "but we sure had fun."

By now, too, it was clear the tanks were good for more than scrap. Intact they could bring from \$3000 to \$8000. And many parts were in demand individually.

What is a war-weary tank good for?

The Pratt-Whitney Division of United Aircraft Corporation had been looking for some time for tanks to use as snow plows on parking lots and ramps at its East Hartford, Conn., plant. Ising sold them six, reportedly for \$36,000.

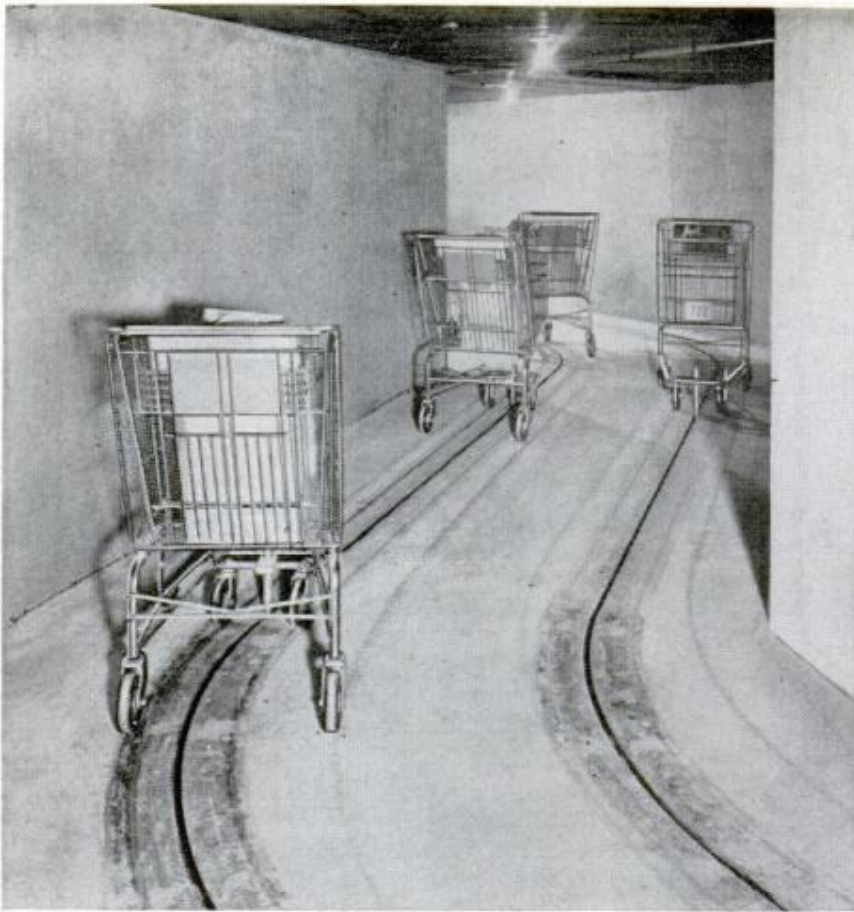
"Our people think they're far superior to plow trucks," one official of the firm said. "They can go 26 miles an hour and push or pull 25 tons."

Stump-pulling is no strain at all for a tank. Lumber mills in swampy areas could

(Continued to page 244)

Gas tanks are removed for sale separately. Because business in tank parts has been so brisk, Ising no longer is trying to sell tanks intact, but prefers cutting them into parts for resale





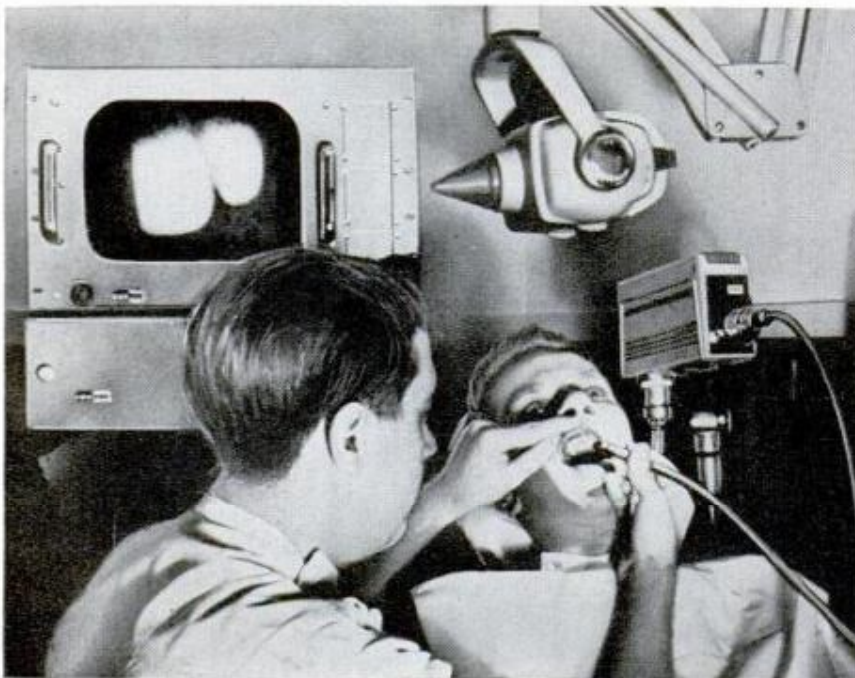
## Supermarket Carts Roll on Conveyor

When a Midwest supermarket had to be located 200 feet from its parking lot, the management installed a conveyor to take loaded shopping carts from the store and through a tunnel to the parking lot. The bagged groceries are paid for at the checkout counter, and the customer is given a numbered tag, a duplicate of which is attached to the cart. An attendant mounts the cart on the chain of the conveyor, which is under the floor and is accessible through a narrow slot. It is a four-minute journey from store to parking lot and 450 carts can be moved each hour. When the cart is emptied, it goes back on the conveyor.



## Junked Police Cars Warn Fast Drivers

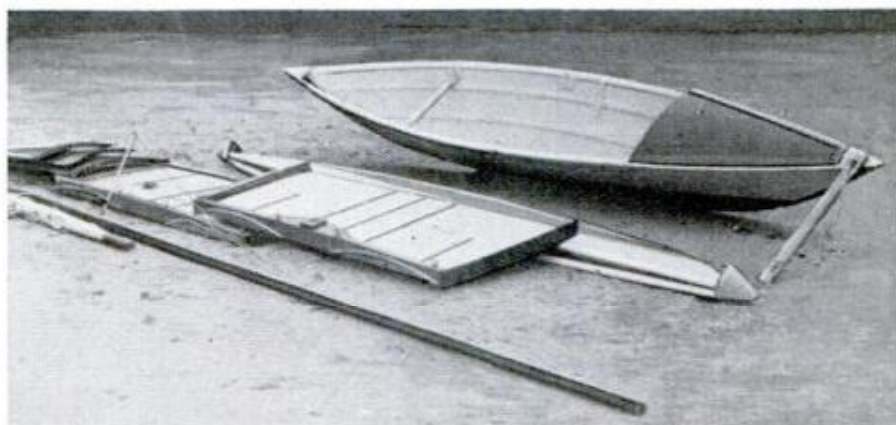
Motorists on Oklahoma's Turner Turnpike are apt to check their speed when approaching junked patrol cars parked beside the highway. The cars bear signs reminding that safety is any driver's responsibility.



## Dental TV Probe Shows Color Views

Tiny synthetic fibers that can pick up light at one end and transmit it to the other have been bundled into an optical probe Navy dentists use to "see" into a patient's mouth. The view, magnified 35 times, is displayed on a television screen. The instrument has a lens the size of a fingertip at the probing end, and can transmit a picture even as the dentist drills; thus it can be used as a valuable aid in instructing students of dentistry.

Right and below, the assembled cat sails in a brisk wind. Front view demonstrates hull design that makes centerboards unnecessary. Below right, hull section opened with cross braces and one deck section snapped into place. Space inside hulls hold buoyancy bags; leftover space beneath the cockpit is used for storage



## Collapsible Catamaran

UNFOLDED out of a box only 2 by 3 by 16 feet, a sailing catamaran can be assembled on the beach in a few minutes, slid into the water, and sailed away. Key to its quick assembly and full-sized performance is a Neoprene seal-and-hinge that allows flexibility in assembly but makes a rigid, waterproof joint on the finished boat. The 22-foot aluminum mast comes in two sections, as does the 6 by 8-foot self-bailing cockpit. Fully rigged, the cat has a sail area of 160 square feet in a standard sloop rig. Inside are four inflatable buoyancy bags.





Learning to work together, four German youths have found an outlet for energies that might go astray



At home, this 10-year-old might not find mother receptive to "mess" he has made during intent work

# Hobby Shop for German Youth

Adults work on their hobbies alongside teen-agers, making the novel workshop a real community affair





A stenographer during the day, this lathe operator enjoys making a decorative vase from a table leg



Some youngsters bring in their bikes for repair. They can rent tools for equivalent of a quarter

ONE West German community, beset with its own problems of juvenile delinquency, has taken the attraction of hobbies, added a social feeling, and come up with a club that is attracting youngsters and keeping them off the streets.

In a roomy establishment at Wuppertal, Germany, teen-agers with inventive instincts or the simple desire to carve a memento for a best girl get the chance they need. Price for the young people is the German equivalent of a quarter, a sum even small-allowance youngsters generally can manage to fish out of their jeans.

Initiator of this program is Gerhard Neumann, who is himself young enough to remember when he roamed the streets, unable to find an outlet for his energy.

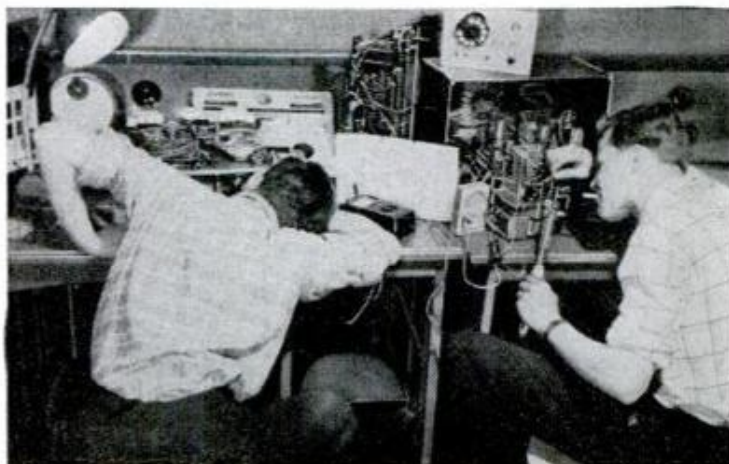
Now, in his novel establishment—it even has exercise machines, so the youngsters can work up a sweat before starting work—Neumann has provided nearly every kind of tool and machine youthful hobbyists could possibly want. Teen-aged builders of airplanes rub shoulders with lathe operators, ship-model makers work undisturbed by leathercrafters. Friends are made, and horizons are broadened—with benefits to all.

Adults, too, are welcomed at Neumann's workshop, and the hobbyists of any evening often include many graybeards. ★ ★ ★



Gerhard Neumann, owner of the shop, works on his own project. He conceived the public shop idea as a way to help eliminate delinquency by channeling youthful energy into creative work

Two of the shop's advanced electronics hobbyists repair a radio and a tape recorder. Even technical work like this attracts the youngsters, if only as fascinated spectators





## DETROIT LISTENING POST

By Art Railton

WHAT A STUDY in contrasts! That was the International Automobile Show in New York's Coliseum. At one stand, a working-man and his family slammed doors and bounced on seats of a \$1600 British Anglia while only 30 feet away another family and its liveried chauffeur tried a \$25,000 Rolls-Royce for size.

Elsewhere crowds stand around a Simca dream car (product more of Chrysler sales promotion than Chrysler engineering, no doubt), listening to a barker explain that this electric car of tomorrow will go 3000 miles without recharging its batteries. Nearby, orders were taken for Formula Junior race cars and a car as big as a house because that was what it was—a house on wheels with thermostatic heat.

At the show were 312 different models, representing 86 different manufacturers in 10 countries, including the United States.

Included was a 3.8 Jaguar sedan on which all the brightwork had been gold plated, giving the normally "proper looking" Jag as revolting a personality as if tailfins had been added. If the car had been for sale, the man said, it would cost \$25,000. Despite the cathedral-like setting and crystal chandeliers, the Jaguar looked so un-British, so unlike the image it holds in this country that you unconsciously looked the other way in embarrassment.

From Japan, shown here for the first time, was the Toyopet Tiara, a lighter and more economical model that is expected to compete strongly with Volkswagen and Renault. It has peppy performance, thanks to low weight and 75-horsepower engine. Suspension is said to be unbelievably good with torsion bars (just like Chrysler's) in front and wide, single-leaf cantilever springs at the rear. This car, if it gets proper dealer organization, could be the real dark horse of the show. Priced at \$1600 on the Pacific Coast (as the rumor is), the car will make life tough for plenty of economy-car dealers. Japan has done it in cameras and radios, perhaps can do it in automobiles. We shall see.

Volvo showed the P-1800 Sport, a handsome powerful-looking sports car, said to handle the way a sports car should. If it is built by Volvo, it will. The car will not be available until the end of the year and will sell for about \$4000.

Shown also for the first time over here was the Triumph Herald. This car, squarish and clumsy in styling, marks a new high in maintenance-free driving. It's a car you can almost forget servicewise. Only four greasing points are on the car. Two have to be lubricated only every 6000 miles, the other two only every 12,000 miles. The body is built in seven bolt-together sections, making replacement inexpensive and quick in case of damage. Here's a forerunner of tomorrow's automobile which will be as dependable and as servicefree as your refrigerator.

How come, you ask, all this imported-car activity at a time when the experts are forecasting troubles for the small cars? Probably because the manufacturers of imports know that the same old models won't be able to compete with our new compacts forever.

Even Volkswagen has semi-officially admitted that a new and bigger four-door model is in sight, probably by Spring of 1961. It will be an additional model as the current two-door will be continued. Other companies are showing the influence of the American revolution. Low-cost, efficient automatic transmissions, now on Hillman, Singer and DAF, will spread through the imports, not only for American sales but because Europeans are now demanding the convenience of shiftless driving.

Luxury and sports cars are expected to have no trouble maintaining their present sales, perhaps to increase slowly through the years. But the \$1600 to \$2500 economy cars are the ones the industry is watching. These small, four-cylinder cars have really only economy and maneuverability to sell. They deliver more economy when you drive them, than the American compacts do when the experts drive them. For those who seriously want low-cost transportation, these cars are still the only ones available. But Detroit experts say, Americans want more than that.

In any case, if imports are in trouble, somebody forgot to tell the public. The Coliseum crowds were more serious about buying than ever. No longer did they exclaim in wonderment, instead they discussed prices. No longer were they bewildered by the variety of models, now they knew what to look at, what to avoid.

The public has accepted the import. From here on, its future depends upon its dealers. ★★★



Daytona Beach Resort Area photo

Looks like a convention in Daytona Beach; they're all hovering on the Hydroair Vehicle's air cushion

# PM EDITOR RIDE THROUGH THE CAR

By John Linkletter

**D**OWN IN DAYTONA BEACH—a city whose name is synonymous with speed—there's a new machine racing over the famed speedways, the swamps and the ocean.

It's the Hydroair Vehicle, one of the newest of a steadily growing fleet of ground-effect machines and probably the largest one in the country—or, for that matter, in the world.

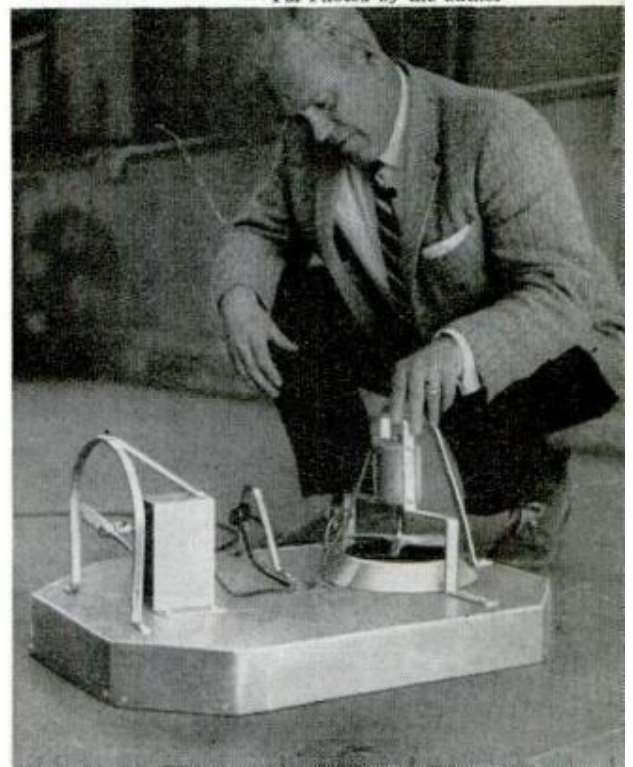
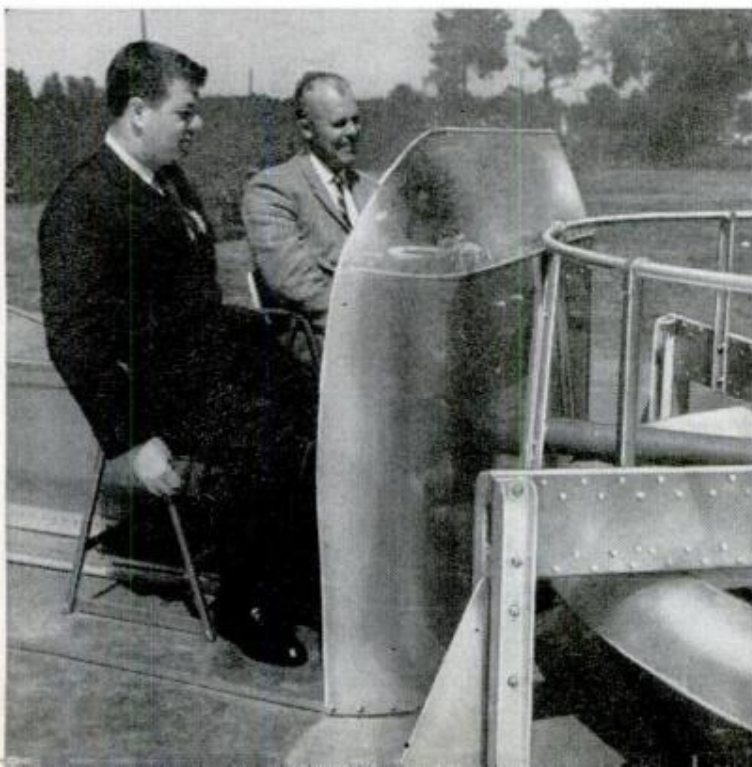
These machines are sprouting around the

country like Iowa corn in the spring; one industrial firm estimated that some 300 existed at the beginning of the year. While they're generally referred to as air cars or air scooters, the more accurate general designation is air-cushion machines or ground-effect machines.

A few weeks ago I rode the Hydroair Vehicle. Carl W. Bollum, Sr., president of Spacetrionics, Inc., sat at the controls—wisely keeping me in a passenger status.

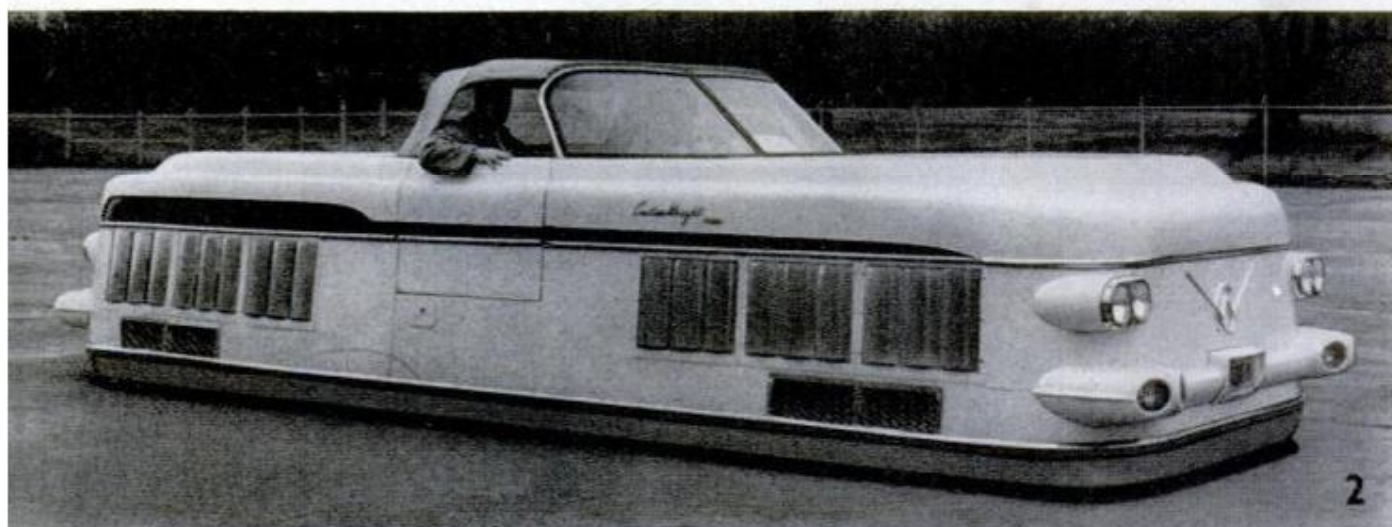
Spacetrionics president Bollum shows me how easy it is to drive and displays electrically-powered model

PM Photos by the author

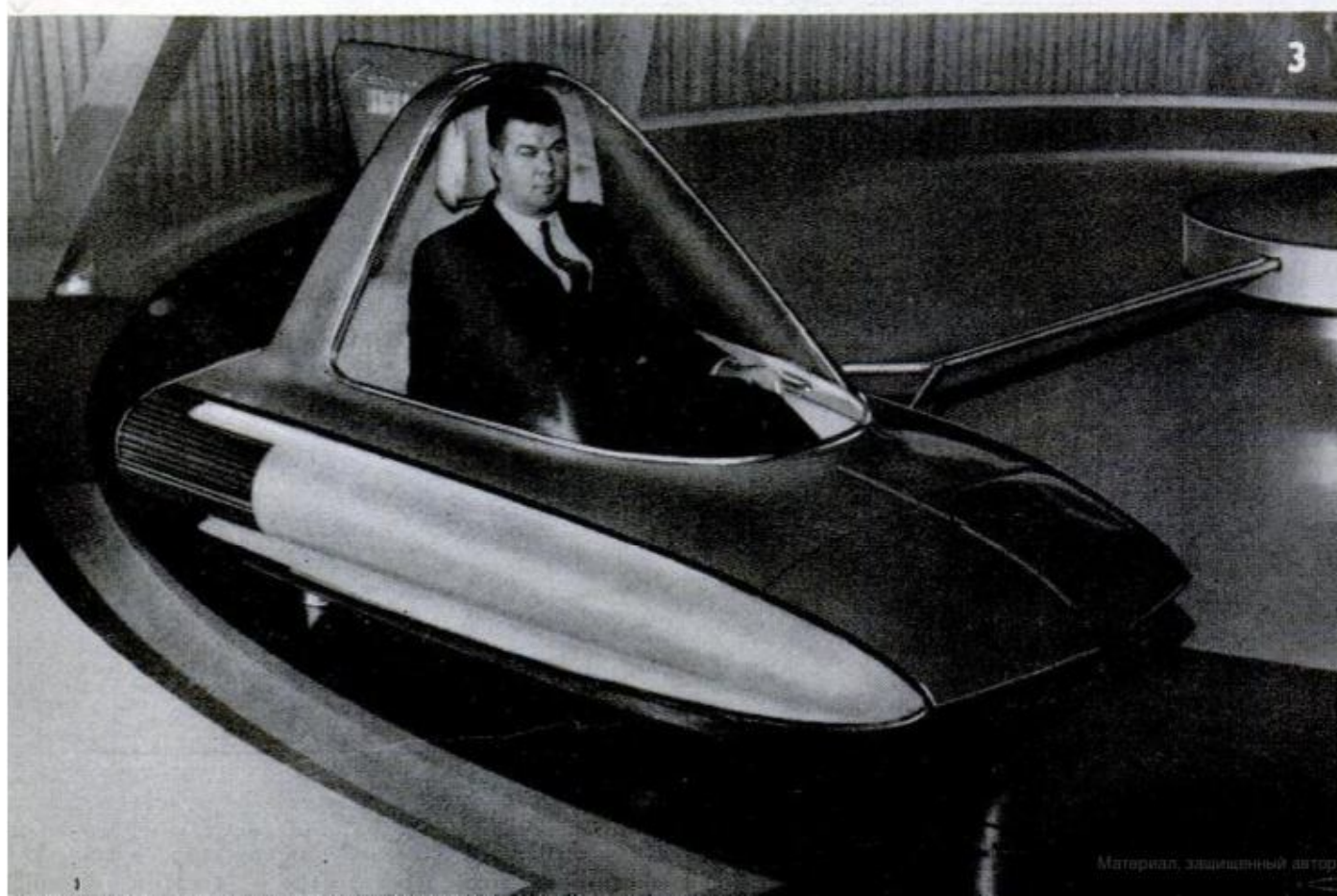




1



2



3



Bell Helicopter's experimental Air Scooter is a plenum chamber type. Its 12-horsepower two-cycle engine lifts the craft (and a research engineer) 2½ inches



Bell Helicopter Corporation photo

At that time, his firm (lately moved from Washington, D. C.) was still negotiating land leases for manufacturing and testing, so there were no full-throttle passes over the Halifax River or the hard sand beaches. However, with Bollum expecting to hit 100 miles an hour over water, I'll be content to pull up a beach umbrella along the sidelines and watch those speed runs—which should be taking place about the time you read this article.

We hovered and moved the craft cautiously within the confines of a road-machinery lot. While the vehicle rode on its self-generated cushion of air about five inches above the ground, I meandered

about its 32 by 24-foot deck and jumped up and down—with an admitted lack of grace—along the edges. It was solid.

This was the fourth ground-effect machine that I had accompanied into the wild blue—some as high as six inches! (Back at the office, I'm known as the astronaut of the air blast.) In all four machines, there are certain characteristics of the ride that are quite similar.

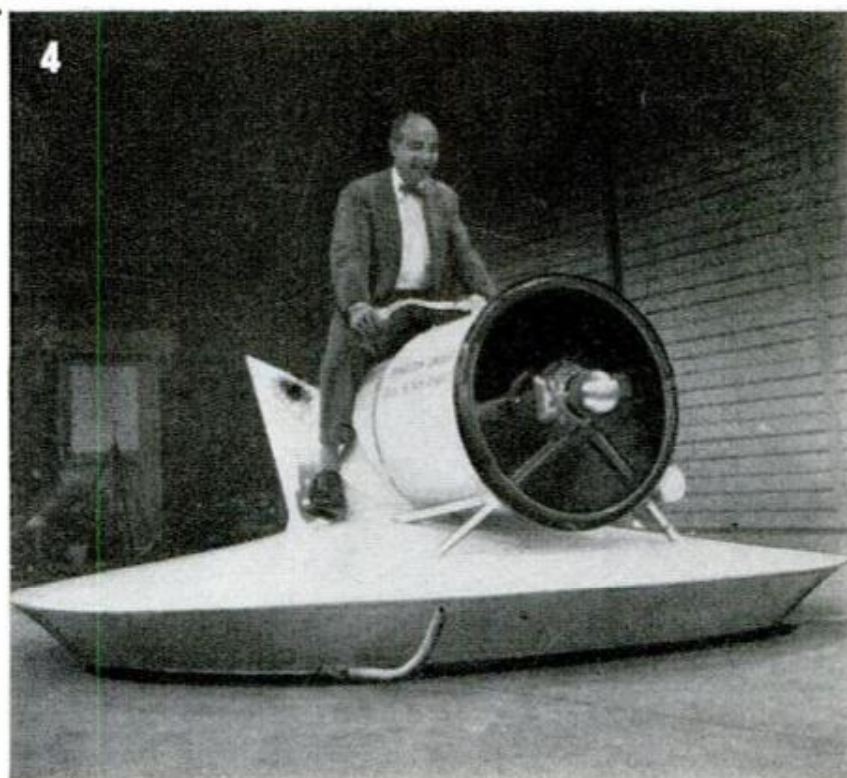
Riding a ground-effect machine isn't like riding an auto—there's no transfer of road bumps to the passengers. You sit on the craft and watch stones and curbs disappear beneath the machine, expecting all the time to feel the bumps while the air-

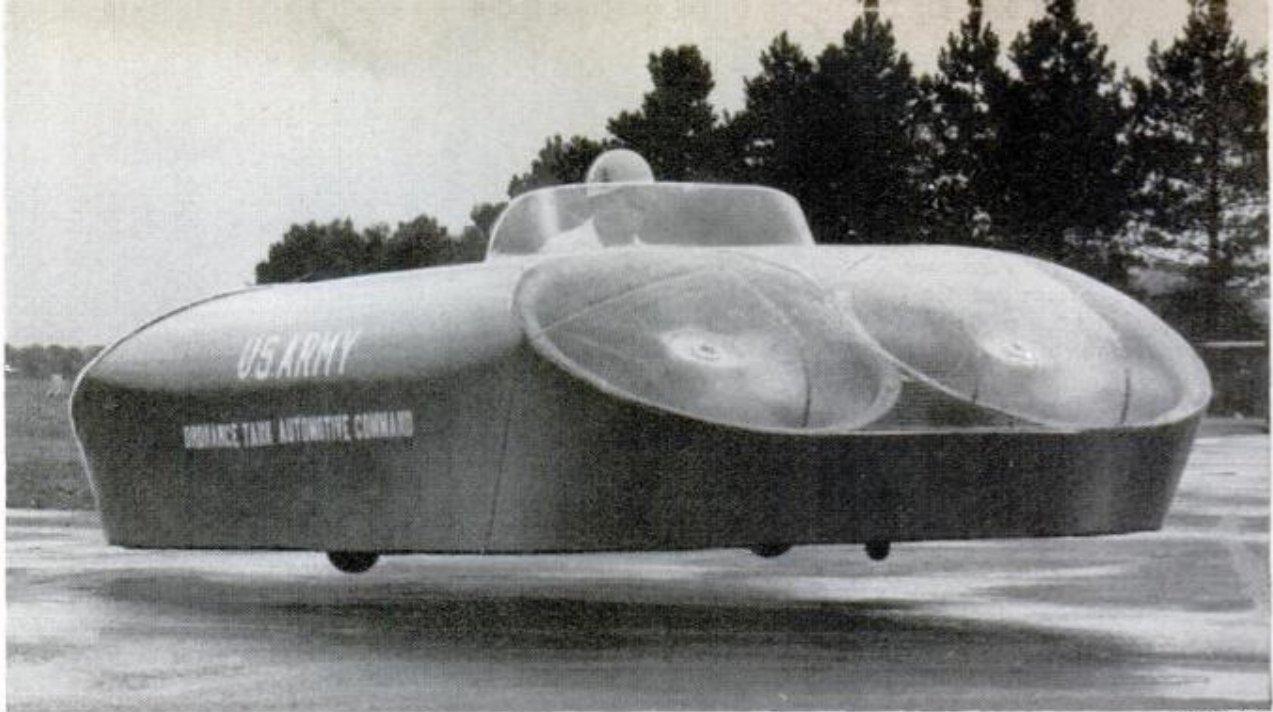
**1.** Even the bravest citizens took cover as I drove Dr. Bertelsen's Aeromobile back and forth through the Neponset streets  
PM Photo by Joan Linkletter

**2.** This time I rode under a jaunty canvas top alongside Don Swem who operated the Curtiss-Wright Air-Car over rough test grounds  
PM Photo

**3.** I couldn't decide whether this was like flying a jet or lying in state. Levacar slides a fraction of inch above metal road  
Ford Motor Company photo

**4.** Tall in the saddle is another high-flyin' PM editor, Dick Dempewolf who maneuvered the Princeton University Air Scooter





UPI photo

One of the machines demonstrated at the Princeton University symposium on ground-effect phenomena was the U. S. Army vehicle built by the National Research Associates. Delegates to the session shared information

borne platform moves on as smoothly as a dab of butter in a hot skillet.

And it isn't like an airplane ride—you don't have the feeling of positive control that comes from the movement of air at high speed over aerodynamic control surfaces. (However experienced operators can control them.)

One way to describe the ride, perhaps, is to compare it to sitting on a piece of plywood on a bunch of loose marbles. The vehicle will turn, move sideways, slide downhill and cavort just that readily on its cushion of air. But it doesn't matter whether the surface below is concrete, mud, dirt or water—the machines move

over all with equal ease because they never touch the surface.

The 5300-pound Spacetrronics vehicle, for instance, is designed specifically for over-water use. Made of aluminum (Alcoa showed its faith in the machine by supplying the metal for the prototype), it has a one-foot thickness of Styrofoam under the deck to provide flotation. The aluminum apron hangs down another foot below the plastic, forming a large open space much like an inverted pie plate. Air blasted into this chamber—known as the *plenum*—forms the air cushion on which the craft rides. Pressure in the air cushion is nine pounds per square foot.

Typical of the forward propulsion systems that appear on current ground-effect machines are these:

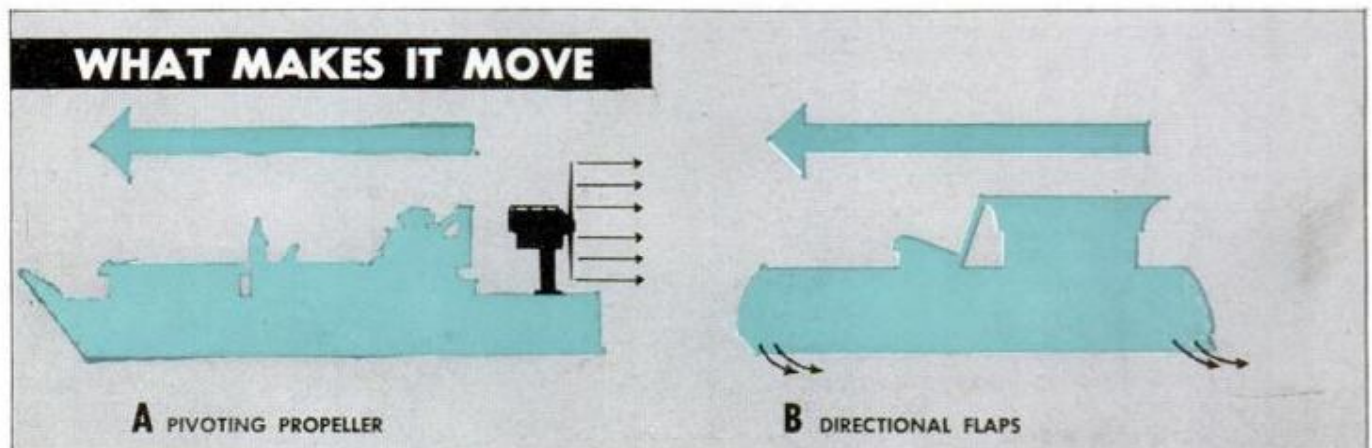
**A:** Engine and propeller independent of the craft's lift system, as in the Spacetrronics Hydroair Vehicle

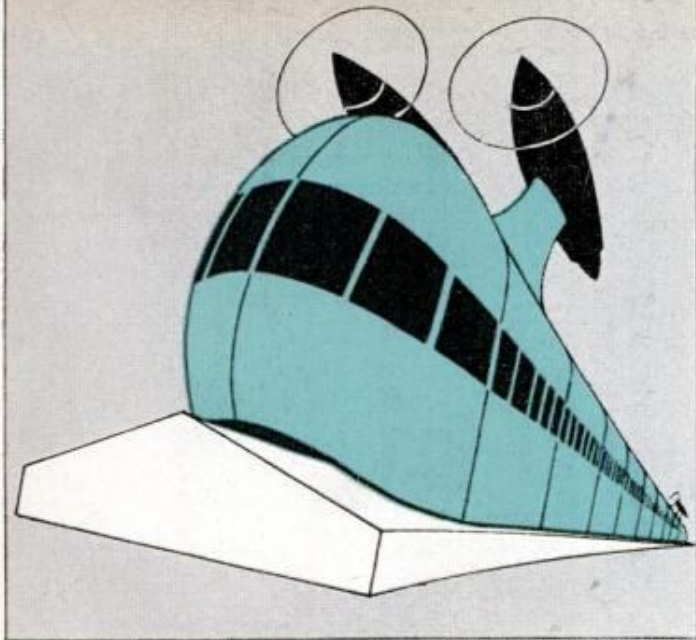
**B:** Flaps extending downward from outer edge of machine to deflect air flow, as on Bertelsen Aeromobile

**C:** Louvers in chamber walls direct the stream of air bled from chamber, as in Curtiss-Wright Air-Car

Methods of utilizing the air pumped into the ground-effect machines to achieve lift are generally these:

**D:** Air goes into large open chamber in which pressure is relatively constant, as in Hydroair Vehicle





From Spacetrionics drawing  
**Futuristic conception from Spacetrionics is a train that rides air cushion on triangular concrete rail**

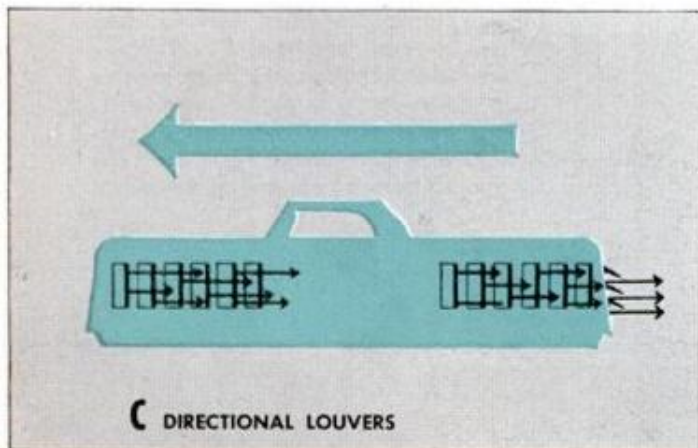
The plenum chamber is the simplest of the ground-effect machines—and the least expensive to manufacture, Bollum points out. He uses the air in the plenum only to achieve lift; propulsion of the craft depends on a second engine and propeller mounted on a stand at the stern of the Hydroair Vehicle. The unit swivels to direct the machine as the operator turns a wheel.

Bollum plans to try a rudder behind the propeller for control. He also will add two more horizontal fans—powered by 180-horsepower helicopter engines—near the rear of the craft and replace the present industrial engine with a 240-horsepower Lycoming to power the forward fan.

**E:** Air is directed to slot around edge and is ejected as a high-velocity air curtain, as in the Aeromobile

**F:** Air pressure under the craft is lowered in stages so that there's a minimum of loss into atmosphere

**G:** High-pressure air entering simple levapad lifts pad off rail a fraction of inch, as in Ford Levacar

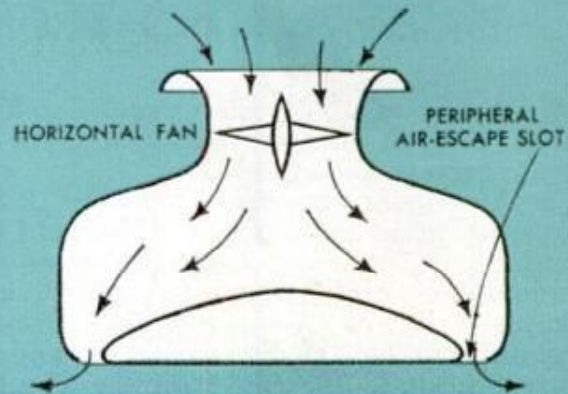


**C** DIRECTIONAL LOUVERS

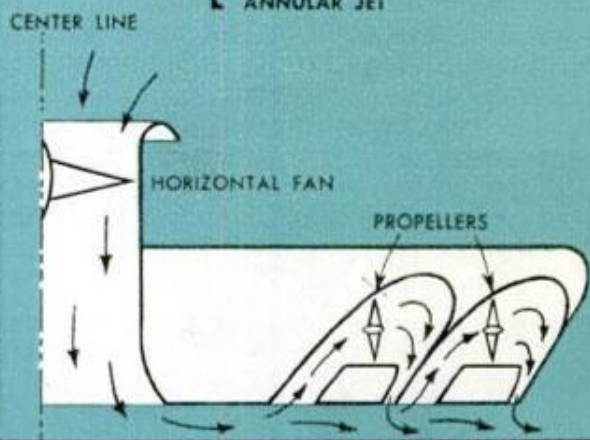
## WHAT MAKES IT RISE



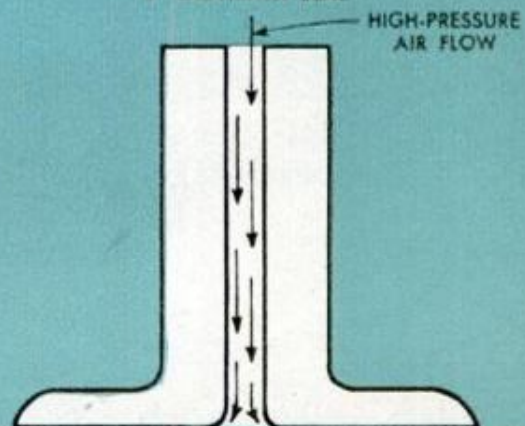
**D** PLENUM CHAMBER



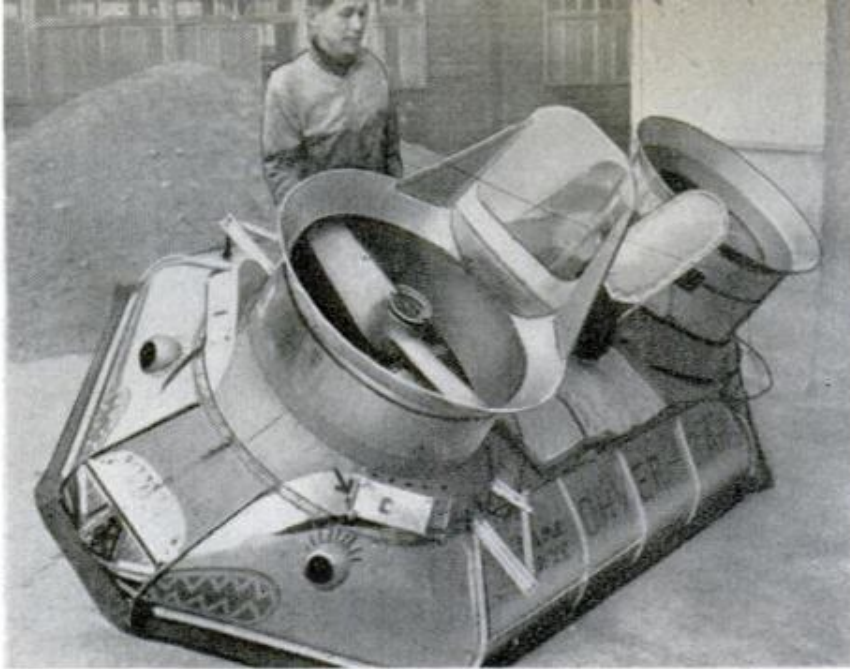
**E** ANNULAR JET



**F** LABYRINTH SEAL



**G** LEVAPAD



UPI photo

Tokyo version of ground-effect machine was built by a mechanic. It has two six-horsepower engines and is named *Kamekaze* (the term means turtle wind)

Spacetrronics has plans for a considerably larger craft in the future, as well as for a smaller sports model this year.

Bollum spent nine years with the U. S. government as an engineer in the field of guided missiles. He became interested in ground-effect craft through contact with inventor Walter A. Crowley in Washington. One of the earlier Spacetrronics experimental craft is on exhibit at the Smithsonian Institution in Washington, D. C.

There's another common method of utilizing the air mass by directing it to a peripheral slot beneath the machine so that there's a high-velocity curtain of air shooting downward from the slot, or *annular jet*.

I rode on this type of craft in the town of Neponset in western Illinois, where a local physician, Dr. William Bertelsen, has developed a very workable machine in his

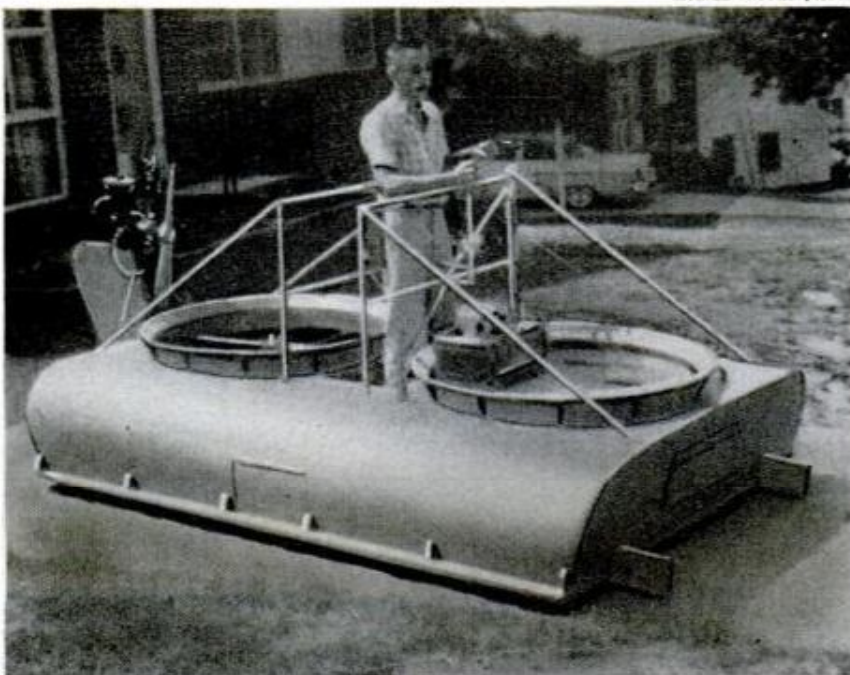
spare time with his father's help. The doctor's aim is to create a vehicle that will take him any place in the countryside where people happen to go to break arms, have babies or otherwise need medical attention.

After building and testing a number of models, Dr. Bertelsen decided that the annular jet best answered his need. As a matter of fact, the control system he developed utilizes the curtain of air that blasts downward from the peripheral slot. There are vertical flaps located on the outside edge of the slot which, when moved by the control stick, deflect the airstream to give the craft thrust in any direction and turn it.

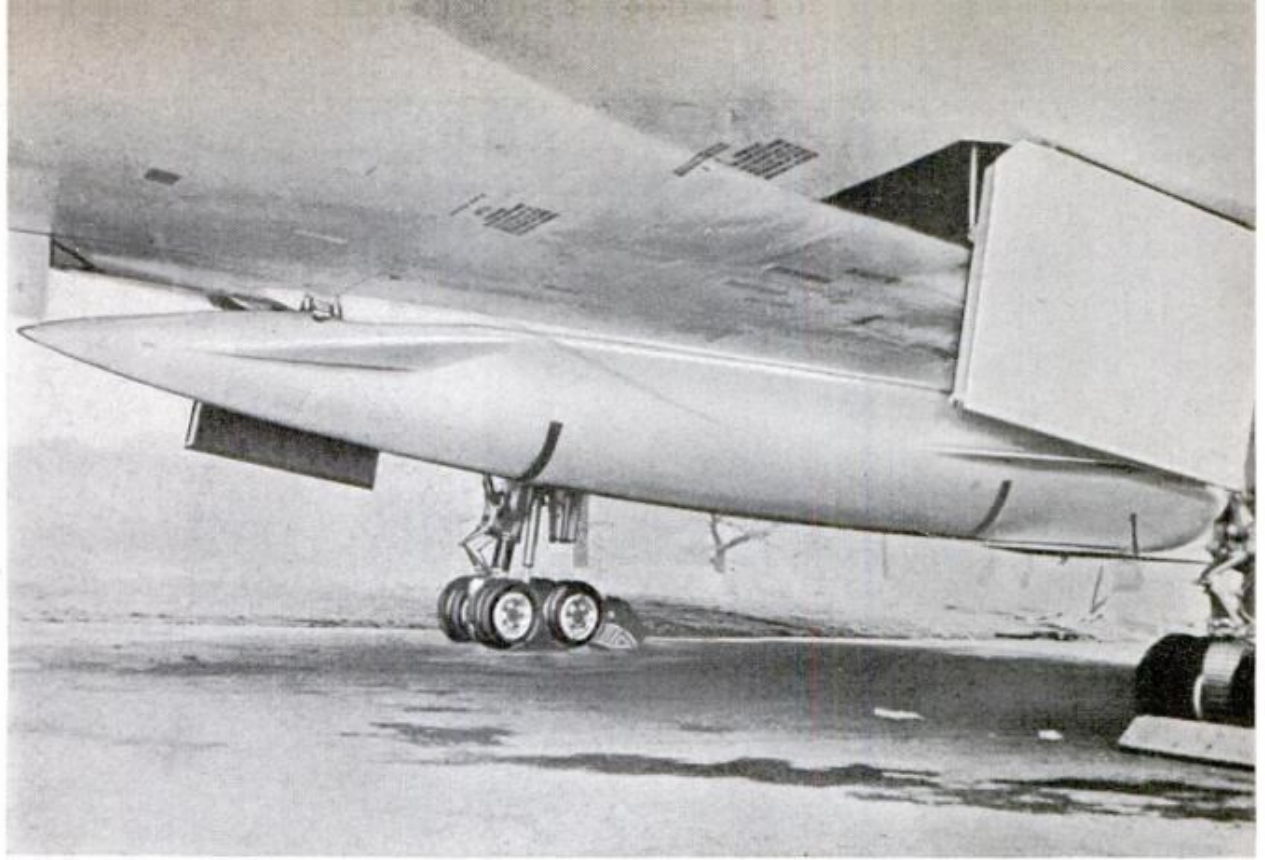
I don't know how many hundreds of hours the doctor and his father had spent perfecting the machine, but they gamely risked all in the hands of this novice by al-

(Continued to page 228)

Harris Woods photo



Harris Woods of Smyrna, Ga., tests machine he and G. W. Wolfe built. Though two engines were planned, a single 25-horsepower plant proved sufficient to elevate the annular-jet craft. A 15-horsepower engine propels it



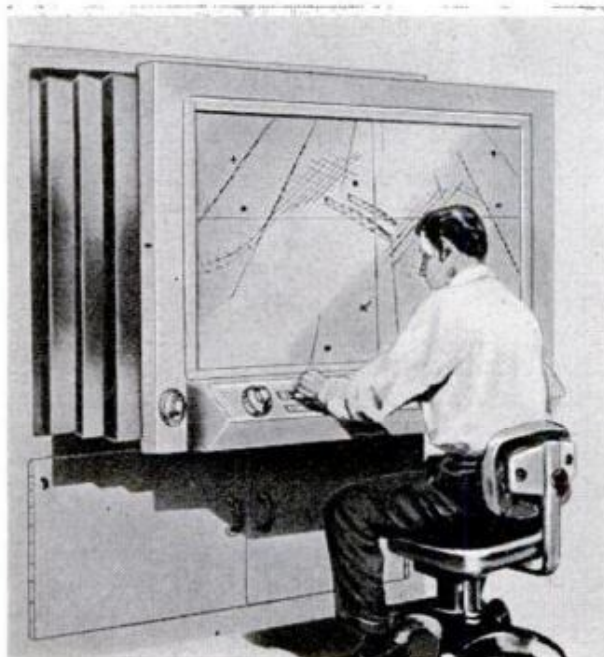
### First Picture of British Nuclear Weapon

Powered, winged and automatically guided to its target hundreds of miles away, the Avro Stand-Off nuclear bomb flies higher and faster than the launching aircraft. The

air-to-ground missile will be carried by Vulcan and Victor V-Bombers. The bomb will be aided in flight by rockets; other details of its performance are secret.

### Map Selector Replaces Library

Army field commanders or missile units can find and view any of 11,000 maps within 15 seconds by pressing a button on a new target map coordinate locator. It projects maps from 70-mm. color microfilm, and occupies only one-fifth the space of an equal map library.

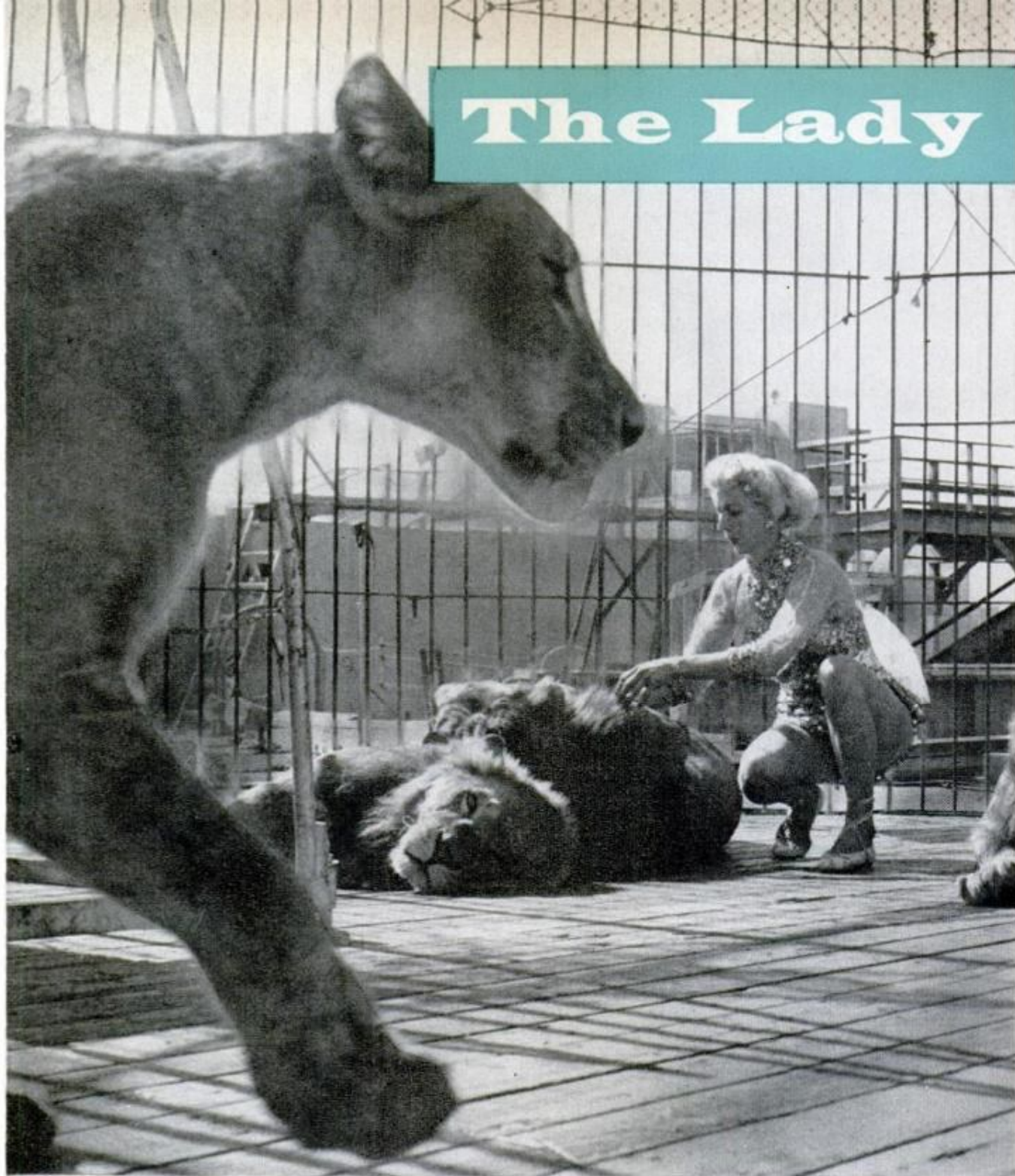


### Solvent Seasons Lumber Quickly

Using hot acetone as a solvent, a new technique for seasoning lumber has proved faster than the traditional kiln-drying method, and causes less warping than high-heat seasoning. Sample on the left below shows result of acetone seasoning compared to kiln-dried sample.



# The Lady



Working closer to her big cats than any other trainer, Evelyn Currie puts them through a roll-over practice session like a family of kittens. Notice—no chair, no whip, no gun; she claim's it's all done with love

**By Alan D. Haas**

"YOU CAN'T PAY AN ANIMAL to get up on a perch and perform; only love can make him do it," says Evelyn Currie, lion tamer and owner of a sensational new animal act. To prove her theory, Evelyn gets in the cage with her big cats and lies on them, stands on them, hugs them, and dances with them, all without the usual boots, gun, and chair. On rare occasions she touches a lazy one, lightly, with a whip, but for the most part they perform, she

says, because they're mad about her. And although her theory doesn't always agree with the thinking of most animal psychologists, Miss Currie's wild-animal act is currently drawing big crowds along the carnival circuit. The only woman working with big cats, she has a really unusual act which includes a litter of tigon cubs born to one of her lionesses by a tiger father. She has been offered "fabulous" prices for the rare hybrids, but refuses to part with

Loves

Her

Cats



Perhaps the most amazing thing about the act is that the animals not only work well, but seem to love it

her "babies." She handles them like a brood of kittens and they respond just like domestic pets.

There are nine beasts in the act, eating 1000 pounds of 50-cent-a-pound beef a week with eggs, milk and cod liver oil thrown in. The troupe travels in a large transport truck, and Miss Currie sleeps in the van. Third generation of her family to work in the ring, she is under contract to the Hamid-Morton Circus, and recently finished an engagement at Atlantic City's Steel Pier, where she will return next year.

JUNE 1960



Dancing with a tigon cub. Below, it's not all fun

## WOMAN WRESTLES WITH WILD CIRCUS CAT; TRAINER WINS

Wichita, Kas., March 7 (UPI)  
—A lady and a tigon grappled in a circus arena Monday—and the woman won as 50 terrified spectators watched. The 250 pound beast, a cross between a tiger and a lion, had bolted from its cage during a picture taking session for photographers.

Miss Evelyn Currie, 29, a 115 pound animal trainer for the Hamid-Morton circus, wrestled with the tigon 30 minutes before attendants slipped a restraining noose around its neck.

Miss Currie suffered a scratch on her shoulder.



Lion waves a paw at Miss Currie, but doesn't really mean it—she must induce them to growl or swing and claims they would never harm her intentionally. If they goof, she simply scolds them—and they listen



"I won't punish or frighten an animal to make him do a trick," says Miss Currie. It is her belief that all wild animals want to be friendly to humans, "even if they claw you a little." She frowns on blank pistols and other gimmicks used by other trainers, and says she prefers to keep her cats happy by cooing in their ears. It seems to work—she has never been clawed except for an accidental scratch or two, though she works closer to her animals than anyone else in the business today, and is getting top billing in shows across the country.

In March, 1960, when one of her half-grown tigon cubs bolted from the cage into an area with 50 spectators, Miss Currie in-





Tigers and fire don't ordinarily mix, but they do in the Currie act without hesitating

sisted that he wasn't dangerous, then captured the frightened cat barehanded, wrestling him to submission and holding him for a half hour until attendants could restrain him with ropes (see clipping, page 99). She came out of the wrestling match with only a scratch, insisting that her main concern was for the tigon—she knew he wouldn't hurt her.

"My cats know they can trust me," Evelyn says proudly, "and that makes them well behaved. Like people, they need lots of attention to be happy." She and her assistant, Argentinian Robert Frangi, never leave the cats alone, "so they can't get lonely." What ever she does, it seems to work. Vive l'amour! ★ ★ ★

Evelyn's animals will stand for almost anything from her—see below and on opposite page



OWNERS  
REPORT

A NATIONWIDE SURVEY



**BASED ON 1,382,845  
OWNER-DRIVEN MILES**

## HOW GOOD IS THE FORD?

Owners like:

Handling ease .....	37.6%
Exterior styling .....	32.0%
Visibility .....	30.0%

## WHAT'S WRONG WITH IT?

Owners dislike:

Poor workmanship .....	15.2%
Low gas mileage .....	9.9%
Water leaks .....	9.6%

## DID FORD BUYERS CONSIDER A COMPACT CAR?

Yes, did consider one .....	35.6%
No, did not consider one .....	64.4%

## WHAT MAKE?

Falcon .....	65.0%	Rambler .....	8.7%
Corvair .....	18.5%	Valiant .....	2.9%
Lark .....	4.9%		

# Ford Handles Well, But Workmanship Poor, Say Owners

**F**ORD FOR '60 is bigger, more stylish than ever—a bold move in the year of the compact car. The trend is toward smaller, simpler machines, a fact that explains in some part why sales of the big Fords are down from a highly successful 1959.

How good is the 1960 Ford? What do the owners think of it? To find out for you, *PM* asked 1000 owners of the new Ford to tell you the good and bad features of this sleek car which is longer than any car in its field, as long in fact, as the Dodge and the Pontiac Catalina.

Tops on the best-liked list is handling ease with 37.6 percent of the owners mentioning it (a much smaller percentage than among compact-car owners). Second is exterior styling (32.0 percent), followed by visibility, riding comfort and roominess, in that order.

Leading the complaints (18.8 percent of the owners make no complaints at all) is poor workmanship with 15.2 percent mentioning it. These questionnaires were sent out in January and the owners are those who bought their Fords early in the model run—a fact which explains, to some extent, the gripes about poor workmanship. Second on the complaint list is poor gasoline economy, third is water leaks, followed by body noises and lack of interior head-room, in that order.

If this first *PM* standard-size-car survey of 1960 is any criterion, the compact cars are doing better in the public mind than their big brothers. Falcon owners, for example, gave the new compact the highest over-all rating ever recorded for an American car with 82.7 percent describing it as excellent and only 0.8 percent rating it as poor. In contrast, only 50.8 percent of the big-Ford owners rate their cars excellent, while a whopping 9.1 percent rate them poor.

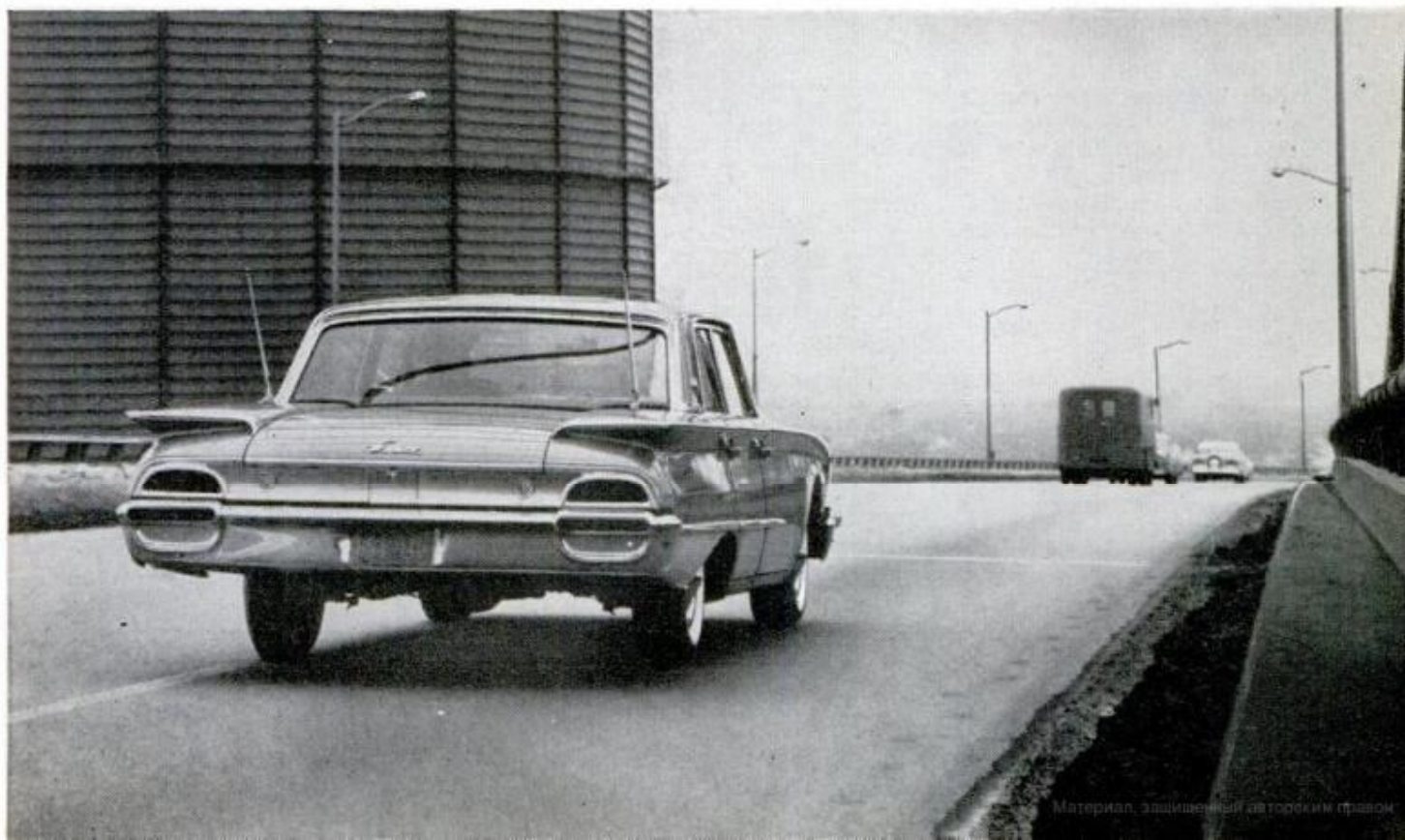
Both the Falcon and the Ford are all-new, yet while 15.2 percent of the big-Ford owners complain about poor workmanship, only 8.8 percent of the Falcon owners do.

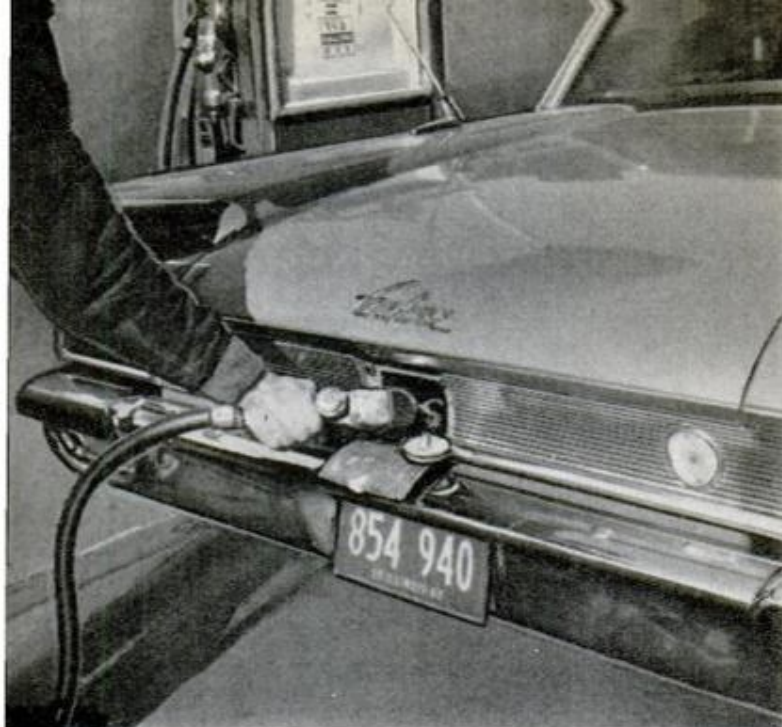
Also the all-new Falcon engine gives less trouble to owners than the time-tested Ford engines. Only 1.8 percent

**MARGINAL COMMENTS**  
BY ART RAILTON  
PM's AUTO EDITOR

← *It's not only long, but wide as well. Ford is the widest body in the industry, being over an inch wider than the Lincoln, Cadillac and Imperial.*

← *This is the lowest excellent rating any car has ever received in this series.*





Owners of both Sixes and V8s complain of poor gas economy. Also disliked is the narrow trunk opening. Above, armrest opening is so small you can't get your fingers in it easily for closing door, especially when wearing gloves

**Test Galaxie, power-steering equipped, was no helmsman's heaven. It had slight tendency to "hunt" on the highway. Steering was not precise nor immediate, more boatlike than desirable.** →

**The down-in-front hood gives the driver the best seat in the house—and who needs it more?** →

**Interesting statistics about interior room: Ford's hiproom is 77% of its exterior width; Falcon's is 82%; Corvair's 86%; Valiant's 81%. Ford doors are thick, wasteful of space.** →

**How many times have you heard: "It'll be a great car when I get the bugs out of it"? Often it takes three months before your new car is as troublefree as the one you traded. Ridiculous.** →

of the Falcon owners complain of considerable engine trouble, while among big-Ford owners the considerable-trouble figure is 5.6 percent.

But let the Ford owners themselves tell the story. Here, in order of frequency of mention, are quotations describing the top five best-liked features:

"Excellent handling."—Illinois accountant.

"Drives with ease. I don't have to fight the wheel to keep it on the road."—California painter.

"Beautiful styling with a minimum of chrome. Should stay in fashion for several years."—Ohio advertising executive.

"Our Starliner gets lots of admiration from strangers for its style and color."—New York housewife.

"I like the closeup view of the road from the driver's seat."—New York plumber.

"Driver can see front fenders and also the rear corners in parking."—Florida realtor.

"Easy riding comfort. While my wife was driving on a Missouri highway, I was able to read a book without straining my eyes. Traveling with the family, we were able to travel more than 700 miles in one day without being over-tired."—Maryland clergyman.

"Roomy. Has space for six people."—California PBX installer.

#### And Some Complaints

The following quotations describe the complaints of the Ford owners in order of frequency of mention:

"Poor construction. Doors do not fit. Rain pours in. Upholstery is bunched. Floor mats do not fit. Wheels out of line. Radio did not work and had to be repaired three times at the loss of six hours to me."—California teacher.

"This car should never have got past the Quality Control Center. Various accessories don't fit right, work right or look right."—Michigan restaurant owner.

"When I bought the car in November, the windshield wipers were on backwards, the speedometer did not work, the trunk leaked and the front wheels were out of line. The dealer fixed these, but I wasted a lot of time."—California salesman.

"Gas mileage is very poor. That is one reason why I bought a Ford six, to get economy. Guess I got fooled. I



Above, Ford is big on the outside, spacious on the inside, with plenty of stretch-out legroom in the back seat of the four-door sedan. Right, entry to the front seat is easy due to the elimination of the full-wrap windshield and the kneebusting dogleg



average 12 miles per gallon in the city, 14 on long trips and I have a handshift transmission.”—Arkansas auto-parts salesman.

“Low miles per gallon on high-test gas. I have a V8 with automatic transmission. Regular gas makes the engine knock, although I was told it could be used. It averages only 10 miles per gallon in city.”—Virginia secretary.

“Water and wind leaks around windshield and ventpanes.”—Pennsylvania insurance agent.

“Engineering design of rear end is conducive to excessive leaking.”—Florida mathematician.

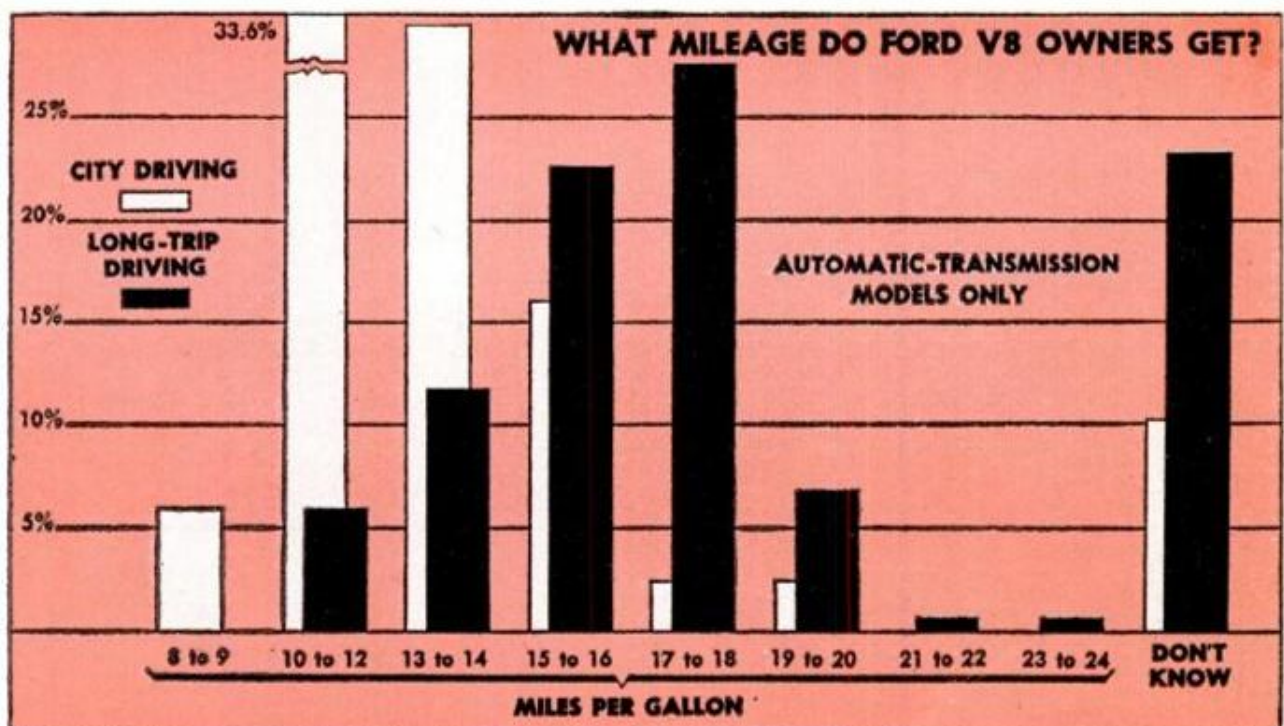
“Body has several squeaks and rattles around the doors.”—New York building superintendent.

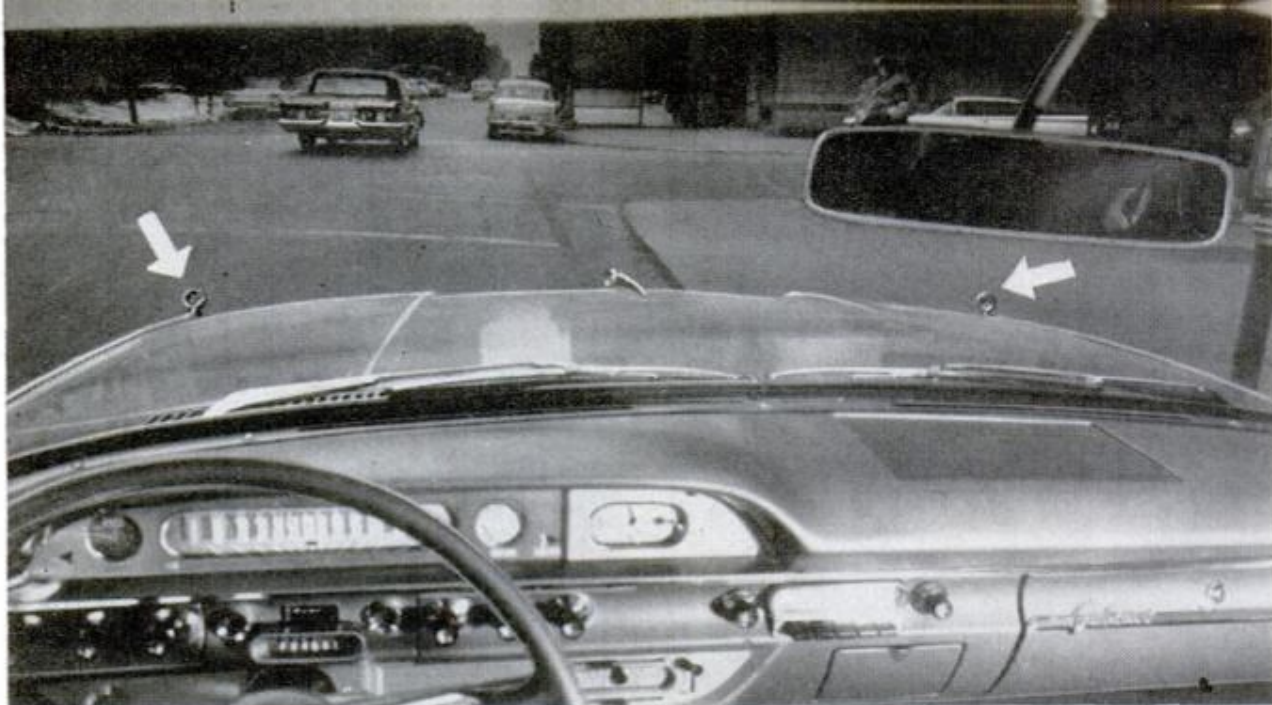
“Windows vibrate, doors rattle. Wind whistles from somewhere around the windshield or doors.”—Iowa ham boner.

← **PM tested a Galaxie V8 (352 cubic inch, two-barrel carburetor), three-speed automatic transmission. Result: Country 12.7 miles per gallon; city 11.8 miles per gallon.**

← **Odometer was optimistic: For a true 100 miles, it read 105.4 miles. Wind noise at high speed is a hard-to-lick affair. It takes only a paper-thin opening to drive you crazy at 65 m.p.h.**

Most Ford V8s with automatic transmissions get 10-14 miles per gallon in city, 15-18 on trips, say owners





Visibility is highly praised. Ornaments on front corners (arrows) have practical value as guides in parking

But it's great for hauling pizzas home. →

"Lack of headroom. I rub my hair on the roof unless I slouch in the seat. Has a fairly large trunk, but is almost useless for large articles."—Michigan night superintendent.

"Car is too low. Rear end hits pavement when going into some driveways. Seats are so low you have to climb to get out. Some curbs are so high you can't open door."—California deputy sheriff.

"Trunk is so low that you cannot place full bag of groceries in upright position."—Texas engineer.

### More Best-Liked Features

The following quotations describe the other best-liked features ranging from power and performance (sixth on

(Continued to page 248)

## SUMMARY OF OWNERS REPORT:

# FORD

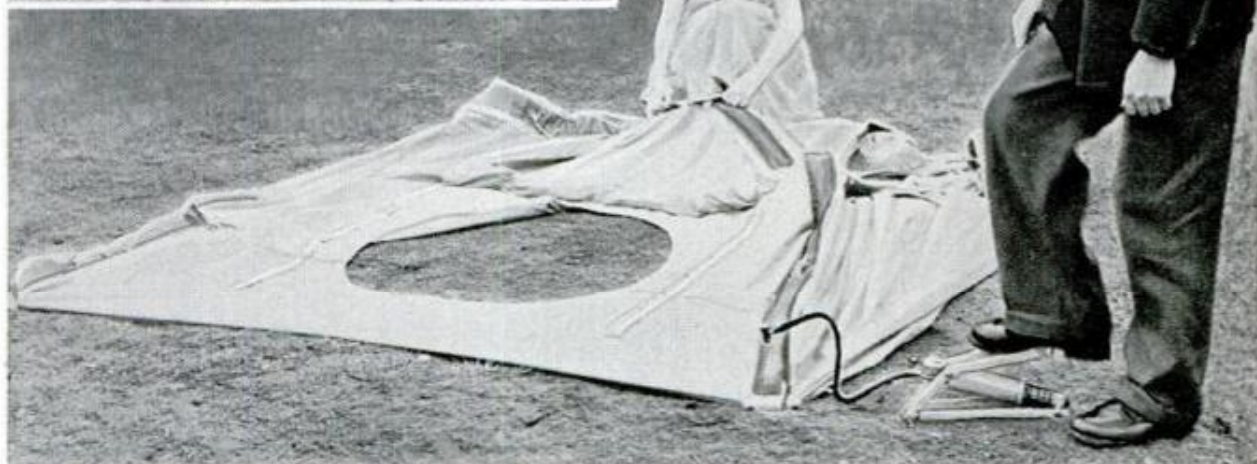
Excellent 50.8%

Average 40.1%

Poor 9.1%



<b>Satisfied V8 economy?</b>		
Yes, satisfied . . . . .	56.4%	
No, not satisfied . . . . .	43.6%	
<b>Satisfied Six economy?</b>		
Yes, satisfied . . . . .	70.8%	
No, not satisfied . . . . .	29.2%	
<b>Best-liked features</b>		
Handling ease . . . . .	37.6%	
Exterior styling . . . . .	32.0%	
Visibility . . . . .	30.0%	
Riding comfort . . . . .	24.6%	
Roominess . . . . .	15.5%	
Power, performance . . . . .	14.5%	
Roadability . . . . .	12.9%	
<b>Most-frequent complaints</b>		
None at all . . . . .	18.8%	
Poor workmanship . . . . .	15.2%	
Low gasoline mileage . . . . .	9.9%	
Water leaks . . . . .	9.6%	
Body squeaks and rattles . . . . .	6.3%	
Interior too low . . . . .	5.0%	
<b>Had engine trouble</b>		
No trouble . . . . .	77.2%	
Some trouble . . . . .	17.2%	
Considerable trouble . . . . .	5.6%	
<b>What was trouble?</b>		
Carburetor, stalling . . . . .	5.6%	
Transmission . . . . .	3.3%	
Valves . . . . .	2.6%	
<b>Best-liked exterior features</b>		
Low, sloping hood . . . . .	22.4%	
Rear end . . . . .	12.4%	
Low, streamlined styling . . . . .	12.2%	
<b>Least-liked exterior features</b>		
Front end and hood . . . . .	11.6%	
Front fenders . . . . .	5.6%	
Trunk . . . . .	5.3%	
<b>Best-liked interior features</b>		
Dashboard, instrument panel . . . . .	17.8%	
Upholstery . . . . .	17.5%	
Roominess . . . . .	11.6%	
<b>Least-liked interior features</b>		
Small glove compartment . . . . .	11.2%	
Lack of leg and head room . . . . .	6.3%	
Transmission hump . . . . .	5.0%	
<b>Did consider a compact car?</b>		
Did consider . . . . .	35.6%	
Did not consider . . . . .	64.4%	
<b>What make?</b>		
Falcon . . . . .	65.0%	
Corvair . . . . .	18.5%	
Rambler . . . . .	8.7%	
Lark . . . . .	4.9%	
Valiant . . . . .	2.9%	
<b>Ford only car in family?</b>		
Yes, it is . . . . .	57.4%	
No, it is not . . . . .	42.6%	
<b>Make of other car</b>		
Another Ford . . . . .	14.5%	
Other Ford Motor make . . . . .	2.3%	
Chevrolet . . . . .	7.9%	
Other General Motors make . . . . .	8.9%	
Chrysler Corp. make . . . . .	5.9%	
Other U.S. make . . . . .	2.6%	
Foreign make . . . . .	3.3%	
<b>How is dealer service?</b>		
Excellent . . . . .	43.6%	
Average . . . . .	37.8%	
Poor . . . . .	18.6%	
<b>Would buy from him again?</b>		
Yes, would buy again . . . . .	59.4%	
No, would not . . . . .	19.1%	
No answer, don't know . . . . .	21.5%	
<b>Car traded</b>		
Ford . . . . .	49.8%	
Other Ford Motor make . . . . .	5.9%	
Chevrolet . . . . .	9.9%	
Other GM make . . . . .	10.6%	
Chrysler Corp. make . . . . .	6.6%	
Other U.S. make . . . . .	3.3%	
Foreign make . . . . .	2.0%	
No trade, no answer . . . . .	11.9%	
<b>Next car will be</b>		
Ford . . . . .	42.2%	
Other Ford Motor make . . . . .	4.3%	
Chevrolet . . . . .	5.6%	
Other GM make . . . . .	4.6%	
Chrysler Corp. make . . . . .	1.7%	
Foreign make . . . . .	1.0%	
Compact car . . . . .	3.3%	
Undecided . . . . .	37.3%	



### Blow up Your Own Igloo

Six feet of headroom with no tent pole and near-vertical walls are features of a new British tent patterned after the Eskimo igloo. The tent can be erected in five minutes by inflating rubber tubes at the four corners with a foot pump. Seven feet square, the tent sleeps two in comfort, four in a pinch, and has been successfully tested on several British arctic and tropical expeditions.

### Bow Line Simplifies Mooring

Anchoring a foredecked runabout usually involves climbing over the windshield or cabin to reach the bow, an inconvenient and even dangerous bit of acrobatics. A new accessory allows the boater to manage the anchor from the cockpit and still keep his bow upwind. The short line clamps to the anchor rope, then the boat's position can be set by slacking the anchor line.





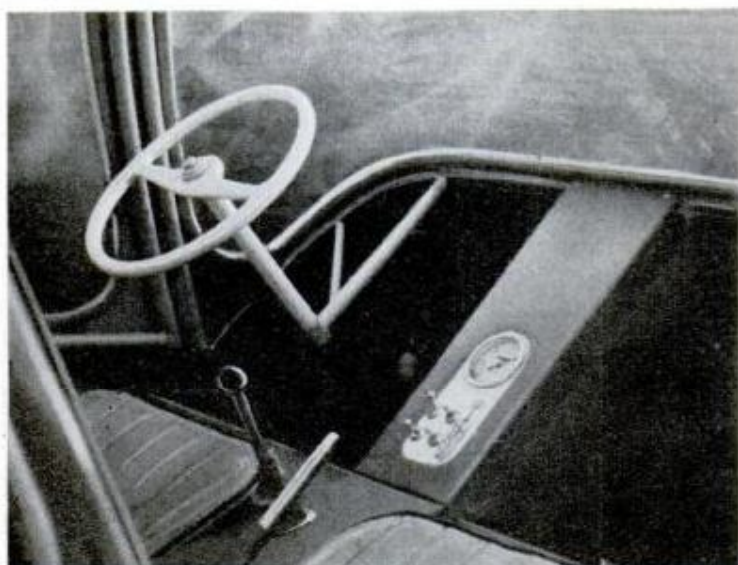
## Fence Erector

Drawn by a tractor, a fence-erecting machine sets posts, pays out wire fencing and then holds the wire in a hydraulic clamp while it's stretched and fastened into place. Stretching is done by moving the unit forward to achieve proper tension. Woven wire fence alone, or woven wire and a strand of barbed wire, or up to five strands of barbed wire can be dispensed. A special end and corner-post assembly utilizes the machine's ability to pay out wire around corners.



## "Egg Car" Seats Four

Plastic-domed for all-around visibility, a three-wheeled bubble car being built by a Hungarian aircraft manufacturer features gull-wing doors to ease entry for the two adults and two children who can fit inside the egg-shaped shell. It is powered by a motorcycle engine and gearbox at the rear, cooled by air ducted through the body from the front grille.



Earthquakes are made to order by a 500-pound machine developed by the California Institute of Technology; it produces quakes by swinging two boxes of weights in opposite directions across, for example, the floor of a building being tested.





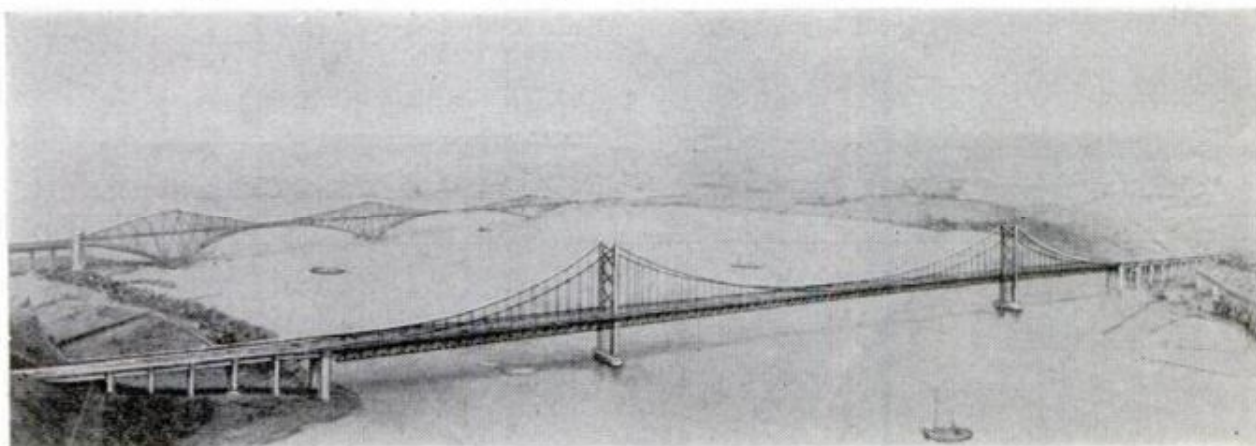
Old railroad bridge across the Firth of Forth for a generation was the longest span bridge in the world

## Road Bridge to Cross Firth of Forth

WHEN COMPLETED in 1962, the Firth of Forth Road Bridge, in Scotland, will be the longest suspension bridge in the world outside of the United States, where there are three longer. Its 3300-foot central span and 1340-foot side spans will give it a total length of more than one mile, and will join the north and south banks of an estuary not far from Edinburgh. The bridge will have two 24-foot-wide road tracks, flanked on either side by nine-foot-wide cycle tracks and six-foot-wide pedestrian walks. It will have the same clearance of 150 feet above the water as does the famous Firth of Forth Railroad Bridge which stands 1000 feet away and which, when built in the late 19th century, was the longest suspension bridge in the world. The new road bridge, which had been proposed many times since 1818, will require 39,000 tons of steel and 150,000 cubic yards of concrete to complete its construction.



New road bridge, shown in artist's conception, will be the fourth longest suspension bridge in the world

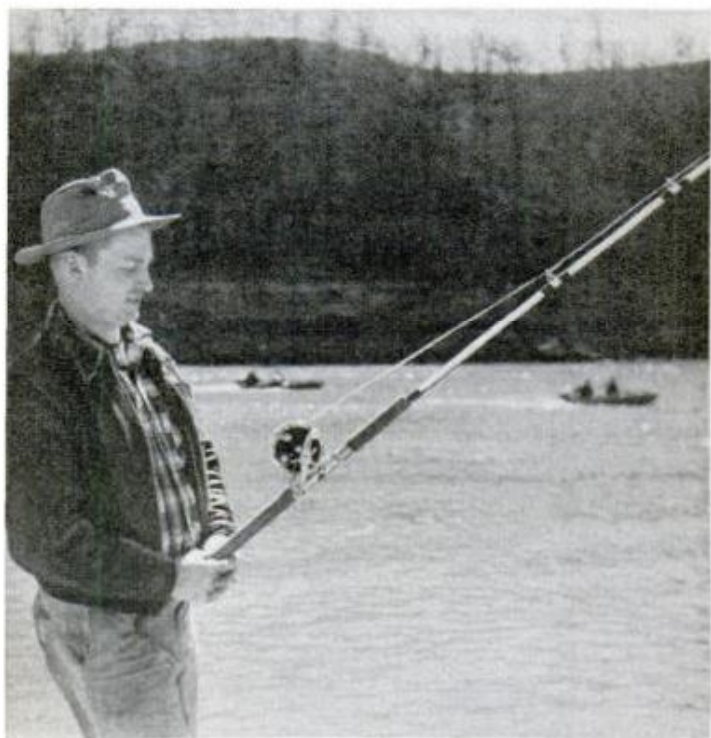


**Twice a year this town goes crazy. The banks of the Osage swarm with fishermen toting big-game salt-water tackle—but it's 600 miles to the nearest salt water. And their prey is a prehistoric piscatorial throwback that they never throw back . . .**

# It's Spoonbill Time

By Webster P. Taylor

Photos by the author



Standard spoonbill-snatching gear—big-game tackle

**T**HE LITTLE TOWN OF WARSAW, Mo., on the banks of the Osage River, is normally as peaceful and serene a place as you'll find anywhere in the Midwest. But with the approach of the two-month snagging seasons in the early spring and late fall, even the most casual visitor becomes quickly aware of a growing sense of excitement in the community, and as the days pass this excitement begins to boil and seethe until it bursts forth in a frenzy almost amounting to hysteria. To add to the general madness, automobiles from surrounding states begin pouring into the quivering town by the hundreds, loaded with equally wild-eyed and excited men. Many of the cars are trailing boats and practically all of them have an odd assortment of fishing gear stowed in luggage compartments.

The reason for all this is simple and a little crazy. By day and by night, hordes of the weirdest survivors of the Mesozoic Era, true prehistoric, piscatorial throwbacks have been slowly wending their way up

During high water, the heaviest concentration of spawning spoonbills is below this dam at Osceola, but playing and landing a big one from a boat on these pounding waters is a sport for the brave and strong





J. C. Daniels of Kansas City proudly shows his 60 pounder, about as big as they come in the Osage

the Osage River, sometimes silently but sometimes rolling and fighting their way over shallow shoals with the sound of a herd of complaining hogs. They're headed for their spawning grounds in a 20-mile stretch of the river from Warsaw to the power dam at Osceola.

This prehistoric monster—and it looks just that—is the spoonbill or paddlefish, a fish that has been pursuing its mud-shoveling ways down through the ages to the present time with no change or refinement of his ugly features or bottom-hugging habits. Which came first, his habits or his features, is difficult to say. But the spoon-shaped bill, which is almost as long as his body, is a sensory organ used like short-range radar to find tiny shrimp, insects, plant life or whatever food may be in the bottom mud. This he strains through that big maw and swallows through a throat so

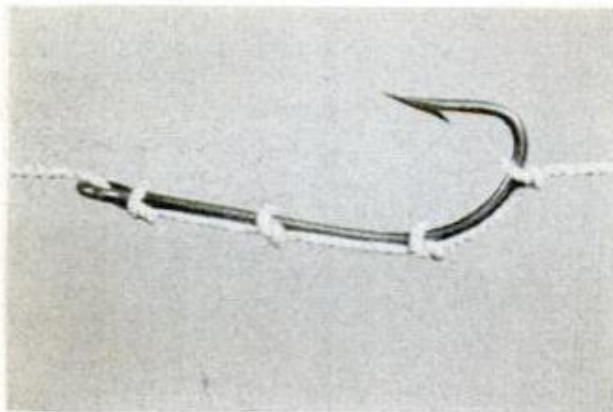
small a peanut would clog it. And because of his feeding habits the spoonbill can be caught in only one way—snagging. Feeding as he does on the minute tidbits found on the river bottom, he has only rarely been known to take any bait offered on a hook. This is what results in the back-breaking work and the type of rig that goes with fishing for this odd fish.

A “deep-sea” rig is the order of the day, with some variations suited to this type of snagging. Many spoonbill fishermen have graduated to regulation boat and surf rods, but many of the old timers still use what was once standard equipment—a billiard cue with big guides taped on it. All of them use a big-game reel with a star drag. Another part of the rig that is almost a must is a plumber's friend or a big rubber suction cup fitted to the butt of the rod.

Whether in a boat or fishing from the

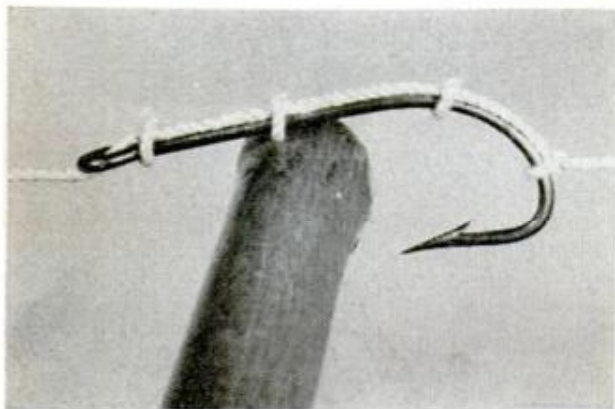


Two happy fishermen with spoonbills of 45 and 51 pounds taken in an hour's fishing near Warsaw



Big snatching hook is laced onto the line by a series of half hitches to the middle of the bend. Properly adjusted, the hook will ride barb upward

When the laced-hook rig slides over any obstruction, the hook flips over, bringing the barb down into position. Scaleless, spoonbills are not hard to snag



bank the fisherman's basic technique is the same. An eight or ten-ounce lead weight is tied at the end of the line while about two feet up is the hook, the big snagging variety with a shank up to four inches long. No leader is used; the big hook is tied to the line with a series of hitches extending well up the curve so when the hook is in water it rides with the barb up. The line is cast out as far as possible; then when the weight has reached bottom the retrieve begins. The rod is pulled back until the tip is well past the shoulder, then brought forward while the line is reeled in slowly. Then the rod comes back again with a jerk and the process is repeated. The heavy weight drags along the bottom, and when the hook rides over any object—log, fish or whatever—the hook whips around, bringing the barbed point down into play.

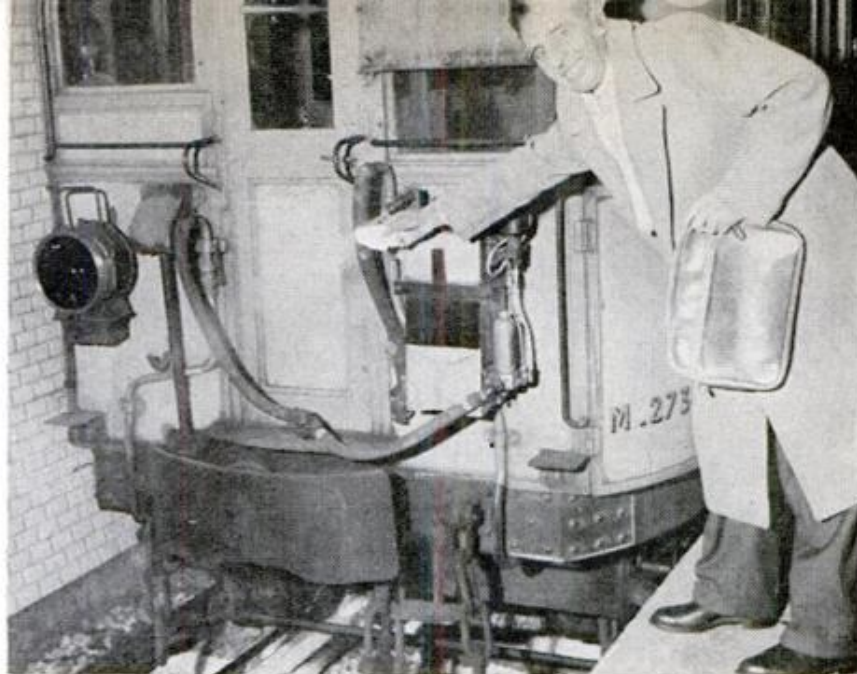
If the spoonbill is hooked in the belly, there is little fight in it; the boys say hauling in a belly-hooked spoonbill is about as exciting and just as much work as hauling in a water-soaked log. This is understandable as the spoonbill will range from 30 to 60 pounds in weight, which is quite a chunk of fish in any water. But should the fish be hooked in some less vital spot, such as the back or tail, then the boys are in for a real struggle. Under these conditions spoonbills have been known to drag a boat for quite a distance before tiring, and they've been known to jerk an incautious lightweight out of the boat or off the bank.

The history of this peculiar fish does go back to prehistoric times, and there are only two places in the world where *Polyodon spatula* have been found. One is in the Yang-tse-kiang and the Hoang Ho rivers in China and the other is in the Ohio, Mississippi and Missouri rivers and some of their tributaries. Apparently the Osage River, a tributary of the Missouri, was one of their favorite spawning grounds. When the big Bagnell Dam was built, impounding its waters and forming the Lake of the Ozarks, thousands of the spoonbills were trapped—and therein lies the story behind the tremendous activity in Warsaw and Osceola when the snagging season rolls around. Once the season gets under way it is practically a continuous performance—there isn't a week end without at least a half dozen neighboring states being represented. Most of the influx of visiting fishermen is concentrated in Warsaw because the heaviest catches are made in that area, though when the waters of the Osage have been swollen by early spring rains the spoonbills concentrate just below the small power dam at Osceola and the banks there are lined with fishermen casting for all they are worth.

(Continued to page 216)

## Perfumed Subway

Passengers on the Paris subway, the Metro, can get a perfumed handkerchief by holding it before the spray nozzles that have been installed on rear cars to disinfect the underground passages. Carnation perfume is mixed with the disinfectant. Lavender perfume will be substituted at times when the price of that scent is low. The spraying apparatus holds a week's supply—18 liters of scent and disinfectant.



## Low-Slung Trailer

Storing many large outboard boats in a garage with a standard 80-inch-high door is almost impossible because the boat, mounted on its trailer, is too high. A new development is a trailer that has a hydraulic "elevator" to drop the trailer bed nearly to the ground, allowing extra overhead clearance. It also simplifies shallow-water launching operations. On the road, the trailer is similar to any other 1800-pound-capacity 20-footer.



## TV News for the Deaf

Television Station WRGP in Chattanooga, Tenn., has a newscaster who never says a word. She's Iva Sue Tallent, daughter of deaf parents, who accompanies the regular newscaster every Friday evening, giving the same news but translating it into the finger language of the deaf for the benefit of WRGP's estimated 600 deaf viewers. When news films are shown, Miss Tallent's picture is inserted in the upper right corner of the screen. Though the service now is only on one day a week, daily service is planned.





Rocket carries cable down to base



Base crew secures cable at bottom, stretching it taut with winch

## Rocket Gun Fires Cable for Mountain Rescue

Proved last year in the much-publicized rescue of mountaineer Claudio Cortis from the nearly impassable north slope of the Eiger in the Swiss Alps, a new mountain rescue technique is being used by alpine

rescue teams around the world. A light, strong cable is fired by rocket from the mountain to the valley below. A stretcher or chair then rides up or down the cable on pulleys. The photos above were made

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## Salvage Tugs Cross Pacific Towing Ships in Tandem

Three of the world's largest seagoing salvage tugs shuttled back and forth across the Pacific last summer delivering ships to Japanese scrap yards, two at a time. Six of the ships (five Liberty ships and a small aircraft carrier) were pulled over in a series of tandem tows, while the 30,000-ton Chilean battleship *Almirante Latorre*, was hauled 11,000 miles from Chile to Japan in what is believed to be

the longest tow in maritime history. The tugs are owned by Island Tug and Barge, Ltd., of Vancouver, B. C.

The tandem tow, developed by Canadian salvage experts, involves a hookup of underwater cables. While being towed, the vessels are unmanned. The tandem tows from West Coast ports took about 38 days each; the battleship tow from Chile, three months.



Drawing, upper right, shows how two ships are secured to single tug for 5500-mile crossing

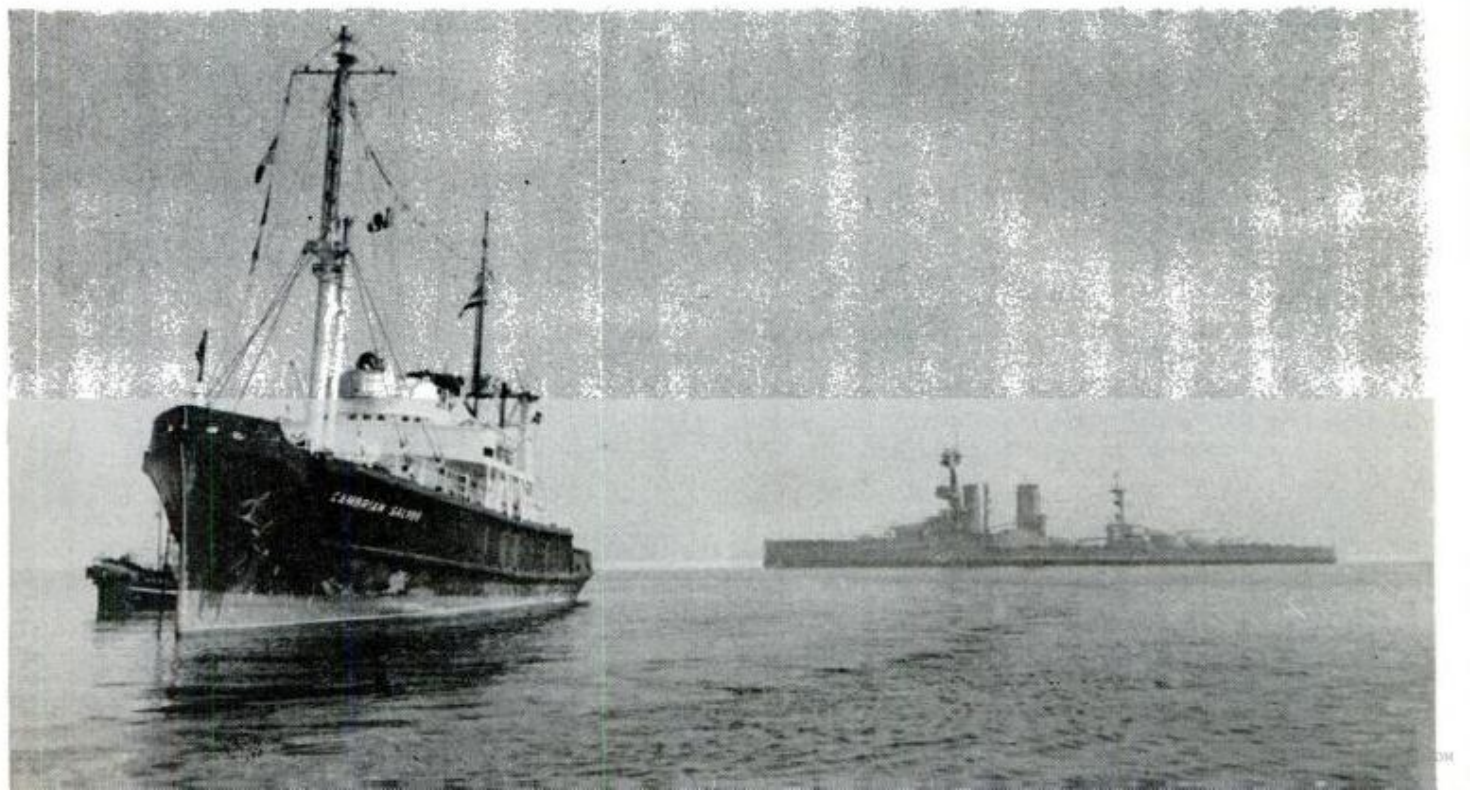
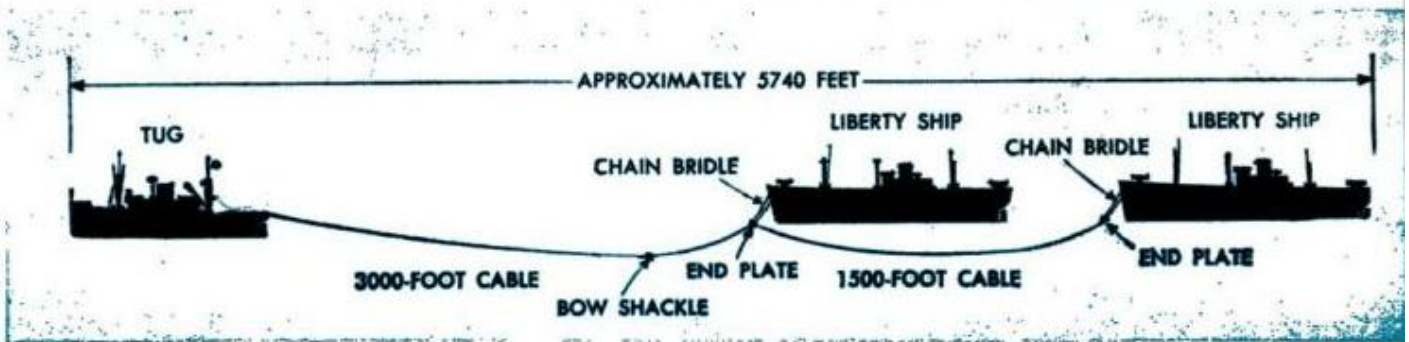
Left, towing two Liberty ships, tug *Sudbury II* heads for Japan from the Victoria, B.C., harbor

Tug *Cambrian Salvor*, right, moves into Yokosuka harbor pulling the *Almirante Latorre*—largest ship ever towed across Pacific Ocean by a single tug



Volunteer goes into the chair, above, and down the mountain to safety. Thin cable has a tensile strength of 1800 pounds

during a recent demonstration of the equipment made by the Eiger rescue squad for other alpine units, during which they duplicated the Cortis operation, using one of their men as "dummy." He was lowered 800 yards to the valley below without a hitch.





This side view of the moon has never been seen by man or telescope. It was created to aid mapmakers

White line in the center of moon view is a 500-foot cliff. Such photos bring the moon within 200 miles



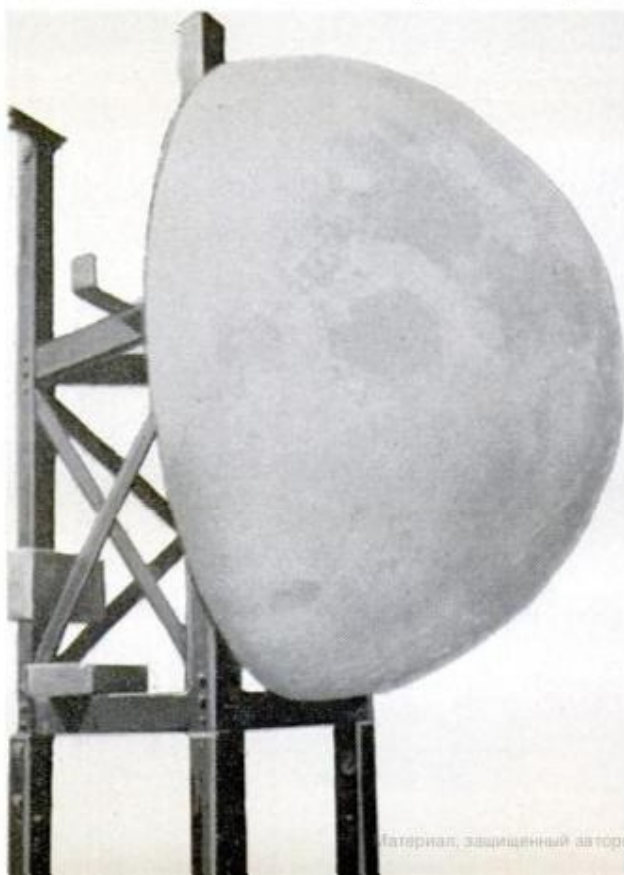
# Mapping the Moon

By Theodore Berland

**T**RICK PHOTOGRAPHY is helping astronomers make a map of the moon. To overcome distortions caused by photographing the round moon on flat film, the mapmakers working under Gerard P. Kuiper, director of Yerkes Observatory at Williams Bay, Wis., are photographing the moon on a glass slide, through a telescope. The slide is then placed into a projector and its image is cast onto a three-foot half-globe, creating a round picture that shows the moon's pockmarked face as it really is. Their 250-page atlas will guide astronomers and astronauts, and will serve as a record against which to check changes—natural and manmade—in the moon's surface.

While he was gathering material for his atlas, Dr. Kuiper also made an important discovery. He found dozens of small, rounded domes each about four miles across and 1000 feet high with holes in their tops a half-mile wide. They resemble what he considers "a most remarkable mountain mass" on the moon which he has nicknamed "Raspberry Mountain." Dr. Kuiper says these domes are proof that much of the moon was once covered by molten lava. They fit in with his theory that 4.5 billion years ago the earth and the moon were molten: The domes were

Side view is made by focusing a slide photograph of the moon onto this three-foot plastic half-globe







Dr. Kuiper, director of the University of Chicago's Yerkes Observatory, selects a moon photo for new atlas

probably formed as hot liquid lava was squeezed up from below and pushed out the moon's crust. (The Black Hills of South Dakota were formed by a similar action.) Dr. Kuiper is certain that moon rockets will find other such lava domes.

He says some other things moon mappers look for in the future are:

- Several satellites orbiting around the moon to illuminate it dramatically. This would allow telescopes on earth or aboard satellites to take detailed photos of the entire moon surface.

- Robots on the moon to answer such questions: What is the surface made of? How thick is the layer of dust that covers some areas? What's the temperature of the moon at the surface and at various depths below? Does the moon have quakes?

- Astronomers are sure the moon's atmosphere is as thin as the air 300 miles or more above the earth. They say this trace of atmosphere is likely to be composed of argon gas generated when radioactive potassium on the moon's surface disintegrates. But are there any other gases?

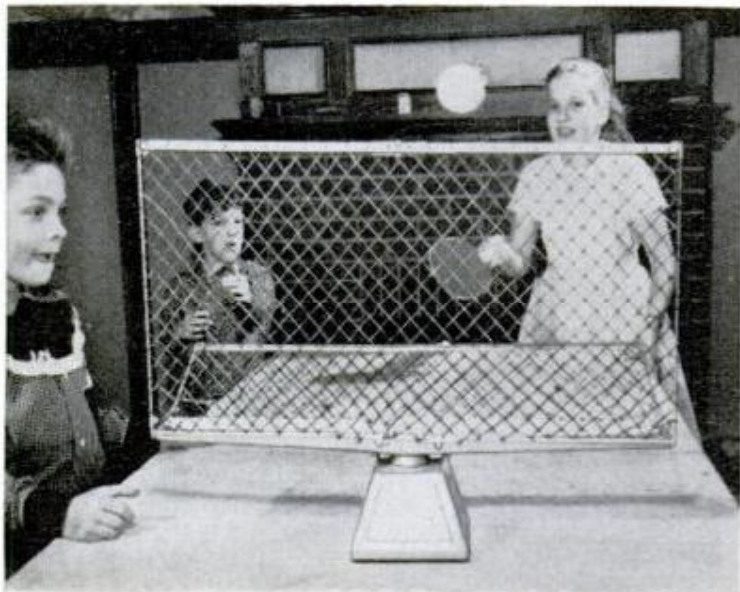
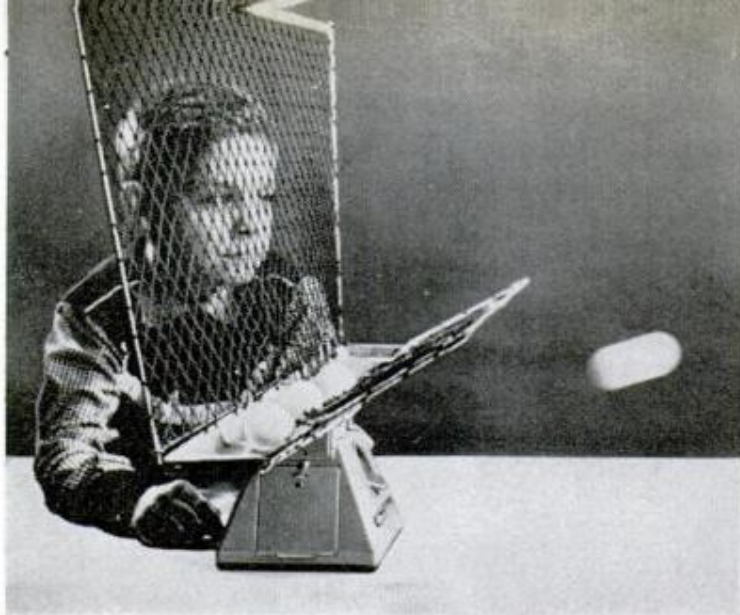
- At the edge of one of the larger fields

of lava domes is a peculiar white patch with a thin white "tail." Was it caused by the collision of a comet?

- Lunik III showed that the far side of the moon was like the front. But astronomers want to know how the craters there are distributed and the size of the center bulge on that other side.

Perhaps the most important reason astronomers are interested in the moon is that it is our best preserved relic of the first days of the solar system. "It shows a continuous record of the happenings in the solar system near the earth for the past 5 billion years; nowhere else is such a record to be found," says Dr. Kuiper. No wind or rain or frost wore the surface down and neither plants nor animals have covered it. And, except for any germs carried by Lunik II, there should be no evidence of life.

To the future investigative astronauts, this is Dr. Kuiper's advice: "The best place to land a space ship on the moon is the old Western land mass. It has few craters to serve as landing hazards and is covered by a soft, sandy surface." ★★ ★



## Who's Winning

Table tennis' biggest drawback has always been that, like the seesaw and the tango, it takes two, which makes it hard to practice or play when an opponent can't be found or talked into a game. But a new robot partner, powered by two standard batteries, returns the ball untiringly for practice, and makes an interesting one man game as well. The machine is 24 inches wide, 20 inches high and 10 inches deep, and sits in the middle of any table. Its two nets catch the ball, drop it into a trough, and eject it (or one already in the firing mechanism) toward the player at an unpredictable height and angle. The action is continuous, and the machine is not only a good player, but almost never gives up a point. It even plays doubles, but never tires, contests a decision, or gets a sore arm.

□ Multi-colored highways and airport pavements may be practical to build with a technique developed by the Esso Research and Engineering Co. Plastic materials which may be pigmented any color are compounded with rock or sand to form the colorful one-inch-thick pavement surface.

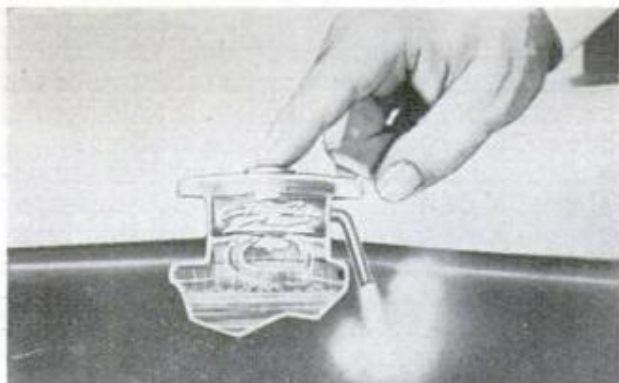
## Binoculars Become Telephoto Lens

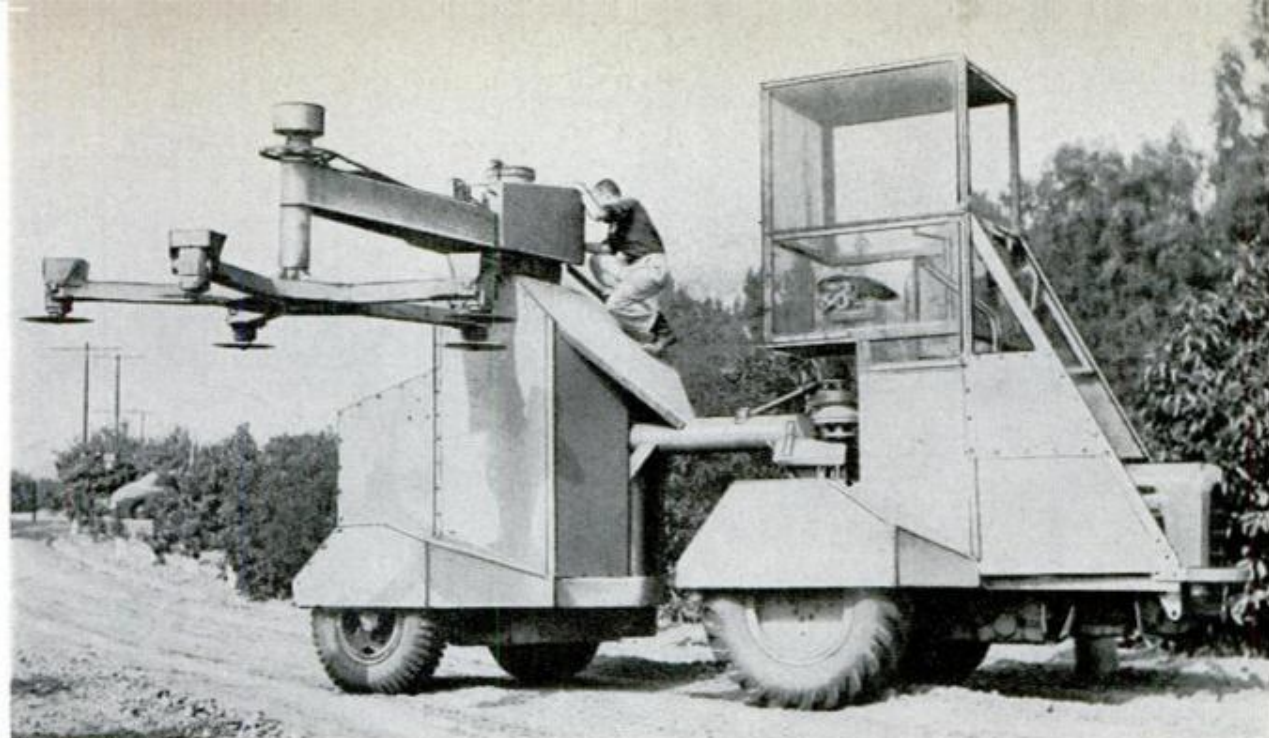
Your camera and binoculars (or monocular) can be joined for long-distance photography by a camera-to-binocular holder that mounts atop a tripod. Length of the unit is 10 inches. Rubber guards hold the binocular eyepiece to the camera and shut out extraneous light. Any binocular may be used with any camera—movie or still. Monoculars, however, should have hinge lugs and bolts.



## Cap Releases Radiator Pressure

Pressurizing cooling systems on modern automobiles have caused many burns and many more surprises for uninitiated owners who unscrew the cap before allowing the system to cool and the pressure to go down. A new kind of radiator cap lets you release the pressure before opening the radiator. Push the button and the steam goes down the radiator runover tube. The caps are available to fit most cars.





## Pruning Machine Gives Fruit Trees a Crew Cut

Next to water and taxes, the biggest expense to a California fruit grower is the cost of pruning his trees to keep the fruit-bearing branches within reach of picking crews. Pruning by hand is a difficult and tedious chore, so a pair of mechanically-minded Californians, E. C. and Charles Kimball, have developed a "whirlybird" pruning machine, which allows one man to top two acres of trees an hour. The ma-

chine carries five 16-inch circular saw blades powered by individual three-horsepower electric motors. They are in turn mounted on rotating arms, which turn at speeds variable from 35 to 50 miles an hour, giving the effect of a 10-foot circular saw. The rotating arms also throw brush away from the tree, saving on cleanup work. The wheel can be rotated from side to side, and is adjustable from 7 to 15 feet.

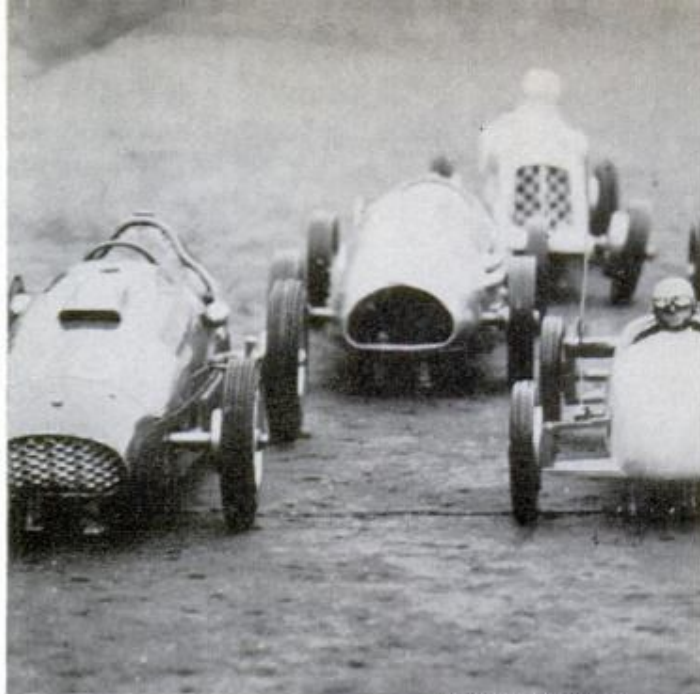
## Scuba Mask Permits Underwater Talk

Skin divers can carry on normal conversation up to a range of 150 feet and down to a depth of 100 feet with a new underwater communicator which uses the water itself to carry sound waves. Powered by two standard underwater pressurized batteries, the device uses a speaker and amplifier in a lightweight container which straps onto the air tank, and a partial face mask which combines both microphone and air mouthpiece. To speak, the diver pushes a button on the mask. The communicator can be used with most standard Scuba gear with the addition of the combination mouthpiece.





Club secretary starts a two-car handicap race. Cars are divided into three power classes, or formulas



Frank Martin photos  
Mercedes, Maserati, Ferrari, Vanwall—but not one over a foot long or .06 cubic inch displacement

# Figure 8 Buzz Bugs

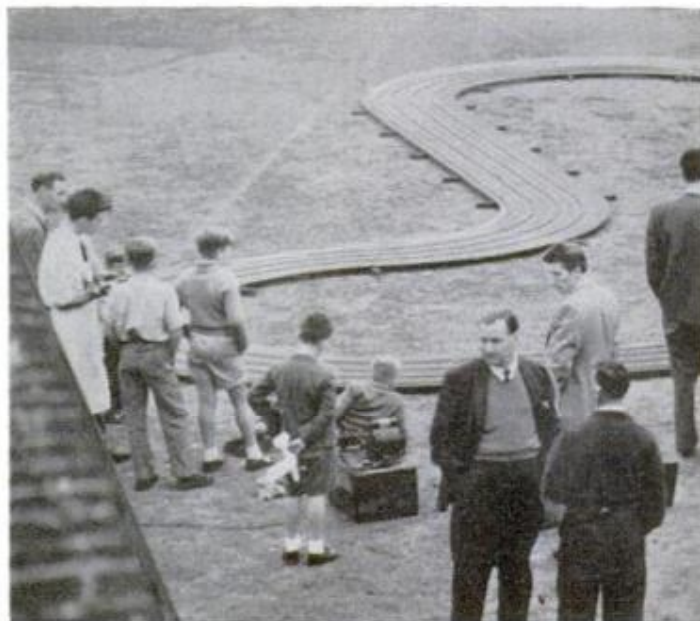
By Lewis De Fries

THE LINEUP of racing cars shown above could have been photographed at any of Europe's famous Grand Prix tracks—but it wasn't. It was on a playing field at Ealing, West London, during a meet held by Miniature Motor Sports Club, a group of model racing car enthusiasts who match their cars on a 120-foot track at speeds up to 40 miles an hour. The little speedsters are powered by model aircraft engines and

guided by wires and channels in the track. A racer costs about \$40; kits sell for around \$25. Cars are classed like the big ones, by piston displacement—Formula One for one cubic centimeter, Formula Two for .8 cc., Formula Three for .6 cc. and under. Cars are raced within their class or given time handicaps. Owners compete within their club or in matches with other groups—rivalry is intense.

Young club member and car in his portable "pit." Model racing clubs are appearing all over England

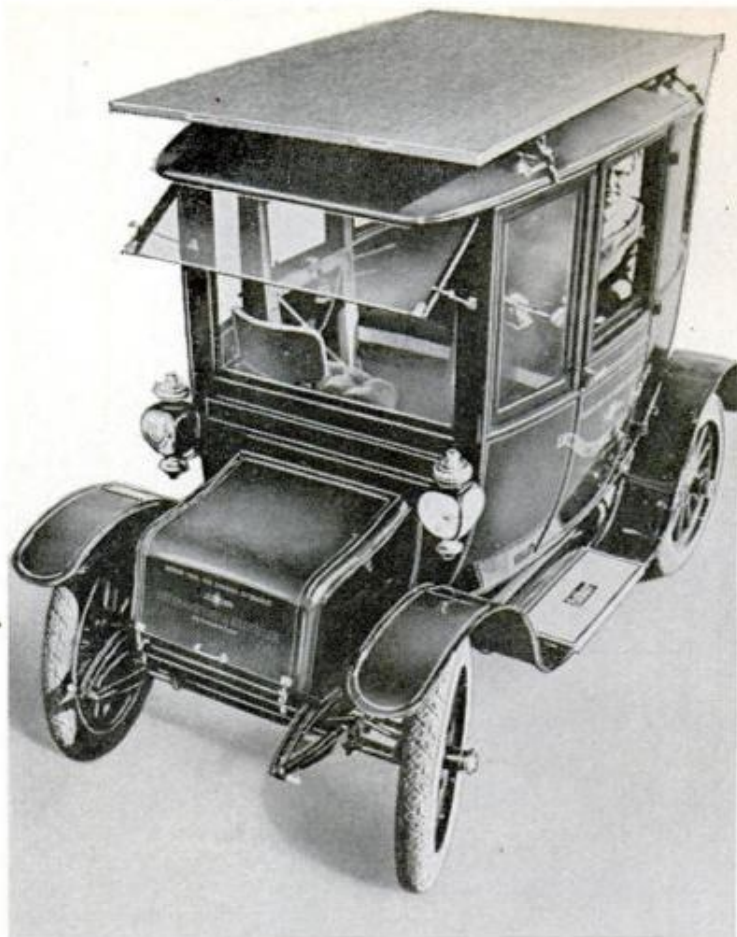
Tracks are figure-eight shaped to equalize length of the four tracks; even bridges are built to scale





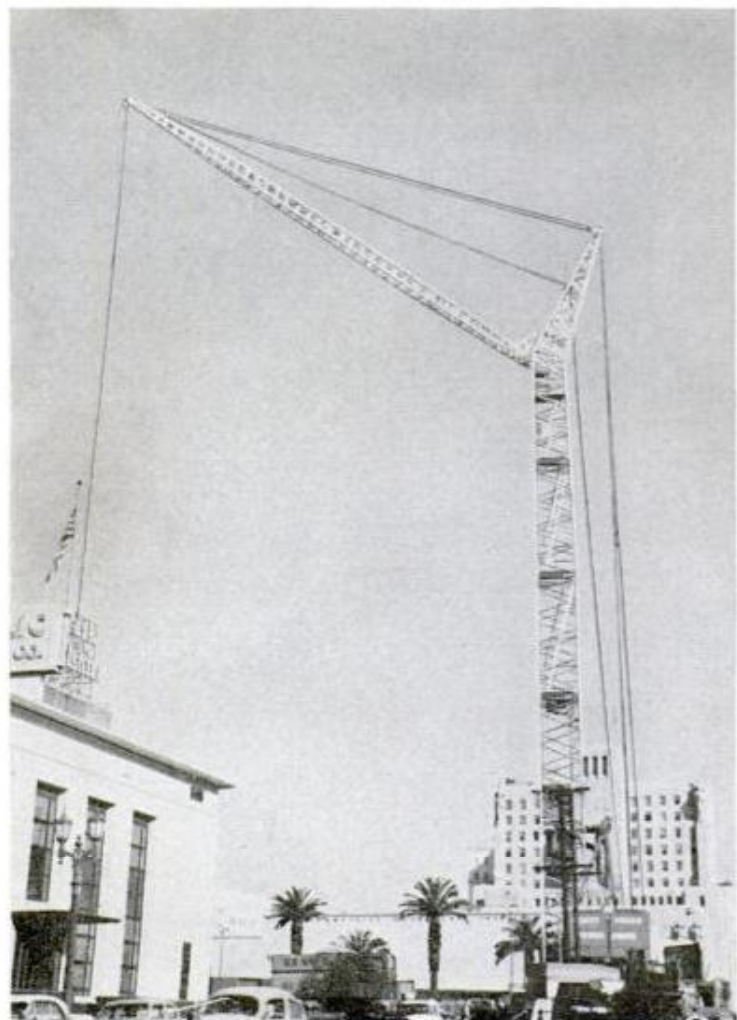
Perfect miniature of Ferrari flashes across the finish line in a two-car match. Note the scale-model advertising on the scale-model bridge





## Sun Powers Old Car

Each spring a new crop of electric cars appears that promises to supersede the noisy, smelly gas buggy. This year, there is a full-size solar car that draws power from the sun. A panel of 10,000 solar cells is mounted on the roof and energy from the sun is converted to electricity by these cells. The motor of the car (a reconditioned 1912 Baker electric) draws current from a bank of batteries which are recharged by the solar cells. The car has a top speed of 20 miles per hour. If driven slowly to conserve electricity, it will go about 50 miles before it needs recharging. Unfortunately, the solar cells do not "make" electricity as fast as the car uses it. So, after 50 miles of operation, the car must stand in the sunlight for 10 hours before it is ready to go again. Built by the International Rectifier Corp., the solar panel has been installed on the car simply as a test and the car, obviously, is not for sale.

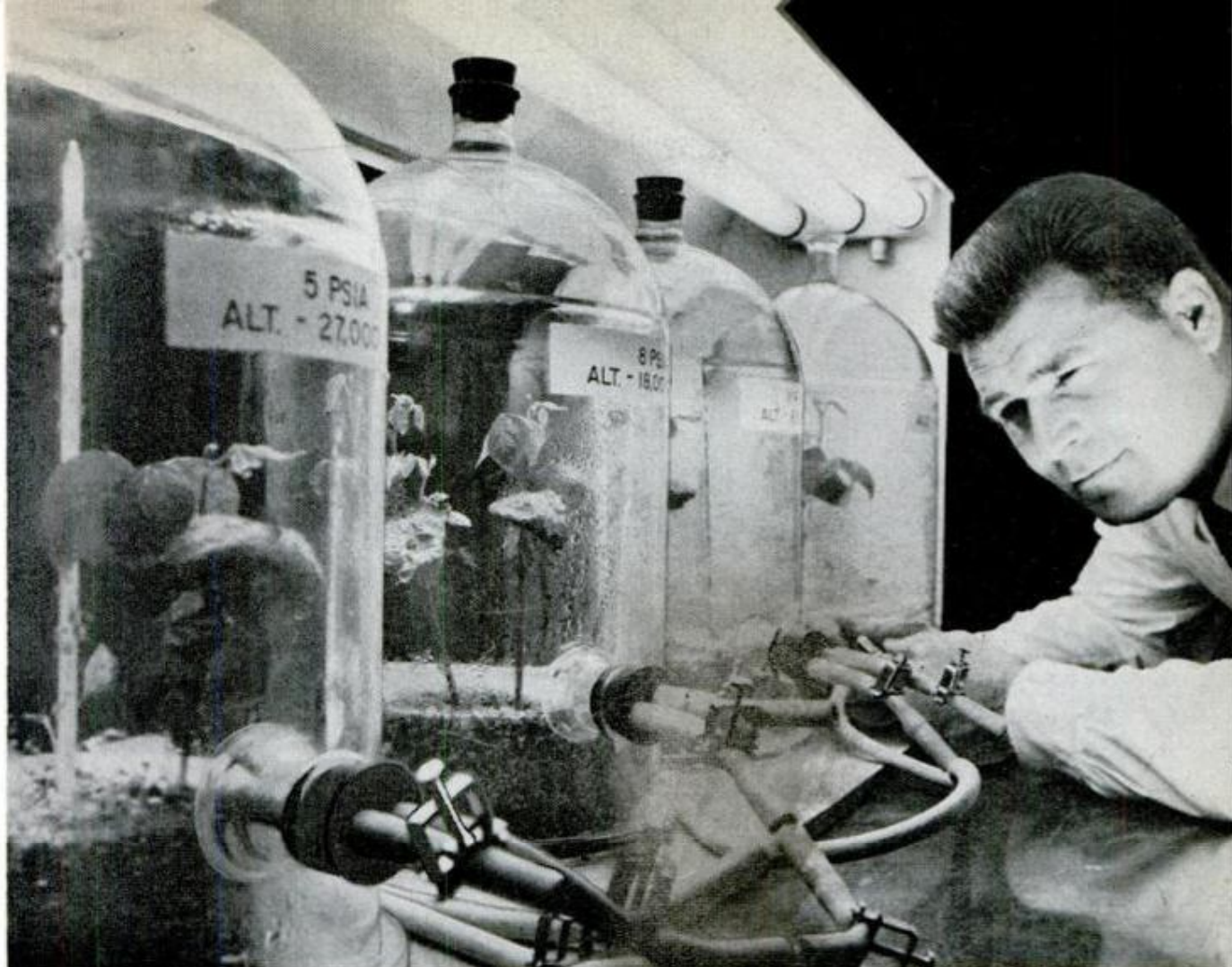


## Monster Crane Dwarfs Building

Towering 292 feet over Wilshire Boulevard in Los Angeles, one of the world's tallest cranes is being used in the construction of a 13-story office building for the American Cement Corp. Standing 100 feet above the top of the building, the crane will be able to hoist materials up and over all four sides of the building without moving from its base. This European technique is not common in this country on taller buildings. Electrically powered, the crane is operated by an engineer from a tiny "office" at the 292-foot level. It can lift huge loads at high speeds, almost silently.

☐ Irrigation with waters carrying chemical effluent from city sewage-disposal systems can increase crop yields greatly, University of Wisconsin tests indicate.

☐ More than 100 square feet of gold plating is used in the United States' Scout rocket to protect instruments from extreme heat caused by atmospheric friction.



Space laboratories are growing such foods as turnips under conditions simulating those of high altitudes

## Gardens to Feed Space Exploration

By Richard F. Dempewolff

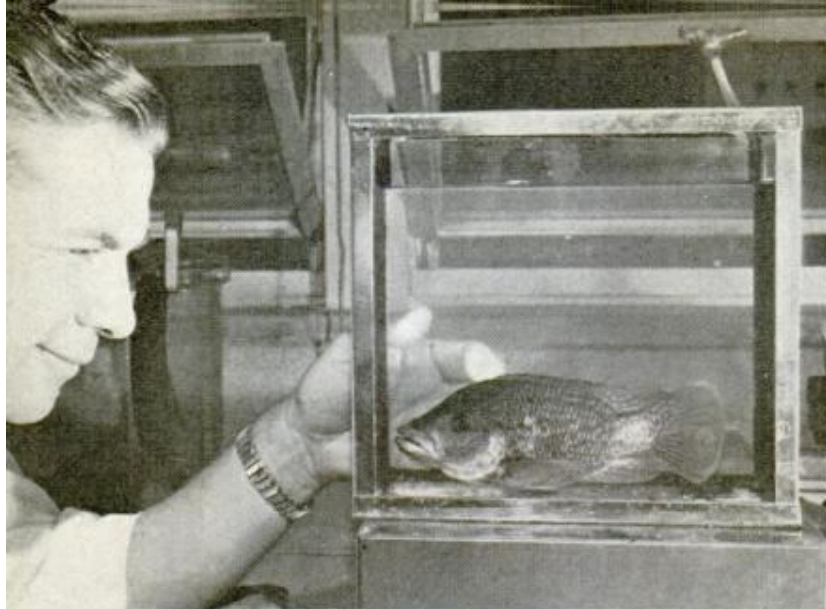
**I**N A CURIOUS array of miniature gardens in Farmingdale, Long Island, a lot of confused vegetables are attempting to make something of themselves against unique odds. Snap beans, for instance, are trying to grow upside-down. Gravity tugs at their growth-guiding hormones the wrong way; light falls on the underside of their leaves, and they get all mixed up. Beets, carrots, turnips and beans, enclosed in bell-jar greenhouses, push up from the soil to find themselves in strange, exotic atmospheres and semi-vacuums. Spinach and turnip seeds, sent soaring 40,000 feet into the stratosphere in balloons, are bombarded with cosmic rays, then planted to see if their genes have been juggled.

Out in Seattle, there's a whole crop of tomatoes, beans, nasturtiums and even mushrooms whose roots have never touch-

ed soil. They're growing in beds of powdered Styrofoam and vermiculite. Here, huge tanks of green algae, feeding and growing on purified human waste, are being raised to feed a fast-growing tropical fish that has proved suitable for human consumption.

Down in Texas, a garden of similar algae in a sealed container is getting the carbon dioxide it requires from the breath of a pair of mice—Yoke and Zebra—sealed in with it. The mice, in turn get their necessary oxygen from the algae. They are known, quaintly, as "mousetronauts."

These, and similar offbeat agricultural enterprises cropping up in laboratories around the country, are all part of a program dealing with the complicated problem of keeping the first long-distance space explorers physically fit and well fed.



Algae, a possible space-food, are rich in nourishment, low in taste appeal. Boeing scientists are experimenting with a system in which a fish, Tilapia, eats the algae, and man eats fish



Scientist, above, studies oysters as source of space-food. Mice, below, eat algae in a closed system resembling that aboard a space ship. They even breathe oxygen produced by algae



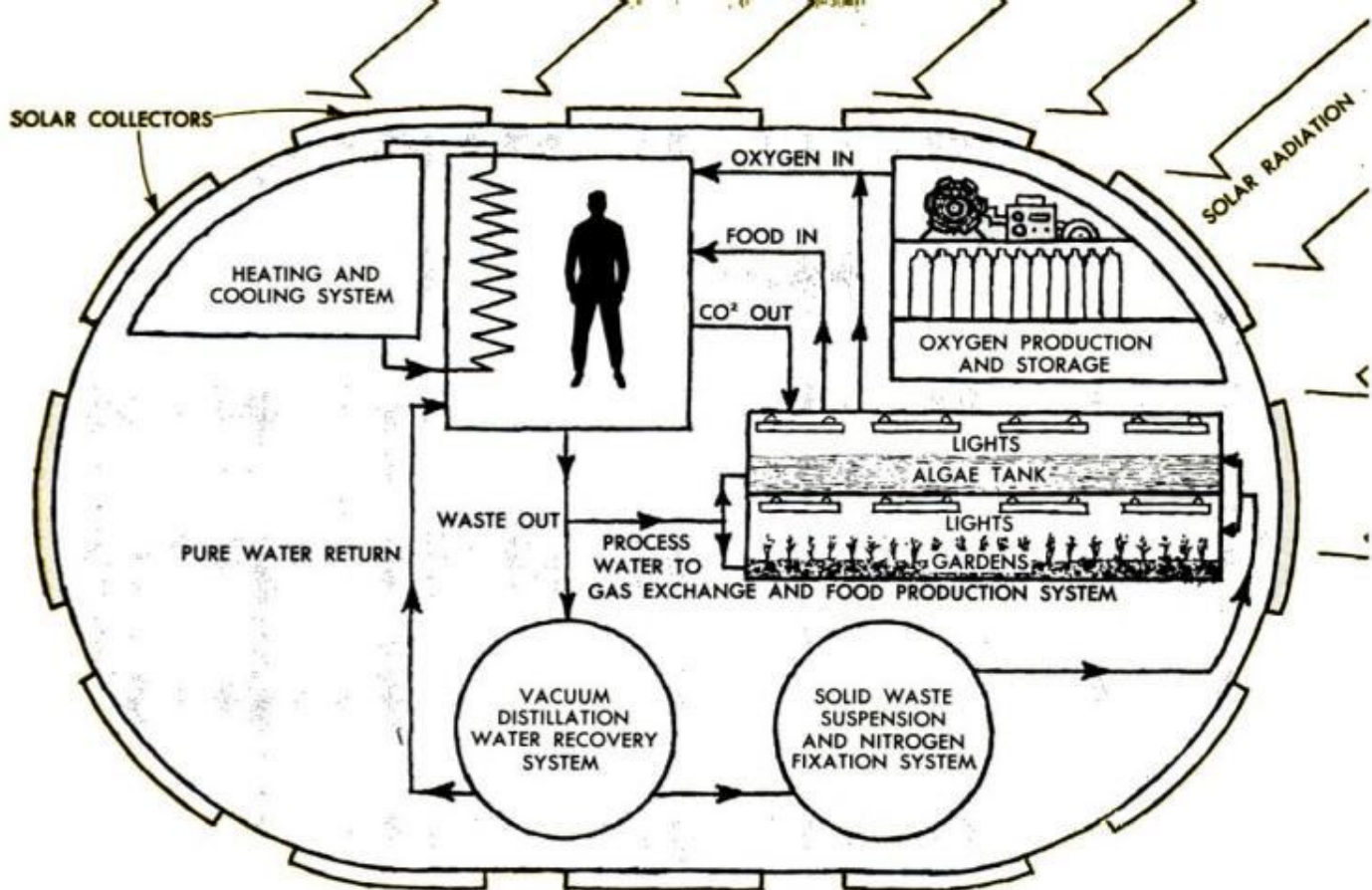
While this may seem like a minor bump among the many roadblocks along the highway to space junketing, it could easily be the one insurmountable hurdle unless these experiments pay off, according to the small group of scientists now digging into a tangle of sticky metabolic problems. Why? What's wrong with the concentrated food in squeeze-tubes, and plastic bags of water, already tested and proved out?

They're fine for the first short hops orbiting the earth or the moon, when astronauts will be testing them for eating techniques rather than long-term sustenance. But out in his new space laboratory at Republic Aircraft Corporation on Long Island, where some of the sticklers are undergoing scrutiny, Dr. Norman Lee Barr paints a different picture of man in outer space from the cozy, air-blanketed environment of a bountiful earth. Every day away from home, he points out, each astronaut will need five pounds of water, twelve dry ounces of food, and some two-and-a-half pounds of oxygen necessary to food utilization. A 516-day round trip to Mars, for instance, would call for two tons of food and 45,000 gallons of water per man. "On top of that," says Dr. Barr, "comes elimination of garbage and waste—a problem involving two vital considerations. First, you can't afford to throw anything away because not one atom of supply can be added to stores during a space voyage. Second, it's nearly impossible to get rid of anything."

Can't a hatch be rigged to eject waste from an orbiting space ship? Sure. But the minute you do, you're in trouble. Space is full of tricky nuisances such as natural laws. Place a bag of garbage gently outside and it will accompany you. Shoot it down, up, or to one side and you might run into it on the opposite side of your orbit. Shoot it backward and it will go into orbit below you, with a chance of collision later. You might shoot it ahead so it would orbit outside your track, but the fact is that you need it, anyway. So much for garbage. It goes with you.

The matter of human waste is an even bigger headache for a





Drawing shows how the closed ecological system mentioned in text would work in a space ship or moon base

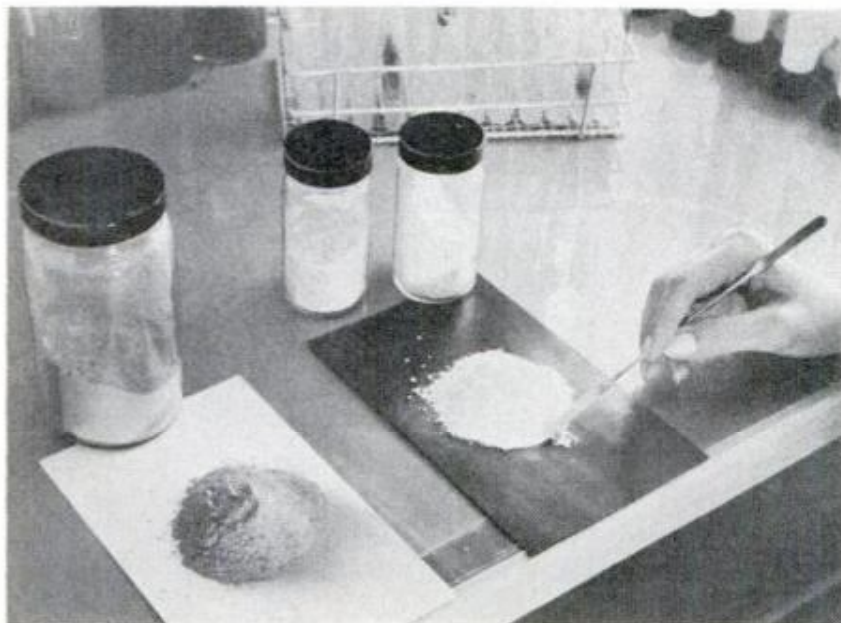
host of weird reasons. Waste eliminated by the lungs alone, from oxidation of food in the body's metabolic process, creates prohibitive problems. "The 42 ounces of oxygen that a man uses each day," explains Dr. Barr, "combines with about 12 ounces of food that has been digested, absorbed into the blood and assimilated. It produces energy—and promptly forms 54 ounces of waste. About 36 ounces of this waste is in the form of carbon dioxide; the remain-

ing 18 ounces is in the form of water."

If the air we breathe has more than three percent carbon dioxide, it poisons us. It's not hard to visualize the predicament of a man sealed in a six-foot sphere—a logical size for a space ship cabin—where he'd soon suffocate on his own breath in a day, if carbon dioxide were not steadily removed.

But even if you get rid of this hazard, there's the 18 ounces of water. This magical

Both green and blanched algae (mounds at left) were baked in cookies. Blanched type gave a good taste (right)



pint, manufactured by the body in the metabolic process, is in addition to the water that a man drinks and eliminates. "This means," says Barr, "that water aboard the space vehicle will increase at the rate of one gallon per week for each man." So, eventually, an astronaut could drown in the water produced by his own lungs and pores, if some way is not found to dispose of it.

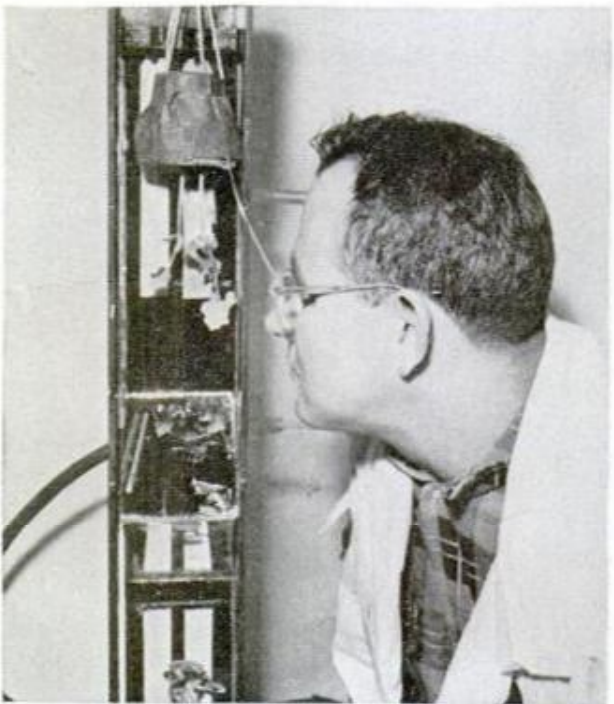
"On short voyages with a one-man crew," says Dr. Barr, "It appears economical to supply dehydrated food and liquid oxygen, and remove the carbon dioxide and water with a chemical agent like lithium oxide. For longer voyages, we must prepare to convert these waste products back into food and pure water. At a space base, this is even more important."

And that's where space gardens come in. In order to survive, plants conveniently need the carbon dioxide and water that people reject, turn it into food for themselves, and give off through their leaves the oxygen and pure water that people need. What's more, some plants themselves provide people with usable food. Theoretically, if you sealed a man and a proper garden together in an airtight chamber, they would go on indefinitely providing each other with the food, air, water and chemicals necessary to each. This is a "closed ecological system."

The trick is to produce such a closed system small enough to be contained within a space ship's limited payload. There are many hair-raising problems to be solved.

First of all, early space ships probably will not be fully pressurized. How will plants like that? In gravity-free space will they become a jumbled mass of roots and tops all tangled up? Will the cosmic radiation of space destroy the reproductive and seed-germination ability of plants? To find answers to some of these questions, Harold Rind presides over a "moon garden" in Republic's environment laboratory. In rows of little sealed hothouses, where air pressures simulate altitudes up to 46,000 feet, you can see vegetable plants growing—some nicely, others feebly. "Dwarf tomatoes have matured and flowered three weeks ahead of schedule under high-altitude conditions," the scientist reveals. "Since we can't produce gravity-free conditions on earth, we've had to try other tricks—like growing plants upside down. They didn't like it, and grew very slowly. Since growth hormones in their stems still reacted to gravity, the stems tried to grow upward. Without a gravity system to tell the cells which way to grow, how will they react? We won't know until we get some plants up there."

(Continued to page 236)



◀ Scientists sent these spinach and turnip seeds up in a balloon to learn what effect cosmic rays will have on their growth



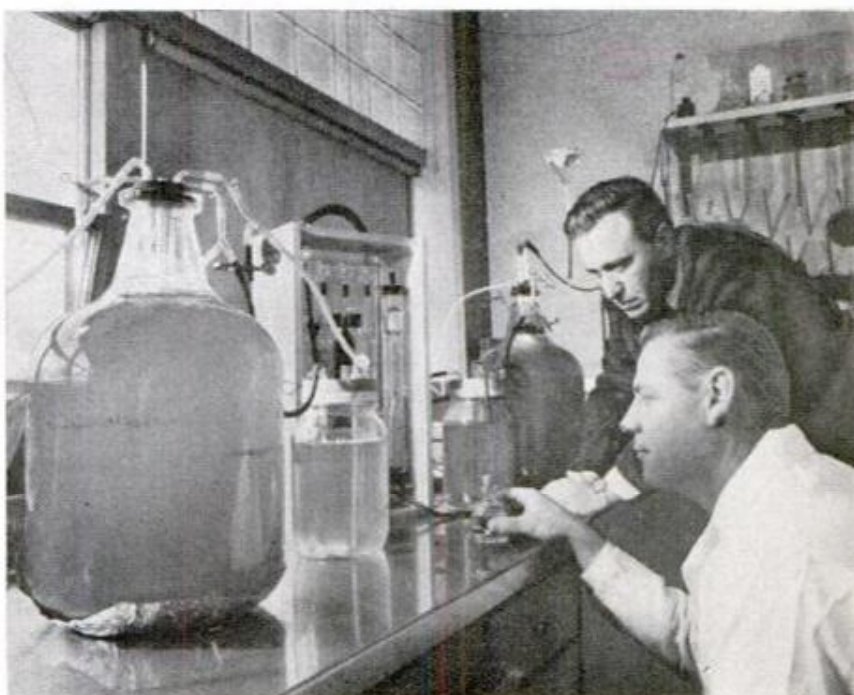
▶ Fruiting tomato plant thrives in inert soil of vermiculite, powdered Styrofoam, purified human waste. Moon soil is inert

◀ Disposal of human wastes is a space problem. This is a vacuum still in which wastes give up purified water for animals



▶ Two Boeing scientists check on the growth rate of a batch of algae they are raising for a space-food experiment at Seattle

◀ Mixed-up beans. These string beans are growing upside-down in an experiment to determine effect of gravity on space food



▶ Algae growing in purified waste and carbon dioxide bubbles give off oxygen which is bubbled into a fish tank (jar in center)



Typical of his entire mining operation, Don Gaston's muscles are the only power supply for the pump

## Lone Man Operates Copper Mine in Chilean Desert

ALONE IN A DESERT that has claimed the lives of his wife and his brother, Don Gaston is struggling to make a self-operated mine grow into a major producer of copper in Chile.

Leaving his native Santiago about 10 years ago at the age of 22, Gaston went into the desert to seek his fortune. He found a rich source of copper in the Atacama Desert of northern Chile. Bringing in

supplies by mule team, he has constructed a mining operation that functions entirely by his own muscle power.

Gaston's wife died after she had been in the desert only a short time, and his brother perished somewhere in the area while searching for gold.

The lone miner sells his output to Anaconda Mining Company, confident of making his small mine into a full-size operation.

**320** CAPABLE OF LIFTING more than its own weight of 50 tons, a huge lift-truck in operation at Elk City, Idaho, normally empties a truck loaded with logs in one huge bite with its shovellike steel fingers. The machine is powered by a 300-horsepower diesel engine and, for quick handling, has power-shift transmission and hydraulic power steering. It is used to load and unload trucks and railroad cars, and to feed logs into a mill-pond. It takes eight minutes to unload and sort a load of logs, compared with 30 minutes by other methods



128 OPERATING WEIGHT — 95,000 lbs.  
LIFTING WEIGHT — 70,000 lbs

POPULAR MECHANICS



Gaston built equipment for copper mine in northern Chile's Atacama Desert. Salt water poured over ore dissolves out copper sulphate; sulphate is precipitated out of solution later

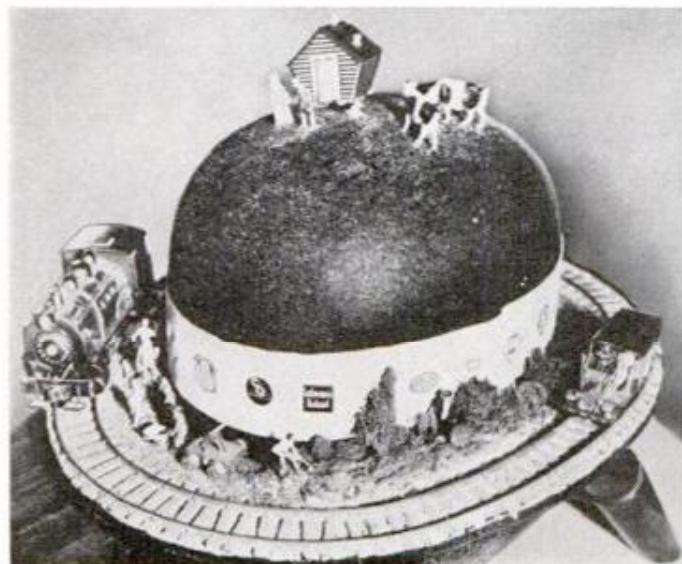


Above right, sole owner and worker in the mine, Gaston digs into the soil for ore to begin the copper-recovery cycle



Right, at end of process, copper lies in a tank from which Gaston recovers it. He sells his output to a large mining firm

**MODEL RAILROAD BUILDER** Anton Ricker of Riverside, Ill., has capped 20 years of hobby experience by laying out a short line around the brim of his derby hat. The derby also displays a farmyard scene, complete with chicken house, as well as surveyors and a road gang at work on the tracks. The train—a locomotive and one car of the type used by officials to travel along the right-of-way—actually runs. It is powered by batteries. Ricker is never far from trains, even at work, for he is a railroad equipment engineer





McBride, left, and Wilson check the largest of their whales on the mud flats of Kvichak Bay before loading. This whale is now at Pacific Ocean Park in Santa Monica, where McBride is on the staff as a biologist

# WHALE LIFT

By Robert M. Austin

Dr. Ray checks one of the whales during first stopover. Whale didn't complain



Ready for unloading in California. Attendants examine the whales before loading on trucks for the last leg of the trip



**A**LASKAN BUSH PILOTS carry a lot of unusual cargo over their far-flung routes, but one flew out of Kvichak Bay on Alaska's west coast not long ago with one for the books—whales.

Led by James Brooks of the Alaska Game and Fish Dept., a four-man expedition had captured three rare white Beluga whales. The other members were Dr. Carlton Ray, of the New York Aquarium, who wanted one; Carcy McBride of Pacific Ocean Park, Santa Monica, Calif., who wanted two; and Charles Wilson, an Alaskan, who directed the netting.

Captured near Bristol Bay, the three whales were towed up a river and penned in a lake while plans for their shipment were arranged, then they were removed from the water and carried to the bush pilot's plane on a litter. Belugas (or any of the aquatic mammals) can remain out of the water for long periods if they are kept wet and cool, since they are air-breathers. Dr. Ray and Mr. McBride covered their prizes with wet muslin and rode along as they flew the first leg of the trip, to Anchorage, Alaska.

At Anchorage the whales were carefully washed, then placed on special foam-rubber mattresses and transferred to a regular cargo plane, still accompanied by the two scientists and their buckets of water. The whales, the largest of which was 14 feet long and weighed nearly two tons, seemed comfortable on their wet beds.

At Seattle the strange, wet cargo was transferred to another cargo plane, mattresses, water boys and all, for the last leg to Clover Field in Santa Monica. On arrival, they were loaded on a truck, got one more soaking and headed for Pacific Ocean Park.

At the park, a special crew hoisted the pallets out of the truck and eased the whales into their tank. All three swam happily away; none showed any ill effects from the long trip, and all adjusted well to the new home.

It had been fifty years since a white whale had been successfully captured, but the four hunters, with the aid of three airplanes and countless buckets of water, had brought 'em back—alive—in 27 hours. ★★★



Above, a final sloshing for the Belugas before the truck ride to Pacific Ocean Park. Below, fat and happy under several layers of muslin sheets, tarpaulins, and a safety net, the whales rode through 27 hours of ground and air travel



Still resting on the foam-rubber mattress, the first whale is lowered into the California tank. It swam away immediately





## One Man Plays Six Instruments—Simultaneously!

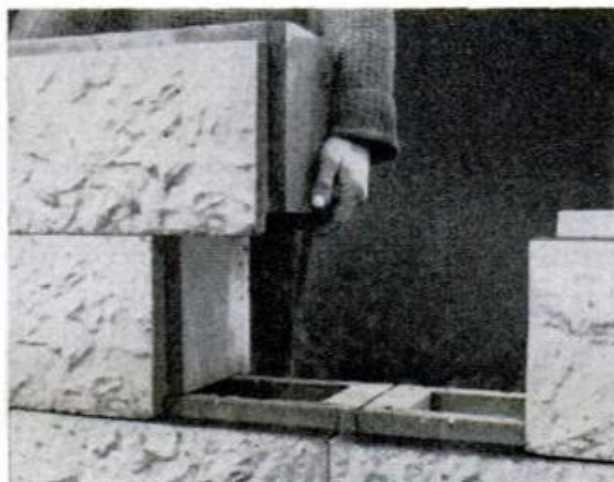
Composite recording—the technique made popular by guitarist Les Paul and others—has reached a new peak in effectiveness with a Czechoslovakian experimental theater group in Prague. There a single, versatile musician plays a jazz sextet—alone. Five parts of the performance,

piano, trombone, trumpet, clarinet, and bass, are superimposed by a succession of retakes on a single film and sound track, which is projected on the screen behind the artist, who then accompanies his other five selves on a second piano—in this case with a singer added.

## Concrete Blocks Hold Without Mortar



Concrete blocks that need no mortar and can be slotted together will enable unskilled persons to build their own houses, says the inventor, Miss Mary Mason of England. Each hollow concrete block measures two feet by one foot. Grooves and overlapping sides hold the blocks securely. Block fronts have a simulated stone face; backs of the blocks are smooth.







## Air Bubbles Keep Arctic Harbor Ice-Free

Compressed air is helping keep a cargo pier clear of ice at Thule, Greenland, despite the extreme cold in that far-northern harbor. Pumped through 5000 feet of one-inch plastic pipe laid on the harbor bottom, the air bubbles upward, bringing up

warmer water from lower levels and creating turbulence that retards freezing. A recent break was quickly mended by Navy skindivers, who simply repaired a plastic connection. The system is being considered for piers on the St. Lawrence Seaway.

## TV—Through a Pipe

British television engineers inspect an experimental television transmission system in Herefordshire County, England, in which live television pictures are sent 3600 feet through an empty three-inch pipe. The system is believed to be the first to send a picture any considerable distance by this method, which is technically known as a circular waveguide, and to use the new pulse-code modulation transmission method developed by International Telephone and Telegraph Corp. (Ordinary waveguide is used to send short-distance signals less than 100 feet.) This system, designed to ease the burden on crowded existing facilities in or between cities, will handle 400 television channels or several hundred thousand telephone conversations simultaneously. On the longer distances, repeater units are used to boost the signal strength. Though this experimental system is mounted above ground, commercial circular waveguide systems would use buried pipe not unlike a conventional pipeline and, it is hoped, at a lower price than the standard coaxial cable or relay-tower systems of transmission in use today.



# Is the Ocean Warming Up?



By Thomas E. Stimson, Jr.

**I**N 1957 the bleak shores of Canton Island in the Pacific sprouted green with lush tropical growth for the first time in white man's memory.

During a 90-day period that winter the earth increased the speed of its rotation and got ahead by 3/100 of a second.

In the same year, drift bottles from the weathership *Papa* in mid-Pacific began going ashore in Alaska and the Aleutians instead of drifting to Canada.

Hawaii had its first recorded typhoon. The ice went out at Point Barrow, Alaska, at the earliest time in history. Sea-water temperatures in the Aleutians rose eight degrees above normal. Tahiti, Pago Pago and Christmas Island all reported that the ocean was growing warmer.

On our West Coast, ocean temperatures began a steady climb that is continuing today. The sea is as much as five degrees warmer than usual and tides are running almost a foot above predicted heights.

What does all this mean?

Obviously some tremendous changes are taking place in the world's greatest ocean. There's even a chance that an abrupt shift

in the world's climate has begun. Oceanographers and meteorologists have been so concerned that several months ago they held a conference at the Scripps Institution of Oceanography at La Jolla, Calif., to discuss the "changing Pacific."

The scientists rejected nuclear explosions and sunspots (which have been at their maximum in the 11-year cycle) as possible causes of the upset.

They concluded that for some unknown reason the ordinary winds and currents of the Pacific have slowed down. This has allowed the thick globule of warm water that exists in the Central Pacific to spread out. To the north and east, at least, the warm water flowed as far as the ocean boundaries. It was the changes in the air and water circulations in the North Pacific, incidentally, that seem responsible for temporary speeding-up of the earth.

Along the West Coast of the United States the inflowing warm water caused changes that delighted local fishermen. There was a redistribution of fish, with a heavy influx of warm-water fish and a retreat to the north of cold-water species.



This camera is going down to film fish and rock. Underwater photography is one investigative tool...

Another is at right: This deep free vehicle submerges to collect fish specimens, comes up automatically

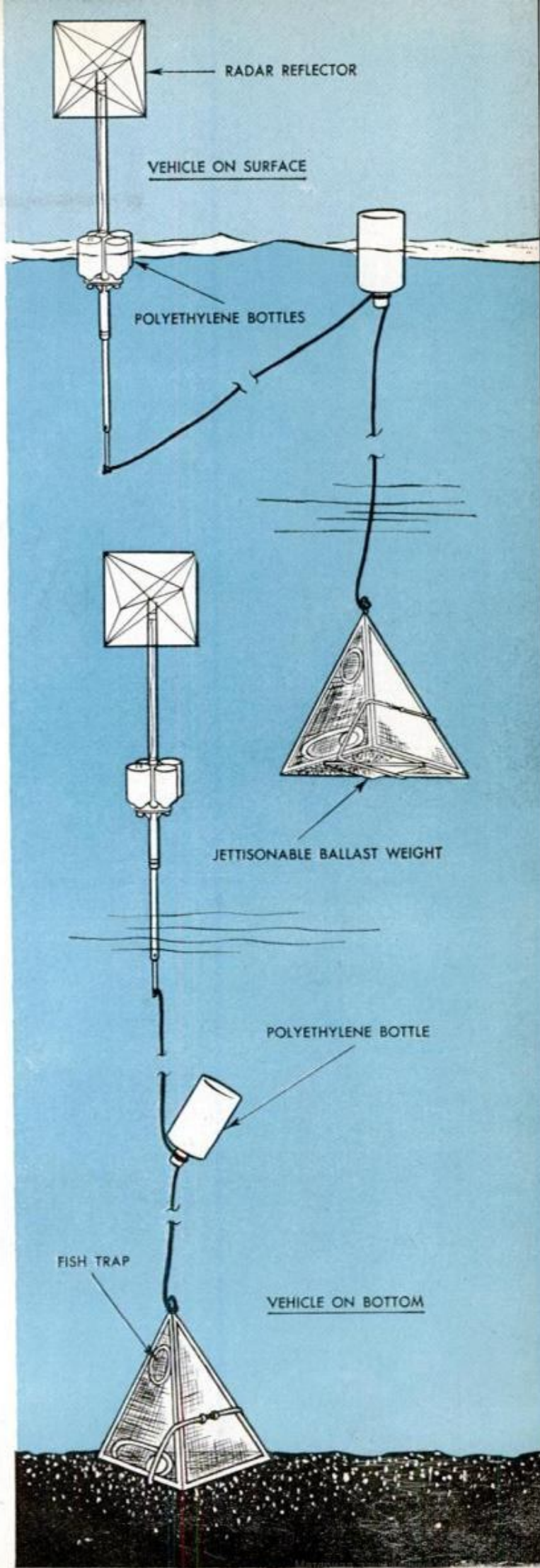
Operated by Scripps Institution of Oceanography, the ship at left dredges weather secrets from the ocean

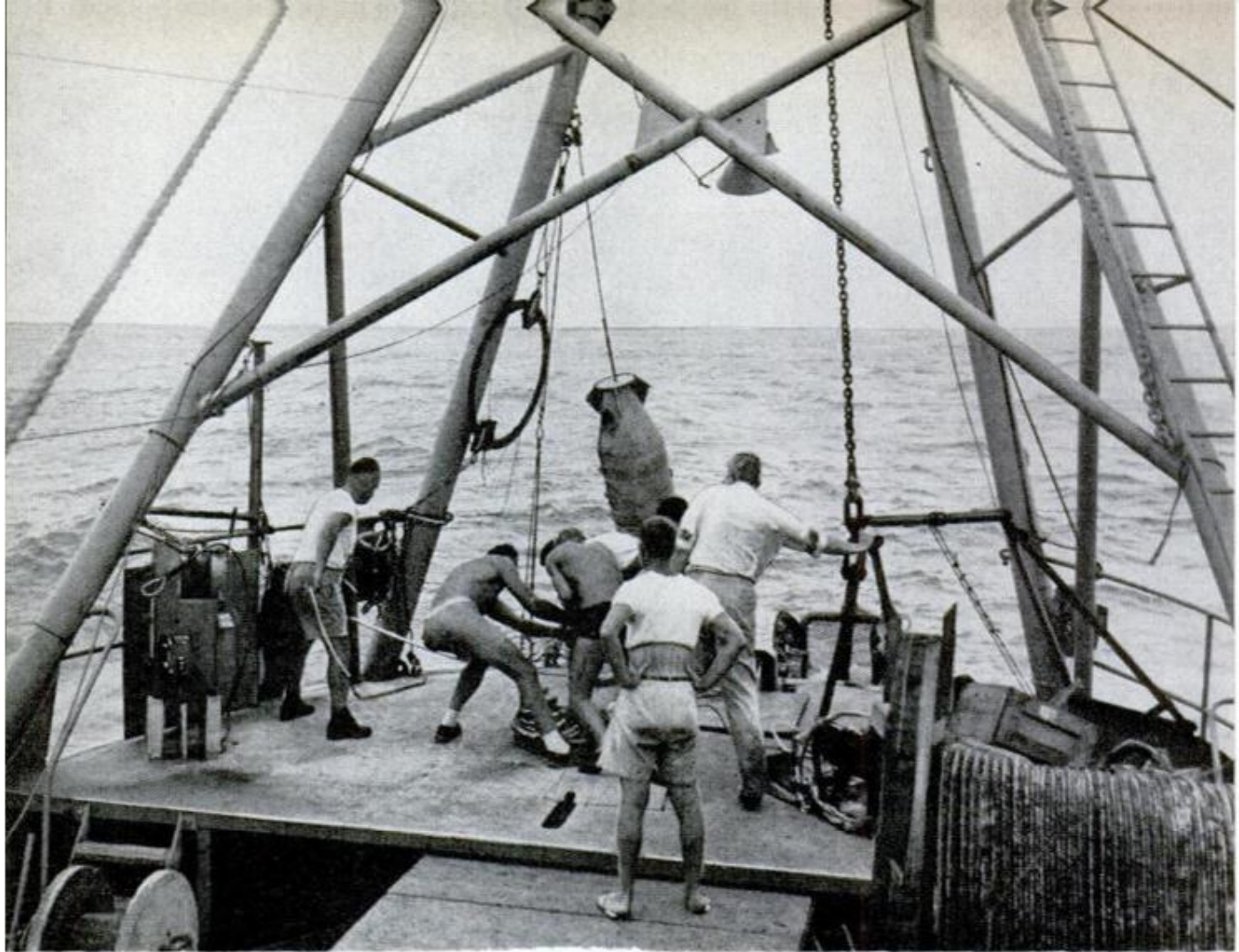
By 1958 some southern fish were migrating as far north as Alaska.

In California, fishermen have been enjoying vast catches of marlin, yellowtail and barracuda. In one season 2805 dolphin were taken from the waters adjacent to San Diego and Los Angeles as against a previous record of 15. Sharpchin flying fish, shortnose spearfish and spiny trunkfish of tropical waters are being taken off the coast, and apparently more Californians were killed or wounded by sharks last summer than in any previous year.

The surprising thing is that at their La Jolla meeting the scientists decided these abnormal conditions in the Pacific are entirely normal.

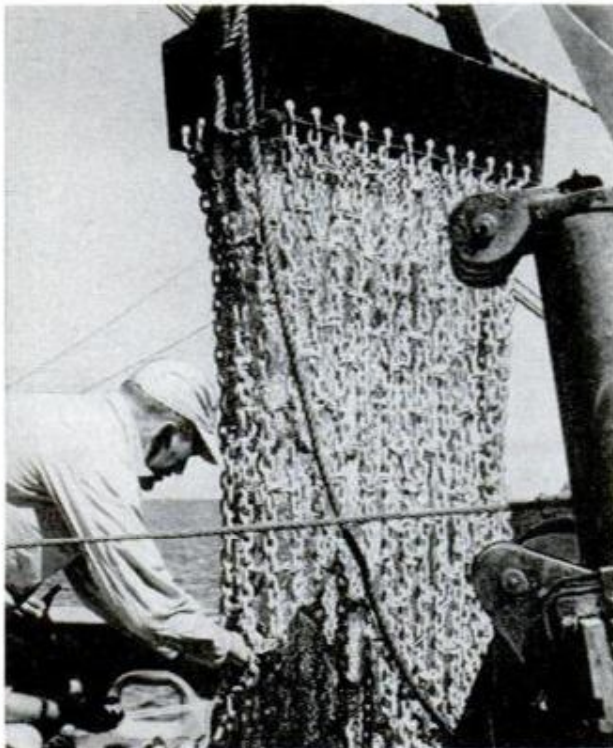
Prof. John D. Isaacs of Scripps explains this paradox by showing that over a period of years the Pacific has wide fluctuations in winds, currents and temperatures. One year the waters in one area may be quite warm, other years they may be cold. He says that the only unusual things about the recent swing to high temperatures are the abruptness of the change and its degree. In 50 years of records he finds no equally long, strong aberration.





Ocean research is no pleasure cruise. Scientists wrestle heavy equipment built to withstand great pressure

This deep-sea dredge of heavy chain, for example, will be dragged along the bottom of the ocean to pick up samples of rock, other informative material

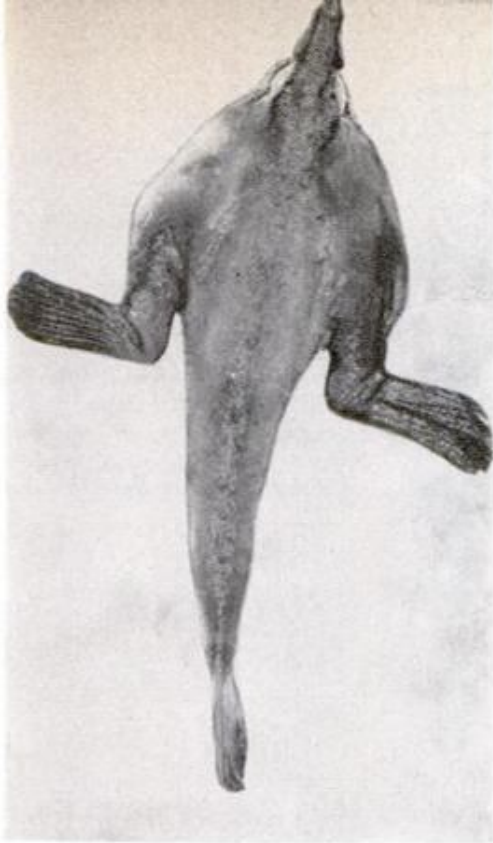


What really was unusual, the scientist says, was the decade that ended in 1957, a 10-year period in which conditions in the Pacific remained monotonously the same. Year after year there were low temperatures and high northerly winds in the eastern North Pacific, warmer conditions in the West Pacific.

The present change, Prof. Isaacs explains, is simply a return to a fluctuating normality. And quite recently the water temperature in the Aleutians began to drop, suggesting that the warm cycle is about to end. The fish can be expected to return to their home areas, the rains probably will diminish at Canton Island and the threat of typhoons in Hawaii will end.

Incidentally, Prof. Isaacs says the sharks probably are not much more numerous along the West Coast than in the past. In his opinion the main reason why more people have been attacked is that more people have been going into the water and have been going farther out and staying longer because the water is warm. "When you put out more bait you are bound to get more bites," he says.

In a general way the fluctuations in the Pacific, as in all oceans, are caused by complex interactions between the atmos-



Odd catch, above, is a batfish. It uses its two fins both for swimming and for crawling on the ocean floor. Scientists at right are lowering a Nansen bottle to collect water sample and take temperature



phere and the water. These place new heat sources in new places, upsetting the existing conditions and starting new sets of conditions.

The oceanographers don't yet know enough about these interactions to be able to predict conditions in the future. They plan to develop more-perfect theories, based on more critical observations. Eventually they hope to be able to make fairly exact predictions of oceanic conditions well in advance, in turn foretelling weather and climate for adjacent land masses.

One thing they have learned is that they must study an ocean all the way down to its bottom instead of merely charting its surface conditions. It once was supposed that ocean currents occur only at the surface and that at depth the water is fairly motionless. But today many subsurface currents are being found, an example being the Counter Gulf Stream that carries cold water southward, thousands of feet below the warm Gulf Stream that moves north along the Atlantic coast. Another recent discovery is the Townsend Current that flows westward under the north equatorial current that moves toward North America from the Central Pacific. Six hundred feet below the surface, the Townsend Current carries more than 1000 times the flow of the Mississippi.

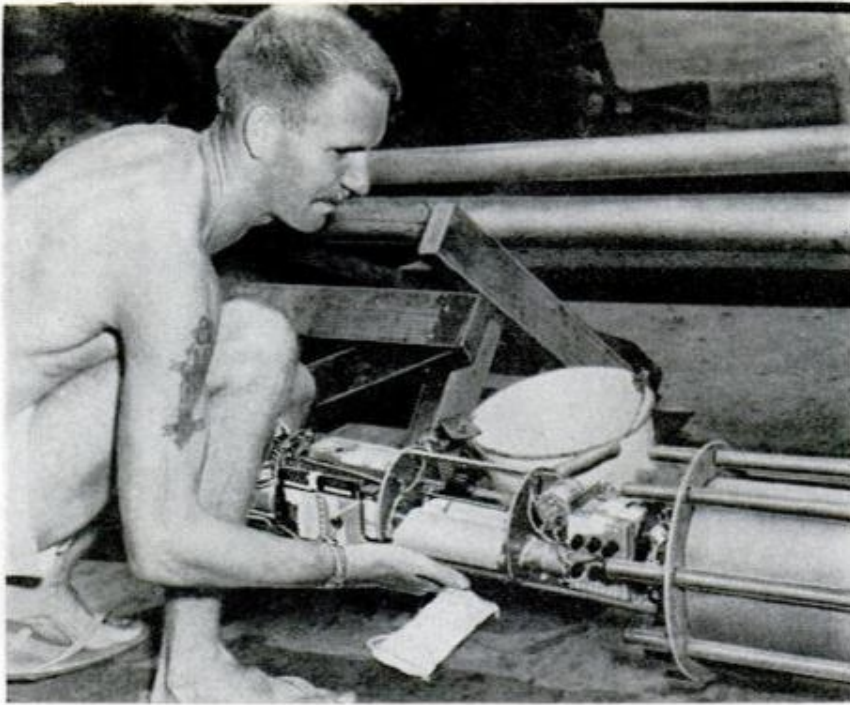
An ocean is now regarded as consisting of many layers of water, each having its own temperature, amount of salinity, and direction and speed of travel.

New instruments are being devised to measure conditions under the surface, one being the "Swallow pinger" that can be set to remain at any desired depth and that emits a constant stream of sonar signals. Picked up by hydrophones on a ship, the signals tell of the speed and direction of travel of the water in which the device is located.

At Scripps a new "deep free vehicle" was invented that dives to the bottom, stays there for a time and then floats to the surface. It has been tested to 6000 feet and is designed to submerge to three times that depth. It can carry a payload of a fish trap or of bottom sampling equipment or instruments that measure temperatures, salinity and other conditions.

The vehicle consists of a 10-foot aluminum tube having an electric light and a radar reflector at its top and a number of polyethylene bottles filled with gasoline at its mid-point. The ballasted fish trap or instrument carrier, together with an additional container of gasoline, is fastened by a line to the bottom of the vehicle.

When this assembly is dropped overboard it sinks to the bottom and rests



**Deep temperature probe is installed in its protective case aboard ship. It takes temperatures at depths at which standard bathythermographs do not**

there until the corrosive sea water has eaten through a magnesium link, freeing the ballast, and allowing the buoyant gasoline to lift the vehicle to the surface. The radar reflector and lamp are aids for locating the vehicle.

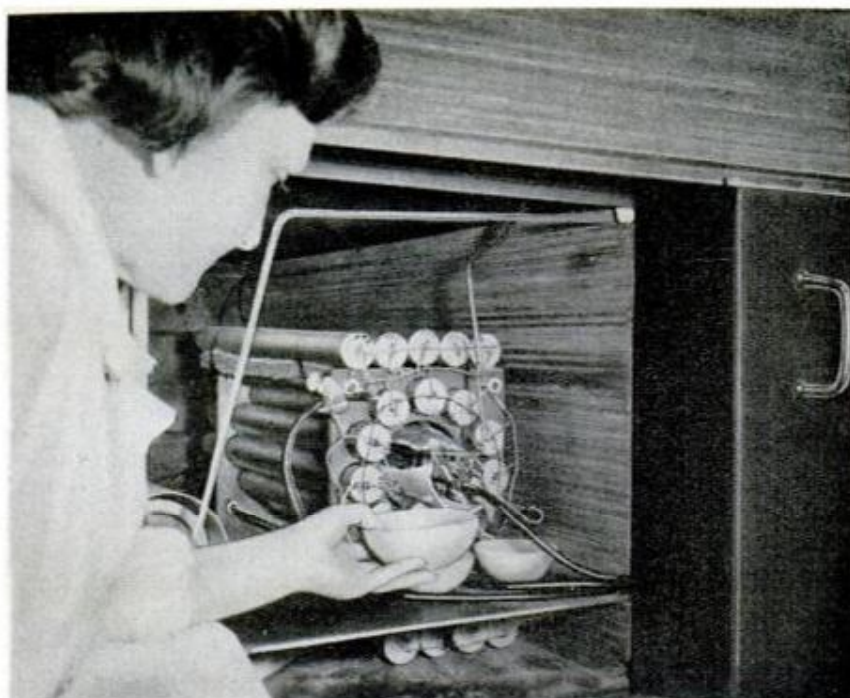
In test dives the vehicle carried a fish trap and brought back a new species of eelpout as well as evidence that the commercially valuable sablefish exists in important quantities almost a mile below the surface off San Diego.

Although oceanographers think that the present hot spell in the North and East Pacific will end soon they expect there will be other and even hotter fluctuations

in the future, just as there have been in the past. Dr. Carl Hubbs of Scripps finds that the Southwest experienced a very warm period about a century ago and that sea temperatures also were higher than at present some 300 years ago, 2500 years ago and 4000 years ago.

Dr. Hubbs' findings are based on studies he made of Indian middens, the cooking areas of ancient tribes. He correlates the amount of Oxygen 18 in the carbonate of sea shells found in the middens with the amount of Carbon 14 in the same shells. The radioactive isotope of oxygen is an indication of the temperature of the

(Continued to page 234)



**Age of ocean materials is determined with this apparatus. Material is burned, its gas processed, and radioactive carbon isotopes are Geiger - counted**

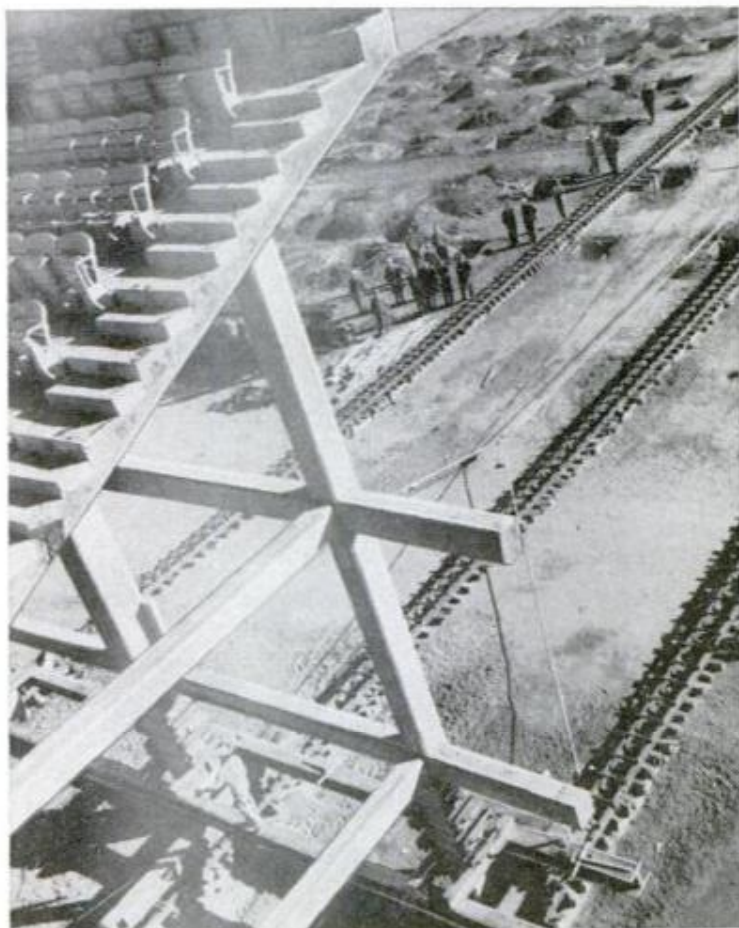


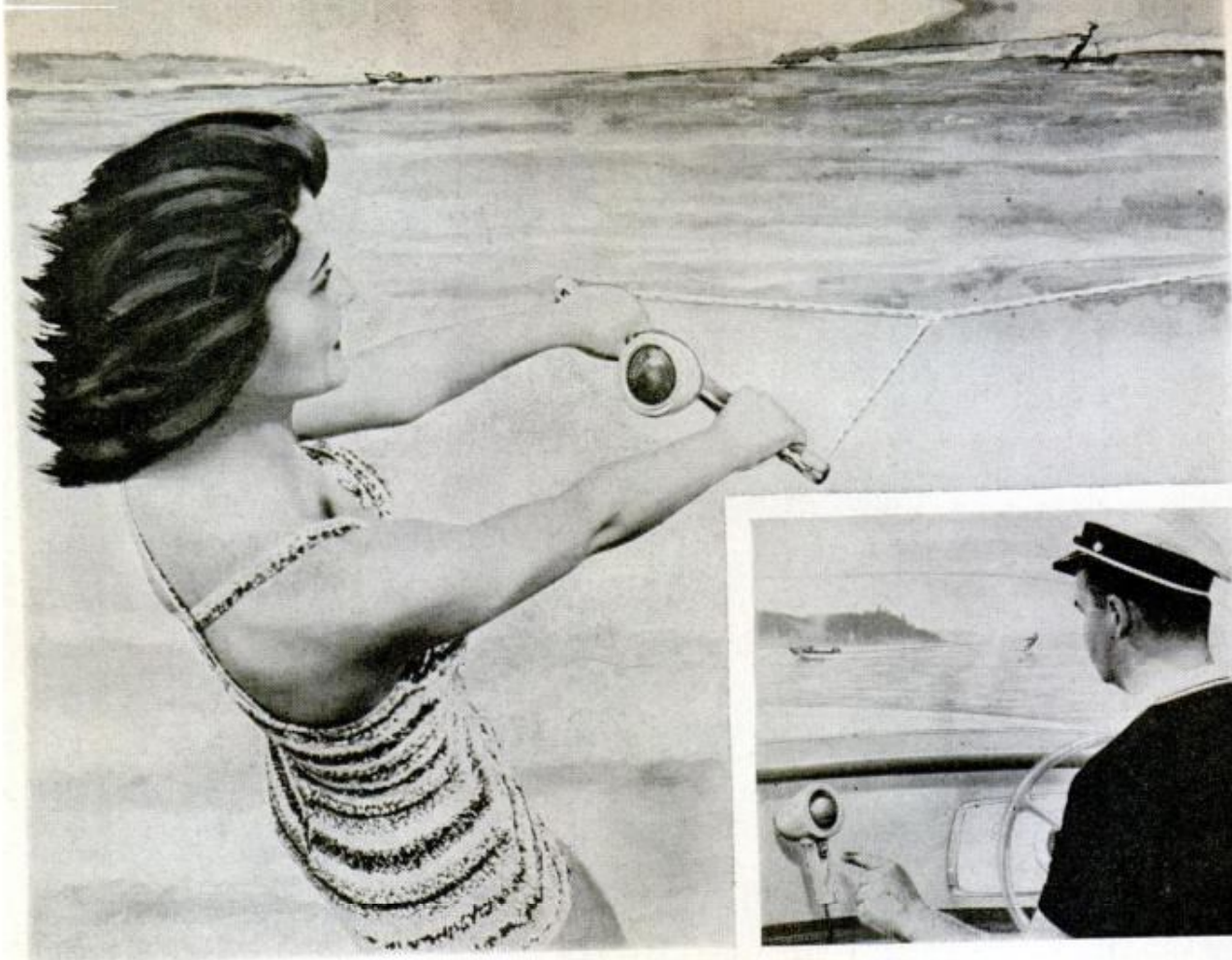
With part of the stadium already in place, workmen lay railroad track under the next section to be moved

## Stadium Expansion Produces Texas-Style Moving Job

WEST TEXAS football fans and sidewalk construction superintendents enjoyed a three-month post-season spectacular at Jones Stadium, Texas Technological College in Lubbock. As part of an expansion program, the entire east side of the stands, 3200 tons of concrete and steel, was moved backward 226 feet. After the move, the field was excavated another 30 feet to allow installation of another 14,000 seats below the level of the existing stands. The stands, in seven sections, were moved back on roller-equipped "shoes" which rolled on several sets of ordinary railroad track. Surprisingly, the huge sections were moved back into their new locations by a single winch truck with a  $\frac{5}{8}$ -inch cable. In position, the sections were fitted onto new footings. The first to be moved was the center piece since the curved sections are wider at the back than at the front. This way all sections could be moved straight back.

Each regular section required three sets of track; bigger end sections needed five





## Two-Way Intercom Lets Skier Talk to Boat

Water skiers can "drive their own boat," or at least have better communication with the driver, with a new two-way intercom that fits into the tow bar. It con-

sists of two microphone-speaker combinations with an amplifier on the boat unit, and 75 feet of tow rope with the wires braided in. The unit works on a 12-volt battery.



## Power Mower Can Be Flushed in Seconds

Gas-powered rotary lawn mowers introduced by Sunbeam have an underdeck washing system. When a garden hose is attached to a rear coupling and the engine started, the mower is flushed in seconds. Another feature, a rear-mounted spreader with a 10-position control, allows seeding, weeding and feeding to be carried on while mowing.







U.S. Army photo

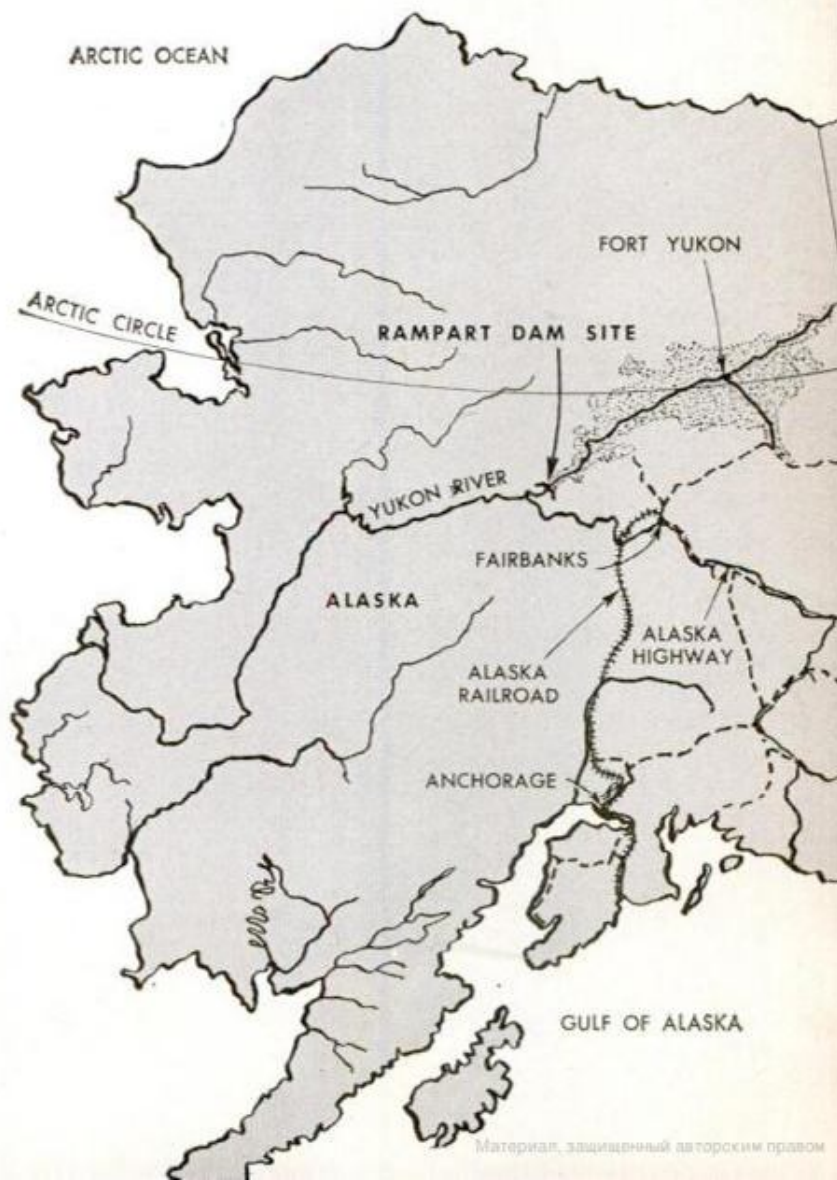
Dotted lines on this aerial photograph indicate the proposed Rampart Canyon Dam on the Yukon River in Alaska

## Largest Power Project Proposed for Alaska

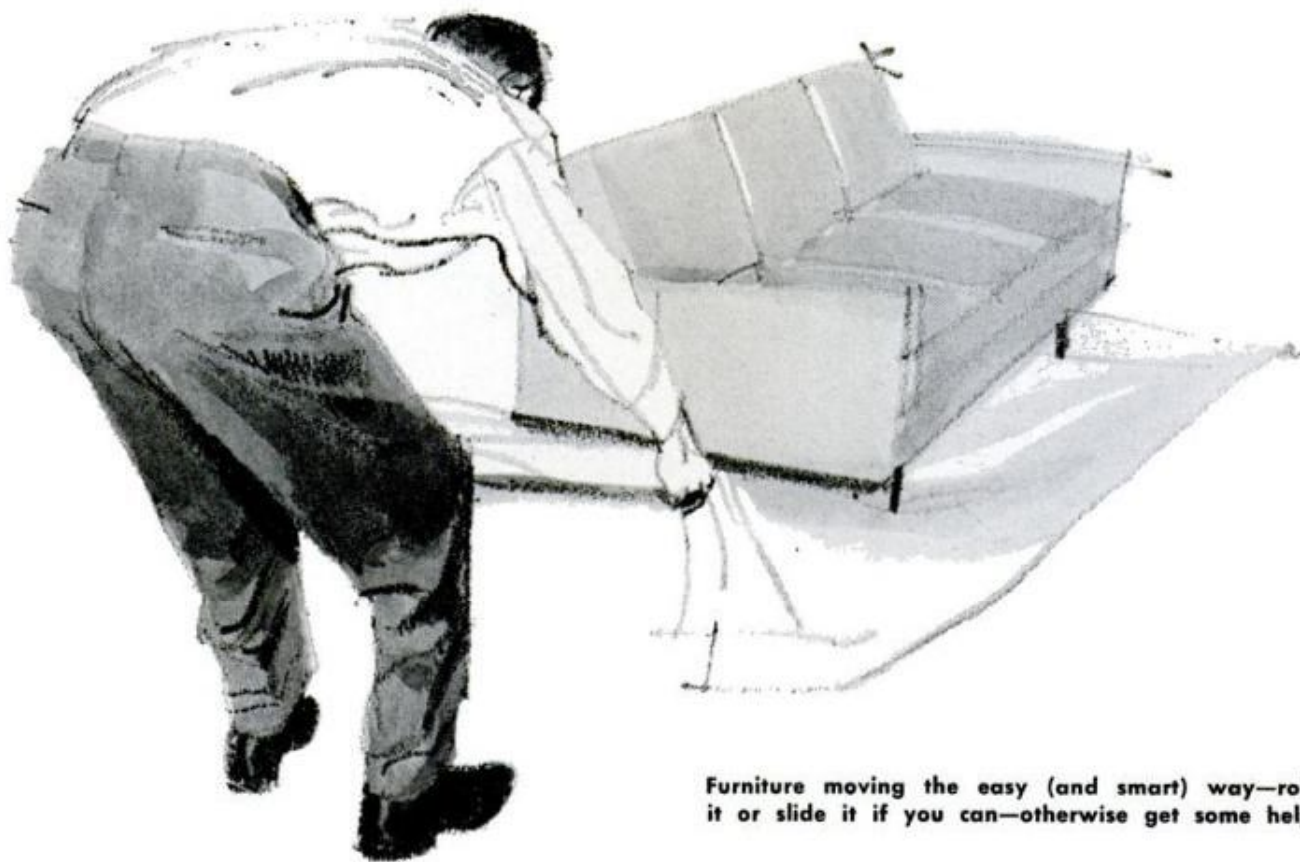
LARGEST HYDROELECTRIC project in the world . . . biggest manmade lake . . . greatest power output—these will be the results if the Army Engineers gain approval to build a dam in Rampart Canyon of Alaska's Yukon River.

Now carrying on studies of the area under a research grant in a public works bill, the engineers hope to be allowed to build the 460-foot-high dam. The structure would be 1500 feet across at the bottom and 2700 feet at the top. Though relatively small, the concrete wall would back up the river for 400 miles, creating a lake that covers 10,700 square miles. Engineers estimate the power potential of the dam at nearly five million kilowatts. The largest U.S. power project now, Grand Coulee, has a capacity of nearly two million kilowatts.

There is also the possibility that the lake would help raise the average temperature of the area and create a better climate for agriculture.



# ***There's a Safe and Easy***



Furniture moving the easy (and smart) way—roll it or slide it if you can—otherwise get some help

Heavy sacks are tricky—and dangerous—if you try to lift and carry them with your arms alone

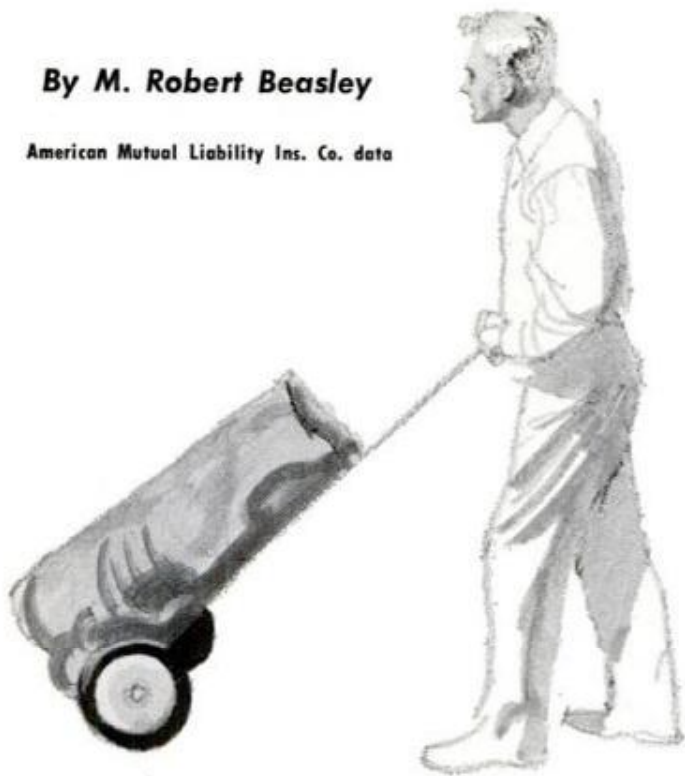
Crouch with the load on a heavyweight pickup, and let the leg muscles take the strain off your back



# Way to Do It

By M. Robert Beasley

American Mutual Liability Ins. Co. data



Wheels save a lot of carrying—even some that weren't really intended for it. A lawn mower does a nice job of mobilizing this sack of fertilizer. Below, how to be sure you get to the bottom of the stairs in one piece—balance, look, and hang on

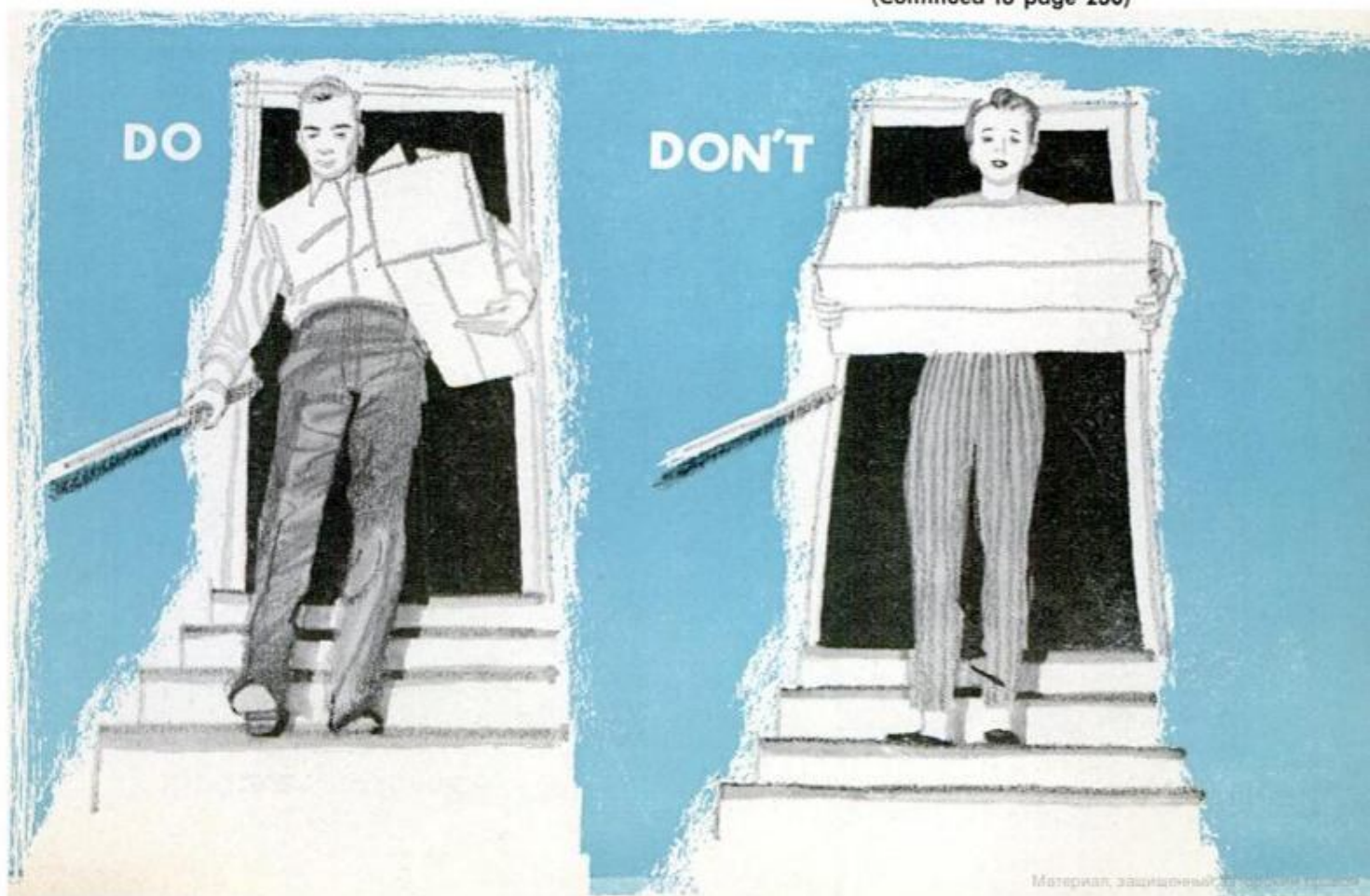
ACCORDING TO The Institute for Safer Living, there are about 250,000 injuries from lifting in industry each year, with at least two or three times that number around the home. This alarming injury rate continues to grow; ruptured spinal discs and muscles, hernias and strains are the natural result of carelessness and improper work habits.

Your body is a mechanical system of levers and hinges activated by cables. Nature intended each bone, joint and muscle for a specific purpose and capacity, and like machinery, it breaks down when improperly used or overloaded. And the rules apply to the strong as well as the weak, since the most powerful bodies are susceptible to strain and rupture if used incorrectly for handling heavy workloads.

Here are some tips from the experts—physiologists, safety engineers and insurance men who make a study of the subject, on how you can do more work with less danger. . .

**LIFTING:** First, make sure the object is safe to lift—no nails, splinters, jagged edges or pinch-points, that the path is clear to your destination, and your hands and the object are clean and dry for a good grip. Crouch before the load with your feet spread from 10 to 12 inches apart and your back and pelvis as straight as possible. This position allows the big leg, thigh, arm and shoulder muscles to do the work. Raise the weight slowly, pushing up with your

(Continued to page 230)





## Water-Powered Elevator Lifts Swimmers From Pool

Swimmers can save their energy for swimming by using a lift that looks like a ladder but operates like an elevator. A swimmer grasps the hand rails, places weight on the submerged step and is quickly raised above the water to a nonskid landing platform. The lift works like this: The swimmer's weight on the step closes a valve, causing step and hand rails to raise as a unit, powered by water pressure. The step remains at the top until the swimmer steps off. The rate of ascent is 25 feet per minute. The lift may be attached to either a hose or permanent pipe anywhere there is 50 pounds of water pressure. Less than 1¼ gallons of water are required to complete the cycle and the water flows silently back into the pool. No water flows when the lift is not in use.

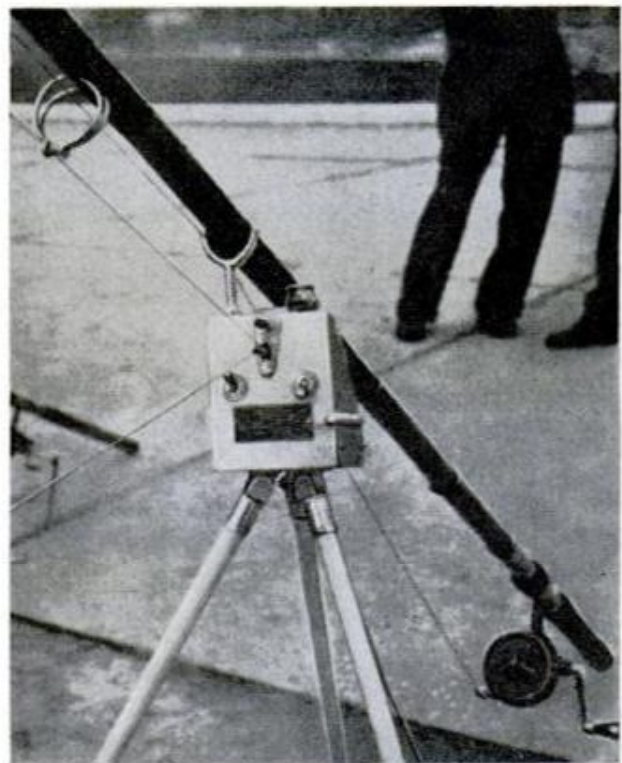
## Automation in the Classroom

Tomorrow's military personnel may learn their technical specialties through a new automated "teaching machine" developed by U. S. Industries, Inc. The automatic tutor locates and presents information on demand, then questions the student, corrects mistakes, congratulates right answers, and sets its pace to his ability.



## Fish Triggers Alarm

Portuguese still-fishermen are learning to relax while their bait does the work by using a tripod-mounted rod holder and strike alarm called the "Jasi." When the line is fed through the front of the battery-powered unit, a strike pulls it loose, starts a buzzer, and flashes a light to alert (or awaken) the fisherman to his good luck.





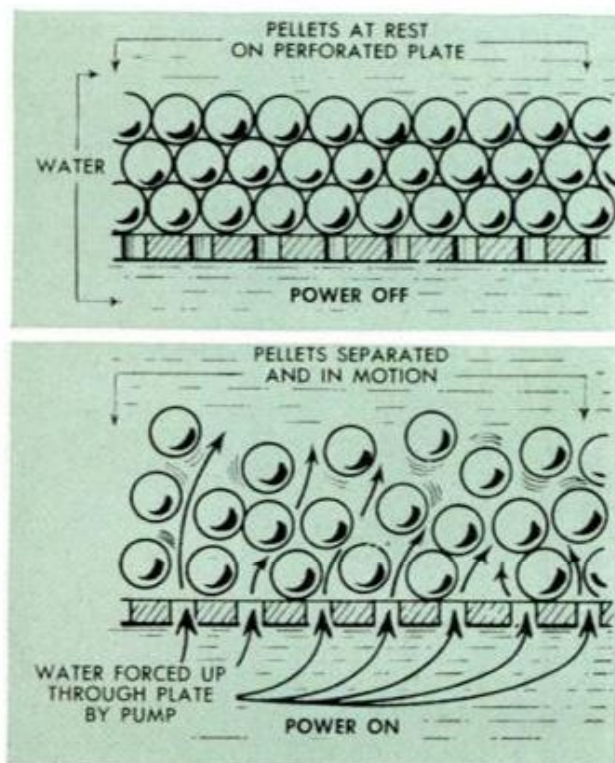
## New Autos Take to the Rails on a Tri-Level Flatcar

Three decks have been built on a railroad flatcar in an experiment aimed at more efficient long-distance hauling of automobiles. The 53½-foot railroad car, which carries eight autos, is the prototype of an 88-foot car that will transport up to 15 autos. De-

veloped by the Santa Fe Railway, the roller bearing-equipped flatcar has a cushioning device which protects freight at impact speeds up to 14 miles per hour. A universal tie-down system makes it possible to ship any "mix" of autos—regardless of size.

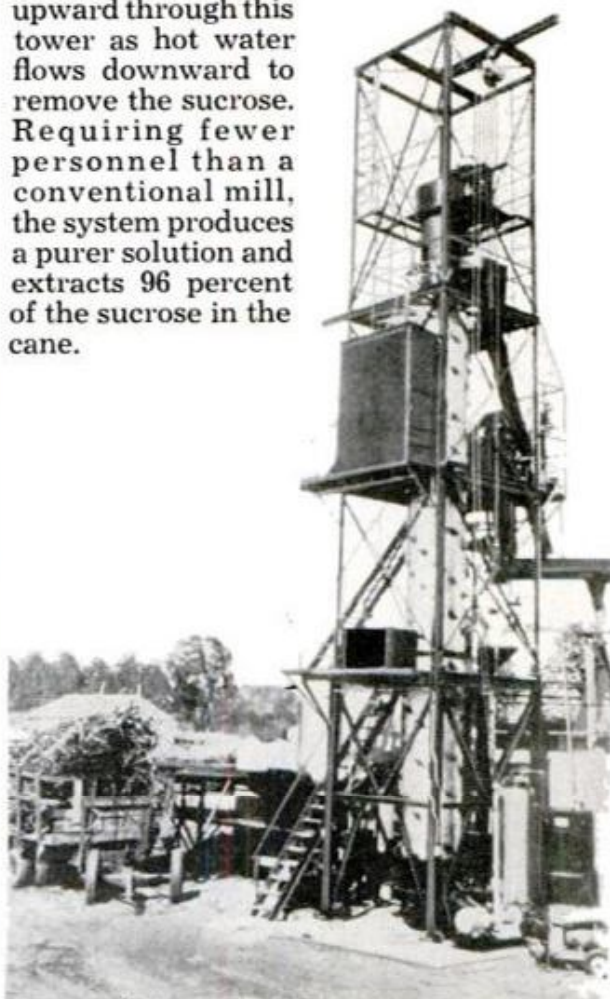
## Reactor Fuel Is in Pellet Form

Pellets of fissionable fuel supply power in a simple nuclear reactor system being developed for the Atomic Energy Commission by the Martin Company. Pellets produce a chain reaction only when separated by a liquid "moderator." Power is turned on when liquid is forced through a perforated plate and the flow nudges the pellets apart.



## Water Process Extracts Sugar

Sugar cane stalks, cut into chips, move upward through this tower as hot water flows downward to remove the sucrose. Requiring fewer personnel than a conventional mill, the system produces a purer solution and extracts 96 percent of the sucrose in the cane.



# WHAT'S NEW FOR Your Home



**BARBECUE-ROTISSERIE** rolls easily along on balloon tires, allowing the home chef to grill, roast or barbecue where he pleases. A special broiler plate raises or lowers for charcoaling steaks or chops  
Hotpoint, Inc., Cincinnati, Ohio

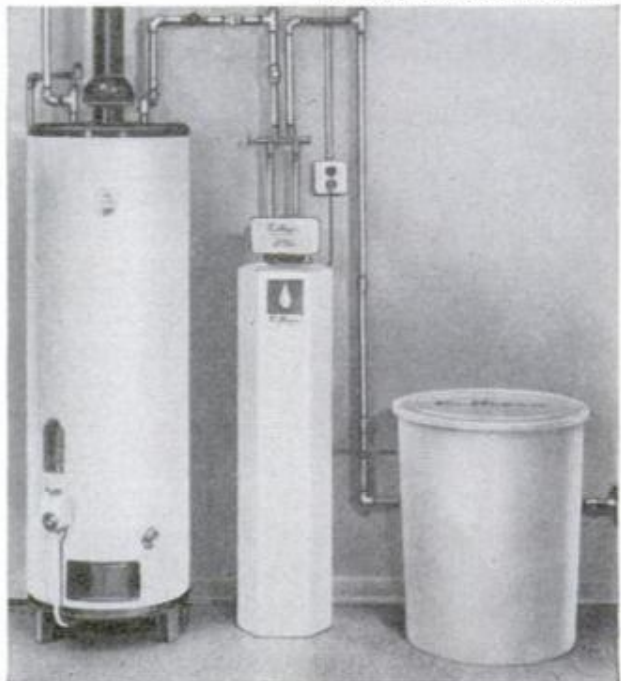


**SPAGHETTI SERVER** has handles that control two lifting cups. The server is operated just like a pair of scissors. The sharp-edged cups clip off excess spaghetti. The serving tool also can be used for salads  
R. A. Miller Industries, Inc.,  
1525 Marion St., Grand Haven, Mich.

**ELECTRIC PEELER**, working with a vibrating action, also pares, slices, shreds and de-eyes fruits and vegetables. Small enough to fit in a kitchen drawer, the vibrating tool can be used in either hand  
Cleveland Detroit Corp., 5400 Brookpark Rd., Cleveland 29, Ohio



**WATER SOFTENER** can be set to recharge itself automatically. After each recharge it prepares sufficient salt solution for the next. It delivers fresh water to all faucets during the recharging process  
Culligan, Inc., Northbrook, Ill.





**WASHER-WAXER** borrows the vacuum-cleaner technique. To wash a floor, the operator puts tap water and detergent into the appliance's tank. She then runs it over the floor, releasing water as needed by flipping a lever in the handle. She presses a switch and excess water and dislodged dirt are sucked up. To wax, she replaces the water with liquid wax. Wax flows to the floor automatically. Excess is picked up by the suction and a smooth, thin film is left

Vac-U-Way, Inc., 2101 Auburn Ave., Toledo 6, Ohio



**TABLE-BLACKBOARD** provides a variety of play activity possibilities for a small area. A hinged toy chest acts as a chair for both the blackboard and play table. The three-play combination is constructed of hardwood and has hand-sanded, rounded edges and smooth, varnished surfaces for durability and safety. The combination also helps instill a sense of neatness, for the toy chest must be closed and the desk cleared before the blackboard can be used

Groden Woodworking Shop, 20 Norris St., Buffalo, N. Y.

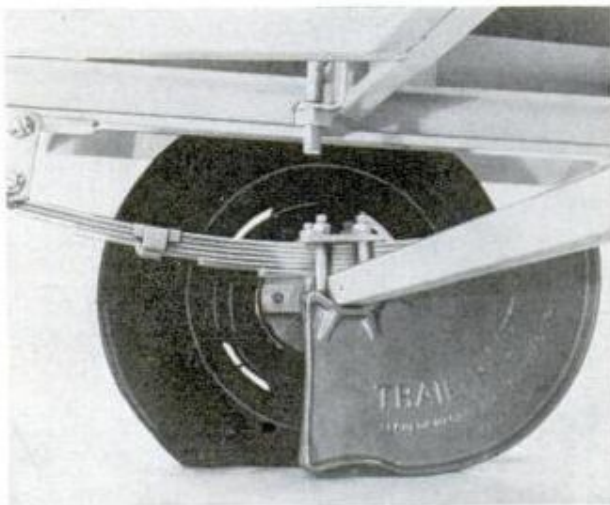




## Safety-Minded Sheep Ward Off Fires at Refinery

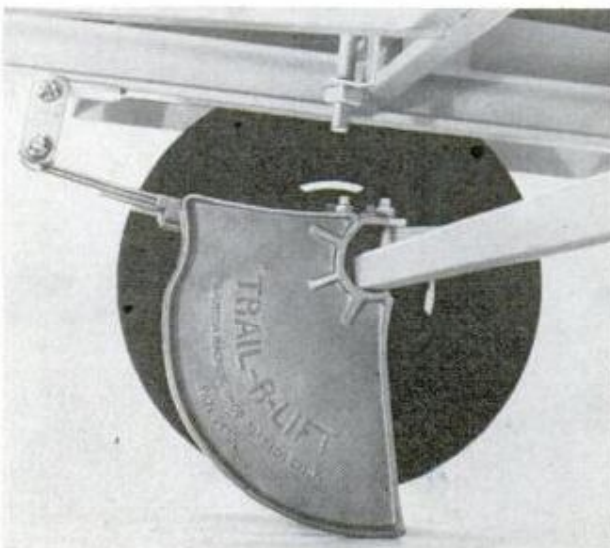
Raised on oil refinery grounds at Fawley, England, a flock of 60 safety-minded sheep reduces the risk of fire by chomping down the grass on fire walls surrounding oil stor-

age tanks. Responsible for the sheep is refinery shepherd Jeffries Kington and his dog, Lindy. The flock will be increased to 300 this year.



## Camlike "Jack" Lifts Trailer Wheel

Changing a tire on a trailer is simplified by a half-moon-shaped "jack" that has no moving parts. There's no pumping a jack handle or turning a screw. The lightweight metal piece has a notch in one corner that fits against the trailer axle. When the trailer is moved about 18 inches by driving the car ahead, the "jack" rolls around onto its point lifting the trailer wheel. To lower the wheel after the tire has been changed, the trailer is simply backed up slightly and the jack rolls down. The metal piece is strong enough to support virtually any trailer load. It comes in various sizes to fit any wheel diameter and will work on any trailer with a round or square axle.



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Five-gallon yard and garden sprayer rolls on two wheels wherever desired. Nozzle, at end of nine-foot hose, adjusts to any spray pattern. For all-over lawn spraying, three-nozzle boom clips to tank

H. D. Hudson Mfg. Co., 589 E. Illinois St., Chicago 11

Handy two-wheel cart carries garden hose on a reel that lifts off to leave the cart free for such utility jobs as toting fertilizer sacks

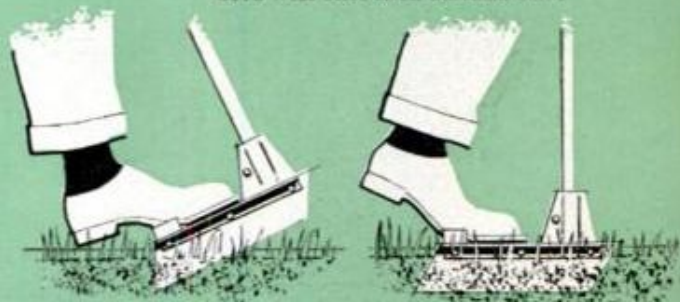
The Specialty Manufacturing Co.,  
2356 University Ave.,  
St. Paul 14, Minn.



# WHAT'S NEW FOR Garde

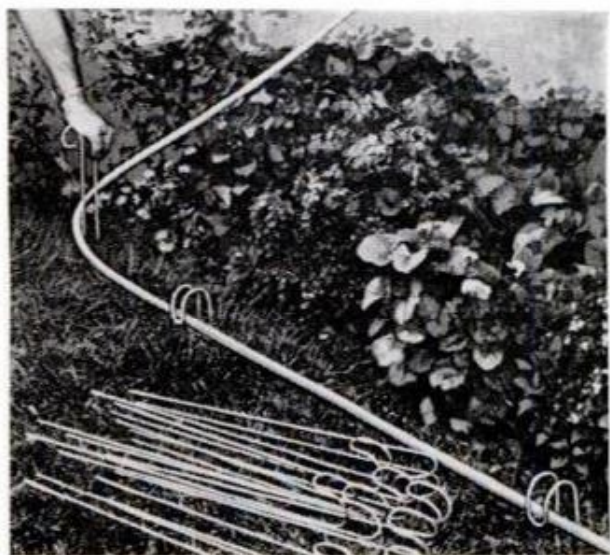
Steel-bladed lawn edger does job with just pressure from your foot. Handle is made of hardwood

El Dorado Mfg. Co.,  
3115 West Olive Ave., Burbank, Calif.



Guide a garden hose or electric power cord safely around fragile plants with wire protectors that you insert at edge of flower bed. Semicircular loops keep hose or cord from slipping over the protectors

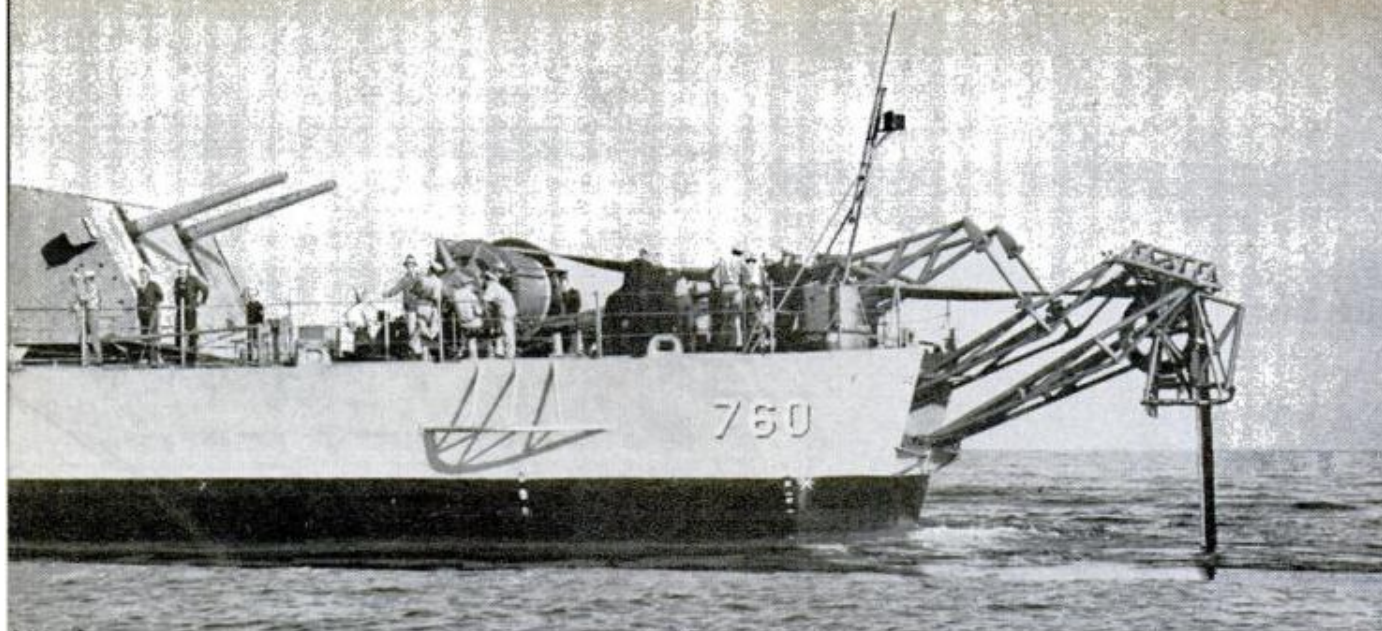
Mid-States Steel & Wire Co., Crawfordsville, Indiana



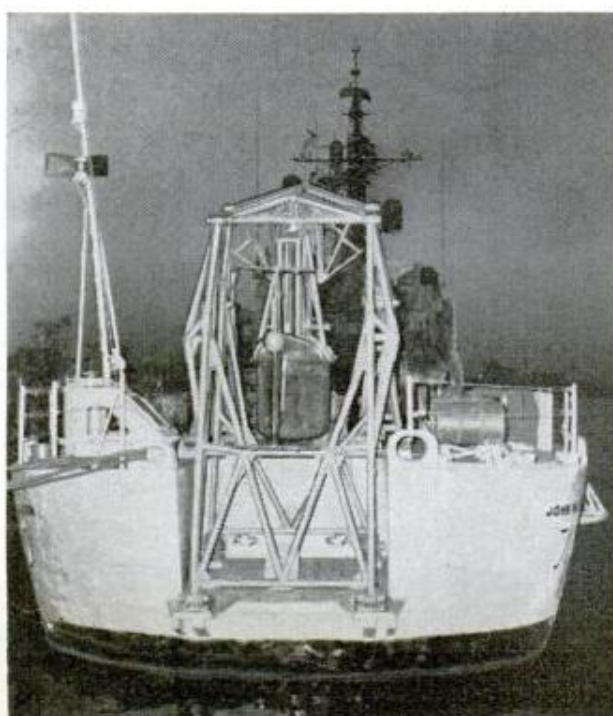
Three-way sprinkler will water at two levels above ground as well as below the surface. Topmost extension allows you to water over obstructions while the second level sprinkles at foliage height

Proen Products Co.,  
9th & Grayson Streets, Berkeley 10, Calif.





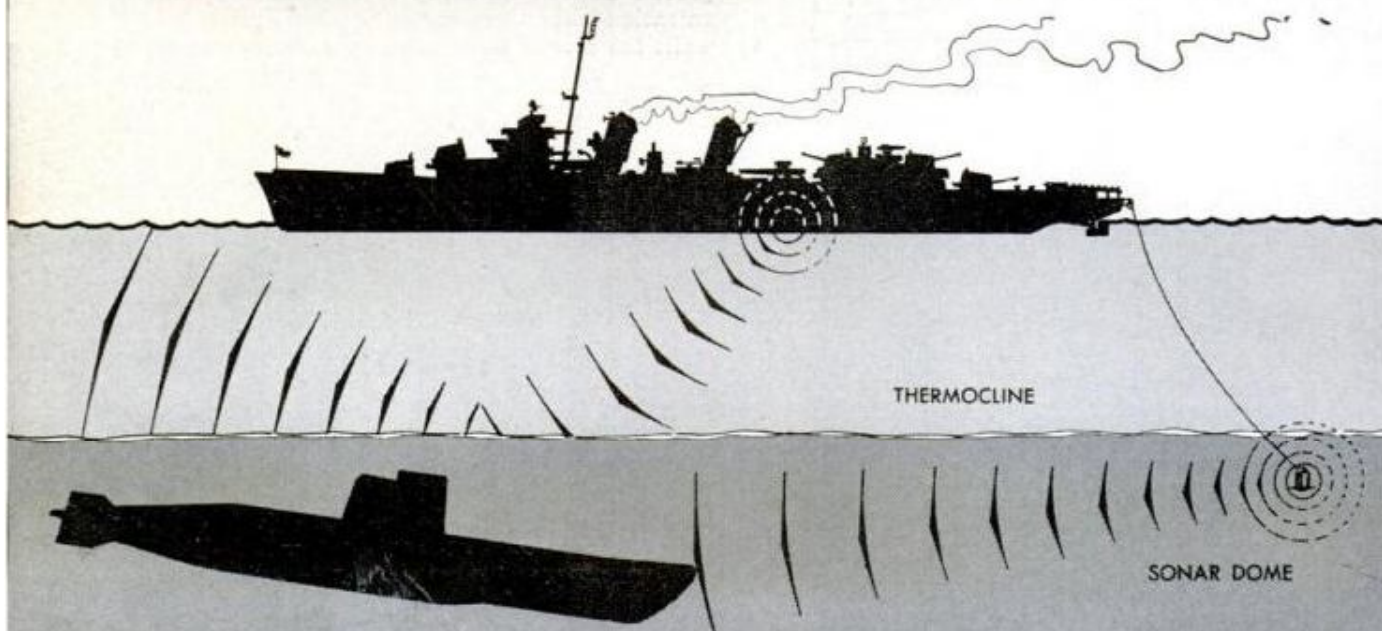
Above, variable-depth sonar in use on the *Thomason*. Left, the sonar dome in its cradle on the fantail



## Sonar Lowered on Cable

CONVENTIONAL antisubmarine sonar, which uses sound waves in locating its quarry, often fails because of its tendency to reflect from the thermocline, that layer in any deep body of water that separates the warm surface water from the colder depths. A submarine beneath that layer is often hidden from sonar gear mounted on the hull of the searching ship. The Navy's new variable-depth sonar, however, can be lowered on its cable to any depth—through the thermocline—to find its quarry. It is shown here mounted on the destroyer *John W. Thomason*, the first ship to be so equipped.

Artist's conception of the difference between VDS and conventional sonar. Surface-transmitted signals bounce, but VDS penetrates the barrier, finds sub



## Pour Continuous Pipe Over Inflatable Form

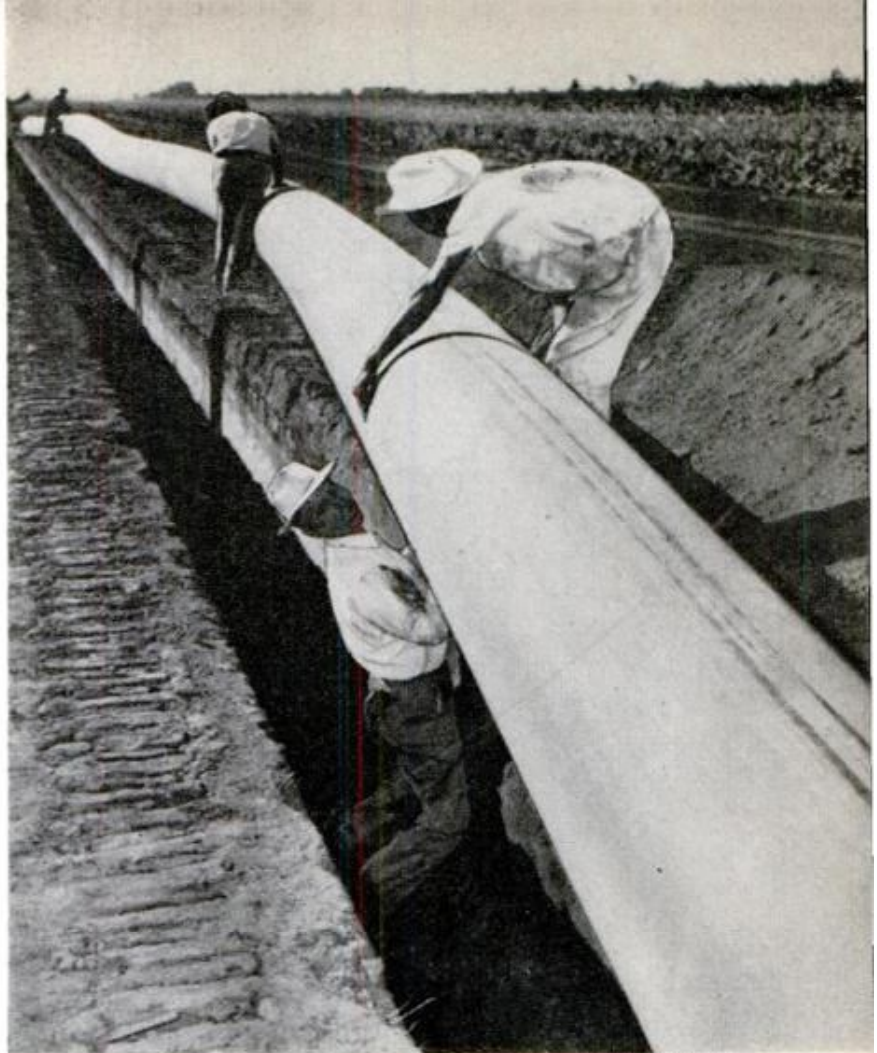
CONSTRUCTION MACHINERY that builds "instant concrete pipe" in a freshly cut ditch at a rate of eight to twelve feet a minute is now being used to make conduits for irrigation water on farms near Phoenix, Ariz. Inventor of the process, R. Fuller, also is adapting the process to build storm sewers and other types of concrete pipe.

Developed over the past nine years, the construction equipment consists mainly of a double-hoppered forming machine that is pulled along the rounded bottom of a ditch while enveloping an inflated inner form.

The inflatable inner form, designed by Goodyear Aircraft Corporation engineers from blimp-type materials, is picked up by the outer form so tamping devices can literally tuck concrete under it. Half of the double hopper, activated by electrically driven tampers, shoves concrete into the bottom of the ditch while the other half forms the top half of the pipe.

Using two 300-foot inflated forms with only three pounds per square inch air pressure, builders can pour as much as 600 feet of concrete pipe at a time without interruption. It is possible to line up forms for runs of miles.

The inflatable tube is easy to handle and can be deflated for extraction about two hours after the concrete has been poured.

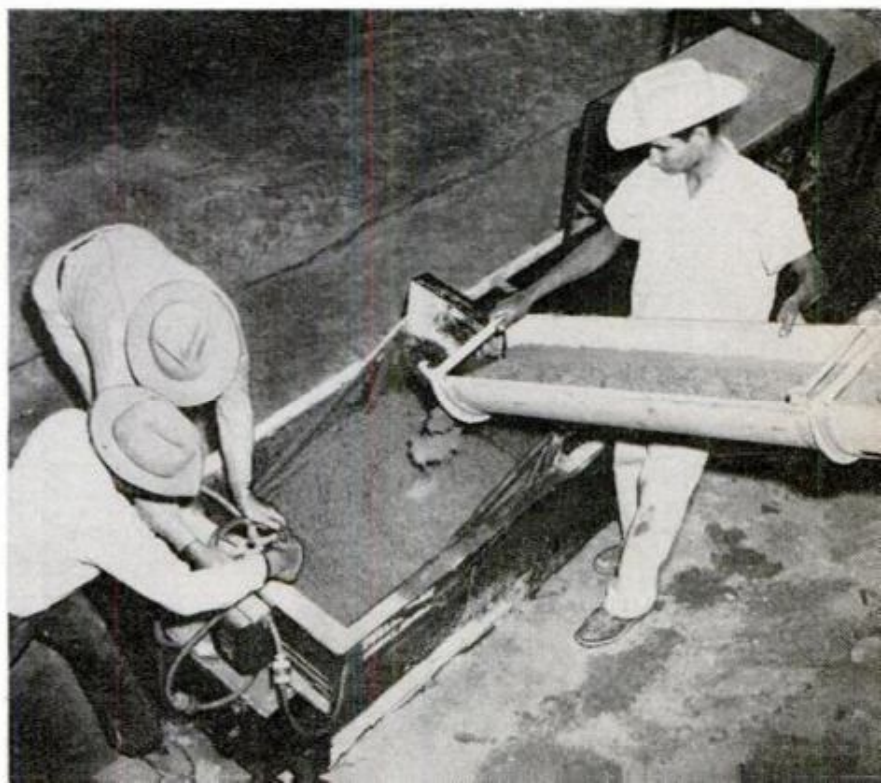


Goodyear photos

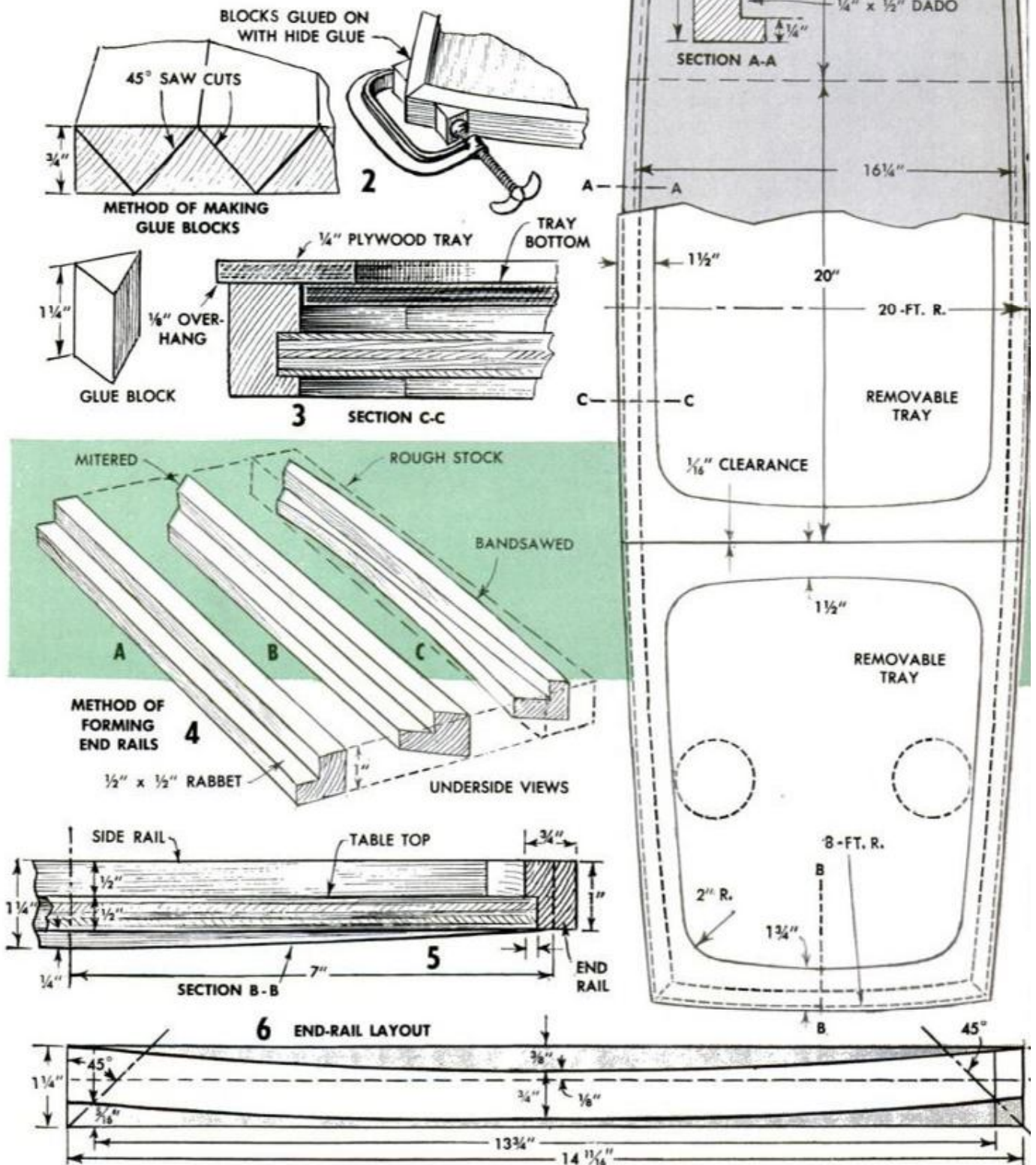
An inflatable rubber and fabric hoselike concrete form is the key to a process for pouring concrete pipe at the rate of eight to twelve feet a minute. The form shapes the inside of the pipe

Moving outer form, lower left, shapes exterior of continuous concrete pipe while the inflated tube supports it from inside

Concrete from a ready-mix truck is poured into the pipe-forming machine. Although first commercial installations have been irrigation pipes, the inventor is developing pipe for city sewers



Housewives with a yen for beautiful furniture and an eye to getting the most livability in the least space will appreciate this smart cocktail table. It is presented as a companion piece to a step table that will appear next month.



By John Jefchak



## Three-Tray COCKTAIL TABLE

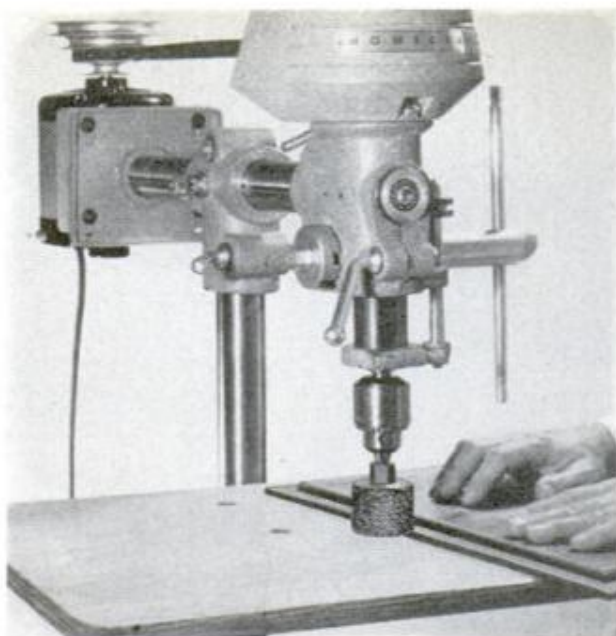
**I**F YOU ARE searching for the unusual in a cocktail table, here is a clever design that is guaranteed to spark conversation. Its medium-low profile provides a practical height, while the moderately bowed sides and ends give it a classical shape reduced to contemporary lines. The table not only is an attractive piece of furniture but it is highly functional as well. It has really two tops, an upper one which consists of three matched serving trays and a lower fixed one. The latter is revealed when the trays are removed as shown in the photo above.

American walnut was chosen for the original table—solid lumber being used for side rails, end rails and legs, and veneer

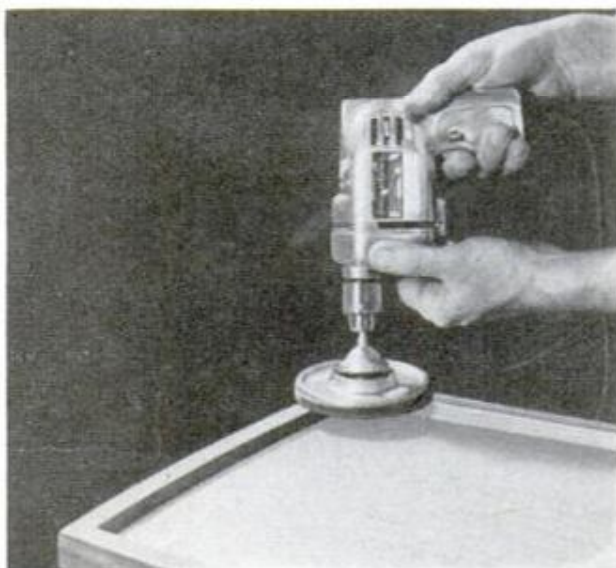
plywood for the table top and trays. All the stock is first cut slightly oversize to allow for possible errors when dressing the parts to their finished dimensions. Notice, however, that the rough dimensions of the end rails control the depth of the rabbets. Needless to say, the miter joints must be laid out and cut accurately to insure proper fit.

### Table Assembly

Begin construction with the table. The trays will be custom fitted to the recessed top later. The two side rails measure  $\frac{3}{4} \times 1\frac{1}{4} \times 59\frac{5}{16}$  in., but add an inch to the length for "elbow room." Each of the end rails is shaped out of stock  $1 \times 1\frac{1}{4} \times 14\frac{11}{16}$  in. Again allow for waste. There should be no



Above, plywood edge of tray bottom is smoothed on drill press, using metal "sanding" drum chucked in drill at a height to just clear plywood top. Below, miter joint on-table is smoothed with disk sander

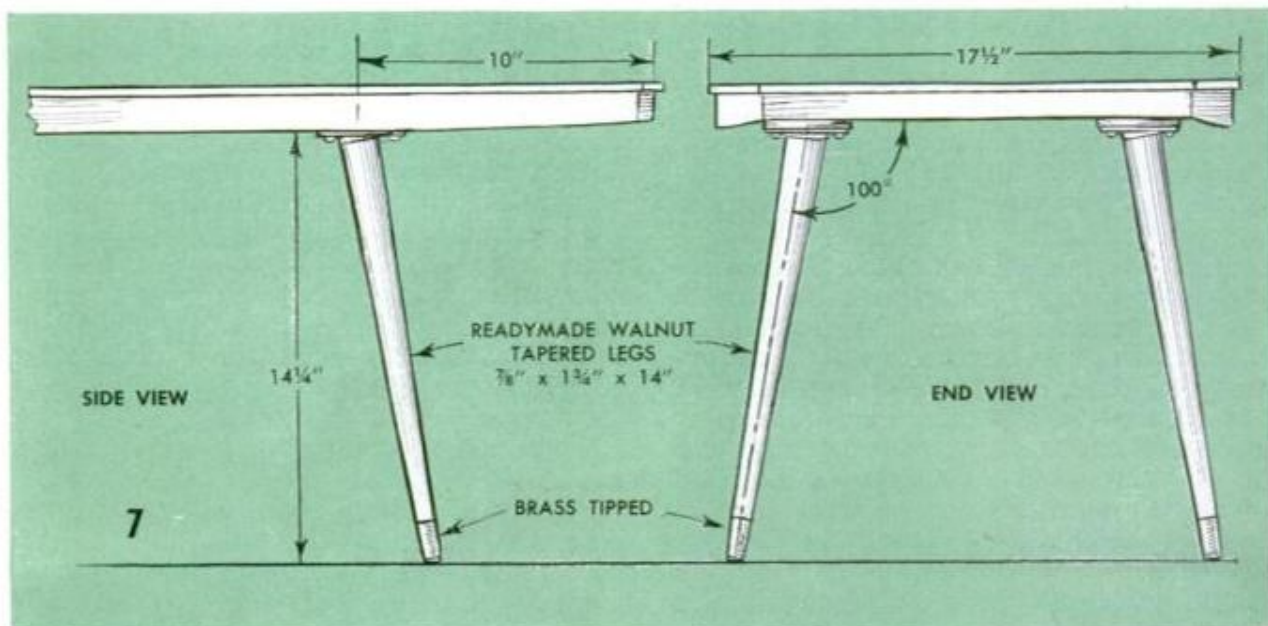


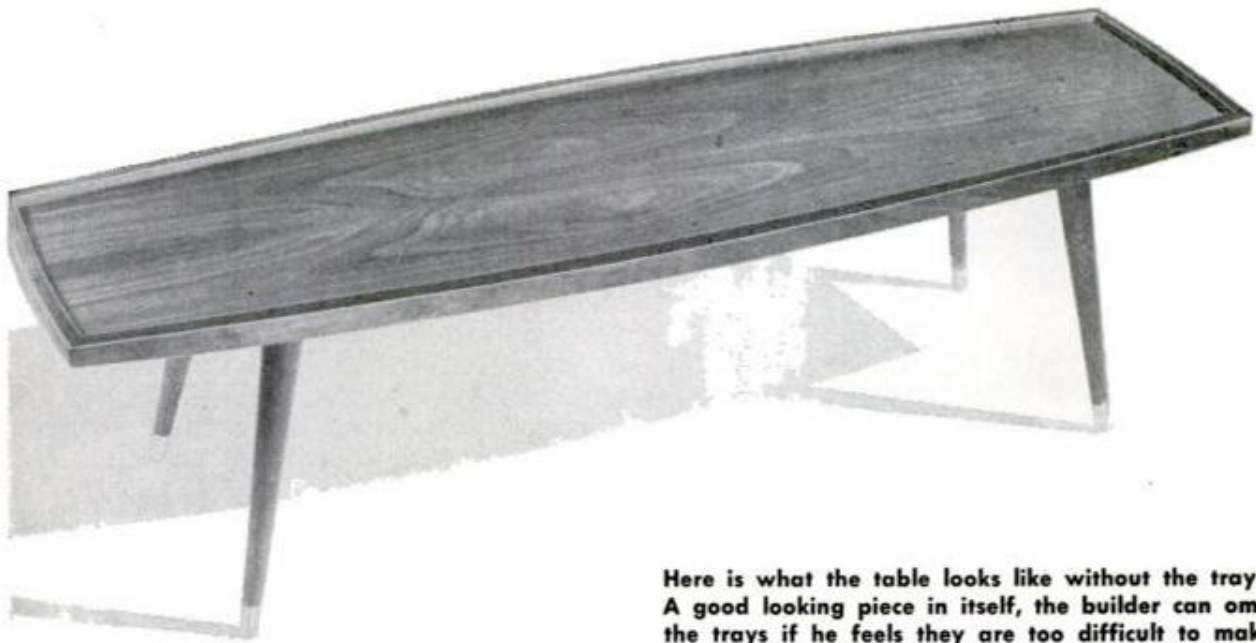
problems with the two side rails since they are finished as straight pieces, except for the last 7 in. at each end which is tapered on the underside. The dimensions for the taper and the  $\frac{1}{4} \times \frac{1}{2}$ -in. dado that receives the table top are given in Fig. 5, section BB and Fig. 1, section AA.

The end rails must be drawn out on accurately cut rough stock and the 45-deg. miter angles marked off at the ends as indicated in Fig. 6 (a top view). Next, cut the  $\frac{1}{2} \times \frac{1}{2}$ -in. rabbets as in Fig. 4-A, then the mitered ends, 4-B. The last step is to bandsaw the pieces to shape, 4-C. The rabbets and mitered ends of the side rails should line up perfectly with those of the end rails.

Next, cut the  $\frac{1}{2}$ -in. walnut plywood top to shape after outlining it carefully according to the dimensions given in Fig. 1. A saber saw is a handy tool for this job. A bandsaw also would do, provided you have help to handle the panel. Stay a little outside the lines and then plane the uneven edges down to the line. When nearing the ends reverse the direction of the plane to prevent splitting the cross-grain plys.

Now you are ready to assemble the top. Do this first without glue (dry assembly), to see that the pieces go together properly. To do this, and when gluing the assembly together later, you will need some means of clamping the corner joints. This is done by gluing small triangular shaped blocks temporarily to the rails at the corners as in Fig. 2. Use clear, soft wood (pine, basswood, etc.) for the blocks and cut them out as shown. Be sure to use a water-soluble glue for gluing the blocks, allowing it to set overnight before applying clamps. When ready, ease the plywood top into the dados in the side rails. If you have difficulty doing this, bevel the plywood edges a little. It may be necessary to use a bar clamp or





Here is what the table looks like without the trays. A good looking piece in itself, the builder can omit the trays if he feels they are too difficult to make

some improvised means of holding the bowed side rails in place until the end rails can be slipped on and the corner joints clamped together. Check the dry assembly to see that the miter joints are drawn up tightly. If they don't fit tightly, remove the clamps, work the joint faces as necessary, reclamp and check again. Some correction may be obtained by planing down the plywood panel edges. When you are satisfied with the appearance of the joints the table is ready for gluing.

#### Preparation for Gluing

Adequate preparation is of primary importance for successful gluing. Have all clamps adjusted to size, enough glue on hand (plastic resin glue), glue brush, a wet cloth for wiping off excess glue and a good spot to do the work, covered with newspapers to catch glue drops. Once you apply the glue, you must work fast, especially in hot dry weather, or the glue will set before the parts are clamped together. This will result in a poor glue line and a weak joint. Prime mitered rail edges first and allow the glue to soak into the grain and dry before coating the panel edges. Priming end grain of wood is highly recommended since there is always the danger of absorption before the glue sets. Cut a regular glue mix in half with water and apply it to the mitered surfaces. Allow the glue to dry before applying the final gluing coat. This procedure will insure a strong joint. Dowels or splined miters were not considered necessary because of the rather extensive glue surfaces in the rabbets and dadoes on the rails.

When ready to apply the second glue

coat on the miters, also coat the panel edges. Follow up with one end rail and the two side rails, coating the rabbets and dadoes completely. Clamp the two corner joints securely, apply glue to the other end rail and draw the pieces tight against the panel edges with clamps as in the dry assembly process. A bar clamp, rubber bands cut from an inner tube, or a helping hand is welcome at this stage to take up the tension on the side rails until the clamps are applied. Be careful not to draw them up too tightly, or you may tear off a glue block. Check the top surface of each miter joint to make certain the members are flush. If they are not, a tap of a hammer cushioned by a piece of scrap usually will bring the high member of the joint flush with the lower one. The clamped top should be placed on a level surface and blocked up as necessary to provide clearance for projecting clamp parts. Use sawhorses for this if available. Do not sand or move the top until the glue has cured about two days.

#### Tray Construction

Each tray consists of a sandwich of two pieces of  $\frac{1}{4}$ -in. walnut plywood cut to the dimensions given in Fig. 1, and glued together as in Fig. 3. One piece serves as the bottom, the other, with the center cut out to leave a  $1\frac{1}{2}$  to  $1\frac{3}{4}$ -in. frame as dimensioned, provides the tray lip when glued to the bottom. Note that the solid outermost lines on the unshaded half of the top in Fig. 1 refers to the outer edges of the trays, which overhang the rails by  $\frac{1}{8}$  in., Fig. 3. When cutting the tray bottoms to size, check them for proper fit within the recess

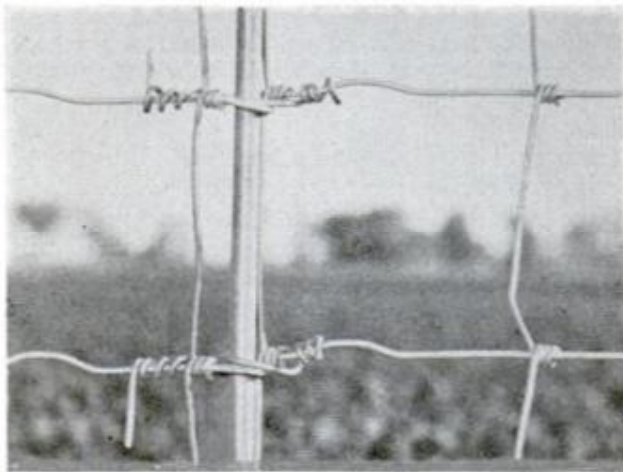
(Continued to page 222)



## Shouldered Sleeve Adapter Holds Broken Twist Drill

Many small shops salvage broken twist drills by making a simple adapter having one end shouldered back to fit the drill chuck and the other end blind-drilled to take the fluted section of the broken bit. In this way even short fluted sections of a shattered bit can be utilized for shallow-hole drilling. The blind hole in the adapter should be drilled undersize and then reamed to take the broken section of the damaged bit. Drill and tap the body of the adapter for a setscrew. To drill clean holes in sheet metal grind the cutting edges of the bit square across with two shallow lips and a spur center.

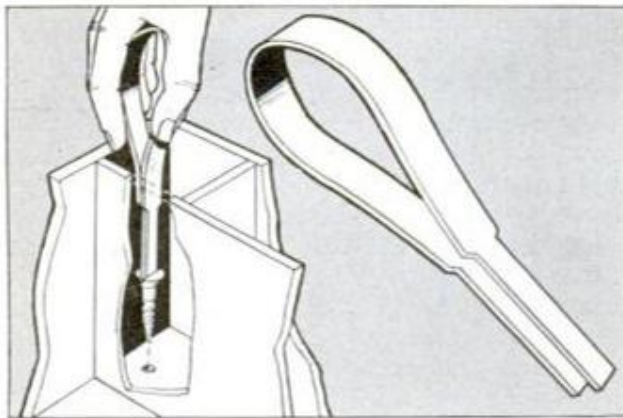
F. H. Loudon, Sarasota, Fla.



## Looped Ends of Fence Rolls Eliminate Need for Posts

Hog fencing can be moved whenever necessary without wear and breakage if permanent loops are formed in the horizontal wires of the rolls. Each roll is then linked to a succeeding one by slipping an iron rod through the loops. With the rods driven into the ground, the necessity for posts is eliminated as the rods are easily pulled up whenever it is necessary to move the fence. The fence is also easily dismantled into shorter sections for storage.

Ray Wilson, Des Moines Co., Iowa



## Screws Set in Inaccessible Places With Spring-Steel Holder

Inserting screws in hard-to-get-at places need not impede the progress of your work. The problem is quickly solved with a piece of spring steel ground and shaped as shown in the illustration at the left. Hardened and finish ground to fit the slot of a flatheaded screw, the holder can be used to start the screw after which a conventional screwdriver can be used to drive the screw home.

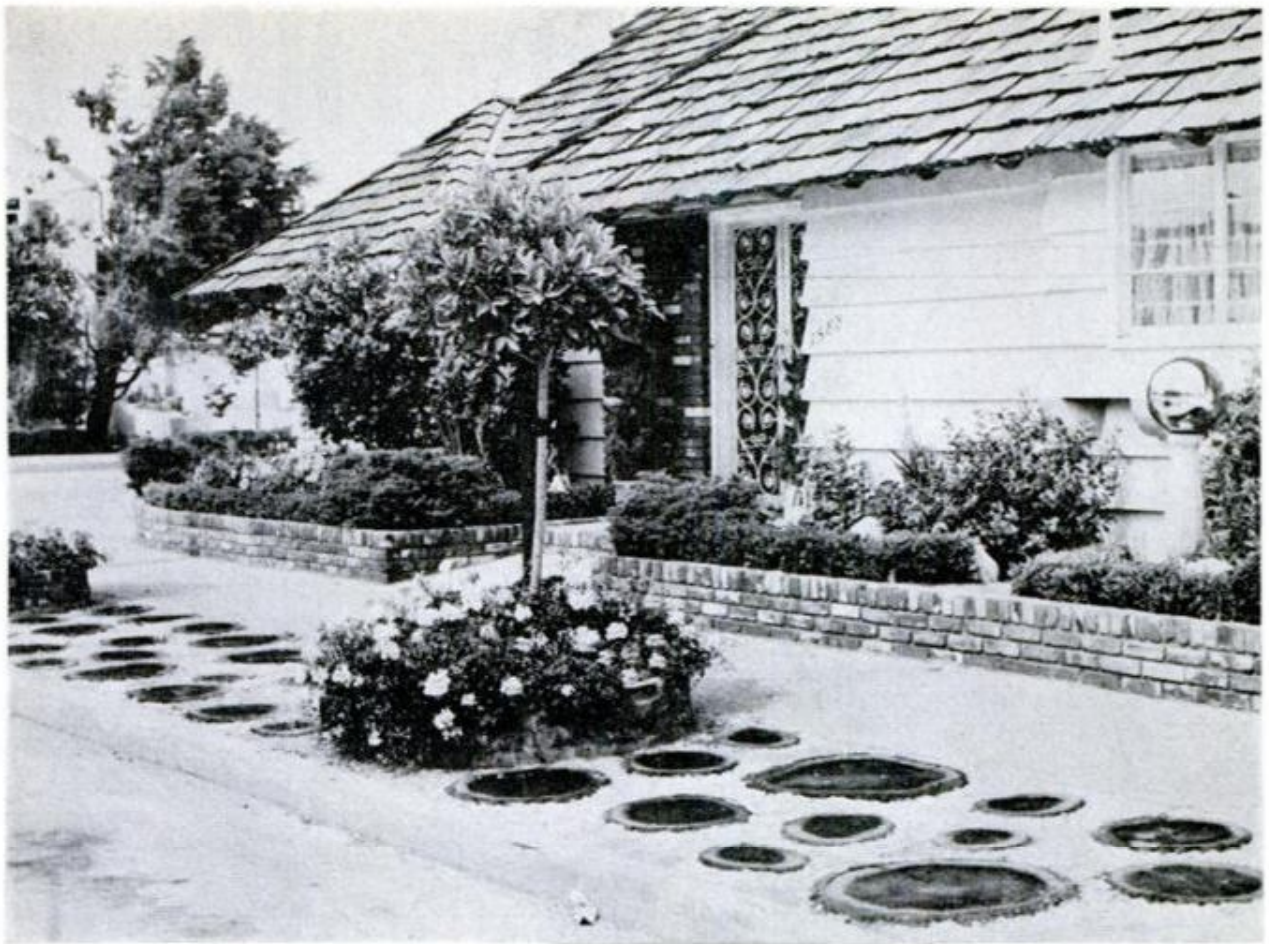
Frank L. Rush, Columbus, Ohio



## Oil Bath Prevents Shrinkage Of Wooden Hammer Handle

When the protective finish wears off the handle of a hammer due to prolonged hard usage, the wood may shrink just enough to loosen the handle in the eye socket. Even though the eye is tapered—as in all good hammers—there is danger of the head flying off. To eliminate this hazard submerge the head in a half and half solution of raw linseed oil and turpentine for 48 hr. The oil will protect against shrinkage.





Laid out in white gravel, this parkway area bordering on the street is broken up into interesting shapes by a novel use of redwood tree sections. Planters of flowers serve as beautiful highlights and add contrast

## LANDSCAPING WITH CONCRETE

WHERE SHADE and kids make a lawn a hopeless problem along a street front, or an area habitually used as a short cut, there's a simple solution—"plant" concrete. Street-front areas may be laid out in pebbled concrete. Wells for shade trees can be spaced at regular intervals and relatively large stone planters may be chosen with colors and textures contrasting with the even expanse of concrete and gravel. Far from creating an arid and sterile look, the use of concrete and stone offers limitless possibilities in the way of tone patterns and color designs and a means of setting off the dominant colors and textures offered by the house itself. Thus street-front and border areas can be transformed into a unified scheme which is beautiful, durable, easy to take care of and highly conversational. Wider areas, as in a yard, may be laid out in pebbled concrete, alternating with grass and shrubs, if desired. More daring souls may venture into free-form patterns of concrete in the form of walks, low dividing walls to discourage short cuts, and perforated-concrete block screens.



Clean, quiet dignity is achieved on this street front by a combination of pebbled-concrete paving and shade trees. Wells for the trees are of alternating red and gray bricks, offering a colorful contrast to the somewhat severe aspect of the paving

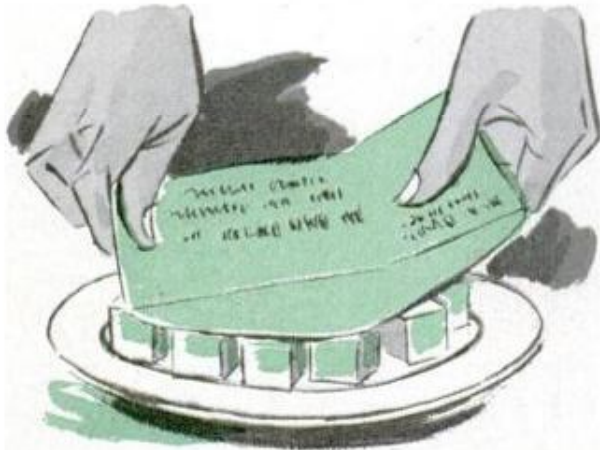
# Solving HOME



**COME COLLECTION TIME**, there's no need to be wakened by the newsboy or to have him come only to find you're not home. Slit a rubber ball and insert the necessary change in it. Suspend the ball from the door knob with a wire hook and he can help himself



**WONDERING HOW MUCH DETERGENT** to use for delicate nylons? One tip of a sugar dispenser full of detergent releases just enough. Virtually spillproof, it also makes an attractive bathroom addition and can be painted to match the general color scheme



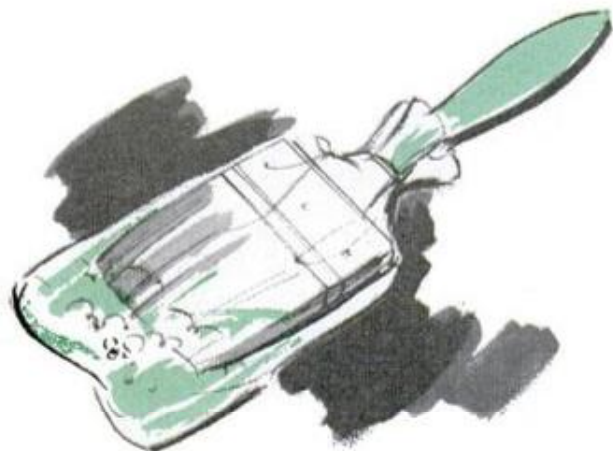
**IF YOU'RE CAUGHT** with a stack of mail to get out and there's no envelope moistener handy, place a few ice cubes in a shallow plate. Running the envelope flaps over the cube moistens them just enough to allow the glue to stick and seal the letters



**VACUUM-BOTTLE CORKS** should be cleaned at frequent intervals to keep them fresh and sweet, especially if the bottle is regularly used to carry milk. Place the cork in a pan of hot water and set a tumbler over it to keep it submerged for several minutes

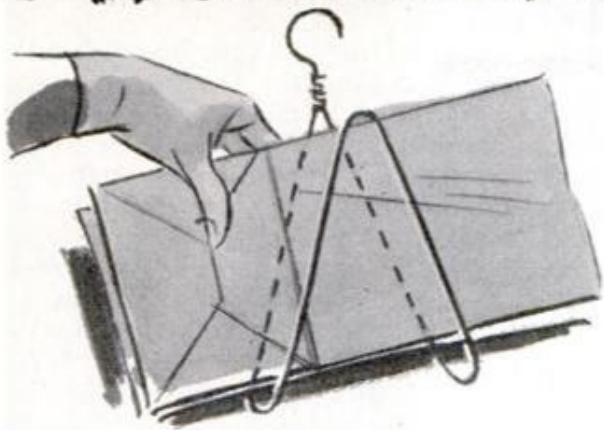


**EXTRA CUP HOOKS** kept loose in a drawer have a way of getting mixed with the drawer's general contents and of eventually disappearing when needed most. Prevent this by inserting the hooks in a piece of soft insulation board and store until needed



**AFTER A THOROUGH CLEANING** in a solvent, a paintbrush should be washed with a solution of hot water and soap. A quick, easy way is to pour the solution into a plastic bag, insert brush, tie the bag shut around the handle and knead the bristles with your hands

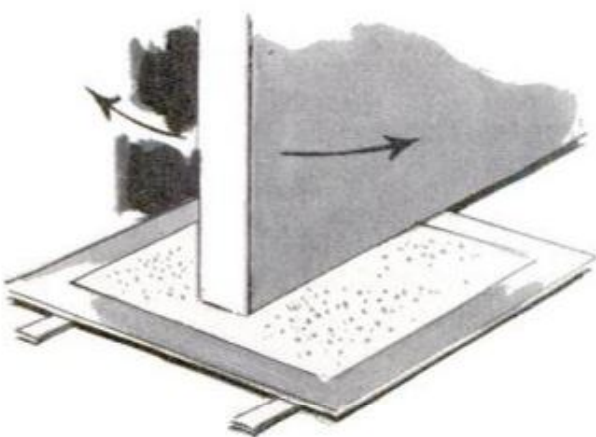
# PROBLEMS



**DON'T LET THOSE PAPER BAGS** take up valuable drawer space. There's a better way to store them. Bend a common wire clothes hanger and insert the bags as shown above. Suspend the hanger from a nail in the kitchen wall and the bags will be within reach



**REMOVING THE CAP** from a plastic capsule bottle is made easy by attaching one or more short tabs of adhesive tape to the inside of the bottle at the rim. The cap, closed over the projecting ends of the tape, is easily loosened by lifting the projecting tabs



**TO EASE AN OUTSIDE DOOR** that binds on the threshold tape coarse sandpaper to a piece of hardboard and slide this under the door. Swing the door back and forth several times, increasing the pressure under the sanding block with wedges until door closes freely

JUNE 1960



CLOTH

**WHY PUT UP WITH** the discomfort of having water run down your forearm and drip from your elbow when you're washing walls and ceilings? Wrap a piece of absorbent cotton, a towel, or a small artificial sponge around wrist and hold in place with a rubber band

159



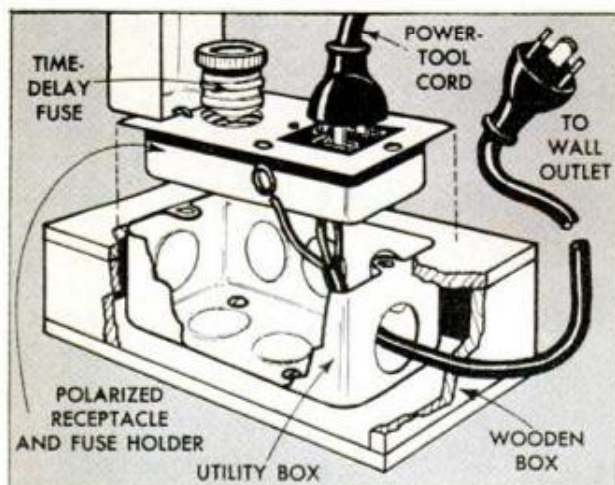
## Extra Handle Aids Pouring From Large-Size Can

When pouring from a full 1-gal. can of turpentine, floor wax, etc., it is easier to control the flow if a handle like the one shown at left is attached to the can. The handle consists of a clamp made from a strip of sheet metal and a U-shaped piece of coathanger wire, the ends of which are bent at right angles after inserting them in holes punched in the clamp. The same type of handle could be used on other sizes and shapes of cans, such as a 5-gal. gas can or 2-gal. oil can, simply by forming a clamp to the shape of the container.

R. Hanscom, Elmhurst, Ill.

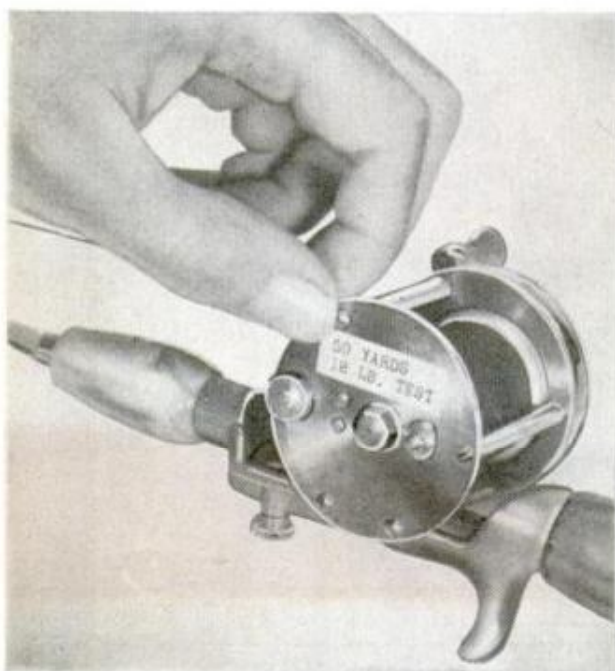
**Car-trunk leaks** resulting from a loose-fitting gasket or slight sprung lid can usually be stopped by this simple expedient. Slip a length of small rope in the groove in the underside of the gasket so that it overlaps the leak area by several inches.

Harvey Muller, Danboro, Pa.



## Portable Fused Receptacle

To provide overload protection for electric tools and any circuit into which they might be plugged, one home craftsman assembled a portable fused receptacle from common electrical parts as shown. The unit consists of a 3-wire polarized receptacle connected to a grounded extension cord and mounted in a utility box which is installed in a wooden box. Each time a tool is used a time-delay fuse that closely matches ampere rating of the tool is screwed into the receptacle. If a tool has a 7.8-amp. rating, an 8-amp. fuse should be used.—J. R. Roche, Huron, S. D.



## Label Identifies Line on Reel

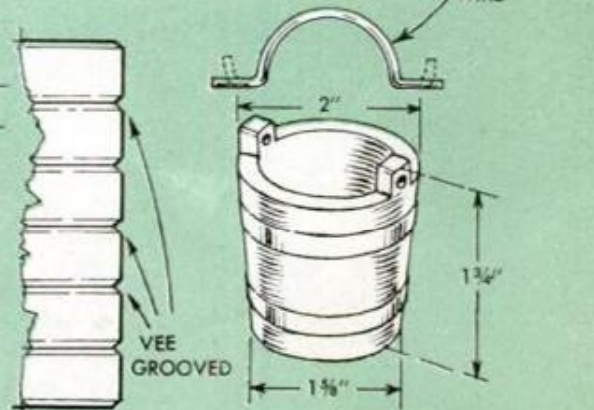
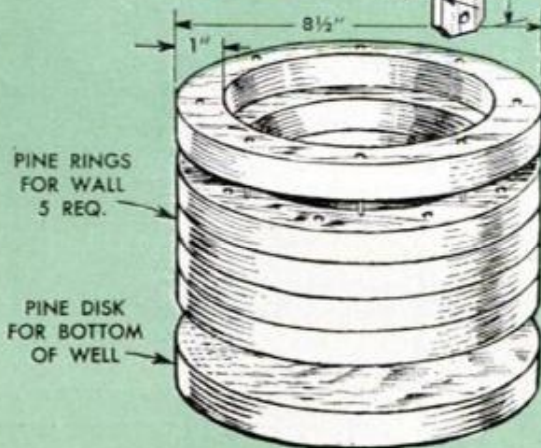
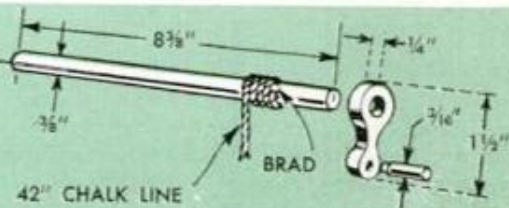
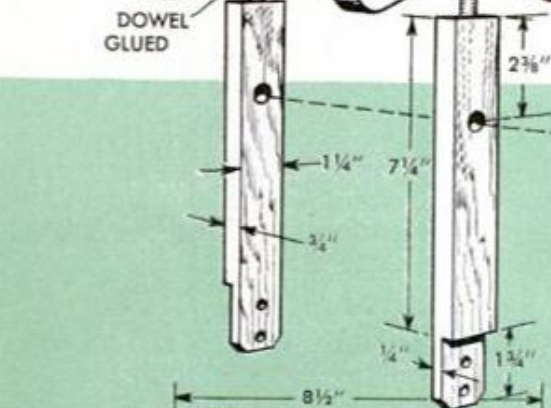
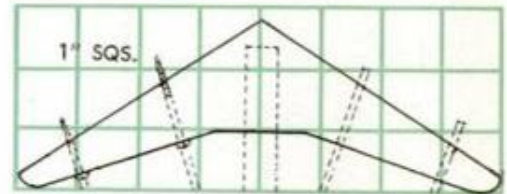
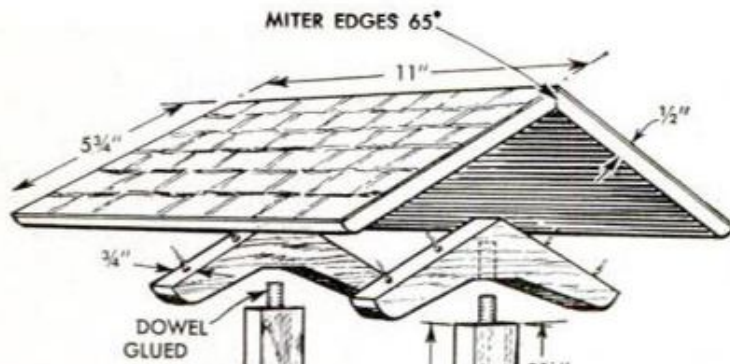
To avoid the problem of trying to remember the test, length and type of line on a fishing reel that is not used very often, here is what one fisherman did. The above data was typed on a gummed label, which then was pasted on one side of the reel as shown in the photo. A strip of cellophane tape placed on top of the label protects it from moisture.

**If your outboard motor** has a fuse in its electric starting system, it is a good idea to carry a few spare fuses with you, say the National Assn. of Engine & Boat Manufacturers. Keep the fuses in your tool box, first-aid kit, or tape them to the motor or boat. The fuses take up very little space and you will be glad to have replacements along when a fuse blows.

# "Old Oaken Bucket" PLANTER

REMINISCENT of early America, this miniature copy of a vine-covered well serves as a novel decorative planter. Complete with oaken bucket hanging from the windlass, the planter is suitable for any indoor climbing plant which should be potted in a low jar placed inside the well. Pine may be used for all parts except the bucket and windlass, which should be of hardwood. The parts can be fashioned by hand, although a lathe will speed the work and permit a better job to be done, especially when making the well enclosure and bucket. The latter is turned from solid stock, while the enclosure is made up of  $\frac{3}{4}$ -in.-thick rings, nailed and glued together. The roof consists of two pieces of wood tooled to give a shingled effect and then fastened to two rafters and two posts as shown.

Dick Hutchinson, San Gabriel, Calif.

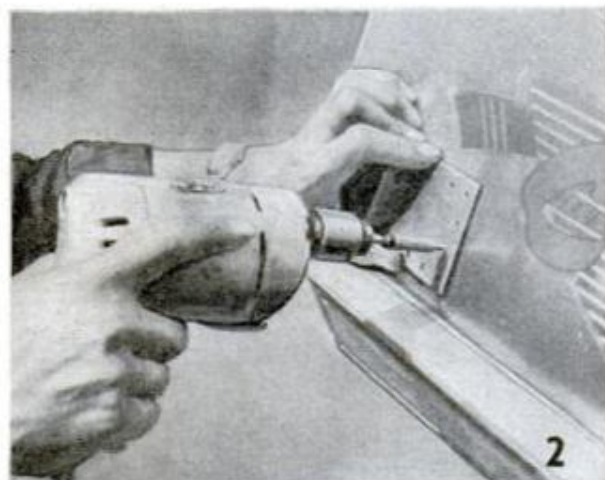


# CARE AND REPAIR OF

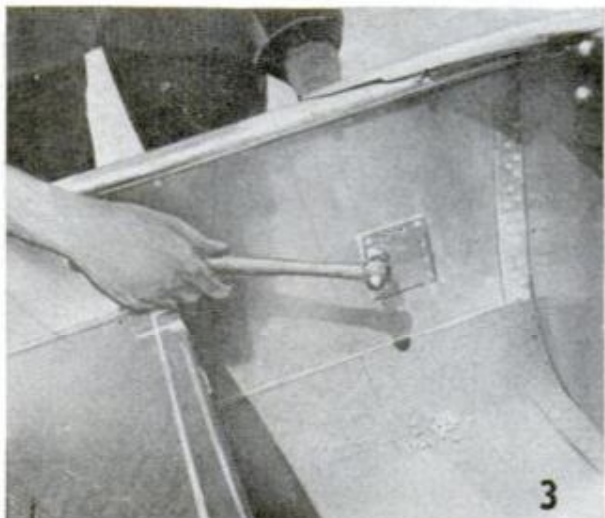
By Earl F. Wobeck



Above, first step in repairing gash in aluminum boat is to hammer metal back into original shape, using nylon hammer and heavy piece of metal as anvil

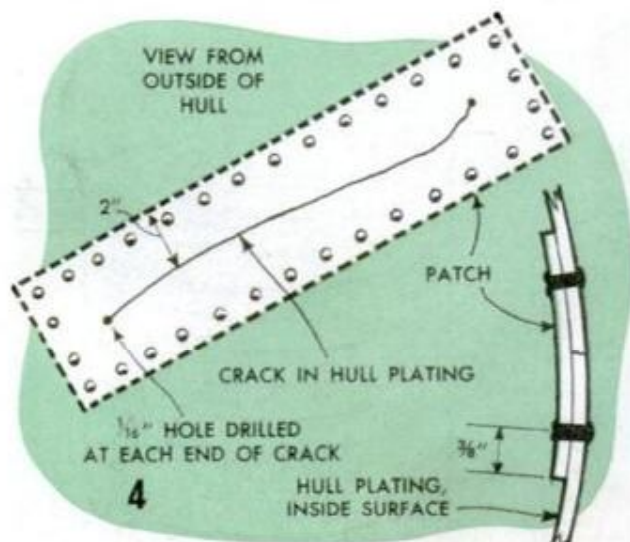


Above, after aluminum patch is cut and drilled to take rivets, it is centered on hole and used as template for drilling matching holes in hull. Below, last step in patching procedure is to apply caulking compound to patch and rivet it to inside of hull

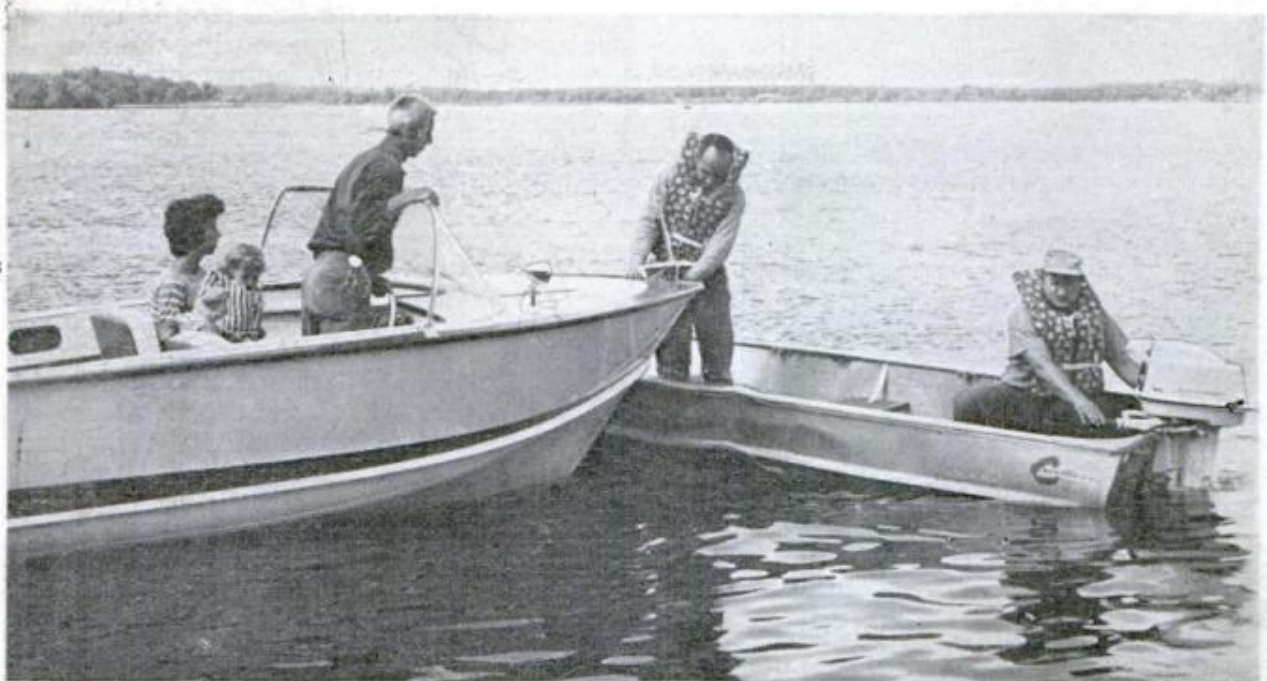


**I**F YOUR aluminum runabout, canoe or skiff isn't the thing of beauty it once was when purchased several years ago, here are some timely repair and maintenance tips to make the "old girl" as seaworthy and appealing as ever. Included in this story are instructions on how to fix holes and dents, stop leaks at riveted joints, install fittings and special painting procedures recommended by aluminum producers and manufacturers of aluminum boats. All the repairs illustrated can be made with hand tools, except for patching, which requires an electric drill to make rivet holes.

Patching is required when a crack occurs in the hull plating as in Fig. 8, and when a hole is too large to be closed with a single rivet. Punctures, of course, result from collisions of various sorts, but there is no mystery as to how such damage is caused, nor is there any question about how it can be avoided. Cracks on the other hand, do appear occasionally for no apparent reason, so it might be worth your while to know what causes them and avoid this form of damage. Improper loading on a trailer is a prime cause. If the boat is trailed with a motor mounted on the transom, it is important to have bunks (supports) that extend from the transom to the next hull frame forward, so that most of the weight is supported by structural members, not the relatively thin aluminum hull. Improper support results in a strain on the hull and rivets so that when the boat is trailed over a rough road constant jarring cracks the aluminum at the support points. Using a motor that is too large for the boat, also can cause cracks due to vibration and



# ALUMINUM BOATS



Crestliner, Inc. photo

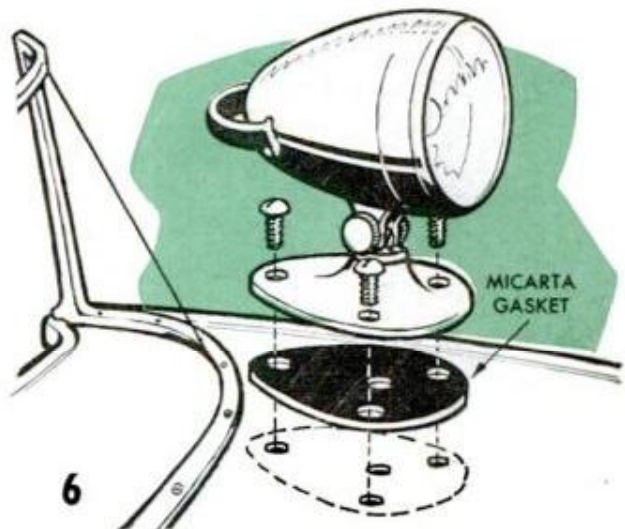
Bent gunwale and other extensive damage sustained by small boat above should be repaired by specialist

torque (twisting action) developed by the motor at high speeds.

The procedures for repairing holes and cracks are about the same. A patch is cut from aluminum sheet metal of about the same thickness as the hull to which it is to be riveted. The patch should overlap the crack or hole by 2 in. all around as indicated in Fig. 4. If it is a crack that is being repaired, a  $\frac{1}{16}$ -in. hole is then drilled at each end of the crack to prevent it from spreading. In the case of a hole, the metal immediately surrounding it usually is stretched out of shape or dented and must be worked back to the original contour, using a rubber or nylon mallet and a bucking tool or anvil as in Fig. 1. The deformed metal should be worked from the outer

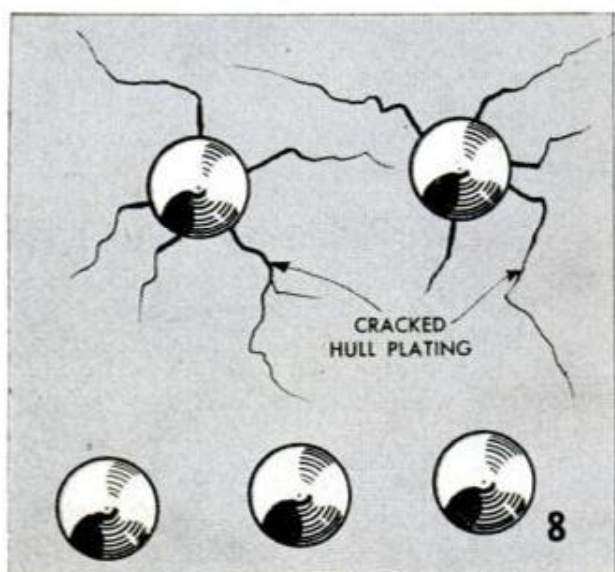
periphery of the dent to the hole. For badly dented metal, whether punctured or not, heat must be applied to shrink it to its original shape. This is a job not to be attempted by the amateur. Most types of aluminum have a "quick" melting point, requiring very careful control of flame temperature to avoid melting or softening the metal permanently.

Next, the paint is removed from the patch area on both sides of the hull, after which the patch is shaped to the hull curves with a soft mallet. Rivet holes are drilled in the patch about  $\frac{3}{8}$  in. from the edges and spaced  $\frac{5}{8}$  in. apart. Then the patch is centered on the hole and a few holes are drilled in the hull to take small bolts, using the patch as a template as in Fig. 2. After draw-

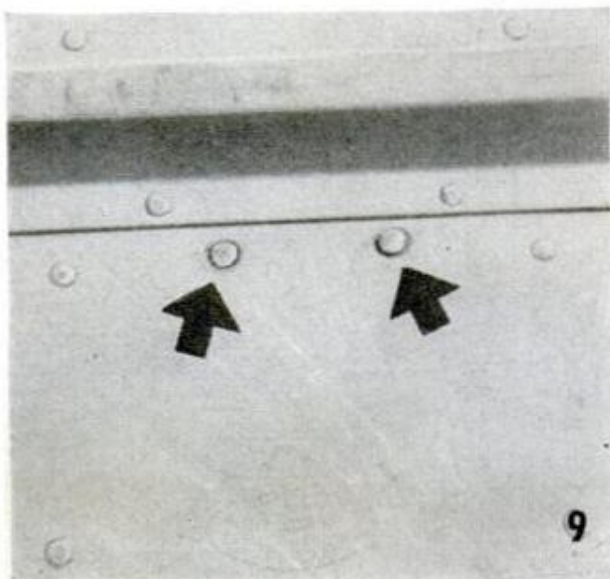




Above, leak in flat seam is stopped by applying sealing compound along lap edge and allowing capillary action of water in the joint to draw it into the void



Above, excessive strain on rivets may cause hairline cracks in hull requiring a patch to stop leak. Below, easy way to spot leak around rivet is to look for discoloration around rivet head. One way of stopping such a leak is to drill out old rivet and replace it with an oversize one, details A, B and C

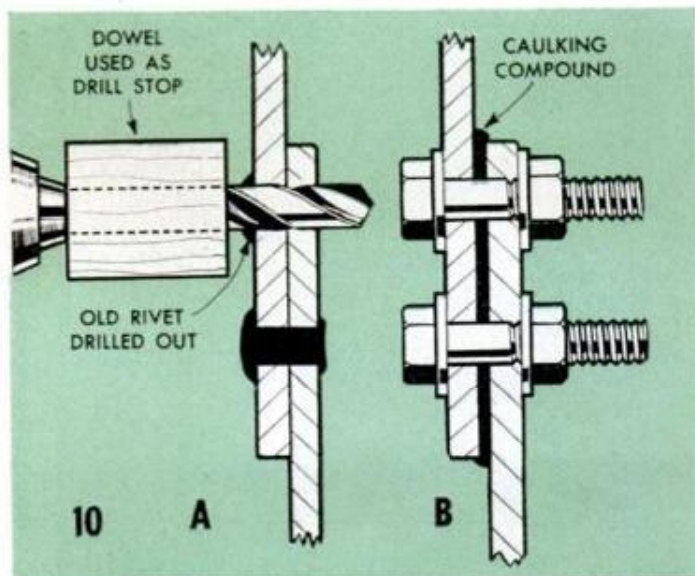


ing the patch tight against the hull with the bolts, the rest of the rivet holes are drilled in the hull. This will assure perfect alignment of matching holes drilled in the patch and boat. Note that a drill stop is used to prevent the chuck from scoring the aluminum. The last step of the patching procedure is to apply a  $\frac{1}{32}$ -in.-thick coat of bedding compound to the patch and tighten it in place again with the bolts to force out excess compound as in detail B, Fig. 10. Then drive the rivets in the usual manner, Fig. 3, replacing the bolts with rivets as well. A few rivets also may be placed near the center of the patch if it is a large one. Good compounds to use for this purpose are, Alumilastic, Gutterseal, or Super Seal, obtainable through most sheet-metal shops.

The procedure for repairing dents has for the most part been covered above in the metal straightening step of hole repair. Extremely deep dents usually can't be removed by the methods explained but should be treated in the following manner. First, drill a small hole in the center of the dent. This will relieve the pressure and provide a place for the overstretched metal to go when reformed. If the metal around the hole is unbroken when straightened, the hole can be closed with a rivet or a plastic aluminum compound. Otherwise a patch will have to be installed.

#### Ways to Repair Leaking Joints

There are several ways of repairing riveted joints that leak. If the leak is only slight, try tightening the rivets in the leak area, using a small anvil and a lightweight hammer. Hold the anvil against the round manufactured head of the rivet and strike the flat driven end, working outward from the leak in both directions for 4 in. If this repair procedure fails, brush a liberal amount of spar varnish into the open edge of the seam on the inside and outside of the





hull for a distance of 6 in. in each direction. Allow the varnish to dry 24 hrs. before using the boat. An easy repair for flat lap seams is to apply a thin bead of sealing compound (Sealer 900) to the outside seam joint as in Fig. 7, after having wetted the seam thoroughly. Capillary action of the water remaining in the joint will draw the sealer into the void as the water evaporates.

If none of the above repair methods seem to stop the leak, it will be necessary to replace the rivets for a distance of 3 in. or more in both directions from the leak. First, drill out the old rivets as in detail A, Fig. 10, using a short length of dowel as a drill stop as shown. Steady the drill with the index finger as in Fig. 12. Pry the loosened seam open slightly with a screw driver, being careful not to bend the metal. Next, clean out the old caulking compound with a putty knife and force fresh compound into the joint, using one of the products recommended for sealing a patch. Then insert small bolts in several rivet holes and tighten them until the excess compound is forced out and the joint line is straight and tight. If the metal is bent, straighten it at this point with a soft hammer and anvil. Remove the bolts, ream the rivet holes to the diameter of the oversize rivets to be used and install them, detail C. Since this is likely to loosen the old rivets slightly next to the repair area, they must be tightened for a distance of 2 in. on either side of the new rivets. This is done with an anvil and hammer in the same manner as before, being careful not to overtighten them, as this would deform the metal and cause the rivets to expand into the space between the joint surfaces as in detail D.

When a leak in a hull is so slight that it is difficult to determine its location by casual observation, look for a dark stain on the plating around the heads of rivets as indicated in Fig. 9. To stop such a leak,

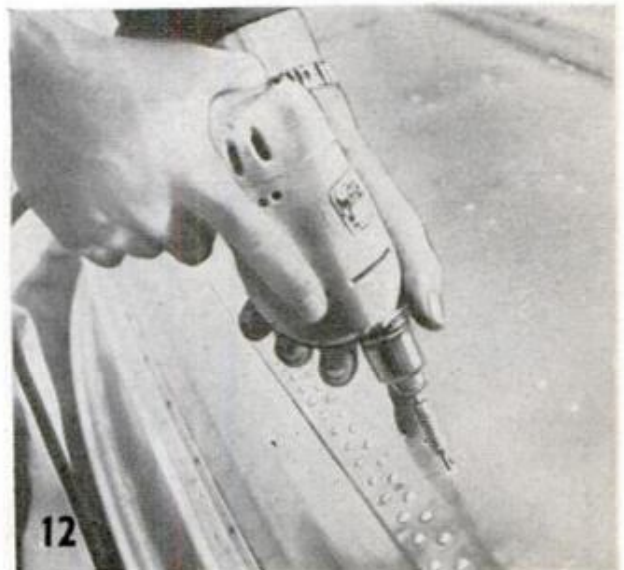
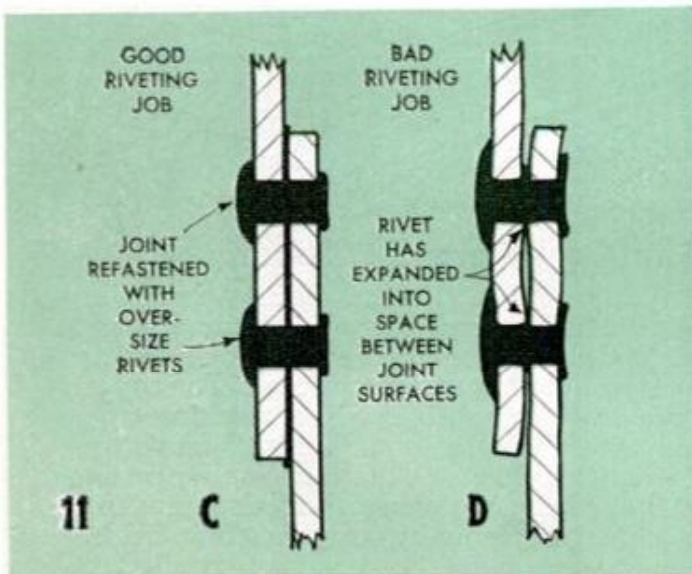
drill out the rivets and ream the holes to take oversize rivets.

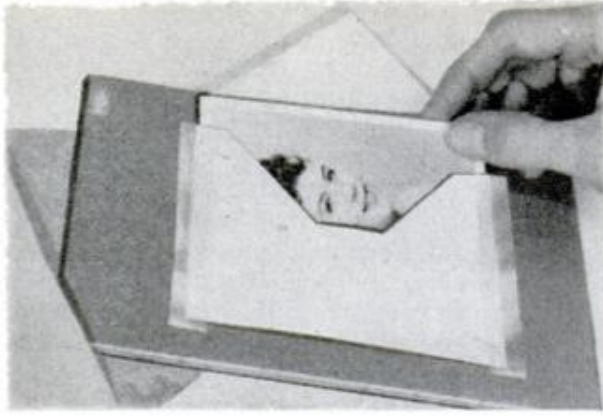
Never use anything but aluminum fastenings on an aluminum boat. Mixing other metals with aluminum may induce electrolysis, a very active form of corrosion. If it is necessary to fasten brass or galvanized hardware and equipment to aluminum, a gasket should be placed between the part and the boat to serve as insulation, Fig. 6. Cut such gaskets from Micarta, Neoprene tape, or other products having similar insulating characteristics.

### Painting Procedure

Painting an aluminum hull is no more difficult than applying a finish to any other hull material. As with any paint job, good results depend largely upon proper preparation of the surface before painting. Although an aluminum hull doesn't need paint for protection from corrosion, except when it is exposed continually to salt water, many boaters like the appearance of a brightly painted craft. For a new unpainted boat, clean the hull with painter's naphtha, paint thinner, or a detergent. Follow with a fresh-water rinse, then a brush application of phosphoric acid-type solution (Alumiprep No. 20, Alodine No. 1200, etc.) and another fresh-water rinse. For a previously painted hull, best results can be obtained by removing the old paint to the bare metal, using a scraper, sander, or any good paint remover. Do not use caustic soda. If paint remover is used, be sure to remove all traces of it before applying the new finish. The clean surface is then sanded lightly to provide a tooth for a brush coat of zinc chromate primer. Two finish coats of marine enamel should follow the primer, allowing sufficient drying time between coats. A nonskid paint finish should be applied on the inside surfaces of the hull.

(Continued to page 226)



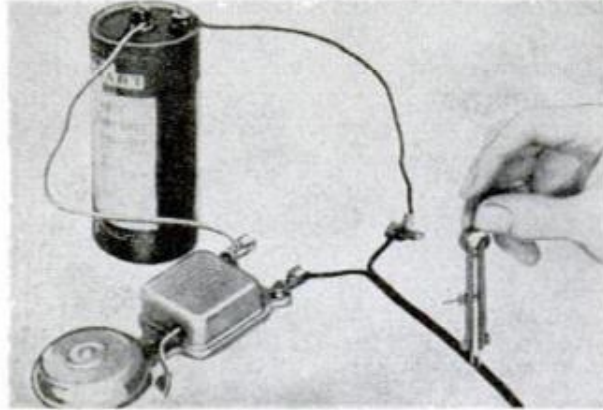
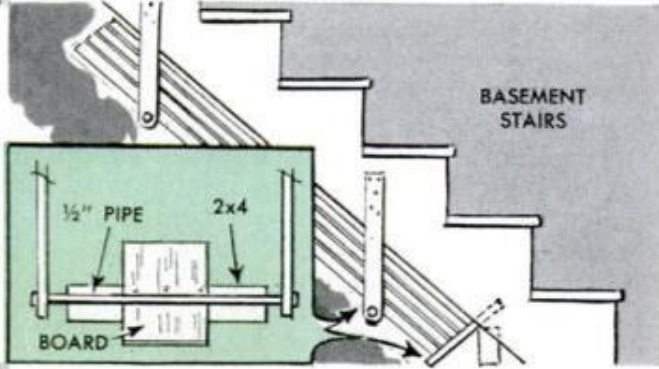


## Protecting Photos in the Mail

Photographs will have added protection against damage in the mail if they are first placed in an envelope which is taped to the center of a larger piece of cardboard. When placed in the mailing envelope the cardboard which extends beyond the edges of the photographs acts as a cushion and thus prevents dog-eared prints which often results when they shift enroute.

## Stair Rack for Storm Sash

Your storm windows are stored safely under the basement stairs in this simple rack. Nail two pieces of 1 x 3 to each side of the stair stringers as shown and fit them with lengths of 1/2-in. pipe capped at the ends. The windows can be kept off the floor by nailing a board to a length of 2 x 4 between the stringers.



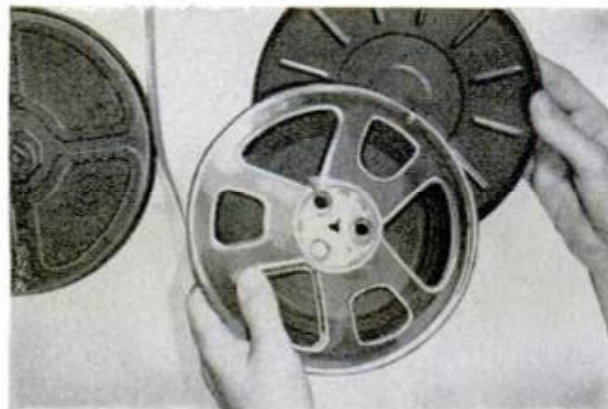
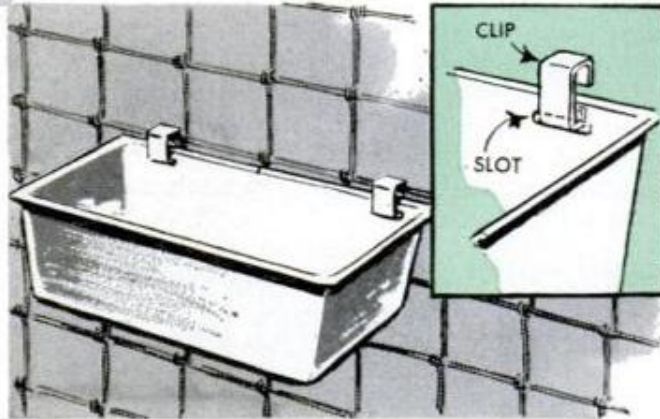
## Finding Break in Lamp Cord

A door bell, a dry cell and a pair of drafting dividers make it a simple task to spot a break in a lamp or appliance cord. The cord is first removed from the lamp or appliance and the bare ends are connected to the bell and dry cell as shown. Probing the length of the cord with the dividers will ring the bell as long as the wires are intact and both are touched simultaneously. Bell will not ring beyond break.

## Fido Won't Upset Water When Pan Is Hung

Does your dog keep knocking his water pan over? Then hang the pan on the fence of the enclosure. You can do this by bending a couple of hooks from sheet metal to fit slots cut in the pan. When hung, the pan cannot be upset, yet is easily removed for cleaning.

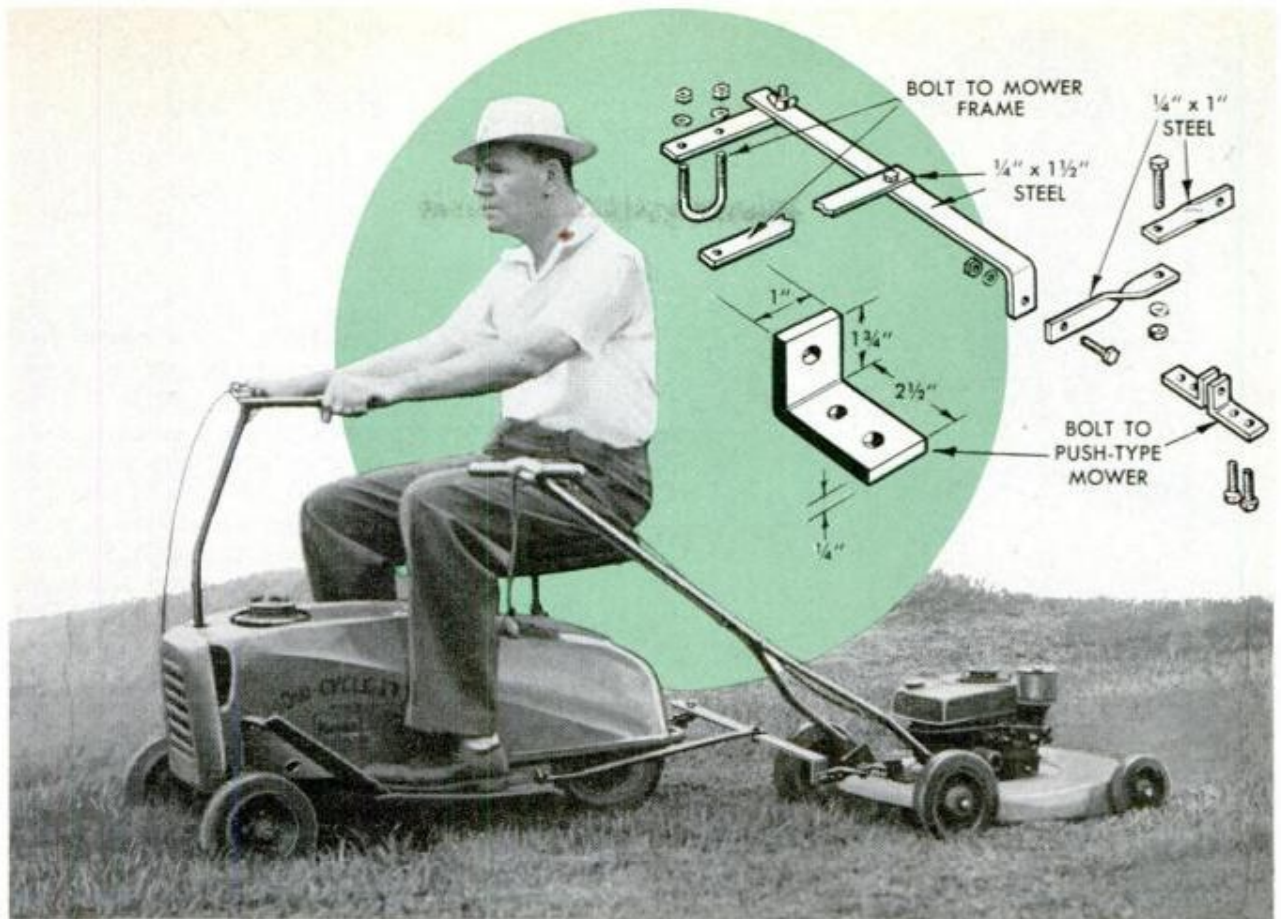
Victor H. Lamoy, Upper Jay, N. Y.



## Film Cans Store Hi-Fi Tape

Large 400-ft. 16-mm. film cans make excellent low-cost storage containers for recorded 7-in. magnetic-tape reels. Each can will accommodate two reels. The cover may be sealed with a strip of masking tape on which titles or other desired data may be written. The steel cans not only protect the reels from damage but also prevent accidental erasing by stray magnetic fields.

Hartwell M. Hughes, Inglewood, Cal.



## Power Mowers Team Up to Cut Wide Swath

By Charles D. Neal

Here is simple arithmetic applied to a problem in lawn cutting: If it takes two hours to cut a lawn with one mower, how can you do the job in half that time? The answer is given in the photo above. All you have to do is hitch a rotary mower to your riding unit as shown in the detail, and cut a swath equal to twice the width of that cut by one mower. The hitch can be adapt-

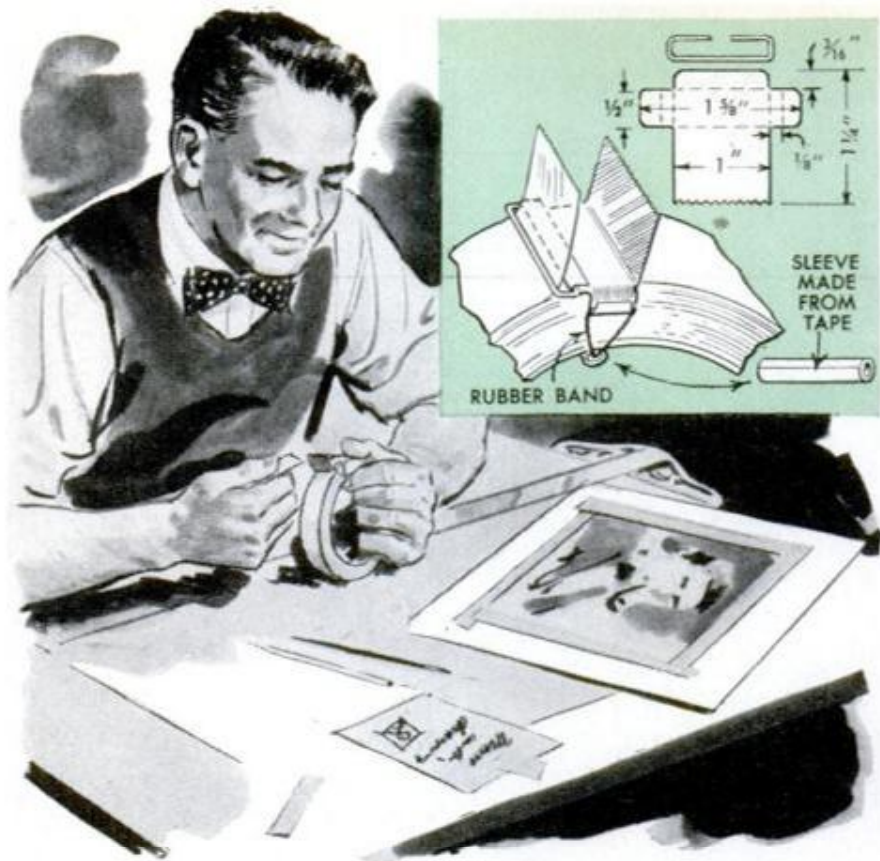
ed for use on any combination of these two types of mowers. Because of differences in construction of various models, most of the lengths of hitch parts have been omitted. To determine these lengths, arrange the mowers to be used so that the trailing unit is about 1 ft. behind the leading one and far enough to one side to provide a slight overlap of swaths cut by each.

## Keep Important Gardening Data In Handle of Sprinkling Can

To keep gardening information handy concerning proper spacing of various plants, varieties that do well, etc., one housewife writes the desired information on a slip of paper as the growing season progresses. The slip is then placed in a small plastic tube which is corked and kept in the hollow part of the sprinkling-can handle as shown in the photo. A cork inserted in each of the open ends of the handle keeps the tube in place and the contents dry for easy reference when it is time for planting the following season.

R. Hanscom, Elmhurst, Ill.





## Tape Cutter Rides Roll

Artists in particular will appreciate this novel cutter which rides around a roll of masking tape as the tape is peeled off. This makes it easy to tear off small tabs of tape for sticking tracings and overlays to artwork. It is made of a piece of tin with ears turned up on each side to provide hooks for a rubber band which first is passed through a paper sleeve and then through the center of the roll. One side is bent to accommodate a wire loop through which the tape is pulled. The other side has a serrated edge. The rubber band holds cutter snugly against the roll. — R. J. Hesch, Santa Fe, N. Mex.

## Awning Over Conditioner Makes Unit Run Cool

Continuous exposure to the hot sun will cause an air conditioner to heat excessively which in turn will reduce its cooling efficiency and increase its cost of operation. It will pay you, therefore, to shade your window unit with an awning if it is located on the sunny side of the house. Any type sunshade will help, canvas, glass fiber or aluminum, although a bonnet awning of the type shown will shade the conditioner the best and still not restrict the air circulation. Avoid mounting the awning too low which would trap heat above the unit.

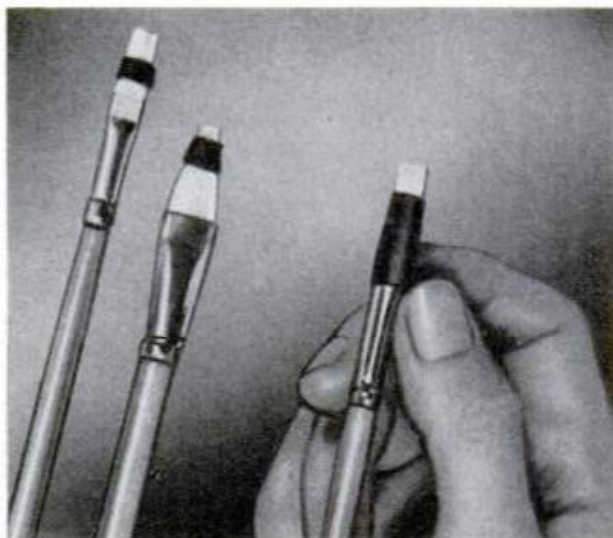
Grover Brinkman, Okawville, Ill.



## Sleeves Slipped Over Bristles Keep Brushes in Shape

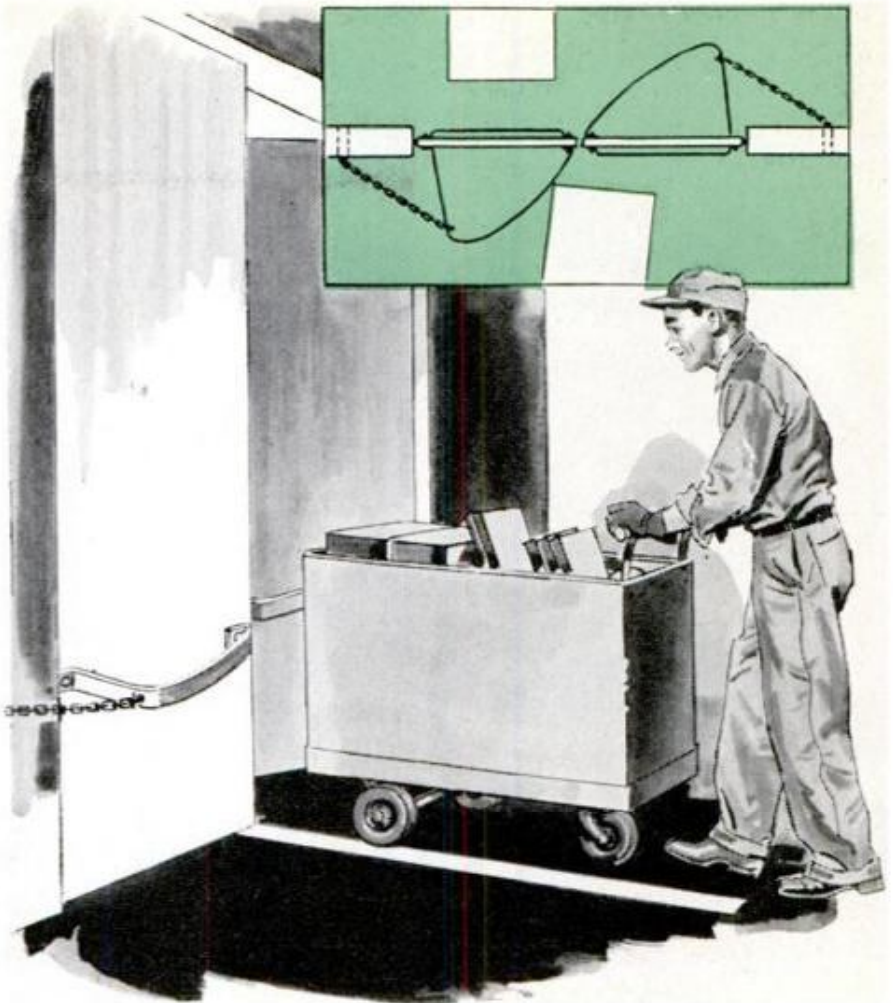
Expensive artists' brushes will be as good as ruined if they are allowed to lose their shape. This can be avoided by making sure that the brushes are thoroughly cleaned after use and that the bristles are held to their proper shape while drying. For this purpose, short sections of rubber tubing make ideal bands with which to hold the bristles. The bands may be slid back onto the ferrule when the brushes are being used and are quickly pulled over the bristles when needed to hold them in the original shape.

R. Hanscom, Elmhurst, Ill.



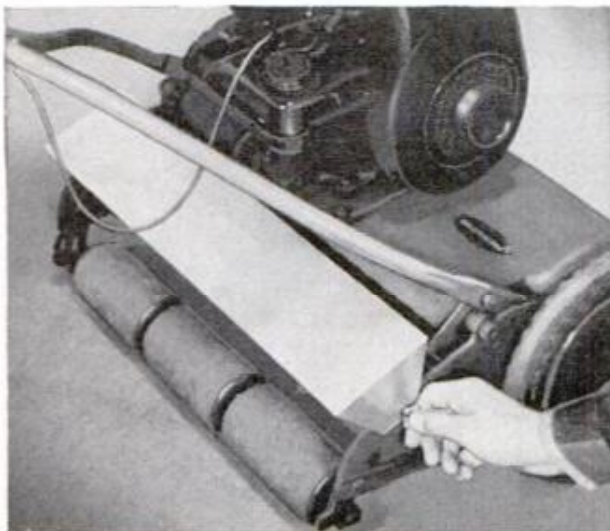
## Curved Door Bumpers Prevent Collisions

Collisions resulting from passing pushcarts through double swinging doors brought about this simple precautionary measure in one Midwestern factory. The diagram shows at a glance how curved steel bumpers, attached to opposite sides of the doors, were used to prevent a collision. Check chains permit only the right-hand door to open, and should a cart be partially in the path of an oncoming cart, the curved bumper on the left-hand door shunts the misguided cart into its proper lane, permitting both carts to pass without mishap. The curved bumpers are heavy pieces of flat steel which are bolted at cart-height to opposite faces of the doors. Flat-steel bumpers applied opposite the curved ones protect the doors from damage.



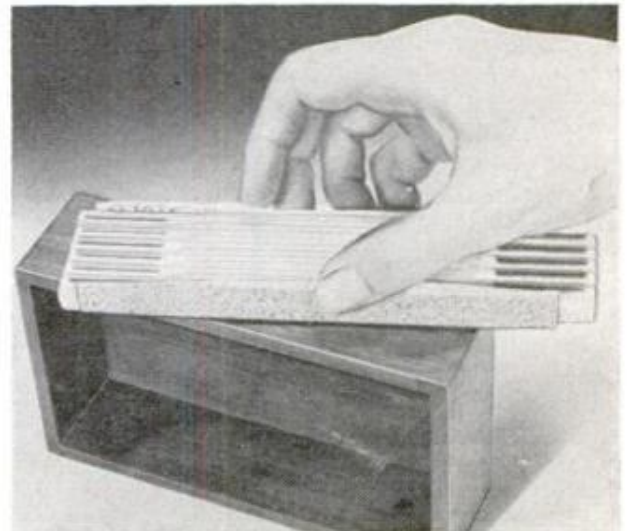
## Stone Guard for Power Mower

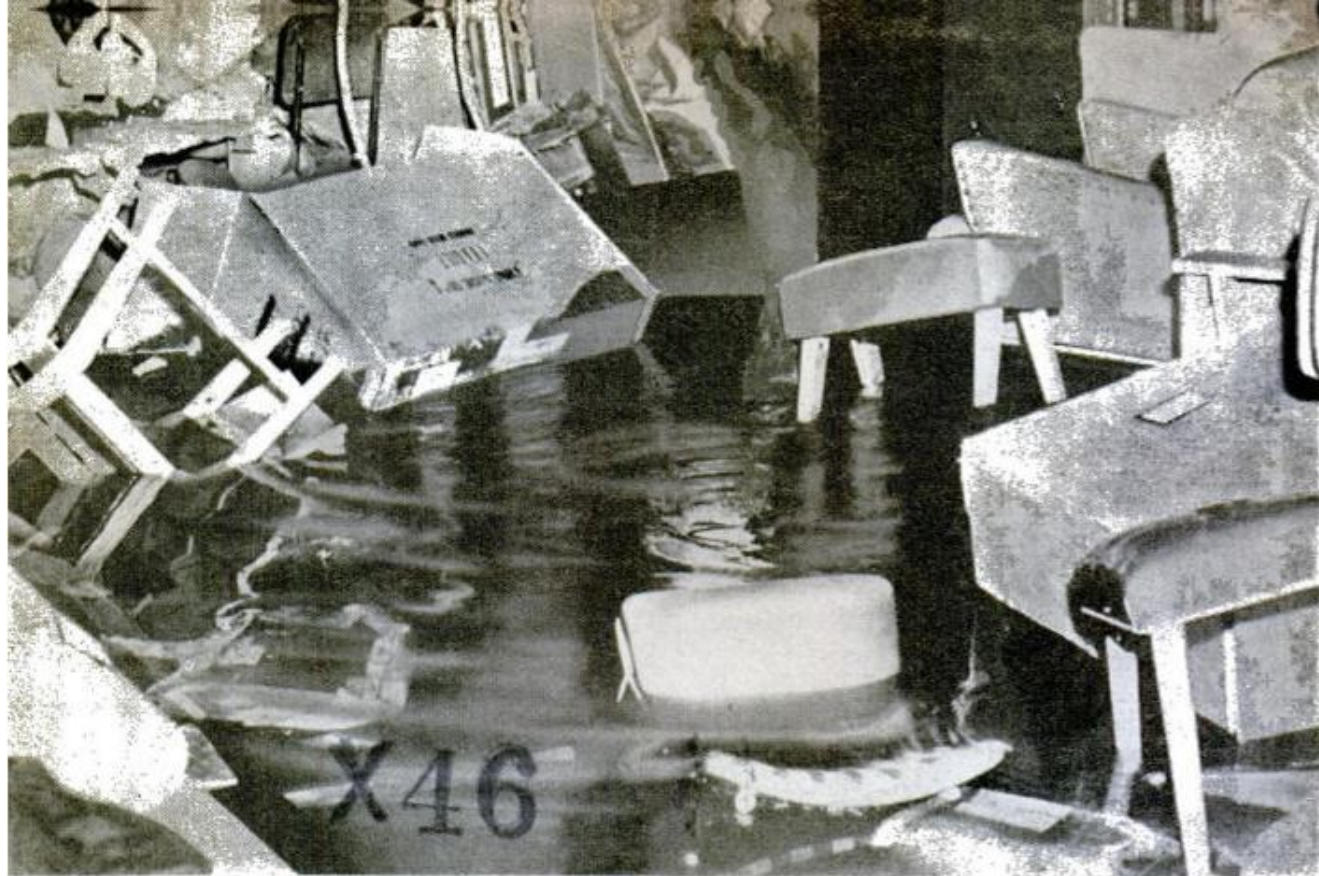
Like its rotary-type cousin, a reel-type power mower also will pick up stones and other objects and throw them with considerable force. To keep from being hit by a flying object, one homeowner added a 5-in. sheet-metal deflector to his mower. This was mounted directly behind the reel as shown and held with bolts and wing nuts so it could be adjusted to permit the grass to clear, yet deflect a flying object downward.



## Rule Used as Sanding Block

Ever find yourself looking for a suitable sanding block? Reach in your toolbox for your zigzag folding rule. Wrapped with sandpaper it makes an excellent on-the-spot sanding block. It fits the hand nicely, and being somewhat flexible, it tends to cushion the abrasive paper and also conform to uneven surfaces. The "block" can be held edgewise as well as flat for smoothing grooves and other narrow surfaces.





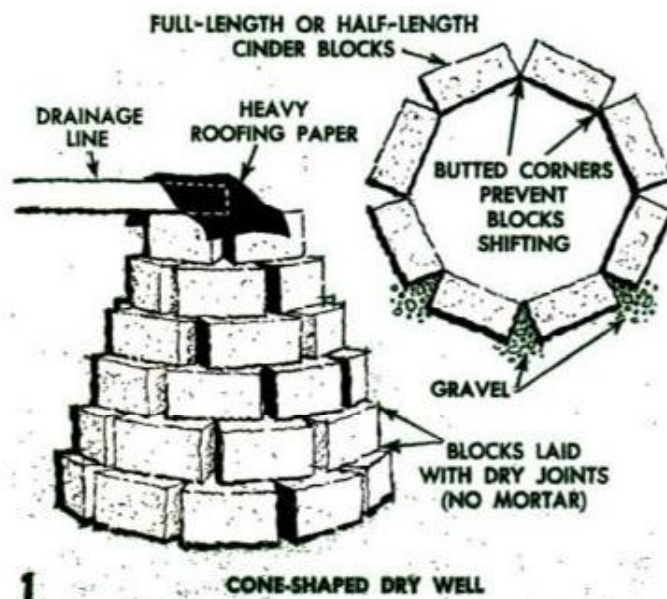
# DRY UP YOUR BASEMENT

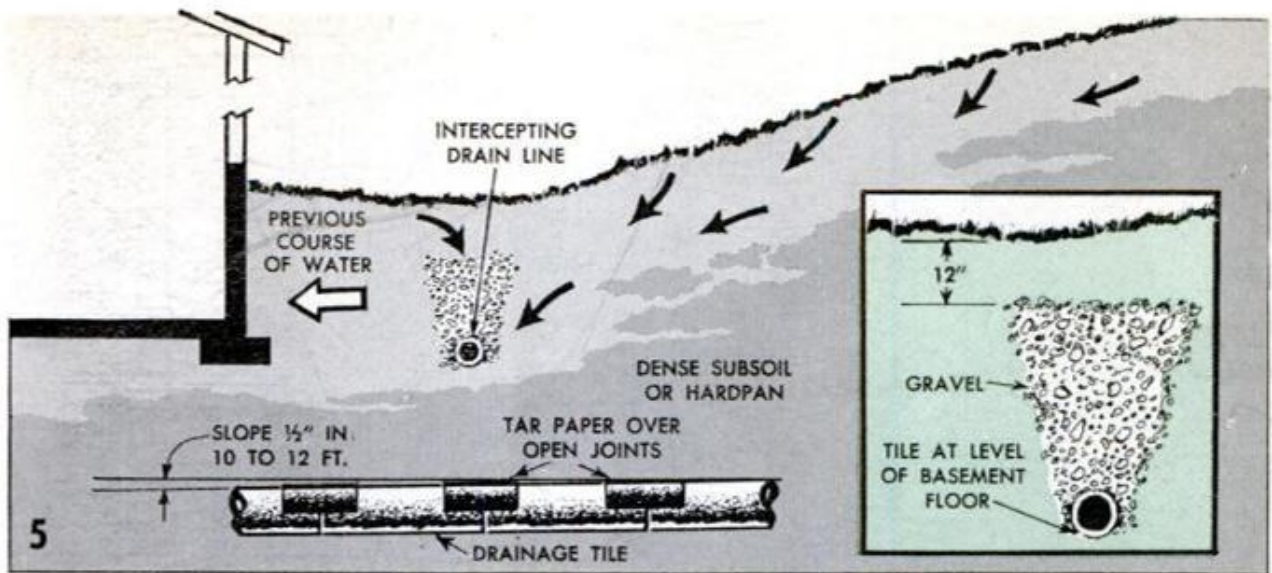
Plagued with a wet basement? E. R. Haan explains how you can lick the problem of leaks, dampness and flooding

**W**ET BASEMENTS cost homeowners millions of dollars each year in damage to stored household goods, appliances, shop tools and depreciation of property values. They also are a menace to family health because they provide breeding spots for disease germs.

The way you go about drying up your basement depends upon the cause for it being wet. Water seepage from the outside through the walls and floors can be stopped in two ways: (1) By diverting or removing the water which collects around a foundation. (2) By sealing the walls and floor to prevent water from getting through them. Often it is much simpler to prevent surface water from entering a basement than it is to waterproof it. When water seeps in during or immediately after a storm first look for leaky roof gutters or downspouts that discharge water alongside the foundation walls. Where downspouts are not connected to city sewers, the water can be conducted underground to dry wells located 10 ft. or more from the walls as in Fig. 2. Cone-shaped dry wells built of cinder blocks as in Fig. 1, have much greater capacity than those which are merely holes filled with gravel.

The grade alongside a house should slope slightly away from it to promote adequate drainage, which is aided considerably by a cover of thick turf. Where two adjoining houses have a flat area between them on which water collects, a swale can be formed as in Fig. 3. Sometimes window wells fill



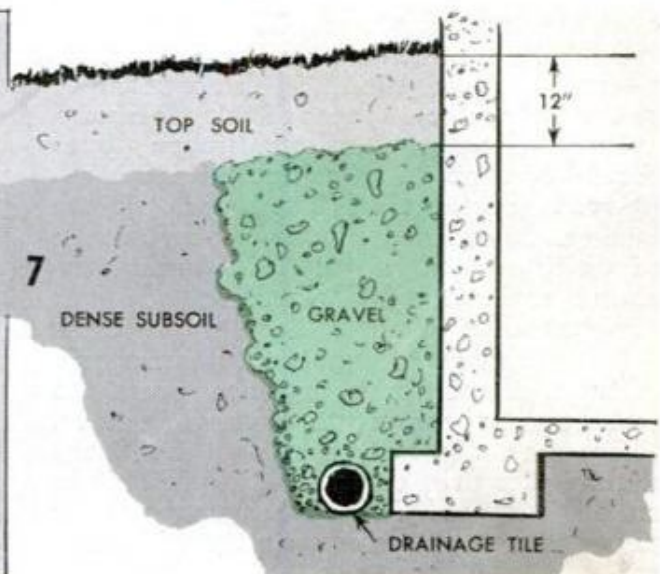
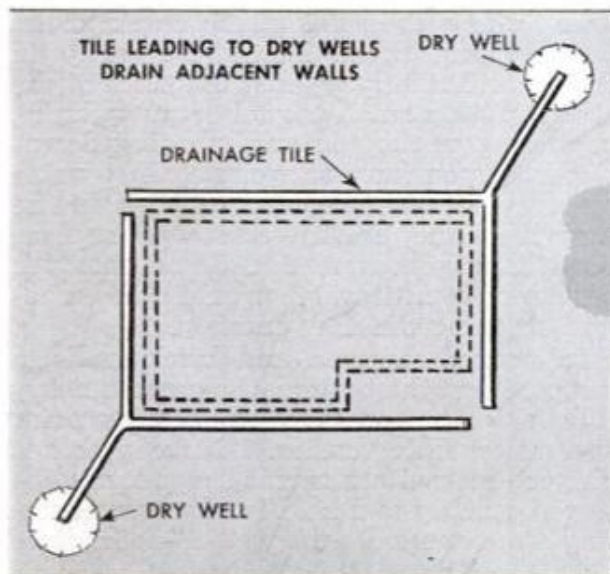


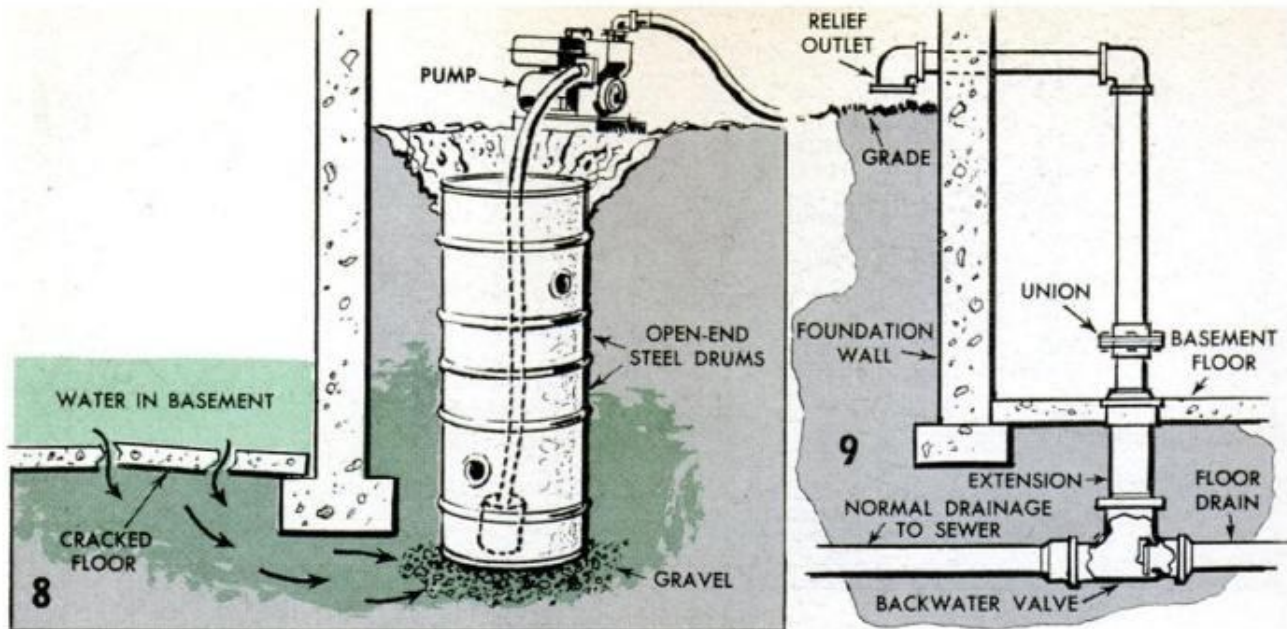
Where the concrete or masonry tends to remain damp, waterproofing compound having a portland-cement base generally is preferred. Usually cement-base waterproofers come in dry powder form to be mixed with water and applied to a moistened surface. In some cases they are provided as a liquid to which portland-cement is added. Also, the compound comes in three formulations. One produces a putty for plugging holes, which if necessary, can be done against water pressure although it is preferable to relieve the pressure first. The second formulation produces a paste which is brushed or troweled depending on the consistency that is best for the job. This seals pores and tiny cracks. The third formulation is a finishing paint, which completes the sealing and also produces a uniform appearance in white or pastel shades. There are slight differences in the manner of application of these waterproofing products. Therefore, for best results the maker's recommendations for application should be followed explicitly.

Intercepting drainage tile will divert water from hillside and discharge into sewer or dry well. Tiles are butted together and joints covered with tar paper



Water trapped in cores of block foundation is drained through weep holes made in the blocks at the floor line. This relieves pressure, makes filling holes easier





Kennedy Valve Mfg. Co.



Josam Mfg. Co.

To assure adhesion of the waterproofer remove all efflorescence, paint, whitewash, excess mortar droppings, oil and grease spots, and loose particles of dirt from the masonry surface. The importance of thorough cleaning cannot be over-emphasized. Cold-water paint, calso mine and white-wash are removed by scrubbing with a solution of hydrochloric (muriatic) acid, 1 part, in water, 5 parts, by volume. The acid is poured slowly into the water while stirring. After paint removal, traces of acid are washed away with a hose. Efflorescence is removed with a 1-to-10 part solution of the above acid and water. Oil, paint, soot, greasy dirt and grease are removed with a caustic-soda solution (1½ lbs. of soda per gal. of hot water). Traces of this are rinsed away with water. **Caution:** Rubber gloves should be worn when using acid and caustic-soda solutions. A transparent plastic face shield or hood should be worn when scrubbing with these. Acid damage to clothes can be avoided by wearing a rubber raincoat when scrubbing.

Where water seepage becomes trapped in the cores of a masonry-block wall, the water can be removed through weep holes. These are made into the cores of the blocks with a star drill or with a carbide bit in an electric drill. In preparing cracks for plugging with water-proof putty, widen the

cracks with a cold chisel to facilitate filling. If the cracks are not sufficiently rough to provide adequate anchorage, they should be undercut, then thoroughly cleaned with a brush and hose spray. Quick-setting putty used to fill holes and cracks should be prepared in small amounts the size of an egg so it can be pressed in place before the putty starts to set. Setting is indicated by hardening and the tendency to crumble while working it. When this happens, discard the putty and use a fresh mixture. To speed up the work you can have a helper prepare the putty while you apply it. Be sure to keep the sides of the cracks moist while filling them. Force the putty in deeply and tightly against the sides of the cracks with a small trowel or putty knife, beginning at the top and working downwards. If you have to work against water pressure, it will be easier to press in the putty by hand, holding each wad in place until setting commences. Sometimes it's best to wait until water pressure eases before stopping the flow entirely.

In poured-concrete and brick walls, a weep hole at the bottom of a crack quickly relieves water pressure above this point and makes filling easier. The weep hole is plugged last with a carrot-shaped plug inserted quickly and held in place until setting commences. Do the wall-to-floor joints



last as in Fig. 11. Weep holes in the blocks at floor level are left open until after the wall has been coated with the sealing compound, which is applied next.

Moisten the wall over all puttied spots and brush sealer of proper consistency over these spots as in Fig. 12. This prevents them from showing through the over-all sealer coat. Then, after a few hours, spray the entire wall with water, followed by two applications of a heavy concentrate of the sealer, 3 hrs. apart, applying it first in a strip 3 ft. above floor level. A coarse, fiber brush is best for this purpose. Cover the rest of the wall as in Fig. 13, remembering that the surface always should be moist with water when applying the sealer. Plug the weep holes along the floor with tapered plugs of the putty a day after the sealer has been applied, and then brush on two coats of sealer over the plugged spots. Follow the sealer coat with an over-all finish coat for uniform coverage.

The same steps of thorough preparation and application of putty and sealer as outlined above also apply to the floor if it is in reasonably good condition. If not, the floor may have to be topped or replaced. A topping on an old floor is simpler than replacing it provided this does not involve too many complications in resetting plumbing and heating units. To replace a floor, the old one is broken up, preferably with an air hammer. Prior to laying a new floor or topping, an effective moisture barrier should be laid. This may be a continuous sheet of polyethylene plastic of suitable thickness, which is laid over the earth and is brought up to overlap the walls. Where it must be cut to fit around pipes, or where joints are necessary, the material is carefully sealed with special cement. The material comes in 10 and 20-ft. widths. Concrete for a new floor or topping should be mixed so that it will be watertight and it should be reinforced with welded wire mesh. Replacing or topping a floor should be done, of course, before walls are waterproofed.

In cases where ground water level interferes with laying a floor, the water must be pumped away,

(Continued to page 218)

JUNE 1960

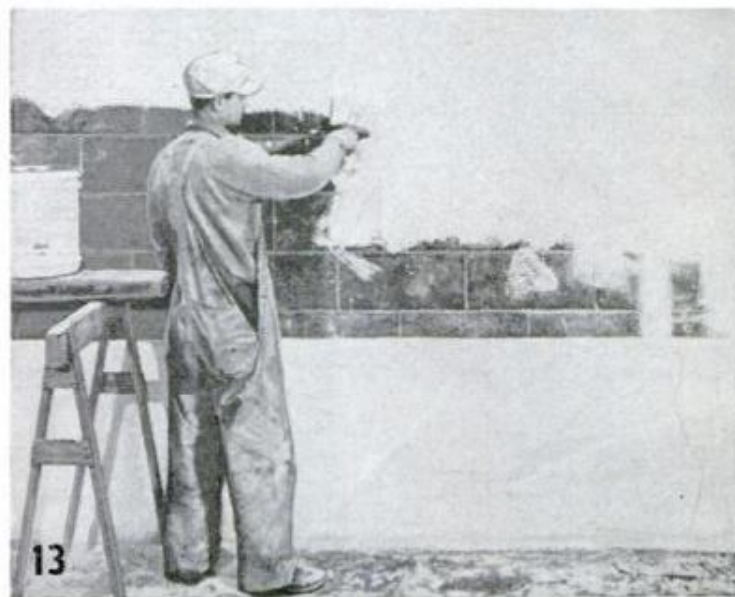


Standard Dry Wall Products, Inc.

Joint where wall meets floor is plugged last. Weep holes in blocks are left open until wall is coated with sealing compound



Above, after the puttied spots are moistened with water, they are concealed by coating them with sealing compound. Below, rest of wall is coated, moistening it first with water



175



### Brush Rest Hangs on Paint Can

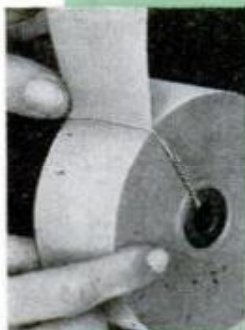
If you do much painting, it will pay you to make this metal brush holder. Hanging from the rim of the can, it provides a place to stand the brush when you need both hands. This keeps the handle free of paint which is not the case when the brush is placed across the can, and being wedge shaped, the holder helps to retain the shape of the bristles.

Frank A. Javor, Newark, N. J.



### V-Notch Holds Wandering Hammer

There is no need to lose track of that hammer in the middle of a job. Form a V-notch in one of the legs of your wooden saw horse and hang the hammer there. You can do this by drilling a hole in the leg and forming the V-notch with a rasp. A metal clip may also be fastened to the leg to hold any other tool you may happen to be using at the moment.—G. E. Hendrickson, Argyle, Wis.



### Paper-Tape Cutter Made of Wire

Paper clip wire can be bent over a roll of paper tape to make a fine cutter. Connect the ends of the wire with a rubber band through the center of the spool. To keep the rubber band's tension as the roll diminishes, the wire on the sides of the roll should be no longer than the spool's thickness.

R. Hanscom, Elmhurst, Ill.



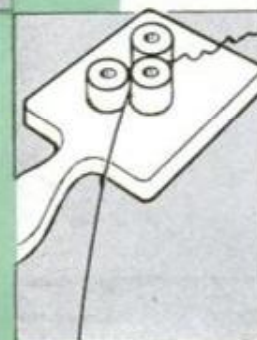
### Rubber Eraser Cleans Test Tubes

Test tubes which have been left sitting for a period of time may have a stubborn sediment sticking to the bottom. To remove these, easily and quickly, pour a little solvent into the tube and use the rubber eraser of a pencil as a scouring tool. For the more stubborn deposits, place a little wad of steel wool under the eraser and scour the bottom of the test tube by twisting the pencil.



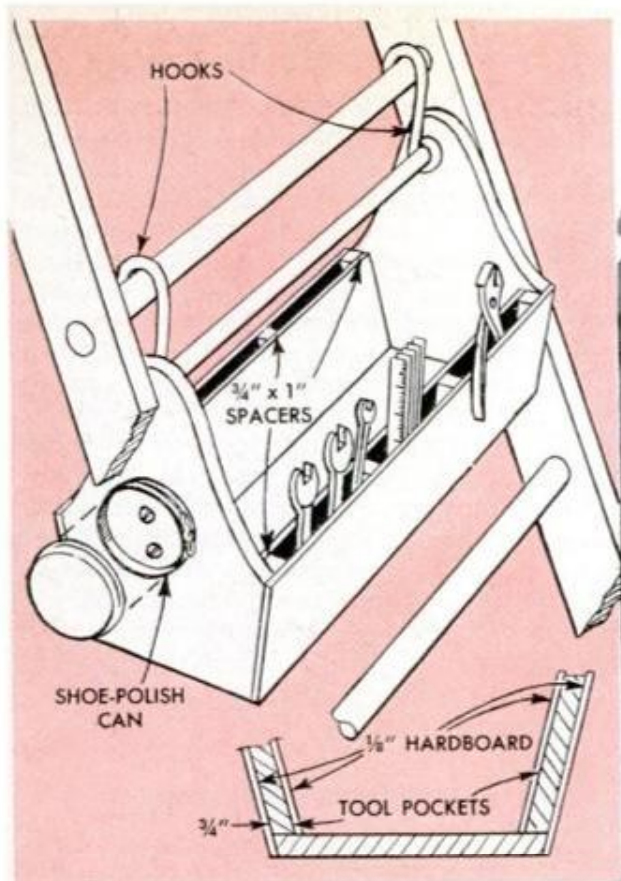
### Paraffin Eases Driving of Screws

Wood screws will be easier to drive if the threads are dipped in paraffin. Heat the screws to keep the coating thin, but do not coat the heads or you will have trouble covering them with paint as the paraffin will prevent it from adhering.



### Spools Straighten Kinked Wire

It isn't difficult to straighten the kinks out of insulated wire if you follow this procedure. Fasten three bolts to a stout wooden paddle and slip three large spools over them, as illustrated. Place one end of the wire between the spools and either grasp it or wrap it around a stick and pull the entire length through the spools.

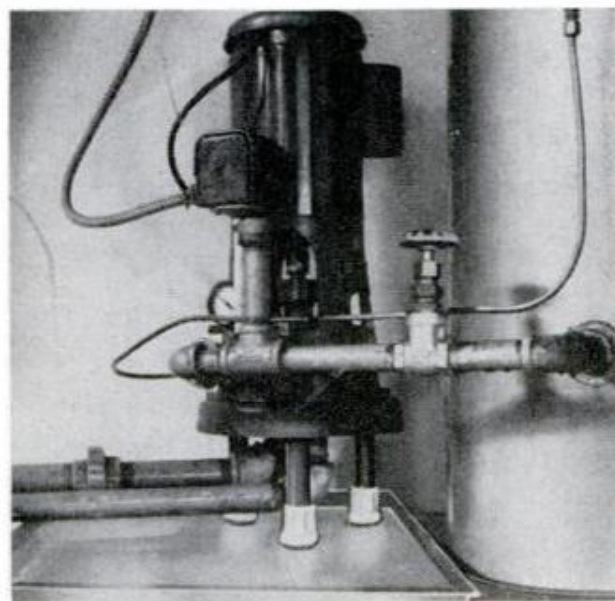


## Tote Chest for Home Handyman

Having all the tools and materials required for a repair job within reach is no problem when a tote chest like the one shown is used for carrying them. Made of  $\frac{3}{8}$ -in. hardboard and 1-in. pine lumber, with a dowel used for the handle, such a chest can save you many trips to the workshop when doing jobs that require more tools and other small items than can be carried in the hands or pockets. Provision

of "tool pockets" in the chest sides, also permits quick selection of tools as they are needed. Hooks mounted on the handle enable the user to hang the chest on the rung of a ladder, making access to tools convenient even when working at high places. A shoe polish can screwed to one end of the chest provides a protected place in which to carry fragile items, such as chalk and a small sharpening stone.

## Rubber Crutch Tips Reduce Noise From Basement Water Pump



To reduce noise from a water pump installed in the basement, one homeowner slipped a rubber crutch tip on each of the legs as shown in the photo at left. The rubber absorbs much of the vibration produced by the motor and pump mechanism, resulting in quieter operation. A shallow aluminum pan placed under the pump catches condensation that forms on it during the summer months.

E. Kraft, West Chicago, Ill.

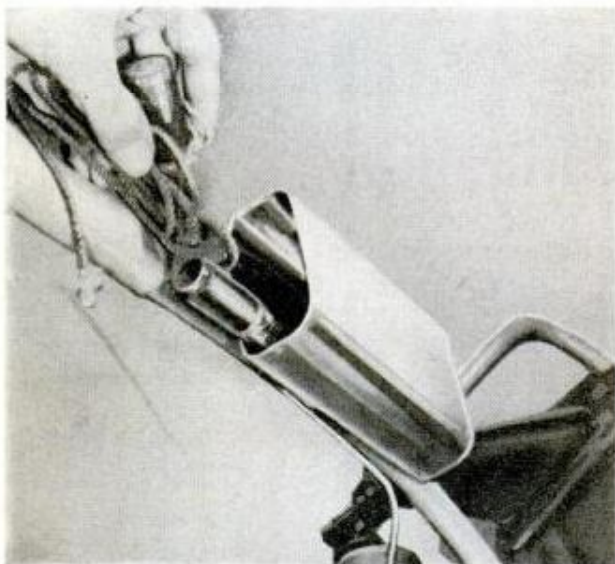
**Knife blades** won't hold an edge when they have lost their temper, which can be restored by the following 2-step procedure: Hold the blade in a gas flame until it takes on a dull-red glow. Then plunge the blade into a potato. Allow the blade to cool before removing and sharpening it.



## Sheet-Metal Retaining Ring Improves Portable Barbecue

When food for just a few guests is broiled on a large portable barbecue, one cookout enthusiast uses a retaining ring formed from sheet metal to confine the fire to the cooking area needed. This saves on charcoal and eliminates the discomfort of having to reach over a wide bed of unused, hot coals to tend the food. The unused area between the retainer and barbecue lip can then be used for keeping cooked food hot until served as illustrated. Holes about  $\frac{3}{8}$ -in. in dia. punched in the retainer, provide draft and make it easy to wire together the overlapping ends after forming it to the diameter desired. A strip of sheet metal 4 in. wide and 6 ft. long is about right for most large-sized barbecues. When punching the holes place the retainer on firm ground and use a sharp-pointed punch.

Harold D. Whiteside, Philadelphia, Pa.



## Toolbox for Power Mower

If you want a handy power-mower toolbox in which to keep a starter cord and a few wrenches, remove the top from a pint-size paint-thinner can and fasten the can to the mower handle as shown in the photo. Two  $\frac{3}{16}$ -in. stove bolts inserted in matching holes drilled through the handle and one side of the can hold the toolbox in place.—R. Hanscom, Elmhurst, Ill.

When decorating a room that has many openings, it is best to paint the wooden moldings and doors a color that matches the walls. In the case of a wallpapered room, select a subdued blending color.

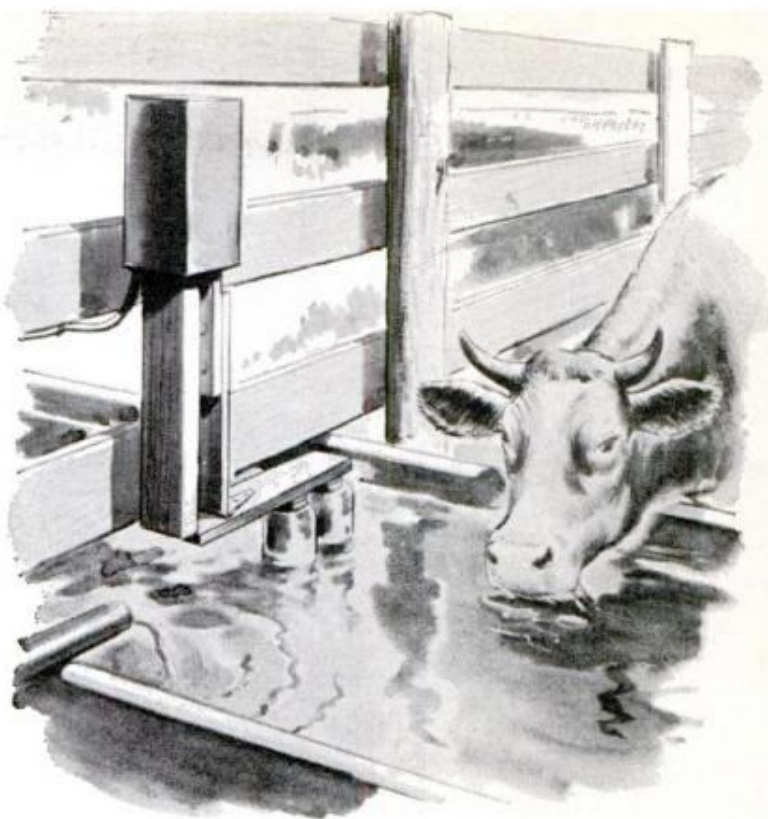
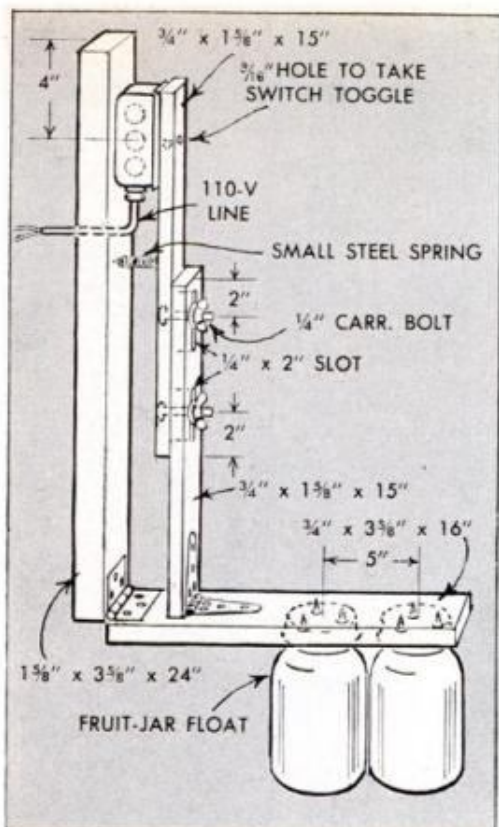


## Suede Brush Used for Cleaning Felt-Backed Picture Frame

Dust that collects on the felt backing of some easel-type picture frames is difficult to remove with a fiber-bristle brush or dustcloth. To make this cleaning job easier, use a small metal-bristle brush, such as is used for cleaning and brushing suede shoes.

Wayne Floyd, Fayetteville, Tenn.

To do a neater job of painting a flower pot place it upside down on a tin can that is tall enough to permit it to be grasped without touching the pot. With a stand such as this, the pot can be turned easily while painting it, and the rim and bottom completely painted at one time.



## Automatic Pump Control Keeps Stock Tank Full

Wanting an automatic control to start and stop a well pump so as to maintain the water level in a stock tank, this is what one ingenious farmer devised. First, he installed a 110-v. line leading from the pump motor to a toggle switch in an outlet box that was fastened to a 2-ft. length of 2 x 4 mounted as shown on a board fence above the tank. Next, a float assembly was made as detailed above. This consists of two 1-qt. fruit jars with one-piece lids which are screwed to a horizontal lever, two hinges and a two-piece vertical arm. The length of the latter can be adjusted to obtain most any water level desired simply

by moving the slotted lower member upward or downward as necessary and tightening the wing nuts. A hole drilled in the upper member of the arm engages the switch toggle.

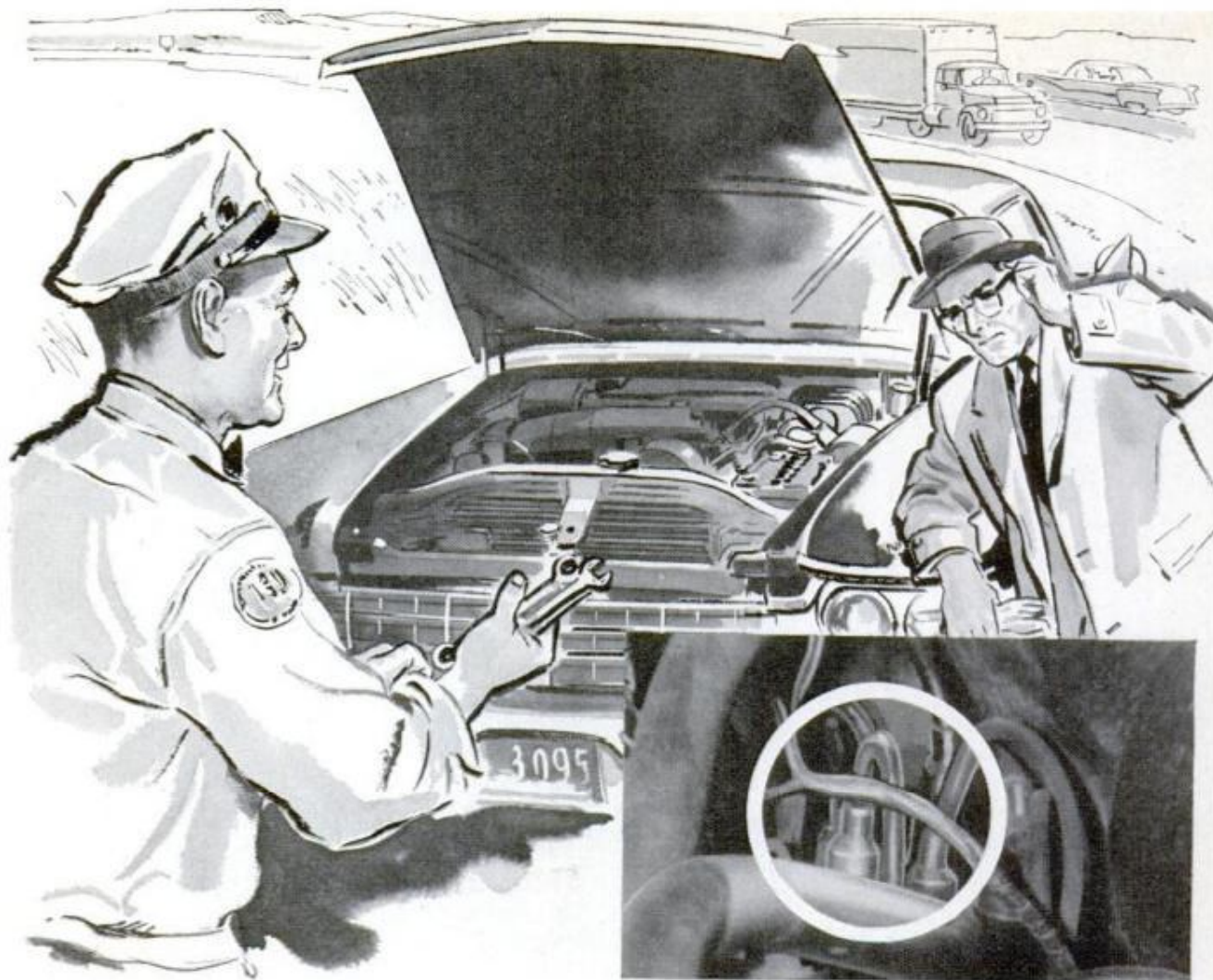
In use, the switch is turned on by the weight of the fruit-jar pulling down on the toggle at low-water level. When the tank is filled, the upward force exerted by the float flips the switch off. A coil spring fastened to the 2 x 4 and the arm prevents the latter from becoming disengaged from the toggle. A 1-gal. can with the top removed is placed over the switch to protect from the weather.—R. B. Dorward, Trafalgar, Ind.

## All Aboard!

When it was no longer possible to repair this old fishing dory, these happy youngsters talked their dad into beaching it in the back yard and building a play cabin on it. The cabin consists of a pine framework bolted to the boat and covered with 1/4-in. tempered hardboard. Two coats of bright exterior paint give the boat a cheery, inviting appearance. Any number of "ship's equipment" can be mounted on the boat, such as toy guns, wooden cannon, pirate's flag, etc.

R. Woiak, Milwaukee, Wis.





## Trouble Shooting

# THE TOUGH ONES

By Ben L. Davis

WHEN THE service call came in my mechanics were busy so I answered it myself. Arriving, there was a '57 Imperial parked on the shoulder of the road with its hood up and beside it a puzzled driver.

It took only a minute to pinpoint the trouble as a snapped rotor and the cause as a loose distributor cap. I replaced the rotor and bent the clips holding the cap to give extra holding power. I noticed that the cap had several nicked electrodes, but it still appeared serviceable. I should have guessed then, but I didn't. I suggested that at his convenience the owner bring the car into the shop for a replacement.

Before the cap could be replaced as I had suggested, I had to replace the rotor again. And by this time I knew the owner of the Imperial was beginning to take a dim view of my ability as a serviceman.

I used a spring bar to rock the engine on its mounts, knowing that a loose engine could be a cause of the trouble. I also knew that on the '57 Imperial there is minimum clearance between the distributor cap and the heater shroud. Note circled area in the photo. But the mounts seemed okay. Not new-car tight, of course, but passable.

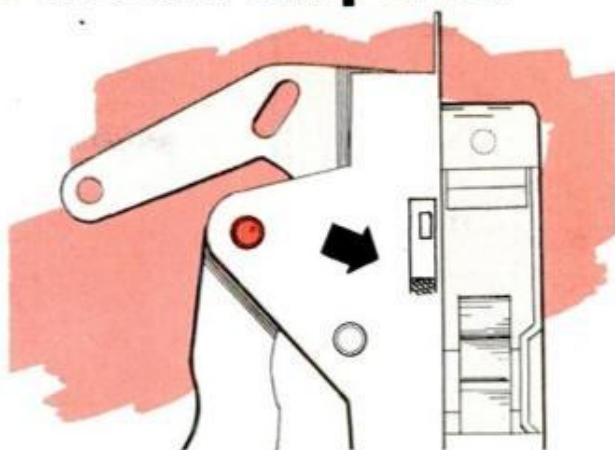
I was about to look elsewhere when I had a sudden hunch. I had an attendant start the car and gun the engine while I watched to see what happened. As I've said, I should have guessed. The torque of the powerful engine rocked it enough to bang the distributor against the shroud with sufficient force to tilt the cap on its seat and pop the rotor in pieces.

A new cap, new rotor and new mounts stopped the service calls on this one.

# Unusual Locations Where Trouble May Occur

## Door-Lock Trouble

If you have trouble with a door lock on your '60 Plymouth, it usually is remedied easily by forcing in that part of the step which you see cross-hatched in the sketch. To carry out this corrective measure, the lock must be removed with care as otherwise you may bend or spring something and end up with more difficulty than you had originally. Use a drift punch to bend inward the section indicated. When bent just the right amount you have a dependable stop for the lock lever.



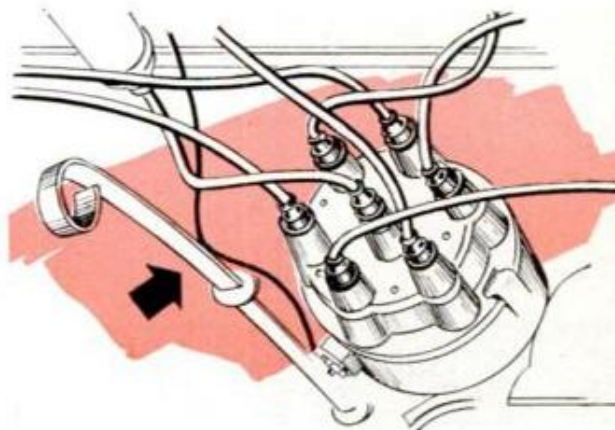
## Sticking Door Panel

If the glass door panel of a '55 Mercury convertible or hardtop sticks, or if it takes undue pressure on the actuating crank to raise and lower it, examine the operating mechanism inside the door. To do this the lower door panel must be removed. There are other causes of this trouble, of course, but one of the most common is the window retainer dragging on the guide arm. Usually a thorough cleaning with solvent will cure the trouble, but occasionally it is necessary to cut away material from the arm to improve the action.



## Relocate Ignition Wire

On Chevrolet sixes the wire connecting the coil and distributor passes very close to the dipstick. Removing and replacing the stick over a period of time may, unless special care is taken to avoid it, coat the wire with oil which will eventually destroy the insulation. Not only that, but the wire may chafe against the stick or even may be accidentally pulled loose from the terminals when removing the stick. To prevent trouble it's wise to replace this wire with a longer one which can be supported in a clip to clear the dipstick.



## Indicator Light Glows

Owners of '58 and earlier Renault Dauphine cars sometimes notice that the charge-indicator light glows dimly under normal driving conditions. Usually when this happens it does not indicate any actual trouble as it has been found that with the combined use of the headlamps, heater and wipers the light often will glow faintly. Although driving with the glowing light does no harm, some drivers may find it an irritation. Usually the glow can be eliminated by shifting the lamp's feed wire to the B coil terminal and exchanging the bulb with the one in the dome light.



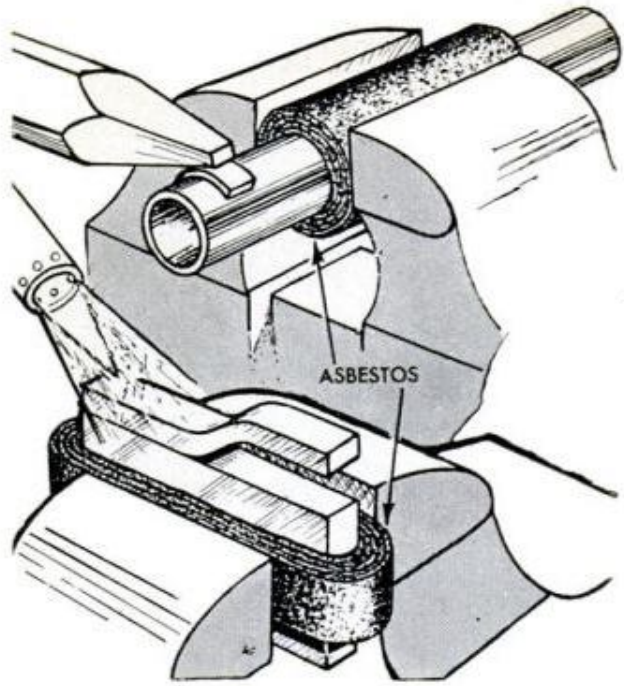
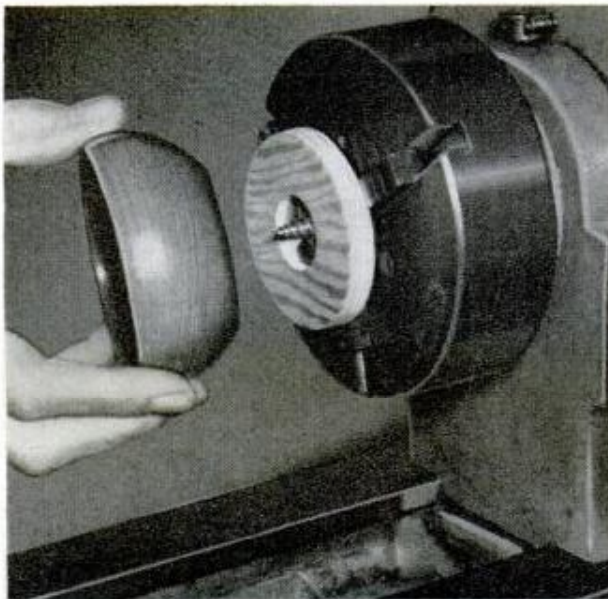


### Miceproofing Binder Canvas

When binder canvas is removed and rolled for winter storage make sure that mice do not enter the rolls by capping them with plastic bowl covers. While mice could chew through the plastic, they will not because there is no food to tempt them. The damage they cause in the canvas is due to their making of nests.

### Wood Turning on Metal Lathe

Lacking a screw center for wood-turning on a metal lathe, one can be improvised by chucking a wood screw in a 3-jaw chuck. A wooden pad is fitted against the chuck to provide additional support for the work. An added advantage is that the screw can be chucked to project any length to take work of varying thicknesses.



### Asbestos Insulates Vise Jaws

To prevent vise jaws from conducting heat away from work being soldered, wrap sheet asbestos around the work to act as insulation. The sheet also protects polished work against damage from the vise jaws. For flat work, use two pads of  $\frac{1}{8}$  or  $\frac{1}{4}$ -in. asbestos packing slightly larger than the faces of the jaws.

### Pipe Splices Wire Fencing

When lengths of woven-wire fencing are used as temporary hog pens, the ends of the fencing can be spliced no matter what the location of fence posts. A length of pipe is threaded through loops twisted in the ends of the wire and driven into the ground. A cap or coupling prevents the wire from being forced up off the pipe.







*On the*  
**MARKET**  
*for Do-It-Yourselfers*

**HYDRAULIC DRAIN CLEANER**, above left, does away with the need for drain augers, force cups and chemicals. In use a spring locks into the drain strainer, a rubber pressure cup seals the drain and an adapter slips onto any standard-size faucet. Turning on the hot water builds up hydraulic pressure which clears sink, tub and shower drains in a matter of minutes

T & E Mfg. Corp., P.O. Box 87, Pasadena, Tex.

**THERE IS SOMETHING NEW** in table and counter coverings. Designwise, this new product, above right, runs the range of abstracts, spatter, marble and ceramic to simulated wood, leather and cork. Plastic finish makes covering waterproof. An aluminum-foil body gives it heat resistance. It is self-adhering, easily applied and can be cut with scissors to desired shape

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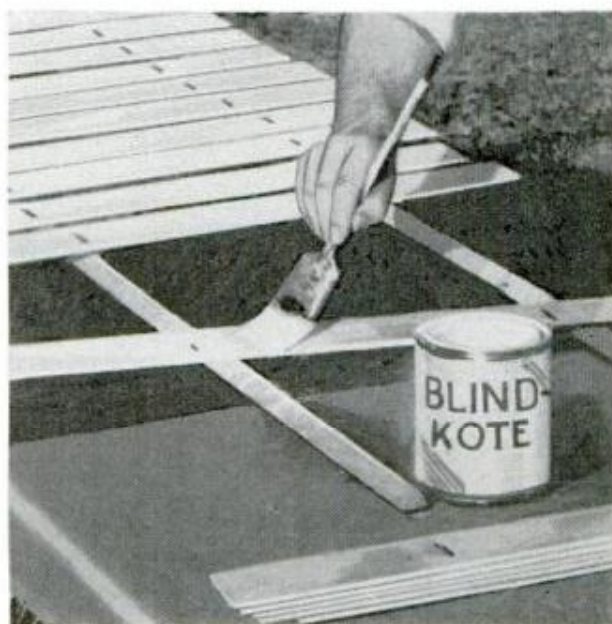
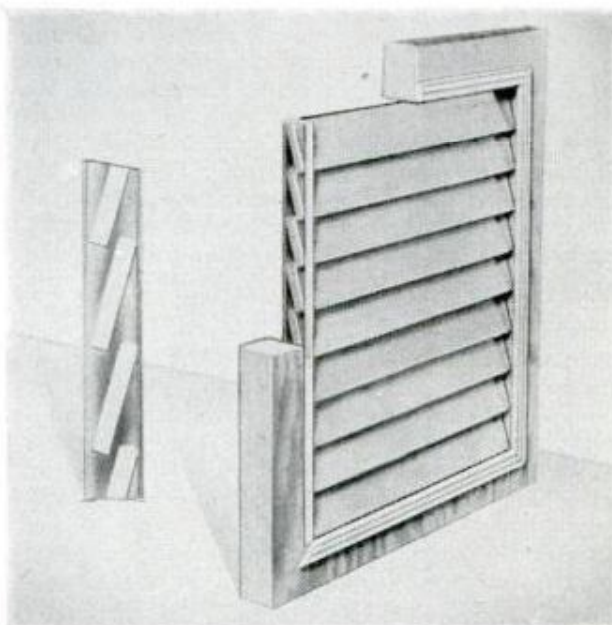
Synthetic Fabrics, Inc., Springfield 4, Mass.

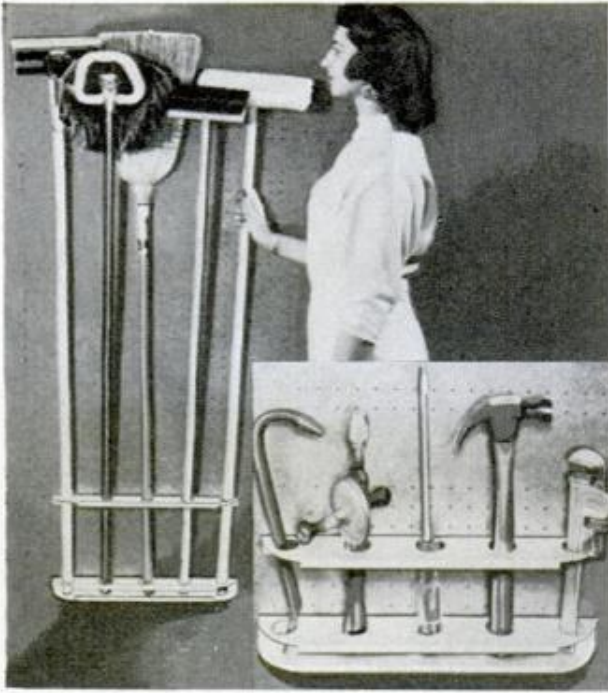
**LOUVERED DOORS** can be made to order in this latest in home-improvement products. Louver rails, center right, consist of metal channels with slots into which glass, wood, or plastic slats can be fitted without cutting grooves. You make frame in conventional manner with stiles and rails, fit channels and slats and assemble with a decorative molding as indicated

Louvered Rails, 379 Cambridge St., Allston 34, Mass.

**NEW VENETIAN BLINDS** for old are yours for no more than the cost of a can of paint. This hard, durable, factory-type finish, right, can be brushed or sprayed on and dries in less than an hour. It's available in white, eggshell white, oyster white, and a pastel green. Also it can be tinted to match any wall color or drapery color. A quart renews several blinds

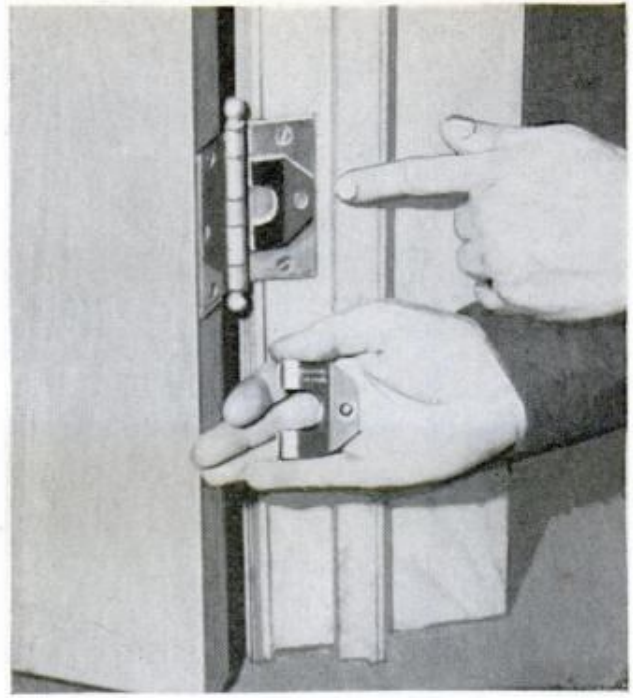
Blind-Kote, R.R. #8, Box 529, Richmond, 25, Va.





**NEED A RACK** for garden tools, hand tools or cleaning equipment? This rack, made of plated, rust-resistant steel, comes as a unit adjustable to accommodate items of any size from hand tools to rakes and spades. Designed for attachment to the back of a basement door, a panel of perforated hardboard, or the garage wall in front of the car, the unit serves as an ever-present reminder to put things away where they belong after use and where they can be found

Bilt-Rite Products Co., 6609 Mack Ave., Detroit 7, Mich.



**THESE DOOR BRAKES** give better control of free-swinging doors. They will hold door either partially or all the way open. They will prevent a door from slamming hard and possibly being damaged. They do not interfere in any way with normal use of the door. They are simple to install by first removing the center hinge screw and inserting the curved projections of the brake in the narrow openings between the hinge leaves. Replace and tighten center screw

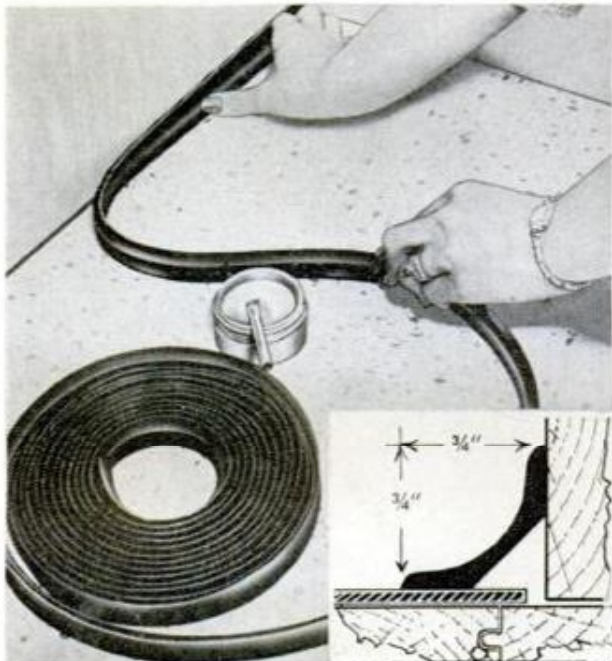
Magnolia Machine Wks., 618 Magnolia Ave., Elizabeth 4, N.J.

**BASE MOLDING** made from live rubber makes replacement of that old quarter round a matter of minutes. It's shaped to conform to any corner irregularities at point where the wall meets floor and is available in permanent colors of black, brown, gray and green. In this range of basic colors the molding will harmonize with any modern decor in any room of the home, including the recreation room, family room, halls, stairways and in the kitchen

Cass Products Co., 6127 N. Cicero Ave., Chicago 46, Ill.

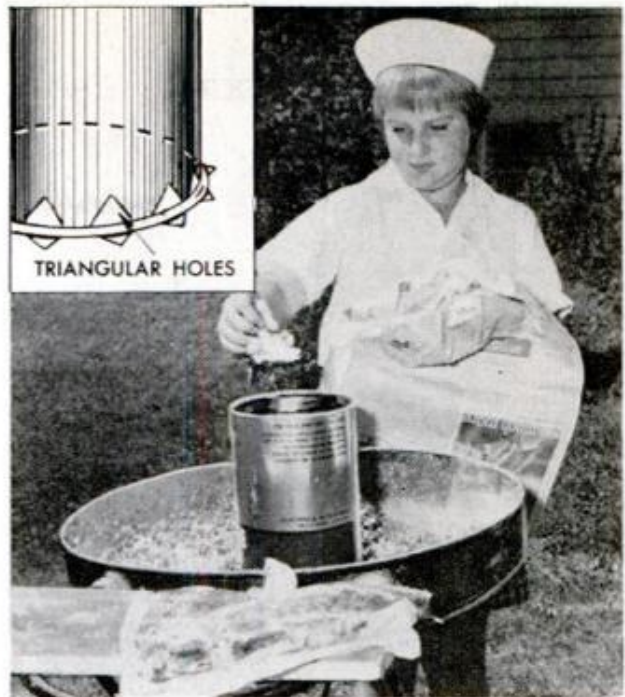
**MATCHING EDGE MOLDING** finishes up the edge on plastic-surfaced tables and counters. Pattern matches that on the surface and the molding is a T-shaped aluminum extrusion with a serrated lug which is driven into a saw cut in the edge of the counter top. Outer face of the molding is finished with a durable plastic bonded to metal. Molding is supplied in patterns matching all plastic laminate sheets in the complete range of colors now on the market

Keller Products, Inc., 41 Union St., Manchester, N.H.



## Tin-Can Combustion Chamber Ignites Charcoal Quickly

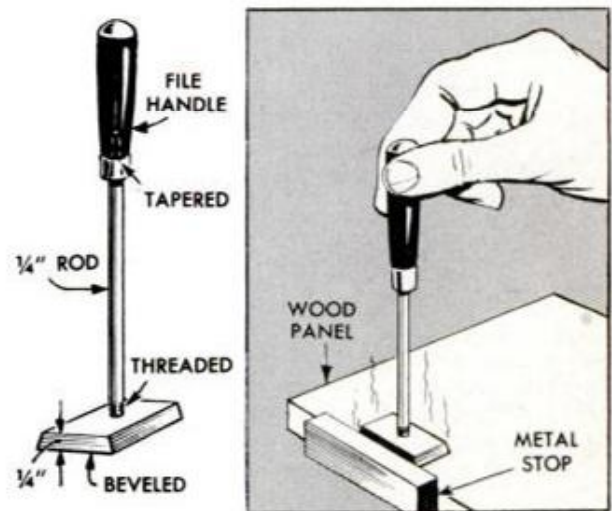
Cookout chefs will appreciate this simple and sure-fire hint for starting charcoal in a hurry. Starting out with a 5-qt. motor-oil can, a series of triangular notches are first punched around the bottom rim of the can with a beverage-can opener. Next, the top and bottom of the can is removed and the triangular tabs are pressed down and around the rim of the can so the points project outward to serve as feet. To start a fire, the can is placed on a bed of ashes in the center of the grill. Then crumpled newspaper is placed in the can, followed by the charcoal. When the paper is ignited, it quickly ignites the fuel due to the strong up draft, and the can soon becomes a glowing furnace. After 10 min. or so, the can is lifted off and the coals spread over the bottom of the grill.



## Hinge Mortises Are Formed With "Branding Iron"

Recently I had to cut shallow mortises for tiny hinges and found it was difficult to chisel them accurately for depth. To overcome this, I thought up the idea of actually burning the shallow mortises with a miniature branding iron. This was made as shown to equal the size of the hinge leaf and heated slightly hotter than a soldering iron. To form a mortise, I first traced around the hinge leaf. Then, holding the hot iron directly over the penciled outline, I pressed it against the wood which will not char beyond the pencil lines.

Fred P. Faltersack, San Jose, Calif.



## Adjustable Rowing Seat Tailors Oarsman to Boat

Where the rowing seat in a boat is non-adjustable, tall and short persons often find it difficult to assume a convenient rowing position since the seat cannot be shifted fore or aft. One lake-resort owner took care of the problem by fitting his rental boats with notched seat supports which made the rowing seat adjustable to suit the stature of the particular boater. Each support was made by first drilling a row of holes in 1x3 members and then cutting out the waste to form notched slots. Stub dowels fitted in the ends of the seat and spaced to rest in the half-round notches of the supports, hold the seat in the desired position. Clearance in the slot permits the seat to be lifted and moved to other notches. The seat supports should be made from hardwood of course, and screwed and glued securely to the ribs of the boat.

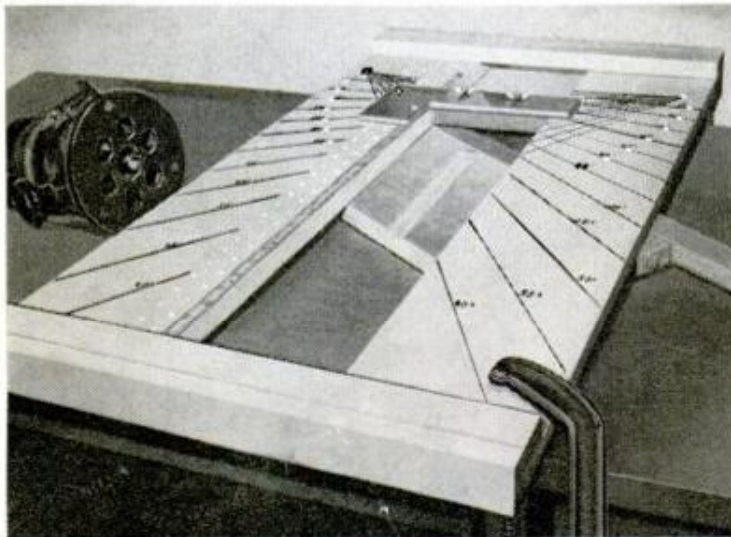


## SHOP NOTES



Routing stair stringers, shelf dadoes, louver slots—any angle grooving cut can be made with this router jig from 90 to 60 deg. on the surface of the stock. An adjustable stop greatly increases the scope of work that can be done. Can be made to fit any small router

Here's the jig set up with work in place and stop set to make a stopped groove, or dado cut. In running heavier cuts such as this, it's a good idea to clamp jig at forward end to prevent any tendency to spring sidewise. Hinges holding jig should be loose-pin type but should be tight with no play



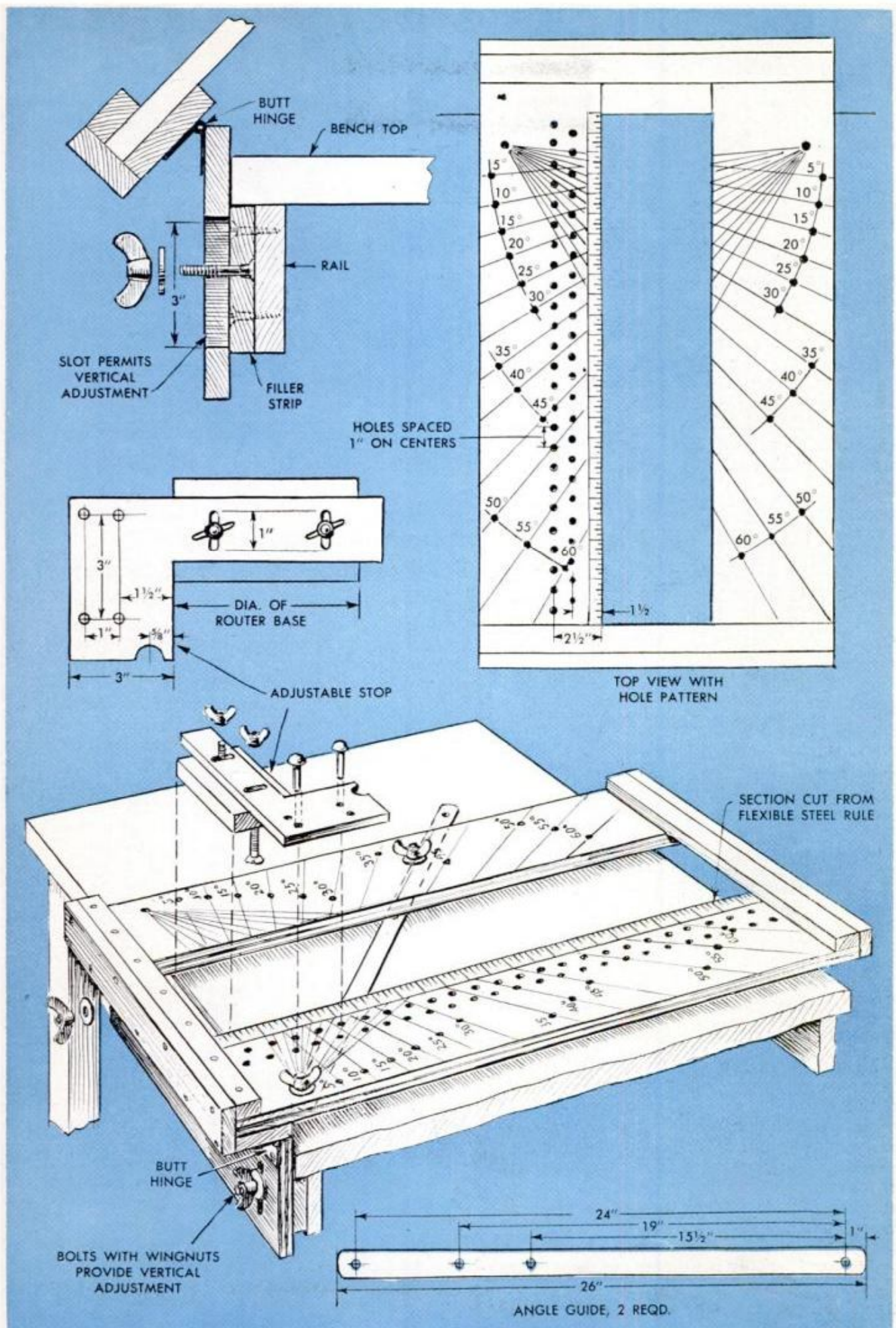
# MAKE ANY CUT WITH THIS ROUTER JIG

By Floyd D. Aldrich

**A**LTHOUGH nearly all hand-operated routers can be fitted with the accessories available to greatly increase their range of usefulness, there are some jobs that require special jigs. This is especially true of the requirements of production and custom woodworking shops where the versatility and high speed of the portable router are utilized to the fullest in producing high-quality work.

The router jig detailed on the opposite page is designed to enable the operator to make any angle cut on the face of the stock likely to be required in this type of router operation. The jig is not dimensioned overall as it must be made to accommodate the router with which it is to be used. Ordinarily the guide slot, or center opening between the two side members, is made to take the router base in a smooth, sliding fit. The length of the opening should permit the router to travel 24 in., that is, the bit should complete a cut 24 in. long. In this way you can work to the center of a panel 48 in. wide. The parts are assembled by gluing and screw-fastening, and care must be taken to see that the jig is assembled squarely and that the guide slot is of a uniform width throughout the length. The jig is designed to be attached to a fairly large table or bench. One end is attached

to the table rail and is hinged as indicated in one of the sectional views. Provision also is made for height adjustment. A stop made as detailed permits the user to stop router cuts at any desired point, a feature which permits making stopped grooves, slots and dadoes of any length within the capacity of the jig. The stop is held in position by two pins which can be placed in either of two rows of staggered holes. There is an additional fine adjustment on the arm of the stop. Parts of the jig can be made from  $\frac{3}{4}$ -in. plywood or hardwood, and all surfaces should be finished and waxed. Hinges holding the jig should be of the loose-pin type to permit removal of the jig from the table or bench. Play in the hinges should be eliminated before installation as looseness will result in inaccuracy. ★★

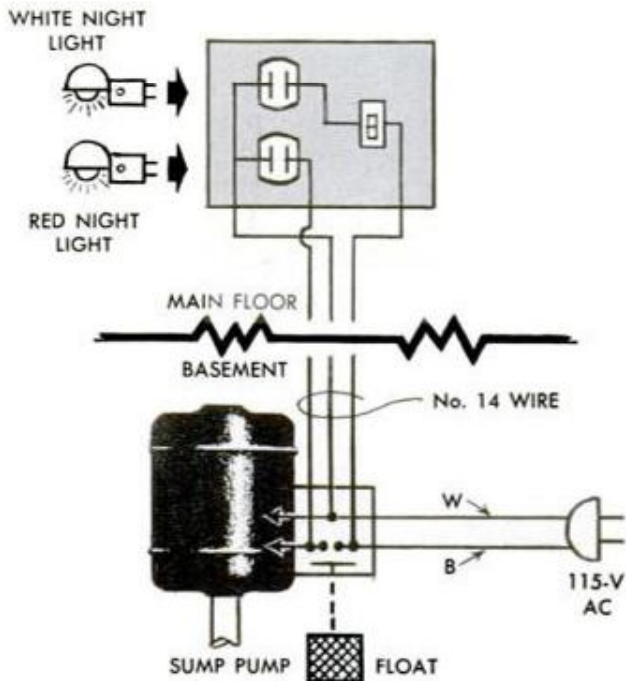
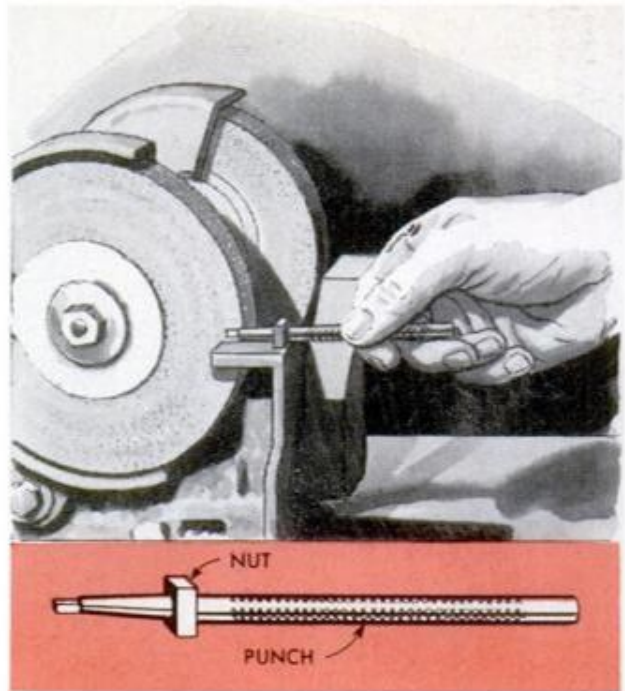


## Square Nut Serves as Guide When Pointing Special Punch

When the need arises an ordinary round punch can be altered quickly to serve as a square punch. Slip a square nut over the tapered end of the punch and tap lightly to wedge it in position. Then place on the tool rest of the grinder and grind the flats on the side of the wheel as illustrated. Use light pressure and dip the punch in water frequently to prevent drawing the temper. The squared end of the punch can be re-ground to its original shape if desired.

Hugh Botts, New York, N. Y.

Circles can be inked neatly by removing the short pencil from your compass and substituting a new type ballpoint pen which will ink a line of uniform weight on almost any smooth surface. Brush away dust from erasures before using the pen.



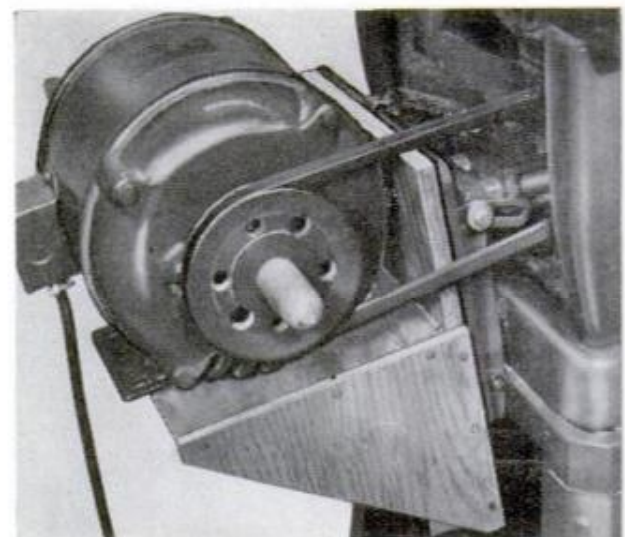
## Automatic Trouble Light For Basement Drainage System

A warning device on your basement-drainage system, such as the one illustrated, may well prove indispensable. Wire two lights, a red and a white one, between the power source and the windings of your drain-pump motor. Run the completed circuits through a toggle switch mounted upstairs with the lights. The circuit for the red light is interrupted between the motor and the power source and is equipped with two contact points. While the motor is running, a flip of the switch will illumine the white light. Should the motor stop running and the water rise, a float set under the contact points will illumine the red light. Thus a flip of the switch once a day will warn you of trouble.—F. G. Coffas, Buffalo, N. Y.

## Sleeve-Bearing Motor for Saw Mounted on Wooden Bracket

Motor mounting plates on tilting-arbor saws usually are located in the vertical position and are intended for ball-bearing motors which can be mounted either vertically or horizontally. If you wish to use a sleeve-bearing motor which requires periodic lubrication, without shifting the end shields, simply make a bracket of 1/2-in. plywood joined with screws and glue and bolt it to the vertical mounting plate. Although an adjustment is provided for tensioning the V-belt, this may not be sufficient. If not, use a longer belt.

H. Hanscom, Elmhurst, Ill.





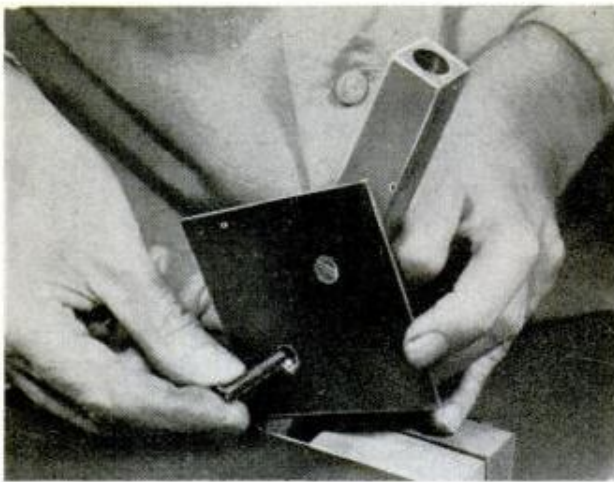
## TRIMMER MAKES ACCURATE MITERS

By Walter E. Burton

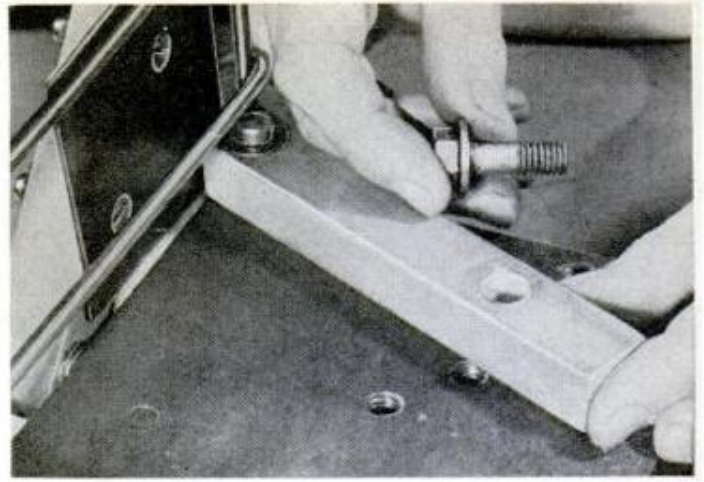
**A**CCURATE MITER JOINERY is the mark of superior craftsmanship. Cutting a close-fitting miter joint on stock from  $\frac{3}{8}$  in. thickness up can be done quite easily with regular tools such as a miter box or a power saw. But working a miter joint on thinner materials is more difficult. Holding a true line even with a hollow-ground blade on a power saw or by hand with a fine-toothed dovetail saw is almost impossible on grainy woods such as walnut or oak. That's where a small miter trimmer comes in handy. It slices neatly through thin wood, cardboard, some plastics and also thin hardboard. When the pieces are fitted and glued you have a fine, hairline joint. This trimmer is designed for such light cuts on material up to about  $1\frac{1}{2}$  in. wide. The two-edged cutter is mounted on a lever, or handle. It pivots on a shaft mounted on one side of the base, which is a length of steel channel. The blade moves in an arc, giving a shearing cut.

The two guide fences are made of hard wood such as oak or maple. The longer one pivots from one corner of the base and its free end is bolted into one of several holes arranged in an arc. This allows miter cuts to be made at any one of several angles. The holes are drilled and tapped  $\frac{5}{16}$ - $\frac{18}$  while the hole in the fence for the index bolt is made slightly oversize so that fine corrective adjustments may be made with a protractor. If desired, a curved slot may be substituted for the bolt holes. This will allow the guide fence to be fixed in an infinite number of settings from 90 to 45 deg. The second and shorter fence is set at 90 deg. and is bolted to one side of the base.

The cutter arm is a section of steel bar with a portion cut away at the center. This cut-away portion provides blade clearance and insures against the arm striking the finger guards. The upper end of the bar is drilled to receive an 11-in. steel rod which serves as a lever extension. The rod is



Cutter is attached to a pivoted handle, or lever with edges in position to give a smooth, shearing cut



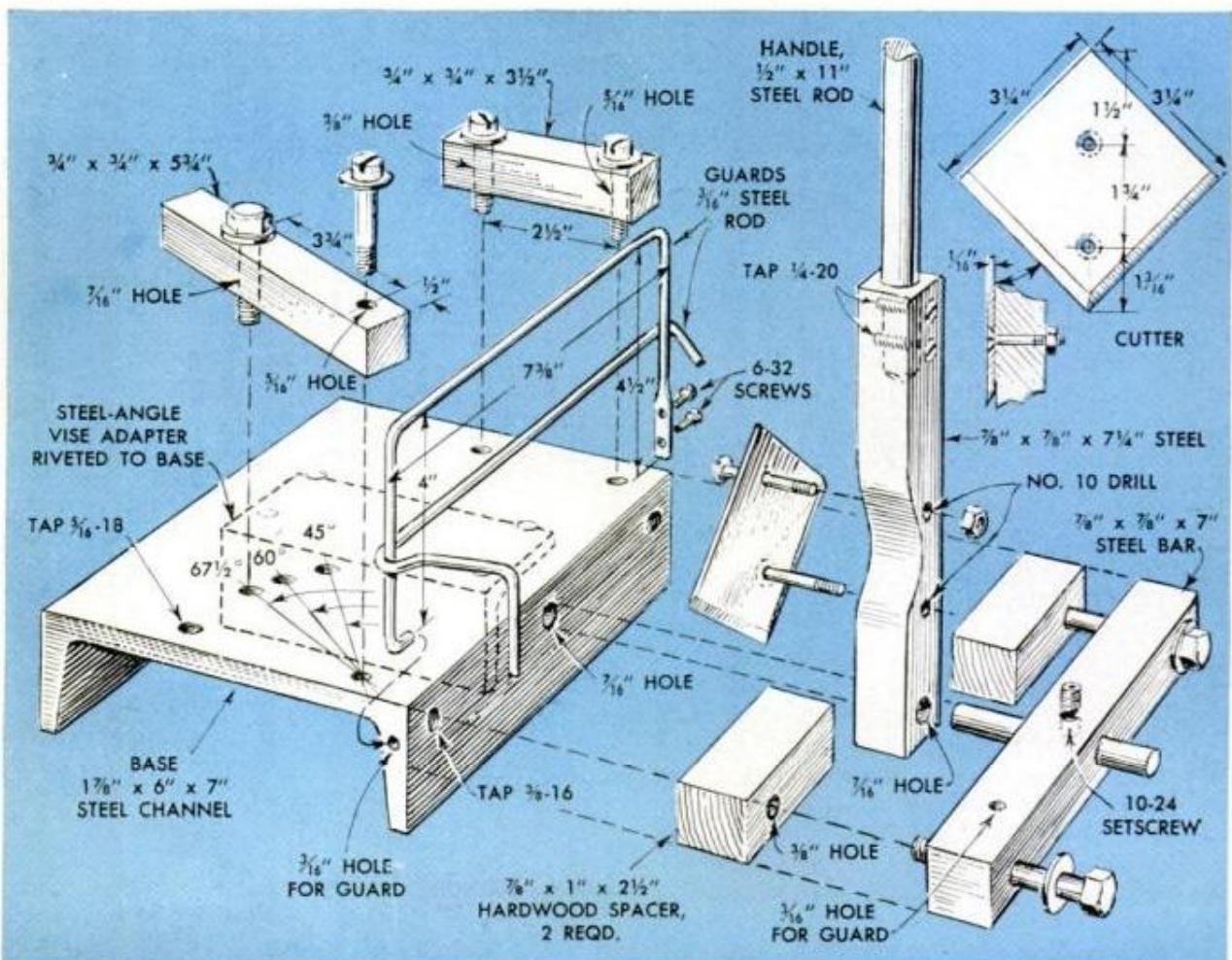
Series of holes arranged in an arc allow various miter settings to be made ranging from 45 to 90 deg.

secured by means of two setscrews and its use makes the arm less bulky than if the bar were used alone. The handle carrying the cutter pivots on a  $\frac{7}{16}$ -in. steel rod which passes through holes in the base and the outside retaining bar. The rod and handle are in turn held in place by the retainer bar bolted to the base with hardwood spacers. These spacers double as the pads on which the blade comes to rest.

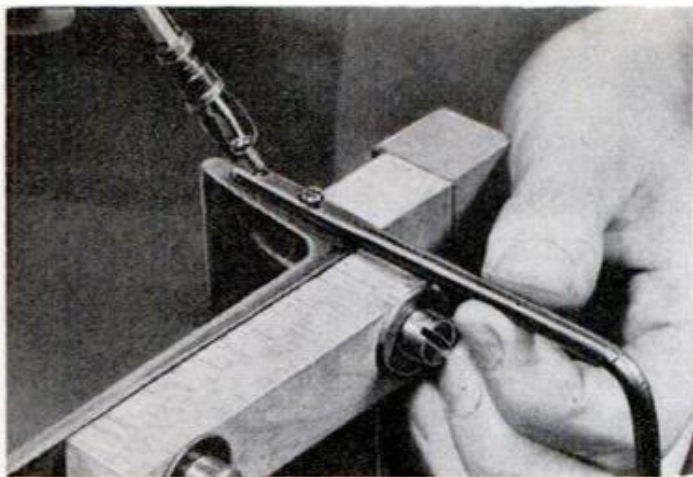
The blade itself is a piece of  $\frac{3}{16}$ -in. tool steel almost square in shape. Its two cutting edges enable the trimmer to cut in

two directions—on the pull or the push stroke. Thus, the end of a workpiece may be squared to 90 deg. by placing the work against the stationary fence guide and by swinging the arm up and back.

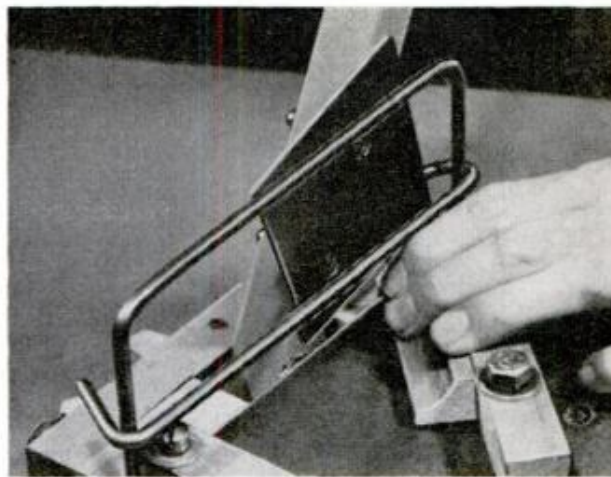
The blade is almost, but not quite square. This is because at the end of the arc in which it is swung its cutting edges must come to rest squarely on the cutting pads. The exact angle of the cutting edges is found by cutting a blank of steel measuring  $3\frac{1}{4}$  in. square. Mount this blank temporarily on the cutter arm and swing the







Although not essential, the trimmer is fitted with hand guards as a safety feature. Guards cover cutting edges through arc of travel in either direction



Here's the trimmer in use making a 45-deg. cut on a common type of molding. Note also that trimmer has a fixed fence located at 90 deg. for convenience

arm so that an outer blade corner is in line with the base. Scribe a line to indicate where the cutting edge is to be ground.

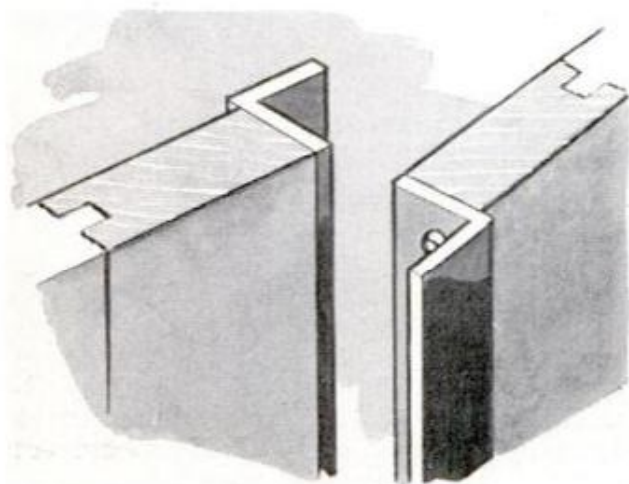
The cutter arm should swing between the base and the retainer bar without appreciable play. It may be necessary to place shims of thin cardboard or sheet metal between the bar and the hardwood spacers to prevent binding. Washers placed between the arm and the base will keep the knife edges from striking the metal base.

The finger guards may be bent from  $\frac{3}{16}$ -in. steel rods. One of the guards is stationary and is flattened and drilled on one end to receive two mounting screws which en-

gage threaded holes in the base. The other end fits into a hole drilled into the base. The other guard is a floating piece which normally rests on the fence guide bolts. This guard is easily removed to accommodate thicker, heavier work. To provide a means of holding the trimmer firmly while it is in use, a steel angle is riveted to the underside of the base. This allows the trimmer to be clamped in a vise. The base and cutter arm may be lacquered or enameled in an attractive color and the guide fences polished for the sake of appearance. The cutting pads need not be finished but extras should be cut to replace worn ones. ★ ★ ★

## Steel-Angle Weatherstripping

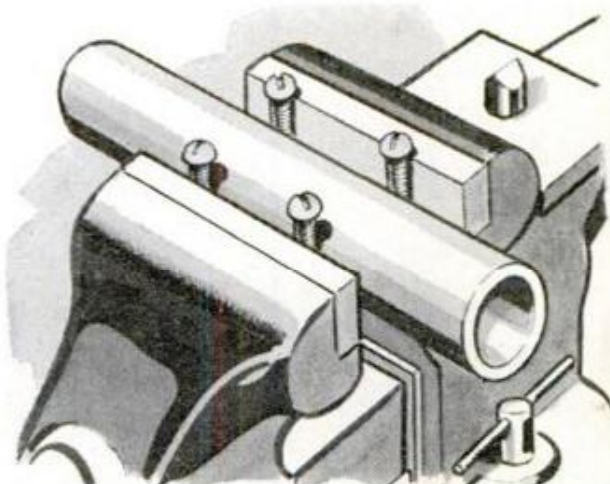
Barn doors and older-type garage doors that open outward and meet at the center when closed, can be effectively weatherstripped with light steel angles attached to the edges with screws. Check the doors for clearance, then attach the angles in the positions indicated, using flatheaded screws with the heads countersunk. The angles not only prevent snow and cold air from entering, they also brace the doors.



## Screws Are Emergency Pipe Jaws

Lacking pipe-jaw inserts it's almost impossible to grip pipe tightly in the regular jaws of a vise without crushing it out of round. But you can do this easily and effectively by placing two screws on each side of the pipe and then tightening the jaws. Care must be taken not to use excessive pressure which will cause the screw threads to cut into the pipe too deeply.

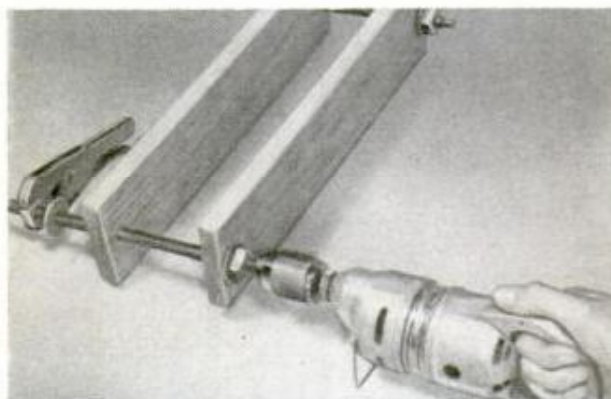
Joseph Fedrico, Jackson, Mich.



## Controlled Drying Oven Made From Old Refrigerator

You can assure yourself of fast and even drying of freshly painted or lacquered pieces with this improvised drying oven. It consists of the cabinet of a discarded refrigerator or freezer from which all cooling units and wiring have been removed. Install four large sockets to accommodate high wattage bulbs or infrared bulbs. Careful testing with a thermometer of the type having its dial externally mounted, will allow you to determine the heat capacity of each bulb separately. For controlled drying, the required number of bulbs can be used and the others removed. To avoid serious burns to your hands, mount the switch on the outside.

Harry J. Miller, Sarasota, Fla.



## Portable Drill Drives Nuts Along Threaded Rods

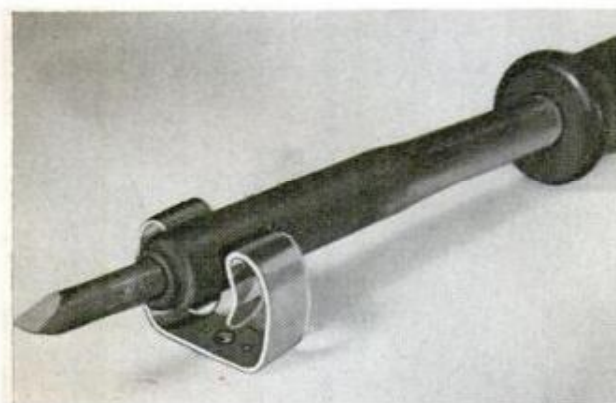
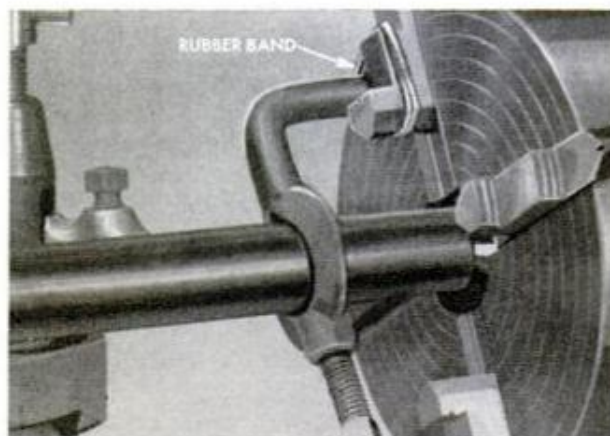
Positioning clamping nuts on long threaded rods is a tedious job. The operation is made easier, however, if a portable drill is used to spin the rod. Turn or file the rod down at one end to a diameter small enough to fit the drill chuck. Hold the nut with a wrench and the spinning rod will traverse the nut quickly to the desired position at any point along the length.

R. Hanscom, Elmhurst, Ill.

## Chuck Jaw Drives Lathe Dog On Between-Centers Turning

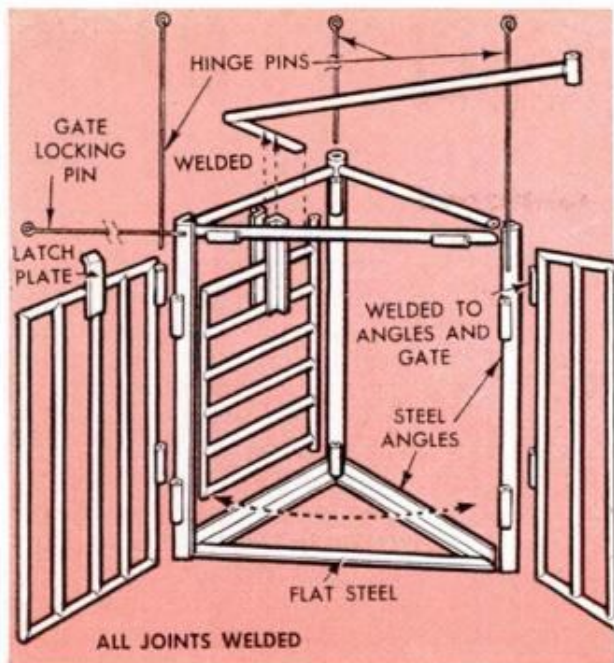
Lathe operators often find it necessary to switch quickly from a chucked machining job to between-centers turnings. By leaving the chuck on the spindle and using one of the jaws to drive the dog, wear is saved on the spindle threads. To prevent any tendency to backlash when taking the final light finishing cuts, wind a rubber band around the tail of the dog to hold it against the jaw.

R. Hanscom, Elmhurst, Ill.



## Broom Clip Serves as Stand For Hot Soldering Iron

A spring-type broom clip or a medium sized spring tool clip screwed to the bench top or to a piece of hardwood serves as a stand for the soldering iron. The spring action of either type of clip holds the iron securely and largely eliminates the fire hazard. The broom clip will hold all medium sized irons and for the small and extra large irons, use a tool clip of the correct size.—H. J. Gerber, Stillwater, Okla.



Above, welded-steel gate is located at corners of three adjoining feed lots, permitting farmer to turn hogs into any lot desired by opening or closing the wing gates and then positioning the diverting gate accordingly

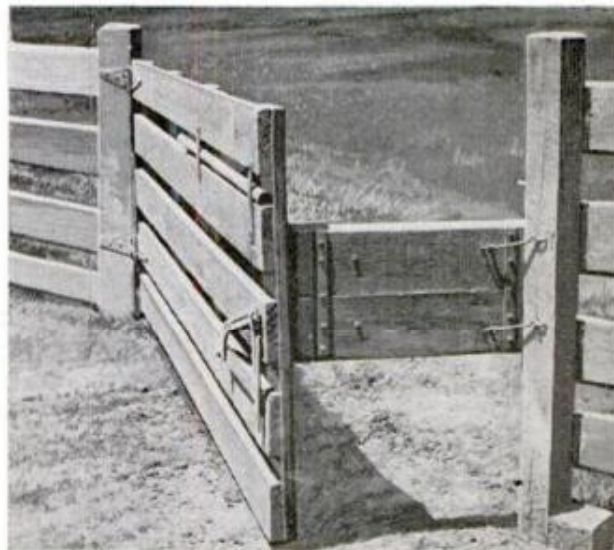
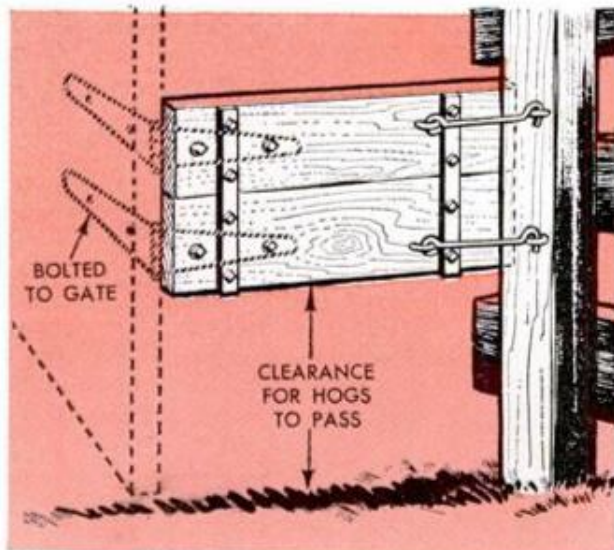
## Gates That Make It Easier to Handle Hogs

Here are two combination gates that will interest hog raisers. The sorting gate shown in the photo and drawing above consists of a two-way gate and two wing gates, each of which is mounted on one corner of a pipe and steel-angle frame of triangular shape. When installed at the corners of adjoining feed lots, it enables one man to sort and shunt pigs being driven from one lot to either adjoining one, simply by opening or closing the wing gates in front and positioning the gate at the back accordingly. The wing gates also make the device handy for loading hogs directly from the feed lot. These are made of lengths of pipe cut, fitted and welded together as indicated in the

drawings. Short lengths of pipe welded to the gates and frame form hinges when fitted with pins cut from steel rod.

The sturdy gate extension shown in the photo and drawing below forms a creep, permitting hogs to pass but preventing cattle from doing so. Mounted on hinges bolted at the end of an existing gate, it is hooked to the gate post by double hooks when in use as in the photo. When the main gate is to be closed, the extension first is swung back on it and hooked in place. The only materials needed to make the gate extension are two  $1\frac{5}{8} \times 7\frac{1}{2} \times 24$ -in. planks, two strap hinges, two short lengths of  $\frac{1}{4} \times 1$ -in. flat steel and a pair of heavy hooks.

Hinged extension mounted midway on end of gate allows hogs to pass from barn to feed lot but not cattle





### Traveling Hoist In Farm Shop

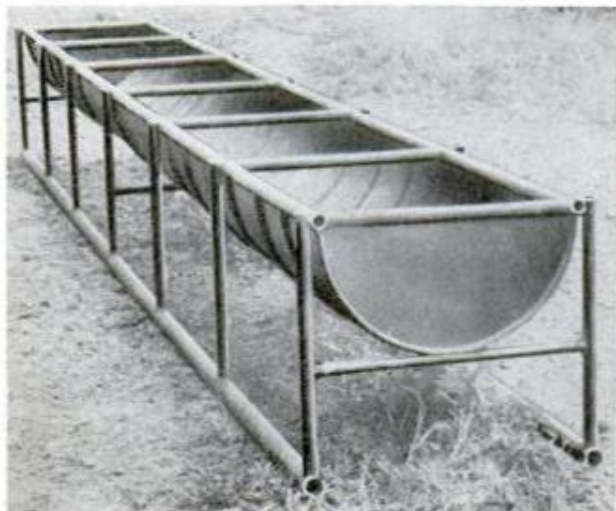
When repairing heavy farm equipment in the shop it's handy to have a traveling hoist with which you can lift the work, move it laterally and lower it to a desired position. You can assemble an efficient hoist as illustrated by using an old hay carrier, a length of carrier track with hangers, a short length of 1-in. steel shafting and a standard chain hoist.

C. F. Marley, Nokomis, Ill.

### Bunk Made From Oil Drums

Three 55-gal. oil barrels were split and welded end to end to make this feed bunk for use in the pasture. Ends were cut out of all but the outer two and the sections were welded to a pipe frame with a post and a cross brace support at each joint. Though sturdy and durable, the bunk is light enough to be carried by two men.

A. Wettach, Mt. Pleasant, Iowa



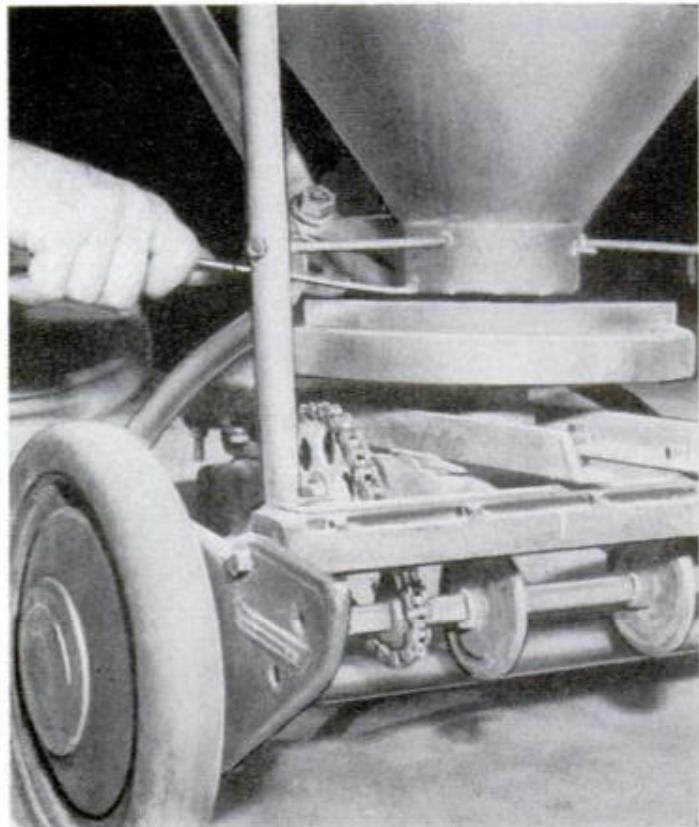
## PIGGY-BACK RIDES CASTOFF

WHEN YOU toss aside your old pusher for a new power mower, don't toss it away. You can put it to good use as a rotary spreader for broadcasting fertilizer on your lawn and garden. It will cover a swath 4 ft. wide with each pass, and there is an adjustment whereby you can regulate the flow from the hopper.

As for the mower itself, all you have to do is remove the roller, the bed knife and the reel. To remove these parts and to make the conversion, it will be necessary to practically dismantle the whole mower. The bed knife will come off easily by merely filing off the rivets that hold it. If the reel is held to the shaft by setscrews, the complete unit is simply pulled off. Where the reel is fixed permanently to the shaft, the curved blades will have to be removed by filing the rivets that hold them to the spiders. As a spreader, the mower is used in an inverted position, and the broadcasting unit is driven by a gear box-and-sprocket drive, the driving sprocket being fitted to the mower-reel shaft.

The pull-apart, cutaway drawings, right, show how the gear box and hopper affair

Flow of fertilizer is regulated by lever which is used to rotate the lower outlet box and close aligning openings in the two boxes placed back to back

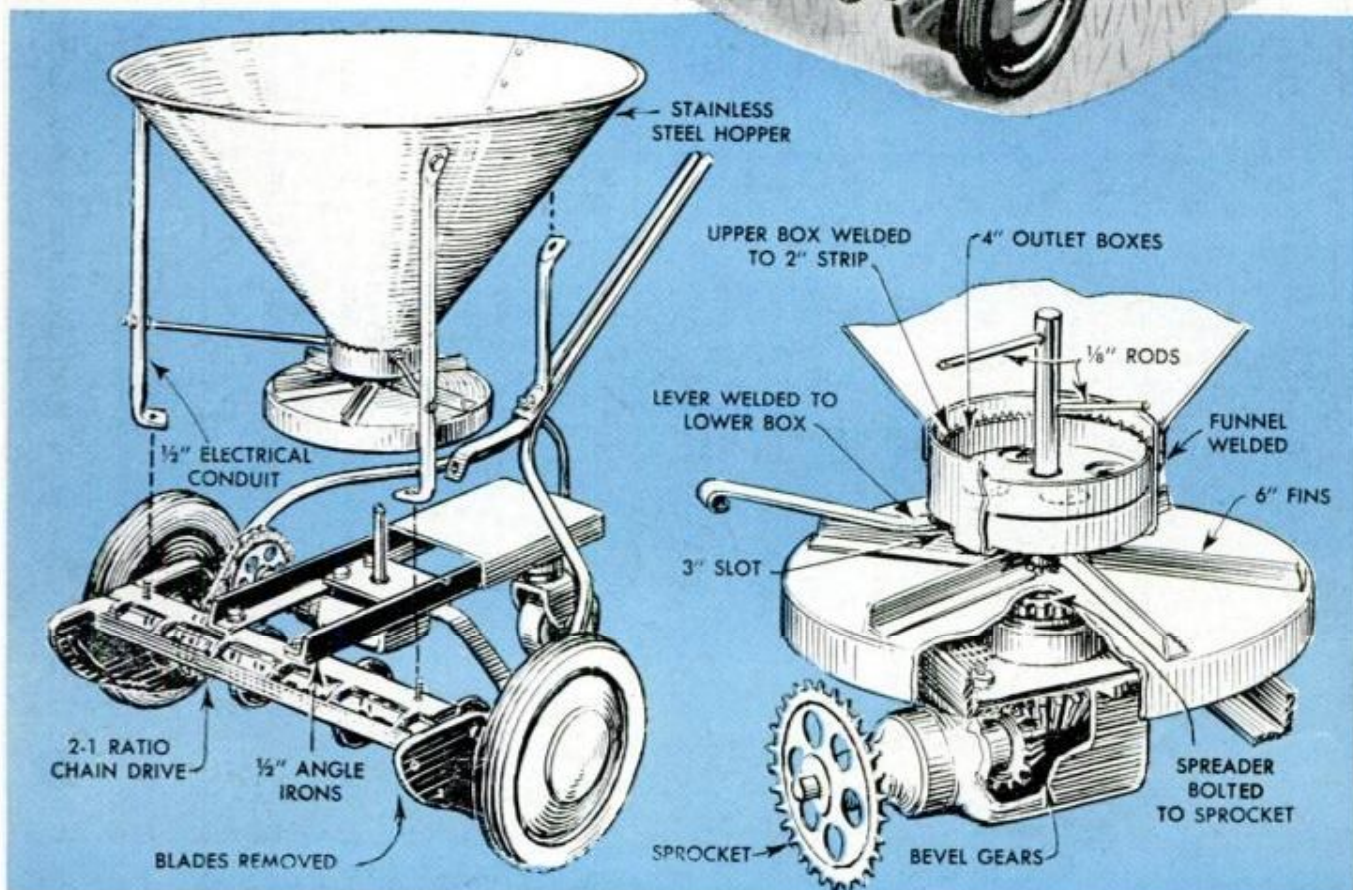
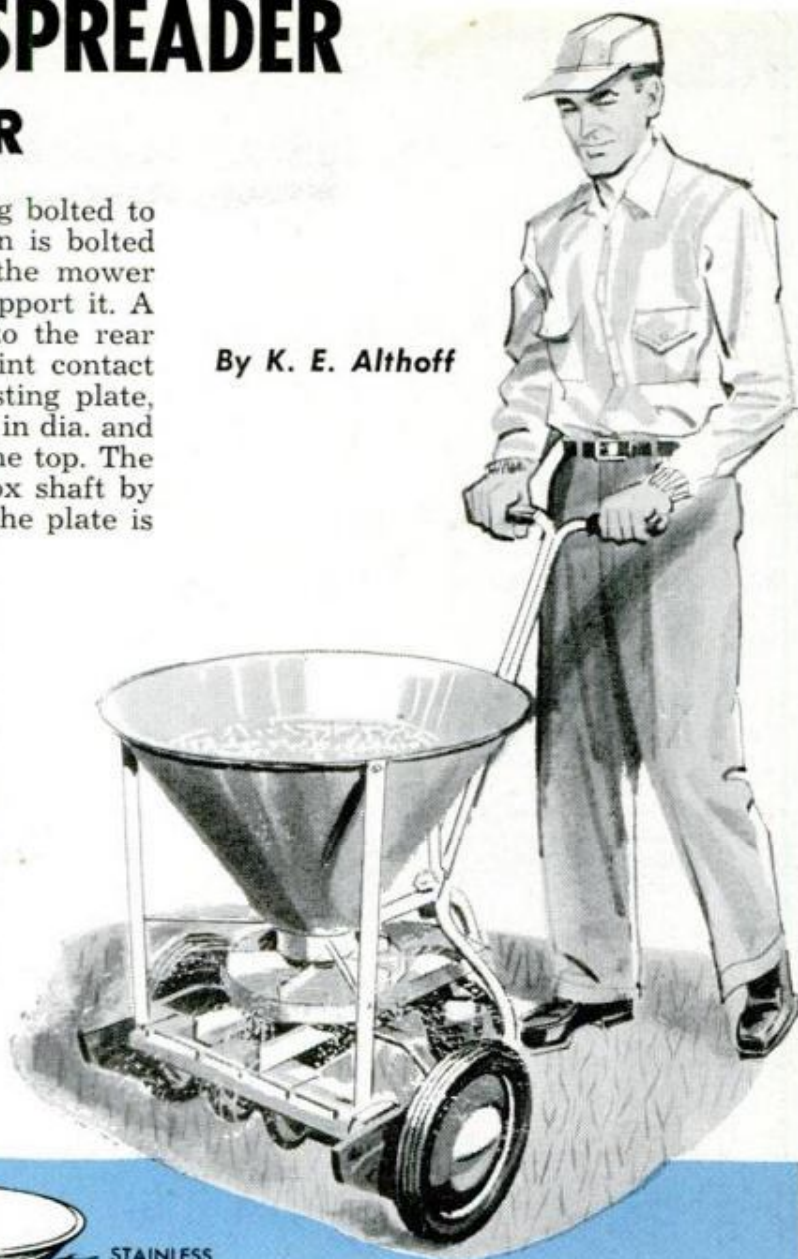


# FERTILIZER SPREADER

## LAWN MOWER

are supported, the former being bolted to a steel-angle bed which in turn is bolted to the cutter bar. Braces to the mower handle and the tie bar help support it. A trailing caster is spot-welded to the rear of the bed to provide three-point contact with the ground. The broadcasting plate, or slinger, measures about 8 in. in dia. and has steel-angle fins welded to the top. The plate is attached to the gear-box shaft by means of a sprocket to which the plate is bolted, the sprocket hub serving as a collar. Two shallow electrical outlet boxes, having the knockouts removed, are placed back to back to form a clever flow regulator. The upper one is tack-welded to a 2-in. band which is tack-welded to the end of the funnel. The bottom box is left free to turn on the turned-under rim of the band. A 3-in.-wide slot in the rim permits the lower outlet box to be rotated by a lever soldered to it. This permits the aligning holes in the boxes to lap and thus vary the size of the openings. ★ ★ ★

By K. E. Althoff



# MOLDED CONTOURS

## STREAMLINE YOUR PROJECTS

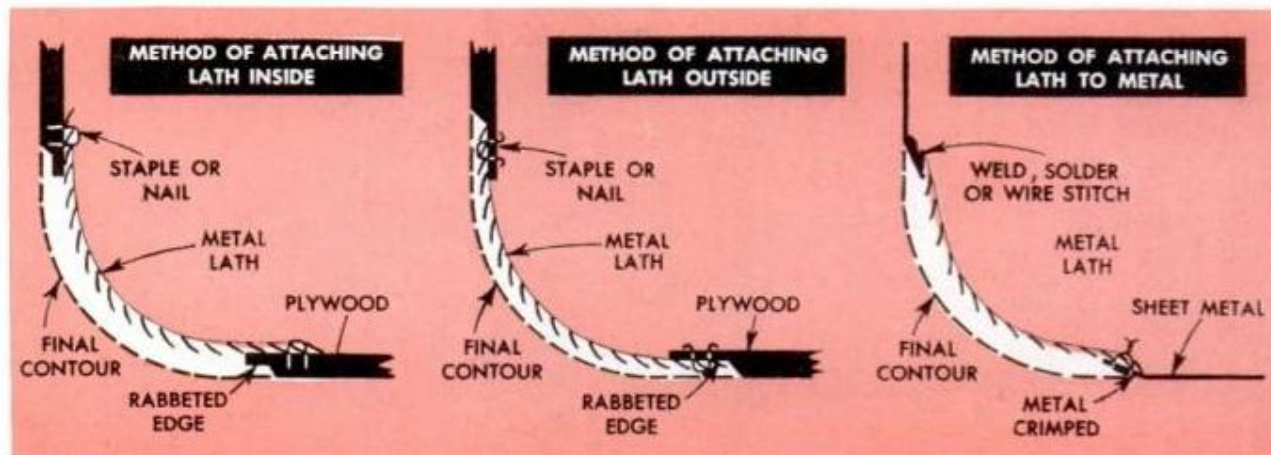
In boat, trailer and sidewalk-car construction contour work pleases the eye and adds strength to the structure. Here's a simple method of contouring with glass fiber, resin and metal lath

By Harold Humphrey

**U**SING GLASS-FIBER CLOTH, ordinary metal lath and resin plastics you can build up almost any desired contour and combine it with flat structural materials such as plywood, hardboard and sheet metals. Usually the finished job owes its professional appearance to the three-dimensional corners, the trailer body illustrated being a typical example. In any type of body construction you'll need to plan in advance the location of the contour

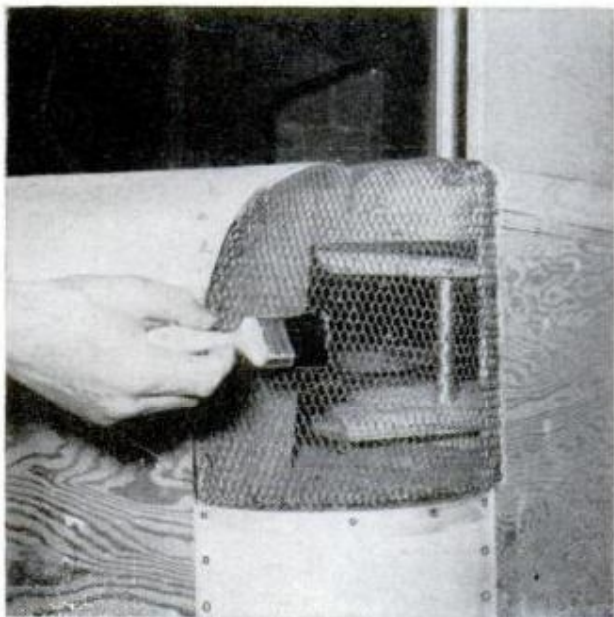
work and make the necessary allowances in framing the project. It's regular practice to frame the job, apply the covering of plywood, hardboard or sheet metal and leave the corners open for later application of the contouring.

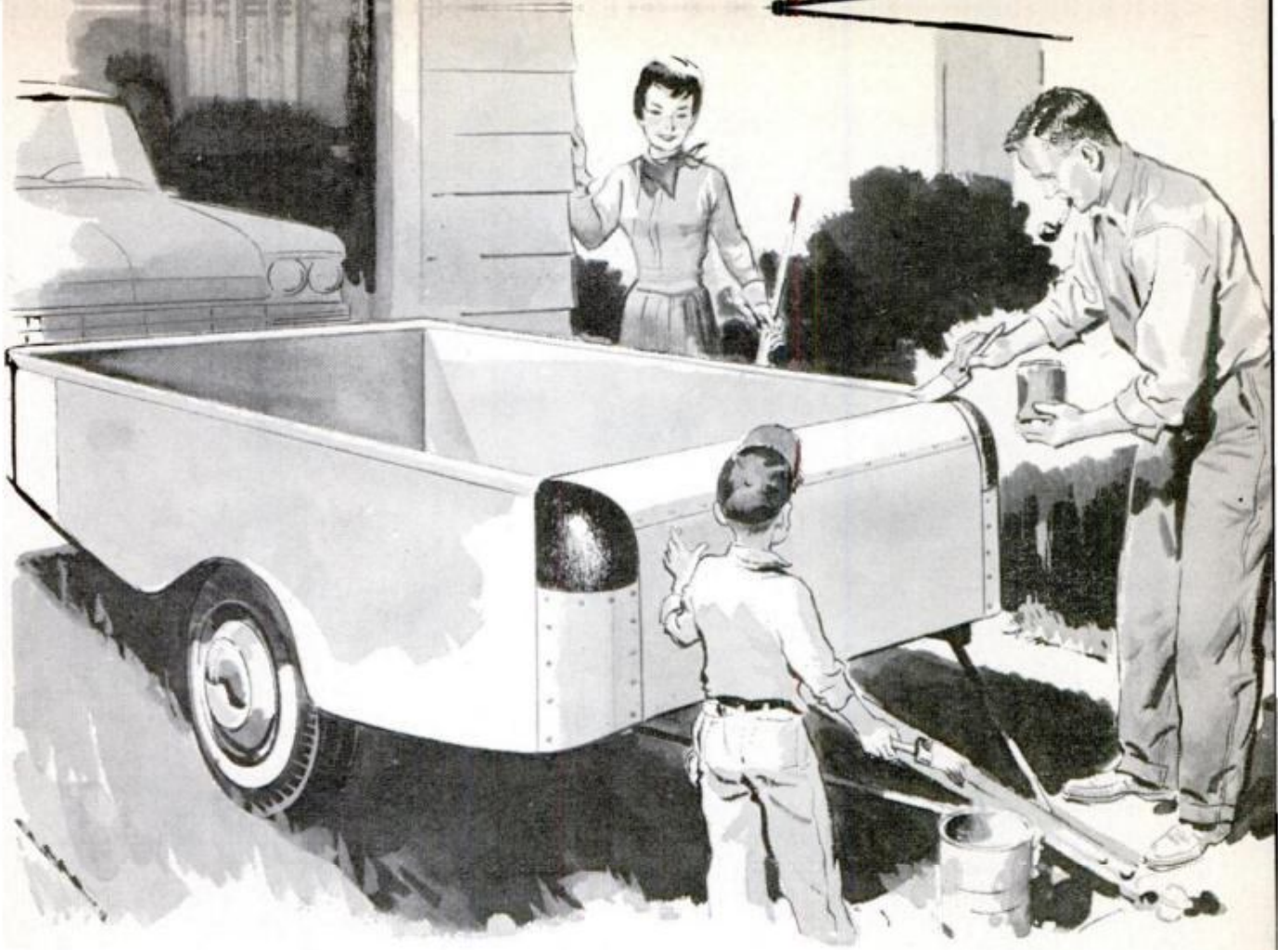
In this step the procedure is quite simple and you have a choice of several methods of application. The first, used where the nature of the assembly and type of materials will permit, is to apply metal lath to



After forming metal lath to desired contour and nailing or stapling in place, next step is to apply brush coat of resin plastic over lath to uniform thickness

Before plastic brush coat hardens, apply glass-fiber fabric and smooth out in all directions to remove any wrinkles. Trim away any excess with scissors





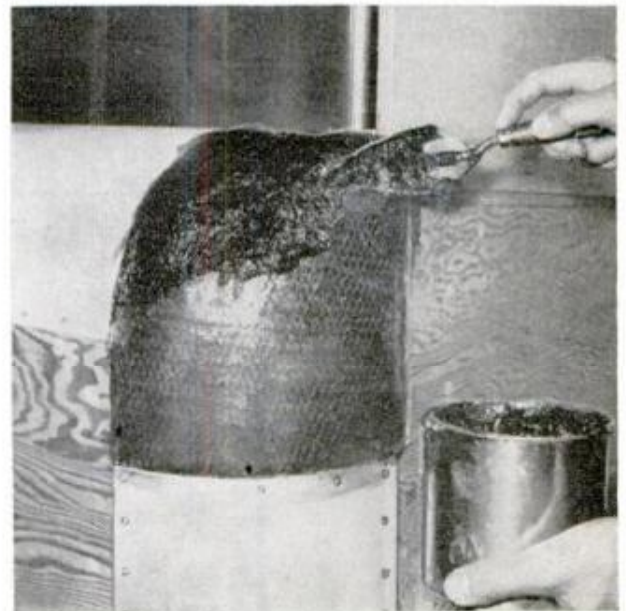
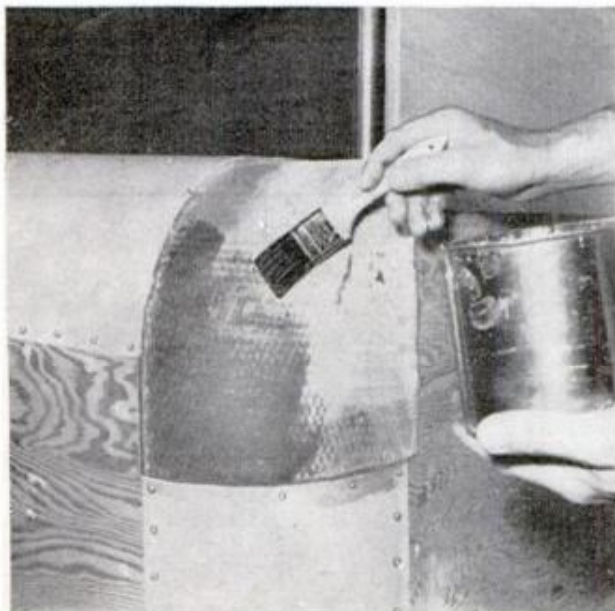
the inside of the curve as in the left-hand detail below. Note that the metal lath is stapled or nailed to the inside face of the flat material. Also that the edges of the covering material are rabbeted to take the plastic. The method forms a tight, water-proof joint that won't shake loose. The center detail shows the metal lath nailed or stapled in a wide rabbet on the outside of

the covering material. This method permits applying the metal lath and plastic from the outside of the body. The third method shows how metal lath is attached to a sheet-metal covering. Here a plastic of the metal-bonding type must be used.

The photos below, left to right, show the step-by-step procedure in building up a typical contoured corner. The metal lath,

**Apply a final brush coat over glass-fiber fabric taking special care to brush on plastic mix to a uniform thickness. Work plastic right up to edges all around**

**Final step in building up contour is applying trowel coat of resin plastic. This is mixed to consistency of light grease so that it is easily worked with trowel**





Spread glass-fiber fabric on a flat surface, the garage floor will do, mark size and cut with scissors

available from any building materials dealer, can be cut easily with tinsnips and can be shaped to three dimensional curves by hand. When attaching and shaping the lath keep in mind that it will be covered with at least  $\frac{1}{8}$  in. of plastic when the job is finished to the final contour. Check the contours carefully before finally nailing or stapling the formed lath in place.

Polyester resins of the type that will bond readily to wood or hardboard, also glass-fiber fabrics are readily available in kit form for covering boat hulls. Or, the resin can be bought by the quart or gallon and the fabric by the yard. The resin comes as a syrup-like liquid and requires the addition of a liquid hardener. For application to the metal lath the mixture must be thickened to a grease-like consistency by the addition of a small amount of powdered asbestos. When mixing resin plastic and hardener follow the instructions.

As the next step brush the mixed material onto the metal lath and before it dries apply the glass fabric and stretch to remove all wrinkles. Trim off the excess at the edges of the opening with scissors. Now coat the fabric with the same plastic mix-

ture, brushing from the center outward to the edges. Allow to harden.

Finally, finish with the trowel coat, which is mixed to a somewhat heavier consistency and laid on with a trowel or wide putty knife. Apply as uniformly as possible, building the material slightly higher than the final contour, then while wet add a second layer of glass fabric. Work out wrinkles and pull the coarse-meshed fabric into the soft trowel coat until it is below the surface. Now smooth the job by hand, taking care to work the surface to a true curvature. Wipe excess material off your hands occasionally with a cloth moistened with acetone. Don't permit the resin to dry on the hands. When applying metal-bonding plastic wear rubber gloves. Trim away any excess glass cloth with scissors and allow the job to dry about 24 hr.

After drying, the trowel coat is worked down to final contour and the curves feathered, or faired, neatly into the flat surface of the covering. This is done with a rasp and sandpaper, working with an eye to true contours and a smooth surface. Any imperfections will show up under the paint or enamel. ★ ★ ★

## Wash Fire Protection Into Household Fabrics

Chemists at the U.S. Department of Agriculture's southern utilization division have developed formulas for fire retardants using inexpensive chemicals that can be purchased at any drugstore. One formula consists of borax, 7 oz., boric acid, 3 oz., and hot water, 2 qts. First, form a paste by dissolving powdered boric acid in a small quantity of hot water. Then complete the solution by adding the other ingredients. A second formula, more effective for resin-

treated cotton and rayon fabrics classed as "crush-proof" and "drip-dry," calls for 12 oz. of diammonium phosphate dissolved in 2 qts. of water. The procedure in impregnating fabrics with either of these fire retardants is no more difficult than starching. Cotton, linen and rayon (not acetate) items are thoroughly wetted in enough of the solution to cover them and then dried. After drying the fabrics are both flame and afterglow resistant.

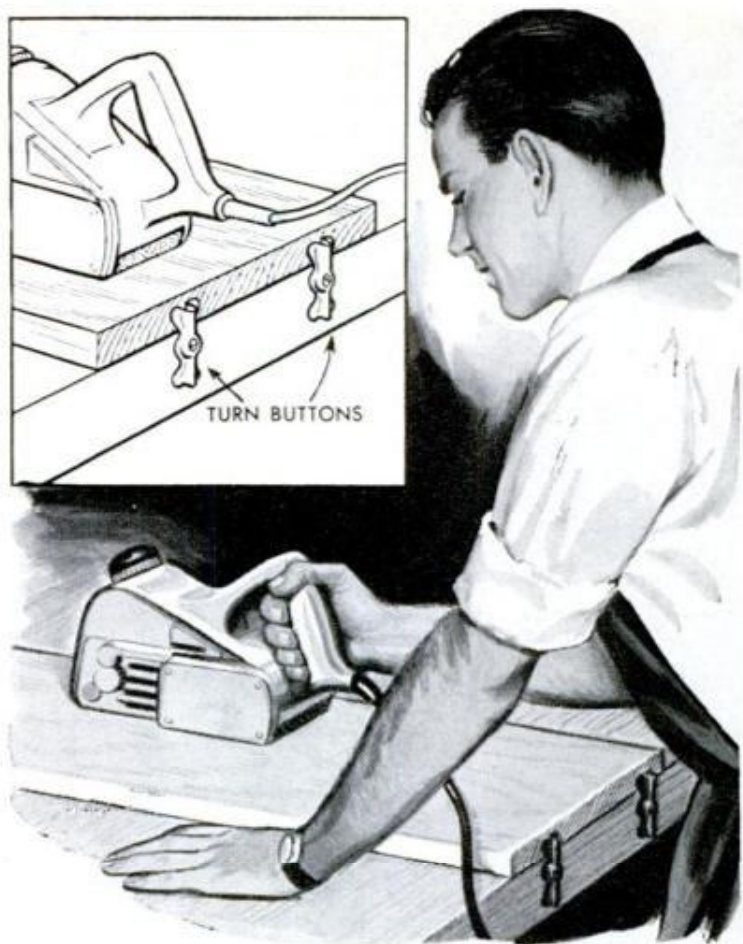
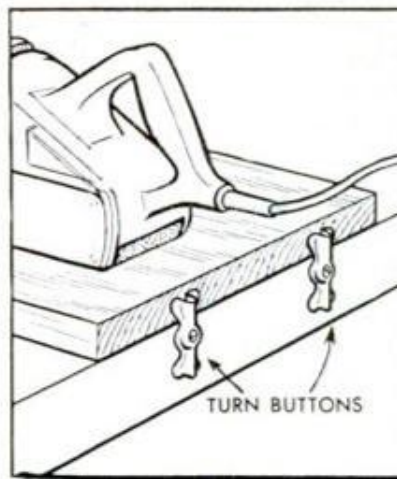


## Metal Turn Buttons Make Bench Stops

Turn buttons screwed to the right or left-hand edge of your bench top serve as handy, quick-acting stops to hold work for sanding, planing or other operations requiring use of a positive stop. Each button should be located so that only about one third of its length projects above the top surface of the bench. In this position the ends of the buttons will clear the surface of  $\frac{1}{2}$ -in. stock. Buttons cut from hardwood also will serve this purpose.

G. E. Hendrickson, Argyle, Wis.

A hand-operated cleanout auger often can be worked around an elbow by chucking the free end in a portable drill and then "tapping" the trigger switch to rotate the auger a turn or two at a time. Using this method of applying power will prevent the auger from kinking. Same method can be used when working the auger through a stubborn obstruction.

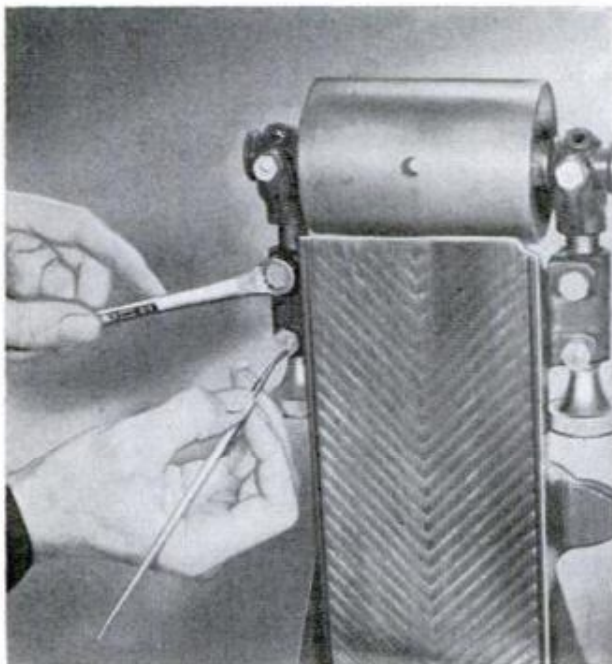


## Color Mates Screw With Wrench

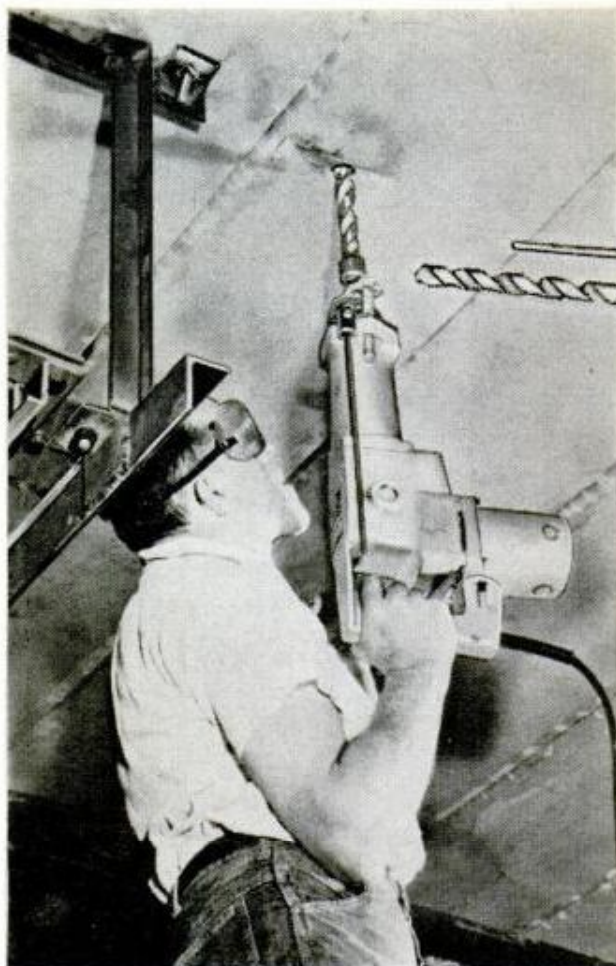
Although small box-end wrenches are marked for size, it's often an added convenience to have some quick, visual means of matching wrench to screw. An identifying color painted on wrench and screw head will match the two at a glance. Use some bright color, such as orange or a light red, or even white, so that it is easily seen even in poor light.

## Cotton Holds Oil in Die

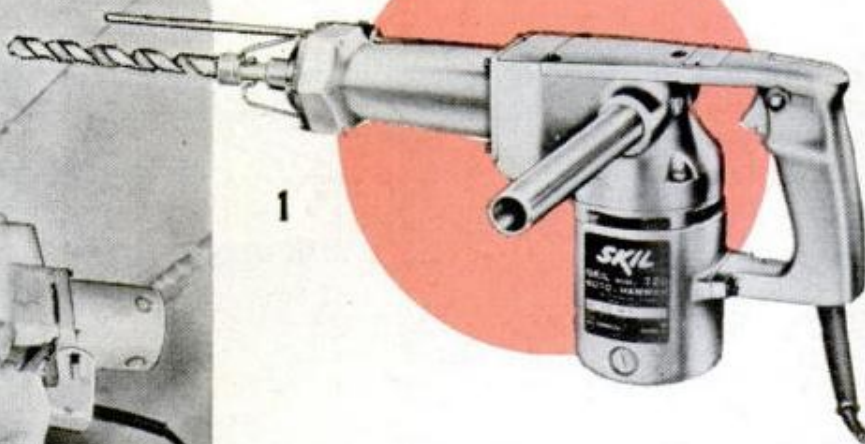
By stuffing a small tuft of cotton into the space between the cutting teeth of a button die and adding a few drops of cutting oil, you will have a built-in wick which will feed oil to the work without interruption. This, you will find, results in cleaner-cut threads and also prevents excess oil from running down the work. Cotton also retains the metal chips.



# SHOPPING



1

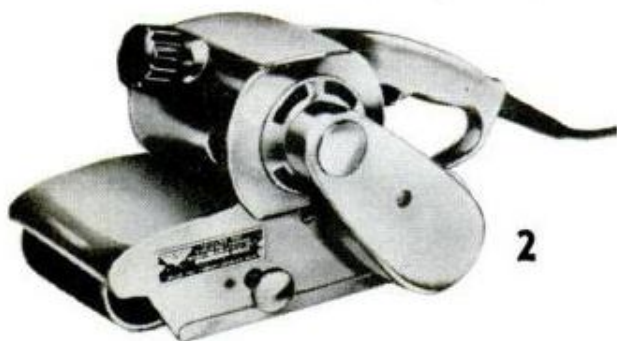


**1. PORTABLE ELECTRIC HAMMER** does three operations—hammering with simultaneous power rotation of tool, hammering without rotation of tool and drilling without hammering. Automatic rotation eliminates need for hand turning of star drills in large holes

Skil Corp., 5033 N. Elston Ave., Chicago 30, Ill.

**2. HEAVY-DUTY PORTABLE BELT SANDERS** in two models and two belt sizes cover requirements of cabinetmakers, boat builders, contractors and homeowners. Smaller size is powered by  $\frac{3}{4}$ -hp. motor, takes 3 x 21-in. sanding belt. Larger size uses 4 x 21-in. belt

Millers Falls Co., Greenfield, Mass.



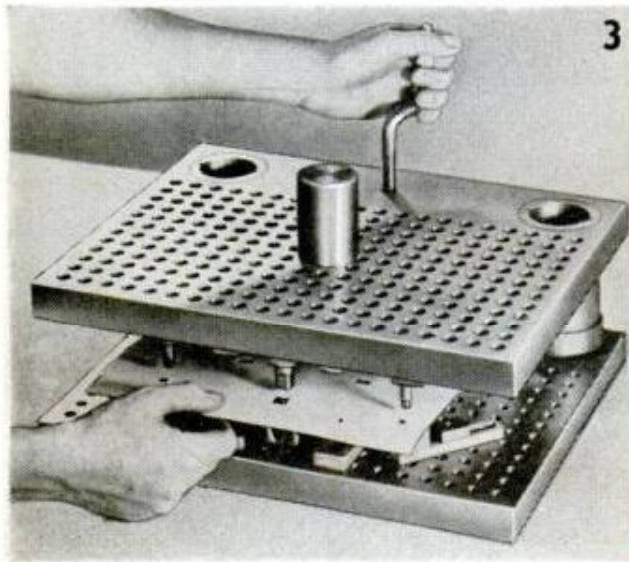
2

**3. PUNCH-AND-DIE UNIT** is designed to permit arrangement of several punches and dies to punch holes in a variety of patterns in sheet metals. Handles mild steel up to  $\frac{1}{16}$  in. and aluminum to  $\frac{1}{8}$  in. Holes in top and bottom plates are spaced on  $\frac{3}{4}$ -in. centers

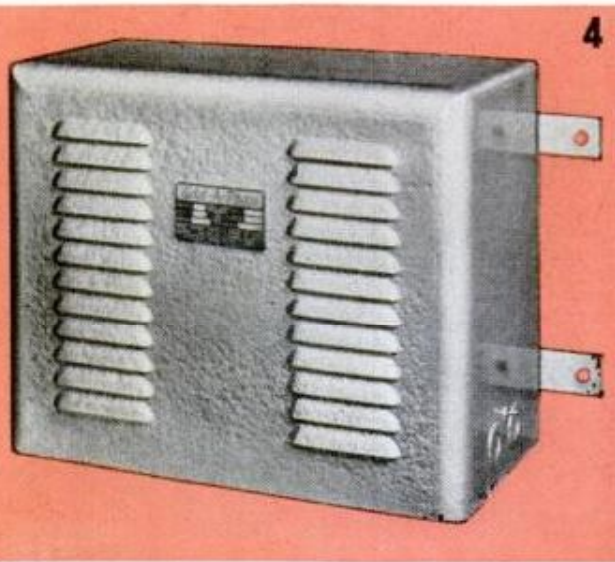
O'Neil-Irwin Mfg. Co., 779 Eighth Ave., Lake City, Minn.

**4. POWER CONVERTER** is designed to permit operation of 3-phase motors on 1-phase current. Unit is a static converter that adds a phase to existing single-phase current, producing 3-phase from a single-phase source. Unit available in 11 sizes, from 1 to 30 hp.

System Analyzer Corp., Nokomis, Ill.

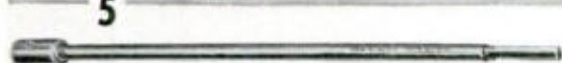


3



4

# FOR TOOLS



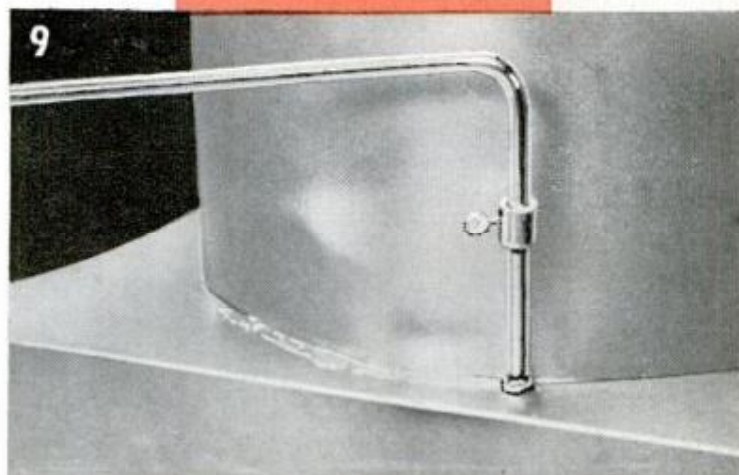
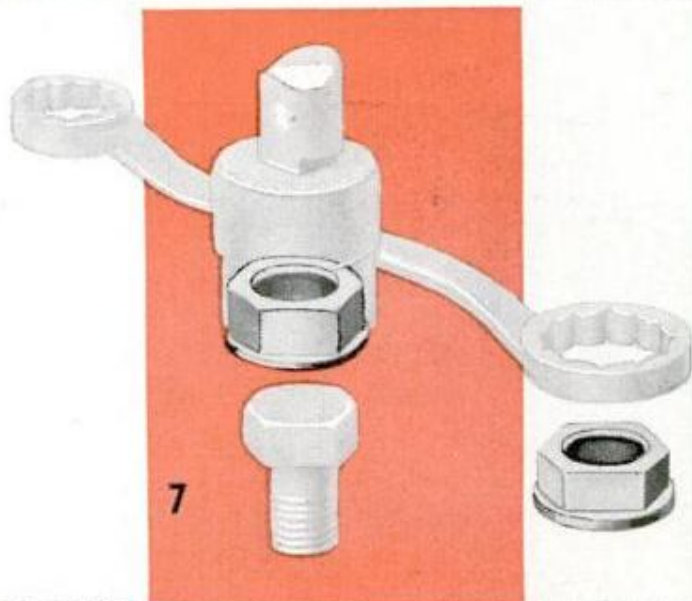
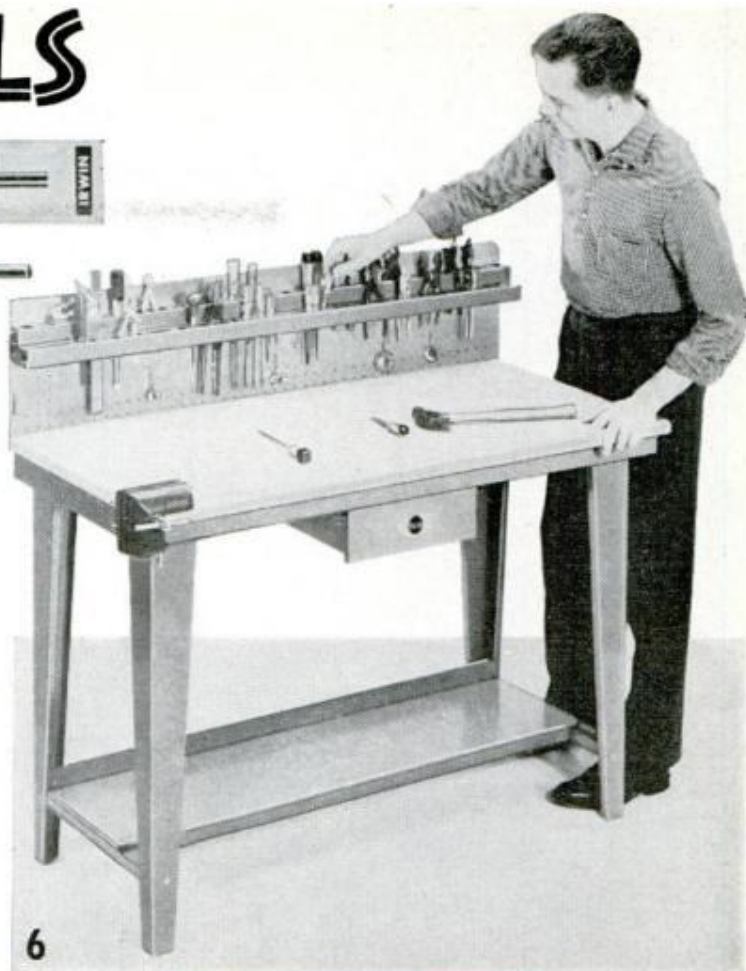
**5. WOOD-BORING BITS** have hollow-ground points which bore cleaner holes in both hard and softwoods. Bits can be used with an extension (illustrated) for greater depth capacity. Bits and extension have 1/4-in. machined shanks for use in small drills  
The Irwin Auger Bit Co., Wilmington, Ohio

**6. A WORKBENCH KIT** has all-steel frame and top of compressed board which will withstand rough usage. Top measures 24 x 48 in. and is 34 1/2 in. from floor. Special feature is a double tier, full-length tool rack with 64 openings of varying sizes for tools  
S. A. Hirsh Mfg. Co., 851 Central Park, Skokie, Ill.

**7. ADAPTER SET** in metric sizes converts socket and box-end wrenches from U.S. standard to metric sizes for auto dealers, service stations and others who service foreign cars and imported machines. Set contains 13 adapters, 9 mm. to 21 mm.  
Wagner Tool & Supply Corp.,  
1020 E. 15th St., Hialeah, Fla.

**8. RIGID MOTOR BASE** has been designed for attachment to various types of appliance motors and also motors having flanged-type mountings. Hole spacings are standard for small motors. Rustproofed compression bands hold motor securely  
Lemmerman-Walstedt Co.,  
519 Lincoln Ave., St. Cloud, Minn.

**9. ALUMINUM-TO-ALUMINUM JOINTS** are made quickly and easily with this new soldering brush and a special fluxless solder. The brush is used to smooth the solder and to break the oxide film that forms  
Reynolds Metals Co., Richmond 18, Va.

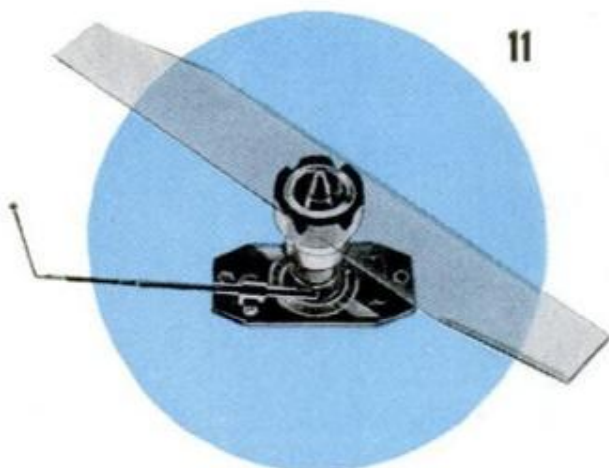




10

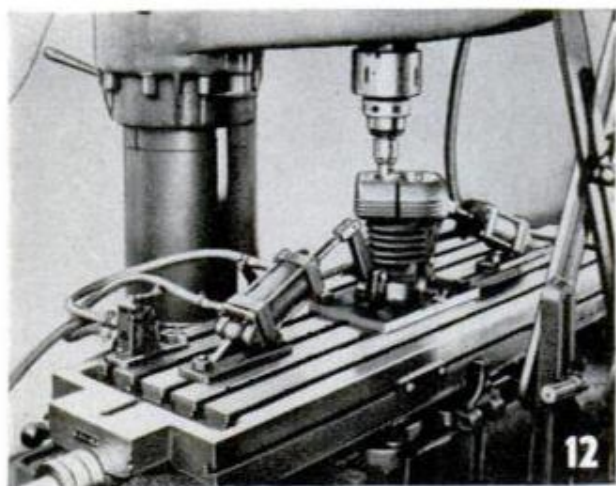


**10. IMPACT TOOL** is designed for punching holes in soft earth around perennials, shrubs, vines and trees for placement of fertilizers and humus. Tool also is used for aerating compacted soils and deep watering of small trees, shrubby plantings and garden root crops. It is 45 in. long and weighs 16 lb., making it easily portable. Body of tool is tubular steel and is fitted with a hardened steel point  
 Impact Tool Co., 102 Girde Rd., East Aurora, N.Y.



11

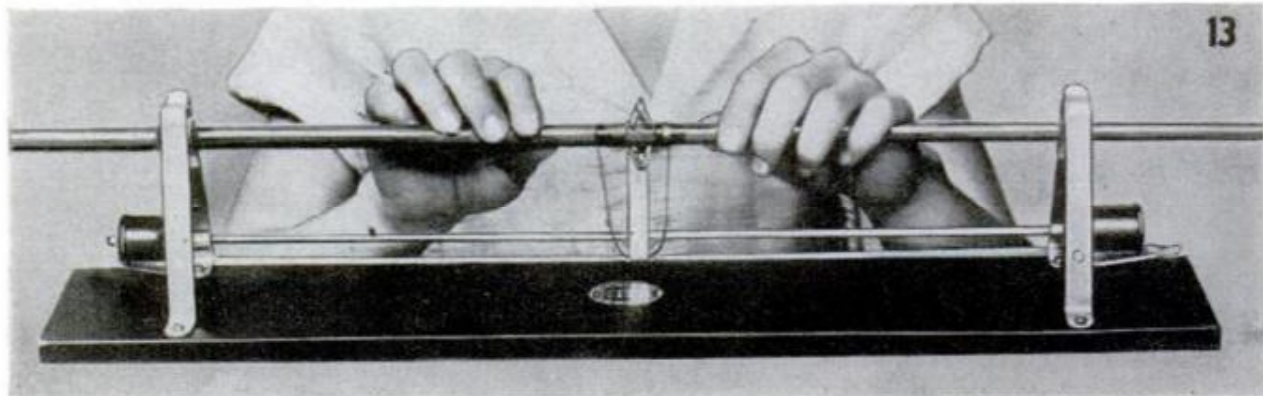
**11. BALANCER** for rotary lawnmower blades attaches to wall of shop, provides a quick, accurate check of blade balance. Cone at outer end of spindle centers blade; magnetic collar at bottom of cone holds blade firmly in place. Tracking of blade is checked accurately by means of ball-ended adjustable arm, or tracker, which can be extended to accommodate all rotary mower blades in common use  
 Magna-Matic Div., A. J. Karrels Co., Port Washington, Wis.



12

**12. PNEUMATIC CLAMPS** displace ordinary strap clamps for holding semifinished work on machine tables for a final finishing operation. Photo shows typical setup and emphasizes versatility and speed of operation of pneumatic clamps. Here cylinder of an air-cooled engine is set up for drilling bores for valve stems. Cylinder has been prefinished to this stage, which permits clamping it to a flat surface  
 Marstonair Limited, Parkshot, Richmond, Surrey, England

**13. WINDING MACHINE** does a perfect job of applying those vari-colored windings you see on fishing rods, golf clubs. Rod is supported in bracket-type carriers and spools of thread are positioned on a rod which is mounted between brackets. After threading, a tensioning device is set to give desired thread tension. Winder is screwed or clamped to a bench or worktable. Complete winding instructions are included  
 B-C Co., 9045-16th Ave., S.W., Seattle 6, Wash.

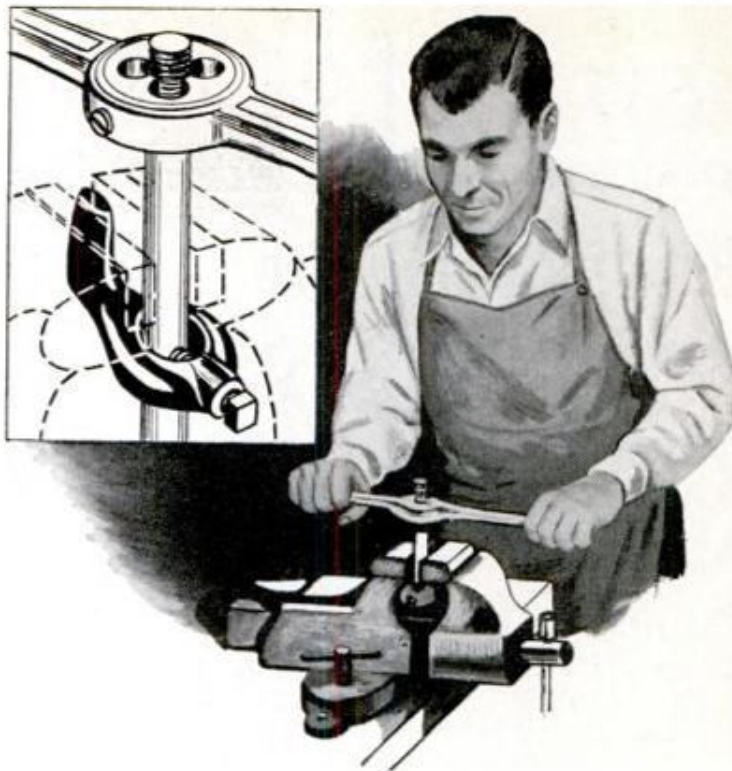


13

## Holding Round Stock For Threading

Without special jaw inserts it is difficult to grip round stock and pipe or tubing in a vise for threading. A lathe dog of a size to fit the rod, pipe or tubing will serve the same purpose. Slip the dog over the work and bring it up to a point about 4 to 6 in. from the end to be threaded. Place in the vertical position in the vise with the tail of the dog between the jaws. Tighten both the dog and the vise on the work. The greater gripping power of the dog will overcome any tendency of the work to turn under the comparatively heavy twisting strain produced by the threading die. Be sure the tail of the dog bears against one vise jaw before threading.

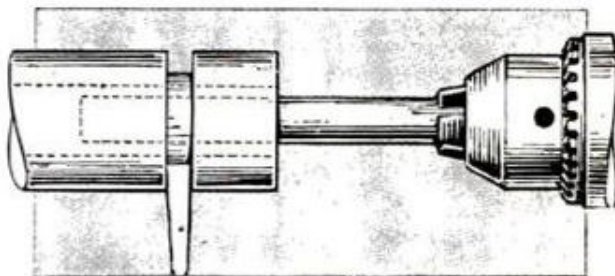
C. W. Woodson, Chicago, Ill.



## Rod Carried in Tailstock Chuck Supports Work Being Cut Off

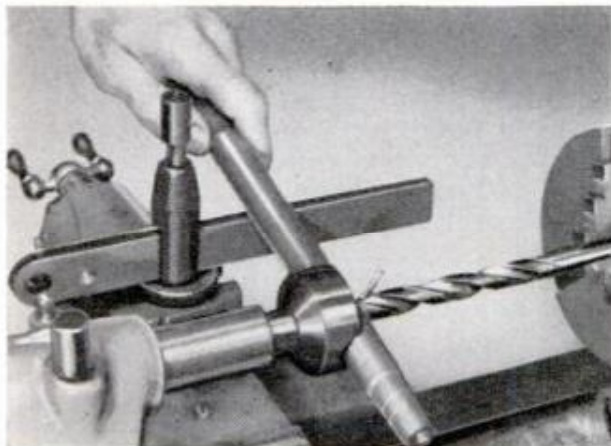
Cutting off in the lathe nearly always poses the problem of supporting the work piece as it is cut off, preventing it from falling to the lathe ways and being damaged. Workpieces that are center-bored often can be supported on a short length of steel rod carried in a drill chuck placed in the tail-stock sleeve. The rod enters the bore of the workpiece and supports it after cutting off cleanly.

Frank L. Rush, Columbus, Ohio



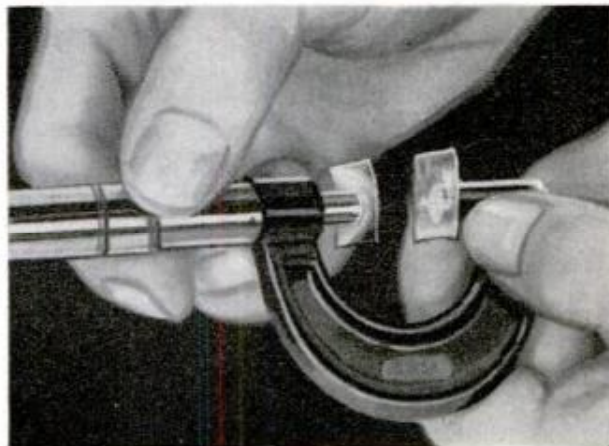
## Bar Supports Work Being Drilled

Work being drilled in a crotch center usually requires a support to prevent it from turning with the drill bit. Should unsupported work suddenly turn with the bit, you may get a badly scored tailstock sleeve if not a painful hand injury. To avoid this, set up the work as pictured with the outer end bearing on a bar held in the toolpost.



## Tape Protects Micrometer Tips

When a mike must be used to check abrasive materials, always protect the ends of the spindle and anvil to preserve accuracy of the instrument. One way to do this is to attach squares of cellophane tape to the end of each part, then close the mike and take a reading of the combined thicknesses. Subtract this from the work readings to get a true measurement.



## Citizens Radio Service— YOUR PERSONAL RADIO NETWORK

By Lothar Stern

**B**UTCHER, BAKER or candlestick maker, if you're a U.S. citizen over 18 years old, you can now operate your own private radio station. That was the decision of the FCC when, toward the end of 1958, it established the Class D Citizens Radio Service. To do this it had to deny that select fraternity of amateur radio operators the use of one of its favorite bands—the 11-meter band—and some of the hams are still screaming. But their loss was everyone else's gain. Certainly, the narrow range of frequencies between 26.965 and 27.225 megacycles could be put to no better service or more widespread use than for radio communications between private groups or individuals with no special electronics know-how or training.

That's right! To get on the air on the Citizens Band you don't have to know a thing about radio. There are no operator's licenses or technical examinations. All you do is buy the equipment, send for a station license (a mere formality, though a necessary one) and you're all ready to operate.

The applications for Citizens Band Radio are legion. Boat owners are using transceivers for inexpensive ship-to-shore and ship-to-ship communications. Fishermen, hunters and sportsmen use them to keep in touch with base stations. Installed in your car, they'll keep you in constant communication with your home or office; in delivery and service trucks, they speed up operations and increase efficiency. For business or pleasure, almost 100,000 transceivers are already in operation, with more applications being processed at a rate of some seven or eight thousand per month.

"Transceiver" is a combination word for a transmitter-receiver combination, and that's the type of equipment most popular for the Citizens Band. It's compact, lightweight and relatively inexpensive. That's because some of the tubes and circuits of



a transceiver are made to do double duty—becoming part of the transmitter when you send, and part of the receiver when you pick up messages. The transition from receive to transmit is made by simply pressing or releasing a button on the microphone or on the front panel. The whole operation is as simple as operating a home intercom system.

Anticipating an ever-increasing demand for C/B radio equipment, some 50-odd manufacturers, including almost a dozen kit manufacturers, are turning out transceivers at a rapid rate. Prices range from about \$40 to \$90 for build-it-yourself kits, and from about \$80 to over \$200 for commercially-assembled units. These are basic prices which do not include such optional accessories as high-gain antennas, mounting brackets for mobile installations, etc. Moreover, the prices are for single units only, and it takes two or more transceivers to set up a communications system. Considering this wide selection, the prospective C/B operator is immediately faced with the problem of what to buy and how much to spend.

How far will it transmit? This is the first and most important question you'll probably ask when evaluating C/B equipment. And, strangely enough, it's one of the few questions that can't be answered with any degree of accuracy. The Citizens Band, according to the FCC, is designated for short-range communications only, and there's a top limit of five watts on the amount of power that can be applied to the final amplifier of the transmitter.

**For business or pleasure, the new Citizens Band is open to almost everyone for personal radio communications.**



Now five watts isn't a great deal of power. Virtually every transceiver made, except for some transistorized "walkie-talkie" types, operates with maximum allowable power. That means that the transmitting range of most equipment is approximately the same. If you were to monitor the signal from a number of different C/B transmitters, all connected to the same transmitting antenna and adjusted for optimum performance, you wouldn't be likely to notice much change in signal strength. Fact is, the transmitter portions of C/B transceivers are so closely controlled by FCC regulations that there isn't much difference between the various types. At least, not so far as range is concerned.

The principal differences in transceivers is in the receiving circuitry. These account for the major cost variations and may influence your ultimate satisfaction with the equipment you buy.

Transceiver receivers fall into two general classifications. The least expensive are the superregenerative receivers which once enjoyed tremendous popularity among radio amateurs. In kit form, transceivers with superregenerative circuits cost about \$40; commercially assembled, they run from \$80 to \$100—per unit. In many applications, these give the more elaborate and far costlier circuits some real competition. Among their advantages are simplicity, low power consumption, inherent a.v.c. action which reduces fading, and an order of sensitivity which approaches that of the most involved circuits. But on the other side of the ledger, there are some drawbacks which should make you think twice before investing. Most important is lack of selectivity.



## TYPICAL C/B TRANSCEIVERS



Most, like the Town and Country, are designed for both fixed and mobile operation



A few transistorized units are for limited-range, portable applications. . . . Some, like the Seiscor unit shown below, are particularly suited for special purposes



In the Citizens Band, where 22 closely controlled channels are packed into a spectrum space of only 260 kilocycles, selectivity can be of the utmost importance. With a superregenerator it is impossible to eliminate interference from adjacent channels. Even stations several channels away may block reception at the desired frequency. In urban areas where C/B communications is, or may soon be, in widespread use, superregenerative receivers may prove to be more troublesome than useful.

Another disadvantage is the high background noise level of such sets between transmissions. Since the equipment is usually left on for hours at a time, this can become somewhat annoying in both fixed and mobile operation. Where the noise can be tolerated, however, and in areas where there are likely to be few other sets operating within a 20-mile radius, the superregenerative set will operate as efficiently as any other.

The disadvantages of the superregenerators are overcome with a well-designed superheterodyne receiver. In such sets, the incoming 11-meter signal is mixed with an oscillator signal within the receiver and reduced to a much lower frequency at which most of the amplification takes place. At this low intermediate frequency (i.f.), adjacent-channel separation is no problem and most sets feature excellent selectivity. They're more expensive, of course, with prices ranging from \$60 to \$90 for kits and up to \$200 for factory-wired units.

In the upper region of the superhet price-range are the double-superheterodynes—the dual conversion jobs. These have two built-in oscillators and, consequently, a two-step frequency reduction. The first intermediate frequency is a relatively high one which gets rid of undesired image signals that sometimes sneak through an ordinary single-conversion circuit. The second i.f., a low one, provides the necessary selectivity for the rejection of other C/B stations. Ordinarily, the double superhet provides the ultimate in selectivity and sensitivity. But it's also the most expensive, and brings up the question, is it worth it?

The answer to that question depends on the area in which the equipment is to be used and your particular applications. To be perfectly candid, the estimated reliable range of C/B transceivers, even under favorable conditions, is about 10 miles. Over water it may be substantially greater while in hilly terrain or in urban areas it may be considerably less. With inefficient antenna systems, such as might be used between two mobile stations, a range of two or three miles is more normal. And the range doesn't depend as much on the type of circuitry as it does on the antenna.

Where, then, do the price variations come in? Some of them, of course, show up in the receiver circuitry, but there are other features which are equally important. Here are a few of the things you should consider before making your selection.

1. Power supply
2. Relay operation
3. Noise-limiting features
4. No. of channels
5. Receiver tuning

1. When you buy a transceiver, or a pair of them, you probably have a particular application in mind.





In selecting your equipment, make sure it operates from the available power source. And few people can drive a car, hold a microphone, and manipulate a panel-mounted send-receive switch simultaneously

Perhaps you want to install one in your home or office, with the other unit in your car. Maybe you want to communicate between two or more mobile units. In either case, you'll have to decide what kind of power is available to operate the sets.

By far the majority of transceivers are designed for 115-volt a.c. operation with separately available converters for mobile installations. Some, however, have built-in power supplies for both fixed (115-V.) and mobile operation. This, of course, increases the price—but also the versatility because the same unit can be used in home or car without additional accessories.

**Suggestion:** When comparing prices, be sure to include the cost of any auxiliary power supplies you may need.

2. Most factory-wired units include relays which permit rapid switching from the "receive" to the "transmit" position by means of a button conveniently located on the microphone. With some kits, however, the "transmit-receive" switch is located only on the main unit. Now this doesn't present much of a problem in the home, but in a car a microphone switch is virtually indispensable.

3. The noise level on the Citizens Band is quite high. In addition to the natural and manmade static, the high sensitivity of C/B receivers causes tube and parts noises to be amplified much more than in an ordinary radio. Unless there are special precautions this background noise level can become extremely annoying.

Superheterodyne receivers usually incorporate two special circuits for keeping this noise at a minimum. They're called "squelch" and "automatic noise-limiter" circuits and they're quite effective. The squelch circuit operates to cut out the audio portion of the receiver in the absence of a radio signal. This may be done either mechanically, with a relay, or electronically, with a gate circuit. The speaker, therefore, is virtually silent until a signal

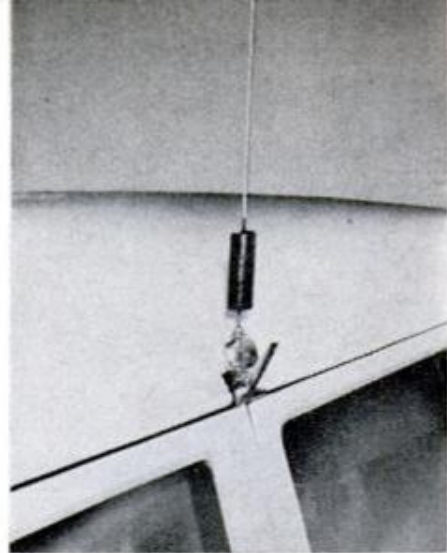
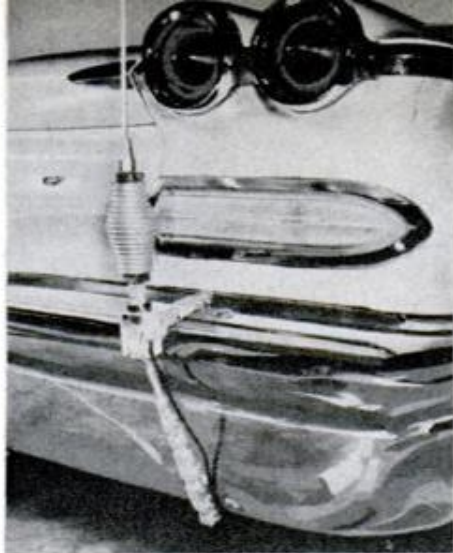
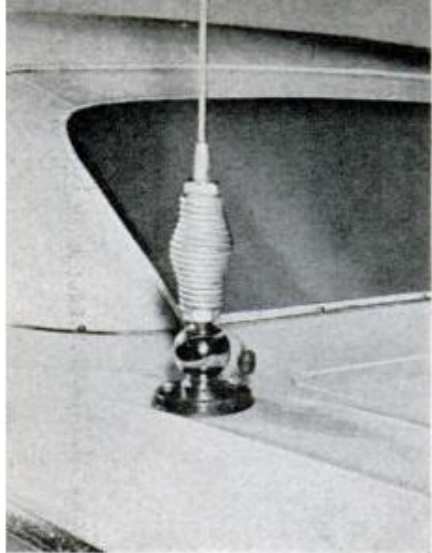
is received, at which time the squelch circuit is disabled automatically and normal reception is obtained.

The noise-limiter circuit does not affect the background noise in the receiver, but it does reduce the noise and static that comes riding in with the signal. Unlike FM signals, AM reception, such as used in C/B radio, can never be entirely noise-free. The noise limiter, however, clips off excessively strong noise bursts and makes the reception of speech far more intelligible.

4. The Citizens Radio Service is intended for private point-to-point communications. While there are few restrictions on the actual use of the band, a general call of "CQ," that time-honored call of radio amateurs inviting others to tune in for a gab-fest, is definitely prohibited.

The majority of transceivers are designed for single-channel operation only. You can choose the channel you wish to employ by specifying a particular crystal frequency at the time of purchase, but once you've made your selection, the frequency cannot be conveniently altered. This insures quick, simple and reliable performance which is perfectly adequate for most purposes. There are instances, however, where it might be desirable to operate on more than one channel. In cases where a particular channel may become crowded or blocked by interference at certain times, a convenient way of switching to some other channel is very useful indeed. And there are a number of transceivers with provisions for up to six-channel selectivity. You'll pay extra for any added crystals, but the advantages may offset the extra cost.

5. In most transceivers the receiving sections like the transmitters, are crystal controlled. The advantages—drift-free reception which is always tuned to the proper channel. There are others, however, in which crystal-controlled receivers are combined with manual tuning, and still others which employ manual tuning only. Among



Utica Communications Corp. photos

Mobile antenna installations are extremely flexible. Rear-deck mounting, left, requires hole in car body. Bumper mounts, center, and rain gutter clamps, right, can be installed without defacing car in any way

the latter are a number of superregenerative sets in which receiver tuning is not at all critical. In the more selective superhets, manual tuning permits monitoring the entire Citizens Band, though you can transmit only on those channels for which transmitter crystal and channel positions are available.

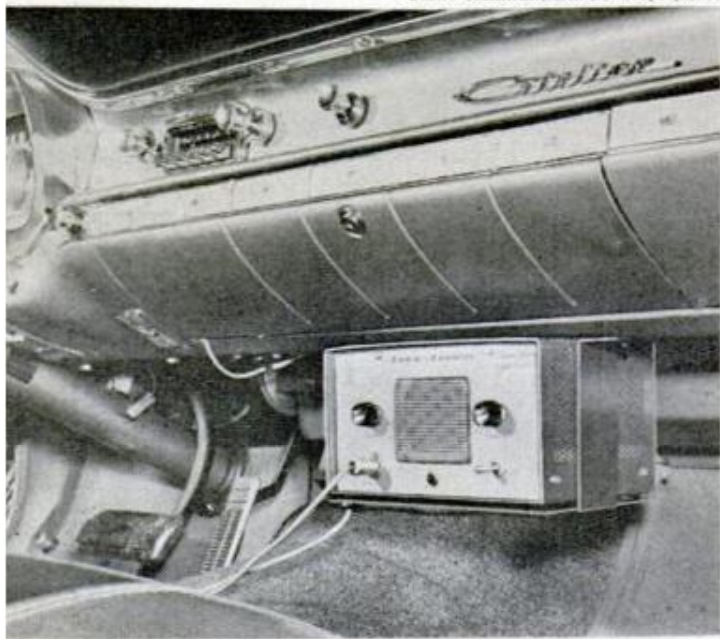
For mobile operation, manual tuning is recommended only if supplemented with a fixed-tuned, crystal-controlled receiver position. The bouncing of a boat or car could easily jar the tuning capacitor out of position, thus necessitating elaborate re-tuning for proper, single-channel reception.

### Selecting the Antenna

Antennas for the Citizens Band are available in a wide variety of sizes and configurations. Most popular for mobile operation are the whip antennas which look very much like the automobile antennas used for

In a typical mobile installation, transceiver fits into U-shaped bracket fastened under dashboard

Utica Communications Corp. photo



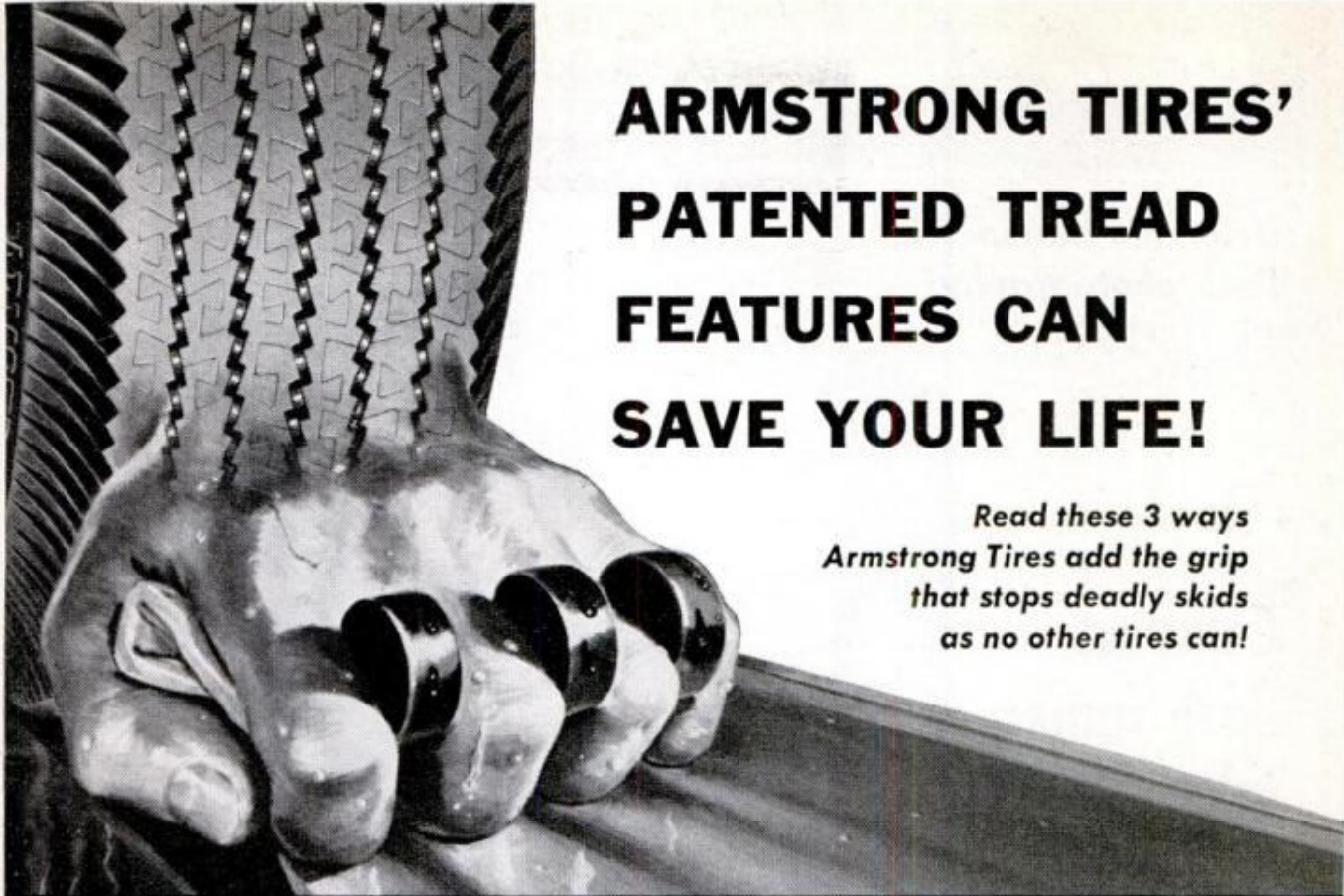
broadcast-band reception. The ordinary car antenna, however, just isn't long enough or efficient enough to do even a reasonably good job.

The most efficient type of basic antenna is approximately  $\frac{1}{2}$  wavelength in length. At frequencies of 27 megacycles this would mean an antenna length of about 17 feet which is obviously impractical for mobile mounting. Instead,  $\frac{1}{4}$ -wavelength whips,  $8\frac{1}{2}$  feet long, are generally employed. In theory, these can be made nearly as efficient as the  $\frac{1}{2}$ -wave units because the car body itself simulates the missing  $\frac{1}{4}$  wavelength. In practice, however, a considerable efficiency loss, often as much as 50 percent, is encountered. Still,  $\frac{1}{4}$ -wave whips are usually capable of satisfactory results.

Where the length of a mobile antenna must be kept below  $\frac{1}{4}$  wavelength, base-loaded antennas can be used. In such units a small coil built into the base of the whip extends the apparent electrical length of the antenna to the proper dimension. Due to the shorter physical length, however, such antennas are not as efficient as their  $8\frac{1}{2}$ -ft. counterparts.

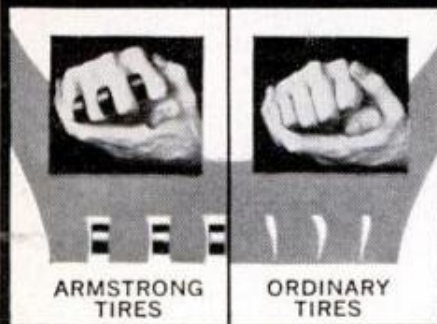
For fixed operation, where the antenna may be permanently installed on a roof top, several configurations are available. Most popular of these is the  $\frac{1}{4}$ -wave, ground-plane type which consists of a center,  $\frac{1}{4}$ -wavelength whip with several radials attached near the bottom and extending away from the center element. The radials act as a simulated ground which supplies the missing  $\frac{1}{4}$  wavelength. Because the antenna is mounted on the roof and, preferably, away from signal-absorbing surrounding objects, they are much more effective than the ground-based antennas mounted on cars or in boats.

For greater efficiency, an 11-meter beam  
(Continued to page 220)



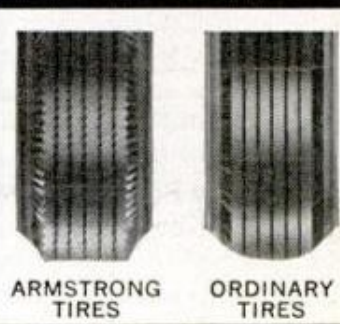
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Another extra: Armstrong's anti-vibration tread cancels noise! No hum, no drone — you ride on a whisper. And compare Armstrong's ironclad guarantee! See your Armstrong dealer — listed in the Yellow Pages.

Get this extra safety at no extra cost!

# ARMSTRONG TIRES

**grip the road to stop deadly skids as no other tires can!**

**Armstrong Rubber Company, Home Office, West Haven, Conn.**

# New Ideas in Photography

**Dramatic advance in flash photography!**

## Compact flash camera takes bright, full-size pictures

**—uses bulbs as small as jelly beans**

Meet the smallest camera with built-in flash in Kodak history!

The new Brownie Starmite Camera fits in your palm or pocket—yet uses regular 127 film for big prints or super-slides. It's always ready—indoors or out, day or night.

The built-in reflector is only two inches across. With tiny low-cost, zirconium-filled AG-1 flashbulbs, it can flood a room with light. Flash exposure data is printed right on the camera itself.



New Brownie Starmite Camera—so small it fits *inside* an old-type 5-inch reflector.

No focusing. Just aim through the big viewfinder and press a button. Results? Beautiful color or black-and-white snapshots, or color slides—12 pictures to a roll. And it costs only \$10.50.

For the same efficient flash system, but even larger pictures on 620 film, see the Brownie Flashmite 20 Camera, \$14.95. Or ask about equipping your present camera with the \$3.95 Kodak Supermite Flashholder that uses the same new AG-1 bulbs.

*"Picture it now—See it again and again."*



New Kodak projector adds sound to 8mm movies.

## New Alloy Brings Quality Sound To 8mm Home Movie Projection

A new metal alloy developed by the Navy—called Alfenol—has led to a major breakthrough in magnetic sound reproduction.

Used in the magnetic recording head of the Kodak Sound 8 Projector, it lets you add sound to 8mm movies with exceptional realism.

Alfenol is "soft" magnetically, so it assures high-quality sound reproduction. And it is physically very hard, making it virtually impossible to wear out. Kodak Sound 8 Projector costs \$345.

# from Kodak

## Atomic "Missing Links" Are Found Through Bubble-Chamber Photographs

The birth and death of an invisible atomic particle called the "anti-lambda" was recorded recently on Kodak film. ▶

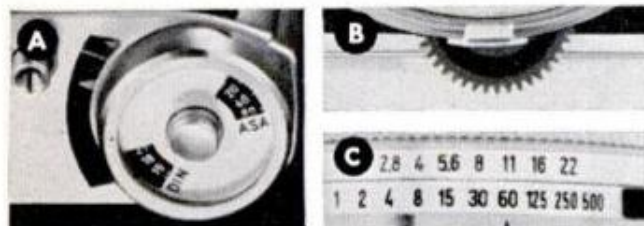
The particle was released by the action of a giant 6-billion-electron-volt accelerator discharged in a bubble chamber of liquid hydrogen. The particle left a trail which could be captured and studied only through photography.

To get the pictures, physicists chose Kodak Linagraph Shellburst Film, originally created to analyze anti-aircraft explosions. Its fast speed, high contrast, and moderate grain helped lead to this atomic discovery.

Knowledge gained by Kodak in developing such specialized products for science and industry assures ever-finer films for amateur use.



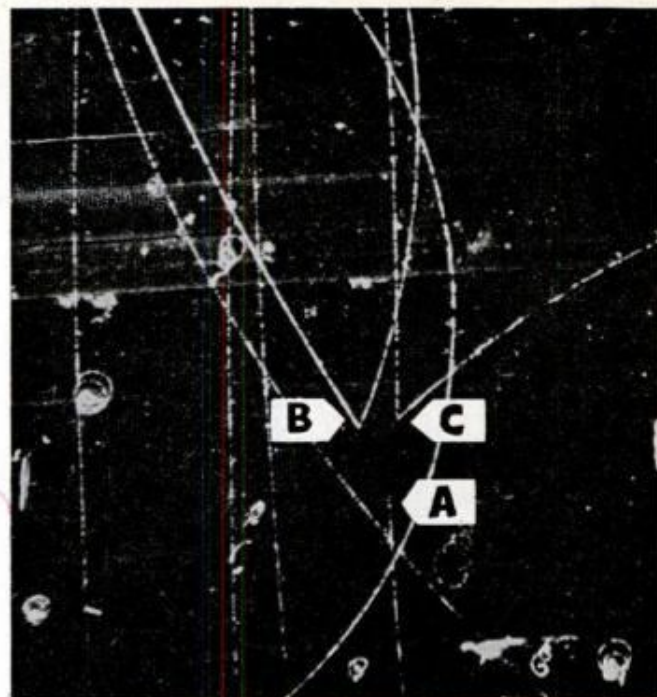
New Kodak Retina Reflex S with built-in meter.



**For exposure control**, aim the camera at your subject. You will see the meter needle move in the window (A). By turning a finger-tip wheel (B), you cover the meter needle with a pointer. This automatically gives you the right lens opening. If you change shutter speeds (C) the lens opening readjusts automatically.

**EASTMAN KODAK COMPANY, Rochester 4, N.Y.**

See Kodak's "Adventures of the Nelson Family" and "Ed Sullivan Show"



**Bubble-chamber picture** shows point (A) where lambda and anti-lambda particles were produced. Since both are neutral electrically, they left no tracks until decaying into particles leaving tracks (B) and (C)

## Change Camera's Shutter Speed— Lens Opening Adjusts Automatically

Why is one of the world's most advanced and versatile cameras so remarkably easy to use?

Partly because the new Kodak Retina Reflex S Camera has *photoelectric* exposure control with all lenses, all shutter speeds, all films.

Partly because you aim directly through the lens, see your subject natural size. And your view is clear even in dim light. The automatic diaphragm keeps the lens *wide open* until you snap the picture.

You focus either on ground glass, or with a critical split-image rangefinder. Automatic indicators show near and far limits of sharpness.

Speed settings go from one second to 1/500, and a scale shows exposure needs up to 250 seconds for dim-light or small-aperture shooting. Interchangeable lenses from 28mm to 135mm are available as well as specialized aids.

See the great Kodak Retina Reflex S. With 50mm *f*/1.9 lens, \$235. With 50mm *f*/2.8 lens, \$199.50, or as little as \$20 down.

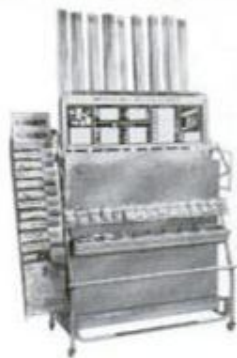
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Here are two unique plans for cool-of-the-evening relaxing. Build electric or candlelight patio lamps. It's easy and inexpensive with rustproof Reynolds Do-It-Yourself Aluminum. Do a professional job in a few hours with ordinary wood-working tools and free plans.



Look for this rack at hardware and building supply stores. Your dealer has advice, material and plans for patio lights . . . or mail this coupon.

Reynolds Metals Co., Richmond 18, Va.

Please send Do-It-Yourself Aluminum How-To booklet with FREE patio light plans.

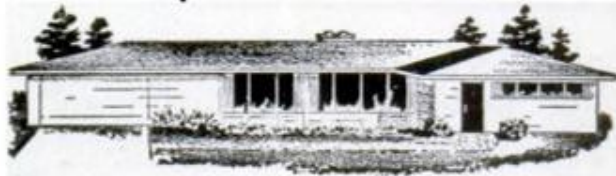
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City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Dept. PM

# Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

## Air Bubbles In Concrete Mold



**Q**—I'm making some ornamental pieces in cast concrete and I'm having trouble with air bubbles in the bottom of the mold. I tamp the freshly poured mix thoroughly but still my casting turns up with air holes in the bottom, which is round and about 12 in. in dia.

**A**—Another item I'm making is poured in a shallow mold about 4 in. deep and about 20 x 30 in. in over-all size. Occasionally I get air holes in this casting. Is there not some way of vibrating the mold to eliminate the bubbles?—O.R., Pa.

**A**—You do not say what you are using as a tamper or what type of mix you are using. We do not know, of course, but we would be inclined to guess that the type of tamper you are using does not reach the bottom of the mold to release the air bubbles. A drain spade usually is best for use as a tamper in any mold large enough to admit it. Otherwise use a short length of steel angle, a piece of flat steel, a sidewalk scraper. Such tampers have more the effect of a vibrator than that of a tamper. Undue use of a tamper should be avoided as this tends to separate the cement and finer particles of sand (fines) from the coarser particles in the mix. Also, you may find it to advantage to use a heavier mix, that is, less water than normally required. This will give you a heavier, drier mix in which bubbles do not form so readily.

## Removing Stain From Marble



**Q**—I have a marble-topped coffee table and the marble top is rather dull and lusterless, not at all like it was when new. Also there have recently developed several stained areas, two of which are of a definite circular shape and the others are of more or less irregular shape and appear to have been made by spilled liquids. But how does one clean marble, remove the stains, and restore it to its original luster?—L.D. La.

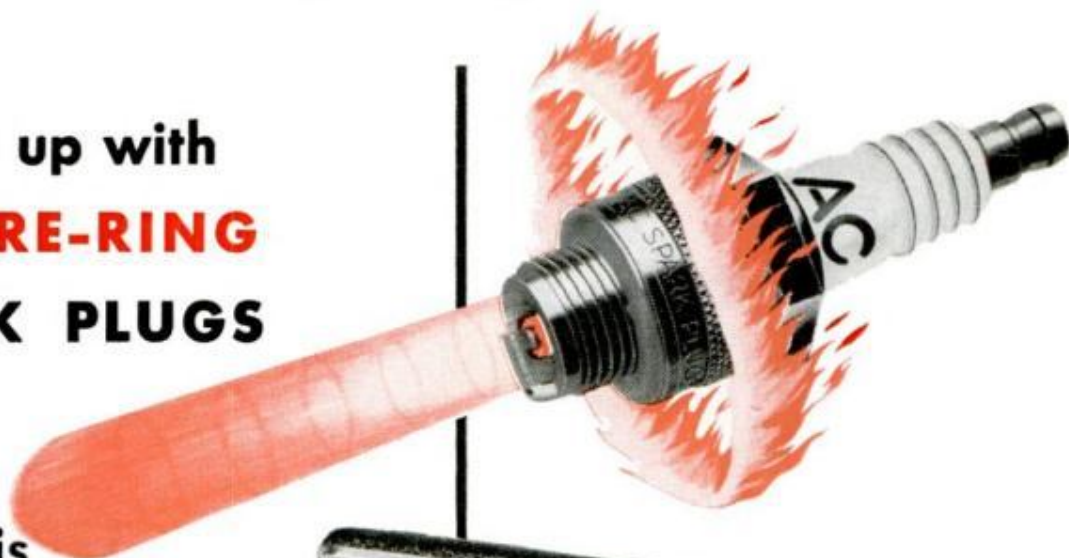
**A**—If marble tops are neglected, that is, not cleaned periodically they tend to become dull and of course the surface acquires small scratches from everyday use. Stains are something else again. The problem is what caused the stain and what method

(Continued to page 214)

# Get better engine performance!

Tune up with  
**AC FIRE-RING  
SPARK PLUGS**

... and this  
**SPECIALLY PRICED  
CAM-DWELL  
INDICATOR!**



Here's a way to put your car in tune for summer driving — and keep it that way all year around. First, replace your worn spark plugs with new AC Fire-Ring Spark Plugs. Second, check your distributor point setting with this specially priced, Cam-Dwell Indicator.

AC Fire-Rings give you extra performance from a host of extra-quality, built-in features, such as AC's exclusive Hot Tip that heats faster and cools faster to burn away fouling deposits. AC's Cam-Dwell Indicator is a pocket-size professional model that home mechanics can use to put automobile ignition systems in tip-top shape.

Order your Cam-Dwell Indicator now. Get new AC Fire-Ring Spark Plugs from your nearest AC dealer — and be on your way to extra driving fun.

The AC Cam-Dwell Indicator comes with complete instructions, and for a limited time, you can get it *plus* this deluxe hard-cover, 48-page, full-color AC Space Age Atlas, for the low, low price of only \$3.98.\*

*\*Includes all sales tax and handling charges.*



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Please send me \_\_\_\_\_ AC Cam-Dwell Indicator(s) and Space Age Atlas(es) at \$3.98\* per set. Enclosed is check , M.O. . Make check or money order payable to: AC Spark Plug Division.

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a wire-stripping notch

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You'll strip off plastic insulation quick as a wink—clean and smooth—with the patented wire-stripping notch of this CHANNELLOCK Diagonal Cutter. And you'll like the handy long reach . . . the precision-matched, hand honed cutting edges, too; A versatile cutter for electrical, radio, TV, Hi-Fi and all other types of electronics work. Comfortable, blue-plastic grips. Top quality, polished forged steel. Ask your tool supplier for a CHANNELLOCK No. 728 Diagonal Cutter. If he's out of them, ask him to order one for you.



Write for Catalog of  
Complete Line of Pliers

**CHAMPION DEARMENT TOOL COMPANY**

Meadville 1, Pennsylvania

should be used to remove it. Common sources of stains on a marble coffee table top would likely be alcohol, tea, coffee, soft drinks with citric acid in their content, some fruit juices and certain foods containing natural oils such as peanut butter, salad oils, and cream. Some fruit juices may contain sufficient acid to actually etch the surface of the marble. Removing a stain usually requires application of a poultice made by applying hydrogen peroxide (hair-bleach strength) and a few drops of ammonia to a pad made by stacking white paper napkins to several thicknesses. Lay this pad, or poultice, over the stained area and weight with a pane of glass or anything that will not absorb the liquid. Leave the pad on overnight. Then remove and wash the area with clean water. Repeat, if necessary, to remove all the stain. Oil stains usually can be removed by rubbing the area affected with a soft cloth dampened with amyl acetate or acetone, or both in about equal amounts. Old oil stains probably will require poulticing with acetate. Scratches and shallow etching can be removed with a very fine abrasive such as 8/0 sandpaper or an aluminum-oxide abrasive of finer grade. Marble tabletops such as yours should be cleaned each time after use. The top should be thoroughly washed with soapy water and rinsed. Twice a year, or more often, the top should be washed with a detergent. Often marble, particularly white marble and also grey marble of a light color, may appear to be stained when actually the discoloration is due to the ageing of a wax coating. Wax coatings should be removed with pure turpentine and the marble washed and polished with an abrasive paste made by mixing rottenstone or very fine pumice with a polishing oil. The abrasive paste must be removed immediately after using and the marble washed with soapy water, then with clean water.

#### Refinishing Old Bike



Q—I have an old bicycle which I would like to refinish so that it appears new again, or reasonably so. It's in rather rough condition—wheel spokes rusty in places, frame finish rough and peeled back to the metal here and there, plating pitted and wheel fenders bent out of shape. I can take care of the new parts required such as the handlebar grips, tires,

seat, but how do I go about preparing and refinishing the other parts?—K.S., Colo.

A—By careful use of abrasive paper, fine steel wool, metal-polishing compounds and pressurized cans of enamel and clear finish, you can work wonders with an old bike. But it's going to take some doing to get a neat, professional job of refinishing and it should be kept in mind that the best finish you can apply won't equal the original for durability. If plated parts are badly pitted by rust, then there is little you can do to improve the surface. It is perhaps best to plan to coat these surfaces with an aluminum enamel. The frame, fenders and rims which have been finished in a baked enamel can be cleaned up with fine abrasive cloth and steel wool and first coated with a metal primer, which is also available in a pressurized container. In this preliminary cleaning up, it pays well to do a thorough job. Feather out the original paint or enamel into any bare spots so that you get a smooth job in the refinishing coat. Do this with abrasive cloth and fine steel wool. Be sure to abrade all the scratches out of those parts on which the original enamel remains. Otherwise these will show under the refinishing coats, even very fine scratches such as those left by the coarser abrasives or steel wool, must be entirely removed. Use a metal-polishing compound to remove superficial rust coating from wheel spokes, hubs, handlebars and any other plated parts. Then coat these parts with a clear finish such as metal lacquer, or a clear plastic spray which is available in a pressurized container. When spraying the frame with primer, protect other parts from over-spray by wrapping with masking tape. If you use more than one finish coat, be sure to allow ample drying time between coats.



**"Kept ice for days in Death Valley heat"**



**Coleman** SNOWLITE cooler

*"I really am sold on the Coleman cooler. Took it to Death Valley with me. A 25-pound chunk of ice lasted all week, and I threw away half of it on my return!"*

So a famous traveler writes about the Coleman SnowLite Cooler. It's the most efficient cooler under the sun. The reasons? Therma-Lock insulation and Coleman seal-tight construction. Leakproof white Royalite liner won't pick up odors, can't rust, easy to clean. Scuff-proof, rust-proof Royalite base. 7 and 14-gallon capacities. Pink, green or charcoal.



**Another cooling champion — Coleman SnowLite Jug**

Holds heat or cold up to 115% longer. The only jug 100% insulated from neck to base. Tough Royalite base won't scuff or rust. The only jug that pours like a pitcher. Also in faucet models—1 and 2 gallons. Choice of pink, charcoal or green.

At sporting goods, hardware and department stores everywhere. Ask your dealer or write . . . Dept. 082-PM.

**The Coleman Company, Inc.,** Wichita 1, Kansas

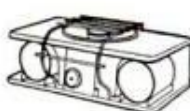
Other famous Coleman Outing Products . . .



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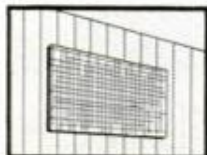
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# INSTALL THIS JBL STEREOPHONIC HIGH FIDELITY LOUDSPEAKER WHERE YOU CHOOSE

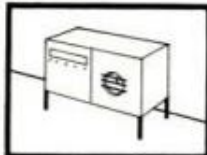


JBL  
LINEAR-EFFICIENCY  
MODEL LE8 FULL RANGE  
8" PRECISION  
LOUDSPEAKER

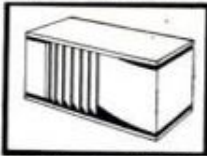
The JBL Linear-Efficiency Loudspeaker was designed expressly for you, the home craftsman. You can install it just about anywhere and still enjoy the clean, rich, deep down bass; the brilliant, smooth treble; the full, accurate mid-range which have long distinguished the precision loudspeakers made by James P. Lansing Sound, Inc. You can design your own acoustical enclosure in virtually any shape and form that suits your fancy. The main requirement is that 1½ cubic feet of air or more be enclosed back of the speaker. And with so little volume required, everyone has room for the two speakers needed for a stereo installation. Start with one, add the second later, if you wish. The JBL LE8 is indeed a fine instrument, one worthy of your finest cabinet workmanship.



in a wall.



in your own cabinet.



in a JBL acoustical enclosure.

**JAMES B. LANSING SOUND, INC., LOS ANGELES 39, CALIF.**

I want to learn more about the Linear-Efficiency Loudspeaker and how to install it. Please send Bulletins SC508, SB1019, SB1016, SB1017, SB1018 by return mail.

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## It's Spoonbill Time

(Continued from page 112)

Opening day in the spring season always yields phenomenal catches. Last year, despite low water and a heavy snow that blanketed a three-state area the night before, over 200 "spoonies" were weighed in at Conservation Commission stations and in years past the opening-day catch has run as high as 700. At the rate they are taken out, one would think the schools would eventually be depleted but there is no indication of that yet.

Many people swear the meat of the spoonbill far surpasses that of the famous Midwest delicacy, channel catfish, and there was a time when restaurants in cities and towns along the rivers featured spoonbill on the menu in preference to catfish. Certainly it must be good eating because the spoonbill fisherman wants something more than just the sport for all the work he must go through to land one.

Sometimes, though, there is the fisherman who hankers for big-game fishing but can't afford it. For those guys spoonbill fishing is just about as much like ocean fishing as you can get anywhere inland. If you don't believe it, take a trip to Warsaw some time when the season is on and have a look for yourself. These spoonies will make your jaw drop, your eyes pop. You haven't seen anything like it. ★ ★ ★

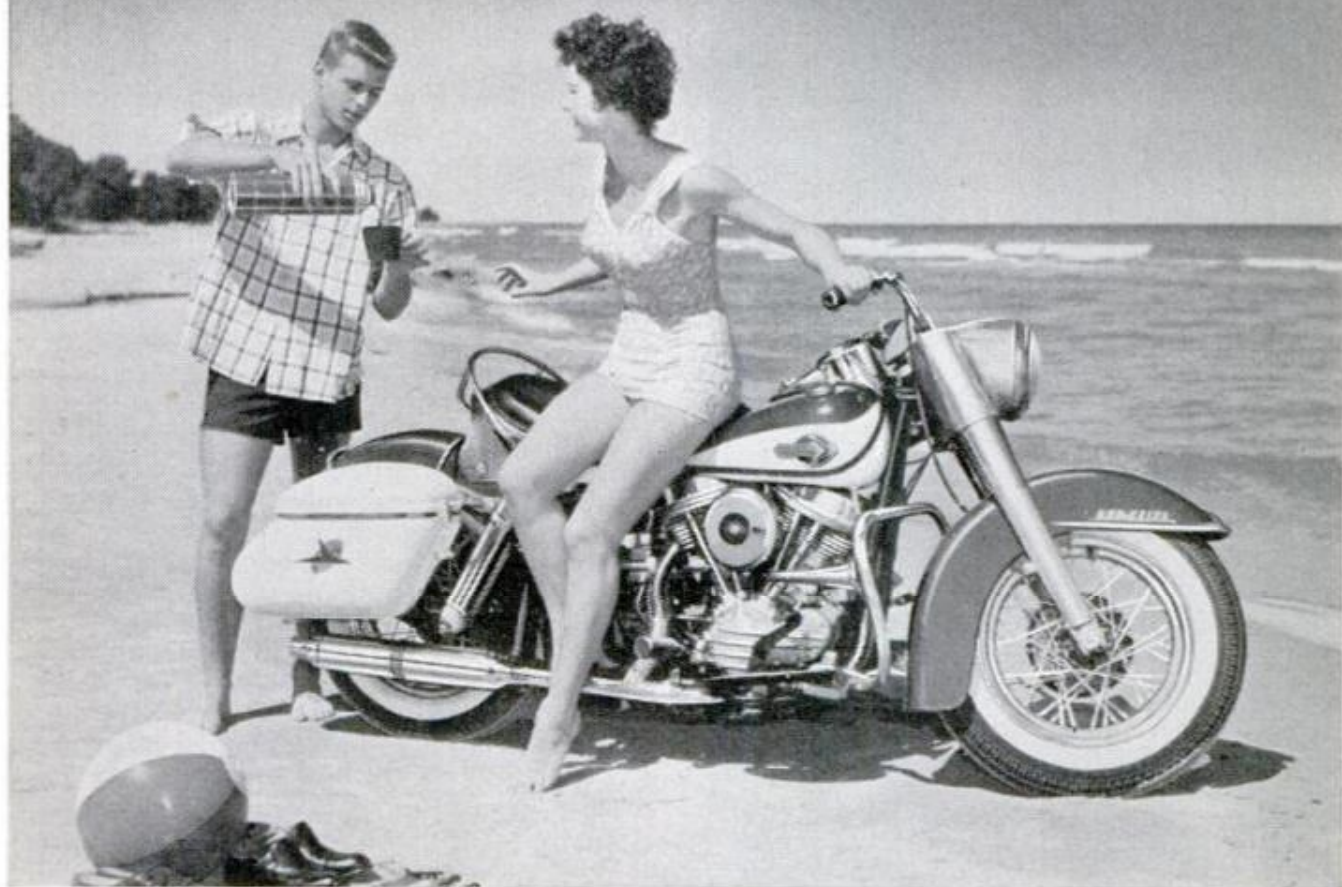
## This Month's "Great Pioneer in Science"

(Page 24)



**Guglielmo Marconi (1874-1937)**

**Fun way to  
reach a beach...**



## **on a HARLEY-DAVIDSON Duo-Glide**

A gal, a beach and a Duo-Glide — it's the perfect combination for a perfect day. But then any destination *is more fun getting to* on a Harley-Davidson Duo-Glide.

You travel in style when you go Duo-Glide — gleaming headlight nacelle and twin-flare paneling blend into a bold new look. Once in the saddle, you'll like the way the big 74 OHV engine flattens out hills, flashes you ahead of traffic. Built for comfort, too! Duo-Glide 3-point suspension smooths out bumps — floating comfort for rid-

ing both solo or double.

Be proud in the saddle — test-ride the exciting new Duo-Glides (both standard FL and super-powered FLH models) at your Harley-Davidson dealer today. Or mail handy coupon for colorful, new folder.

**HARLEY-DAVIDSON MOTOR CO.**  
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Send me more facts on the luxury cruiser of motorcycles, the Harley-Davidson Duo-Glide.

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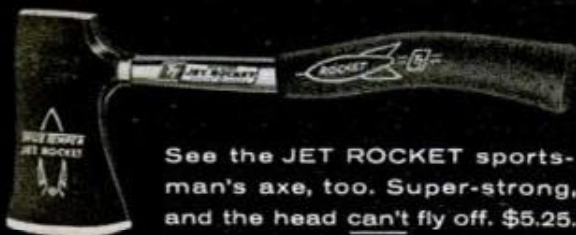
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## Shake hands with a JET ROCKET

You can feel the dynamic power and balance in this famous tool. You'll enjoy the aliveness of the JET ROCKET as it centers the power of your swing and smoothly absorbs impact shocks.

Head is permanently locked to tubular-steel handle. Comfortable cushion grip won't slip, even when wet. Shake hands with a JET ROCKET at your favorite hardware store today. True Temper, 1623 Euclid Avenue, Cleveland 15, Ohio.

\$4<sup>49</sup>



See the JET ROCKET sportsman's axe, too. Super-strong, and the head can't fly off. \$5.25.

**TRUE TEMPER**  
THE RIGHT TOOL FOR THE RIGHT JOB

## Dry Up Your Basement

(Continued from page 175)

Fig. 8, which may require several days. The pump should be operated to keep the water level well below the level of the floor until a few days after it has been laid. When laying a new floor a sewer backwater valve can be installed if this is deemed advisable. After the floor has been laid, it may still be necessary to seal the wall-to-floor joints with waterproofing compound.

Besides the damage caused by sewage backing up into basements, the resulting pollution is a health hazard. The most effective way to avoid the trouble permanently is to install a backwater valve in the house drain, Fig. 10. They permit drainage toward the sewer but close automatically when the flow is reversed. Fig. 9 shows a backwater valve installation just inside of the foundation wall, which not only makes the valve accessible but also provides a relief outlet. The latter protects the drainage line and valve against damage from sudden high-pressure backflow. A backwater valve should be installed only when the house drain and the house sewer are cast-iron pipe.

If it is not desired to go to the trouble of installing a backwater valve and cast-iron pipe, a considerable degree of protection against sewer backflow can be provided by "standpipes." These are 3 or 4-ft. lengths of pipe screwed into threaded floor drains, allowing backflow to rise in them. A toilet in the basement will reduce the overflow level to the rim of the toilet bowl. In extreme cases of backflow where sewage overflows the standpipes, a number of small holes in the floor at inconspicuous locations have been found helpful for drainage. However, such drain holes defeat the purpose of a thorough waterproofing job if the basement is periodically subject to seepage from ground water. Then the installation of a sump pump is always to be recommended.

About the most practical manner to dispose of excessive moisture in basement air is to provide an electric dehumidifier. When condensation on cold-water pipes is experienced occasionally during warm weather, it can be stopped by wrapping the pipes with insulation and a vapor barrier. A number of antidrip pipe coverings are available from hardware stores. ★ ★ ★

Night crawlers are sensitive to bright light and scurry when caught in the beam of a flashlight. To fool them and yet have ample light to see them, subdue the light by covering the lens with a red-plastic drinking cup or a piece of red cellophane.

*Aluminum Paint  
now in colors!*



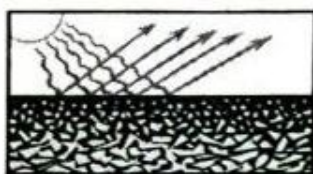
## Paint an aluminum roof onto your home

Here's a tough, weatherproof, metallic shield you brush, spray, or roll on: paints and roof coatings made with Reynolds Aluminum Pigment, now offered in colors.

The aluminum flakes in these paints and coatings form a continuous protective shield over the surface—weatherproofing, protecting, beautifying.

They'll help prevent rust, corrosion and decay on metal, masonry or wood surfaces. And they'll reflect the sun's radiant heat for better insulation.

Write today for names of leading brands: *Reynolds Metals Company, P.O. Box 2346PB, Richmond 18, Va.*



Aluminum flakes form protective shield on coated surface.



# REYNOLDS ALUMINUM

Watch Reynolds TV shows: "ADVENTURES IN PARADISE", "BOURBON STREET BEAT" and "ALL STAR GOLF"—ABC-TV

## Your Personal Radio Network

(Continued from page 208)

antenna may be employed. Such units consist of a  $\frac{1}{2}$ -wavelength antenna element with an added director and reflector similar to some of the TV antennas currently in use. These antennas are best suited for communications between two fixed stations since, like TV antennas, they are highly directional and radiate and receive signals only from one direction. For best results, they require careful orientation but, properly installed, they provide exceptional results.

### Installation

Installation of C/B antennas for fixed operation follows techniques similar to those employed for TV antennas. They may be mounted on short masts or fastened to chimneys or vent pipes. The major difference is in the lead-in which consists of 52-ohm coaxial cable rather than 300-ohm twin-lead. It is not necessary, therefore, to keep the lead-in away from metal conduit or other metal parts which would absorb energy from ordinary 300-ohm line.

For mobile car installations, there are several possibilities, as illustrated on page 208. The permanent installation, with the antenna mounted on the cowl or rear deck of the automobile, is preferable where there are no objections to drilling a hole in the car body. Alternatively, rear-bumper mounting is usually quite suitable for  $\frac{1}{4}$ -wave whips. For temporary automotive installations, special clamps fastening the antenna to the rain gutter of a car are available. In addition, most transceivers have provisions for fastening the antenna directly to the unit itself. This is often desirable in boats where the transceiver is not permanently installed.

### Using the Citizens Band

While radio communication on the Citizens Band has virtually unlimited possibilities, it was definitely not intended as a hobby, or for technical experiments, or for general "contacts" of a random nature. The FCC has been quite liberal in sending out violations notices to C/B operators who ignore this restriction. Repeated willful violation of this rule is cause for having the station license revoked and can, in extreme cases, result in fines or even jail sentences. Specifically, the regulation states that "except for brief test transmissions or emergency or civil defense communications, transmissions must be addressed to specific persons or stations within the normal groundwave coverage

range." This does not mean, however, that the operator may never communicate with stations outside his own specific network. There are instances where motel operators and service stations advertise the call signs of their citizen radio stations so that they may be contacted by passing, radio-equipped motorists. This type of station-to-station call is perfectly legal, as is a general call for assistance in the event of emergencies involving the safety of life or the immediate protection of property.

The Class D Citizens Radio Service is still in its infancy. The future may bring changes for the improvement or extension of the service. Proposals before the FCC would designate and allocate specific channels within the band solely for emergency purposes or for commercial enterprises such as gas stations and motels, or the use of boats, etc. Whether or not such proposals will eventually be adopted, the Citizens Radio Service seems destined to play an important role in our communications setup. ★ ★ ★

## Bacteria From Earth May Exist on Moon

Many varieties of bacteria found on earth could survive on the moon, say two researchers who also caution that man-made rocket ships might carry bacteria to the moon where they would survive.

Drs. Stephen Zamenhof and Sheldon B. Greer, biochemists at Columbia University's College of Physicians and Surgeons, found that many types of bacteria can survive heat as intense as that presumed to exist in sunlight on the surface of the moon. Many scientists believe this temperature to be well above the boiling point of water. Many bacteria, the two men found, survived in a vacuum when the heat reached 275 degrees F., 63 degrees above the normal boiling point of water at sea level. They conclude that many bacteria should be able to survive in the dry state of a vacuum on the moon.

It was previously assumed by many scientists that only bacteria spores survived high temperatures. (Spores are a form of bacteria extremely resistant to heat, chemicals and radiation.)

This information could mean that earth-bacteria are growing on the moon now—if the decontamination processes of the Russians failed. U.S. scientists assume, however, that the Russian rocket that crashed on the moon last September was sterile. But if the rocket dirtied the moon, it may spoil chances of determining whether any organisms found there originated during early stages of the development of the early development of the solar system.



PERFECT CIRCLE PISTON RINGS ARE BUILT TO TAKE IT



# HOTTER THAN A BLOWTORCH

The searing heat that's created inside engine cylinders causes inferior piston rings to lose their strength and resilience, and wear out far before their time. That's why Perfect Circle employs special metallurgical skills to produce ring materials that have the high heat stability needed for long life.

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Whatever the job, Perfect Circle rings are built to take it. Insist on Perfect Circles—first choice of leading engine manufacturers and mechanics everywhere.



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# WORLD'S THINNEST UTILITY PLIER

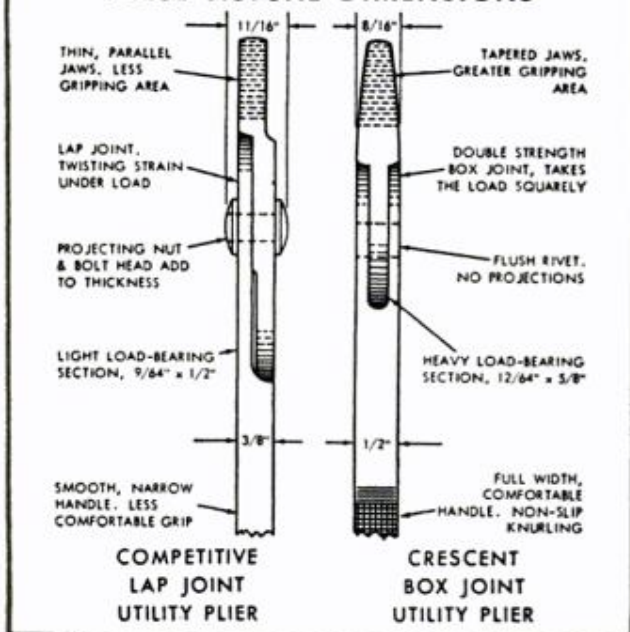


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## Three-Tray Cocktail Table

(Continued from page 155)

of the top. There should be ½-in. clearance along the sides and ends of the table; 1⅝ in. between the tray bottoms.

### Transferring Tray Outlines

An easy and accurate way of getting the tray top outlines on the plywood stock is to first make a pattern. This is done by placing the table face down on a sheet of wrapping paper and tracing around it. Then a second line is drawn ⅛ in. outside the line all around to mark the tray overhang. When finished, this will give you a pattern that is ¼ in. longer and wider than the table. Mark off the tray lengths (20 in.) and cut the sections or tray patterns apart. Each pattern is then rubber cemented to your plywood stock and cut out along the outside of the line. Cut and fit the end tray tops first, being careful not to stay outside the lines when cutting. By leaving the center tray until last, you can cut along the inside or outside of the division lines as necessary to obtain the correct fit (⅛-in. clearance between tray tops). There is no need to be too precise at this point as final fitting is done after the trays are completely assembled. Next the inside cutouts are made in the tray tops, after outlining them from the dimensions given (radii in Fig. 1). After this is done, the edges are sanded to the tracing line and the paper pattern is peeled off. The remaining rubber cement can be rolled off easily with the fingers.

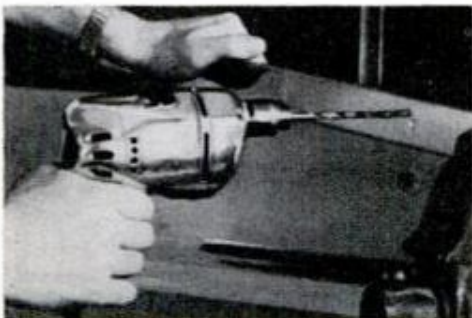
### Bottom Pattern Also Needed

A pattern also is necessary to make the tray bottoms. To do this, stretch a sheet of paper over the table and tape it underneath. Then trace an outline of the top along the inside edge of the rails, using the side of a blunt pencil point and holding it at an acute angle so as not to puncture the paper. The tracing is then removed and cut exactly along the center of the lines. Again, draw lines across the pattern where the facing edges of the tray bottoms should be. Cut out the pattern for each bottom and cement it to the walnut plywood stock reserved for these parts. The bottoms at this point should fit snugly within the table recess, except along facing edges of the trays, which are spaced slightly under 1⅝ in. to allow waste for final trimming.

The following procedure is used to align the tray tops when gluing them to the bottoms. The bottoms are blocked up on the table top so that the tray tops rest on them but not on the table rails. Spacer blocks also must be placed between facing edges

(Continued to page 224)





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of the tray bottoms to hold them in the proper position, after which the tops are aligned and a light but easily visible line is traced on the bottoms around the inside edges of the tops. The pieces are then removed, glue is applied to the mating surfaces and the parts are clamped together, sandwiching the tray between a piece of scrap plywood at the bottom and small blocks at the top to protect the surfaces. Weights may be used to apply pressure in place of clamps. In either case, turn the tray right side up before applying pressure. This gives you an opportunity to wipe off excess glue and center the top, using the outline previously traced on the bottom as a guide. If weights are used, remember to place paper underneath, otherwise you may find a tray glued to the workbench. After allowing sufficient time for the glue to cure, the exposed or top edges of the trays are sanded smooth and the plies of the wood are concealed by covering them with strips of wood tape. This you can buy in ribbon form which comes 1 in. wide. Split it in half lengthwise and apply to the edges with glue, letting it straddle the tray edge in the case of the outer edges of the trays. On the inside edges, the tape is allowed to stick up above the rim surface. After all the edges are taped and the glue has dried, the excess tape is carefully trimmed away and sanded flush with the surface. When completed, the trays will appear to be solid stock.

Next, the completed trays and table are sanded, using garnet 4/0 and 6/0 on the solid stock and garnet 6/0 only on the plywood, it being necessary only to remove pencil marks and soil from the face veneers. Be sure to sand with the grain.

### Mounting the Legs

Four  $\frac{1}{4}$  x  $3\frac{1}{4}$ -in. fir-plywood disks are needed as mounting blocks for the legs, which are located as indicated in Figs. 1 and 7. After cutting the disks, smooth the edges, drill a  $\frac{1}{2}$ -in. hole in the exact center of each one and then glue them in place. The holes help locate the legs and they accept the ends of the hanger bolts, which may protrude through the leg hardware when installed. The four 14-in. tapered walnut legs are purchased ready-made. Metal hardware supplied with them simplifies the job of fastening the legs to the plywood disks. To be sure that all legs assume the same (100-deg.) angle, the straight edges of each mounting plate are positioned so that they are parallel to the table side rails. Should the screws used for fastening the mounts be too long, and shorter ones are unavailable, nip them off. It is best to drill pilot holes for the screws.

### Applying the Finish

Before applying the finish, go over the table again with 6/0 garnet paper to remove soil and to sand anything that was missed before. Then do a good job of dusting all surfaces just before applying the first coat of the finish. The finish used on this model is easily applied, is durable and reveals the full beauty of the wood. First, you apply a generous amount of clear penetrating sealer (oil type) with a brush, or use a mop made from a cloth. Take care not to miss any spots. Allow the sealer to set for 20 min. and then wipe off the excess, using a clean cloth or paper towels. Work only one surface at a time, such as a tray top, table rails, etc., keeping in mind that you have only a few minutes to wipe off the excess sealer once it starts to get tacky. Should the sealer set too quickly, dilute it with turpentine applied with a cloth. Allow 12 hrs. drying time. Then, rub down the table and trays with #000 steel wool to smooth the surface. Apply the second coat and repeat the above procedure, but this time allow only 10 min. for the sealer to set, before wiping off the excess. Allow 12 hrs. for drying and follow with a final steel-wool rub down. Be sure to remove all traces of steel wool between sealer coats. A coat of furniture wax applied in the usual manner completes the job.

### MATERIAL LIST

(All dimensions net or approx.)

#### TABLE

(Solid American walnut)

2 pcs.— $\frac{3}{4}$ " x  $1\frac{1}{4}$ " x  $59\text{-}3/16$ "—side rails  
2 pcs.—1" x  $1\frac{1}{4}$ " x  $14\text{-}11/16$ "—end rails  
4—14" tapered legs, with hardware

(Walnut plywood)

1 pc.— $\frac{1}{2}$ " x  $16\frac{1}{4}$ " x  $58\text{-}9/16$ "—table top  
4 pcs.— $\frac{1}{4}$ " x  $3\frac{1}{4}$ "—disks

#### TRAYS

(Walnut plywood)

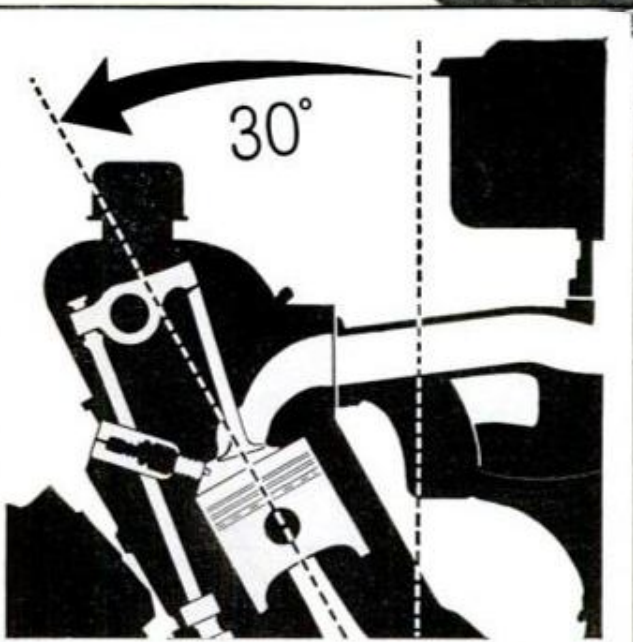
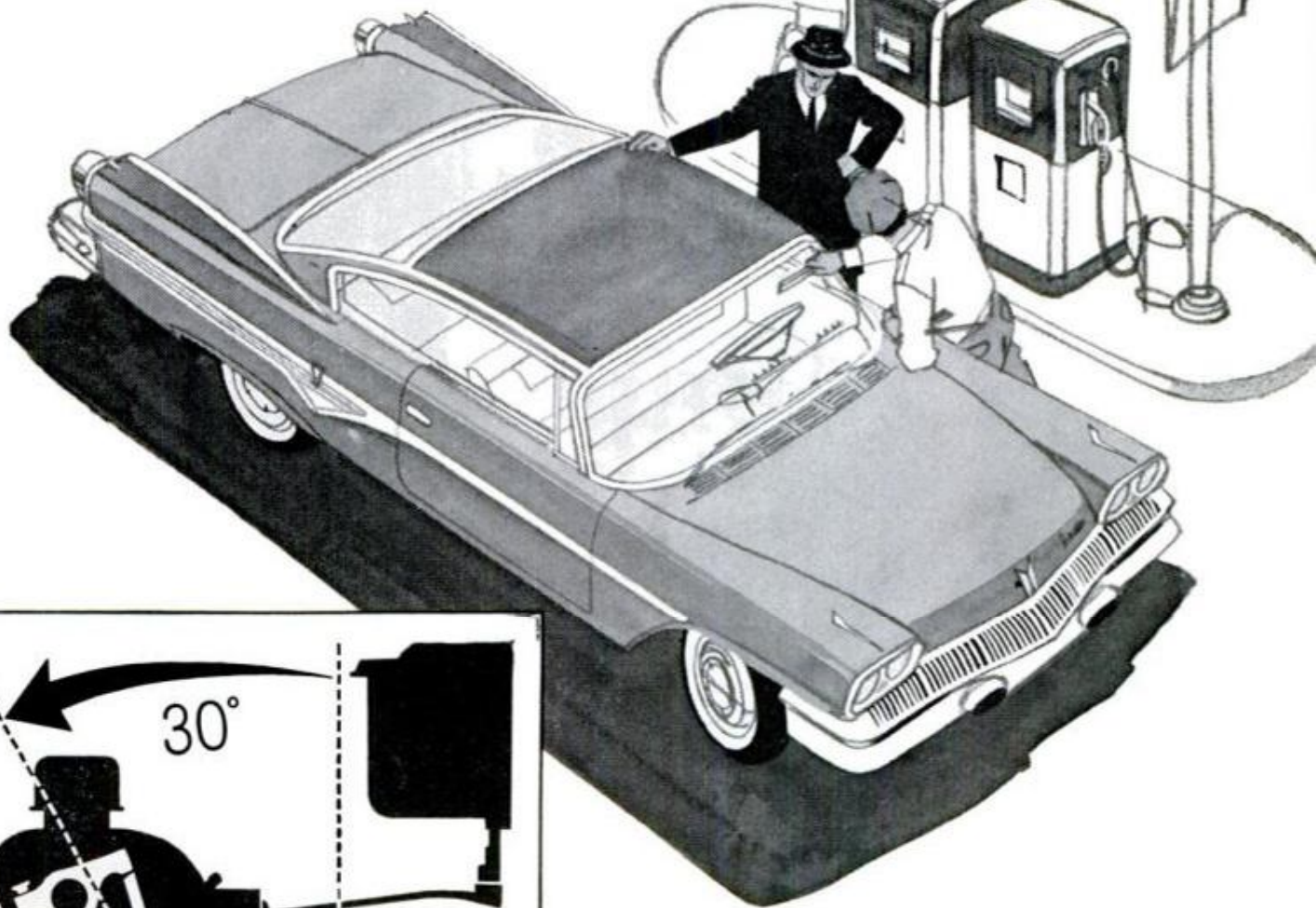
2 pcs.— $\frac{1}{4}$ " x 14" x 17"—top  
1 pc.— $\frac{1}{4}$ " x  $17\frac{5}{8}$ " x 20"—top  
2 pcs.— $\frac{1}{4}$ " x  $12\frac{1}{4}$ " x  $15\frac{1}{4}$ " x  $18\frac{3}{8}$ "—bottom  
1 pc.— $\frac{1}{4}$ " x  $15\frac{3}{4}$ " x  $18\frac{1}{2}$ "—bottom

#### MISCELLANEOUS

8 softwood glue blocks  
Sandpaper, garnet, 4/0 (med.), 6/0 (fine)  
Plastic resin glue (powder)  
1-in. walnut wood tape  
White glue (liquid)  
Clear penetrating sealer  
Furniture wax  
Steel wool, #000 (fine)

★ ★ ★

# You'll think they've cut the price of gas 4¢ a gallon

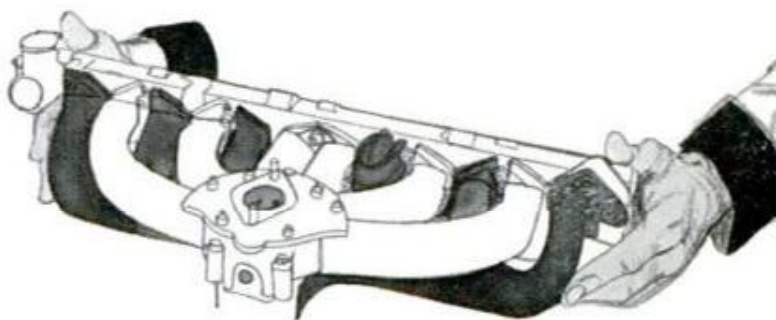


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## Aluminum Boats

(Continued from page 165)

Antifouling paint is recommended for surfaces below the water line, especially if the boat is not removed from the water after each use. Copper-bearing antifouling paint must never be applied directly to aluminum but should be preceded by a coat of zinc chromate primer.

For touch-up jobs, the most convenient approach is to apply the paint from a spray can if the color is available. The correct procedure is to first remove loose paint, clean the metal as explained previously and then apply a primer coat. Follow this with one or more finish coats. To paint a water-line stripe, or produce any straight line as when one color meets another on a two-tone job, cover the adjacent areas that are not to be painted, using masking tape taped to the edges of wrapping paper or newspaper as in Fig. 5. Applied according to these procedures, a paint job should be good for several years of normal use.

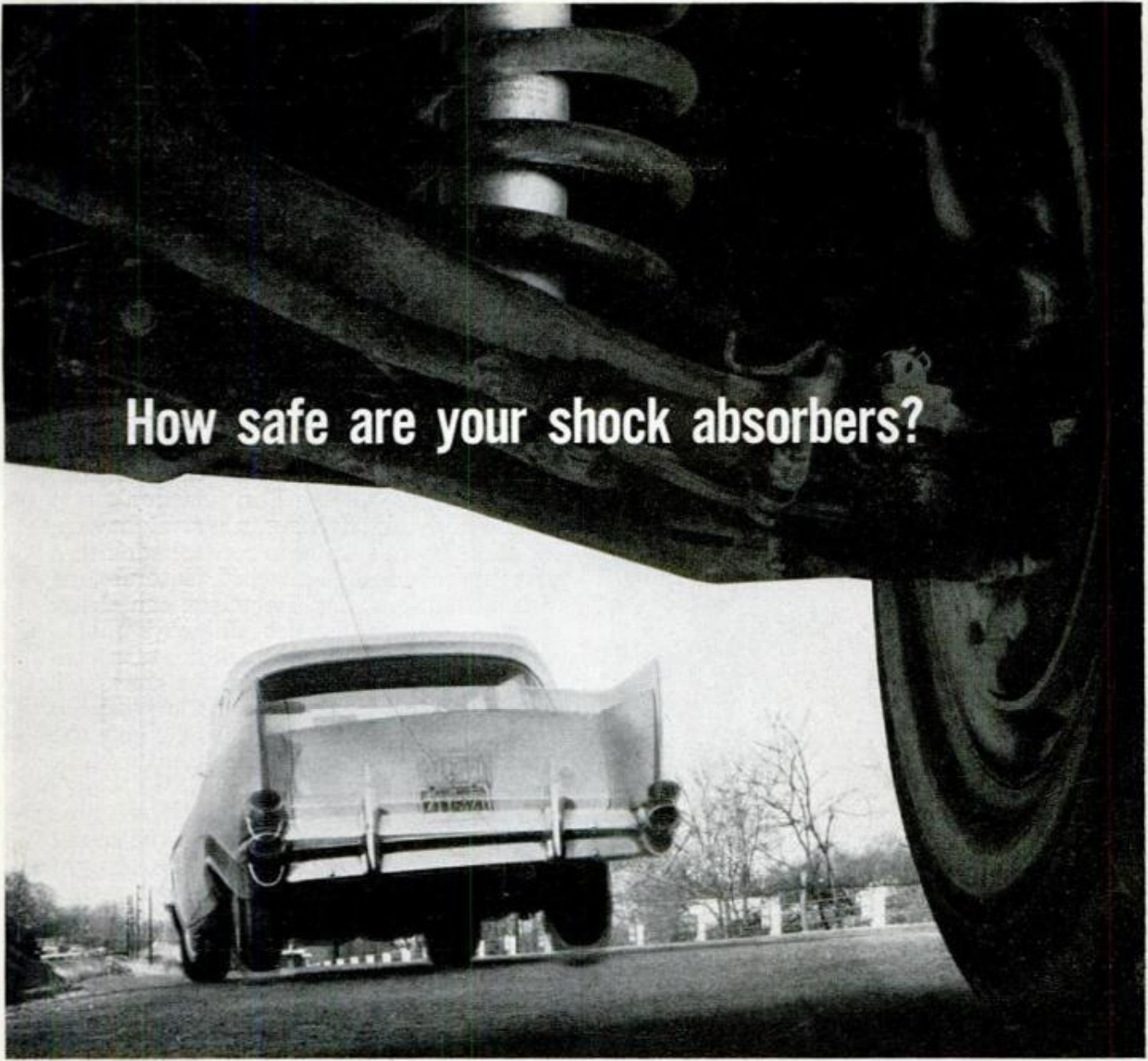
For boaters who like the natural bright finish of aluminum, either on the entire boat, or on certain trim pieces, here is how the metal can be polished to a high luster and kept that way with very little attention. First, if only a part of the boat is to be treated in this way, mask off the adjacent painted parts. Then rub the area to be polished with #00 steel wool. Use a straight-line motion and continue rubbing until the desired brightness is obtained. To speed this step, lubricate the surface with any good automobile cleaner. Next, clean the surface and wax it as you would the family car. For a hard protective coating, use clear lacquer of the type sold for this purpose at most auto-supply stores. The last step is to launch your boat and admire it—all season long. ★ ★ ★

## For Boating Comfort and Safety

Lacking a foot cleat against which to brace yourself when rowing a boat operated usually by motor, simply form a loop with the anchor or mooring line and secure the loop ends to the rowing seat. Adjust the loop length to give the best rowing position.

A few large candles kept on board are handy for lighting campfires in wet weather, for use as an emergency light, or simply to provide some illumination for baiting hooks at night. Wax candles float on water and can always be ignited, even after being left in a wet bilge for days.

Easiest way of straining fuel poured into a motor fuel tank from a gas can is to place a rubber faucet strainer (household slip-on type) over the end of the pouring spout.



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Shocks are as important to *safety* as they are to comfortable riding. They stabilize your car, keep wheels from bouncing off the road, prevent erratic steering and side sway. Shock absorbers wear so gradually that you often don't realize that your car's ride qualities are deteriorating. Sometimes, it takes an accident caused by loss of control to point up the danger of worn shocks. Don't wait for that to happen.

If your speedometer now reads more than 20,000 miles there's a good chance you're already driving on "dead" shocks—shock absorbers that are worn to the danger point. *And dead shocks are deadly!*

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## A PM Editor Rides the Air Cars

(Continued from page 96)

lowing me to solo the craft. Down the main street of Neponset I maneuvered by Aeromobile, grimly eyeing chrome bumpers of parked cars in the manner of a windjammer skipper sailing through coral reefs.

It was a tricky business. In the first place, the 72-horsepower Aeromobile handily hoists lean and lanky Dr. Bertelsen a good four or five inches off the ground, but my physique being what it is (portly), the craft's clearance was cut down. That meant that as the machine tilted slightly nose-down to move forward (as it normally does), I was quite likely to hang up the front end on a snowy rut—which I did.

Secondly, the Aeromobile takes a little learning of its "feel." You just don't step aboard and start driving in a straight line, I found. There's a single control stick that governs forward, rearward, lateral and turning motions. Dr. Bertelsen can easily sweep down the street sideways, backwards, forward, spin on a dime, turn corners—just about anything but slow roll. But it takes a beginner a little while to learn to balance his weight and move the control early enough so it has time to "take hold" when he wants it to.

The quest of the ground-effect machine took me to South Bend, Ind. in the midst of a rainy spell to see the Curtiss-Wright Air-Car. They told me the test area wasn't in good shape, and they were right. It looked like a spot the Marines would choose for a survival hike.

But Don Swem headed the vehicle away from its concrete apron and out toward the raw, half-finished test area.

Even though I knew we were floating above it all on a cushion of air, I still couldn't quite convince myself that this or any other vehicle could make its way over that sea of mud. Soon muddy spray shot from beneath the Air-Car while Swem worked the wheel to keep the 2700-pound vehicle from hitting trees or boulders.

Swem (member of the Air-Car engineering staff), L. B. Geithman (general manager, Air-Car) and myself (a healthy chunk of ballast) were seated side-by-side in the craft's wide cabin.

We slid sideways off the crest of the "road," and I braced myself, expecting to feel a thud and perhaps roll over as we plopped sidelong into a ditchlike depression. But no thud came. The car slid smoothly across the water at the bottom of the depression and up the other side of the gouge—jolted only briefly when a corner of the craft hit a knob of dirt.

(Continued to page 252)

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JUNE 1960

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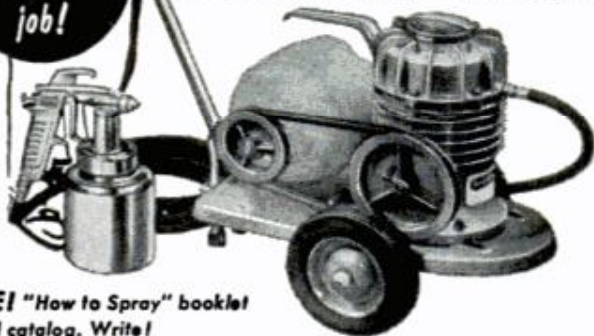
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## There's a Safe and Easy Way

(Continued from page 143)

legs, with the lower part of your body rising with the load. Balance the load against one knee, and avoid quick movements or twisting. Once it's up, move and change directions by moving your feet, not by turning your body. Lifting by bending the waist creates strains in the back up to 15 times the weight of the load, with none of the strain passed on to the leg muscles.

**LIFTING TO SHOULDER HEIGHT:** Imitate the professional weight lifters by making the original lift from a crouched position. Raise the weight to chest level, then straighten your legs and let your body and the load come up together with the work done by your leg muscles.

Trying to lift the load above your shoulders transfers the strain to your back muscles and spine. It's better to rest the load on a shelf or a helper while you get to a higher position for the rest of the lift.

**CARRYING THE LOAD:** Once you've raised the weight (and made sure your path is clear), hold the load close to your body, with your elbows resting against your sides and the weight balanced evenly. If you can't see where you're going or can't balance the load, *put it down and get some help.*

Never carry a load with outstretched arms. It will put all the strain on your back and obstruct your vision at the same time—potential danger from two sources. Carrying heavy objects on one hip is another mistake, since one arm and leg get all the weight, and the one-sided strain abuses the back as well.

**CARRYING THROUGH DOORWAYS:** Doorways can present serious problems. The corner of a heavy load hitting a door jamb can twist your body, and scraped knuckles can make you drop your load on a leg or foot. Make sure of your clearance, even measuring the load if necessary. If it's too big to allow easy clearance, get some help or break up the load into smaller pieces.

**CARRYING ON STAIRWAYS:** Never carry anything up or down stairs unless you have complete vision ahead and down and one hand free to hold the handrail. That boils down to carrying the load under one arm. If it's too big or heavy for that method, break it up or get some help.

If you try it anyway, and feel yourself falling, *drop the load.* Your personal safety is worth more than anything you might be carrying.

**PUTTING IT DOWN:** Getting rid of the load is as difficult and important as pick-

(Continued to page 232)





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ing it up, and presents the same potential physical abuse. Get it down by reversing the lifting method, using the leg muscles by squatting with the load close to your body and the back straight. Set the part of the object that is away from you down first, then remove one hand at a time as you set it on the floor.

**COOPERATIVE LIFTING:** Heavy or bulky loads are always easier with two or more persons. The consolidated manpower should be evenly spaced around the object, but one person should be placed at the front with clear vision, and another at the rear, with others (if any) spaced equally between. Where more than two are involved, positions should be spaced equally on both sides to prevent the object from twisting or sliding. One person should be in charge to give lifting, moving and lowering instructions and eliminate confusion.

When a load is to be carried at shoulder height, it's important to space the carriers according to height, so each absorbs equal weight.

**MOVING FURNITURE:** One of the most popular ways to injure a back around the home is in moving heavy or bulky furniture. The first rule with anything but the smallest piece is to get help, especially if you're going up or down stairs. But here's a trick—remember that if you aren't going to change levels, there's no real need to lift the piece at all. You can move the biggest loads by rolling or sliding them. A mover's castered platform, of course, is ideal, but you can get almost the same advantage by sliding the furniture on a piece of canvas or other stout material. Pick up one leg at a time, placing the material under the legs, then slide it to the new location.

**HANDLING SACKS:** Another common source of lifting injury is handling heavy sacks of sand, cement, fertilizer, etc. The first rule and the easy way is to put it on wheels—the lawn mower trick shown is a very good one.

If it's absolutely necessary, though, let your knees and shoulders do the work. Crouch with knees bent and back straight and grasp the sack at diagonal corners. Lift it to one knee by straightening the legs, then guide and boost the sack upward with one knee and toss it over one shoulder, keeping the knees slightly bent to serve as a "knee action" shock absorber. Carry the sack balanced on one shoulder, steadying it with one hand.

Avoid carrying sacks in your arms or on one hip—the uneven load can strain your back and abdominal muscles.

**GARDENING:** Working in the earth

causes aches and pains, both from working the wrong way and from doing too much work. Avoid the second by spacing the heavy jobs and taking an occasional break, though rest won't repair the damage already done by mistreating your body.

**DIGGING:** First law—keep your tools sharp and they'll work their best with a minimum of effort on your part. Get handles long enough to save bending, too. In use, keep your back straight, but keep your knees and elbows slightly bent to get full leverage from free movement. Change your position and rhythm occasionally—digging is harder work than you think.

**RAKING:** Another tiring gardening job, and surprisingly hard on the back. Again, if you're tall, get a long-handled rake. Keep your knees relaxed, feet wide apart, and swing your weight rhythmically as you work. Change hand positions occasionally to save wear and tear on your palms, and rake with your arms flexed and elbows close to your sides. This method will minimize fatigue and reduce muscular strain.

**PUSH-TOOLS:** With lawn mowers or other push-tools, push with your arms bent, back straight, and elbows close to your body. Apply equal pressure with both hands, keeping a steady grip on the handles.

**WORKING ON THE GROUND:** Bending from the waist to work at ground level can result in back injury, or at least fatigue and stiff muscles. The work is easier if you'll get down on your knees or sit on a cushion. You may not cover as many square feet per hour, but you'll save your strength and get more done in the long run, and be more comfortable while doing it. Remember: Gardening is supposed to be fun, not backbreaking work.

Early in the season, after a long winter of watching television, remember your soft winter muscles and give yourself a chance to get into condition for the heavy work. Learn—and practice—the easy way.

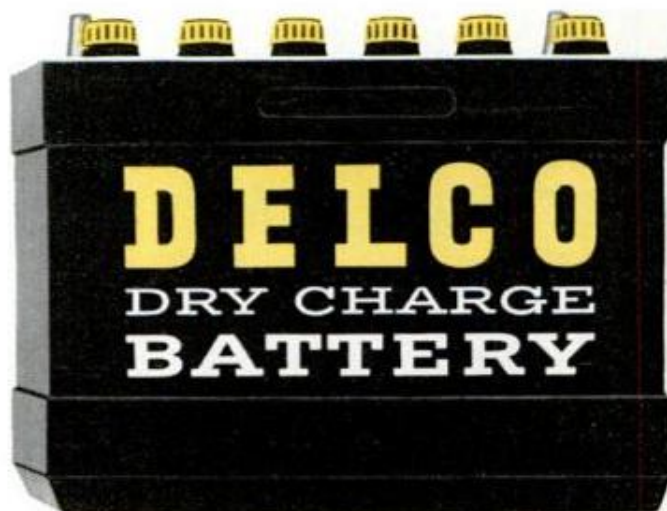
The U.S. Department of Labor suggests that the maximum load for repeated lifting should be around 50 pounds for men and 25 pounds for women. The figure will vary somewhat, depending on your condition, but 10 pounds can be too much if you feel strain, pain or "pull" when lifting or carrying. And after a few trips with the heavy stuff, remember that you're more subject to injury if you're tired. So rest.

You'll get more work done, easier, and profit more from the exercise if you'll use your head—and literally save your back.

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## Is the Ocean Warming Up?

(Continued from page 138)

sea water in which the shellfish grew, while the Carbon 14 measures the age of the shell. This technique allows Dr. Hubbs to say definitely that certain periods were characterized by a warm ocean and that in other periods the ocean was colder than normal.

As a climatologist, Dr. Hubbs has been finding evidence that western North America has literally been drying up in recent times, just as have parts of the Old World at comparable latitudes. As one example of what has been occurring he cites the case of Fish Creek on the arid western slope of the Salton Basin in southern California.

Today this area receives less than five inches of rain per year and the bed of Fish Creek is dry most of the time. No one lives there. Yet 1000 years ago there was a fairly extensive Indian population along the creek, judging by the number of middens, and part of the Indian diet was fresh fish, judging by the numerous bones of fresh-water fish found in the middens. Dr. Hubbs' conclusion is that the fish lived in the creek, which means the area received at least 10 inches of rain per year.

### Coastal Islands Have Changed

Another example of the present drought concerns one of the Coronado Islands near San Diego. As recently as 400 years ago a considerable number of Indians lived on the island, yet today there isn't enough fresh water and brush on the island to support more than a family or two. To some extent this is true of all the islands off the California coast.

There is evidence that the general trend toward increased aridity has accelerated in the last 25 years. "There are reasons for thinking that the great drought that started in 1934 is perhaps the most severe of any that has occurred since the Ice Age, during the last 15,000 years," Dr. Hubbs says.

As for the future, he concludes that the climate in the southwestern part of the United States will fluctuate widely and perhaps abruptly and with a general trend toward warmer weather, as well as becoming more arid. His conclusion suggests that the entire arid Southwest, including southern California, will need to save every drop of water that it can find in the future. Eventually, water or the lack of it will be the deciding factor as to how many people can live in southwestern United States. ★ ★ ★

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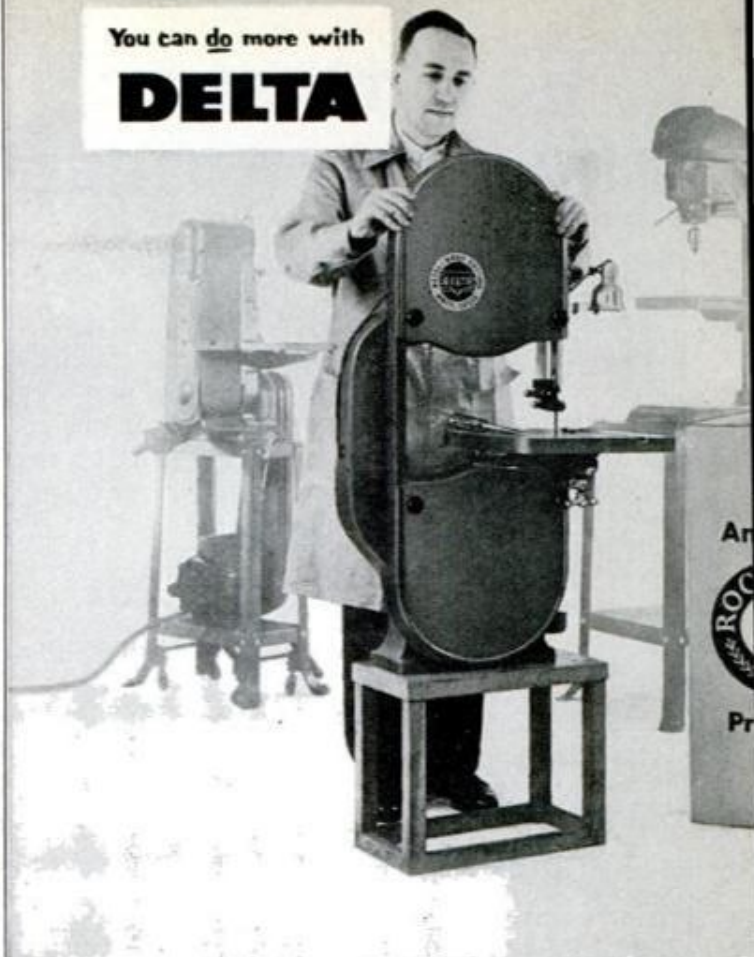
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## Gardens to Feed Our Spacemen

(Continued from page 127)

To learn what cosmic rays may do to seeds, the lab experts recently sandwiched several hundred spinach and turnip seeds between cosmic radiation strike-counter plates, and hoisted them into the stratosphere on a Navy balloon. Now planted in the moon garden, they soon will reveal whether or not they may qualify for space ecological systems.

In a small, curious sphere at the Farmingdale labs, scientists have been distilling, purifying and regenerating the kind of troublesome liquid wastes that will plague space ships. For a month, the distillate was served successfully to small laboratory animals for drinking water—a time period equal to a man drinking it for two-and-a-half years. In a space ship, according to Dr. Barr, the vacuum of outer space can be used to do this job at space's low temperatures, so that heat isn't wasted in the process. Water shot into an unpressurized chamber up there would explode into vapor instantly, then condensed back.

One nice thing that the plant experiments at Republic have indicated so far is the possible increase in crop production that might occur when the surrounding air pressure is lower than that on earth. And by increasing the length of the day, scientists have found that plants grow in less than half their normal time. "Since a lunar day runs to some 14 days of continuous daylight," one of them points out, "we can expect to reduce growing time in a lunar garden to about one-quarter that required on Earth."

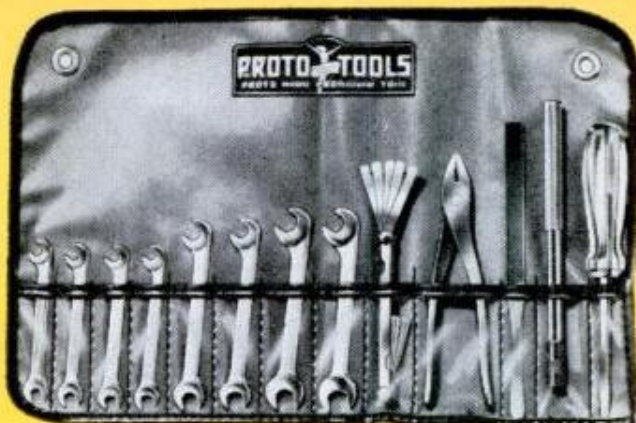
"To supply the needs of one astronaut for one lunar day and night (29 days)," he adds, "requires 900 square feet of growing area using present agricultural methods. On the moon, we hope to reduce this."

Naturally, no space ship yet imagined—much less designed—could contain 900 square feet of garden for each man aboard. So, in many labs, space scientists have turned to less appealing but more efficient plant life to solve the problem.

One of the favorites is algae—the slimy green gloop that grows in still, shallow ponds. The single-celled, free-growing plant uses light so efficiently that some types can double their weight 12 times every day, gobbling up carbon dioxide and nitrogen products at a phenomenal rate. Since they are loaded with chlorophyll, algae produce oxygen and pure water abundantly, acting as odor-removing agents in the process.

So efficient is this unglamorous slime,

(Continued to page 238)



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that it seems like a top candidate for a closed ecological system. To give it a real workout, space-medicine scientists at Chance Vought Aircraft in Dallas sealed off their two white mice, Yoke and Zebra, in a tiny glass-and-plastic world. The "mousetronauts" live in a large glass jar sitting on top of a double-walled plastic tank in which floats a four-quart mass of dark-green algae brew. The algae tank is flooded with fluorescent light to simulate sunlight, and is connected to the mouse house above it by a system of pumps and tubes that carry out the exchange of carbon dioxide (from mouse breath) to the algae, then returns oxygen (from the algae's photosynthesis) to the mousetronauts.

Yoke, going it alone at first, stayed sealed up for a run of 292 days no worse for wear. More recently, both mice ran up 17 days together and continued thriving. So far, the mice have been eating prepared pellet food, but in future experiments will be fed algae from the tank, where their own waste products will be used to feed the algae. The ultimate goal is a completely closed system.

The fly in this ointment may lie in getting the mice to eat the algae. One of the big objections to harvesting algae for space meals is that, although the plant is rich in protein, carbohydrates and fat, and is technically edible, the stuff looks horrible and, when dried, has all the flavor of old hay. As one scientist put it, "even the best steaks get tiresome after three days if that's all you get to eat. And who ever heard of an algaeburger?" The danger is that a spaceman could lose his appetite.

In an effort to jump this hurdle, bio-scientists at Boeing Airplane Company laboratories in Seattle, have been playing tricks with the green slime. "If people can't eat the stuff," the researchers asked themselves, "then what can?"

The answer turned out to be a big-mouthed tropical fish, *Tilapia*, which lives in scummy ponds. Since this fish is delicious, Boeing's biochemists are testing its growth rate in the materials that might be available in space vehicles. It is hardy, produces young when it is eight weeks old, and loves algae. The idea of course, is for the fish to eat the algae and the astronauts to eat the fish. And all the while, the algae, by photosynthesis, produce oxygen from waste products of both man and fish. In order to see exactly what might happen when this cycle is closed, Dr. John Liston, at the University of Washington College of Fisheries, is now growing algae in beakers in a liquid solution of human waste products. Each day, some of the algae thus

(Continued to page 240)



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produced are siphoned off and fed to the fish to see how they manage. So far, they're doing beautifully.

The work at Boeing doesn't stop with the algae-fish ecology. Other experimenters in the lab have grown experimental mushrooms in solutions similar to those used by Dr. Liston. Still others are busy growing more ordinary plants under all sorts of strange conditions to see, like the scientists of Long Island, whether roots will grow down and tops up when the plants are in a gravity-free state, how they'll react to weeks of darkness, weeks of daylight, and the like.

More recently, another approach was tried at Boeing to make the algae scum look better. From a plastic wading-pool tank where the algae is grown, the researchers harvest a crop every five days. As an experiment, one batch was blanched under high-intensity lights to get rid of the green color, then centrifuged and air-dried. Dr. Arthur Pilgrim, a biochemist at the laboratory, took home samples of both the green and the blanched plant and had his young daughter bake cookies with them. The result was a batch of lumpy green cakes, and a batch of creamy white ones. "The former," according to cookie tasters, "tasted like baled hay; the latter like sugar cookies." Things are looking up.

Dr. Joseph Stern, of the Boeing laboratory, with an eye toward future gardens on the moon, is raising a substantial crop of vegetables in such inert material as ourlite, vermiculite and powdered Styrofoam. Since the soil of the moon is assumed to be inert, but might possibly be used to root plants, this will tell tomorrow's space travelers how to make their moon gardens grow.

There's another problem in a closed ecological system. Even if gardens can be grown, and people eat the produce, what do you do with the unused fibrous material that goes into the garbage pail at home? Some animals, such as cows, have bacterial enzymes that convert indigestible plant cell-walls to sugar, liberating the sugar and thus providing more food. People drink the cow's milk and get the benefit of all this for nothing. Unfortunately, cows don't travel in space.

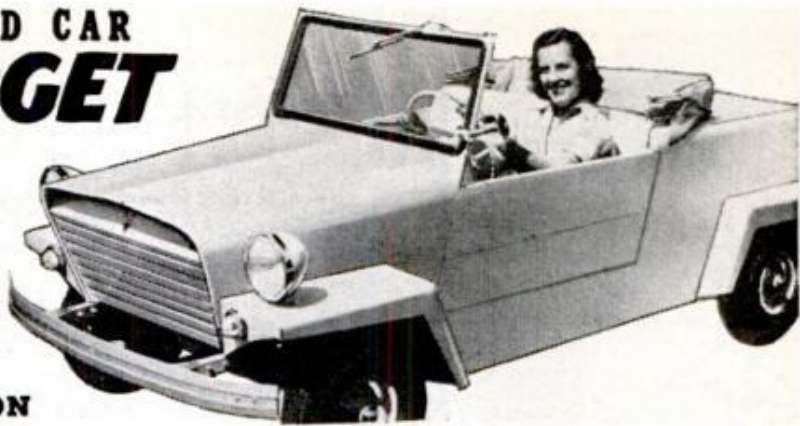
But Dr. Barr, at Farmingdale, thinks a mechanical and chemical cow substitute can be easily devised for a space vehicle. "The protein of the plant tissue," he says, "can be liberated from its fibrous sheath by fracturing the sheath with shock or explosion. The vacuum of space can be used to create the explosion. If a heated weed stem is suddenly exposed to vacuum, tiny

(Continued to page 242)

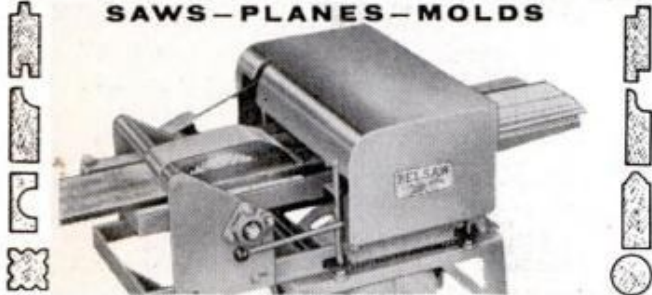
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With Exclusive Push-button Loading and Built-In Staple Extractor.

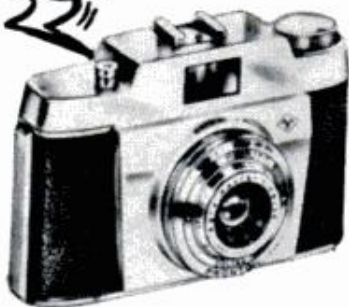
Indispensable for home use... and never before priced so low! This compact, all steel, powerful SWINGLINE 101 staple gun is ideal for insulation, carpentry, upholstery, screening, wire fencing, plus thousands of other uses. Handle locks to fit pocket. Lightweight, maneuverable, jam-proof! Staple sizes 3/4", 5/16". Send for FREE book—"Tips for Tacking".

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explosions occur from the plant tissue cells which rupture the cell walls, liberate the confined protein and make it available to use by man."

It won't be necessary to send a weed into space to see if this will work, or whether the proteins thus harvested can be converted into usable meat substitutes for astronauts. A brand-new space-environment laboratory is already under construction at Republic. Here pressures and temperatures found 150 miles in space can be simulated—atmospheres in which pieces of steel fuse when struck together, where watches stop because there isn't enough air to lubricate their bearings. Already, the artificial-cow experiments are among the first on the docket.

The space scientists themselves are the first to admit that they have a long way to go. Perfecting a closed ecological system, according to several experts, is still 10 years away. Even algae, with all their efficiency, pose some horrifying headaches. Besides their lack of aesthetic appeal, it would take 800 pounds of algae per man for a round trip to the moon. A vat big enough to produce the required amount per day would call for 2500 gallons of water. Besides, algae need solar or artificial light to grow. They must be aerated, and their population density controlled. Scientists have to learn how to harvest them simply, and to turn them into desirable food. They must design a miniature processing plant to handle human wastes so they can be fed back into the ecology. They must learn to control cellulose build-up, build the entire system to fit into narrow payload limits, and make sure everything will work under zero-gravity conditions to hold it together. You could drown in a glass of spilled milk in space.

Perhaps, though, if Einstein was right, the whole business of food in space will be solved by the natural laws of space. According to George Gamow, if you were to put a space vehicle enroute at a speed just 1/10,000,000 of one percent below the speed of light, a space passenger's digestion, as well as his watch, would be slowed down by a factor of 70,000. At that rate, a space pioneer would only need one dinner for every 6570 consumed by his friends back home. You could, in fact, make a round trip to one of Sirius' planets—nine light years from the sun—and need only one box lunch for the trip. Although you'd come back to Earth to find you'd been gone for 18 years, the apparent time lapse would have been less than a day in the space ship. Whether or not it comes out this way, probably only the first space junketeer will be able to tell us. ★ ★ ★

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There's an Elmer glue for every job you do! "Elmer's Guide to Good Gluing" tells you all about them with hints, tips and what to use where. Send stamped, self-addressed envelope for your free copy of this 16-page illustrated guide book. The Borden Company, Dept. PM60, 350 Madison Avenue, New York 17, New York.



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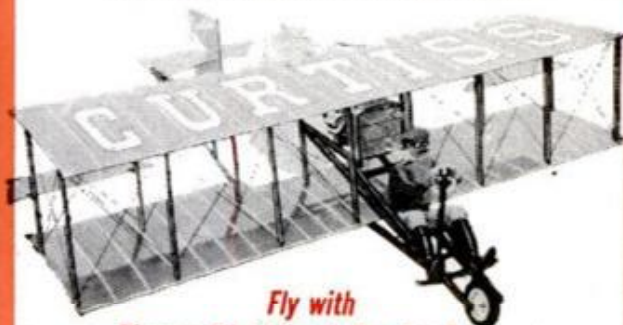
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**SURPLUS CENTER**  
LINCOLN, NEBR. DEPT. 808

## The Man Who Owns a Tank Corps

(Continued from page 85)

well use tanks. Auto wreckers could compress an old chassis with no trouble, salvage operators could mount a boom atop a Sherman and have the fastest crane in the West, and demolition companies also could do wonders with them — two tank trips through a house brings everything down within easy reach.

How about tanks for city or American Legion war memorials? Or bulldozers? Or as carriers for mobile well-digging equipment? Or as movie props?

"Carnivals might offer tank rides," Ising said in one flight of fancy. "A tank has five seats. You could get a real thrill, couldn't you?"

At one point he had a plan to use college students as salesmen during vacations. "Go sell yourself a tank and take the rest of the summer off," was his pitch. But nobody bought.

Several veterans contacted him about a tank as a personal souvenir. One brought along as a good-will offering a scale model for Ising's desk.

"He wanted a full-size tank," recalls Ising. "Then I mentioned \$1000 for shipping it. He said, 'No thanks.'"

Ising might have tried for State Department approval to sell to foreign governments. He decided not to. "It's too easy for a tank to get in the wrong hands," he explained. "Then where would I be?"

Shipping costs are so steep, and business in tank parts has been so brisk, in fact, that even though 150 or more Shermans are operable Ising won't try selling many more intact. It's been easier to peddle parts that seem to be in demand, than keep employees busy cutting up tank bodies.

Because several friendly nations have Shermans, all the bogey wheels and tracks he can find are sold almost immediately.

At \$500 to \$1500 each, engines also have sold well. (The Shermans contained either 250-horsepower twin diesels or 500-horsepower gasoline engines.) One university with a wind tunnel bought several. Shrimp-boat operators have purchased others. Still others have been bought for irrigation projects, oil rigs and varied other purposes.

Small gasoline-powered generators have sold to owners of cabins in remote regions, or to dealers who sell to them.

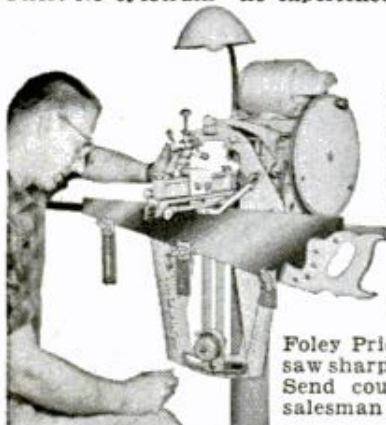
Lumber mills and steel firms have bought transmissions and rear-end assemblies for use in connecting motors to saws and conveyors. Plastic molders and mining and petroleum-equipment firms have obtained

(Continued to page 246)

## NEW PISTON RINGS CUT OIL WASTE

## FREE PLAN tells how to start your own business FILING SAWS

Here is a steady repeat CASH business you can start in your own basement or garage in your spare time and make up to \$3 or \$6 an hour. You can file hand, band and both combination and cross-cut circular saws on the Foley Saw Filer. No eyestrain—no experience needed. "The first saw I sharpened with my Foley Filer came out 100%"—writes Clarence E. Parsons.



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Charles H. Smith.

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Built to slide into the accessory clip of 35-millimeter cameras, a 1½-ounce flash unit newly introduced to the U.S. measures only 2 x 1 x ½ inches. The telescoping, polished steel reflector retracts into the unit, simultaneously ejecting the used flash bulb. It is designed to use "jelly bean" all-glass flash bulbs and is powered by a long-life 15-volt battery. It is finished in smooth satin chrome.

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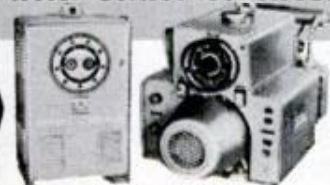
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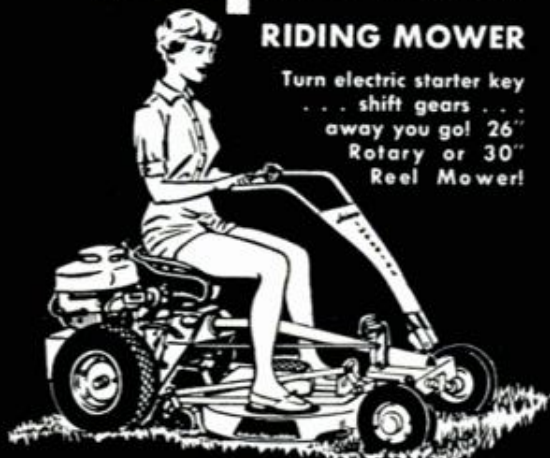
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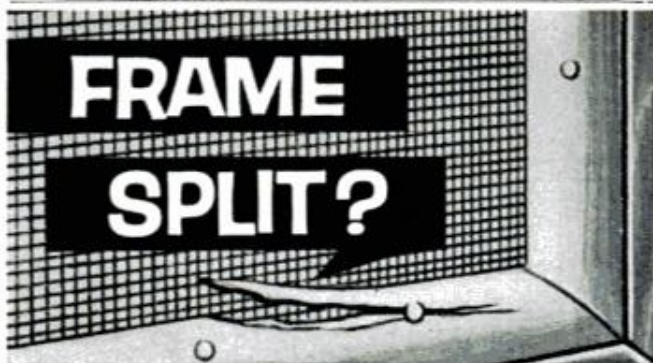
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Easy! No skill required. Won't chip or crack! Nothing like it to resist water, weather!

For surest results always use GENUINE



**PLASTIC WOOD**  
Handles like putty—hardens into wood!

a number of pumps. Two-way radios have been sold for various purposes, and even seats, fire extinguishers, lights and similar items have been in demand.

Ising hasn't advertised his wares. "Persons who are interested keep track of who has tanks," he says. Also, news reports and feature stories about the purchase, plus promotional moves such as lending a tank to a Sterling theater have helped.

The scrap market has fluctuated more than Ising expected. But he has kept a team working at cutting Shermans. If he can sell when the market is right, one observer estimates, Ising stands to make a "tidy" profit: at least \$50,000.

But no matter what, Ising is glad he owned a tank corps, if only for a few months. For few persons, even the fabled Walter Mitty, could have done it.

And, he says with a twinkle, who else, if caught in a traffic jam, could look at cars solid to the front and rear and think:

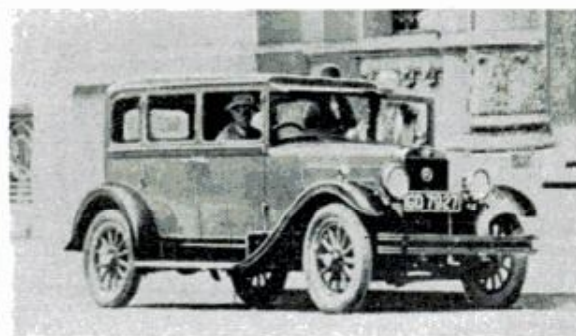
"Not far away I've got the vehicle that can go through the whole mess—at 26 miles an hour." ★★★

### Navy Radar Bends Over Horizon To Find Target 2600 Miles Away

Radar that can see over the horizon and detect missiles as they are launched from submarines has been developed by the Naval Research Laboratory. The discovery, called the Madre system, means that for the first time a radar has been built that is not limited in its vision to the line of sight from the transmitting antenna. Its beam can bend over the horizon and pick up moving targets as far away as 2600 miles. Signals are transmitted over the horizon by bouncing them off the ionosphere—the electrified layer in the earth's upper atmosphere—from where they are reflected back to earth. A prototype Madre station is under construction near Chesapeake Beach, Md.

### Do You Know This Old-Timer?

(answer to quiz, page 12)



**1928 Erskine Sedan**



## ADJUSTABLE MITER BOX & CORNER CLAMP



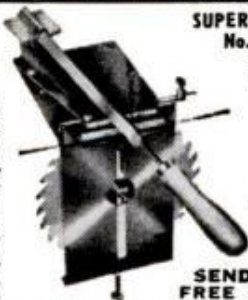
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COMBINATION  
MITER BOX AND  
CORNER CLAMP**

Holds the wood and holds your saw. Uses any handsaw for accurate cuts from 0° to 180°. Full 3" capacity. Sides of joints exposed for nailing, gluing.

**\$2.75 ppd.**

No. 33 Works the same as No. 44, but without saw guide adjustment.

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**SUPER FILER  
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For both hand and circular saws. Steel rollers give all teeth correct height, pitch and bevel.

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**SATISFACTION GUARANTEED OR YOUR MONEY BACK**

## Owners Report on the Ford

(Continued from page 106)

PM test: 0-30, 5.1 seconds; 0-60, 15.6 seconds; 40-60, 8.2 seconds. It's no bomb, but who wants a bomb these days? We're making sense now, remember? But compared with Ford's 292-inch V8 two-speed automatic transmission, this is a bomb.

'Tis great to see the wrap windshield disappear. It was the biggest mistake Detroit made in years. What will disappear next? Could be the hardtop—it's losing ground fast.

She's got a point. In terms of stable dollars, today's value is even greater. You may think cars cost more than they should, but Detroit has done better than some industries in holding the price line. Of course, one result may be poor workmanship that we complain about.

He's driving the small V8 with the two-speed automatic transmission. Its passing gear is useless, just as he says.

What he should have said is: "I shouldn't have bought such a heavy car." Ford weighs over 200 pounds more than last year. Engine is unchanged.

the list) down to the heater and defroster (14th). They are quoted in order of frequency of mention.

"I like the get-up-and-go power at the slightest touch of the accelerator."—Illinois assembler.

"Handles great on curved roads at 50 to 60 miles per hour. It really hugs the road."—New York tobacco salesman.

"Most economical car I have owned. It is light on gas and doesn't use any oil at all. I have 6000 miles on the car and the tires are still like new. Even with six cylinders, it has the power of eight."—Tennessee painter.

"Door 'jog' has been eliminated, making it easier getting in and out of front seat."—Ohio secretary.

"Beautiful upholstery. Luxurious appearance." Illinois housewife.

"I like the steering, agility and maneuverability."—Texas oil-field pumper.

"It starts good at 30 below zero. Very good in snow and on slippery roads."—Minnesota laborer.

"Smooth, quiet operation of the motor."—Minnesota serviceman.

"Has an excellent heater. Even in awful cold weather (15 to 20 below), the windows are clear."—Minnesota service-station manager.

"With all the talk of rising costs, I was amazed to find this Fairlane four-door Six handshift cost me only \$55 more than my 1953 Nash Statesman that was a two-door, without radio or undercoating (which I have on the Ford)."—Massachusetts housewife.

### Now Other Complaints

Sixth on the list of Ford owners' complaints is the transmission. There are complaints about both hand shift and automatic models. This and other complaints are described in the following quotations (arranged in order of frequency of mention):

"Passing gear drops back to high at 50 miles per hour. This is no advantage at all in trying to pass a car or truck. The 1956 passing gear did not drop back until it reached 65 miles per hour. This change alone is disgusting."—Florida retired owner.

"The handshift is worse than in either Plymouth or Chevrolet, both of which I am used to and both of which are smoother."—Louisiana salesman.

"Hard to get in. You have to crawl and fall into the seat."—Ohio Latin teacher.

"Motor knocks real bad when cruising. They even called the headquarters, which said it was natural. But my 1956 Ford motor was quieter."—Michigan hardware retailer.

"I have the 352-cubic-inch V8 with two-barrel carburetor. The car lacks power for the extra weight of the new body."—Michigan tool-and-die maker.

"Don't think the motor is large enough for the rest of the car. I do not think the six-cylinder engine should be put in a Galaxie four-door."—Iowa maintenance mechanic.

"The dealer did not check this car before delivery. And they look so surprised every time I take the car to them for repairs. I am not a mechanic, but they expect me to tell them where the trouble is or else they cannot find

(Continued to page 250)

America's "BEST BUY"  
Riding Mower!

ROTO-HOE's 32"



Enjoy lawn mowing! Ride on this comfortable spring seat away from motor heat and fumes. Cuts a full 32" swath, takes far less time to mow lawn; trims so closely that you have little left to trim. 5½ h.p. engine, variable forward speeds and reverse;

exclusive outrigger wheels give maximum stability on side slopes. Only \$249.50 f.o.b. Write for free folder. ROTO-HOE, DEPT. P-19, NEWBURY, OHIO.

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FAYETTE R. PLUMB, INC.

Philadelphia 37, Pa.

What does he expect?  
the dealer's busy  
selling cars.

No company gives trips to  
Hawaii for the best service  
department—just for the  
most sales!

Summary: An anachronism  
is the new bigger Ford.  
Smaller cars are in style,  
but Ford went longer.  
Scrying is a hazardous  
occupation. Entry and exit  
are easy by today's down-  
and-under standards. Rear  
sill obtrudes into foot  
space, leaving small wells  
on each side of tunnel.  
Center rider in rear seat  
sits like a cowboy, his  
legs bowed around tunnel.  
Wipers do not swing far  
enough, you peer through  
a crescent-shaped keyhole.  
Heater gurgles at slow  
speeds like an embarrass-  
ing stomach. Interior fin-  
ishings excellent in this  
top-line model. It is a far  
cry from the nimble, alert,  
scattish Ford of a few years  
ago—and Falcon (successful  
though it is) has not  
picked up the mantle.

it. Always ready to charge me for whatever they do."—  
California nurse.

"Main annoyance was with the dealer. Once the deal  
was set we had quite a time getting the car serviced. Left  
it one full week and when we went to get it, it was still  
not ready. The salesman was 'conveniently' out and no one  
else seemed interested. We had to take it back three  
times."—California lather.

"Body could be insulated against road noises a bit  
better."—California tool-and-die-shop owner.

"Windshield wipers do not cover outer ends of the wind-  
shield."—Mississippi project manager.

"Wipers should be changed from vacuum to electric."—  
Indiana pharmaceutical salesman.

"Trunk door and glove compartment too small."—New  
York technician.

"After car is washed, the door locks always freeze."—  
Wisconsin salesman.

"Too much windshield. Sun makes too much glare."—  
California traffic supervisor.


"Doors too thick, making car wider than necessary for  
the interior room."—Florida accountant.

"I don't like the wider body. It cannot be put in the  
garage by my wife or daughters. I occasionally scrape the  
chrome bead strip."—Massachusetts drug-store manager.

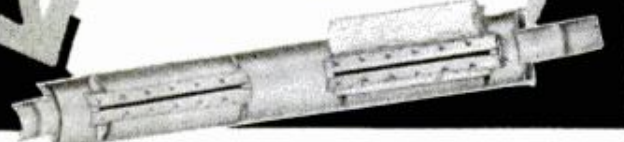
"Rear fender is not so hot. Looks like a copy of the  
terrible Chevy fins. More simple styling needed."—New  
York comptroller.

That's it—the story of 1,383,845 miles of driving by Ford  
owners. For a complete summary of the results of the  
survey, including percentages, turn back to page 106. Next  
month, the Owners Report will describe the 1960 Plymouth.

LOOK at its economy —  
LISTEN to its "whis-purr" —



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**MUFFLER**



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sive exhaust acids, QUIET-TONE mufflers last  
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KNIFE SERRATOR**

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just 2 minutes on all types scissors and shears, including  
pinking shears. Knife guide puts proper edge on any blade.  
Knife serrating attachment puts saw-tooth edge on hard or  
soft steel blades. Quick profits from homes, dressmakers,  
barbers, restaurants, hotels, butchers, etc. No experience  
needed. Big opportunities with this precision ball bearing  
machine. Has 3/4 h.p. motor. A money-making investment—  
write for **FREE FOLDER PM-9**  
**BEAVER MFG. CO P.O. BOX 434, 800 So. Isis Ave.**  
Inglewood, Calif.

G-1 150-250 amp 30V New \$17.50 used \$9.95  
 R-1 300 amp G.E. O.H. \$24.50 Good C. \$16.50

**Accessories Kit For Arc Welder** for above generators has helmet, gloves, elect. holder, volt reg., rheostat, voltmeter, Ground Clamp 30' cable & switch, \$22.50. With R-1, 300 amp gen \$37.50, with 100-250 amp gen \$26.50

**New Reactor Coil Arc Stabilizer** for R-1, P-1, G-1 & AC-DC \$10.95 incl. engine throttle solenoid control \$14.95

**AC-DC WELDER KIT** #511 G.E. Generator. Makes 1250 Watts AC light plant and 200 amp. DC welder and battery charger. Includes all items listed in accessories kit, AC-DC generator & instr. \$38.50

**Complete Pk. Accessories For welding & battery Chg.** including Reactor coil arc stabilizer \$29.50. With 300 amp gen \$45.50. With 100-250 amp. \$33.50

**V Belt Pulley Kit** fits all gen. has 2 B. bearing blocks H.S. bearings, 3V pulley shaft 8" L. & fl. coupling \$17.50

**New, throttle, Solenoid & idling device** for all gens., 1" travel \$7.50  
**Vapo-Liquid Fire Extinguishers** 1 qt. brass, good C. \$4.95 ea. 2/\$7.50

**NEW HYDRAULIC CYLINDERS**

Air or Oil Bore	Stroke	Shaft	D.A. 2000 PSI
607	1 1/2"	4 1/2"	1 1/8" \$3.95 2/\$7.50
300	2 3/8"	9 1/4"	1" 7 lbs. \$10.95
511	3 1/2"	2 1/4"	1 1/4" 15 lbs. \$24.50
311	3 1/2"	10 1/8"	1 1/2" 15 lbs. \$14.75
600	4 1/2"	8"	3" 35 lbs. \$34.50
115	1 3/8"	1 3/8"	1" 9 lbs. \$ 7.50
114	1 1/2"	8 1/2"	3/4" 8 lbs. \$10.50
116	1 1/2"	17 1/4"	1 1/8" 11 lbs. \$12.95
124	3"	6"	1 1/8" 10 lbs. \$18.95

**HYDRAULIC PUMP BARGAINS 1500 P.S.I.**  
 Type RPM GPH \*Reversible  
 \*Pesco Gear 4500 270 \$ 9.95  
 Vickers .410 3750 375 \$17.50  
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**Small Hyd Kit** has 2 D.A. Cylinders 1" bore 1 1/4" stroke each rated 786-lbs. with 1000 PSI, hyd pump, hose, tank & fittings Value \$37.50 kit price \$14.95

**SAVE ON SURPLUS MOTORS**

**H.P. 24-12V.D.C. Shaft (+.15%)**  
 Delco 1/8 8.4 amp. 5/16"x1" \$5.95 2/10.50  
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 Gear Red mtr 271 or 51 1/5 HP 3800 RPM \$4.85  
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 Gear Red mtr. 541 1/20 HP 5A 200 RPM \$4.75  
**New open center 4 way control valve** #10080 with adj relief for 1 to 4D.A. cyl. 3/8" ports \$12.95 #3w57 for 1 cyl 3/8" P \$6.95

**NEW HYDRAULIC SYSTEM KIT**

#400 K heavy duty Power driven rated 16000 lbs lift. Consists of 2 D.A. hyd cylinders 3 1/2" bore x 2 1/2" stroke ea. rated 8000 lbs with 1000 P.S.I. 1 four way hyd control valve with built in relief #821 1 Vickers hyd pump 400GPH 1500 PSI 3750 RPM filter, gauge, hose & fittings. Value \$169.95 save \$90.00 \$79.95 same kit with Two D.A. Cylinders 3 bore x 10 1/2" stroke \$63.50

**12 1/2 TON TRUST NEW HYDRAULIC POWER KIT**

Consists of 2 DA cylinders 4" bore x 5" stroke each rated 12500 lbs. with 1000P.S.I. working independently, 1 four way Hyd c. valve with press relief 1 stratopower hyd pump 375GPH 1400PSI 4500RPM 1 accumulator 3000 PSI press gauge 0-2000PSI, filter, tank, unloading valve, unloads pump at pre-determined press setting allowing pump to operate under no load when accumulator is charged hose & fittings \$242.75 value save \$100.00 kit price \$142.75

**New Linear Actuator** 5 1/4" travel & 1/4HP DC motor \$8.95. Rotary pump 180GPH 200 PSI 29" vacuum \$7.95

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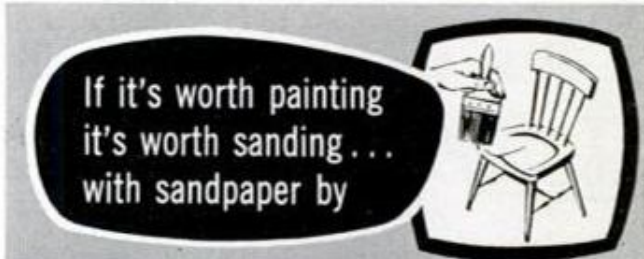
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Hydraulic power splits profits from waste wood • 7 HP trailer model • two speed • auto shift • auto stroke. Power "squats" to receive large diameter logs without "dead" lift—eighteen ton smooth hydraulic force cuts right through knots, 26" stroke handles up to 30" length, any diameter. Your name on a postal card will bring literature. **THE WACO AIRCRAFT CO., Dept. D, Troy, Ohio** Dealer Inquiries Invited

**Bore 35 standard holes  
with just one tool**

**New IRWIN  
Expansive Bit**

lets you dial your size

Just turn the dial and you're set to go with this new Irwin Expansive bit. No hunting for the size you need. Fits all hand bit braces. Clean, fast, accurate boring action from 7/8" to 3"—35 standard hole sizes in all!

And what a really fine precision tool to own. It's drop-forged from special bit steel, heat treated full length, machined for accuracy and sharpness, highly polished, too. Two cutters supplied with each bit. Model No. 21 with 5/8" to 1 3/4" boring range also available. Ideal for home handyman, professional woodworker, or farm. See your independent hardware dealer soon.



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Micro  
Dial  
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\$4.00**  
7/8" to 3"  
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the original solid  
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**WELD**

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\$14.75**  
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**WELDER**  
Complete with  
Twin Carbon Arc  
Torch and ac-  
cessories... to  
handle all metal-  
craft work.

Acclaimed by thousands of Homeowners, Mechanics and Hobbyists as the welder of 1001 uses. Easily operated from properly wired 110 volt AC or DC line. The ideal gift with a life-long use. Order today on 10 day money back guarantee. Send only \$3.00 today. Pay postman balance C.O.D. plus charges. Literature on larger equipment on request.

**FOUR-WAY WELDER CO., Dept. F2-F**  
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(Item 24)



**World's THRIFTIEST Light Plants**

700 Watt, push button start, 115 v. 60 cyc. AC. 2.2 HP, easy starting Briggs eng. No wiring necessary; just plug in and operate. Plenty of current for any oil burner, freezer, brooder, emergency lights, etc. which require up to 700 watts. Ideal for television and radios. Complete with voltmeter and built-in winding to charge 6 v. auto batteries. (Item 24) Wt. 75 lbs. Easily fits in car trunk. Be prepared if storm

**\$143.50**

knocks out power lines. Reg. \$275...

**\$199.50**

1200 Watt Plant (Item 45) same as Item 24 but larger generator and engine with 50% greater output.

**ELECTRONIC BRAIN** Now Available On All Our Plants—Write

**MASTER AIR COMPRESSOR**  
**COMPARE:** This is the only compressor built with a **NO RUST** stainless steel tank. Safe up to 500 lbs. (Item 209) High pressure type (4.5 in.). Large volume of air for heavy duty spraying, inflating truck & auto tires, greasing, sand blasting, etc. Piston type 2" bore compressor with built-in air filter. Master built with high strength alloys and precision bearings. Tank, 12"x24", 2100 cu. in. cap. Equipped with automatic switch that starts and stops motor to maintain desired pressure (up to 150 lbs.) and check valve, safety valve, gauge, shut-off valve, 20 ft. air hose and tire chuck.

Tank Tested up to 500 lbs. per sq. in. Beautifully balanced on ball bearing wheels and rubber tires. Don't take chances with used or surplus equipment. Our compressors are factory new and are guaranteed **SAFE**. Low factory prices. 1/4 HP. Model Regularly \$175. (Item 209)..... **\$109.50**  
1/2 HP. heavy duty model, Industrial motor motor and unloader switch. (Item 209a)..... **\$129.50**

**MASTER MECHANIC MFG. CO., Dept. A-66, Burlington, Wis.**

Southern Customers Order from Dept. A-66, Box 65, Sarasota, Florida

(Continued from page 228)

Unable to get out of the depression by moving forward, Swem backed the Air-Car a short distance—just as you might do with a wheeled vehicle in a similar spot—and jockeyed it back onto the main path.

He poured on throttle and edged up a slope of some seven or eight degrees. Then, turning at the top of the hill, Swem aimed the car at a very wet-looking lake and let it roar downhill at about 40 miles an hour. I mentally conditioned myself for a dip.

Swem, without batting an eye or slowing down, let the car roar out over the surface of the lake. And it stayed on top! He casually drove to a flat beach area where he settled the craft on relatively solid ground.

"Not bad, even if the test area isn't ready yet," commented Geithman. I had already jumped out into ankle-deep mud and was only too willing to testify that I could see a very strong argument for air cars in general on terrain like that.

Two 180-horsepower Lycoming engines, one fore and one aft, power the Air-Car and supply both lift and propulsion. Air is bled from the chamber walls and directed through louvers on the sides and rear of the craft to make it go forward, reverse, and turn.

There's another method of getting lift from air which is being utilized by Ford Motor Company. Ford engineers have worked out a system of directing compressed air out through tiny holes in the bottom of a metal pad—called *levapad*—so that the air works like a lubricant between the pad and metal rail or flat metal surface. The Levacar, which was on display in Dearborn until recently, rode on levapads which elevated it a few thousandths of an inch above a circular steel road.

Obviously, you don't feel this craft rise to its operating height when the air is turned on, but you get a virtually frictionless ride that gives the feeling of gliding on ice skates.

Dr. Andrew A. Kucher, Ford vice-president who proposed the air lubricant idea some 30 years ago, points out that wheels reach their ultimate usefulness at about 150 miles an hour. Since levapads do not have the limitation of wheels, they'll permit ground travel in the 200-to-500 miles per hour range.

The 450-pound Levacar Mach 1 rides on three levapads about seven inches in diameter into which air is fed at 50 pounds per square inch pressure. A 1 1/2-horsepower air jet propels it forward.

Ford engineers foresee the time when the levapad principle will be applied to trains which will scoot over rails, suspended on

(Continued to page 254)

# LOCK-EASE®

## Graphited LOCK FLUID

For house—car—garage—office locks. LOCK-EASE makes all locks work easier. Flushes out dirt, seals out moisture. Protects against freezing. Frees stuck locks. Prevents sticking, stops rust. American Grease Stick Co. Mushegon, Michigan L-205-S



Electric Model \$64.95



### 5 GAL. PORTABLE MIXER

Not a toy—built for long hard use. Mixes cement plaster, paints, chemicals, plastic, feed, fertilizer. One man operation can mix 15 cubic feet per hour. Comes complete with 5 gal. removable pail, agitator, electric motor, switch and cord ready to plug in and go to work. Gasoline powered model with 10" wheels. \$89.95. Write Dept. M.

Modern Mfg. Co. 160 N. Fair Oaks, Pasadena, Calif.

## ELECTRIFY PLAYER PIANOS PUMP ORGANS

YOU CAN QUICKLY END TIRESOME FOOT-PUMPING With a Compact Low-Cost Lee Silent Suction Unit



EASY TO INSTALL  
FULLY GUARANTEED  
1000'S IN USE  
write to

LEE MUSIC MFG. CO.  
Box 595, Tujunga, Calif.



"Yesterday his back ached so he couldn't even carry some curtain rods up out of the basement."

## SAVE UP TO 85% AT PALLEY'S

### 100 TO 1 HEAVY DUTY REVERSIBLE GEAR HEAD MOTOR

A real "workhorse" in a compact, rugged gear head motor. Gear ratio is 100 to 1—gives the 24V., DC motor tremendous take-off power. Has clutch set at 375 ft. lbs. Take-off shaft is 1-1/16" dia. . . . 2450

### NEW 3-3/4 HP ELECT. MOTOR

An ideal motor to operate a portable winch such as tow truck or utility boat. Series wound for continuous duty. Rated 3.75 HP at 2300 RPM. Draws 240 Amps on 24 volt DC. Has 5/8" diameter drive shaft. . . . 1295 NEW 895 USED

### SAVE HYD. HAND PUMP 675

Operates at 1500 PSI. Displaces .19 GPM at 30 cycles per minute. Has capacity of 1.5 cu. in. per a stroke cycle. Has built-in check valve. Regularly \$17.50

### FOUR WAY HYDRAULIC VALVE No. V-13USU

Sliding piston type with built-in relief valve to limit stroke. Pressure balanced in neutral position. Has 5/8" AC tube ports. Reg. Catalog price \$12.75 788

### STRATO POWE. HYD. PUMP 39.95

A variable displacement, piston type pump. Delivers 7 1/2 GPM at 1800 RPM. Max. output is 15 GPM at 3600 RPM. Full flow at 1275 PSI. The parts are 1" AN suction, 5/8" AN on pressure, 3/8" AN case drain. In new condition. PUMP MOUNT for above with a 4-hole foot mount . . . . . 1695

### BLOWER/EXHAUST FAN

Miniature type. 4" diam. fan forces air thru 5/8" long housing. Has 1/100 HP, 27.5 VDC electric motor, tandem mounted behind fan blade. Lifiting bearings. For ventilating closed compartments, darkroom, etc. . . . 488

### GOV'T SURPLUS BLOWER/MOTOR

Operates on 24 volts DC at 1.35 amps. Direct drive fan blade turns 4700 RPM. Fan has central intake and two opposed exhaust ports. Fan housing is 8" in diam. 388 Motor 3"x3". No. EM-BL3

### 4 SPEED HOBBY OR BARBECUE MOTOR

Extra rugged, precision built electric motor for your home workshop, barbecue, lab, etc. Uses 110 volt, 60 cycle current. Has 4 take-off shafts turning at 5, 25, 150 and 4000 RPM. Another Palley Extra Value. Worth \$14.95—NOW 1088

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TO ORDER—Send check or M.O. 1/2 deposit with C.O.D.s. All prices are F.O.B. Los Angeles Warehouse. All items sent postage or freight collect.

## HYDRAULIC CYLINDERS

1500 PSI Double Action CYLINDER—Bore 1-1/2", Shaft 9/16", Stroke is adjustable 1-3/16" to 4-3/8", length 14-1/2". No. H-84. . . 395

Double Action Hydraulic Cylinder. Will stand 2000 PSI. Steel barrel. Ideal for hydraulic press. Has 2-1/2" bore, 7" stroke, 1-5/8" shaft, 19" length. Catalog No. H-240 Palley Cat. price \$12.75 . . . 995

1500 PSI, long stroke cylinder—Has Stroke of 15-5/8", Bore 1-3/8", Shaft 1", Length 22". No. H-14 Cost Gov't approx. \$120.00 Palley Catalog Price \$11.75 795

1500 PSI Double Action CYLINDER—Bore 2", Shaft 7/8", Stroke 9", eye-to-eye length 14-1/2". Catalog No. H-48 . . . 595

World's largest stock of Hydraulics on our shelves. Send your requirements.

1000 PSI VICKERS PUMP  
A piston type, positive displacement Hydraulic Pump. Displaces .507 cu. in. per revolution. Capacity: 6 GPM at 3000 RPM with 1000 PSI or 3 GPM at 1500 RPM. Cat. No. H-P4USU . . . 2250

PUMP MOUNT for above. No. H-PM-1. Adapts pump to 1/2" key slot drive. Has ball bearings . . . 1195

### 400 GPM FUEL PUMP AND MOUNT Only 1195

Top quality Gov't Surplus! Designed to deliver 400 GPH. Vane type—20 PSI, 3/4" standard pipe parts. Has relief valve in head for adjusting pressure. Complete with a foot mount with 1/2" keyway shaft for driving with belt, gears, pulley.

## GENERAL ELECTRIC R-1 GENERATOR

Aircraft type. Easily converted for use as Arc Welder. Rated 300 Amps, 24-32V, DC. 3750 to 4000 RPM, counterclockwise. 3/4" splined shaft. Instructions for Arc Welder conversion FREE! 1695 Mfg. General Electric.

WELDING REACTOR  
Can be used with R-1 Generator or equivalent. Has an iron core wound with No. 4 wire. Withstands up to 400 Amps current load \$10.95

THROTTLE CONTROL SOLENOID 795  
Use as welder or motor control. Has 5" shaft, 1" travel. . . .

24 V. RHEOSTAT 195  
For control of welder output. Has 5 variable outputs and an "off" position.

"V" BELT PULLEY ADAPTER 12.95  
For use with the R-1 generator. A Palley Bargain!

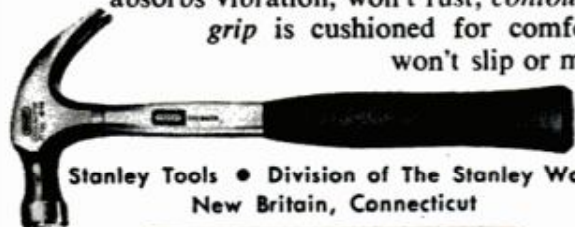
DOUBLE HANDLE 1000 lb. HOIST 1988  
Portable. Has 21 to 1 gear ratio. A double handle for speed and power. Has automatic brake. With 20 ft of 1/4" steel cable.

Pound for  
pound the  
finest hammer  
ever made



## STANLEY "STEELMASTER"...\$5<sup>25</sup>

You feel it the moment you lift it. The grip, the balance, the all-steel power instantly tell you, "This is it!" Buy one. It will serve you well. Here's why: *tempered rim* minimizes chipping; *locked-on head* will never come loose; *chrome alloy handle* has built-in flex, absorbs vibration, won't rust; *contoured grip* is cushioned for comfort, won't slip or mar.



Stanley Tools • Division of The Stanley Works,  
New Britain, Connecticut

# STANLEY®

MAKE HOME IMPROVEMENTS NOW

# BALKY



# MOWER?

**QUICK!** Speed it up fast with a few drops of 3-IN-ONE. Penetrates hard-to-get-at places. Doesn't gum up.

## 3-IN-ONE OIL

REGULAR • OIL SPRAY • ELECTRIC MOTOR



the thin film of air that lets them glide free of friction.

One other *PM* editor, Dick Dempewolff, rode the Air Scooter that Princeton University has developed. It, too, is the annular jet type of craft which is steered by the rider's shifting his weight in the direction he wants to go. He found that even the casual wave of an arm could cause the center of gravity to shift so that the craft moved in that direction.

These were the vehicles that *PM* editors tried firsthand—but every day, it seems, a manufacturing firm or an amateur comes up with another machine.

One of the best-known of the foreign vehicles is the Hovercraft, built by Saunders-Roe, a British firm. It's the annular jet type and has crossed the English Channel, among other feats.

Prominent in ground-effect experimentation and development is Carl Weiland, a Swiss engineer who just recently sold a 60-mile-per-hour craft to the U. S. Marine Corps. (The military, of course, is strongly interested in ground-effect machines; Spacetratics has a contract to deliver one to the Marines also, and Curtiss-Wright has delivered an Air-Car to the Army.)

Weiland, in trying to reduce the air loss inherent in the air-cushion craft, has carried on a great deal of experimental work with the *labyrinth seal* system. The effect of the labyrinth is to lower the pressure underneath the craft in a number of stages and to let air escape into the atmosphere with a minimum of loss. He reported that for a given craft—with all other factors equal—a labyrinth seal increased the payload 220 percent over the load an annular jet would support.

What about the future of ground-effect machines?

All to whom I talked agreed that more experimentation must be carried out. Fine control of the craft is one of the greatest problems facing the builders. And dust clouds are a problem in a crowded area.

However, Curtiss-Wright is setting up a production line in its South Bend plant with an eye to civilian and military sales. And Carl Bollum, of Spacetratics, says that it's "very possible that within a period of five or six years we may have ferry systems operating from Florida to South America carrying passengers and cargo at speeds up to 100 miles an hour. It is also very possible that within the next 10 years a transoceanic vehicle will be built approximately 300 feet in diameter, operating up to 30 feet over the top of the water, at speeds of 200 miles an hour."

It looks as if the new form of transportation is here to stay. ★★★

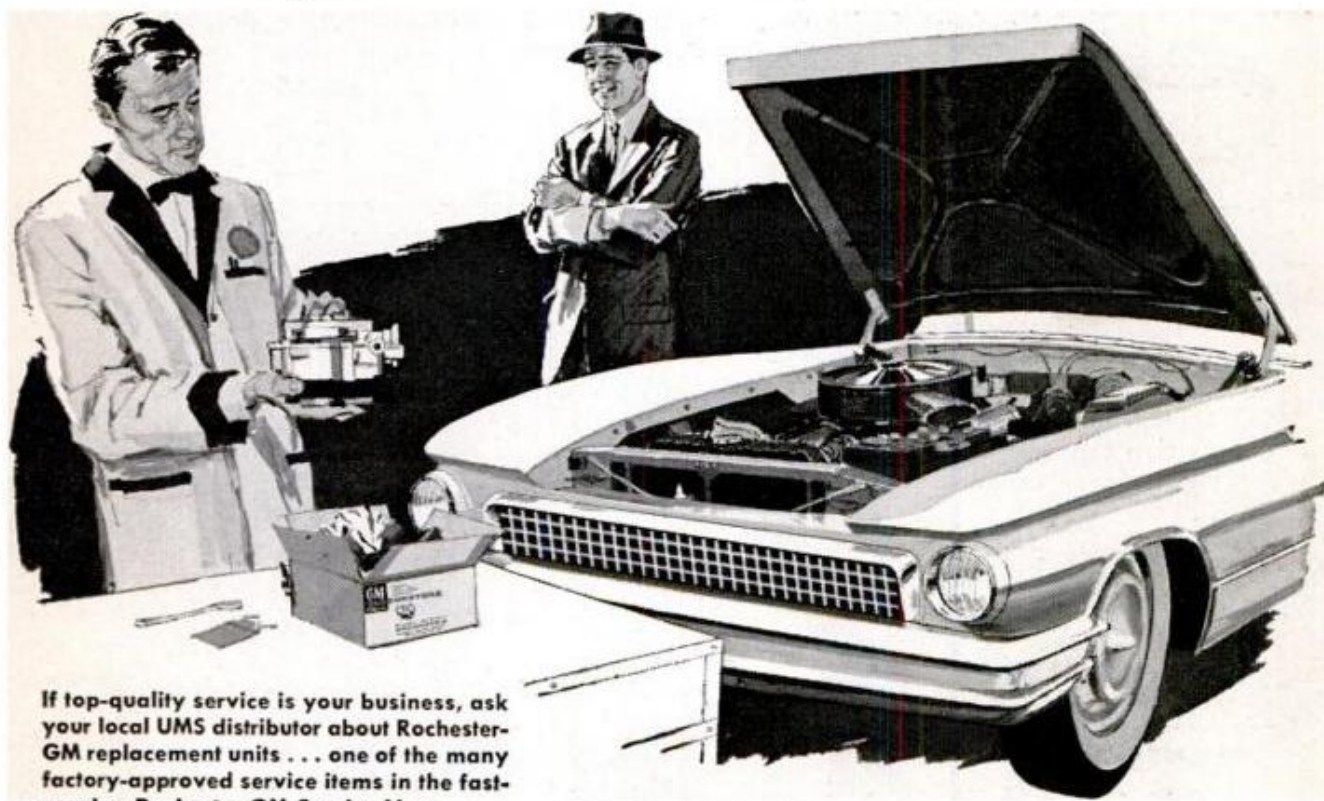


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# IT'S

## WHAT DEALS!

### FREE CARRYING CASE AND RIP GUIDE WORTH \$15

Get both with any of these three Heavy Duty saws. They're professional performers. Loaded with power. "Deep-cut" design. Big capacity. Patented Micro-Guide®. Price of saw includes FREE case and rip guide.

Saw	Capacity		Power	Price
	90°	45°		
No. 646-6½"	2"	1½"	1.5 HP	\$74.95
No. 747-7¼"	2¾"	2"	2.0 HP	\$84.50
No. 800-8¼"	2⅞"	2½"	2.0 HP	\$95.00

### PRICE CUT \$5 ON POWER SAW

A husky, all-purpose 6½" model. Handles any job. 1.0 HP cuts 2¾" at 90°, 1¾" at 45°. Better bargain than ever. (No. 626)

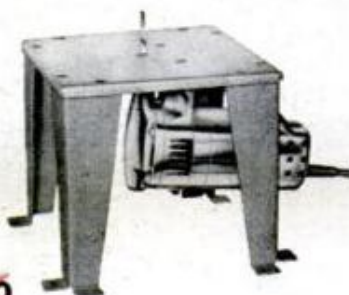
REG. ~~\$54.50~~ **TOOLTIME \$49<sup>50</sup>**



## GREAT!

### \$5.95 BONUS JIG SAW OFFER

Free bench stand and table included with purchase of No. 360 Jig Saw. Saw cuts own starting hole in wood. Fastest in its class.



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~~\$35.90~~

**TOOLTIME \$29<sup>95</sup>**



### NEW! NEW! NEW! NEW! NEW!



**No. 830**  
3" belt ¾ HP  
**\$74<sup>50</sup>**



**No. 840**  
4" belt 1 HP  
**\$84<sup>50</sup>**

### HEAVY DUTY BELT SANDERS

Two new additions to the MF line. Professional quality, yet priced lower than any comparable models. 16 special features. Powerful MF motors. Ball and needle bearings. Slip-proof timing belt drive. Contour handles and anti-gouge back rest.

# TOOLTIME!

WHAT BARGAINS!

## RICES SHAVED ON PLANES

Save a buck! Fine bench plane with fast depth and side adjustments. Cutter is solid of steel 2" wide.

REG. ~~\$6.29~~ **TOOLTIME \$5<sup>29</sup>**

9¢ off! Excellent quality block plane. Sides are highly polished. Lever cam lock. Cutter depth screw adjusted. (No. 75)

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TERRIFIC!

## COMBINATION SQUARE DEAL

Popular, accurate square. Deeply etched—8ths and 16ths on one side, 16ths and 32nds on other. Cat's-eye level. (No. 200)

REG. ~~\$2.25~~

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## HAMMER KNOCKED DOWN 80¢

Tubular steel shaft and cushioned handle absorb shock. Perfect balance. Should last a lifetime. (No. 692C)

REG. ~~\$4.99~~

**TOOLTIME \$4<sup>19</sup>**



## HACKSAW FRAME PRICE CUT

Comfortable pistol grip. Back of frame is reinforced. Nickel finish. Blade is easily adjusted to face in 4 directions. (No. 1237)

REG. ~~\$2.50~~

**TOOLTIME \$2<sup>19</sup>**



**HURRY! OFFERS GOOD FOR LIMITED TIME ONLY**

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Dept. PM-34, Greenfield, Mass.



WOW!

## DRILL BIT SET SLASHED \$1.31

High speed steel blades packaged in handsome plastic carrying roll. Sizes 3/8", 1/2", 5/8", 3/4", 7/8", 1". (No. 8006)

REG. ~~\$7.80~~

**TOOLTIME \$6<sup>49</sup>**





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outboard...*

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**LARK II**

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*\*In 1959, there were 126 motor models on the market—ranging in size from 1½ hp to 70 hp. Of these, 1 in every 11½ motors bought was an Evinrude Lark.*

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