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AUGUST, 1960

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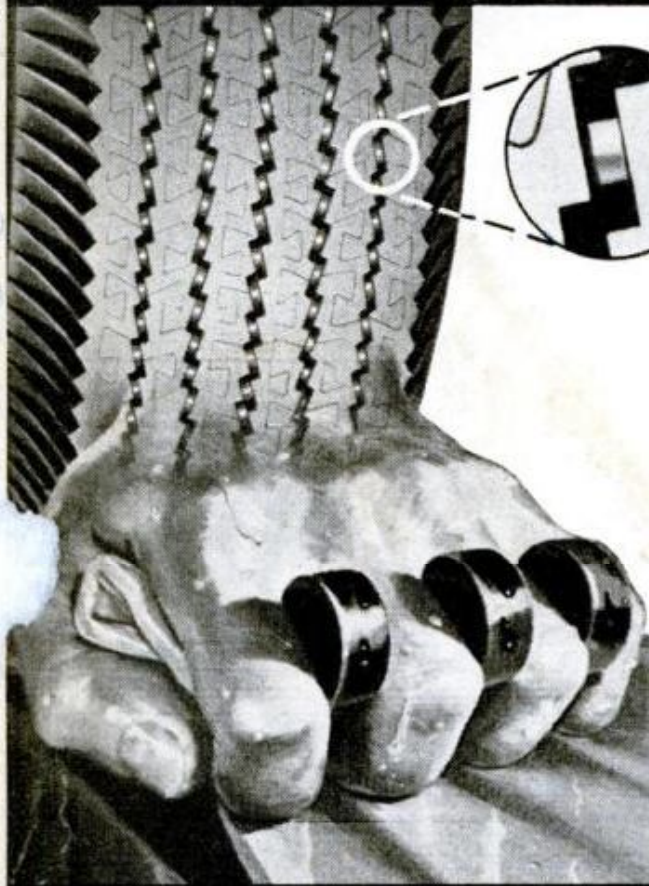
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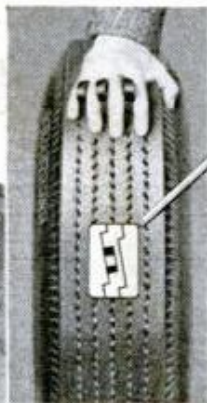
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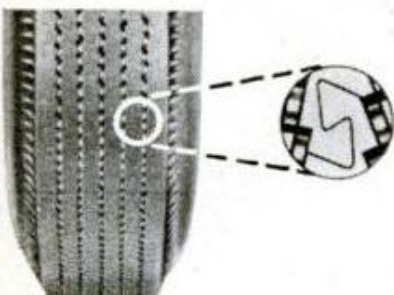
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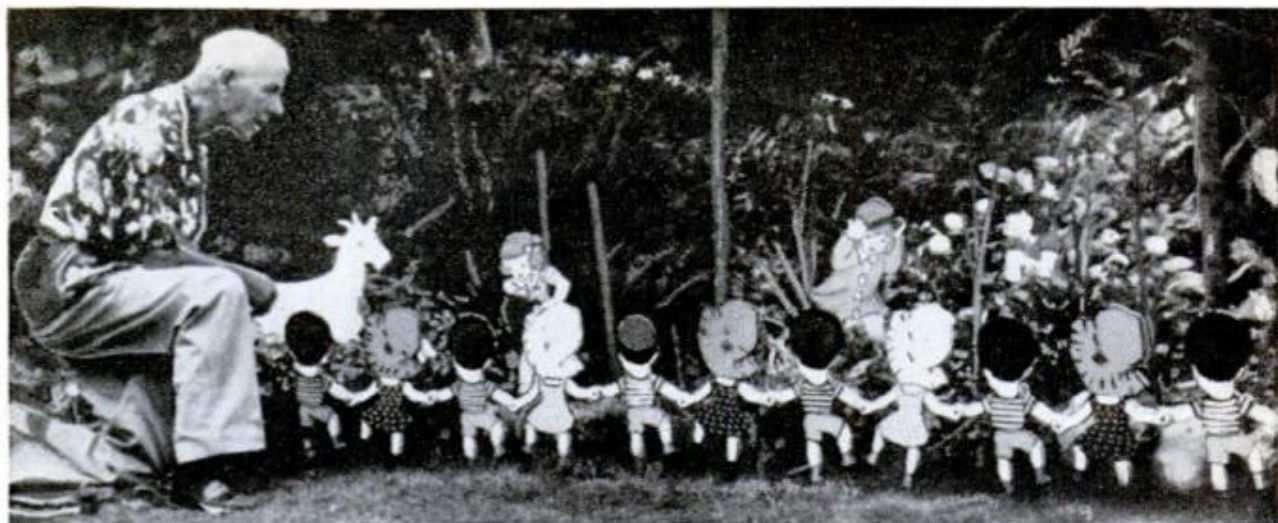
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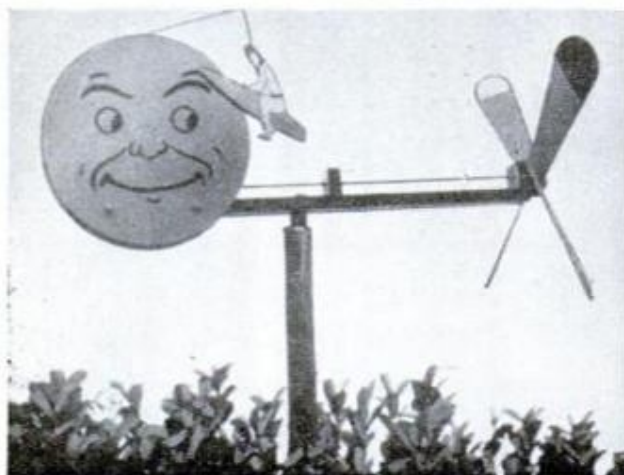
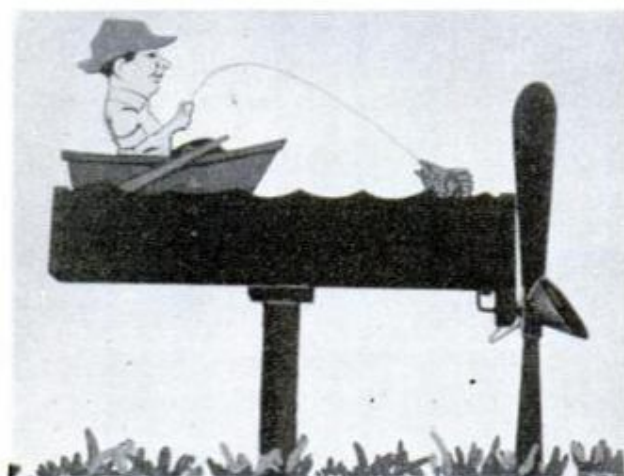
FLIGHTS BY THE U-2 brought espionage, normally hidden, into sharp focus. In the September issue, a former OSS officer tells how an intelligence agency gathers and evaluates information. . . . Creators of "Huckleberry Hound" explain the tricks they use to grind out an hour of top-notch TV cartoons each week. . . . Owners report on their Thunderbirds. . . . And scientists tell why they believe life exists elsewhere, and how they hope to talk to other worlds



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Rev. Eric Howell photos

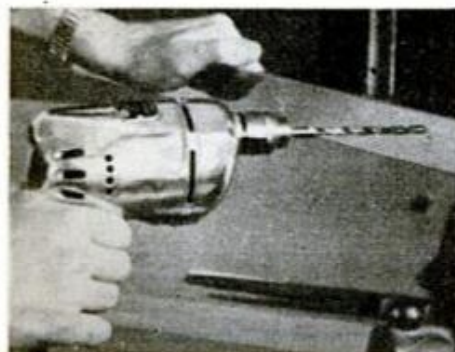




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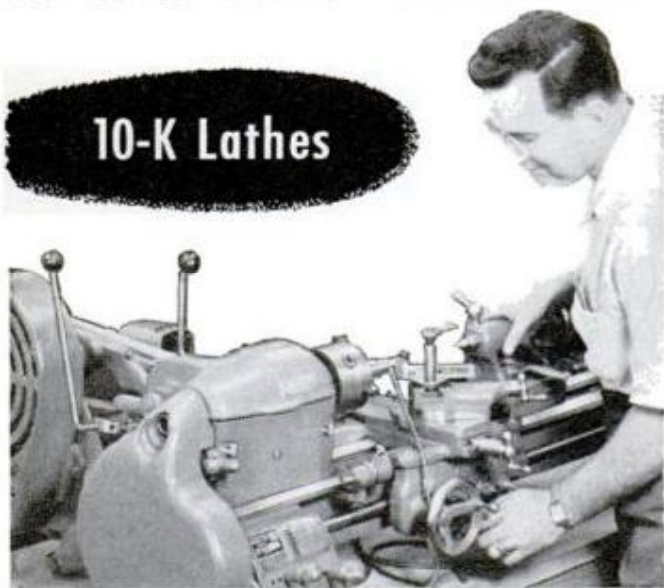
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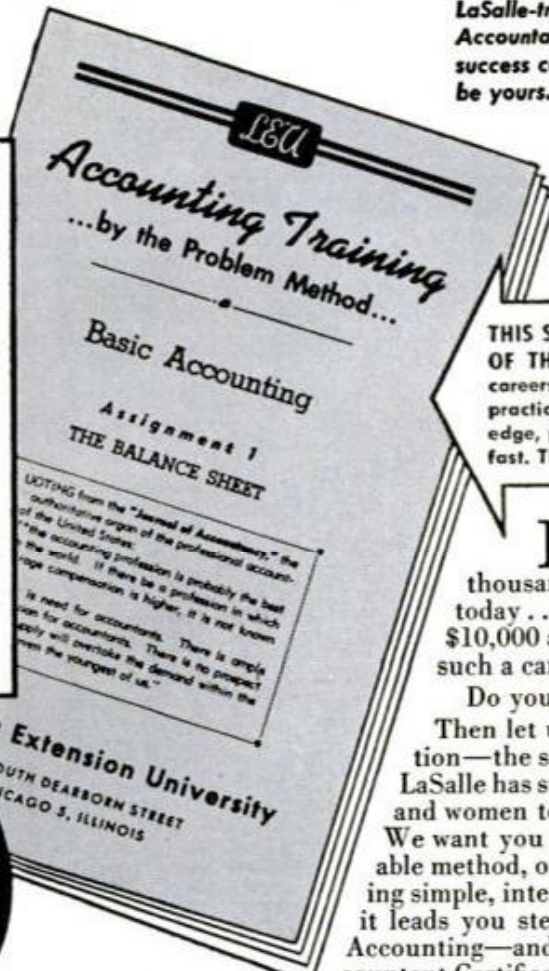


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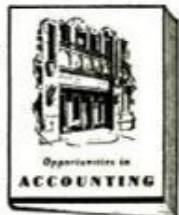
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect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

Does Summer's Blue Haze Help Create Petroleum?

That blue haze you see over your vegetable garden or farm field in the summer may be petroleum in the process of formation.

Dr. Frits W. Went of the Missouri Botanical Garden, St. Louis, believes it is, and his new theory about how petroleum originates is attracting scientific interest. Dr. Went theorizes that the haze is caused by asphaltic and bituminous particles created when living plants expel gaseous hydrocarbons. Hundreds of millions of tons of these particles enter the air each year and eventually rain down on earth. In time they form petroleum, he suggests.

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Over the Editor's Desk



To the Editor:

One of the most pleasant sounds in the world to Albert Lahew, of Waynesburg, Pa., is the powerful purr of his self-created garden cultivator.

By blending ingenuity and some artistry with a hacksaw and acetylene torch, Mr. Lahew has created a low-cost, highly-efficient motorized garden tool.

He has developed a full-scale, 20-inch-wide garden cultivator using an assortment of parts from some 25 different motors, machines and discarded appliances.



Basic parts are: a gear case from an old vacuum-cup washer with a 36 to 1 reduction ratio; steel wheel disks from a 1929-model automobile; ratchets from an old clutch gear assembly in a 1930-model washing machine and a two-thirds-horsepower Briggs and Stratton motor from another discarded washing machine.

The jack shaft was made by Mr. Lahew who also made skillful use of some bar steel and one-inch water piping for guide arms and handles and wheel cleats.

Most recent improvement to his "garden gadget" is a sliding motor base.

Richard V. Morgan
R. D. #3
Waynesburg, Pa.

(Continued to page 14)

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PIONEERS IN MODERN CIGARS

To the Editor:



Enclosed is a photo of a three-wheeler I built. I used a Crosley rear end and frame, a Cushman motor and an Indian transmission and front end. She goes about 25 m.p.h. I was more interested in power than speed. That's my pop at the tiller.

Benneville Le Van
Kutztown, Pa.

☆ ☆ ☆

To the Editor:

I want to thank you for the nice articles (and cover spread) in your May issue (10 Unusual Vacations). I had no idea that it was to appear in your magazine and as a result we were caught unprepared.

We have received about 50 inquiries thus far and we have set up a proposed 10 day cruise between July 11 and 21 for the first 30 reservations that we receive. We are calling it the "Special Popular Mechanics Cruise."

We are answering each inquiry and outlining the cruise and the costs. Costs are \$250 per person. Since December the ship was changed to *Caribbean Star* and is now operating as a Bahamian-registered ship. We thus are able to sell tickets to individuals as well as charter the ship.

We are pretty well booked for the summer and had only this one date of ten days available. We have some dates open during the fall months.

Again, please accept our thanks.

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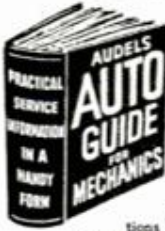
☆ ☆ ☆

WE THINK you'd enjoy a book just published about the Project Mercury Astronauts called *Seven Into Space*. The author is Joe Bell whose two-part article "I Lived with the Astronauts" ran in the December, 1959 and January, 1960 issues of *PM*. Jammed with facts and profusely illustrated, *Seven Into Space* tells the whole exciting story of the men and hardware of our man-into-space program. It is available from the publisher, Popular Mechanics Press, or at most bookstores. Price is \$3.95.

(Continued to page 16)

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To the Editor:

You did a very good job with article "What to Do Until the Firemen Come" (*PM*, Feb. 1960).

I have been in the fire service for many years and have done a lot of work in the fire-prevention field. One thing I can not see is that you say in the article, "There are a dozen or more inexpensive automatic fire alarms on the market which may—or may not—be better than nothing." What I think you should have said, that for fire protection, only Underwriters Laboratories approved equipment should be used.

In the opinion of many fire fighters, any equipment for fire fighting should have the UL label on it. Ask yourself "would you have a butcher operate on you?" The same thing is true with firefighting equipment; get it from the right person and get the right things, as it is your life that you are going to trust with the equipment.

R. D. Hedges
Camp Borden, Ont.

☆ ☆ ☆

To the Editor:

I request that you make a formal apology to Volkswagen. In the April *PM* you said: "This new Ford compact (Falcon) racked up the best record of owners approval in the history of *PM*'s Owner's Reports: Excellent 82.7%; Average 16.5%; Poor 0.8%."

In the October 1956 *PM* the Owners Report on the Volkswagen contradicts this. The VW report was as follows: Excellent 95.8%; Average 4.2%; Poor 0.0%.

John Kloos
Ellwood City, Pa.

Mr. Kloos is right. PM slipped a cog here.

In the final paragraph of the Falcon Owners Report we acknowledged this fact, but somehow failed to include it in the opening remarks. The Volkswagen indeed does hold a better record in the surveys.—EDITOR.

☆ ☆ ☆

To the Editor:

In the May issue I read the most interesting story of the demolition of the aircraft carrier, the "Big E." I was somewhat disappointed when you said she was the first to receive a Presidential Unit Citation in the carrier group. I don't know whether you mean the first and only one, but from November 11, 1943 to May 11, 1945 when we were nearly sunk by suicide planes and enemy attacks in all manner, the mighty *Bunker Hill*, CV 17, also got a Presidential Unit Citation. I had a ringside seat for the suicide attack on the "Big E." They attacked the *Bunker Hill* first as we were the flagship. Then we were badly hit and the flag staff went to the "Big E." Then they

were kamikazed. I don't mean to minimize the gallantry of the "Big E," but honestly that is all one ever reads about. We would at least like honorable mention. There was a carrier—the *Bunker Hill*, CV 17.

Robert C. Snyder
ex-Aviation Machinist Mate 3/c
Shingleton, Mich.

☆ ☆ ☆

To the Editor:

As you know, our government is very interested in the improvement of foreign language teaching in this country. Several hundred foreign-language teachers this summer will attend classes under the National Defense Language Institute Program in which classes are not only free but for which is paid a stipend of \$75.00 per week plus an additional allowance of \$15.00 for each dependent.

I, as a foreign-language teacher am bettering myself at no cost to my government. Probably many others would be using the same method had they thought of it. The idea seems to be one that would be of interest to your readers.

I am teaching Spanish, French, and Italian simultaneously for the Fullerton Union High School District. In order to maintain fluency in these languages I receive from more than 15 friends in foreign nations interesting radio programs about their countries recorded on magnetic tape. This way I can study the foreign languages and the culture of the countries at the same time. The programs are played through the intercom system so when I am at home I can listen to programs that were recorded in remote sections of the world with the same ease that most people use in listening to local stations.

Before I close I want to say that I enjoy your magazine very much. I usually read it in three languages—French, Spanish and English. I know of no better way of learning technical vocabulary.

James R. Reese
Sunny Hills High School
Fullerton, Calif.

☆ ☆ ☆

To the Editor:

After reading your article "Offshore Cruising by Outboard" in *Popular Mechanics*, March, 1960, I think you should be given credit for bringing forth the real pleasure and enjoyment that can be gained from fishing and boating. Your annual boating section is a true to life article that gives a clear definition of what boating can mean to an enthusiastic reader.

Dave Smeltzer
Tucson, Ariz.

Great Pioneer in Science Do You Know Him?

By James S. Thistle

IN THE FACE OF OPPOSITION from the church and the scientists of his day, this Pioneer had the courage to advance his theory that the earth was *not* the center of the universe, but, like the other planets, revolved around the sun. For this bold but correct reasoning he is called the "father of modern astronomy."

Astronomers had observed that the Great Dipper moved slowly, night after night, around the North Star. This led them to think that it was the sun that moved. Our scientist, however, maintained it was the earth's turning on its axis which produced this effect.

So bitter was the feeling against our scientist's radical view of the universe that his masterpiece, *The Revolution of the Celestial Spheres*, was withheld for 36 years. At long last Pope Clement III approved the work, but too late to bring comfort to its author. He died without knowing that he had become famous.

*These letters, unscrambled,
spell the name of this
month's Great Pioneer
in Science:*

LAONICCENSORSPIUU

(First and Last Names)

Write the correct name here:

Now turn to page 214 for the answer.

AUGUST 1960

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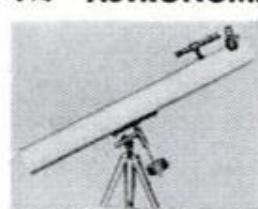


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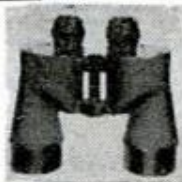
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M-2



TUNE IN ON THE INVENTORS

By John Linkletter

IF THE SKY seems to be too full of flying things already, wait until they start putting wings on motor scooters! And it may well happen, for a patent (No. 2,938,681) has been granted to Antonio Palermo of Ottawa, Canada, on his design for a flying motor scooter. It features wings that fold back against the sides of the scooter for land travel.

Bird lovers, heretofore limited to watching and feeding the feathered creatures, can now give them shower baths. Alan Hinton of Brooklyn, N. Y., got patent No. 2,938,495 on a device that squirts a shower of water on a visiting bird when an observer squeezes a rubber bulb.

To better imitate the flight of a real insect, William Pratt of Forest Park, Ga., put helicopterlike "wings" on a fish lure—and received patent No. 2,935,809.

A two-wheel drive system on a bicycle enables the cyclist to get extra speed and hill-climbing ability. He supplies front-wheel power by pumping the handle bars with an upward lift of the arms. When the extra boost isn't needed, the handlebars are locked and only the pedals are used. Inventors, who have applied for a patent, are Maxwell Price and Arthur Wissinger of Peru, Ind. ★ ★ ★



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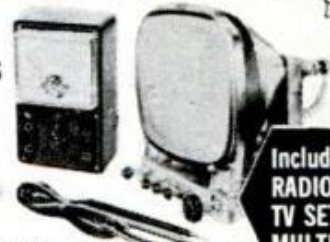
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Sidelights from the PENTAGON

By William R. Kreh

PLAYFUL PORPOISES wearing falsies may help the Navy double the speed of its submarines and torpedoes. The specially-trained sea mammals will be placed in a windowed tank where cameras can record their every motion. Tiny instruments, fastened to the rubbery skin with suction cups, will radio each porpoise's heartbeat, respiration and temperature. Purpose of the tests is to find out why a porpoise can knife through the water at speeds up to 40 knots with so little effort. One theory is that a rich mass of blood vessels just under the mammal's skin may furnish a sudden flow of blood which warms the surrounding water, thus thinning it out and allowing the porpoise to swim at high speed. Another theory is that this same rush of blood may flow backward along the body, creating microscopic ripples in the skin. These ripples may break up tiny bubbles that form on the surface of bodies moving through water, causing drag. If these principles could be applied to the Navy's underwater craft, it could double their speeds and cut down considerably on fuel.

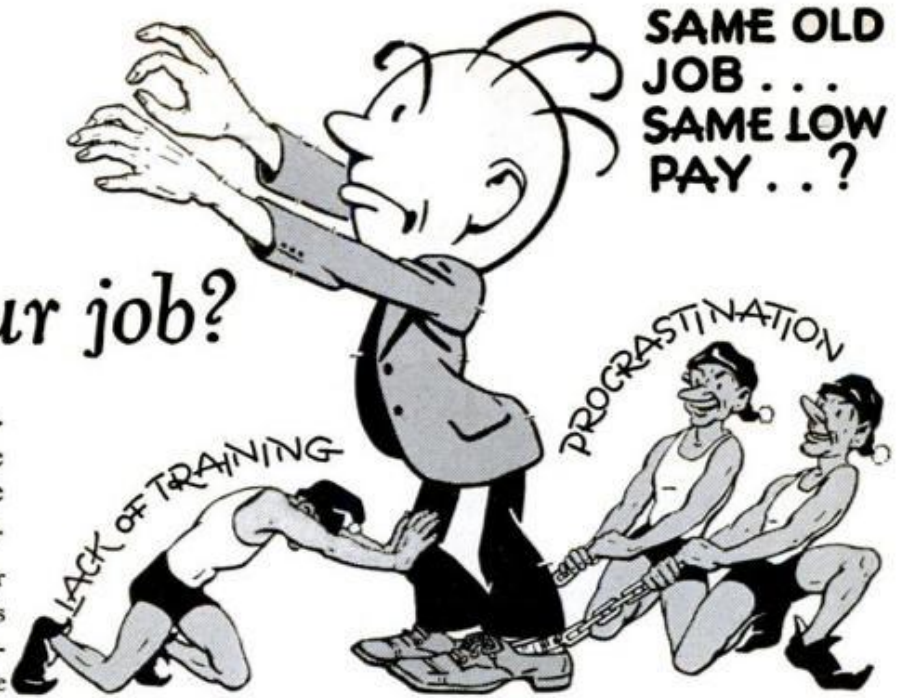
What's the heaviest single object that can be safely parachuted from an airplane? That's what the Air Force Flight Test Center is trying to find out over the California desert. It recently hit a new record when 17½ tons floated to earth safely. Using a huge C-130 cargo plane, the experimenters pushed overboard a unique payload they affectionately dubbed "the bathtub." A rectangular metal container with rounded corners, the bathtub has inside slots which hold 500-pound sheets of boiler plate. By putting the weights in different slots, the center of gravity can be changed to get different performance data. For the record drop, six parachutes, each 100

(Continued to page 22)

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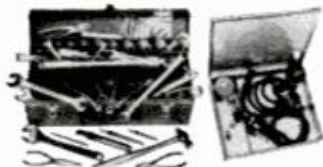
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feet in diameter, were used to float the 17½ tons to earth.

Ever wonder what happened to "Speedy," the Army's famous 'fraidy cat? She gained prominence last year in films showing her recoiling in terror before a tiny mouse after being subjected to a new psychological fear gas. She recently raised a family at the Army's Chemical Center in Edgewood, Md., and scientists say she's as good as new again, ready and willing to battle any mouse.

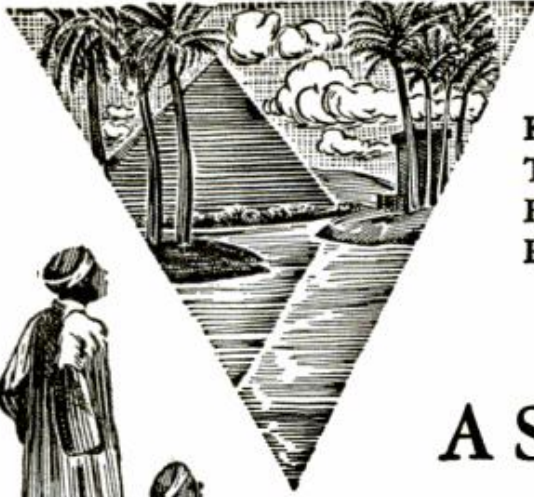
"Instant" animals for museum exhibits have been developed by a biophysicist at the Naval Medical Research Institute in Bethesda, Md. Dr. Harold T. Meryman does it by deep-freezing the newly-dead animal and then drying out its tissues in a vacuum chamber. The animal comes out without any change in shape and is good for indefinite preservation. To restore it to the newly-dead state again, he simply adds water.

In Monrovia, Calif., the local police department's stolen-car detail received a rare complaint: An Army tank had been stolen. The National Guard had moved the M-74 into the street while it cleaned out its armory, and some hod-rod prankster couldn't resist the temptation. The tank was found several miles out of town with a burned-out engine.

Here's a clever gimmick that a few large civilian garages might adopt. At March Air Force Base, Calif., apprentice mechanics wear green buttons to identify themselves as those still learning and needing frequent supervision. After promotion to a skilled level, they get blue buttons which give them more freedom from supervision.

Bottled sunshine leads mariners safely to harbor at Los Angeles. The Coast Guard has a light on a breakwater powered by a solar battery. The battery turns sunlight into electricity and packs it into a storage battery. At sundown, an automatic switch turns on a light that's visible for three miles. With sunrise, the light goes off and 300 solar cells begin recharging all over again.

PENTAGON POTPOURRI — The Navy may soon "blast off" instead of "cast off." A new device under study consists of a small charge on a ship's anchor or mooring chain, allowing the ship, in an emergency, to get away in a hurry . . . the Army has developed a portable shower that will wash radioactive particles off more than 800 men within hours. ★ ★ ★



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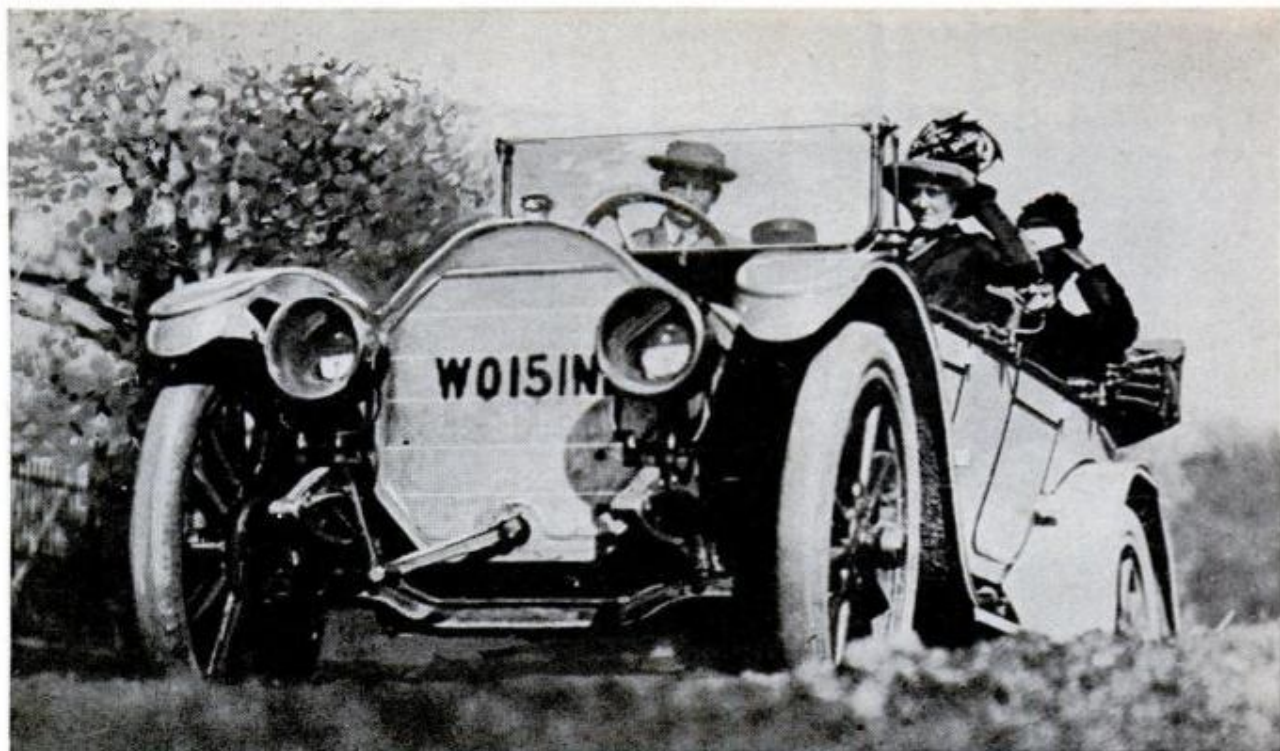
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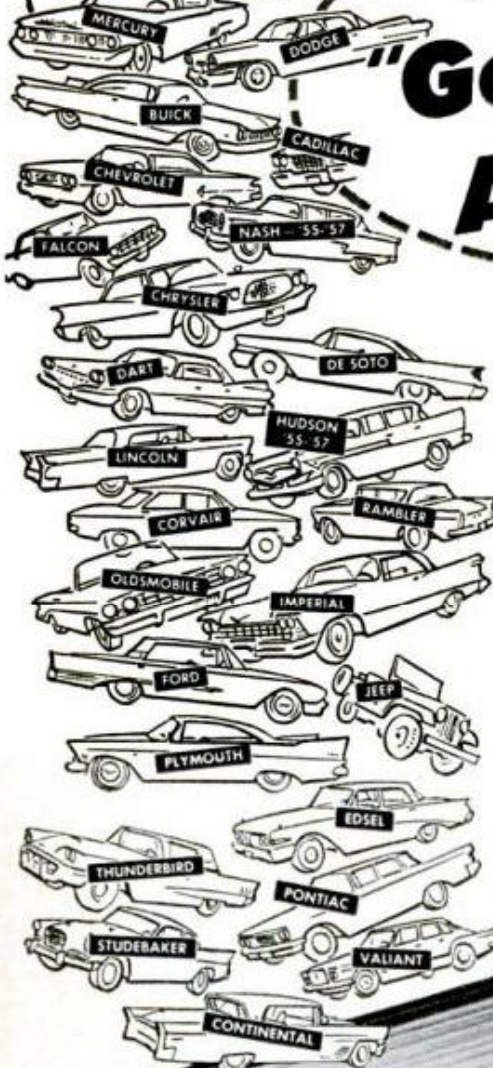
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**Radio Heaters That Fuse Plastics
Threaten Navigation of Airplanes**

Heaters that use radio waves to fuse plastics interfere with radio-navigation aids used by airplane pilots, according to the Federal Communications Commission. In the New York City area, improperly shielded heaters have also disrupted a secret broadcast circuit used by the military for national defense and have hampered police communications. So far, however, neither an air crash nor failure of a policeman to make an arrest has been traced to such interference, says George S. Turner, chief of the FCC's field engineering and monitoring service.

"The airways check out their own electronic-navigation beacons periodically," he says. "When serious interference near a beacon is noted, both pilots and the FCC are alerted."

Most of the improperly shielded heaters are used by small manufacturers, says Turner, and tracking them down sometimes proves difficult.

Adding to the difficulty in tracing the source of interference is the fact that the heaters do not operate on a single radio frequency. The frequency of the heater changes rapidly as the plastic melts. This causes interference to sweep rapidly across the band of radio frequencies. It makes difficult the job of getting a radio "fix" on the direction from which the interference is coming.

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Four new catapults, each nearly twice as powerful as those now used to launch heavy jet bombers, will be installed aboard the nuclear-powered aircraft carrier *Enterprise*, which is under construction at Newport News, Va. Using compressed air, jet fuel and water as their driving force, the catapults can accelerate aircraft from zero to 200 miles an hour in less than three seconds over a distance of 248 feet, and at 30-second intervals. The catapult system was developed during the past year at the Naval Air Test Facility, Lakehurst, N. J., and test pilots report the giant slingshot has very smooth action. To catapult, a blast of high-compression air is admitted to the combustion chamber of the launching tube. Fuel used in jet aircraft is injected into the combustor and ignited. Water sprayed into the inferno is flashed to steam by the intense heat, greatly increasing the mass of the propellant. This mixture enters the catapult tube, drives the piston bearing the airplane down the short runway and the heavy bomber is airborne.

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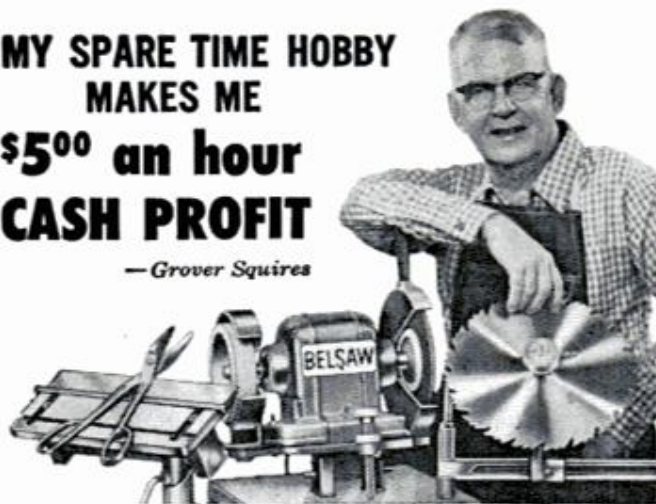
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**Keeping up
with the
ATOM**

By James Biery

THE DEATH RAY, that fantastic invention of science-fiction writers, someday may be a terribly real weapon of both the U.S. and the U.S.S.R. Few scientists are talking about it, but scattered reports indicate that both governments are interested in developing a neutron bomb—a device that could destroy men with bursts of radiation but, like the fictional ray, would leave buildings and machines unharmed.

The subject came to light recently when U.S. Senator Timothy J. Dodd, of Connecticut, told reporters he has learned that "Such a bomb can theoretically be produced by tailoring the energy of a fusion explosion so that, instead of heat and blast, its primary product is a burst of neutrons." Dodd called the device a "death ray," adding he believed experiments looking toward its development have been conducted in both the U.S. and the Soviet Union.

Such a bomb would be a formidable weapon for it would create little blast damage. A city could be bombed without destroying property. It would produce little uncontrolled fallout, so the bomb could be used without contaminating friendly forces or areas that would have to be entered.

The bomb, according to Dodd, would be fashioned from the same ingredients that go into the hydrogen bomb—heavy hydrogen and a little lithium—but it would be exploded in such a way so as to free a great many neutrons. Normally the neutron radiation is dissipated in the blast and debris of a hydrogen bomb explosion. That explosion, by the way, is triggered by ingredients of the atomic bomb. There has been talk that TNT or another ordinary explosive could be used to set off a neutron bomb.

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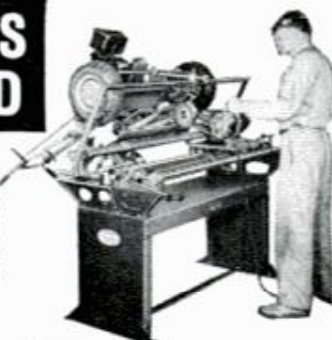
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WHAT'S UP IN THE AIR



By Kevin V. Brown

"HURRY UP with the coffee, dear. I'm late for the 8:15!" A familiar complaint in suburbia, but harried commuters may now be talking about the 8:15 plane. An airline in Texas (where else?) recently inaugurated commuter service on the busy Dallas-Houston run in direct competition with rail, bus and auto transportation. It features 12 round trips daily at \$10.80.

Each spring planes of the U.S. Air Force's Military Air Transport Service (MATS) have to speed up their schedule of cargo flights to Air Force weather stations in the frozen Arctic—and for an ironic reason. They have to get there before the warm weather comes. Most of the stations are located on huge floating islands of ice. Summer temperatures make the ice runways too mushy for landing large transports.

MATS, incidentally, has a motto, "We Deliver Anything Anywhere." One of its airmen took it literally recently—he delivered his wife's baby. She entered labor pains before an ambulance could be called, and the frantic young airman was forced to handle the job at home alone. His unit later gave recognition by adding an extra footnote to its monthly tonnage report: "One 6-pound, 5-ounce girl off-loaded to base hospital. Mother, daughter and loadmaster doing fine."

And speaking of the birds and the bees, missiles and space ships have been nicknamed "birds," so it was only a question of time before the bees got into the act, too. Space vehicles will need gardens to provide food and convert carbon dioxide back into oxygen for the crew (PM, June, 1960), but pollinating the plants creates a problem. One space medic says that the original method developed by Nature would be much more efficient than anything man could devise. He suggests that the first space garden include a pair of old-fashioned honey bees.

One of the most venerable aircraft in the short but exciting history of aviation is heading for the last takeoff. The Air Force's C-47 (known as the DC-3 in civil aviation) is being phased out of service. Introduced in 1935, the "gooney bird" has spanned half the history of flight. ★ ★ ★

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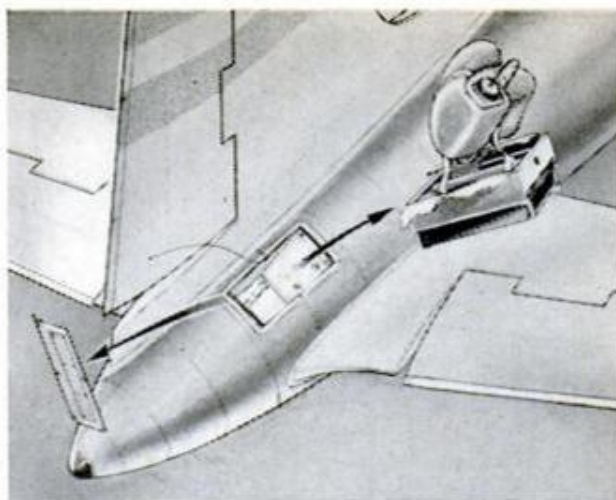
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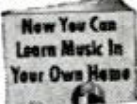
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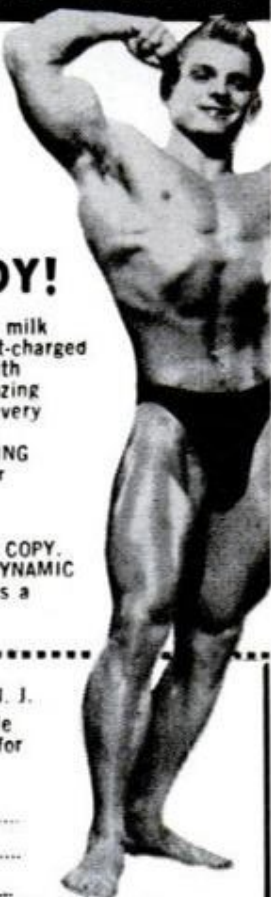
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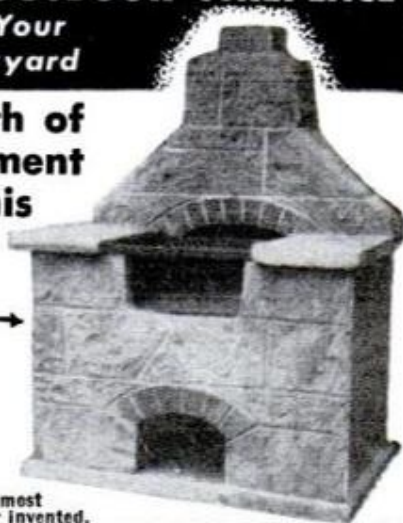
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ITEMS FROM ALL OUTDOORS

By Dick Kirkpatrick

WHEN SIR EDMUND HILLARY leads the World Book Encyclopedia Himalayan Expedition up the slopes of 27,790-foot Mount Makalu next month, some of his 400 coolie bearers will be toting a new product that should develop into good news for outdoorsmen, and which could eventually revolutionize our entire system of distributing perishable foods. After several years of research, Armour and Company has begun producing limited quantities of meat, vegetables, and fruits processed by lyophilization and sublimation, or "freeze-drying." This process, which involves quick-freezing, then drying at low temperatures in a partial vacuum, removes 98 percent of the moisture, leaving a feather-light dried food product that looks and feels almost like a papier-maché fake. The dried food, sealed in plastic bags, can be stored for long periods without refrigeration, but can be restored quickly by soaking in water for a few minutes. Once rehydrated, the food is almost indistinguishable from its fresh form, and recovers its appearance, taste, and nutritional value. Foods that were precooked before freeze-drying can be eaten immediately; raw foods are cooked as if they hadn't been processed. And the samples prepared for PM's reporter by Louis Szathmary, Armour's Executive Chef, were excellent.

Freeze-dried foods will not only save a lot of weight on Hillary's expedition (100 pounds of meat freeze-dries to 20 pounds), but are expected to be a big morale booster. It'll be a real treat to get a home-style Sunday dinner after chasing around at 20,000 feet in the Himalayan winter after the abominable snowman or working on the group's nine-month program of exploration, mountaineering, mapping, glaciological and physiological research.

The Coast Guard has approved an official distress signal for small boaters—stand with arms outstretched on both sides, then repeatedly raise and lower the arms. The new signal does not eliminate the use of other signals, but will help avoid confusion; if you see someone on your lake executing that flapping motion, don't smile and wave back—he's in trouble. ★ ★ ★

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BULLETINS

from the world of **SCIENCE**

By James Biery

"CHEMICAL MEMORY," a process developed by scientists at the National Cash Register Co., will join the punch card and magnetic tape processes in storing the facts it is important to have tucked away somehow. The new process came out of work the NCR men were doing with "encapsulation." In that process, droplets of liquid are wrapped in tough gelatin skins to produce cells one-millionth of an inch in diameter. One million of these cells could be fastened to a square sheet of paper. Why not try to store information in them?

After much experimentation, it was found the cells could serve as storage units if they were made into tiny reservoirs of a light-sensitive dye, dissolved in oil. One such dye is colorless to begin with. But it will turn bright blue when exposed to light and will remain blue when the light is removed. When exposed to a special yellow light, the dye becomes colorless again. The oil-filled cells, arranged in patterns of blue and colorless dots, represent units of computer information. They can be read by a light-sensitive unit and can be erased by exposing them to yellow light. The system is able to store lots of information in a small area. The entire Bible can be contained on three sheets of typewriting paper.

The chemical means by which the eye is able to change light into nerve impulses that lead to the brain are being investigated by Dr. E. W. Abrahamson, associate professor of physical chemistry at Case Institute of Technology. He's been flashing a light, about 10,000 times as bright as a flashlight into pigments taken from the eyes of cattle. His light can last as short as two-millionths of a second. When the light strikes the pink rhodopsin (a light-sensitive chromo-protein on the eye's rods and cones) it is converted into a new orange substance called metarhodopsin, in less than a millionth of a second. This substance disappears quickly to be transformed into a yellow compound called trans-retinene which is returned to the blood where it is changed into a substance that again regenerates rhodopsin in the retina of the eye.

The rapid reversible change in the protein configuration is most likely to account for the way the chemistry of the eye produces nerve impulses. ★ ★ ★

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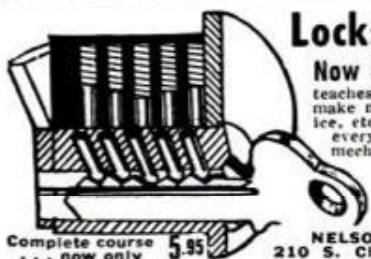
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FREE Import catalog. Items useful, decorative. Billotte Imports, 2749 N. Geronimo, Tucson, Arizona.

FOREIGN Import directory \$2.00. Gives comprehensive listing of exporters in foreign countries. All foreign exporters and manufacturers are cordially invited to list with us. Foreign Import Directory, Box 284, Logan, W. Va.

JAPAN: Direct mail-order. 26 page catalogue, kimonos, dolls, novelties, gifts, business information, manufacturers' names, addresses. Send \$1.00. Clarence Yamagata, 814 Toginbiru, Marunouchi, Tokyo.

IMPORTS. From the exquisite to the unusual. Catalog 25¢. G. W. Youma, Imports, Box 31, Murock, Illinois.

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ELECTROSTATIC Generators 200,000 V. kit \$24.95 postpaid; 500,000 V. kit over 3 feet tall \$32.50 postpaid; other models to 1,000,000 V. Vacuum equipment; Mechanical pumps \$34.50; Diffusion pumps \$16.00; McLeod gauges \$14.00. Write for free catalog. Morris Lee, 294 Elm, Buffalo 3, N. Y.

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Diesel Mechanics—

INCREASED USE OF DIESEL POWER RAISES DEMAND FOR MECHANICS

by B. Richard

The ever-growing numbers of diesel engines being used in American industry have brought about a corresponding increase in job opportunities for qualified diesel mechanics.

The economical operating costs of the diesel engine make it a valuable source of power in a large number of varying types of industry. For example, diesels are used today in trucks, buses, locomotives, tractors, ships and construction machinery. Additionally, diesels are widely used in stationary power equipment such as electric power generators, pumping and drilling equipment.

The number of diesel-powered trucks and buses in this country almost doubled between the years 1953 and 1957, and diesels are by far the most-used power source in today's railroads. In fact, the advantages of diesel power are so well known that one of the world's leading car manufacturers offers a diesel-powered passenger car.

An important consideration in the increased use of diesels in industry and in the increase in job opportunities for diesel mechanics is the fact that most industries using diesels in large numbers are expected to expand their activities considerably in the coming decade.

Great numbers of diesel-powered bulldozers, cranes and other earth-moving equipment will be manufactured and sold because of the government's multibillion dollar highway expansion program. Farm mechanization has been steadily increasing for a long time and this trend will continue at an accelerated pace in years to come. This has opened up a gigantic market for diesel-powered harvesters, tractors and other farm equipment.

The expanding petroleum industry will be ordering great numbers of diesel engines to run generators which supply power for drilling and pumping equipment.

Diesel equipment is used in ventilating, drilling, pumping and hauling in modern mining operations. It is expected that the

use of diesel equipment in mining will be expanded to an even greater extent in coming years.

An advantage of the diesel engine is that it operates relatively inexpensively. Not only is diesel fuel cheaper than gasoline, but the engine itself burns fuel more efficiently, uses less fuel for a given amount of work and delivers more miles per gallon for moving equipment.

American industry will be putting diesels to ever greater use wherever dependable and economical power is needed and wherever it is possible to apply diesel engines to the job.

Because of this increased use of diesel power, many mechanics with years of experience on standard gasoline engines are taking educational courses in diesel mechanics so they can capitalize on these new opportunities. The similarity of the basic parts of diesel and gasoline engines (although fuel feeding and firing systems differ) makes gasoline engine experience a valuable asset for a diesel mechanic.

Many young men have found it helpful to take correspondence or resident-training courses in the theory and practice of diesel mechanics while they are working full-time on standard gas engines. In this way it is possible to broaden employment potentials and build a good base for the increased income opportunities available to qualified diesel specialists.

Some correspondence schools offer by mail detailed courses in diesel engine repair and maintenance. These courses are often tailored so that they are of value not only to beginning mechanics with limited job experience, but also to experienced gas-engine mechanics who want to broaden their knowledge to include diesels.

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(Continued to page 56)

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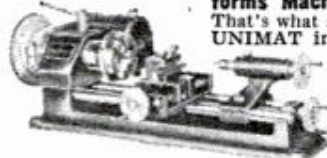
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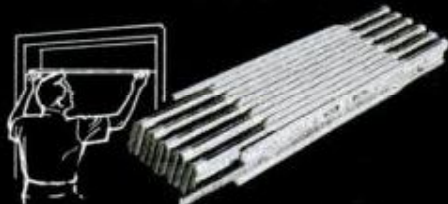
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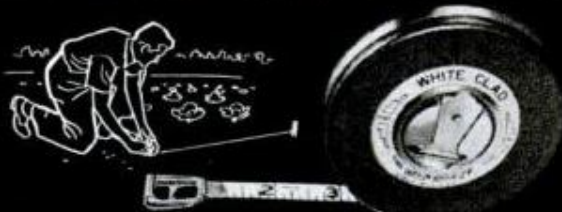
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By Art Railton

HEAD-TURNING, that's the Renault Caravelle. The sleek, well-proportioned two-door sport coupe was first introduced at the 1958 Paris Auto Show, but only became available for U.S. delivery early in 1960.

Graceful and sculptured, the design is from the clay rooms of Ghia, Italy's most famous stylist. Beneath the beauty is a conventional Dauphine chassis with a somewhat more powerful version of the regular engine.

How would it be to own? If you don't mind being envied by everyone in town or whistled at by the great unwashed, you'll love it. In fact, you'll love it anyway.

It drives as easily, with as much needle-threading precision, as anyone could demand in a car built for normal people. Frustrated Fangios may object to the slight oversteer at high speed, but most of us won't even notice it.

The two front bucket seats provide good back and bottom support for comfortable hours on the highway. No austerity here. The rear seat is no seat at all, just an "occasional seat" as brochures describe it. In more honesty, it is a luggage rack with a padded underside which you uncover by lifting up the platform. Kids don't mind riding on it briefly, but if you need a back seat, forget this car (if you can).

For couples, young or old, it is as pleasant and as economical a touring car as you could find and one that inflates your ego every time you pull into a hotel driveway.

The test Caravelle was the four-speed model (top three synchromesh), an extra-cost item, the three-speed Dauphine transmission being standard. Despite the lack of synchromesh in first, it slips into low with

(Continued to page 60)



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virtually no complaint at rolling speeds. The test car was a hardtop coupe. Also available is a soft-top convertible and a combination model that is a soft-top convertible with a removable hardtop.

Economy is exceptional, especially at high speed, thanks apparently to minimal frontal area. In a rural-road fast-driving test, the Caravelle averaged 40.5 miles per gallon, with no attempt at miserly driving. In the city test, the average was 35.1 miles per gallon. You can't complain about that kind of economy, even if the car does cost \$2445 (heater included).

Ride is good and despite the lowness of the body, the seats (front seats, that is) are built for comfort. Firmly contoured, the cushions hold you securely in place.

Acceleration is average. You'll soon get used to letting the other fellow drag away, preferring to watch envy drip from his lips, than victory drip from his tailpipe. Average zero-to-60 time was 23.7 seconds; zero-to-30 time was 6.8 seconds; 40-to-60 time was 14.2 seconds. This puts this Caravelle in about the same league as the handshift Falcon.

The water-cooled rear engine (four-cylinder overhead-valve) is as quiet and well behaved as anybody could ask. Idling is so quiet that at first you are sure it has stalled. Coil springs are used on all four independently-sprung wheels and, on the test car, the new Aerostable air bags were added. These air-filled rubber bags (air is at atmospheric pressure so no compressor is needed) allow the use of softer coil springs than usual. When fully loaded, the suspension goes down into the air bags.

Tests showed that the speedometer was accurate at highway speeds, but the odometer was pessimistic (a rare fault indeed). It showed only 97 miles for a true 100.

Like beauty everywhere, this Gallic gets-the-girls-like-crazy car has a few faults. But the flaws are minor, in some cases, trivial.

Only fault that approaches the consequential is the shift linkage. The four-speed box is a bundle of wet noodles. The shift lever feels like a stick in a barrel, no matter which gear it's in. Anyone accustomed to a crisp stick may throw up his hands in disgust at the rubberyness, but be patient. With a few minutes' acquaintance, the disgust disappears. Once you learn to find the four little barrels at the ends of the H-pattern, you'll get along fine. Meshing is quiet and foolproof with no chance of beating the synchromesh.

Reverse gear, however, can't be dismissed so lightly. To get there you pull the lever toward you, through a gate and then back (a normal location for four-speed boxes). However, the gate is as easy to

crash as an afternoon TV studio audience and, as a result, on fast downshifts from third to second, you usually find yourself trying, with embarrassment, to slip into reverse at about 30 miles per hour!

Renault's short turn circle (30 feet) makes it very maneuverable and steering is fast enough to take advantage of traffic openings. Wide wheel housings do cut into front-seat legroom.

At about 68 miles per hour, a silent powertrain whine is noticeable. Day or night there is an annoying dash reflection on the windshield. The instrument lighting cannot be dimmed or turned off. Atop the dash is what was not designed as, but what turned out to be a self-emptying ashtray. However, it empties itself all over the dashboard. Each time you flip it open to use it, ashes fly out in all directions. Messy, what?

The cigarette lighter, far to the right, is out of the driver's reach. Glove compartment is small, but handy. Pockets in both doors and in the panels at the toeboard are convenient, providing ample room for items that usually overflow from the glovebox. In hardtop models there is also an enclosed small-package compartment behind the rear-seat back. In front, under the hood, is the fully-lined trunk with adequate storage space for touring couples. The spare tire is carried in a shelf beneath the trunk floor and accessible from outside through a hinged door in front.

New on the Caravelle (and not on the Dauphine at the moment), is a carburetor air intake at the front of the body with a filter element inside the hood. The air is ducted all the way back to the rear engine where it is filtered once more before going into the carburetor.

You can't lock either door from the inside and must use the key twice when parking (an unnecessary arrangement certainly). The rear quarter windows pivot outward for good ventilation. Hardware is of excellent design. Heater gives inadequate heat in real cold weather at fast speeds, enough for survival in traffic. Heated air comes in under the dash and also through a small opening behind the front seat.

Here's a car you won't be ashamed to take home to Mamma, but once you do, you'll probably never see it again except as she drives away. It's a car for the young-in-heart of any age and will put wanderlust in the most stuck-in-the-mud soul.

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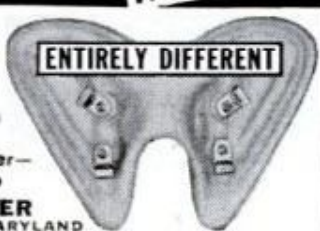
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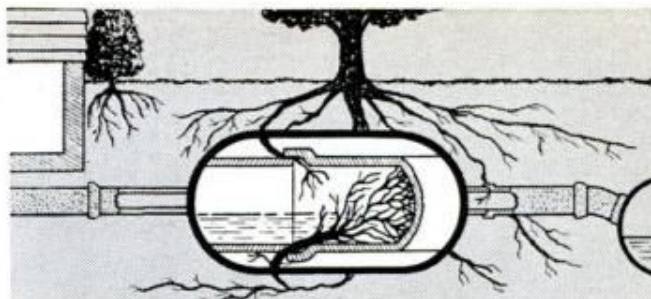
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GRAIN HAULER: Otto Hannewald, Adrian, Michigan. "I like the extra traction Firestones give me in farm loading areas. I can't beat them for road mileage, either. I think they're the best tires built!"



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Pittsburgh perfects a sensational new **Latex** house paint!

Easier to apply...even paints over damp surfaces...dries in 30 minutes...resists blistering...lasts longer



- **Leadership in research** pays off! After years of laboratory work and field tests in all parts of the country, Pittsburgh perfects an amazing new house paint — Pittsburgh Latex!

- **This new paint** is the greatest advance in paint development in years . . . gives you advantages in ease of application and durability never before thought possible!

- **New Pittsburgh Latex House Paint** is made from the same miracle resins that keep many of today's cars and appliances new-looking year after year! It can be used on wood, masonry, stucco, asbestos or metal surfaces.

- **Read below** about the remarkable results you can expect from new, perfected Pittsburgh Latex House Paint!



- **Sensational new Pittsburgh Latex House Paint** can keep your house looking "just-painted" years longer. The colors are fade-resistant . . . white stays white, colors retain their

crisp, clean beauty . . . and the new miracle resins are so durable they fight the effects of time and weather far longer! The result? A money-saving bonus of extra years between paint jobs!

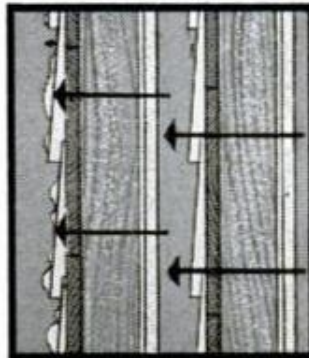
- **You'll save hours** because Latex goes on so fast and smooth! No brush drag, no lap marks. Use brush, roller or spray.



- **Paint over damp surfaces!** With Latex you can paint over surfaces damp with dew or rain . . . or paint between showers.



- **Dries in 30 minutes!** Forget about rain, dust and insects messing up your paint job! Latex dries in only 30 minutes.



- **Resists blistering!** Correctly applied, Latex resists blistering. It lets trapped moisture out, yet will not let moisture in!



- **Clean up with water!** Cleanup and brush care is a snap! Just wash brushes, roller or spray gun in plain soapy water!



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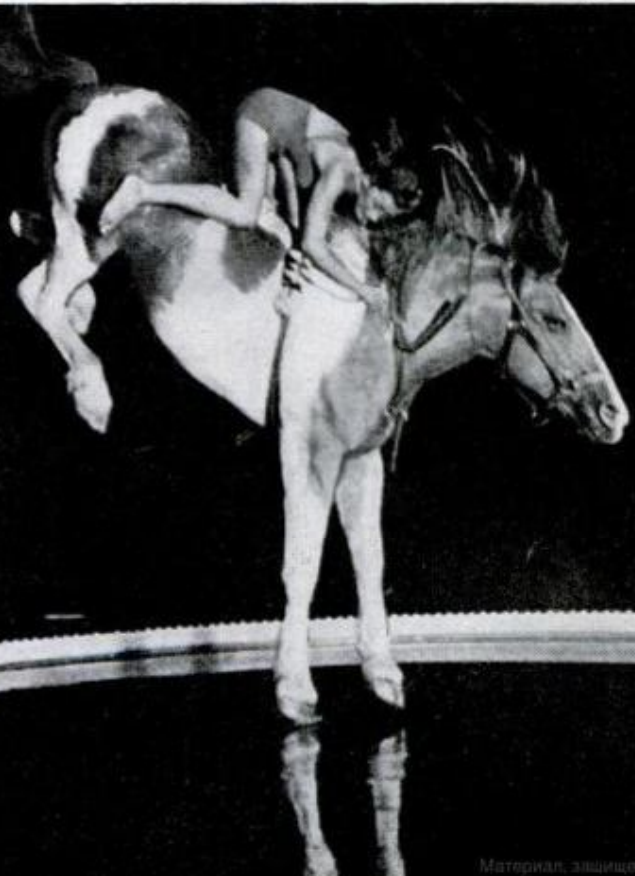
POPULAR AUGUST
1960
MECHANICS

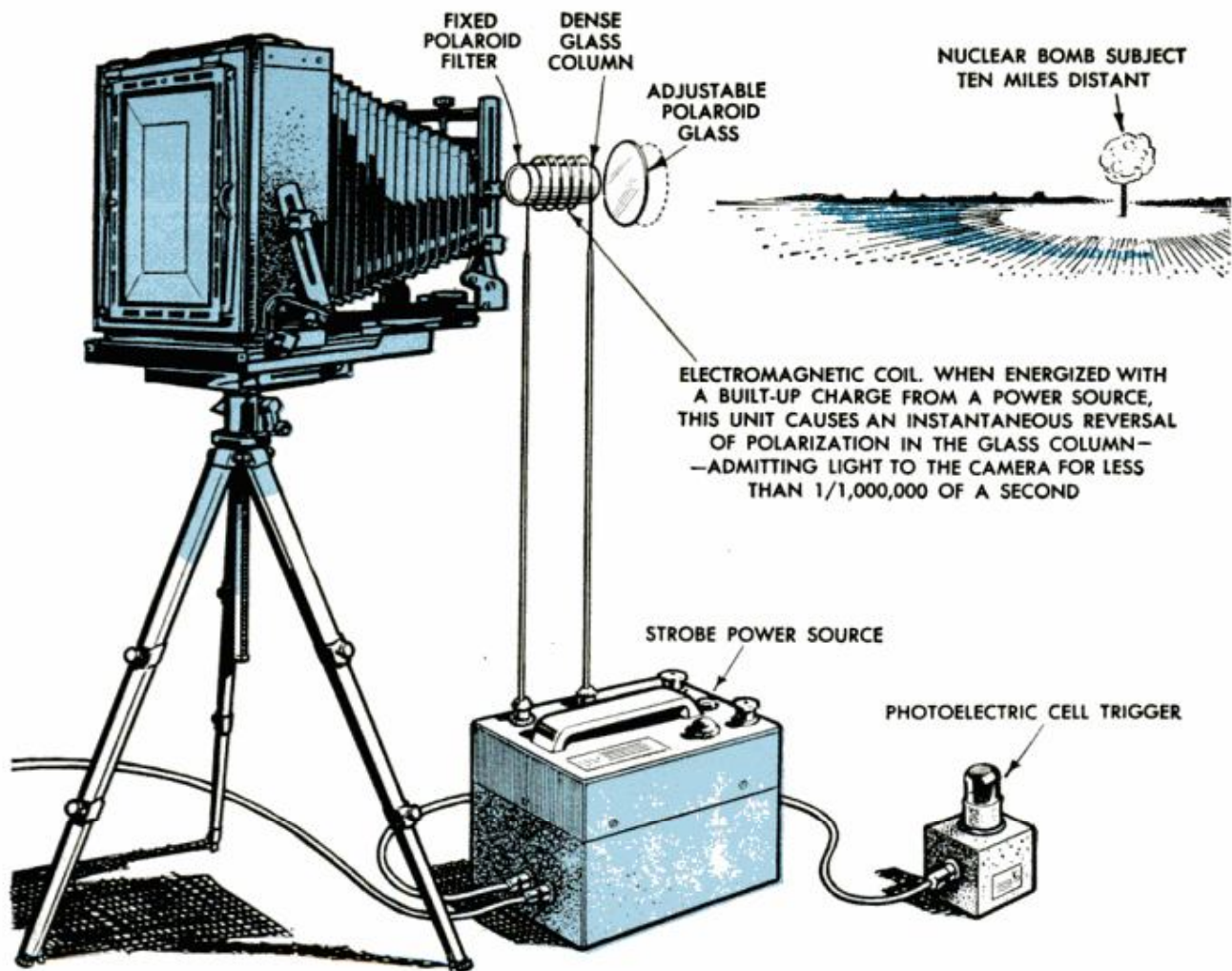
WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 114 NO. 2



Pictures That Freeze Time

Scientists flash lights that snap pictures in 1/3,000,000 of a second to find what happens when a horse jumps or a nuclear bomb explodes





Dr. Harold Edgerton devised this apparatus to make a portrait of a hydrogen bomb at the moment it touched off. The subject, at Eniwetok, was ten miles away but its radiation would have made a normal lens opaque

By Richard F. Dempewolff

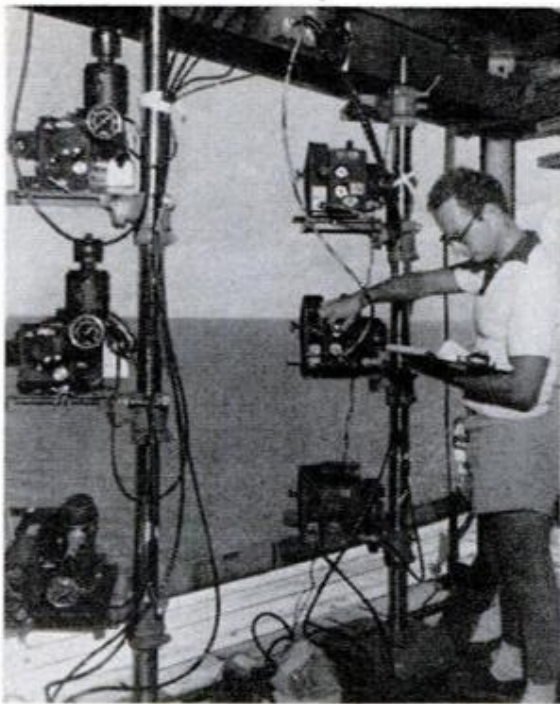
QUICK-AS-A-WINK is slower than mud in the photo-electronic world of Dr. Harold E. Edgerton. It takes a lumbering fortieth of a second for most people to blink an eyelid shut and open. In that length of time all kinds of things may have come and gone: an atomic bomb fireball has melted its steel tower and grown to monstrous size; a hummingbird's whirring wings have beat up and down almost twice; a .30-caliber rifle bullet may have zinged a good 30 yards through the air.

Edgerton is known as "The Doc" among his colleagues in electronic, photographic and academic circles. He is a slender gentleman of middle years with thinning hair, usually found wearing rolled-up shirt-sleeves, a bow tie and the faintly penciled frown of a dedicated scientist who seems to be wondering if he should be spending time on whatever he's doing when there's

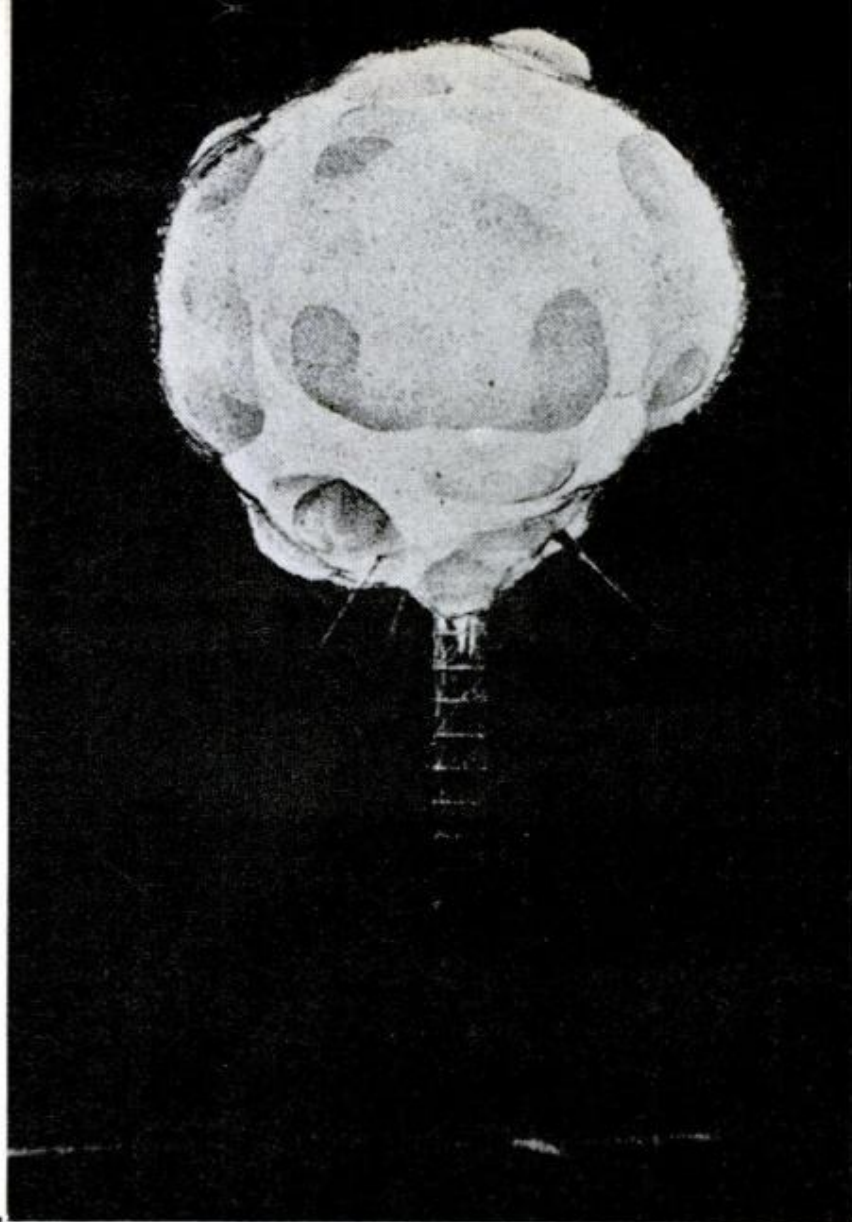
so much more to be done. His work-strewn laboratory, reminiscent of the back room in a busy TV repair shop, occupies a fourth floor area on the campus of the Massachusetts Institute of Technology. The cluttered rooms hum with talk about things like "microseconds" and "millimicroseconds"—bits of a second usually expressed in fractional figures trailing six or seven zeros.

This is the laboratory where modern high-speed photography grew up. From it have poured the prototypes for most of the unique devices with which a photographer today can snatch an unblurred image of a bullet in mid-flight; freeze a swiftly flying bird sharp and clear on the slowest color film; halt a 200-mile-an-hour Maserati broadside on the straightaway at Indianapolis—as dead in its tracks as though it were parked at a curb; stop the buzzing wings of a bee so sharply you can count the veins in them. With Edgerton's magic, a drop of water can be photographed 100 times as it falls from faucet to sink; the graceful swing of a golf club in the hands

NOTE: The picture on the preceding page was taken by John E. Fletcher. It won first prize in the White House News Photographers Contest and is reproduced by the courtesy of the National Geographic Society



Cameras equipped for the polarization of the lens element get a final check before being used to photograph the hydrogen bomb in the act of exploding. Portrait of bomb at start of chain reaction is at right. It was made at speeds higher than $1/1,000,000$ of a second and shows tower disintegrating



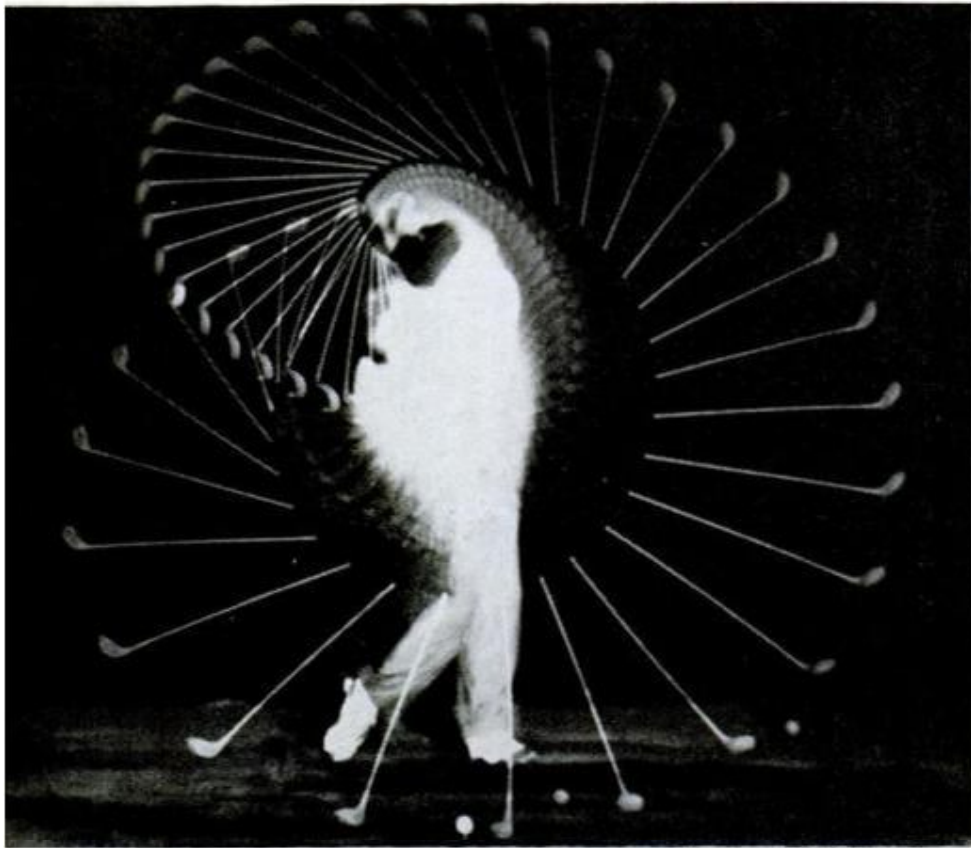
of a "pro" can be halted hundreds of times on one sheet of film; scientists can see precisely what a nuclear bomb looks like—in a crystal-sharp image—at the instant it lights off; manufacturers can stop high-speed machinery going full tilt, spot flaws or malfunctioning parts.

No more than 20 years ago, a still-camera capable of shooting at $1/1000$ of a second was fast. Today, real high-speed photography begins at $1/10,000$. Most stop-action shots are made at $1/50,000$ or faster. One-millionth of a second is a routine exposure for many professionals, and plenty of unique shots are being made at $1/3,000,000$ or faster with standard equipment. How long is a three-millionth of a second? If you imagine a second as the distance from Miami to Seattle (almost 3000 miles), then $1/3,000,000$ of that distance would be a little shorter than the length of your bed!

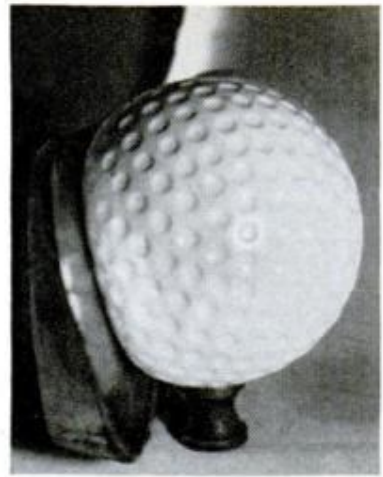
The secret, of course, does not lie in the camera. Even with a good camera, set for a mechanical shutter speed of $1/1000$ of a second, a broadside picture of Fangio hitting 130 miles an hour on a race course straight-

away would show up as a blurred mish-mash about two feet long! To stop him sharply would require an exposure faster than $1/100,000$ of a second. No ordinary shutter can manage it.

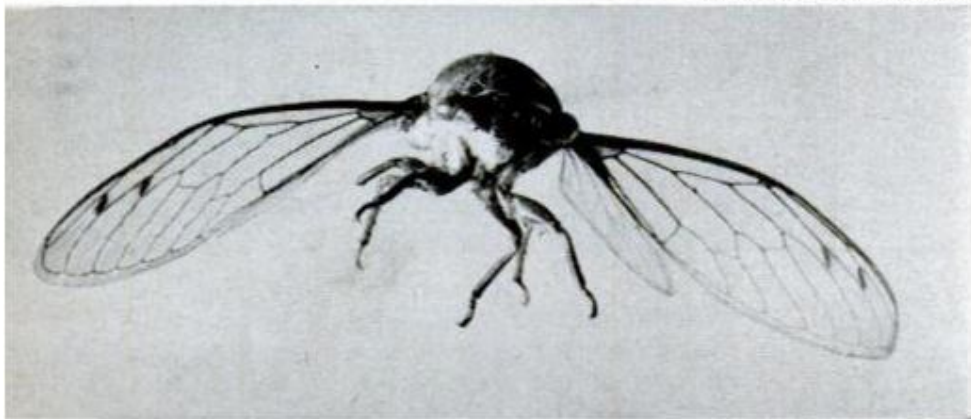
In the Kodak laboratories at Rochester, N. Y., engineers can show you a collection of highly complicated cameras designed to take pictures at phenomenally high speed. "What most of them do is to dissect the picture into tiny segments," they explain. "That way, intricate shutter arrangements can be made to flick across each segment much faster than any shutter could open and close across a whole lens." There is a "grid" camera, for instance, with a curtain-like copper screen containing 500 slots. Each slot allows a tiny section of image to be exposed on the film behind it at speeds in the range of $1/50,000$ of a second. Another fancy arrangement is a "lenticular" camera, using a cylindrical lens in which the glass is divided into 80,000 microscopic openings—each one functioning as a separate lens. Pictures from most of these devices, while they will stop action, leave



Courtesy of Harold E. Edgerton



Golfer's grace is shown in multiple exposure. Strobe flashes up to 600 times a second to illuminate details of his drive, record impact of iron on ball



Courtesy of Harold E. Edgerton

*CICADA
(see Nov 60, 10)*

Wasp's wings stand still in the quick-flashing light. Stroboscopic technique produces crystal-clear and knife-sharp pictures



Dr. Edgerton holds balloon about to be burst by a bullet. Bullet was stopped by lamp flashing at 1/1,000,000 of a second

Multiple - flash strobe pictures, such as this one of a diver, are a help to athletes in analyzing — step by step — their form



Courtesy of Harold E. Edgerton

unexposed lines or areas which must be filled in by the viewer's imagination—like the dots of white in a printed engraving.

Edgerton's trick is a lamp that produces bursts of light brighter than the sun for brief periods of time. For one-millionth of a second, a single such lamp can trigger a blaze of light equal to the output of 40,000 fifty-watt electric light bulbs. To prove its fabulous intensity, the Doc one night took a picture of the entire center of Boston with one lamp; its brief white flash lit up the whole city and was visible 50 miles away.

Core of the lamp is a small gas-filled tube. Electricity flows through the circuitry of a separate power package and builds up in a sort of electrical storage tank known as a condenser. When the "tank" is full, the proper charge has been reached. At that point, the bottom drops out, as it were, and all the stored voltage pours out

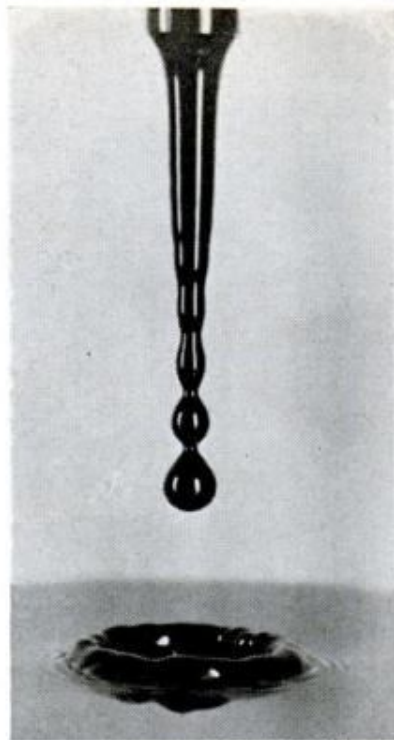
in one jolt. In the lamp tube the charge jumps a gap, creating an intense spark like a miniature bolt of lightning, and causes the gas to light up in a cascade of brilliance. Not only does the resulting flash illuminate the subject, but its duration controls the exposure time. And that's not all. That electrical storage tank can be adjusted so that it overflows at microscopic intervals, causing a regular succession of light bursts at phenomenal rates. This unique feature gives the lamp its name—stroboscope.

There's nothing new about stroboscopes. Back in 1836 a French scientist named Plateau discovered that if he looked at a spinning wheel through slots in a disk whirling at the same speed, the wheel would appear to stand still. Nearly everyone has seen wagon wheels appear to turn backward in the movies. The same optical principle is at work.



Courtesy of Arthur D. Little, Inc.

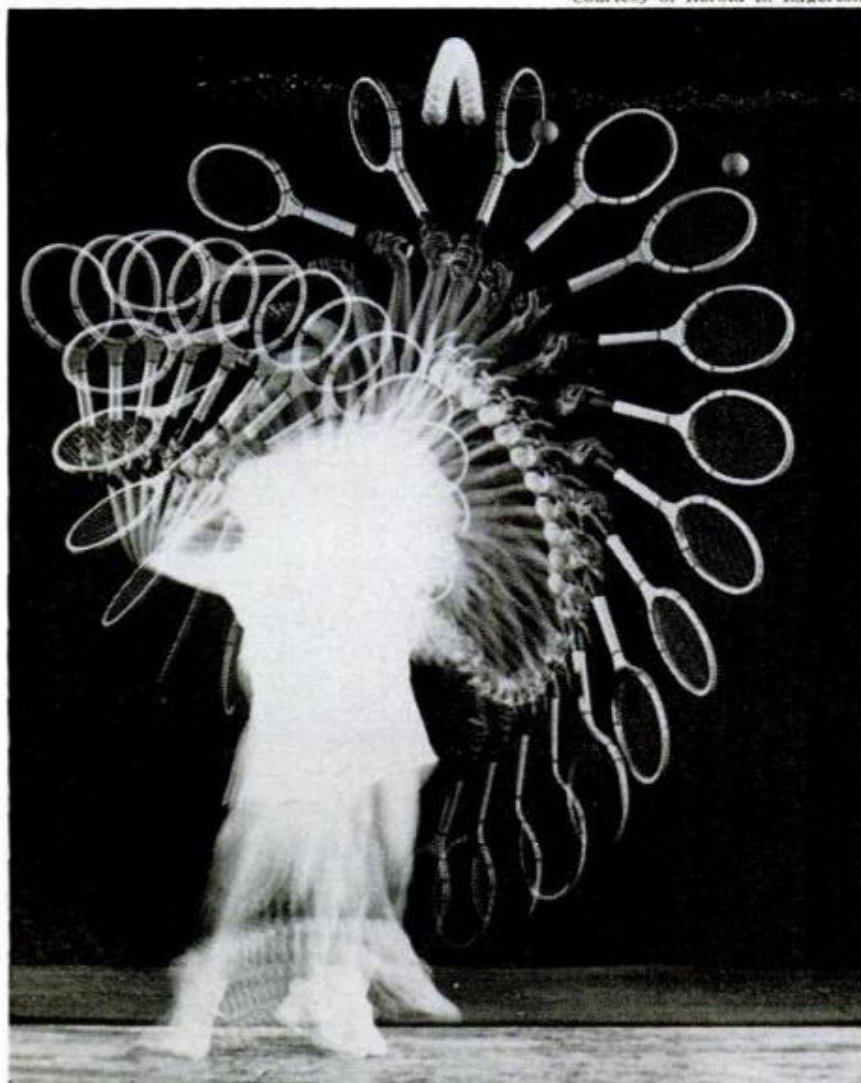
Concussion of cup hitting floor triggered the light which flashed at 1/70,000 of a second and pictured coffee about to leak from cracks



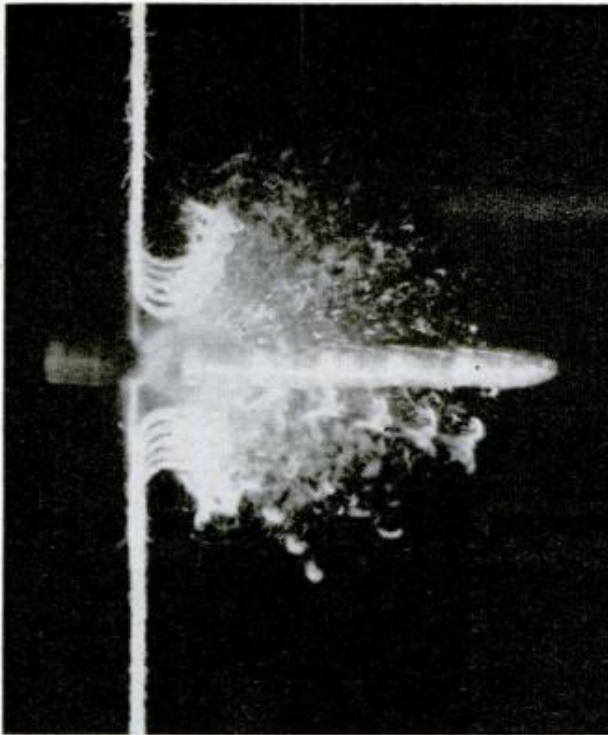
Courtesy of Harold E. Edgerton

Drops of ink falling into an inky pool formed this sculptured column

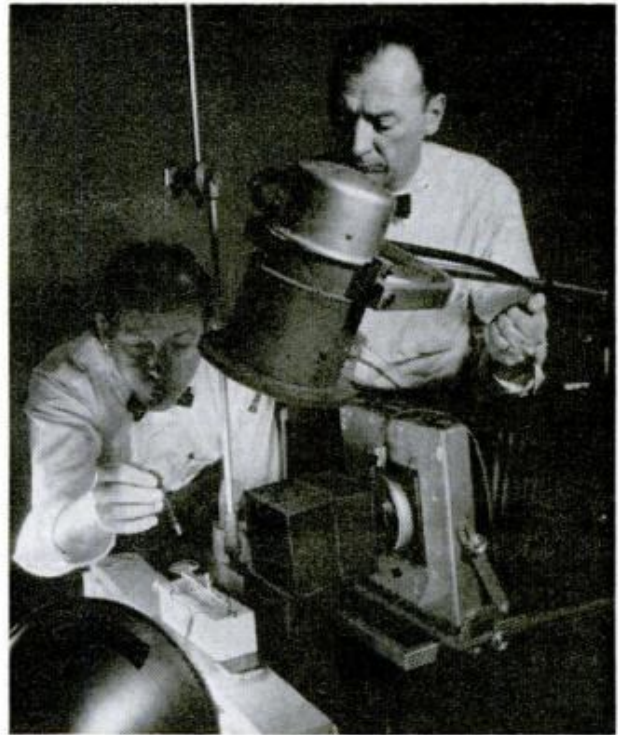
Courtesy of Harold E. Edgerton



Form of a professional tennis player serving a ball is diagrammed by multiple flash. Such pictures are aids in teaching



Bullet breaking string was photographed six times. There was 1/100,000 of a second between exposures



Drops squeezed from eye dropper hit a glass platform to trigger the strobe lights. Camera lens is open

Edgerton and two of his students—Kenneth Germeshausen and Herbert Grier—used modern circuitry and electronics in order to achieve the same effect with flashing lights capable of winking at speeds better than a millionth of a second per wink. Earl Quinn, a high-speed expert at Kodak's labs, keeps a three-bladed fan in his office to demonstrate flashing "strobe" lights. Each blade is painted a different color. In ordinary room light, the fan, spinning at 1500 r.p.m., is a transparent blur. But under a strobe light flashing 1500 times a minute (at that speed it appears to be shining as steadily as a theater spotlight), the colored blades stand still. Only the hum of the

motor tells you they're still actually whizzing around. If the light flashes less often than the fan revolves, the blades seem to be moving slowly; if it flashes more often, they seem to be turning backward—just like those wagon wheels photographed faster than they can complete each revolution.

As far back as the 1930's, Edgerton and his colleagues had begun hooking up their blinking lamps to cameras. Then the world began to see pictures the likes of which had never before come from a camera. Drops of milk were frozen in sculptured coronets as they splashed, clay pigeons were caught exploding under a pattern of buckshot in

(Continued to page 232)

Using a strobe gun to trigger a burst of X ray, Edgerton was able to get this spectacular X-ray picture of a placement kick



THEY QUOTE PM IN RUSSIA

Following is a translation of an article that appeared May 13, 1960 in Trud, the newspaper of the Central Council of Trade Unions, Moscow:

Millions of people to whom peace on earth is dear angrily condemn the spy flight by an American plane over the territory of the Soviet Union. They rightly consider this outrageous act by American militarists as playing with fire. They see in it the desire of aggressive circles to make the atmosphere red hot. . .

And now a number of political figures and newspapers in the United States are raising espionage up nearly to the level of an international standard of behavior. As if this were not enough, American newspapers and magazines are blabbing out plans for creating new cosmic spies.

"If the uproar raised in connection with the airplane which gathered intelligence information and was shot down over the Soviet Union does not cause a change in plans," the newspaper *New York Times* reported recently in an offhand way, "then the United States will attempt to launch its first spy satellite early this fall."

What spy satellite are they talking about?

The American magazine *Popular Mechanics* has told about it in considerable detail.

This artificial satellite, says the magazine, will travel around the Earth at a speed of 16,000 miles an hour in a polar orbit. . . According to present plans, the American Army will equip it with television cameras. . .

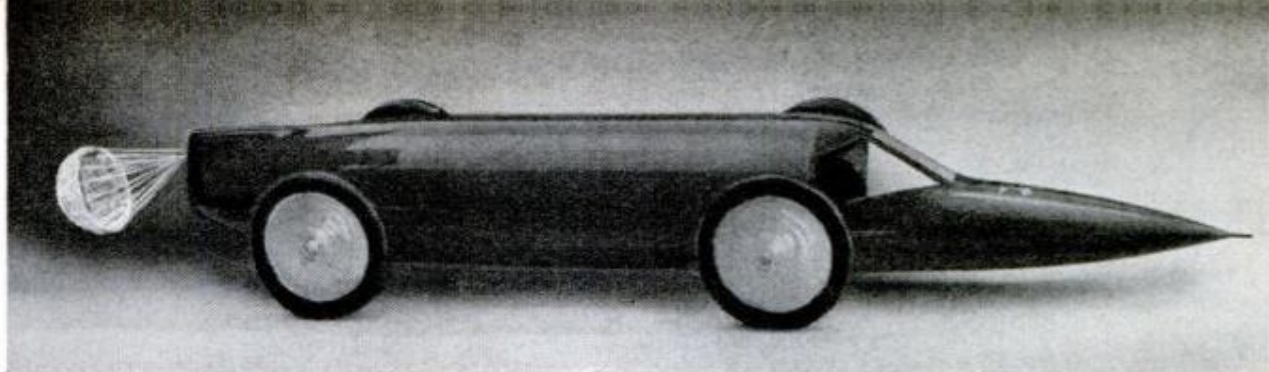
When, according to the calculations of American militarists, the spy satellite is over enemy territory, a time relay will turn on the appropriate solenoid which will automatically open the shutters of half a dozen cameras with long-focus lenses. . . In order to reveal concealed enemy objects, an infrared radiation detector will be used. This detector will be able to locate things by means of the radiated heat of steel rolling mills, blast furnaces and other objectives. . .

In 45 minutes, when the artificial satellite is over its own territory, the time relay will again function and turn on a powerful transmitter. The collected data will be transmitted to a complex recording installation. . .

That is what the article says. That is how the ordinary American is being educated.

But the Soviet people are calm and vigilant. They know their own strength. They well recall the words of Nikita Sergeevich Khrushchev, spoken in regard to the bandit flight of the American spy plane: "The plane flew at great height and a rocket reached it at an altitude of 20,000 meters. And if it flies higher, we will also reach it!"

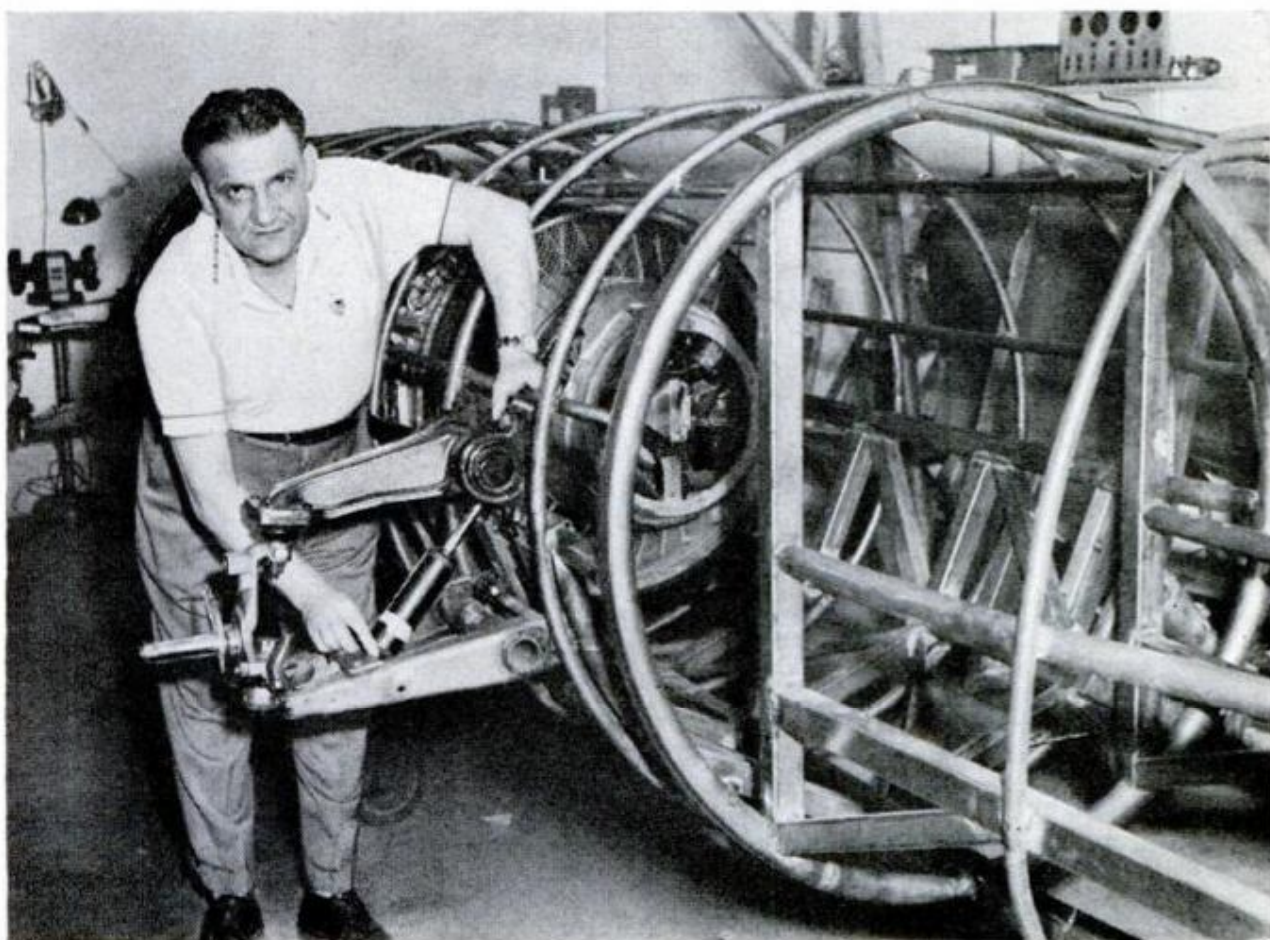
With considerable pride we point out that Trud is far behind Popular Mechanics in reporting these satellite developments. The article that served as the basis for the Trud story did not appear in Popular Mechanics recently. Indeed, we "blabbed out plans for creating new cosmic spies" in the April, 1958, issue—more than two years ago, and long before the U-2 incident. Incidentally, while blasting the United States for planning such a satellite, Trud failed to translate one part of the PM article for its Russian readers: "Last October, at the International Astronautical Federation conclave in Barcelona, a top Soviet space scientist conceded that Russia's spy satellite will be capable of 'keeping constant watch on the activities of the entire world.'"



First Jet-Powered Contender Assaults Land Speed Record

FLAT-OUT RACING BUGS around the country will be watching Bonneville's salt flats in late August, where Dr. Nathan Ostich, Los Angeles, Calif., racing physician, will run his new *Flying Caduceus* in an attempt to break John Cobb's world land speed record of 394.2 miles an hour. And the electronic calculators and wind-tunnel instruments say he has a very good chance; the General Electric turbojet engine will develop 5200 pounds of thrust, enough to shove the 9000-pound streamliner to 200 in a quarter-mile, 500 in four miles, and possibly as high as 600 miles an hour. The enormous power of the big jet engine (7000 horsepower at 500 miles an hour) makes the usual stabilizing fins and wheel streamlining unnecessary, but at the same time creates some special problems. Nine-inch, eight-ply nylon-cord tires had to be designed and built for the 250-pound, four-foot aluminum wheels. And a whole

new system of stopping had to be devised to keep the near-sonic rolling missile inside the 14-mile Bonneville course. The doctor plans to coast down to 300, then release an aircraft-type ribbon arresting chute to slow the car to 175, the highest speed at which he dares touch the big four-wheel brakes. Sitting in his padded compartment in the nose section, the doctor has a minimum of instruments to record airspeed, fuel consumption and engine temperature. Two-way radio contact with his observers will warn him of outside trouble such as tail fires or burning tires, which he can't see. Technical aides from Firestone, North American Aviation, California Polytechnic College and the racing business, who have worked many hours on the *Flying Caduceus*, agree that it should break the record easily, but that information on high-speed tire performance alone will make the project well worthwhile.



AN EYE ON SPACE

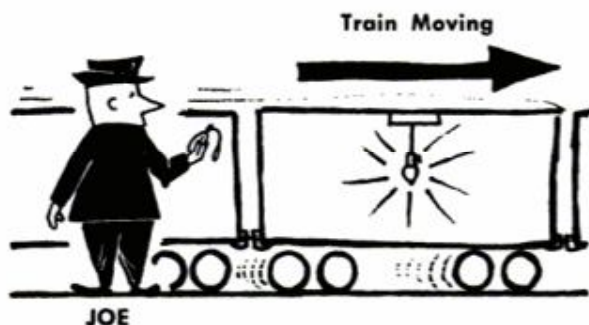


By Dr. Dan Q. Posin

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

WAS EINSTEIN RIGHT? That is a question that is still being asked by scientists, even though most of them believe he *was* right. Not only is the question being asked, but scientists are continually devising experiments to put Dr. Einstein's theories to the test.

Of course, we all know that strange calculations and conclusions came forth from Einstein as he grappled with the problems of the Universe:



JOE
To Joe, the speed of light is still 186,000 miles per second

1. The speed of light, 186,000 miles per second, is the top speed in the Universe. Radio waves, X rays and gamma rays travel as fast as light, but no object (material) can travel this fast. Also, you cannot speed up light waves, for example, by lighting a lamp on a moving train and then having someone on the ground measure the speed of the light.

This question of the *constancy* of the speed of light has been checked out very thoroughly recently in some experiments at Columbia University. The result: Einstein was right.

2. Matter should be convertible to pure energy. As you know, we can all burn, say, a 10-pound piece of wood and get heat. But if you catch the gases and gather up the ashes and weigh it all, you'll still have the same amount of mass, your 10 pounds.

Einstein did not mean that. He meant that the material can vanish *utterly* and become pure energy like light, X rays, gamma rays. Thus mass is not necessarily *conserved*, as most high school books say it is.

This has been confirmed in many experiments, some, alas, sad ones. At Hiroshima and Nagasaki, some uranium vanished utterly. . . .

Nuclear reactors—of which scores now exist—also give proof, and daily, of the Einstein idea of mass being convertible to pure energy. Such conversions go on all the time in these machines—that is their principle of operation.

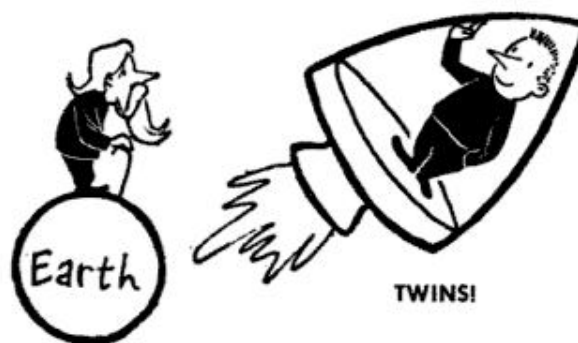
Transmutation experiments, wherein phosphorus is changed to sulphur, or platinum to gold, all involve some conversion of mass to energy, or energy to mass.

A striking experiment along these lines is that in which an electron meets a positron, and the two annihilate each other utterly, giving pure energy—gamma rays.

Moreover, protons and antiprotons, when they unite, also check Einstein's conversion principle.

3. Time, too, behaves peculiarly. Time is not a thing. At best, it is a rhythm; and this rhythm can change. If a space-ship leaves Earth and travels at great speed, time will run more slowly on the space-ship than on the ground.

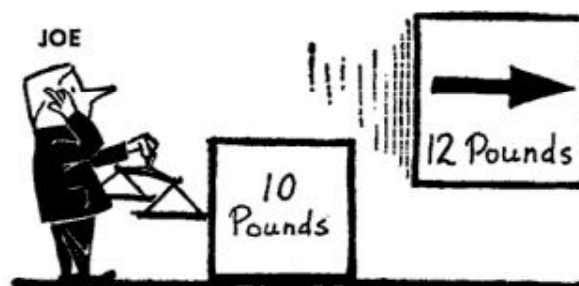
This slow-down of time due to speed has been tested. Here's how: Some radioactive particles that we produce on Earth die out readily, stop their activity in a hurry. But those of the same type coming to us from the heavens at great speeds do not die out so readily. They ought to have died out long ago, while traveling through the enormous distances. But they don't. Their time rhythm runs more slowly. They are younger than their Earth twins.



Another experiment to test the time slow-down due to speed is that in which a clock is to travel aboard an Earth satellite while broadcasting its ticks to the ground, while an identical clock remains on the ground for comparison. The clocks, now being manufactured by Hughes Aircraft Co., must be of a very special sensitive type, "atomic" clocks, in which vibrating atoms take the place of gears.

4. There is a strange notion about mass that Einstein foresaw: If an object *travels* away from us or toward us, we judge its mass to be greater than when it was at rest:

This, too, has been confirmed. In fact, it was confirmed many years ago for moving electrons. And nowadays every high-energy cyclotron is designed to take account of this effect. That is, it is expected that the masses of the spinning particles will increase, and they do!



To Joe, the weight of an object increases when it is moving

5. Still another expected effect is that in which the time rhythm is influenced by *gravity* instead of by speed. This, too, can be tested by satellites at varying heights above the ground—because gravity is different at different heights.

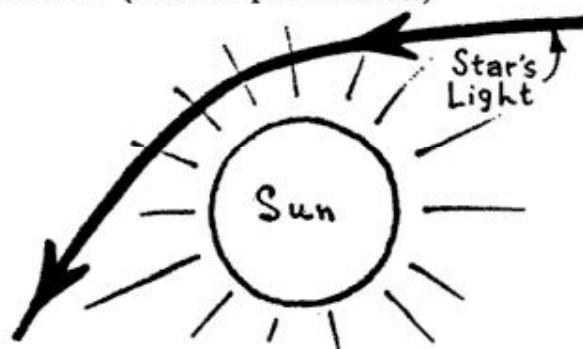
This experiment can even be performed on Earth, by the use of a tower, since gravity at the top of the tower is slightly less than that at the bottom. And the nuclear clocks are sensitive enough to respond to such a small height difference.

British scientists as well as those at Harvard have been performing such experiments. Theory indicates that a space traveler who decides to settle on a planet of great gravity will have his time rhythm slowed down.

6. Another Einstein calculation explained the strange motion of the planet Mercury. It does not close its ellipse, but rosettes. (The ellipse rotates.) Newton's theory explained a *part* of this rosetting, but Einstein's theory explained it all.

7. We should not forget Einstein's prediction that a massive body like the sun should deflect a beam of light passing near the body. This has been confirmed a number of times.

So, it is likely that Dr. Einstein was right. But we'll keep making tests, to feel more certain about the nature of our Universe.





DETROIT LISTENING POST



By Jim Whipple



No stampede to smaller compacts in near future.

GM favors separate body and frame on "big" '61 cars.

Prospects for a full-scale Detroit invasion of the "compact compact" car market aren't so immediate as you might think. (What other term is there for cars of 100-inch wheelbase or less, that are smaller than compacts, bigger than smallest imports?)

Ford has done lots of work on its own version, but to the best of our knowledge hasn't taken the fatal step across the automotive Rubicon and started tooling.

Basically there are good reasons for an "After-you-Gaston!" attitude on Detroit's part. First of all, cost is a tough nut to crack. It is difficult to tool up a new car today and sell it much below the price of the bottom-of-the-line compacts.

Since the labor involved in making a 100-inch-wheelbase car and a 112-inch model is virtually the same and since cost of the material used to make a slightly larger car is so small, it's a nearly impossible feat to cut \$200 off a Falcon's price just by eliminating a few inches, two cylinders and a couple of hundred pounds.

However, American Motors may be in there again with a solid gold guinea pig in the shape of their brand new Rambler American.

This six-passenger car will be only four to six inches longer in wheelbase (perhaps 18 inches longer over-all) than four-passenger, four-cylinder Volkswagens, Hillmans and Fiats. Thus it will be very near to economy imports in size and gas economy, and fairly near in price.

This smaller compact will hit the imports at an unhappy time just as many of them are really beginning to feel the slump in their sales curves. The downswing is hitting mainly in the second rank of the economy and medium-priced sedans. The really well-established front runners are still going great.

Volkswagen, the Space-Age Model T, shows a 67% sales increase for the first four months over the comparable '59 period. The Beetle is in solidier than the Washington Monument, thanks to a good basic design, excellent workmanship and a top-notch dealer network that makes many a U.S. sales manager turn green with envy.

The sports cars like MGA, Triumph, Sprite, Austin Healey and Sunbeam Alpine are here to stay too, because they're well-made, attractively priced, fun to drive and have, up to now, faced no domestic competition.

However, sports car importers will do well to watch such developments as Corvair's Monza, a remarkably Porsche-like sports coupe.

The '61 models show considerable evidence that common sense is re-entering automobile design and that "way out" stylists have been scared back down to earth by the consumer outcry against low roofs, knee-fracturing wraparound windshields, and bottom-bruising tunnels lurking under springless center-seat cushions.

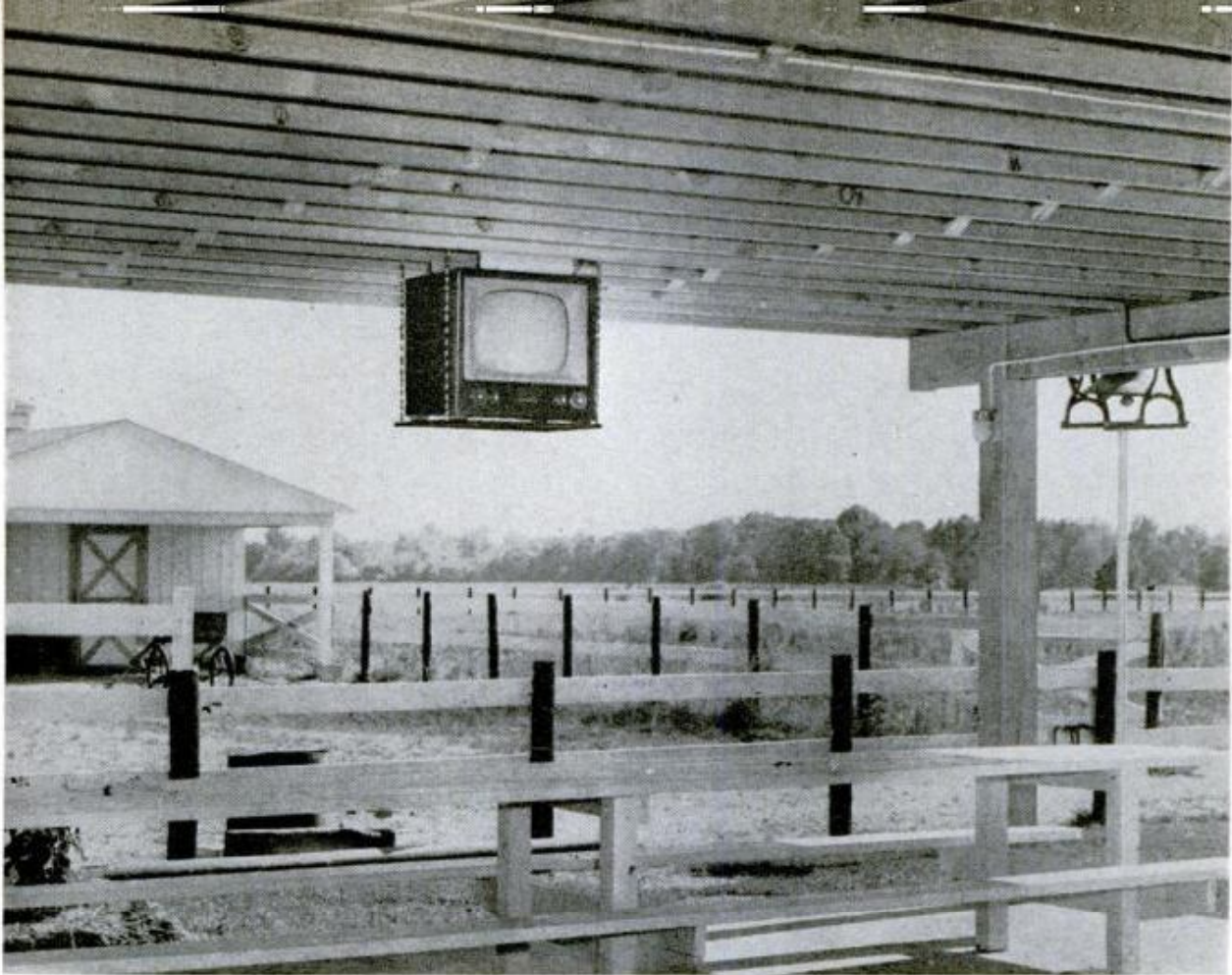
To the surprise of some people the new bodies responsible for these happy changes in passenger package of the '61 Chevrolet, Pontiac, Olds, Buick and Cadillac aren't unitized. Ford Motor Co. has retained separate body and frames for Ford and Mercury too.

There are a number of reasons for sticking to the traditional frame such as the high cost of converting production facilities, ditto on the problem of extensive annual model changes.

Then too, the frame-and-body boys have discovered how to achieve most of the rigidity of unit construction. The near shakeproof structure of the '60 Olds is a good example, where "computer engineering" located the body-to-frame insulators at points of minimum vibration.

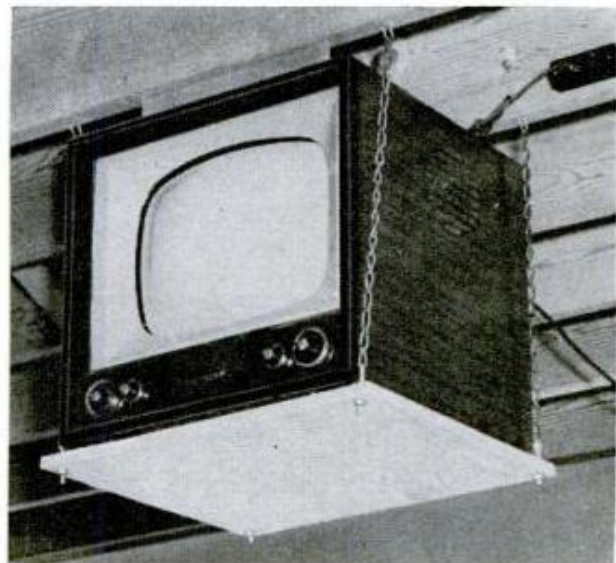
The space problem is being licked by such items as the '61 Pontiac's "outrigger" frame, even wider than its wide track, that leaves the passenger compartment floor virtually flat except for the tunnel.

Buick makes space by virtue of a redesigned driveline with smaller torque tube. The frame mounted differential-transmission combination, "transaxle," as used on GM's new compacts, Pontiac Tempest, Olds F-85, Buick Special, would work out just as well on a separate frame and body and eliminate all but the weight objection to "two-piece" construction. ★ ★ ★



Outdoor Television Set Hangs from Patio Ceiling

Builder Clarence Behrman, of Okawville, Ill., installed a television set on his backyard patio, but wanted it to be easy to see from any area and to be safe from storms. His solution was to hang the set from the ceiling, six feet from the nearest edge. The set rests on a plywood platform supported by equal lengths of machine chain, which link to eyebolts in the platform and hookbolts in the rafters. Safe from the weather and easily seen even with a crowded patio, the set, platform and all, can still be taken down easily for repairs or for the move back indoors at the end of the season.



Receiver in Telephone Base

Users of a new, Swedish-made telephone can answer it and carry on a conversation without ever lifting the receiver. The receiver is built into the phone's base, and the voice of the person on the other end of the line comes through slots running around the edge. The user talks to the phone, which also has a built-in microphone. There are control buttons where the receiver's cradle normally would be. Called the "Ericovex" by its developers, the new phone, at the present time, costs \$300 in Sweden.



Olympic Records— Is There No Limit?

Citius, Altius, Fortius—quicker, higher, stronger—
the motto of the Olympic Games. But how much longer
can athletes continue to improve on heroic past performances?

By R. B. Kirkpatrick

Drawings by Bill Fleming

WHEN BARON PIERRE DE COUBERTIN persuaded the world to re-establish the Olympic games in 1896 and founded the modern Olympic series, he earned sports immortality by renewing what author John V. Grombach has correctly called "the oldest show on earth." For the first recorded Olympic games were held in 776 B.C., and they are thought to have been established in Greek history as far back as 1253 B.C. The next games are being held late this month in Rome—that's 3000 years since that earliest festival of sport, with 309 recorded meets. Not the oldest sport in history, perhaps, but certainly the oldest history in sport.

Olympic record-keeping, however, goes back only as far as the first games in the modern series, held in Athens in 1896. Accurate records have been maintained for the same events, with few exceptions, for the past 60 years, through 14 games.

Ever since that time, in every consistently measurable event, competitors have lived up to their motto. They have run a little faster, jumped a little higher, thrown a little harder—and performed better over-all—than their fathers and grandfathers did. Or could, apparently, for a hundred meters is the same now as it was in 1896, and the high jump crossbar is still placed by the same yardstick. How can modern athletes improve so greatly on their predecessors while times, distances, and motivations have remained the same?

PM set out to get an answer, thereby plunging into a private little



Four Americans who could break Olympic records in Rome this month—high jumper John Thomas, sprinter Bobby Morrow, pole vaulter J. D. Martin, and shot-putter Parry O'Brien



AUGUST 1960

79

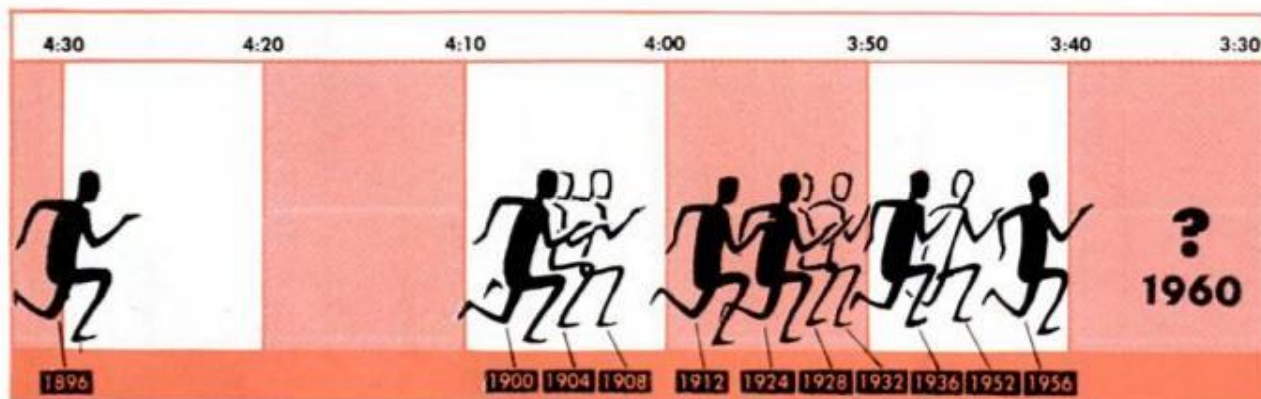


1500-METER RUN. Nearest Olympic event to our popular mile run, it'll be hotly contested by runners like Australian Herb Elliott, above. The record in this event has been broken 10 times in 14 Olympic games

world occupied by a strange breed of men who call themselves (or at least each other) "track nuts." They're the only thing worse than baseball statistics bugs, who can tell you who was the first left-handed right fielder to drop a fly ball in the fourth inning of a world series game in Comiskey Park. Track nuts, led by such people as H. Archie Richardson, author of "Archie's Little Black Book," one of their bibles, delight in dropping remarks about "Winters 50-11 $\frac{1}{8}$ hop, step and jump in Paris in '24." And they really know what they're talking about, but they don't agree on what makes Sammy—or Ivan, or Sven—run . . . so fast.

We canvassed a dozen readily-available track nuts, then thirty of the nation's leading authorities—champion athletes, their trainers and coaches, college athletic directors, Olympic officials, sports writers, physiologists, second-rate shot-putters, and everyone we could think of who might know the answer. They all agreed that something is happening in the comparable track and field events; that's common-enough knowledge. But they didn't always agree on the reasons and offered many theories. Some sounded good, some sounded pretty strange, but all were interesting, because they all may be partly right.

First, everyone agreed that records are broken at every Olympic meet in astonishing numbers. The oldest record in the 22 men's individual track and field events (the area with which we are concerned here) is Jesse Owens' historic 26-foot, 5 $\frac{5}{16}$ -inch broad jump, which has survived since 1936. But Owens, everyone agrees, was a giant in his specialties, and he was. Other giants have appeared, set records, and watched them broken, sometimes years later. And once broken, they continue to be reset again and again. One other record, 10.3 seconds in the 100-meter run, was set in '32, but tied in '48, and again, both performances were by great sprinters. But the world record, outside the Olympics, 10.1, is shared by four other men, and all ran in



1956. Of the other 20 records, 16 were set in 1952.

Only in the spring events, have records the short running 100 meter run record has been broken for long. The three times and tied once in an broken and in the 200 meter run only. But the discus record has been broken eleven times in 14 Olympics; in the 100 meter run and the pole vault, ten times in 14; the shot put, nine times out of 14; the high jump, 800 meter run and 110 meter hurdles, eight times out of 14; broad jump (before Owens) and hop, step and jump, seven times. In those nine events, a new record has been set at more than half of the Olympic games.

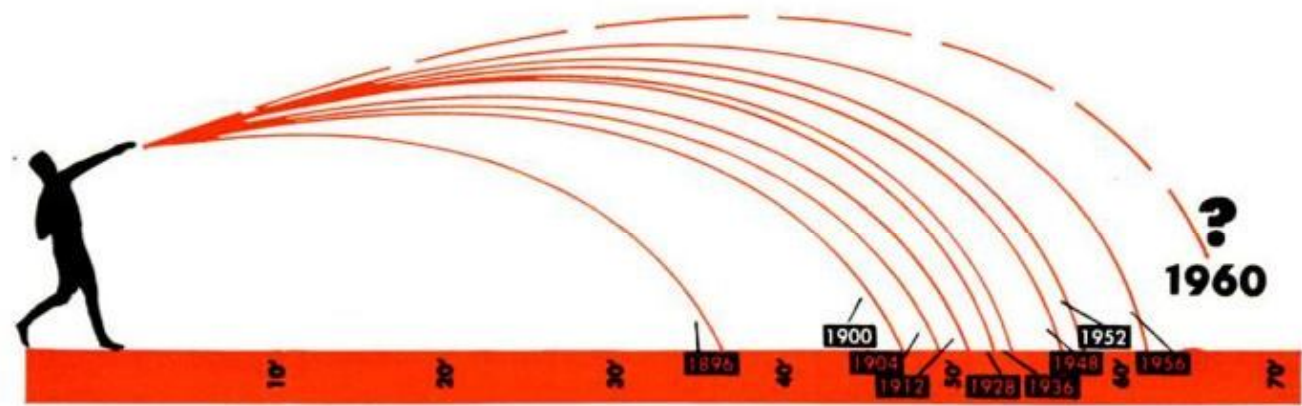
And they aren't always shaving fractions of seconds or adding fractions of an inch, either. A big 52 seconds has come off the original time for the 1500 meter run. The high jump has gone up a full foot, and the pole vault over two feet. They've improved in the shot put by 22 feet, 9 inches; the discus throw by over 89 feet; the javelin throw by over 105 feet. Again, the least improvement is where there's the least room—in the shorter sprints. Perhaps they've reached the limit? Not until they've caught up with the world record, a difference of .2 second in the 100 meter run; .6 second in the 200 meter run; .7 second in the 400 meter run. And maybe by that time there'll be a lower world record to shoot for.

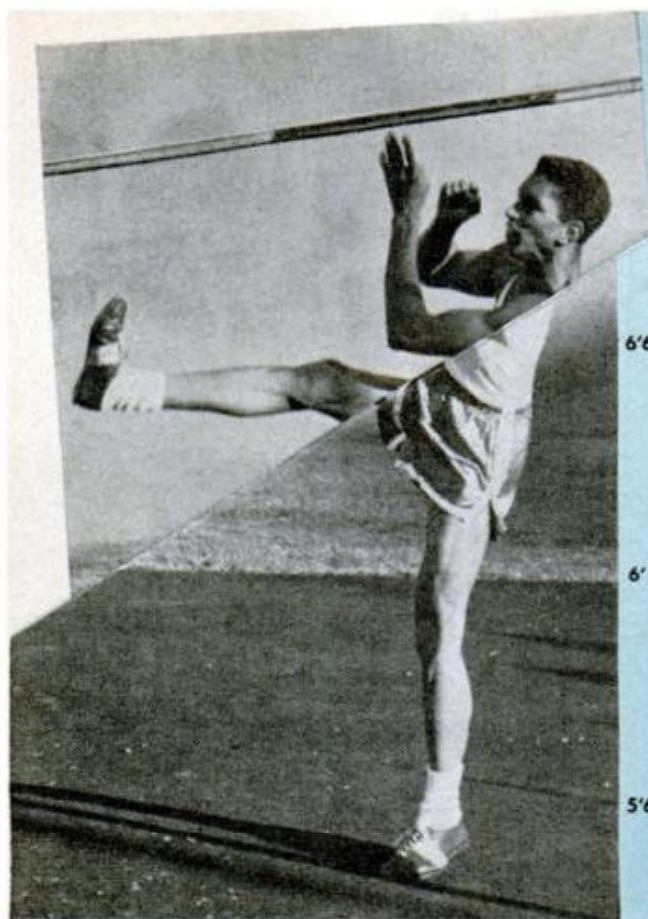
Track fans love "barriers." They talked for years about a four-minute barrier in the mile run, then in 1954, Roger Bannister ran the mile in 3:59.4, and now the record is clear down to Herb Elliott's 3.54.5. That's over a minute faster than the earliest recorded mile we could find, run by Charles Lawes in England in 1864. And Elliott will be after the Olympic 1500-meter record in Rome this month. (There is no mile run in Olympic competition, but that's the classic example.)

They also talked and argued the possibil-

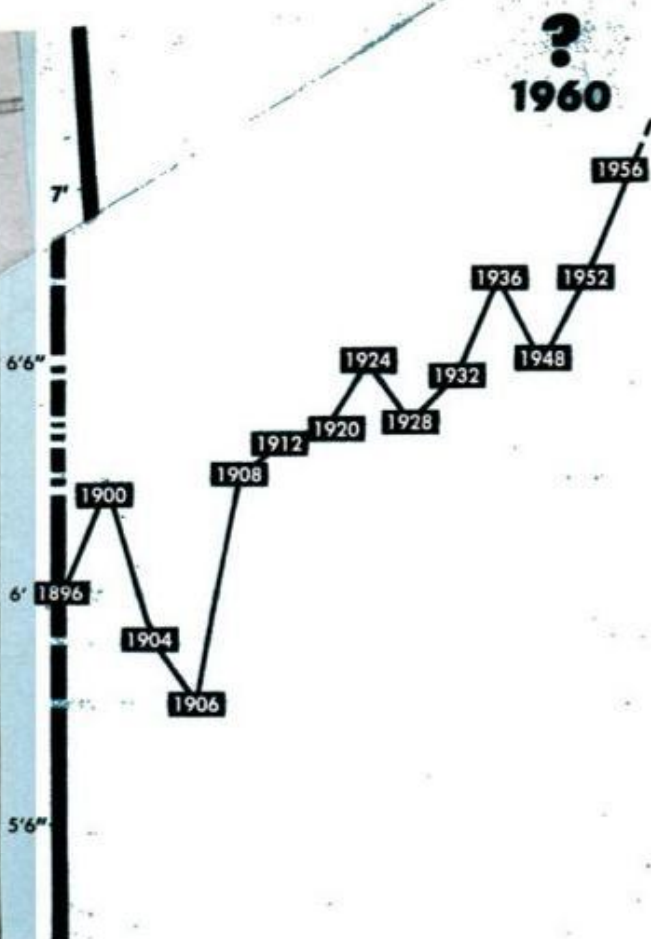


16-POUND SHOT-PUT. Americans have dominated this event since the Olympics began, breaking each others' records nine times in 14 games. The question this year is not "will it be broken?", but "by which man?"





RUNNING HIGH JUMP. World record holder John Thomas, taking off above, has jumped 7 feet, 2½ inches; over seven feet 18 times. He should be the ninth high jumper to better the Olympic record



ity of a 7-foot high jump, a 15-foot pole vault, and a 60-foot shot-put in the same reverent tones as the 4-minute mile. Now all three are history, and there is even hopeful talk around track circles of a 70-foot shot-put and a 16-foot pole vault in the next few years. Ridiculous? Maybe, but then again maybe not.

Men's track and field events have been this country's strongest point in the Olympic Games since the beginning of the modern series. National championships are unofficial in Games, but the unofficial championship has never left the United States. And we are sending a team of strong young men to Rome who will threaten many of the existing records; men who have already turned in better performances in their events, or who hold official world records already. John Thomas in the high jump, Glenn Davis in the 400-meter run, J. D. Martin in the pole vault, Al Cantello in the javelin throw, Harold Connolly in the hammer throw, Parry O'Brien in the shot-put, and so many record-class sprinters that it's hard to list them — Bobby Morrow, David Sime, Leamon King, Ira Murchison, Ray Norton, Eddie Southern. All are holders or coholders of Olympic and world rec-

ords; many will show up on our Olympic team, and some will bring home gold medals and new Olympic records.

In the shot-put, our team may be made up of men who have all beaten the existing Olympic record. Competing for berths with record-holder O'Brien will be unofficial record-holder Bill Neider, and Dave Davis and Dallas Long, all of whom have held the unofficial record at one time or another—the three challengers each broke the record in the short space of four weeks. They almost take turns. There are even dark rumors that Irvin Roberson, Pan-American Games broad-jump champion, may threaten Jesse Owen's tremendous broad-jump mark.

That's a very short history of what's been going on. But why? There are several possibilities. Here's *PM's* digest of the experts' opinions, in order of popularity:

Better Men

1. We are growing bigger, stronger, healthier men today than we were even ten years ago. The same factors that produced them will let them compete earlier and longer than ever before. They are naturally better before they ever step on a track.

POPULAR MECHANICS



100-METER RUN. Left to right, Ray Norton, Bill Woodhouse, and Bobby Poynter finishing a close final heat. They placed first, third and second, in that order ahead of Olympic record coholder Bobby Morrow

Better Training

2. Training and conditioning techniques have improved. Coaches and trainers can work a potentially good runner into a great one by building the specific muscles for his specialty, working on endurance and teaching the form of champions with high-speed photographs and movies. Otis Chandler taught his athletes to develop the base strength for their specialty by weight lifting, and current coaches are following his example—Bill Neider credits his shot-putting ability to upper-body exercises, and John Thomas breaks high-jump records after working on leg lifts and lower-body exercises. Pole vaulters take up gymnastics to build their arms and shoulders for that last great shove over the bar. They train hard but scientifically—Dr. Harold Edgerton of Massachusetts Institute of Technology made high-speed multiple-exposure strobe-light photographs of pole vaulter Bob Richards' form; they analyzed faults too fleeting for the eye to catch, and Richards raised his vaults from 14 feet, 6 inches to a 14-foot, 11½-inch Olympic record.

Better Methods

3. New styles, many developed through cooperation with physiologists, have boost-

ed performance in several events. Olympic and world record holder Parry O'Brien developed a shot-putting style that other "weightmen" are copying to threaten his crown. The "Minnesota style" discus throw changed the record books, and new techniques have helped break records in the high jump and pole vault.

Better Facilities

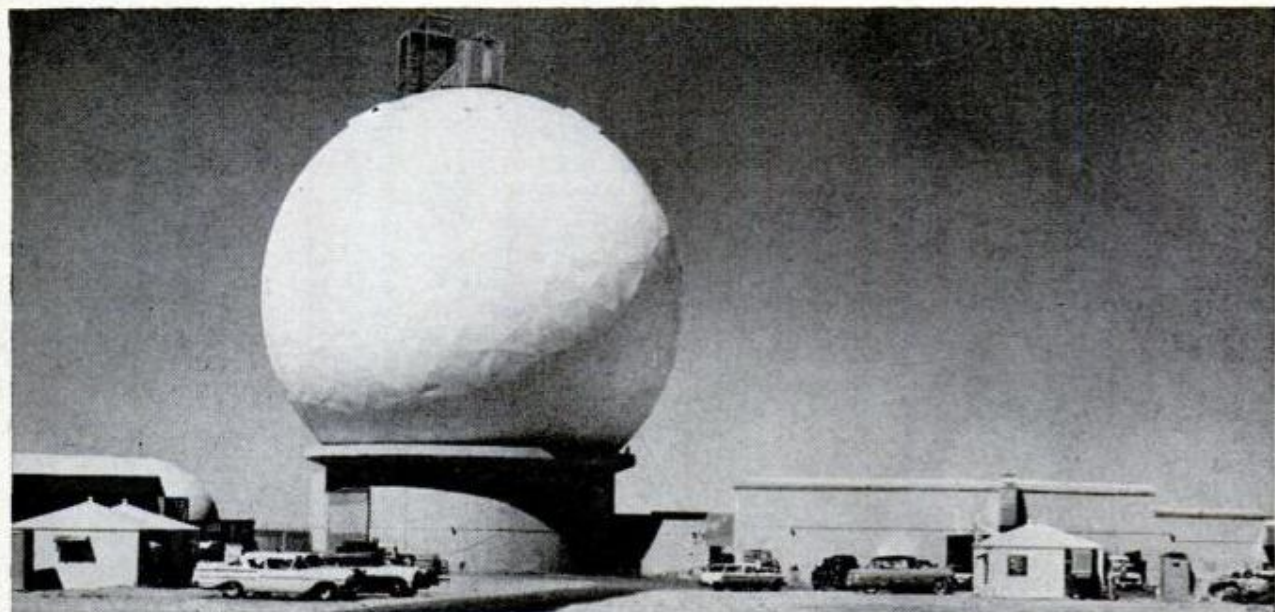
4. Tracks, performing surfaces, equipment and even clothing and shoes have improved greatly. The aerodynamic aluminum javelin and aluminum and Fiberglas vaulting poles get a lot of credit in those events, with more to come as vaulters learn to use the difficult but wonderfully springy Fiberglas. Tracks and surfaces are built to allow good performances in weather that would have ruined track meets 20 years ago. Concrete rings for shot-putters and discus throwers, and asphalt runways for javelin throwers and jumpers have resulted in better, faster, and more positive footing. Shoes and clothing are made lighter—Bill Bowerman, Oregon's great track coach, makes special shoes for his runners, and they win. He says one ounce off a track shoe saves a miler up to 200 foot-pounds of ener-

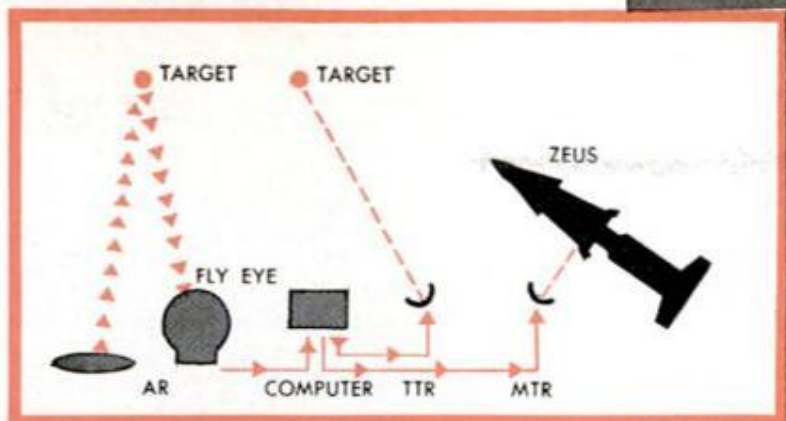
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Nike Zeus Hunts a Target

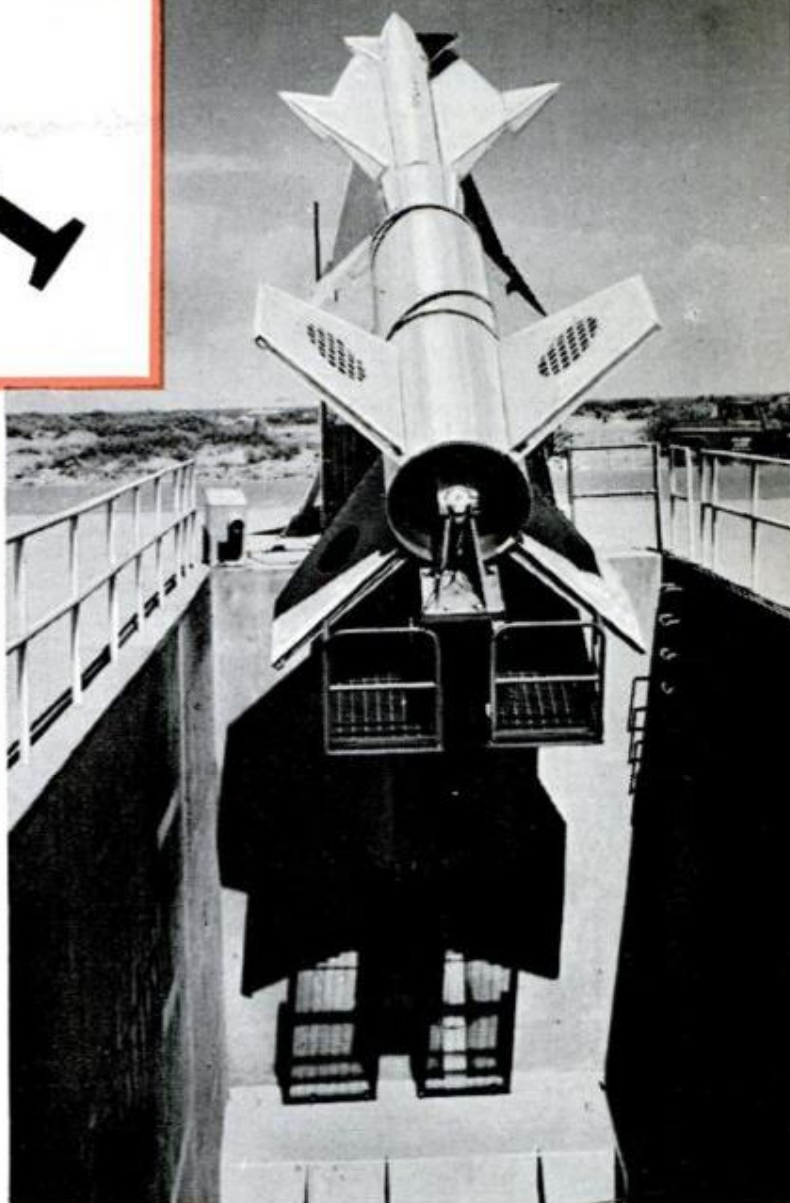
Four hundred thousand pounds of thrust, supplied by a solid-fuel booster, blasts the Nike-Zeus skyward. A solid-fuel motor takes over when the booster, its fuel exhausted, drops away. The anti-missile missile is guided by three sets of radar. The dome below shields the receiver for the first, acquisition, system





AR — ACQUISITION RADAR
 TTR — TARGET-TRACKING RADAR
 MTR — MISSILE-TRACKING RADAR

THE ARMY is developing its Nike Zeus—a 50-foot missile built to blast attacking missiles from the sky—for a test against an incoming warhead in 1962. Twenty feet of the Zeus is a booster rocket that slams it upstairs with 400,000 pounds of thrust, but the missile's success rests primarily on how fast and accurately its radar will spot an incoming missile (which can be moving at 15,000 m.p.h.). The Zeus system uses three sets of radar to do the job. A powerful radar transmitter and a separate radar receiver form the acquisition radar system that scans the entire sky, picking up a reflected signal at a great distance and relaying the information to a computer. This information directs another system, the target-tracking radar, which locks on the target and follows it. When a Zeus is fired, another radar tracks it and controls its path. If all goes well, the Zeus intercepts and destroys the target by an atomic blast some 200 to 250 miles above earth.



Poised for flight is current model Zeus. A longer-range missile is being developed and tested at White Sands. Large transmitter for acquisition radar sends out a powerful signal to be bounced off possible enemy missiles.



Rambler Is Comfortable and Easy to Drive— But Marred by Minor Flaws, Say Owners

MARGINAL COMMENTS
BY JIM WHIPPLE
PM's AUTO EDITOR

Strange as it seems, the present 108" wheelbase Rambler grew from original 100" Rambler in response to demand for a larger, four-door car back in 1954-55. →

Rolls Royce would have some quality-control problems if they doubled their production in two years as Rambler has. →

RAMBLER OWNERS have been, by and large, the most enthusiastic group around since New York baseball fans lost their Giants to San Francisco.

In recent years these Rambler boosters have been talking like people who just discovered the automobile, and to a certain extent they had, because their word-of-mouth endorsement of the maneuverable, economical Rambler sparked its zooming sales which, in turn, triggered the whole compact car revolution.

For an up-to-the-minute look at the Rambler from the viewpoint of its owners, *PM* sent questionnaires to a large sampling of 1960 Rambler buyers and herewith sets down what they revealed, the good and the bad.

What these Rambler owners like about their baby even more than its economy of operation (26.4%), is the ease of handling and comfort (55.5% and 27.7% respectively). Enthusiasm runs high for the car's solid construction and compactness too.

But, in 1960 a serpent has entered Rambler's Garden of Eden in the form of a number of nagging complaints; disappointment with gas mileage, water leaks, hard gearshifting, faulty parking brake and sloppy workmanship.

This disenchantment, plus the recent availability of four other American compacts, has lowered the level of owner enthusiasm to a point where the percentage of owners who say that their next car will be a Rambler has dropped from a high of 65% in the 1959 Owners Report to 51.9% this year.

Nevertheless, the owners of 1960 Ramblers generally put

Clever styling job on '60 Rambler coupled with 15-inch wheels makes it appear larger than it actually is



**BASED ON 2,149,858
OWNER-DRIVEN MILES**



How Good Is the Rambler?

Owners like:

Handling ease	55.5%
Riding comfort	27.7%
Economy of operation	26.4%
Compact size	22.3%

What's Wrong With It?

Owners dislike:

Lack of interior room	10.4%
Poor gas economy	9.1%
Water leaks	7.7%
Transmission trouble	5.8%

Did Rambler Buyers Consider Another Compact?

Yes, did consider one48.0% No, did not52.0%

Which Make Did They Consider?

Corvair	29.4%	Valiant	16.6%
Falcon	37.9%	Lark	16.1%

Did They Consider An Import?

Yes, did consider14.5% No, did not85.1%

Entering back seat of Rambler three-seat wagon requires some acrobatics for 5'4" model, right, but once inside (opposite page), she finds lots of room. On the way out, far right, things get a bit tricky, and a snagged nylon or two becomes a hazard of the journey. What this rig really needs is a folding step

The backslanted window frames on rear doors, below, are a menace as they swing much closer to entering passenger than the door handle, and can give the unwary a nasty bump (arrow)



themselves on record as pleased because more of them rate their cars excellent (75.9%) than any other 1960 owner group polled by *Popular Mechanics* with the exception of Falcon owners, [PM April], who registered the highest enthusiasm in recent years with 82% rating their cars excellent.

Let's listen to some of the praises sung by Rambler owners. Here, in the order of frequency of mention, are quotations describing the five best-liked features:

"Handles extremely well on open roadways at 60-65 miles per hour."—Wisconsin engineer.

"Wife says it is easiest car she's ever driven."—Ohio civil engineer.

"With short wheelbase and power steering it is tops for city driving."—North Dakota teacher.

"I drive on long trips at high speed and am not 'beat' after eight hours at the wheel."—California salesman.

"Rides like one of the more plush, heavier cars—never tiring, takes curves beautifully."—West Virginia service man.

"I buy gasoline about half as often as before, and most

Scant rear-seat legroom, below left, is one of the few prices paid for Rambler's compact virtues. Reclining seats, below, are a real plus





of my driving is done in the city.”—California secretary.

“The low cost of maintenance is very appealing.”—Wisconsin parts and service man.

“I average 18.5 overall and car (wagon) is loaded with 2000 lbs. of boiler parts.”—New Jersey service engineer.

“It’s compact on the outside with adequate room on the inside for six passengers.”—Ohio clerk.

“Big-car room, small-car convenience.”— Pennsylvania secretary.

“We wanted more space for vacation camping without having to drive a large car for the other 50 weeks of the year.”—Massachusetts teacher.

“I’m a confirmed compact owner. I looked at a ‘low-priced-three’ wagon that was two feet longer, nine inches wider and 800 pounds heavier than Rambler. Who needs it?”—Massachusetts engineer.

“The best constructed automobile that I’ve ever owned.”—Tennessee welder.

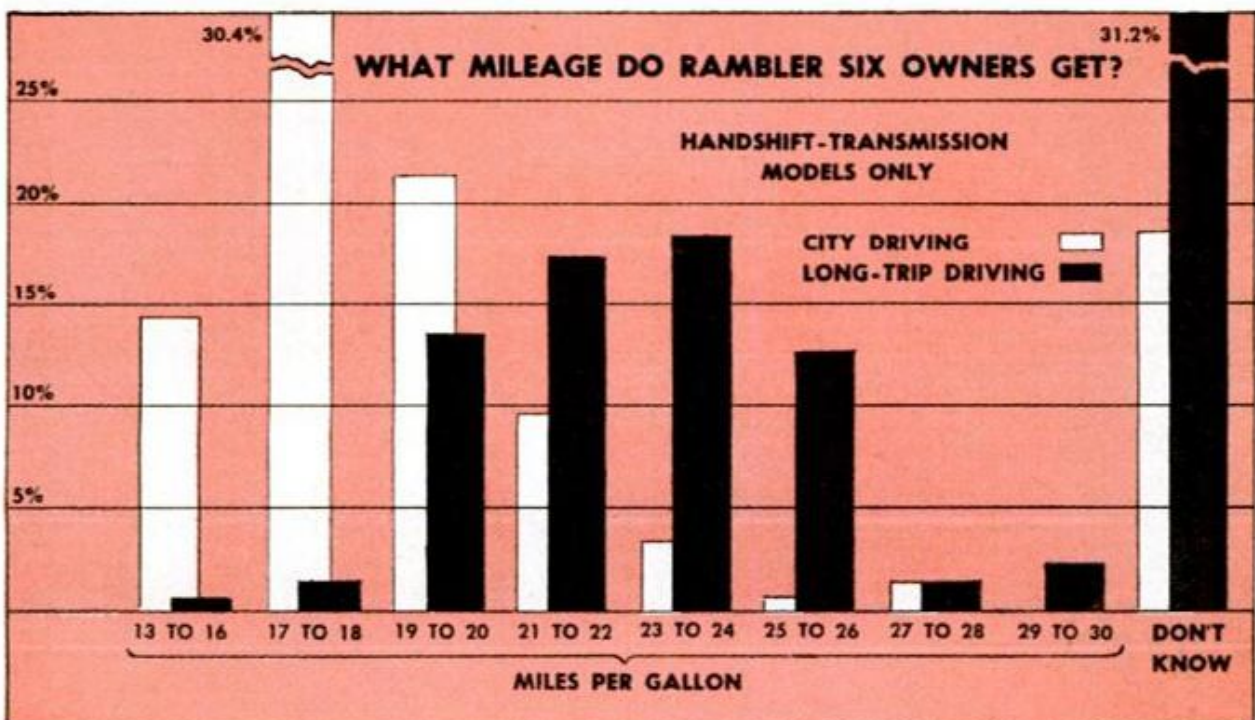
“This car has a good solid feel, doesn’t rattle like other cars I have owned.”— Michigan manufacturer’s representative.

← *Yep, that’s what the man said!*

← *This is one of the big reasons for the compact car boom—a dual-purpose vehicle for a one-car family.*

← *More people every day are discovering that they need less car. If this keeps up compacts will account for 50% of all sales by 1962.*

Six owners do pretty well on the open road with nearly half getting more than 20 miles per gallon. Stop-and-go driving reduced miles per gallon to less than 18 for 45 percent of all owners reporting





Rear-view mirror definitely blocks forward vision, left, for tall and average-height drivers. Low rear opening on wagon, right, limits loading capacity; 30-inch trash barrel can't be loaded upright

Successful design of a car on a short wheelbase with adequate legroom for both a tall driver and long-legged rear seat passengers is a tough problem for all compact-car builders—you've got to save space somewhere.

And Now for the Complaints

Here, in the order of greatest frequency, are quotations describing the five most-mentioned complaints.

"It takes practice to learn how to get in. Passengers who have never ridden in a Rambler always bump their heads."—Kansas teacher.

"It is far too low in the seat, driver's seat should be four inches higher. Too low in the roof as well, roof should be two to four inches higher."—New Jersey designer.

"Not quite enough room in the back seat for this tall generation."—Colorado nurse.

"Rambler advertising of 'up to 30 miles per gallon' is misleading in my opinion. I average 16.8 on my Six with automatic transmission."—California Naval officer.

"Even my '55 Statesman (Nash Six) got more miles to the gallon than my new Rambler (20 miles per gallon over-all)."—Georgia marine surveyor.

(Continued to page 228)

EXCELLENT 73.2%

RAMBLER

AVERAGE 24.0%

POOR 2.8%



Satisfied V8 economy?	
Yes, satisfied	71.2%
No, not satisfied	28.8%
Satisfied Six economy?	
Yes, satisfied	74.6%
No, not satisfied	25.4%
Best-liked features	
Handling ease	55.5%
Riding comfort	27.7%
Economy of operation	26.4%
Compact size	22.3%
Solid construction	21.7%
Easy to park	20.3%
Reclining seats	14.8%
Most-frequent complaints	
None at all	30.5%
Lack of interior room	10.4%
Poor gas economy	9.1%
Water leaks	7.7%
Transmission trouble	5.8%
Brake trouble	4.9%
Sluggish power	4.1%
Had engine trouble?	
No trouble	79.7%
Some trouble	18.1%
Considerable trouble	2.2%
What was trouble?	
Carburetor, stalling	9.9%
Spark plugs	1.9%
Timing	1.6%
Best-liked exterior features	
Clean, simple lines	20.1%
Absence of big fins	6.9%
Rear-end styling	6.6%

Least-liked exterior features	
Bumpers	8.8%
"Timid" fins	6.6%
Rear-end styling	4.1%
Best-liked interior features	
Reclining seats	49.4%
Upholstery	9.6%
Roominess	8.5%
Least-liked interior features	
Lack of interior room	9.3%
Glove compartment	3.8%
Dashboard design	3.8%
Did consider different compact?	
Yes, did consider	48.0%
No, did not	52.0%
What make?	
Falcon	37.9%
Corvaire	29.4%
Valiant	16.6%
Lark	16.1%
Did consider an import?	
Yes, did consider	14.9%
No, did not	85.1%
What make?	
Volkswagen	32.1%
Opel	13.2%
Mercedes	11.3%
Peugeot	9.4%
Renault	3.8%
Rambler only car in family?	
Yes, it is	65.9%
No, it is not	34.1%

Make of other car	
Another Rambler and	
AM make	5.5%
General Motors make	14.0%
Ford Motor make	4.1%
Chrysler Corp. make	6.3%
Other U.S. make	2.5%
Foreign make	4.9%
How is dealer service?	
Excellent	52.0%
Average	35.4%
Poor	12.6%
Would buy from him again?	
Yes, would buy again	63.2%
No, would not	15.4%
No answer, don't know	21.4%
Car traded?	
Rambler	21.4%
Nash	4.1%
General Motors make	31.0%
Ford Motor make	13.2%
Chrysler Corp. make	13.5%
Other U.S. make	3.6%
Foreign make	3.6%
No trade, no answer	9.6%
Next car will be?	
Another Rambler	51.9%
General Motors make	3.9%
Ford Motor make	1.4%
Chrysler Corp. make	0.8%
Other U.S. make	0.8%
Foreign make	0.5%
Unnamed compact car	2.5%
Undecided	38.2%



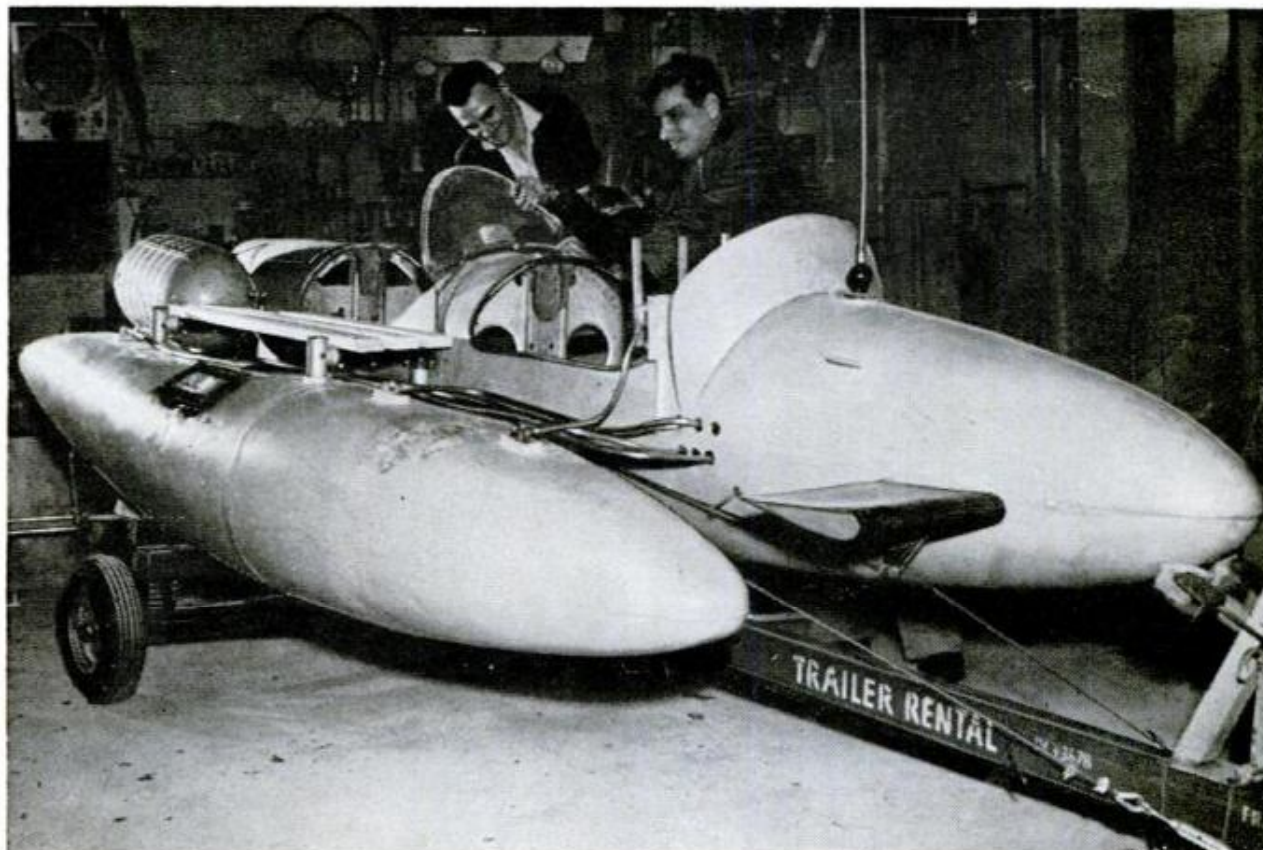
Open-air submarine, which cost \$500 to build, is guided to shore after its first successful 40-foot dive

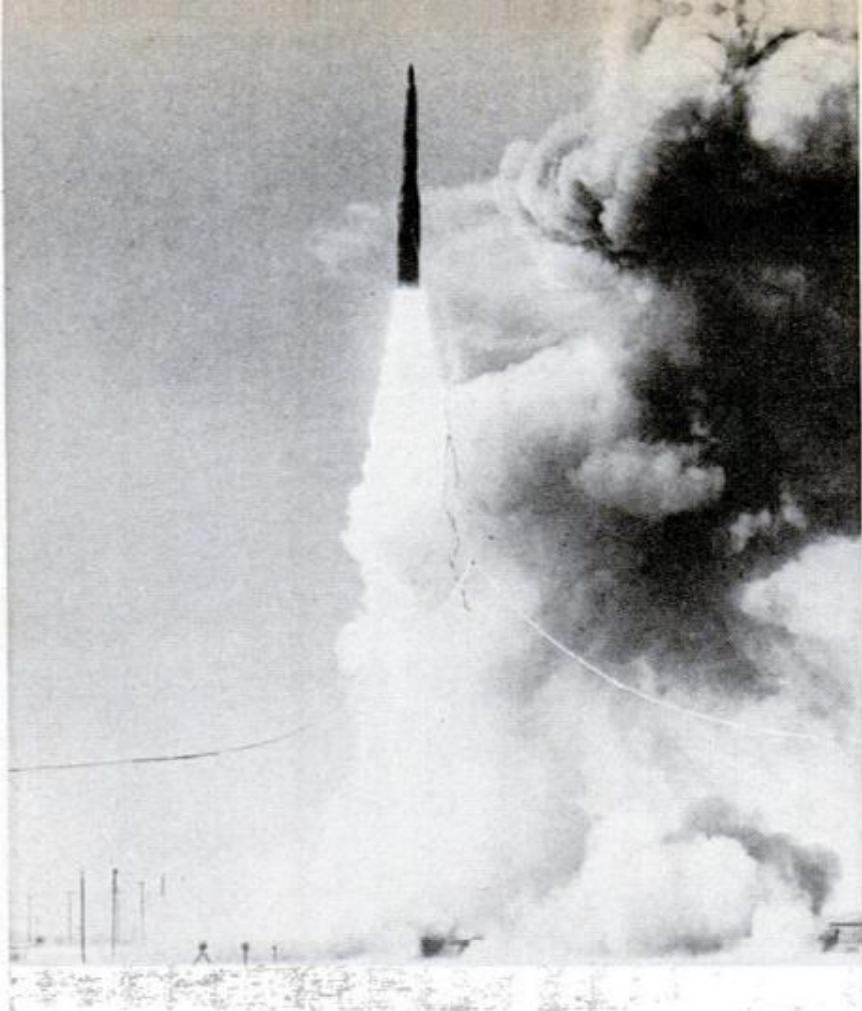
Two-Man Submarine Built From Surplus Airplane Parts

TWO AMATEUR skin-divers have successfully launched a homemade submarine, built from surplus aircraft parts. Designed for underwater photography and possible salvage work, the submarine consists of a central, open-cockpit body and two-dive-

and-control buoyancy tanks, all war-surplus aircraft wing tanks. Surplus Navy oxygen bottles supply air necessary to control diving or surfacing, aided by fore and aft diving planes. A battery-powered motor and variable-pitch propeller drive the sub.

Ugo Andreolli (left) and his partner, Frank Palazzola, put finishing touches on their homemade craft





Minuteman Missile Fired on Tether

Air Force scientists have fired full-size (but under-fueled) models of the Minuteman ICBM on tethers of nylon. The purpose is to learn what shape and size to build the underground silos from which the missile may be fired. Now under development for the Strategic Air Command, the Minuteman is expected to be capable of delivering a nuclear warhead some 6300 miles at speeds up to 15,000 miles an hour. Its power plant is in three stages, each a solid-propellant rocket engine. When operational, the missiles will be deployed around the United States in underground silos or on trains that will move at random across the land.



French Sports Car Weighs 680 Pounds

Constructed of Fiberglas reinforced with aluminum, the "France Jet" car weighs only 680 pounds. Its rear-mounted, one-cylinder, four-cycle engine drives it to a top speed of 70 miles an hour. According to the manufacturer, the car gets 65 miles to the gallon.



Floating Lounge For Lazy Swimmers

Four dome-shaped floats support a legless lawn chair in the swimming pool. One pair is attached to the tubular frame at shoulder level and the other pair at leg level. The center part of the lounge sinks into the water so that it covers part of the swimmer's body. A floating table is also available as a snack bar or as a card table, so that swimmers can spend the day in the water.



It's Bonneville Time Again

Zooming along the course at 150 miles per hour is *Peanuts*, a Class C roadster restricted to gas for fuel

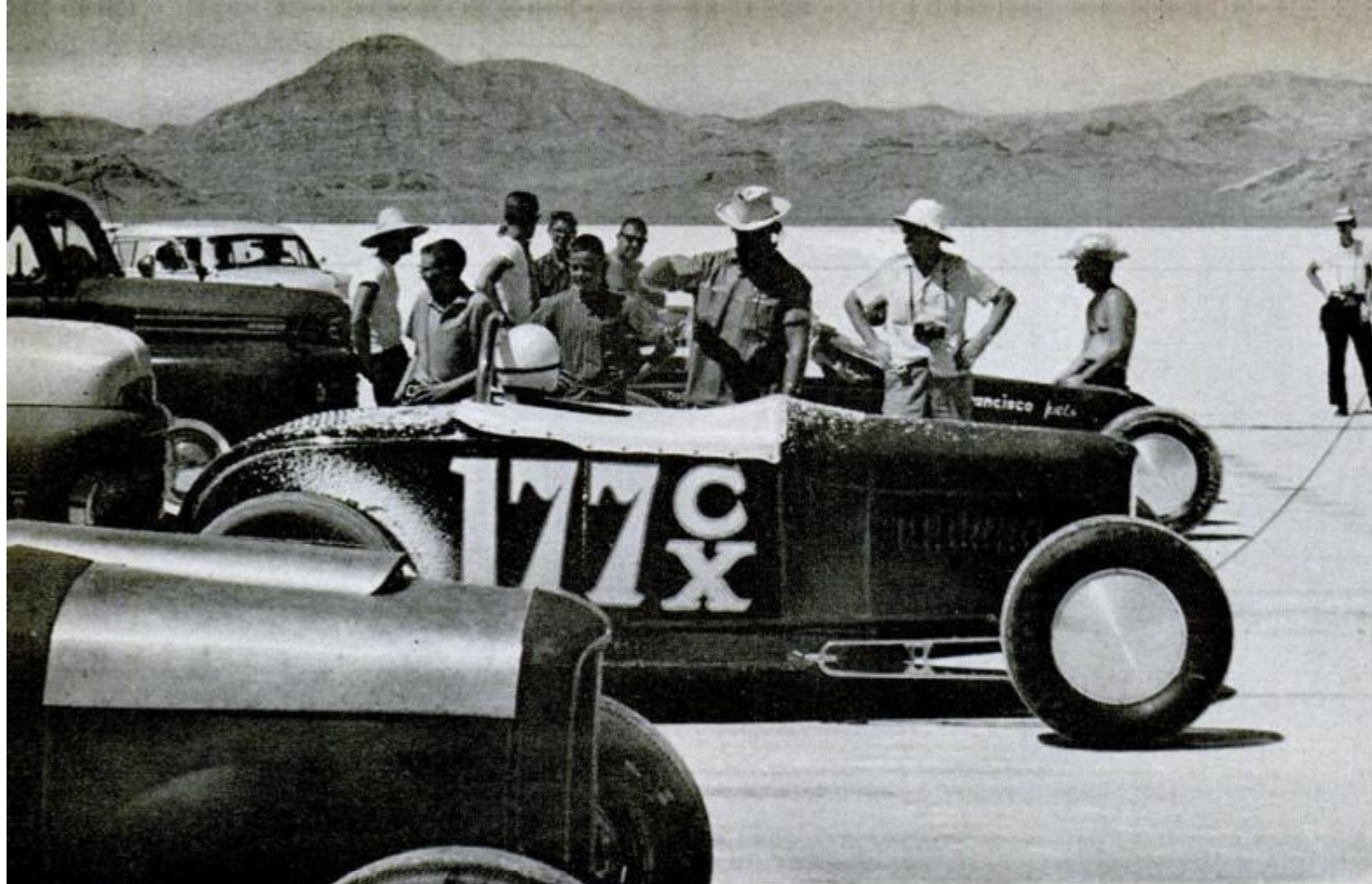
By **Frank A. Tinker**

Photos by the author

SAY THE NAME *BONNEVILLE* and you quicken the heart of any racing-car fan—now more than ever. Once reserved for the big, expensive cars and their tremendous dashes, for the past 11 years the courses there have been given over for a week each year to the hot rodders and the general public. Anyone who thinks he has a fast jalopy is free to come and prove it. Free, that is, if he can prove first that he has a safe car and knows how to drive it.

The officials of the Bonneville Nationals lay claim to the title of “the safest meet in racing” and are safe in making this claim for two reasons. One, every entrant must

submit his car to a complete inspection, which eliminates the enthusiast who ties a few wheels to a surplus Air Force jet and calls it a racer. Two, the virtually unlimited space afforded on the flats makes most skids or wanderings from the designated course little more than an extra thrill. Sir Malcolm Campbell, before World War II, skidded his *Bluebird* broadside at 250 miles per hour and this year Mickey Thompson, in his *Challenger I*, had the same thing happen when he released a drag chute to slow his car. In neither case was the car overturned or damaged. On any other track in the world there would have been no recovery.

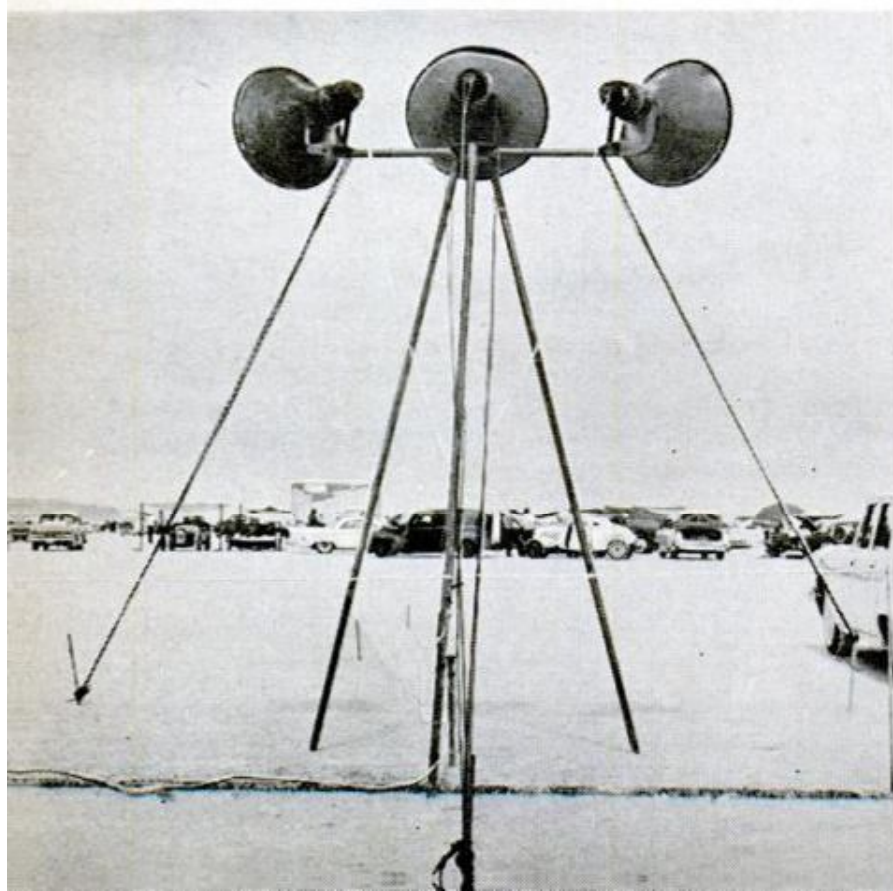


Dodge-powered roadster, set for a time trial, will turn 170 miles per hour on the nine-mile straightaway

Thus the rodders who flock here every August or September gun their mounts down the straightaway in comparative safety, and they take advantage of the lee-way thus provided. Most of the cars are regular entrants in drag or stock races throughout the West, but are tuned to the

particular requirements of their specialty, be it acceleration or endurance. Here at Bonneville the only idea is speed—as much as possible—over a smooth mile course. They are given several miles to attain this speed before they enter the timing traps, and watching the cars (most of them home-

Speakers boom out urgent requests for wire, piston rings and other parts needed to keep the cars running



built) roar away from the starting line restores faith in the ingenuity of the country's youth. It seems that every one of them is sure to break some kind of record.

For the uninitiated, the speeds obtained on such an unlimited track are phenomenal. A 1930 Ford roadster—which was no longer a 1930, a Ford, or a roadster—was spurred across the salt at 240 miles per hour. Standard stock cars reach 150 and better. And, of course, Mickey Thompson in his Pontiac-powered, backyard-built *Challenger I* topped 360 miles per hour.

Like most other meets of this type, though, much of the attraction it held lay in the chance it afforded to the car enthusiasts to get together and exchange ideas on cams, carburetors and clutches. Reservations for the few motel rooms in Wendover, on the line between Utah and Nevada, were booked a year in advance. The entrants and spectators, who came from Portland, Denver, San Diego and even Australia, slept in pickups, tents, or wherever fatigue found them. A portable radio, a drink cooler and a magazine were standard housekeeping equipment for the desert living which went on between runs. Old cargo chutes served as canopies.

And they loved it. The chief sponsor of the event, the Southern California Timing Association, says that each year more and more interest grows in this chance to make a run along the straightaway used by Cobb, Campbell and Eyston. There is no particular order in the runs, except for the record tries. One gets in line, proceeds to the front,



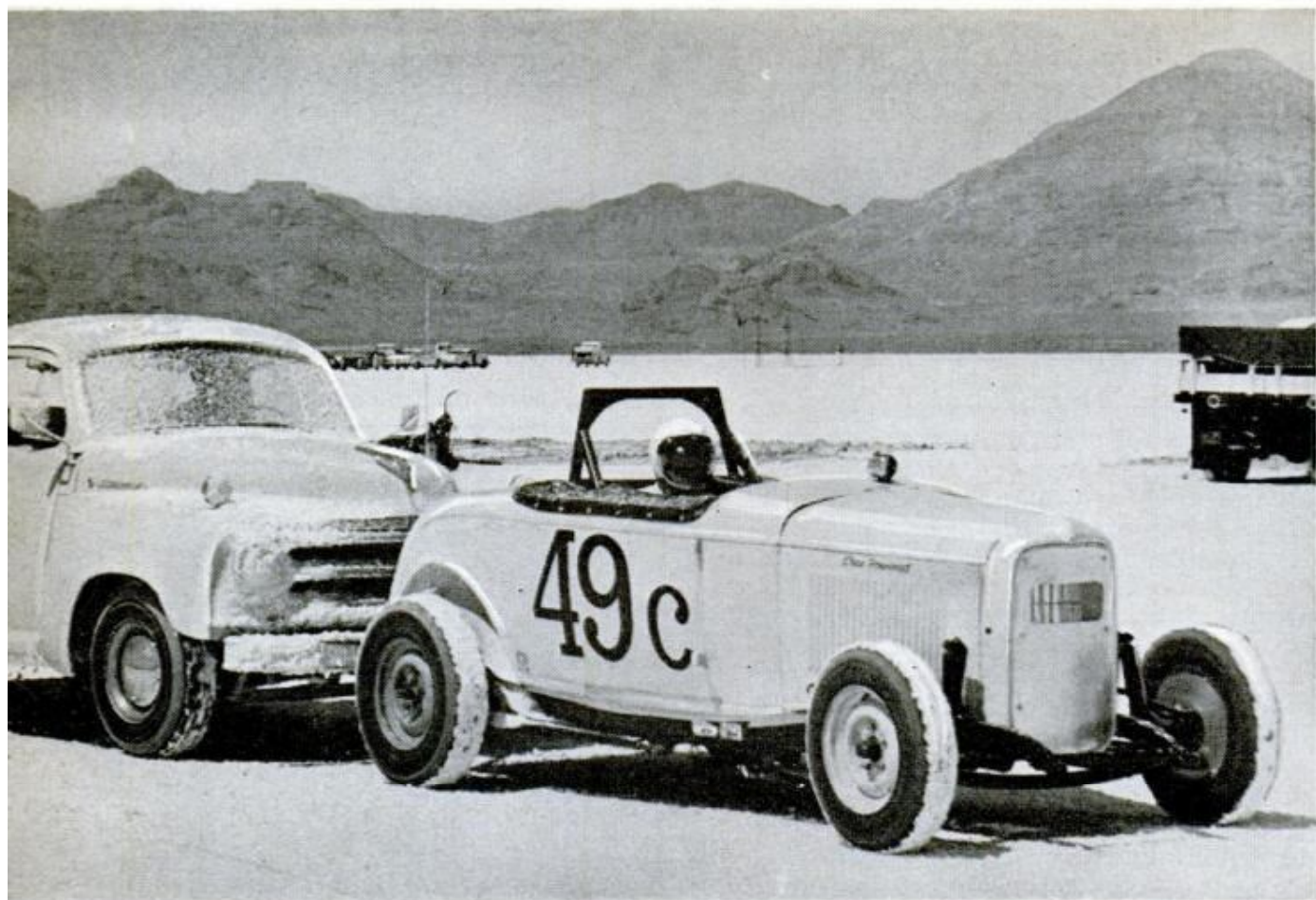
Stretching ahead of the little special being pushed by the pickup truck is the fastest course in the world



Car that pushes racers gets salt coat in a few hours

Pat Connolly's *Triumph* roars away from the starting line toward the timing traps located two miles away



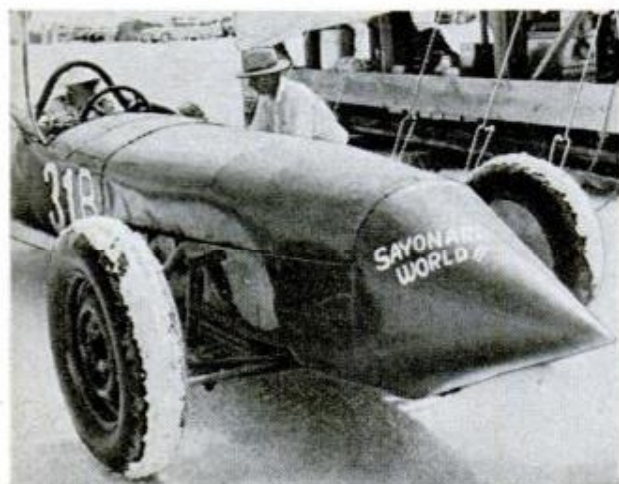


Few of the faster cars are equipped with starters. This roadster is getting a boost from a pickup truck

and when he reaches there is sent on his way down the timing route. Cycles, rods and streamliners make the jaunt indiscriminately, and the casual spectator becomes even more casual at speeds under 200.

Under water during much of the year, the salt flats dry out in late summer, and the course is scraped by the Utah State Highway Department. The autumn rains almost immediately erase the evidence of the year's activity, so the course is ready the following spring for a new batch of cars.

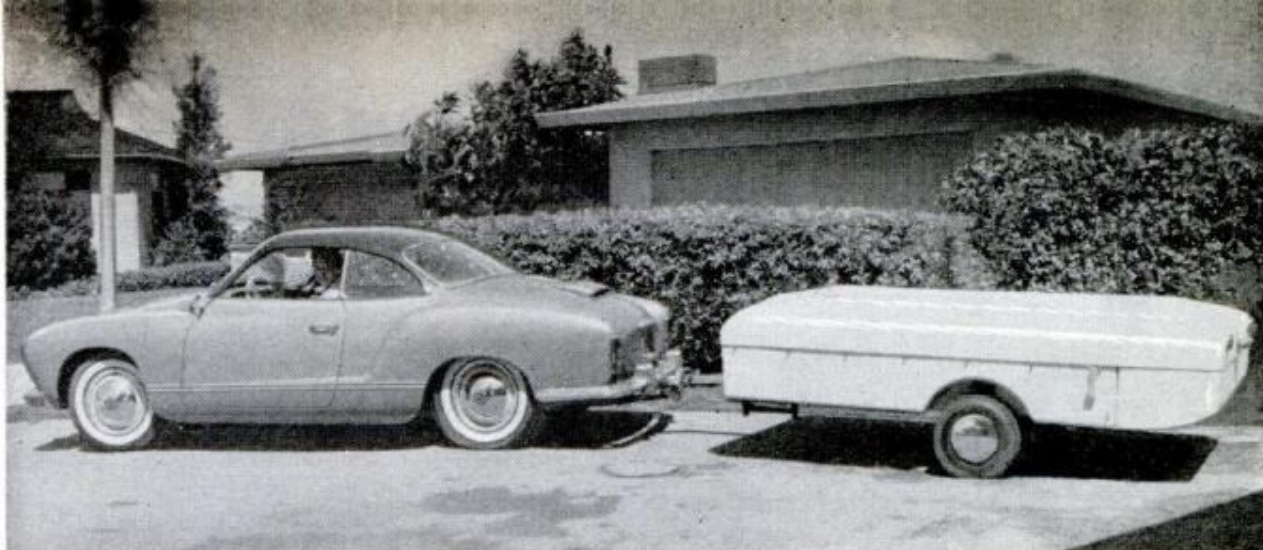
Many and varied are the cars entered; this Class B lakester is powered with a supercharged Olds engine



The brine from which the salt of the flats has precipitated lies only a few inches beneath the rocklike surface, thus cooling the racing course and lending safety to the fantastic whirling of the nitrogen-filled tires.

Each year that the meet has been held at Bonneville the records have been pushed higher and higher. In the larger cars, such as Thompson's *Challenger*, the problem is now posed that the 14-mile straightaway is not long enough. There is, however, no track on this earth which is longer or as suitable. The larger cars will simply have to accept this limitation; meanwhile, the rods and their owners are not worrying. Bonneville is perfect for them.

Also, happily, they have become more and more welcome at Bonneville. From a rather shady start, the rodders have progressed to a reputation of being considerably more restrained than any group of conventioners. They are primarily a group of persons, many of them no longer young, who are possessed with a driving interest in automobiles and their improvement. The old days of roaring through a town en masse and using the highways for impromptu drag strips are about over, at least for members of the upper crust. They can get more speed, more safely, out of the salt at Bonneville. ★ ★ ★



Even Trailers Go Compact

Meeting the trend toward smaller cars with lower driver line-of-vision, a new camping trailer is scaled down to a compact 6½-foot-long, 250-pound package. It's low enough for good visibility with the compact or imported cars, yet it opens out to a full-size tent with over six feet of headroom, a full-size double bed off the ground, a built-in wardrobe and 20 cubic feet of storage space.

Nuclear Air-to-Air Guided Missile

Guided by radar, the GAR-11 Nuclear Falcon missile can be launched by an Air Force pilot to destroy enemy aircraft that he cannot actually see. Falcons will be carried by F-102A all-weather jet interceptors. The newly developed missile is the first U.S. air-to-air weapon capable of destroying with a nuclear explosion. It is seven feet long, 11 inches in diameter and weighs 200 pounds.



Skimak Speeds on Water or Snow



Skimak, prototype of a new family of sports and utility vehicles, shown during tests for PM. The specifications: Length, 17 feet, 9 inches; width 6 feet, 8 inches; weight, 550 pounds; skis, 102 inches long, average 7 inches wide; snow clearance 8 inches. Static weight of only half a pound per square foot—it won't sink in soft snow. Power, 135-horsepower aircraft engine driving 66-inch propeller

Ultra-Light .22 Rifle Stores Inside Its Own Stock

Developed for sporting use after a prototype was accepted by the Air Force as a survival weapon, a new eight-shot semi-automatic .22 rifle travels and stores with its barrel and action *inside* the 16½-inch

glass-fiber stock. Reassembly only takes 45 seconds and requires no tools. Accuracy with standard .22 rimfire long rifle ammunition compares with conventional rifles, though its total weight is only 2½ pounds.



On This Month's Cover...

VISITORS AT THE NEW Mount Shasta Ski Bowl witnessed the proving of a radically new snow vehicle recently when Skimak, first of a family of airscrew-driven, high-performance craft, shot across snow-covered straightaways at 100 miles an hour and slid over 30-degree slopes with ease.

Former Navy engineer and airman Richard L. Barkley, designer of the "Alphibian" family (from *alpine* and *amphibian*), plans to market three versatile all-season sports-utility craft.

Skimak, shown on these pages, is fast and agile over snow surfaces, and with a marine conversion kit (this month's cover) will "ski" equally well over water.

Snomak, a similar craft mounted on twin pontoons, will maneuver better on water, especially at normal boating speeds, and will skim over nonmountainous, snow-covered terrain on the same pontoons.

Nordak, which has a more conventional boat hull, is designed for water use, but will slide over snow as well, and can be fitted with hydrofoils for high speed on water or can use hydraulically retractable wheels for a limited amount of land travel without snow.

Front ski is spring-mounted; tilts in turns to bite the snow to prevent sideslipping. Rear skis are hinged to follow uneven snow contours. Shown here is the two-man side-by-side model with dual controls

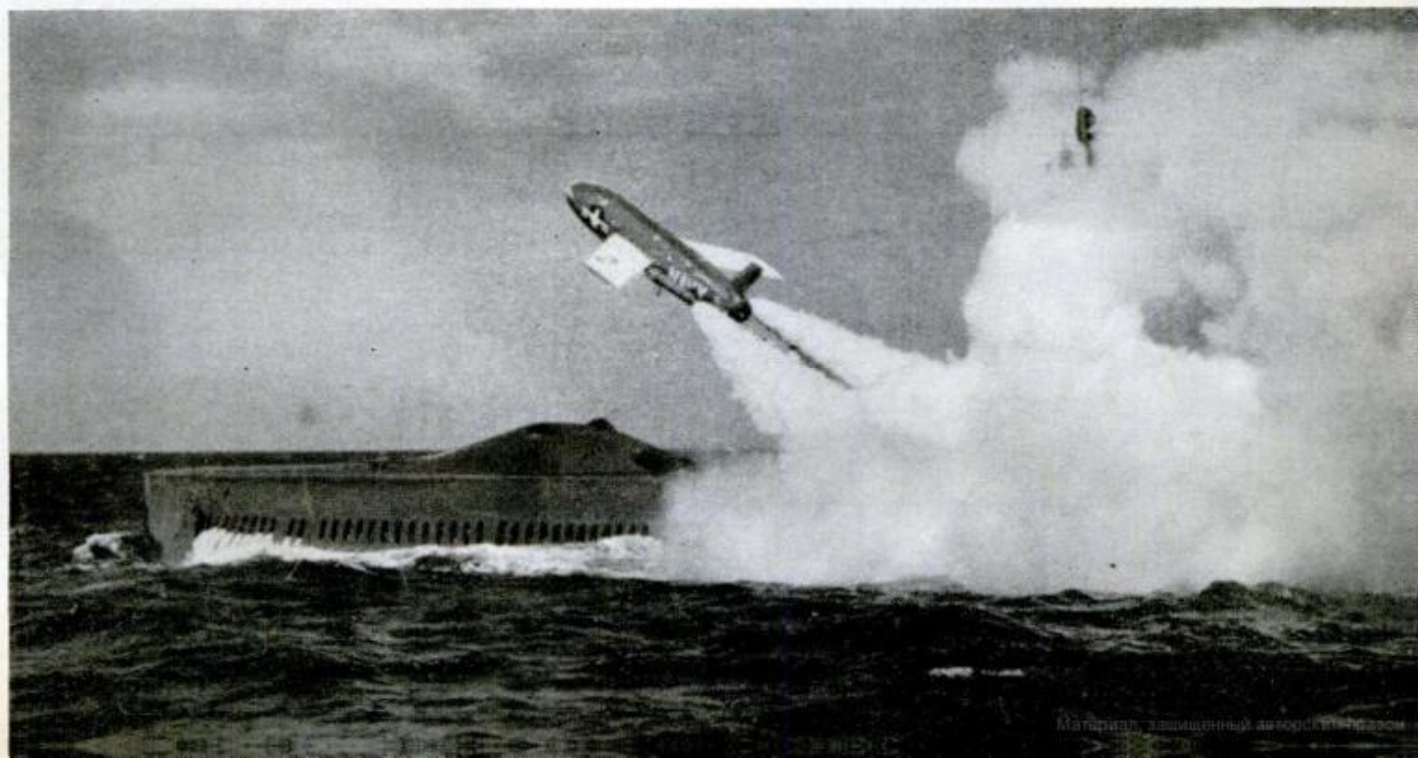


PM photos by Thomas E. Stimson, Jr.

Atomic Sub Launches Guided Missile

First atomic-powered submarine to launch a guided missile, the USS *Halibut* fires a Regulus I from her deck during a training mission off Oahu, Hawaii. After the 500-mile missile successfully reached the target area, its control was taken over

by two chase planes, who led it to Bonham Field. Five miles from the field its control was handed over to ground technicians and the missile was landed safely. This method allows the same training missile to be reused indefinitely.



Nose Cones

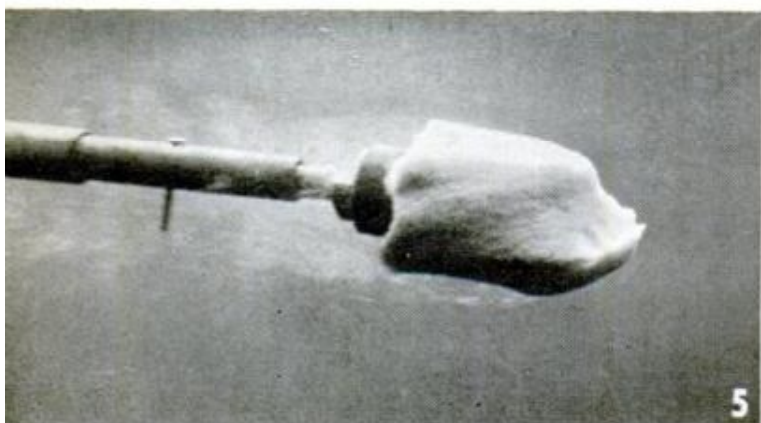
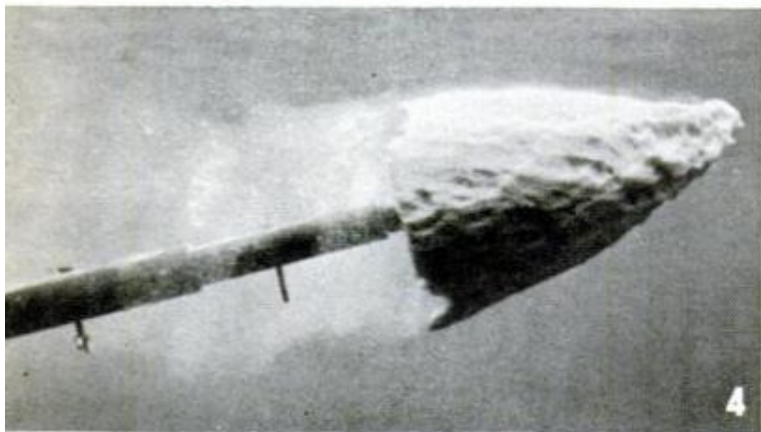
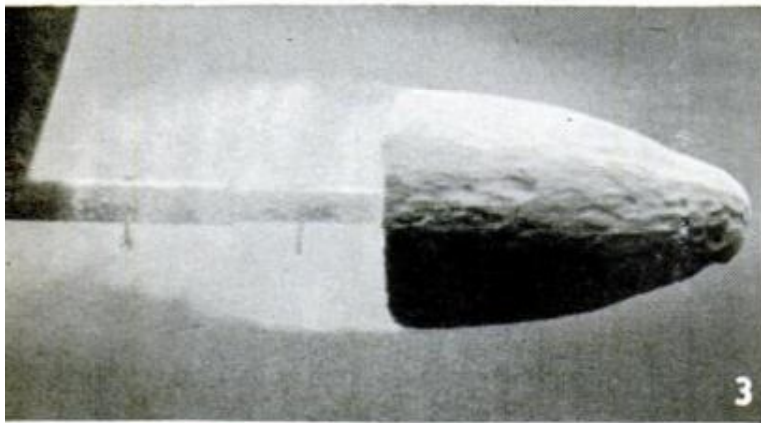
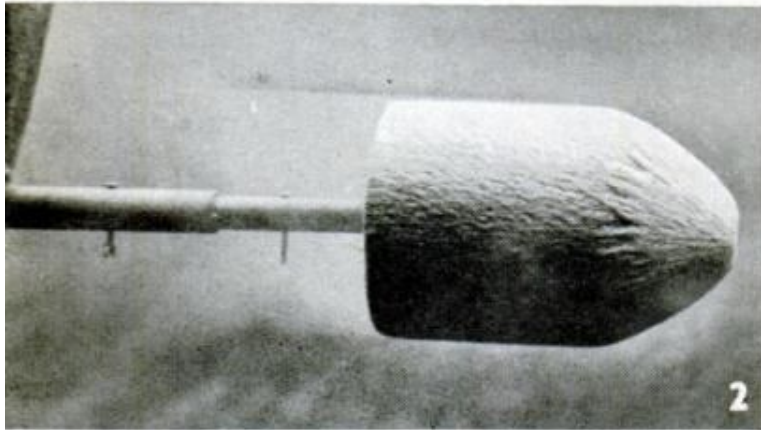
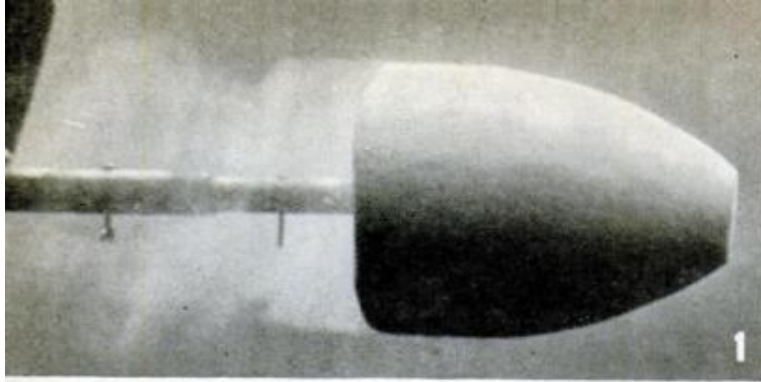
WELL, YES AND NO. *These* nose cones were turned out of ordinary cattlemen's salt blocks, but they'll never make it into deep space—they do their work in water.

Testing salt-block nose cones under the surface of a Florida river seems an unusual way to go about space vehicle research, but it isn't strange to Dr. David T. Williams, professor of aeronautical engineering at the University of Florida. Working on a grant from the National Space Foundation, he has been moving dummy nose cones through the clear waters at Florida's Silver Springs to study the way they erode and change shape as the water washes away the salt surface.

Nose cones on real missiles, re-entering the Earth's atmosphere at extreme speeds, turn white-hot, melt, and erode away from air resistance. The outer surface, or heat shield, usually a ceramic material, is intended to melt away, but is thick enough to protect its precious (or deadly) cargo. The big trick is to design a cone that will melt away uniformly without pitting or losing its shape. The weird and twisted shape of meteorites is caused by air resistance in entering the atmosphere, and Dr. Williams' salt nose cones, moving through the water, erode almost exactly like an object going through those tremendous temperatures and pressures. They even look very much like meteorites after they have been "melted." By studying them, he hopes to provide a scientific background for the development of vehicles that retain stability though they change shape in flight—a hitherto unknown field of aeronautics.

Dr. Williams' dummies are mounted on a bracket attached to Silver Springs' famous "photo-sub" boat, which has a glass-walled hull extending deep under water. While the boat cruises through the crystal-clear water of the Silver River, he and his crew can observe and photograph the performance of different nose-cone shapes.

Simulating the erosion and deformation of an object entering the atmosphere at high speed, the dummy nose cone at left starts with a smooth, aerodynamic shape and surface in photo 1. In photo 2, erosion has begun—the nose shortens and the cone begins to pit around the "shoulders". In photo 3, the surface friction has worn down the shoulders, and heavy pitting is beginning. By the time photo 4 was taken, the rear had begun to break off, and the cone, no longer streamlined, begins to wobble in the flow. Such instability would be disastrous to a missile warhead or space vehicle. The last photo shows the end of the test—the cone is worn away



Made of Salt?

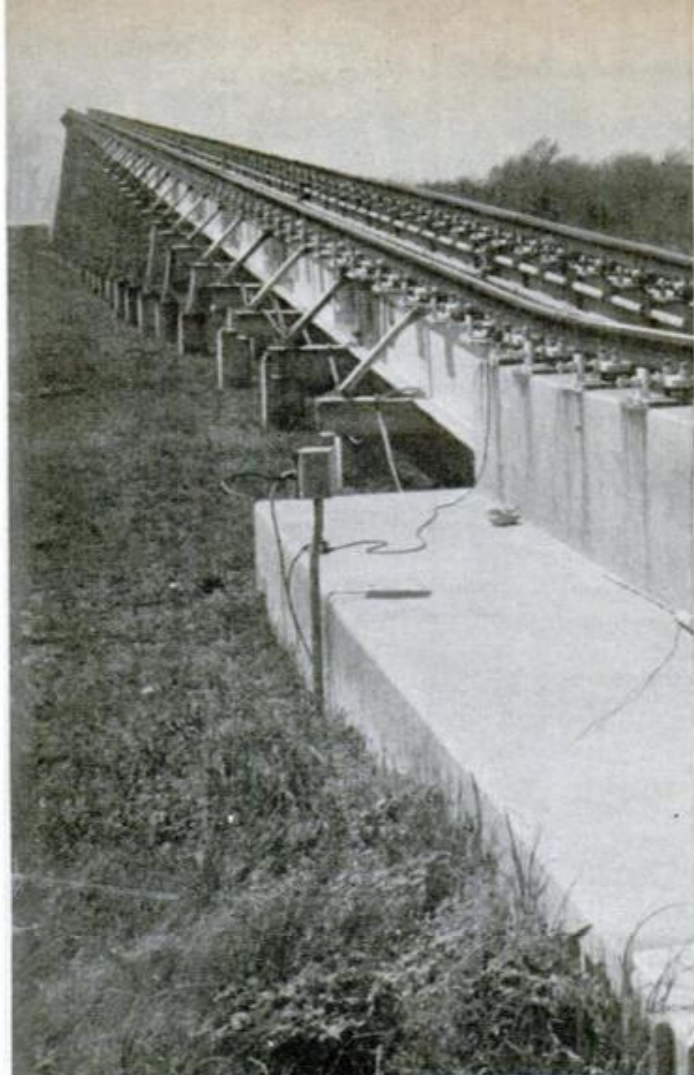
Photographed for PM
At Silver Springs, Florida
By Bruce Mozert

Leaning from a surface window on the photo-sub, Dr. Williams inspects a new cone-shaped salt block before a new series of tests. When it comes up again, it will look more like a meteorite one third its original size





Electrical engineering student Mary Butler and her husband switched to the co-op plan while attending college. They work at White Sands half of the year



Alabama Polytechnic Institute students John Gresham and Edwin Liverett inspect Redstone Arsenal's ballistic-missile ramp. Sometimes, it's their lab

Space-Age Scholarships Go Begging

By
William V. Kennedy
*3400 Hawthorne Dr
Camp Hill, Pa*

TOM AYARS is a slightly built, scholarly lad with a talent for quick, penetrating comment on any subject that interests him. He spends six months each year as a physics major at Philadelphia's Drexel Institute of Technology. He spends the other six months working with Army scientists at the Signal Corps Research and Development Laboratory, Fort Monmouth, N.J.

Tom has had a part in instrumentation of satellites and evaluation of International Geophysical Year communications research.

This is Tom's third year of the six-months-classroom, six-months-Fort Monmouth routine. After two more years, he will receive his Bachelor of Science degree from Drexel. During all this time, Tom receives a Civil Service salary that started

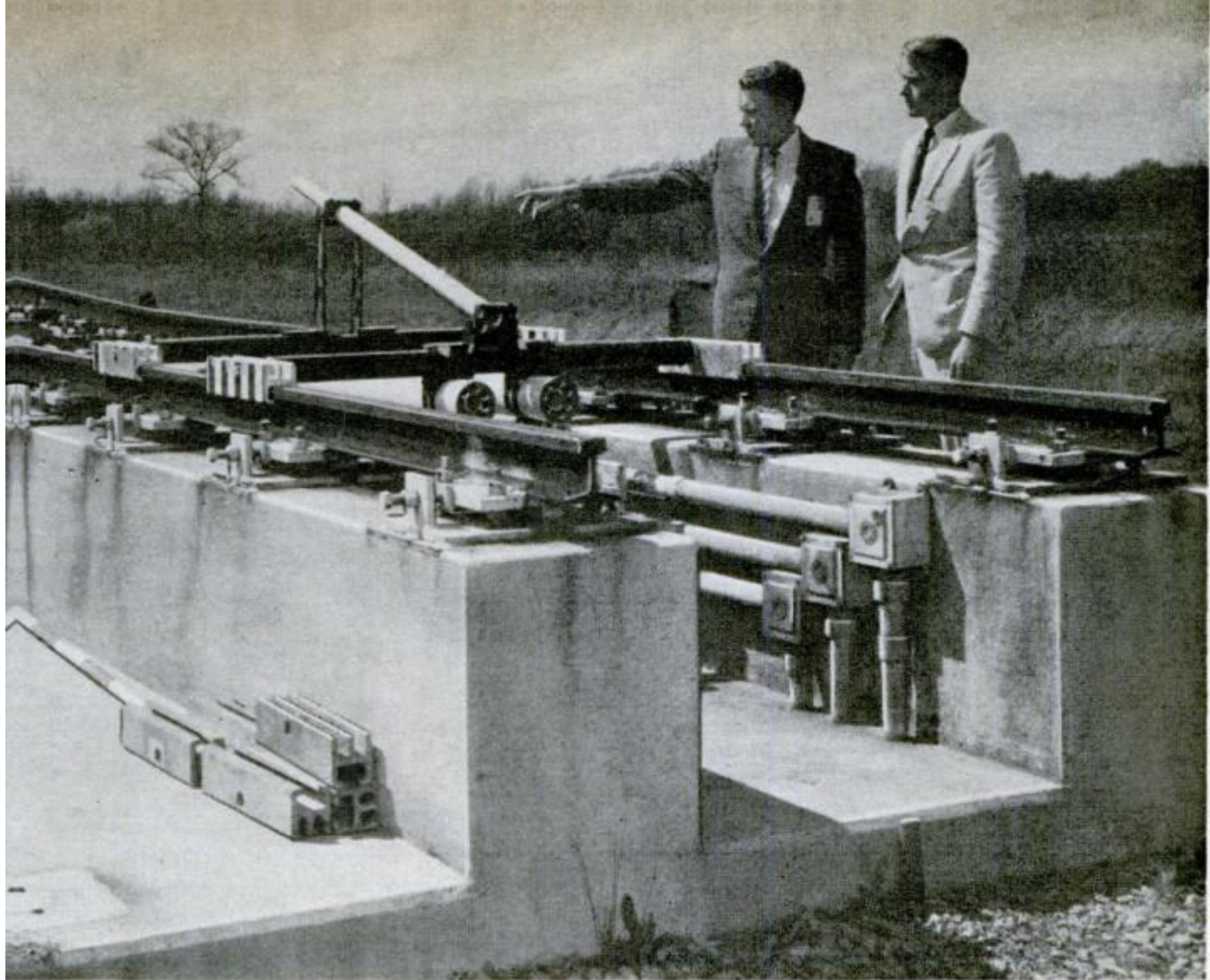
at \$1600 per year, in actual cash received, and will go up to \$2000 per year by the time he graduates. On graduation day, Tom can, if he wishes, step into a full-time job at Fort Monmouth, at a salary of \$5400 per year.

This is the Army's student cooperative training program. With more than 850 students enrolled, nationwide, it has been helping to solve our shortage of young missile, electronics and nuclear trainees.

Surprisingly enough, the Army must "beat the bushes" each year to keep the program going. It has not been able to recruit enough capable youngsters to expand the program to a potential of 2000 students.

Here is how the program works:

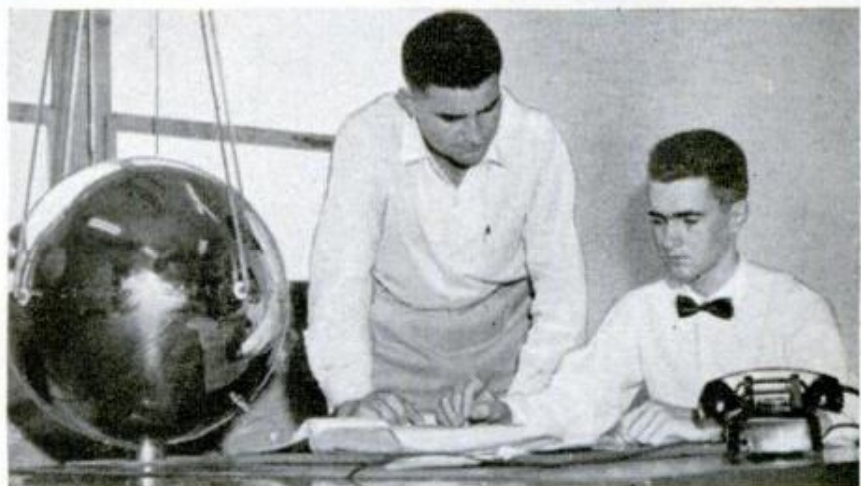
A high-school student with a bent for science or mathematics, selects a college or

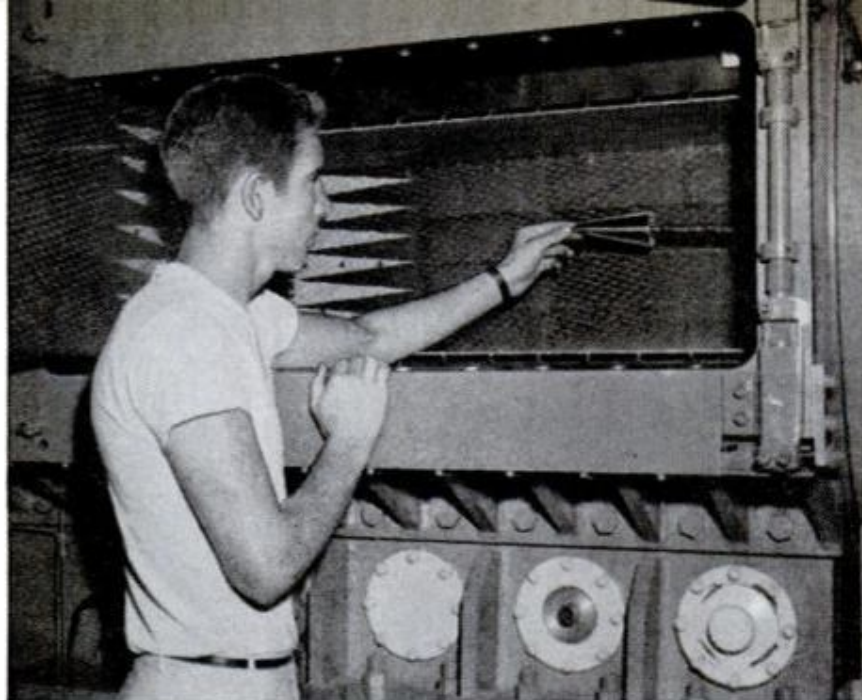


Liverett and Gresham, right, run through a countdown before the ramp is used in a rocket test. Ramp simulates airborne firings



Dr. Wilhelm Nordberg, a supervisor at the Fort Monmouth astro-electronics lab, advises a co-op student, Tom Ayars, right





Thomas Lundy, adjusting a nose cone model of a missile for a wind tunnel test at Redstone Arsenal studies at Georgia Tech

university from among the 62 participating in the Army program. They range through the alphabet of the states from Alabama Polytechnic Institute, Auburn, to Marquette University, Milwaukee, Wis. (A list of the cooperating schools can be obtained from local Civil Service personnel offices, or from the U.S. Civil Service Commission, Washington 25, D. C.)

Once he is assured of acceptance in the school of his choice, the graduate—both boys and girls are eligible—applies to his local Civil Service office to take a four-hour competitive qualifying examination. Those who qualify receive a Civil Service appointment in an Army research laboratory nearest their school or home.

In the Northeast, the Quartermaster test center at Natick, Mass., and Fort Monmouth are the principal co-op centers. In the Southeast, it is Redstone Arsenal, Huntsville, Ala., home of the Jupiter missile and

the Explorer satellite. A total of 137 co-op students are participating in the program at the White Sands Missile Range, New Mex. Several other important Army test centers are in the program.

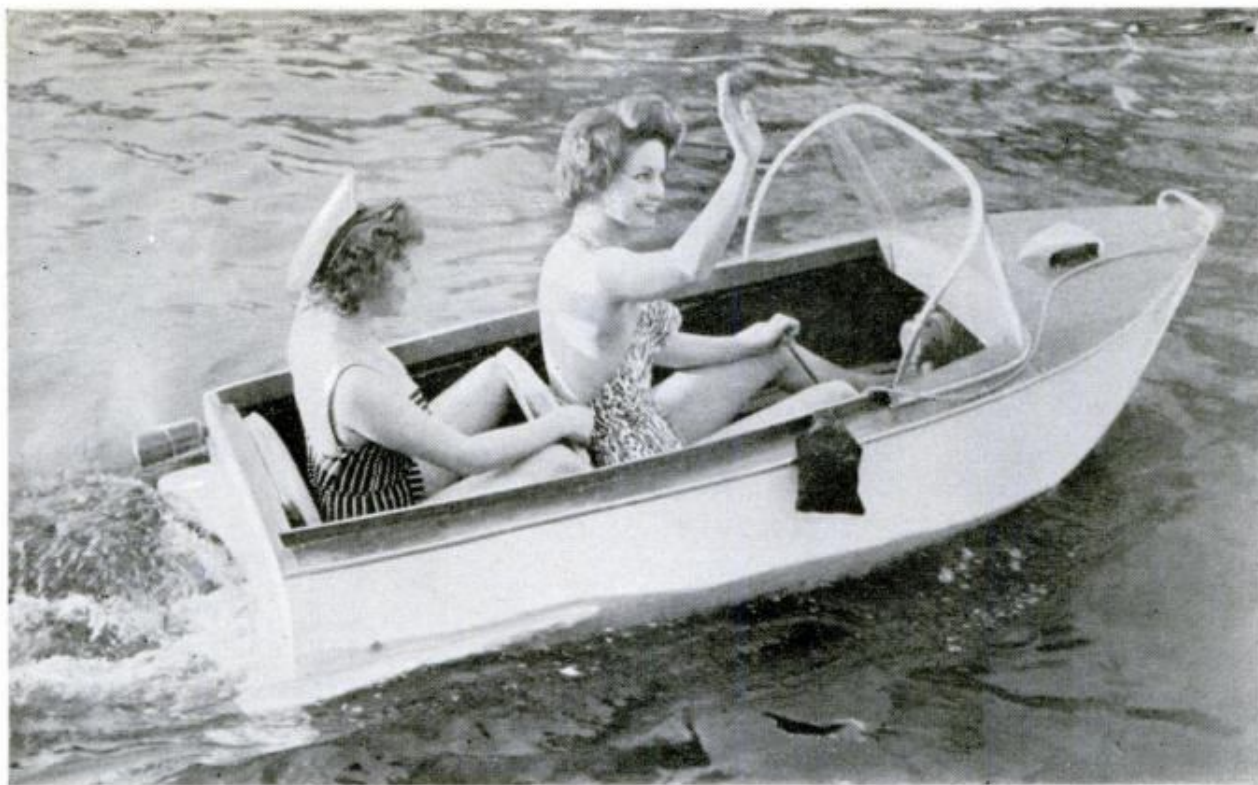
Length of time required to be spent "on campus" before entering the laboratory phase of the program varies according to the school. Drexel, for example, requires the co-op student to spend his full freshman year—nine months—on campus. Where a considerable on-campus period is required, the student must be able to pay initial tuition and living expenses. His Civil Service pay does not start until he is on the job.

Once he does report for work in his Army job, the co-op student starts with routine laboratory chores and works up to greater responsibilities as his training and ability warrant. He works under the men who are working out America's destiny with space.

(Continued to page 222)



Joe Hendrix, a junior engineering student at Alabama Polytechnic Institute, assists in guidance-equipment test at Redstone



Down to the Sea in Sidecars

Mobility over land and water hits a new high in a British boat that doubles as a motorcycle sidecar. Called the Canterbury Belle, it carries two passengers, raising the motorcycle's capacity to four persons for road travel. Detachable in a few seconds, the 168-pound sidecar can be lifted into the water or launched from its bracket as from a boat trailer. The two-cycle inboard engine is installed in the bow, under the foredeck, and drives the little runabout at 11 knots (about 12½ miles an hour) with two aboard. The rudder is controlled by a "joystick"—the driver moves the lever forward to turn right, pulls back to turn left.



Dolly Carries Spray Tank

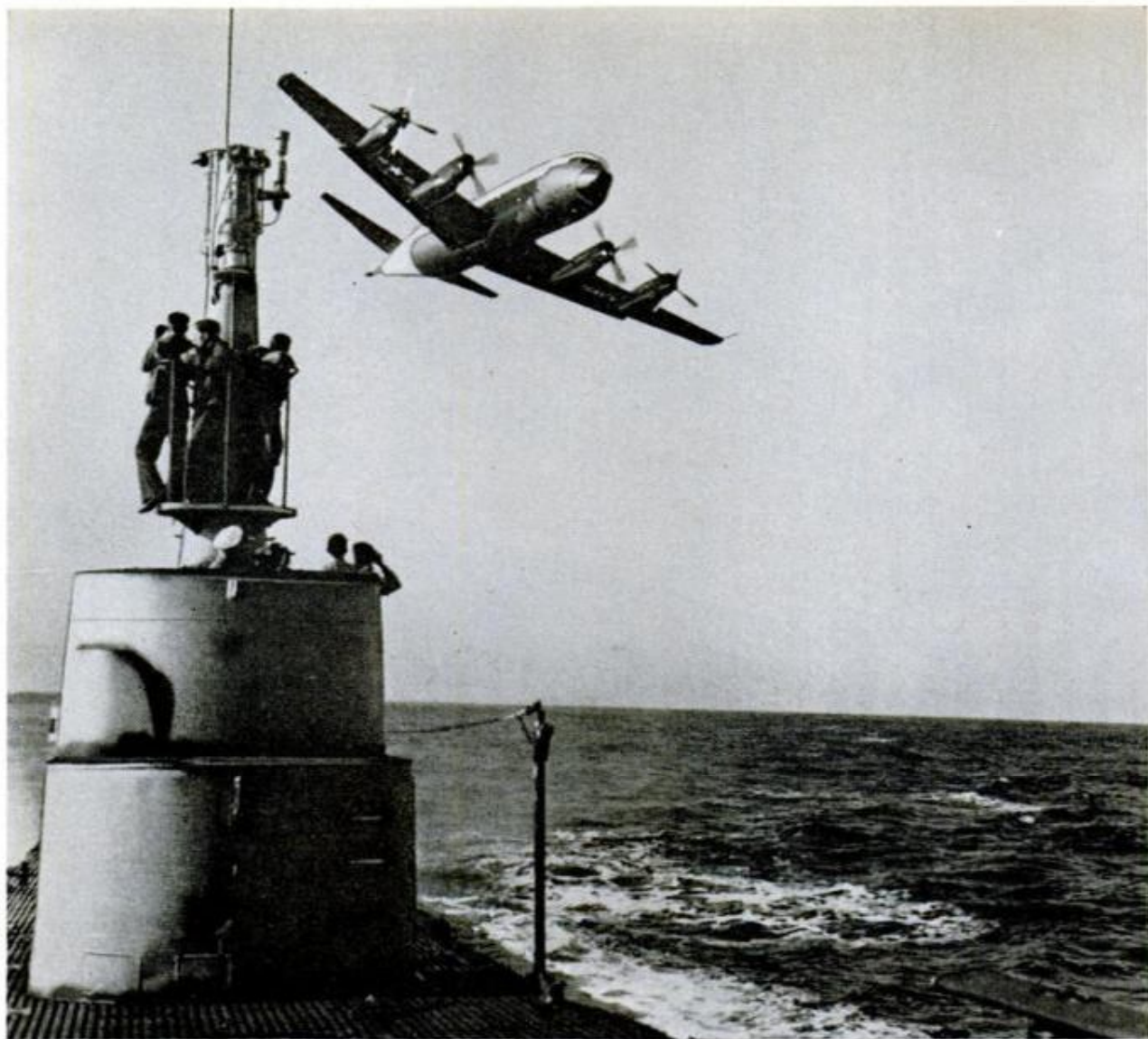
Easing the job of toting a heavy compression sprayer around the lawn or garden, a new dolly puts wheels under any standard 6½ to 8-inch tank so it can be pulled or pushed along as you work. Attachment is simple—a curved bottom plate fits the bottom edge of the tank, and a cadmium-plated steel spring clips securely around the top. The handle adjusts to any height.

QUOTE:

"Human volunteers have lived on irradiated foods for weeks at a time with no ill effects. There is no reason or statistically valid evidence to believe that radiation-preserved foods are less wholesome than cooked ones."

—DR. PAUL C. AERBERSOLD
U.S. Atomic Energy Commission





Antisubmarine Plane Developed From Electra

Lockheed's P3V-1, the latest plane to be used by the Navy to search out submarines, will sometimes fly on only two of its jet-prop engines to extend range and

fuel on long search missions. Booming along on all four, the plane which was developed from the civilian Electra, will cruise at more than 400 miles per hour.



Camera Accessory Serves as Eyeglass

Photographers who wear glasses may take them off when they take pictures with one 35-mm. single-lens reflex camera. The Minneapolis-Honeywell Regulator Co., whose Heiland Division distributes the Pentax camera, now supplies an eyepiece accessory that is fitted to the owner's own optical prescription. It clips onto the camera's regular eyepiece. This enables the user to dispense with his eyeglasses when making pictures and still have the correction he needs. The accessory is similar in appearance to a small lens shade. Buyers may turn their prescription over to their photo dealer, who will have it ground at the manufacturer's shop, or they may have their own optician grind the glass.

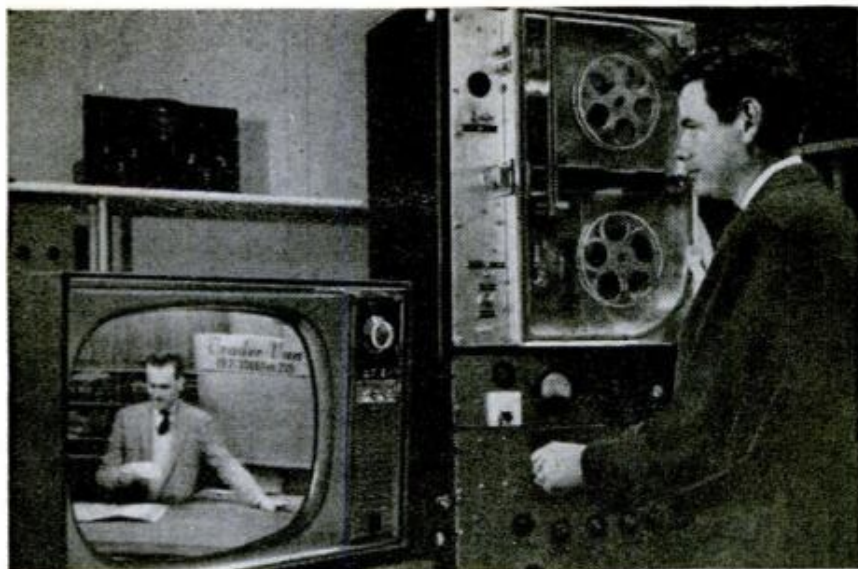
Recording System Works on "Wrinkles"

Thermoplastic recording, a new video recording system developed by Dr. William E. Glenn of the General Electric Research Laboratory, will combine the processing speed and versatility of magnetic recording with the storage capacity of photography, and will offer some advantages over both those systems, according to the manufacturer. The recorder transforms a television image into a series of minute patterns on a plastic-coated transparent tape. To project the recorded transmission, a special optical system passes light through the wrinkle patterns, and the original image is played back. Thermoplastic recording can concentrate 100 times as much information in a given space as can magnetic recording; this method could record all 24 volumes of the Encyclopedia Britannica on a reel the size of a spool of thread—and take only a minute for each volume.

Bike Built for One Rides Man and Dog

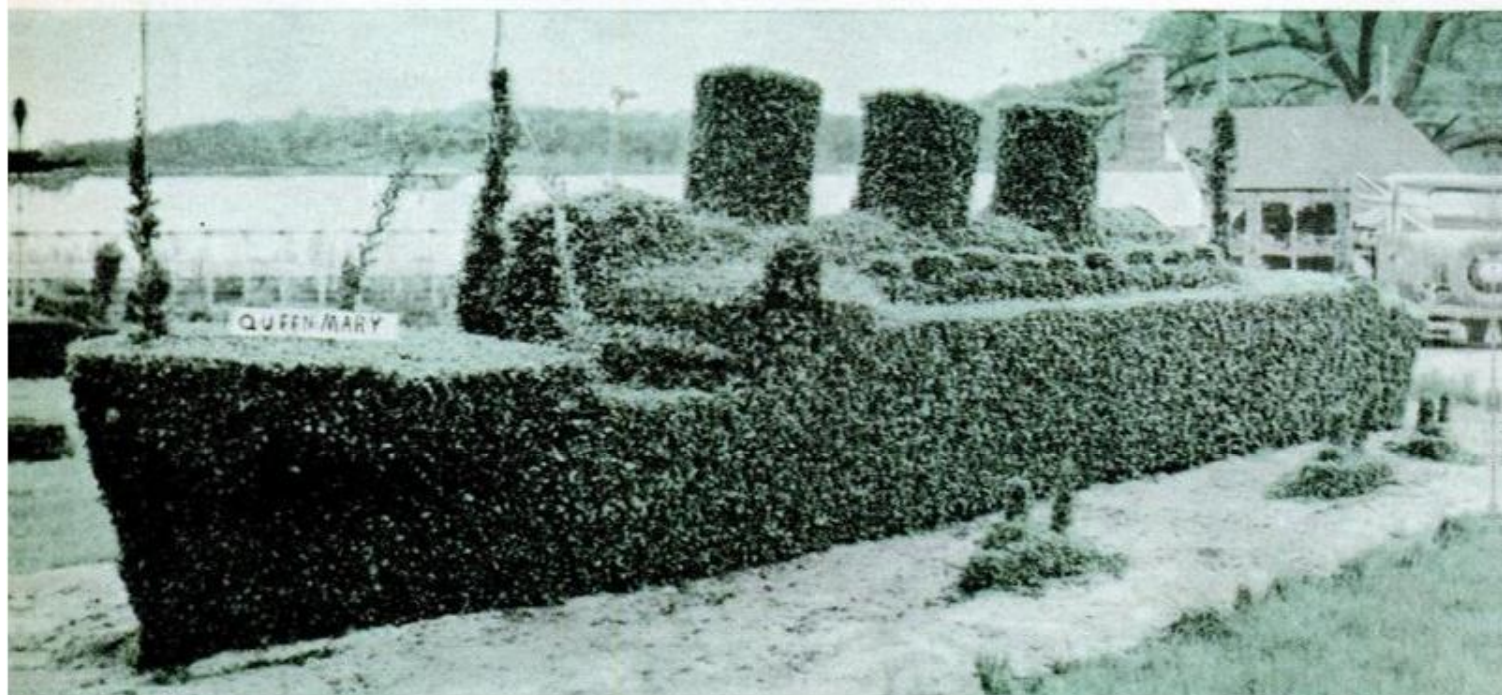
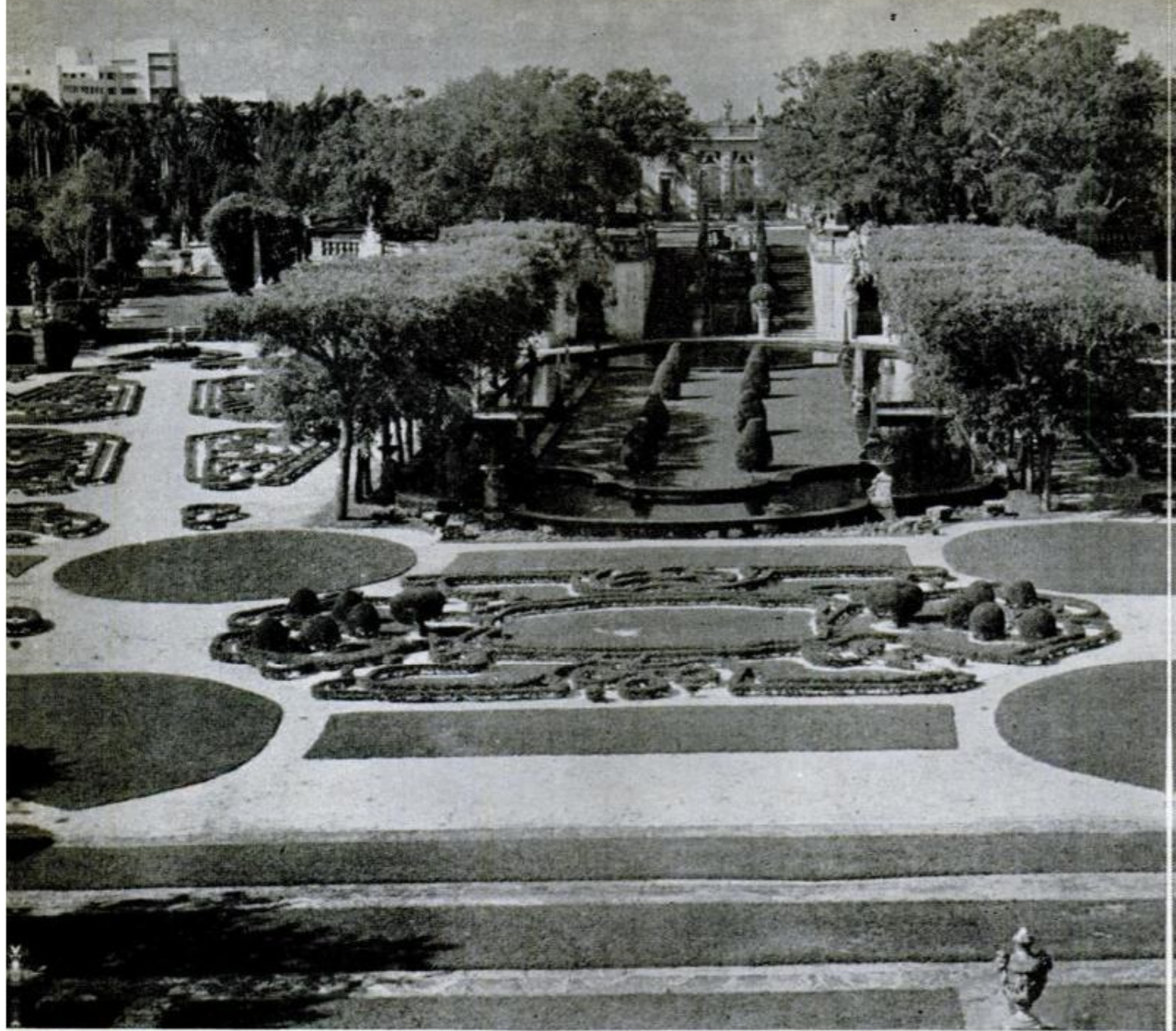
Passengers taking a morning constitutional stroll around the deck of the ocean-liner *Queen Mary* recently were startled to see a man and dog riding at full tilt toward them on a 12-inch high bicycle. Though the sight was strange, the explanation was simple: the man was a trick-riding circus clown; the dog was his partner in an act they were practicing to introduce in the U.S.

☐ An electronic machine that counts 6000 pills per minute is being produced in England.



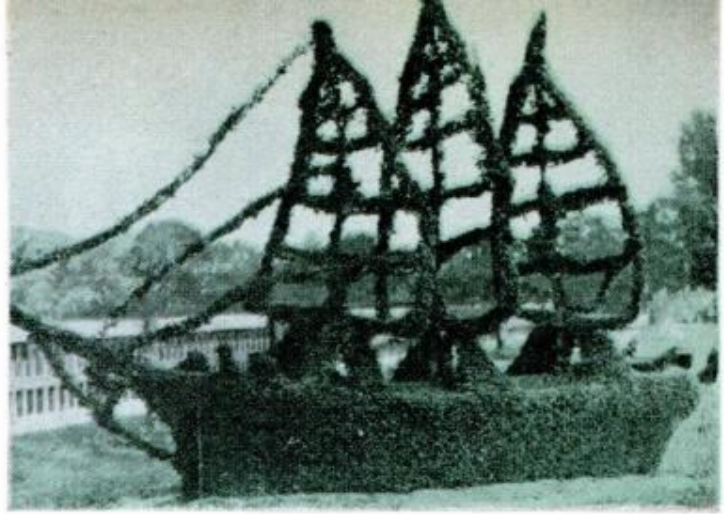
Above, Dr. Glenn uses his new thermoplastic system to record TV signal. Below, image reproduced from plastic instantaneously, without processing







Formal gardens at Vizcaya, a public park in Miami, show the Italian style of topiary. Sand patterns accent carved shrubs



Cutty Sark, a clipper ship, emerged after 22 years of work

By *Charles V. Mathis*

THE LATEST NEWS from the field of landscape gardening is that the ancient art of topiary is back in style. In the United States, exhibits of trees and shrubs that have been trained into odd and ornamental shapes are open to the public in Los Angeles, Calif., Williamsburg, Va., and Miami, Fla.

But one of the most extensive and remarkable gardens belongs to Gus Yearicks, a retired magnesium plant worker, of Wildwood-by-the-Sea, N.J. Singlehandedly, he has carved more than 175 statues, creating, incidentally, one of the

Queen Mary, left, grows in the garden of Gus Yearicks, at Wildwood-by-the-Sea, N. J. He spent 17 years pruning ship into shape



Yearicks, right, trims the hedge hat of a bicycle rider who peddles nowhere in garden visited by thousands of tourists



Jersey Cape's biggest tourist attractions. Tens of thousands of people visit his garden each year to see such spectacular exhibits as a full-rigged clipper ship, the *Cutty Sark*. This required 22 years of patient effort to bring to its final form.

While nothing attracts so much attention among garden displays as does topiary, the fashioning of figures and geometric designs is neither prohibitively difficult nor expensive. Yearicks, for example, is a man of modest means. He created his hedge garden as a hobby in the square acre of his own yard. There are two traits essential to the practice of topiary, however. These are patience and a willingness to spend time. A branch must be trained in just the right way—trimmed here and let grow there—and possibly tied and wired a bit to force the proper growth at the right

place. It takes a steady hand and a keen eye to clip and shear in just the right way and place.

Yearicks feels that assessing the potentialities of a hedge plant is perhaps the most difficult aspect of the art. For his garden he uses ordinary privet hedge, although beech, hornbeam and hawthorn also may be used for the larger forms. He waits to see what lines the hedge develops along and is dictated to by the hedge as to what he will form.

To make shapes in the early stages, he usually employs wire patterns and ties the appropriate twigs firmly in place. From then on, it is a matter of careful and gentle persuasion with the aid of bits of stick and wire, plus well-considered clipping and pruning. Privet hedge naturally requires frequent pruning and clipping so that the



Privet hedge serves as roadway for six horses and stagecoach, left, in Gus Yearicks' garden

Shrub team of ballplayers dominates one section of the square acre of topiary art on display



Setting hen, in square on the opposite page, ruffles green feathers in the restored colonial gardens at Williamsburg

Topiary accents, such as the carved tree at left, are prevalent at Williamsburg—just as they were in 18th century gardens

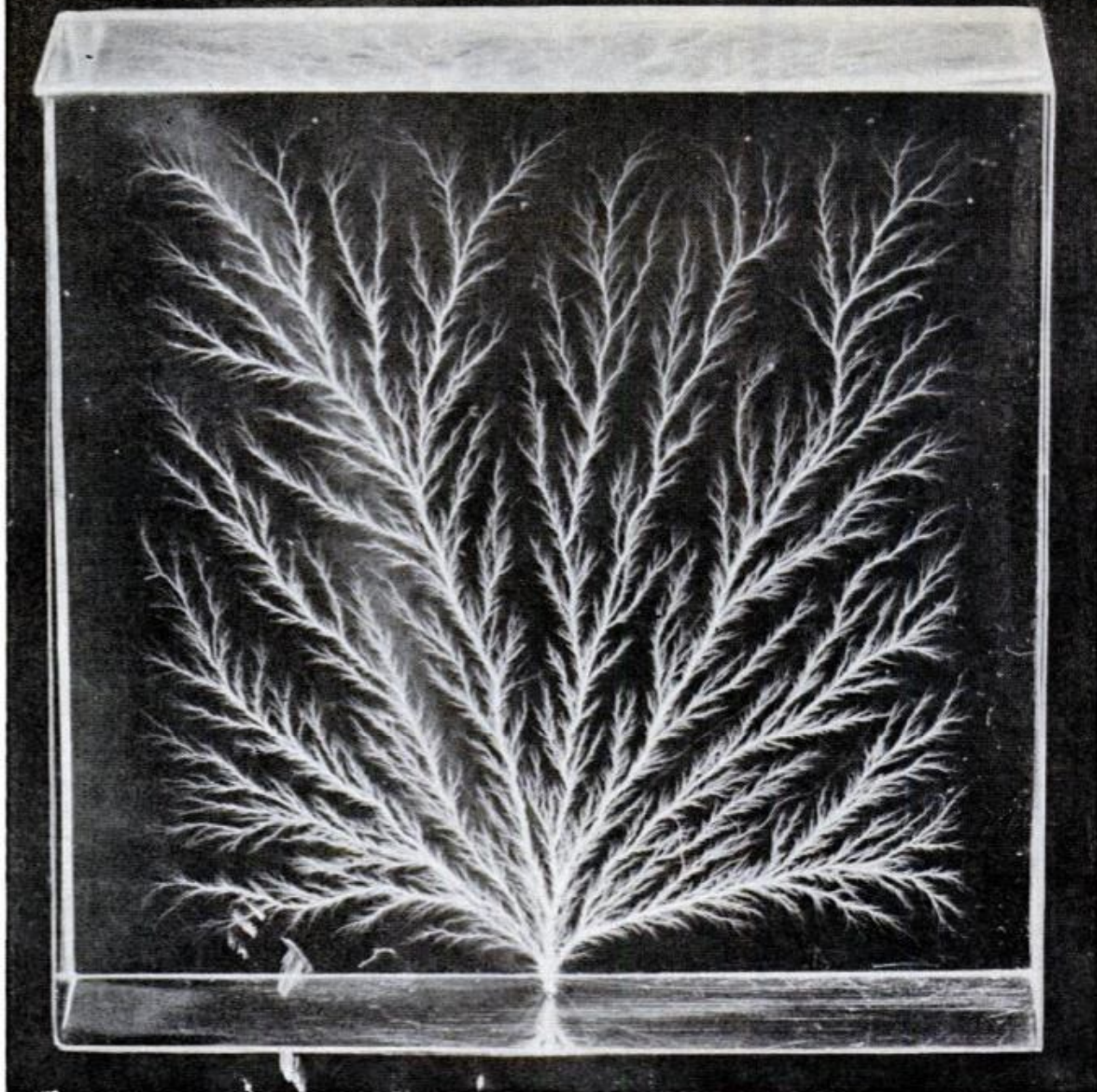
Yoshio Osaki molds cypress and eugenia plants into animal forms. He sells his tubbed creations along a Los Angeles road

statues do not become too ragged. In addition to thin wires, Yearicks also uses a few light bamboo rods to complete the hedge training. Sailing ships are represented as the most difficult evergreen statues to make, but he has, without undue difficulty, created three—the *Cutty Sark*, a replica of the *Queen Mary* and a smaller sailing ship. While topiary is not mastered in a single season, simple shapes can be completed in a season or two by the average home gardener.

The secret of effectiveness with any kind of clipped work is that the statue have compactness and apparent solidity. Training should start when plants are small. For hedges, begin with closely-spaced lines of small material cut back and sheared severely at pruning time. Each year's growth must be held back by hard pruning to force heavy twig growth which will give compact foliage. The first severe pruning is done in

(Continued to page 226)

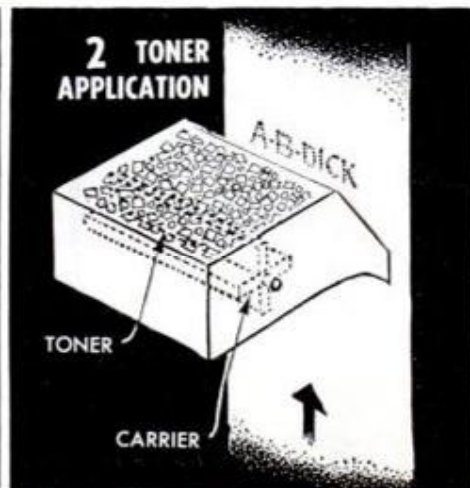
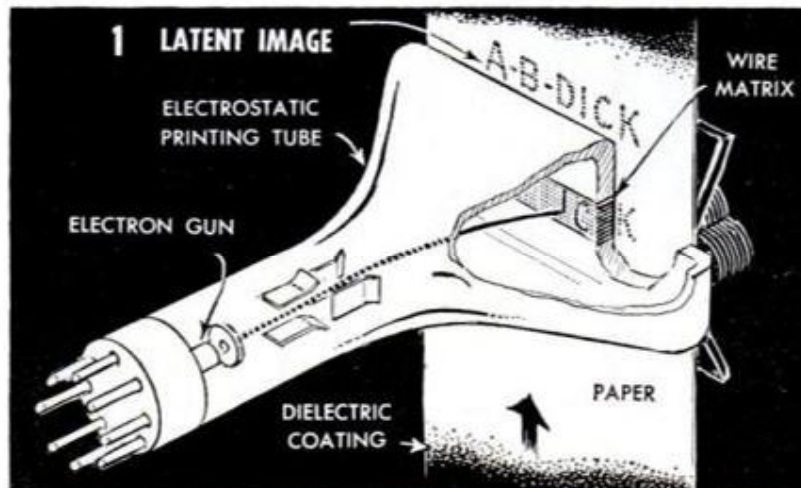




Even Lightning Comes Packaged in Plastic

Which way does lightning travel? Navy researchers, studying atmospheric electricity, create lightning to see if it flashes outward from the bolt or inward toward it. By charging a plastic block with high-

velocity electron beam and touching it with a metal object, scientists create a phenomenon similar to natural lightning—which is “frozen” in the plastic. Slow-motion movies are taken for closer study later.

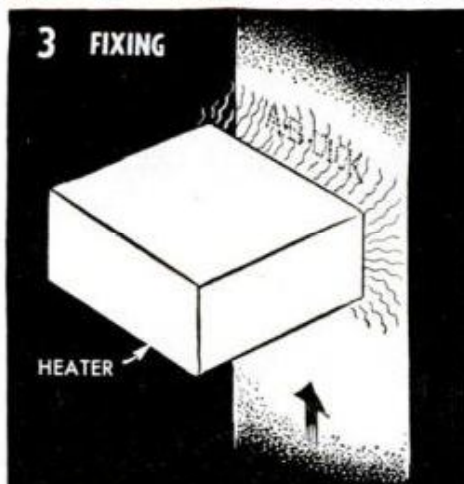




Trailer Provides Shelter, Boat, and Storage

Combining a camping trailer, fishing boat, and enclosed carrier, a new vacation package sleeps two in the base section, floats two in the top section, a sturdy dinghy, and is easily convertible to a 300-

pound utility trailer. The matched halves are molded of glass-fiber reinforced plastic with built-in trailer hitch and torsion-bar suspension, taillights, and boat hardware. Travel weight is around 600 pounds.



Electronic Process Translates Codes

Complicated data from high-speed computers can be translated and printed at the rate of 20,000 characters a second through an electronic printing process that converts pulse-coded electrical signals directly into printed words. Brain of the system, developed by A. B. Dick Company, is an electronic character generator that translates the pulse language of a computer into television-type signals. These signals a television receiver to convert the video signals into print. When units are connected by microwave link, are fed into an electrostatic printing tube similar to facsimile copies of graphic source material can be reproduced remotely almost instantaneously.

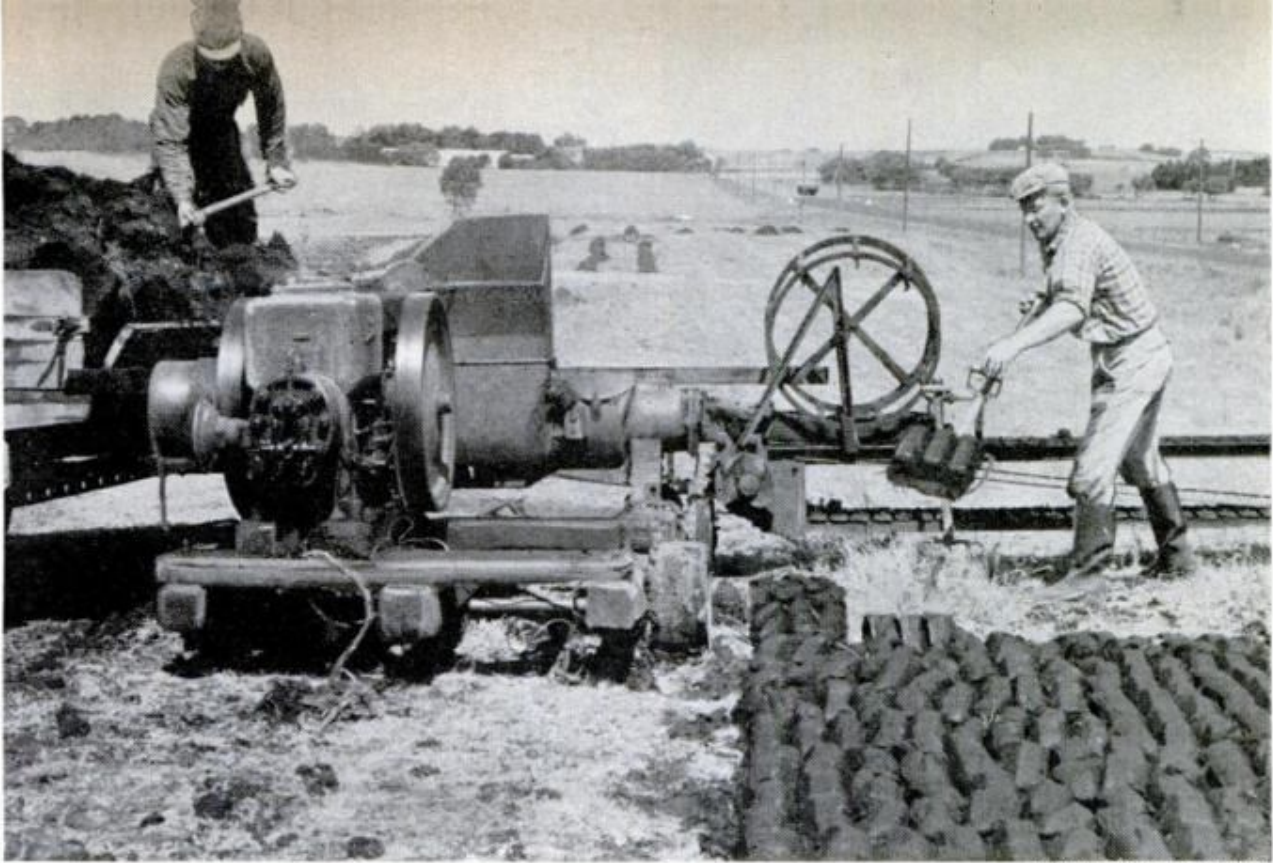


Richard Harrington photo

An Irish farmer and his sons stack dry turf into a rick at the cutting edge of their section of a peat bog

Peat for the Lamps of Ireland

By *Lyn Harrington*



Richard Harrington photo

In Denmark (shown) as in Ireland, peat is put through macerating machine that extrudes sod onto conveyor



Irish Peat Board photo

Forty-foot aluminum blade on ridger pushes dry milled peat into ridges for collection by the harvester

THE FLICKERING MARSH LIGHTS that terrified early man now burn steadily in Irish light bulbs. The gaseous bogs provide peat to generate 29 percent of Ireland's electricity.

In 1946 the Irish Peat Board (Bord na Mona) was established to carry out plans its predecessor, the Turf Development Board, outlined after successful experiments in large-scale peat harvesting. Some \$57 million has been poured into research, development of machinery and markets and housing to achieve an output of four million tons of peat annually.

At present, some 7000 men are employed by the Peat Board, and when the bogs are in full production the figure will rise to 9000.

Total peat production is raised to about

five million tons a year by farmers who cut their own sections of bog close to home.

Ireland uses "milled" peat (as dust or briquetted) and the traditional sod peat (hand-won or machine-harvested).

One-fifth of Ireland is peat bog, a six-foot blanket in mountain hollows and up to 20 feet deep in the great interior plains. Ireland's dish-shaped contour is responsible for the immense bogs, since water drained into the center. Trees, ferns and mosses grew and died, to be overlaid with water that regulated their decay. Lacking pressure, this vegetation didn't quite turn to coal, which has more than twice the heating quality of peat. Ireland has a few small deposits of anthracite coal, but all bituminous coal is imported from England.

"Hand-won" peat sod is cut by farmers



Richard Harrington photo

Lorry dumps load of hand-won peat at West Kerry generating plant where it helps produce electricity

in communal bogs, where the ground is as resilient as foam rubber. The digger cuts the face of the bog where he left off last year, using an ancient-type slane, a narrow-bladed spade. To produce a brick-sized turf two pounds in weight, the digger cuts a sod weighing around 20 pounds, for the peat is 95 percent water.

Some peat is actually mud. As of old, the women shape it into bricks by hand, but small machinery is coming into wider use. The wet peat is dug or scooped out, fed into a macerating machine which extrudes the wet peat in a slick continuous strip. This is automatically cut to turf size and carried forward on a continuous belt to a helper who lays the turfs on the ground to dry.

Even with Ireland's low wage-scale, hand cutting and turning are vastly more expensive than mechanical harvesting. Large and complicated machinery has been devised for use in the big central bogs. The machines require especially wide treads, for the quaking bogs slowly swallow any stationary object.

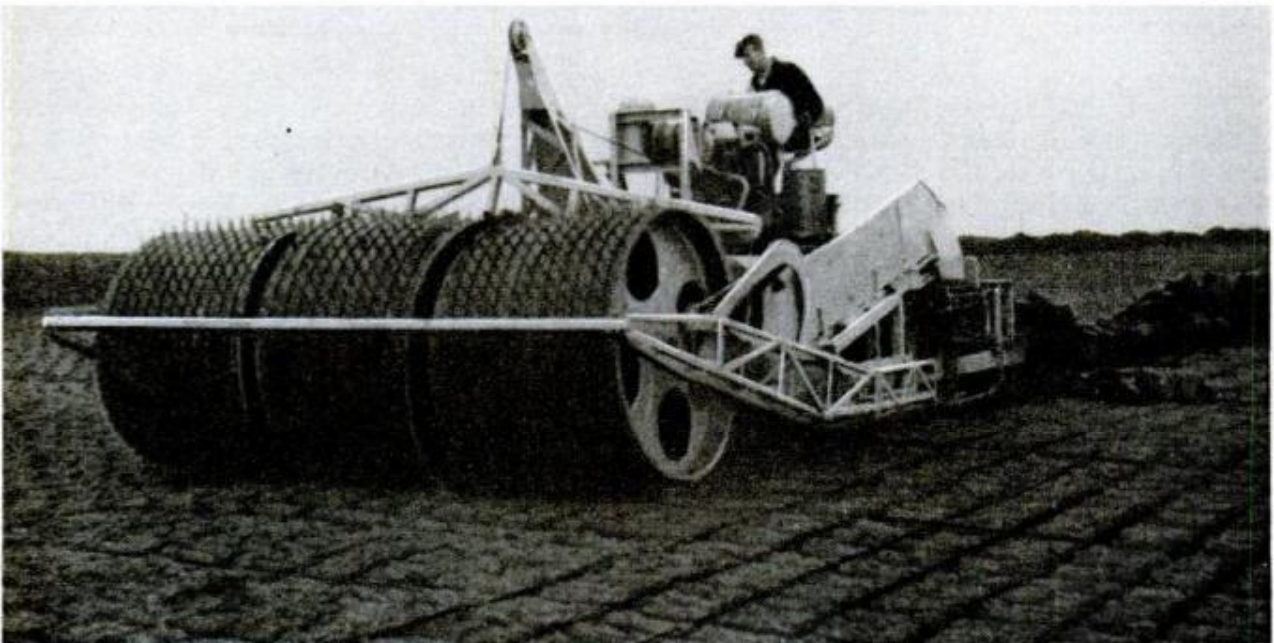
The first step is to drain the bogs, using ditching machinery on tracks and rollers. Trenches are cut so that the following year the bog is dry enough for the next operation. Then the peat is stripped of a mat of heather, moss and tough grass, which is ground up and blown into the excavation, eventually to become humus. Well-drained areas from which the peat is cut are con-

[\(Continued on page 216\)](#)



Extruded peat, left, is cut to size by row of disks. Below, latest improvement in mechanization, the sod peat windrower, picks up drying peat on pins and feeds it into a chute that delivers windrows at rear

Irish Peat Board photos





Plastic Pool Withstands Winter Temperatures

Demonstrated at the 1960 International Spring Fair in Frankfurt, Germany, a new do-it-yourself plastic swimming pool can be installed anywhere that a suitable hole can be dug. It can be left in place the year around, since the plastic will withstand the coldest weather. Intended for four-foot depth, the pool plastic is available in any size. The apron is concrete block.

Mighty Big Bite

Largest mobile land machine ever built—more than twice the size of any shovel in operation. That's the claim made for a mammoth stripping shovel being built by the Bucyrus-Erie Company for a strip coal-mining company. Towering 210 feet tall and weighing 7000 tons, it will be able to pick up 173 tons of material, dump it 464 feet away from the digging site, and swing back for another bite—all in 50 seconds. The shovel will be used to remove overburden, the earth covering near surface coal deposits, and will uncover more than twice its weight in coal—*daily*. Some other statistics: 52 electric motors totalling 12,000 horsepower; one-man operation from an air-conditioned "office"; 4000-gallon hydraulic system.





REMOTE CONTROLS for a new group of room air conditioners allow temperature adjustments to be made from bedside should the weather suddenly change. The panel enables the user to control heating and cooling temperatures, direction and volume of air, and exhaust. Because the thermostat is in the control panel, temperatures are set according to conditions prevailing in the room, rather than near conditioner

Whirlpool Corp., St. Joseph, Mich.

WHAT'S NEW FOR Your Home



ELECTRIC-POWERED grass cutter is designed for cutting under fences and trimming flush to trees and walls. A built-in safety feature prevents the scissor-action, self-sharpening blades from throwing stones or dirt. Should an obstacle get caught between the blades, a slip clutch prevents damage to the tool. Cutting a six-inch swath, the power tool can be used above ground to shape shrubs, evergreens

Skil Corp., 5033 Elston Ave., Chicago 30, Ill.

DOORBELL for dogs operates without need of wiring or batteries. It attaches to the door frame with two screws and is activated when the dog presses his paw against a wide pedal. The manufacturer says most dogs can be quickly trained to use it

Love Sales Co.,
1807 Church St., Nashville 3, Tenn.

NOZZLE for garden hose is operated by a thumb control. In a single half-turn, the spray is quickly changed from fine mist to a jet stream. Made of rustproof metal and brass, the nozzle locks into desired position automatically; it does not use springs or locknuts

SKIL Corp.,
5033 Elston Ave., Chicago 30, Ill.

LAUNDRY RACK for drip-drying while traveling takes up little room in a packed suitcase. Unfolded, it provides 7½ feet of drying area on five rods each 18 inches long. End pieces may easily be hooked onto towel racks or shower frames. It's completely coated with plastic

Hayes Products,
800 N. Clark St., Chicago, Ill.





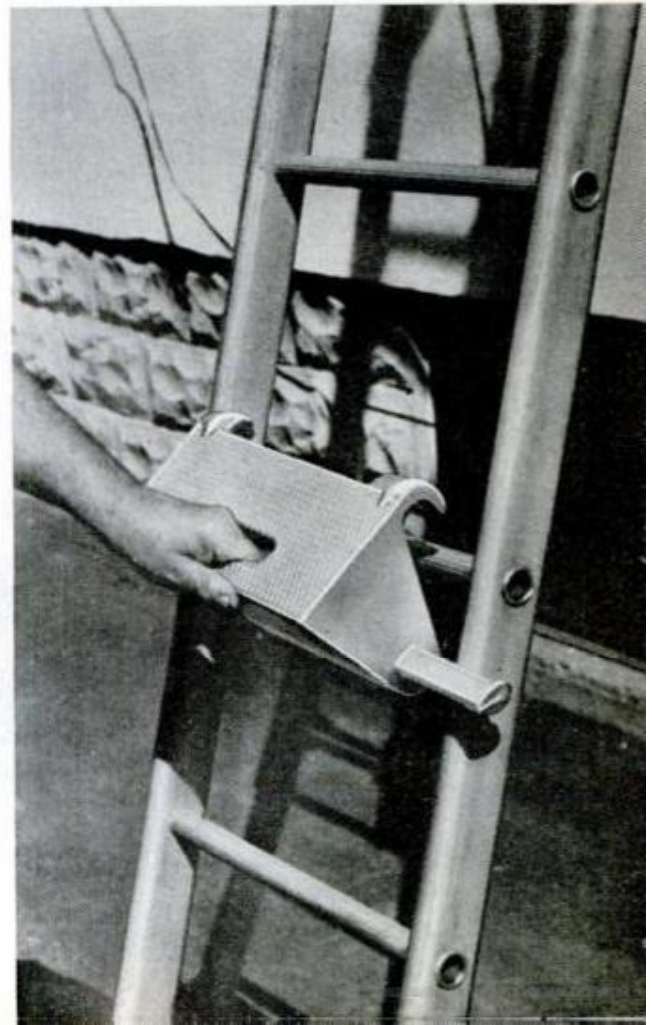
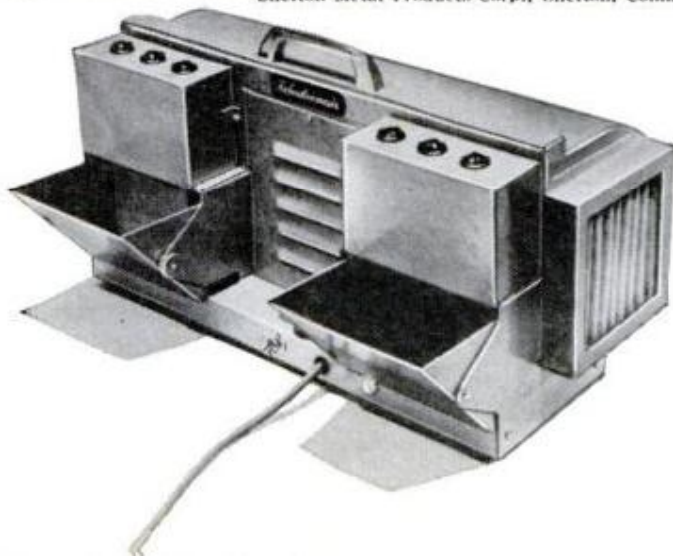
ROOM COOLER equipped with an ultraviolet, germ-killing lamp purifies air in three ways: The germicidal lamp destroys air-borne bacteria; the cooling filter removes dust, lint and pollen; and an activated carbon filter can be attached to remove odors. The cooler reduces temperatures by drawing air through filters saturated with water by a built-in pump. As this water slowly evaporates, it removes heat from air
 Metalaire Products Co., 560 S. 15th Street, P. O. Box 468, Phoenix, Ariz.

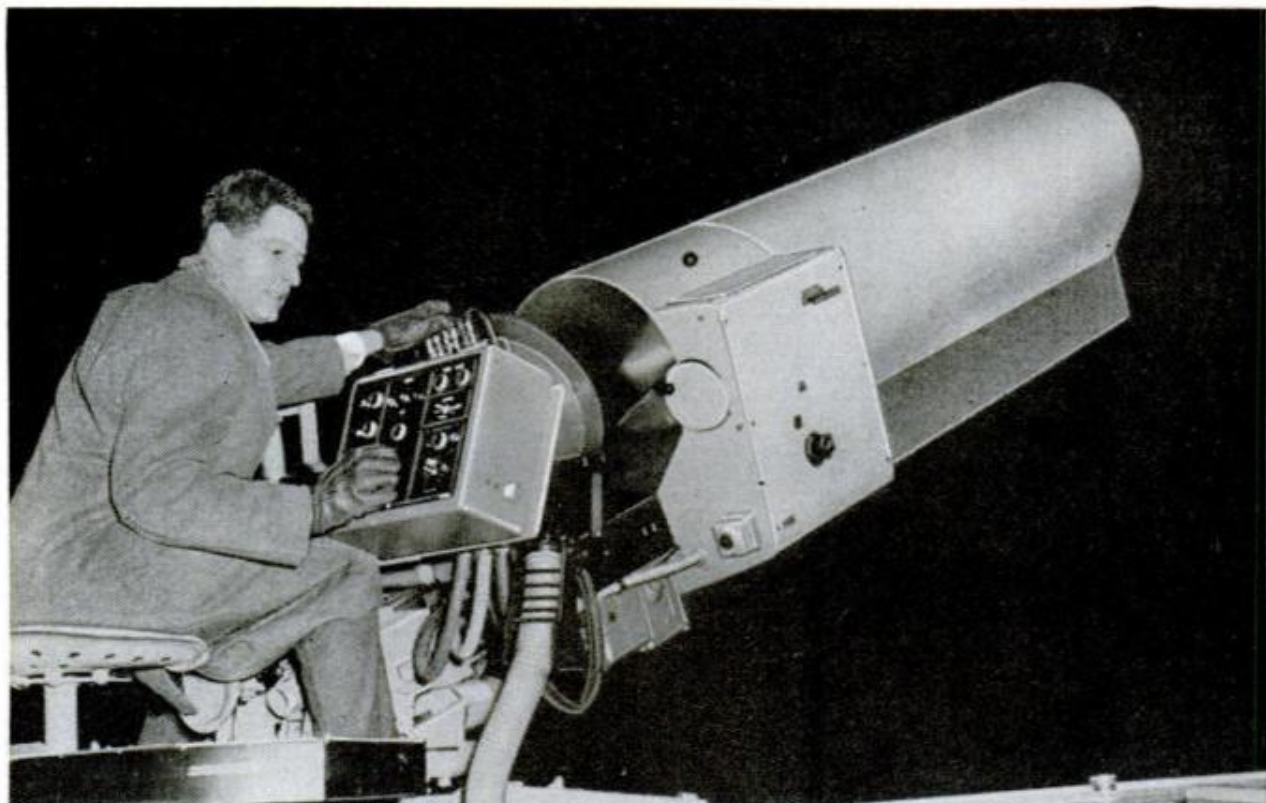


WALL CLEANER made of plastic holds a half-pint of household cleaner in its handle. One handful is enough to clean 110 square feet of hard-surfaced material. The fluid is pumped into the head, which is five inches in diameter and consists of a sponge inside a circular brush. Sponge is replaceable
 E. R. Wagner Manufacturing Co.,
 4611 N. 32nd St., Milwaukee 9, Wis.

LADDER PLATFORM—a shaped aluminum casting with a deep, diamond foot tread—hooks onto any rung of a standard ladder. It converts the rung into a broad step, giving the user a safe foot rest. A pair of hooks extend forward from the step's surface. These hook over the rung and hold fast. The step is held firmly by two rods which extend out to rest on the ladder's uprights. The platform eases strain of long periods on ladder
 Utility Tool and Body Co., Inc., Clintonville, Wis.

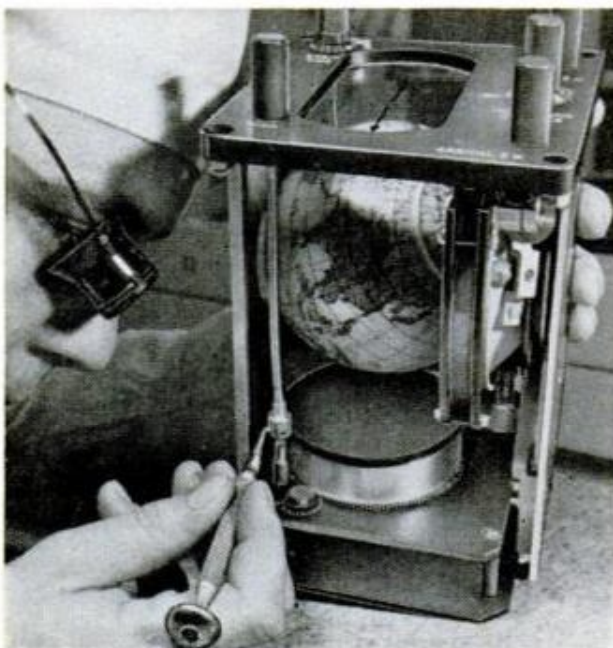
AIR PURIFIER designed to help allergy, sinus and pollen asthma sufferers strains particles as small as $39/1,000,000$ of an inch from the air. Cleaning capacity comes from the flow power it develops and from six germicidal, ultraviolet lamps. Air velocity through the machine is 2000 feet per minute and the lamps kill bacteria as high-velocity air moves through twin filters. The filters may be removed for washing
 Shelton Metal Products Corp., Shelton, Conn.





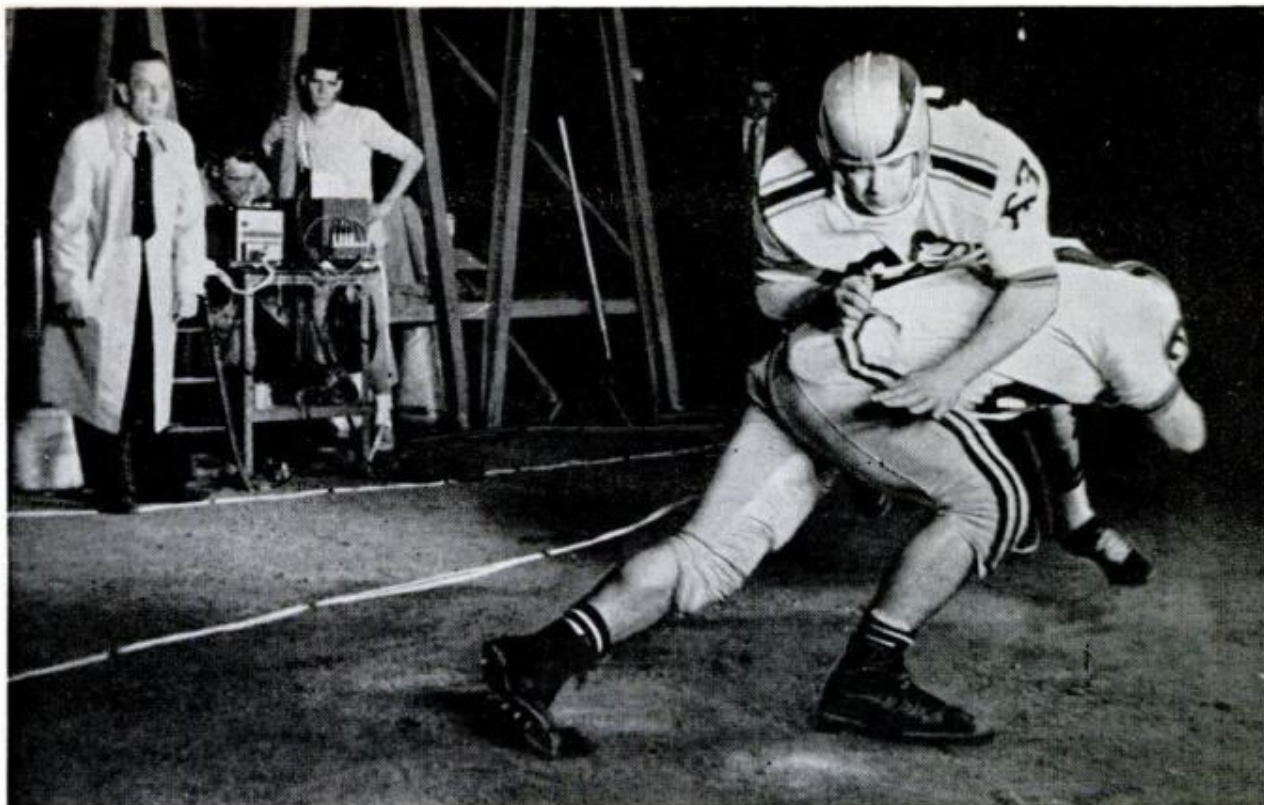
No Hiding Place Down Here

Ultimate medium for spectacular outdoor advertising may be here with a Swiss invention, the "Skyjector," a mobile projection device which will project a message or picture onto any large surface, including clouds, buildings, and mountainsides. Capable of enlarging a slide 72 million times, it will produce an image 1000 yards across at a range of five miles. The 92 million candlepower light source is the equivalent of 60 to 80 searchlights. It generates temperatures up to 2000 degrees inside the projector, and requires its own air-and-water cooling system.



Astronauts Get a World to View

When the first astronaut, sealed from the universe in a space capsule, orbits Earth at 18,000 miles an hour, he will get his bearings from an unusual compass. The device is a revolving globe of the world and is called an Earth Path Indicator. Space engineers of the Minneapolis-Honeywell Regulator Co. who developed the instrument for Project Mercury said the astronaut will view the slowly revolving globe through a window in the top of the instrument and get the same impression as if he were actually seeing the world below him through a window in the capsule. The compass will tell him where he is in relation to the countries, oceans and cities of Earth. This information is of critical importance when he fires the rocket for the return to Earth.



How Many G's?

Football line play bears little resemblance to space medicine, but Joe Romig and Ken Vardell, two husky guards from the University of Colorado team, crashed together full tilt several times last spring while engineers from the Stanley Aviation Company recorded the shocks to their bodies. Air Force criteria for ejection equipment calls for shocks under 15-G, but the two collegians generated shocks from 55 to 70-G in their collisions, indicating that the average flier should be able to withstand at least 30.



Garage in the Attic

Faced with a real "problem lot" but determined to build in an area overlooking the Worcestershire countryside despite a sharp slope, a British family managed by simply building the home upside down. To gain access to their 2½-story home, they built the garage on the top level, with a bridge driveway leading to the road. Beneath the garage (and the road level), it's a contemporary story-and-a-half L-shaped home, sheltered by trees on both sides and the slope on the north to form a natural suntrap.



RAILROAD QUIZ

By Samuel Cabot, Jr.

HERE ARE 20 QUESTIONS that will test your standing as a railroad buff. Circle the answers that you think are correct; then look to facing page and see how you fared. Anything over 12 correct is good; over 16, excellent, and a perfect score should entitle you to a lifetime pass on the Belfast & Moosehead Lake. All aboard!

1. A **hotbox** is:
 - a. A freight car loaded with explosives.
 - b. An overheated journal bearing.
 - c. A wildcat strike.
 - d. A device for thawing frozen switches.
2. Only one of the following four railroads reaches the **Pacific**. Which one?
 - a. The Quanah, Acme & Pacific.
 - b. The Missouri Pacific.
 - c. The Chicago, Rock Island & Pacific.
 - d. The Chicago, Milwaukee, St. Paul & Pacific.
3. The correct name of the railroad nicknamed the **Nickel Plate** and using the initials NKP is the:
 - a. New York, Chicago & St. Louis.
 - b. Niles, Kalamazoo & Petoskey.
 - c. Nashville, Knoxville & Piedmont.
 - d. Erie.
4. When railroaders use the word **mogul**, they mean:
 - a. A railroad magnate, like Commodore Vanderbilt, the "Grand Mogul" of the New York Central.
 - b. A large rotary snowplow.
 - c. A railroad worker of Chinese ancestry.
 - d. A type of locomotive.
5. Which of the following is **not** a railroad?
 - a. Wabash.
 - b. Pere Marquette.
 - c. Central & Southwest.
 - d. Seaboard Air Line.
6. What's the width of **standard-gauge** track?
 - a. 5 feet, 2 inches.
 - b. 4 feet, 8½ inches.
 - c. 6 feet.
 - d. 3 feet, 6 inches.
7. A fine **short story** has a locomotive for its hero. It is:
 - a. ".007" by Rudyard Kipling.
 - b. "Whistle Twice for Ghost Crossing," by Ambrose Bierce.
 - c. "The Flying Switch," by O. Henry.
 - d. "Night Express," by Ernest Hemingway.
8. The **St. Louis & San Francisco** runs from:
 - a. St. Louis to St. Joseph, Mo.
 - b. St. Louis to San Francisco, Calif.
 - c. St. Louis to Pensacola, Fla., and Ft. Worth, Tex.
 - d. St. Louis to Denver, Colo.
9. **Talgo** means:
 - a. The Trackmen's and Line Guards Organization, a railway labor union.
 - b. An articulated train, first used in Spain.
 - c. A female hobo.
 - d. Word for "stop" in the Sioux language, still in use on the Northern Pacific.
10. "Hear the story of **Phoebe Snow**, Who took a trip to Buffalo. Phoebe's gown stays spotless white Upon the Road of Anthracite." What line did Phoebe patronize?
 - a. The Delaware, Lackawanna & Western
 - b. The Lehigh Valley.
 - c. The Erie.
 - d. The New York Central.
11. A **gandy dancer** is:
 - a. An empty gondola car.
 - b. A track layer.
 - c. A brotherhood member delinquent in paying his dues.
 - d. An East Indian laborer.
12. **Fred Harvey** contributed to railway progress by:
 - a. Inventing the double-pin coupling.
 - b. Founding the Pullman Porter's Brotherhood.
 - c. Leading the Rock Island forces in the 1910 struggle for control of the Cotton Belt.
 - d. Organizing a chain of restaurants to serve passengers on the Santa Fe.
13. The Chesapeake and Ohio, under the presidency of the late Robert R. Young, ran a famous **advertisement** that helped to bring about a significant change in passenger service:
 - a. "A hog can cross the continent without changing cars, but you can't."
 - b. "The boy in Upper 4."
 - c. "No recourse for the Iron Horse?"
 - d. "Look down, look down that lonesome road."
14. **Hump** in railway parlance means:
 - a. The Great Divide in the Rocky Mountains.
 - b. A tender carrying extra fuel.

- c. A freight yard in which cars are distributed by gravity.
 d. The Donner Pass in the Sierras.
15. That signaling device with the colored arms at the top of a pole is called a:
 a. Sophomore. c. Cynosure.
 b. Samovar. d. Semaphore.
16. At American Legion conventions, one hears a lot about the antics of a fun-making group called the 40 and 8. Where did they get that name?
 a. The distance in kilometers from Paris to Chateau-Thierry.
 b. A mispronunciation of a French phrase meaning "Clear the track!"
 c. The railway fare in francs from Paris to Brest.
 d. The marking "40 hommes, 8 chevaux" painted on French freight cars used for military transport.
17. The rear car of a freight train is called the:
 a. Calaboose. c. Caboose.
 b. Papoose. d. Doghouse.
18. Demurrage means:
 a. Penalty charged for keeping a freight car overtime.
 b. Amount of time behind schedule.
 c. Refusal of a shipment.
 d. Excess-baggage fee.
19. For a long period during the depression of the 1930s, the only actively traded stock on the New York Stock Exchange selling above 100 was a railroad stock. Which one?
 a. Norfolk & Western.
 b. Southern Pacific.
 c. Bangor & Aroostook.
 d. Kansas City Southern.
20. A unique peculiarity of the Chicago & North Western is the fact that it:
 a. Is the only major railroad still using steam locomotives exclusively.
 b. Pays all its employees stationed west of the Missouri River in silver dollars.
 c. Serves free drinks on its long-haul passenger trains, to compete with the airlines.
 d. Runs its trains on the left-hand track in double-track sections, as in England.

Here are the answers to the 20 questions in the Railroad Quiz.

1. b 2. d. 3. a 4. d
 5. c. Central & Southwest is a utility company.
 6. b. 7. a. 8. c.
 9. b. 10. a. 11. b.
 12. d. 13. a. 14. c.
 15. d. 16. d. 17. c.
 18. a. 19. a. 20. d.

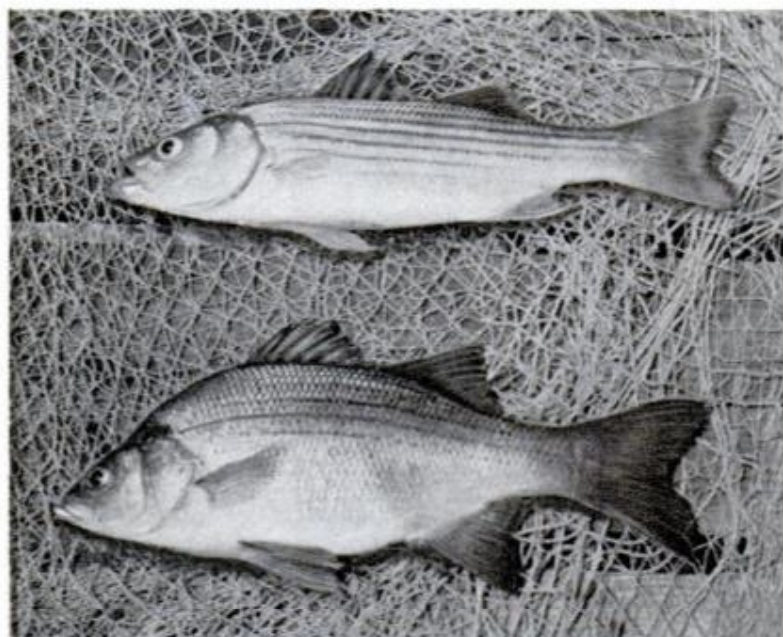


Folding Cart Carries Outdoor Equipment

Almost as good as having someone else to carry the load is a new outdoorsman's carry-all cart. It unfolds from a compact seven-pound bundle, carries anything from a deer to a load of camping equipment over nearly any trail that you can walk over, then folds again in camp to make a comfortable chair. Snap-on joints make it easy to put together but give it an ample 300-pound capacity.



America's Best-Kept



By
Russell Tinsley

Salt-water striped bass, *Roccus saxatilis*, top, and his fresh-water cousin the white bass, *Roccus chrysops*. But the lower fish is an adult; the striper has just begun to grow, and could go to 100 pounds. At right, a fat striper taken from Florida's Apalachicola River below Jim Woodruff Reservoir. Wow!

IN THE DEEP SOUTH there is a unique brand of fishing which may someday revolutionize our favorite outdoor pastime, yet few people outside these states even know such sport exists. It is fresh-water fishing for the salt-water striped bass, the most-sought surf fish on both coasts.

This blue-ribbon sport has been available to natives of Florida, Mississippi and Alabama longer than anyone can remember. Only within the past few years have fishermen in South Carolina been blessed with the same privilege. Someday, if present experiments prove successful, anglers in other states may also get a crack at stripers or some other salt-water game fish—transplanted into fresh water.

Focal points for this striped bass fishing in inland waters are below Jim Woodruff Dam at Chattahoochee, Florida, where big stripers migrate up the Apalachicola River to spawn, and in the Santee-Cooper region of South Carolina where a striped bass population is landlocked in the man-made impoundments of Lake Marion and Lake Moultrie.

Anglers work the swift waters below Jim Woodruff Dam, about 103 miles inland from the Gulf of Mexico in the Florida panhandle, for "jumbo rockfish," as the stripers are known locally. In early spring the bass move upstream to spawn. The concrete span blocks their migration, so they simply mill in the fast tailrace waters. This terrific fishing is perhaps the

best-kept angling secret in this country.

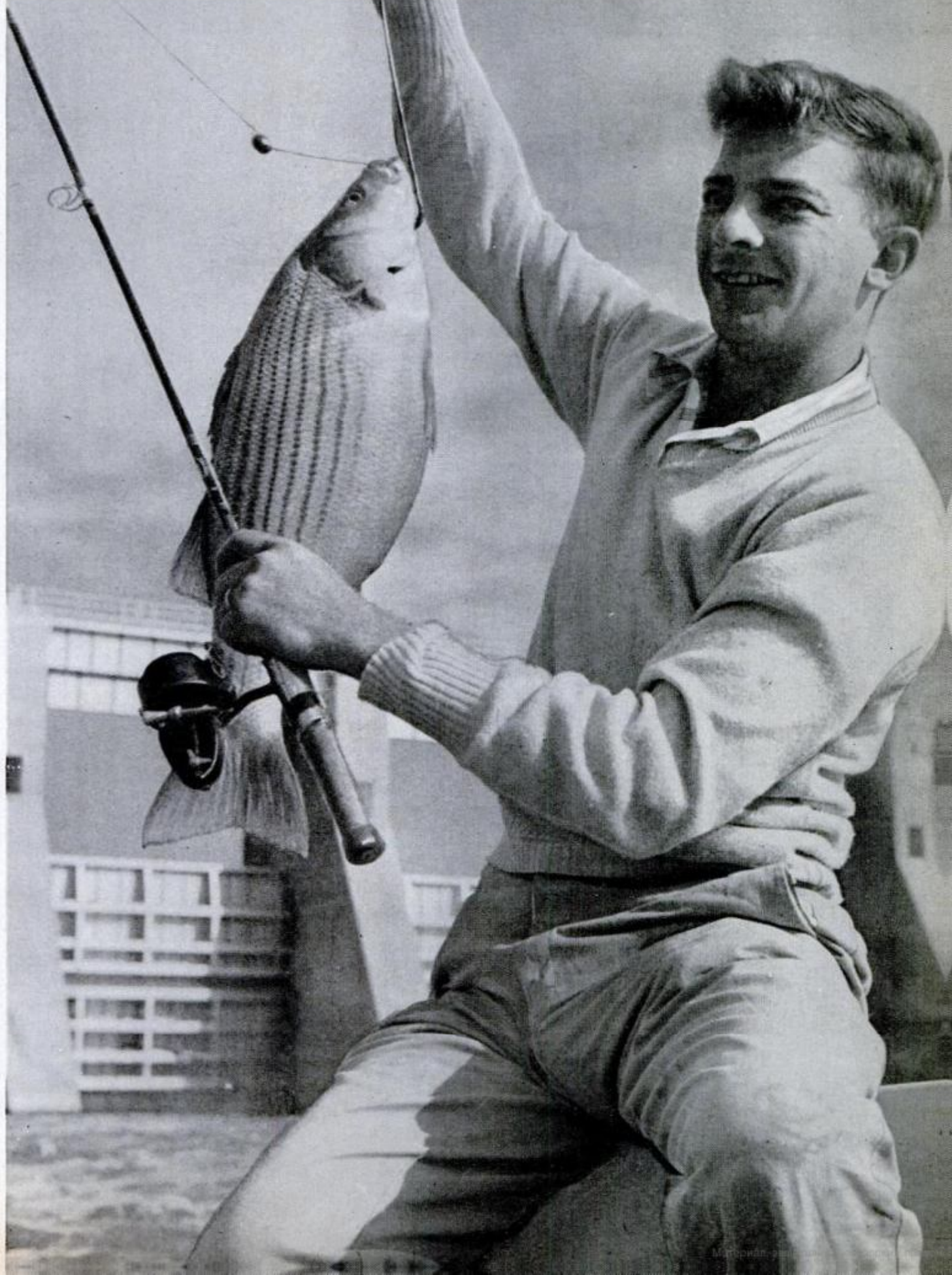
At lakes Marion and Moultrie in South Carolina, creel censuses revealed that 10 percent of the anglers in one year caught 28,000 stripers.

How or why the striped bass originally got into those waters is still a mystery. Although this southern striper is identical to the striped bass found along the Atlantic coast, it is different in that it apparently never returns to the ocean. Only during winter do they drift downstream to the brackish waters of coastal bays.

There are other little-known striper fishing spots in the South Bayou Portage near Pass Christian and the Wolf and Biloxi rivers in Mississippi; the Apalachee, Tensaw and Raft rivers where they flow into Alabama's Mobile Bay; Weeks Bay and Magnolia Springs, also in Alabama; the Intercoastal Waterway between Apalachicola and Panama City in Florida; the lower reaches of the Carrabelle, Crooked, Ochlockonee rivers between the cities of Apalachicola and Tallahassee in Florida; the mouth of the Choctawhatchee River, La Grange Bayou, Garnier Bayou, the mouth of Escambia River and the upper part of Escambia Bay on Florida's Gulf coast for the 100 miles between Panama City and Pensacola.

The striped-bass story of the Deep South implies that some salt-water species can be adapted to live in fresh water. Down in Central America there is further

Fishing Secret





proof. In Lake Nicaragua, 110 miles long by 62 miles wide, there are sharks, sawfish, snook and tarpon thriving and multiplying. This lake is connected to the Caribbean by the San Juan River, but ichthyologists believe the salt-water species probably became landlocked sometime in the distant past by an earthquake. Through the centuries the fish became acclimated to their new environment.

In Florida and Mexico both tarpon and snook often are caught far up tidal rivers in water that has little salt content, but, according to biologist Ken Jurgens of the Texas Game and Fish Commission, the fish probably must return to the sea to complete their life cycles and propagate.

Yet projects in some states seem to hint that acclimating salt-water fish to fresh water might be one of the greatest boosts to fishing in history. In South Carolina, for example, the landlocked stripers of Santee-Cooper were moved to other inland waters in the state back in 1955,

when 297 stripers were caught and transferred to Lake Greenwood, about 170 miles away. Several have since been caught from Lake Greenwood, but there is no concrete proof of reproduction.

Then stripers were moved to other states. More than 1500 were planted in Lake Ouachita near Hot Springs, Arkansas, in 1959, but this young experiment is not yet proved. At Kerr Reservoir in North Carolina transplanted stripers are reproducing. Texas plans to move striped bass into some of their larger inland lakes in the near future.

Experimental projects with salt-water species other than striped bass also have been attempted in some states, a few with notable success. A little more than three years ago about 2000 channel bass (redfish fingerlings) were transferred from the Gulf to the Pecos River in west Texas, a stream with a high salt content. Last Labor Day, a 6 pound, 11 ounce channel bass was taken from the Pecos by Stanley

Left: A string of whoppers—landlocked striped bass taken from Lake Marion in South Carolina

Right: Introducing stripers to another fresh-water home—one of the 1500 transplanted into Lake Ouachita near Hot Springs, Ark., early in 1959

Below: Gizzard and threadfin shad, considered undesirable in many reservoirs, are a favorite of striped bass, and provide both forage and bait



Adams of Marfa. Marion Toole, director of the Inland Fisheries Division for the Texas Game and Fish Commission, said the big "if" of the project is whether or not the channel bass will reproduce in their new environment.

"But even if the channel bass won't reproduce, the project still would be highly desirable from our viewpoint as put-and-take fishing," explained Toole. "It creates fishing where otherwise there would be none." Texas fishermen agree.

Each year our population continues to grow, yet our waters remain about the same while fishing pressure mounts with every passing season. Biologists of the various state and federal fishery departments are constantly seeking new methods for improving fishing, and putting salt-water fish into fresh water appears to be one logical answer. But Toole admitted that the surface hasn't been scratched as yet. The experiments still are in the preliminary stage. One of the biggest

problems is to determine which of the myriad salt-water species will adapt to fresh water. The striped bass has proved it can take the abrupt change in stride, but there are still countless other salt-water game species to be tried.

Toole said it has been proved that brackish-water fish can be moved from tidal rivers and bays to fresh water by a slow adjustment of gradually reducing the salinity of water, but again the question is whether they will grow and reproduce away from the ocean.

A total of 1382 channel bass and 184 spotted weakfish (seatrout) were transferred from the Gulf to Lake Kemp in north Texas at the same time the channel bass were planted in the Pecos River. Fishermen have reported catching both species in Kemp, but as yet there has been no specimens brought in for examination. More channel bass and weakfish will be transplanted into Red Bluff Lake on the

(Continued to page 212)



Left, naturalists who enjoy the woods, but don't like to hike will find the Tote Gote the answer to their dilemma. Right, not built for highway use, it is light enough to be lifted onto a truck bed or a car trunk

Mountain-Climbing Scooter Goes up Anything But Trees

Lightweight and sure-footed, a rugged utility scooter is designed for those who like to do their mountain climbing in a seated position. With a top speed of only ¹⁵ five miles per hour, the scooter (called Tote Gote) will go places a horse can't.

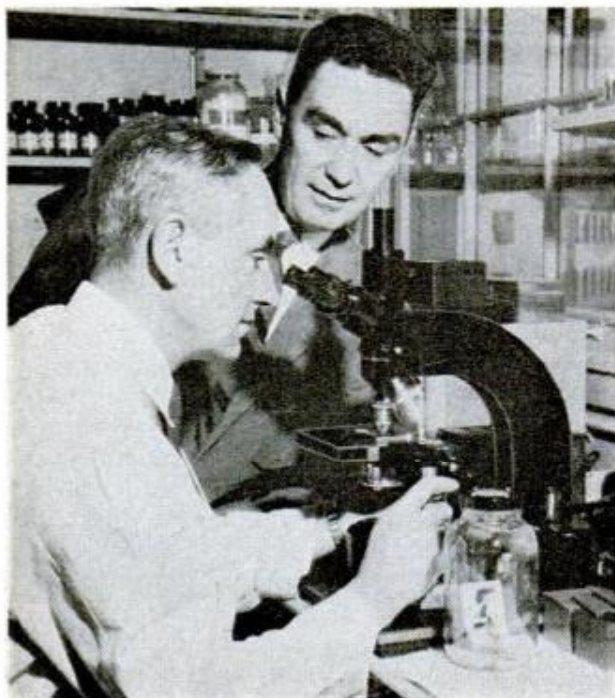
If the going is too rough for riding, you can walk alongside the machine as it runs, much as you would lead a pony.

The design is as simple as possible. The three-horsepower air-cooled engine is a four-stroke design and will take you ⁴⁰ 30

miles per gallon. There are brakes on both wheels, controlled from the handlebars. There are no springs of any kind. You simply ride on the axles. A steel mesh covers the entire working portion of the rear end to prevent entanglement with clothing or underbrush.

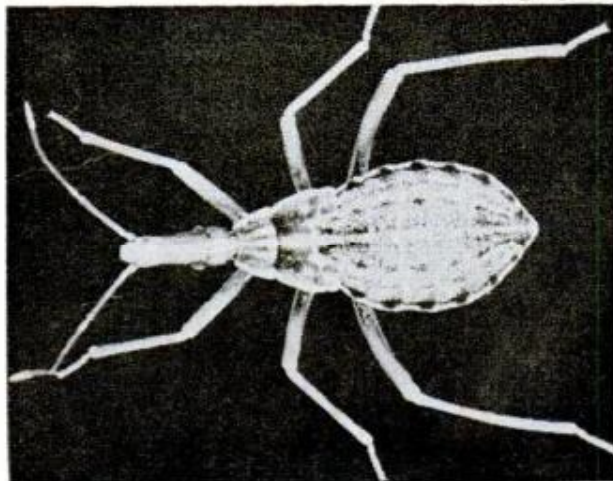
Weight of the vehicle is only ¹¹⁵ 108 pounds. It is being produced by a small company in Utah and was designed by a former engineering student at Brigham Young University who liked to hike trails the easy way.

Radiation of "Kissing Bugs" Gives Clues to Cell Damage



Rhodnius prolixus, the South American "kissing bug," does not show effects of radiation until it moults. Then parts that have been radiated blister. Dr. W. F. Baldwin of Atomic Energy of Canada, Ltd., who conducts radiation experiments with *Rhodnius*, says this gives a clue as to why human beings do not get sick until several days after exposure to radiation: Cells can function until need for their division arises.

Montaigne photos

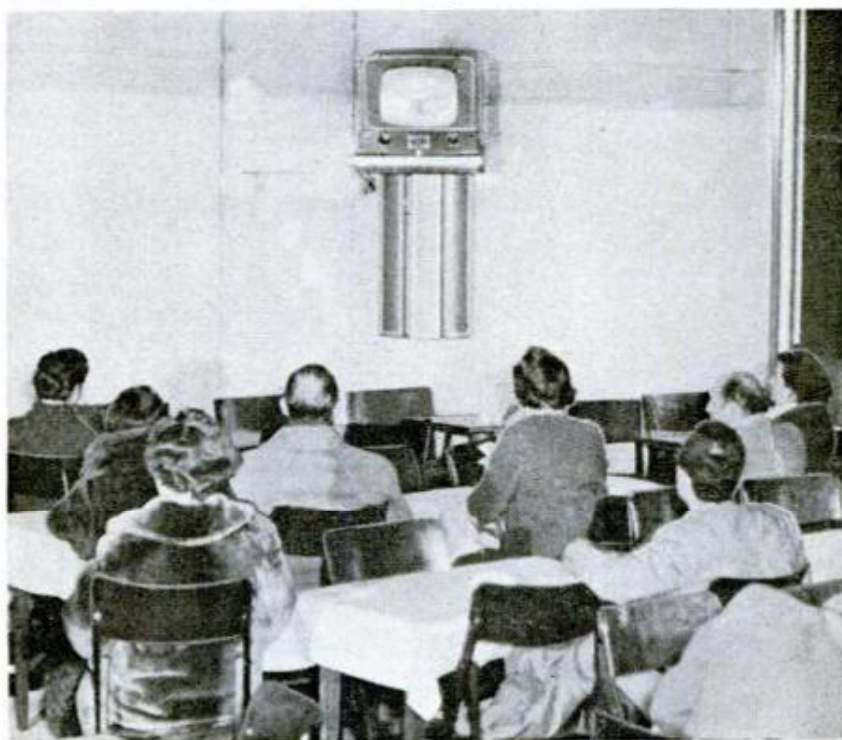




As much fun as a mountain goat (which it is named after), the go-anywhere scooter takes brooks in stride. The rear drive assembly is protected by the heavy mesh. Platform at the rear is designed for pack carrying

Theater Latecomers, Locked Out, Follow Play on TV

France's Theatre Nationale Populaire, long recognized as a progressive force in the theater world, has a solution to the age-old problem of latecomers disturbing the play by hunting seats after the curtain rises. In TNP theaters, late arrivals are greeted by an usher who gently but firmly refuses admission to the audience, but shows them to a lounge in an annex where they can watch the remainder of the act in progress on closed-circuit television. At the end of the act, the usher leads them to their seats during the brief intermission. The cast and audience have not been disturbed.





Kazik Pazovski photos

"Bite Tester" determines biting or chewing ease. Steak must bite through under 25 pounds, candies between 7 and 11 pounds

Adams **"Consistometer"** works like a slump test. To qualify, these preserves must spread to seventh ring, not past tenth



Torture Tests For Food

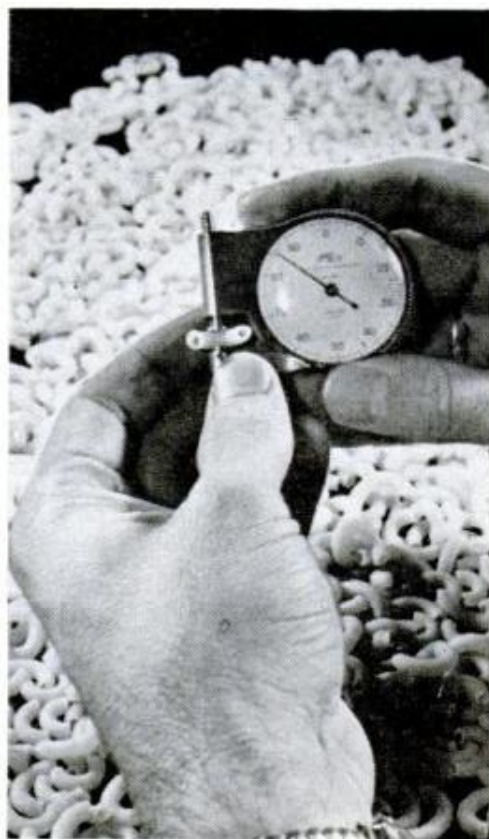
By Kirk Polking

HAVE YOU EVER SEEN a cookie buster? A gelatin jolter? A guillotine for steak? Probably not, but all those devices, and more, are in use at the Kroger Food Foundation in Cincinnati, Ohio, where foods are tested for purity, stability, and taste before they're sold in the company's 1400 supermarkets.

A cracker, for example, must be crisp enough for good eating, but not so fragile that it crumbles in the box on the way home. Jelly beans must be chewy enough to please the small fry, but not so soft that they mash flat when stacked 25 bags high on the counter.

These are only two of the food-testing problems handled by the 25 technologists at the laboratory, who handle an average of 625 items a day. They test new products before the stores receive them, then re-examine them periodically in the stores to be sure they're holding up as expected.

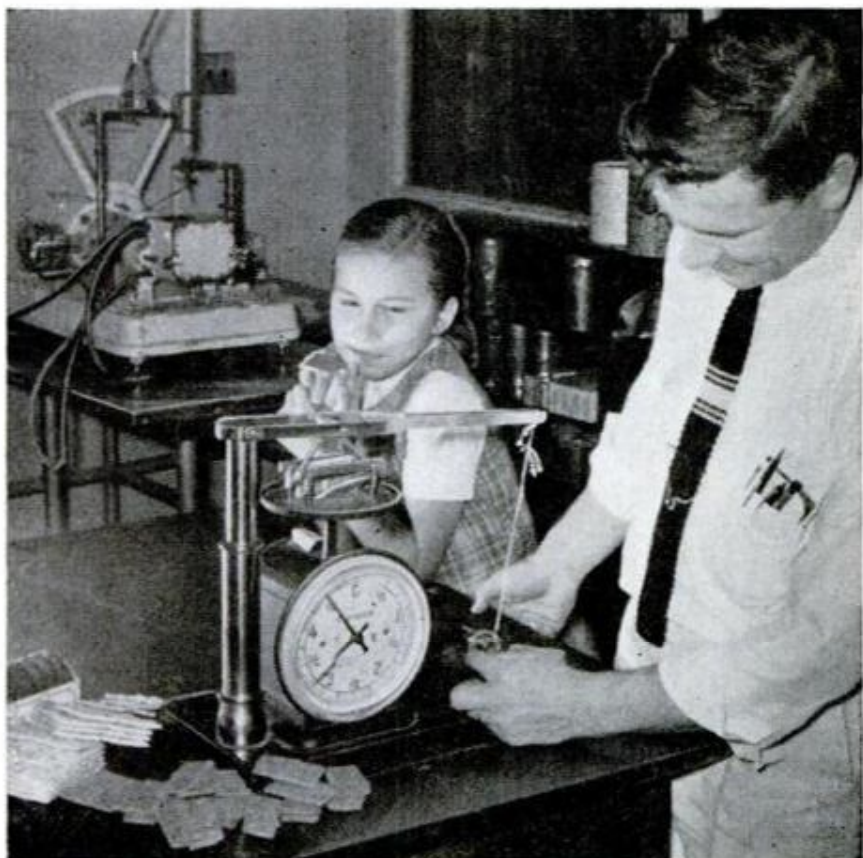
"Macaroni Micrometer" tests wall thickness for uniformity. 4/100-inch is standard



"Penetrometer" measures uniform consistency in a jar of salad dressing. Same machine, with attachment, measures jelly and gelatins for shimmery firmness



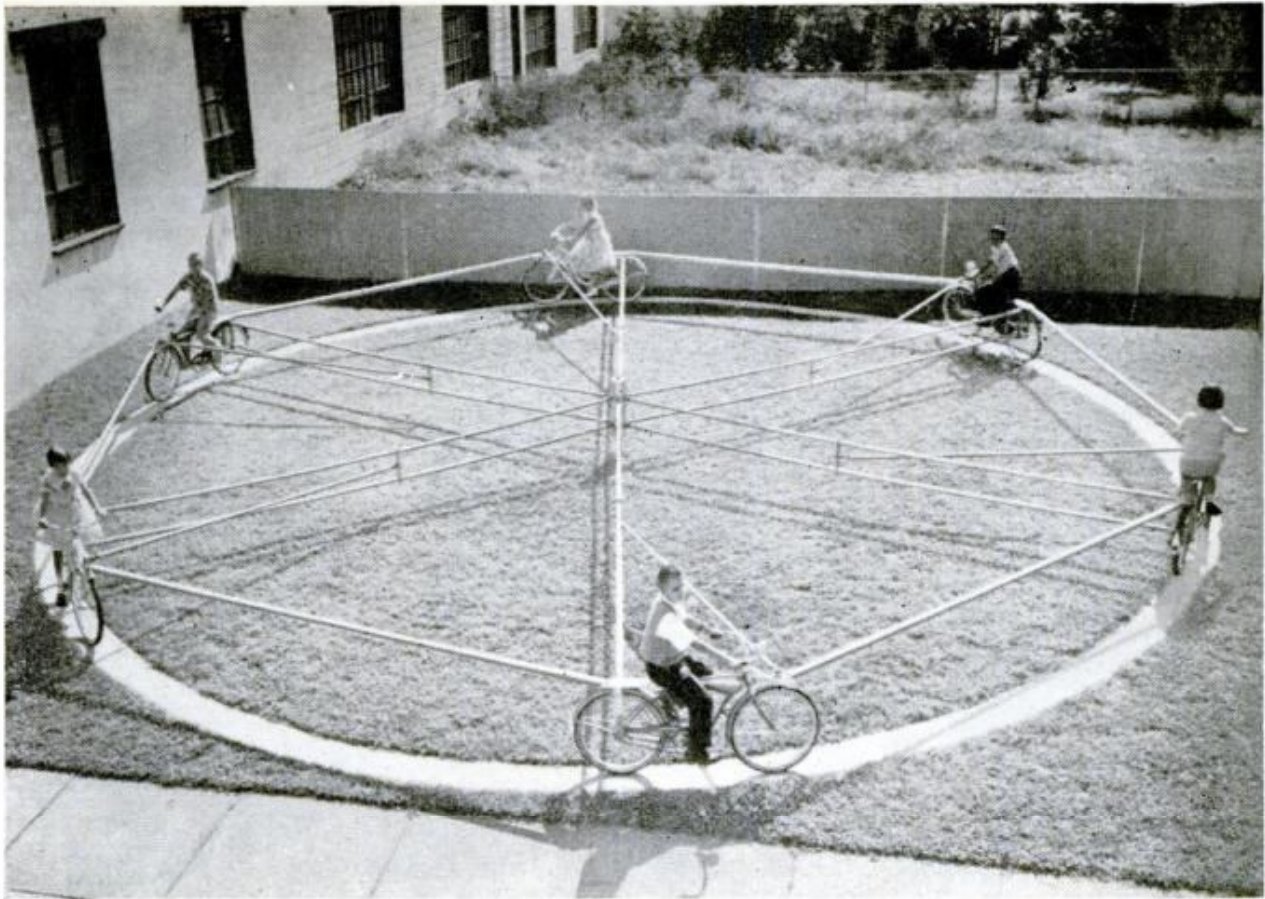
"Shortometer" breaks crackers to measure "shortness" (breaking strength). Most people prefer soda crackers at 2½ pounds; graham crackers at 3½ pounds





Magnetic Instrument Finds Oil Deposits

HOW DEEP do you drill for oil before giving up? There's a new instrument being perfected that answers that question for oil seekers. It's called simply the NML—Nuclear Magnetism Log—which has proved able to measure precisely the depth of potentially productive oil formations. NML's readings depend on the phenomenon of nuclear-magnetic resonance. The nuclei of many atoms (notably hydrogen, a component of oil) resemble tiny bar magnets spinning topline in directions influenced by the earth's magnetic field. Introduction of a stronger magnetic field causes their spin to line up with the new field; when it's shut off abruptly, the nuclei revert to their normal direction of spin.



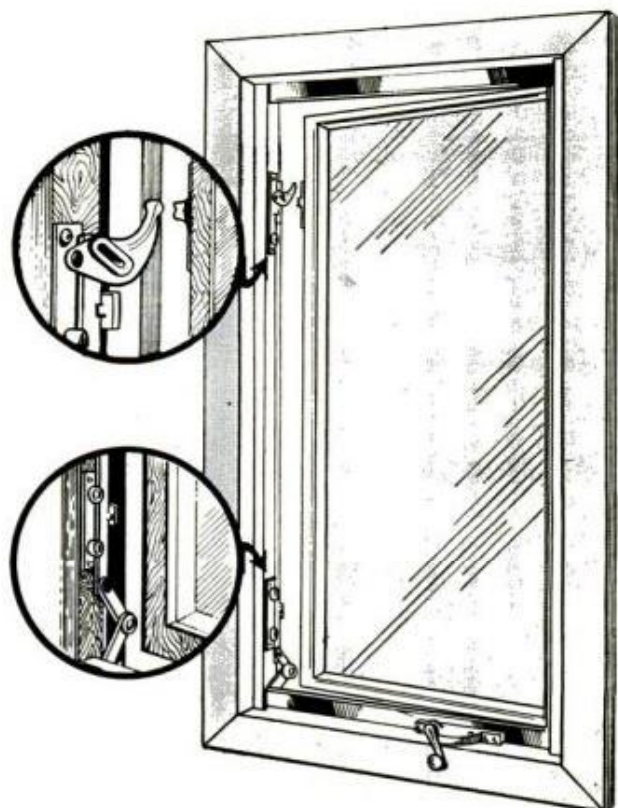
Blind Children Cycle Around Huge Wheel

Guided and supported by a giant aluminum wheel, six students in a school for the visually handicapped ride bicycles without assistance. Although they don't really get anywhere, they do get a big

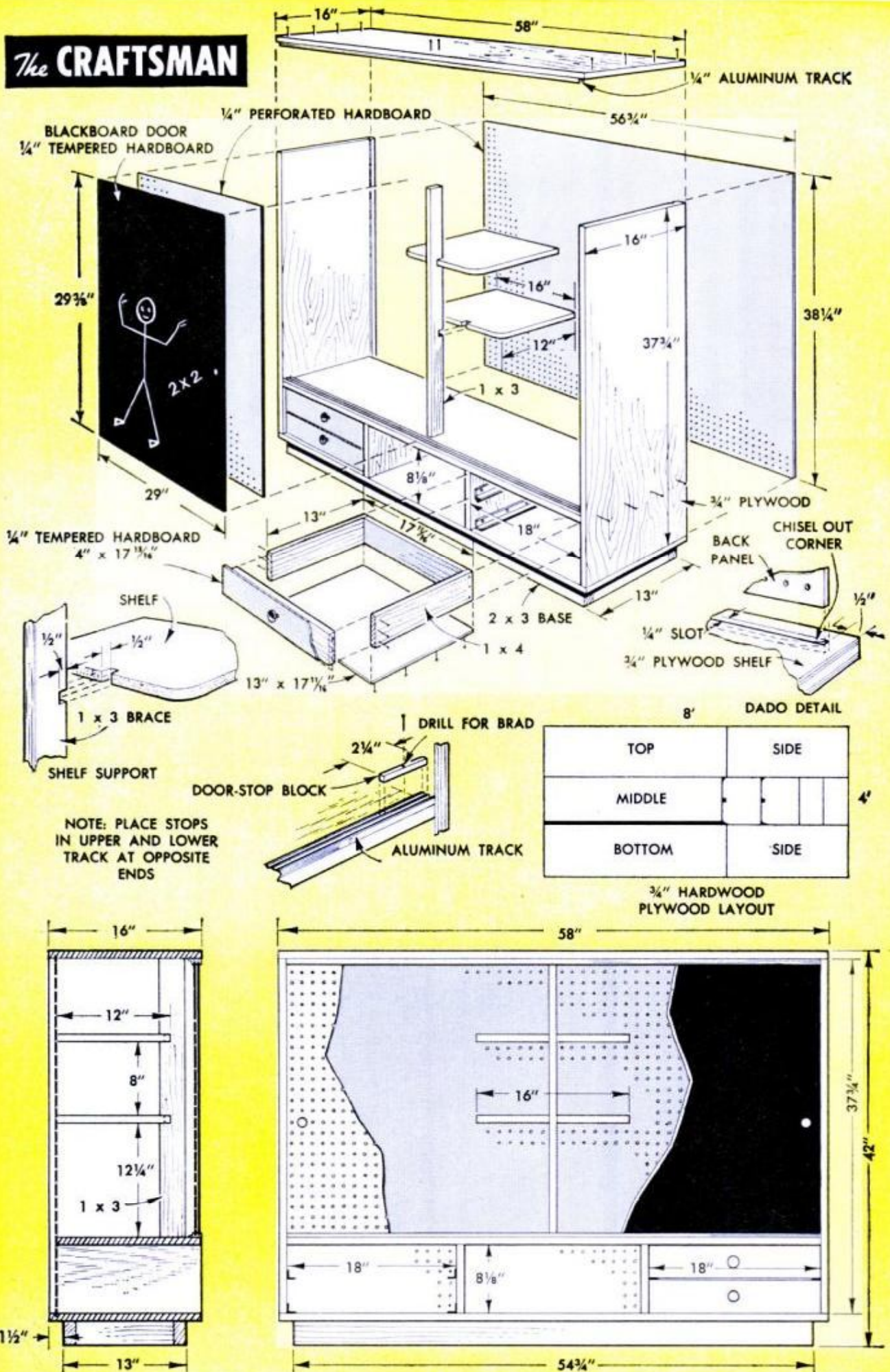
thrill from simply riding the bikes, and the exercise is excellent. The wheels are made in several sizes, one big enough for 18 riders, and have a telescoping feature which makes them adjustable to any area.

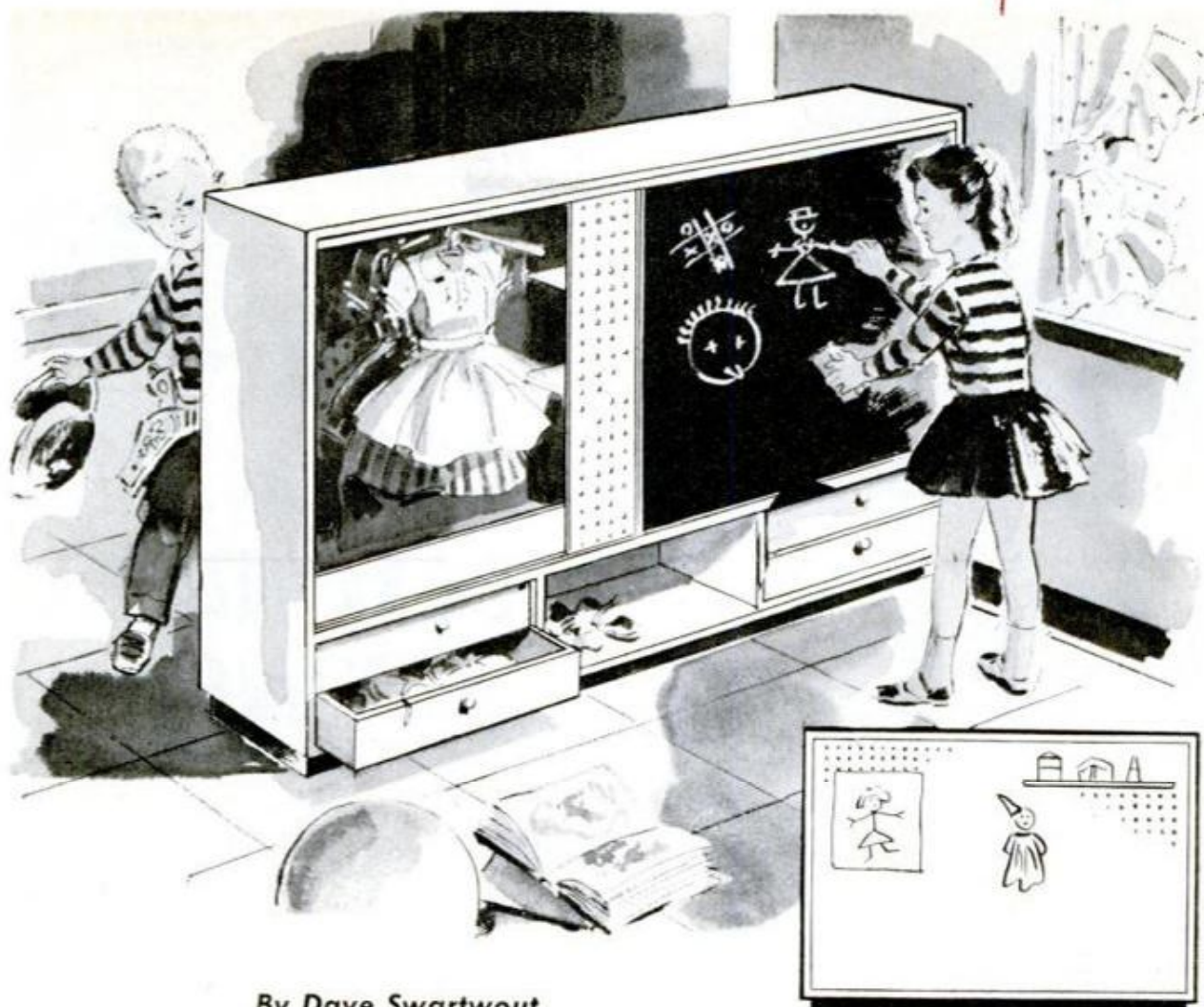
Casement Window Is Self-Locking

Unlocking, opening, closing and locking of a casement window are accomplished with a single roto-gear handle—eliminating the need for a separate manual locking device. The automatic unlocking feature frees the homeowner from the danger of damaging casement windows when he forgets to unlock them before turning the gear handle. As the window is closed, the sash comes in contact with an elbow on the locking mechanism (lower inset). Straightening of the elbow thrusts a locking bar upward, causing a nylon hook to engage a keeper on the sash and lock the window. Other features of the window are vinyl weather stripping and a concealed hinge that replaces the conventional extensional-type hinge. Two vinyl gaskets, which form the weather stripping, contact the sash at parallel planes around its complete circumference. When the window is closed, the gaskets form a compression seal between sash and frame. All wood parts are adequately treated against water and insect damage.

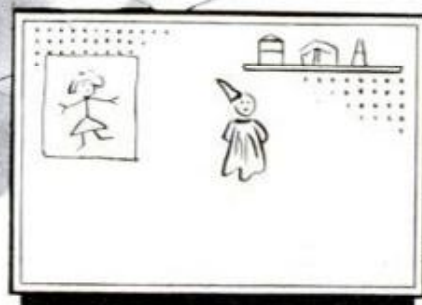


The CRAFTSMAN





By Dave Swartwout



REAR VIEW

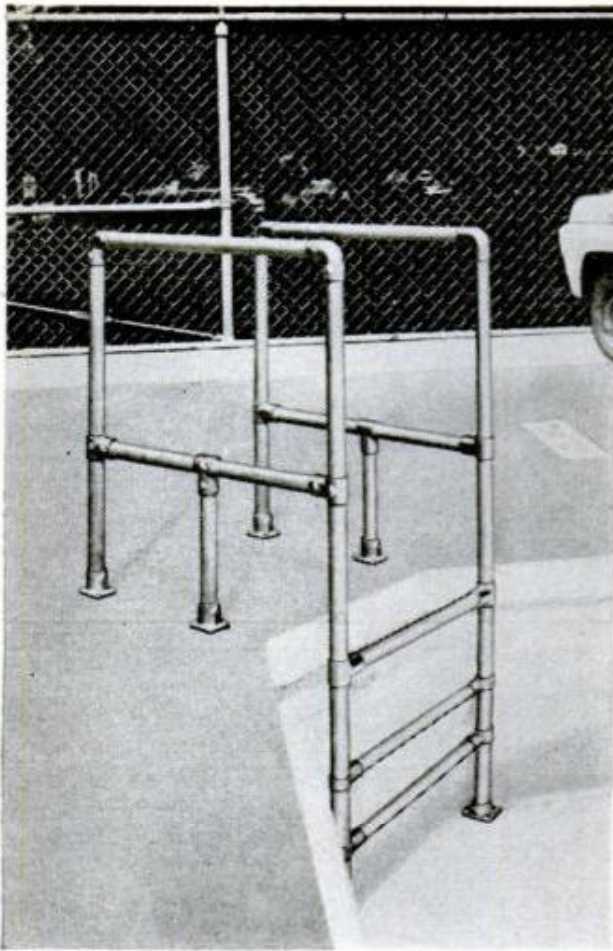
CHILD'S WARDROBE Is Island of Storage and Play

GROWING FAMILIES having a shortage of wardrobe space can relieve some of the "bulging-at-the-seams" by building one or more wardrobes like this one. Designed as a child's wardrobe, it may be backed against a wall, or located as above so as to project into the room like a divider.

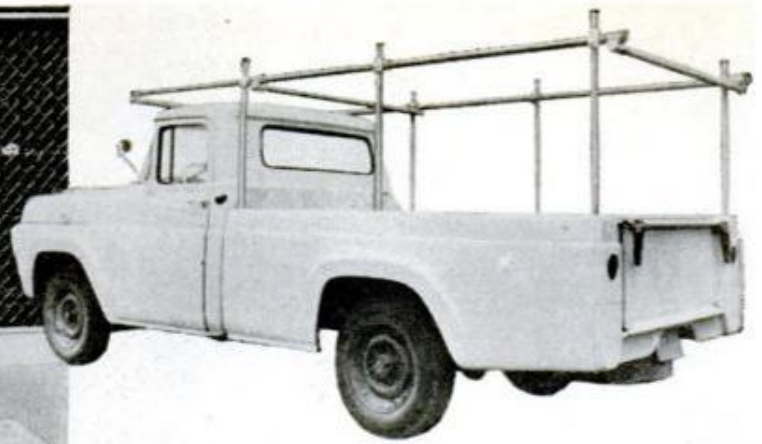
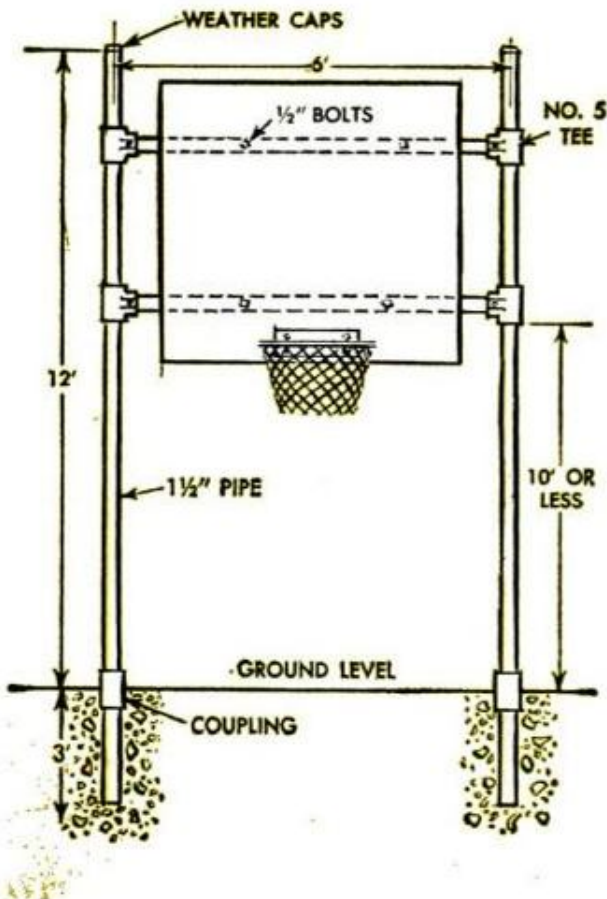
The upper three-fourths of the wardrobe-divider has two shelves and two clothes hanging compartments, while the lower part has four good-sized drawers and a shoe compartment. Two sliding doors enclose the front, one of which is perforated hardboard. The other is tempered hardboard that may be painted flat black or green to serve as a blackboard. The back of the unit is covered with a panel of 1/4-in. perforated hardboard, providing a pin-up surface for play, inset above, or for hanging things on utility hooks such as are available for this purpose. Sides, top, middle and bottom shelves, plus drawer partitions and center

shelves of the wardrobe are cut from a 4 x 8-ft. panel of 3/4-in. solid-core hardwood plywood as indicated in the layout detail. Drawer sides, backs and fronts are made of 1 x 4-in. lumber. Bottoms and drawer-front facings are 1/4-in. tempered hardboard. The drawers slide on 1/8 x 3/4 x 3/4-in. aluminum angles screwed to the wardrobe as shown in the drawings.

After cutting out all wardrobe parts, begin assembly with the base, which consists of 2 x 3s nailed on edge to the 3/4-in. plywood bottom. Then install the drawer slides and dado the wardrobe sides, top and bottom to take the hardboard panel at the back, which is glued and nailed in place. Drawer partitions, drawers and shelf assembly are installed next, followed by the sliding doors, which are fitted in a double aluminum track as shown in the track detail. Installation of pull-out-type clothes hanger or brackets and a coat or two of paint, completes the wardrobe. ★ ★ ★



Believe it or not, the swimming-pool ladder shown above, was assembled by an ardent do-it-yourselfer who had never tackled anything similar before. The same type of slip on fittings used in it were used to make a backboard like the one illustrated below



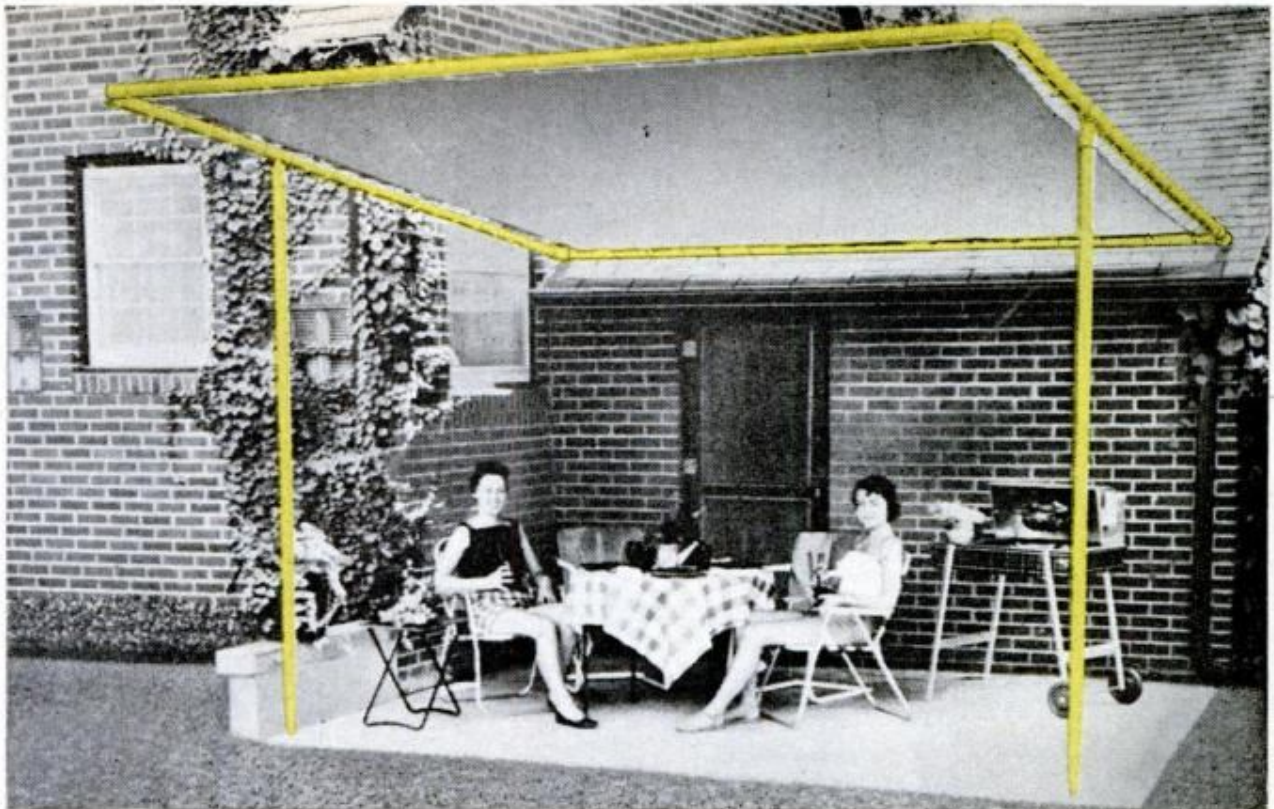
Make It Easy With **SLIP-ON FITTINGS**

Now, do-it-yourselfers can branch out into pipe and tubing projects without becoming involved in tedious welding, threading or bending operations. Patio awnings, porch railings, shelves, tables and dozens of other projects call for no more than slipping the pipe or tubing through a new type aluminum fitting and on to subsequent fittings. What's more, the variety of fittings available makes possible structures of any shape desired. A twist of the setscrews locks the fittings in place.

The swimming-pool ladder, for example, involved little more than anchoring six rectangular-base flanges to the concrete. From there on it was a simple matter to slip the vertical sections of aluminum tubing into the flanges and to slip on the additional fittings and sections as required. One twist of the setscrews and the result was a sturdy, rigid, durable ladder, the equal of any assembled in the conventional manner.

The same general procedure was used in making the truck rack, except that in this case 1/2-in. pipe was used instead of tubing. In the case of the basketball backboard, the only permanent feature is the pair of close-





Designed and built by Ray Troutfetter

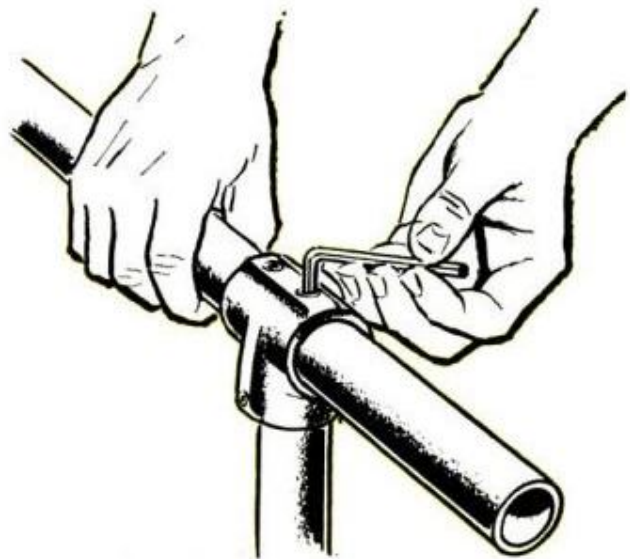
fitting couplings set in the concrete. Since the upright posts can be lifted out, the whole deal is easily taken down and disassembled for storage. In addition, the tee fittings make it possible to raise or lower the board and basket to accommodate athletes of different age groups and heights.

The framework for the patio awning, shown above is of 1½-in. galv. pipe. The upright posts are set into two rectangular-base flanges anchored to the concrete floor. The horizontal members are anchored to the roof by means of two adjustable flanges secured with wood screws and the corners were joined using slip-on elbows. With the frame erected, the tarp was added by lacing canvas to pipe with rope.

Slip-on fittings are available in the following sizes: For standard iron pipe (i.p.s) ¾, 1¼ and 1½ in. For heavy-gauge steel or aluminum tubing 1, 1-5/16, 1⅝ and 1⅞ in. (o.d.).

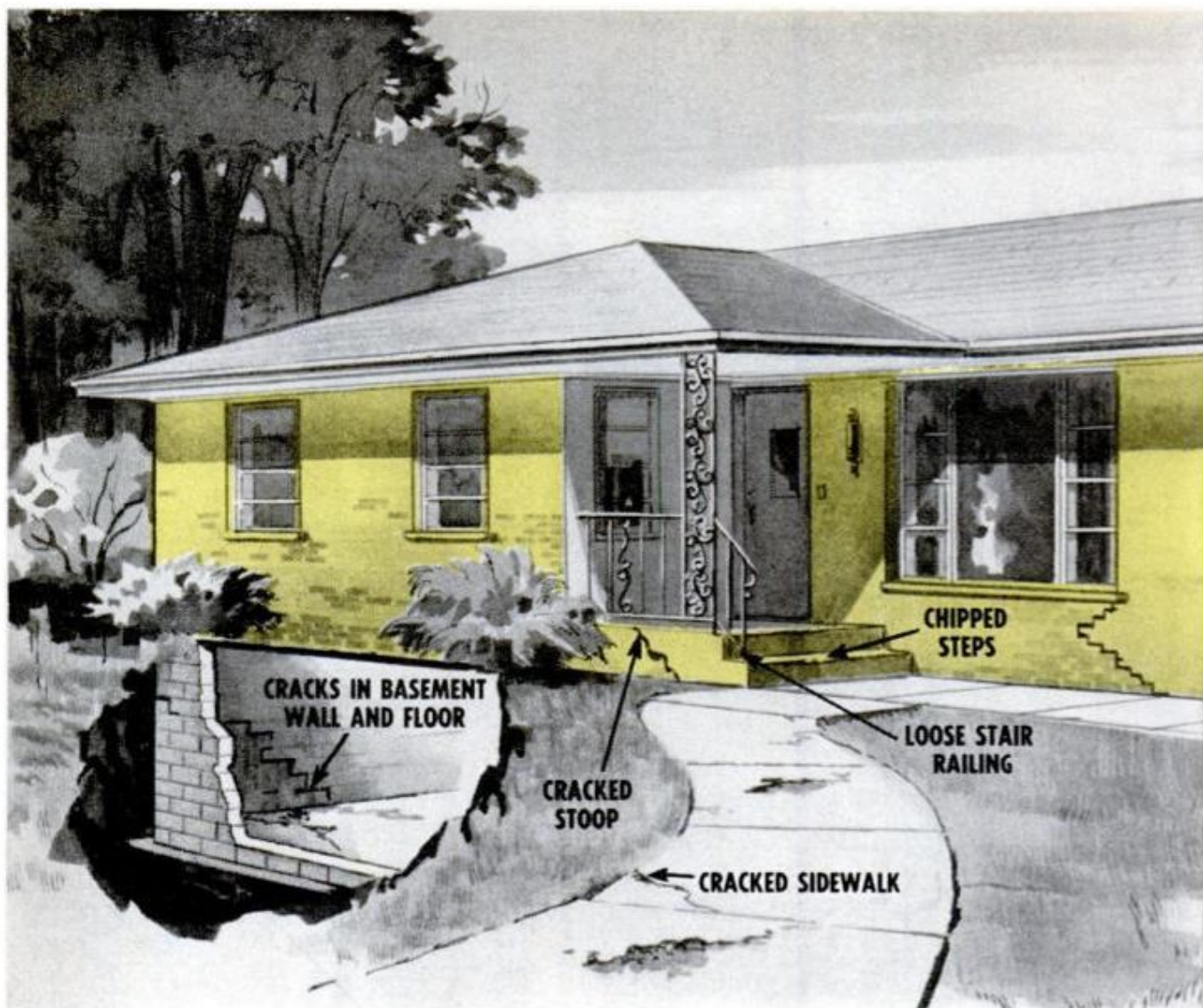
★ ★ ★

Below are shown a few of the standard fittings available. In addition there are adjustable fittings which swivel full 180 deg. to simplify railing construction



Secret of slip-on fittings is the combination of open-end barrels plus locking setscrews, illustrated above. Below, adjustable flanges are screwed directly to the roof to secure framing for patio awning





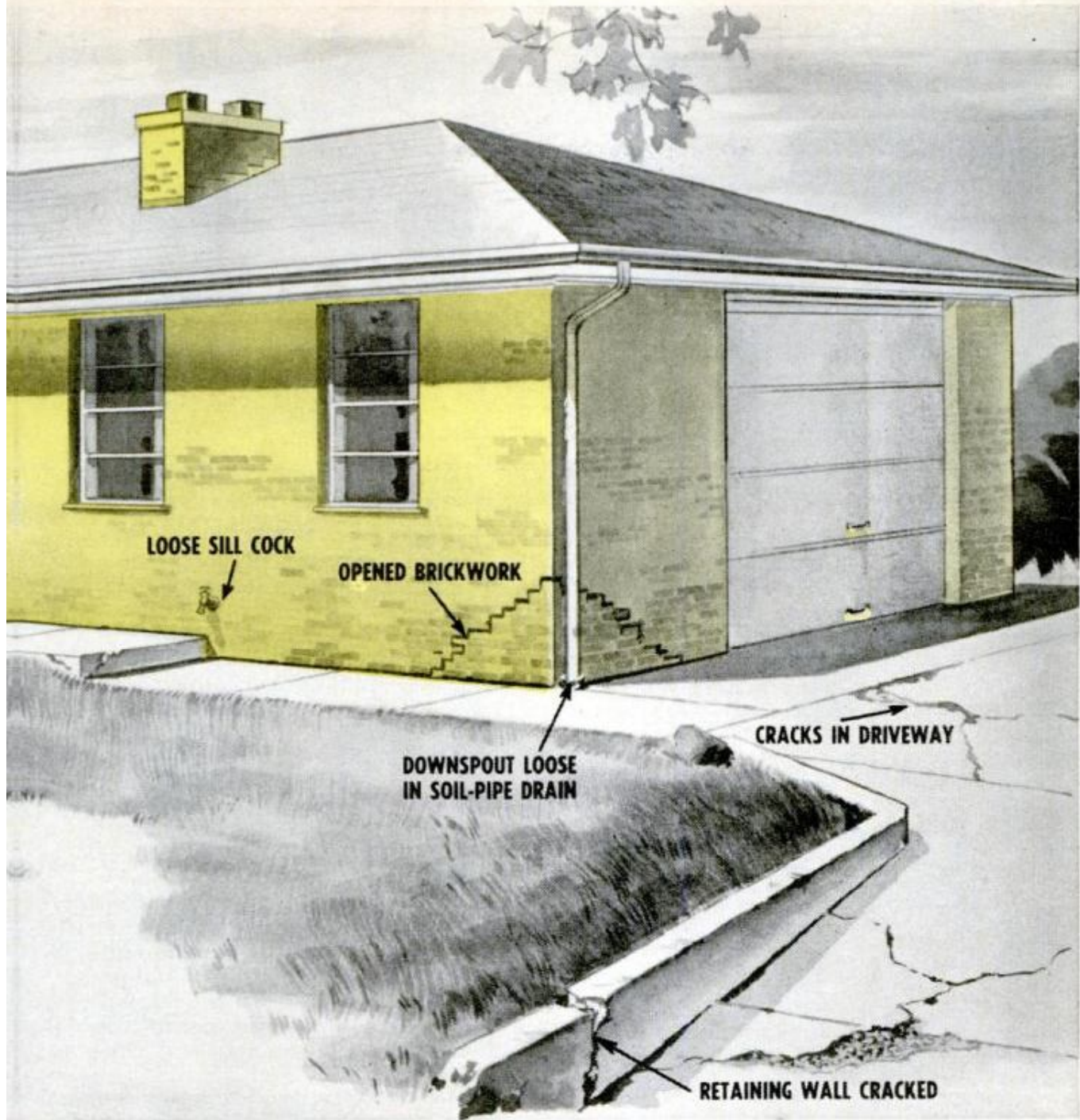
NEW MATERIALS "WELD" CONCRETE

CRACKS IN THE concrete masonry and brickwork of a home are invitations to big repair bills, unless patched as they occur. Modern repair compounds like the ones illustrated in this story not only make this an easy job, but because of their tenacity and durability, repaired cracks seldom reopen. Being of two-part formulation, setting of these compounds occurs primarily through chemical action when the parts are mixed, rather than by exposure to air as with ordinary cement.

These relatively new repair compounds have great load-bearing strength, even when applied in 1/16-in. thicknesses. One product, Plastic Mastic, bonds to metal surfaces, making it an excellent calking compound where metal parts pass through foundation walls, Fig. 3. or where they must be anchored to existing concrete structures, Fig. 1. This product has an epoxy base, which when mixed with the hardener, cures to a dense, iron-hard substance. Recommended proportions for mix-

ing is in the ratio of one part base to one part hardener, although this may be varied somewhat without affecting the end result. A stiff 1-in. putty knife is ideal for working the mastic into cracks, or for buttering broken pieces of concrete to be replaced, Fig. 8. After the mastic is applied, it can be worked to a mirror-smooth finish by dipping the putty knife in water and smoothing the surface with the flat of the blade as in Fig. 7. Curing, sufficient to support traffic, takes 8 hrs. or longer, depending upon the temperature. This time can be shortened considerably by applying heat. The compound's color when hard is medium gray. The wide variety of materials to which this product will bond—metals, ceramics, minerals, plastics and wood, makes it an excellent repair compound.

A repair compound that is suitable for all types of masonry repairs where surface water is not present is Camp Latex Concrete. Available at most building-supply stores, this two-part product consists of



1. Mastic-type compound used to cement loose railing in step as shown, is fine for metal-to-metal joints



2. Hole left in concrete when fence was moved, is given rock filling topped with latex-mixed concrete

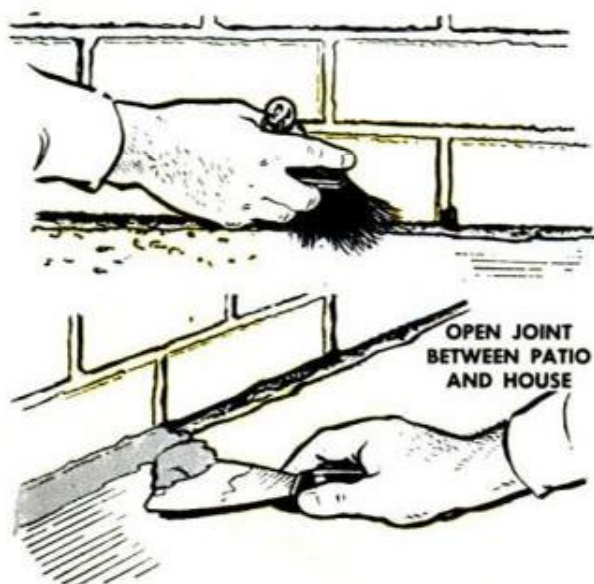




3. Above, old mortar around sill cock is removed and replaced with more permanent, epoxy mastic



4. Board staked against sidewalk edge confines patching material to crack, resulting in neat repair



5. Loose mortar in joint between patio and house is brushed out before filling with concrete compound

a concrete powder mix and latex liquid. When mixed to the consistency best suited for a job and applied, it hardens to a tough patch the color of new concrete. It has a working period of one to two hours, depending on temperature and drying conditions. At 70 deg. F., it cures completely in 16 to 48 hrs., depending upon the thickness of the application. In addition to filling cracks and holes, the compound also may be used to fill low spots on uneven floors. When doing this, it should be mixed to brushing consistency and applied in coats 1/16 in. thick, building up the surface until it is level with adjacent flat surfaces.

As with the application of any repair or surfacing compound, it is important that the surface be free of loose and foreign material. A dirty, weak, powdery, oily or greasy surface will prevent good adhesion. Cracks that are too narrow to permit the repair material to be introduced and com-

6. This fast-setting two-part compound is ideal for cracks where moisture is present, as in basement



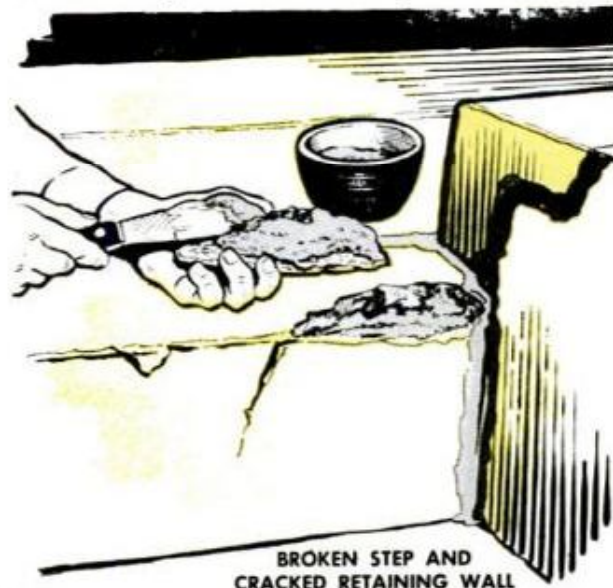


7. Loose downspout drain is calked with epoxy mastic, after wrapping with thin sheet plastic to keep it free for easy removal when a replacement is needed

pacted properly, should be widened with a chisel or other tool, Fig. 9. When filling large cracks or cavities, all old material should be removed first. Then, clean, coarse gravel or crushed rock is tamped into the void as a filler and the repair compound troweled on top as in Figs. 2 and 5. This saves on compound, which is too expensive to use as a filler in large holes. When troweling compound into a crack at the edge of driveway, a board should be staked against it as in Fig. 4.

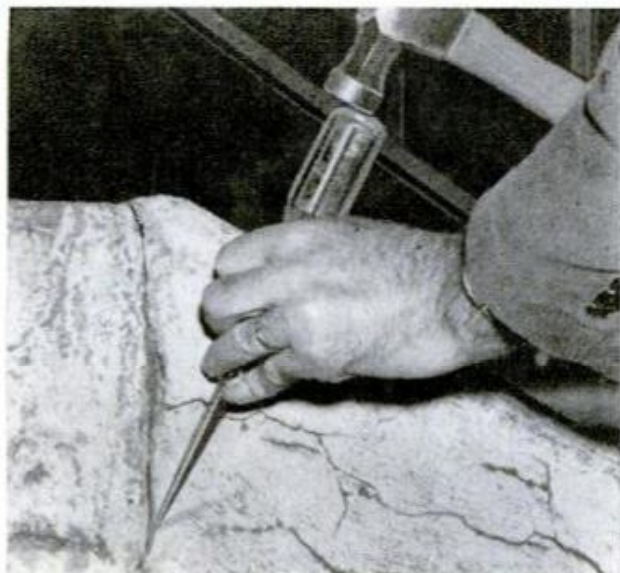
While either of the two preceding products may be used for patching cracks in dry basement floors and walls, they will not form a bond when surface water is present. A product that will produce a watertight repair in the latter case, is Hydro-Plug applied as shown in Fig. 6. Consisting of dry hydraulic cement and latex-silicone liquid, this two-part compound is fast setting (3 min.) and cures to a substance harder than concrete in less

(Continued to page 214)

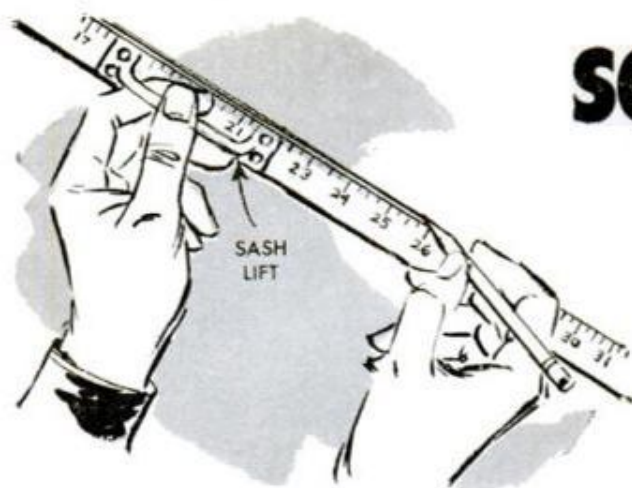


8. Broken concrete in places which bear heavy traffic such as steps, is best repaired with epoxy mastic

9. Fine cracks in concrete are widened slightly to give patching compound a better chance to anchor



SOLVING HOME



A **SASH LIFT** fastened to the center of a yardstick provides a handy grip and makes the measuring and marking of walls and other flat surfaces much easier. It may be secured with short flathead bolts and offers a means of hanging the stick when it is not in use

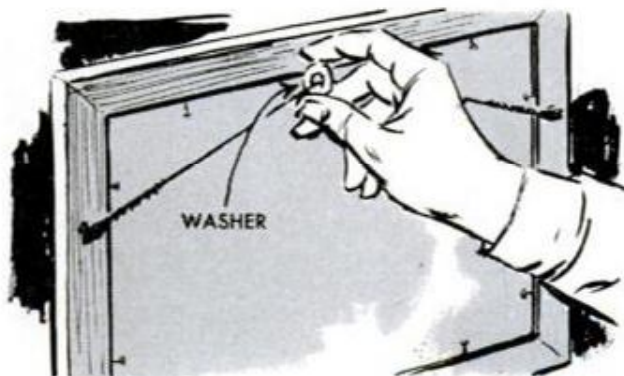


FESTIVE OCCASIONS demanding flowers often won't wait for the blooms to open, or may find them wilted by the time the party starts. Next time, cut the flowers before they bloom, place them in water and add ice cubes. They'll be in full bloom in an hour



FOR AN ANIMATED CENTERPIECE at your next dinner party, mix water and vinegar in the following proportions—water 3 parts, vinegar 1 part. Add a teaspoon of bicarbonate of soda and several moth balls. The balls will rise and fall in the vase up to 24 hours

IF YOU HAVE an electric fry pan, you can use it to defrost your freezer compartment in a hurry. Simply fill the pan with water, place in the compartment and plug it in. Steam from the water will melt the ice long before your frozen foods have a chance to thaw



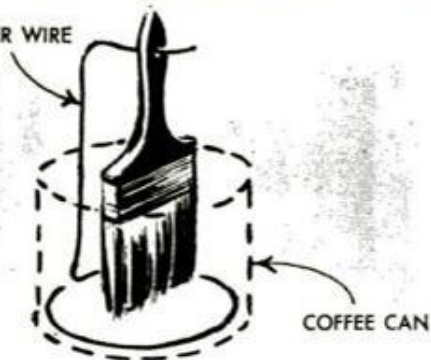
KEEPING WALL PICTURES level is easy if you use a large washer as a hanging ring. Positioning the picture becomes a simple matter of sliding the string or wire through the washer and the picture will stay straight without continual readjustment

DON'T THROW AWAY that old powder puff! It can be put to the most surprising uses. For example, as an applicator for the polishing of silverware you will find it is not only soft and nonabrasive, but easy to handle and it retains the polishing material



PROBLEMS

COATHANGER WIRE



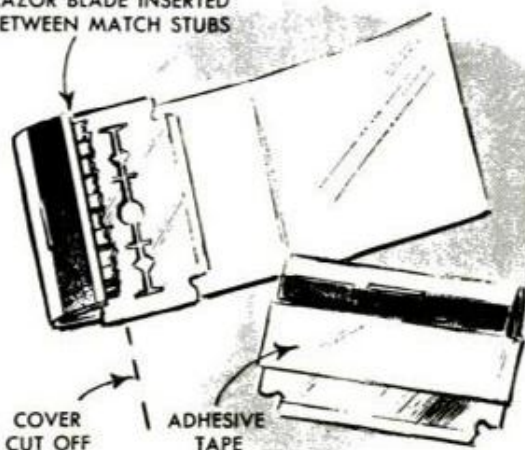
WHEN STANDING A BRUSH overnight in solvent, don't run the risk of spoiling the shape of the bristles by letting them rest on the bottom of the container. Make a brush hanger like the one above from a wire coathanger to keep the brush suspended in the liquid

GOT CLOSET-CLUTTER TROUBLES? Then pigeon-hole those hats, gloves, mufflers and purses so everything is findable. In minutes a closet shelf can be converted into a row of handy compartments by adding a plywood top and dividers in manner shown above, right



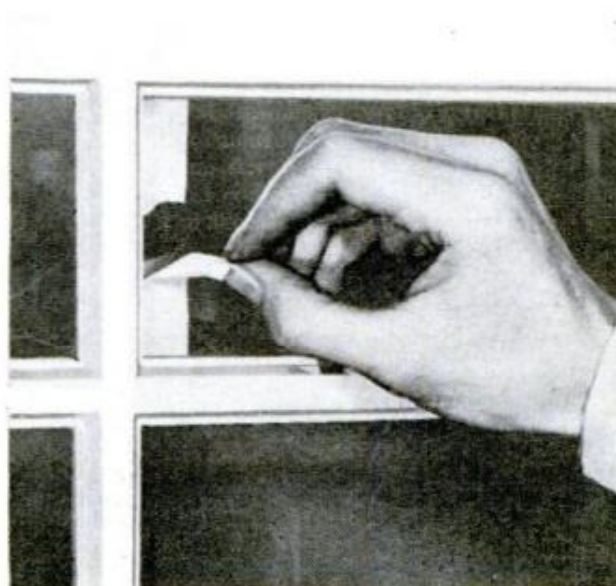
DOUBLE-EDGED RAZOR BLADES are not the best things to use for hobby work, but often they have the only keen edge available. To use them safely, cut the cover from a book of matches, as shown at the right, place it over one of the blade edges and tape it on

RAZOR BLADE INSERTED BETWEEN MATCH STUBS



YOUR GARBAGE DISPOSAL UNIT may occasionally spit fragments back through the drain while grinding large bones. In this case, invert a strainer over drain, below left. It allows the water to run through and will act as a catcher for flying particles

WHEN MASKING SASH for painting use two pieces of tape on the four sides of each pane instead of one. Cut each piece slightly over half the required length and fit one end of each squarely in the corner. The two will overlap at the center, giving a perfect seal



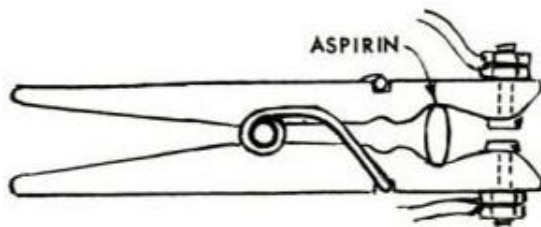


Fish "Broiling Board" for Camp-Out Anglers

Delicious broiled fish can be had right at the seaside or campsite without an elaborate array of cooking equipment. Simply make a broiling board and take it along on the next fishing trip. Since the board also serves as a dinner plate, one should be provided for each member of the group. To broil, the cleaned fish is cut along the backbone so that it can be spread open on the board and tacked in place, using zinc-coated roofing nails as shown. Two or

three strips of bacon tacked over the fish helps to hold it in place, imparts a fine flavor and provides a source of grease. Each board is staked in the ground and tilted toward a bed of hot coals while the fish is being broiled, which takes surprisingly little time when several boards encircle the coals and confine the heat. An occasional mopping with melted butter gives the broiled fish an appetizing, golden-brown appearance.—Hi Sibley

No Longer a "Headache"



Dear Editor:

I would like to bring to your attention an article in the April 1960 issue "Doorbell System Does Double Duty As Basement-Flooding Alarm".

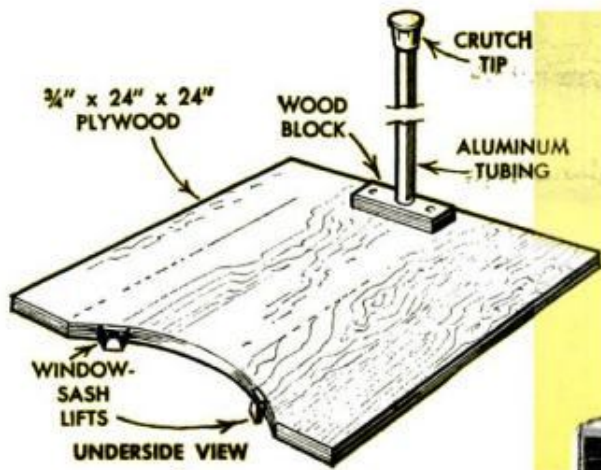
I made one exactly as shown but it doesn't work for the

simple reason that the aspirin tablet won't dissolve completely. Tiny aspirin particles remaining between the contacts won't dissolve and let the contacts close.

However, I found that the contacts will close perfectly when the aspirin tablet is placed in the clothespin as shown in the accompanying diagram instead of between the contacts.

I am 13 years old and am in the 8th grade. I like your magazine very much.

Sincerely,
Boyd Hakes



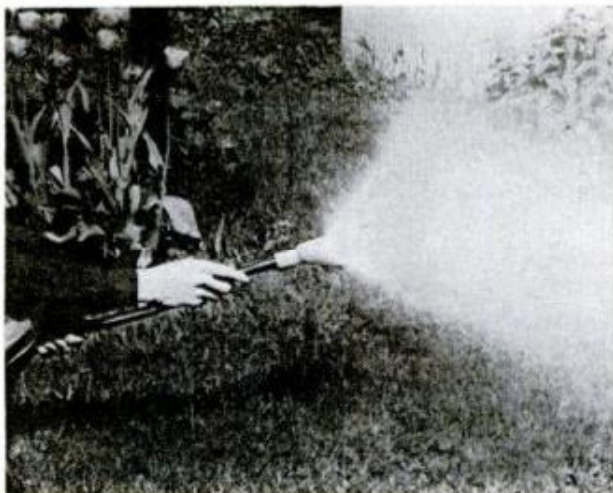
BRASIER END TABLE

You outdoor chefs who use a brasier-type grill will find this end table the answer to your workspace problems. Cut one end of a piece of $\frac{3}{4}$ -in. plywood to formfit the curved side of the grill and fasten the table to the grill by means of two window-sash lifts having the finger holds bent inward to serve as clips. The other end of the table rests on a leg made from a length of aluminum tubing. Press-fit the tubing into an undersize hole in a small wooden block and screw the block to the underside of the table.



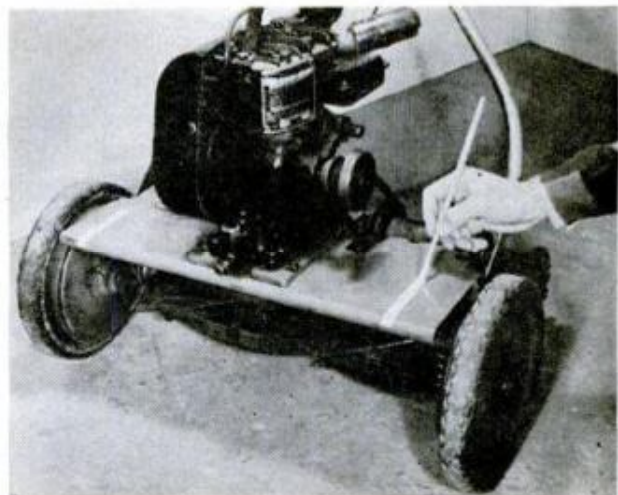
Screen Wire Produces Fine Spray

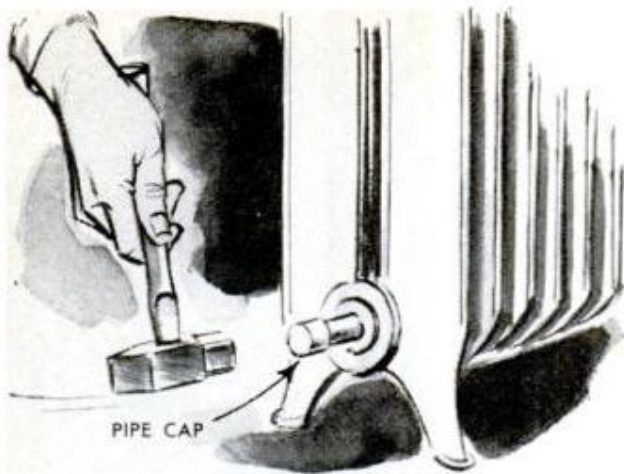
Don't take a chance on injuring those newly set out plants, seedlings and delicate flowers with a strong stream of water. If your adjustable hose nozzle will not give a fine enough spray, one or more layers of plastic window screening folded over the nozzle and fastened with several turns of wire around the hose as shown will produce the spreading, mistlike spray you need.—R. Hanscom



Cut Full Width With Reel Mower

In mowing the lawn you'll save steps if you keep the mower cutting the full width of the reel each way. To make it easier to follow the edge of the uncut grass, paint guide stripes in a contrasting color on the reel guard just above the extreme ends of the reel. The stripes should be about $\frac{1}{2}$ in. wide so that they are easily seen. Similar guide stripes also can be painted on the housings of nearly all rotary mowers.





Cap Aids Removal of Nipple Without Damage to Pipe

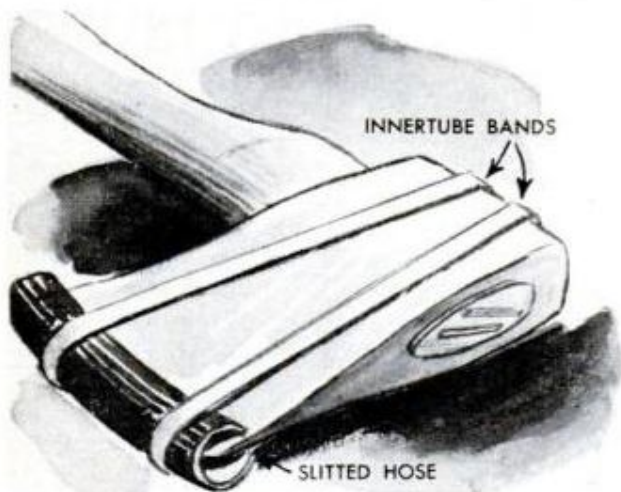
When making radiator repairs, attempts to remove rusted pipe nipples may result in damage to the threads and the pipe. To avoid risking this damage, screw a pipe cap onto the end of the nipple and tap it with a hammer. This will serve to break the rust in the threads and permit the nipple to be removed with a pipe wrench without fear of crushing it. In hammering the pipe, use only gentle blows, which is actually all it takes to break the rust.



Furnace Pipe Set in Sand Permits Marking at Angle

Marking lengths of furnace pipe to join at an angle becomes a simple job if the pipe is placed in a box filled level with damp sand. The pipe is inserted in the sand at the desired angle and the sand is firmed around it. Then a line is drawn around the pipe at the sand line, being careful not to disturb the sand in going around the pipe. It then is a simple matter to cut to the line with a pair of tin snips.

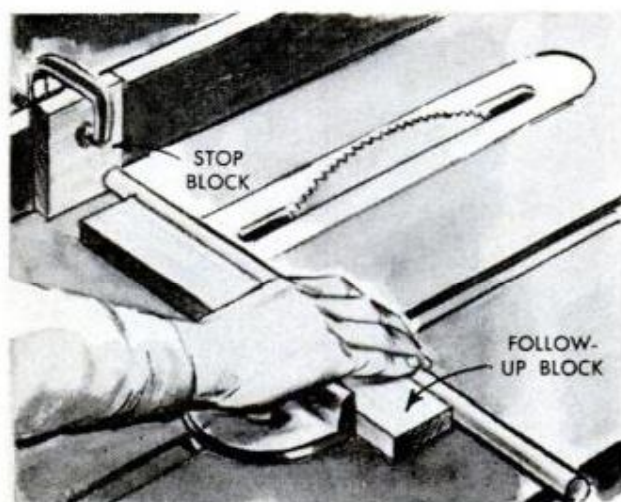
—Roger G. Allard



Garden-Hose Sheath on Ax Protects and Safeguards

Serving a two-fold purpose, a guard on an ax head will not only protect its keen cutting edge but will safeguard one from accidental injury when the ax is not being used or is carried in the car. A simple and effective guard can be made from a short section of garden hose, one wall being slit to press over the cutting edge. Two bands cut from an innertube will keep the guard from coming off. Protected in this manner, the cutting edge will not be nicked when stored with other tools.

—Ann Zawistowski



Two Safety Rules Pay Off When Mass-Cutting Dowels

Cutting quantities of dowels to a specific length demands observance of two rules of safety. 1.) The fence should never be used alone as a stop. A stop block should be clamped to it to provide ample clearance between the blade and the fence for the cut off pieces. Without clearance, the work will bind and catch and be thrown with considerable force. 2.) Always follow up the cut with a backing block attached to the miter gauge. The block not only adds firm support to the dowel rod but it prevents chipping and produces a clean cut.



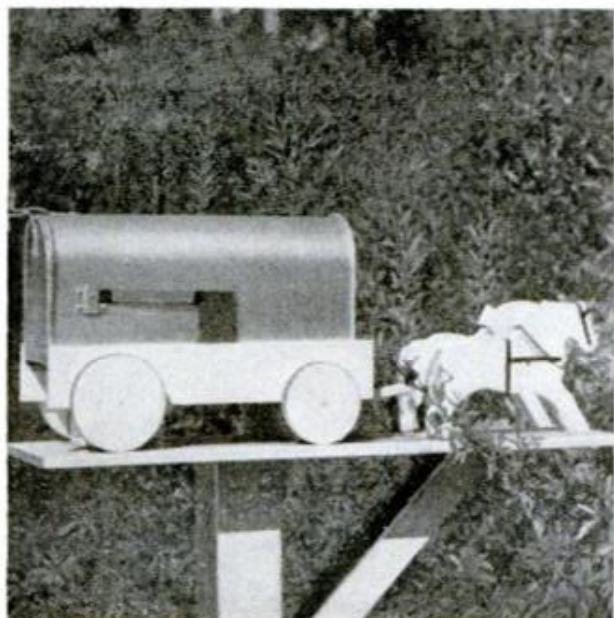
MAILBOX ART PLEASURES PASSERS-BY

ROCKING HORSE uses the rural box as the body. In this one the box is supported by four posts, or legs, cut from thin-walled tubing and attached to a wooden platform. The head is scroll-cut from light plywood and the tail is made from a hank of frayed hemp. When decorating mailboxes, don't attach anything to the drop front of the box that makes it difficult to open and close.

CHINESE JUNK is built up around the mailbox, utilizing the box as the galley. Carefully made its cleverness is sure to catch the eye. Hull is carved from thick pine plank. The sail can be made from a fabric, of course, but is more durable if cut from thin sheet metal. Paint the whole affair in bright, durable colors to add interest and protect it against weathering.

COVERED WAGON can light up the memories of oldtimers still living. Here the mailbox serves as the canvas cover of the wagon. Wheels can be plain disks as pictured or you can go a step farther toward realism by making spoked wheels. Horses are simply profiles cut from $\frac{3}{8}$ -in. outdoor plywood. Frayed rope forms tails, bits of leather the harness.

HOUN' DOG can be anybody's dog, of course, but this one is very much an individual and rather proud of it, as you can see. Remember your rural mail carrier. He opens and closes a lot of boxes along the way and he delivers your mail every day, rain or shine. Attach the head of the dog so that it does not interfere with opening and closing the drop lid of the box.



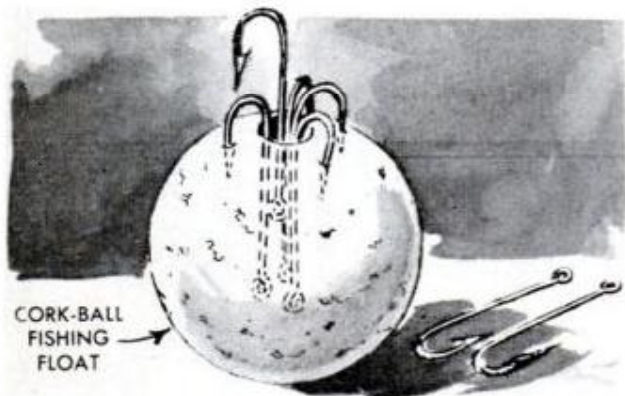


For the Fisherman



Safe Way to Handle Fish

Safest way to handle fish when removing a hook—and the cleanest, is to grip the fish with a damp wash cloth or turkish towel as shown in the photo. The thick, rough-surfaced cloth protects the hand from sharp fins while permitting the angler to get a better grip on the fish. Small fish that are thrown back also have a better chance of surviving when handled in this manner because the cloth absorbs very little of the fish's protective coating.



Float Is Pocket Hook Holder

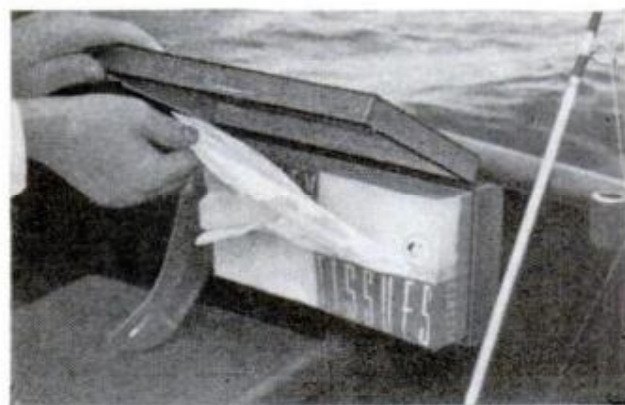
An assortment of fishhooks can be carried safely in the pocket simply by inserting the shanks in the center hole of a cork ball fishline float and pressing the barbs into the cork as shown at left. Since only a small portion of each hook is exposed, there is little chance of dislodging them, as may be the case when a cylindrically-shaped bottle cork is used for this purpose.



Scanner for Spotting Lost Tackle

You will find no better way of spotting fishing tackle lost overboard in clear water than to look for it from the boat, using some type of glass-bottom viewer. The one shown can be improvised by stretching a clear plastic bag over one end of a mailing tube and tying it in place. Since plastic is used instead of glass, it must be stretched flat over the tube end to avoid viewing distortion.—

—G. E. Hendrickson



Tissue Dispenser for Your Boat

One family of fishing enthusiasts who like to have a box of facial tissue in the boat for wiping hands and other uses, keep the box dry in a protective dispenser screwed to the gunwale. It is made of 1/4-in. exterior plywood cut and glued together to form a box measuring 2 x 5 x 10 in. inside. A strip of rubber neoprene cemented to the lid and box serves as a watertight hinge. Brads driven through the back of the dispenser impale the tissue box.

—Wayne Judy



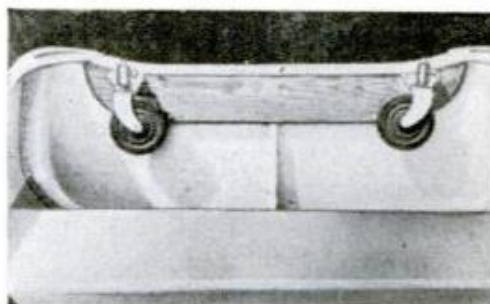
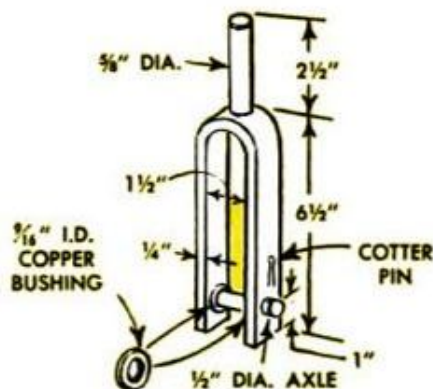
Car-topped boat is easy to unload and wheel to water's edge when wheels are mounted temporarily on transom

PORTAGING WHEELS FOR CAR-TOP BOATS

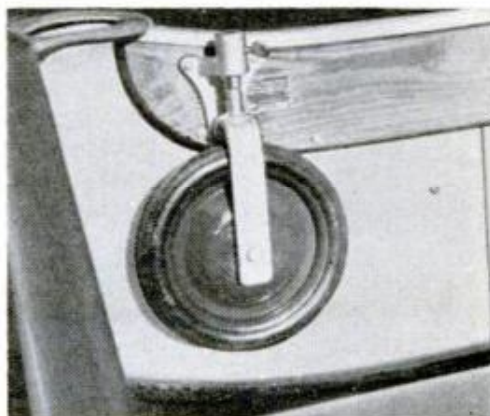
By Harry J. Lance

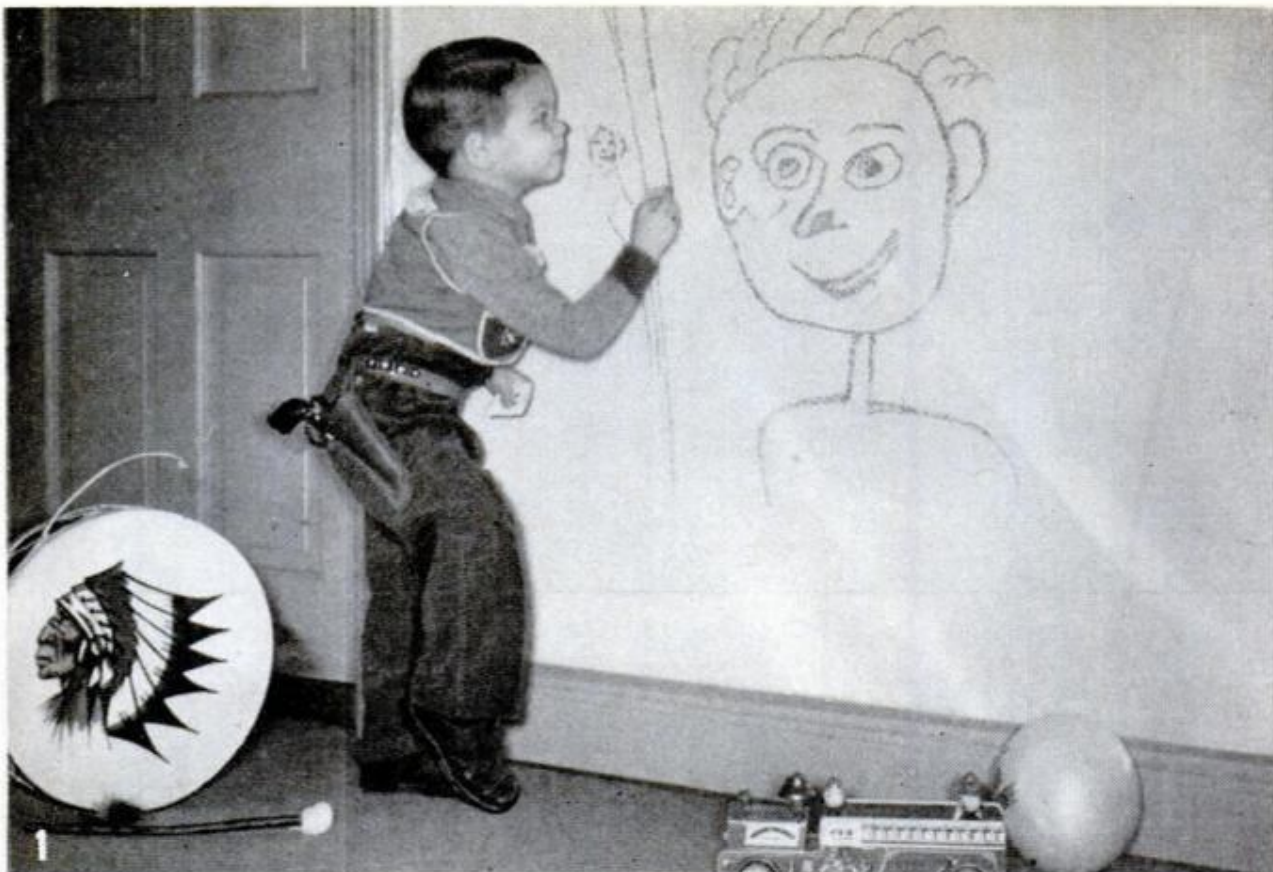
CAR-TOP BOAT OWNERS can eliminate the difficult job of carrying or dragging their craft from car to launching site, or when portaging, simply by providing demountable wheels on the transom as illustrated. Not only is it a whole lot easier to "wheelbarrow" a 150 to 250-lb. boat over rough ground in this manner but it saves wear-and-tear on the boat and back muscles as well.

Two types of "portaging wheels" are featured here, one of which is a manufactured, industrial-type caster having a 5 or 6-in. wheel shown in the photo below the drawing. The second type consists of a fork welded from a $\frac{1}{4}$ x 1 x 14-in. length of flat steel and a $\frac{5}{8}$ x $2\frac{1}{2}$ -in. rod to take an 8-in. utility wheel as shown in the drawing. Both types are adapted to mount on a pair of oarlocks bolted on the inside surface of the transom at the top as shown in the photos. Any style oarlock socket may be used for this purpose, provided it has a wide base that mounts in a vertical position. A hole is drilled and tapped axially into each socket to take a $\frac{1}{4}$ -in. thumbscrew as indicated in the photo below, right. The thumbscrews lock the wheels in place when in either the "roll" or the inverted position, the wheels being completely out of view from outboard. To positively prevent the wheels from pivoting when wheelbarrowing the boat over soft ground, a hole to take the thumbscrew should be drilled half-way through each fork spindle. Since oarlocks come in two sizes, to take $\frac{1}{2}$ -in. or $\frac{5}{8}$ -in. shank diameters, it is important to check this measurement before obtaining rod stock for the fork spindles. The same applies to the wheel spindle, although most 8-in. utility wheels take $\frac{1}{2}$ -in. shafts.



When not in use, wheel-fork assemblies are clamped in oarlock sockets in inverted position out of view. Manufactured casters are shown above, homemade in photo below





Let the artist have his way. He can't hurt that papered wall if it's covered with clear sheet plastic

20 WAYS TO "KIDPROOF"

By E. R. Haan

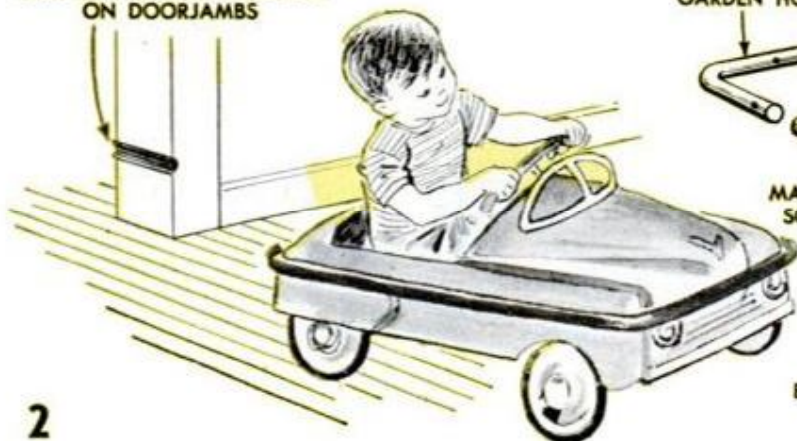
HIGH-SPIRITED youngsters are a joy to have around the home and their antics are a real source of amusement—until they begin to expend their energies on the walls and furniture. When you're stuck with scratched furniture, marred woodwork, kicked-in screens and torn and scribbled-up books, your admiration for Junior's vitality will be somewhat dimmed. Attempts at reasoning and scolding won't

sink in for long, so the next best thing you can do is to prepare for the onslaught, set up the barricades—in other words, make your house as thoroughly "kidproof" as possible.

Those Worried Walls

For example, in an artistic mood young Rembrandt will find the walls irresistible and there's nothing will ruin ordinary wallpaper better than pencil and crayons.

BUMPER PREVENTS GROOVES ON DOORJAMBS



2

$\frac{3}{8}$ " OR $\frac{1}{4}$ " GARDEN HOSE

MACHINE SCREW

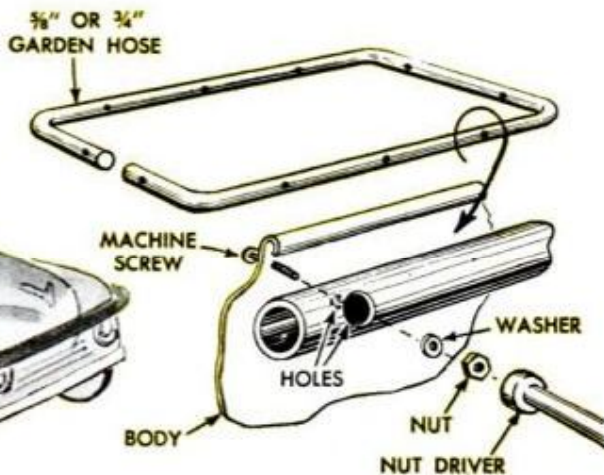
HOLES

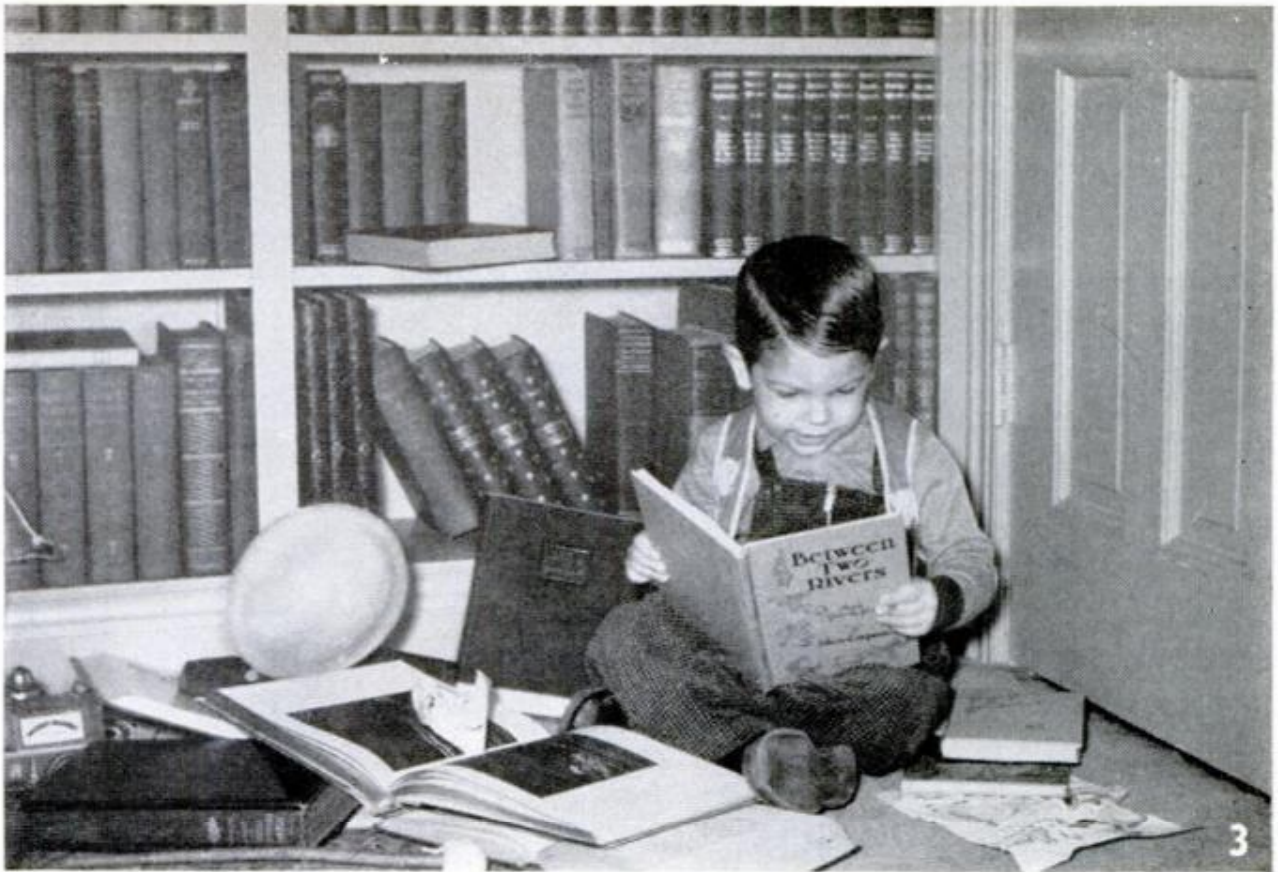
BODY

WASHER

NUT

NUT DRIVER

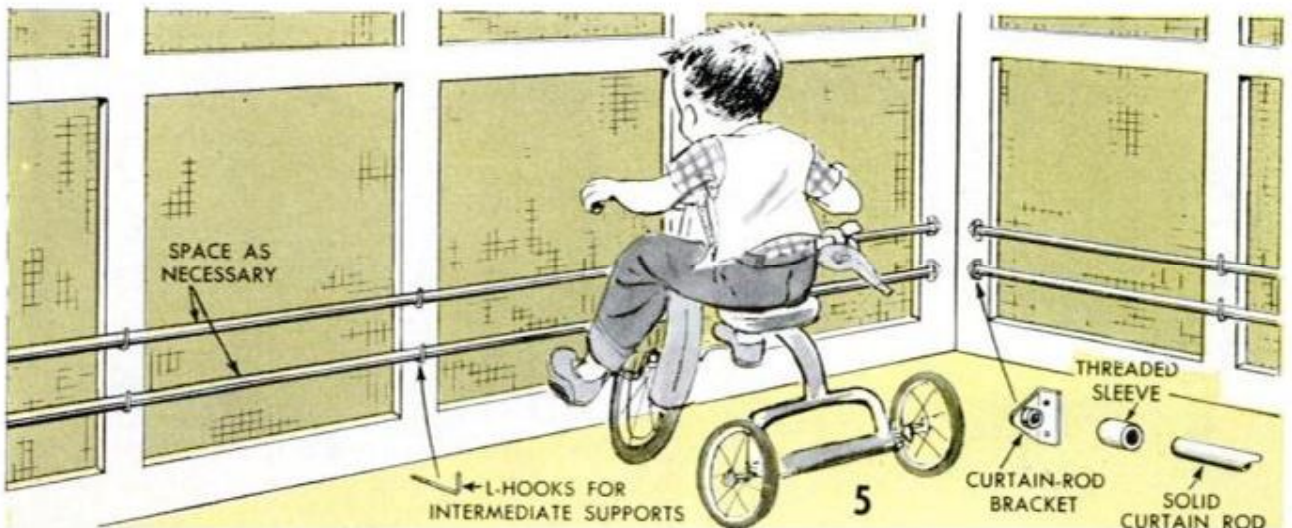
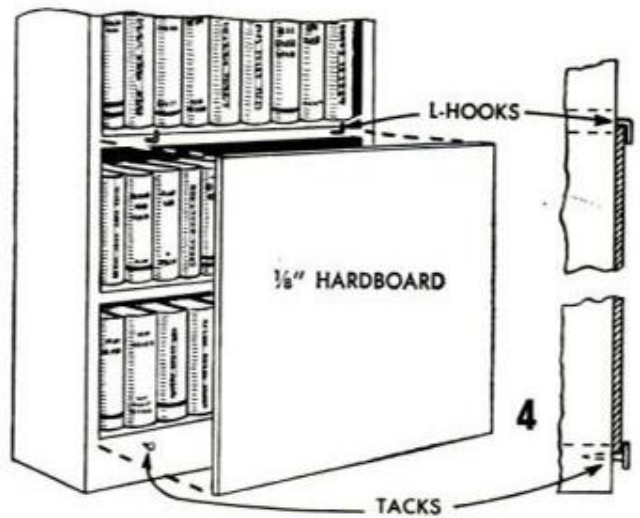




Someday he may write the great American novel; meantime you'd better make those lower shelves off limits

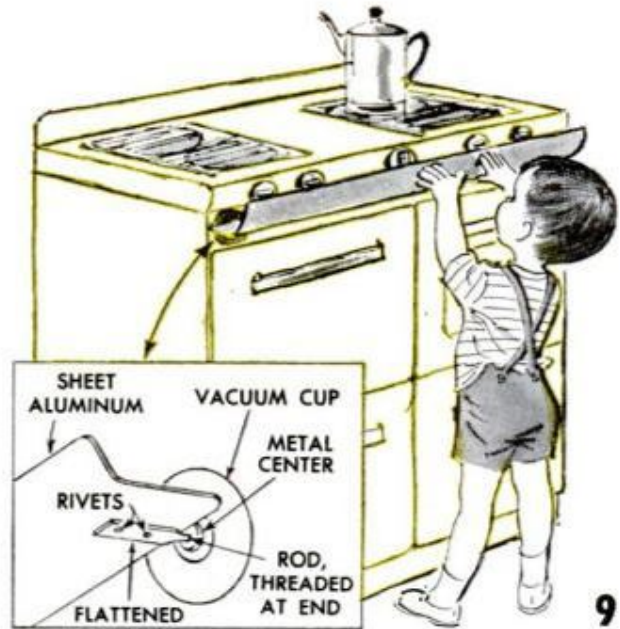
YOUR HOME

Though washable paper is best for nurseries and playrooms, ordinary wallpaper can be given a coat or two of waterproofing lacquer. This keeps the paper from absorbing grease, jelly and other substances which seem to be part of a child's natural covering. Walls in play areas also may be covered with clear plastic, Fig. 1, tacked or taped in place and extending four feet or so from the floor—just above the little fellow's reach. The plastic won't be as noticeable as you think.





Open fireplaces are an open invitation to crawlers

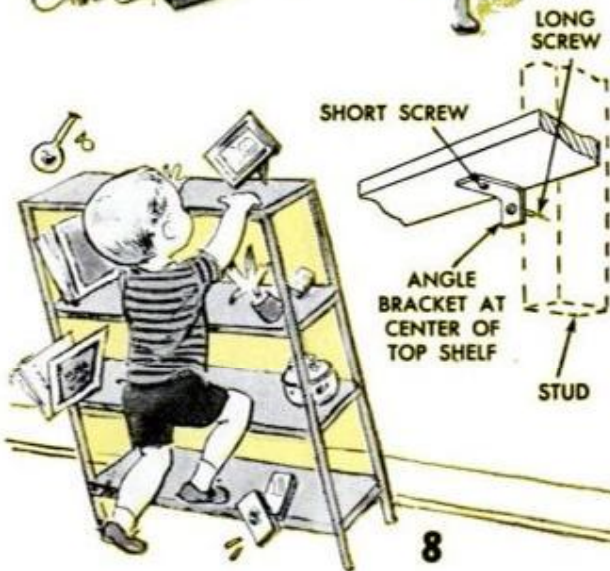


Foiled again! dad covered the knobs on the stove

TACKED TO UNDERSIDE OF TOP AT EACH CORNER



TACKS SAFETY PIN
CLOTH TAPE, ENDS DOUBLED



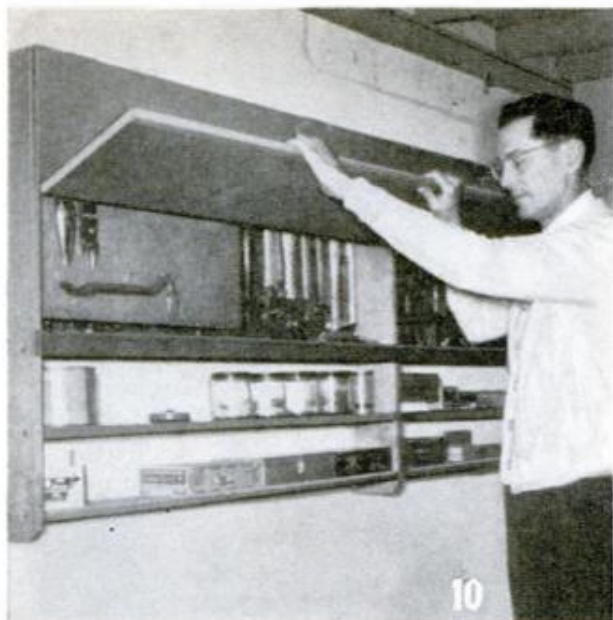
Of Tots and Wheels

Wheeled toys may be considered another weapon in Junior's war against furniture and walls. Here, bumpers of rubber tubing or garden hose will save the day. These are best placed all around the vehicle at the outermost points and may be secured with small machine screws as shown in Fig. 2. A screen enclosed porch also will come in for a lot of abuse, especially on rainy days when the porch becomes a playground. Stopping the front wheel of a tricycle can make old screen out of new in a matter of minutes. Guard rails can be made easily with solid, steel curtain rods fitted into screw-type brackets placed two or three feet from the floor, Fig. 5. These cannot be removed even by the most enterprising of children.

Boy, Book and Trouble

The little fellow shown in Fig. 3 has obviously developed a literary bent, but unfortunately it won't be long before his enthusiasm gets out of hand. Torn and scribbled pages are, of course, a foregone conclusion. Patient mothers may spend part of each day with the child "reading" him stories and pictures. But what to do when she's not around and those lower shelves become a temptation? One way around this is to conceal the lower shelves behind removable panels of hardboard or plywood. The lower edges may be set to rest on tacks, as shown in Fig. 4, while the upper edges are held by L-hooks which turn to permit removal of the panel.

Fireplaces are another hole in the wall into which youngsters love to crawl, much to mother's consternation, but there's no reason why it can't be closed up when not



A hinged door on the toolchest keeps kids out



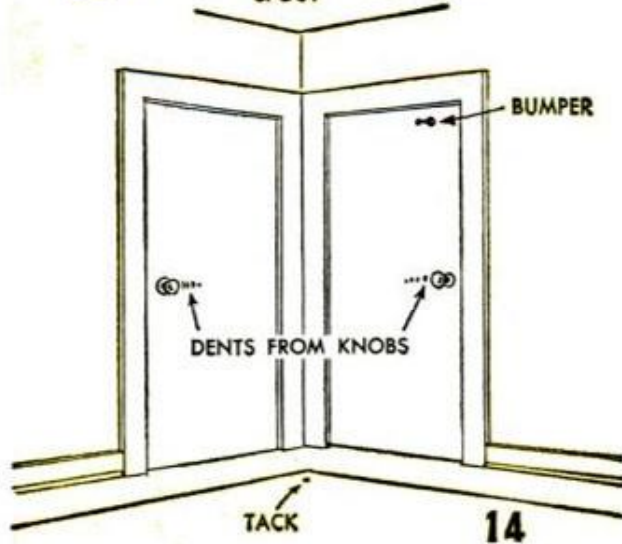
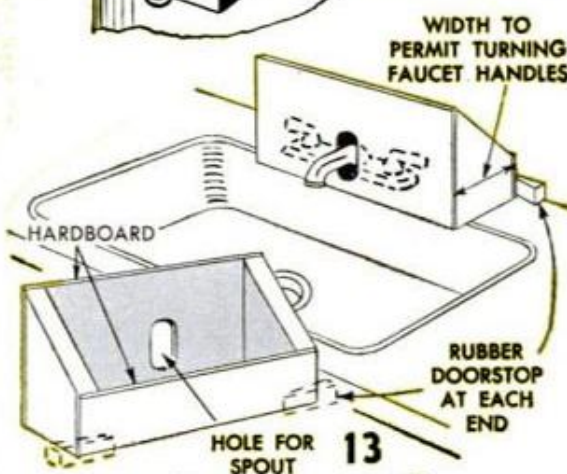
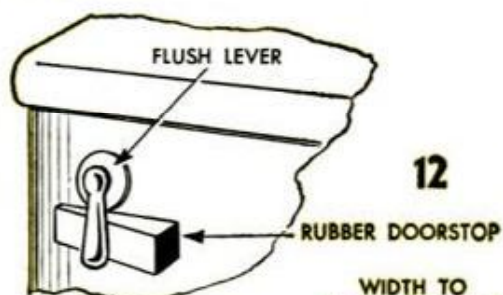
Top shelf's the best place for paint and varnish

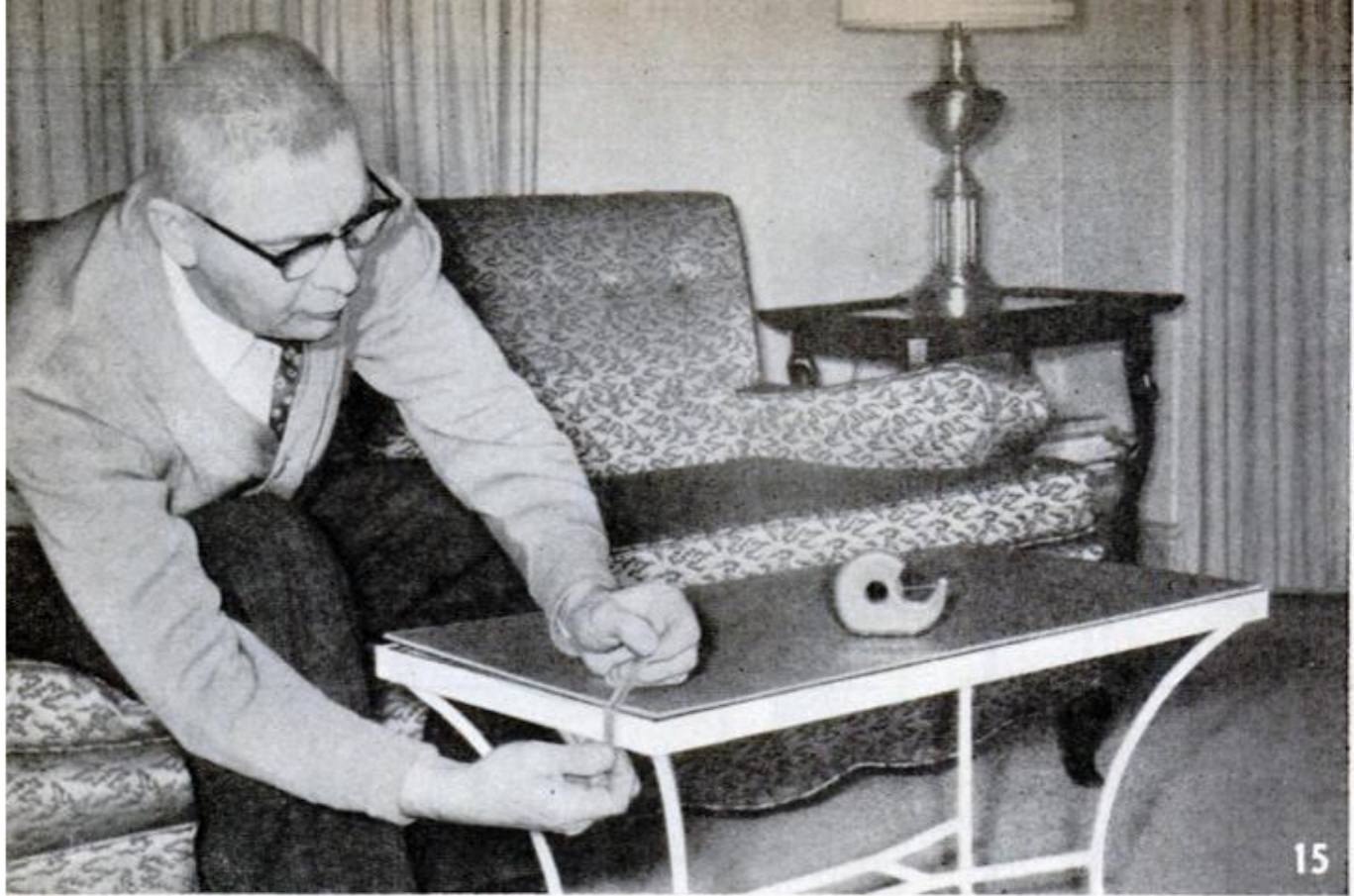
in use. Simply nail together a frame of 2 x 4s which fits snugly inside of the fireplace opening and cover this with hardboard, Fig. 6. It can be quickly removed when you're set for a cozy evening around the fire.

Nail It Down

With their seemingly inexhaustible supply of energy and a craze for creeping, crawling and climbing over everything, it would seem that the only way to keep everything from going to ruin would be to nail everything down. A table completely set with place setting and all, for example, just begs for that toddler to come along and pull the whole works down on the floor. This can't happen if a piece of tape is used with tacks and a safety pin, as in Fig. 7, to "pin" that cloth down. The little guy in Fig. 8 is in for a bad bruising, but it won't happen a second time if dad will attach an angle bracket to the shelf and screw it into a wall stud. His brother in Fig. 9 has seen mother light the stove time and again and those little knobs are just too much for him—he's got to try them. Fortunately, someone had foresight enough to cover the controls and knobs with an aluminum guard fitted onto suction cups, as illustrated.

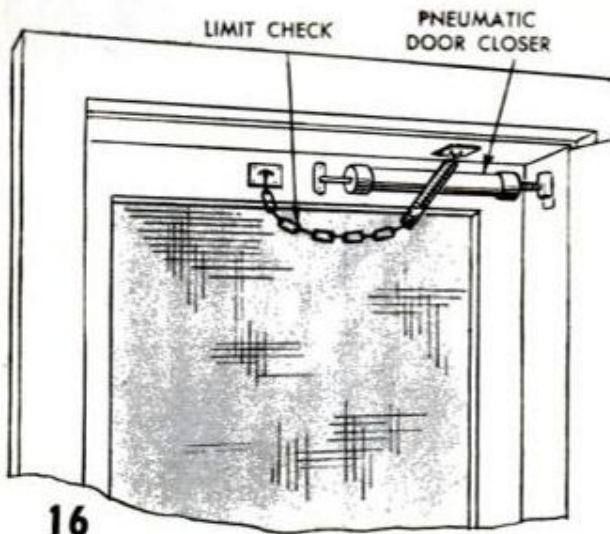
The shiny tools in dad's workshop too, will eventually become a source of fascination. But, it's when dad's away that the tots will want to play and the results can be havoc. A hinged door like the one in Fig. 10 can be locked, keeping the cabinet's contents out of the hands of unwelcome guests. The wise fellow in Fig. 11 stores his paints, varnish and the like on a shelf high enough to elude even the most ingenious and persistent of children. To play it double safe, better put your ladders away where the gang can't find them.





15

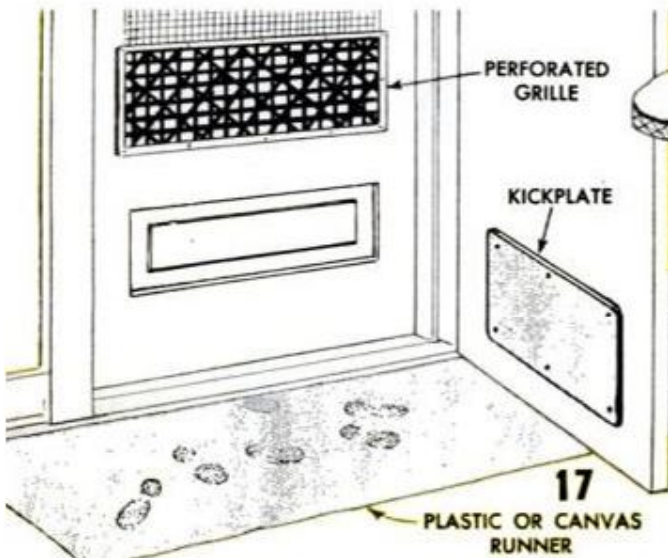
What's the lifespan of a glass-topped coffee table with kids around? Don't press your luck to find out. Play it safe and cover it with a piece of hardboard



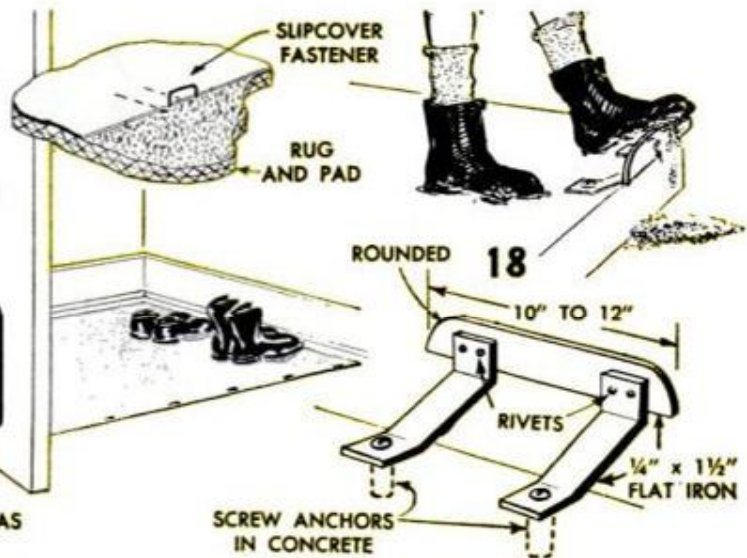
16

Water, Water Everywhere

And then there's running water. Ever watch a small child wrapped up in the fascination of running water? Sooner or later he'll want to get his hands in it, then float his toys and away we go until no source of water is sacred. One couple, harried to the point of exasperation, couldn't find a way to keep little miss trouble from dropping toys into the toilet bowl. Things got worse when she learned to flush it. Two or three plumbing bills later, dad hit on the idea of wedging a rubber door stop behind the flush lever—tight enough so that it could only be removed by an adult, Fig. 12. The kitchen sink too attracted



17



18

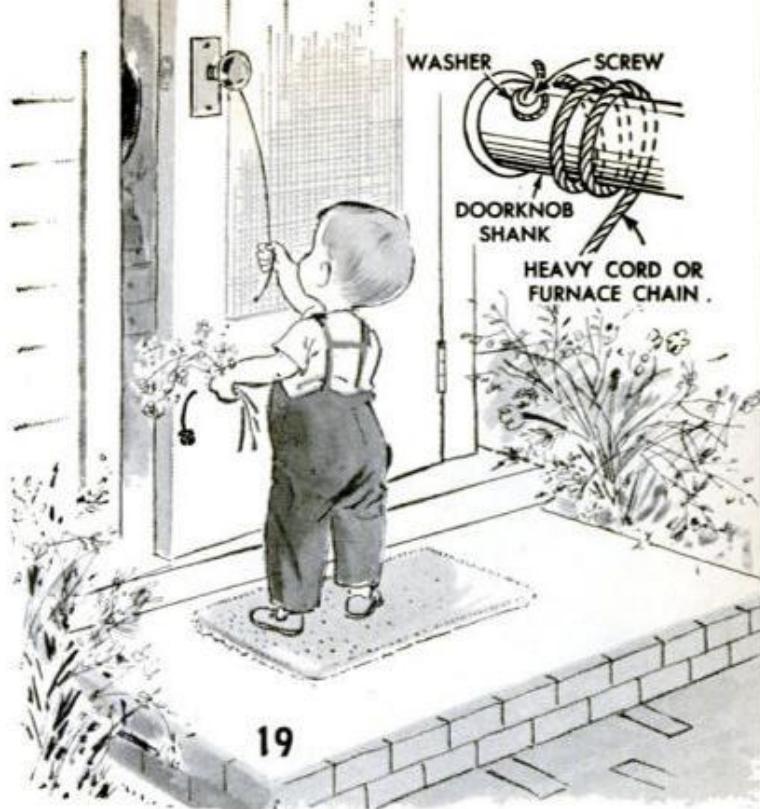
little miss trouble and she was forever "washing dishes" and making a general wet mess of things, herself included. Of course, there was always the danger she would scald herself with the hot water. The solution? A hood made of hardboard as shown in Fig. 13. The back portion of the hood was wedged between the faucet housing and the wall using two rubber door stops. This still left enough room for an adult to be able to reach in and turn the faucets on and off.

In and Out With a Bang

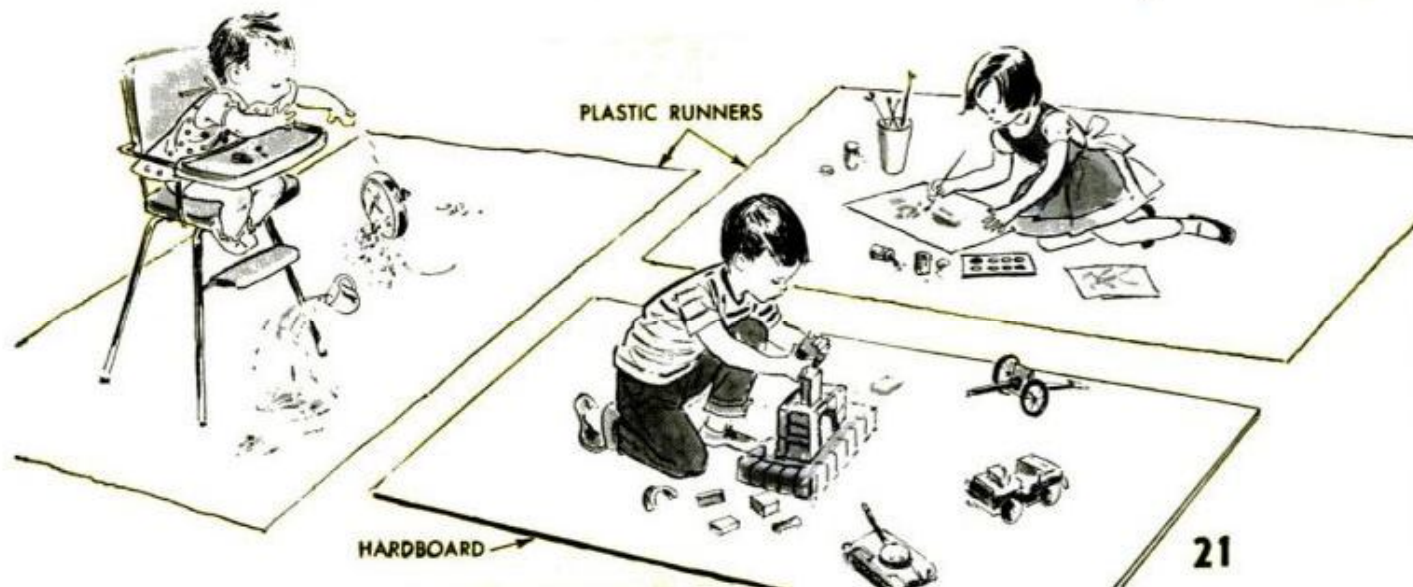
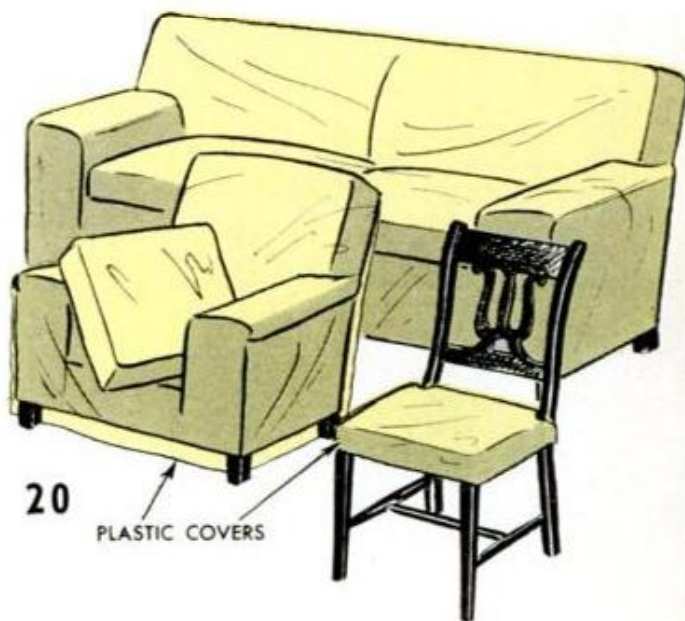
Doors, of course, are little more than a nuisance to six- and seven-year-olds and must be opened with as much haste and violence as possible—resulting in cracked plaster in the wall behind the door and marred finishes where doors are installed in a corner, as shown in Fig. 14. Since a word to a child is soon forgotten, the only answer is to locate a door stop at the top of one of the doors and to place resilient covers on the doorknobs. A tack placed on the corner of the rug will keep running feet from kicking the rug back and trampling on it—the short way to ruin for many a fine floor covering. And, speaking of doors, there's many a pneumatic door closer that has been ruined by a gang of youngsters pushing the door past the closer's limits. This is best prevented with a chain and spring mounted as shown in Fig. 16.

The more delicate pieces of furniture, like glass-topped coffee tables, are naturals for free-swinging kids. Rather than take odds on how long the glass top will last, cover it with a piece of hardboard or plywood as is being done in Fig. 15. Cellophane tape will hold it on and is easy to remove when company arrives and the kids are safe in bed.

(Continued to page 218)



No more whining at the screen door. Li'l Mike lets himself in with this handy door opener on the knob

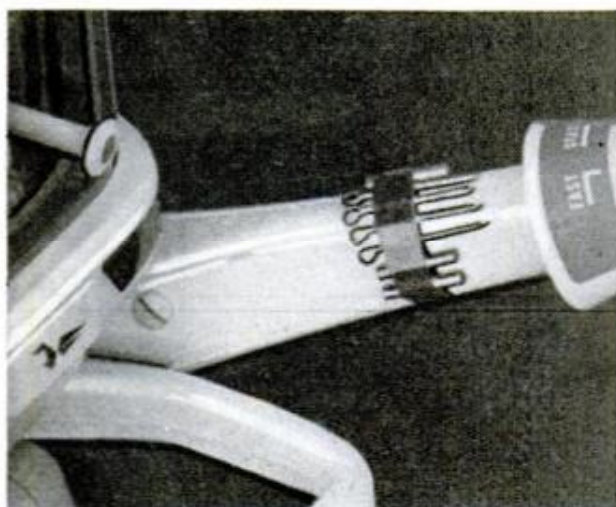




Rod Holder Made From Spools Is Fisherman's "Third Hand"

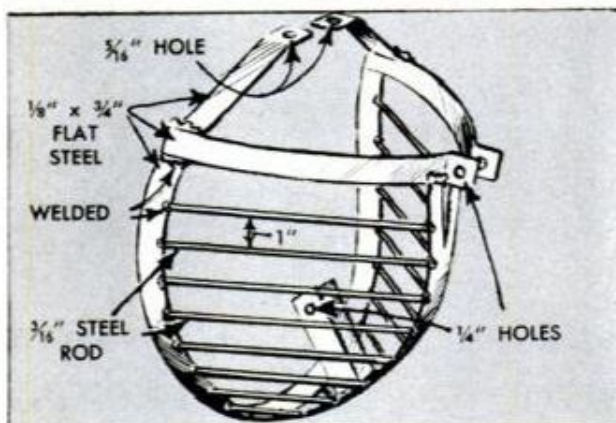
When still fishing from a small boat, there are times when a "third hand," like the one shown, is helpful for holding a rod or fishing pole, as when eating lunch, or rowing to change fishing locations. The holder is made from two large thread spools which are screwed to the inside of the boat at the gunwale. The angle and spacing of the spools depends upon individual preference and the rod or pole to be accommodated. For some boats a spacer block may be necessary to bring the lower spool in line with the upper one.

—G. E. Hendrickson



Spare Shear Pins Taped to Motor

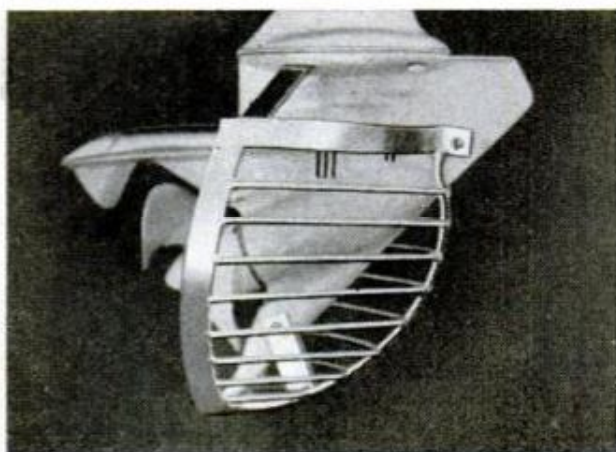
To always be sure that the correct size of propeller shear and cotter pins are on board and not back at the boat house or garage, tape several of each to the steering handle as shown in the photo. Any other easily accessible place on the motor will do just as well. Plastic tape should be used for this purpose because of its excellent adhesive qualities and resistance to moisture and oil. To hold the pins more securely and prevent the finish from being marred, it's a good idea to sandwich them between a short strip of tape and a longer one that can be wrapped around the motor part and overlapped on itself.

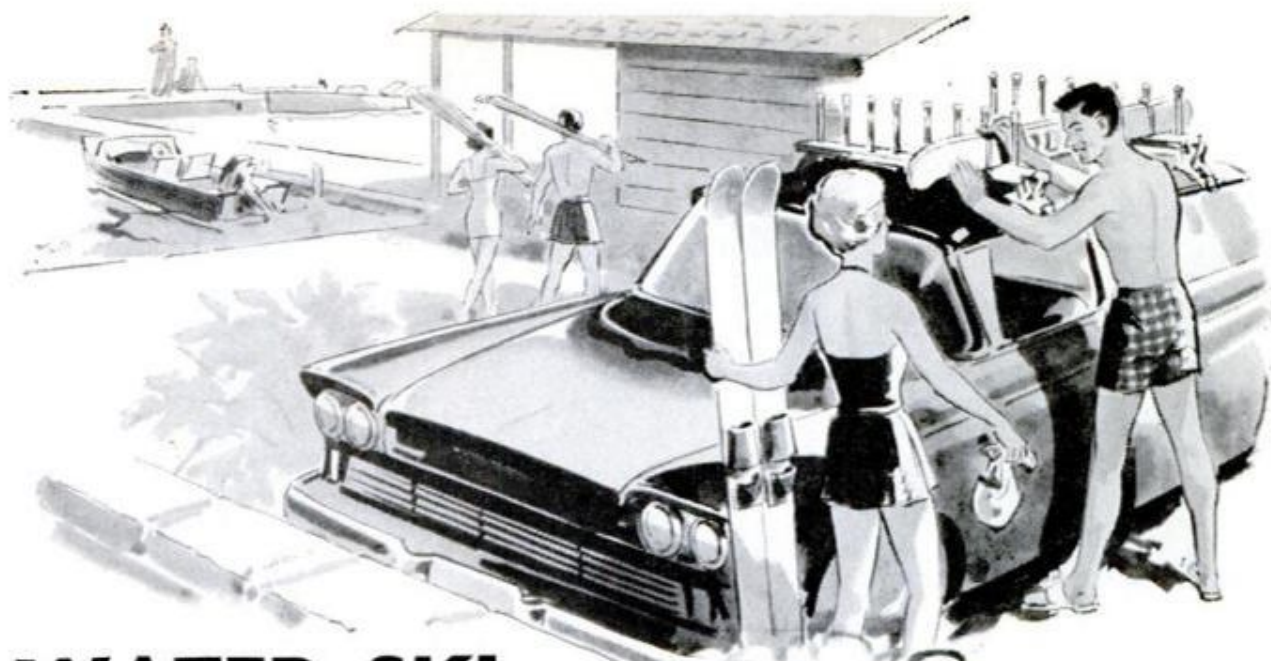


Guard for Trolling Motors Prevents Propeller Fouling

It is almost impossible to foul the propeller of an outboard motor with fishing lines or weeds, when a guard like this one is installed on the lower unit. The guard can be used on any trolling motor not radically different than the model pictured (lower unit only is shown). Dimensions are not given because there are various differences in the design of the lower unit of most brands of motors. However, construction details may be changed as necessary so that the device can be attached to most any trolling motor. The only requirements necessary are that the guard give the propeller a minimum clearance of $\frac{3}{4}$ in. and that it be fastened securely to the lower-unit housing. The unit is welded together from $\frac{1}{8}$ x $\frac{3}{4}$ -in. flat steel and $\frac{3}{16}$ -in. rod as detailed. The guard also will prevent damage to the propeller and save on shear pins, two advantages that can best be appreciated by the fishing enthusiast who frequents unfamiliar, rock-studded shoreline in search of the big ones.

—Wayne Judy





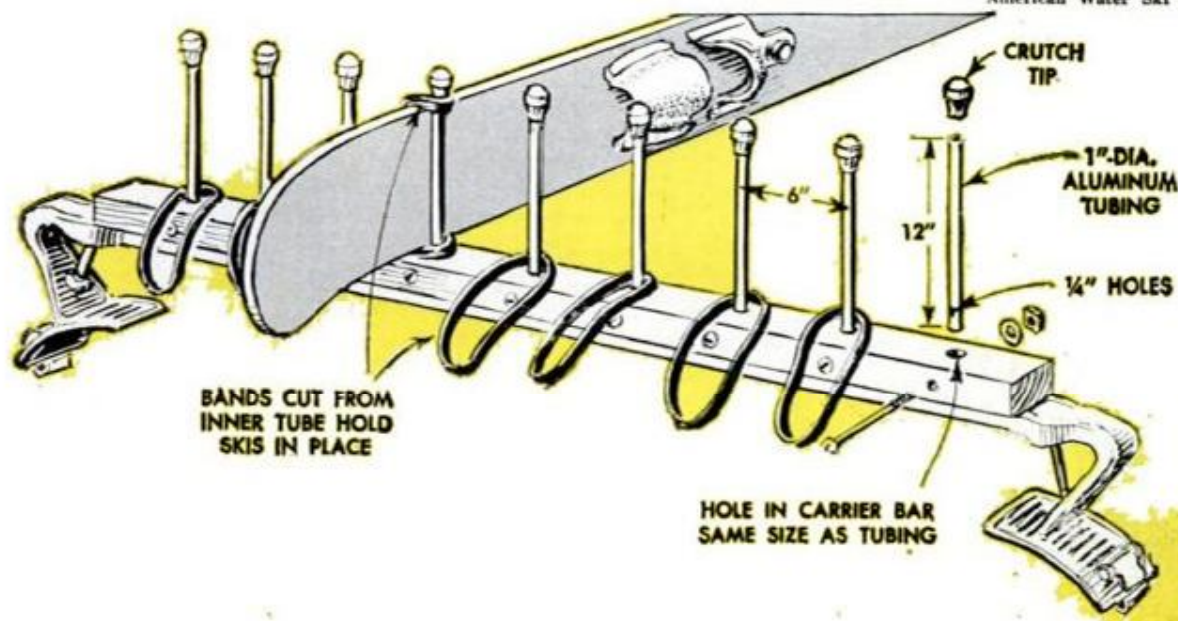
WATER SKI CARRIER RACK

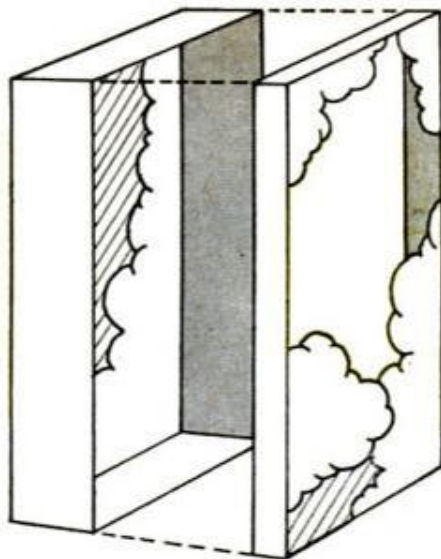
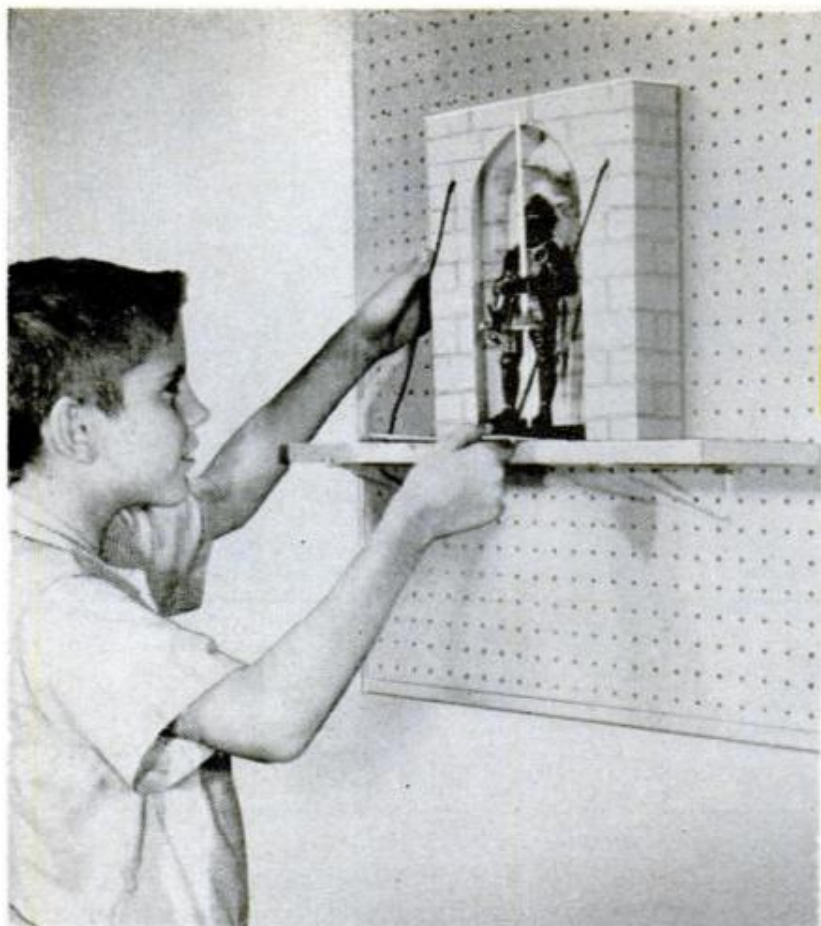
QUALITY WATER SKIS deserve good treatment, which is what they get when transported on these car-top carrier bars that can be adapted to handle as many as four pairs of regular skis and one slalom ski. The rig consists of two adjustable carrier bars which are screwed to $\frac{3}{4} \times 2\frac{5}{8}$ -in. mahogany crossbars and fitted with aluminum (tubing) pegs as shown in the drawing below. Several holes for fastening the wooden crossbars are drilled in each carrier bar to take No. 12 round-head screws. Note that each peg is fastened in its hole in the wooden crossbar by means of a $\frac{1}{4}$ -in. bolt that engages a hole in the peg when the latter is slipped in place.

Bands cut from an inner tube permit skis to be secured quickly on the rack in the manner shown. Rubber crutch tips are cemented on the ends of the pegs to prevent the bands from working loose, and to avoid injury to arms or damage to skis.

The crossbars may be coated with epoxy resin in place of varnish, in which case the resin can be used to cement the pegs in the holes. This will give a neater appearance than when bolts are used as shown. When doing this, saturate the end grain in the holes with resin before coating and inserting the pegs. Be sure to use epoxy resin as polyester will not adhere to metal.—W. W. Hewett

American Water Ski Assn.

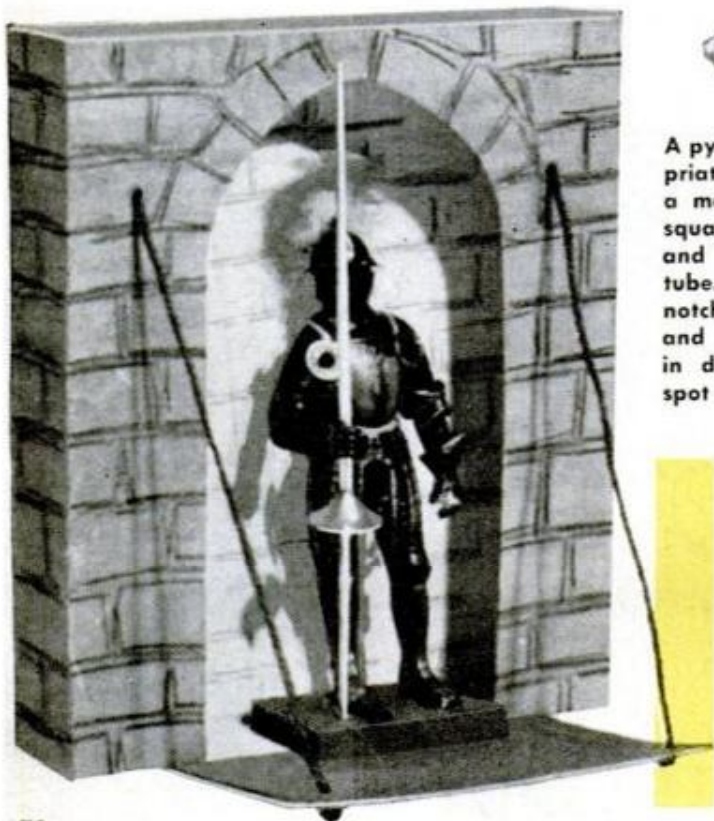




By
Frank N. Stephany

DISPLAY

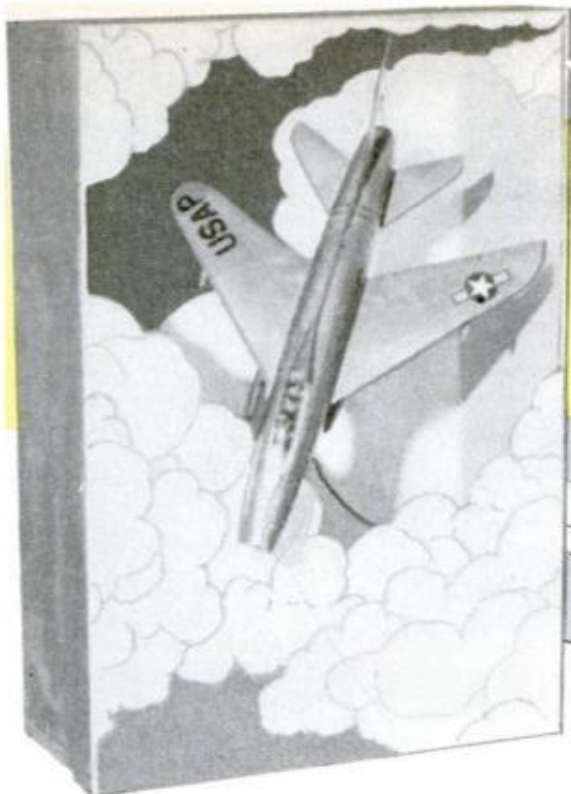
A castle drawbridge attached to a "stone" archway makes a fitting display case for a knight in armor. Archway is cut in box lid. Then lid and inside of box bottom are painted, and the stones are drawn with pencil or crayon. The cardboard drawbridge is painted brown to look like wood, after which it is taped to the box and supported by lifts of twine



A pylon makes an appropriate "trophy" base for a model plane. Base is square cardboard box and column is mailing tube. End of tube is notched to hold plane, and model is anchored in diving position with spot of airplane cement



POPULAR MECHANICS

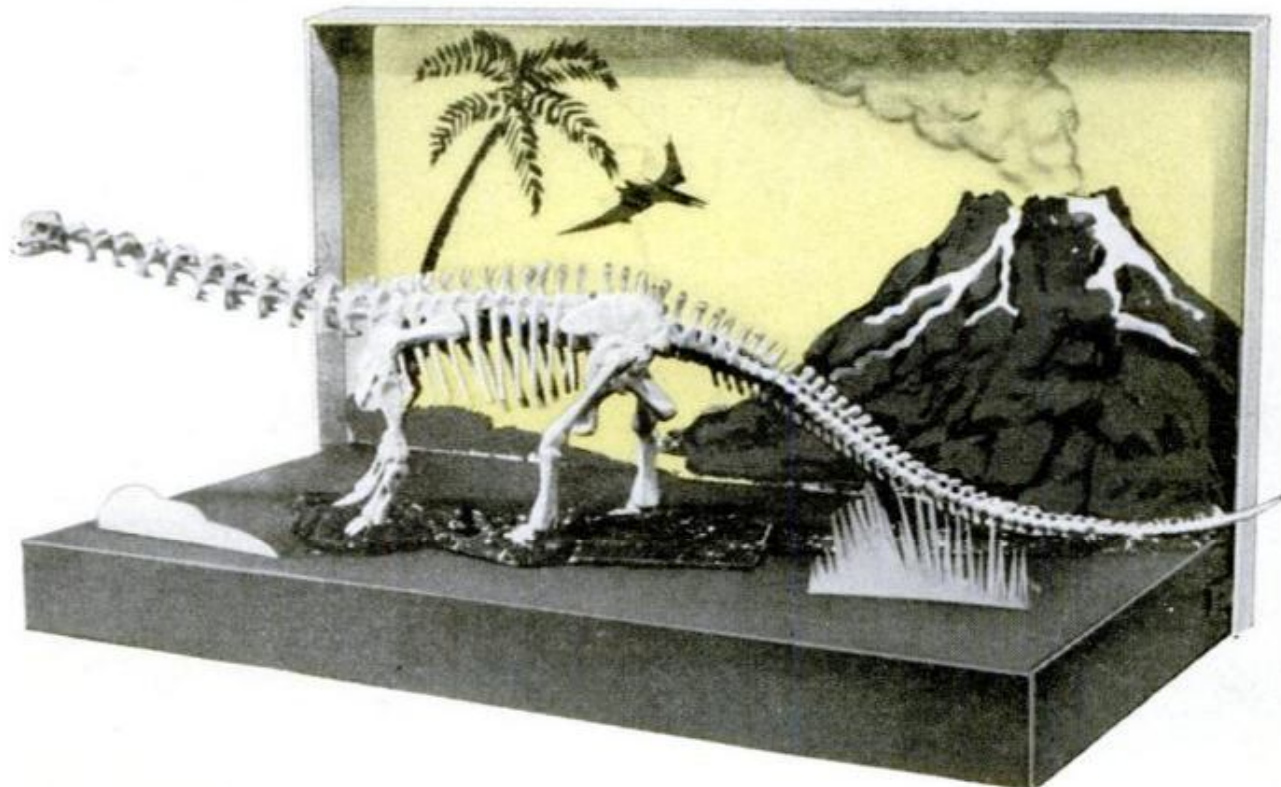


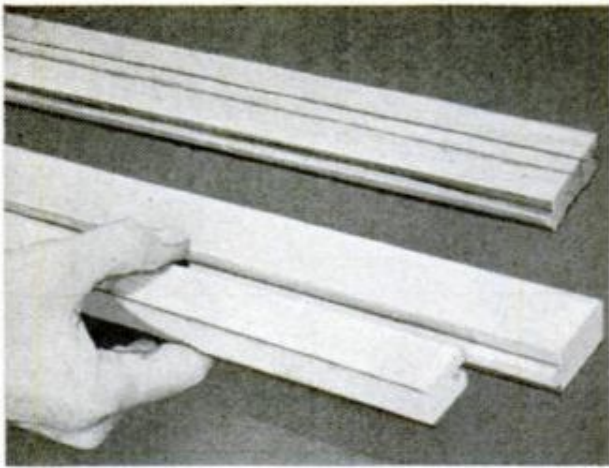
A 3-D cloud setting for diving plane is made from sturdy cardboard box. Draw cloud formations on lid and inside of box. Then cut opening in lid, paint sky light blue and suspend plane by picture wire

THOSE PLASTIC MODELS

REALISTIC plastic models are fun to assemble and paint. But once they're completed, they frequently end up on a closet shelf or even broken for lack of a place to put them. You can double the fun of building these models by making individual display cases for them. Made from cardboard gift boxes, shoe boxes and even cereal

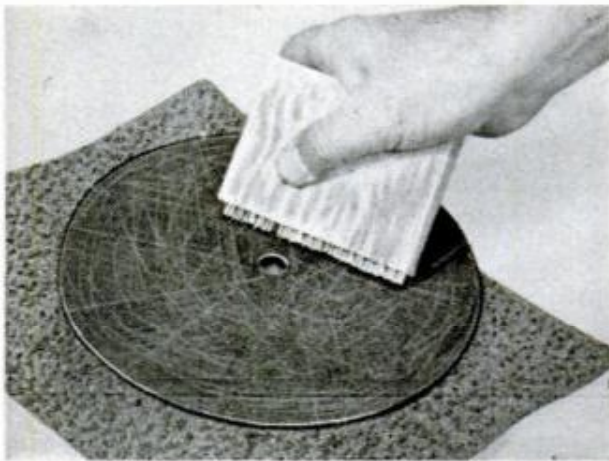
boxes, the display often can be designed to place a model in a setting which simulates its natural environment. The dinosaur skeleton set against a tropical volcanic background, the jet fighter diving out of the clouds and the black knight guarding the castle drawbridge are a few clever examples to get you started.





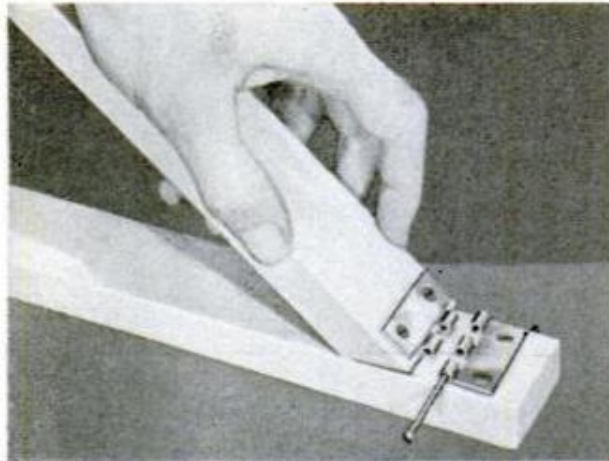
Sliding Parts Cut From Tongue-and-Groove Lumber

When drawer guides or similar sliding wooden parts are needed for a project, one home craftsman cuts the required tongue-and-groove parts from hardwood flooring. Usually, both the tongued and the grooved sections can be cut from the same piece, then matched end for end and fastened into the assembly as necessary. Not only does this method produce sliding parts that work smoothly but it eliminates the extra work of cutting the tongue-and-groove.



Hardboard Gluing Tip

You will get a better bond when joining other parts to the hard, smooth face of hardboard if it is roughened before applying the glue. This can be done easily with a special serrated surfacer made from a wooden block and a few corrugated fasteners. The fasteners are inserted in a shallow saw kerf cut in one edge of the block. To insure a tight fit, the fasteners are bent slightly so as to apply tension against the sides of the kerf.—Bill Toman



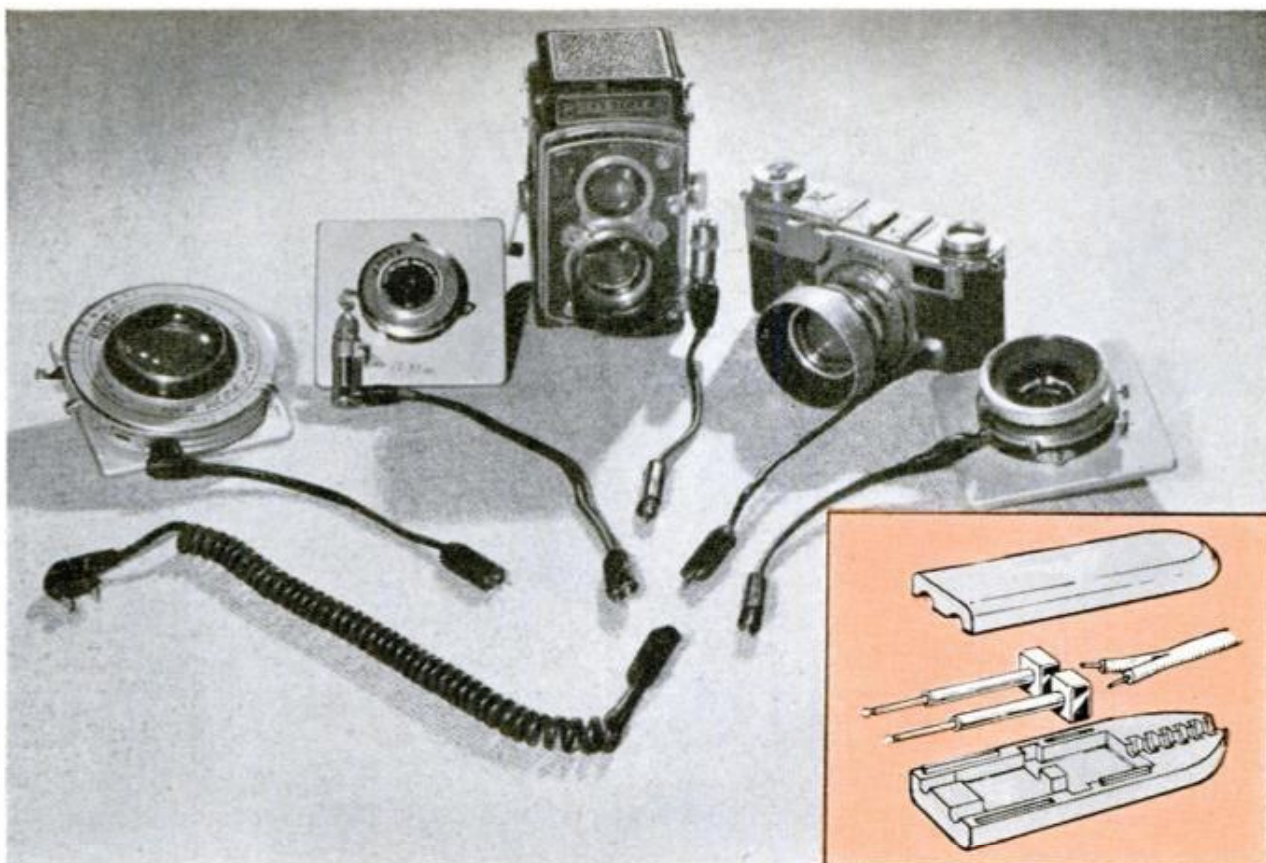
Equipment Assembled With Hinges

Portable equipment, such as an artist's easel, folding room divider, or camping tables, can be quickly assembled or dismantled when the parts are joined together with loose-pin hinges. This manner of assembly permits large pieces of equipment to be handled easily and stored in a fraction of the space required for permanently assembled pieces. Joints are made simply by screwing one hinge leaf to each member so that they will align as shown. Pins may be tied or taped to members to prevent loss.



C-Clamp Provides Non-Tip Base For Touch-Up Container

When painting from a small bottle or can of paint, the container will be less likely to become overturned accidentally if it is held with a small C-clamp in the manner shown at left. The clamp provides additional weight and temporarily enlarges the base, making it almost impossible to upset the container. Using a larger clamp, the same idea may be employed to prevent a larger partially filled container from being upset.—R. Hanscom



UNIVERSAL FLASH-GUN CORD

Most professional photographers have more than one camera as well as several lenses for each one. Their choice of lenses and shutters varies to suit their particular fields, but not all shutters have the same flash contacts. This means that separate cords are required for each camera, and since two separate lengths of cord are also required—a short one for on-camera work and a long one for off-camera work—the photographer is burdened with many cords. To lessen the number of cords needed, one *PM* photographer fitted a jack to the end of each short cord so it could be plugged into a single universal cord which

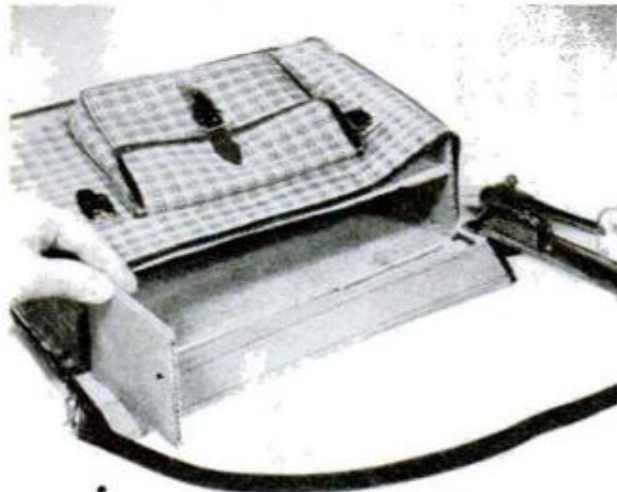
was fitted with a matching plug. The plugs and jacks are available at most radio supply houses and consist of two halves which are cemented together after the prongs are carefully soldered to the bared ends of the flash-gun cords. It is well to test the connections before cementing the two parts of the jacks together. This can be done with a continuity tester or simply by trying to fire a flash bulb. An added advantage in using the jacks is that in case of an accident where the flashgun might fall, the plugs and jacks will separate right away before the flash contacts will pull off the shutter housing and be damaged.

Can Label Serves as "Stand-In" When Focusing on Dark Objects

A stunt worth remembering when trying to focus sharply on a dark object which in itself offers no clear point of focus, such as an all-black object, is to use the lettering of the label on a can or package as a "stand-in". Placed alongside the object and at the center of focus, the clear-cut lettering permits pinpoint focusing which in turn brings the object to be photographed into the same sharp focus. The can, of course, is removed before the exposure is made. This idea also is helpful when working in dim light or with failing eyesight making critical focusing difficult.



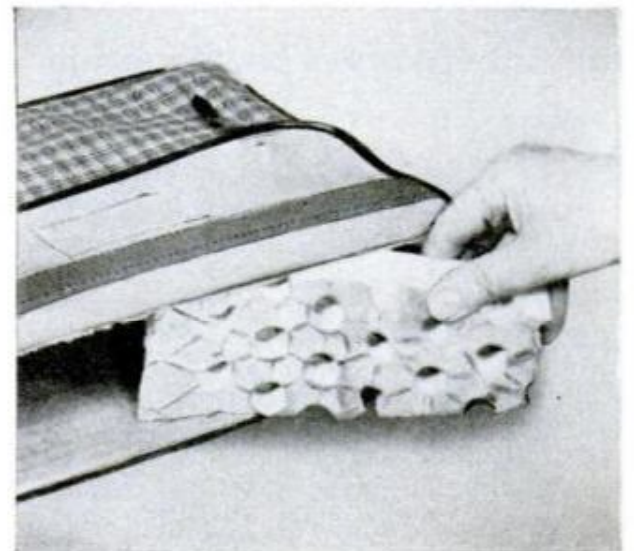
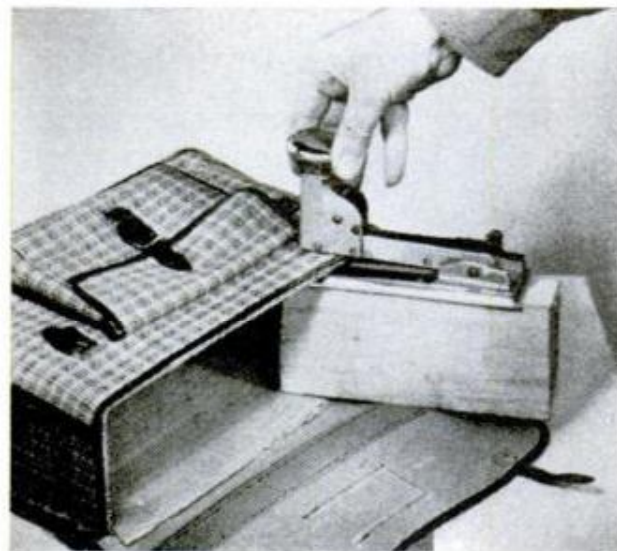
TOTE BAG FOR SHUTTER BUGS

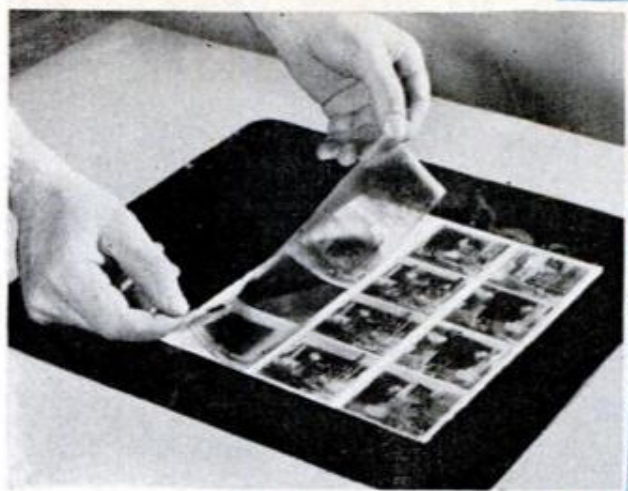


FROM SCHOOL BAG to camera gadget bag in a few minutes—it's as simple as that to convert an inexpensive plastic bag to accommodate a camera, flash equipment, tripod, light meter and extra film. Any school bag having a shoulder strap will do for this purpose. The conversion consists of backing up the bottom, sides, front and back of the bag with pieces of corrugated cardboard to stiffen it. A piece of foam rubber cemented to the bottom cardboard helps to protect the camera and meter from shock or jolting. Note how a wooden block is used to support the stapler at the right height when fastening the cardboard to the bag.—H. Leeper

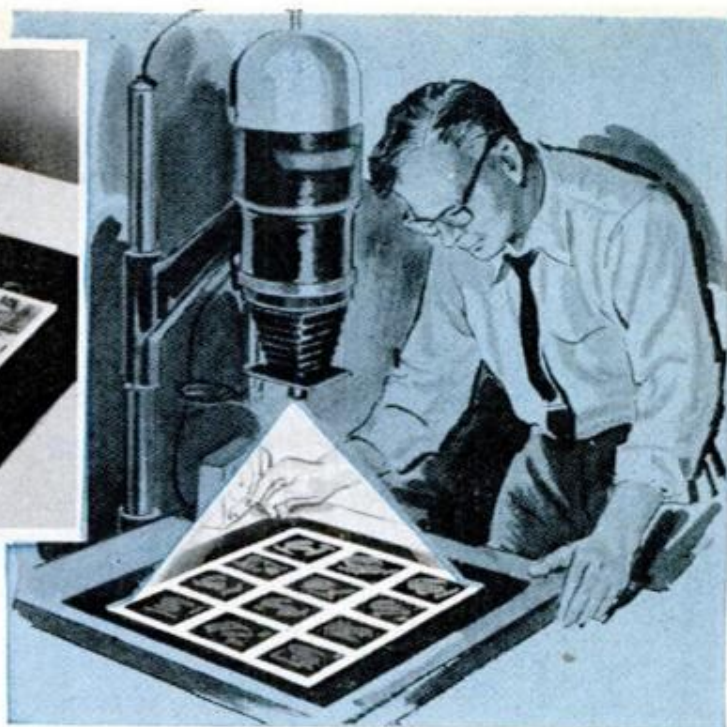
Above, first step of conversion is to cut cardboard stiffening pieces to fit snugly inside of bag at bottom, sides, front and back. Below, block is used to hold stapler in position while fastening cardboard

Piece of foam rubber is cemented to bottom piece of cardboard, which is then cemented to bottom of bag to provide cushioning for camera and meter. Cardboard lining may be finished with a coat of liquid rubber





To make contact prints from wet negatives, wet enlarging paper is placed on ferrotype plate, after which negative strips are placed on top of paper, emulsion to emulsion, and exposed with the enlarger light



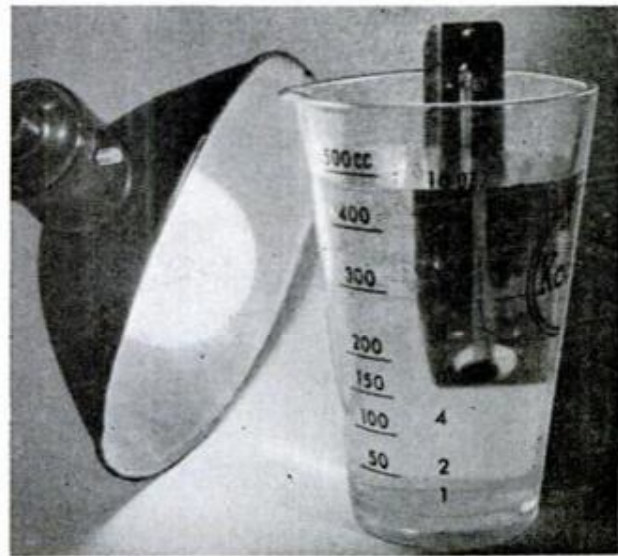
QUICK CONTACTS FROM WET NEGATIVES

For the photography hobbyist who wants contact prints in a hurry, here is an easy way of producing them without having to wait until processed negatives are dry. An enlarger and a ferrotype plate are the only pieces of darkroom equipment needed to do this. Begin by immersing an unexposed sheet of 8 x 10-in. enlarging paper in water for a few minutes. Then, allow it to drain while cutting the film into strips of four

frames. Place the paper, emulsion side up, on the ferrotype plate and arrange the negative strips on top, emulsion side down. Wipe lightly with a damp sponge to flatten the negatives. Then expose the paper in the same manner as when using a contact printer. After exposure, immerse the negatives and paper in water to separate them, as the emulsion surfaces tend to adhere to each other.—G. Robert Smith

Bandage boxes of the type shown make handy pocket-size carrying cases for 35-mm. film cartridges when they are removed from their containers and wrapped in metal foil. One box is used for unexposed film, one for exposed. — Walter E. Burton

Solutions for film processing can be warmed to the correct temperatures quickly and easily by beaming a 100 to 200-watt light bulb on the solution in a graduate. Use a gooseneck desk lamp or photo flood reflector to concentrate the heat.





Trouble Shooting THE TOUGH ONES

By Ben L. Davis

IN THE auto-repair business it seems there's always something to learn—and sometimes it's enough to throw you. For instance, about a week ago a woman phoned. It seems she had been out of town for about a week and had left her car parked in the garage. Now she wanted to know if it were possible for tires to look round and yet, despite a pressure check, run as though one of them were flat. I suggested that we be allowed to look over the car and a short while and a few blocks later, we saw what she meant. The car *did* run as though it had a flat. An examination of the tires revealed a crack in the inside of the casing of the left rear tire. Since the right rear was also in poor shape, we advised her to buy two new tires. She did, and no further thought was given the matter—until a few days later on a Friday. Same voice, same complaint. Again the trouble seemed to have occurred after the car had been standing in the garage a few days, and had been noticeable for only about the first half hour of driving. This made it appear the new tires were not needed. Frankly, my face was red.

In desperation I checked the wheels for balance, the shocks, tire pressure and the entire chassis for looseness—all for nothing. I gave up then and ordered the car parked for the owner to pick up the following Monday.

But I couldn't get the thing out of my mind. Few jobs had ever "bugged" me the way this one did. Early Monday morning I took the car for a spin and sure enough, there was that *whump, whump* sound, just like a flat. On a hunch, I overinflated each of the tires in turn by 20 lbs. The ride was smoothed considerably each time. This appeared to me to narrow the thing down and point to the tires as being at fault.

It wasn't until I heard from the manufacturer's agent that the mystery was solved. He informed me that new nylon cord will tend to hold its deflected shape. Thus, if a car is parked for a good length of time, part of the cord on which the weight of the car rests will remain flat for a short while until it can "snap back". The tire will recover its shape when the car has been driven a spell and the cord has had a chance to regain its resiliency.

Unusual Locations Where Trouble May Occur

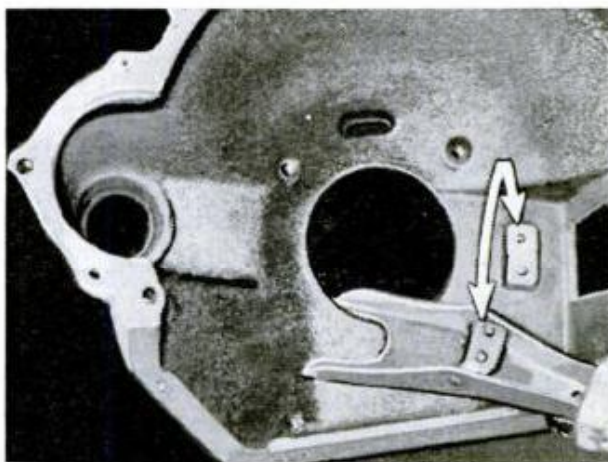
Powerglide Reverse Gear

Drivers who habitually give their automatic transmissions a hard time will most probably run into trouble before long. On the '58 Chevy Powerglide this often turns up as a malfunction of the reverse gear. If your indicator reads "Reverse" and the car won't move, the chances are you've gunned the engine unnecessarily either during or immediately after having moved the shift lever and now have a broken reverse band. Automatic transmissions will give good service if you just treat them right.



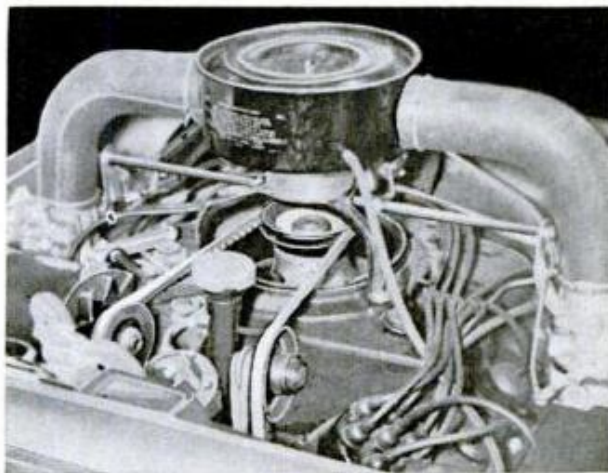
Ford Clutch Fork

If your '58 Ford with standard transmission suddenly develops excessive clutch play, the clutch fork may have possibly broken away from its fulcrum. This will make it virtually impossible to adjust the clutch for clean, clear shifting. The fork is held by a spring-wire to an L-shaped bracket and the bracket is riveted to the inside of the bell housing. Under severe strain the rivets may have sheared. If so, they may be drilled out and a pair of 1/4-in. bolts and nuts substituted.



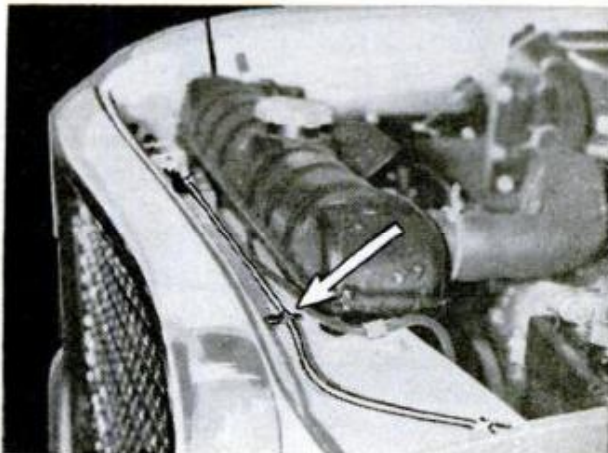
Corvair Fan Belt

With all its innovations, the new Corvair may be expected to produce a few eccentricities of its own. For instance, watch that fan belt and be sure to have it tightened after the first few hundred miles. Because of the various angles through which it runs the belt may twist or "flop over" if allowed to operate on the loose side, and you're almost sure to lose it. A generator-warning dash light that flashes at fairly high road speeds also may be an indication of belt failure. So, play it safe and carry a spare, especially on long trips.



Lark Hood-Release Cable

Another one of those little annoyances that take much of the kick out of owning a new car may pop up on the '59 or the '60 Studebaker Lark. Keep an eye on the clip that holds the hood-release cable housing, indicated in the photograph at the right. If allowed to loosen its grip, the housing will creep and the opening action of the cable itself will be canceled out. No amount of pulling on the release handle will do any good and you'll find yourself stuck with a locked hood.





Use Cardboard Mount as Aid For Choosing Best View

Ever wish you could check the framing of a scene without setting up your camera? For this purpose an empty cardboard transparency mount makes an excellent "view checker." Just hold the mount in front of you. Then, looking through it with one eye, move the mount about until you obtain the desired framing. By moving the mount closer or farther from your eye you can regulate the size of the scene. This allows you to select the proper camera angle and distance without delay. With practice you'll learn how far to hold the mount from your eye so that the view corresponds, approximately, with the field of the camera lens. For other negative sizes, cut additional viewers from pieces of cardboard.

Walter E. Burton, Akron, Ohio



Tin Can Makes Hard-to-Spill Ash Tray for Your Boat

An ash tray for a boat, one that isn't easy to spill, can be improvised from a short section of screen-door spring and a tin can. Stretch the spring so that the turns are about $\frac{1}{4}$ in. apart and bend as shown. The ends clip over edges of can to form a convenient cigarette holder. When it's necessary to bail out the boat, the can will serve as an emergency bailer.

Ken Murray, Colon, Mich.

☐ Ink stains on the fingers can be removed simply by dampening the head of a sulphur match and then rubbing the match briskly over the stains.

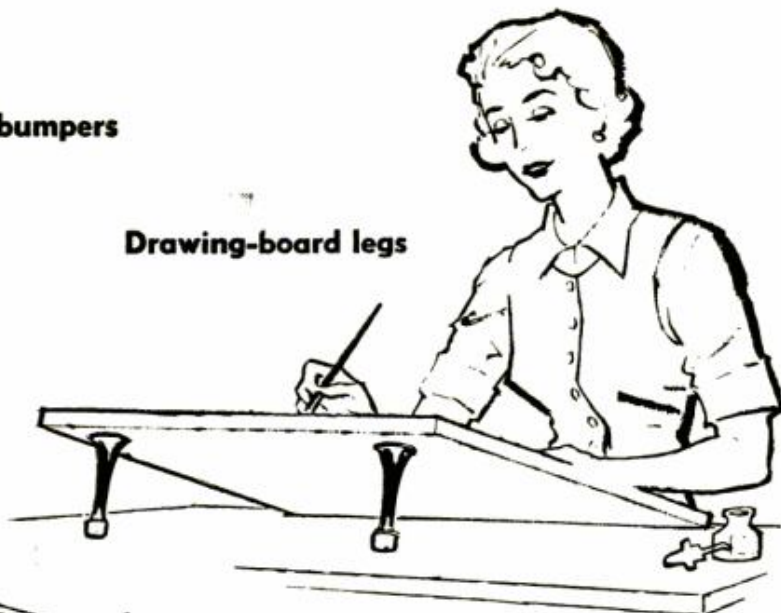
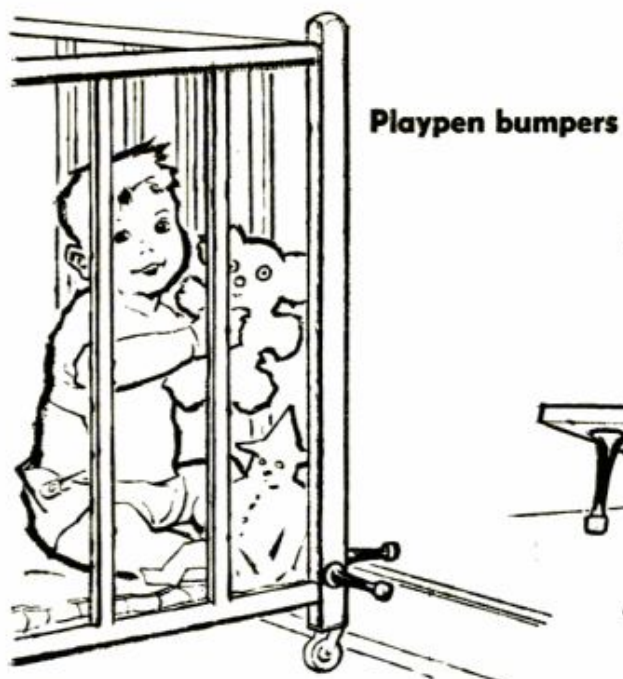


Yardstick Finds Tiny Objects Dropped on Floor

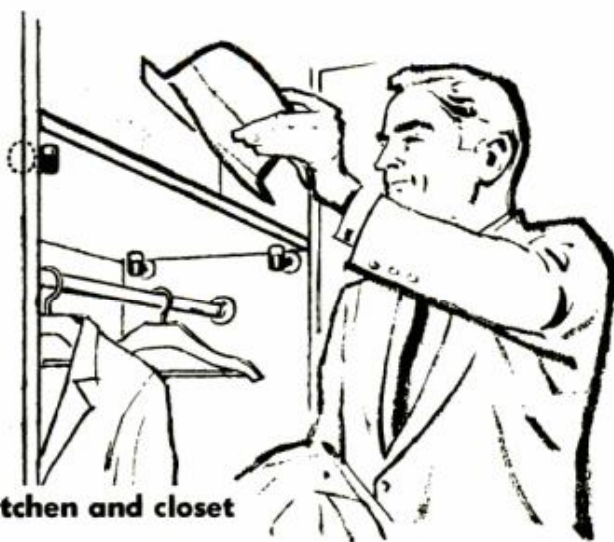
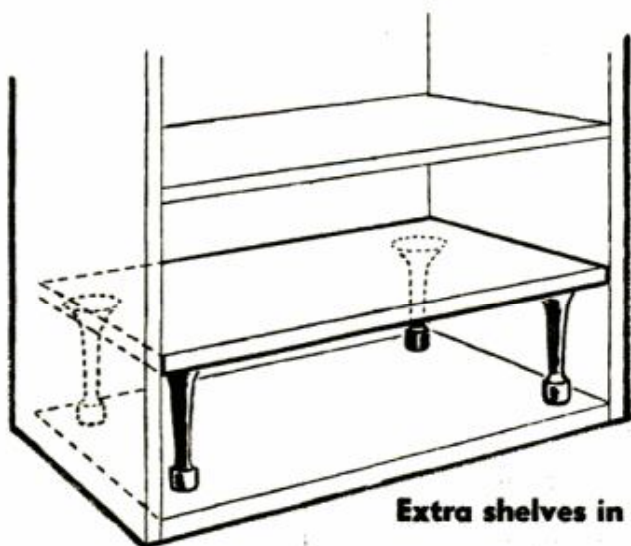
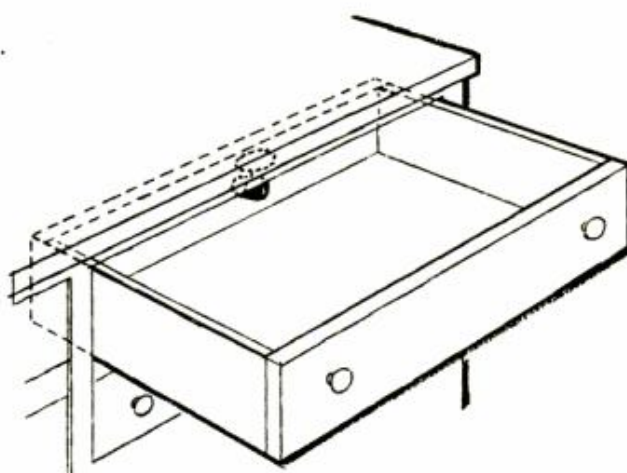
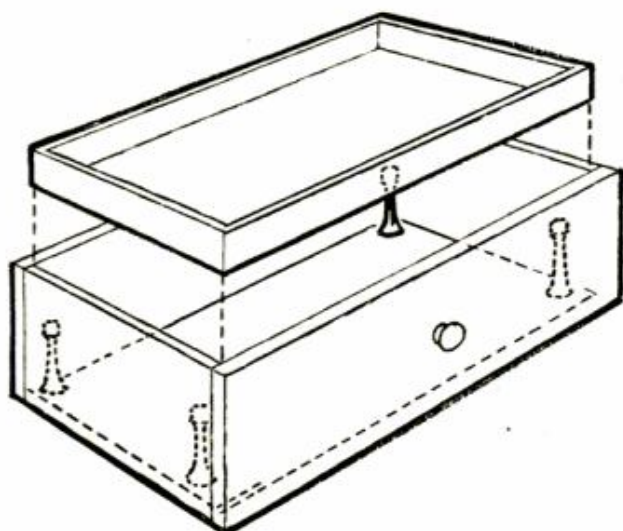
When you have about given up looking for a tiny screw or other object dropped on the floor, remember that a yardstick will often make up for dim light or failing eyesight. Held by the edge and scraped slowly across the floor, the yardstick will generally round up the errant item which can be retrieved by looking along the yardstick. In most cases, the lost object will be there. — Robert L. Sagisson, Berwyn, Ill.

☐ Heating run-down flashlight batteries on the exhaust manifold of your car will rejuvenate them long enough to allow you a chance to make minor repairs. When the flashlight becomes dim, remove batteries and place them on the hot exhaust manifold for about five minutes.

Frederic H. Burrall, Gainesville, Fla.



6 WAYS TO USE DOORSTOPS





On the MARKET

for Do-It-Yourselfers

1. DECORATIVE GLASS-FIBER PANEL features a random pattern in multi-colored leaves, butterflies and gold flecks in a frost background. Comes in 4 x 12-ft. panels. The material is shatterproof, lightweight and can be cut, drilled and nailed with ordinary hand tools. Can be worked into translucent room dividers, shoji screens and luminous ceilings
 Filon Plastics Corp., 333 N. Van Ness Ave., Hawthorne, Calif.

Cut of Business

2. WHEN INTERMIXED, this new adhesive and sealant makes a permanent repair on porcelain, glass fiber, aluminum, marble, steel, masonry, glass, wood, plastic, leather, cork and fabric. It's waterproof, non-flammable and resists breakdown by oil and chemicals. Repair can be painted, filed, drilled and sanded. Comes in two self-measuring tubes with instructions
 R. H. Fisher & Co., 117 West 21st St., Norfolk 17, Va.



3. FILTER MATERIAL for air conditioners removes dirt, dust and pollens with a minimum reduction of air flow. Cut it to fit with scissors, wash it clean in soapy water and rinse out the accumulated dirt. It's a permanent filter material; requires no frame or other support. Filter also is specially treated to destroy the common airborne bacteria and fungi
 The Campbell Co., P. O. Box 151, Lansdale, Pa.

4. FIRE EXTINGUISHING WASTE RECEPTACLE utilizes smoke from a fire originating inside it as the extinguishing agent. Should fire start in the receptacle by spontaneous combustion or from other causes, the resulting smoke is diverted back across the top opening, thus preventing oxygen from reaching the flame. Operates without any chemicals or any moving parts
 Rock Royal Corp., 120 S. La Salle St., Chicago 3, Ill.

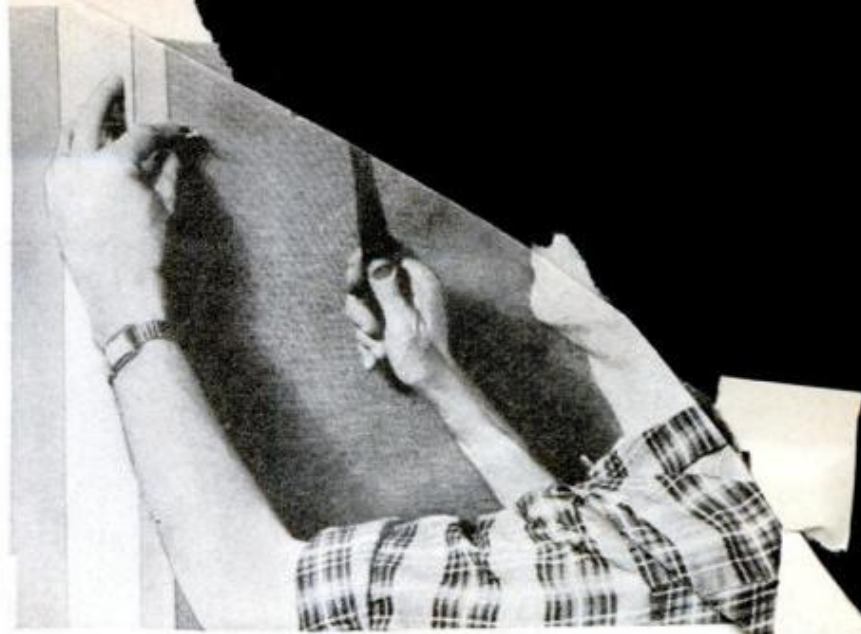




5

5. VINYL-FINISHED WALLBOARD comes with a textured surface, goes up just like regular plasterboard. It's the surface that does the decorating job; you build and decorate rooms in one operation. Available in 5 colors, the textured surface simulates colored burlap and other decorative wall fabrics and wallpapers. It's washable, takes bumps, scuffs, and stains without permanent damage. Available in panels 4 ft. wide

National Gypsum Co., Buffalo 2, N. Y.



6. BELLOWS-TYPE DISPENSER of plastic works something like an oilcan, spreads a special glue in drops for pinpoint applications or in a continuous stream, or bead, for covering larger areas. A special feature of the cap is a spiked top which is clipped or snapped off to open. Reversed the top forms a sealer for the container, preventing the glue from hardening in the opening. Available in 2 and 4-oz. sizes

United States Plywood Corp., 55 W. 44th St., New York 36, N. Y.



6

7. RUST REMOVER converts rust coating into colorless salts which are soluble in water. Simply coat the rusty surface, allow plenty of time for the remover to act, then rinse away with clean water. Can be applied to any ferrous metal or fabric except artificial silk without harm. Removes rust stains from sinks and bathtubs, from garden tools, from kitchen cutlery without damaging the metal in any way

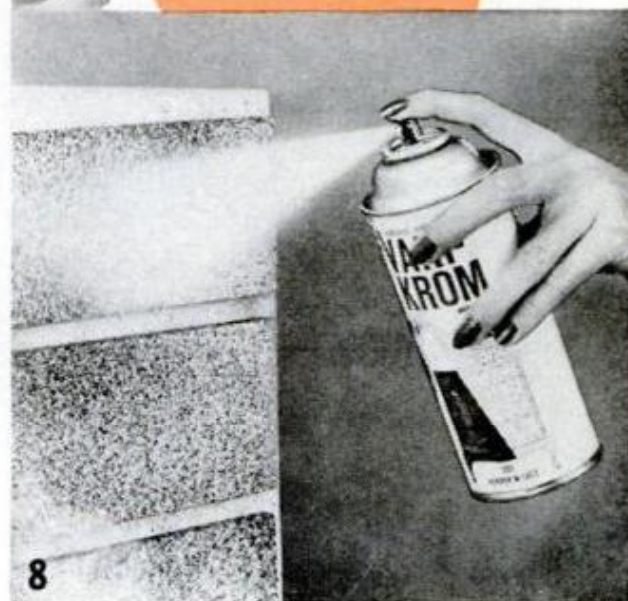
Wewoka Trading Co., Wewoka, Okla.



7

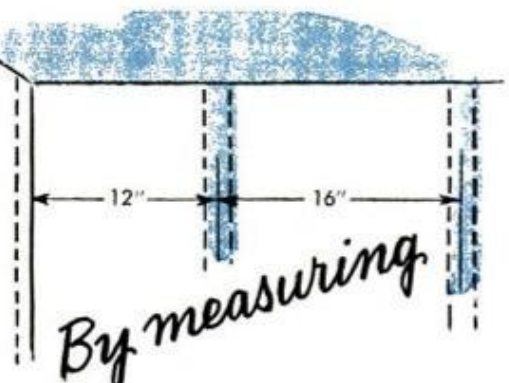
8. MULTI-COLOR SPATTER PAINT goes right on over any old finish. Covers in one coat and dries to a tile-tough, textured finish that is scrubbable. Makes old furniture look just like new. Comes in 8 colors, a gold fleck on white; black flecks on white; white flecks on gray; taupe and white flecks on beige; white and gray flecks on pink; blue flecks on white and light and dark green flecks on white

Vari-Krom, Inc., Hoboken, N. J.



8

DOWSING for STUDS



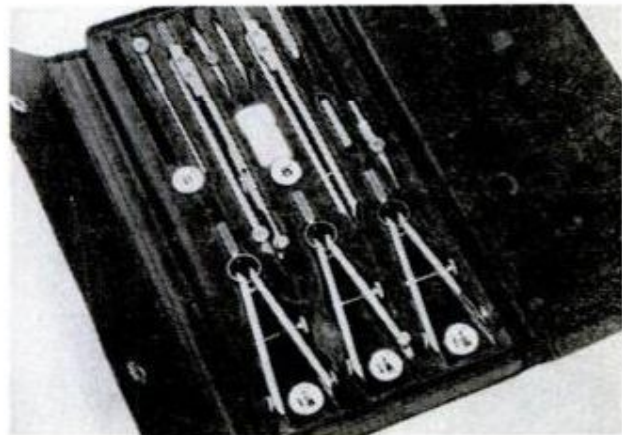
Rubber Hose Over Rim Cushions Edge of Tub

When a common steel washtub is used as a wading pool for tykes you'll make it more comfortable for them to sit on the rim if it is padded with a length of rubber or plastic hose. This requires slitting one wall of the hose so it can be forced over the rolled rim of the tub. If you want to go a step farther, a wide plywood seat can be added to the tub in the form of a king-sized stool with the center cut out. Jigsawed in the form of a ring from waterproof plywood, the top is supported with four legs, these being long enough to rest on the ground and center the plywood ring over the tub. The center cutout is made smaller than the diameter of the tub so the seat will rest on the rim. Made about 12 in. wide, the seat will provide a comfortable ledge all around. A coat or two of paint will help protect the wood.



Labels in Drafting Case Give Instruments' Capacity

Draftsmen will find that time will be saved in selecting the proper piece of equipment if the maximum settings for dividers, pens, compasses and other drawing instruments are marked on small labels and fastened to the case near each instrument. The labels may be fastened in place with rubber cement or water-soluble paste so that they may be removed easily if necessary.—H. Hanscom, Elmhurst, Ill.



Bench-Top Dust "Drawer" Catches Shavings and Chips

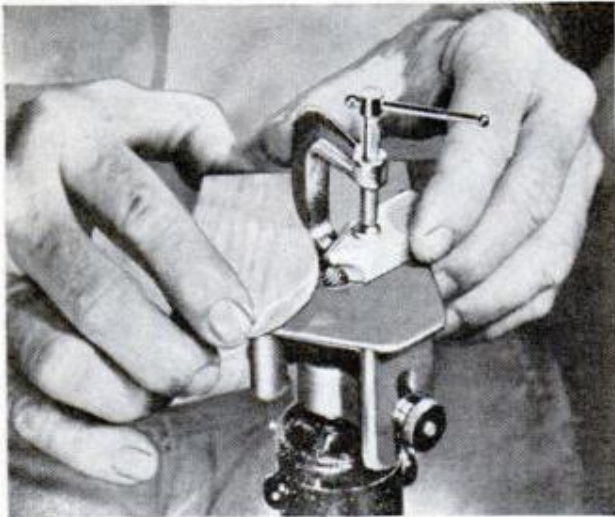
What could be handier for keeping your bench top clean than this pull-out dust bag. Located underneath, it pulls out like a drawer, making it convenient as can be to whisk the top clean of sawdust and chips with a sweep of a brush. When full, it is an easy matter to empty the bag. The unit consists of a frame of 1 x 2-in. stock about 16 in. square. A cloth bag is tacked to the inside edge of the frame, and the whole affair slides in and out on L-shape runners attached to the bench top.

—G. E. Hendrickson

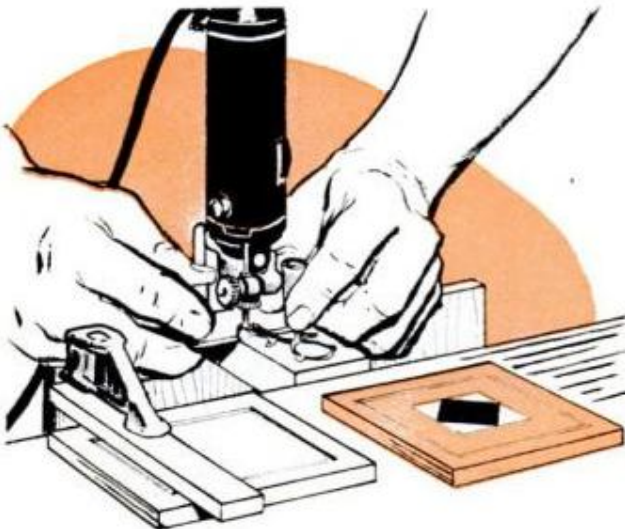
Paint blisters require special treatment before repainting. First, remove all loose paint particles, then sand the surface with coarse sandpaper to feather the edges of the shallow recess smoothly into the adjacent paint film. Follow with fine sandpaper to remove scratches. Then dust thoroughly.



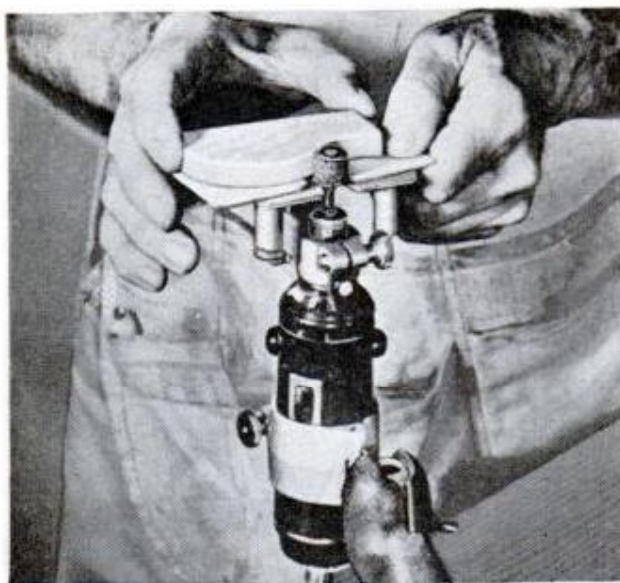
SHOP NOTES



Used with rotary-file accessories of various shapes, a hand grinder in a fixture makes high-speed shaper



Above, used with veining bits, a hand grinder can't be beat as a router. Below, it's a spindle sander



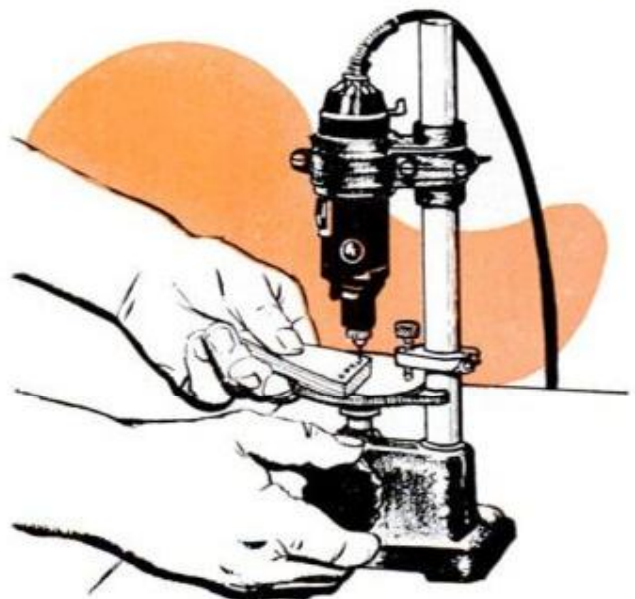
HAND GRINDER

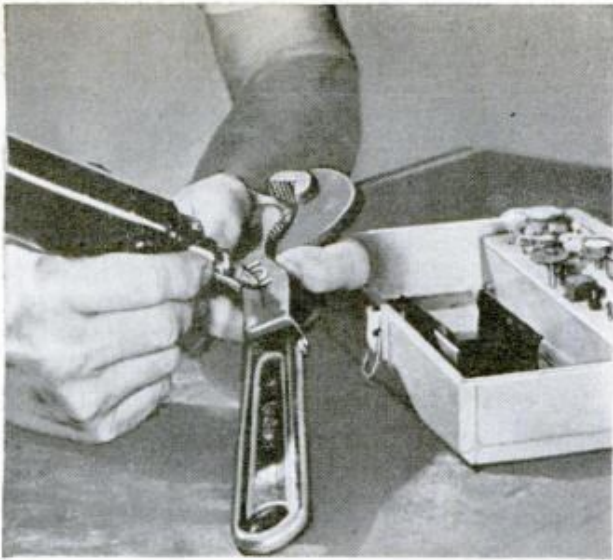
Speeds up to 25,000 r.p.m. make this tiny power tool a real shop workhorse

WITH THE accessories available, a hand grinder can be made to do just about anything within the capacity of the motor. It can be mounted in fixtures and used as a shaper, router, vertical-spindle sander, drill press, carver, speed lathe and circular saw. Used freehand with grinding wheels of various shapes, rotary files and felt wheels, it can do any work that calls for abrading, cutting or polishing on small workpieces.

The extremely high speed of the motor and direct drive to the cutting and abrading tools results in exceptionally smooth, accurate work on both wood and metal. Free-hand sanding and rotary filing are operations that require very high speeds for acceptable accuracy and easy control of the tool. Drilling tiny holes in model parts of wood or metal calls for sustained high speeds to prevent heating and drill breakage. That's why experienced model-makers, laboratory technicians and hobbyists make wide use of hand grinders and the many accessories available. The simple saw table detailed on the opposite page converts your hand grinder into an efficient circular saw for ripping and crosscutting tiny model parts.—Edwin M. Love.

Precision drilling is assured with this midget drill press. Handles hair-sized bits without breakage





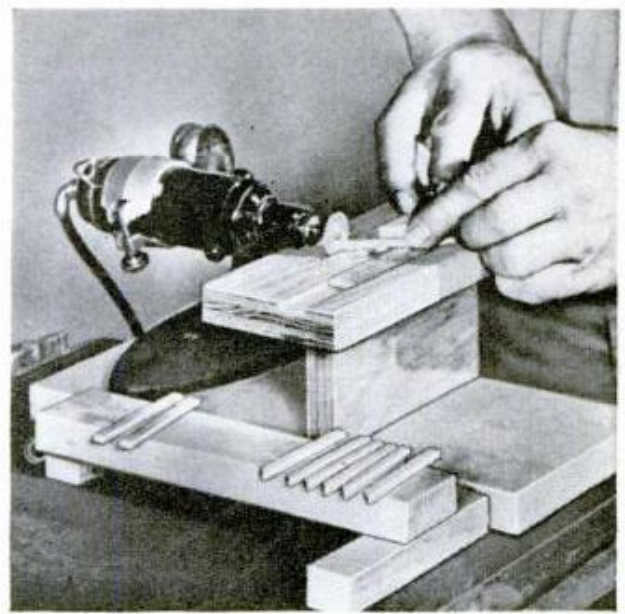
Using various sizes and types of abrasive wheels you can etch your name on tools, do light die sinking, grind small edge tools, work designs on metal or glass



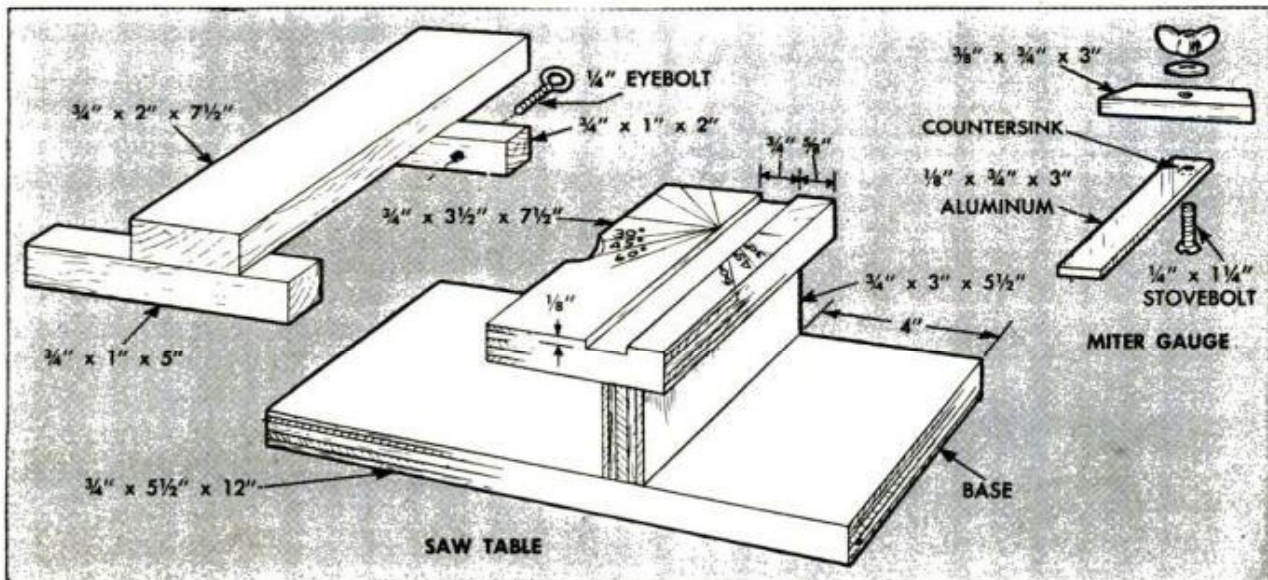
Here carving is being done freehand with grinder held in a fixture. Similar work also can be done with grinder held freehand and workpiece clamped to bench



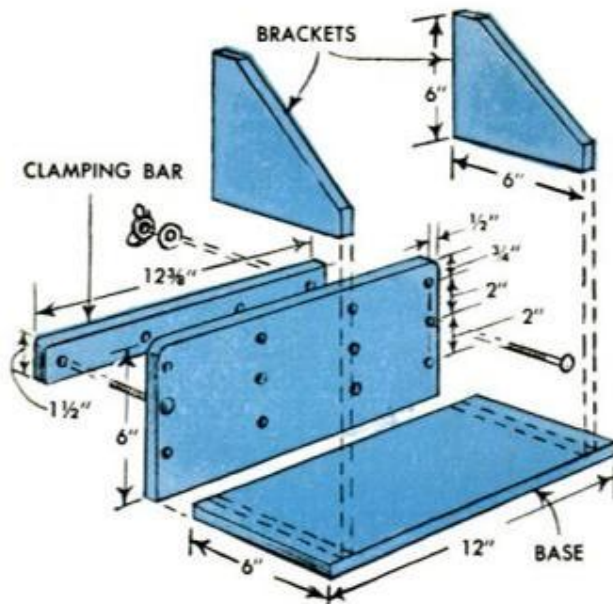
Modelmakers often have use for a midget speed lathe on which pencil-sized turnings can be made. Here's such a lathe in operation with improvised tool rest



Tiny circular saw blade is accessory for hand grinder. Make table of plywood, solid stock as in detail below, mount grinder in fixture and there you are

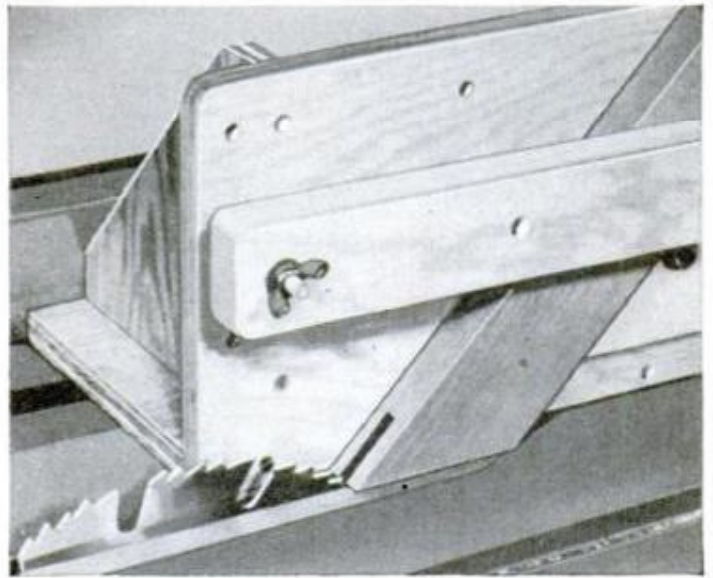
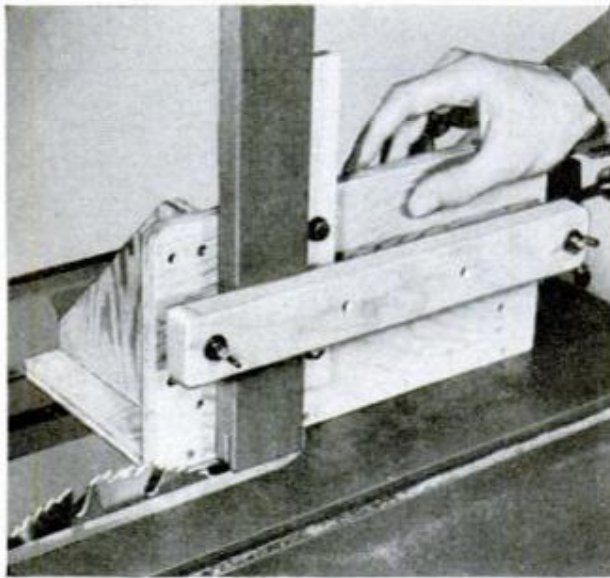


CUT ANY TENON YOU NEED



Cutting tenons and slotting mitered parts for splining on a circular saw always presents the problem of holding the stock securely and preventing it from creeping while the cut is being made. This shop-built jig does both. It holds the stock vertically, holds it at an angle with the table and also holds two pieces for slotting in a single pass. One of the photos below pictures the variety of work it will handle.

The jig consists of two pieces joined at right angles, a clamping bar and an adjustable stop. These parts are dimensioned in the pulled-apart detail at the left. When assembled the unit is guided by the ripping fence. For use on small, bench saw tables you may have to change the dimensions somewhat to adapt the unit to use on the small table. Make the base, the



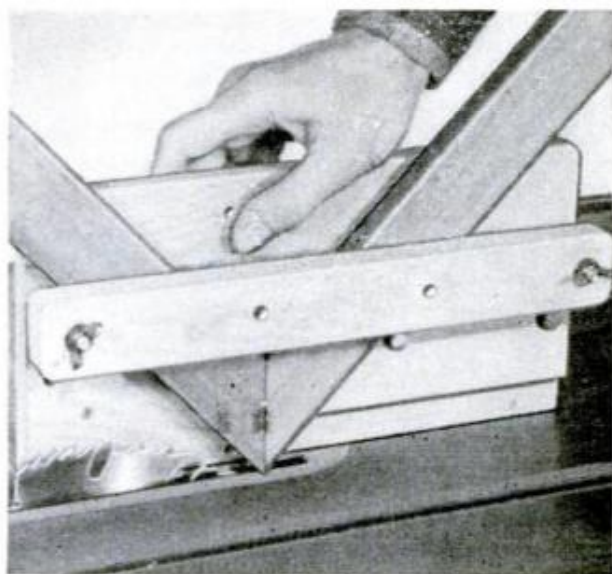
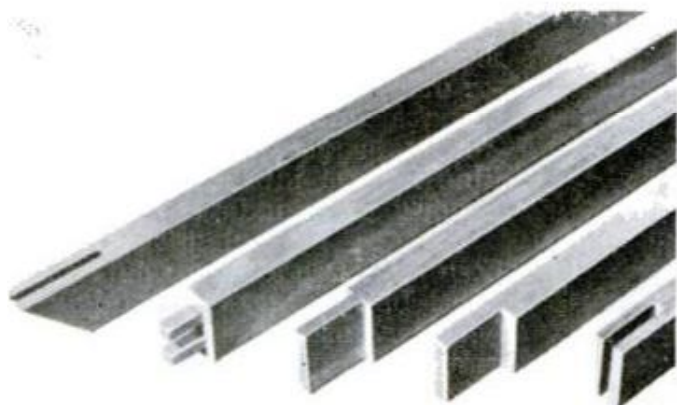
Wood Shavings Deflector

When rough-turning squares between centers on a wood lathe or turning disks on the faceplate, there are times when you must hold the chisel in positions that seem to aim the chips straight at your eyes, or, if not thrown directly at your eyes, you'll find them later on in your pockets. If you wear glasses, goggles or a face shield there is little danger of injury, of course, but without these protectors you can make the simple chip deflector pictured and get along equally as well. It's cut from cardboard or sheet aluminum, the deflector being about 2 1/2 in. square and having a projection, or lip, which is bent at right angles and held between the thumb and the top of chisel or gouge.—Wayne Judy

WITH THIS JIG

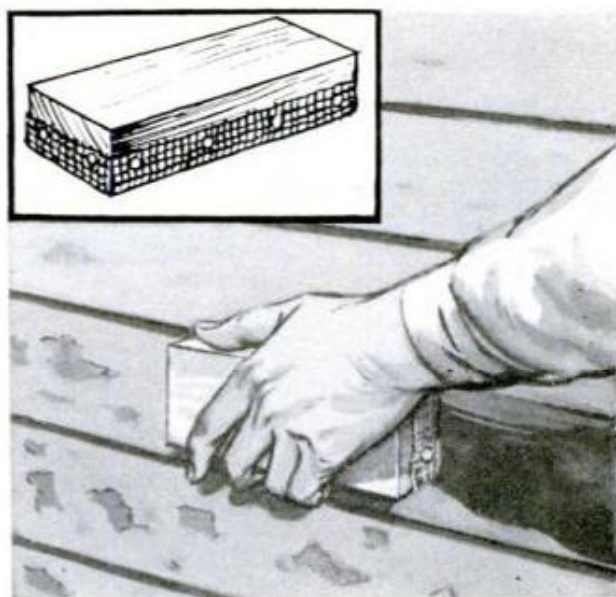
vertical backing piece and the brackets, or braces, from $\frac{5}{8}$ or $\frac{3}{4}$ -in. plywood, and the clamping bar and stop, pictured in the left-hand photo on the opposite page, from selected hardwood. Or, cut all the parts from hardwood, your choice. The important thing is to cut all pieces accurately to size and assemble with the right-angled members exactly at 90 deg. so that you get accurate cuts on the workpieces.

Drill a pattern of holes through the backing piece to permit the clamping bar to be located at varying heights above the saw table. These holes also will permit the stop to be located in different positions to accommodate workpieces of varying widths. The stop is used only when the workpiece must be held vertically as in the left-hand photo, opposite page.—Richard Hanscom

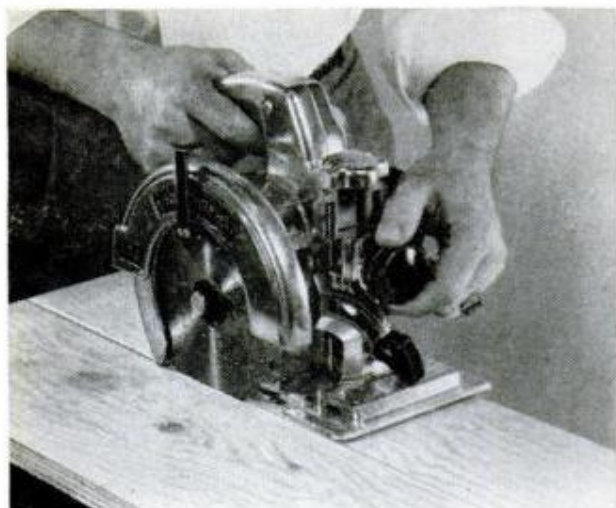


"Screen-Sanding" Old Paint

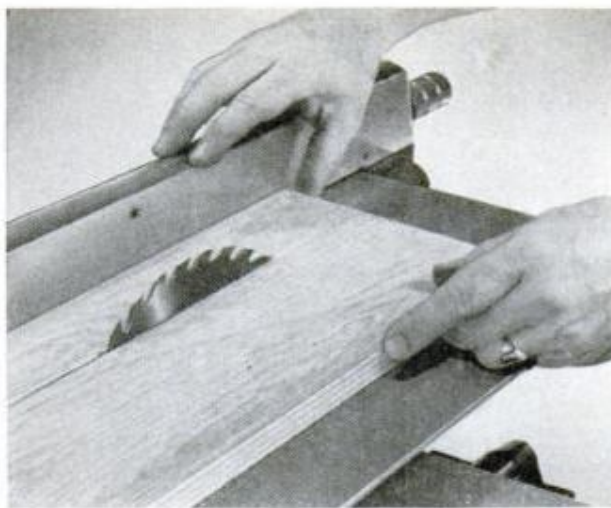
A rectangular piece of ordinary window screen tacked to a wooden block is as good or better than a wire brush for removing checked, blistered paint in preparation for repainting. The rough, open mesh of the screen wire is effective in breaking up old paint which has alligatored, checked or blistered and also for feathering edges of a blistered area so it won't show through new paint. It's good, too, for removing loosened pigment, dust and grime from old paint which is still bonded solidly to the wood but which needs a thorough cleaning before applying new paint. It's excellent for removing old calcimine and whitewash and masonry paints that have become weathered or discolored.—Charles Latour, Jr.



Up-and-Down Sawing Leaves Smooth Edge on Plywood



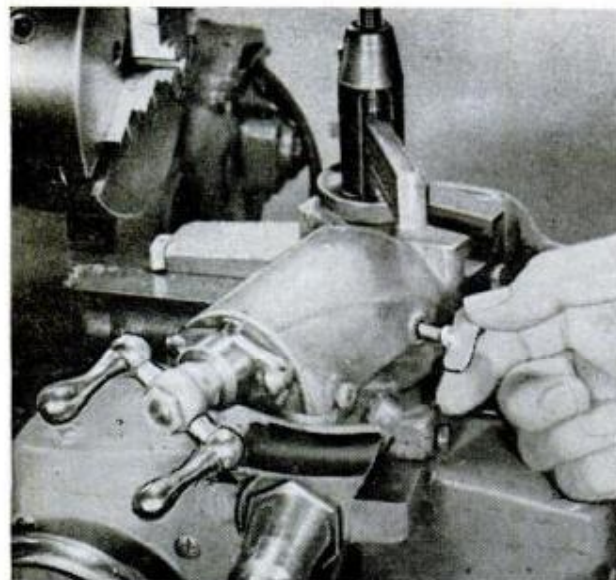
There's a point in good craftsmanship to keep in mind when sawing plywood: the blade on your table saw cuts only when the teeth are going down. But when you use a portable saw the blade cuts going up. When sawing plywood of the grade known as "good one side," place the workpiece on the table saw with the good side up as in the right-hand photo. With the workpiece in this position, the cut will be made with the teeth of the blade going down. Due to the down-cut the corners of the saw kerf on the



top side of the workpiece will not be splintered or chipped, even though you use a blade with a wide set. But, when you are cutting plywood with a portable saw, turn the workpiece over with the good side down as in the left-hand photo. The effect is the same as cutting the workpiece with the good side up on the table saw and you get a smooth cut. The blade must be sharp, and on the table saw, the ripping fence must be properly aligned with the blade.
—John A. Comstock

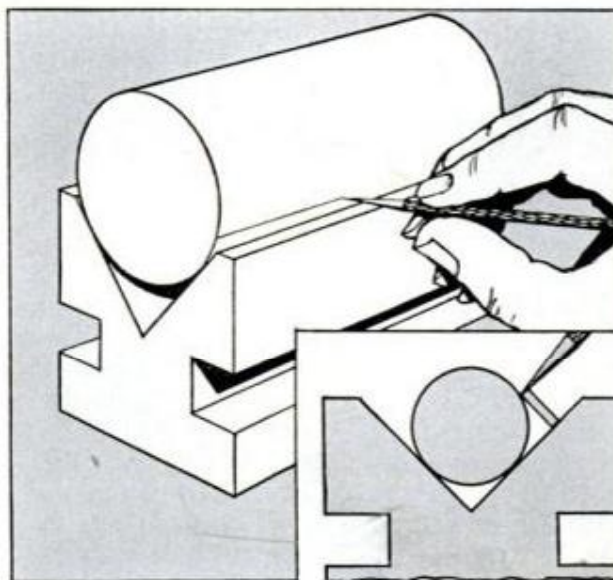
Clamping Screw Saves Time

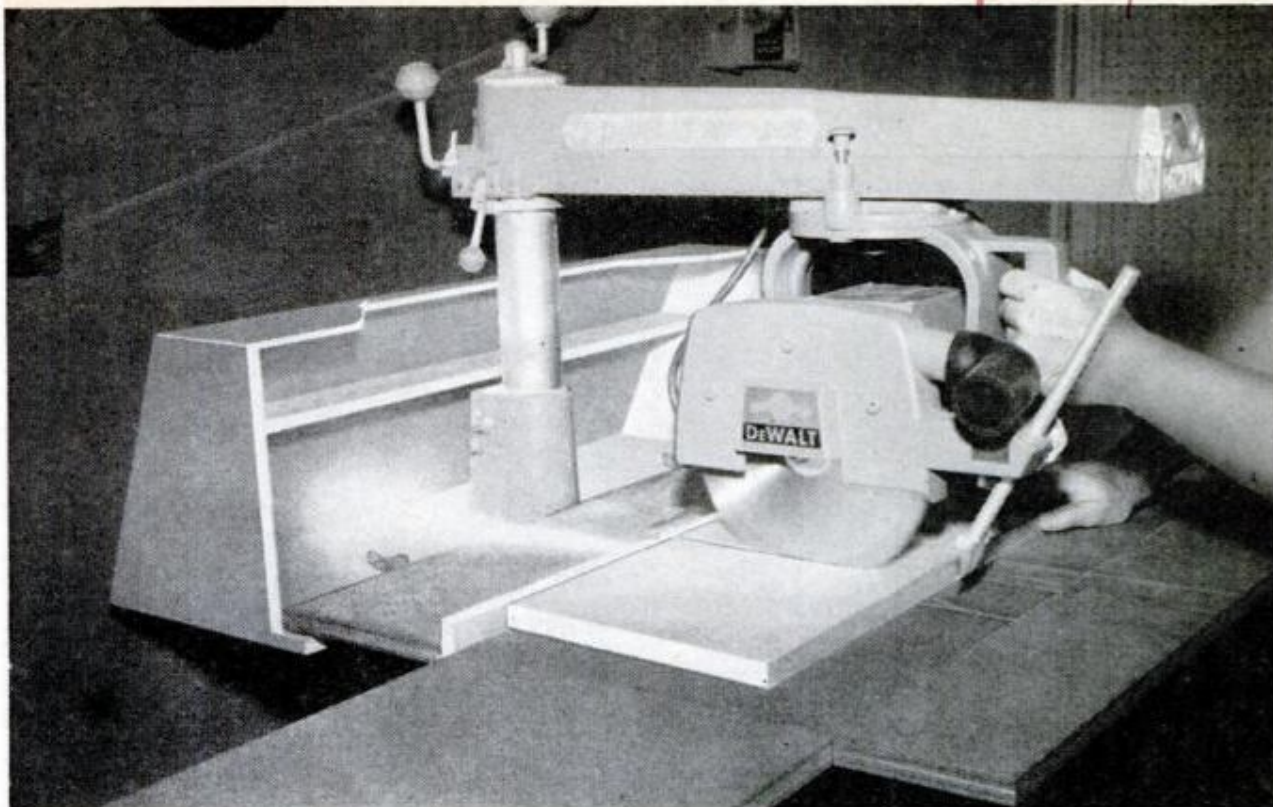
When the nature of the work makes it necessary to reset the compound often, a clamping screw on the slide is helpful and can save a lot of time. When accuracy requirements will permit, you can loosen the gib screws so that the compound will move freely and then remove one of them and substitute a thumbscrew. This permits you to move the compound easily and lock it in the desired position.—H. Hanscom



Scribing Line on Round Stock

One quick, accurate method of scribing a longitudinal line on round stock is to place it in a V-block and use the top edge of the block as a straightedge. Short rounds can be scribed in this way as in the larger view below. If the stock is of relatively small diameter, use a parallel as in the inset view. Make sure that meeting surfaces of the work and V-block are free of metal chips.—Federico Strasser

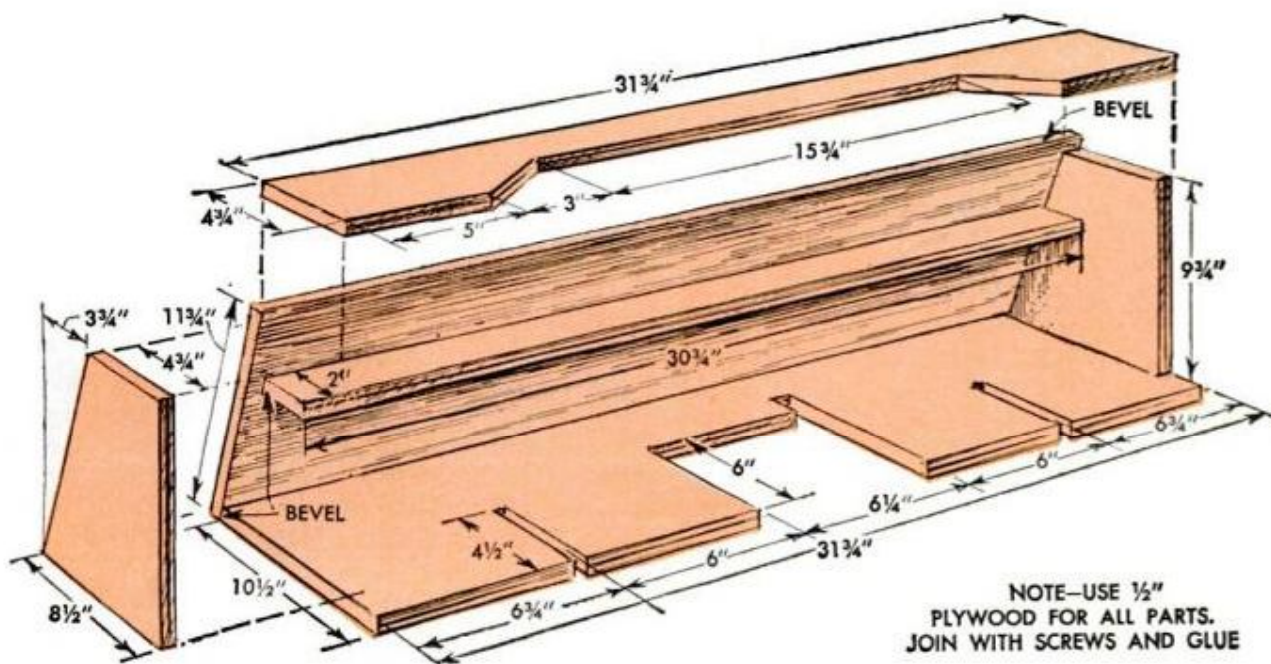




Playing Catch With Sawdust

ALTHOUGH the discharge port on a radial-saw guard directs most of the sawdust to one side and clear of the table, certain cuts do throw a lot of dust to the back of the machine. This simple dust catcher collects it for easy and safe disposal. Essentially the unit consists of a rectangular, open-sided box fitted with a single baffle. All parts are cut from $\frac{1}{2}$ -in. plywood, the edges of the top and bottom pieces being cut away to fit around the column supporting the arm. Note that the bottom projects

to form a lip which slides under the back edge of the machine table and holds the unit in position. The top and bottom pieces and also the end pieces are beveled to take the back panel at an angle. Before assembling the pieces, sand each one, apply a coat of special fir-plywood sealer and finish with paste wax. Polish the wax coating and the fine sawdust won't stick to the inside surfaces. After finishing, assemble with flat headed screws about 1 in. long, countersinking the heads flush. ★ ★ ★





YOUR OWN CONCRETE MIXER

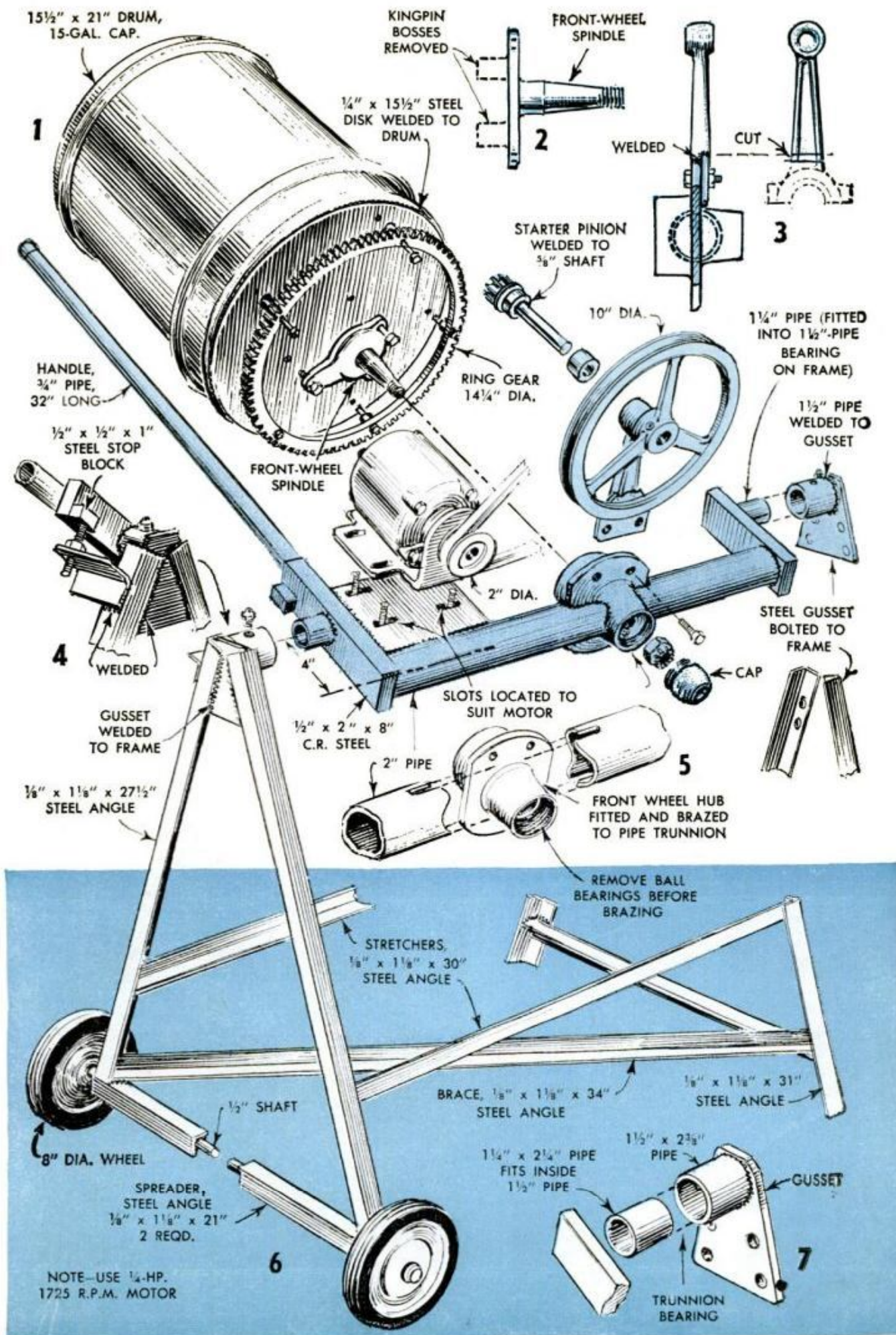
By F. C. Presotto

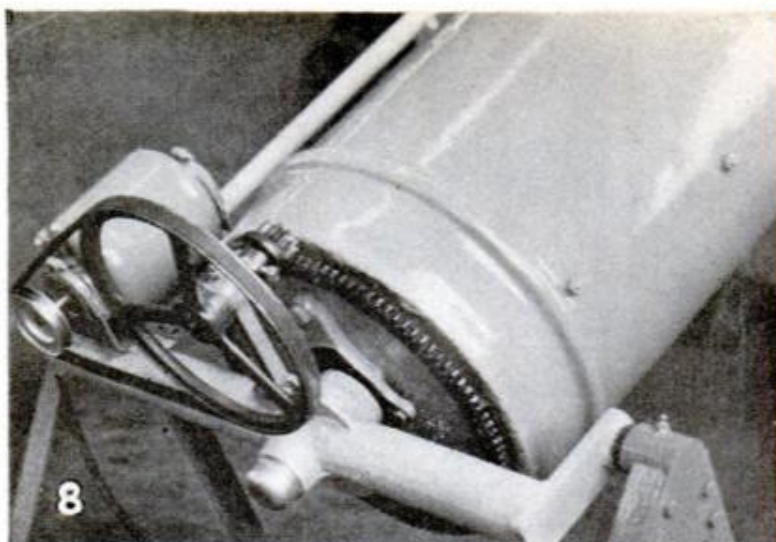
THAT WEEK-END JOB of mixing concrete for a planter, patio, section of walk or terrace steps won't look half as tiring if you have this mixer to take over the hard work. It's of a size to keep you busy, but not too busy, shoveling gravel, sand and cement and wheeling the concrete mix to the forms.

Thorough mixing—that's the secret of good, sound concrete work. This little mixer does everything the big ones do, but does it at a one-man rate. Its main parts are a 15-gal. steel drum, and auto starter pinion and ring gear, a front wheel hub and spindle, an auto-engine connecting rod and a ¼-hp. motor. Figs. 1 through 5 show how these parts are altered and assembled on a trunnion, which is mounted on a wheeled carriage, or cart, for easy portability.

With the necessary parts at hand, first cut and weld a steel disk to the bottom of the drum. Then spot and drill holes for the bolts holding the ring gear, Fig. 1. Note that spacers are indicated on the ring-gear bolts. Ordinarily, these should be about ⅜ to ½ in. long to allow clearance for the pinion. Next, the kingpin bosses are cut from the auto-wheel spindle, Fig. 2, and the altered spindle is bolted to the bottom of the drum.

Note in Fig. 3 how the connecting rod is cut and then shouldered by grinding or filing down to the web. A ¼-in. steel plate is welded to the shouldered portion. In the assembly, Fig. 5, it will be noted that this plate is bolted to the flange of the wheel hub and that the bearing at the upper end of the rod, originally the wrist-pin bearing, forms a bearing for the



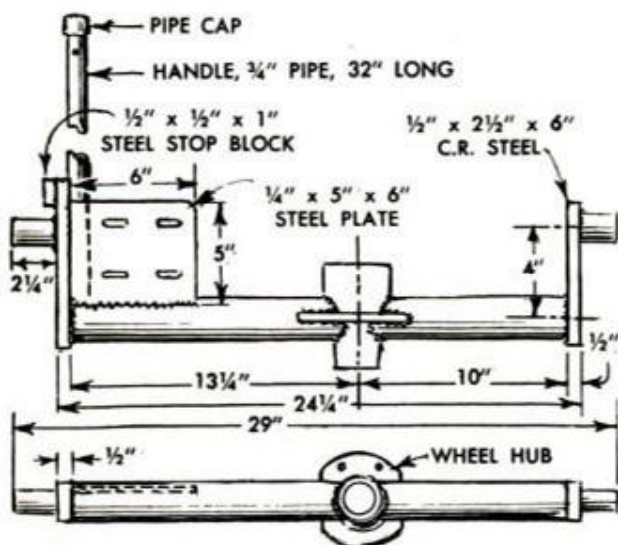


8



9

INSIDE VIEW OF DRUM



10

TRUNNION ASSEMBLY
(SEE FIG. 5)



11

pinion shaft. Refer to Fig. 10 for dimensions of the trunnion, handle and stop. The latter also is shown in Fig. 4. Cut the ends of the two lengths of pipe which form the trunnion shaft to fit the contour of the wheel hub, then slot the ends to fit around the hub flange as in Fig. 5. Obtain a close fit of these parts. Join by brazing. Weld the other parts to form cranks with 4-in. offsets. Weld the handle, stop block and the motor mounting plate in place.

Before assembling the drum and the drive mechanism, cut parts and assemble the cart, joining all parts by welding as in Fig. 6. Note that the trunnion swings on bearings made by telescoping two short pieces of pipe, 1 1/4-in. pipe into 1 1/2-in. pipe as in Fig. 7. The larger half of the bearing is welded to an A-shaped steel gusset, one of which is welded to the A-frame of the cart. The bearing assembly on the opposite end of the trunnion must be bolted to the A-frame. Now, set the trunnion in place, bolt the bearing assembly to the A-frame of the cart, then weld a steel angle bracket to the opposite A-frame, locating it so that the end will clear the arm of the trunnion. Drill and tap the bracket to take a short length of threaded rod. Turn the length of rod into the tapped hole, run down a nut and you have a simple adjustable stop as in Fig. 4. Set the drum assembly in position, bolt the motor in place and then assemble the parts of the driving pinion, Figs. 1 and 8.

As the final steps, fit three mixing blades inside the drum, spacing them equidistantly and attaching them with steel angles and bolts, Fig. 9. Bend a 1/2-in. steel rod to a U-shape and weld to the A-frame as in Fig. 11 to form a handle for wheeling the cart. When in use the mixer should be thoroughly flushed with water after every batch, otherwise a residue of hardened material will build up on the inside of the drum. ★ ★ ★

Cantilever-Type Mailbox Stand Eases Job of Rural Carrier

Rural mail carriers who drive in all kinds of weather will appreciate this mailbox stand. It's a cantilever type that overhangs the turnout and permits driving a car within inches of the box without danger of hitting the conventional mailbox post. The stand need not be anchored. It can be moved in or out on the highway shoulder, or pulled out of a snowdrift and set within easy reach from a single open lane. An old implement wheel forms the base and the box is supported by two lengths of steel angle and a length of pipe welded to the wheel rim.



Supply Pipe of Irrigating System Passed Through Road Culvert

Farmers and truck-crop growers who use overhead irrigating systems in fields or truck plots on both sides of a road can utilize a corrugated culvert to carry the supply line under the road rather than across it. Often it is possible to use an existing culvert for this purpose. Where no culvert is handy it usually is possible to obtain a permit to install one under any secondary road. Convenience and time saved will quickly offset the cost of the installation.

—C. F. Marley



Rotating Egg-Basket Tree Solves Space Problem

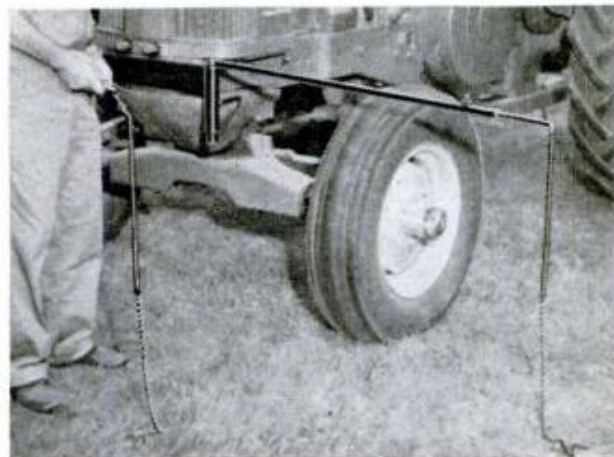
When placed on the floor or side by side on shelves or tables, baskets of eggs can take up a lot of space, often more than can be spared in the average laying house. One poultryman solved the space problem with the rotating basket tree pictured. The pipe column extends from the floor to the low ceiling and rotates in simple bearings at these two points. The baskets are supported on pipe arms welded to the column in uniform spacings which allow ample clearance for each basket.

—John Krill



Adjustable Tractor Guide Arms

When seeding with a grain drill drawn by a tractor, guide arms like those pictured enable the operator to sit in a normal position and steer the tractor so as to keep the narrow row spacings uniform. Each guide consists of a hinged extension arm which drags a chain. When the arm is extended the desired distance and the drawbar correctly set, the operator guides the tractor so that the chain follows the mark made by the drill wheel on the previous pass.





AS A MULCH for young fruit trees and newly planted shade trees, a square sheet of black plastic film can serve a threefold purpose; it kills weeds, retains moisture and promotes growth of soil bacteria



CLEAR PLASTIC FILM is just the thing for enclosing an open porch during winter months. Admits sunlight, keeps out rain, snow and cold winds. Can also serve as storm sash and windbreaks on homes and outbuildings

PLASTIC FILM TAKES TO



VALUABLE FARM MACHINES can be protected with rainproof, snowproof plastic film. Use black film, tie over machine, padding sharp projections with folded bags. Cover stationary engines, motors when not in use

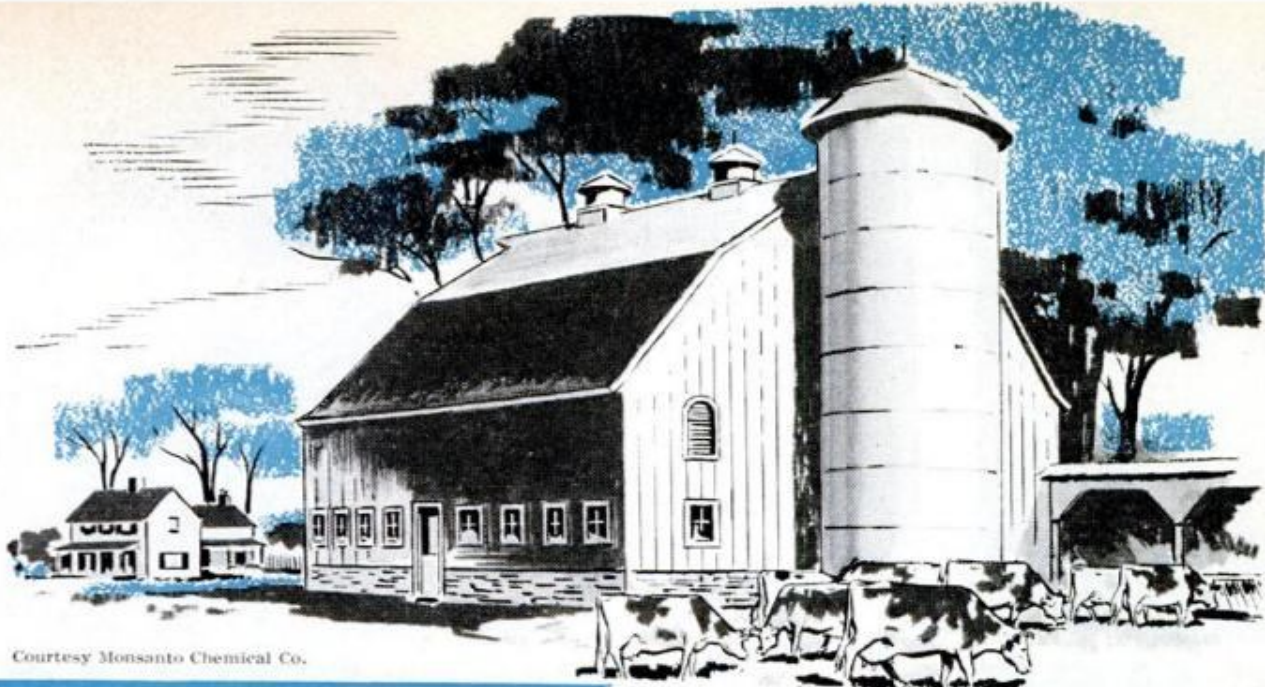
IN CONCRETE SLAB FLOORS plastic film makes the perfect moisture barrier, assures a dry floor in poultry houses, dairy barns and homes. Lay film over partially set grout coat; pour finish coat on top



PLASTIC FILM makes ideal weedless, moisture-retaining mulch for low-growing plants. Simply place film over plants, anchor edges with soil and make an X-cut in film above each plant. Use only perforated film

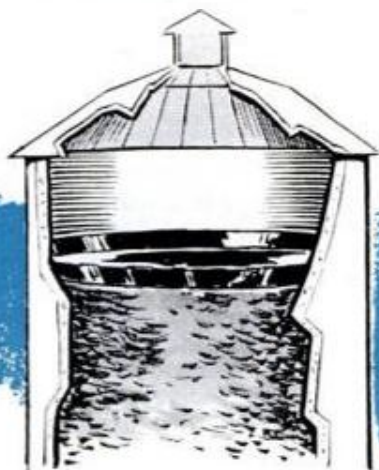
WEED CONTROL along fences and hedges is simplified by laying a strip of film along fence on each side. Notch one strip to fit around posts. Overlap edge with strip of film on the opposite side of fence





Courtesy Monsanto Chemical Co.

THE FARM



PROTECT SILAGE against spoilage in trench, bunker and upright silos by sealing with black plastic film. Precut circles of sealer film are available for round silos and in sheets 32 ft. wide for other types

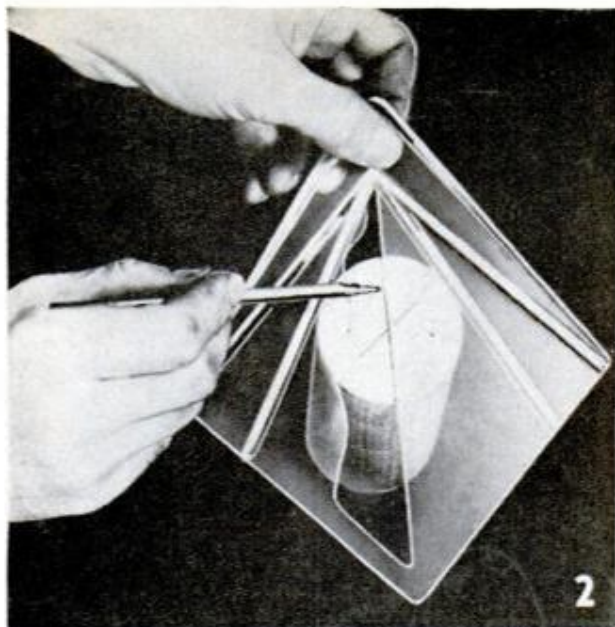
STORM WINDOWS AND DOORS for farrowing houses and poultry houses can be put up and taken down in a few minutes if you use plastic film. Just cut film to size and attach with wooden strips tacked along edges



SUNSHADES of black plastic film will be appreciated by hogs, turkeys, calves and sheep during the hot summer months. Temperatures under such shelters can be as much as 10 to 20 deg. cooler than in the sun

DITCH LINERS of plastic film prevent seepage in ditches cut in loose soils. Anchor edges of film with soil. Film also is useful in making portable dams for use in feeder ditches when irrigating



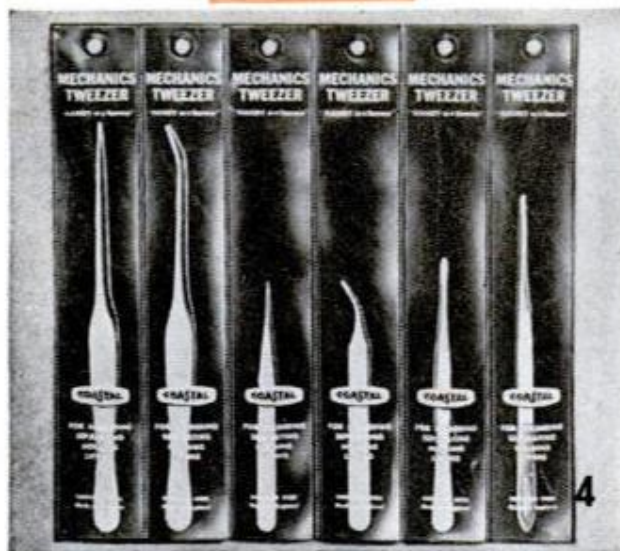


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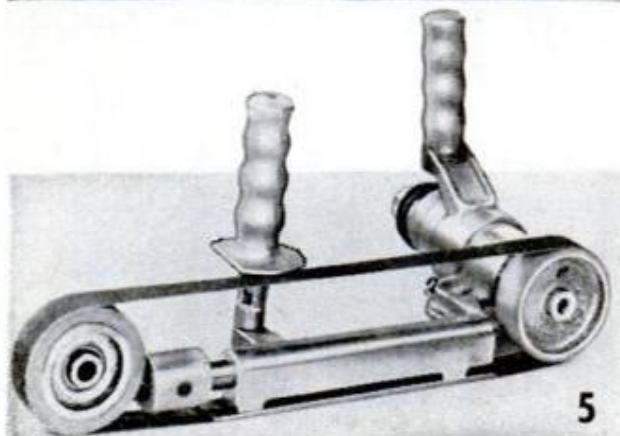
SHOPPING FOR TOOLS



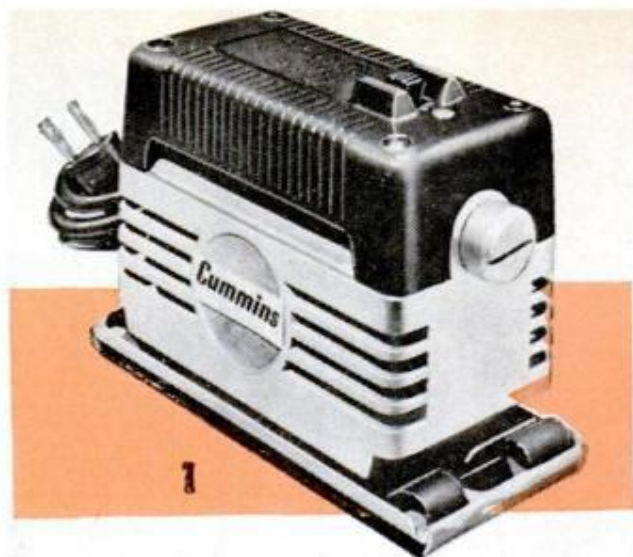
3



4



5



1

1. PAD SANDER differs from orbital type in that the pad moves in a straight line and at a speed of more than 14,000 strokes per minute. Straight back-and-forth stroke of pad combined with extremely high speed makes this sander especially useful for final finish sanding on hard and soft woods. Motor is magnetic type which reduces wear parts to minimum

Cummins Portable Tool Div., John Oster Mfg. Co., 3055 N. Lyndell Ave., Milwaukee 17, Wis.

2. CENTER FINDER makes center locating and marking simple and accurate. Works on rounds, squares, hexagons and octagons without having to make calculations or adjustments. Capacity is 8 in. for rounds, squares and octagons; 5 1/4 in. for hexagonal shapes. Just the thing for marking centers on stock that is to be turned in a lathe. Works on either wood or metal

Athens Fabricating Co., Athens, Ga.

3. END-CUTTING TILE NIPPERS are made in two sizes, 6 and 8 in., and have been designed for cutting mosaic tile, although they are equally effective for cutting tiles made of glass and ceramic materials. Handles are fitted with stops which prevent jaws from closing fully. This feature gives a clean break when cutting; does not cause crushing of tile

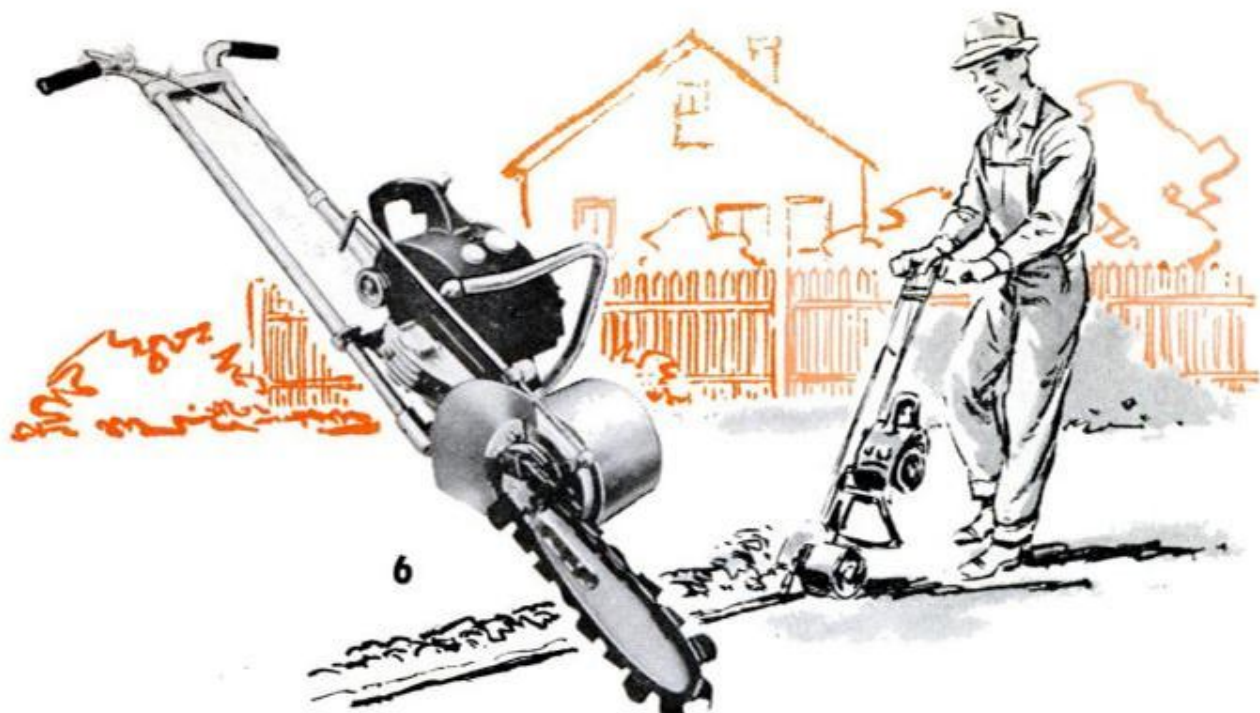
Diamond Tool & Horseshoe Co., Duluth, Minn.

4. SIX-PIECE TWEEZER SET contains a size and type for handling just about anything in a tiny size which requires use of tweezers for holding or placement. Kit contains two 7-in. soldering tweezers, two 4 1/4-in. utility tweezers, a 4 3/8-in. spade-point tweezer and one 5 1/2 in. long with a blunt, serrated point. Set comes in a heavy plastic container for safe storage

Coastal Abrasive & Tool Co., Inc., Long Island City 1, N. Y.

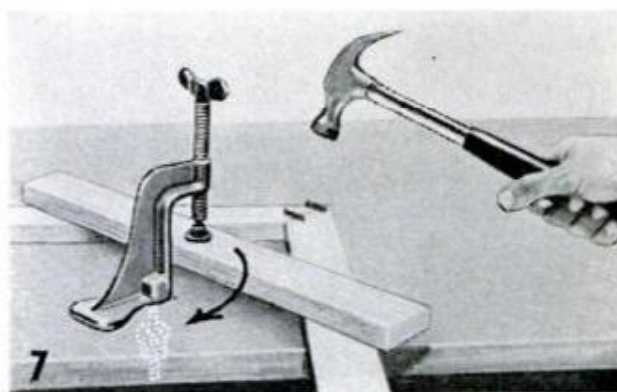
5. AIR-POWERED ABRASIVE BELT UNIT is portable, can be hand-held or mounted on a bench for abrasive work on small parts requiring abrading or polishing on slack side of belt, on a platen or on a wheel. Uses a 1 x 36-in. abrasive belt. Belt change and tracking are simple and quick. Belt speed is 4500 surface feet per minute. Air motor develops 1 hp. at 6000 r.p.m.

Nu-Matic Grinders, Inc., 8224 Carnegie Ave., Cleveland 3, Ohio

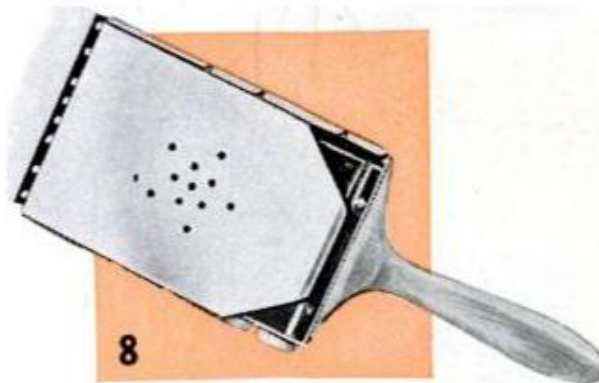


6. HAND-OPERATED TRENCHING TOOL weighs less than 70 lb., cuts a trench only 1 in. wide to varying depths for laying tubing, conduit and small-diameter pipe for gas, water, electrical and telephone service installations. Powered by air-cooled engine
 Auburn Machine Works, Inc., Auburn, Neb.

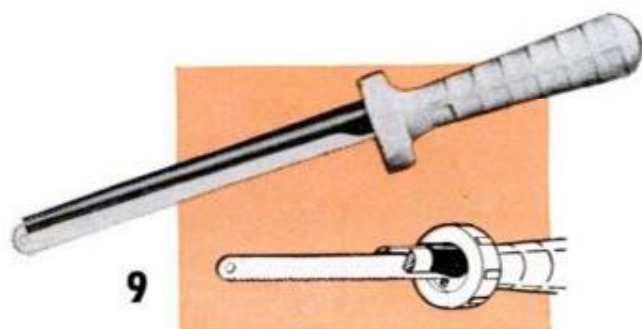
7. HOLDING CLAMPS can be used on a bench top, on the edge of bench top, or on a machine table for holding work for machining, assembling or for any operation with hand tools which requires that work be held rigidly. Base of clamp is slotted to take special bolt
 Adjustable Clamp Co., 417 N. Ashland Ave., Chicago 22, Ill.



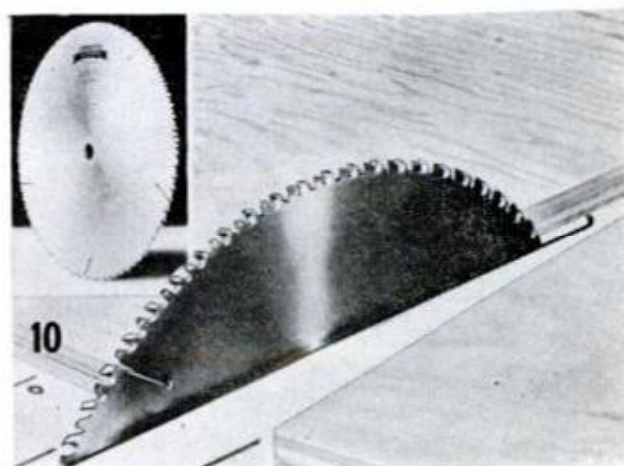
8. PAINT-BRUSH CONTAINER is shaped to conform to the brush, comes in three sizes, 2, 3 and 4 in. Eliminates the time required to clean the brush each time you stop painting. Place the brush in the container, close cover and stand in solvent until ready to use again
 Commodity Sales, Inc., Mfrs. 3440 Main St., Hartford, Conn.



9. SABER-TYPE HACKSAW gets into places where conventional hacksaw cannot work. Blade is rigidly supported when extended to 6 in. When extended to 10 in., flexibility of blade can be utilized to permit working flush against a flat surface. Uses any hacksaw blade
 Dreier Brothers, Inc., 7301 S. Woodlawn Ave., Chicago 19, Ill.



10. CIRCULAR BLADE has specially designed teeth for cutting plywood without chipping or splintering the edges. Blade is clearance ground two full gauges. Available in 8, 10, 12, 14 and 16-in. diameters in one standard thickness and number of teeth per diameter
 Simonds Saw & Steel Co., Fitchburg, Mass.

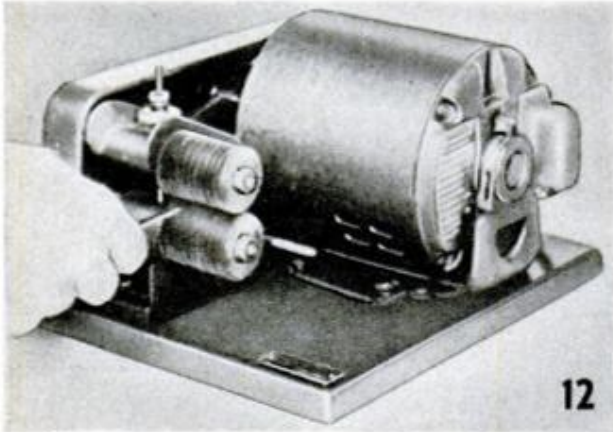




11

11. MICRO-METER dials visual readings automatically from zero to 1 in. Helps to eliminate errors and speeds operations where a number of measurements must be made on a single part or where measurements must be taken and recorded. Direct reading feature of this mike also is a help where measurements must be taken in poor light. Unit is fitted with conventional friction stop and lock screw. Anvil is carbide-faced

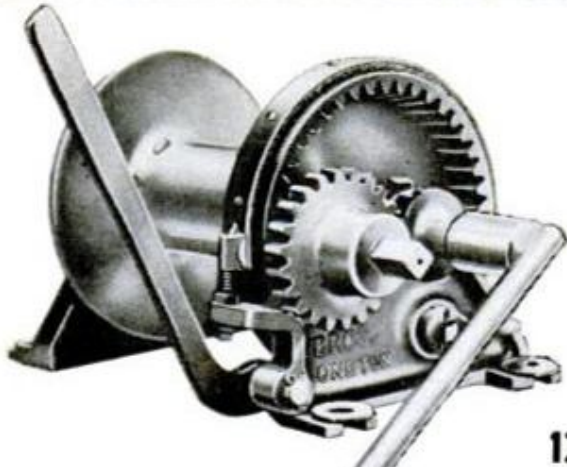
Kromedge Distributing Co., Inc., 863-65th St., Brooklyn 20, N. Y.



12

12. MOTORIZED WIRE STRIPPER for fast removal of film and bonded-type insulations or combinations of these various types of insulations. Handles either single or stranded-wire conductors. Spacing between stripping wheels is adjustable to take various sizes of wire. A pressure regulator permits adjusting machine to remove insulation cleanly without reducing diameter of the electrical conductor. Weighs 22 lb.

Carpenter Mfg. Co., DeWitt 14, N. Y.



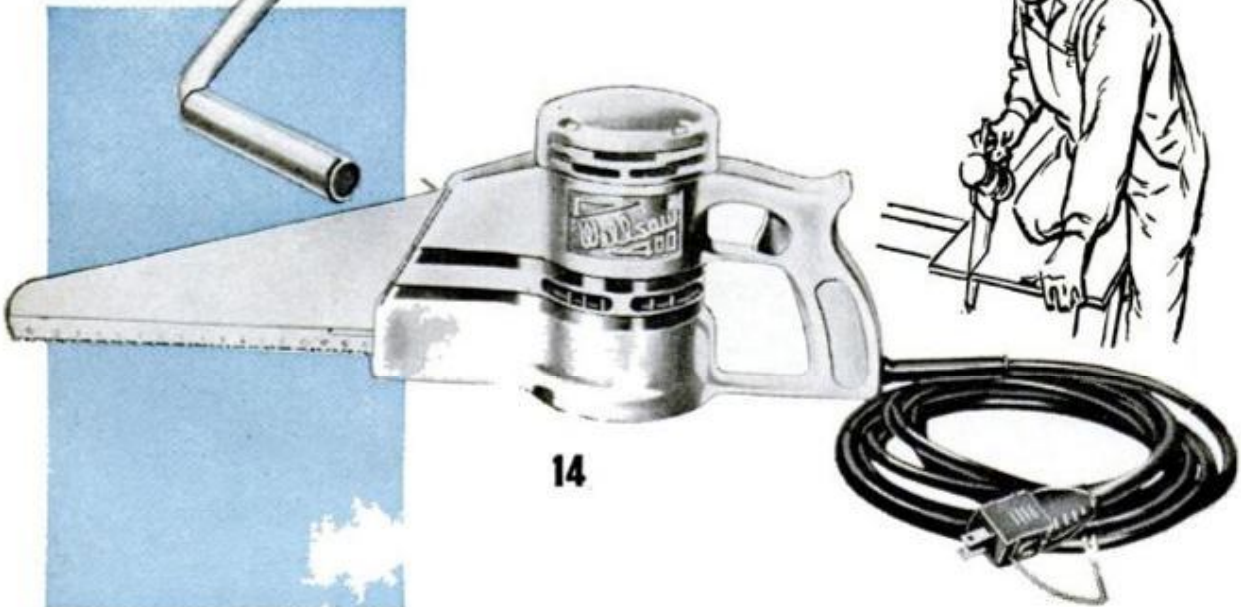
13

13. HAND-OPERATED WINCHES in 1/2 and 1-ton sizes are available with hand brakes for convenience in handling a load. The 1/2-ton winches come with drums 3 or 6-in. wide, with or without brake, and have a gear ratio of 5.3:1. One-ton winches also are available in a choice of 3 or 6-in. drum widths and have two speed ranges, 5.3:1 and 10.5:1. Both sizes of winches have 2-way spring-operated holdings dogs

Beebe Bros. Mfg. Co., 2724 Sixth Ave., S., Seattle 1, Wash.

14. ELECTRIFIED HAND SAW is a powered version of the craftsman's old standby. Blade cuts on both forward and return strokes and is driven at 8000 strokes per minute. Blade is 8 in. long and is usable throughout its full length. A built-in blower keeps work line clear of sawdust. Blades are disposable type and can be changed quickly and easily. Moving parts are mounted on ball and needle bearings. Weight is about 8 lb.

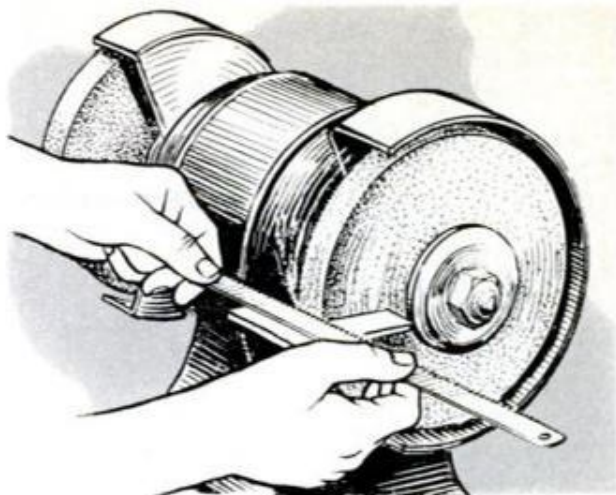
Wells Mfg. Corp., 490 Service Road, Three Rivers, Mich.



14

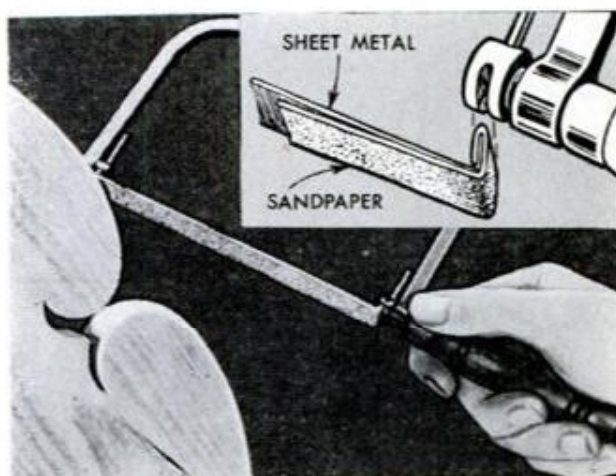
Discarded Hacksaw Blade Doubles as Wheel Dresser

Softer metals "gum up" a grinding wheel quickly, especially one of the finer grade. Rather than dress the wheel often, which reduces its size quickly, many grinder operators use an old hacksaw blade to clean accumulated metal from the face. This procedure removes very little abrasive and does not round the face of the wheel. To carry out the procedure, grasp the hacksaw blade as illustrated, let it bear on the tool rest, and apply very light pressure.—Charles H. Hardy.



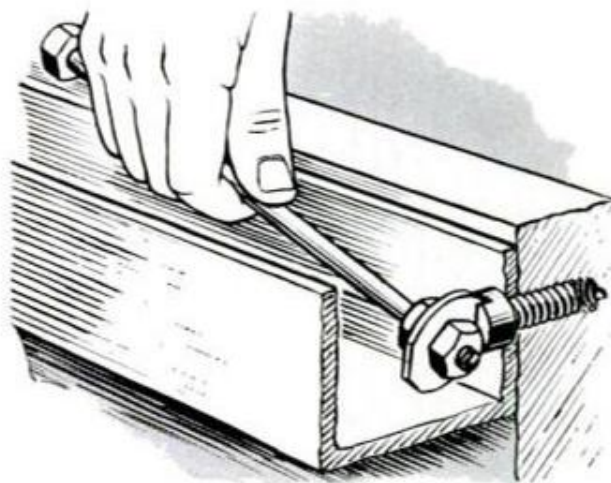
Frame of Standard Coping Saw Utilized to Make Band Sander

It is difficult to sand scroll work by hand and still retain the sharp corners that are a mark of good craftsmanship. One method that produces good results is to use your coping-saw frame as a holder for a strip of sandpaper. First, cut a strip of sheet metal about $\frac{3}{8}$ in. wide to serve as backing. Bend the ends to the same angle as the slots in the blade chucks. Then assemble a strip of sandpaper and the backing strip as in the detail, place the bent ends in the blade chucks and tighten to uniform tension.



Improved Offset Screwdriver

Here's another problem frequently encountered — that hard-to-get-at screw located where only an offset screwdriver will reach it. If your toolbox doesn't stock one, then a threaded rod or long bolt, two nuts and a washer can be assembled in a jiffy, as shown, and will do the job in a pinch.—Joseph Federico.

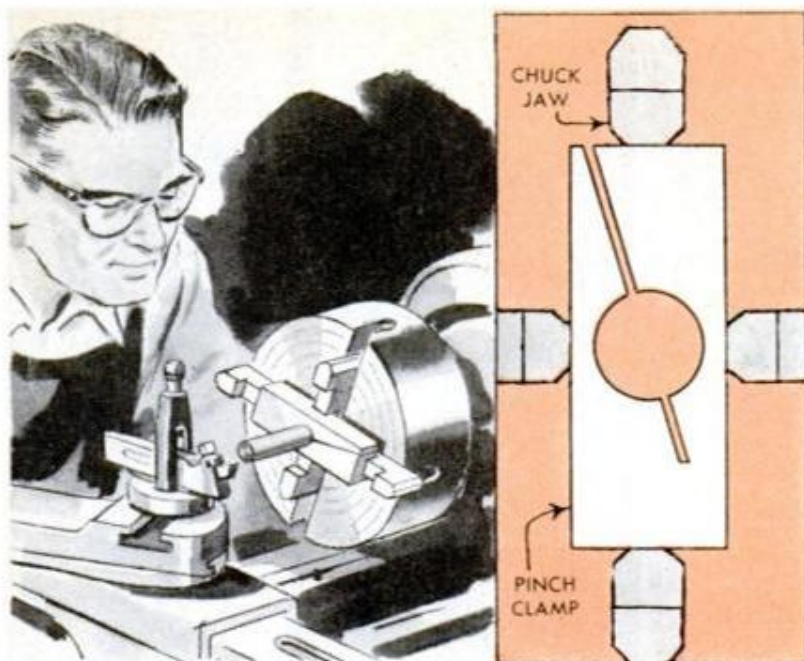


Nails won't rust out and allow boards to loosen if all exposed nail heads are countersunk and covered with putty and the board is given a good coat of paint.

Large Pencil Clip on Mike Holds Instrument in Pocket

Drop a micrometer on the floor just once and you'll always have the feeling that it may fail you in a critical measurement. That's why careful craftsmen and machinists who use precision measuring instruments take special care to prevent them from dropping onto a hard surface or falling to the floor. If you must carry a mike in your pocket, fit it with a large clip as pictured. This will prevent it from slipping out of your pocket when you bend over.





Chuck Collet

Simple repetitive lathe jobs not requiring fine accuracy or high finish can be handled speedily with this one-piece chuck collet, or pinch clamp. It's simple to make and once you get it centered in a four-jaw chuck you can remove and replace the work pieces by loosening and tightening only one of the four jaws. For working only a few pieces the clamp is made from cold-rolled stock but if somewhat greater accuracy and longer life are required by the job, then it's usually a good idea to machine it from a suitable hardening stock.



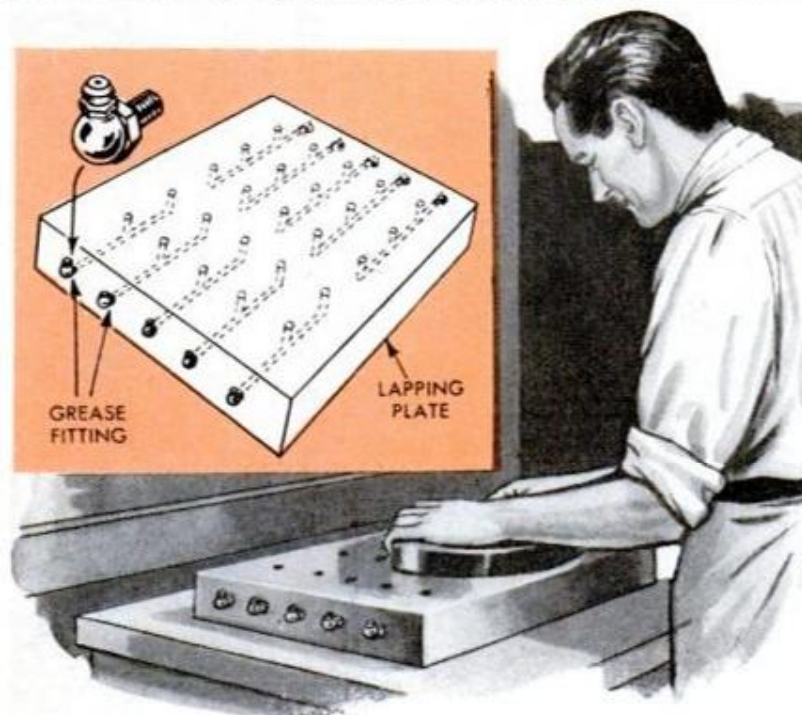
Tractor Skid

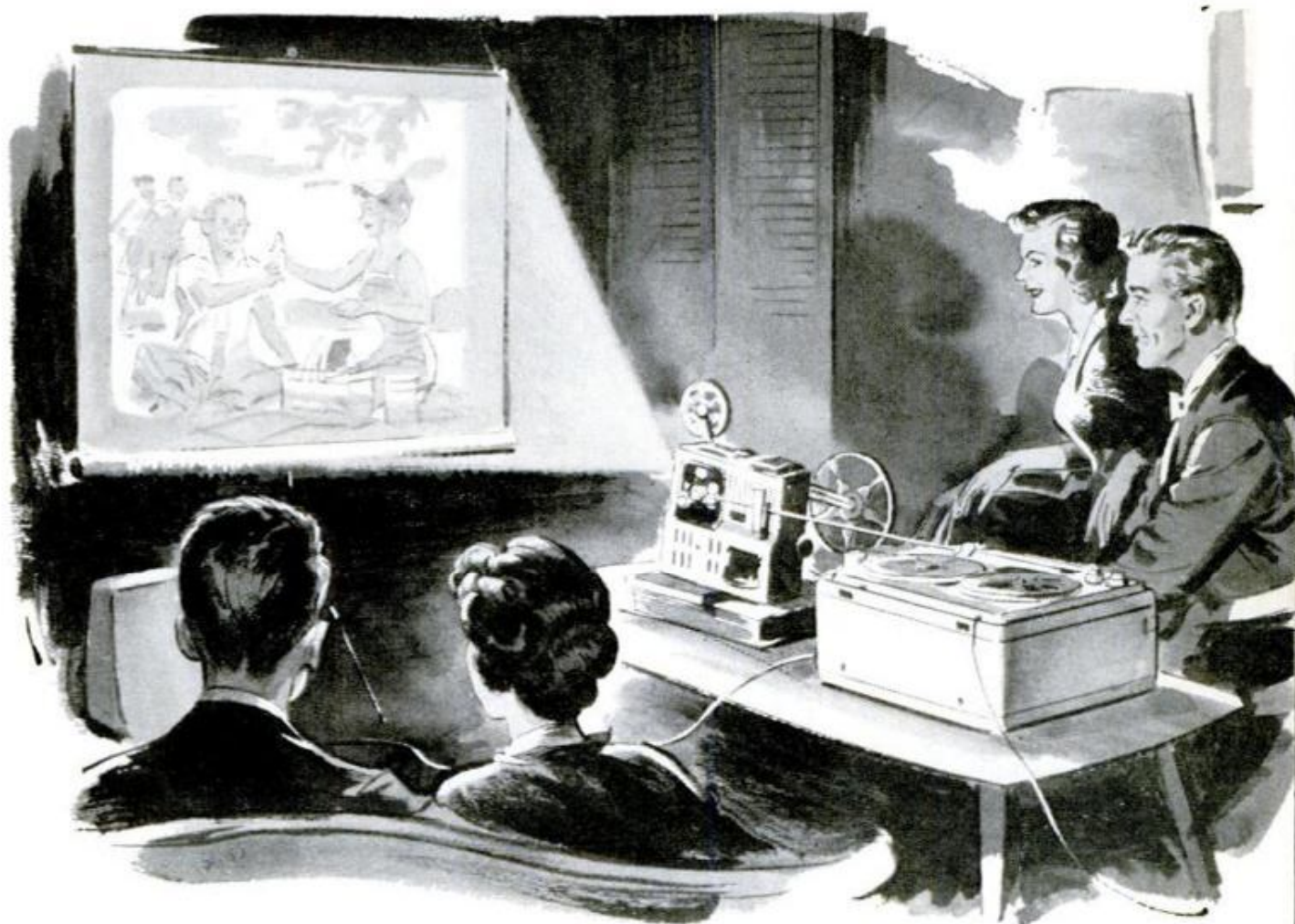
An old truck frame stripped down to the two rails, or side members, and two of the original cross-braces make this handy tractor skid for moving machines from one field to another, for skidding hog houses or moving sacked fertilizer and feeds. The frame is simply inverted and a chain and clevis are attached to the turned up ends of the side members, which serve as sled runners. For hauling sacked materials the rails are covered with plywood or boards. Fine for hauling cordwood during the winter months.



Lapping Kink

By drilling a pattern of spaced holes in from the top surface to meet holes drilled in from the ends you can make a self-feeding lapping plate. Holes drilled in from the ends are tapped to take standard grease fittings as detailed. Then by filling a grease gun with a prepared lapping compound you have a means of force-feeding the compound to the surface of the plate in measured quantities. In this way you get even distribution of the compound to the surface of the workpiece, less waste and a shorter cleanup period when the job is finished.



RADIO**TV****HI-FI****ELECTRONICS**

Tape recorder combined with synchronizing projector provides narration and background music for home movies

NEW TAPE-RECORDER MAGIC

By Art Zuckerman

BACKGROUND MUSIC greets guests arriving in your home—and repeats itself later without further attention.

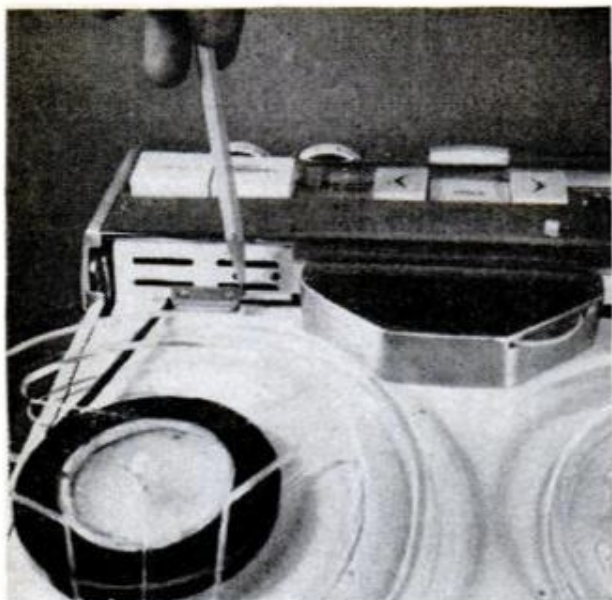
As the evening goes on, you show slides and movies of a trip you took with your friends. The slides are introduced by theme music, and your voice is heard setting each scene as the slides change automatically.

Then you show the movie, and again your voice narrates events against a flow of background music, all in perfect synchronization with the film. The sound and picture finally come to a halt, though you haven't moved to turn anything off.

For a final touch, you play a recorded vocal duet—both parts clearly recognizable as sung by you!

The magic necessary to make such tricks possible is built into many of today's better tape recorders. These wondrous machines give the tape recording hobbyist many of the effects that a few years ago were possible only in professional operations.

Take a little thing like automatic stopping, for example. Some machines, like the costly Ampex and the more moderately priced Revere T-200 series, use tension devices that turn off the machine as soon as the tape runs out. But a number of European recorders, such as the German Grundig and the Dutch Norelco, introduced a different way of doing the trick. Metalized tape leaders hit a special electrical contact and turn off the works.



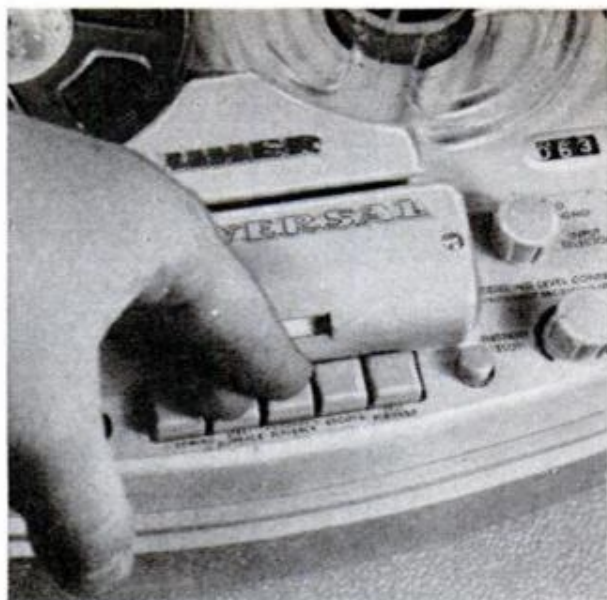
Photos by the author

Metal strip on tape hits contact post to start rewind and replay on Wollensak 1600 series recorders

The Uher people in Germany and our own Wollensak Optical Co. took a good look at this gimmick and came up with one better. Why not use the tape leader contact to make the machine rewind itself? Then why not have the metalized leader at the opposite end of the tape stop the rewind and put the recorder back in play? That's exactly what the 17-pound Uher Universal and the 20-pound Wollensak 1600-series machines do.

Another interesting little feature of the Wollensak 1600 is a "back space" bar. Suppose you're playing a tape and pass something you want to listen to more closely. With most recorders, if you want to replay a portion of tape, you've got to push the stop key, then the rewind key, then the

Slide switch on Uher Universal microphone permits remote control of record, stop, rewind and playback

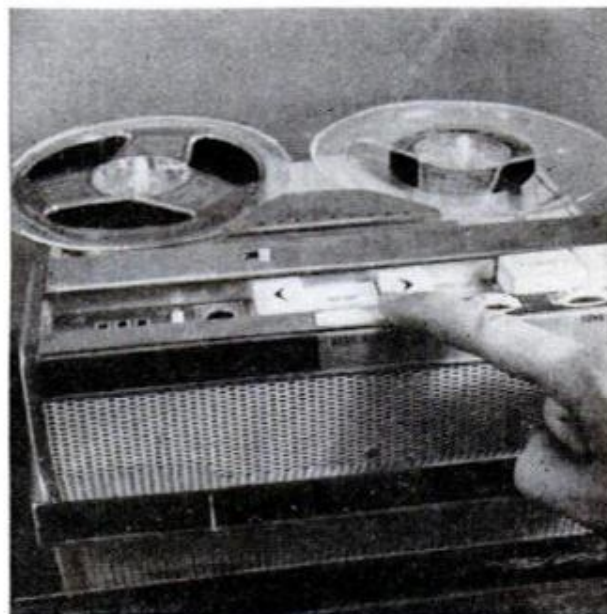


Depressing playback key on Uher recorder causes foil leaders on tape to set off rewind and replay cycle

stop key again. And then you must finally go into the "play" mode. With a Wollensak 1600, if you hear something you'd like repeated, you simply depress the back space bar. The tape immediately stops and proceeds to reverse itself at high speed until you take your finger off the bar. Then it starts playing back again.

Almost any tape recorder can be used to provide top-notch narrative and background sound tracks for home movies nowadays, thanks to several 8-mm. projectors that are designed to be synchronized with tape. This same kind of synchronization is also possible with a remote-control slide projector if you use a Uher recorder. The secret lies in an accessory unit called an *Akustomat*, which is connected to both the

Back-space bar of Wollensak 1600 series makes tape rewind until bar is released, then start playing again





Uher Synchro-Akustomat (black box) puts inaudible tone on tape that actuates automatic slide changer

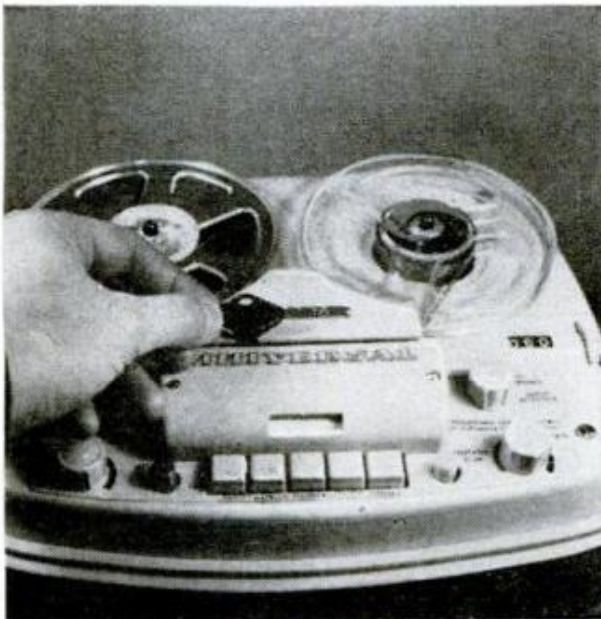
recorder and the remote-control projector.

To prepare a program, you project a slide and record the music and narrative that go with it. Then you change slides. This causes the Akustomat to send the recorder an inaudible high-frequency signal, which is recorded on the tape. The process is repeated for each slide. When you're ready to give a show, the slides shift automatically as the recorded cueing signals pass the tape head.

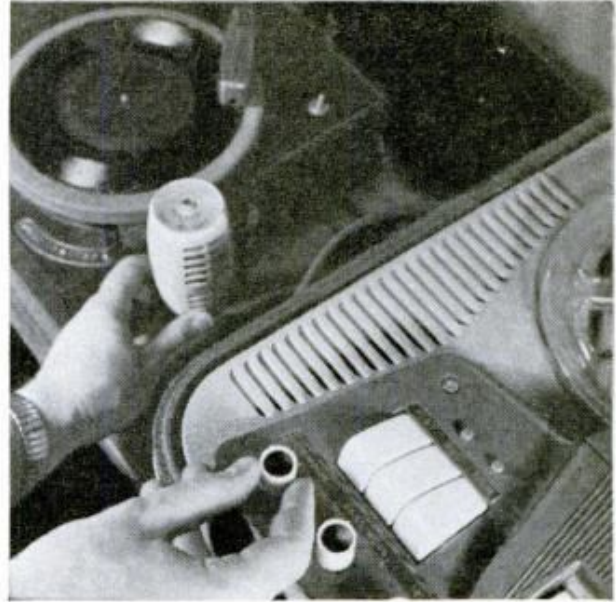
With the Akustomat attachment, the Uher can perform another interesting trick. You can actually make the tape start merely by talking. When you stop talking, the tape stops.

Good "sound-track" tapes for slides or movies result from a blending of appropriate music and narration. Usually you

Plastic device in Uher recorder separates erase head from tape so narrative can be recorded over music



AUGUST 1960 (see Nov 60, 12)



Separate radio-phono and mike inputs, each with a level control, permit internal mixing in Norelco

want to cut the level of the music when you add the narrative, then bring it back up when you're through talking. Up to fairly recent times, you needed an accessory mixing unit to blend and control the relative level of mike and phono pickup.

But with such recorders as the Ampex, the Concertone 505, or the Norelco Continental 400, you can mix these inputs right in the tape machine, thanks to separate recording-level controls for mike and phono channels.

The Norelco and other imported machines like the Uher and the moderate-priced Telefunken make voice-music blending easier still with a "dubbing" or "trick" control. This control overrides the erase head. You can put all your music on the

Dubbing switch on Norelco recorder permits narrative without erasing previously recorded background music





Recorders like Uher Stereo Record III permit you to record on track two while listening to track one



Three-speed machines, such as Norelco (above) and Stereo Record III, turn on and off by same switch that controls 1 7/8, 3 3/4 and 7 1/2-inch-per-second speeds



tape, then rewind it and add your narrative without wiping out the music of the previous recording. Better yet, the background music will be toned down just enough so that your narration won't have to compete with it.

Ever get the yen to do a duet with yourself on tape, in the manner of a Les Paul-Mary Ford multiple recording? Such sound-on-sound trickery used to call for two tape recorders, plus a mixer. But such stereo machines as the Ampex and the Concertone 505 allow you to produce this effect without any extra recorders or gadgets.

All you have to do is record the first "take" on the second stereo channel, then rewind and patch the channel-two output into the channel-one phono input. Next you plug your mike into the channel-one mike input. Set the machine on monophonic record, and it will start transcribing from channel one.

With the aid of monitor earphones, you now use the mike to blend in a second "take." And there's your duet, neatly recorded on channel one.

The very fidelity of today's better tape recorders is magical in itself. At a 7 1/2-inches-per-second tape speed, they offer you the entire audible range of sound. At 3 3/4 inches per second, they sound better than the best 7 1/2-i.p.s. efforts of machines made a few years ago. And such three-speed machines as the Dutch Norelco, the German Uher and the Norwegian Tandberg, when played at a mere 1 7/8 i.p.s., can easily make your clock radio or television set sound sick by comparison!

Even the limits of time have been conquered by the new four-track stereo recorders. They provide at 7 1/2 i.p.s. an hour of highest-quality stereo music reproduction from a 1200-foot reel. Such a reel used to offer only a half hour of stereo at that speed. On monophonic record play, they split the 1200-foot reel into two hours of 7 1/2-i.p.s. performance, instead of one hour.

At 3 3/4 i.p.s., they give you four hours of playing time instead of the old two hours. And the quarter-track machines that have 1 7/8 speed will actually provide eight solid hours of monophonic playing time!

Any way you look at it, the modern tape recorder is the Aladdin's Lamp of sound!

★ ★ ★

QUOTE:

"If this country's total power needs were supplied by fission reactors, each year we would have to dispose of radioactive fission products, equivalent in activity to those released by the explosion of 200,000 atomic bombs."

—JOHN H. WILLIAMS, Commissioner
U.S. Atomic Energy Commission

Helpful Hints for Homemakers

There are few household problems without a simple solution, and few solutions that can't be put into effect with everyday materials found in any home. This applies to everything from furniture to fixtures, and from woodwork to windows. For example, the extensive use of aluminum for furniture poses the problem of keeping the furniture shiny. Abrasive polishes will only cut through the dull surface oxide. The exposed metal will shine for a while and in a short time become dull again. Try washing the aluminum with warm water and soap, rinse and dry with a soft cloth. Periodic washing and rinsing will keep the metal shiny and bright.

How about wobbly tables? Get on your nerves? The individual who started evening up table legs with a saw and wound up with a table only knee high should have used a bit of wood putty instead. Just put a gob of the putty on a sheet of wax paper, stand the short leg in the putty, and press down on the table until all four legs stand even. Trim off the excess putty, and when

dry, sand it smooth. They say that lubricating oil will rot rubber casters. Try castor oil instead. It preserves the rubber. Loose lamp cords are a nuisance and dangerous where there are small children about. Keep that cord off the floor by slipping a few hairpins along its length and insert the prongs behind a baseboard. Curled-up throw rugs are also dangerous — ask the insurance companies. Keep yours flat on the floor with a coat of flour paste applied to the corners.

Simple tasks like window washing can be vexing when stubborn streaks and spots are encountered. As unlikely a thing as toothpaste comes to the rescue here. Rub the toothpaste on with a soft cloth. Its soapy, abrasive action will clean and polish the glass. Where clothes are concerned, mothballs are more effective as a protective measure if used properly. Since fumes of mothballs are heavier than air, they should be placed *above* the clothes, allowing the fumes to settle downward to a level where they will be the most effective.

Tips to Cut Theft of Boat Equipment

It is pretty risky business to leave an outboard motor and other boating equipment unattended in public places, as evidenced by the many lists of serial numbers of stolen motors circulated to dealers by the motor manufacturers. Although it is impossible to lock up everything as with a car, there are a number of things you can do to minimize theft risks. Here are some practical suggestions from the Marine Products division of McCulloch Corp.

1. When leaving your boat overnight, moor it at a dock, boatyard or marina that is well lighted and has an attendant or watchman on duty at all times.

2. If the boat must be left unattended

with the motor attached, it is advisable to remove all portable gear and equipment, such as cushions, paddles, fuel tanks, radio, binoculars, etc. Attach the motor to the boat with a chain and padlock, or use one of the patented motor-locking devices available. Keep a record of the motor's serial number, also that of the boat and attached equipment if they are so numbered. In case of theft, notify local law enforcement officials and local marine dealers immediately, giving full descriptions of stolen items. To guard against financial loss, carry theft insurance. It is inexpensive protection, giving you a new lease on your boating enjoyment if the entire rig is stolen.

Repair and Touch-Up Kit for Boaters

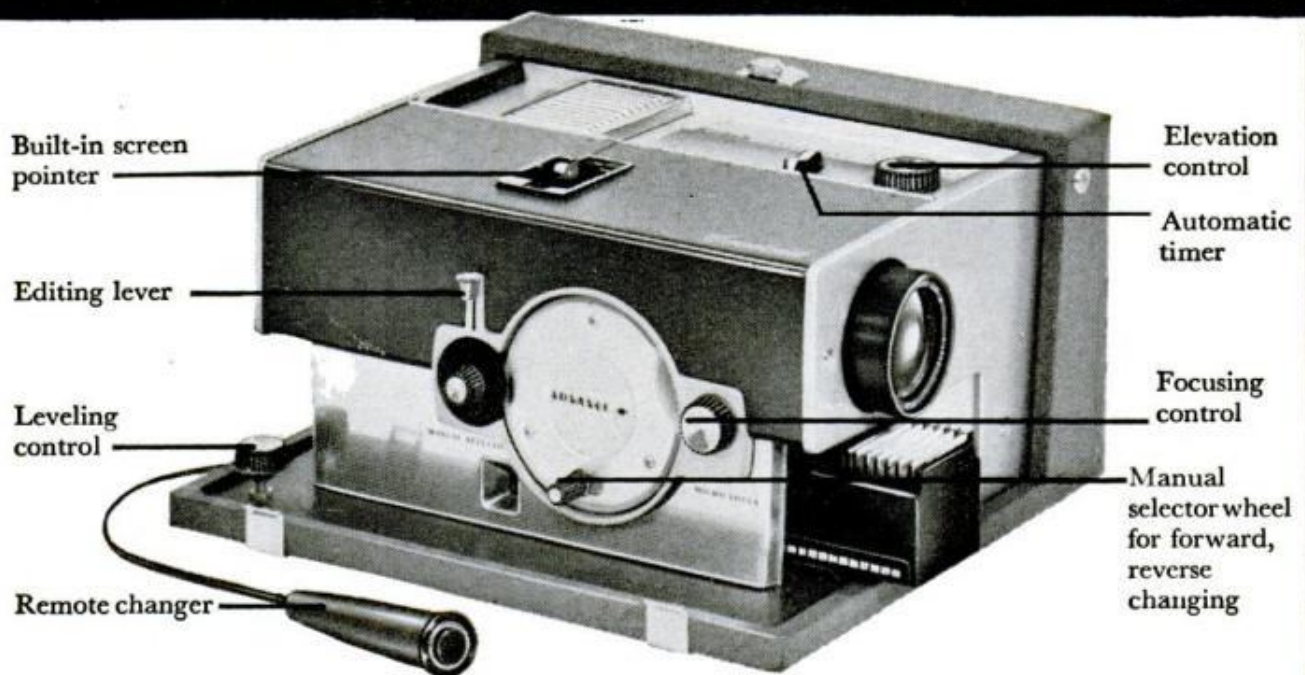
Boat maintenance can be kept to a minimum if a kit containing on-the-spot repair and finishing materials is taken along on boat trips when small damage occurs. The kit should include a tube of plastic aluminum, nailpolish bottles refilled with paint colors to match those of your boat, glass-fiber repair materials and a few pieces of coarse and fine-grit sandpaper.

Use plastic aluminum to mend cracks, punctures and leaking seams in metal boats. Thinned to brushing consistency, corroded metal parts can be coated with it, then sanded smooth and buffed to a fine finish. Even small nicks and dents affect

propeller efficiency. Replace lost metal and fill dents with the plastic metal squeezed directly on the repair areas from the tube. When hard, dress the metal down with steel wool or sandpaper.

Glass-fiber repair materials should include small amounts of epoxy resin, catalyst, glass cloth patches and a few short strips of stiff cardboard to be used as resin applicators. Since epoxy-type resin will form a bond with most materials that have no surface film of wax or oils, it is the best all-purpose repair compound. Use it on wooden, metal, or glass-fiber hulls and structural parts.

New Ideas in Photography



Automatic Projector Changes Slides 4 Ways

No glaring screen between slides

Here's an automatic slide projector that gives you a choice of *four* ways to change slides—and makes you a master showman with them all.

The Kodak Cavalcade Projector changes slides *for* you automatically at intervals of 4, 8, or 16 seconds . . . lets *you* change them by remote control . . . or by push-button . . . or by manual wheel.

You can put on a show at the pace you

want. Take as much time between slides as you need to explain them to guests. The Cavalcade Projector's controls let you hold slides, skip over some, repeat others—even on fully automatic. Between slides, there's no glaring screen. Slides change fast, too—no long dark period *between* them.

Ask your dealer to demonstrate all these superb features. Kodak Cavalcade Projector, Model 510, with 5-inch *f*/2.8 lens, \$159.50. Or as little as \$16 down at many dealers'.

Picture it now—see it again and again!

Compact Brownie Star Cameras Lead to New Trend in Low-Cost Picture-Taking

A few years ago, many people were content to go on using an old-type box or folding camera, no matter how bulky or heavy it was.

Then along came the modern Brownie Star Cameras—small, light, easy to use—to make picture-taking more fun and more convenient for millions.

Brownie Star Cameras are modern four ways. They're compact, palm-size. Easy to use: no focusing. Versatile: take snapshots *and* color slides. And two have a built-in electric eye to assure correct exposure every shot. Yet prices begin at only \$6.25! Go take a look—and see how modern a low-cost camera can be.



Brownie Starlet Camera, \$6.25



Brownie Starmite Camera, \$10.50



Brownie Starmeter Camera, \$19.95



Brownie Starmatic Camera, \$29.95

from Kodak

Missiles or Microbes: New Faster Color Movie Film Tracks Both Easily

Super-sensitive color motion-picture films recently introduced by Kodak are being used as powerful new data-collecting aids for science.

Known as Kodak Ektachrome ER Films, they are true and sharp enough to capture the faint changes in a missile's flame pattern . . . to permit microscopic movies of cell division and tissue culture without dangerous hot lights . . . and to help enlarge man's knowledge in many other fields where high-speed color photography has not been practical before.

The ER films have the same speed and fine grain as the sensational new Kodak High Speed Ektachrome Films, which permit 35mm photographers to shoot pictures they never could before, at indexes of 125 in artificial light, and an amazing 160 in daylight! They are part of Kodak's continuous search for finer films for every area of photography.

Meter in Kodak Electric-Eye Cameras Compensates for Too-Bright Sky

When you use an ordinary exposure meter, you must tilt it down to allow for sky brightness.

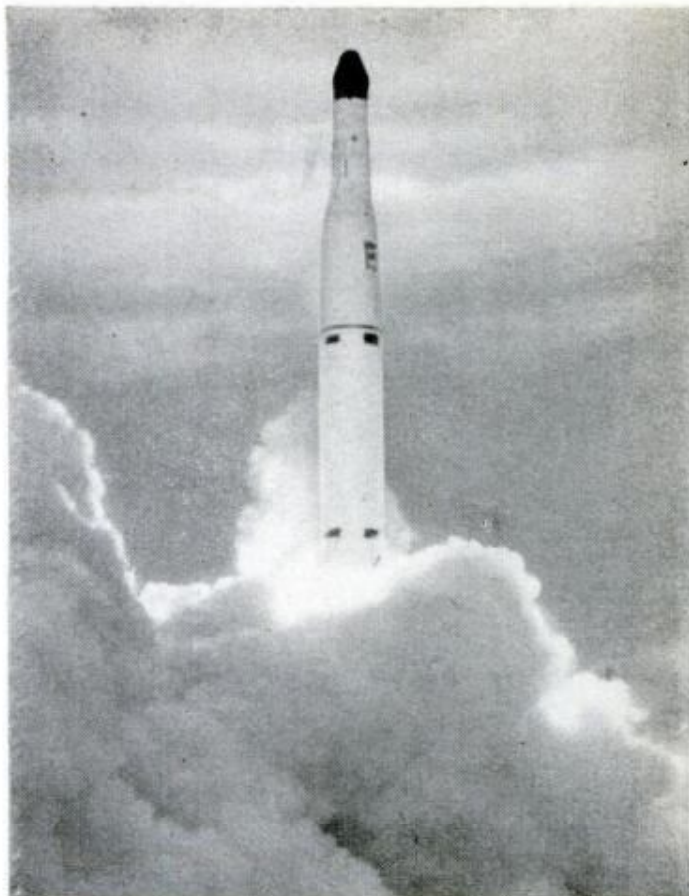
This isn't necessary with Kodak's new automatic electric-eye still cameras, because engineers have built the meter "tilt" right in! You just aim the camera directly at your subject, and shoot. The meter window (see diagram) diverts part of the sky light away from the sensitive photocell—compensating automatically for sky brightness!

This is why, with normal subjects, these cameras assure you correct exposure—"a good shot every shot." Let your Kodak dealer show you the automatic Brownie Starmatic Camera, only \$29.95; the Kodak Automatic 35 Camera, \$89.50. Look at the Kodak automatic movie cameras, too. These cameras will introduce you to the new automatic electric-eye era of photography.

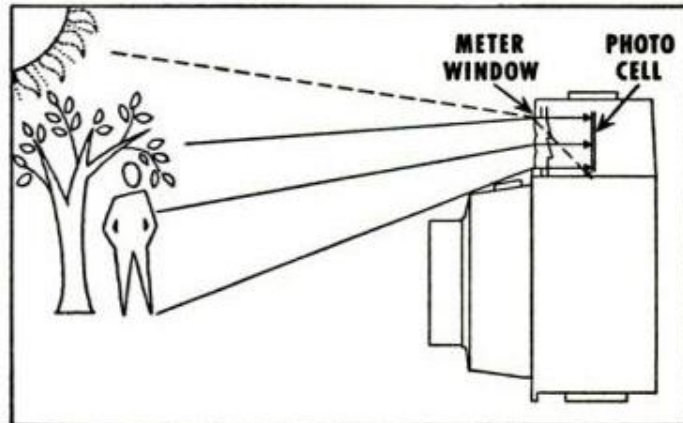
Prices are list, include Federal Tax, and are subject to change without notice.

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Asbestos Shingles Over Siding

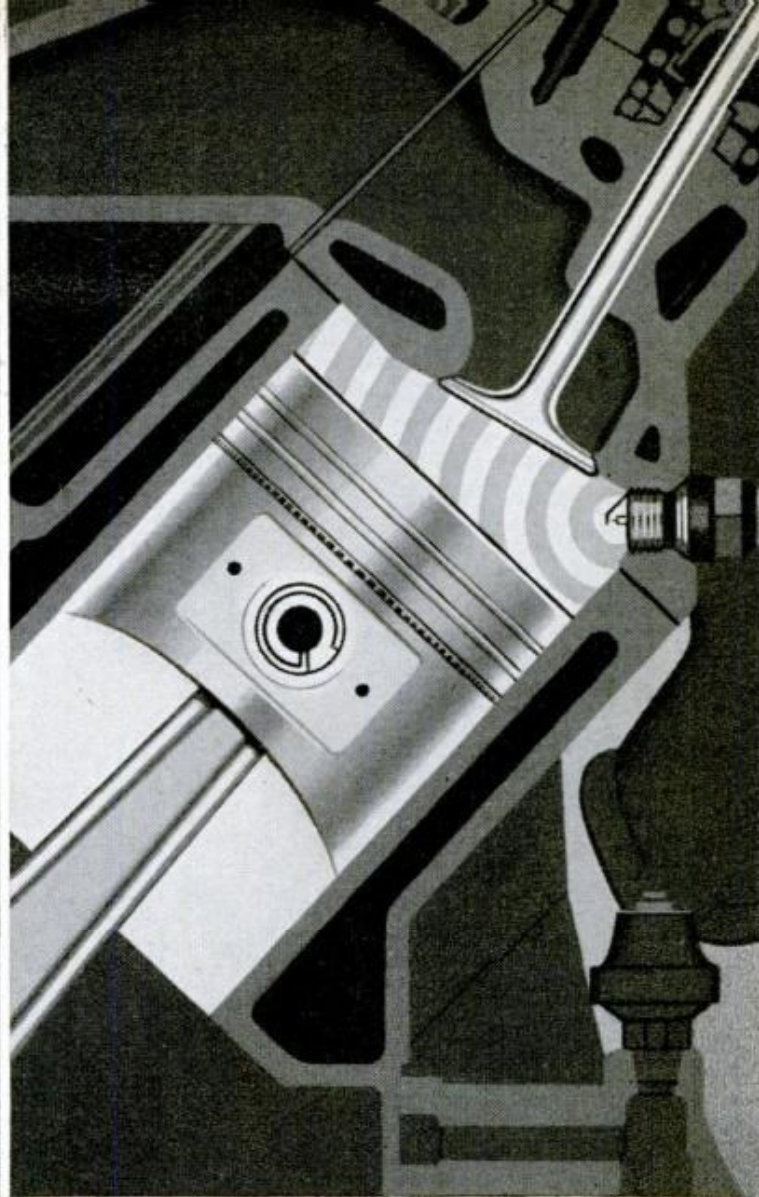
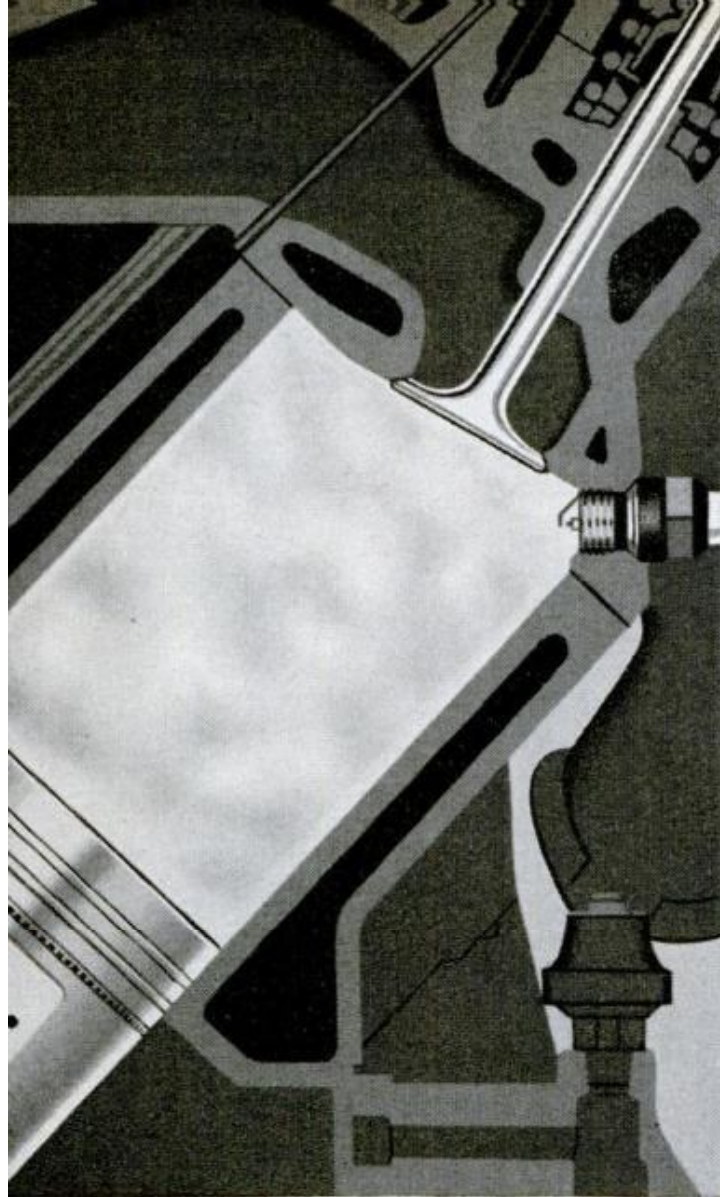


Q—I have had so much trouble with paint peeling from the siding of my home that I'm thinking of covering the walls with asbestos shingles. I have painted the house twice in four years and the paint is again peeling under the overhangs and in several other places above the foundation. But there is a question in mind about whether the dampness will penetrate these asbestos shingles and rot out the siding and possibly the framing in

time. I'd like to know before I apply the asbestos shingles.—A.B., Mass.

A—The moisture does not penetrate the siding or shingles from the outside. The moisture that is causing the trouble you describe comes from inside the house. In homes where insulating material has been installed without a vapor barrier, also in some walls having no insulation, the moisture in the form of vapor passes through the walls from the room side and is stopped by the paint film on the siding. This is the cause of the paint peeling and blistering as you describe. Application of shingles will, of course, hide the unsightly appearance of the walls but will not cure the basic trouble. In a home already built the installation of an insulating material faced with a vapor barrier is expensive, undoubtedly prohibitive in most cases. So the only hope one has of minimizing the basic trouble is to reduce the moisture content of the air in the rooms. This can be done in several ways. Venting floor furnaces, clothes dryers, ovens, shower stalls can often reduce moisture in the house as much as 30 percent. A boiling teakettle can release a pint to a quart of moisture to the air in the rooms in a very short time. Painting the room side of all outside walls with two coats of oil-base paint forms a fairly effective vapor barrier, not comparable, of course, with approved barriers but in most instances is sufficiently effective to warrant application. If the walls have been painted with a water-soluble paint then, of course, this must be removed before applying any oil-base paint. If you follow these simple steps in reducing moisture inside the house you can at least minimize the tendency of the paint to peel from the wood siding.

(Continued to page 210)



The space occupied after explosion (left) is 9 times what it was before explosion (right). Therefore, the compression ratio is 9 to 1.

What compression ratio really means

Compression ratio is the ratio between the amount of space which gases occupy after explosion (left), and before explosion (right).

Here's what happens during the four-stroke compression cycle used in most passenger car engines. First, the piston in the cylinder goes down as the intake valve opens. This lets the vaporized gasoline-and-air mixture enter the cylinder. Second, the piston rises to its end position, squeezing the mixture together (compression).

Third, the spark plug ignites the mixture, causing an explosion that forces the piston down on its power stroke, which turns the crankshaft. And fourth, the piston again rises as the exhaust valve opens, pushing the burned gases out of the cylinder (exhaust).

To keep all the power built into your engine, use this combination of Texaco products: Sky Chief Su-preme gasoline in the tank, and new Havoline Special 10W-30 motor oil in the crankcase. Here's why:

Sky Chief Su-preme has a special petroleum base additive called *Petrox* that gives you unusual upper-cylinder protection other gasolines don't offer. And new Havoline Special 10W-30 protects moving parts in summer heat and freezing cold as no ordinary motor oil can do. You use the same grade in all seasons... but it should be changed *regularly*.

That combination offers just two reasons why you'll drive with more pleasure and save for good measure with Texaco.

Buy the best...buy TEXACO

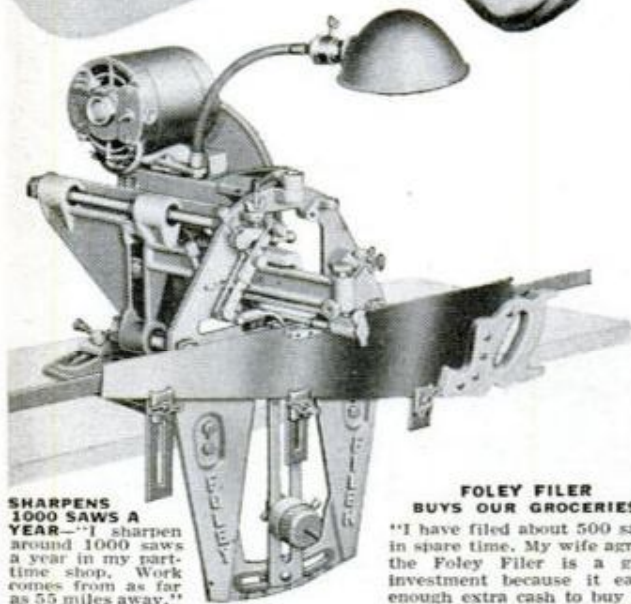
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Here is a steady repeat CASH business that pays from \$3 to \$6 an hour, and you can start in your own basement or garage in your spare time. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings more customers. J. C. Deibert wrote us: "Since I got my Foley Filer five years ago, I have averaged 4 1/4 saws each day over all this time." Howard Kuhns says: "We operate 2 Foley Filers, and our business averages about 500 saws per month. The count last year was 5,798 saws."

The new model 200 Foley Saw Filer (shown above) is the first and only machine that automatically sharpens combination (rip and cross cut) circular saws—also all hand saws, band saws and crosscut circular saws. The adjustments are simple—there is no eyestrain—and you can start right away to turn out perfect cutting saws. Exclusive jointing action evens up irregular teeth — old saws cut like new!

"**MONEY MAKING FACTS**" explains how you can get business from hardware stores, home owners, farmers, carpenters, schools, mills, factories, etc. Just think, with a modest investment, no overhead, no stock of goods to carry, you can start right in on a cash business that will help pay the rent, buy groceries, or a new car. Time Payments available; send coupon today for this practical money making plan. No salesman will call.



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Finish Turns White

Q—My new home has a flush-type exterior door. It was originally sanded and finished in the regular way with stain, sealer and varnish. Recently I noticed that the finish was turning a grayish-white color in spots. On the outside the finish seems to be full of very fine checks, but on the inside it is discoloring as described. What's the cause of this and what can be done to prevent it?—D.E., Del.

A—Probably the discoloration on the inside face of the door is caused by moisture condensing on the surface which is colder during the winter months than the air with which it is in contact. Some types of varnish, also shellac, will discolor under these conditions, especially if prolonged over a period of time. Checking of the varnish coat on the outside of the door can be due to several causes. Application of a varnish not intended for exterior use is a common cause of the trouble you describe. In some instances long exposure to direct sunlight each day speeds up oxidation of the finishing material, causing it to check. Dampness absorbed by the wood either before or after finishing also can cause checking. Perhaps it will be best to remove all the old finish to the bare wood and build up new. Sand smooth after removing the finish (either with a remover or by scraping), follow with a stain in the desired color, then when the stain is dry, apply two or more coats of exterior varnish, treating both sides of the door the same. Be sure to finish both edges also, to prevent absorption of moisture.

Repairing Downspout

Q—One of the downspouts on my home has opened at the joint. The opening is about 6 or 8 in. long and of course most of the water coming down the spout leaks out at this point. The installation is only 3 years old and I'd like to repair the break if it is possible, rather than renew the whole thing. What is likely to have caused this break and is there any way I can repair it?
—B.Y., Nebr.



A—It would seem best to replace the entire section of downspout rather than attempt to repair it. A 10-ft. length costs

only a few dollars and is comparatively easy to install. The break was probably caused by whole or partial clogging of the spout with leaves or short twigs. This mass would tend to collect water and freeze during cold weather and the expansion would force the lock seam open. The advisability of a repair is open to question but if you wish to attempt it, here is one way of doing it: Wrap a length of wire once around the spout and twist it tightly with pliers. Wrap another turn to wire around the spout just below the first and twist this tightly. Repeat the process until the tension of several loops of wire draws the edges together and closes the opening. Coat the break with paste white lead and imbed a piece of open mesh fabric such as muslin in the white-lead coating. To prevent the break from opening make a wide band clamp from light sheet metal and draw tightly around the downspout over the break.

Tips from Weldwood—the people who know what's good for wood



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CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

Best-Kept Fishing Secret

(Continued from page 127)

Texas-New Mexico border, another body of water with a high salinity count.

Kokanee salmon, a landlocked subspecies of the sockeye salmon, have been successfully transplanted in many of the northwestern states from Colorado to Washington. Latest state to undertake such a project is Pennsylvania, where 421,000 fingerling kokanees were placed in five lakes as sport and forage fish.

The Salton Sea of California was devoid of fish life until alien species were brought in from the Pacific, but today an assortment of salt-water fish can be taken from this inland sea, with the golden croaker leading the list.

At the moment, the best bet seems to be striped bass. Certainly the anadromous fish (those which spawn in fresh water but usually return to the ocean) are the most likely to succeed, and the Serranidae, the North American true basses, are already cooperating. The family includes the striped bass; the white perch, which inhabits brackish coastal waters but has frequently been landlocked; and the ubiquitous and popular fresh-water white bass, which was probably a salt-water fish at one time. The popular theory is that the white bass became adapted to fresh water through countless years of living in the brackish bayous of Louisiana, and eventually became landlocked in Caddo Lake on the Texas-Louisiana boundary, where they adjusted to their new environment and multiplied.

Thirteen white bass were transplanted to Lake Dallas in 1930. Not only did the fish multiply in such astronomical numbers that they soon overran Lake Dallas, but they have spread to waters across the nation and today are found as far north as Michigan, southeast to Tennessee and west to Arizona. Since the white bass possesses many of the habits of the salt-water striped bass, such as schooling on the surface to feed, fighting in short and spirited rushes, and feeding on shad, it is believed that the white is a cousin of the striper. They have similar markings, although the white is more deep-bodied and much smaller.

Should the striped bass prove to be as adaptable as the white bass, it could give a tremendous boost to fishing. The white has a maximum size of about five pounds, while fresh-water stripers have been known to reach 100 pounds—the rod and reel record is 73 pounds. That alone is enough to make any conservative angler's blood pressure soar. ★ ★ ★

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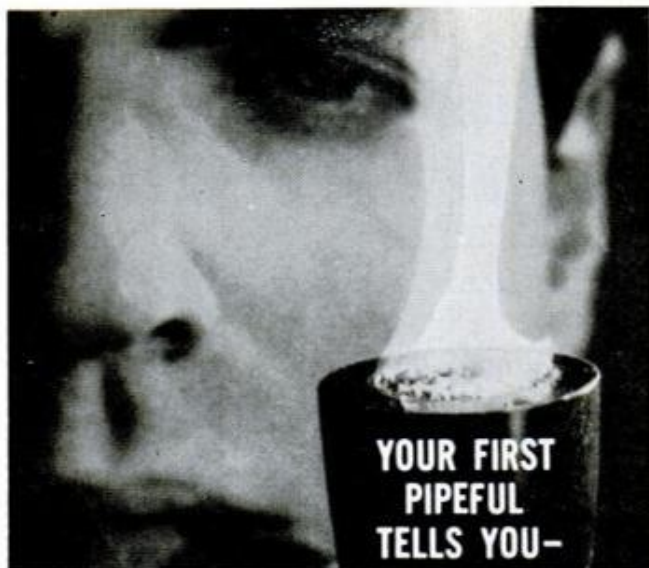
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AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

New Materials "Weld" Concrete

(Continued from page 141)

than 1 hr. Its color when hard is medium gray. Note that in the first of the three photos of Fig. 6, a wire-wheel brush chucked in an electric drill is used to remove paint and loose concrete along the crack to provide a better bonding base.

When there is an active flow of water from the hole or crack to be repaired, simply take enough mixed material to more than fill the opening and form it into a cone-shaped plug with the hands. When the material begins to stiffen, push it hard into the opening and hold the plug in place for 5 min. If part of the void remains unfilled on the first try, repeat the process after 10 min., leaving the first plug in place. To fill a fine crack, either widen the crack before applying the mix as in Fig. 9, or thin the mix to brushing consistency and apply it with a paintbrush.

Although all of these repair compounds can be sanded smooth after setting, they should be troweled flush with the surrounding surfaces at the time of application to save this hard tedious work. When using these products, or similar ones, follow the manufacturer's directions to the letter and probably you'll never have to make the same repair twice. ★★★

This Month's
"Great Pioneer in Science"

(Page 17)



Nicolaus Copernicus (1473-1543)



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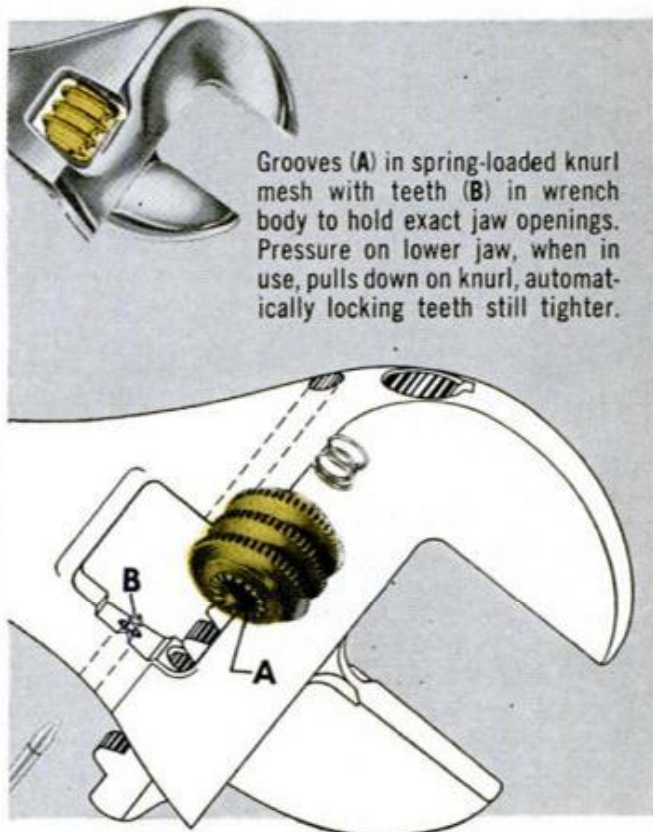
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Peat for the Lamps of Ireland

(Continued from page 116)

verted into pastureland and cropland in time.

In some bogs, a layer of peat moss may be harvested, and Ireland has found an export market not only in England, but as far away as Cyprus and Israel. Its value as a soil conditioner, poultry litter and potato wrapper are well known.

Depending on the weather, the surface of the bog may be "milled" twenty times between April and August. Milling is very simple, though it requires large equipment.

A tractor on treads scrapes loose about a half inch of soil, which dries quickly. A harrow is used to break up any clods, and a scraper gathers the peat dust into ridges. By spiral conveyor, a harvester gathers up the dust and dumps it on a stockpile beside temporary narrow-gauge railway tracks. From there, the loader eats into the stockpile, transferring the mound of peat dust into railway boxcars at 50 tons per hour.

Ireland produces over two million tons of milled peat, of which the great majority goes to the 60,000-kilowatt Ferbane Generating Plant. Here the peat dust is further dried, then blown by forced draft into the furnaces. Two smaller 40,000-kilowatt stations are now under construction, both designed to use milled peat.

At present, 50,000 tons of milled peat is briquetted under five tons pressure per square inch. This type of baled fuel is in great demand. Two more briquetting factories will be in operation in 1960, since briquettes are much cheaper than sod peat to transport by rail, lorry or barge.

But the traditional peat sod is still being gathered in volume. Seven generating plants use it as their sole fuel, four geared to hand-won peat, three to machine-harvested.

In March, great 40-ton electric-powered machines roll out on the scalped bogs to last year's cutting edge. The machines gouge out the soft wet peat—each mouthful 10 feet deep by 7 feet wide—and carry it into a macerating machine, which extrudes it as a continuous sod into a spreader arm. This massive conveyor belt, 150 feet long, heaves the sod to the ground, and disks slice it into turfs as the whole complex machine moves forward.

Turning the sods by hand is a slow back-breaking chore. Three machines have been invented to carry out these operations. One turns the sod in the moist stage. After three weeks of drying in fair weather, an ingenious new machine, resembling the sheep-foot roller used in road construction, rolls over them. Its sharp points pick up the sods

and feed them into a chute, which dumps them out behind in windrows. Special fore-and-aft attachments to a tractor pick up and overturn the windrows later, to expose the bottom turfs for air drying.

The next step, one that has bowed turf-cutters' shoulders for generations, is gathering the sod. Here, too, a newly developed automatic collector completes the last phase of a fully mechanized production. The very wide machine is mounted on treads and advances slowly upon six windrows of dry turf. The sods are lifted from the ground at the same time on six jack-ladders, and fall onto a moving belt, which carries them to the loader at the railway tracks.

These recent developments in an ancient resource are impressive in Ireland. They strengthen the country's economy by contributing power and reducing costly imports of coal and oil. Rural electrification now reaches throughout the Republic, creating new jobs where none existed and vastly lightening older forms of work.

At a consumption rate of five million tons annually, the Irish Peat Board calculates the peat will last another 500 years. But not in all regions. A power plant in West Kerry, one of four burning seven tons of hand-won peat hourly, estimates local reserves at about 20 years.

"Still, that's about the life of this power station anyway," said the engineer. "And by then atomic power may have replaced all our present-day methods." ★ ★ ★

Planets Circling Other Stars? Moon Telescope Could Spot Them

Detection of planets in other star systems, a problem that has frustrated astronomers for centuries, could be done through a large telescope installed on the moon, according to Dr. Nancy G. Roman of the National Aeronautics and Space Administration. From the moon, with no atmosphere to interfere with sharp definition of a nearby star's image, the telescope could spot possible planets by measuring the amount of light coming from the area immediately around the star. Most logical stars for the experiment, according to Dr. Roman, are Alpha Centauri, Sirius, Procyon, Altair and Arcturus. All five are relatively close, bright stars visible to the naked eye, but atmospheric distortion prevents really accurate telescopic inspection. The time-consuming, exacting observation will require a large, steady telescope, and could not be done from an observation satellite, so Dr. Roman points out that "it is not too early to begin" considering the possibility of a moon-based observatory.

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"Kidproof" Your Home

(Continued from page 155)

When Junior Leaves a Trail

The battle against tracked-in mud is best fought with a plastic or canvas runner fastened to the rug with slipcover fasteners, as shown in Fig. 17. A metal mud scraper, Fig. 18, anchored to one side of the porch will work wonders, once you've taught the kids to use it. And to protect the screen and the door finish, there's no substitute for a grill and a kickplate to absorb the blows most kids find a necessary part of entering the house.

It's All in the Game

Of course, the mess kids make is a natural part of their learning and growing. After all, these little people *do* live in a world of adults and have a hard time adjusting to it. Take our little friend Mike, in Fig. 19; the door certainly wasn't designed with him in mind. A little ingenuity on dad's part, plus a screw, a washer and a length of cord brought the problem down to a toddler's size. Plastic covers are best for protecting fabric-covered furniture, Fig. 20, and plastic runners protect the floor when learning to eat means throwing the food around, as witness our friend in Fig. 21, or when play means using paints, ink, etc. Then again, rolling toys run better if the rug is covered with a sheet of hardboard. ★ ★ ★

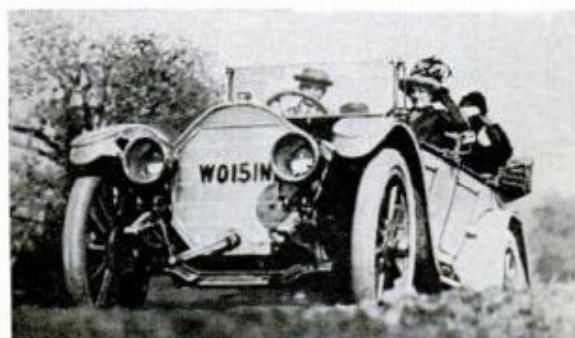
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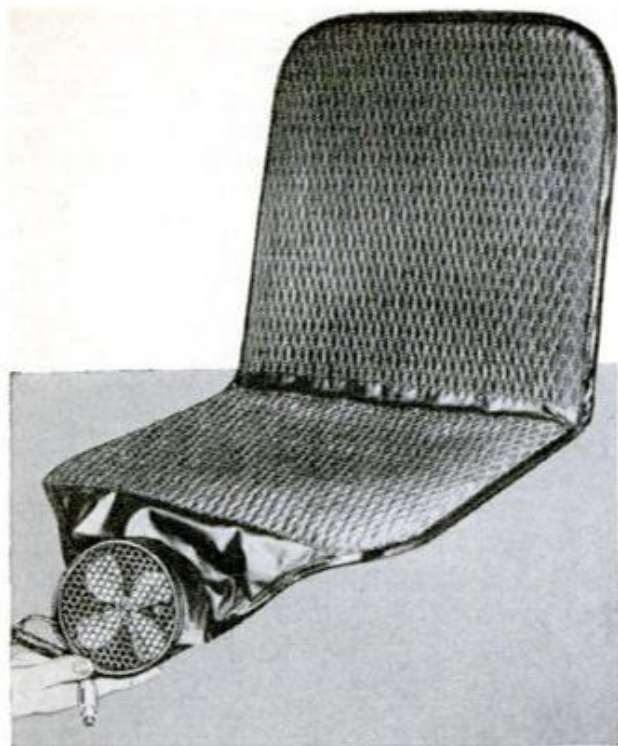
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USAF, Air Research and
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Do You Know This Old-Timer?

(answer to quiz, page 24)



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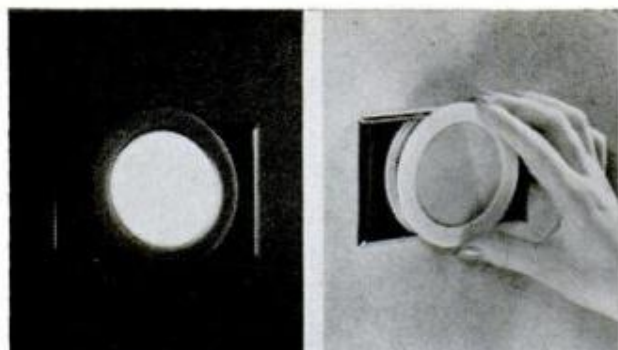
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Ignition System for Rockets Prevents Accidental Firing

Accidental blasting of a missile is prevented with a new ignition system that uses a small wire to ignite rocket fuel. To set off the rocket, a heavy charge of electricity is shot into the wire, causing it to explode. This charge is much heavier than what would be received if a high-powered radar beam accidentally hit the missile, thus preventing stray waves from firing the missile. Known as the Exploding Bridgewire System (EBW), it has been developed by a subsidiary of General Precision Equipment Corporation.

Photo Emulsion Prints Image On Cardboard, Glass or Steel

Under experimental testing by the Air Force is an emulsion, developed by a Denver photo lab, that makes it possible to print an image on cardboard, glass, steel or any flat subject. The emulsion is a full-color positive image. According to the inventor, Jay Wilson, it can be coated on any flat surface. After it is exposed to light, the image is transferred by contact printing, without the use of light, directly on black and white or full-color print material, says Wilson.

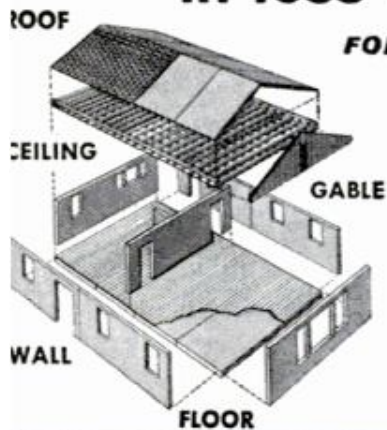


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Someday the sun may be used to relay radio messages between distant points on earth. Donald J. Blattner of the RCA Laboratories, Princeton, N.J., says radar pulses bounced from the sun demonstrate that the sun's gases could also reflect coded radio signals. He says the system is technically possible and may in the future be justified by the growing demand for communications channels. It could be especially useful when the moon is not in position to act as a reflector. The solar method, he says, would require large antennas, a transmitter with a power output of a million watts and electronic data-handling equipment.

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Scholarships Go Begging

(Continued from page 104)

Abe Littenberg, a third year Drexel student at Fort Monmouth, is working on a "pure research" project investigating gas discharges in temperatures of 1,000,000 degrees centigrade.

Jack Crenshaw, an aeronautical engineering Junior at Georgia Tech, is studying thermal effects on nose cones, fins and other missile components in the Aeroballistics Laboratory, Redstone Arsenal.

Important though this work may be to national defense, none of it counts toward reducing the male student's military obligation.

"Generally," says James M. Pride, Pentagon director of the co-op program, "a student can be deferred from the draft until he finishes college. Since many co-op schools also offer ROTC courses, he can work toward a commission and fulfill his obligation by that means."

Educators and Army laboratory supervisors are unanimous in praise of the opportunity afforded by the co-op program.

"The co-op student matures faster and takes an increased interest in his college work," according to David Gregg, White Sands Missile Range supervisor.

Capt. Rhys C. Wood, adjutant of the New Mexico State College Army ROTC unit, reports that "a comparison of grades earned by co-op students and other students clearly indicates that those of the co-op students are significantly higher, in both their academic and military subjects."

Dr. Walter Wharton, an Army Guided Missile Agency research chemist, was somewhat surprised by the quality and interest of the trainees.

"We do basic research here," Dr. Wharton said. "One might think that a student trainee would be of little help. To the contrary. They make very good technical aides. We are pleased with their work, and they have helped our program considerably."

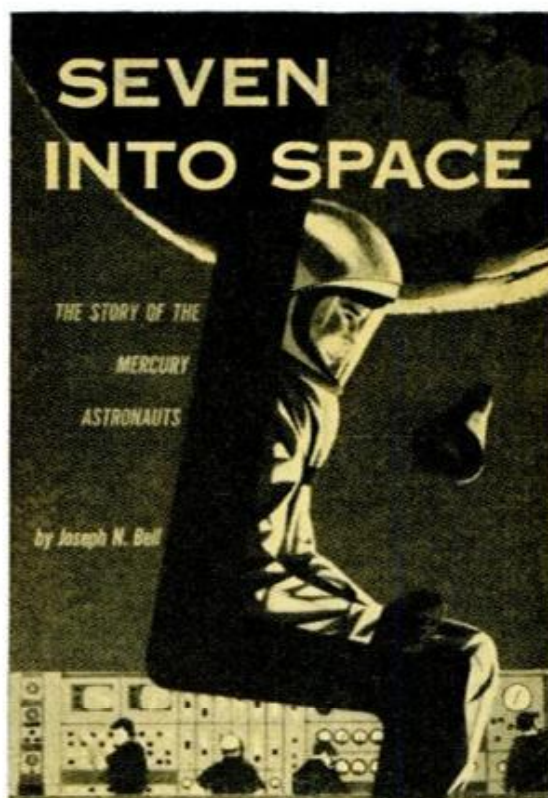
Student reaction to the program is downright enthusiastic.

"The laboratory experience gives you a burning desire to learn to solve the problems of your profession," was the general reaction of Ray Rugarber and his fellow Drexel-Fort Monmouth trainees. "Better still, someone will always take time out to answer a question for you."

The principal disadvantage of the program is its extension of the normal college course to five years and, in some cases, to six. Also, the co-op student misses much of the life of the college campus.

(Continued to page 224)

POPULAR MECHANICS PRESS ANNOUNCES



THE AUTHOR

Popular Mechanics readers will remember Mr. Bell's article, "I Lived with the Astronauts," which appeared early this year.

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None of the students interviewed at White Sands, Redstone Arsenal and Fort Monmouth considered these disadvantages worth worrying about.

Mike Keeseey, a Virginia Polytechnic Institute student employed in the Rocket Development Laboratory at Redstone saw no drawback at all.

"I'm learning to work out practical problems that I could not do in school alone," Mike observed.

At present, income from the Civil Service job is not sufficient to pay all the costs of a college education.

"I can just about make ends meet," was the experience of those who are able to live at home throughout the year. "I have to have help from dad," or "I work at additional part-time jobs," was the finding of those who live away from home.

Personnel directors at posts where the co-op program is in operation are anxious to see the trainee pay scales increased. Said one: "For a very few dollars more, we could enable the trainee to earn enough to pay for his education. He could quit worrying about part-time jobs. Rich or poor, he could obtain a top scientific education if his talents merited it. Best of all, from a psychological standpoint, he would be earning his way."

The low starting salary after graduation is also a sore point. Despite this, the Army has scored a remarkably high retention rate—as high as 79%—among the graduates of its co-op program.

"It's the equipment," Jerimiah Regan, Chief of Fort Monmouth's Human Resources Office, believes. "Private industry cannot afford the equipment we have assembled to support the satellite instrumentation and other research and development programs. We have scientists working here at salaries far below what they could obtain in civilian laboratories. But they are more interested in the quality of the work they are able to do here than in the pay. The same applies to the co-op students."

The best the Army can hope to do at present is to expand the co-op program, within the confines of its present budget, by "doubling up." By this means, one co-op student holds a laboratory job for half a year, then turns it over to another co-op student when he returns to the campus. But in expanding, the Army has run into difficulty recruiting qualified students.

"We hope that by wider public knowledge of the advantages of the co-op plan, we will be able to stimulate the necessary interest," says program director Pride. "This is an investment in the future, with insured dividends that are almost beyond calculation." ★★★

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Sculptured Gardens

(Continued from page 111)

early spring; successive light prunings follow throughout the growing season. In northern climates no heavy pruning should be made after August, because winter killing of young growth induced by pruning may spoil the outline the following year.

Topiarists work with a hedge as a sculptor works with marble. First, the general mass is blocked out and, by pruning as the plant grows, the eventual shape begins to take form. If you try to rush things before compact growth has been established, the brown twigs will show and you will never achieve what you want. Always make sure the mass of green is well established before pruning further. Look your plants over carefully, decide what they are suitable for according to their growth and natural shape. Have a sure idea of the outline of the object you wish to form, then go ahead. From then on, it is simply a matter of repeated tying and cutting.

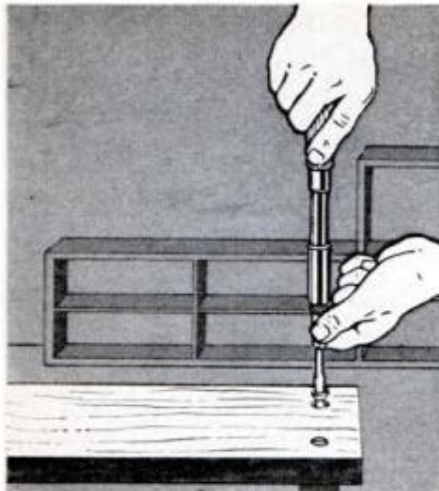
You might start with what the English call a "penny loaf," which means a large round ball not always perfectly symmetrical, with a much smaller ball on top. These have a great deal of style. In any event, begin with simple forms and graduate to more elaborate ones. It is interesting the first day you begin and you can produce a good effect the first season. Always, be sure to tie down and over and round, bunch together and tie fast, clip and shape.

The application of topiary at Williamsburg demonstrates how it blends with residential areas. Boxwood, red cedar and holly provide the raw stuff for shaping.

Topiary is displayed in formal Italian gardens at Vizcaya, a 30-acre park and museum, in Miami. A terrace embroidery of clipped hedges is emphasized by beds of gleaming sand. In the Italian manner, the gardens are thought of as a vast garden room open to the skies and combining walls of masonry or clipped hedges, statues, splashing or dripping fountains, and an elaborate tracery of garden paths and intricate jasmine hedges. These gardens are on many levels so it is possible to look down from a higher terrace to the intricate design of the level below.

On the West Coast, Yoshio Osaki, of Los Angeles, has created a thriving business by clipping tubbed eugenia, cypress, juniper and myrtle into the shapes of elephants, apes, camels, reindeer and eagles.

Osaki's hedge art brings fancy prices from California garden owners. A life-sized bear brings him \$150, an eagle, \$22. He sells his creations from a roadside market called the Osaki Plant Zoo. ★ ★ ★



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What's good and bad about the THUNDERBIRD?



In the September issue we give you the answers from questionnaires sent to 1000 Thunderbird owners

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Marlite plastic-finished paneling

ANOTHER QUALITY PRODUCT OF MASONITE® RESEARCH

Owners Report on the Rambler

(Continued from page 90)

Some of this is due to driving habits, traffic conditions or poor engine tune, etc. But economy → potential of compacts has been over-sold by emphasizing unrealistic economy-run gas mileage.

It's hard to rationalize → this sort of thing after paying \$2200 for a new car.

Many more adjustment stops of seat back between bolt upright and fully reclined are needed. Rambler could also use vertical adjustment of driver's seat. →

Neat design trick here. The Rambler is a bit (4 to 14 inches) longer than → other compacts, but manages to look still larger.

Rambler's 127-horsepower engine seems to be → powerful enough to satisfy almost all owners.

"Unexpectedly low mileage, only 12½ miles per gallon in city driving with a Six automatic."—Michigan chemical worker.

"When I bought the car the dealer assured me of 26 miles per gallon (Six, automatic). I'm now doing a little better than half of that!"—New York teacher.

"Front doors leak water in on the floor mat."—Georgia real estate salesman.

"Leaks around doors flood front floor boards in heavy rain while standing."—South Dakota Army officer.

"Car leaked around windshield but dealer corrected it after four or five trips to the shop."—North Carolina teacher.

"Hand shift is very rough. Sometimes I cannot shift into second even by double clutching."—New York scenery designer.

"A little hard shifting—especially from first to second."—Michigan insurance salesman.

"The brakes do not seem to take hold as well as I think they should."—Ohio store manager.

"Brakes make noise when applied."—California rigger.

Here Are More Best-Liked Features

The following quotations describe other best-liked features ranging from ease of parking (sixth on the list) down to performance (10th). They are quoted in order of frequency.

"With my Rambler there isn't so much of a parking problem here in Boston where streets are narrow."—Massachusetts owner.

"Its size is an asset when it comes to getting in and out of tight spots."—Pennsylvania steelworker.

"In my opinion all cars should have these divided front seats that adjust separately."—Florida teacher.

"Divided seats with reclining backs are wonderful for trips."—Iowa salesman.

"Seats are very comfortable for a 'tricky' back like mine."—California banker.

"Good, clean lines with no excess chrome."—Texas army officer.

"Its lines don't give it the appearance of a small car."—Illinois owner.

"Even when it's a little dirty, people still turn their heads to look at it."—Utah mechanic.

"Has more usable room for passengers than any other car on the market, and yet is not ridiculous in size."—New Jersey industrial designer.

"For a so-called small car it has plenty of room for my family; my three kids are crazy about it."—Georgia superintendent.

"Reacts like an eight-cylinder car, yet is economical, too."—Massachusetts bank teller.

"The instant response of the six-cylinder engine (manual transmission) is better than I expected."—Arkansas real estate man.

Some Additional Complaints

Eleventh on the complaint list is poor workmanship. Here, in order of frequency of mention, are quotations describing this and other complaints:

"Doors do not fit well; cheap work on upholstery."—Nevada office manager.

(Continued to page 230)

Sponge Will Mop Spaceman's Brow

When the first U. S. astronaut orbits the earth in a space capsule, a "pulsating" vinyl sponge will play an important part in the system being designed to keep him cool and supplied with oxygen. The sponge will absorb perspiration given off in the body cooling process, It will be squeezed automatically at intervals by a mechanical squeezer.

The astronaut will have two oxygen supplies sufficient to sustain life 56 hours, according to a staff report. The supplies will keep the space capsule pressurized in normal flight or will pressure the astronaut's suit in an emergency, with the second oxygen supply switching into the system automatically when the first supply runs out.

The supplies will be connected to a closed pressure-suit circuit and a cabin-pressure regulator valve. A lithium hydroxide canister will remove carbon dioxide and odors, a blower will circulate the oxygen, a water-boiler type of heat exchanger will remove the spaceman's heat output and the "pulsating" sponge will soak up body moisture.

"Disappearing Letters" Tested by Post Office

U.S. Post Office officials may have found the solution to a problem that has slowed development of plans to transmit letters quickly across country by wire or microwave radio beams. The problem was that there would be no secrecy, that the operator who received the transmitted letter would have a chance to read it.

Recently, officials attended a demonstration of such a radio sending and receiving set-up. A special facsimile paper received and recorded the message, which then disappeared for 30 minutes. At the end of that time the message reappeared. This gave plenty of time for the letter to be snipped from the receiving machine and placed in an envelope without the operator or carrier being able to see the contents. The way the paper does this, is, of course, a trade secret.

But the Post Office's transmission system would work something like this:

A sending machine "scans" the material put into it, converting what it sees into electrical impulses. These impulses are changed back to their original form by another machine at the receiving end.

The "disappearing letter" equipment can record up to 1000 inches a second, so the Post Office could use fast communication channels and fast communication recorders.

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- Feed releases automatically when flare is fully formed.
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- Yoke clamp screw fits into centering hole . . . locks bars, yoke and tubing into perfect alignment.
- Stop pins keep yoke on die bars at all times . . . yoke can't slide off.

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RIGGID No. 457 for 45° flares, 1/8" to 3/8" O.D. (7 sizes)

RIGGID No. 459 for 45° flares, 1/8" to 1/4" O.D. (9 sizes)

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See and try these new **RIGGID** Flaring Tools
at Your Hardware and Building Supply Dealer's

RIGGID

The Ridge Tool Company • Elyria, Ohio, U.S.A.

This is a classic case of an ill-planned piece of design that lingers for years between major body changes. AM's head stylist should have this "dog-leg" on his office door to remind him to THINK.

Rambler's engine, including the carburetor, is a settled design that's been around since 1956. Even rapidly expanded production doesn't explain this much trouble.

This is a problem, but we found it easy to fix on PM's test car.

Here's the other half of Rambler's problem: zooming sales require rapid addition of new dealers who can be inexperienced, inefficient or just plain no good.

Visibility is good, but could be even better if stylists would slope hood and fenders toward the front.

This is one of the big pluses that sparked the Rambler boom. Body is really rattle-free, but could use more sound insulation.

Maybe Mr. Average could but should he? At any rate this happy condition permits rapid first aid for sick carburetors.

"The car has some rattles, improvement in body construction is needed."—Idaho appraiser.

"The workmanship is poor . . . can't understand how car was allowed to leave the factory in such condition."—Florida linotype operator.

"Overall assembly of the car was poor, but was made right after many trips to the garage."—Texas soldier.

"When you open rear doors you risk getting poked in the face with the rear corner."—Massachusetts housewife.

"Sharp point at top of back door is apt to hit you."—Minnesota graduate student.

"My wife and children have bumped themselves often on rear doors."—Ohio truck driver.

"Rear bumpers will not support car when jacked up."—Michigan purchasing agent.

"There's a lot of wind noise around front doors."—Utah sales engineer.

"Engine stalled frequently in cold weather due to malfunction of automatic choke."—New Jersey chemist.

"We had a great deal of trouble with the carburetor."—New York banker.

"The carburetor was overhauled four times."—Ohio hospital representative.

"I've had four replacements of carburetors on my Rambler V8."—Pennsylvania salesman.

"Windshield wipers meet in center of windshield and jam—dangerous in a heavy rain."—Louisiana manager.

"The dealer from whom I bought the car doesn't have proper facilities to service my car."—Illinois chemist.

"It's my opinion that the Rambler dealers aren't as carefully selected and supervised as those of the 'big three'."—New York manager.

"I believe Rambler has gotten up near the top and has become lax in choosing quality dealers."—North Dakota optical company manager.

"If dealer would give proper predelivery inspection a lot of troubles would be eliminated."—Illinois radar technician.

Now for a List of Best Liked Features

Eleventh on the list of things that Rambler owners like is visibility. Other best liked features are described in quotations appearing in order of frequency.

"Hood styling that allows you to see the road very close to the front of the car."—Maryland meteorologist.

"Good visibility."—Michigan service station operator.

"The interior is in a class with more expensive cars."—Wisconsin carpenter.

"The body is absolutely without rattles or squeaks, the whole car has a solid, quality feel."—Oklahoma salesman.

"Holds the road beautifully, even at high speed."—Montana housewife.

"Very good roadability and handling, can attain high speeds with considerable ease."—New York landscape designer.

"One thing that I like about Rambler, the engine is easy to work on."—California carpenter.

"Easier for the average motorist to do some of his own maintenance."—Illinois mechanic.

"Trunk door opening just at bumper level, makes it easy to load."—Illinois salesman.

There is the story of the 1960 Rambler as told by the owners—a story based on 2,149,858 miles of driving experience. For a complete summary of the percentages turn back to page 90. Next month, the owners will tell you about the 1960 Thunderbird.

★ ★ ★

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| 5. <input type="checkbox"/> Woven Fence | 11. <input type="checkbox"/> Planter Box Screen |
| 6. <input type="checkbox"/> WINDOW AWNING | 12. <input type="checkbox"/> Coffee Table |

NAME

ADDRESS

Meter Measure

There may be a new standard for the meter by the end of the year. It will define the meter in terms of the orange-red spectral line of light emitted from excited atoms of krypton 86 (isotope with atomic weight 86). The meter will be 1,650,763.73 times the wavelength of this line. The suggestion that the meter be based on a wavelength of light is more than 100 years old. Problems delaying its adoption have included finding the most suitable isotope of a usable element and separating a large enough quantity of this isotope for practical use. Present international meter standard is the distance between two marks on a bar of platinum and iridium, housed at the International Bureau of Weights and Measures in Sevres, France.

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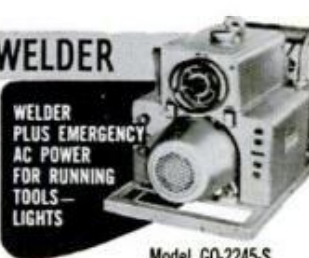
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Pictures That Freeze Time

(Continued from page 71)



Courtesy of Harold E. Edgerton

Flash picture of tennis ball flattening against a racquet was triggered by impact sound in microphone

mid-air, flattened baseballs were trapped on film at the instant the bat hit them. The pictures were critically sharp and proved things no one had ever known: that a bird's primary feathers separate in flight—each one acting as an individual air foil; that a bat uses the membrane between its legs as a dragchute for sudden stops in mid-air; that a bullet's compression will burst the other side of a bulb it has hit long before it gets there; that a falling drop of liquid assumes a tumbling egg-shape—not the popularly conceived pear-shaped teardrop.

Until multiframe stroboscopic lights came into the hands of photographers, no one had ever seen the single sweep of a golf club in each of 600 or more positions as the golfer lofted a healthy drive. Today, coaches are able to analyze their students' form in such multiple exposures, and compare it against the form of champions—inch by inch through any single maneuver—then detect and correct flaws. A special Edgerton "strobe light" rigged to a Polaroid picture-in-a-minute camera permitted one diving coach to show his students what they did wrong as soon as they climbed from the water. And it was a series of Edgerton multistrobe pictures that helped pole vaulter Bob Richards to analyze the form that made him the first man to clear 15 feet for an Olympic championship.

(Continued to page 234)

Superslick Surface Sheds Dust

Dust and dirt cannot cling to surfaces made slick by a waterlike fluid that has been successfully tested for industrial maintenance. The secret of the new coating is that it fills the microscopic pores of a seemingly already smooth surface, producing a surface so slick that there is virtually nothing for dirt to adhere to.

Based on colloidal silica, Du Pont soil-retardant concentrate is mixed one part with 14 parts water and sprayed, brushed, roller coated, mopped or wiped on a clean interior or exterior painted surface as thinly as possible. Within 15 minutes a hard, transparent coating has formed that sheds dust and dirt particles deposited from the atmosphere. Smudges remove easily.

A solution of colloidal silica in a test tube would easily pass for plain water with a drop or two of milk stirred in. A look through an electron microscope, though, would show billions of clear, hard spherical particles moving about. They are smaller than the smallest dirt particles. In varying degrees, all surfaces possess microscopic pits and pores where dirt particles wedge themselves and resist removal. The soil retardant fills in such surface flaws.

Chemical Film Works Like Muscle

"Muscle engines" that someday may be doing the work of many men have a crude forerunner in an instrument turned out at the Army's Frankford Arsenal in Philadelphia. The muscle in the Army's engine consists of an organic film that contracts when it comes in contact with an acid, and expands when it comes in contact with an alkali. In one demonstration, the contracting film was made to lift and lower a cardboard arm resembling the arm of a man. The film also lifted small weights. The Army project is aimed at finding a way to convert chemical energy directly into mechanical energy without application of heat.

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\$8.95 Ppd.

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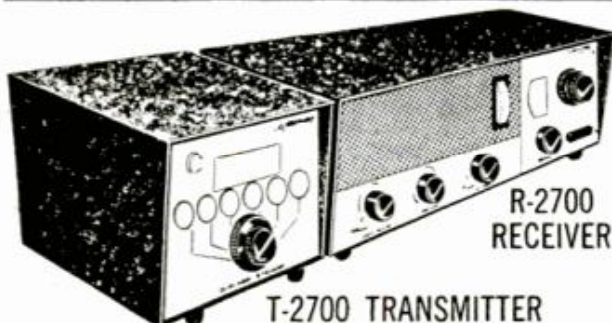
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On-the-Belt Radio for Security Guards

Guards on remote posts can be in constant communication with each other and with their headquarters with a new transistorized two-way radio outfit that weighs only five pounds but has a range up to five miles. The microphone and speaker can be either held, as shown, or worn on the lapel. The transceiver itself is worn on the belt. The unit works inside buildings and from moving vehicles.

It's one thing to have a light that will snap a picture for you in $\frac{1}{3,000,000}$ of a second, but quite another to make it go off at the pinpoint in time when you want it. Edgerton tries all kinds of stunts. He used a microphone to pick up the sound of a tennis ball hitting a racquet, and thus plinked his light with an audio signal at the instant the ball had buried itself in the racquet strings. Mikes have also been used to start the strobes for a bullet series. Sometimes, bullets trip a circuit the instant they hit whatever they're aimed at. Tiny trip wires in front of a golf tee sparked the flash for at least one spectacular shot of a driver-head whacking a ball. Cups of coffee and glasses of milk tripped circuits with their own concussion as they hit the floor, producing remarkable still pictures of china and glass in the process of shattering, and liquid in the middle of a spill.

By timing his flashing light to synchronize with the speeding film in a movie camera, Doc Edgerton has given science and industry a tool with which all time and motion can be slowed from supersonic speed to an oozing crawl. In fact, Edgerton's high-speed pulsed "strobe," capable of plinking on and off at the incredible rate of hundreds-of-thousands of times per second, was so far ahead of available photo equipment that a whole new family of high-speed movie cameras was born to accommodate it. The best that a mechanical shutter in a movie camera can handle is about 250 frames per second—fast enough to produce curious slow motion when projected at the normal speed of 16 frames per second, but a long way from what Edgerton had in mind. By eliminating the shutter and whipping the film through the camera, Edgerton was able to harness his lamp circuit to the film-driving mechanism, and synchronize the flashes to the speeding film so that each exposure was properly located. At 4000 frames per second, the film moved through the camera close to 170 miles an hour. Each frame was exposed for $\frac{1}{800,000}$ of a second.

Since that beginning, the bursting whine of high-speed movie cameras has reached ear-splitting crescendos in factories and laboratories throughout the world. Most shoot at anywhere from 150 to 16,000 frames per second. Revolving prisms "wipe" the image on the film as it whips through the camera.

Such films, when projected at normal speed, produce the world's slowest slow-motion. A jet plane, photographed at 3000 frames a second while it streaks across the sky at the speed of sound, would creep across the viewing screen at a three-miles-an-hour walking pace! With movies like

(Continued to page 236)

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One of your payments should be to yourself. Many families make out a check for U. S. Savings Bonds along with the ones that pay the monthly bills. The check for Bonds comes back to them—\$4 for \$3 in 7 years, 9 months.

that, industry has been able to "see" metal fatigue and breakup in airplane parts, detect the "bugs" in new speeding engines, study explosions, and solve a host of intricate problems.

Recently, a rubber company had an inexplicable blowout problem with a new tire. Ultra-high-speed movies of the tire spinning at 90 miles an hour on a dynamometer quickly showed structural faults in the sidewalls. In super slow-motion, the tires bobbed, grew square and were "seen" coming apart before the actual blowout occurred. Engineers eliminated the flaws.

In spite of all this, the modern space age cries for higher and higher speed. By rotating a helium turbine prism in the opposite direction to a zipping strip of film, one group of wizards has managed to achieve a rate of 10 million frames per second. Eeriest of all is the "drum" camera that snaps a spring-loaded film strip across a wide open lens at a fantastic 40 million frames per second. This is "streak photography," in which the subject (flame or explosion) provides its own light source. The picture is just a long blur, but a useful one in jet or rocket flame studies.

While technical experts and manufacturers use and embellish his high speed developments, Edgerton is constantly busy with a clutter of new ideas. He has a great reputation for thriving on other people's "impossible" problems which, more often than not, he solves with boundless energy and enthusiasm.

When nuclear physicists needed ultra-high-speed pictures showing the actual birth and development of a hydrogen bomb explosion, Edgerton packed up his gear and headed for Eniwetok. Lights were no use here. The bomb supplied its own illumination—in fact too much of it, along with other things. "Previous atom bomb pictures showed that radiation made the lens glass opaque," Edgerton recalls. "We needed a long lens and some kind of shutter that would operate at $\frac{1}{1,000,000}$ of a second or better."

While reading some old optical reports, he had come across an experiment that had failed because a magnetic field had changed the polarization in a piece of glass so it no longer let light through. It sparked an idea that resulted in Edgerton's famous "Rapatronic" shutter. The "shutter" is really an electronic one. He wrapped a column of dense glass in a coil and placed it in front of the lens elements of a camera. A surge of current, supplied by strobe units, zips through the coil and changes the polarization in the glass column, allowing light through for an instant as brief as one microsecond.

At Eniwetok, Edgerton set up banks of cameras and strobe power units. "I made corrections by taking pictures of myself 10 miles away with a long-focus lens, holding and triggering the strobe power source to trip the Rapatronic shutter," he says. "There was so much light from the bomb, we had to stack the shutters. One was rigged to open a second before the explosion, the other $\frac{1}{1000}$ of a second after."

Results made photographic history, for Edgerton had caught the mighty fireball at the instant of touch-off. The pictures revealed initial melting and vaporization of the steel tower on which it was perched. Other pictures in the series showed similar things no man had seen before.

Edgerton's ingeniousness in getting "impossible" pictures frequently involves more than electronic and photographic wizardry. He designed and built a camera that was lowered from Jacques Cousteau's research ship *Calypso* to the $4\frac{1}{2}$ -mile-deep floor of the Romanche Trench off the west coast of Africa. No camera had ever been lowered to such a depth before. Edgerton built a camera into a steel cylinder with a $1\frac{1}{2}$ -inch plate glass window. But one of Cousteau's snaggiest problems was to find cable strong enough to hold up under its own weight at that depth—let alone support an anchor or a camera. The Doc solved it by coming up with a tough nylon line having the same specific gravity as sea water—so the line itself was weightless in the water. Everything worked, and though one of the glass windows cracked under the staggering pressure of $5\frac{1}{2}$ tons to the square inch in the stygian depths, a number of startling pictures were obtained. They revealed life on the 24,500-foot-deep floor of the sea, and areas of sharp rocky outcrops—things no one had suspected would exist down there.

The work is never finished in Edgerton's lab. More recently, he designed a deep-sea camera for Woods Hole oceanographers. "We rigged it with a photo-multiplier tube trigger," he explains, "so a luminescent fish swimming by would take its own picture." Last year, the Doc announced a new system for taking high-speed pictures of full-scale shock waves in broad daylight. He sets up a screen of Scotchlite (the reflective material used in road signs) behind a subject such as a flying bullet, then places his high-speed light near the camera and fires away. "Shock waves," he explains, "are like the shadows of ripples you see on the bottom of the bathtub. Air acts like a fluid in such reactions. The light flash goes through the shock wave and is reflected back to the camera by the screen. The bending of the light caused by the wave

(Continued to page 238)

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2 1/8"	3 3/4"	2 1/4"	13"	10 1/2 lbs.	\$ 7.95
2 1/4"	6 3/4"	9/16"	19 1/2"	6 1/2 lbs.	\$ 9.95
2 1/4"	4"	1"	13 1/2"	5 lbs.	\$ 8.95
2 3/8"	18"	1 5/8"	26"	11 lbs.	\$19.50
2 7/8"	16"	1 3/4"	33"	16 1/4 lbs.	\$18.75
2 1/4"	9"	1 1/2"	24"	12 lbs.	\$14.95
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shows as a thin shadow on the screen and the camera picks it up." The system will enable scientists and engineers for the first time to take shock-wave pictures of real aircraft in flight.

The high-speed lamps are forever being improved, too. The firm of Edgerton, Gernsmaier and Grier is developing one stroboscopic light with which anyone can make exposures at $\frac{1}{3,000,000}$ of a second and another that repeats up to a 100,000 flash per second rate.

Complicated circuitry and condenser packages that once needed a pickup truck to tote them around, come in easily portable sizes. Some single-flash strobes are less bulky than many flashbulb units, and are used regularly by most professional and many amateur photographers. New ultra-high-speed films for both still and movie cameras are making it more possible for the average shutter-bug to take spectacular stop-action or nighttime pictures with even the simplest cameras.

Already color films exist which can be shot faster than the fastest black and white of 15 years ago. Kodak engineers are proud of a new black and white film so fast that anyone can take high-speed shots of night baseball or basketball games without lights. On the way are newer high-speed color films with even better definition. There are hazards connected with this kind of thing, though. One photographer recently tested a new film by taking pictures of his girl friend mailing a letter under a dim street lamp at midnight. He was stopped by a cop who wanted to know what he was doing. "Taking snapshots," the photographer replied. The policeman nodded sagely. "Okay, wiseguy," he said, "you can tell that one to the captain." It took a half-hour lecture on the fabulous properties of new high-speed films before the officer was convinced. ★ ★ ★

Dummy Submerged in Water Tests Deceleration Force

Containing a 134-pound dummy, a water-filled, one-ton steel capsule recently was mounted on a rocket-powered sled and fired along the 35,000-foot missile test track at Holloman Air Force Base, N. Mex. The purpose of the experiment, the results of which are still being explored, was to determine if a water cushion will help space-men withstand the body-smashing forces of deceleration. The dummy, equipped with a skin-diving suit and breathing apparatus, withstood 40-Gs (40 times the weight of its body) in a smashing stop after traveling a 4000-foot run at 615 miles an hour.



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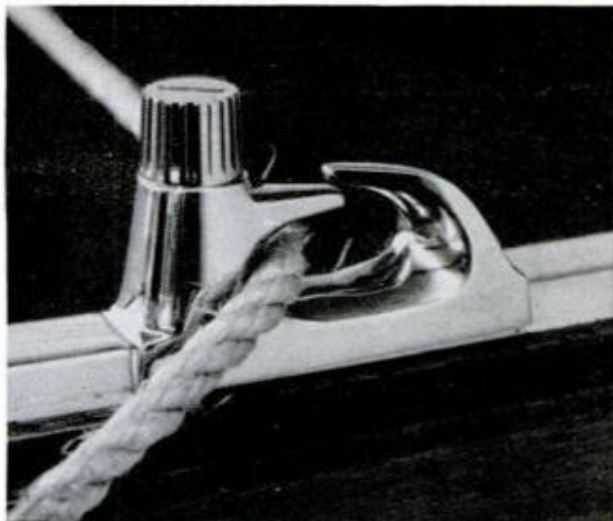
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Bananas From Alaska?

Grapefruit from Siberia and bananas from Alaska may soon be on the grocery shelves. Key to growing tropical fruits in cold climates is the discovery of a narrow band of light rays from incandescent bulbs and fluorescent lamps responsible for most plant growth.

Future farmers may even go underground where temperature, weather conditions, plant diseases, nutrition and lighting can be accurately controlled, according to Robert L. Zahour, manager of application engineering for Westinghouse Electric Corporation's lamp division.

Several years ago, a long-term project was begun with the cooperation of Rutgers University. An artificially lighted greenhouse, from which all daylight was excluded, was found to contain enough light for several different plants to grow. Light intensities—similar to those found in home reading lamps—were about one-hundredth of noonday sunlight, Mr. Zahour said. Other researchers have also shown that ordinary light bulbs can be economically and efficiently used to heat hotbeds for growing some kinds of plants.



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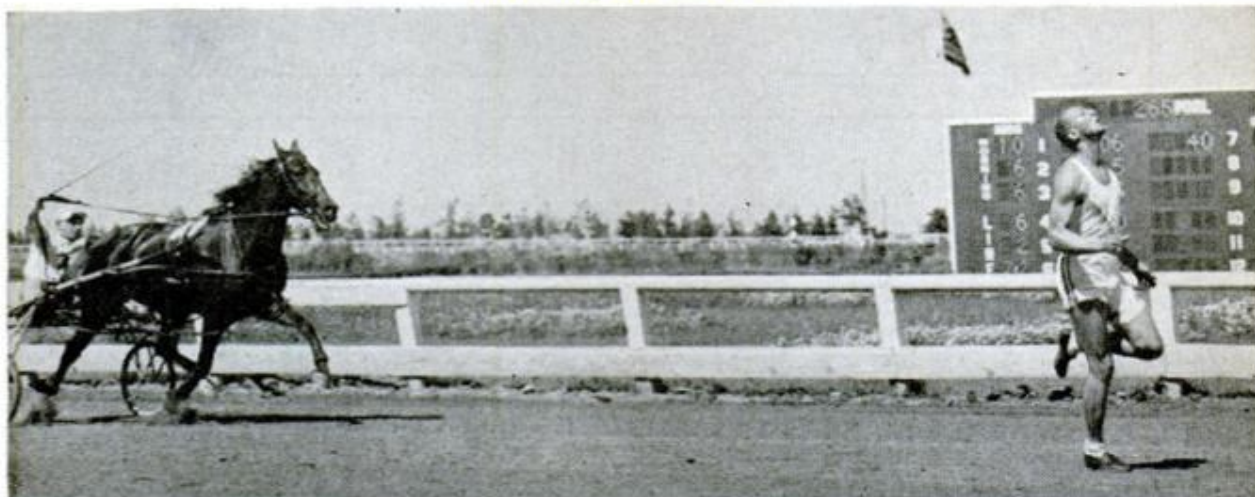
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"This year I got smart—I planted weeds and the grass killed them."

Olympic Records

(Continued from page 83)



Jesse Owens, Olympic champion in three events, outdistanced humans and horses alike in the sprints

gy, perhaps enough to increase his speed a fraction and break a record. And track shoes everywhere are better fitted and have spikes of ideal length and placement for each event. Coaches and trainers miss nothing that might save a fraction of a second or add speed for a runner's effort.

Better Psychological Training

5. Coaches, working with psychologists or from their own experience, have gained understanding of the problems of athletes that was unknown a few years ago. They break down barriers and build up incentive in every competitor, and help prepare their men to extend their best effort in each performance.

Better Early Training

6. As methods and facilities improve and cumulative knowledge grows, coaching improves, reaching into lower grade levels to help younger athletes. High school coaching in this country today is better than college coaching was only 15 or 20 years ago. The boys start earlier and learn faster, and a potential champion can be spotted and helped along by his coaches from one level to the next, and into the Olympics.

Better Competition

7. More boys are going to school, simply because there are more boys. They are getting better help from better coaches and school facilities and the help continues through school and into the armed forces or postgraduate programs in athletic clubs. Competition, as a result, is tough, both within the team and between teams. And competition makes better performers; better competitors break records in the stiff competition of the Olympic games.

Better Transportation

8. More directly related to athletic performance than you'd think, improved transportation of athletes contributes greatly to their performance when they must travel long distances to compete. Trips that were impractical or extremely difficult twenty years ago are made in hours on jet aircraft, and the athletes arrive rested and ready—and get more and better competition from other athletes from other distant points. This one, unnoticed factor may have had a big bearing on the number of outstanding performances in the 1956 Olympic games in Melbourne, Australia.

How long can athletes continue to break each others' records? No Olympic record stands as the world record today, though some Olympic record holders, Vladimir Kuts of Czechoslovakia, Americans Jesse Owens, Harold Connolly and Parry O'Brien and Norway's Egil Danielsen, also hold world records, but for better performances outside the Olympics. So there is room for improvement, though the margin of improvement narrows with each new record. But there is always the chance of a new technique, a better piece of equipment, an improved method of training, or a superior surface to run on or throw from that might allow another few tenths of a second to come off the time or another few inches to go onto the distance.

Perhaps most encouraging is the thought that there will always be giants like Jesse Owens, who in the 1936 Berlin Olympics, broke records in the broad jump and 200-meter run and broke the 100-meter record, too, but with a tailwind that caused that record to be disallowed and called a tie. His 10.2-seconds time, however, still stands as

(Continued to page 242)

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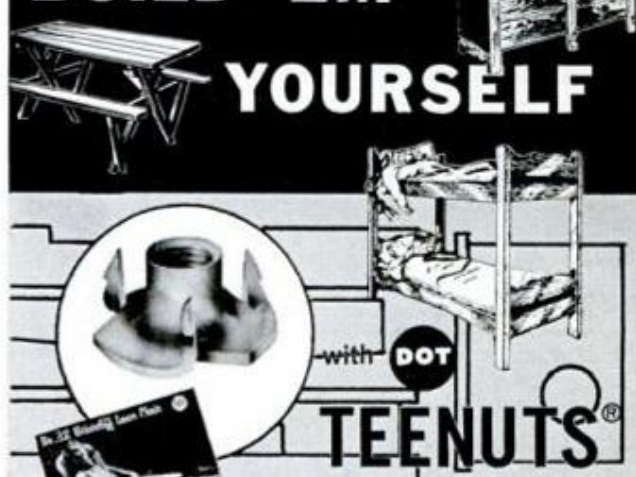
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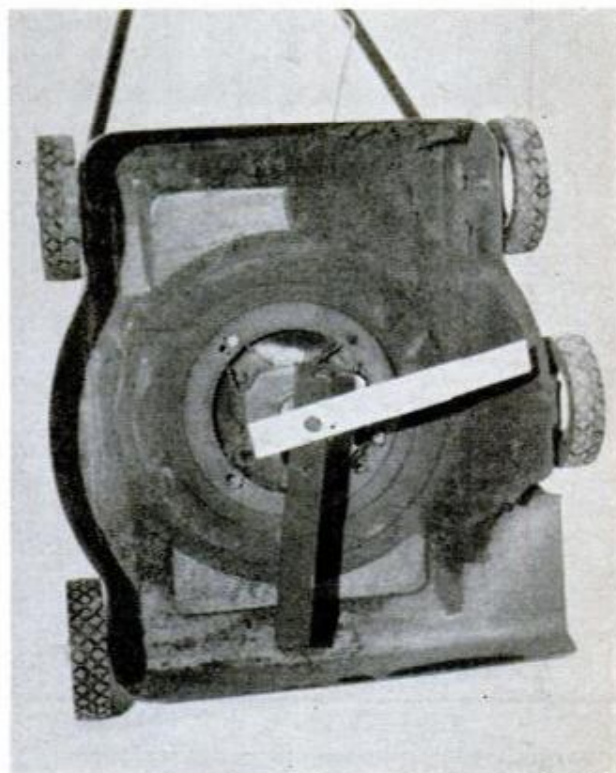
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the best Olympic performance in that event. His broad jump that day is still the Olympic record, and his 200-meter time has been beaten by only .1 second.

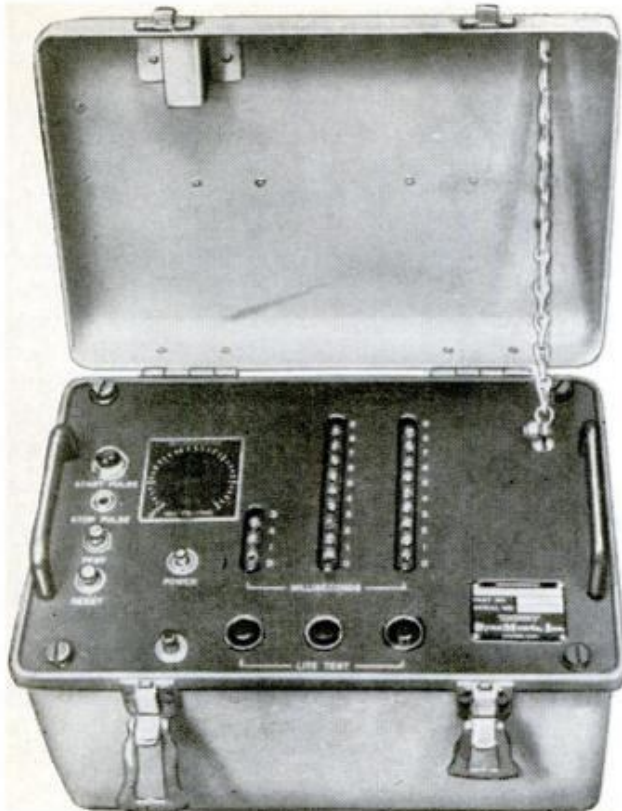
In May of 1956, Britain's Prince Philip wrote, in the foreword to Harold Abrahams' "The Olympic Games Book," "It seems incredible to me that performance can go on improving at the present rate, but I have no doubt that Mr. Abrahams will have a lot of rewriting to do before the 1960 Games." Mr. Abrahams did. A lot of big, strong, well-trained young men from all over the world will be in Rome this summer trying to break them all over again, and they probably will. Jack Clowser, a leading "track nut" and respected sports writer for the Cleveland Press told me, "At Rome this summer I expect to watch the greatest assault on records in history." I think he's right. ★ ★ ★



Trans America Business Services, Omaha, Neb.

Two-Piece Blade Cuts Mower Damage

Broken drive shafts and snapped blades needn't be the price of hitting rocks and other obstructions with power mowers. A blade that's manufactured in two sections simply jackknives when it whacks a solid object. The two sections of the blade overlap where they fasten to the shaft of the mower. Small knobs on one blade fit into dimples on the other, holding the two sections in alignment during normal operation—while allowing them to separate upon contact with a solid object.



DynaMetric, Inc., 2955 E. Colorado Blvd., Pasadena, Calif.

Seismic Timer Explores Earth

Exploring the structure of the Earth to depths of 50 feet can now be carried out with the aid of a transistorized seismic timer that does away with the need of drilling. The system is a simplified adaptation of techniques once used in oil exploration. Shock waves are generated by someone banging a sledgehammer against a steel plate on the ground. The timer measures the arrival of the waves at bedrock, showing the time directly in milliseconds.

Electrons Weld and Machine Metals

Streams of electrons that change matter physically or chemically can be adapted to do both precision welding and machining of complex shapes.

Used as a welding machine, the process handles stainless steel for missile structures, producing T sections 60/1000-inch thick from sheet stock at the rate of seven feet per minute. It will butt weld 3/8-inch stainless steel at the rate of an inch every three seconds and has, in the laboratory, welded through one inch of stainless steel. The flexibility of the machine and the precise focusing of the beam has permitted welding of complex shapes in hard-to-weld materials.

When adapted to machining, the process permits creation of accurate holes and slots as small as .0008 inch in hard materials.

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Typewriter Cases Become Raft

Using polystyrene foam to make light, strong, close-fitting packing cases for Royal McBee typewriters is only a little less ingenious than the uses that customers have devised for the empty cases. The happy family at right used a few scrap boards, a roll of wire and 10 of the cases to make a raft. Others have used them for dart boards, kickboards, hassocks, playhouses and playhouse furniture, and storage boxes. Imaginative small boys have devised dozens of floating vehicles around the cases, and the demand has grown so heavy that the Royal McBee Company has obligingly made the boxes available to the public through its district sales headquarters and distributing offices.



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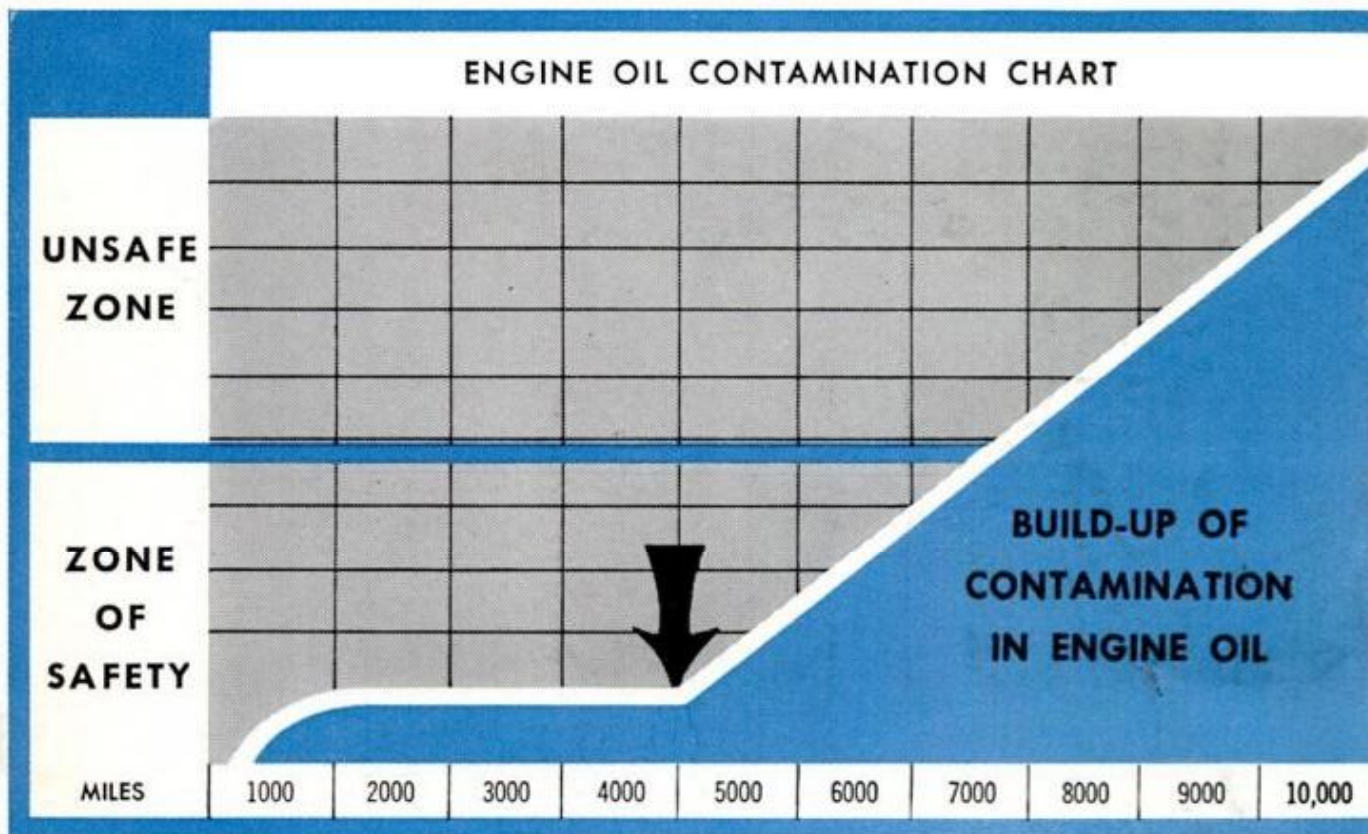
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