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APRIL, 1961

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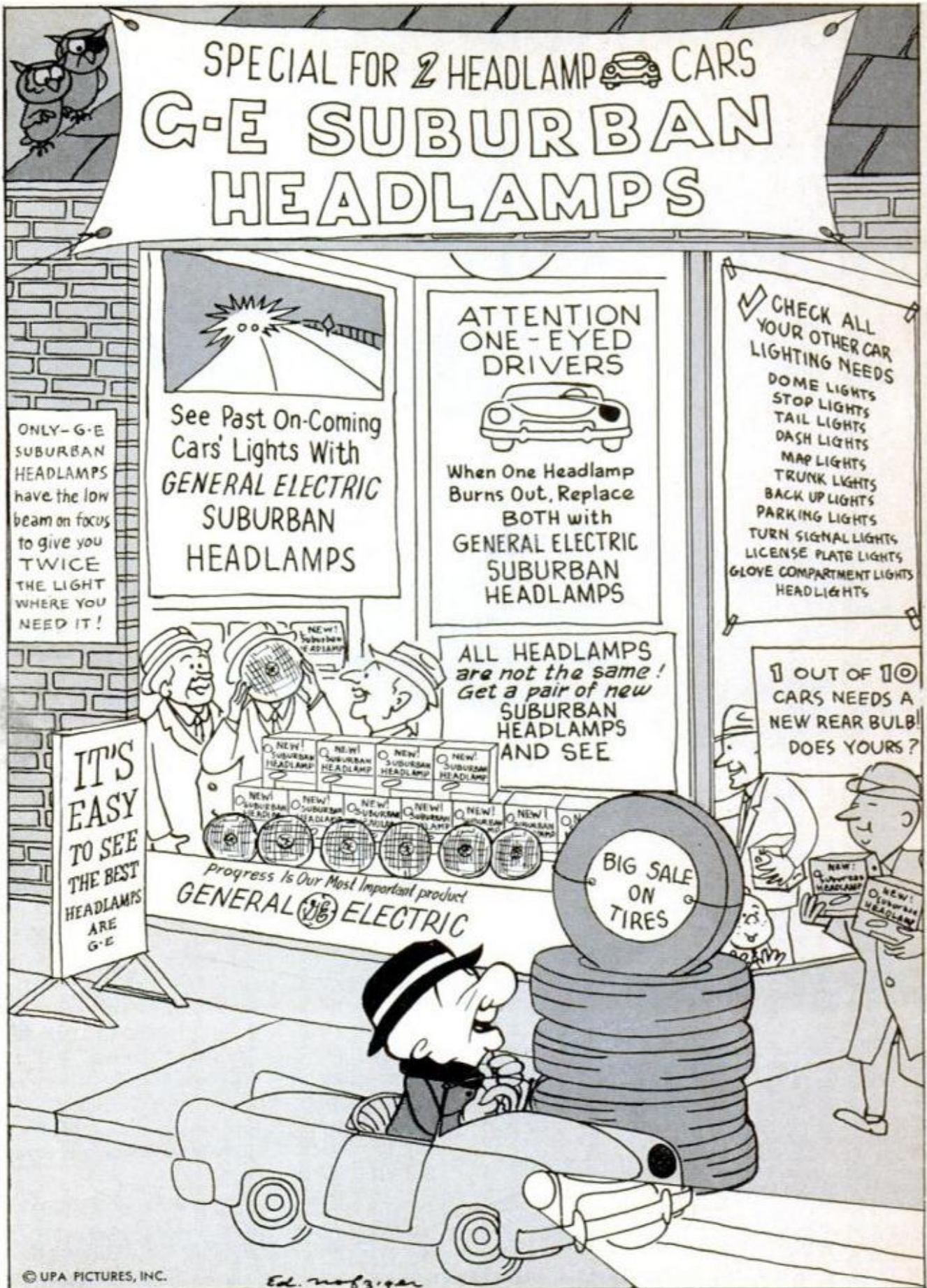
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APRIL 1961

1



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Volume 115

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Next Month...

10 HIDEAWAY VACATIONS, all within reach and some of them an easy ride away from you. Read about them in the May issue's special 22-page vacation section. . . . In the same issue, the owners tell you what they like and don't like about their 85- and 101-horsepower Comets, based on over a million miles of driving savvy. Also: "Will a Compact Car Really Save You Money?"



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BULLETINS FROM THE WORLD OF SCIENCE

TOMORROW'S Moon visitor might get a drink from rocks. Dr. Roy G. Brereton of Aerojet-General Corp. says that since some rocks on the Moon may contain as much as five percent water, the traveler could dump a few in a vat, and with a mirror focus the Sun's rays on them. When the water in the rocks got hot enough it would steam. A dome would catch the steam, letting it condense and drip off as useable water.

Or would it be the first true moonshine?

The American inventor of the radiocarbon dating technique, Dr. Willard Libby, is experimenting with new chemical elements he believes will allow the technique to measure age of matter 200 million to 300 million years old. Dr. Libby's method, at present, dates matter 50,000 years old.

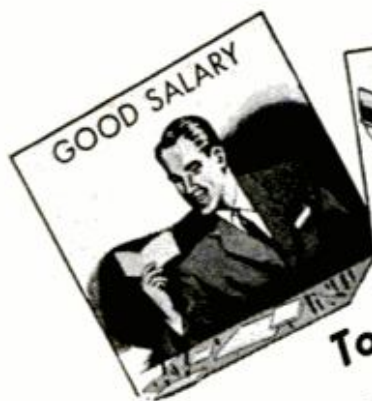
Earth's whirl apparently has no effect on the way our biological clocks keep time. "Clock" is the term given to the obscure mechanism which keeps man, plants and other organisms functioning rhythmically. (Some plants, for example, fold their leaves at night, unfold them during the day.)

Dr. Karl Hammer of the University of California took bean plants, hamsters, fungi and fruit flies to McMurdo Sound and South Pole Base—where they were close to the Earth's axis of spin. He put them on turntables and spun them with the Earth, against the Earth and at varying rates of time compared to the Earth's 24-hour rate. The biological clocks kept their times.

Radioactive fallout levels in man and foods showed a continued increase in the past two years despite the general decline in fallout since tests of nuclear weapons were ordered stopped in 1958. The Atomic Energy Commission's recent report to Congress says this apparently is a result of accumulation of longer-lived contaminating elements from both weapons testing and nuclear development. AEC biologists say levels are still within acceptable limits.

Another report on radiation, prepared by the U.S. Atomic Bomb Casualty Commission in Hiroshima, Japan, says 230,000 persons still suffer from radioactive disease, ranging from burns and bleeding gums to cancer as a result of atomic bombs dropped on Hiroshima and Nagasaki more than 15 years ago.

(Continued to page 8)



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



If you're that person, here's something that will interest you. Not a magic formula—not a get-rich-quick scheme—but something more substantial, more practical.

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

Still, wouldn't it be worth your while to sacrifice some of your leisure in favor of interesting home study—over a comparatively brief period? Always provided that the rewards were good—an excellent salary, job security, etc.

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

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TODAY... SURE!**

Of the total, 4500 were still in hospitals at the beginning of this year.

Right now, nuclear-powered generating stations in the U.S. have a total capacity of nearly 400,000 kilowatts—enough to supply the electrical needs of a city the size of Minneapolis, Minn.

Does rain cause lightning, as is generally thought, or does lightning cause rain? An experiment on the Illinois prairies indicates that lightning may turn part of a cloud into an electrostatic precipitator which coalesces cloud droplets into rain drops.

A team from Arthur D. Little, Inc. and the Illinois State Water Survey laid down eight miles of steel wires near the ground. Charged particles produced by 30,000-volt current were carried up to small cumulus clouds by updrafts and the team found they could, to some extent, influence the electrical field in the clouds.

The idea, developed, may bring about electrical seeding of clouds to make rain.

Living organisms can survive barren environments 6000 feet above sea level. This was established by the recent discovery of two dozen springtails (a primitive wingless insect), and a dozen parasitic mites at the head of Mackay Glacier in Antarctica—a plateau on which there are no plants.

Famines and droughts recorded by unknown painters and writers 1700 years ago in Asia, North Africa and Europe are now being studied by meteorologists seeking clues to effects of solar cycle on climate.

To test effects of new drugs on learning performance, Dr. Jack Findley of the University of Maryland has first had to teach a baboon named Cowboy to count. Cowboy now gets food by pushing a button that first turns on a light — orange, red, green, blue or white. After the light is on, he must count a certain number of beeps that sound. Having counted the proper number the light demanded, he pushes a second button and gets a morsel. The beep tones have varying times between them so Cowboy must count, not merely mark time. It takes about 200 button pushes a day to provide his meals.

Findley hopes to teach Cowboy to add—by another system of counting. Then drugs will be given him to see what effect they have on performance.

James Biery

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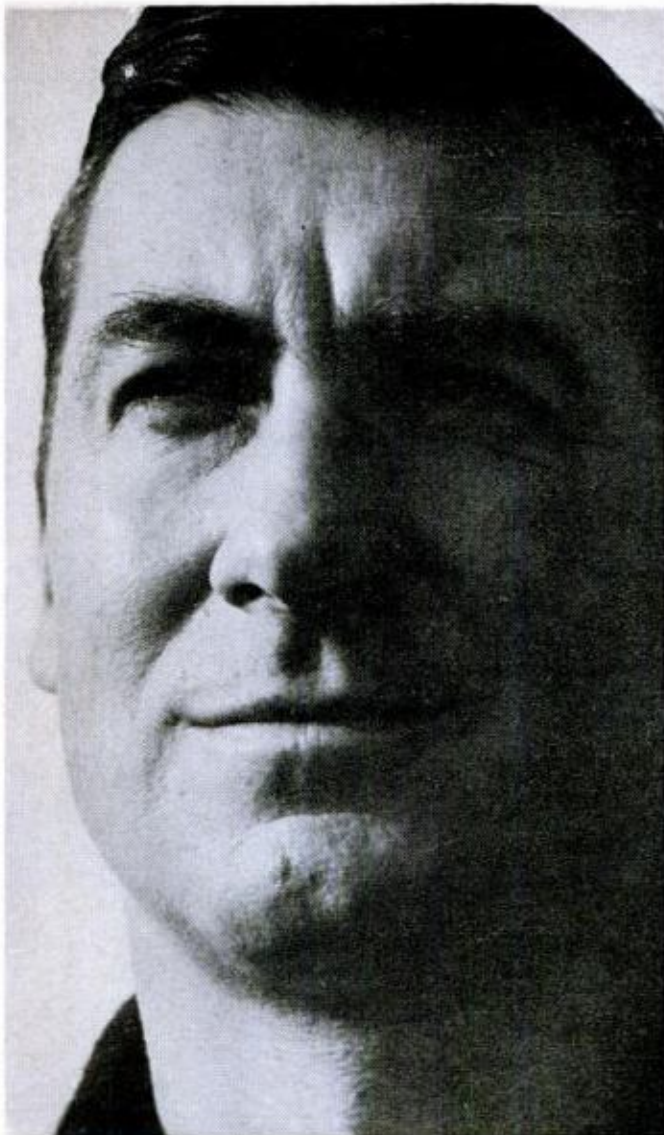
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OVER THE EDITOR'S DESK



Metric Melange

Our December issue pro and con articles on the metric system stirred up a large measure of emotion. Arvi Rand of Toronto, Canada feels that the article opposing the adoption of the metric system drew absurd conclusions, grossly underestimated the adaptability of American industry and showed a lack of familiarity with the buying habits of the average housewife. Among other detailed arguments, reader Rand notes that 83 percent of the world's population is using the metric system today, including the scientists in the few remaining countries which still employ the inch system. Superior products, machined to 2.5 closer tolerances, would be possible with metric measurements, reader Rand observes.

L. R. Holcomb of No. Abington, Mass., writes that, from reading a book on weights and measures by Yale professor C. A. L. Totten, one will learn that the metric system is based on scientific error and is morally wrong. If it is morally unsound, reader Holcomb concludes, the metric system is eventually doomed.

We never realized that an inch could generate so much heat and we only wish there were more space in which to present the very excellent arguments which many of you readers have been firing in on this subject.

Kill Them With Junk?

From another quarter comes even warmer comment. It's a note from Capt. Frank A. Tinker, veteran pilot and author of the conscience-stinging article, *Are We Flying Junk?*, which appeared in the recent March issue of *PM*.

"Last night," reports Frank, "another good friend of mine was sacrificed to the slipshod maintenance and general rundown condition of World War II C-46s being used by a nonsked flying service. He and his copilot were killed when their ancient Dumbo's right engine caught fire and burned through the wing before they could get it down. To me and the rest of the lads who fly these things, the situation is more than merely critical—it's way past the argument stage. . . ."

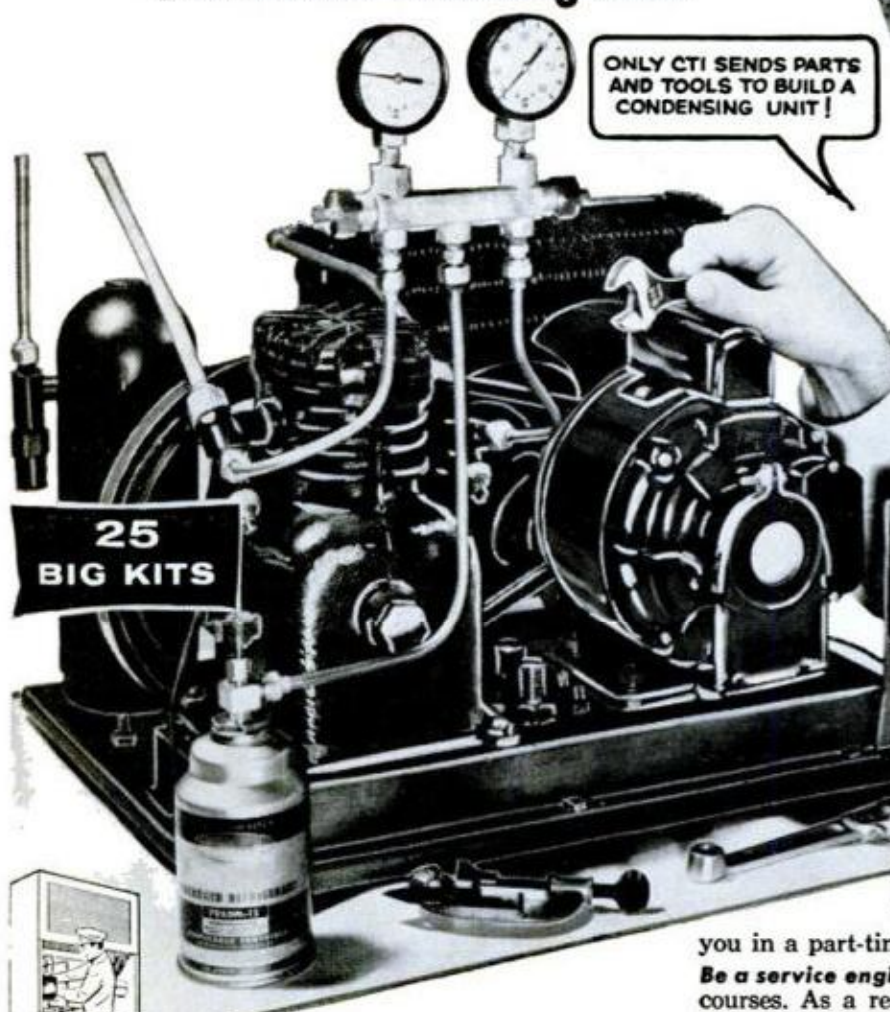
Let's hope that some of the appropriate

(Continued on page 14)

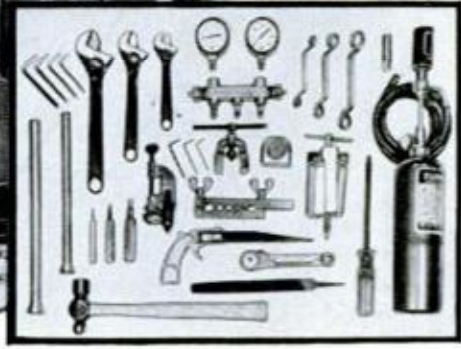
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you in a part-time business while you're still a student! **Be a service engineer.** Few universities offer refrigeration courses. As a result, the industry chooses its engineers from technician ranks. If you have above-average ability, you too may get into planning and estimating—the engineering phase of a great business.

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Water Sports



*Selected by the editors of *Golden Argosy*, the magazine for men, and *Outdoors*, the magazine of outdoor recreation.

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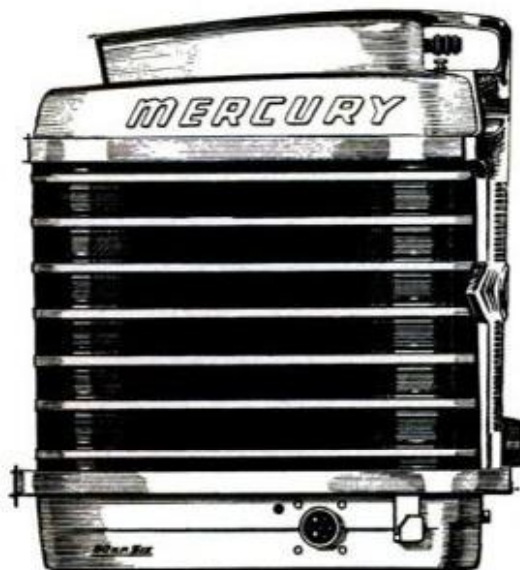
Grand National Pleasure Boat Champion Drives Mercury! California's Charles Mersereau won three of the world's toughest marathons, including the 6-hour pleasure boat endurance at Kissimmee, Fla. He says: "To run first or run first class, your choice will be the same as mine — Mercury!"

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Family Cruising Champs Choose Mercury! The Glenn Kirkpatricks, Winterhaven, Fla., say: "Mercury has powered us from Seattle to Ketchikan, Alaska, and on many another thrilling cruise. Merc power and handling ease make cruising as simple as driving the highway in the family car."

(Continued from page 10)

federal aviation officials concerned with safety standards are tuned in on Frank's urgent frequency.

Bahama Knight

A more relaxed note is injected by Jim Robertson of Nassau, Bahamas, who sends us this photo of the cabin cruiser built from PM's 1957 plans for *Sea Knight*. Jim com-



pletely fibreglassed his craft, a first-time boatbuilding effort which he calls *Fanny III*, and reports that it will do 25 m.p.h. with a 1959 50-hp. Evinrude. He changed the front windshield and side windows a bit, left out the basin and portable head, and gained cruising range by putting an 18-gallon fuel tank in place of the water tank originally specified.

A design with greater breeze-conditioning was preferred by Jack O. English of Barnesville, Ohio, who sends in a snapshot of the pontoon boat (below) he constructed from our March, 1959, plans. Jack reports that it is a great compliment-getter and we'll add ours to the lot, in the hope that he may invite us down for a leisurely cruise one of these days.



Lobster Pot Preferred

Not so pleased is Paul B. Willson of Hingham, Mass., who feels that the mailbox ideas *PM* published in August were not as impressive as some New England versions, including his own lobster-pot design shown here. Paul built this unusual mailbox of



pine laths fastened to bows of copper tubing with sheet-metal screws. It has a watertight inner box made of sheet aluminum. The "heads" were knitted from regular nylon lobster trap heading twine, the "monkey's fist" handle is braided from white nylon line, and all wooden parts are "weathered" with driftwood stain.

Vinegar Palace

Something unusual in pooch housing is this puppy palace built by Ralph E. Dorsey of Graysville, Pa. According to Richard



Morgan of Waynesburg, Pa., who sent us the photo, the palace is built from an old vinegar barrel with grooved two by sixes used to keep it stationary and off the ground. A hinged door and roof-top ventilator are luxury touches that should give Fido extra status in the canine clan.

Come to think of it, we wouldn't be surprised to see some designer of "people" houses come up with something similar. The ones we have seen lately have been almost as unusual.

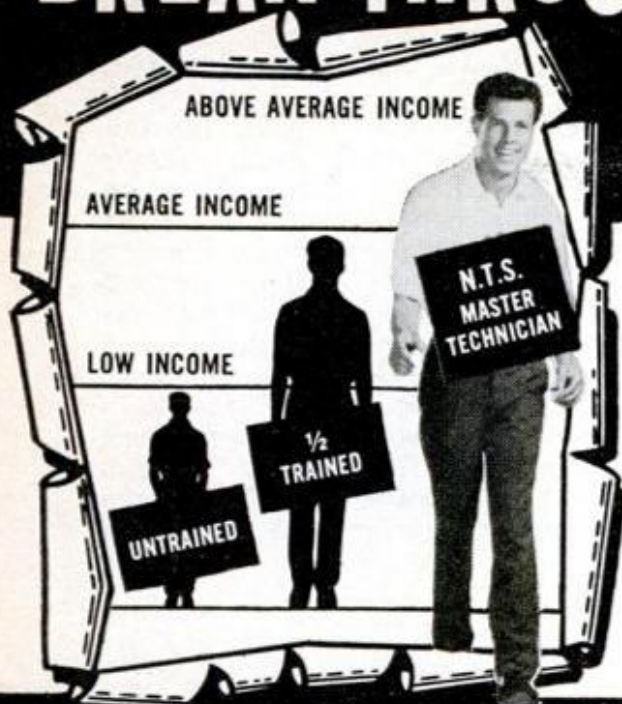
The Editors

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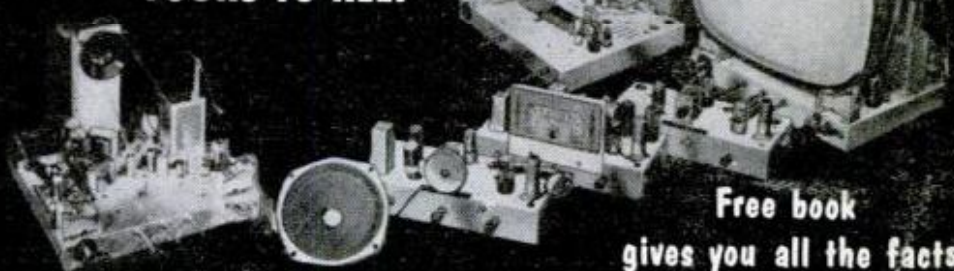
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SIDELIGHTS FROM THE PENTAGON



By William R. Kreh

TALKING TARGETS now tell Navy fighter pilots how close they come to getting hits. The targets, towed behind a plane, are used to train pilots in the use of Sidewinder heat-seeking air-to-air missiles. They send out one smoke puff for a miss of 15 feet, two for a miss of 15 to 30 feet and three for beyond 30 feet.

Each nine-foot target carries flares on its tail to attract the Sidewinders. It picks up the incoming missile on radar, figures the "miss" distance and sends the smoke signals from a double necklace of pots just behind its nose. Pilots claim it cuts down their marksmanship training period by half.

Ground-up apricot pits help keep Air Force jets flying. When jet engines get dirty they lose efficiency, so they are fed "roughage" to clean them out and perk them up. The apricot pits are ideal for the job.

The ground-up pits, called carbo-blast, are fed into the intakes as the engines are "revved" up on test blocks. They are fine enough to go through the engines, but rough enough to clean out dirt, leaves, paper and other foreign matter that is sucked into the intakes.

Electricity is being studied by the Army as an anesthetic for battlefield surgery. It enters the patient's body through two electrodes on the head. The patient is asleep within a minute after the current is turned on and wakes up in about the same time after the operation—with none of the usual after-effects of anesthesia.

Miracle-fibers, such as orlon and acrilon, may replace the old cotton-bunting flags now used to send visual messages between ships at sea. Navy tests aboard the cruiser USS *Des Moines* indicate that the fabrics, dyed with bright fluorescent colors, can be read a full mile farther away.

There's a 15-foot piece of wire in orbit around the earth.

The wire—only $\frac{1}{16}$ of an inch in diameter—was identified as a de-spin device which broke off the Explorer VIII satellite shortly after it was put into orbit last November. It was discovered by the Navy's sharp-eyed space-surveillance system at Dahlgren, Va., which showed an object in

orbit where none was known to be. With the aid of an electronic brain, the blip on the graph was traced back to the time of the Explorer launch and its characteristics narrowed it down to the de-spin device.

Designed to protect radar technicians from harmful radiation during emergency work on their equipment, a radiation resistant suit has been developed by the Air Force consisting of four layers, a neoprene-coated nylon coverall, two inner layers of silverized cloth which reflect most of the radiation and a cotton liner.

An "ultrasonic can opener" may help future demolition squads disarm unexploded bombs. A Navy study is being made to see if "silent sound" (beyond the range of human hearing) can be adapted to cut into steel-encased bombs without generating too much heat.

The Army has been making alcoholics out of monkeys. Tests at Walter Reed Army Institute of Research show that the monkeys, like men, may turn to drink when put through periods of stress.

For 43 days the animals had a choice between alcohol and water. They had nothing special to worry them and they drank both, but usually more water. They could take the alcohol or leave it alone.

Then they were put under extreme stress. They were taught to press a lever to avoid an electric shock, given once per second. If the lever was pressed as often as once a second, the shock was withheld. The animals were under constant stress to avoid getting shocked.

They still had a free choice between alcohol and water, but the change in their habits was striking. Water consumption went down and the monkeys turned more and more to booze to forget their troubles.

It used to be hard to take care of the grass and undergrowth around the ammunition magazine at Fort Belvoir, Va., chiefly because of the rough ground but also because snakes and wasps plagued the GI gardeners. Then a civilian employee suggested using goats. Now the goats munch happily on the landscape, the GIs relax in the shade and the man who made the suggestion is out spending the \$360 he got for the idea.

The Navy is now putting its hot air to work—lifting research balloons for atmospheric studies.

One was launched near Rapid City, S.D., recently and rose to 9000 feet. It made its own hot air with a propane gas burner inside the mouth of the plastic balloon. ★★

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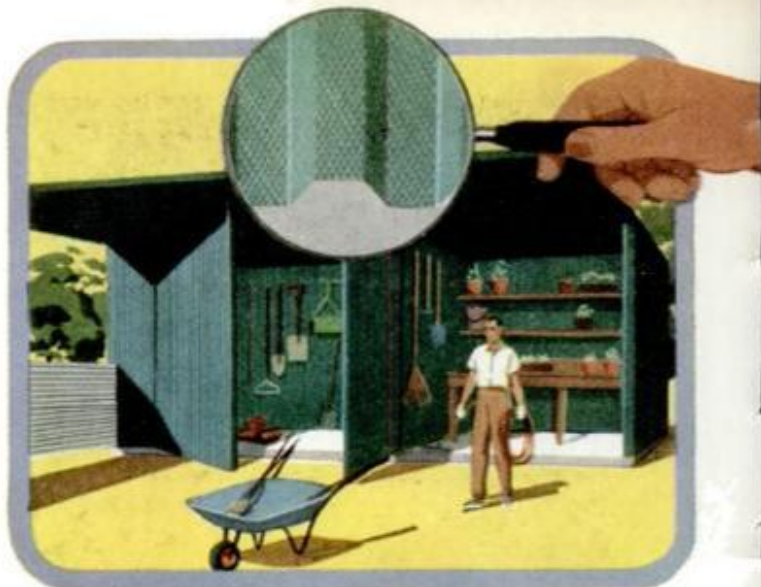
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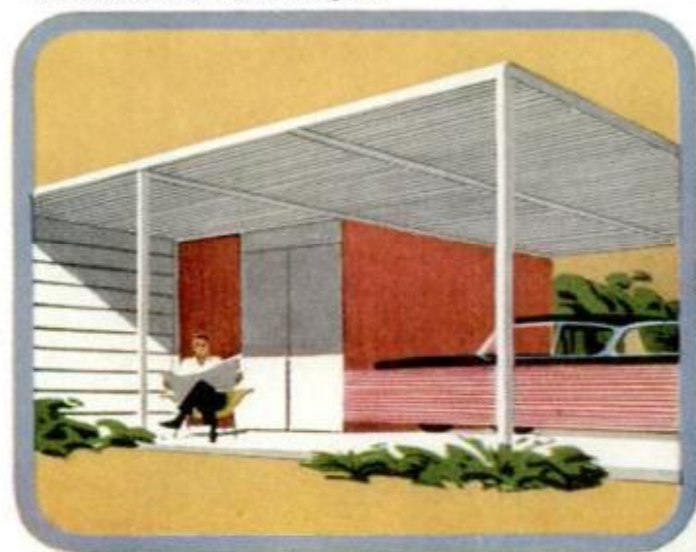


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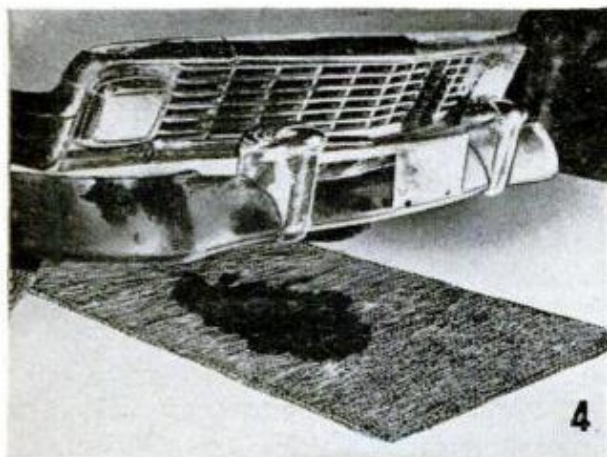


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2. TIME-TESTED LIQUID CEMENT now comes in a convenient tube with a spreader cap that makes point application of the liquid easy and certain. Model builders especially will appreciate the handiness of the tube which makes brush application unnecessary, gets the smallest drop of cement right where you want it. Available from your dealer or The Ambroid Co., E. Weymouth, Mass., in 1 $\frac{3}{4}$ and 4-oz. tubes

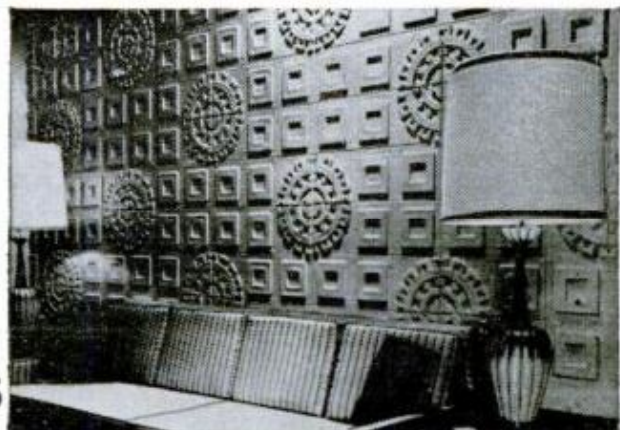


3. CLEAR FINISH for flagstone, concrete floors, brick, quarry tile, fireplace facings and slate used in homes seals surface, protects against water penetration and weathering, guards against dusting of concrete floors. Must be applied only to a dry surface. Drying time is about 1 hour, coverage 80 to 1000 sq. ft. per gal., depending on surface. Product of McCloskey Varnish Co., 7600 State Rd., Philadelphia, Pa.



4. GREASE SPOTS and oil drips under your car will no longer stain the concrete floor if it's protected by this oil and greaseproof mat. Catches drippings from oil pan, transmission and rear end of all average size cars. Lays flat, won't roll or curl at the edges or gather dampness. No fastenings necessary; just unroll and place in position. Made by A1-Chroma Paint Co., Stevens Point, Wis.

5. PROBLEM WALLS yield readily to this decorator wall covering. Among several designs available is one showing in authentic detail ancient Peruvian stone carvings as in right-hand photo. Another three-dimensional design is pictured in left-hand photo. Wall covering is formed from rigid vinyl, is stain resistant, nonporous and is easily cleaned. Made by the Decro-Wall Corp., 21 Saw Mill River Rd., Yonkers, N.Y.



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TUNE IN ON THE INVENTORS

By Dick Kirkpatrick

YOU THINK YOU HAVE TROUBLES. Trying to sell an invention isn't half as hard as trying to get somebody to invent something for you.

The National Inventors Council was established to bring inventions to the attention of the armed forces—and it has done the job so well that now the armed forces send NIC a list of the inventions that they wish somebody would develop. Their December 1960 "Inventions Wanted" bulletin lists 136 separate items that the armed forces and other government agencies wish you'd invent and sell to them.

The list covers every field of military and government effort from aeronautics, missiles and weapons to nutrition, medicine and clothing. Running through the list, we find quite a few that somebody may be working on in his basement right now:

- A way to reduce smoke and flash from small arms ammunition.
- A way to connect self-sealing hoses with identical—rather than male and female—mating parts.
- A way to drive ground anchors or stakes into hard-frozen or rocky ground.
- A booster mechanism that would increase the strength and endurance of an individual.
- A new way to make almost any electronic component a little bit smaller.
- A way to make a completely different audio signal—other than sirens, horns, whistles, bells, buzzers, or explosions.
- A way to create electrical power from a missile's environment when it's in space.
- A portable device that would transmit a signal for positive and fast identification of friendly troops, vehicles or aircraft.
- A method for observing the inside of a burning rocket motor.
- A really lightweight personal armor material.

Those are just a few of the inventions listed. For a copy of the full report, with instructions for submitting ideas and all the available specifications for the inventions that are wanted, write the National Inventors Council, U. S. Department of Commerce, Washington 25, D. C. Or see the nearest field office of the Department of Commerce. The list is free.

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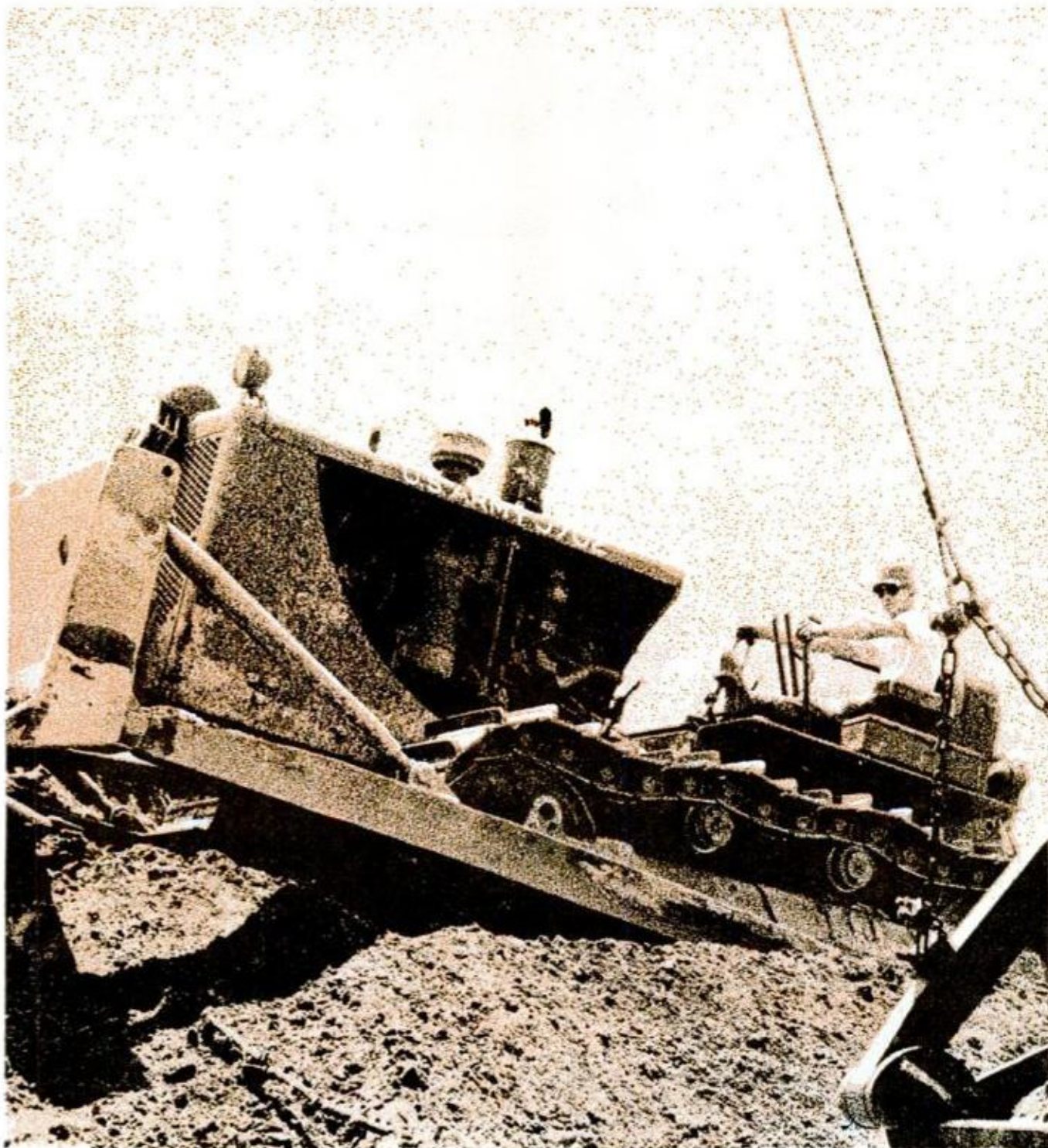
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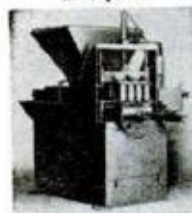
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POPULAR MECHANICS

SIDELIGHTS ON AVIATION

LAUNCHING ASTRONAUTS poses still one more problem not resolved by the recent space flight of the chimpanzee, Ham. How will a man bear up under the tension on the launch pad after he's strapped into the space capsule and the countdown is delayed? It happened to Ham. Strapped in at 5:37 a.m. for an 8:30-a.m. launch, Ham sweated out a countdown that lasted until nearly noon, more than six hours after entering the capsule. An astronaut, fully aware of his mission, might get a little impatient at any unscheduled delays. The chimp, completely oblivious of his historic role, fell asleep.

Well, the birds are still making aviation news. And why not? They were the original aviators.

It has been suggested that the best way to clear airport runways of the hazard of birds before airliner takeoffs is to buzz the area in a helicopter and scare them off with the noise of the whirling rotors.

It worked in Germany where a group of desperate grape growers pleaded with the U.S. Army for aid. Hordes of starlings were devouring their crops. So the Army sent a helicopter which swept back and forth across the orchards for several days. The birds became so frantic with fright that they finally flew off for good.

In England, the jets themselves have scared the birds. The Yorkshire Homing Society reported plaintively that RAF jets have turned their racing pigeons into timorous neurotics, too scared to fly. "They cower in their lofts and shudder every time a jet goes over," the society wailed.

The boys on Madison Avenue will drool into their martinis when they hear this:

A ceramist for Lockheed Aircraft Corp. reports that sodium vapor trails, that will be left by the retro-rockets of future satellites, can produce a glowing orange pattern that would remain visible for 30 minutes. Ad messages, like "Drink Soup-o-Cola," can now be written 140 miles up in space.

Plans to throw a champagne party for Mr. Steven Mueller, the 2,000,000th passenger to leave London on a TWA flight, were suddenly called off when Mr. Mueller arrived. He was two years old.

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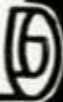
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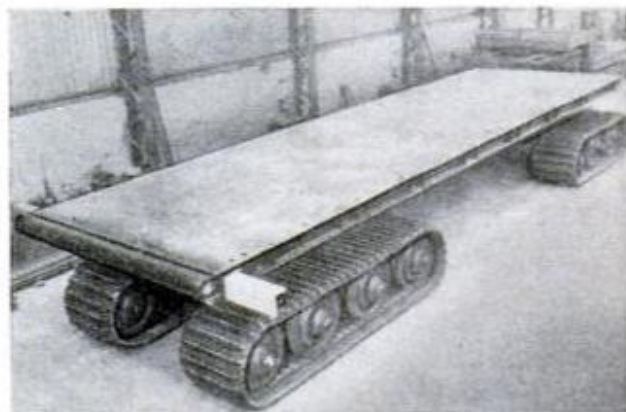
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Founder of original heavy equipment operators school tells why proper training in the field is the secret to success.



GILBERT SHAW, President and Founder

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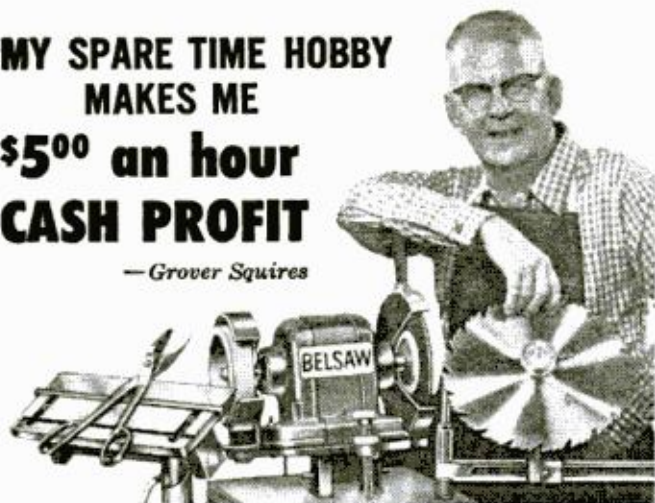
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**ITEMS FROM
ALL OUTDOORS**



GOOD FISHING is hard to predict. It isn't often that an outdoor editor climbs out on a limb to tell his readers exactly where and when they'll find the best fishing in the country. But this year *PM's* nomination for the best fishing of the season can go to Table Rock Lake, south of Springfield on the Missouri-Arkansas border. Table Rock, upstream brother of famous Bull Shoals and Norfolk Lakes, comes of age this spring with a tremendous population of large-mouth bass. They will hit their peak during April and May to provide the furious fishing that happens just once in the history of every artificial impoundment.

The bass will average three and four pounds, and there'll be thousands of them in every bay and backwater around Table Rock's thousand miles of shoreline. And in with them are the old settlers—the bass that lived in the White River before the dam was built—mossy old monsters who'll go 10 pounds and who can get around the biggest lure and take it away from you.

Take your heavyweight gear; the local fishermen use stiff casting rods and 15-pound monofilament line—and still lose fish.

We can even quote our authority for the news to prove this is no blue-sky statement. We got the tip from Harold Ensley of Kansas City, Mo., who is the world champion fresh-water sport fisherman, and Bob Bright, of Lampe, Mo., one of the best fishing guides in the Ozarks, who just moved his operation to Table Rock from Bull Shoals to take advantage of the peak fishing.

Ever feel the urge to own a Bowie knife? A lot of knives carry the name, but they're a far cry from the pattern of the original. Chas. D. Briddell, Inc., cutlery manufacturers in Crisfield, Md., is building a three-quarter scale Bowie as the first of a series of reproductions of the great blades of history. The 15-inch knife was patterned after a Bowie from the collection of William Sweet of Attleboro, Mass., and is authentic right down to the brass strip along the heel of the blade, the beechwood handle and the brass fittings. It'll be available wherever their Carvel Hall knives are sold.

Dick Liepatrik

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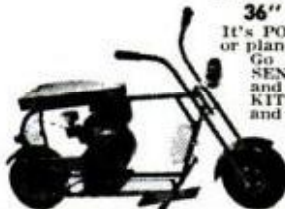
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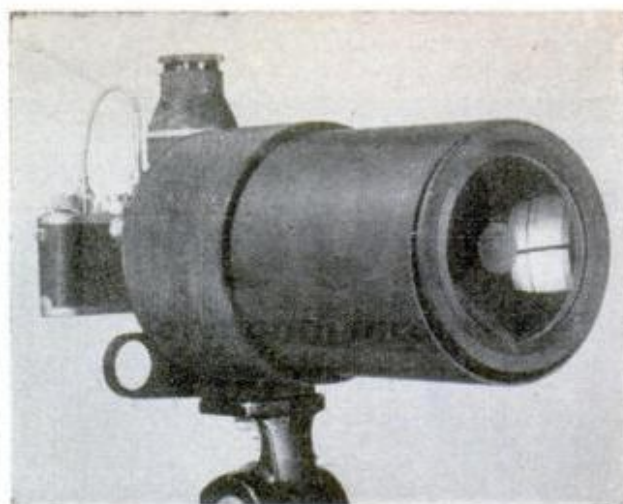
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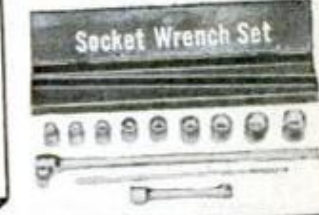
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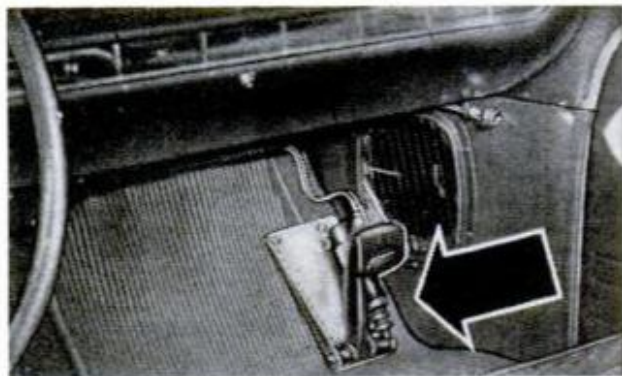
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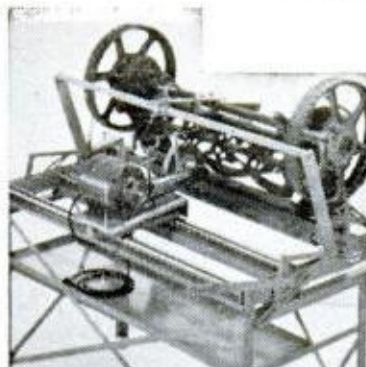
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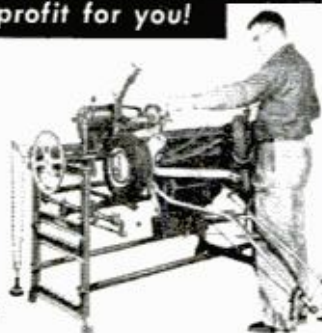
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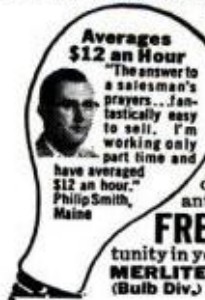


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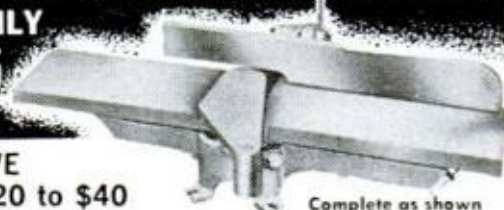
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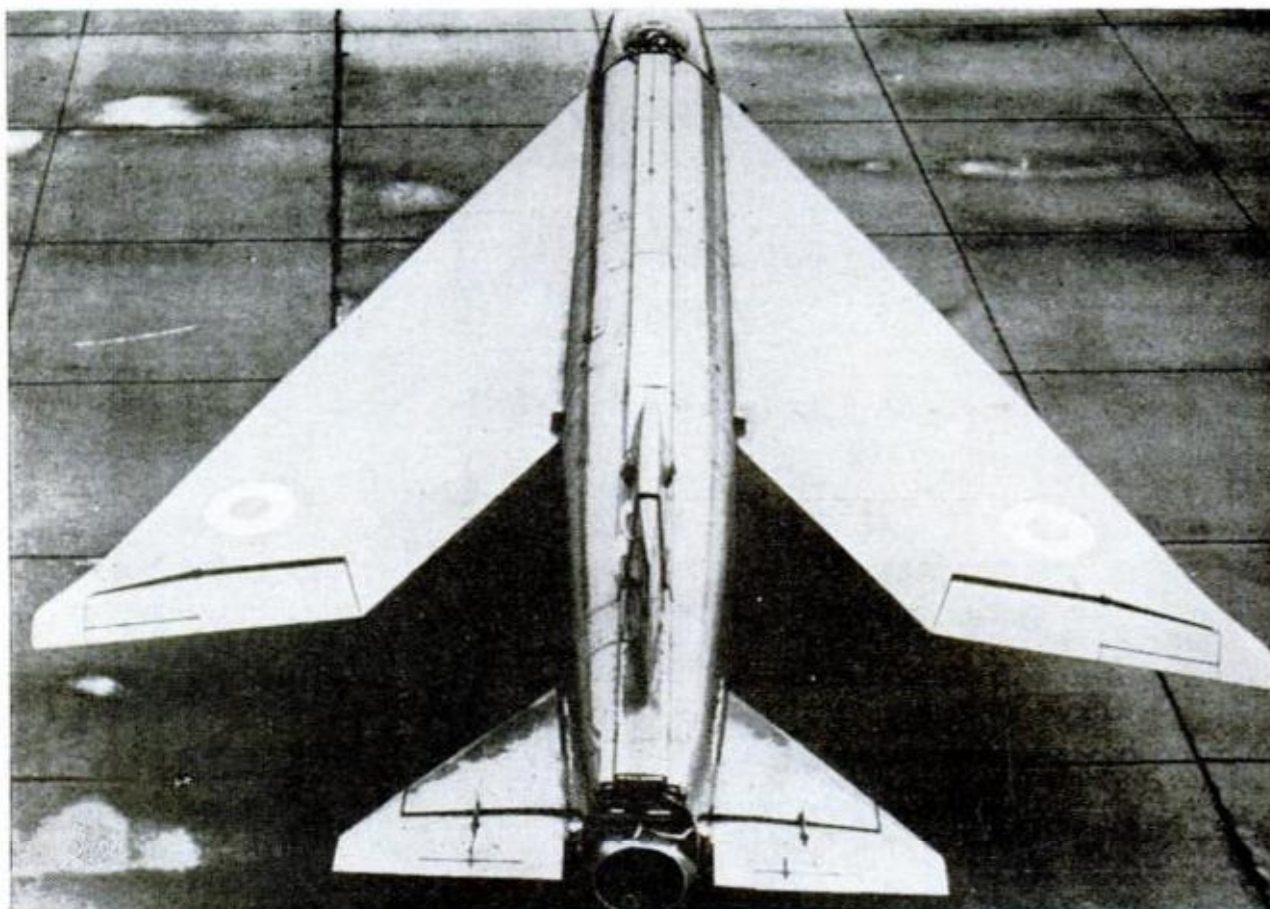
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PROOF Sets, 1957 \$4.95, 1960 \$4.95, both for \$9.00. Gold, Russian 5 rubles, \$9.95, British half sovereign \$9.95, both for \$17.95. Metrocoins, P.O. Box 4101, Ft. Worth 6, Texas.

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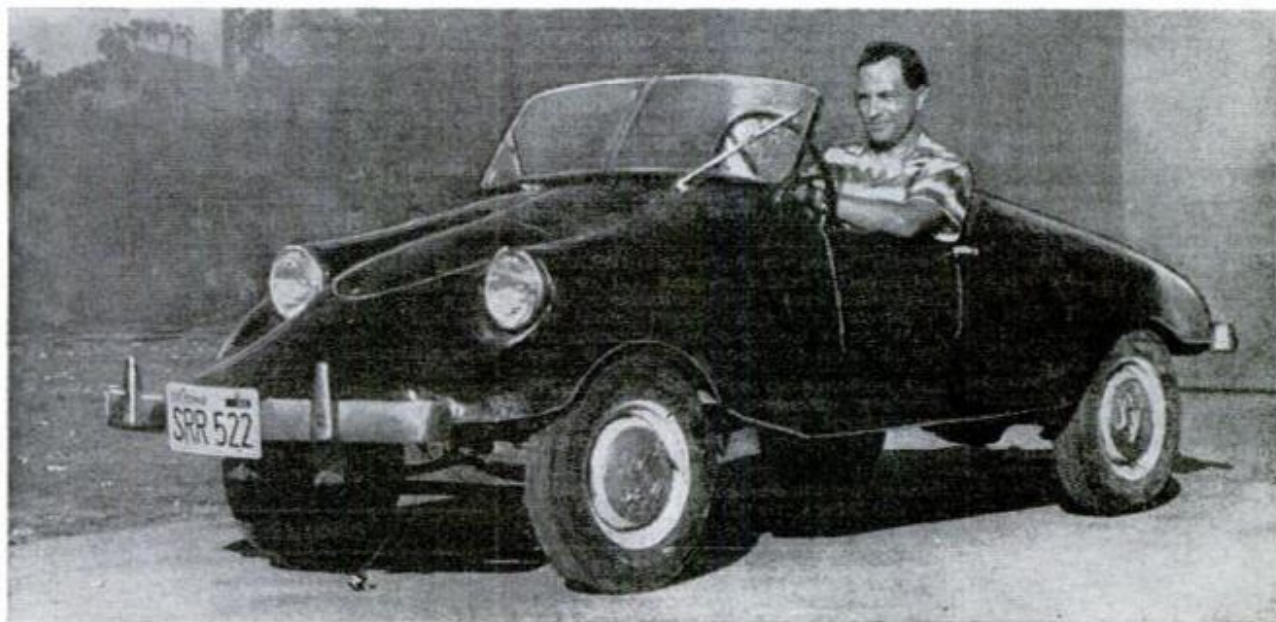
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Fiat 1200 Spider

By **Guerrino Amati**



AGILE AND RESPONSIVE, the Spider kicks up slush and gravel taking a sharp curve at 40 m.p.h. Good weight distribution, tight steering and a snappy stick shift allow the driver complete control of the car

ALTHOUGH its modest power plant keeps it out of class competition, Fiat's 1200 Spider turns out to be a fairly lively little sportster with steady handling characteristics. This two-seater convertible distributes its 2072 pounds over a 92-inch wheelbase in such a fashion that you feel the center of gravity is squarely under the seat of your pants.

Result—there's a close rapport between man and vehicle allowing the driver to snap the Spider in and out of slides and to take curves at fairly high speeds with complete confidence and control. Taut, responsive steering and a good suspension system—coil springs and swing arms in front, leaf springs in the rear—are the reasons why.

Hard braking on a sharp curve at 40 m.p.h. produced little or no tendency for the car's rear end to "break away." Even on slush and gravel, the rear wheels dug in fairly fast so that the Spider took the curve steadily with a downshift into third. Taking the same curve without downshifting left the Spider a little slow on the uptake.

Though a Grand Prix driver would find the Spider's 63 hp. aluminum four too tame a mill, the car will reach a top speed of 90 m.p.h. and cruise along at 60-70 with no strain. The small engine makes the most of its 74.5-cubic-inch displacement with a three-bearing crankshaft, overhead valves (pushrod operated), and a compression ratio of 8.25 to 1. Also on the plus side is the fact that the Spider's engine is neither

(Continued on page 68)

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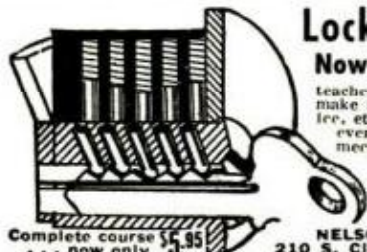


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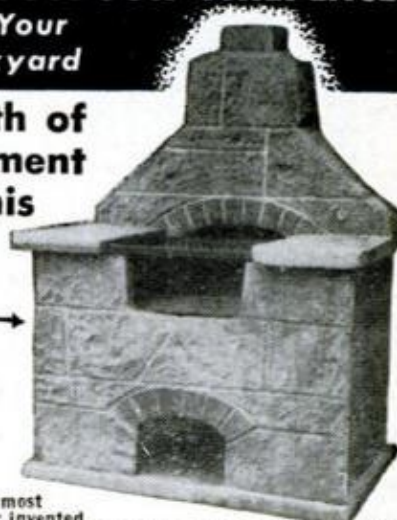
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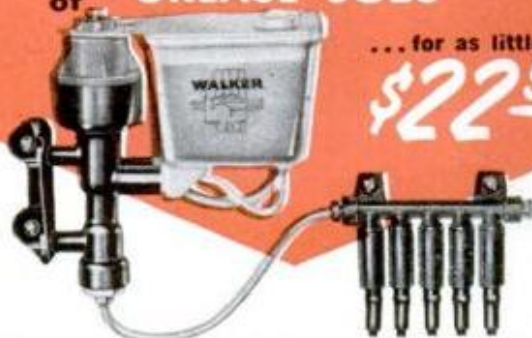
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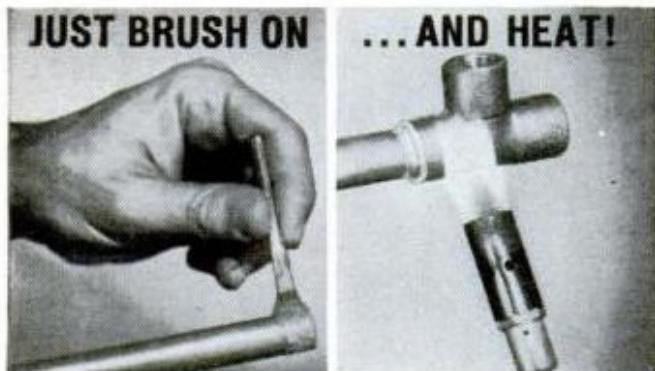
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finicky in everyday driving nor difficult or expensive to keep in top shape.

Gear ratios in the four-speed transmission begin with a rather abrupt jolt in first—until you learn to manage your r.p.m.'s properly, at which time she'll move through the gears with ease. As is true with most low-horsepower jobs, there's little reserve power when you're cruising along in fourth, so you have to calculate a bit in advance for any long passing shots. The gear box has constant meshing in second and third gears and ring synchronizers on second, third and top speeds.

Shifting action is smooth, with short, direct thrusts from first to second and third to fourth and little wasted side travel across the bar of the "H" from second to third. Reverse is to the far right and down and takes neither a stretch nor a grunt to negotiate (this is not true of some four-speed imports).

Though the driver's compartment may appear cramped at first glance, you've only to slide in for a happy surprise. Legroom is enough to take a six-footer without cramp or strain and the twin bucket seats hug the back firmly for maximum comfort. Long-limbed folks may find the seats too short for the best thigh support but being a little guy, this writer didn't find them so.

Locating the hand choke and throttle levers, partially hidden under the dash panel, is a hide-and-seek proposition, and it takes a little living with this car to remember which is which. This can be important when the temperature drops and you find that the twin-throat carburetor must be heavily choked before the engine will start.

The heater-fan-defroster control panel is also tucked under the dash and is set with a row of flip switches for lights, etc.,

(Continued on page 70)

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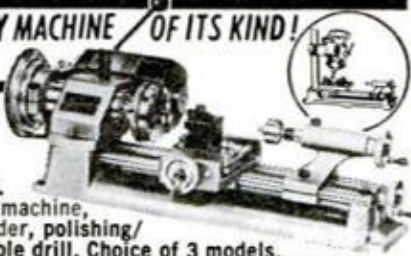
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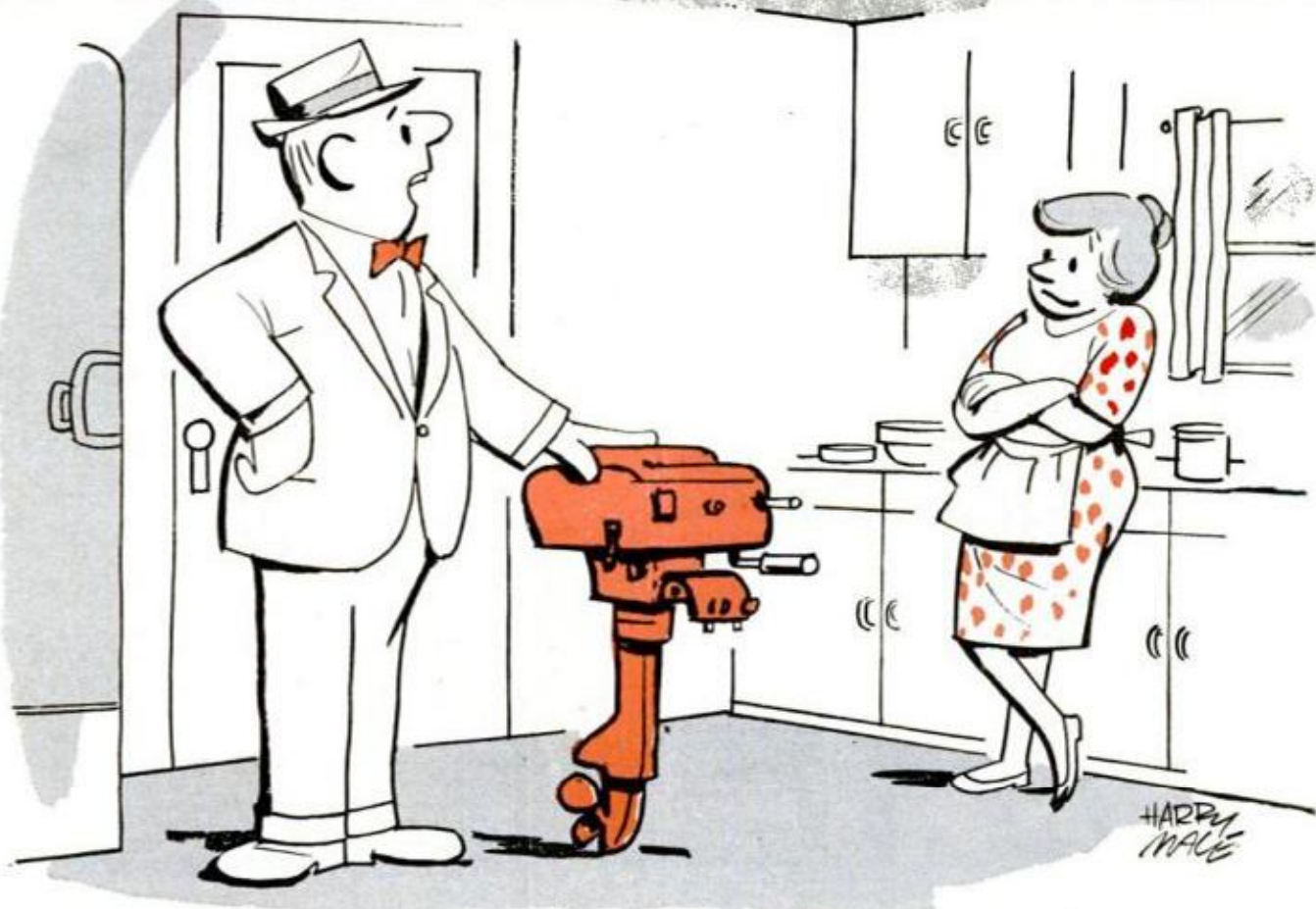
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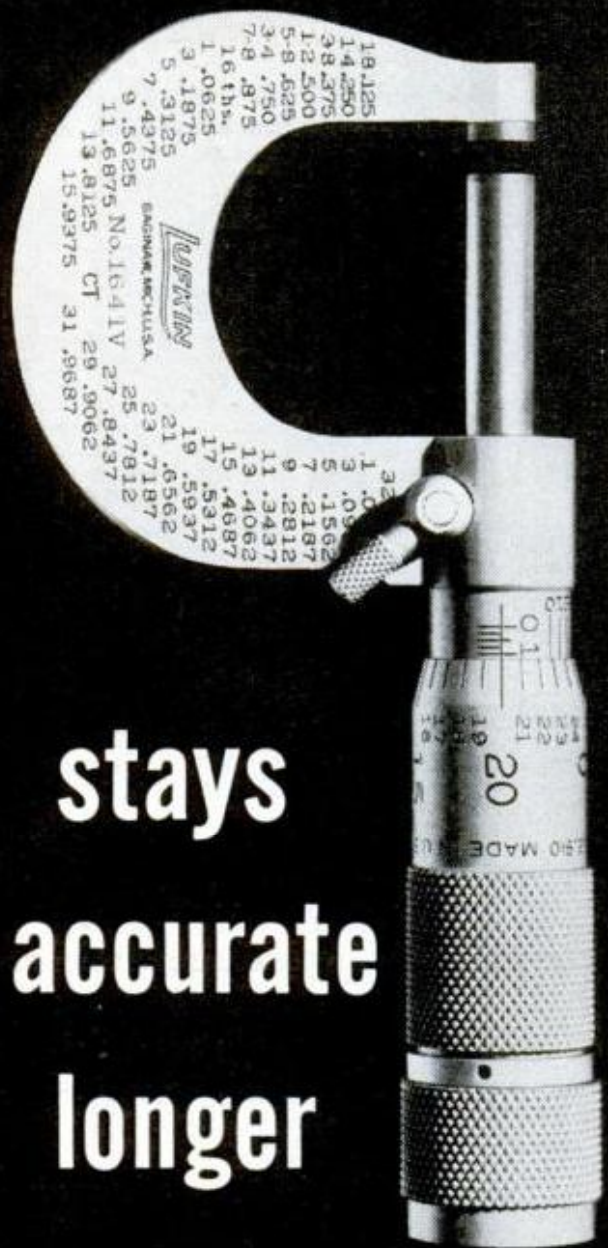
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STARTING TO RAIN? Reach back, grab the handle, and swing the top forward. This is one of the few cars that converts without your having to get up and out

that keep you guessing until you've figured them all out. You may also be left with the impression that the heater-defroster should speak with a little more authority.

Turning on the headlights involves one switch on the dash panel, but getting a high beam is a matter of manipulating a lever on the steering column. Although it is curved to clear the directional-light lever, this involves some precise finger work to keep from flipping the wrong one.

The convertible top on this sportster rates with the best. To put the top up, you've only to reach back, grab the handle and swing the top forward. The drum-tight, steel-framed fabric top then snap-locks in place with little or no effort. With the top up or down, there's enough space behind the seats for a golf bag, fishing tackle, or, for those who must, for the baby and his traveling togs.

Sports-car lovers who are tired of strapping their gear onto a midget-sized roof or to an inadequate rear-mounted luggage rack, will be delighted with the Spider's trunk. The spare under the trunk floor leaves a goodly amount of usable space.

As for looks, the Spider sports clean, simple lines from the single-unit headlamps to the somewhat American-styled taillights. Add a wide, mesh-type grille and an air scoop on the hood and the result is quite a handsome little buggy.

In good sports-car fashion, the hood slopes downward gently, providing a fine view of the road ahead through the curved one-piece windshield. Front fenders perch higher than the hood and seeing them reminds you that *you* are in charge of the car.

Standard equipment on the 1200 Spider includes spray-type windshield washers, heater-defroster unit, and white sidewall tires (14 inch). Price at port of entry, New York, \$2595. ★ ★ ★

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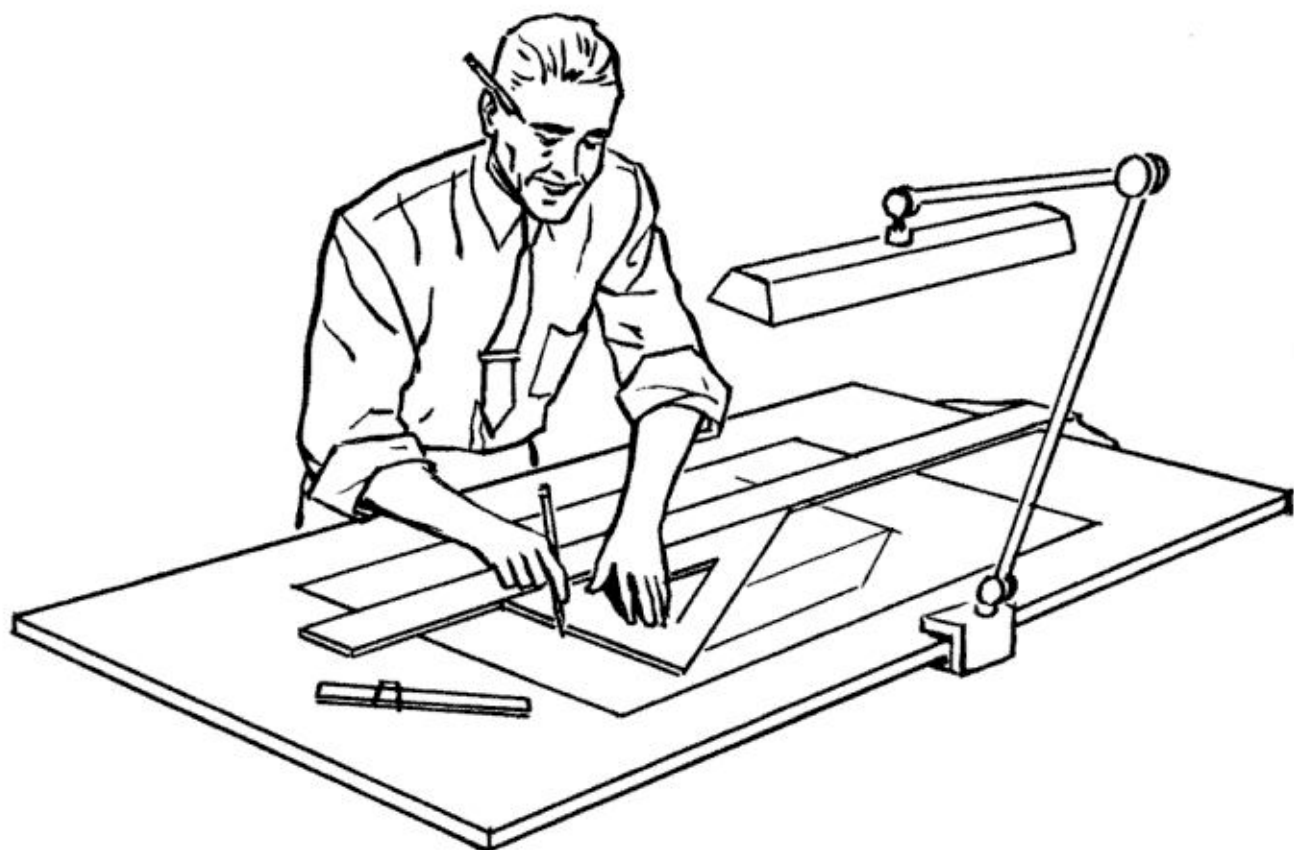
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A Career Guidance Editorial—SKILLS for AMERICA

PROFESSIONAL DRAFTSMEN

***Needed in the production of almost all products . . .
translate engineers' calculations into practical plans***

by B. Richard

Draftsmen make a vital contribution to virtually every product that is manufactured or constructed. That is why well-trained, professional draftsmen have many employment opportunities, and these opportunities are expected to increase in coming years.

It is the job of the professional draftsman to convert the specifications, rough drawings or field notes of an engineer, architect or designer into scaled drawings which can be used by skilled craftsmen in making the desired object, whether it be an airplane, house, ship or any one of the thousands of products produced by industry.

Highly-qualified draftsmen, generally referred to as senior draftsmen or design draftsmen, must have enough background in engineering so that they can accurately draw an engineer's specifications. They are sometimes required to calculate the strength, quality or cost of materials used in final construction, and they must have enough shop experience so that they can

explain the plans to the craftsmen who make the final product and tell him just what procedures to follow.

Senior draftsmen can do much more than ordinary mechanical work. They sometimes do their own independent designing, and trusted senior draftsmen can be called upon to start and complete projects from their inception to the production line.

Detailers are draftsmen who expand on the layouts prepared by the design draftsmen. Detailers prepare working drawings of details or parts of the product to be manufactured. This is a job requiring experience, care and a great deal of training.

The profession of drafting requires responsible, highly-skilled men, and the pay of these men increases as they increase their training and job experience. In 1958, draftsmen in supervisory positions made up to \$8320 in a year's time, and even junior draftsmen earned up to \$91 weekly.

A good way to get training in drafting is through a technical institute or correspon-

dence school. Technical institutes, offering resident training, have the advantage of giving you practical classroom and laboratory work under the supervision of a qualified instructor, and correspondence training enables you to learn the skills and techniques you need without interrupting your present job.

If you are man with family responsibilities, you could find correspondence training in drafting extremely helpful in opening up a new career. You will be able to set your own classroom hours and your work will be graded and corrected by your instructor. The correct solution to your lesson will be returned in the mail so that you can profit by your errors.

A technical resident-training institute is ideal for a man who is able to devote more hours during the day to instruction. Many who take their training in this way work in the evenings to defray costs. This method will probably give you a shorter period of training because you will get more instruction in a day's time.

It is possible to become a draftsman after serving a three to four-year apprenticeship, and, in some areas, this might be a requirement even after a period of school training. The apprenticeship program without additional school training has the disadvantage of not offering instruction in mathematics and the physical sciences — important instruction for more highly-skilled drafting positions.

The employment outlook for draftsmen is expected to be good throughout the 1960's with continued expansion of employment opportunities in the long run. With the increasing complexity of industrial operations, design problems assume more importance and well-trained draftsmen will be needed more than ever.

In addition, industries that employ the most draftsmen are expected to expand. The government's defense and missile program, for example, has been increasing steadily in recent years and will be expanded even more if present indications hold out.

Department of Labor statistics show that there will be no increase in industry's demand for *unskilled* labor in the coming years. In fact, there will be an actual decrease. However, the demand for *skilled* workers such as draftsmen will increase as our population grows and as our industrial economy expands.

For your free copy of Popular Mechanics' career-guidance booklet, **SKILLS for AMERICA**, write Popular Mechanics, Department SFA, 200 East Ontario St., Chicago 11, Illinois.

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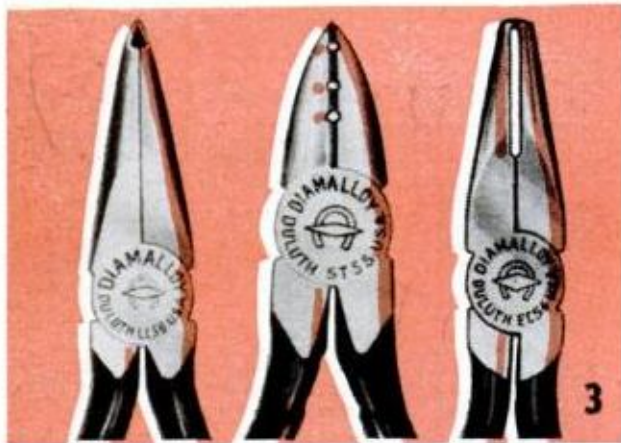


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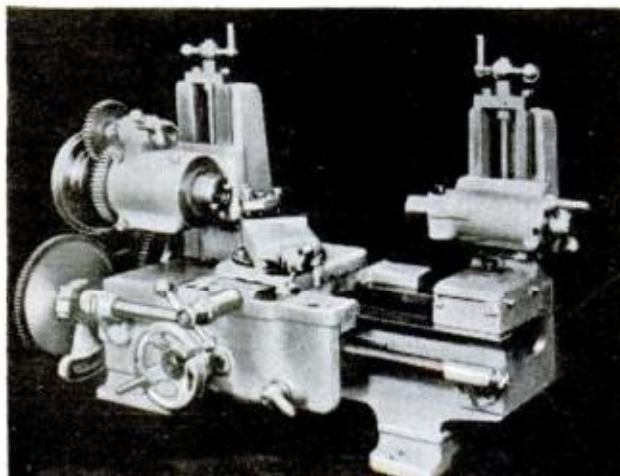
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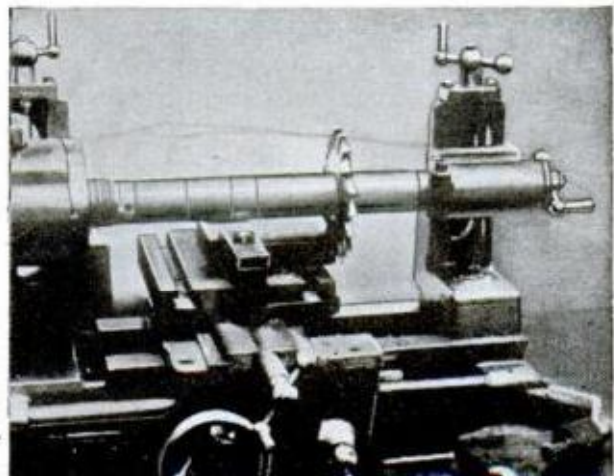
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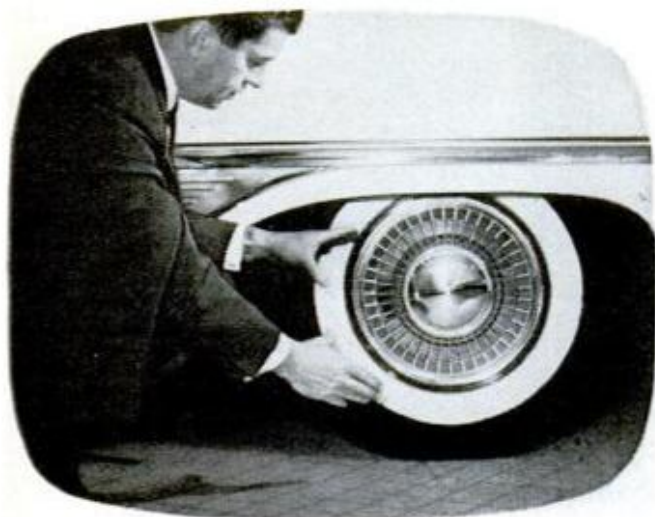
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TV's Professor Jonathan Karas shows why

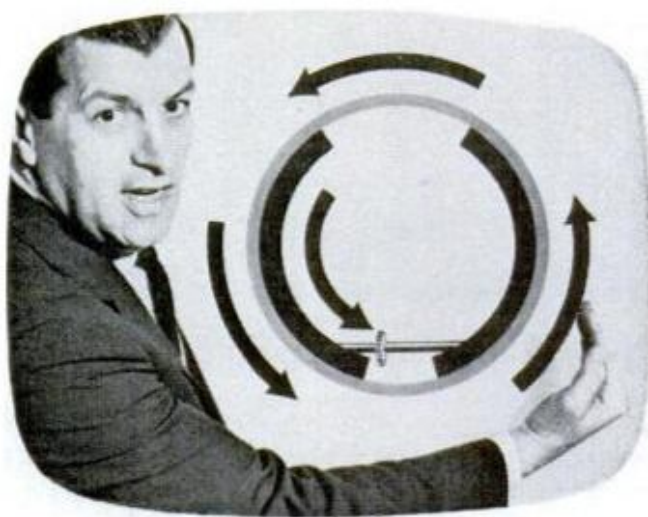
The brakes



Professor Jonathan Karas, physicist at Lowell Technological Institute, uses a rifle to demonstrate—as he does on Ford's TV shows—a remarkable feature of the '61 Ford.



3. "This principle of harnessing existing energy is employed in the brake system on the '61 Ford. When linings wear down, they no longer have to be adjusted by hand!"



4. "In stopping a car, the brake shoes are not only forced against the drum, but the whole assembly tends to shift slightly in the direction the wheel is rolling."

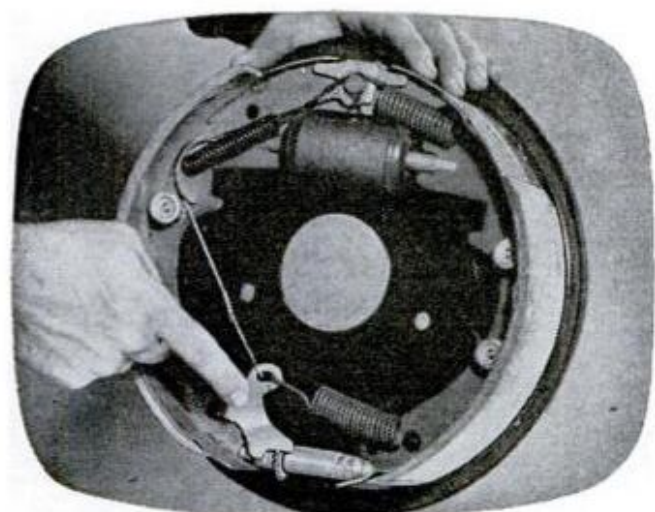
on the 1961 Ford adjust themselves automatically



1. "Here are two types of rifles. One is a bolt-action, the other an automatic. The automatic does one particular job that has to be done manually with the other rifle.



2. "It uses its own energy to eject one shell and introduce another. This is a perfect example of harnessing energy that would otherwise go to waste.



5. "Ford uses this motion (and energy) to adjust the brakes while in reverse. It turns the adjusting nut when necessary, doing the job *automatically and more precisely than by hand.*



6. "Self-adjusting brakes . . . 30,000 miles between chassis lubrications . . . 4,000 miles between oil changes! All are features of the '61 Ford, *beautifully built to take care of itself!*"

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Electronic Paddy Wagon Rounds Up Vagrant Signals

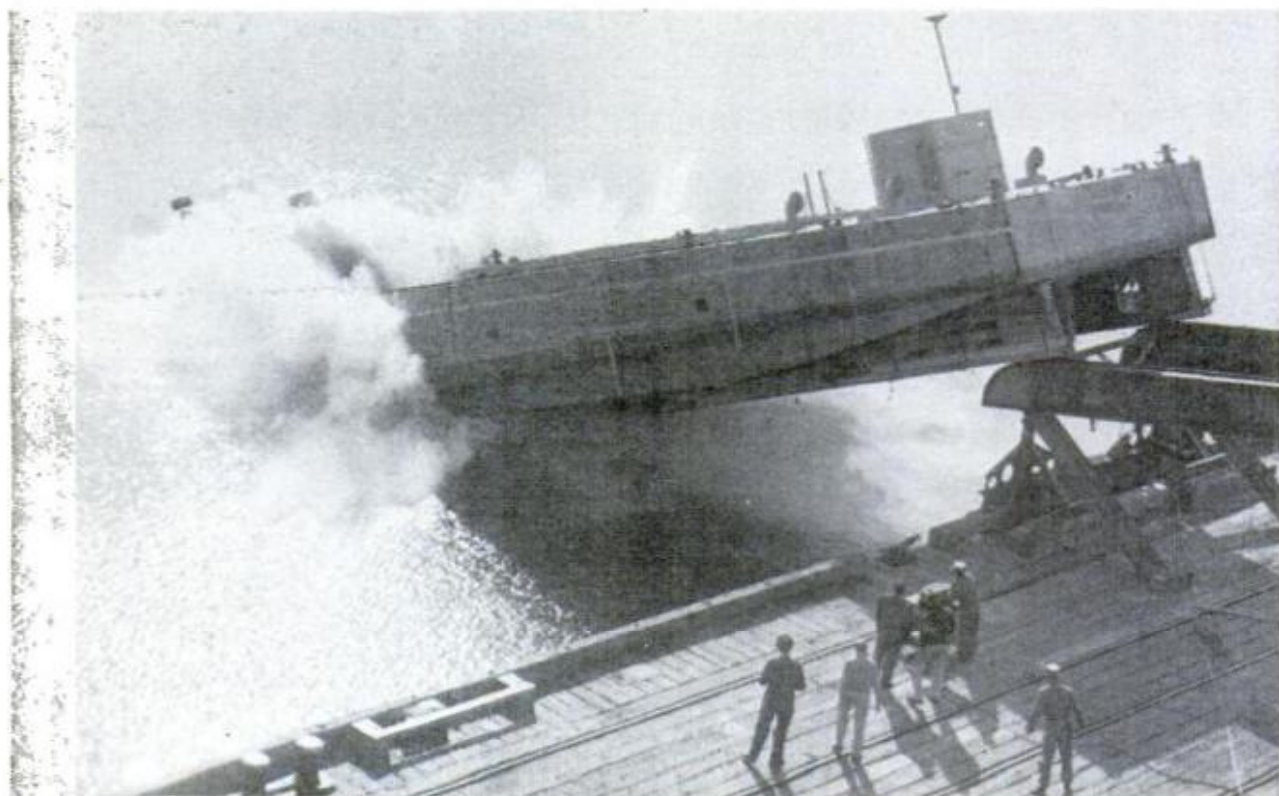
Wayward radio waves, which could hamper guided-missile operations at the Air Force Proving Ground at Eglin, Fla., are tracked down and their sources rounded up by a van nicknamed the "electronic paddy

wagon." Its four domes hold revolving direction-finder antennas which feed signals to radar scopes inside. Common sources of interference include welding units, power carts and even faulty auto ignitions.

Landing Craft Survives 20-Foot Test Drop

Launched from a pier 20 feet above the water, an Army LCM-8 (landing craft, medium) weathered its recent baptism with no apparent damage. It was the first

in a series of tests to determine whether a craft of this size could be launched successfully from the deck of a cargo ship. The "piggyback" system could speed landings.



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says **DICK GROAT**, Pittsburgh Pirate captain



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Off hours, family man Groat likes to relax in his well-equipped home shop. Equipment always includes a tube of DURO PLASTIC ALUMINUM. Atomized aluminum metal in putty form, DURO PLASTIC ALUMINUM fills, seals, solders, repairs — adheres to virtually any surface.

Made with ALCOA® Aluminum Powders by Woodhill Chemical Co., Cleveland, Ohio, DURO PLASTIC ALUMINUM is applied like paste; dries metal-hard in three hours. Users say it fixes anything.

ALCOA does not make aluminum putties, but ALCOA Aluminum Powders are used in all the best brands. Cold solders are easy to use; require no tools, heat or flame. They adhere to metal, wood, plastic, glass or concrete . . . are not affected by water, oil or gasoline . . . can be burnished to a high luster or even painted. Write today for more information. Use the coupon.

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PLASTIC ALUMINUM

Made With ALCOA Atomized Aluminum

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HUNDREDS OF USES FOR THIS AMAZING METAL IN PUTTY FORM!
Applied Cold . . . Easy to Use!

SEALS • SOLDERS • REPAIRS

Air-Dries to a Metal-Like Hardness
ANYONE CAN USE IT!

Guaranteed by Good Housekeeping

Adheres to Metal, Wood, Concrete, Glass and Most Plastics

SATISFACTION GUARANTEED

PLASTIC ALUMINUM
An original metal in putty form... 5% of economy size
APPLIED COLD - HARDENS INTO METAL - READY TO USE

HUNDREDS of Uses For the Home, Auto, Boat and Shop

REPAIR Holes and Leaks in Laundry Equipment

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FOR YOUR CAR:
- Repairs Holes and Sinks in Auto Bodies
- Seals Gasoline Tank and Muffler Leaks

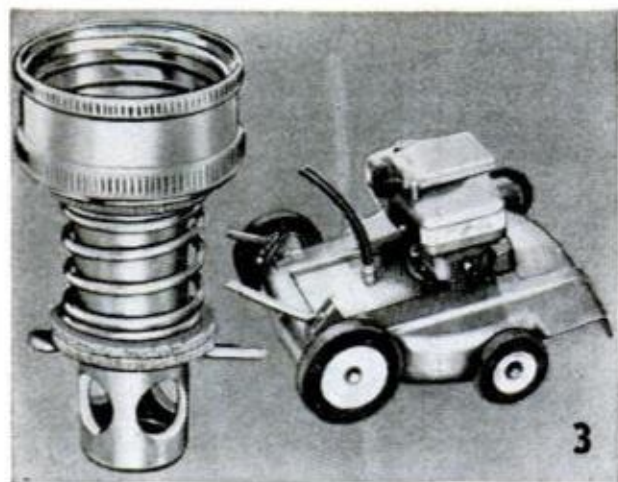
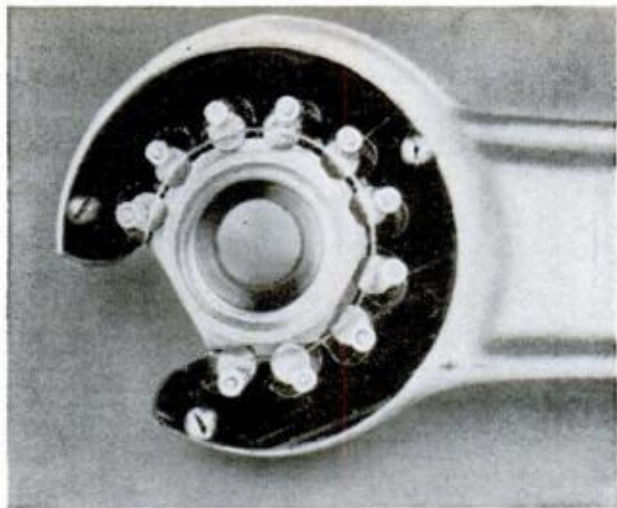
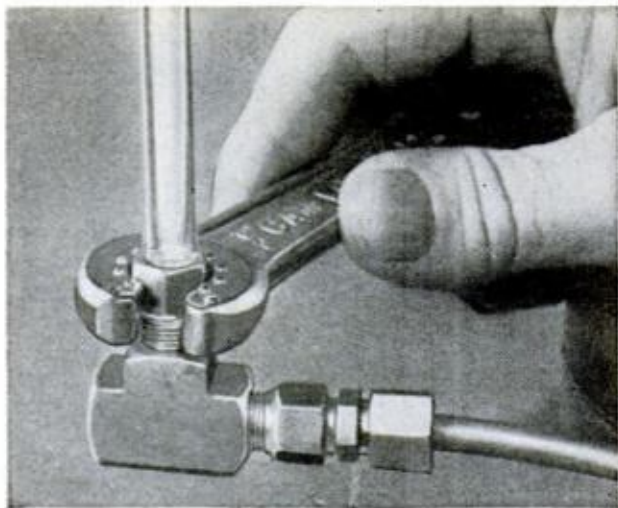
REPAIR Holes and Leaks in Pans, Pans and Pails

ALCOA ALUMINUM
LIFE

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Please send more information on cold solders made with Alcoa Aluminum Powders.

Name _____
Address _____
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SHOPPING FOR TOOLS

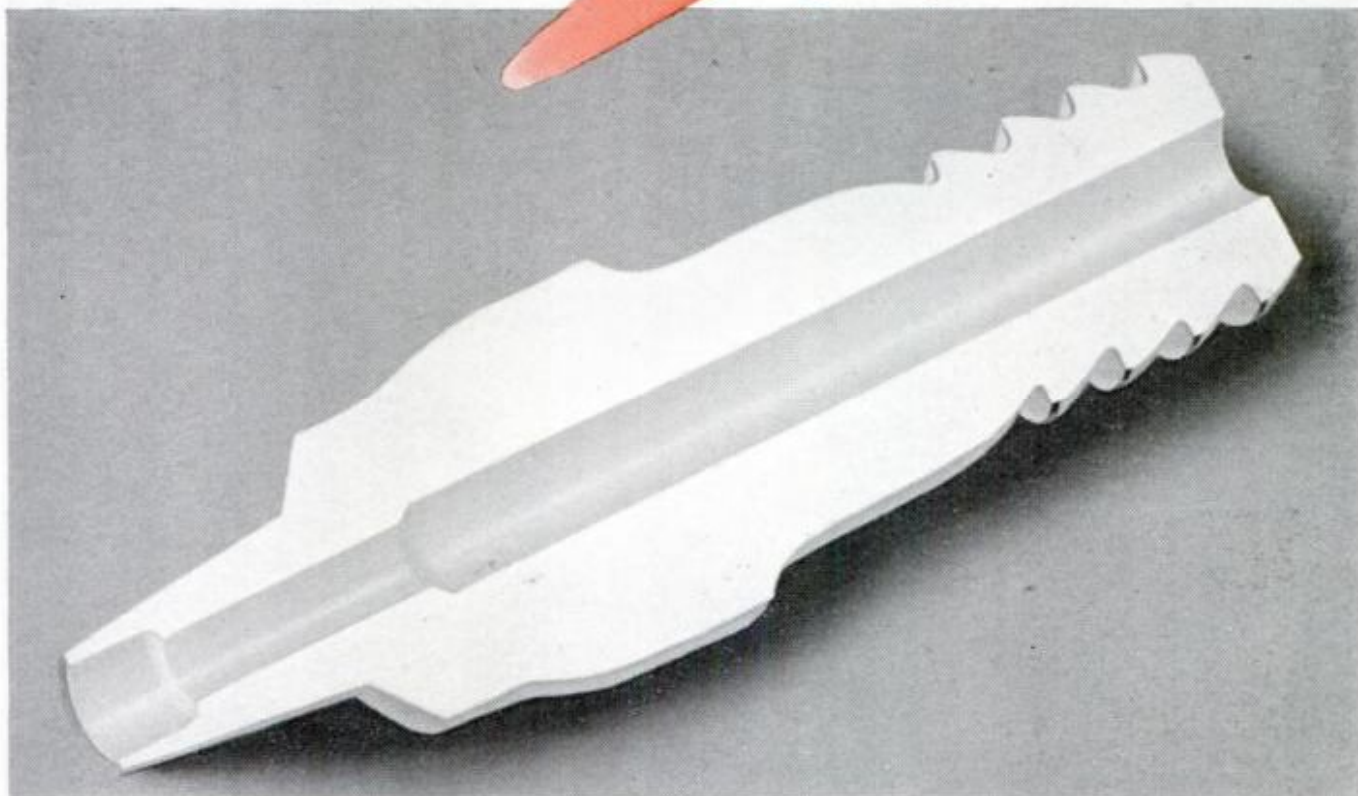
1. ROLLER-RATCHET WRENCH will tighten tube fittings to highest permissible tensions without crushing. Note vertical glass tube in left-hand photo. Won't score chrome-plated fittings. Short ratcheting arc permits work in confined area. Available with attachments for use with $\frac{3}{8}$ and $\frac{1}{2}$ -in. square-drive sockets. Right-hand photo shows cam-locking roller jaw. Kramer Fabricating Co., 920 Fisher Bldg., Detroit 2

2. COLLET CHUCK has hand spinner for rapid closing and opening. Hardened steel collets are slotted at both ends and have two camming surfaces which collapse collet over its entire length as nose piece is drawn in. This permits collet to grip end mills and drills over flutes as well as shank. Standard collet capacity from 1 to $1\frac{3}{8}$ in. and from $\frac{1}{2}$ to 1 in. Erickson Tool Co., 34350 Solon Rd., Solon, Ohio

3. WATER PRESSURE, combined with whirling action of rotary mower blade, removes impacted grass cuttings in a jiffy. Special nozzle is easily attached to housing of any rotary mower to provide the connection for any garden hose. Nozzle directs sprays of water horizontally in all directions under the housing. Requires $\frac{3}{8}$ -in. hole in housing, is held by cotter pin and spring. Solder-Craft, Plymouth, Mich.

4. SELF-CONTAINED ELECTRIC SPRAYER has a three-position turret head which enables operator to dial spray pattern desired. Sprays almost anything sprayable except heavy liquids. Handles paints, varnish enamels and lacquers, light oils and insecticides. Spray head is easier to clean than a brush, head is shock-proof and is fitted with a handy hanging hook. Priced at \$19.95. Burgess Vibrocrafters, Grayslake, Ill.

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spark plug
insulator



assures extra resistance to fracture for maximum sure-firing performance

Because of their unique design and the near-diamond hardness of the material, AC Fire-Ring Spark Plugs are highly resistant to fracture and resulting shorting and missing.

AC Fire-Ring insulators are made of aluminum oxide, the material of rubies and sapphires. AC pioneered the use of alumina powder for spark plug insulators and developed a special processing formula that makes it extra hard and extra strong. AC

engineers devised an insulator design which utilizes this strength to provide important benefits in heat control and over-all insulating properties.

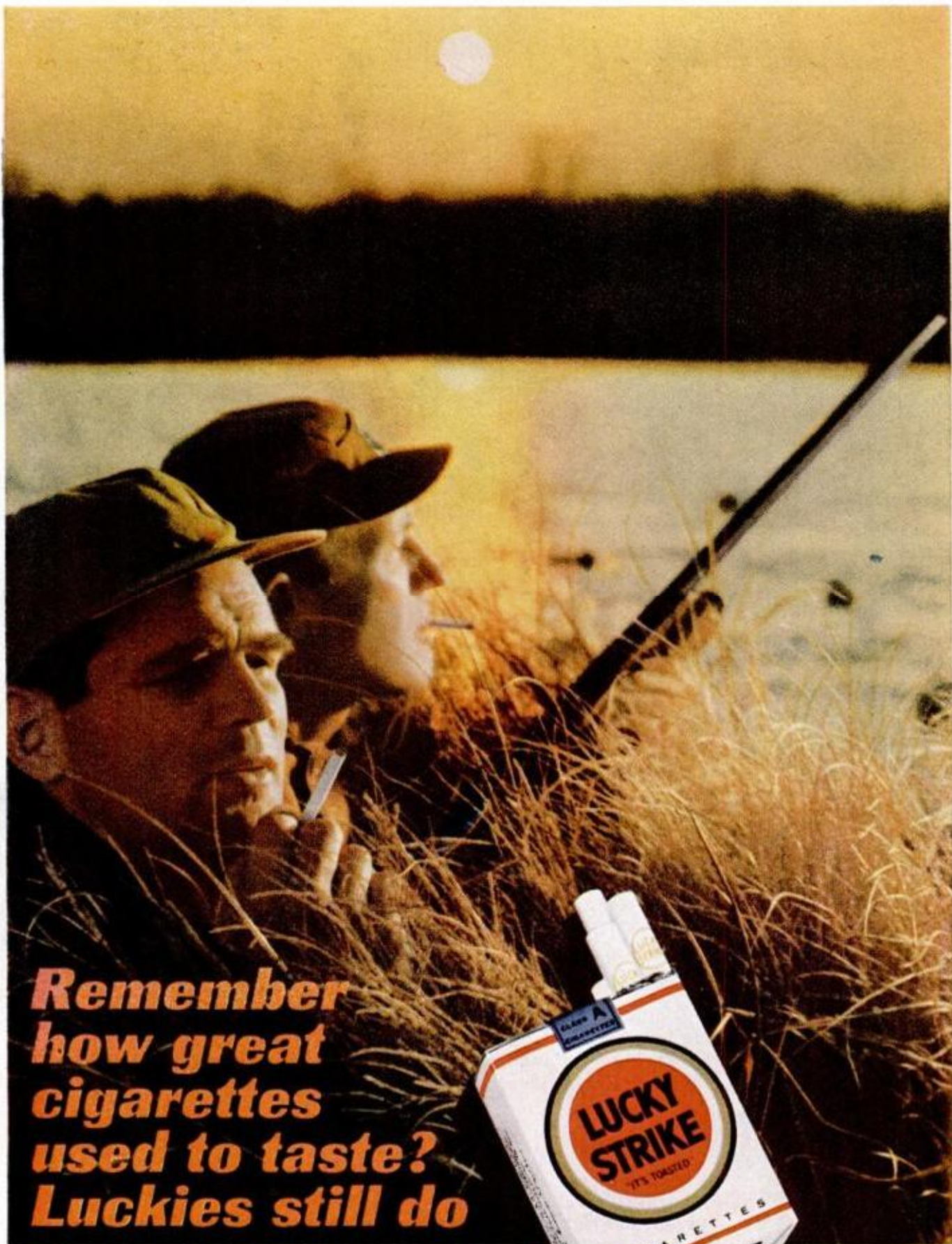
The AC aluminum oxide insulator is one more of many advanced features that AC gives you for superior spark plug performance. Next time you need a spark plug change, ask for rugged, long-lasting, sure-firing ACs.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS



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**Remember
how great
cigarettes
used to taste?
Luckies still do**

**Change to Luckies and get
some taste for a change**



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POPULAR MECHANICS

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POPULAR
MECHANICS

APRIL
1961

VOL. 115

NO. 4

IS THIS THE WORLD'S WORST AIRLINE?

41848



By
Frank A. Tinker

All photos by Sovfoto unless otherwise credited

PICTURE AN AIRLINE which flies some of the fastest craft in service, yet which assures passengers that fastening seat belts is unnecessary because the pilots are so well trained! So, during landings and takeoffs, in banks and turns, the planes' aisles may be crowded with roving, indifferent travelers. This line's aircraft, once they are pruned loose from Slavic whim and stifling bureaucracy, can take you from one city to another in remarkably short time. But when you arrive the pilot may have decided to ignore the schedule and proceed

If you were a passenger on Aeroflot...



1. YOU WOULD check in at "modern" terminal — impressive outside, bare inside—and hope flight gets off on schedule

to another town more to his liking. Some of the aircraft used are touted as being the most advanced in the world. Yet the countryside they overfly has only the bare rudiments of a transportation system.

This study in contradictions gives a fair picture of Aeroflot, one of the world's largest airlines and the Soviet Union's major peacetime display item. It is a picture that resembles a Hollywood western in which most of the scenery is false front.

Aeroflot's strongest claim to membership in modern aviation lies in a few basic aircraft which are good "going" machines, beyond a doubt. But they are not nearly as good as advertised and certainly not as representative of Soviet aviation as that country would have a credulous world believe. Happily for this state-run airline, however, its accomplishments can be boosted and its mistakes hidden without challenge.

Thus the few comparatively worthy planes

3. DISPATCHER, when he reports for work, might eventually OK takeoff

4. THEN YOU'RE in for thrill of a lifetime—a "hot rock" takeoff, Russian style. This is actual photo of Tu-114 at Idlewild, N. Y.

UPI photo





2. IF LUCKY, your plane (perhaps Il-18, foreground) is parked nearby, weather is nice and luggage light. If not, you might have to tramp 1½ miles through snow, carrying your own cases, to opposite side of field

such as the twin-jet Tu-104 and the Il-18, powered by four turbo-props, are given top billing as the workhorses of the Soviet fleet, although both have had their problems. Much less, or nothing, is said about the Tu-110 or 114, the BB-152 or the An-10, once highly touted machines which have failed the designers and the cause during recent years.

O. K. Antonov, from whose name the "An" designation is taken, illustrated the

hazards of state employment when he came a cropper with his new An-10. Designed to operate from the dirt fields of Russian secondary cities, this four-engined turboprop proved to be very unstable in flight, costly to operate and generally did not meet the demands of the front office. For this slip, Antonov was reportedly designing gliders for the youth troops, and his disappointing plane consigned to the Polar Aviation Administration, Aeroflot's doghouse.

5. AH, BUT once airborne happy People's Workers take over. Here, cook takes personal order for meal



6. FLIGHT CREW, like French cab drivers, are known to follow own plans then, if convenient, the airline's





7. UNTRAINED STEWARDESS, in ill-fitting uniform, talks over grandiose Russian version of intercom. She may be relaying distressing news that passenger insists on going to destination for which he purchased ticket. Pilot may have other plans



8. BUT ALL'S WELL that ends well. Some flights actually do get where they're going . . . sooner or later . . . and happy passengers are reassured that heroes of socialist aviation have indeed the "world's greatest airline." The best in Russia, anyway

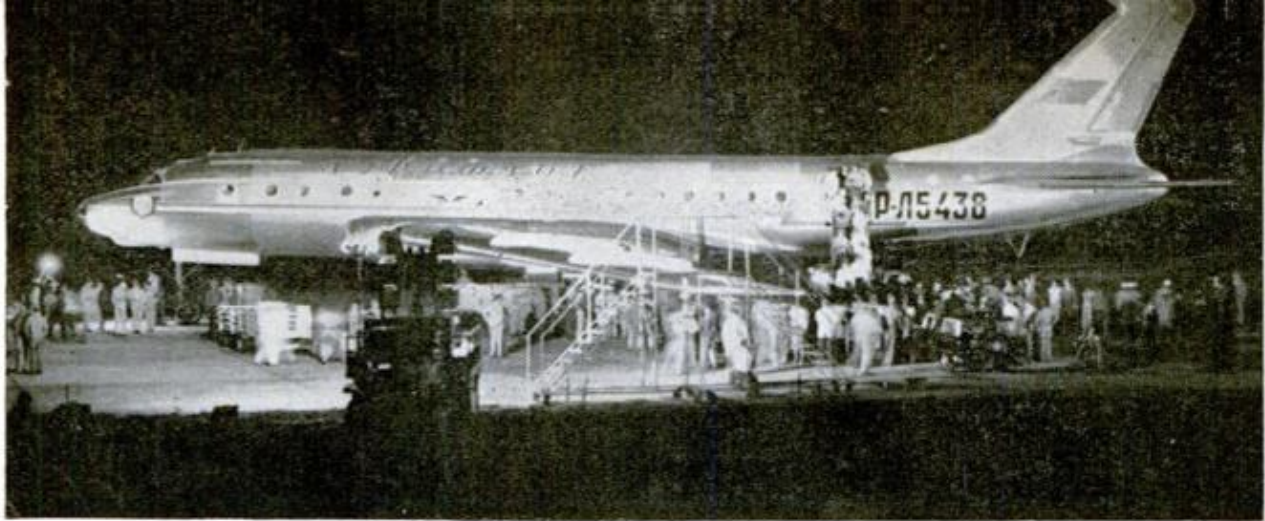
It should be understood that, in the Communist hierarchy, international effort in aviation is carefully apportioned, most of it under the direction of Aeroflot in Russia. Czechoslovakia, for instance, has made only prop-driven aircraft. The East Germans, when they can assemble a factory quorum, worked on turboprops designed in Russia. The pure jets were left to the masters in Paradise, Ltd.

In this restricted arena, German Professor Brunolf Baade appeared several years ago with his BB-152, a pure jet which was so impressive by Soviet standards that an exception was made and the plane was developed entirely in Dresden, East Germany. Unfortunately, the Soviet bloc feels a constant need for propaganda illustrations of its technological superiority and the BB-152 was apparently ordered into the air prematurely. In March, 1959, although its development and first flight were carefully guarded secrets, the backward peoples it was meant to impress could not help but see the smoke and hear the boom when the plane crashed ingloriously and unpatriotically shortly after takeoff.

After several years of gloom, the designer's initials—and the designer—were removed from the project and the *Type 152* is again under development. Equipped with old-style engines, the swept-wing twin jet compares roughly with craft long in service in western countries. This time, however, the makers have provided themselves with a ready excuse for any failure by uncovering a West German spy in the design department.

From this kind of setback, which happens more often than is admitted, one might understand the temptation which overwhelmed Nikita Khrushchev when he saw the French Caravelles during his 1960 Paris visit. The effusive premier said wishfully and only half-jokingly that Aeroflot might order a dozen of these efficient planes. Later, it was hurriedly emphasized that this was only a jest, since the Soviet Union already had the best airliners in the world.

Like, for instance, the Tu-110. Again, this was to be the *ne plus ultra* of civil aviation. But in late 1958, after much ballyhoo and effort, it suddenly was dropped without explanation, which was roughly equivalent



TWIN-JET TU-104 (above), a good airplane, gets most Aeroflot publicity, but airline consists largely of World War II-vintage transports such as ancient Il-12s and 14s donated to Congo in recent Red propaganda splurge



UPI photos

to squelching talk and work on the Boeing 707 in this country. The only reason for this could be a series of unannounced crashes or failures. In typical hammer-and-sickle subtlety, the 110 re-entered the scene briefly in late 1959 on the face of a postage stamp, so it may yet be flown publicly. Right now it is three years overdue.

The now-familiar Tu-104 was also supposed to have been the best available and a finished product when it was pushed into service in 1956, but authorities agreed that its primary value was in propaganda. It can average 480 m.p.h. from terminal to terminal, but consumes fuel at a rate which would prohibit its use in competitive commercial operation. General Elwood R. Quesada, former chief of the U.S. Federal Aviation Agency, after a visit to Aeroflot's facilities in 1960, reported that it took both pilots to "manhandle" the controls, since it had no auxiliary boost to overcome the large pressures on the airfoils. It has frightened many passengers and probably an equal number of pilots with its high landing speed (180 m.p.h., compared with the much larger Boeing 707's 120).

Another complaint against this plane has been its excessive racket. The New York Port Authority twice refused to let the 104 land before undergoing noise-level tests. The third request was honored at the intervention of our State Department.

The Il-18 similarly was billed as the top turboprop when it appeared, notwithstanding the reports of a disturbingly severe vibration which ran through the craft at brief intervals. Last summer a plane of this type, carrying an African delegation on a display tour, failed in flight and crashed near Kiev, killing all aboard. The Russians were forced to acknowledge the crash because of the VIPs aboard. Since the designers of the Il-18 had only recently been awarded the Lenin Prize, it was a bitter prestige blow when the plane had to be grounded. An alteration was made in the fuel injection system and it was ordered back into service; whether this solved the trouble remains to be proven, because three more have reportedly crashed inside Russia without any official announcement.

The An-24, a plane first scheduled for

(Continued to page 248)

**OWNERS
REPORT**

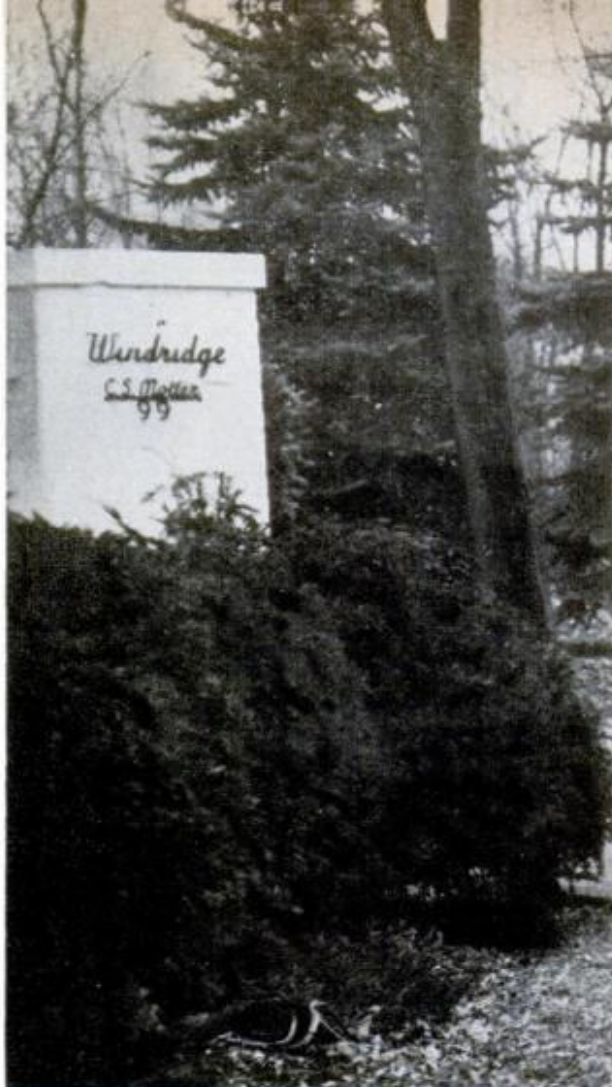
A NATIONWIDE SURVEY

WHAT RAMBLER OWNERS LIKE

- Handling ease
- Economical operation
- Ease of parking
- Roominess

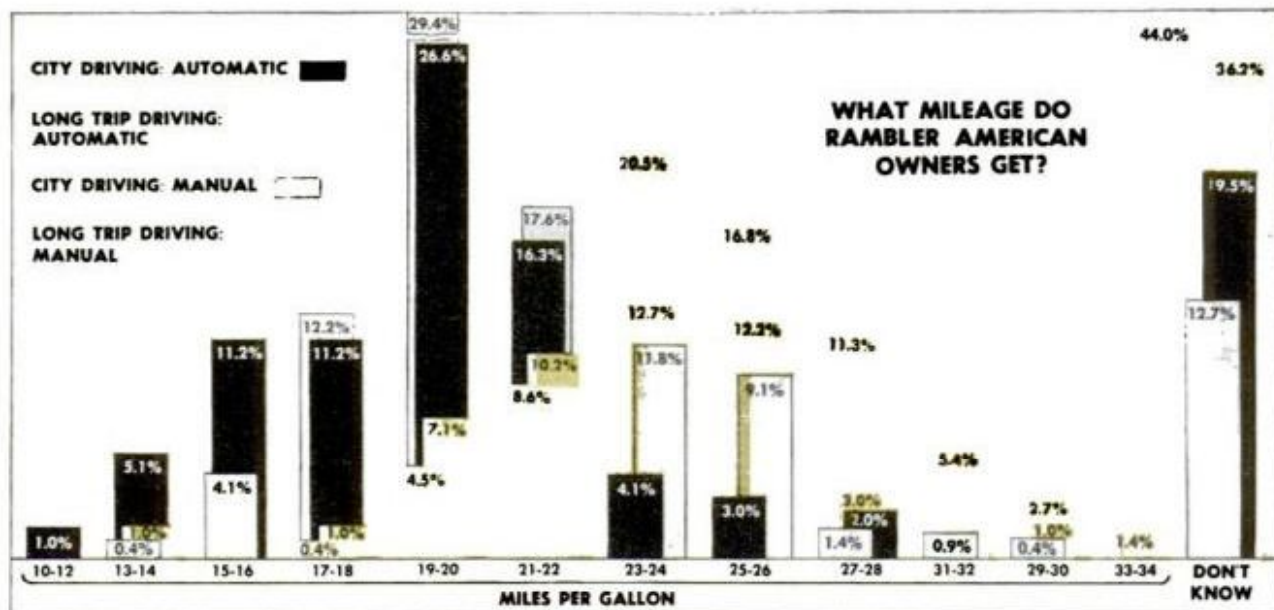
WHAT THEY DISLIKE

- Water leaks
- Lack of leg, headroom
- Difficult entry, exit
- Fuel-filler pipe



Owners Cheer Rambler American's

BASED ON 1,143,124 OWNER-DRIVEN MILES





Looks, Performance, Economy

Editorial comments in boldface type by Jim Whipple, PM's Auto Editor

ECONOMY WAS THE major reason most owners gave for their decision to buy the 1961 American. A majority of 59.4 percent found gasoline mileage as good as they expected it to be, while 17.9 percent were happy to report that miles per gallon exceeded their expectations.

The American pleases most owners, earning an over-all rating of "Excellent" from 76.3 percent of them. An additional 21.5 percent felt that their new Ramblers were "Average." A tiny minority of 2.2 percent rated the car as "Poor."

Now for a look at the facts as reported by Rambler owners themselves. Here, in the order of frequency of mention, are the five best-liked features of the American.

"It is easy to handle; gets in and out of traffic and congested areas easily."—Connecticut insurance salesman.

"Delightfully nimble in traffic and handles well on the open road."—Washington lab technician.

"It's a joy to drive."—Iowa inspector.

"This car offers great handling ease, especially

IF YOU SQUEEZE a sedan on a 100-inch wheelbase, rear wheel wells encroach on seat space and limit capacity to five adults. Narrow rear doors make entry-exit difficult





FRONT PASSENGER can relax in reclining seat; driver's seat also reclines for overnight stops on long trips



THERE WAS PRAISE for Rambler's trunk—spare set way back leaves goodly amount of storage space



HOW TO MAKE THE MOST OF a minimal 173-inch length: Rambler designers stayed away from frills and kept body styling simple and uncluttered. Result is crisp, modern styling wrapping up a small package

SUMMARY OF OWNERS REPORT: RAMBLER AMERICAN

Excellent 76.3%

Average 21.5% Poor 2.2%





OVER-SIX-FOOTERS could knock a knee against steering wheel when moving foot from gas to brake pedal

in tight parking situations."—Michigan tool maker.

The American's happy handling is due to its short wheelbase and relatively light weight of 2600 lb.

"Even though my driving consists mainly of hard city driving, the American is still economical to drive."—Michigan mechanic.

"I drive my Rambler about 365 miles per day in mountain country and average 26 m.p.g. on 'cut-rate gas.'"—Maryland foreman.

"I have gotten 33.01 m.p.g. out of my low horsepower, flathead '6.'" Never seen anything like it."—Virginia draftsman.

"I am a rural mail carrier with a 64-mile route. So far my gas mileage adds up to 26 m.p.g."—Tennessee rural mail carrier.

"I couldn't be more pleased with the economical, trouble-free performance of this car."—Illinois telephone-line foreman.

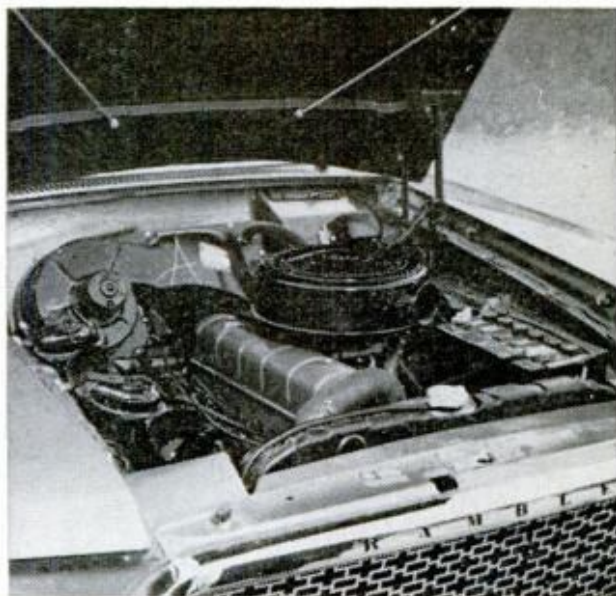
Over-the-road fuel consumption averages well into the 20-30 m.p.g. range for manual transmission cars. For its size the American might well be even lighter in weight permitting a higher (lower numerical) axle ratio and even better mileage.

"This Rambler has very good visibility, drives easily and I can park it in a sensibly short space."—Louisiana mechanic.

"High on my list of good points is the fact I can park this car with little strain and move it through crowded cities and towns with minimum effort."—Texas physician.

American's 173-inch over-all length puts it close to the four-passenger imports in parkability.

"Finally found a car which is easy to park and which still gives my six-foot



OWNERS WERE quite pleased with Rambler's larger 125-horsepower engine—praised power and economy

frame plenty of legroom."—Wisconsin minister.

"Considering the fact this is supposed to be a compact car, it gives me plenty of interior room for the wife and kids."—Kansas X-ray technician.

Front compartment of American compares favorably with cars that are a foot or so longer in wheelbase. Five average-sized adults will find the car quite comfortable.

"I am very pleased to find this car rides much better than I expected."—Florida retired teacher.

"Have found the American comfortable and relaxing to drive on long trips."—S. Carolina bookkeeper.

"It is wonderful to drive and gives a safe and secure feeling on long trips."—Tennessee teacher.

Noise level is quite low with windows closed, and there were no rattles or resonance at 60-65 m.p.h. in PM's test car, a Custom.

Now, on the other side of the coin, are some complaints, numbers one through five in order of frequency of mention.

"I was highly annoyed to find the body had several leaks and allowed the rain to get in."—Virginia serviceman.

"Car leaked 24 quarts of oil in two months before a new valve cover plate was installed. A large amount of water leaks into the trunk due to loose fitting gasket the dealer has not fixed properly."—Maryland attorney.

Trunk of PM's test American leaked badly when car was washed by hand. There is little reason for this even on a car made early in the model run.

(Continued to page 256)

**OWNERS
REPORT**

A NATIONWIDE SURVEY

WHAT CHEVY OWNERS LIKE

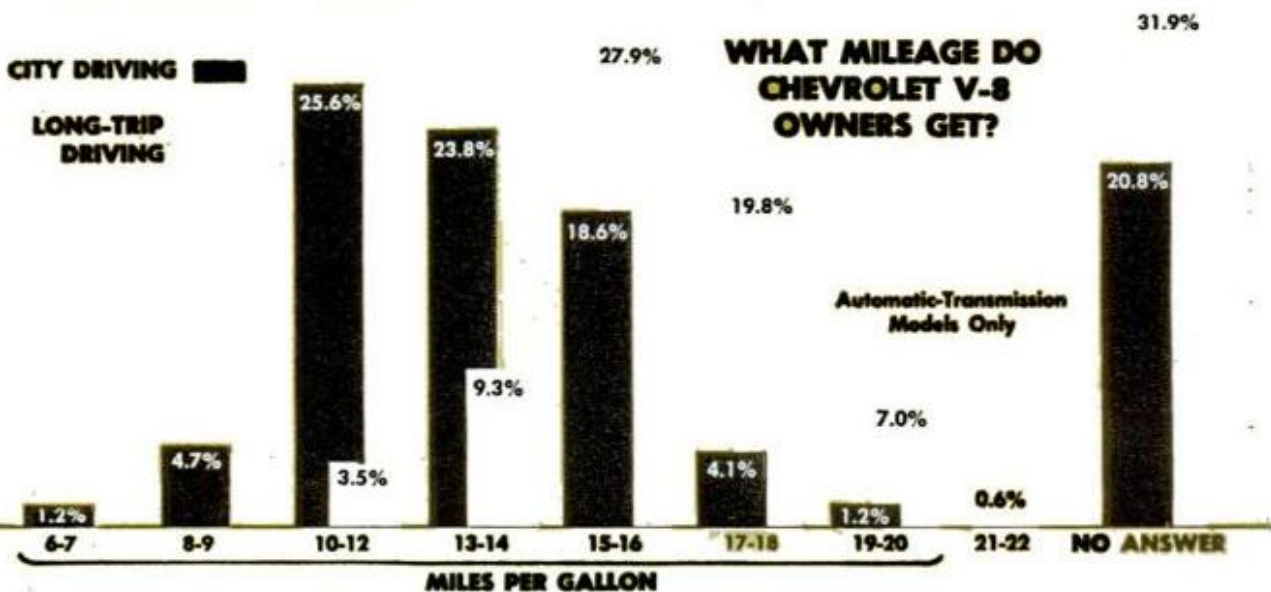
- Handling ease
- Riding comfort
- Conservative styling
- Power, performance

WHAT THEY DISLIKE

- Insufficient gas economy
- Windshield too large
- Poor workmanship, paint
- Horn control



**BASED ON
1,053,366
OWNER-DRIVEN
MILES**





Owners Approve "Sensible" '61 Chevy

Editorial comments in boldface type by Jim Whipple, PM's auto editor

TO MANY OWNERS REPORTING their new '61 Chevys are merely the latest chapter in a long story of many years of Chevrolet ownership. A surprising number volunteered the information that the new car was their 7th, 8th or 11th Chevrolet.

Among these habitual owners there was a common opinion that the new design of the '61 body was a step in the right direction — backwards. Those who had owned Chevy's of '55-'58 vintage and a '59 or '60 model compared the '61 favorably with the older series of cars in respect to ease of entry and exit, headroom and comfort.

A majority of these loyal repeat owners shed no tears over the passing of the prominent fins which gave the rear deck of the '59 and '60 models the look of a sheet metal sea gull.

One owner, a woman, said that she'd been ready to trade in 1959 but had stuck with her '54 Chevy until styling became "sensible" once again.

Whether they are first time Chevy owners or "lifetime members" of the club, most buyers approved of the basic virtues of

their '61 Chevrolets. Ease of handling, comfortable ride, the new conservative styling, power and roominess went a long way toward earning the approval of 96.7 percent reporting who rated the car as either Excellent or Average. (The percentage breakdown was: 63 percent Excellent, 33.2 percent Average.)

Study of the questionnaires showed that many owners rated their Chevys "Average" instead of "Excellent" because of disappointment in the gasoline economy. Of the 80 percent who reported on city mileage, five of every eight owners who had a V-8, with automatic transmission reported mileage of 10 to 14 miles per gallon. In long trip driving nearly five out of every seven reporting said that they were getting between 15 and 18 miles per gallon.

Fuel economy, or the lack of it, has become the magnificent obsession of the American motorist. Sensing this, advertisers and salesmen have stressed the optimum (lowest) fuel consumption obtained under special, economy-run conditions. The result is unreasonable disappointment with "normal" mileages.

A number of owners of both six-cylinder and 283-cubic-inch V-8-powered Chevys remarked that they were getting fewer miles per gallon with their '61 Chevys than they did in '56 or '57 models with the same engines.

They should. These new cars are bigger and consequently 350 to 400 lb. heavier. Naturally with unchanged driving patterns they use more gas just as they would have if they had carried two more adult passengers in their older cars.

But let's get to the heart of the matter. Here in order of frequency of mention are the five best-liked features of the '61 Chevrolet described in quotations from the owners themselves.

"Handles easily in traffic."—Florida office manager.

"Very easy to handle yet drives and feels like a big car."—North Carolina housewife.

"Handles nicely, rides nicely."—Wisconsin real estate saleswoman.

PM concurs with reader opinion with these reservations; easy handling in city or suburban traffic demands that '61 Chevy be power-steering equipped; its good handling holds true under average driving conditions, not at higher speeds on winding roads.

"It has a very smooth ride."—Oklahoma student.

"Excellent, big-car riding qualities."—Oklahoma engineer.

"Suspension system smooths out bumpy and rolling roads well."—Maine timberland manager.

These three of the 39.4 percent of owners who mentioned riding comfort know whereof they speak. Today's Chevy rides as well as the Cadillac of only a few years back. But then 3500 pounds and 209 inches over-all length is not a small car.

"Clean lines without too much trim."—Indiana labor estimator.

"Like the absence of fins in the rear giving the car a sleek, modern look."—New Jersey business machine technician.

"I like the slim body better than the '60, because it's not so big and heavy looking."—Tennessee engineer.

"The change in styling was one of the major factors in my decision to purchase a Chevy this year."—Connecticut music teacher.

PM couldn't agree more wholeheartedly. Chevy has switched from the flashy look of a carnival rocket ride to the sophisticated appearance of a well-designed automobile.

"Good pickup for a six."—Boston housewife.

"The 170 horsepower engine (V-8) has enough power for my use."—Wyoming electrician.

"I like the performance of my car (six, manual transmission). I have no trouble on mountain roads and seldom have to shift down."—Montana student.

HERE'S THE '61 CHEVROLET at its best—wide open and ironing out the bumps on a long straightaway



SUMMARY OF OWNERS REPORT: CHEVROLET

Excellent 63.5%

Average 33.2%

Poor 3.3%



POPULAR MECHANICS



CHEVY'S TRUNK rates few owner complaints. Spare tire on rear shelf leaves wide, uncluttered storage space



FORTY PERCENT of Chevy owners found this scene all too familiar—complained of car's poor fuel economy



GONE IS THE DOGLEG from Chevy's front door. With this out of the way, entry or exit is much easier



REAR COMPARTMENT drew mixed reaction — deep floor wells are hard to clean but add to seating comfort

The smaller, or "standard" of Chevy's two V-8 engine options does a nice job with a minimum of fuss. PM tested a car with 348 cubic inch, 250 horsepower engine and Turboglide transmission. Indicated top speed was 105 m.p.h., over-all mileage 15.8 miles per gallon of premium gasoline.

"Room in the '61 is much better than in previous years."—Delaware store manager.

"I'm 6'4" and have plenty of room."—Utah fire inspector.

PM's auto editor measures 6'3" and he agrees with the man from Utah with one exception—you'll have to remove your high-crowned hat.

"There's plenty of room for my luggage and samples and six people, but it's not bulky on the outside."—Colorado salesman.

All owners do not find their 1961 Chevrolets to be peaches and cream, however. Here, in the order of frequency of mention, are the five biggest complaints.

"Gas mileage is very poor in highway driving. I traded a 1960 with 250-horsepower engine and standard transmission

and bought a 170-horsepower engine with overdrive, and mileage is slightly lower."—Missouri salesman.

"I expected better gas mileage from the 170-horsepower V-8 (15.5 miles per gallon over-all)."—Michigan machine designer.

"Gas mileage in city driving very poor (9.5 m.p.g.)."—Colorado engineer.

"I specifically bought a low-priced six for better gas mileage in the city. Understood that we'd get 18 to 23 miles per gallon. We get about 15 miles per gallon with manual transmission."—Pennsylvania housewife.

"A nice car but, it will be my last big Chevrolet (V-8) unless they change that carburetor so that I get more miles per gallon."—Nebraska salesman.

And so it goes. About four of every ten owners are dissatisfied with gasoline consumption, yet Chevy sixes and V-8s are not any thirstier on the average than competitive cars of comparable weight and engine size. To achieve better economy the motorist must choose a lighter, smaller-engined compact.

(Continued to page 272)



By Jim Whipple



Well-disciplined French motorists hold their honks A good car, like a good wine, takes time

This month the *Listening Post* moves to Europe, for a look at "imported cars" on their own home ground.

The trip was made to preview the new **Peugeot** (pronounced *pur-zhjoé*, if you please) 404 sedan which will be featured in next month's **PM Spotlight**. Now however, let's take a brief look at the European motoring scene.

Barreling down the roads of eastern France and weaving through the bustling traffic (no jams) of **Paris, Geneva and Lyon** gave us an opportunity to learn much about European motorists, their roads and the rules they stay alive by.

Most noticeable feature of French motoring is the lack of noise. Nobody but nobody, from **DeGaulle** on down, blows his horn. It is forbidden by zealously enforced laws. Before this prohibition, Gallic temperament made French cities hideous with metallic din. Now touching the horn button is the last resort instead of the first impulse. In 775 miles we tooted the 404's matched horns just three times.

Instead of a horn the French motorist relies on two factors in addition to his constantly sharpened powers of observation: one is the electric directional signal, the other is the rule of the right (the car to your right has right of way).

In the first case, any change of course is announced by blinking your directionals. This means, literally that, if you pull two feet to the left to pass a bicycle (every few yards in villages), you must signal.

Neglect to blink your intentions and whatever move you make may be your last as a wine-hauling tanker mashes you into the ancient masonry of a French farmhouse.

Rule of the right is observed equally scrupulously. You can butt into a counter-clockwise traffic circle with *savoir faire* in a tiny **Renault** while huge semitrailers hiss their air brakes in deference to your "right." Getting out of these vehicular roulette games is another matter. You must wait 'til the very last motor scooter on your right has passed before turning out.

You must also use your headlamps day and night to signal your intention to pass.

This explains the steering-column headlamp control so puzzling to U. S. buyers of French cars.

The French also use smaller headlamps with top halves shaded with glare-killing yellow plastic. True, these lamps don't spread as much light as ours but they leave oncoming motorists undazzled. The net result is that drivers actually see more of the total scene ahead, including cars moving in from side roads.

A look through the Peugeot works at Sochaux, France, revealed some of the reasons for the high quality that we've come to take for granted in many imported cars particularly where the car is a medium-price-range model such as the Peugeot.

The major ingredient is time. On the body finishing and assembly lines, workers have the extra time necessary to make sure that the doors are properly hung or that all trim pieces are lined up. Relief men, at each station on the line, are ready to pitch in when two pairs of hands are needed. Result, few details pass by that are below the standards intended by the designers.

Subassemblies, too, get tender, loving care. Every transmission is listened to in a soundproof test booth as it is "run up" to speed in each gear. All of *Peugeot's* unique worm-gear rear axles get similar stethoscopic treatment.

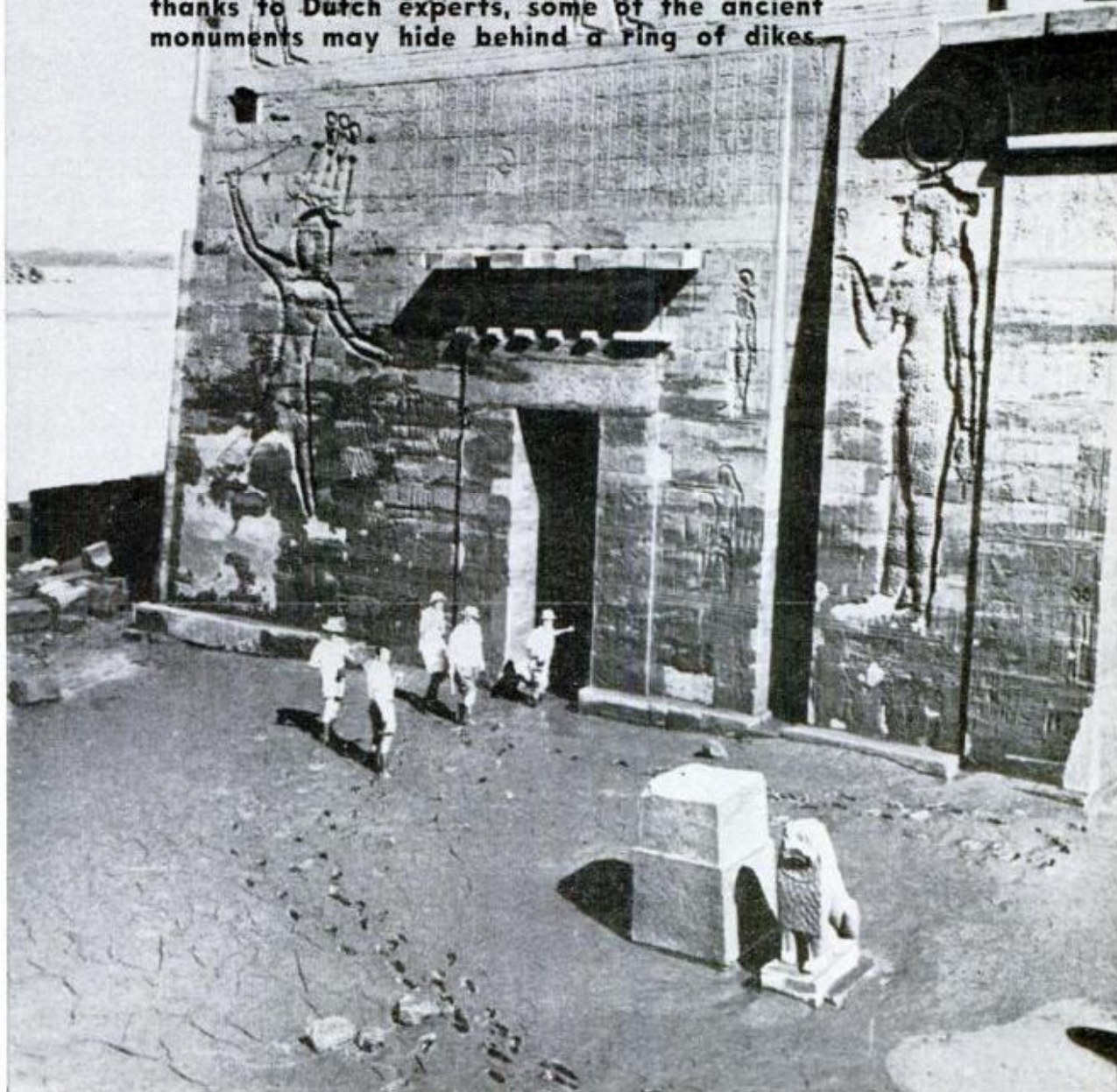
Engines are run briefly on test stands under the watchful eyes of experts straining to hear a loose timing chain or the sight of a poorly fitted distributor.

And yet this is no custom shop, staffed exclusively by "old world craftsmen" tailoring cars to individual order. The big Sochaux plant is manned by some 19,000 workers who turn out 1000 cars and light trucks per day.

Vehicles emerge at the rate of one per minute, yet there's time enough for every one to get a short but intensive test drive during which operating parts, from shift linkages to shock absorbers, are checked out. To those who don't think that this sort of quality control pays off, we can only say that it has made **Peugeot** the best-selling medium-priced car in France. ★ ★ ★

SAVE THE TEMPLES OF THE NILE...

was the plea of Middle East governments. Now, thanks to Dutch experts, some of the ancient monuments may hide behind a ring of dikes.



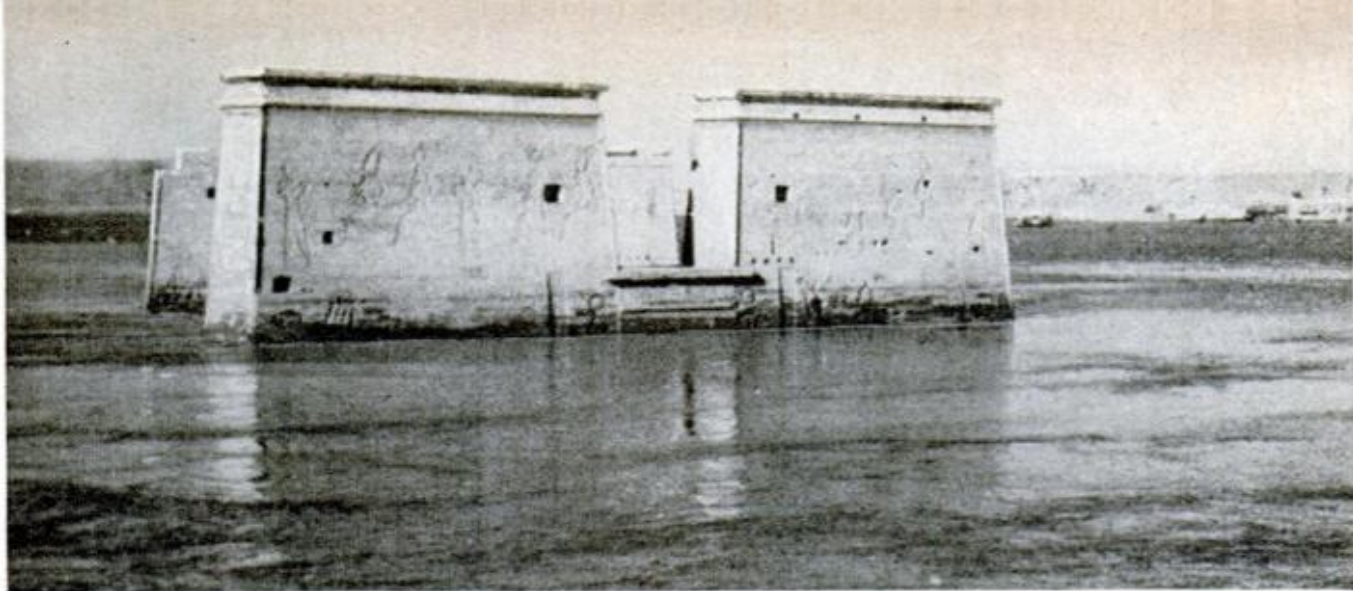
TEMPLE OF ISIS, where Cleopatra once worshipped, is in danger of being buried underwater forever

PROGRESS AND HISTORY often conflict, and history often suffers. This maxim was proved again last year when construction began on a new dam on the ancient Nile in the land of the Pharaohs.

Scheduled for completion in 1967, the Aswan High Dam will unquestionably be a boon to progress. It will create the world's largest man-made lake, irrigate nearly two million acres of earth in the most arid area of Egypt, increase arable land by one-third and multiply available power by 60 percent.

It will also drown forever some of the most priceless treasures of history, Egyptian temples and monuments built before the time of Christ.

It will drown them unless plans to salvage an island—*below the level of*



PHILAE TEMPLES, including Temple of Isis and (right) Pavilion of Trajan, are shown partly submerged in recent picture. Unless dikes are built before new dam, they will remain submerged and eventually erode



PAVILION OF TRAJAN shown during recent three-month period when waters of Nile had receded and island of Philae was seen again. Dikes would preserve island permanently; otherwise, river would engulf all

the lake—are fulfilled before the dam is finished. Construction has already begun.

The temples of Philae are located on this island. The oldest of them was built by Nectanebo I, one of the last of the Pharaohs, about 370 B.C. The island was the center of worship for Isis, the ancient Egyptian goddess. Cleopatra herself, among others, is believed to have participated in rites there. The temples are valuable, not only as irreplaceable edifices, but because scholars have hardly scratched their historical significance.

Other valuable monuments further upstream (south of Aswan) are threatened by the new dam, but the case of Philae is unique. So is its solution.

It is located near the city of Aswan in

southern Egypt, a winter vacation resort. Prior to 1902, Philae—as it was in the time of the Pharaohs—was an island in the Nile untouched by progress and in no danger of inundation.

In 1902, however, the original Aswan dam (now called the Aswan Low Dam) was built by the British north of Philae, backing up the Nile and flooding Philae for nine months of the year. In subsequent projects, the dam was raised twice to its present height of 174 feet, but even this was not sufficient to provide enough resources for Egypt's growing and impoverished population.

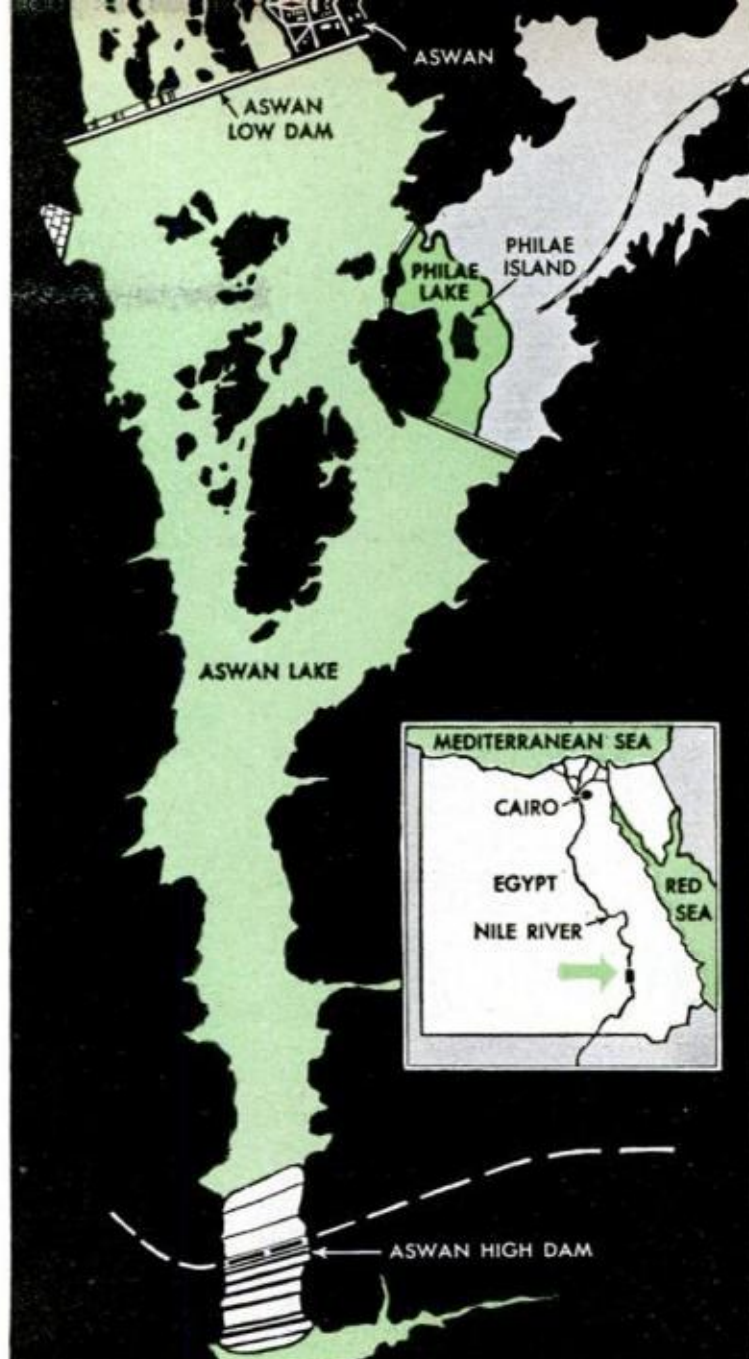
The Aswan High Dam was proposed, decades ago, for a narrow area further south that was more advantageous for a larger



BIGGEST LOSS would be to scholars. Temples and inscriptions are irreplaceable



CLOSEUP OF INSCRIPTIONS. Scholars have only begun to grasp their significance



PHILAE DIKES would separate Philae Lake (dark green) from Aswan Lake. Philae Temples, on Philae Island, would be saved

dam. Ground was finally broken early last year (with Russian Communist aid, incidentally). It is believed that the High Dam will be the world's largest, 360 feet tall, and will back up the Nile River into a 300-mile-long lake covering more than 1500 square miles in Egypt and Sudan to the south.

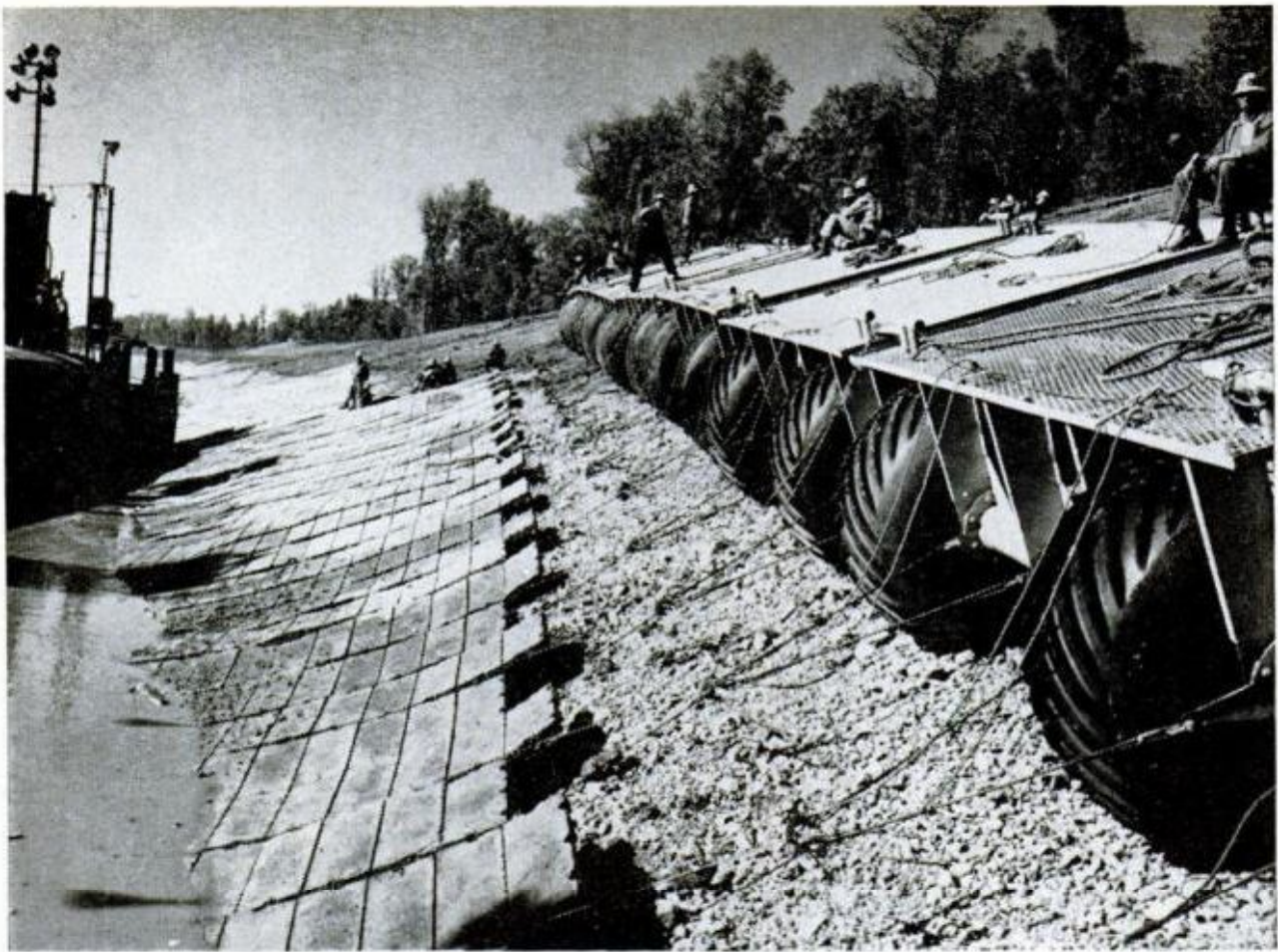
When the dam is finished, Philae will be located between the High and Low dams. When it had only the Low Dam to contend with, Philae was underwater nine months of the year. But for three months, when the Nile was low, it was above water and available to tourists and scholars.

With both the Low and High Dams, however, Philae will be in the lake created between the two. It will be submerged permanently, unless a plan to protect it with

dikes is successful. Then it will be above water—permanently—just as it was in the days of the Pharaohs.

The plan involves two dikes extending from the mainland shores to two higher islands near Philae, and a third dike between the islands. This would create Philae Lake, in the center of which would be the island of Philae and its temples. The water level of Aswan lake would be about 30 feet above Philae, and the dikes would tower about 20 feet above that, or 50 feet above Philae.

The plan resulted from a plea by the United Arab Republic to save the Nile temples. UNESCO accepted the project and, to no one's surprise, chose Dutch engineers to handle preliminary studies. The Dutch should know how to build dikes. ★ ★ ★



Many-Wheeled Monster Pulls Rug Up a River Bank

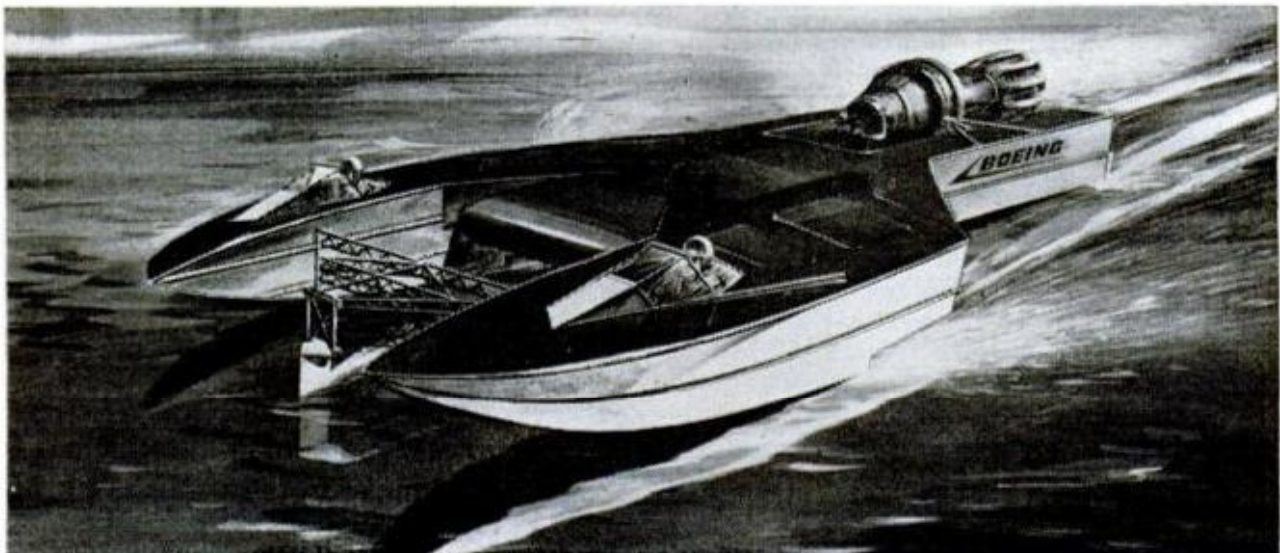
Rivers, while they stay away from most doors, are cannibals about their own river banks. They eat them. Revetments—huge concrete mats, up to 500 feet long and 140 feet wide—are placed at sensitive areas to

save the banks from erosion. The problem of getting these ungainly mats into place is solved by a 28-wheeled vehicle which wades into the river to meet the barge, hauls the mat off and up the bank.

Jet Boat to Test Ultra-High-Speed Models

It's not a contender for the world's water-speed record, though it bears a family resemblance. A Boeing test boat is designed in the familiar lobster-claw shape to allow models of hydrofoils and other hydrody-

namic shapes to be pushed through the water between the forward sponsons for testing. Pushed by a big Allison J-33 jet engine, the 38-foot plywood speedster will reach 110 knots (115 miles an hour).



Krafft A. Ehrlicke helped develop the German V-2 ballistic missile during World War II. He became a U.S. citizen in 1954 after serving in this country's missile and rocket development program. He is director of the Centaur space vehicle program for Convair Division, General Dynamics Corporation



MAN IS A MULTI-DIMENSIONAL CREATURE, simultaneously blessed and cursed with an existence which spans the material and the spiritual realm. From this complex interface he derives a greater capacity for excitement than is given any other living being known to us. And yet, a critical examination of today's excitement-studded life shows only relatively few truly exciting moments of importance and consequence in one's life.

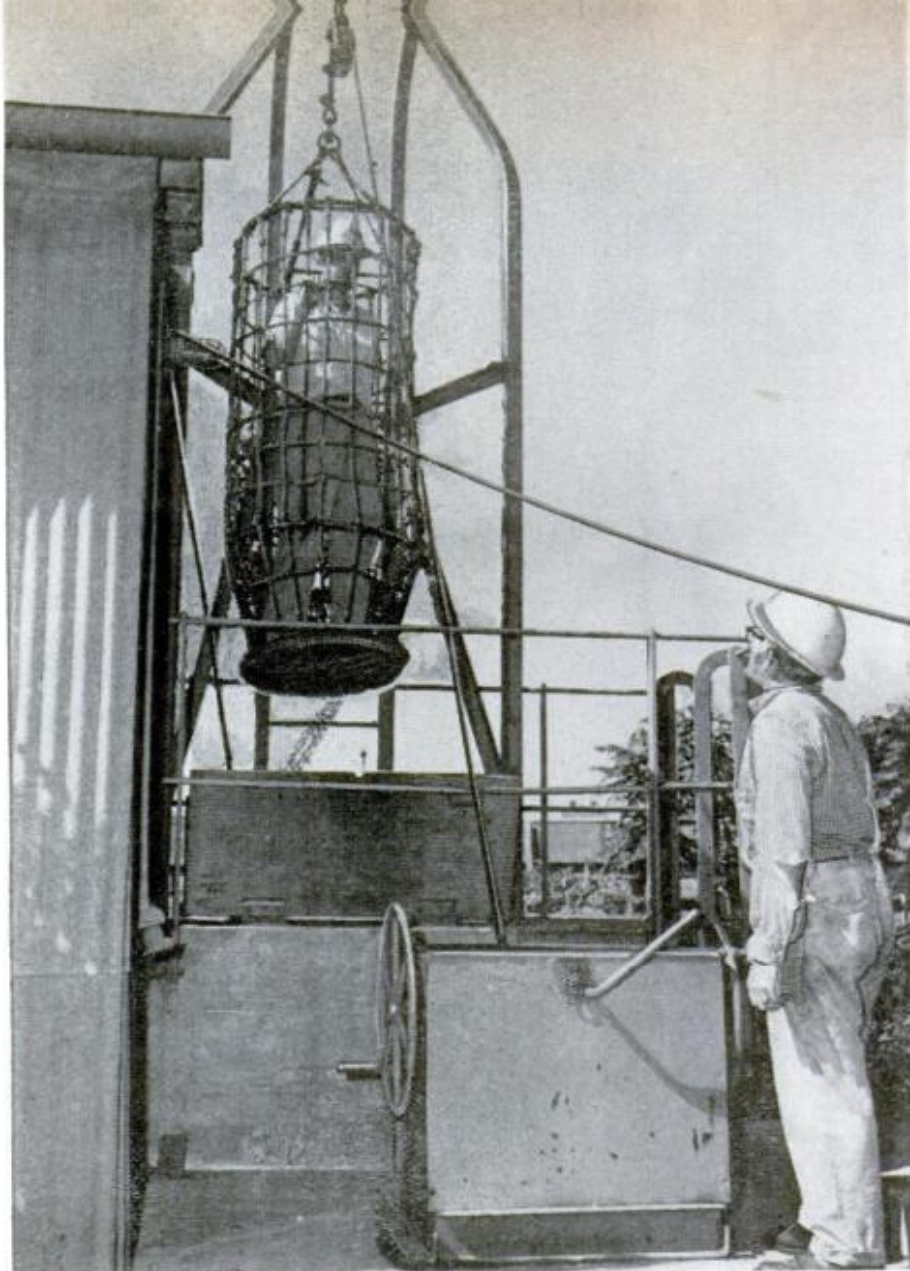
Stretching the term "moment" to cover several months, still a brief span in a lifetime, enables me to discuss what I consider my most exciting moment, namely, the relatively short period in my youth when I acquired a sense of mission for my life. Next to life itself, this is perhaps the most precious gift one can receive. It is the spiritual birth which follows the material birth, the electrifying feeling of having gained the privilege to push man's frontiers back just a bit further. It happened to me with unexpected force back in 1929/30 during the 12th year of my life.

The sequence of events leading up to this change was simple. In October I attended in my hometown of Berlin the world premiere of the prophetic science fiction film, "Girl in the Moon." Professor Oberth, one of the truly great space flight pioneers, contributed as scientific advisor. For Christmas 1929, I received my first books on astronomy and on space flight, plus a small telescope. Letting my mind penetrate the depth of space, from the moon's surface to distant galaxies, was an incomparable first experience. The enormous potential of a space-going mankind began to become apparent to me, and I felt, intuitively at first, that the technological age into which I was born would be capable of making such a dream come true. Before the year 1933 had ended, I was firmly resolved to devote my life to the task of man's expansion into space.

I can think back to this event only with a sense of humility and obligation. Through the subsequent years this decision guided my work, inspired me with a firm faith in man's cosmic destiny and gave me the persistence to overcome personal adversities toward my goal. As the years become decades, this moment stays with me and refuses to become distant past. After all, what can be more exciting than the self-knowledge gained with the acquisition of a powerful sense of a mission in life?

Never again will you so firmly and so proudly be in control of your destiny as in that one moment in which you deliver your life into the service of an ideal greater than yourself.

K. A. Ehrlicke



MAINTENANCE CREWS ride basket cage lift to reach gas lines 60 feet down

Underground City

By Edward Hymoff

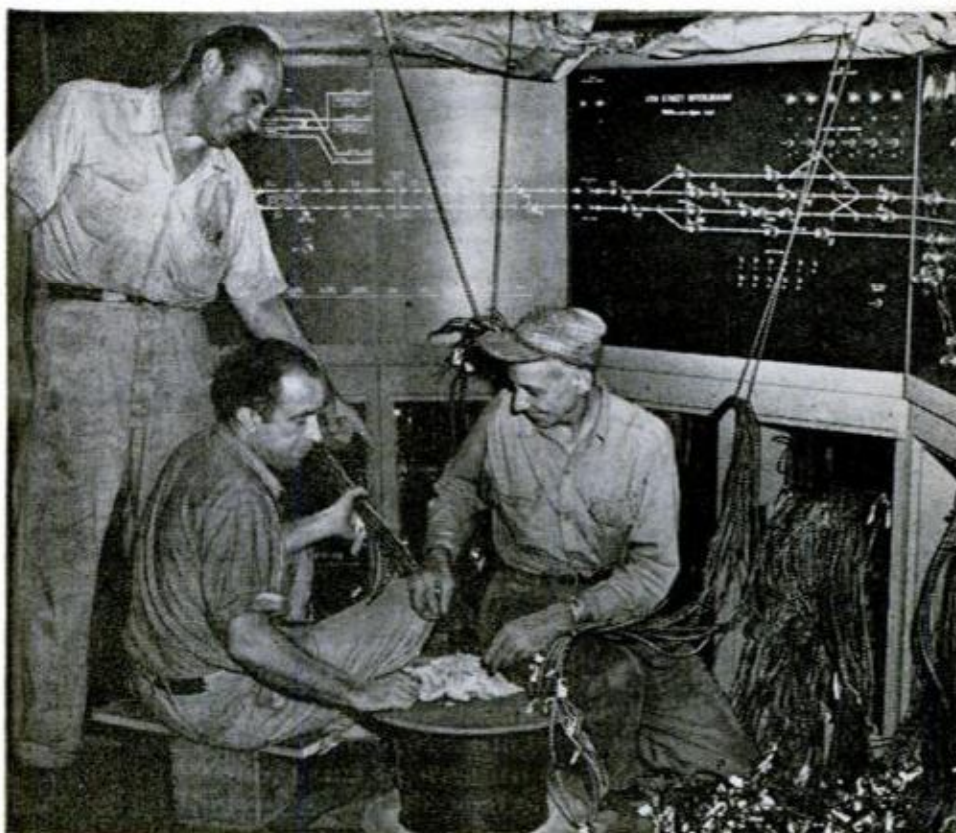
BENEATH NEW YORK CITY'S skyscrapers is a bustling and mysterious metropolis carved out of solid rock. It is a city of caverns and tunnels in which an estimated 100,000 people work and even attend school without benefit of daylight. It's an underground community linked together by railroad and subway tracks; a city of shops and department stores and a uniformed police force of more than 1000 men.

It's also a city of mystery with a nether jungle of twisting manmade vines, slime and muck and danger at every turn. Within this artificial forest of live steam pipes and hot high-tension cables stalk rats as big as cats, cats as big as hunting dogs and occasional slithering eight-foot-long reptiles as well as clouds of king-size flying cockroaches. You would be fasci-

UNDERGROUND passageways that connect New York's subways look like the main streets of many towns. Pedestrians can shop at drugstores, florists, butcher shops, jewelry shops and the like without regard for the weather above the ground



BOARDS like this show the location of every train in the subways. Eyes and ears of the underground railroad signal system are some 70,000 relays



ASTORIA TUNNEL, built for the use of Consolidated Edison Co., principal supplier of gas and electricity, carries utility lines under the East River. In addition to three gas mains and two electric cables, the tunnel contains a steam main, oil line and telephone cables. Astoria is one of the four underwater tunnels built for the use of the large utility firm



WEST

42nd STREET

PARK AVENUE
TRAFFIC RAMP

MAIN WAITING ROOM

PASSAGE TO TIMES
SQUARE SHUTTLE

CONNECTING
PASSAGEWAYS
TO SUBWAYS

OYSTER BAR

LOWER-LEVEL TURNING LOOP
FOR COMMUTER TRAINS

STEAM BOILERS

FAN ROOMS

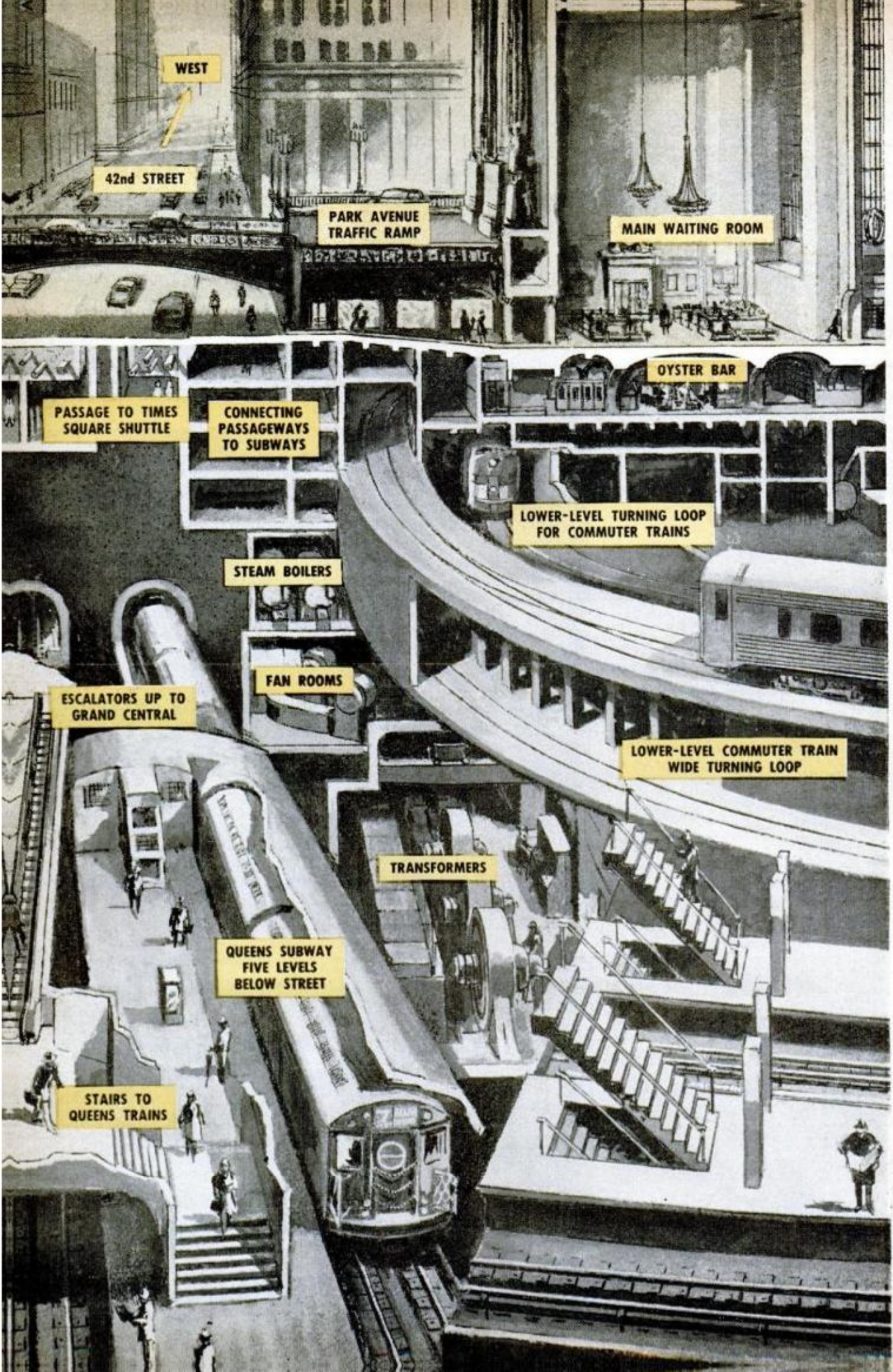
ESCALATORS UP TO
GRAND CENTRAL

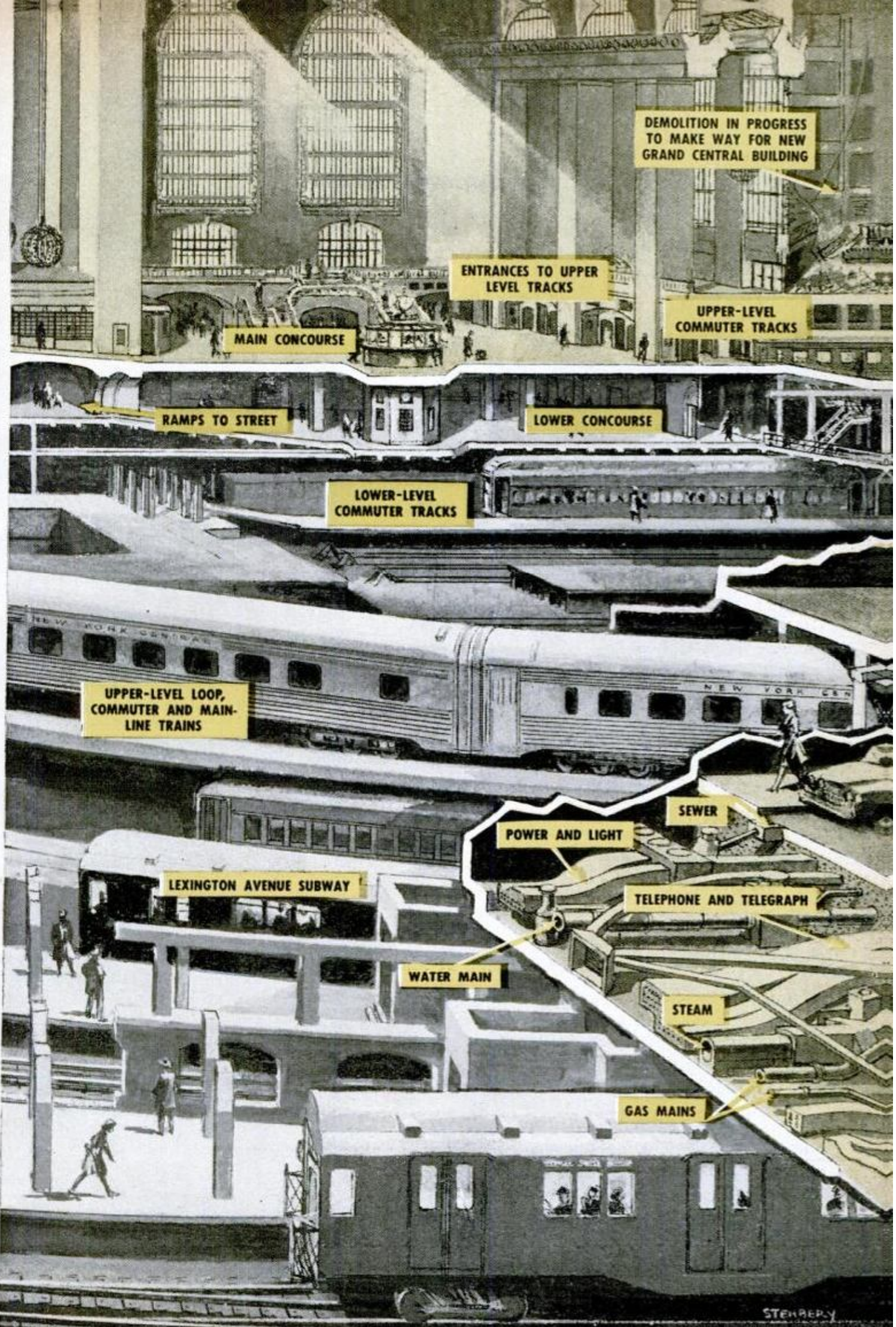
LOWER-LEVEL COMMUTER TRAIN
WIDE TURNING LOOP

TRANSFORMERS

QUEENS SUBWAY
FIVE LEVELS
BELOW STREET

STAIRS TO
QUEENS TRAINS





DEMOLITION IN PROGRESS
TO MAKE WAY FOR NEW
GRAND CENTRAL BUILDING

ENTRANCES TO UPPER
LEVEL TRACKS

UPPER-LEVEL
COMMUTER TRACKS

MAIN CONCOURSE

RAMPS TO STREET

LOWER CONCOURSE

LOWER-LEVEL
COMMUTER TRACKS

UPPER-LEVEL LOOP,
COMMUTER AND MAIN-
LINE TRAINS

POWER AND LIGHT

SEWER

LEXINGTON AVENUE SUBWAY

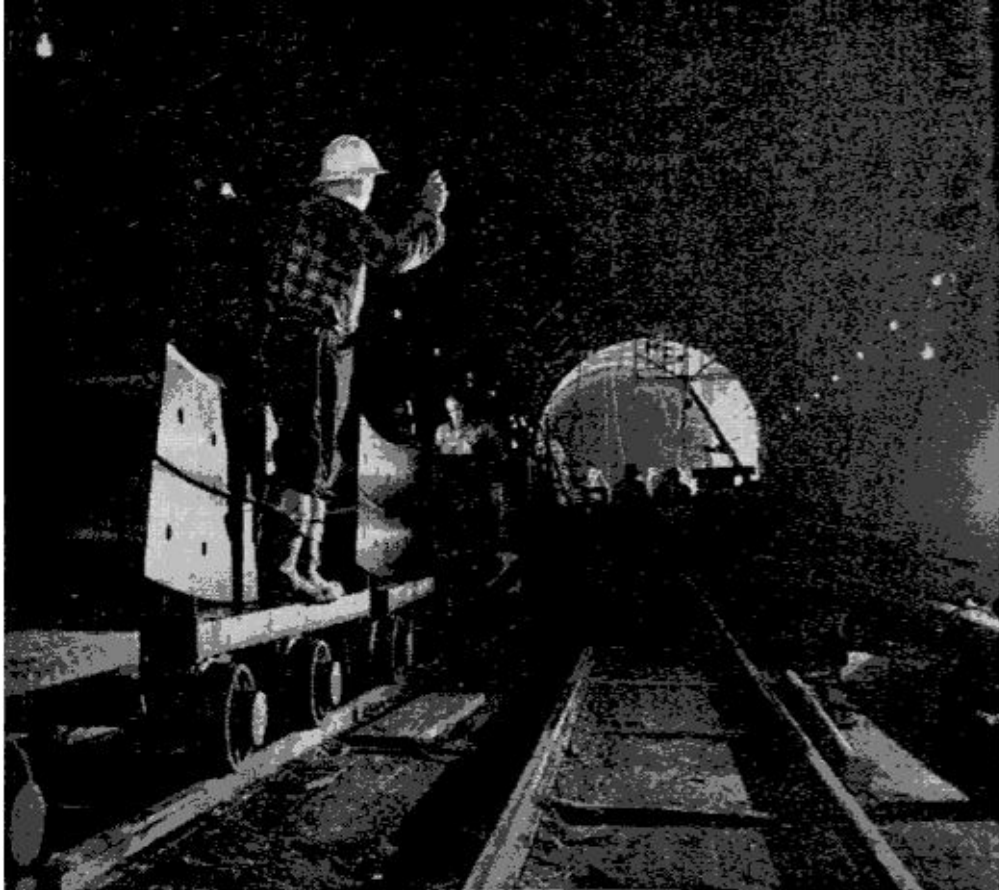
TELEPHONE AND TELEGRAPH

WATER MAIN

STEAM

GAS MAINS

STENBERG



← **TRAIN LOAD** of cast-iron segments is moved into the new Lincoln Tunnel tube. Latest addition to the tunnel, this third tube comes to the surface near Times Square in New York

UTILITY LINES under First → Avenue had to be excavated and relocated when a portion of the roadway went underground. Purpose of the move was to create an open plaza in front of the United Nations headquarters building in Manhattan

nated—and horrified—at what you could see in this underground city.

Beneath New York's impressive skyline are bank vaults containing the wealth of nations. In addition there are hundreds of millions of tons of steel, iron, brass, lead and copper put into the ground by man instead of nature.

Manhattan island, the major borough of New York City, is well known throughout the world for its impressive skyline and glamorous way of life but few people—including its own residents—are aware of this underground empire.

Manhattan is a pile of rock formed hundreds of millions of years ago. If there were no 22 square miles of "Manhattan schist"—as it's called by engineers and geologists—the heart of New York City would be unable to support the massive skyscrapers, hanging bridges and the maze of tunnels beneath this steel and concrete complex. Formed at an early age in the earth's history, Manhattan island is practically buried today in concrete, masonry, asphalt and steel and has been excavated, tunneled, bored into and built upon more intensively than any other piece of land of comparable size in the world.

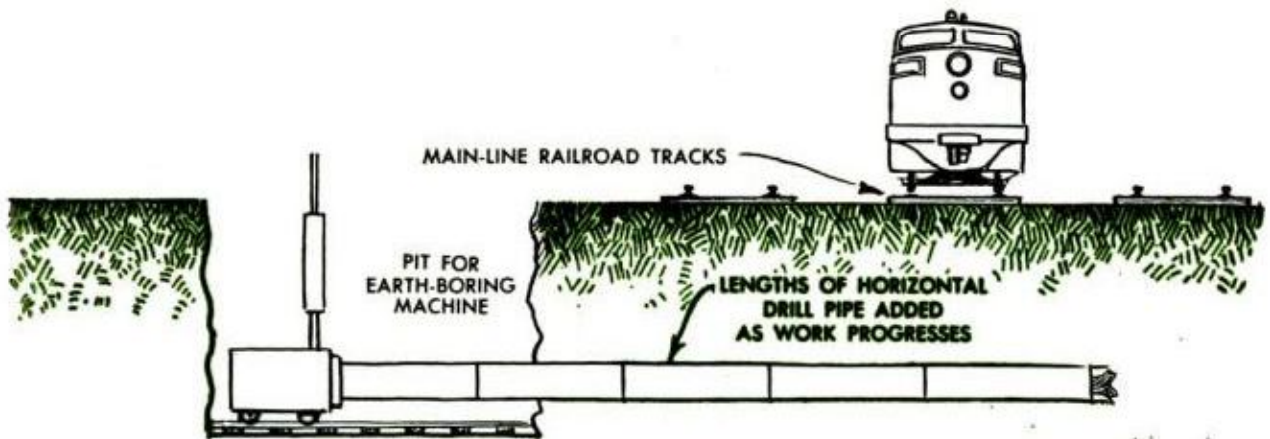
Little of Manhattan's original rock outcroppings can be seen today. Nor can be seen its original 47 ponds, rivers, swamps and natural springs mapped in Colonial times and since deliberately covered over to make room for the influx of people. Buried within this rocky island 13 miles long and 2 miles wide at its thickest point is a treasure trove of valuable precious and semiprecious stones—170 varieties such as garnets, amethysts, opals, beryls and tourmalines. The cost of mining them today is prohibitive.

But Nature's treasure has since been supplanted by man-made treasure. For the monetary wealth of Manhattan—as well as its vital organs and its very life—lies beneath the city. Away from daylight, deep within the bowels of Manhattan, are the bank vaults, containing an estimated \$5,000,000,000 in cash, gold, jewels and blue-chip securities along

[\(Text continued on page 264\)](#)

EARTH-BORING machine, designed and built by Consolidated Edison Co., drills 24-inch holes under such installations as railroad tracks, streets and parks without breaking the surface or disrupting service

DRILL PIPE lengths are added to the earth-borer as work progresses. Five conduit holes, each 110 feet long, were recently drilled under the main tracks of the New York Central Railroad without disrupting service





HELICOPTER PILOT Tim Clutterbuck fastens Timothy Dill-Russell securely into a regulation strait jacket first

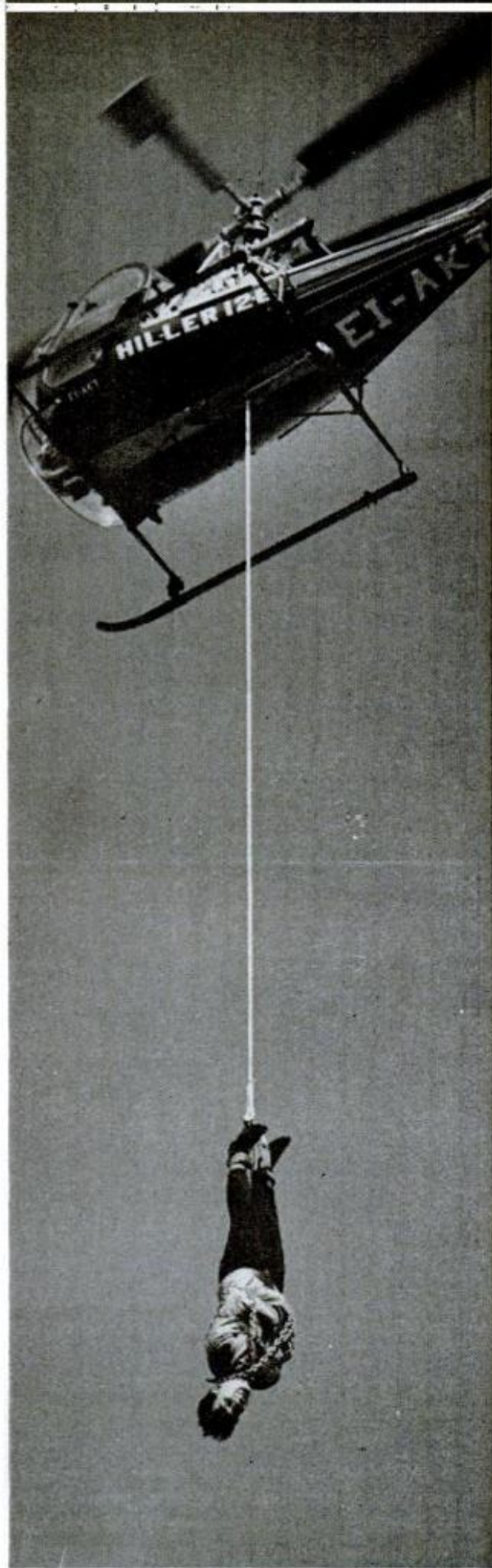
HELICOPTER HOUDINI

HARRY HOUDINI, greatest escape artist of all, didn't have helicopters for props in his spectacular stunts, but there's a young British "escapologist," Timothy Dill-Russell, whose ambition is to outdo the old master himself. He performs his latest feat hanging from a chopper at 100 feet.

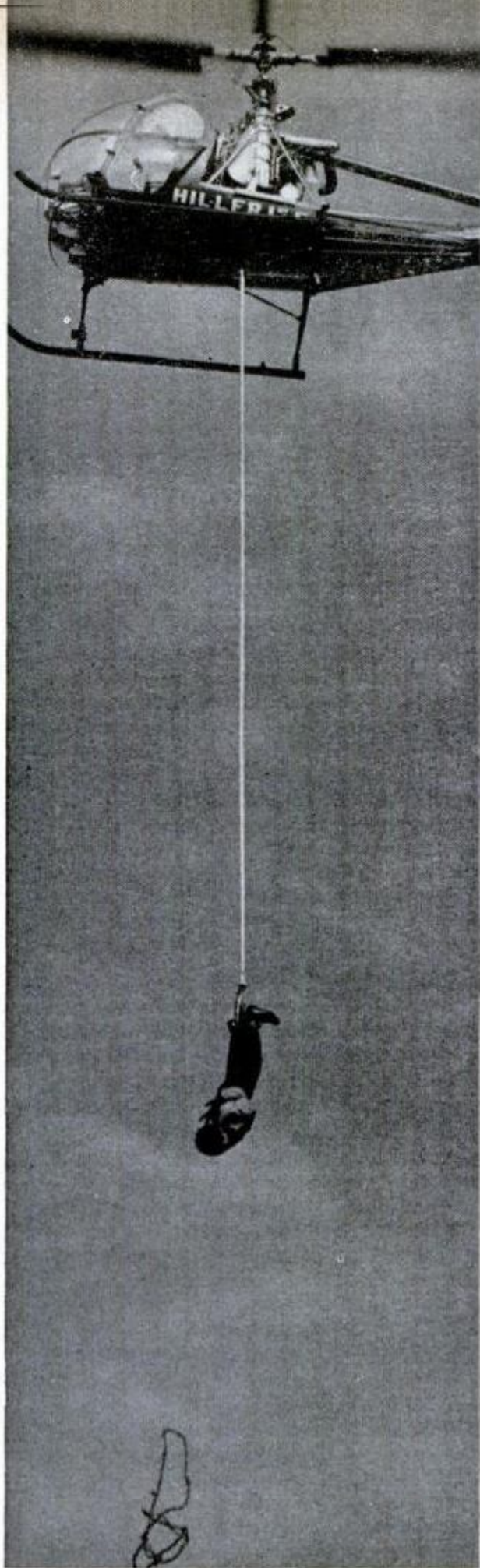
The spectacular act is all in a day's work for Dill-Russell, who has already escaped from the usual tanks of water, coffins of ice, and sealed barrels. His last big escape before this one was from the condemned cell of Newgate Prison, where he was chained to the wall in a strait jacket and locked in with three padlocks. After that, this aerial trick must have seemed easy.



SECOND STEP is addition of handcuffs and a heavy chain around his body, padlocked front and back. His ankles are tied with webbing; rope hooks to that

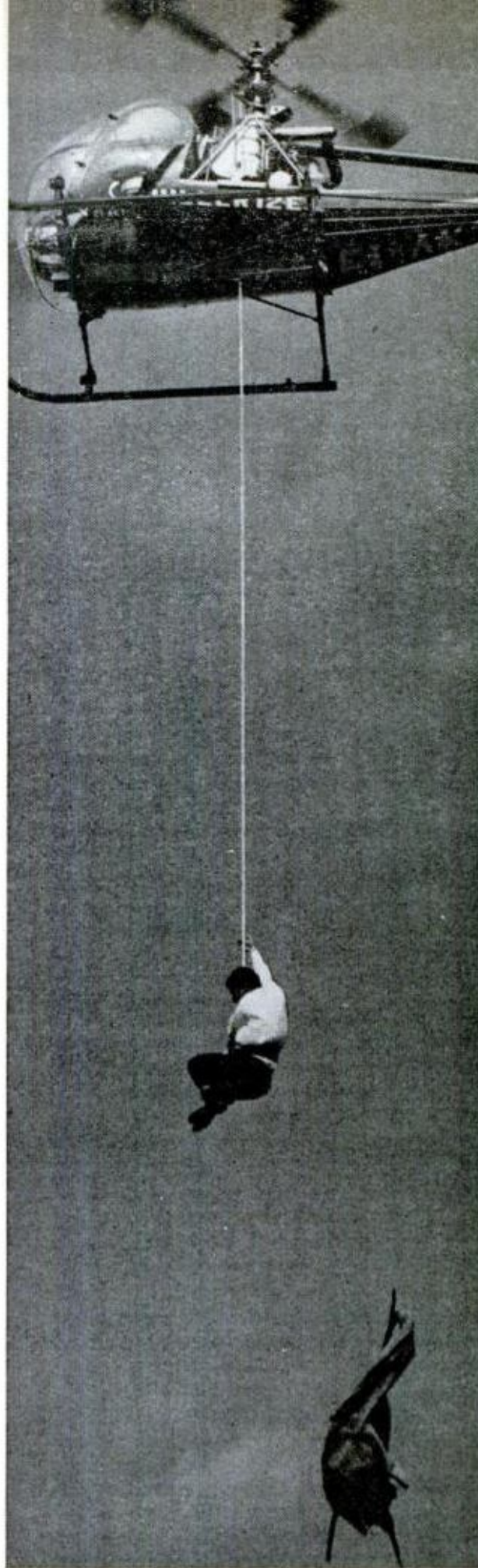


HANGING HEAD DOWN 100 feet in the air, the escapologist is still smiling as he prepares himself for the aerial escape effort, never before attempted



AFTER 30 SECONDS and a few fast twirls on the end of the rope, the double-padlocked chain comes free and drops to the ground. But that's the easy part

APRIL 1961



BILLOWING STRAIT JACKET and handcuffs fall to earth as Dill-Russell works on the ankle bindings. The entire escape took only one minute, 45 seconds

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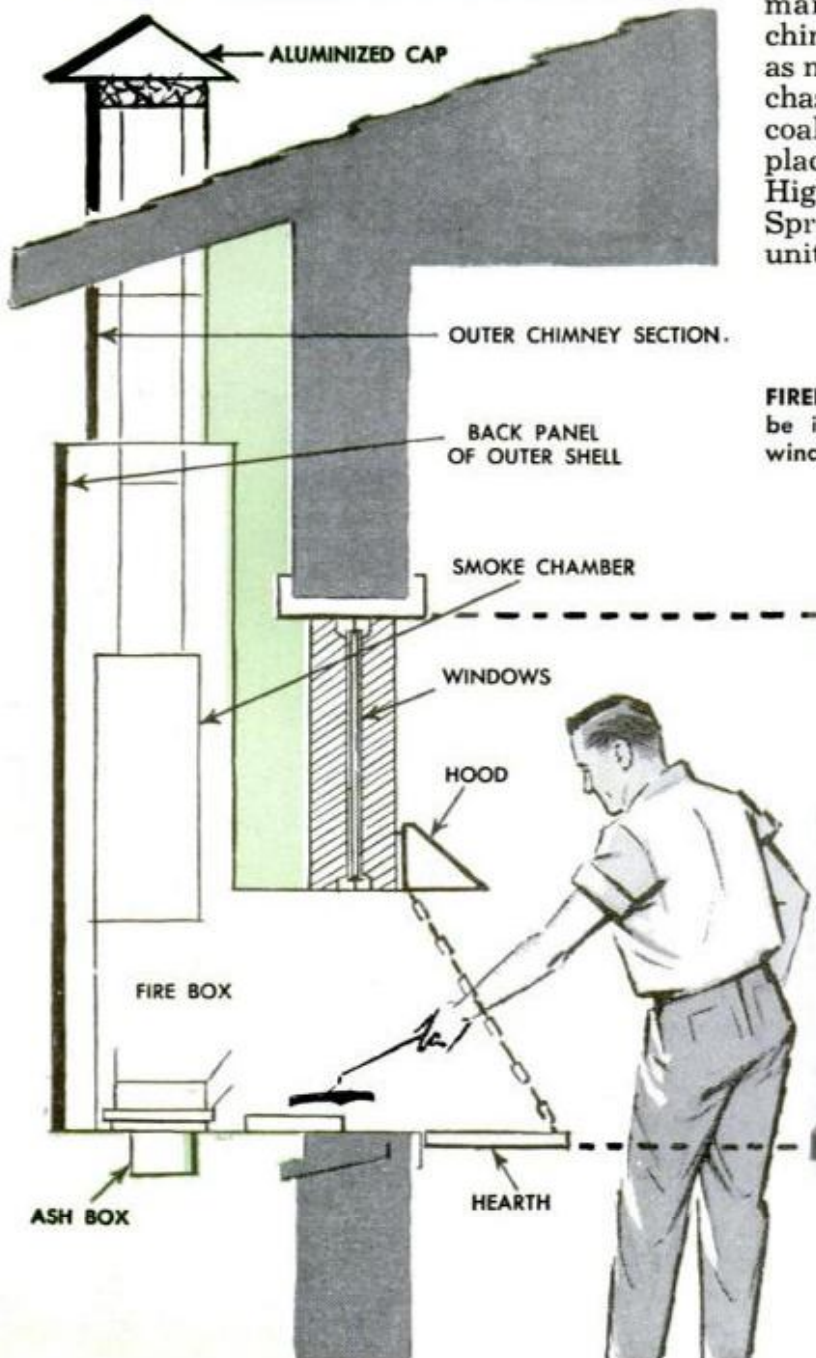


Fireplace-Barbecue Mounts in Window

CAPABLE OF being mounted in almost any double-hung window, a dual-purpose metal fireplace and barbecue combination can be installed by a homeowner.

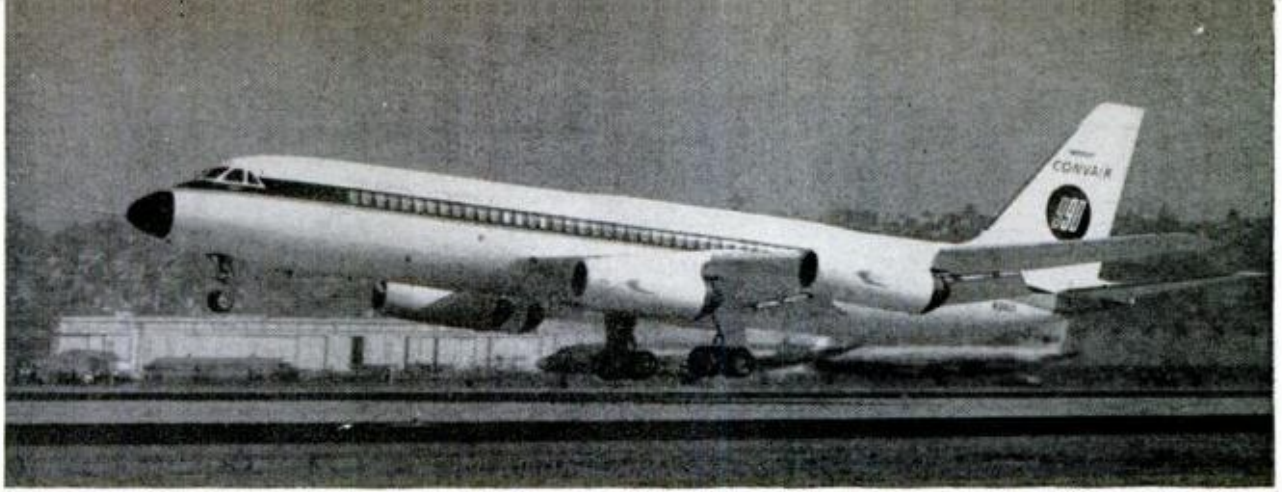
The chimney and a major portion of the fireplace are located outside the house, so holes need not be cut through the walls or roof. The unit, however, can be placed in a specially cut opening in an exterior wall if the owner desires. The ash box empties from outside the house.

The fireplace comes from the manufacturer assembled. The chimney is made in sections so that as many as are needed can be purchased. An electric spit for charcoal cooking is optional. The fireplace is manufactured by Waist High Fireplaces, Box 52, Blue Springs, Mo., and prices of the units start at \$395.



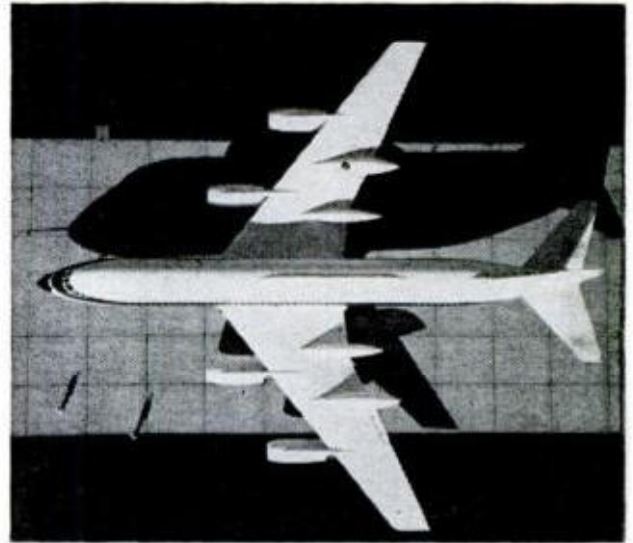
FIREPLACE and barbecue combination can be installed in almost any double-hung window opening without removing window





Second-Generation Jetliner Flies Close to Sound Barrier

Specially designed to fly close to the speed of sound, the Convair 990 is rated at 640 miles per hour in level flight and will be the world's fastest jetliner when it goes into commercial service later this year. It has been ordered by American Airlines, Swissair, Scandinavian Airlines System and Real Aerovias Brasilia. Its speed results from a specially designed thin wing that has a 39-degree sweep-back (more than any other transport plane) and from four jet engines which develop 16,100 pounds of thrust each. The wings feature four "speed capsules" on the trailing edges to minimize the sonic shock wave and its resultant drag. The 990's sister-ship, the Convair 880, which it closely resembles, is now the fastest airliner at 615 m.p.h.

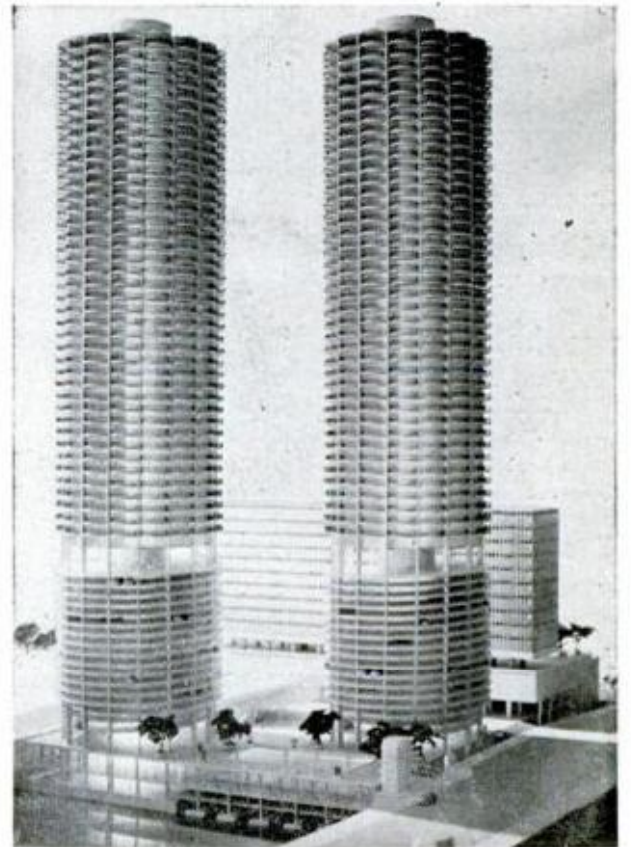


World's Tallest Apartments

Twin towers of the world's tallest apartment building will soon be rising 555 feet above the Chicago River as construction proceeds on Marina City, a 2500-person community-within-a-city on the northern border of the Chicago Loop.

Part of a sweeping plan to return vital population to the urban areas, Marina City (scale model at right) will include five buildings in all. The two huge tower buildings will have 20 levels of spiral parking ramps topped by 40 floors of apartments—900 living units in all. Also on the lower levels and in the other three buildings will be a theater, an office building, a 700-boat marina, a yacht club, bowling alleys, swimming pool, restaurants, exhibit spaces and other living conveniences.

Designed by architect Bertrand Goldberg, the development is being built by the Building Service Employees International Union at a cost of about \$36,000,000. The FHA commitment for the project was the largest in that agency's history at \$17,800,000. The apartments will radiate outward like the petals of a flower from a utility core in the center.



The Great Debate About Your Outboard Motor

Agreement—and disagreement—among outboard engineers will change your ideas about outboard fuels and ignition systems, and may even help you get more work from your lawnmower. . . .

By Dick Kirkpatrick

IT'S HARD to argue against the effectiveness of two-stroke-cycle outboard power for small boats. Certainly until you have a boat that needs more than 75 or 80 horses, it's no argument at all, for the American outboard motor, whatever the manufacturer's name, probably does the world's best job of pushing the average boat.

But there *are* drawbacks to two-cycle power. One of the worst is the loss of efficiency from the collection of combustion products on the hot surfaces of spark plugs, piston crowns and combustion chamber walls. Plugs can foul within 20 hours of operation; glowing deposits can cause pre-ignition or can even build up heavily enough to block the exhaust ports. The results range from annoying plug failure to real damage from pre-ignition.

A lot of good engineers have been working on solutions to that problem, and during recent months they've suggested a lot of solutions. But they don't necessarily agree about what's best for their product—or the other guy's, either. The resultant "debate" about two-cycle fuels and ignition systems will almost surely affect *your* motor, and should help you get more out of it—and from your lawnmower or racing cart, too.

PM interviewed the engineers of the major outboard manufacturers and collected their opinions. Here they are, edited from their official statements:

Kiekhaefer Corporation (Mercury Outboards): The two-cycle outboard engine and automobile fuels and oils become less compatible every year. The outboard does not need high-octane fuels or special additives, and those additives are causing most of the trouble in outboard ignitions. Outboards run best and cleanest on unleaded "white" gasoline and specified outboard oils. While marine white gas is not always available, the boater can trade a little time and trouble in getting his fuel for a lot better engine performance. (This does not mean that Mercs won't still run well on auto fuels, but that any motor will run better on more suitable mixtures.) Boaters can improve the white-gas supply situation by demanding that their suppliers keep it in stock; the oil companies will respond if the demand becomes big enough.

Outboard Marine Corporation (Evinrude, Gale and Johnson Motors): We have developed an engine which we believe to be tolerant of a wide variety of fuels and lubricants, since white gas is not readily available, and the suppliers claim the market is too small to justify better distribution. But as a general rule with OMC powerheads, the worst that can happen from using auto fuel and oil is plug fouling and some pre-ignition, and when the plug is replaced, the engine can operate normally again. There is no doubt that the use of white gas will produce a cleaner-running engine, but since it is not universally available, we recommend a good regular gasoline with an outboard-type oil.

West Bend Aluminum Company (West Bend Motors): Our motors are warranted for a full year with no restrictions on fuels, since the motors are sold in many areas where there is no choice of gasolines. Since marine white gas keeps the engine cleaner than leaded fuels, we recommend its use for the best care of the motor. "Cold" spark plugs have been specified on some motors, and for 1961 there is a trend to "colder" plugs which will improve the situation."

Marine Products Division, McCulloch Corporation (Scott Motors): A revolutionary new ignition system, which virtually eliminates pre-ignition and power drop-offs, is a feature of the 1961 Flying Scott Custom motor. The system, incorporating a special surface-gap spark plug, the Champion UJ-17-Y, has been developed after four years of research, but requires three major changes in the motor:

1. Operation with a 40-to-1 mixture of regular gasoline and a special Scott outboard motor oil or an approved substitute;
2. A 30-kilovolt electrical system with suitable insulation; and
3. A uniform water-jacket temperature, made possible by a thermostatically controlled cooling system in the Flying Scott.

Those four brief statements do little to show the great amount of engineering research that is going into the problem, but they'll give you an idea of what's being done—and what you can do—to improve the performance of your outboard motor. What *you* do about *your* motor is up to you.

Wildest Ride on the River



Downstream paddleboat racing offers thrills—and chills—that make it a combination of fast boating, downhill skiing, and going over Niagara Falls in an up-ended umbrella. . . .

By Peter D. Whitney

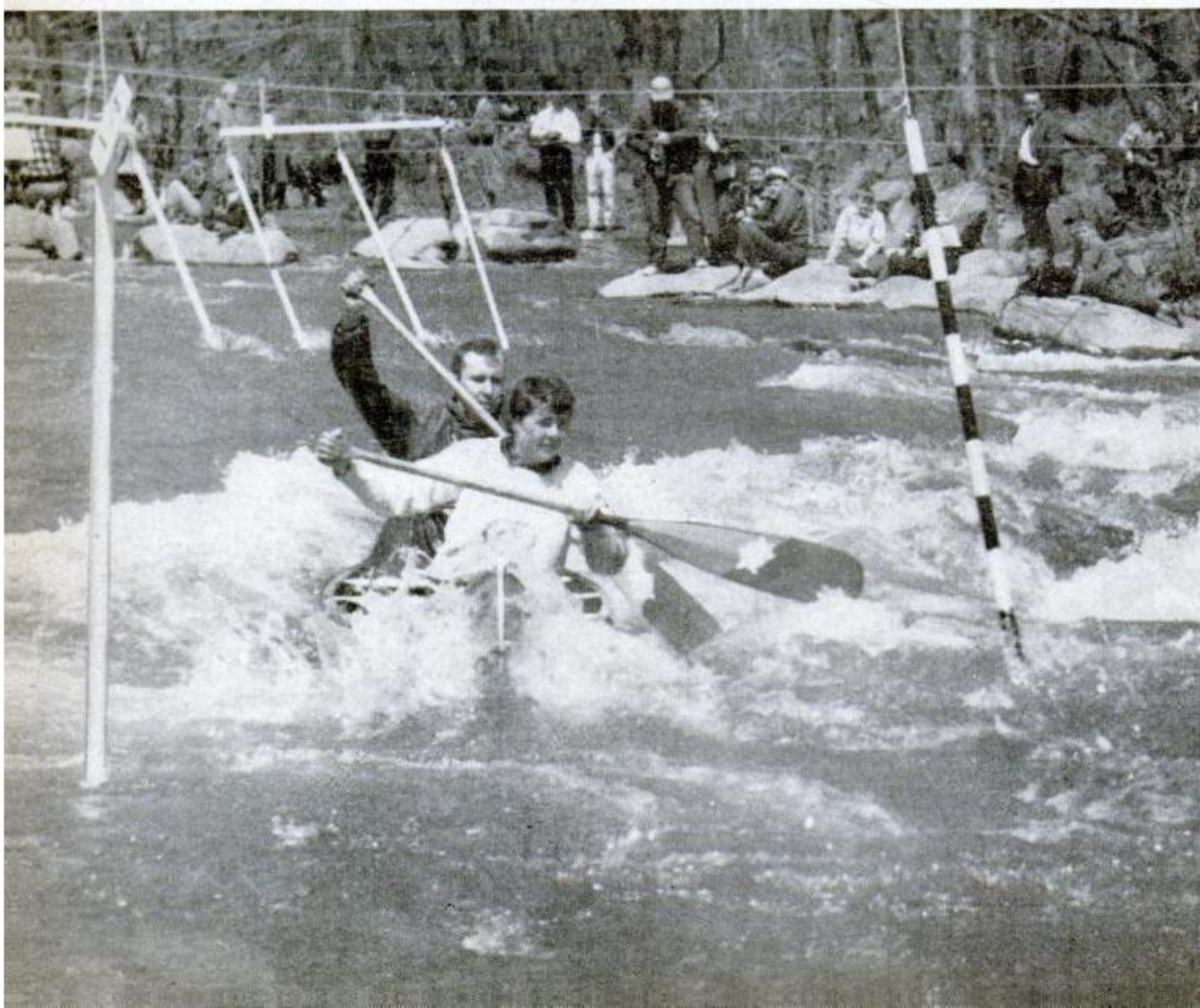
From the author's new book, *White-Water Sport*, published by The Ronald Press Co., New York City

RUNNING WHITE WATER in paddleboats began as an achievement sport, like mountaineering, in which the competition was purely between man and nature. The kayaker or canoeist measured himself against the hardest rapids just as the climber pitted his skill and endurance against the terrifying overhangs of the Alps and the Himalayas. The emphasis was on teamwork as the expert paddlers of the world vanquished first one, then another, of the torrents of Europe. They exchanged information on how it was done.

Direct competition, in the form of slalom and downriver races, is a relatively late innovation. Many sportsmen dislike it, be-

lieving that it introduces a frenzied and egotistical note into what should be an essentially contemplative and self-forgetful pursuit. "We took up canoeing to get away from the competition of everyday life," they cry. "Why should it follow us onto the river?"

This is an entirely valid fear as to what *may* happen as the sport becomes more popular. In Europe, where white-water canoeing has been caught up in the keen rivalry of the Communist and non-Communist worlds, this has already begun to happen. One kayak star who defected from a Communist country was in serious danger of being kidnaped back by secret police





ABOVE, TRICKY MANEUVER through triple gate with two reverses—he's in trouble

LEFT, THE HARD WAY—no boat. Contestant on pontoons in 1960 Brandywine Slalom

plug-uglies and had to be spirited away from a meet in Austria by friends from the non-Communist world.

So far, however, the American white-water competitions have been characterized by a friendly and intimate atmosphere with a minimum of heartburning; the experts have come to display their talents, the novices to learn. The hectic and semiprofessional attitude of the "amateur" tennis tournament has so far failed to appear.

Doubters who have entered these competitions have usually come away praising the opportunity it gave them to measure their technical faults and virtues and to set new standards for themselves. The lessons, most of them felt, were of great advantage when they returned to river cruising. Slalom poses problems of boat-handling that may not be met once in years of ordinary cruising but that—once mastered—may save a life or a boat when an emergency arises on the river. Downriver racing draws the paddler to the utmost extreme of his endurance, teaching him what he may expect from his body by way of fortitude and exertion.

Thus competition has proved itself as a forcing ground for white-water paddlers. It is certain that the process will continue and that those who shun competitions will find themselves outdistanced even in the province of cruising which they reserve for themselves.

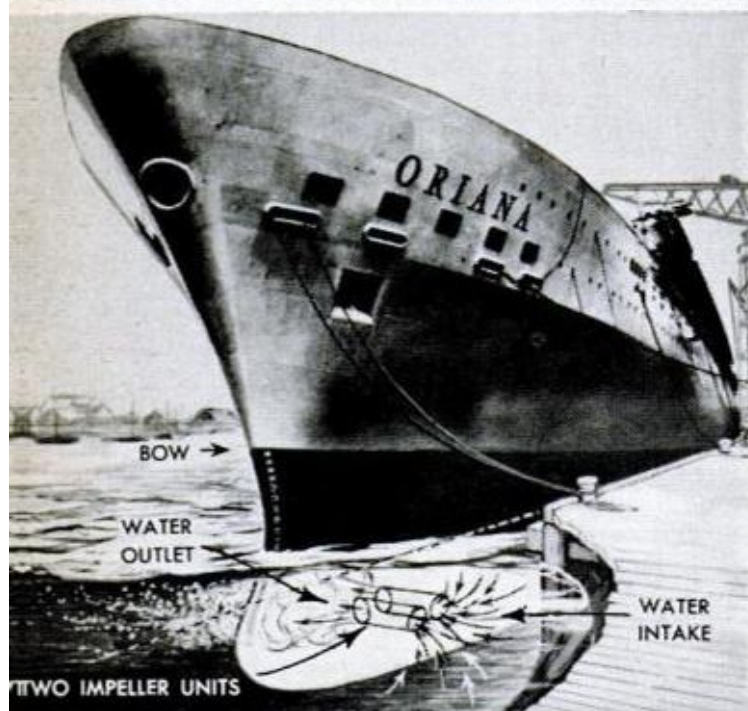
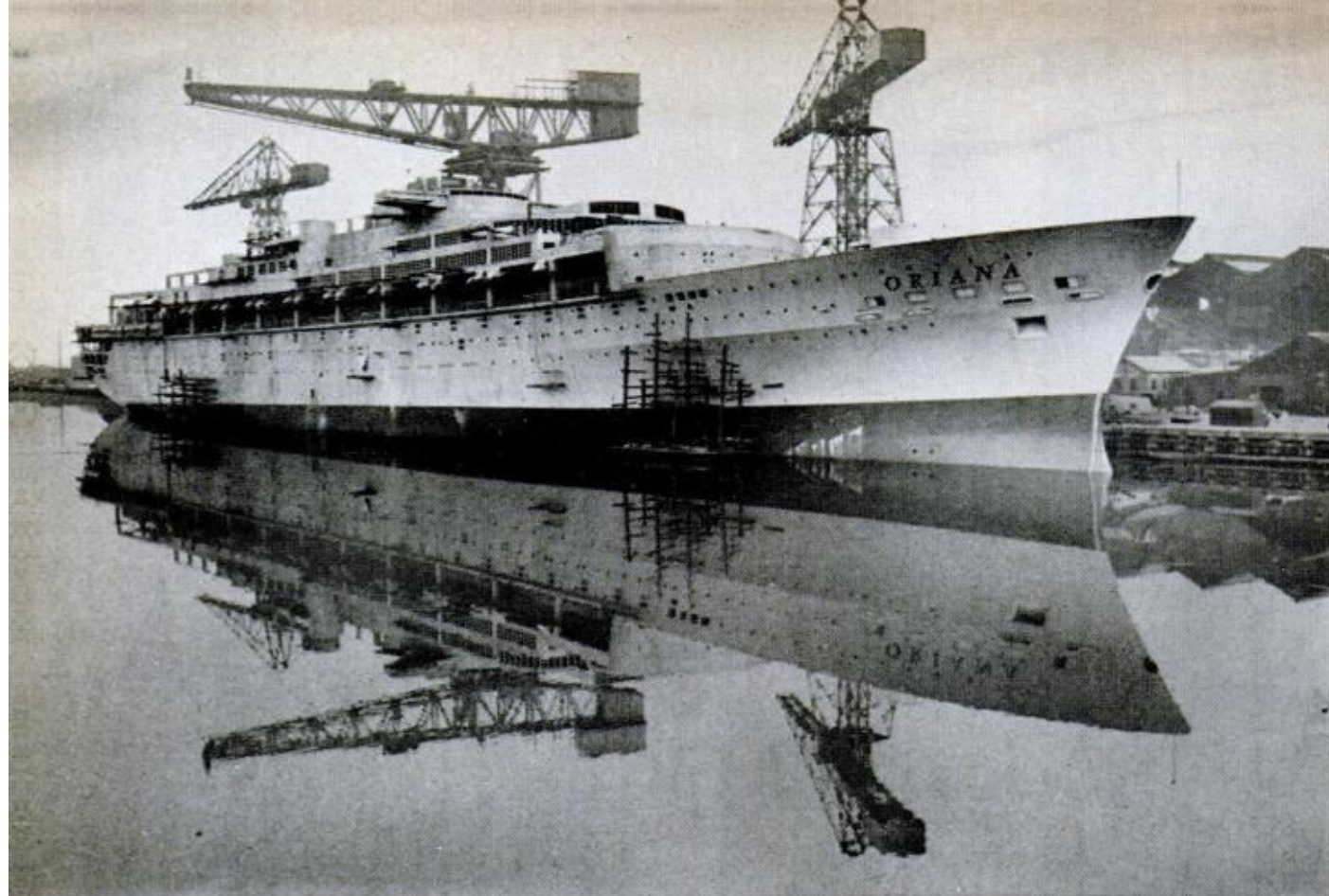
At the moment of writing, there is an official national slalom championship recognized by all the major canoeing bodies, above all by the American Canoe Association which—though not a white-water group—is in charge of the records and rules. The meeting

(Continued to page 232)

LEFT, CANOE FOR TWO looks like it's being swamped, but it's only in a trough

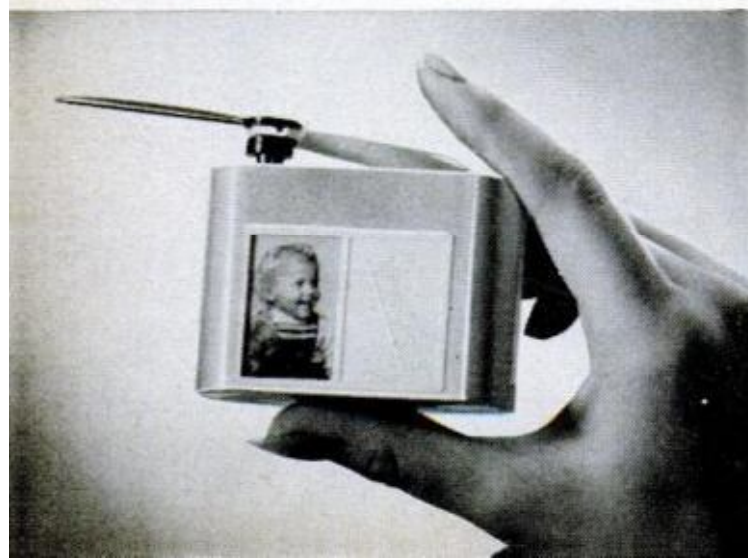
BELOW, CHAMPIONSHIP form pays off as Paul Bruhn shoots a tricky reverse gate





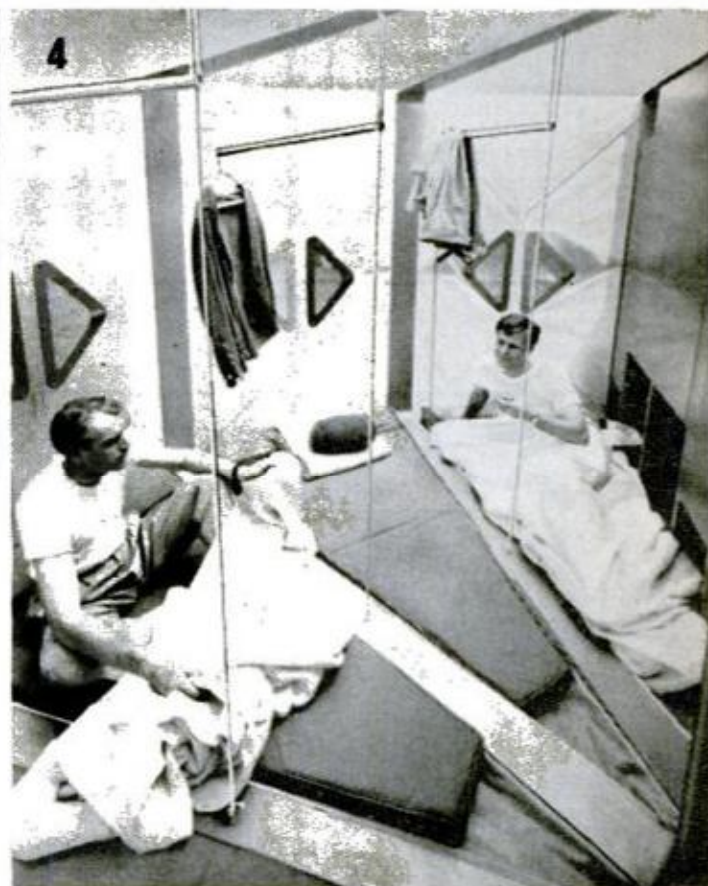
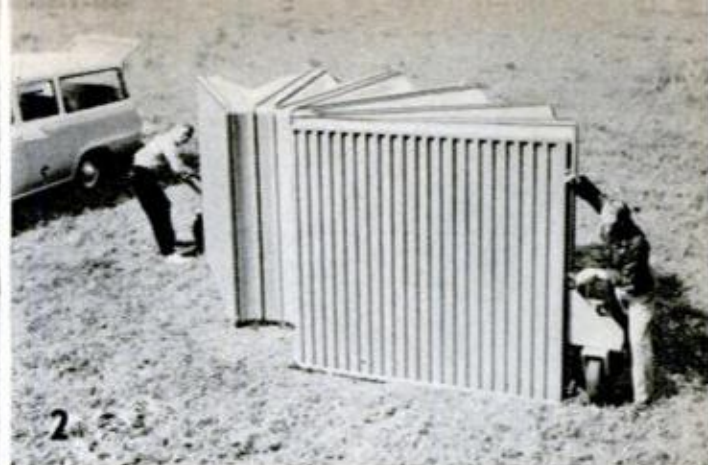
Big Ship Docks Without Tugs

Solving one of the mariner's oldest problems—that of warping a large ship alongside a dock in the limited maneuvering space of a busy harbor, the 40,000-ton British ship *Oriana* boasts transverse propellers which will move her sideways or even in tight circles. Mounted inside four six-foot tubes, two fore and two aft, big electrically powered impellers work like axial-flow pumps, and their discharge drives the ship accurately in any direction. She can enter a busy harbor and berth herself without the aid of tugboats. At sea, steel doors seal the tube openings to eliminate turbulence and drag, so there is no effect on her hull performance. The units are remotely controlled from the bridge. *Oriana* was built in England by Vickers-Armstrongs, and goes into service this year.



Small Package of Good Things

You can keep cool, perfumed, equipped with a flashlight and have your color-slide viewer right at hand by carrying a four-in-one pocket accessory called the Mini-air II, which is manufactured in West Germany. A minor mechanical triumph in the storing of many things in a small package, the apparatus is powered by two 1.5-volt batteries. The perfume atomizer is built into the fan blades. The flashlight lens has a holder for frameless color slides.



Test Accordion Camp Trailer

Opening like a fan or an accordion out of a small square trailer, an experimental plastic and aluminum shelter may be the camping trailer of tomorrow. Designed by Henry Glass for Alcoa, the trailer is made of two shallow-box end sections supporting an aluminum framework under a laminated nylon and vinyl skin. Once opened, the outer walls lift to make a sunshade at the front. Open, the shelter encloses 700 cubic feet of space with sleeping "rooms" for six.

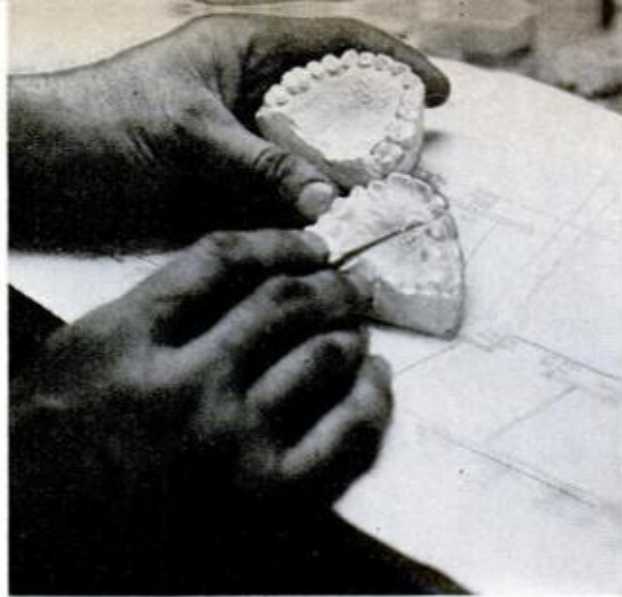
Accidents Roll Off This Bumper

French engineer Jacques Gerin has mounted the spare wheel on the front of his car in such a way that the rubber tire not only absorbs shock of collision, the wheel turns to the right or left so that a colliding car or oncoming obstacle is deflected. So mounted, his free-wheeling fifth wheel has allowed him to run into other cars (in demonstrations) at 30 miles an hour and to hit a concrete pole at 35 with no damage to his car. Gerin points out that his turning bumper is no answer for collisions at high speeds, but that it does provide protection at lower speeds. He estimates it would cost no more than \$80 to equip a car. The spare wheel is solidly attached to a vertical steel bar which, along with two rubber-covered bars, must be placed under the auto's hood. The bumper extends four inches in front of the car.





Dr. Dahlberg (left) has collected 30,000 teeth casts, from which he has isolated 7 basic characteristics



Many teeth characteristics are inherited. Casts of two Southwest Indian cousins are almost identical

Tooth Sleuth



THE WHITE chunks of plaster shown at the left helped catch an Omaha burglar.

The hands holding them are those of a unique Chicago dentist, Dr. Albert A. Dahlberg, who spends his spare time in a dusty anthropology laboratory. There he studies the teeth of men and animals from all over the world, from prehistoric times to today.

Dr. Dahlberg's dental delvings established a system of teeth classification by which detectives can positively identify suspects.

This system rests on the statistic that the chances are one in a billion that any two people have identical sets of teeth.

Take the Omaha burglar. During his night-time pilfering of a grocery store, he stopped to take three bites from a hunk of cheese. Then he fled. Omaha police, who had heard of Dr. Dahlberg's work, contacted him and asked for his help.

The Chicago dentist carefully made plaster casts of the teeth bites in the cheese, then told the police what kind of choppers to look for. When a likely suspect was confronted with the cast, he confessed.

Here are other examples where such tooth sleuthing has paid off:

- the bodies of three children, burned beyond recognition in Chicago's Lady of the Angels School fire, were identified by matching their teeth against dental records;

- in New York City, bodies washed to the Hudson River were identified through their teeth as having been victims of a months-old airliner crash;

- a skull with what looked like a bullet hole was found by skin divers off Chicago's downtown lake shoreline. Scrutiny of the shape of and stains on the teeth revealed



Evolution of teeth structure is studied by comparing them with teeth of apes, which are quite similar



Dr. Dahlberg (rear) is perhaps the only practicing dentist to hold faculty appointment in anthropology

A Chicago dentist tracks down criminals, traces ancestry, studies anthropology and identifies crash victims — all by looking at teeth

the head had belonged not to a recently murdered Chicagoan but to a prehistoric Indian squaw from Michigan's upper peninsula. And the hole had been caused not by a bullet but by the skull's bouncing on a rock.

As director of the University of Chicago's Zoller Memorial Dental Anthropology Laboratory, Dr. Dahlberg leads a handful of young scientists who have analyzed over 30,000 plaster casts of teeth, from gibbons, to the earliest humans, to modern man.

From his studies, Dr. Dahlberg has evolved a seven-point system for analyzing teeth characteristics. These points include: (1) heredity and inherited characteristics; (2) the timing and order in which the teeth erupted, matured and were lost; (3) evidence of malnutrition and serious illness; (4) general sizes and coloring of roots, cusps, crowns; (5) manmade filings and fillings; (6) signs of aging and wear; and (7) the effects of his society.

The bite of primitive peoples who used mutton bones as pacifiers is quite different from the bite of today's children.

Because of the tough meat and bones on which they chewed, the teeth of early man, says Dr. Dahlberg, seldom lasted beyond 40 years. But then, not many prehistoric men outlasted their own teeth.

With our soft, refined foods, and longer life spans, dentists have been really challenged to keep what teeth we have sound. From a detective's or coroner's point of view, this has merits. Each filling, each bridge, each correction is another mark on the chart and another step toward being able to name with precision the man to whom a set of teeth belongs. ★ ★ ★

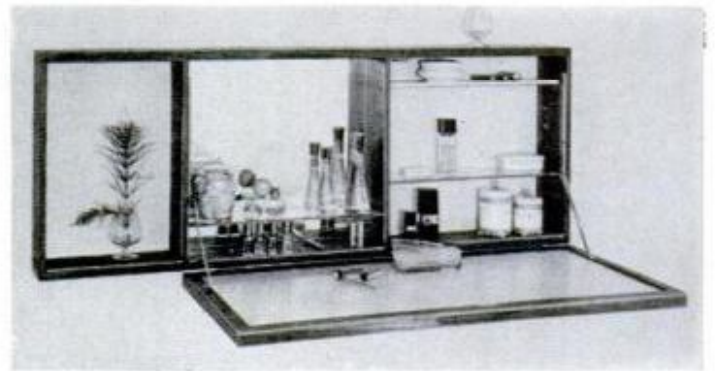




WHAT'S NEW FOR Your Home

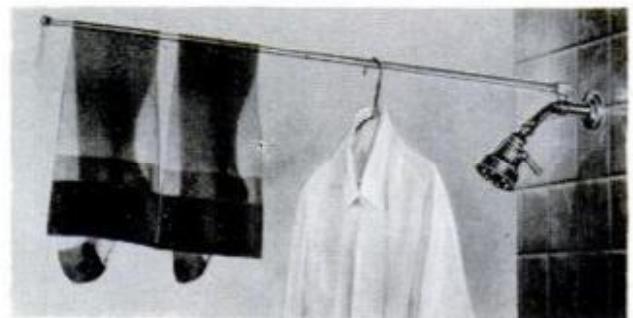
RUBBER-TIRED, steel-framed carrier for moving garbage cans with ease converts to snow scoop with addition of metal wings (inset). Price: \$14.98; Consolidated Metal Products, 1028 Depot St., Cincinnati, Ohio

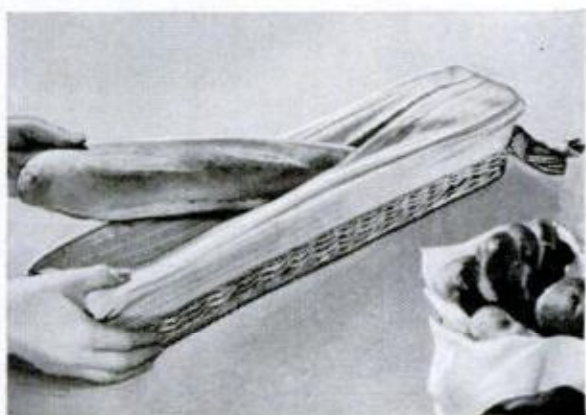
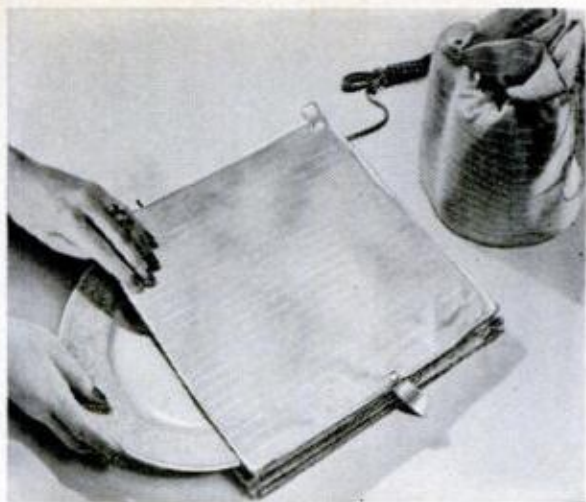
WALNUT CABINET, called an organizer, hangs on wall and serves as desk, bar, vanity or breakfast table. It measures 17½ by 44 by 5 inches. Designer-manufacturer is Hugh Acton, 588 Brookside, Birmingham, Mich.



SHAMPOO BRUSH made of polyethylene plastic holds a supply of liquid shampoo in a handle shaped to fit the hand. Liquid flows out when pressure is applied. Pearce Plastic Co., 911 Air Way, Glendale 1, Calif.

DRIP-DRIER, installed to a shower head without tools, folds out of the way when not used. It telescopes to 34 inches in length. Price: \$1.98. Goode Products Co., 7542 Maie Ave., Los Angeles 1, Calif.





ELECTRIC WARMERS for plates, buns, French bread heat up in 15 minutes and, having a thermostat control, hold the desired temperature. Container covers are washable. Kaz, Inc., 614 W. 49th St., New York 19, N.Y.



SUN LAMP, which the manufacturer says can't burn, works this trick by employing a filter that prevents the shorter ultra violet rays from reaching the skin. The lamp adjusts from 11 to 61 inches in height, weighs 15 pounds, retails for \$39.95. The Safe-T-Sun Lamp Corp., Williamsburg, Va.

MOVABLE CABINET for charcoal grills may be built in with other kitchen units, under a vent hood. In warm weather, the cabinet rolls on rubber-tired wheels to the patio. Made by the Majestic Co., Huntington, Ind.



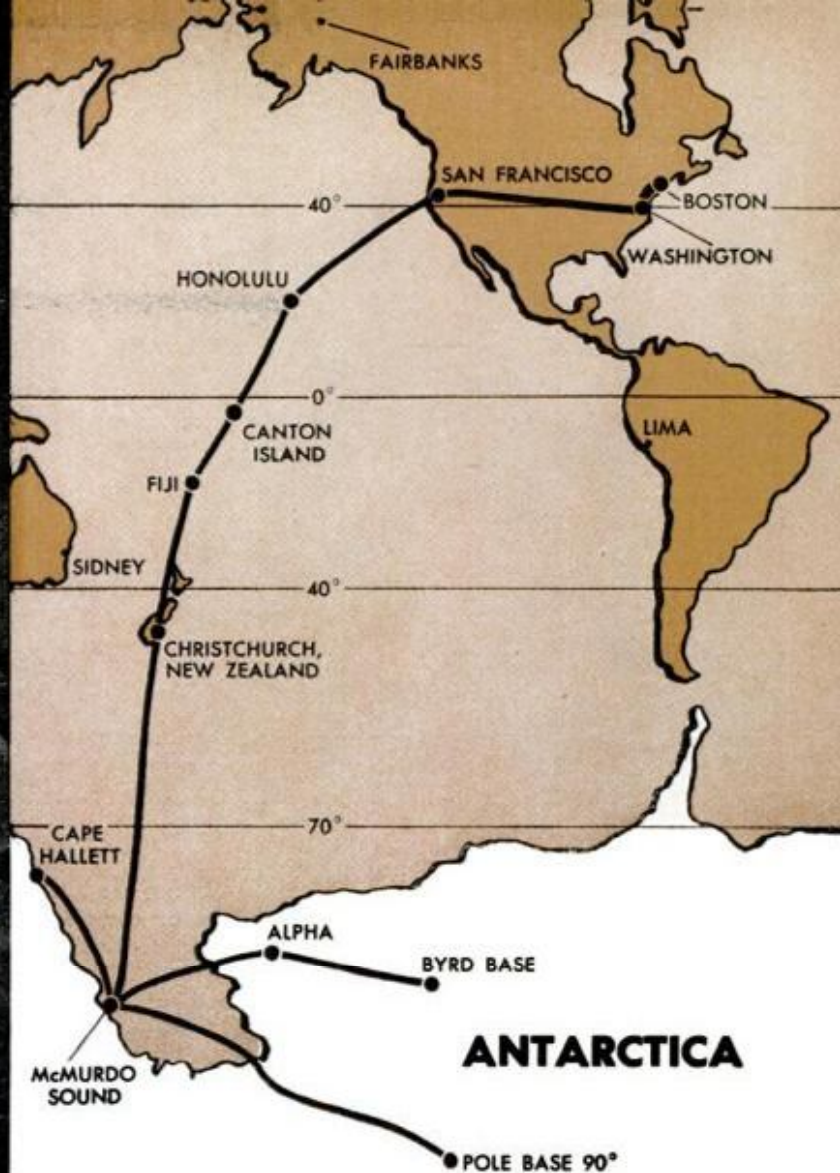


FROZEN PEAKS are welcome sight in essentially flat area where pilots sometimes can't tell snow from clouds

I RODE THE AIRLIFT TO THE SOUTH POLE

BLASTING OFF, a P2V photo plane gets a JATO kick from icy runway. Ski-wheel gear works on ice or snow





By
Richard F. Dempewolff

It's a long, dangerous trip from Rhode Island to the South Pole—the route spans two hemispheres—but the daring and resourceful men who deliver the goods to bases in Antarctica are turning it into a milk run

AUTHOR: 35,000 miles, four unshaven weeks



APRIL 1961

WE WERE about to take off. Over the intercom, Comdr. E. B. Binkley ran down a check-list with his navigator, the flight engineer and copilot. Each of the four turbojets on the huge Hercules C-130 wound up to a high whine. Outside, the midnight sun glared coldly against the icy slopes of Mt. Erebus, the smoking volcano in Antarctica that rises 13,400 feet on the eastern rim of McMurdo Sound. A 20-knot wind lifted the hissing snow and deposited it along the sea ice in patterned drifts called *sastrugi*.

Along with a handful of other passengers, I was going to make the last of a series of giant leaps to the bottom of the world—but no credit was due my stamina.



HELICOPTER CREW sets up an automatic weather station to lessen the hazards of flying over Antarctica's featureless ice. The station, at position Alpha-1 on route to Byrd Base, gives homing signals. During the polar night, below, the crews check the snow-drifted condition of lashed-down planes in -70 degrees F. weather



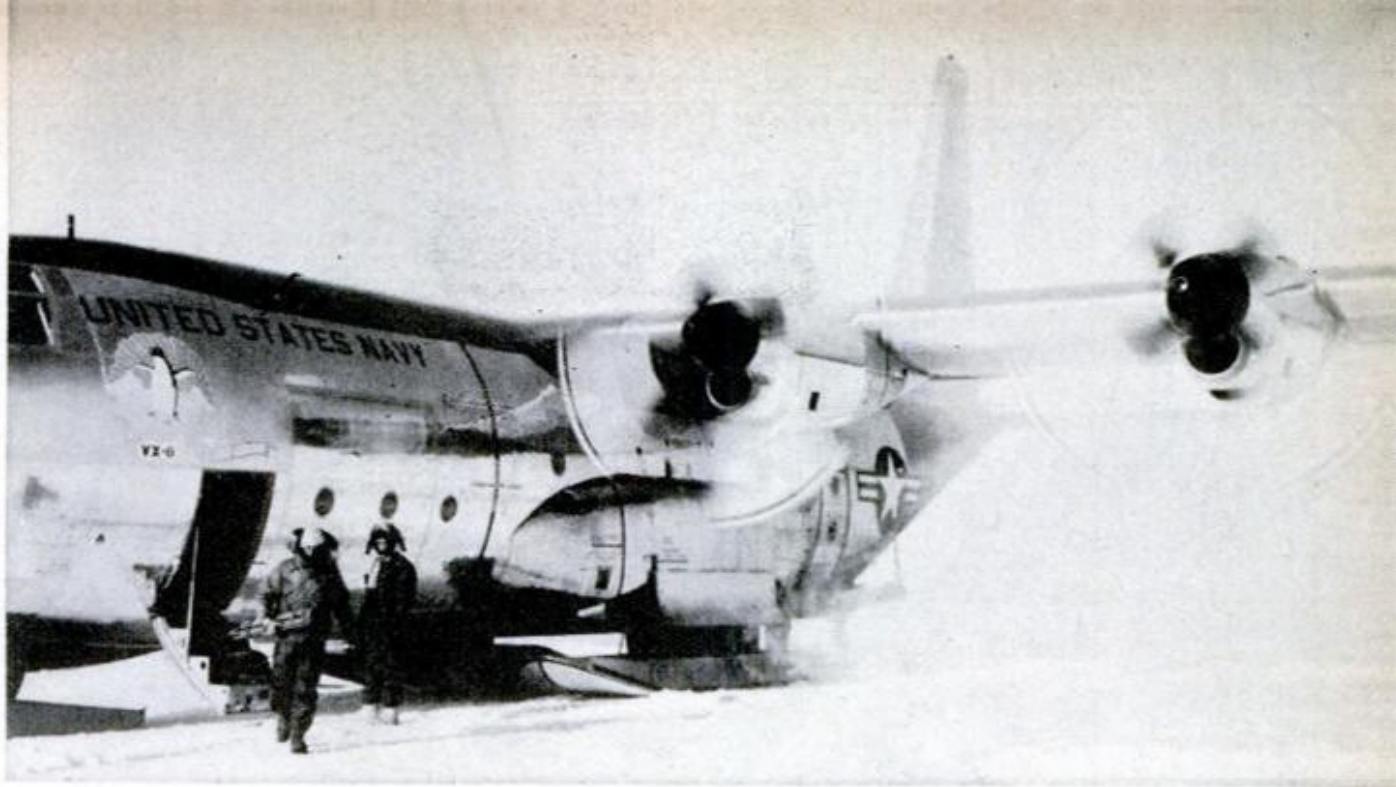
Our vehicle was a far cry from the dog sleds used by early explorers who crept painfully across the high ice. This big cargo plane, squatting belly-down on its ski-wheel landing gear, is one of our four new freight haulers operated by the Navy's Antarctic Squadron—VX-6. Its 3750-horsepower jets would lift us 25,000 feet and in less than three hours deposit us some 750 miles out on the continental ice, at the Pole. In contrast, Britain's Capt. Robert Scott and his party of four plodded approximately the same route on foot in 1912. They spent three frost-bitten, scurvy-ridden months only to die in a six-day blizzard 11 miles from a food and fuel depot.

With a powerful surge, our Hercules roared down McMurdo's ice runway. Twenty minutes later and four miles below our

port wingtip, the five-mile-wide Beardmore Glacier stretched away for 125 miles. It rose like a tumbling white river to the 10,000-foot polar plateau. Once on top of the two-mile-thick icecap that blankets virtually all of Antarctica's 5,500,000 square miles, the scenery flattened to a snow desert.

The navigator announced the outside temperature was 77 degrees below zero. In the pressurized aircraft, we were toasting at 70 above. Most of the 15 crew members peeled down to waffle-weave undershirts for comfort.

Back in the boxcar-sized cargo compartment (it's 41 feet long, 10 feet wide and 9 feet high), loadmaster F. W. Whitney and his crew checked the chain tie-downs on our 22,000-pound pay load of fuel in 55-gallon drums.



HERCULES C-130 propjet cargo planes whine through icy Antarctic summer, delivering oil and other supplies to inland bases. The boxcar-sized planes can land on skis. Engines must be kept turning in the thin air. The condensation cloud at -55 degrees F. spews for miles. Below Air Force Globemaster drops oil drums





PORTABLE TOWER, radar and crew quarters, top left, are on sleds and are hauled away when ice goes out at McMurdo. Runway cracks, right, are repaired with fast freezing water. Despite precautions, climate takes its toll. As author watched, the Constellation, above, landed 1000 feet short of runway in "whiteout"



"We gross out at 135,000 pounds," he told me. "We can't land up there with anything over 125,000. But don't worry. By the time we reach the Pole, half our own 37,000 pounds of fuel will be used up. It takes a gallon and a half of gas to deliver one gallon of diesel to these inland bases. It's worth about \$10 a gallon, delivered. This plane, in just 10 flying days, has already delivered 190,294 pounds of cargo to Byrd and Pole bases."

It was still early morning when the skis of the big plane touched down on the snow runway of South Pole Base, shooting clouds of drift past the windows. The temperature was 55 degrees below zero. Smoke from the stacks of the camp (which is buried under snow) billowed into clouds of vapor as it hit the cold air. Condensation from our roaring jet exhausts built into a massive ground fog covering miles of icecap.

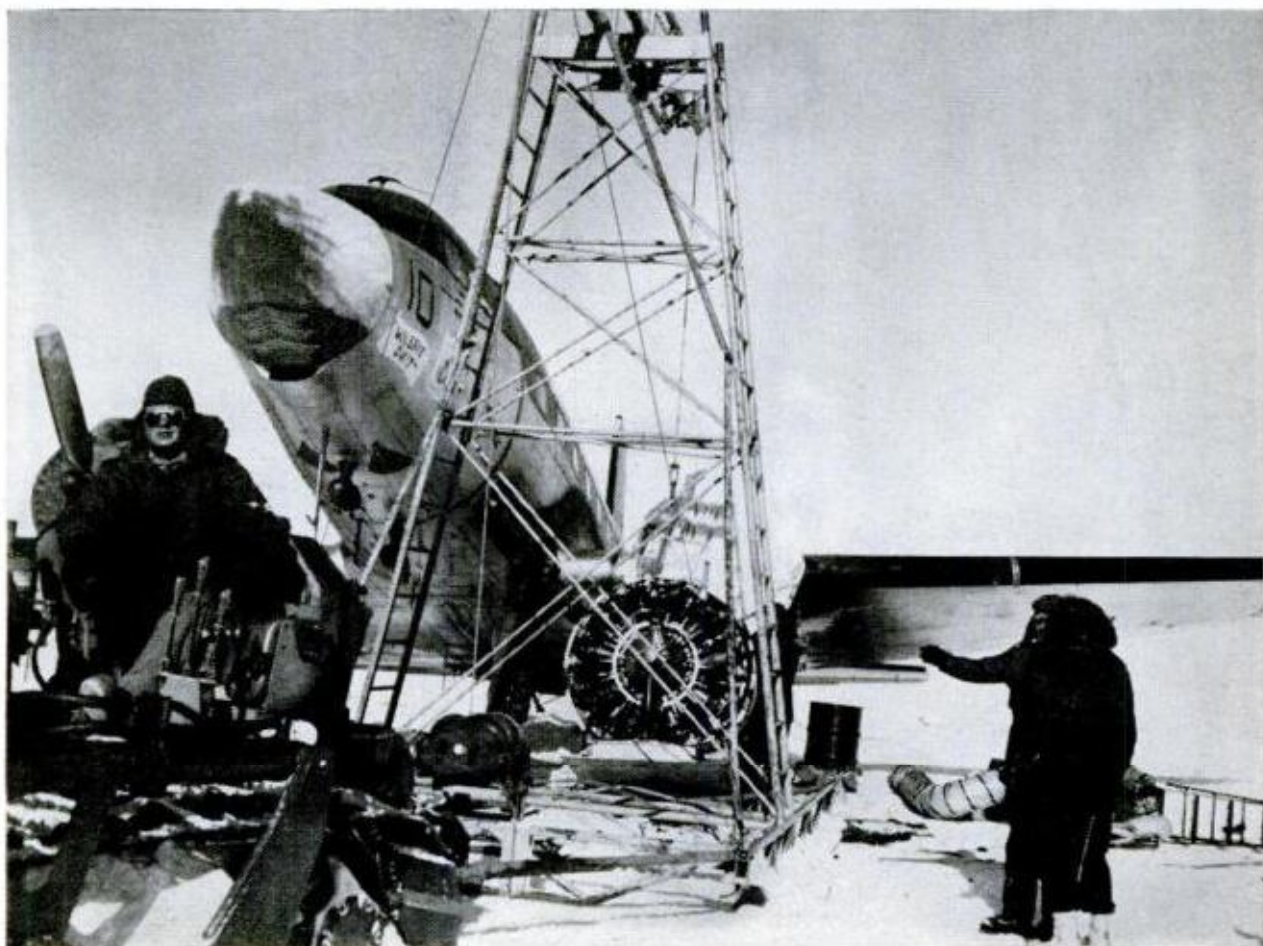
"We have to keep the jets going," Binkley explained, "because the starter compressors won't work in this cold high altitude. If the engines stop, we're dead."

Within 35 minutes, all cargo was off-
(Text continued to page 242)

NOSE-ON, one of the four busy Hercules looks like winged submarine. The big planes are workhorses



MAINTAINING PLANES in deep subzero cold takes a rugged constitution and ingenuity. A blast of air, above, is played over mechanic and wingtip during reactivation of R4D in polar dawn. Navy mechanics, below, perform an engine change on an R4D, the "Wilshie Duit," that came down 1500 miles out on polar plateau



A Fresh Approach for **PM** Parents—

THE THOUSAND WONDERS OF A CHILD

By Robert R. Bowers

This isn't the type of article you generally expect to see on these pages. However, we concluded long ago that the readers of *Popular Mechanics* are inherently curious; they want to know the how and the why. So we think there will be a receptive audience for a story of how one father fostered this trait in his son



FOUR YEARS AGO, my three-year-old son, Mike, would walk up to my white pine seedlings, caress the new growth with tender affection, then suddenly break the shoots off the tree. Weary of scolding him, I decided to try another approach. Obviously, the youngster was fascinated by the light-green needles. Yet, just as had often happened with the puppies next door, he would fondle them and then for no reason try to hurt them. It occurred to me that most boys are thought of as destructive, but perhaps it is because adults just don't bother to explain things to them. So I called Mike over to the small tree he had just mutilated.

"Mike," I said, "these needles are new growth of this tree. This tree is like



BOYS ARE born curious about living things. At left, Mike studies flowers, a grasshopper, the egg case of a praying mantis. Comparison helps him to remember and understand. The similarity between the root system of a tree, above, and the base of building is grasped by an eager and alert young mind

a little boy. If it isn't protected, it won't grow up big and strong." As an afterthought, I promised, "If you will take care of these trees, I'll give them to you for your very own." His face brightened, and he was excited. I knew our minds had found common ground.

From that day to this, Mike has not broken a needle, nor have his small friends. He protects those seedlings at all costs, which once included a bloody nose from a slightly indignant pal. But the pines are doing fine.

That was my first experience with my son in the world of



youthful impressions, and since then Mike has become a thousand wonders richer. He is now seven, and for the past four years his youthful inquisitiveness has been allowed to run rampant in our back yard, where both plant and animal life are plentiful. As a result, his love of living things, curiosity, and interest in new experiences continue at a high pitch.

To him, the back yard is where "Charley Cottontail" makes his home, where the bobwhite quail calls each dawn and dusk and the violets come up in the spring. It is where "God makes it rain when the plants are thirsty." And it is there that the oak produces acorns, the robin raises her family in its branches and the "sassafras tastes pretty."

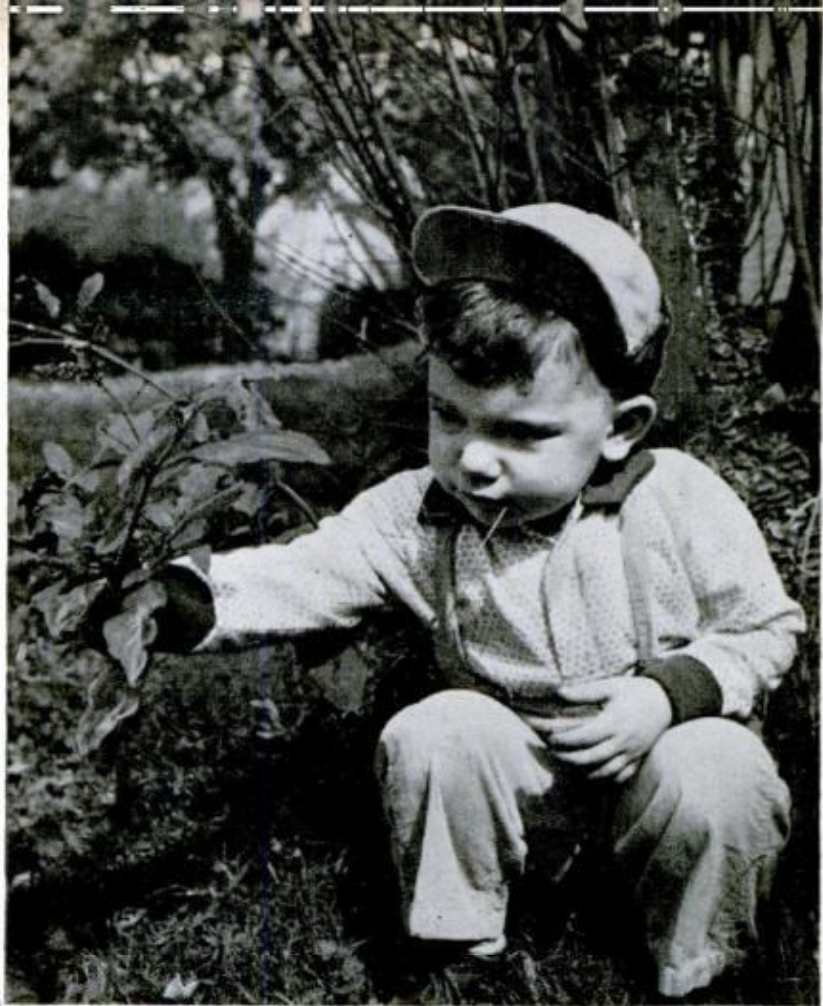
I have made a point of citing at least one special characteristic that Mike could remember for each plant. He knows his own white pines by the five needles in a "bunch," the dogwood by its biscuit-shaped buds. The red cedar pricks his fingers when he touches it, and the sourwood twig tastes like vinegar.

To make our lessons more entertaining, we play games. I tell him the tree's name and how he could remember it, then he tells me how he will call it to mind. He is captivated by the "duck-billed" buds of the yellow poplar and tickled by the mitten-shaped leaves of the sassafras; he easily visualizes a "duck on the tree limb," and he knows, "I wear mittens in the winter."

Through such games, Mike remembers by association the things he likes. He enjoys the challenge of thinking up new and "funnier" ways of recalling these plants. To keep his interest fresh, I have planted 30 varieties of native plants and shrubs. Gradually, Mike

PRIDE OF ACCOMPLISHMENT glows in Mike's face as he examines an onion that he planted by himself and watched grow to this size

DO-IT-YOURSELF is a remarkable teacher. Mike once watched garden planting, but now prefers to do it himself, left. He and friends set up their own division of labor



LEARNING IS FUN for Mike. He gets acquainted with plants by tasting (note twig in mouth, right), touching, and associating their shapes with objects that he knows well



is learning them. And he is learning to compare, as when he notes that birds, like people, can be identified by their voices.

Along with learning about plants, Mike has become intrigued by the insects which live upon them. For instance, the praying mantis is a common sight each summer. We have watched it devour a grasshopper, and in turn be attacked by a robin, which got us into the rather difficult subject of food chains among animals, including people. Once we took the mantis's egg case, along with the greenbrier vine to which it was attached, into the house, where it hatched in a glass jar in about a week. I don't believe Mike will ever forget seeing 200 tiny insects emerge one after the other from that one encasement.

We had hardly delved into the food chain aspect, when I inadvertently mentioned the similarity to chain reactions. Before long we were in Mike's room setting up a chain reaction with his erector set and blocks. So, from a back-yard study of animal food chains, we ascended to a study of chain reactions in one simple lesson.

Mike's interest in what I do leads to imitating my actions. Consequently, when I started to plant my onion bed, Mike and a half-dozen of his friends got under foot. So, I handed the youngsters three pounds of onions, a rake and a hoe and told them to go to it. With surprisingly systematic ability, the group set up their own pecking order and had the bed planted in no time. The rows were not too straight, and the onions were not well covered with soil, but the pride

(Continued to page 220)

OBSERVING BIRDS around the yard led young Mike to notice the similarity of their swept wings to the wings of jet airplanes



SCIENCE OVERSEAS

By William Kreh

A TELESCOPE said to be powerful enough to watch landings by manned rockets on the Moon has been developed by the Japanese. The 25-inch instrument will be located at Kyoto University.

Since it's so hard to create an absolute vacuum on Earth, why not bring it back from outer space? That's the suggestion of Prof. George Pokrovsky. Writing in a Russian journal, he said manned space ships of the future could bring back containers of vacuum for use in scientific research.

Norwegians may now get their vitamins from seaweed. One company offers a tonic drink made from it and other firms are marketing a crisp bread made from flour and seaweed which contains vitamins A to K and 60 minerals.

Great Britain is making it easier for the blind to read. In one new method, tiny points of light scan lines of a printed page, such as in a newspaper. The shapes of the letters are noted by a change in pitch of a musical sound. The blind can read 46 words a minute with this Optophone scanner.

The British also have halved the size and weight of Braille books. Instead of forming raised dots on heavy manila paper, a new system uses lightweight paper on which dots of plastic ink are baked.

The Swedes have succeeded in turning lead to gold but the method isn't likely to replace the old-fashioned mining process. Scientists at the University of Uppsala bombarded lead with nuclear particles and obtained minute particles of gold. Only trouble is, the power it takes to produce the nuclear particles costs much more than the worth of the gold produced.

A lake in Czechoslovakia's Tatra Mountains may be lined with plastic to keep it from drying up each summer if last ditch plans to fill in the cracks in the lake bed with clay and sand fail to work.

Soviet scientists may try to do away with night. At least they think it possible to set up a solar power station on a space satellite which would generate power to be changed into light which, in turn, could be projected to Earth's surface.

In a report made to the All-Soviet Academy of Sciences, some astronomers calculated that with the aid of an optical system, enough light could be focused on an area of the Earth to produce an illumination equal to that of the full Moon on a cloudless night.

The French are testing a five-watt solar battery for possible use as runway guide markers on isolated African airports. Scientists say the Sun often generates one kilowatt of energy a square meter in Africa.

The first air-breathing life on Earth lived in Scotland, according to Prof. James Brough of the University of Cardiff, Wales. His candidate for the early honor is *Paleomolgophis Scoticus*, more affectionately known as "Old Molgo," who left the sea for land 300 million years ago. Besides being one of the first four-legged animals to live on land, he also was a reptile. Most authorities have believed that the first life on land were fish with fins used for walking.

The earliest known meteor crater is now placed in Bavaria, as a result of an observation by Dr. Eugene N. Shoemaker of the U.S. Geologic Survey. Visiting in Nordlingen, a city built in an 18-mile-wide crater once thought to have been caused by a volcano, he noticed that a church had been built of coesite, a rock mined from the crater. Coesite has been made in small quantities in the laboratory, but it has been found in quantity in only one other place—the meteor crater at Winslow, Ariz. The rock indicates a meteor impact since only a meteor collision with Earth could produce the temperatures and pressure needed to form coesite naturally. Dr. Shoemaker says he believes the meteor hit the Bavarian countryside some 12 to 15-million years ago.

Philippe Gerard, a French orchestra leader, is using the human heart as a musical instrument. He makes recordings of heart beats under varying conditions and combines them into a rhythmic pattern he says makes good listening. In his opinion, a normal heart beats in the rhythm of rock-and-roll, while a heart under pressure has a cha-cha-cha beat. ★ ★ ★



Dome Dominates Metals Society Headquarters

Arching across the new headquarters of the American Society for Metals near Cleveland, Ohio, is a large, open geodesic dome. Set on five pylons, the dome—100 feet high and 275 feet across—is a symbol

of the metals industry. The society used every possible metal in constructing the three-level headquarters building, and in a saucer under the dome is a display of 350 ores from throughout the world.

Two-Story Car Has Combined View Dome and Sleeper

Long automobile trips by John Swanberg of Minneapolis, Minn., are made in buslike comfort since he added an extra deck to his 1956 Dodge. Swanberg built the addition in his spare time. He said that the cost

of the top deck was \$1000. The second level, equipped with a reclining seat for three, gives passengers a panoramic view in daytime or furnishes a place to sleep at night in upper-berth comfort.



First Successful VTOL Jet

Successful hovering trials of the English Hawker 1127 make it the world's first VTOL jet fighter. Unlike the United States' Bell D-188A (see page 139), the Hawker's single Bristol Siddeley jet engine achieves vertical or horizontal thrust, not by rotation, but by moving internal nozzles which direct the thrust downward or rearward. It can even direct the thrust forward for braking in flight or taxiing. Auxiliary wheels at the wing tips give the plane ground stability for taxiing.



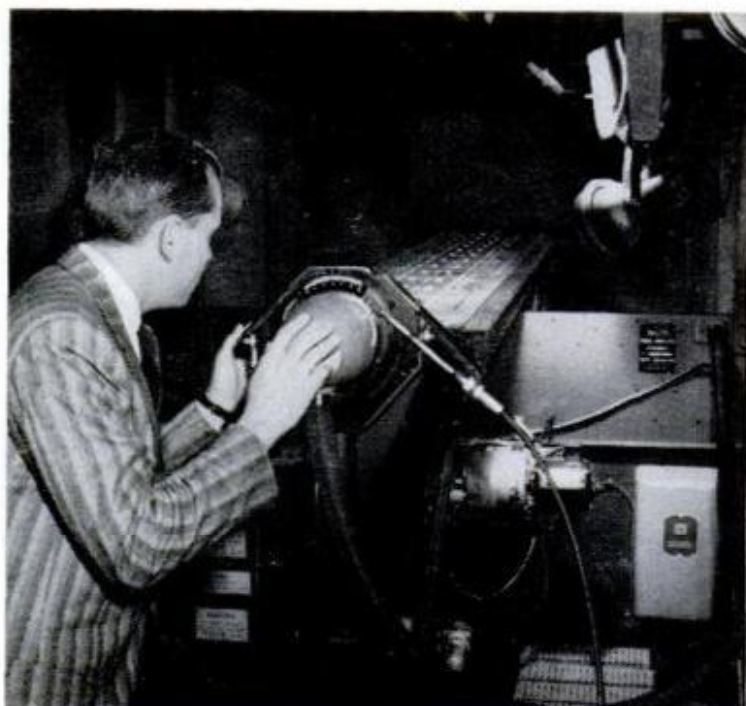
Vacuum Cleaner Bails Boats

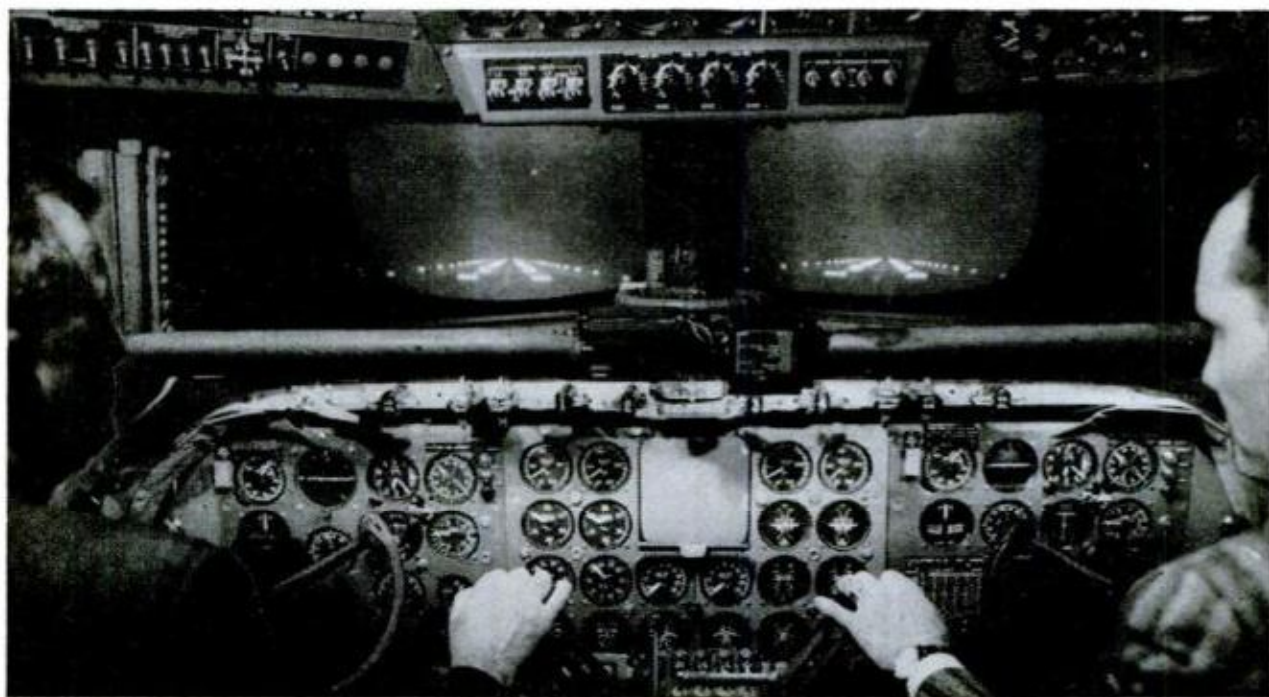
Bailing water out of a boat can be a bothersome job; so can cleaning out a dirty one. But a boat that needs both cleaning and bailing presents a real problem. You must bail first to get rid of the water, then let the boat dry until you can sweep it out. John Shea, operator of a tunnel of love at Waldameer Park in Erie, Pa., tired of doing the job by hand, so he tried using an ordinary heavy-duty vacuum cleaner as a suction pump. Now, without interrupting service to his customers, Shea can stand by his mill race and vacuum both water and trash from his boats as they go by. When the big tank is full, he simply takes off the head and pours out the water.



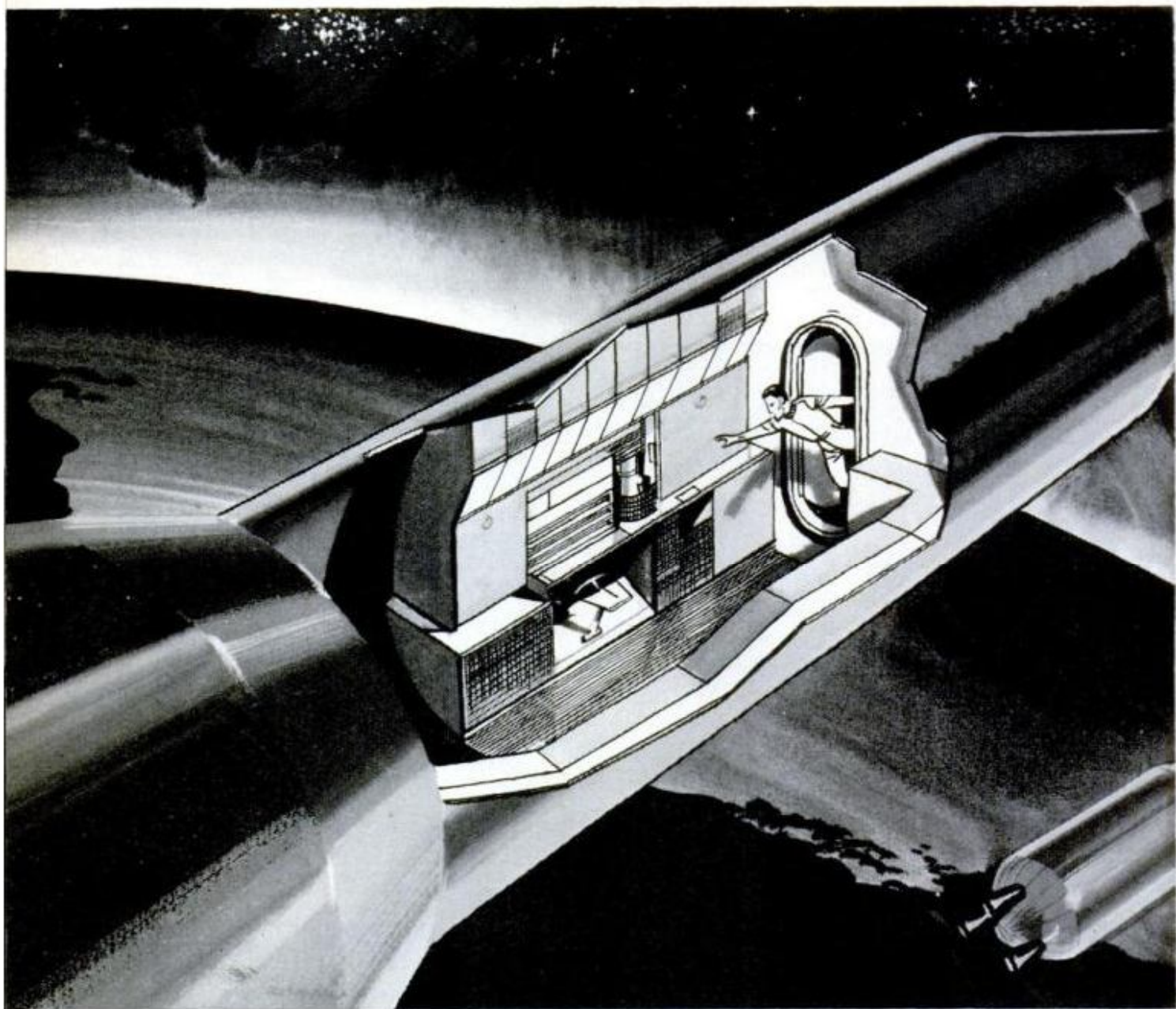
TV Trains Pilots

Closed-circuit television and a revolving belt on which runway light patterns are depicted with fluorescent paint are used as a training aid at the Denver Flight Training Center of United Air Lines. The belt is equivalent to a 7000-foot runway with 2000 feet of approach lighting. Moving at the relative speed at which the pilots are "flying" the flight simulator, the belt passes in front of the TV cameras which pick up the fluorescent light patterns. The patterns are activated by ultraviolet light. The image is transmitted to two 27-inch screens in front of the windshields. The flight simulators are designed to represent speeds of both piston-engine and propjet aircraft. Six of them are in use.





SPACEBOUND KITCHEN



By Ken Warner

SOMETIME AFTER the first of May, three men will make a two-week gastronomical trip through space with the equipment pictured on these pages.

They may do it without leaving the ground, and probably will do it without leaving their capsule, but they could do it between here and the moon, because the Air Force's "space feeding console" is built to specifications that would allow it to be the galley of a three-man moon-shot capsule.

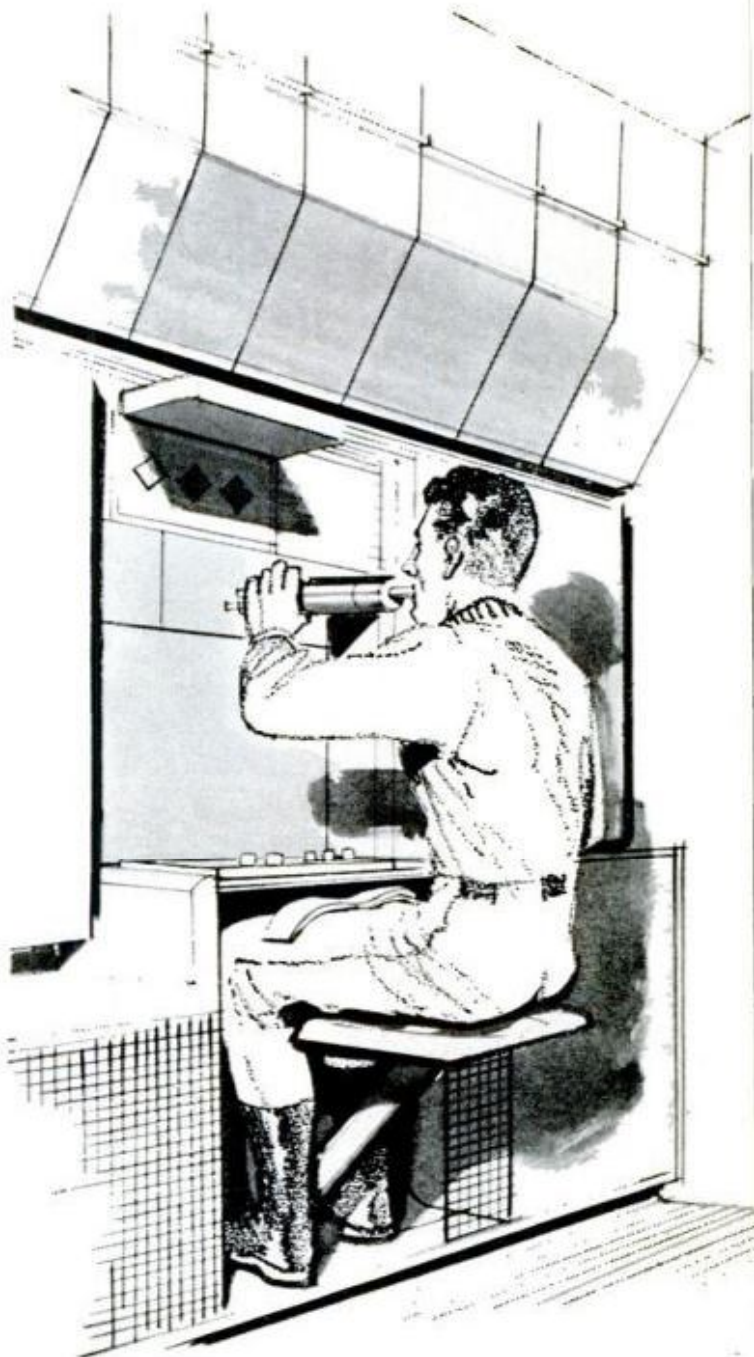
Designed and built by engineers of the Whirlpool Corp. in St. Joseph, Mich., the moon-shot mess hall takes into considera-

tion—and meets—all the known problems of human feeding in space, such as:

Zero gravity—weightlessness—in which condition men must anchor themselves while performing the simplest tasks lest their own movements send them sailing about the cabin through the simple physics of action-reaction. The same for tools, utensils—everything.

A hostile environment outside the capsule which may produce unexpected psychological effects on taste, appetite, or eating habits, and will require the utmost in "design insurance." This means foolproof operation, sturdy construction, alternate

How to feed three men for two weeks — in space



DINNER FOR ONE—in space. Floating at the "table," spaceman pumps food into his mouth, above. Below, hand pump moves water from reservoir into containers

systems and spare parts. There's no eating place along the route.

Cramped quarters and the need for light weight in everything. A pound saved on the feeding console means another pound of instruments can be taken or thousands of pounds of fuel saved.

Short time—the space explorers will be too busy to spend much time at their meals, though they must keep healthy and happy. Even in space, an army travels on its stomach!

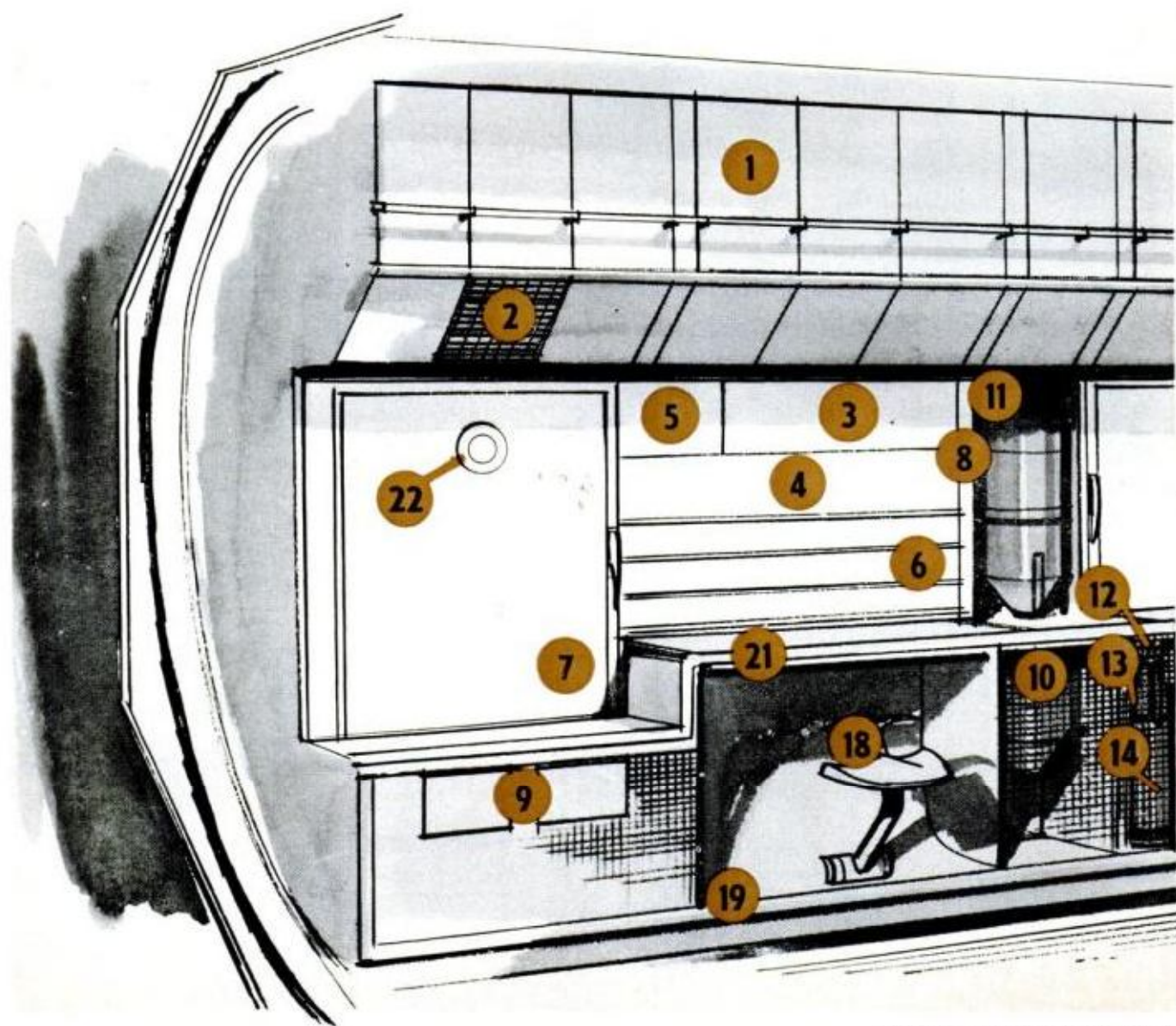
These are the things we know about zero gravity that had a direct effect on the kitchen design: With no weight to hold

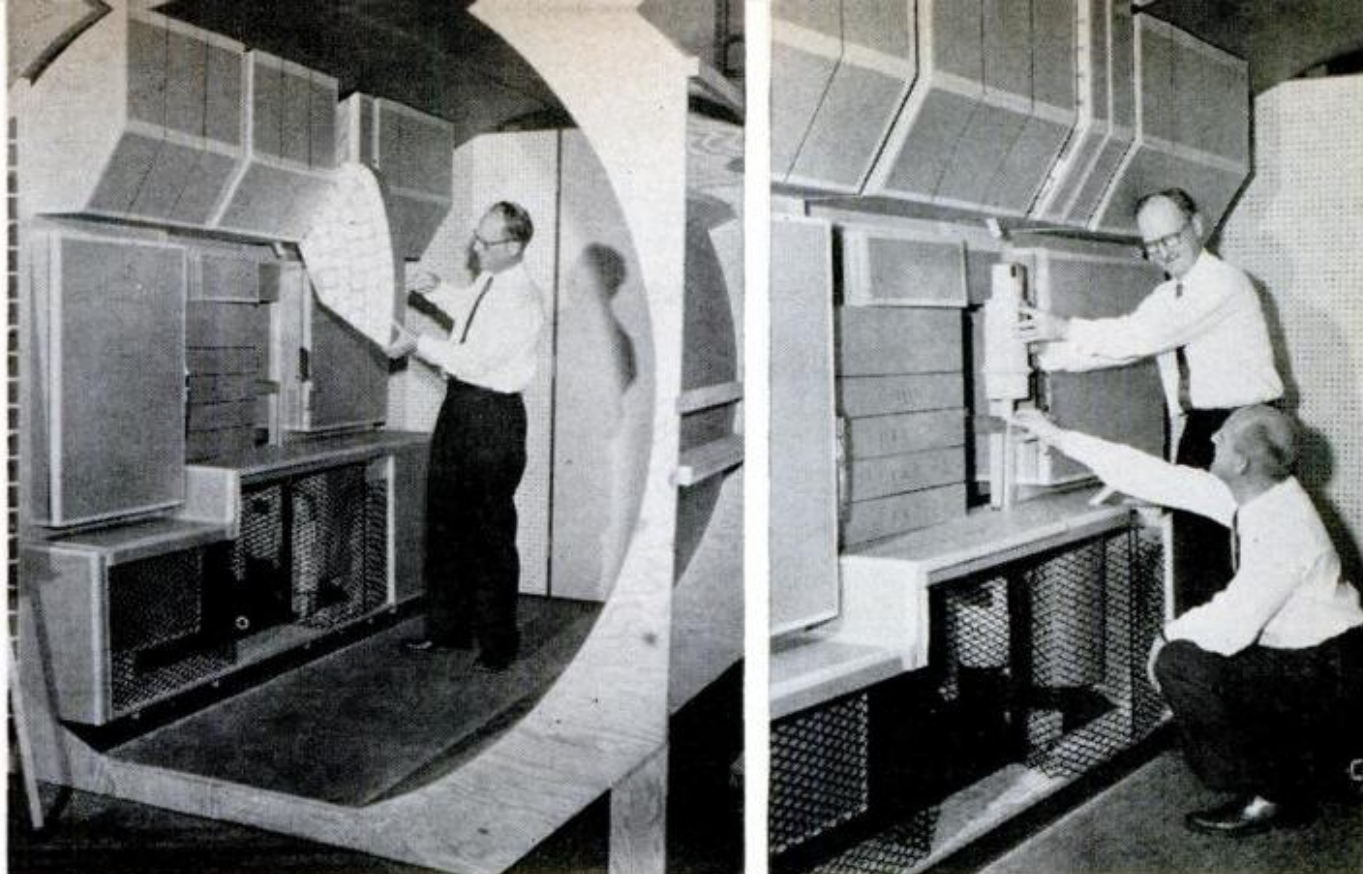


Drawings by
Bill Fleming



DAILY SKULL SESSIONS helped Whirlpool engineers as they progressed from specifications to artists' conceptions to the plywood-and-cardboard mockup, then into the actual building of the kitchen's hardware





ORIGINAL SPECIFICATIONS gave engineers the entire 7½-foot cylinder, but careful fitting and miniaturization put the kitchen into half that space. You can easily imagine the problem of trying to "think weightlessly"

them in place, every item not held firmly in hand must be tied down. This requires a lot of tying and untying, locking and unlocking, so latching devices must be quick and easy. Water in zero gravity does not act like water—it just lies there. It must be force-pumped under control, for it will not flow; to rehydrate dried foods, a mechanical arrangement must jam the food and the water together. The same goes for other fluids.

Still, the menus are all set and this kitchen will be delivered to the Air Force by April 28.

The menus look perfectly ordinary, but they're not. Under space-flight conditions, nothing the astronauts eat, except bite-sized snacks like cookies, cakes and sandwiches, will ever get out of a can or a tube until it is delivered into the eater's mouth.

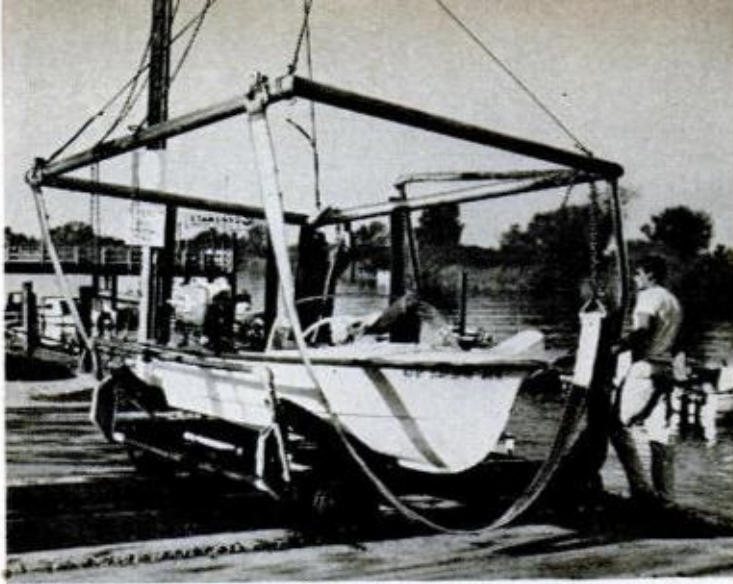
Here's the menu for breakfast for "Thursday" or the fourth day out: Grapefruit sections, scrambled eggs, bacon, coffee cake, milk and/or coffee. But here's how it is prepared and eaten:

At breakfast time an astronaut will "swim" down to the galley ("swimming" is the generally accepted

(Continued to page 236)

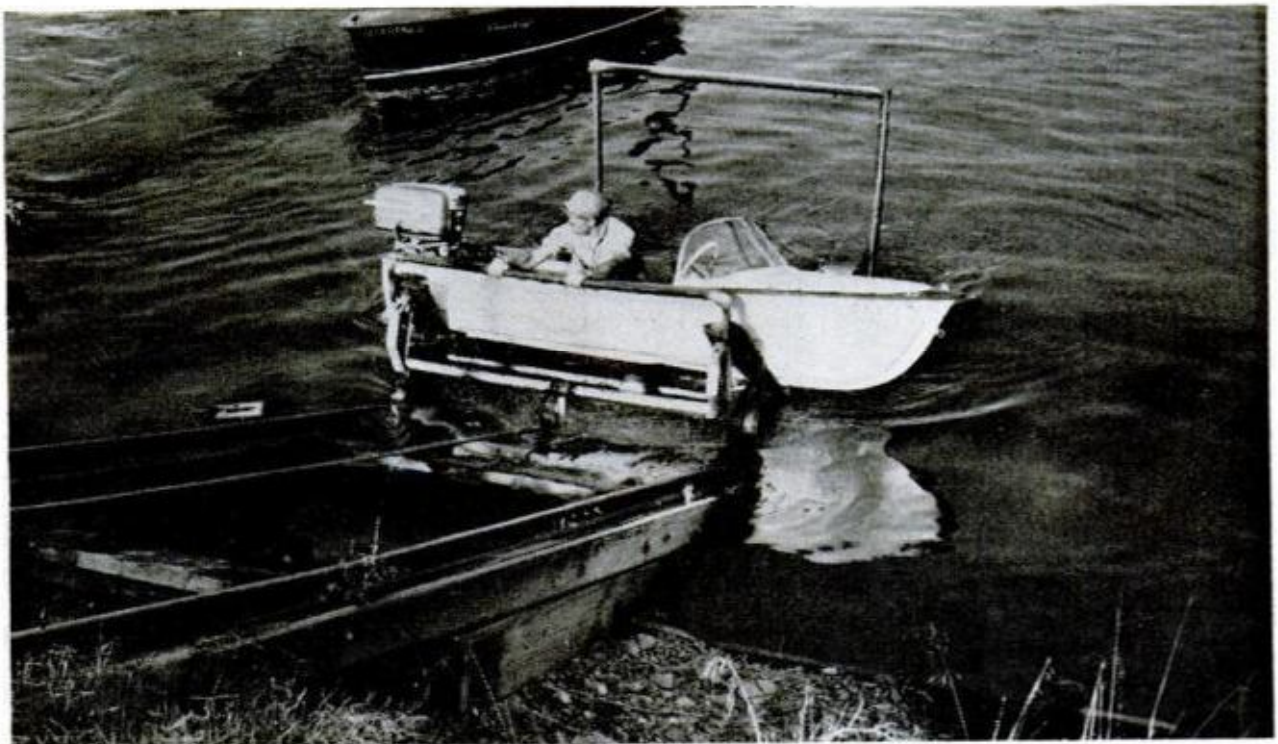


- | | |
|------------------------------|-------------------------|
| 1. Dry-food storage | 12. Hot-water tap |
| 2. Air ducts | 13. Hot-water tank |
| 3. Oven | 14. Water transfer tank |
| 4. Mouthpiece storage | 15. Wet-waste storage |
| 5. Glove and pad storage | 16. Dry-waste storage |
| 6. Feeding trays | 17. Refrigerator |
| 7. Freezer | 18. Fold-away "chair" |
| 8. Supporting structure | 19. Toe-hold undercut |
| 9. Refrigeration power units | 20. Grab bars |
| 10. Cold-water tanks | 21. Counter top |
| 11. Cold-water tap | 22. Temperature gauge |



Power Launching Ramp

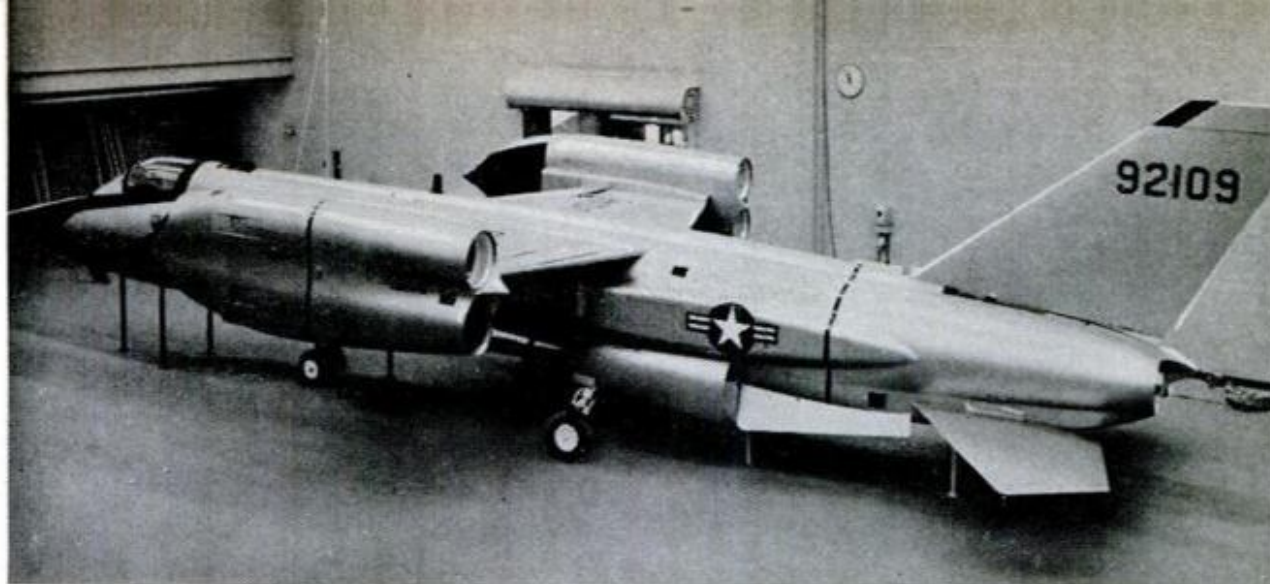
Central California's great delta country offers a thousand square miles of prime boating and fishing water to anyone who can get his boat down the steep levee banks. One popular launching method is the power ramp. The boat is lifted from its trailer with a sling hoist, then placed in a sling-cradle rail car. The operator rolls the car into the water until the boat floats free; the procedure is reversed to get the boat out and back on its trailer.



Ear to the Ground— The Easy Way

Looks as if he's eavesdropping on something serious, but this London Water Board inspector is only listening with a dip rod for trouble spots in the water-main system. To save inspection time, he lowers the flat-topped rod through a midget manhole until it is in contact with the water main. By pressing his ear against the top of the rod, he can hear the sound of flowing water conducted through the solid metal. With a little practice he can learn to judge the condition of the main by the sound.

☞ Some soil on the Caribbean island of Martinique is so fertile that a signpost may take root and sprout leaves.



Supersonic VTOL Jet

Powered by eight jet engines for vertical takeoff and landing (VTOL) and Mach-2 speeds in level flight, the D-188A fighter-bomber is being developed by Bell Aerospace Corp. under joint contract with the Air Force and Navy. In its conventional configuration, it resembles a jet fighter. Two horizontal jet engines in the rear of the fuselage and two jet engines at the tip of each wing will power it in level flight. For vertical takeoffs and landings, the four wing-tip engines rotate for vertical thrust. They are aided by auxiliary thrust from two more vertically positioned jet engines located in the forward fuselage ahead of the wings. The mockup model shows both configurations. The vertical takeoffs and landings, Bell says, can be accomplished within 60 seconds. The plane is also designed to take off in conventional manner. The purpose of VTOL aircraft is to operate from bases with short runways.



Tiny Power Plant Runs on Heat

Five watts of electrical power are developed from a cathode which is part of a tiny electrical generator using energy from the sun as a heat source. The generator, developed by the Bendix Corp. for use in space satellites, is called a cesium vapor thermionic converter.

The use of cesium vapor as a field through which electrons move from cathode to anode allows these two parts to be spaced 50 times further apart than in the vacuum-type converters, according to the Bendix researchers. This gives the generator a greater resistance to shock and vibration—important in satellite use. The cathode is a quarter inch in diameter.

A similar generator is being developed for use with nuclear reactors. It should permit simple and direct conversion of nuclear energy into electrical power.





Simulating an accident situation, driver above runs his car off the road at a five-degree angle and at a speed of 30 miles per hour to test the stopping power of a single row of multiflora rose bushes



Above, the "sleeping" driver ploughs into the bushes. Car's original speed was cut to 15 miles an hour. Below, the car emerges into opposite lane. A double row of bushes would have stopped it, officials claim



Multiflora Rose Bushes Bloom as Lane Barriers

In search of a lane divider that would neither stop a car with a jarring crash nor throw it out of control, Connecticut highway officials came up with what may prove

to be the answer—multiflora rose bushes. In a series of tests, the bushes came out second best, and the car survived with no damage a paint job won't cure.



Flip-Up Shield Fits Any Helmet

Racing helmets of any make can be fitted with a plastic flip-up face shield. A kit provided with the shield includes a template for positioning the helmet snaps which are glued in place with a special liquid adhesive. Manufactured by Belaire and Hull of 6525 Third Ave., Detroit, Mich. Sports equipment dealers will stock it.



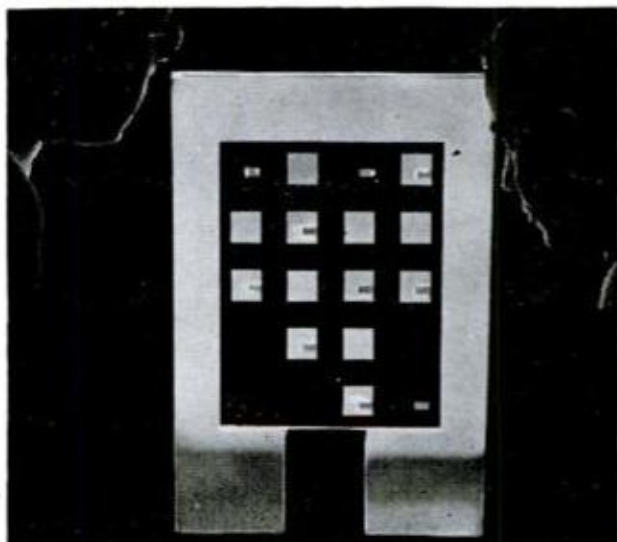
Electric Current Heats or Cools

When an electric current is passed through a junction of two dissimilar metals, heat can be generated or absorbed, depending on the direction of the current flow. The phenomenon, discovered in 1834 by Jean Peltier, has been put to work by the Garrett Corp., Los Angeles, in a unit that cools electronic missile systems.



Electronic Telephone Control Office Has a Long, Quick Memory

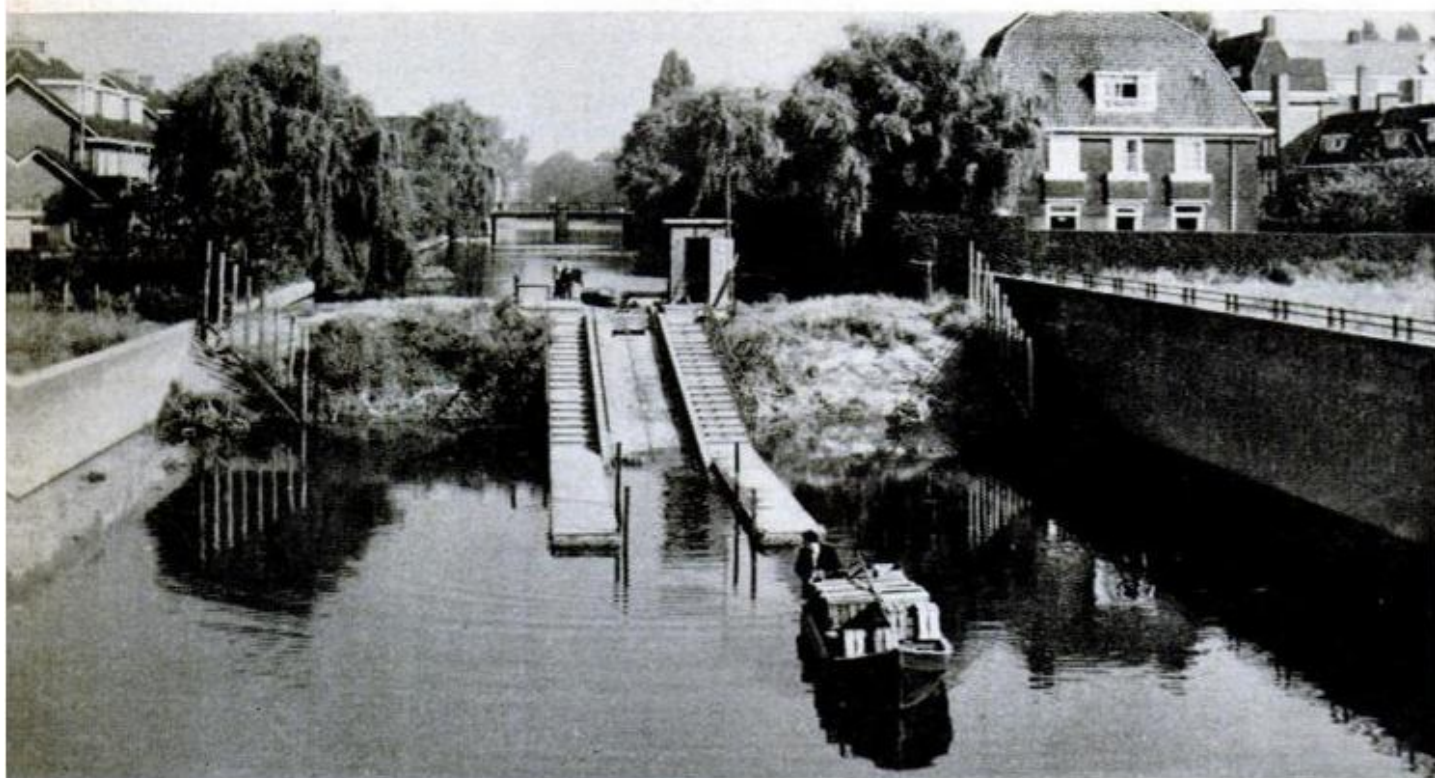
Silently switching calls through 23,000 tiny neon-filled tubes and remembering in a millionth of a second any of the 2,225,000 bits of information stored in its system, the world's first electronic telephone control office is now serving Mount Morris, Ill. (population: 7958). The experimental system, called ECO, also uses 12,000 transistors and 105,000 diodes.



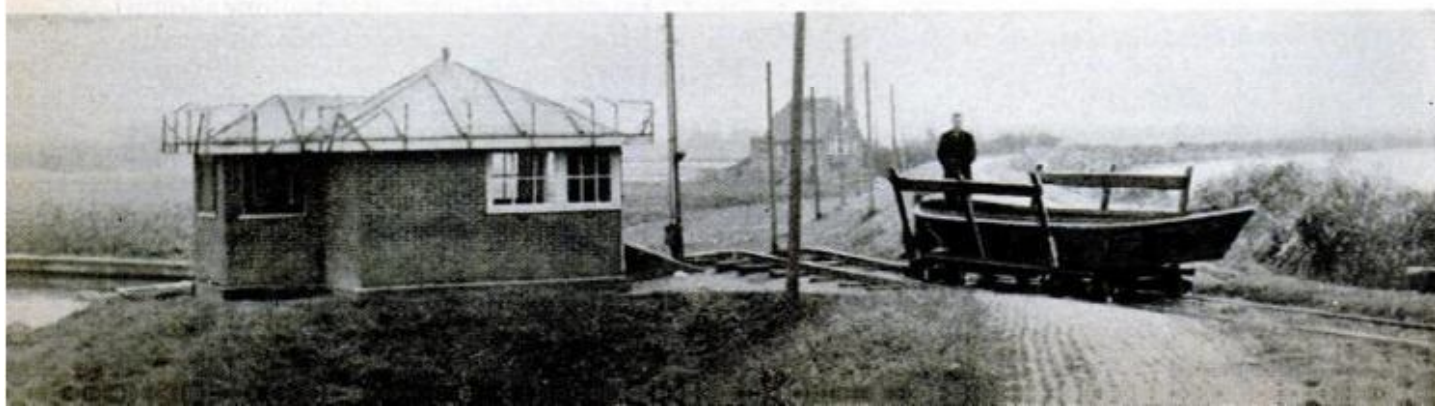
ECO allows home extension phones to be used as intercoms; it routes incoming calls to another, specified phone when the line is busy. If customers are visiting friends, ECO will route calls to the friend's house if a code number is dialed beforehand. The picture at left shows neon tubes that replaced electromagnetic relays; at right, four of these plates are ECO's memory.



DUTCH FARMER, headed for market, enters slip, above, and goes over and out, below, almost without stopping



ROLLING ACROSS A DIKE on rails, this farmer's boat presents a new concept in highway traffic hazards



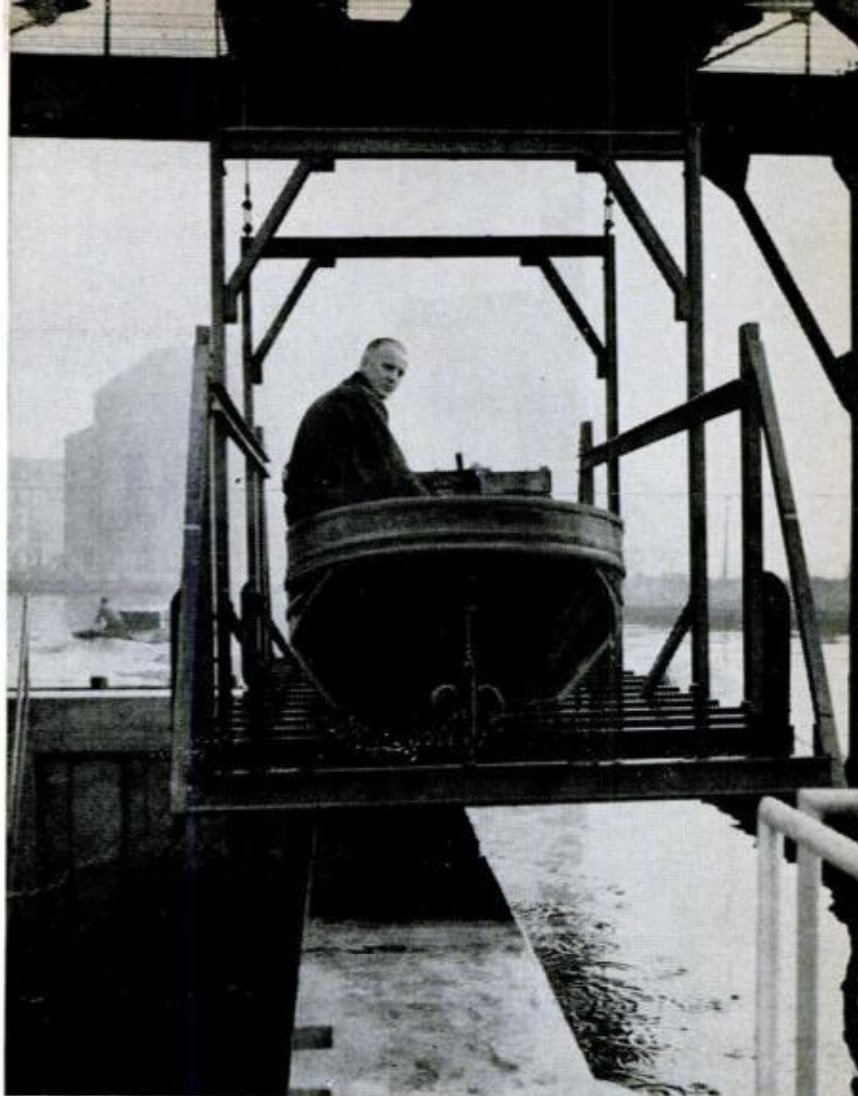
Boat Escalators

IN HOLLAND, where motor launches take the place of trucks for moving farm produce to market, small canals are important arteries of transport. The canal system is as important to Dutch farmers as the secondary road to their American counterparts. But the scores of rivers and canals were cut through the lowlands as they were reclaimed and pieced together from the ocean floor, so there are almost as many water levels as there are waterways. The usual locks serve the major canals, but on the smaller, feeder canal systems, the hundreds of necessary locks would be uneconomical.

Forced to find another way to move the loaded boats from one waterway to another, the Dutch canalmen have worked out systems of elevators, escalators and marine railways.

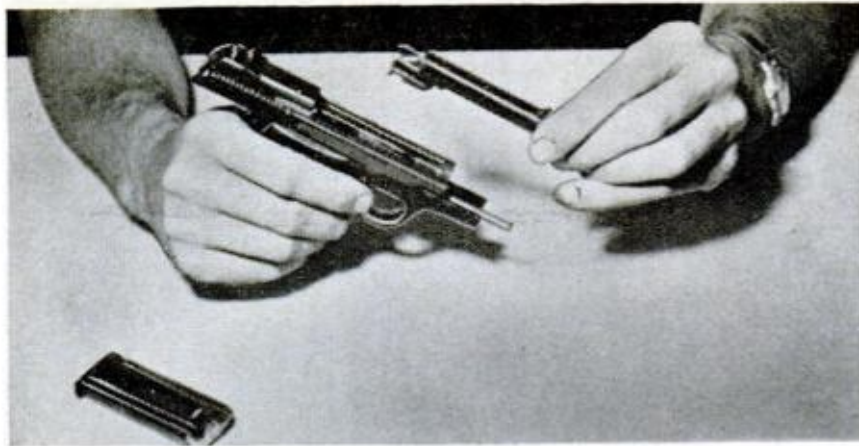
Over the Dam—The Easy Way

Approaching the end of one canal, the boatman maneuvers his launch into a slip and over a cradle that has been submerged in the slip. Since most of the boats are flat bottomed—for shallow draft and because there is no great need for deep hulls in the quiet canals—they sit squarely on the cradle as it is lifted or pulled from the water, over the dike or dam, and relaunched at the new level. The boatman pays a small fee to the operator for the service, much as a driver would pay toll on a bridge or an expressway, and is on his way, usually in less than a minute and without leaving his boat. The escalator is not only less expensive than a lock, but takes much less time since there are no basins to be filled or emptied. There is seldom a waiting line. While the system works only with small boats on small canals, it serves the waterborne Dutch farmer well.



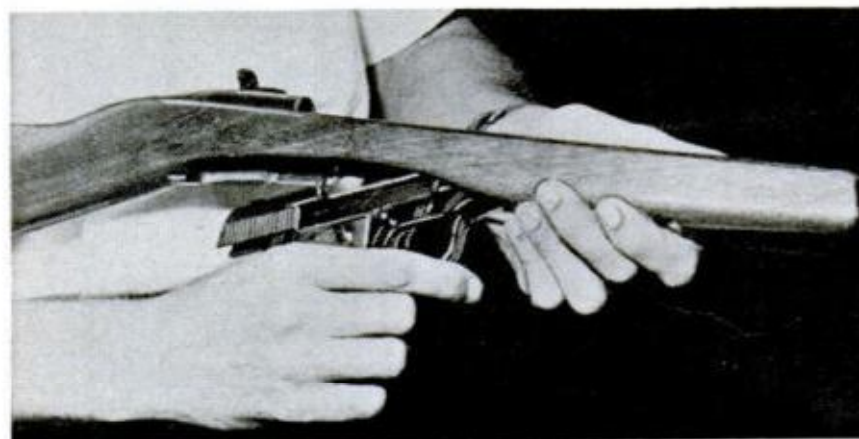
NEAR AMSTERDAM, a boat elevator lifts boat—pilot and all—out of a slip at one canal level, then rolls it across the dam to another, parallel slip at the next canal's water level





"Instant Rifle" Pistol Accessory

Shooters can switch from handgun to long gun in 10 seconds — without tools — with a new combination .22 automatic marketed by Firearms International Corp. The unique firearm consists of a conventional-looking .22 pistol plus a rifle stock unit with stock, barrel, sights and operating rod. The shooter removes the pistol barrel, then slides the action into the bigger unit, where it functions as both grip and receiver.



Fire Protection From Compounds

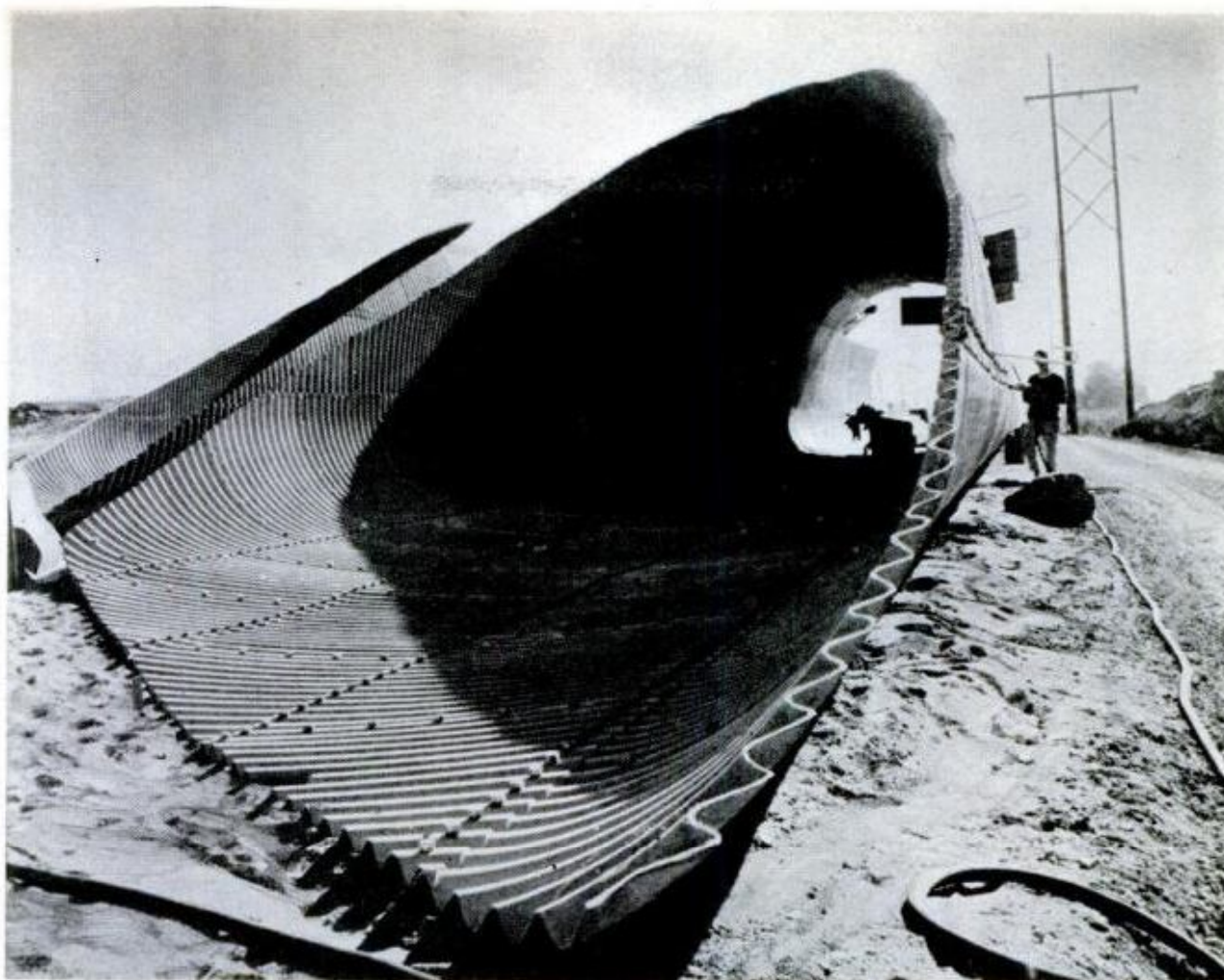
Six new compounds, identified as organopolyphosphorus esters, may give flame-retarding qualities to a wide variety of plastics, synthetic fibers, rayon and wood products. The compounds, developed by Monsanto Chemical Co., St. Louis, Mo., are being further tested as a cheap and efficient means of imparting flame resistance to polymers such as polystyrene, polyesters, phenolics, acrylics, epoxies, polyurethanes, and polyolefins — plastics used in building and structural applications.



Copper Welding Eliminates Solder

Using a new tungsten electrode shielded by a stream of inert gas, a new all-copper weld can connect commutator risers to armature coils with a pure copper joint as strong as the copper parts. Softer, easy-melting soldered joints are eliminated, allowing the use of the electric motor or generator in high-temperature jobs in industrial locomotives and rapid-transit passenger cars.





Culverts Form Underpass

Giant steel culverts erected side by side form an automobile underpass through a new interstate highway in Illinois. Each of the twin structures is 334 feet long, and the tunnels they form are 20 feet wide and 17 feet high. Each will carry a 14-foot roadway and pedestrian walk. The prefabricated steel units allowed construction time to be cut to about four weeks from three months.

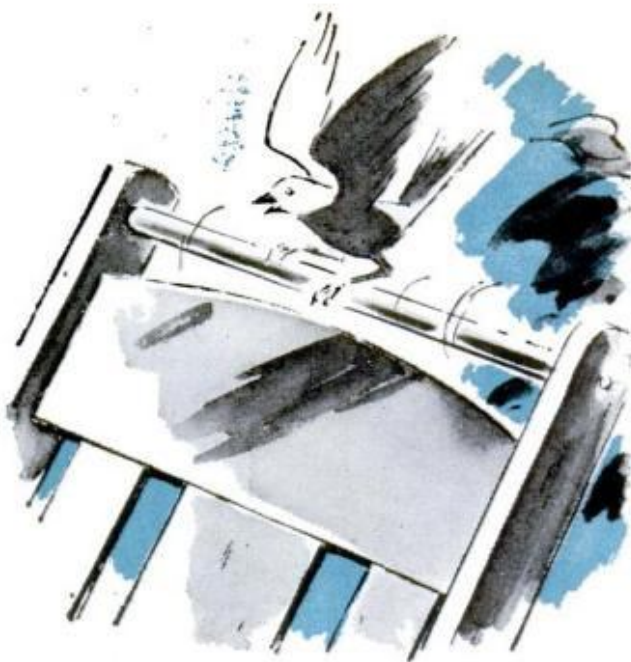
A Plane's Brains

Supersonic flight requires supersonic thinking at times, and pilots can't do it all alone. So a thinking man's plane includes assorted automation units that handle such jobs as navigation, bombing and fire control, radar search and automatic identification of other aircraft. Shown is the Air Force F-105 Thunderchief, a supersonic fighter capable of carrying thermonuclear bombs, with some of its "brain cells" spread out before it.





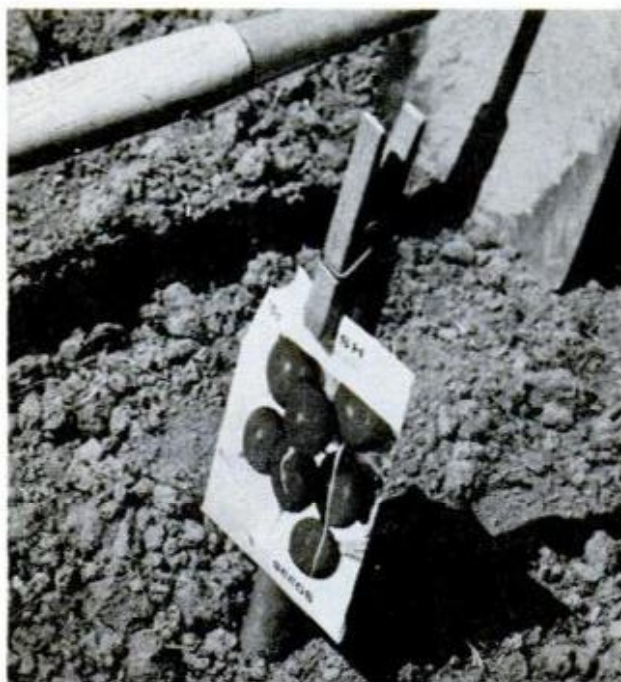
GOOD WAY TO KEEP your hands clean when polishing shoes is to wear a plastic "glove" on the hand that holds the shoe as shown. Any small plastic bag without holes will do for such a glove, which can be kept with the shoe-shine kit for convenient reuse



BIRDS WHO ROOST on wooden lawn chairs of the type shown above can be discouraged from pursuing this habit if a free-turning dowel is mounted at the top between vertical side members of back. Holes drilled in latter take nails driven in dowel ends

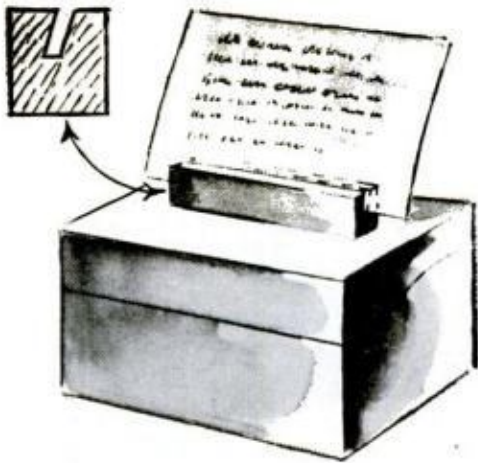
SOLVING HOME PROBLEMS

THIN-WALL CONDUIT cut to 1-ft. lengths makes excellent garden row markers or stakes. After planting seeds, the packet is clipped to stake with a spring-type clothespin for handy future reference



CELLULOSE SPONGE with hole cut in center to take glue bottle helps prevent accidental tipping of bottle, soaks up glue drippings and affords excellent "anti-mess" insurance where tots are concerned





WOODEN BLOCK cemented to lid of recipe-card file box as shown above, serves as handle and as holder for recipe being used. Groove for latter is cut at 80-deg. angle to hold card at easy-reading slant

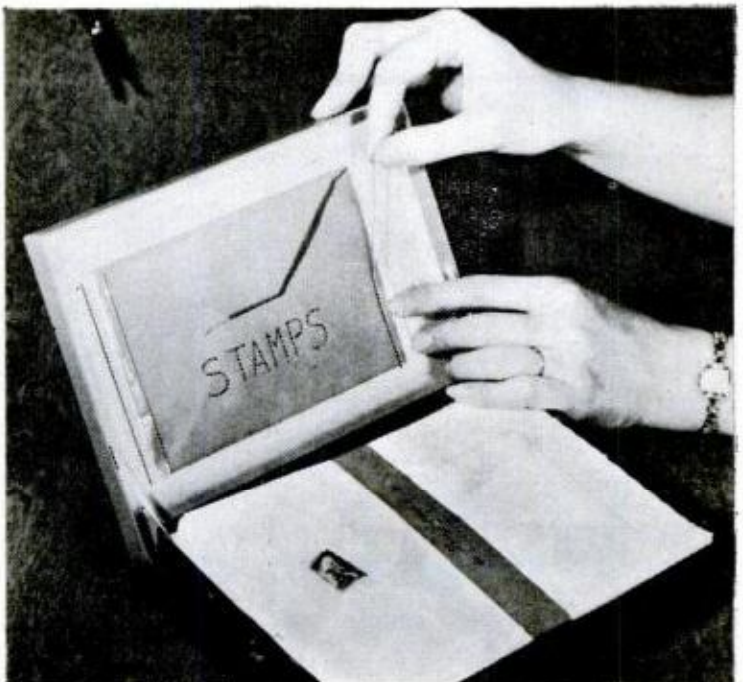
SMALL ALUMINUM-FOIL pie pan, above right, catches drippings from chocolate-coated ice-cream bar, keeping mess off child's hands and floor. Handle is inserted in hole pierced in pan bottom with knife



PLASTIC COVERS used for protecting transplants from late frost, right center, should be supported with wire arches to avoid crushing them. Supports are formed from short lengths of clothes-hanger wire



POSTAGE STAMPS won't get mislaid if you keep them in envelope taped to inner side of your stationery-box lid as in the photo, below right. At a desk, tape envelope to the inside of a drawer front



DO YOU GIVE pull-cords on blinds or draperies test pulls each time they are opened or closed to determine which cord to pull? Then, invert the pull knob on the "opening cord," below, to tip you off



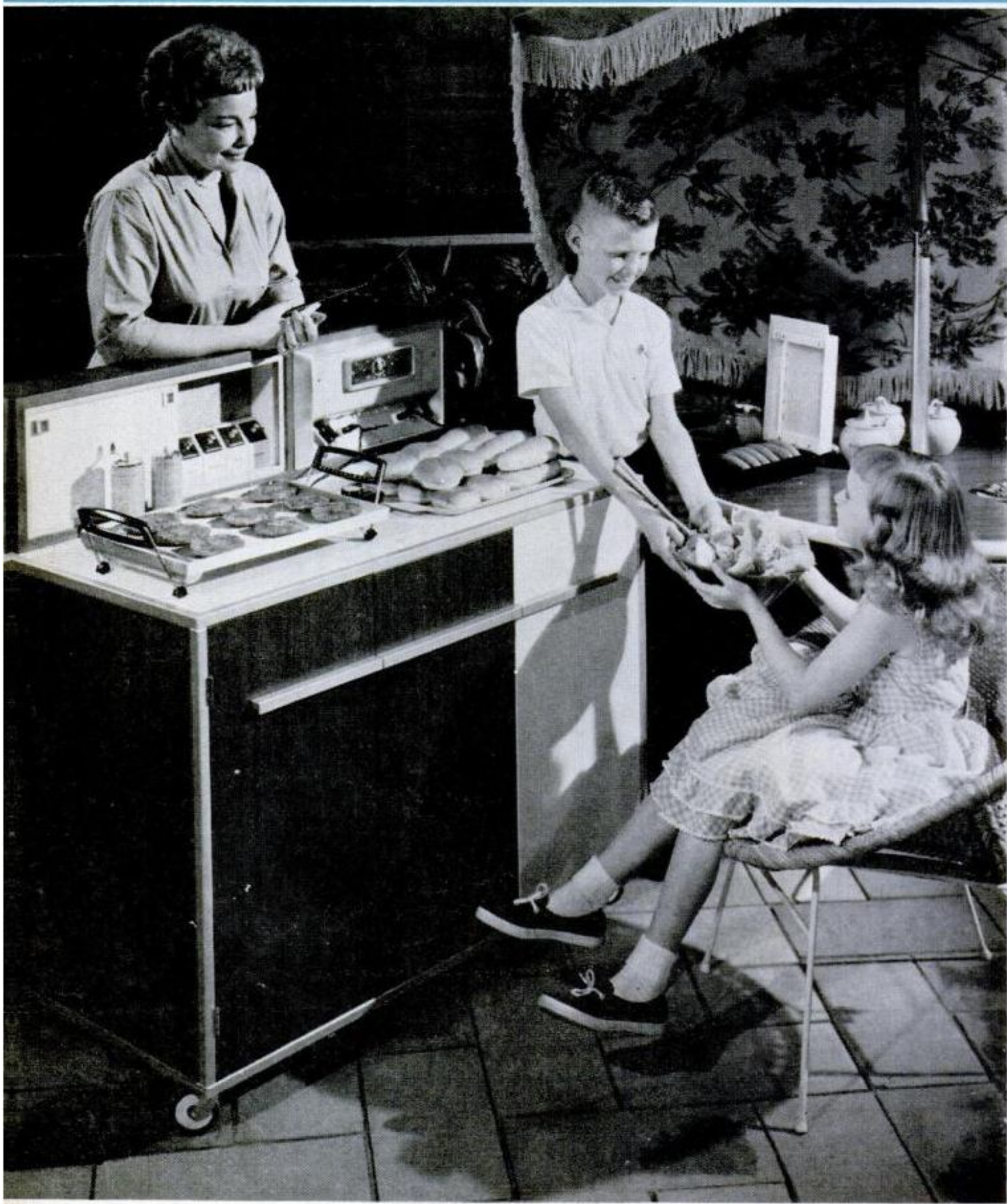
BACK YARD HO!



The annual exodus to a summer of tempting cookouts, grand fun and lazy living will soon get under way. Here in PM's 6th annual outdoor section are 22 pages of how-to suggestions for back-yard living



patio cart

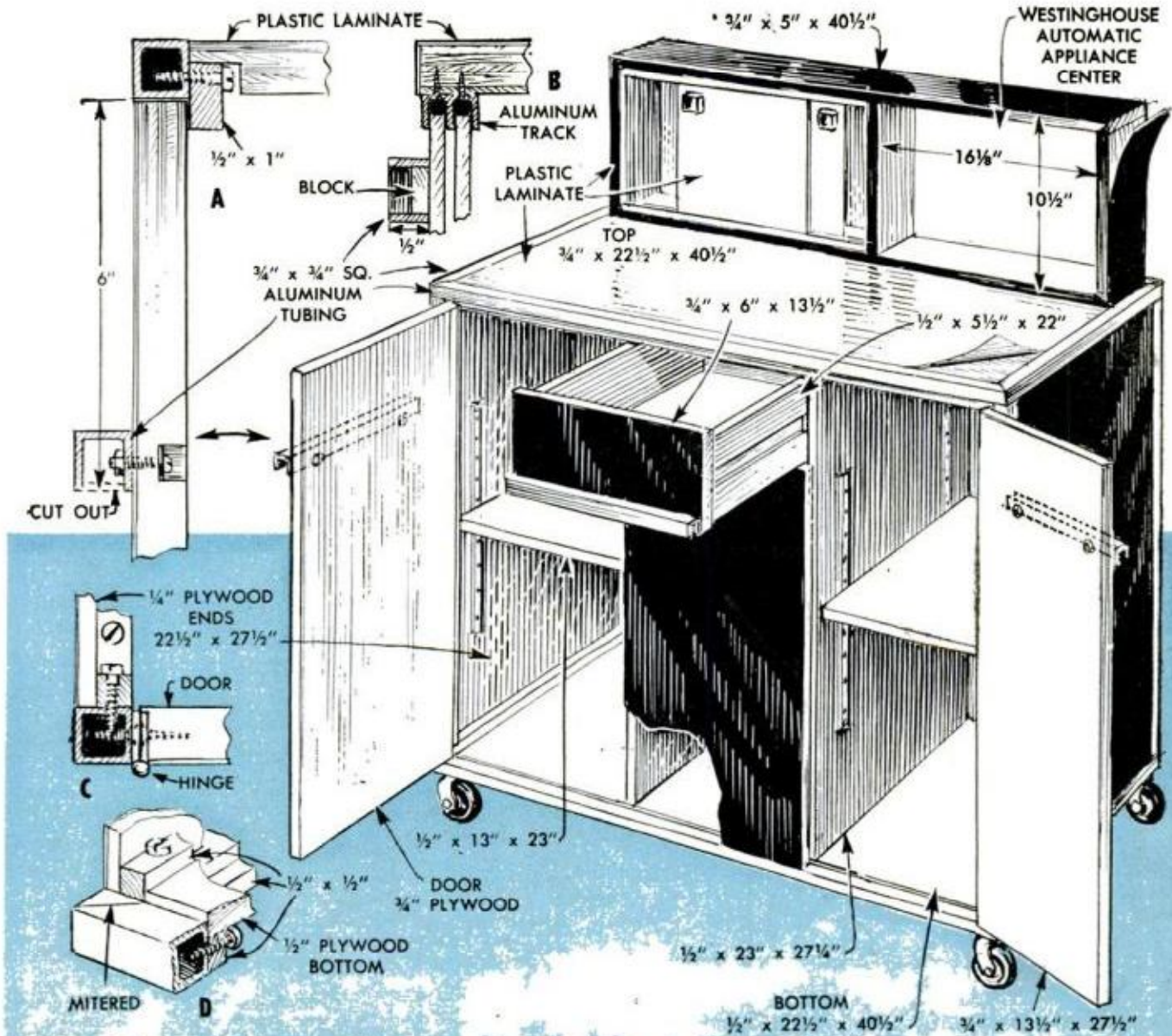
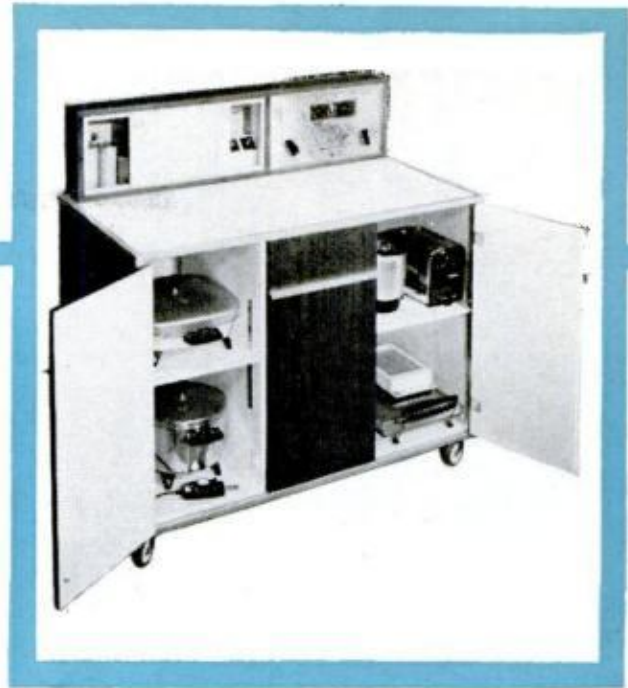


It's a rolling counter top with a plug-in panel for all electrical appliances needed in outdoor cookery

DESIGNED ESPECIALLY for use with the Westinghouse Automatic Appliance Center, this patio cart has everything. You can't buy it ready-made; you build it from plywood, plastic laminate and square aluminum tubing, following the details below.

Study the cutaway view carefully and go over the details A through G so that you have the assembly clearly in mind before you cut materials. Detail A shows the assembly of the cabinet as a section through

(Continued to page 228)

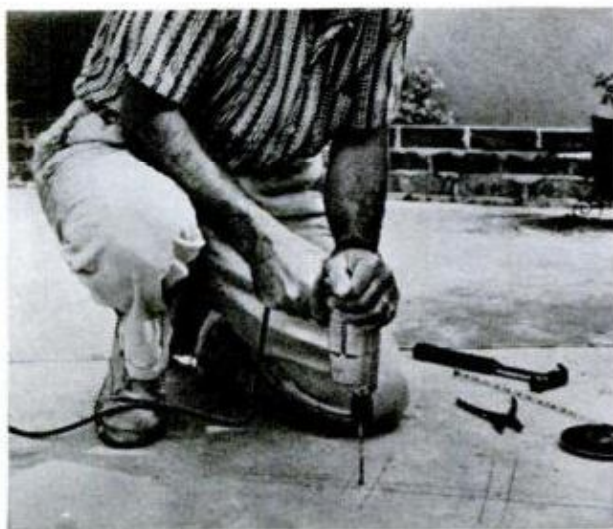
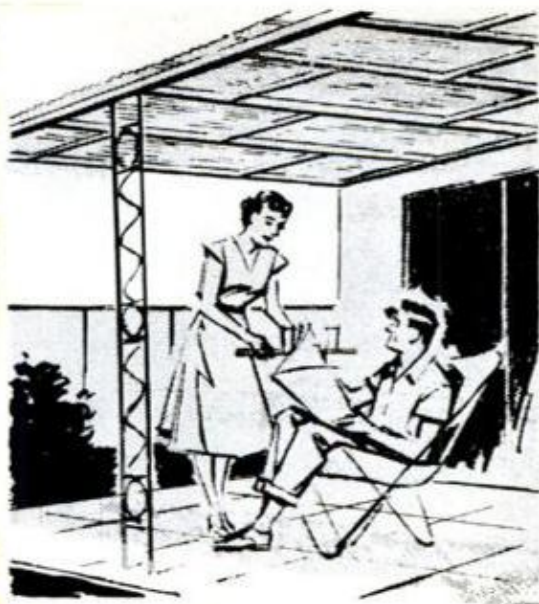


patio roof



You'll enjoy your patio a lot more by adding a fibreglas roof to provide protection from sun and rain

IT ONLY TAKES a sudden shower or the late afternoon sun to make a cookout on an open patio an unhappy experience. The answer, of course, is to deck it over. One of the best looking shelters can be erected by applying panels of colorful translucent fibreglas to an open framework supported by ornamental iron columns. The series of photos on these and the following page take you through steps of building such a deck using redwood and Filon fibreglas, which can be drilled, nailed and sawed like wood.



LOCATING FRONT supporting posts is first job of installation. Use $\frac{3}{4}$ -in. masonry bit to drill holes in concrete to take expansion-screw anchors and bolts



BACK HEADER cut to width of patio roof, then is fastened to house, driving nails into wall studs. Proper height is 8 to 12 ft. above patio floor

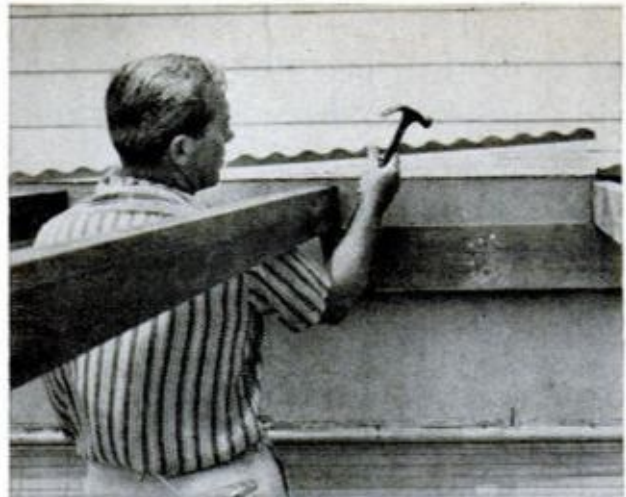
FRONT HEADER is installed next. Due to wide width of owner's patio (24 ft.), front header is erected in two sections joined together on a center post

NOTCHES ARE cut in front header to take rafters, which also are notched to give neat interlocking joints. Rear ends of rafters are toenailed to house

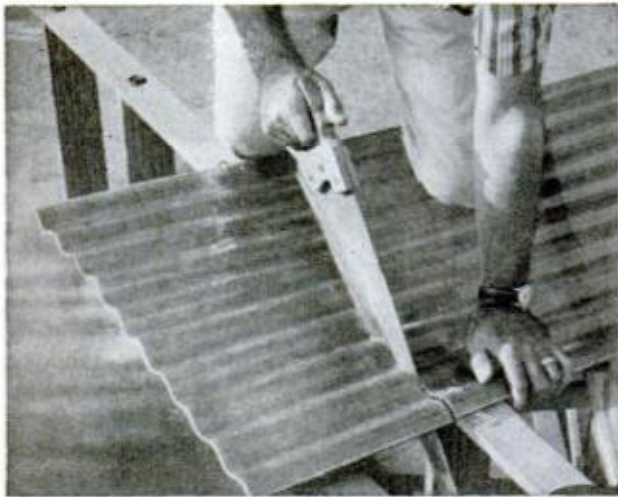




CROSS BRACING is nailed to rafters in staggered, egg-crate pattern, spaced a maximum of 4 ft. apart. If framework is to be painted, it must be done next



CORRUGATED WOOD molding is nailed on top of back header to insure seal between fiberglass panels and house wall, and to provide more secure nailing



FIBERGLAS PANELS are cut to required length, after measuring carefully and marking them with grease pencil. Fine-tooth handsaw works best for this



HOLES FOR nailing panels to framework are drilled through crown of corrugation, spaced 12 in. along rafters, every second or third corrugation at headers

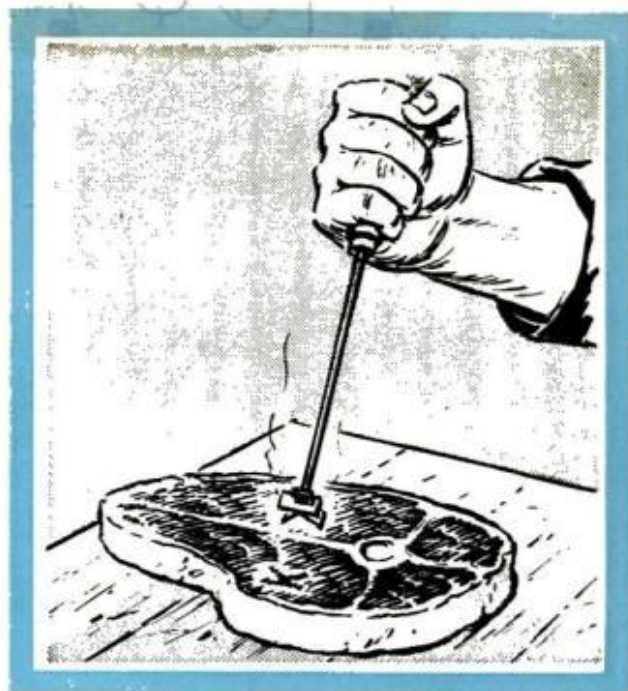
ALUMINUM NAILS (10 ga., 1 1/4 in. long) are used for fastening panels. Neoprene washer under nail-head seals hole to prevent possible water seepage

ENDWALL FLASHING nailed to house and header on bedding of nonhardening mastic provides waterproof seal. Mastic also may be used at panel lap joints



branding iron

Make your barbecue party a real western roundup by giving each guest his personal branding iron

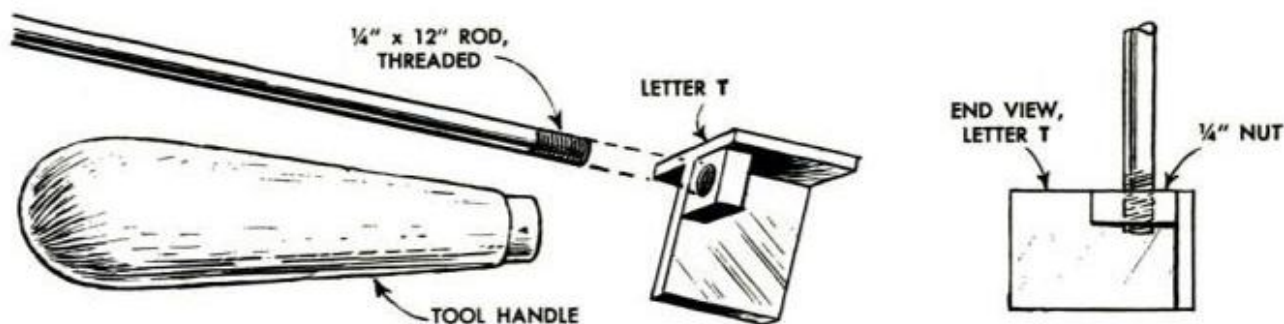


YOUR BARBECUE PARTIES will be more fun if guests are given their own branding irons and told to wrangle their steaks. Each guest heats the iron and plants his initial on the steak of his choice.

Make as many rods as there are guests. Fit a tool handle on one end of $\frac{1}{4}$ x 12-in. rod, thread the other end and screw on each

individual's initial. The letters are made by bending them cold from $\frac{1}{8}$ x $\frac{3}{4}$ -in. flat iron. Weld the letter together and then weld a $\frac{1}{4}$ -in. nut to the letter.

Over-all sizes of the letters can be any you choose. Ordinarily they would be made about 1 to $1\frac{1}{2}$ in. high with the widths in proportion. Finish the bends with a file.



LITTLE USED INITIALS I, Q, X AND Z ARE OMITTED

X 669

swimming pool

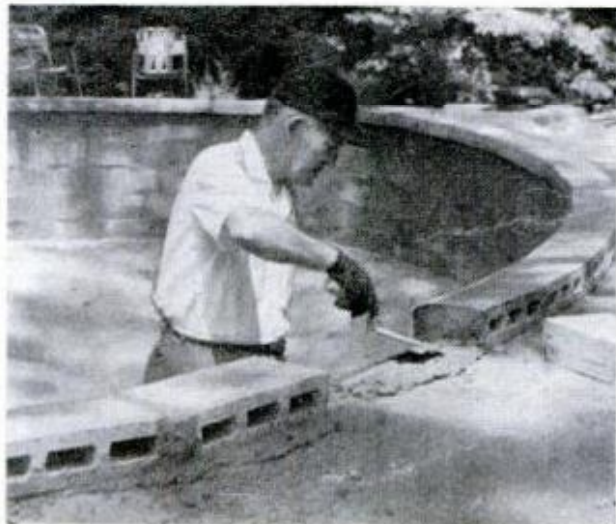


The 16 x 32-ft. pool you see on the opposite page was built for a total materials cost of just \$229

WHAT'S MORE all-summer fun for the whole family than a swimming pool? A pool and poolside patio provide everything one could wish for in leisure-time living out of doors. If your lot is average size, you have plenty of space right in your own back yard for a pool like that pictured.

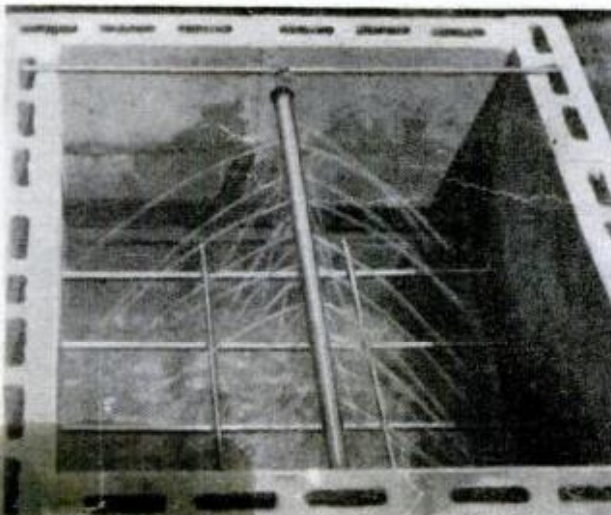
You build it yourself, starting from scratch. Take a long look at the details and notes on the following page and you've got just about the whole story of the construction. As the first step, couple two 50-ft.

(Text continued on page 230)



COPING IS MADE by laying concrete blocks laterally with 2-in. overhang. Openings in blocks are mortared

LOOKING INTO FILTER before filtering materials are added. Note the support bars and spray head



APRIL 1961



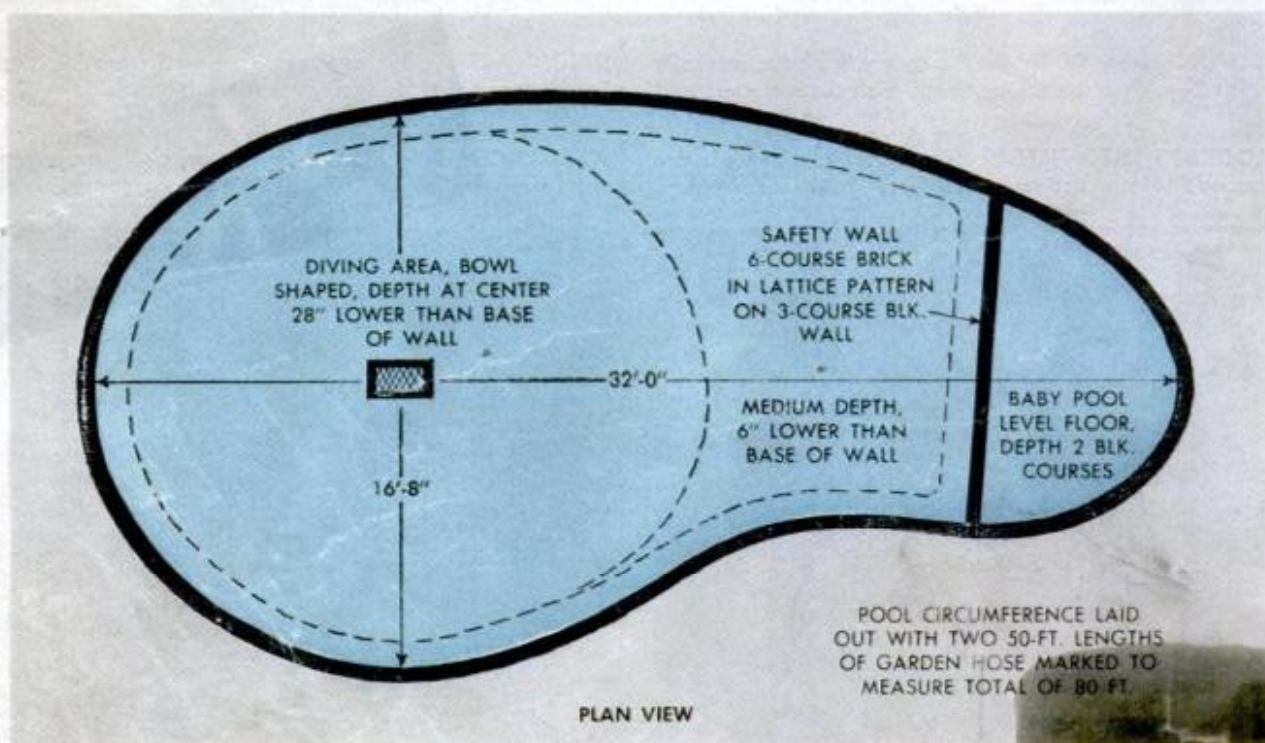
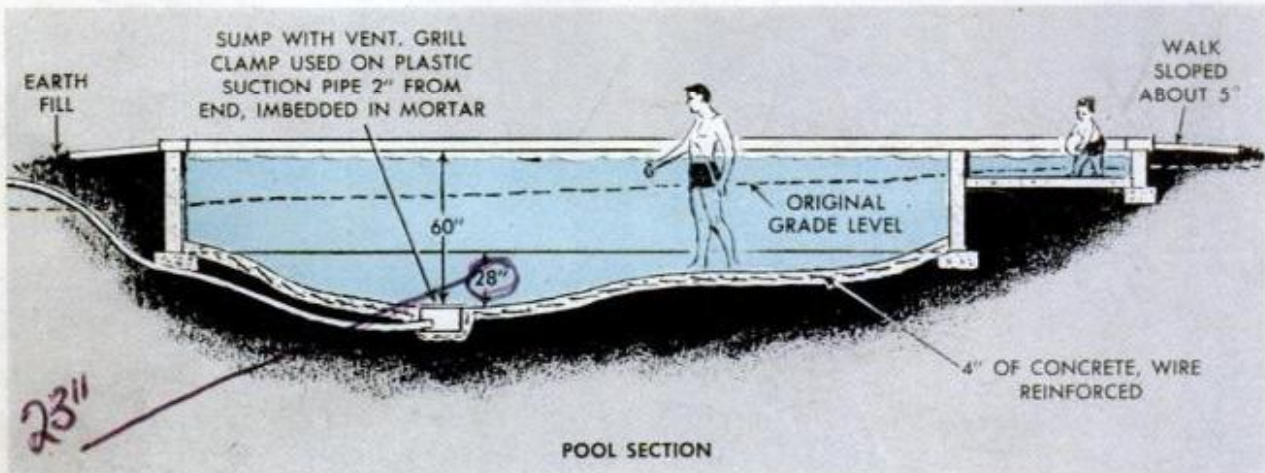
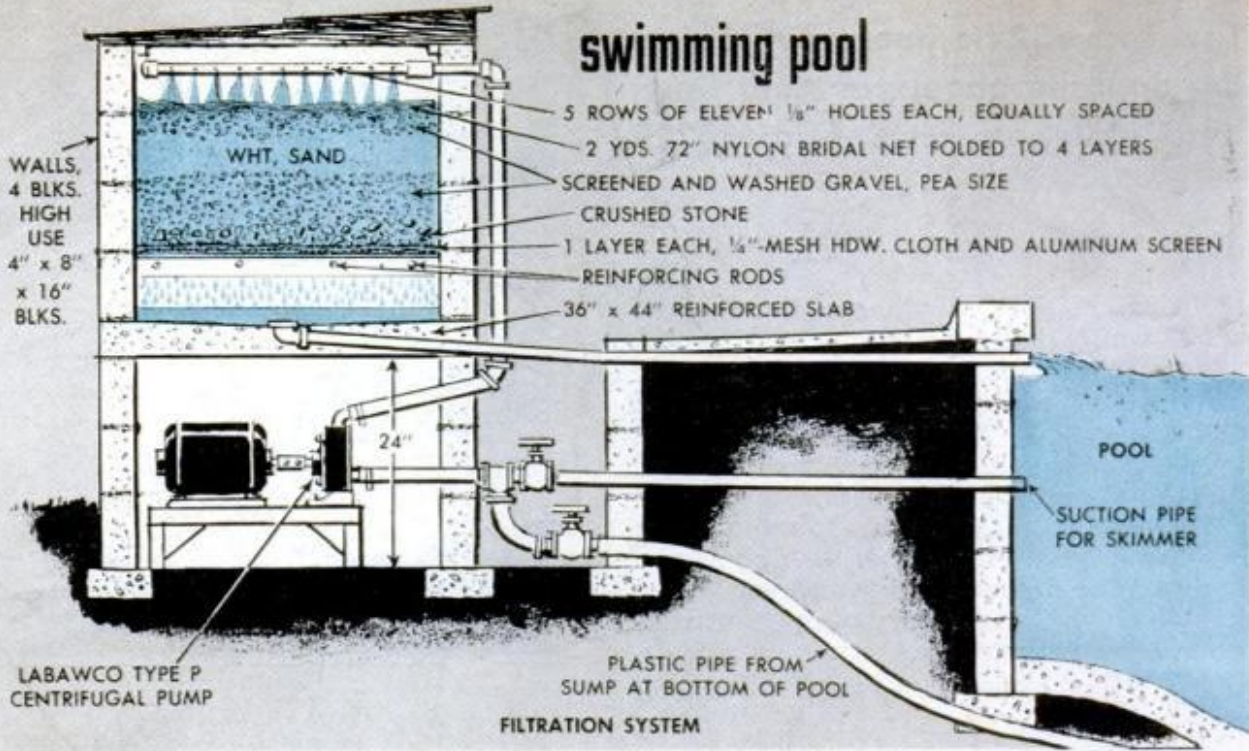
DIVING AREA is dug out after pool walls are laid up. Earth excavated is later used as fill outside walls

WALL IS CEMENT-PLASTERED with specially prepared waterproof mix and is finished with masonry paint



MORE

swimming pool

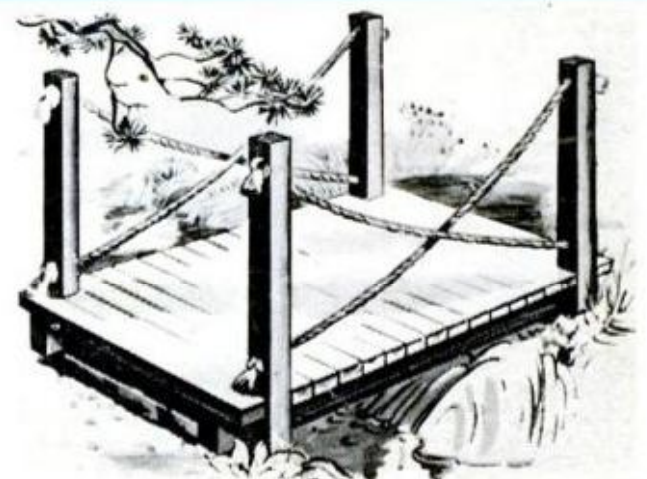
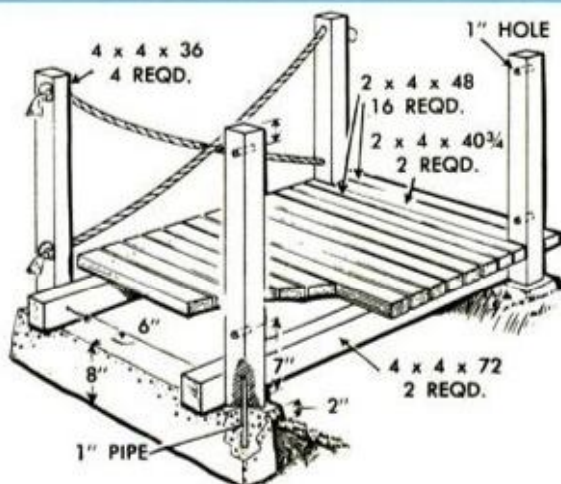
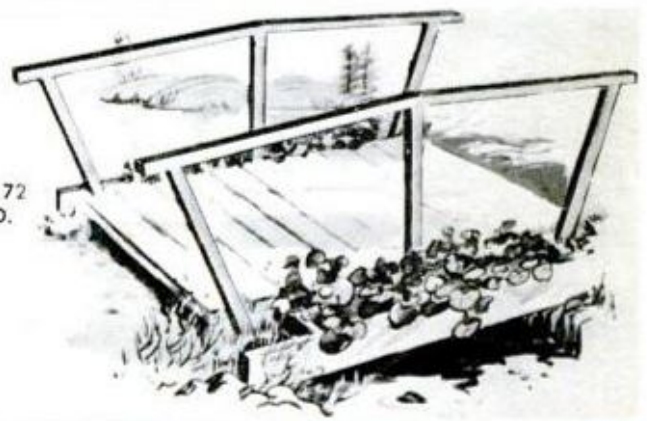
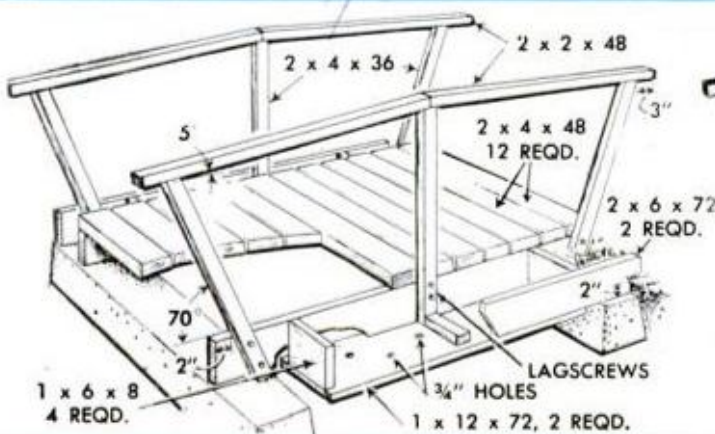
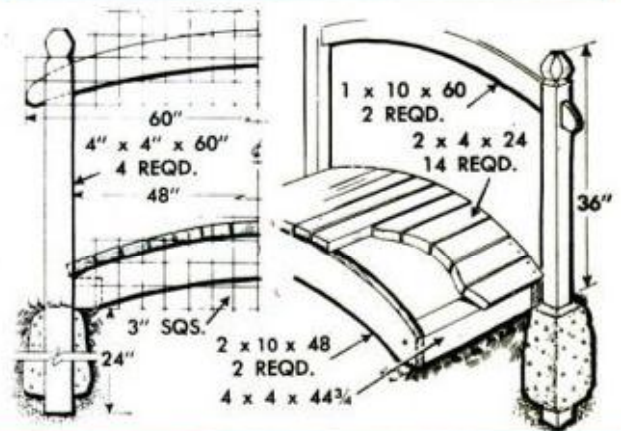


bridges

Make a footbridge the center of interest in the garden—one that invites your guests for a stroll

SURE, you can have a footbridge in your yard, even if there is no creek or pond to give you a good excuse for one. Why not go Japanese and build the "moon bridge" design over a shallow garden pool? The pool can be of irregular shape, made simply by packing a stiff concrete mix against a scooped-out earthen form.

The bridge may be varied to suit your fancy and the garden landscape. Here are several suggestions to make the bridge an eye-catching point of interest. It may be built without the railings or with a railing on one side only. Rope railings add a necessary design detail.



fences

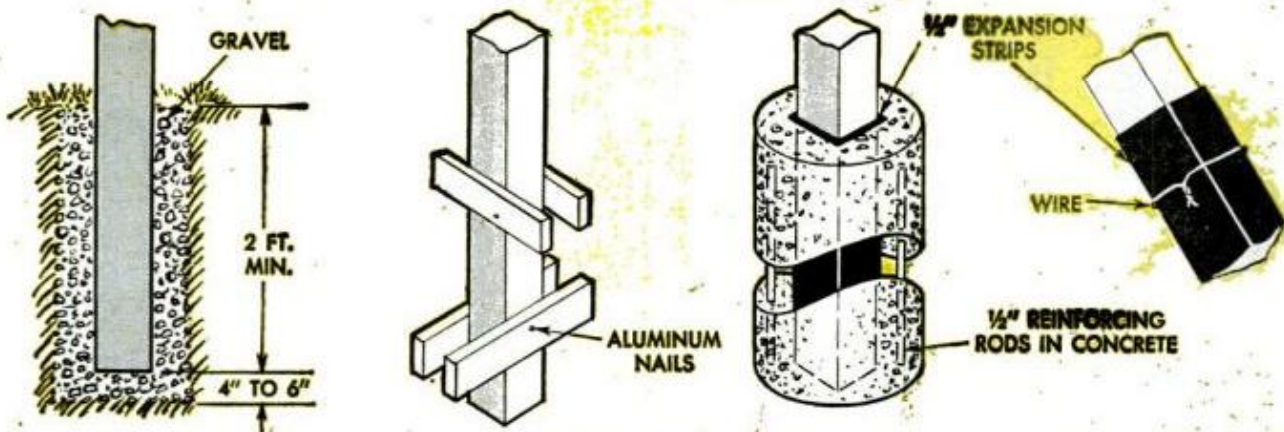
X270



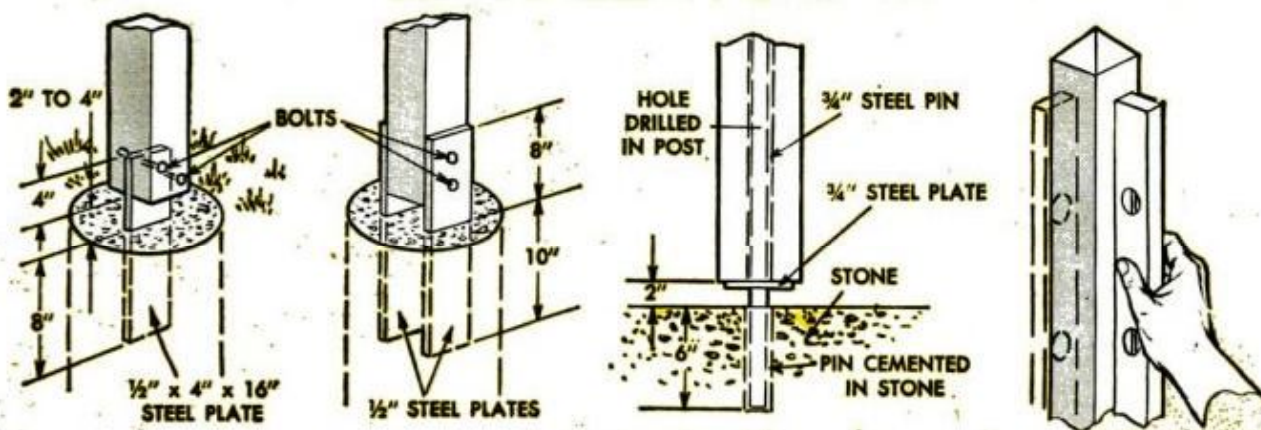
Choose any one of these six attractive fence styles and build it yourself with only a few common tools

A FENCE has a place in modern living. It can form the walls of your outdoor living room. It can assure you privacy, guide a breeze across your patio or serve as a wind-break. It can accent architectural lines of your home, curtain unwanted views or frame a landscape, form a backdrop for flower plantings. And a fence can be attractive just in itself.

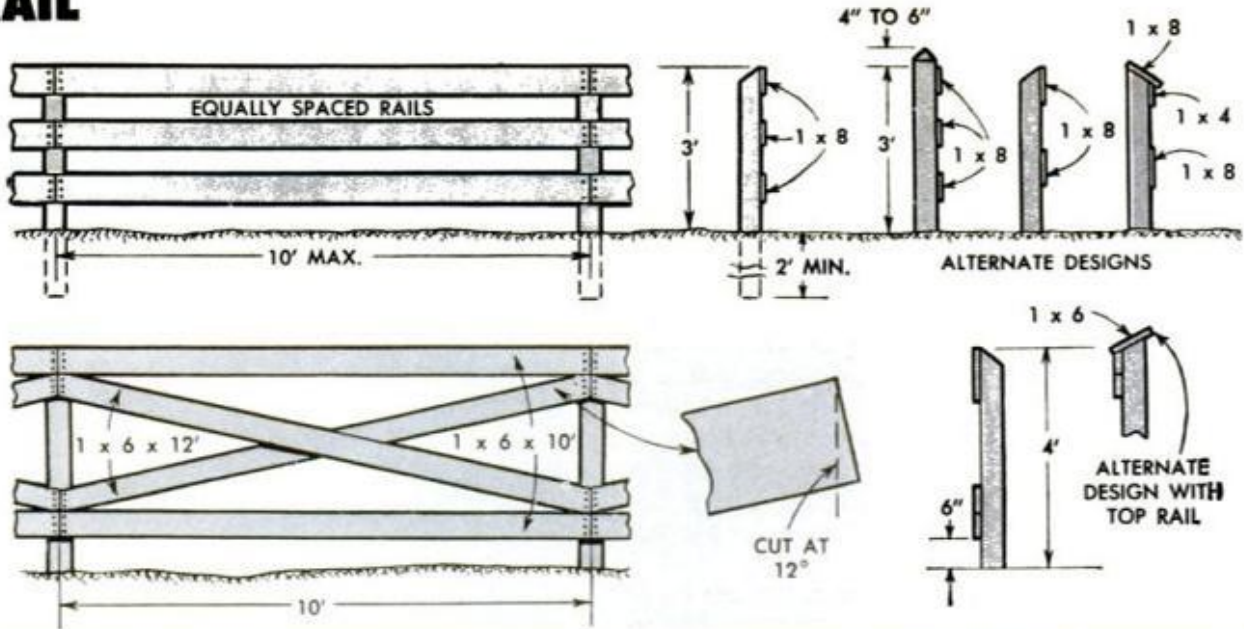
Fencing is permanent and must be built of durable materials. Its design must fit the property and suit your requirements. So,



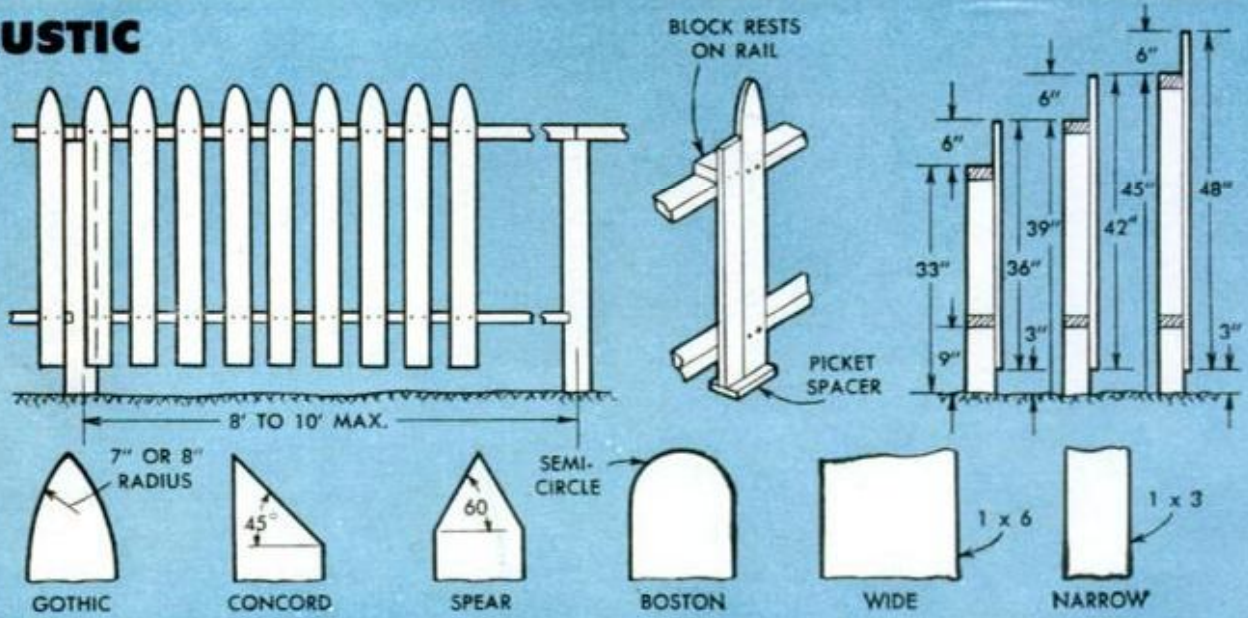
selection of materials and design requires a little forethought. First, you make sure you know where the property lines are located and then you check your codes governing the location and height of fences permitted in the community. Next, you select woods that are resistant to decay such as cedar, redwood and cypress and decide on the design that suits you. Details above and below show different methods of setting posts to give the necessary rigidity and prevent rapid deterioration of the wood. Setting in tamped gravel is perhaps the simplest and fastest way of anchoring posts in heavy clay soils.



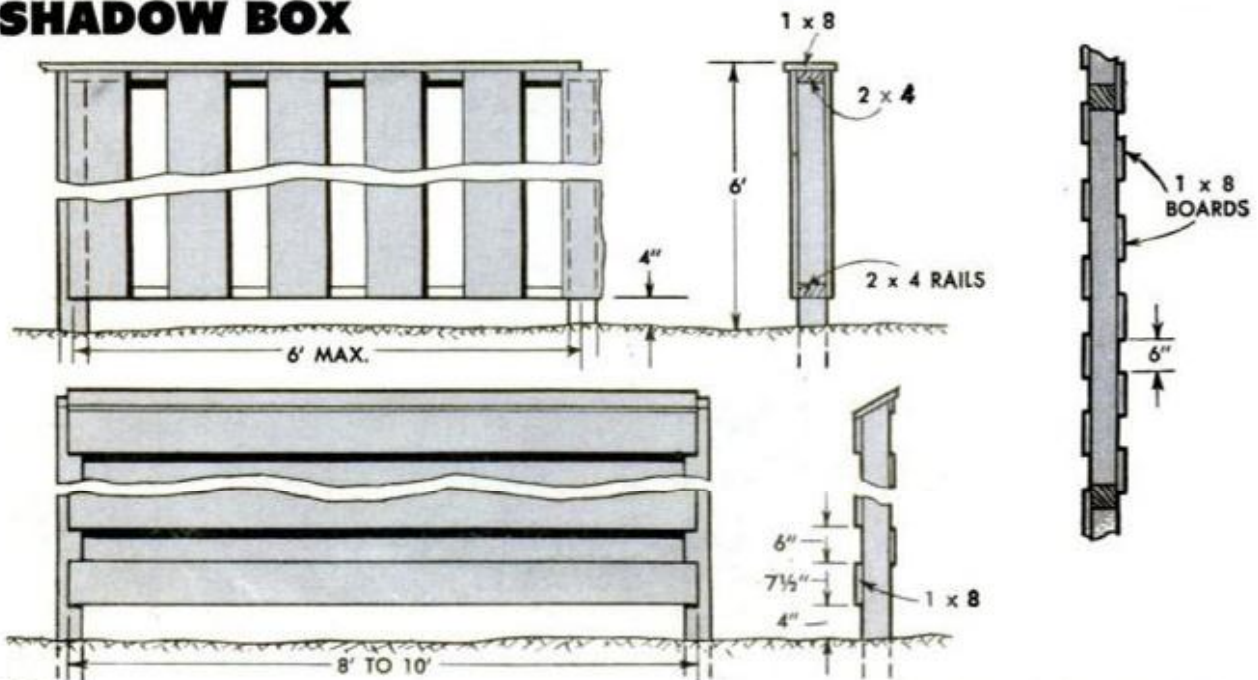
RAIL



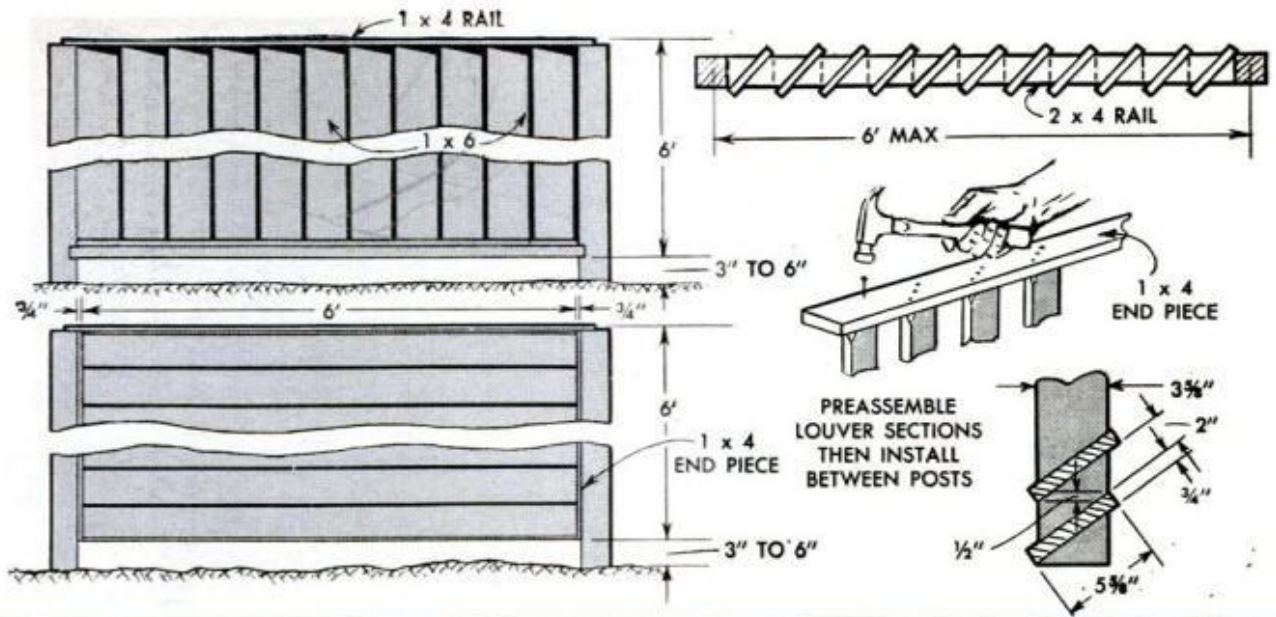
RUSTIC



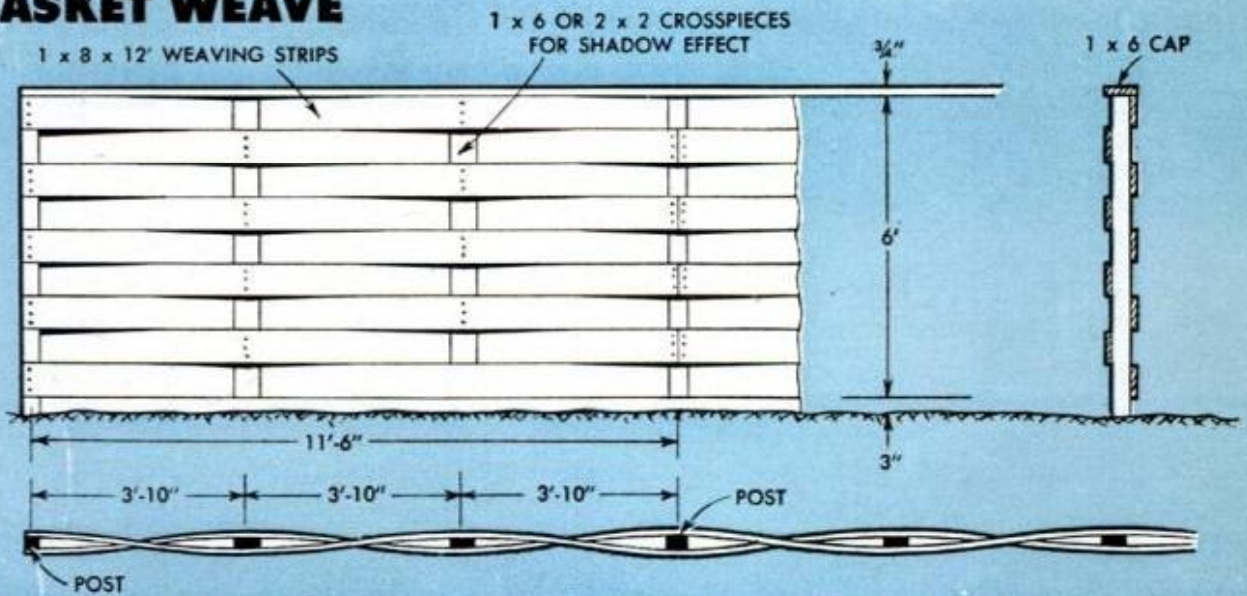
SHADOW BOX



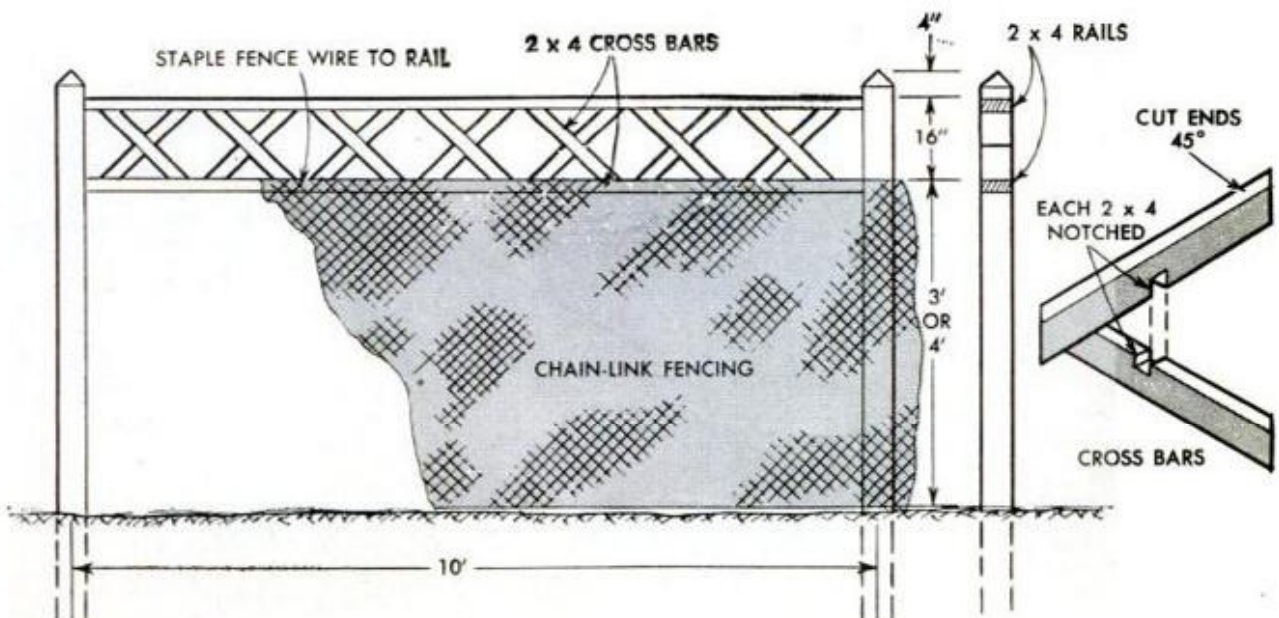
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BASKET WEAVE

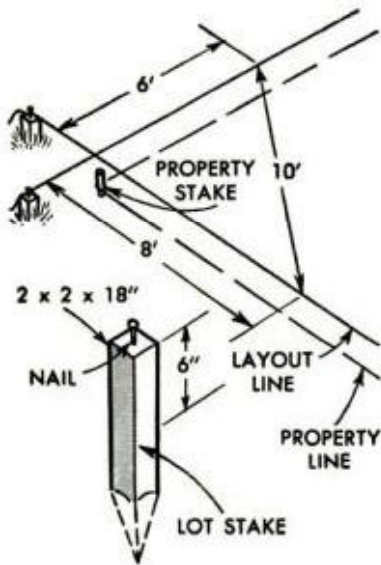
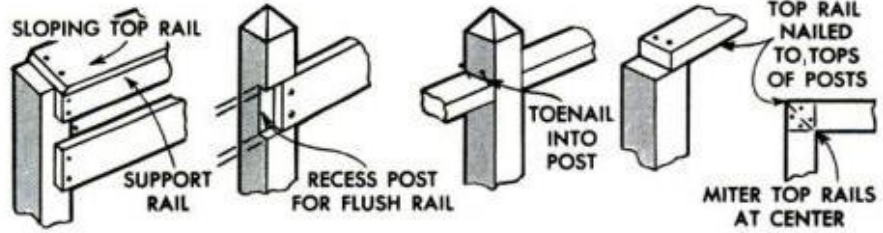
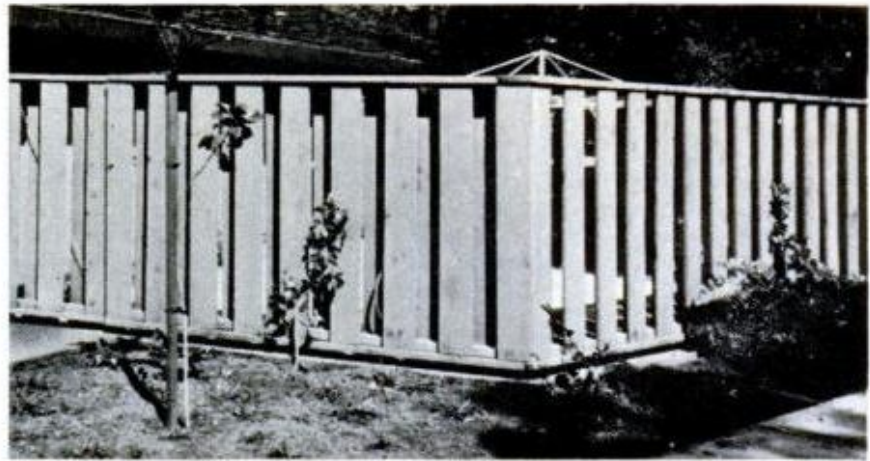


COMBINATION



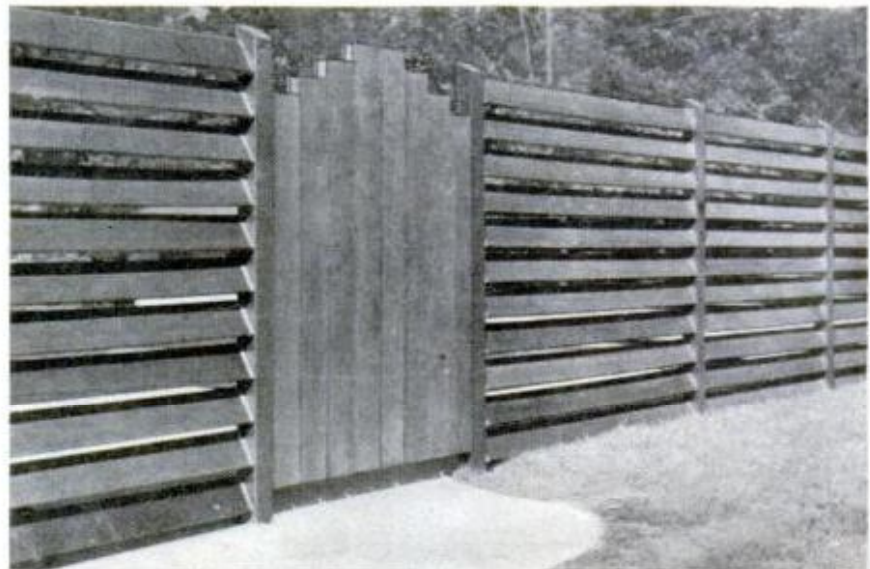
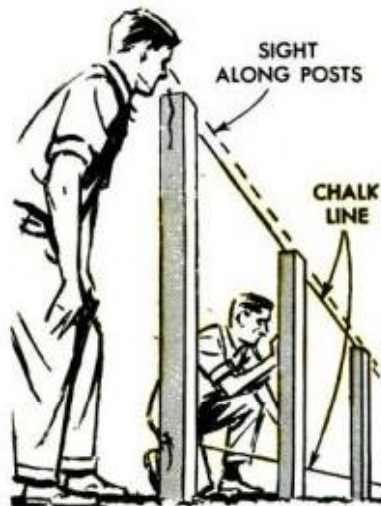
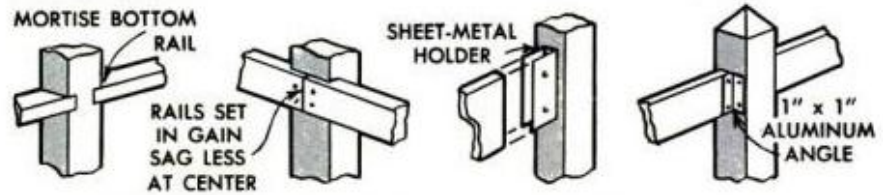


SOAK UNTREATED POSTS in creosote before setting. Treated portion of post should extend at least 6 in. above grade level



In lighter soils posts should be set in concrete by any one of several methods detailed. Unless posts have been pressure treated with creosote it's a good idea to coat the wood with a preserving chemical or soak that part below ground in creosote before setting. Taking your choice of any of the several designs illustrated build the fence with careful attention to the simple details of construction. That's what makes a neat, workmanlike job that pleases the eye of a craftsman. See that the posts are lined up at the time of setting. Make sure before you cut stock to length that you have the correct measurements. Keep the nails well back from the edges and ends of stock so that the wood doesn't split when the nail is driven home. A fence is exposed to all kinds of weather all year 'round so use aluminum nails for fastening. ★ ★ ★

WAYS OF LOCATING fence and aligning posts are detailed above and below. Close attention to detail makes a workmanlike job



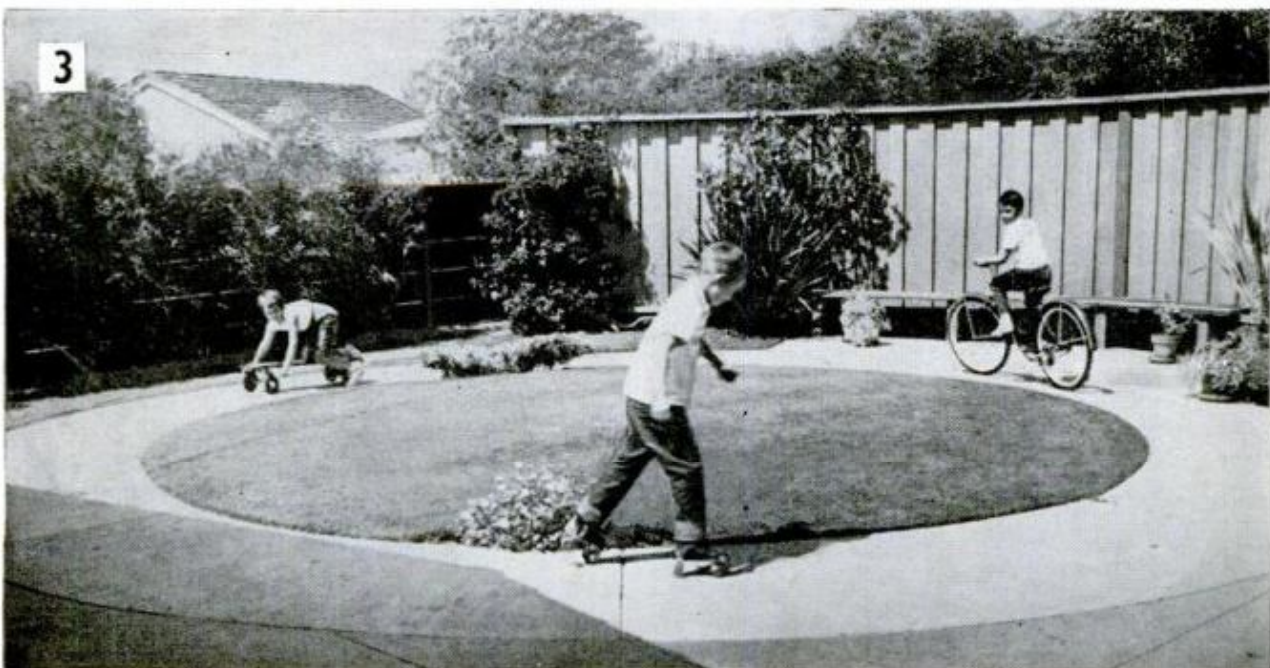


for the backyard

1. VIEW BOX, an Alcoa design of the future, is a 16-foot-square portable retreat that's made up of light aluminum sections

2. GARAGE DESIGN includes a plant ledge along one wall. Ledge, made of concrete block, holds plants at convenient height

3. CIRCULAR WALK provides maximum length in small area for children on wheeled toys. It's also handy for lawn furniture



speed lawn chores

IT WAS MAN AND MACHINE pitted against time and grass in my own mid-summer Olympics. The purpose: To prove that *anyone* can set performance records—with enough supplemental power.

The playing field was a 60 by 180-foot lot covered with such hazards as my brick home, a few trees, driveway, about 50 feet of hedges, some 150 feet of wood fence and, otherwise, by grass in general.

The Decathlon, designed to prove that mechanization can save hours of time, consisted of mowing, trimming and sweeping the lawn and clipping the hedges. Base time for the course was established by leg- and arm-powered tools on a day I still recall

as Strenuous Saturday. Here's how it went:

The lawn took two hours by hand mower, which, of itself, wasn't too great a chore. But then came 86 minutes of clipping under fences, around sidewalks and other places the mower missed. I rested. After that came 41 minutes with the hedge trimmers, a longer rest, and finally 19 minutes with the lawn sweeper. Total time: 4 hours and 26 minutes (with rest periods unlocked). Frankly, I was tired.

There soon followed, though, that memorable day when I wheeled out the full array of mechanized equipment and slashed the time in the Suburbanites' Decathlon to 56 minutes—a saving of 3½ hours.



By John Linkletter

Editor's yard jobs go almost five times faster after mechanization

Preliminary heats in earlier weeks had sharpened my skill with the Porter-Cable garden tractor, so I whisked its 32-inch mower attachment over the lawn in 26 minutes. Moving smoothly (ground rules say no running) to the electric hedge trimmer and electric lawn trimmer, I completed those phases in 6½ and 13½ minutes respectively. The sweeper behind the tractor finished the job in 10 minutes.

Of course, variables—such as mower size—affect time. But with mechanization, a few minutes more or less don't matter; I could finish one job fresh enough to start another and do all of them in a short portion of a Saturday morning. ★ ★ ★

EASIEST WAY to mow and sweep is on riding machine, left. Tractor did 60 by 180-foot lot in 36 minutes

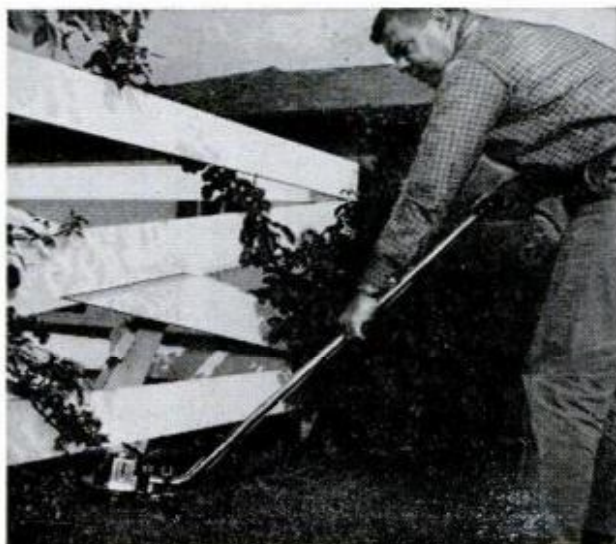
ON 50-FOOT HEDGE, electric hedge trimmer cut 41-minute job to a mere 6½ minutes—and saved blisters

TRIMMER, bottom, gets to places mower can't. Blade of Black & Decker unit trims flat, tilts to do edging



SELF-POWERED 21-inch rotary mowed lawn and gathered grass clippings in 45 minutes. Bag on side of Toro machine can be exchanged for empty one in seconds

LAWN TRIMMER cut this job from 86 minutes to 13½ minutes. Porter-Cable machine, below, is very lightweight. Electric trimmers proved great back-savers



ideas for shade



LARGE PLASTIC DISKS, looking like petals of a giant flower, provide pool-side shade at the Charles Smith home in Pacoima, Calif. The metal upright that supports the circles is topped by a cone-shaped kerosene torch

CURVED STEEL CHANNELS support a gracefully arched patio covering. The canopy is made of translucent fiberglass panels attached to the three-and-a-half-inch steel members. The patio surface is a concrete slab



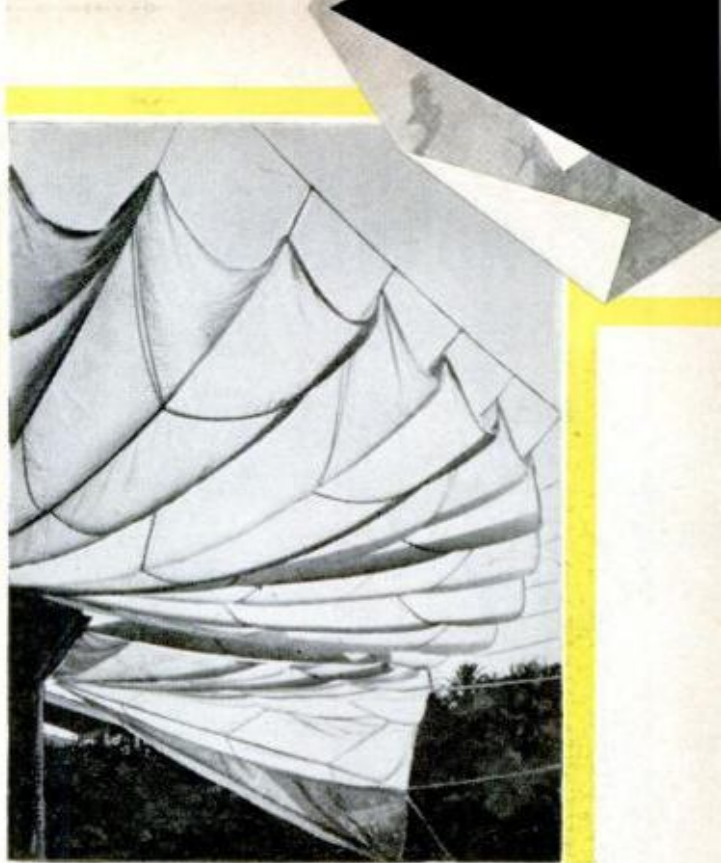
Striking new shapes for shade can be created from steel and plastic — and even parachutes

WITH **INGENUITY** and some material that'll stop the sun's rays, you can have shade just about anywhere you want it.

An attractive — and maintenance-free — device for casting shadows is a cluster of plastic disks suspended from a metal stand. The 36-inch circles at left were cut from colored quarter-inch plastic.

A contractor designed the arched steel-and-fiberglas covering, lower left, for the patios of new homes he built.

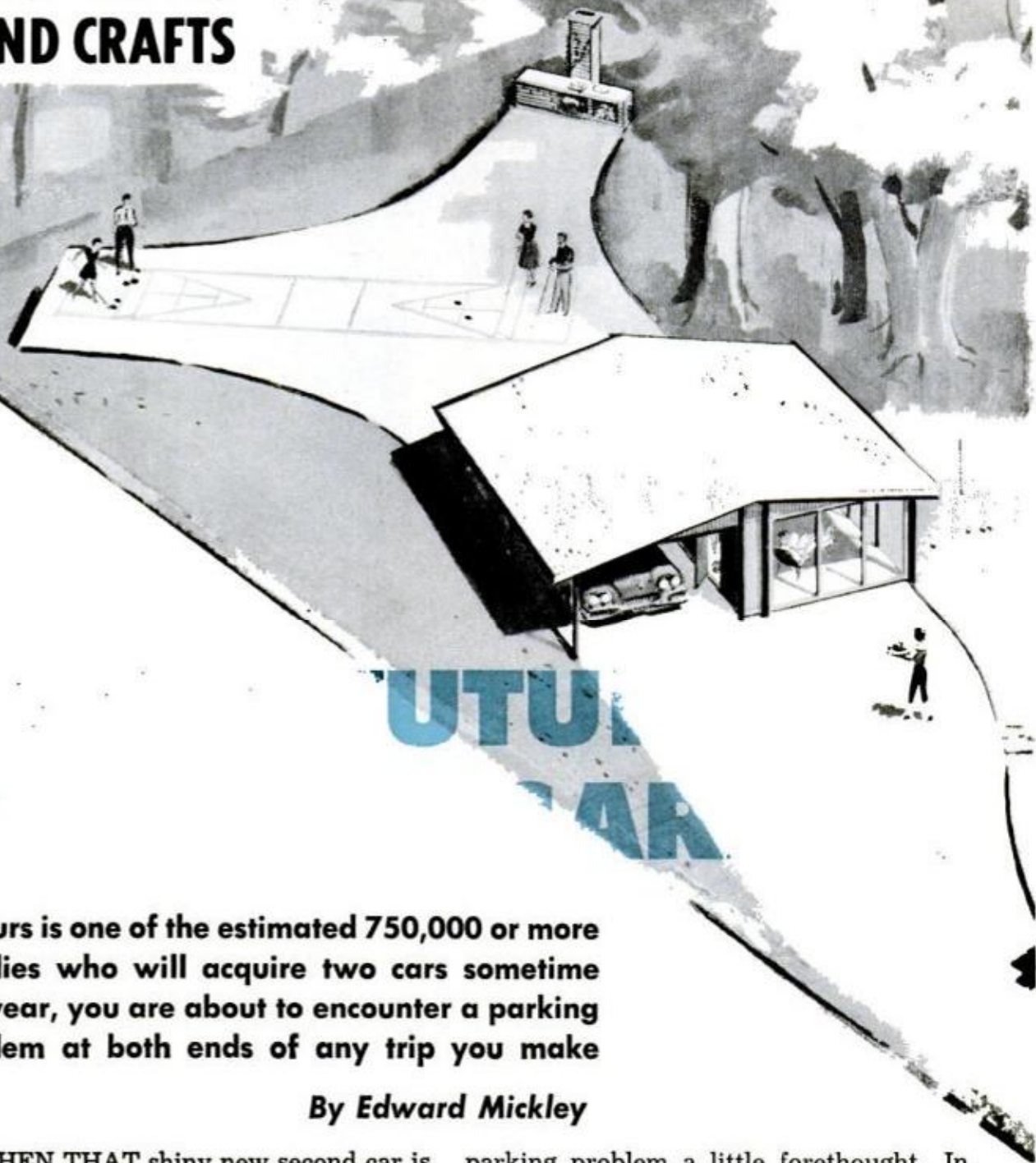
And Elmar Baxter, West Covina, Calif., has found that surplus 24- and 28-foot parachutes make excellent patio covers. He also uses the 'chutes to keep debris out of his pool and to keep the water from cooling off too much at night.



SURPLUS NYLON PARACHUTES form lightweight canopies to shade back-yard activities. The fabric is held in place by fastening the main portion of the 'chute to the roof of the house and the shroud lines to a guy wire



SHOP NOTES AND CRAFTS



If yours is one of the estimated 750,000 or more families who will acquire two cars sometime this year, you are about to encounter a parking problem at both ends of any trip you make

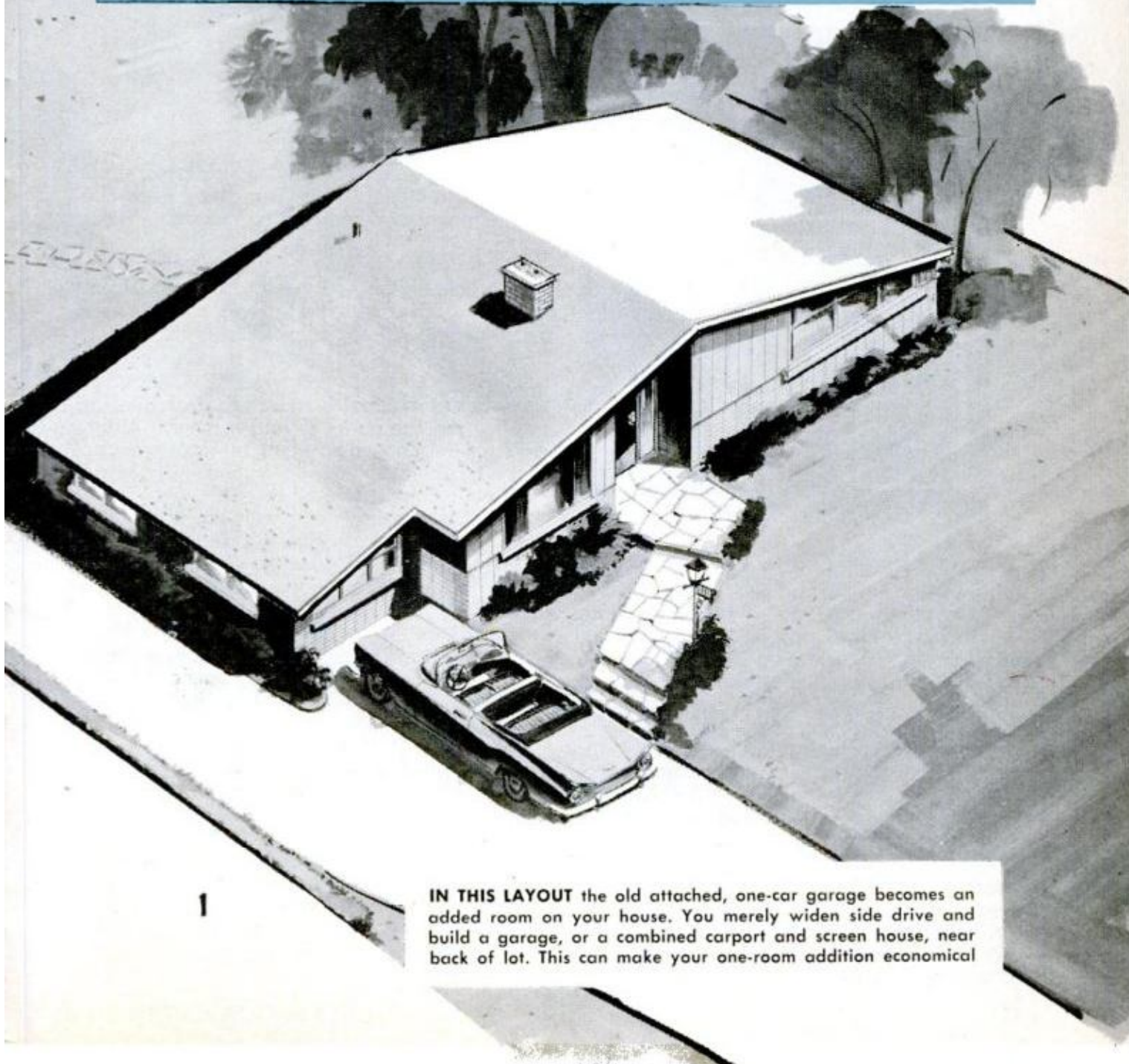
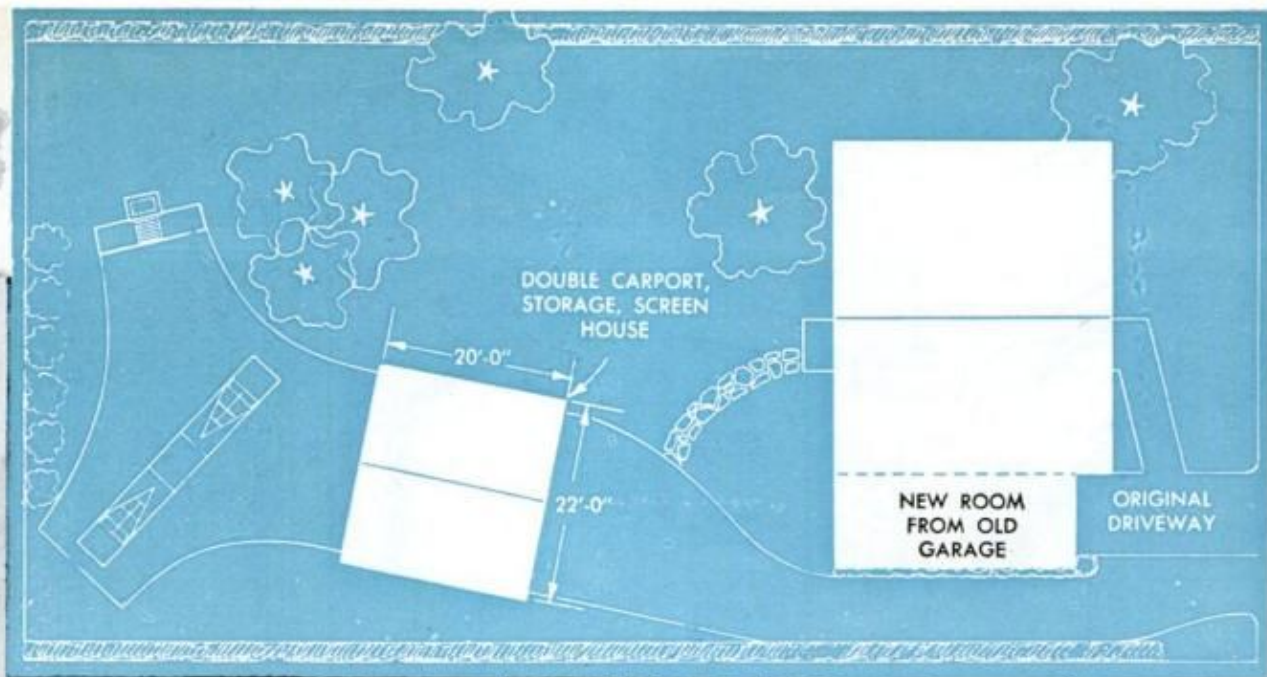
By Edward Mickley

WHEN THAT shiny new second car is delivered the question is, where to park it? Unless you have taken time to do a little planning and possibly some remodeling beforehand, there may seem to be no simple answer except to let it sit in the driveway. If you have a single garage and a narrow side drive and you park the second car tandem, the trapped car usually is the one wanted, or needed in an emergency. Few existing two-car garages permit opening both doors of one car with the second car parked alongside, an inconvenience at best; a hazard at worst.

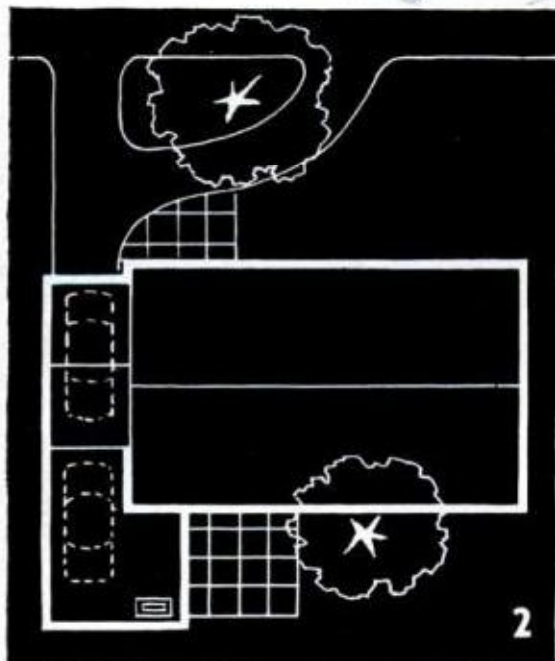
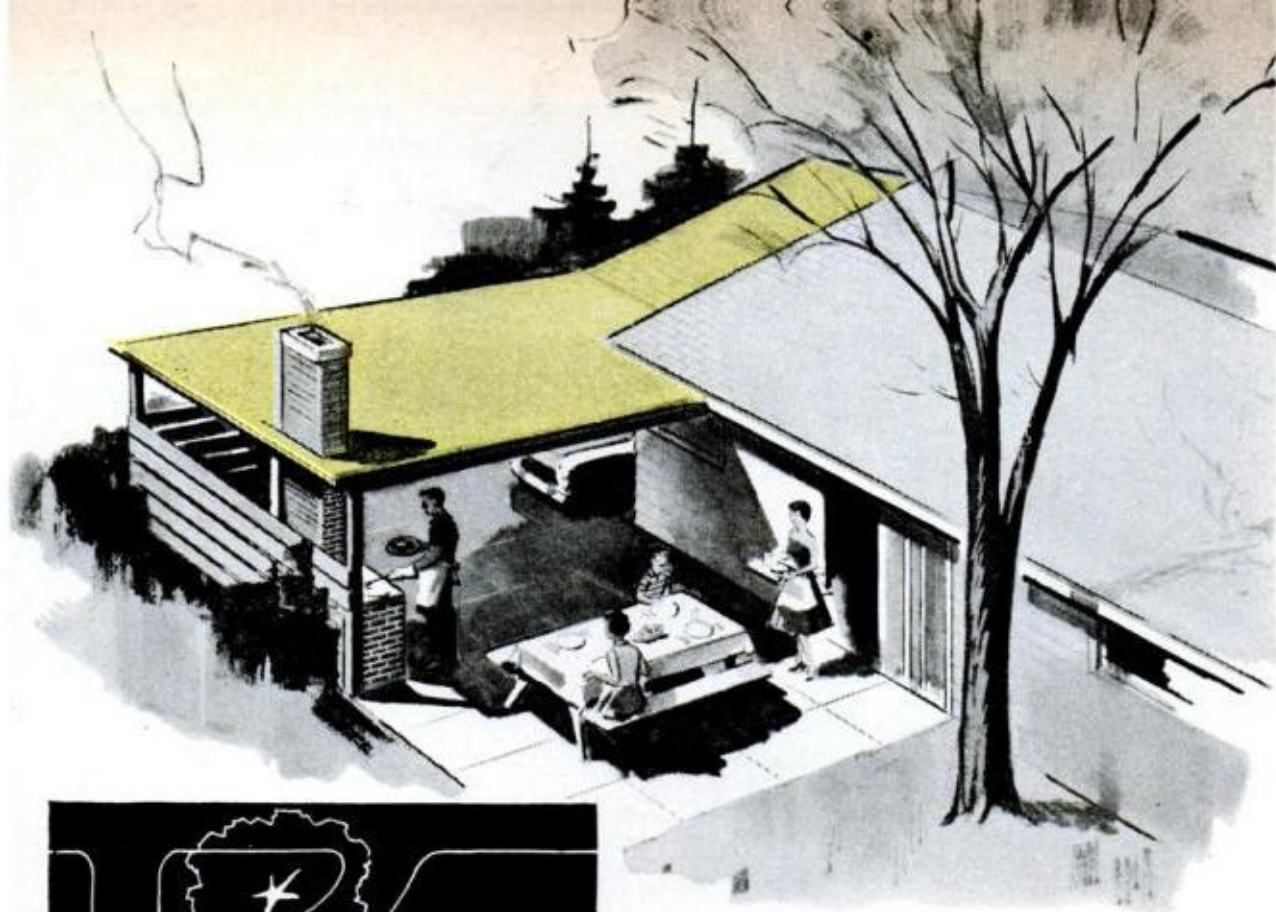
But nearly all types of existing garages can have a future if you give the home

parking problem a little forethought. In many instances the original garage can be utilized for second-car parking or for an extra room in the house. Either way you get not only a solution to your individual two-car parking problem but a property improvement and possibly more actual indoor-outdoor living space as a bonus.

The time to start planning is now. With everyone depending more and more on cars, a garage or carport should be planned for maximum convenience. Safety is another consideration. Instead of having to back into a busy street, a garage or carport can be combined with a new driveway, turnaround area, or possibly a circle drive to



IN THIS LAYOUT the old attached, one-car garage becomes an added room on your house. You merely widen side drive and build a garage, or a combined carport and screen house, near back of lot. This can make your one-room addition economical



permit heading into the street. If you have a house that now has a small, semiattached or free standing garage at the end of a long, narrow driveway, remodeling both garage and driveway will make it convenient for two or more cars. If your house has no garage, plan to build a double garage to catch up in one step.

Three questions should be answered during the planning of a remodeling project:

- What logical plan will make it easy to drive the car into the garage, step out with ease or drive the car into the street or alley again with minimum backing and turning?

- How can privacy be increased to make outdoor living even more enjoyable without being under the eyes of neighbors or passersby?

- Can the remodeling include provisions for outdoor games and sports to keep the children entertained at home and off the streets?

Good planning can help any homeowner achieve a logical answer to these questions. For example, a paved patio can do double duty if it is located near the garage. It then can be used as a turning area to permit heading out into the street. It can serve as a badminton court if holes are provided for poles and the court is laid out with paint. With a backboard and ring mounted on one end of the garage, the kids can enjoy a basket-ball practice court.

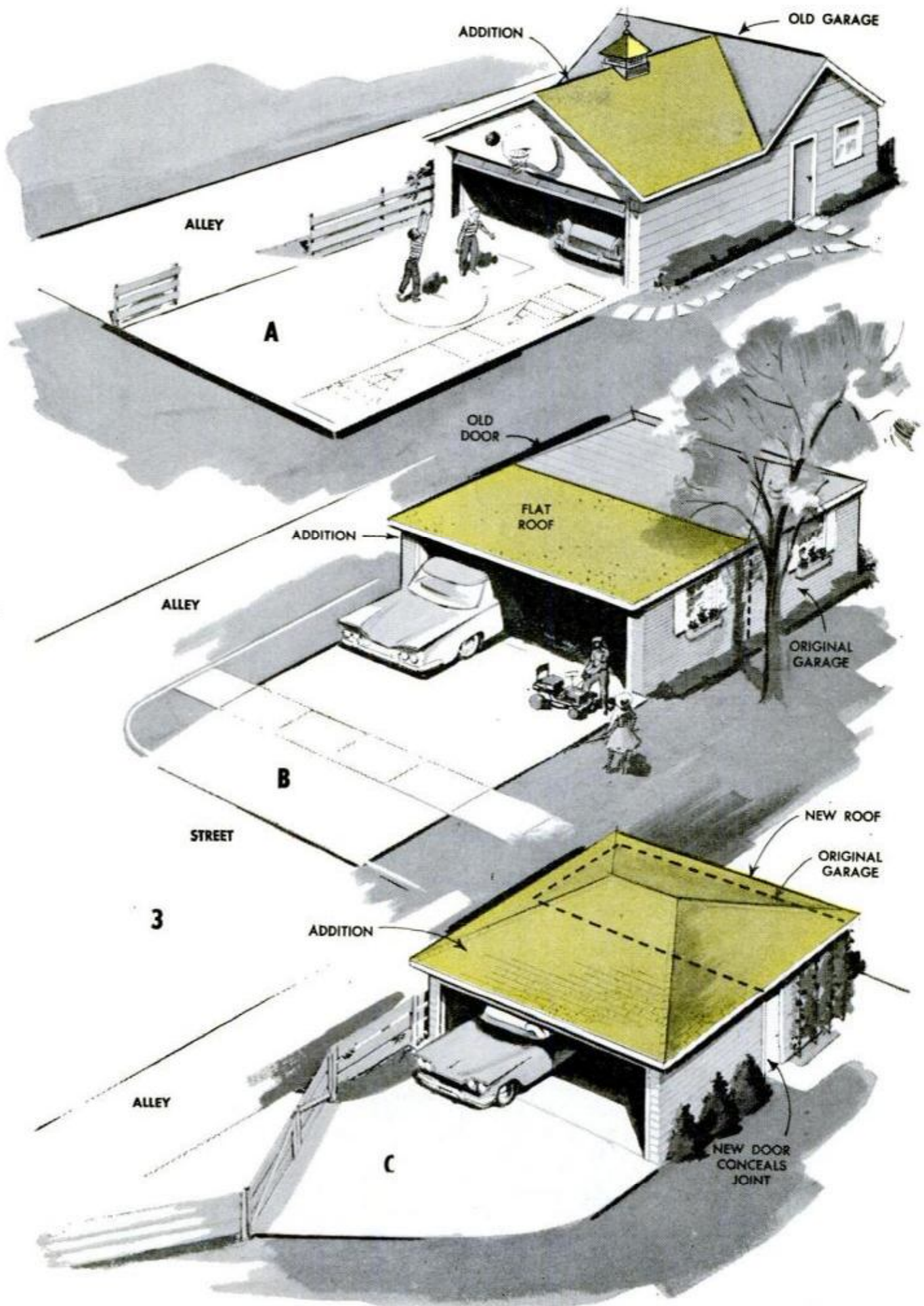
The first step in any remodeling job is to develop a plan. Since individual problems are seldom exactly alike, here are several typical problems and solutions that may help you.

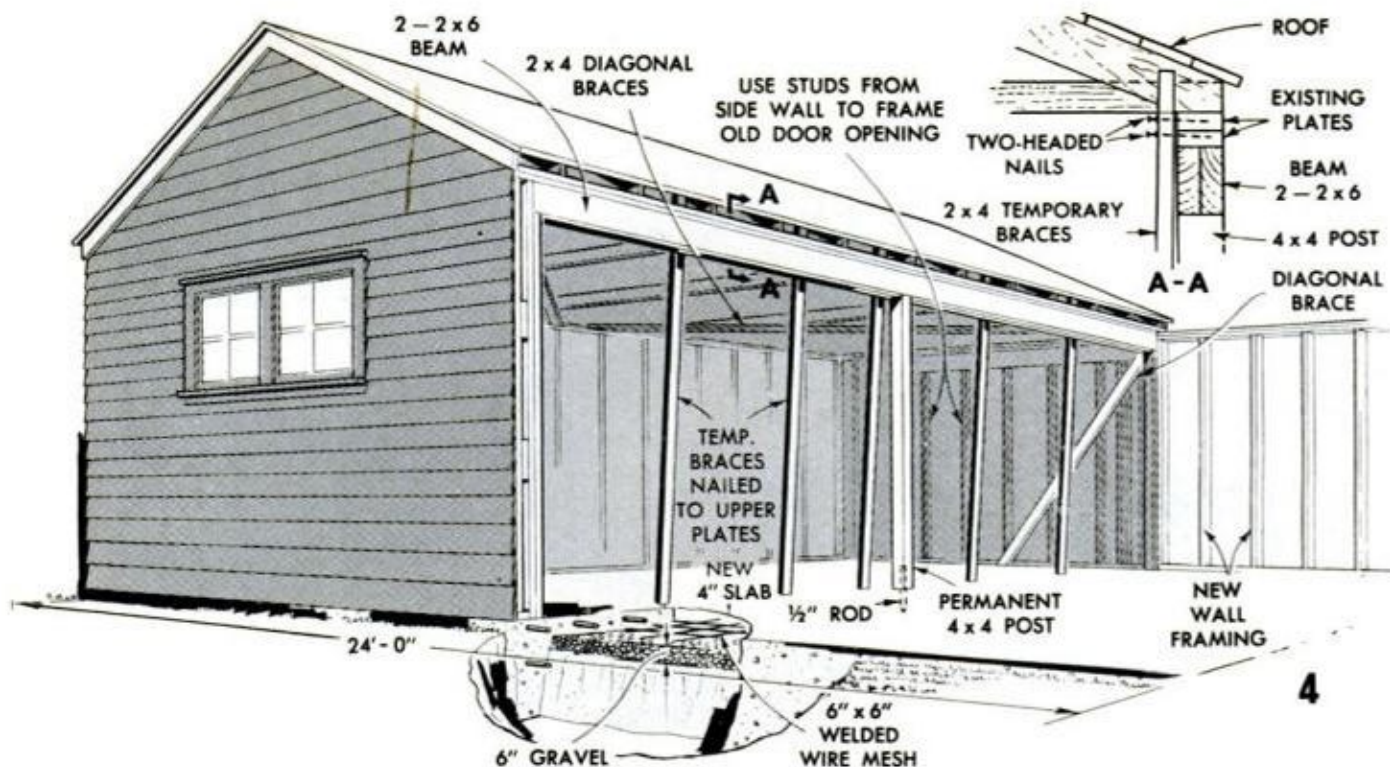
Problem: Many homes have been built since World War II with an attached single garage affording minimum space for the average car and no additional storage, work, or play areas.

Solution: Build a completely new double garage or carport near the back of the lot with a Y-type turn-around, Fig. 1, and then make the existing attached garage into an extra room of the house. The new double drive, with a turn-around at the back of the yard eliminates backing out of the drive and the turn-around area serves also as a roller-skating rink, and a court for basketball, badminton and other play.

A very similar problem is posed in

THREE WAYS TO ALTER AN OLD ONE-CAR GARAGE FACING ON AN ALLEY





the post-war development house with no garage or carport. Usually the structure is built across the lot leaving no space for an attached double garage or carport but with only space enough for a narrow drive.

Here again you can follow through as in Fig. 1 and build a double carport and if you wish, screen half of it as suggested in the illustration. By fitting the two ends with overhead doors and screening in the outside wall, the space does double duty during the warm months of the year. A row of storage cabinets can form a dividing wall and at the same time provide space for storing garden tools, bicycles, and other yard equipment. Most tract houses do not include storage space in the utility room for wheeled equipment.

The double carport works this way: When you drive in, take whichever space is open, or, if both spaces are unoccupied, use the accustomed stall for the car you are driving. Usually two-car families have firmly fixed locations for each car. When you are ready to drive out, pull ahead, turn around in the area at the back of the lot, and drive back through the space just vacated. By turning around at the back of the lot, you can head directly out.

Problem: As diagrammed and pictured in Fig. 2, the house includes a narrow one-car garage or carport attached to one side of the house. Many of the tract houses built since the war followed this design. A long drive leading to the garage requires a steady eye and a sure hand on the wheel while backing into the street. In most cases, the building code for the area will not permit building any structure between

the front of the house and the street. Also, the code probably requires a certain setback from the street, and all houses on the street will be set on the same line. Usually houses of this design are built on small or narrow lots which do not leave enough room for building an attached double garage. Before doing any planning or building check the building code.

Most building codes set up a minimum width that must be left clear between the house or garage structure and the lot line. This width of building-free area usually is termed a side yard. Some codes call for a minimum width in feet. Other codes set up side yard restrictions as a certain minimum percentage of the lot width.

Solution: Extend your single garage as in Fig. 2 to permit parking two cars in tandem. If your present car housing is a carport, it is a simple matter to open the back end to permit driving through. A garage will require removal of the back wall and addition of a supporting beam over the cut-out area, Fig. 4. The new addition may be a sheltering carport that runs naturally into a paved patio area with an outdoor fireplace.

Problem: Another problem garage is the small single structure at the rear of the lot. Entrance to the garage is from a narrow alley with severely restricted turning space. In such a situation, you probably would find it necessary to back and turn a number of times before finally squeezing the car into the narrow, undersized garage.

Solution: Where the old garage fronts directly on the alley at the lot line, plan a new entrance from the side into a flat-

roofed carport having a curved approach, Fig. 5. This type addition can double as an entertainment shelter. The old garage still can be used for one car, or you can make one wall form the end of a new, gable-roofed garage or a flat-roofed, two-stall carport, Fig. 3, A and B. If the second car is to be a new compact model, the chances are it will fit nicely into the old garage. This latter arrangement of the old and new is especially suited to a corner lot where entrance to the old garage is off the alley and where there is still space available for a full-width ramp, or approach, from the street to the new two-car addition, Fig. 3, B. Here you are actually providing space for parking three cars at a minimum outlay. Nearly all old garages fronting on alleys will permit this addition with very little alteration of the original.

Problem: This one is similar to the foregoing but involves a garage built on an inside lot and fronting on an alley at, or near, the property line. Size of the lot limits the space available for a curving, concrete approach off the alley. You need only two-car garage space, no more. The original structure is of brick and has a gable roof.

Solution: Utilize the old structure as a part of the new one by removing the roof and one wall and bricking up the original entrance. Then you extend the end walls, pour a curved concrete approach from the alley, provide a new hip roof and you end up with the attractive modern job you see

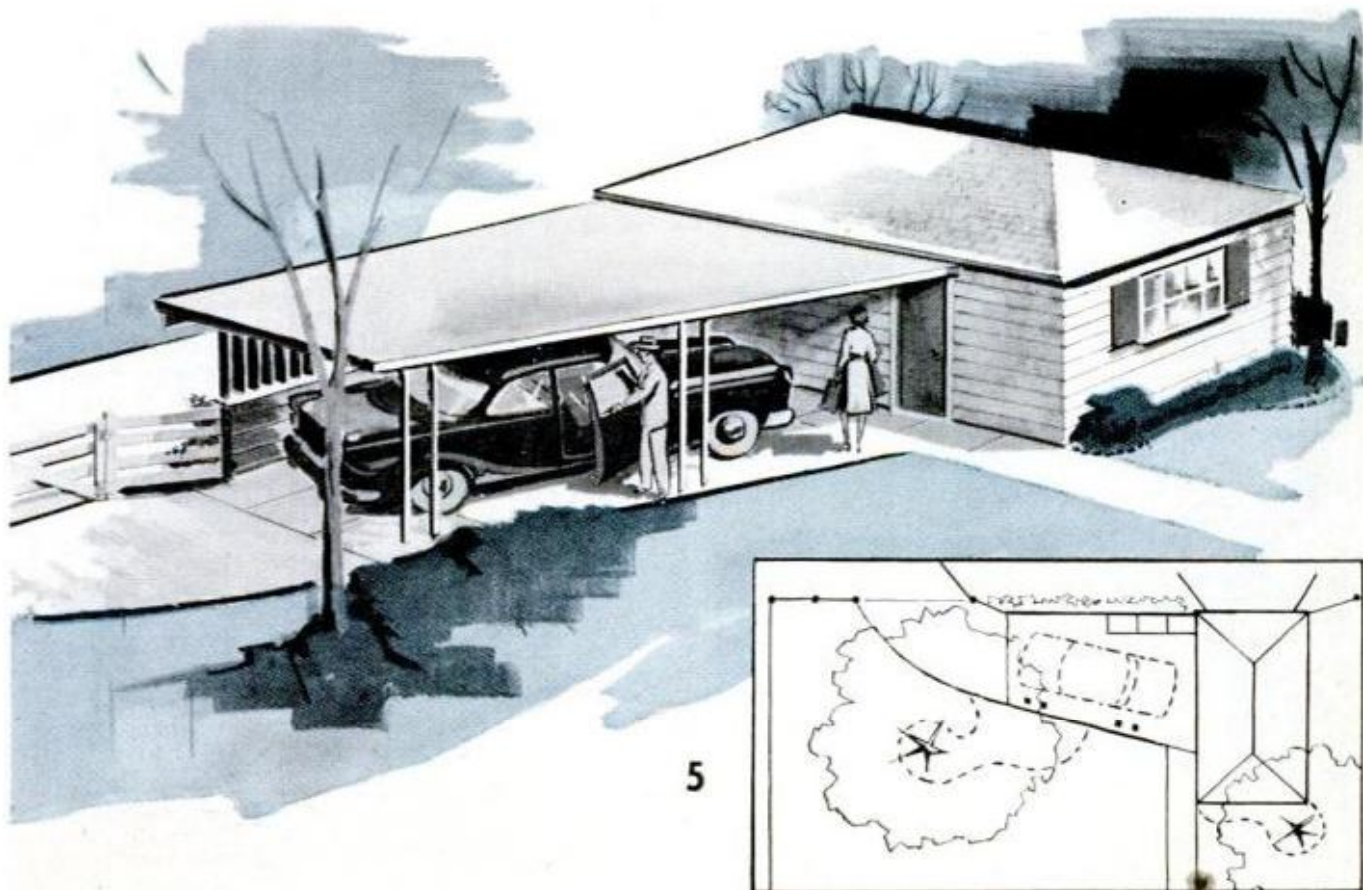
in Fig. 3, C. Relocating the service door at the point where the new masonry wall joins the old makes the new-and-old joint less conspicuous. You don't especially care about the alley side as you don't see it. These three solutions, Fig. 3, A, B and C, will take care of most problems posed by old garages that face on alleys. One thing to remember: Always check your local building codes before planning changes. Know exactly what you can and cannot do before beginning work. Also, keep in mind that when the side of the structure is opened for making an addition, the plate must always be supported with a beam, or lintel, made and installed as in Fig. 4.

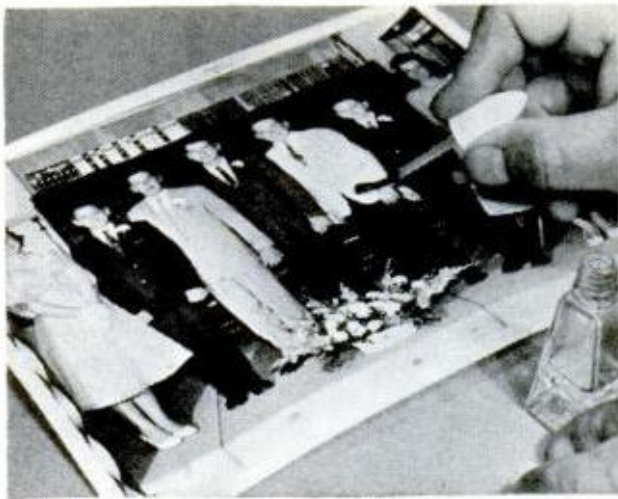
Problem: Not pictured, but similar to that shown in Fig. 3, A. You wish to add a new single-car garage to an existing garage as an Ell having an approach curving off the paved alley.

Solution: Proceed by locating the new addition with one wall aligned with the front of the old garage. This will give you an easy, curving approach from the alley.

Problem: This is an old one involving countless numbers of old single-car garages that lack a few inches of admitting the newer, longer cars.

Solution: Add an extension at either end of the original structure. If you are careful to select siding, shingles, trim and windows that match those of the old structure, you will finish with an addition that will blend right in with the old building. ★ ★ ★





DARKROOM HINTS

Spotting Ferrotyped Prints

After a print is dry and comes off the ferrotyping tin, several dull spots occasionally show up. Instead of soaking the print and repeating the drying process such spots can be given a matching gloss with clear fingernail lacquer. Brush the spots lightly with the little brush that is a part of the stopper. The fingernail lacquer dries almost instantly without showing any noticeable difference in the glossy surface.

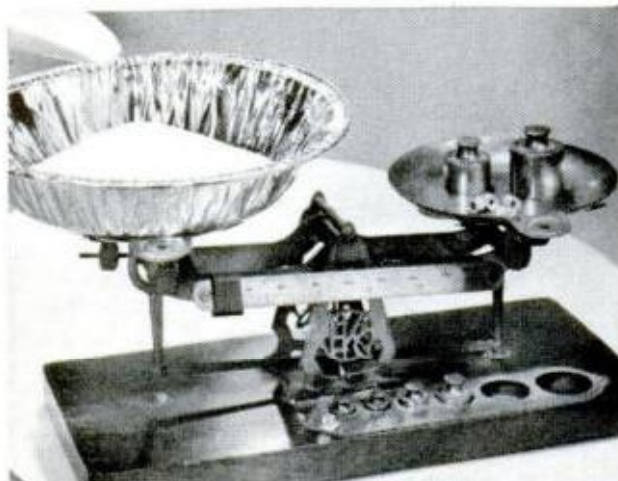


Plate Increases Scales Capacity

Aluminum plates such as those in which frozen foods are packed will greatly increase the capacity of your darkroom scales and make it easier to handle the chemicals. Their light weight can easily be compensated by adding a few pieces of lead shot, but if you have two plates, place one on each pan so that they balance each other. Lacking the plates, cut out two pieces of paper to the same size and crease one piece several times so that the creases meet at a point in the center. The paper will form a quick on-the-spot pan for chemicals.



Store Sponge in Glass Jar

There is always the chance of scratching and contaminating your negatives unless the sponge used for swabbing them is kept perfectly clean. A very practical and convenient way to store the sponge is to place it in a screw-top jar. Fasten the cover to the underside of the shelf with two screws so that the jar can be removed or replaced with only a twist of the wrist. The use of the jar keeps the sponge off photographic work tables, where it would pick up chemical dust that eventually would discolor prints and negatives.



Novel Process Textures Prints

Want to do something different with your glossy prints? Try giving them a textured surface for an unusual novel effect. Cut a piece of clean plastic screen wire larger than the print being textured. Lay the ferrotyped print face down on the screen. Then run a roller over it several times. To be effective, be careful that the print does not shift while being rolled. You'll find single-weight prints are the best thickness to use for this novel treatment.—Bil Toman

NEW FOR SHUTTERBUGS

HAND-CRANKED VIEWER-EDITOR lets you have a quick preview of your 8-mm. movie film as soon as you get it back from processor without fuss and bother of setting up projector. Battery illuminated, 200-ft. film capacity, gives twice-up magnification, can be cranked at any speed without flicker or blackout. Folds compactly for carrying in pocket. Sells for \$12.95

Manafield Industries, 1227 N. Loyola St., Chicago 26

ELECTRIC-EYE MOVIE CAMERA is designed for automatic operation. Camera has one speed and a universal-focus lens. Viewfinder is coupled to zoom lens, shows exactly what lens sees. Electric eye adjusts lens opening to correct stop for all changes from bright sunlight to shade. Retails at \$169.95

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HOME-MOVIE LIGHT is unique unit that does job of a multilight bar. Gun uses compact yet powerful halogen-filled quartz lamp with a rated life of 10 hours, tilts for bounce lighting. Light output and color balance remain constant throughout life of lamp. Spread of light is wide enough to cover field of wide-angle lens. Fits any camera. Lists at \$24.95

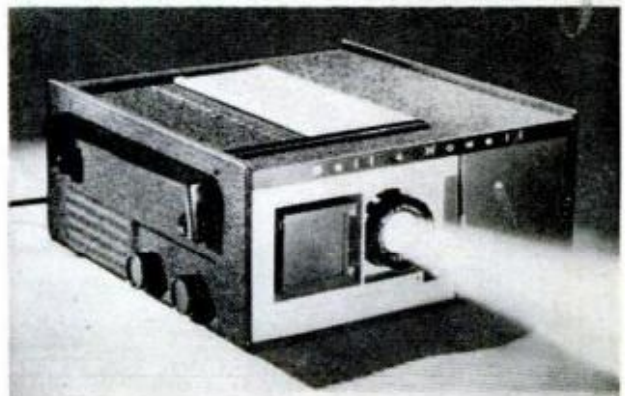
Sylvania Electric Products, Inc.,
1740 Broadway, New York 19, N.Y.

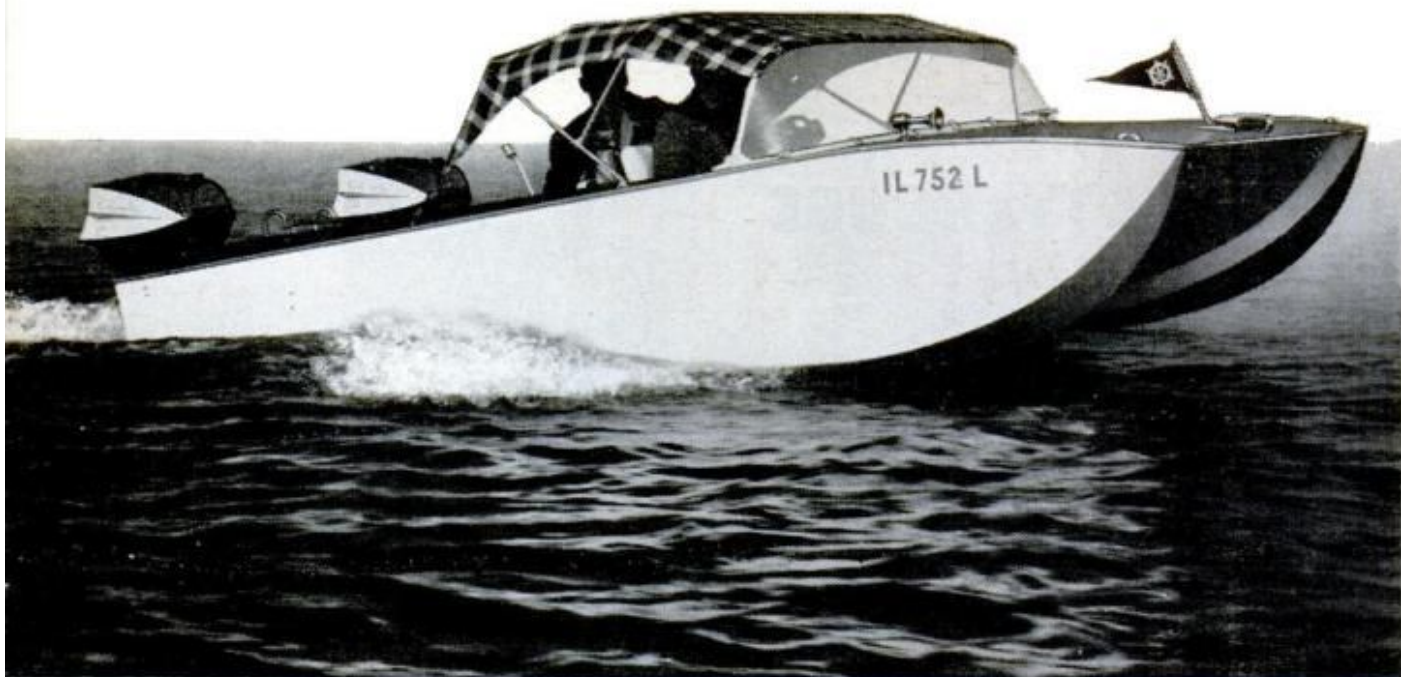
AUTO-LOAD SLIDE PROJECTOR. New "look and load" editor correctly positions slide to avoid upside-down projection and permits projectionist to check scene before flipping loading device forward. Holds 35-mm. Bantam or superslides intermixed in tray. Black-out shutter keeps screen dark during slide changes

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TRANSISTOR RADIO AND SUBMINIATURE CAMERA is combined in one precision unit. The 6-transistor radio operates on a 9-v. battery, gives about 80 hours continuous operation. Camera shutter has speeds up to 1/200; focus from 3 ft. to infinity, features fixed-focus f:3.5 lens. You can load your own magazines with 16-mm. movie film. Complete by mail at \$49.95

Silver Bells Limited, P.O. Box 982, Carmel, Calif.





BUILD PM's POP-CAT*

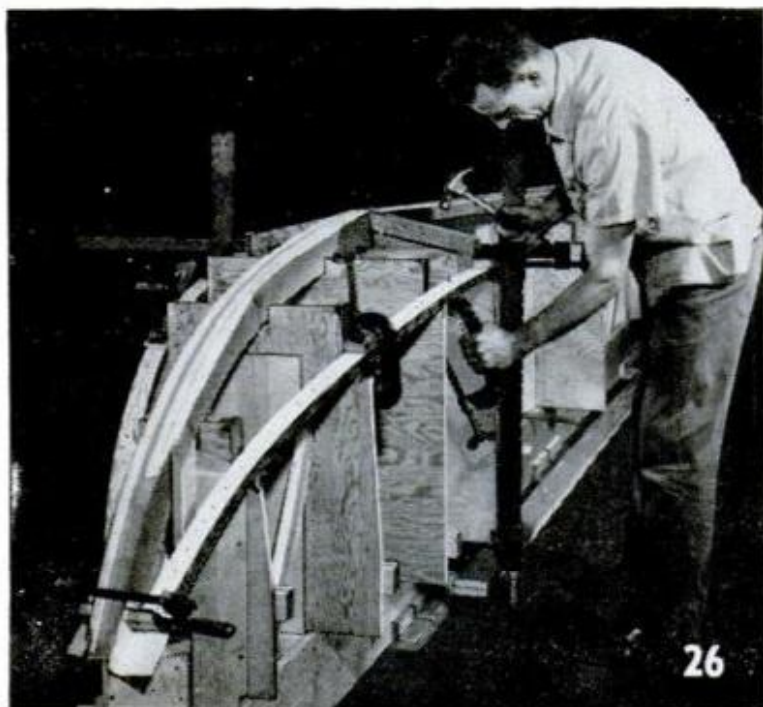
PART II

By Earl Wobeck

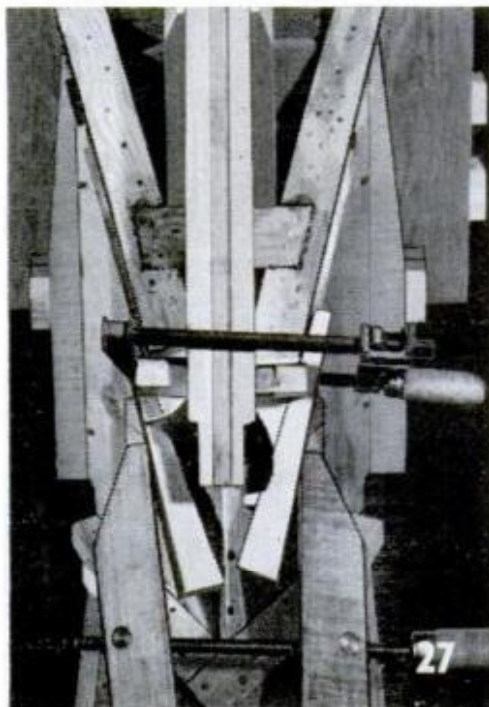
HAVING FITTED and faired the straight sections of the outer chines on the first hull of the catamaran as in Part I, builders of Pop-Cat now are ready to start the laminated section of each outer chine. Note that the straight outer chine sections are not to be glued in place until the laminated, curved parts are completed. These are glued-up on the building form from the plywood and spruce laminae cut previously. The laminated chines are glued in the stem notches at the extreme forward end and to bulkhead 3 near the after end,

where about 12 in. of the laminated chine extends aft of the bulkhead. The pointed part of the 9-in.-long double-scarf joint which joins the straight chine with the curved part, is formed from this 12-in. section as in Fig. 28. The joint is located 1 in. aft of the forward bulkhead gluing strip.

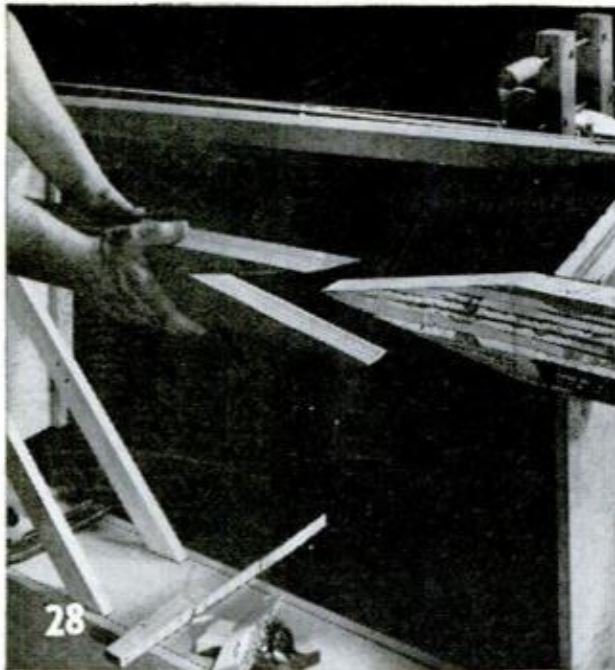
*The name Go-Cat, which appeared in the first installment of this article, is the trademark of a portable motor-sailer catamaran manufactured by Duncan Sutphen, Inc., of New York City. We regret any confusion that may occur as a result of the use of the trademark "Go-Cat," and have changed the name of our design to "Pop-Cat."



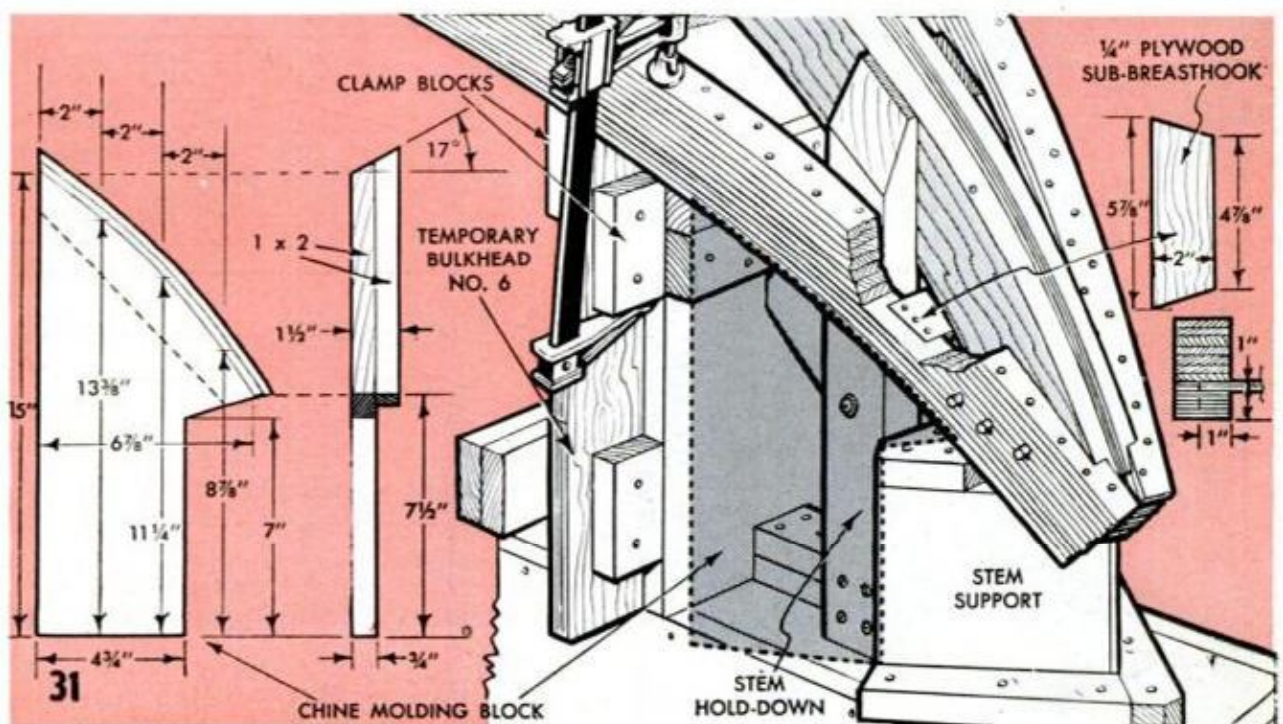
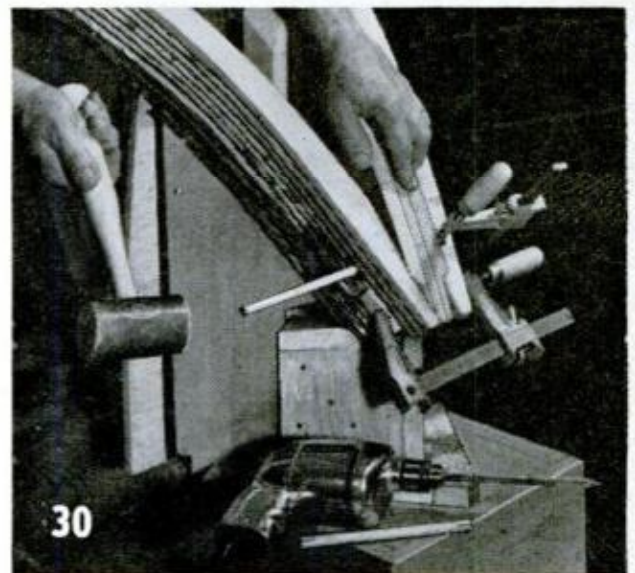
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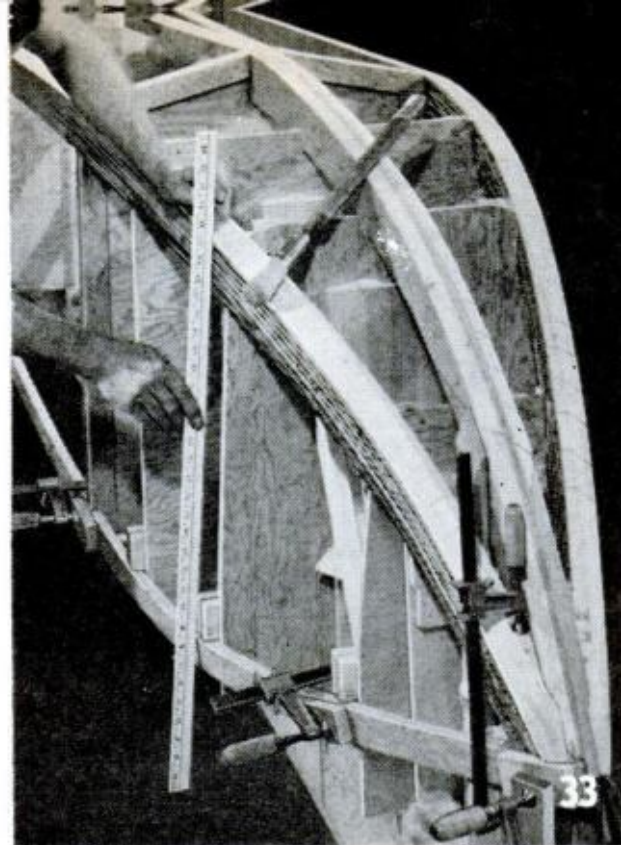


When gluing the chine-laminae groups (Fig. 23, Part I) in place, the pieces are coated with glue on both sides, stacked and aligned with one another and then clamped to the temporary bulkheads and bulkhead 3 as in Figs. 29 and 31, starting at the forward end of the stem. To distribute the stresses in the sharply curving section between bulkhead 6 and stemhead (top of stem), a molding block is made for each chine and nailed to the building form as in Fig. 31. At this time the angle of beveled surface on the upper edge of each block should be parallel with the top of the building form, as the upper surfaces (boat upright) of the laminated chines must be level and on the same plane with each other for proper fastening of the wing deck. Both





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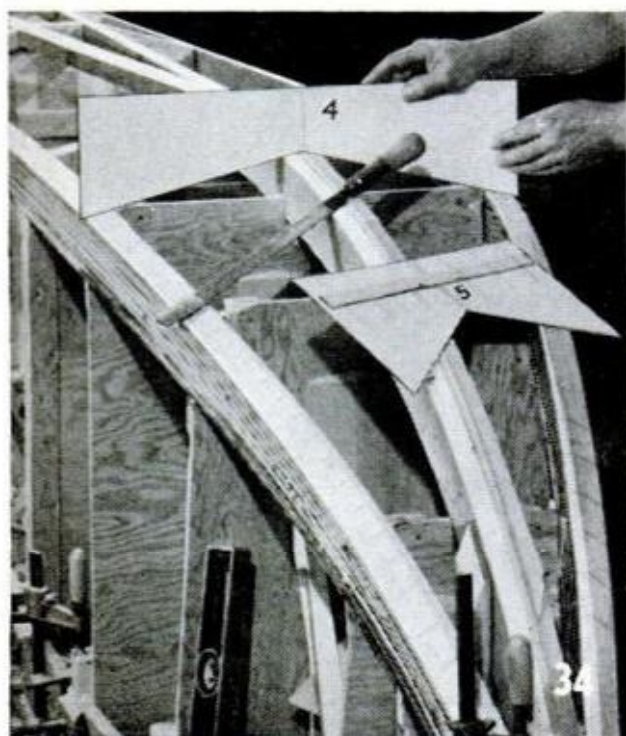


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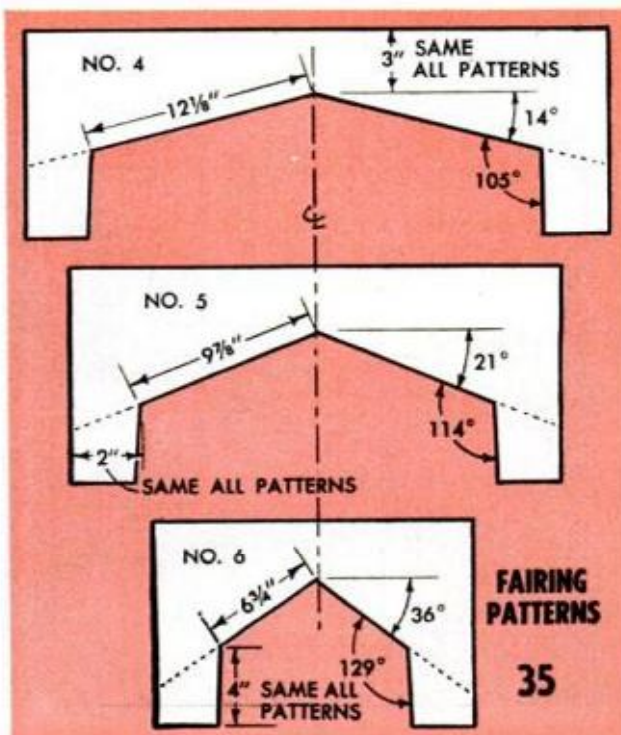
laminated chines should go on at the same time to avoid unbalanced strain on the stem, fastening a laminae group first on one side and then applying the same number of pieces on the opposite side. A stem hold-down, Fig. 31, is screwed to the building form and glued to the stem on each side to keep it rigidly in place during this operation. The hold-down is unfastened from the building form and split off the stem when the hull is removed from the latter.

Note the locations of the adjustable and parallel clamps holding the four plywood lamina in position at the stemhead, Figs. 26 and 27. The after ends of the laminated

chine are held in place by two bar clamps, one arranged vertically to pull downward and the other placed horizontally to pull the chine end inward as in Fig. 29. Straight sections of outer chines should be clamped in position to touch laminated ones. The latter should be forced into alignment with the straight chine sections at this time, as it will be impossible to do so once the glue hardens. Paper is placed under the chine pieces at temporary bulkheads, molding block and stem support to prevent the chines from being glued to them. A 1/4-in. plywood sub-breasthook spliced into the fourth plywood lamina of each chine as in



34

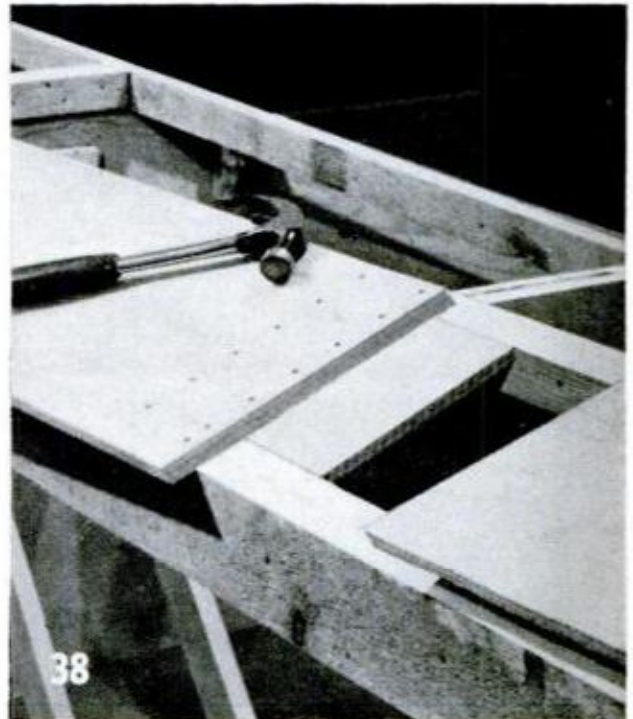
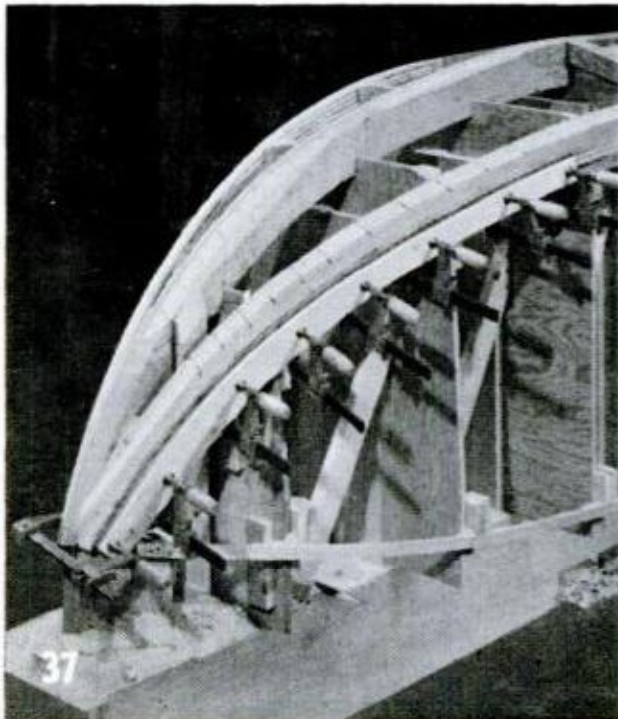


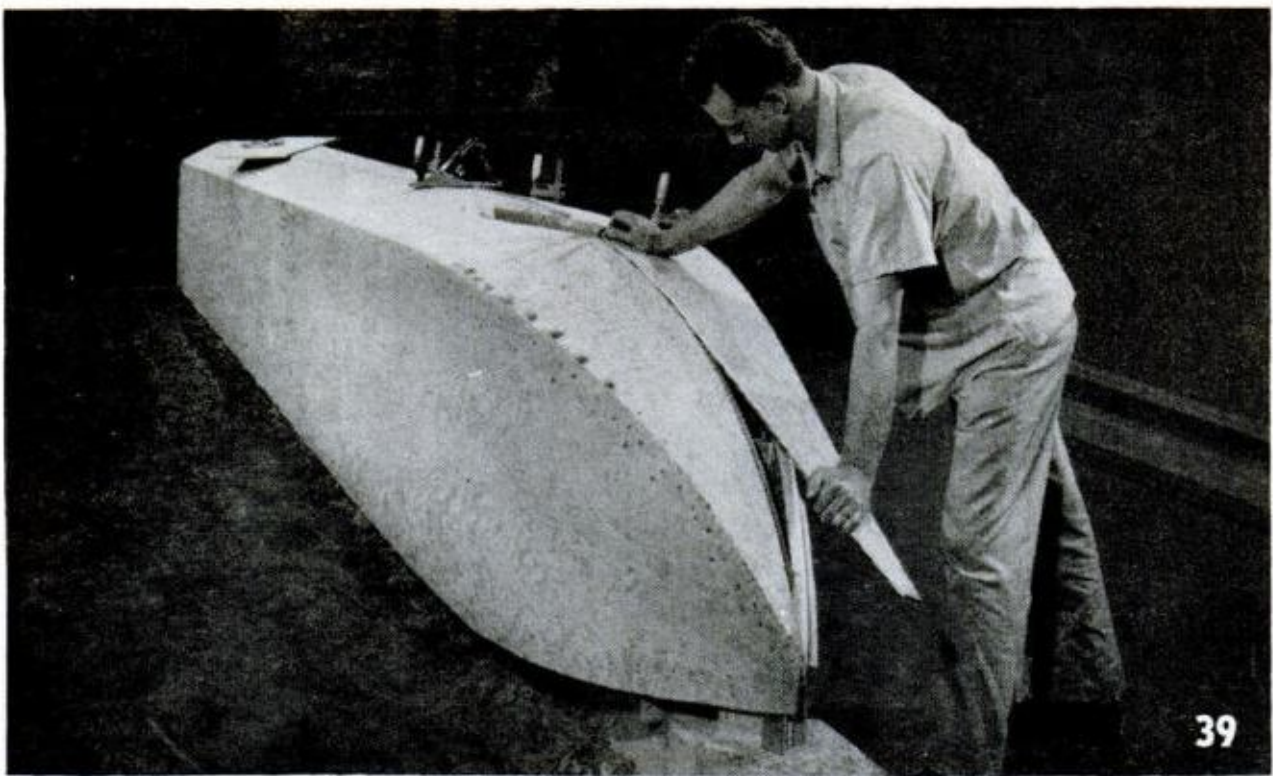


Figs. 27 and 31, binds them securely to the stem. Three $\frac{3}{8}$ -in. hardwood dowels glued in holes drilled through the chines and stem, Figs. 30 and 31, give positive assurance that this important joint will remain intact though subjected to the most severe of operational stresses. When laminated chines are completed (they must be built-up to the same cross-sectional dimensions as the straight sections), they are spliced into the straight sections as explained previously. Make sure mating splice surfaces fit accurately to avoid chine distortion.

The sheer log is next. A batten sprung

in place and clamped against temporary bulkheads at the sheer location as in Fig. 37, will aid you in determining how much waste must be cut away from the chine to make the notch that receives the sheer log. From the side of the stem, the notch depth extends to the old surface of the chine notch. From the stemhead, it extends to a depth of $\frac{3}{4}$ in. The extreme forward end of the sheer log then is beveled to fit flush against the stem on the surface of the chine notch cut in it previously. Vertical positioning of the sheer log in this notch is such that $\frac{3}{4}$ in. of it is allowed to extend above

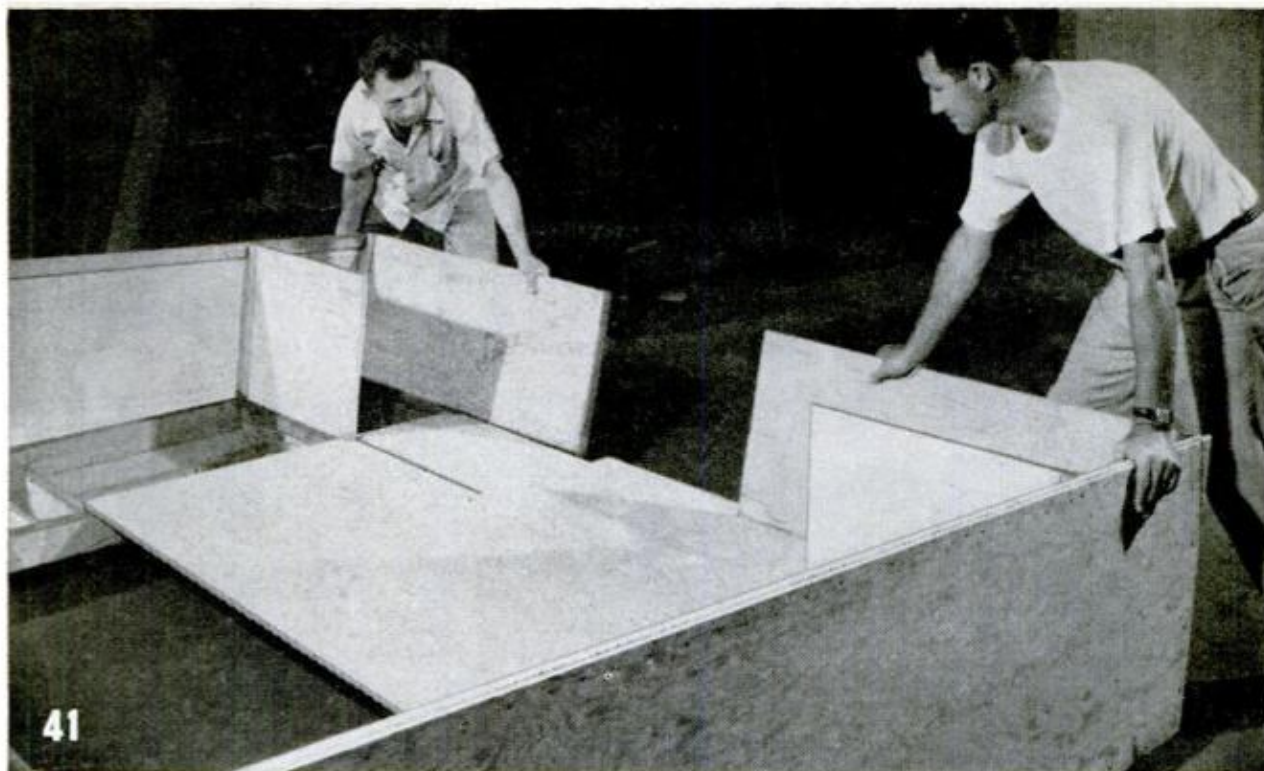




the surface of the stemhead, both (sheer log and stemhead) of which are fastened to the breasthook later. Note that there is a sheer log only on the outboard side of each hull. Since it is difficult to obtain 1 x 2 sheer-log stock in lengths greater than 16 ft., it is necessary to splice about a 1-ft. length on the after end. This should be done before it is installed, making a 2 to 3-in.-long glued scarf joint. When stem notch and chine log are ready, the log is glued and nailed in place applying glue only at permanent bulkhead locations and stem notch and clamping it as in Fig. 33.

The next step is to fair the laminated chines, stem and sheer log to take the planking. This is done in the same way as when the straight sections of the chines were faired in Part I, except that fairing patterns are made with which to check the work, Figs. 34 and 35. Bottom surfaces of the stem and chines are faired first, after making saw cuts across these members to the depth to be faired to ease the job of removing waste and produce accurate results, Fig. 32. The legs of the fairing patterns must be cut off or bent back on the pattern at this time since the sides of the chines

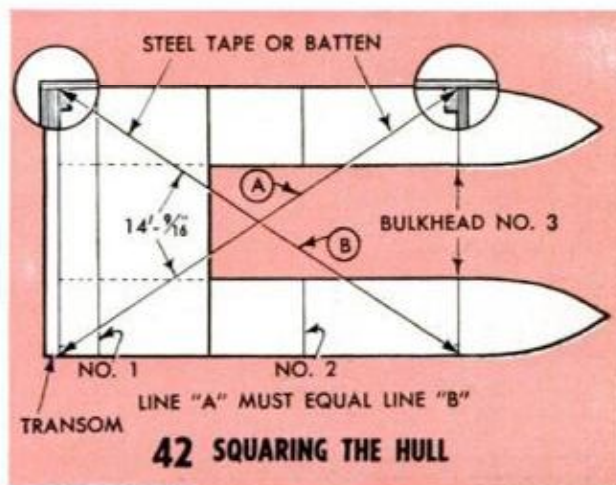


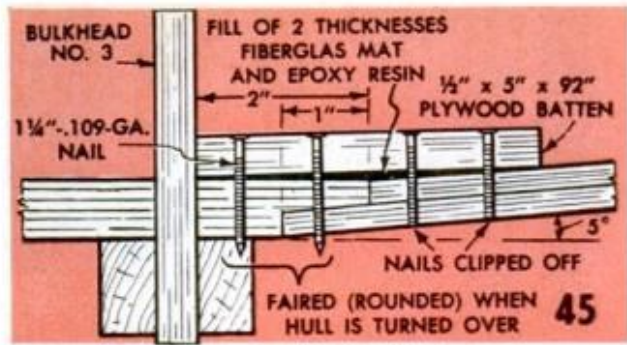


have not yet been faired to receive them. Later, the legs can be taped back on the patterns for final checking of the faired members. Note that the dimensions and angles on the patterns refer to the hull dimensions at temporary bulkheads 4, 5 and 6, and must be used accordingly only at these check points. When the outboard chine side is faired to the sheer log, only a narrow gluing surface for the topside planking is left. To extend this surface, a 2-in.-wide, 1/2-in.-thick strip of spruce cut to the chine curve, is glued on the chine as in Fig. 37. This then is faired to the angles given on the patterns. No nails should be driven in this piece. While such a strip is not needed for structural purposes on the inboard chine, one is glued on and faired in the same manner so that the angle of bottom to topside planking is the same on both sides of the bow.

The bottom planking goes on next, which is cut roughly to shape, glued and clamped to chines and stem as in Fig. 36. The center piece is put on first, after which the nontrip pieces are glued and nailed in place. Then, the edges of the latter are faired flush with the chine sides and the topside planking is attached. (See Fig. 25, Part I).

The 16-ft. 3/8-in. plywood panels are about 6 in. too short for the nontrip planking, requiring a splice to be made as in Fig. 38. Edges of planking pieces forming the scarfed point are beveled 45-deg. and then glued and nailed to a 9-in.-wide backing block of 3/8-in. plywood that is fitted snugly between inner and outer chines, and centered on the joint as shown. The parts

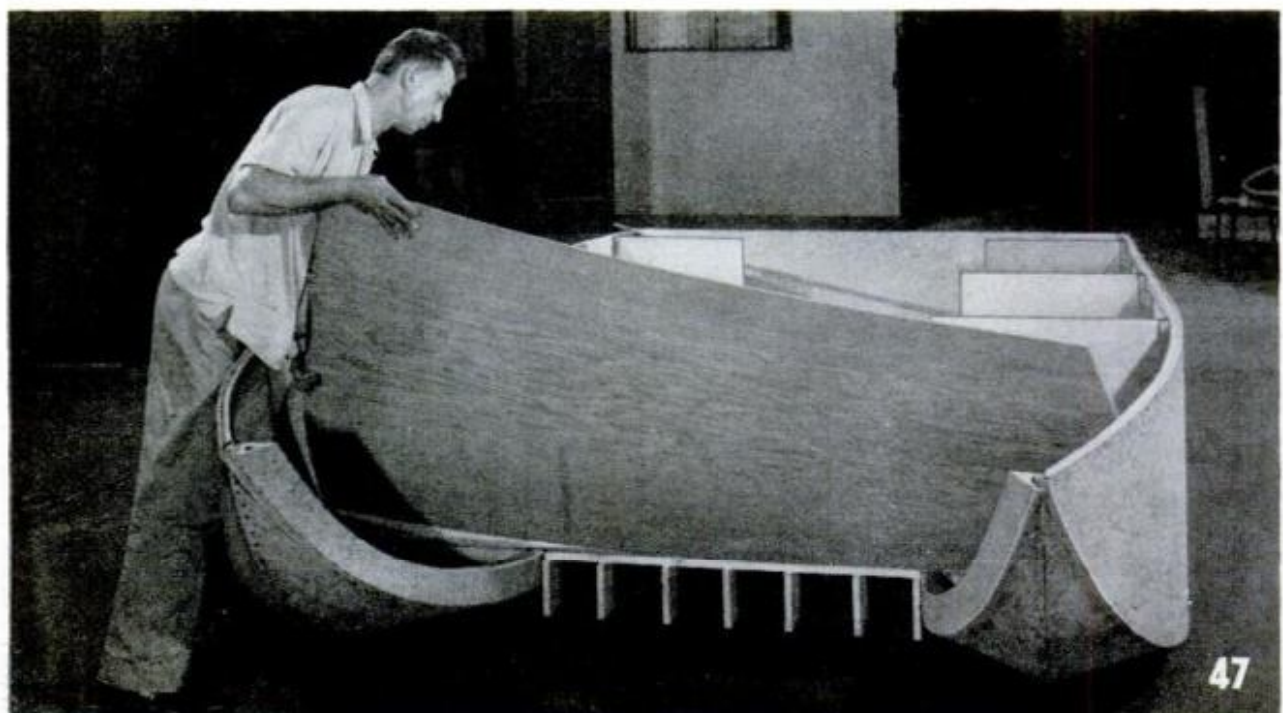
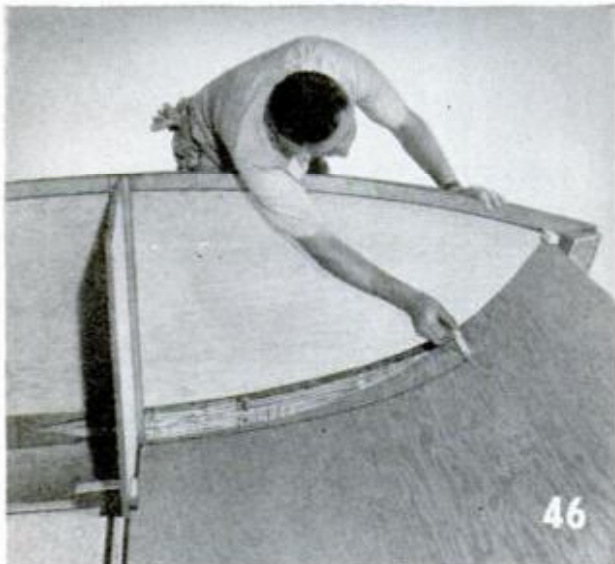


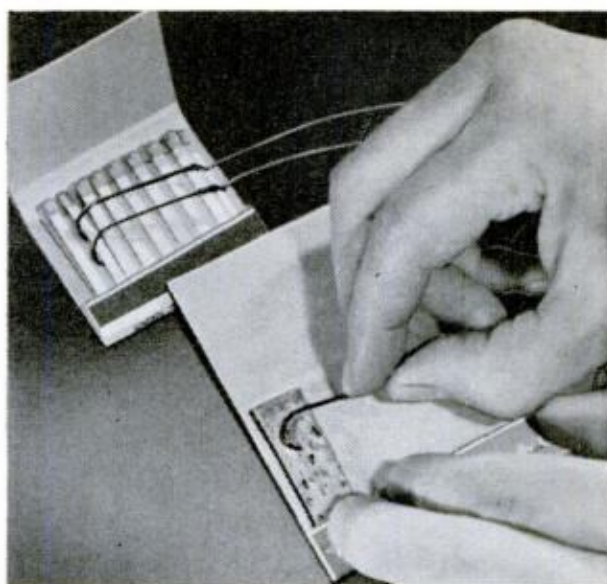
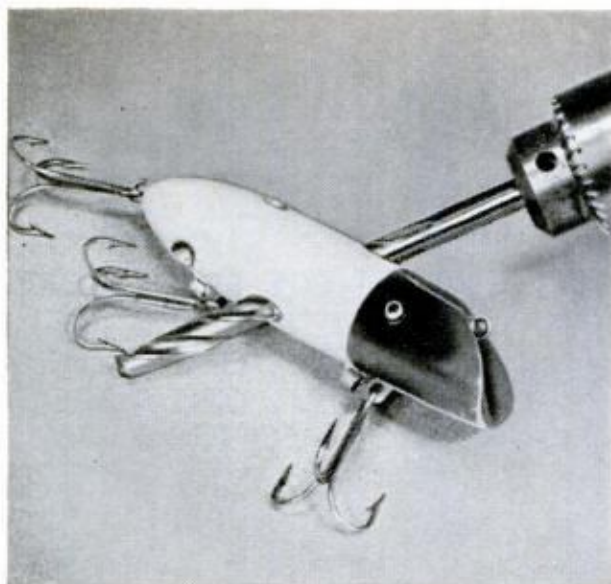


should be cut and dry assembled before gluing, to assure a good fit. Properly-made splices between bulkhead locations, are stronger than the rest of the planking and will be unnoticeable when sanded and painted, or fibreglased. All splices should be made where the planking has a straight run, if possible. While the 16-ft. panel reserved for the outer topside planking falls $1\frac{1}{2}$ in. short of the transom at the top only (when positioned flush with the stem tip) it does overlap completely onto the bulkhead gluing strip. The small triangular area remaining is covered with a $\frac{3}{8}$ -in. plywood scrap butted against the panel edge. The grain of the outer lamina of this piece should run in the same direction as that of the panel. No scarfed splice is needed in this case because of the solid backing provided by the bulkhead. The inner topside planking actually is nothing but a cover strip for the exposed chine log, Fig. 43.

When rough-cutting the planking to fit, it is best to clamp the panel to the chine or sheer log as the case may be, and then trace an outline of it directly on the plywood, using the chines and sheers as a guide. Allow about $\frac{1}{2}$ -in. excess at each edge to

(Continued to page 222)





HERE'S A LEFT HOOK FOR THE FISH

ON DAYS when fish won't bite you'll try anything short of going in after them with bare hands. But while you're sitting there hoping, has it occurred to you that if you're longing for action, so are the fish? Then why not feed them something appetizing—with a hook in it. You'll have to near-ruin a perfectly good plug to carry out the idea presented but what's the price of a plug when just the sight of a fingerling would brighten the day?

So to catch fish and a fish story when everything else fails drill two small holes through the body of your best plug, or maybe the second best, at an angle of about 45 degrees as pictured at the left above. This simple step adds a couple of new antics

to plug performance that you can hope the fish have never seen the like of before. The holes cause the plug to perform with a most unusual popping action and at the same time leave a trail of bubbles.

On that same gray day you may have bought a handful of fish hooks at a crossroads store and put them in your pocket. Fishermen do such things in unguarded moments and sooner or later there's trouble. How much better to store the hooks in a match book as in the upper right-hand photo. You can do this two ways: use the book of matches as in the top view, same photo, or glue a narrow strip of cork in an empty book and then catch just the points of the hooks in the cork strip.

COMING UP NEXT...

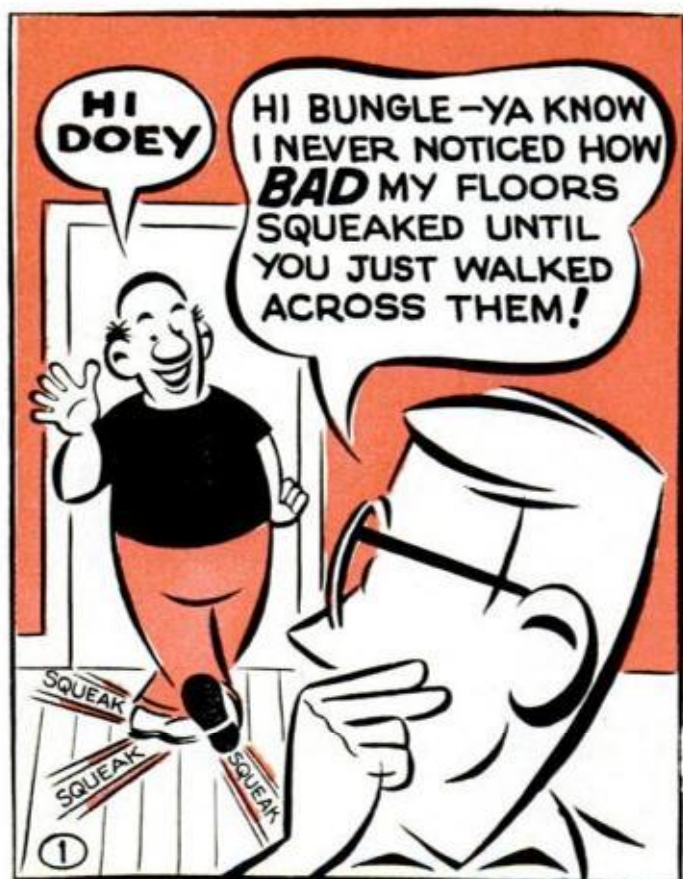
BACKYARD JUMPOLINE. That's just what it is, lots and lots of jump, so much so that you're mostly up in the air. For the sport of the thing even Grandpa might be tempted to accept its challenge if he could be sure nobody was looking. Built sturdy for safety from a kit of parts.

HOW TO REFINISH A HARDWOOD FLOOR. Time was when the floor was just something you walked on, the bottom of the box which came to be called a room. But nowadays decorators and homeowners include floors in their scheming and there comes a time when these floors must be refinished. Next month **PM** tells how, starting with sanding.

RIGHT MOWER FOR YOUR LAWN. Power lawn mowers are made in your size. If you have a hillside acre of grass to curry twice a week, you need a mower that really cuts a swath, and without pushing. Otherwise you're at it all day. But if your lawn is only table-top wide and long, there's still a power mower for you. Next month **PM** sizes them up.

INSTALLING CENTRAL AIR CONDITIONER. It's going to be easy to keep cool this summer but you'll have to start planning next month, right after you've read this article on installing an air conditioner. It takes a weekend or two to get the machinery in place and working.

MR. DOIT AND BUNGLE



As long as floors are made of wood they will shrink and swell and squeak. There are simple ways to stop a squeak and Bungle learns them all

IN AREAS WHERE I CAN'T REACH TH' UNDERSIDE OF TH' FLOOR, I FILL THE CRACKS WITH LIQUID GLUE, GRAPHITE OR DISSOLVED SOAP.



WHERE THERE'S NO CEILING I DIP TIPS OF WOODEN SHINGLES IN GLUE AND WEDGE THEM BETWEEN SUBFLOOR AND JOISTS



WHEW, IT WAS A LOT OF WORK BUT I JUST COULDN'T STAND THOSE SQUEAKS

I KNOW HOW Y' FEEL — I USED TO HAVE 'EM AT MY PLACE TOO

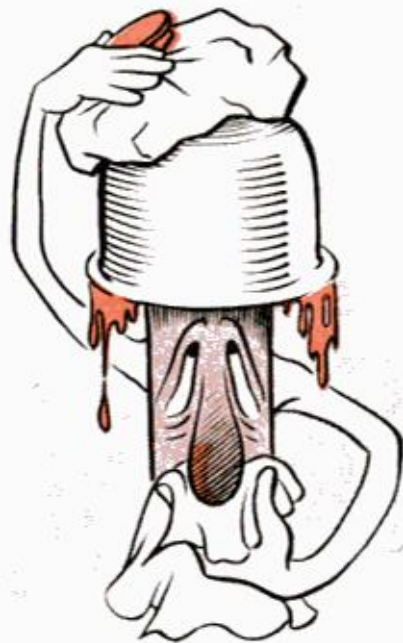
OH? WAS IT AS MUCH TROUBLE TO FIX YOURS?



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All Rights Reserved

HECK NO!
ALL I DO IS TAKE OFF THESE **SQUEAKY SHOES** BEFORE I GO INTO MY HOUSE





GET YOUR CAR IN TUNE WITH SPRING

Every car—~~young~~ or old—needs this dollars-and-sense seasonal checkup

By M. Robert Beasley

ALL YOU NEED to put your car in peak operating condition for warm-weather driving are a few hand tools, a passing acquaintance with what's under the hood and a free week end. The time and effort

you expend in a thorough checkup of your car's condition after a winter's driving, can pay off in cash savings and a better knowledge of the operations of a car.

Cleaning the Engine: Cleaning the engine is the first step in a thorough spring tune-up job. Use a nonflammable solvent and a stiff brush to clean the carburetor, coil and distributor, then cover with a self-adhering plastic material such as that used to package foods for freezing or storing. With the electrical units protected, you can flush most of the dirt off the engine with hot water. Finish the job with solvent right down to the original paint, paying special attention to the oil pan. A pan encrusted with oil and dirt doesn't receive the cooling air flow it must have.

Radiator: Remove the filler cap and drain plugs from the bottom of the radiator and engine block so that the antifreeze solution can drain completely. Then insert a garden hose in the filler cap, and when it begins to overflow, start the engine and leave it at idle. The clean water should cir-





culate through the system for at least 15 minutes. While this is being done, check the radiator hose for soft or worn spots, replacing hose that shows any imperfections. If the radiator gives evidence of being plugged, a reverse flush should be used. Replace the drain plugs and fill the radiator about half full of water. Add a rust inhibitor, then fill to the full mark. Run the engine at approximately 25 miles per hour for one minute to mix the inhibitor. Clean the radiator core on both sides with a stiff-bristle brush. Dirty fan blades can reduce gasoline mileage and affect engine performance. Remove grease and grime from blades and check for alignment.

Water Pump: With the water level at full mark and the filler cap tightly sealed, attach a rubber tube to the lower end of the overflow pipe. Drop the other end of the tube into a jar of water. Warm the engine, accelerate and hold at medium r.p.m.'s for about one minute. If there is an air leak at the water-pump gasket or worn pump-shaft packing, air bubbles will appear in the water jar. If such a condition shows up, it should be corrected at once, either by replacing gaskets or installing new shaft packing, or both.

At this point check the thermostat, usually located on the forward part of the

block. A badly corroded thermostat can be cleaned, but if it is stuck in either the open or closed position and won't open when placed in hot water, it is faulty and should be replaced.

Fan Belt: In late-model cars the fan belt does three important jobs: driving the fan, water pump and generator. A worn or loose belt can cause reduced voltage output and insufficient cooling in high-speed summer driving. If you have noticed consistently





low readings on the ammeter and a tendency of the engine to overheat, you'll probably find the cause in a loose fan belt. Conversely, a belt too tight can cause undue wear on water pump and generator bearings.

Proper deflection of a fan belt ranges from $\frac{1}{2}$ to $\frac{3}{4}$ in. To check, lay a straight-edge across any two pulleys and check belt deflection with a rule. Reset loose belts by loosening the pivot bolt on the generator and moving the generator until proper deflection is obtained. Make sure the pivot bolt is drawn up tightly to prevent it from slipping. If the belt shows cracks or is oil soaked, it should be replaced. Many cars today have multiple belts which should always be replaced in sets even though only one belt is defective. Newly installed belts should be inspected frequently for proper deflection, as they have a tendency to stretch with use.

Oiling System: With the engine warmed and revved at moderate speed, remove the filler pipe cap. Heavy vapors floating from the pipe indicate a blow-by, which means that combustion gases are escaping past piston rings into the crankcase. A heavy



puffing from the pipe indicates stuck piston rings or scored cylinder bores, or both. Oil splashing from the pipe may mean a cracked piston. Remove the dip stick and check for gasoline odor, which normally indicates that gas is getting past the rings into the crankcase, causing oil dilution. If any of these warnings show up, consult a reliable mechanic, as your car probably needs professional attention.

Otherwise, soak the pipe cap in solvent for fifteen minutes, let it dry and coat the filter element with a light motor oil. With the engine warm and idling, place your hand against the oil filter housing. It should be warm. A cold filter housing denotes insufficient oil circulation. If the filter is dirty, or the recommended change period is near, install a new cartridge. When changing oil in your car, always drive it a few miles first, to warm up the engine. Warmed oil will do a more complete job of carrying off sludge and waste material as it is being drained.

Battery: Unless it is properly serviced at regular intervals, the battery is a likely



source of summer driving trouble. Close air-vent holes in the caps with strips of tape, then use steel wool or a wire brush to remove corrosion from the terminals, clamps and carrier. Then, wash the areas with a strong solution of soda and water, rinse with clear water and dry thoroughly. Inspect cables for deterioration or breaks, replacing any defectives. Remove the clamps, clean and resurface contact surfaces with emery cloth and replace them. A thin film of petroleum jelly on terminals and clamps will minimize corrosion. Remove the tape from air-vent holes and take the caps off. Clean vent holes with a pipe cleaner. Make sure the caps are seated tightly, as loose ones jiggle up and down causing a pump-like action which will force electrolyte from the cells.

Batteries require water more frequently

during summer months, and should be checked weekly during ordinary driving, daily in long-distance traveling or trips at high speeds. Water level should be kept about $\frac{1}{2}$ in. above separators, but use caution not to overfill.

Ignition: Check all ignition wiring for insulation cracks and friction spots, and remove the grease and oil film from wires with a solvent. Replace wires that show any sign of deterioration. Replacement wiring is available in kits, already equipped with terminal ends. Where numerous wires need replacement, do them one at a time to avoid confusion and insure proper connection. The wiring under the dash should be checked for broken or cut insulation where wires may come in contact with sharp metal edges. Replace such damaged wires and protect new ones with wrappings of friction tape where wires touch metal.



Check the fuse clips for solid connections and clean contact surfaces with emery cloth or steel wool.

The primary wire and junction plates, which are generally located on the firewall, should be checked for solid connections and good contact. Spray a plastic coating over exposed terminals and connections to protect against corrosion.

Spark Plugs: Wipe spark plugs and sockets clean, then remove the plugs, being careful not to crack the porcelain with the wrench. If the car is near the end of a 10,000 mile period, or if the plug electrodes are pitted or burned, it will pay to install new plugs. Dry electrodes of a light chocolate color indicate that the plugs still are doing an efficient job. Plug ends containing a white deposit, along with scorched electrodes, indicate the plug is too "hot." A grayish blue tinge and a moist condition means the plug is too "cold." Dry, fluffy, black deposits on the electrodes indicate the gas mixture is too rich, while badly



burned electrodes show that the mixture is too lean. For slow speeds over short distances, hot plugs will give best performance, while cold plugs are best suited to fast, long-distance driving.

If the plugs are in good condition, use a knife or sand-blasting equipment to clean them, blowing them out with air pressure to insure removal of all particles and debris. Proper gapping distance for your car can be obtained from a regular chart. Improper gap settings frequently result in pinging, or secondary combustion, which can prove harmful to the motor. When installing plugs use uniform wrench tension, and always install new gaskets when replacing plugs. Check wire caps for solid contact and make sure they are clean, as grease and dirt can cause misfiring.

Distributor: Clean the outside of the distributor cap and inspect for cracks. Pull lead-in wires from the cap one at a time, while the cap is still positioned, cleaning contacts at the bottom of the holes with steel wool inserted and twisted a few turns.





If wire tips are burned or pitted, they should be resurfaced with emery paper, the cap holes blown out, and the wires replaced. If it was necessary to replace the plugs, the points and condenser probably also need replacement. They are easily installed and provide inexpensive insurance against possible trouble. On serviceable points, renew contacts with emery cloth, then check gapping with feeler gauge, performing required adjustments by turning the locking and adjustment screws. Make sure all locking and adjustment screws are firmly seated. Check rotor for cracks, badly burned or uneven contact areas. Install a new rotor if indicated, otherwise clean and resurface the present one. Put one drop of light machine oil on the rotor-shaft wick and turn the starter to work it into the bearing. Replace the rotor with finger pressure after aligning the flat spot on the inside of the rotor with the flat side of the shaft. The condenser should be wiped clean and the ground screw and terminal wire checked. Clean out inside of the distributor before replacing the cap.

Bearing and Coil Check: With the engine idling, use a long-handled insulated screwdriver to ground one plug at a time against the engine block. If this produced a loud knocking sound from inside the engine, it may indicate loose bearings. On any such findings a mechanic should be consulted to prevent certain future trouble.

With the screwdriver shank still against the contact top of the plug, lift the blade off the block about $\frac{1}{4}$ in. Correctly gapped plugs, whether they are old or new, should cause a lively spark to bridge the $\frac{1}{4}$ -in. distance between the screwdriver blade and the block. A feeble spark, or total lack of it, could indicate either loose coil connections or a defective coil. Check the coil for good contact surface and housing cracks. Examine wires for insulation deterioration. If these points all pass inspec-

tion, and there is still a lack of a strong test spark, your coil probably should be replaced.

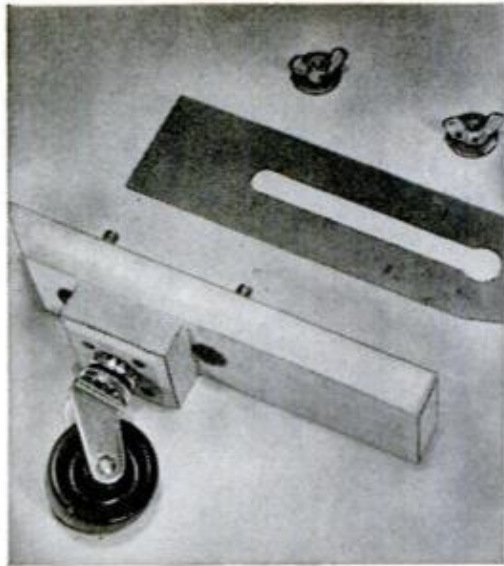
Carburetor and Air Cleaner: Remove and dismantle the air cleaner, and soak the element in solvent for 15 minutes. Your carburetor is probably okay if you have been getting good mileage and having no starting or flooding troubles. If you have been experiencing difficulty, remove the unit and soak the entire assembly in solvent, or use a regular carburetor solvent which is fed into the carburetor top with engine running. Either system will clean the unit. After soaking, dry with moderate air pressure.

In replacing the air cleaner, avoid over-tightening the retaining screw, as excessive pressure can affect choke action. Replace oil to indicated level on oil-bath type cleaners. Check fuel lines for snug fittings and unkinked lines. In adjusting the throttle idle screws to desired speed, set them a little lean for fuel economy. Turn needle valve clockwise until the engine sounds erratic, then slowly turn counterclockwise until the engine idles smoothly. Repeat this process where there are two needle valves. Adjust the automatic choke, setting it a little to the lean side. While this setting might sacrifice some high-speed performance, it does effect a fuel saving.

Fuel Pump and Filter Bowl: Unscrew the line leading from the fuel pump to the carburetor. Gas should come through this line in an even pulse when the starter is operated. Weak fuel flow denotes a defect in the diaphragm, gasket or the pump itself. Such defects should be investigated and corrected. Inspect the flexible hose from the

(Continued to page 240)





SHOP SHORT CUTS

It's the Bevel That Makes the Cutting Edge

Sharpen a hand-plane iron with the perfect bevel for the job and you'll be in for a surprise. You will find it easy to set a plane iron to cut to any depth, from lifting a paper-thin shaving to a roughing cut that takes off a lot of stock. The secret is in the straightness and degree of the bevel and there's only one sure way to keep it straight and hold it true when sharpening the cutting edge. That's to make the rolling holder, or sharpener, pictured in the photos above.

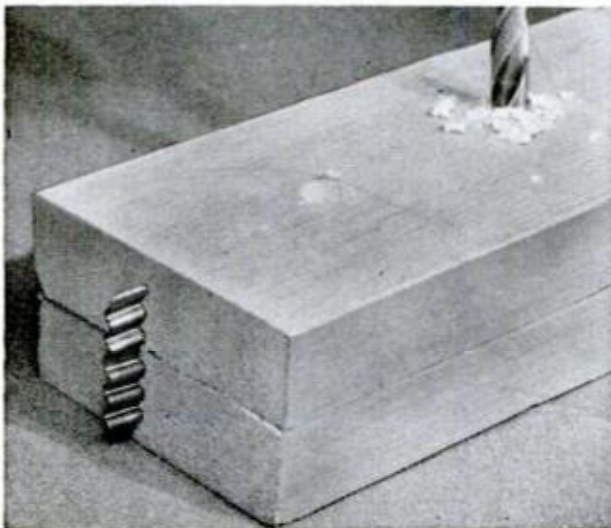
All it takes is a small shank-type castor, four screws, two blocks of hardwood and a couple of 1/4-in. stove bolts with wing nuts and washers. The long block should be about 6 in. long and slightly less in width than that of the plane iron. The small block should be the same width and square. Drill holes for the castor shank, screws and bolts and assemble as pictured. Attach the plane iron and hold as in the right-hand view. —H. Hanscom

Fastener Holds Alignment

Holding two pieces of stock in alignment for drilling registering holes is no problem when you use two corrugated fasteners as clamps. Just place the pieces in the position desired, one atop the other, and drive a fastener part way in at each end so the fastener laps half its width on each piece. Two fasteners, one at each end, will hold narrow pieces of stock up to 3 or 4 ft. long for drilling. If the pieces are wider than 4 in., use two fasteners.—Bil Toman

Handle for Steel-Wool Pad

There's just no sure way of protecting your fingers from steel-wool "splinters." They'll work through leather gloves, rubber finger cots, even rubber gloves if you bear hard enough. But if you grip the stuff in a paper clamp as pictured, you're coming close to the ideal solution to the problem. Open the clamp and press the wool tightly between the jaws. Then release the jaws and there's your handle and finger protector all in one.



SPACE-AGE TELESCOPE

Building the Telescope and Tripod and Setting Up for Observation

PART II

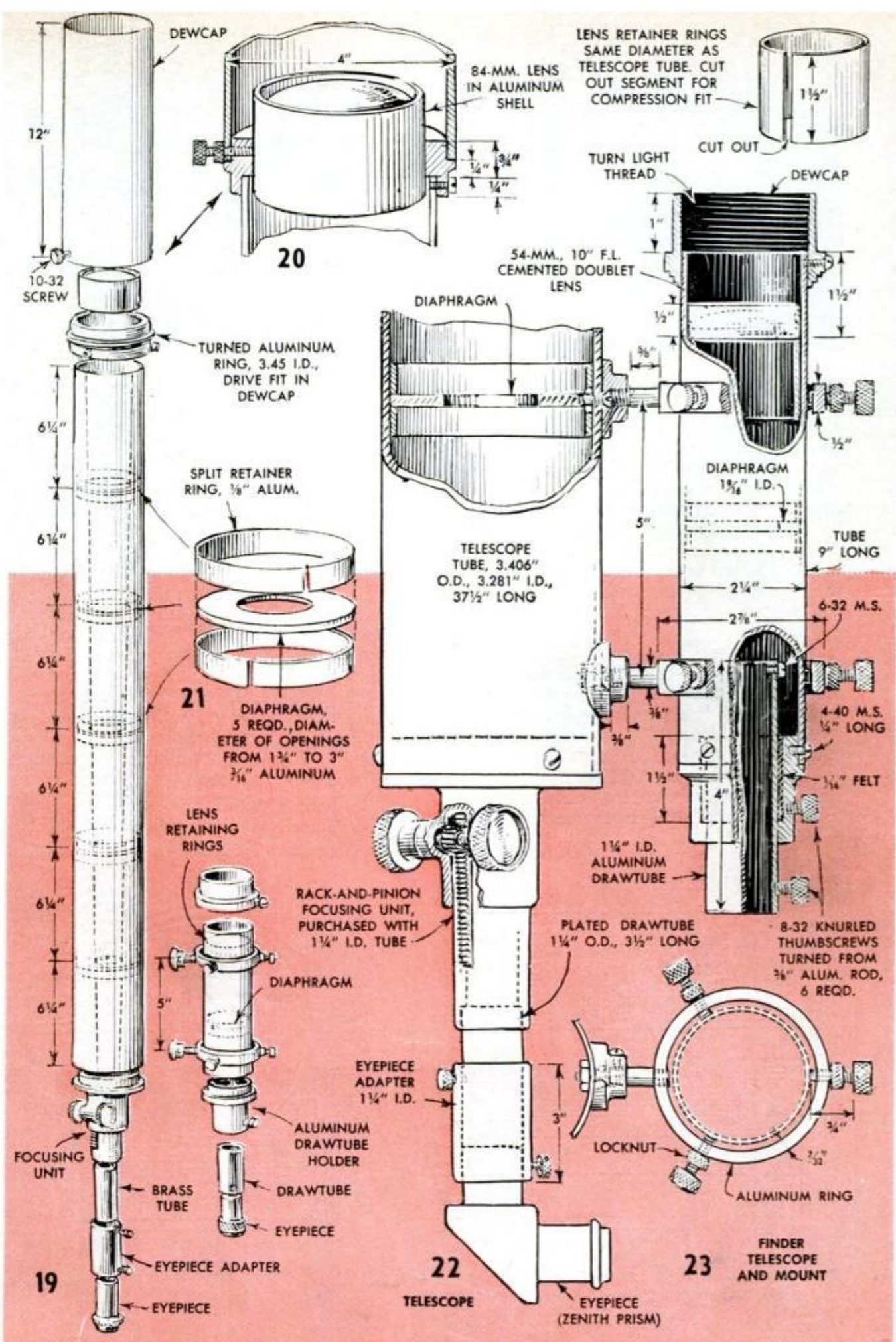
By Manly Banister

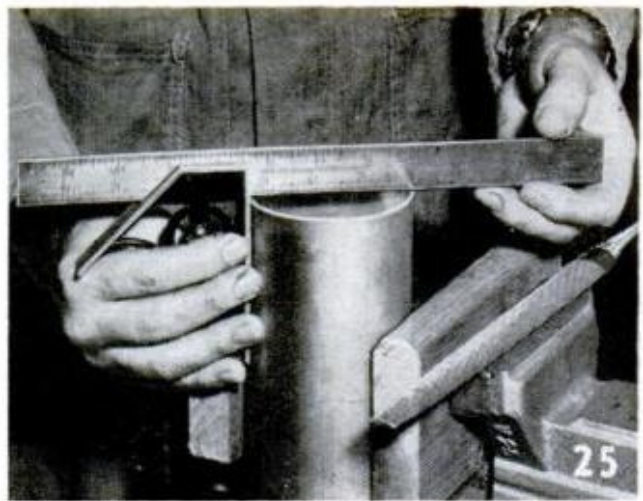
AFTER YOU have built the equatorial mounting described in Part I the telescope and tripod come easy. In the purchased parts of the telescope and the finder 'scope you get most of the machine work and the accuracy that's needed as tubing and lens mountings are held to close limits in manufacture.

Figs. 19 through 23 detail the assembly of the telescope and the finder 'scope. Before you purchase any parts or begin work it's a good idea to have clearly in mind what is required. You will note right away that assembly of the telescope and finder is very much the same. Of course, you can purchase the finder 'scope ready for use if you wish, but it's more fun to make it complete. In the construction and assembly of the telescope about the only procedures you have to worry about are the machining of the objective-lens ring, or support, and the machining and placing of the diaphragms, Fig. 19. The latter are the most exacting, mainly because of the difficulty of getting each one correctly positioned in the tube. Perhaps the best procedure is to make each diaphragm complete with its pair of retainers, Fig. 21, then check for fit. Keep the units in order as they are made so that you don't get the sizes mixed when installing. It is important that the spacing of the diaphragms in the tube be done accurately as otherwise the edges of the openings may tend to distort the light cone passed by the objective lens.

The next step is to mark the locations of the diaphragms on the outside of the tube. Then you can use a rule both inside and outside the tube to get each one correctly located. Begin by placing the center diaphragm. First coat the area at the center of the tube with a flat-black enamel. Then insert one of the retainers, coat with enamel and push it into approximate position. A heavy cardboard tube that will fit closely inside the telescope tube is just the thing for this job. Follow immediately with the diaphragm and the second retainer, both coated with enamel. Then with your long-







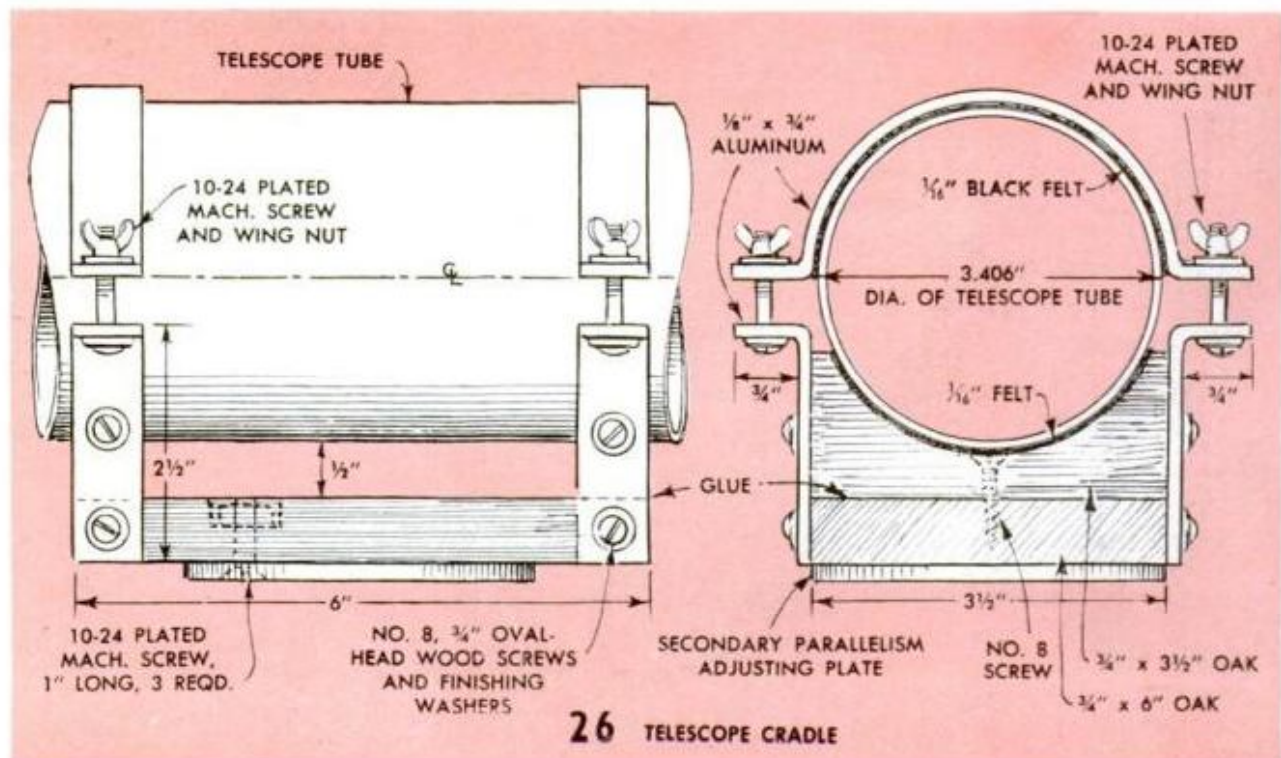
handled brush, spread enamel around the inside of the tube for a distance of about 6 in. from the first diaphragm. Now use the same installation sequence again. Coat the parts with enamel, press into approximate position, check with the rule inserted in the tube and then ease the parts into place by stages so that you are certain not to go too far. Proceed with this same sequence, working from both ends of the tube, until the five diaphragms are in position. When the enamel sets it will hold them securely in place.

Next comes the turned aluminum ring, Figs. 19 and 20, which fits on the top end of the telescope tube and serves the two-fold purpose of a mounting for the objective-lens shell and a seat for the dewcap. Care should be used in machining this ring so that you get a light, press fit of all parts. Before installing the ring, cut the dewcap to length, Fig. 24, check both ends for

squareness and also check the top end of the telescope tube, Fig. 25. It's important that the ends be perfectly square. Coat the inside of the dewcap with flat-black enamel.

At the lower end of the telescope tube (when it is in viewing position) you install the rack-and-pinion focusing unit, Fig. 22. This can be purchased already shouldered to fit into the 3.281-in. I.D. tube as detailed. The balance of the fittings consist of a plated drawtube, an adapter, and the eyepiece of your choice, either the standard 28-mm. type shown in Fig. 19 or the star diagonal, or zenith-prism type in Fig. 22. The latter permits you to carry out observations on objects near the zenith from a comfortable viewing position as in Fig. 18.

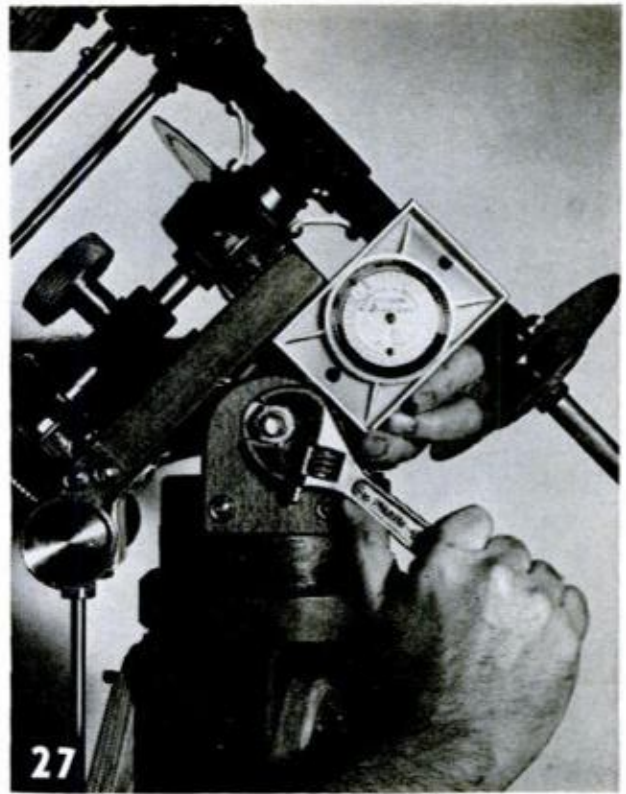
At this point you decide whether to make the finder 'scope as detailed or to purchase one ready-made. Some ready-made finder 'scopes attach to the telescope tube with a single bracket, or arm, but notice that the



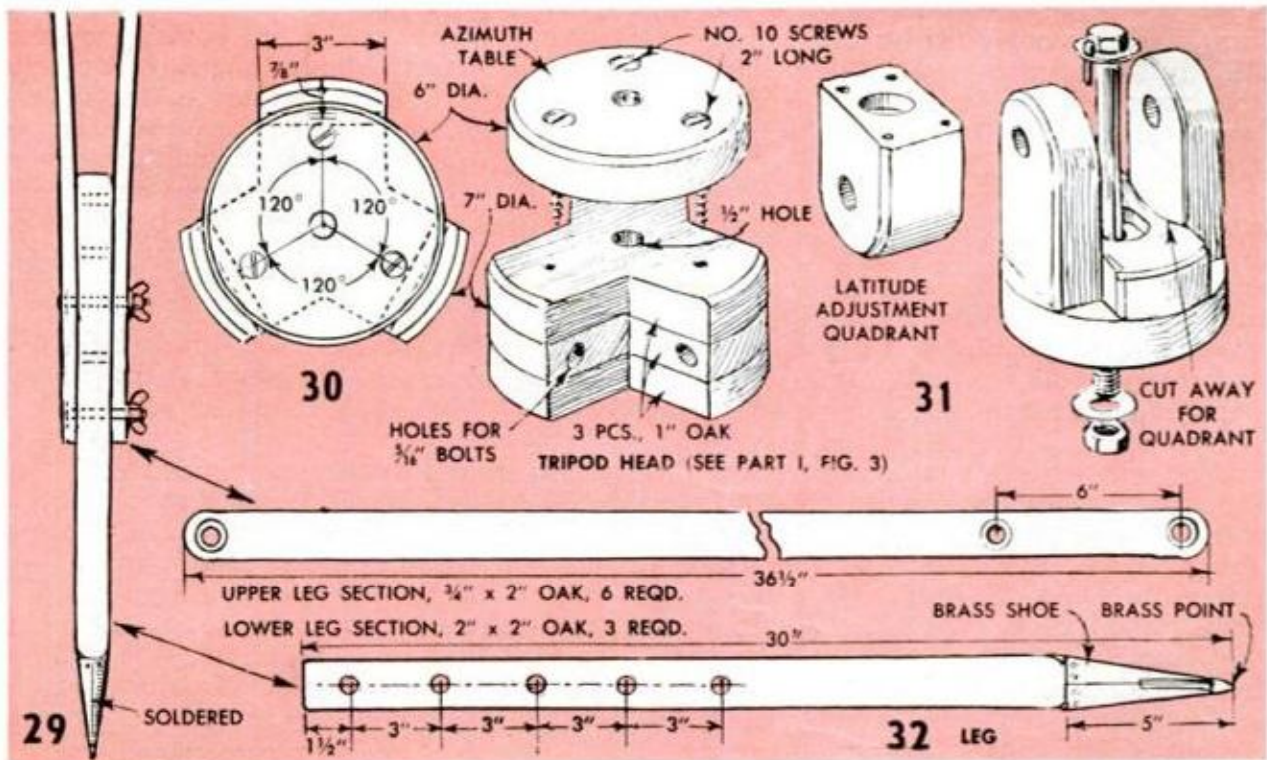
'scope detailed is mounted in two adjusting ring-type mounts, Figs. 23 and 34. The finder 'scope is fitted with only one diaphragm and the eyepiece is carried in a drawtube having a 6-32 machine-screw stop near the inner end which prevents it from being pulled all the way out. The dewcap is machined from heavy-walled aluminum tubing to provide a flange at the lower end for the holding screws. Turn a very light, fine thread on the inside down to the flange. This thread serves no purpose other than breaking up light reflections and preventing glare, which might affect the lens. Paint the inside of the tube and dewcap with flat-black enamel, using the procedure described when enameling the inside of the telescope tube. The saddle-type bases for the adjusting rings should be filed to a very close fit on the contour of the telescope tube, Fig. 23.

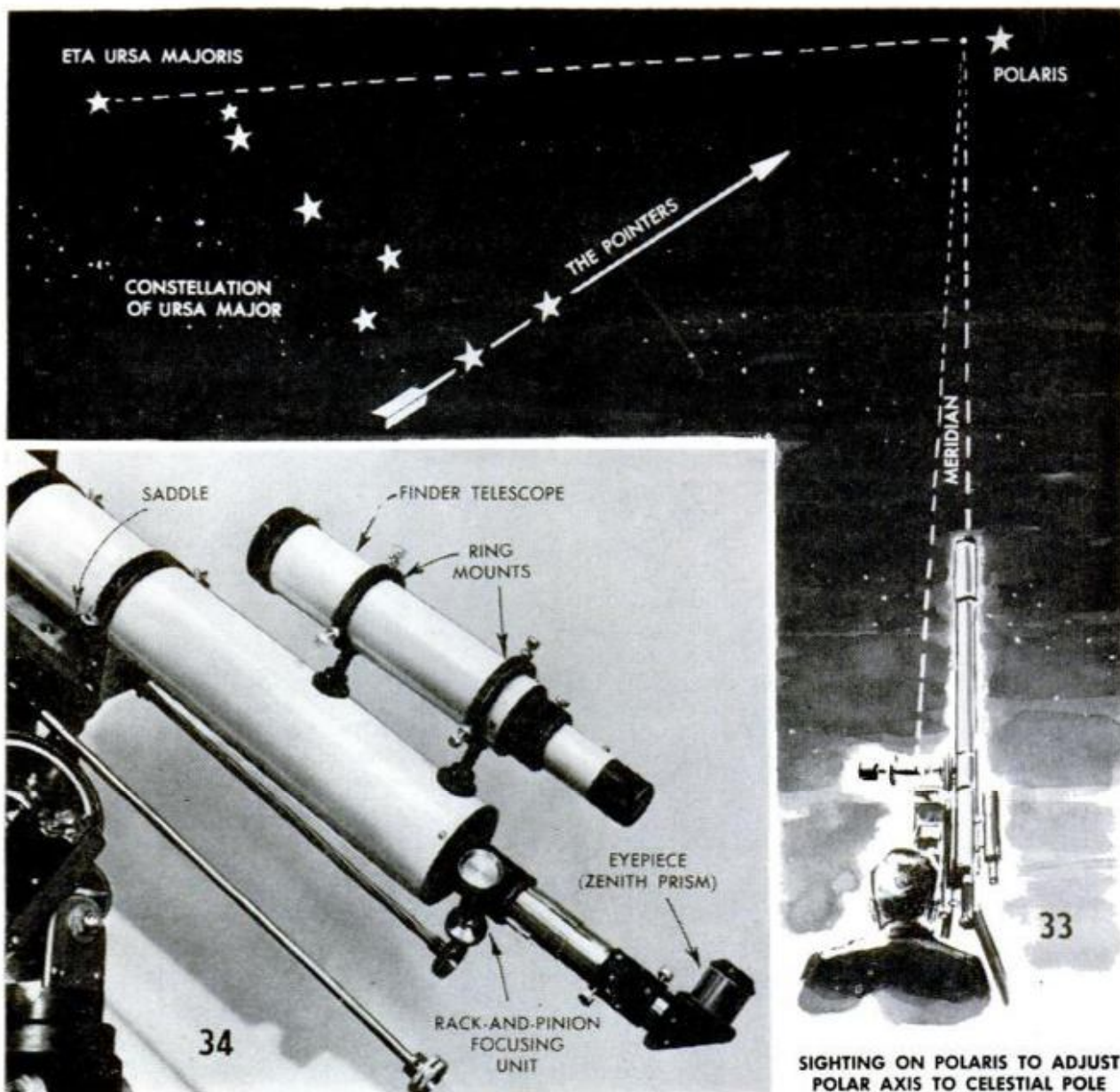
With the telescope and the finder 'scope ready for mounting you come now to the telescope cradle, or saddle, Fig. 26. This is a comparatively simple affair consisting of two band-type clamps mounted on a hardwood base. Both the fixed and movable sections of each clamp are felt lined as in Fig. 26. Also, you will notice that one of the parallelism adjusting plates is shown attached to the base of the saddle. Refer back to Figs. 6 and 14 of Part I and you can see how the saddle is mounted on the end of the declination-axis assembly.

The tripod you build must be sturdy and Figs. 28 through 32 show how the original was made. Figs. 30 and 31 detail the tripod head, which is made of hardwood, including the azimuth table and the latitude quad-



SETTING MOUNTING, above, to latitude with a dial level usually can be done with sufficient accuracy. Below, tripod legs are fitted with metal shoes





rant. Each leg consists of three pieces, Fig. 32, which are assembled as in Fig. 29. Note that counterbores for the bolt heads and washers are indicated in the upper-leg member, Fig. 32. Although these refinements contribute nothing directly to rigidity of the tripod, they are a mark of good workmanship. The lower ends of the 2 x 2 members are tapered, pointed with metal and fitted with brass shoes, Fig. 28. The shoes and metal points are not essential but they do add to the durability and appearance of the tripod. To make the metal points, center a hole in one end of the leg section and drive in a large brass screw the length of the threads, leaving only the body projecting. Cut off the head. Then taper the wood about as indicated and make a paper pattern with which to cut the metal shoe. Bend the metal to fit, solder the joint and then fasten in place with three flat-headed screws.

Now finally, comes the counterbalancing weight which consists of one 4½-lb. lead

weight and two 1¼-lb. barbell weights turned down and faced to weigh about 1 lb. each. Turn a mild-steel sleeve, 2½ in. long and 1⅜ in. outside diameter and bore out to fit the declination-axis shaft projection. The barbell weights are bored out to slip over this sleeve, which can be adjusted along the length of the shaft by providing two shaft collars, one at each end. Cast the lead weight in a No. 2½ tin can. When the lead casting is cold, mount in the lathe and turn down to the diameter of the barbell weights, taking off the can as you go. Centerbore the lead weight to ⅝ in. to fit directly onto the declination-axis shaft.

That's it, so far as the actual construction goes. Finishing the parts, squaring the declination axis with the polar axis and setting up for observation are the final steps. Before you finish the housings of the polar and declination axes, one must be squared with the other. This can be done with a carpenter's square. Lay the assembled

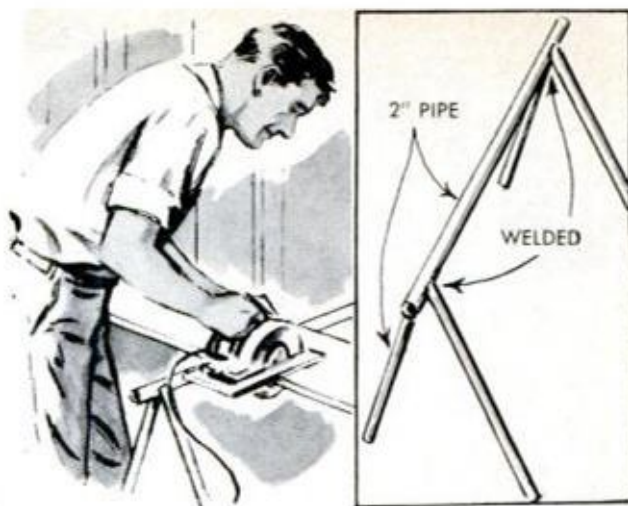
(Continued to page 218)

WORTH REMEMBERING

When You Need Sawhorses

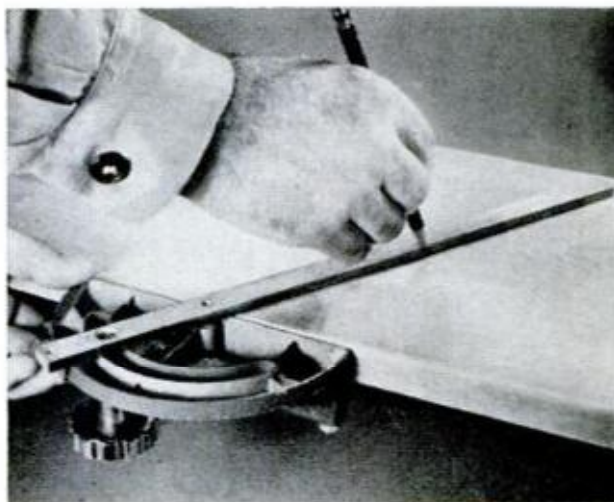
If you're a builder, mason, or one of those do-it-yourselfers who likes to tackle rough jobs, you need a pair of sawhorses that can take it. And here's just the horse for you. It's made from welded pipe, slim, trim, neat, also sturdier than any that can be made from wood. Although 2-in. pipe is specified for both the legs and beams you may find it somewhat easier to weld on 1½-in. pipe for the legs. Beams can be any convenient length and legs any height you want.

—C. F. Marley



Miter Gauge as Protractor

When you can't find your protractor or T-bevel for laying off an angle accurately remember that the miter gauge on your table saw is the perfect substitute for either one. Just set it to the angle you want, flip it over and place against the edge of the stock as pictured. Strike a line along the gauge bar and you've got it right on the nose. The gauge will work from 0 to 45 degrees almost anywhere there's a straight edge against which to place it. This range covers just about any common angle you need to lay off. Just make sure the gauge is set right and you can't miss.—Bil Toman



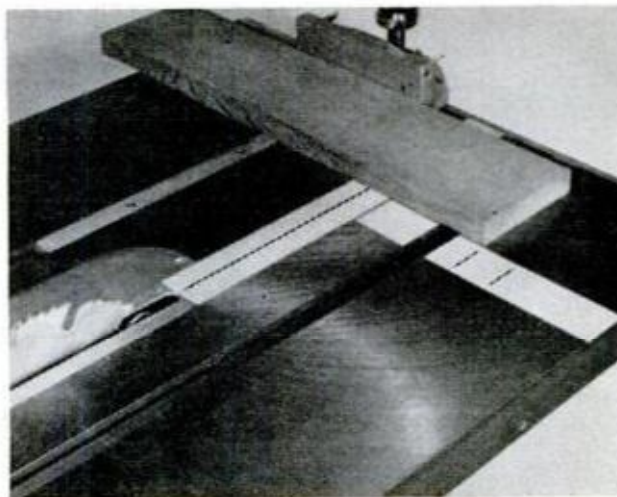
Wrench for Big Taps

It may be only once in a lifetime that you will have need to tap threads in a large-diameter hole. You'll have to buy the tap but there's no need to purchase a regular tap wrench. Just pick up a turnbuckle of a size that will permit the squared end of the tap to fit the slot in the body. The 'buckle is cheaper and there are other uses for it. To use it as a tap wrench center the squared end of the tap in the slot in the turnbuckle, tighten the screw eyes and there's your ideal substitute wrench.—H. Hanscom

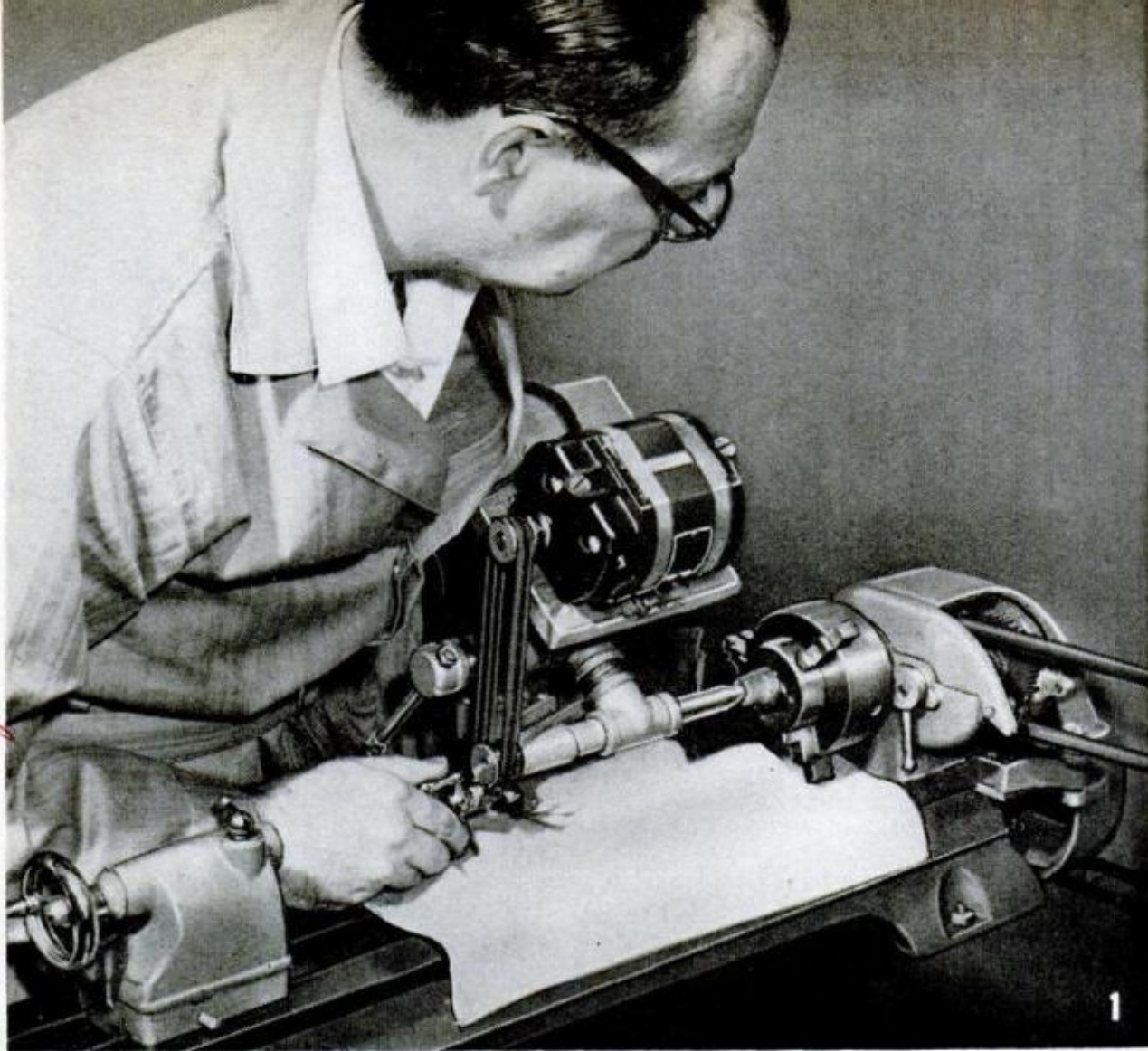


Tape Carries Reference Marks

When you're making repetitive cuts, either crosscutting or ripping, it's handy to have reference marks right on the saw table. When extreme accuracy is not involved, stick strips of adhesive tape to the table surface and ink the marks on the tape, using a ruler and ruling pen or a ball-point pen. This is better than scoring marks on the surface of the saw table as the tape is easily stripped off when no longer needed, leaving the surface smooth. After inking, check the marks on the tape for location just to make sure that they are in the positions desired. Tape 1 in. wide is best.



Lathe made by Sears, Roebuck & Co.



THIS TOOL-POST GRINDER

**does a precise job and is shop-built
from stock parts available anywhere**

THAT MIRROR-BRIGHT finish you see inside and out on small metal parts designed to fit together with precision usually is done in a lathe with a tool-post grinder. In the toolpost-grinder setup both the wheel and the work are rotated simultaneously in opposite directions, a procedure that produces a finish on metals that just can't be equaled by any other common finishing process. That's why tool-post grinding is widely used as a means of sizing and finishing fine work.

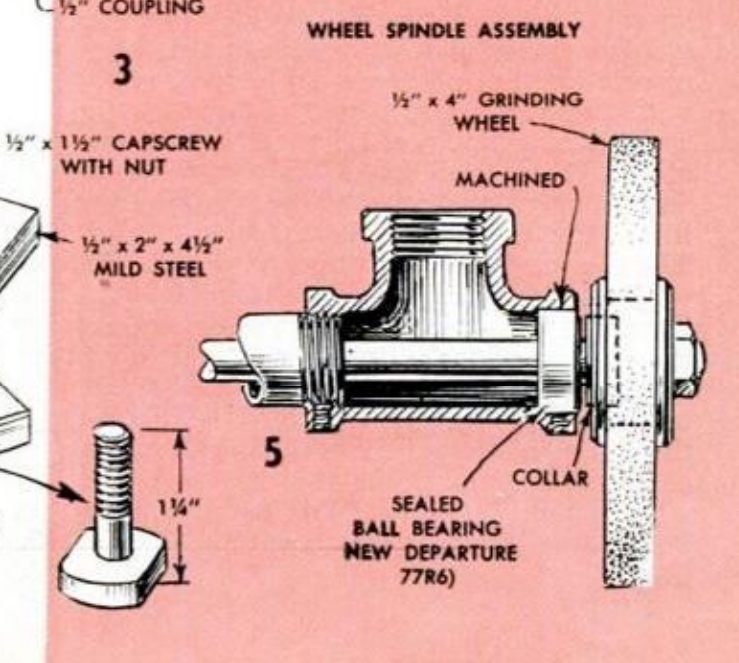
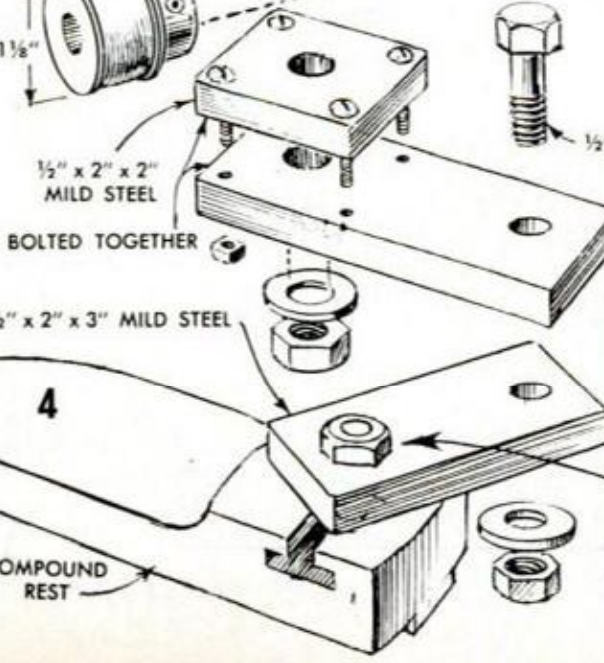
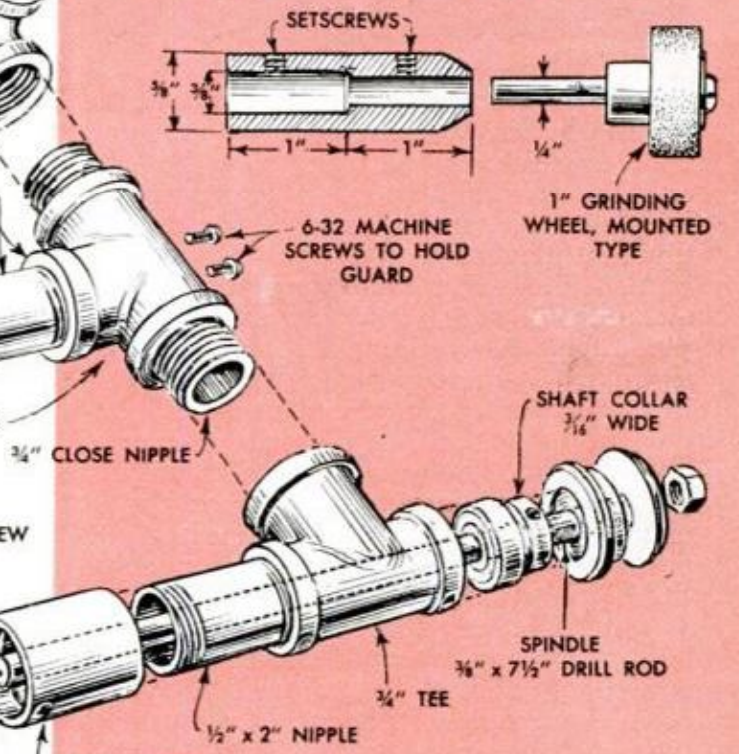
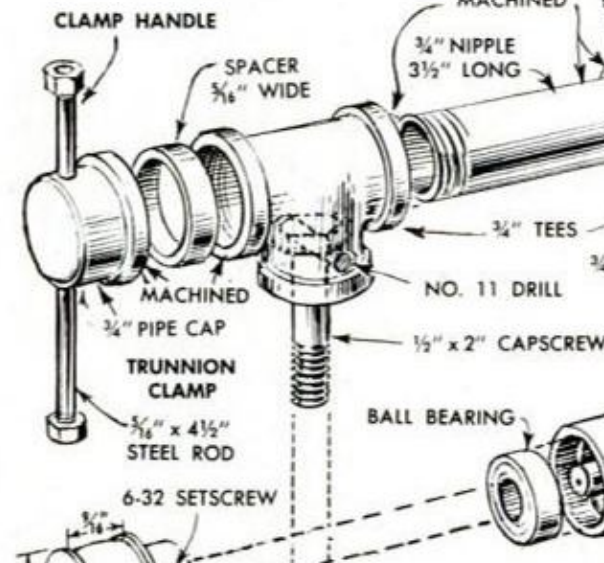
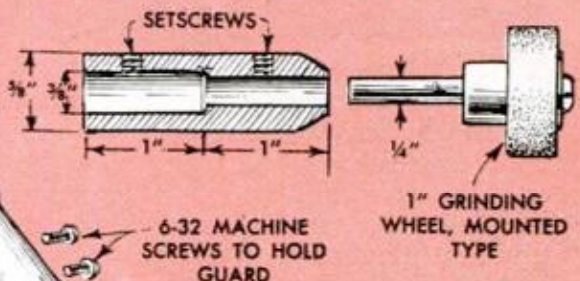
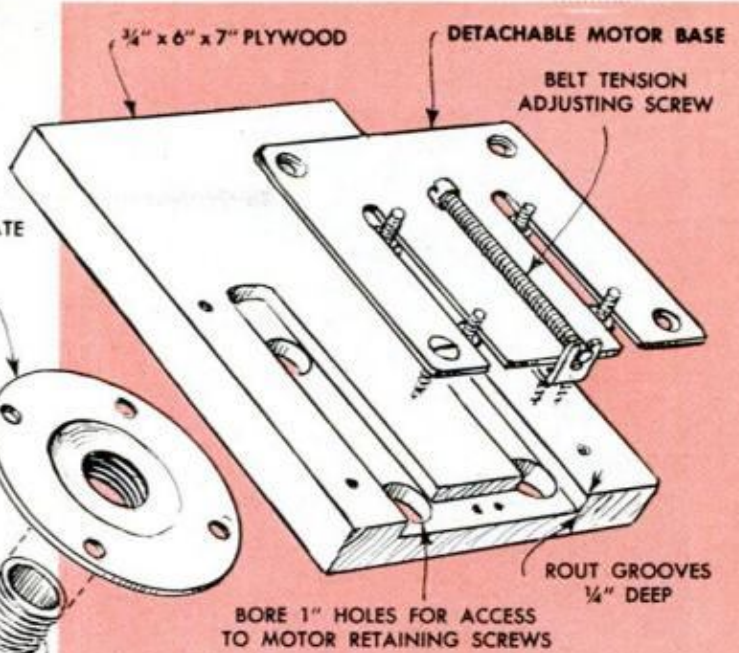
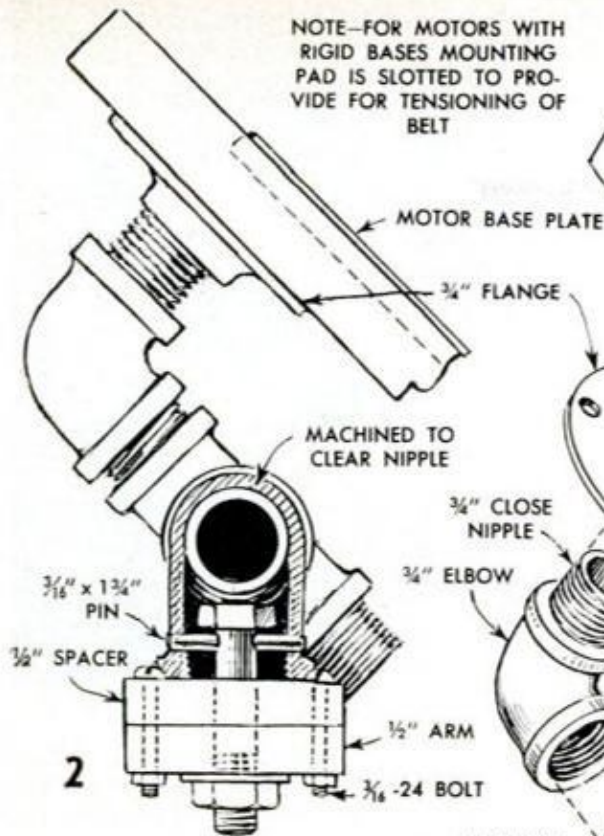
The frame of the small tool-post grinder pictured in Fig. 1 is made from ordinary steel pipe fittings and obviously does not have the refinements of the precisely made commercial units. But if care is used in selecting, machining and assembling the parts, it will do very accurate work which is acceptable for all practical purposes.

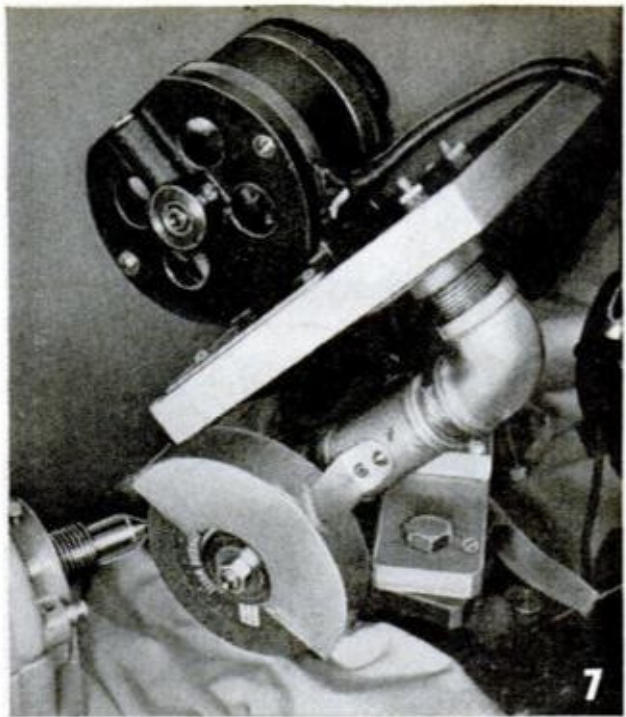
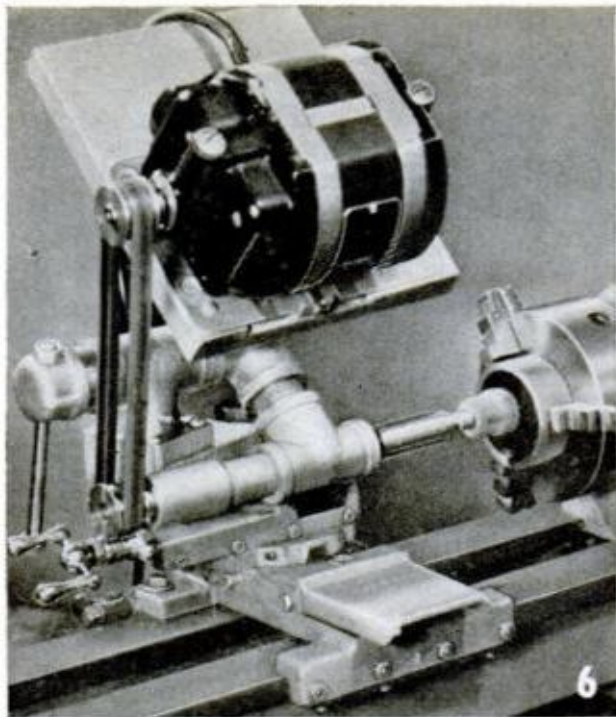
Figs. 2 through 5 show how the unit is put together. The motor on the original grinder pictured in use on a 6-in. lathe in Fig. 1 is a type that was salvaged from an office machine. It came with a detachable motor base shown in the pulled-apart view, Fig. 3. Any motor of similar size and power (about $\frac{1}{15}$ hp.) of the universal type having a speed of 3000 to 5000 r.p.m. will serve the purpose very well. Alter the base, Fig. 3, to suit.

Before you get into the construction there are several points to be noted. Common steel pipe is made with allowable variations in inside and outside dimensions. This can mean that where an assembly of pipe or fittings like that in Fig. 3 is called for, you may not end up with precisely the dimensions you plan on. As an example of what to avoid, note the wheel-spindle assembly in Fig. 3. The over-all length of the

Reprinted Shop Projects 1961

NOTE—FOR MOTORS WITH RIGID BASES MOUNTING PAD IS SLOTTED TO PROVIDE FOR TENSIONING OF BELT





spindle is given as $7\frac{1}{2}$ in. but don't cut the spindle to length until you have made a trial assembly of the pipe-fitting housing and have checked it out to determine the length of the spindle required for that individual assembly.

Also note in Fig. 3 that the pivot, or trunnion, carrying the frame assembly is a $\frac{3}{4}$ -in. pipe nipple $3\frac{1}{2}$ in. long. The nipple passes through a $\frac{3}{4}$ -in. tee which serves as a bearing after boring out the threads. It's important that the tee and nipple be machined to a close fit. The accuracy and rigidity of the whole unit largely depends on the fit of these two parts. So use care when you bore out the threads of the tee and machine the nipple to fit.

As will be seen from Fig. 4, the grinder adjusts for position on a two-part linkage which is bolted to the tool-post saddle, or boss. This arrangement, worked in conjunction with the trunnion, Fig. 3, gives a universal motion and enables you to align the grinder spindle with the axis of the lathe or position the spindle at any desired angle with the lathe centers. The trunnion clamp consists of a pipe cap, a handle made from a $\frac{1}{4}$ or $\frac{5}{16}$ -in. steel rod and two nuts, and a spacer which gives the clamp a "camming" bite so that it can be depended upon to hold. The flanged ends of the tees are machined to give a true bearing when the machined flange of the pipe cap is tightened against the spacer, edges of which are machined.

The spindle turns on sealed ball bearings, one being mounted in the tee, Fig. 5, and the other in the outer end of the coupling as you see in the pulled-apart view of the wheel-spindle assembly. The spindle pulley is machined from mild steel round $1\frac{1}{4}$ in.

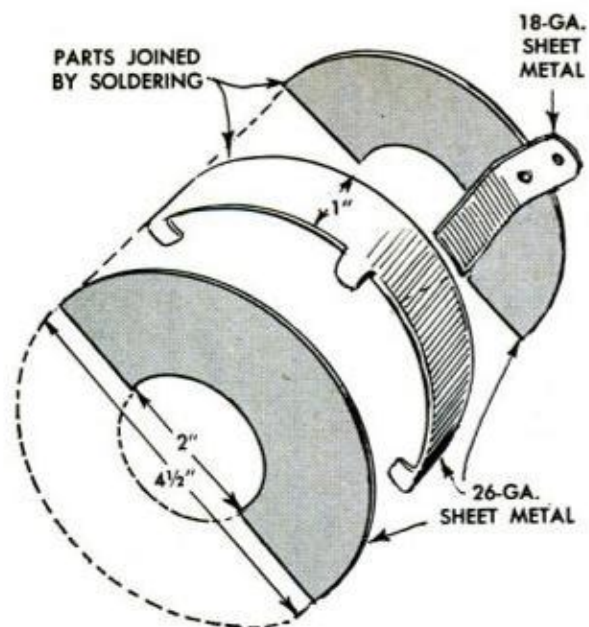
in diameter. Note that it is crowned and has two low flanges with a $\frac{1}{16}$ -in. face between. A motor pulley is machined to the same dimensions. Only the dimensions given are of importance. Care must be used in boring the ball-bearing seats in the tee and coupling. The bearings should be seated in a light, press fit. Don't machine the seats for a drive fit as this may cause distortion of the outer races and cause the bearings to heat and wear rapidly when subjected to high speeds.

Internal grinding, Figs. 1 and 6, requires the use of mounted grinding wheels of small diameter, having $\frac{1}{4}$ or $\frac{1}{8}$ -in. arbors. The center right-hand detail in Fig. 3 shows how to machine a counterbored chuck which slips over the outer end of the grinder spindle, replacing wheel collars and nut.

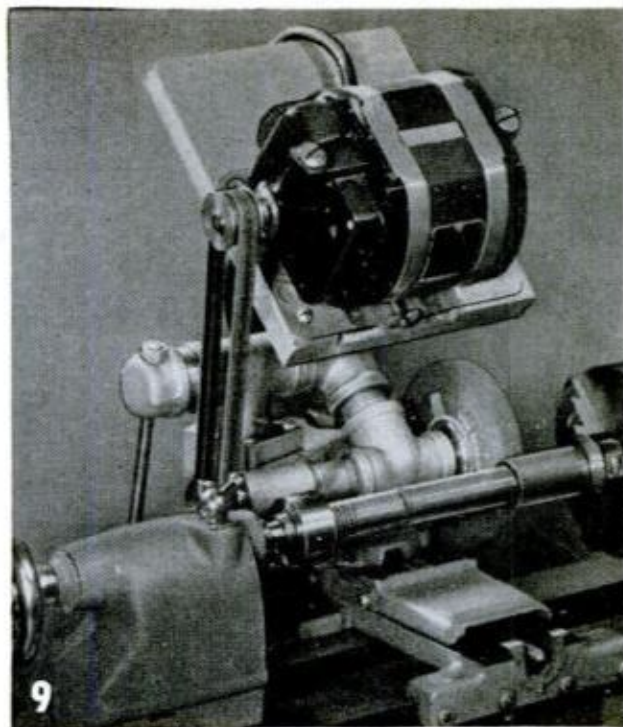
In all the photos the external grinding wheel is shown without a metal guard for clarity. For safety the wheel should be provided with a guard assembled as in Fig. 8. If the operator does not regularly wear glasses, a face shield or goggles should be worn to protect the eyes. And always protect the ways and carriage of the lathe with a tightly woven cloth as in Fig. 1.

Rotation of wheel and work for external and internal grinding are shown in Fig. 10 and typical operations of internal grinding are pictured in Figs. 1 and 6 and external grinding in Figs. 7 and 9.

Each time the wheel is used for external grinding it must be dressed, preferably with an industrial-diamond dresser. Fig. 11 shows how to make a simple and effective holder for a diamond dresser. It's mounted on a bracket attached to the lathe carriage as detailed and pictured. ★ ★ ★



8 WHEEL GUARD



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MOSES ASCH, left, president and director of Folkways Record Co., describes his methods of recording folk sounds during an informal, tape-recorded interview with *PM*'s electronics editor, **Byron G. Wels**

MOSES ASCH is the president and director of Folkways Record Company which boasts "the world's largest collection of authentic folk music on long-play records."

You may think of folk music as the product of a guitar-strumming, nasal, jug-carrying mountaineer. In the Folkways interpretation, folk music is produced in every land. Consider "Taureg Music of the Southern Sahara." The instruments used are the tendi, water drums and imzhad.

What kind of a man is Moses Asch? Trained as an electronics engineer, he gave up this career for the more personally gratifying work he is doing. *PM* turned the tables on "Moe" Asch by putting him at the other end of the tape recorder.

Mr. Asch, just what does "folkways" mean?

Anything that is sound, from Indonesian folk music to James Joyce reading his own poetry. Frequently, I am interested in a writer's own expression. We have documented people like James Farley on "What Is a Politician" and Margaret Mead on

"What Is an Anthropologist." I have recorded American folk singers also.

After a recording is made, how do you edit the material?

The only way to edit is in terms of what I am trying to say. We don't change material, but we record more than the final record will have. We try to give a complete

LAURA BOULTON records Eskimo rituals in Alaska. Asch says that isolated cultures are reluctant to submit to the tape recorders. Anthropologists must first befriend—even live with—natives to secure their cooperation before attempting to make a tape recording



picture of a people from childhood through death. I am interested in the literature, content and reflection of the life of a people—expressing it from its intellectual, rather than its musical viewpoint.

Do you call on your engineering background for unusual sounds?

I issued a recording of the various documentary sounds—just what you hear . . . sounds of machines, sounds of electronic equipment and the sounds of a continent.

The use of sound and supersonics is an important part of our expression. Super-sonics is something that our brain reacts to that we don't consciously hear. I think that by slowing down super-sonics or "speeding up the rumble of the earth," we may be able to understand phenomena in rhythms.

What sort of equipment is used for field recording?

Our people go into the deepest parts of the world with primitive equipment because weight becomes a problem. When you go out among the primitive people, you have to live primitively, and your equipment has to be primitive. The modern por-

table units with transistors are a different story. Still, Margaret Mead, the famous anthropologist, went out with \$50,000 worth of equipment to record her material in Samoa, and it came back in a primitive state. She discovered that you can't create a laboratory setup in a primitive society.

I can't go into your home and interview you about your personal life and background. It's the same with anybody. Primitives are very resentful of strangers, especially white men. You must actually live with these people. The more primitive a man is, the less apt he will be to accept you.

The American Indian is the most isolated human being on earth. He does not want any interference by the so-called Western civilizations. He wants, more than anything else, to retain his own culture.

The people who are recording live with Indians for five or six years. One young man spends every bit of his time outside the university living with an Indian family. During a recording of a meeting of the Huron tribe, he took off his coat and joined in the ceremonies. You see, he lived this, and when you live it, they accept you. A



MARIO ESCUDERO, flamenco guitarist, plays for a recording session at the Folkways studio in New York



THE NOSE FLUTE, a primitive instrument, is recorded in Malaya. The music has a distinct oriental flavor

"CAT IRON," a folk singer, is recorded in the deep South. Tape is edited, then produced in disc form



young anthropologist must first be a doctor, second a photographer, third a recording engineer and last, an anthropologist.

Is it difficult to establish yourself with people the world over?

Once you learn how to live with people, it is not difficult to talk with them. I have recorded Ceylonese and Africans in my studio. They were aware that my approach was not as a stranger, but as a friend.

How do primitives react to hearing themselves for the first time?

No different than you, the first time you heard yourself. You said "That isn't me!" It's a lot of fun.

Do you ever attempt to disguise the fact that you are making a recording?

Among primitive peoples, the less you disguise, the more honest a recording you will obtain. Certain sects, such as the Hasidic Jews, the Quakers, the Shakers and many Islamic religions forbid an outsider to enter. We have never released a recording without first obtaining proper sanction. Sometimes they send for the records to relearn their own heritages. When you hear of this happening, you feel that you have really done something.

What does the future hold for recording?

I don't think we can stop. We started with the old cylinder records, then to the acetates, and now we have tape. People think in terms of electronic expression rather than content. With me, it is just the opposite. I am interested more in the content than the mechanics.

What interesting experimental recordings have you made?

We record birds, trying to find out the difference in bird sounds. Why do two types of wrens sound different? We try, by the use of slowed-down tape, to get sequences of bird sounds and analyze them from musical scale angles. A new world of sound has opened up with "audio-microscopics." The tape recorder has become a very important tool for the scientists, and I have done a great deal of study in this field.

We were recording in the South American Rain Forest and a couple of birds had to be recorded in the local zoo. We couldn't get the macaws to react at all until we got a peep from one and played it back. Then they started to talk to each other.

What are your most popular records?

Where is the broadest field of interest?

American Indian is my largest seller. Of course, people who are creating communication with other people, like Pete Seegar, communicate what they sing in relationship to their audiences. We all had "causes" when we were young. Now there are fewer causes. People are lost and look for communication and association. It seems that

SOUTH AMERICAN ARTIST receives instructions from Asch on use of tape recorder to record her comments while she paints



the folk song is a source of association. Since it is folk music, it never dies.

The young people of today no longer associate with forests or digging ditches or country life. They find that they can express themselves using the urban life and are creating their own way of playing and singing. The industrial era is creating its own music. It started with the railroad songs and has gone on to the jet age. In the city, you deal with city folk singers. Here, groups are creating a folk music that is akin to the first days of jazz. The young people come together and although they are a group, each expresses himself individually. This is called "Bluegrass."

Has anyone attempted to document the songs of children at play?

We have an album called "One, Two, Three and a Zing, Zing, Zing." It is done with children in the city of New York, in a neighborhood where four or five different cultural groups live together. Children communicate with each other. They sing their songs and when they reach a certain age, forget about them. Some of these songs date back to the early Egyptian age. Children have the same games all over the world, but use different words. In some areas there is no communication, but somehow they know that this is the way to sing the song.

What can you tell the home recordist, by way of advice?

Primarily, they are afraid of wasting tape. You can always edit, but cannot always record. When you record, what are you trying to document? The sounds of a people, their ceremonies—or something you just enjoy?

I think the formation of a recording session at home is very important. We always forget that there are people to come. We think of people who were, and who we are, but what of those who will follow? People

just don't think this way. They buy a tape recorder for entertainment, not as a serious piece of family equipment.

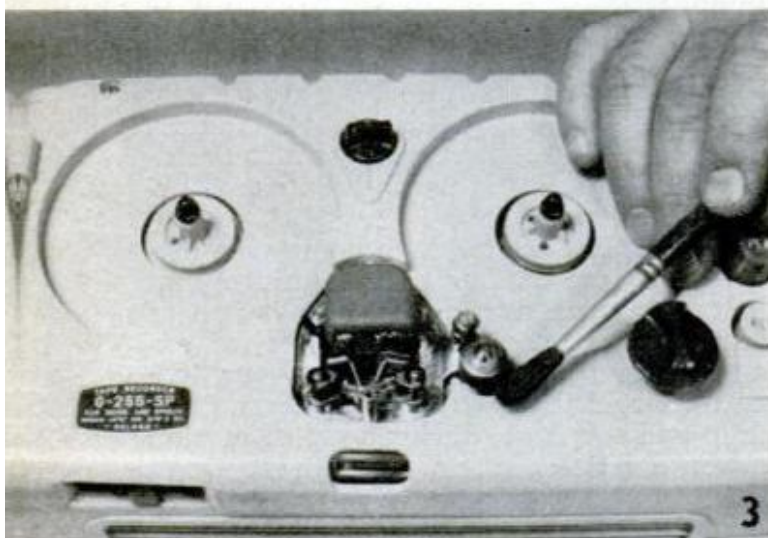
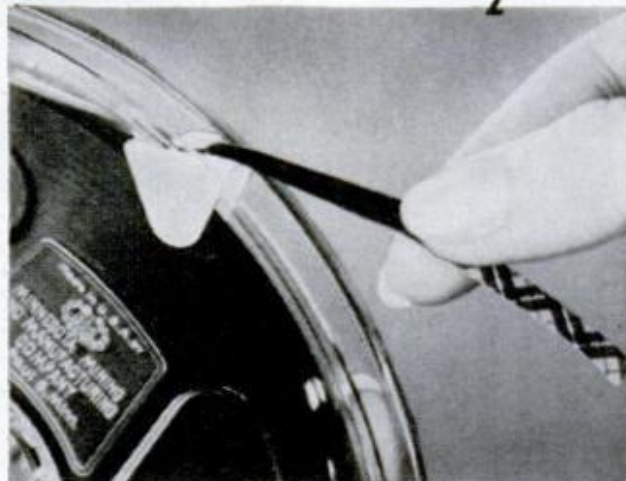
What can you do when people are conscious of the mike?

This is soon overcome. Ask them over, tell them why you are recording and they will cooperate. I feel that family documentation is very important. The only way to be a family is to know what a family is. This business of running from the family to a society is a terrible thing. We are a social people and should try to be a part of others, but individual understanding is also necessary. We should not try to hide from ourselves.

I would like people with home tape machines to record family life, things that belong to them as a group. This is just as valid as a photograph. Children, for example, are my specialty. The only way to a better world is through the children. Children will cooperate during a taping session if you don't treat them as children. Don't try to conceal the fact that you are recording. Explain it to them, condition them, and they will cooperate.

What audio experiments can you tell us about?

A young artist from Peru has settled in Chicago. We try to capture her "flow of consciousness" as she paints. The recording equipment in her studio provides us with an oral image of what happens. Artists, I understand, are never happy with their first impressions. Also, we have the "City of Chicago" sounds. Every city has its own character and it is interesting to get a morning-to-night sound of a city. We have done this in New York. However, New York is entirely different from Chicago. More than just a difference of accent. It's a completely different type of expression as are all the individual sounds of the world and its peoples through the ages. ★ ★ ★



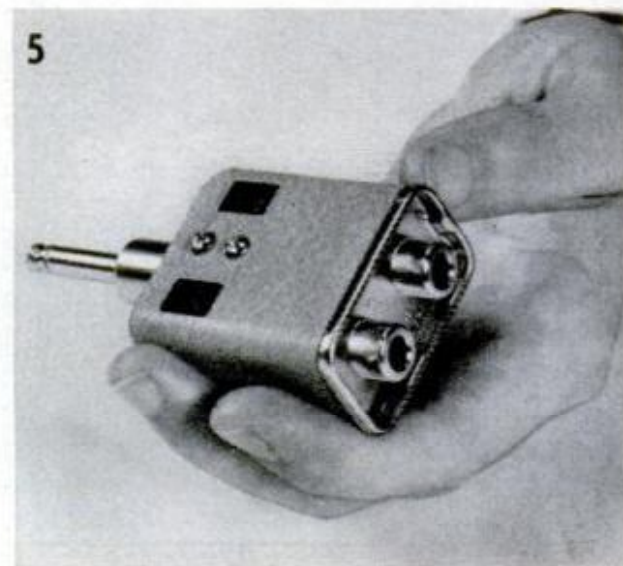
1. "LETTERS THAT TALK" are three-inch reels of tape. Boxes have space for address labels, and they can be mailed anywhere in the U.S. for only eight cents

2. TAPE CLIP holds tape securely. Tape end slips through slot on clip, and clip fits into reel to prevent spillage. Clip simplifies tape handling

3. TAPE-RECORDER HEADS suffer from clogging by metallic coating on tape. Keep machine in top condition by frequent use of small camel's-hair brush

4. STYLUS PRESSURE GAUGE, Garrard's SPG3, provides accurate indication for balancing tone arms. Included is five-gram weight for checking accuracy

5. MINI-MIX plugs into any hi-fi input, provides two additional inputs for mixing or balancing such accessory sound sources as microphones and phonos





Start the season with *this* spark plug— especially designed for boating by Champion!

Loaded with outstanding and exclusive features, this great marine Champion is performance-proved! It gets the best out of every outboard—including yours . . .

This great marine spark plug is especially designed for boating by Champion—the spark plug specialist! It's the kind of spark plug you need for top performance in *your* marine engine. (These marine Champions sparked every class winner in

both the 1960 National Stock Outboard meet and the APBA Outboard Championships!)

In waterproof packs that make them ideal as spares, too, these Champions have rust-resistant plating, attached gaskets for easier installation, and Powerfire

marine electrodes for longer plug life. Get the new boating season off to a sparking good start with a new set of the spark plugs especially designed for boating—*marine Champions!*

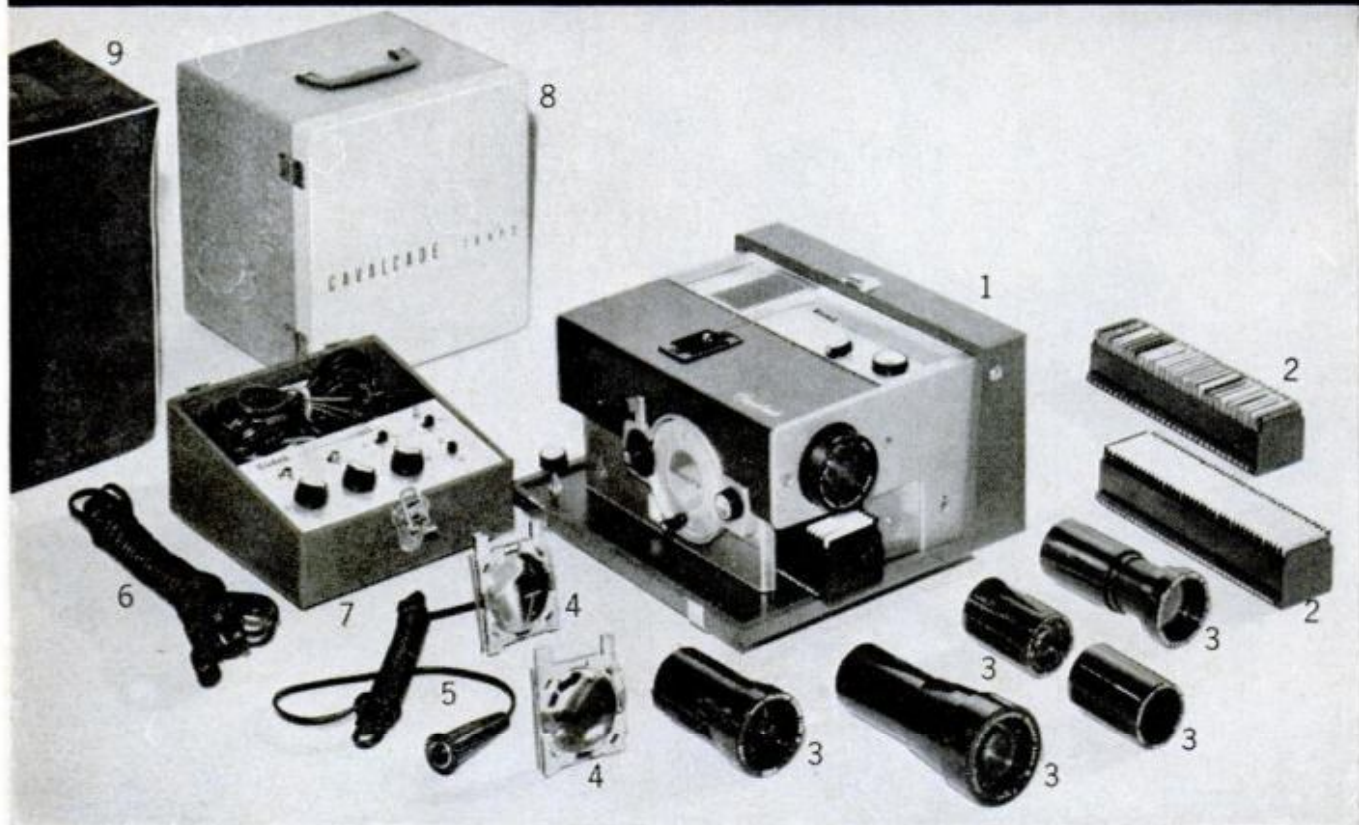
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New Ideas in Photography



1. Kodak Cavalcade Projector, Model 510. With 5-inch $f/2.8$ lens, less than \$140. Model 520, with 5-inch $f/3.5$ lens, less than \$110.

2. Two types of trays hold all 2 x 2 mounts.

3. Five lenses let you fit picture on big and small screens, at long and short projection throws. Sizes are 3", 4", 5", 7" and zoom ($3\frac{3}{4}"$ to $6\frac{1}{4}"$).

4. Two condensers: universal, for all 2 x 2 slide sizes; hi-efficiency condenser for extra brilliance with 35mm and No. 828 slides.

5. Remote control cord, 12 feet long.

6. Extension for remote control cord adds 25 feet. Use any number.

7. Programmer lets you add synchronized voice commentary and music to all your color-slide shows. Any popular tape recorder may be used. Makes every show "come alive."

8. Carrying case for slide trays.

9. Protective cover for projector case.

"Cavalcade" system lets you advance from showing slides to showmanship

Now you can custom-build an automatic slide-showing system that exactly fits *your* needs. Just start with a Kodak Cavalcade Projector (*shown above*) and add components when you need them.

Cavalcade Projectors not only change slides automatically—they also let you reverse, repeat, skip, or hold a slide on screen. Don't need constant focusing because slides are pre-conditioned by warm air. You can edit slides instantly. And the system of aids

gives Cavalcade Projectors unique versatility. Let your dealer show you.

New Camera Simplifies Flash Shots

Flash exposures are set automatically by new Kodak Motomatic 35 Camera. When subject is 5 to 25 feet away, setting the focus also sets lens opening. Film-winding is automatic, too. A tiny motor automatically advances film, cocks shutter, after each shot. Less than \$110.

from Kodak

New wonder metal brings rich sound to your 8mm movies

Precision engineering and a new "wonder metal" have now brought top-quality do-it-yourself sound to 8mm home movies.

New Kodak equipment lets you convert your 8mm films to sound movies—with wide-range music and your family's true-to-life voices. All it takes is a magnetic stripe on the film and a Kodak Sound 8 Projector in your living room.

You need precision magnetic striping, such as Kodak Sonotrack Coating, and a precision projector—because the magnetic stripe on 8mm film is only 3/1000 inch wide!

The sound-pickup head is so small that ordinary magnetic materials wear out quickly. Kodak engineers achieved an almost wear-proof head by choosing Alfenol—a new, incredibly hard magnetic alloy. It gives hundreds of hours of use!

And the engineers found a way to keep the 2/1000-inch-wide head dead-centered on the 3/1000-inch track. There's no "edge tracking" to distort sound.

How the system works. Ask your dealer to have Kodak Sonotrack Coating put on your 8mm films. Then project the film with a Kodak Sound 8 Projector. Talk through the mike. Add music, sound effects, by connecting your record player or tape recorder to the projector.

After recording, play your new sound movie back instantly. If you want to make changes, just erase and re-record! You play back through the projector's own high-quality balanced amplifier system. Or you may hook in your home hi-fi system.

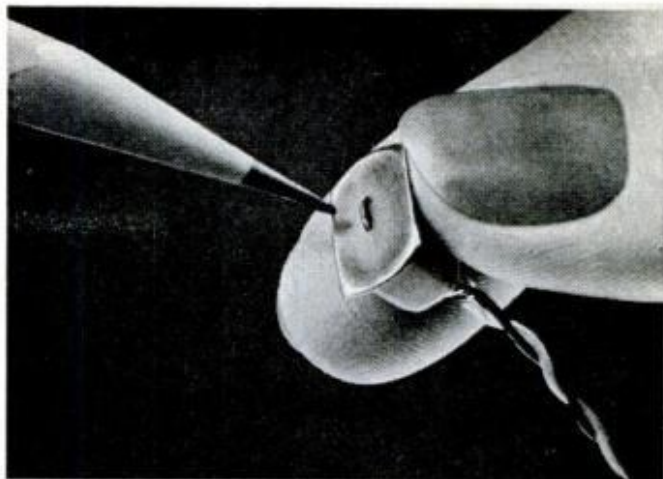
Movies are brilliant and sharp, up to five feet wide. Choice of two forward speeds (16 and 24 fps), still and reverse.

Kodak Sound 8 Projector, with mike and phono connector cord, is less than \$350. See your dealer for exact retail prices.

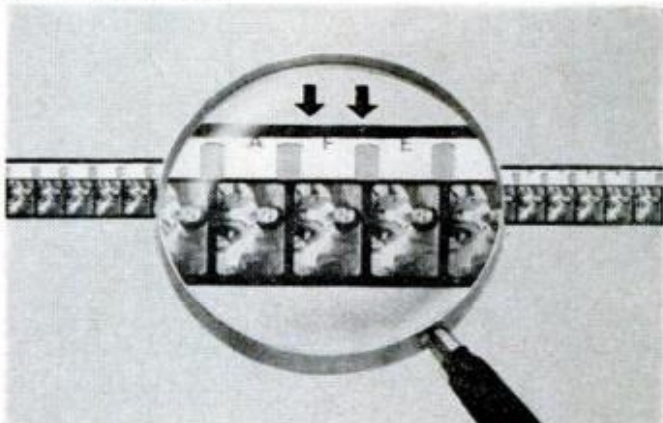
EASTMAN KODAK COMPANY, Rochester 4, N. Y.

See Kodak's "The Ed Sullivan Show" and "The Adventures of Ozzie and Harriet"

APRIL 1961



INCREDIBLY HARD magnetic head made of Alfenol will record for countless hours without any loss in the sound quality.



TO ADD SOUND to your 8mm films, take processed film to dealer and have Kodak Sonotrack Coating applied to edge. Costs but a few cents a foot.



VOICES, MUSIC, SOUND EFFECTS add realism, professional touch. Children's voices, recorded at different ages, dramatize growth shown in movies.

Prices are subject to change without notice.

Many dealers offer terms as low as 10% down.

Kodak
TRADEMARK



It's the lightweight champ among shovels! Just 3½ lbs. of grizzly-tough, heat treated high carbon steel, and seasoned White Ash handle . . . Reinforced with an I-Beam insert in the handle, rolled shoulders across the blade, and a welded stiffener in the base of the shank. Worth looking for. Worth asking for by name — *Jet Lite!*



THE WOOD SHOVEL & TOOL CO., Piqua, O.

CLINIC FOR HOMEMAKERS

As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

Will Edging Damage a Lawn?

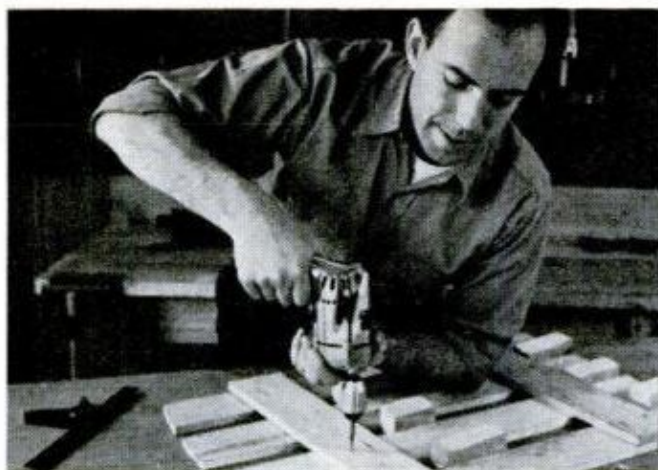
Q—I had always understood that edging the lawn along walks was a more or less approved practice. Now I'm told that it is not, that in very dry seasons the grass along the edgings will be seriously damaged if not killed out entirely during a prolonged dry spell. I don't want this to happen as I have a good lawn, well established. Yet I'm always attracted by a neat edging job when I see one. Is it true that there's danger of serious damage to the grass?

—A.W. Ohio



A—Not directly. It is true that there is a possibility of damage during extremely dry weather due to the exposure of the roots. But you can largely offset this by scheduled watering. Unless, of course, watering restrictions prevent sprinkling at the critical time when it is most needed. Probably the main objection to edging is that you provide an ideal furrow for the lodgement of weed seeds of all kinds during the fall and winter months. And once started in this particular location they seem especially difficult to eradicate, even with approved herbicides, or weed killers. In this we are referring to the practice of cutting a rather deep furrow at the edge of the walk. Another objection to this particular practice of edging deeply is that on a slope it invites washing, or gulying, during heavy rainstorms. This can cause more damage to the lawn in an hour or less than a prolonged drouth of weeks or months. A shallow edging, cutting the grass blades that overhang the edge of the walk, would have none of these objections, of course.

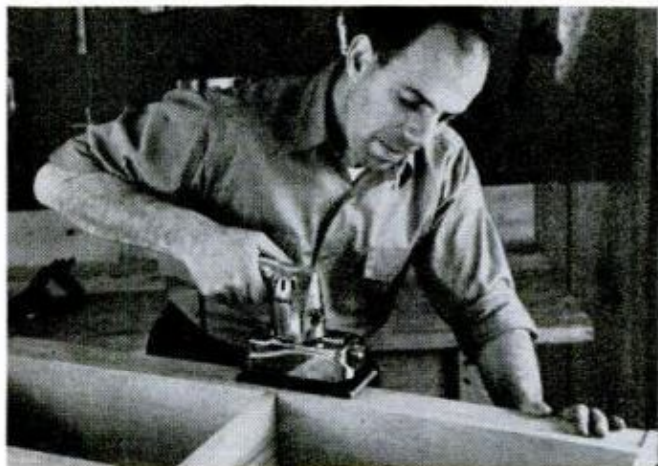
(Continued to page 214)



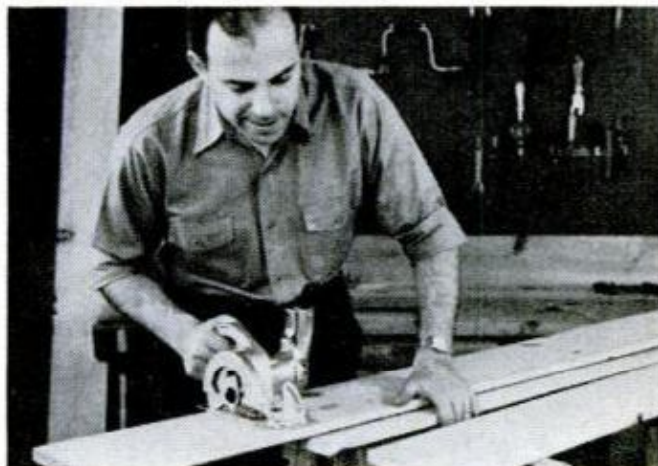
Drive screws—drill in wood, aluminum, plastic, steel, concrete.



Cut fancy designs with B&D Jig Saw attachment.



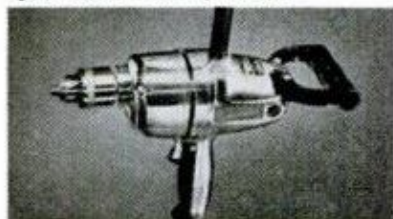
Sand to satin smoothness with B&D sander attachment.



Saw accurately, fast with B&D 5" blade saw attachment.



Save \$10.00! Famous B&D 1/2" Deluxe Drill with extra capacity for pros and semi-pros. Regularly \$39.95. Now \$29.95.



B&D 1/2" Deluxe Drill. Packs tremendous power for heavier installation, construction and maintenance work. Real Value!



New B&D Golden Drill Fixkit. Handsomest, handiest power tool kit of all. B&D 1/4" Drill. 27 pieces. \$29.95 value. Only \$24.95.

Why settle for second best? B&D Drills start at \$16.95!

It's said that *imitation is the finest form of flattery*. We agree! There are drills that look like Black & Decker Drills. But from the armature out, *no* drill is built like Black & Decker. On job after job, *no* drill performs like Black & Decker. And the men who buy drills—homeowners, carpenters, builders—aren't fooled by looks. They've bought more Black & Decker Drills than any other brand!

B&D Drills are designed, engineered and built for superior power, performance, speed, versatility, ruggedness and long life. And they *do* far more than drill! Nothing on the market can match B&D-built drill motors for powering saw, sander, polisher, hedge-trimmer and other attachments for hundreds of build-it, fix-it jobs. When you're looking for *real* value, make your drill a Black & Decker Drill. B&D prices start at \$16.95!

For free power tool catalog, write: THE BLACK & DECKER MFG. Co., Dept. D-041, Towson 4, Md.



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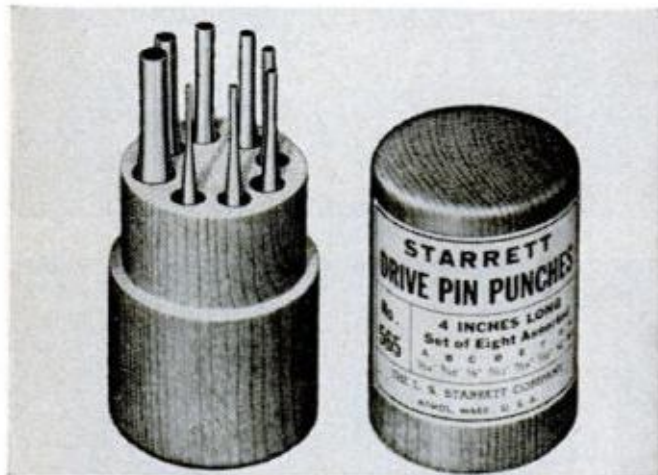
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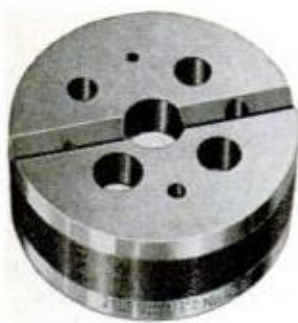
No. 565 Series **Starrett**
DRIVE PIN PUNCHES



For driving cotter pins, drift pins or bolts — also for lining up bolt holes. Made of specially selected tool steel hardened and polished with chamfered heads and knurled grips. Set of eight from 1/16" to 5/16" in round wood box or red plastic case.

3" BENCH BLOCK

No. 129



Handy for driving pins, drilling, heading — also makes an excellent light anvil. Forged, hardened and ground with a smooth finish to protect work and knurled side grip for easy handling. Nine holes range from 1/8" to 5/8".

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Please send my free copy of the big new Starrett Catalog No. 27.

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Repairing Table Leaf

Q—I have a dining table which is part of an estate. It is not especially valuable as it is not very old, but because of the pleasing design of table and matching chairs I would like to re-finish it. I think the wood is cherry as it is red and shows a rather curly grain, although the finish is now quite dark. One leaf is split from one end back about 9 or 10 in. How to repair this split is my problem. Do you have any suggestions to guide me?—R.R., Vt.



A—You do not say whether the table leaf is veneered or solid wood. It is quite possible that the wood is maple, stained, but that is not important. If the leaf is veneered construction and the veneer has split with the core stock, and also if the split is comparatively recent, then it should be possible to force glue into the split, draw together with clamps and get a fairly satisfactory job. But if the veneer has drawn away from the core stock or if the split is quite old, then you have a more involved repair. We would question whether the leaf is worth the time it will take to repair it successfully. You can make a duplicate leaf from similar wood in much less time than you can repair the original. But if, on the other hand, you still wish to attempt repair of the original, here's one way of going about it. If the split is old then the wood probably has stabilized at the open position and it may be difficult to draw the separated parts together tightly as they may not align properly when drawn up with the clamps. Clean out any grime that may have collected in the split and draw together with the clamps as tightly as possible. Then, using a ship auger, bore a 3/8-in. hole into the edge of the leaf, the hole centering as nearly as possible in the split and following it. Bore the hole to a greater depth than the split. Release the clamps and fit a 3/8-in. dowel in the hole, the dowel well coated with glue. Draw the clamps tight again and allow to dry thoroughly. While this is drying, you can refit the split veneer, trimming the edges if necessary to get a tight-fitting joint. Spread glue and draw the veneer into place with a C-clamp and a block of soft wood. When glue is dry remove clamps and cut off the projecting end of the dowel. Sand the repaired area smooth, stain to match and apply a clear finish.

(Continued to page 216)

Weekend Painters get a break with a new kind of Latex House Paint!

If you're planning to paint the outside of your house this year, there's a new kind of house paint from "Dutch Boy" that can make your job a lot easier. It promises professional results to even first-time painters!

Until recently, the weekend or vacation painter had to wait for an extended period of good weather. Now new "Dutch Boy" Latex can be used even right after a rainstorm. And it's specially helpful for the stop-and-go kind of exterior painting that most homeowners have to do. With this remarkable new paint, you can pick up right where you left off. Lap marks won't show. Skips and holidays can be touched up any time.

Extremely easy to apply, there is no tiring brush-drag with new "Dutch Boy" Latex. On certain exterior surfaces, you'll find a roller works perfectly. This new paint literally flows on over wood and masonry—and it covers fast and evenly. This easy application means that two coats go on in little more than the time it takes to apply one of regular paint.

When repainting surfaces with "Dutch Boy" new Latex, there's no need for a separate oil-type primer with all its complications. Instead, you simply use the easy-to-mix additive, PBL, with the first coat... "Dutch Boy" does the rest.

You have a paint job that dries, bug-free, in just 30 minutes. Add the second coat when convenient.

Messy solvents and thinners are unnecessary, too. Brushes and equip-

ment—like the painter himself—can be cleaned up with soap and water.

Homeowners who have used new "Dutch Boy" Latex House Paint claim it ends exterior house painting as they've known it before. It's an easy, simple, low-cost way to have a complete exterior paint maintenance program. Once applied, new "Dutch Boy" Latex lasts for years and years. Colors will stay bright and clear. Simple one-coat touch-up is all you will ever need. The part of a house exposed to more severe weathering can be repainted at any time *without repainting the whole house*. So long as you keep the same color, your Latex program means that you may never again need to repaint the outside of your entire house at one time.

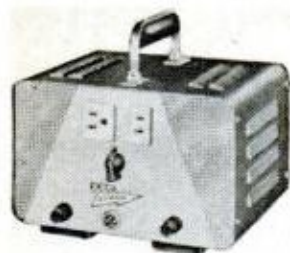
Properly applied, this new paint can eliminate most blistering and peeling problems caused by trapped interior moisture. New "Dutch Boy" Latex House Paint "breathes"—allowing interior moisture to escape yet sealing out the weather.

This new paint promises much to the do-it-yourself homeowner. Check with your nearest "Dutch Boy" Dealer listed in the Yellow Pages, or write for informative free booklet to: NATIONAL LEAD COMPANY, General Offices, 111 Broadway, New York 6, N. Y.



The Miracle of Transistors Brings You

110 AC FROM BATTERIES



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PACKAGED POWER

ACTIVERTER

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Dependable Power
for Hundreds of Uses

Now—using a totally new concept in electronic design—the ESB engineers have developed a revolutionary, fully transistorized inverter-charger, the ESB ACTIVERTER. This major breakthrough in "packaged power" means that you can now have the convenience and the utility that 110 Volt AC current can bring, and you can have it wherever you can take a 12 Volt storage battery!

Just connect the ESB ACTIVERTER to a battery and you can have 110 AC instantly, anywhere, for many hours. You can plug in portable electric power tools, an electric blanket, electric lights, even a television set! A flick of a switch and the ESB ACTIVERTER fast or slow charges 6 or 12 Volt batteries.

Compact, Rugged, Truly Portable

The compactness of the ESB ACTIVERTER design makes it possible to have a 12 Volt storage battery, an inverter, and a battery charger all in one self-contained and portable package. One PAK-O-POWER ACTIVERTER model provides a source of 110 Volt AC, with an output rating of 500 Watts, in a package the size of a portable picnic cooler! Because solid-state electronic components are used throughout, ACTIVERTERS are both rugged and lightweight. There are no moving parts, no vibrators.



4 Sizes — from 150 to 500 Watts

MODEL I-152 INVERTER—Inverter only, operates from direct connection to 12 Volt battery or through cigarette lighter socket of cars with 12 Volt systems. Output ratings: Intermittent Use — 150 Watts, 1.5 Amps. AC... Continuous Use — 125 Watts, 1.2 Amps. AC. Shipping Weight: 8 lbs.

MODEL IC-252 ACTIVERTER—Inverter-Charger operates from direct connection to 12 Volt battery. Output ratings: Intermittent Use — 250 Watts, 2.3 Amps. AC... Continuous Use — 200 Watts, 1.8 Amps. AC. Shipping Weight: 15 lbs.

MODEL IC-202P PAK-O-POWER—Inverter-Charger with compartment for 12 Volt battery. Completely self-contained unit. Output ratings: Intermittent Use — 250 Watts, 2.3 Amps. AC... Continuous Use — 200 Watts, 1.8 Amps. AC. Shipping Weight less battery: 22 lbs.

MODEL IC-506S PAK-O-POWER—The Multi-Service Inverter-Charger-Car Start unit, with large 12 Volt battery compartment and Car Start leads. Completely self-contained with built-in fast and slow charger—Charging rate: 60 Amps. for 6 Volt, and 40 Amps. for 12 Volt batteries. Output ratings: Intermittent Use — 500 Watts, 4.0 Amps. AC... Continuous Use — 300 Watts, 2.5 Amps. AC. Shipping Weight less battery: 55 lbs.

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Cracked Ceilings

Q—Plastered ceilings in several rooms in my older home are in rather poor condition, the surface being cracked here and there and apparently quite soft and porous. The ceilings have never been painted at least as far as I can judge by the appearance and condition of the plaster. I'm wondering what is best to do with them. Preparing the surface for painting would be a lot of tedious work and replastering would come rather high. Still, it might be best in the long run. What is your opinion?—A.R., Mont.



A—Replastering over expanded metal lath would probably be best as you have suggested, but, of course, the initial cost will run much higher than other covering materials you might use. For a relatively quick job at reasonable cost—very reasonable if you do the work yourself—we would suggest covering the ceilings with plaster board, finishing the joints with putty and tape in the approved fashion. Or, for an easy do-it-yourself job apply acoustical tile over the old plaster, using an approved cement to hold the tiles in place. If the plaster is unusually rough or wavy, then it may be necessary to apply furring strips and attach the tiles to the strips with brads or special fasteners.

Burned-Out Concrete

Q—Last summer I poured about 20 ft. of concrete walk from my house to the garage using a recommended mix. Now I notice that the walk is breaking up and the surface is powdery. What happened, and what do I do to repair it?

—H.D., Ia.

A—We don't think you can repair it, that is, if we can judge correctly from your description of the condition of the concrete in the walk. We do not know, of course, but we would suspect that you poured the walk during a dry, hot period and that the concrete simply burned out, or cured too fast. This could have been prevented by covering the freshly poured mix with burlap or straw and keeping it damp for a week or more. We think it best to break up the walk and replace with a new pouring, taking precautions to prevent the fresh pouring from curing too fast.

First Time Ever! Free Tool Offer!

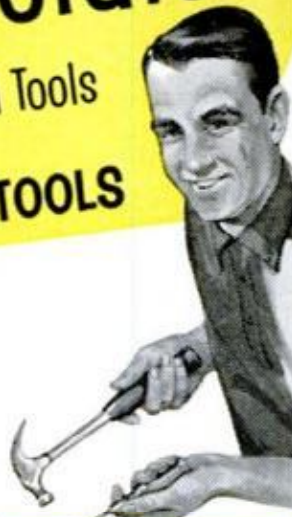
STANLEY

Spring Specials

STANLEY'S "Best Quality" Hand Tools
FREE with
STANLEY POWER TOOLS

FREE! A "Steelmaster" Hammer (Value \$5.25!) or a "Yankee-Handyman" Spiral Ratchet Screw Driver (Value \$4.98!) with each purchase of a Stanley Power Tool as shown. See these Stanley Spring Specials at your Stanley Retailer today.

Why buy tools twice — BUY STANLEY!



Model H75 Sabre Saw. Heavy-duty performance that will satisfy the most demanding craftsman! Cuts scrolls, curves, wood, metal, plastic, veneers. Exclusive $\frac{5}{8}$ " stroke (3300 per minute). With free Spiral Ratchet Screw Driver and at reduced price — Only \$44.95.



Model H31. Heavy-duty Belt Sander with positive non-slip timing belt drive. Easy tracking adjustment; simple belt changing; out-of-way cord. Air-cooled motor has sealed ball bearings. Offered with free "Steelmaster" Hammer — Only \$89.95.

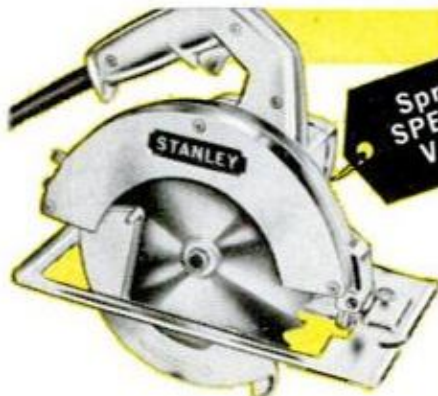


Model H37. Finishing Sander for "professional" sanding and refinishing jobs — table tops, chairs, cabinets, etc. Rugged, smooth-working. With free Spiral Ratchet Screw Driver — Only \$34.95.



Model H36. Heavy-duty Finishing Sander for use on wood, metal, plastic. Air-cooled motor; ball bearing construction; wide, flat sanding pad. Tapered handle; perfect balance. With free Screw Driver — Only \$49.95.

Prices slightly higher in Canada.



Model H272. New 7" Builders Saw . . . the best builders saw for the money! Heavy-duty; improved construction. "Motor Saver" Drive. Nearly 40% more cutting force at working speeds. Compare price! Special Value — Only \$49.95.



Model H264. $\frac{7}{8}$ H.P. Router. Heavy-duty; 23,000 R.P.M. "Spotlights" working area; brightness increases with work load. Recessed safety switch; micrometer depth adjustment. Full ball bearing. With free Screw Driver — Only \$69.95.



Model H273. New 7" Heavy-Duty Builders Saw . . . Ball-bearing construction; "Motor Saver" Drive. Large, rear position depth and bevel control knobs. With free Hammer — Only \$64.95.



Model H267. $1\frac{1}{4}$ H.P. Router. Heavy-duty; 27,000 R.P.M. Spotlight throws bright beam on guide line! Micrometer depth adjustment for settings as fine as $\frac{1}{4}$ ". With free Screw Driver — Only \$85.00.



Model H274. New $7\frac{1}{4}$ " Saw . . . the deluxe heavy-duty builders saw for contractors! All ball-bearing construction. Exclusive Ball-Bearing Lower Guard; won't jam at any angle. With free Hammer — \$79.95.



Model H15. $\frac{1}{4}$ H.P. Router. 27,000 R.P.M. This lightweight champion of the router world will do 90% of your woodworking jobs! With free Spiral Ratchet Screw Driver — Only \$42.00.

BETTER YOUR HOME
ON YOUR OWN

STANLEY POWER TOOLS
DIVISION OF THE STANLEY WORKS
624 MYRTLE STREET, NEW BRITAIN, CONNECTICUT

Space-Age Telescope

(Continued from page 198)

parts on a table and support them in a level position. Check with the square and make any adjustments necessary by loosening and tightening the screws supporting the floating sleeve bearing which carries one end of the declination axis. When you are sure the shafts are squared at right angles, tighten these screws.

Finishing the parts should, of course, be done before final assembly. On the original all wooden parts were finished in the natural color with a sealer, filler and spar varnish. The housings of the declination and polar axes were given a black wrinkle finish, also the straps of the telescope saddle and the weights. The telescope tube, dewcap and the finder-'scope tube were finished in white, semigloss enamel.

Assembling and Adjusting

Now assemble the tripod and equatorial mounting, install the telescope in the saddle and balance it before tightening the clamp bands. Then install the counterbalancing weights, turn the declination axis to the horizontal position and balance the weights against the weight of the telescope.

You are now ready to adjust optical axis of the telescope parallel with the polar axis. Perhaps the simplest way to do this is to set up the telescope in a vacant lot or any level open space with the declination axis and the telescope in the horizontal position. Drive a 4-ft. stake into the ground about a hundred feet distant. Sight on the stake with the telescope and center it in the field of view. Now drive another stake about the same distance in the opposite direction from the telescope. A straight line between the stakes should pass through the center of the telescope tube at the declination axis. Now swing the telescope through 180 degrees of declination and sight on the second stake. It should appear exactly in the center of the field. If it does not, then the optical axis of the telescope is not parallel with the polar axis. Now, remember the push-pull parallelism adjusting screws which control the position of the parallelism adjusting plates under the saddle? You use these to adjust the position of the telescope in relation to the polar axis. Turn the screws in or out to bring the stake near the center of the field. Then again swing the telescope through 180 degrees and sight on the first stake. Continue to make corrections in this manner until both stakes appear precisely in the center of the eyepiece field. Then tighten the screws.

Adjusting Polar Axis

Now you adjust the polar axis parallel to the earth's axis by tilting it at an angle equal to the latitude. A fairly accurate setting can be made with a dial level as in Fig. 27. Level the declination axis horizontally (use a level) and adjust the hour circle on the polar-axis shaft so that the pointer points to 0 on the hour scale. Turn the telescope to the horizontal position (again use the level) and lock the declination axis. Adjust the declination circle until the pointer points to your latitude with the zero mark up at your latitude, but southward toward the celestial equator with the 90-degree position toward the

WHERE TO BUY THE PARTS

From A. Jaegers, 691 Merrick Road, Lynbrook, Long Island, New York:

84-mm. mounted astronomical telescope objective, in black anodized aluminum cell, 3 $\frac{1}{4}$ " diameter, 48" focal length, four surfaces magnesium fluoride coated
Aluminum telescope tube, 3.406" o.d., 3.281" i.d., 48" long
Rack & Pinion eyepiece mount to fit 3.281" i.d. tubing
2 $\frac{1}{8}$ " coated achromatic objective, 10" focal length, for finder telescope
1 ft. aluminum tubing, 2 $\frac{1}{8}$ " i.d., 2.24" o.d. for finder
6" aluminum tubing, 1 $\frac{1}{4}$ " i.d., finder draw-tube

From Edmund Scientific Co., Barrington, New Jersey:

28-mm. Kellner eyepiece
Circular level vial
5 $\frac{3}{4}$ " setting circle set
Prism erector system (for terrestrial use of telescope)
Prism star diagonal (zenith prism)

From Boston Gear Wks., 5445 W. North Ave., Chicago 39, Ill.:

Worm gear and matching worm gears. Wood, metal for various parts, screws, bolts, etc., can be purchased locally.

north celestial pole. Later these adjustments can be checked against a star whose coordinates are known and any corrections made accordingly. All these adjustments need to be made only once.

Aligning Polar Axis

You will have to line up the polar axis with the earth's axis each time you set up for observing celestial objects. Do this as in Fig. 33 by setting up the tripod with one leg pointing approximately due north and adjust until the instrument sets level as indicated by the circular level on the azimuth table. Loosen the wing nut under the tripod head and turn the mounting until you can sight on Polaris, the North Star, along one edge of the polar-axis base, or

(Continued to page 220)



Six big men and full cargo don't cramp the ride and performance of the new Tempest Safari!

(Only new-size wagon balanced, sprung and powered to move like a big one!)

Wide seats (58½" in front, 58¼" in rear). 44 inches of legroom in front—37½ inches in the back. Even the middle man can stretch his legs. The big front floor hump is gone—the rear tunnel is low. Chalk this benefit up to the rear transmission.

Front engine/rear transmission puts equal weight on front and rear wheels. Wagons need that balance. Full load or solo driver, the back end of this one takes a solid grip on the road. Doesn't skip or jounce. Less weight on the front wheels. A cinch to steer.

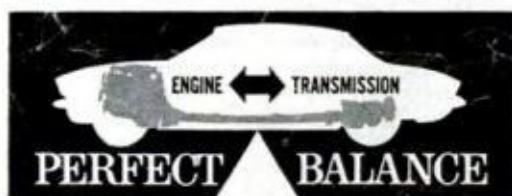
Fill the Tempest Safari with passengers and gear. The 110 to 155 h.p. gas-saving 4-cylinder engine will scoot the car up steep hills in high gear.

Take a turn in a Tempest. Find out first-hand why Motor Trend editors gave it their Car of the Year Award. Your Pontiac dealer has the Tempest.

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PONTIAC'S TEMPEST
PICKED BY MOTOR TREND MAGAZINE AS
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NO OTHER WRENCH LIKE CRESTOLOCK[®]

No. ACL110
10" Size. 1 1/8" cap.

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on the jaws permit
presetting to any size.

PUSH TO LOCK
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one hand operation.

Made by the originators of the Crescent Wrench, here's a practical, dependable adjustable wrench *that can be locked at any infinite opening size within its capacity.* It's the famous Crestoloy Wrench PLUS a simple, positive, thumb-operated locking device. There's no strain on the lock...no projections. Available in 8, 10 and 12 inch sizes, chrome plated with stainless steel locking device. Sold by hardware dealers everywhere.



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

table. Note from Fig. 33, which has been purposely exaggerated, that the north celestial pole is about one degree from the Pole Star (Polaris). So you locate the last star in the handle of the Big Dipper. Then run an imaginary line across the sky from the North Star to this star (Eta Ursa Majoris). This line passes almost directly through the north celestial pole, about one degree from Polaris. Sight on this point, adjust the mounting accordingly and you're in business for the evening.

You locate and observe near celestial objects by picking them up in the low-power finder 'scope and then sighting on them with the telescope. But distant objects which are invisible to the naked eye and the low-power 'scope, you locate by looking up their coordinates on star maps or other references and turning the telescope until these coordinates are pointed out on the hour and declination circles of the telescope mounting. Then you look through the eyepiece. If all adjustments have been made correctly, you'll find the object you seek in the field of view. ★ ★ ★

The Thousand Wonders of a Child

(Continued from page 129)

of accomplishment glowed on every face, including mine.

Our back yard wonders have served as a type of aptitude test for Mike. While my own leanings are for the outdoor sciences, his now are heavier for designing and constructing gadgets. For instance, while he enjoys planting and working with soil, he constantly strives to apply my outdoor instruction inside the house where paper, pencil, hammer and nails are handy. He likes making a garden, but would rather construct his own toys. Where he used to love to think up new games for remembering plants, he now favors thinking up some revision of a game we bought him. And he sits down, draws his own plans and slowly, patiently prepares some understandable but badly spelled directions for playing it. "Mike's games," as his friends call them, are played by all the neighborhood boys.

While Mike favors making gadgets now, he still loves the outdoors. He mixes up his trees and his observations are often twisted, but then that is part of the game—a game which has succeeded in putting his natural curiosity on a constant alert. He still wonders why lightning bugs light up, why frogs sing when it rains, and why the rabbit doesn't like the neighbor's cat.

But to wonder is to inquire, and to inquire is to learn. And Mike knows a lot about the world around him for a boy so young. ★ ★ ★

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Building the PM Cat

(Continued from page 184)

guard against possible under-lap (shortage) when the final assembly is made. Curved bow sections can be traced from paper patterns made by stretching wrapping paper over the sheer, chines and stem and running the side of a pencil point along the edge, doing one at a time. The center piece of the bottom planking has right-angle edges; nontrip planking that butts against it, has beveled edges. The latter, as well as the joint formed by both nontrip pieces on the stem, are planed or rasped to fit "by eye," as in Fig. 39. When doing the curved ends, the planking should be clamped and nailed temporarily to the chine and stem as far forward as bulkhead 3, so that the joint surfaces remain in the same position throughout the work. Make location marks (pencil lines across joints) on the planking being fitted and leave the nails in it, so that the planking may be returned to the same location when glued. When gluing and nailing the planking, first fasten it only at bulkheads and at extreme ends to minimize evaporation of the fluid contained in the glue mix. This will give you time to bring all joint surfaces into contact before setting begins. End grain should receive extra coats of glue to assure a good bond. After all the planking is on, the hull is lifted off the form, and the second one is built in the same manner as the first.

Wing-Deck Gluing Strips

When both hulls are completed, 1 x 2 cleats for the wing deck are glued and nailed on both sides of each bulkhead as shown in Fig. 40 (piece touching vacuum brush) and Figs. 1 and 25 of Part I. These extend from chine to chine of individual hulls, with the upper edge of each exactly on the same level as the uppermost chine edges adjacent to it. Only the forward sides of the transom bulkheads require such gluing strips. This is a good time to drill the 1-in.-dia. limber holes in bulkheads 1, 2 and 3, which are located on the centerline, 1/8-in. up from the bottom planking of each hull. The holes allow condensation to drain aft to the motor-well sump.

Next, inboard facing edges of transom bulkhead halves are cut to 45 deg. to form a scarfed joint when the hulls (hull halves) are joined together permanently. This is a good job for a portable electric saw, using a straightedge clamped to the bulkhead as a guide. Builders are cautioned at this point not to apply glue to any of the parts until all wing-deck panels have been cut to size and prefitted.

(Continued to page 226)

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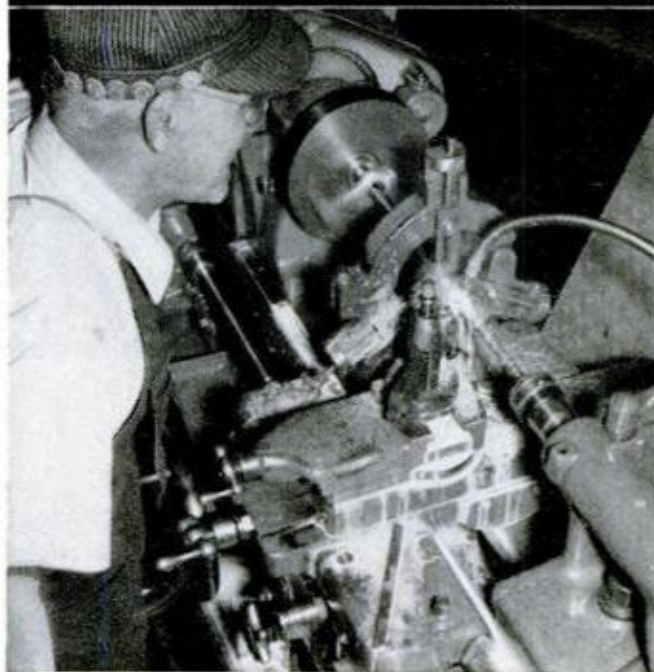


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Shipping weight, 7' bed.....	1760 lbs.	2089 lbs.
Base price.....	\$1759	\$2178

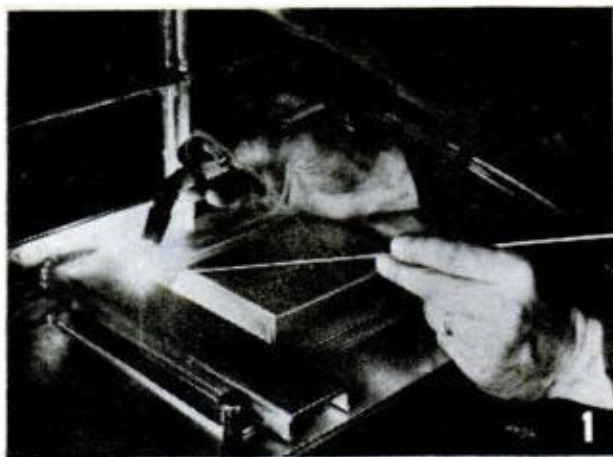
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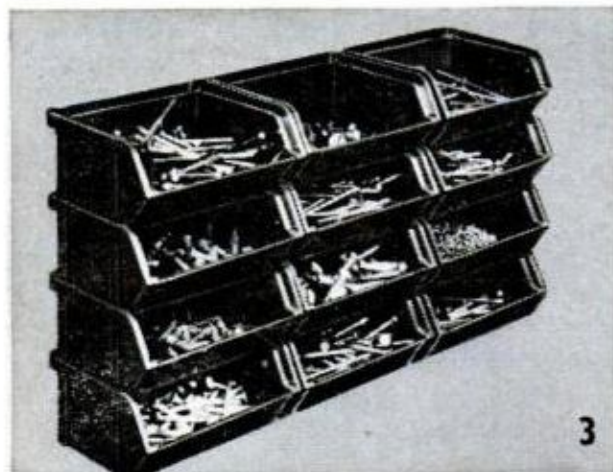
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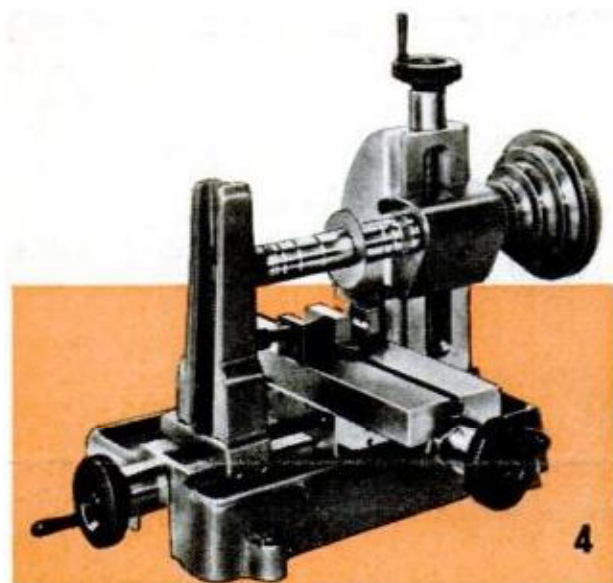
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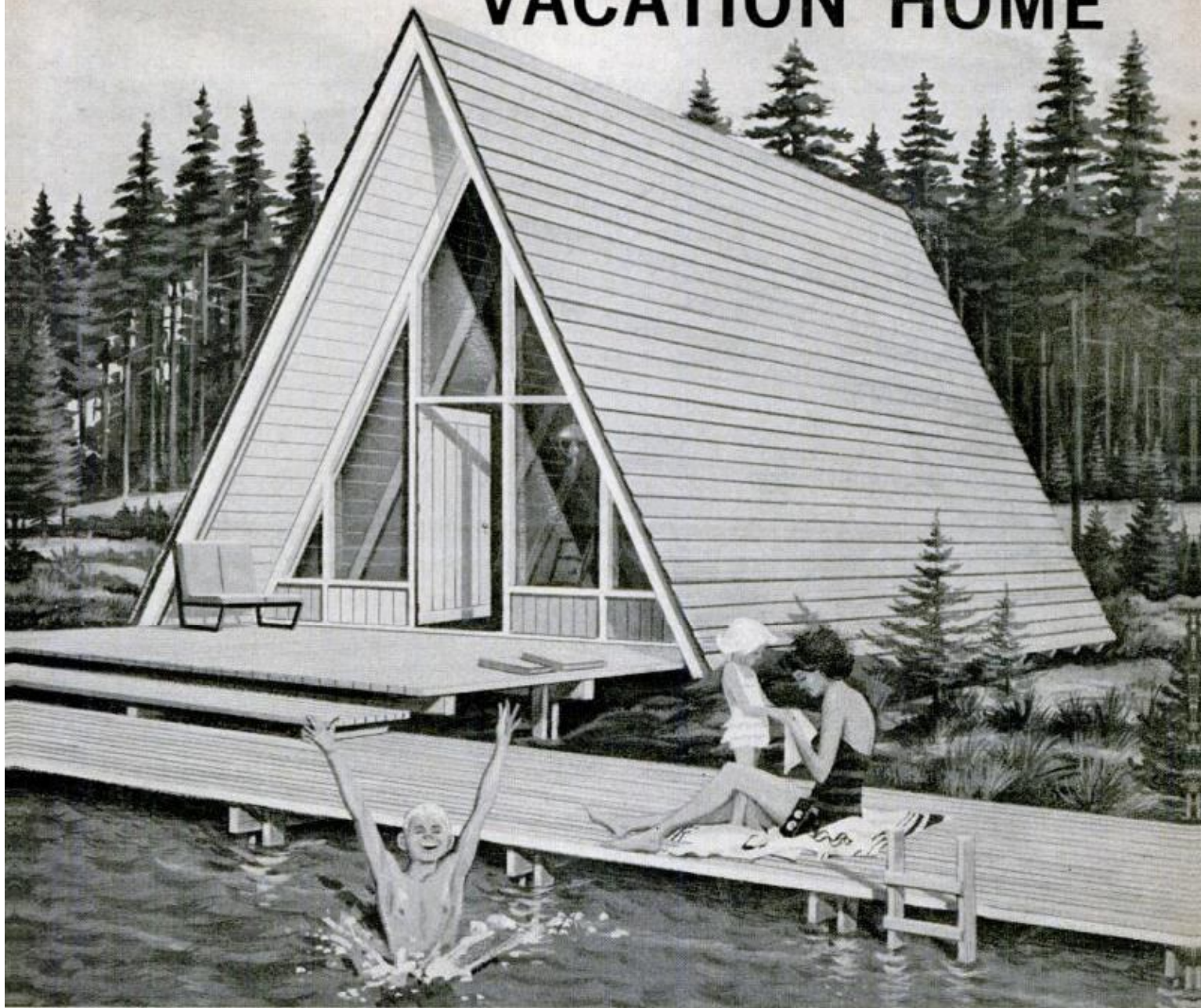


4. BABY MILLING MACHINE is only 16 in. long, 12 in. wide and 12 in. high and has a table 9¾ in. long and 3 in. wide with a 6-in. travel and a 4¼-in. traverse. Has ball-bearing spindle and Acme lead screw. Dials are calibrated in thousandths. Spindle height adjustment is 3¾ in. It's right size for modelmakers. McKin Mfg. Co., 4223 Lincoln Blvd., Venice, Calif.

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You are now ready to cut and fit the $\frac{5}{8}$ -in. wing-deck planking, the ends of which fit snugly against the topside planking at the chines. Panels also are notched to receive the bulkheads which in the prototype were cut back $\frac{3}{4}$ -in. along the in-board vertical edges at this time so as to let the wing-deck overlap one half of the chine width at bulkheads. This eliminates a potential source of leaks, especially if fiberglass is not applied. However, before doing this, it is wise to square-up combined hull units as in Fig. 42. The aftermost panel may be cut to fit and dry assembled as in Fig. 41 for this step, to aid positioning the individual hulls. This panel is notched to extend under the transom bulkhead between hulls, which requires them to be pulled apart, the panel slipped in place on one and the hulls shoved together again. The hulls then are positioned so that the beam dimensions are the same at bulkhead 3 and transom. Battens clamped loosely to these members to tie the two hulls together will aid you in this procedure. Next, the battens are screwed temporarily in place and a steel tape or batten is extended from the inside port corner of the transom to the inside starb'd corner of bulkhead 3, similarly on the opposite side of the cockpit, Fig. 42. The dimensions at lines "A" and "B" should both be 14 ft. $-\frac{9}{16}$ in. A slight difference matters little, but it is important that each line or tape intersect the other exactly at midpoint, which indicates that the boat hull in the cockpit area is squared.

Wing-Deck Planking

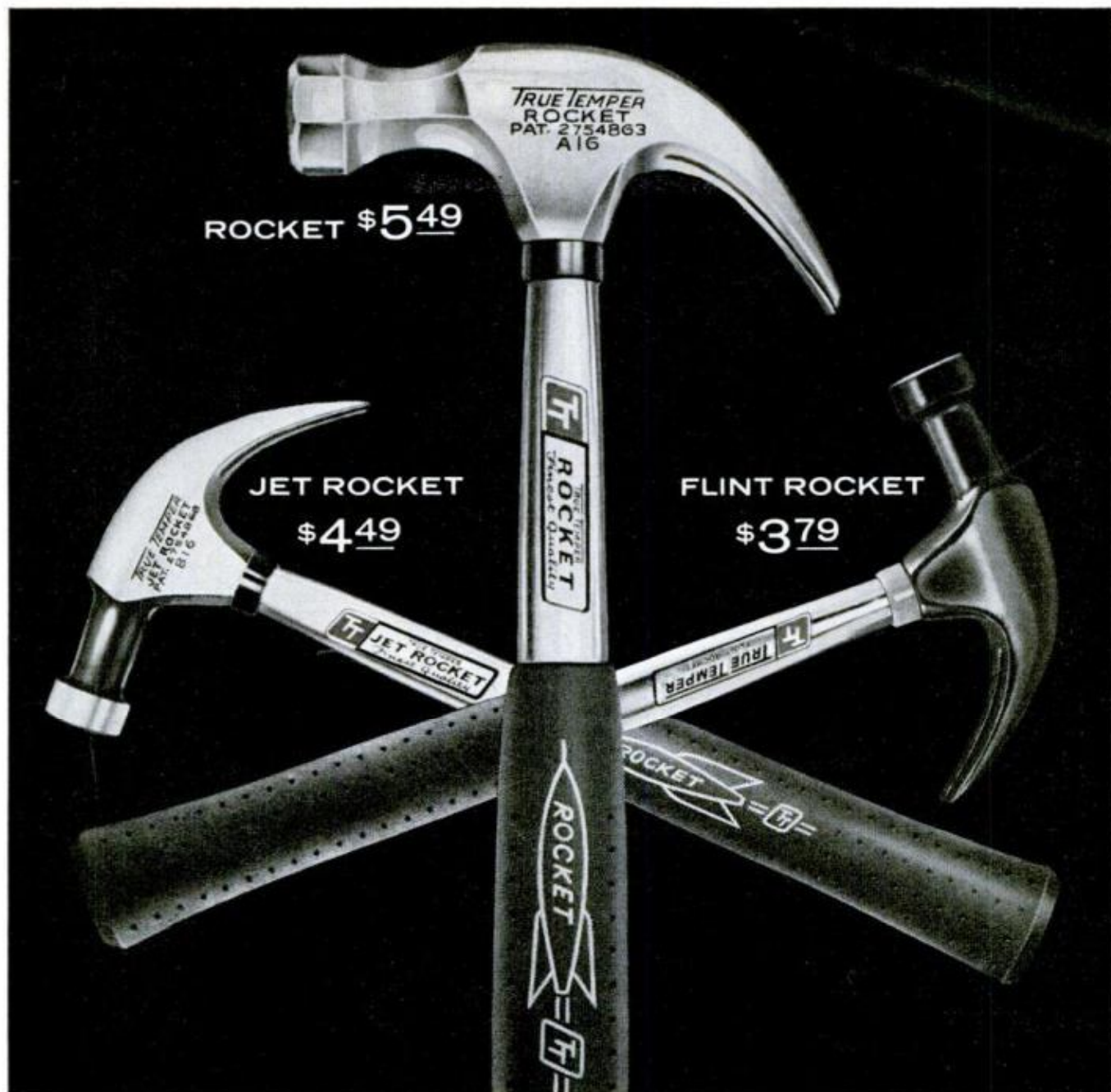
Three full panels of $\frac{5}{8}$ -in. plywood are needed for the straight section of the wing deck, plus another panel used as a batten and stiffener that goes on top of the first one in the stern area. All edges butt against topside planking, bulkheads and adjoining panels, except on the forward edge of the panel at bulkhead 3, which forms a half-lap joint with the $\frac{1}{4}$ -in. laminated plywood wing deck forward of it as in Fig. 45. The lip on the forward edge of the $\frac{5}{8}$ -in. panel is made by first making a $\frac{1}{4}$ -in.-deep cut across the bottom face 1 in. in from the edge and then making a 95-deg., 1-in.-deep cut along the edge, using a portable electric saw clamped to a jig as in Fig. 44.

The curved, $\frac{1}{4}$ -in. wing-decking is marked for cutting by pulling the hulls far enough apart to permit placing a full 4 x 8-ft. panel across the chines as in Fig. 46. A compass, made from a length of wood at one end of which a hole is drilled to take a pencil tightly, then is used to trace the inward curve of the chine on the panel. The compass marking pencil should be located

so as to span the distance from the topside planking to the nearest edge at bulkhead 3. Note the small block wedged between the upper edge of the panel and sheer log (both sides), keeping it snugly against the chines while marking. The outline for the (same) cut to be made on the opposite side of the panel can be traced from the cut-off piece of the first side, after marking off the beam dimensions at upper and lower edges of the panel and flipping the piece over, of course. The inner $\frac{1}{4}$ -in. plywood wing-deck lamina is traced from the outer one just completed. As with the previous $\frac{5}{8}$ -in. wing-deck panels, these must be dry fitted, with the hulls in squared position, before any of them are glued in place.

Assembling the Hulls

The last step before installing the wing deck is to vacuum all dust from the bilges of both hulls. Also, this is the last opportunity to make the limber holes. If by chance you should forget to make them, do not be overly concerned. There should never be more than an extremely small amount of condensation, due to the good insulating characteristics of the thick plywood wing-decking and bottom planking. Wing-deck panels should go on one at a time, starting at the stern. You should have some help for the first panel, as the hulls must be pulled apart to take it, then shoved together again and the over-all boat hull squared as before—all before the glue sets. Ring nails are used throughout as recommended in the material list. Be sure to coat butting edges between panels. Battens on the inside of the boat covering panel joints are installed later, except for the one that covers the joint formed by the $\frac{5}{8}$ -in. panel and laminated $\frac{1}{4}$ -in. panels at bulkhead 3, Fig. 45. When fastening this batten, a temporary backing block is wedged under the wing deck, centered on the joint as in Fig. 47. The one shown is a 1 x 4 board nailed to several upright pieces of the length required to give a snug fit. The 4 x 8-ft. $\frac{1}{4}$ -in. wing-deck panels will be a little short of reaching the stemheads, requiring one narrow strip for the bottom and one about an inch wider for the top. Both are glued in place at the same time, clamped between paper-covered boards and nailed to the chines at the ends. Two battens, each consisting of two laminated 1 x 4s, are glued and screwed across the inside of the curved wing deck. These are spaced equidistantly between stemheads and bulkhead 3 as in Fig. 1, Part I. This completes the basic catamaran hull. The breasthook, decks, seats and the remainder of the construction details will be given in Part III in the May issue of *Popular Mechanics*.



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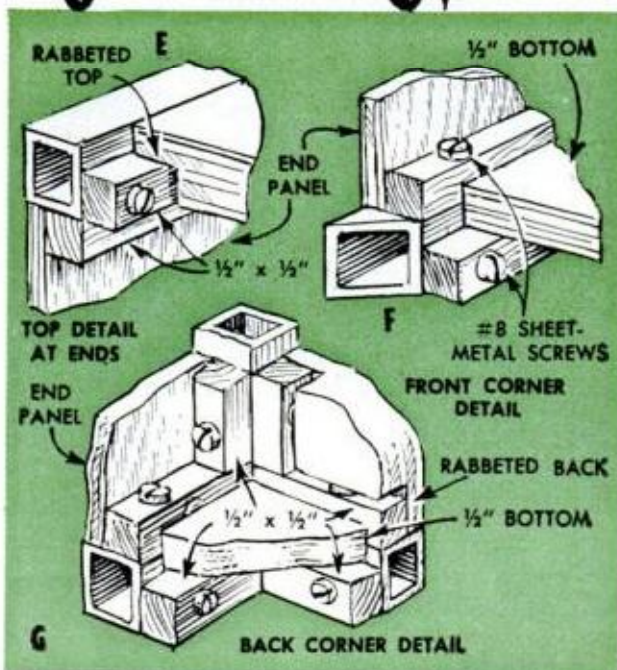
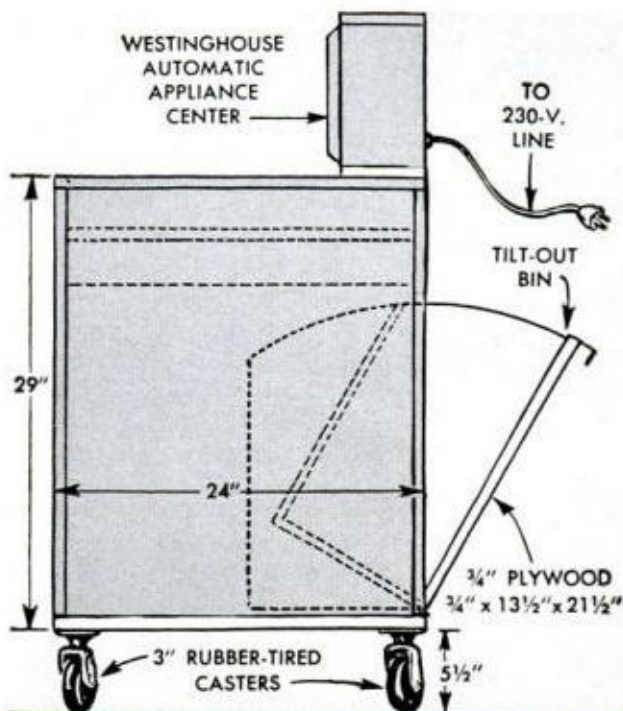
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Patio Cart

(Continued from page 151)



one of the swinging doors. The same is true of detail B, which shows a section through the slide-past doors in the cabinet at the left of the appliance center. Detail C is a section through the corner post and one of the lower cabinet doors, while detail D is a perspective view of the assembly at the lower front rail. Connect these details with details E, F and G and you've got the whole story of the assembly of the upper and lower cabinets. In all cases, sheet-metal screws are used in fastening the wooden cleats to the square aluminum tubing. Note that the upper cabinet consists of two compartments, one for the appliance center. ★ ★ ★

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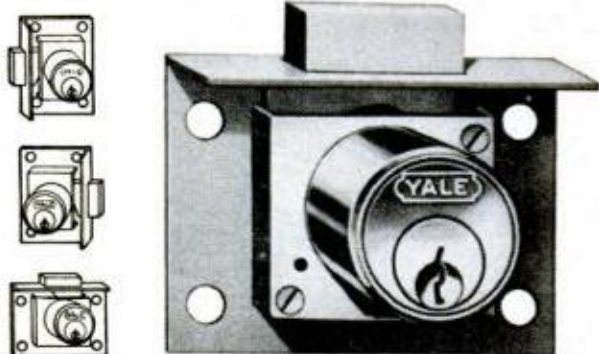
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Swimming Pool

(Continued from page 157)

lengths of garden hose and lay out and mark the contours of the pool as in the plan view. Then you know where to dig. Plan on the depths given in the sectional view. Just how much you have to excavate depends to some extent on the lay of the area. If it slopes as indicated by the dotted line in the sectional view, you will have less digging to do. The excavated material is used as fill for leveling up the grade around the walls. After the excavation has been made to full depth, install the sump with its 8 x 16-in. grill and ditch for the plastic pipe leading to the pump. Install the pipe and cover with earth. Note that the pool section shows footings under the walls which are laid up with 4 x 8 x 16-in. concrete blocks.

The Floor Comes Next

Once the walls are up you're ready for the floor. The original floor was poured with ready-mixed, 3000-lb.-test concrete to a depth of 4 in. and wire reinforced. After thorough curing both the floor and walls are finished with a smooth-troweled cement plaster which was prepared by mixing one part cement with three parts sand and adding approximately $1\frac{1}{2}$ quarts of a liquid laundry soap mix per sack of cement. The soap mix is prepared by slicing six cakes of yellow laundry soap into three gallons of water and boiling until dissolved. The purpose of the soap additive is to force out air bubbles and produce a more nearly waterproof coating. Of course, you can use a commercial waterproof cement if desired. The coping consists of regular 4 x 8 x 16-in. blocks laid flat on the top of the wall so that the inner edges overhang the inside face of the wall about 2 in. Openings in the inner edges of the coping blocks are filled with mortar which is troweled smooth.

This done, you build the filter box, proceeding as in the sectional view of the filtration system on page 158. Then you fill in around the walls with the excavated earth, soaking down the fill by stages with the hose to achieve a solid pack that won't settle. Then you build the concrete walk around the pool the easy way. Roll the fill with a weighted lawn roller, spread damp sand to about $2\frac{1}{2}$ to 3 in. depth, then scatter dry cement as evenly as possible over the sand. The original walk was about 3 ft. wide and required 11 sacks of cement. The sand and cement are mixed by raking and the surface leveled with a board. Then it's rolled with the roller, wetted with a fine spray from the garden hose and the surface troweled smooth. ★ ★ ★



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Weighing less than five pounds, an ion generator produces negatively charged atom particles at a rate of a billion per second. Called the Ionaire, it is sold by the U. S. Radium Corp., Morristown, N. J., and is said to relieve respiratory difficulties. Price: \$149.50.

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Wildest Ride on the River

(Continued from page 113)

is held in the East and the West in alternate years. In the years when the nationals are held in the East there is a regional Western championship, and vice versa. The oldest and greatest event continues to be the Arkansas River Race at Salida, Colorado.

White-water slalom is frankly modeled on ski slalom, many paddlers being winter-time skiers. It is held on a short course that makes few demands on endurance—the paddler finishing his heat, usually, in under 5 min. But it does make many demands on nicety of boat control, the penalties for missing gates being so prohibitive as to put a sharp discount on rash speed or brute strength.

A slalom course is usually set up on a stretch of rapids of medium difficulty, although in Europe it is frequently staged on artificial fast water of extreme speed, with high waves, such as the outlet of Lake Geneva or certain dam sluiceways in Germany and Austria. It is an obstacle course among poles hung from ropes stretched across the rivers or buoys. The colors of the poles or buoys dictate how the paddler must pass them; numbers indicate the sequence.

Pole Marking Code

Solid red pole: to be circled completely on paddler's left without touching.

Solid green pole: to be circled completely on paddler's right.

Striped red-white pole: to be passed on paddler's left.

Striped green-white pole: to be passed on paddler's right.

A pair of such striped poles makes a gate. When the red-white is on the left and the green-white on the right, the gate is to be taken directly, bow first. But when the red-white is on the right and the green-white on the left, the gate is either a reverse gate or an upstream gate.

If it is a reverse gate, it is so indicated by the letter "R" suspended above it. It must be taken in a downstream direction, but the paddler must turn his boat and enter it stern first. If it is not so marked, it is an upstream gate, which he must first pass and then enter from below, paddling upstream.

Yellow poles mark the barrier (usually one to a slalom course), which cost a prohibitive 100 seconds if touched. The barrier is usually strung across the river below a particularly difficult gate.

Solid white poles must be circled but may be approached from either side.

Black-and-white-striped poles may be passed to either right or left

Penalties:

For touching a pole with body, boat, or paddle: 10 points.

For missing a gate: 50 points if the paddler succeeds in touching a pole with body, boat, or paddle; 100 points if he misses it entirely.

For hitting the barrier: 100 points.

Races are held in two heats, each against the clock; the contestant's better time is chosen. The seconds consumed in reaching the finish line are added to the penalty points; the lowest figure wins.

Slalom gates are so arranged as to test to the extreme the paddler's ability to handle his boat in complex currents. A 360-degree pole is commonly placed in an eddy behind a rock with sharp currents on both sides. A downstream gate in a fast chute will be followed by an upstream one beside it, requiring the boater to leave the current in a high-speed eddy turn, then fight his way back. "Flush gates," set sideways in the river instead of perpendicular to the current, test the paddler's ability to lean and draw his boat sideways. Once he has passed a given gate, a contestant may foul its poles freely in approaching or leaving subsequent gates.

Slalom is very unlike the natural obstacle courses found in the river in one important respect. Since the poles are hung just above the surface of the water, there is not the slightest shift of current in front of, around, and behind them. The paddler has no "water cushion" such as he could be sure of in front of a natural obstacle. Slalom obstacles, in fact, most resemble a very serious hazard on some rivers—the dense overhanging brush or the fallen trees and snags through which powerful current can sweep even the most cautious paddler.

Tight Squeeze

Slalom gates are actually so narrow (minimum 47 inches) that they would require some care even in still water. The canoeists' gunwales pass through with a handspan to spare on each side when the boat is presented at a fair 90-degree angle. The kayaker must have his paddle at a forward-stern position or foul the pole.

Almost all slalom courses are so arranged that, with any normal distribution of skill among the field of competitors, fouling even one such pole will cost first place. There are exceptions—some gates, particularly in European courses set on canal sluices, are so fiendishly difficult that almost all the competitors elect to foul one pole for the

(Continued to page 234)



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sake of making a good approach to another gate. In that case, though, they are conceding a 10-point penalty to prevent a 50-point or 100-point one downstream. Seldom if ever is it justifiable to risk fouling a pole for a mere time advantage.

A tipover in slalom disqualifies a paddler entirely unless he makes a recovery by esquimautage, righting himself without leaving his boat. A strict interpretation of the rules means that neither paddler in a canoe may push off obstacles with his foot.

Downriver races vary considerably between those which are essentially tests of endurance and those which have a high proportion of difficult rapids. The Arkansas River Race, over 25 miles long, has two very difficult rapids and some other less difficult ones, but is generally rated by Europeans as a race for musclemen. No other American course is yet sufficiently difficult to single out the skillful as distinguished from the strong.

The Giant Slalom

Conscious of the defects of a course that opens possible victory to those who are barely versed in white-water skills, race committees have been introducing a few gates into the downriver courses and calling them "giant slalom" events. They are following the model set in skiing, when too many downhill races were being won by the man who had guessed right on the correct wax for the day.

An ideal downriver course would be such a difficult one from the whitewater point of view that it could be entered only by highly skilled paddlers. It would not exceed 10 miles but would pack into that distance white-water problems that would force even the best paddler to slow down and pick his way, so that the merely strong could not make up time on the skilled.

In a downriver race, as in a slalom, you are not racing directly against your competitors but against a clock; you are started at intervals of about two minutes. It is a lonely and doubtful feeling, to be flailing the water alone in a wild valley, in between the bridges where spectators congregate. A watch on your wrist (waterproof) and, above all, familiarity with the course, are great assets. You have the opportunity to pass other competitors in such a long race, and kayaks ordinarily pass canoes while double canoes pass singles. Courtesy and sportsmanship require you to pass without crowding the other man.

Training pays off in downriver racing, whereas practice pays off in slalom. You must be physically fit to maintain a steady high speed and to reserve enough energy to wrestle with turbulent water. ★ ★ ★

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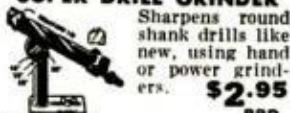


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Spacebound Kitchen

(Continued from page 137)

word for locomotion under zero gravity; "down" is arbitrary for he may very well swim "up."), fit himself into whatever functions as a chair, and start coffee.

Coffee is a dry-packed food in the menu. It will be in a plastic tube, and to get the brew, the astronaut must handpump 175-degree water into the tube two ounces at a time, then squirt it into his mouth.

In a tray locked to the counter in front of him, will be four cavities for solid-food dispensers, four for liquid and semiliquid food tubes, and a space to tie down bread, sandwiches, cookies or cake.

Space Cookery

Then he starts "cooking." Grapefruit sections are canned and so is the bacon, so he will swing down a wall section honeycombed with squarish holes full of squarish cans and pick out the labeled bacon and fruit. The bacon should be hot, so he'll lift a small door and pop the whole can into another squarish hole for automatic heating. Meanwhile he can put the fruit can into a feeding device that is nothing more or less than an elaboration on the common calking or grease gun. He'll fit the feeder with one of his personal nozzles or mouthpieces—

these take the place of fork, knives and spoons—and lock it into his tray.

Eggs are next. They are packed dry, too, and must be mixed with hot water. Back to the pump with another plastic tube to mix up some 175-degree scrambled eggs. He does the same thing with the dried milk, this time using cold water.

Coffee cake is frozen, so he must get it out of the freezer and strap it down to thaw. By this time, the bacon is hot, so with an asbestos glove he picks the can out of the oven and locks it into a feeder, threads on another nozzle, and breakfast is ready. The eating is simple, if a little tedious and quite unlike any earthbound meal: One at a time the feeders and the tubes are picked up, a mouthful squirted into the mouth, and the gadget locked down again. The solids require more force to move them, so he gets the mechanical advantage of a geared-up feeder; the liquids he squirts by squeezing the tube with his hand—like toothpaste.

Lunch on the fourth day will be vegetable soup, spaghetti and meat sauce, buttered peas, pineapple, bread and butter, sugar cookies, cocoa or milk. For dinner, the menu lists apple juice, baked ham with raisin sauce, steamed rice, buttered succotash, bread and butter, pound cake, and coffee or tea.

(Continued to page 238)

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All foods are canned, dehydrated, frozen or dry-packed. The freezer is mostly used to hold foods like fruits and berries, cakes and rolls. Dehydration is used on the same foods we get today in supermarkets—oatmeal, soups, potatoes, milk. Most meats and vegetables are "canned."

After meals, the spacemen will use "wet-or-dry" tissues stored next to the oven to clean the mouthpieces and tray. Each man has his own "locker" for mouthpieces, and his trays are also private property.

Even the food is stored so that each man has his own areas in the overhead bins, freezer and refrigerator. In case "cabin fever" becomes a serious problem, the designers felt it was better to allow the complete separation of individual food supplies.

Space Appliances

The solutions for the technical and mechanical problems presented by the space kitchen provide an interesting blend of simple tools in use beside the latest, most advanced electronic and chemical equipment. The only difference between this water system and a house system, for example, is that there is no air in the system, and the "faucets" work by positive displacement, that is, hand pressure working through pump valves actually "grabs" two ounces of water at a time and moves it from the reservoir into a chamber inside the pump.

The refrigerator and freezer will look pretty familiar, too, but they're not. The only resemblance between these and the standard household items is that they are cubical and they keep things cold. The basic principle used—known for a long time but never practical before—is reverse thermoelectricity. There are a couple of phenomena involved, but essentially, thermoelectricity works on the basis that a current passed across a joint between two dissimilar metals will, under proper conditions, take heat from one, making it cool, and deliver it to the other, making it hot.

Weightlessness also forced a new design for the kitchen water heater. On earth, a water heater relies on convection currents to move the hot water away from the element, thus bringing the cold water in contact. Since the hot water rises in the tank, it is a pretty simple system—on earth. But it depends on the difference in weight between the hot and cold water, and in space there isn't any difference. The heater had to put coils in contact with all the water at once. So the space water heater is coiled all through with heating elements. That's another example of an earthbound concept which had to be left behind at the launching pad. ★ ★ ★

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Get Your Car in Tune With Spring

(Continued from page 192)

fuel line leading into the pump for proper connection. Look for worn or heat-hardened spots in this line and for areas unusually soft to finger pressure. If deterioration is noticed, replace the line.

Observe the fuel-filter bowl as the starter is operated a few turns. Air bubbles appearing inside indicate a leaky line between the tank and fuel pump. Remove the sediment bowl and soak the screen and filter in solvent. Inspect gasoline in this bowl, if there are beads of water present, you probably also have water in the tank. Upon finding such a condition, drain the tank to remove the potentially troublesome water. Dry the bowl, screen and filter. Use a new gasket in replacing this unit, since even a small air leak can cause costly fuel waste and poor engine performance. These units are designed so normal finger pressure will tighten them sufficiently.

Fuel Line: Start at the fuel tank and check the connection leading from the tank to the fuel line for secure seating. Then inspect the fuel line running along the inside of the chassis from tank to engine. Slide the metal retaining clips aside and inspect for frictional wear under each clip. Watch for dents which are often caused by stones thrown by the tires. Dents are usually straightened by applying plier pressure. Where deep dents are discovered that cannot be repaired, the line should be replaced. If the line has been rubbing against the body or retaining clips, put a layer of friction tape around the line at the point of contact, and apply very light pressure to bend the tube away from contact. Lost or broken clips should always be replaced as they are necessary to the prevention of vibration damage.

Tire Care: When tires are under-inflated, they have more surface in direct contact with the road which causes excessive flexing, overheating and increased internal pressure. Under these conditions there is always the danger of a blowout. Tire pressure should be checked either early in the morning or late in the evening, when the tires are cool. Pay particular attention to equalized pressure in all tires, holding to the recommended pressure or not more than a couple of pounds over. Don't bleed air from tires during hot weather driving. While such a procedure reduces the pressure it simultaneously increases the inner temperature. Tires should be rotated every 5000 miles, with the spare being included, and a different tire going into the trunk on each change. Full utilization of the spare can increase tire wear by 20 percent.

Wheels: When tires show signs of uneven wear, it can mean that the wheels are out of alignment. Wheels that are improperly aligned cut tire mileage in half. Where this condition is found, it is advisable to have a reliable mechanic check the toe-in, chamber and caster and make necessary corrections.

Flat spots on tires generally indicate improperly balanced wheels. Check balance by jacking up the wheels and spinning them by hand, marking the tire each time it stops. A wheel in balance will come to rest at a different spot each time. One out of balance, or operating with other mechanical obstruction, will stop at the same spot after each spin. Improper balance can be corrected with rim weights.

Brakes: During the past few weeks if you have noticed your brake pedal getting softer and closer to the floorboard, now is the time to do some checking. Fluid in the master cylinder should be checked every 5000 miles. Clean the top of the cylinder with solvent, dry thoroughly, then unscrew the cap. Use a good grade of brake fluid (one approved by S.A.E.) and bring the level to within $\frac{1}{2}$ in. of the filler neck or to the indicated level. Jack up each wheel and dry the cover from the shoe adjusting slot. Turn the notched adjustment gear inside the drum with a screwdriver until the brake shoes begin to drag, then back off adjustment until the wheel spins free. Check hydraulic lines from master cylinder to each wheel for loose fittings or signs of leaks, kinks or dents. Make immediate corrections if irregularities are discovered, for your life, and the safety of others, can depend on the efficient operation of the brakes. Where scraping noises have been noticed when applying brakes, or where there has been a sidewise pull where braking, the wheels should be removed and the brake linings examined.

Exhaust System: With the engine warmed and running at fast idle, remove the air filter from the carburetor. Pour a thin stream of light machine oil or kerosene into the carburetor throat, which will produce a heavy, white smoke from the exhaust. Partially block the tail pipe with a cork or rags and the resulting back-pressure will force the smoke to escape from any defective connections. If you use a solvent to clean the carburetor, as outlined earlier, the exhaust-system check can be performed simultaneously, as the solvent creates a dense exhaust smoke. ★ ★ ★

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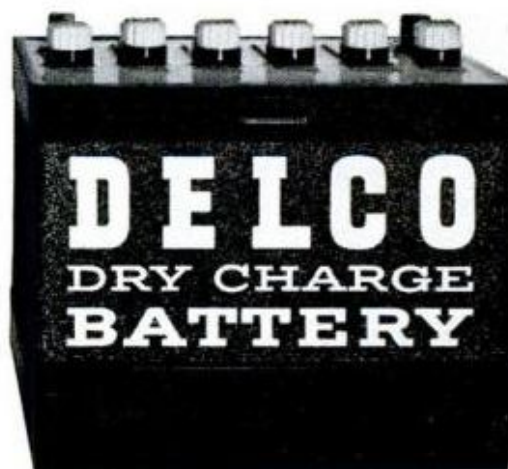
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Airlift to the South Pole

(Continued from page 125)



SUPER TAXICAB is used to ferry men from ships to base. It was made by clipping wings of an old, tired R4D

loaded. After three short hikes around the world in 10 minutes (a striped barber pole topped by a mirrored fish bowl marks the South Geographical Pole nowadays), I trudged back to the plane. The hatch slammed shut behind me, and the Hercules headed back to McMurdo for another 12 tons of freight.

The hop from McMurdo Sound to the Pole today is just a milk run—the final link in the most incredible air lift the world has known. Starting in the U.S. at Quonset Point, R. I., the lift spans most of two hemispheres, crossing two continents and two oceans, for a total of 13,278 miles. What it takes to operate it is a story of ingenuity, brawn, daring and courage.

Basic framework for the big leap was laid down in 1955, as part of Navy Task Force 43—the support arm of Operation Deepfreeze during the International Geophysical Year. That season, heavy aircraft of the Air Force's 90th Troop Carrier Squadron and the Navy's VX-6 squadron were flown for the first time directly from another continent to an ice runway in the Antarctic. A ski-equipped R4D Skytrain landed and took off at the South Pole, a feat no one was sure could be accomplished—and nearly wasn't.

The pilot used most of his JATO to blast his frozen skis loose, pulled maximum rpm from his screaming engines, fired his last JATO bank, held his breath and hauled back on the stick. The plane wobbled into the air at 60 knots—and stayed airborne. Ski-wheel P2V Neptunes fanned out to photograph a million square miles of unex-

(Continued to page 244)

WEARY PASSENGERS don polar garb during nine-hour flight in Constellation from New Zealand to McMurdo



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plored interior. Helicopters of VX-6 became the workhorses of the Antarctic.

Pilots quickly learned, however, that South Pole flying is "hairy" at best. One pilot rammed his plane into a peak in the Queen Alexandra Mountains during a blizzard. The men walked some 75 miles before a search plane found them.

A P2V photo plane blew an engine some 1200 miles out over the 12,000-foot polar plateau (the plane is designed to fly at 8000 feet on one engine). By running his bad engine to total ruin and throwing everything overboard, the gritty pilot was able to skim a few hundred feet above the ice. He practically skied down the Beardmore Glacier, soaring out over the low ice shelf as the bad engine died.

Since then, the South Polar air lift has grown into a sprawling complex of aircraft missions and facilities. From the East Coast of the U.S., Military Air Transport Service R5Ds (Navy version of the DC-6) and VX16's own Super Constellation haul passengers and cargo direct to McMurdo Sound. The leapfrogging transports touch down at Travis AFB, San Francisco; Hickham Field, Honolulu; Canton Island; Fiji; Christchurch, New Zealand—then make a 2100-mile broad jump to Antarctica.

Payloads From People to Penguins

Ten big Air Force Globemasters shuttle back and forth with cargo and people between New Zealand and Williams Air Facility on McMurdo Sound Ice. VX-6's summer complement of 50 officers and 300 men operate their four new C-130s, three P2V-8 Neptunes with tri-metragon cameras in their bellies, four R4Ds, six Dehaviland Otters and four helicopters. All planes but the Globemasters, R5D and Connie wear skis, with wheels penetrating slots in the center—enabling them to land on McMurdo's hard ice or on the soft inland snow. The Air Force's Globemasters thunder over the icecap air-dropping cargo (picked up in New Zealand) to isolated interior bases, returning to McMurdo for safe landing.

In full flight, VX-6 is a jack-of-all-trades to end them all. "We haul everything from people, penguins and sled dogs to the 31-ton Peter Snow Miller delivered to Byrd Base by C-130 this year," says Lt. Jim Hahn who heads up the helicopter unit. "Last year, we delivered 1300 tons of supplies to inland bases—including a mysterious cargo of crates labelled 'lawn mowers for Deep-freeze.' We lay out food and fuel caches for scientific exploration parties, air lift some of them from place to place, and service their tractor trains en route."

Crevassed ice on the polar plateau is one of the constant headaches of trail parties.

Drifted over with thin snow bridges that make them invisible from the surface, the great cracks—yawning to depths of 600 feet and often stretching hundreds of miles—become boobytraps for men and vehicles.

From the air, they can be spotted by coloration and a slight dip. When a tractor party was caught in the middle of a vast crevasse area, recently, VX-6 sent out a chopper loaded with flags tied to spiked bamboo poles. Hovering over the area close to the surface, ice experts picked out a safe route for the tractors, while a crewman, leaning out the hatch, marked it by stabbing the flags down into the ice. Vehicles and tractors followed the zigzag trail.

Men Are Airstrip Markers

Landing a plane up on the icecap beside a scientific exploration party is always a gamble, and there have been some real hairy ones. In a region shot with crevasses, a scientist dropped 65 feet into one of the chasms and was critically injured. Two VX-6 pilots flew out in an Otter, circled, but saw no safe place to land. Semi-white-out bleached the snow terrain. Over his radio, the pilot told the traverse leader to line his men along the tracks made by the trail party's Snocats and sleds, figuring that if they hadn't gone through the plane wouldn't. Using the men as air-strip markers, he landed the Otter safely, picked up the scientist, and flew him out.

Polar whiteout is *not* a fog. It is a condition of overcast in which light bounces back and forth between clouds and snow surface, obscuring all shadows so a pilot doesn't know if he is 1000 feet high or right on the surface. "It's like flying around in a bottle of milk," one pilot told me. "In a ski plane, you keep your descent to 200 feet a minute, like landing a seaplane. When you hear the crunch of your skis on the ice, you're there, so you cut her."

Landing safely on the high ice doesn't guarantee you'll get off safely or easily. One major problem is freezing skis. In deep subzero temperatures, three minutes is all it takes for metal ski bottoms to fuse solidly to the polar surface. One R4D pilot, delivering fuel to a cache for a trail party, found his plane glued. He gunned his engines, blasted his JATO, bounced his tail, and rocked his wings. No go. The crew shoveled the skis loose, but by the time they climbed aboard, they were frozen again. So they sat out on the icecap for two days on C-rations until another plane could fly in with enough JATO bottles to literally blast them into the sky.

What happens when planes are damaged thousands of miles out on the inaccessible

(Continued to page 246)

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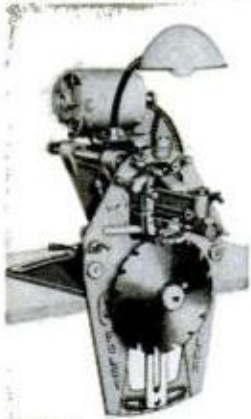


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ice? Lt. Garland "Skip" Renegar is the VX-6 line chief whose boys worry about such things. "You use your ingenuity," he says, "and you don't lose your sense of humor or you get the awful awfals."

Engine Change at 80 Below

Last year, when an R4D lost an engine on takeoff up at Pole Base, Skip's boys flew up there with a new engine and a test stand, and performed an engine change right out on the icecap at -80 degrees in a roaring blizzard. "They used a drop 'chute for a cover, and shot the blast from a Herman Nelson heater under the cloth," he recalls.

One supply plane landing beside a trail party recently came in on four-foot-high sastrugi, smashed a ski and an engine caught fire. "You can't jack a plane on snow," says Renegar, "so we took a big salvage lifting bag and blew it up under the wing." Out there in the frozen boondocks, the men lived in igloos and tents, repaired the gear, and changed the engine.

Not the least of the mighty air lift's headaches is the big ice airstrip at McMurdo Sound, where air activity centers each season. First job each year is to find it. It may be there or it may not. Last year, a chunk of it broke out and went to sea. In mid-August, with temperatures at a whistling 70 degrees below zero, bulldozers rumble out onto the Sound to scrape some 600,000 cubic yards of drifted snow from the runways. Cracks in the ice are welded with water that is hosed into them.

The winterized R4Ds, Otters and helicopters (the big planes fly out at summer's end) are often completely hidden beneath the snow. They are dug out and run up. The portable air base—tower, GCA and radar buildings, barracks and mess hall are all perched on runners—glides out to position on the strip behind D-8 tractors, from winter stowage on Ross Island.

Surface of the ice runway, in order to give plane wheels traction and prevent skidding, is ground to chopped ice by a giant "pulvi-mixer" that looks like a king-size garden tiller. Rollers mash the chips into a pad of ice powder that cures into a three-inch cushion for the big babies.

Automatic weather stations and radio beacons are flown out and placed at points on the icecap, for navigation. The USS *Willhoite*, a radio relay picket ship, takes up her position midway between McMurdo and New Zealand to guide the fly-ins.

When the big P2Vs fly down to stand by for wing escort, should one of the transocean flights develop trouble, the *longest* air lift in the world is ready to begin the world's *ruggedest* flying for another year.

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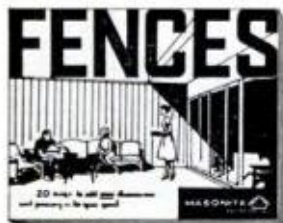
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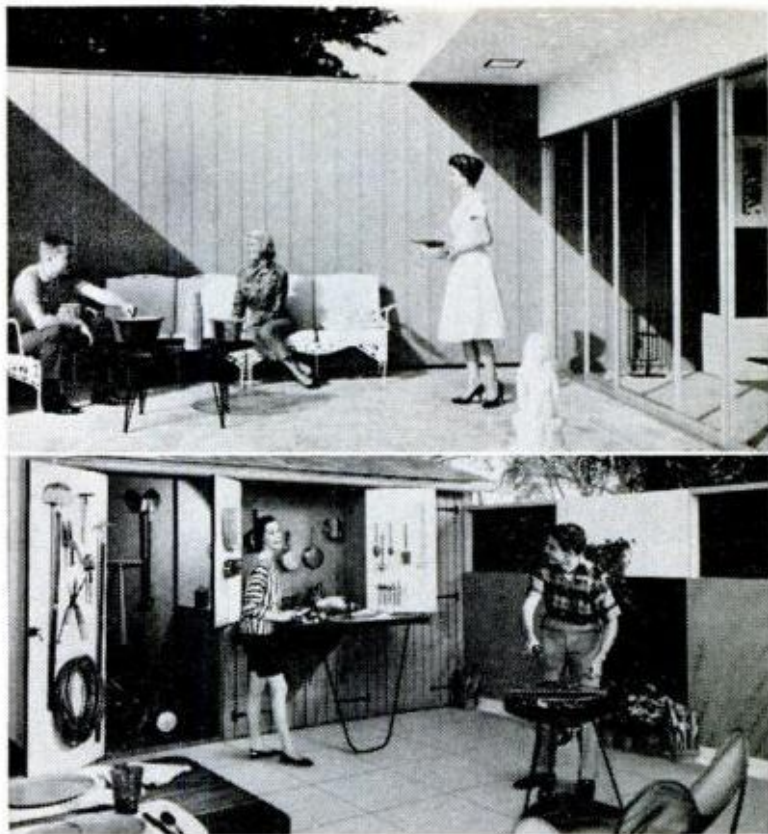
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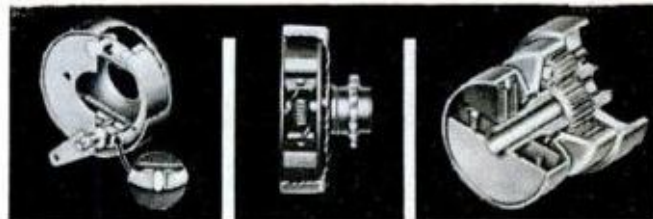
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World's Worst Airline?

(Continued from page 85)

1959 duty which resembles our F-27, and a new twin turbo-fan designated the Tu-124 are now being heralded as the modern replacements for Aeroflot's medium and short-range craft. However, in 1960 branch officials of the line were notified by their chief that the old Il-12s and 14s would have to be used another three or four years. Until recently it had been maintained that 15,000 operational hours was an absolute maximum for the 12. Now the planes will be allowed to fly as much as 20,000 hours if their main structural members are not affected by intercrystalline corrosion. This places a large trust in the inspection techniques of a ground staff already notoriously lacking in equipment and know-how. Gen. Quesada reported that he did not see a single indoor line-maintenance facility along Aeroflot's routes.

Still Using Biplane

The Il-18, designed for 75 to 100 passengers, is now carrying 130. Meanwhile, back on the steppes, the old An-2, a single-engine biplane which was built for 10 passengers is being re-bored so that 13 can be crammed inside its rustic cabin. Also, the Il-12 and 14, originally seating 18 and 24 lucky people, respectively, are now being asked to carry 32. Obviously, Aeroflot was showing a nasty capitalist loss.

These and other unrealistic demands have caused squawks from managers in the field and show a typical bureaucratic setup. The airline is clearly over-equipped in some areas, with planes flying empty and being uneconomically scheduled. But, unlike field managers, the front office of Aeroflot is quite likely loaded with party members who don't know a piston from a turbine, but have an overwhelming mania for ostentatious paper efficiency.

In 1960 the Soviet aviation paper *Soviet-skaya Aviatsiya* complained that due to a lack of modern weather communications and ground-landing systems, adverse weather at a single terminal could close down the entire system. Service was so poor that the northern terminals did not know either the weather or the movement of other planes along their route. Arrivals, departures and other schedules were a farce. "The fact is," the paper reported, "our air transportation is still largely dependent upon weather conditions. . ."

Yet in the face of this home-grown criticism the Russians have proposed a grandiose charter flight operating from London. They are also pressing for a N.Y.-Moscow

(Continued to page 250)

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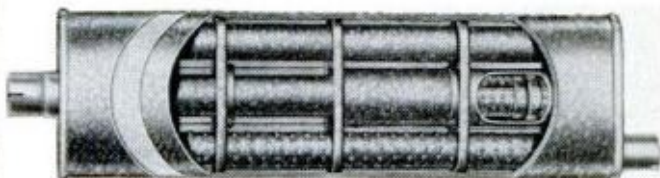
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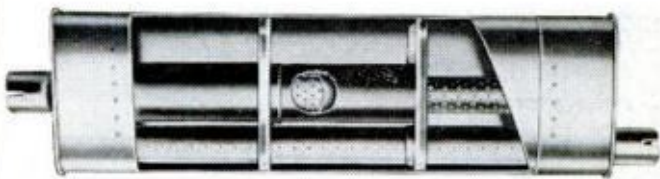
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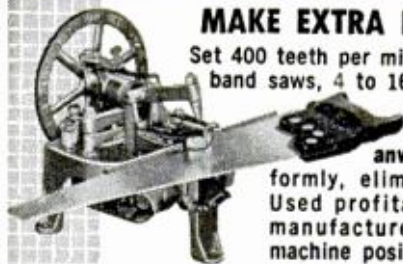
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exchange flight, one major purpose of which has been to show off the Tu-114, their new counter-rotating four-turboprop job. But negotiations over such a flight were cancelled indefinitely in 1960, which may be welcome to Aeroflot. The 114, like the 110, seems to look better on paper than in the air. Indeed, from photos made during this period, some U.S. authorities have assumed that there was only one Tu-114 in existence.

New Planes, Old Airports

But with the relatively few proven aircraft which the Soviet designers have produced, their only claim to modernity and self-sufficiency comes to a sodden end. The visitor, having seen these aircraft, looks out the window of one of them and finds that there is not a single up-to-date airport in all of Russia. The first to be built along Western design is scheduled for completion at Kiev this year. After two years of haphazard construction at Vnukovo, Moscow's premier port, traffic was shifted to Shereumentyev in June, 1960. This supposedly better field has a single 7000-foot runway. The general scarcity of even this type of facility was such that American pilots, under the exchange flight, would have had to use Copenhagen, Denmark, as their alternate in case of bad weather.

The lack of airports is actually holding up the use of the more advanced jet craft. As for terminal buildings at these fields, now and for a long time to come the gloomy barracks which would be condemned in the West must pass for passenger shelter even in large Soviet cities.

As for technical aids, when it became obvious in 1960 that Aeroflot would have to install an instrument landing system at one of these airports, the country which could boast of its electronic missile achievements had to buy the comparatively simple apparatus from London. Similarly, the shiny new Aeroflot jets are still navigating by simple radar and even simpler old low-frequency radio-range stations, long since supplemented or superseded in this country by VOR (omni-directional range) networks. At present, Soviet airways are in approximately the same stage of development as those in the U.S. 20 years ago. And they carry about the same traffic.

The proper use of advanced electronic equipment by Aeroflot flight crews is doubtful in any event. Too many persons in aviation elsewhere recall that at the time the new Russian jets were being forced into service, pilots there were still skimming the ground to maintain visual contact rather than try simple instrument flying.

Even the most experienced Soviet pilots

(Continued to page 252)



Air Freshener Uses Activated Carbon

Forcing air through activated carbon, a five-pound air freshener removes paint, smoke and other obnoxious odors. It uses less current than a 20-watt light bulb, and its replaceable filter normally retains full effectiveness for a year. The Sano-Fresh unit is sold for \$39.95 by Roark Industries, Inc., P. O. Box 29, Oklahoma City 1, Okla.



Pull-Type Combine Has Corn Attachment

Capable of harvesting the same wide variety of crops as a self-propelled combine, a pull-type machine can be equipped with a two-row corn attachment. The machine has a nine-foot cutting platform. It will handle nine feet of grain and three rows of beans. The pull-type combine has been developed by John Deere engineers for diversified farmers whose operations don't justify investing in a self-propelled unit.

APRIL 1961

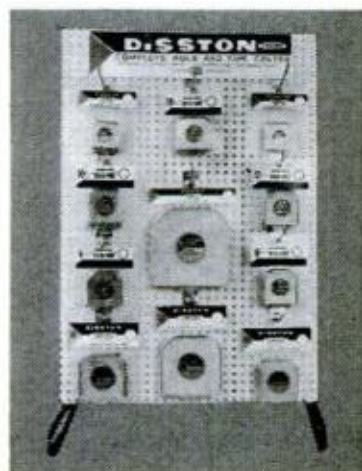
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have had less than half the hours of their Western counterparts in actual instrument flying. The only time they encounter advanced control and blind-landing techniques is when they are outside their own country. Another serious objection made against them by other agencies is that as late as 1960 the Soviets refused to recognize international standards of pilot training or to permit any inspection of their methods in this regard. General Quesada stated that some such inspection should be mandatory before their pilots were permitted to enter our high-density traffic.

Russian refusal to permit observation of her air crew training is understandable, however. There, a pilot attends the state school of aviation and, upon graduation, may be assigned either to a Mig-17 in the air force or a Tu-104 in Aeroflot. His training is basically military.

As for the stewardesses, until 1959 there was no school at all for their instruction.

There is much evidence that pilot Ivan still has not been corrupted by an overdose of technique. It may be rather refreshing, but hardly reassuring to the passenger, to know that he remains the same lusty type who flew World War II planes at continuous full throttle, one foot figuratively on the ground. Taking off, even from Moscow, he

is barely off the runway when he starts his first steep turn. Gen. Quesada noted apprehensively when Aeroflot's jets left the ground, there was less than a fifth of the runway left as a safety factor, which is practically none at all. American pilots require almost 50 percent for emergency.

In the same manner, the attitude of Aeroflot's crews seems to be that of hearty indifference to schedules and techniques. Ivan's object is to get where he is going, or where he decides to go, have a good time about it and to hell with the front office. Under this simple philosophy, and the heavy hand of state administration, things got so bad that its own newspaper, *Izvestia*, sent out an honest reporter, I. Drozdov, to get a picture of what was happening. His findings were anything but complimentary.

At Tashkent in the Republic of Uzbek, having suffered through several miserable days on the road, Mr. D. found his flight back to Moscow postponed until the following day, in fact, at which time it was postponed again without prior notice. For the next three days the shiny Tu-104 sat idle through perfect weather, according to Drozdov, with the passengers fuming until eventually someone in authority persuaded the flight to continue.

During this trip the reporter had a long

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look at the typical Soviet air terminal. On a brisk Russian winter day it was colder inside than out. The doors were blown ajar and clouds of dirt swept along the gloomy concrete floors. A pair of sailors, elevated on vodka, sailed in on the wind and began a rousing battle, defying the attempts of brave citizens to part them. Since there were no willing police at hand, the fight continued to its bloody end.

Bumping along through the Socialist Republics of Turkmen and Uzbek near Asia Minor, enroute to Mary, Comrade Drozdov was understandably dismayed when the stewardess announced blithely, "You will be happy to know we will not land in Mary, but will continue to Bukhara."

"But my destination is Mary!"

"Really?" The stewardess, in unhappy surprise, went forward to confer with the crew, who apparently were eager to get on to Bukhara and had no interest in Mary. Grudgingly, they put the reporter down at the scheduled stop.

Once on the ground they parked the plane a mile and a half from the terminal—a routine maneuver in Aeroflot. There was no other transportation. Forty minutes later some of the more hardy outbound passengers appeared, struggling wildly through the snow with their luggage.

Such flight-crew independence has become legendary here. Even at first-class airports the originating flights may depart an hour late or, even worse, a half hour early, because that is the time the pilot gets the urge to fly. When the Moscow jet stops a half mile from the terminal building, all good proletarians will shoulder their bags if they want to see the stuff again, ever, and hike to their destination. The brave citizen or tourist who decides to let Aeroflot cart the suitcase from plane to drafty terminal faces a two-hour search in recovering his goods. Another three hours by doubtful bus gets him into the city. Recently, several Soviet newspapers and citizens' groups have joined the outcry against this tyrannical treatment.

The more advanced Aeroflot crews may have carried their deviationism a little too far, however. Alcoholism is one of the major problems of the Soviet society and apparently pilots are no exception. In 1959 two officers, after what must have been a monumental toot, were publicly condemned for their tipping on duty. In the U.S., a pilot apprehended while under the influence would never set foot in a cockpit again.

An enterprising group of Aeroflot crews succumbed to a scurrilous capitalistic urge

(Continued to page 254)



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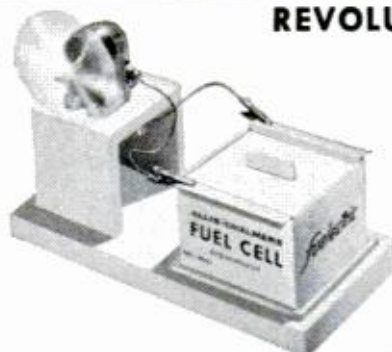
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and operated a thriving business for a time carrying black-market salmon from Baikal to Irkutsk. In the tight Siberian food situation, anyone could forgive a comrade making a few kopeks on the side, but these crews kept their planes and passengers waiting while they ransacked the town markets for fish. The same thing went on in the south, where pilots bought fresh fruit and ferried them to Moscow for resale. Both these groups of entrepreneurs were nipped, fined and reprimanded for delaying flights and using the official position for private gain, as well as bringing discredit upon Aeroflot. Again in the U.S., an airlines pilot who delayed a flight while he searched the local stalls for a trinket that might fetch a price in Peoria would find himself back in the nonscheduled airlines next day.

Iron Curtain on Crashes

But the Russian pilot is right about one thing—getting there is what counts. And here the Soviet statistical office is stonily silent. Russian air crashes are never reported in the press unless they involve foreigners or have occurred where foreign reporters have heard of them. Operational losses in the Red air force are known to be exorbitant, however, and much the same can be assumed for Aeroflot. The frequent delays in getting much-publicized new craft into service indicate more than simple disappointments in testing.

When 23 persons were killed in the crash of an Aeroflot Il-14 at Copenhagen in 1957, it merited only small type in *Pravda*. The next year 76 died when a Tu-104 fell 400 miles east of Moscow and this year the Il-18 crash near Kiev had to be acknowledged, although all of these rated only secondary headlines. The crash of an American airliner, however, is given top billing in the Soviet press. Americans may be astonished to learn that exactly 4429 of their fellow citizens died in 452 mid-air collisions here during a four-month period in 1958! This was duly reported by the *Sovetskaya Aviat-siya* as fact. Actually, there was one mid-air collision during that period, and two collisions involving airlines in all of 1958.

A timid capitalist, upon reviewing Aeroflot's pilot training, the peculiar and lusty habits of its flight crews, its lack of navigational or instrument landing equipment, its haphazard schedules and the rigors of its terminals, might be tempted to stick to the road. Nevertheless, the airline announced that it had carried more than 50,000 foreign tourists last year. As far as this writer is concerned, however, it only proves that there are 50,000 people in this world who are not quite as cowardly as he is. ★ ★ ★

Ice Water Is Good for Burns

When burns are covered with ice water, pain will frequently stop within five hours, says Dr. Alex G. Shulman of Los Angeles, Calif. He treated 150 patients suffering from burns during the past eight years and found that although the injurious effect of the burn took place, the pain associated with it could be reduced and the inflammatory process at times reversed by ice-water therapy. His method is to place the burned area immediately into a basin containing tap water, ice cubes and the disinfectant, hexachlorophene. Where immersion is impractical, as when burns are on the back or head, he applies towels chilled in a bucket of ice water. The treatment is continued until it can be stopped without the return of pain. This normally ranges from 30 minutes to five hours, as compared to as much as 24 hours of pain in first degree burns not given the ice-water treatment.

Isolate Flavor From Meat

Scientists of the Department of Agriculture have succeeded in isolating the aroma-bearing materials and flavor-producing compounds from beef and pork—the part that gives the meat its distinctive flavor. Studies indicate that the substances that create those compounds are low-molecular-weight polypeptides, carbohydrates, and amino acids. The flavors are produced by the interaction of those compounds. The flavor and aroma-bearing materials may eventually be used to enhance the flavor of food concentrates being developed for space travelers.

How Dizzy Can You Get?

Tests have shown that there is a limit to dizziness, and that after initial illusions and nausea astronauts probably can adapt to the spinning of a satellite and regain their coordination. Four men were locked in a circular room at the U.S. Naval School of Aviation Medicine in Pensacola, Fla., and the room was rotated at a constant speed for two days. Unpleasant symptoms such as apathy, illusions and nausea prevented the subjects from performing simulated space tasks, but the troubles rapidly disappeared. They reappeared in a more moderate form when the spinning stopped. The conclusions were that spacemen would be able to adapt to life in a satellite which would be rotated at similar speeds at launching. Satellites might also be rotated in orbit so that centrifugal force could offset the feeling of weightlessness.

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Report on the Rambler American

(Continued from page 89)

Satisfied 90 h.p. manual economy?	
Yes, satisfied	77.1%
No, not satisfied	22.9%
Satisfied 90 h.p. auto. economy?	
Yes, satisfied	67.4%
No, not satisfied	32.6%
Satisfied 125 h.p. economy?	
Yes, satisfied	89.3%
No, not satisfied	10.7%
Best-liked features?	
Handling ease	61.2%
Economical operation	36.8%
Ease of parking	29.8%
Roominess	21.0%
Riding comfort	19.8%
Power, performance	18.3%
Compact size	17.8%
Styling	14.6%
Most-frequent complaints	
None at all	32.5%
Water leaks	9.0%
Lack of leg, headroom	6.8%
Difficult entry, exit	5.9%
Fuel filler pipe	4.9%
Windshield wipers	4.6%
Had mechanical trouble?	
No trouble	73.6%
Some trouble	23.9%
Considerable	2.5%
What was trouble?	
Carburetor	2.7%
Transmission	2.7%
Missing, stalling	2.2%
Brakes	2.0%
Best-liked exterior features	
Smooth, straight lines	14.2%
Simplicity of design	10.0%
Compact size	5.1%

Least-likes exterior features	
Grille	6.8%
Doors	6.3%
Bumpers	5.6%
Rear end	5.1%
Best-liked interior feature	
Dash panel, instruments	17.8%
Reclining seats	14.9%
Adjustable, comfortable seats	12.7%
Heater	12.7%
Upholstery	9.3%
Glove compartment	6.3%
Headliner	2.9%
Washable seat covering	2.4%
Least-liked interior features	
Seats—uncomfortable, small	9.3%
Rear-wheel fender wells	6.6%
Sun visors	5.6%
Ash tray	4.1%
Door locks	3.9%
Considered another compact?	
Yes, did consider	57.1%
No, did not consider	42.9%
What make?	
Falcon	47.5%
Corvaire	21.0%
Comet	11.1%
Valiant	9.8%
Lark	8.5%
Buick Special	2.1%
Tempest	2.1%
Lancer	1.3%
F-85	0.9%
Considered an import?	
Yes, did consider	19.5%
No, did not consider	80.5%

What make?	
Volkswagen	42.5%
Renault	16.3%
Opel	12.5%
Rambler American only car in family?	
Yes, it is	62.2%
No, it is not	37.8%
Make of other car?	
Another Rambler	7.1%
Chevrolet	8.5%
Other G.M. make	9.3%
Ford	3.7%
Other Ford Co. make	1.9%
Plymouth	3.9%
Other Chrysler Corp. make	2.7%
Other U.S. make	1.2%
How is dealer service?	
Excellent	58.3%
Average	31.2%
Poor	10.5%
Would you buy from him again?	
Yes, would buy again	64.4%
No, would not buy again	10.5%
No answer, don't know	25.1%
Car traded in?	
Rambler or Nash	24.9%
Chevrolet, other G.M. make	22.0%
Ford, other Ford Co. make	14.1%
Plymouth, other Chrysler make	11.9%
Other U.S. make	2.7%
Import	10.0%
Make of next car	
Rambler	56.4%
General Motors make	2.7%
Ford Motor Co. make	1.7%
Chrysler Corp. make	0.7%
Compact	1.0%
Undecided, don't know	36.8%

"Rear-wheel fender wells protrude into the back seat and the back doors are difficult to get in and out of."—Alabama grocer.

"Rear seats are uncomfortable for three people as the rear-wheel fender wells interfere with seat space."—New Jersey retiree.

"My family finds that the leg and head room in the rear is not adequate."—Wisconsin engineer.

"The Rambler could do with an additional two inches of headroom to accommodate six-footers."—Georgia grocer.

When you shorten up wheelbase to 100 inches and use 15-inch wheels, it is difficult to wedge a passenger compartment with full seating room for six between front and rear wheel housings. American might well have had its passenger compartment moved further forward.

"Seems to me they could design a car with a bit more exit and entry space in the rear."—Alabama pharmacist.

"Why do they bother making a four-door model and then make it so hard to get into the rear-passenger compartment?"—Maryland educational counselor.

"It's all right once you get in but the 'humps' on either side of the back seat should be eliminated."—Kentucky teacher.

"It is exceedingly difficult for anyone to get in and out of the rear seat compartment."—Arkansas contractor.

All these exit-entry complaints stem from the basic design problem of those pesky rear wheel housings. Let's hope American Motors gets the message.

"The windshield wipers should be redesigned to clean off more windshield area. They should also relocate the wiper motor as it freezes up in cold weather and at best becomes sluggish."—Ohio office manager.

"I found that the windshield wipers do not clean the edges of the windshield. This makes it difficult to see around a corner when making a turn."—Maryland teacher.

"The windshield wiper motor is outside and freezes up. This could lead to accidents."—Vermont teacher.

Wiper blades could be a bit longer. Vacuum wiper motor sits right in air vent beneath grille exposed to elements, yet must be serviced from back of the instrument panel.

Here are some additional best-liked features ranking from 6th through 14th in order of frequency of mention.

"There's no doubt this car has more than enough speed for fast highway travel."—Iowa retiree.

"Has as much speed as the law allows and performs well in passing and in uphill climbing."—Idaho minister.

"I drive about 1000 miles per week and

(Continued to page 258)

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80 percent of them are hard highway miles; this car can really take it."—Texas liquor salesman.

"It has surpassed all our expectations. On a 1200-mile trip we found that at 50, 60, or 70 m.p.h. it did everything any other car could do."—Iowa dairyman.

With the 125 hp. engine, standard on Custom models, optional on others, the American will approach the performance level of the standard Ford-Chevy V-8 models.

"I have long been intimidated by big cars and hesitant in driving one. This Rambler is of an excellent size, especially for a woman."—Virginia housewife.

"Rambler's new body style makes this a beautiful little car."—West Virginia bookkeeper.

"For a compact, it has a nice 'big-car' look."—Missouri watchmaker.

"As far as I'm concerned, the buyer is finally getting a break. Since the style doesn't change as often, he gets a better trade on a new car."—Alabama druggist.

The restyling of the American for 1961 was very successful especially since the basic frame-platform and inner body shell were unchanged.

COMET LOVERS OR HATERS? How do the owners of the new Comets feel about their cars? Read the answers, based on close to a million miles of owner-driving, in the May issue.

"You sit up higher and are able to see around much better than in some of the other compacts."—Missouri pressman.

"I like the lack of body noises with this unit construction."—Nebraska farmer.

"No trouble washing this car; no fancy cutouts and frills to scoop grime out of."—Wisconsin retiree.

Cleanability as well as attractiveness is a by-product of a really good design job.

"It handles very well on winter roads and I don't have to fight the wheel over ice ruts and tracks."—Maine lumberman.

"I've pushed this car the limit and she handles like a heavy car at high speeds."—Alabama nurse.

"It is so easy to drive I don't tire on long trips. It has wonderful roadability—stays right on the straight and narrow with just a touch of the finger—and I do not have power steering."—Washington D. C. typist.

Strange as it may seem, Rambler makes power steering available on American for the first time in the car's history this year. With it you can get a "faster" steering ratio which is nice but not worth the extra cost.

(Continued to page 260)

Candy Cleans Water Lines

Internal cleaning of pipelines in drinking water systems presents the problem of maintaining sanitary conditions during the cleaning. Mechanical cleaning methods are expensive and require bacteriological tests before returning the lines to service. Pieces of ice have been used, cleaning the pipe by friction as they run through the system by water pressure, but fast melting makes that method difficult. One major oil company solved the problem by using candy "jawbreakers" on four to 16-inch lines. The line to be cleaned is opened at two points from 400 to 2500 feet apart, and 25 to 125 pounds of the hard candy balls are poured in at the "upstream" opening. The line is resealed and pressure is turned on full, driving the balls through the system at high speed, virtually sandblasting the pipe before they reappear at the downstream opening. Plugging is not a problem; if the balls become jammed in a line, they soon melt and clear themselves.

Wood-Pulping Process Eliminates Pollution

Pulpwood processing, often a cause of water-supply pollution, can be cleaned up with a new chemical method developed at the University of California. California water-use laws prevent wide use of conventional pulping processes. The new process uses nitric acid, then ammonium hydroxide on the wood chips being pulped, then extracts the chemicals to produce a good nitrogen fertilizer. Even the waste water has enough nitrogen content to make good irrigation water additive.

Manganese Carpets Ocean Floor

Lumps of manganese, ranging in size from a few ounces to several hundred pounds, litter the floor of the Pacific Ocean for several hundred miles off the west coast of Central America between 17 and 20 degrees north latitude, at a depth of 12,000 feet. The deposits were discovered by the Russian oceanographic ship *Vityaz*, and photographed by underwater cameras from the U.S. Coast and Geodetic Survey ship *Explorer*. Studies are under way to consider the practicality of "mining" the manganese by dredging or suction pumps. On the same voyage, between Seattle, Wash., and Norfolk, Va., *Explorer* dropped 5000 drift bottles—one every two hours—containing post cards to be returned by the finders to Washington Survey headquarters. Object of the bottle drop was to study movement of coastal ocean currents.

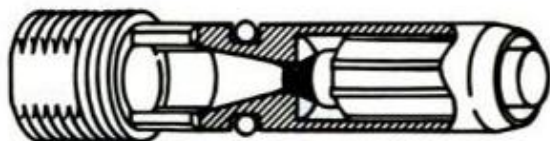
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The Holley Viton Needle Valve practically eliminates carburetor flooding caused by dirt in the fuel supply! Its resilient tip of tough Viton assures a perfect sealing of the valve and seat (virtually impossible with metal or rubber), even when there are contaminating particles in the fuel. And Viton defies abrasion and high heat. More than two years of exhaustive testing proved that the Holley Viton Needle Valve assures many thousands of miles of trouble-free service. Holley Viton needle and seat



replacement assemblies are available at low cost for all late-model Holley single, dual and four-barrel carburetors. If you are troubled with carburetor flooding, better see your Holley Distributor or Dealer today.

★ ★ ★

When you make your own carburetor or ignition repairs, be sure to use genuine Holley parts. Your Authorized Holley Distributor or Dealer, listed in the Yellow Pages, has a complete stock of Holley carburetor and ignition repair kits and parts, plus brand-new replacement PEP[®] Carburetors, priced competitively with rebuilds. All are engineered and built to original equipment standards.

*Dupont's Registered Trade Mark

ORIGINAL EQUIPMENT MANUFACTURERS
HOLLEY
Carburetor Co.

OF CARBURETION
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FUEL USERS ATTENTION

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with the remarkable New-Concept Supplement GS-1000 and DFS-1000—as reported to the Nation exclusively by the Popular Mechanics feature news article, March, 1961.

Stated simply, Fuels Research Laboratory products achieve more COMPLETE combustion—a Combustibility never before possible in fuels technology.

Thus—2 Basic Achievements in a single product:

FULL POWER RELEASE—from every drop!

Exhaust hydrocarbon emissions are reduced half!

REVERSES THE CYCLE of carbon and corrosives build-up into their CLEAN-UP!

Our products effectively attack the basic CAUSE of engine damage—UNBURNED FUEL. Through radical reduction of residual deposits in the entire combustion system, both increased mileage and horsepower result. Bonus benefits include greatly reduced engine wear, maintenance and down-time.

Over 10 MILLION MILES of supervised testing and usage by major fleet and industrial companies. They attest in writing that our statements are FACT.

Other fine Supplement products include those for motor oil, burner fuel, hydraulic oil, gear oil, automatic transmissions and water absorber.

We invite your inquiry.

FUELS RESEARCH SERVICE CO.

1622 Arapahoe St., Denver 2, Colo. KEystone 4-5391

Now some negative evidence. Here are some representative complaints covering items 6th through 12th in order of frequency

"There is a lot of annoying wind noise from the vent windows when they are opened."—Colorado resort manager

"I am a bit disappointed to find gas mileage not as good as advertised."—Georgia probation officer.

"I think riding quality could be improved. This Rambler does not take bumps and rough roads as it could be made to."—South Carolina barber

"Ride is choppy on rough roads. Cornering characteristics only fair, particularly at high speeds."—New Jersey executive.

"Noisy, rough reaction to rough pavements and dirt and gravel trails."—New Mexico teacher.

We found that PM's test car rode a bit stiffly on some washboard surfaces, but that its ride was better than that of almost all imported family cars.

"Definitely poor fit of door-window frames and low-quality upholstery."—Kentucky housewife.

"Rear windows in two-door sedan will only open about four inches."—New Mexico rancher.

ARE SO-CALLED COMPACT CAR SAVINGS fact or fiction? You'll find the answers, based on a careful analysis of prices, discounts, maintenance and operating costs and trade-in values—all in the May issue.

"My largest complaint concerns definitely inferior assembly and finishing; for example, had to have two rocker panels repainted, both doors reset, muffler and tail pipe rehung, grease seals replaced, etc."—Florida minister.

"Not as much power as I would like, especially when it comes to hill climbing."—Virginia government worker.

"There's a sluggish feel to the automatic transmission and the windows will not shut tight."—Tennessee serviceman.

"If I were to buy another American it would be with the larger engine plus overdrive as the L-head engine in this car seems to be wound a little tight at speeds above 65."—Mississippi repairman.

Very good idea. The bigger engine with overdrive carries a 3.31 axle ratio which means that with overdrive in operation the final ratio is a lazy 2.31 revolutions of the engine to each one of the rear wheels.

(Continued to page 262)

WELD - BRAZE - SOLDER - CUT

REPAIR MOST EVERYTHING MADE OF METAL.

Home Appliances, Auto parts, Farm-garden equipment, toys, Make and repair playground equipment, lawn chairs, tables, ornamental iron work, gates, wagons, etc. Solder, heat, bend, and straighten, with terrific heat from arc torch.

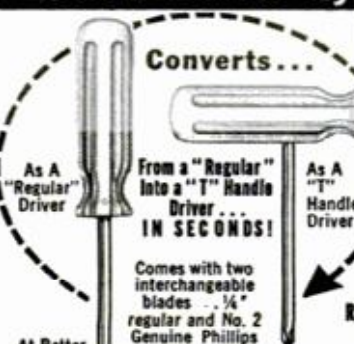


Cut and weld up to 1/4" steel plate. A million uses for Home, auto, farm, inventors, factories, etc. Works from any home 110

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SEND ONLY \$3 (cash, ck. mo.) and pay postman \$11.95 plus COD postage on arrival or send \$14.95 and we will send postpaid. Ideal gift for mechanically minded home owners, relatives, friends. Order now for early delivery. Available only from: **MIDWAY WELDER Dept. DPM-4 Kearney, Nebraska**

New "SIDE ARM" Screw Driver by



Converts...

From a "Regular" Driver into a "T" Handle Driver... IN SECONDS!

Comes with two interchangeable blades... 1/4" regular and No. 2 Genuine Phillips

FREE BONUS INCLUDED:

a new "Handi-Angler" fishing kit (bobber, fish line, sinker and hook) FREE with complete set

Regular \$4.00 Value Only **\$2.98**

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317 East Ontario St., Chicago 11, Illinois



Transparent Galaxy Globe Shows Location of Stars

Blown up like a beach ball, a miniature planetarium allows a student to visualize the relationships of the heavenly bodies. By peering through the transparent vinyl globe, the viewer can line up the luminescent figures on the opposite side of the globe with their celestial counterparts. The sun, moon, stars and planets can thus be seen in proper relationship to the earth for any given time of the year. Produced by Seelo Galaxy Co., Claremont, Calif., the celestial sphere is available for \$15.00.



Metallwarenfabrik Albert Teschlade, 502 Steinfurterstrasse, Muenster, Westfalia, West Germany

Toy Train Carries Children

Perfect gift for the child who has everything: a train. West German engineer Albert Teschlade is manufacturing scaled-down locomotives, cars and track which the child can lay himself. The 24-volt engine powers the train at pedestrian speed. Locomotive and tender cost \$570.

APRIL 1961

PAINT THRU RUST



Spray it...

brush it

NEW additive* lets you paint over tight, non-scaling rust because it penetrates through to the metal; seals against further rusting... PROTECTS LONGER THAN ORDINARY "RUST PAINTS." Rustmaster enamel available in colors.

*Patent applied for.

RUSTMASTER



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The Glidden Co. • Cleveland 14, Ohio • West Coast: The Glidden Co., General Paint Co., 1000-16th St. San Francisco 7, California • In Canada: The Glidden Co., Ltd., Toronto, Ont. Rustmaster also sold by dealers for CLIMATIC HEATH & MILLIGAN • ROYAL • MOUND CITY.

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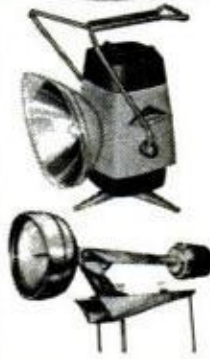
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POWERlite The all-time favorite! Wide floodlight from top. Brilliant spotlight. Sturdy steel case. Anyone can use it. \$6.15

STARFIRE Rotary switch operates powerful spot beam and flashing red light. Hang it or set on the handle—point the light where it's needed. \$7.95

ASTROLite Flashing red light pivots on arm. Piercing spotlight. Adjustable head. Dual fingertip switches. Mounts on twin-pack battery. From. \$7.95



Only Delta has sixteen beautiful electric lanterns—each with advantages for different uses. There's a lantern with features and design suited to your needs. Prices begin as low as \$1.79. See the Deltas at your dealer's, or write for literature and Free Fishin' Calendar.

Prices list, less 6-volt batteries.

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PLUS NEW LONGER LIFE!

**QUIET-TONE
MUFFLERS**
Hi-Efficiency Fiberglass-Packed
Featuring
GARD-KOTE



Rust-Resistant
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Steel Case and
End Caps
(Both inside
and outside)

"NEW EXTRA" in Quiet-Tone Mufflers — already famous for distinctive deep tone and straight-thru, full-power construction. Long-lasting satisfaction assured with corrosion resisting "Gard-Kote". Exclusive Turbo-Jet Diffuser eliminates back pressure . . . increases power . . . produces low, acceptable "whis-purr" sound. Easily installed on any car.

See "Quiet-Tone" at your favorite dealer — he also has a complete line of duals including all 1961 models

GRAND AUTOMOTIVE PRODUCTS
Dept. PM-4, 2055 N. Ruby St.
Melrose Park, Illinois

World's Largest Producer of Dual Exhaust Systems

And here are the final best liked features in order of frequency of mention.

"Had it parked out of doors for several days and the temperature dropped to 30 below. But I stepped on the starter and it kicked over right away."—Minnesota housewife.

"We have had no cold-weather starting problems since we bought this car."—Minnesota clerk.

"Handles and drives like a big car and holds the curves very well."—Mississippi bank clerk.

"Drives and handles like a big car at speeds up to 80 m.p.h."—Louisiana serviceman.

"It has all the qualities to be found in a larger American-built car."—North Carolina druggist.

This is a reaction that just about everyone gets after their first ride in an American. It is a car that drives big but parks small.

"This is one car I rate high in quality workmanship."—Minnesota merchandising manager.

"This was my first new car and I appreciate its low cost and good prospective trade-in value."—Nebraska distributor.

"I appreciate the standard, simple engine—big enough to do the job."—Pennsylvania creamery worker.

"My wife and I wanted a simply-designed and operated car without gadgets that tend to create trouble and this is the car for us."—Rhode Island banker.

Like several other compacts the American is a sturdy, relatively uncomplicated car. It is an ideal car for do-it-yourself maintenance and the excellent owner's manual tells you how.

Now for a final short list of complaints, 13th through 16th.

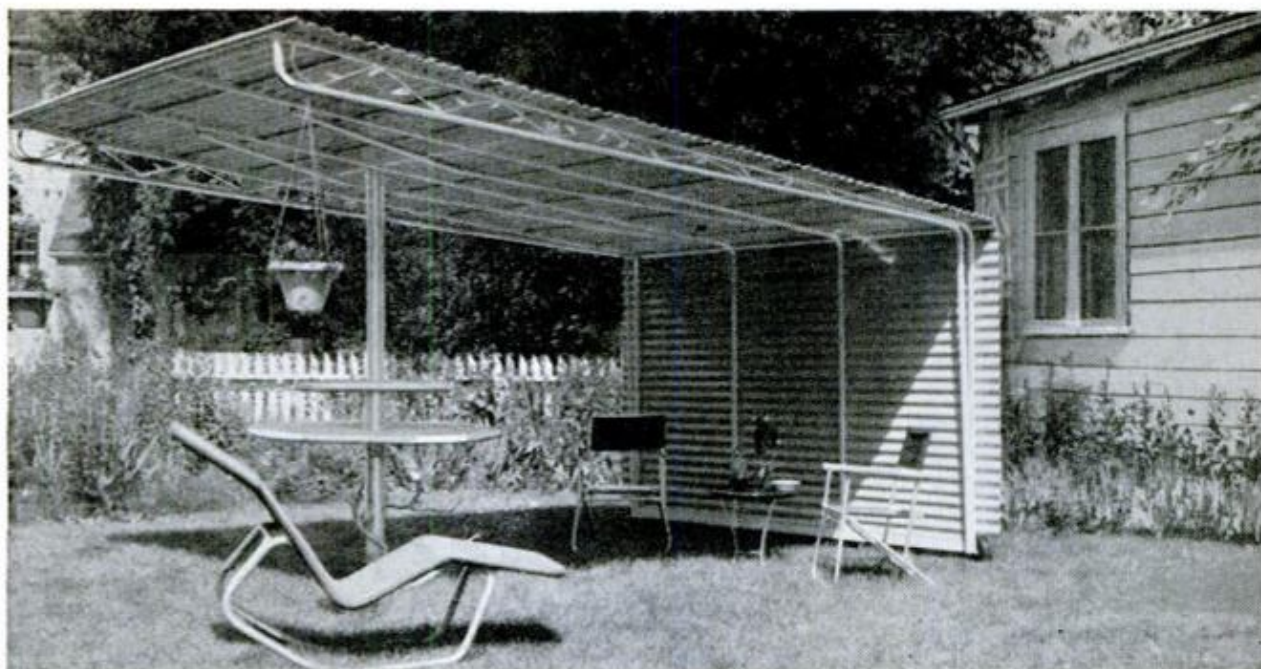
"Too much cold air whistles in somewhere through cowl air vents even with controls all the way off."—Pennsylvania plumber.

"There is a leak under the dash panel coming from the Weather Eye heating system which seems to be impossible to fix."—N. Carolina office manager.

"Steering on this car is too touchy, making the car hard to hold on the road at 60 m.p.h."—Alabama shipping manager. ★★ ★

10 AWAY-FROM-IT-ALL VACATION SPOTS. Some of them are probably within easy reach of where you live. You'll find these fun-time hideaways described and located for you in the May issue.

POPULAR MECHANICS



A & A Building Products, Denver, Colo.

Colorful Awning Moves With the Sun

Operating like a Lazy Susan, a light-weight glass-fiber and steel awning swivels in a complete circle to offer maximum protection from sun and wind. The awning, rolling on two eight-inch wheels, rotates around its center pole. Framework of the shelter is steel, which is covered with colorful fiberglas panels. Six to eight people

can dine around a table mounted on the center pole, and a real Lazy Susan—mounted on the same pole—serves the diners. The awning is 15 feet long and 10 feet wide. It is designed to support a snow load of 30 pounds per square foot, so it can be left outdoors the entire year without fear of winter snow damage.

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Until I Invented Magnetic Wood Facings That You Can Snap On or Off Instantly!



If you wish you had an extra pair of hands everytime you clamp a workpiece in your steel vise, order a pair of my "Vise Guards"—smooth blocks of All-Heart Redwood that are magnetized and attach themselves instantly to your vise jaws. On in 2 seconds—and off again just as fast! Fit any vise. A great timesaver for home workshops, hobbyists, craftsmen. No more fumbling with scrap wood to protect wood, plastics, etc., from being scratched or gouged by the steel jaws of your vise. Money back if you don't say they're great!

"DOC" NELSON, CINCINNATI 22, OHIO—Only \$2.00 Ppd.

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APRIL 1961



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Underground City

(Continued from page 105)

with the veins and arteries and nerve centers that feed the city and give it life. These vital organs carry the light that illuminates Broadway, the power that runs the garment center's many factories, the gas that cooks the meals, the steam that heats buildings and the water that makes life and an accumulation of treasures possible.

Moreover, it's only the magic of modern engineering that permits Manhattan to exist at all. Although 1,650,000 persons reside in Manhattan, the daytime working population is three times greater. Encircled by three rivers and a harbor, Manhattan could spread only a few hundred feet by way of fill over the years. Unable to stretch further into the Hudson and East Rivers, the island began to reach toward the sky and down into the ground into two cities—the metropolis on the surface and the literally unknown city beneath.

Aaron Burr's Water Company

Without water Manhattan would cease to exist. In 1677 early Manhattanites dug their first public well in front of the British fort at Bowling Green, now the financial district. In the years between the first public well and 1795 the city almost died because the water supply became contaminated by everything from old graveyards to salt water seepage. In 1795 Aaron Burr organized the Manhattan Water Company and proceeded to build a subterranean water system snaking its way through 10 miles of lower Manhattan.

As Manhattan expanded northward away from the Battery's docks and center of trade and finance more drinking water was needed for the city's growing population. A huge cast iron tank distributing water through 12-inch cast iron water mains failed to halt the fire of 1835 which almost levelled the city. Water, Manhattan's life blood then as it is today, was sought elsewhere. Conduits from Westchester's Croton Reservoir 20 miles north began to supply New Yorkers with water in 1842.

With a rapidly expanding population sewerage became another serious problem and the first sewer was easily built by constructing a roof over the Broad Street Canal. That was in 1680. The roof became a road and the road is now Canal Street; and this sewer is still in use after 280 years. But prior to the present extensive sewer system, New Yorkers relied upon more than 20,000 scavenging pigs to keep the city clean. A few years after the Civil War the first underground sewer system was started.

The city went underground with a vengeance following the crippling blizzard of '88. Tangled telegraph, telephone and high-tension lines of 90-foot-tall poles, with as many as 50 crossarms, snapped beneath the weight of the snow and fell across buildings and in the streets. More than 200 persons died from electric shock and 350 fires were recorded in the three-day period following the blizzard. Mayor Hugh D. Grant summoned the heads of the utilities companies and ordered them to put their "damned wires underground—or else!"

Approaching the million mark at the turn of the century, New York City slowly began to wither. The city's inhabitants were packed solidly in the only areas where they could live and travel daily to their jobs in the area below 23rd Street. Soon street frontage to build more houses for the teeming tens of thousands of immigrants no longer existed. Employers began fleeing the city with their machinery and their workers followed. New York, they foresaw, was dying, strangled by a population it could never handle.

Seventy years ago the engineers began to take over the problems of this dying city. In the interim they returned it to life and threw in the youthful fervor that is still part of this growing metropolis.

"Preposterous" Subway

Foreseeing the need to move vital organs underground, city engineers proposed an underground railway system and water supply system. When the idea was first broached to financier Russell Sage that a subway system be built he refused to finance it. "Preposterous!" he snorted. "New York people will never go into a hole in the ground to ride to work and to their homes." Today some 4,500,000 passengers ride the New York Transit Authority subways daily on 236.7 route miles of track, or 723 miles of running track in five boroughs of which 80 percent is underground. With the exception of a mile and a half of track above ground in uptown Manhattan, the remaining 63.82 route miles of transit system in Manhattan is underground—blasted through solid rock. Moreover, it's estimated that the average New Yorker spends at least seven full 24 hour days a year travelling underground by subway or walking beneath the city's streets.

Manhattan's underground water supply system is considered one of the greatest engineering feats of all times. "Without water," Commission Armand D'Angelo of the Department of Water Supply, Gas and Electricity added emphatically, "this great city would shrivel up and die!" More than

(Continued to page 266)



Heater in Bird Feeder Keeps Water From Freezing

For lovers of birds that winter in cold climates, a new feeding station provides water as well as food. When the temperature drops to freezing, a thermostatically controlled electric heater located under a rustproof brass basin keeps the water liquid. The heater is weatherproof, the plywood platform is waterproof, and the station can be mounted on a wall, window sill or pole. Called Bird-Spa, it is priced at \$5.95 and can be purchased from Gates General Corp., Farmington 2, Conn.



Table-Top Solar-Energy Kit

Harnessing the sun in a small solar furnace that develops temperatures up to 2000 degrees can be achieved with a do-it-yourself kit that includes a 14-inch fresnel lens and directions for constructing the furnace from scrap wood. The furnace can be used for soldering or brazing or even roasting hot dogs. The lens is a flat, thin piece of plastic on which has been molded a series of concentric zones that concentrate the light. The kit, priced at \$6.00, is made by the Edmund Scientific Co., Barrington, N.J.

APRIL 1961

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Makes painting

EASIER

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At paint and hardware stores.
Send 25c for Refinishing Manual or write for free Wil-Bond folder.

Wilson-Imperial Co.

118 Chestnut St., Newark 5, N.J.



\$1,200,000,000 has been invested in New York's water supply system since Tunnel Number One was put into operation in 1917. Blasted out of solid rock 200 to 750 feet below street level as it bores through 10 miles of Manhattan's rocky base, Number One (it has no other name) carries most of the 375 million gallons of water used daily by Manhattan. Number One took almost 10 years to build and has never been closed down for repairs. This huge tunnel averages 11 to 15 feet in diameter and is big enough to drive a small truck the length of the island. A second tunnel, appropriately named City Tunnel Number Two, was completed in 1936 and carries water to the Bronx, Brooklyn and Queens and is 17 feet in diameter. New York City's water supply system provides more than the 1,204,000,000 gallons of life-giving water used daily and is planned to provide for the population expected in the world's greatest city more than half a century hence.

Disguised Water Supply

The huge water supply tunnels were deliberately built deep to contain the high-pressure flow of water that courses through at express train speeds. In Manhattan, for example, 25 well-placed shafts are located in various public parks disguised to all but the men from D. W. S. G. & E. (Department of Water Supply, Gas & Electricity). Many of the city's million and a half manholes also lead to 5800 miles of water mains 6 to 72 inches in diameter that is part of the vital water distribution system consisting of 165,000 gate valves and 90,000 hydrants. With the exception of the hydrants, the rest of the system remains underground.

A broken underground main can tie midtown Manhattan into knots, as one did recently in the area below Times Square. Until D. W. S. G. & E. maintenance men found the burst main, traffic for two miles around the flooded area was diverted through already jammed avenues and crosstown streets, and one subway line was washed out of action during the morning rush hour stranding half a million passengers on their way to work.

New York's massive sewer system for more than 40 years remained indelibly inscribed in the head of wizened, squint-eyed and tobacco-chewing Teddy May, also known as the "Sultan of the Sewers." A civic employee of the "old school," the hunched, tough-talking little man defied every public official from the mayor on down and got away with his many indiscretions—because he was the only man who knew the sewers intimately. There are 500 miles of sewers in Manhattan and they are

mapped, now that Teddy May has retired.

Some 4,479,775 miles of telephone wire in cable weighing in at 67,000,000 pounds and worth more than \$21,000,000 on the copper market is laid in what appears to be an endless tangle of spaghetti beneath Manhattan's streets. Congestion under the downtown streets is so great that at the corner of Broad and Wall Streets in the financial district it's impossible to insert so much as a wood pencil between the tangled spread of all utilities from curb to curb. The New York Telephone Company, for example, is reluctant to release for publication maps of its facilities for obvious "security reasons."

Master Map Impossible

The jungle of cables, pipes and mains is so congested that a master map is impossible. Each utility and municipal department with equipment underground maintains its own maps. But these records go back 70 years or less. Construction men have found old graveyards, a British dungeon harking back to Colonial days, chests of coins, Colonial weapons and tools, old ship hulks and anchors and some foot tunnels with a curious history. One was found on the west side of the city leading to the Hudson River. The other end, closed and forgotten, led to a neighborhood saloon, which in the old days was a speakeasy headquarters for the old "Dutch" Schultz mob. The mobster chief's bootleggers unloaded their "imported" booze from fast speedboats at the tunnel entrance and delivered the cargo to the saloon where it was moved throughout Manhattan billed as "good stuff just off the boat."

Aside from the working tunnels used by the utilities, there are an untold number of underground vaults, sub-basements, private passageways and pedestrian tunnels. Some of the more public foot tunnels are known to a relatively small number of New Yorkers. One network of tunnels in the Grand Central area, for example, can lead the oriented pedestrian from the Socony Mobil Building at the corner of Third Avenue and 41st Street to the Lobby of the Roosevelt Hotel at Madison Avenue and 45th Street, more than half a mile away.

Even cattle and sheep have their own subway and are safely herded from the cattle cars parked on sidings near 12th Avenue on the west side at 39th Street to nearby slaughterhouses a few blocks away.

Some of the fauna underground leaves much to be desired. Perhaps the sewer workers are plagued more than any other utility maintenance crews. Besides side-stepping floating metal drums, battered

(Continued to page 268)

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RIDGID®
HEX WRENCH
YET?**



Six Sizes
with Maximum
Jaw Openings
of 1 1/16", 1 1/2",
1 3/4", 2 1/2",
3 1/2" and 4 7/8"
across flats.

**the Perfect Mate for your
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Finest of All Adjustable Smooth-Jaw Wrenches

MORE GRIPPING POWER...

Puts a wrap-around grip on hexes that just won't slip. You pull with at least three sides. Works on square nuts, unions, gas cocks and flat shapes, too. Smooth jaws won't mar polished or plated surfaces.

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Built good and solid. Thin jaws slip into tight places.

RIDGID No. E-110 Offset Hex Wrench

Big Jaw, Short Handle for
Sink and Tub Drain Nuts

Maximum Jaw Opening
2 5/8" across flats.



RIDGID No. E-11 End Hex Wrench

Offset Jaw for Easy Work
in Tight Places

Maximum Jaw Opening
—1 1/2" across flats.



Your Dealer stocks the RIDGID Work-Saver Pipe
Tools you need for easy home repairs!

RIDGID®

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wooden crates, and occasional murder victims in whole or in parts, these adventurers have come up against alligators that were children's pets until Dad flushed the growing reptiles down the family toilets, eight-foot long eels, huge and vicious rats and a species of sewer cats that are lean and wiry and can leap 15 feet in the blink of an eye. These sewer department men often have had to fight off king-size "clocks" or cockroaches six inches long and which, they swear, fly in clouds. One group of sewer workers broke into an ancient and unused sewer near Radio City when the Sixth Avenue subway was undergoing construction and inadvertently released, according to the accounts of the day, an estimated 100,000 white mice who had never seen humans. Apparently a colony of field and cellar mice had multiplied and mutated into white mice in the darkness over an undetermined period of years. Manhattan women, so the news reports related, shrieked themselves hoarse for weeks as the rodents chased them in the streets or suddenly appeared in office desk drawers.

Today, there's more of a pattern to the city beneath the city. The newly rebuilt streets follow a pattern. Sewers are 12 to 15 feet below the street surface to insure good drainage. Steam lines, of which there are 87 miles carrying 150 pounds of live

heat at a scalding 350° F., need at least six feet of cover to allow other utilities and services to pass over and under them. Water mains are now placed at least four feet deep and just below the frost line. Gas mains are laid at the same depth and far enough away from electric ducts to insure safety from a spark and a leak. Closer to the surface are power and telephone cables 18 inches to two feet deep. And for new areas there's a horizontal pattern agreed upon by all services and utilities. Power cables are set nearest the curbs, telephone cables next and then gas and water mains and sewers in the center.

Railroad Terminals

Perhaps the busiest underground areas lie beneath the two railroad passenger terminals—Grand Central and Pennsylvania Stations. Beneath Penn Station 21 tracks, some 86 to 92 feet below the street, pass under five different converging subway lines. Underground foot tunnels veer as many as four crosstown blocks leading to five different subway lines and also to nationally known Gimbels and Macy's department stores. Grand Central Station boasts of 49 separate railroad tracks which lead out of the station's vast underground area and beneath wealthy and exclusive

(Continued to page 270)

PROFESSIONAL'S WAY to remove furniture finishes

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WHERE-TO-FIND-IT List for this issue, free on request, gives sources of supply or further information on all editorial items for which this information is available. Send a stamped, self-addressed envelope to



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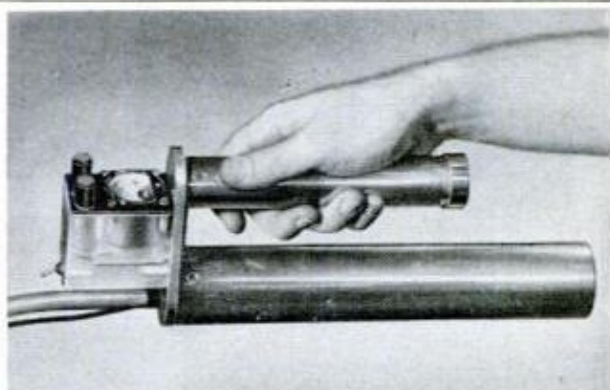
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Park Avenue unavoidably "close to the tracks." Moreover, Grand Central's underground complex contains a hospital, an art school, exclusive shops, entrances to three major hotels and even bank deposit windows guarded by a police force which rarely sees daylight during daylight hours.

Then there are the huge vehicular traffic tunnels that lead out of the city. The triple-tube Lincoln Tunnel 8216 feet long and 93 feet below the Hudson River and the 8557-foot-long Holland Tunnel 93 feet beneath the same river are complemented on the east side by the Queens Mid-Town Tunnel and the Brooklyn Battery Tunnel spanning the mile-plus distance beneath the East River.

Every once in a while something underground goes awry and puts on a show. One hot summer day some years ago a high-pressure water main burst and sent a geyser of water spurting 40 stories high, rivaling "Old Faithful" for multicolored beauty in the sunset. Then there are occasional gas main explosions that can rocket 200-pound manhole covers 500 feet into the air. Or the time in 1935 when housewives were scandalized when half-inch long silvery fish began popping out of faucets at the kitchen sink.

Engineers and maintenance crews from Consolidated Edison, the principal supplier

of gas and electricity, are called out day or night, in fair weather or foul, to repair and service what's wrong. Con Ed is responsible for 17,023 miles of vital electric cable and conduits and 1370 miles of gas mains. The "doctors" from Con Ed often have to dig deep and fast to halt a gas leak or a cable short circuit or breakdown before it spreads.

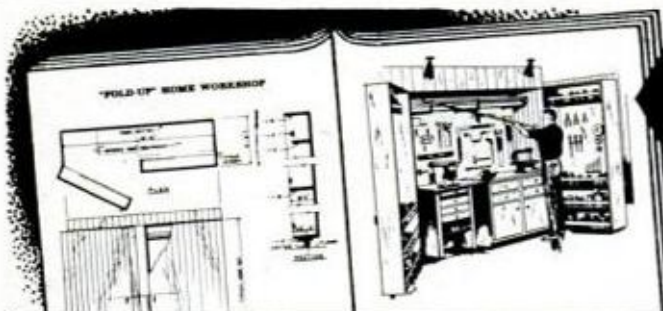
This maintenance typifies the digging that will forever go on in New York City and especially well-excavated Manhattan island. ★ ★ ★

Quick Test for Soybean Oil Content

Soybean producers are paid largely on the basis of the oil content of their beans, but the laboratory test that determines that important factor takes about eight hours and requires some technical skill to make. An electronic device being developed for the Department of Agriculture will test sample beans in about 15 minutes and requires no technical skill to operate. The device has been tested commercially, but needs further refinements before it can be put into general use. It will make it possible to pay producers on the basis of their crop's oil content without undue delay.

Radio-Controlled Coal Chute

Short-wave radio signals sent from the cabs of two coal carriers control the operation of two coal chutes at the Georgia Power Company plant, near Newnan. Conveyor belts carry coal to a tower and the chutes above a half-mile-long stockpile at the plant. Drivers of the carriers wheel their rigs under the tower, send the signal and a chute dumps in a load. While one man loads up, the other spreads his load over the pile. The plant uses 40 carloads of coal a day.



Here is a complete guide to home-improvement with 18 "fascinating ideas" illustrated in full color and thoroughly explained. Each "idea" is supported by a working diagram and easy to follow building instructions. You'll find such "naturals" as an "Alaskan Bedroom Hide-away" for boys—a "Lazy Susan" wardrobe for mother—and a fold-up home workshop that fits into an 8' wide area for dad. This 40 page booklet includes a helpful reference section titled "Facts You Should Know about Lumber and Plywood." Send this ad with your address and 25c to Weyerhaeuser Company, P. O. Box 5890, St. Paul, Minnesota.

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Owners Report on the Chevrolet

(Continued from page 93)

Satisfied V-8 automatic economy?	Best-liked interior features	What Make?
Yes, satisfied59.3%	Dash panel25.1%	Buick Special38.9%
No, not satisfied40.7%	Comfortable seats16.7%	F-8532.1%
Satisfied manual Six economy?	Upholstery14.3%	Tempest8.3%
Yes, satisfied67.9%	Did consider medium-priced car?	Chevrolet only car in family?
No, not satisfied32.1%	Yes, did consider30.4%	Yes, it is62.9%
Best-liked features	No, did not consider69.6%	No, it is not37.1%
Handling ease46.8%	What make?	Make of other car
Riding comfort39.4%	Pontiac41.9%	Another Chevrolet15.5%
Styling28.9%	Oldsmobile26.9%	Other G.M. make9.7%
Power, performance21.9%	Dodge10.6%	Ford or other Ford Co. make 6.4%
Roominess19.3%	Ford4.8%	Plymouth or other Chrysler
Trunk17.8%	Buick3.8%	Corp. make5.8%
Most-frequent complaints	Chrysler1.0%	How is dealer service?
None at all29.8%	Mercury1.0%	Excellent54.9%
Insufficient gas economy14.0%	Did consider buying a compact?	Average35.0%
Windshield too large12.3%	Yes, did consider28.9%	Poor10.1%
Poor workmanship, paint11.4%	No, did not consider71.1%	Would you buy from him again?
Had engine trouble?	What make?	Yes, would buy again58.2%
No trouble81.7%	Corvair36.4%	No, would not buy again9.1%
Some trouble17.1%	Falcon16.2%	No answer, don't know32.7%
Considerable1.2%	F-8510.1%	Car traded
What was trouble?	Rambler8.1%	Chevrolet or other G.M.
Carburetor4.7%	Comet7.1%	make64.6%
Stalling, missing, timing2.7%	Buick Special7.1%	Ford or other Ford Co. make 10.5%
Valve lifters, rocker arms2.3%	Valiant6.1%	Plymouth or other Chrysler
Best-liked exterior features	Tempest5.1%	Corp. make3.8%
Absence of fins, frills17.0%	Import5.1%	Next car will be
Smooth, sleek lines13.5%	Lark3.0%	Chevrolet52.8%
Least-liked exterior features	Lancer1.0%	Other G.M. make5.3%
Rear end10.5%	Considered compact of same price?	Ford Motor Co. make1.8%
Rear roof deck overhang5.0%	Yes, did consider26.8%	Chrysler Corp. make0.9%
Lights2.9%	No, did not consider83.2%	Other U.S. make0.6%
		Import0.6%
		Compact1.2%
		Undecided, don't know36.8%

"There is too much glass area to heat the car when the sun is shining."—Arkansas farmer.

"Windshield extends too far back on top letting glare into your eyes."—Minnesota executive.

"Too much windshield, sun shines in your eyes."—Mississippi acid worker.

In city traffic this tall windshield is a boon as it enables the driver to see overhead lights and signs. What this car could use is a full-width dark plastic sunshade that would slide down from car roof to screen out glare.

"Body work quite rough in places."—Washington college student.

"Over-all quality of the body has been cut down."—Georgia clerk.

"Car was not delivered in top condition. Doors, hood and trunk lid do not function properly."—California Army officer.

"Many body rattles, body work in general very rough."—Alabama systems engineer.

Once again the familiar, sad refrain. The first manufacturer to lick quality control problems for ten consecutive years will corner the market.

"Horn buttons (Impala) hard to find while turning steering wheel. This is dangerous in emergency situation."—Pennsylvania pharmacist.

"The horn bar (Bel Air, Biscayne) is poorly designed, in fact dangerous because

it catches the coat sleeve when turning a corner."—West Virginia chemical engineer.

Here the stylists ran amok, making a double goof in a single year. Deluxe steering wheel on Impala has tiny switch bars that are difficult to find except when wheel is in straight ahead position. The "standard" wheel has cross bar that's easier to find, but dangerously easy to catch sleeve in. Solution: the ancient, honorable and thumb-handy horn ring.

Now, let's shift over to the upbeat side and consider the best-liked features of the '61 Chevy ranking from 6th to 12th in order of frequency of mention.

"Good for family trips due to spacious rear compartment that's easy to load and unload."—New Hampshire serviceman.

"Good usable trunk space."—Texas public relations man.

"Lots of good clear unobstructed vision."—Pennsylvania route supervisor.

Here's the other side of that "windshield's too big" story. Frankly we'll take the Chevy's good vision and wear sunglasses and a cap to cope with the glare.

"Luxurious interior for considerably less than more expensive medium-priced cars."—Georgia farmer.

"Increased seat height, more comfort, nicely finished inside and out."—Idaho salesman.

"I like the '61 because it's less bulky, fits

(Continued to page 274)

Heavy duty Cable No. 0, 100' \$24.50, 50' \$12.95, R-1 300 amp. Gen. \$16.95, G-1 '80 250A New Cond. \$19.50 Good Cond. \$12.50

Accessories Kit For Arc Welder for above generators has helmet, gloves, elect. holder, volt reg. rheostat, RC relay, voltmeter, Gr. Clamp, including switch plus spined coupl. & G-1 Gen. \$26.50 Kit With G-1 160-250 Amp Gen. plus 30' cable & reactor coil \$34.95

Multi-Weld R., D.C. Arc Welding Kit Complete with G.E. R-1, 300-350 amp gen. incl. accessory kit, reactor coil w/solenoid control \$47.50

AC-DC WELDER KIT - 511 G.E. Generator. Makes 1250 Watts AC light plant and 200 amp. DC welder and battery charger. Includes all items listed in accessories kit. AC-DC generator & instr. \$38.50

V Belt Pulley Kit, fits all D.C. & A.C. gen. has 2 ball bearing blocks, 2 H.S. bearings 3V pulley, shaft 3/4" x 8" & Spl. fl. coupling \$17.50.

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Bore	Stroke	D. shaft	Len.	air/oil	
1"	1 1/8"	5/8"	6"	1 1/4 lbs.	\$ 3.25
1 1/2"	4 1/2"	1 1/8"	10"	3 1/2 lbs.	\$ 3.95
7/8"	2 1/2"	3/4"	24"	6 lbs.	\$10.50
1 5/8"	25"	1"	38"	11 lbs.	\$12.95
1 1/2"	8 1/2"	3/4"	13"	8 lbs.	\$ 7.95
2 3/8"	7"	1"	13"	7 lbs.	\$ 8.50
2 3/8"	13"-18"	1 1/4"	30"	11 lbs.	\$17.50
2 7/8"	16"	1 3/4"	33"	16 lbs.	\$18.95
2 1/4"	9"	1 1/2"	24"	12 lbs.	\$12.95
3 1/4"	11"	1 1/2"	20"	11 1/2 lbs.	\$19.75
3 3/8"	18 1/2"	1 1/2"	25"	9 lbs.	\$21.50
3 1/2"	8 1/2"	1"	20"	12 lbs.	\$15.75
3 1/2"	21 3/4"	1"	29 3/4"	15 lbs.	\$25.50
3 3/4"	16 1/4"	1 3/8"	24"	30 lbs.	\$35.75
4"	18 1/2"	1 5/8"	30"	30 lbs.	\$37.50
4 1/2"	48 1/2"	1 3/8"	16 1/2"	17 lbs.	\$18.50
4 3/4"	8"	2"	22"	35 lbs.	\$32.75

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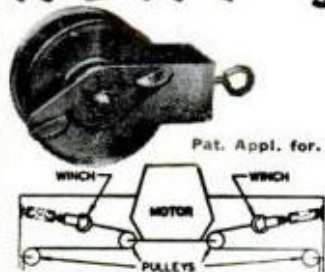
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better in our garage."—New Jersey housewife.

"Operates on a smaller amount of fuel than other eight-cylinder cars I have owned."—West Virginia retiree.

"I like the front seat legroom, it's easier to get in and out of than former models."—New Mexico merchant.

Most of these comments are votes in favor of the improved body design of the '61 Chevy as compared to the '59 and '60 models.

"I like the smoothness and quietness of operation."—Tennessee banker.

"The engine runs so smoothly you can hardly hear it."—South Carolina farmer.

PM's test Impala had a pleasantly low noise level at highway speeds with windows closed.

And now to balance the kudos, here are some additional complaints in order of mention from 6th to 12th.

"Too many body squeaks."—Pennsylvania creamery supervisor.

"The '61 body seems tiny compared to the 1955, '56 and '57 Chevys that I've owned."—Oklahoma merchant.

"Very poor seating, uncomfortable over 100 miles of driving."—Missouri airline employee.

This may very well be true for this man as Chevy seats, like those of many other cars, lack vertical and tilt adjustment such as six-way power seats provide. The industry needs a good, low-cost manual six-way adjusting system.

"Wells in floor of car collect water from melted snow."—Colorado salesman.

"Dislike step-down feature getting into the car and the step over the hump."—Missouri housewife.

"Big hump in the middle is very uncomfortable for person sitting in the center of seat."—Connecticut supervisor.

"The car is much too low for comfortable access or seating."—Delaware chemist.

"Not much headroom, little legroom in rear."—Massachusetts carpenter.

"Too low for a 6'2" man."—Kentucky production superintendent.

Such complaints add up to some pretty tough marketing and design problems. How can you make a car look stylishly low yet have adequate ground clearance, interior seating height and headroom and still find space for adequate frame structure and the driveshaft? The unitized body and rear-mounted transmission such as used on new Pontiac Tempest may be the next logical step for all carmakers.

To return to the brighter side, here is the final group of most liked items in order of frequency of mention.

(Continued to page 276)

Now you can see how thousands of home owners slash heating bills

with Iron Fireman CUSTOM Mark II oil furnaces and boilers

- drastic cut in fuel costs
- no smoke or soot
- service costs cut about 90%
- no chimney draft needed

What is VoluMetric Combustion?

It's an exclusive new method of oil firing that achieves 100% fuel combustion. Instrument tests show *no smoke or carbon residue*, even after a cold start. Thoroughly proved over a period of years. Now in use in thousands of homes and buildings—in many for as long as five years. *Users report savings up to one gallon out of three; some even more.*

Combustion Flow fan

Natural chimney draft is erratic, undependable. It is affected by the temperature of the chimney, the strength and direction of the wind, by nearby trees and buildings, and (most troublesome) by short modern chimneys. The Combustion Flow fan controls the air supply *accurately and automatically*. No more puffing fires or soot formation. CUSTOM Mark II units *create their own draft*. No chimney draft is needed. A vent pipe through the roof will do the job (local codes permitting).

Fuel and air injector

VoluMetric Combustion makes a clean fire *from the first split second of ignition*. At the start the combustion chamber is flooded with excess air to insure *100% fuel*

combustion. As the chamber warms up, the air supply is gradually diminished, maintaining maximum efficiency. A natural draft burner cannot make this adjustment. It must be regulated for top efficiency at operating temperature only. As a result it starts with an air-starved, smoky flame. With as many as 50 or more starts a day, about par in normal use, soot (which is nothing but unburned fuel), becomes a serious fuel waste.

A clean fire is more important than you think

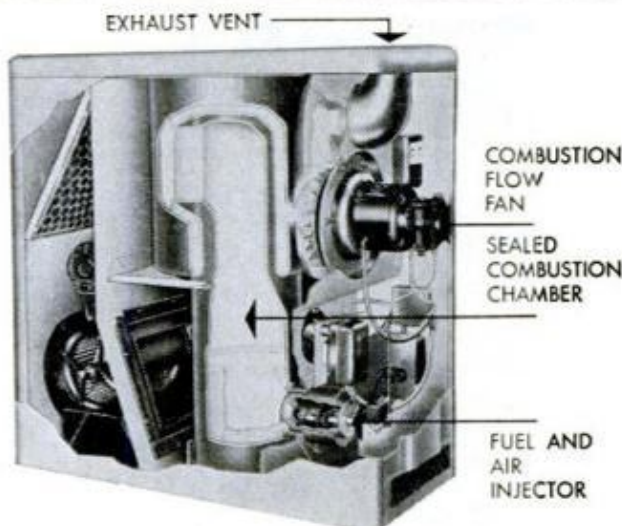
Smoke and soot are more than just a nuisance. At the end of the heating season your furnace or boiler has become far less efficient because an insulating layer of soot has gradually built up on the heating surfaces—the very surfaces you depend on to transmit heat into your home. Soot also causes about nine out of ten service calls, due to sooted flues, soot-fouled electrodes and car-

boned oil nozzles. CUSTOM Mark II VoluMetric Combustion reduces service troubles to almost nothing. No annual furnace and chimney cleaning is needed.

Conventional burners WASTE fuel AFTER THEY STOP

When the flame turns off, the chimney, flues and air ports remain wide open. Cold air passes freely through the furnace, carrying stored heat out the chimney. It's a *major* fuel waste. VoluMetric Combustion stops this "standby loss" in its tracks. First, the Combustion Flow fan, when it stops, becomes a damper that traps furnace heat. The heat goes into your home. Second, the sealed combustion system means that there is *no* infiltration of cold air through breather vents, draft regulator, observation port, or chinks around furnace doors. No other firing system has ever eliminated this serious fuel waste.

Mail coupon for further information, sent free.



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- CUSTOM Mark II furnace. CUSTOM Mark II boiler.
 CUSTOM Mark II horizontal furnace for commercial or home heating.

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Address _____

City _____ State or Prov. _____

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All-Purpose STAPLE GUN



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\$1250

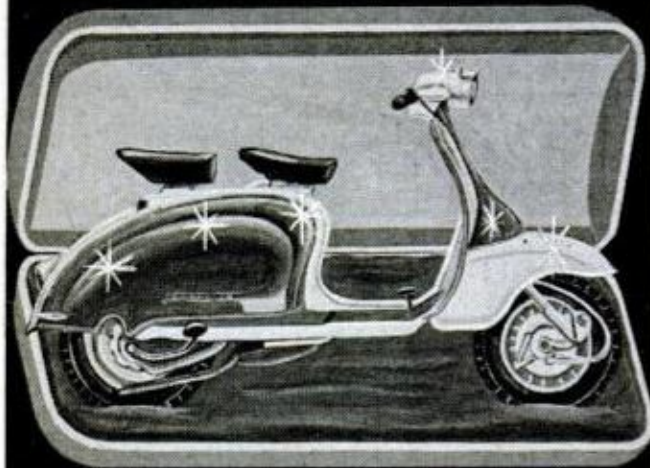
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- Install ceiling tile
- Install insulation
- Weatherstrip doors and windows
- Reupholster furniture
- Staple wire fencing to posts
- Repair window and door screens
- Fix loose wiring to floors, walls
- Replace worn window shades
- Tack down carpets
- Lay new linoleum
- Attach vines to trellis
- Affix plywood panels to walls
- Wrap and staple young tree trunks
- Line kitchen and closet shelves
- Hang drapes and curtains
- Make decorative cornices
- Cover valences with material
- Put up Christmas decorations
- Staple down building felt
- Quickly repair odd wood-working jobs

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- Large 3.50x10 wheels for greater stability and more comfort.

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Go **Lambretta**

Three models to choose from
Write for free 4-color brochure to:

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"Steering wheel has been lowered to make steering less tiring."—South Dakota music teacher.

"Easy to park, gives me more room in my garage."—Connecticut salesman.

"Positraction is great in mountains in the winter."—Vermont clerk.

Positraction, Chevy's limited slip differential can be a real lifesaver and it's cheaper than a good set of snow tires.

"A substantial amount of pre-servicing has apparently been done at the factory. This car has surprisingly few bugs."—Colorado treasurer.

Now here are a few final owner gripes running from 13th to 21st in order of frequency of mention.

"The doors fit very poorly."—Arizona field representative.

"Loose windows are noisy and leak occasionally."—North Carolina accountant.

"Wipers not long enough to cover the vast area of the windshield."—Virginia Army officer.

Rainy weather vision on PM's test car proved adequate, we felt.

"Loud air noise at end of windshield."—North Dakota foreman.

"Seems to me quality of interior treatment should be better on Impala."—Florida salesman.

"Steering wheel too close when seat is moved all the way forward to accommodate short drivers."—New Hampshire linotype operator.

A worthwhile device would be an adjustable steering column, but there aren't enough complaints to justify cost to manufacturer.

"Passengers in rear seat are cold even when heater is on high."—Vermont restaurant owner.

"Heater controls are too close to ignition switch."—Ohio school principal.

"For the price I think that Chevy should have included an oil filter on six-cylinder Biscayne."—Maryland letter carrier.

So do we.

"Still several inches too wide and too long, although far better than in '59."—Maryland clergyman.

Amen!

That winds it up. Owners of the '61 Chevy appear to be highly practical people with a definite inclination toward thrift. They are quick to spot the flaws in their cars, but seem to appreciate its solid virtues. For most it would be safe to predict that their next new car will be a Chevy.

★ ★ ★

WAR SURPLUS AND OTHER BARGAINS SAVE UP TO 90%

AIRBORNE ALL-PURPOSE ELECTRIC WINCH
Fully bearinged 3 HP motor with a reduction of 240 to 1. Will operate on 6, 8, 12, 24 or 32 V. Will lift up to 2 tons. Safety clutch set at 3 tons. Fully reversible. Adjustable hand brake and lock. Drum will handle over 500' of 1/4" steel cable or 5/8" rope. A terrific, compact power takeoff for beaching boats, etc. Will work off any battery within the range from 6 to 32 V. Cost of this unit is less than an installation for a competitive brand. Shpg. Wt. 150 lbs. Complete, ready to run (less cable). Dim.: 8" W x 34" L x 18" H. NEW, \$99.50.

ELECTRIC STORAGE BATTERY WINCH
Fully reversible with heavy-duty, 2-way drum switch. Heavy-duty motor, 150 to 1 reduction. Drum will handle 60 ft. of 1/4" cable. Can be operated manually by hand crank. Use on 6, 12, 24, 32 V. battery. Lift cap. 2000 lbs. plus. Complete with mounting flange, safety locking brake and leads. Ready to install & operate. Dim: 17" long x 9" wide x 7" high. For jeeps, trailers, boats, trucks, etc. Approx. GOVT. COST \$400. NEW, \$46.50

USAF FOOD WARMING OVEN—Terrific for boats, campers, shops. Can be used to warm canned or dry foods—keeps warm for hours. Low amp. draw. Two sep. elements will work on 12, 24 and 32 DC and 110 AC. Therm. set at 225°. Portable; hand-carrying handle. Fiberglass insulated. 10 1/2" H x 8 1/4" W x 9" deep; 2 sep. shelves. Approx. GOVT. COST \$135. Shpg. wt. 12 lbs. NEW, complete with matching plug & cord—ready to use—\$12.95.

WOOD PROPELLER Genuine rock maple radio drone "prop." Perfect for den, trophy room, boy's room. Smooth, highly varnished 26" tip to tip. Clock, baremeter or photo can be inserted easily into center (mounting holes provided). Pusher type, can use to operate ice sleds, etc. Approx. GOVT. COST \$57. NEW, \$4.95 ppd.

ELECTRIC PUMP WITH CONTROL UNIT
Runs on 12 or 24 V. Centrifugal type. Draws 5.2 AMPS. Has built-in removable filtering screen. Great for bilge, circulating or sump pump... bait tanks, etc. Pumps 500 GPH. Complete with variable control rheostat. Explosion-proof motor. Mfd. by Ingersoll-Rand. Shpg. Wt. 7 lbs. Approx. GOVT. COST \$195. NEW \$8.95.

AUTOLITE DC GENERATOR Terrific gen. for arc welding, battery charging or wherever DC power is required. Low 2275 RPM. 140-200 Amp. Approx. GOVT. COST \$350. NEW, factory boxed, \$17.95.

BUILD YOUR OWN ARC WELDER, LIGHT PLANT OR BATTERY CHARGER \$37.50
Kit incl. 1 Navy NEA-5 Gen. combination AC-DC type. AC 115 V. DC 24 V., 200-300 Amps. 2 complete generators in 1, yet no larger than reg. gen. Ideal for home, shop and farm lighting plants. Delivers 1200 Watts AC, DC side for charging batteries, welding and operating war surplus motors. Also in kit: 2 Voltage Regs., AC & DC, Reverse Current Relay, 30' New Welding Cable, 1 Ammeter, Rheostat, Electrode Holder, Toggle Switch, Welder's Shield, Wiring Diagram for kit. Wt. under 100 lbs. Approx. GOVT. COST \$650. Kit—\$37.50. Navy NEA-5 Gen. as above, purchased separately, \$23.50.

"SUPER 9" 200 AMP WELDING KIT With Deluxe accessories consisting of one 200 AMP. Gen., adjustable helmet, electrode holder, ammeter & shunt, rheostat, giant toggle switch, voltmeter, voltage reg., 1 pr. heavy-duty welder's gloves and 30' cable. All units guaranteed pre-tested. Approx. GOVT. COST \$500. Most items new—all perfect. \$27.50.

HEAVY-DUTY CABLE—Size No. 0. Four layers insulation. Fiberglass jacket. Use as positive and negative electrode cables for arc welder. High amp. rating, late government spec. Approximate GOVERNMENT COST \$40. 50' lengths—\$14.50.

140-1 REDUCTION GEAR For beaching boats, winches, hoists. Ideal motor in golf or boy's electric car. DC motor & clutch. Easily reversible wiring diagram furnished. Hi torque, 105 RPM. Runs on 6-12 or 24-32 V. 65 lbs. gross. Approx. GOVT. COST \$300, \$12.00. Matched splined gear—\$3.00 ea. *225-1 Reduction Gear—\$13.50.

CHROMOMETRIC TACHOMETER Built to U. S. Navy & Air Force specs. Jaeger Watch Co. For counting revolutions per min. of any rotating shaft. Can be used on speeds up to 10,000 RPM. Accuracy to 1/10 of 1%. Complete with male and female tips and leatherette hand case. GOVT. COST \$87.50. LIKE NEW. Only \$19.95 ppd.

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Ships Get 3-D Radar

U. S. NAVY cruisers and destroyers armed with missiles are now being equipped with lightweight radar systems capable of pinpointing simultaneously three target dimensions—range, bearing and altitude.

Conventional radar systems usually require combinations of several antennas, transmitters or receivers for three-dimensional information, plus heavy mechanical gyro-stabilizing equipment to compensate for pitch and roll of a ship. The new Frescan (pronounced free-scan) does not. Single antenna, left, does all the work of detecting instantaneously the range, bearing and altitude of supersonic targets.

Electronically stabilized, Frescan can pitch and roll with the ship and still function, thus eliminating the need for heavy gyro equipment. Its target information is relayed to radar scopes in the combat information center, above. Frescan was developed by Hughes Aircraft Co.

Probe Human Body's Method Of Regulating Its Temperature

Research is underway at the University of Michigan, Ann Arbor, to clear up one of the mysteries of human life—the way the body regulates its own temperature. The secret appears to lie mainly within the hypothalamus, a small region deep in the brain which seems to function as the body's thermostat, according to Dr. Madeline M. Fusco, who is probing the problem under a grant from the U. S. Public Health Service.

The hypothalamus, she says, contains some sort of "thermostat which maintains body temperature within very close tolerances. It governs those bodily activities which maintain a balance between heat production and heat loss.

If body temperature goes up, the hypothalamus triggers a pattern of responses—sweating, rapid breathing and increased blood flow to the body's surface—to discard heat from the body. If the temperature drops, the hypothalamus turns up the system that converts food into heat; it reduces blood flow to the surface and starts muscles shivering to create still more heat, she says.

A network of nerves provides temperature detectors through the body. They respond to changes in the internal and surface temperatures and carry this information to the hypothalamus which then orders the proper response.

Muddy Mixture of Chemicals Seals the Bottoms of Ponds

A mudlike chemical compound called SS-13 is being applied to the bottoms of ponds, reservoirs and irrigation canals to help them hold water. The U. S. Bureau of Reclamation estimates that as much as 50 percent of water channeled to irrigate crops seeps into the sides and bottoms of canals and reservoirs before it has a chance to do its job. To find a way to drain the last life-giving drop of water onto crops, the bureau is, among other things, testing SS-13. In one test, along a two-mile stretch of canal in Arizona, the bureau found that application of the compound cut a normal loss of 950,000 gallons of water a day to a loss of 380,000 gallons. The cost of pouring in SS-13, on the average, is 15 cents a square yard, compared to the \$3.00 and up charged for laying in a square yard of concrete.

Developed three years ago and sold by the Brown Mud Co., SS-13 is described by its developers—George Brown and Harlan Glenn—as a "mixture of resinous polymers and heavy atoms in a carrier of common diesel fuel."

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2000 PSI HYD. CYLINDERS
Engineered for earth moving equip., lift gates, presses, agricultural equip., lift assemblies, industrial machines, etc. Ideal for backhoes and front loaders.

Part No.	Bore	Stroke	Eye-to-Eye Lgth.	Shaft Dia.	PRICE
H-70A	2-1/2"	8-3/8"	18-3/4"	1-1/2"	\$9.88
H-70E	2-1/2"	30"	40-1/2"	1-1/2"	24.88
H-70G	3-1/2"	8"	19"	2"	17.88
H-70L	3-1/2"	43 1/2"	55-1/8"	1-3/4"	44.88

HEAVY DUTY
SAVE 82%

Part No.	Bore	Stroke
H-70A	2-1/2"	8-3/8"
H-70E	2-1/2"	30"
H-70G	3-1/2"	8"
H-70L	3-1/2"	43 1/2"

SPECIAL AIR TANKS
G-1 TANKS - Stainless steel. Tested to 400 PSI. 12 1/2" x 24". 1/4" ports. Used - **11.95**
NEW G-1 Tanks **15.95**

F-1 Stainless Steel TANKS - 500 cu. in. capacity. Size: 10" x 18" . . . \$ **10.95**

Stainless Steel J-1 AIR TANKS - Size: 24" x 45". Capacity 18000 cu. in. **\$95.00**

1500 PSI Dbl. Action HYD. CYLINDER
Has 2-3/8" bore, 19" stroke, 1-1/4" shaft, 30 1/2" lgh. Gov't cost approx. \$75.

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No. H-53AU - USED . **12.75**
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1500 PSI HYDRAULIC CYLINDER - Has Bore of 3-1/2", Shaft 1", Stroke 21-5/8", Length 29-3/4". Parts are 3/8" AN (9/16"-18 thread). **29.75**
Cat. No. H-27-ASU NEW . . .

1500 PSI - Double Action CYLINDER
Bore 2-3/8", Stroke adjustable from 7-3/8" to 9-5/8", Shaft 7/8", eye-to-eye length is 20".
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Double Action Hydraulic Cylinder. Will stand 2000 PSI. Steel barrel. Ideal for hydraulic press. Has 2-1/2" bore, 7" stroke, 1-5/8" shaft, 19" length. Catalog No. H-24D **9.95**
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A spring loaded, poppet type valve. Pressure balanced. Off in neutral. Has 1/4" tube ports. Cost Gov't approx. \$30

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Drives through a 6-gear train that rotates on self-lubricating, high speed roller bearings. Has 180° offset drive. Take-off shafts are 1-1/4" and 3/8" diam. **9.95**
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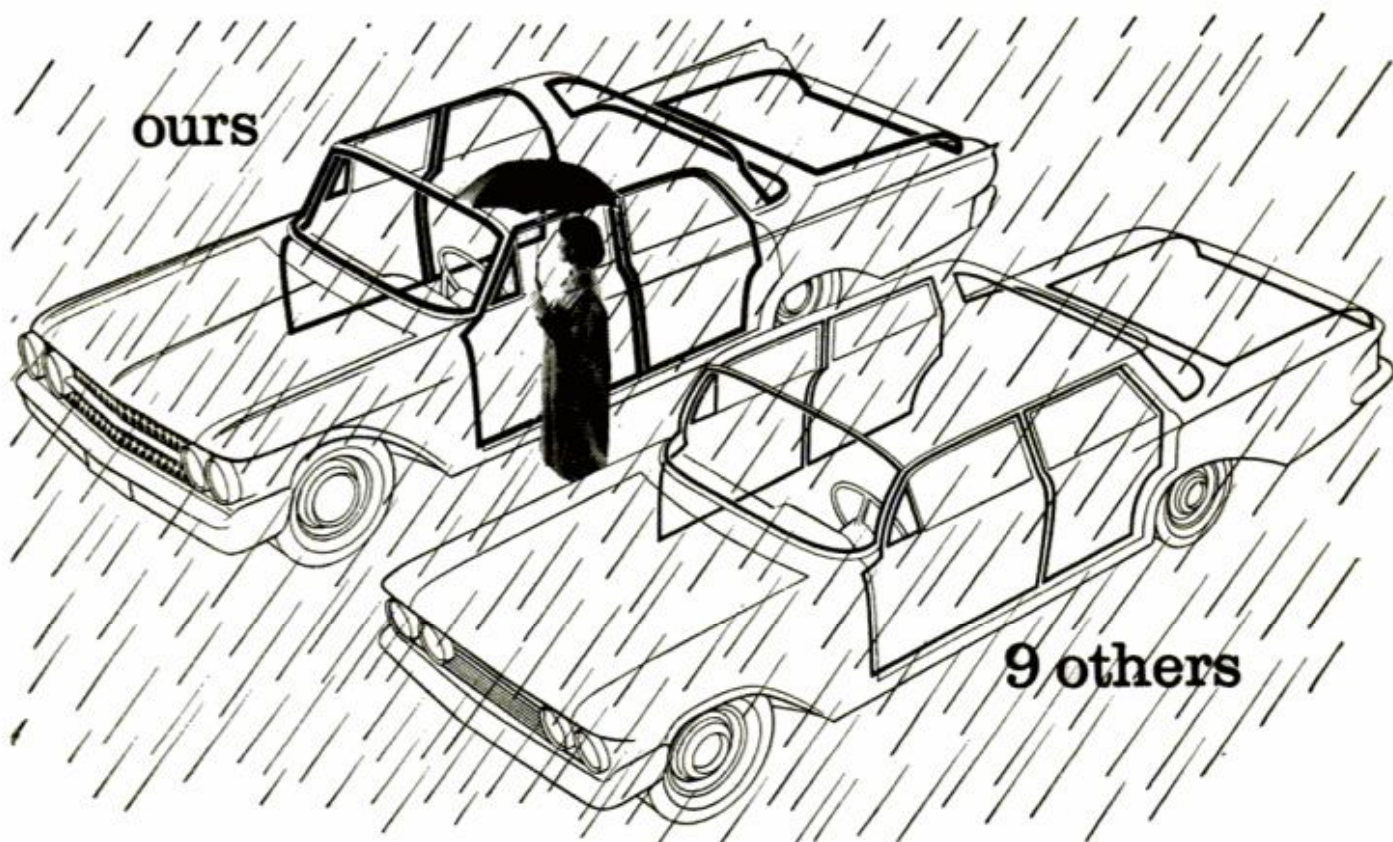
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the ride is the extra sound insulation. We use more than other manufacturers use in comparable cars. In the Mercury, for instance, we use over 65 pounds of sound and weather insulation.

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