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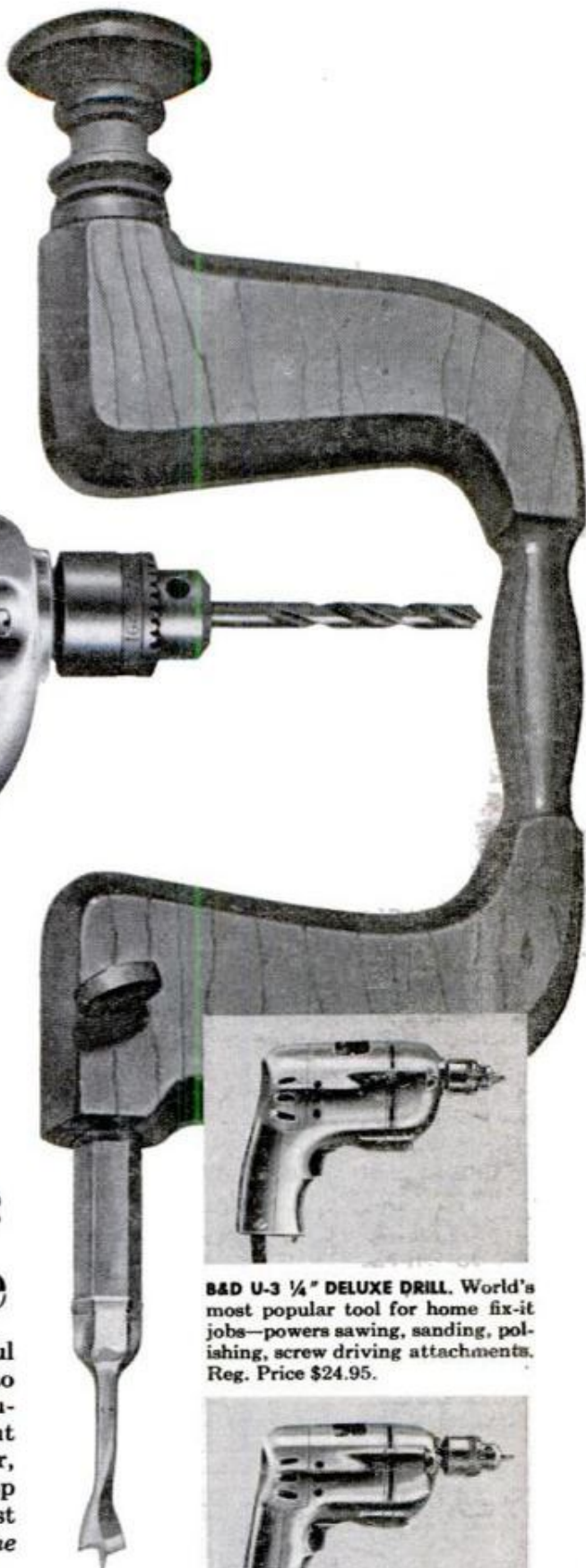
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Next Month...

SEE SOME of the most fantastic photographs ever taken—a bullet stopped in flight, an atomic bomb at the instant of detonation, a golf ball flattened at impact. . . . Also in August, veteran Rambler owners tell what they think of the new compact cars, and a PM editor, on the eve of the Olympics, explains the reasons behind the rash of broken records in track and field events

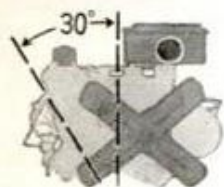
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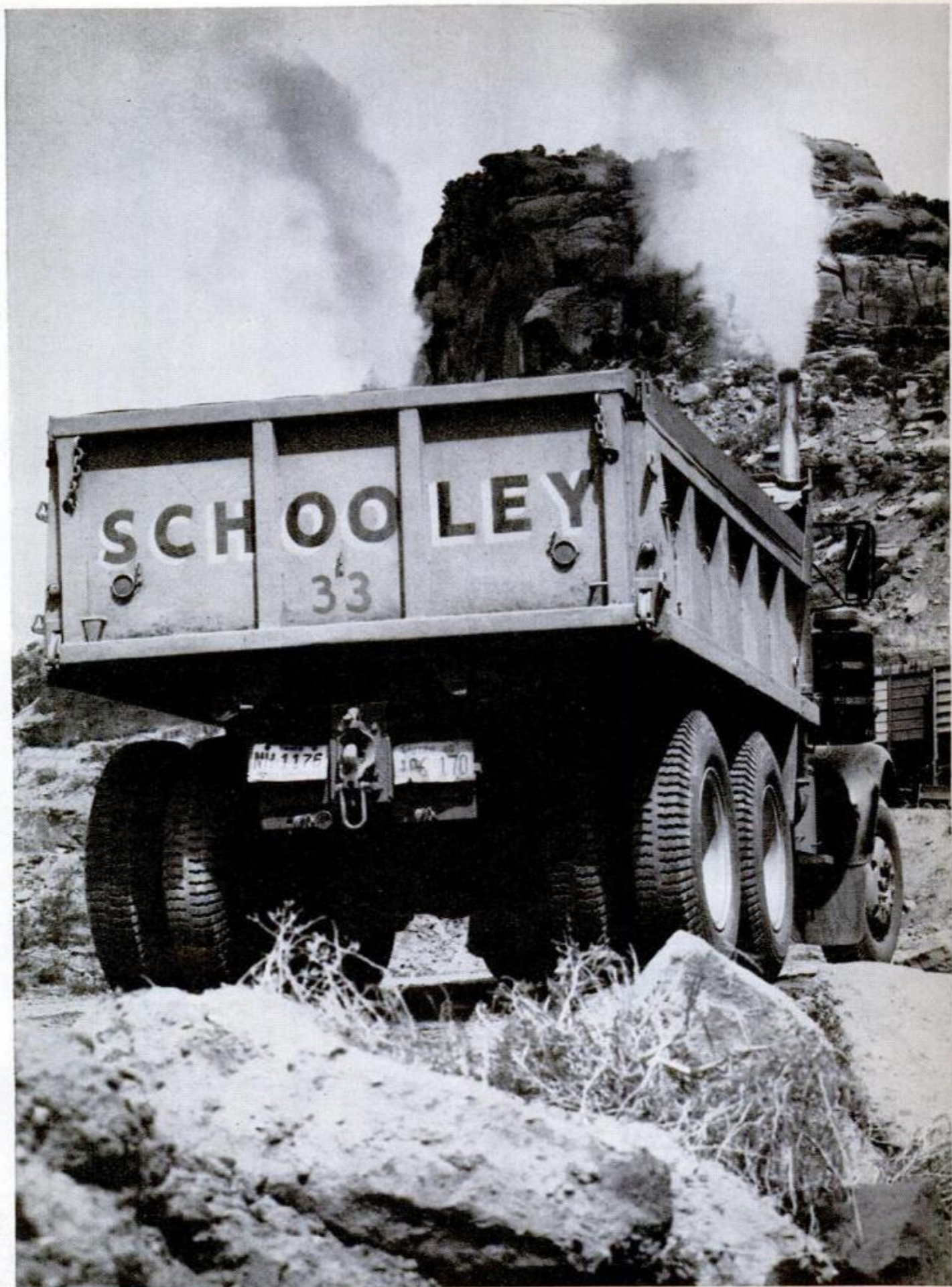


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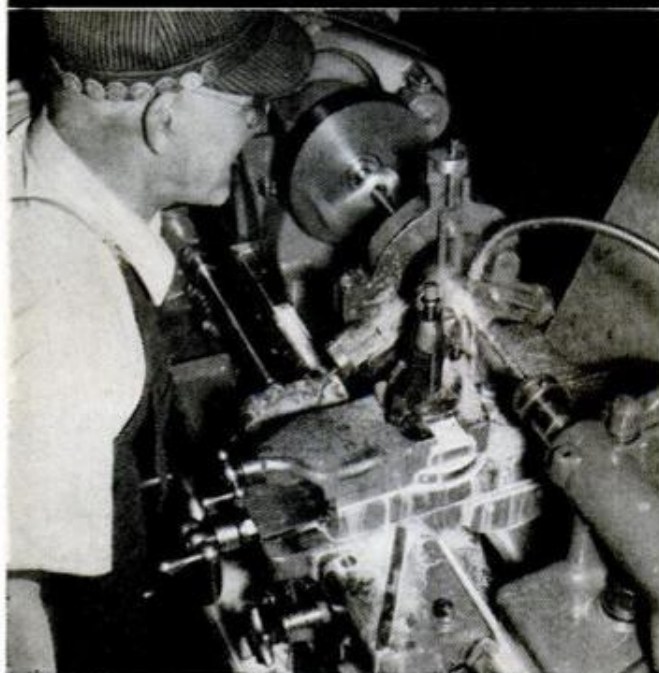


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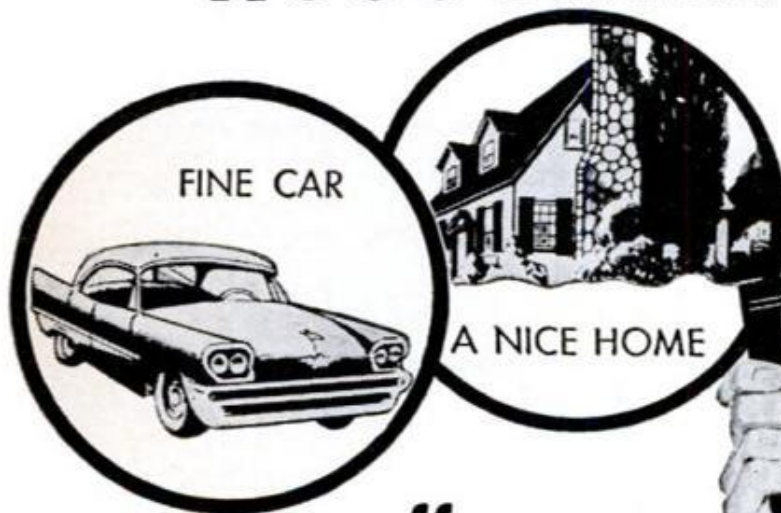
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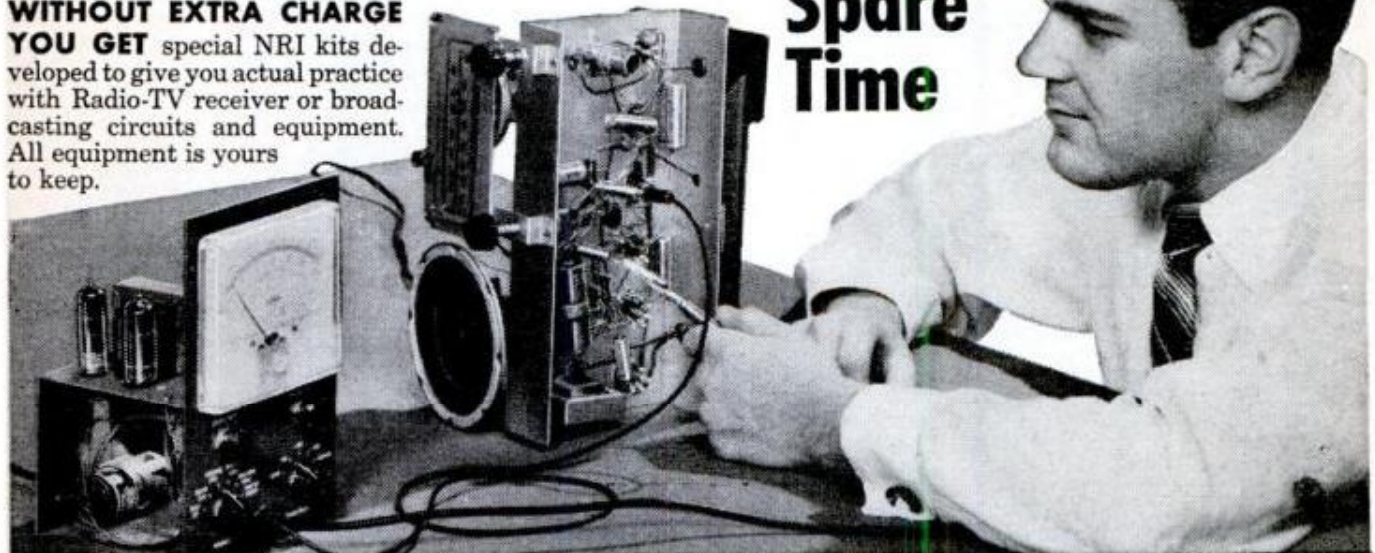
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect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

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Over the Editor's Desk



To the Editor:

I thought you would be interested in this model of a beautiful funeral coach which used to serve this locality. I have taken great pains to reproduce it as near like the original as possible, however all I had to



build it by was old photographs. The wheels have metal hubs and are held on by tiny burrs; the lights, handles on casket, railings, hames and buckles, etc., on harness are made of silver. It took me about 60 days to gather photographs, data, etc., draw the plans and build the model. The horses are made of soft pine. This model won a trophy at the State Fair.

Lyndon J. Graham
Fairview, Utah

To the Editor:

Travelers atop the Montana Continental Divide on U. S. Highway #10 where it crosses the Divide via MacDonald Pass are sometimes startled by the sound of a bear's roar, reverberating dramatically over the lonely landscape. The roar emanates from an animated group depicting a trapped grizzly bear harassed by a dog and trapper.

Constructed by resort owner John Quigley to advertise his unique "Frontier Town" atop the Divide, the group is mounted on



a concealed trailer for storage during the winter season when snow here lies many feet deep. The bear, paw in trap, roars frightfully and the little dog leaps frantically up and down. Sound comes from a record and P. A. system inside the base, activated by battery power, which also provides power for the mechanism for action.

Eric Thane
Helena, Mont.

(Continued to page 14)

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To the Editor:

Upon reading the automotive section of the January issue I note a statement which applied to the Thunderbird, page 161, which read "the first sliding sun roof on an American car as optional equipment."

However, I am of the opinion that this is not a T-Bird first, for to the best of my knowledge, Cadillac offered a Sunshine Turret top on its 1939 Series 60 Special sedan, and Series 61 4-door sedan. A similar panel was, I believe, offered on the 1939 La Salle Series 50, 2-door and 4-door sedans. The cost ran around \$40.

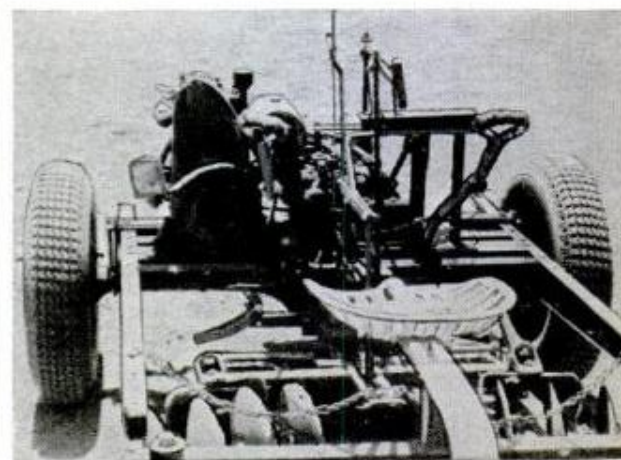
I enjoy your magazine a great deal and have been a faithful reader for many years.

John Kulik,
Cicero, Ill.

☆ ☆ ☆

To the Editor:

The enclosed picture shows a merry-mix-up garden tractor made of one old Dodge automobile transmission, one Harley-Davidson motorcycle transmission, one Briggs & Stratton 3½ hp. air-cooled engine for power plant. The master drive is an Olds 88 rear end with wheels and tires mounted; this unit not only serves as the main drive but also for steering by locking or slight braking of either right or left drive wheel,



using for this a Chevy master cylinder mounted on right and left of operator's seat. By locking either side one can pivot in tracks. The tractor has nine forward speeds and three reverse. Mounted in the picture is an Oliver disc plow, or it will take just about anything one wants to hang on. No steering wheel, leaving hands free for lever work. Drive between units, three Duckworth motorcycle chains. Small air-tired wheels in rear are caster-mounted to allow for quick turn arounds.

Hugh McDaniel
Venice, Calif.

(Continued to page 16)

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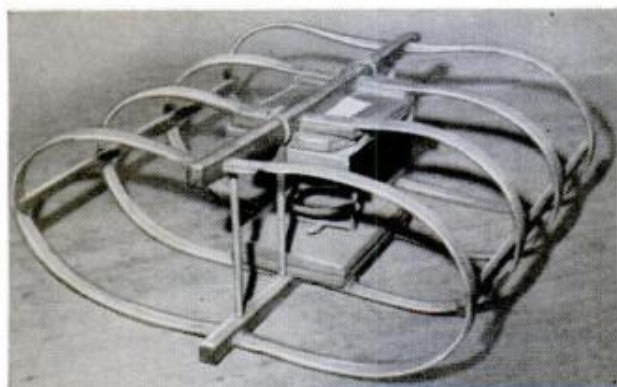
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To the Editor:

Of increasing interest and rarity, a by-gone and curiosity, this bed-warmer is in Wilmington Priory, Sussex. To use this,



the bottom metal tray was covered with glowing embers, the contraption placed in bed and covered with bedclothes, the curved wooden ribs holding off and preventing the clothes catching fire.

J. Higham
 Sussex, England

☆☆☆

To the Editor:

Enclosed is a picture of the 1914 Stutz Bearcat I built for my daughter Lynn. The car is built to ½-scale of the original sport car. It has an automatic clutch, 6-volt light system, *ah-ooo-gah* electric horn, switch



key for the ignition, gas pedal, emergency brake, rubber-covered running boards, honeycomb copper radiator, Alemite fittings on every moving part for lubrication, and is powered by a 1½-hp. Briggs and Stratton engine. I worked on the car a few hours each Saturday for a year.

Russell W. Smith
 Norfolk, Va.

☆☆☆

Nike Protects Speeders:

It was recently disclosed that radar at a Cleveland Nike site not only protects the city from air attack but also protects speeders, on an adjacent highway, from arrest.

Beams from the giant radar interfere with police speed meters enabling speeding motorists to escape detection.

John A. Marotta
 Euclid 23, Ohio

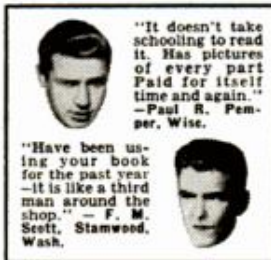
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Spotlight on the

VW Microbus

By Art Railton

GOT A BIG family? Like to tour? If you answer "yes" here's a machine built to order.

It's the Volkswagen Microbus—a vehicle so roomy that a family of six rattles around in it and wonders where everybody went.

People may rattle around in it, but that's all. This solid body, unlike some wagons, is as rattle free as the VW sedan—and that's saying something.

This is the only car in which the driver gets lonesome while traveling with four children. There's so much room in it that the front seat is usually deserted (except for the driver, that is). If you've ever gone touring with four children (bless them!) you'll know how ecstatic loneliness can be on such occasions.

But wait. Before you rush out and trade the family sedan for one, let's look at its disadvantages. Right off, you'll notice the problem of getting into the front seat. The second and third seats are easy to enter, but not the front seat. Of course, if you're nimble and athletic, it's a cinch. But short-legged folk (especially tight-skirted varieties) find it virtually impossible.

Once in, you are lord of all you survey—and you survey plenty of territory. Sitting high and forward, you have visibility that beats a pedestrian's. The steering wheel (big and easy to turn) is almost horizontal atop a nearly vertical steering post. Within 10 minutes you'll be whipping the nimble machine through traffic like a kid on a scooter. The steering-wheel angle takes

(Continued to page 20)



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some getting used to as does the upright, church-pewish driver's seat.

How does it ride? Up front, the ride tends to be choppy. On concrete or smooth blacktop, the ride is excellent, but on a choppy roadway, you'll bounce a bit.

Riders in the other bench-type seats, however, enjoy Pullman-car luxury. Chair-high seats give as much comfort as you'll find in any car—more than in most. There is plenty of squirming room for long trips and sitting upright as you do, you don't feel as if you've been training for a space-capsule flight at the end of the day. Having driven these machines for 20 continuous hours on several occasions, I can discuss this with some authority.

In case you're beginning to suspect that the writer has a prejudice for this loaf of bread on casters, you're right. And with reason. My wife and I and our four children have covered thousands of enjoyable miles in these buses through the years. To our family, the Microbus is as comfortable on long trips as a Pullman bedroom. The kids, ranging in age from 12 down to 5, look upon this machine as a home on wheels and sleep better in it than in their own beds.

Here (offered as an aside) is one way for large families to travel long distances economically and without parental breakdowns. Bed the kids down in the bus (they sleep on the floor, on the seats and on the luggage shelf), a separate bed for each (including Mother), and drive all night. Mom and Dad take turns sleeping and driving. You may not go fast, but you go far and without feuding. Everybody still loves everybody else at journey's end!

What could be simpler? Or more economical. The bus, driven at about 55 miles per hour, averages 23.9 miles per gallon. On one vacation trip of 1844 miles, including about 200 miles of mountain driving, the over-all average was 22.3 miles per gallon. In a city-traffic test of 20 miles with four stops per mile, the bus went 23.7 miles per gallon.

This 1960 VW bus has a new engine and transmission, not yet available in the sedan models. The gearbox is fully synchromesh, including first gear. The throws are short and crisp. You can flip it into first gear while crawling along at five miles an hour without any gnashing of teeth.

At highway speeds, the interior is as quiet as a Cadillac. The engine is so far to the rear and so well insulated by the body that nothing gets through to the riders. You get the feeling you're in a sailboat.

Speaking of the wind, it's something you have to live with in this bus. Sitting up in the air like a shoebox, the bus is susceptible to wind. Headwinds reduce top speed

and gas mileage, tailwinds boost speed and mileage. Side winds buffet a lightly loaded bus considerably. Fully loaded, the bus is not bothered by wind wander much, but when empty it's a problem.

There are three bench-type full-width seats. On the right side, there's a double door which permits passengers to get in and out easily. There is no rear-seat entry on the driver's side. Optional is a split front seat that allows you to move from the front to the back without climbing over the seat. At the rear is a wide, carpeted luggage shelf on which the youngsters love to ride and sleep (right above the engine, the soothing purr seems to mesmerize them and touring parents couldn't ask for anything more).

None of the seats folds. None adjusts (an annoying disadvantage in the case of the driver's seat). The two rear seats are easy to remove and once they are out, you can haul a spinet piano inside (if you have any need for hauling one around). The middle seat can be turned around to face rearward (breakfast-nook style) if you want to get up a hand of bridge.

Over the windshield is a vent to bring in air. Thus you can drive with all windows closed. The heater (included in the price) keeps rear-seat passengers cozy, but the driver may have cold feet. Wipers are slower than they should be, but being electric, although slow, they are constant.

Ground clearance is unbelievable. It has 9.4 inches of clearance and will go just about anywhere you can push a wheelbarrow. It's great for those backwoods roads. Having very low gearing, it climbs like a mountain goat.

How much? It comes in various models ranging from the plain, comparatively glassless model at \$2245 to the fancy, glass-house, slide-back roof model (such as shown on page 18) that lists at about \$2650.

The engine is the regular VW air-cooled, four-cylinder rear design. However, the bus uses a new version of it. Displacement and power are the same. Reduction gears at the rear wheels give the extra power needed. Gear shifting is so easy, so pleasant, you'll wonder who thought an automatic transmission was necessary.

Altogether, this is as practical a car as you can imagine. But it has such limitations (including the psychological—after all, you do feel like a shrunken bus-line operator driving one) that you should get well acquainted with it before buying one. If you can adjust to its limitations, you'll have the most satisfying, most useful, most versatile machine you ever owned. It will give new dimensions, new horizons, to vacation touring with the family. ★★

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POPULAR MECHANICS

By James Biery

THE MOON'S SURFACE, which sometimes looks like a mass of cliffs, is probably no more rugged than that of the earth. This conclusion was reached at the Air Force's Cambridge Research Center in Bedford, Mass. Scientists there have been studying photographs made of the moon during the past two years with a new technique in lunar photography.

In several observatories throughout the world, timing instruments moved telescopes so cameras could record the march of shadows from various prominences across the face of the moon. Charles Campen, program director, says the pictures indicate that "steep slopes of towering rock faces are absent from the lunar surface," although there might be some exceptions.

A MOON ILLUSION that has baffled astronomers for almost 2000 years — the way the moon looks larger on the horizon than overhead — has apparently been explained by two curious psychologists, Dr. Ervin Rock of Yeshiva University and Lloyd Kaufman, psychologist at the Sperry Gyroscope Co.

Their explanation, at first, seems to be contrary to good sense: Terrain or water between an observer and the horizon makes a low-hanging moon seem far away in comparison with the overhead moon, which is seen against an apparently flat, featureless background of sky. Good sense or not, this would make the overhead, or zenith, moon seem smaller, though it is perceived as being closer than the horizon moon.

Though the reason for this is not understood, scientists have long known that objects are usually perceived as having a constant size regardless of the variations in distance.

We see the moon as the same size in either position and perceive it as larger on the horizon by compensating for what seems to be a farther distance.

MORE MYSTERIES about the heavens will be unraveled when a new international astronomical center opens in the mountains of Chile. It will be the most powerfully equipped in the Southern Hemisphere. The telescope, for example, will be a 59-inch reflecting Schmidt, which can record stars of the 21st magnitude. ★ ★ ★

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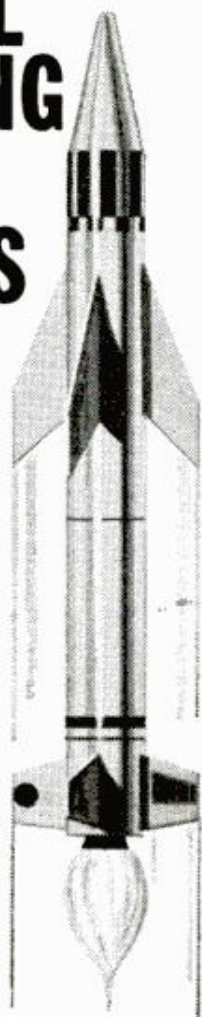
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Sidelights from **the PENTAGON**

By William R. Kreh

THE JET AGE is catching up with that time-honored GI institution—the dog tag. Future servicemen may wear tags that resemble department-store charge plates.

The newly designed tags are now being test-worn by a few Marine Corps units. They contain up to 22 lines of information—everything from the usual name, rank and serial number to age, date of enlistment and even a photograph and signature of the serviceman.

The services believe the new dog tags should cut down on paperwork, since the information on them could easily be printed on routine lists and official papers.

The Navy's guided-missile cruiser *USS Canberra* set some sort of a "first" recently. She launched a missile that hit its target the day before it was fired!

It happened when the *Canberra* was crossing the Pacific near the International Date Line. She fired a Terrier from west of the line and the missile hit its target east of the line. The missile was actually shot on Monday and hit its target on Sunday!

The Army is studying a pill that may protect its fair-skinned soldiers from sunburn. Tests on albino mice have been successful.

The Air Force predicts that space vehicles will be lined with rubber padding so that weightless passengers, when not tied down, will bounce off unharmed. A new substance, Ensolite, tested at Wright-Patterson Air Force Base, Ohio, is so resilient that a raw egg, dropped from 14 stories, bounced off uncracked.

Utah's Army National Guard is issuing bows and arrows to its fighting forces. Maj. Gen. Maxwell E. Rich, Utah Adjutant General, says

(Continued to page 30)

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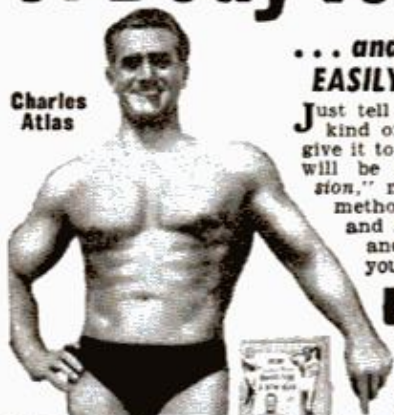
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—space age to the contrary—that "Unconventional warfare demands unconventional weapons." He explains that archery-trained units could be dropped behind enemy lines to organize guerilla fighters. Best weapon for the job, he says, would be the medieval, but silent, arrow which has an effective range of 300 yards.

The Navy's antisubmarine aircraft carrier USS *Bennington* is still unwinding. She has to.

The *Bennington* recently spent 40 straight hours making 308 left circles within a 2000-yard area. The purpose was antennae-radiation tests which required the ship to remain within a one-mile circle so that the radiation patterns could be calibrated.

It's reported that her crew had a persistent list to port when the ship finally straightened out.

The Navy has turned a new weapon loose in the war on insects—the 500-mile-an-hour jet.

At Jacksonville, Fla., they've been experimenting with jet planes to spray insecticides. Not too practical for peacetime use, the jet might have to be used in combat areas to control disease-carrying insects. Slower propeller-driven planes and helicopters would be too vulnerable to enemy attack. The jet, at close to supersonic speed, can fly at 150 feet and spray 300 gallons of insecticide per minute.

A Marine Corps recruiter, S/Sgt. Louis Manter, has patented an "oil-condition indicator"—a device that fits on an auto's dashboard and shows at a glance the condition of the engine oil. The instrument has two transparent tubes. One contains new oil and the other is connected to the car's oil system. Lights allow comparison of the oils.

The Air Force has put together a new, miniature cold-weather survival kit that will allow aircrew members who are forced to bail out to survive for nearly two days.

Compact and tight, the kit contains twelve matches, three fire-starter pads, one button compass, a needle, two fishhooks, a small knife, three water-purification pills, one Band-Aid, a small water container and three safety pins. The kit is stored in the parachute pack and attached to a riser.

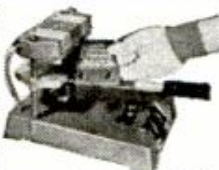
During tests, one man survived for 41 hours in temperatures below 10 degrees.

The Naval Ordnance Laboratory discovered a new use for golf balls—to break up lumps of explosive mixtures in blender machines. It replaces a slower, and more dangerous, method of sifting the mixtures through screens. ★★

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Not only will employment opportunities grow in existing fields of Electronics, but many new areas of electronics work are expected to develop in coming years. This will create an unmeasured additional demand for skilled technicians and servicemen.

The advent of color television will do much to intensify the need for technicians and servicemen during the 1960's. It is expected that great numbers of color sets will be installed in the coming 10 years, and the fact that these sets will be, initially at least, considerably more complicated than black and white receivers will open up additional opportunities for highly skilled, specially trained television servicemen.

Electronics service and repair is a rapidly growing field with excellent employment opportunities for skilled workers who have an understanding of electronic principles.

Among the jobs in this field are radio and television repairman, broadcast technician, radio and radar operator, and electronic data machine serviceman. There are also an increasing number of openings for electronic production work in major industries, and highly-trained technicians are needed to assist engineers in the design of electronic systems and equipment for use in manufacturing, guided missiles production and aircraft work.

Salaries available in this field rise proportionately with a man's experience. In 1958, for example, experienced men in specialized electronics jobs were earning about \$10,000 a year, exclusive of overtime. In 1958, most radio and television servicemen earned up to \$130 per week.

Technicians who worked with companies manufacturing electronic equipment in 1958 were paid up to \$3.00 an hour with ample possibilities for overtime, especially in aircraft, military and commercial manufacturing plants where complex production schedules were required.

Also, it is often possible for technicians holding production jobs in manufacturing to repair television and radio sets in their spare time, and in this way, add a substantial amount to their income.

Therefore, not only do electronics technicians and repairmen earn far above average incomes, but as they accumulate additional knowledge and experience, they have the opportunity to earn greatly increased salaries by becoming specialists in the more complex electronic equipment that is becoming more and more a part of today's industry.

If you are interested in electronics, you should investigate this type of work, not only because of the opportunities that exist at present, but because even greater income potentials and an even larger number of job openings are being predicted for coming years.

How would you go about training for this field of employment? First of all, you should have an understanding of the basic principles of electronics in addition to a certain amount of practical training and experience so that you can specialize in a particular phase of the industry.

Most training authorities recommend a one or two-year course in electronics at a good technical school or institute as the best preparation for a high-level electronics job. These technical institutes provide classroom and workshop instruction in the fundamentals of electronics and often make night courses available so that you can continue your present full-time job.

Another good way to learn fundamentals is through correspondence training. Some institutes offering correspondence training in electronics even provide testing equip-

ment for their students' use at home, and the cost is included in tuition. This type of training has the advantage of letting students set their own classroom hours so that full-time jobs can be held while a course of instruction is in progress.

Because so many new developments are taking place in the field of electronics, workers must continue learning new techniques throughout their careers. Technical school courses, correspondence training, and manufacturer-sponsored training programs provide the training you need to take advantage of the extra income offered by more highly technical jobs.

The fact that employers often prefer technical school graduates for high-level electronics jobs doesn't prevent men who are just starting out from progressing to more highly skilled positions. Correspondence training and night technical school courses let you learn new skills while you are getting practical experience in your beginning electronics work.

It might be well for you to investigate the opportunities for valuable training and work experience offered by the Armed Services. Since World War II, Armed Forces technical schools have helped thousands of men qualify for well-paid civilian electronics jobs.

Because of the changing nature of our

Armed Forces, greatly increasing quantities of electronic equipment are being used. In 1958, more than a quarter-million members of the Armed Forces were engaged in operating and maintaining electronic equipment. More than 100,000 of these men specialized in the maintenance of such equipment as radar, guided missile controls, radio, and fire control instruments.

Obviously, if you are of service age, this is worth looking into because of the excellent training and experience you will receive while you are undergoing your service obligation.

As increasingly complex equipment comes into wider use, there will be more and more demand for highly-skilled and specialized electronics technicians who will be needed to keep this equipment in top operating condition.

This means there will be expanded numbers of jobs with upper-range income qualifications. More and more technicians with advanced training and specialized skills will have the opportunity to earn \$10,000 and over per year.

If your interests lie in this area, you should take steps to profit from this interest by looking into the training that is available. For further information write Skills for America, Popular Mechanics, 200 E. Ontario Street, Chicago 11, Illinois.

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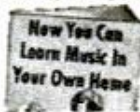


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**Great Pioneer in Science
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—By James S. Thistle—

OUR SCIENTIST THIS MONTH is best known for his discovery of the laws of gravitation which laid the foundation for much of modern science. Scientists believe that the work of Albert Einstein would have been impossible without the discoveries of this early Pioneer. His third law of motion, which states that for every action there is an equal and opposite reaction, is the principle of jet and rocket propulsion. The rearward thrust of the jet shoots the plane forward in a powerful motion by which it quickly gains altitude.

Almost equal in importance to gravitation were his contributions to the theory of light, explained in his *Optics*. He showed that white light is a combination of the seven colors of the rainbow, called the spectrum.

Among this man's other accomplishments were his inventions of a reflecting telescope and integral and differential calculus. His country honored him with burial in Westminster Abbey among England's greatest men.

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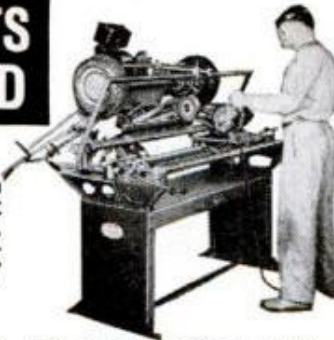
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**TUNE IN ON THE
INVENTORS**

By John Linkletter

AMERICAN INVENTORS are a prolific crew when it comes to turning out new ideas. They bombard the U.S. Patent Office with an average of 350 patent applications every working day. And the Patent Office, in turn, grants some 1000 patents per week. Incidentally, that's a lively pace for such an old-timer as the Patent Office which celebrated its 170th anniversary this spring.

Troops in training can experience a realistic atom-bomb explosion with the help of an atom-bomb simulator invented by Patrick Lizza of Palos Verdes Estates, Calif. The device, claimed not to be dangerous outside a 100-foot radius of the point of explosion, puts forth a large column of white smoke which develops a mushroom head. Simulated fallout drops during and after the cloud formation. Its patent number is 2,934,013.

There's \$5000 waiting for the inventor who can devise a revolutionary wheel chair to make it easier for a physically handicapped person to move around in an industrial building. The chair must be able to carry a 200-pound occupant, negotiate stairs, fold to fit in a car and retail for no more than \$500. The National Inventors Council of the U.S. Department of Commerce will receive and screen ideas.

"Lower your heels, Mabel, you've got a short date tonight," may soon set Mabel to shortening the telescoping high heels of her shoes. And the adjustable-height heels, invented by Marion Mistarz of Oak Park, Ill., will also be a godsend to married men whose wives can make one pair of shoes serve as both medium-height afternoon shoes or high-heel dress shoes. The device was granted patent No. 2,934,840.

Fishhooks won't foul in weeds when outfitted with an attachment invented by William Meucci, Glenview, Ill. Relatively light pressure, such as a fish biting, exposes the point. Patent number is 2,932,114.

Robert Horton, St. Paul, Minn., says that the mild vibration and hum of his infant pacifying device (No. 2,932,821) keeps a youngster quiet. ★ ★ ★

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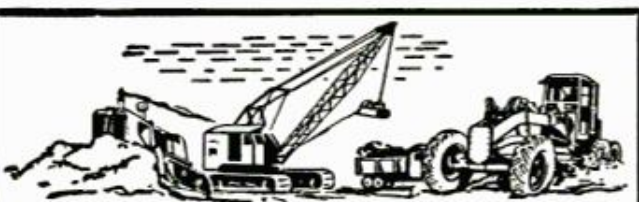
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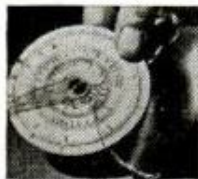
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PLASTIC And supplies for laminating. Colamco, 12 Center, New Haven, Conn.

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REPAIR False teeth yourself. Special, new professional plastic. \$2.00 postpaid. Guaranteed. Grant Dental Laboratory, 219 W. 7th St., Los Angeles, Calif.

VINYLITE. Laminating supplies, information free. Solomson, 4 Beacham, Everett 49, Mass.

PLASTIC Vacuum-forming machine. Hobby. Easy. Profitable. Details. Burr, 330 East Center, Kalamazoo, Michigan.

SIMPLIFIED Plastic molding, repairing, trial unit \$2.00. Hallmark Dental Co., Box 1924, Detroit 31, Mich.

NEW Liquid casting plastic, clear, colors. Embed real flowers, butterflies, photos, coins. Send 25¢ for two handbooks "How to Cast Liquid Plastics" and "How to Make Extra Money at Home." Castolite, Dept. H-101, Woodstock, Illinois.

FREE Sample plastic vacuum molding. 3 sizes of machines. Utilize ordinary vacuum cleaner. \$40 up. Makes 3D signs, pictures, displays, skin pacs. 2000 in use. Free sample, literature. RAB Industries, 6363 Wilshire, Los Angeles 48, Calif.

MAKE, Sell, signs. Plastic letters. Samples 25¢. Refundable. Dixie Plastics, Lakeland, Fla.

AGENTS WANTED

MEN-Women sell penny shoe shine and famous nationally advertised Turtle Wax products. Earn big money fast! Penny shine pre-sold by Bing Crosby coast to coast. Other big promotions. 122% profit possible. Send for free information. Plastone Sales, Dept. 60C, 1800 N. Clybourn Ave., Chicago 14, Ill.

MONEY For you... quickly, easily. Everybody is waiting to be shown our personalized costume jewelry. No investment. 100% commission. Free details and photo. Mag Jewelry Works Co., 143 Summer St., Providence 3, R. I.

SELL Low priced plastic laminating machines and supplies. Sipco, 4469 East Olympic, Los Angeles 23, Calif.

MAKE Your spare time profit time! Over 800 money-makers! Gifts for men, women, children, the home! Distinctive greeting cards, stationery, toys, novelties, jewelry, cosmetics, gadgets at prices for every pocketbook. No minimum order. Make up to 92% profit! Write today for exciting details, colorful catalog. Greetings Unlimited, 6-205 Park Square, St. Paul 1, Minn.

DOUBLE Spare-time earnings with 65¢ profit on exclusive, new \$1.25 Christmas card assortment. Imprints, 40 for \$1.50. Over 400 assortments, gifts retail \$1 up. Get samples on approval, \$1.25 assortment. \$1 gift on free offers. Cardinal, 1400 State, Dept. 36-A, Cincinnati 14.

UP To \$300 extra money. Show friends fabulous self-selling Evans Christmas card, gift line. Profits to 100%. Send no money—write for sample boxes to be paid for or returned, plus big free album personalized cards, 2 catalogs 300 items. New England Art Publishers, North Abington 740-C, Mass.

AMAZING Christmas card profits! Make 75¢, not 50¢, on fast-selling \$1.25 assortment; \$75.00 on 100. Gift bonuses. Complete line; assortments, novelties, \$1.00 up. 53 personalized samples free; assortments on approval. Free gift offer. Creative, 4401 Cermak, Dept. 506-P, Chicago 23.

MONEY Fast! Big profits! Sell Papoo-Seat (baby carrier) to individuals, stores. New! Weighs only 3 ounces! Not a gimmick! Part, full time. Details. Box 22505, Houston.

CHRISTMAS Cards—with customer's name imprinted. Personal and business designs—all in one album. These deluxe cards pay deluxe commissions. Earn \$300 to \$500 (plus bonuses) easily this season, even in spare time. Sales experience unnecessary. Free sales kit includes sample album and easy-to-follow selling instructions. Send for kit now; pocket profits next week! Write: Process Corp. (reliable for 39 years), Dept. PM-1, 1954 S. Troy, Chicago 23, Ill.

EVERY Man a prospect. Request refundable sales kit offer showing line of belt buckles, tie clasps, money clips, cuff links, lapels, individualized with customer's name and emblems. Cap badges for trucking, bus, taxi, police, firemen also heavy construction emblems. Choice 3000 emblems. Hook-Fast, Box 1425PM, Providence, R. I.

GOLD Or silver letters, numbers. Windows, doors, trucks. 1" to 6". 500% profit. Free samples. Atlas, Box 543-T, Oak Lawn, Ill.

MEXICAN Art goods! Free sample! Send 14¢ stamps mailing. Sylviak, Apartado 9036, Mexico City.

PRINTING, Advertising salesmen—Excellent moneymaking sideline selling decalcomania name plates, small quantities. Automobile initials, sign letters. Free samples. Raico, XL, Boston 19, Mass.

YOUR Ad in this space will get some good agents for you. Yes, I'll prove it. Write for Folder "A" right now. F. W. Johnson, Classified Advertising Manager, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

SELL Champion, AC, Autolite spark plugs. Reconditioned, electroplated, guaranteed 10,000 miles. 100% profit. Free sample. Lee Plugs, 1608-E Roberts, Houston 3, Texas.

YOUR Own business—Used suits \$1.50; overcoats 65¢; mackinaws 35¢; shoes 12½¢; ladies' coats 30¢; dresses 15¢. Enormous profits. Catalog free. National Mail Order, 2111-AA Roosevelt Road, Chicago 8, Ill.

DON'T Miss our ad under "Salesmen Wanted" in this magazine. National Press.

MAKE Profitable men's-women's wear. Sample free. Sunmade, Brockton 64, Mass.

BEAUTIFUL Feather pictures! Free details. Sample 20¢ stamps. Apartado 1668, Mexico 1, D.F.

BIG Free money-making catalog can make extra money for you! Take orders in your spare time. Show colorful catalog of jewelry, toys, gifts, greeting cards, collector's items and household gadgets. Work your own hours. No experience necessary. For free catalog, write: North Star, Dept. 6-603, 251 East Fifth Street, St. Paul 1, Minnesota.

START Making money now. Earn top commissions taking orders for all magazine subscriptions. Friends and neighbors are your prospects. No experience needed. Write for free money-making kit. McGregor Magazine Agency, Dept. 5A, Mount Morris, Illinois.

MAKE \$10-\$100 A day! Sell new 5 year light bulbs. Guaranteed. Send for sample 6 pak \$1.98. Sells for \$4.69. Free details. Sunmaster, 366 Fifth Ave., Dept. O7PMC, New York City.

MAKE Up to \$50.00 a day soliciting delinquent accounts. Terrific commissions. Write today. National Credit, 304Y Pickwick Bldg., Kansas City 6, Mo.

MEN-Women agents: Sensational new moneymakers—beautifully hand-painted, plastic personalized photo enlargements, compacts, rings, bracelets, lockets, etc. Simply take orders, pocket 40% commission. We deliver and collect. Sales outfit free. Noveico, 3343 North Ave., Chicago 47.

MAKE \$25-\$500. Sell Christmas, all occasion greeting card assortments; gifts, wrappings, stationery. Experience unnecessary. Big profits. Name imprinted Christmas cards. Salable samples on approval. Write Hedenkamp, 361 Broadway, Dept. PM-62, New York.

NEW Bathroom deodorizer. Hangs on wall. Banishes odors bathroom, kitchen. Lightning seller. Samples sent on trial. Kristee 73, Akron, Ohio.

MEN! Women! 60% profit on cosmetics. Famous nationally advertised Hollywood cosmetics pay 60%. Make \$25 day up. Hire others. For free samples, details, write Studio Girl, Glendale, California, Dept. 1207J.

BE The Popular Mechanics representative in your neighborhood and earn big profits in your spare time. Write Popular Mechanics, Room 7-A, 250 West 55th St., New York 19, N. Y.

SELL Famous Swami car and furniture polishing cloths, treated with General Electric Silicone Oil. Over one million sold. Write Swami Kloth, Box 155, Great Neck, N. Y.

DAMASCENE Earrings. Exotic oriental-ism. Huge profit. OHGA, PM-202, Sigakenkusatu, Japan.

SELL Aluminum embossed name plates for mailboxes, lawns, posts. Write: Star-metal, Stirling Road, Warren Twsp., Plainfield 12, N. J.

BIG Profits. Stamp social security plates, key protectors. Sample 50¢. Catalog free. General Products, 11 No. Pearl St., Albany 7, N. Y.

BUY IT WHOLESALE

BOOTS, Handsome western styles. Free catalog. Austin Boot Co., Box 5303J, El Paso, Texas.

BELOW Wholesale most merchandise. Write: Factory Buyer, 446, Jacksonville, Illinois.

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2,000 PAGES Wholesale catalogs. Write: Mosaser, Box 47-B, Newark, Ohio.

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

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MAKE Extra money—Big cash commissions plus premiums for you and your customers. Sell advertising book matches. Sensational new tenor, glamour girls, hillbillies; dozens others. All sizes. Quick daily sales; big repeat business. Free master kit makes selling easy. No experience necessary. Superior Match, Dept. M760, 7530 Greenwood, Chicago 19.

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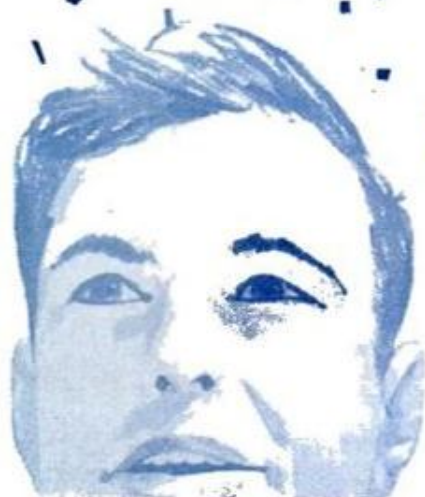
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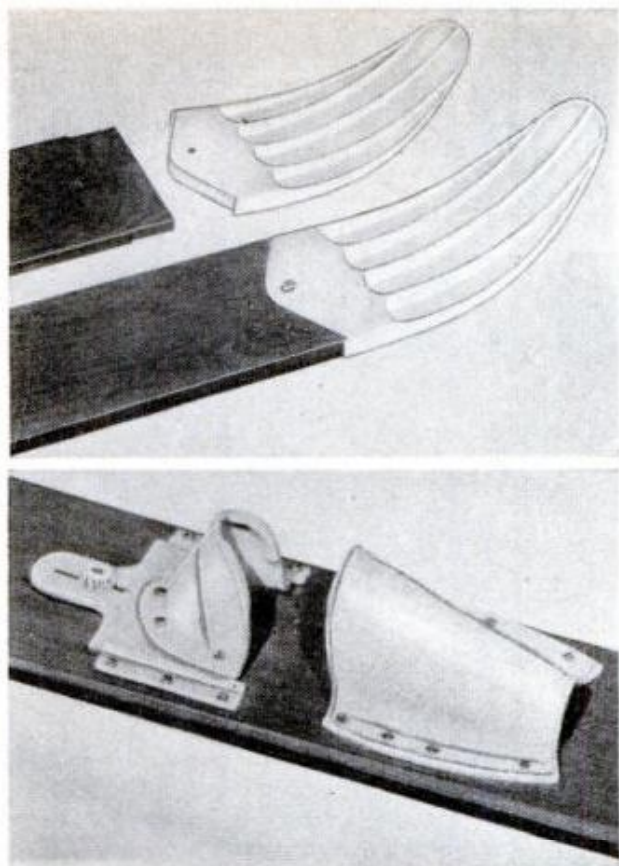
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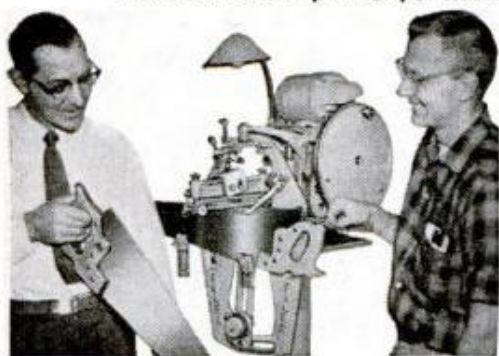
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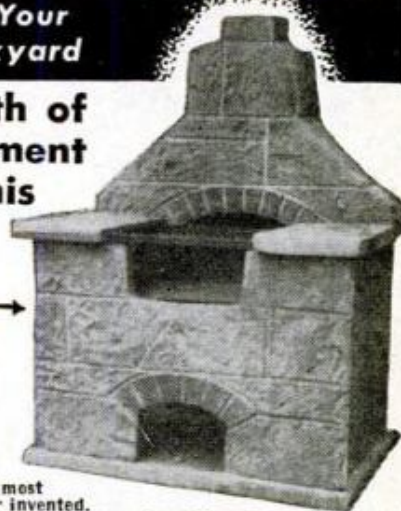
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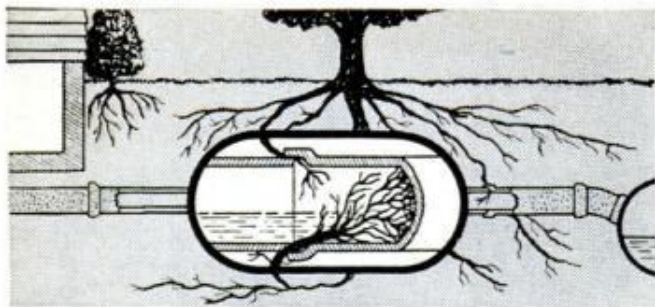
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Keeping up with the ATOM

By Clifford B. Hicks

ELECTRICITY FROM the atom now is lighting the barnyard of an Illinois farmer. It's also operating his incubators, illuminating his home and powering the factory up the road. In fact, electricity from the atom has started flowing all over northern Illinois.

In a gradual start-up, the Dresden Nuclear Power Station is going "on the line." This is the first full-scale, privately financed nuclear power plant in the world. At its full capacity, which will be reached later this year, the plant will produce electrical energy at a rate of 192,000 kilowatts. About 12,000 kilowatts will be needed to operate the plant, leaving a net of 180,000 kilowatts. This is enough electricity to supply the needs of a city of 200,000 people.

The reactor core contains 65 tons of uranium dioxide. This fuel will produce as much power as a conventional plant burning 1700 tons of coal *a day*. One load of the nuclear fuel is expected to last 3½ years. During that period, a coal-fired plant of the same capacity would burn about two million tons of fuel.

BUT NOW THE question has been raised: Will nuclear reactors ever produce electricity on a worldwide scale? The answer is no, according to Dr. Niels Arley, an eminent Danish scientist.

"Never has mankind spent so much effort on international research projects which obtained so few results," he states.

He bases his judgment on two factors: 1. If fission were used on a worldwide scale, there would be so much radioactive waste that all the oceans in the world couldn't dilute it sufficiently. 2. If uranium were used to produce all the world's energy, there would be only enough uranium to last about 60 years.

Dr. Arley believes energy from the sun offers the best possibility for the future.

AND ANOTHER BLOW to atomic power: A panel of maritime and nuclear-energy experts recently agreed that the atom won't power merchant ships on a competitive basis for a good many years because of the high cost of nuclear-power machinery.★★★



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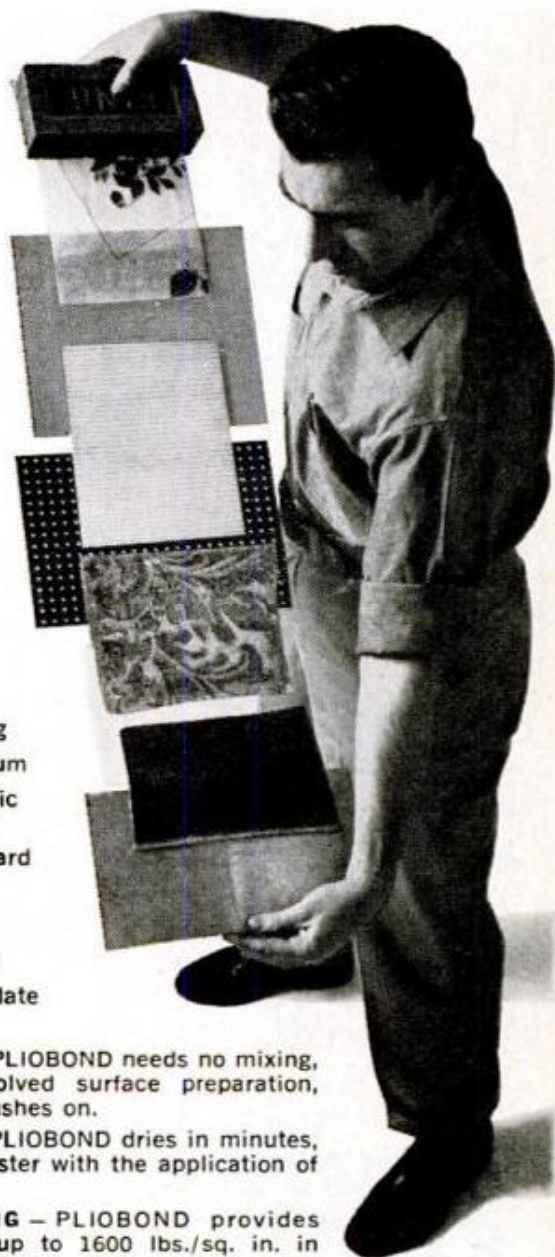
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WHAT'S UP IN THE AIR



By Kevin V. Brown

AIR FORCE ground crews may all look like rabbits soon—but without the ears.

Fed up with reports of damage traceable to "foreign objects" that fell from the pockets of his crewmen when they were making periodic inspections of the intakes of jets, the maintenance officer at the U. S. Air Base at Bentwaters, England, asked one of his airmen to design some kind of wearing apparel that would eliminate pockets and cover the crewman from head to toe.

The result was a one-piece coverall with elastic wrist and neck bands that left only the hands and head uncovered. All green, except for a large red panel in front, the suits were officially dubbed "engine-intake uniforms," but the boys on the base promptly nicknamed them "bunny suits" and were quick to assure the ground crew that they looked real cute in them.

Small civilian airports near cities are getting caught in the same squeeze that has throttled the growth of the large metropolitan airports and made many of them obsolete. The growth of cities since World War II—a factor which should have encouraged the building of more airports to accommodate the increase in population—has actually eliminated many of those that already existed. They fell victims to suburban housing developments, superhighways, or high land taxes. The few new small airports are being built farther and farther out in the country.


Contrary to popular opinion, the external decor of airliners is not decided by the airline-president's wife. It's functional.

White paint on the upper half of the fuselage protects the plane from the sun and especially from solar heat when the plane is parked on the ground. This much is common to all airliners. The airlines differ on how they finish the job, but most are content with adding a second color and their own special identification and markings. About 17 gallons does the whole job on a DC-8 Jetliner.

After 13 years of investigating more than 6000 reported sightings, the Air Force was moved recently to announce once again that it has found "no evidence to confirm the existence of flying saucers." ★ ★ ★

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JULY 1960

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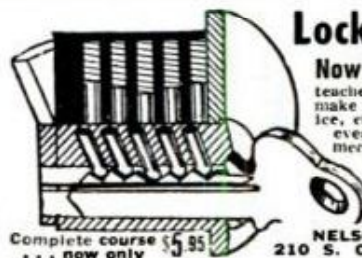
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		750/16-8	9.71
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I enclose 10¢ in coin and end tab from a "Duco" Cement carton. Please send me 3 packets of Du Pont Car Wash. Offer expires Dec. 31, 1960.

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ITEMS FROM ALL OUTDOORS

By Dick Kirkpatrick

CHOOSING the right propeller for your outboard boat and motor, even with the help of a qualified dealer, often ends up as an educated guess at best. Many dealers, though, are now using a "loan prop"—a variable-pitch outboard propeller with seven possible pitch settings from 9 to 15 inches. You try your own outfit under operating conditions at all the settings, then buy the fixed-pitch prop that best suits your needs. Or, if it becomes obvious that no one pitch will handle all your boating activities efficiently, you can always buy your own variable-pitch model.

TRANQUILIZERS GO UNDERWATER with the free diver's equivalent of the conservation officer's "stun gun," an expendable underwater projectile with a hypodermic syringe instead of a spearhead. Divers can use different drugs in the syringe to kill, paralyze, tranquilize or medicate fish up to two tons. The advantages are obvious—a fish "hunter" can tackle really big fish with impunity, since he won't be tied to an angry monster with his spear line. He can shoot, then follow until the drug takes effect. Diving biologists can stun fish and bring 'em back alive and unharmed for study or exhibition. It's made by James Chochos, Jr., Arlington Towers, Arlington, Va.

A NEW STUDY in fisheries research, by George J. Ridgway and George W. Klontz of the U. S. Fish and Wildlife Service in Seattle, Wash., has established that there are different blood types among salmon. This is expected to prove a valuable tool for fisheries management and conservation workers in identifying "races" or subpopulations within species of salmon, and in their never-ending job of charting salmon migratory patterns and routes.

GOOD NEWS for catamaran and pontoon boat owners—"cat" styled trailers are coming on the market, with side roller channels and hull supports designed to fit most of the standard hull shapes. One of the manufacturers, Tee-Neer Trailer Co., of Youngstown, Ohio, is also making a cat-conversion kit, with twin-hull rollers that can be used to convert their other trailer chassis. ★★★

dingy gray to matching blue in one afternoon



John Primeau chose blue Masticote to match his house. Masticote is made by The Madison Paint Co., Cleveland, Ohio.

Cleveland man stops roof leaks with Masticote Colored Aluminum Coating

John Primeau, of Cleveland, Ohio, reports solution to a familiar homeowner's problem—a dingy, leaking roof. He simply brushed on a new one—and did it in one afternoon—and color-styled it to harmonize with his house.

He used Masticote, a fibrated aluminum roof coating made with Alcoa® Pigments that offers the famous, all-season protection of aluminum in a choice of sun-proof colors.

It's weatherproof. An aluminum fibrated coating protects in any climate—stays firm on top, soft and pliable underneath, will not run or crack. It literally seals the surface, thus protects against surface deterioration and extends roof life. And reflective aluminum turns back part of the sun's heat, helps keep interiors cooler in summer.

One coat hides any surface. A coating like Masticote is ideal for

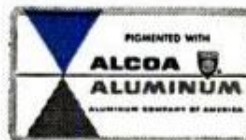
built-up composition roofing, asphalt shingles, tar paper and slate. Also seals and protects concrete, cinder block and stucco as well as corrugated steel, sheet metal and weathered, galvanized surfaces.

Handsome metallic colors. Good colored aluminum coatings are fade-proof, stay new-looking for years. Weathering actually intensifies the colors.

Easy to apply. Coatings like Masticote come ready mixed, require no thinning or heating. Apply with ordinary roofing brush or stiff bristle paint brush.



ALCOA does not make roof coatings, but we will be happy to refer you to reputable manufacturers who do. Send today for our booklets, *Painting With Aluminum*, *Painting With Aluminum in Color*, and *Aluminum Roof Coatings Make Time Stand Still*. Use the coupon.



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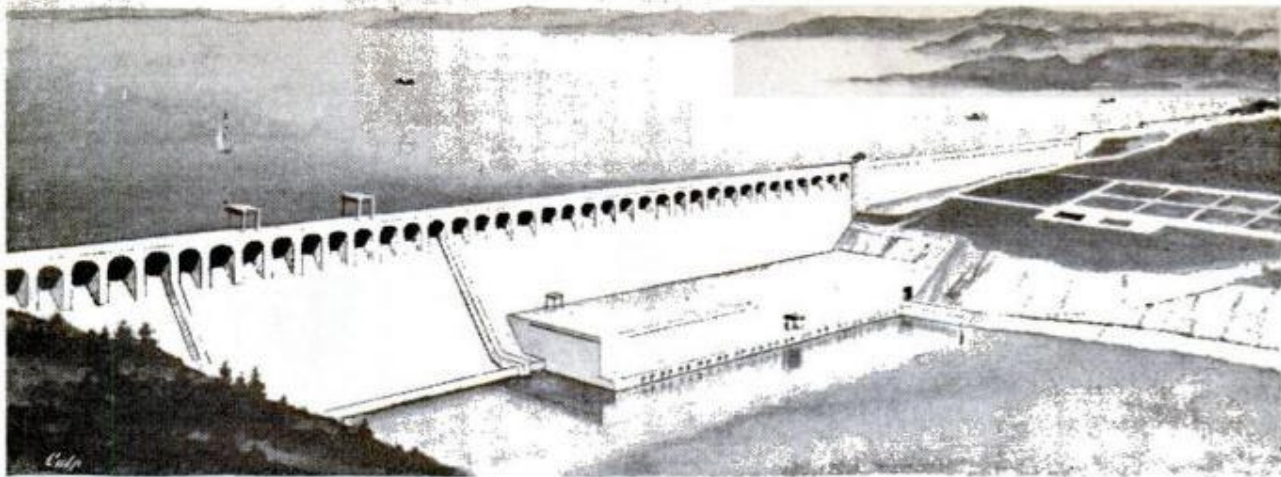
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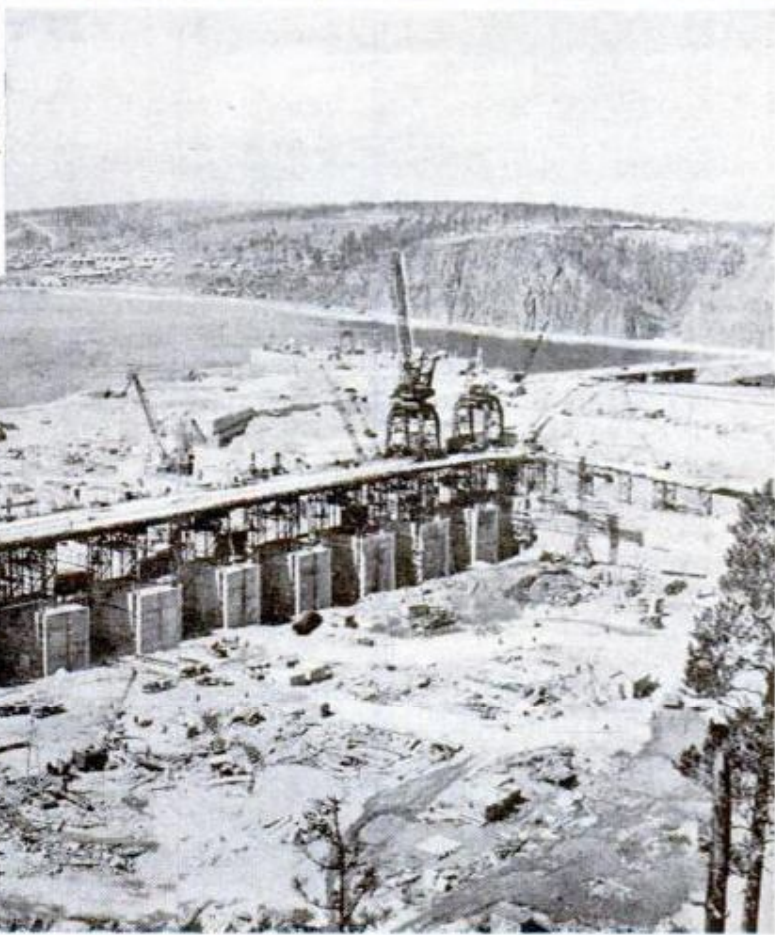
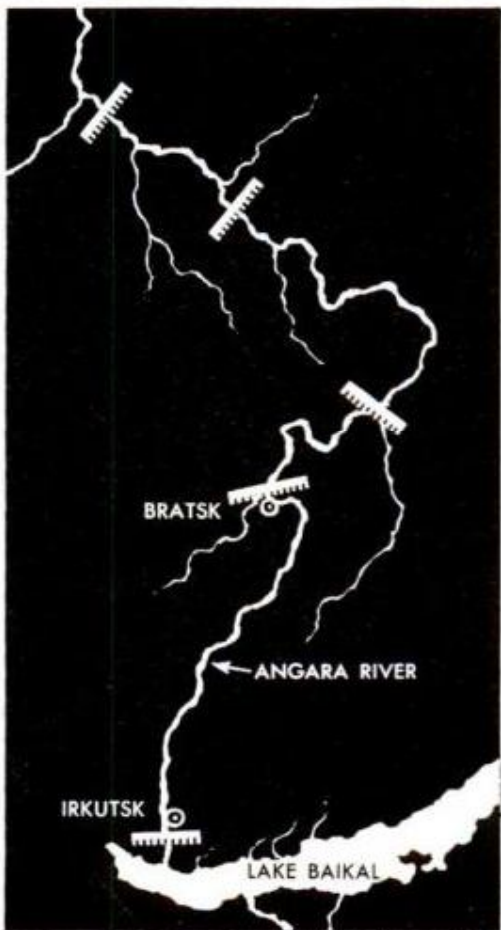


This is an artist's conception of how Bratsk hydroelectric station will look. It is one of several dams under construction

Huge Power Plant Rises in Siberia

NEAR THE TOWN of Bratsk, in mountainous Siberian wilds 3000 miles southeast of Moscow, U.S.S.R. engineers are building the world's largest hydroelectric station. Its 20 generators—each is of 225,000 kilowatts—will produce more than twice as much power as does the Grand Coulee, largest such U.S. project. Some of this power will be sent 2500 miles east on high-tension lines for use at Vladivostok, the Pacific Ocean port. At present, work is centered on a huge dam spanning the 1000-yard-wide gorge of the turbulent Angara River, the only stream to flow from Lake Baikal. When completed next year, the dam will rise 400 feet above the Angara, creating a reservoir 350 miles long.

Damming the turbulent Angara River will provide electric power for steel and iron production in the Siberian wilderness



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UNCLE SAM'S "HOW-TO" MEN SHOW THE WORLD

about methanol gas

By Clifford B. Hicks

WHEN THEY SIT DOWN to dinner, a good many Pakistani men can thank a relatively unknown American for an improvement in their "vittles." Now, Pakistani housewives are really cooking with gas, and it's all due to Duncan Fisher's ingenuity.

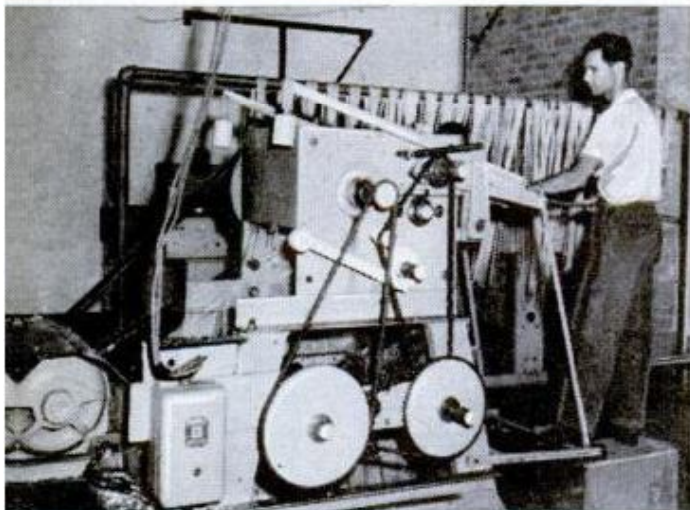
Might be a bit crowded, but it gets there. Body parts are made locally, other parts imported with ICA aid





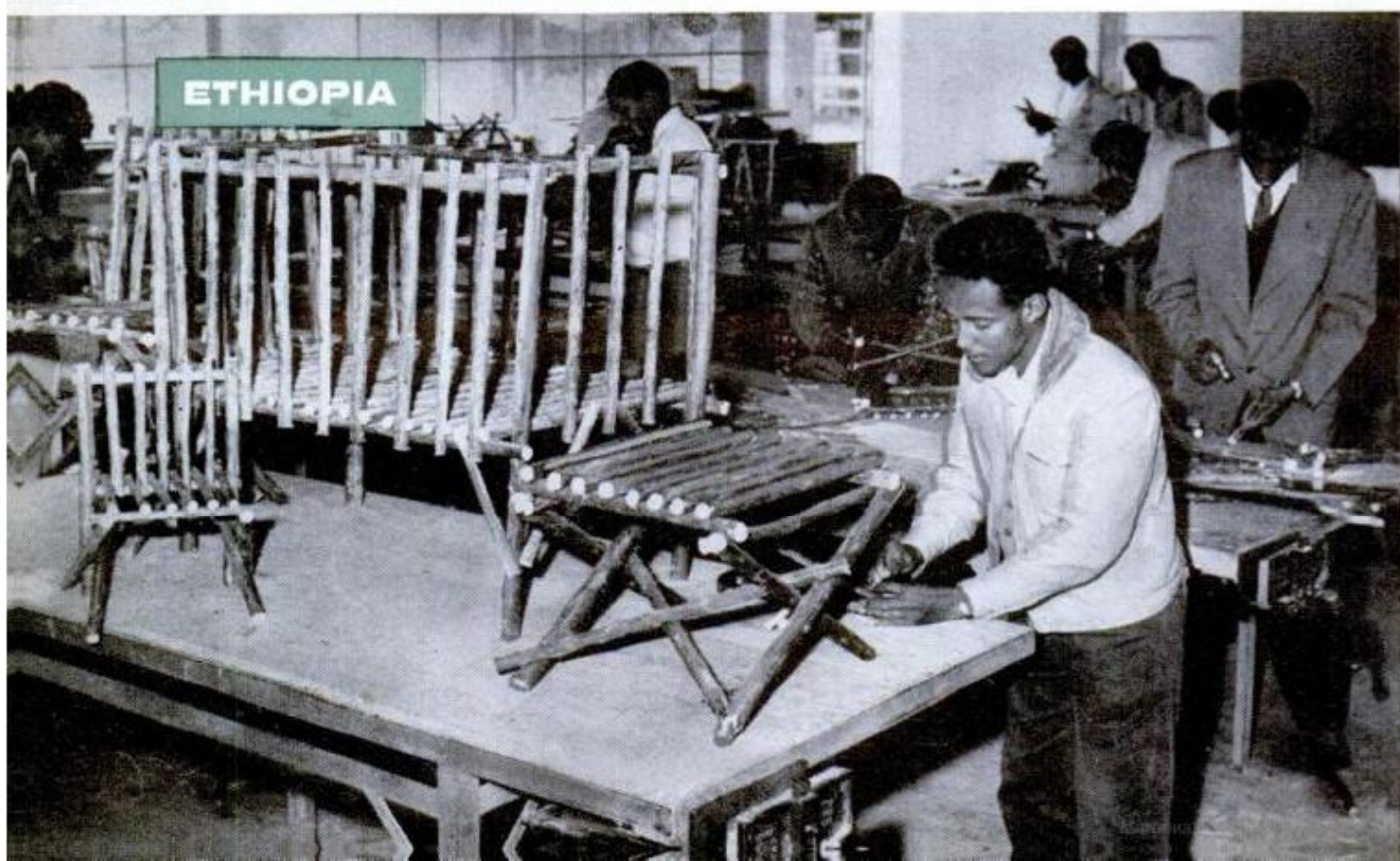
PAKISTAN

Taught by an ICA advisor, girls learn something their mothers never knew—how to preserve fruits and vegetables. This "new" technique is helping eliminate yearly famine periods



← Experimental machine produces fiber directly from several tropical plants found throughout the world. It is patented, and will be made available to interested countries

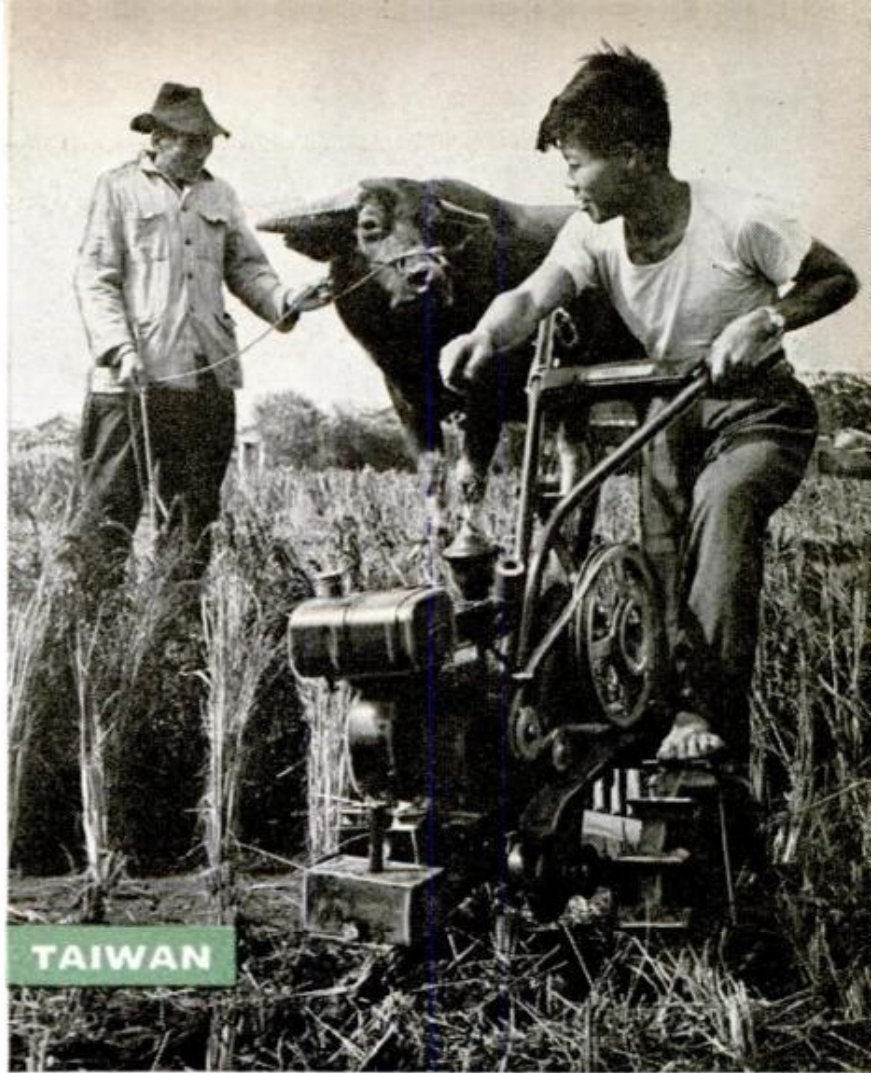
Below, students learn how to construct simple furniture from eucalyptus poles. The students then will return to their home areas to teach the same techniques to others



ETHIOPIA

A few years ago Fisher arrived in Pakistan as a representative of the International Cooperation Administration (ICA). His job, basically, was to help the villagers help themselves. He literally did it up brown, at least as far as their food was concerned, for he brought gas "ranges" to Pakistani homes—ranges almost as convenient as your chrome-trimmed model.

It wasn't a matter of giving the Pakistani housewife a taste of Western luxury. You have to unravel a long string of problems to see the significance of Fisher's gas stoves. Pakistan is an overpopulated and underfed nation. Many villagers live on a diet barely above the level of starvation, simply because farmers can't grow enough food to support all the people. If the land could be fertilized, food production could be stepped up significantly. The supply of fertilizer is no problem, for animal power is used to cultivate the land. But manure never has been used to improve the soil. In all of Pakistan there is very little fuel to burn. For centuries the Pakistanis have been burning caked animal dung to heat their homes and cook their food. Thus for countless generations the land has been robbed of its nutrients. The Pakistanis have been forced to overdraw their soil-bank account for untold years, and have never made any deposits.



On the ancient farms of Taiwan, small power tillers are challenging the traditional position of the water buffalo. Some ICA machinery is developed on the spot, some is imported

Beach grass is planted from a tractor-drawn cart in the wastelands of Chile. The grass will help reclaim and control the sand dunes. ICA experts offer on-the-job help and advice





LIBERIA



LIBERIA

Top, workers stamp out mud blocks which are used as inexpensive building blocks. These particular blocks soon became wall of a new rural school

Above, simple hand press is used to mold clay into tiles, which then go into kiln. ICA hopes to foster small-industry loans for such projects. The loans would be granted to local businessmen

In a pilot study, ICA is helping three high schools in the Philippines in an effort to aid secondary education. Here a 14-year-old student proudly shows off a tremendous squash that was raised in the lush nursery of one of the schools

All of these problems were apparent to ICA advisers including Fisher. He figured that the basic problem was to save fertilizer, and to do this he had to come up with a new fuel. He managed to do it.

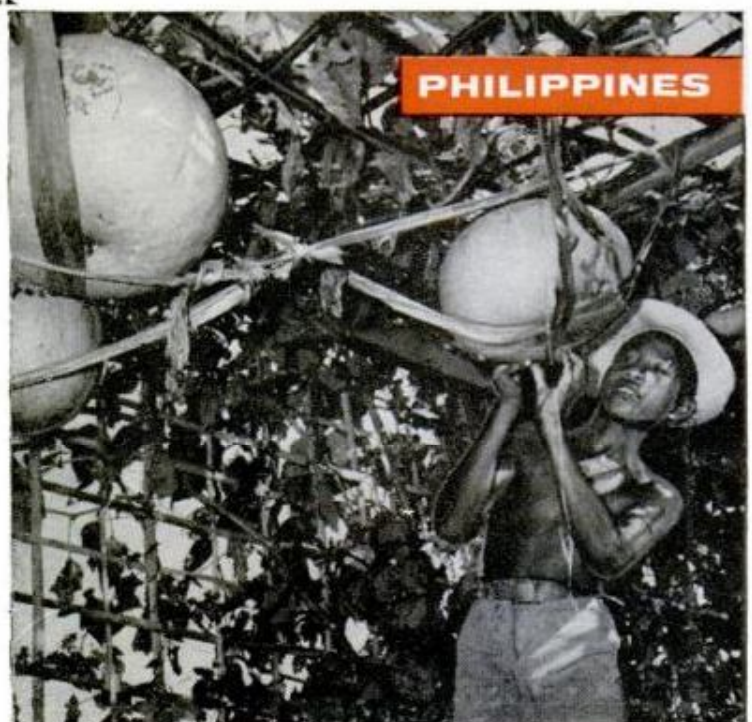
First he dug a fermentation pit 12 feet deep. Above the pit he suspended a storage tank five feet high. In the pit he placed liquefied animal dung. Meanwhile he designed and built gas-burner rings, which he attached to the stoves of a few of the villagers. He connected these to the storage tank by pipe.

For several days nothing happened. Villagers were beginning to look on Fisher as just another crazy American. Then the slurry in the pit began to ferment, producing pure methane gas, which was trapped in the tank. Fisher called the villagers together, turned a valve, lighted a burner and cooked some vegetables. The villagers were amazed. They were even more delighted when he put out the fire instantly, then relighted it. He pointed out that he was wasting very little heat because he could extinguish the fire as soon as the vegetables were cooked.

As a result of Fisher's crude but efficient gas generator, the ICA can proudly report that, at least in Pakistan, more people than ever are cooking with gas.

Best of all, the slurry from the fermentation pits can be used as fertilizer with no appreciable loss of plant nutrient. Thus at one stroke Fisher helped the Pakistani housewife, improved her husband's disposition with better-cooked food, and put more and better food on the table.

Duncan Fisher is just one of thousands of ICA workers who are helping the peoples of underdeveloped areas help themselves. For the most part their work



PHILIPPINES

INDIA



ICA helps provide steel for ancient Persian wheel. Blindfolded camel, started in circle, works for hours

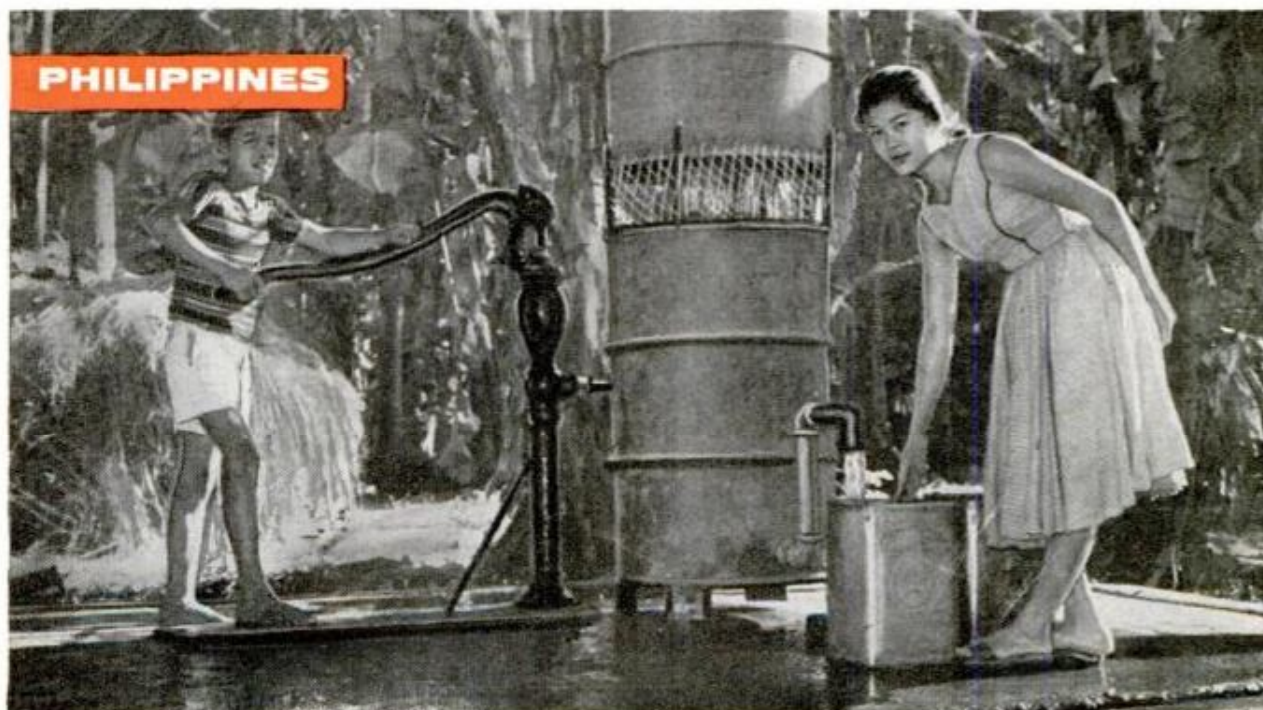
goes unsung and unnoticed—except by the people they are helping. The ICA people are too busy bringing a little better life to fellow humans to consider the effects of their work on the cold war, or how many “uncommitted people” they can bring to “our side.” In an age when most of us are thinking about putting men on the moon, they are thinking about putting privies in the remote reaches of Brazil.

In this dedicated group, Fisher is not the only inventor. Many of them bring a strong streak of ingenuity to their work.

As an example, take Isadore J. Silverstone. Formerly of Rockaway Park, N.Y., Silverstone is an ICA water-supply engineer in the Philippines. This was the problem that ended up in his lap:

For several years, Philippine villagers have been drilling wells with American

Steel-drum “waterworks” designed by Silverstone removes high iron content from water used by villagers



PHILIPPINES



PAKISTAN

Gas generator of unique design was devised by Duncan Fisher, ICA adviser. Animal dung, fermented in the tank, produces methane gas. Piped to a homemade stove, below, the gas provides flame for cooking in an area where there is virtually no fuel



economic assistance. Many of these wells, though, were scorned by the villagers. This was pointed out to the President of the Philippines, who soon pinpointed the trouble. The wells were producing red water. The red agent, which occurs naturally in the ground, really is rust—iron hydroxide. It wasn't damaging anyone's health, but it was downright unpleasant to behold. Coffee and tea turned black. There wasn't any tattletale gray in the housewife's laundry, but there *was* a muddy pink. And who wants to eat purple rice?

The President asked the director of the ICA mission if American technicians could solve the problem. The director pitched it to Silverstone. He knew he had to design a low-cost unit that could be built of readily available materials. In his tours across the countryside he had noticed an abundance of 55-gallon oil drums. Starting with these, he designed what has been billed as the "world's smallest public water-treatment plant." Any farmer or villager, almost anywhere in the world could build the unit to solve a local water problem.

Silverstone welded one drum atop the other. In the top drum he placed trays of slats (made of bamboo in the Philippines). The bottom drum he filled with layers of gravel topped with sand. From the well, water is pumped into the top drum. It cascades over the bamboo slats, is oxidized, and trickles down through the filtering layers. At the bottom it emerges clean, pure—and colorless.



INDONESIA

Silverstone's miniature waterworks was so efficient that the Philippine Government began building and installing the units across the countryside at a cost of \$10 apiece. At last count, 100 waterworks were in operation, and some villages were so impatient for units that they were building their own. Thanks to Silverstone, no more tattletale pink, no more purple rice.

East Pakistan had a more critical problem. During the growing season there is an abundance of food, but near-famine sweeps the country during other seasons. Strange as it may seem, the Pakistani housewife never has learned something that Grandma learned when she was still in pigtails: how to preserve food by canning it. ICA home-economics advisers figured it would be relatively simple to teach Pakistani housewives the art of canning—until they discovered that there wasn't a single manufacturer of glass jars in the entire country.

Meetings were held. A local glass manufacturer pledged his cooperation. CARE authorities agreed to ship several thousand jars to be used as teaching aids until jars could be produced locally. The East Pakistan Government organized classes. ICA gals started training "village workers" who in turn would train the housewives. The glass manufacturer, at his own expense, traveled around the world to study modern methods of making jars. Soon after his return, jars started rolling out of a local factory by the thousands. Today women throughout East Pakistan are canning

Soil-brick press permits one man to exert pressure of 20,000 pounds. It was developed by Ralph Dunkle, one of the most ingenious of ICA men. Below he is shown supervising the operation of a rice thresher operated by bicycle pedals and chain





LIBYA

Shifting sand dunes, constant threat to Libyan farmers, are being tamed with ICA aid. Vegetation is planted in a network across the sand-blown area. Later a tree will be planted in each of the squares

vegetables and fruits to supplement their meager fare during seasons of scarcity.

In August, 1957, E. B. Brown arrived in Ethiopia. No bands played, no delegations welcomed him, yet this man was to change the Ethiopian countryside. Bowen is a farm-machinery specialist, and his assignment was to help Ethiopian farmers produce more food. In his first trip through the farmland he noticed the Ethiopian plow, which had been changed very little in cen-

turies, was highly inefficient. It had a single shaft of eucalyptus, and a very narrow point which turned only a three-inch furrow. With this age-old plow the Ethiopian farmer had to plow and crossplow his field four or five times for each crop.

Bowen sensed that any new plow would have to resemble the traditional one or the farmer simply would turn his back on it. In a local supply dump were several two-

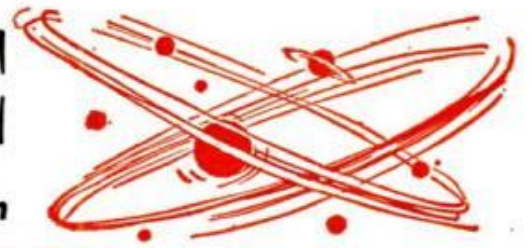
(Continued to page 222)

Carpenters work on the exterior wall of a prefabricated home. ICA advisers introduce new ideas under the philosophy of helping others help themselves. Their ultimate aim is to put themselves out of business



NEPAL

AN EYE ON SPACE



By Dr. Dan Q. Posin

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

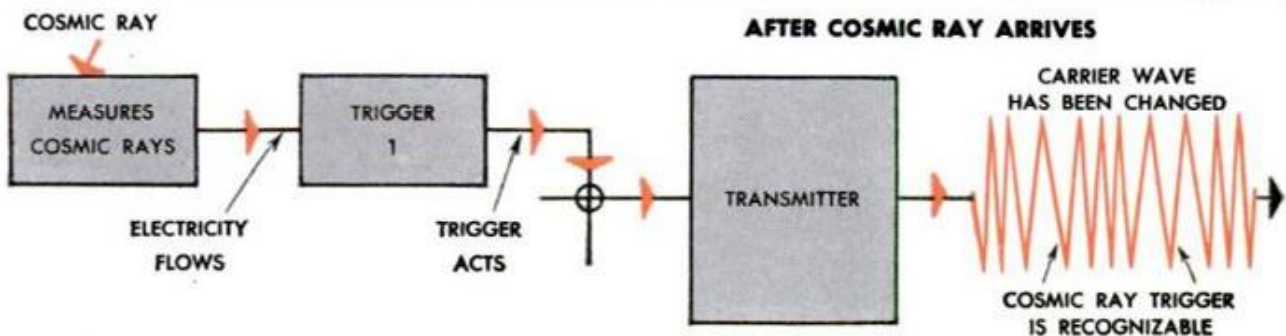
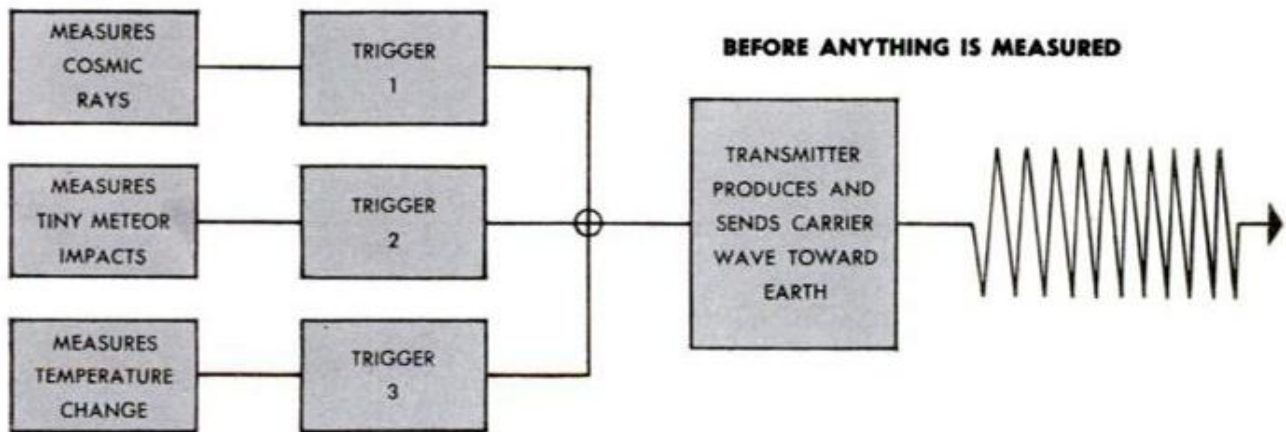
THANKS TO SATELLITES, we're gleaming a lot of information about space these days. Just how do these little spaceships send so much information back to Earth?

Vanguard I, the smallest of all satellites, has held its own in sending back information. It has been out there, since its launching on March 17, 1958, orbiting Earth, coming as near as 409 miles and swinging out as far as 2453 miles. And that is why it is still out there—it is so far out that it encounters virtually no friction drag, and should be able to retain its speed for perhaps another 1000 years!

It is small, as you recall, a "grapefruit" 6.4 inches in diameter and weighing 3.25 pounds, but it is mighty. It has learned much about space—or, rather, we have learned much about space by keeping track of the detailed motion of Vanguard I. For, the fact is, that Vanguard I sends us only its transmitter's radio signal, unmodulated by any instruments. Yet, as we keep tab on the satellite's flight we learn, for example:

1. The Earth's atmosphere at 400 miles, although extremely slight, is nevertheless about five times denser than we thought.
2. The Earth is pear-shaped, having a 50-foot peak at the North Pole and a 50-foot depression at the South Pole. (See page 211.)
3. The Moon's gravitational pull can be observed in the satellite's motion.
4. The Sun's rays can push a vehicle through space, and this has been observed as Vanguard I has gone slightly off course—rising and sinking by about one mile at its point of closest approach to Earth. In the course of one

(Continued to page 238)





DETROIT LISTENING POST

By Jim Whipple

LIKE ALICE'S Wonderland, Detroit seems to grow "curiouser and curiouser." An early look at the '61 lineup reveals that the big ones are getting smaller and the small ones getting bigger. Compacts are growing less so. The trend started with the Comet, stretched inches longer than the Falcon from which it derived.

Now we will have the BOP cars, offshoots of GM's Buick, Oldsmobile and Pontiac Divisions, all of which will be longer in wheelbase and bumper-to-bumper dimensions than the Corvair from which they've borrowed their basic body shells. Typical will be Pontiac's Tempest with a wheelbase of 112 inches and an over-all length of approximately 187.

This trend toward a "medium" compact has grown from a well-founded suspicion that the public would react favorably to a slightly larger compact as long as it retained the blessings of maneuverability.

It is interesting to note in passing that these BOP compacts will shape up very close to the dimensions of Fords, Chevs and Plymouths of six or eight years ago. And those were cars that no one ever criticized for being big or unwieldy. If Comet's success is a bellwether, we can expect the BOP cars to follow suit.

At the other end of the seesaw, down come the over-generous dimensions of the mediums and the luxuries. By now the word is out that the BIG Lincoln will be scaled down to proportions more manageable in city traffic. Mercury is expected to offer luxury touches on a smaller scale as it once again shares bodies with Ford.

The larger GM cars, Pontiac, Olds, Buick, and quite possibly Cadillac, as they share basic body understructure, will all show beneficial results of the engineering Slenderella treatment.

Wheelbases will probably be down two to three inches and bumper-to-bumper measure may drop as much as six inches.

To make the picture really rosy there will be very noticeable improvements in passenger comfort with a couple of extra inches of headroom and more legroom for

all six passengers by virtue of wider, deeper "step-down" floor pans and lower transmission humps and drive-shaft tunnels.

Even better news for owners of crowded garages is the reduction in widths of these cars by as much as three inches. As a result of the paring-down process, weight has been reduced, bringing a welcome "free" boost in performance, or improved economy depending on engine and axle option.

It seems that Detroit has really gone in for "sensible shrinkage" in response to rumblings of discontent with the turnpike behemoths of recent years. They got the message back in 1958, but the curse of lead time between approval of wood and clay mockups and full production once again brought a frustrating delay. Three rousing cheers for smaller-on-the-outside-bigger-on-the-inside thinking that has resulted in genuinely better "big" cars for '61.

Could the compact philosophy applied to big cars combined with the stretch-out thinking re the compacts—if carried to ridiculous extremes—lead to 27 different versions of the same sized car?

It would not seem to be in the cards, as there's plenty of evidence that Detroit is trying, more than ever before, to meet the varied demands of 50-million customers. Proof—the compacts and the personal cars such as Thunderbird and Corvette. Balancing up the shift toward larger compacts for '61 is Rambler's American with an all-new body and, for the first time, genuine six passenger capacity.

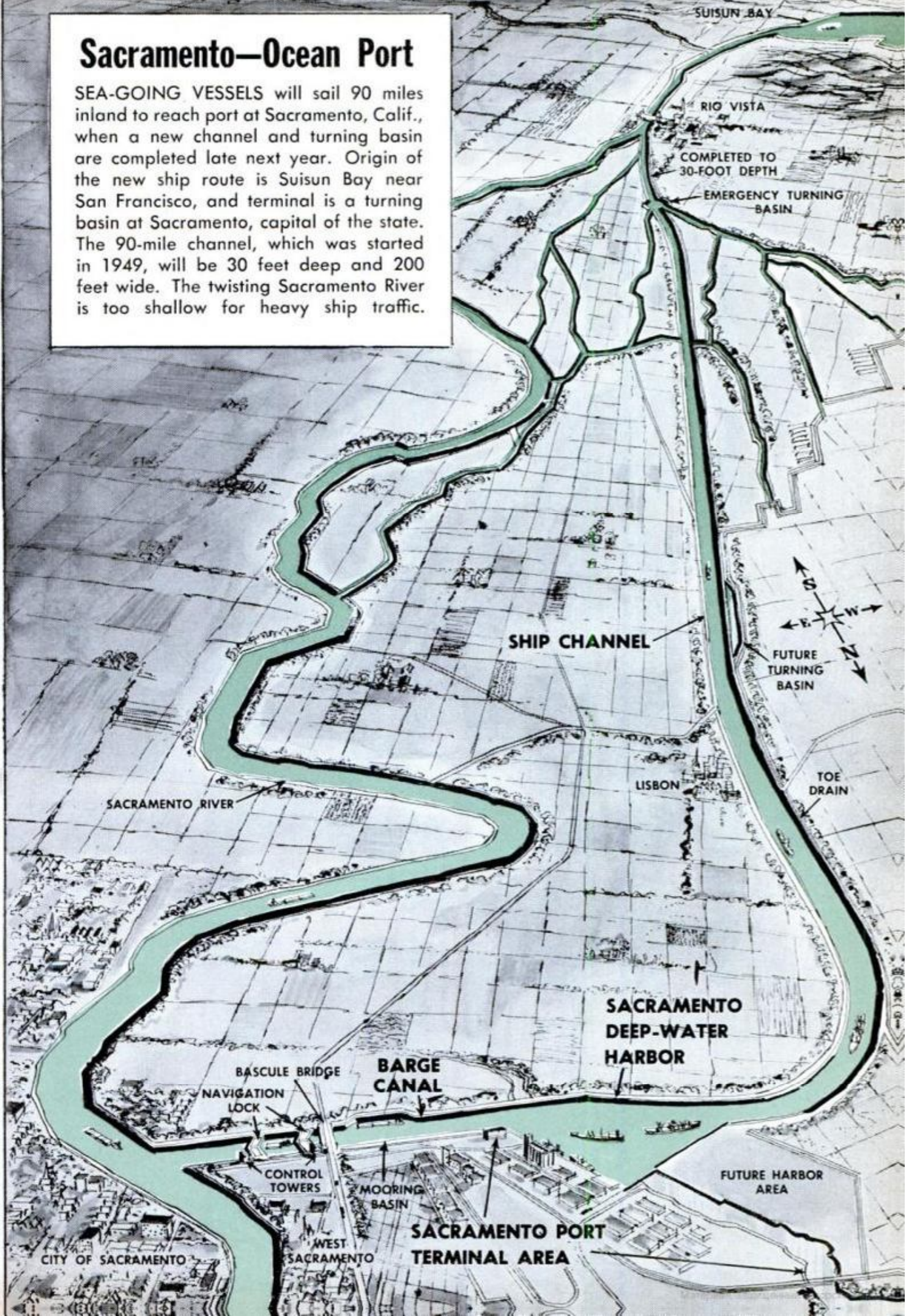
American's styling will not be miniaturized 108-inch Rambler and there will be no hint of the old (1950) familiar ocarina shape. Wheelbase will remain at a truly compact 100 inches with improved seating dimensions a result of squeezing the passenger compartment nearer the front wheel housings, American's model lineup is broadened by addition of a four-door wagon and a convertible.

With expectations of holding the base price of the stripped two-door at the magic figure of \$1795, AM's new American could carve itself a really big slice of the market providing a full, six-passenger car at just \$100 or so above the popular imports and while undercutting its less compact competitors by the same amount.

Something for sporting types will definitely be under the hood of Pontiac's new compact Tempest. Believe it or not a big (195 cubic inches) short-stroke four! Rumor has it that the warmer version of this futuristic four-holer will develop 165 horsepower. And, to ice the cake for those who get their kicks from really driving, the manual transmission will be a fully synchronized, four-speed floorshift. ★★

Sacramento—Ocean Port

SEA-GOING VESSELS will sail 90 miles inland to reach port at Sacramento, Calif., when a new channel and turning basin are completed late next year. Origin of the new ship route is Suisun Bay near San Francisco, and terminal is a turning basin at Sacramento, capital of the state. The 90-mile channel, which was started in 1949, will be 30 feet deep and 200 feet wide. The twisting Sacramento River is too shallow for heavy ship traffic.



If It Can't Be Repaired-



BOWL. Kiokichi Sano drills holes in stems of china flowers so they can be set on metal pegs and replaced in the bowl. Some 25 large pieces will be joined with this technique; smaller splinters will be cemented

INSIDE HIS SMALL, quiet shop just around a corner from New York's bustling Third Avenue, a tall, energetic man named Gabriel Hirsch holds a court of last resort for people who break things—whether it be a handle on a cooking pot or an Etruscan vase thousands of years old.

The shop—it's called Hess Repairs, after the founder, Roscoe Hess, who died 12 years ago—has a reputation for repairing *anything* except large pieces of furniture or appliances. Many of its customers are referred from Tiffany's, the jewelry store; from Haviland & Co. and Josiah Wedgwood Sons, Inc., renowned china makers; from Baccarat & Porthault, Inc., the crystal mak-

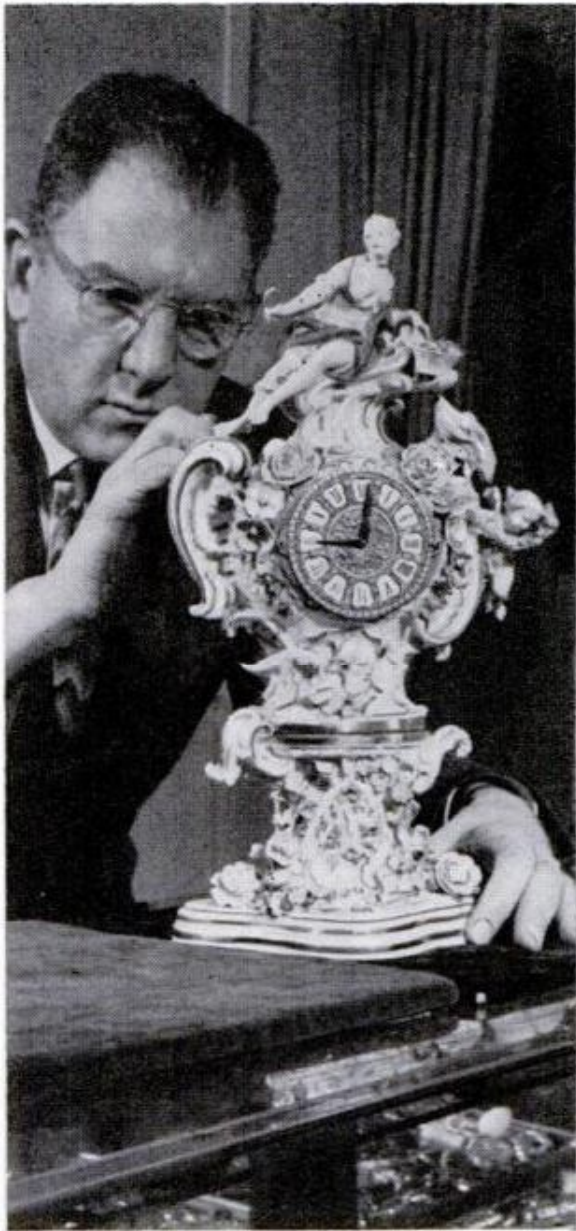
ers, and from art museums and antique shops throughout the country.

Hirsch is aided by a group of men and women he advertises as being "Repairers of the Irreparable" and as some 2500 customers discover each year, if these artisans can't repair what's been broken, the chances are nobody can. Luckily for the butterfingers, few appeals for help are turned down.

All told, some 250,000 items have been repaired in the shop since it opened in 1945. They include teapots, bird cages, drinking glasses, toy pianos, dinner plates, French tapestries, fishing-rod reels, chess sets, lamps, clocks, ivory and lace fans,

SEND IT HERE

By
James Biery



CLOCK. Shopowner Gabriel Hirsch test-winds a restored Meissen china clock

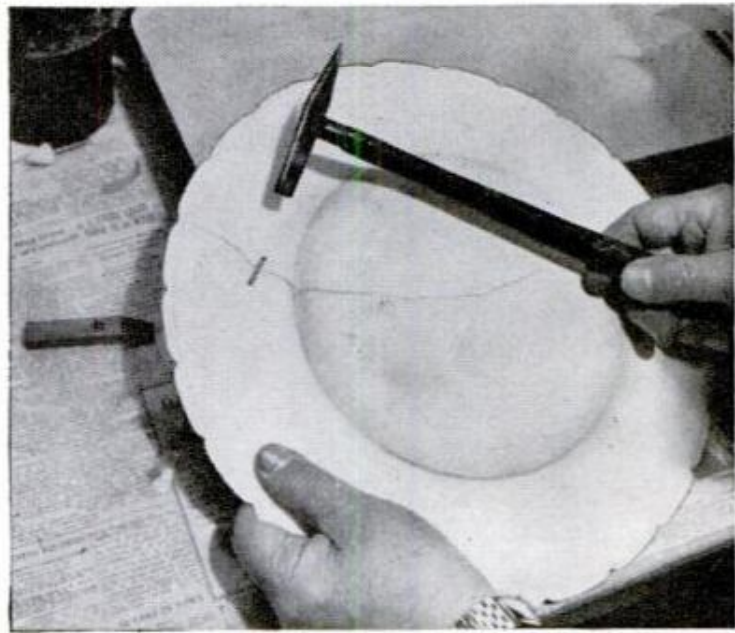
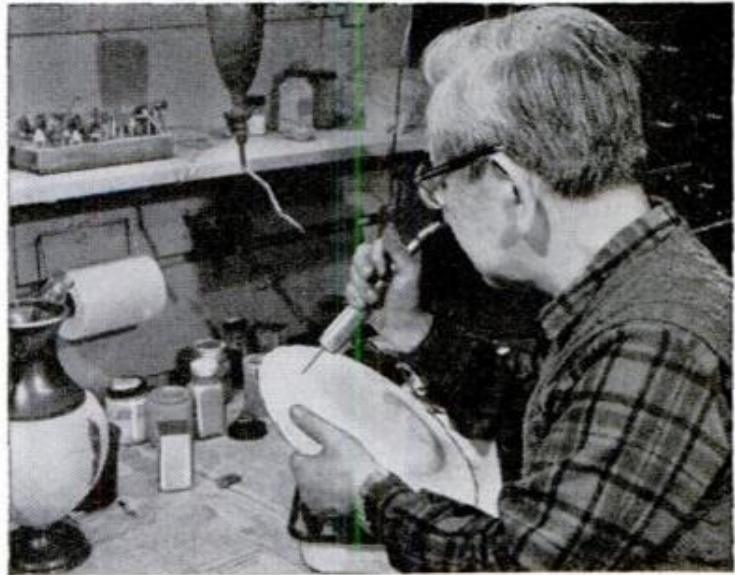


PLATE. Sano pounds a staple into holes he had driven alongside a crack. A porcelainlike material will cover staple

pepper mills, gold-mesh evening bags and umbrellas. All entered the shop either in pieces or smashed to smithereens, with parts missing or somehow not in working order. After an average stay of six weeks, they went out as good as new—or in extreme cases, as repaired as possible—to customers in all parts of the United States (including Alaska and Hawaii), Canada, Jamaica and the Virgin Islands.

There are, of course, no typical days at Hess Repairs. But one day recently, a visitor would have found Hirsch, his wife Bernice, Kiokichi Sano and Irena Marlewska processing some of the 500 items then awaiting repair. Staff member Al Bosle was

grinding nicks off drinking glass rims in his home workshop.

Hirsch examined an ivory chess piece and a cuff link a young woman had brought in. "We can fix these easily enough," he told her. He then made phone calls to locate cork (to be placed in the silver tops of bottle stoppers) and velvet (to be glued to the top of a daguerreotype case) before taking the items into a smaller room where Mrs. Hirsch catalogued objects accepted for repair.

Lying on a table were, among other things, a teapot with a broken spout, a worn daguerreotype case, a porcelain fisherman broken in two and a bamboo and brass pipe

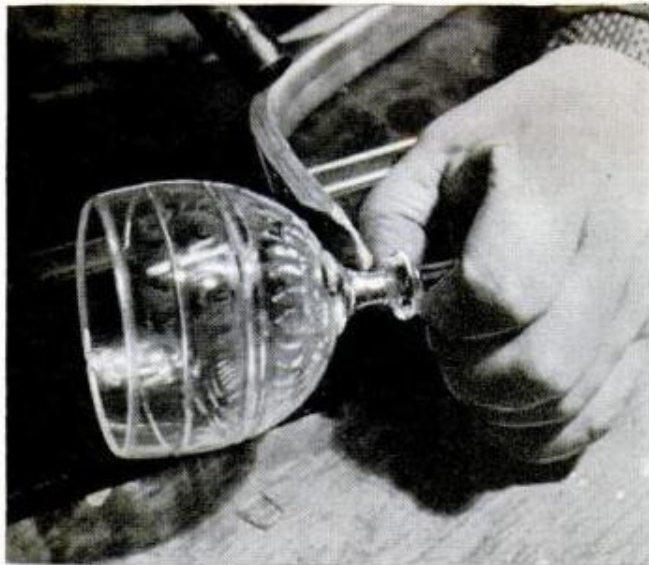
with a shattered ceramic bowl. Taking each item in turn, Mrs. Hirsch taped on a numbered paper, marked the number on a customer's card in a filing cabinet, then wrapped each piece and splinter in tissue paper before placing each item in a separate jar bearing the matching number.

In a large workroom, Kiokichi Sano repaired a cracked marble plate. He bored a hole with a dentist's drill on each side of the crack, then snipped off a section of steel wire and formed a staple in a vise. He pounded the staple into the holes and brushed over it a porcelain-like material which, when dry, he would paint to match the plate. He next unwrapped from tissue paper a china bowl holding china flowers, most of which had broken off. He would restore the bowl using some pieces no bigger than a match head.

Irena Marlewska repaired a blue, 1844 Sevres plaque decorated with gold vines. Having stapled and cemented a seven-inch section of the rim into place, she extended the gold vine pattern to cover the crack and then painted gold vines at intervals around the rim, balancing the pattern. Her



PEGGING A BEAK. Irena Marlewska drills a hole in a porcelain bird beak to prepare for pegging the broken tip to it. Peg will sit in shellac



BANDING A GOBLET. Sano first cut a ring around each part of the broken stem. He then wound copper wire from one ring to the other, wrapping the break. He is applying solder over the wire

AWAITING PAINT. The join will be sanded flush and then painted a color matching rest of beak

second job that day was to fill in a gouge in a papier-maché figure of a boy. She began mixing paper and paste.

"I can't say we use many unusual methods," Hirsch said, "but I think we often are unique in our ingenuity. Take the red Bohemian glass hurricane lamp we repaired. It was shattered. The large pieces we put together with staples and then we sewed on the tiny pieces with silk thread. It was like closing a patchwork quilt to draw them together to form the lamp. We decorated with red paint and while you could see the lamp had been repaired, the customer was pleased because she could use it with another lamp as a pair."

Why do people want things repaired? So they can use it in a pair, because they have





Old-time portable phonograph restored by Sano is typical of the sort of items that wind up at Hess Repairs

a sentimental attachment to the object, because it must be in working order to be of use, or because it may be of great value. Or irreplaceable, as was a recent, difficult repair. A sculptress brought in a sack of fragments and crumbling bits of pottery that had been an Etruscan vase before her cat knocked it over (a common cause for repair) three years before. She provided a sketch of its shape from memory.

"Our man examined each piece, deciding how the potter might have used such a form," Hirsch said. "The sketch was not much help. But he patiently reconstructed it, cementing in all the little crumbles. When the sculptress called for the vase, she said 'That's it! That's how it really looked. I didn't remember when I gave you the sketch. How did you do it?'"

The ability to repair, Hirsch explained, depends upon skill, experience, imagination, and, perhaps most important, patience—a quality that is often sorely tried at Hess Repairs. He cited an experience of Sano.

"An archeologist brought in a silver object that looked like a cigarette case that had been run over by a truck. He had found it in some ruins and though he had no idea what it was, he wanted it restored. Mr. Sano began tapping it out with a hammer. The silver was old and thin and each time he tapped it split. So he hammered and soldered. When he was through, he'd re-

created a beautiful cup with raised figures around its outside."

The shop is willing to tackle any repair job, but it has a particularly fine reputation for repairing crystal, china, porcelain and glass. Hirsch suggested that the four basic methods of handling these delicate materials could also be adapted to other materials in the home workshop.

"We cement pieces together," he said, "and this is all right if the use is decorative, but not for soaking in water." Such a repair was made on a glass candlestick holder. It took five hours of uninterrupted work to piece together and paint the shattered base. But the repair was detectable to the touch only because the paint had a different texture than the glass. "It's like working the most intricate jigsaw puzzle," Hirsch said, "and cementing, itself, is an art. You must put the parts absolutely flush so you can run your fingers over the repair or test it with a level and it will be smooth. We use a special cement, not household glue as do many amateurs, because ordinary adhesives sometimes destroy such materials as porcelain."

Stapling, the method Sano used on the plate, is frequently used on fragile materials. On heavy pieces, and where it might show, the staple is laid in a trough and covered with the porcelainlike material.

(Continued to page 230)



Lots of Summer Fun With Outdoor Toys

Nylon net returns any ball thrown at it—giving a youngster fielding practice. A batter and pitcher can use net as "catcher"
Tigrett Industries, Jackson, Tenn.

Rockers, ladders and parallel bars of tubular steel form a versatile outdoor plaything. Boys, lower left, are rocking
Universal Manufacturing Co., Bossier City, La.

Bucking bronc is glass-fiber horse on a steel spring. It comes with portable base or can be mounted permanently in cement
Game-Time, Inc., Litchfield, Mich.

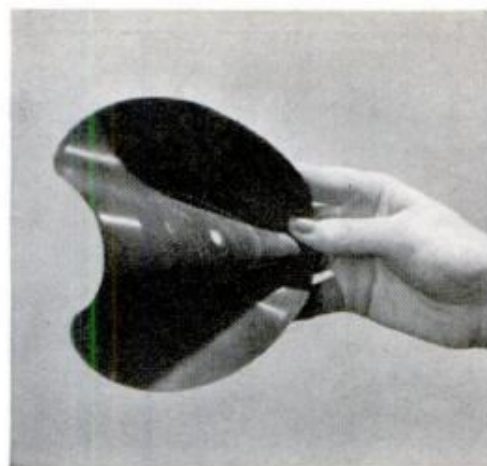


Portable Sprayer With Extension Covers Wide Area



Hinged spraying arms on a portable sprayer extend to seven feet, enabling the operator to spray an eight and a half-foot swath across lawn or garden. The tank can be pressurized by either a foot pump—which comes with the unit—or a portable compressor. The sprayer, which operates on low pressure, will handle liquid fertilizers and weed killers, and can also be used to spray paint on floors or driveways.

☛ To purify water contaminated by radioactivity in event of a nuclear war, Army engineers have developed a water-purification unit to be dropped from the air to areas hard to reach by land.

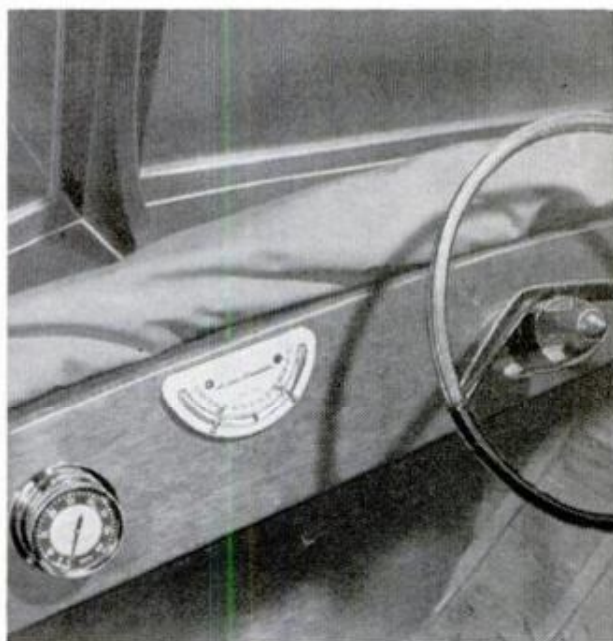


Ultrathin Record Slips Into Package

Pliable plastic platters—records made of polyvinyl chloride plastic only four thousandths of an inch thick—may be turning up in your cereal box or mail box soon. Available in all three speeds, the seven-inch, high-fidelity discs weigh only one-eighth ounce and are so flexible that they can be dropped into product packages, rolled in mailing tubes, or simply inserted in envelopes without special handling. The manufacturer expects to produce 40 million of the records in 1960, for use in sales promotion, direct-mail advertising, as inserts in books and magazines, and to provide vivid, verbal instructions to accompany new equipment and appliances in the home.

"Clinometer" on Instrument Panel Indicates Boat Trim

Boaters often underestimate the importance of lateral trim in small boats, though it's important for safe, efficient boating to keep the hull as level as possible. In sailboats, a few degrees of heel can cut your speed noticeably. A new "clinometer" for small boats gives an exact reading at any angle up to 70 degrees; it works by gravity with a glass ball sliding through a viscous liquid inside a tube.





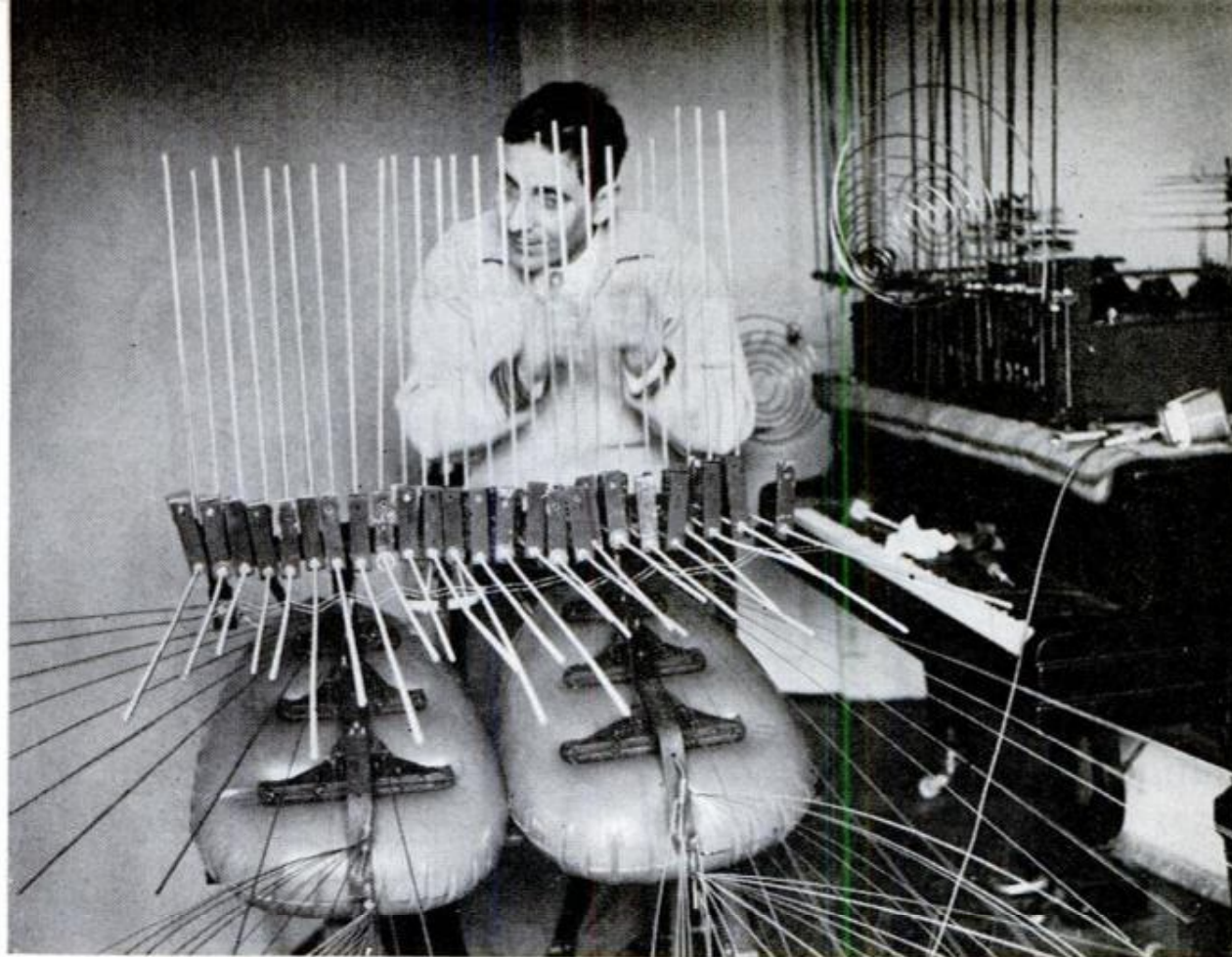
Strange-looking mandolin? The sounds that inventor Francois Baschet gets from it are even stranger

STRANGE MUSIC

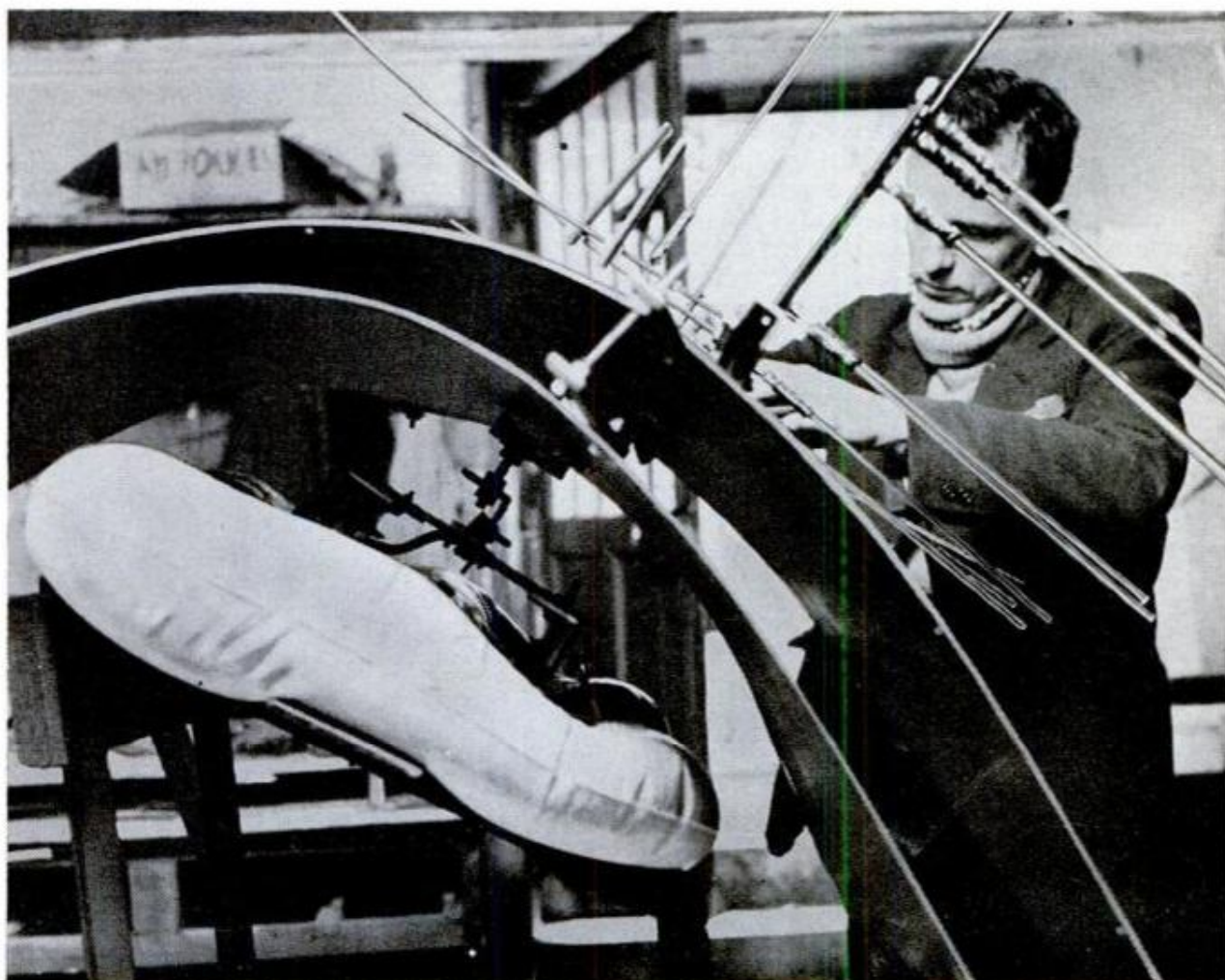


ATOM-AGE musical instruments that look like designs for science fiction movies are making strange sounds in a quiet section of Paris. Two French musicians, in a workshop that looks as fantastic as it sounds, have invented guitars with soft soundboxes filled with air, pianos with glass tubes and violins that sound like altos. The secret is in the glass tubes, which replace the strings and make strange music when they are rubbed with wet fingers.

Composer Jacques Lasry tunes up contraption atop piano that gives piano notes unusual tone depths



Soundboxes for this instrument look like seaplane floats, but when Lasry rubs the glass tubes with wet fingers, he produces some weird music. Below: Another instrument where glass tubes replace strings





Helicopter Proves Successful at Minesweeping

Whirring above the Gulf of Mexico, a Sikorsky S-60 *Skycrane* recently demonstrated a new Navy technique for safely clearing mine-infested waters. The two-engine helicopter was fitted with a pod containing winch tows, cables and mine-

sweeping gear. As it flew along, the winches streamed out 600 feet of cable fitted to explode mines. The technique is safer than employing conventional surface minesweepers which, themselves, are vulnerable to mines.

Compressed-Air Vacuum Cleaner

Manufactured for use at automobile service stations or other places where compressed air is available, a new, hand-held vacuum cleaner picks up both wet and dry dirt by converting compressed air to suction. The conversion is made by drawing the air into a tube that is narrower on one end than the other and passing it through chambers which are angled. This creates a vacuum in the pickup chamber, causing material to be sucked in. It has no moving parts, no electrical connections and is operated by pressing a finger lever that controls the supply of compressed air.



Battery Corrosion Preventive

Using copper coins to prevent battery terminal and clamp corrosion is made possible by a new, polyethylene clamp which fits both positive and negative terminals of most batteries. The clamp holds the coins. The copper becomes a sacrificial metal, capturing acid fumes and keeping battery parts clean. This, of course, is a requirement for fast starting, long battery life and a minimum loss of voltage. The clamp may be installed permanently in a minute or so. It is designed to allow replacement of coins at the flip of a finger and without removal from the battery.

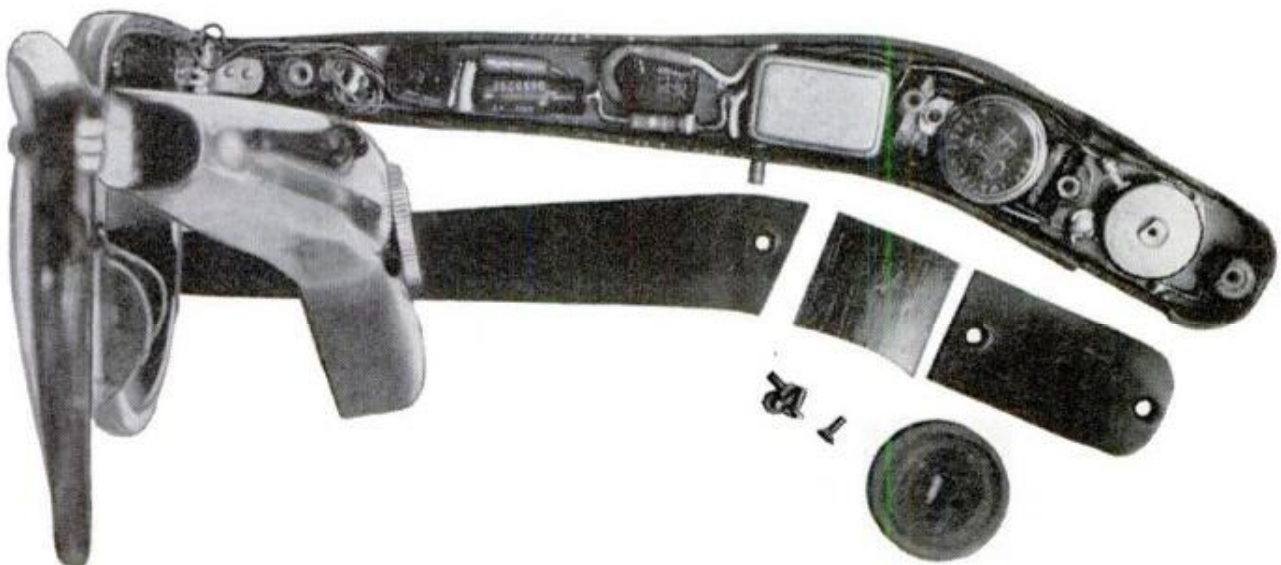




COMMUNIST CHINA'S first passenger car to show up at foreign exhibitions was displayed at the recent Leipzig Fair in East Germany. Called the "Red Flag," the big six-passenger sedan is powered by a V-8 engine developing 220 brake-horsepower at 4400 r.p.m. Length is 226 inches; wheelbase is 133.5 inches. It comes with automatic transmission, hydraulic-power steering, vacuum-assisted brakes and auto-tuning radio

Radio for Sunglasses Has Station Selector

People who have a yen for listening to the radio while outdoors or traveling, but balk at carrying a heavy portable or wearing a small one in their pocket with the cord and earphone showing, now can wear the radio in their sunglasses. The transistor radio-sunglasses have the radio parts built into the sidepiece, the left one of which also has a selector knob and a small button earphone. A piece of wire crossing the hinge gives the only clue they are not ordinary sunglasses. The glasses can be fitted with glass to match a prescription. They cost about \$34.50 for the standard type and come complete with an aerial which does not always have to be used.



POPULAR MECHANICS

**OWNERS
REPORT**

A NATIONWIDE SURVEY

**BASED ON 1,678,825
OWNER-DRIVEN MILES**

How Good Is the Plymouth?

Owners like:

Handling ease	43.1%
Riding comfort	39.6%
Power, performance	24.8%

What's Wrong With It?

Owners dislike:

Poor workmanship	20.1%
Burns, leaks oil	12.8%
Doors, door latches	8.5%

Did Plymouth Buyers Consider a Compact Car?

Yes, did consider one35.3% No, did not consider one64.7%

Which Make Did They Consider?

Valiant	33.1%	Falcon	24.4%	Rambler	18.1%
Corvair	15.7%	Lark	7.1%	Dart	1.6%





Owners Praise Plymouth's Handling, Complain About Workmanship

FOR YEARS, Plymouth has been a fine handling car and this 1960 model is no exception. Plymouth owners rank handling ease tops, followed by riding comfort, power and performance, exterior styling, in that order.

Popular Mechanics surveyed 1000 owners of the 1960 Plymouth, asking them to tell us the good and bad features of their new cars. They did and this article is what they wrote, a nationwide report on the Plymouth.

In the complaint department, a new ogre is coming up fast to make the manufacturers tremble. For years, the big complaint of owners was poor economy of operation, but today that seems to be of less concern. Today's major complaint (in the Plymouth and also in the Ford, surveyed last month) is poor workmanship. Buyers are looking at their new cars and criticizing them for poor assembly-line workmanship.

Among Plymouth owners there are 20.1 percent who put poor workmanship on their complaint list. Second on the list (and principally among owners of the new slanted-six engine) is oil consumption and oil leaks with 12.8 percent mentioning it. Third is door design and latch operation.

Over-all the Plymouth, like the Ford last month, came up with a much lower rating than any of the three compact cars surveyed earlier this year. In fact, more Plymouth owners gave their cars a Poor rating than any group of owners we have surveyed in recent years.

But it is better to let the Plymouth owners tell the story. Here, in order of frequency of mention, are quotations describing the five best-liked features:

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

← *If each buyer refused to sign anything until he could check over the actual car he is getting, this trouble would vanish in a year. Problem is that we get so emotional about a new-car purchase that we can't see through the rosy glow until it's too late.*

← *V8 owners are twice as happy as Six owners: 6.3% of V8 owners rate the car Poor; 14.4% of the Six owners rate it Poor.*



Above, owners are generally satisfied with the gas economy of the 1960 Plymouth although many owners of the slant Six say it requires premium gasoline

Left, doors on the new body are thick and heavy, but do open wide for ease of exit from the rear seat

To a guy who drives a truck all day, the Plymouth may seem sportscarish, but a Sprite owner would disagree. It handles well, but is too big, too soft, to be as intimate as a sports car must be.

You mean people are still doing this?

There's restraint until you get inside a Fury—that was when the stylist reached for the panache box.

"Handles nice on highway, especially on curves and in windy conditions."—Illinois minister.

"The real reason I bought a Plymouth is that I want a car that handles like a sports car. I found Plymouth was the only one that came close."—California trucker.

"Easy ride on rough roads."—Tennessee attorney.

"Smooth ride. And I drive 28 miles to work daily, 9 miles on rutted rock roads, the rest on rough blacktop."—Kansas foundry worker.

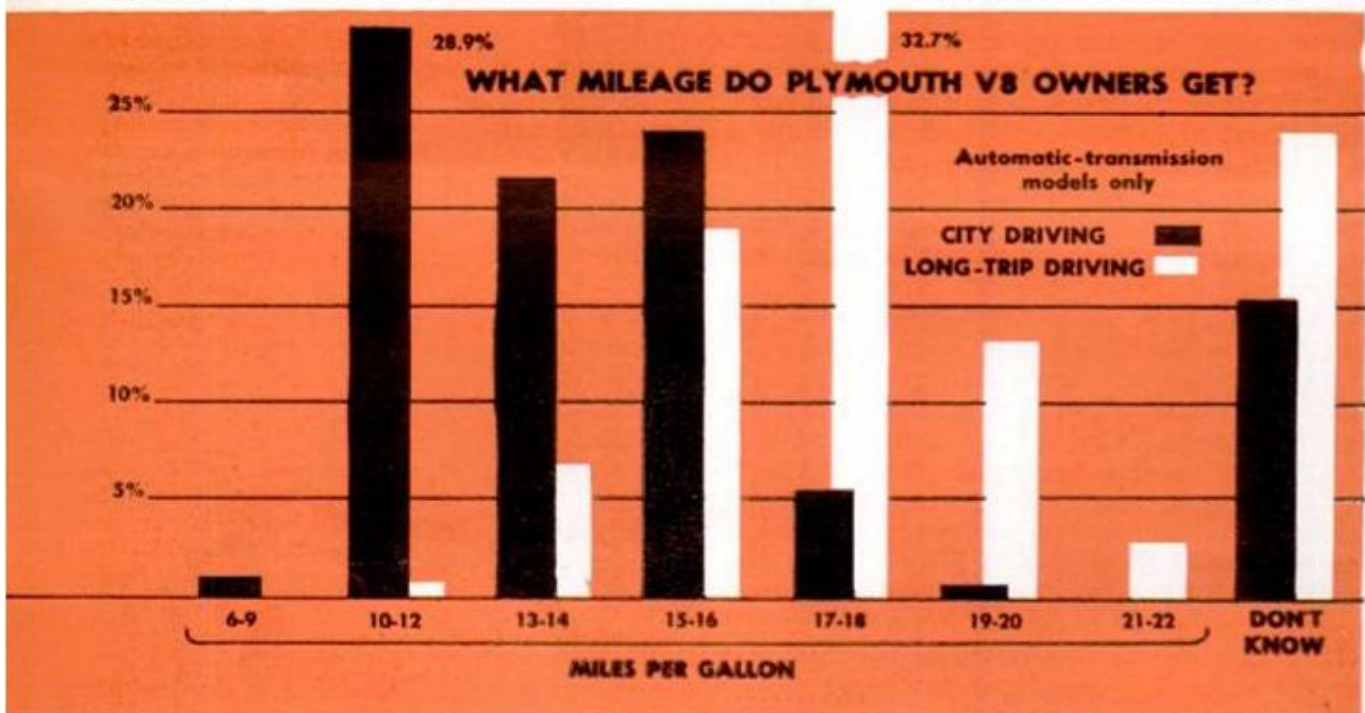
"Plenty of torque and power. I can run off and leave any Ford or Chevy in a drag race."—California tire recapper.

"Had an Eight before, but think this new Six has more pep than the Eight did."—Virginia pattern maker.

"Plymouth style is well done, combining restraint and flair in a tasteful manner."—Ohio engineer.

"Looks a little better than most of the garbage Detroit makes."—New Jersey tool-and-die maker.

Most V8 automatic-shift owners say they get between 10 and 16 miles per gallon in city, 15 to 18 on trips





Checking master cylinder on a Plymouth with power brakes is tough. It's hidden under the power assist and can be felt but not seen by service attendant

Front-seat back is higher behind driver. It must be for styling as driver shouldn't lean back and nap



"Economy is the one feature I like best about the Plymouth. I came in first in a supervised economy run for Plymouth, getting 25.829 miles per gallon over-all with a handshift Six."—Louisiana businessman.

"I get 20 miles per gallon over-all with this handshift Six and like it. Can't see much use in buying an eight-cylinder engine."—Pennsylvania engineer.

← PM tested a Fury V8 with automatic shift. It averaged 13.3 miles per gallon in city; 14.7 on rural roads.

And Now the Gripes

The following quotations describe the complaints of the 1960 Plymouth owners in order of frequency:

"Poor workmanship. I found lots of things that were left off at the factory. Molding around tailgate and heater hoses were missing. Door handles fell off. If Chrysler can't build a better wagon than this for \$2745 I don't see how they ever hope to come to the top in sales."—Arkansas meat cutter.

"Too many things wrong with it. Split axle housing, bad

← I'd like to have seen the way this guy cut the meat the day his door handles fell off!

Electric wipers clear large portion of windshield. Rectangular steering wheel allows clearance for fat laps





Trunks are wider than ever and lower as well. The spare tire is carried horizontally and it interferes with loading convenience. Plymouth's tailfins are biggest in the business and a large percentage of owners say they do not like the bulkiness

What does he mean, if he were a dealer? He, the buyer, is the most important person. He can refuse poor workmanship. →

That speedometer is a nightmare. It's like reading a series of bar charts in a footnote. Who decided that a needle on a round dial was no good? →

points, defective spark advance, defective heater, bad seal on master cylinder, bad pressure cap."—Ohio estimator.

"If I were a dealer I would not accept the cars I have seen so far. Maybe some day the companies will discover the public would like to have a little workmanship."—Ohio flight coordinator.

"Burned a quart of oil every 400 miles. They finally put in new rings."—Illinois electrician.

"Oil leak in back of transmission has made hand brake useless on two occasions."—California shipping clerk.

"Speedometer makes a noise like a clock ticking. Dealer removed it six times, replaced parts, but it is still noisy."—Georgia postal clerk.

"Poor, poor, poor engineering of doors. A real safety hazard. They spring open to the touch."—Pennsylvania insurance agent.

"Automatic door locks had to be removed. They do not operate in cold weather. I feel they should be discontinued until perfected."—South Dakota accountant.

(Continued to page 226)

SUMMARY OF OWNERS REPORT: PLYMOUTH

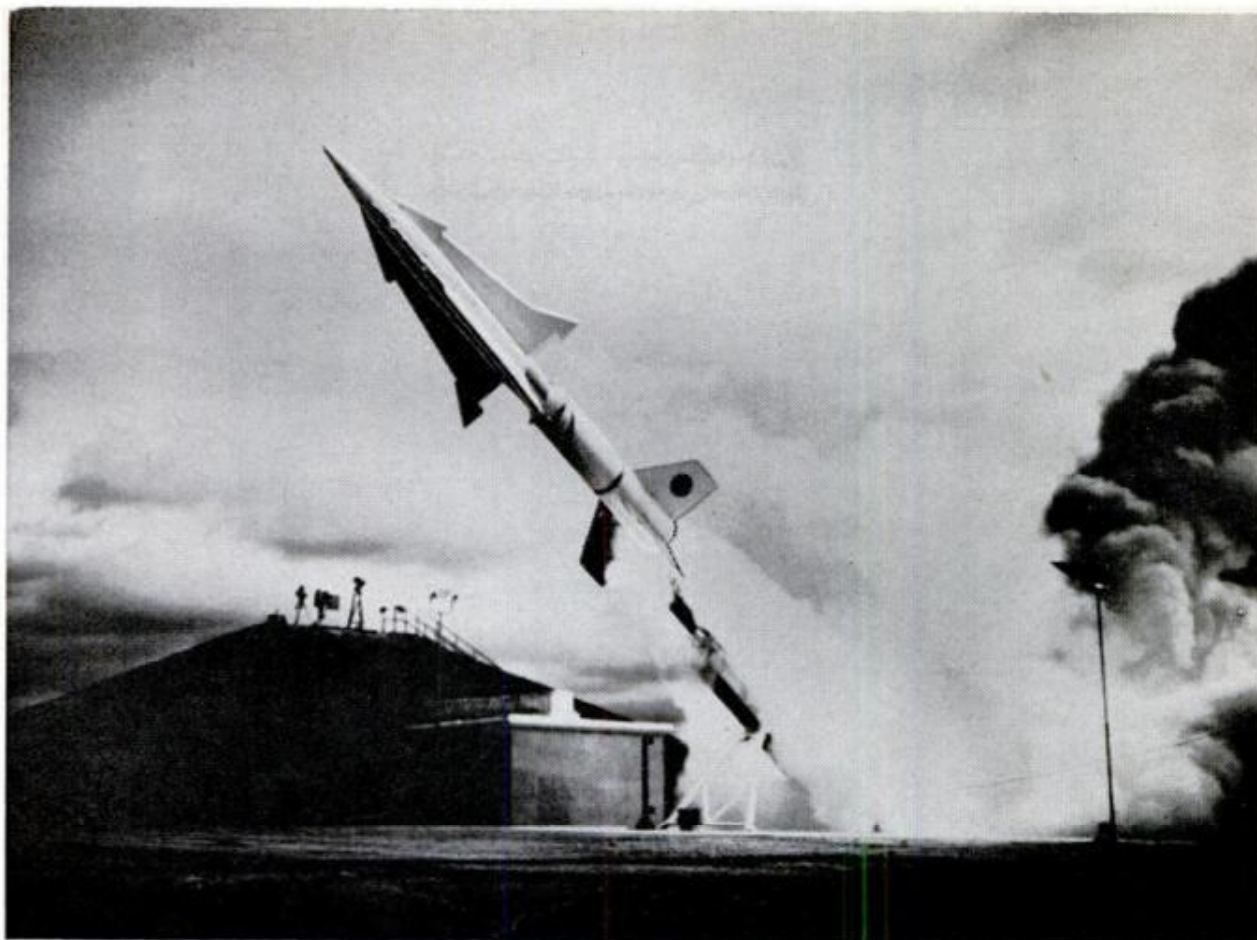
Excellent 50.9%

Average 38.2%

Poor 10.9%



Satisfied V8 economy?		Best-liked exterior feature		Make of other car
Yes, satisfied 73.3%		Front end 15.7%		Another Plymouth 10.2%
No, not satisfied 26.7%		Low, streamlined look 13.4%		Another Chrysler make 5.5%
Satisfied Six economy?		Tailfins 9.0%		Ford Motor make 7.6%
Yes, satisfied 78.1%		Least-liked exterior feature		General Motors make 11.6%
No, not satisfied 21.9%		Tailfins 26.2%		Other U.S. make 3.8%
Best-liked features		Front grille 2.9%		Foreign make 2.3%
Handling ease 43.1%		Windshield 2.1%		How is dealer service?
Riding comfort 39.6%		Best-liked interior feature		Excellent 45.1%
Power, performance 24.8%		Seats 22.2%		Average 37.9%
Exterior styling 24.5%		Dashboard 20.1%		Poor 17.0%
Economy of operation 16.6%		Upholstery 10.2%		Would you buy from him again?
Roominess 13.1%		Least-liked interior feature		Yes, would buy again 53.9%
Roadability 12.2%		Lack of room 8.4%		No, would not 20.4%
Most-frequent complaints		Rear-view mirror 8.1%		No answer, don't know 25.7%
None at all 16.9%		Transmission hump 6.7%		What make was traded?
Poor workmanship 20.1%		Did consider a compact car?		Plymouth 42.0%
Leaks, burns oil 12.8%		Yes, did 35.3%		Other Chrysler make 11.7%
Door design, latches 8.5%		No, did not 64.7%		Ford Motor make 14.0%
Noisy speedometer 8.5%		What make compact?		General Motors make 13.6%
Not enough room 7.3%		Valiant 33.1%		Other U.S. make 5.5%
Cheap interior 7.0%		Falcon 24.4%		Foreign make 1.5%
Had trouble with V8?		Rambler 18.1%		No trade, no answer 11.7%
No trouble 84.3%		Corvair 15.7%		Next car will be?
Some trouble 13.9%		Lark 7.1%		Plymouth 33.5%
Considerable trouble 1.8%		Dart 1.6%		Other Chrysler make 6.7%
Had trouble with Six?		Plymouth only car in family?		General Motors make 7.6%
No trouble 56.5%		Yes, it is 62.1%		Ford Motor make 2.3%
Some trouble 22.9%		No, it is not 37.9%		Other U.S. make 0.3%
Considerable trouble 20.6%				Foreign make 1.5%
				Unnamed compact car 1.2%
				Undecided 46.9%



U.S. Army photo

Army Tests Nike Zeus at White Sands

Test firing of an early model of the U.S. Army's Nike Zeus missile has taken place at the White Sands, N.M., Missile Range. The weapon is now in the research and

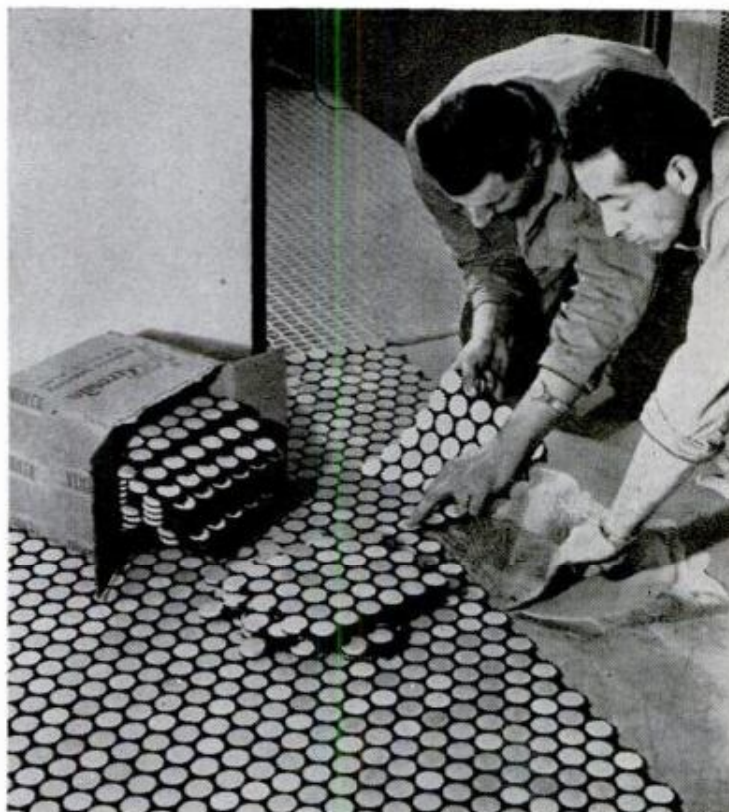
development stage, the Army reports, and all performance details—such as speed, altitude and effective range—are still “highly classified.”

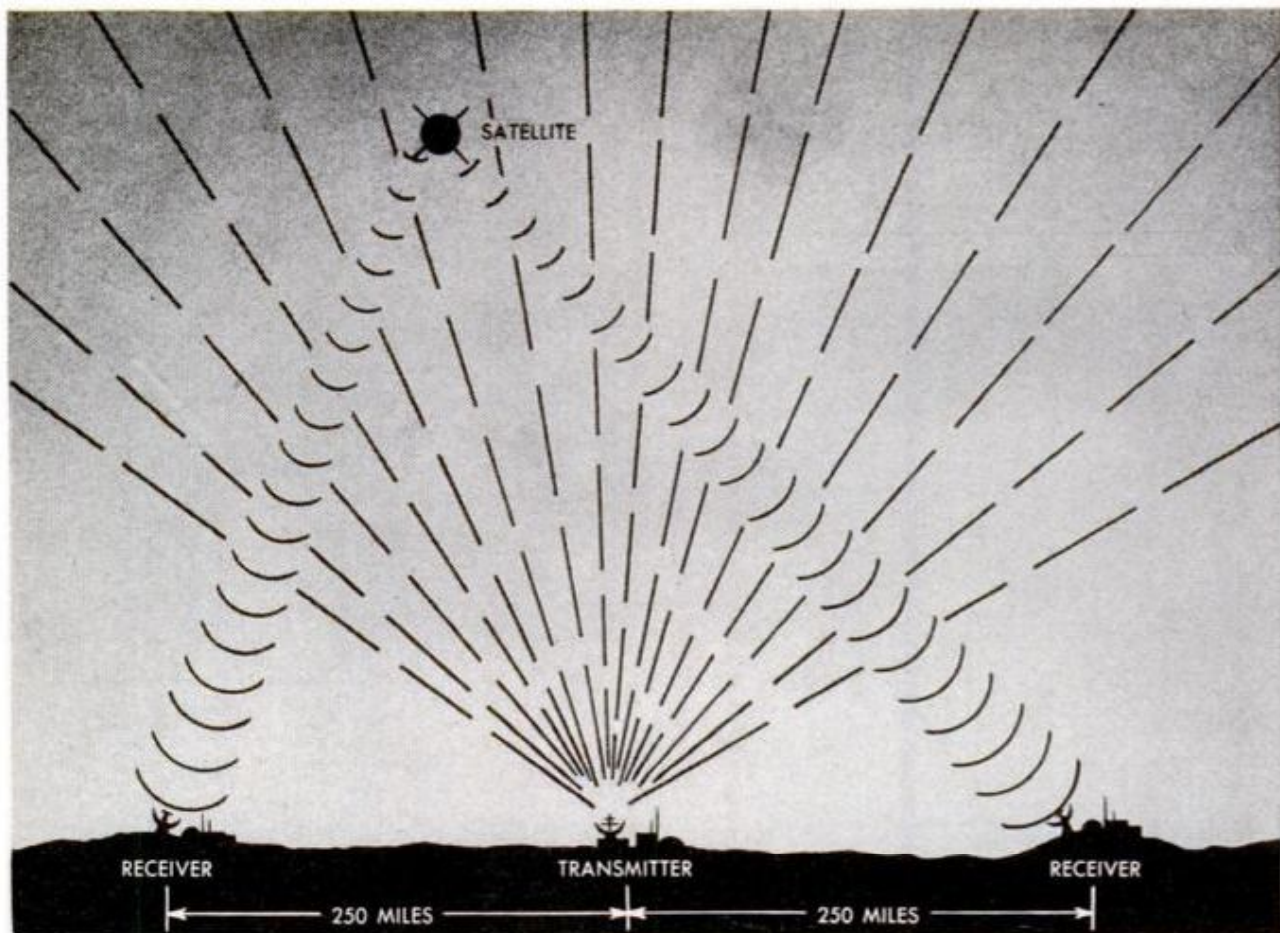
Mosaic Tile Set in Rubber

Developed in Italy, a new mosaic flooring has ceramic tiles set in rubber sheets for rapid laying as well as for under-foot cushioning, silence and nonslip properties. The tiles are held by molded cavities in the flexible matrix. They can be replaced easily if accidentally broken. The sheets come in 8 by 8-inch and 12 by 12-inch squares and are ready for cementing to the floor.

☐ Woven into a new British-made carpet is a heating element which produces 1000 watts of evenly distributed heat that is controlled by a thermostatic plug.

☐ Spent liquor from Scotch whiskey distilleries, formerly regarded as a waste product, is now being processed to produce a valuable food for livestock and poultry.





Artist's conception of one of two radar "fences" that gather information about all orbiting satellites

U.S. Navy's Space Surveillance System Tracks All Satellites

WHEN THE NAVY announced last February that a mysterious satellite was circling Earth, rumors that it somehow was spying for Russia obscured a more important bit of news. The news? That for the previous two years the Navy had been quietly spotting satellites and tracking same.

Its space-surveillance system, called "Spasur," was set up to detect, track and predict orbits of noncooperative or hostile satellites passing over the United States. Although still in the experimental stage, Spasur tells the Navy, minute by minute, just where each satellite that has been sent from Earth is moving. It even keeps track of the "garbage," the bits of rocket that float around after a satellite has orbited.

"Garbage," by the way, is what the Navy called both the mysterious satellite and rumors that it was Russian. Officially, it's the re-entry body of Discoverer V, an Air Force satellite.

Spasur is a complex of electronic and radar gear. Headquartered at Dahlgren, Va., is an illuminated map of the world. The map shows satellite positions at the moment of viewing, but a flick of the switch causes it to show what the locations and paths of the manmade moons will be hours, days and even weeks ahead.

Predicting is done by an electronic computing machine performing 15,000 arithmetical computations a second from data sent to it from two radar "fences" which stretch, like a belt, across the lower half of the U.S. Each fence is 500 miles long; each has a radar transmission station which sends signals far out into space in the shape of a fan. Signals bounced off a passing satellite are picked up by receiving stations at each end of the fence.

In the southeastern fence, the radar transmission is at Jordan Lake, Ala.; the receiving stations are at Fort Stewart, Ga., and Silver Lake, Miss. The southwestern fence has its transmitter at Gila River, Ariz.; receiving stations are near San Diego, Cal., and Truth or Consequences, N.M. In both fences, the transmitting and sending stations are fields of aluminum wire covering areas 1600 by 300 feet.

The receiving stations have the necessary equipment to measure in a very precise manner the direction from which the satellite reflections are received. With this information the Dahlgren computer determines in a fraction of a second the altitude, speed and course of the satellite—whether mysterious, Russian, or domestic—passing overhead.



Military Bridge Floats Without pontoons

Lumbering across the Rhine River at Koblenz, Germany, on a new type of military bridge, a heavy tank barely got its treads wet—though the bridge is con-

structed without pontoons. Instead, it is built with metal plates that are hollowed out to provide buoyant air spaces inside. The plates quickly lock together.

Boat Top Unzips to Let Air In, Boaters Out

Convertible tops are made to order for outboard runabouts for protection from sun and weather, but they often restrict air circulation and traffic inside the boat. A

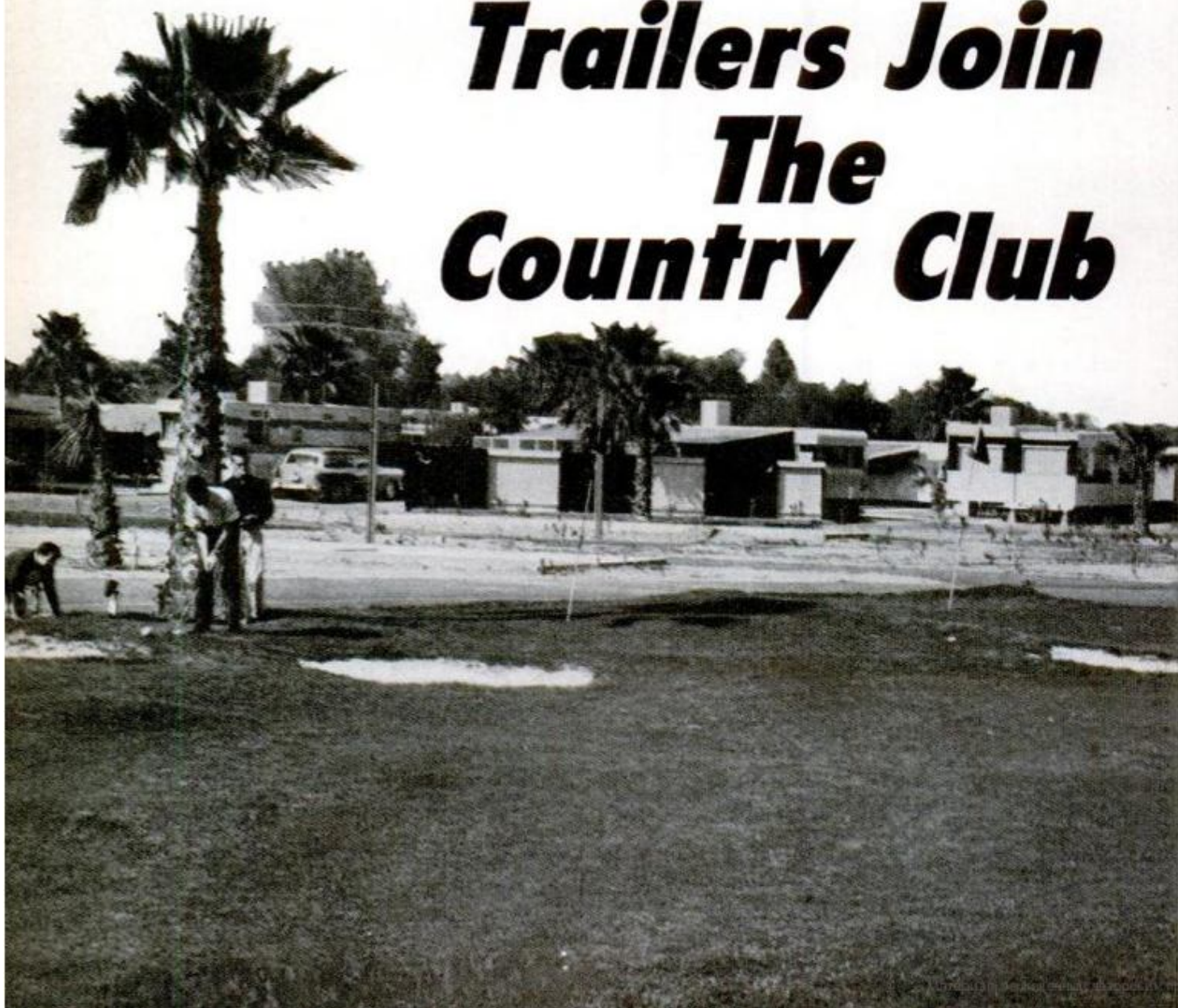
new top, rigged with two zippered slits in the front, solves the problem by letting air in under the scooplike front, and allows the front to be opened like a hatch.



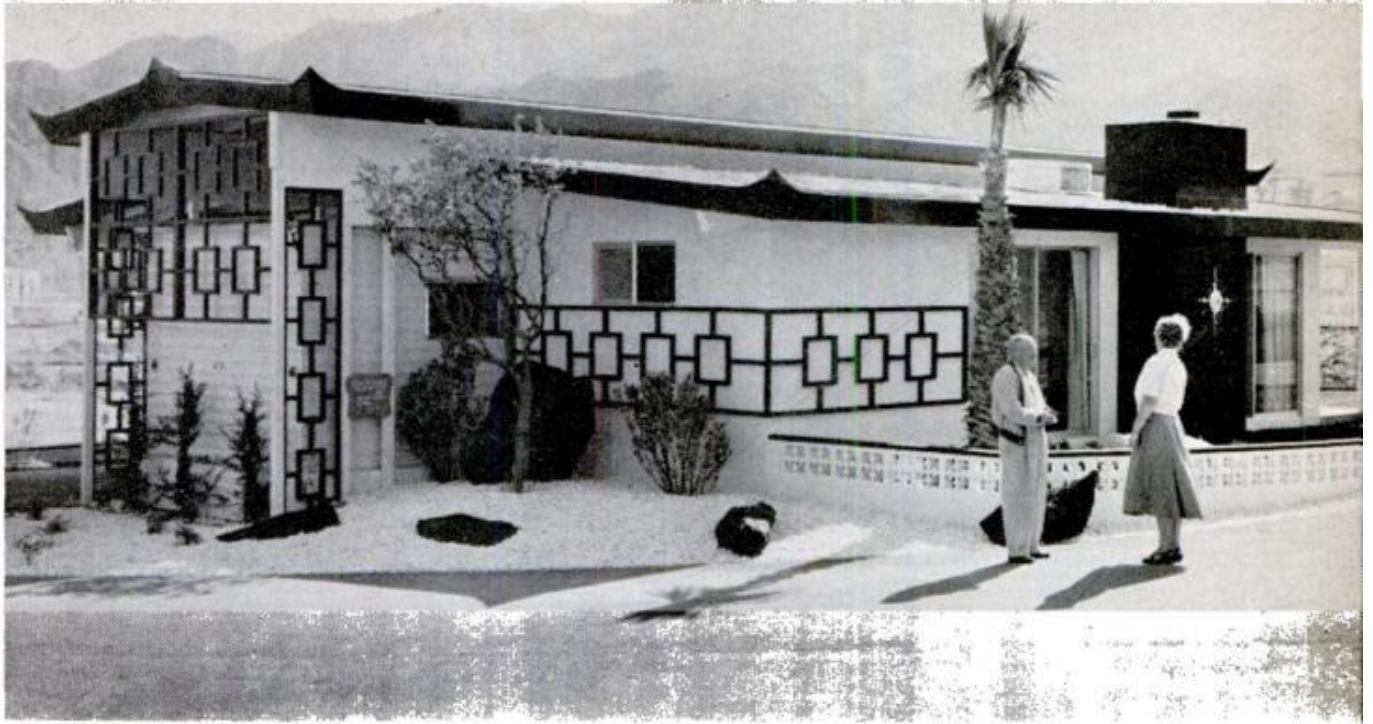


Problem—find the trailer in this oriental-motif mobile home installation in Bing Crosby's Blue Skies Park near Palm Springs, Calif. Below, view of the park from its private pitch-and-putt golf course

Trailers Join The Country Club



See OCT 60, 16



Another view of this month's cover "home." Trailer sits on concrete foundation which doubles as storage space

By Thomas E. Stimson, Jr.

HOW WRONG CAN YOU BE? That was the general reaction a couple of years ago when an economist predicted that 20 million Americans would be living in house trailers in 15 or 20 years. But now it's beginning to look like the forecaster knew what he was talking about. Some fabulous things are happening, and mobile homes are becoming permanent and luxurious residences.

Technically they are still trailers, and

the law says that they must have wheels and tires, a towing hitch and an annual license plate, but from the practical standpoint it's a real chore to uproot a 60-foot trailer and put it on the road.

All this started years ago when people with small vacation trailers first stretched an awning out to one side, creating outdoor space for a few folding chairs. Later they put down ground coverings, then put up screens to keep out the bugs. This

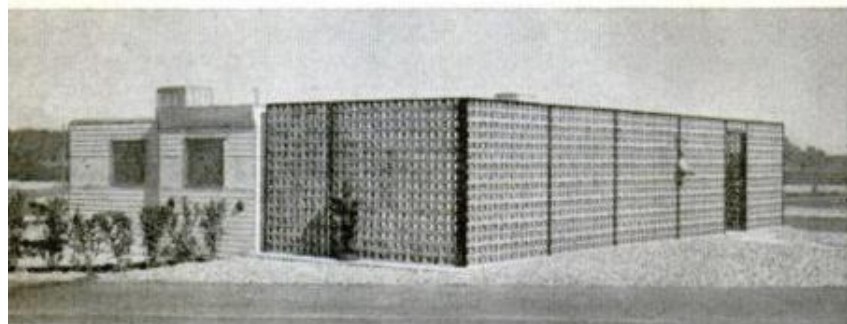


Homeowners in Back Bay Park can moor their boats in their front yards

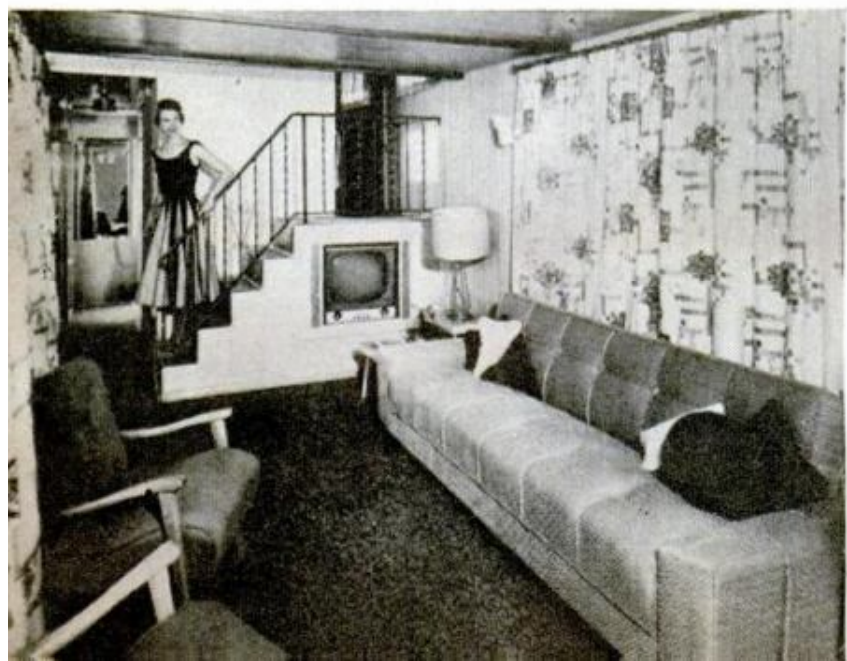




Above, typical modern mobile home interior. Below, "Expando" trailer with concrete block patio screen



Below, interior in a new "tri-level" trailer. Full-draped walls and extra-length davenport minimize narrow living room



led to the cabana, a room with its own roof and walls attached to one side of a trailer. Meanwhile, some of the trailers were growing uncomfortably large for highways.

Look what has happened now. For a good look, visit "Blue Skies," Bing Crosby's new million-dollar trailer court near Palm Springs, Calif. Rex Thompson, Bing's manager, proudly shows you the park's swimming pool, the billiard and card rooms and the shuffleboard courts, the pitch-and-putt golf course and the big recreation building where visiting TV talent make personal appearances.

Still under construction, the park is to have its own small shopping center, a uniformed gateman and maid service for those who desire it. Thompson tells you that the 26 acres inside the park contain 152 trailer spaces, but there is hardly a trailer in sight. About all you can see are some small, beautiful homes, each attractively landscaped. Only a close look reveals that the end of a trailer projects somewhere from each structure.



Pool at Blue Skies Park. Other features include shopping center, recreation building, even maid service

These are residential mobile homes such as no one ever saw before. Each consists of three parts—the trailer itself; attached, permanent cabana, often with a fireplace and porch; and a ramada or separate roof that stretches over the trailer and an adjacent carport. Next to the carport there may be a row of storage lockers and a small building for the home laundry.

A typical 10 by 60-foot trailer at Blue Skies is custom-built and furnished and decorated by an interior decorator. Part of one wall is removed to open that side to the cabana, creating a living room some 20 feet wide. From inside, one can't tell where trailer and cabana join. Wall-to-wall carpeting covers the joint in the floor.

The utilities are all underground, and include natural gas for heating, 220-volt current for the electric kitchen, two phone lines (one to the park switchboard, one a private outside line), and water and sewer connections. An underground coaxial cable brings in color TV from a master antenna.

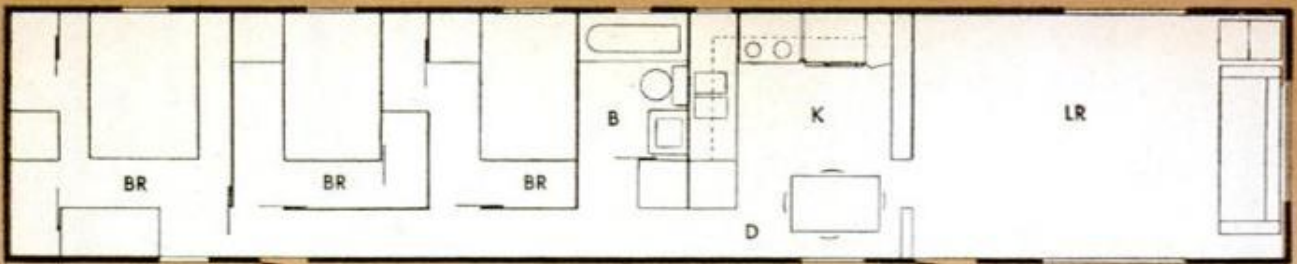
This is not cheap living—a deluxe trailer like that costs around \$15,000. The cabana and other structures, designed by an architect, cost about as much and Rex Thompson reports that some owners at Blue Skies are spending even more—up to \$40,000 for

their complete mobile homes. In addition, they pay a ground rent from \$720 to \$1200 per year, plus their own utilities.

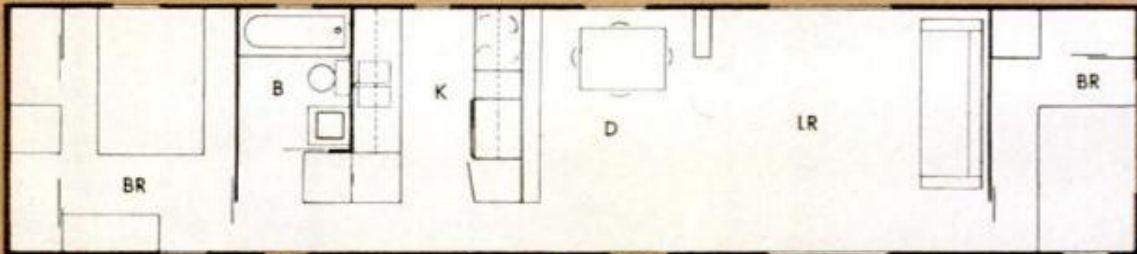
Blue Skies is not the only example of a sumptuous trailer park. Just being completed at Newport Beach, Calif., is Back Bay Park on upper Newport Bay. Here the residents moor their boats in their own front yards. They have their own beach and a spectacular bay-front clubhouse.

At Back Bay the trailers are custom-designed to fit the cabanas instead of the other way around. Each trailer measures 10x50 feet; each cabana another 12x40 feet plus porch, outdoor barbecue and carport. The trailer-cabana combinations sell at from \$12,000 to \$25,000; ground rent runs from \$80 to \$150 per month.

Why should anyone pay prices like these when he can buy a permanent residence for the same money or less? There are a number of reasons. Most of the top-priced mobile homes are bought by well-to-do people who are retired or semiretired. They no longer want the bother of maintaining a large home, and a compact, efficient mobile home exactly fits their needs. The most expensive trailer parks are located in high-priced resort areas where *any* kind of living is expensive. Each resort



56 x 10 CAPRI—THREE-BEDROOM CONVENTIONAL



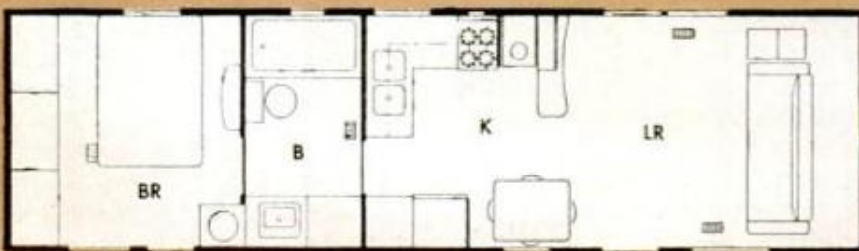
50 x 10 CAPRI—SPLIT THREE BEDROOMS



50 x 10 GOLDEN STATE—TWO BEDROOMS, FRONT KITCHEN



45 x 10 GOLDEN STATE—ONE BEDROOM, CENTER KITCHEN



37 x 10 GOLDEN STATE—ONE BEDROOM, CENTER KITCHEN

Five examples of mobile home floor plans—several optional plans are usually available in standard models. Fronts are to the right. Trailers are completely furnished and feature many ingenious built-ins



Hillside Trailer Park near Santa Monica enjoys a fine view over the coastal highway toward the Pacific

park is like a private club and has a well-planned program of activities.

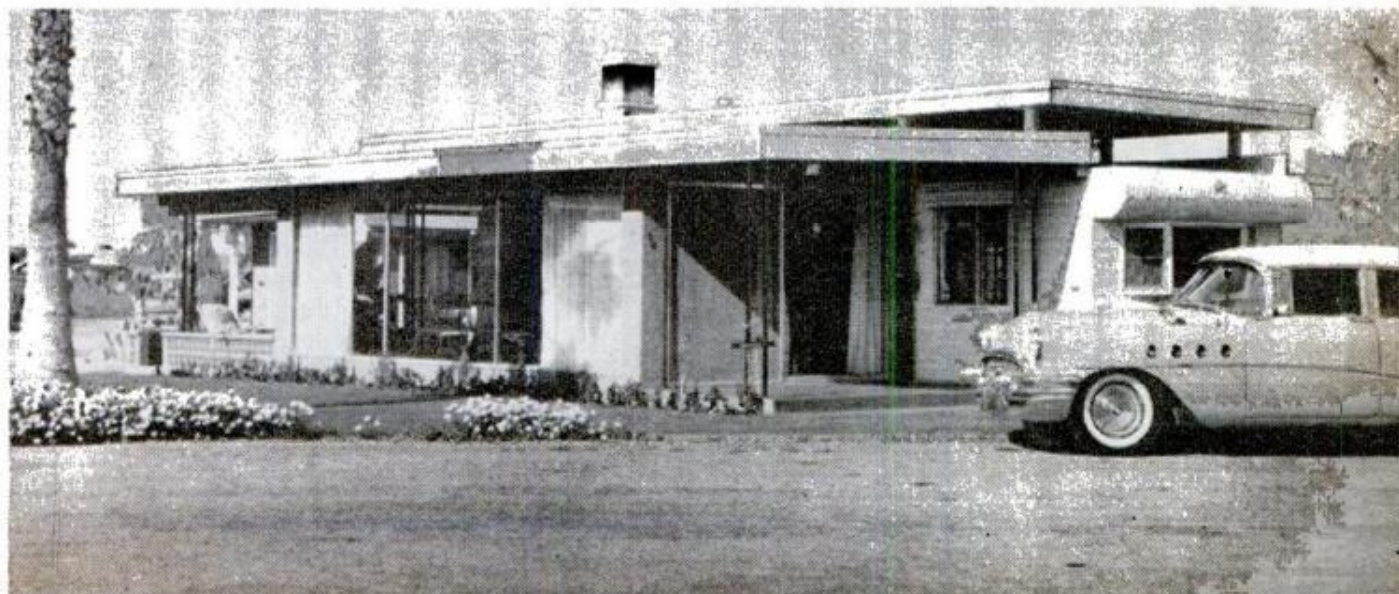
The Sahara mobile home park just outside of Palm Springs, for instance, has ballroom dancing twice a week in its recreation hall, and motion pictures in the hall on Wednesday nights. They have card parties and potluck dinners. Tennis courts, riding clubs and golf courses are only a few minutes away, and if a resident tires of all this he can hitch up his smaller trailer that is stored in a parking lot and take a vacation.

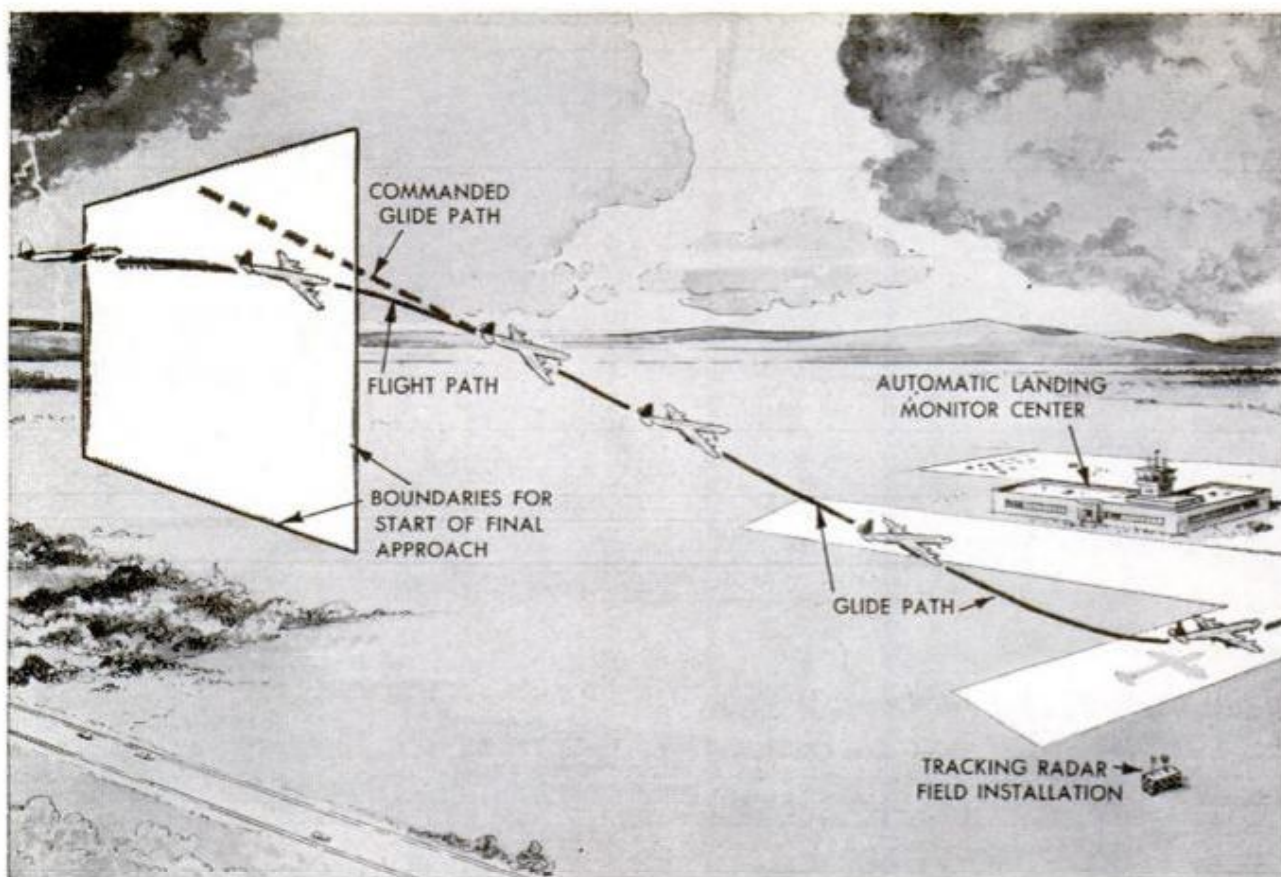
About every four years the average resi-

dent moves to another park in another region. If his residential trailer is a big one, say 10x50 feet, he hires a licensed towing service to do the job. In California a big mobile home may be towed on the highways only during daylight hours and not in inclement weather or on weekends or holidays. If the owner leaves a permanent cabana behind him, he arranges to sell it to the next occupant, in turn he buys any permanent improvements that are installed in the space he occupies at the new park.

(Continued to page 214)

Trailer seems almost incidental in this cabana-ramada installation at Sahara Trailer Park in Palm Springs

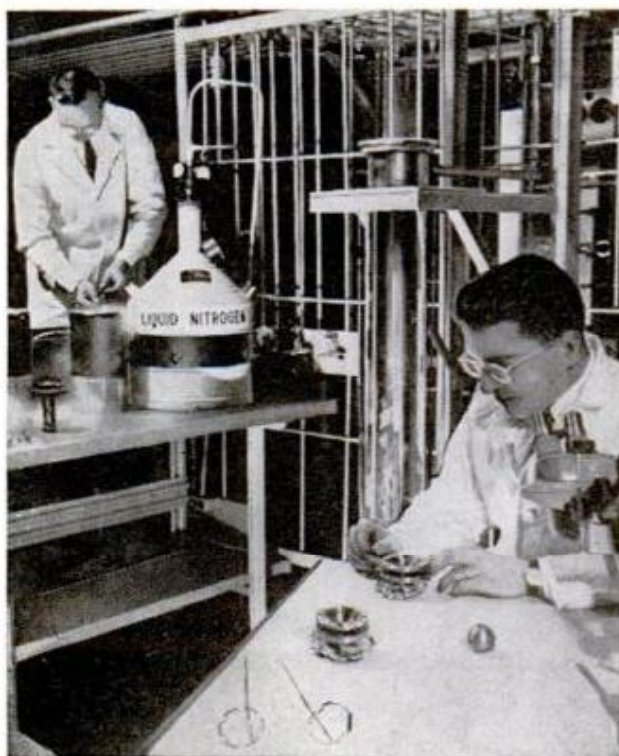




Automatic System Lands Two Planes a Minute

Even in stormy weather, two airplanes a minute are landing on a runway equipped with a system undergoing tests at the National Aviation Facilities Experimental Center, Atlantic City, N. J. The automatic landing system uses radar to track a plane and radio to transmit controls to the automatic pilot. The tracking radar "locks on"

the plane when it flies through an electronic window from two to four miles from the runway. Course corrections are automatically transmitted to the plane's automatic pilot. If the plane is not making a proper approach or is in danger of overtaking another landing plane, the system automatically waves it off.



Gyroscope Spins at -456 Degrees

Tomorrow's voyager through space may navigate by using a gyroscope that spins at -456 degrees F. Such a device is under development at General Electric's laboratories. It's called a cryogenic gyroscope because it takes advantage of the fact that at extremely low temperatures some metals offer almost no resistance to electricity. The components of the gyroscope include a golfball-sized metal sphere that floats in a vacuum, suspended solely by an invisible magnetic field. It is spun by another magnetic field, and should be able to spin freely for many months or possibly years after once being set in motion. Liquid nitrogen and helium have been used to provide the low temperatures for testing the device. After further tests, experiments will be made to fit the gyroscope into inertial guidance systems for missiles, navigational systems for submarines and, it's hoped, for space.



He Lets His (Sailing) Cat Out of the Bag

When Carl Ehrman of Palo Alto, Calif., goes sailing, he carries his sailing catamaran down to the sea in two duffel bags. It takes about a half hour to inflate the two

pontoons, rig the deck, daggerboard keel, mast, and sail, and the 70-pound, 12-foot boat can be lifted easily. The boat is so successful that Ehrman is marketing it.

Japanese House Is Boxed Against the Weather

Built at Urasoe-Son, Okinawa, a model farmhouse combines the traditional open style of Japanese architecture with strength to weather a typhoon. It is tucked within a

concrete box formed by pillars and an overhanging roof. Shutters can close to protect the windows. The house can be built at the cost of \$100 for each 36 square feet.



TAKE YOUR MEASURE!

By Samuel Cabot, Jr.

TEST YOUR KNOWLEDGE of weights and measures by answering the 20 questions below. Check the answers that you think are correct, then compare them with the list of correct answers on next page. Any score over 12 is good—over 16, excellent.

1. What track event is known to sports writers as **the furlong**?
 - a. The two-mile run.
 - b. The 440-yard dash.
 - c. The 220-yard dash.
 - d. The marathon.
2. **Troy weight** is:
 - a. The standard weight system of western Turkey.
 - b. A small weight used on a balance scales.
 - c. A derogatory expression used in Upstate New York to signify short weight.
 - d. A weight system used by jewelers.
3. My Russian gazetteer says it is 240 **versts** from Minsk to Pinsk. How far is that?
 - a. About 1200 miles.
 - b. About 160 miles.
 - c. About 9 miles.
 - d. About half a mile; Minsk and Pinsk are sister cities separated by the Bulloni River.
4. On British scales, my wife weighs exactly **10 stone**. What does she tip the beam at in America?
 - a. 100 pounds.
 - b. 120 pounds.
 - c. 140 pounds.
 - d. 200 pounds.
5. A farm lad sang to his sweetheart, "I love you a **bushel and a peck**." How many quarts did he love her?
 - a. 10
 - b. 28
 - c. 36
 - d. 40
6. A **dekameter** is:
 - a. 100 decimeters.
 - b. 1/100th of a decimeter.
 - c. An instrument used in the lumber industry to measure decay.
 - d. A line of poetry containing 10 syllables.
7. A long ton is larger than a short ton, but how about a **metric ton**? Is it
 - a. Larger than a long ton?
 - b. Smaller than a short ton?
 - c. Larger than a short ton, but smaller than a long ton?
 - d. The same as a long ton?
8. When Eb and Flo drove to Canada, Flo was appalled at the price of gasoline. "It costs only 30 cents a gallon in the States," she complained. "But," said Eb, "these are **imperial gallons**, so if we overlook the exchange problem, we get just as much gas for a dollar here as at home." How much did gas cost in Canada?
 - a. 24 cents per gallon.
 - b. 36 cents per gallon.
 - c. 37.5 cents per gallon.
 - d. 40 cents per gallon.
9. In Shakespeare's "The Tempest," there is a song that starts "Full **fathom five** thy father lies." How deep is that?
 - a. 30 feet.
 - b. 50 feet.
 - c. 60 feet.
 - d. 100 feet.
10. A **dram** is:
 - a. A Swedish mile.
 - b. A Scottish unit of liquid measure, as a dram of whiskey.
 - c. A metric unit of dry measure.
 - d. Three scruples.
11. "The sailboat approached the buoy at **six knots per hour**." What's wrong with that statement?
 - a. No boat could sail that fast.
 - b. A knot is a measurement of speed, not distance—therefore the expression "knots per hour" is incorrect.
 - c. A knot is a measure of depth.
 - d. Boats are required by law to slow down when nearing buoys.
12. How many cubic feet in a **cord** of wood?
 - a. 32.
 - b. 48.
 - c. 96.
 - d. 128.
13. "**Half a league**, half a league, half a league onward!" How far did the Light Brigade charge?
 - a. A mile and a half.
 - b. Two miles.
 - c. Three miles.
 - d. Nine miles.
14. A **pedometer** is:
 - a. A gadget the shoe store clerk uses to measure your foot.
 - b. A device that measures how far you walk.
 - c. A measure of length in the metric system, equal to 10 kilometers.
 - d. A foot rule.
15. The **height of a horse** is usually expressed in:
 - a. Feet.
 - b. Rods.
 - c. Hands.
 - d. Fetlocks.

16. "Give him an inch and he'll take an ell," runs the old saying. What's an ell?
 a. A carpenter's square.
 b. A unit of cloth measure.
 c. Abbreviation for league.
 d. A square yard.
17. The two-armed instrument used to measure **diameters** is called a:
 a. Calibrator. c. Calibre.
 b. Capillary. d. Calipers.
18. The abbreviation **cwt.** stands for:
 a. Hundredweight.
 b. Counterweight.
 c. Pennyweight.
 d. Carat
19. Which of the following does **not** equal **16½ feet**?
 a. Perch. c. Pole.
 b. Stere. d. Rod.
20. The British periodical **The Fortnightly Review** is published:
 a. Every fourth night.
 b. The fourth of every month.
 c. Every two weeks.
 d. Every other month.

Take Your Measure!

Here are the correct answers to the questions on weights and measures that appear on these pages.

1. c. 2. d.
3. b. A verst is about two-thirds of a mile. Another Russian verst, used locally in Karelia, is slightly longer.
4. c. A stone is 14 pounds; 160 stone make a long ton.
5. d. 6. a.
7. c. Short ton, 2000 pounds; long ton, 2240 pounds; metric ton, 1000 kilos or 2205 pounds.
8. b. An imperial gallon is equal to about 1-1/5 U. S. gallons.
9. a. A fathom is six feet.
10. d. Scruples and drams are units of apothecaries' weight.
11. b.
12. d. A cord is 4 by 4 by 8 feet.
13. a. A league is three miles.
14. b.
15. c. A hand is four inches.
16. b. 17. d. 18. a.
19. b. A stere is a cubic meter.
20. c.

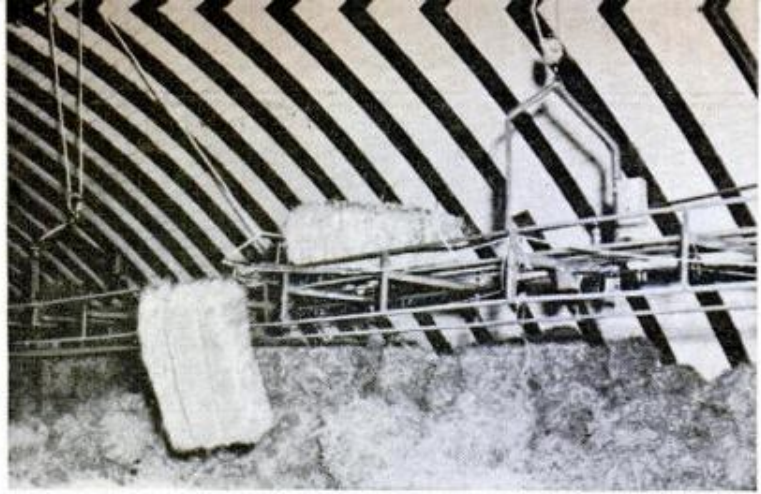


"Belly Whopper" Goes Anywhere

Indoors and outdoors, on land and on water, a roller-wheeled plastic toy lets youngsters "belly whop" to their heart's content. Made of unbreakable plastic, the craft is a little over a yard long, 15 inches wide and weighs six and a half pounds. The front roller wheel is guided by a side-arm steering handle. Being made of plastic, the little craft will not mar furniture and is rustproof. It will operate on sand, concrete, grass, snow, ice and water.

Retreat of Glaciers Indicates Warmer Climate

Glaciers in Russia are retreating faster, and ice formations in Russia and Finland are breaking up sooner in this century than they have in the past, says Russian scientist B. Sh. Tsomaya, confirming speculation that the climate is warming up. Tsomaya analyzed positions of glaciers in the central and eastern parts of the main Caucasus mountain range which have been measured since 1911. He found the speed of the glaciers' retreat is greater in recent years than in the preceding period. Especially large changes in the retreat speed began in 1930, he says. Some retreated three times faster than they had previously. Measurements also have shown that the rise in the snow line on the slopes of some mountains has increased three to four times during the past 100 years.



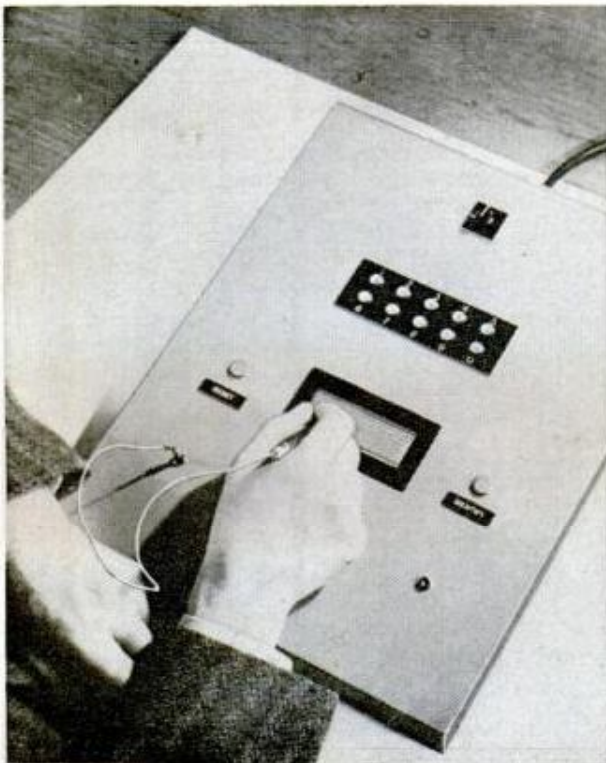
New Holland Machine Co. photo

No More "Bricklaying" With Hay Bales

One man can perform a tough farm job—that of storing hay—with a conveyor system that drops bales off automatically. The system fits the trend of random storage of short bales in preference to laborious hand stacking. The "bale locator," which tips bales off anywhere along the conveyor, is controlled remotely; a tug on a rope moves it to a new position. The conveyor system is lightweight, and will negotiate turns and dips.

Machine Reads Handwriting

Boasting a 10-word vocabulary, a machine the size of a briefcase reads handwritten words. Developed by Bell Telephone Laboratories, the handwriting reader can read the numbers "zero" through "nine," spelled out. While using the machine, the operator writes on a special surface with a metal stylus. When he touches an "identify" button, a light appears above the correct digit. Such machines may be valuable where data must now be translated into machine language.



"Orange Peel" House

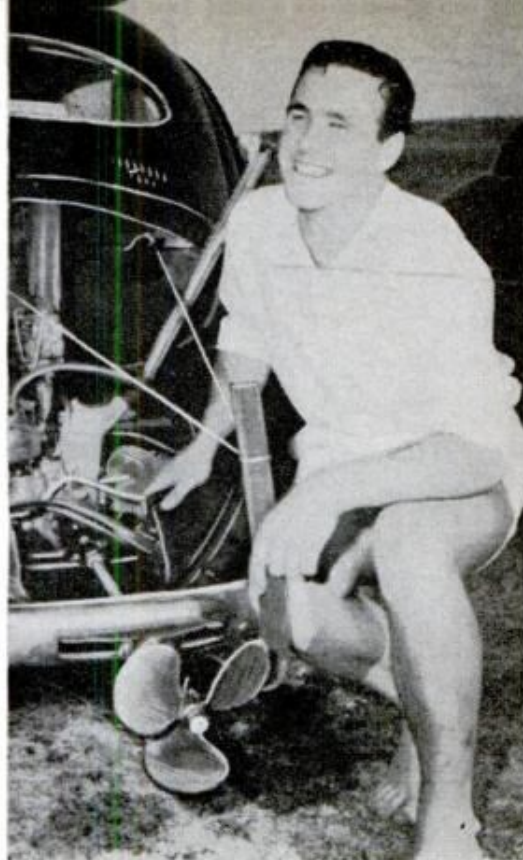
Eight plastic segments that fit together like pieces of orange peel form a small, spherical house now being produced in Germany. An adhesive used on the seams makes them weathertight. Inside the small dwelling are a kitchen, bathroom and living room—which doubles as a bedroom at night. The components of the house can be transported easily in a large chest. No foundation is necessary when it is erected. Inventor of the plastic structure is auto engineer Egon Bruetsch of Stuttgart.





VW Doesn't Go Under Down Under

Australian Peter Webster had a Volkswagen and wanted a boat. So he waterproofed the ignition system, ran snorkel pipes from the exhaust pipes, from the oil breather, and from the carburetor air intake. Then he attached a propeller to the fan-belt pulley, running the shaft through a bearing in a bumper slot. Thus equipped he headed for the beach, drove around the harbor for five miles and returned safely to land. To keep the "ship" from sinking, his passenger manned a small bilge pump.



Camera Can Shift Speed, Zoom In

Apparently this young man is about to photograph the scene in the next column—and he can do it without any more concentration (on photography) than he shows here. The 8-mm. camera has an electric eye to adjust the lens aperture automatically, a zoom lens that lets him get close-ups without moving and a control that changes camera speed to slow motion and back without losing a frame. The f/1.8 lens zooms from 9 mm. to 27 mm.

Filter for Back-Yard Pools

Even the girl next door will come over to see what keeps your pool so clean. Explain that it's a filter specially designed for plastic pools. Water is pumped into the filter unit inside a 14-inch drum where it passes through a diatomaceous earth media. The filter bag, made of fabric woven from acrylic fiber, will last indefinitely. The unit will handle 987 gallons of water per hour—ample capacity for the average plastic pool.

Lomart Industries photo





Compromise Cruiser

For boaters who want the inexpensive comfort of a houseboat but would also prefer the performance of a cruiser hull, a new live-aboard cruiser offers both, but at about half the cost of a full-scale cruiser. The welded steel hull is 37 feet long and 11 feet, 10 inches across the beam; two 113-horsepower gas inboard engines push her to 16 miles an hour. The cabins have six-foot, four-inch headroom. The boat sleeps four or six depending on the floor plan chosen. It is wired for 12 or 110-volt current, and carries 120 gallons of gas and 60 gallons of water. The boat even has a "basement," 10 by 11 by 2½ feet, under the cabin deck.



"Airlift" Camera Tripod

Air pressure in the center column of a new camera tripod allows the photographer to raise, lower, and adjust his camera up to 62 inches high more smoothly than with manual tripods. A side lever (see arrow) controls pressure as needed. Designed chiefly for professional cameras, it will work on any with a 3/8 or 1/4-inch fitting.



Number, Please!

Whenever you write us to

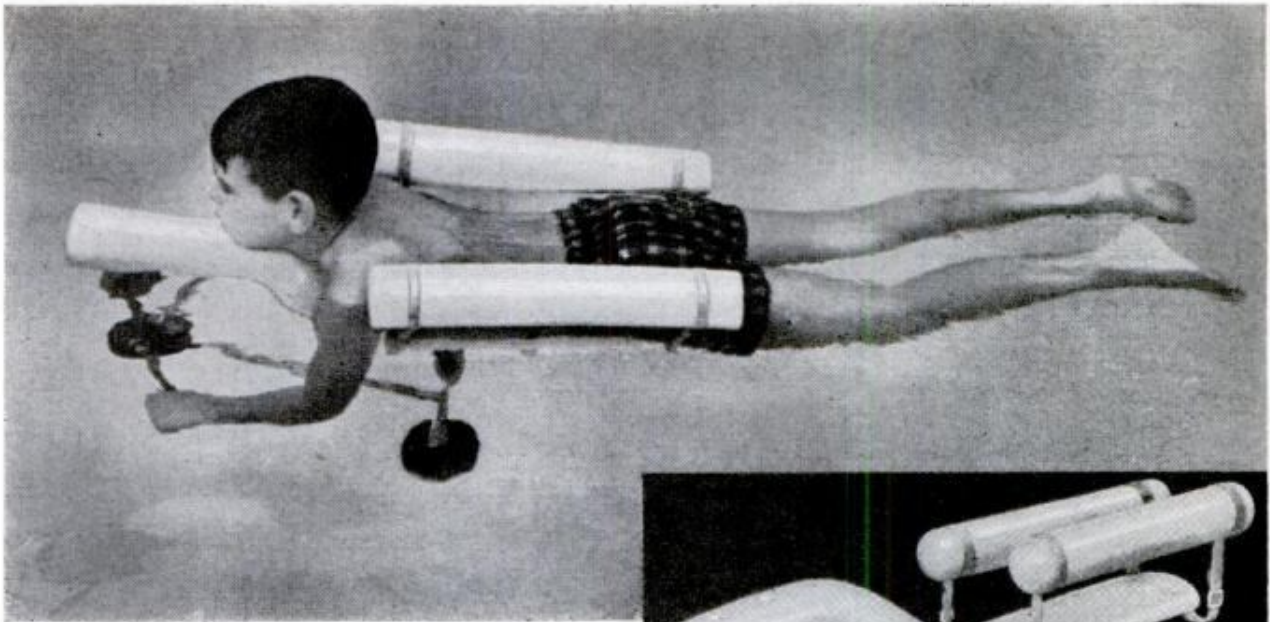
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- Change your address
- Order your own or a gift subscription

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PLEASE INCLUDE YOUR CITY POSTAL ZONE NUMBER IN YOUR ADDRESS

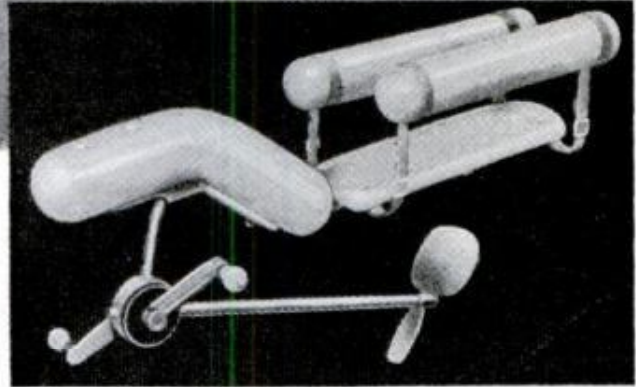
This insures better delivery.

It helps you and it helps the postman.



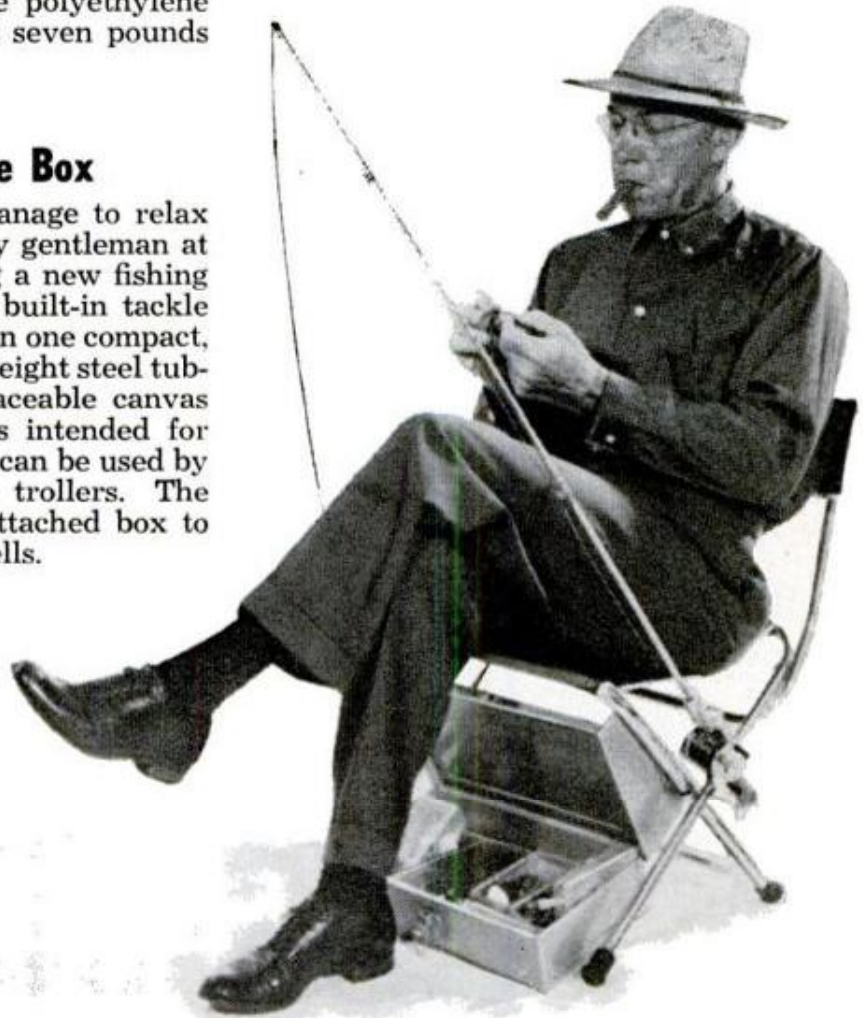
Hand-Propelled "Water Wings"

Strictly for fun in the water, a new hand-operated float lets a child "swim" around indefinitely whether he can swim or not. What's more, it can even be adjusted to fit adults. It's made of four soft polyethylene-foam floats connected by aluminum tubing, and cradles the body comfortably while the hand crank drives the safe polyethylene propeller. The float weighs seven pounds and folds for carrying.



Chair Has Built-in Tackle Box

Still-fishermen seldom manage to relax as comfortably as the happy gentleman at right, who is demonstrating a new fishing chair that provides a seat, built-in tackle box, and double rod holder in one compact, folding unit. Made of lightweight steel tubing with washable or replaceable canvas back and seat, the chair is intended for bank and dock use, but also can be used by boat fishermen, especially trollers. The duck hunter can use the attached box to store his lunch and extra shells.



Throw Back The Big Ones

By Jack B. Kemmerer





A FEELING of overwhelming menace grips you. It's bearing down, ever down. Death feels imminent. You're not sick, especially, but you are haunted with fear—a blind, unreasoning fear. You know, beyond all reason, that your time is up—you're going to die. So strongly do your exposed nerves feel this that you lie down and wait for death to come.

Ten — twelve hours later, you awaken. The futile fear is gone, but in its place are memories so excruciating you feel as if you had been brought back from the dead.

What happened? You just ate a small piece of tropical fish containing natural poison which causes terrific hallucinations of depression and fear. This poison is but one of several new poisons found by the 20th century witch doctor of the seven seas, Dr. Bruce Halstead, in his worldwide hunt for the secrets of primitive witch doctors.

Thirty-eight-year-old Dr. Halstead is the Director of World Life Research Institute of Colton, California. He doesn't look his years and it is easy to mistake this tall, slender scientist dressed in his skin-diving equipment, for a weekend sportsman. Dr. Halstead, however, is recognized as the world's foremost authority on poisonous fishes.

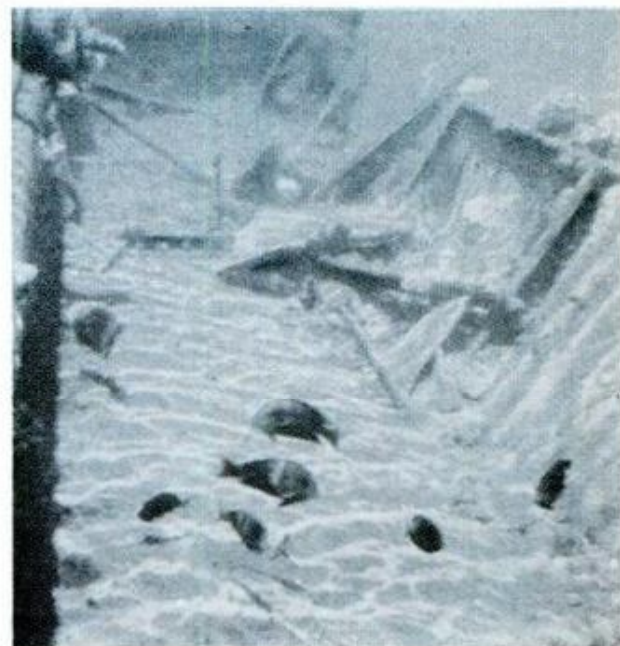
Dr. Halstead has probably caught and handled more fish in his time than any man in the country. His years of intensive research in tropical regions have been centered mostly on one subject — poisonous fishes. In addition to the material gained from these scientific expeditions, the doctor has come up with one iron-clad rule for all fishermen:

"Between latitudes 35 degrees north and 34 degrees south in the central and western Pacific or the West Indies, *throw the big*

At left, Dr. Bruce Halstead in his own natural habitat, inspecting a porcupine fish speared off the Galapagos Islands on the equator just west of Ecuador. The porcupine fishes are puffer-like, and are among the most poisonous of the marine fishes

Parrotfish, above left, and red snapper, above right, picked up on an expedition to the central Pacific. Both are known causes of one type of ichthyotoxism

Happy hunting ground for scientist and fisherman alike, submerged wrecks on the floor of tropic seas are favorite hangouts for many species of ocean fish



fish back, and the bigger they are, the more you should be careful of them." He adds, however, that cases of fish poisoning are quite rare in the waters off the west coast of the United States and Mexico, and in Florida's coastal waters.

The reason for Dr. Halstead's numerous expeditions actually had its beginning back during World War II when hundreds of American servicemen were poisoned by eating such common fish as the great barracuda, amberjack and sea bass caught in tropical waters. After the war the military decided that they wanted to be ready with new survival kits and instructions for their men in the event they were called upon to fight again in the tropics. Then the U. S. Public Health Service got into the act when sea bass caught in the Midway Island area poisoned a large number of people who dined on them in Honolulu.

So Dr. Halstead was selected to head an expedition. His problem: "Find out what fish are poisonous—where—and why?"

Nobody sent an expedition to the South Seas to examine spoiled fish that were poisoning people. It's not that kind of poisoning—in fact, it is entirely different from any other type of poisoning known today. This new poison, extremely deadly, often produces extraordinary results even when it is not fatal.

The poison, though, isn't a new one. Man's knowledge of eating poisonous marine organisms dates back to the time of the Pharaohs of ancient Egypt, to the

Toltec civilization, and to the days when Moses led the children of Israel out of the land of Egypt with the warning, "These shall ye eat of all that are in the waters; all that have fins and scales shall ye eat: And whatever hath not fins and scales ye may not eat: it is unclean unto you." (Deuteronomy 14: 9-10). The emperors of ancient Japan forbade their soldiers to indulge in the most poisonous of all fishes, the deadly puffer. Similar restrictions were issued by Alexander the Great to his soldiers, and Captain Cook almost terminated his famous world voyage in 1776 after eating poisonous fishes which were sold to him by the friendly natives of New Caledonia.

"It is an extremely interesting and yet baffling group of poisons to work on," Dr. Halstead says. "Poisonous fishes cannot be detected by their appearance, very little is known about the chemical and pharmacological properties of fish poisons, and no simple chemical test exists for poison testing in the field."

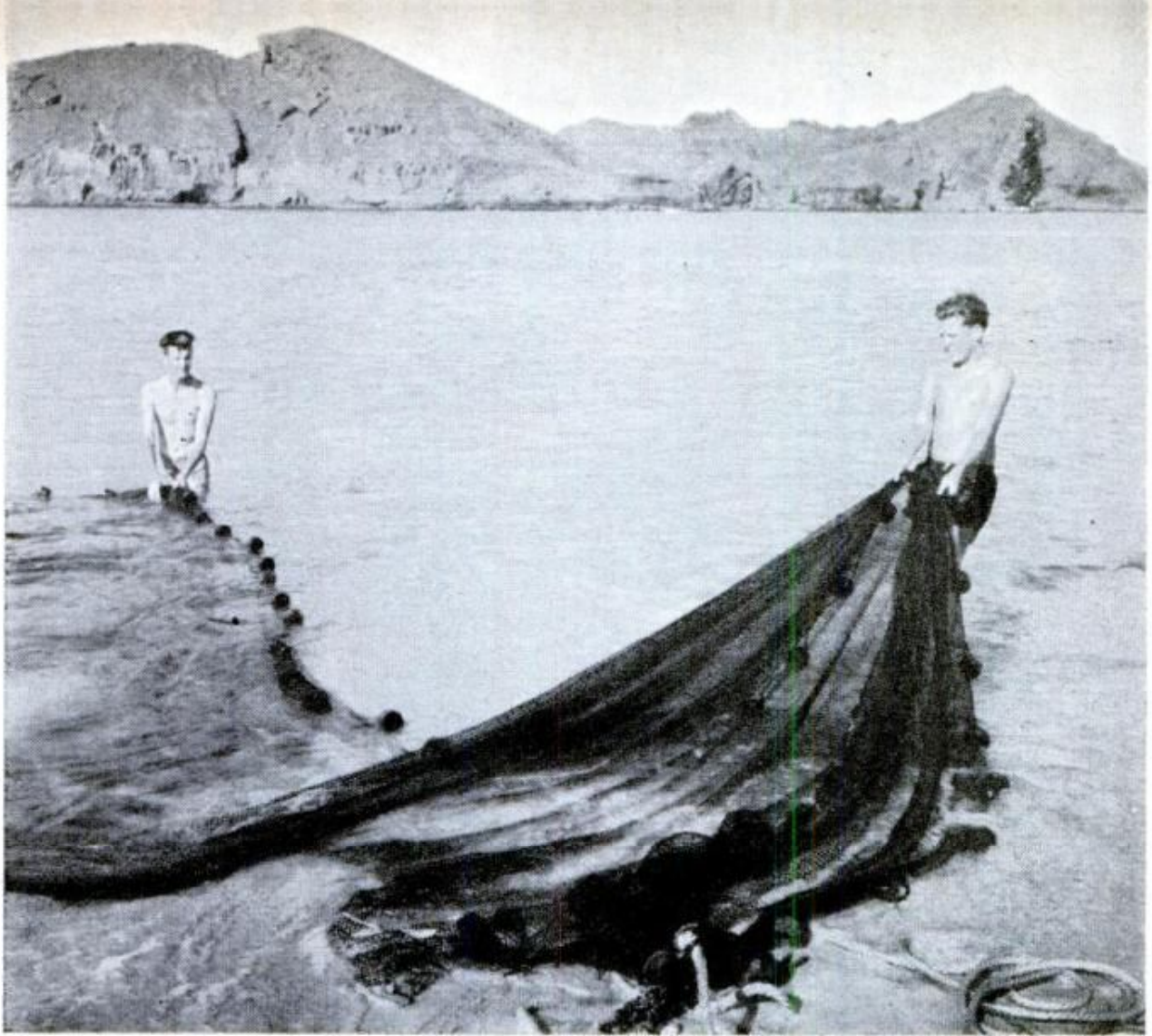
Dr. Halstead sees the danger increasing because more people are venturing farther from home. With big advances in the popularity of skin diving the danger is even greater. Many skin divers are constantly seeking new areas where there is warmer and clearer water, and more abundant sea life—a description that fits the tropics exactly.

The best safeguard, of course, is to know what fish is poisonous, but that's difficult,

(Continued to page 216)

Haul from one collecting expedition to the Las Perlas Islands being catalogued in the lab before analysis



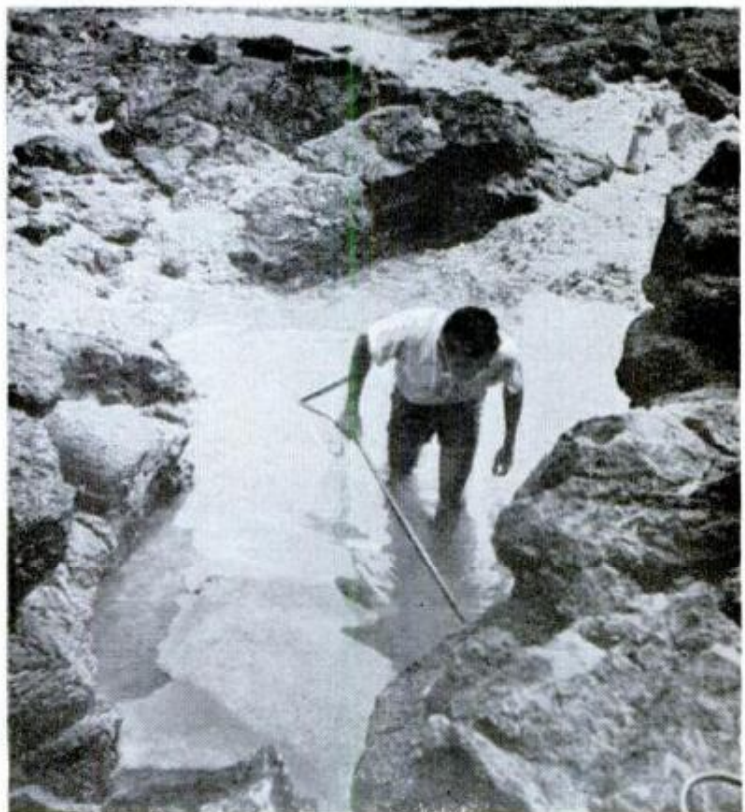


It isn't all fun and free diving—expedition members hauling a seine onto the beach in the Galapagos Islands

Collecting a shark liver for study — they are usually very poisonous in the tropics



Probing carefully for octopus, a member of the expedition searches the rocky shore of an equatorial Pacific Island





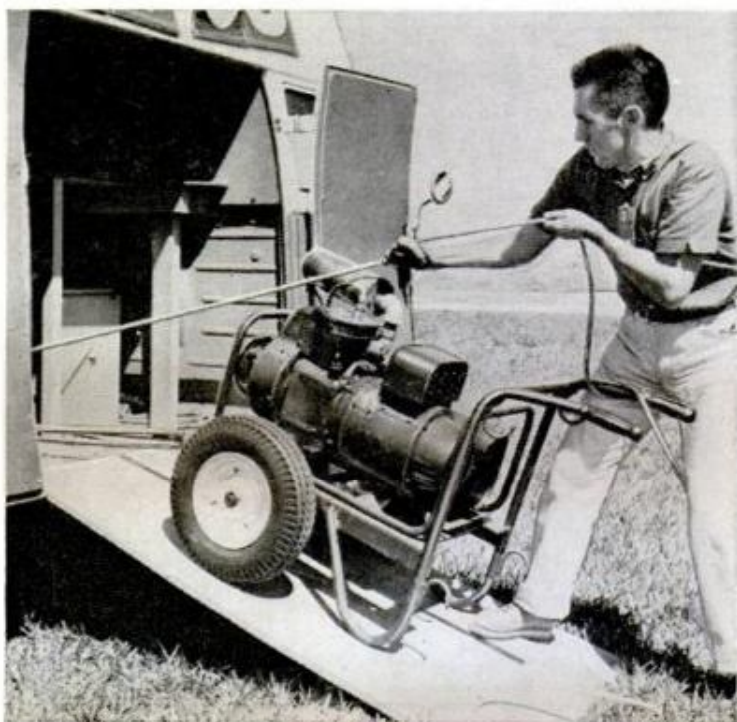
Photographer Wever raised the Volkswagen's roof to install a darkroom, painted it white to reflect heat

Traveling Photographer Builds a "Photomobile"

WHEN STEVE WEVER chucked his job as a newspaper photographer in Miami, Fla., to wander the country taking pictures, he first combined a darkroom with his means of transport—a converted 1959 Volkswagen delivery van he calls his "photomobile." He equipped it to operate under a variety

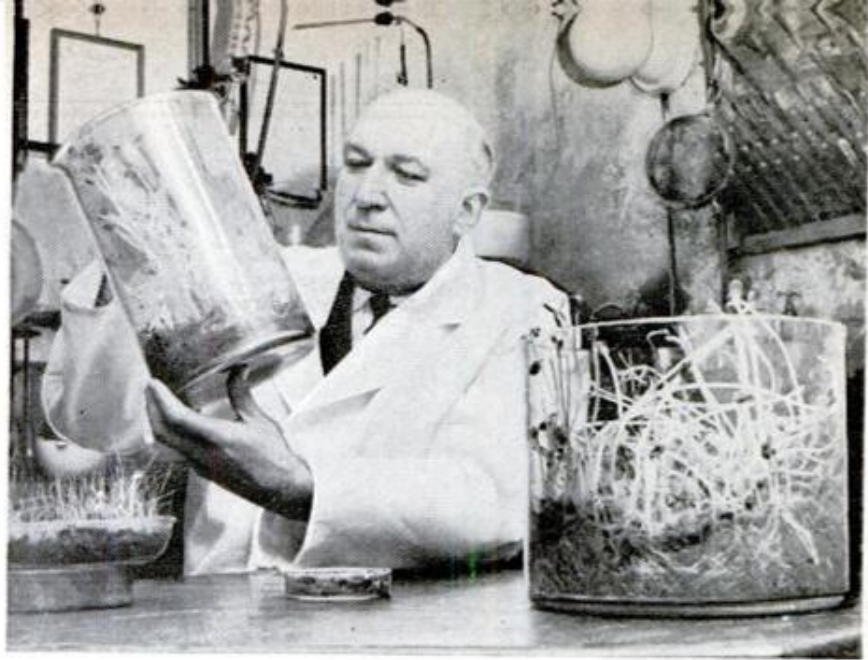
of conditions. Installed above the driver's compartment is a half-ton air conditioner to cool the darkroom in hot climates. He also carries an ice cooler to chill film developer and an electric generator for working far from town. The van also has water connections for hooking into city utilities.

He makes an enlargement, left, and, the job completed, pulls up his portable electric generator to move on



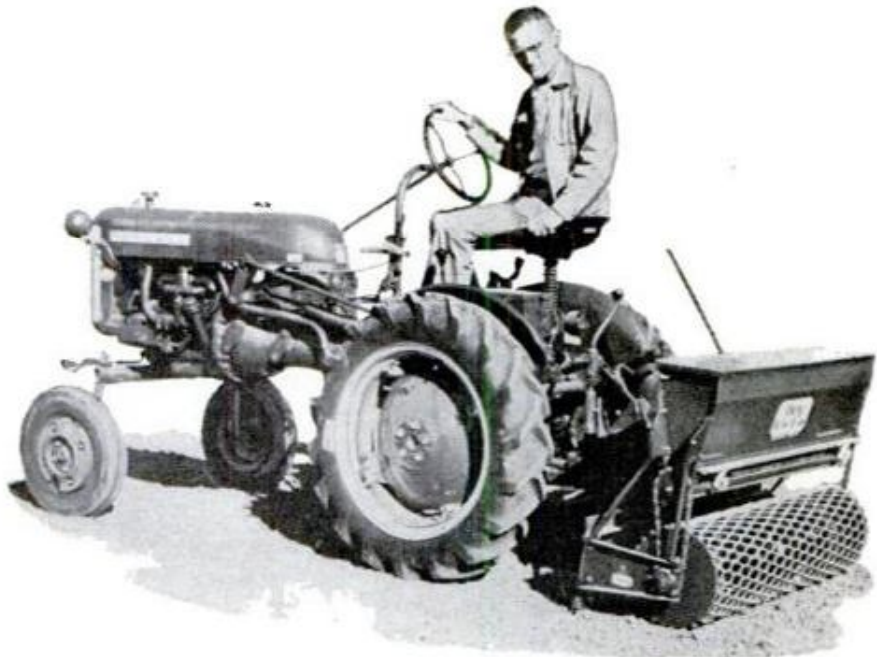
Desert Soilmaker

Desert sands could become fertile grasslands with a gelatine-like additive developed by West German chemist Herbert Kurth. Mixed with sand, the chemical enables it to absorb and hold large quantities of water—up to a gallon of water in an ounce of “soil.” A desert area carpeted with the material would hold the rainwater it now loses to runoff and evaporation, and would quickly bloom.



Roller on Tractor Levels Rough Land

Anyone who can drive a tractor can level a rough-graded area with a new roller blade that shears off the high spots as you drive over them. The roller, which floats behind the rear wheels, will also roll, seed, compact, and scarify land—or even spread salt on sidewalks in the winter. The manufacturer estimates that an inexperienced operator can turn 600 square yards of rough-graded land into a seed bed in 20 minutes.



Window Insert Vents Stale Air

Even in stormy weather, the passenger compartment of a car or truck can be kept free from stale, smoke-laden air with a transparent insert that fits atop the window pane. The insert consists of a wide band of plastic that is perforated with a series of vent holes. Installed in the window channel above the door glass, it becomes a part of the door glass itself. If desirable, the window and insert can be lowered during hot weather. Three sizes are available and each is designed to be trimmed to fit any car.





BOTTOM OVEN of a new range pulls out like a drawer for cleaning and the shelves may be removed for washing at the sink. Its heating unit is sealed. The top oven has French doors for easy access and cleaning. Both have automatic controls

Frigitaire Div., General Motors Corp., Dayton 1, Ohio

REFRIGERATOR has a center drawer which can be opened without disturbing other parts of the appliance. It has two compartments. One is a 21-pound-capacity meat keeper said to keep meat fresh for seven days. The other is a large vegetable crisper

Westinghouse



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WHAT'S NEW FOR Your Home

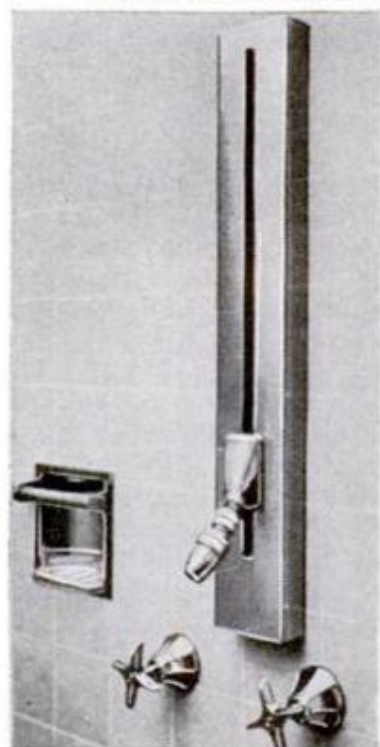


ALUMINUM GRILL is built to give intense heat but not drip grease into the brazier or onto the stove. Its slots are shielded and crossed by channels which carry the grease to a well that runs around the edge. The grill has a detachable handle

J-T Flameless Grill Co., 312 Wyzalhurst Ave., Baltimore 10, Md.

SHOWER HEAD can be adjusted in height. It may be raised for tall people, lowered to save women the inconvenience of wet hairdos, lowered further for children. The chrome-plated brass head, connected to the water supply by a hose, slides on a plate

Bickford Mfg. Co., Napa, Calif.



POPULAR MECHANICS



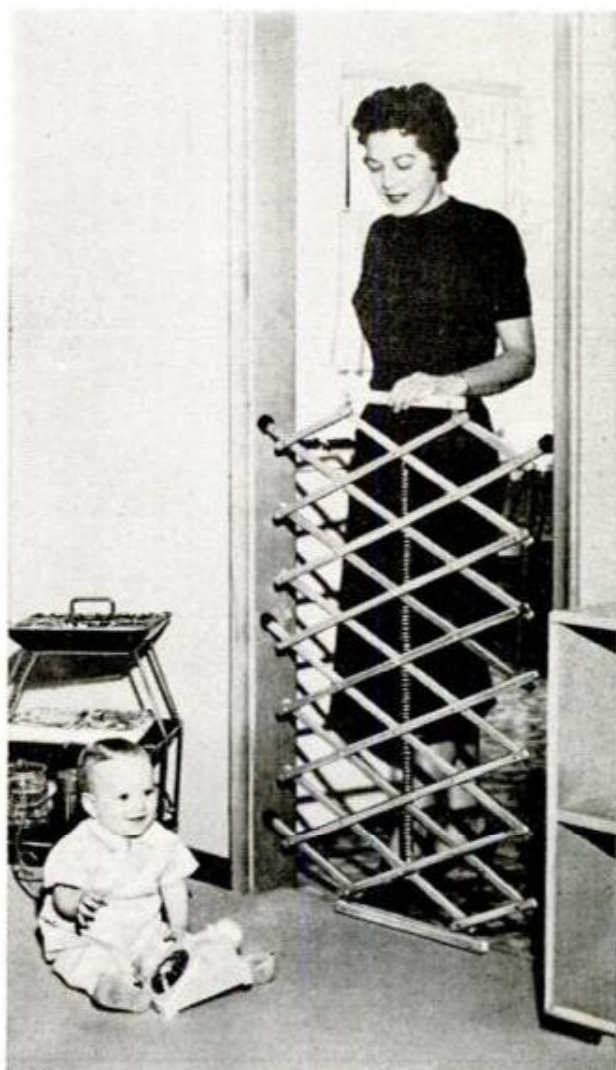
HOSIERY DRYER made of plastic resembles a sea shell ornament when not in use. Pulled down, the shell provides 32 slots for holding stockings, socks or gloves. The dryer comes in a variety of colors and has adhesive on its back for attaching to the wall
Hallmark Industries Corp., 2323 Biscayne Blvd., Miami, Fla.

ELECTRIC BROILER is mounted above a ceramic bed in a redwood patio cart. Equipment includes a temperature-control unit, a tilting grill mechanism with crank adjustment for efficient grease runoff and a revolving spit. The reflector lifts out for washing
Stanthony Corp., Los Angeles, Calif.



SAFETY GATE locks into a doorway without use of a screw or bolt. Spring tension forces the gate tightly against the door frame, but it can be set up or taken down with one hand. It has rubber bumpers on contact points so as not to mar the woodwork
North States Prod., Inc., 1011R W. Broadway, Minneapolis, Minn.

REMOTE CONTROL dial for a new water heater may be set to control temperature and the amounts of water to be heated. By choosing the proper setting on the dial, the user may cause the unit to function as a 30-gallon, 40-gallon or 50-gallon water heater
Rheem Mfg. Co., 7600 South Kedzie Ave., Chicago 52, Ill.



Go to College Outdoors

By George W. Martin

IT WAS a sunny afternoon in August and I was sitting in a high mountain meadow, overlooking Hoh Lake, where I could watch the shadows play on the glaciers and peaks of Mount Olympus, to the south across Hoh valley.

My reverie was interrupted by a jubilant shout, "Look here!" I looked at the ten-year-old running toward me with two twelve-inch rainbow trout. Right beside him was his father. I couldn't tell which was most excited.

"What do you think of that? Billy caught them himself! He and I have never been fishing together before, but there's going to be more fishing for us from now on!" Father and son hurried on to their own camp to show their catch to the boy's mother.

This is typical of the developments and changes I have seen take place among members of our college outdoor classes. Families live new and rare experiences together; young folks gain friendship and self-confidence through the informal camping; adult cares slip away in the refreshing and exhilarating experience of contact with nature.

This opportunity for outdoor living was developed by Olympic College, a junior college in Bremerton, Wash., to fill a long-



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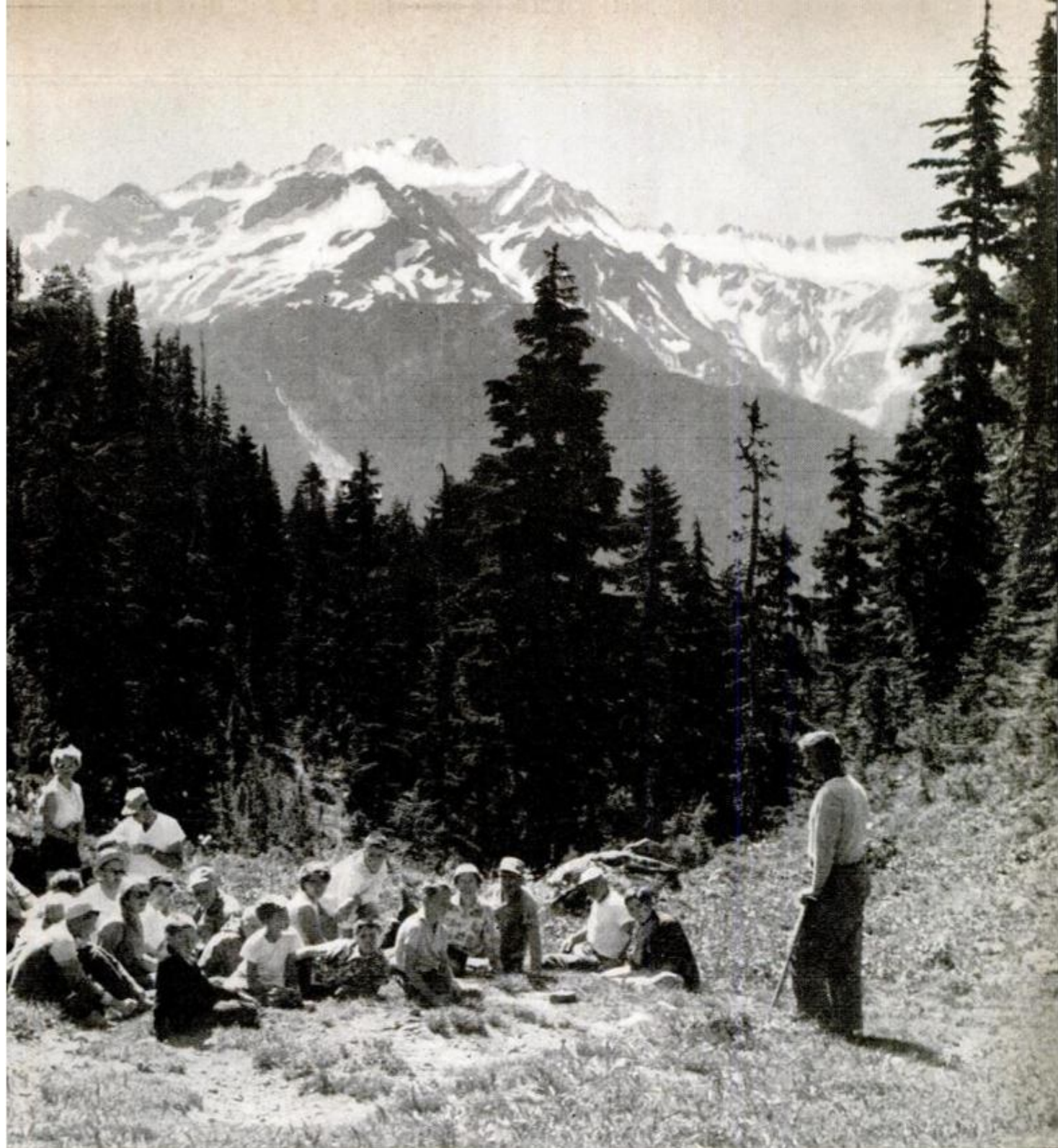


Photographers find subjects everywhere in the vast park; this pair focuses on a clump of wildflowers

standing need here. We are situated so close to the Olympic Range, towering on the western skyline, that it is natural for the people to turn to the mountains for recreation. Every August, Olympic College sponsors a 14-day class trip, hiking and camping through the most scenic part of Olympic National Park, in the northwestern corner of our state.

The purpose of the trip is the unusual and valuable experience of learning to be at home with nature in this great wilderness area. At least three college instructors.

POPULAR MECHANICS

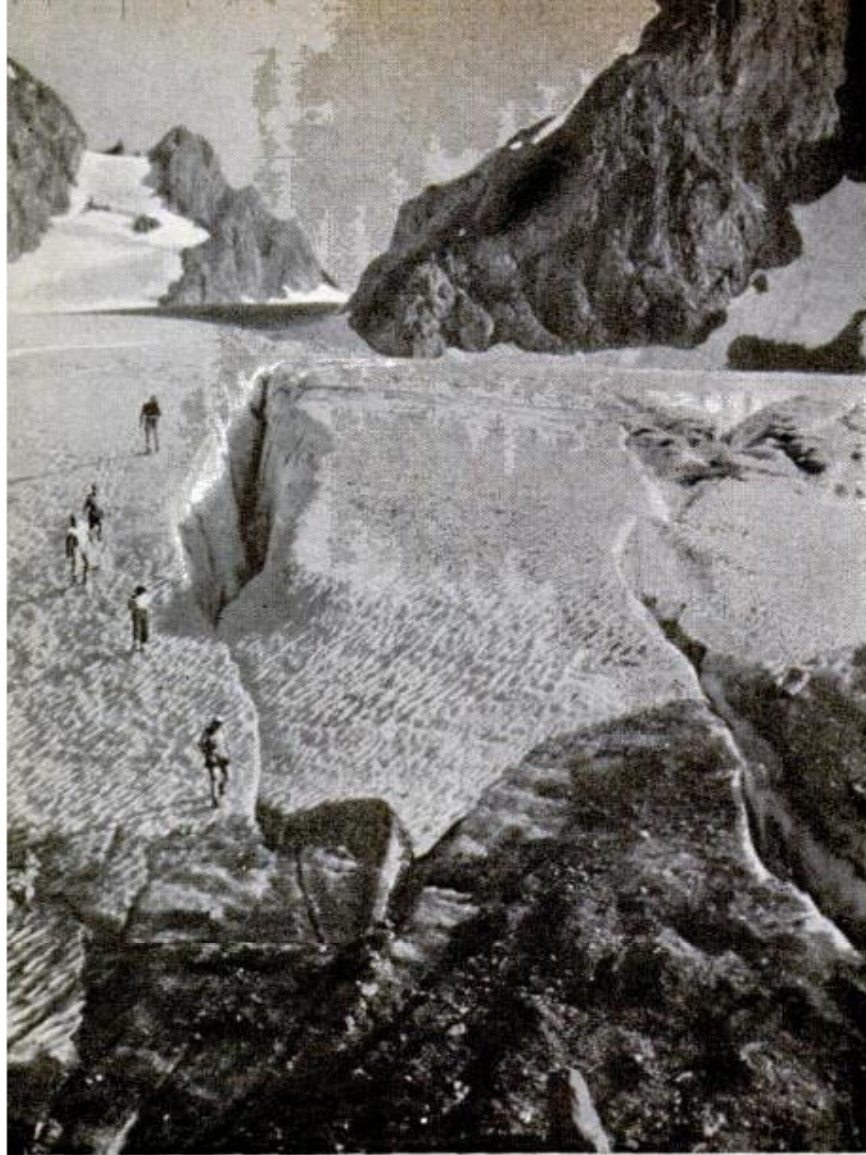


What better classroom for meteorology than the open air? Besides the regular guide-instructors, other instructors and park rangers rendezvous with the group along the way for special lectures or field trips

familiar with outdoor living in the mountains, lead the class and lend confidence to the group in its ventures. The class is instructed on such subjects as botany, geology, astronomy, meteorology, safety, first aid for hikers and general campcraft. Additional instructors and park rangers join the class at various points for special lectures and field trips. They travel on foot through an area that changes almost daily in its fascinating and magnificent growth.

The 75-mile route starts in the forest area at Solduc Hot Springs, 25 miles west of

Port Angeles. The trail winds its way up through the heavy forest by way of Deer Lake to the spectacular High Divide, with its alpine meadows and panoramic views; then on to Hoh Lake, which looks from above like a great blue jewel in a rich setting of golden ridges. From the lake shore, looking across a rippling outlet and through a wide ravine, there is an arresting view of Mount Olympus, the destination point. From Hoh Lake, a one-day downhill trek is necessary. The class experiences its greatest thrill after the next uphill climb



Practicing for the climb up Mount Olympus, a group circles a crevasse on Blue Glacier. Experienced mountaineers assist

when the hikers reach the alpine meadows, with a side trip across broad glaciers and the 7900-foot peaks of Mount Olympus itself.

Experienced guides and mountaineers assist the leaders in routing the class safely around dangerous crevasse areas and across the broad snowdome to the summit. Three days are spent at the base of Mount Olympus, then the return trek begins through the great forests, continuing down until it reaches the Hoh River. This expansive, low-level area is nationally famous for its rain forest and the 12-mile hike among towering Sitka spruce, Douglas fir, Alaska cedar and massive maple trees, ending with the famous nature trail. On every side the ground is covered with a soft, thick carpet of moss, and golden streamers of moss hang from the branches of the big trees.

Everywhere along the route those with cameras stop to record views of scenery, animals and flowers. Adventure waits around every corner; perhaps a herd of Olympic elk grazing in an alpine meadow or a big bear eating blueberries. A marmot may whistle to its mate from a rock slide, or a doe and fawn may stroll blithely through camp. Endless fields of

Eager would-be mountaineers find many side trips to challenge their climbing ability on the route to Mount Olympus. Here a "student" poses on a rock peak while the photographer (see shadow) mounts another





After a long, careful stalk, a student photographer caught this herd of Olympic elk resting in a snowfield. Bear, mountain goat, and deer also abound in the wilderness areas of the Olympic Peninsula

flowers include colorful lupin, tiger lilies, mimulus, buttercups, avalanche lilies and many others, generously mixed with heather.

There is time for fishing in lakes or relaxing on sunny slopes; eager mountaineers are taken on side trips. Every effort is made by the staff to help members enjoy their outdoor adventure and to learn as much as possible on the higher as well as lower levels of Olympic National Park.

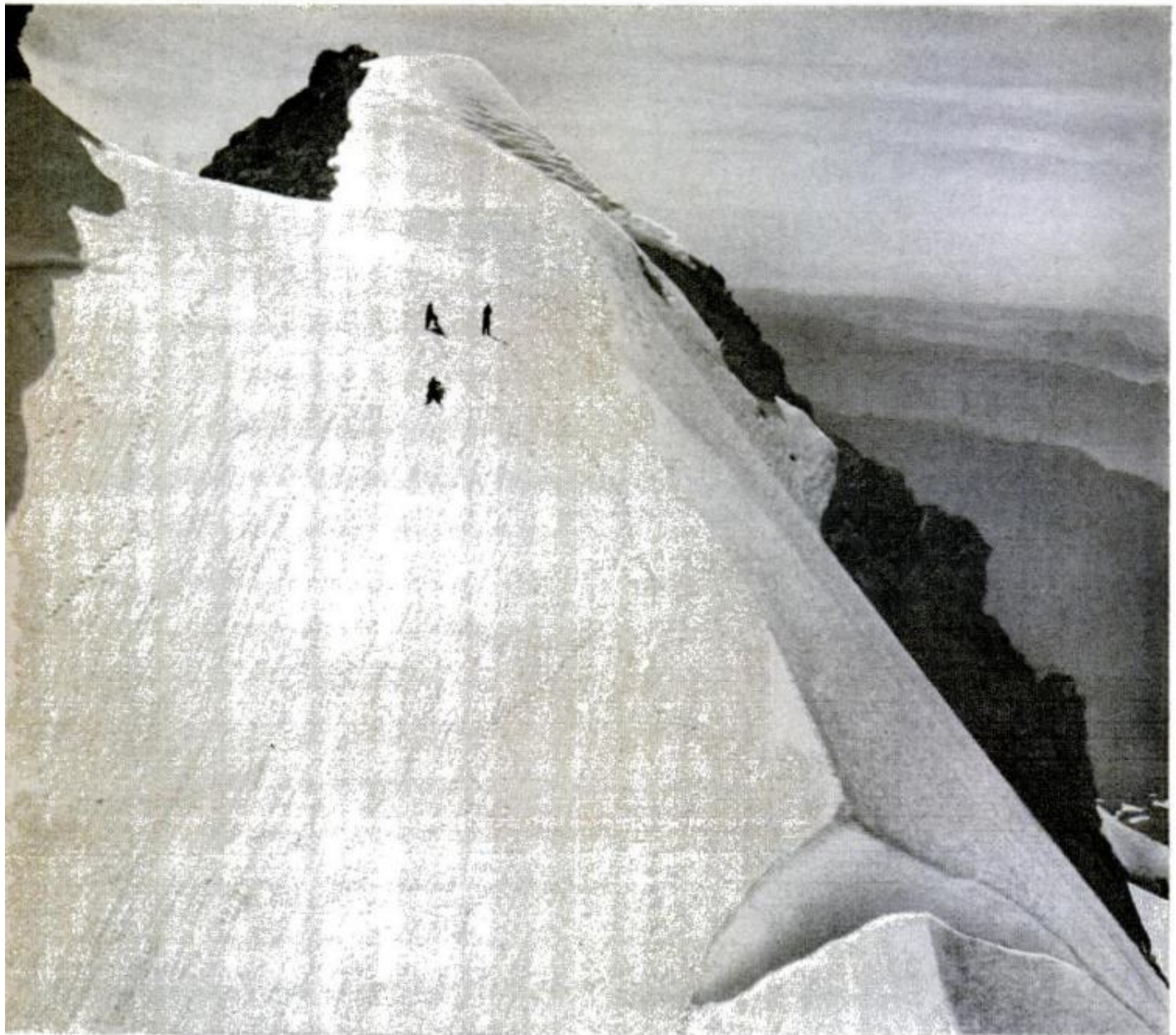
The class is part of the regular college summer session and carries five-hour credit in physical education for those who claim

it. Since most members have had little experience in outdoor living, the first days are filled with instruction, informal talks and field trips. In fact, learning starts from the moment the class first meets. Preparing a packsack, hoisting a packboard, or holding an ice ax is a stimulating experience for the tenderfoot, as is setting up the first campsite with groundcloth and tarp.

The philosophy of learning by doing is applied in the group — all members cooperate in handling the work around camp. The class is divided into four teams, each with definite responsibilities. The teams

Mountaineers and guides lead the group across the broad snowdome near the summit of 7900-foot Mount Olympus. The college boasts that the Special Campcraft Class covers the area from sea level to ski level





Gaining confidence with experience, the mountain-climbing field trip members glissade down a steep snow field near the summit of Mount Olympus, sliding on their heels with an ice ax behind for a brake

alternate fire-building, cooking, washing dishes and cleaning up, while the fourth group has earned the coveted free day, called "bye." Teams learn all phases of camping and are reorganized three times to allow members a chance to become better acquainted with the entire class.

Living amid open campfires in comparatively primitive style, surrounded by lush, relaxing, natural habitat is the value and real pleasure of the trip. Burdensome loads for hikers are discouraged at the beginning. All food is transported in advance by pack-horses and is cached every five or six miles along the route at base camps. The hiker then carries only his personal gear.

The class usually has a wide age range; children, teen-agers, college students, adults—even grandparents can enjoy the trip. Children from 10 to 16 must be accom-

panied by an adult and, of course, all must submit a doctor's certificate of fitness.

Our staff is continually amazed at the development of the class in the two short weeks. A letter from a fifteen-year-old member of a family of six who flew out from the east to join us is typical of their enthusiasm.

"I really don't know how to express myself when thanking you for the lovely trip in the mountains. When we started to prepare for the trip, I knew one member of the family would come home loving the trip, but never did I expect the whole family to rave about it as we all do. It's a trip for everyone."

Olympic College feels fortunate to be able to extend its campus to include the vast wilderness classroom of Olympic National Park. ★ ★ ★

Second Top for Car Keeps Interior Cool

Down Under, in Australia, a Sydney manufacturer is distributing a glass-fiber shield which, fitted above a regular auto top, is said to keep the car as much as 20 degrees cooler. There is a $\frac{3}{4}$ -inch gap between roof and shield.



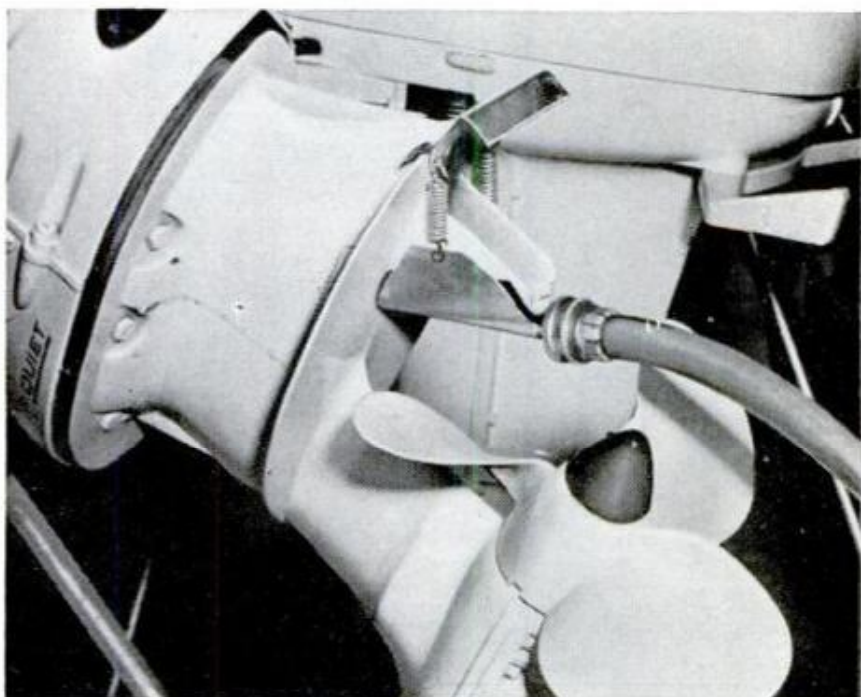
Auto Cooler Features Built-Ins

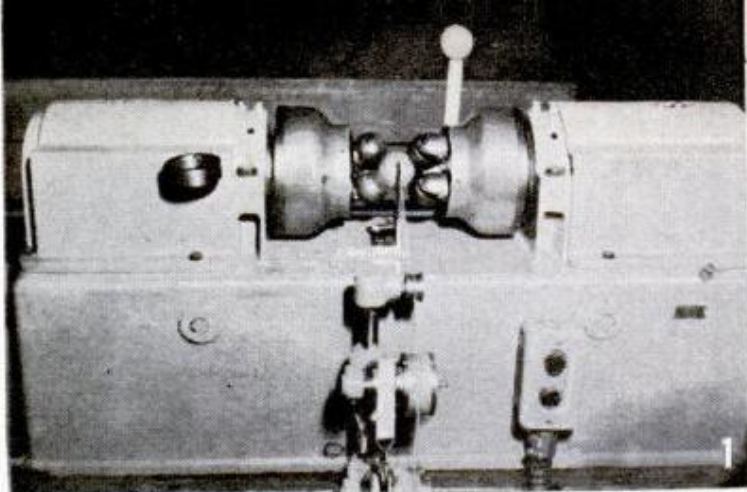
Adaptable for either car or home use, a new portable cooler plugs into cigarette lighter socket or wall plug and blows over 550 cubic feet of air per minute through a spray of water to produce a cool breeze. Two and a half gallons of water will cool for four hours of driving. Built of high-impact Cyclolac plastic, it's rustproof and sloshproof, too. Other features include a built-in ice chest for cooling beverages on the road; built-in coasters and ash trays; even a cap lifter. It's adjustable to fit any car floor.



Hose Connection Flushes Outboards

Testing an outboard motor or flushing its cooling system without removing the motor from the boat is almost unheard-of with no water around; but a new connection allows outboarders to connect an ordinary garden hose to the cooling system intake and flush out salt water, silt, mud, or sand or test the motor for minor adjustments—in their own backyard. Six models will fit most engines without special tools; discharged water is allowed to run on the ground.





PGA photos



Missile With a Frozen Heart

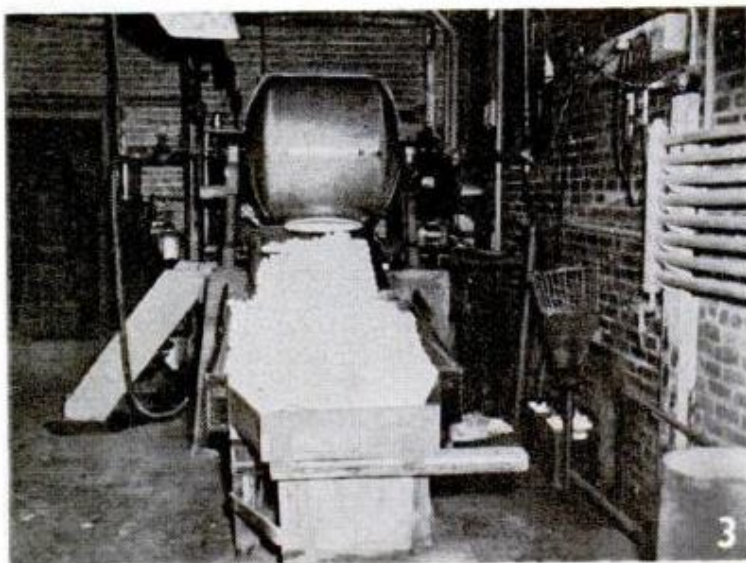
By Bob Kelly

1. Raw rubber thread whips quickly around frozen liquid cores in the winding machine. Cycle takes only 20 seconds

2. Covers, molded separately under great heat, are hand-fitted over the wound cores like a shell over a nut meat

3. Covers are vulcanized into a single, seamless piece, then rinsed carefully by a tumbling process in still another machine

4. Painting machine handles 178 balls per minute. They are dried, tested, then branded and ready to go — see above right



When champion professional golfer Chick Harbert addresses the ball for a tee shot, he must know what distance and direction to expect from his drive. Thanks to modern golf engineering, the same consistency is now available to everyone



DON'T FEEL SORRY for your golf ball. By the time your #2 wood sends that little pill into orbit (after distorting it to a lemon-shape as it leaves the tee) it has already been strangled with rubber thread, frozen at 120 degrees below zero, coated with South American gum, vulcanized, enameled, checked for compression and branded.

The reason it is coddled, exhaustively tested and fretted over is simple—better performance and lower score for You.

But it hasn't always been this easy. Prior to 1900, you batted a leather golf ball around. Then someone invented a solid ball made of gutta-percha, unhappily offering nothing to the golfer who took his game seriously.

Finally, shortly after the turn of the century, Colburn Haskell of Cleveland invented and patented the first golf ball to use a rubber-thread, center-core winding. This basic principle has remained unchanged through the years though the materials of construction have improved.

The PGA golf ball, for example, is born as a frozen liquid center. It is shaped in a mold at 120 degrees *below zero* before winding with the rubber thread. This simply insures perfect roundness while being wound in an automatic machine that completes the cycle in 20 seconds.

Speed is the most important phase of the winding operation, since the core eventually thaws and would lose its shape if not wound in time.

Next, refined Balata, the gum of a South American tree, is compounded with pigments and chemicals and molded over the rubber-wound core. Penetration into the windings is required to insure good adhesion. Specially molded covers are then vulcanized into place over prepared cores.

To give the ball a brilliant, long lasting finish, it is sprayed with three coats of high lustre, synthetic enamel. Names, brands and numbers are placed on the completed ball with high-speed marking machines that imprint in eight different positions on the ball.

The manufacturers, however, never trust the machines—and conduct regular tests. The finished products are checked for the all-important compression as well as for accuracy of weight and balance.

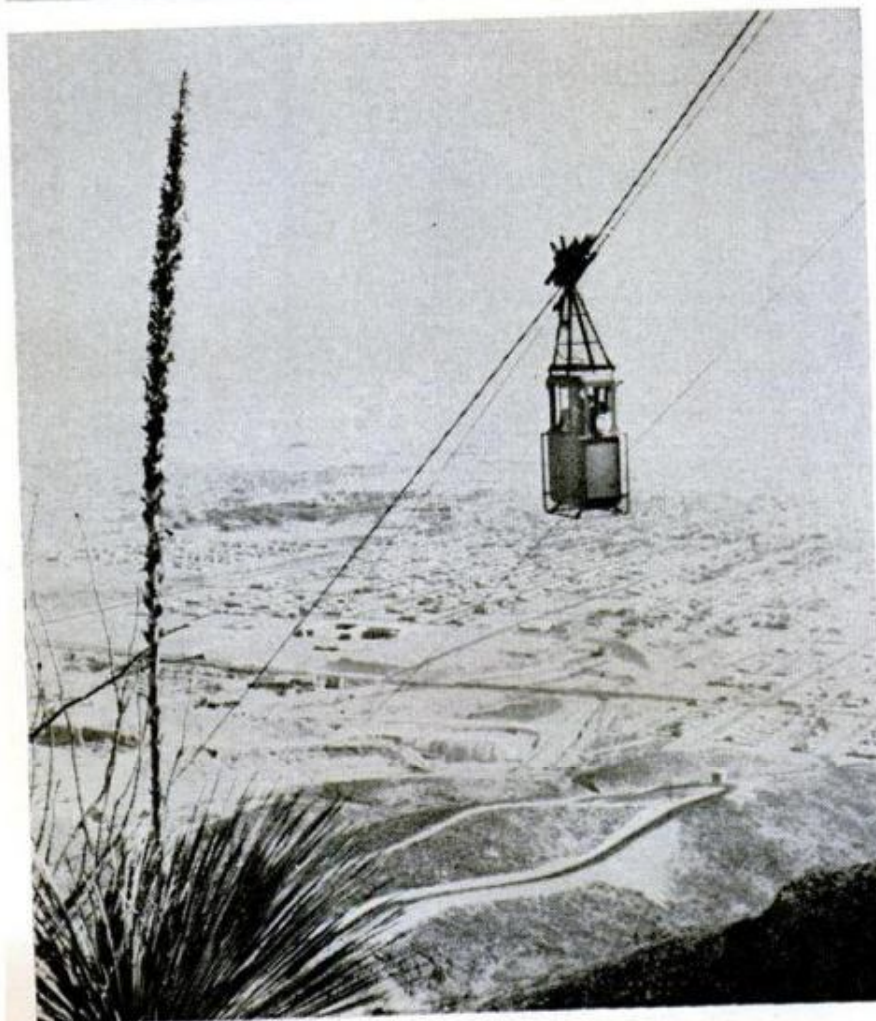
The golf ball is a sensitive thing—if you treat it that way, you'll be happy with the results. For instance, the cover of the ball is only 3/64 of an inch thick. Yet at the moment it is actually struck by the club it is compressed to one half of the ball's over-all thickness, which is normally 1.68 inches. And all without cracking!

(Continued to page 210)



Camper's Shower Is Set Up on Car

Campers can shower—in privacy—anywhere there's water with a collapsible, portable shower unit that is set up alongside a car, trailer, or truck body. The camper can undress inside the car, step into the shower, then step back into the car to dress again. Curtains on all four sides assure privacy and protect the car. Water comes from a two-gallon tank that sits on the roof of the car and runs through the hose by gravity; two gallons are enough for a pretty good showerbath if used sparingly. The 30 by 30-inch shower framework hangs from the car's rain gutter; plastic sheet covering hangs from the aluminum frame. The heavy plastic floor is a separate piece.



Aerial Tramcar Serves as "Elevator"

Employees at El Paso's new radio and TV station, KTSM, get a real thrill out of going to work. Instead of a driveway or an elevator, they use an elevated tramcar to shoot 960 feet up to their tower, sitting 2000 feet above the Texas city on 5692-foot Ranger Peak. The car travels 2300 feet in about three minutes, reaching a speed of 1000 feet per minute and often suspending the passengers 350 feet above the canyon floor. The capacity is six adults, and though it takes a bit of getting used to, the builder insists that the system is as safe as an elevator. Built as the best method of moving employees to their work, the tramway may soon be open to the public, too.

POPULAR MECHANICS



Even Skin Divers Can Use This Flashlight

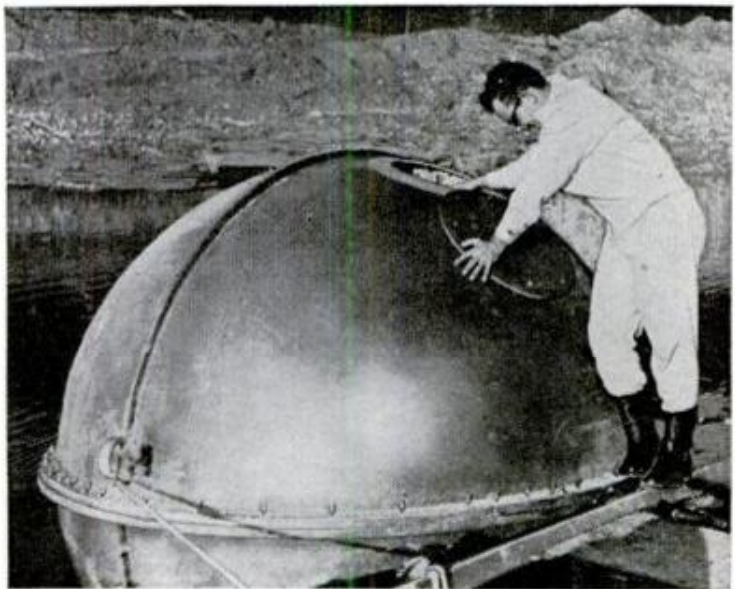
Sealed inside a plastic shell behind thick Neoprene gaskets, a waterproof sealed-beam lamp is designed for firemen, police, miners, oilmen, outdoorsmen — even skin divers, since it works under water. It

can stand on several bases of its square battery case or hang from its nylon cord in several positions. The lamp generates 6000 candlepower with a six-volt battery. Case contains dehydrant to absorb condensation.

Plastic Balls Float Pulpwood Chips to Mill

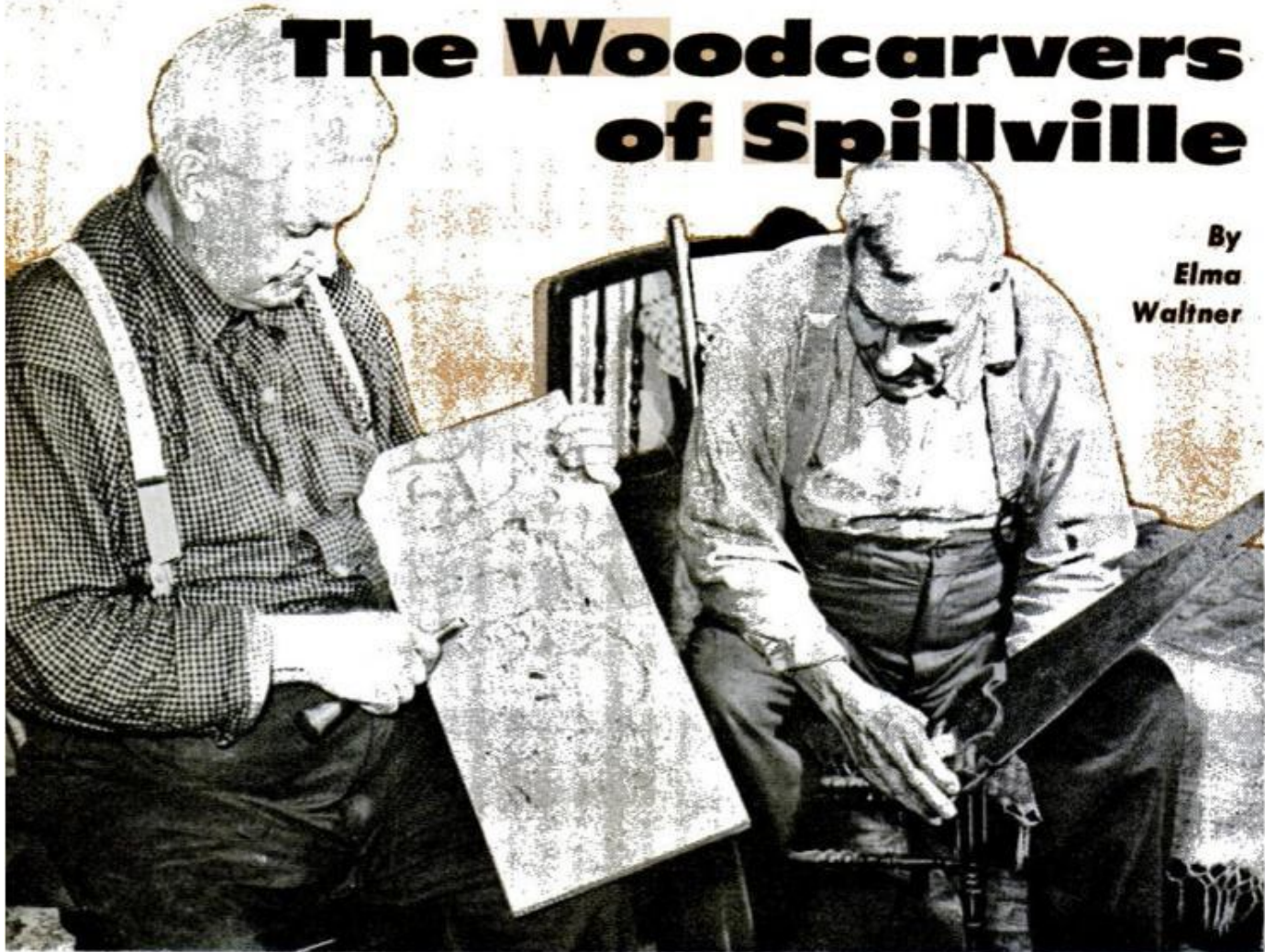
Pulpwood chips and scrap, burned as waste in lumber camps but valuable in paper manufacture, may be saved through the use of a new method of river transportation. Stuffed into a bright red glass-fiber ball eight feet in diameter, a test load of

chips was floated 50 miles down Canada's Fraser River and arrived safe and dry. The "bobbers" need no supervision—a man at the pulp mill is posted to watch for the containers as they come floating downstream.



The Woodcarvers of Spillville

By
Elma
Waltner



Frank and Joseph Bily have pursued their hobby of carving clocks since 1913. They use only hand tools and divide the labor in making their intricately beautiful creations. Frank, left, is the carver and Joseph, right, constructs the cabinets. Many people call at Spillville to see the display of their interesting collection

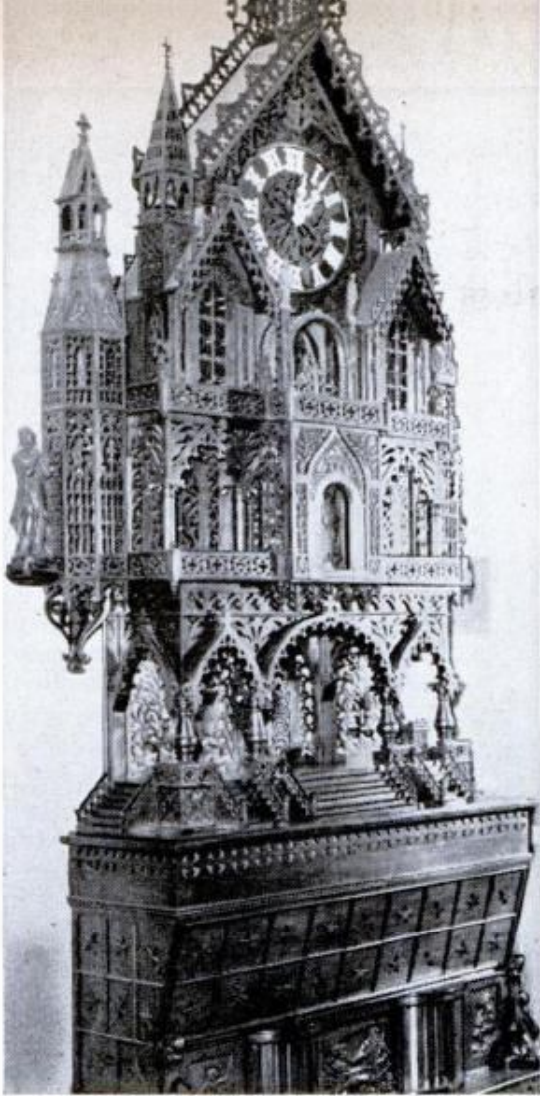
This is a miniature of the "Little Brown Church in the Vale." While chimes play, a bridal party comes around the church to the front and enters the door



WHEN FRANK BILY left school he was presented with his desk—which he had been elaborately carving for years. His activities resulted in an interesting work of art but ruined the desk for its originally intended purpose. Frank put it to good use, however. He converted the top into a gift for his mother by doing more carving to produce a plaque depicting the Holy Family. Today the plaque is admired by the many visitors who stop at Spillville, Iowa, where it is on display with other intricate carvings that make up the Bily brothers' carved clock collection.

The brothers, farmers and carpenters by trade during their younger years, are now in their late seventies. Woodcarving as a hobby occupied their spare time from childhood and continued to intrigue them in their adult years despite opposition by their father who told them they were wasting time which could be put to more profitable use in farming. Their carving talents first centered on clocks in 1913, when a neighbor brought them a clock base he had carved and asked help in installing the works. Through the years, they've built a collection of clocks, some being several

(Continued to page 200)



Religious and historical themes appear frequently in the collection. The Normandy Clock, left, has two sets of chimes: one is in the "Westminster Abbey" base. The brothers' masterpiece is the American Pioneer History Clock, at right. Four years in the making, the series of panels represents scenes from American history

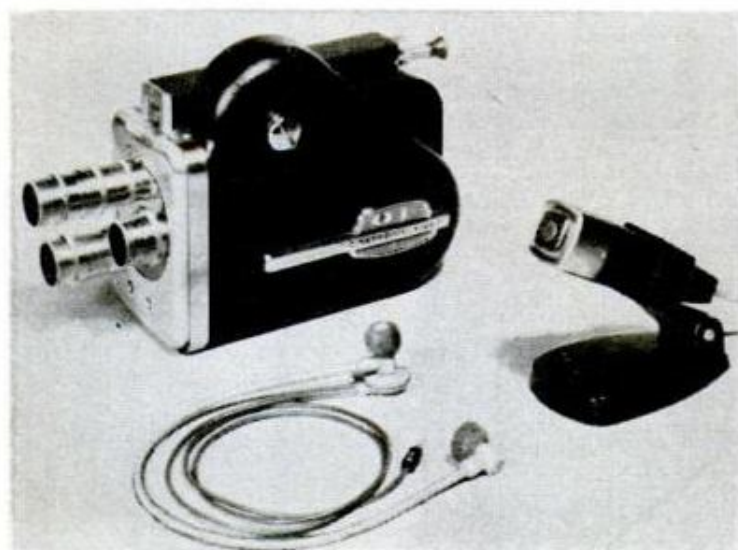
Spillville's artisans respect the work of others. They restored the 300-year-old Deer Clock, of Swedish make, and added a rough-carved base to point out the earlier carver's precise work. Though they buy clock works, the Bilys make moving works themselves. As the clock chimes the "Anvil Chorus," the smithy hammers





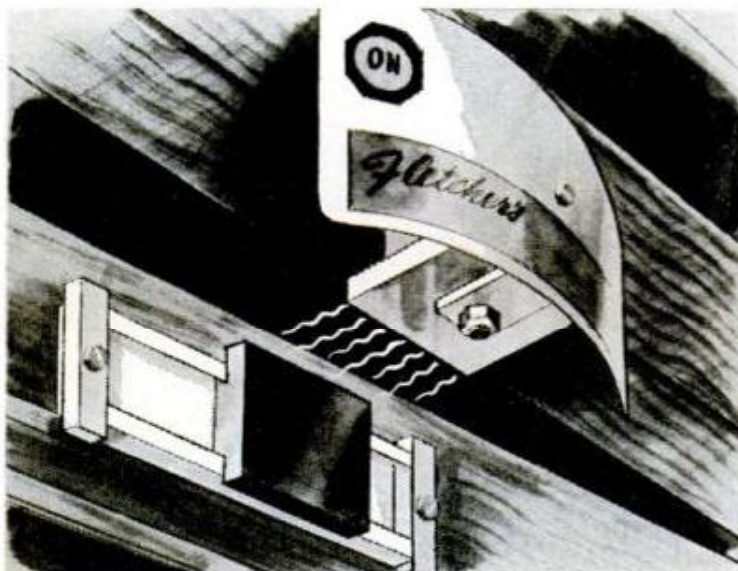
Hydraulics Handle Motors

Even the heaviest of the big modern outboard motors can be handled easily by one man using a new hydraulic "Motor Toter," which lifts motors on and off boats or testing platforms with no need for manual lifting at all. The motor is held by self-locking rubber forks while a steel catch bar prevents the lower unit from swinging backward. The motor is lifted hydraulically to a preset height, then wheeled to its new location and lowered back onto its transom bracket. The clamps do not interfere with the transom clamps. The rubber forks allow the "toter" to handle outboard motors of any make, model, or size, regardless of their weight. Frame is heavy steel, and rolls on hardened steel axles, ball-bearing wheels, and semi-pneumatic tires.



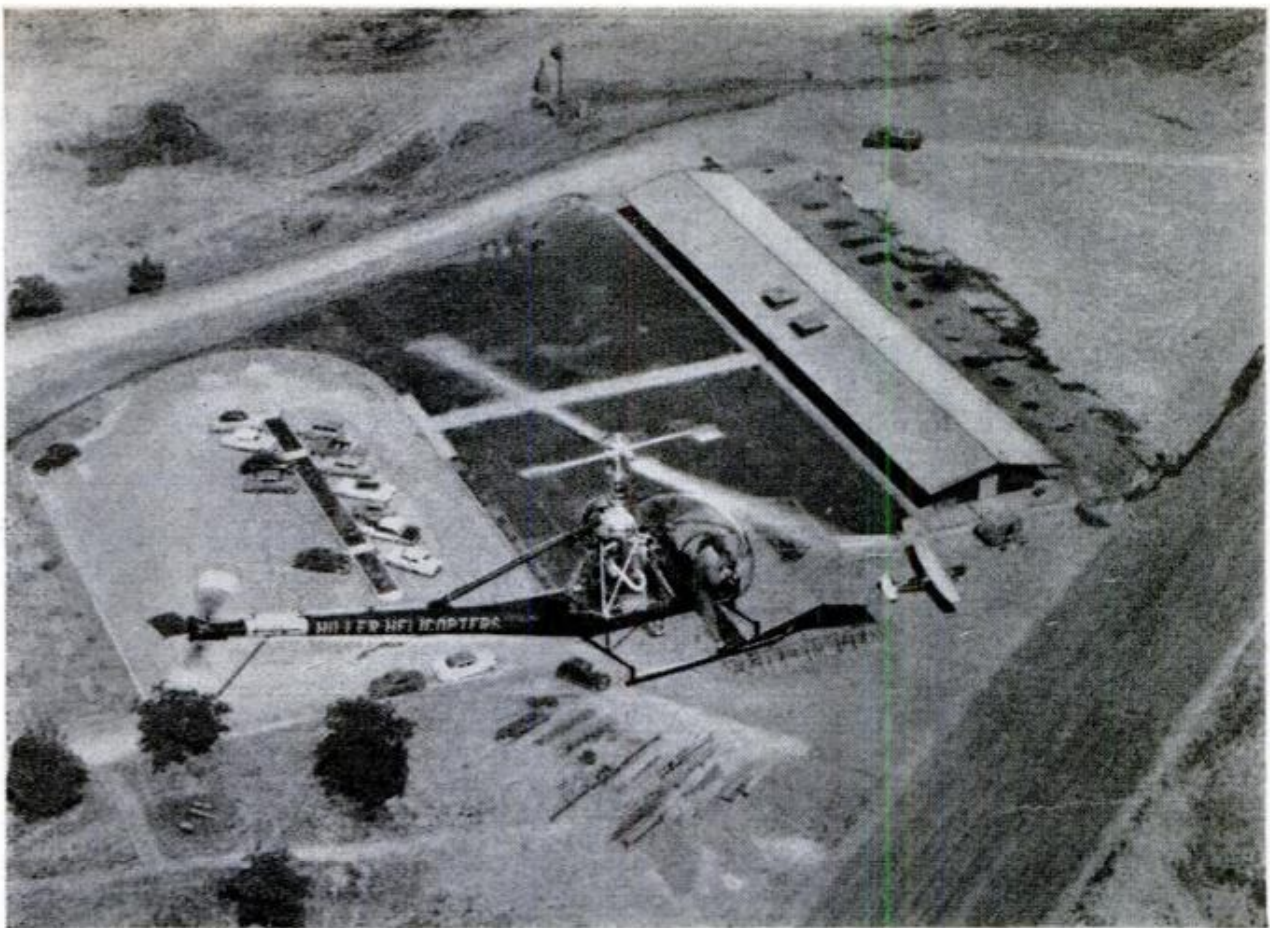
Sound Movie Camera in 8 mm.

Amateur moviemakers can make their own "talkies" with a new transistorized 8-mm. movie camera which can pick up and record the sounds of a scene onto the film simultaneously and with exact synchronization. The battery pack and sound amplifier are contained inside the camera body for easy operation and portability. Shown here with its microphone and headset for monitoring sound volume, the camera also has a companion sound projector which can also record new sound on the film or allow sound editing.



Magnetic Door Retainer

Winter's cold winds or summer's dusty gusts won't blow open doors equipped with an adjustable, magnetic retainer. It can be set to allow the door to open easily or with pressure. A steel block which slides on a track is screwed onto the top rail of the door. The magnet attaches to the underside of the door frame. When both pieces are in position, the magnet pulls flush against the block. If less than the full 50 pounds of pulling force is wanted, the block is moved on the track so it only partially contacts the magnet.



Whirlybird's-eye view of the Pick Laboratories on a leveled hilltop in California's Santa Cruz Mountains

There Must Be a Better Way

By Thomas E. Stimson, Jr.

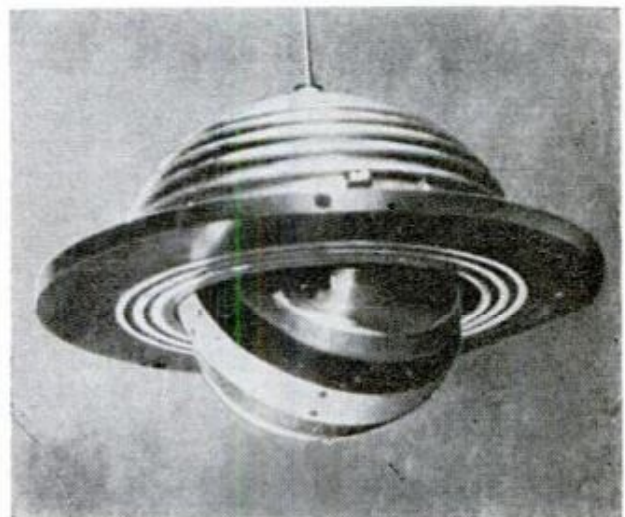
That's what Vernon Pick said as he fought mountain lions, desert heat and rattlesnakes to find a fabulous uranium deposit. Now he's built a laboratory to find those better ways

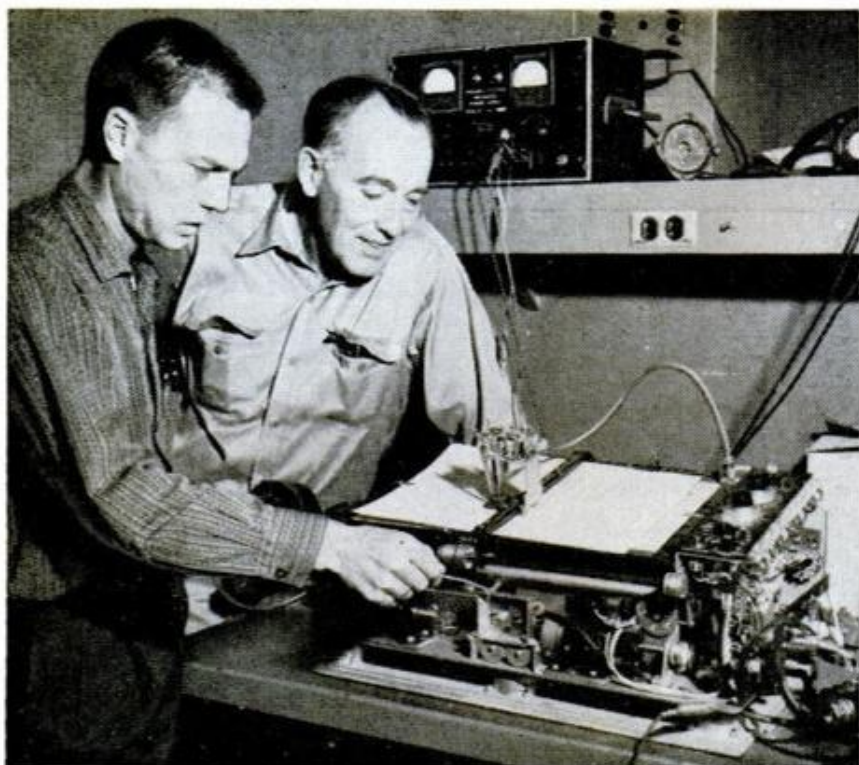
CAN A super doodlebug be invented that will discover a body of ore that is buried 1000 feet underground? And do it from an airplane?

How about an airborne ultraviolet lamp so intense that minerals on the ground would fluoresce brightly in its rays? Or a source of "black light" so powerful that you could take night infrared flash shots of the terrain from an airplane?

These are some of the projects that are being studied at the Pick Laboratories in the Santa Cruz Mountains 50 miles south of San Francisco. The unique laboratory is

Airborne gravity gradiometer measures variations in gravitational pull, spots ore deposits from plane





◀ Airborne scintillometer draws contour map in four colors to show location, size and shape of radioactive anomalies (hot spots) passing under the plane

Old aerial survey measures total gamma radiation; terrain and background radiation affect the reading. Pick Anomaly Locator rejects background; reads easily

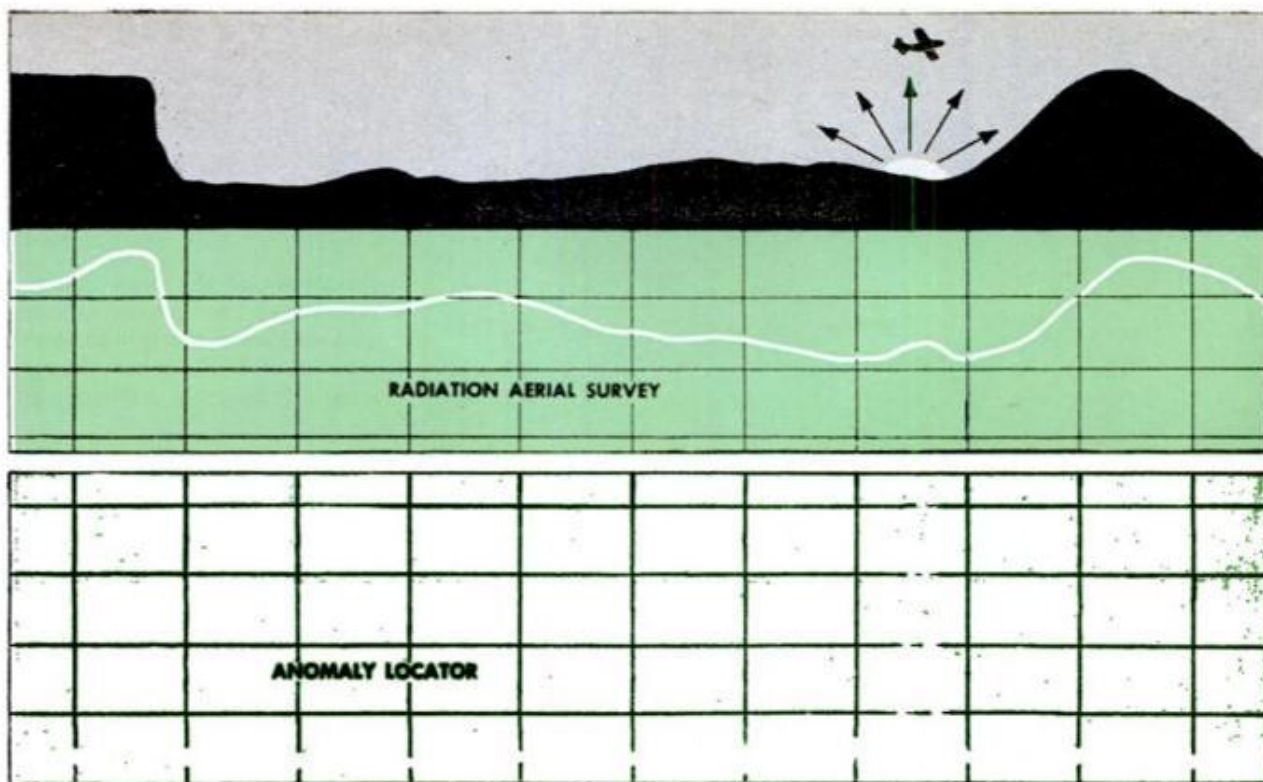


financed and directed by Vernon J. Pick, famed uranium prospector.

When Pick was hunting for uranium on foot in 1954 in Utah he decided that there must be a better way to do it. Plodding across the desert in 120-degree heat, dodging rattlesnakes and tracked by mountain lions, he was convinced that there must be a better way.

Pick's story is one of the classics of the modern West. Almost at the end of his strength and ill from drinking poisonous water, he made one last hike into a remote

No operator needed on Pick's trap range—microphone at his feet actuates trap mechanism at word "Pull"



canyon and discovered one of the richest uranium mines in the world.

Today, six years and six million dollars later, Pick is devoting much of his energies and part of his fortune to finding a better way of doing a number of things. That, in fact, is the philosophy of his research organization.

The laboratory itself occupies a long, low building on 900 acres of leveled-off hilltop near the small town of Saratoga, Calif. He

Pick, right, tests isodose plotter designed by his laboratory to help in radiotherapy for cancer

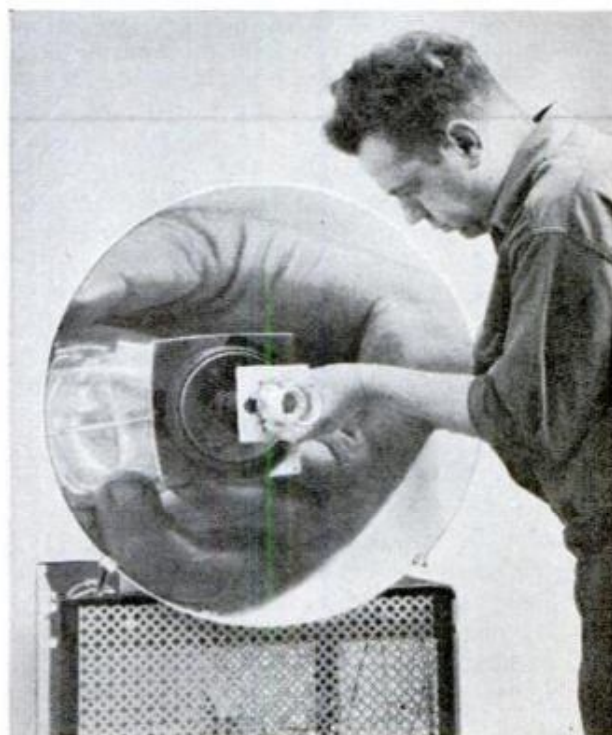
wanted a site that was fairly close to the electronics industry centered around Palo Alto, but remote enough to allow undisturbed concentration on the problems being studied. The job of the lab is to take a new idea, develop it, build the device that's called for, test it thoroughly, and finally produce a practical working prototype ready to be marketed.

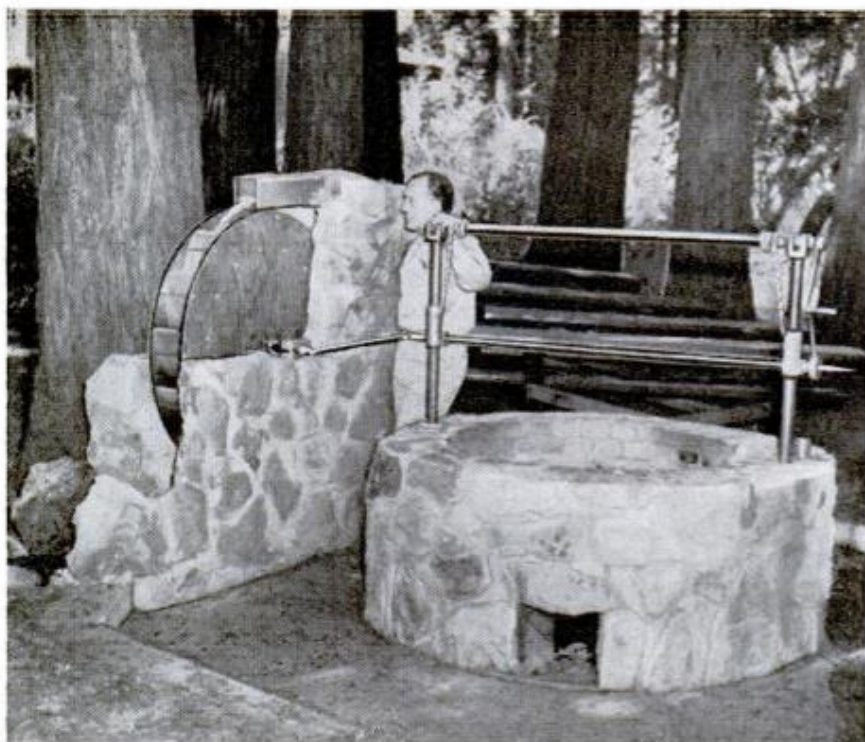
Twenty scientists, research people and technicians under Dr. R. Maurice Tripp,

Heat source goes into center of 30-inch parabolic reflector for "flashless" night aerial photography



JULY 1960





Developer of the most modern methods and equipment, Pick still uses man's oldest source of power—a waterwheel—to turn the spit over his own big barbecue pit

research manager, make up the staff. Among its other facilities the lab has a well-equipped machine shop, woodworking and pattern shop, metallurgical shop and electronics shop. It is intended to be as self-contained as is practical, so its facilities also include a photo lab and print shop.

In this environment the staff often tackles a new problem together, each member of the team contributing ideas based on his own training. All the projects are important, some are too technical to attract much public interest.

For instance there's the "multi-field isodose contour plotter" of which the laboratory is exceedingly proud. This long-winded name refers to a machine that saves time and money in treating cancer victims with radiotherapy. One of the great problems in such a treatment is avoiding an overdose of radiation to healthy tissue while irradiating a deep-seated tumor. The new machine plots a safe pattern of radiation in a few minutes as opposed to the present tedious process, which takes several hours.

Here's something that probably has a lot more popular appeal. Pick recently built a trap-shooting range near the lab building for himself and some of the members of the staff. On most trap ranges an operator is needed to release a clay pigeon every time the shooter calls "Pull!" But not here.

When the shooter calls for a target on the Pick range his voice is picked up by a portable microphone lying nearby. The electrical signal created by his voice is amplified and used to actuate the trap, automatically throwing a clay pigeon into the air. No operator is needed.

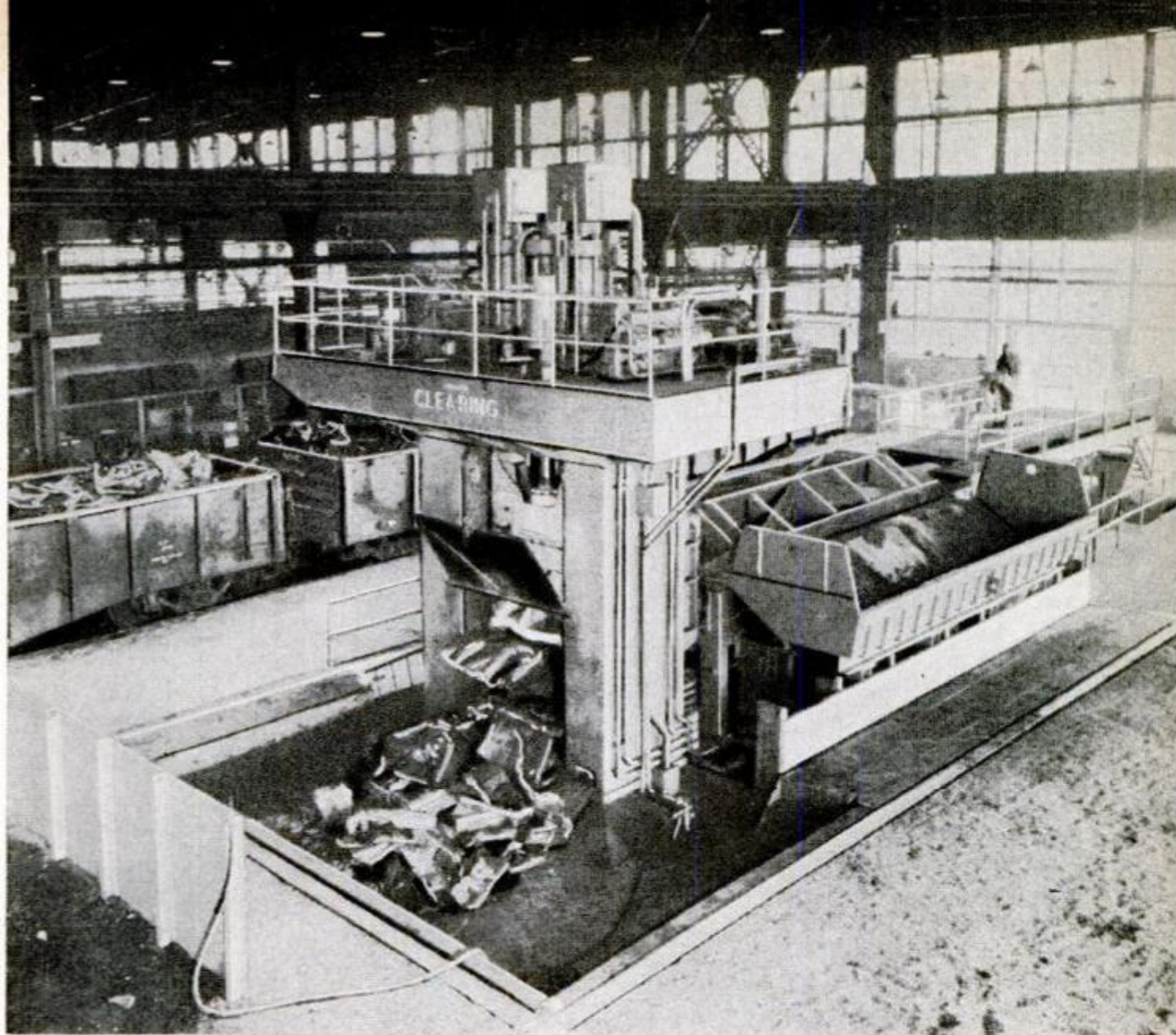
At his large home near the laboratory, Pick uses part of the flow of a mountain spring to maintain the water level in a small fishing pond. He puts the water to other uses as well. He installed a waterwheel alongside his big open barbecue pit and connected the shaft of the waterwheel to the spit. The spit rotates slowly over the fire when he opens a valve that sends water flowing over the wheel.

One of the things Pick has wanted is a better airborne scintillometer, a gamma-ray detector used in prospecting for uranium. These instruments already are available, of course, but they require constant attention in the air and it often takes weeks to evaluate the results of one day's flying.

The "Pick-Air Prospector" that the laboratory created is so great an improvement that it recently won an award from the mining industry. The new scintillometer does all its own paper work automatically and at once, drawing a picture that allows even an untrained operator to spot any unusual radiations beneath the plane. The device automatically rejects the background count, compensates for variations in terrain and altitude, and covers almost four times as much area in an hour and does it cheaper. With an associated three-dimensional plotter coordinated with ground radio transmitters, it can draw a radiation contour map in four colors, showing "hot" areas and their sizes and shapes.

The laboratory hasn't yet completed another of its projects, the device that would locate underground ore bodies from the air. The instrument is actually a gravity gradiometer that measures differences in

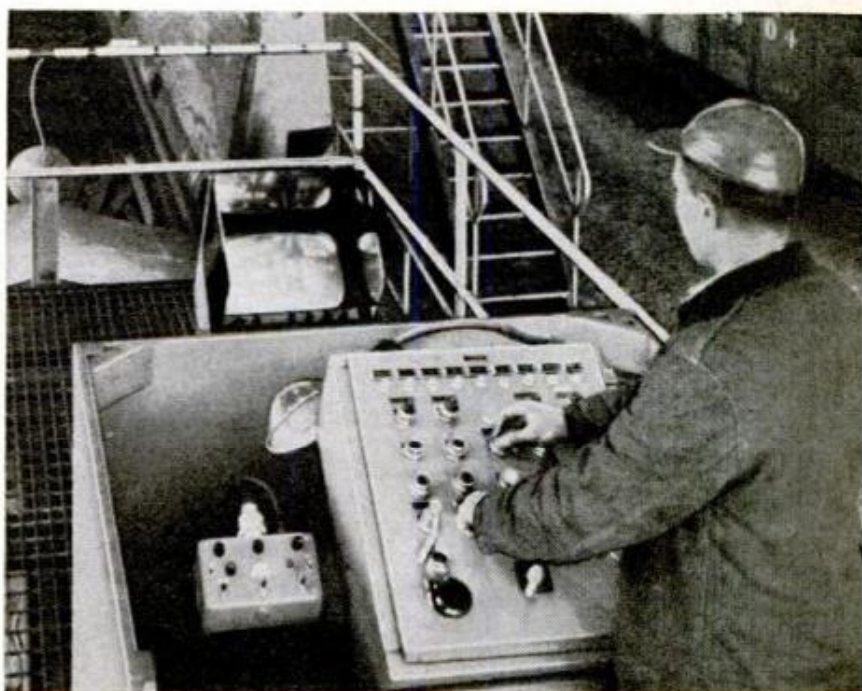
(Continued to page 202)



Cut into easy-handling size, the remains of an old freight car tumble from the shear's business end

Pushbutton Shear Chews Up Freight Cars

WITHOUT MOVING from the console of his big new shearing machine, the man at right can cut 30 freight cars a day into neat, easily handled chunks of scrap steel for melting in foundry furnaces. So big that he must have closed-circuit television to see what he's doing, the monster scissors weighs 335,000 pounds and stands two and a half stories high, and chops up over 400 carloads of scrap a month—a total of 18,000 tons of steel. First of its type to be used by a railroad, the machine is installed in the New York Central's Ashtabula, Ohio, scrap and reclamation plant, where it eliminates much of the torch cutting in the scrap yard. Adjustable to take bites of 6 to 48 inches at a time, the shear works on a 12-second cycle, using 600 tons of pressure.



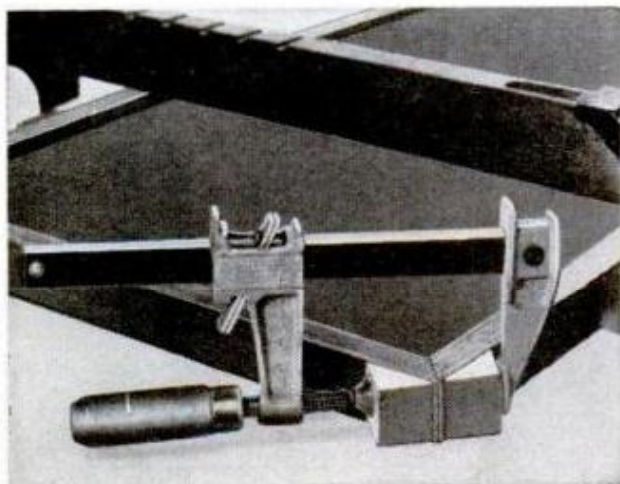
The CRAFTSMAN



By John Jefchak

Last Month You Built the Cocktail Table. Here's the

Clamping blocks are attached to table rails with hide glue—later removed and cleaned up with water



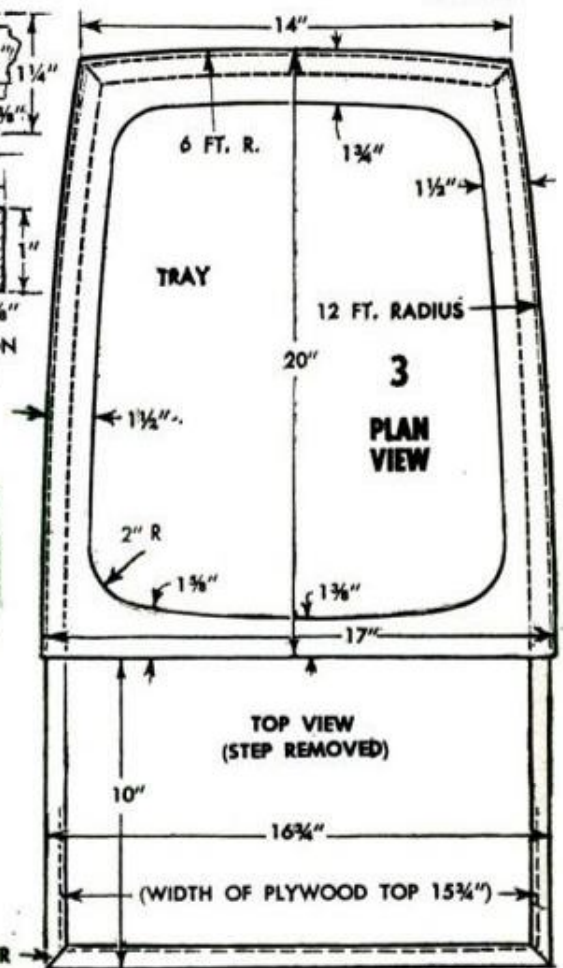
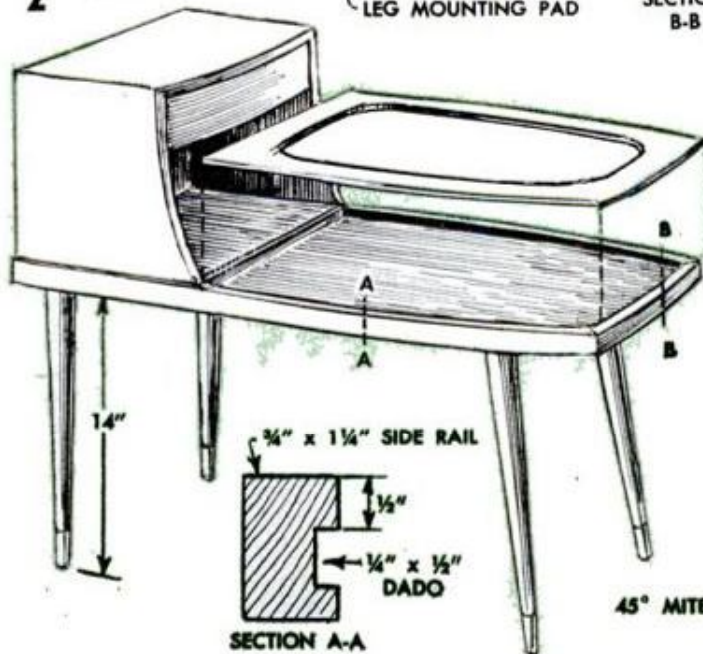
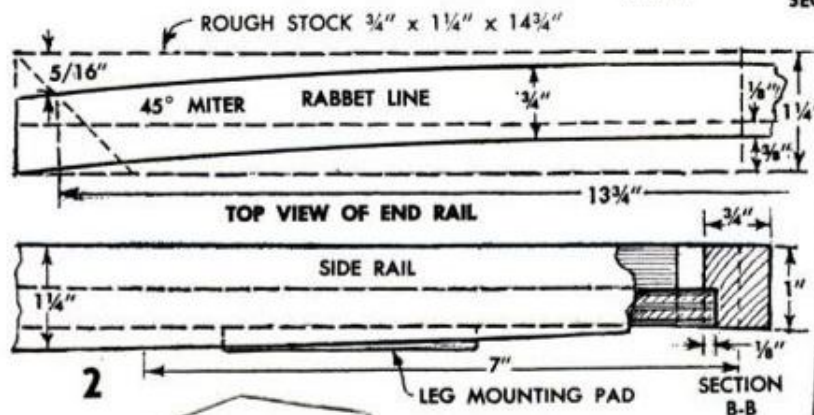
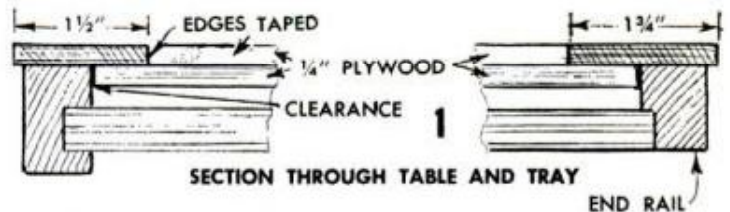
THIS STEP TABLE has a surprise feature that allows you to convert it to a table of many uses. You'll undoubtedly want two of them—for use as end tables on each end of your davenport. When used with the step, the design has a classical feeling. But with the tray and step removed, you have a pair of stunning end tables for casual use. Placed back to back, these tables form an unusual coffee table. Such convertability will be welcomed by the modern homemaker with limited space and budget.

Start with the table first. The rails are cut from solid stock—American walnut being used in the original. The side rails and the rear end rail are dadoed on the inside faces to fit over the edges of the

plywood table top. This dado measures $\frac{1}{2}$ in. wide and is cut $\frac{1}{4}$ in. deep, $\frac{1}{4}$ in. up from the lower edge of the rail. See the sectional detail A-A below Fig. 2. Note that the side rails measure $\frac{3}{4} \times 1\frac{1}{4} \times 29\frac{5}{8}$ in. and the rear end rail $\frac{3}{4} \times 1\frac{1}{4} \times 16\frac{3}{4}$ in. The curved front rail of the table is cut in precisely the same manner as described for the cocktail table presented last month. Starting with stock measuring $\frac{3}{4} \times 1 \times 14\frac{3}{4}$ in., you first rabbet the lower edge, then miter the ends and finally bandsaw it to the proper radius. See the top-view drawing and section B-B, Fig. 2.

Next, cut out eight triangular glue blocks and glue them to the rails $\frac{1}{8}$ in. from each mitered end. Hide glue should be used because it gives maximum strength and is soluble in water. It is a good idea at this time to sand the exposed inner faces of the rails.

Lay out the proper shape of the table top on $\frac{1}{2}$ -in. plywood measuring $15\frac{3}{4} \times 28\frac{7}{8}$ in. Check the drawing for respective radii. Note the straight length that extends for $9\frac{7}{8}$ in. along the sides. This coincides with the straight edge along the bottom of the step. Chamfer



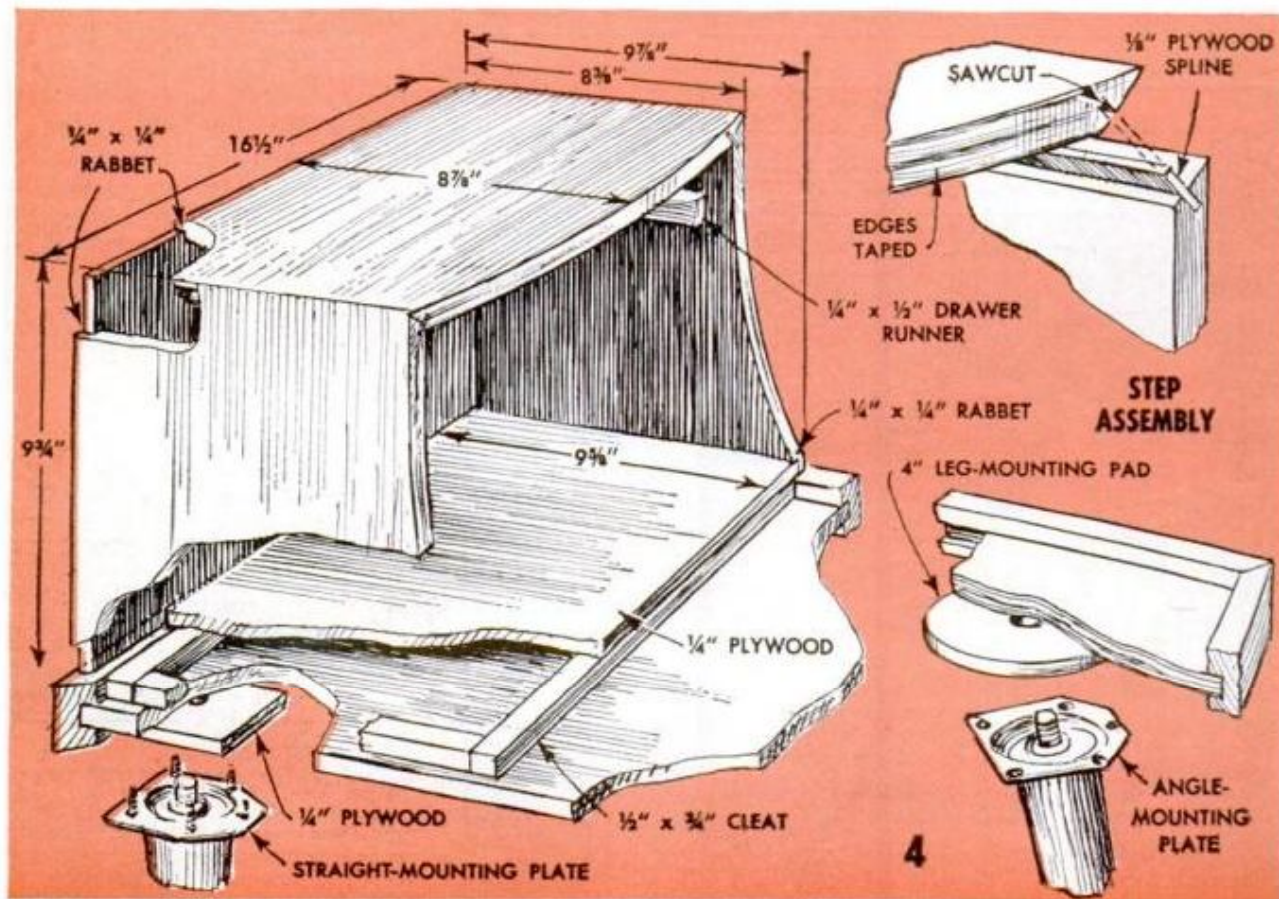


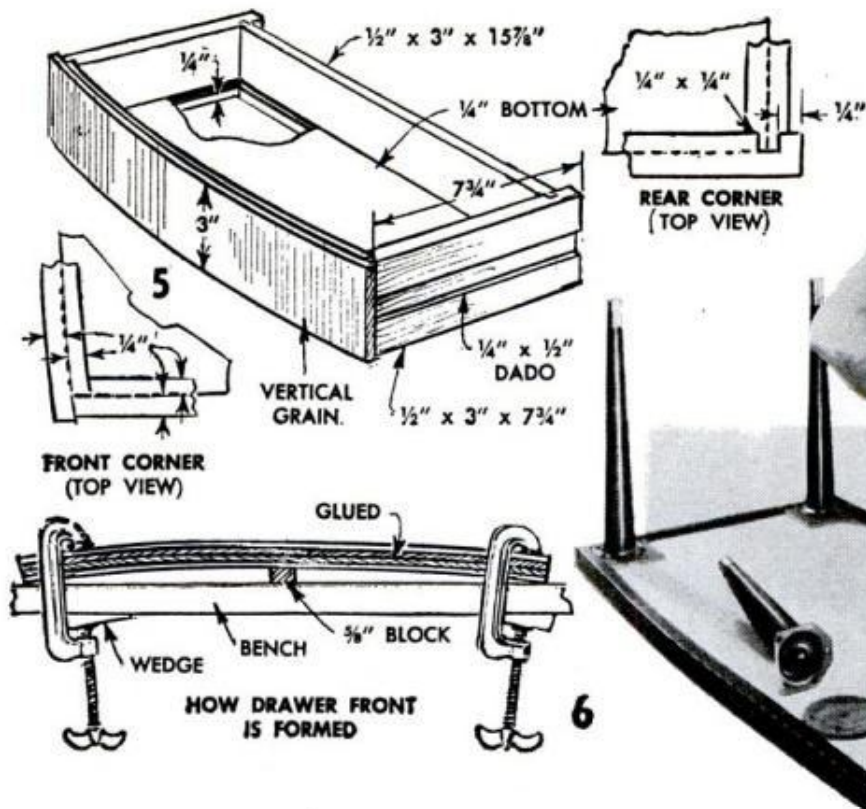
Curved pieces can be quickly sawed from the large sheets of plywood with a handy portable sabre saw

the edges of the $\frac{1}{2}$ -in. plywood slightly to allow slipping the piece easily into the dadoes. Assemble all parts dry and apply clamps to the glue blocks so that you can check the joinery. In gluing the work permanently, use a plastic resin glue or a similar positive adhesive since tension is created in bending the side rails. Prime the

mitered edges and allow them to dry thoroughly before gluing. Apply pressure carefully to prevent tearing off the glue blocks and wipe off all excess glue. In removing the glue blocks, use a chisel, observing normal caution. Remove traces of glue with a sponge and water.

The tray is identical in every respect to the trays described last month, two-layers of $\frac{1}{4}$ -in. plywood being glued together and the exposed edges covered with wood tape. Cut out the top and bottom parts of the tray following the dimensions given in Fig. 3. Note that the top part overhangs the rails $\frac{1}{8}$ in. all around and that the bottom part should have a $\frac{1}{16}$ -in. clearance inside the rails. To assemble the two parts of the tray, place a scrap piece of $\frac{1}{4}$ -in. plywood on the table top and position the bottom part of the tray on top of it, centering it between the rails. Now temporarily fasten the top part to the rails with masking tape. With this done, run a pencil around the inside of the top part of the tray to mark its position on the bottom. Remove the tray from the table and glue both parts together, watching to see that the top part registers with the pencil line. Apply clamps or carefully flip it over and weight with heavy objects. Be sure to clean off excess glue from top surface, since it will show under a clear finish. After gluing wood tape to the exposed edges of the tray, carefully trim it flush with the surface and sand lightly





with fine garnet paper. You'll find that contact cement simplifies bonding the tape to the edges.

Building the "step" is next. Unless the plywood is faced on both sides, you can either apply a face veneer, or glue two $\frac{1}{4} \times 9\frac{3}{4} \times 9\frac{7}{8}$ -in. pieces together, back to back. To utilize the full beauty of your veneered stock, mark out the two sides and top from one continuous piece. The grain will then match when the pieces are assembled. Splined miters are used at the corners to produce strong joints. Cut sides and top of step to exact over-all size, then cut the miters and grooves to receive the splines. Cut the splines so that the grain runs crosswise and allow sufficient clearance to take care of excess glue and assure complete closure of the miter joint by cutting the spline slightly undersize.

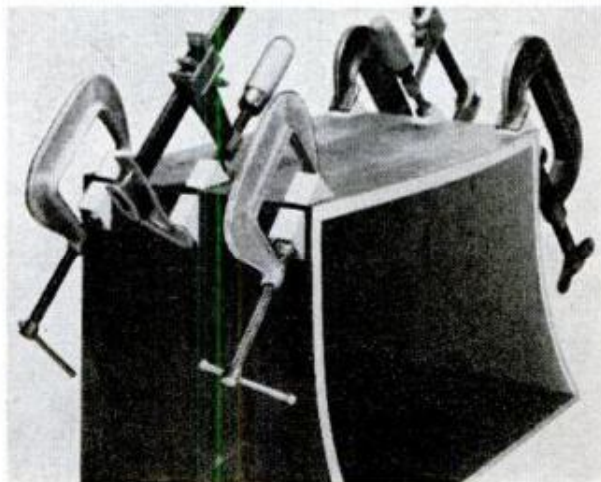
Cut out $\frac{1}{4} \times \frac{1}{4}$ -in. rabbets to receive the bottom and back panels of the step. Mark and cut out the curved front edges of sides and top pieces and fasten three glue blocks along the mitered edges with water-soluble glue. Glue entire step at one time, using brads to secure bottom and back panels while glue sets. Check for squareness. Cut and fit a filler strip along front edge of bottom panel. Sand and apply edging strip, add cleats on the bottom to fit inside the rails. The exposed front edges of the step are faced with wood tape as before.

The curved front of the drawer is made from two pieces of $\frac{1}{4} \times 3 \times 15\frac{5}{8}$ -in. ve-

neered stock. Vertical grain was chosen to improve the design. Cut the dado on the inner piece before laminating. Apply glue, place back to back and sandwich between two similar scrap pieces. Center the work on a $\frac{5}{8}$ -in. block and draw down both ends with C-clamps as in Fig. 6. Allow to dry thoroughly. When dry, square all edges and fit the drawer front to the step, allowing for a $\frac{1}{16}$ -in. clearance. Cut rabbets on both ends of the curved front for the drawer sides and complete the drawer as in Fig. 5. The drawer bottom measures approximately $\frac{1}{4} \times 7\frac{7}{8} \times 15$ -in.

Test-fit the drawer before gluing to make certain it will slide properly. Locate
(Continued to page 212)

As was done in clamping table rails, blocks of wood are glued along step miters for applying C-clamps



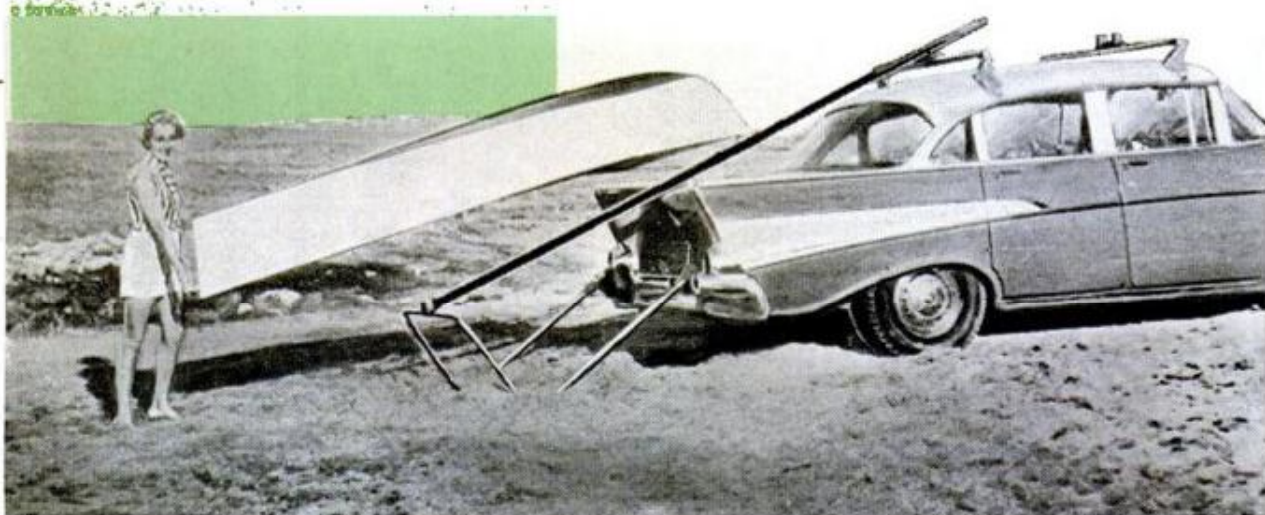
CAR-TOP BOAT TOTERS



Cascadian Mfg. Co., Ltd. photo

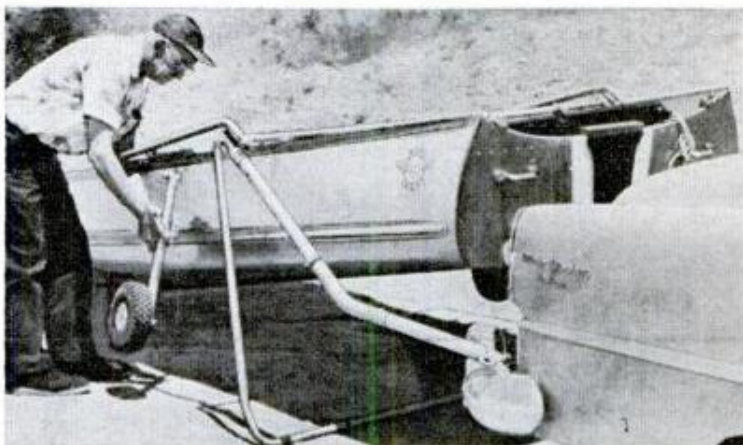
ONE OF THE EASIEST to use of the different types of car-top boat loaders available, the model illustrated on this page can handle boats up to 14½-ft. long with a maximum weight of 250 lbs. The unit consists of two components, a steel track that mounts on the carrier bars, and tubular stanchions, or arms, that mount on the rear bumper. In use, the bow eye of the boat is first connected to a dolly mounted on the track. Then, the boat is lifted at the transom (by the person loading it) and rolled up on the track as shown below, after which the transom is clamped to the stanchions. The boat then is raised further and rolled forward, completing the loading. A combination of springs and counterbalances leave little lifting to the skipper or mate

WITH THE rental demand for small outboard boats exceeding the supply in many good fishing and boating areas, many smart boaters are toting their own lightweight craft on car-top carriers like the ones shown on this and the next three pages. Special loading equipment that can be attached to the car or carrier eliminates heavy lifting, making it a snap even for the "weaker sex" to load a 200-lb. boat as shown in the photos. Boats weighing as much as 250 lbs. and up to 15 ft. in length can be accommodated on a car roof in this manner. For boats weighing more than 100 lbs., carrier bars that clamp to the rain gutter should be used since they concentrate the load at the extreme outer curvature of the roof where it is strongest. Car-top boat-loading devices make it possible to take a boat along on camp-out and vacation trips without having to tow a trailer.



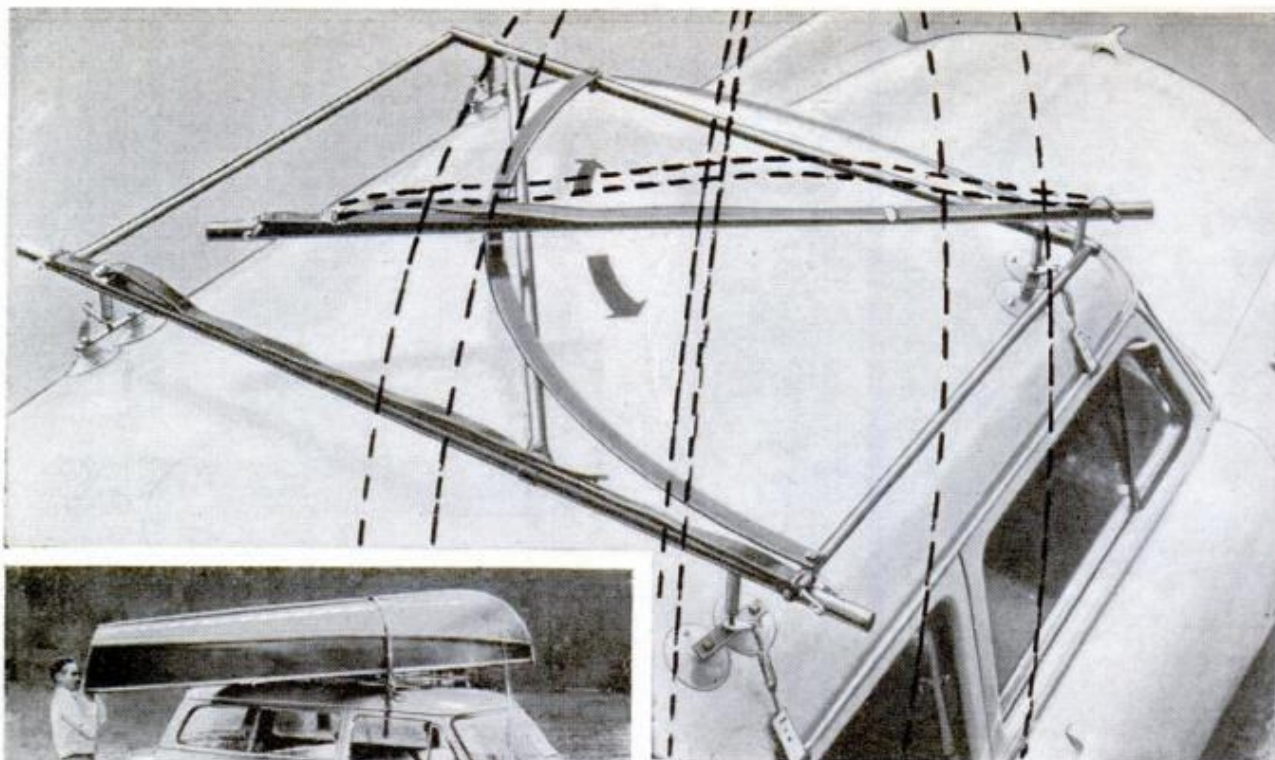


THE LOADER shown in the photos above and right is of the side-loading type. It consists of two segments, one of which is a tubular rack that fastens temporarily to the carrier bars. The other segment is a leg that pivots on the outboard end of the first one. Loading is accomplished by tipping the boat onto the rack, then raising the rack so that the center leg supports it level with the carrier bars, after which the boat is slid on the car and strapped in place. Finally, the rack-and-leg assembly is disconnected and placed under the boat where it is secured to the carrier bars. Use of a collapsible dolly permits one-man launching and elevates the boat for easy loading



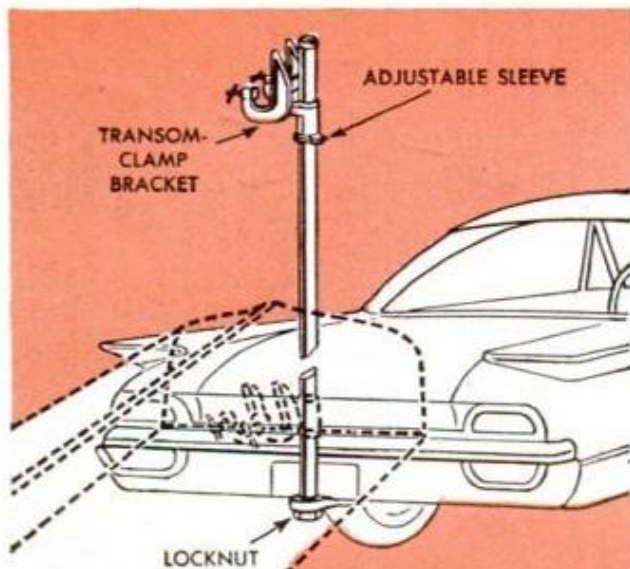
BUMPER-MOUNTED BOAT LOADER shown in the two photos at lower right, is designed for effortless loading of the heaviest boats that can be carried safely on a car roof. A roof load of more than 250 lbs. will tend to make a car top-heavy and may damage the roof, especially when traveling on rough roads. Mounted on the car's rear bumper, the unit is easily installed and removed. Its counterbalancing mechanism makes the boat's own weight lift the load. A pair of demountable wheels that snap into brackets on each side of the boat permit one person to wheel the boat to and from the water's edge. The wheels also elevate the boat to the right height when it is coupled to the loader. The brackets are attached permanently to the gunwales. A padded crossbar clamped to the gutter rails forward provides support for the boat bow





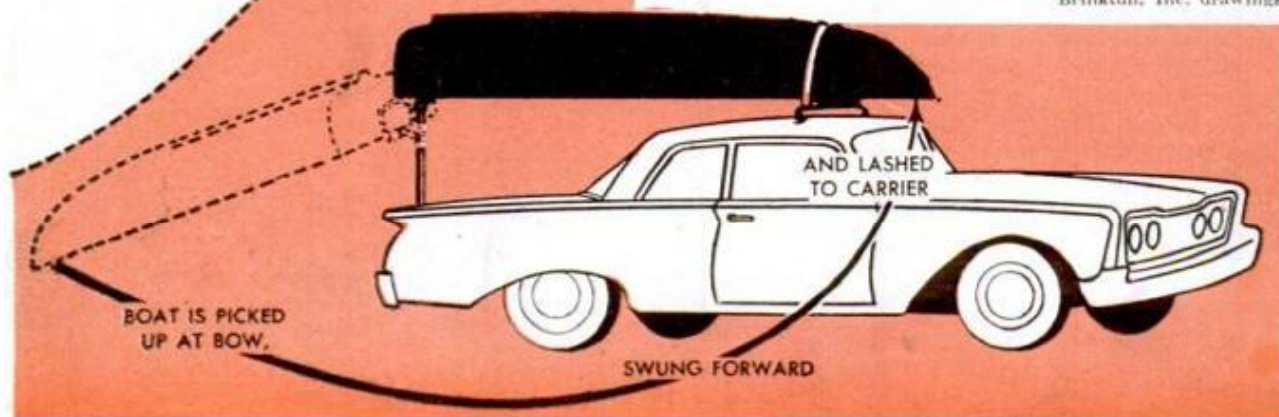
Pro-Weld Co. photo

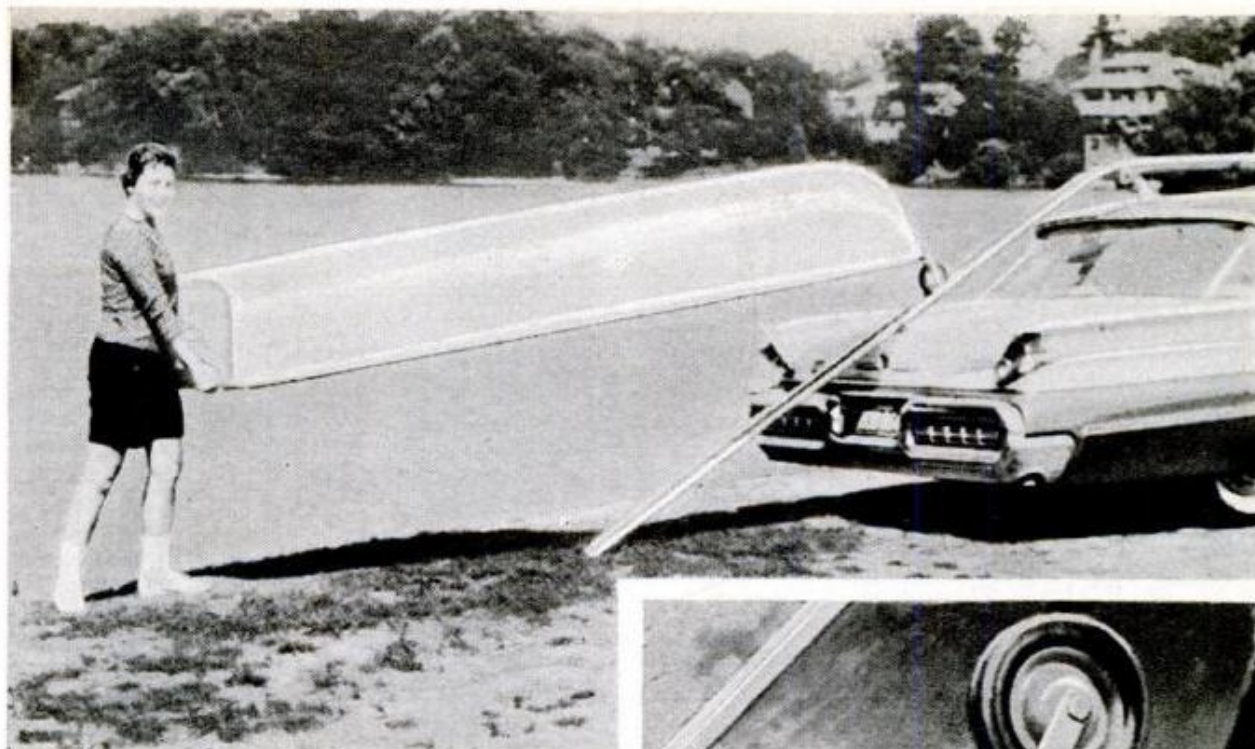
ANOTHER SIDE-LOADING TYPE of boat loader is shown in the photo and inset above. Loader and carrier come as one unit that fastens to gutter rails as shown. Loading is accomplished in two easy steps. First, the boat is tipped on the stern and against the carrier sidebar, gun'ls down and strapped tightly to the traveling bar that pivots on the right-front corner of the carrier. Then, the boat is picked up at the stern, pivoted into position on the carrier and secured with a stern strap. The loader-carrier will handle boats up to 175 lbs. and 60 in. beam



SHOWN IN THE DRAWINGS at left and below, is one of the simplest car-top boat loaders. It consists of a steel column having a transom clamp bracket that slides on it as shown. A U-clamp located below the bracket permits locking the latter at whatever height is desired. In use, the boat transom is clamped in the bracket at bumper height, then picked up at the bow, swung forward onto a carrier bar and lashed down. This loader is ideal for short-roofed cars; and it is suitable for medium-weight boats. One drawback is that a trailer hitch is required for mounting it, the base bolt being fastened in place of the ball

Brinkton, Inc. drawings





Market Forge Co., photos

THE BOAT LOADER illustrated on this page is about the easiest model to install and use. It features "wheelbarrow loading," and consists of a four-section, telescoping, channel-steel loading ramp, two carrier bars and a bow wheel. After a special bracket for the latter is installed on the boat, the wheel is simply inserted in it when loading or unloading as shown in the inset in the photo above. When boating, the wheel may be left ashore, or it may be kept in place for easy one-man portaging. Two bolts hold the wheel securely in place. The loader is designed to accommodate boats up to 200 lbs. and 14 ft. in length. The inclined portion of the loading ramp is removed and stored under the carrier bars when traveling. An adjustable bracket cushioned by two rubber suction cups is attached to the lower ramp section to stabilize it and protect the car-trunk finish. This carrier and the two models shown on the preceding page of this story sell for less than \$50, \$100 to \$140 for the ones shown on the first two pages





"Dustpan" on Hedge Trimmer Catches Thick Clippings

Attached to the comb of an electric hedge trimmer, a sheet-metal apron will do a fine job of collecting the clippings from the top of a hedge and permit tossing them aside with a sweeping motion. This saves the task of later raking the clippings from the top of the hedge which is generally necessary for appearance sake, particularly when the clippings are unusually thick. In most cases, the apron can be attached by the same machine screws that hold the comb to the cutter bar.—Hugh Lineback, Stillwater, Okla.

☞ When a damask or velvet-covered sofa or chair begins to show signs of wear along the edges of the sprung seat, you can cover up such worn places by trimming the seat with upholstering fringe. Use decorative-headed tacks in applying the fringe, driving them in a closely studded row.



Wax Paper Lines Soap Case

A wet cake of soap will invariably stick to the bottom of a plastic soap case and become a nuisance to remove. A simple way to keep it from sticking is to place a folded piece of wax paper in the bottom half of the case. The soap then will drop out with the wax paper stuck to it. The paper is easily peeled off the soap cake and replaced in the case. Remember this hint the next time you pack your bag for a business trip.—Donald Spichuk, Brooklyn, N. Y.

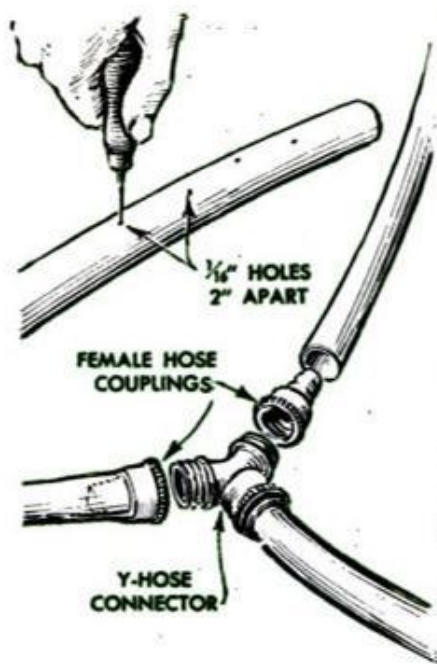


Flower-Pot Match Snuffer

If you are a pipe smoker and enjoy smoking while working in your basement shop, the fear of a carelessly tossed match starting a fire among loose shavings can be forgotten by having a match snuffer handy at your bench. This one is nothing more than a common clay flower pot inverted in an ashtray or saucer. Inserting the match in the hole in the bottom of the pot extinguishes the match instantly.

Never a Dull Edge

Tossing your sharp-edged tools in a tote box is, of course, poor practice. In contact with other tools they will soon lose their keen cutting edges. It is far better to wrap them individually in protective cloth sleeves soaked in linseed oil before putting them away.



FROM HOOLA HOOP TO SPRINKLER

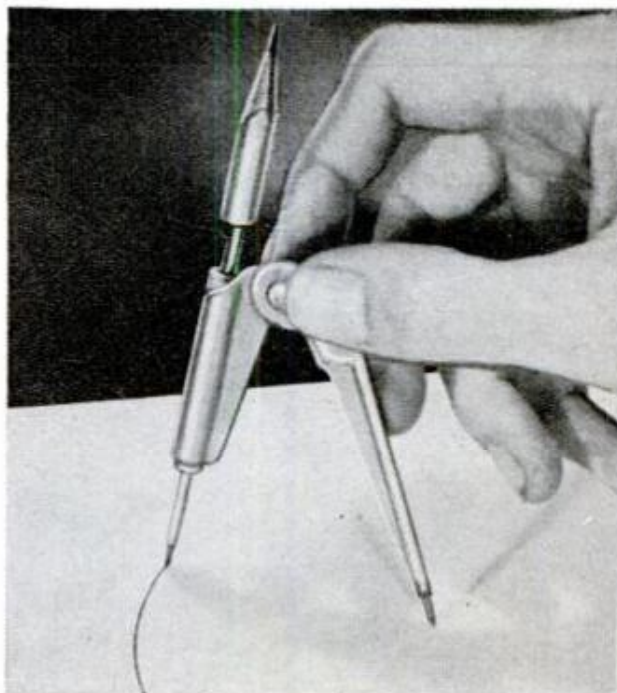
Got a castoff hoola hoop hanging in the garage? It takes only a few minutes and a few hose parts to convert it into a lawn sprinkler and shrub soaker. The kids will get new fun out of it, too, as a shower on hot summer days. Begin by removing the staples and the wooden plug which join the ends of the hoop. Cut away about 1 in. from each end and soften these ends by soaking them in hot water for ten minutes. This will make it possible to insert female hose couplings of the type that are normally used in plastic garden hose. Because the inside

diameter varies, it will be necessary to check the size before selecting the couplings. The assembly is completed by connecting the couplings to a hose connector. Beginning about 4 in. from each end, punch a series of 1/16-in. holes at 2-in. intervals in one wall of the hoop, slanting the holes so that the water will spray in all directions. Placed upside down around a shrub and the water turned on slow, the hoop makes an excellent soaker. As a king-size lawn sprinkler, the hoop will spray a wide area when the water is at full force.

Ball Points Find Their Place Among Draftsman's Equipment

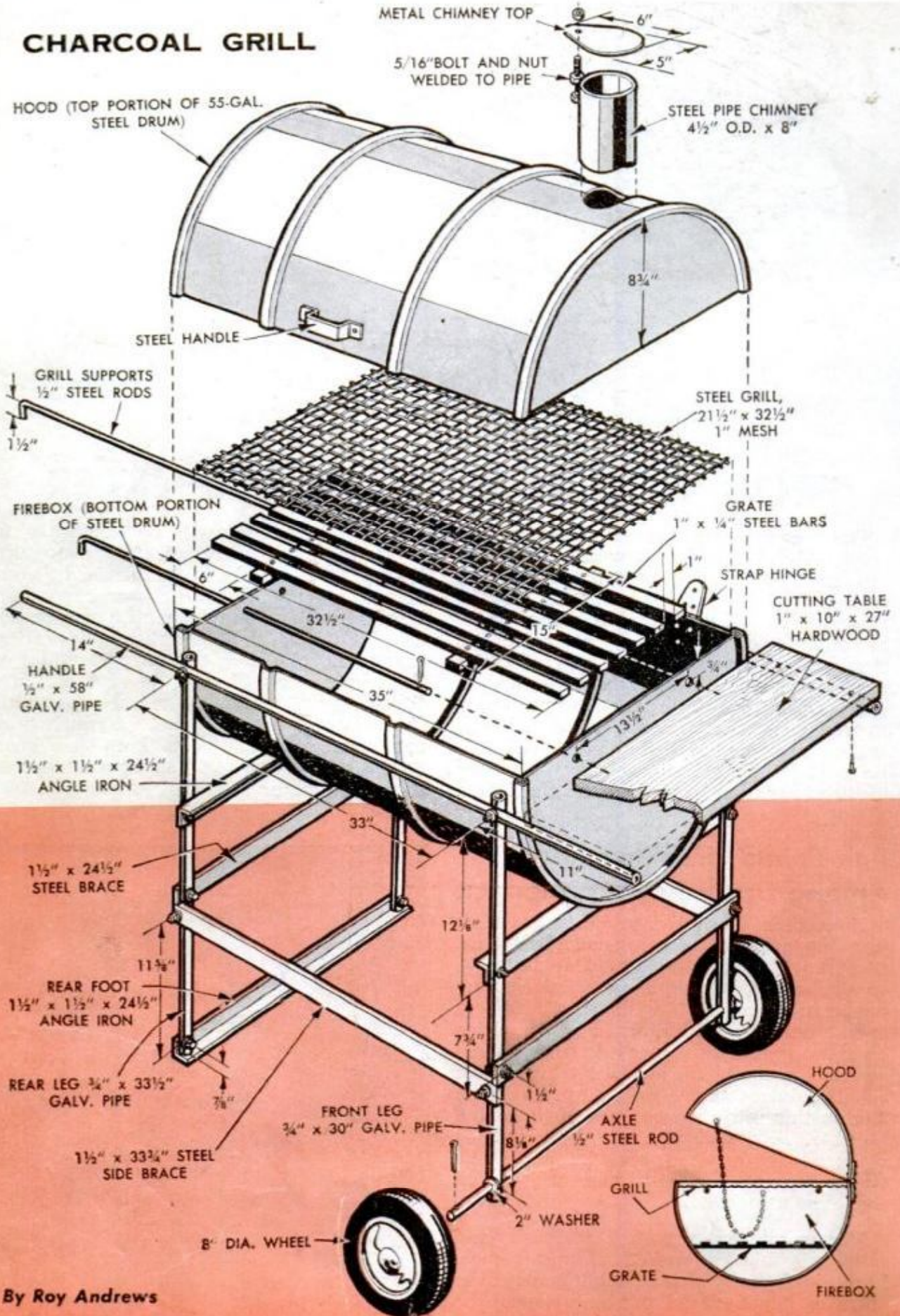
Next time you need to ink a penciled drawing, or make a tracing use a ball point pen. It will make a sharp, clean line and won't require refilling like a regular ruling pen. Furthermore, it will never blot and spoil otherwise good inking. For use with a compass, drill out the graphite from a short section of pencil to form a sleeve into which a ball-point cartridge may be press fitted. Clamp this into the compass in the usual manner. A pencil tip may be similarly drilled to fit on the opposite end of the cartridge, making both pen and pencil available as needed.

☐ Ink can be erased from paper easily and quickly using commercial liquid bleach. Dip a cloth in the bleach, dab it gently over the area being erased and blot. Repeat the process until the ink disappears.

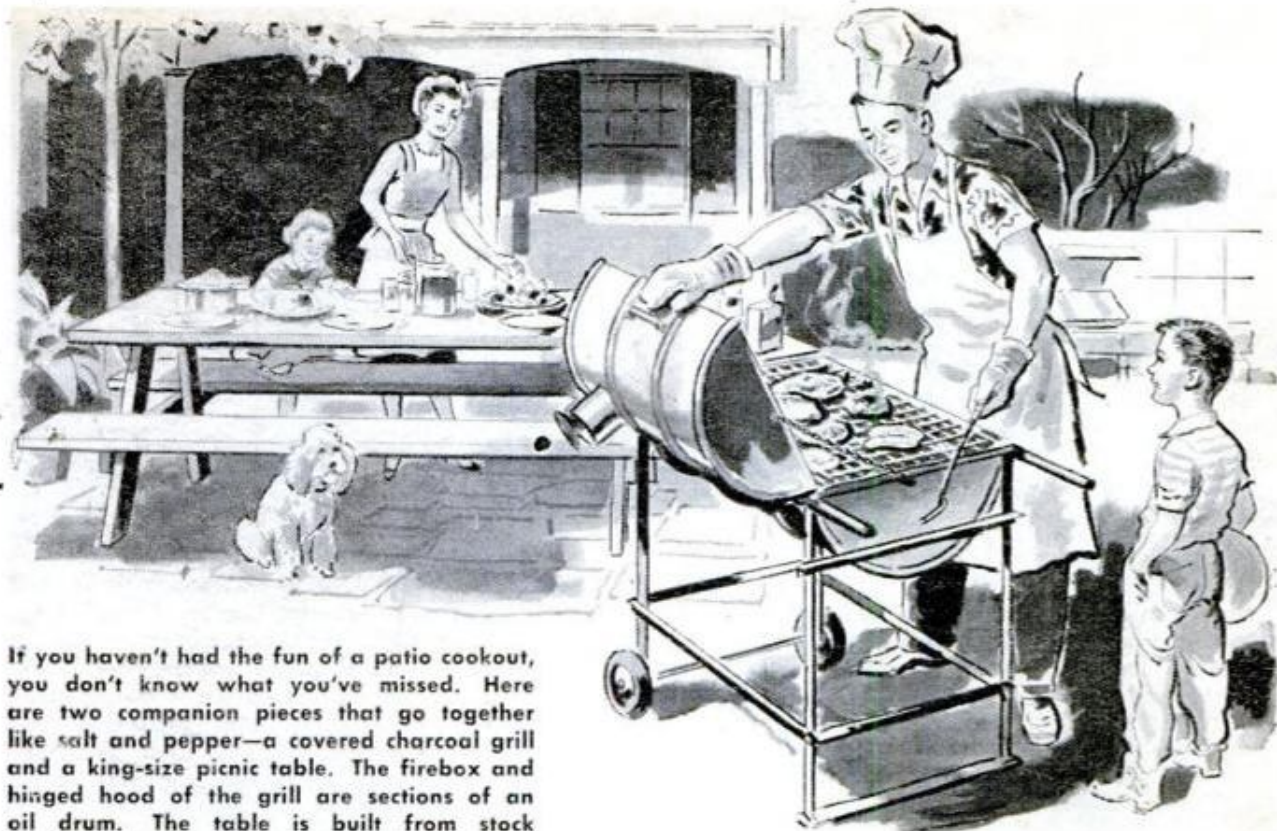


X677
PLANNED FOR COOKOUTS

CHARCOAL GRILL

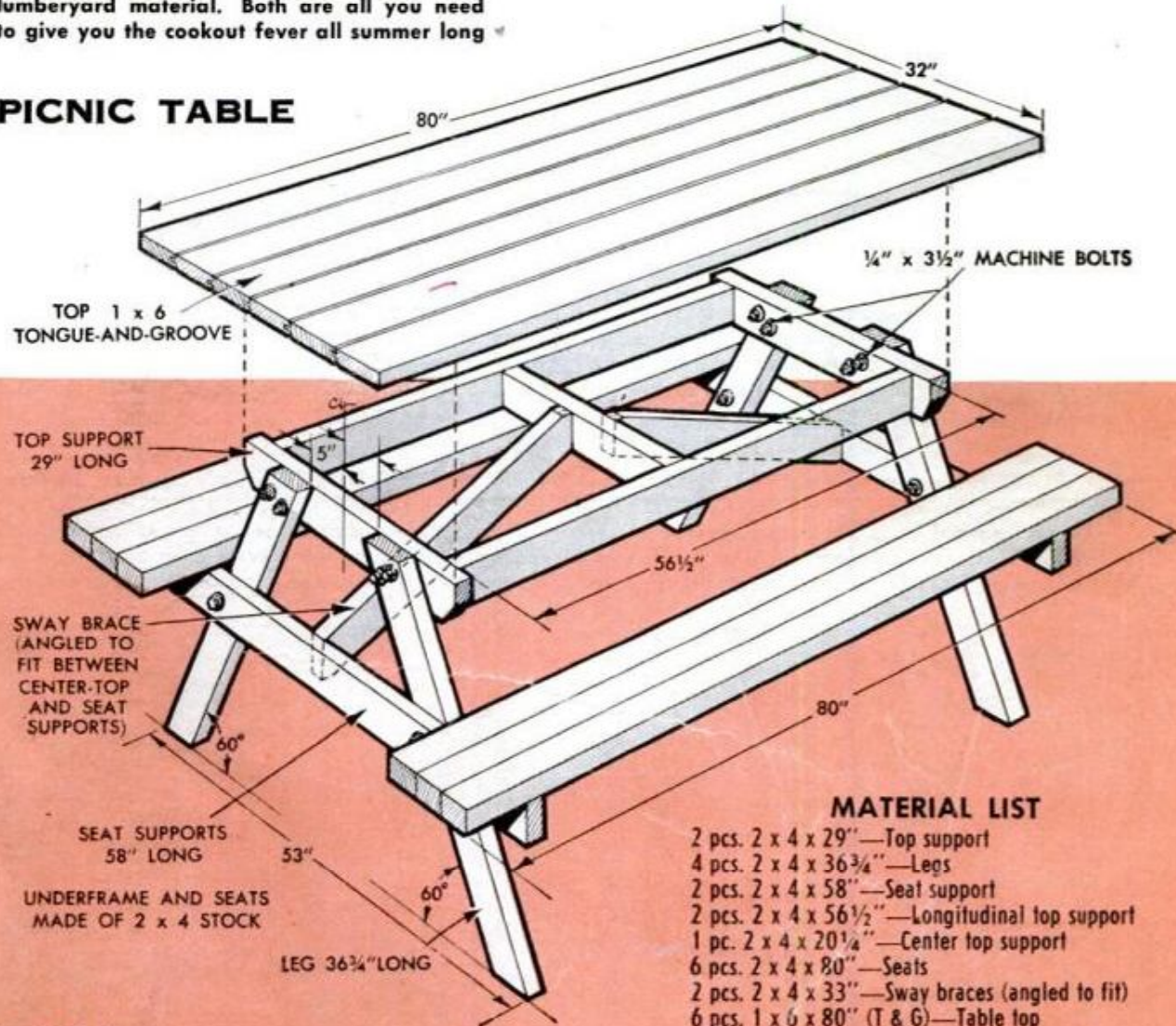


By Roy Andrews



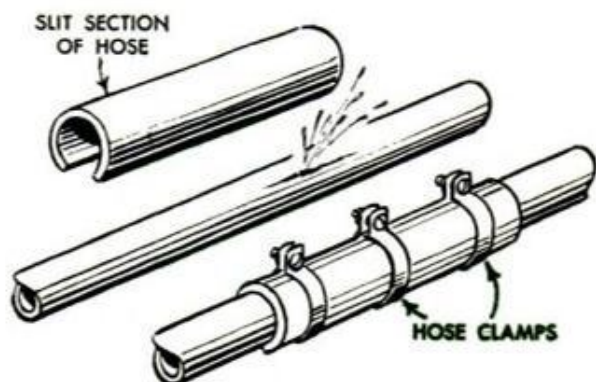
If you haven't had the fun of a patio cookout, you don't know what you've missed. Here are two companion pieces that go together like salt and pepper—a covered charcoal grill and a king-size picnic table. The firebox and hinged hood of the grill are sections of an oil drum. The table is built from stock lumberyard material. Both are all you need to give you the cookout fever all summer long.

PICNIC TABLE

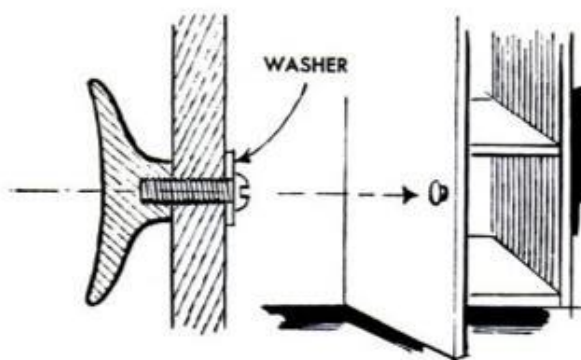


By W. H. Fogle

SOLVING HOME PROBLEMS



WHEN FREEZING bursts a water pipe an emergency repair can be made quickly with a length of radiator hose (or garden hose) and two or three hose clamps. First slit hose and trim meeting edges so that it fits tightly around the pipe. Then clamp securely in place



METAL PULLS AND HANDLES on wooden kitchen cabinets often loosen after a short period of use. This usually is due to slight shrinkage of the wood after installation. Tighten them permanently by placing metal washers under heads of the attaching screws



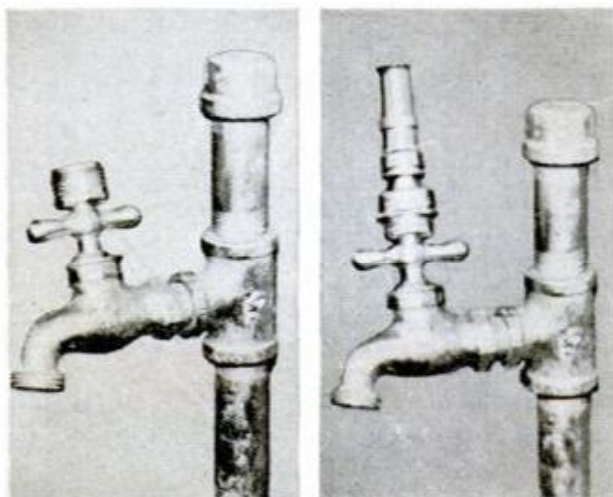
STEPLADDER TREADS can become treacherously slippery when wet. Reduce danger of a serious fall by covering treads with slate-surfaced roofing attached with cement and nails, or temporarily with tape. Slate coating will stay in place if coated with shellac

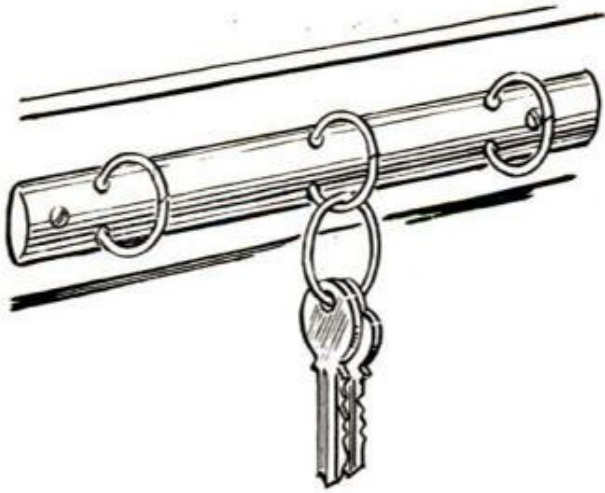


IF YOU LOSE the applicator that comes with the paste jar, a finger pad, or cot, makes a good substitute spreader as you can turn it with the holes up and wear it on a finger while you're assembling that scrapbook. A cot cut from a rubber glove also will do

HANDY PLACE to store a hose nozzle is right on the sill cock where you attach the hose. Cut threaded section from an old hose connector, remove screw that holds sill-cock handle, place a washer inside connector and screw back in place as in left-hand photo

A BURNED-OUT FUSE is not always easy to locate on a panel even if you use a flashlight. To make the dead fuse easier to see, place a heavy dot of sealing wax on the window of each one. When fuse blows the wax will melt, leaving the window clear





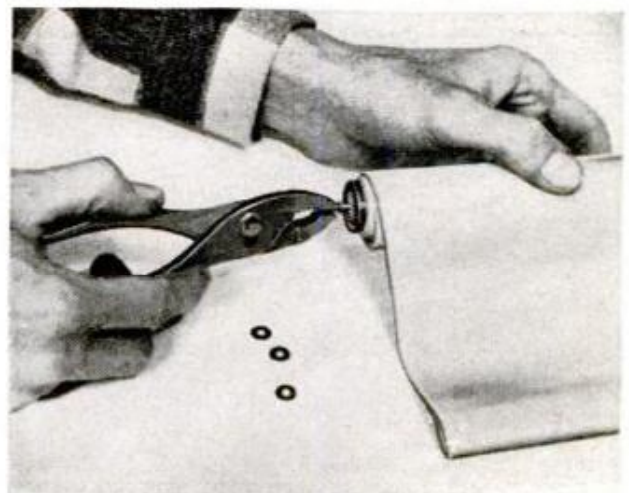
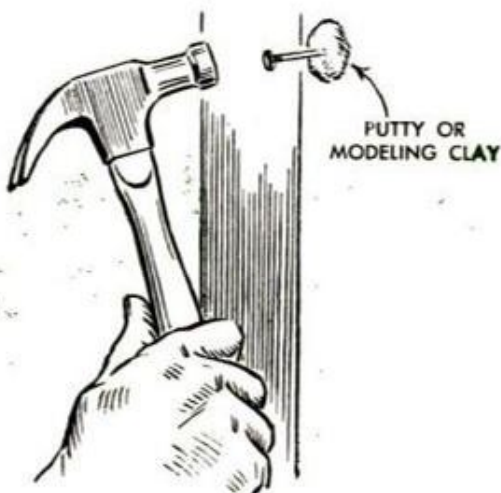
BEFORE YOU TOSS OUT that worn three-ring binder remove the back and take another look. It's a household key ring perhaps—or maybe even a hanger for utensils or tools that you don't use every day. You can easily adapt it to these and possibly other uses

JUNIOR MAY LEARN that it's fun to keep time with one foot or both while practicing at the piano. While this may be all to the good, it can be rough on finish of lower panel. Protect surface with a piece of carpet folded over top and bottom edges of panel

CLOGGED JETS of gas-stove burners should be cleaned periodically for efficient and economical operation. Use a short length of fine wire (furnace wire is just right) to remove encrustations from the orifices of the jets, then finish the job with a pipe cleaner

STARTING A NAIL in a hard-to-reach place often calls for a little ingenuity. Save fingers by remembering this trick: Roll up a small ball of putty between the palms and place it where you want to start the nail. Press nail into putty and there you are

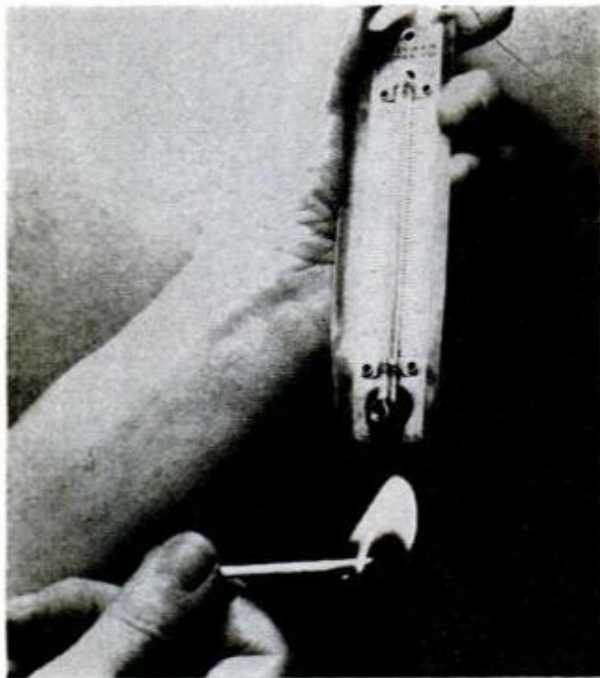
IF YOU'RE FITTING new shade rollers and chance to cut one a trifle too short, there's an easy way to lengthen it. Remove the fixed pin and flanged metal protector from the end of roller, place a small metal washer inside protector, then tap pin back in place





Four-Sided Pencil Pointer

While hand pencil pointers are nothing new to artists and draftsmen, they always have been messy to use. Graphite dust gets on the hands and eventually on the drawing. Such smudges are avoided with this novel pencil pointer in that it has a container to catch the dust. As the pencil lead is being pointed on a built-in abrasive block, the dust falls into the attached container. It's nothing more than a glass jar or can having a screw-top or slip-on cover in which a four-sided abrasive block is mounted. Tabs cut in the cover and bent downward to form a slot serve as bearings for the abrasive block. The latter is a block of wood faced on four sides with emery cloth and fitted with pin shafts, or axles, to rotate in holes made in the end tabs.—Yasiro Honda, Kanagawa, Japan



Match Held to Thermometer Rejoins Mercury Column

Mercury will sometimes separate into globules in the column. However, this does not mean that the instrument is no longer useable. In most cases, the mercury in the column can be rejoined by holding the flame of a match to the bottom of the tube for a few seconds. The heated mercury will rise quickly and rejoin the separated portion, after which the column will return to its proper level.—Wayne Floyd, Fayetteville, Tenn.

When using plastic electrician's tape in cold weather it can be made to adhere more effectively if it is first warmed slightly by holding the roll near a lamp bulb. Heat from the bulb will soften the adhesive making the tape adhere to itself firmly.



Tape Mounted on Waxed Paper Can Be Inserted in Typewriter

Labeling is done neatly when the data is typed on masking tape. But how to run the strips of tape through a typewriter presents a problem. One simple way to do it is to place the strips on a piece of waxed paper. This lets you run both through the machine, just like a sheet of typing paper. After typing, the tape is easily peeled from the waxed sheet.—Donald Spichuk, Brooklyn, N. Y.

Paint will adhere to new galvanized sheet metal if common household vinegar is first applied to the surface with a cloth swab or small sponge and left to dry.

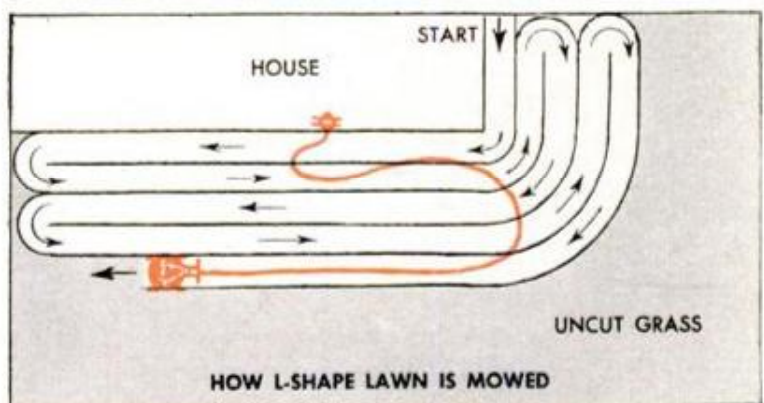
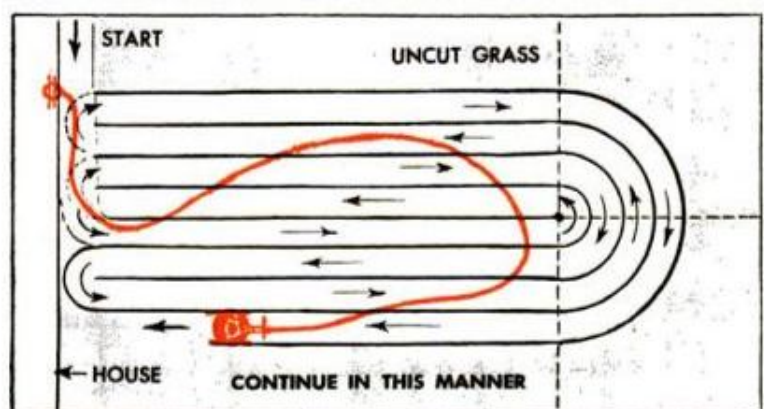
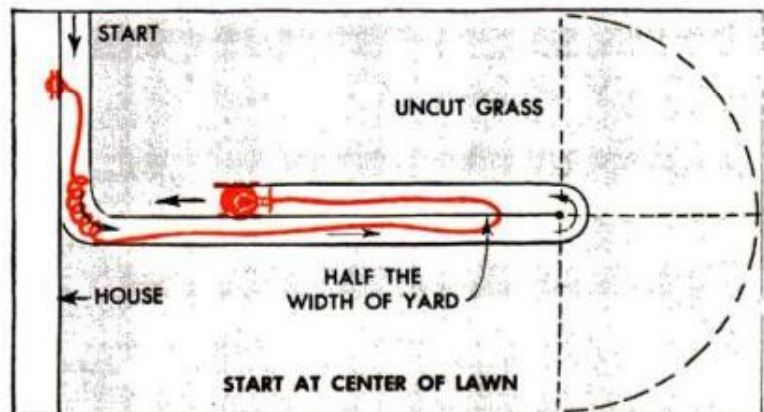


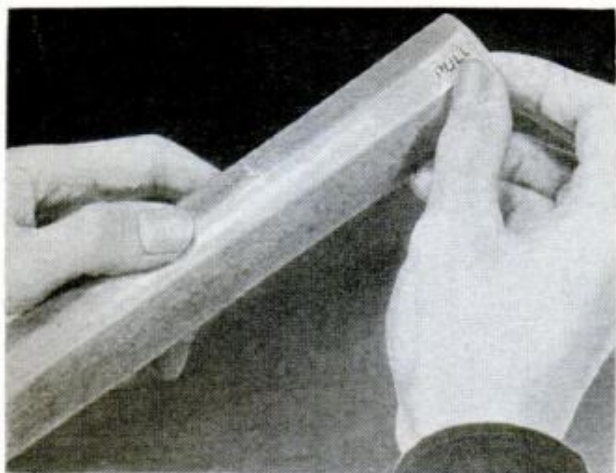
MOWING PATTERN KEEPS CORD IN TOW

WATCHING to see that you don't cut or get tangled up in the cord of an electric mower is not the problem it might seem when a set mowing pattern is followed. The three diagrams at the right show how simple it is to keep the cord from underfoot when mowing either a rectangular or L-shaped yard. In the case of a rectangular shaped yard, you start mowing at the center and mow to a point which is half the width of the yard measured from the side and one end of the lot. From this point you simply keep doubling back and forth, making tight right and left turns as shown in the second diagram. In this manner, the cord is always trailing from behind and out of the cutting path.

In mowing an L-shaped yard, start out close to the house. Then follow an L-shape route as mapped out in the lower diagram, making tight right and left turns as before. As you can see in this mowing pattern, the cord will always be trailing the mower in the previously cut area where the cord is safe from being accidentally severed by the mower. In the two mowing patterns given here you will note that the convenience outlets are located at points handy to the area being mowed. Several outlets should be provided.

A. E. Hilliard, Rison, Ark.



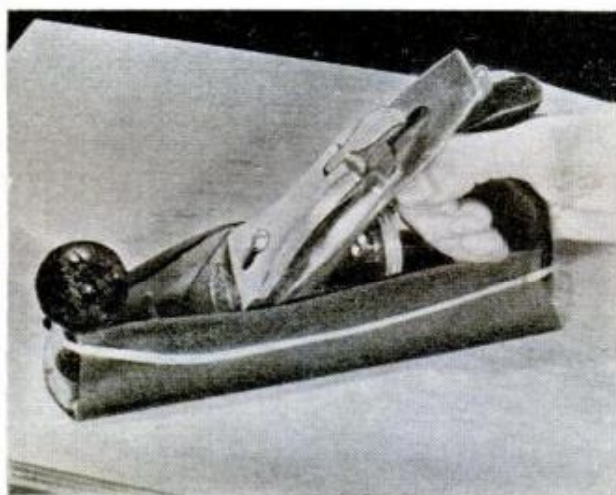


Cellophane Tape Makes It Easy To Remove Mailing Wrapper

When plans and drawings are wrapped around a mailing tube and then wrapped for mailing, you can make it very easy for the addressee to open the parcel without fear of damaging the contents if the wrapper is sealed with a strip of cellophane tape instead of gummed paper. The cellophane tape can be easily peeled off to open the wrapper whereas the gummed paper cannot, resulting in slitting the wrapper and damaging the contents. To make it doubly easy to grasp the end of the tape, add a tab and mark it 'pull'.

Two-Handed Sanding Block

In a pinch, your wood plane can be put to use as a dandy two-handed sanding block. Because of the two handholds it provides, you'll find the plane perfect for sanding large surfaces where it is desirable to exert a uniform downward pressure throughout the sanding stroke. The sandpaper is held by merely folding it up around the plane frame and securing with a rubber band. Naturally, you should first back off the plane iron so it does not extend beyond the sole.



DECORATOR'S

Design flair and unusual wood-graining fit this lamp into any modern decorative scheme. It's big, nearly 3 ft. tall, a size which makes it contemporary with lamps accepted by decorators



LAMP BASE FROM PLYWOOD

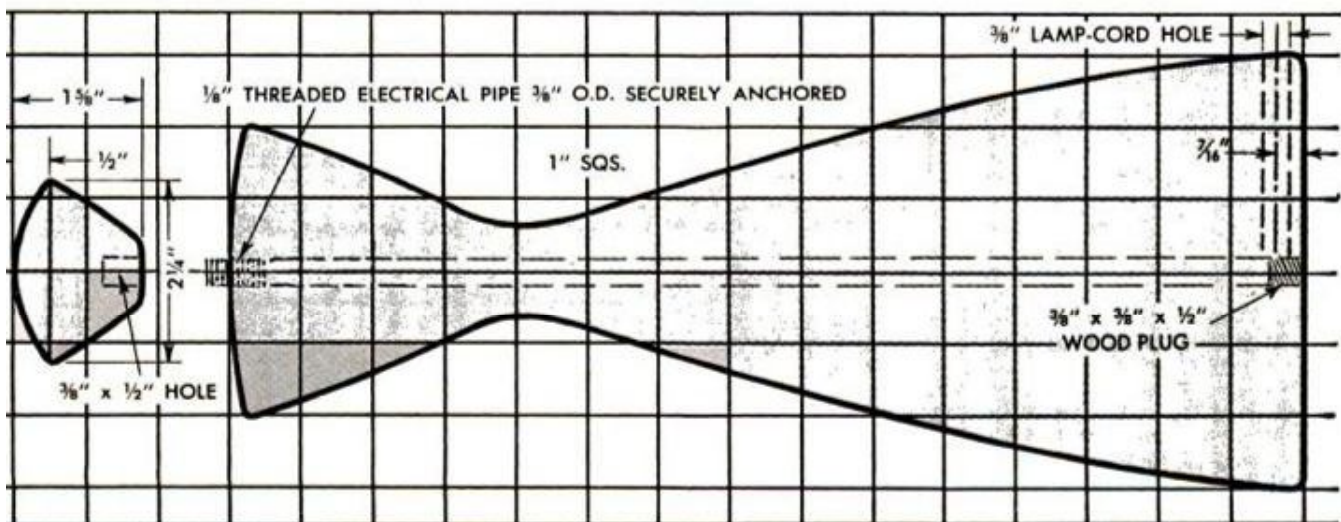
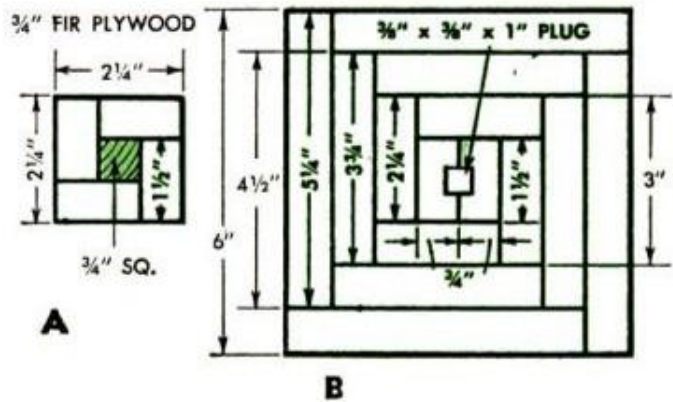
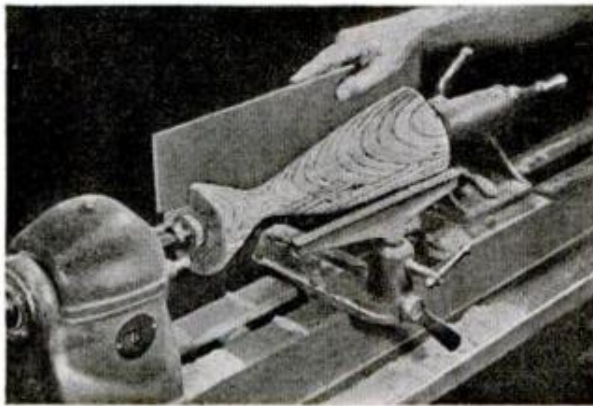
IT'S THE final shape of the turning itself and the placement of the fir-plywood strips in the built-up block that give this lamp base its unusually smart appearance. When finished in the natural color of the wood, the surfaces of the base and finial present a pattern in a series of overlapping parabolic curves on four sides of the turning. The exposed glue joints appear much like inlaid veining.

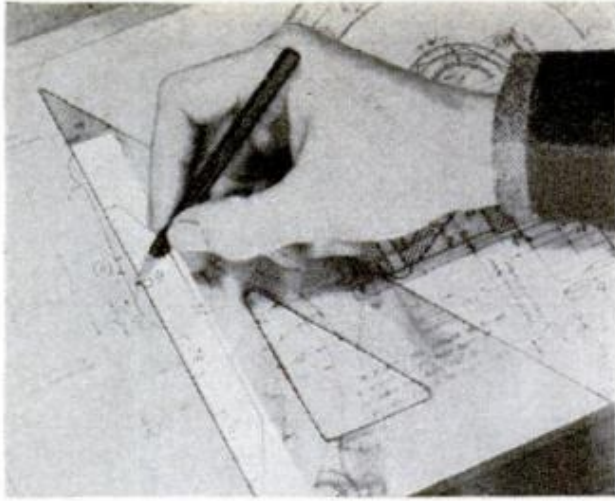
Details A and B give the widths of the plywood blocks and show the order of assembly in gluing them up to make the base and finial. Finished length of the base is 15 in. but in cutting the blocks you should allow at least $\frac{1}{2}$ in. at each end for waste, making each block 16 in. long. Note that the two center blocks which are $1\frac{1}{2}$ in. wide, are grooved $\frac{3}{16}$ x $\frac{3}{8}$ in. before gluing. While the glue is drying make a template from plywood or hardboard to use as in the photo when turning the base block to profile. Plug both ends of the block as indicated, then mark centers and mount in the lathe. Use the slowest lathe speed and rough the block into round by using a turning gouge. Wear a face shield or protect the eyes with goggles. Take light gouge cuts as fir plywood tends to

splinter rather badly if you cut deeply. Resharpen and hone the gouge frequently, as a sharp cutting edge is essential to smooth work.

Bring the shape down with the gouge to within about $\frac{1}{8}$ in. of the finished size, checking frequently with the template to be sure you do not cut below the finish dimension at any point. Then shift to a higher lathe speed and bring the work to the finished size with a wide skew chisel. Be especially careful to prevent the chisel from digging in as you run the sloping cuts.

Examine the work all over and fill any small openings between the plys with matching stick shellac. Then sand the work with the lathe at medium speed, using several grades of coarse and fine sandpaper to get a smooth finish all over. Before applying a finishing material, drill the hole for the lamp cord and fit the section of $\frac{1}{8}$ -in. threaded pipe into the top end, so it will tap itself into the hole. Finish with two or three coats of white shellac or bar-top finish, rubbing down each coat with fine steel wool. Turn the finial on a screw center and drill a $\frac{3}{8}$ x $\frac{1}{2}$ -in. hole in the small end as indicated, so that it may be screwed directly onto the harp.





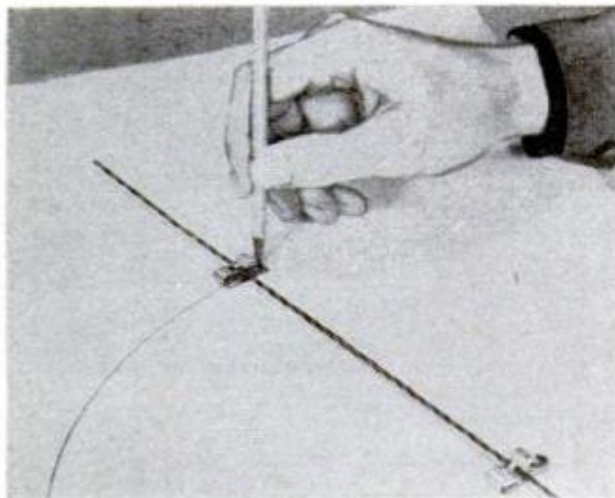
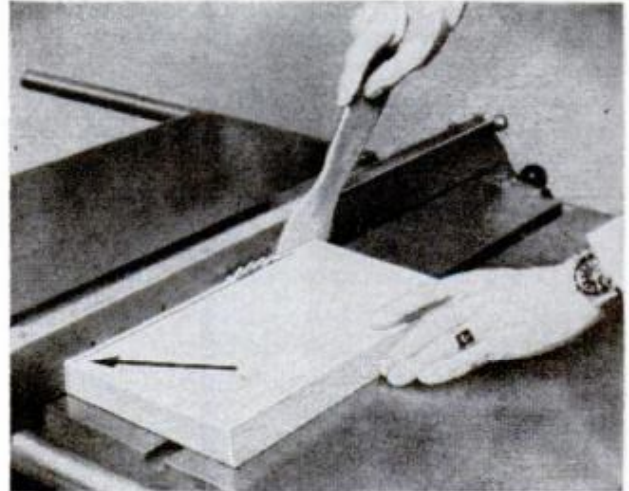
Scales Taped to Triangle Speeds Scale Drafting

The bother of constantly laying aside a triangle to pick up a draftsman's scale is avoided when making a scale drawing by having the particular scale right on the edge of the triangle. For example, if a scale of $\frac{3}{8}$ in. equals 1 ft. is being used, it will pay you to take the time to mark off the calibrations on a strip of self-adhering tape and stick it along the edge of the triangle. Here it is immediately available for quick reference. Different scales can be added by merely peeling off the others.

Correct Use of Push Stick

When ripping thin strips from short pieces you usually set the ripping fence a distance from the blade equal to the thickness of the strip and then use a push stick to aid in moving the stock past the blade. In this operation the trick is to keep the pressure equalized. If you apply greater pressure with the left hand, you will force the stock in a direction of the arrow. This closes the saw kerf, binds the blade slightly and results in scoring of the work.

Wayne Judy, International Falls, Minn.

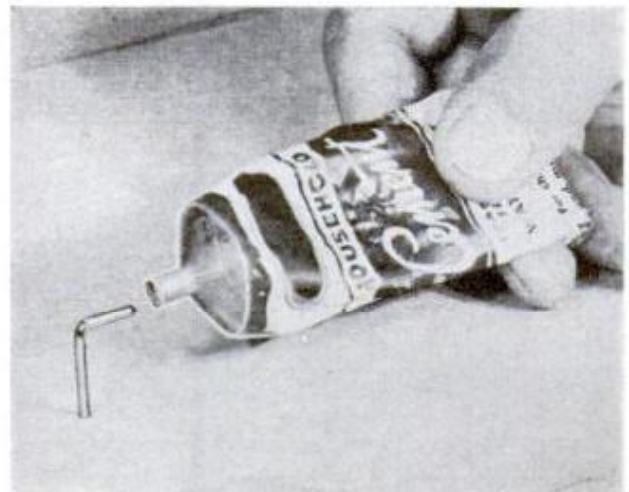


Clip and Wire Trammel Scribes Outsize Circles

If you are ever faced with the job of scribing a large arc or circle too big for a regular draftsman's compass, try making a trammel out of two Fahnestock clips and a piece of stiff, heavy wire. The clips are quickly positioned along the length of the wire to swing the proper diameter and one is fastened down with a tack to serve as the pivot point. A pencil or scriber can then be inserted through the hole in the other clip to scribe the circle.

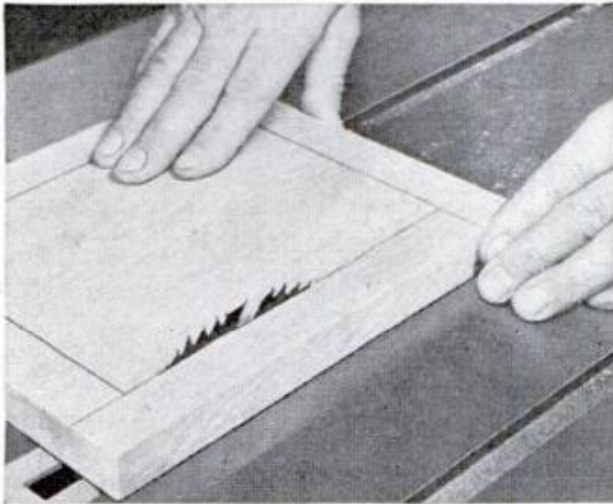
Cement Tube Slipped Over Hook Saves Frequent Recapping

Small jobs requiring frequent use of a tube of household or rubber cement will proceed much faster if you don't have to continually recap the tube. One way to get around this is to screw a small L-hook into the workbench or a board. Instead of repeatedly recapping the tube simply slip the end of the tube over the L-hook and use it as a stopper. You'll find this idea particularly helpful when assembling plastic models.—Bil Toman, Palatine, Ill.



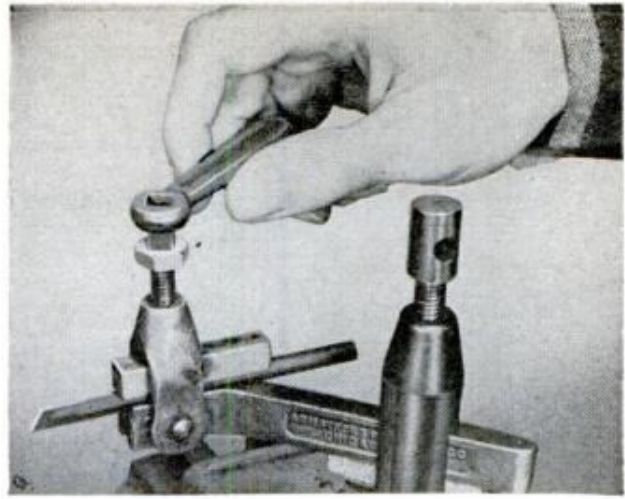
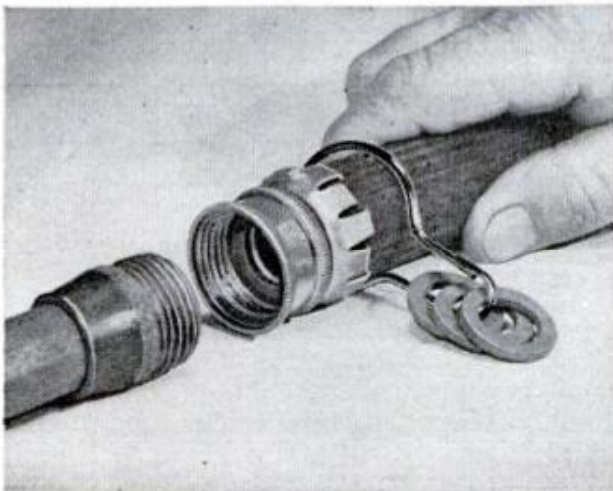
Nut Run up on Clamping Screw Forms Shoulder for Wrench

On some types of small lathe tool-holding clamps the screw is not provided with a shoulder, or flange, below the squared head. On certain types of work involving repeat operations it saves time to leave the box-end wrench on the screw head after tightening the screw. A flange to hold the wrench in place on the squared head of the screw can be provided by running a nut up to the head and tightening it so it will stay in place. The nut prevents the wrench from slipping down onto the threads.



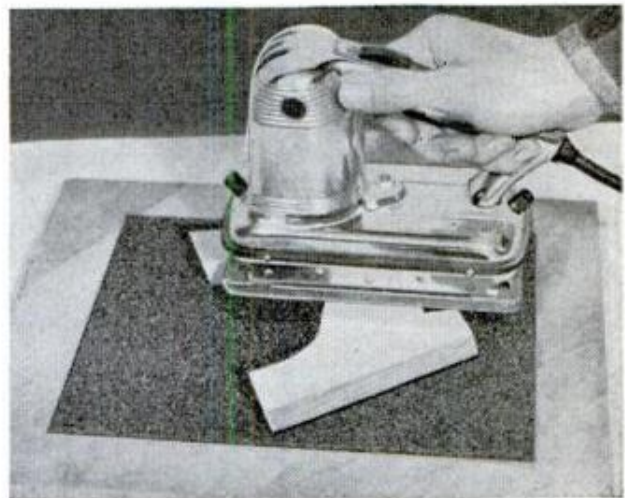
Small Work on Sandpaper Base Stays Put Under Sander

Using an orbital sander to surface relatively small wooden workpieces often is made difficult by the tendency of the pieces to follow the oscillating motion of the pad. This may be overcome if the pieces are placed on a board to which a large sheet of sandpaper is glued. The board then may be clamped to the workbench or to some other flat surface. A fine or medium-grade paper matching that on the sander will hold the work firmly until the job is finished.



Inside Cuts on Circular Saw

Where undercut corners are not objectionable, openings can be cut in plywood or solid stock with a table saw. Measure from the face of the ripping fence to the opposite side of the blade, including the set of the teeth, and shift the fence until the distance is equal to the width of the opening required. Lower the blade below table level, place the stock over it, hold firmly in place and then raise the blade slowly until it cuts through the top surface. Run the cut to the end of the gauge line, then repeat the procedure.



Shower-Curtain Hook on Hose Keeps Spare Washers Handy

Like many a proud owner of a lawn and garden, you have probably at one time or another coupled the sections of your garden hose only to find one coupling leaking because of a missing washer. This meant having to hunt up a spare. To save yourself this trouble, keep several spare washers on a shower-curtain hook clipped around the hose. Bend the round end so that it will grip the hose tightly. Since it is made of brass, the hook will not rust and should outlast the life of the hose itself.

MORE QUIET

IN YOUR HOME

Sound conditioning will lessen kitchen clatter, party patter and the din of modern living

By E. R. Haan

YOU NEEDN'T BE an acoustical expert to sound-condition your home for more peace and quiet. It's relatively simple to nip unnecessary noise—first, at its source and then by using soundproofing methods and materials to lessen unavoidable noise.

Nipping Noise at Its Source

Although each little noise in your home may not be disturbing in itself, it adds to the din. Eliminating or reducing these individual noises often can make a surprising difference. You can replace loud-snapping wall switches in or near bedrooms with noiseless mercury switches; a blatant doorbell with pleasing chimes; a raucous telephone with one having variable volume control.

Radios, TVs and phonographs can be operated at a temperate rather than at a tempestuous level. If you don't have a separate room for this equipment, an accordion-type "folding wall", Fig. 3, permits some members of the family to enjoy programs and records without annoying others.

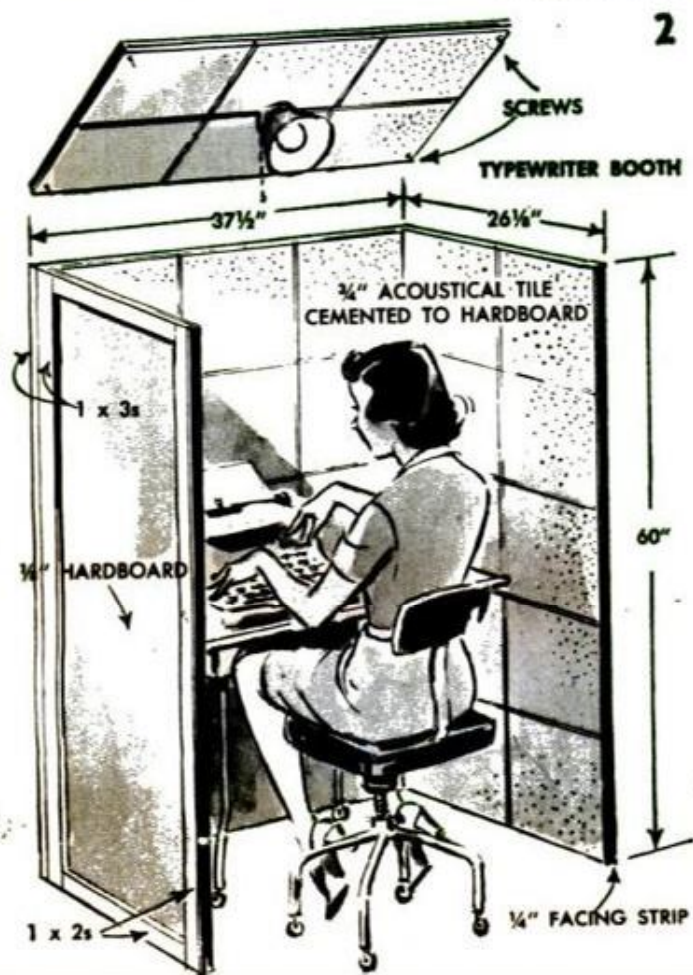
To reduce transmitting sound through floors, mount the cabinets on rubber feet of suitable resiliency, Fig. 6. For this, use relatively stiff sponge rubber—about the same resiliency as crepe soles. Soft sponge rubber compresses easily and therefore defeats its purpose. Hardboard under the rubber permits you to slide cabinets slightly without removing the feet. Because of its weight, solid rubber, which is slightly more flexible than rubber heels, is best for pianos. Neither cabinet nor piano legs are set directly on the rubber, but on a rigid-cupped top piece, which distributes weight uniformly.

You can lessen sound transfer of a loudspeaker through the wall directly behind it by hanging a panel of acoustical tile at the open back of the cabinet. Sponge-rubber kneeling pads used under food mixers, Fig. 4, noisy fans and other small appliances are effective sound deadeners.



Wool Conversion photo

2





New Castle Products photo

Loud clatter of a typewriter can be muted by mounting the machine on acoustical tile cemented to a sponge-rubber kneeling pad, Fig. 5. If the noise is still disturbing, make a sound-absorbing booth, Fig. 2, which is similar to telephone booths in stores. Or, perhaps you may prefer to substitute a typewriter of the "noiseless" variety.

Most fans that are permanently installed in walls or windows can be provided with resilient mountings to minimize vibration to the wall or window frame. Fig. 7 shows four ways to provide resiliency between a motor and the fan housing. Bent or misaligned fan blades that cause excessive vibration should be bent and realigned to match the other blades.

A large fan rotor which is out of balance also causes vibration. Remove it from the motor shaft, slip it on a separate shaft, and place it in V-notches cut in two sheet-metal supports to hold it in a level, horizontal position, Fig. 8. Then to correct the condition,peen a piece of wire solder in a hole at the end of a blade as shown. End play of a fan or motor shaft causing rattle can be cured by reducing the clearance with a thin metal washer.

Measures to stop vibration noise of a

4

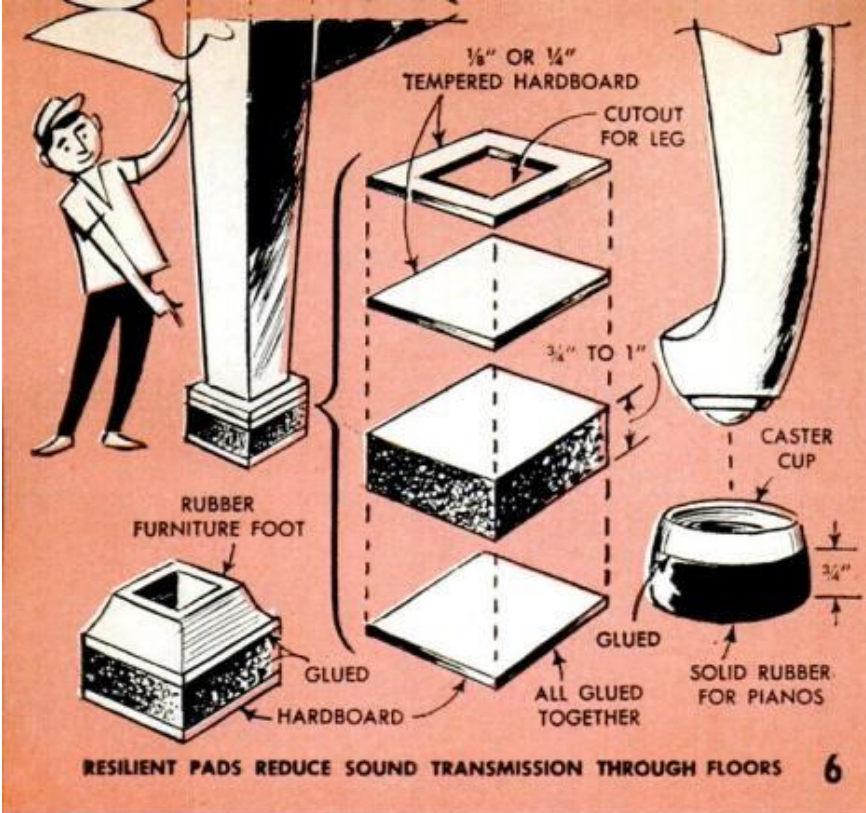
SPONGE-RUBBER
KNEELING PAD
UNDER MIXER



5

ACOUSTICAL TILE
GLUED TO SPONGE-
RUBBER KNEELING PAD





RESILIENT PADS REDUCE SOUND TRANSMISSION THROUGH FLOORS

6

fan will not decrease the noise that results from the friction of moving air on the blades. This is done only by reducing the fan speed. Consider this when purchasing a fan as various makes differ in the noise they produce.

Sounds from a warm-air heating plant or a central air conditioner, which "telegraph" through a house, can be reduced by resilient sleeves on the ducts, Fig. 9.

Hammering noises in water-supply pipes can be stopped by installing one or more air chambers, or by bleeding the existing ones that have filled with water. Where water pressure is high, a pressure-reducing valve helps to eliminate water hammer.

Dripping faucets, often accompanied by gurgling sounds in drains, require new faucet washers. High-pitched whistling in

toilet flush tanks is sometimes remedied by adjusting the water-intake valve. If this does not help, replace the valve. Sound of water slowly flowing into a toilet bowl is caused by a worn discharge valve that does not seat properly—usually it requires replacing.

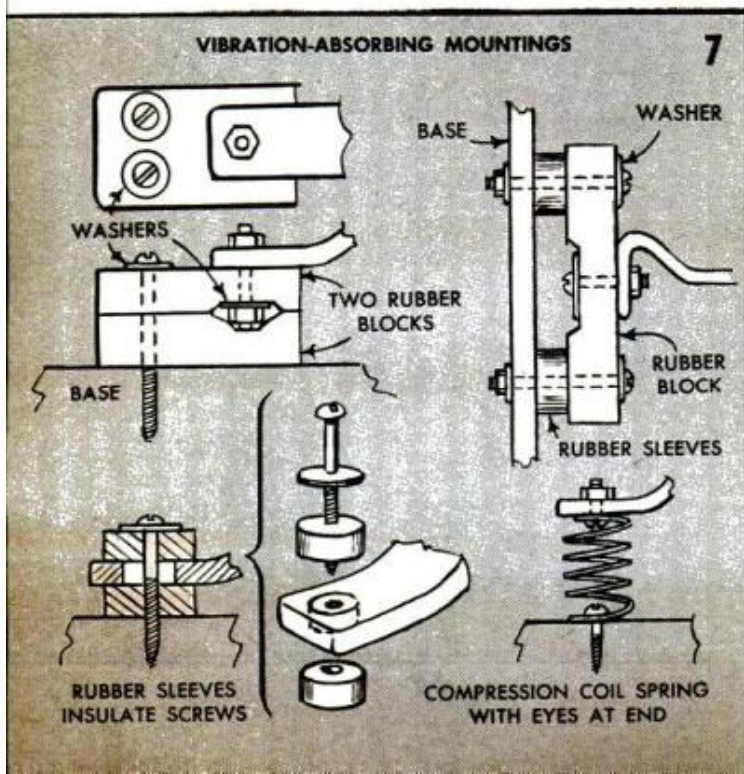
To prevent noise of automatic washers from being conducted over water-supply pipes, install rubber-hose inserts, Fig. 11. Noise of clothes washers set on wooden floors can be arrested by setting them on rubber pads.

Use spiral nails to tighten loose floor boards and squeaky loose floor boards and squeaky treads. Also effective are shingles driven between joists and sub-floors at the squeaky area, Fig. 12. Silence rattling shutters by eliminating play at the fastening points. Weather stripping stops rattling of doors and windows, besides reducing heat losses.

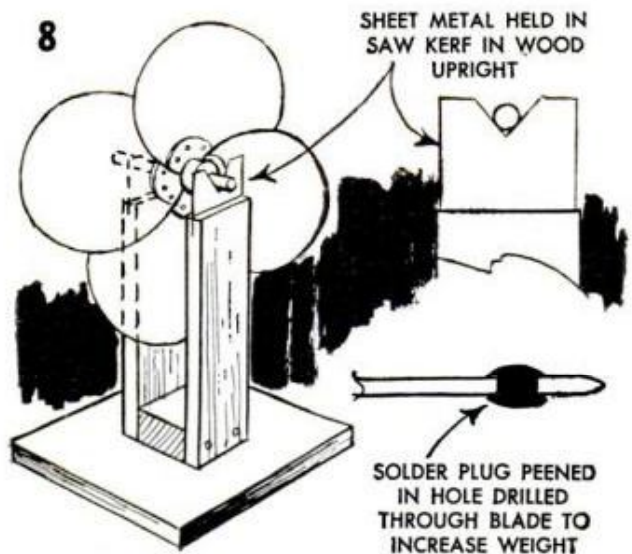
Methods and Materials

Unavoidable and hard-to-control noises in homes result not only from increased use of mechanical and electronic equipment, but also from lightweight wall construction and more openly designed interiors in modern homes.

Noise control by construction methods and materials consists of (1) absorbing some of the noise in a room or area where it originates, and (2) by arresting most of the noise that travels to other areas. The first is done by means of sound-absorbing materials which soak up sound waves as a sponge soaks up water. The second is done by means of sound-insulating methods and materials to produce sound bar-

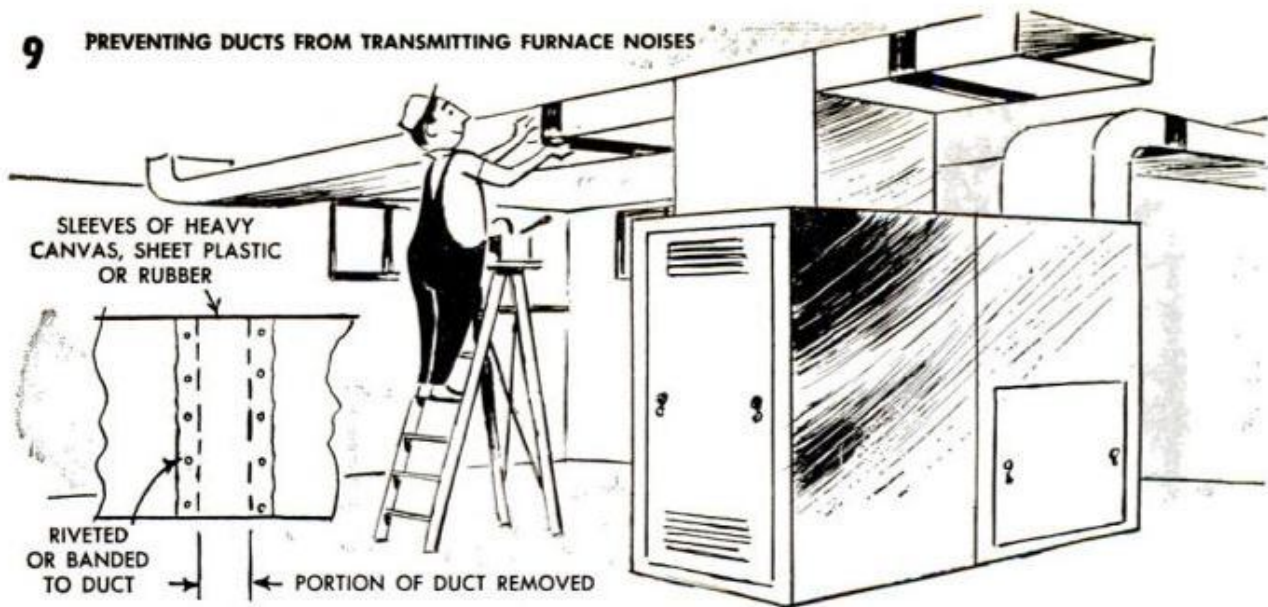


7



METHOD OF TESTING FAN FOR BALANCE

9 PREVENTING DUCTS FROM TRANSMITTING FURNACE NOISES



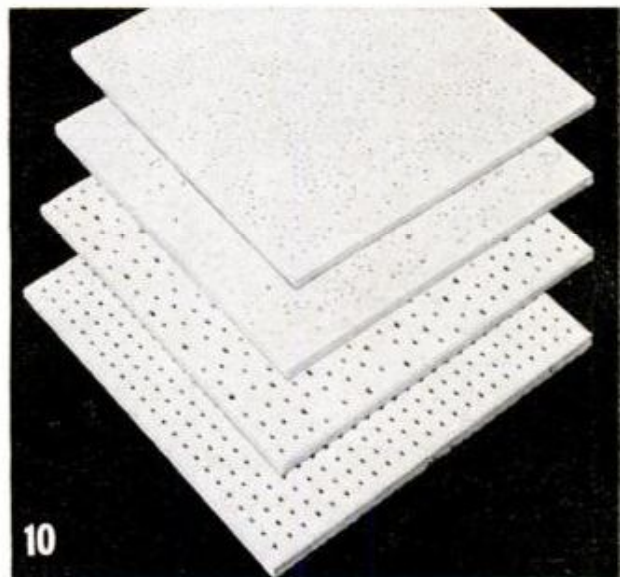
riers. Some materials are both sound-absorbing and sound-insulating, but an effective sound absorber is not necessarily a good sound insulator.

Noise Absorption

Sound waves produced in a room are reflected back and forth by hard surfaces such as walls, floors and ceilings. Overlapping of sounds creates a disturbing noise level. Heavy draperies, overstuffed furniture and wall-to-wall carpeting will absorb considerable sound, but this often is not enough. Also needed is acoustical material on ceilings and sometimes even on walls.

Acoustical tile is made of either mineral wool or cellulose fiber. It comes in 12 x 12, 12 x 24-in. and other sizes, and in various thicknesses up to 1 in. The edges are either tongue-and-groove or plain butt. There are many surface finishes, some of which are shown in Fig. 10.

Cellulose fiber tiles are the most pop-



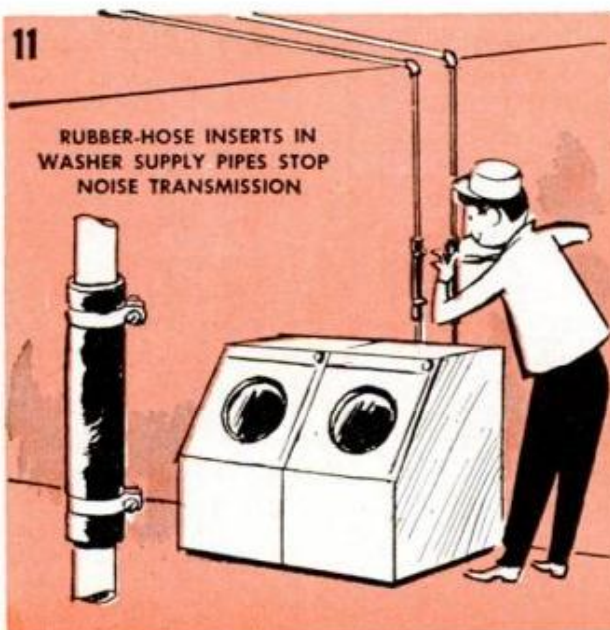
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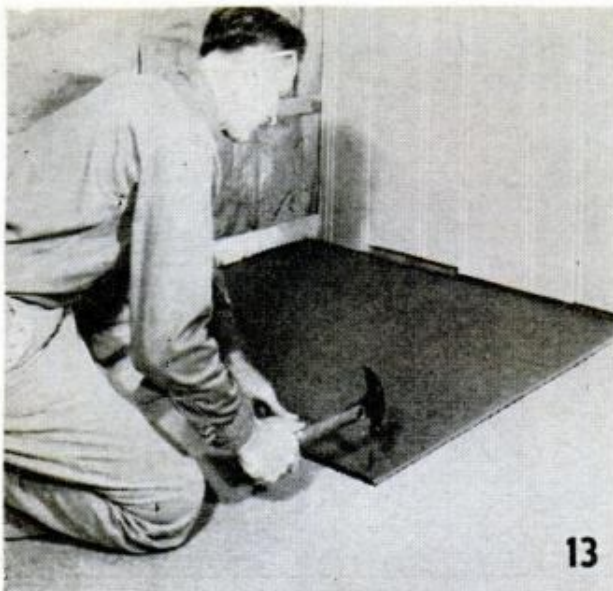


TONGUE-AND-GROOVE



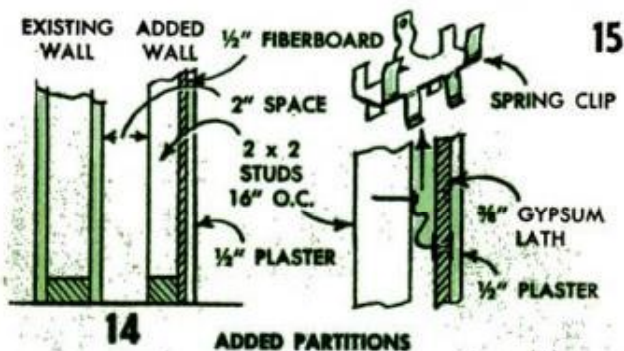
BUTT EDGE





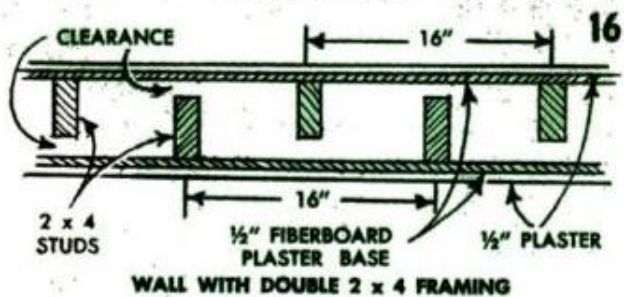
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Insullite photo



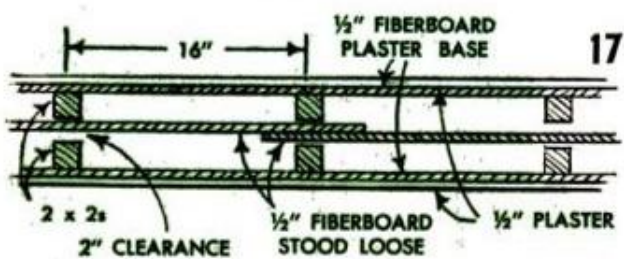
14

ADDED PARTITIONS



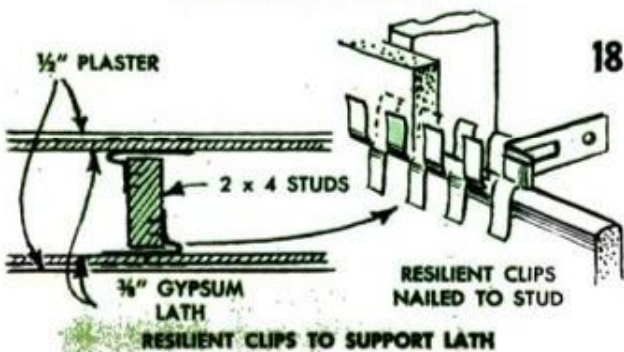
16

WALL WITH DOUBLE 2 x 4 FRAMING



17

WALL WITH SEPARATE 2 x 2 FRAMING AND FIBERBOARD INSERT



18

RESILIENT CLIPS TO SUPPORT LATH

lar for use in homes. They are low in cost, high in sound-absorbing efficiency and easy to install. They can be adhered directly with acoustical cement to smooth, sound and clean ceilings, Fig. 1. For uneven or cracked ceilings, the tiles are stapled, nailed or attached with clips to 1 x 3-in. softwood furring strips, Fig. 19.

Another method of installation is by mechanical suspension—tiles then being snapped or fitted into metal channels. Cove molding can be used to conceal irregular edges of the tile at walls.

There are other sound-absorbing materials. Plastic foam comes in 24 and 48-in.-wide rolls, 1/4 in. thick—also in tile form. Acoustical plaster can be applied to firm existing plaster. Some plastic sound-absorbing materials are sprayed to produce coatings as much as 3/4 in. thick.

Reducing Sound Transmission

Decreasing noise in a room by sound absorption doesn't necessarily prevent it from traveling to adjacent areas. An efficient sound-absorbing material such as low-density, cellulose-fiber tile, may transmit noise through itself. Transmitted sounds are either airborne, such as speech, or are produced by impact, such as walking. Airborne sounds striking a wall surface cause it to vibrate like the diaphragm of a telephone receiver.

Transmission of airborne sound can be reduced as follows:

- By walls and floors of heavy, high-density materials of suitable thickness, which remains relatively immovable when subjected to sound vibrations. Although concrete walls are effective for this purpose, they are impractical to install in an existing house. High-density, mineral-fiber, acoustical tile helps to reduce transmission of sound in addition to reducing the noise level in a room.

- By wall and floor construction and the use of materials to dampen and dissipate sound waves. Examples are resilient support for gypsum lath, or the use of low-density, glass-fiber blankets or batts. The latter may be put between furring strips and covered with rigid wall material such as hardboard or plasterboard. It may also be hung centrally in a divided partition instead of fiberboard installed as in Fig. 17. Or it may be placed between studs of a divided wall as shown in Fig. 16.

- By wall and floor construction in which there is no physical connection between the two sides, plus the use of materials that reduce sound transmission.

- By combinations of the above materials and arrangements, some of which are shown in Figs. 14 to 23.

Sound caused by impact such as walking

is reduced by providing suitable resiliency to absorb the shock, as provided by cork or rubber flooring, or thick carpeting on padding. Most overhead playrooms require measures to reduce transmission of both airborne sound and those from impact—in addition to acoustical material to reduce the noise level in the playrooms.

Highly effective results in reducing transmission of airborne sound through an existing wall are possible by adding a partition as in Fig. 14. In the added wall, still greater resistance to sound transmission is obtained by using resilient clips for attaching gypsum lath to studs as in Fig. 15. For new partitions, the construction methods shown in Figs. 16, 17 and 18 provide practically the same effect. In all these instances wider doorjambes are required.

When walls are sound-insulated, provide equivalent sound barriers at doors. Solid-core, flush doors or accordion-type plastic-covered, folding doors transmit much less noise than hollow-core or panel-type doors. Sound leakage at door edges can be reduced by using heavy felt weather stripping and a spring-activated closing device between door and floor.

Noise from an overhead room through an existing floor is reduced by installing an extra floor on sleepers as in Fig. 20.

For an overhead room not having a floor, you first cover the joists with subflooring, and then follow the arrangement shown in Fig. 20. Another solution, Fig. 21, applicable for high rooms, is to install a separate floating ceiling. In case a floating ceiling is desired in a room not over 8 ft. high, the arrangement in Fig. 22 only reduces room height a few inches. In both cases, the only indirect connection between the ceilings is at the walls. Noise from basement rooms, which penetrates to the first floor, can be decreased by construction shown in Fig. 23.

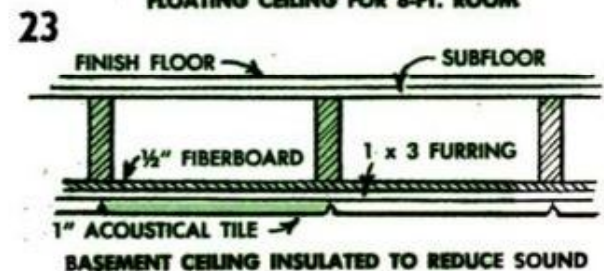
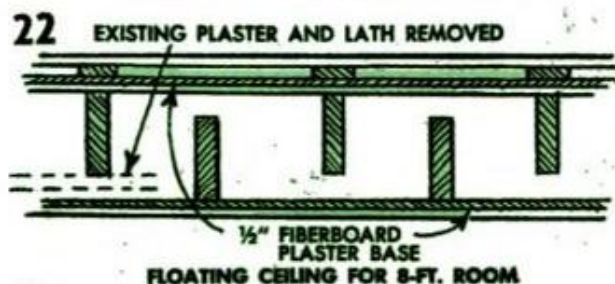
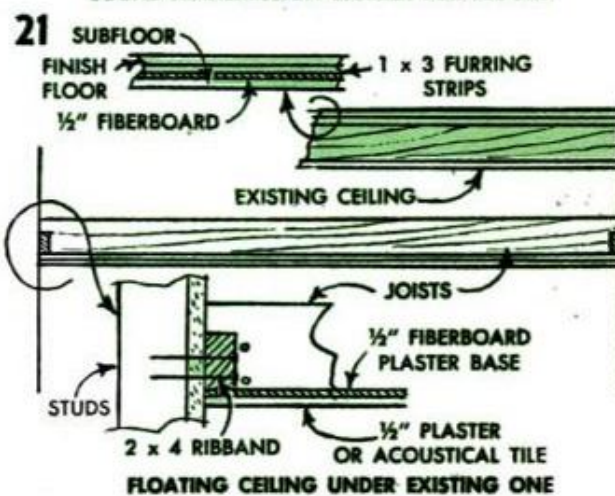
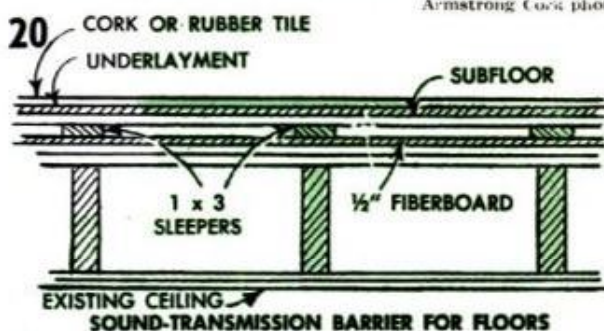
Barriers to Outside Noises

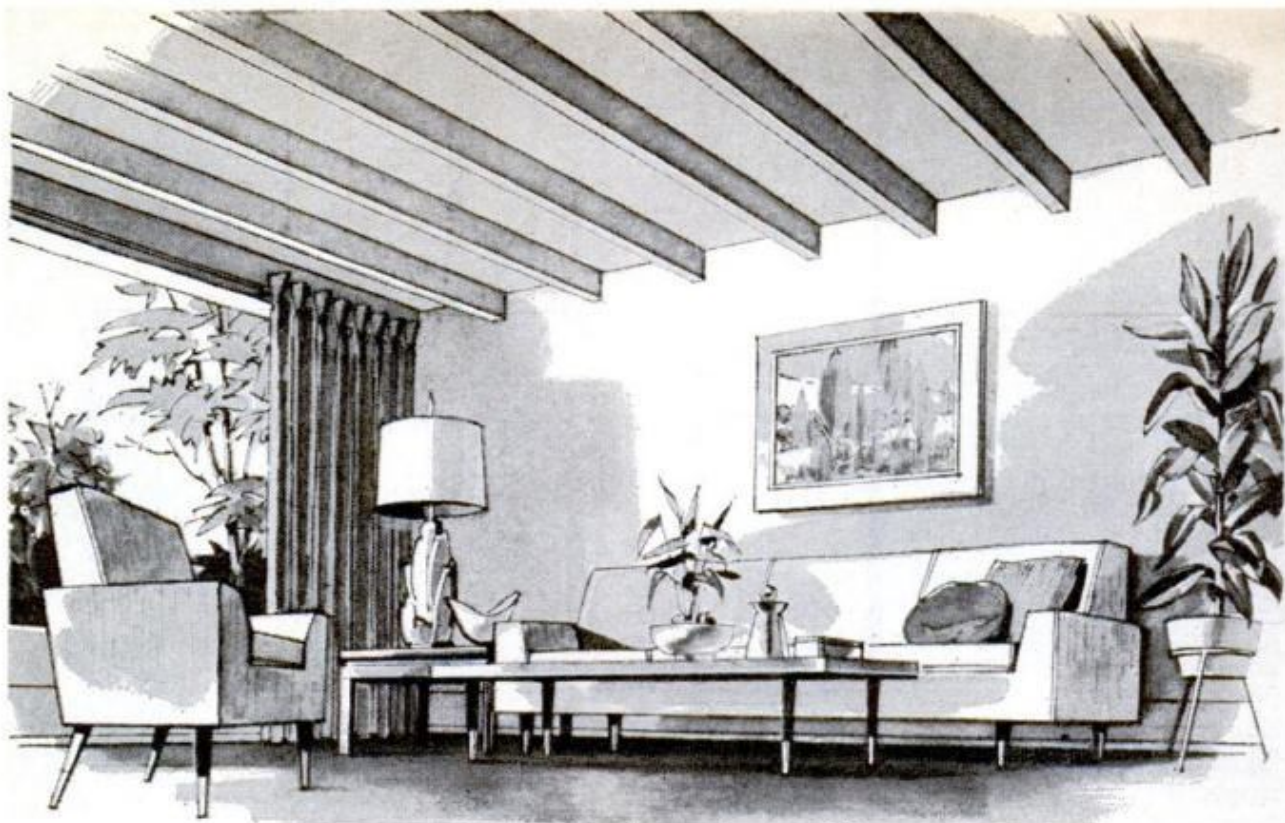
Transmission of outdoor noises into a house can be reduced by adequate sound barriers. Some effect will result from solid fences of suitable height, particularly fences of stone or brick. Thick, dense hedges also have some effect. However, the best barriers to stop noise from entering through windows are storm sashes installed tightly with felt strips at the edges, double-glass windows, felt weather stripping for all windows and heavy drapes.

Masonry walls conduct less airborne noise into a house than wooden walls. A thick cover of ivy on brick veneer or stucco walls helps to reduce noise transmission. Uninsulated frame walls can be made more resistant to noise with high-density insulation, such as vermiculite blown in. ★ ★ ★



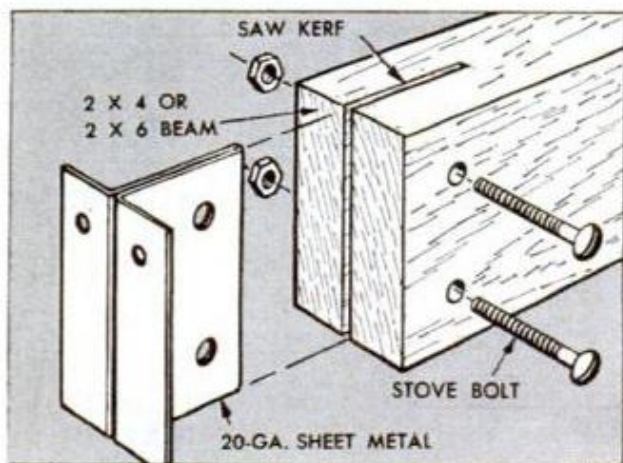
Armstrong Cork photo





False Beams Decorate Your Living Room

By Bob McKinney



To give a living room a feeling of old adobe interior decor, ceiling beams can be installed by using metal brackets to support the ends. Selected 2 x 4 stock is preferred, but 2 x 6s can be used. Measure and cut the beams individually to length and finish as desired. Make the brackets from 20-ga. sheet metal, bending the metal back on itself and then bending the ends at right angles to form nailing pads. Kerf both ends of each beam to take the webs of the brackets. Kerfing can be done with a hand rip saw and an improvised guide, or with a portable electric saw. Nail the brackets to the plate at the ceiling, slide the beams up into place and fasten with stove bolts concealed in countersunk holes.

Youngsters Are Safe Behind Station-Wagon Window Screen



Rough-house play in the back seat of an open station wagon has brought more than one parent near to heart failure for fear of losing a youngster out the tailgate window. This led one station-wagon owner to safeguard his lively passengers with a safety screen that is inserted in the endgate window channels and locked in place. The screen is custom assembled from standard aluminum screen molding and screen wire which can be purchased in hardware stores. Special corner fixtures are provided to lock the mitered corners of the molding together, after which the screen wire is applied and held with a spline wedge.

Cord Suspended From Sun Lamp Gauges Proper Height

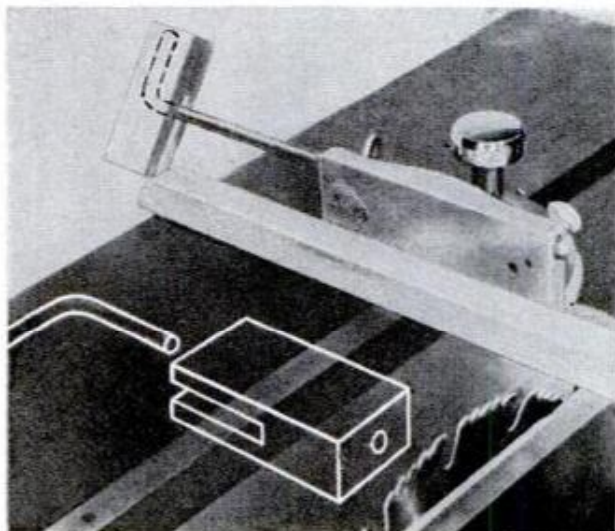
Sun lamps and other heat-producing bulbs can produce rather painful burns when improperly used. One way to avoid this is to first learn the recommended distance the lamp should be from the body. Once this has been determined, cut a piece of cord or ribbon to coincide and suspend it from the lamp. Thus, each time the lamp is used, it can be correctly positioned a safe distance without guesswork.

When a crack appears in the joint between the bathtub and wall due to settling and shrinkage and requires calking, a neat fillet may be formed with the rounded end of a frozen-sucker stick or a dowel. A fifty-fifty mixture of portland cement and sand is forced into the crack and then the mortar is struck, or troweled, by drawing the dowel along the joint. A $\frac{3}{8}$ or $\frac{1}{2}$ -in. dowel forms a perfect fillet which later can be given a top dressing of white grouting cement to match the tub.

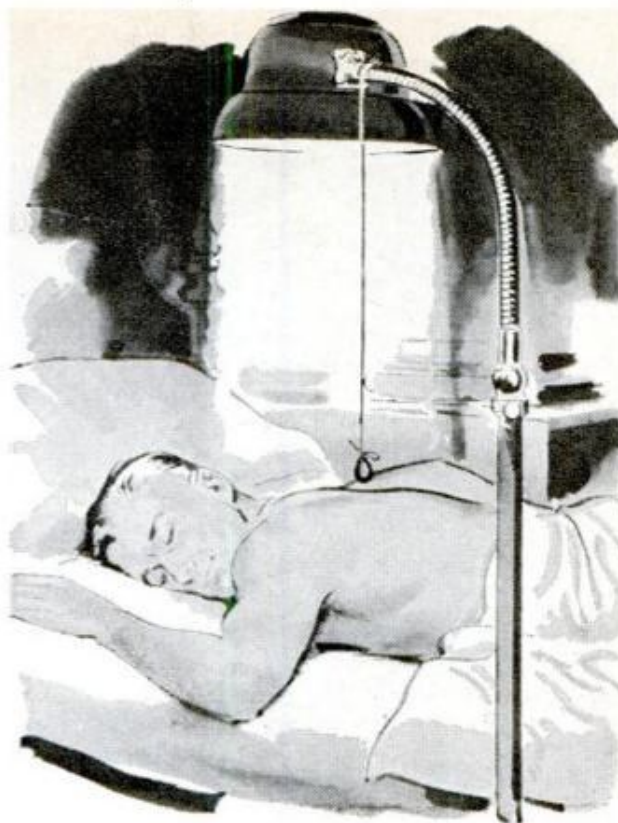
Ted Fenn, Chicago

Slip-On Stop Block Holds Original Setting

Crosscutting duplicate work to length usually requires squaring one end of each piece of stock first before setting the stop rod in the crosscut gauge. But once the stop rod is set for length, further squaring off cannot be done without disturbing the initial stop-rod setting. To overcome this, Henry Hanscom of Elmhurst, Ill., fitted the rod with a slip-on stop block so the rod itself could be left undisturbed in making additional squaring-off cuts. Fitted on the L-shaped end of the rod which is originally set to point toward the operator, the wooden block is simply removed to allow long stock to pass.



JULY 1960

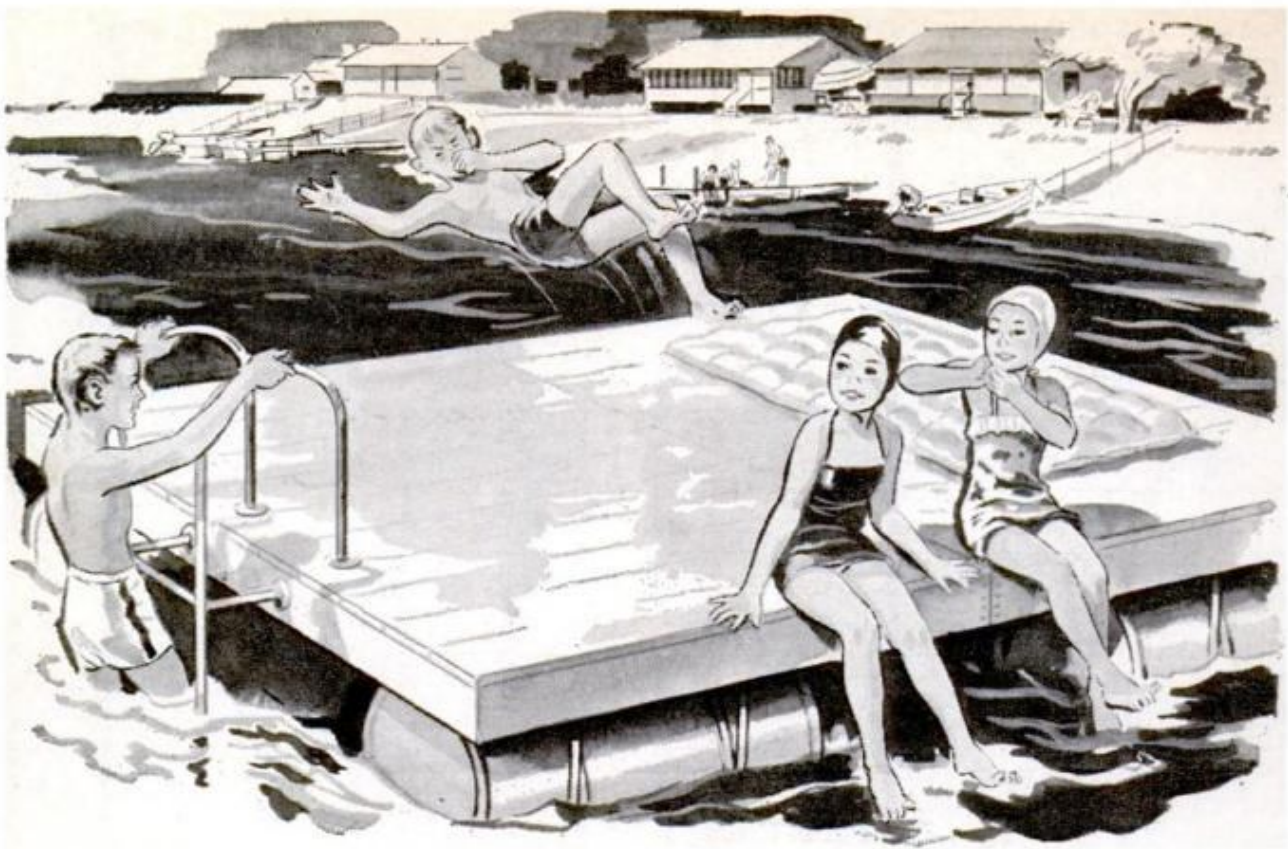


Loose Joints in Old Work Anchored With Steel Wool

When attempting to reglue the round-tenoned joints of old or antique pieces of furniture, you may find that the wood has shrunk, making the holes so small that there is no wood-to-wood contact. To reduce the size of the hole, try using steel wool. Coat both the mortise and the tenon with glue, place a layer of steel wool over the end of the tenon, force the latter in place and clamp. You'll find that fibrous steel wool serves as a wedge which when impregnated with glue anchors the member solidly in the mortise, making a joint which is almost as strong as new. You should use fairly coarse steel wool.



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LAKE-FRONT FLOAT

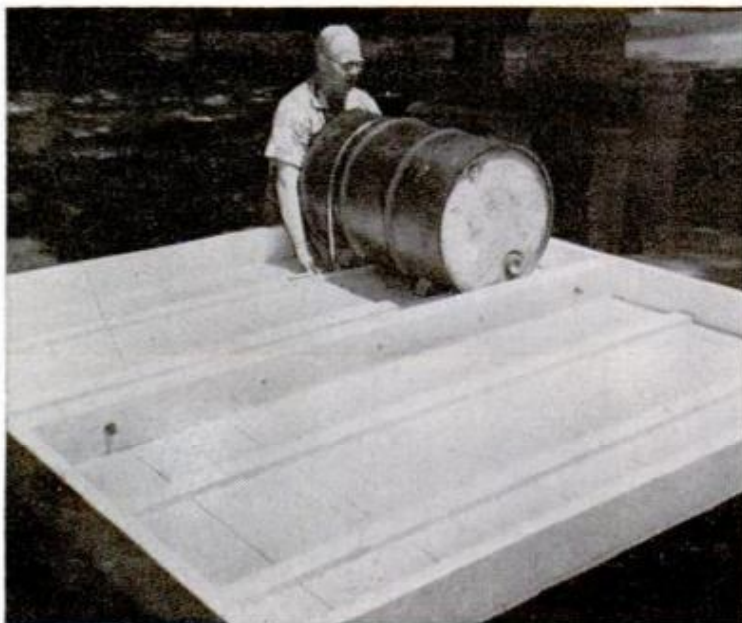
By A. H. Slater

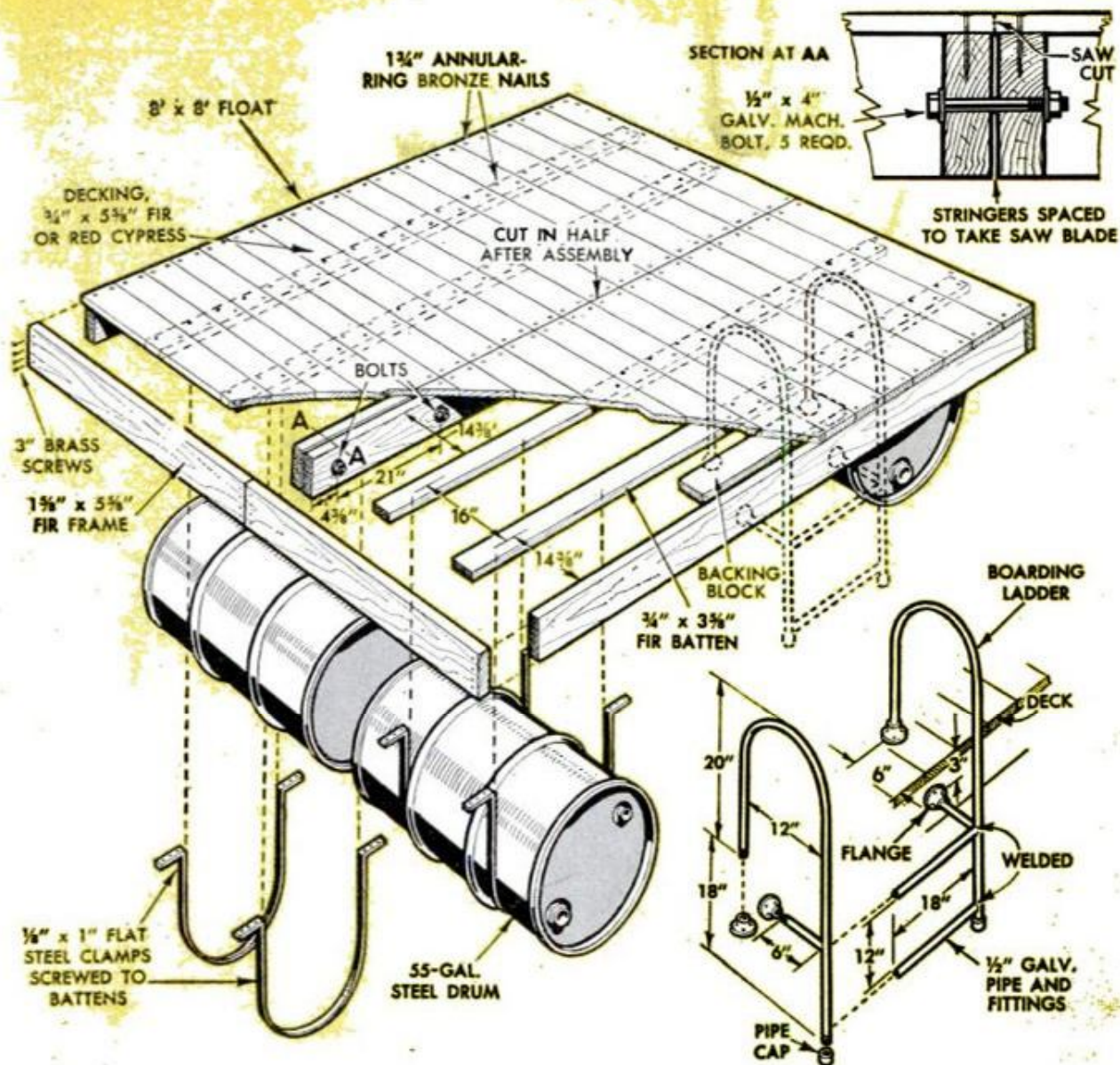
COTTAGE OWNERS whose lake-front property lacks good swimming facilities need not deny their youngsters the pleasure of convenient, safe swimming. A float, such as the one illustrated here, serves this purpose nicely without putting much of a dent in the family budget.

Made of lumber in stock sizes and using 55-gal. steel drums for flotation, the float

can be knocked together in one day. If the lumber is ordered cut to the lengths required, the project really is only an assembly job. A boarding ladder for the float is made of 1/2-in. galvanized pipe and fittings welded together as shown in the photo below and the drawings on the opposite page. If you don't have a welder or pipe bender, cut the pipe to the required

Below left, float sections are bolted together temporarily so that drums can be aligned with one another while mounting them on the float. Below right, flanges on steel pipe ladder are bolted to deck and float frame





lengths and have this work done at a plumbing supply store, or put the ladder together with slip-on fittings. A small diving board may be installed on the float opposite the ladder.

The float deck consists of two 4 x 8-ft. sections which are bolted together as shown in the drawing and sectional detail. To save construction time and assure perfect alignment of bolted sections, the deck is assembled as a single unit, the double stringers at the center being drilled before cutting the deck in half. Note that these stringers are not nailed next to each other but are spaced to take a saw blade. Having the float in two sections makes it easy to haul, launch and retrieve the structure, an important consideration if it is not to be built and remain at the launching site. A float that is built at the launching site and left in the water permanently should be finished as a single unit, in which case only one stringer is placed at the center of the float instead of two as shown.

The float should be treated with a wood preservative and the underside painted before the steel drums are clamped in place. Use Cuprinol or Penta wood preservative and follow (when dry) with two coats of marine paint. Paint the top of the deck last to avoid scratching it when turned upside down to attach the drums.

Two 1/8 x 1-in. flat-steel clamps, drilled and screwed to the battens as detailed above, hold each drum in place. In the case of a two-sectioned float, the sections are bolted together temporarily to make it easier to align the drums as shown in the photo on the opposite page. If the float is to be taken out of the water each fall, it is advisable to fasten the clamps with 7/16-in. galv. carriage bolts instead of screws. Be sure the bungs have gaskets on them or they will leak. Turn them down tight before launching the float. To anchor it, connect a chain to an eyebolt fastened to the stringers and secure the other end to a heavy weight. ★ ★ ★

Trouble Shooting THE TOUGH ONES

By Ben L. Davis

LISTENING to the complaint of the pert young lady driver it was plain to me that she was more or less resigned to paying an expensive repair bill. I knew that from the way she banged the door of the '55 Dodge. I didn't like that because I don't want people to think of my shop as "that place where they do expensive repair jobs."

In a routine check of the Dodge I found it would idle quite smoothly, but would not take the throttle above idling speed. Tap the foot throttle and the engine sputtered and faded.

It must have been one of those days, or maybe it was the gal, but all I could think of was a general tuneup. Just as I had anticipated, the spark plugs were dirty and the gaps were nearly twice the specs, timing was late and the sediment I found in the filter could have been the cause of almost anything.

I finished servicing the common check shooting trouble wide of the mark. I got points with the gathering feeling I was into the car and flipped the starter key.

Now the engine idled rather nicely and I was feeling better until I kicked the foot throttle again. Much the same, only the sputter had become a vigorous backfire, soothing to a hotrodder, maybe, but more than a challenge to an old fellow like me.

I stopped the engine, then flipped the starter key again and did something I should have done at the outset. I watched the oil-pressure gauge closely as the engine took hold. The needle climbed to the stop on the high side and stayed there.

Of course. I should have known. The '55 Dodge has hydraulic valve lifters and something more than normal oil pressure was, in effect, pumping up the lifters and forcing the valves off their seats. That could only mean that the plunger of the oil-pressure regulator was stuck about halfway open. That would affect engine performance above idling speed. I dropped the oil pan and, sure enough, there it was. It was then a simple job to free the plunger and replace the oil-pressure gauge, which had been damaged.

Unusual Locations Where Trouble May Occur

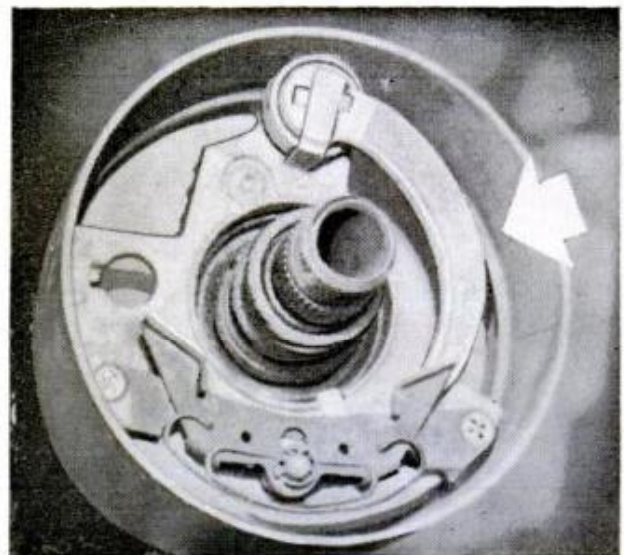
Replacement Brackets

When '57 Fords come into the shop with broken upper shock-absorber brackets, due possibly to rough winter-road conditions or over-loading, don't try to reweld the parts. Use bolt-on replacements which can save you a lot of time and save your customer something on the labor charge.



Switch-Arm Breakage

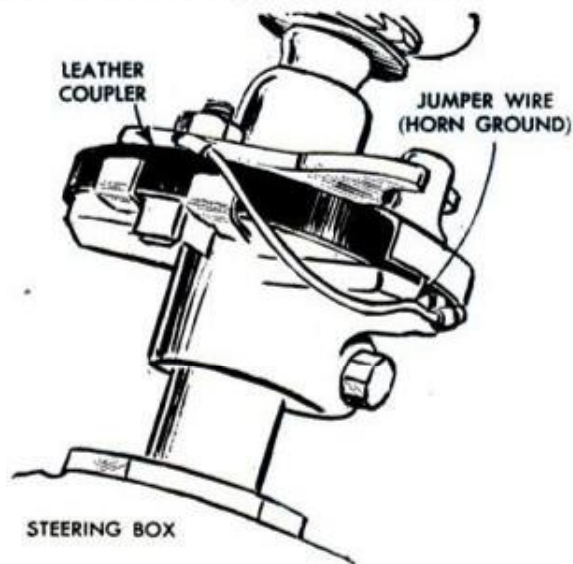
Occasional failure of the curved actuating arm can make it impossible to operate the directional lights on '55 Plymouths. This arm is in the switch box under the steering wheel and connects the handlever on the post to the directional-light switch inside the box. Replace the arm.





Loose Jumper Wire

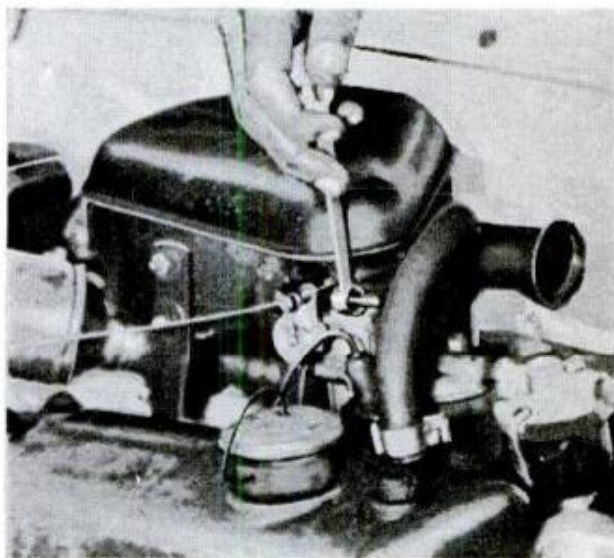
When you have a horn complaint on the '59 Mercury, don't forget to check the jumper on the sectional steering post. Do this first and the chances are you'll locate the trouble. If the connections are loose or corroded or if the wire is broken, the horn either will be undependable or dead.



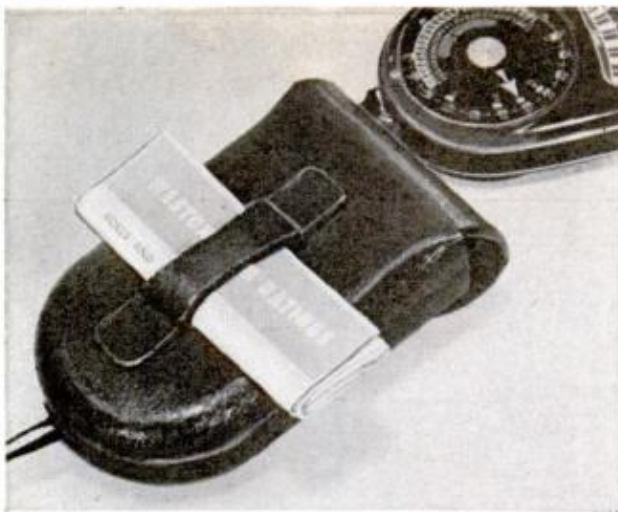
JULY 1960

Air-Filter Rattles

On some Metropolitans the air filter may persist in working loose after it has been removed the first time for servicing. A trick that usually works is to set the filter body level in its strap supports—you can see the side strap in the photo—then tighten the carburetor clamp.



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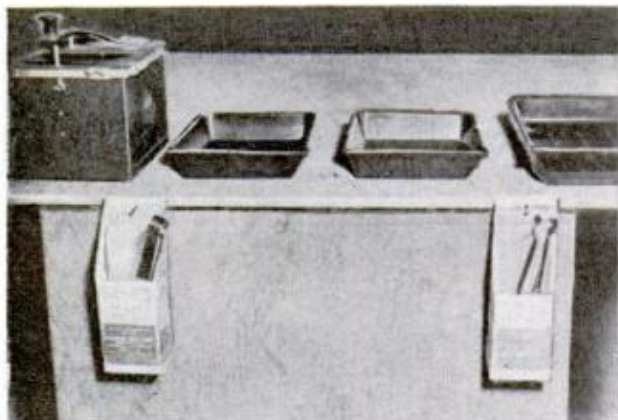


PHOTOKINKS

Meter Case Holds Data

Photo information can be carried conveniently in the belt loop of an exposure-meter case. Fold the sheets separately so they can be removed individually. The reference will always be handy for checking flash guide numbers, filter requirements, film rating and other data.

R. Hanscom, Elmhurst, Ill.



Print-Tong Holders

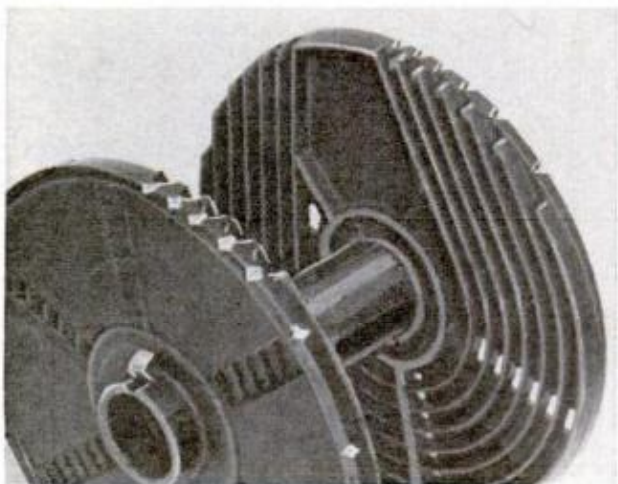
Ever have trouble keeping print tongs separated and their handles out of the "soup"? One way to avoid this and also reduce cleanup is to tack milk cartons—minus their tops—to the front of the bench. By cutting off the carton tops at the angle shown, tongs will be easy to pick up. The containers reduce the chance of getting the developer and hypo tongs mixed up and the solutions contaminated.

David A. Cleary, Fargo, N. D.



Stop for Tripod Screw

Some tripods have two slots in the pan head to permit shifting the base screw. This in turn allows the photographer to change the camera position so that a dropped camera can be used. But often the screw falls out and is lost. To prevent this, "behead" a $\frac{3}{8}$ -16 aluminum bolt,peen one end and add a screw slot. Now insert the bolt in the top of the head, making certain that it fits snugly. The bolt should be long enough to come through, but not long enough to interfere with the tilting head.



Faster Film Loading

A plastic cut-film developing tank can be loaded quickly if you first use a file to notch along the outside edges of the reel, indicating where each film should be inserted. Then, in the dark it's simple to locate the corresponding notches by feeling with a fingernail. Also, with the slots marked, it's easier to count the number of films that have been loaded.

☛ A kitchen sink spray is handy to use in the darkroom for cleaning trays and equipment. Even a discarded one is useful—just add a new hose and faucet coupling.

"PAINTING" OUT BACKGROUNDS WITH YOUR ENLARGER



Producing outlined prints with an enlarger is a simple trick which saves painting out unwanted backgrounds later. Briefly, it consists of preparing a mask from one print and then making a second or duplicate print by exposing the paper through the cutout portion of the mask without disturbing the enlarger setup. The important step is focusing the image precisely through the mask since overlapping of the opening will be evident in the final print. As focusing must be done after the mask is placed in the easel (preferably under glass) and on top of the unexposed print, registering the image must be done

with the enlarger turned on and focused through the red filter on the enlarger. A test exposure or two may be required before both register perfectly. The mask is prepared by developing and drying the first print and then carefully cutting out the figure with a sharp stencil knife. Here it must be remembered that any error in cutting outside the outline of the figure will be noticeable in the outlined print. Photos most suitable for outlining in this manner are ones where the subject predominates the composition, such as the example shown at upper left.

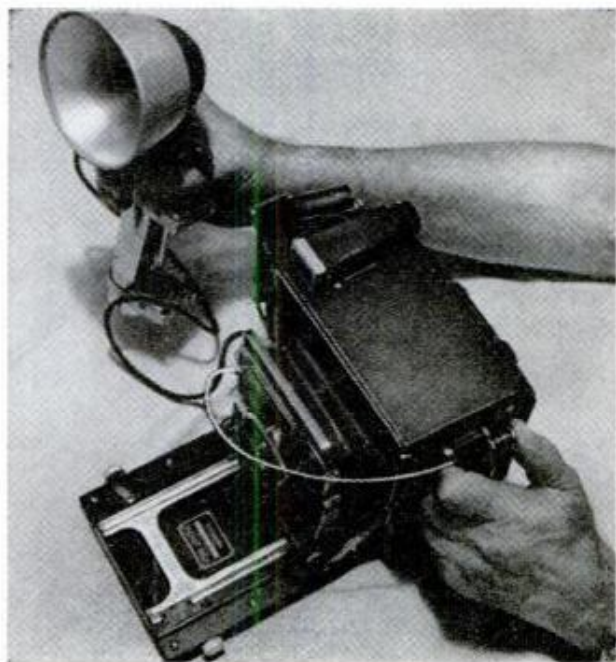
J. C. Cobb, Independence, Mo.

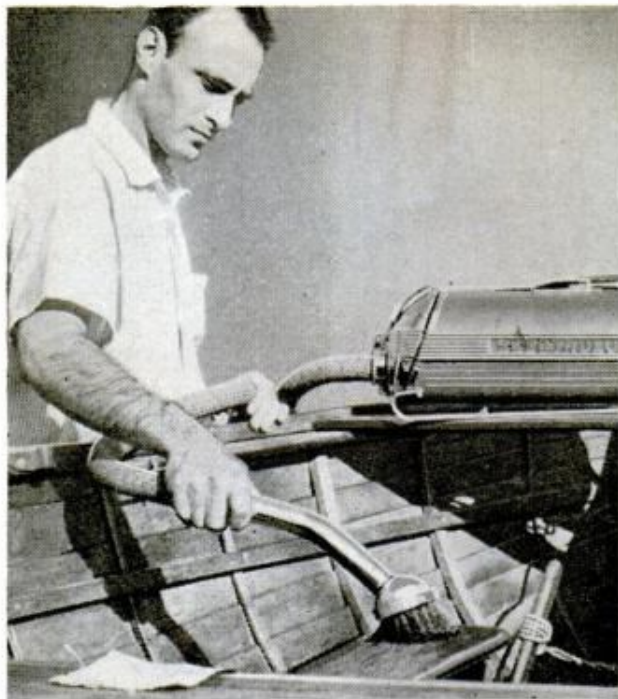
Cable Release Through Hand Strap Permits Off-Camera Flash

By looping the cable release through the hand strap on a press camera, the camera can be easily held and fired with one hand while shooting in the normal position. This is especially helpful when firing with synchronized flash through the shutter which would otherwise require three hands to hold the camera, press the release and hold the flashgun off camera.

Wayne Floyd, Fayetteville, Tenn.

☞ To help make your darkroom lightproof, try attaching a piece of weather stripping to the bottom of the door. Use the kind composed of a metal strip with felt attached. This will shut out any light that might filter in under the door yet at the same time allows for free movement of the door.



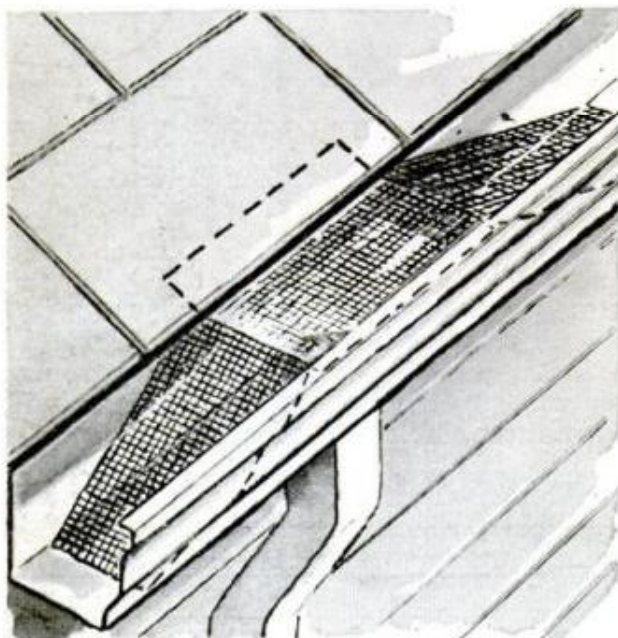


Vacuum Cleaner Makes Quick Work of Removing Dust From Boat Bilge

Cleaning out dirt and dust from the bilge area of a wooden boat after sanding is a job that can be done best with a tank-type vacuum cleaner. Use one of the narrow wand attachments for hard-to-reach places. The brush attachment, used for cleaning furniture, is fine for "dusting" sanded surfaces that are to be varnished. Follow with a tack cloth, such as is used by auto painters, to remove any last traces of dust.

P. S. Goldstone, Hollywood, Calif.

☐ When you shop for furniture, it is a good idea to make a pencil sketch of the room in which the new pieces will be located and take it along. Include room dimensions so that you can plan arrangement of your own furnishings.



Improved Downspout Guard Made From Hardware Cloth

Wire-cage leaf strainers for downspouts prevent debris from washing down them but the strainers also clog very easily, making frequent cleaning necessary to keep the downspouts open. A better type of strainer is shown at left. It is cut from 1/4-in.-mesh hardware cloth and bent to the shape shown, leaving a narrow projecting strip on each side at the top. One strip is inserted under a shingle, the other is forced under the flange on the gutter. Of course, complete protection can be had by installing a strainer of the type that covers the entire gutter. These are available at most stores that sell rain gutters and are easy to install.

Robert L. Sargisson, Berwyn, Ill.



Filing Corrects Striker Plate Fit

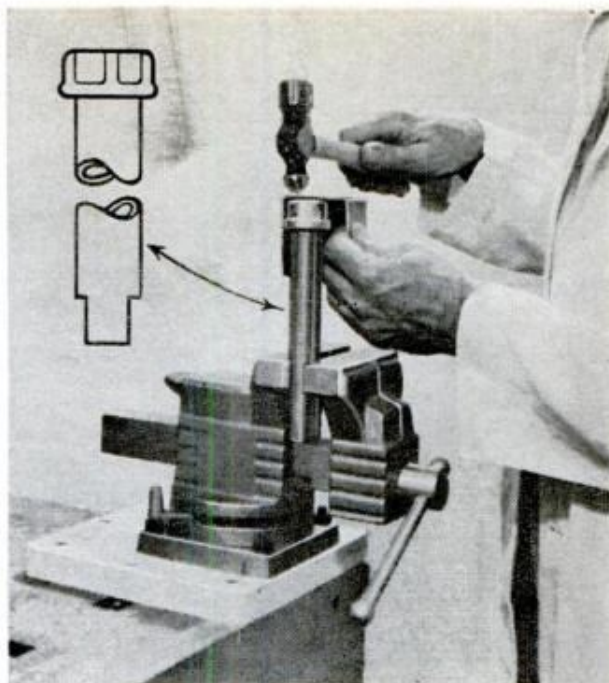
When the striker on a door lock does not engage the striker plate on the jamb, a small amount of filing on the edge facing into the doorway usually will correct the difficulty. File away only enough metal to permit the striker to engage the plate opening. If too much metal is removed, the door will rattle when closed. If the plate is out-of-line considerably, it usually is best to remove the screws and relocate it.

☐ When it comes to being photogenic, cats have all the qualifications. However, if you want to shoot a candid action shot of your cat, put butter on her paws. While she is industriously licking them you'll have ample time to focus and shoot a "prize-winning" picture.

Mushroom Anvil

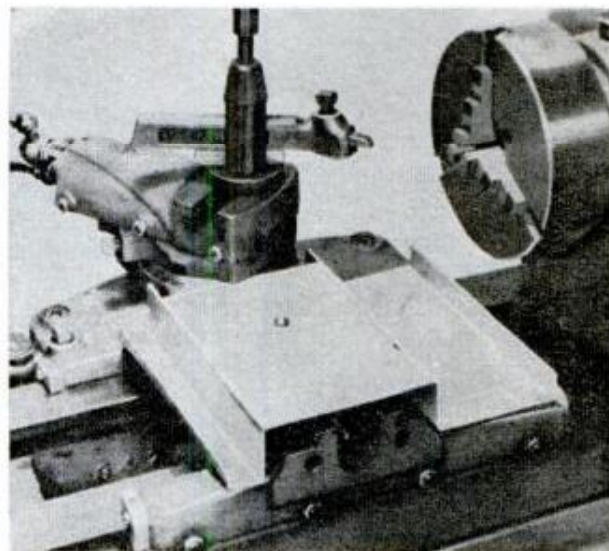
When you need a mushroom anvil for tapping dents out of sheet metal, planishing, forming and raising, you can make one suitable for many of these operations simply by screwing a pipe cap tightly onto a nipple. The convex ends of some pipe caps are rounded just right for the purpose; others you may have to file to the desired radius. Notch the lower end of the nipple on opposite sides as in the detail to form shoulders that will bear on the vise jaws.—Robert L. Sargisson, Berwyn, Ill.

When installing additional electrical outlets in the walls of rooms other than the kitchen or laundry, locate them 18 in. above the floor. At this height outlets are more easily reached. In the kitchen and laundry 48 in. is the recommended height.



Sheet-Metal Chip Tray

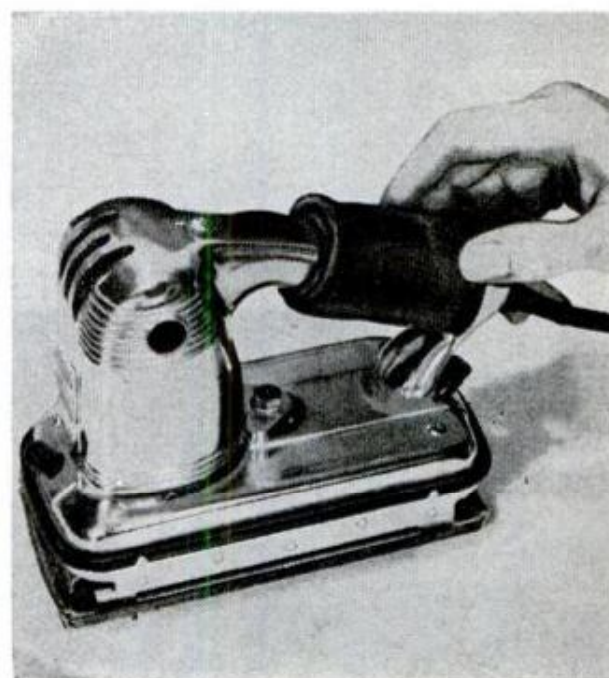
It's much easier to make a small tray to catch fine metal chips, also the dust from a grinding operation, than it is to clean up the lathe after the job is done. Nearly all small lathes will accommodate a tray screwed to the compound slide and the extensions form shallow trays. Bend the tray from thin sheet aluminum so that it forms a saddle over the compound slide and the extensions form shallow trays. If desired, end pieces can be formed on each tray, but in actual use this was found not to be necessary. The open-ended trays are easier to clean and if the bottoms are coated with light grease before use, chips and dust will be retained.



Vibration Dampener

Vibration of the handle of a pad sander can cause some discomfort if the tool is operated over a long period of time. The operator will tend to relax his grip on the handle which will reduce the efficiency of the sander. Solve this problem by wrapping the handle with several layers of rubber, using a strip cut from an old inner tube. Hold in place with wrappings of electrician's rubber tape. When making the wrappings, be sure that they do not interfere with free operation of the switch.

Before painting or repainting any sheet-metal kitchen utensil such as a canister or salt shaker, the Shellac Information Bureau advises that you prime the bare metal with a thinned coat of white shellac. Paint or enamel will adhere readily to the shellacked surface.





On the MARKET

for Do-It-Yourselfers

1. CEDAR CLOSETS ON DEMAND and any chest or cedar chest. This is possible through the use of a new product—pulverized aromatic cedar wood. Dissolved in water it may be brushed or sprayed onto any surface, or onto the walls of any closet, giving in effect a cedar-lined interior. One lb. covers 15 sq. ft. and fragrance and protective quality last almost indefinitely.

Cook Enterprises, 54 Holland St., Asheville, N. C.

2. NEW ROLL-ON TRIMMER assures a professional look when finishing narrow trim and sash frames. Plastic container holds half pint of enamel, varnish, water or oil-base paint. Foam-plastic roller turns easily when wet for an even distribution of paint. No chance of wavy edges or smears—roller shield holds you to the line, making even trimming a snap.

Damar's, 768 Damar Bldg., Elizabeth, N. J.

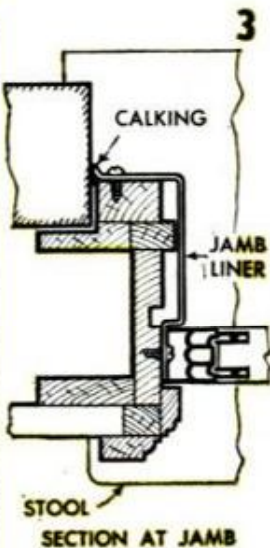


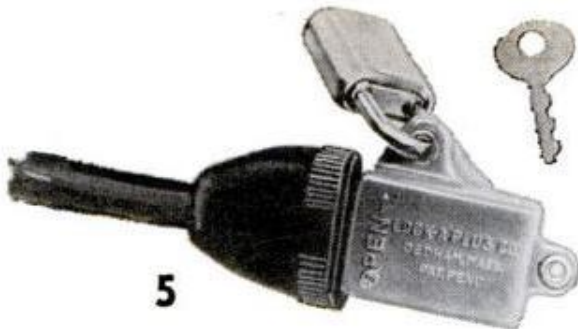
3. METAL WINDOW SASH can be installed in old wooden frames. First take out the old sashes and remove stops. Install metal head, jamb and sill liners from outside. Then screw-fasten double-hung window unit as in the section detail and fit wooden stop and wood trim. Standard sizes for all types of walls.

Per-Fit Products, Spickelmier Industries, Inc., 122 E. 52nd St., Indianapolis, Ind.

4. PLASTIC-PANEL RESURFACER restores the exterior finish of any weathered or discolored translucent glass-fiber panel. Quick-drying liquid may be applied with a brush and dries smoothly with no brush marks. Also can be used to deepen panel coloring to reduce heat and light transmission. Available in green, white, sand, clear, yellow, coral, blue or gray.

Chemiglass Inc., San Diego 9, Calif.





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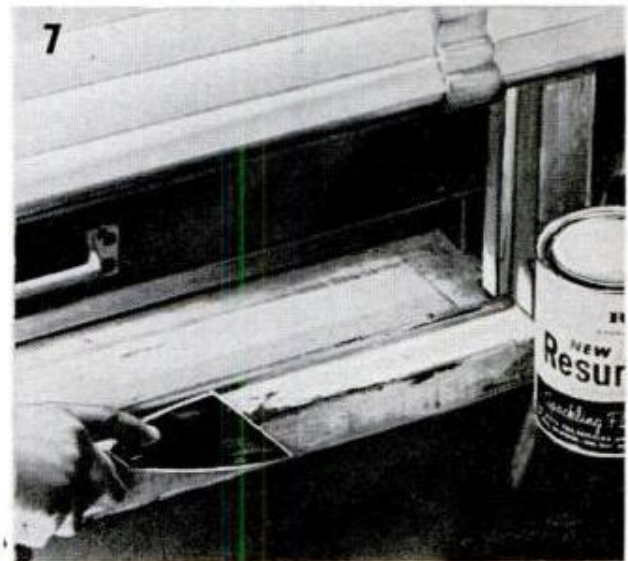
5. NEW PLUG GUARD keeps kids, sitters and other unauthorized persons from availing themselves of the use of your TV, hi-fi, power tools and other electrical equipment. Guard consists of a simple plastic fitting which locks over the plug prongs of the appliance cord
 Lock-A-Plug Co., Box 85, Dedham, Mass.

6. THREE LADDERS IN ONE, yet light enough to be carried by one person, the tough and weather-proof Saf-T-Ladder may be used in single 6-ft. sections or combined to full 15-ft. length as needed. Easily disassembled, sections may be stored in a minimum of space
 Murray-Black Co., 552 W. State St., Springfield 15, Ohio



6

7. READY-MIXED SPACKLING PASTE is a new boon to the do-it-yourselfer. Good for almost any interior or exterior repair job, may be applied to plaster, wood, hardboard, masonry, tile, metal and glass. Dries in an hour and may be sanded and finished
 The Reardon Co., St. Louis, Mo.

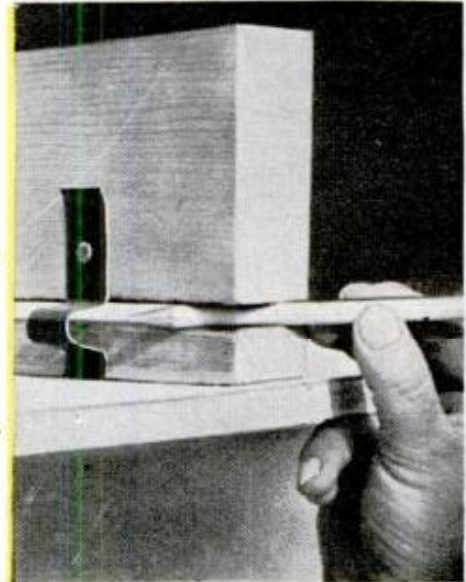


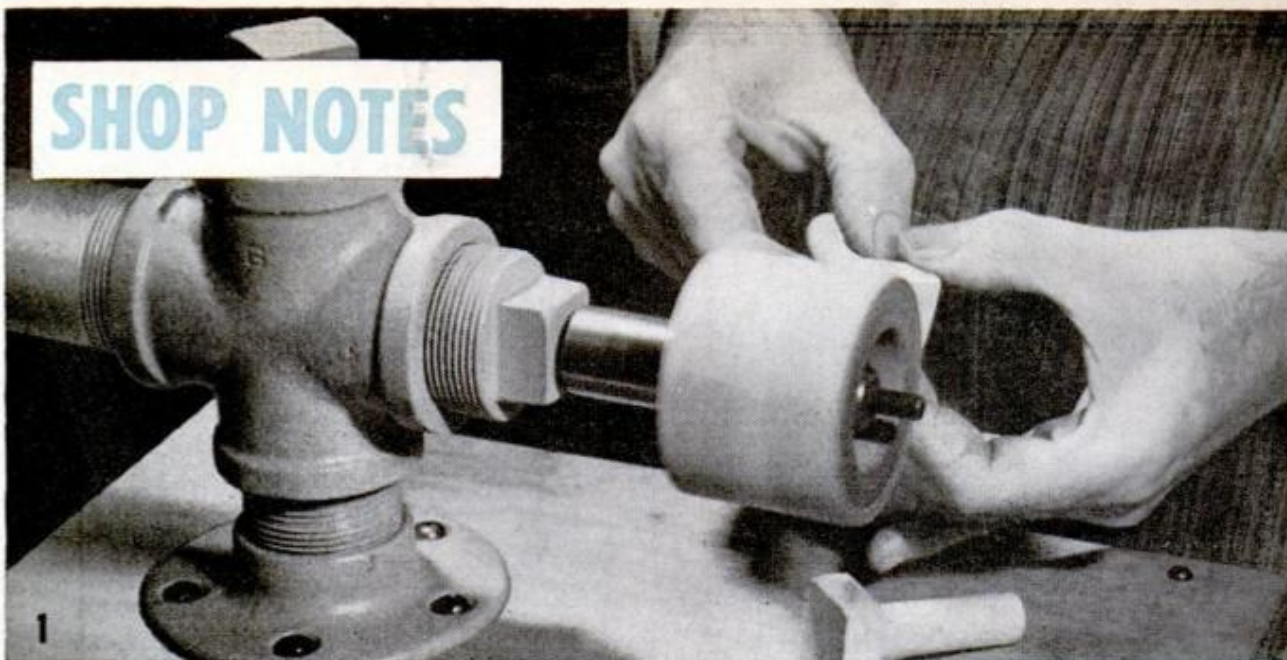
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8. MIX-IT-YOURSELF PATCHING makes a quick job of ordinary concrete repair. Powder mixes with latex to form a paste which is quickly and easily applied as a durable and shrink-proof patch for steps, floors, masonry—any repair which would normally call for cement
 The Flintkote Co., 3 Rockefeller Plaza, New York 20, N. Y.



8





BUILDING A LONG-ARM

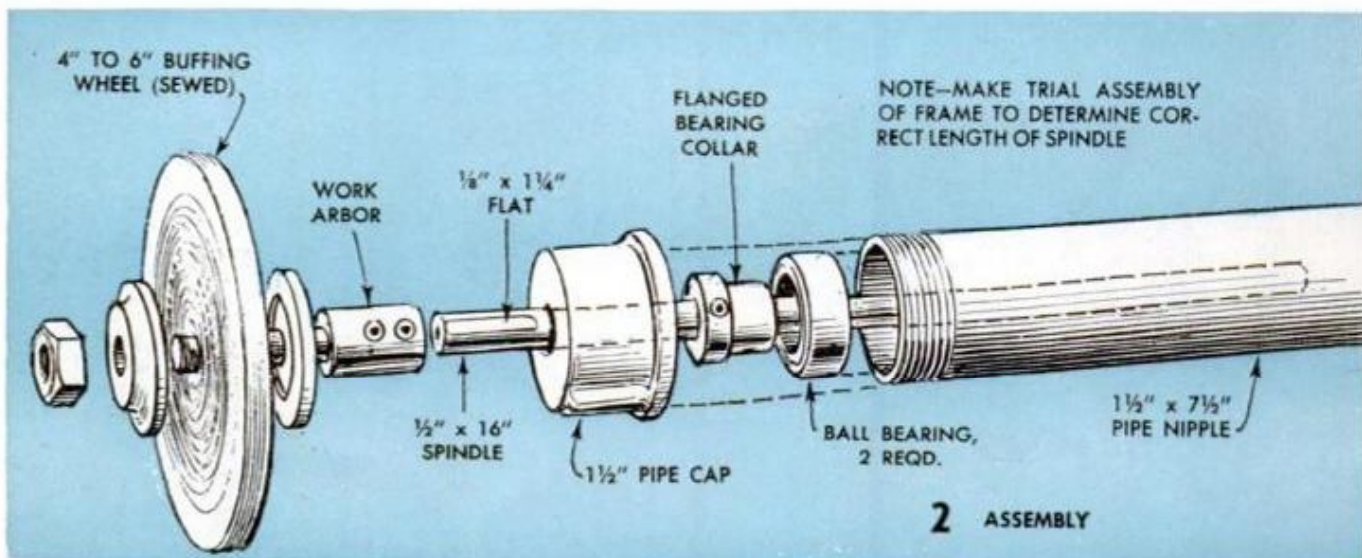
By Walter E. Burton

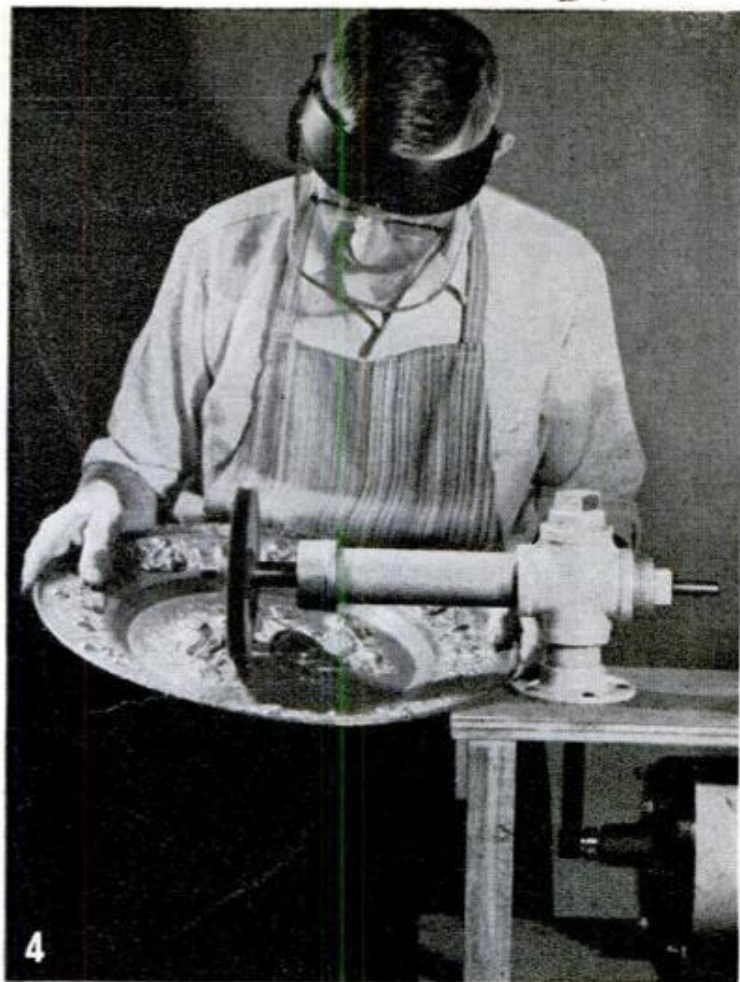
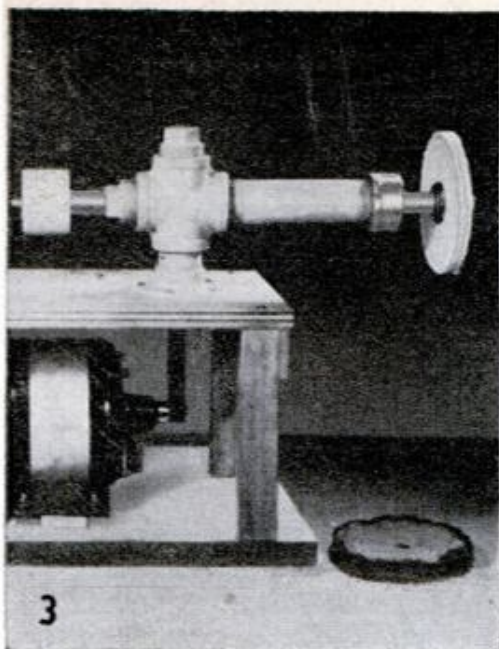
LONG-ARM BUFFERS handle those large and odd-shaped workpieces whose centers cannot be reached with regular polishing equipment. Small shops having only occasional use for a buffer of the long-arm type can make a single or double-arm unit easily by using parts and materials which are readily obtainable. Although a unit with only one long arm will serve for almost all ordinary applications, there are some types of work that can be done better and faster with a double long-arm unit. A wire wheel or a fiber-bristle wheel can be mounted on one arm while the other carries a cloth buffing wheel. This arrangement permits the operator to clean and polish a single workpiece

without changing wheels or stopping the machine.

The single-arm buffer pictured and detailed also can be made in the double-arm type, although single-arm construction permits use of both ends of the spindle as in Figs. 1 and 3. If desired, the unit can be assembled with two long arms of equal length. The only problem in making the double long-arm job is that of aligning the shaft in ball bearings mounted in pipe fittings. With care this can be done satisfactorily.

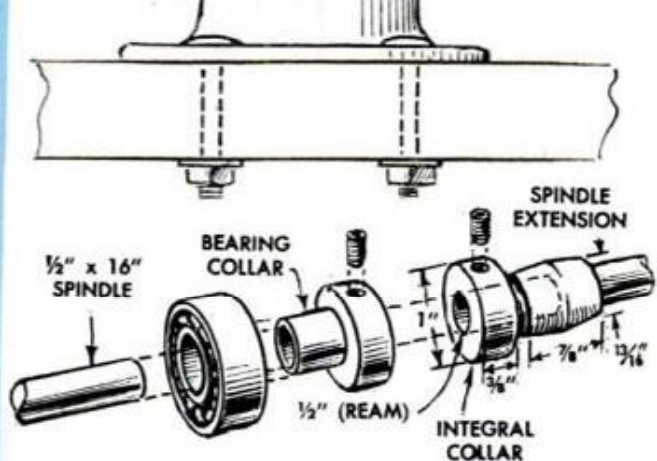
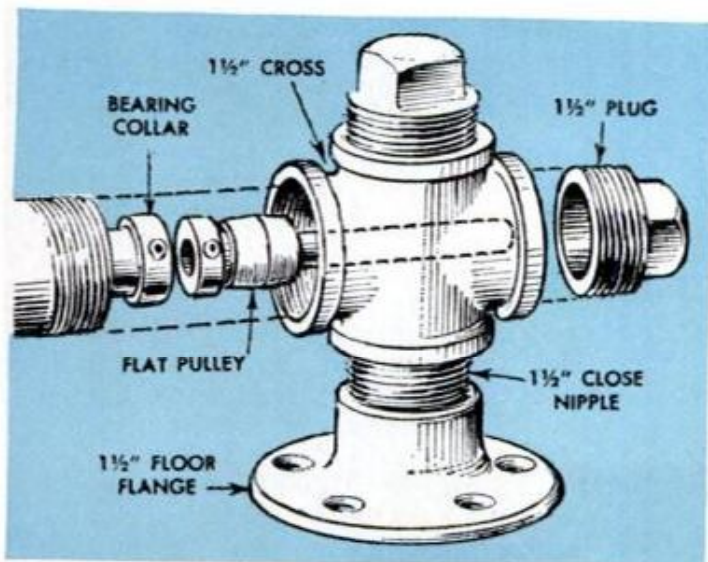
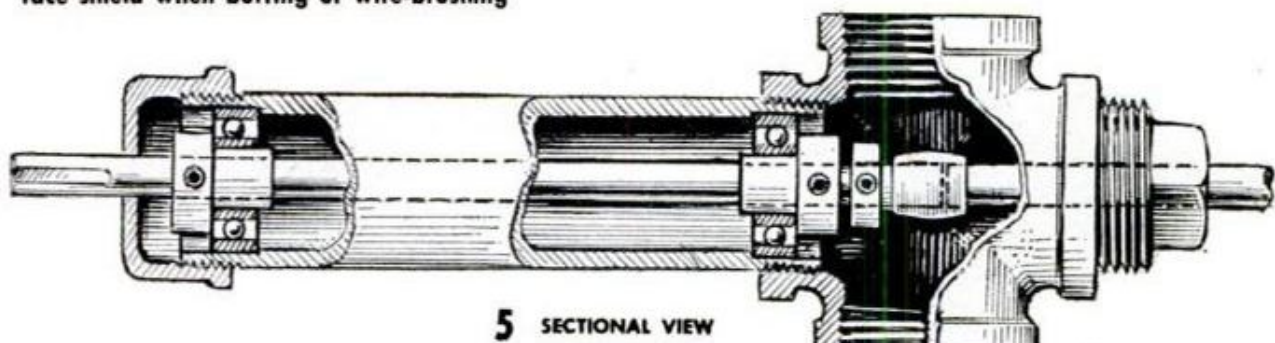
The frame of the unit is assembled as in Figs. 2 and 5, the latter a sectionalized view showing all parts in position. It should be remembered that there are



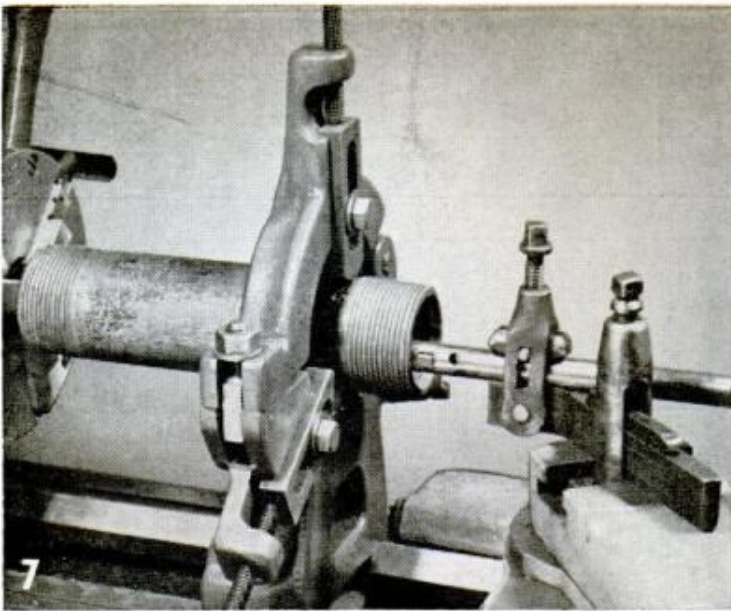


BUFFER

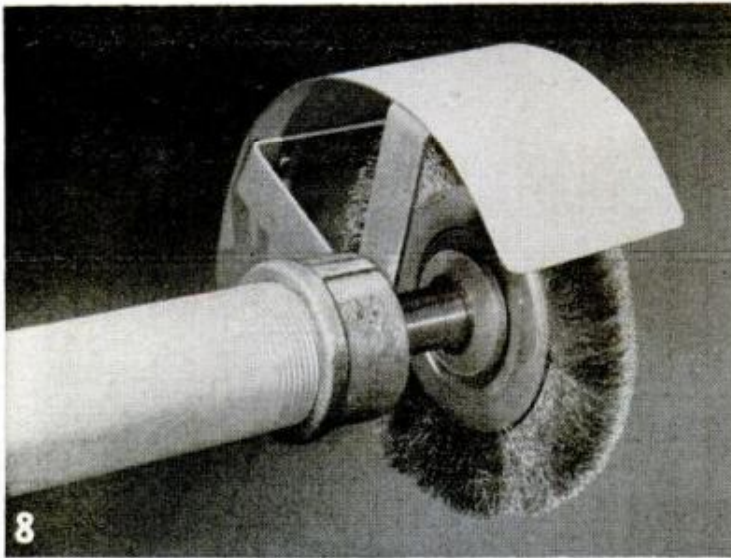
Above and at the right you see the long-arm buffer mounted on its bench-type base. Note that the reach of the long arm permits working to center of a large workpiece without interference from arm or base of machine. As a precaution, always wear a face shield when buffing or wire-brushing



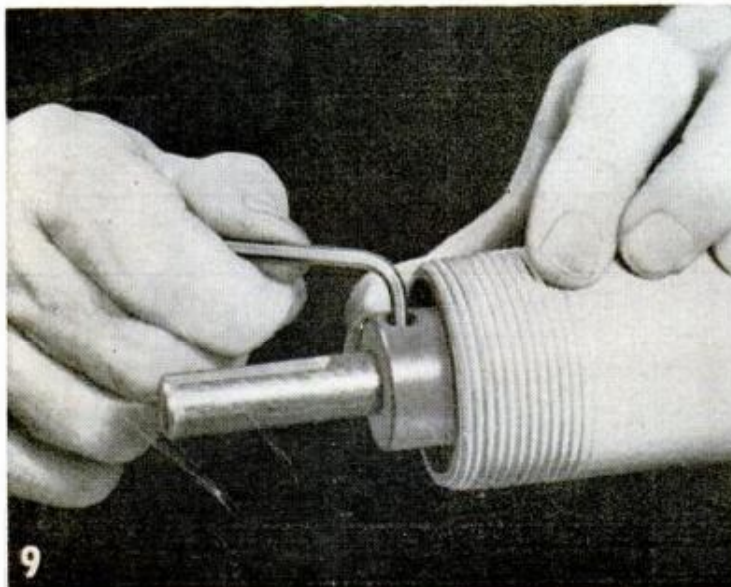
6 SPINDLE ASSEMBLY AT PULLEY END



7
Ball bearings carrying the spindle are mounted in a pipe nipple. In some instances it may be necessary to machine the ends of the nipple in order to provide a suitable seat for bearings



8
Above, if you don't have a face shield, then the wheel always should be guarded. Make a guard by riveting sheet metal to L-shaped brackets and attaching to pipe cap with small screws turned into holes drilled and tapped in the cap. Below, bearings are carried on flanged collars setscrewed to spindle



9

allowable variations in sizes of standard steel pipe and fittings. These variations may make it necessary to bore out the inner ends of the nipple which forms the long arm in order to form suitable seats for the outer races of the ball bearings, Fig. 7. Flanged bearing collars setscrewed to the shaft carry the inner races of the ball bearings as in the sectional view, Fig. 5. This type of assembly permits tightening the flanges against the inner races of the bearings (preloading) to prevent any end play or looseness, Fig. 9. The shouldered diameters of the bearing collars are machined sufficiently close to provide a light press fit of the collars in the inner races. This will assure that the races rotate with the collars.

Note in Fig. 6 the spindle assembly at the pulley end. The pulley is crowned for a flat belt and is machined with an integral collar. The collar end of this assembly, which also includes an integral spindle extension, is bored to take the end of the regular spindle. At this point it should be noted that, although the details show the frame assembled entirely from 1½-in. pipe fittings, you can use a larger pipe cross, floor flange and close nipple to obtain more belt and pulley space if desired. The 7½-in. nipple which forms the long arm can then be screwed into a reducer which has been turned into the pipe cross.

Wire wheels and cloth buffing wheels, or buffs as they are often called, are mounted on a work arbor, Figs. 2, 3, and 4. This is an accessory item available ready-made at a very nominal cost. The sleeve of the arbor is setscrewed to the buffer spindle, the setscrews bearing on a flat filed or milled on the end of the spindle as in Fig. 2.

Figs. 3 and 4 show the type of base which was designed for mounting the original buffer unit. It's a simple affair consisting of a plywood top, base and supporting posts. The motor is mounted under the top and drives with a short, flat belt. When using the buffer either wear a face shield as in Fig. 4, or provide a wheel guard as in Fig. 8. The guard should cover at least half of the wheel circumference. ★ ★ ★

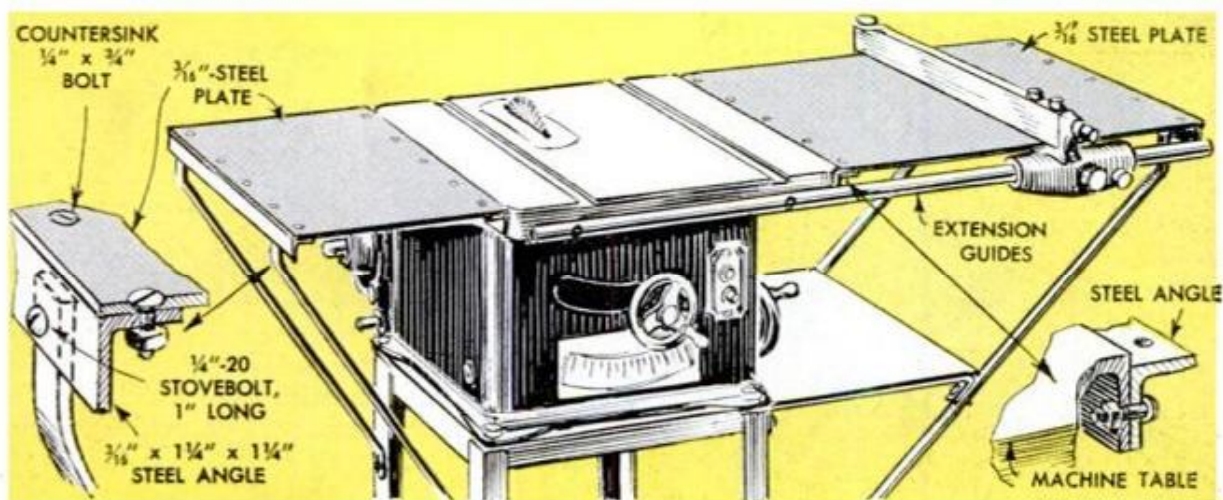


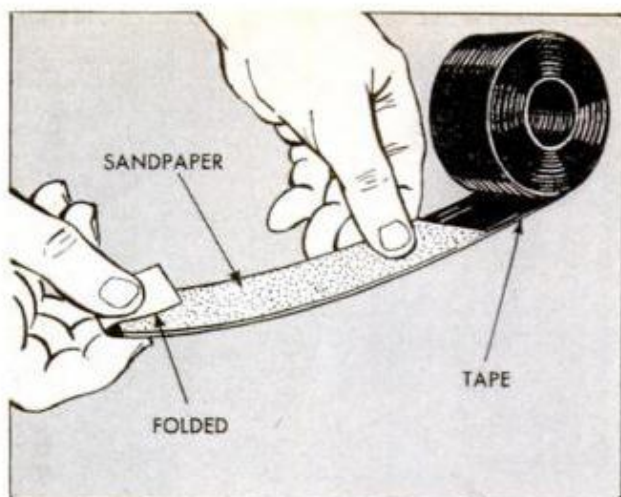
Table Extensions DOUBLE WORK RANGE OF BENCH SAW

BIG-SAW output from a small bench saw usually can be had simply by fitting the small machine with table extensions. Many of the older bench units were not equipped with tables having milled edges for attachment of table extensions, or wings, but generally it is possible to bolt small steel angles to the edges to support extensions

made of flat steel. The detail below suggests one way in which this can be done. No over-all dimensions are given as the extensions, guides and supports must be adapted to the individual machine. Bracing must be worked out which will maintain the extensions rigid and level.

Floyd D. Aldrich, Chicago, Ill.

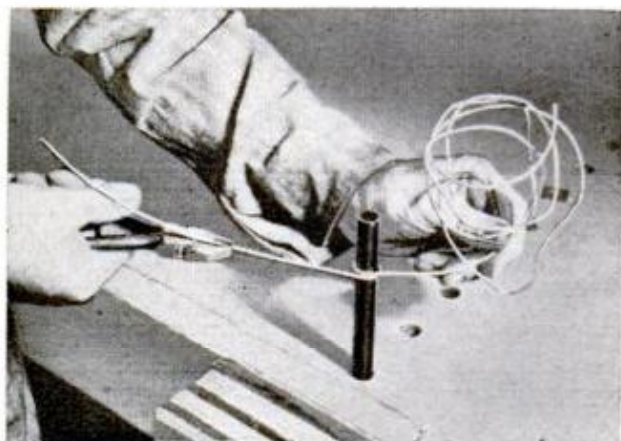




Use Tape to Back Sandpaper

When cloth-backed sandpaper is not available for sanding turnings and other lathe work, you can substitute plastic or cellulose tape as a good supporting material. Simply cut the sandpaper in strips and press them onto lengths of tape. Then fold the tape over to secure the ends of the paper and provide finger grips. Where the tape is too wide to sand intricate turnings it is simple enough to cut the tape into narrow strips after the sandpaper is applied. Extra strips can be made up with various grades of abrasive attached.

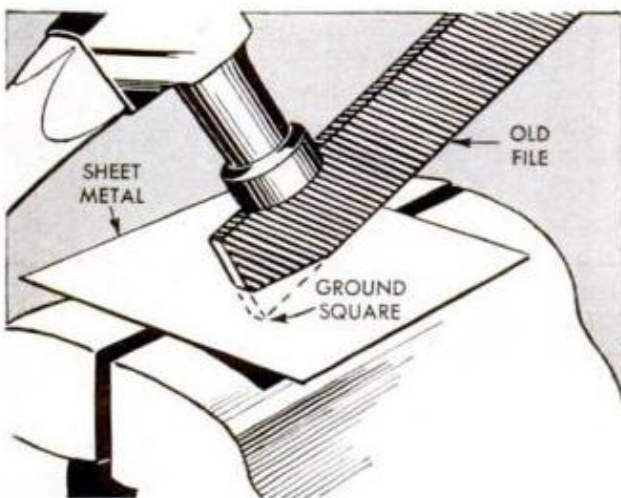
Daniel Bousha, Jackson, Mich.



Straightening Kinked Wire

It's easy to straighten out those kinked pieces of wire—just draw them around a mandrel. This tool is a short length of iron pipe or a steel rod. Fasten the mandrel in a vise, or stand one end in a bench hole. Loop the wire around the pin and grasp the end with pliers. Draw the wire straight with a steady pull. To straighten wire of large diameter, use a correspondingly larger pin.

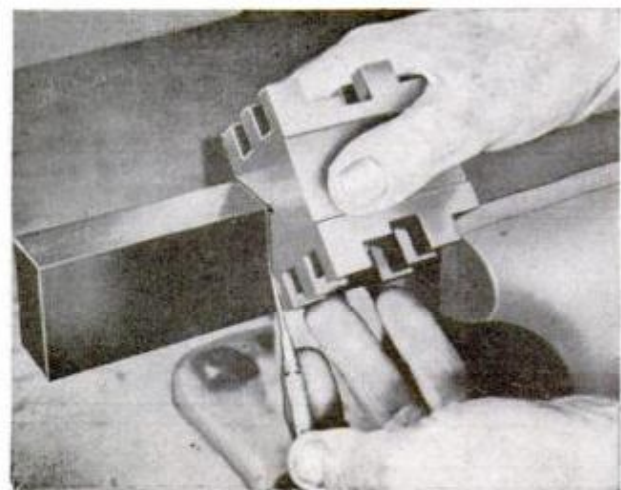
Wayne Judy, International Falls, Minn.



How to Slot Sheet Metal

To cut slots in sheet aluminum and other light-gauge metals, use a vise and an old file or a power hacksaw blade the thickness of the desired slot. Grind a flat, square corner on the cutting tool. Then set the jaws of the vise to just clear the tool. Position the cutting tool so the squared corner will pass through the sheet metal and between the jaws of the vise. Tapping the file with a hammer produces a shearing action through the metal. Snip off the waste at the end of the slot.

Norman W. Byrne, Hamilton, Ont.



Scribe Angles With "V" Block

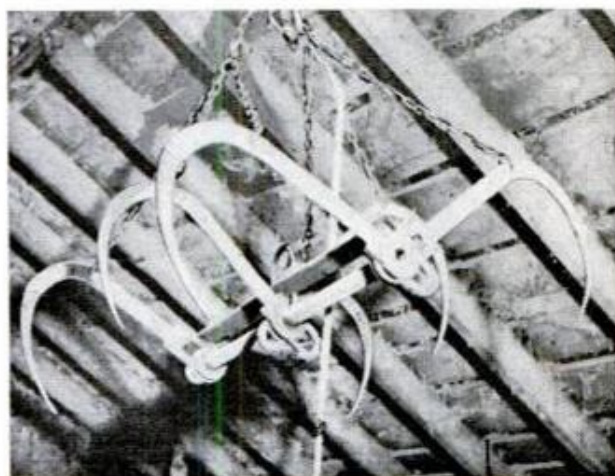
A precision V-block is superior to a machinist's square for scribing coincident lines across two adjacent surfaces of rectangular or square bar stock. First, make sure the V-block is seated against the two surfaces to be marked; then scribe the two lines as shown. When laid out with such a precision tool, the lines can be drawn accurately at right angles to the edges of the stock. The resulting lines on the four faces of the work will coincide perfectly with each other.

H. J. Gerber, Stillwater, Okla.



FARM-BUILT TOOLS SPEED HAYMAKING

IN HAYMAKING it's the handling that takes the labor and time. Farmers can make use of these shop-made helpers to lighten the work load and speed the handling job when every minute counts. Above, for example, you see a bale drag that brings the bales from the elevator back into the mow. Bales can be picked off the drag at any point for storing. The grapple fork pictured at right has its tines altered to a sharper angle so that it will pick up bales as well as loose hay. Operated from a carrier the fork is set and tripped in the conventional manner. A drawbar attached to the tractor mower, below, pulls a side delivery rake or a trailer. The belt tightener shown below at the right can save time at the bale elevator.

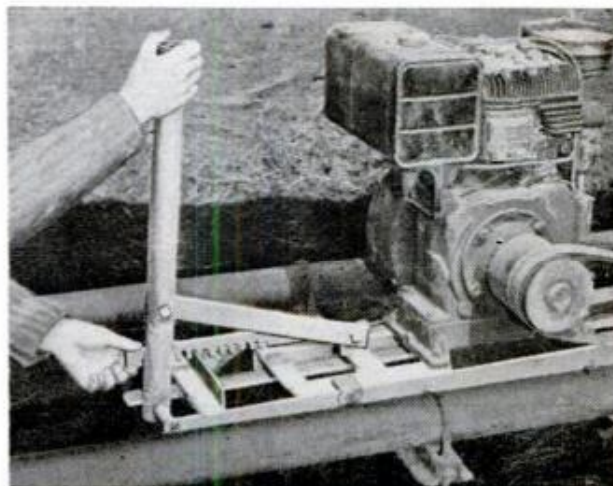


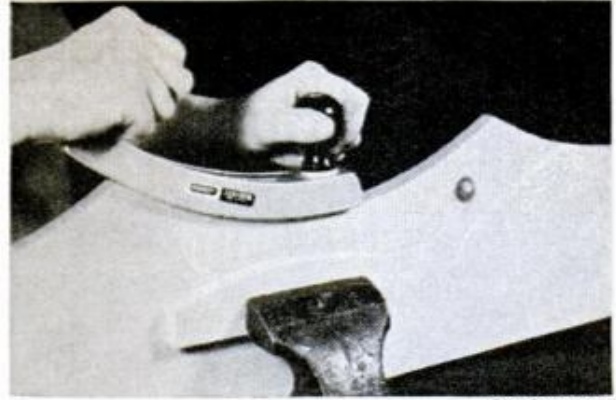
A grapple fork on carrier is sometimes used to get baled hay into mow. Fork tines are altered to grip bales

Special drawbar on tractor mower pulls a trailer to or from field, or a side-delivery rake behind mower



Adjustable belt tensioner saves time at the bale elevator. This one is shop-built from farm-machine parts





Stanley photos

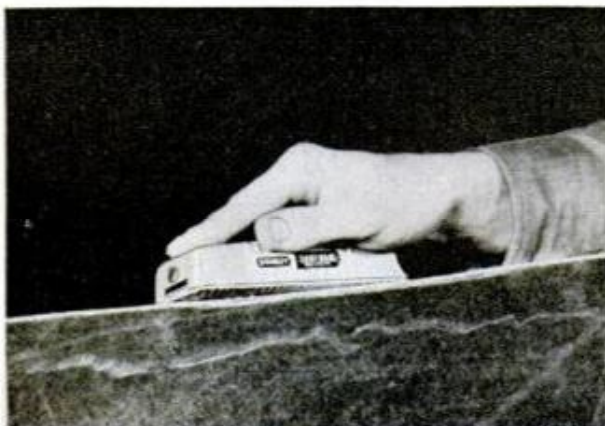
Above you see the convex surface-forming tool being used like a hand plane on the curved edge of the scroll which has been rough-cut in wood and is being smoothed with a few strokes of the new forming tool

At the left you see the same forming tool working on a metal surface. This time it's used to smooth the repair job on an auto fender and it's being handled much as you would a plane or conventional body file



The straight forming tool can be used on metal or wood simply by changing the blade. Blades, or shoes, are available for work on flat or concave surfaces

Here's a block plane with more than a hundred blades, each having a beveled cutting edge. As you can see, it's block-plane size and is designed for one-hand use



NEW RASPS

ALTHOUGH THESE surface-forming tools are designed to work in a manner similar to rasps, planes and sanding drums, their cutting action is a departure from that of the conventional tools. Each of the new tools is fitted with a detachable blade, or shoe, one face of which presents hundreds of individual, chisel-like cutting edges to the surface of the work. On all the different types of blades available, these cutting edges are staggered so that they do not track, and also are formed at an angle so that each makes a shear cut. Each cutting edge has its own chip-clearance opening, a provision which prevents clogging when working either wood or metal surfaces.

Two-blade patterns are standard. The regular cut is designed for fast removal of stock from the softer materials such as hard and soft woods, composition boards, asphalt tile and plastics. The second, or fine-cut, pattern works metals, ceramics, plaster and other hard and brittle material. Fine-cut blades take only half the bite of the regular type. Both regular and fine-cut blades are specially hardened to retain sharp cutting edges for long periods.

Note in the illustrations of the various tools at work that they can be used on convex, flat and concave surfaces, and also inside small openings. Due to the novel cutting action and automatic depth control, the tools are equally effective when hand and power operated. ★ ★ ★

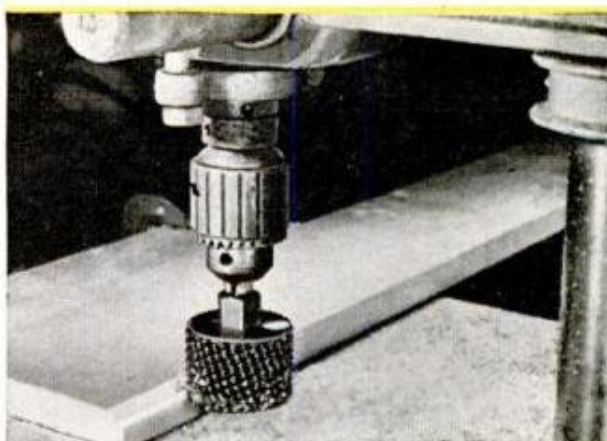


Above, this form of the tool uses a flat blade and is handled just like the conventional jack plane. Of course, it can be used on wood or metal by changing the blade. Here the tool is used to bevel plywood

Right, rasp-type tool being used to ease a tight-fitting door, one of the many uses of surface-forming tools around the home. Myriads of tiny blades having beveled cutting edges remove stock rapidly



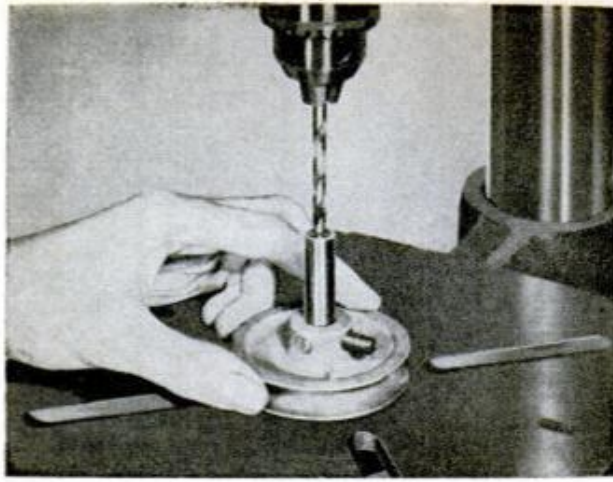
SHAPE WOOD AND METAL



Two views of the rotary surface former give you an idea of how it works when power-driven in a drill press or by a portable electric drill. Tool consists of a multi-edged blade 2 in. in diameter attached to an adapter having a 1/4-in. shank for use in 1/4-in. portable drills. Cuts smoothly and exceptionally fast

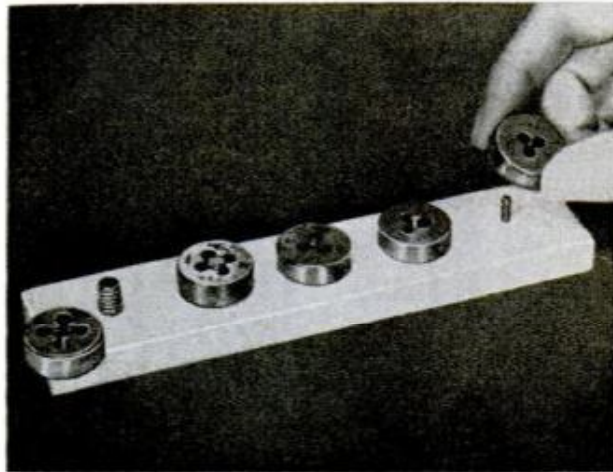
Surface-forming tools will cut almost anything. Below you see the round rasp, or file, being used to enlarge a hole in a brick and for cutting half-round scallops in the edge of a board. On this tool the cutting edges are curved so that they cut cleanly, without leaving ridges or offsets on the curved surface of the work





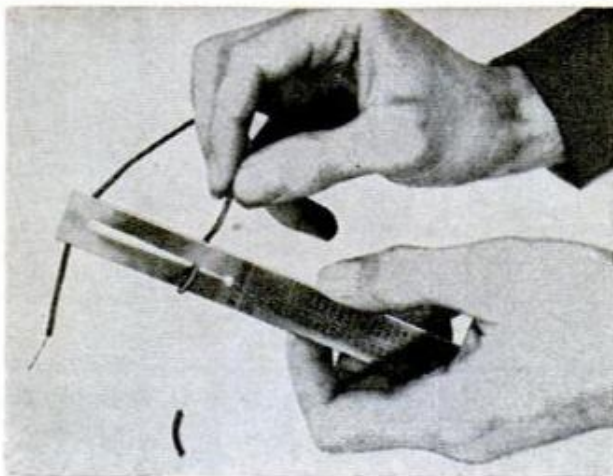
Pulley Hub Holds Round Stock

Without a suitable drill vise, center-drilling round stock poses the problem of improvising a method of holding the workpiece vertically and centering it under the drill bit. An ordinary V-pulley having a bore diameter near that of the workpiece will serve the purpose almost as well as a drill vise with a veed jaw. Place the pulley on the drill table with the extended side of the hub up. Drop the work into the bore, tighten the setscrew lightly and there you are. Best pulleys for the purpose are those made from cast iron. These have machined rims and accurately bored hubs.



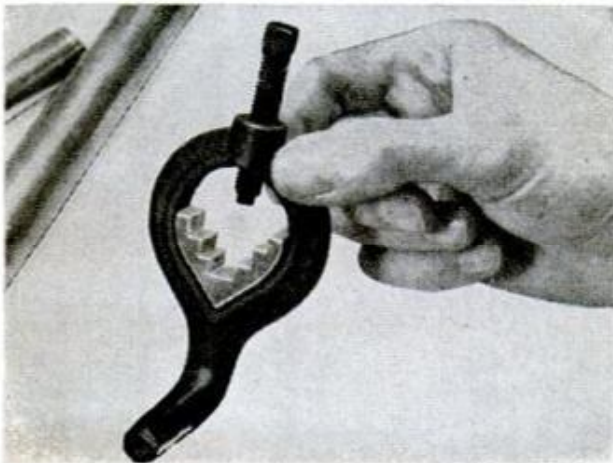
Rack Protects Split Dies

Split dies, or button dies, stored in a drawer with other tools are likely to be damaged and possibly lost. The simple rack pictured takes less time to make than any compartmented case and is just as effective. Line up the dies to be stored side by side, add an inch or more and you've got the length of the block needed. Cut it from $\frac{1}{2}$ -in. hardwood and drill spaced tap holes along the length. Then thread a short length of rod with the die to be stored and turn the threaded rod into the tap hole in the block.



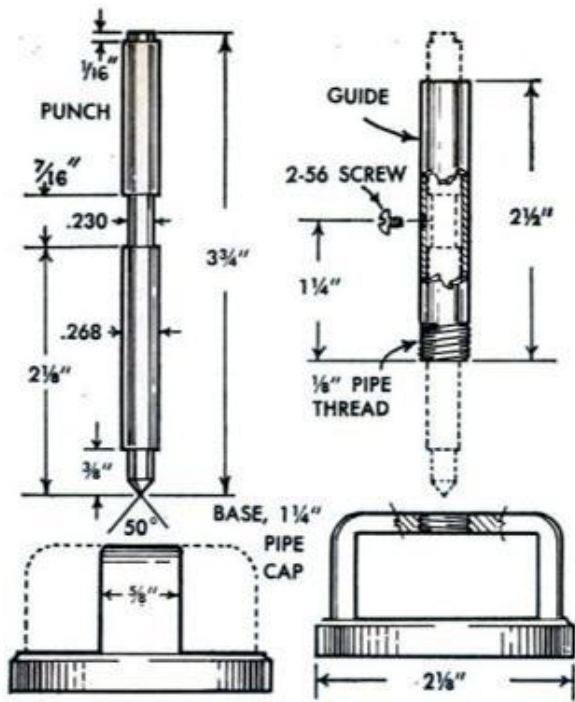
Rule Used as Wire Stripper

A steel rule of the type having a wire-gauge slot makes a good wire stripper for small-diameter insulated wire of either the solid or stranded type. To use, the wire is forced into the slot, given a half turn, then bent upward at the point where it enters the slot. A sharp, upward pull on the wire strips off the insulation neatly and cleanly without tearing or stretching. By filing the edges of the slot at a bevel to form cutting edges you also can strip insulation having a braided fabric covering. Filing the slot may tend to affect its accuracy when used as a wire gauge.



Lathe-Dog Insert Grips Work

If the lathe dog slips when you're cutting a thread, the workpiece, in most cases, will be ruined entirely. To guard against this possibility and to insure that the dog won't slip under any reasonable load, make and fit a steel insert as pictured. Mill or grind and file to the stepped form indicated and harden so that the sharp edges of the steps, or jaws, will bite into the workpiece when the screw is tightened. This gives the dog the holding power of a pipe vise and assures a positive drive.—R. Hanscom, Elmhurst, Ill.



GUIDED PUNCH FOR ACCURATE LAYOUT

A guided punch, or toolmaker's punch as it is sometimes referred to, is preferred by many shop men for accurate layout work. This one is made right in the shop using a short length of steel or brass pipe for the sleeve-type guide and a steel pipe cap as the base. The punch is machined from a length of drill rod and hardened. The guide is reamed and the body of the punch is ground to provide a smooth, sliding fit. If steel pipe is used for the guide,

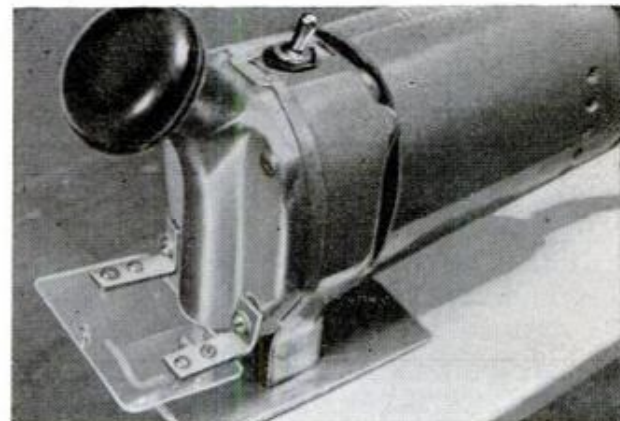
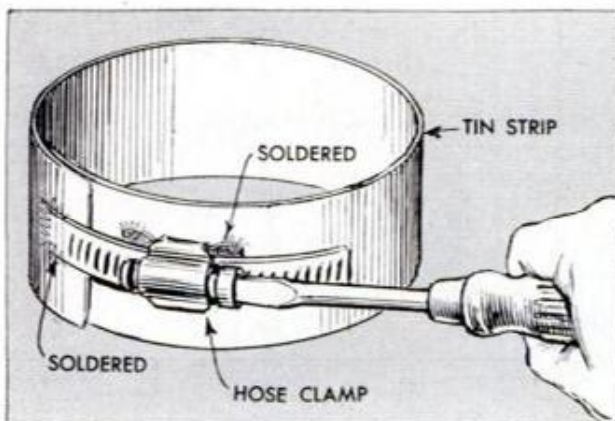
the body dimension of the punch may have to be varied slightly from that given as there are allowable variations in pipe sizes. For this reason brass pipe is to be recommended for the guide. To form the base, the pipe cap is machined all over. Then the section of the cap above the flange is cut away to form a bridge which is drilled and tapped to take the guide. When threading the end of the guide take special care to start the die accurately.

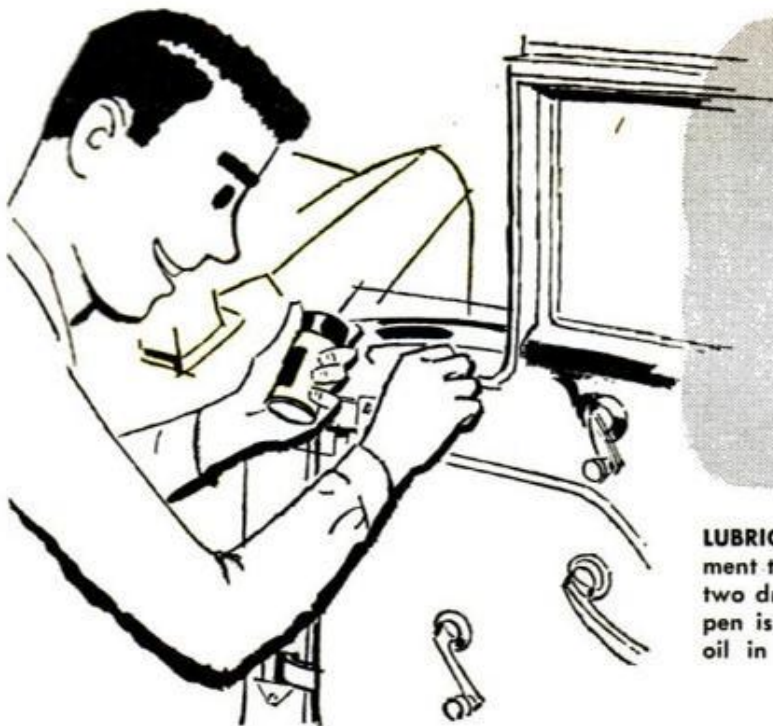
Improvised Ring Compressor

Should you need a piston-ring compressor in a hurry you can make this one in about 10 minutes. And it works perfectly. All you need is a strip of sheet metal (a strip cut from a No. 10 can will do) and a 1-in. hose clamp. The detail shows how to assemble these parts.—Guy R. Cantrel, Apache Jct., Ariz.

Chip Guard for Saber Saw

Portable jigsaws, or saber saws, cut on the upstroke and when working metal the fine chips are thrown upward with some force. If you don't have a face shield, take time to fit the saw with a clear-plastic guard as pictured. It's good insurance against eye injury.—Russel E. Cline, Sacramento, Calif.



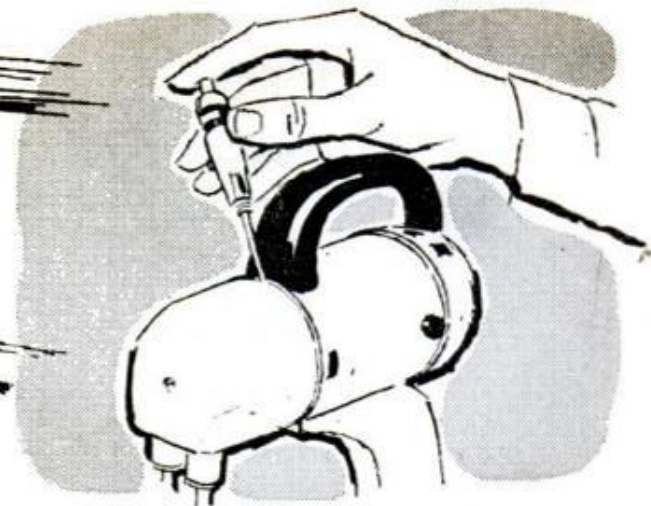
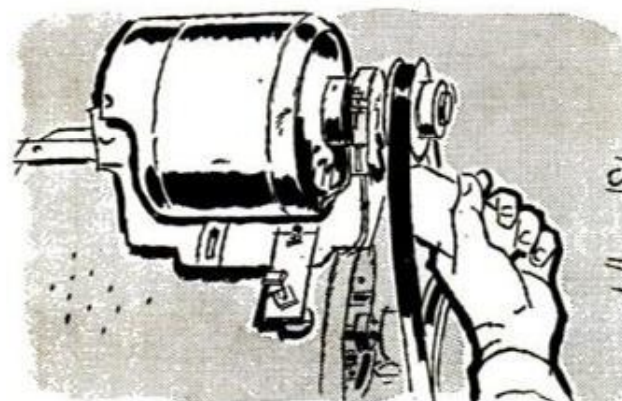


RUBBER CAR-DOOR GASKETS are dusted with tire talc to keep them from sticking to car body. Apply powdered graphite to door latches and wipe trunk gaskets with glycerin or glycol-base antifreeze during the cold months to keep rubber from freezing to the gutter

PASTE WAX wiped occasionally on a steel tape permits it to be pulled out and recoiled easily, and it protects painted calibration marks. Coat of same wax applied to plane or scissor's blades prevents rust



V-BELT SQUEAKS may be silenced by rubbing the veed surfaces with soap. When a belt creates static electricity that causes radio interference, wax and dust wear surfaces lightly with powdered graphite



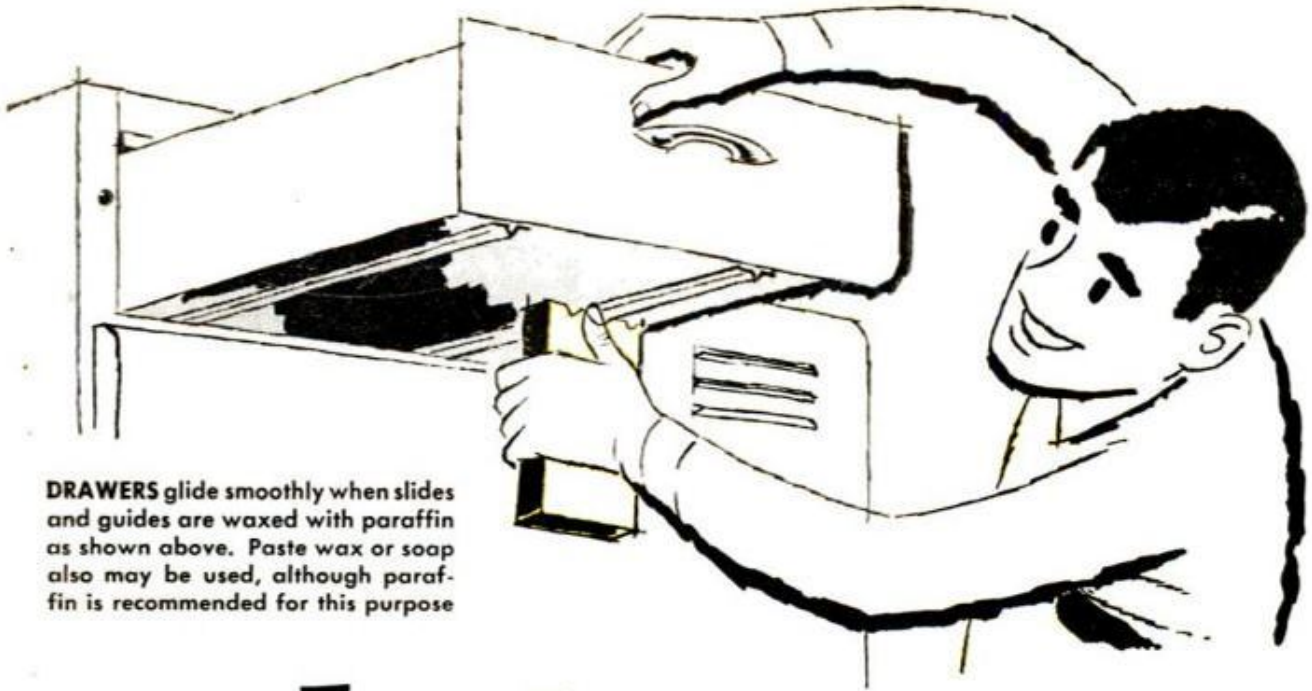
LUBRICATE most motor-driven household equipment twice a year, applying no more than one or two drops of light machine oil each time. An oil pen is handy for depositing the right amount of oil in tiny lubrication orifices on small motors

Tips

GREASE, OIL and other types of lubricants not only stop squeaks in the bearings and other wear parts of home appliances but help to keep them in good running order as well, when serviced periodically. The type of lubricant you should use depends upon the function of the device, or part of it, and its operational speed. But don't wait for squeaks to develop. Make a list of the appliances and keep lubrication dates with them.—Joe W. Rocke, Huron, S.D.

GEAR BOXES of portable power tools should be cleaned and repacked regularly, using multipurpose grease or lubricant specified by manufacturer. Oil armature bearings with lightweight motor oil





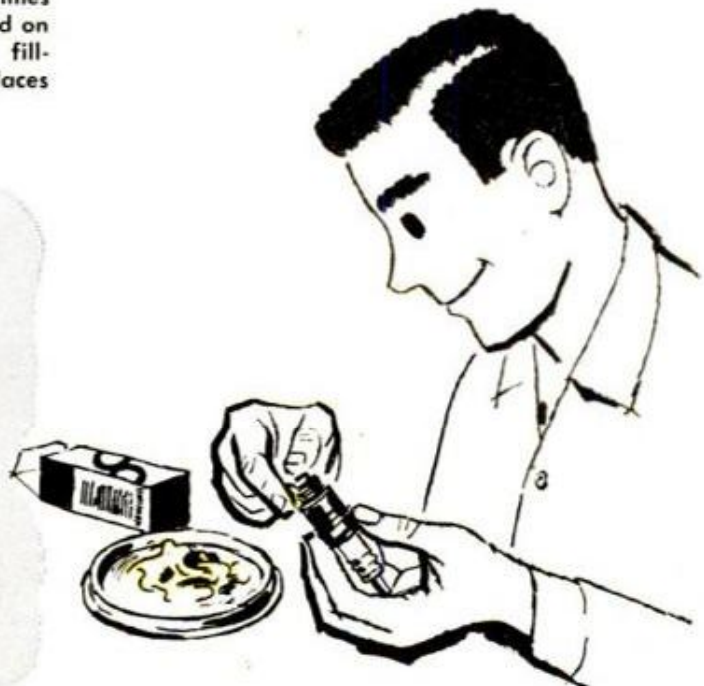
DRAWERS glide smoothly when slides and guides are waxed with paraffin as shown above. Paste wax or soap also may be used, although paraffin is recommended for this purpose

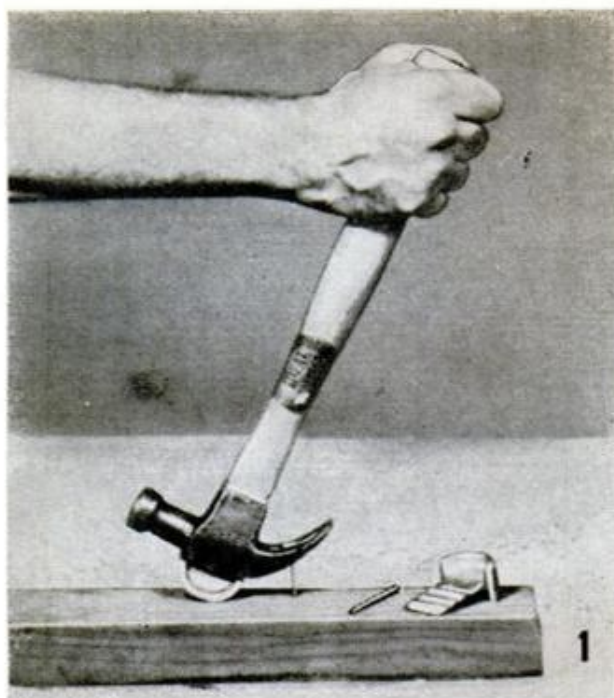
on Lubrication

BEARINGS on home-shop machines should be washed with solvent and repacked periodically, more often if given hard usage. Use long-fiber wheel-bearing grease for car wheel bearings, soft grease or heavy motor oil for high-speed bearings in light-duty machines

GREASE THREADS on spark plugs before installation to prevent them from becoming rust-seized in the holes. Since engine heat will cook out ordinary grease, use commercial antiseize compound available at most auto-supply stores, or make your own by mixing powdered graphite with pressure grease. Apply the mixture sparingly so as not to foul the electrodes

LUBRICATE BEARINGS on portable electric fans with a few drops of light machine oil two or three times a season, depending upon use. Soda straw slipped on oil-can spout provides flexible extension for filling oil cups located in difficult-to-reach places

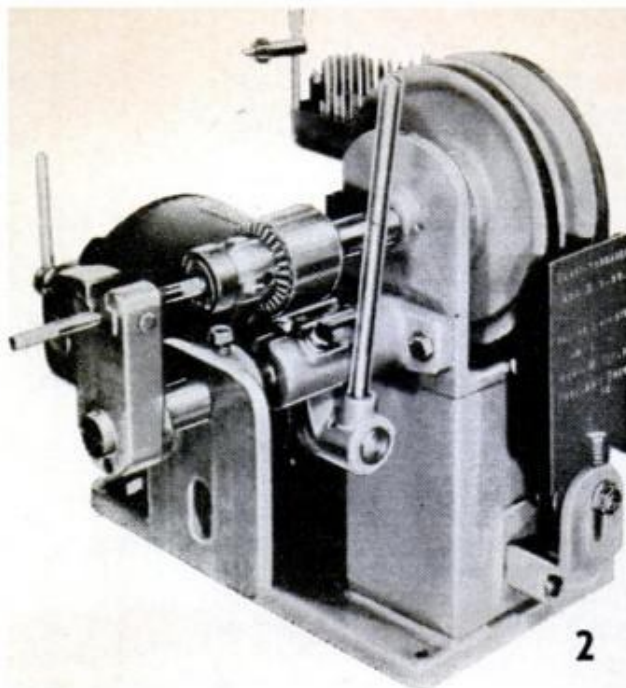




1. HANDLE LOCKING WEDGE

1. HANDLE LOCKING WEDGE includes a fulcrum for lifting and pulling nails without bending. Half-round curve of wedge is polished to prevent it from marring finished surfaces. Designed to replace standard handle wedge in hammers with wood handles, it has the same wedging action in holding the handle in the tapered eye of hammer head as does regular wedge

Specialty Sales Co., 8011 $\frac{1}{2}$ Houston St., Arlington, Tex.



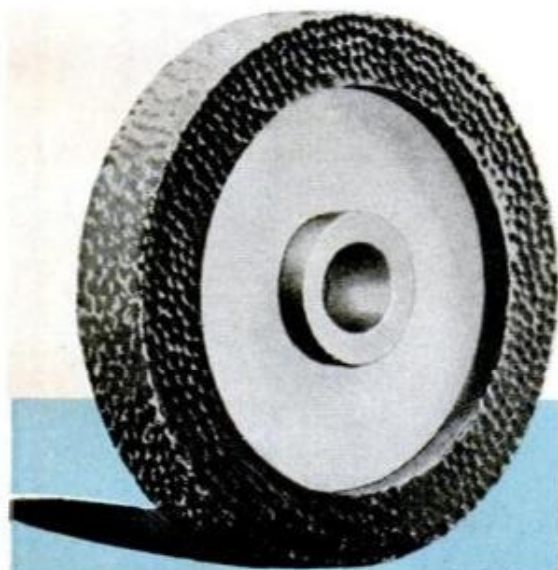
2. HAND-FEED POWER THREADER

2. HAND-FEED POWER THREADER for tapping and cutting external threads also performs other production jobs such as undersizing of threads to be electroplated, chamfering, deburring, countersinking, stud threading, reaming and spot facing. Designed exclusively for hand feeding of work which enables operator to control feeding rate throughout each operation

Sens-Threader Sales Co.,
4820-49th Ave., S.W., Seattle 10, Wash.

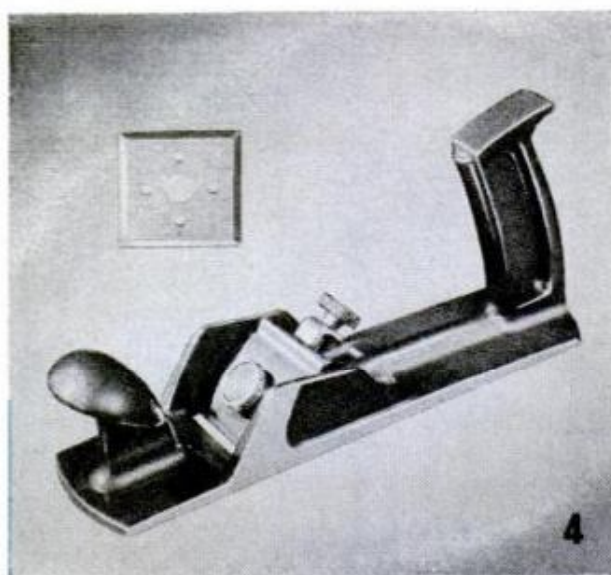
3. CUTTING WHEEL performs the same work on non-ferrous metals as an abrasive wheel and does it faster, smoother and without clogging. Especially effective on lead and soft aluminum. Wheels are made of hardened steel with faces and edges indented in a random pattern, each indentation producing a curved cutting edge which gives a shearing cut. Available in various sizes

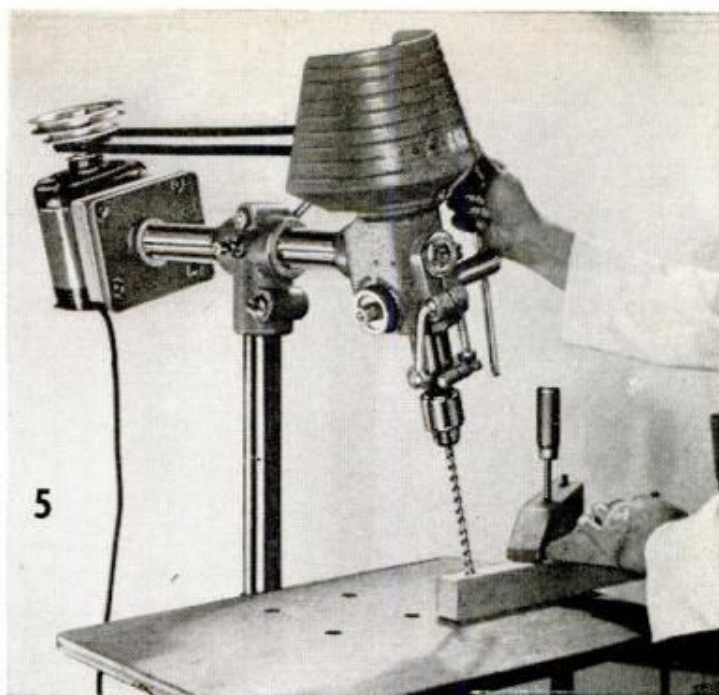
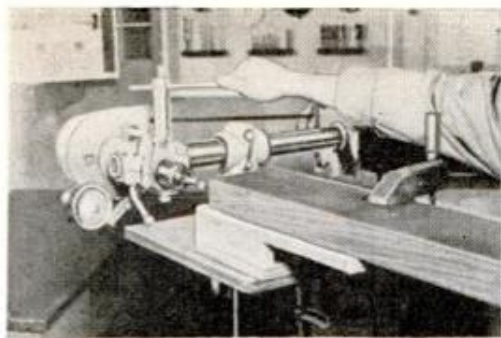
Schmidgell Mfg. Co., 307 Cass St., Peoria 2, Ill.



4. CARPENTER'S PLANE in a new simplified design features a four-edged disposable blade and an aluminum frame which is exceptionally light and easily controlled. Accurate adjustment of the cutter permits lifting shavings from tissue-thin to coarse on hard and soft woods. Special four-edged blade is factory-sharpened and is easily turned to present a new cutting edge

Sears, Roebuck & Co., 925 S. Homan Ave., Chicago 7, Ill.



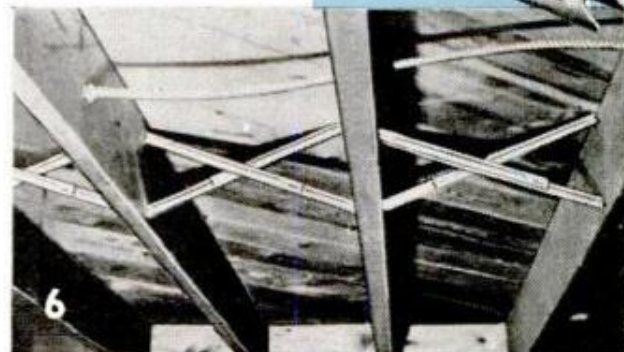


5. RADIAL DRILL PRESS does just about any drilling operation that can develop in a small shop. The head tilts, swings right or left in relation to the work, rotates about a center and can be moved outward far enough to work at the center of a 32-in. panel. Has choice of four speeds, 700, 1250, 2400 and 4700 r.p.m.

Delta Power Tool Div., Rockwell Mfg. Co.,
465 N. Lexington Ave., Pittsburgh 8, Pa.

6. STEEL BRIDGING snaps in place, without cutting and without nailing. Its use stops squeaks in old floors, reduces installation time on new construction. Made of metal, bridging can't loosen after installation due to warping or shrinkage. Metal is plated to prevent rusting. Widely used by home builders

Taber-Bushnell Co., Metropolitan Bldg., Minneapolis 1, Minn.

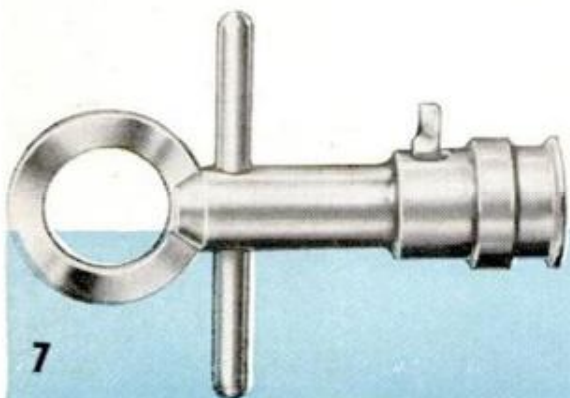


7. EXTRACTOR has been designed for removing Type S fuse adapters quickly and without damage to fuse block or Edison base screw shell. Tool is a time-saver for servicemen in the electrical and maintenance fields. Small enough to fit in any tool kit or can be carried in pocket. Full instructions are included

Trico Fuse Mfg. Co.,
North Fifth at West Chambers, Milwaukee 12, Wis.

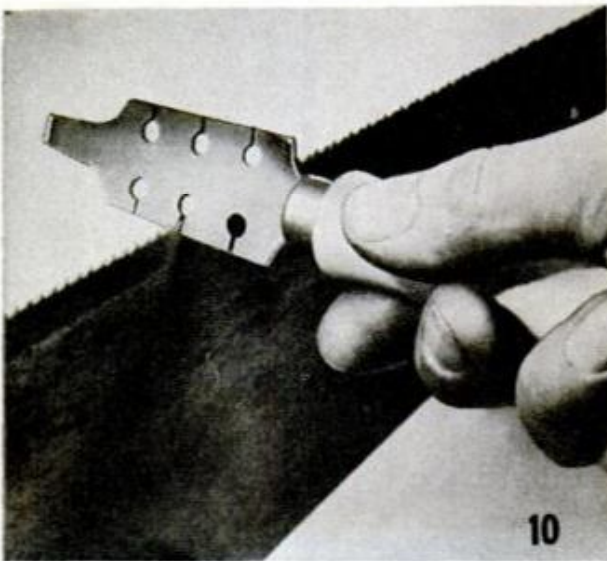
8. DRILL PRESS is equipped with a six-station turret taking tools for performing six different operations on a single workpiece. There are two speeds for each spindle. Also has a built-in power indexing mechanism giving progressive sequence. Spindles are mounted on ball bearings and have overload clutches

Burgmaster Corp., 13226 S. Figueroa St., Gardena, Calif.

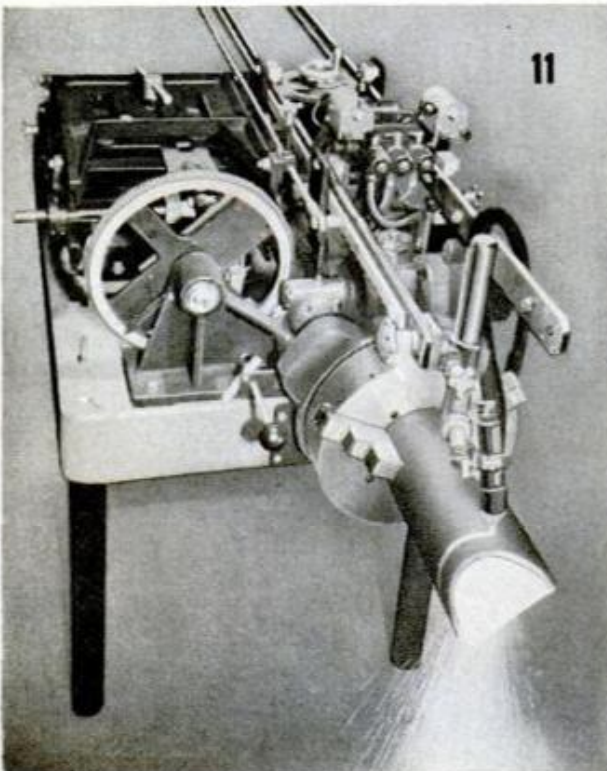




9. RACE-WINNING ENGINES for power carts are available in several models and displacements which qualify for Class A and Class B competition. Engines are fuel-lubricated and have chrome-plated cylinder bores. Series 580 is available in standard and deluxe models, standard model having a float-type carburetor and deluxe model comes equipped with a diaphragm-type carburetor. All engines have recoil starters
 Industrial Engine Div., West Bend Aluminum, Hartford, Wis.



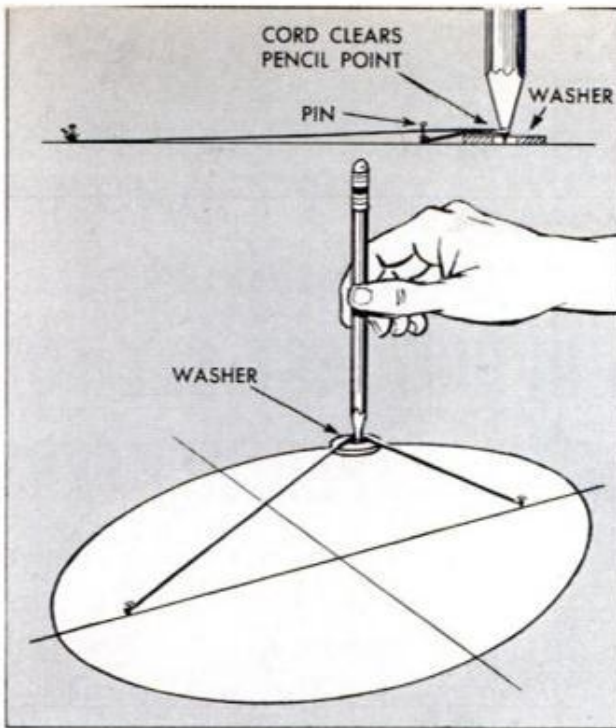
10. SAW SETTER has been designed especially for setting the teeth of handsaws of both ripping and crosscutting types. Consists of a handled blade having six slots, each of a different width to fit handsaw blades of varying gauges. To use, simply select a slot of a gauge equal to gauge thickness of blade, place slot over tooth and lift upward on handle. This action bends, or sets, each tooth
 Industrial Products Sales Co., 1182 Broadway, New York, N. Y.



11. AUTOMATIC CONTOUR CUTTER eliminates templates, layouts and patterns when joining pipe or fabricated parts. Cutting head can be equipped with special gas torches for cutting carbon steel, stainless steel, copper, aluminum, magnesium and cast iron. Pipe to be contoured is clamped in 3-jaw chuck, an electronic controlling mechanism is set to produce desired contour. Machine is then activated by pushing button
 Steffan Mfg. Corp., 276 S. Lincoln St., Salem, Ohio

12. OUTSIDE MICROMETER has blade-type anvil and spindle for measuring diameters at the bottom of narrow grooves and other inside diameters where mikes with standard spindle and anvil won't reach. Otherwise instrument is standard in every way, with easy reading figures and rigid one-piece frame
 The L. S. Starrett Co., Athol, Mass.



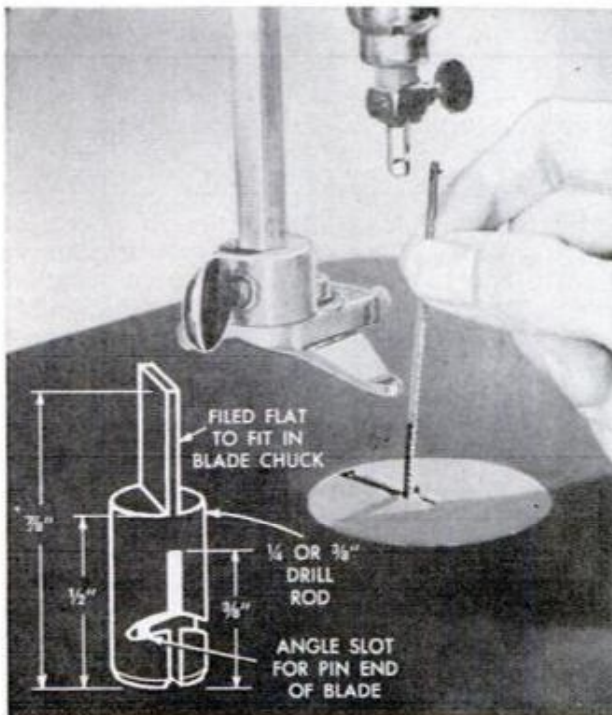


Washer Aids in Drawing Ellipse

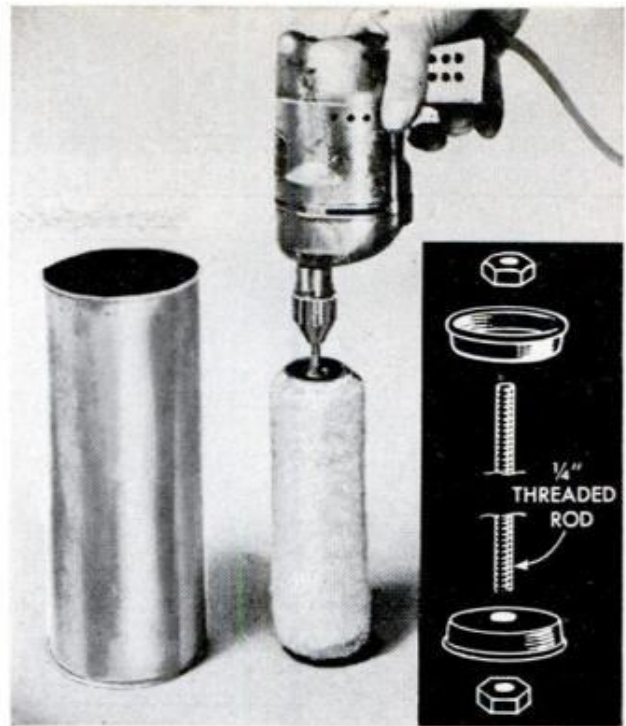
When describing an ellipse by the cord-pins-and-pencil method it's difficult to prevent the cord from slipping under the pencil point. You can solve the problem by setting the pencil point in a small washer and then place the cord on top of the washer as illustrated.

Chucks Take Pin-End Blades

Jigsaw chucks that take both pin-end and crimped-end blades are timesavers when you're working a detailed scroll design. You can remove the blade, pass it through the starting hole in the work and replace ready to go again in seconds.



JULY 1960

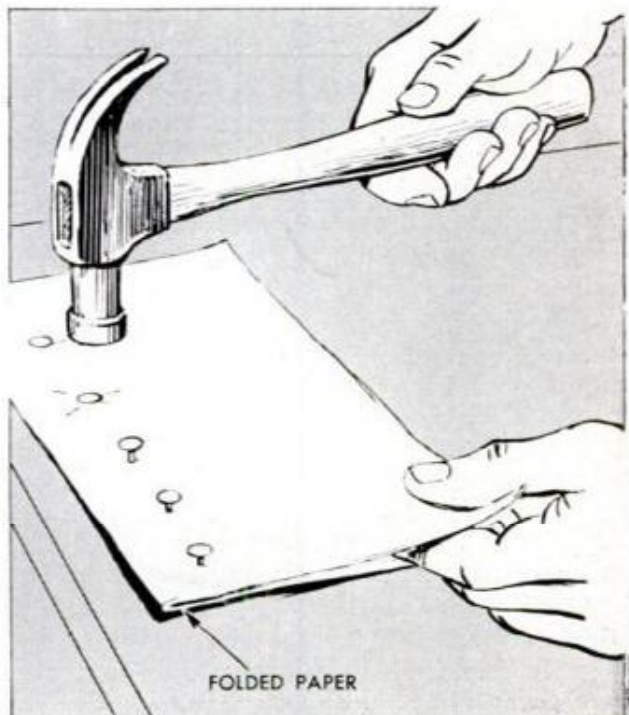


Power-Cleaning a Paint Roller

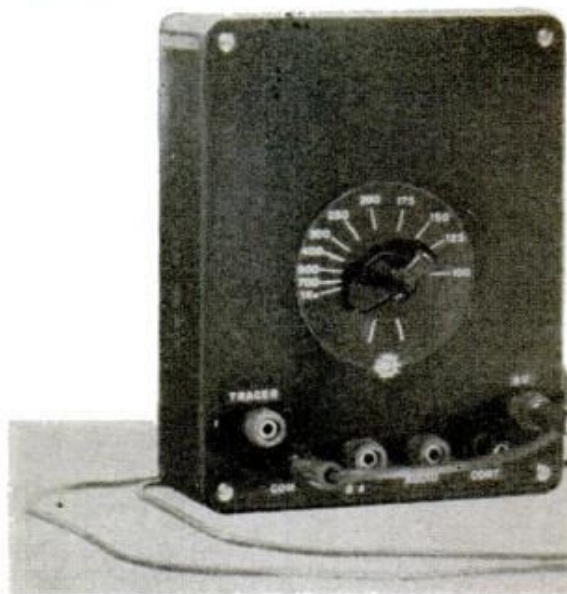
Paint rollers used with water-soluble paints can be cleaned with your portable drill. Mount the roller on a spindle made from threaded rod, chuck in the drill and insert the roller in a fruit-juice can containing water. Switch the drill on and off in short cycles until the roller is clean.

Driving Rows of Tacks in Line

There are occasions when it is necessary to drive a row of tacks uniformly spaced and precisely in line. Fold a sheet of paper, draw a pencil line if desired, press the tacks through the paper. Locate on the work and drive each tack individually.



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Simple and Inexpensive . . .

6-IN-ONE TEST SET FOR RADIO EXPERIMENTERS

By Otto Fried

THIS LITTLE test set won't exactly replace a shop full of elaborate test instruments, but it does duplicate some of the most-used functions of a number of them. It's easy to build, easy on the budget and easy to use. It is, therefore, a handy tool for the electronics hobbyist, basement experimenter, student, or part-time serviceman whose investment in test equipment must necessarily be limited.

Here is what it will do:

1. Measure d.c. voltages from a few volts to 500 volts. Measure a.c. voltages from about 100 to 500 volts.
2. Check parts and wiring for continuity—open or short circuits.
3. Check capacitors for leakage or short circuits.
4. Provide a test signal for checking audio stages in receivers and amplifiers.
5. Can be used as a signal tracer in r.f. and i.f. radio stages.
6. Act as a variable d.c. power supply with available output voltage from 0 to about 60 volts—for bias, a.g.c., transistor circuits or other low-current applications.

All this is accomplished with a handful of common parts, most of which are probably available from any experimenter's "junk box," but which cost less than a 10-dollar bill even if purchased brand new.

How does it work? To explain the operation of the test set, let's take a look at the simple, individual circuits which comprise the complete tester.

The simplified schematic of the voltage indicator is shown in Fig. 1. Here, the voltage to be measured is applied, via test leads connected to terminal posts J1 and J5, to the series-wired resistors R1 and R2. Because of the resistance ratio between R1 and R2, most of the applied voltage appears across the potentiometer R2. Neon bulb, P, is connected between the variable terminal and the end of R2 so that any portion of the voltage appearing across R2 may be applied to the bulb.

To fire the bulb, a voltage of approximately 80 volts d.c. is required. The bulb will light, therefore, when the potentiometer is rotated to the maximum clockwise position and the voltage under test is approximately 90 volts d.c. This, then, is the minimum external voltage that can be measured with this particular circuit configuration.

Voltages in excess of 90 volts can be measured with reasonable accuracy by rotating the potentiometer knob in a counter-clockwise direction until the bulb just goes out. The value of the voltage can then be read directly on a calibrated scale glued to the panel over the potentiometer shaft.

Precise calibration of the voltage-indicator scale would require a variable-voltage source and a vacuum-tube voltmeter. Reasonable accuracy, within about 5 percent, can be obtained merely by cutting out or copying the full-size calibrated scale of Fig. 7 and gluing it to the panel. The knob should be affixed to the potentiometer shaft so that with the pot. in the full-clockwise

position the pointer is aligned with the first reference line (the line below the "100"-volt calibration mark).

Accuracy of the calibrations can be checked by using the internal batteries. To do this, connect a wire externally between J2 and J5. Rotate the knob until the bulb just goes out. The knob should indicate 125 volts—the value of the internal batteries.

Since the bulb will light for a.c. as well as d.c. voltages, both types can easily be measured. To use the same scale calibrations, however, the capacitor C1 must be connected across the bulb. Without it, the instrument would indicate **peak** rather than **rms** a.c. voltages. Calibration accuracy for a.c. can be checked using the 115-volt a.c. line as a reference source. If the instrument indicates substantially less than 115 volts, replace the .003 mfd. capacitor C1 with a .002 mfd. unit.

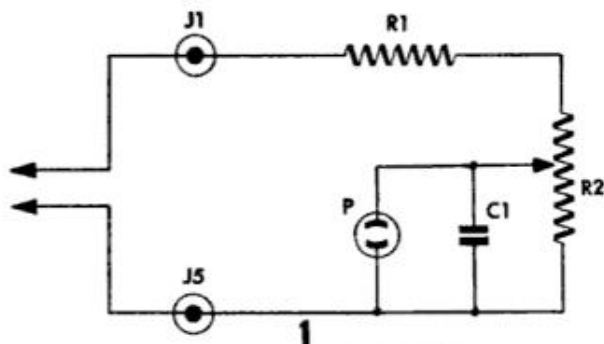
Measuring Low Voltages. Voltages below 100 volts can be measured with the circuit shown in Fig. 2. In this circuit, the internal 125-volt battery is automatically connected in series with the external low voltage to be measured. The 125-volt line on the calibration scale, therefore, becomes the 0-volt point for low-voltage measurements.

When an unknown external voltage is applied between J2 and J5, and the knob is rotated until the bulb just goes out, the voltage value indicated by the pointer is that of the 125-volt battery plus the unknown voltage. The exact unknown voltage is that indicated on the scale minus 125. A second scale can easily be added for low-voltage measurements using the 125-volt line as 0, and the 250-volt line as 125 volts.

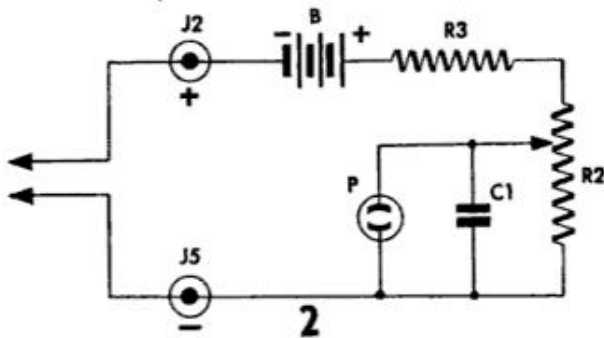
Continuity and Capacitor Checker

The circuit shown in Fig. 2 is used also for continuity tests and for checking capacitors for leakage and short circuits. In these applications, the potentiometer is set to the maximum clockwise position and the test leads connected to terminal posts J2 and J5. If the open ends of the test leads are shorted out, the bulb will glow because voltage from the internal batteries is applied to the bulb. Similarly, if the leads are connected into a circuit with less than 1.5 megohm resistance, the bulb will also light. If it does not light, the circuit is "open" or has more than 1.5 megohms resistance.

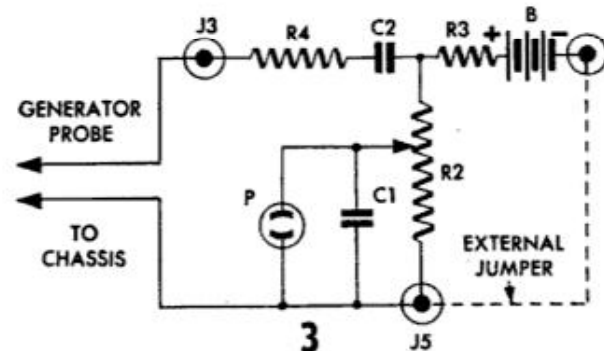
When the leads are connected across a capacitor with a value in excess of .02 mfd. the bulb will light for an instant as the capacitor charges, and then goes out. If it fails to go out, the capacitor is short circuited or has excessive leakage. Low-value capacitors, below .02 mfd., are not likely to give any charging indication. These can be checked only for leakage as indicated by a lit bulb.



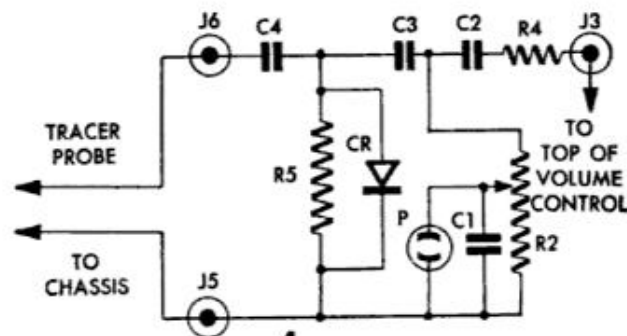
1
VOLTAGE TESTER—AC OR DC
(FOR 100 VOLTS OR GREATER)



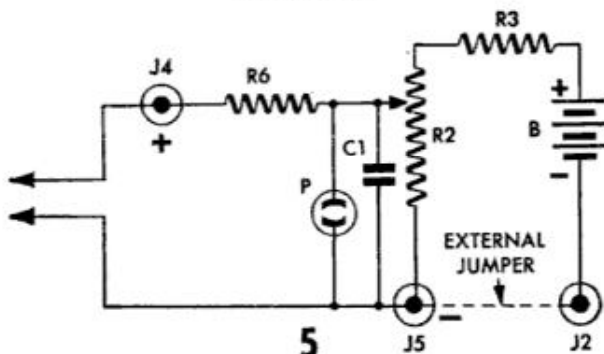
2
LOW DC VOLTAGE TESTER (LESS THAN 100 VOLTS)
CONTINUITY TESTER CAPACITOR CHECKER



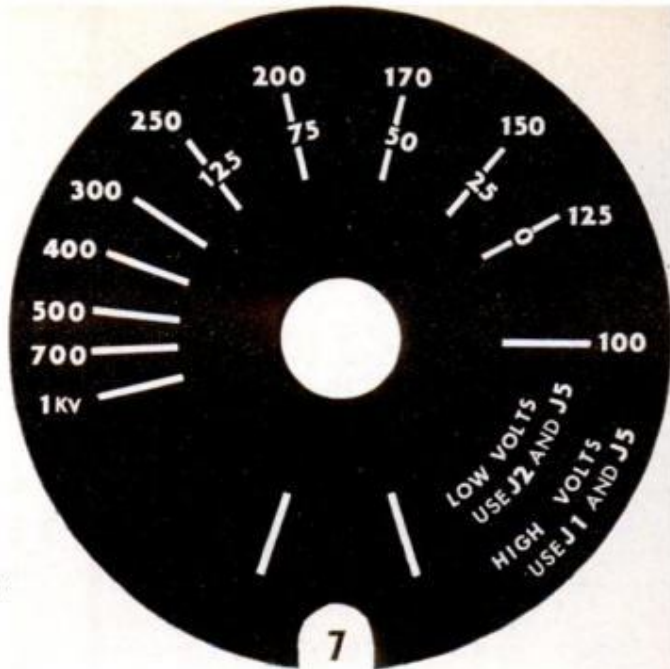
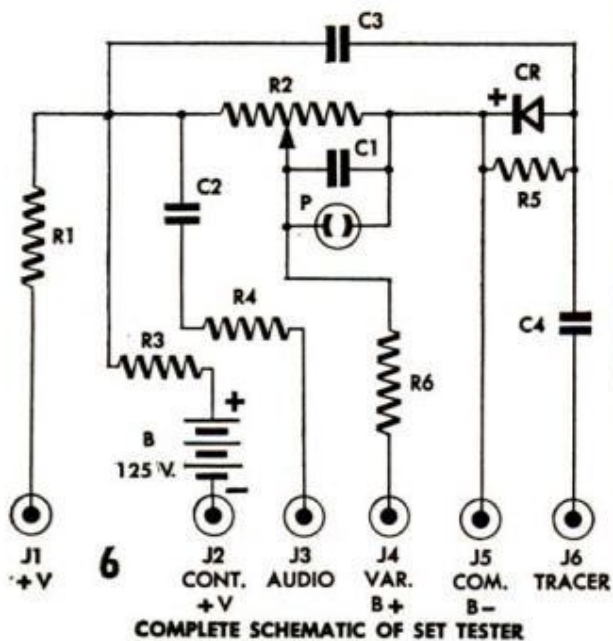
3
AUDIO GENERATOR



4
RF-IF TRACER



5
VARIABLE POWER SUPPLY



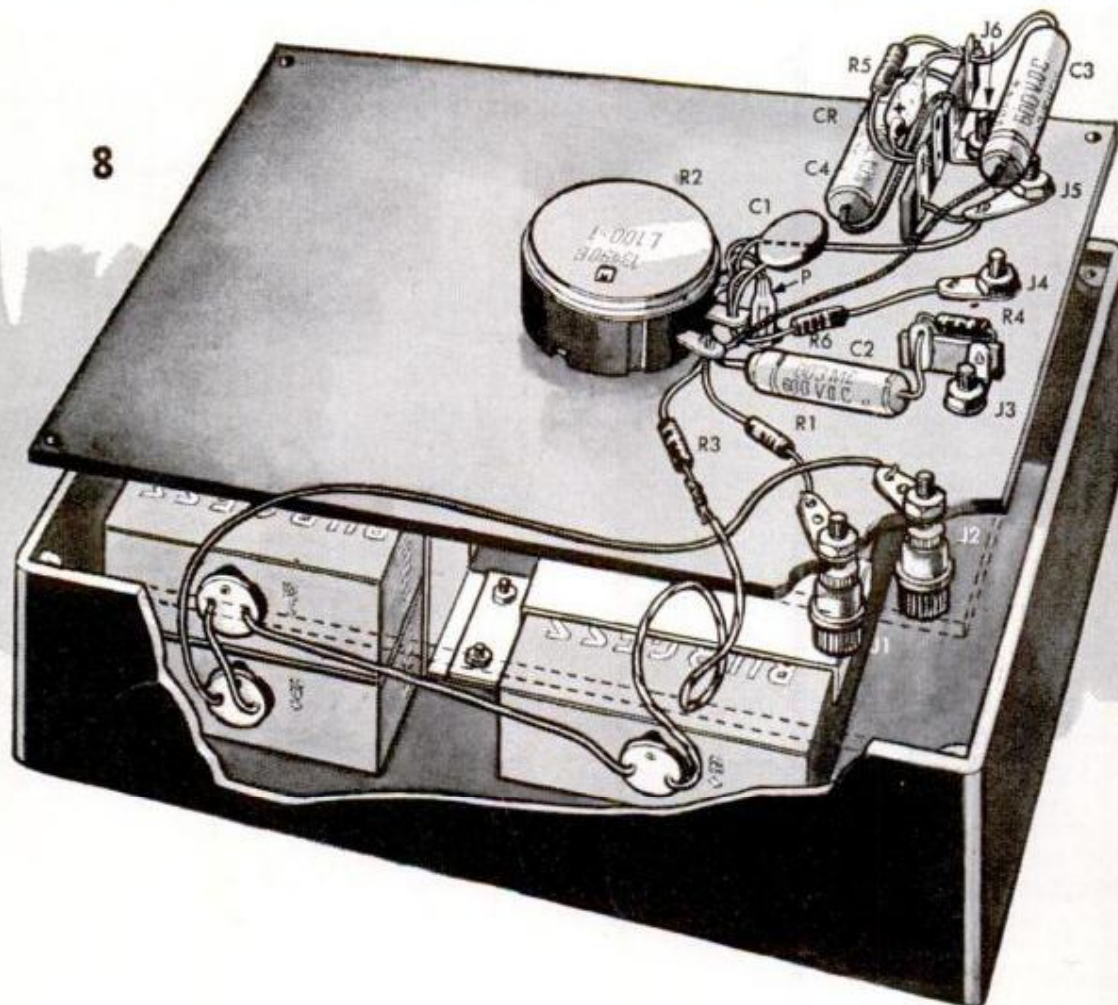
Audio Generator

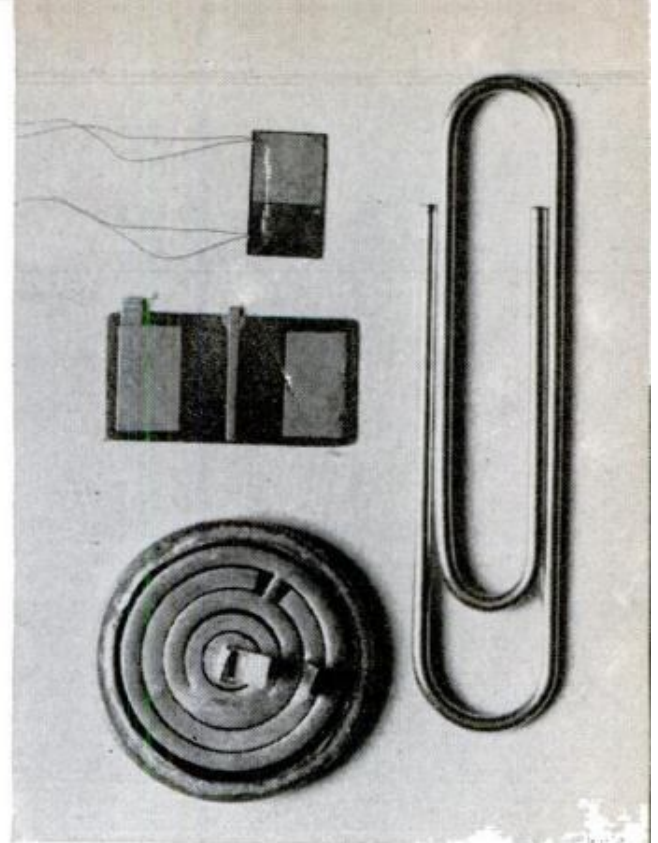
Fig. 3 shows the circuit of a simple audio signal generator. Here, the neon bulb is used as a simple relaxation oscillator which generates a signal between 200 and 800 cycles depending on the setting of the potentiometer.

To use the generator, a wire must be connected externally between terminal posts

J2 and J5 and the potentiometer set to a point between 100 and 125 on the calibrated scale. The audio signal will then appear between test leads connected to J3 and J5. The signal is applied between grid and ground of an audio amplifier stage and if the stage is operating properly, an audible tone will be heard through the loudspeaker.

(Continued to page 204)





Button-like objects between turntable and speaker bear little resemblance to today's amplifiers and pre-amps., but perform the same jobs. Three of eight molecular electronics function blocks developed so far include (above, right) two-stage video amplifier, free-running multi vibrator and five-watt audio amplifier

MOLECULAR ELECTRONICS

A New Concept in Electronic Technology

AN AMPLIFYING SYSTEM the size of a dime; telemetry units weighing an ounce or less; complex electronic components reduced to the size of a wafer—these are only a few of the amazing things being produced by the latest and greatest stride yet made in electronics—the concept of molecular electronics. Size, however, is only one aspect of this important new field. Space-age engineering has already produced vast electronic systems on a scale suitable to the demands of space flight. But the critical factors involved here demand a degree of reliability and performance which even miniaturization, with its dependence on individual components, circuits and connections cannot deliver. Molecular electronics promises to solve these problems. It exploits a new concept in the design and function of electronic systems depending on phenomena occurring within and between domains of molecules in a solid state. The most promising break-through so far has been in the production of “function blocks.” These individual solid state elements provide, entirely within themselves, the functions of numerous components of bulky electronic hardware. Thus, these elements are not intended as “components” as such, in the

way we think of transistors and tubes, but rather as “subsystems.” That is, each of the function blocks performs the electronic job of numerous tubes, transistors, resistors, capacitors, and other small parts all working together. In this manner, individual blocks do the work of amplification, oscillation, telemetering, etc. Because there are no internal connections or components and the only external connections are for coupling inputs and outputs to the complete system, subsystems can be built whose risk of failure is equal to or less than that of familiar solid state devices, like diodes and transistors, and perhaps one-thousandth that of subsystems built of many parts for the same purpose. In addition to this high degree of reliability, the internal functions of units involve distances on the order of a few atomic spacings. Thus, they are almost microscopically small and virtually weightless.

The production of these blocks does not involve the assembly of various small components. Rather, it begins with a basic semiconductor wafer which is given the necessary “domains,” or areas of function, by the same techniques used in the production of conventional semiconductor de-

(Continued to page 206)



Tuning in on New Products

WHAT'S NEW in the way of new radios and phonographs? Plenty. And here's a sampling of recently announced new products. For example, in response to the demands of discriminating motorists who enjoy a more specialized programming, Mo-

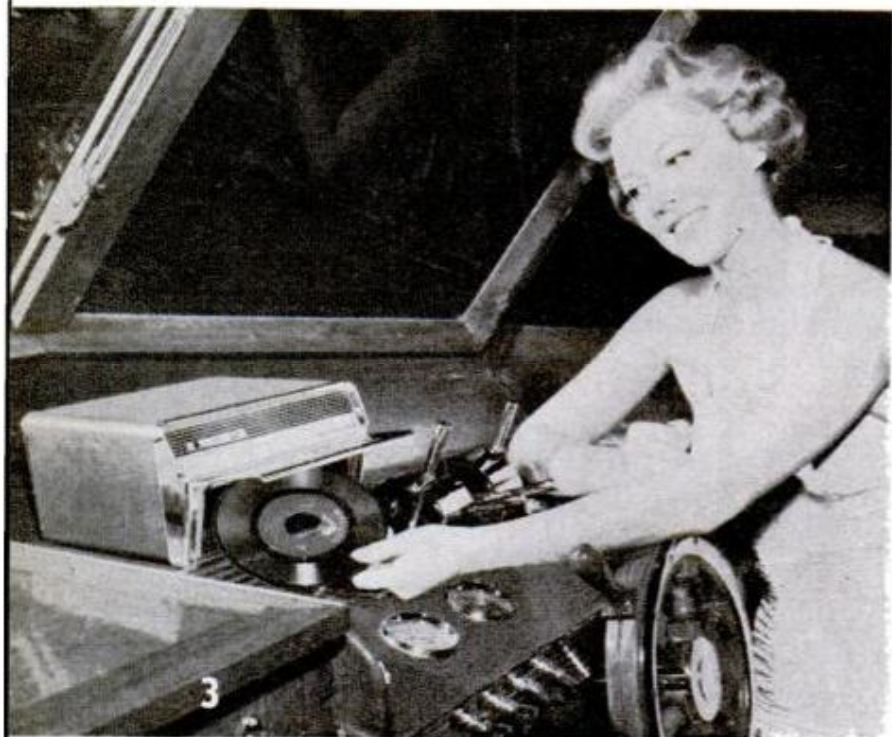
torola has introduced America's first mass-produced, transistor-powered FM car radio, shown in Fig. 1. Installed under the dash, the radio has its own speaker and is in all respects an independent unit. This means it may be operated independent of or in addition to the car's existing AM radio. It is capable of reproducing the full range of audio transmitted by FM radio stations.

Hi-fi bugs will be interested in a new *lifetime* diamond phonograph needle, see Fig. 2. No, this doesn't mean the lifetime of the disks, nor the lifetime of the set. It is guaranteed for the lifetime of the *owner*. Jensen Industries of Forest Park, Ill., recognizing the fact that the needle is the most sensitive, yet the most abused part of a phonograph, has succeeded in perfecting a manufacturing method for processing diamond styli that results in a needle which need never be replaced. Replacement styli are available for most cartridges.

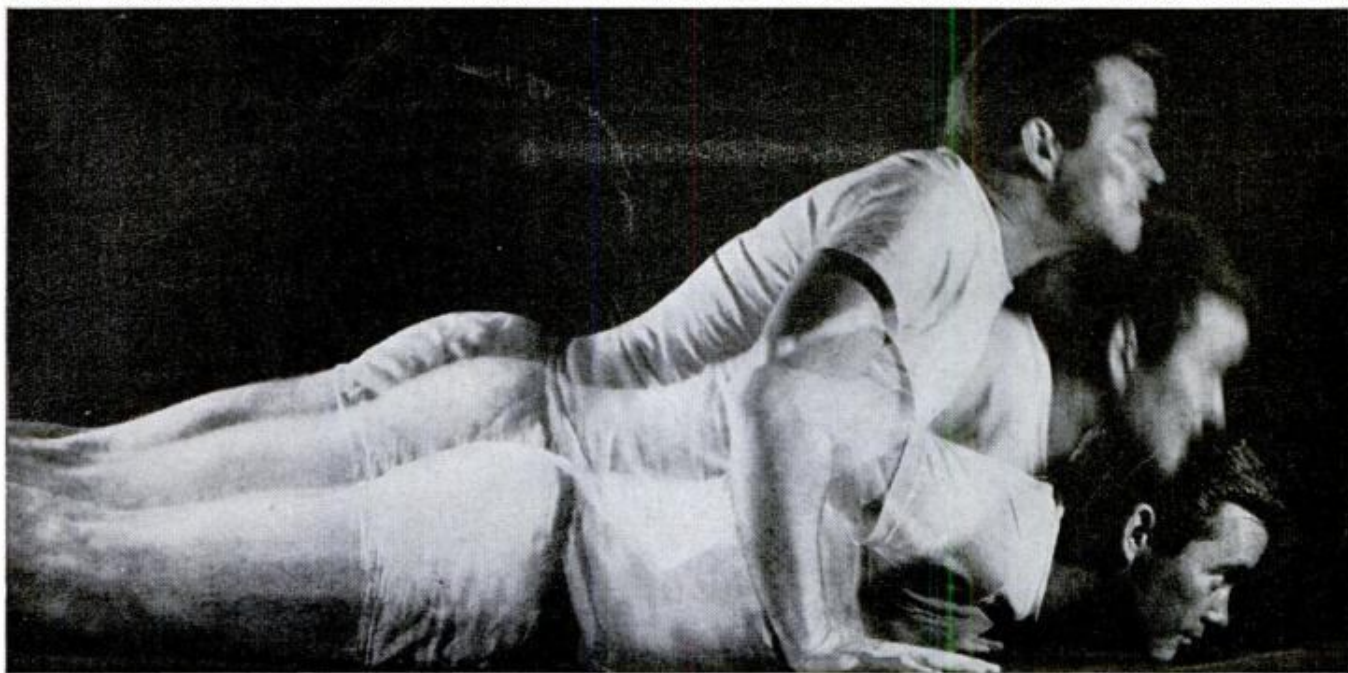
No, boat owners, they haven't forgotten you. Even you can enjoy your records while off on a cruise. RCA's Boat Victrola, Fig. 3, plays the records upside down, keeping the needle gently, but firmly in the groove despite the pitching of small craft.

After portable everything else, Emerson boasts a new-type portable phonograph, Fig. 4, which requires no turntable. Slip the records in and the battery-operated phono starts to play, automatically selecting the proper record speed.

Here is another one you may have been waiting for—a rechargeable battery for transistor radios, and a companion battery charger, Fig. 5, produced by Beamco Associates of Jenkintown, Pa. The battery has an average life of 15,000 hours, giving up to 15 hours of service per charge, even after months of disuse. The charger is plugged into any convenient a.c. outlet.



TRIPLE EXPOSURE at f11 is how our Speed Graphic caught this fellow flexing his muscles. Just try this exercise yourself. See how fast you tire out. When you do, remember that tires do 700 "push-ups" per mile as they roll along under your car.



Too much flexing wears out people...and ordinary tires! But not
THE TIRE THAT DOESN'T GET TIRED

New *Low Profile** tire is actually made lower and wider so it flexes less, lasts longer.

Excessive flexing is what wears out, burns out tires, weakens rubber and fabric, increases blow-out danger. And ordinary tires do flex excessively.

But U. S. Royal has pioneered a new "Low Profile" shape tire that *flexes less, runs cooler, lasts longer*. It offers new protection against high-speed failure and heat blowouts.

Other tire designs don't give such thorough protection. Yet "Low Profile" tires cost no more than ordinary tires. So don't run the risk of tire failure. See the *complete* line of U. S. Royal "Low Profile" tires—now in 5 price ranges for every make and model car—at your U. S. Royal Dealer.



Same air pressure...but look at the difference

Excessive flexing pushes the temperature of ordinary tires above 240°F. That's the danger mark. But the lower, *wider* shape of U. S. Royal "Low Profile" tires reduces flex, keeps tires *cooler*, even at top highway speeds.



*"Low Profile" is United States Rubber Company's trademark for its lower, wider shape tire.

PIONEERED BY U. S. RUBBER AS THE ANSWER TO GREATER TIRE SAFETY AND LONGER WEAR

U.S. ROYAL *LOW PROFILE TIRES**



United States Rubber

Rockefeller Center, New York 20, N. Y.

New Ideas in Photography



Measures the light, tells you the setting for picture-perfect exposure

New Brownie Camera Has Electric-Eye Control

New production methods are making it possible to put deluxe-camera precision into electric-eye Brownie cameras—yet keep prices down to the traditionally low Brownie cost.



Kodak recently announced the low-cost

Brownie Starmeter Camera. Its photoelectric meter system is as sensitive as the meters on top-quality, high-priced miniature cameras. And the mechanism is rugged—built to withstand jolts as great as 50 G's.

Brownie Starmeter Camera eliminates exposure guesswork, gets 12 good shots on each roll of size 127 film. Yet it costs only \$19.95, or as little as \$2 down.

Picture it now—See it again and again

Everything You Need But the Scene Is Packed in Kodak Gift Outfits

Americans like cameras—and *convenience*. That's why the big new gift trend today—for family, friends, newlyweds, young people—is the complete camera outfit.

This is a real trend—no fussing around, everything in one box, ready to start shooting! For a quick survey of the way people enjoy buying gift cameras today, visit your Kodak dealer and look at the beautifully gift-boxed Kodak and Brownie outfits. You'll find combinations that fit every gift need—from \$11.35 up.



Most popular outfit includes Brownie Starflash Camera with built-in flashholder, film, flashbulbs, batteries, instructions. All attractively gift-boxed for \$11.35.



Home movie kit—for movies indoors and out—contains new Brownie 8 Movie Camera, $f/2.7$, and a 2-lamp light bar with reflector flood lamps. \$32.50.

from Kodak

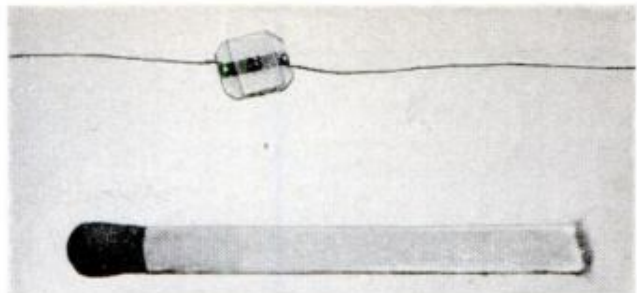
Kodak Cell "Sees" Invisible Light, Lends Helping Hand to Weathermen

An ultra-sensitive Kodak heat-sensing device, first created for weapons use, is now helping meteorologists. Called the Kodak Ektron Detector, it forms the "eye" of two new instruments.

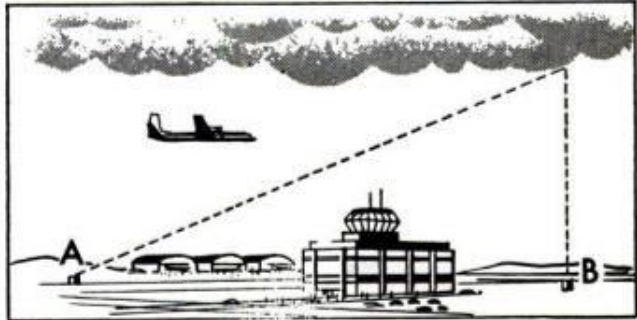
One instrument measures the height of clouds by bouncing a beam of infrared radiation off the base of a cloud formation. The echo is "sensed" by an Ektron Detector stationed a known distance away, and the cloud height is determined by triangulation.

The other instrument measures water vapor in the air. Scientists project two infrared beams of different wave lengths. The first is partially absorbed by water vapor, the second is unaffected. The difference in energy received by a Kodak Ektron Detector tells how much moisture is present.

The same kind of Kodak research that develops better ways to see and use light, leads also to finer films, filters, and lenses for amateur and professional use.



Special bits of glass are coated on one side with lead sulfide or lead selenide photo-conductive materials sensitive to invisible infrared radiation, to form Kodak Ektron Detectors. Picture above shows how Ektron Detector compares in size with a match.



Used chiefly at airports, the cloud-height measuring system is accurate up to 5000 feet. A rotating projector (A) bounces infrared light off the cloud base to the detector (B). The signal is fed to an indicator at the control tower for computation.



New Brownie 8 Movie Light

Fits on top of the Brownie 8 Movie Camera, out of the way. Provides ideal "over-the-camera" illumination for indoor movies. Only \$5.95 (300-watt reflector flood lamps extra).

Kodak Movie Camera, Only \$24.50! Uses New "Rabbit Ears" Light Bar

This all-new Brownie 8 Movie Camera makes sharp, clear 8mm movies with snapshot ease. And it's the lowest-priced movie camera in Kodak history.

Outdoors, you just dial a setting like "Bright Sun" or "Open Shade" or, if you prefer, use the *f*/stop settings. Aim through the enclosed optical viewfinder and shoot—it's that simple.

Indoors, you use a new compact light bar that attaches to the top of the camera for easy handling and ideal lighting.

Other features you'll like: the inch-wide shutter release eliminates fumbling, and the footage meter resets automatically after loading.

Best of all, however—it's yours for as little as \$2.50 down. Ask your photo dealer for a demonstration.

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

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

SEE KODAK'S "ED SULLIVAN SHOW" AND "ADVENTURES OF THE NELSON FAMILY"

Kodak
TRADEMARK



You Need
All These
Basic Tools

...MOST
OF
ALL

CHANNEL LOCK

Ask any skilled electrician or auto mechanic about CHANNELLOCK Pliers. He'll tell you they're the handiest pliers of them all . . . basic tools he wouldn't be without. And this same all 'round usefulness will help you do hundreds of jobs . . . faster, easier. Be sure your basic tools include genuine CHANNELLOCK Pliers. Get them at your tool supplier's. If he's out of them, ask him to order for you. Available in three jaw capacities: $\frac{3}{8}$ " , $1\frac{1}{2}$ " and 2".



Use it as a plier



Use it as a wrench

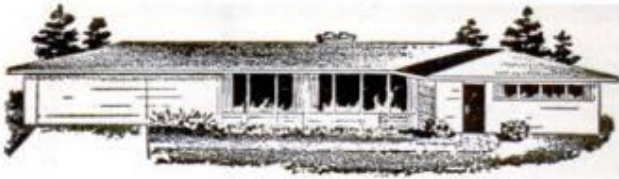


Write for Catalog of Complete Line of Pliers

CHAMPION DEPARTMENT TOOL COMPANY

MEADVILLE 1, PENNSYLVANIA

Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.



Tree Won't Blossom

Q—I have an apple tree which is about 12 years old and it never blossoms in the spring. It appears to be perfectly healthy, the bark is in good condition and the shape is perfect. Although it serves well as a shade and ornamental tree, I would like to induce it to blossom and bear fruit. Is there any way this can be done successfully?

—Y.W., Ill.

A—Has the tree been pruned regularly? You do not say and we would guess that it has simply been allowed to grow normally and assume its own individual shape. If this conclusion is correct then the top growth should be reduced about 15 percent the first season and another 15 to 20 percent the following season. Pruning should be done when the tree is dormant, that is, any time after the leaves fall naturally. In the pruning procedure remove all interfering branches, but none of the frame branches, removal of which would alter the shape and general balance of the tree. Thin all clusters of twigs throughout the entire top of the tree, making the greatest reduction in numbers of twigs in the lower half of the top. In cutting off any larger branches and twigs, be careful to make clean cuts, without stripping the bark away from the wound at any point. Seal all wounds with asphaltum or with a preparation made especially for the purpose. Then, to compensate for the growth removed from the top, the roots should be pruned. This usually can be done adequately with a spade having a sharp cutting edge. Work at a distance from the trunk of the tree which is a little less than the maximum spread of the branches. Stand the spade vertically, force it into the ground the full length of the blade. Make adjacent cuts all the way around the tree, taking care to keep a fairly uniform distance from the trunk and inside the spread of the branches as already mentioned. Then punch random holes nearer the trunk and place a tablespoon or so of 4-12-4 fertilizer in each hole. Fill the holes with soil. This treatment usually will induce a tree to blossom, although it cannot be said to be reliable in all cases.

(Continued to page 198)



SAE MOTOR OIL VISCOSITY GRADE CLASSIFICATION SYSTEM

SAE VISCOSITY GRADE NUMBER	VISCOSITY, SAYBOLT UNIVERSAL SECONDS			
	AT 0° F.		AT 210° F.	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
5W		4,000	39	
10W or	6,000	12,000	40	
20W or	12,000	48,000	45	
20		48,000	45	58
30			58	70
40			70	85
50			85	110

Viscosity is measured by the time required for 60cc of oil in the Saybolt Viscosimeter Tube to flow through a standard opening, at a given temperature.

What viscosity really means

Viscosity is a liquid's *resistance to flow*. It varies among different liquids, and increases to some extent as temperature drops.

In the United States, the viscosity of oils is usually determined with a Saybolt Universal Viscosimeter. It simply measures the time in seconds required for a given quantity of oil to drain through a standard hole at some fixed temperature. The SAE Motor Oil Viscosity Grade Classification System (see chart above) uses these viscosity seconds to specify the viscosities of its SAE 5W, 10W, 20W, 20, 30, 40 and 50 motor oil grades. The first three "W" grades are especially suited for winter use.

The viscosity of your motor oil is very important. When you start your engine at a subzero temperature, a heavy, slow-flowing oil takes much too long to reach engine parts and permits more wear than thousands of miles of driving.

However, a light, fast-flowing winter oil

does not have enough viscosity to prevent wear at high summer temperatures. Thus, with ordinary oils, it is necessary to change grades seasonally.

Havoline Special 10W-30 Motor Oil is the wisest choice for any car owner because it magically combines the fast-flowing property of the Winter SAE 10W grade with the high temperature, wear-preventing quality of the Summer SAE 30 grade. It's the ideal, all-temperature oil. Use it *in all seasons*.

In addition, Texaco's special refining and exclusive additives in Havoline Special 10W-30 prevent the harmful sludge deposits and varnish that are so prevalent with ordinary oils in today's stop-and-go driving.

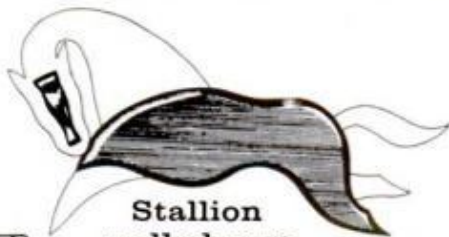
The few extra pennies for this finest of motor oils is your best insurance against engine damage and repair bills. See your Texaco Dealer for a change to Havoline Special 10W-30 ...and change it *regularly*.

Buy the best... buy TEXACO

TUNE IN: TEXACO HUNTLEY-BRINKLEY REPORT/MONDAY THROUGH FRIDAY/NBC-TV



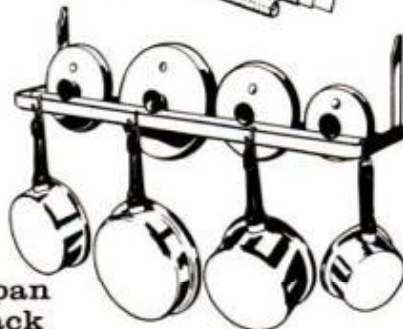
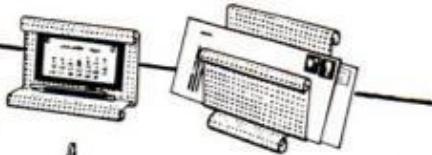
Make 'em yourself in ONE EVENING



Stallion
wall plaque



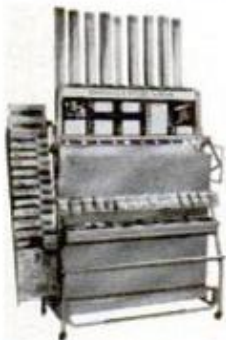
Desk set



Kitchen pan
and lid rack

with Reynolds DO-IT-YOURSELF ALUMINUM

Make any of these handsome, useful aluminum articles in just one evening. Use ordinary woodworking tools. It's fun, it's satisfying . . . and we furnish free step-by-step plans (see coupon).



Look for this rack at most hardware and building supply stores.

sheets, tubing,
tubing fittings,
window and screen
frame sections,
fasteners, rod,
bar, angle

Reynolds Metals Co. · Richmond 18, Va.

Please send Do-It-Yourself Aluminum How-To booklet with free one-night project plans.

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Dept. PM



Stop Mildew

Q—I painted my nearly new home a couple of years ago and lately I've noticed that the paint on the north side seems to be covered here and there with a grayish mold that cannot be removed entirely by scrubbing or even by brushing with a wire brush. My neighbor says it's mildew, but I never heard of it on paint. Is he right?

—N. H., Ga.

A—He is right. Mildew attacks paint which is not formulated to resist its growth under climatic conditions which favor it. It is caused by airborne spores which are present nearly everywhere in the warmer, more humid climates. Prolonged warm weather and relatively high humidity favor mildew growth on unprotected organic material, especially when the surface is shaded from the direct rays of the sun and is located where there is inadequate air circulation. After the growth has been well established on a painted surface it is rather difficult to remove, although once it is eliminated new growth can be prevented. The procedure is quite simple. You'll need a stiff-bristle scrubbing brush, trisodium phosphate, water, and time to do a thorough job. Mix a trisodium-phosphate solution in the proportions of about three heaping tablespoons to the gallon of water. There probably will be less waste of the solution if you apply it to the siding with a sponge and then immediately scrub the wetted surface with the stiff-bristle brush. Continue scrubbing on all surface affected until all the mold has been removed and the paint exposed. Then immediately apply a coat of mildew-resistant paint. It's important that there be no appreciable delay between scrubbing and painting with the mildew-resistant paint, as washing off existing mildew does not proof the surface against a new attack. **Caution:** When using a trisodium-phosphate solution in the manner described, wear rubber gloves and protect the eyes against spatters.

Tile Loosen



Q—Two years ago I laid linoleum tile in my kitchen. Tiles were laid over a hard-board underlayment. Now I notice that some individual tiles are loose; they can be lifted easily, while others seem perfectly solid. Those along the baseboards are all firmly attached to the underlayment, not a single loose tile. This puzzles me. Why should some individual tiles be loose?—C.H., N.J.

A—We don't know—for sure. Tiles do loosen, but this usually is due to failure to follow the instructions for laying in all details. Or, failure may be due to some peculiarity of the structure or some abnormal conditions under which the tiles were laid. One common cause of loose tiles is lack of care in spreading the cement to a uniform thickness. Unless one watches this detail closely there is a tendency to work cement to the edges of the area being coated and thus leave a thinner film in the center of the area. In some cases one tends to cover an area with cement which is so very nearly the exact size of the area covered by a given number of tiles that when an adjoining area is coated the cement will be thin along the edge of the tile just laid. Sometimes the underlayment is permitted to get wet, or is stored in a damp basement immediately before placement and laying of the tile. There are other causes, of course, but any of those outlined can cause failure of individual tiles to adhere solidly. You can, of course, relay the loose tiles by removing all the loose particles from the recesses, coating with a thin film of cement of uniform thickness and pressing the tiles back in the recesses, coating with a film of cement of uniform thickness and pressing tiles back in place.

192.001 MPH FOR STRAIGHTAWAY MILE!

ANOTHER WORLD'S RECORD SET WITH CHAMPION SPARK PLUGS!

It's further proof that every engine
does its best with Champions . . .

Slashing across the surface of Lake Washington with its Rolls-Royce engine screaming a song of speed, the unlimited-class hydroplane *Miss Thriftway* sets a new

World's Record for the Straightaway Mile
—192.001 miles per hour!

Again a World's Record has been set with Champion spark plugs.

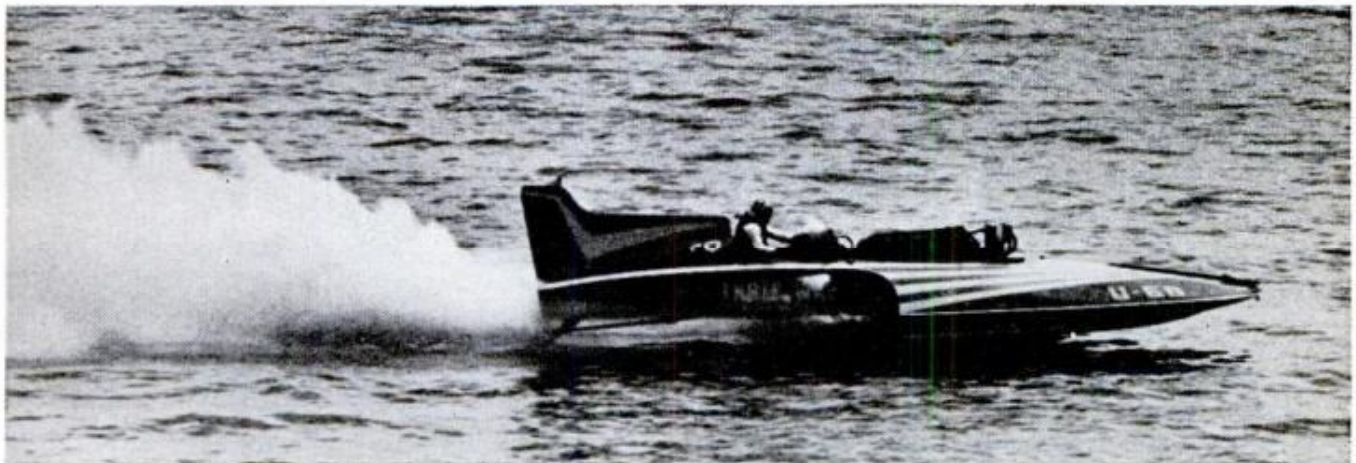
In both inboard and outboard marine engines, Champions are the plugs that set most of the records, and win most of the races. In 1959, for example, all 11 winners of the National Outboard Championships were powered by Champion spark plugs. Also 8 out of 10 winners of the '59 National Stock Outboard Championships—plus 13 of 14 winners of the '59 National Outboard Association Championships!

You may never want to try for a record or run a race, but you do want dependable power from your engine. And Champions deliver *all* the power built into any marine engine. For racing, skiing, cruising or trolling, you can depend on Champion spark plugs.

DEPENDABLE
CHAMPION
MARINE SPARK PLUGS



CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO





REFINISHING?

IT'S A SNAP
WITH
THE RIGHT
Red Devil
SCRAPER!



That's why Red Devil offers you a choice:
18 different kinds of Wood Scrapers! Find out
which is best for you at the most helpful dealer
in your neighborhood...the one who sells
Red Devil Tools:

Glass Cutters • Wall Scrapers • Glaziers' Tools
Wood and Paint Scrapers • Hardware Specialties
Putty Knives • Floor Polishers • Paint Conditioners

Red Devil Tools.

Dept. PM-7, UNION, N. J., U. S. A.

PLEASE SEND FREE BOOKLET
"How To Prepare Surfaces
For Finishing."



Name _____

Address _____

City _____ Zone _____ State _____ 2901

The Woodcarvers of Spillville

(Continued from page 127)

years in the making. Each base is carved around some central theme. They are equipped with chimes and musical works and many have animated figures. The working mechanism of these is of their own construction but clock works and chimes are factory-built with one exception which has carved wooden works.

Simple Tools and Simple Approach

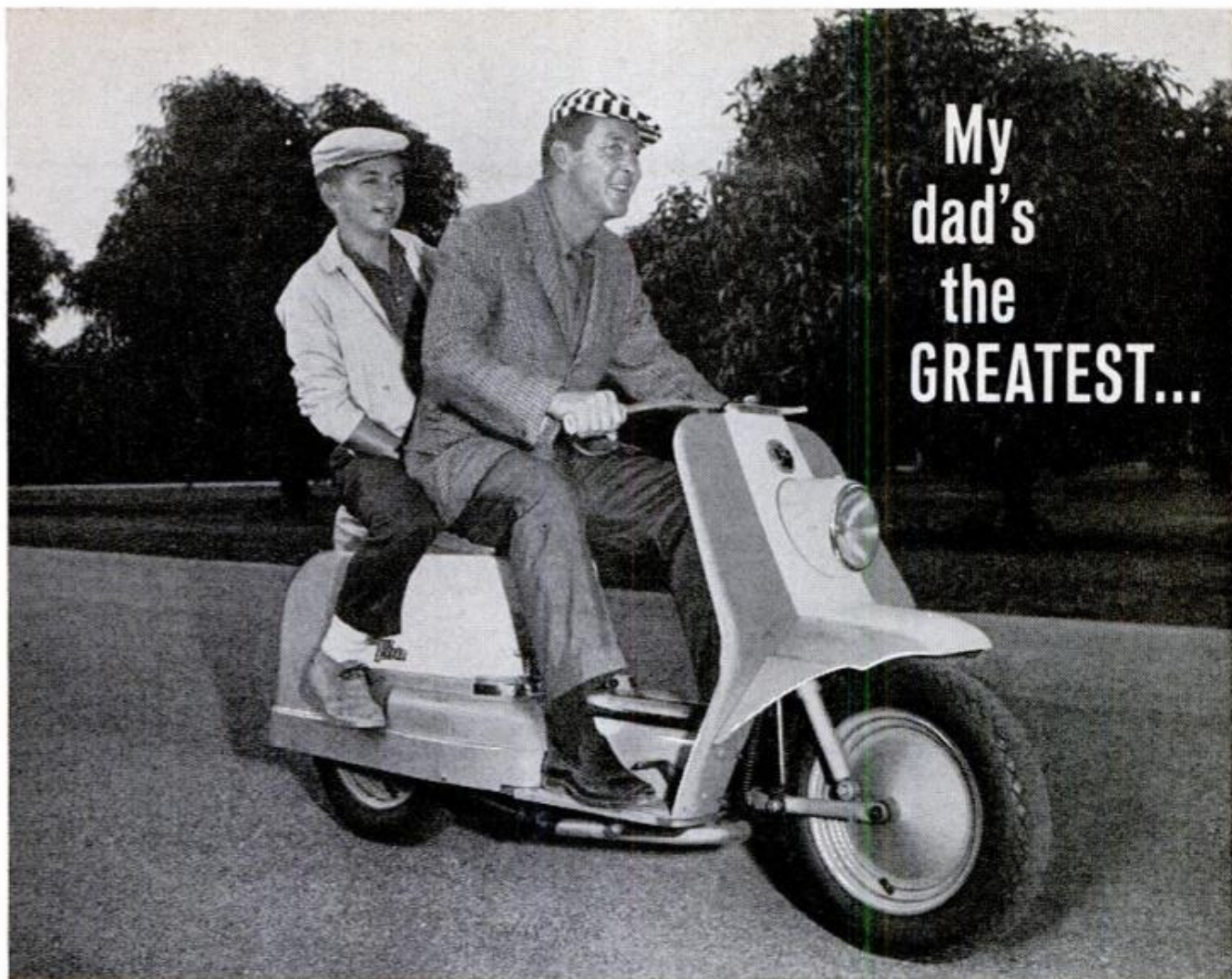
The brothers are artisans of the old school and use simple hand tools. Frank is the carver and his older brother, Joseph, is the cabinetmaker. Some carving tools used by Frank are homemade from such lowly items as hatpins and needles: from these items he made a tool which he uses for some of the most delicate carving. Wood suitable for carving, Frank says, must be fine textured, tough and strong. They use American walnut, butternut, hard maple and oak. The carving technique is devoid of complications. It consists of putting a hunk of wood into a vise and hacking away until the figure takes the form Frank sees in his mind's eye.

When a new clock goes on display, it is not necessarily complete. New details may be added over a period of years as new ideas occur to the brothers. Ideas for designs come from many sources: events in history, the Bible, famous buildings or people, or experiences the brothers have had. A motor trip to scenic points in their own state, for example, sparked the idea which resulted in the "Struggle for Time" clock. It symbolizes the rapid tempo of life today.

Collection Not for Sale

Various offers have been made for the clocks, but all have been refused. Recently Frank and Joseph made arrangements for the entire collection to become the property of the town of Spillville after their death. It is never to be broken up in any way and is always to remain at its present location. It is housed in the Dvorak Building, in the lower floor of the home where Dvorak, the composer, spent a summer. The second floor houses a museum of pioneer implements and has one room dedicated to the composer.

If the Bily brothers' father knew that since the 1920s hundreds-of-thousands of visitors have stopped at Spillville expressly to see the Bily clocks, and that in a typical month, August, 1959, 6325 people from 39 states and six foreign countries admired his sons' work, he would have to admit their carving had been far from a waste of time. ★★



My
dad's
the
GREATEST...

and so is my new HARLEY-DAVIDSON **TOPPER**

Like father, like son... happy with the new Topper.

What a ride — gentle as a billowy summer cloud... with dual suspension and large foam rubber saddle. Dependability — plenty of get-up-and-go. Automatic *Scot-away* transmission—no shifting or clutching needed.

Dad is sold on safety features like the large diameter wheels and sure-stop front and rear drum brakes. Tells everyone about Topper economy — up to 100 miles to the gallon.

Mom's a Topper fan, too! She likes its good looks: sharp, clean

lines molded in tough beautiful fiberglass... two-tone color styling... chrome-plated instrument panel.

See your Harley-Davidson dealer. He will arrange a fun-filled demonstration ride. Or send in the coupon for literature.

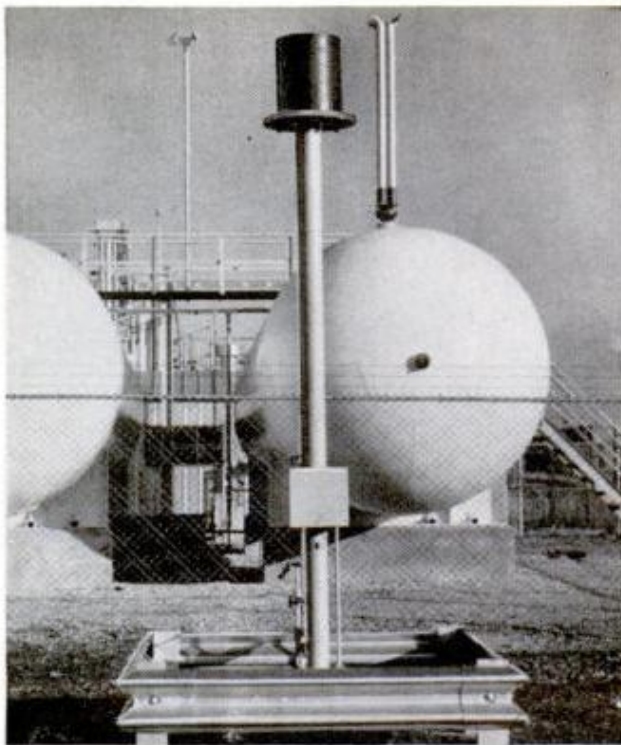
HARLEY-DAVIDSON MOTOR CO.
Dept. P, Milwaukee 1, Wisconsin

Send me more information on
the Harley-Davidson Topper

Name.....Age.....

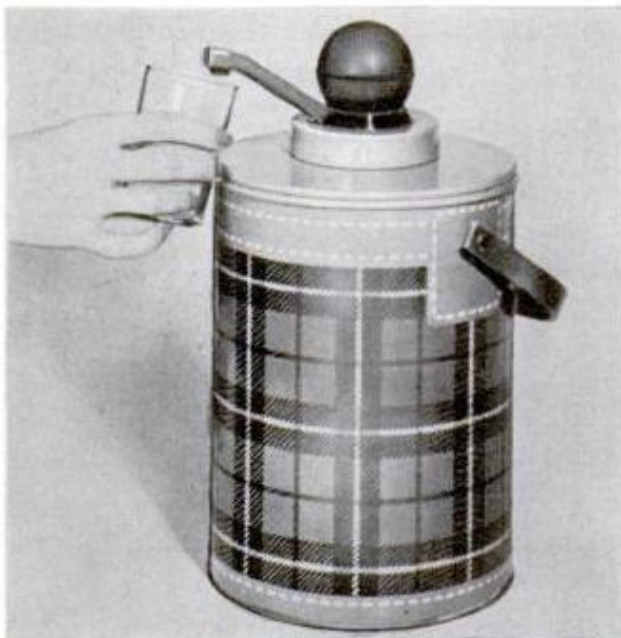
Address.....

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Safety Goes High Hat

Looking like a top hat that somehow got misplaced on the way to the opera, a flare sitting on a pole outside a gas works actually is an important safety device. It burns off excess mixtures of propane and air to prevent explosions at the works.



Hamilton-Scotch Corp., Hamilton, Ohio

Dispenser Atop Insulated Jug

Lifting and tilting large insulated jugs—difficult anywhere and downright acrobatic in a car or boat—is eliminated in a new model that features a pump and spout built into the top. Operated by squeezing the plastic bulb, the jug yields up a glassful for a couple of squeezes. There's no need to move the jug itself. Ice or fruit pulp won't jam it.

There Must Be a Better Way

(Continued from page 132)

gravity. A massive sulphide ore body, for instance, has a higher specific gravity than has the surrounding rock, hence in theory can be located even if it happens to lie deep below the surface.

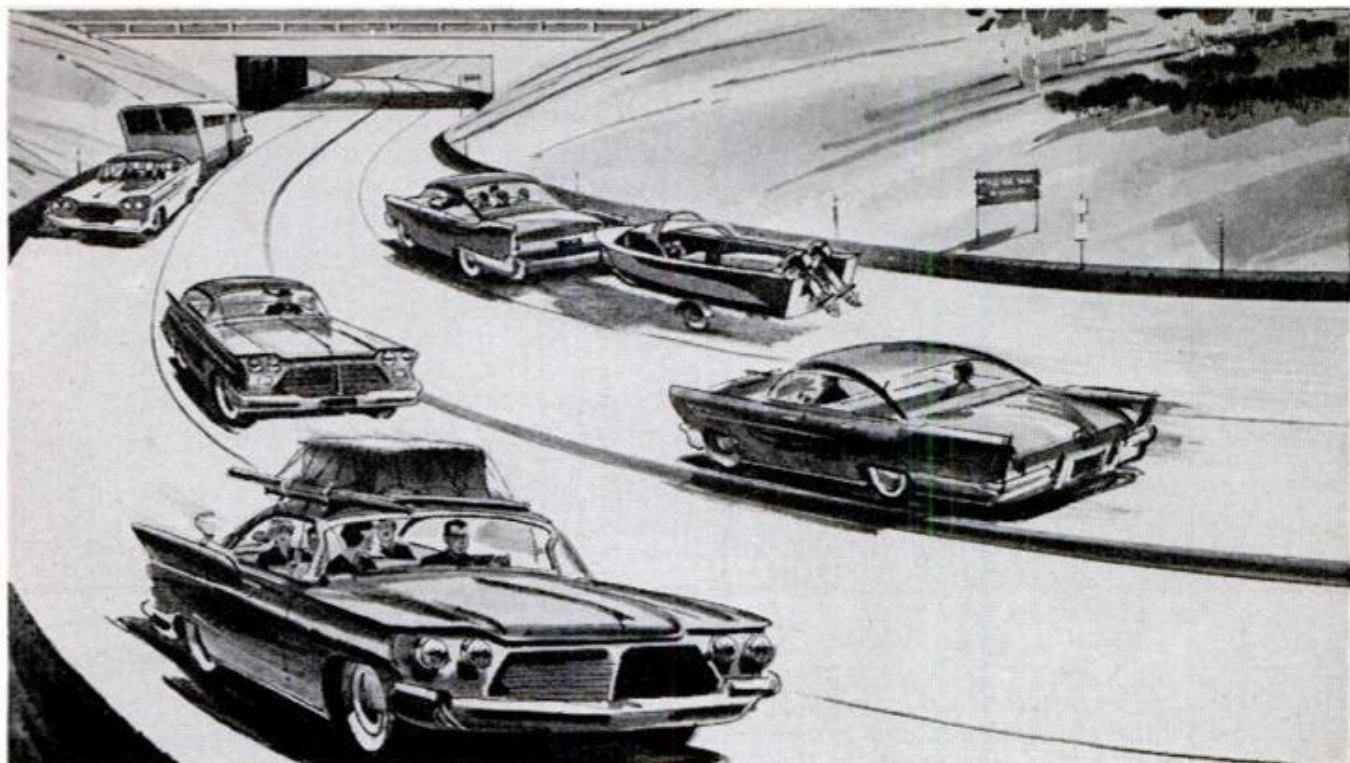
A gradiometer that is to detect this difference from the air must be of unparalleled sensitivity. The instrument that the Pick scientists have been putting together is able to measure forces to one part in several billion, at the same time discriminating against other forces that are millions of times stronger. The instrument is so sensitive, in fact, that the influence of the moon is observable, a factor that is constantly changing because of the moon's rotation around the earth. The gradiometer may turn out to have other uses in addition to prospecting. It has big promise in the field of precise aerial navigation.

The black light or infrared studies that the laboratory has done are preliminary to a parallel study of ultraviolet. Some minerals, such as those of tungsten, fluoresce when exposed to ultraviolet light and it has been Pick's hope that a powerful UV beam from an airplane could fluoresce minerals on the ground so brightly that they could be seen from the aircraft. This kind of prospecting must be done after dark, of course.

So far the studies have been confined to infrared and a 30-inch parabolic mirror has been built with a heat source mounted at its focal point. Power that is built up in a set of condensers is fired through the heat source, creating a burst of infrared energy that is projected as a beam from the mirror. There's a chance that this kind of apparatus can be used in military reconnaissance for making aerial photos after dark, undetected from the ground.

For the last several summers Pick has been flying crews of prospectors into remote parts of Canada and Alaska, for one thing to test the airborne prospecting equipment that his laboratory puts together. The field trips are completely self-contained; everything moves by air.

Aerial prospecting has been a main subject of research at his laboratory but it isn't the only one. For instance, experiments are underway which seek to develop a process for taking aerial photographs having a three-dimensional effect without mechanical viewing aids. Work is also progressing on techniques for solving geophysical problems which also have application in other fields, including navigation in outer space. And Pick has a lot of other ideas that he wants to try out on the staff when some of the current work is completed. ★★★



Now—a revolutionary new hydro-pneumatic suspension assist!

GOLDEN GLIDE Load-Absorbers

PAT. APPL'D. FOR

Give new load-carrying capacity without sacrificing riding comfort!

A sensational advance in ride engineering! Golden-Glide announces the self-compensating, adjustable hydro - pneumatic Load - Absorber. Installed in place of shocks in the rear of the car, Load-Absorbers do everything any combination of steel helper springs and shocks can do—and much more! Here at last is greatly increased load-carrying capacity and rear-end stability—at *no sacrifice in riding comfort.*

Carrying the load on a cushion of air, Load-Absorbers *automatically* sense changes in car load, *automa-*

tically compensate by hydro-pneumatic pressures to maintain level, stable riding qualities.

Golden Glide Load - Absorbers are factory-set for light, normal or heavy loads. But for *extremely* heavy loads, such as cars pulling trailers, Load-Absorber air pressure can be increased through an external valve—this keeps the rear of the car at the proper riding height. Be sure to ask for the amazing new Golden Glide Load-Absorbers, available now at your favorite service station, dealer or garage.



THE GOLDEN GLIDE SHOCK ABSORBER COMPANY

Cleveland 15, Ohio

GOLDEN GLIDE

Load-Absorber

PAT. APPL'D. FOR

6-in-One Test Set

(Continued from page 190)

By starting with the output stage and working backwards towards the input, a defective stage can easily be located.

RF-IF Signal Tracer

The signal tracer circuit, Fig. 4, is essentially a diode detector whose output appears between terminal posts J3 and J5. It is used for locating a defective r.f. or i.f. stage in a radio receiver.

To use this portion of the test set, it is assumed that the audio amplifier section of the receiver is operating normally, having been checked out previously with the signal generator. Used as a tracer, a lead from J3 is connected to the top of the receiver volume control and another from J5 to the radio chassis. A test probe connected to J6 can then be used to trace the r.f. and i.f. signal through these stages of the receiver.

When the probe contacts a point in the receiver r.f. or i.f. circuit where a signal is present, the signal is "detected" in the test set and the resultant audio is applied to the audio amplifier of the receiver and will be heard through the speaker. By starting at the antenna and working forward towards the detector, a defective stage can readily be recognized. In this application, the receiver volume control should be set for maximum volume and the potentiometer of the test set should be in the extreme counterclockwise position.

Variable Power Supply

A variable d.c. voltage is available between terminal posts J4 and J5. The voltage can be varied between 0 and approximately 60 volts by rotating the potentiometer. Either a positive or a negative voltage can be obtained, depending on which of the terminal posts is used as the common ground point.

Very little current can be drawn from this power supply, but it provides a handy substitute for low-voltage batteries used in many transistor radios.

Building the Test Set

The complete test set is illustrated schematically and pictorially in Figs. 6 and 8. Neither parts layout nor wiring is in any way critical. Construction, therefore, requires little additional explanation. There are, however, a few precautions that should be carefully observed.

For safety's sake the unit should be built into a plastic or wood box as indicated in the list of materials. While the tester constitutes no shock hazard, a metal case could become dangerously "hot" during measurements of high external voltages.

When soldering the 1N34 diode, CR, into the circuit, the diode lead about to be soldered should be grasped with a pair of long-nosed pliers at a point between the diode body and the solder junction. This prevents excessive heat from the soldering iron from reaching and possibly damaging this heat-sensitive part.

Complete All Wiring

Finally, all wiring should be completed before the battery plugs are inserted in the corresponding battery sockets. Though the individual battery voltages are too low to be dangerous, wired in series as they are, they have a potential of about 125 volts. And that's enough to give you an unpleasant shock should you become careless and touch the opposite ends of the series-wired battery assembly simultaneously.

LIST OF MATERIALS

Resistors: (All $\frac{1}{2}$ -watt carbon, $\pm 10\%$. K=1000 ohms) R1, R3=470K; R4=51K; R5=10 megohms; R6=330K; R2=4-megohm pot., 2 watts, linear taper, (Allied Radio Corp. #31MM110 or equiv.).

Capacitors: C1=.003 mfd. disc ceramic; C2=.003 mfd. 400-v. tubular; C3, C4=.005 mfd. 600-v. tubular.

Misc.: CR=1N34 diode; P=NE-2H neon bulb; J1-J6=insulated terminal posts; B=Burgess XX30P1 battery (2 required), Burgess XX22 (1 required)—connect in series; Plastic case, $6\frac{1}{16} \times 5\frac{9}{16} \times 2\frac{5}{16}$ in., with matching plastic panel, (dimensions non-critical); hardware; wire; solder.

★ ★ ★

Beeps, Hums, Time Signals Are Station WWV's Program

Radio station WWV, broadcasting 24 hours a day from Beltsville, Md., has perhaps the most important, if smallest, audience of any station in the U. S. It is operated by the National Bureau of Standards and offers a continuous program of hums and beeps which are supplemented, at five-minute intervals, by a voice, on tape, giving time announcements. The audience is located in industry, research centers and laboratories throughout the country, and it uses the program in ways that eventually affect the lives of most citizens. The watch-making industry times its products by the broadcasts. The research centers, makers of aeronautical and electronic equipment and power plants, use the 86,400 beeps a day to keep equipment properly cycled. Manufacturers of musical instruments pitch them according to the hum. Operators of short-wave receivers can pick up the signals on frequencies of 2, 5, 10, 15, 20 and 25 megacycles.

TIRE FACTS THAT CAN SAVE YOUR LIFE

ONLY ARMSTRONG TIRES HAVE PATENTED INTERLOCKING SIPES

"SIPES" are the slots put in a tire's tread to give more gripping edges, to stop skidding. Armstrong's interlocking, S-shape siping (see magnified view at left) provides grip in ALL directions, gives you sharply improved protection against both forward and side skids.

AND UNLIKE tires which have siping just cut into the tread, Armstrong siping is *molded* in, deeply. Long after the mileage that wears away the shallow siping of ordinary tires, Armstrong siping continues to give you full protection. Safeguard your car against deadly skids . . . compare, and see how Armstrong gives you far more siping than other leading tires.

ONLY ARMSTRONG TIRES HAVE PATENTED SAFETY DISCS

*—Grip the road to
stop deadly skids
as no other
tires can!*

ARMSTRONG TIRES



TREAD STAYS OPEN

Like fist above with discs between fingers, tread CAN'T squeeze shut. Hundreds of Armstrong Safety Discs hold tread's gripping edges open, always ready to "bite."

ORDINARY TIRES



TREAD CAN CLOSE

Without discs, tread CAN squeeze shut, like fist above. Tire's gripping edges are pushed together, lose their grip. Even brand new tires can go smooth like this . . . and you skid!

ARMSTRONG RUBBER COMPANY
Home Office, West Haven, Connecticut



WHAT THE HECK

IS A "MOTOR MINDER"?

Technically speaking, it is a special kind of vacuum gauge, but to the man who knows engines it's a great deal more. It tells you more about what is going on inside your engine than any other instrument on your dash.

A Stewart-Warner Motor Minder alerts you in time to these five types of common engine troubles: (1) Bad valve timing (2) Leaking valves (3) Improper ignition timing (4) Obstructed exhaust system (5) Defective spark plugs and points.

What's more, the Motor Minder helps you save fuel by indicating the proper range for most economical engine operation.

*Ask for it at your service station, garage,
or automotive parts store!*



1840 Diversey Parkway, Chicago 14, Ill.

Molecular Electronics

(Continued from page 191)

vices—diffusion, plating, electronic-beam machining, etching, cutting, radiation, alloying, and photographic processes. Although the function block at this stage performs its function, it must then be encapsulated to protect it against shock and vibration and make it stable under the conditions of radiation and temperature it will encounter.

Perhaps the most remarkable development so far has been the rapid production of semiconductor crystals in a form that requires no cutting or removal of material to make the basic substance suitable for use as an electronic element. This is the *dendrite* process. Here the germanium crystals in the form of a ribbon $\frac{1}{8}$ -in. wide and a few thousandths of an inch thick, are "grown." That is, they are produced by drawing them from a molten mass. In this continuous process, the germanium grows at a rate of 6 to 12 in. per minute and in the precise direction of crystal growth needed for application. In contrast to the conventional system where crystals are grown as thick ingots, no cutting, and hence no X-ray or crystallographic examination is necessary. The surface of the ribbon is always correctly oriented, optically flat and immediately usable as a working surface.

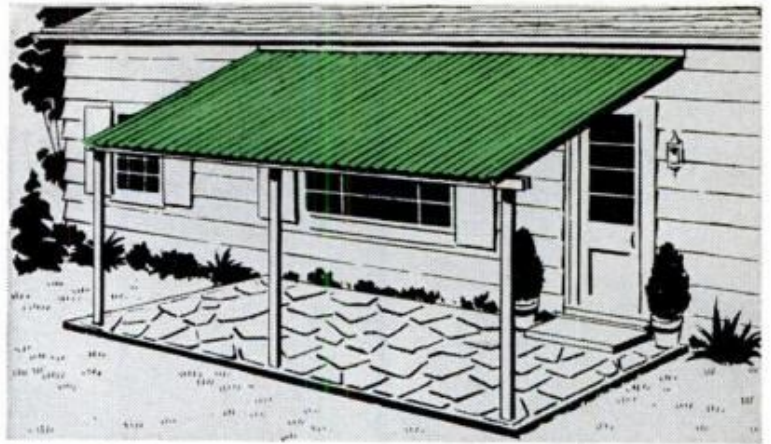
All the potentials of this process have yet to be realized. Its greatest significance is its ability to bring about a number of completely new processes for the production of function blocks. For example, a recent modification makes it possible and practical to carry out diffusion, plating, and evaporation processes directly on the crystal as it grows from the furnace. With this technique it is possible to create semiconductor devices all ready for the attachment of leads. Lengths of ribbon have been produced along which multiple-junction systems are distributed. Since the ribbon can be easily processed to become a long series of tiny amplifiers, it may be snipped into lengths to provide amplifiers of whatever gain is desired. Although near-automatic production of semiconductor devices and function blocks is a long-range objective, it is highly probable that it will be possible to grow multizoned crystals while simultaneously performing radiation, photographic and other operations on it as it issues from the furnace. This means that entire systems of electronic equipment, such as radio receivers and amplifiers, may eventually be grown directly from molten materials without additional processing. ★ ★ ★

**ONLY SIMPLE CARPENTER TOOLS
NEEDED TO BUILD YOUR OWN**

PATIO ROOF

**with JOHNS-MANVILLE
CORRULUX PANELS**

STRONG, lightweight fiber glass Corrulux is the answer to a handyman's dream...nail it, saw it, drill it with ordinary carpenter tools. Available in beautiful translucent colors. And, because Corrulux panels are lightweight, minimum framing is required. Send coupon and 5¢ in coin for detailed construction and materials of patio illustrated above or any other plans listed.



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In Canada, Plastic and Allied Building Products, Ltd.
Box 250, Dundas, Ontario.

Please send me the plans checked. Enclosed find
in coins. (If all 12 plans are desired, enclose 30¢)

Plan No.

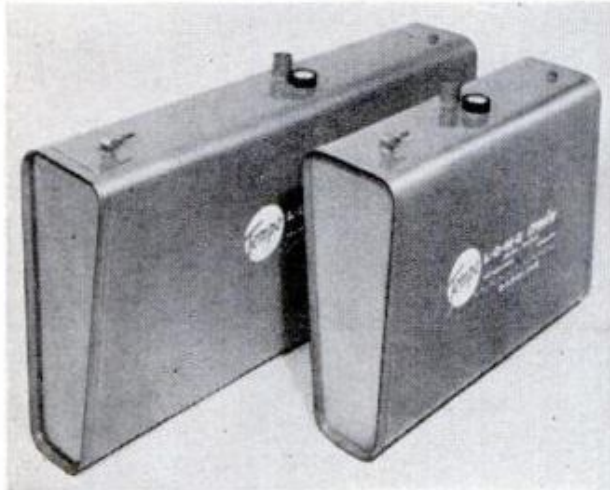
- | | |
|--|---|
| 1. <input type="checkbox"/> PATIO ROOF | 7. <input type="checkbox"/> Fluorescent Ceiling |
| 2. <input type="checkbox"/> Room Divider | 8. <input type="checkbox"/> Indirect Lighting Fixture |
| 3. <input type="checkbox"/> Folding Decorative Screen | 9. <input type="checkbox"/> Adjustable Wind Screen |
| 4. <input type="checkbox"/> Weather-protected Entrance | 10. <input type="checkbox"/> Wind and Sun Screen |
| 5. <input type="checkbox"/> Woven Fence | 11. <input type="checkbox"/> Planter Box Screen |
| 6. <input type="checkbox"/> Window Awning | 12. <input type="checkbox"/> Coffee Table |

NAME

ADDRESS



JOHNS-MANVILLE



Tempo Products Co., 2062 E. 70th St., Cleveland 3, Ohio

"Contour" Fuel Tanks For Outboard Boats

Taking advantage of every inch of otherwise wasted space under motor wells or inside flared hulls, a new line of "contoured" fuel tanks for outboard boats allows greater fuel capacity for extended cruising. Available on some boats as original, built-in equipment, the tanks are also sold for installation in existing boats. An optional fueling kit allows extension of the filler tube outside the hull for greater convenience and safety in fueling operations.

Space Heaters

Keep Alaska Highway Open

Canadian army engineers charged with maintaining a 1225-mile stretch of the Alaska Highway — from Dawson Creek, B. C. to the Yukon-Alaska border — last winter tried a new technique to keep northern sections of the road open to traffic. At Beaver Creek, mile 1140, they installed space heaters in drainage ditches to keep the ground from freezing and the water running freely. In previous years, sheets of ice piled across the highway because the water froze before draining.

Two-Zone Climate for Home

Regulated heating or air conditioning of two areas in a home can be accomplished with a two-zone control system that features multiblade dampers on the furnace or central air conditioner. A thermostat in each of the two areas of the house controls a damper for that zone. Dampers are actuated by a motor mounted directly on the damper casing. The Rheem Auto-Zone System allows living and sleeping areas to be maintained at different temperature levels automatically. The thermostats bring about constant repositioning of the floating dampers, allowing the proper percentage of heated or cooled air to pass into each zone.

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PIPEFUL TELLS
YOU—YOU'LL
GET ALONG
FINE WITH
AMPHORA**



Make your *next* pipeful AMPHORA; the even-burning, longer lasting, gentle blend from The Netherlands, at tobacco counters everywhere.



AMPHORA

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**KLEAN-STRIP
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CHANGE SPARK PLUGS REGULARLY

**FREE
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THE COMPASS
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New **DINSMORE
Celebrity
COMPASSES**

in Beautiful **GOLD OR SILVER**

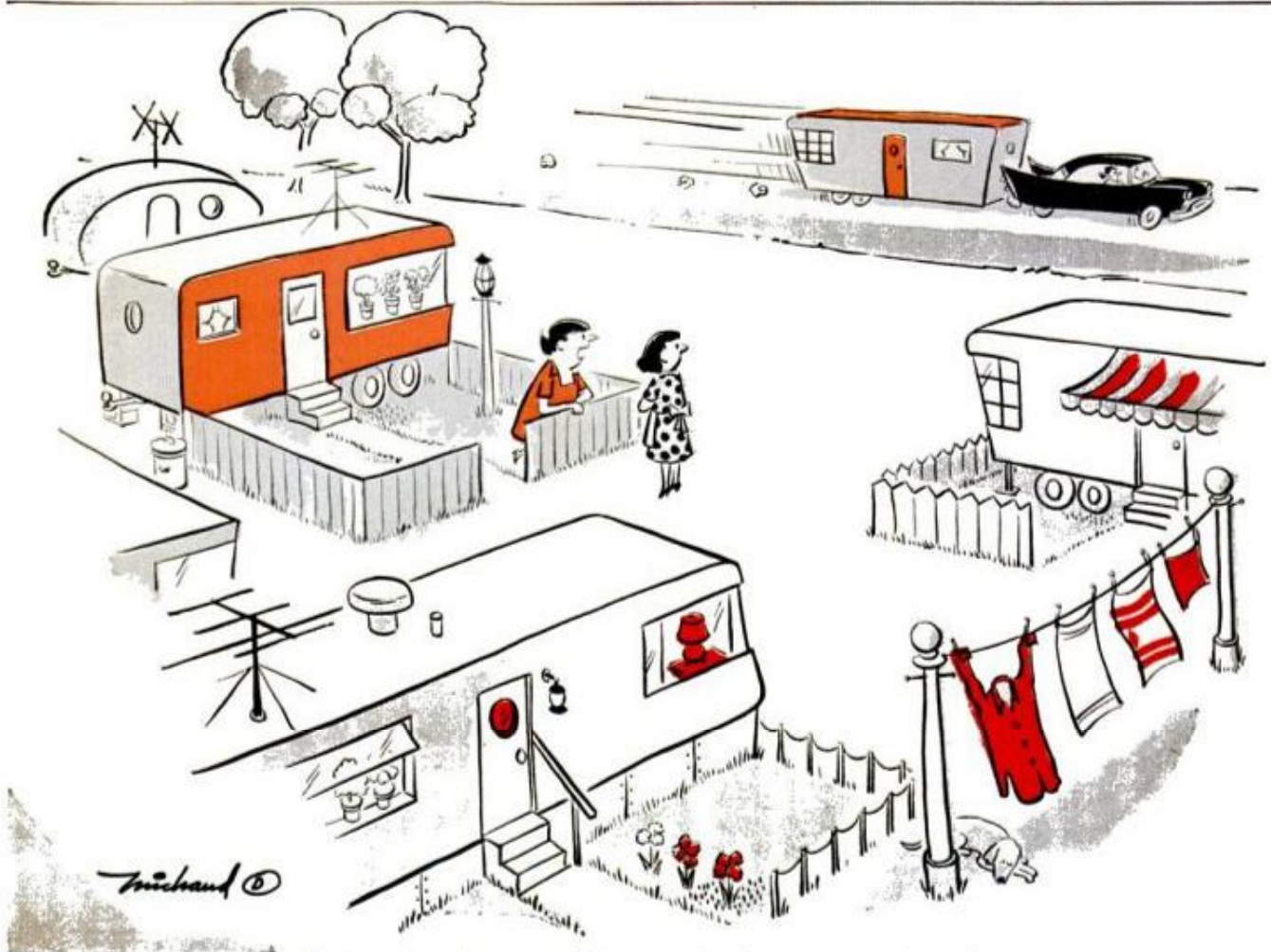
A jeweled, precision instrument—designed for modern cars. Full, indirect illumination. Sharp, clear letters. Silver or gold Celebrity models \$7.45, standard models \$5.95, illuminated \$6.95

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Fine Quality Compasses for over 31 Years

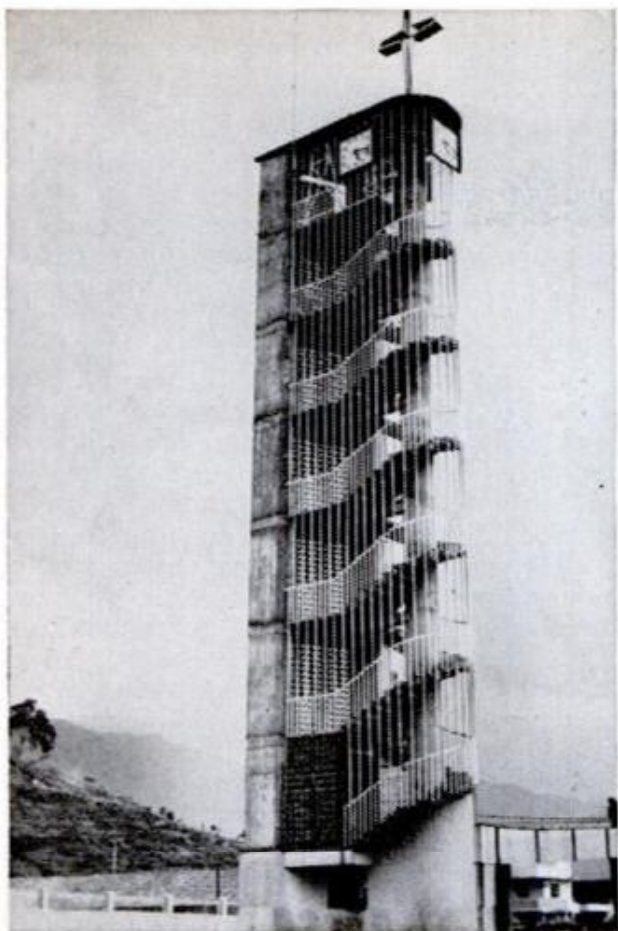
DINSMORE INSTRUMENT CO.
1802 Kelso St., Flint 1, Michigan



Write
for Folder



"Now there's something you don't see very often."



Bell-Tower Stairway

Appearing at first glance to be nothing but spiral stairs and landings, the bell tower of Our Lady of Fatima church in the city of Medellin, Colombia, looks like a futuristic fire escape. The bells and machinery are located inside the tower walls, and the tower is situated some distance from the church building.

QUOTE:

"And be assured that chemists, physicists and engineers continue to have the plight of the housewife very much in mind. Before long she may have sufficient time at her disposal to pursue the advanced engineering degree that she will need to understand, and possibly maintain, the functioning of her fully automated household."

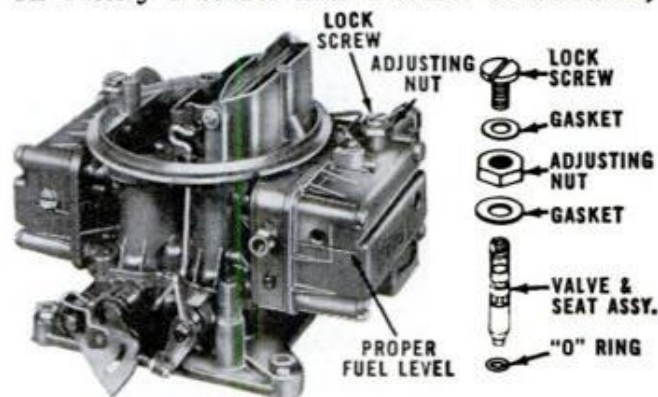
—DR. GUY SUITS,
Director of Research
General Electric Company

SUPPORT
YOUR
MENTAL
HEALTH
ASSOCIATION



ONE SIMPLE ADJUSTMENT TO YOUR HOLLEY CARBURETOR

If you are getting poor idle or unsatisfactory fuel economy, one cause may be improper fuel level in the bowl. Because of the accessibility of the adjustable needle and seat arrangement on Holley 2-barrel and 4-barrel carburetors,



it's a simple matter to check the fuel level. Here are the easy steps: (1) Make sure the car is on level ground, then start the engine. (2) Remove the sight plug to check the fuel level in the bowl. (It should just reach the lower lip of the sight plug.) (3) If the level is too high or too low, loosen the lock screw with a screwdriver. Turn the adjustment nut clockwise to lower the fuel level—counter-clockwise to raise it. A 1/6 turn is the equivalent of 1/16-inch wet fuel level in the bowl. (4) Operate the engine until the fuel level is stabilized, then recheck level at the sight plug. Be sure to replace the sight plug. This adjustable needle and seat arrangement is one of many important developments of Holley's continuous research and engineering. There are, of course, other causes of unsatisfactory idle and economy. If this simple adjustment does not correct the trouble, your Holley dealer will be glad to make a thorough check of the carburetor.

★ ★ ★

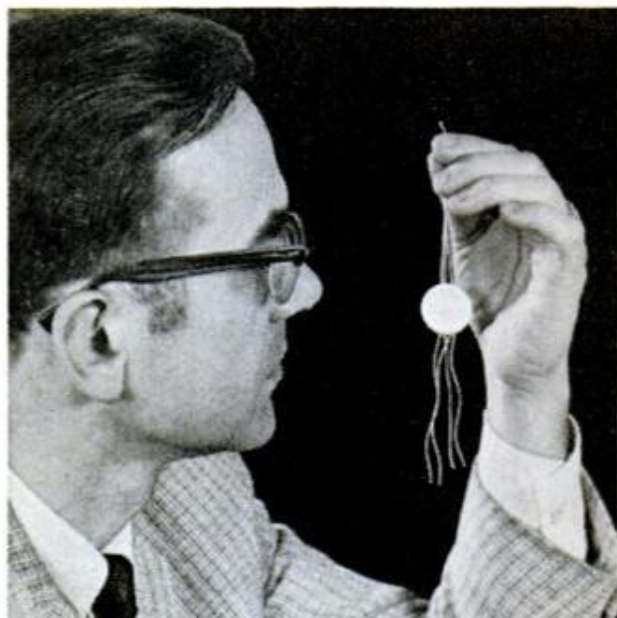
When you make your own carburetor or ignition repairs and parts are required, be sure to use *genuine* Holley parts. Your Authorized Holley Distributor or Dealer, listed in the Yellow Pages, has a complete stock of Holley carburetor minor over-haul kits, tune-up kits, ignition parts, and brand-new replacement carburetors priced competitively with rebuilds. All are engineered and built to exacting *original equipment standards*. It will pay you to buy or specify Holley Parts.

HOLLEY
Carburetor Co.

THE
COMPLETE LINE
OF CARBURETION
and
IGNITION EQUIPMENT

C-1

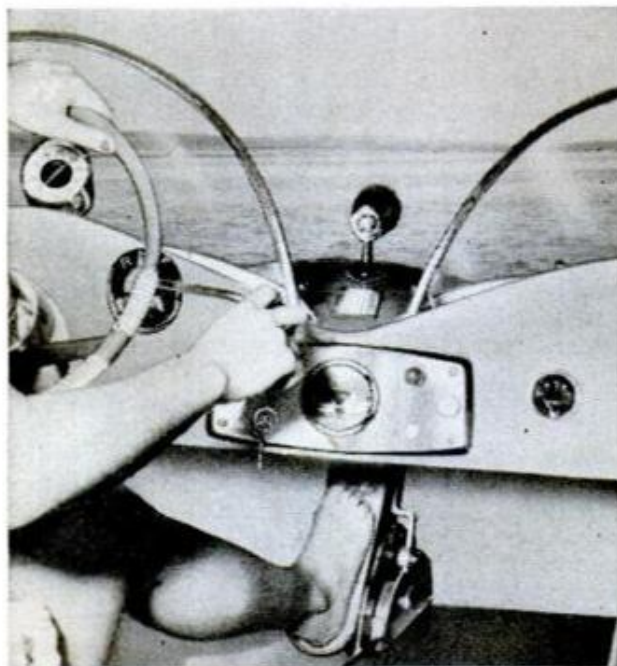
11955 E. Nine Mile Road • Warren, Michigan
ORIGINAL EQUIPMENT MANUFACTURERS FOR OVER 55 YEARS



The Franklin Institute, Benjamin Franklin Pkwy., Philadelphia 3

Temperature Transmitter for Animals

Implanted in a laboratory animal for its lifetime, a temperature-recording device promises to give researchers accurate information on fever—man's natural defense against germs. The telemeter works when the animal in which it is placed is surrounded by a low-frequency power field. From the power field, the device gets energy to send its findings to a receiver.



Tempo Products Co., 2062 E. 70th St., Cleveland 3, Ohio

Drive Your Outboard Like a Car

Taking advantage of coordination and reflexes learned in driving an automobile, a new outboard-boat control outfit has a dashboard gearshift and foot throttle. It simplifies control of speed and direction, especially in docking or maneuvering in winds or currents. The gearshift is adaptable to the control cables of most motors.

Missile With a Frozen Heart

(Continued from page 123)

While most professional golfers average 250 to 275 yards with their drives, the average golfer sends his tee shot off at a speed of 160 m.p.h., the same as the pro although probably to somewhat less yardage. And the ball attains this amazing speed from contact with the club of only .0004 of a second.

Do you rotate your golf ball on tee shots? If you don't you may be permanently altering its shape, and you will lose control of direction on your drives. If possible, rotate the ball each time you drive so that the impact will be distributed.

Heat and cold affect the liveliness of the ball. If you're golfing on a chilly or even a cold day, warm the ball before placing it on the tee. You'll notice the pros keep the golf ball in their trouser pocket prior to the shot in an attempt to warm the compressed core. The reason is simple. The warmer the ball, the more "bounce" you'll receive when you hit the ball, and this means more yardage.

Many average golfers are not aware of the fact that golf balls are available with two surfaces. A cut-resistant, tough cover for duffers and a regular cover for better golfers. The ladies can avail themselves of golf balls with the same general specifications with the exception that their models have lower compression factors more suitable to the lighter feminine touch.

With 4,000,000 golfers in the United States, of which 800,000 are women, it's quite easy to see how over 5700 golf courses of all types in this country find a ready clientele. In 1959, these golfing Americans played 72,000,000 rounds of golf. And the object of our discussion, the golf ball? 42 million were sold in 1959!

The golfing industry as a whole is growing rapidly too. Nearly \$70,000,000 worth of golfing equipment was sold last year, twice as much as ten years ago.

There's little doubt that modern technology and design have played a big part in the tremendous increase in popularity which the game of golf now enjoys, but a good portion of the credit goes to the little golf ball, to many early-rising week-end duffers a marvel of engineering. ★ ★ ★

QUOTE:

"There is as yet no substantial statistical, epidemiological or research evidence that breathing polluted air in our communities causes lung cancer."

—SEWARD MILLER, Director
University of Michigan
Institute of Industrial Health

It's a Pear-Shaped World

Scientists at the National Aeronautics and Space Administration are changing our concept of the shape and structure of the Earth through their studies of the orbital variations of the Vanguard I satellite. The fact that the Earth is really not round, but is an "oblate spheroid, slightly flattened at the poles" is an old one, but their work has shown now that the Earth is also slightly pear-shaped; higher at the North Pole and in the Southern Hemisphere, and lower at the South Pole and in the Northern Hemisphere than had been thought. The seemingly slight change, amounting to

about 50 feet at the poles and less elsewhere, is important in that it indicates that the Earth's structural strength is much greater than once thought. Dr. John A. O'Keefe of the NASA concluded from the figures that the Earth's mantle, 1800 miles thick, is not a large mass of rock being churned by convection currents, but is a material of about the same structural strength as brick. The calculations changed the old measurement of the Earth's flattening at the poles and means that the Earth's radius at the poles is about 13 miles shorter than at the equator.

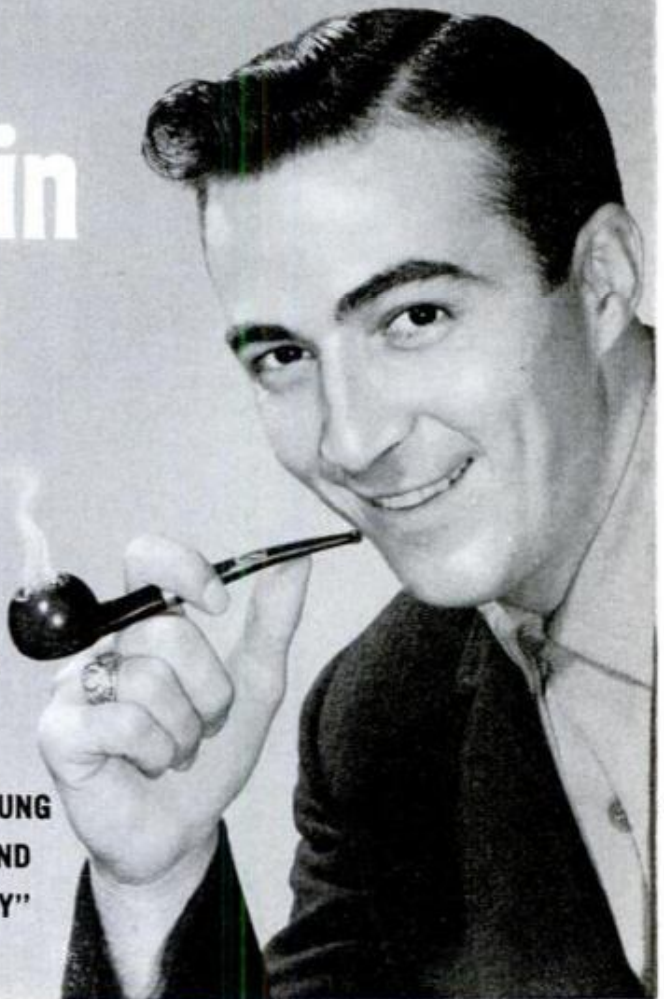
The proof is in the puffing

and P. A. has the flavor
most favored in the U.S.A.



R. J. Reynolds
Tobacco Co.,
Winston-Salem,
N. C.

FARON YOUNG
OF "GRAND
OLE OPRY"



- always tastes fresh
- mild, mellow flavor
- cool 'n' steady burning

PRINCE ALBERT

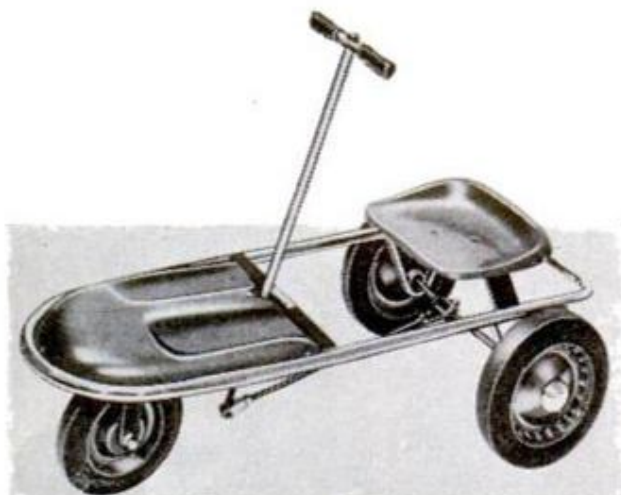
America's Largest-Selling Smoking Tobacco!



Perardua Products, Box 46, Old Greenwich, Conn.

Shade Fits Any Size Lens

Designed to fit any size camera, a flexible shade eliminates the necessity of carrying a separate shade for each lens. Instead of screwing into the lens, the shade is held in place by a flexible band around the back of the camera. Filters can be slipped in behind the shade and held in place. Thus the largest size filter will accommodate any lens, and only one set of filters need be carried.



MG Industries, PO Box 7226, Minneapolis 12, Minn.

Velocipede for Crippled Children

Crippled or handicapped children who have retained the use of at least one arm can have greater freedom and mobility and enjoy themselves while exercising with an arm-powered velocipede. It is propelled and steered with a single lever, which drives the rear wheels. Designed originally for a paraplegic child but now available for home, hospital and school use, the glass-fiber and steel vehicle is built low for stability. Backrest and safety belt are optional accessories.

Step Table

(Continued from page 137)

runners ($\frac{1}{4}$ x $\frac{1}{2}$ x 7-11/16 in.) and fasten with brads and glue. The bottom edge of the drawer front serves as a drawer pull.

The 14-in. tapered walnut legs and mounting plates are purchased in sets of four, four angle-mounting plates being required to splay the front legs of a pair of tables. To provide added thickness to the table top for screwing the leg mounting plates to it, $\frac{1}{4}$ -in. plywood pads are glued to the underside at the locations indicated. Finish the completed tables to match the cocktail table.

MATERIAL LIST

TABLE

Solid Stock

- 1 pc.—1"x1 $\frac{1}{4}$ "x14 $\frac{3}{4}$ "—End
- 1 pc.— $\frac{3}{4}$ "x1 $\frac{1}{4}$ "x16 $\frac{3}{4}$ "—End
- 2 pcs.— $\frac{3}{4}$ "x1 $\frac{1}{4}$ "x29 $\frac{3}{8}$ "—Sides

Plywood

- 1 pc.— $\frac{1}{2}$ "x15 $\frac{3}{4}$ "x28 $\frac{7}{8}$ "—Top
- 4 pcs.— $\frac{1}{4}$ "x3 $\frac{1}{4}$ "—Support blocks for legs

TRAY

Plywood

- 1 pc.— $\frac{1}{4}$ "x17"x20 $\frac{1}{8}$ "—Frame
- 1 pc.— $\frac{1}{4}$ "x15 $\frac{1}{8}$ "x18 $\frac{3}{8}$ "—Bottom

STEP

Plywood

- 2 pcs.— $\frac{1}{2}$ "x9 $\frac{3}{4}$ "x9 $\frac{7}{8}$ "—Sides
(or, 4 pcs.— $\frac{1}{2}$ "x9 $\frac{3}{4}$ "x9 $\frac{7}{8}$ "—See text)
- 1 pc.— $\frac{1}{2}$ "x8 $\frac{7}{8}$ "x16 $\frac{1}{2}$ "—Top
- 1 pc.— $\frac{1}{4}$ "x9 $\frac{3}{8}$ "x16"—Bottom
- 1 pc.— $\frac{1}{4}$ "x9 $\frac{1}{2}$ "x16"—Back panel

DRAWER

Plywood

- 2 pcs.— $\frac{1}{4}$ "x3"x15 $\frac{5}{8}$ "—Front
- 2 pcs.— $\frac{1}{2}$ "x3"x7 $\frac{3}{4}$ "—Sides
- 1 pc.— $\frac{1}{2}$ "x3"x14 $\frac{7}{8}$ "—Back
- 1 pc.— $\frac{1}{4}$ "x7 $\frac{7}{8}$ "x15"—Bottom

Solid Stock

- 2 pcs.— $\frac{1}{4}$ "x $\frac{1}{2}$ "x7 $\frac{11}{16}$ "—Runners

MISCELLANEOUS

- 2—8' Rolls edging tape (matching veneer)
- 4—14" Legs with hardware
- White glue, plastic resin glue
- Contact cement
- Garnet paper, 4/0, 6/0
- Steel wool, No. 000
- Glue blocks

★★★

Adjust Binding or Rattling Sashes

OFTEN IT IS POSSIBLE to prevent a window sash from rattling, or, conversely, from binding at some point, simply by shifting the metal weather stripping. This can be done with a putty knife, a dull chisel or a short length of flat steel, anything having a square edge that can be placed against the edge of the weather stripping. A light mallet tap or two on the handle of the putty knife or chisel will shift the weather strip slightly, just enough to ease a binding sash or prevent a loose sash from rattling.

LOOKING FOR LONG WEAR IN SERVICE SHOES?

TRY **Thorogood**[®]
JOB-FITTED

SHOES WITH
NEOPRENE SOLES!



By Weinbrenner Corp.,
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Neoprene soles give long wear...
resist oil, grease, chemicals
and cold weather cracking.
Neoprene soles are resilient...
cushion each step...help make
standing jobs less tiring.

*Ask for neoprene soles
the next time
you buy service shoes.*



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FIBERGLASS or PLYWOOD

\$41.95 Up: EASY TERMS
FREE CATALOG

50 Models 8-22 ft.

Cruisers, houseboats, run-
abouts, convertibles, fishing,
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factory-built. Save 1/2 to 3/5. Free catalog has all details, color photos,
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NOW! a hi-compression
staple gun
for only
\$4.95



With Exclusive
Push-button Loading
and Built-In
Staple Extractor.

Indispensable for home use...and never before
priced so low! This compact, all steel, powerful
SWINGLINE 101 staple gun is ideal for insula-
tion, carpentry, upholstery, screening, wire fencing,
plus thousands of other uses. Handle locks to
fit pocket. Lightweight, maneuverable, jam-proof!
Staple sizes 1/4", 5/16". Send for FREE book—"Tips
for Tacking".

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The NEWEST and FINEST: Buck's 400 Series

CHROME EDGE CHISELS

You get: ★ The Finest Cutting Edges
★ Tough Tenite II Handles
with Inserted Steel Caps
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1" - \$2.90
3/4" - \$2.70
1/2" - \$2.40
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Plastic pocket Kit -
4 Sizes \$10.30

Most complete line of Chisels,
Gouges and Carving Tools

BUCK BROS. INC.
RIVERLIN WORKS MILLBURY, MASS.

CATALOG AVAILABLE!

Trailers Join the Country Club

(Continued from page 99)

But everyone knows you don't have to be a millionaire to enjoy trailer living. You can buy a fairly large and extremely comfortable mobile home for three or four thousand dollars. A good rule of thumb is \$125 per running foot. Financing is about the same as with an ordinary home, and there are plenty of modern, attractive trailer parks that charge no more than \$30 or \$40 per month space rent.

There is a trend now toward trailer-park subdivisions in which you *buy* your plot of ground instead of renting it. The largest of these, and probably the world's largest trailer park, is Trailer Estates near Sarasota, Fla. The 1500 lots in the park each measure 2400 square feet or more and are sold for \$1800 to \$3000. Each lot owner pays a \$10 per month maintenance fee, which goes to the upkeep of the paved streets, street lighting, central TV antenna, watchman and other facilities. Trailer Estates has its own moorings for pleasure boats, for which an extra fee is charged.

If you haven't walked through a modern residential trailer you have a real surprise coming. It is a complete home. A purchaser has his choice of up to a dozen floor plans and can select his own color combinations and interior styling. The trailers are completely furnished and feature many ingenious built-ins.

A 10x50-foot trailer is apt to have a 10x17-foot living room and two separate bedrooms in addition to full-sized kitchen and bath. Walls and ceilings are expensive veneers, the sturdy floor is carpeted wall-to-wall. Kitchens have hot and cold running water and all the usual facilities including a combination refrigerator-freezer. Some have garbage disposers, dishwashers and automatic clothes washers. Bathrooms have standard plumbing, including tub-shower combinations.

When a cabana is added, the cabana is often divided into a living room space that augments the trailer's living room, and a dressing room that is entered separately from one of the trailer's bedrooms. Sometimes a cabana contains an extension of the trailer's living room plus an extra bedroom and extra bath.

Modern mobile homes are well insulated and have their own central heating plants that duct hot air to floor registers in every room. They can be equipped with space coolers or refrigerated air conditioning for the hot months. In California, where a number of the manufacturers of large mobile homes are located, the state housing authority enforces minimum standards for heating, plumbing and electrical installa-

tions that are comparable to those for conventional houses.

The Trailer Coach Association estimates that four million people are living in mobile homes today and that one out of every nine housing starts is a mobile home. The association expects that 50,000 of the large residential units will be built and sold this year. There are something like 14,000 trailer parks in the U.S. and new ones being built at the rate of about 1000 per year.

It costs from less than \$100,000 to over a million dollars to open a new park for mobile homes, depending on the cost of the land and the improvements that are installed on it. Paved streets, the latest in sanitary systems, parking areas, a service building that includes washing machines, dryers, and showers, and good recreational facilities are necessary in a modern park.

Trailer parks for semi-permanent mobile homes are divided broadly into two groups: commercial parks adjacent to cities or other work areas and whose occupants have regular jobs, and parks in resort areas whose occupants are retired or on vacation. Florida and California have most of the resort parks, although these luxury accommodations are spreading rapidly.

Trailer parks have become such a big business that several firms specialize in the design and engineering of parks. The firm of Walters & Son, Corona Del Mar, Calif., has designed more than 300 parks and has work representing \$6 million in costs on its drawing boards at present. K. W. Walters of this concern expects that the high-grade accommodations that are available in mobile home parks will be extended shortly to parks that cater to the smaller travel trailers. Such parks would compare with quality motels in the services that they offer. One of their features will be a series of parallel driveways that allow drivers to pull their trailers up alongside utility islands for the night and from which they can depart in the morning by driving straight ahead. The system eliminates backing or jockeying of the trailers.

This idea is to be used in a \$2.5 million vacation marina on the west shore of the Salton Sea in southeast California. The whole project includes a 150-room motel, a mobile home park with 150 spaces, and a travel-trailer park with 200 spaces. In addition there will be restaurants, boat storage, boat launching ramps and boat docks.

Eventually, Walters believes, parks that cater to the overnight travel trailers will provide a permanent cabana at each trailer space. It would contain all the comforts that a travel trailer usually lacks, including a large living room with TV and a bathroom with tub and shower. ★ ★ ★

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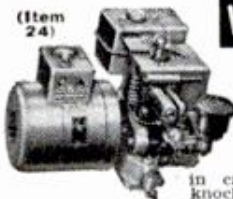
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Throw Back the Big Ones

(Continued from page 111)

too. Fish that are good to eat in one area may be extremely poisonous in another. The dual personality of these fish has caused much confusion and the fact that a fisherman may have eaten a particular fish on hundreds of occasions with no harmful results is no guarantee that this same fish, under slightly different conditions or in some other locality, will not produce intoxication and rapid death.

The big problem facing Dr. Halstead and other ichthyologists today is learning how the fish become poisonous and what factors contribute to the condition. While the answers are still unknown, it is believed that in most cases the fish become poisonous through their feeding habits, with the poison originating in a marine plant. Plant-eating fish feed on these plants, manufacture the poison in their bodies, and in turn are eaten by carnivorous fishes, making both groups poisonous—but not poisoning either group of fish.

Believed to be the most poisonous of all marine animals are the puffer-like fishes; this group includes ocean sunfishes, sharp-nosed puffers, the true puffers and the porcupine fishes. The true puffers are the greatest offenders and there are about 90

or more species in this group. A characteristic of all puffers is their unusual ability to blow themselves up—hence the name—to as much as eight times their usual size. The puffer accomplishes this trick by gulping in large quantities of air or water.

“To make things more confusing, some puffers are not poisonous,” Dr. Halstead says. “However, some that are poisonous can cause death to a full grown adult as quickly as 17 minutes after the first bite of fish is eaten.”

Oddly enough, the fresher the puffer the more deadly this fish is likely to be. And still odder is the fact that of all food fish to be found in Japan—world’s largest fish eaters—the puffer brings the highest price. In the old days, according to the doctor, puffer flesh was reserved strictly for the emperors of Japan, probably because of the effects often derived from eating the fish.

In Japan the puffer is called fugu, and is prepared and sold in special restaurants hiring specially trained fugu cooks. The fugu chefs soak the puffer’s flesh in water for three hours, then cook and serve it in very small pieces. The result is something like smoking a marijuana cigarette—the diner is “sent,” as the beatniks put it. He has a sense of great well-being, of floating lightly through the air and of being very pleased and happy with life in general.

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This is exactly the opposite of the effect that was described in the beginning of our story. Nevertheless, with all the special treatment, puffer fish is still the number one cause of fatal food poisoning in Japan. It has been estimated that as many as 200 Japanese have died from it in a single year.

"At best, eating puffer is a game of Russian roulette," Dr. Halstead grinned. "Unless you feel that you are a fugu connoisseur, leave puffers alone. You'll probably live longer."

When puffer is eaten unsuspectingly the symptoms of poisoning are quick to appear. Within 10 to 45 minutes the lips and tongue begin to tingle. When you feel this, it is time to call your lawyer for the tingle soon reaches the fingers and toes and they become numb. If you can take it (and are lucky) you might make it; less than 40 people survive out of every hundred poisoned. However, it will be a long time before you are sure—recovery often takes months.

Another form of ichthyotoxism, as poison from eating fish is called, is ciguatera. More than 300 species of ocean fish have been traced as causes of this type of poisoning. Fish most commonly involved are sea bass or grouper, barracuda, snapper, parrotfish, wrasse, surgeon fish, and other types of reef fish.

An odd symptom, unknown to any other disease, crops up with this type of poisoning. It is a reversal of temperature sensations. Cold things may feel hot and hot things cold.

Dr. Halstead tells of a case concerning a naval officer who was poisoned by eating amberjack in the Virgin Islands during fleet maneuvers. He suffered only a mild attack and soon recovered.

Four weeks later, however, he was observed in the wardroom unconsciously blowing on his ice cream, which was "burning" his tongue.

When a victim does survive, his recovery and convalescence may be very prolonged, with extreme weakness, sensory disturbances, and excessive loss of weight the last symptoms to disappear. If the poisoning has been severe, complete recovery has been known to take several years. Several cases are on record in which the symptoms persisted for as long as 25 years.

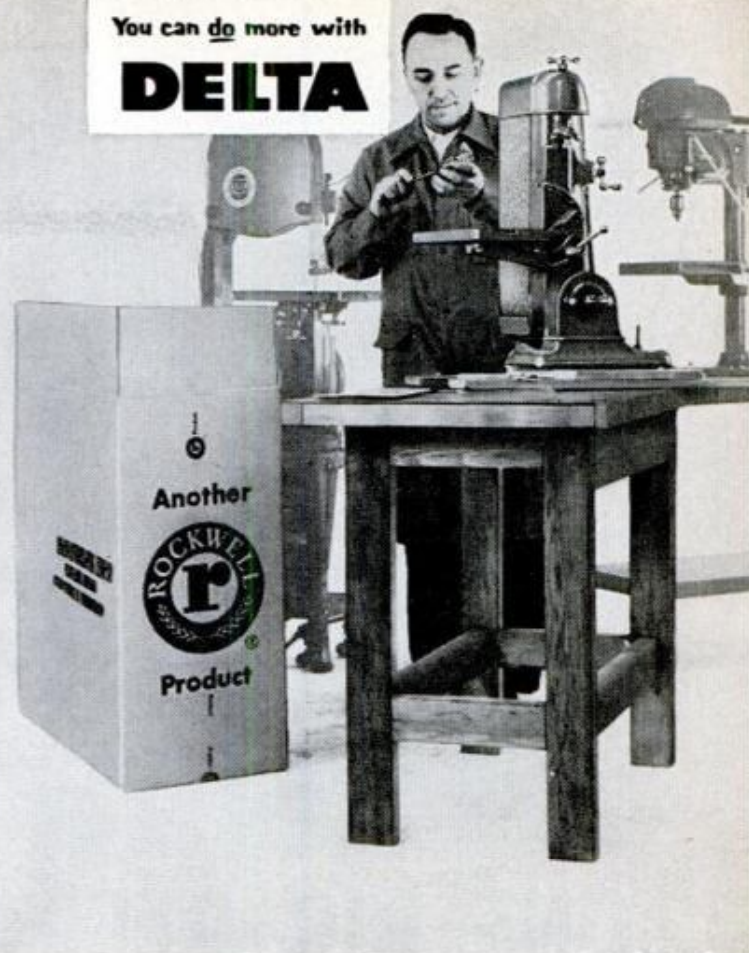
Unfortunately, poisonings resulting from fishes are very frequently confused with a variety of other ailments because of a similarity of symptoms.

Other symptoms from ichthyotoxism include vomiting, diarrhea, severe abdominal pains, extreme muscular weakness and

(Continued to page 218)

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pain along with partial or complete paralysis. Skin disorders are frequently reported consisting of intense itching, red rash, blisters, extensive loss of skin, especially on the hands and feet, and occasionally ulceration. There may also be loss of hair and nails.

If you are living under survival conditions, and questionable fishes must be eaten, it is advisable to cut the fish into thin fillets and to soak them in several changes of water—fresh or salt—for at least 30 minutes. This will serve to leach out the poison which is somewhat water-soluble. It should be emphasized that ordinary cooking methods do not destroy or even weaken the poison.

Dr. Halstead has long been interested in fish. He has made so many expeditions that he's lost count but does remember making his first trip at the age of 17 when he was hired to assist in making a fish census of a large lake. When his high school class was taken through the San Francisco aquarium, the aquarium's curator offered a job without pay to any boy who wanted to help. The Halstead boy took the job and fish have been his occupation and pre-occupation ever since.

Today, Dr. Halstead is the director of World Life Research Institute now under construction in the mountainous foothills of Colton, California, which lies about 60 miles east of Los Angeles. The Institute already possesses one of the largest libraries in existence in medical marine biology, particularly on marine biotoxicology. They receive letters from all over the world asking for information on fish. "The trouble is," Dr. Halstead says, "many of the questions have no answers—but someday they will."

Scientific interest in fish poisoning underwent another revival with the remarkable sequence of poisonings which took place between February 1946 and April 1947 at Fanning Island in the Line Islands—a small group of coral islands lying along an almost straight line between Hawaii and the equator. During this period there were 95 cases of fish poisoning among a population of 224 persons, caused by eating the same fish species they had always eaten before with complete impunity!

Investigation revealed that a startling change in the edibility of the shore fishes began about 1943, involving the islands of Midway, Johnston, Kingman Reef, Palmyra, Fanning and Christmas Island. These poisonings reached a peak about 1947, and have continued, somewhat abated, to the present time. Strange to say, the fishes of most of the Hawaiian Islands and Washing-

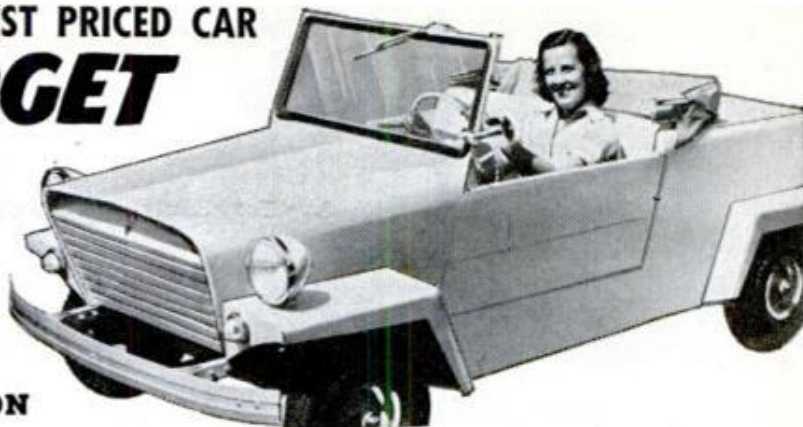
(Continued to page 220)

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Scientists Find Huge Island Submerged in Arctic Ocean

Four Columbia University scientists have discovered a huge island submerged 900 feet below the icy surface of the Arctic Ocean. About 14,000 square miles in area on top, it resembles some of the great tablelands in western United States. Underwater photographs show abundant marine life on top of the island. Specimens taken by trawls along the top included eight-inch starfish, four-inch bristled flat worms, a strange two-inch tadpolelike creature resembling a teardrop with large blue eyes, and a new species of a small mosquitolike creature with a long antenna.



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ton Island have remained unaffected and without any change in their edibility.

For centuries it has been known that a fish species may be edible in one area and violently poisonous in another. Toxicity in a fish seems to develop without apparent cause, but this is undoubtedly only because we do not completely understand the mechanisms involved.

The most recent surge of poisonings caused by the eating of marine organisms, namely squid, octopus and certain types of oceanic fish, took place in Japan, the Philippines and elsewhere in the Indo-Pacific region. It has been estimated that more than 40,000 persons were involved in the 1955-56 outbreaks. The unknown cause of this outbreak is the big question for the underwater medical researchers of the future to answer. The sea represents a vast reservoir of latent resources, whose combined values attain astronomical proportions. Even Dr. Halstead insists that the greatest gain from his work with poisonous fishes is the exploration of sources for useful organic chemical agents so far unknown to medical science. It is the last great frontier left to us and man must continue to unravel the mysteries hidden in the ocean depths. ★ ★ ★

This Month's "Great Pioneer in Science"

(Page 34)



Isaac Newton (1642-1727)

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Uncle Sam's "How-To" Men

(Continued from page 72)

handle plows which had been imported some 15 years before, but never accepted by the farmers. Bowen converted them to one-handle plows and altered the share to resemble the traditional Ethiopian plow. The significant difference was that the new plow turned a six-inch furrow. As soon as Bowen demonstrated it, farmers got the point. With such a tool they would have to plow their fields only twice, instead of four or five times.

Today the new plows are in use in all the farming areas of Ethiopia. Thanks to a simple change in a basic farm tool, Bowen has the confidence of the Ethiopian farmers. This has permitted him to introduce more advanced implements of his own design—simple harrows, cyclone seeders and corn shellers. Such tools have never been seen on Ethiopian land, but promise to increase production significantly. Furthermore, local industries are beginning to produce the new implements in quantity, and the farm-implement business is booming.

It's an oversimplification, but in a way you can trace most of this bootstrap improvement to a man of ingenuity who spotted a slight improvement he could make in the point of a plow.

Perhaps Miss Sybil Bates set herself the highest goal. A home-economics adviser with the ICA in India, the determined Miss Bates set out to improve home laundry techniques. Changing a housewife's methods of doing the washing isn't easy, as any housewife will testify.

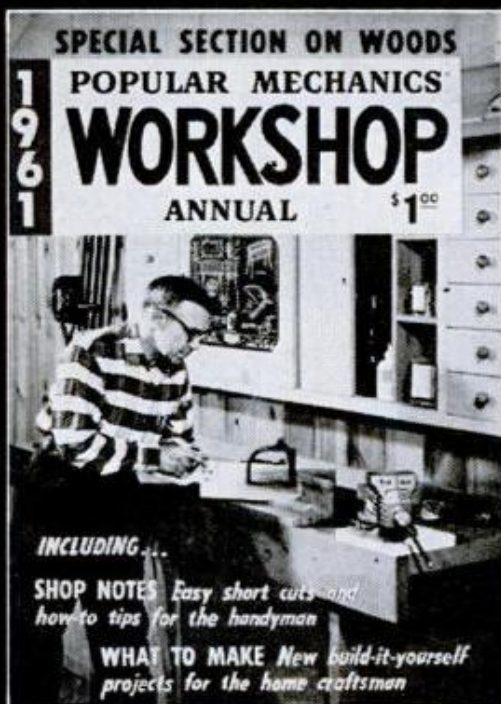
The energetic Miss Bates has come up with a variety of arm-powered washing machines. One resembles an old-fashioned butter churn; another is a true agitator type that is about as efficient in cleaning clothes as your own automatic.

Another washing machine—the famous Pettit-Holtzclaw contraption—is the most successful gadget in the history of ICA. The idea has been exported throughout the world, and thousands of washers are popping up from the wilds of Canada to the hidden valleys of Burma. Why Canada? Sportsmen are building them to do their laundry at remote fishing cabins! Any sportsman interested will find plans in the July, 1959 issue of *Popular Mechanics*.

But the prize for top inventor in ICA must go to a balding middle-aged man named Ralph Dunkle. A design engineer by profession, Dunkle has come up with a wide variety of simple easy-to-build machines that have been mass-produced in Indonesia to increase productivity and

(Continued to page 224)

PM ANNUALS



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HOW TO BUY A STEREO SOUND SYSTEM—WHAT'S NEW IN TAPE—SPECIAL SECTION ON HI-FI KITS. OCTOBER

HOT ROD ANNUAL

COMPLETE RESULTS FROM BONNEVILLE, AHRA DRAGS AND DETROIT NATIONALS—HOPPING UP THE COMPACTS. NOVEMBER

CAR FACTS ANNUAL

PM'S AUTOMOTIVE EDITOR REPORTS ON THE 1961 MODELS—COMPLETE SPECS OF ALL THE NEW CARS. DECEMBER

SCIENCE ANNUAL

THE YEAR'S EXCITING BREAKTHROUGHS IN SCIENCE AND TECHNOLOGY—REPORT ON PROJECT MERCURY. JANUARY

BOATING ANNUAL

BUYING A USED BOAT—VACATION FUN AFLOAT—NEW BOATS—HOW TO BUILD YOUR OWN HOUSEBOAT. MARCH

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1960 CATALOG

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ICA has helped spread 4-H Club movement throughout world. Here a happy youngster displays first crop

raise the standard of living. ICA has how-to-do-it plans for several of his machines—a rice thresher operated by bicycle pedals, a press for turning out bricks made of soil cement, a wind pump that resembles the old windmill, except that it's more efficient.

Last year you, as an "average" American, gave about 1 1/3 cents per day to support the work of Dunkle, Miss Bates, Bowen, Silverstone, Fisher and thousands of other dedicated workers. You gave a lot more, too. To Ecuador you gave one small flock of chickens. The chickens multiplied, and today hundreds of flocks are paying for the education of scores of Ecuadorean boys. Many of these lads, because of their educational advantage, will become the leaders of Ecuador within a few years, and very likely will lift the country to a higher standard of living. Quite a payoff for one small flock of chickens.

To Vietnam you gave the leadership of a man named Millard Cox, who showed 10,000 singing, sweating Vietnamese how to construct an irrigation canal in four days. That one canal boosted the local community's production of corn, rice and beans by 1000 tons a year.

To some 60 nations, through ICA and its part in the Point 4 program, you gave the skills, knowledge and ability of dedicated and ingenious Americans.

Most of all, you gave to millions of people the prospect of a little more food, a little less drudgery, a better life. ★ ★ ★



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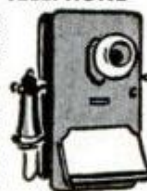
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HOW TO TURN CONCRETE INTO GOLD

Owners Report on the Plymouth

(Continued from page 90)

Windshields bowed to progress 20 years ago. Flat vertical panes are best. They're coming back in trucks and buses now. →

"Styling is pleasing, but not comfortable. I'd like to see the seats raised and the roof raised. You must almost place the heel of your hand on the door sill and support your weight on it as you 'roll' out of the car. The windshield is so far back into the roof that on a sunny day you feel like you are in a solar furnace."—Tennessee supervisor.

"Grunt, groan and strain getting out, particularly if near a curb, causing knees to be higher than fanny."—New York engineer.

What About the New Six?

New for 1960 is a slanted overhead-valve Six (it is incidentally the same design, although not the same size, as the Valiant engine). As you might have expected, the Six, being brand new, had a few bugs.

Over 5 times as many Six owners had "considerable" engine trouble as V8 owners—the reason, of course, is that the Six is all-new, the V8 is not. →

Here are some quotations about the troubles the owners had with the new engine:

"Six cannot be timed to burn regular gas. It is advertised to burn regular. Dealer says the ad does not state that it will not knock on regular, just that it will burn it."—Louisiana construction superintendent.

"Very bad spark knock. Have to use high-test gas."—South Carolina salesman.

"Oil burning. Had new rings at 4500 miles."—Illinois produce manager.

"One bearing reversed, burned a rod out. Engine was replaced. Second engine had been coated with a preservative during steel strike and oil-ring holes were plugged. Got new rings."—Florida piano teacher.

"Motor out of balance in rods or shaft."—Illinois atomic engineer.

Other Best-Liked Features

Sixth on the list of best-liked features is roominess, a point especially stressed by station-wagon owners. Here are quotations describing this and other best-liked features in order of frequency of mention:

It should have room. It's the same size as the Chrysler New York wagon. If that's not big enough, you need a bus. →

"Station wagon has lots of room. I have four children. Wish it was a nine-passenger. I was talked out of a nine-passenger by the salesman. I am going to try to buy a third seat and install it myself."—Maryland cataloguer.

"Roadability. Has a stable feeling on all types of roads."—Maryland salesman.

"I like the full-time power steering. My wife is crazy about the way she can park it."—California maintenance man.

Chrysler Corporation is up to its eardrums in acoustics and it's beginning to pay off. →

"Combined torsion bars and ball joints make front suspension great."—Utah truck driver.

"Quiet running car."—Florida student.

"Low hood enables me to see without pillow."—Georgia airline stewardess.

"Trunk is large and easily accessible."—Ohio product designer.

"Most solid. Not one rattle. No noise on the road."—South Dakota salesman.

Heater push buttons are good, make sense. Can't say same for transmission buttons. Each year, there's a new pattern to learn. →

"Brakes stop better than the power brakes I formerly had on my Dodge and this Plymouth doesn't have power brakes."—Georgia insurance agent.

"Doors open wide to permit entering and exiting with ease."—Michigan housewife.

"Defrosters and heater best I've seen."—Massachusetts foreman.

Imitation Vitamins Starve Clothes Moths

CIGAR SMOKERS who carelessly drop ashes on rugs and say, "Let them be, they keep the moths away," are, out of laziness, keeping alive an old folk tale that definitely is false.

Entomologists who have experimented with imitation vitamins, called antimetabolites, which actually starve to death clothes moths and carpet beetle larvae—chief destroyers of textiles—say that cigarette and cigar ashes really attract, rather than repel, these insects!

The reason is that fabric-feeding insects depend on vitamins in woolen fibers and certain vitamins within the B-complex in order to grow. Clean fibers do not have enough food value to support them through a life cycle. But the required vitamins are added in all sorts of stains, perspiration and body oils.

"Even cigar and cigarette ashes yield traces of micronutrients that attract rather than repel clothes moth larvae," says Roy J. Pence, associate specialist in entomology, University of California, Los Angeles.

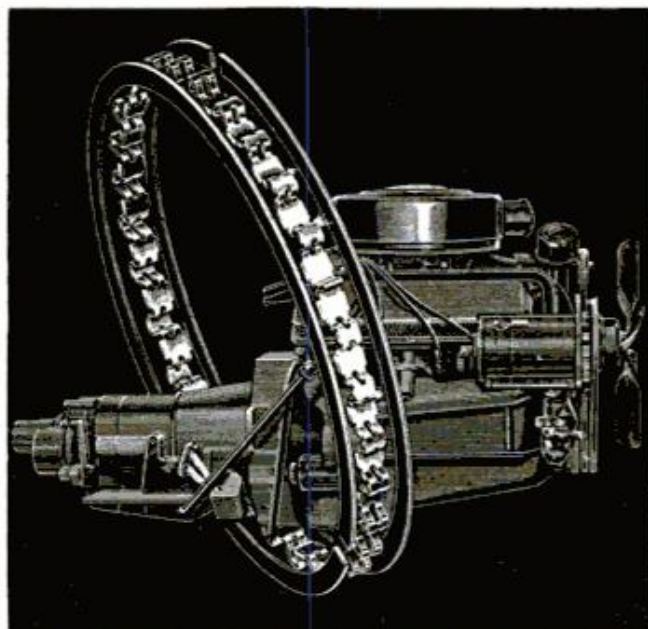
Antimetabolites closely resemble, in chemical structure, vitamins or other growth substances. But, by design, perhaps a single atom has been omitted or added where it does not belong when the substance is manufactured. It may, however, smell or taste like a vitamin to a fabric-feeding insect. But it will never serve the same purpose. When eaten it becomes antagonistic to the vitamin it resembles.

When antimetabolites in a water solution, for example, are sprayed onto fabric, the young larvae, driven to eat increasing amounts of the pseudo-vitamins soon die of either a vitamin deficiency or some other form of starvation, Pence says. The more-mature larvae eat sparingly of the treated fibers and then move off.

Effective vitamin antimetabolites are quite inexpensive, have long-lasting properties and seem to immunize the fibers against future attacks. In laboratory demonstrations, the richest of nutrients added to treated fabric did not yield suitable food for the insects. Also, when the treatment was applied over existing food and liquid stains high in elements of the vitamin-B complex, it neutralized the nutritional values in the stains. The antimetabolites, Pence says, probably will never be resisted by the insects.

At last, cigar smokers, we have a good five-cent moth repellent!

JULY 1960



STAINLESS STEEL OIL RING, U.S. PAT. NO. 2,789,872

Sealed Power has *Stainless Steel* ...the very best oil ring metal ever used!

Stainless steel oil rings deliver superior oil control—and for easily understood reasons. First, stainless steel resists the corroding and pitting effects of the gases of internal combustion engines. This means the oil ring surface stays clean. There is nothing for sludge or carbon to cling to. Thus the return oil vents stay open and you get the *long lasting* oil control you expect.

Second, stainless steel has no significant tension loss at engine operating temperature. This is unlike carbon steel oil rings. No tension loss assures proper tension of the side rails of the oil ring against the cylinder walls—even in tapered and out-of-round bores. Again, this proper tension is exerted for the entire life of the ring which means better oil control longer.

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Other Complaints

Sixth on the complaint list is poor quality of the interior finish, including upholstery. Here are quotations describing this and other complaints in order of frequency of mention:

"Very cheap ceiling and seat covering."—Illinois supervisor.

"Bad fit on upholstery."—Wisconsin plant manager.

"Speedometer taken out three times and it still rattles. Gas pedal rattles. Plastic cover over radio speaker rattles. If the rattle is in the book, I've got it."—Pennsylvania electronics engineer.

"Something should be done with rear-view mirror on dash. Front seat too low. I'm unable to see out of the mirror."—New York grocer.

"Car is really just a four-passenger, even though it's a four door. No foot room in rear. Driveshaft hump ruins foot space and seat for third person in either front or back seat."—Tennessee chemist.

"Transmission jumps with a thump from first to second gear. Dealer tells me it is proper to do so, but I am still not convinced."—Maine tile setter.

"Tailfins too high. In rear-view mirror it looks like someone is behind you."—California letter carrier.

"Tailfin sticks up in my side-view mirror. Must be careful how I back up."—Michigan fireman.

"Shock absorbers are noisy after 3000 miles and must be renewed. Others have same complaint."—Ohio secretary.

"In cold weather the back shocks are noisy until you run a ways then noise disappears."—New York carman.

"Every rainstorm or snowstorm the car floor is soaked. I mean really soaked. I know a convertible leaks a little but should it leak enough to have a large pool of water on the floor?"—New Hampshire cook.

"Trunk deck leaks. All welds are rough and paint comes off welded places."—Texas minister.

"Steering ratio too high. It takes too many turns to make a sharp corner. Rectangular steering wheel is difficult to hold when allowing wheel to spin back after a turn."—Ohio clerk.

"Steering wheel cuts view of generator and oil warning lights. Driver would not catch either of these lights during daylight."—Nevada locomotive engineer.

"Separate speedometer pod is utterly foolish. It is unattractive and no advantage."—Michigan minister.

"Speedometer is so located as to make you duck your head to read it, thus your eyes leave the road longer than they should."—Indiana soldier.

"Wish front seat was straight instead of inclined. One has the feeling of being in a semi-reclining position. I don't care what's in the sky! I would like to see the road."—Rhode Island housewife.

"Poor steering with passengers riding in third seat of station wagon."—Michigan surveyor.

"Difficult to read total mileage recorded. I have to crouch down in the seat to see it and I am not tall. Someone surely goofed on that."—Minnesota housewife.

"Automatic rear window in wagon constantly breaks down and there is no way to raise or lower it by hand when this occurs."—Pennsylvania merchant.

That is the story of the 1960 Plymouth as told by the owners—a story based on 1,678,825 miles of driving experience. For a complete summary of the percentages turn back to page 90. Next month, the owners will tell you about the 1960 Rambler. ★ ★ ★

More progress: Average 1927 car was 67 inches wide; average 1960 car is 77 inches wide. Average 1927 car was 162 inches long; average 1960 car is 208 inches long. Both seat four persons in comfort, six in pain. That's progress.

Patience, sir. Next year, the Plymouth folds its wings.

No!

Cornering with that rectangular wheel is like juggling a cigar box.

Miscellaneous:
Instrument panel is almost indecent, it's so jazzy. When the rectangular gold-flecked plastic steering wheel is added, it embarrasses anyone whose bow tie doesn't light up. Seats are a good height and comfortable except in the middle. Odometer scale is hidden by square steering-wheel, so are amp and oil warning lights. Couldn't see them if they came on. Best spot on the dash is devoted to a clock, which probably is not accurate anyway. A sweet driving car, but too big for relaxed city driving. Seems little reason for more expensive cars when this "low price" car is so deluxe. It's a good big car that, despite the boxing adage, is being hurt by a good small car (the Valiant).



Alloys of Ice and Fiberglas Form Arctic Building Material

Scientists at Ice Research Laboratory, Massachusetts Institute of Technology, added small amounts of Fiberglas to ordinary ice and produced an alloy 10 times stronger than ice. It has a tensile strength of 2000 pounds per square inch, allowing the men pictured above to support a heavy typewriter from a narrow bar of the material. A stick of the new ice alloy only a quarter of an inch in diameter can bear the weight of a man. Laboratory experiments are designed to learn how to use ice and snow for Arctic building material.



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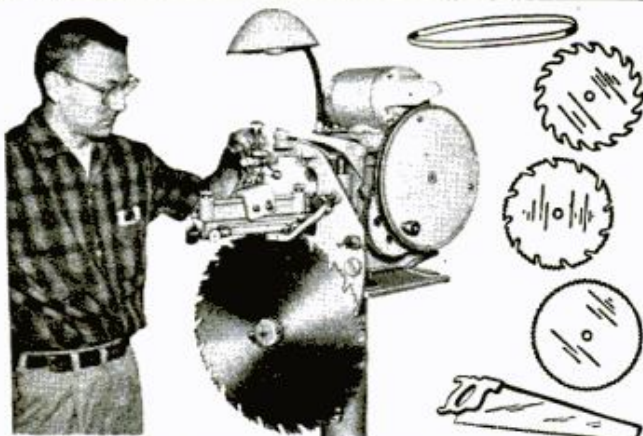


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If It Can't Be Repaired

(Continued from page 79)

"Pegging is a method we frequently use to join porcelain figures such as the fisherman we just received. We drill holes in the parts to be joined, then insert metal pegs in a base of shellac or other adhesive," Hirsch explained.

"Banding is one repair few other shops make. We repair crystal and glass goblets with this technique. We drill a groove around each of the parts to be joined. We wind copper wire from one groove to the other, covering the break. The wire is covered with solder which is ground down, polished and sometimes painted to match the decoration."

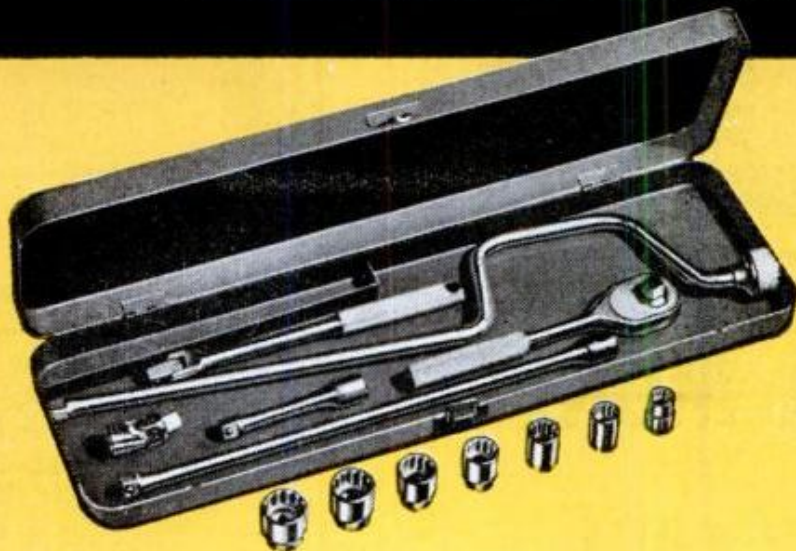
Hirsch broke off his explanation to greet a woman bearing a goblet that lacked a base, and a bottle stopper in three pieces. He told her he would locate a base of proper height. The charge was \$12.50 for banding together the stopper.

"Stoppers are a big item," he said. "Sometimes we get wine decanters or perfume bottles with stoppers broken off in them. There's nothing to get hold of to work them out. Sometimes a few drops of oil left in the top to filter down will ease them out. Sometimes we boil the bottle. We drill them out as a last resort, for this might break the bottle."

But anything can be fixed if the customer has the patience to wait and the money to pay for it, he said. The cost of repairs in the shop that day ranged up to \$30 for a cameo pin broken in three parts to \$75 for a silver lamp needing dents hammered out to \$1000 for a porcelain-and-metal bird cage that was rusted and broken. Though Hirsch counsels customers that unless they have a special reason for the repair, it might not be worthwhile to have it done, sentimental attachment often outweighs the economics involved. This was shown by the action of a woman who wanted an inexpensive plate pieced together. The job would cost \$12. On one of his many trips down Third Avenue—the home of many antique stores, second-hand shops and hand craftsmen—Hirsch found a set of plates identical to the broken one, selling for \$2 each. He phoned his customer, but she told him to go ahead with the repair, because she really wanted the old plate, not a new one.

The shop has gained its reputation, in part, because it is one place that will go to great lengths to get something fixed. This often involves a great deal of legwork, as illustrated by the repair of a 100-year-old cast-iron clock. Missing from its top was

(Continued to page 232)



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a figure of a knight. Hirsch suggested his receptionist might find such a figure in a Third Avenue shop.

"She started at 34th Street and walked to 59th Street. Then she walked over to Second Avenue and was coming back down when she located a cigarette lighter shaped like a knight. We bought it, sealed up the lighter, japped it to match the clock and it worked out just right."

Although 90 percent of the repair work is done in his shop, Hirsch believes it is just as important to know where to get materials and to find people who have old or odd skills as do the actual repair work.

"You often need specialists, he said. "When I started I found this business overwhelming. I didn't know how we could ever repair many of the things people brought in. One day we had to repair a brush set. The handles were of expensive silver, but the bristles were worn. Well, I had to find someone who puts bristles in brushes—that's a trade in itself." Over the years, he has found many such skilled men and women. "I make use of a daguerreotype restorer around the corner on 35th Street. There is a housewrecker at 87th Street who takes chandeliers, glass globes, tubes and lamps from old hotels, and I get parts from him. There's a lapidary in the downtown business district who provides me with stones and gems. I know a barometer worker in Greenwich Village: we do the wood restoring and he works with the mercury. A lady two blocks away reweaves tapestries, and I've located a dry cleaner who cleans old materials without ruining them."

One problem that plagues Hirsch is locating people who have the necessary qualities to take on any sort of job as staff members. "We can't get a replacement just by advertising and not many young people want to learn artisan work. Also, it's difficult to keep at this type of work very long. You can't work eight hours a day at it. Irena may paint for a half-hour on a project, such as the plaque, using a magnifying glass. The eyes get bleary if you work longer. The people who have done the best work are patient, and they've included men with such diverse backgrounds as an art professor between university posts and a retired sea captain. Skill is not necessary in the beginning but talent and patience are essentials." Of his present staff, Miss Marlewska did similar work in London, 76-year-old Kiokichi Sano had his own shop for a number of years and on retirement agreed to work part time, and Al Bosle has worked with glass for 35 years.

All day long, packages of "irreparable" items had arrived in the shop at 168 East

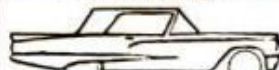
(Continued to page 234)

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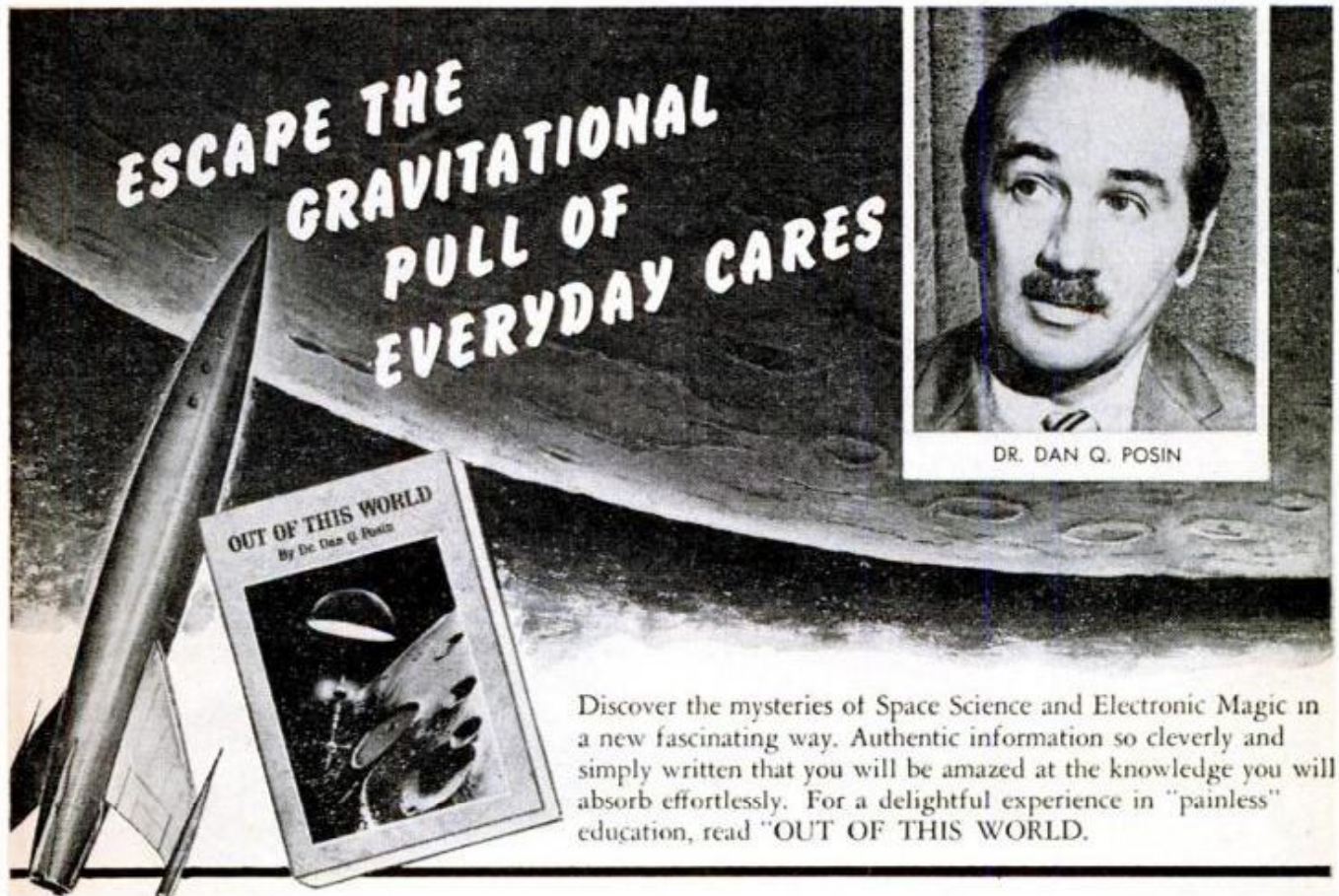
Meteorite Provides Clues To Solar System Origin

Elements that make up our solar system finished evolving 4950 million years ago, according to observations of a meteorite made by a University of California scientist. The meteorite fell in Richardton, N. D., 41 years ago. Dr. John H. Reynolds, associate professor of physics, reached his conclusion after studying traces of the rare gas xenon dissolved in the meteorite.

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33rd Street. They came from Beatrice, Neb., Battle Creek, Mich., Buffalo, N.Y. and elsewhere. And, toward evening, a woman came in, stunned.

"You've done work for me," she told Hirsch, "but this is out of this world." She laid a cracked china lamp on the counter. It was held together by adhesive tape. "The four-year-old twins finally broke this one, too."

"We can take care of it," Hirsch told her. "We'll fasten it with staples and paint them white."

When the woman left, appearing much relieved, Hirsch said, "This business suits my temperament. It's a challenge, and we like to help people. There's one repair, though, we don't try anymore—and that's fixing butterfly dishes."

These dishes, he explained, had an outer shell. Dried butterflies were placed on the bottom in an adhesive. A glass liner was placed over the butterflies. "If that glass breaks, there's no way of getting it out without tearing up the butterflies. We've done a few, but no more."

He took the cracked lamp to the filing room and, looking at the table of unusual items awaiting repair, he said, thoughtfully, "But if we ever hit on a way..." ★★★

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USAF, Air Research and
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Do You Know This Old-Timer?

(Answer to quiz, page 24)



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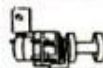


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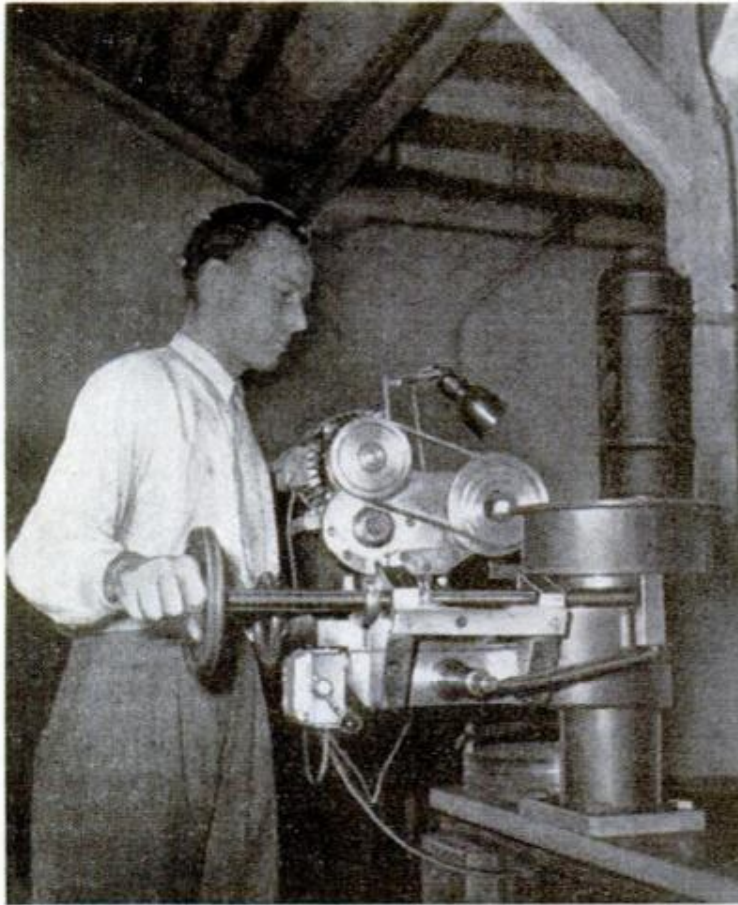
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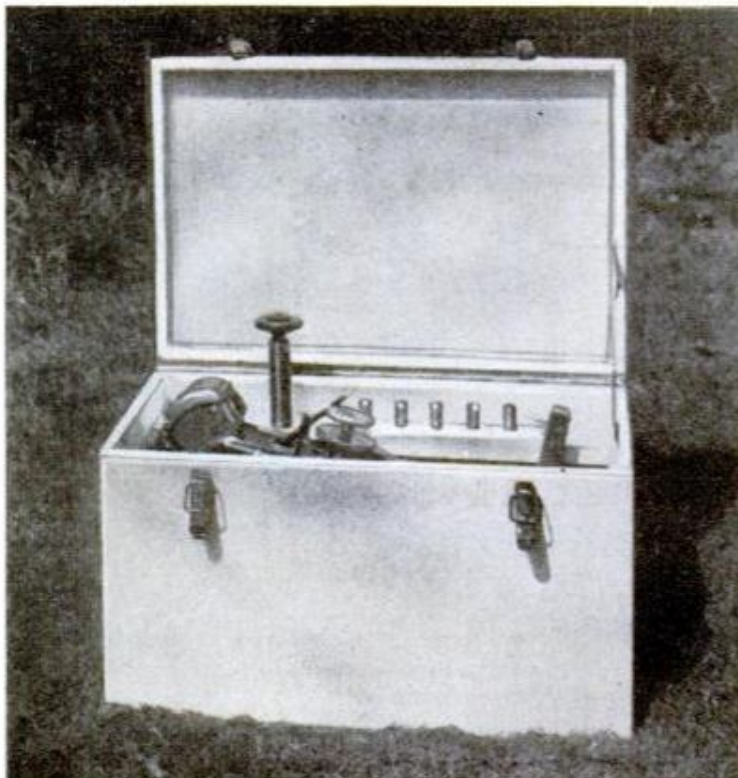
"First I added a little bit of red and it wasn't right, so I added a little bit of white, then..."

SEVEN-MAN DUTCH FACTORY MAKES PISTON RINGS

By J. Mortimer Sheppard



Six hundred atmospheres of pressure leakproof the slots in piston rings in the machine above, built for the plant. Below, the new "Rodel" portable shipboard grinding and milling tool



THERE IS AN international saying of unknown vintage that maintains: "You can't beat the Dutch" and Bennard Rottink of the village of Delden in Holland, personifies that saying.

The father (now deceased) of 34-year-old Rottink raised hogs successfully and was a man of some means. It was the elder Rottink's hope that his son would carry on with the hog business, but Bennard had more lofty ambitions; he wanted to manufacture diesel piston rings.

Friends told young Rottink that it was impossible—that piston rings are manufactured by large firms, and he had only limited capital. But he sold off the family's hogs, took a special course in a technical school, then returned to his home, set up a few machines and gathered a skeleton crew of men who had faith in his idea.

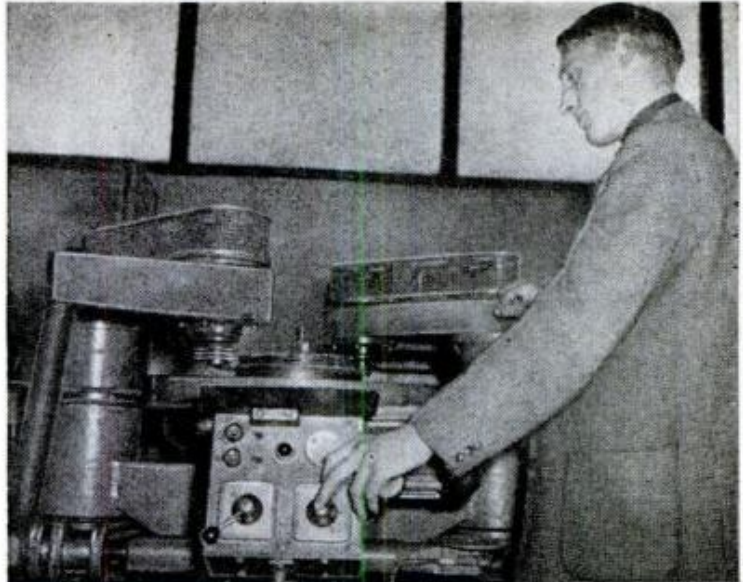
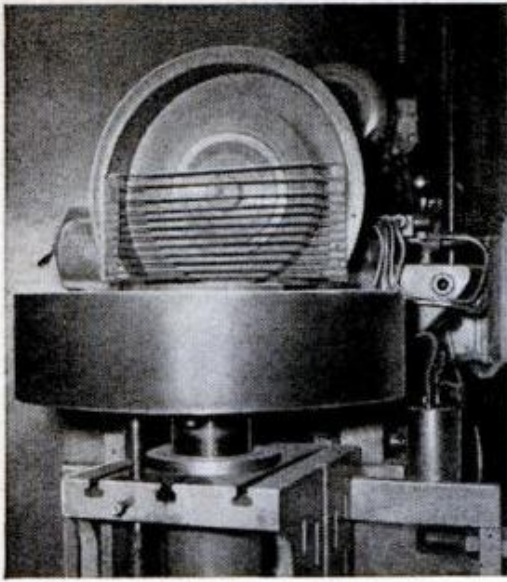
That was shortly after the end of the late World War when Bennard Rottink was barely past 21. Now he heads a small but profitable business housed in the same building in which his father fattened hogs for market.

Three of the Rottink machines were made right in the tiny plant by his own men. These include a grinding machine for surfacing piston rings, a machine for making leakproof slots, and another that cuts slots for scraper rings. The little firm makes piston rings up to 32 inches in diameter.

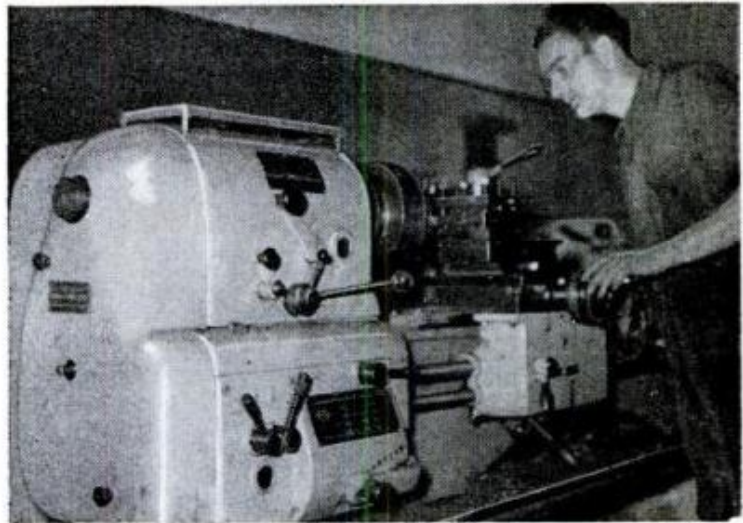
The company offers to make piston rings to order and guarantees delivery within 24 hours. This remarkable service brings business on rush orders from ships that have urgent need of rings and are willing to pay for speed in delivery so that valuable cargoes will not be delayed and schedules upset.

Working at full capacity, the little Rottink factory can turn out a thousand piston rings per week in steel, bronze or cast iron. Although the total staff of the factory numbers only seven men besides

POPULAR MECHANICS



Above, special grinding machine built for surfacing piston rings. Above right, a milling machine built in the tiny factory for handling oil rings from 4 to 32 inches in diameter. Below, a standard metal lathe, not for ring-making, but for the building of special machines and tools used in precision piston ring manufacture



the owner, the crew often works all night on rush orders. "Normally," Mr. Rottink told this reporter, "we work a 45-hour week, but 60-hour weeks are not unusual for us. My boys are not clock watchers, and when there is a job to be done, they simply get on with it."

Cottage industry is usually confined to women's work in sewing, knitting or weaving, and rarely found or expected in such a line as the manufacture of piston rings. Yet that is exactly what this business is—a small "cottage" affair with the factory nothing more than an extension of the owner's home. And as might be expected, there is a "family" attitude in the work. On jobs that call for night work, the working crew will troop into Mrs. Rottink's kitchen for a midnight snack, or she will bring a tray of sandwiches and a big pot of coffee into the factory. The Rottink home is the center of their activities; there are celebrations on the Queen's birthday, at Christmas, and other holidays, and the men bring their wives and children to share their fun in the Rottink home.

While your reporter was visiting the Rot-

tink factory, a wireless message was received from a small freighter in the North Sea that was heading for the Dutch port of Rotterdam. The message stated the date and hour that the ship hoped to reach Rotterdam, and went on to explain the exact dimensions and number of piston rings that would be needed. Rottink's men had 34 hours' notice on this job. "The rings," Mr. Rottink stated, "will be on the dock when that ship pulls in."

Two years ago Rottinks developed a machine which they call the "Rodel," a portable attachment for lathes in the machine shop of ships that will do a first-rate milling and grinding job. The machine has ten speeds, operates at from 350 to 6000 r.p.m. and is priced at 1200 Dutch guilders or about \$350. Rottinks are receiving orders for their Rodel from many ships under numerous flags, but piston rings constitute the little firm's main line of endeavor.

At 34 years of age, Bennard Rottink has achieved a modest but growing success in life. From pigs to piston rings is quite a jump, but when a Dutchman sets his mind to anything, he sees it through. ★ ★ ★

An Eye on Space

(Continued from page 73)

year, it has been calculated, the Sun's light is able to push the satellite off course by one mile.

We have said that the satellite's radio signal is unmodulated—just a single monotonous wave. But this is not exactly so. The signal changes very slowly as the skin temperature changes. The lowest temperature so far indicated by this effect is 40 degrees F., while the interior temperature is a rather constant 70 degrees.

The newer satellites have radio arrangements which enable them to send information, instead of having it inferred from the satellite's motion. Thus, the findings relative to space dust, charged particles, temperature, solar energy, magnetism, all can be made to change the carrier wave of the transmitter, each in a special way, which can then be detected at home. How is this done? One way is to have a series of low-frequency wave-makers (oscillators), each triggered by one effect, such as the impact of tiny meteorites. And, as one of these oscillators is thus activated, it puts its effect upon the real carrier wave. But each of these oscillators has its own special frequency, so we see that the same carrier wave can be modulated in a distinctive way by each of the oscillators. The distinctiveness is preserved in the carrier no matter how far it travels, and the unscrambling is easy to achieve at home, either by visual examination (as on an oscilloscopic display), or on a punched tape.

The various oscillator circuits for individual experiments may be called "channels," but, as we have said, only one carrier wave is transmitting.

The input works like this, let's say for a temperature experiment:

The temperature of a wire ("thermistor") is changing; this changes its electrical conductivity; this effectively changes the frequency of the temperature-experiment oscillator.

This in turn changes the form of the carrier wave.

Of course, there usually exists at least one more transmitter, operating at another carrier frequency. This may be called upon to transmit stored information in a satellite; that is, findings which were recorded on a tape. The storage section may be triggered on command from the home base, on Earth. And still another transmitter may be always broadcasting so that the satellite can be tracked continuously. But, generally, a few transmitters with many channels suffice to inspect the universe. ★ ★ ★



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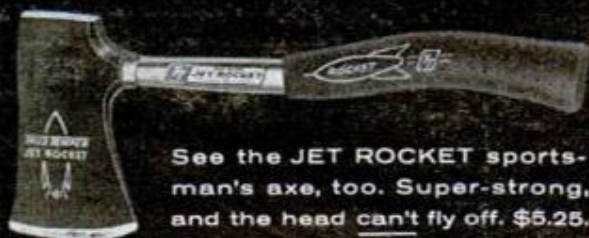


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Engineer Ants Give Lessons In How to Live Underground

By Bert Reichert

SCIENTISTS are studying a species of mound-building ants to learn how they survived the destruction of their prairie environment in southwestern Wisconsin. They believe this information could be useful in teaching man how to live and work underground — knowledge that could become important in this age of increasing population and spreading industry.

Having somehow survived the invasion of man and his plows, the mound-builders now occupy a strip of virgin land, known as Ipswich Prairie, along a railroad siding near Platteville, Wis. The strip is about a mile long and averages the width of a large living room but the ants remain there, refusing to enter cultivated fields only a few feet away.

Known to science as *Formica Ciner Ciner*, the ants build mounds that sometimes reach a height of 16 inches above ground. A man-sized equivalent of the mounds in construction would be something like 400 feet high and 500 feet in diameter. But the above-ground section is only a small part of the colony. Underground, secure from the elements, is a honeycomb city that may go down as far as eight feet.

Russell O. Wagner, associate professor of biology at Wisconsin State College, Platteville, and his associates counted 159 ant mounds inside the area of a city lot and have counted more than 6000 inhabitants in a single mound colony. Each colony has a queen and some winged ants capable of reproduction. The other inhabitants are workers whose job is providing food and carrying on duties necessary for survival. In warm weather, many carry the pupae of new ants out into the sunshine each day and back inside when the sun goes down.

When a mound is disturbed or damaged, the ants apparently become confused. But not for long. As if in obedience to the commands of a single intelligence, they quickly regain their composure and begin making necessary repairs. Within a few hours the mound is again fully covered and the damaged runways inside are repaired and again in use.

Although they always seem busy, the ants do no unnecessary work. In warm weather, their occupied quarters may extend only a short distance underground. But with the approach of cold weather, the ants wisely go deeper to quarters below the frost line.

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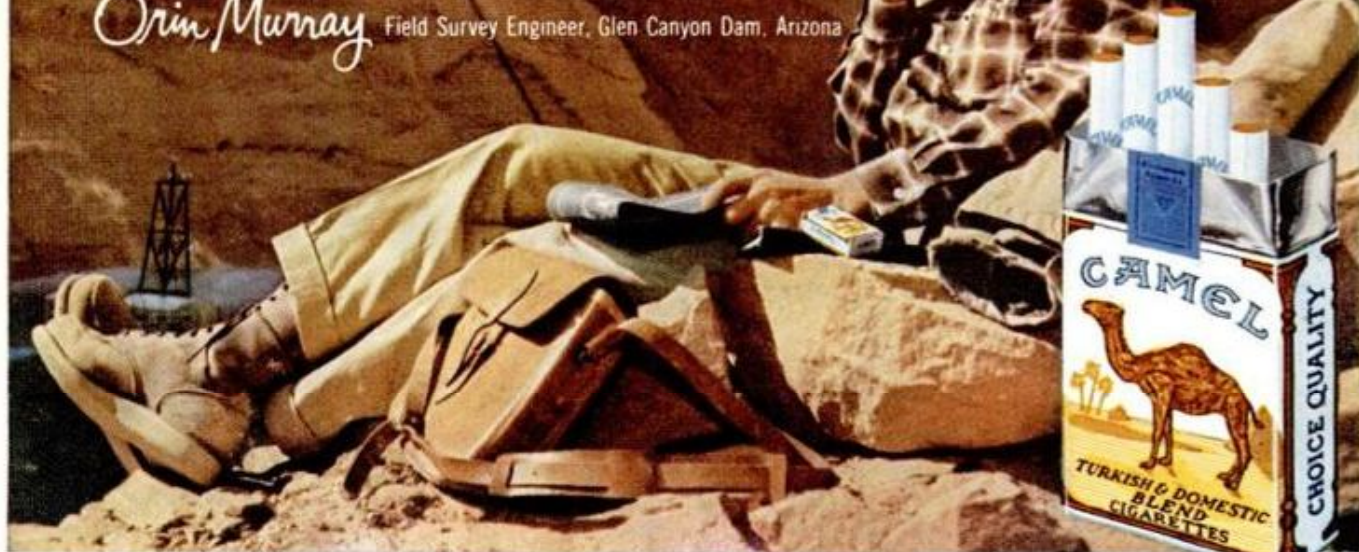
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