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DEC. 1961
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to serve



... (and especially) to smoke

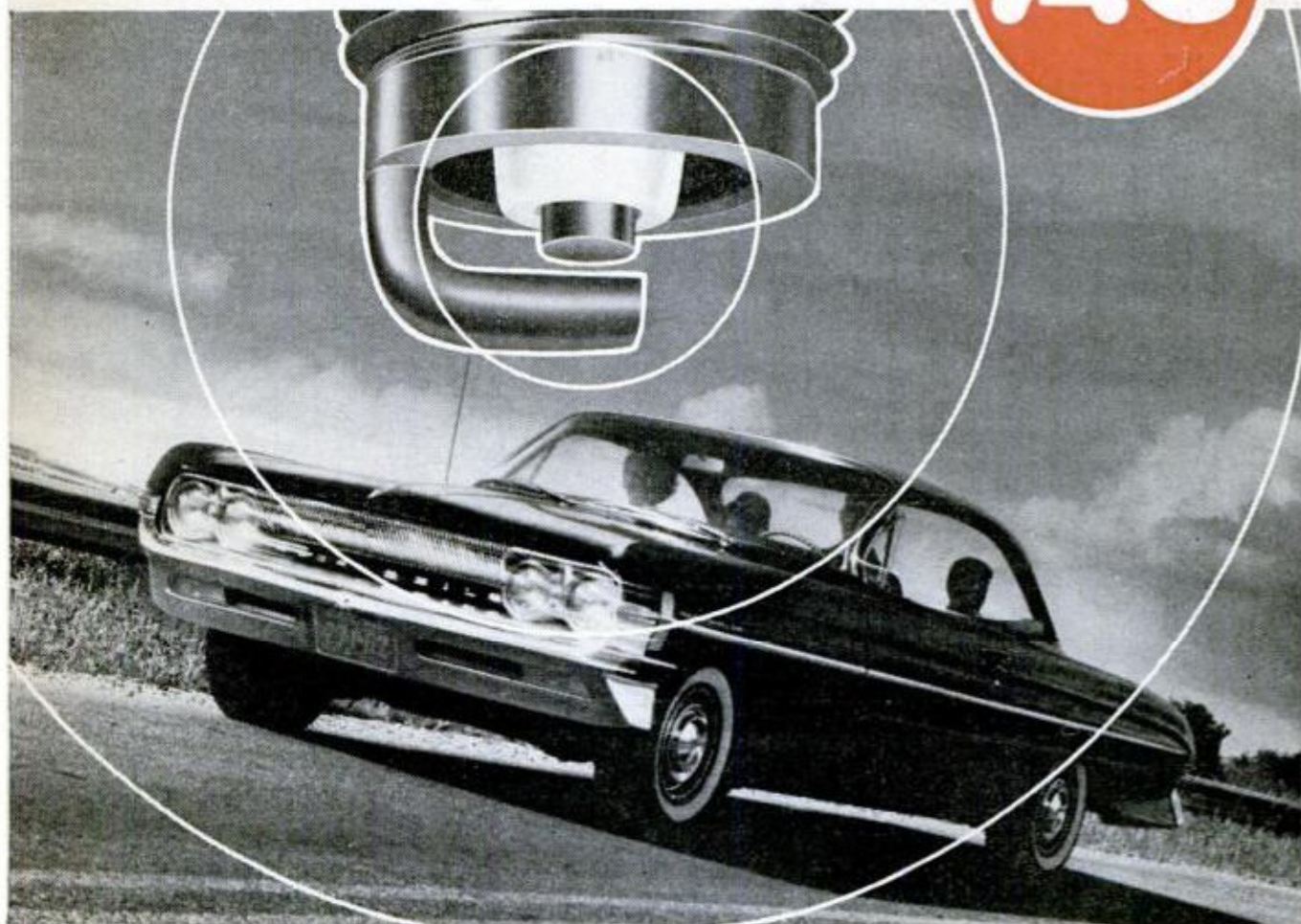


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sure of the insulator tip and electrodes to combustion gases for "self-cleaning" action. What's more, these extended tip spark plugs are for use in certain cars only. For those cars that require them, AC provides extended tip design with the exclusive Extended Shell that gives added protection against "drowning" and insulator tip breakage.

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DECEMBER 1961

1

If he's particular,
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he wants

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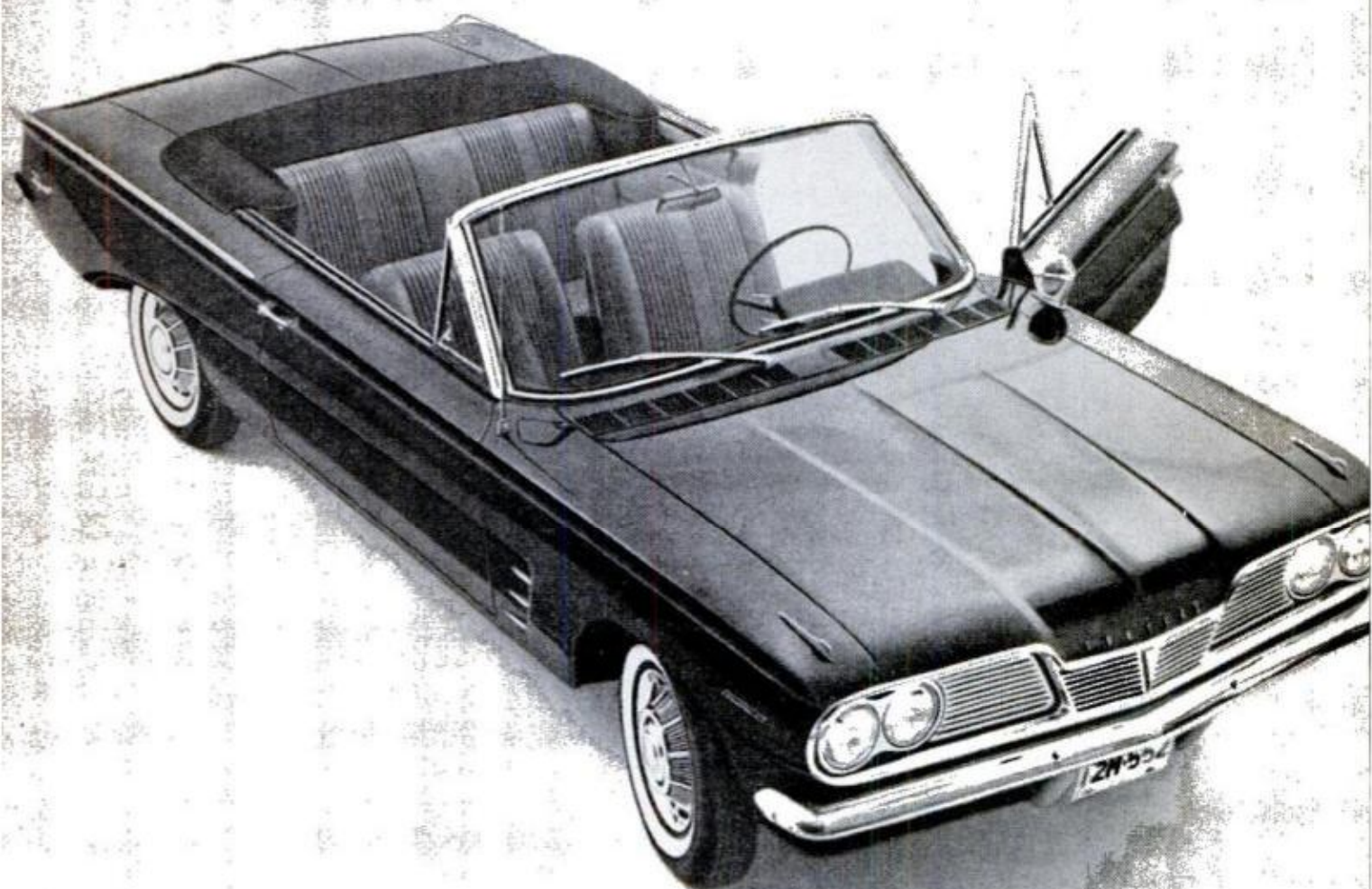
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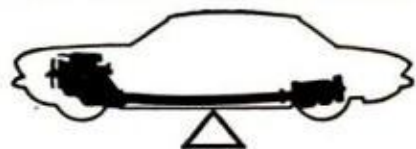


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DECEMBER 1961

VOL. 116

NO. 6

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PM's 60th Anniversary Special!

NEXT MONTH—Behind the headlines and under the hoods of the 1962 cars, as the driver, the engineer and the serviceman see them. Complete find-by-color specifications. Drive tests on Chevy II, Ford Fairlane and the new slim Plymouth. Famous dream cars undergo analysis. Special tests on remarkable new metallic brake linings. Beginning in the same issue: Plans for your own family fitness gym.

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Smart ski shopping—page 102



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Sugarplum house—page 150

Tool of 1000 angles—page 182



This One



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Up to 10 different types of instrumented information plus the human voice can now be transmitted simultaneously through the sea.

Using a cableless system that combines sonar and telemetry, a diver, for instance, can have his physical reactions and his voice monitored by the ship on the surface. Buoy-type relay stations can be used to relay information via radio as well.

The system has wide application in undersea biomedical problems, oceanography research and geophysical experimentation for oil exploration. Transmission can be reversed and used as command system to control a subsurface unit, similar to a drone in air.

The cableless underwater "news" method is a development of the Pacific division of the Bendix Corporation.

Man on the Moon Research Will Be Handled in Houston

Man's flight to the moon will have its beginnings—in the U.S.—at a \$60,000,000 manned-space-flight laboratory due to be built in Houston, Tex.

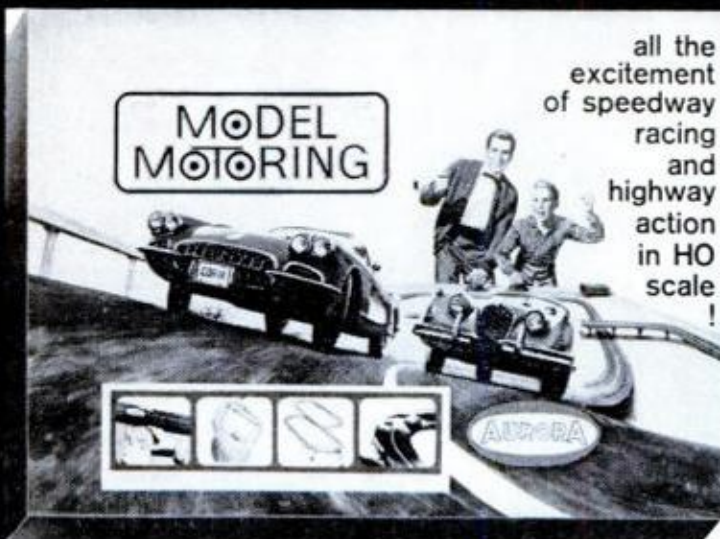
The center will be charged with placing men on the moon. It will be used to design, develop, evaluate and test the craft for Project Apollo, train the crew that will fly the missions and then control the moon mission.

The center will contain a flight project facility, an equipment evaluation laboratory, a flight-operations facility and an environmental testing laboratory.

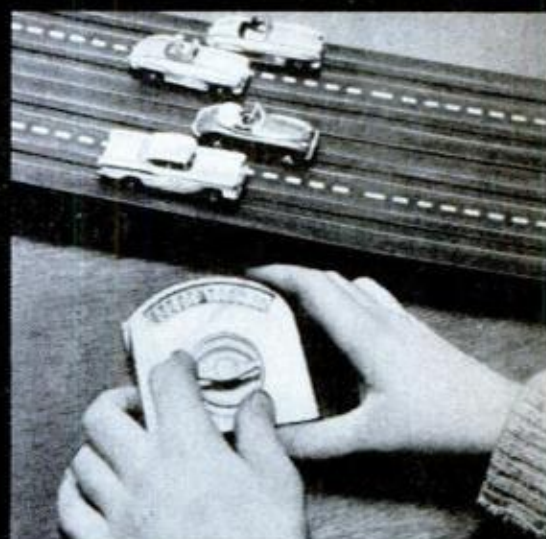
Missiles fabricated at the Michoud Plant near the mouth of the Mississippi River at New Orleans and spacecraft tested at the Houston center can be shipped by water to Cape Canaveral, where the spaceships are scheduled to be launched.

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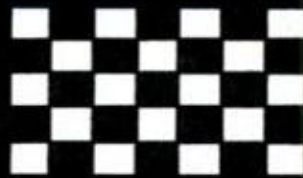
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Over the editor's desk

Debating Dean's Machine

For over a year, I have studied the possibilities of the rotating mass. Had just given up the idea when I got my September PM, telling me that Norman Dean had invented it. I predict almost unlimited speeds for this machine.

Denver, Col.

JOHN JENSEN

... Although I haven't gotten around to getting a patent or completing a model, I, too, have been working on this same theory since 1943 ...

Upper Darby, Penna. ANTHONY CARRELLI

... It is nothing new inasmuch as I built such a machine in 1953 ...

Park Rapids, Minn.

EVERETT T. DEMOSS, JR.

Whom are you trying to kid? Norman Dean's machine never lifted itself in its entirety and never will. The principle he harnesses is neither new nor sophisticated. He simply employs a friction ratchet.

Beverly Hills, Calif. WARNER CLEMENTS

We are passing along various comments received on this article to Mr. Dean, and hope to have answers to some of the questions readers have raised in time for an early issue.

Higher Body

Recently made this sidewalk sports car for my 11-year-old son (I had been saving the plans since the August 1955 PM). I made the body higher and of 1/8-inch tempered Masonite, venting the engine and



adding an air grille in front. Am using a 1.6-hp. engine and a pulley ratio that permits 10-12 m.p.h.

Miami, Fla.

WM. C. WHEELER

Peachy Tip

It was a dark and stormy night. I decided to get out of bed and close a window. Alas, the electricity was off. There was a candle on my bedside table but, alas, no candlestick. An empty beer bottle would have served but, alas, I'm an abstainer.

Remembering the hint (p. 218, Sept. '61 PM), I went to the pantry for the suggested can of peaches. There were tomatoes, apricots, beets, soups but, alas, no peaches. Nothing left but to brave the storm and hie me to the corner grocery. In raincoat, rainhat and rubber boots I went. The grocer came downstairs in his pajamas to satisfy my urgent request. Alas, he was fresh out of peaches.

I apologized for troubling him, went home and tried some other fruit in a can. Now all I needed was a rubber band. My garter was too big, so I woke my wife to borrow hers. Alas, they were straight elastic, with a clip at one end to grip the stocking and the other end was attached to, well, never mind. By this time, the electricity was on again. Thanks for the tip anyway.

Maitland, Mo.

TIMOTHY SHAY

It still must have been a peach of a tip to have provoked such an entertaining story as yours, Tim.

Cutting Remarks

The VW on page 70 of your July issue could well be mine, as the same thing happened to me in August, 1960. I attempted to pass a truck when the windshield exploded (or seemed to) cutting me on the face and hands. My wife and four-year-old son in the front seat also suffered many cuts about the face, head and hands. The circular area missing from the glass in your photograph also fell out of my windshield down into my lap, gouging the steering wheel as it did so. The inside of the car was literally covered with bits of glass as were my two daughters in the back seat.

Fortunately, both my wife and I had on glasses which kept us from serious eye injury. The lenses and frames of our glasses were cut and scratched by the flying glass. Never again will I purchase a car that has tempered glass.

Nashville, Tenn.

VIC DURRANCE

Did you buy your car in Europe, Vic? U.S. safety codes call for laminated glass windshields and even imports sold through

(Continued to page 10)

Are You "STANDING STILL" on your job?

**SAME OLD
JOB...
SAME LOW
PAY..?**

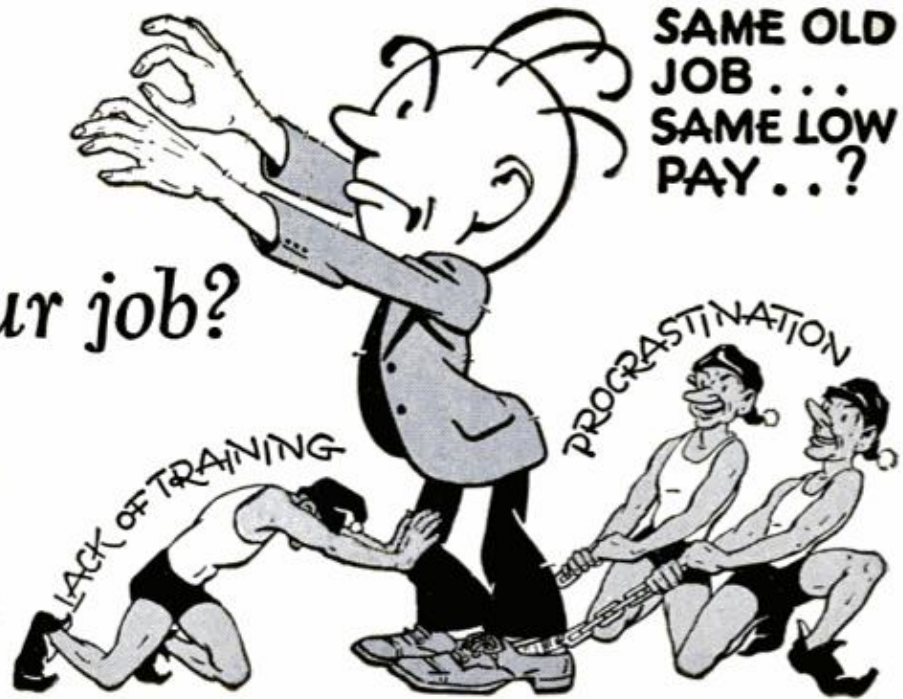
You can justify a real pay raise and a better position—by making one simple move—the move that opens the way to more earnings and promotions—*practical training.*

If YOU are "standing still" on your job—no promotions—only token increases in pay—then you had better do something about it. You know that if you are untrained, your chances of getting ahead are slim. **NOW IS THE TIME TO PREPARE.**

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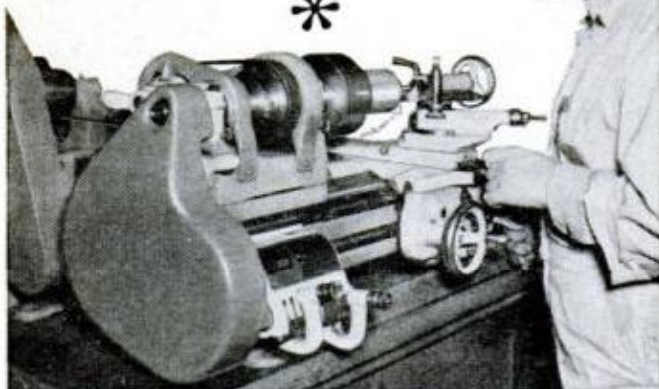
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regular dealers in this country are not supposed to use tempered in windshields. The circular glass insert you mention was not tempered—a practice followed on many European cars to give drivers a quick "see-through" hole when the windshield shatters.

Kitchen Chair for Pilot?

Been studying Korta's fine paintings of flying machines (June PM). In 1916 I saw the Wright machine that Wilbur flew at LeMans. Mr. Korta has apparently introduced a bit of sophistication in the 1903 machine that didn't exist even in the 1908 machine—the streamlined struts. The struts on the 1908 machine were rectangular and broadside to the wind. The pilot's seat was a kitchen chair with legs sawed off and bolted to the top of the lower wing. Northport, N. Y. **DABNEY HORTON**

According to the National Air Museum, the struts on the 1903 plane were tapered. It had no seat and the picture made at the moment of takeoff plainly shows Orville lying face down on the lower wing with the engine beside him. Later versions did have seats, and your impressions of the 1908 version are undoubtedly correct. But our painting of the original 1903 plane is accurate.

Editors, Readers and People

You might be interested in some more unusual ideas for articles we have received from readers lately. They include requests for plans for building an Italian gondola, a bubble-making machine, a wind generator, a starting box for greyhound racing, a Finnish sauna or steam bath and a driveway turntable. If any of these ideas tickle your fancy, let's hear from you.

On a more sober note, Lowell Baker of the National Association of Real Estate Boards (NAREB) points out that we did not distinguish, in our September article on selling your home, between active members of NAREB who may call themselves realtors and nonmembers of NAREB who qualify as real estate brokers but cannot call themselves realtors. He also pointed out that the sales form reproduced in the article which carried an NAREB trademark is not generally circulated.

Our favorite letter from recent mail was the one which was addressed to "Dear Editors or People." Perhaps we have been using the wrong signature on this column, when we signed off with "The Editors." It might be a better idea to sign off with—

*The People
who edit your magazine*

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A CTI student spends a considerable part of his time training with kits we send. The 20 field-type projects provide him with experience. Due to the practical nature of this exclusive training, many students soon do repair work in spare time for profit. They make calls on their own, or develop servicing arrangements with local distributors and contractors. Their earnings often pay the cost of tuition before graduation.

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Tune in on the inventors

The lone inventor, with or without help, still plays an important part in our technology, though. According to the Patent, Trademark and Copyright Foundation at George Washington University, he is responsible for almost 40 percent of the patents issued, and is able to market 60 percent of his inventions. That figure should be encouraging to inventors looking for manufacturing and marketing help. Here are three PM reader-inventors who'd like some leads:

An automobile saddlebag won patent No. 2,979,098 for Mrs. Willis B. Greaves of Atlanta, Ga. Her device is a twin bag which hangs, fore and aft, over the front seat of a car, with pockets for all the odds and ends that clutter up the average car. It folds to glove-compartment size when not in use.

Pick-N-Chicken, a useful toy on a wheeled shaft which picks up items from the floor with its beak, won patent No.

2,996,836 for Justin Tieri of Grand Rapids, Mich. He claims it'll teach the kids to be neat, and to help mother by keeping their things picked up.

A neat double bend in an otherwise-ordinary wire clothes hanger is pending a patent for A. C. Patch of Topeka, Kansas. The simple improvement bends trousers twice, holding them firmly in place so they can't slip off the horizontal bar.

Both profit and pitfalls exist in the business end of inventing, and a new booklet, *Patents for Management*, by patent attorney Worth Wade, gives information on both in layman's terms. Though intended for management use, the book contains material useful to anyone interested in commercial invention. Some typical chapter titles are, "Origin and Nature of Patents, Patent Rights of Employee and Employer, Patent Licensing, Proper and Improper Use of Patents, and Design Patents." The booklet is offered at \$5.50 by Advance House Publishers, Box 334, Ardmore, Pa.

Copies of the original patents may be ordered for 25 cents each from the Commissioner of Patents, Dept. of Commerce, Washington 25, D. C.

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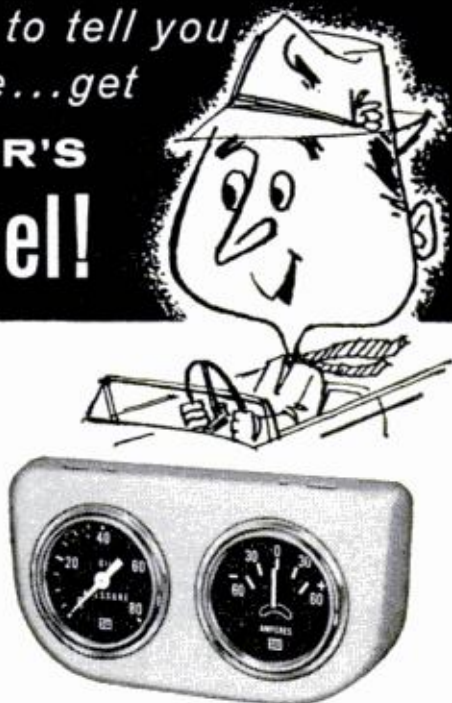
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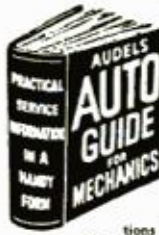


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(Continued to page 20)

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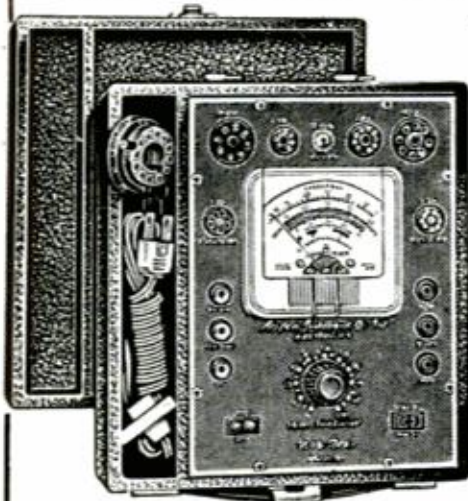
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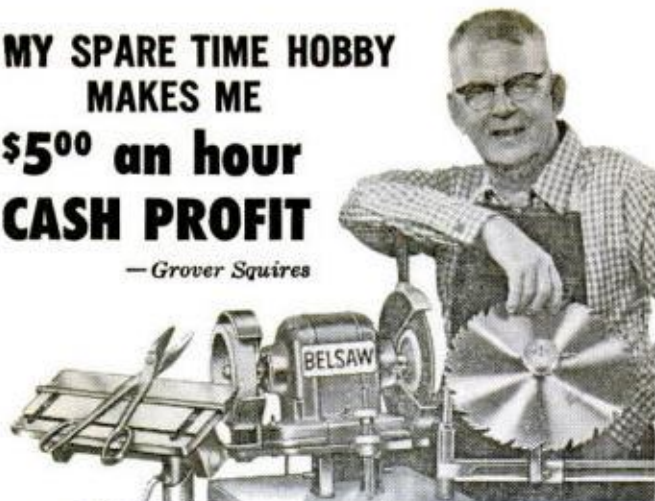
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**Sidelights
on aviation**



WILLIAM PIPER, left, turns Cub over to Dr. Donald Shelley of Ford Museum. Right: PM editor Jim Biery

TIME: September 16.

PLACE: Henry Ford Museum, Dearborn, Mich.

OCCASION: William Piper, the 80-year-old president of Piper Aircraft Corp., was presenting a J3 Cub to the Museum for its display of planes that made history. This was a result of the Cub being included among "The Twelve Most Significant Aircraft of All Time" in the June issue of *Popular Mechanics*.

As we waited for the ceremony to start, Mr. Piper spoke of the future for light planes. I was sitting in, that sunny afternoon, for PM aviation editor Kevin Brown, who was pursuing a story in Japan.

"There is a tremendous job open for privately-owned planes, if we are to have a complete system of air travel in the U.S.," he said. "Big planes, which must go from one city to another, can never give us full service. The thing holding back private flying, though, is the availability of places to sit down wherever people want to go—in a state park, at a fishing hole, close to town."

Mr. Piper said this situation, brought on by a reluctance to build expensive, two-directional concrete runways and staff small airports, could be resolved by building small, unmanned landing strips.

"We now have tricycle landing gear," he said. "This means only a strip, say 100 feet wide by a half-mile long, of trimmed grass, is needed. When the nose wheel touches, the plane is down, and is rolling ahead."

(Continued to page 24)



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With the old tail-wheel landing gear, planes got pushed around by wind and it was necessary to build runways a mile in each direction."

Mr. Piper added that he advocates many small strips with, perhaps, only one in ten being operated for plane maintenance.

Recalling that more than 30,000 Piper Cubs were sold after being introduced in the 1930s, and that 75 percent of U.S. pilots trained in them in World War II, he commented on the failure of private flying to boom in the direction predicted after the War—a plane for everyone.

"That was a big year in aviation—1946. The industry turned out 31,000 planes; some 30,000 war surplus planes were dumped on the market. Next year was bad. When Uncle Sam stopped paying the GIs, they stopped coming out to the airports. Also, we'd broken the market for light sports planes.

"The planes we're building now—for business, for families—are three and four seaters and have more utility. I'm convinced there is a wonderful future for the family airplane. It won't be low-priced, possibly there will be a lot of renting, but people will fly them if those strips are put down so they can go where they want to. . . ."

The ceremony started and, naturally, there were references to Mr. Piper—who began piloting at 50—as the "Henry Ford of Aviation." And why not? He has so far produced the closest thing to a flying Model-T—the Cub: one of the 12 most significant aircraft of all time.—James Biery



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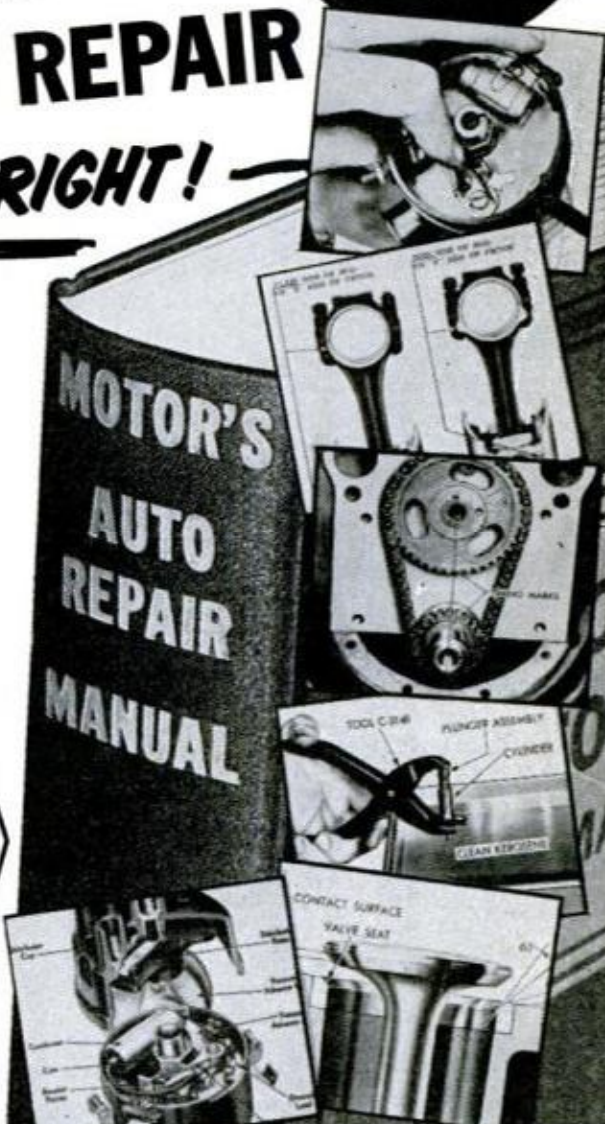
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Science overseas

By William Kreh

Do sheep chomp, munch or chew? Do they bolt or savor their meals? Agriculture scientists in Australia are attaching radio signaling units to sheep jaws to find answers to these questions, to learn more about the sheep's grazing habits.

Living without light was investigated by nine Italian scientists who recently spent a month 2650 feet down in a cave. When they came out, their pulse rates were above normal, they were tense and nervous and their sense of smell had become more acute. Knowing the effects, they now are searching out causes.

A lost inch has been discovered by Swedish researchers. They found that a pilot ejected from a jet plane may be an inch shorter when he lands than when he took off because the jolt presses his vertebrae together. It's temporary, however, as the vertebrae eventually work back to normal.

Everybody's throwing things into space. Latest entry in the rocket pitching contest is Japan. Scientists at Nagoya University, Tokyo, hope to send a monkey into space late next year, and are training a one-year-old Macaca, for the flight.

The Japanese rocket program—growing rapidly—is concentrated primarily on space biology and space medicine. A launching center at Kogoshima on the Pacific coast is under construction and a new rocket capable of hurling instruments more than 100 miles high is being built.

Aerial prospects from Chile's Institute of Geological Research, using low-flying electronically equipped planes, have found a rich vein of iron ore 90 miles long beneath the sands of the Atacama Desert in the north part of the country. The hitherto unknown deposits have been estimated in the hundreds of millions of tons.

Remember flying saucers? Now they've shown up behind the Iron Curtain. The newspaper *Pravda* disclosed widespread reportings of saucer spotting in the Russian interior.

One photograph, ostensibly taken of a flying saucer, was announced to be a fake by the Soviet Academy of Sciences. The

Kremlin says the flying saucer rumors are spreading too wildly and that the populace should stop reporting them "no matter how interesting they do seem to be."

The Russians, as yet, have not claimed they invented the saucers.



Instant Easter eggs. The German Information Service reports that a German professor on a trip to South America discovered that Araukanian chickens, named after an Indian tribe, laid eggs with blue shells. He took some of the chickens home, crossed them with German chickens and raised offspring that laid eggs with green shells. He is continuing his experiments hoping to broaden the palette of poultry colors.



It isn't what penguins say so much as how they say it, according to scientists back from a study of penguin communications in Antarctica. They found that the birds recognize each other by their voices. Thus, the Adelie penguin always rejoins its last year's mate at the beginning of each new mating season and continues doing so the rest of its life. Tests with tape recordings indicate the bird does this by distinguishing voices among its flock.



Golden-green coal? English housewives soon will be able to buy coal colored to match their living room drapes. National Coal Board technicians have perfected a process to dye artfully shaped lumps gold, silver, red, purple or green for use in fireplaces.



A 22-acre antenna will be part of a new radio observatory for studying electron densities of the upper atmosphere and outer space. The Jicamarca Observatory is being built 17 miles east of Lima, Peru. This location was chosen by the sponsors—the U.S. Bureau of Standards and the Instituto Geofisico de Huancayo—because, in that area, the lines of forces of Earth's magnetic field are nearly horizontal, a condition that makes possible experiments that can't be performed elsewhere.



Television and some radar and radio, could be knocked off the air for as long as a year if a supernova, or star explosion occurred around 10 light years from Earth, says C. M. Cade, a British scientist. There are three stars within 16 light years away that could develop into supernovae—Sirius, Procyon and Altair.

Cade says that even an explosion within a 1000 light years of Earth would set up so much cosmic radio noise that it would have serious effects on communications. ★ ★ ★

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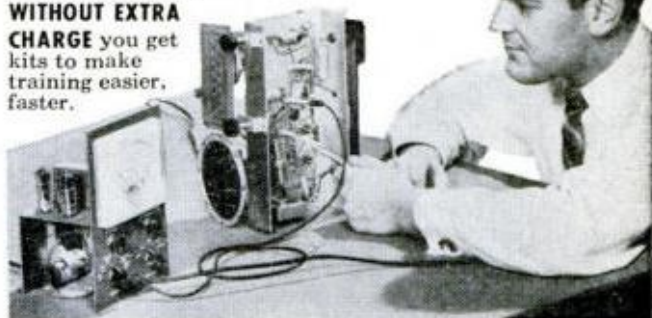
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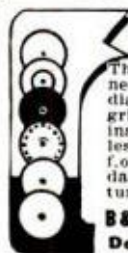
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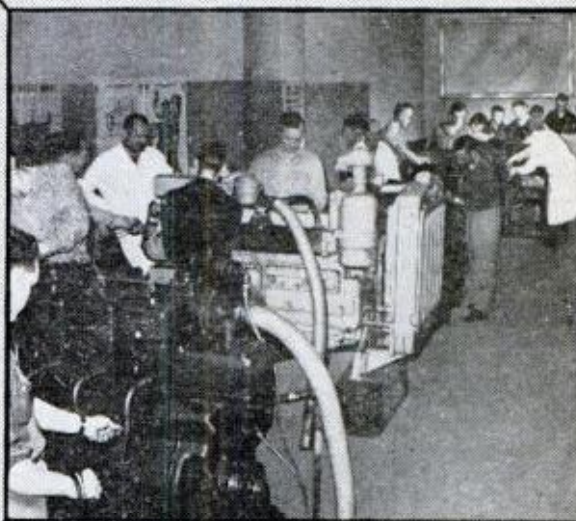
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Items from all outdoors

PM's baseball detectives turned up an interesting sidelight during their investigation of the "jackrabbit baseball" (see page 82). They picked up a hot lead that the ping-pong ball ain't what it used to be, either. Some table tennis players and sporting-goods dealers claim that the modern ball is neither as lively nor as durable as the ball of a few years ago, though the manufacturer of the tournament ball insists that it's still made with the same materials and by the same processes. The argument seems to be as hot as the baseball controversy was this summer. Anyone interested in a full-scale investigation?

Russell Tinsley's survival article in the August and September issues of PM aroused a lot of interest among PM's outdoor readers. Several asked for sources of information on wilderness survival techniques for the nonwoodsman. The same mail brought a letter from Mr. G. C. Stanley, of Orlando, Fla., who recommended George and Jacques Herter's *Professional Guide's Manual, volume one*, as the best book he'd seen on the subject.

I found a copy of the 260-odd page book, originally written for the North Star Guide Assn., and spent an interesting week end browsing through it.

I'm inclined to agree with Mr. Stanley — the book covers subjects I've never seen in print, and should make a good guide for anyone suddenly stuck with outdoor living.

It is divided into sections on fishing, hunting, camping, cooking, boating, first aid, clothing and dogs, and is crammed with such subjects as how to make jerky and pemmican, how to get rabbits out of their burrows, how to fish through thin ice, how to make "brush butter," how to eat algae, and a thousand other things.

Between useful sections you'll find such interesting odds and ends as the odds on twin births among elephants, the Kodiak bear's method of catching salmon, and how to get a dog to drop a retrieved bird when he won't let go. (Blow in his ear.) (But pick a friendly dog.)

The manual is published by Herter's, Inc., of Waseca, Minnesota, and is available by mail for \$1.60.

Dick Kieckhefer

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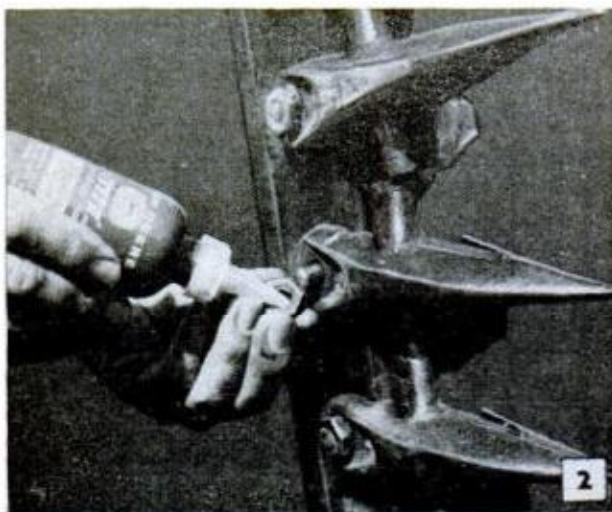
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2. LIQUID LOCKING COMPOUND for studs and bolts permits selecting the amount of locking friction you desire. Loctite sealant remains wet while exposed to air. When confined between close-fitting parts, metal catalyzes material into tough, plastic bond. Makes any threaded part self-locking. Comes ready to use. American Sealants Co., Hartford 11, Conn.

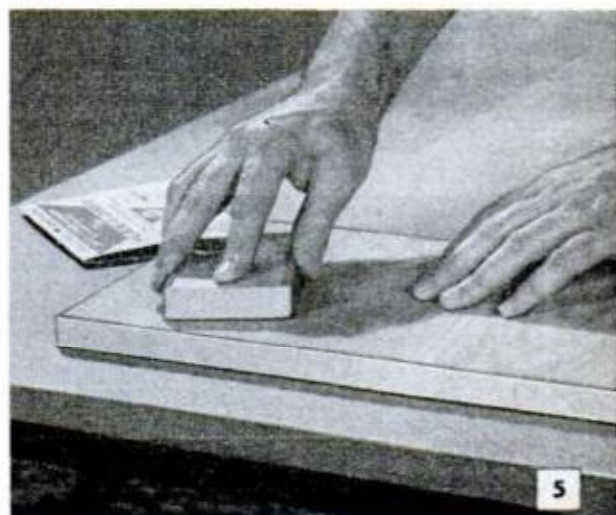


3. HATE TO CHANGE sanding disks? Temporary spray adhesive allows you to apply and peel off disk five times before another application is needed. Not a glue. Now you can use your own disks cut from large sheets. Adhesive may be sprayed on paper and other materials. Acts as third hand. Priced at \$1.39. Stanley Tools, 195 Lake St., New Britain, Conn.



4. LIQUID RUBBER squeezed from a tube permanently eliminates battery terminal corrosion. The flexible rubber coating may be stripped away whenever terminals must be removed. Other uses include repairing rusted mufflers, auto body holes, upholstery tears and similar work. Retail at 98 cents a tube. Manufactured by Devcon Corp., Danvers, Mass.

5. ABRASIVE-COATED MYLAR sandpaper (Flex-I-Grit) may simply be flexed to clean. Tough plastic back is said to last much longer than ordinary sandpaper. You can fold, roll or crumple it—perfect for irregular shapes and hard-to-get-at places. Pack of five sheets (4½x5 in.), in different grades, 49 cents. Raybestos-Manhattan Inc., Passaic, N. J.



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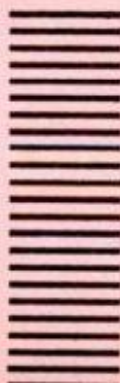
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Science bulletins

Men soon may be able to dive 3000 feet to the ocean floors and work there for several hours without suffering ill effects. One effect, "rapture of the deep," has up to now, prevented such deep plunges. When seized by the rapture divers were apt to do foolish things, such as cutting off their air supply.

Dr. Hannes Keller and Albert Beuhlmann, Swiss biochemists, have made experiments indicating the rapture develops when high-pressure oxygen and carbon dioxide accumulate in the blood. They have worked out a formula employing new gas mixtures that will be fed to the diver at the proper depth. Also, they propose new rates of ascent and decompression.



When immature male mosquitoes get too hot, they grow up to be females, say University of Illinois researchers. Except for a slight difference in certain feelers, the males are indistinguishable from normal females.



Earn money sleeping? University of Texas researchers have found that even a sleeping person can perform better, if he is motivated. They promised more money to volunteers for an experiment to determine how sleeping people can respond to sounds if they would wake up each time they heard a telephone ring or bagpipes play.

With the promise of extra pay, the volunteers differentiated between telephone bells and doorbells, and collected.



One bee sting can bring another, according to two Cornell scientists. After pulling out 5000 honeybee stingers (from the bees), the busy men found the bees secrete an "alarm odor" on their stingers which tags an intruder who comes near the hive. He is then a marked target for more stings.



Tense modern pigs are getting ulcers maybe because they are kept in confinement, according to a report from the University of Wisconsin. Scientists there plan a four-year study to see if pig ulcers are similar to people ulcers.

James Biery

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by F. L. Krimston

A story is told about the door-to-door salesman who decided to advertise his product and sell it by mail. His business increased so greatly that in one week he made more profit than he had in a whole year of door-to-door soliciting.

This story emphasizes the fact that there are profits to be made in direct mail selling. It's the type of business that offers a unique opportunity to start your own enterprise without the necessity for a large financial investment. In fact, some of the largest companies in the country started as mail order operations.

You can start your own direct mail business on a part-time basis without interrupting your regular job. It can be a valuable source of extra income, and profits can be used to expand the business to a full-time operation.

Thorough Preparation Needed

To be successful a mail order business must be established on a sound basis. This means that you must thoroughly study all the ins and outs of mail order selling by reading mail order journals and publications and possibly by interviewing successful businessmen in the field. It's also important that you use plenty of that good old American talent, ingenuity in selecting the product or products to be sold and in bringing these products to the attention of your potential customers.

Many a successful mail order business

has begun with an investment of less than \$1,000. Success isn't as dependent on the amount of money invested as it is on good judgment, the right type of sales promotion and sound budgeting.

Probably the most important factor in product selection is your own knowledge and interest in the product. You must thoroughly understand the product you intend to sell; know its uses, values and exclusive features. You must be so enthusiastic about your product that it is relatively easy for you to "sell" the need for the product to potential customers.

For example, one successful direct mail operation is based on the sale of a booklet on fishing secrets. The booklet was prepared by an avid fisherman who became convinced that his fishing techniques could help other fishermen. Specially selected advertising and mailing lists enabled the author to promote the sale of his booklet to other fishermen; and, before long, he had underway a small but profitable business.

Honesty Essential for Success

Although honesty is an important quality for any businessman, it is of particular importance to the mail order dealer. The growth of any mail order business depends in large part on the sale of new products to customers that have already purchased other products from you. If you do not live up to your advertising claims, your customers will not buy from you again and one

(Continued on page 40)

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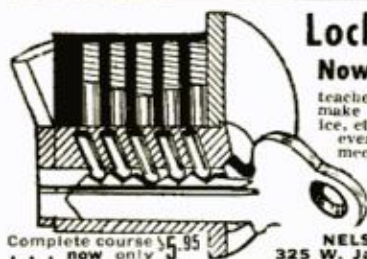
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Saber saw from an old sewing machine head? Plans for this clever conversion will appear in the January issue of **Popular Mechanics**.

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An amazing Air-Cushion Invention allows body freedom at work or play. Light, neat, cool, sanitary. Durable, cheap. Day and night protection helps Nature support weakened muscles gently but surely. No risk. Sent on Trial! Write NOW for free Booklet and Proof of Results. All correspondence confidential.



Brooks Company, 143-E State St., Marshall, Mich.

of your most important sources of extra sales will be eliminated.

There are three types of direct mail business: those offering a product for sale, rendering a service, or supplying information. The products sold by mail today are extremely varied. They include houses, worms, furniture, stamps, jewelry, insects, coins, magic tricks—the list is almost endless. Many direct mail businesses supplying information sell books or pamphlets on a particular subject. Booklets on such varied subjects as "How to Get a Raise," "How to Make Money" have been successful mail order sellers. Photo developing and watch repair are examples of the many services sold by mail.

Buyers Like Unusual Products

In deciding the product or service you would like to sell, it's important to keep in mind that mail order shoppers like the unusual, the product that can't be bought in the local store, or the product or service with some special appeal.

After your product or service has been decided, you have to examine manufacturing costs, advertising and mailing expenses so that you can determine an asking price. Markups have to be high enough to cover all costs and still allow a margin of profit. Markups range anywhere from one-third to three-fourths of the original price, depending on the nature of the product or service and the demand.

Selecting a source of supply is a step that should take a good deal of consideration. If your product is something made at home, there is no problem, unless it might be in supplying the demand. If the product is manufactured elsewhere, however, a reliable source must be found. If possible, several manufacturers should be compared as to cost, quality, distance and delivery time. It's important that suitable transportation be available so that your product can move from the manufacturer to you at minimum cost and maximum speed.

How to Sell

The next step in setting up your own direct mail business is to decide how you will sell your product.

Many profitable direct mail businesses have started with an inexpensive classified ad in a newspaper or magazine. In most

(Continued on page 42)

POPULAR SHOPPING

worth
writing
for...

"Home Painting and Color Guide" is the title of 48-page, 4-color booklet available for 10¢. It shows many attractive color combinations and takes you step-by-step through painting interior and exterior surfaces. Write to the Du Pont Co., Dept. PM-61, Wilmington 98, Del.

Pruning is vital to good plant growth. A 25¢ booklet contains 38 pages of valuable information on how and when to prune shrubs, trees, flowers, hedges, vines and lawns. Ask for "How to Prune" from Seymour Smith & Son, Inc., Dept. PM-62, Main St., Oakville, Conn.

Workshop projects are featured in the 25¢ booklet "101 Home Workshop Projects for Wood Rasps and Files." File techniques are also included. Write Nicholson File Co., Dept. "Proj.," Providence, R. I.



NATIONAL BRAND VITAMINS 25% to 50% Discount

Government Protection. Registered pharmacists fill every vitamin order. Same day service. Geritol Tablets 100's \$4.75, postpaid. Write for free price catalog.

APPROVED MEDICAL SUPPLY
SERVICE, Dept. PM
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UNUSUAL TOOLS BY MAIL

#44 CORNER CLAMP & MITER BOX COMBINED

Holds the wood.
Holds your saw.
Accurate cuts
with any handsaw from 0° to 180°.
Full 3" capacity. Sides exposed for
mailing and gluing. \$2.75 ppd.
No. 33. Same as No. 44 without saw
guide attachments. \$1.75 ppd.



EASY SAW FILER

No. 11 Gives correct
height, depth, pitch, be-
vel to any 6" to 10"
hand or circular saw with
no side pull. Includes
8" file. \$9.95 ppd



SAW SET

automatically
sets teeth
at 10° or more
\$2.95 ppd

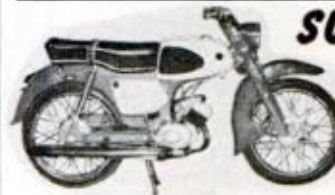


DRILL GRINDER

Sharpens round shank
drills like new with hand
or power grinders \$2.95
ppd.



MONEY BACK GUARANTEE
A. D. MCBURNEY, 5908 Hollywood
Blvd., Hollywood 28, Cal. Dept. A-12



SUZUKI

Model
50 MC
\$295
F.O.B.L.A.

50 m.p.h. — 4 speeds 180 m.p.g. **ELECTRIC STARTER**

**BOAT DEALERS—SPORTS CAR DEALERS
—SPORTING GOODS DEALERS . . .**

Start making money right NOW! Sell SUZUKI Motorcycles, the high quality, lightweight line from Japan. Ideal ride for everyone, gives you added High Revenue.

Write for
full details,
no
obligation.

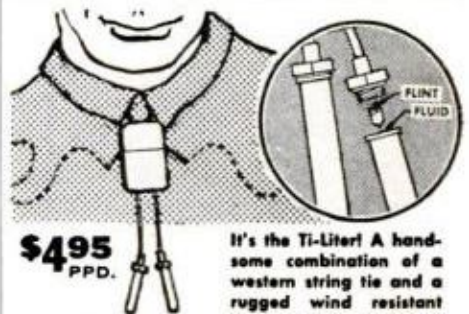
Ken Kay

DISTRIBUTING CO.

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FOR EVERY SPORTSMAN

NEVER • LOSE ANOTHER LIGHTER
• RUN OUT OF FLUID
• RUN OUT OF FLINT



\$495
PPD.

It's the Ti-Liter! A hand-
some combination of a
western string tie and a
rugged wind resistant
lighter. You can't lose it
once you've put it around your neck. Hollow
metal tips on tie hold extra supply of flints
and fluid, so you can't run out. It's ideal for
the active, outdoor man. Order yours today.

SEND CHECK OR MONEY ORDER TO
TI-LITER INC., P. O. BOX 1026 N
SIOUX CITY, IOWA

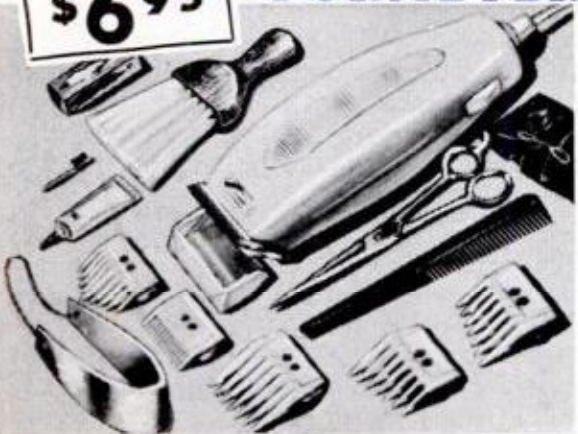
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electric clippers actually
work on a comb principle.
Special instruction book.
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tapering neck and sides—
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ming—plus all items pic-
tured—only \$6.95. SU-
PER DELUXE SET with
deluxe adjustable taper
clipper, plus right and left
taper adjustments, neck
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min. order
three tarps

These giant transparent, durable plastic
tarps protect floors, upholstery, carpets,
furniture, cars, boats, bikes, etc., from
weather, paint, dust, grease, dampness.
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ing facilities now make this amazing offer
possible:

MINIMUM ORDER 3 TARPS for \$1 plus
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feet of rugged protection for just \$1.25.
That's how much just one of these fabulous
tarps formerly cost.

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Please send me **FREE** book, "Your New Way to a Successful Career," and **FREE** sample lesson. No obligation—no salesman will call.
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Name


(Please Print Plainly)

Address

City Zone State

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Chance of lifetime! Amaze & mystify others! Be Life of Party! Get double your money. Only 1.00 brings you Tricks with Eggs, Cards, Cigarettes, Mind Reading, and lots of others! You can do them all! Hurry! Limited offer. Act now and get 160 Page Giant Catalog of 1000 other Tricks too!

CATALOG ALONE 25¢ TERRIFIC!

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FREE Blue Book of Crime MAIL COUPON

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1920 Sunnyside Avenue, Chicago 40, Ill.
Rush Blue Book of Crime . . . **FREE!**

NAME

ADDRESS

TOWN STATE

cases this classified ad would offer free descriptive sales literature on the product or products sold. Names of readers who replied to the ad are kept on record for future mailings of sales literature, and the names of readers who actually bought the product are separated and also kept for future use.

This is usually the most inexpensive and effective way to start a mail order business. The cost of classified ads vary according to the publication in which they appear. They are invariably an economical means of informing the public about your product, if they are carefully prepared and placed in a publication whose readers might be expected to be interested in your product.

In all cases, it is important that you insert a special key number in each ad you run. In this way you can be sure you are getting good results from the publications you use and you can test the quality of the copy you use in your ad.

As your profits grow, you buy more advertising, and you continue to expand in this way until you are ready to offer a new product. Then you can send your sales letter, brochure or catalog to those who have replied to your advertising. If your new product is related to the original item (for example, you might have offered a type of fishing equipment as your original product and then branch out with a different type of fishing equipment) you can expect good returns from your original customers and inquirers.

Mailing Lists Available

It is also possible to buy selected mailing lists from companies who specialize in providing such lists. If you are selling a product that would appeal to new mothers, for example, you can buy or rent a list of new mothers. Ordinarily, you can find mailing list houses in your local phone directory.

Usually, you can expect that a mailing list built up from inquirers and customers who have responded to your ads will produce better results than a list bought or rented from an outside source.

When making promotional mailings, you should keep in mind that your mailing piece actually takes the place of a salesman. Your mailing piece must "close the deal" for you and has to be carefully prepared. You must stress the exclusive features of your prod-

(Continued on Page 44)

twenty to one dividend . . .

that's the reward you can receive from a college education in engineering or business. Employers like Tri-State graduates . . . interview seniors on campus. Qualify faster. Bachelor of Science Degree in 27 Months in Electrical (Electronics or Power major), Mechanical, Aeronautical, Chemical, Civil Engineering. IN 36 MONTHS a B. S. in Business Administration (General Business, Accounting, Motor Transport Management majors). For earnest, capable students. Small classes. More professional class hours. Modernized buildings, well-equipped labs, new dorms. Modest costs. Year-round operation. Enter January, March, June, September. Founded 1884. Write J. E. McCarthy, Director of Admissions for Catalog and "Your Career" Book.



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HELP WANTED—SPARE TIME

SENSATIONAL NEW LONGER-BURNING LIGHT BULB. Amazing Free Replacement Guarantee—never again buy light bulbs. No competition. Multi-million dollar market yours alone. Make small fortune even spare time. Incredibly quick sales. Free sales kit. MERLITE (Bulb Div.), 114 E. 32nd, Dept. C-15M New York 16, N.Y.

In Canada: Moga Co., Ltd., 371 Dowd St., Montreal, P.Q.

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Train quickly in 8 short weeks at Toledo for a bright future with security in the vital meat business. Big pay. Full-time jobs—**HAVE A PROFITABLE MARKET OF YOUR OWN!** Pay after graduation. Diploma given. Job help. Thousands of successful graduates. Our 38th year! Send NOW for FREE catalog. No obligation. GI approved. NATIONAL SCHOOL OF MEAT CUTTING, Dept. 50-Z, Toledo 4, Ohio



get into operating or repairing EARTH MOVING EQUIPMENT

Men needed now for good paying jobs in booming road and construction work. Learn operating or repair-rebuilding of heavy road machinery, cranes, bulldozers, earth carriers, etc. Actual "on the job" training. 5 to 13 1/2 week courses. Classes start every Monday. Reserve your space now. Complete catalog and reservation facts FREE. Approved for veterans. Write

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\$300 post-paid

USES POWDER CHARGE

This small bore gun shoots .12 cal. lead bullets fired by small 4.4 mg. powder charge. Not a CO₂ gun! You'll like the handsome lines, grip, and balance. Western in style, but patented ball and cap action allows this low price. 9 3/4" steel barrel cased in knurled styrene stock, overall 13 1/2". Develop pistol form, accuracy at a fraction of cost of large caliber pistols. Comes with 50 lead bullets. Satisfaction guaranteed. Send \$3 to: HAIGMFG. CO., P.O. Box X-4, Alhambra, Calif.

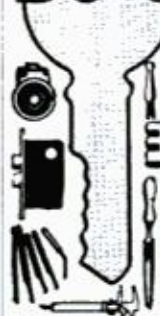
DECEMBER 1961

EARN \$750 WHILE TRAINING!



H. G. HENDRIX of Gretna, La., says:
"During my training period I was able to earn \$750! I think the school is wonderful. Every step in the Locksmithing course was so easy. Thanks again to your school and to my instructor."

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Add 50%-100% to YOUR INCOME with easy spare time earnings. Cash in on nationwide shortage—trained locksmiths in demand! Quickly step into a big-pay opportunity job—high-profit shop of your own.

Earn Extra Money RIGHT AWAY! All Special Tools, Supplies Furnished FREE.

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For a future as your own boss or in a high-pay job, write now for FREE illustrated book! Only school of its kind. Lic. State of N.J., Accredited NHSC. Locksmithing Institute, (Div. Tech. Home Study Schools) Dept. 112-1, 150 Park Ave., E. Rutherford, N.J.

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Please send Free Illustrated Book without obligation.

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FREE

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Sensational New Methods

Less Time—Less Effort—Better results

BODY-TONE, Box 638, North Miami 61, Fla.

(Continued from page 42)

uct or service—show how these features can benefit the reader. Try to put on paper all your enthusiasm for your product or service in such a way that your own feelings will be transmitted to your potential customers.

Keep Mailing List Current

You should take steps to keep addresses on your mailing list up to date so that you don't waste the money you invest in your direct mail selling. Third class mailings are not returned to you if you have used a wrong address unless you imprint "Return Postage Guaranteed" on your envelopes. If you imprint "Request Form 3547" on your envelopes, the Post Office will, for a small charge, return misdirected mail and notify you of address changes.

Postal regulations are an important governing factor in direct mail selling, and you should be thoroughly familiar with the various types of mail and size and weight restrictions. A copy of "Postal Guide" is available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. and this will give you the information you will need on postal regulations.

You should also be familiar with the rulings of the Federal Trade Commission which prevents unfair methods of competition and deceptive practices in the sale of goods in interstate commerce. For information, you can write the Federal Trade Commission, Washington 25, D. C.

Fill Orders Promptly

Now that you have a manufacturer for your product and a method to sell your product by mail, you must be ready to fill orders. A system should be devised so that orders can be handled quickly and efficiently. Records should be kept on each shipment for future reference and follow-up business.

Find the best possible way of packaging your product and take precautions to prevent breakage. It can be costly to have to replace shipments that have been damaged while in transit.

Careful record keeping is a must in the direct mail business. Not only is this necessary for tax purposes, but it gives you a good indication of how business compares

with previous years and months, lets you know whether or not you're increasing your sales, and gives you an indication of what kind of profits you might expect in future months.

Unless strict zoning ordinances prevent it, you can operate your mail order business from your home. If this is not possible, or undesirable for any reason, you might want to use a Post Office box number as the address for your orders and correspondence. This can be disadvantageous in that some people have more confidence in sending their money to a street address rather than a Post Office box. Careful selection of a company name can help give potential customers extra confidence in dealing with you for the first time.

Another Way to Get Started

There are companies who specialize in helping you get started in the operation of your own mail order business. Some of these companies sell you advice on how to get started, others sell a plan telling you steps to take, and others sell you products and literature.

Before taking advantage of such offers, examine them carefully. Seek advice from those who are already selling by mail to get their opinions and be sure before you invest your money.

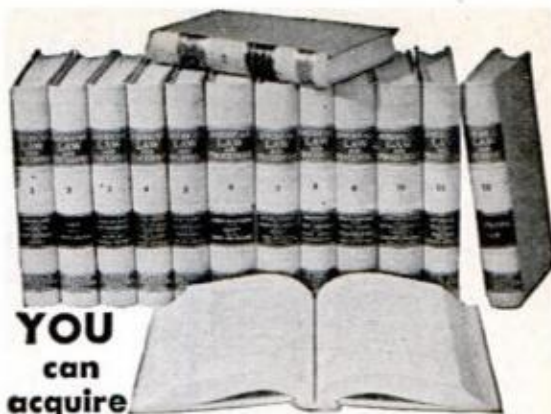
It is possible for such companies to save money by ordering goods, promotional literature and catalogs in large quantities, quantities far larger than you would be apt to order for your own use. These savings are passed on to you by a reputable company. Such services can be of value if you anticipate selling a wide variety of merchandise, rather than specializing in one product or a group of related products.

Satisfaction, Plus

To men who have been in direct mail selling for many years, there is no greater satisfaction than arriving at their place of business on Monday morning to find a stack of orders waiting to be filled.

It's a money-making satisfaction that can be yours. For additional information write Popular Mechanics, Department MO, 200 East Ontario Street, Chicago 11, Illinois.

DECEMBER 1961



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WE SHIP COAST TO COAST Wholesale Disc. up to 50% off

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For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain - without surgery.

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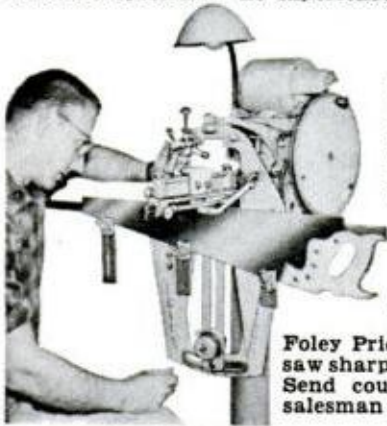
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Under the hoods and behind the wheels of the 1962 cars, as the driver, the serviceman and the engineer see them. It's all in the January PM Anniversary Special issue, together with find-by-color specifications and drive-comparison tests on Chevy II, Ford Fairlane and the trim new Plymouth. There is also a special performance report on some remarkable metallic brake linings, and an analysis of the influence famous dream cars have had on today's new models.

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Pentagon sidelights

By William R. Kreh

"Go fetch it," may become a standard command at White Sands, N. M., after a missile firing.

Ex-Marine L. Wilson Davis, working under a long-term government contract, already has two canines—a Weimaraner and a German pointer—trained to hunt out missile fragments. They may eventually form the nucleus of a missile-locating K-9 squad for the Army to use on its firing ranges at White Sands. The dogs would hunt pieces of any missile which misfires so that scientists may find the reason for the malfunction.

In a recent test at White Sands, the two missile mongrels were able to locate 147 out of 150 fragments that had been scattered about the desert over a wide range.

What's in a name? The Air Force was all set to name an office at Vandenberg Air Force Base, Calif., the Strategic Aerospace Division, Strategic Air Command, until someone pointed out that in the military's abbreviation language this would become SAD-SAC. The Air Force quickly changed it to STRAT-AD.

How fast does a man fall? The Air Force has done some tests with dummies that show that a 200-pound man jumping from 83,000 feet will reach at least 400 miles an hour. This velocity would be reached in the first 14,000 feet. After that, air resistance and other aerodynamic forces would slow the descent and, if he didn't use a parachute at all, he'd hit the ground doing 116 miles an hour.

Chances are, though, he'd never feel it. The research showed that a parachutist with an unopened pack would spin clockwise in a horizontal position to a built-up rate of some 465 revolutions a minute during his first 33,000 feet of fall. The fatal spin rate for man is calculated to be about 150 revolutions a minute. That's why sky divers and others who parachute must learn to keep their body out of a spinning position while free-falling through space.

How high the "Pi"? Two scientists at the Navy's David Taylor Model Basin have

(Continued to page 66)

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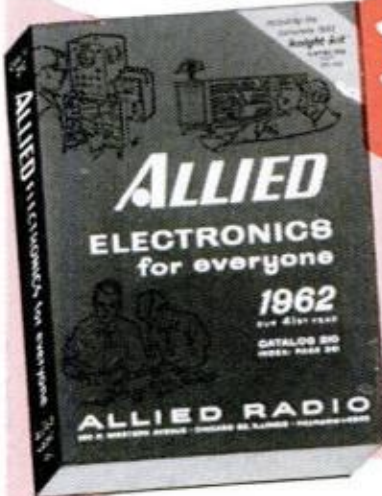
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used a high-speed electronic computer to calculate the value of "Pi" to 100,000 decimal places. The previous record, computed in Paris in 1959, was 16,167 decimal places. It took the computer only eight hours to do the job.



A new tank-killing missile called the Tomahawk uses reflected ultraviolet light to hit its target. With the system, one soldier shines a narrow beam of ultraviolet light on the enemy tank while another aims the missile launcher and fires. As the missile nears the tank, a homing device in its nose locks onto the invisible reflection of ultraviolet light and guides it to destruction.



Electric eels may provide an antidote for nerve gas. Navy scientists say the fish contains large amounts of cholinesterase, an enzyme vital to the transmission of nerve impulses and that a nerve gas antidote can be synthesized from it.



Rattlesnake venom consists of 14 parts and each part is deadlier than the whole, the School of Aerospace Medicine has found. So if some disability keeps the snake from producing one or more parts of the venom, the rest is still deadly.

The poison isn't deadly to the snake itself because of some built-in neutralizing agent, but this agent fades away when the poison is injected into another body. If this could be isolated, man would have a first-class defense against rattlesnake poisoning.

In one experiment, Air Force scientists tried to test the idea of flushing out the poisoned blood in veins of a victim with fresh blood. But when the blood was drained, no evidence of the venom was found, and what happened to it is still a mystery. It may cling to the walls of the veins or change into something else and enter the body's glands, the Air Force reported.



Sharks use water vibrations instead of smell to locate victims, according to Navy researchers.



Automatic "blinders" to protect eyes from the extreme brilliance of nuclear explosions have been developed by the Navy. The brightness of a nuclear explosion is powerful enough to burn out the sight organs in unprotected eyes, but a new material has been found by the Navy which clouds over when an extremely bright light hits it. Used in goggles or portholes of ships, it becomes transparent again when the light fades.

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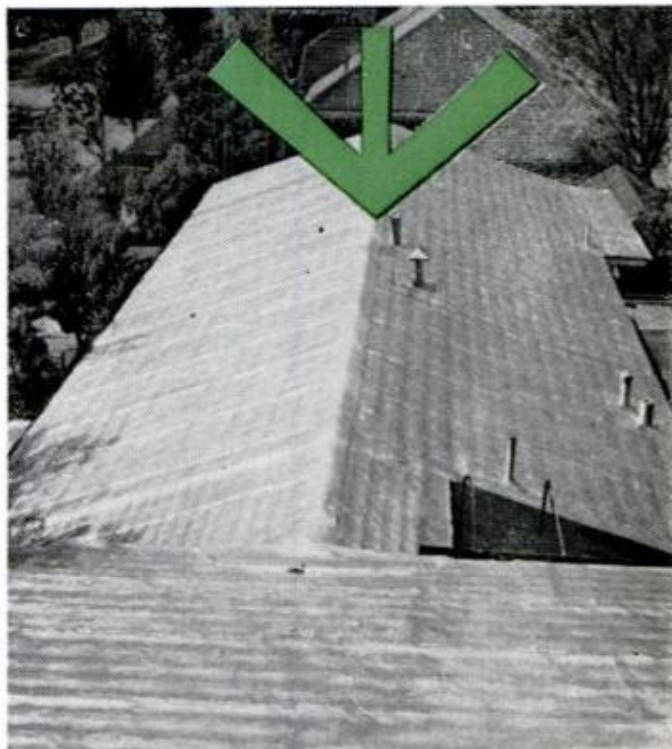
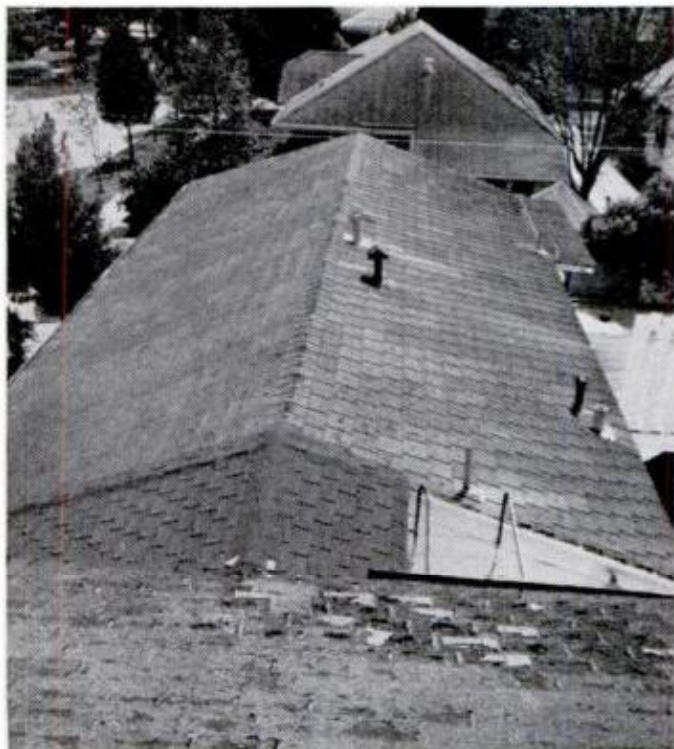
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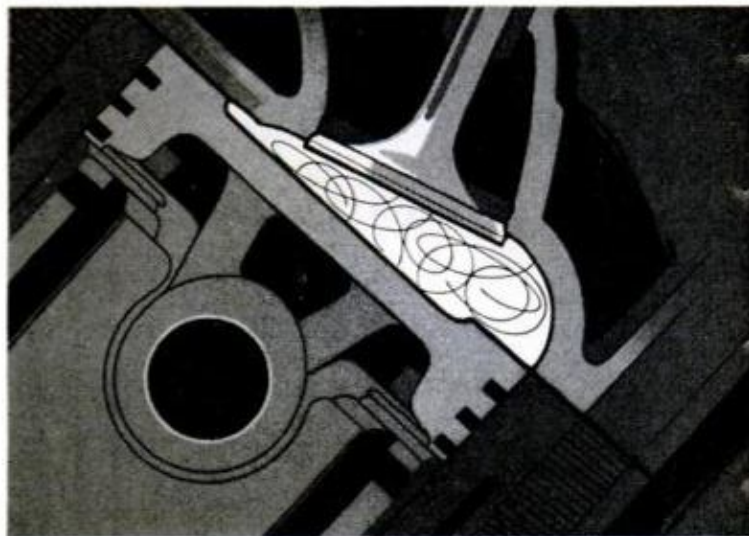
New 280-h.p. Rocket Engine with Fire-Swirl Combustion . . . new low-ratio rear axle . . . give the '62 Dynamic 88 extra sass with savings to match!

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EDITOR FISHER, above, after 90-m.p.h. test run in coupe powered by the Wankel engine, (shown below)

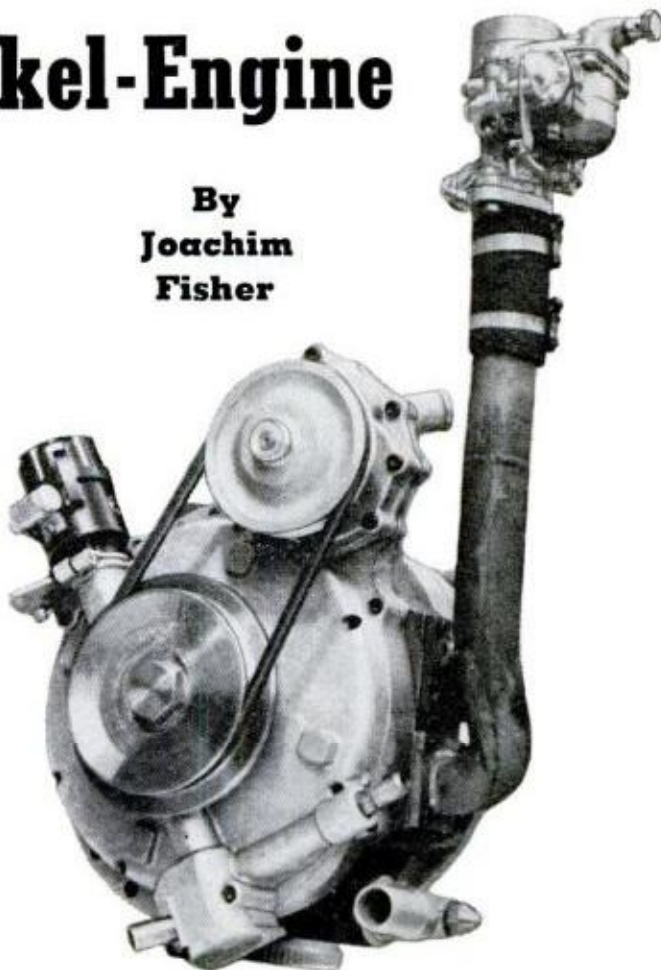
I Drove the Wankel-Engine Car 90 m.p.h.!

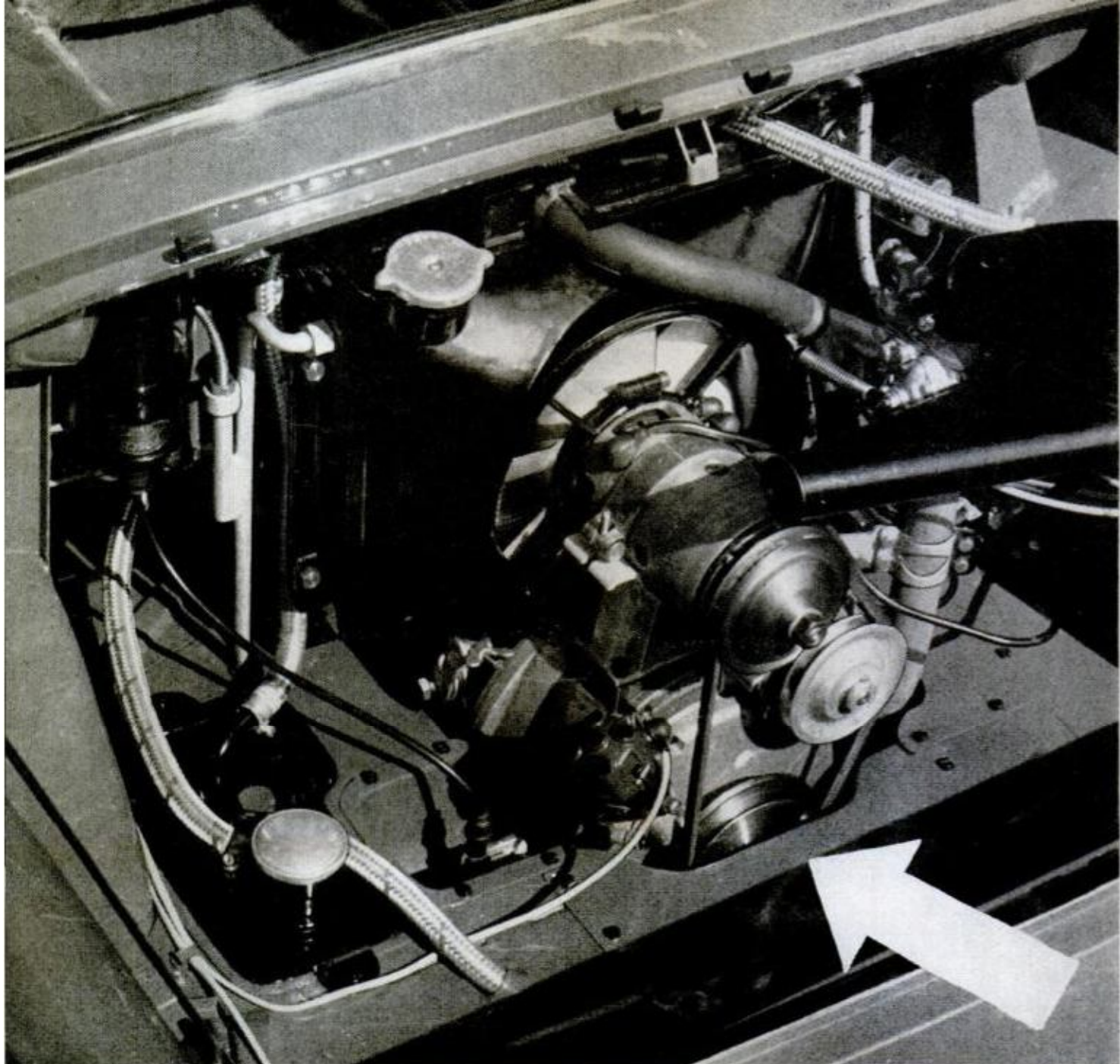
By
**Joachim
Fisher**

EDITOR'S NOTE: PM is fortunate in getting this first-hand driver report on the revolutionary Wankel rotating piston engine. Joachim Fisher is the editor of "Motor Rundschau," leading West German automotive magazine, and one of the very few men outside of the NSU organization to have an opportunity to test drive a Wankel-engined automobile.

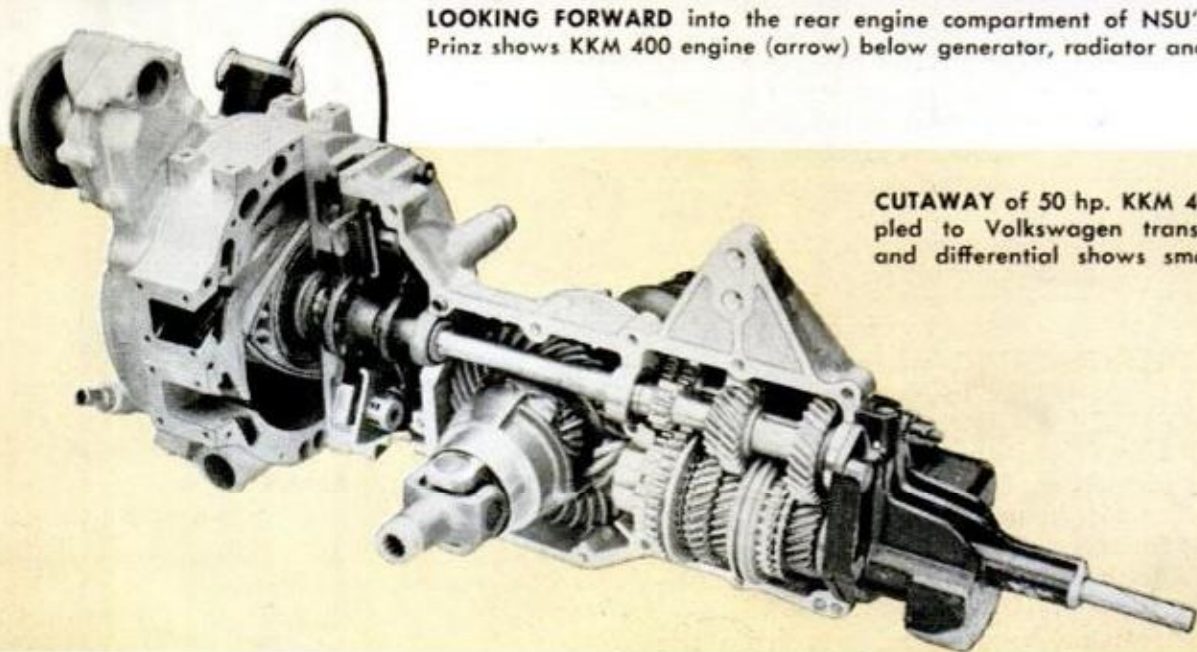
IT WAS RAINING when I arrived at the NSU-Werke in Neckarsulm to test drive the KKM 400 engine. (The letters KKM abbreviate the word Kreiskolbenmotor, which in German means literally, "rotating piston motor." The number 400 stands for the combustion chamber volume of 24.4 cubic inches, expressed in centimeters.)

I was there because reports from the





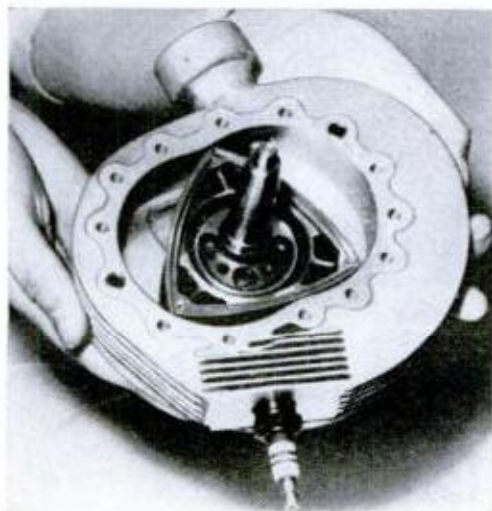
LOOKING FORWARD into the rear engine compartment of NSU's Sport Prinz shows KKM 400 engine (arrow) below generator, radiator and pump



CUTAWAY of 50 hp. KKM 400 coupled to Volkswagen transmission and differential shows small size



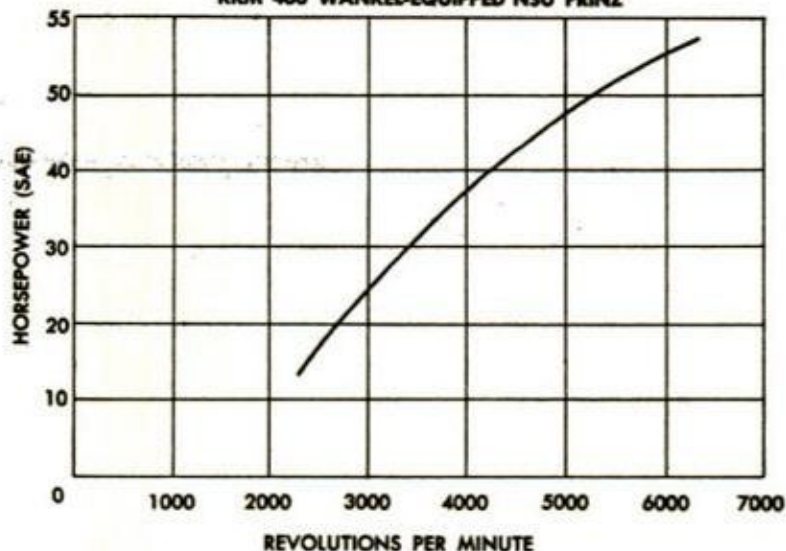
AIR-COOLED version of the rotating piston engine, below, displaces 3.65 cubic inches, could be used for a motor bicycle or power lawn mower



DECEMBER 1961

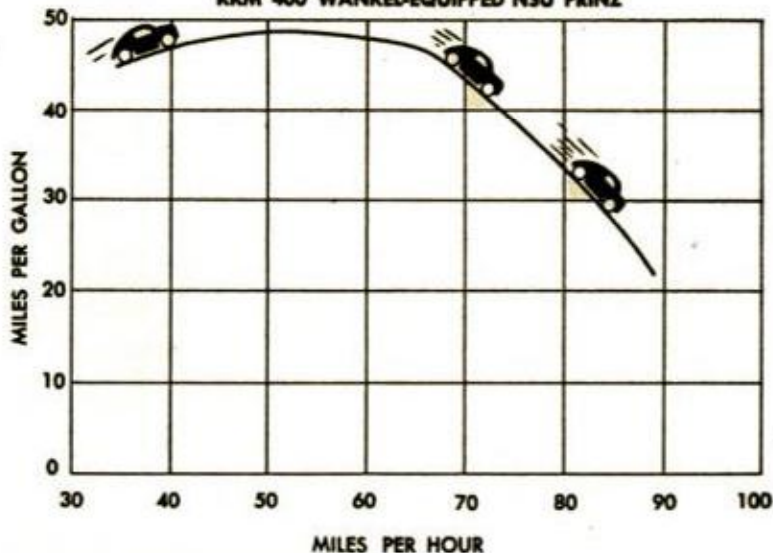
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KKM 400 WANKEL-EQUIPPED NSU PRINZ



HOW MANY MILES PER GALLON?

KKM 400 WANKEL-EQUIPPED NSU PRINZ

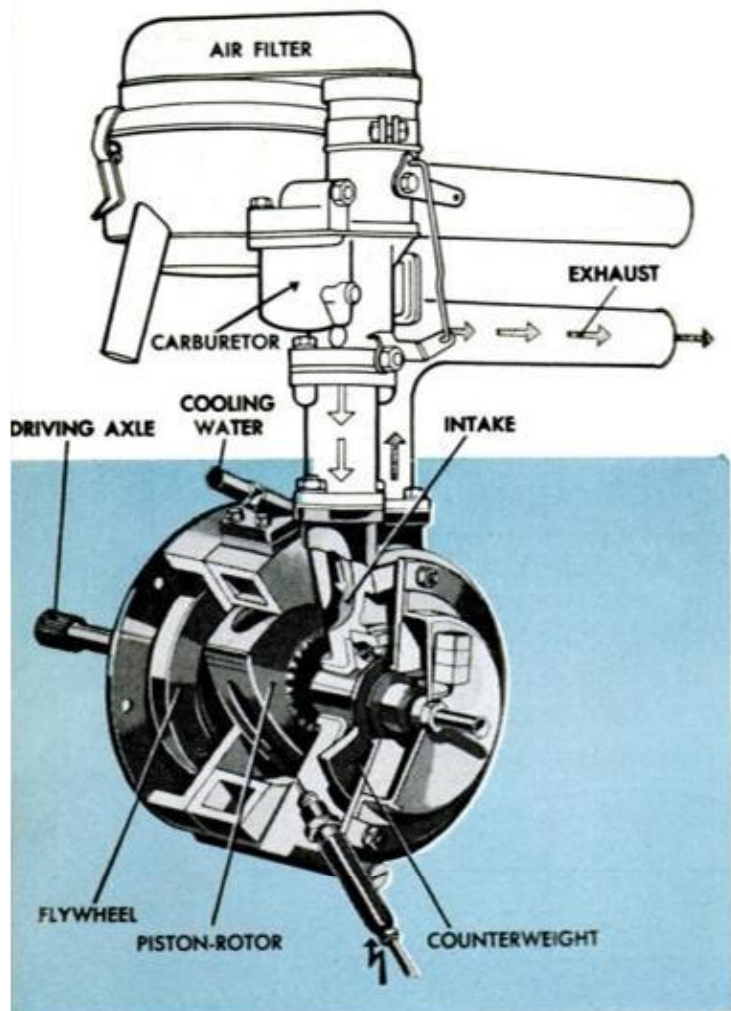


REMARKABLE power output of KKM 400 engine is shown in top graph; engine hits over 50 hp. Constant-speed economy, below, is terrific

NSU Research Department indicated that development of the NSU-Wankel or KKM had reached an advanced state so that the engine now had the flexibility to withstand the constantly changing loads and speeds characteristic of automotive operation. But no performance figures can substitute for actual operation in a car and on the road, so I persuaded the NSU officials to let me have a test drive.

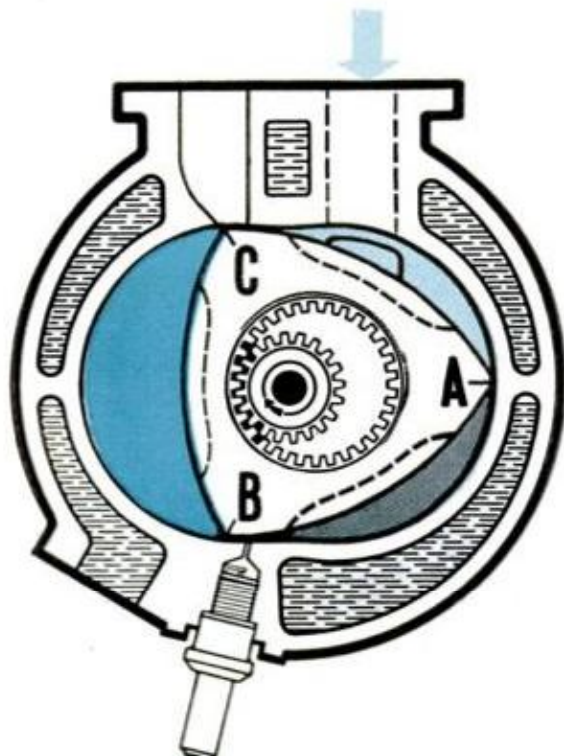
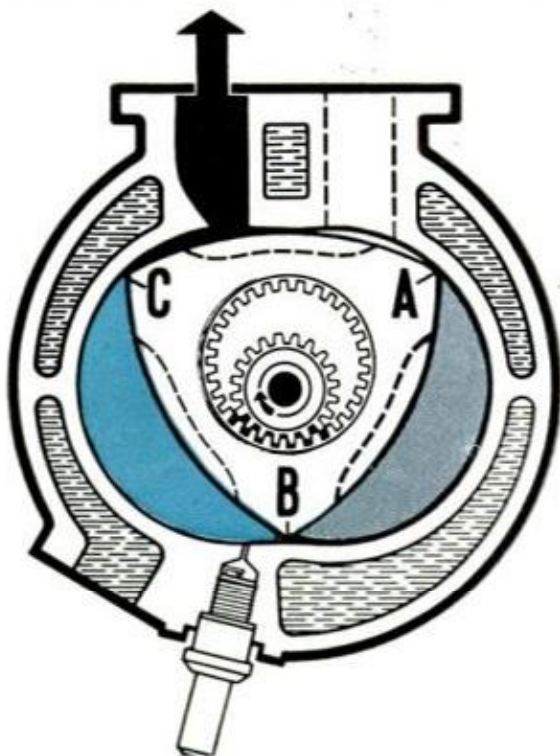
The engine was installed in an NSU Sport Prinz two-passenger coupe, a car normally powered by a conventional, air-cooled two-cylinder engine of 26 horsepower and weighing approximately 1200 pounds.

The KKM 400 engine was fitted to a Volkswagen transmission and transaxle assembly, inasmuch as the Prinz is already a rear-engine car and because these Volkswagen components are strong enough to transmit the peak power of the rotating piston engine. Its rating is



COMPACT single rotor version of Wankel engine is shown in drawing above. Oil enters rotor's interior through crankshaft to cool it and lube the eccentric

WORKING CYCLE of Wankel engine is shown in drawings from right to left, below. Rotor orbits eccentrically in clockwise direction around crankshaft. There is one firing for each third of a revolution described



close to 50 horsepower (SAE rating) at 6000 r.p.m., roughly twice the speed and output of the Prinz's original two-cylinder conventional engine.

Transmission Mismatched

The gear ratios of the VW transmission were designed for a 40-horsepower engine which delivered its power at about half the speed of the KKM engine and the Prinz coupe of course weighs a lot less (400 lb.) than the VW. And other parts, such as the simple, Solex carburetor and the Ford radiator, etc., were also not designed to complement the rotary engine by any means. Nevertheless, NSU felt that their basic product would prove interesting.

The engine started at the turn of the key. It idled a bit roughly even at 1400 r.p.m., more than twice the idle speed you'd expect with a conventional reciprocating engine.

But, when I put my foot down on the throttle and engaged the clutch I realized very quickly that I had something special in hand. From 2000 to 6000 r.p.m., the engine might have been a gas turbine, so smoothly did it run.

It accelerated easily under load through the operating speed ranges from 2000 to 6000. Out on the road I found that this could be translated into actual road speeds of from 35 to 90 miles per hour in direct (high gear) drive. I did not take any timed acceleration runs due to the mismatch between the high-speed engine and the VW transmission and the less-than-perfect mat-

ing of a carburetor designed for a different engine.

I drove the KKM 400-equipped Prinz over the wet roads around Neckarsulm and was able to test the rotating piston engine under various conditions: everything from driving slowly through traffic, accelerating abruptly or slowly, passing, climbing, or speeding down the highway at full throttle.

The engine makes a smooth, powerful, sound, much like a multicylindered sports-car engine, and there is very little vibration transmitted to the car throughout the operating range and no trace of power impulses are felt above 2000 r.p.m.

Up to 47 m.p.g.

I had no opportunity to judge fuel consumption for myself, so must for the moment accept NSU's own figures of 21.5 to 47 miles per gallon (U. S.) at various constant speeds (see graph page 71). Likewise the power output figures are also from NSU-Werke. The KKM engine weighs 51 lb. dry and not counting the separate radiator and hoses.

Its performance of 90 m.p.h. in the Sport Prinz would make the rating of 50 horsepower seem quite reasonable.

The performance was almost too good for what was obviously a pretty experimental combination of engine, gearing and automobile. The KKM 400 Prinz did everything very well without incident or complaint, so that I did not have the feeling of pioneering a brand-new invention. It was

more like driving a new sporting version of some engine and a commendably quiet one at that.

After driving the KKM 400 Prinz I have no doubt that this engine has a future in automotive use. Whatever problems there may yet be to solve before going into production, they are not major ones, as the performance and operating characteristics are convincing.

As to when initial production may come I would hesitate to make a definite statement. However, I think if necessary a rotating piston engine could be released from the NSU research department (for production) in the near future. It would be better, however to grant this research team another year. Even then there will be some time from complete prototype to daily commercial production of this engine.

Paging a New Car Design

In addition, this new engine cries for a new car. The possibilities for design brought about by the extremely light, compact KKM engine are intriguing. Such a KKM-powered car might be of practical aerodynamic design with luggage space both in front and rear and with the engine stored away just behind the rear seat with the radiator at the side."

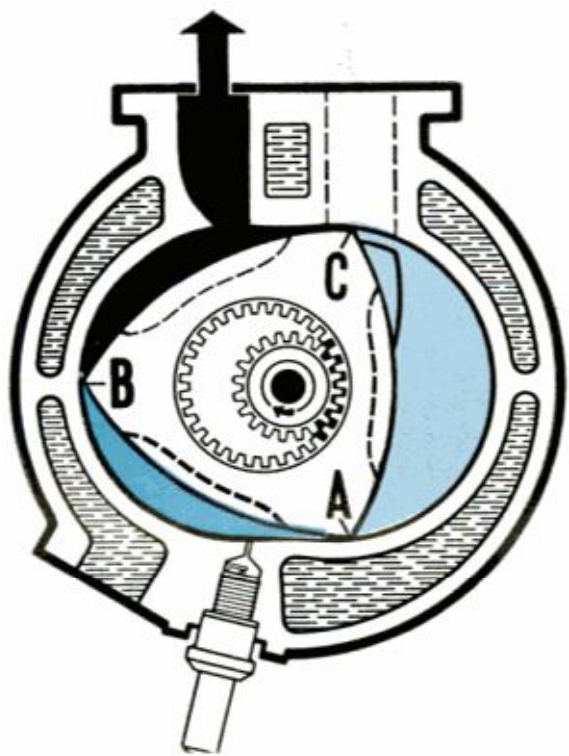
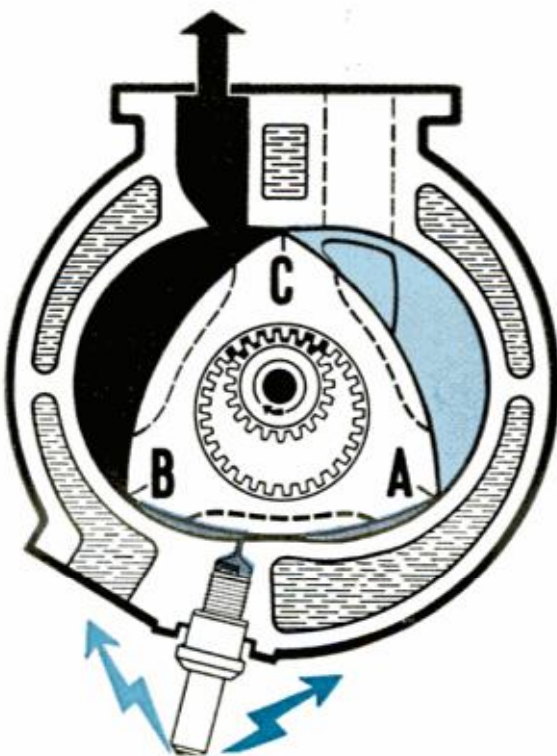
How the Wankel Engine Operates

The Wankel rotating piston combustion engine, or KKM, as the German engineers call it, has no conventional valves, springs,

(Continued to page 218)

BLACK—EXHAUST STROKE
PALE BLUE—INTAKE STROKE

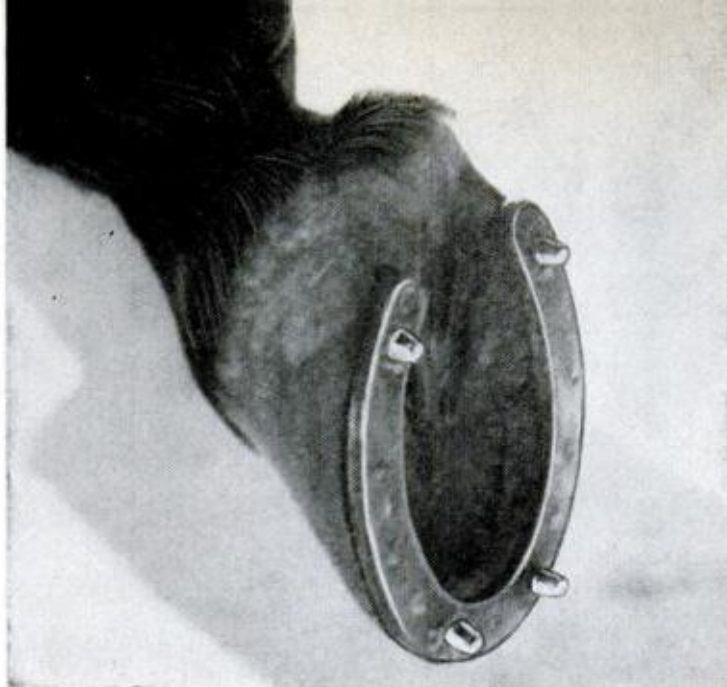
GRAY-BLUE—COMPRESSION STROKE
BRIGHT BLUE—POWER STROKE



Trotters' Winter Track

Undaunted by snow-choked tracks, New England harness-racing fans go right ahead with their sport in the middle of winter by moving out onto the frozen lakes.

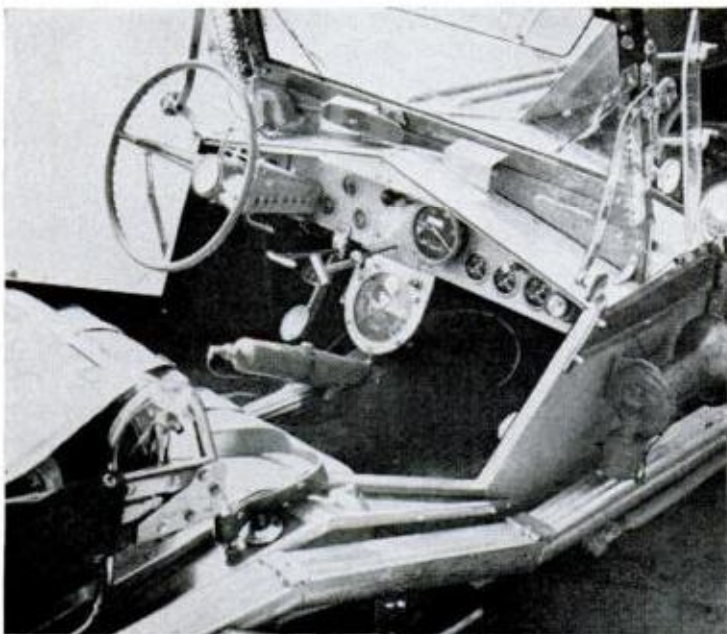
With horses shod with spiked shoes and bundled in blankets, these trotting fans do their racing on Sunapee Lake near Newbury, N. H. A special wool nose protector keeps flying ice chips out of the horses' faces, but the harness, sulky and equipment is otherwise the same as for summer racing. The sulkies often reach speeds of 30 miles an hour over the ice.



Eight-Wheel Dream Car

When the driver of an eight-wheel car tools around Red Wing, Minn., he also is displaying parts of cars made in every year since 1915. The car actually is in a state of growth; owner Nickie Johnson adapts new items to its home-hewed lines every year or so.

The frame, made of tubular steel, carries water for cooling the engine back to the rear trunk radiator. The car, a rakish 28 inches high, is powered by a 250-horsepower V8 engine. It has four-wheel drive. Instead of an automatic choke for starting, there's a propane-gas tank between driver and passenger for this job. The steering column has 12 switches to control lights and accessories.

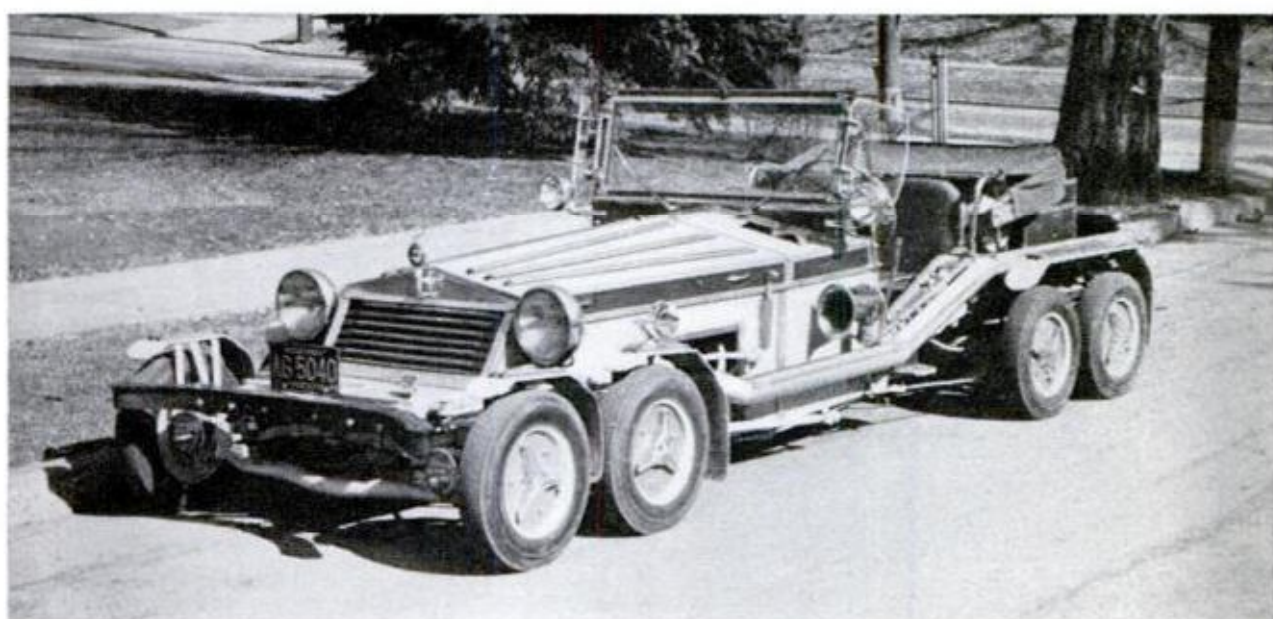


Instant Bridge

Designed by a Frenchman during World War II but never built until recently, a portable bridge can propel itself over land or water and, with proper accessories, span rivers up to 130 feet wide.

It is powered by two 220-horsepower engines that can move it at 40 miles per hour over level ground or climb 50-degree grades. Inflatable pontoons float it in water, so that, with two extensions used in tandem, it can span a 130-foot waterway quickly. For wider rivers, several of these portable bridges can be floated sideways and bridge tracks laid across their backs, according to *France Actuelle*, which first published these S.C.A. photographs.

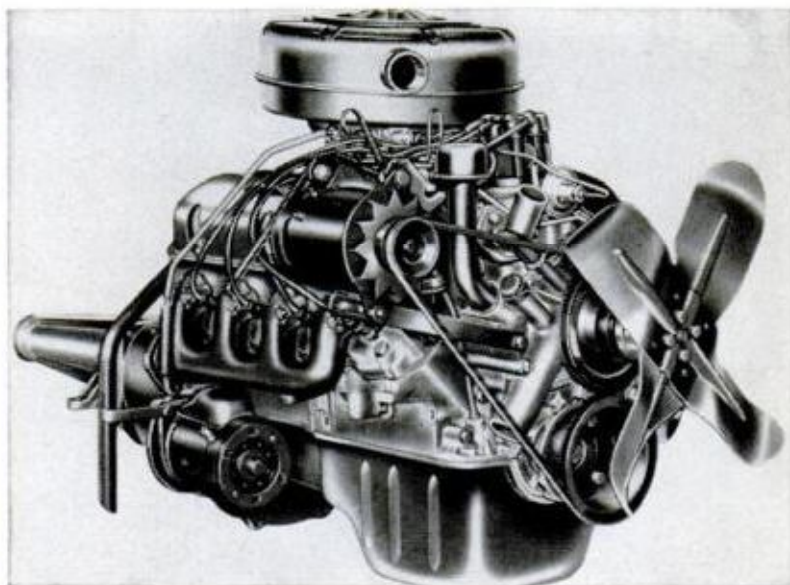




Mercury's Meteor— a new family-sized car

A light V8 and "two-way stretch" suspension team up for some nimble comfort

By Jim Whipple



METEOR'S new lightweight short-stroke V8, above right, is extremely compact, weighs only 75 pounds more than the 170-cubic-inch standard six. It develops 143 horsepower from 221 cubic inches of displacement. Precision casting of alloy iron in head and block, shown at left, has eliminated gas-wasting excess weight

LAATEST OF THE '62 models to be introduced is Mercury's Meteor, a brand-new car to be sold by Lincoln-Mercury dealers. It holds a place in the Mercury lineup between the compact Comet and the full-size Monterey.

Since it shares its basic unit body shell with Ford Fairlane, interior and over-all dimensions are similar, as is true of other "paired" cars such as Falcon and Comet or Galaxie and Monterey. But front and rear fender panels, hood, grille, rear deck, door panels, bumpers and trim are different.

The Meteor is 203.8 inches long over-all compared to Fairlane's 197-inch length. Wheelbase is one inch longer than Fairlane's at 116.5 inches. Width and height at 71.3 and 56.1 inches respectively are within a half inch of the Ford Fairlane.

Weight of the manual-transmission, six-cylinder, four-door sedan is 2874 pounds.

The basic engine offered is Ford Motor Company's lightweight, cast-iron in-line six of 170-cubic-inch displacement. With a compression ratio of 8.7 to 1, it is rated at 101 horsepower and 156 lb.-ft. of torque.

This is the optional "big" engine used on Falcons and Comets. It is over-square in design with a bore of 3.50 and stroke of 2.94 inches. As used in the '62 Meteor it has a larger carburetor venturi, a die-cast aluminum timing gear cover, new crankshaft center weight and a front vibration damper of the rubber friction disk type.

Meteor's optional engine is Ford Motor Company's brand-new, compact, lightweight cast-iron V8 which weighs only 75 lb. more than the standard (170) Six.

This new V8 is another triumph of design and manufacture from Ford's foundry, a leader in the art of precision casting. The new engine is also over-square with a bore



METEOR CUSTOM four-door sedan, at top, shows family resemblance to other Ford Motor Company products in its flat hood, broad grille and T-Bird roof line. Plainer Meteor, above, eliminates chrome-rocker panel strip, chrome on rear fender skirt, shows typical Mercury touches in rocket-tube tail lamps, roof line.

of 3.50 and stroke of 2.87 inches, making for a displacement of 221 cubic inches.

Horsepower of the V8 is 143 at 4500 r.p.m., while peak torque of 217 lb.-ft. occurs at 2200 r.p.m. Compression ratio is a conservative 8.5 to 1. A unique feature of the new power plant is its fuel mixture temperature control system. This involves a permanently-open exhaust crossover to heat the intake manifold, combined with a hollow aluminum spacer or collar just below the carburetor. Hot water from the cylinder-head water jacket is routed into this collar, around the intake throats, providing more direct heat to fuel mixture and reducing icing tendency.

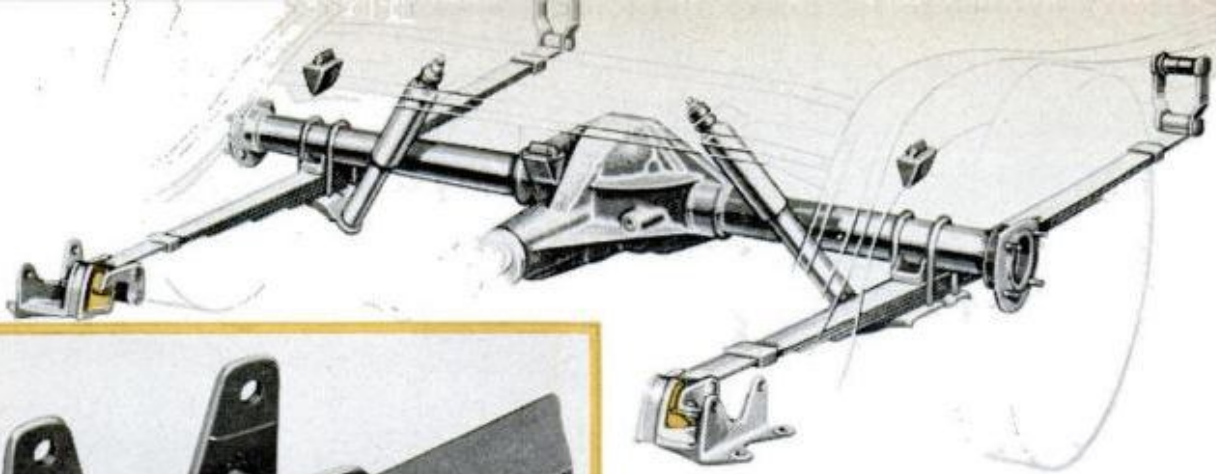
Valves of the "221" V8 are operated by a newly-designed valve train with individual, precision-molded iron rocker arms pivoted

on ball-shaped studs. Lubricating oil for this valve train flows from the hydraulic tappets up through hollow push rods to the rocker arms.

Standard transmission is a three-speed synchromesh with column shift lever. Overdrive is optional on the V8 only, while a two-speed and torque-converter automatic transmission is available with either six or V8. Shifting between high and low speeds in the automatic's planetary gearing is controlled by engine vacuum instead of by linkage for smoother shifting.

Axle ratios are: 3.50 to 1 and 3.25 to 1 on manual and automatic six-cylinder cars respectively while V8 ratios are 3.25 to 1 manual, 3.50 to 1 overdrive and 3.00 to 1 automatic.

Meteor's suspension system is meant to



METEOR'S "Cushion Link" rear suspension recesses with horizontal bump thrust absorbed by arm embedded in rubber attached to swing shackle

provide an extremely quiet car with a soft, luxurious ride not generally found on cars of this size and weight. Front suspension is conventional independent with coil springs and ball-jointed spindles. However, the coil springs are longer and mounted above the upper control arms, terminating in rubber pads mounting high in the body structure.

The lower control arm is triangular with its forward leg incorporating a shackle and short coil spring that permits the lower arm, and thus the wheel itself to "recess" up to one-half inch to the rear as well as absorb vertical bump displacement. This combination of actions absorbs additional harshness from rough roads.

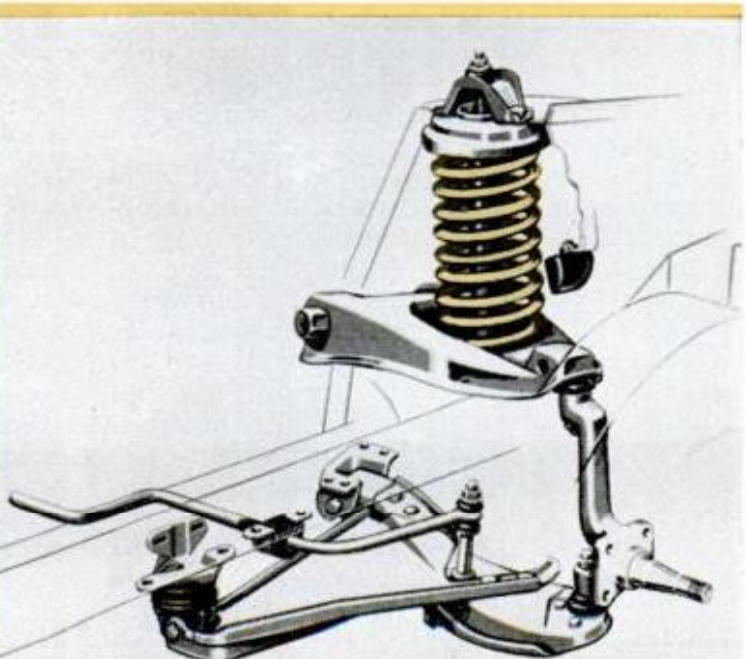
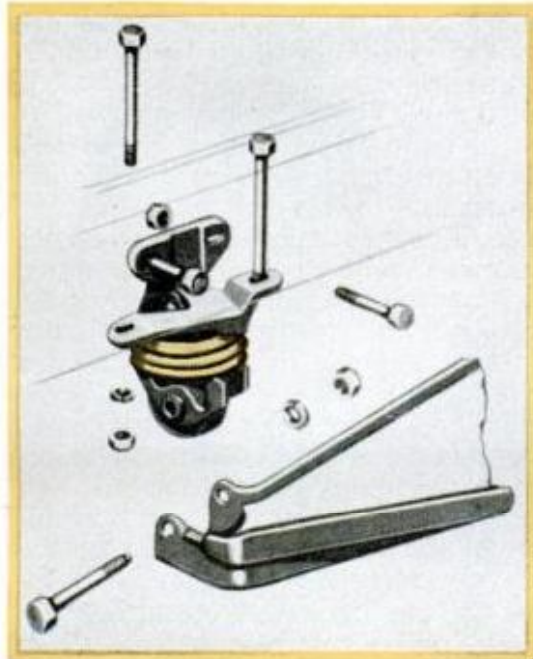
A similar setup, Mercury calls it "Cushion Link" is incorporated into the leaf-

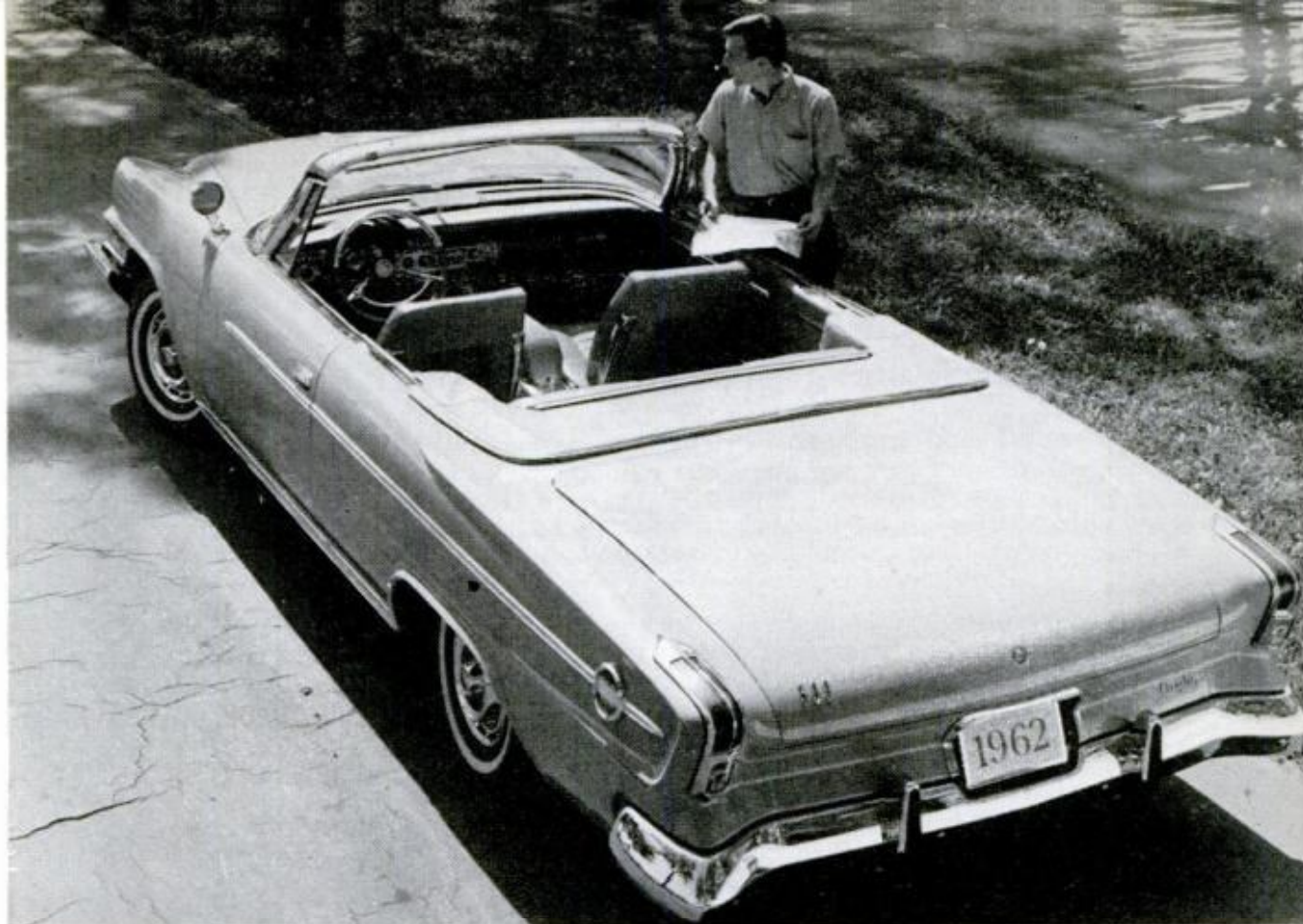
spring Hotchkiss drive rear suspension. It consists of "tension" shackles that permit the springs and axle to have fore-and-aft movement. The front shackle has a lever arm with its end sandwiched in a rubber block. The rubber permits the shackle, and thus the entire assembly, to recess slightly "giving" with the force of the bumps and thus absorbing some of their shock.

Meteors have self-adjusting brakes as standard equipment. To insure perfect shape and prevent distortion, brake drums are annealed to relieve stress before final finishing. Power brakes are optional.

Suspension and steering linkage, front-wheel bearings and universal joints are scheduled for service only every 30,000 miles. ★ ★ ★

SMALL SPRING (inset color) absorbs shock of horizontal thrusts on front suspension lower control arm

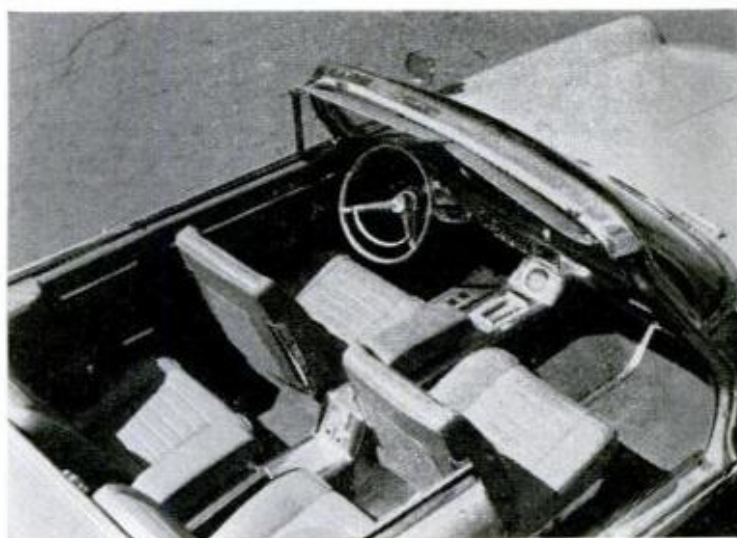




CLEAN, SIMPLE styling is carried through on rear deck of the distinctive 300-H

LONG CONTROL console separates the leather bucket seats

CHRYSLER 300-H



CHRYSLER has broadened its line of "300" models, but the king is still the high-performance powerhouse with the letter after its name. This year it's the 300-H (for *hot?*). Displacement is the same as last year's 413 cubic inches but five more horses have been added to push the total to 380.

Carburetion is through a pair of four-barrels, and the mixture is subjected to a 10.1:1 compression ratio. Camshaft is a special, high-performance grind used in combination with mechanical tappets. Heavy-duty shocks and brakes and a sway bar are installed to help you hold it down.

The 300-H will be produced only in a two-door hardtop or convertible model. Both have power steering, power brakes and auto-

matic transmission as standard equipment.

Interiors are elegant in a sporty manner, with individual bucket seats, front and rear. Each of the individual bucket seats has its own adjustment and is upholstered in genuine leather. Under that hide is five inches of foam rubber contoured to fit the body.

The center instrument console that divides the seats runs from front to rear. It contains an ash tray, power window controls and a tachometer up front. In the rear is another ash tray, a lighter and the rear window controls.

The newest 300-H edition carries on the reputation its predecessors acquired for smashing acceleration, exceptional handling and considerable comfort. ★★★



By Jim Whipple



Compacts, In-Betweens Look Good for '62.

Rambler's Great New Feature — a Built-In Price Cut!

They're off and running. Prices are posted, salesroom doors are open, the supply pipelines are filled (or rapidly filling in the case of Ford after the short strike). And some indication of the public's preference is already shaping up.

The word was out among dealers by the end of October. "It looks like a year for compacts," said one. And there was already a scarcity of **Buick Special V6s**, **Chevy IIs** and **Pontiac Tempest** convertibles.

It's not hard to understand why compacts look big for '62 when you read the latest figures for eight full months of registration in 1961. Compacts sold 1,246,051 out of a total of 3, 812,063 units. And 1961 started off as a slow year for the industry.

Then too, the compacts are seasoned; all but one of them, Chevy II, will have been on the market for a year and will have won acceptance from all but the doubtingest of Thomases.

Although it's pretty early to tell much, the prospects of the new "family-sized" or "senior" compacts **Plymouth**, **Ford Fairlane**, **Dodge Dart** and **Mercury Meteor** look good. All these cars fall in the up-to-\$2700 price class which accounted for 80.74 percent of all registrations for the first eight months of 1961.

A look at some of the comparative base prices of these 115-117-inch-wheelbase cars is interesting: **Plymouth Six Savoy** four-door sedan, \$2262; **Dart Six** four-door, \$2297; **Fairlane** and **Meteor** prices have not been announced at press time, but the **Ford Galaxie Six** is pegged at \$2507 and the **Chevrolet Six** at \$2378. Now in all fairness it should be pointed out that the **Galaxie** as "lowest priced full-sized Ford" doesn't quite compare with **Chevy's Biscayne** at \$130 less. The **Fairlane** will probably be priced between the \$2262 of the **Plymouth** and the \$2378 price tag which is being carried by the **Chevrolet**.

This is a good time to point out that all **GM** and **Ford** products include the heater in their base price. Those who live in lower Florida or Hawaii may have to get their prices escalated downward and the heater

removed. (Heaters in the under-\$2700 brackets run about \$75, so add this figure to **Dodge** and **Plymouth** prices and you'll even up the score.)

These "in-between cars" should enjoy quite a play from the thrifty folks who trade only every five years or so and who have held off swapping in their '57s and '56s in the hopes that cars like the 57 **Ford Custom** (116-inch wheelbase, 202 inches overall) might return again.

Then too, there will appear for the first time, especially within the ranks of **Ford**, **Chrysler** and **GM**-oriented owners, a new breed. Perhaps we could call this new breed "The Compact Traders."

A million or two owners of 1958-60 **Ramblers**, 1959-60 **Larks** and 1960 **Falcons**, **Corvairs** and **Valiants** will be back in the game and eligible for trading.

These are the original pioneers of the compact movement who followed George "The Pied Piper" Romney in flight from the "Gas-Guzzling Dinosaurs." These good people should find nothing monstrous about the size or appetite of the "new-sized" **Ford Fairlane**, **Plymouth**, **Dart** or **Mercury Meteor**, especially if they shop the sixes, or in the case of **Fairlane** and **Meteor**, option an overdrive with their V8s.

Remember, in 1959 and '60 (and '61 for that matter) there were no cars, not even imports, in between the economical compacts and heavyweight full-sized cars. Now there are, and the fallout of the 1962 market pattern will be exciting to watch.

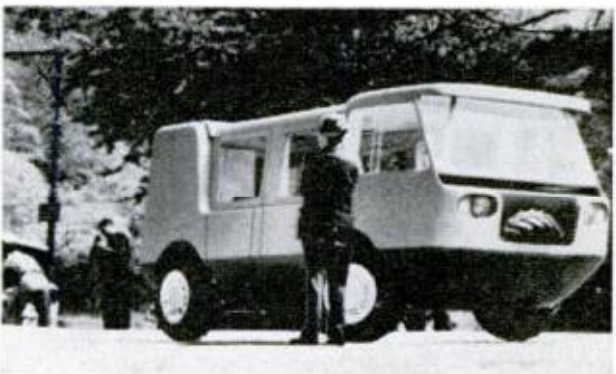
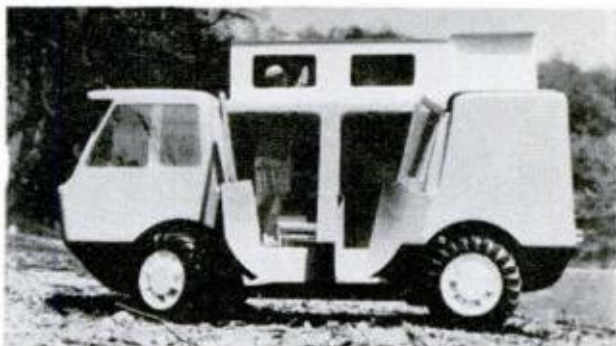
The Big Three haven't taken the play away from **American Motors** by a long shot. In case you might have gotten the impression that **Rambler** was a fading star, some 237,000 of them were registered in the first eight months of 1961 and now the irrepressible Romney has come out swinging for 1962 with a load of improvements topped off with a price cut of \$176 on the popular Custom Classic 108-inch-wheelbase sedan. Americans are cut up to \$98. Three cheers. George really knows how to lick inflation! ★ ★ ★



Rear-Engine Test Plane

Built to study flight at supersonic speeds and also at low speeds necessary during landings and takeoffs, a new British jet aircraft is billed as the trailblazer for supersonic airliners.

The Handley Page 115 "Arrowhead," unveiled recently at Bedford, England, has a rear engine and intake and a delta wing. It was designed to test flight problems that will be encountered by a 1400-miles-per-hour airliner now planned by the British.



Dream Camper

Applying the dream car theory to the camper field resulted in the Amphicamper. Conceived by John H. Bowers, Jr. of Pratt Institute, and executed in aluminum, a model of this all-purpose vehicle won an Alcoa Student Design Merit Award.

Amphicamper is intended to serve five people as an overland and water vehicle and a living shelter. Length is 16 feet. Top speed is 60 miles per hour on land and 5 knots in water.

Where-To-Find-It List

If you want to find out more about the articles in this issue, write for sources of supply or further information which are given in the free WHERE-TO-FIND-IT list. Send stamped, self-addressed envelope to SERVICE BUREAU, 200 E. Ontario, Chicago 11, Illinois.



For the hot-stove league: Final Report on Those Baseball Changes



LAMINAR-FLOW wind-tunnel tests, run for PM by Jim Miller, an engineer from Illinois Institute of Technology, proved that a smooth baseball isn't a fast one. The opposite turned out to be the case

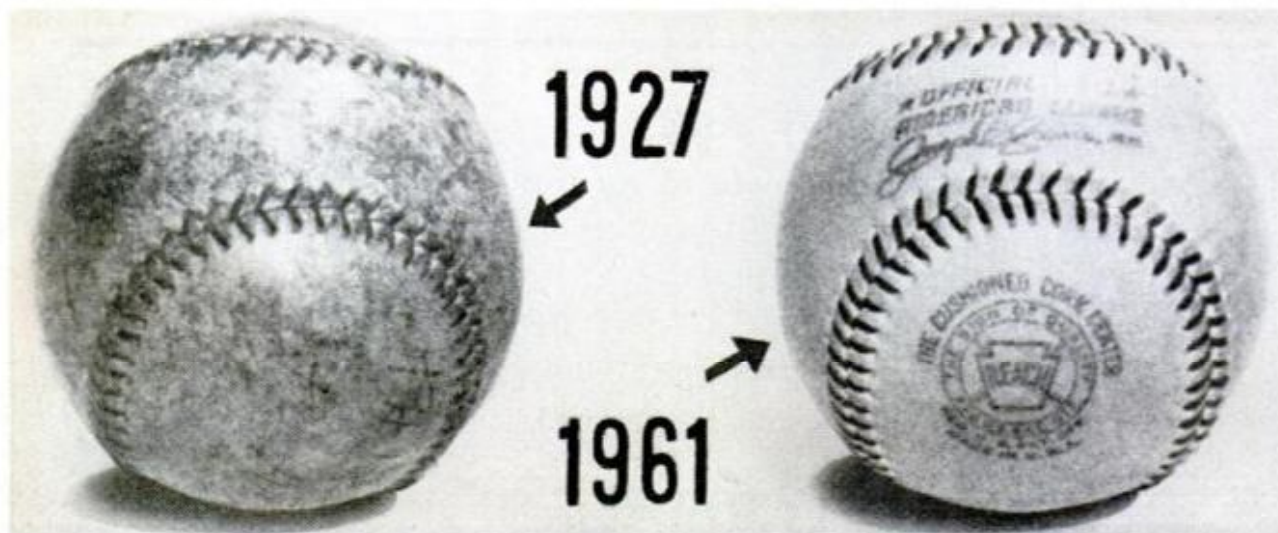
AFTER FOUR MONTHS of chemical and mechanical tests, the editors of *Popular Mechanics* and a team of researchers at Armour Research Foundation are satisfied on two counts: One, the baseball has undergone changes since the Ruth era. Two, the baseball being used in the major leagues today is "livelier" in the sense that

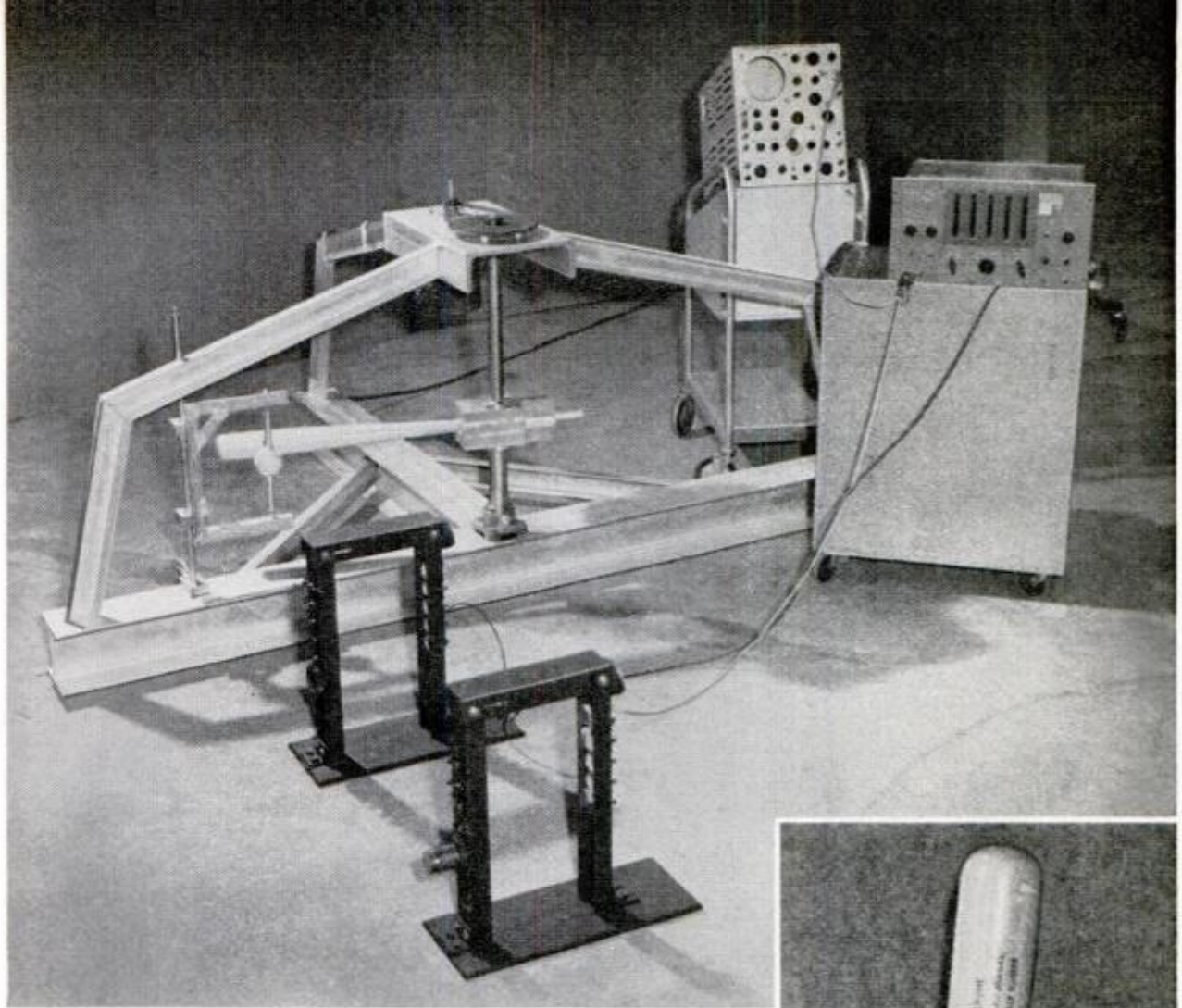
it can be hit a greater distance—under some circumstances—than the ball used in the late twenties and early thirties.

Some very interesting discoveries were made during the tests. Here's an outline of the findings:

Chemical tests showed that, while a lot of effort has been made to keep the ball

1927 BASEBALL, left, shows smaller seam and tighter, flatter stitching that make it smoother than the 1961 ball, right. Though the number of stitches is the same, their difference in size and width shows strongly here

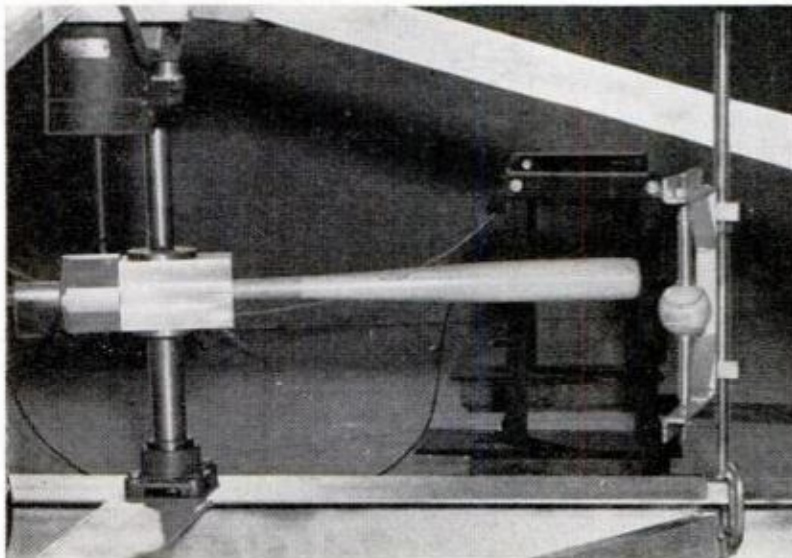


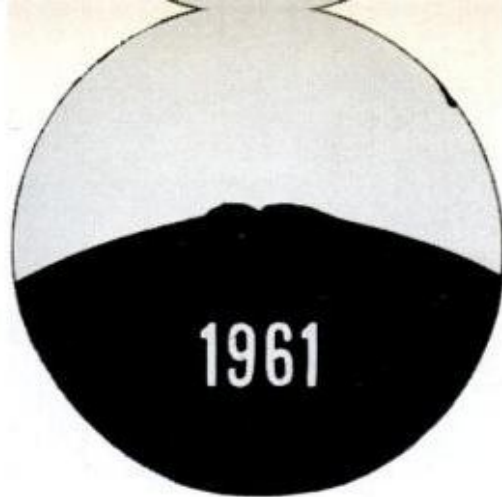
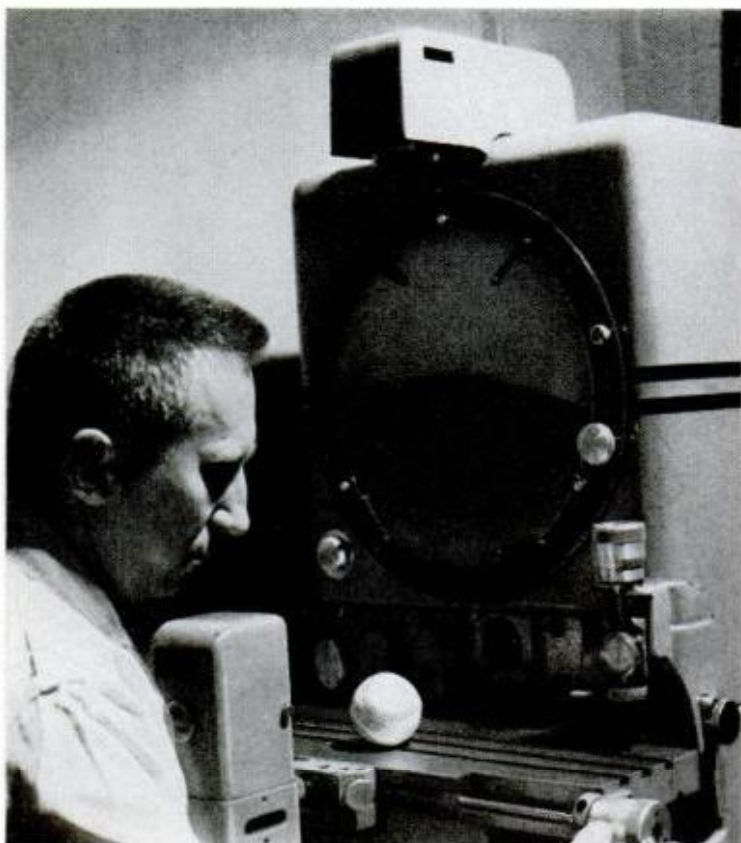


BATTING MACHINE, designed for PM tests, allowed balls to be hit at any speed. Ball was hit out through double photoelectric screens, and oscilloscope measured speed between the traps. Polaroid camera focused on oscilloscope screen gave photographic record of results in 10 seconds; 5000-frame-per-second movies showed ball reaction

SIMULATED HANDS held the test bat, mounted in live rubber, then mounted in turn inside aluminum block on batting-machine axle

BUSINESS END of the batting machine shows test ball mounted between cone coiled springs on solenoid-operated placement mechanism





SHADOWGRAPH inspector Ed Swider demonstrates method of measuring seam size. Inserts show comparison

consistent through the years, there have been changes in yarns, rubber and cork core materials, and manufacturing processes. A few greatly different compositions were discovered—one 1927 ball was wound entirely with one continuous type of wool yarn instead of the specified three types. (One ball whose owner stated he had caught in the stands at a major league game in 1925 even had a solid rubber core with no cork at all. The modern ball was first produced for the 1925 World Series, but the 1925 regular season ball was supposed to have a cork core inside a single layer of rubber.) Even in apparently-identical balls, the tensile strength of the wool windings and the cork-and-rubber composition cores showed inconsistencies. While the effect of these irregularities on “liveliness” is hard to predict, it’s almost certain that they would not have performed identically.

The chemical tests indicated that the age of our sample balls should not make the mechanical tests meaningless.

Wind tunnel tests were started after the earlier tests showed that many of our baseballs from the late twenties had a much different seam structure than the 1961 sample balls. The older seams were narrower, tighter, seemed to be sewn with lighter thread, and were much flatter than the 1961

seams. As a result, the contour of the older balls was smoother.

Several years ago, during a series of tests on golf balls, the Armour wind-tunnel experts found that, in many cases, golf balls with dimpled surfaces showed *less* aerodynamic drag than perfectly smooth balls, and could be hit faster—and therefore further, than the smooth balls. Someone suggested that the difference in the seams on our sample baseballs might produce the same effect.

They did. Wind tunnel tests showed that the higher, coarser seams on the 1961 balls caused a surface turbulence in the air flow over the ball. The turbulent “boundary layer” results in a smaller trailing wake, reducing the ball’s over-all drag. The same effect showed on the older balls, but to a much lesser degree; they showed 10 to 15 percent *more drag* than the 1961 balls. The test engineers estimate that the difference in drag coefficients could result in a five to ten percent distance advantage for the new ball. That’s enough to boost a 350-foot fly ball to a 385-foot home run.

Impact tests were conducted on 24 sample balls—12 brand-new Reach American League game balls contributed by the Chicago White Sox from their game locker,

(Continued to page 210)

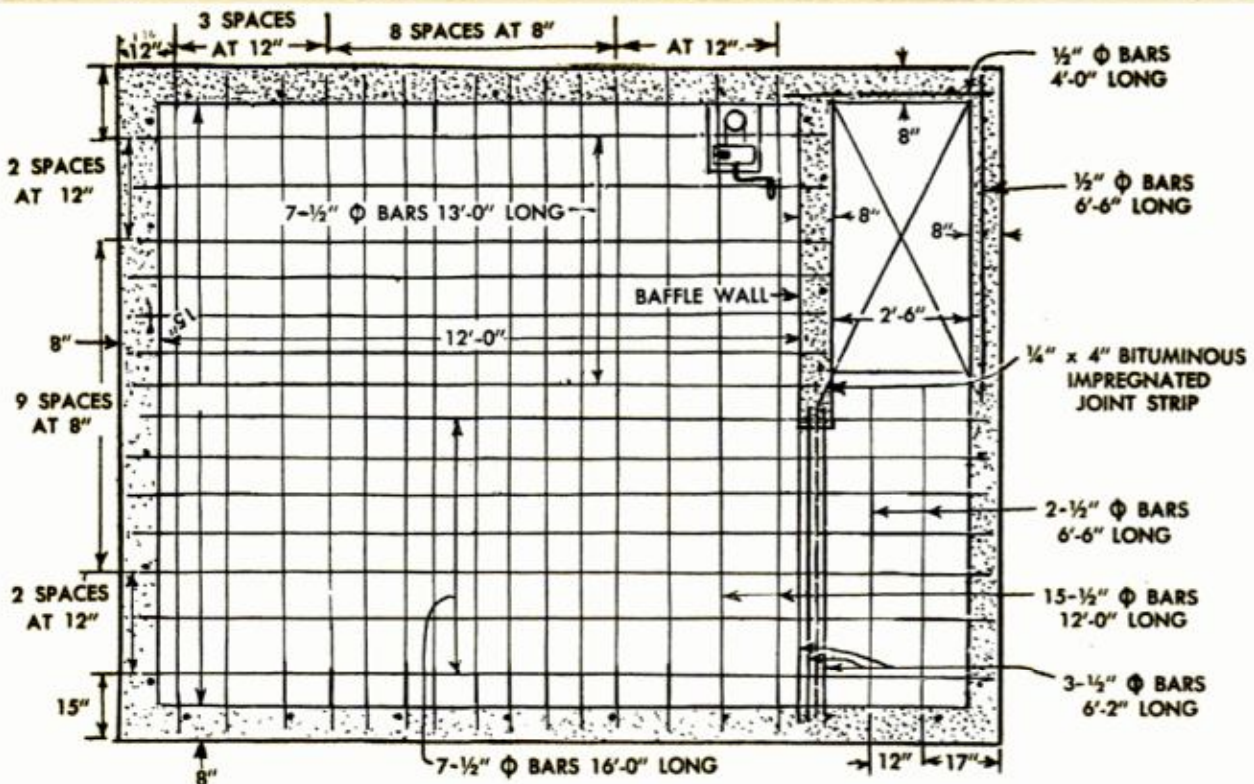
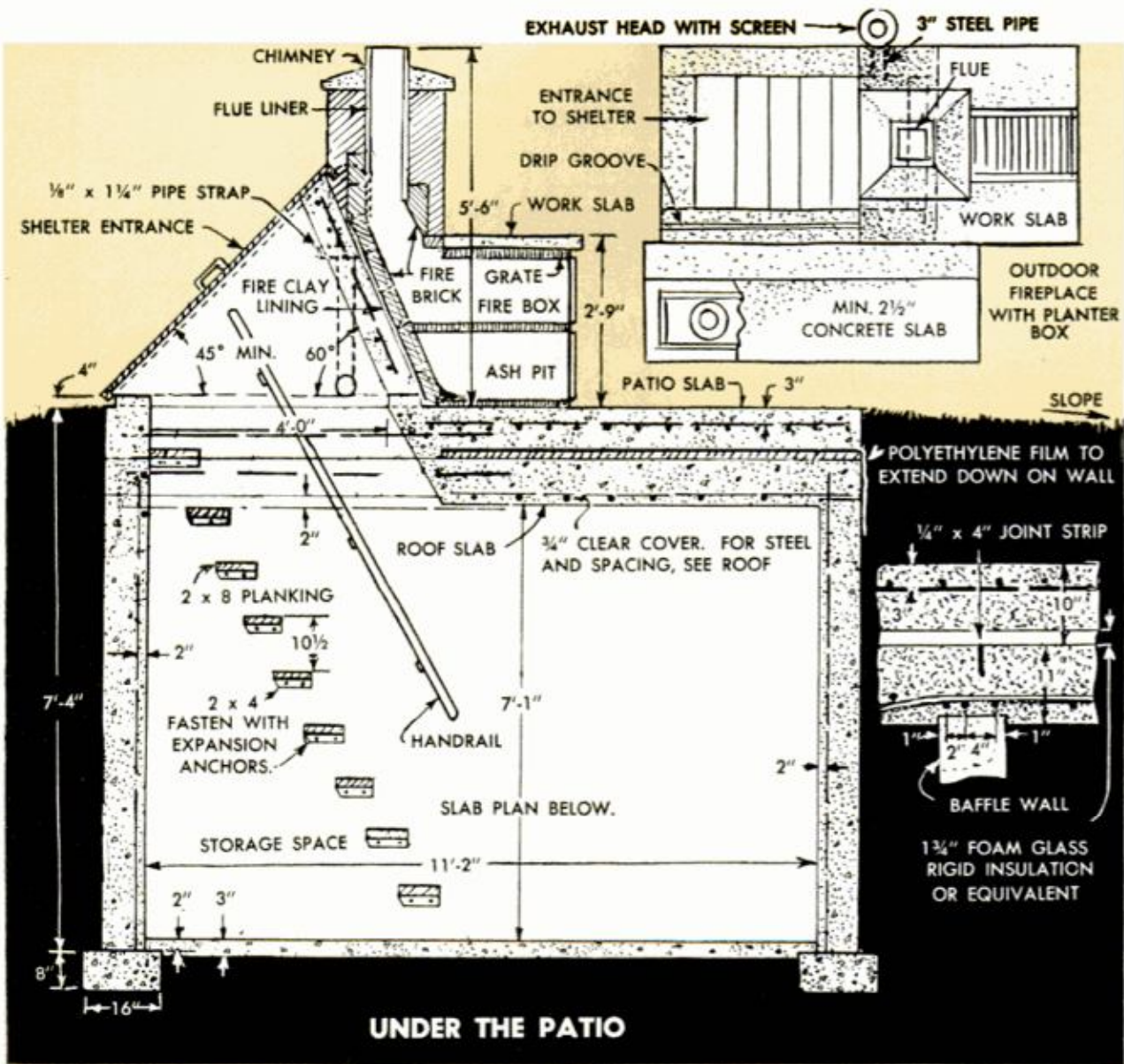
You Can Build a Low-Cost Shelter Quickly

\$30 . . . \$97 . . . \$280 — This can be the cost of materials for a family fallout shelter

NUCLEAR SCIENTISTS who have built shelters to protect their families against possible fallout radiation have, in many cases, put up simple, inexpensive structures that can be erected quickly. Following this example, *Popular Mechanics*

presents on these pages the construction details of three previously unpublished plans prepared by the office of Civil Defense and one by a nuclear engineer. They include some of the low-cost and most rapidly-built shelters available.





UNDER-THE-PATIO Shelter is typical of some constructions being offered by commercial builders—for a family or cooperative group desiring to house up to eight people. Because the official plans call for the building of a room underground and making a structure that has another use, this shelter is the costliest PM is presenting. Its cost estimate, obtained through the Mason Contractors Assn., totals \$1841, a

figure that includes \$776 for installing footings and top slab and is a figure that could serve as a cost guide for anyone contemplating having any similar shelter installed commercially.

Drawn up by the Office of Civil and Defense Mobilization this year for inclusion in its to-be-revised edition of the Family Fallout Shelter booklet, the plan is Number S.O. 20.

SIMPLEST SHELTER OF ALL is the design of R. M. Stephenson, professor of nuclear engineering at the University of Connecticut. He based his shelter on experience gained from 10 years working with the atomic energy program and a successful design concept used by the British in the last war. Prof. Stephenson says:

"Recent tests by the AEC show that this type of shelter will reduce radiation levels by a factor of from 200-1000. This means that even in a region of high fallout, the radiation exposure of a person in this shelter would be no more than what he might get from a series of X rays.

"I want to emphasize that this shelter has been designed only on the basis of cheapness. Depending on the size of your family, you may want to have a bed or cot, or chairs, etc. I would suggest that before starting a shelter, you assemble the family in a corner of the room and decide the size and height of the shelter required."

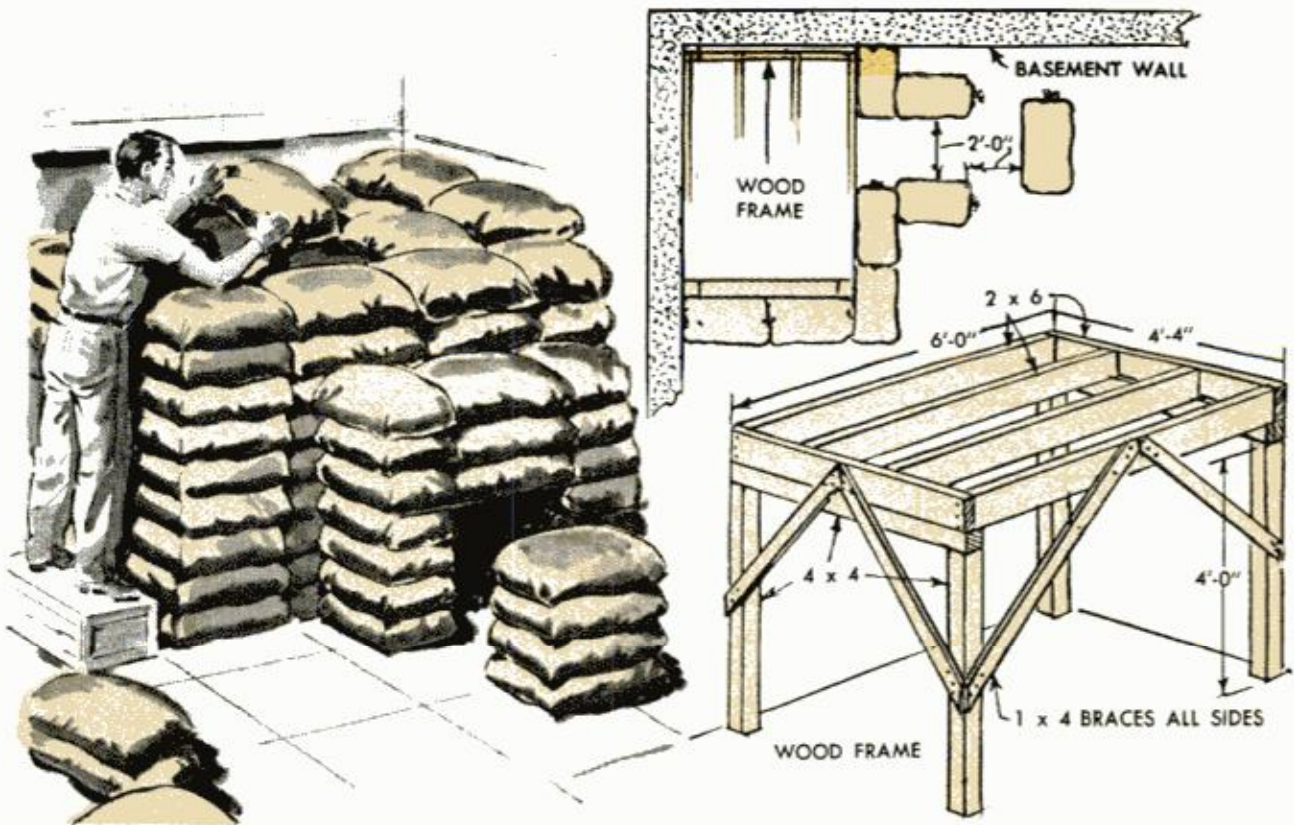
The bill of materials came to \$30 for Prof. Stephenson. It consisted of 100 sandbags,

20 x 30 in.; 10,000 pounds (four yards) of dry sand; lumber as shown; one pound of 4-in. spikes, 2 pounds of six-penny common nails, and 100 feet of strong cord for tying sandbags.

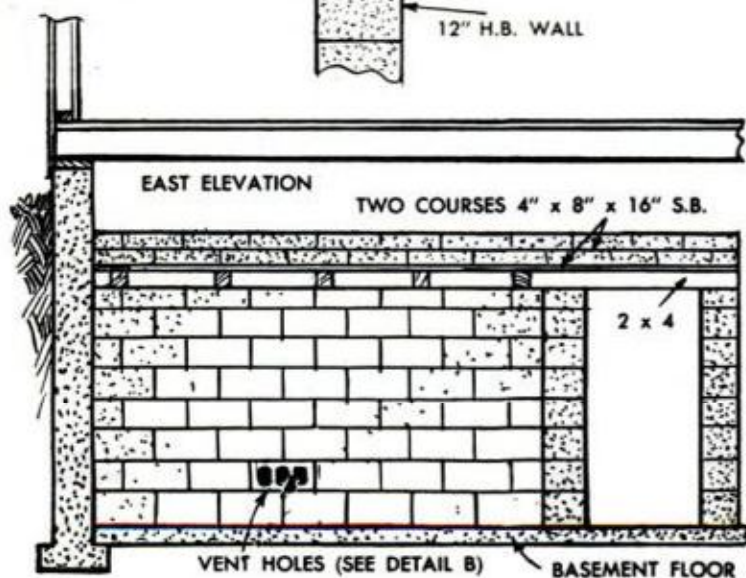
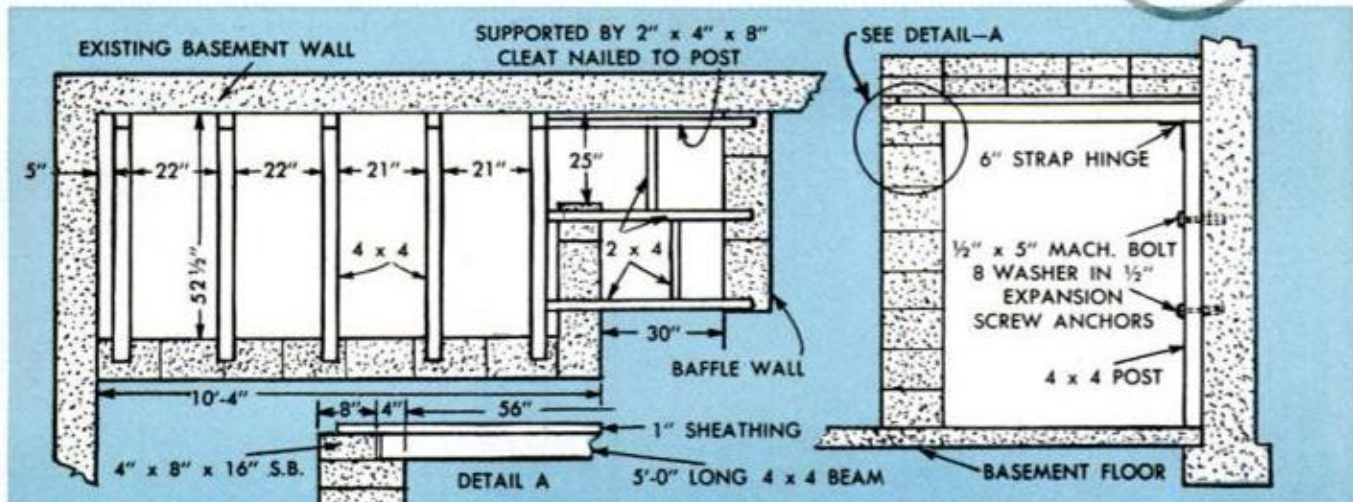
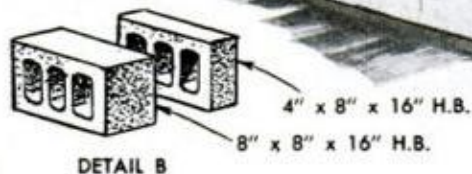
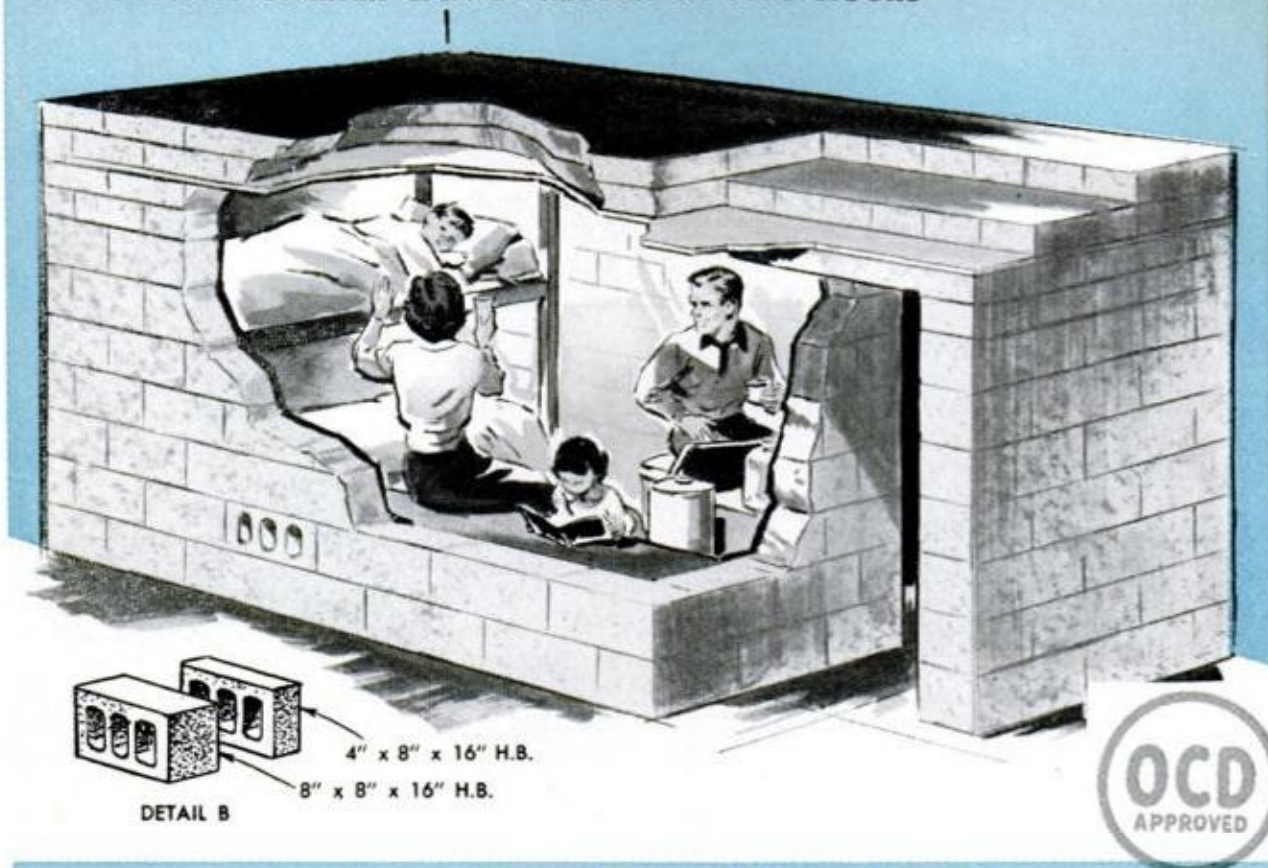
"If you leave small holes when you stack the first layer of bags," says Stephenson, "this, combined with the door into the shelter, should provide plenty of ventilation. If you have a basementless house, the same shelter can be used except that two more walls of sand bags are required and the opening into the shelter must be a little more elaborate to prevent direct entrance of radiation."

Prof. Stephenson also suggests closing and locking all doors and windows of the house since it will protect against the entrance of fallout dust; shelters protect against radiation from such dust.

To get Popular Mechanics' booklet on shelters and survival information, send 25 cents to Popular Mechanics, Department RSB, 200 E. Ontario St., Chicago 11.



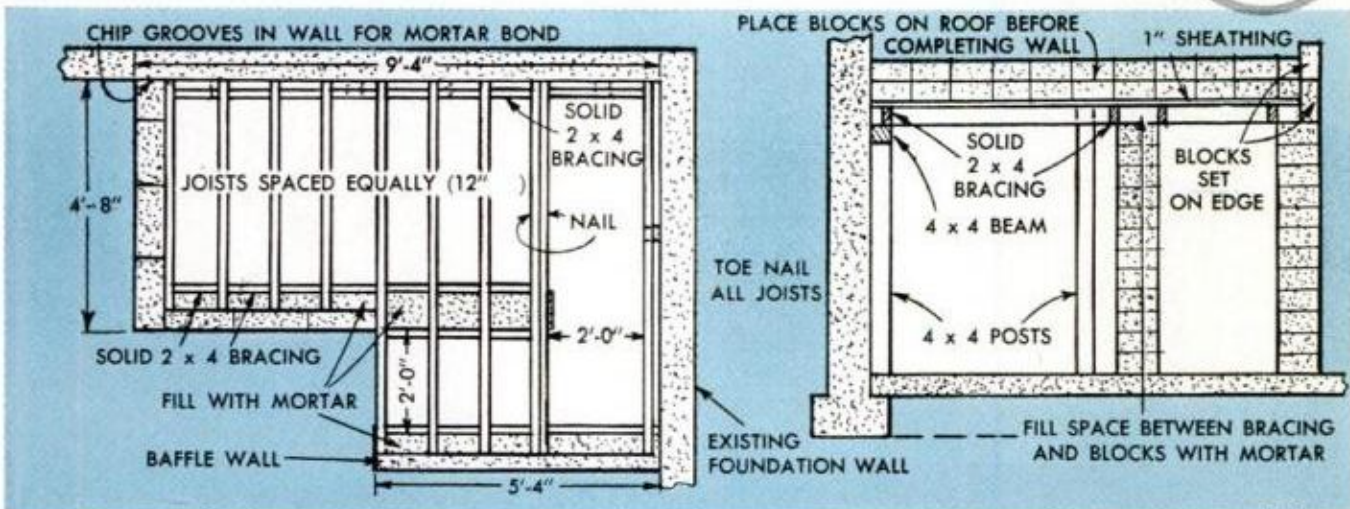
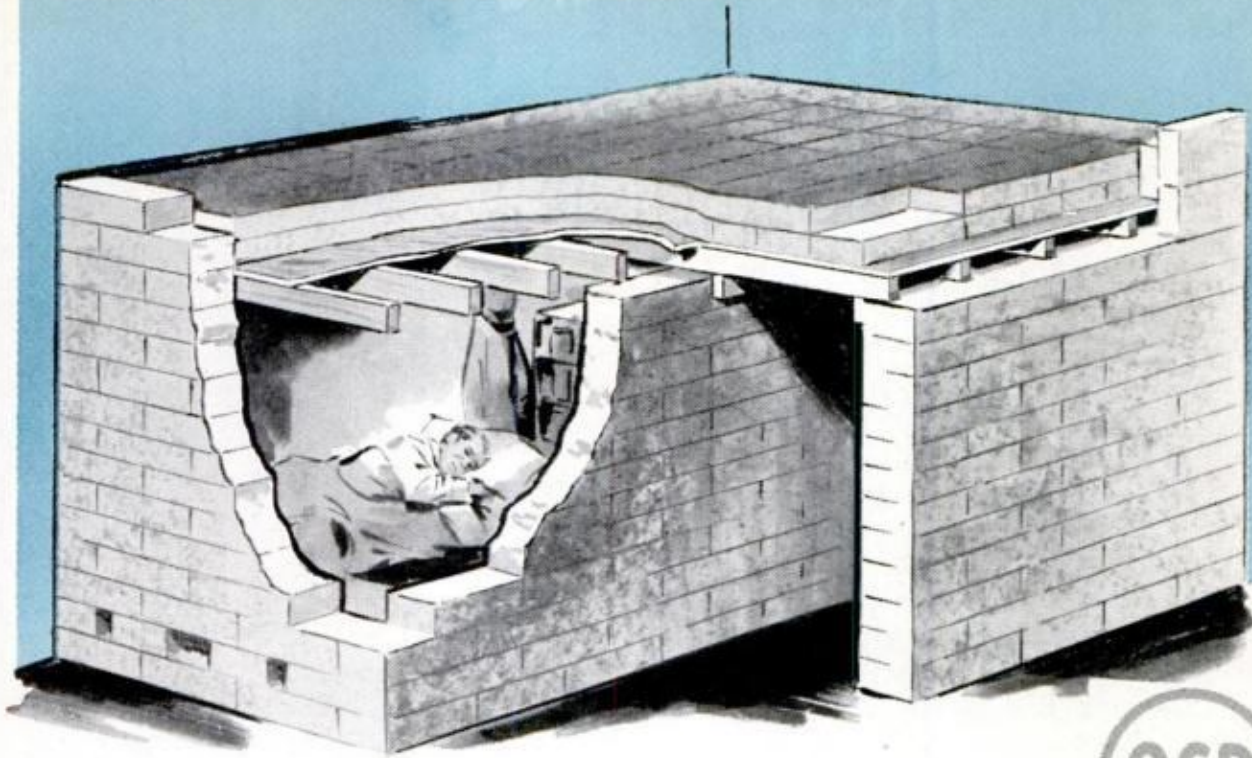
STORE-AWAY SHELTER CAN BE REBUILT IN TWO HOURS



THIS SPACE-SAVING DESIGN (OCDM No. S.O.29) can be set up by one person from its store-away position in two hours or less, once the initial construction work has been done. Cost of material, according to Portland Cement Assn., amounts to about \$97. Total time of the initial construction is about 33 man-hours, including drilling wall, drilling and cutting lumber and placing blocks. Wood frame top is hinged to fold against wall. No motor is used.

All food and water is stored outside the shelter. Upon taking shelter, one or two days' supply of food and water can be carried in.

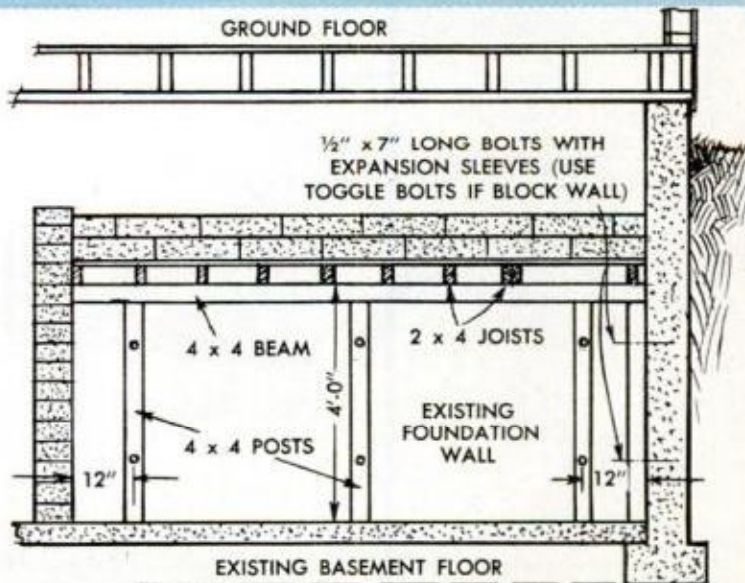
BASIC SIT-DOWN SHELTER FOR BASEMENT



FOUR PERSONS can be sheltered in this structure which costs an estimated \$280.

Taken from OCDM drawing number S.O. 2, it is made basically of concrete block, and designers suggest that lumber surfaces in contact with existing walls or floor be coated with tar or white lead paste to prevent rot.

Those who desire more elaborate, blastproof underground shelters should request the Family Blast Shelters Interim Technical Bulletin from the Office of Civilian Defense, Department of Defense, Pentagon, Washington 25, D. C. It is free.



Great New Sport: TABLE-TOP RACING

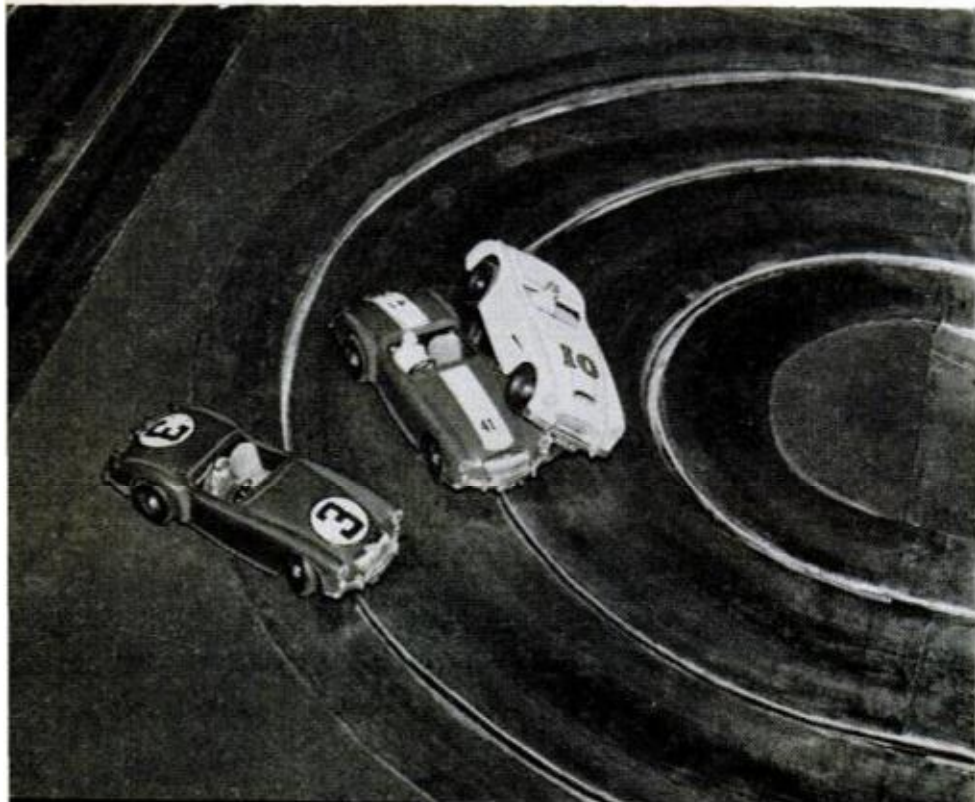
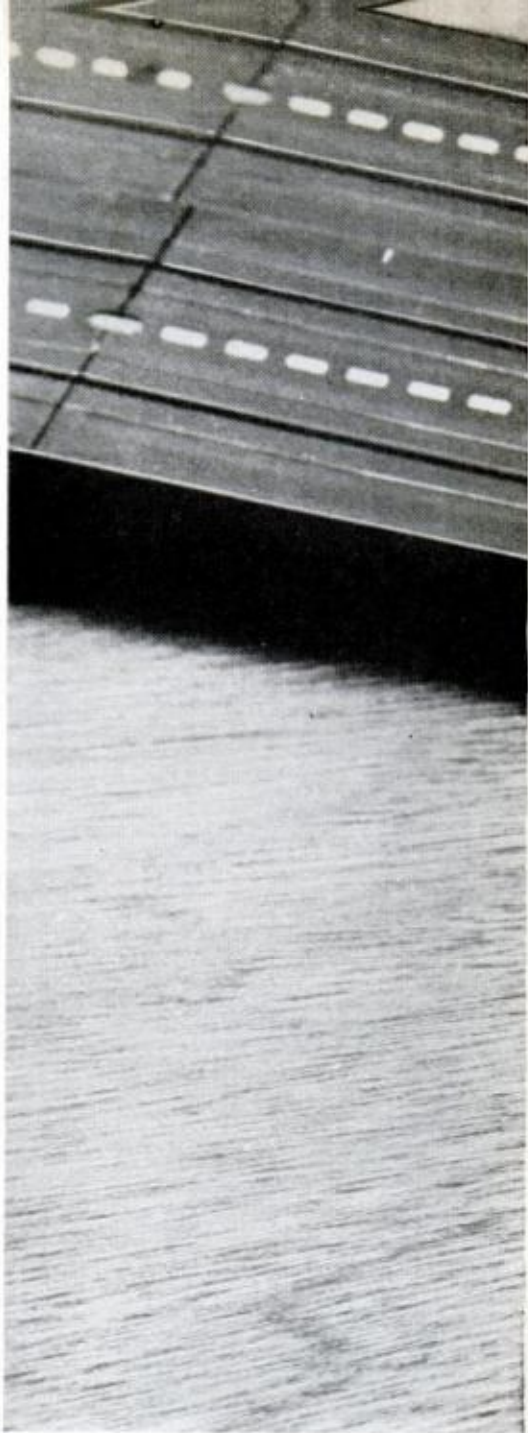
*You have to be a savvy driver with
a lead foot to guide a hot
Maserati to victory*

By Richard F. Dempewolff

BILL PROCTOR'S MASERATI screamed down a long grade between hedgerows of greenery, and nosed into the tightest turn on the course. You could hear the whine as he poured on the coal. The car began to drift. Proctor eased off on the juice too late. A split second later, the "Mazzer" spun out, sideswiped Bob Fennelly's speeding D-Jag, which slithered into an uncontrollable spin, then ploughed into Prentice Cookman's Ferrari as it came from behind on the outside. Both cars flipped, hurtling into the spectators.

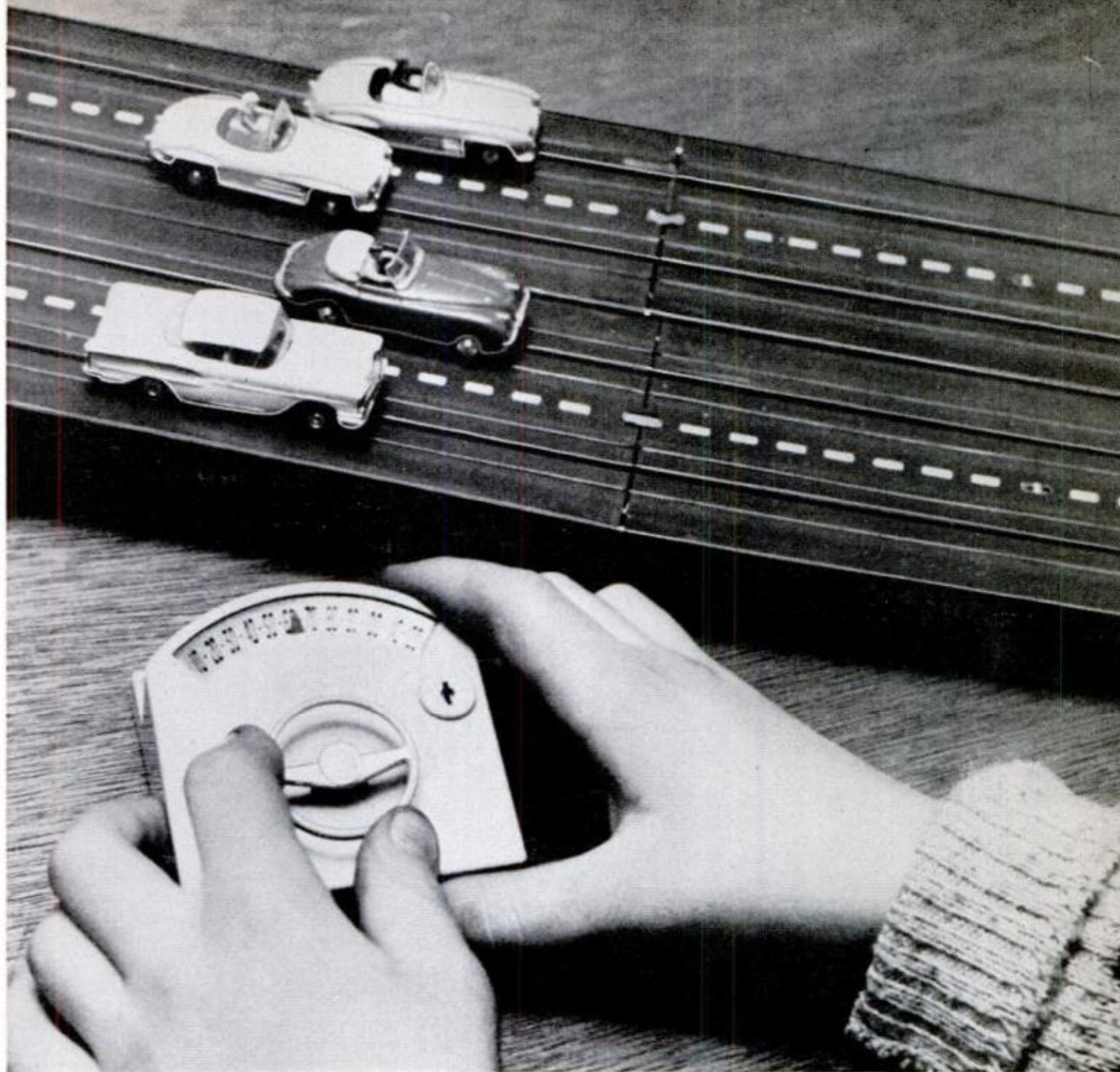
"Not bad, not bad—that was ten whole laps without a spill," Proctor observed as he picked up the Maserati. He put it back on the road-racing course that snaked over hills, through curves, tunnels and mountain scenery all over the basement of Bob Fennelly's home in Hamden, Conn.

Proctor, whose name has appeared on the starting line-up at many a genuine road race, is one of a growing army of enthusiasts applying driving



POURING IT ON, driver turns up rheostat, supplying more juice to car motors via contacts on track

SPINNING OUT, Car 10 is booted along by Car 41. Both smashed into Car 3. None of drivers was injured in the spectacular crash



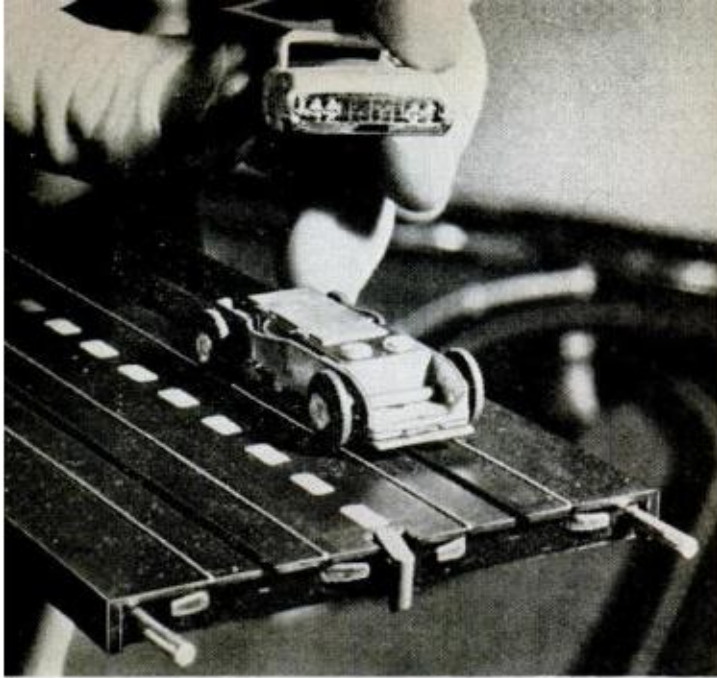
skill and a keen knowledge of road vehicle behavior to a fascinating new kind of sport. It involves *driving* precision-scaled electric models of free-rolling cars around equally precise scale courses. These may range from simple loops that fit on a card table to elaborate raceways that weave through an entire game room like a deluxe model train layout.

But unlike electric trains, the baby cars aren't irrevocably committed to a pair of metal rails. Road tracks, made to accommodate two to six cars at a time, provide the little vehicles with plenty of latitude for slithering and roaming if they're not properly controlled. If the operator's skill is up to par, his car will drift on the curves and fishtail into the straightaways under added power; if he misjudges, his car may spin out, crash into competing cars, and

wind up in the pits with a smashed body, stripped gears—or any one of a number of failures familiar to full scale automobiles.

Instead of a major repair bill, however, the broken vehicle can be back on the road at the cost of a few cents and a little tinkering. Or the owner can assemble another, new car from a kit for about \$2 total.

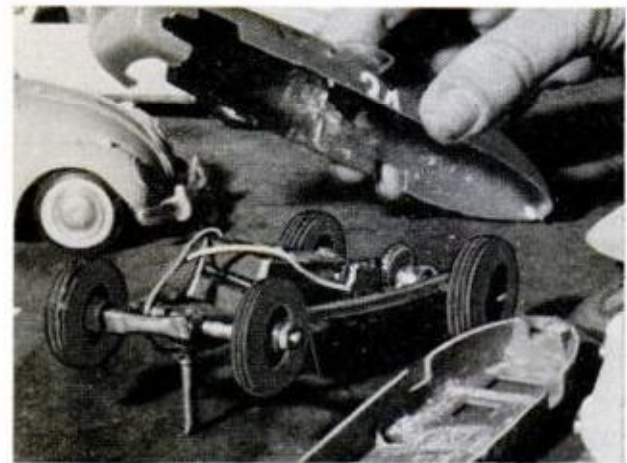
Scale model electric-drive cars first began to whiz around table-top tracks in England only eight years ago. The sport was known as "rail racing," because the cars were guided by a raised rail that also supplied the power. It was three years later before the first home made layouts, using plywood roadways and rolling stock assembled from plastic hobby kits, showed up in this country. Since then, rail racing—as it is still called by the purists—has taken off like an ICBM.



UNDER THE HOOD. Spark-gap motor picks up electricity from silver-nickel strips running down each track lane. Center groove is for the guide post under car

More than half a dozen toy manufacturers here and in Britain have jumped on the bandwagon with ready-made cars, kits and track, varying in size from HO scale to 1/29 and 1/24 scale vehicles. The bigger cars, running to six or seven inches in length, make far and away the most spectacular layouts because of the detail that can be achieved.

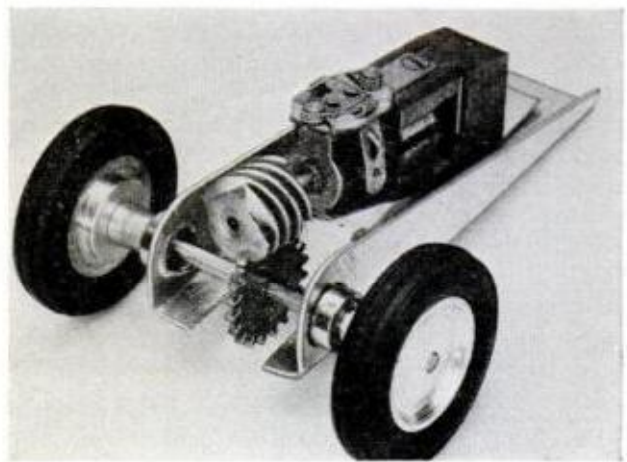
No longer does a rail jut from the track. Circuits are sunk flush with the road surface, or in a slot beneath it. Current is picked up by spring wire "feelers" under the cars, by delicately sprung brushes, or by rollers of varying design. In most layouts, ordinary house current is fed through 6 or 12-volt transformers (depending on motors used), thence to rheostats that control the speed of the cars. Great ingenuity is displayed in the speed controls. Some outfits use hand-held pistol-grip squeeze throttles; others are floor pedal affairs simulating car accelerators; some are op-



PLASTIC BODY and wheels are taken from kit, axles are specially made. Guide pin projects down, front

IN THE PITS. Prentice Cookman of Hamden racing team solders crash bar on a disabled Maserati

WORM DRIVE and motor assembly are adopted from standard hobby equipment, operate on house current



POPULAR MECHANICS

erated like airplane throttles from a control console. All are wired to the pairs of metal contact strips on the track, from which the cars pick up juice to power their tiny motors. In the 1/24 and 1/29-scale cars, these may be 6-volt model motors, or conversions from HO gauge locomotive motors.

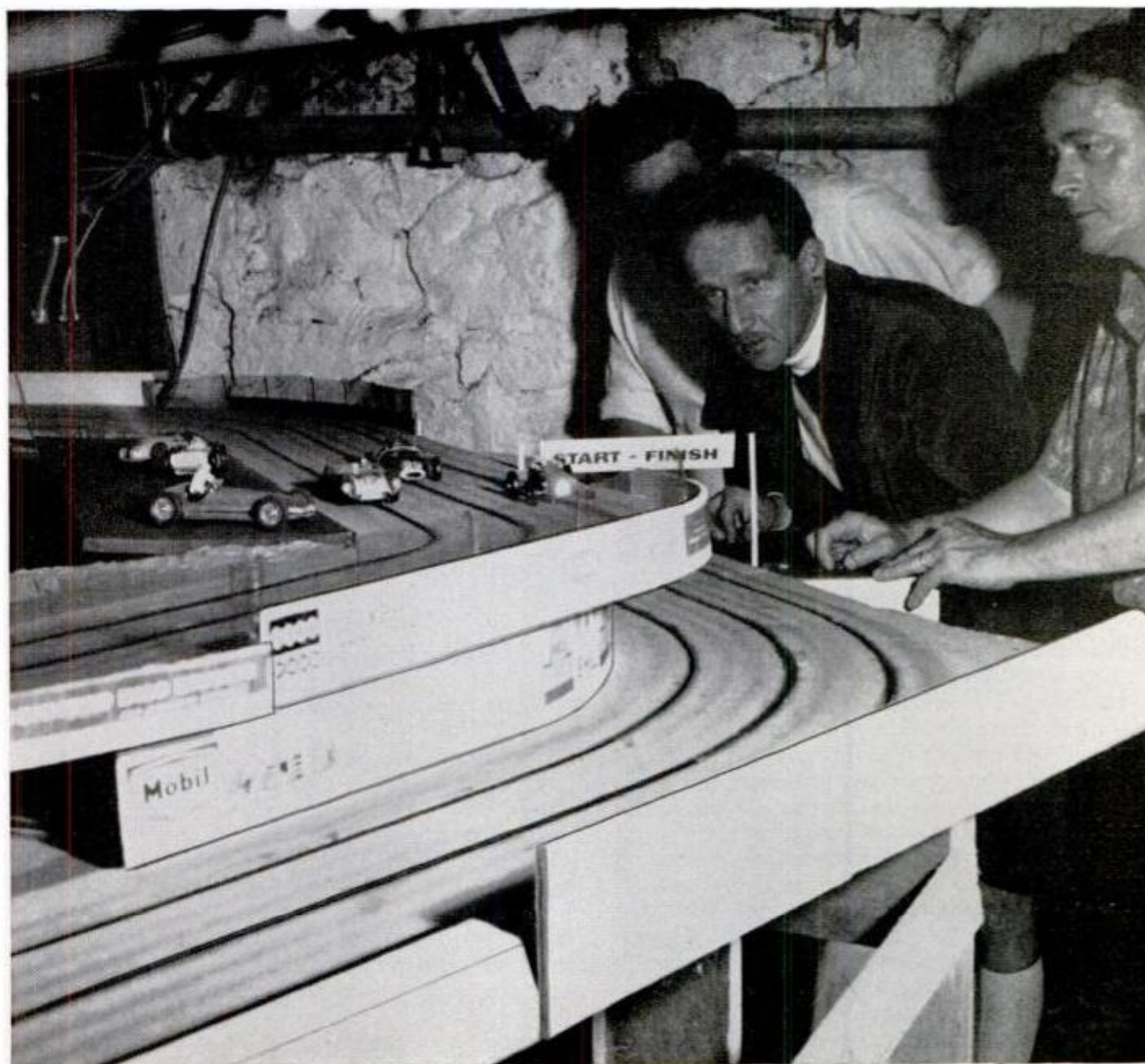
Guidance Methods Vary

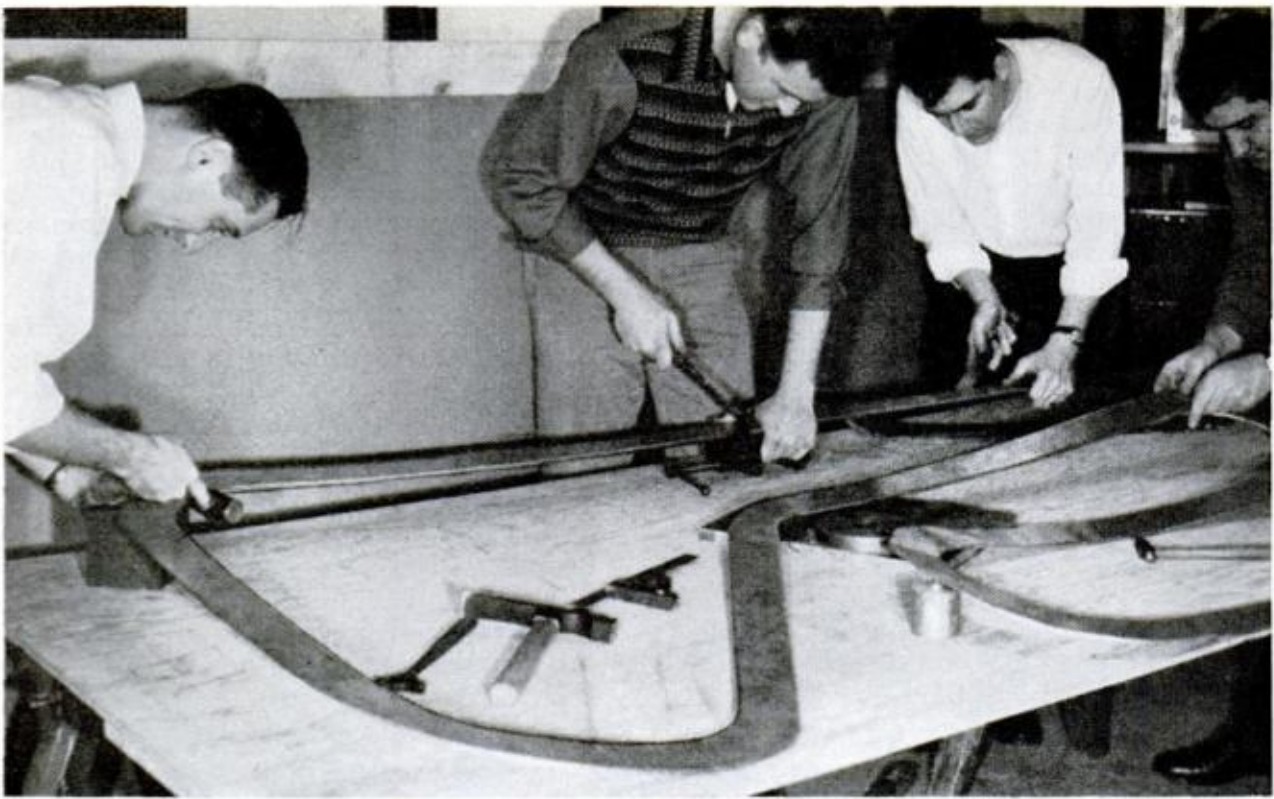
Cars are guided by various means. Some employ a nylon rod jutting from under the front end into a slot between the contact strips in the track surface. Others use a roller that rides a groove in the track. One outfit employs a nylon fin under the front end, which is connected to tie rods. It fits in a slot in the track, and when the road curves, the fin turns with it, automatically turning the car's front wheels. Devotees of this system claim that it greatly increases roadability and performance. Kits

include plastic bodies, complete down to such details as rear-vision mirrors, knock-off wheels with rubber tires, 6-volt motor, gears, axles, chassis and a scale model driver with helmet and goggles. Molded plastic track sections in curves, straight-aways and crossovers can be accumulated one at a time, or whole hog—along with endless scenery accessories.

For people who don't like assembling models, there are lines handled by most big hobby shops which provide a whole stable of sports and racing models in 1/29 scale—complete and ready to go. Naturally, they cost more. But one outfit will put anyone in business with two slick, molded plastic Grand Prix type cars, a speed controller for each, a five-foot-long oval of track sections complete with guard rails, and a dry cell powerhouse—all for something under \$30.

TIGHT RACE. Models slither out of curve on Hampden course. It has two highway levels, crossovers and tunnels





HOME-BUILDING of a track of sheet copper is done one section at a time, carefully hammered out to close tolerances. Most rail-racing enterprises involve groups of men who share expenses and labor, and know-how

Home-Built Layouts

To build and maintain the kind of layouts that will provide them with the ultimate in atmosphere, plus dozens of yards of convoluted roadway with every conceivable hazard built into it and huge stables of cars, fans have formed neighborhood rail-racing clubs. This helps defray the costs of a big layout, and spreads the labor of building it. Such purists as Bob Fennelly and his brother Joe, in Connecticut, and Ted Mathews (who provided many of the pictures for this story) frown on most ready-made products. They do, however, use built-up cars sometimes, which they modify to suit themselves. And their home-built tracks are embellished with all sorts of hobby shop atmosphere.

Stand beside Bob Kennelly's track while it's in operation and, before long, the cellar walls fade away and you're looking at the real thing. The four-lane roadway starts in front of the pits. Here, 20 or more cars, bathed in light from scale model floods, are being worked over by scale model mechanics. Scale engine blocks sit on scale racks. Tiny knock-off wire wheels and rubber tires rest against scale-size walls pasted up with scale-size billboards and posters, advertising everything from Michelin-X tyres to Amoco white gas. Thimble-size gasoline cans and tiny tool chests are scattered here and there. Goggled drivers stand around watching the work.

Cars whine by on a broad four-lane cir-

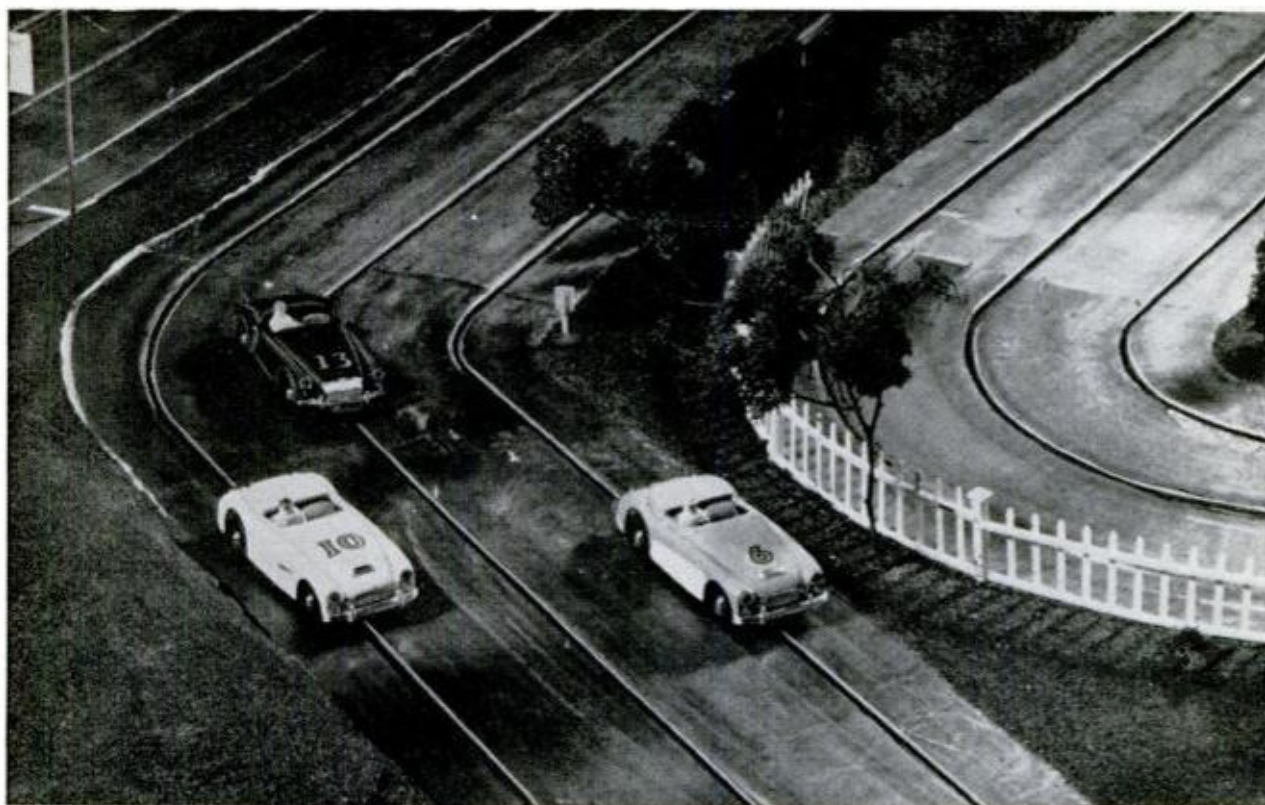
cuit that doubles back over and under itself for a total lap distance of some 90 feet. Sweeping around a banked curve guarded by an aluminum screen fence, the cars zing across meadows dotted with farms. Then they swing up a plaster-on-screen hillside, covered with vernal, plastic-sponge bushes and trees, zip through a tricky chicane (a wrecked D-Jaguar lies crumpled in the gulch below), and circle the field once more on an outside loop that comes past the pits again through an underpass.

"You can't really duplicate anything as big and elaborate as this successfully with fabricated track sections," Bob explains. "So we built the track ourselves out of plywood. That's what most clubs do."

Chew Up the Track

Bob Fennelly's plywood track is surfaced with a carpet of 1/4-inch sponge rubber. "It provides good traction, but the cars still move around on it in the corners," he points out. "It produces something pretty close to scale drifts and slides. But it does get chewed up—you can see the ruts on the curves."

Bob's brother Joe has a similar track of his own, but it is covered with painted cork. Ted Mathews' group in Flushing, N. Y., built its entire track of plywood strips covered with a surface of sheet copper. The surface of the track itself provides the current. The strips of copper roadway, separated by guide slots, carry



TRACK DETAILS on this layout were achieved with plastic sponge for foliage, sawdust for grass and accessories from HO-gauge model railroad equipment. The effect is realistic. Cars hit scale speeds of 70 m.p.h. here

alternate polarity. All that the cars need are simple brushes kissing the roadway surface on each side of any slot.

When it comes to rolling stock, you're likely to find anything tearing around a do-it-yourself rail-racing track. The hobby already has a set of international regulations calling for 1/32-scale cars. This means the bodies must be hand-carved, since few, if any, acceptable body castings are made in this size. The staunchest purists—among them the Kalamazoo Valley Miniature Auto Club which, under one Thomas Cook pioneered rail-racing in this country and has sent competition teams to England and entertained foreign teams here—turn out fastidious models in balsa wood, with soldered tubular chassis and truly ingenious power trains.

But most buffs, anxious to put a lot of rolling stock on the road fast, settle for the larger scale that toy manufacturers reproduce nicely in plastic. "We use the bodies and sometimes the wheels of car kits made by the model outfits," Joe Fennelly explains. "In some cases that's about all you get, anyway. So we make our own sheet metal channel-type chassis, which is simple and easy. We use stock wheels, tires and axles from good model shops. Our motors usually are units from HO-gauge locomotive kits, and we adapt 12-to-18-volt HO power packs. We fabricate our own drive shafts and rear ends from standard hobby equipment. Some cars are propelled

by worm gear drives, some by rack and pinion gears. That way we can adapt a large variety of plastic car kits."

You can see what he means when you look at Joe's own stable of rolling stock. Besides a wide assortment of Grand Prix and Grand Turismo models, his landscaped parking areas are cluttered with a regular classic car concourse of Model "T" Fords, Volkswagens, Rolls Royces, Corvairs and the like—all contrived from plastic hobby kits and powered up with HO motors. Joe's layout, which runs along an entire wall of his basement game room, consists of a single circuit with a variety of curves at each end of the 25-foot straight-aways. Working this one is more like attending a gymkhana at an antique car rally. His brother Bob's layout is really a junior Le Mans.

Adapt Your Railroad

Suppose you're an HO fan, with an elaborate layout of hand-built trains and scenery, and don't want to get mixed up with a whole new layout in a different scale size calling for different equipment. Then the HO scale highway layout is for you. Recently, some outfits have come along with roadway sets ranging in price from \$11 to \$50. These micro miniature go-buggies can be worked right into a train layout.

Available tiny vehicles include everything from stock cars and trucks to sports

(Continued to page 208)



Water-Filled Tree Base

Falling needles can be retarded with a dome-shaped Christmas-tree base that holds a gallon of water to keep the tree fresh.

The dome shape keeps the water away from children and pets, and the enclosed seamless pan of tin plate is leakproof.

Three adjustable prongs hold the tree in place. The base is made of rustproof spot-welded steel, which has a white baked-enamel finish with gold flecking.

Retail price is \$4.95. It's made by Ward Manufacturing, Inc., 2530 Spring Grove Av., Cincinnati 14, Ohio.



Medical Data by Telephone

Electrocardiographs, X rays and other, similar medical data may soon be transmitted to remote recording instruments or consulting specialists anywhere in the country by telephone over a special Data-Phone system being developed by the Bell Telephone Laboratories.

With the electrocardiogram system, a technician attaches electrodes to the patient, then dials the telephone number of the recording device at the other end of the circuit. By pushing a button, he transmits the heart pulsations to a visible recorder, which produces a graph instantaneously. A connection can be made on a patient undergoing surgery, for instance, and a heart specialist across the country can "sit in" on the operation, commenting through a regular voice telephone circuit. Trial runs between New York, Ohio and Pennsylvania have been successful.

Heart of the system is the Bell 600 series data-phone setup, which permits sending and receiving of handwriting, charts and diagrams between stations equipped with the system. Regular telephone circuits supply the connection anywhere that telephone service is available.



Do-It-Yourself Optics

Forty-nine different optical instruments can be assembled from the components of a new kit. The pieces fit together easily and can be disassembled for construction of other items.

Among the instruments that can be made are field glasses, telescopes, microscopes, periscopes and magnifiers.

Each part is numbered, and the instructions explain the order in which the various pieces go together.

The Optic-Variant 49 kit, a product of Germany, sells for \$59.95. It's available from the Hertvy Co., Inc., Rego Park 74, New York, N.Y.



To Boost Your Bowling Score: PLAY THE ANGLES!

Only three easily "spotted" angles of delivery will take care of 90 percent of the pin combinations you'll meet. Learning to use them can add 20 points to your average. Here's how:

By Bob Kelly

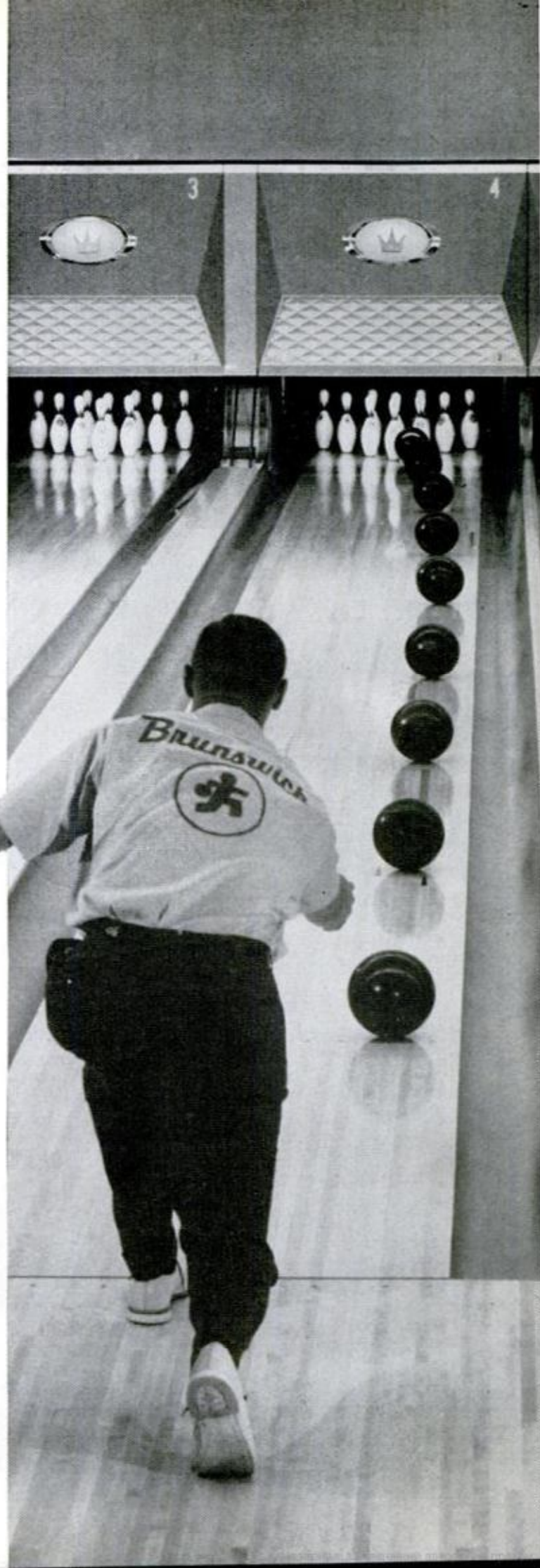
ARE YOU A "STRIKE-HAPPY" BOWLER? Most bowlers are. If their first ball fails to clear the lane, they lose interest in the second delivery, and they miss spares from simple lack of interest—or from a lack of knowledge of how easy it is to learn the formula for picking up spares.

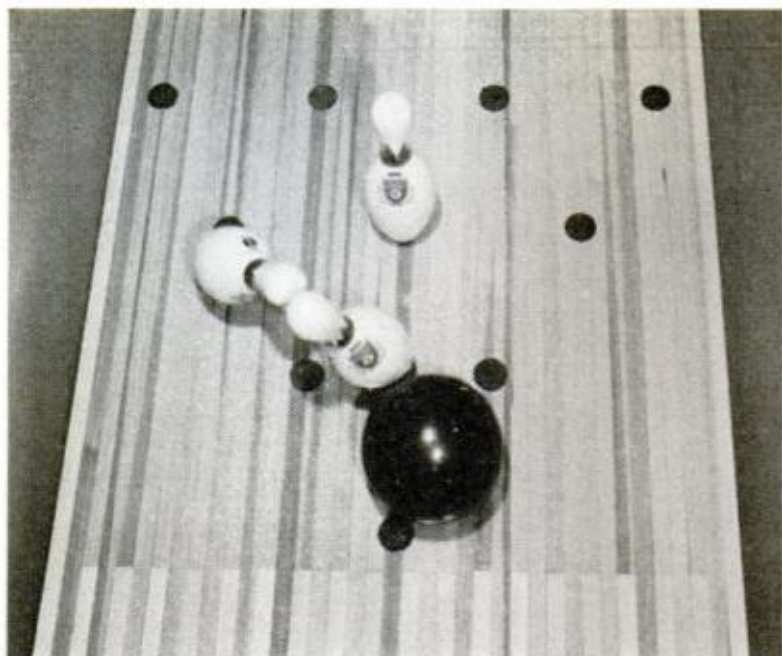
How important is the spare to your score? If you bowled a line, downing nine pins each

time and "picking the cherry" with each second delivery, your score would be a fat 190 without a single strike!

The average more-than-occasional bowler bowls 154, getting two or three strikes and leaving three or four open frames in each line. He picks up four or five spares in the line. But if he'd take the time to learn the facts about picking up spares, Mr. Average Bowler could pick them up around 90 percent of the time—and could boost his score by 20 pins.

What's the secret? It's simple. Barring splits or freak hits, one of three basic angles of delivery will pick up every spare in the book. And they're predictable enough that you can learn to spot-bowl the magic deliveries as easily as you can learn to spot-bowl for the strike pocket. No need to change your form or speed—it's better if you don't. Just learn to position yourself and start the ball over the right alley target spot, and the spares come tumblin' down. Turn the page to see how it's done.





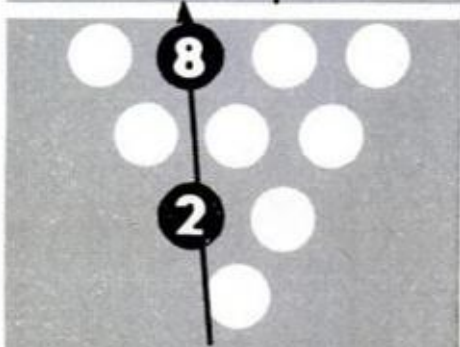
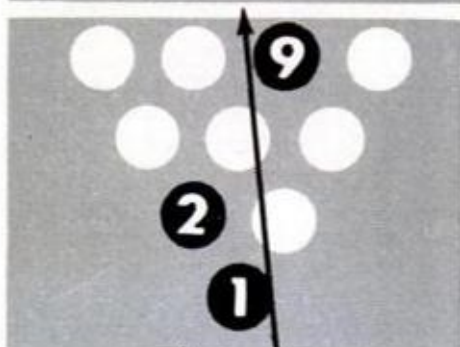
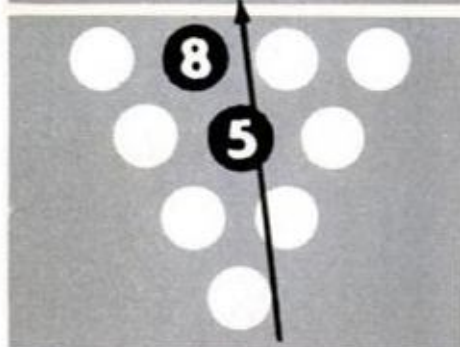
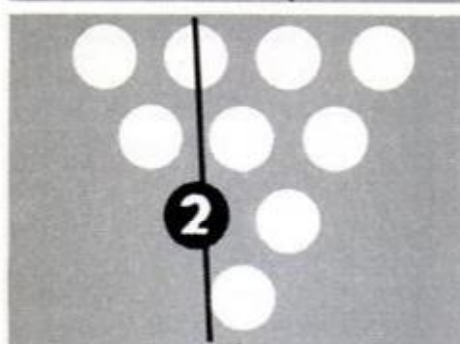
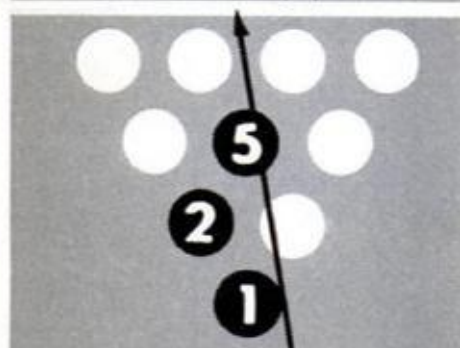
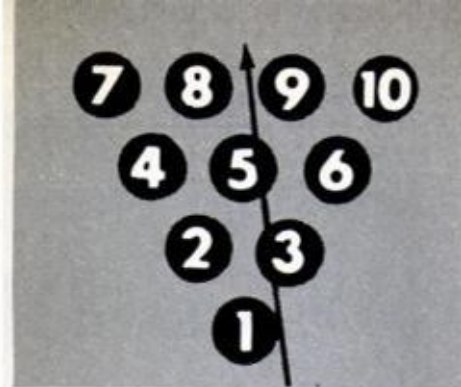
The "Strike Ball" Spare

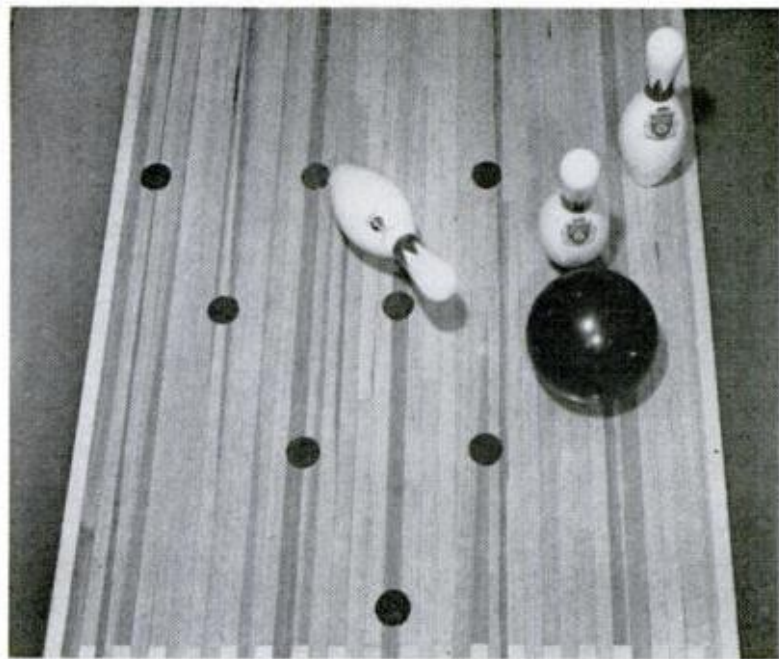
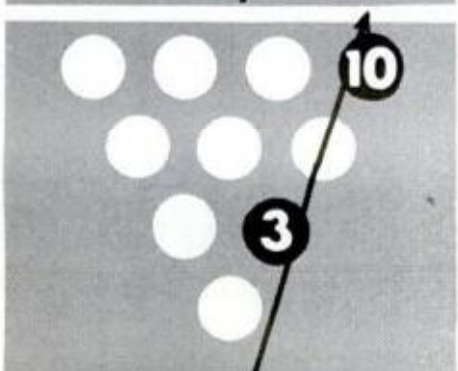
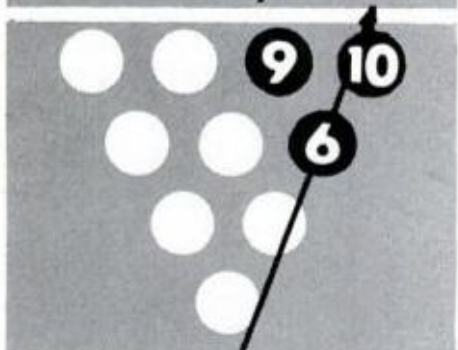
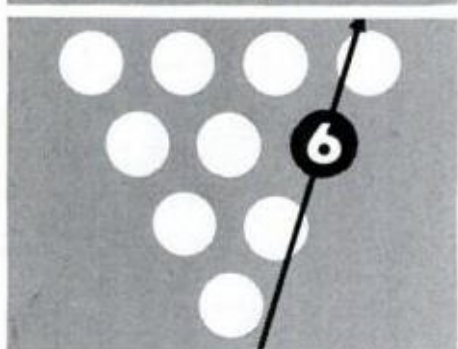
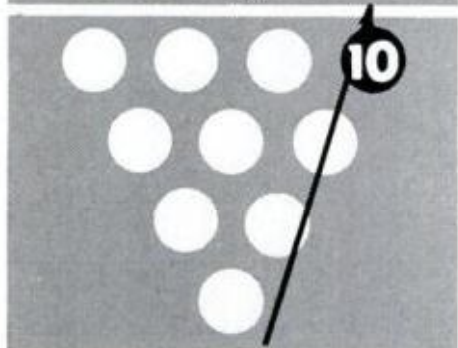
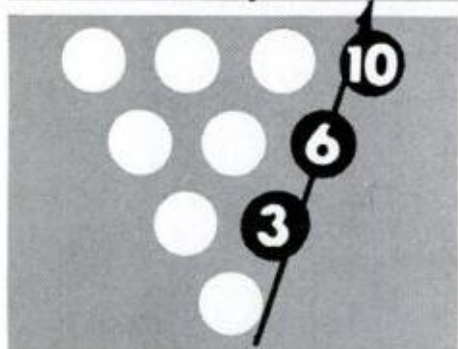
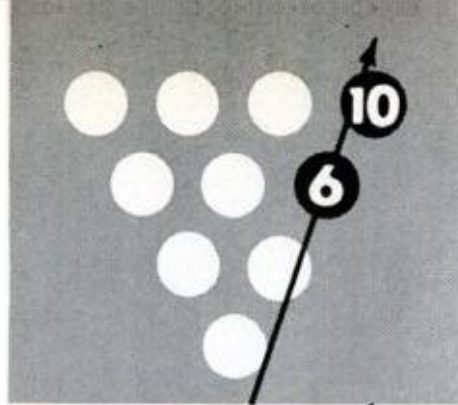
THE FIRST THREE common spares are easy—you can pick them up with exactly the same delivery that you use for the 1-3 strike pocket. Since half the balls you roll are (or should be) aimed at that pocket, these should be a snap. Start with your feet in the normal strike position, and deliver the ball over your normal strike target on the alley.

The experts say it's best to forget the urge to aim toward the left on the 1-2-5; your consistent strike delivery will be more likely to connect, and if you overcorrect to the left, you could miss the 5 pin. The 5-8 doesn't offer as much temptation to would-be sharpshooters.

With the 1-2-9 spare, accuracy becomes very important, since a ball too far right will send the king pin across without taking out the 2, and a ball too far left will miss the 9.

The same delivery picks up the single 2 and the 2-8 spares, but for a sure hit, don't aim from your usual position. Position your feet a pin's width (about 4½ inches) to the left of their usual starting spot, and bowl over a spot the same distance to the left of your usual strike-ball target. The ball follows the same path, adjusted leftward, but otherwise, the delivery is the same as for a strike. You'll pick this one up more often with that delivery than you will with an aimed ball.





The Right-Side Spare

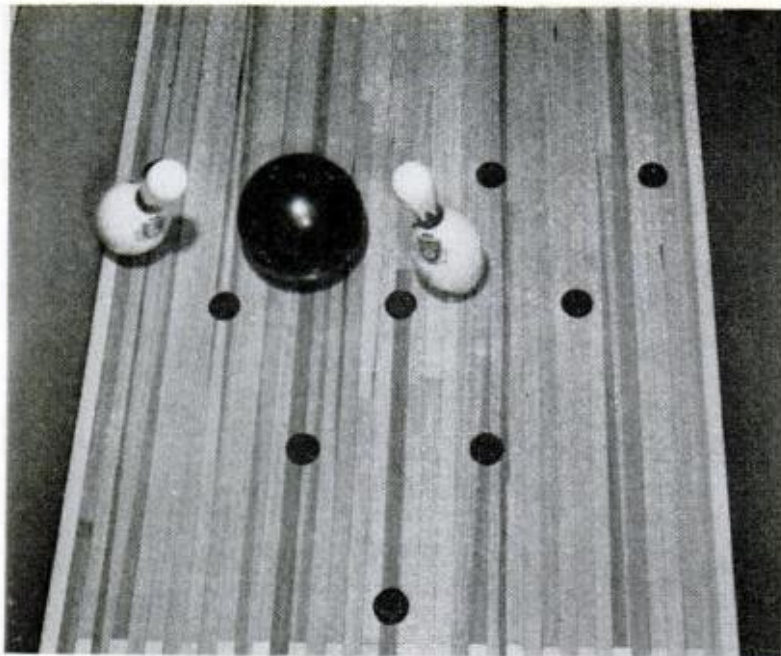
TOUGHEST OF THE COMMON SPARES for the right-handed bowler are those on the right side of the lane. A standard delivery from the right side gets a narrow sweep of the standing pins, and a natural curve or hook, pushed too far to the right, can drop into the gutter before it reaches the pins.

To play it smart, move as far as possible to your left, face the pins and bowl cross-lane. Unless your curve or hook is a natural one, and hard to change, switch to a straight ball. The result is a ball that moves down the 1-10 side of the pin cluster, leaving a maximum margin for error in those spares.

For the six common situations shown here, the delivery path is identical; the ball is aimed to cover the 6-pin. And if it's on target, there's little left to luck and pin action; the ball covers the spots well.

One variation of the right side spare delivery is needed when a light hit leaves the head pin standing, too, as in a 1-3-6-10. With that situation, use the extreme left-side delivery, but alter your aim to hit the 1-3 pocket, heavy on the 3 side.

Again, with a single 6 or 10-pin standing, it's better to stay with the same right-side spot delivery instead of an aimed ball. If your "automatic" delivery is right, it'll go down.



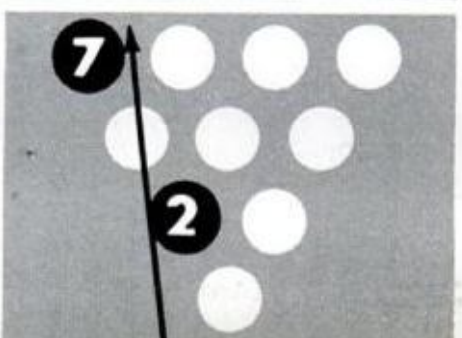
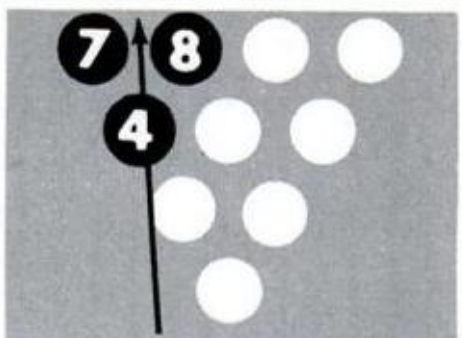
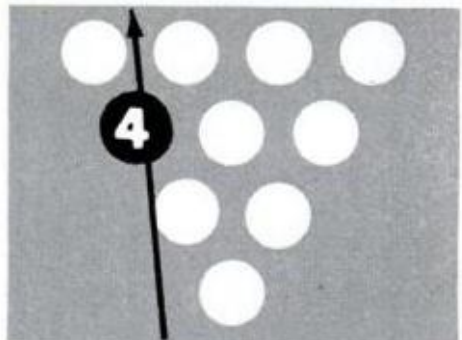
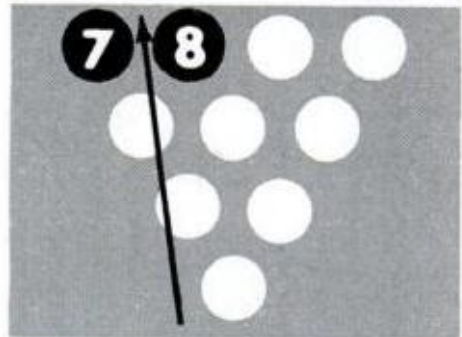
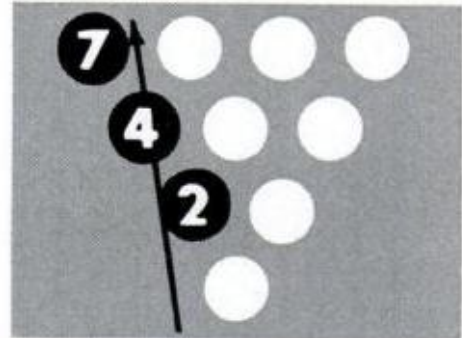
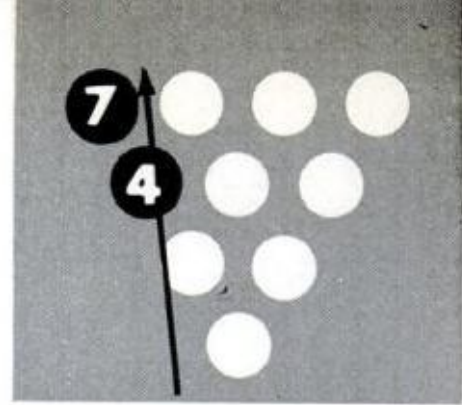
The Left-Side Spare

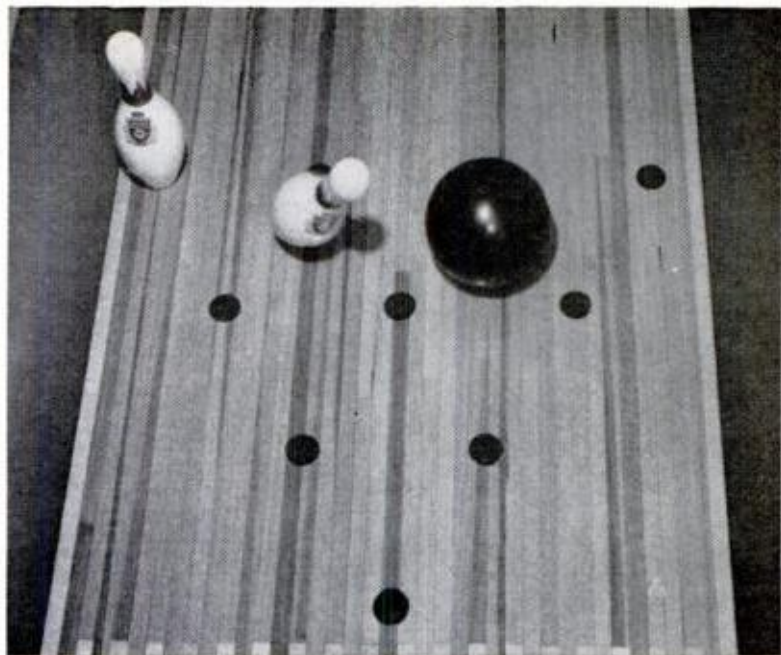
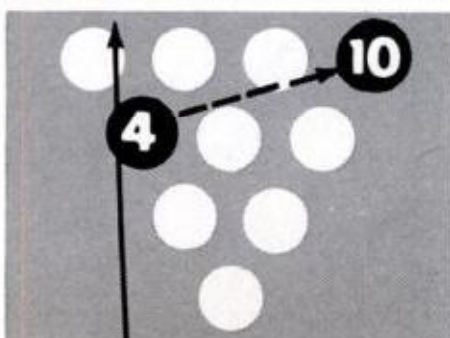
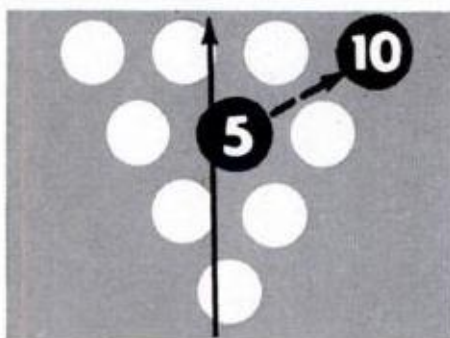
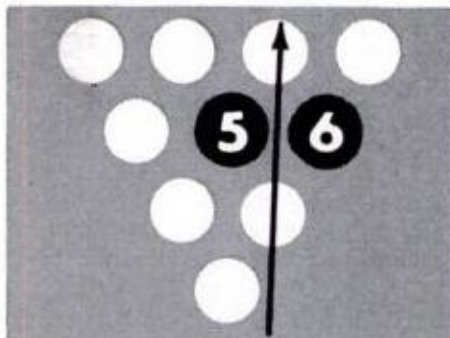
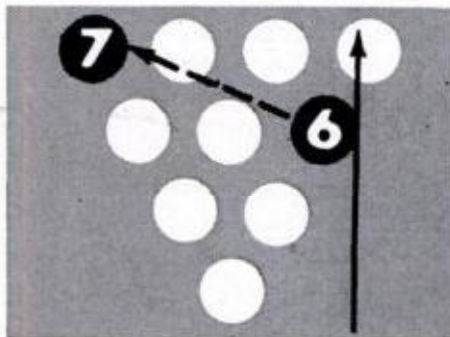
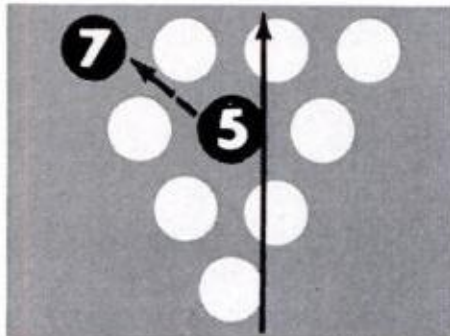
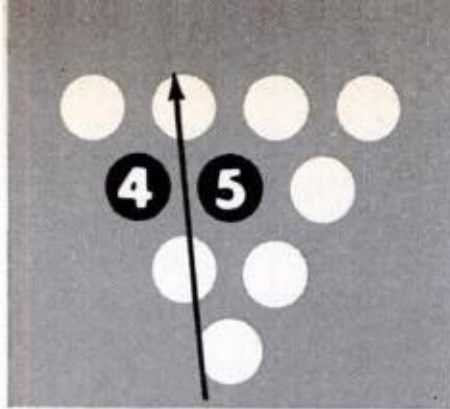
EASIER FOR RIGHT-HANDED BOWLERS, the left-side spares allow a more natural delivery to sweep down the 1-7 side of the cluster, allow a sharper cross-lane delivery angle, and let you use a curve or hook more effectively than on the right-hand spares. But for best results, move as far to the right as possible, face toward the pins, and bowl across a target that will put the ball right on the 4-pin.

On the 7-8 spare, the ball is only two inches wider than the space between the pins. But if you aim on the 4-pin target, you'll split them right down the middle. It's that advantage that prevents the 7-8 from being classified here as a split, as are the 4-5 and 5-6 leaves. But in some areas, the 7-8 is still called a "small split."

The pin clusters shown on all these pages are not, of course, all the possible situations you might face, but they're the most common in each category for right-handed bowlers. (If you're a southpaw, your leaves—and everything else—will be reversed; you'll have your easiest time with right-hand spares, and should switch to a straight ball for those on the left side.)

We haven't tried to show the exact foot position and target to bowl over, since lanes vary somewhat and the ABC rules still don't specify the exact position of the markings or designs used for targets.





The Exceptions—Splits

SPLITS, OR RAILROADS — pins left standing with no other pins between or in front of them—are the toughest shots in bowling and the least amenable to formula treatment. But don't let them worry you. Any split can be converted, and it's a real test of your ability.

Since split conversion requires your steadiest and most accurate delivery, most of the pros recommend that you start from a comfortable spot just to the right of center and aim the ball straight toward the contact point with whatever type of delivery is easiest and most accurate for you. Since the wide splits are almost as demanding as billiards, your ability to shave the edge of a pin is all-important.

The 4-5 and 5-6 situations are classed as splits even though both pins can be struck by the ball at the same time. With only two inches of hitting area between the pins, a straight-ahead, dead-center shot is considered best.

Three splits aren't shown. The 6-7-10 and 4-7-10 are handled just like the 6-7 and 4-10; the corner pin is automatic if you hit the front pin properly.

The other one? The 7-10. For this impossible-to-predict, freak or trick shot, take a tip from the pros and go for one single rather than take a chance on missing both. If you learn how to get it every time—go on the stage.

PM Shopping Guide

This is the first article in a new PM series that will show you how to test and rate merchandise right in the store and without special equipment. Future articles will cover hi-fi, TV, tape recorders, sporting goods, appliances, and power tools. To build up a file of money-saving information, clip and save each article as it appears

THREE IMPORTANT personal factors that affect your selection of skis and ski equipment are: first, your height and physical strength; second, your athletic ability and age (which foretell how rapidly you'll learn); and third, where and how often you'll be going skiing.

If you're a tall, rugged type who picks up sports fast, you'll be able to use a longer, stiffer ski than your short, nonathletic neighbor, who'll need a shorter, softer ski, especially if he's only an occasional skier. The fun in skiing is in the turns, especially if you're using slopes that are well used and likely to be fairly crowded, and the shorter, softer ski is easier to turn on, though the longer, stiffer ski gives a better ride and crisper turns if you can handle them.

Aside from quality, then, the two factors to consider in ski selection are length and stiffness. The tables on pages 104-105 will give you the basic

JUDGING STIFFNESS is tricky. Go down the rack and bend several skis as shown at left to get the feel of an "average" flexible ski

METAL SHOES at tip and heel protect skis, especially from others' skis. Mark of quality is shaped fit, mounting with several screws



Ski Equipment

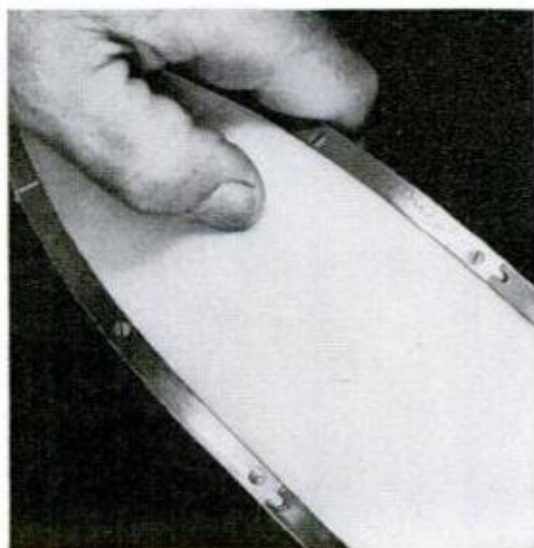
length; go up or down from there in accordance with your personal characteristics.

When in doubt, go a little short—and a little soft.

Materials give you the best yardstick of quality in skis. They're made of maple, ash, laminations of ash, hickory, laminations of hickory with other woods, laminations of pure hickory, laminations of aluminum alloy with various wood materials, and reinforced plastic, better known as fiberglass. The experts agree that, with the exception of fiberglass, the materials are listed here in order of their excellence, with the aluminum laminations on top. Fiberglass offers great promise, but hasn't yet proven itself over a long period of time.

The same experts admit that there's little need for the beginner to go over \$40 for his first pair unless he wants to spend the extra money for refinements. *Warning:* You'll probably

DECEPTIVELY soft-feeling "Kofix" bottom shows up on skis from about \$60; makes a fine, almost-frictionless plastic surface. Skis from about \$30 have sheet plastic bottoms; less expensive skis have painted plastic, okay for occasional skiing or deep powder snow, but which wears through with hard use. Edges here are interlocking steel—superior to plain bevelled joints. Sharp steel edges are important for grip on hard snow; essential on icy slopes; not so important in powder snow



want another, better pair later, when you've learned enough to know more about your requirements.

Most ski shops rent skis and equipment, too. If you're in doubt, you can usually rent skis, poles and boots for a week end for six to ten dollars. The field test will eliminate a lot of guesswork in your choice of length, stiffness and material that's best for you.

Higher prices in skis usually means better wood, better bottoms, better edges, better tops, better tips and heels. But not always. Look close and ask questions, especially on imported skis. For example, thick, shiny paint on edges and tops can look like desirable protective plastic, but it isn't. Read the tag of laminated skis. Such skis are usually better than solid wood skis, since they have uniform strength and flex, and resist warping. But a "hickory" lamination isn't always all hickory unless it says so.

Ski poles are easier to pick. Wood

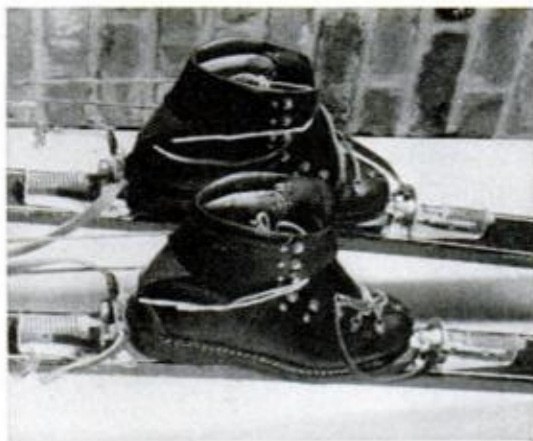
SAFETY is all-important in bindings. Both heel and toe must release, and release tension should be adjustable. Most important are sideward toe release, as shown, and forward heel release. Best of all are slow-release types which give under strain but return to position if strain eases before reaching release point. Binding position is critical for easy turning; toe piece goes one inch behind center of ski's running surface for regular slopes; half-inch more for powder snow



PM Shopping Guide



SPRING-POWERED bindings offer good release; easy in-and-out. They require some installation, but you can save by doing it yourself



HARDWARE for spring types makes it impossible to use boot trees, but you can prevent curling by leaving the boots locked in the bindings

has all but vanished from the scene, and has been replaced by aluminum and steel. Some good skiers, however, stay with wrapped split bamboo poles. They're inexpensive, light, and strong enough. When you break one, you buy another.

Be sure to look at the new plastic-web types. With no ring, the web doesn't catch on twigs. Another safety factor in poles is a breakaway strap in case it does catch.

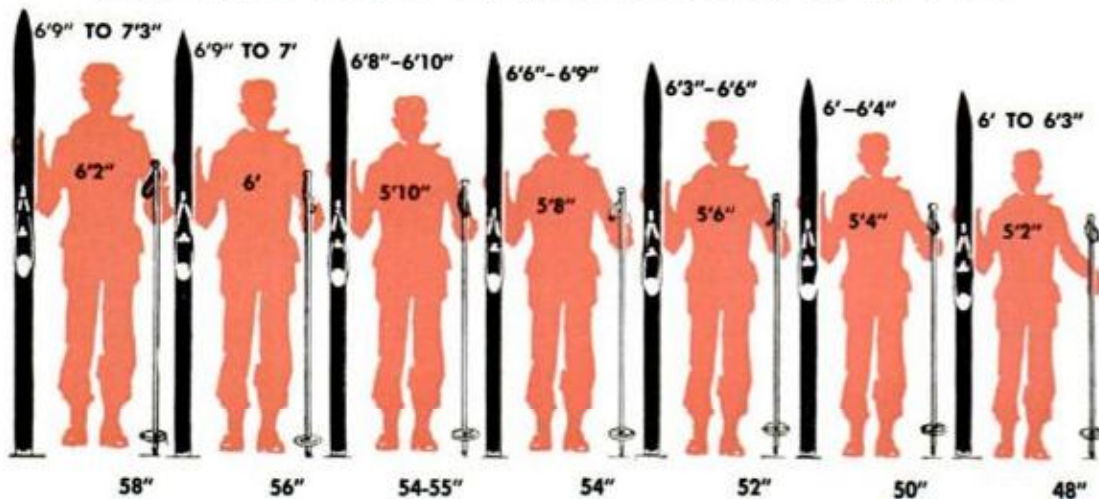
Best clue to workmanship on poles is the leather (or plastic) work around the handle. You'll need a wide, strong strap to withstand the soaking and strain you'll give it.

You can almost sum up the boot

situation with a dollar sign. \$30 will buy a good safe pair. The occasional skier will probably never need to pay more, though the more expensive boots do have some good features. Here's what to look for in your boots: Double construction; an inner boot for your foot and an outer boot to protect it. A heavy sole with a steel shank and extra heavy heel leather to take the cable binding. A transverse slit in back to allow maximum forward lean without ankle discomfort.

Get your boots fitted properly. Get them fitted with your regular-weight ski socks on, and, to really get the right fit around your ankle, with your ski pants on, too.

SKI AND POLE LENGTHS FOR MEN . . .



Ski Equipment



"LONGTHONG" bindings look good on instructor, and are convenient, but stick with conventional bindings until you learn to fall safely

SKI POLES are best measured with handle on floor. Web should just reach armpit. This compensates for distance tip sinks into snow

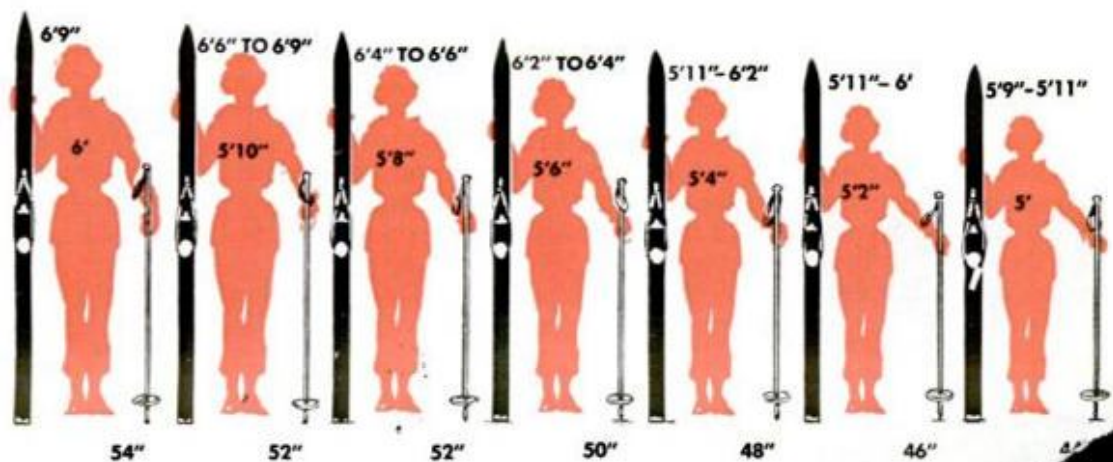


A ski boot should "take hold" of your heel, but ordinary shoe-fitting methods don't work. When you try the boot on, kick your heel into the floor to force your foot back into the heel section where it belongs. Lace your foot back hard with the inner boot before you check with your toes for the fit in front. A proper fit will be the right length and width, and will hold your foot firmly but without binding. You'll need that kind of support to ski all day without tiring.

Centimeter-to-feet conversion table for European-made skis.

175	centimeters = 5 feet, 9 inches
180	centimeters = 5 feet, 11 inches
182.5	centimeters = 6 feet
185	centimeters = 6 feet, 1 inch
190	centimeters = 6 feet, 3 inches
195	centimeters = 6 feet, 5 inches
200	centimeters = 6 feet, 7 inches
205	centimeters = 6 feet, 9 inches
210	centimeters = 6 feet, 11 inches
215	centimeters = 7 feet, 1 inch
220	centimeters = 7 feet, 3 inches

SKI AND POLE LENGTHS FOR WOMEN . . .





WIDER, EXTRA-STRONG supertires, right, replace conventional duals as shown on cement-hauling truck



"SUPER" PUTS 12 inches of tread on the road as compared to only 15 inches for two tires it replaces

SUPERTIRES for Trucks

By James Joseph

HAVE YOU PASSED a heavy truck on the highway lately that looked like it was missing half its tires? Most likely it was a vehicle chosen to road test a new, single, extra-wide, superstrong, low-pressure truck tire.

These new "supertires" have been road tested from coast to coast on selected truck fleets and are destined to replace the familiar "duals" on heavy trucks. A big rig that used to roll on 22 tires now needs 12.

The new supertires are essentially two tires in one and, for their size, cross section and weight, are probably the strongest tires ever built. A super weighs 100-150 lb. less than the two tires it replaces, yet is nearly as wide as both of them. Tread sizes average 80 percent of the dual width. With its thick sidewalls and heavy-ply construction the super can handle twice the weight of standard tires or the normal load of a dual-treaded combination.

Designed to do the job of two tires, the super is superstrong. The Duplex 10-16.5, one of 11 sizes of supers to be turned out by Firestone, with a ply-rating probably half again or double the 6.00-16's usual six plies, can shoulder an amazing 3000-lb. load. In contrast, an average run-of-the-road 6.00-16 has a maximum load rating of only 1250 lb.—500 lb. less than the super. The replacement Duplex has a 10-inch cross section, but two inches narrower than the combined widths of two 6.00-16s. The super actually puts more tread on the road because it carries only 45 lb. of pressure as compared to the 90 lb. required by the two it replaces, making it more flexible. In addition, more of its tread touches the road to distribute the load. In theory,

each partner in a pair of duals should bear its share of the load.

They seldom do. On crowned roads, in rough terrain, or where there's a mismatch in tread depth, one tire often bears all or most of the load while its mate just goes along for the ride.

Supertires run smoother and cooler, giving longer tread and carcass life. Road maintenance is easier, too, with only one half the number of tires to check.

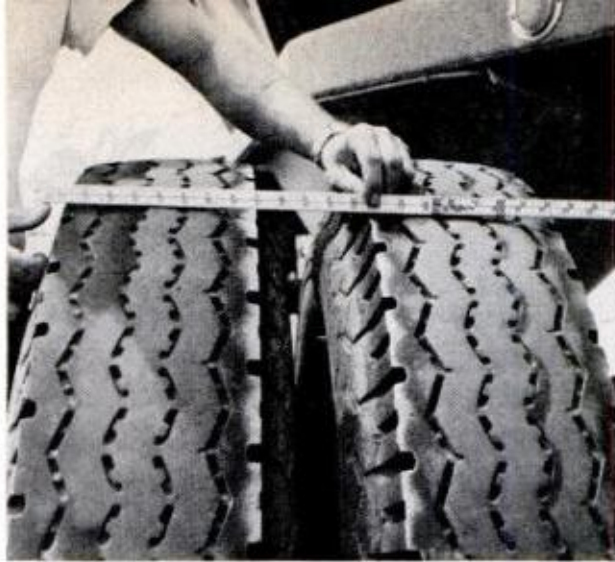
Supertires provide improved roadholding and reduce skidding and the chance of jackknifing. In tread-tracking tests, deliberate efforts to jackknife a supertired rig were unsuccessful.

Truckers will be glad to know that supertires will cost about 25 percent less than a pair of regular tires. A big western trucker who's switching to supers as soon as they're available puts it this way:

"Duals are a pain in the neck, and in the pocketbook, too. It plain doesn't make sense to use two of everything—rims, wheels, tubes, flaps and tires—to get the load distribution the average big rig needs."

Firestone believes a trucker can cut his inventory in half, with supertires, by eliminating extra rims and wheel spacers needed to separate duals. Twenty-four pieces, eight tires, eight rims and eight wheel spacers, could be eliminated from a tandem tractor and trailer. Weight savings alone in this instance amount to 1000 lb. Some truckers figure the weight savings alone will pay for their new supers in a few months' time.

Used in place of a conventional light truck tread, of course, a super won't replace two tires but will add inches to tread width, hold far more weight and ride softer.



TREAD OF DUALS totals 15 inches, just a few more than super. Note wasted space between the wheels



LESS AXLE room can foster radical frame redesigning

and Trailers

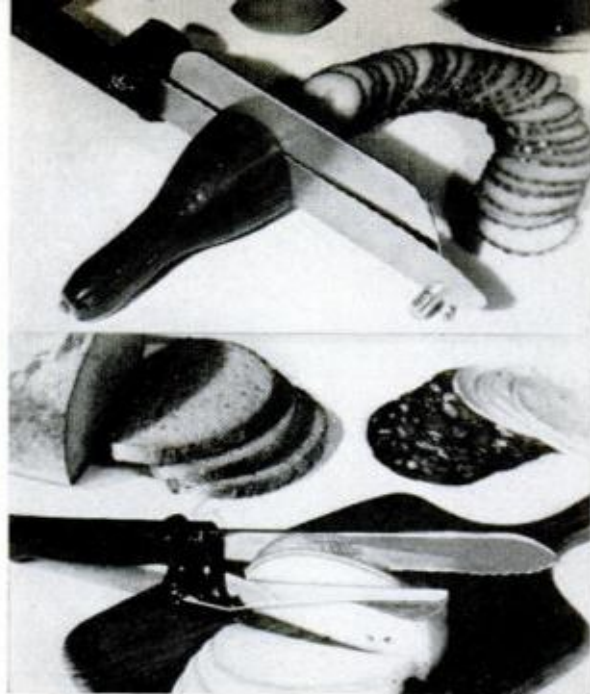
Four of Firestone's 11 new supers are designed to replace conventional light truck tires ranging from 6.00-16s (used on some boat trailers) to 8-19.5s, an oversized tubeless carcass for 1/2 to 3/4-ton pickups. Other supers would fit campers (often treaded with 7.17.5s or 8-17.5s), Jeeps and the like.

The super's over-wide tread and generally lower inflation is calculated to float it on sandy or soft terrain and should prove to be a boon to boaters whose trailers often

bog down during off-road launchings or loadings. The U.S. Rubber Co., whose "Uni-Master" supertire is also under test, says the new design has a superior flotation quality, particularly in off-road use.

Super-width tires should also make the transport of mobile homes and trailers safer. Low pressures mean fewer blowouts. Even when punctured, the low-pressure supers lose air but slowly, even without a puncture-sealing compound. ★ ★ ★

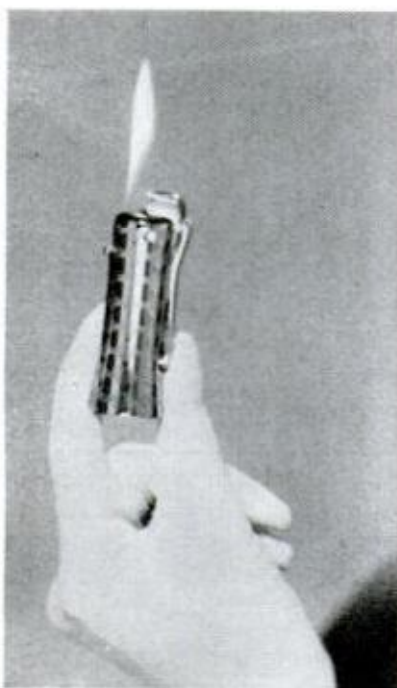
CONVENTIONAL Size Tires	DUPLEX Replacement Sizes	Load (lbs.)	DUPLEX Inflation (lbs.)
LIGHT TRUCKS			
6.00-16	10-16.5	2320	45
7.00-15	12-16.5	3000	45
7-17.5			
8-17.5			
7.00-17	13-16.5	3,680-4570	45-65
7.50-15	13-17.5	4000	50
8-19.5			
HEAVY TRUCKS			
7.00-20	13-19.5	5040	65
7.50-20			
7-22.5			
8-22.5			
8.25-20	15-19.5	5700	70
9-22.5			
9.00-20	17-19.5	7800	70
10-22.5			
10.00-20	18-19.5	9000	75
11-22.5			
10.00-22	18-22.5	9600	75
11-24.5			
11.00-20	19-22.5	10,900	75
11.00-22			
12-22.5			
12-24.3			
11.00-24	23-23.5	15,600	60
12.00-20			
12.00-24			
13.00-20			



Gifts for Her



KITCHEN KNIFE can be used three ways, as all-purpose knife, as automatic slicer with slicing attachment setting thickness, and as automatic shredder with shredding attachment setting size of slice. \$4.95. Hollis Company, 1133 Broadway, New York 10, N. Y.



LIPSTICK LIGHTER looks like a lipstick but is a ladylike lighter. Special flame adjustment allows "dialing" flame to desired height. \$20. Ronson Corp., Woodbridge, N. J.



TILTED VANITY angles mirrored sliding doors for viewing either standing or sitting. Includes three shelves, outlet for electric hair dryer, two-way lighting (up for room, down around mirrors). Comes in three sizes. Lau Blower Co., 2027 Home, Dayton, Ohio



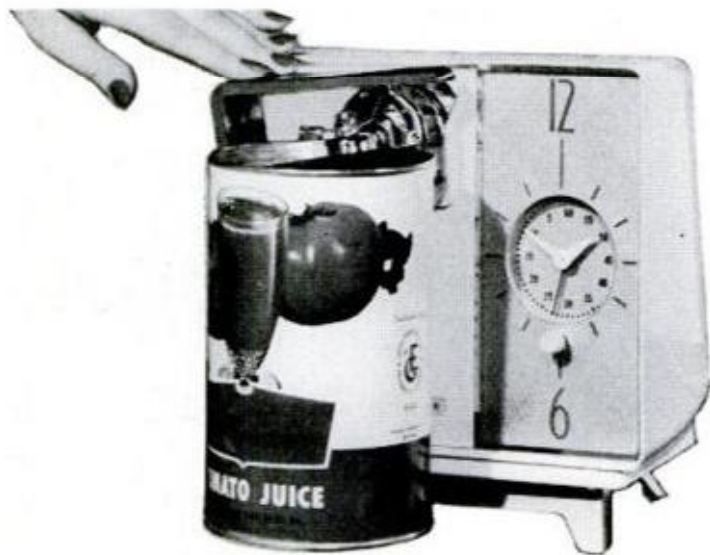
SPAGHETTI MAKER grinds pasta like meat grinder grinds meat. Assorted heads shape pasta into spaghetti, macaroni, ravioli, lasagne and various noodles. Italian recipes included with instructions. \$16.95. M. A. Scalise Co., 119 S. 1st St., McAllen, Texas



PLASTIC LUNCH BAG adds colorful accessory to working girl's daily wardrobe, eliminates paper bags. Insulated, waterproof. Five colors. \$1.25. Rosanna, 1419 N. LeClaire, Chicago 51, Ill.



ONE-CUP COFFEE MAKER uses real coffee, brews it as easily as instant. Coffee is placed in filter, covered with perforated lid and boiling water is poured in. 98¢. RMS Electronics, 34 W. 74th, New York 23

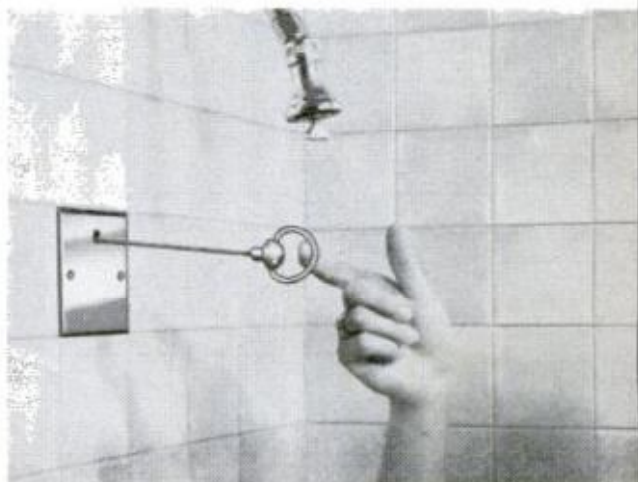


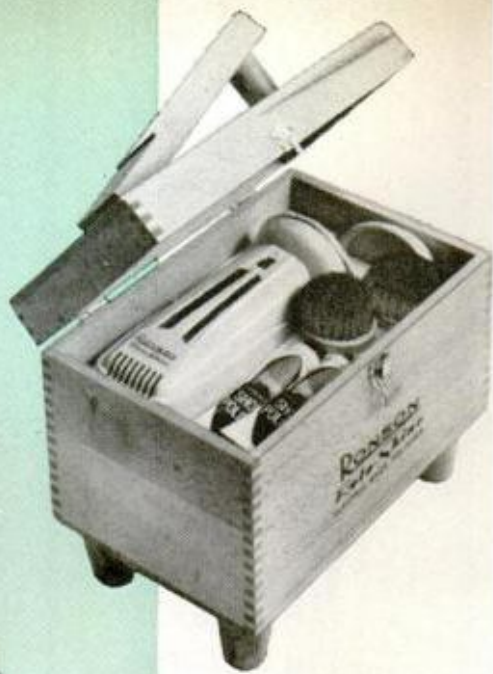
ELECTRIC CAN OPENER with clock-timer opens cans, tells time, has signal alarm. Comes in white with chrome trim or sandalwood. \$34.95. Rival Manufacturing Co., 36th & Bennington, Kansas City 29, Mo.

ELECTRIC OVEN toasts, bakes or browns. For toasting and baking, top and bottom heaters are used, bottom is turned off for browning. \$34.95. General Electric, Bridgeport, Connecticut



CLOTHESLINE reels out of shower wall for use, reels up out of way when clothes are dry. Eliminates inevitable clutter of clothes over shower rod, wash basin, etc. \$14.95. Santo Bros., East Elmhurst 69, N. Y.



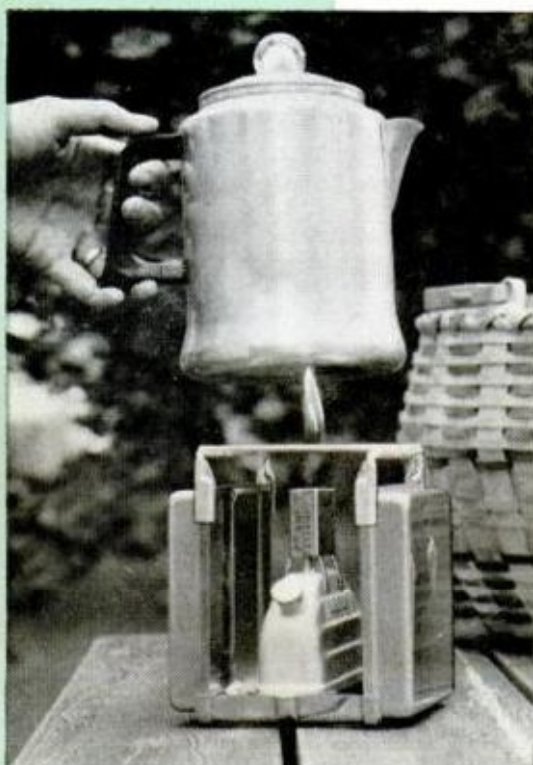


ELECTRIC POLISHER for shoes includes brush and buffer attachments. \$23.50. Ronson Corp., Woodbridge, N. J.



PUSH-BUTTON LIGHTER plugs into a.c./d.c. outlet, lights cigarettes when button is pushed. \$1.98. Young's, Burlingame, Calif.

Gifts for Him

COMPACT STOVE folds up into pocket-size kit. Burns 1½ hours on single filling of fuel. Burner detachable. Taykit, 4407 16th Street NW, Washington, D. C.

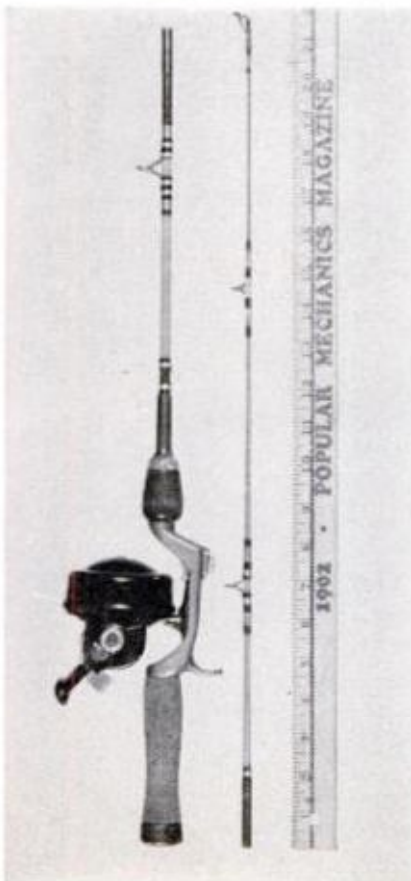


SHOOTING GLASSES fit over regular glasses. \$1.98. Haack Enterprises, Fond du Lac, Wis.



POWERED OUTCASTER extends the range of fly casts. Avocation Products, Box 624, Santa Clara, Calif.

BRUSH ROD breaks down to 22 inches. \$5. Louis Johnson Co., Highland Park, Ill.



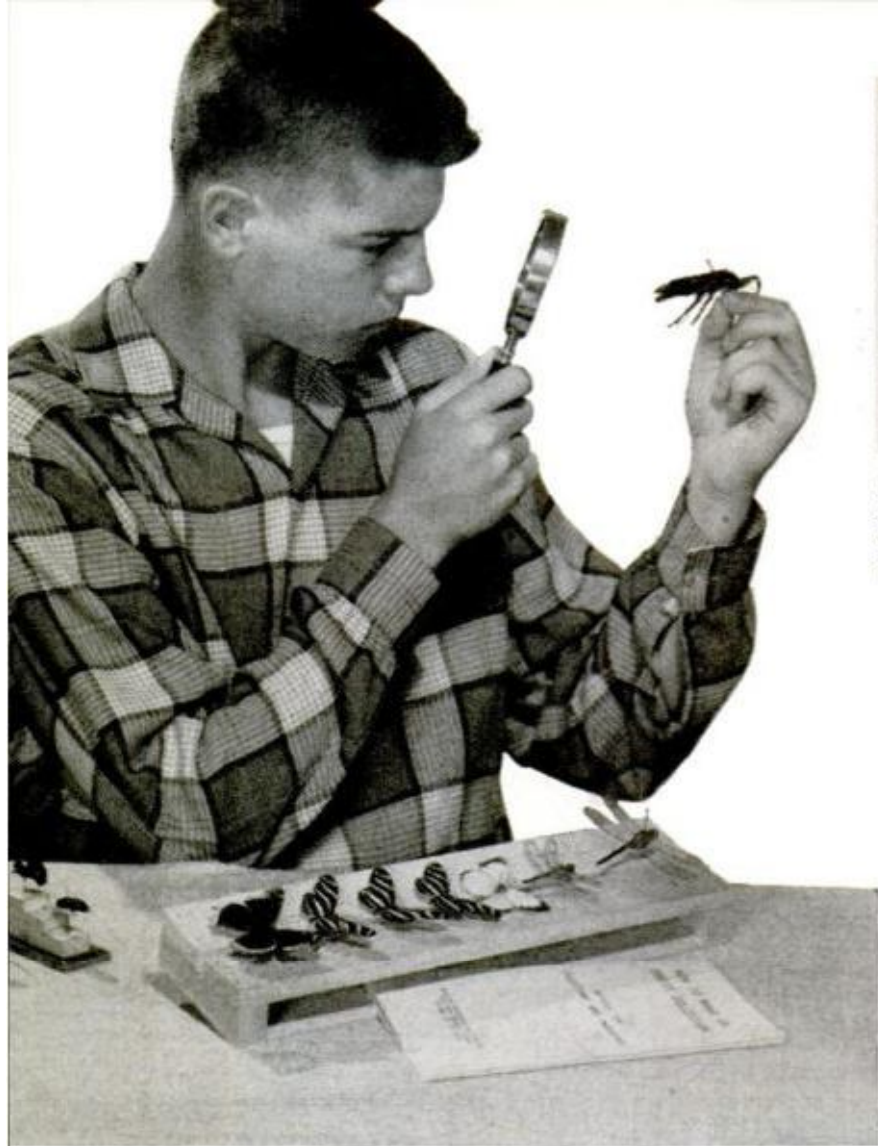
DECEMBER 1961



LIVE NET hangs from waist, has no sharp edges to puncture waders. \$6. S & M Products, Troy, Ohio



MODERN BUTLER has tie and shoe racks, hangers, jewelry tray. \$20. Concord Shear Co., 49 W. 23rd, N.Y.C.



BASIC COMPUTER does simple arithmetic, statistical analysis, plays logic games. Six instruction books. \$85. Central Scientific Co., 1700 Irving Park, Chicago, Illinois

Gifts for Future Scientists

BUG-COLLECTING KIT includes nets, mounting boards, insect pins and instruction book. \$6.95. American Entomological Supplies, 7528 W. Catalpa Ave., Chicago

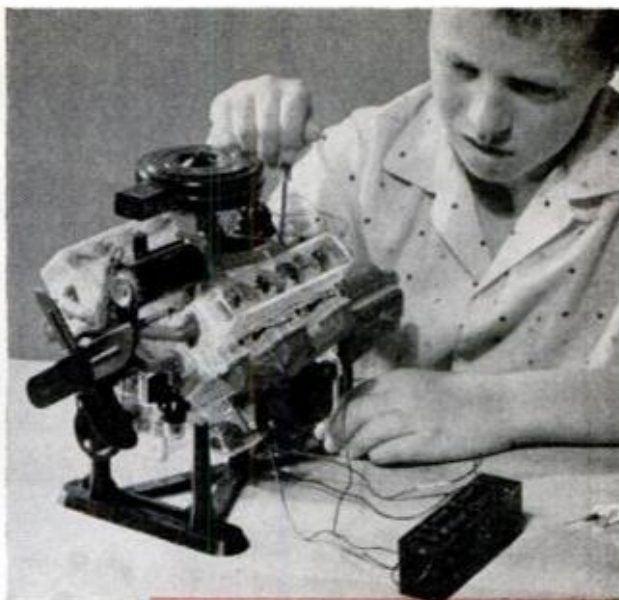
MATHCRAFT SET is basic introduction to mathematics. Includes slide rule, abacus, protractor, compass, etc. \$7. Porter Chemical Co., Hagerstown, Maryland

SCIENCE BOOK-LAB series includes one on seeds with real seeds. Others on jets, magnets, air. \$3.95. Science Materials Center, 59 Fourth Av., N. Y. 3, N. Y.





CHEMICAL LAB provides basic glassware for experiments in chemistry. Professional shapes. \$10. The Perfect Parts Co., 1500 N. Chester, Baltimore, Md.



VISIBLE V8 ENGINE comes in kit form and, when assembled, runs on D-size batteries. \$10.95. Distributed by Edmund Scientific Co., Barrington, N. J.

VISIBLE ORGANS teach anatomy of eye, ear, touch, smell, taste, the heart and head. In kit form from \$2 to \$10. Superior Plastics, 426 N. Oakley, Chicago 12, Ill.



PLASTICS SETS supply materials for casting with real plastics. \$8 to \$25. Lionel Corp., 15 E. 26th St., New York 10, N. Y.

WEATHER STATIONS perform measurements and computations for predicting weather, instructions for calculating temperature-humidity index, relative humidity, etc. \$10 to \$20. Lionel Corp.

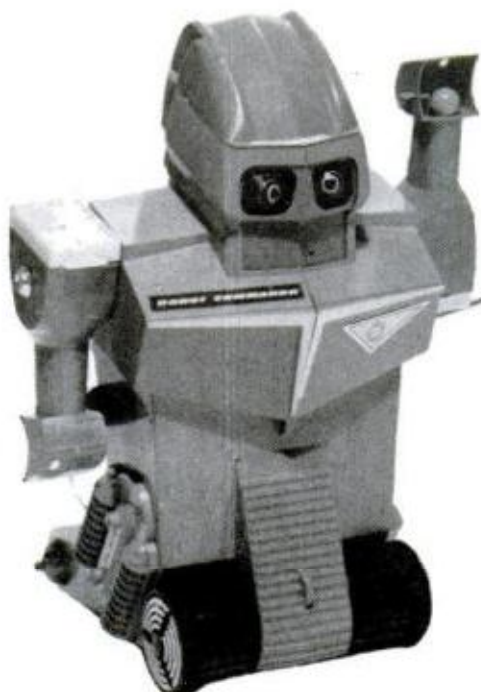




More Gifts for Children



ROBOT obeys voice commands, moves forward and backward, turns, fires rockets, throws missiles. Ideal Toy Corp., 200 Fifth, New York



SEWING MACHINES for tots include manual and electric models. Third model only cuts paper dolls. \$5 to \$25. Singer Sewing Machine Co., 149 Broadway, New York

TINY TAPE RECORDER transcribes voice, music, etc., has switch for reverse, playback, transcribe. \$30. Made by Bell Products Co. Distributed by Edmund Scientific Co., Barrington, N. J.



BB SIX-GUN, single action 12-shot repeater, is replica of original Peacemaker. \$7.95. Daisy Mfg. Company, Rogers, Ark.



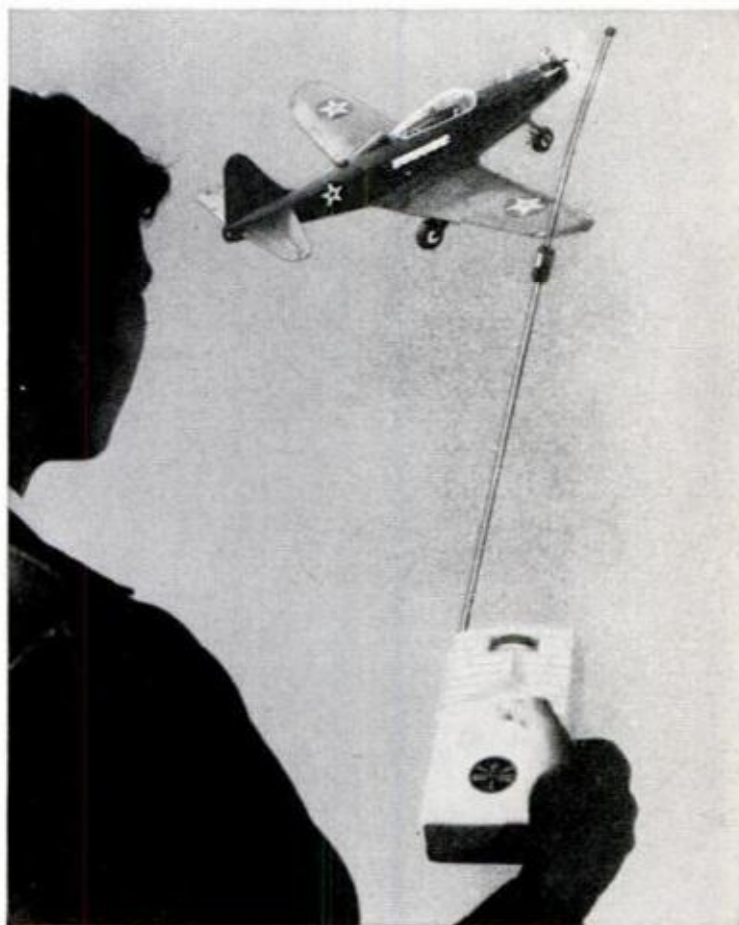
FOOTBALL TARGET for passers, endorsed by Johnny Unitas of Baltimore Colts, bounces ball back to man who throws it. \$9.95. Tigrett Industries, Jackson, Tenn.



FREE-WHEELING tricycle features rear wheels that turn 360 degrees when control level is shifted. American Machine & Foundry Co., 269 Madison Ave., New York, N.Y.

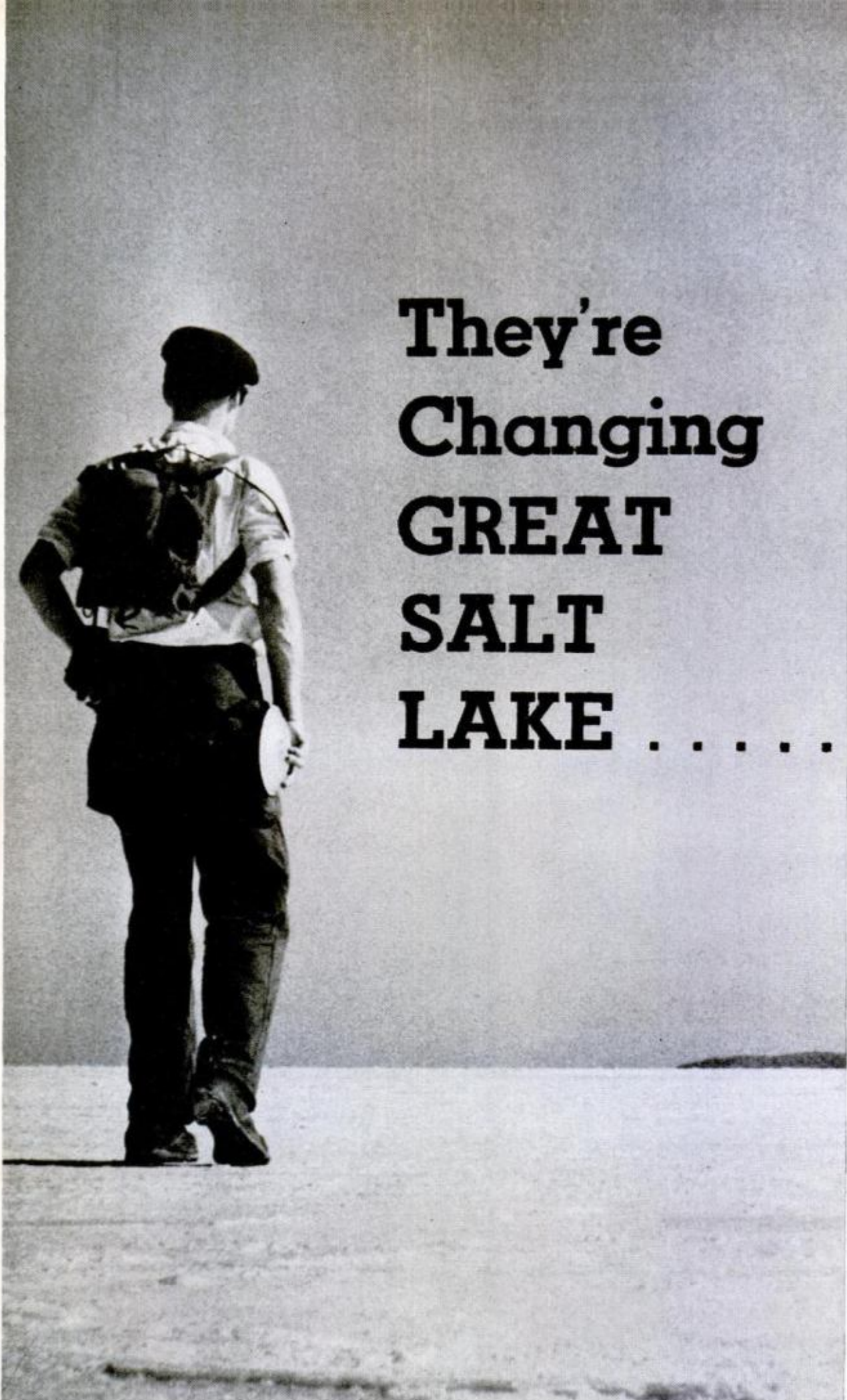


BATTERY TRANSMITTER controls model aircraft from ground. \$70. Wen-Mac Corp., 11511 Tennessee Ave., Los Angeles 64, Calif.



PUSH-BUTTON STARTER for gas-engine model airplane keeps fingers free of propeller. Complete aircraft, \$9.75 each. Comet Model Hobbycraft, 501 W. 35th St., Chicago





**They're
Changing
GREAT
SALT
LAKE**



. into a Fishpond

By Frank A. Tinker

SAUERMAN TOWERS gouge out huge ditches at edge of Salt Lake. Hole will become fresh-water reservoir

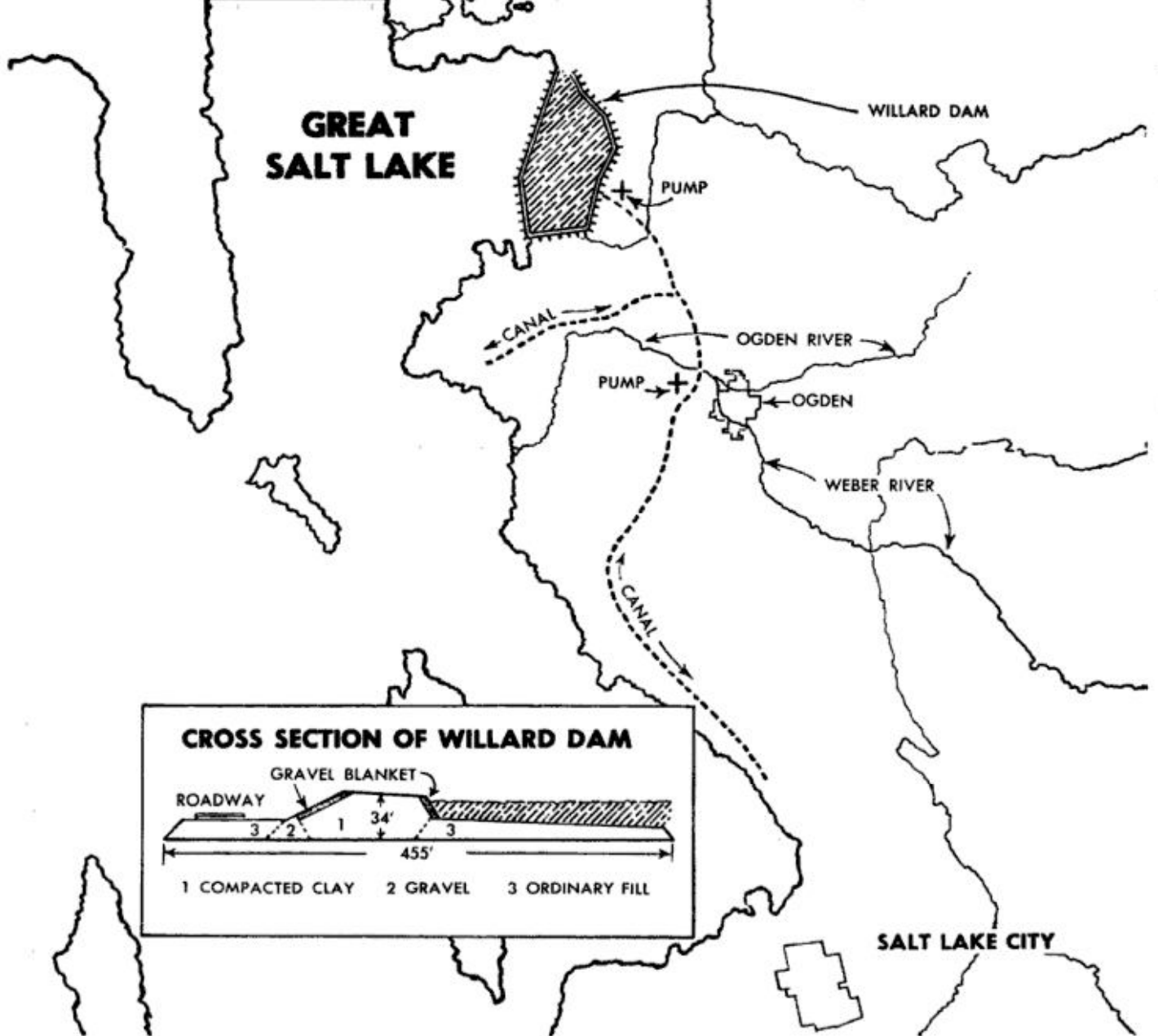
SOME 75,000 YEARS AGO the waters of what was the huge Lake Bonneville receded and became the Great Salt Lake. Ever since then, the rivers draining Utah's main Wasatch range have been wasted as they drained into this huge brine pool. The Great Salt Lake is not merely salty—it is so loaded with chemicals that during cold weather long bars of various compounds simply precipitate out of the water and line the shores like pilings, sometimes to a depth of several feet.

This brine is five times as salty as the ocean—a quart will yield a full cup of various salts when evaporated. Fresh water, until it has had a month or so to mix into the lake, actually skates over the heavy brine. Occasionally it freezes into grotesque icebergs which float high in the supercooled solution and are driven around the lake by winds.

Like most of the West, the surrounding countryside now has to rely heavily on the mountain waters for irrigation, and house-

←
SALT LAKE has receded in sections, revealing bed of salty clay. Lake gets its brine from this bed





MAP SHOWS reservoir site near Ogden which will impound fresh water from Ogden and Weber rivers. When needed, pumps will reverse flow through canals to irrigate surrounding area. Insert shows dam construction

hold and industrial use. Thus it has been painful to residents here to watch the rivers drain down and discharge their valuable loads into the lake.

Now, however, this situation is about to be changed. In effect, a small part of the Great Salt Lake will become a huge, fresh-water pond, from which water can be pumped in time of need, and over which water skiers and bathers may frolic.

This is being accomplished by laying one of the world's largest earthen dams around a selected area in the northeast corner of the lake. This area has been flushed for years by fresh water floods as the brine receded, and thus is suitable as a reservoir bottom. The bay is being enclosed by a dam $12\frac{1}{2}$ miles long and 450 feet wide at the base, which slopes gently to a crest of 34 feet. When completed in 1963, part of its basin will already have filled and a few years afterward, depending on the precipitation, there will be a lake 30 feet deep

covering 11,000 acres standing where once there was only salt and mud flats. A total of 215,000 acre-feet of water will be impounded here, enough to solve the water problem in Utah's principal valley for years to come.

The dam itself has a strange dual purpose. Not only does it retain the fresh water of two major inlet rivers, the Ogden and Weber, but it will keep out the brackish floods which sweep over the bay at times, and even prevent the Salt Lake's brine from invading should a sudden rise or shift occur.

To build Willard Dam, Bureau of Reclamation engineers have been faced with some stiff problems, entirely unique to this area. First, dikes had to be built to provide not only a dry base but dry fill material. Even several years of natural drying did not prove sufficient, however. When the contractor gouged out this basic clay, it was found that the salt it contained acted like



WILLARD DAM will have dual purpose, keeping out salt water from Salt Lake (right) and impounding fresh water in basin now under construction (left). Aerial view shows north portion of dam which will be 12 miles long

a sponge and kept the soil so wet that it had to be spread out a second time and plowed and turned with dozers to dry.

Further, the dam could not be erected at top speed, but had to wait for nature. The several hundred feet of lake sediments on which it sits is a treacherous base. Thoroughly saturated, the same soft muds have caused railroad embankments which cross the lake nearby to slip and slide out of sight many times. It was found that as the tremendous weight of the dam is applied at the center of the structure, the pressure caused by this weight fans out beneath the surface, then rises and "blows out" at the surface again. Such a blowout might occur a hundred yards on either side of the middle of the dam. To counter these shifting pressures, the structure had to be given a base half again as wide as a football field is long.

Old railroad construction records, as well as those of the engineers who built Holland's earth dikes, were consulted before

work was begun. Tests showed that a dam of only 18 to 30 feet in height could be erected here. To avoid the buildup of pressures beneath, which might cause the slippage and failure the huge earth pile had to be constructed in slow stages, letting the soft subsurface shift gradually to adjust to the weight.

Even spreading the construction over a period of five years, however, did not eliminate the danger. At several points along the dam a series of gauges have been sunk into the sediments beneath. These devices, called pisometers, are simply porous stones which reflect the pressures at their depth, and are connected by long plastic tubes to meters at the surface. A constant check is maintained to avoid any excessive underground pressures as the thousands of tons of earth are piled onto the dam overhead.

Basically, building Willard is the familiar process of taking various kinds of earth fill and placing it in a very precise pattern,



RECEDING WATERS on west side of Great Salt Lake make some wonder whether lake will eventually dry up because of new reservoir. Geologists doubt it because much of lake water is from underground seepage

layer upon layer, until the desired shape and height has been attained. When finished, 17 million yards of such fill will have been transported and laid here.

Like most dams of this type, the Willard has a basic core of high-grade clay, almost impervious to water. Along the face of this core and the beaches of the lake which will result are laid "blankets" of gravel. Drainage is provided by another large section of loose, gravelly fill directly behind the clay core. The rest of the dam is solid earth.

To transfer the fill from "borrow" areas to the dam site, a six-lane highway has been built. Trucks carrying 30 cubic yards of fill roar along here at 60 m.p.h. Without stopping, these trucks open the bottoms of their hoppers, the fill cascades out onto the dam, and the trucks continue on for their next load. Immediately, the dropped fill is scraped into place by dozers, watered, compacted, dried, and the dam grows another fraction of an inch.

In addition to these trucks, four 100-foot Sauerman dragline towers rise over the flats. From them cables stretch far out into the basin and are attached to movable anchors. Five-yard buckets pulled by these lines scoop deeply into the clay and are hauled up onto the dam. These Sauerman rigs, powered with 400-hp. GMC B-12 diesel units, had to be used in place of the conventional earth-movers here because the soil was too soggy and soft—a dozer might sink out of sight at any time.

Work has already started on a canal to divert the waters of the Ogden and Weber rivers, which at times of top flow will fill the Willard lake. Pumping stations will simply reverse the flow along this canal when irrigation water is needed in the valley.

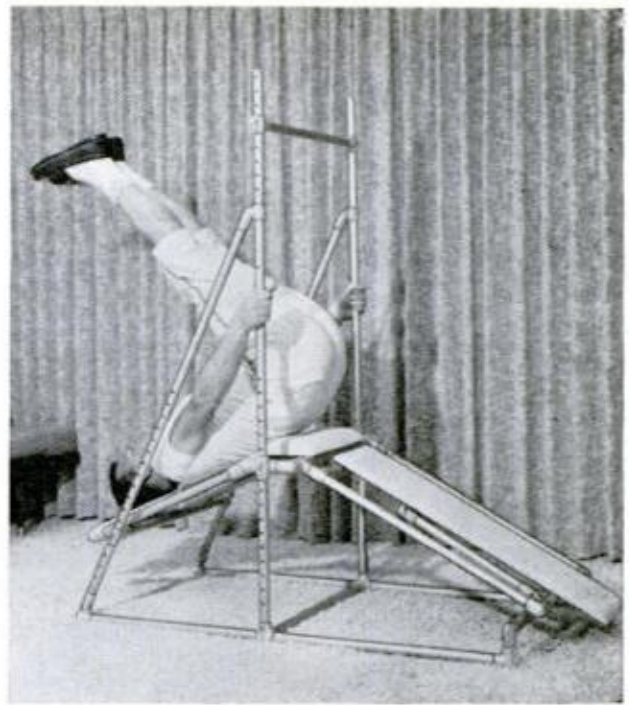
Falling Lake

And what of the Great Salt Lake itself? Is it destined to dry entirely, and become one shimmering expanse of salt? Actually, geologists say this has probably happened several times during the life of the lake, although not within human memory. It has no outlet of any kind. Since much of the water now flowing into the lake will later be impounded by the Willard dam as well as in other smaller reservoirs, the level of the lake will certainly fall—and has already done so. Of the four sizeable streams emptying into the lake, three will have been impounded when the Willard dam is complete. On the west side of the Great Salt, vast new stretches of mud and salt have been uncovered.

However, much of the water which makes its way into the lake does so through underground seepage. Theoretically, any water entering the valley eventually winds up in the great sink, either through such seepage, surface flow, or rain. After an initial lowering, then, the Great Salt Lake may rise again as the seepage caused by these storage projects increases.

To find out, we may have to wait a hundred years or so. Right now, the character of this freak of nature is being changed radically by engineering genius. ★ ★ ★

ADDRESSES of manufacturers and persons mentioned in this issue are published in the monthly Where-to-Find-It list, available free from Service Bureau, 200 E. Ontario St., Chicago 11, Ill. Send a stamped, self-addressed envelope.



Adjustable Table Is Compact Gym for Keeping Trim

Developed by a surgeon, a new rest and exercise table uses progressive position settings and the body's weight to flex and stretch muscles, either with easy exercises

or simply by lying on it. The Arch-Gravity table is made by Ryan Research and Development Co., Box 821, Cleveland 22, Ohio. A steel model costs \$150, aluminum \$225.

Cave Dwellers Never Had It So Good

Not an urban penthouse apartment, as you might think, but quite the opposite—this comfortable living room is located half a mile beneath the Kansas prairie. Built by

Underground Vaults and Storage Co. in a salt mine at Hutchinson, Kans., the room is part of a complete apartment for entertaining the firm's storage-service clients.

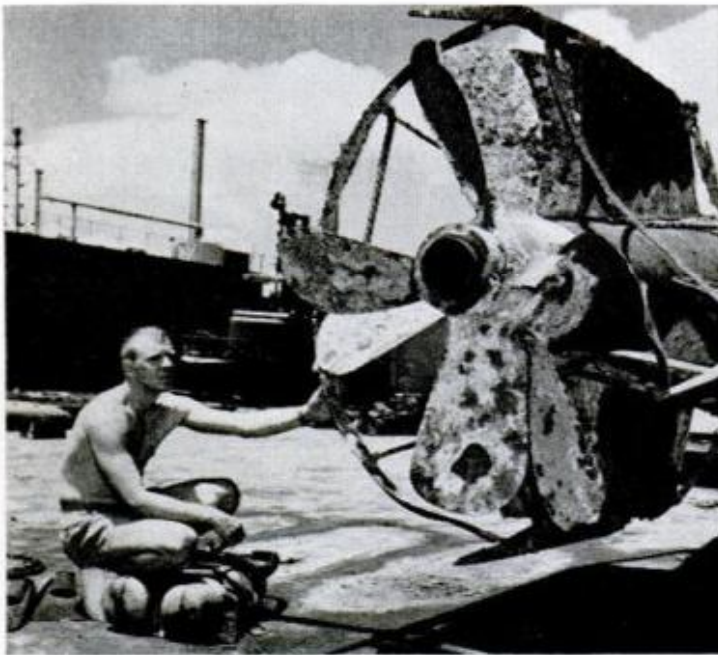


MIDGET SUB:

Ghost of Pearl Harbor

*Buried in a watery grave since Dec. 7, 1941,
a 2-man Japanese subsurface craft is salvaged*

SUB'S DISCOVERER was Clifford Buhl, (left), diving instructor. When salvaged, sub was corroded with rust. No sign of crew was discovered



TWENTY YEARS AGO this month, Japanese naval forces attacked Pearl Harbor. Recently, a grim reminder of the "day that will live in infamy" was resurrected there.

It was a midget Japanese submarine. A Navy man, Clifford Buhl, shipfitter first class, discovered it accidentally while giving diving instructions. He spotted the vessel resting on a bed of coral 70 feet underwater off the entrance to the harbor.

The sub, believed to have been with the Japanese invasion during the attack on Pearl Harbor on Dec. 7, 1941, was lifted from the depths by a salvage crew.

The midget sub was raised slowly to permit draining and as a precaution against escaping dangerous gases that might have accumulated during the little craft's 20-year entombment.

Navy bomb experts dismantled two 12-foot torpedoes which had not been fired.

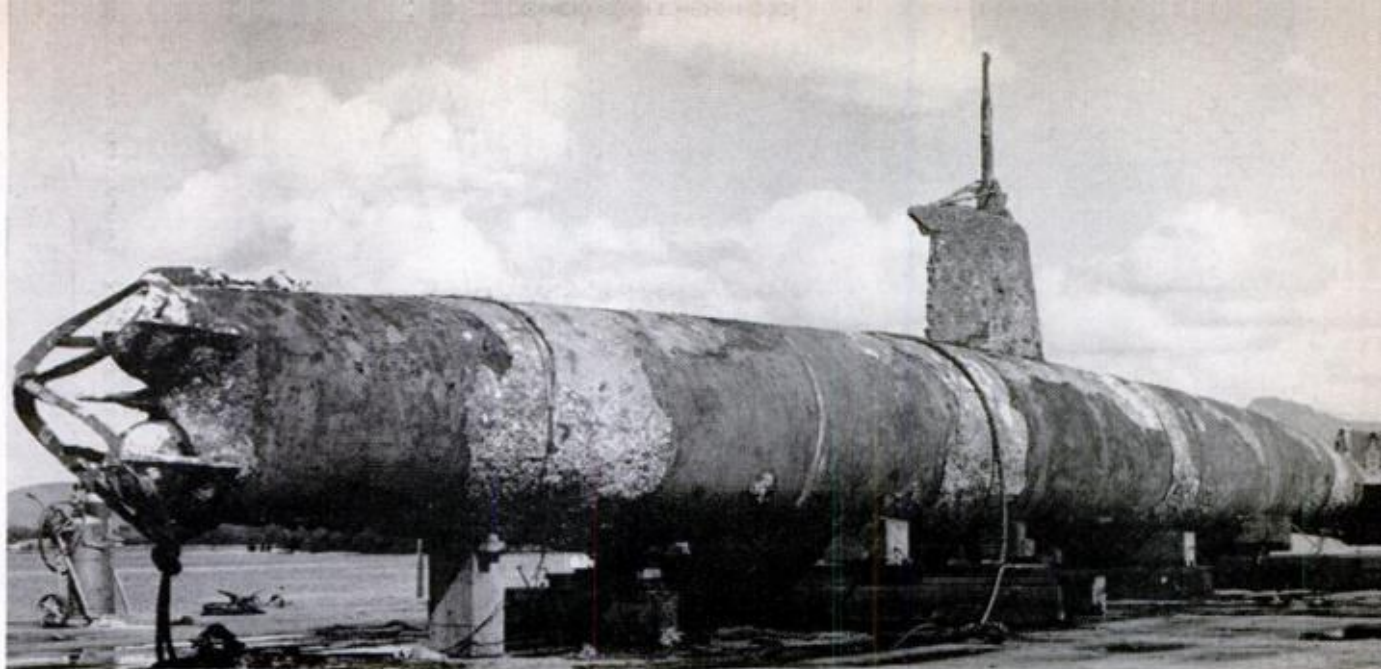
Only the bottom of the 80-foot submarine was badly deteriorated. Damage inside and outside indicated the sub might have been depth-charged by a U.S. ship. The inside was covered with silt and badly rusted.

No bodies were found. The conning tower was open and Navy authorities believe the occupants escaped before the sub sank.

It is believed that five of the two-man Japanese subs were involved in the attack on Pearl Harbor. One was sunk inside the harbor, another was beached on the shore and a third was thought to have been sunk outside the harbor entrance by the destroyer USS *Ward*, which fired the first U.S. shots.

The 80-footer brought up from the coral reef may have been the *Ward's* victim.

The sub has been returned to Japan where it will become a memorial. The torpedoes were dumped at sea.



MIDGET SUB, with torpedoes still in bow, was pictured shortly after salvage. Divers (below) worked in 70-foot depths to resurrect it





Tractor Runs Under Ice

Its spiked wheels gripping the *underside* of ice on a lake, a battery-driven vehicle designed at the University of Wisconsin pulls scientific equipment through the waters of winter-closed lakes.

The tractor, an airtight aluminum box, floats against the ice. It has a hydrophone to sense sound impulses sent to control it.



Inflated Space Station

Boosted into orbit in a package carried by a rocket, expandable space stations shaped like doughnuts could be inflated into shape to provide living quarters inside for one or more persons, according to the Goodyear Aircraft Corp.

Goodyear is building a 24-foot-diameter station for test use by the National Aeronautics and Space Administration, and says even larger manned stations could be put into orbit within three years.

Inflated in space, the structure would be made rigid by injection of quick-setting plastic between its walls.



Boon to Batching

Dumping operations are easier and take less time with cab-controlled batch trippers on a dump body made by Hercules, Galion, Ohio.

Hydraulic locks hold batches in place until released by the driver. The body isn't lowered between batches and no helper is needed to release them. The truck backs into a skip, trips and clears in 9 to 11 seconds because it moves in and out with the bed elevated.



Dome Houses Dry Cleaner

Wooden geodesic domes house the new coin-operated automatic dry-cleaning establishments being installed across the country by the RCA-Whirlpool Corp.

The domes have a diameter of 26 feet, a peak height of 13 feet and a floor area of approximately 485 square feet.

They will hold six dry cleaners, necessary mechanical and electrical equipment and furnishings.



Instant Intercoms

Transistor intercoms use house wiring instead of inter-unit wires. Drawing less current than an electric clock, they remain plugged in at all times. Press to speak or lock for baby-sitting. Each unit has separate adjustable volume control. \$74.50. Webster Productomatic, 182 Ave. D., Rochester, N. Y.

This Christmas . . . Decorate With Music

If you like the idea of carols at Christmastime, use a continuous loop tape, such as the Cousino tape vendor. Record the carols from your phonograph and when the tape is finished it automatically starts again without the clicking and attention a phonograph needs. To keep from ruining good quality indoor loudspeakers, use weather-proof outdoor types such as the Electro-Voice (A) or the Jensen (below). The tape recorder (B) must be equipped—as most are—with a free-wheeling spindle to operate with the tape vendor.





Pretty Motorcyclists Are Zipping Their Lids

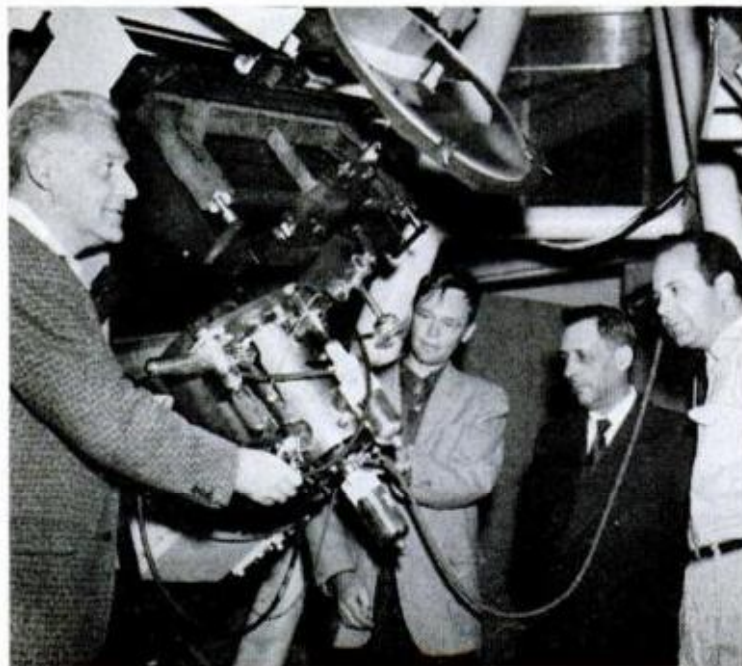
Lady cyclists can ride all day with hair blowing in the breeze—and still arrive with as neat a coiffure as they had when they started. The secret is a wig that zips onto the cyclists' helmet, protecting the lady's hair from the wind.

There's a choice of three wig colors—

blonde, brown, or auburn—and all are made of synthetic fiber that can be combed, brushed or shampooed without losing its curl. The helmet is glass fiber with a cork lining and foam-rubber headband.

Manufacturer is Kangol Ltd., 39 Fitzroy Square, London, W.1, England.

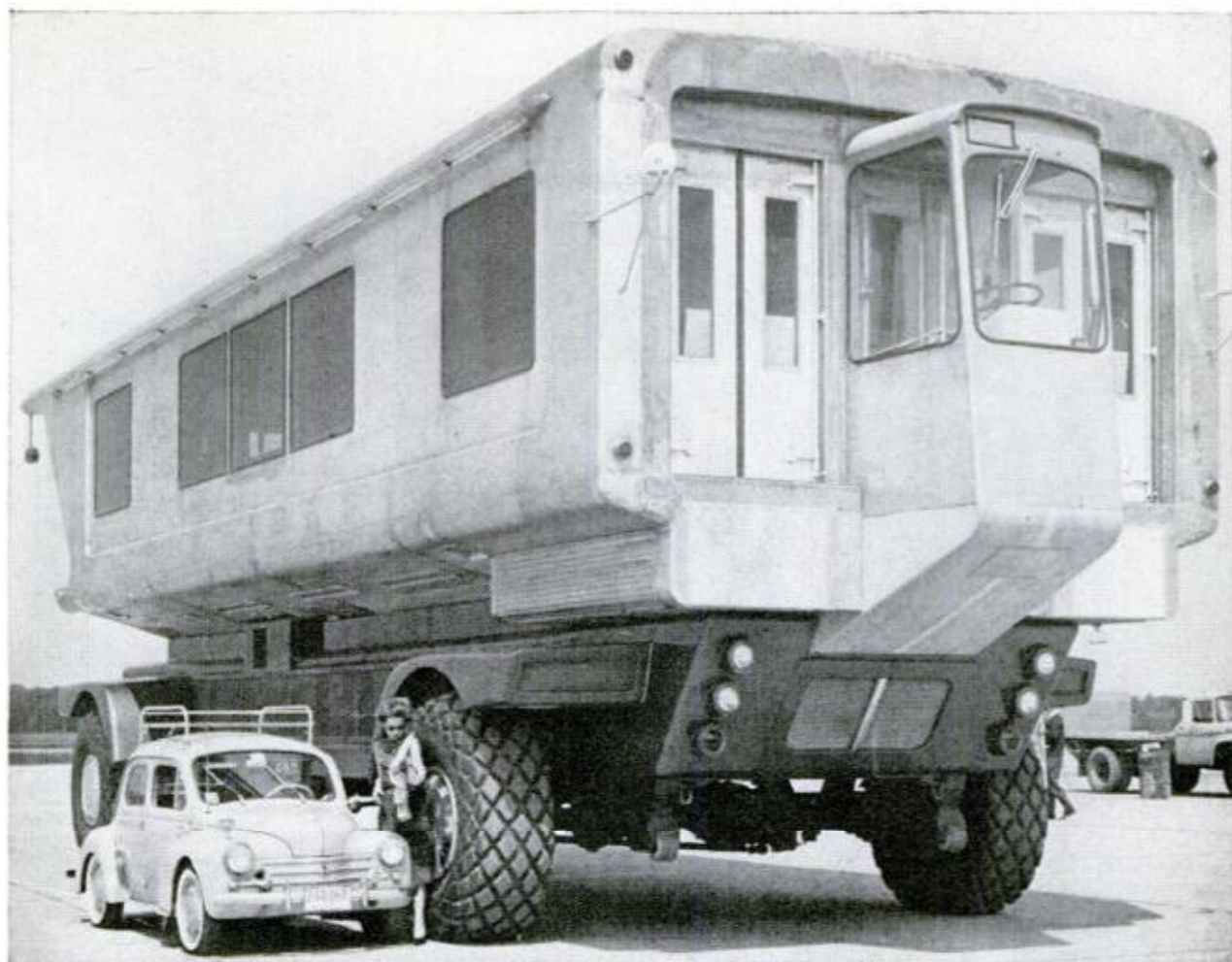
Electronic Camera Speeds Up Star Photography



Capable of recording images of the solar system in 15 minutes that might take as much as four hours by conventional photographic methods, a new camera promises deeper penetrations of space with large telescopes and a new life for smaller telescopes that were becoming obsolete.

Developed by a French astronomer, Prof. Andre Lallemand (second from right), the camera converts the weak light of stars to electricity, amplifying it and using the electrons to form an image instead of photons of light energy.

An extremely complicated camera—parts of it have to be baked in an oven before use—it is being used only in France and at Lick Observatory in California.



Mobile Airport Lounge

Washington's Dulles International Airport has inaugurated service with a monster mobile lounge that carries 90 passengers—in living-room comfort—from the terminal to the aircraft.

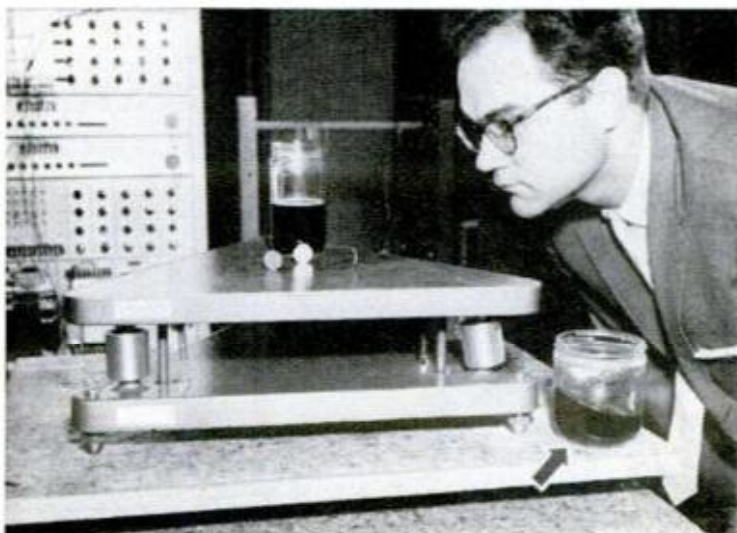
Since the 38-ton behemoth is too ungainly to back up, there is a motor and a driver's cab at each end. The \$1,500,000-prototype is operated by a former test driver for Army tanks.



Vibration-Free Platform

While the bottom section of a new platform may be subject to movement, the upper section remains motionless. It is designed as a support for electro dynamometers, balances, surface-roughness measuring devices and other sensitive equipment.

A variation of the platform may be used to support a vibrating machine and to prevent the vibration energy from being transmitted to the surrounding area. The platform is made by Tenlo Research Corp., Minneapolis, Minn.

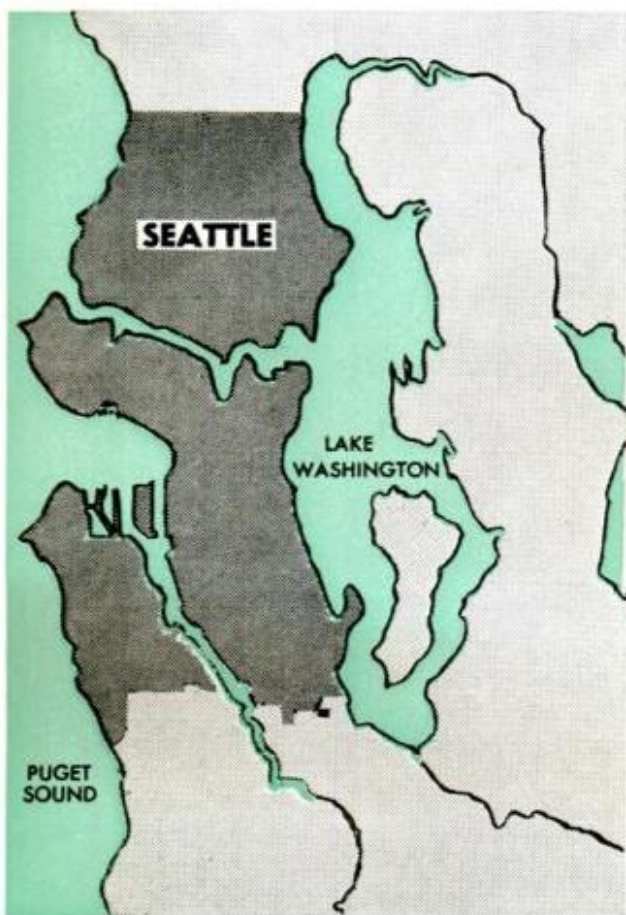




SEATTLE'S FLOATING PROWL CAR.....



RESCUE WORK is also facilitated by the fold-down tailgate on Patrol Boat No. 1. The motorboat cops, as can be seen on map below, have a long watery beat to patrol. There are 65,000 small boats in and around Seattle



problems now being experienced throughout the nation. Patrolling the waterways calls for the most modern equipment. That's why the Seattle police have designed the latest in patrol craft—a mother boat with a faster one riding piggyback.

The hull of the mother boat is made of plastic so tough a rifle bullet won't go through it; the decks are of fiberglass and the cockpit is self-bailing. Rimming the craft is a rub rail of iron bark—the same material used on Coast Guard icebreakers. Aft is a hoisting davit capable of lifting more than a ton of deadweight from the sea.

For emergency fire fighting, powerful pumps can shoot out 1000 gallons of water a minute. (The same amount can be sucked from a sinking craft.) When the fire hose is operating, the jet force is so powerful that one of the boat's two engines must operate to keep the boat from being driven from its target. Engines are 220 hp. diesels.

The searchlight lights up waters a mile away; the siren can be heard over a greater distance; the public address system can bawl instructions across the water. There is an electronic depth finder for plying areas of unknown depths. Radio contact can be kept with land squad cars, a pon-



HELPING HAND is given to fisherman whose boat ran out of gas. He'll be towed to a dock. Police boats on occasion are pressed into service to fight fires on neighboring docks. The department won a fire-fighting award

toon-equipped police helicopter and with any radio-equipped boat.

Capt. Stanley Stevenson is acting chief of this harbor force. While most of his 25 years' service was spent on a motorcycle, chasing highway speeders, his heart has been in boats. He owns a modest one, has raced in water events, and during World War II he was a chief bosun's mate on a mine sweeper.

As I talked with him at the Ballard Dock police station, a gill netter docked his boat and stuck his head inside the station door.

"I need a check-out on my forward light," he said. "Salt water corroded the wires and the light wouldn't work. One of your boys gave me a warning ticket yesterday."

In all my years as a police reporter for a newspaper, I'd never seen a man pull up to a station in a boat to square a ticket.

Stevenson grinned. "Repairs to lights on fishing boats are going on at all the docks. We give one warning ticket. Our police boats are like floating prowls. We use them for investigation and enforcement work and for just being handy. We have learned where we are likely to be most needed. Look . . ."

He held up a map of Seattle. On the water

areas were hundreds of numbered and varicolored thumb tacks.

"The tacks represent trouble calls during the past year. The colors and numbers tell us the different kinds of trouble. We know where to concentrate our efforts."

All call cards are run through an electronic machine and tabulated. Speeding represented almost 50 percent of the harbor ordinance violations in the past year. Main offenders: boaters in the 20 to 24 age bracket; next, those from 25 to 34. Several arrested speeders were in their 60s.

"It's a funny thing," Stevenson said: "People who wouldn't think of speeding on a clear highway will race through a congested harbor. People who don't drive automobiles when they are drunk think they are capable of operating a boat in that condition. Not since the Model-T days have I caught anyone riding on the hood of an automobile, but many persons try riding on the foredeck of a speeding boat. Accidents can happen in the water without encouraging them."

Seattle's worst water accident in recent years occurred to a 40-foot pleasure boat, the *Lois Ann*, in mid-afternoon while a 40-

(Continued to page 202)



CHRISTMAS 'TREE' of scrap metal is sprayed with water which freezes to form beautiful pattern of icicles.

Deck the Iron With Ice and Be Jolly



Men of the North American Air Defense Command (NORAD), who man the radars of the ballistic-missile early warning system in Greenland, weren't about to go through the Yuletide season without a Christmas tree.

But in Greenland—which is *not* green but mainly ice—trees are rare. So they built their own.

Using scrap pipe, iron and sheet steel, they built a "tree" that stands 35 feet high—almost as tall as the giant radar towers. They used a fire hose to add icicles—they just kept spraying it until the frigid Greenland weather froze the water in beautiful natural patterns—then trimmed it with about 150 red and blue bulbs.

To make sure the tree would stand erect, they blasted a hole in the ground, filled it with water, set the base of the tree in it and let it freeze solid.

The Greenland site is the northernmost in the NORAD system.

NORAD MEN in parkas stand around do-it-yourself Christmas tree and sing carols

POPULAR MECHANICS



Small Car for Big Cities

Paris traffic jams have caused French science-fiction writer Henri Viard to propose a radical solution—a long-term policy that would result in banishment of all but the tiniest autos from the city's streets. Full-size cars would be allowed to park for only a limited time during the next two years, after which they would be banned altogether.

Then, only the Bulle (air bubble), designed for Viard by motor engineer Francois Boufort, could be used. This tiny car, about six feet long, seats two or three passengers and takes up only a quarter of a normal parking space. Its two-cylinder engine delivers about 70 miles per gallon and a top speed of about 40 miles per hour. Price, according to Viard, would be about half that of the smallest car now being made, and running expenses less than the cost of public transportation.



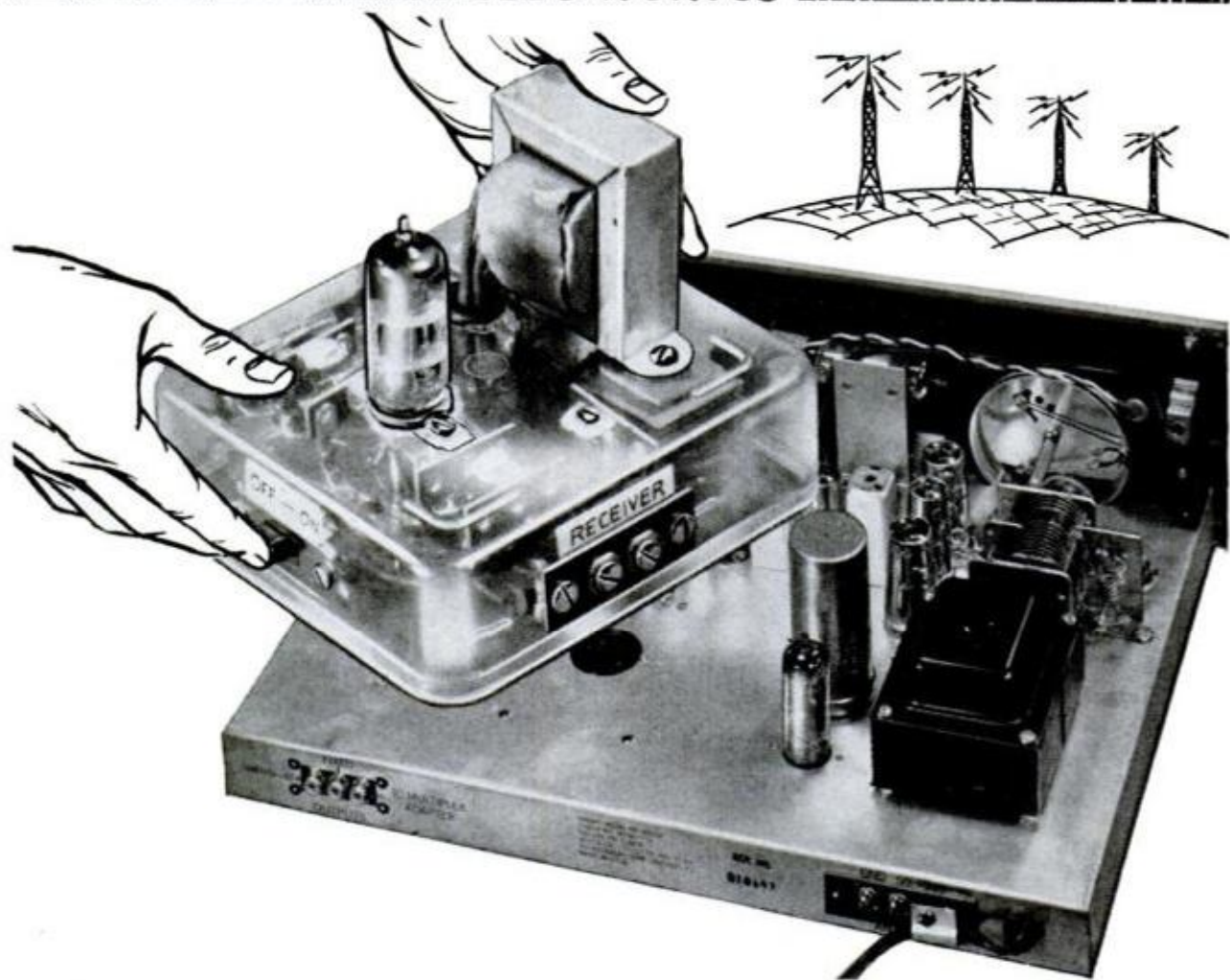
Push-Button Tooth Cleaning

Spinning 3600 revolutions per minute, the power unit of a new battery-operated dental treatment kit actuates attachments that do a complete job of dental cleaning—from brushing teeth to massaging the gums.

Attachments include a nylon brush, cleaning disk and cone-shaped gum massager. Also included in the kit is a cleansing paste.

The complete kit is available for \$3.98 from Modalities, Inc., Dept. P, 3101 Steinway St., Long Island City 3, N. Y.





Give Your FM Tuner a Boardinghouse Reach

By Joseph R. Noonan

BY ADDING THIS useful "signal sucker" to your tuner, you can make stations that sound weak seem as if they were just around the corner—and bring in some stations you were never able to receive before. Such a booster is almost a "must" if you are 50 miles or more from the nearest FM station, or if you are fussy (as we are) about noise-free listening.

Use a plastic sandwich box as the chassis. Save the lid as a bottom cover when the wiring is complete. Holes for parts mounting can be made either by careful drilling, or use a heated nail for small holes and a

heated knife-blade for larger ones. Parts placement is not critical, but keep all leads as short as possible. Mounting strips can be used to support small components such as resistors and capacitors. When mounting the coils L1 and L2, place them on opposite sides of the tube socket.

The coils use 5600-ohm, two-watt resistors as coil forms. Start by soldering one end of the coil wire to one of the resistor pigtails, close to the body. Evenly space the turns until the required number is reached. Where a tap-off is required, twist the wire into a small pigtail before continuing the

coil. When the coil winding is finished, wrap the free end of the wire around the remaining resistor pigtail and solder snugly near the body. To prevent the wire from unraveling, coat the entire coil with Polystyrene "Q"-Dope.

After the wiring has been completed, check it carefully against the diagram. Connect terminal strip TS-1 to the antenna, and TS-2 to the FM receiver. Make these connections with standard 300-ohm twin-line. Turn on both the FM receiver and the booster. In order for a booster to operate properly, it must first be neutralized. While this is usually done with elaborate test equipment, here's how you can accomplish a fine neutralization simply with basic tools and a sharp ear. Adjust trimmer capacitors C5 and C6 to the point midway between where oscillation begins, as indicated by an excess of noise and distortion. Tune these for maximum noise.

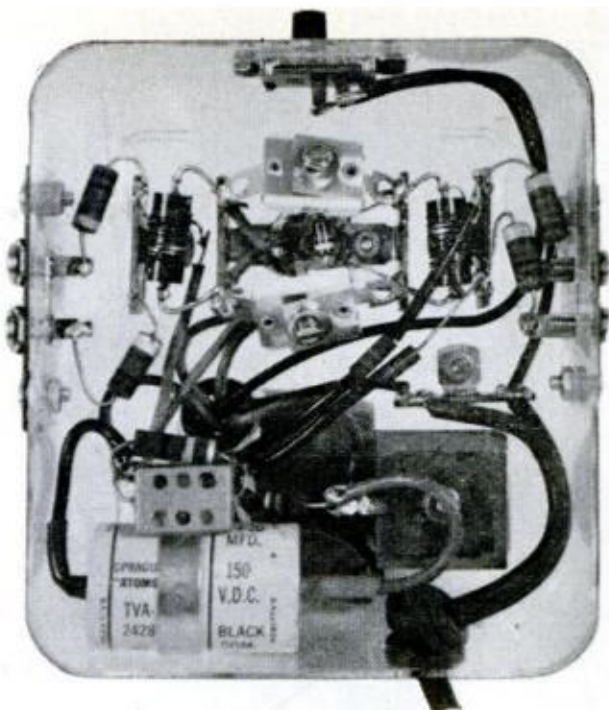
Then, adjust coils L1 and L2. Tune a station near the center of the dial and using a toothpick, compress and spread the coil windings along the resistor body. Watch the FM tuning indicator, or listen very critically while adjusting and space the windings for maximum signal boost.

Check station reception at both ends of the dial as well, to be sure a good compromise has been affected. When satisfied that maximum signal is coming through, coat the coil with Polystyrene "Q"-Dope to prevent accidental shifting of the windings.

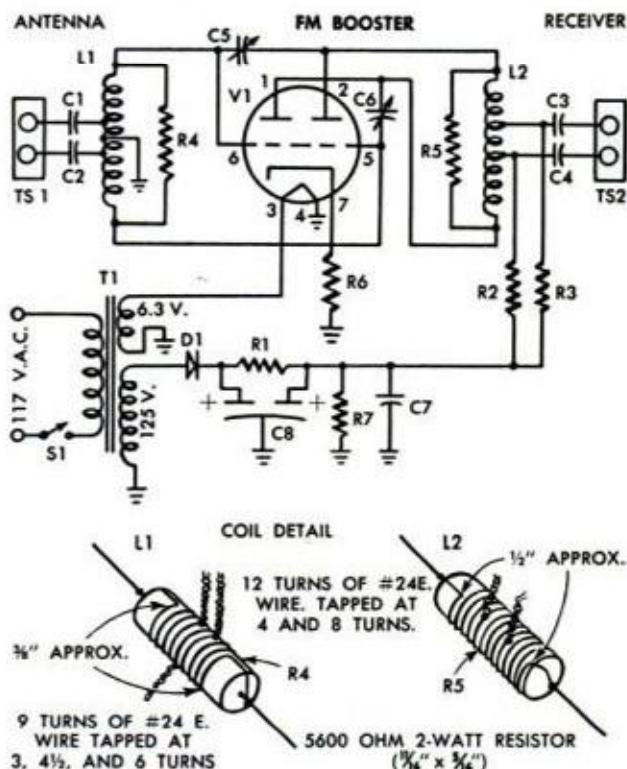
Your booster will require no additional attention, except to turn it on and off. If you live in a fringe reception area, you will want the unit on at all times when the FM is on, in which case it might be wise to leave the switch in the *on* position and plug the booster line cord into the switched accessory outlet on the rear of the FM tuner if one is available. This will turn the booster on and off with the tuner.

Should you find some stations in your area which are too strong when the booster is used, you can turn the booster off, and it will provide some measure of attenuation, reducing the signal to a usable level.

★ ★ ★



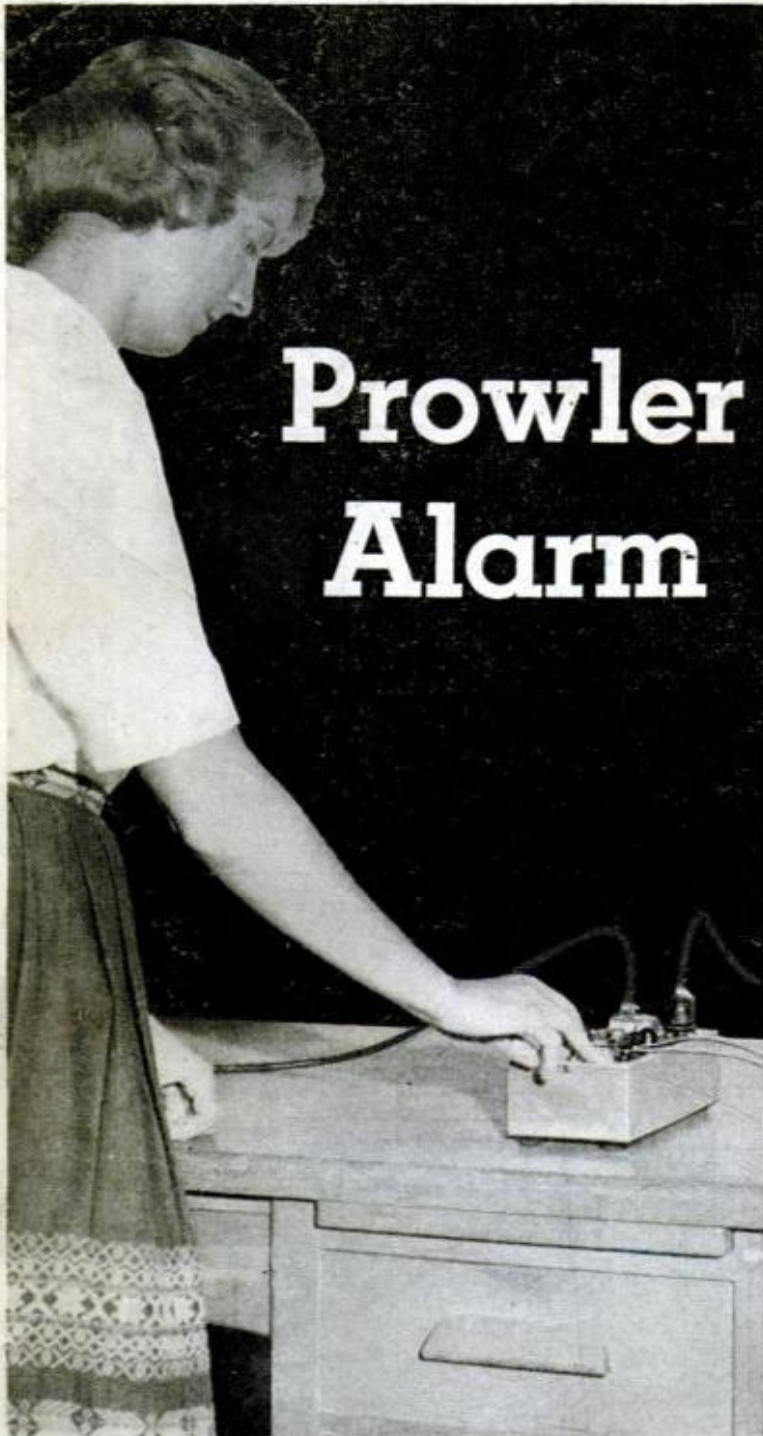
BOTTOM OF CHASSIS shows one possible arrangement of parts. Below, schematic diagram and coil data



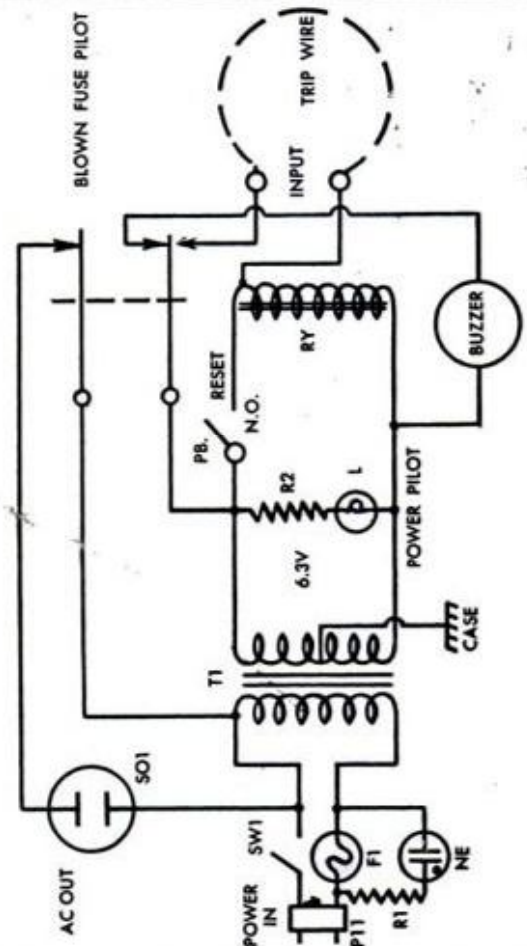
FM BOOSTER PARTS LIST

C1, C2, C3, C4—51 mmf., 1000-v. ceramic capacitor
 C5, C6—3-30 mmf. midget trimmer capacitor (BUD MT 833 or equivalent)
 C7—100 mmf., 500-v. mica capacitor
 C8—20-20 mfd., 150-v. electrolytic capacitor (Sprague TVA 2428 or equivalent)
 D1—50-75 ma., 130-v. selenium rectifier
 L1—9 turns of #24 enameled wire wound on resistor R4, and spaced $\frac{3}{8}$ ", tapped at 3 turns, $4\frac{1}{2}$ turns, and 6 turns (see text)
 L2—12 turns of #24 enameled wire wound on resistor R5, and spaced $\frac{1}{2}$ ", tapped at 4 turns and 8 turns. (See text)
 R1, R2, R3—1000-ohm, $\frac{1}{2}$ -watt resistor

R4, R5—5600-ohm, 2-watt resistor ($11\frac{1}{16}$ "x $5\frac{1}{16}$ ")
 R6—47-ohm, $\frac{1}{2}$ -watt resistor
 R7—100,000-ohm, $\frac{1}{2}$ -watt resistor
 S1—SPST switch
 T1—Power transformer: primary 117 v. a.c.; secondaries 125 v. a.c. @ 15 ma., and 6.3 v. a.c. @ 0.6 A. (Knight 61G410; Stancor PS-8415, or equivalent)
 TS1, TS2—2-lug screw-type terminal strip
 V1—6J6 tube
 1—7-pin miniature tube socket
 1—plastic sandwich-box $4\frac{1}{2}$ "x 4 "x $1\frac{3}{8}$ "
 6—2-terminal mounting strips
 Misc.—Grommets, power cord, etc.
 (Approximate cost of parts: \$7)



Prowler Alarm



TURN ON THE POWER, press the reset button and your house and property are safe even if nobody's home

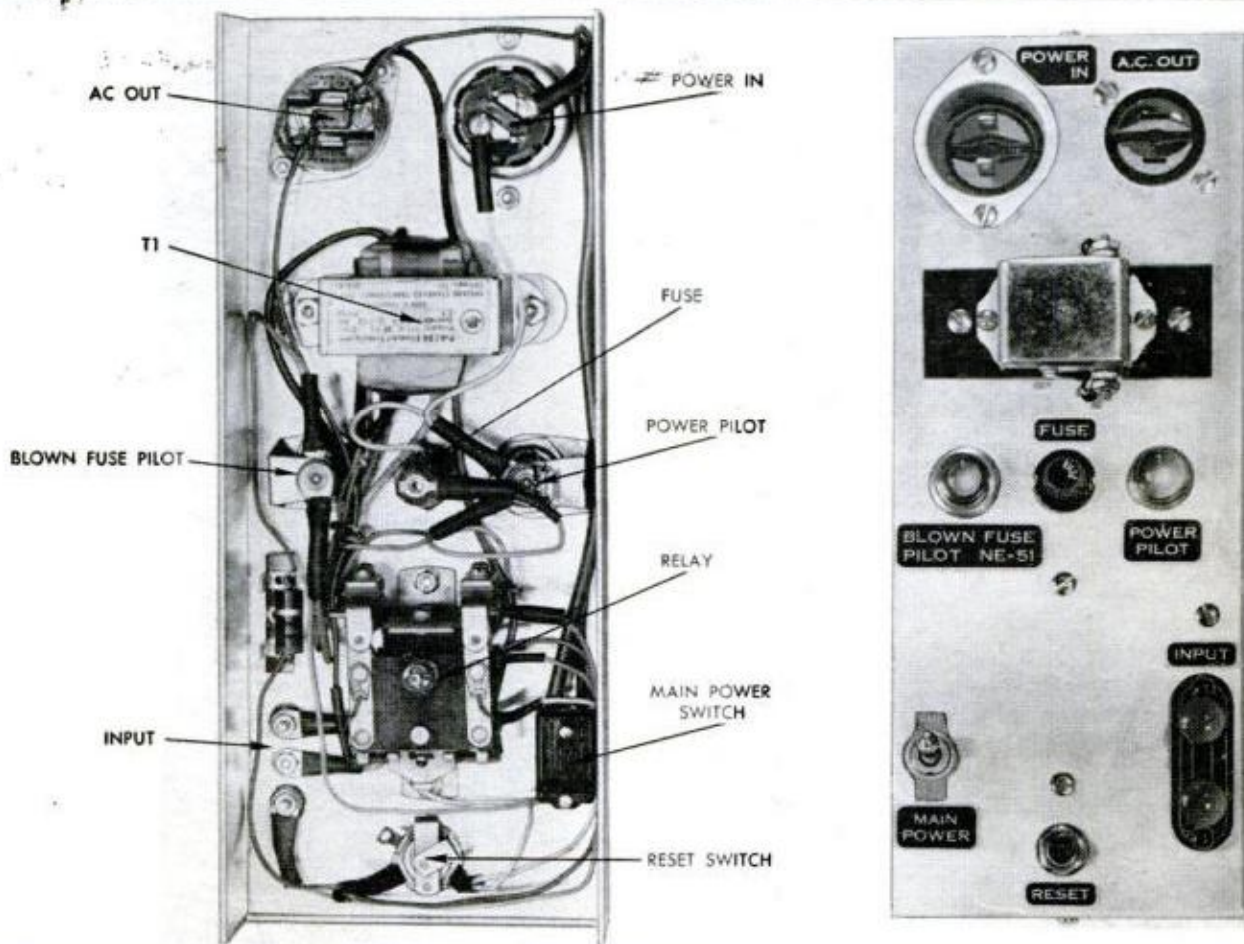
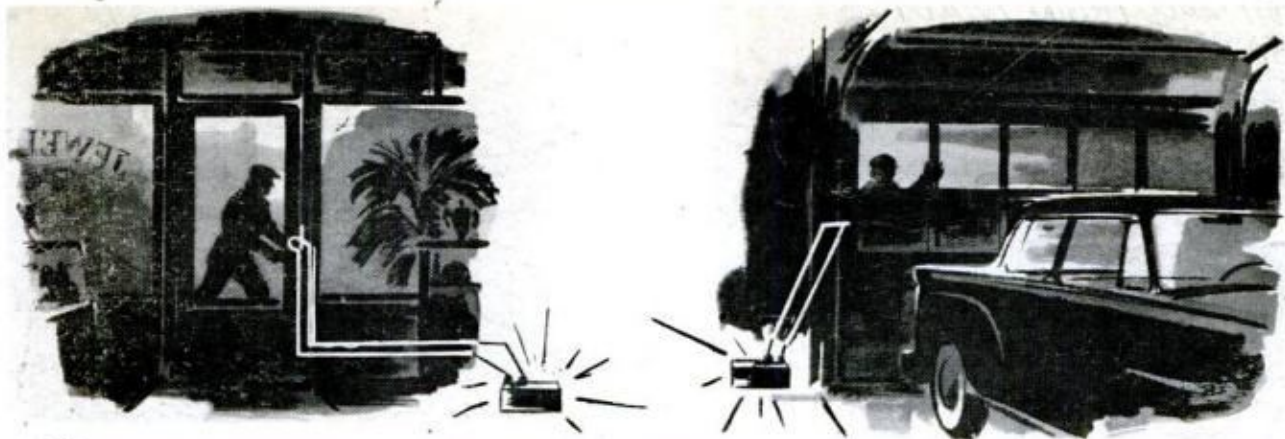
AS A burglar discourager, this prowler alarm does a fine job. The unit operates with a trip wire which keeps a relay in a locked position. Should the wire break, the relay opens and whatever you have plugged into the a.c. outlet will then be activated. The alarm can be either a floodlight, a bell, or a combination of these.

As the unit is electrical rather than electronic, there is no serious problem concerning lead dress or parts placement. Keep the leads as short and direct as possible, and avoid short circuits.

The trip wire should be very fine, such as a number 38 enameled. This will be invis-

ble in the dark, yet will break readily under pressure. As line voltage isolation is provided by transformer T1, there is never more than 3.15 volts through the wire.

For stringing the alarm wire around the doors and windows, note the setups suggested in the sketches shown above. If the wire is strung tautly over a partly open window further to gain entry will break the wire and sound the alarm. Similarly, a door can be protected by looping the wire over the knob. A garage door can be guarded simply by using two nails. Attach them so that in the closed position the nail on the door



UNDERCHASSIS VIEW above left shows uncomplicated circuit. Top view, right, indicates author's layout

makes contact with the nail in the jamb. Connect one trip lead to each nail, and as long as the door is closed, the alarm will be silent. You will need a switch outside the garage to let yourself in, however. You will probably be able to devise numerous other methods yourself.

Using the Unit

In use, turn the power switch on and press the reset button. The unit is now "on guard." When the wire breaks, the a.c. out socket is activated and the internal buzzer sounds, or the floodlight lights, if you are using a light for an alarm.—*Ronald L. Ives*

PARTS LIST

- P1—Recessed male a.c. plug
- SO1—Flush female a.c. receptacle
- Case—Aluminum chassis box 10"x4"x2½", LMB No. 144 or equiv.
- R1—100,000-ohm, ½-watt carbon
- R2—10-ohm, 2-watt carbon
- SW1—SPST toggle switch and plate
- F1—1-amp. fuse in holder
- RY—6-3-volt DPDT a.c. relay, Potter and Brumfield MR-11-A or equiv.
- NE—NE-51 bulb with jewel and socket
- L—Mazda 44 with jewel and socket
- T1—6-3-volt, 1.2-amp. filament transformer, Stancor P-6134 or equiv.
- Buzzer—6-volt adjustable buzzer
- PB—Push button, normally open
- Miscellaneous—2-terminal tie point, 2 terminal binding posts (Eby 21-5 or equiv.), cable ties, etc.

COST OF MATERIALS, PLUS PLAYING
EQUIPMENT AND TRAIN LAYOUT:
\$ 130-150 (see MARCH 62, 12)

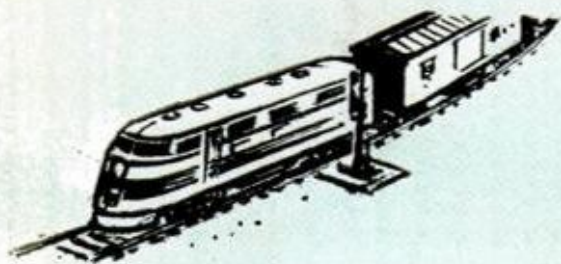
TRIPLE-TOP FUN TABLE

By John Jefchak

PART I



Piggyback, flip-over top lets you switch from pool to table tennis to model railroading at the mere suggestion—all on the same table



WANT TO GIVE the family a real Christmas gift? Promise them you'll start building this exciting fun table. It's a 6 to 60 gift the whole family will enjoy and well worth waiting for even though you won't have it ready by the 25th.

Basically it's a home-size pool table with an extra two-faced top which lets you enjoy table tennis or HO-ga. railroading on the same table by merely flipping over the piggyback top. For pool, you simply lift off the extra top and lean it against the wall. This space-saving feature makes the affair ideal for the average basement playroom where there would not be room enough for three individual tables.

Roomy compartments in the base of the table provide a convenient place to store rolling stock, the scenic mountain and other lift-off props of the model track layout, also the table-tennis equipment; and there's room to spare for other games and playroom toys. The whole thing rolls about on casters and is designed to dismantle in easy-to-handle sections for moving in and out of the house. In lieu of the model train layout, the reverse side of the table-tennis surface can be used by the youngsters as a paste-and-color table, as a birthday-party table or as a nice big area for spreading out table-top games.

A logical beginning is to construct the pool-table top first and Fig. 1 shows the

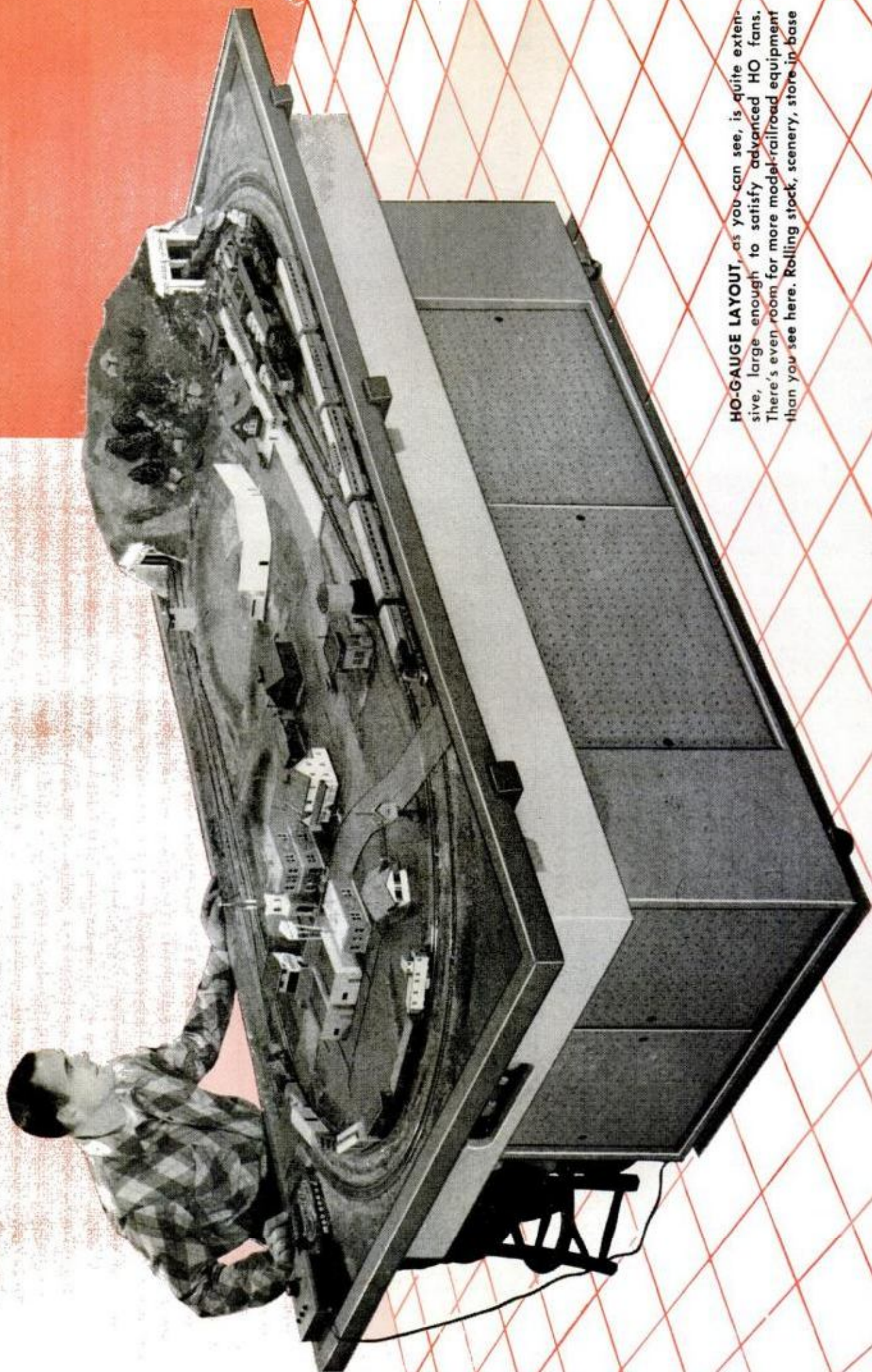


SHOP AND CRAFTS

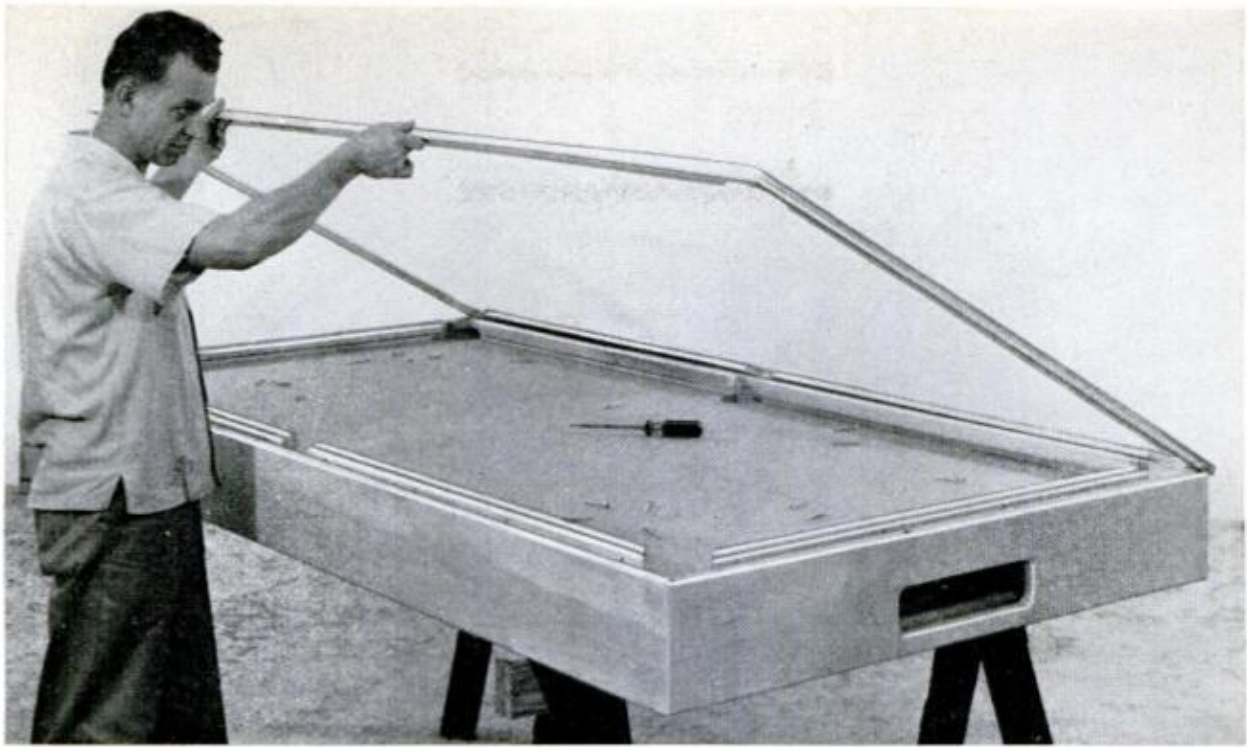
basic assembly at a glance. Begin with the side rails, using $\frac{3}{4}$ x 8-in. solid stock (or plywood if you prefer). Hardwood is best, the original top was made of poplar and painted.

Rip the rails to a width of $7\frac{1}{2}$ in. The sides measure 92 in. long, while the ends are 48 in. in length. Cut a rabbet $\frac{1}{4}$ x $\frac{1}{2}$ in. along the outer edge of each board, with the remaining tongue, or tenon, considered as being on the inside. This is accomplished with two passes on the table saw. Next, cut a $\frac{3}{8}$ x $\frac{3}{4}$ -in. dado on the inside, at a point $2\frac{1}{4}$ in. down from the top of the tongue. Use either a standard saw blade or, preferably, a dado head, which will cut the groove in one pass. Mark out the ball-return opening on one end rail, Fig. 12. Cut out, using a portable electric saber saw or a key-hole saw (if done by hand), and smooth and round off all edges. Cut a 45-degree miter at each end of each piece, eight miters in all. Take care to retain a small flat edge, about $\frac{1}{32}$ in., on the ends





HO-GAUGE LAYOUT, as you can see, is quite extensive, large enough to satisfy advanced HO fans. There's even room for more model-railroad equipment than you see here. Rolling stock, scenery, store-in-base



HERE YOU SEE the top completely framed with playing board in place and mitered top rail being tried for fit

of the miters in order to maintain the true dimensions. Now cut a groove $\frac{1}{4} \times \frac{3}{8}$ in. across each mitered surface, $\frac{1}{8}$ in. in from the inside corner, to receive a $\frac{1}{4} \times \frac{5}{8} \times 8$ -in. plywood spline, Fig. 4.

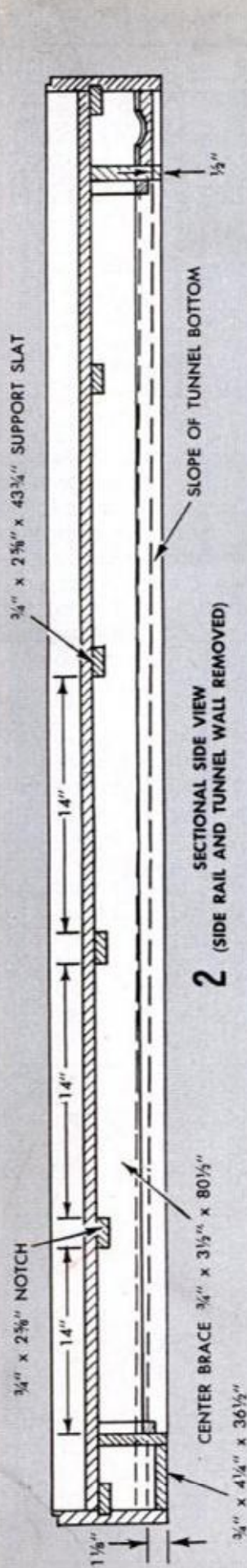
Cut 24 triangular clamp blocks from $\frac{3}{4}$ -in. stock. Using a water-soluble hide glue, place three blocks equally spaced, at each end, about $\frac{1}{8}$ in. from the mitered edge. Make certain that corresponding clamp blocks are in line in order to receive the clamps for permanent clamping as in the photo to the left of Fig. 4, and for trial fitting. Prime the mitered edges with a thinned mixture of plastic-resin glue to insure a good bond. Allow to dry thoroughly. Then apply glue to the spline and both mitered edges and clamp together, using an equal pressure on all clamp blocks. It takes twelve clamps to complete the four corners at one time. Otherwise, work as many corners as there are clamps available.

Check for squareness before the glue sets, since it is essential that all four corners be joined at 90 degrees. Use a framing square in each corner, then hold in position with diagonal strips. Use a wood chisel to remove excess glue down to the glue line of each joint. Remove any glue residue from the wood with a damp cloth. Allow glue to set for at least 24 hours, then carefully trim off the clamping blocks with a wood chisel and trim the splines off flush at each end.

Cut out two pieces of plywood $\frac{3}{4} \times 5\frac{1}{4} \times 86\frac{1}{4}$ in. These are the side walls for the ball-return tunnels running lengthwise,

Fig. 1. Cut out two pieces $\frac{3}{4} \times 5\frac{1}{4} \times 36\frac{1}{2}$ in. to serve as side walls for the ends, one of which blocks off an unused space at the end opposite the ball-return opening. The bottom piece for this unused space measures $\frac{3}{4} \times 4\frac{1}{4} \times 36\frac{1}{2}$ in. There is a rise in the bottoms of the side tunnels of $\frac{5}{8}$ in. from one end to the other lengthwise, Fig. 2. The ends therefore require an angle cut of approximately 1 degree. Allow at least $\frac{1}{4}$ in. for fitting and trimming. The tunnel bottom at the ball opening is made from solid stock, measuring $\frac{3}{4} \times 4\frac{1}{4} \times 46\frac{1}{2}$ in., Fig. 3. A groove with a $1\frac{1}{8}$ -in. radius runs down the center for the entire length and is cut out on the table saw by passing the work repeatedly across the saw table at an angle as in Fig. 10. This is done by raising the blade slightly with each pass of the work. The piece is curved by forcing down the center $\frac{1}{2}$ in. below the ends which rest on two $\frac{1}{2} \times \frac{3}{4} \times 5$ -in. supporting blocks, glued and nailed to the side rails, Fig. 1. Ends of the grooved piece are cut at approximately $1\frac{1}{2}$ degrees on the table saw. The length is approximately $\frac{1}{32}$ in. longer than the dimension of $46\frac{1}{2}$ in. between the side rails.

Cut out parts for the bed shelf, two pieces $\frac{3}{4} \times 1\frac{3}{4} \times 91\frac{1}{4}$ in. for the sides and two pieces $\frac{3}{4} \times 1\frac{3}{4} \times 43\frac{3}{4}$ in. for the ends. Apply glue and insert into the $\frac{3}{8} \times \frac{3}{4}$ -in. dadoes in the rails, the long pieces first, followed by the short ones. Mark off the $\frac{5}{8}$ -in. incline with a pencil on the inside of the side rails, $\frac{1}{2}$ in. at the ball-opening end, and $1\frac{1}{8}$ in. at the other end, Fig. 2. Likewise mark off the same incline on the two

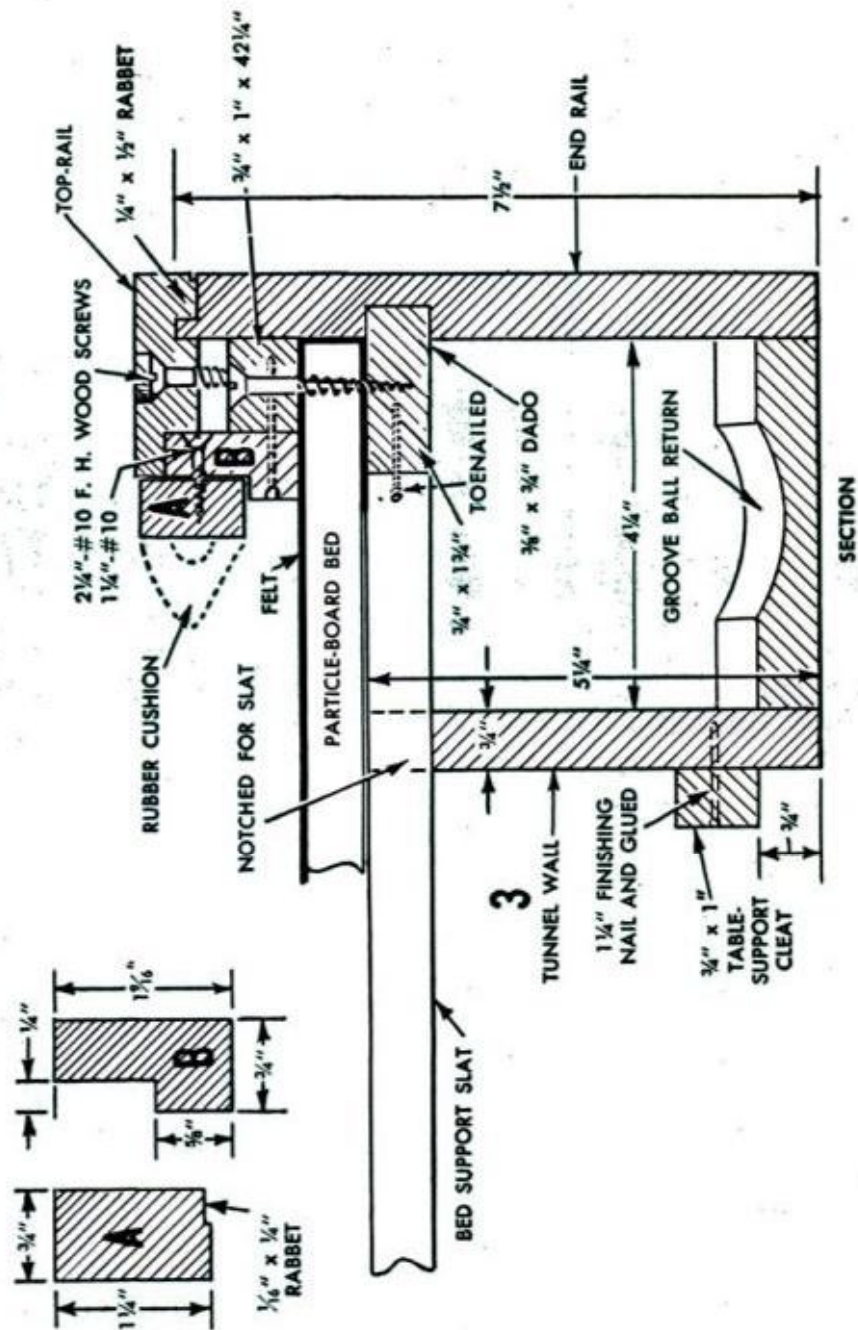


2 SECTIONAL SIDE VIEW (SIDE RAIL AND TUNNEL WALL REMOVED)

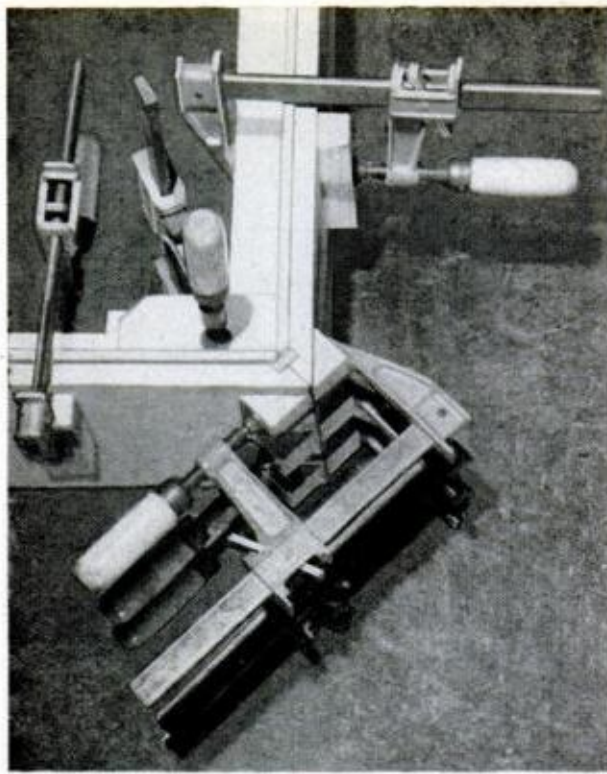
side walls of the tunnel returns. Now glue and nail the bottoms to the sides, placing glue liberally on the edges that come into contact with the side walls. Follow the guide lines and clamp into position.

Check for squareness. The bottom edges of the side rails and the sides of the ball-return tunnel should be flush, Fig. 3. Follow the same procedure at the end opposite the ball opening. Glue in place the remaining tunnel end wall (ball opening end) and hold in place with several nails driven in at the top edges. When glue in these joints has set, spread glue on the edges of the grooved ball-return bottom, force into position and nail from both sides. Set exposed nails on the side rail and putty over.

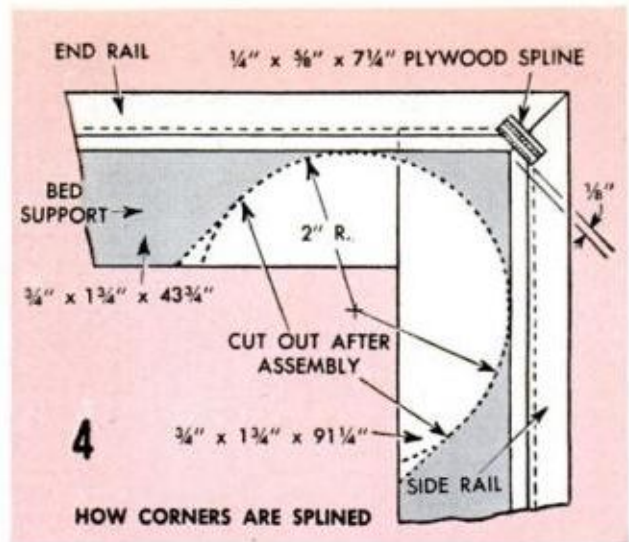
Mark off $\frac{3}{4}$ in. from the lower edge on the inside of the tunnel walls and nail and glue $\frac{3}{4}$ x 1 x 80 $\frac{1}{2}$ -in. cleats above this line along the sides and $\frac{3}{4}$ x 1 x 35-in. cleats along the ends, Fig. 3. These cleats support and register the pool-table-top on the storage base. Lay out and cut a center brace $\frac{3}{4}$ x 3 $\frac{1}{2}$ x 80 $\frac{1}{2}$ in. which serves as the center support underneath the particle-board bed. Cut $\frac{3}{4}$ x 2 $\frac{5}{8}$ -in. notches in it, spacing them 14 in. apart. Next cut four pieces $\frac{3}{4}$ x 2 $\frac{5}{8}$ x 43 $\frac{3}{4}$ in. These serve as support slats



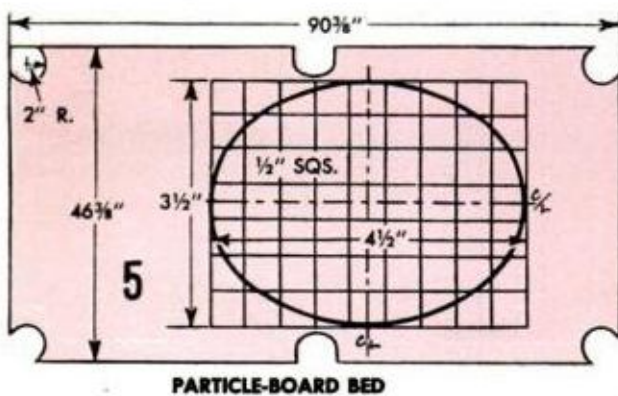
SECTION



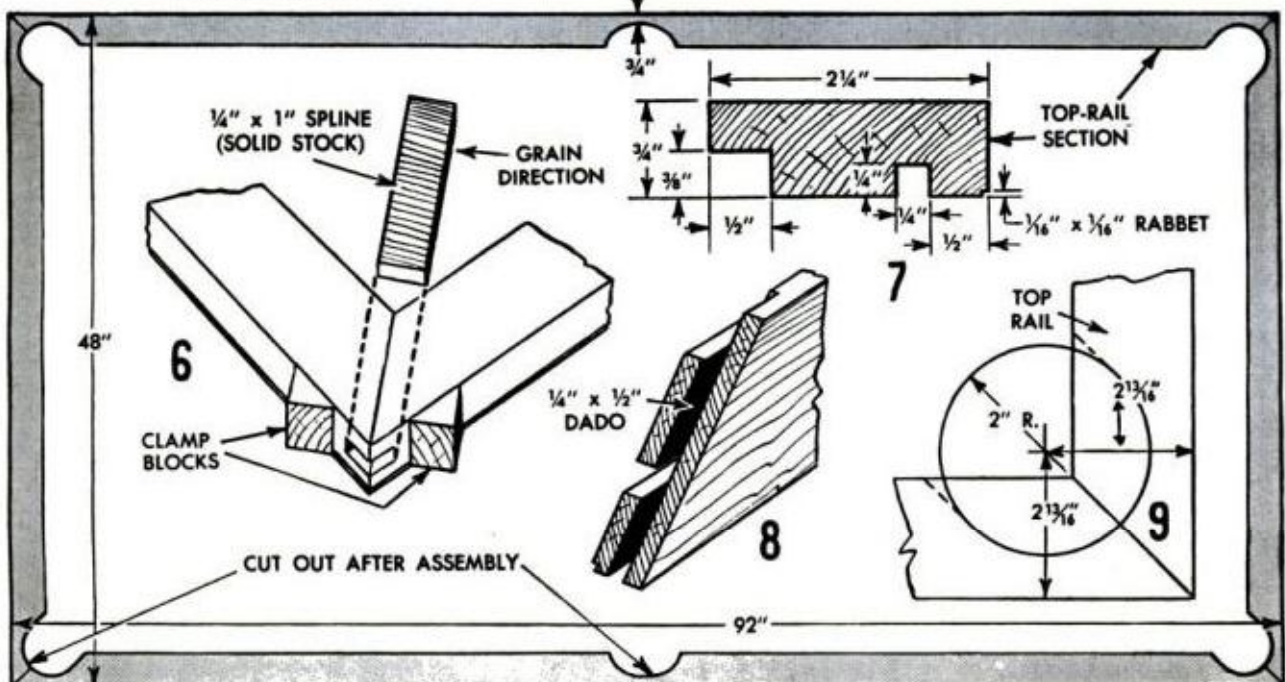
MITERED AND SPLINED corners of the side rails are glue-blocked and clamped as you see here. Note that three clamps and six blocks are used per corner. Note also the spline and refer to Figs. 4, 6 and 8



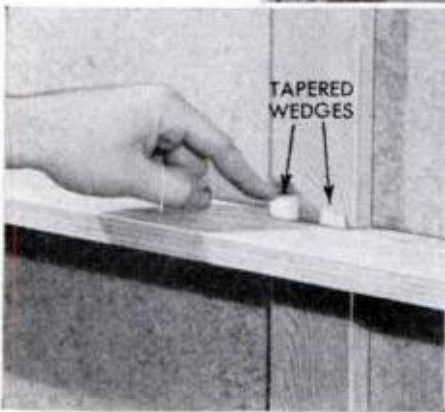
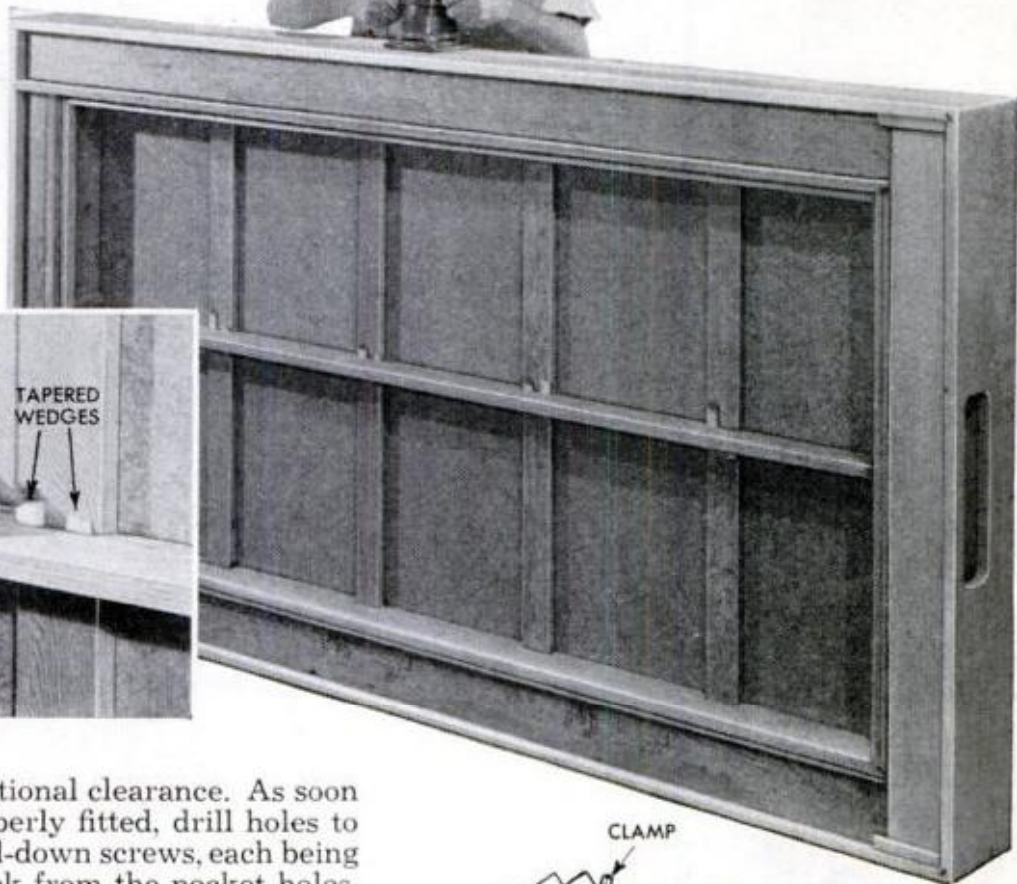
for the bed, Fig. 1. Since these butt against the shelf members, $\frac{3}{4} \times 2\frac{5}{8}$ -in. notches also must be cut in the tunnel side walls to receive the slats, using a miter or back saw and chisel to cut the notches. Apply glue generously in the notches and to the ends of the slats, and nail into place. Toenail the ends of the support slats to the support shelf. Nail $\frac{3}{4} \times 1\frac{1}{2} \times 3\frac{1}{2}$ -in. corner blocks on each side of the center support at the ends, Fig. 1.



Lay out the $\frac{3}{4}$ -in. particle-board playing bed, following Fig. 5. The detail below Fig. 1 shows how to scribe the corner pockets, a pattern is made for the elliptical side pockets. Cut out the pockets, using either a portable saber saw or a coping saw. Now place the bed on the $\frac{1}{8}$ -in.-wide shelf and check the fit. There should be at least $\frac{1}{16}$ in. clearance equally around the edge. Plane down to fit, reducing the given dimension of $46\frac{3}{8} \times 90\frac{3}{8}$ in. to $46\frac{1}{4} \times 90\frac{1}{4}$ in. should the thickness of the cloth, or felt,



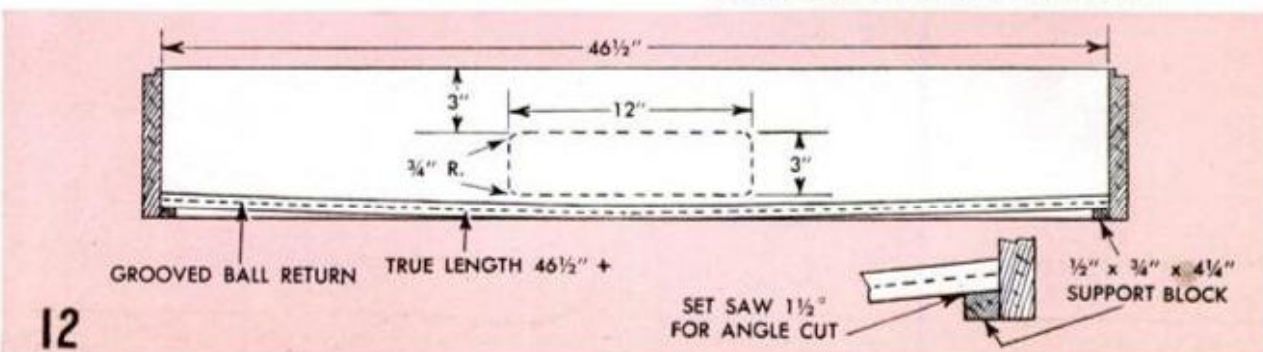
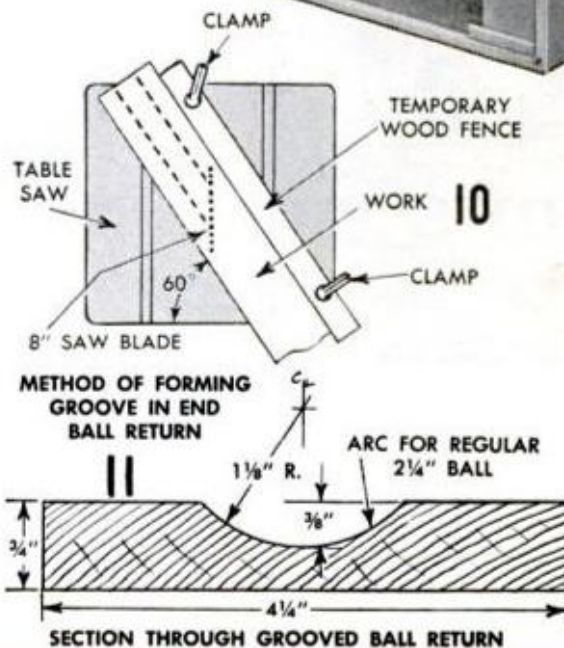
UNDERSIDE VIEW of pool-table top and inset photo below show how wedge shims are inserted at center support to remove any sag in center of particle board



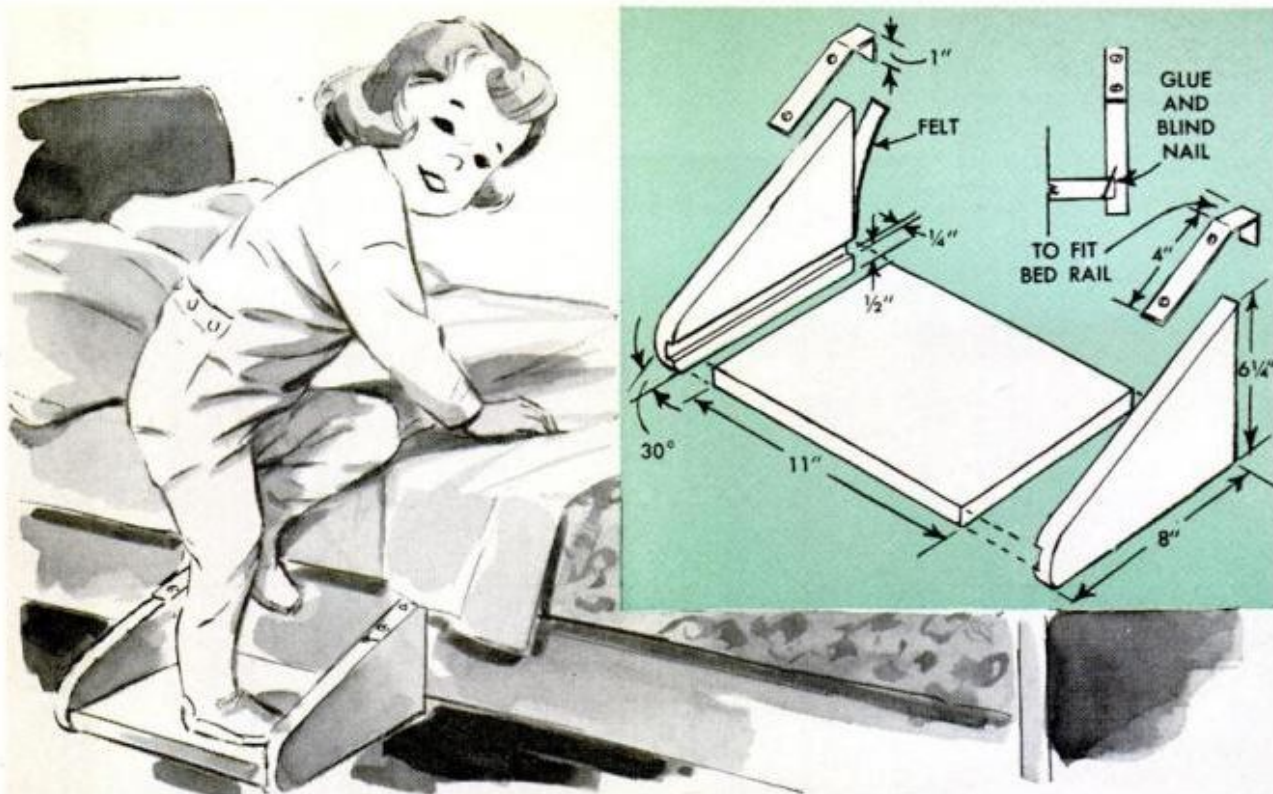
used require additional clearance. As soon as the bed is properly fitted, drill holes to receive the 12 hold-down screws, each being placed 2½ in. back from the pocket holes. Countersink the heads for 1¼ in. No. 10 flathead wood screws. With the bed in place trace the outline of the pockets on the bed-support rails. Fig. 4 shows how a compass is used to strike a 2-in. radius at the corner pockets. This is done similarly in the case of the side pockets except that the elliptical pattern is used to mark the outline instead of a compass. A keyhole saw is used to cut out the pocket openings.

Next comes the top rail, Figs. 6 through 9. Like the side rails of the table, the top-rail members are mitered like a picture frame and grooved for a spline as shown in Fig. 6. This is done first, after which the members are rabbeted and dadoed on the underside

(Continued to page 200)



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DETACHABLE BED STEP is a welcome accessory when a child is switched to a youth bed while she is quite small. All joints are glued and nailed for rigidity. Hanger clearance depends on thickness of the bed rail

Solving HOME PROBLEMS

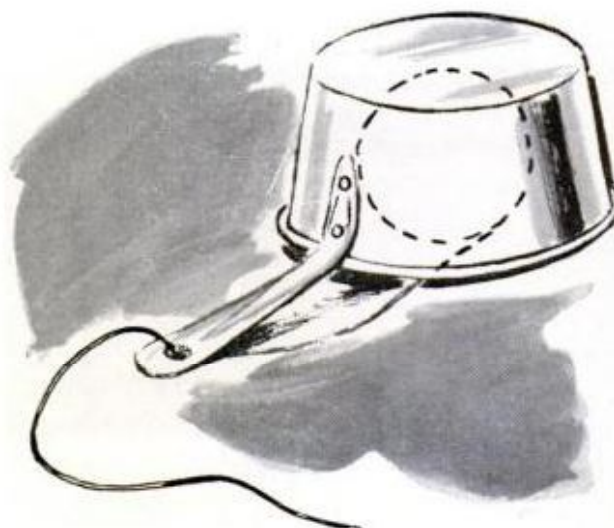


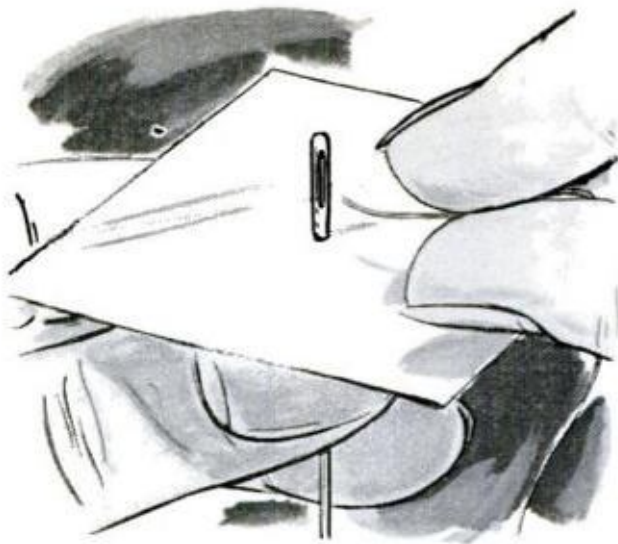
WHEN YOU TAKE A BREAK while painting, slip a plastic bag over the roller and twist it tight to keep the paint from drying

FIDO'S DINING AREA is likely to be sprinkled with bits of spilled food after each meal. A drainboard tray placed under his eating dish will protect the floor better than newspapers and is easy to wash



WRAPPING CHRISTMAS PACKAGES for mailing? Try placing your ball of twine under an inverted saucepan and threading the end through hole in handle. Such a "twine holder" also works well with knitting yarn



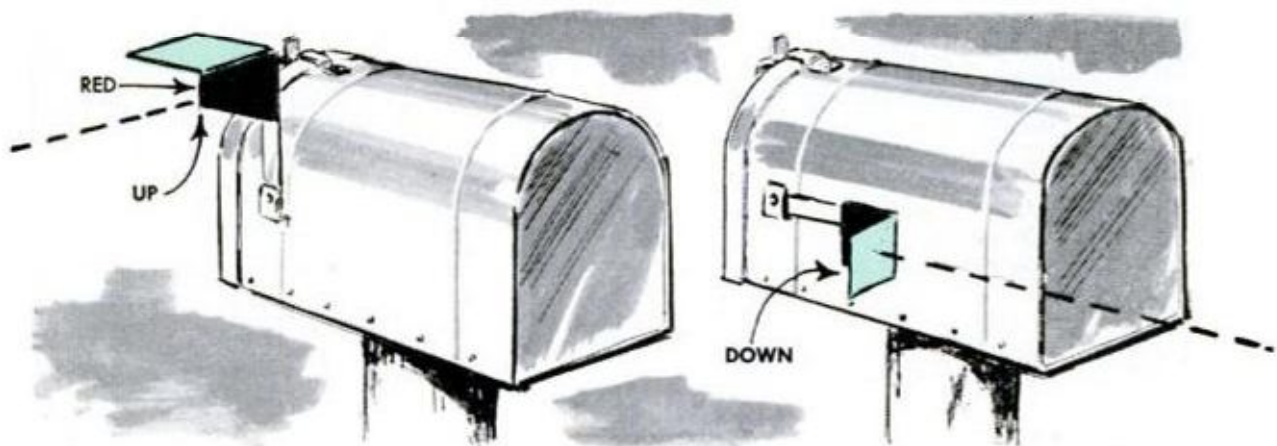


TO THREAD A NEEDLE easily and quickly, push the head through a small sheet of white paper until just the eye is visible. The white background makes it easier to see both thread and eye, thus avoiding eyestrain



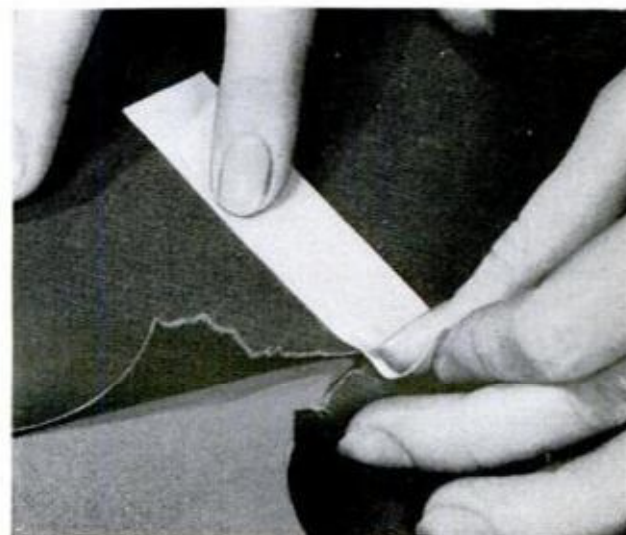
YOU CAN TELL from the house when rural carrier has picked up outgoing mail by soldering L-shaped flag to red flag which becomes visible when latter is down

EXTRA SILVER which won't fit into your silver chest can be stored in a quart fruit jar. Since the silver is sealed from air, this helps prevent tarnishing



STAMP COLLECTORS will find that it is easy to remove canceled stamps from envelopes by passing a steam iron over them to provide the necessary moisture and peeling off the stamps before they become dry

TORN WINDOW SHADES can be mended with masking tape. While light tape was used on a dark shade here for picture clarity, the tape will blend well with most light shades and can be colored with a crayon



Coming Up Next . . .



HOME HEALTH SALON. In two parts, beginning in January PM, Part I will show in plans and pictures how to build a bike exerciser and a rowing machine to provide daily workouts for the entire family. Part II will detail and picture construction of a belt massager and abdominal board.

FILM DRYER. This efficient circulating film dryer delivers a negative ready for printing in ten minutes flat. Main part of it is adapted from a 32-gal. metal garbage can and heat is supplied by plastic-insulated electrical tape wound spirally around the inside of the can. Holds twenty-four 4 x 5 negatives. See January PM.

HYGROMETER. Or, more properly, a psychrometer, an instrument for measuring the vapor (moisture) in the atmosphere or in your home. Psychrometer is a big word but the instrument is simple and can be built in an hour or two by anyone, using two ordinary thermometers. It's accurate, too. Next month's PM tells how.

LATHE JIGSAW. It's an old sewing-machine head turned upside down and mounted on your wood lathe; you supply the plywood table and there's your jigsaw almost ready-made and running. Only slight alterations of the sewing head are necessary to adapt it to jigsawing. Uses regular saber blades. You'll find photos and plans in the January PM.



When You Need Three Hands

When installing roll or batt-type insulation to sound-deaden a basement ceiling, cut several 1x2 strips to fit snugly between joists. Wedge them under the batt or roll, every 4 or 5 ft. to hold it for stapling.

Short Order for Birds

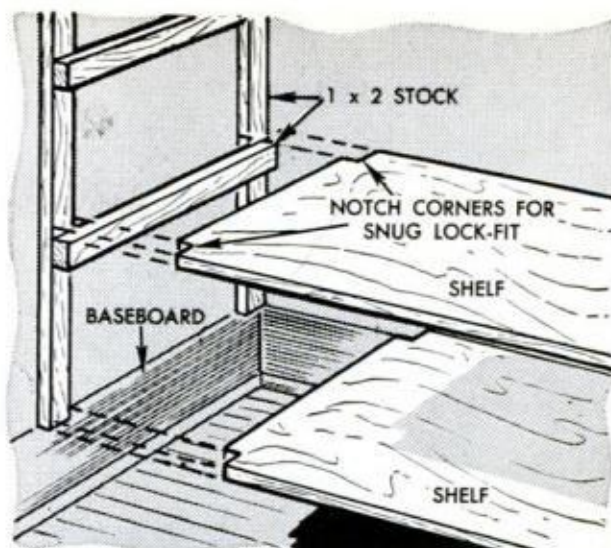
Birds that stay the long winter through will be regular customers at this hanging feeder. To make it nail bottle caps to two or four sides of a 2 x 2 about 12 in. long. Fill caps with suet or peanut butter.



QUICK AND EASY

Shelf Sufficient

Looking for a way to add additional shelves in a closet without driving nails in the wall? Make a pair of ladders from 1 x 2s and wedge the shelves between them. As shown, the ladders rest on top of the baseboard of two facing walls and each shelf is notched at the four corners to fit inside the upright members. With the notches cut a bit shallow, the shelves will wedge securely in place without marring the walls. Note that the "rungs" of the ladders are applied to the outer face of the uprights to support the shelves their entire width.—*Bernard Draper*



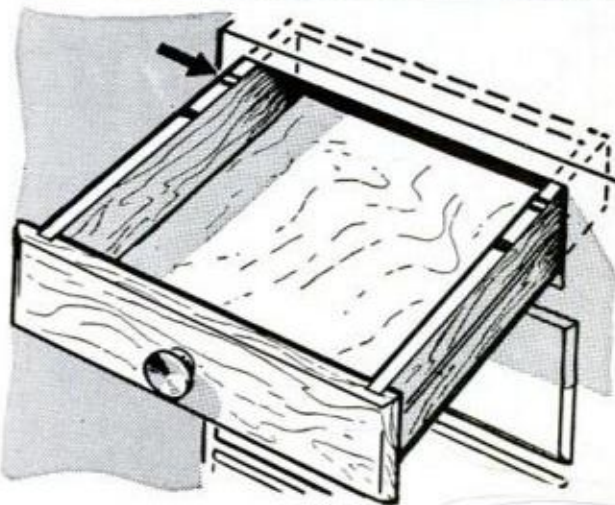
Stop Right There

When it's necessary to drill a number of 1/8-in. or so holes to a given depth with a portable drill you'll need a depth stop. What to use? Reach for your box of faucet washers and turn several onto the drill bit, running them up tightly one against another. Locate the lower washer a distance from the cutting end of the bit to give the depth hole required. Then when drilling ease up on the pressure just before the stop contacts the work. This will assure holes of uniform depth.—*Bil Toman*



Warning Marks

No doubt at some time you have pulled a drawer all the way out and—c-r-r-a-s-h! You spent the next half hour picking up things scattered far and wide over the floor. To help prevent a recurrence of this kind of thing, determine just how far you can pull the drawer out safely. Paint a red warning stripe across the top edge of each of the drawer sides at the rail. Then paint a black stripe on each of the drawer sides about 2 in. from the red stripe. Pull the drawer out no farther than the black mark and you'll be safe.—*Bernard W. Draper*



Paint-Can Bib

If you like things clean and neat, then you just can't abide paint smears on the rim of the pail. And it's sure to become coated when in use. This makes it difficult to close the friction cover tightly, unless of course, you take time to shape a protective covering, or bib, of aluminum foil all the way around the rim. This will catch all the drippings, keep the top of the pail as clean as new and also protect the label should you wish to refer to the number when ordering a matching color. Household foil will serve the purpose very well.—*Wayne Floyd*





Santa's Sugarplum House

LITERALLY good enough to eat, this cookie-and-candy house will make an enchanting centerpiece for your Christmas table. Just add a few candle figures—Santa, reindeer or elves—and you have the makings of any youngster's night-before-Christmas dream.

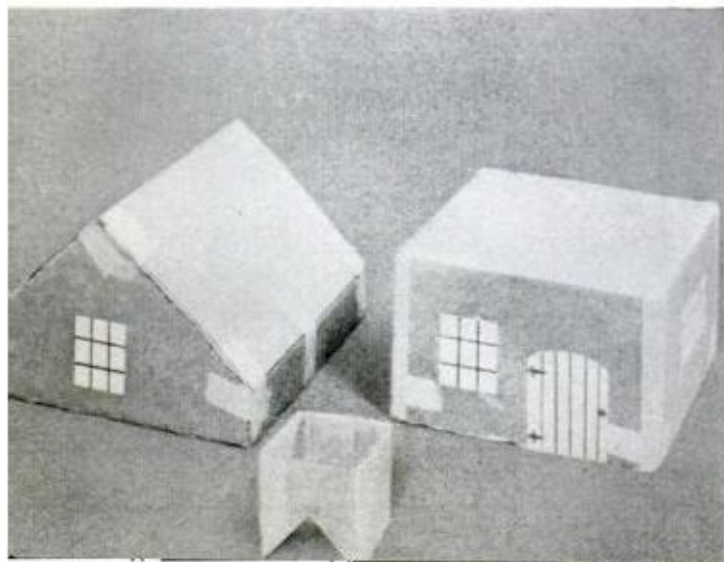
Cut the pieces for the house from heavy, corrugated grocery cartons, following the patterns on the facing page. To prepare both upper and lower stories, score the cardboard along the dotted lines using a

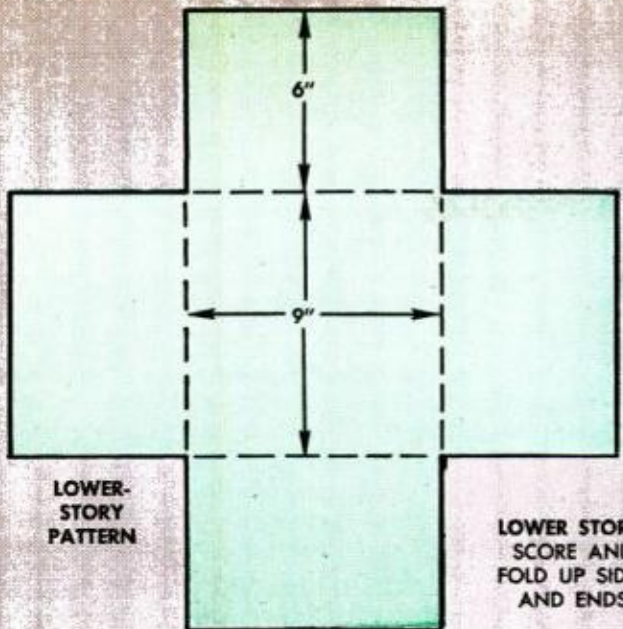
table knife and straightedge. Bend up the four sides of each story and tape them together at the corners. Finish the upper story by taping on the roof support pieces. Then turn the lower story over so that the open side is on the bottom and add the door and windows. These are cut from yellow construction paper. Pencil in all details and cover the windows with pieces of cellophane before attaching them to the house with cellophane tape.

Three kinds of cookies are used in the

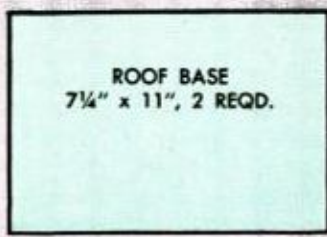
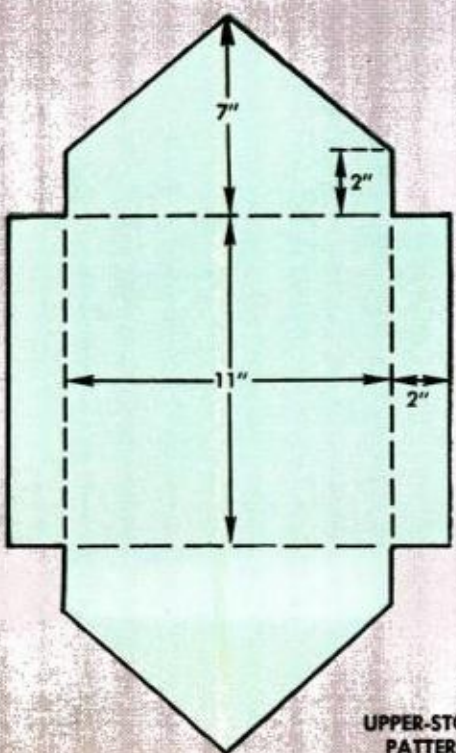
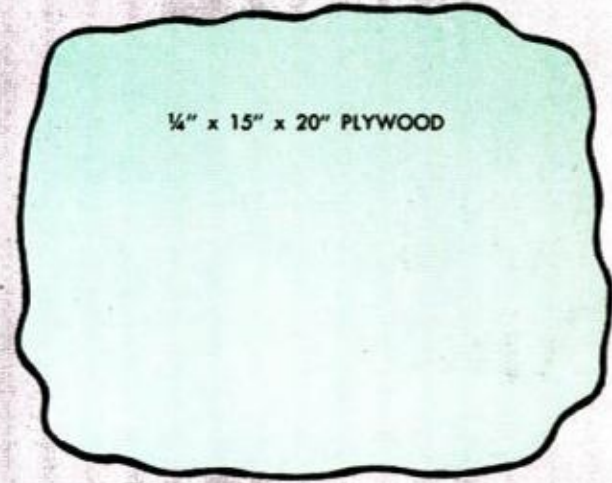
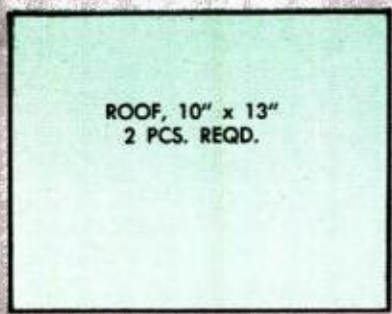
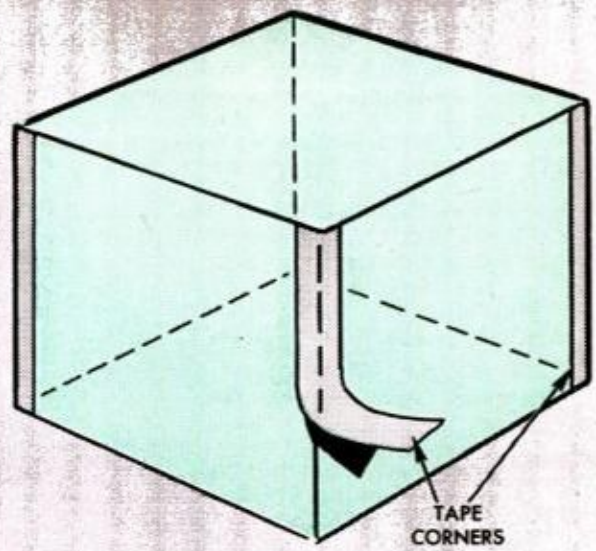
DOORS AND WINDOWS of the house are made from yellow construction paper. Details are added with pencil

SUGAR GLUE is used to stick the different kinds of cookie siding to the two boxes making up the house

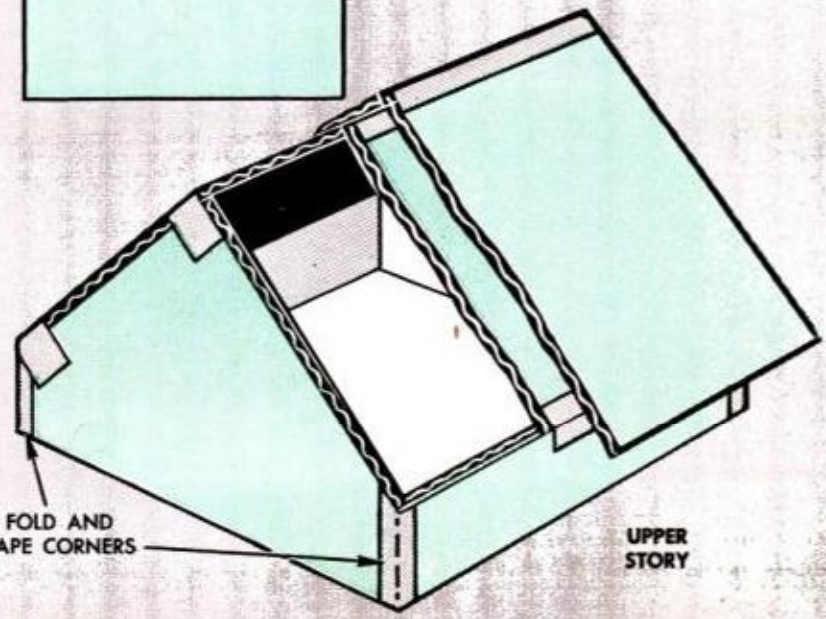


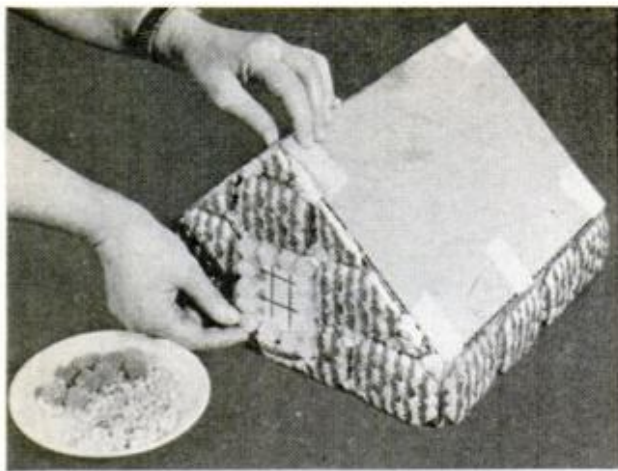


LOWER STORY, SCORE AND FOLD UP SIDES AND ENDS

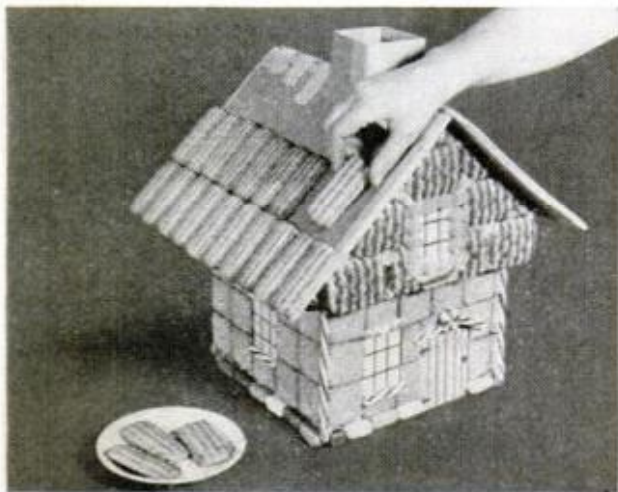


FOLD AND TAPE CORNERS





CANDY TRIM should be used lavishly to decorate the house. The windows here are framed with gumdrops, though any other candy can be substituted. Each piece should be stuck in place with a dab of sugar glue



UPPER STORY overlaps the lower story about 1 in. on all sides. After cookie siding has been applied to each, the two are glued together and roof pieces added. The roof is then ready for tiling with cookies

COCONUT SQUARES make excellent chimney bricks, but you may substitute any other square or oblong candies. Leave enough space at the top of the chimney to add a row of lifesavers or other bright-colored candies



house. Siding for the gable ends of the upper story is oblong cookies striped with chocolate. Approximately one pound should be enough for the job. Ribbed coconut bars make fine tiles for the roof. As for the lower story, separate square sandwich cookies, remove the frosting and use the halves individually. When a cookie must be shaped to fit, lay it on a flat surface and trim by pressing straight down with a sharp knife. To stick the cookies to the house use a sugar glue made of one cup powdered sugar and approximately one tablespoon water. Stir this until smooth, but remember that the glue must be stiff.

After covering the sides of the house with cookies, glue the upper story to the lower story. Then glue the two overhanging roof sections to the upper story and attach the chimney. After tiling the roof with ribbed coconut bars, build up the chimney with coconut squares or small square marshmallows and top it off with a colorful row of lifesaver mints. Apply candy decorations with a lavish hand, using whatever type of candies you wish with a dab of sugar glue to hold each piece.

After decorating, glue the bottom of the house to a free-form base cut from $\frac{1}{4}$ -in. plywood and cover the base with cotton. The split-rail fence is made of stick candy.

The fanciful little gnomes pictured with the cottage have pine-cone bodies and colored pipe cleaners for arms and legs. Their heads are balls of cotton covered with crepe paper, and they wear felt hats.

This candy cottage can serve as a centerpiece for children's parties throughout the year by changing the color of the base and using different accessory figures. For instance, cover the base with paper grass and add small bunnies and jelly-bean eggs for an Easter theme.—*Elma Waltner*

LOG FENCE which surrounds the house is made from striped stick candy assembled with sugar glue. As for figures, you may either make the pine-cone gnomes or buy a small Santa and reindeer at the dime store





Christmas Quickies

All three of these novel Christmas-candle holders are made from tall fruit-juice cans. To make the flicker one, you merely remove the top of the can, drill vari-sized holes completely around it and paint. In the case of the glittering angel and the holder with the handle, the seam of the can is left as a "backbone." The angel pattern is cut after the can has been partially cut away and opened up flat. Twist the curls on the ends of the wings as in the photo and bend the narrow strips at the top of the head to form a halo. Finish by spraying gold and decorating with sequins.

The handled holder is made by cutting a $\frac{3}{4}$ -in. strip down the seam to a point $1\frac{3}{4}$ in. from the bottom and cutting away the rest. Vertical slits are made almost to the bottom, then curled with long-nose pliers. Whole thing is painted flat black and handle is wrapped with red yarn.

—A and B Joselyn



DECEMBER 1961

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New Gift Stickers

Looking for something unusual to decorate your Christmas packages this year? You can make up your own contemporary stick-on figures with a new kit manufactured by the Avery Label Co., Monrovia, Cal. Called "Decoroids," it includes 119 self-adhesive parts in different shapes and colors. Since they require no moistening, you simply peel off the desired shapes and stick them in order on the package. Also included in the kit are gold foil and white felt to use in trimming the figures. The kit sells for about \$2.00



Материал защищенный авторским правом

Add a Boston Rocker

to your Colonial collection. This simplified rocker is one of the easiest chairs to build in your shop

X535

By Frank Hegemeyer

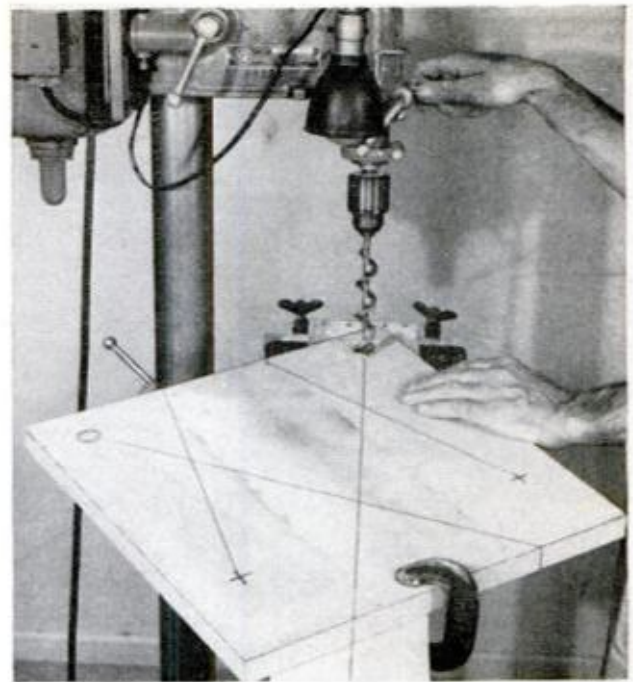


POPULAR MECHANICS

BOSTON ROCKERS have been rocking people for well over 100 years and still offer the comfort of a well designed chair having a pleasing simplicity of line that goes well with modern or traditional furnishings. This one has been purposely simplified in certain details, mainly the seat and the back rail, or headrest, which in the originals had deeply rolled edges.

Dimensions given in the detail drawings are actual sizes of the parts, but those in the material list are oversize to allow for cutting and fitting. Note in Fig. 2 that the seat is made the required width by edge-gluing three pieces, three dowels being used in each joint. It is important that the boards be arranged for gluing with the heart and sap faces alternating. After the glue is dry plane the piece to a uniform thickness of $1\frac{1}{8}$ in., working both sides. Bring to the width dimensions given in Fig. 3, then lay out the locations of the holes taking the leg tenons as in Fig. 2.

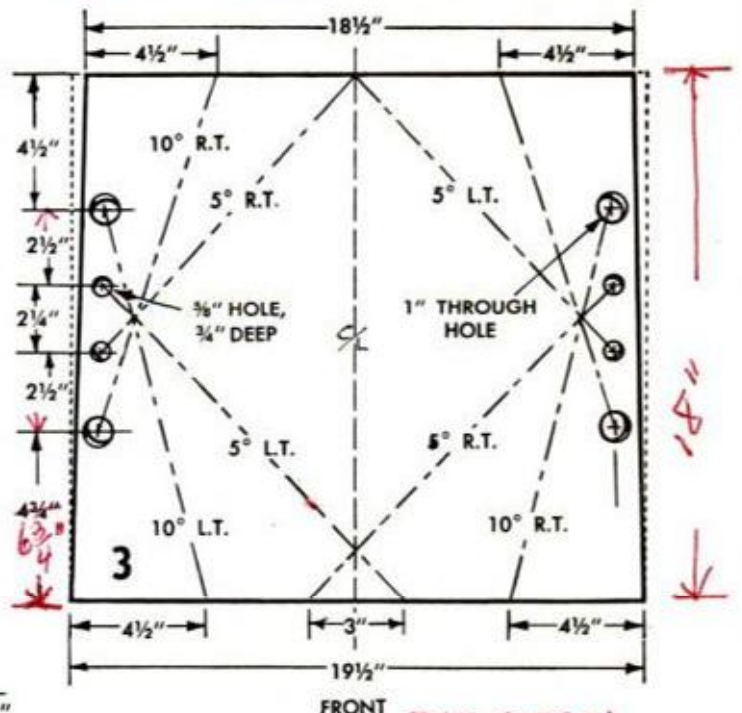
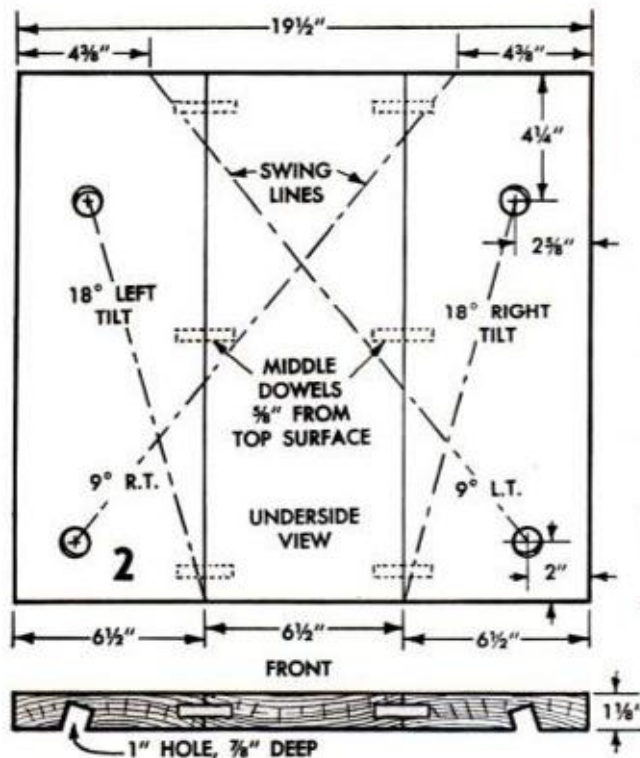
Now note especially the legends on Figs. 2 and 3, and also the dotted lines referred to as swing lines. Note especially how these lines are positioned on both drawings, and that the abbreviations R.T. and L.T. mean right tilt and left tilt respectively. Now look at the setup in Fig. 1 and you'll see how all this works out in locating and drilling the holes for the legs at the proper angles. You need an auxiliary drilling table which is cut from $\frac{3}{4}$ -in. stock, measuring about 8 in. wide and 30 in. long. A line is scribed along the center line of the table to serve as an alignment line to which the swing lines are set. Now clamp the auxiliary table to the regular drill-press table



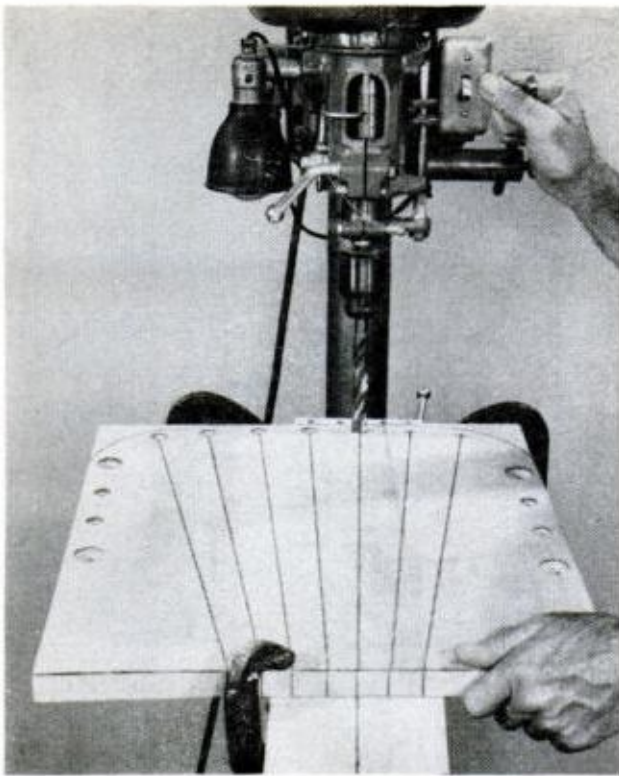
1. SETUP for drilling leg holes in chair seat at compound angles. Method saves hours of layout time

MATERIAL LIST

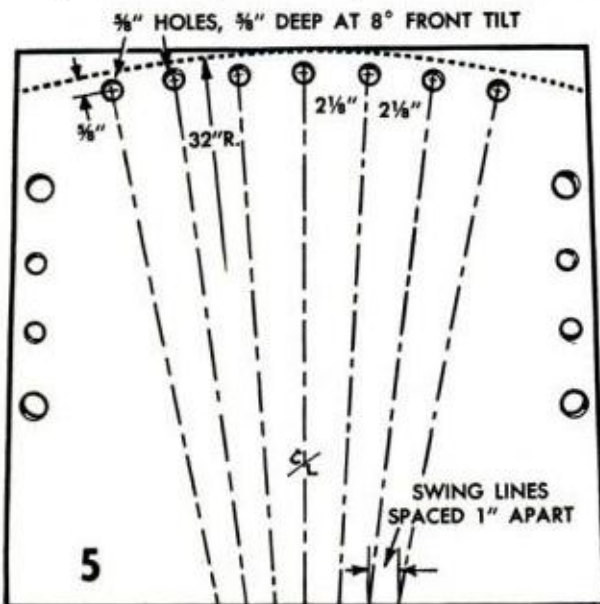
No. pcs.	Size (all dimensions in inches)	Parts
3	$1\frac{1}{4} \times 6\frac{3}{4} \times 18\frac{1}{4}$	seat
1	$2 \times 2 \times 21\frac{1}{2}$	roll edge
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 12$	front legs
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 11$	rear legs
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 17$	front rung
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 15\frac{1}{2}$	rear rung
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 15$	side rungs
2	$2 \times 2 \times 14$	arms
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 12\frac{1}{2}$	arm posts
1	$1 \times 1 \times 11\frac{1}{4}$	arm spindles
1	$1 \times 1 \times 11$	arm spindles
1	$1\frac{1}{2} \times 1\frac{1}{2} \times 26\frac{1}{4}$	back posts
3	$\frac{3}{4} \times \frac{3}{4} \times 26$	back spindles
3	$\frac{3}{4} \times \frac{3}{4} \times 25$	back spindles
1	$3 \times 4 \times 24$	back rail
1	$\frac{3}{4} \times 6 \times 29\frac{1}{2}$	rockers



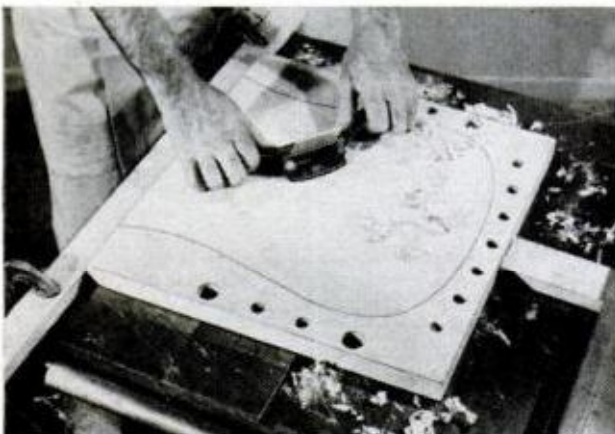
THE HOLES IN FIG. 3 ARE $\frac{3}{4}$ " FROM THE SIDES OF THE SEAT.



4. SETUP for drilling holes in seat for back posts and spindles. Compare with Fig. 1 and note similarity

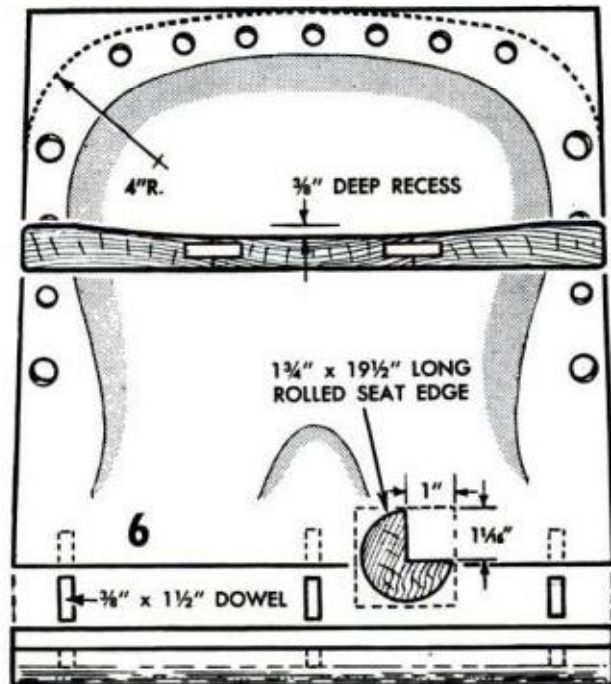


7. RECESSING of chair seat can be done with hand scraper, using wide gouge for deepest cuts at center

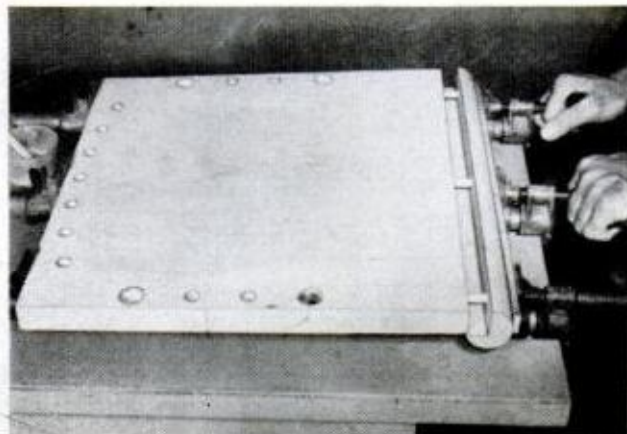


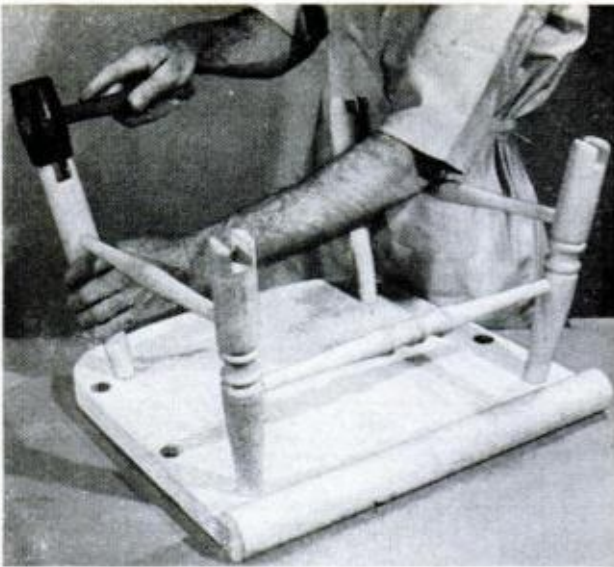
with the alignment line directly below the center of the bit. For a left tilt the free end of the auxiliary table extends to the left; for a right tilt, to the right, the drill-press table being tilted to 9 degrees and 18 degrees right and left as in Fig. 2. This method greatly simplifies the drilling of the holes at compound angles. In the actual drilling you simply clamp the chair seat to the auxiliary table with the swing line directly under the center of the bit and in alignment with the center line on the auxiliary table as in Fig. 1. Proceed in the same fashion when laying off and drilling the holes for the arm posts and spindles, Fig. 3. Note that these holes are drilled clear through while those for the legs are drilled only to a depth of $\frac{7}{8}$ in.

Use the same general procedure when drilling the holes for the back, Figs. 4 and 5, except arrange the auxiliary table for an 8-degree front tilt by nailing a cleat to the rear end as in Fig. 15, the lower detail. These holes are drilled clear through. Next step is

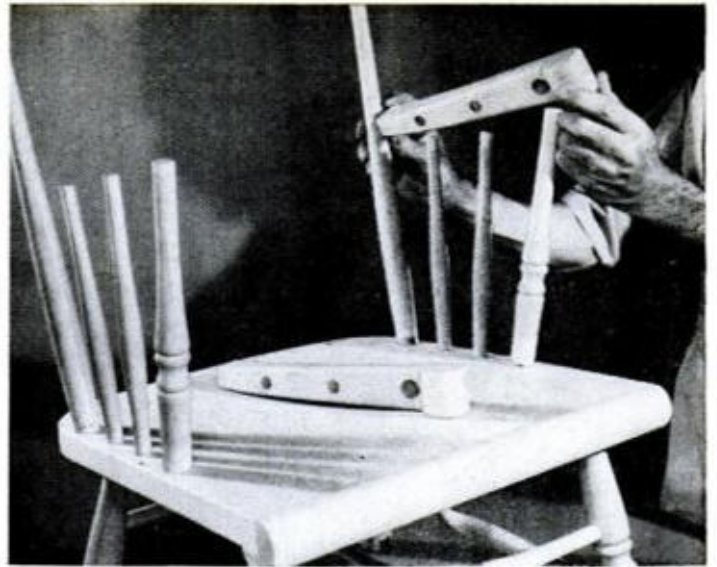


8. SEAT EDGING is doweled and glued in place. Use three bar clamps and be sure part is uniformly seated

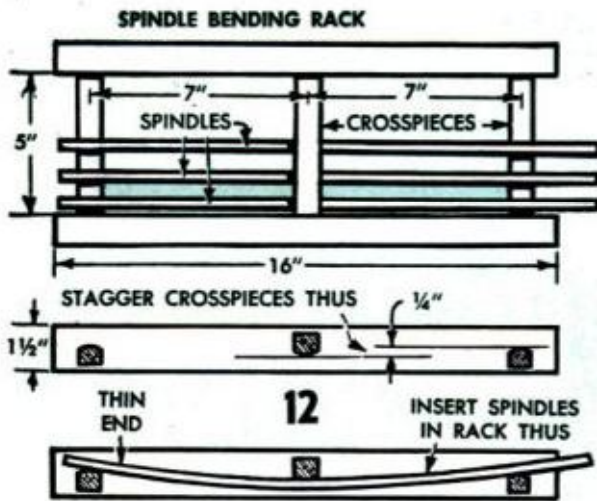




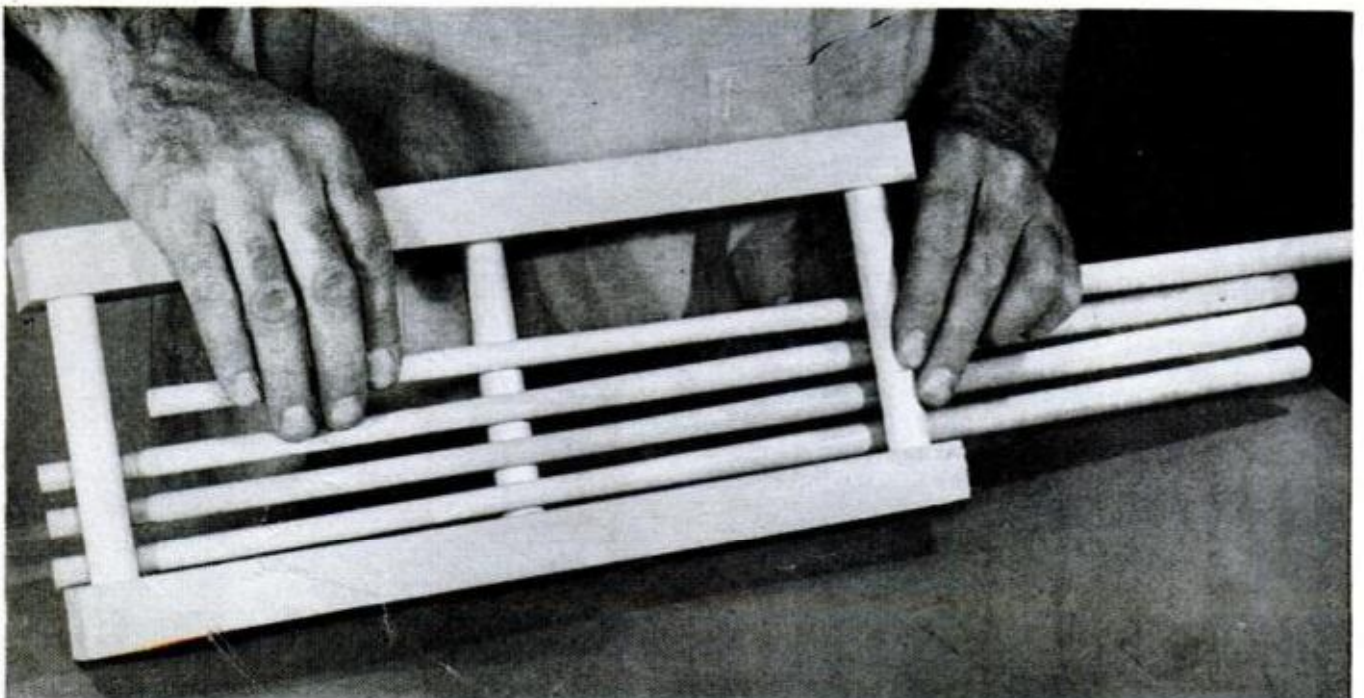
10. MAKE TRIAL assembly of all parts, beginning with legs and rungs. Top parts in place with soft mallet



11. TRIAL ASSEMBLY of arms, posts and spindles is necessary to catch any inaccuracies before gluing



13. BACK SPINDLES are bent in this jig which is detailed in Fig. 12. Spindles should be of selected, straight-grained stock and should be soaked overnight in water before bending. Cut to length before bending



to recess the seat top as in Figs. 6 and 7 and fit the rolled seat edge as in Figs. 6 and 8. To make the roll you start with a 2-in. square and cut a rabbet on one corner as in the end view, Fig. 6. A pine filler strip is fitted in the rabbet and held with screws driven in the waste just beyond the cutoff point at each end. After the stock is turned into round and the waste cut off at each end, the filler strip is removed.

Next you cut the back rail and arms to contour as in details A and H in Fig. 9. The back rail is sawed to curvature from solid stock as in Fig. 15 and the holes for the posts and spindles are drilled as detailed. Drill four holes in each of the arms for post and spindles and note especially how the



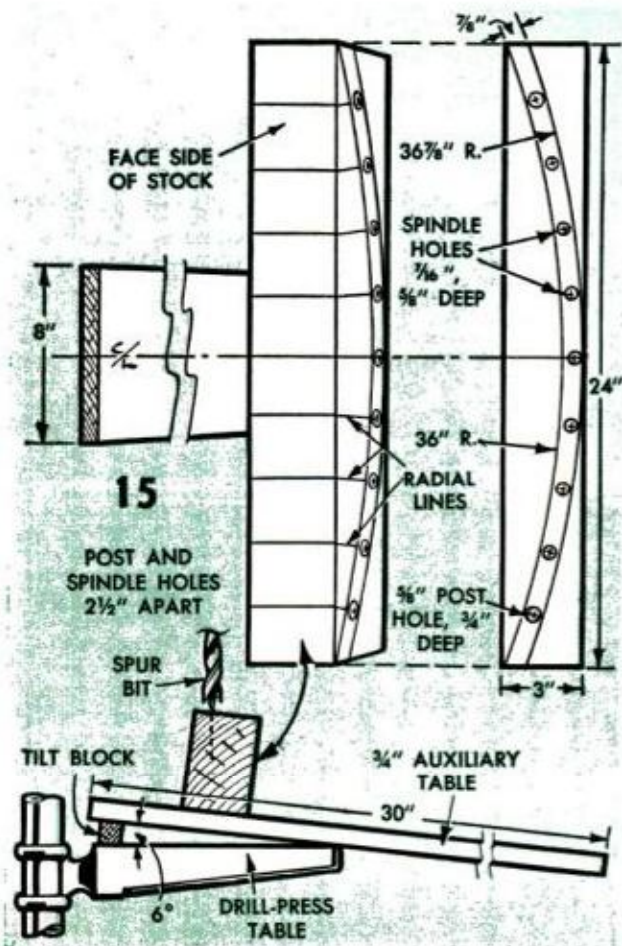
concavity is formed in the small end of each arm for the post, Fig. 9, detail H.

Next you turn the legs, C and D, Fig. 9, from $1\frac{3}{4}$ -in. squares. Slot one end of each leg to take the rocker and fit a plywood pad as in detail C to take the lathe center. This done you continue making the turnings for arm and back posts and spindles, parts I through N in Fig. 9. The long back spindles are only tapered and can be made by hand from $\frac{5}{8}$ -in. dowels. All others must be turned in the lathe. You'll need a steady

(Continued to page 204)



14. BENT SPINDLES must be correctly positioned before gluing in place. Once spindles have been correctly located make registering marks on the parts



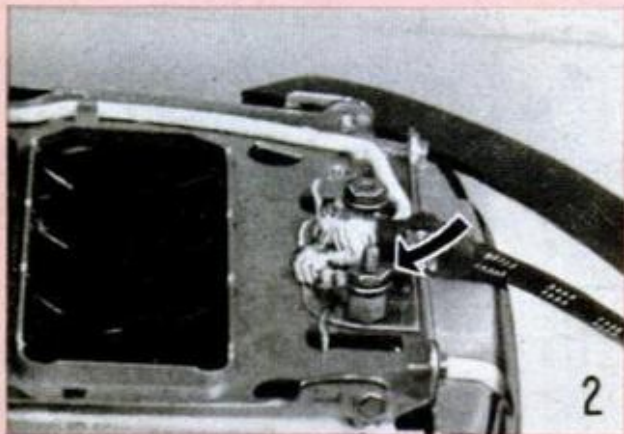
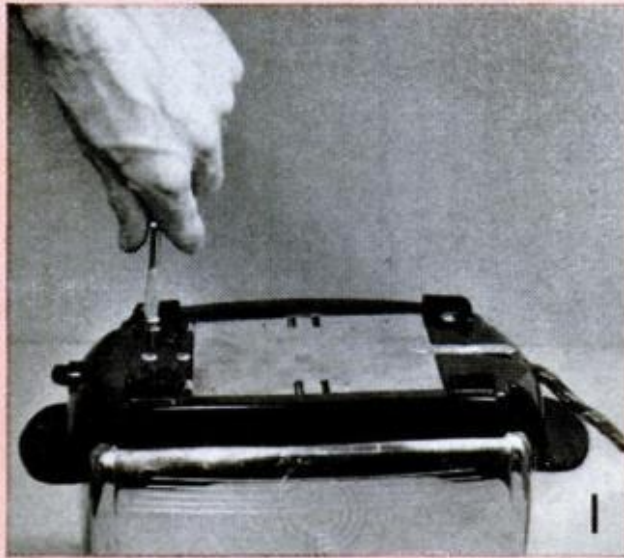
16. ROCKERS must be a snug fit in slots before being glued and pinned in place. Some hand fitting with a rasp may be necessary here. Note use of soft mallet



TOASTER

X711

Household



LIKE SO MANY other home appliances that operate electrically your automatic toaster can take it daily for years and then, without much of any warning, there's the morning when you go without that tasty, browned toast. The toaster simply quits and that's it. Unless, of course, you know how to fix it.

All good toasters, automatic or not, are pretty tough gadgets and quite simple in construction and assembly, but there are certain parts that just won't take careless, rough handling or poking with a screwdriver, so take it easy when you turn a toaster upside down and begin taking things apart. Or maybe you don't turn it upside down; some toasters come apart right side up. Find out before you pull or pry too hard on something you think should come loose.

First of all, open or pull out the crumb tray and brush out everything reachable with a small brush, Fig. 4. When you get the bottom off, Fig. 1, take a close look at the terminals; the arrow in Fig. 2 shows these on a typical automatic toaster. Check closely for looseness of the terminal nuts and eye every inch of the wires for frayed insulation. In order to get at the operating mechanism and elements you generally have to remove the outer shell. On the toaster pictured you do this with a wrench on small nuts or screws at the corners, Fig. 3. Again the caution—take it easy on the wrench!

When you get the outer protective shell, or housing, off you'll likely see something

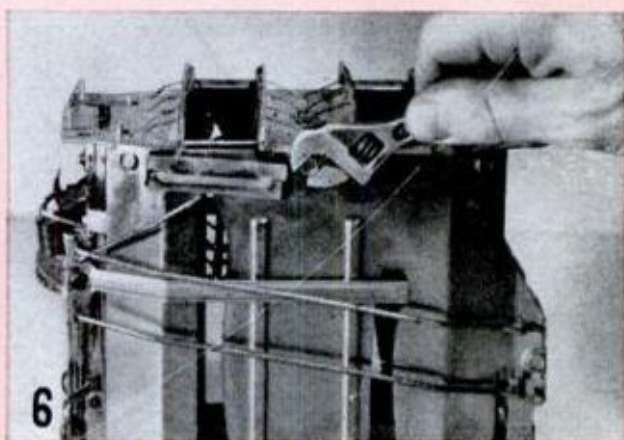
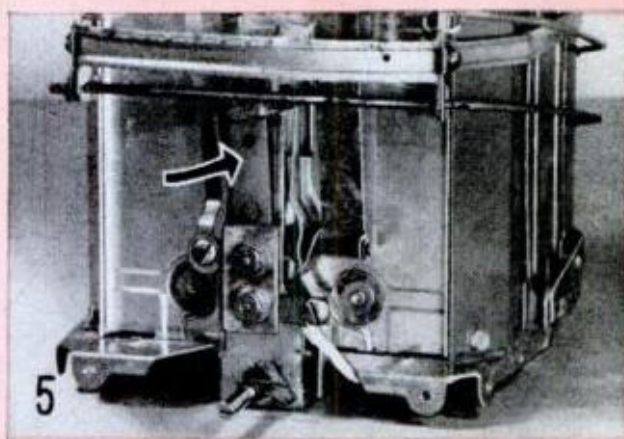
Appliance Fix-It File

like that pictured in Fig. 5, with the arrow pointing out the thermostat and the mechanism that controls the length of the toasting cycle. These are the critical operative parts and they should be examined closely for any defects. Usually you'll find the points coated with a carbonlike deposit and possibly rather deeply pitted. If you see the latter condition, it probably will be advisable to replace the entire control unit. Otherwise, a thorough cleaning and a light (very light) touch of fine sandpaper on the points may restore them to working condition, at least for a time.

Heating elements can become weak with age before they actually burn out and quit for good. Look them over carefully; replacement of any that appear doubtful will pay off in the end for if any or all of them are nearing the end of a useful life, they are likely to go at any time. Loosen the electrical connections to the elements first, then loosen the screws that hold the elements as in Fig. 6. Be careful not to damage hex heads, strip threads or bend any parts in this operation. Replace new elements in reverse order. While you have the toaster apart, clean everything thoroughly before reassembling in the reverse order.

One other thought, and it applies to any appliance you may already have or are planning to purchase: Always save the instruction sheet, parts list and any other informative material that may come with the appliance. File where it is easily located when needed.

—John Pennington



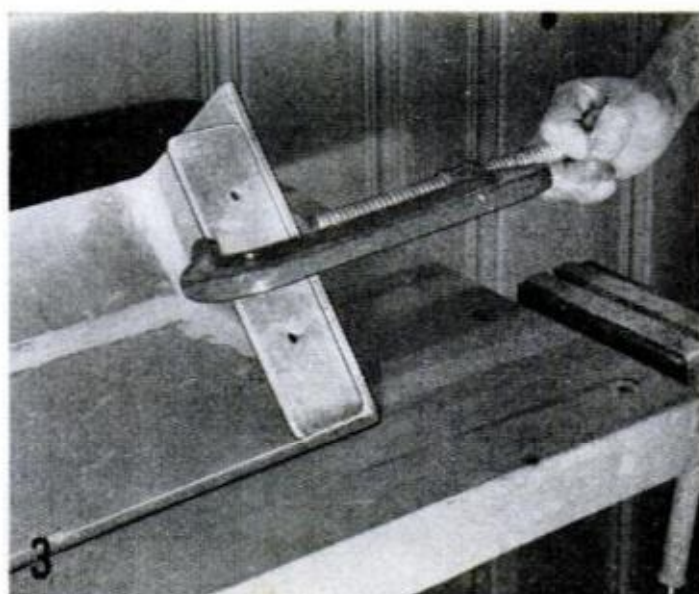
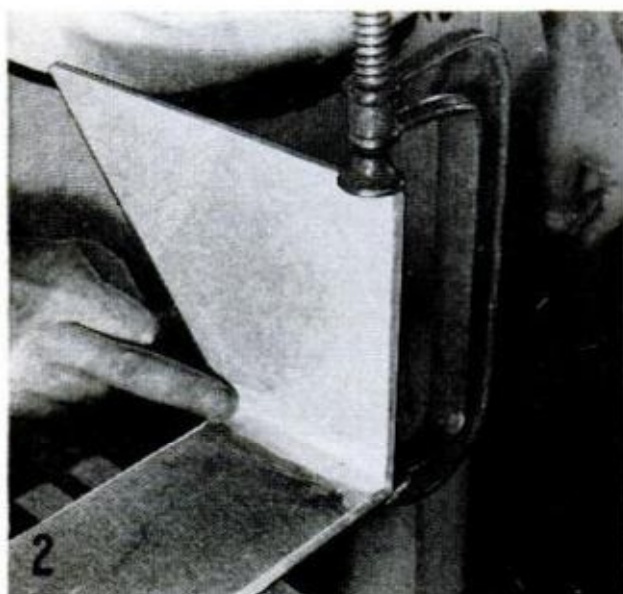
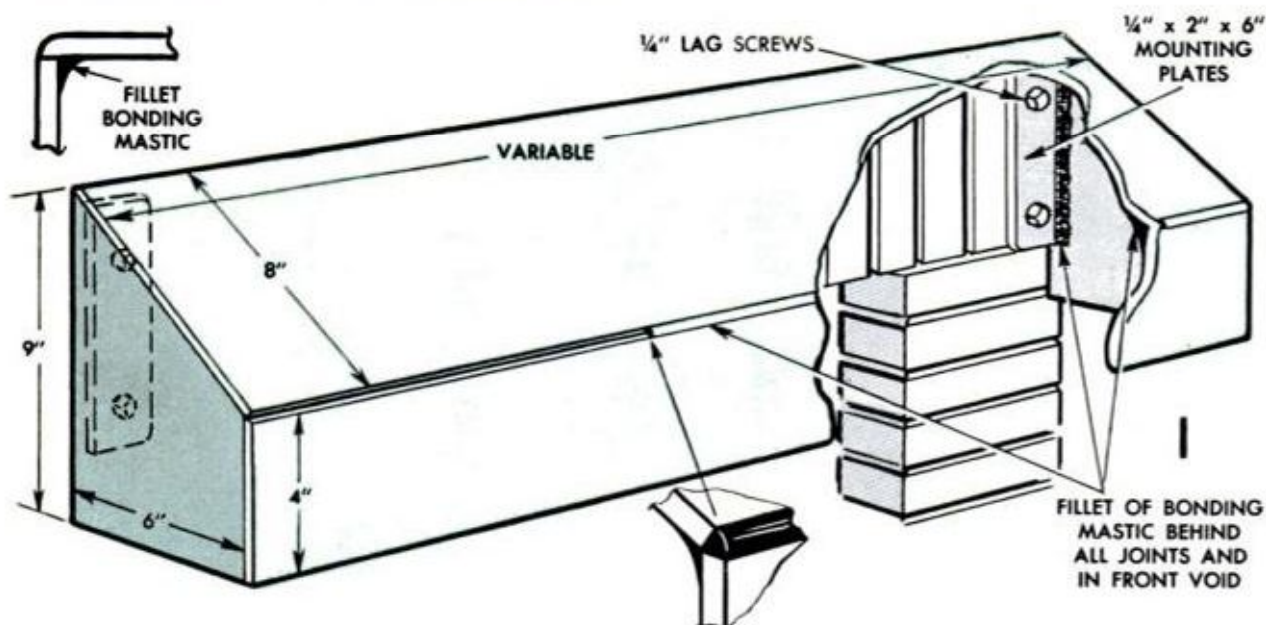
X284A



Hood for a Fireplace

MODERN FIREPLACE walls often pose problems for home decorators, especially when the wall expanse is relatively large. For such walls a fireplace hood of a simple design usually proves to be the answer. Not only does it introduce certain decorative values in both line and proportion, but a hood can serve a functional purpose as well in helping to offset any tendency of the fireplace to smoke when draft conditions and temperatures vary.

Instead of metal, this hood is made of $\frac{1}{4}$ -in. asbestos-cement board, a tough, durable, fire-safe material available from any



building materials dealer. You will require about six square feet for the average fireplace. The board can be cut with an ordinary hand saw or with an abrasive wheel on a power saw. After you have cut the six pieces to size, square and smooth all the edges with a file, then drill two $\frac{1}{4}$ -in. holes in each of the asbestos-board mounting plates Figs. 1 and 3. Clamp the end pieces to the front panel and make sure the assembly is square. Then join by building up a fillet of epoxy cement at each joint, using your finger to get a good spread on both surfaces, Fig. 2. Don't apply the cement to the area of contact as you do with other adhesives. It's the built up fillet that makes the bond. Hold the top panel in place with strips of transparent tape and fill the V-shaped gap where it meets the front panel with epoxy to finish it off, Fig. 1. Turn the hood upside down and form fillets of mastic along the other joints. Now put it aside until the epoxy sets which usually takes about five hours. No heat or pressure are necessary and when dry, the pieces are permanently bonded together. Round the front edges with a file and go over the hood with fine sandpaper.

You will have your own ideas about matching finish and trim. The hood pictured was given two coats of dull black lacquer, the type available in a pressure can, and decorated with wood-fibre trimmings attached with epoxy and painted gold color. With a star drill make two holes in the masonry on each side of the fireplace opening, Fig. 4, insert expansion plugs or lead anchors and fasten the hood in place with four lag screws.

In working with epoxy cements mix only the amount needed since once the hardener is added to the mastic any left over cannot be reused. When cured epoxy cement becomes as hard as stone.—*Robert E. Russell*



DECEMBER 1961

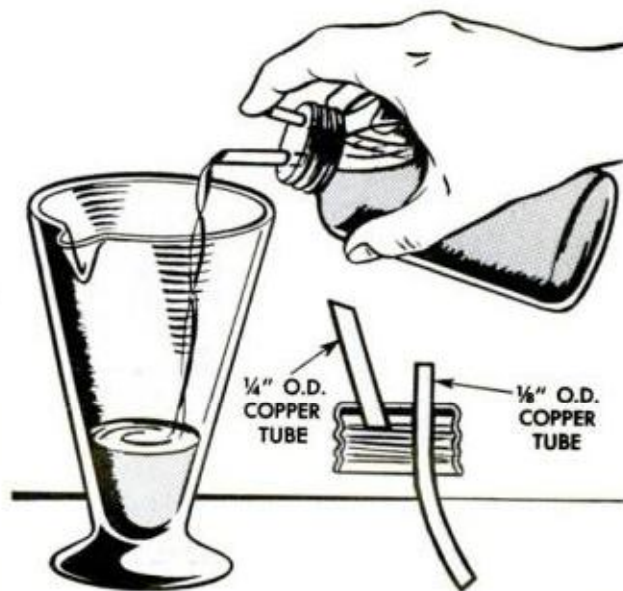


Wax Coatings Prevent Rust

Where applications of oil or grease are undesirable, rust can be prevented on bright metal surfaces by coating with melted paraffin or paste wax, whichever material is most convenient to apply. Clean the object or surface to be protected, then brush on melted paraffin or coat with paste-wax, making sure that all the surface is covered.—*R. Hanscom*

Pour Without Spilling

Measuring liquids almost to the drop without waste is no problem when you can control the air intake into the container. Drill two holes in the metal screw cap and solder in two short lengths of tubing as indicated. The $\frac{1}{8}$ -in. tube is $2\frac{1}{2}$ in. long and bent as indicated. A finger over the end of this tube controls the amount you pour. The other tube is $1\frac{1}{2}$ in. long and serves as the spout.—*Walter Fehlberg*



X474A

CAPACITOR

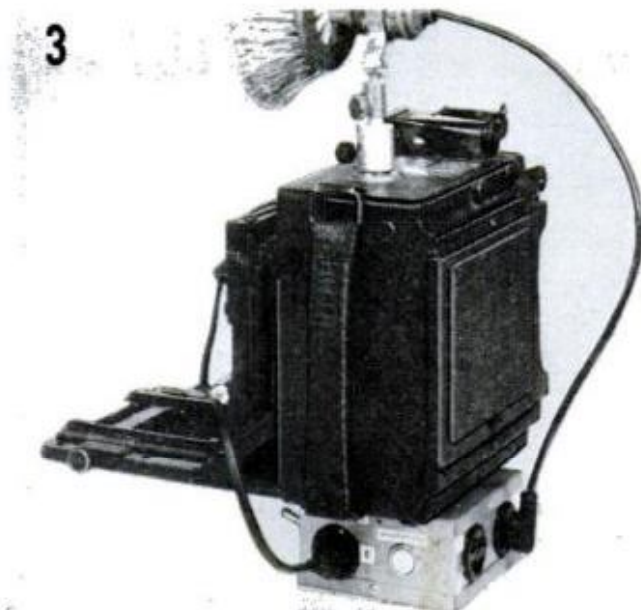
By Frank P. Fritz

PM's Chief Photographer



COMPONENTS can be installed in any size box to fit camera or special needs. The box can be mounted directly on the camera, above, or on a bracket, below

WITH A SPEED GRAPHIC, you may attach the box to the bottom of the camera and the reflector to the top, so the whole unit can easily be mounted on a tripod



FLASH BOX

MANY SHUTTERBUGS have synchronized or solenoid-operated flash cameras but either don't own flash guns or else have guns which are only powerful enough to fire one flash bulb at a time.

This low-cost, battery-capacitor flash box will fire several flash lamps simultaneously from a synchronized shutter or trip solenoids without flash and even some with flash (i.e., Heiland). It also saves bulbs because if the circuit is broken by the absence of a bulb in one flash lamp, a bad lamp or a switch in the "off" position, none of the lamps will fire. The box houses a 22½-volt battery with a capacitor in an R-C circuit, and the battery will last a year or more, depending on its use.

The flash box either can be mounted on the bottom of the camera, Figs. 1, 3 and 5, or on a bracket attached to the camera, Figs. 2 and 4. By mounting a socket and reflector directly on the camera or on the box, you have a simple one-lamp flash gun. You can obtain the mounting stud from any store which carries Graflex accessories.

For natural lighting or studio effects, all flash lamps may be located remote from the camera. However, when you use more than two lamps with a sync shutter you must plug them into a series-wired double socket formed by wiring two female plugs and one male plug together in series. A common double socket is wired in parallel and thus cannot be used, nor can side-light flash guns not wired for B-C.

The box can be any size, Figs. 6 and 7,

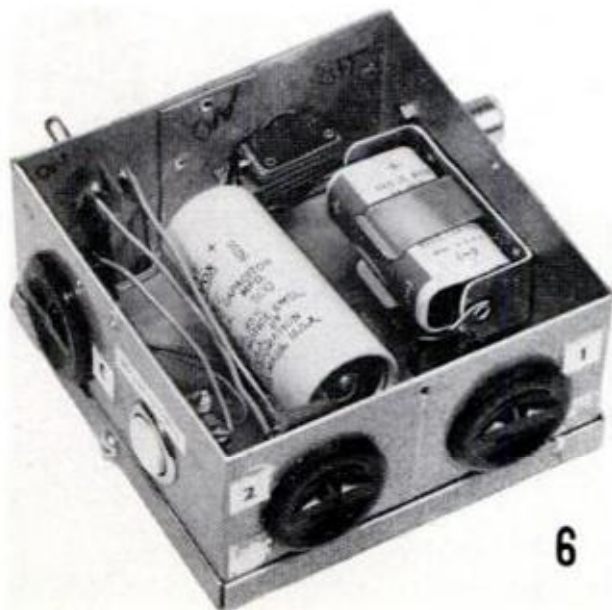
DIMENSIONS OF BOX and layout of components within the box will depend on personal requirements. The two shown here, below and below-right, are examples



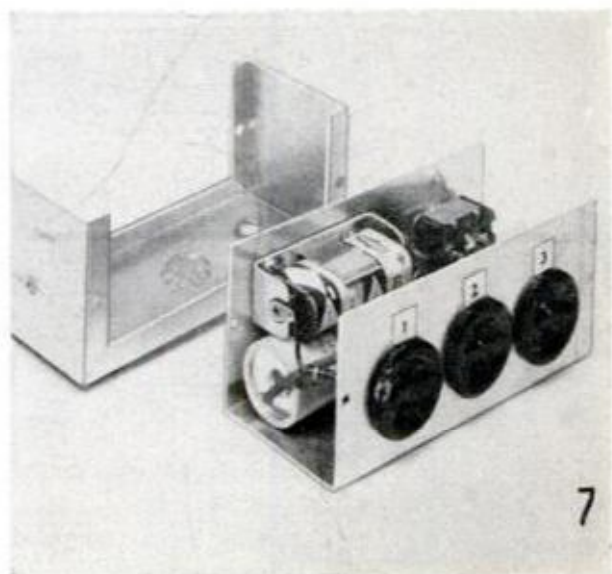
IF YOU WISH to take color and black-and-white shots simultaneously, you can mount a second camera on a bar connected to the first and attach box between

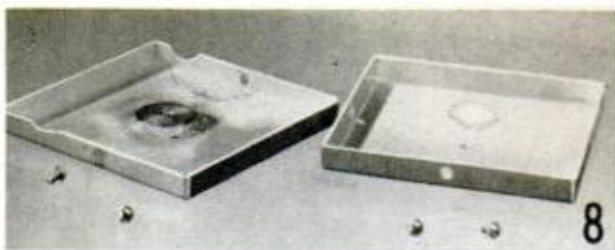


SOLENOID IS BEING USED when box is mounted on the base of an old model Rolleflex. If additional side lights are desired, they may be connected through box

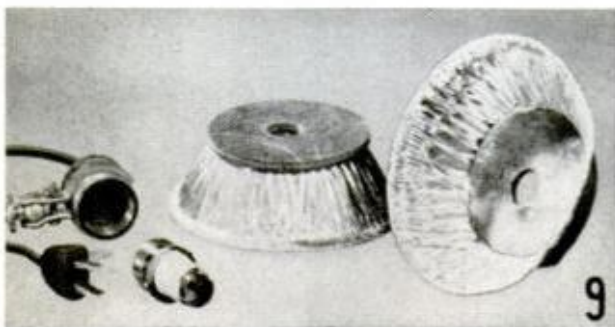


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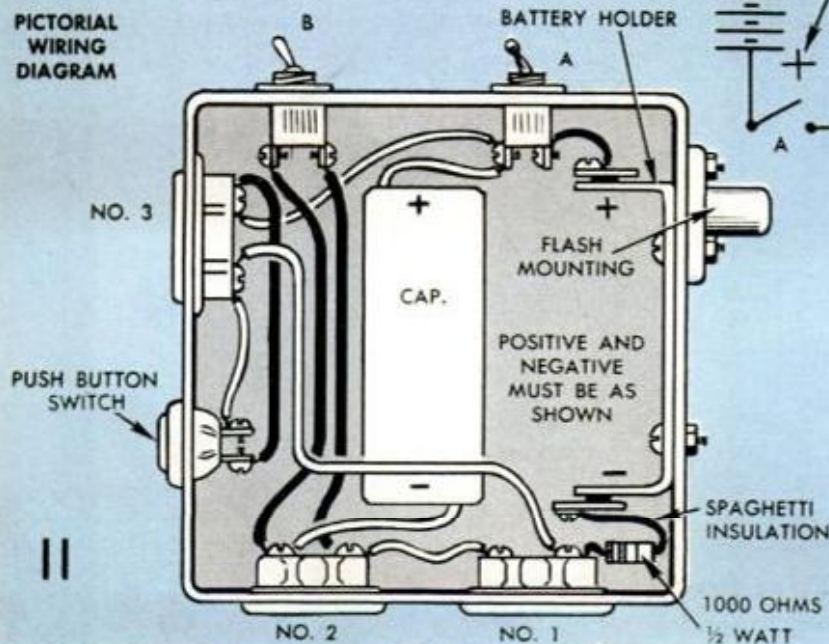
TOP AND BOTTOM of the flash box, above, contain tapped holes for the tripod screw and camera mount



POT-PIE REFLECTORS, above and below, right, will help to reduce "hot spots." The commercial reflector, below-left, is wired in parallel and cannot be used in series setups where more than one flash lamp is desired. On such occasions, use pot-pie reflectors



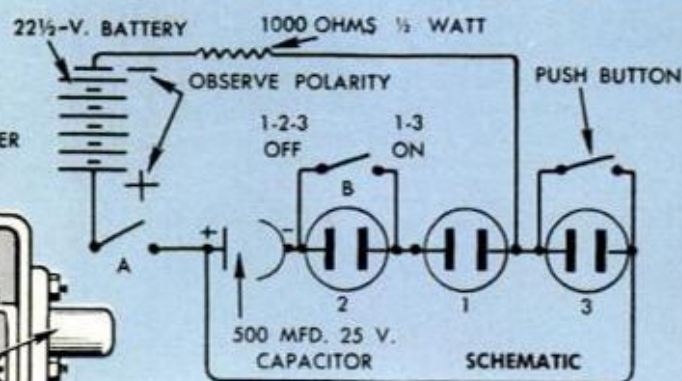
PICTORIAL WIRING DIAGRAM



but holes for the flush-mounted Amphenol female plugs should be made by your radio serviceman who has the proper tools for a neat job. Follow the wiring diagram carefully, Fig. 11, adding the capacitor last to avoid possible damage from the soldering gun. To provide for tripod mounting, solder a small aluminum plate inside the bottom using liquid aluminum solder, Fig. 8. Drill and tap a hole for the $\frac{1}{4}$ -20 tripod screw and another hole in the top of the box for the $\frac{1}{4}$ -20 camera mounting screw.

To make a pendant push-button switch for tripping the solenoid from a distance, press a standard flush-mounted push button in the end of a short section of pre-drilled broom handle, draw the wire through and add a male plug on the end.

The "hot spots" so common when ordinary flash reflectors are used with a wide-angle lens can be reduced by using homemade reflectors, Figs 9. and 10. Cut a hole large enough for the socket of a mid-geet flash-bulb adapter in the center of a small foil pie pan. Then cut a hardboard disk to fit the bottom of the pan, drill a hole for the adapter socket and glue the disk to the bottom of the pan. Insert the adapter in an ordinary light socket and attach it to a bracket or ball-clamp mounting. Finally, wrap the outside of the adapter with masking tape to insure a tight fit and push it into the hole in the pie pan. A slight increase in exposure may be necessary when using the reflector. ★ ★ ★



LEGEND

- A—POWER SWITCH
- B—CONTROL SWITCH
- 1—FLASH OR SOLENOID PLUG
- 2—FLASH PLUG
- 3—PUSH BUTTON OR SYNC. SHUTTER CORD

CONTROL SWITCH

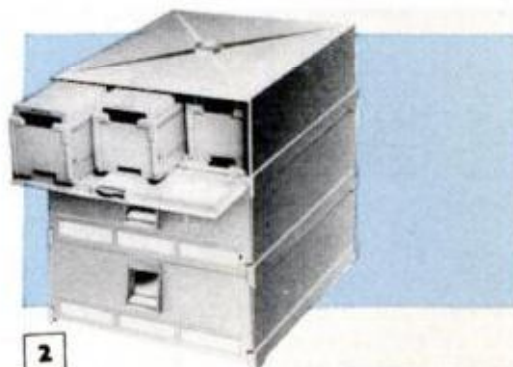
- OFF — USE ALL PLUGS, 1, 2 & 3
- ON — USE ONLY PLUG 1 WITH PLUG 3 TO SHUTTER OR PUSH BUTTON FOR SOLENOID USE

NEW FOR SHUTTERBUGS NEW

1. TURNABOUT POLE SCREEN becomes charming decorator planter when not in use. Installs anywhere, adjusts up to 9-ft. ceilings. Screen stores vertically behind planter panel. Standard 40 x 40-in. screen, complete with flowerpots and spring tension pole, retails at \$26.95 from Da-Lite Screen Co., Warsaw, Ind.



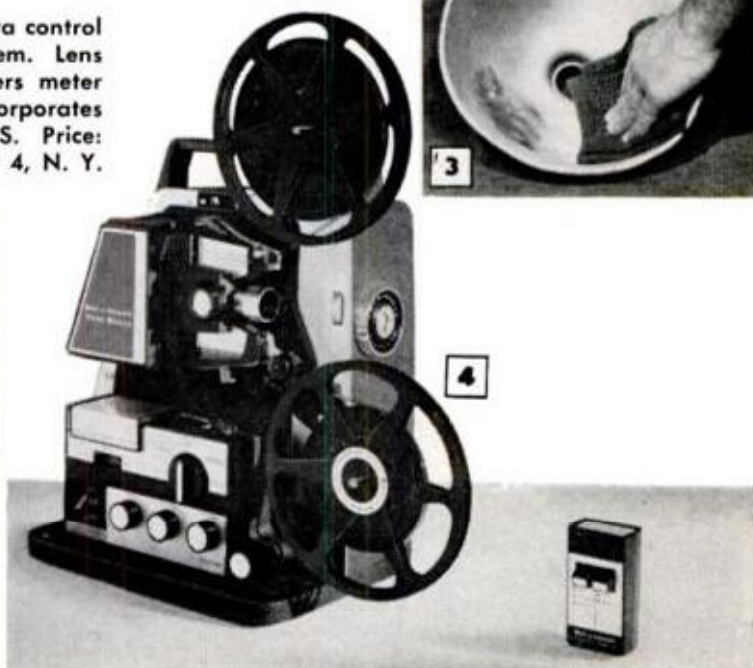
2. STAK-PAK SLIDE FILE is an inexpensive plastic container for storing three individual trays. Several units may be stacked and held securely by an interlocking device that makes it possible to remove individual trays without disturbing others. Tray unit sells for about \$4.00. Ansco, Binghamton, N. Y.



3. CLEANING AND FINISHING pad of nonwoven nylon makes it easy to keep studio and darkroom equipment clean. Use one on that dingy reflector or stained tray. Scotch-brite pads may be used with hot water and detergents and then rinsed for re-use. Made by Minnesota Mining and Mfg. Co., St. Paul 6, Minn.

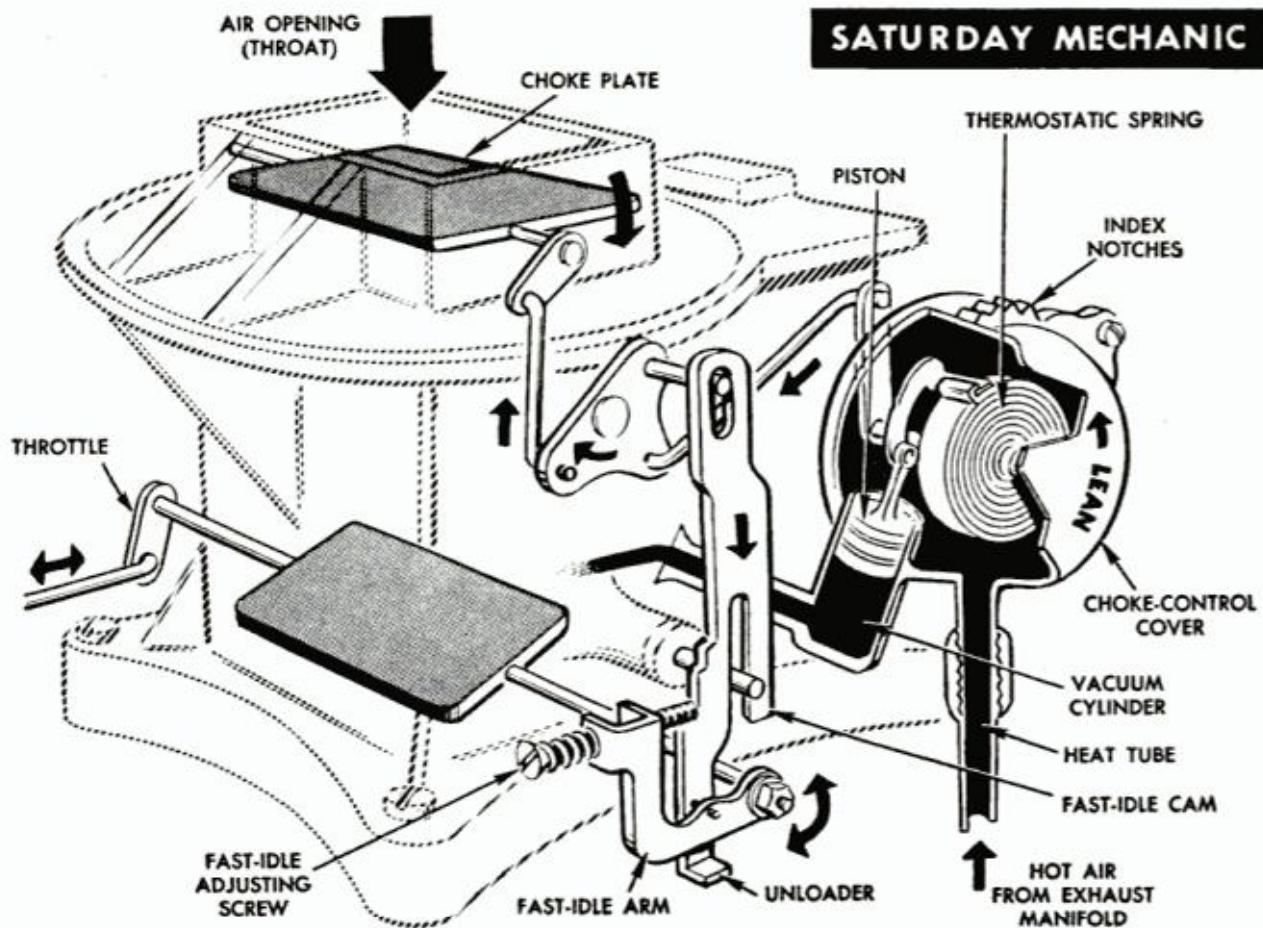


4. REMOTE TELE-SONIC 8-mm. projector permits you to sit back and enjoy home movies. With the hand-held wireless control, user can start, stop and reverse image on the screen from as far away as 40 ft. Control is no bigger than a nickel candy bar. Bell & Howell, 7100 McCormick Rd., Chicago 45, Ill.



5. RETINA REFLEX III offers complete camera control with the dual photo-electric exposure system. Lens opening is set automatically as user centers meter needle in view-finder brackets. Model incorporates all other basic features of Retina Reflex S. Price: about \$215. Eastman Kodak Co., Rochester 4, N. Y.





All About Automatic Chokes

By Morton J. Schultz

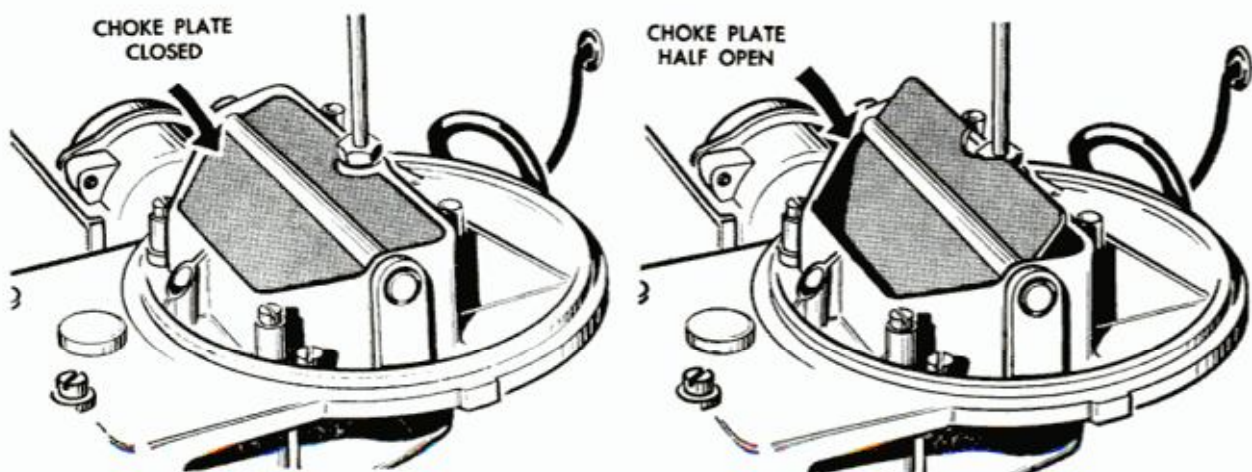
CAUSES OF hard starting, flooding, and poor gas mileage are sometimes traced to your car's automatic choke, a simple mechanical device which is in operation every time you start your car, winter, summer and in-between seasons. When it's working properly, and it usually is, it varies the fuel-air mixture according to engine temperature.

The three views in Fig. 1 and 2 show

how the choke mechanism operates the choke plate. In starting a cold engine the choke plate is closed, Fig. 1, causing a rich fuel mixture to enter the engine. As soon as the engine starts, the choke plate moves to the half open position.

As the engine warms up, the choke plate continues to open and when the engine reaches normal operating temperature it is fully open as in Fig. 2.

1. CHOKE PLATE, shown here in closed and half-open positions, is typical of those in common types of carburetors. Choke-plate positions control amount of gasoline in fuel mixture, varying from rich to lean

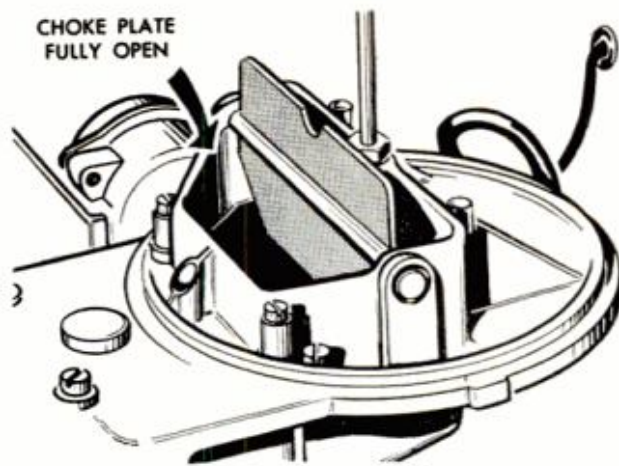


This is the general procedure carried out by the automatic choke and here's how it does its job: the cutaway drawing of a typical automatic-choke device on the opposite page will help in understanding its operation. In warm weather the engine probably will start simply by turning on the ignition and kicking the starter switch. But this isn't good practice, especially with late-model cars. If you drive under average conditions, it's well to form the habit of depressing the accelerator pedal once before starting. This action, which is recommended by many car manufacturers, does three things simultaneously, trips the fast-idle cam, closes the choke plate and primes the carburetor.

Choke-Control Piston

As the engine catches, intake-manifold vacuum pulls the choke-control piston downward (note the cutaway) causing the choke plate to open partially. Hot air from the exhaust manifold enters the choke-control unit through the heat tube, causing the thermostatic spring to lose tension as the engine warms up.

And that isn't all. The choke-control piston also assists in opening of the choke plate. It helps to pull the thermostatic spring down as the spring loses tension and, as it moves, it uncovers heat bypass slots permitting more heat from the manifold to enter the choke control unit and affect the



2. CHOKE PLATE in wide-open position, reached only after engine is at or near operating temperature



CHOKE OPERATION

PROBLEM	CAUSE	FIX
Hard starting when cold.	Choke not closed.	Depress accelerator once before starting engine. This trips the fast-idle cam, closes the choke, and primes the carburetor.
Hard starting when hot.	Depressing or pumping accelerator when engine is hot. This loads intake manifold with raw gas and closes the choke, leading to flooding.	Hot engine should start immediately without pumping. If not, check functioning of choke control unit and plate.
Flooding.	Using accelerator too enthusiastically when starting.	Dump over-rich mixture from manifold by bringing unloader into play. Depress accelerator to floor and hold it there while turning engine over.
Poor gas economy.	The driver.	The choke operates in relation to engine temperature. The colder the engine, the richer the mixture. If you take-off at wide-open throttle with a cold engine, the partially closed choke restricts the flow of air. Cylinders pull fuel out of the carburetor in a stream. Go easy on the throttle until the engine reaches normal operating temperature, at which point the choke is fully opened.

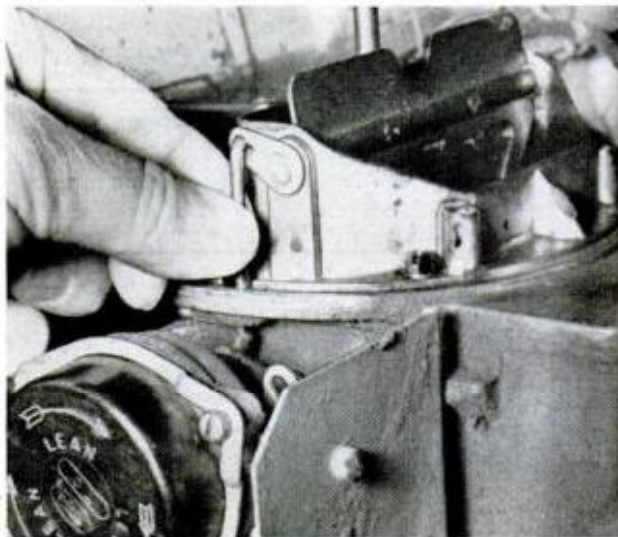


thermostatic spring. As the thermostatic spring loses tension, the choke linkage, which pulls the choke plate open, is activated. At the same time, the action of the linkage causes the fast-idle adjustment screw to drop away from the fast-idle cam. When the engine reaches normal operating temperature, the thermostatic spring has lost all tension, opening the choke plate to the maximum.

An automatic choke should give good performance for the life of a car and you can assure continued service by checking the parts periodically. These are inspection of the choke linkage, choke plate, heat tube, and choke control unit, setting of thermostatic spring tension and adjusting of the fast-idle mechanism.

Collections of dirt and moisture are the main causes of malfunction of the automatic choke. To prevent trouble from this source check the unit periodically for freedom of movement of the parts. Have a

3. CHECK PARTS by hand to see that there is no rough movement or binding. In some cases it may be necessary to replace parts not operating efficiently



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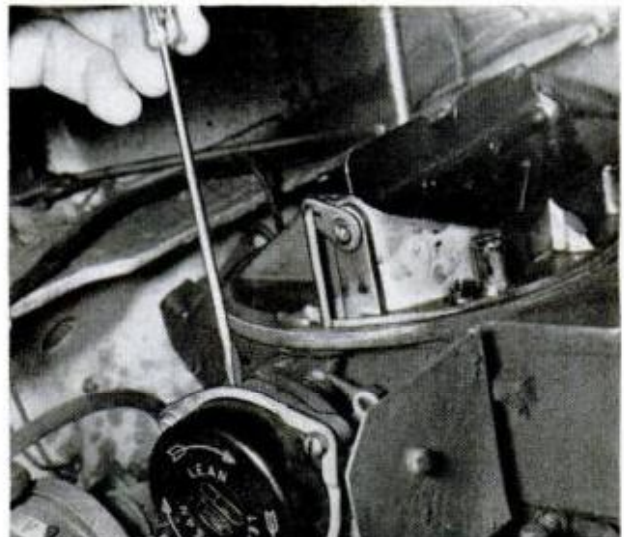
helper step on the accelerator (ignition off) to hold the throttle open and prevent interference from the fast-idle cam and unloader as you manually operate the linkage throughout its full range of travel, Fig. 3. If the choke plate does not open and close smoothly, or if it binds noticeably at any point, the cause could be foreign deposits on the linkage, in the housing, or cover, or on the edges of the choke plate itself.

Manual Check

To make sure, disconnect the linkage from the choke plate and manually operate the plate with your finger. Binding of the plate can be caused by damage to parts or dirt and moisture accumulation. Blow dirt out from around the choke plate with an air hose. If this does not relieve binding, probably the parts are bent, sprung, or otherwise damaged and need replacing.

If the trouble seems to be in the linkage, first wipe clean with a cloth. This may turn

4. BEFORE DISMANTLING parts of the automatic choke be sure there is a witness mark on the cover. If not, make a mark so that you know how to reassemble



POPULAR MECHANICS

out to be the remedial measure needed. But if it fails, then investigate the control cover. Caution: never oil the linkage. Oil on the linkage will collect dust and cause malfunction of the entire choke assembly.

First note at what setting the index on the choke control cover is set. All new cars have this setting plainly marked, but in some older models it may be necessary to mark the setting by scribing a witness mark on the control cover, Fig. 4. Then remove the choke-control cover and inspect for carbon deposits and moisture, Fig. 5. Clean with solvent. If this cleaning does not free all moving parts, replace the unit.

Moisture and especially carbon deposits inside the choke-control housing indicate that exhaust gases may be escaping through pinholes and cracks in the heat tube. If the condition continues, sufficient foreign material will accumulate to prevent proper operation of the choke assembly. If the tube appears flattened or otherwise damaged, replace it, Fig. 6.

Choke-Control Unit

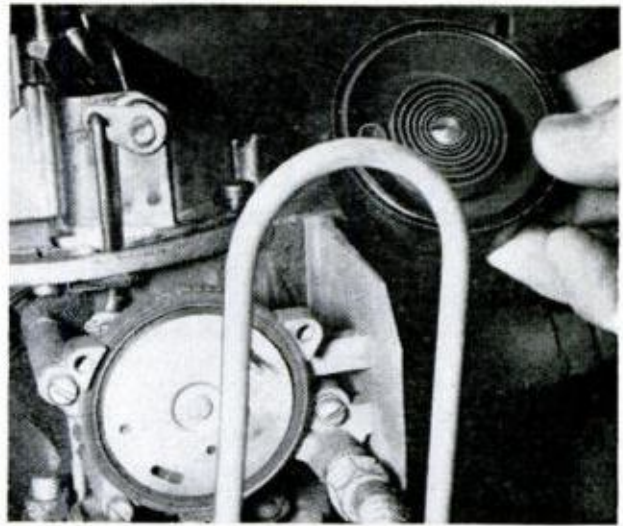
If the linkage and choke plate are operating properly, the final check is to determine whether sufficient vacuum is being built up inside the choke control unit to operate the piston. To do this, have someone start the engine (cold) and notice the action of the choke plate. It should operate in the sequence and timing diagrammed in Figs. 1 and 2. If it does not operate properly or if resistance is not noticeable as you try closing the plate manually, the choke control piston is sticking or there is insufficient vacuum. If the piston sticks, it should be removed and cleaned with a solvent such as carbon tetrachloride.

Lack of vacuum usually indicates a leak in the tiny circular gasket between the control unit body and the carburetor, or a warped or cracked choke control cover. Replace any defective parts.

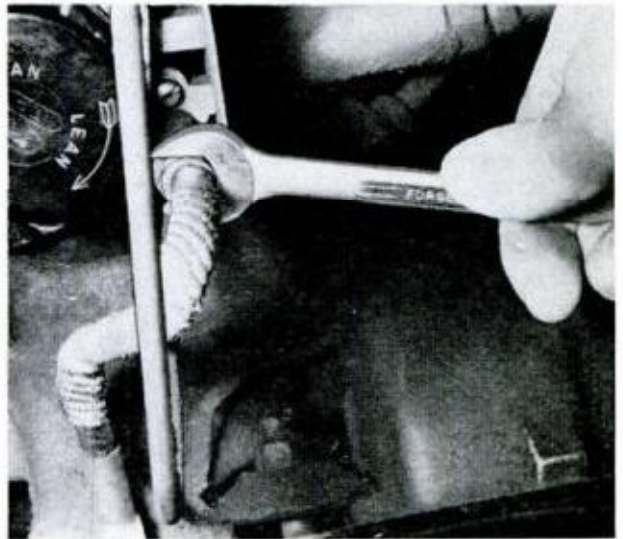
Thermostatic Spring Tension

The index setting of the choke control cover controls the tension of the thermostatic spring which is inside the unit. If the setting is too high, the choke plate remains closed too long when starting the engine, may never fully open. This can result in flooding and, of course, high fuel consumption and rapid engine wear.

An index set too low (lean) can result in hard starting. To make sure your choke's index setting is correct, Fig. 7, first check to determine the index setting recommended for your car. This usually is given as "zero," "two notches lean," or "one notch rich." Move the cap to the correct setting. ★ ★ ★

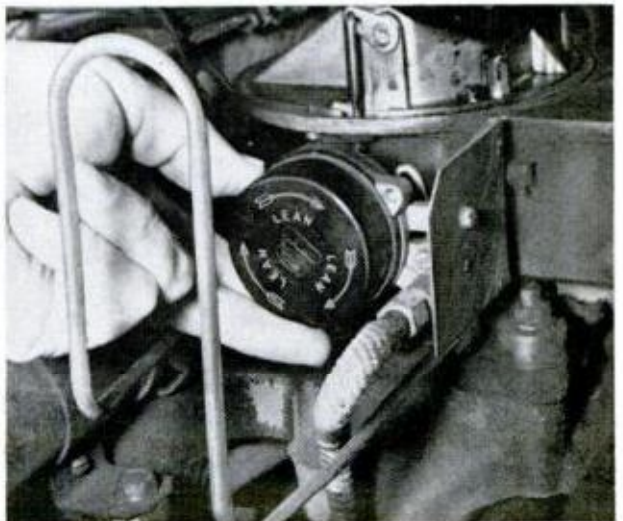


5. INSPECT CHOKE-CONTROL COVER closely for carbon deposits and moisture. Clean with a solvent. Excessive carbon deposits indicate that exhaust gases may be getting into housing through breaks in heat tube



6. IF HEAT TUBE appears flattened or otherwise damaged, it usually is best to replace it. Take it easy on wrench, otherwise you may damage fittings

7. BEFORE SETTING choke control check manufacturer's recommendations for your car. Then, after reassembly, move choke-control cover to correct setting



Better CARKEEPING

● **WHEN USING** a tank for testing tubeless tires for leaks the job will be made a lot easier if you place a handful of lead shot in the tank. You can obtain the pellets from shotgun shells or possibly in bulk. The round pellets will not corrode and they cause the tire to roll easily in the tank

● **FROZEN BRAKE CABLES** can be freed quickly by attaching cables from a booster battery, or the regular car battery, to each end of the brake cable sleeve. Just a few seconds of this treatment will thaw ice from the cable. There will be no damage if you allow the current to pass only a few seconds

● **SMALL DENTS** in car tops can be repaired easily by drilling a small hole at center of dent, driving in a sheet-metal screw and then using a hammer to "pull" the screw as you would a nail. A light, easy lift on the hammer handle and the dent will pop out. Repair with filler, grind smooth and paint

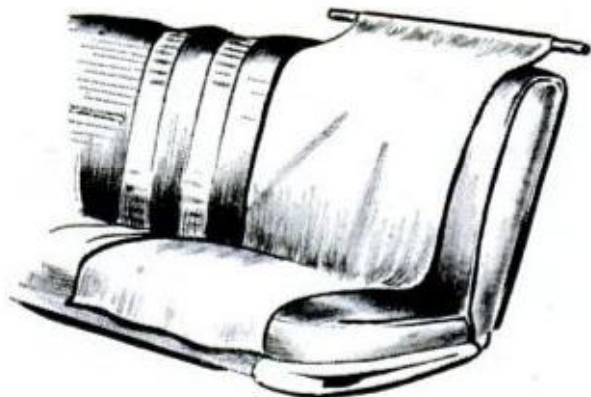
● **WHEN WASHING** ball bearings don't dry them with the air line. The high-pressure air stream spins the balls at high speeds in dry races and can be the cause of early bearing failure. Allow to dry normally and apply fresh lubricant before installing. This avoids any possibility of damage

● **WHEN IT IS DIFFICULT** to attach timing light to spark plug, or where it is difficult to locate proper wire in distributor cap, connect timing light to high-tension terminal on ignition coil. You'll have proper synchronization and the light will be brighter and much easier to read accurately

● **LOCATE HARD-TO-FIND** leaks in the windshield or rear window by coating the inside surface with a glass cleaner. Then allow the cleaner to dry. When dry, play a light stream of water from a hose on the outside of the glass and all around the moldings. Leaks will show up on the inside

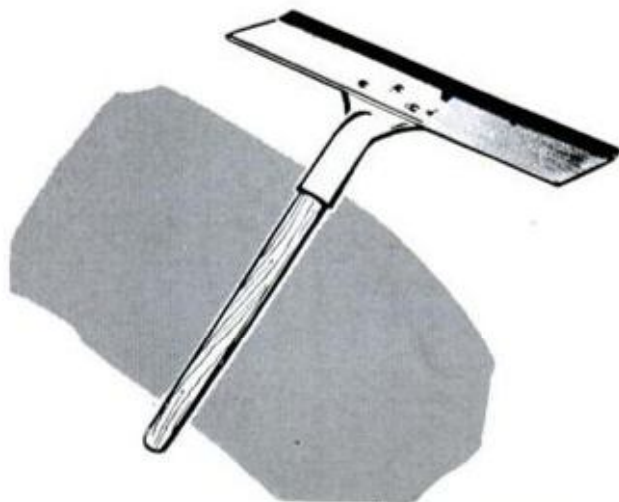


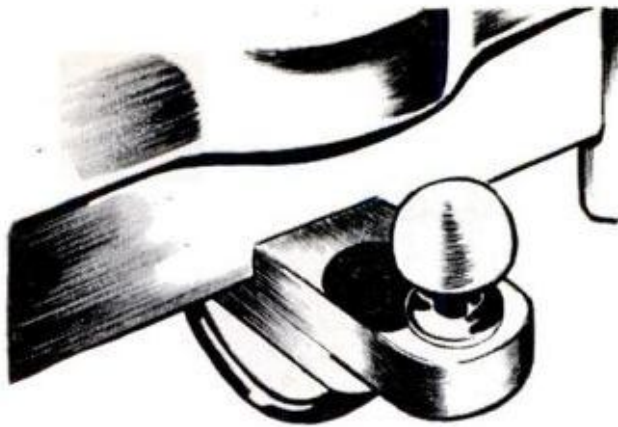
REFLECTING TAPE placed inside the hub cap or wheel disk on each of the four wheels can serve as a warning to other drivers when you're changing a tire. Set cap or disk on edge near roadside so that the tape will pick up headlight beams of oncoming cars



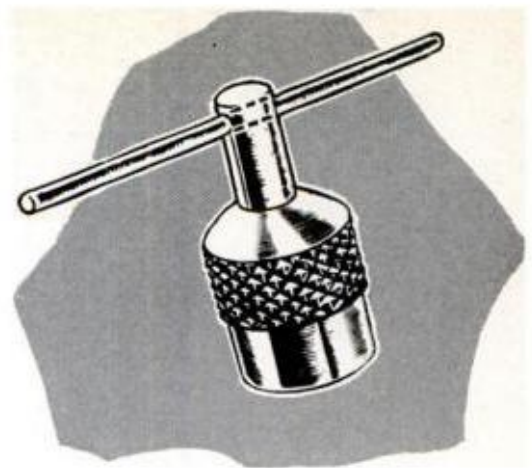
CAR MECHANIC'S cover cloth will spread smoothly over a seat back or fender and stay in place if a large dowel is inserted in a hem at one end. Dowel should fit fairly tight in the hem so that it will stay in place. Weight of dowel keeps cloth from falling down

WINDOW SQUEEGEE, about 6 in. long, gets that heavy, slushy snow-sleet mixture off the windshield and rear window with all the effectiveness of a shovel, yet it will not score the glass. Make a 25 or 30-in. handle from a 3/4-in. dowel and fit into squeegee tang

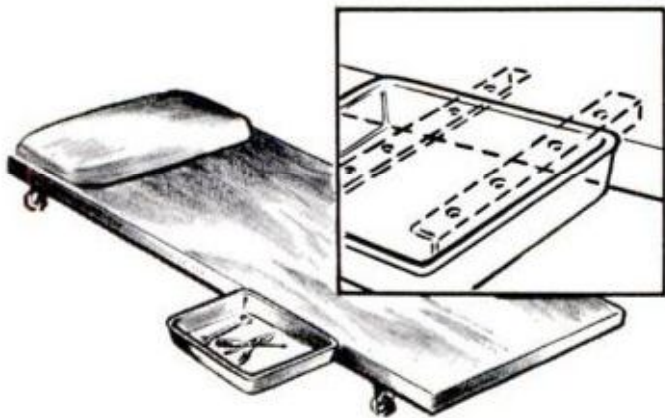




HOLLOW RUBBER BALL makes a good protector for trailer hitch ball. Just slit the rubber ball about a third of the way around, place a small dab of petroleum jelly inside the ball and slip over the hitch ball. Protector prevents rust and keeps out dust and mud



CUT HEAD AND BODY from a brass screw, discard the threaded portion and solder screw head to a valve cap. Drill small hole through body of screw and solder in short length of wire. Screw onto stem to prevent stem from working under rim when changing tire



TOOL TRAY attached to side of creeper keeps needed tools always within easy reach. Rivet or bolt a shallow baking pan to two short pieces of light steel angle. Then bolt the projecting ends of the angles to side member of the creeper, using stove bolts

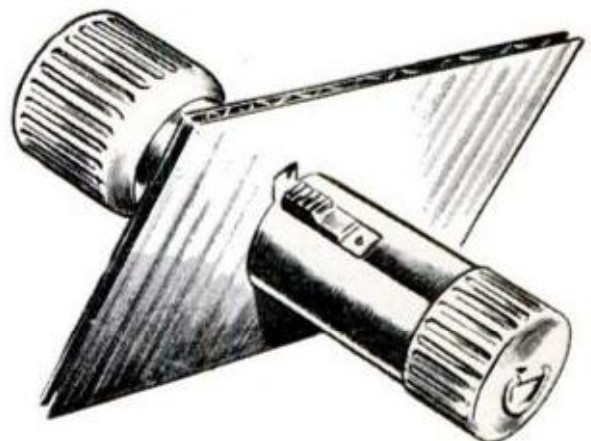


MEASURE CYLINDER TAPER almost as accurately as with an inside mike by using a worn piston ring and a feeler gauge. Press ring into cylinder with piston so you know it's square. Then measure distance between ends of ring with gauge. Repeat at lower end of cylinder

IF YOUR ignition condenser goes out and leaves you stranded, you can use the radio suppressing condenser as a substitute. This condenser usually is found near the voltage regulator. Ground it and connect its pigtail to the insulated binding post on distributor

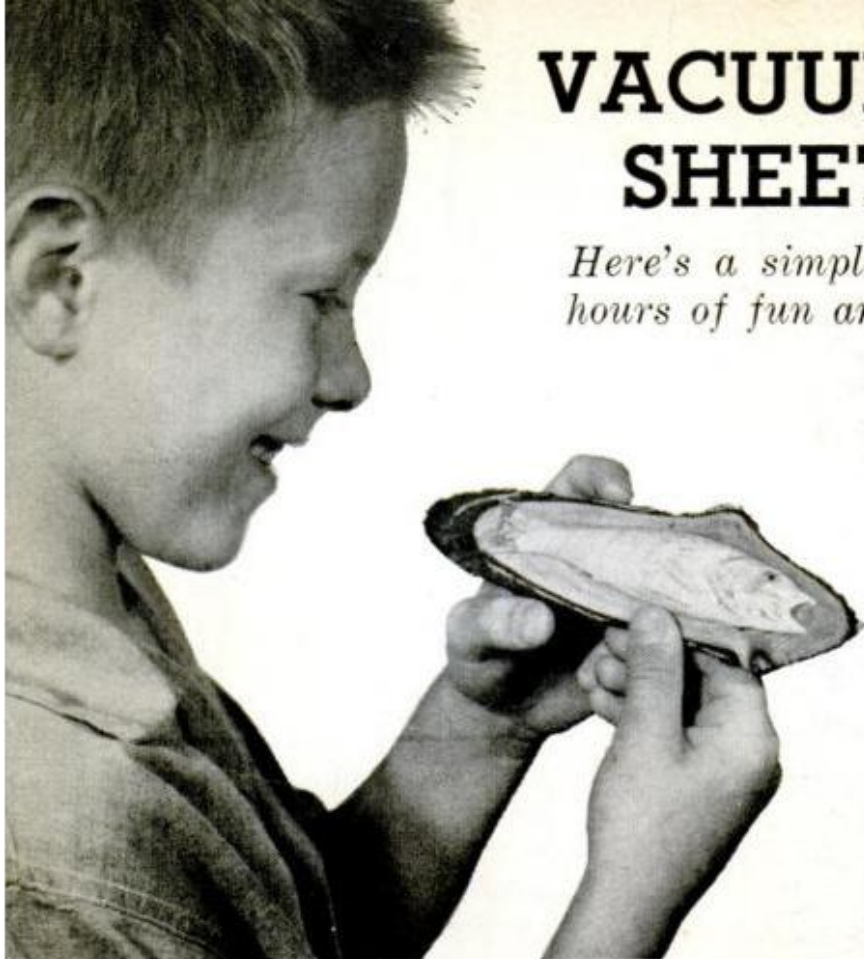


TIRE CHANGING at night is something no one looks forward to, but it can be a lot easier and safer if you carry a flashlight and a 6-in. square of cardboard with a hole cut in it to take the light in a snug fit. Just insert flashlight and set on edge as pictured

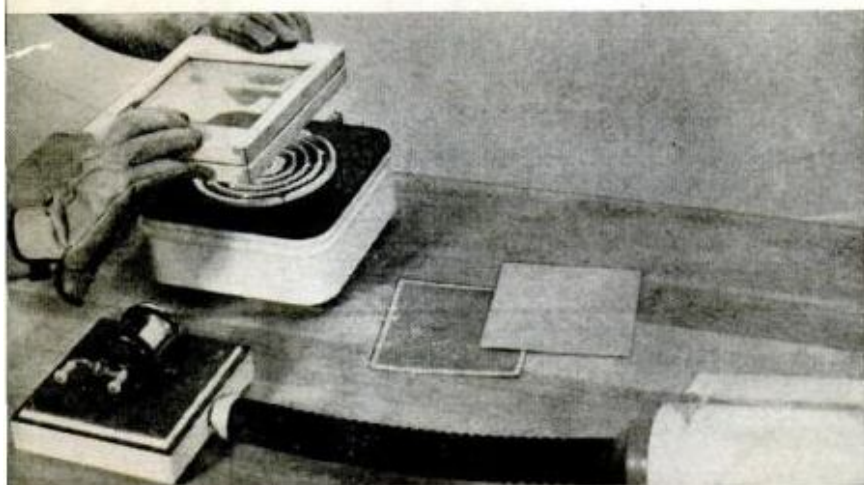


VACUUM-FORMING SHEET PLASTIC

Here's a simple vacuum box that offers hours of fun and even spare-time income



1. THIS FISHERMAN is on the way to bigger things. Here he's looking at a vacuum-formed plastic replica of that first fish



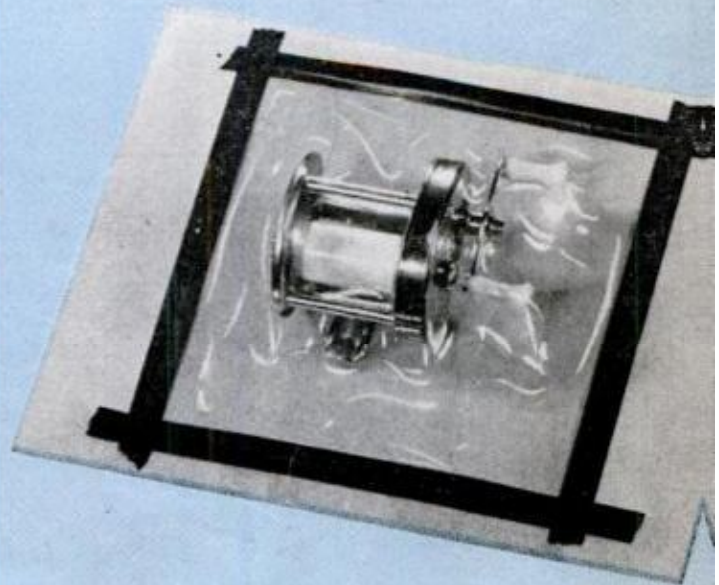
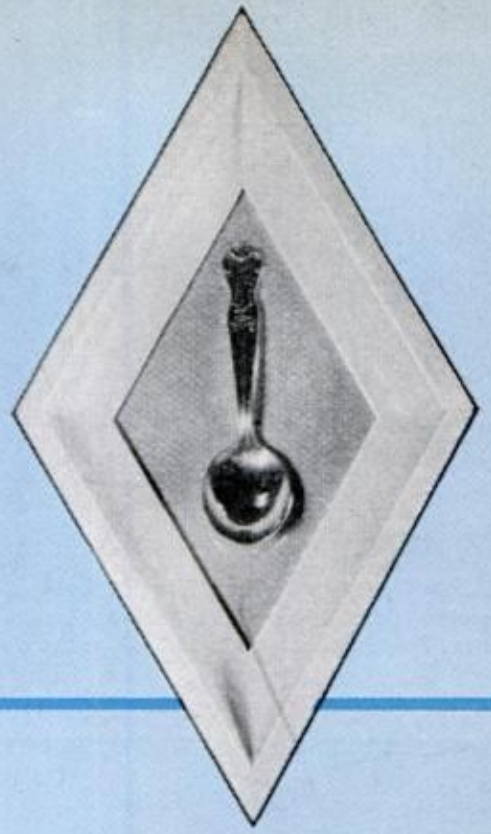
2. PLASTIC SHEET, above, is heated on both sides over electric plate to bring it to right degree of plasticity for forming. Then holder and sheet are placed over pattern on vacuum box. Air pressure, below, forces plastic into contact with pattern

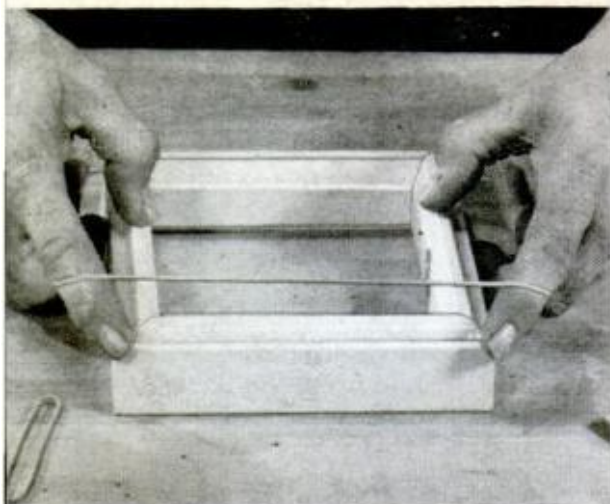


INSTANTANEOUS forming of a plastic shell over almost any small object is done with this simple kit of parts you put together yourself. When you get it assembled you have a vacuum box, or chamber, which is attached to your vacuum cleaner, and a plastic-sheet holder consisting of two nesting frames. A close look at the pulled-apart view and the sectional views on page 177 will show how these parts are assembled and how the plastic-sheet holder fits over the vacuum chamber. Figs. 3, 5 and 6 picture steps in assembling the vacuum chamber.

The two views in Fig. 2 show clearly how the assembled unit works. As the first step in the process, you hook your vacuum cleaner hose to the vacuum chamber as pictured. Then you place the plastic sheet in the holder and the object to be used as a pattern is centered on the platen of the vacuum chamber as in the photo at left (in this instance a fishing reel is pictured). Now, turn on the cleaner and then hold the plastic sheet, in the frame as pictured, over an electric hotplate (never over a flame) applying heat alternately to each side. As soon as the sheet becomes pliable and sags slightly at the center, quickly place it over the vacuum chamber as in the lower photo. The sudden vacuum created causes air pressure to force the sheet not only to take the precise over-all contour of the pattern but also to contact the whole exposed surface of the pattern, thus reproducing faithfully in relief every surface detail.

And that's all there is to it. From here on you let your own imagination take over, remembering that almost any object you can get on the perforated platen with only a little space all around it, can be reproduced in detail with this setup.





3. TWO HEAVY RUBBER BANDS serve as gluing clamps when assembling vacuum box. These wooden parts come with the kit

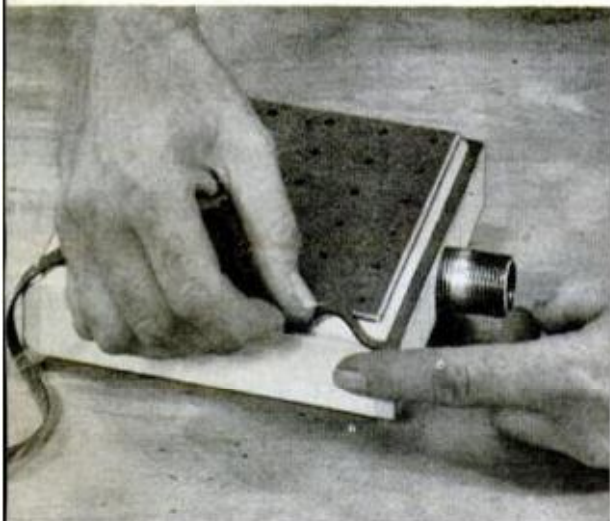


4. SMALL-PARTS TRAYS can be duplicated in vacuum-formed plastic. Or you can assemble a small tray from thin stock and use it as a pattern for forming any number of duplicate plastic trays



5. BOTTOM of vacuum box is plywood. It must fit tightly to prevent air leaks. Corners of box are made airtight with tape

6. SELF-ADHERING rubber sealing strip forms airtight seal between vacuum box and holder when latter is placed in position



For example, take the fish plaque the boy is admiring, Fig. 1. Of course, this fish isn't big as some catches go but maybe it's his first one and if this is so, he's entitled to admire it. Here's how it was made: The live fish was used as a pattern for the plastic shell which was vacuum-formed as described. This shell can now serve as a mold for a plaster-of-paris casting or the shell only can be colored like the original live fish, mounted on a plaque made by sawing a section diagonally from a tree limb. One face of this is smoothed and varnished and the casting or the colored plastic shell mounted on it as in the photo. Sharp? Of course, because it's a copy of the original catch, fin for fin, scale for scale, size for size.

Then there are other stunts. You need a tray for drafting instruments or small tools. Lay the tools or instruments on the platen, pop a piece of plastic down over them, lift off the holder, remove the formed plastic, turn it over and there's your tray. Or, suppose you want to shape a plastic cocoon over each of baby's shoes to preserve them as mementos. Proceed as already described, only use black plastic. Then, leaving the shoes inside the covering, run a bead of household cement in the space between the soles and the fold of the plastic. After the cement has hardened trim off the projections of plastic at the soles and heels. When the black plastic covering is sprayed with a mist coat of bronze, permitting the black to show through, the effect is remarkably similar to shoes cast in bronze.

If you wish to protect valuable tools or instruments, the fishing reel or any metal object against rust and corrosion, just form a plastic cocoon over it and tape the edges of the formed cocoon to a sheet of cardboard. The fishing reel, lower right-hand illustration on page 175, has been "mothballed" in this fashion. Other illustrations on the same page show the wide range of vacuum forming possible with this unit.

Of course, if you wish, you can make the parts of the vacuum chamber by following the details given on the opposite page for the frames and other parts. Care must be used as the finished job must be air-

MR. DO-IT AND BUNGLE

HMPH—DOEY SITS ON HIS BIG FAT PATIO WHILE I SLAVE OVER A BROKEN SASH CORD—OH, WELL, THIS TIP FROM POPULAR MECHANICS TO PRY STOP FROM INSIDE IS SURE A GOOD ONE



NEXT, I'LL LIFT THE LOWER SASH OUT OF THE FRAME—OOPS, DROPPED MY HAMMER! SAY, DOEY, WILL YA GET MY HAMMER FOR ME WHILE I REMOVE TH' WEIGHT POCKET DOOR



WELL, ALL DONE... I'VE LUBRICATED THE SLIDING SURFACES AND REPLACED THE STOP. SAY, DOEY, HOW 'BOUT A ROUND OF GOLF?

SORRY, BUNGLE, I'M TOO TIRED

WHAT'S THE MATTER WITH YOU, DOEY? HOW COME I DO ALL THE WORK YET YOU GET TIRED?



5

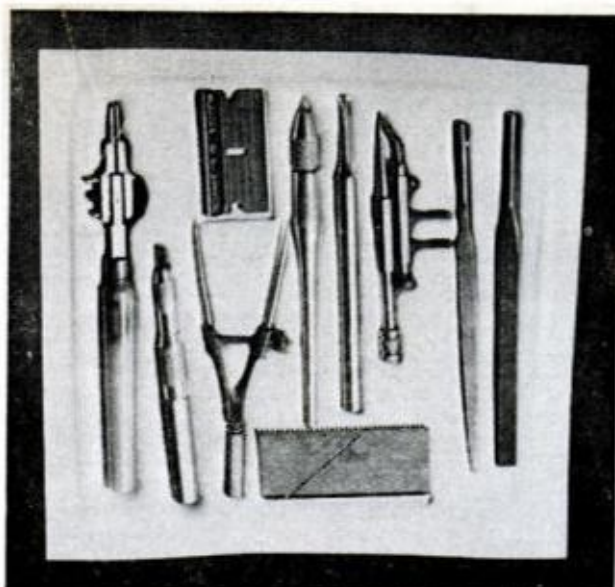
IT ISN'T THE WORK, BUNGLE. IT'S THE RUNNIN' AFTER IT THAT GETS ME!

SO LONG HONEY, I'M GOIN' NOW

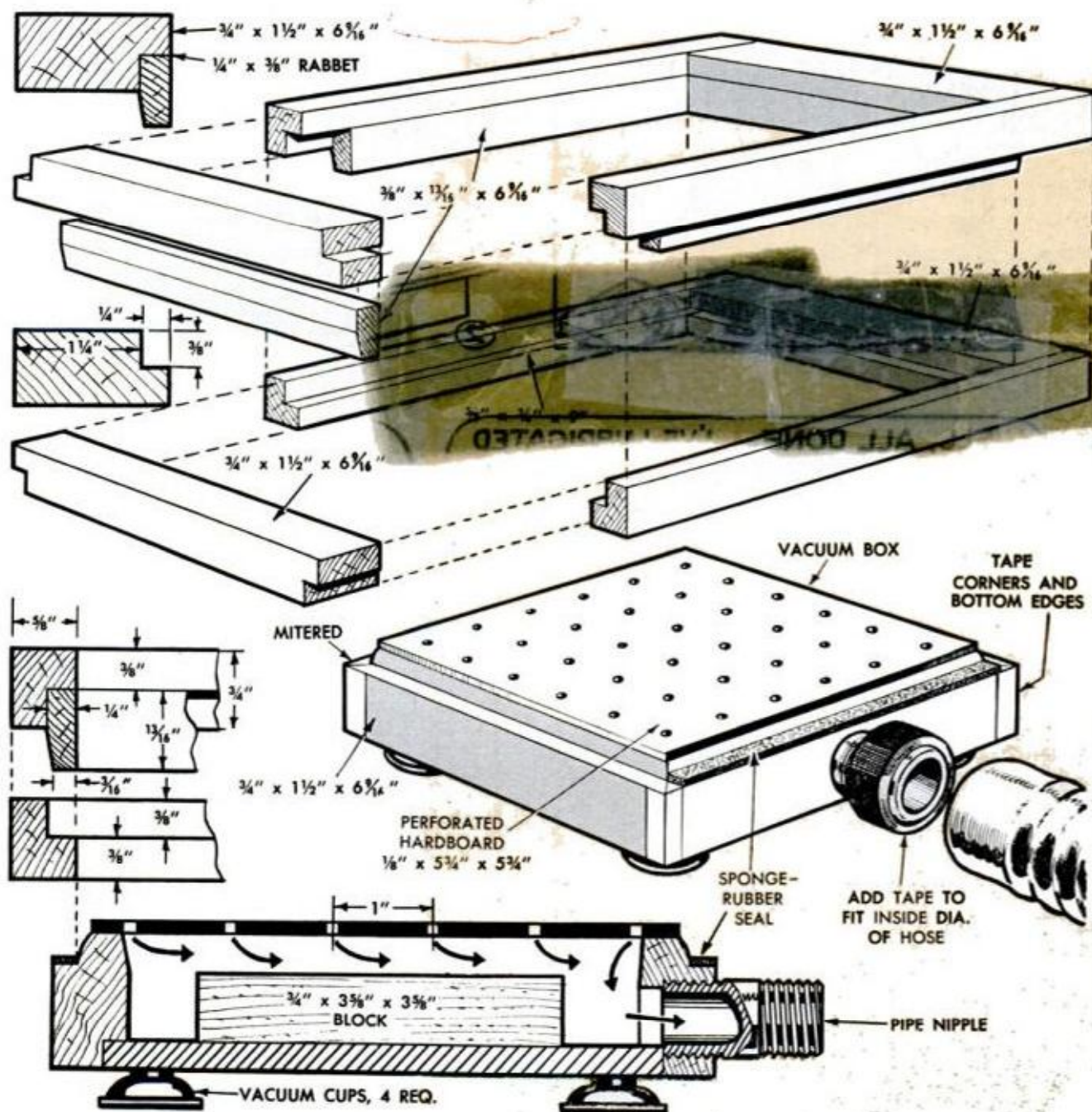


6

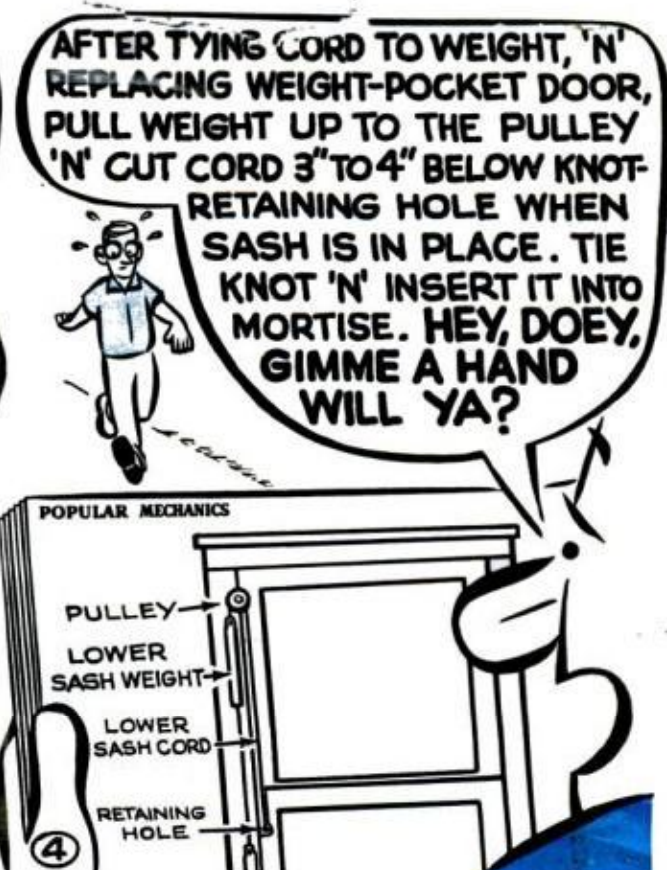
tight Cost of materials, including a few sheets of plastic, should not exceed \$5.00. On the other hand you can spend a couple of dollars more and get a kit that includes all wood and hardboard cut to rough size, sponge-rubber gasket, suction-cup feet, some thirty plastic sheets and instructions, for \$6.95. A second kit comes at \$12.95, ppd., with all parts cut to size ready to assemble, also, glue, masking tape, brads, pipe nipple and full instructions for using, including suggestions for utilizing the unit for spare-time income. Both kits are available from Bench-Craft, 3011 Starling Lane, Rolling Meadows, Illinois. ★ ★ ★



7. SPECIAL TRAY for instruments, small tools is made by placing tools or instruments directly in the platen



Bungle finds that he can replace a broken sash cord in no time at all. Give him enough rope and he'll hang anything, even his helpful neighbor, Mr. Do-It





PERFORATED HARDBOARD template must be clamped so it cannot shift while each set of holes is drilled

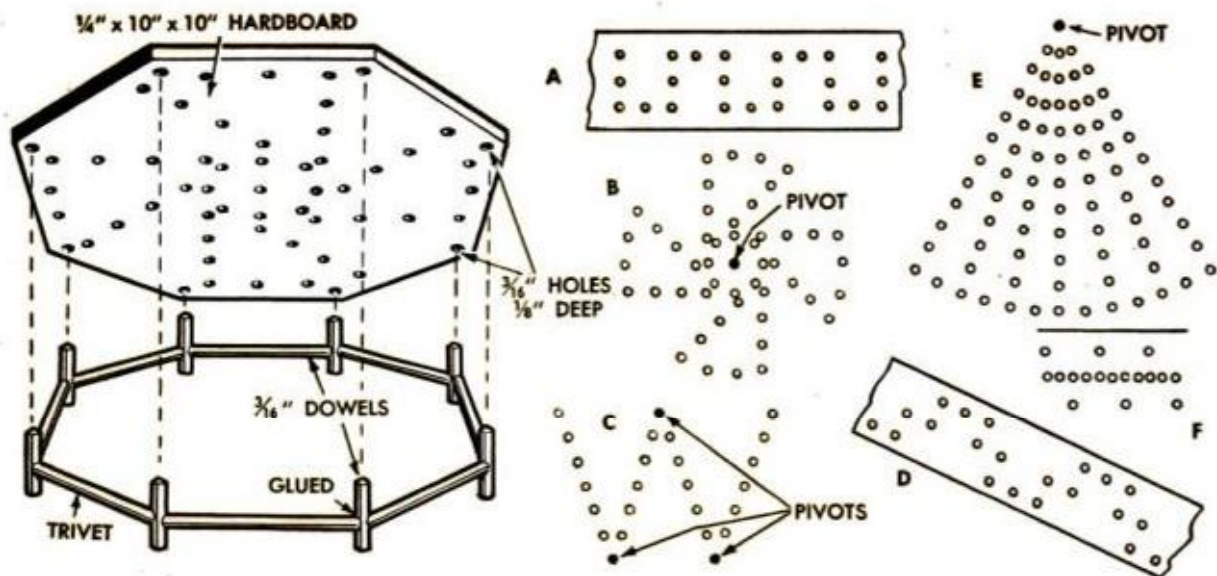
Design Drilling With Perforated Hardboard

WITH ITS PRECISE, uniformly spaced rows of holes, perforated hardboard provides a ready-made template for drilling a variety of decorative geometrical designs in plywood, sheet aluminum and similar panel materials. Such decorative drilling can be used for embellishing cabinet doors, trivets, trays, hot-dish pads, table tops, wall panels, screens, picture frames, shutters and so on. The drilled holes themselves can form the decorative design, or they may be filled with dowels or a plastic material to produce an inlaid effect.

To develop a design with the aid of a hardboard template, you either can use certain holes in a fixed template, patterns A, D and F below, or vary the patterns by rotating the template to successive positions around a fixed peg, designs B and E. You may vary the pattern still further by shifting the template laterally or changing the angle, pattern C. It is best to work out the design on paper before you begin to drill.

Use a drill bit the size of the holes in the hardboard template. If your design requires pivoting the template on a peg, drill the hole for the dowel first. Clamp the template so it cannot shift while you drill each set of holes. After drilling the second hole insert another dowel to serve as an extra guard against shifting, regardless of how many clamps are used.

When most materials are drilled, burrs form around the holes. You can remove these by sanding the panel surface or by lightly touching up each hole with a countersink. However, some materials cannot be sanded, and if you are working with prefinished paneling or similar materials, a conventional countersink may chip the finish. In such cases a conical abrasive wheel touched lightly into each hole, while being rotated in a drill press, hand drill or even with the fingers, will quickly polish off the burrs.—Walter E. Burton



SHOP SHORT CUTS

Cleaning Sanding Disks

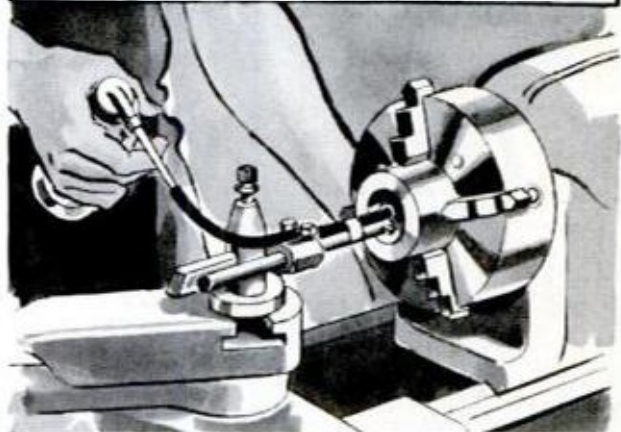
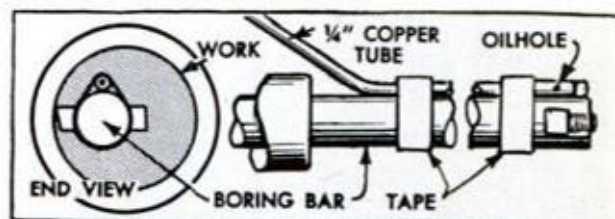
When a sanding disk becomes clogged with accumulations of paint, resin or other materials, you can get a lot more service out of it by cleaning the surface with a length of common screen rolled up tightly to form a round wire brush. Simply start the sander and move the end of the wire brush back and forth across the surface of the disk until all accumulations are removed. If desired, the brush can be taped or wired to form a hand grip and hold the screen firmly in place. Such a brush will serve for a considerable length of time if renewed occasionally by applying the end against a grinding wheel.

—G. E. Hendrickson



Lubricating Boring Bar

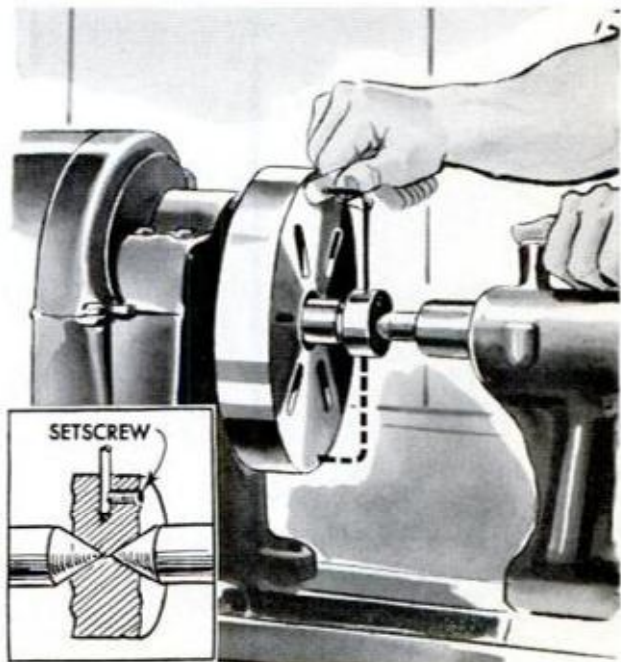
A simple arrangement for lubricating a boring tool is shown in the detail, above right. First, plug one end of a short length of $\frac{1}{4}$ -in. copper tubing and drill a small hole in the side of this tube near the plugged end. Lay the tube along the boring bar so that the small hole is centered over the cutting tool. Friction tape can be used to hold the tube parallel to the boring bar, or if a more permanent connection is desired, the tube can be brazed to the bar. Bend the open end up so that it is easily reached with the oil can spout. A few drops of cutting oil forced into the tube occasionally will keep the cutting tool lubricated continuously.—Robert Hill

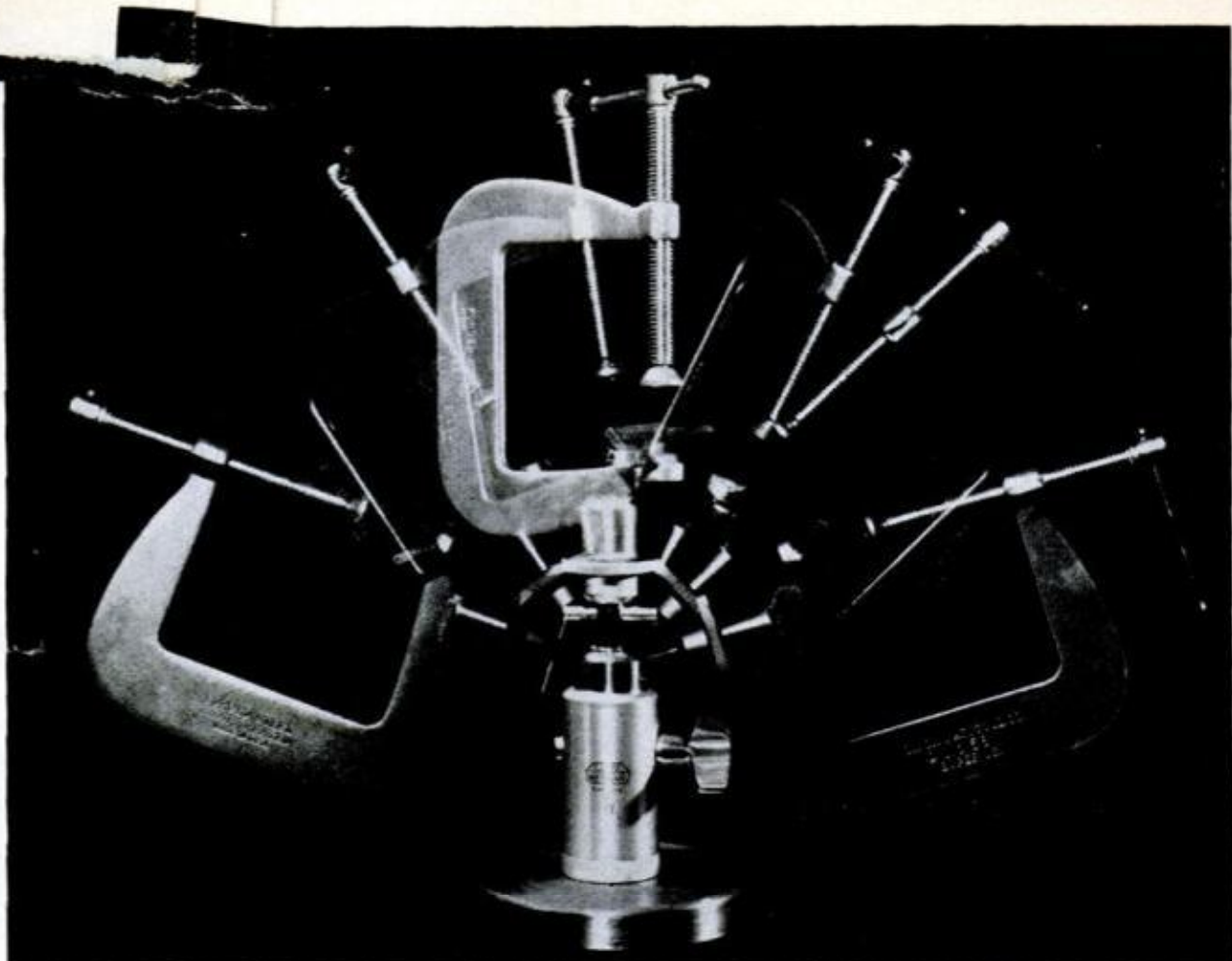


Checking Lathe Centers

Alignment of lathe centers can be quickly and accurately checked by the simple method illustrated. The collar is made from a piece of suitable round stock and has two 60-deg. centers drilled in line. Drill a $\frac{3}{32}$ -in.-dia. hole for the length of wire and drill and tap a hole for a set screw to hold the wire in place. The bent end of the wire should be rounded off and adjusted so that it just clears the faceplate. Bring the centers up against the collar friction-tight, yet permitting it to be turned. Check the clearance between the faceplate and wire with a feeler gauge. Then rotate the collar one-half turn and check the clearance at the new position. One half the difference between the two readings is the amount of misalignment. Before testing the centers, check the faceplate for runout, and if necessary, correct this with light cut across the face.

—M. W. Loftus





HOLD IT!

Here's your third hand—grips, clamps, holds almost anything

By Martin D. Koehler

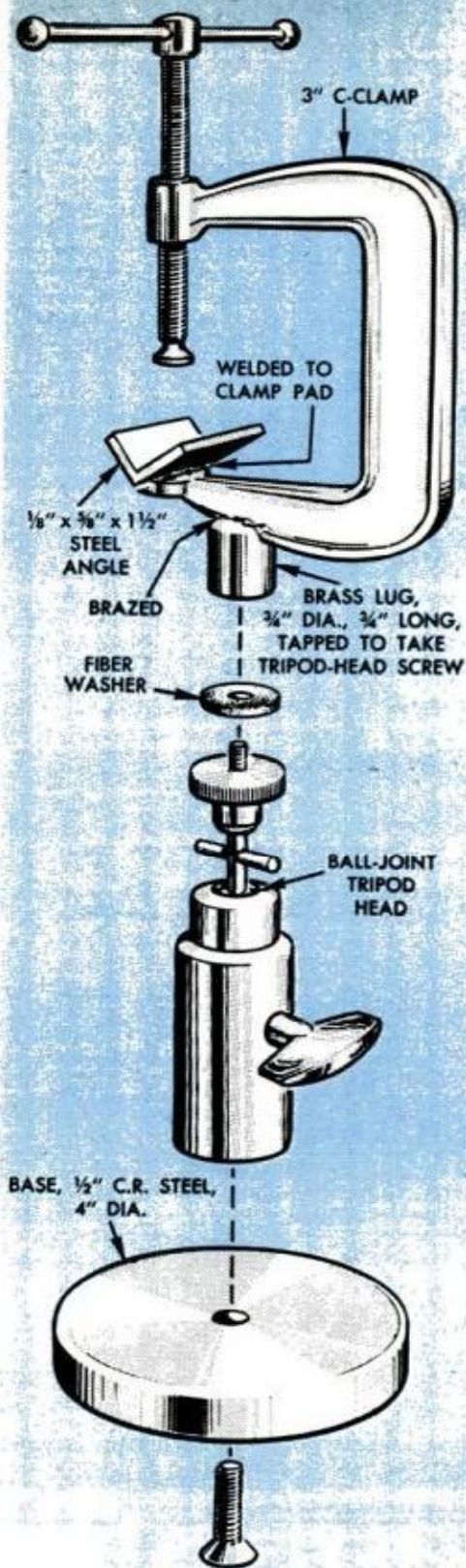


ALL YOU NEED to make this universal bench-top holder are a C-clamp, a ball-joint tripod head, a 4-in.-diameter steel disk $\frac{1}{2}$ in. thick, or a square piece of the same size, and a short length of $\frac{5}{8}$ or $\frac{3}{4}$ -in. steel angle. The heavy disk or the square of steel serves as a weighted base, but, of course, you can use a thinner piece and attach it to the bench top with screws.

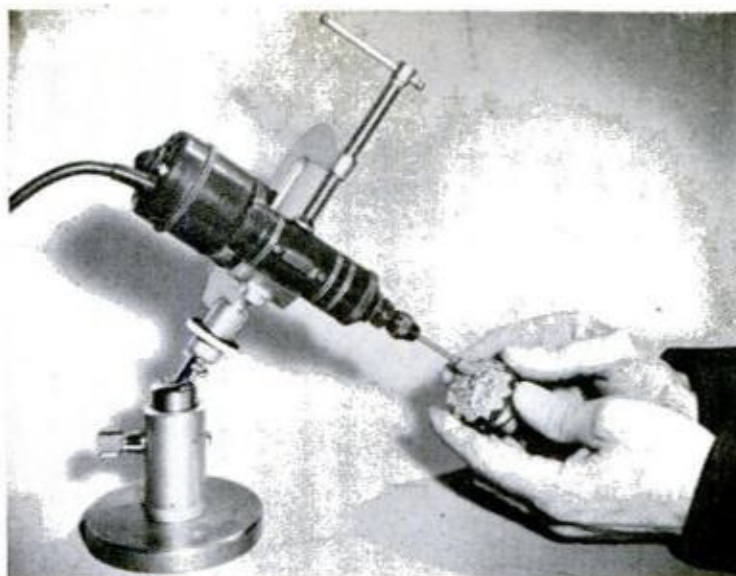
The pulled-apart detail on the opposite page shows how the parts are assembled. The tripod head, of the ball type, you obtain from a camera shop and attach it with a screw to the round or square base as in the detail. Then you weld the short length of steel angle to the stationary pad of the C-clamp. Next you drill and tap a short length of round brass to take the tripod-head screw. Braze this to the clamp jaw in approximately the position indicated.

The ball-joint tripod head gives you a universal adjustment of the clamp. The clamp with the work held in the V-jaw, can be positioned at any convenient angle, right, left, up or down, or any angle between. The holder will support tools or round work in any desired working position as you can see from the three photos on the opposite page.

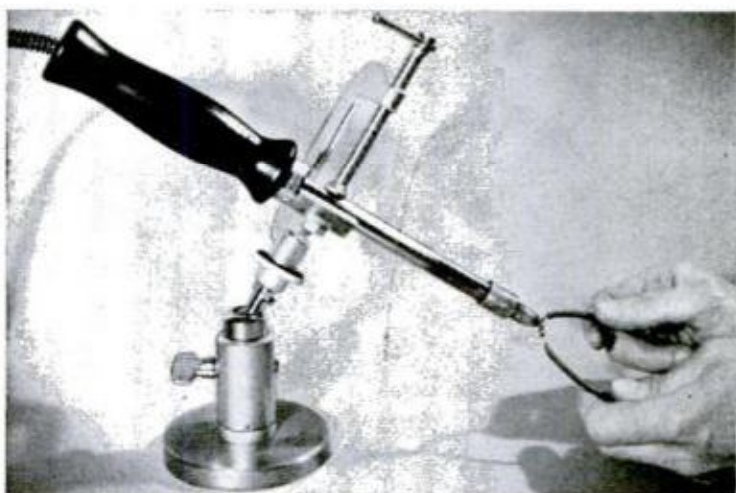
MICROMETER can be converted to a bench instrument by clamping it in the holder and adjusting the angle



BALL-JOINT HEAD can be mounted directly on the base or attached to a steel rod to elevate the C-clamp to a greater height. If you use the rod extension, increase the diameter of the base, since the higher mounting will tend to make the holder less stable

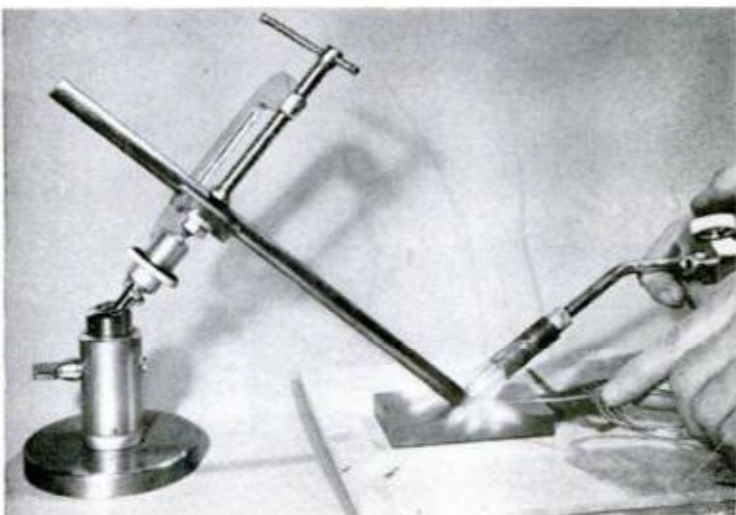


FINE GRINDING OR POLISHING will be much easier if the grinder is clamped in the holder and adjusted to the most comfortable angle. With both hands free, you're sure of an accurate job



SOLDERING SMALL PARTS which must be held by hand is no trick at all when you clamp the iron in the holder. Also, this will prevent the hot iron from damaging the bench top

BRAZING at odd angles is another chore which often requires holding two or more parts. With the aid of this angle clamp, it is as easy as any simple brazing job and takes no more time





1. DIAPHRAGM SPRAYER, above, has direct-connected motor, separate gun. Sprayer at right has turret nozzle, gives three spray patterns



PAINT WITH AIR!

By **E. R. Haan**

2. WHEELABOUT SPRAYER with a belt-driven compressor and separate gun. Unit is diaphragm type



3. WHEELABOUT SPRAYER has engine-driven, piston-type compressor. Used where electricity is not available





4. COMPACT UNIT with direct-connected motor and compressor. Gun with attached cup is the bleeder type

SPRAY APPLICATION of paints, enamels, lacquers, stains and clear finishing materials gives you the perfect finish on almost any paintable surface and in a fraction of the time necessary to brush-finish the same area. There are no brush marks in spray finishing, no laps, no sags or runs. You simply point the gun or the nozzle of the pressurized spray can, pull the trigger or press the button. It's almost, but not quite, as simple as that. There are a few tricks in handling a spray gun you should know before you begin.

For jobs such as picture frames, small pieces of furniture or touch-up work on your car, the simplest paint-spraying device is the pressurized can. There's no gun to clean, no thinning or straining of finish-

5. NEARLY ALL TYPES of sprayers can be used for spraying insecticides effectively. Gun is adjusted to give fine-mist spray pattern for full, uniform coverage



6. EVER BRUSH-PAINT a picket fence? Then you can appreciate the speed and ease with which a spray unit gets the job done—on both sides of fence, too

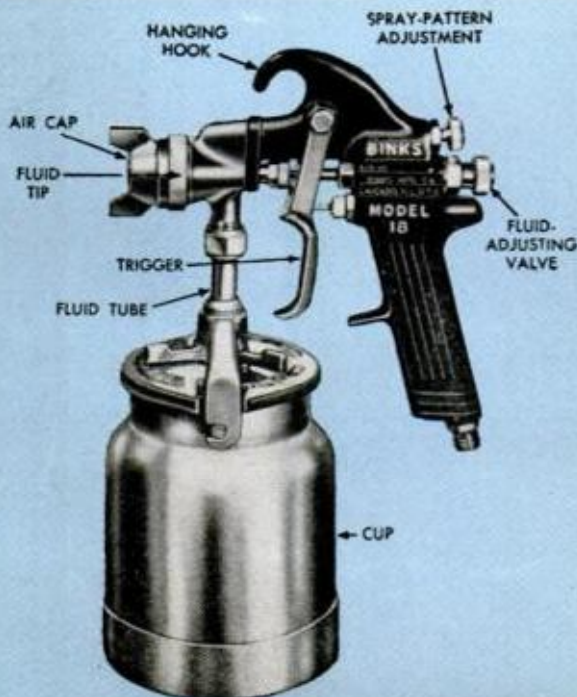
7. THIS GUN attaches to your vacuum cleaner and also to the 1-quart can the paint comes in. Just hook up the two and you're in business. Simple to use, adjust





8. THIS SPRAY UNIT has a portable paint cup, or container. Unit is operated on an air line from a compressor. Gun and container are small and readily carried from room to room or job to job as needed

9. INTERNAL-MIX GUN of type used by pros. Legends point out important parts of gun which is of the type used with a cup, usually of 1-quart capacity. Gun has wide range of adjustment for varying patterns



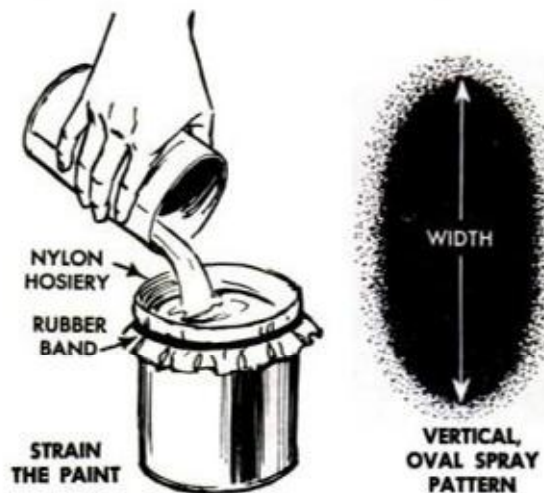
ing materials. But for more extensive work you'll find a regular spray gun practically indispensable around the house and home workshop. You can use it for interior and exterior painting, lacquering linoleum, applying floor sealer, finishing furniture and other miscellaneous jobs such as mothproofing, and applying weed killers and insecticides, Fig. 5.

Small spray units: There are several types of paint-spray units available at modest cost. Good results can be obtained with paint-spray attachments for vacuum cleaners. There are handy, lightweight spray units that have built-in vibrator-type motors. One has a triple-nozzle turret Fig. 1, giving a fan spray for large, flat surfaces, a circular spray for general painting of small articles, and a fog spray for insecticides.

Most spray guns are designed to operate either directly from an air compressor, Figs. 5 and 6, or from a pressure tank. The latter may be connected to a compressor, Fig. 11, or it may be a prefilled, replaceable tank fitted with a reducing valve to dispense air at desired working pressure, Fig. 8.

A compressor generally is operated by an electric motor, Figs. 1, 2 and 4, but units driven by a small air-cooled engine, Fig. 3, also are available. In some sprayers the motor is direct connected to the compressor, Figs. 1 and 4. In other types the compressor is belt driven as in Figs. 2 and 6. Most home owners will find it best to purchase a kit consisting of gun, compressor and hose. Compressors may be of the diaphragm type, Fig. 2, or the piston type, Fig. 3. The former is the least expensive and will serve all the needs of the average home owner. The diaphragm will last many hours and is simple and inexpensive to replace. Piston-type compressors are used for heavy-duty work. Most light-duty guns have an attached paint cup but there is one

10. STRAIN PAINT before spraying, especially paint in can which has been opened and contents partially used. Right, pattern for use on vertical surfaces



which is made for quick attachment to any quart can of paint, Fig. 7. This gun can be operated from a vacuum cleaner, or from a special electric air blower which is available.

For heavy-duty jobs painters often use a gun with a remote paint cup, or container. Paint is forced to the gun by air pressure. A gun not weighted by a paint cup is much lighter and easier to manipulate. Large remote paint containers of 1 to 5-gal. capacity or more, often hold enough paint for an entire job.

Variations in spray guns: Spray guns differ as to the way paint is fed to the nozzle. In a suction-feed (or siphon-feed) gun, air passing over the fluid-tip causes a partial vacuum and thus permits atmospheric pressure on the paint to force it up to enter the air stream. This type of gun is identified by the fluid tip extending slightly beyond the air cap, and by an air vent in the cover of the paint cup on the gun. In a pressure-feed gun, Fig. 9, part of the air is diverted to a closed paint container to force the paint to the fluid tip. This type of gun is capable of spraying heavier liquids than is possible with a suction-feed gun. A remote paint container requires the use of a pressure-feed gun.

Spray guns that operate directly from small air compressors having no pressure-controlling device, are

12. MEASURE DISTANCE from nozzle to wall by this rule-of-thumb method, right. You'll have nozzle at just the right position

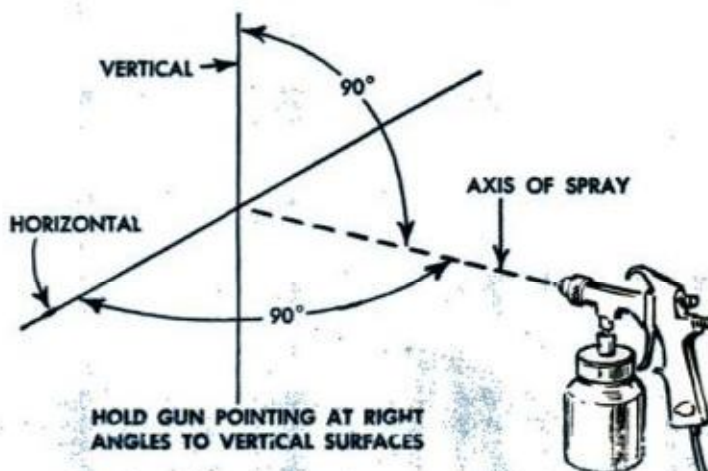
13. WEAR RESPIRATOR on all paint-spray jobs, especially indoors. Right, study this diagram; it tells its own story for painters



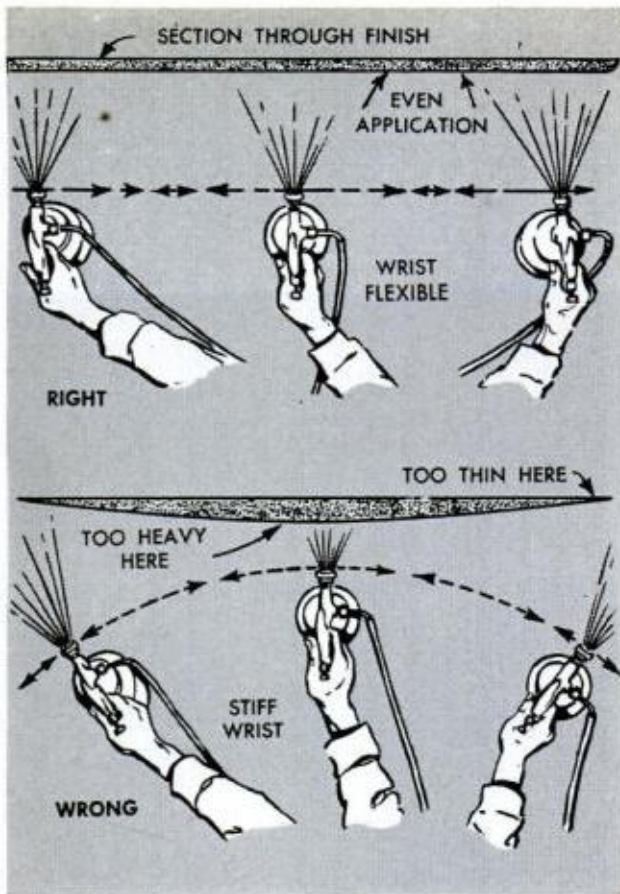
11. HERE'S SPRAY RIG for big jobs, such as painting a house or maybe your car. Remote container holds enough paint for entire job. Paint in container is under pressure



USE A RESPIRATOR



HOLD GUN POINTING AT RIGHT ANGLES TO VERTICAL SURFACES



14. RIGHT AND WRONG ways to handle spray gun when painting vertical surfaces are diagrammed at left. Here's the real trick in uniform spray application

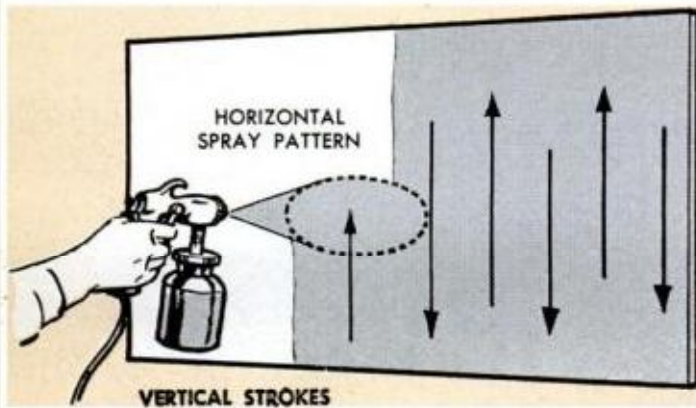
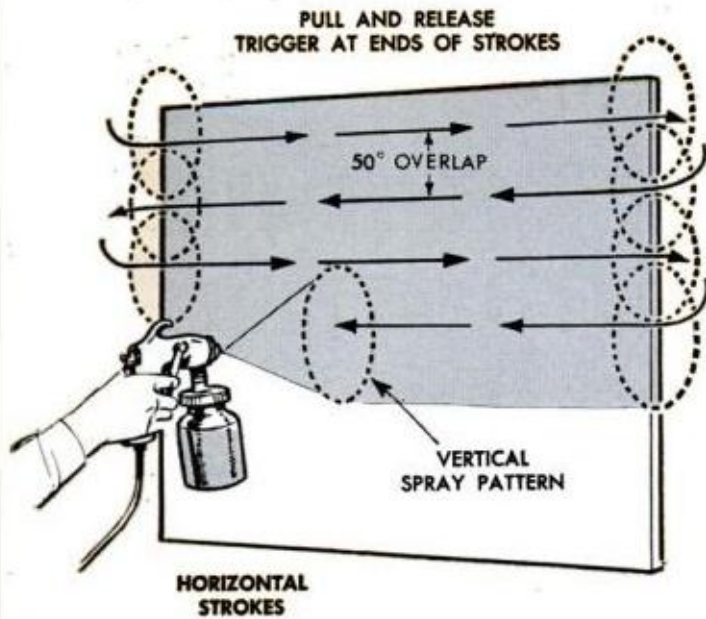
of the bleeder type made to pass air at all times and so prevent a pressure buildup in the air lines. Non-bleeder guns are used on controlled pressure lines where the gun trigger controls both air and paint flow. Guns mix air and paint either inside or outside of the nozzle, and are referred to as internal and external-mix types.

Preparations for spraying: Paints formulated for brush application can be sprayed with a pressure-feed gun. Some paints come in both brushing and spraying consistencies. Usually ordinary paints and lacquers must be thinned for use with suction-feed guns.

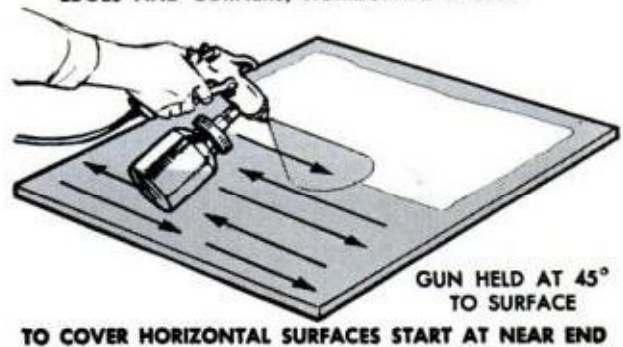
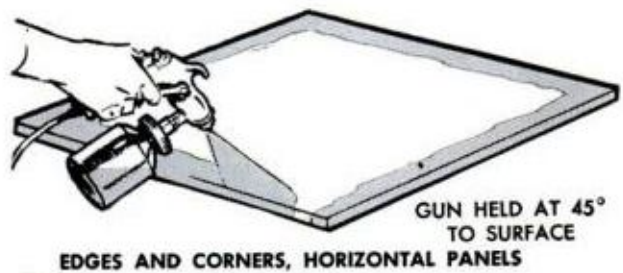
As a rule, paint should be sprayed at a temperature not less than 70 deg. F. The viscosity of a cold paint often makes it difficult to spray. Always strain paint to be sprayed through a 60-mesh screen or a piece of nylon hose, Fig. 10.

For operator comfort and safety, use a respirator, Fig. 13, to avoid breathing pigment particles. Never spray in a room where there is an open flame as nearly all finishing materials are highly flammable. Always provide ventilation, preferably by means of an exhaust fan in a window to draw paint fumes outside. Objects not to be sprayed should be removed from the room, or covered to prevent over-spray from being deposited on them. Where considerable paint-spraying is to be done in a home workshop, provide a ventilated spray booth, Fig. 19.

Spraying techniques: You can acquire



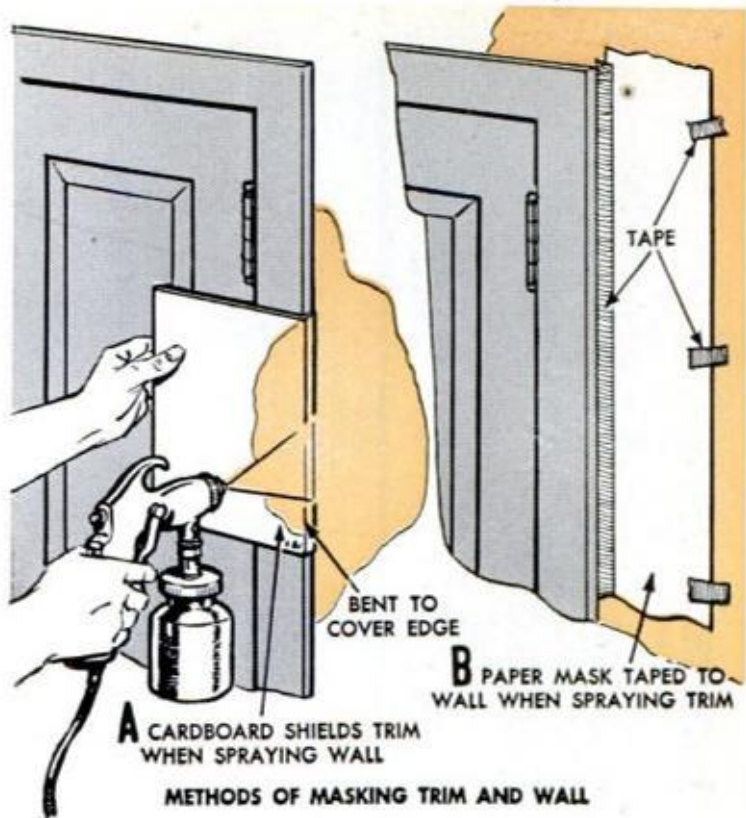
15. SPRAY TECHNIQUES that work are diagrammed for you at the left and below. Note especially the use of both vertical and horizontal spray patterns



needed skills in handling a spray gun by practicing on newspapers taped to the side of a large carton. Experiment with the full range of fluid adjustment, starting from the nearly closed nozzle position that produces a pattern of about one inch wide when the trigger is pulled back fully. Many spray guns produce a fan-shaped spray that forms an oval pattern but some produce a round pattern, and others can be adjusted for either pattern. The longer dimension of an oval pattern is referred to as its width, Fig. 10.

As you adjust for a wider pattern and increase the flow of liquid, atomization becomes coarser. A pattern having a width of 6 to 8 in. when the gun is held 6 to 8 in. from the surface is practical for wall painting. For most other work the pattern should be of a lesser width. The air cap on the gun is turned to produce either a vertical or a horizontal pattern, Fig. 15.

Distance of the gun nozzle from the work surface should be between 6 and 8-in., which can be measured quickly by hand, Fig. 12. A lesser distance than this causes a heavier deposit of paint in a smaller area unless the speed of stroking is increased. For vertical surfaces, the gun should be aimed so that the axis of the spray cone is at right angles to the work surface, Fig. 13. This produces a coating of uniform thickness. On each stroke the gun is moved parallel to the

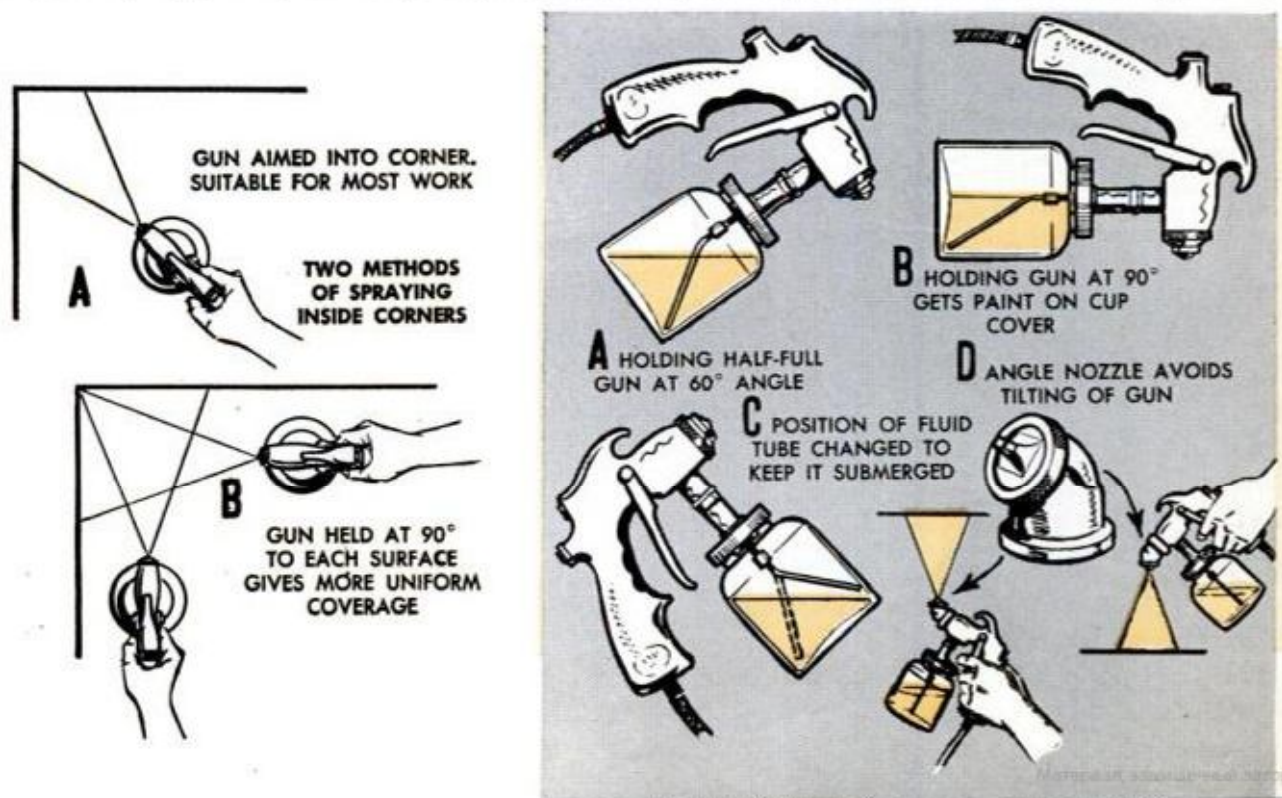


16. HOW DO PAINTERS get that neat, straight line where two colors meet? Answer is by masking as you see it done above, details A and B. Use newspaper, cardboard as masking material

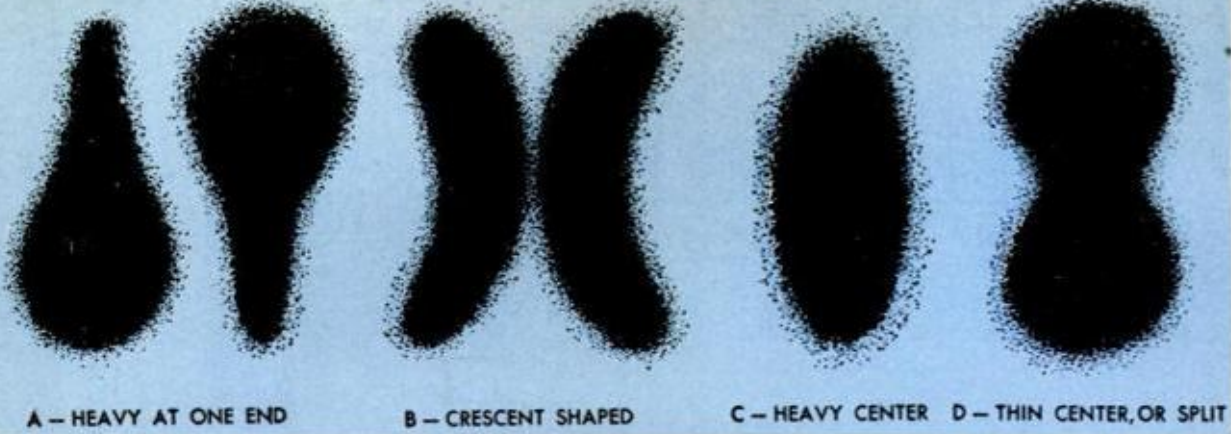
work, using a free arm movement and flexing the wrist at the ends of the stroke, Fig. 14.

Each stroke should overlap the previous one about 50 percent. A lesser overlap may result in streaks. When coating a panel with horizontal strokes the nozzle is adjusted to produce a vertical spray pattern,

17. DETAILS A and B at left and details A through D at right cover important points in the technique of spray painting. Note especially two methods of handling an inside corner, use of angle nozzle



COMMON DISTORTED SPRAY PATTERNS



A — HEAVY AT ONE END

B — CRESCENT SHAPED

C — HEAVY CENTER D — THIN CENTER, OR SPLIT

18. DISTORTED SPRAY PATTERNS like those above usually mean your gun needs cleaning thoroughly, or new nozzle parts

Fig. 15. Consecutive strokes are made in opposite directions.

On long, narrow panels the strokes can be made vertically with the nozzle adjusted to produce a horizontal pattern, Fig. 15. When spraying large surfaces where horizontal strokes must be overlapped, the ends of the strokes are feathered. Similar feathering of adjacent strokes will build up the paint coat to proper thickness at the overlap.

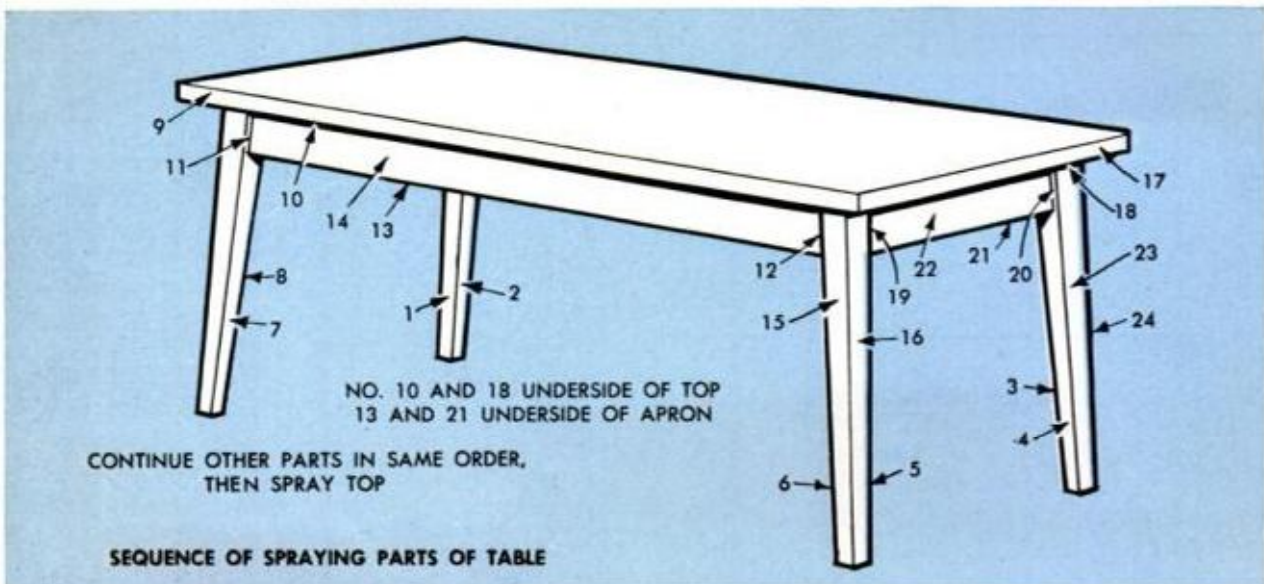
On horizontal surfaces such as table tops the edges and corners are sprayed first, holding the gun at a 45-deg. angle, Fig. 15. Then the center area is sprayed. To finish an inside corner, usually it's

(Continued to page 196)



SPRAY BOOTH

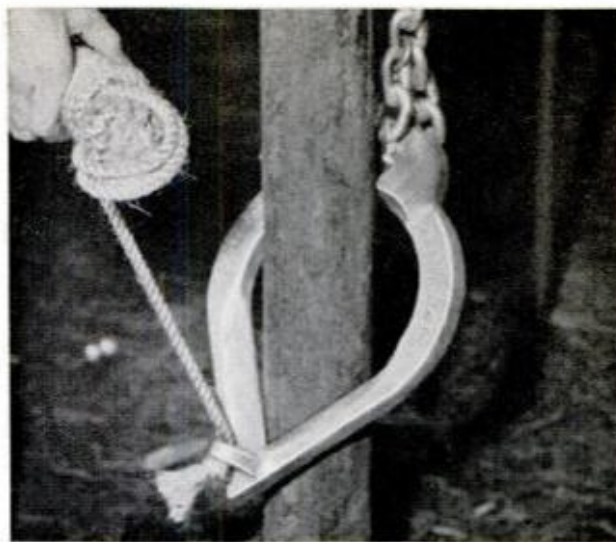
19. SPRAY BOOTH, left, is a help in spray finishing. Below, number sequence shows you how to proceed in finishing a table



FARM TIMESAVERS

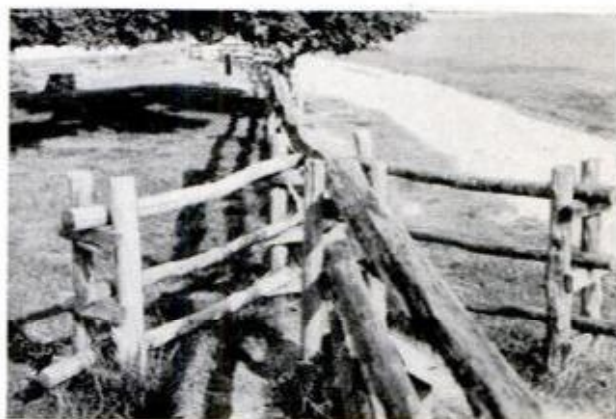
Timber Hitch

This heart-shaped ring of welded steel grips a post, sapling or small timber in a manner similar to a timber hitch tied in a rope—the greater the pull the tighter the grip. It was designed originally for pulling fence posts with a tractor-mounted loader. Notice that the inside edges near the bottom of the heart shape are beveled and that an eye is formed at the opposite end to take a heavy chain. A trip rope knotted to a ring releases the load.—A. M. Wettach



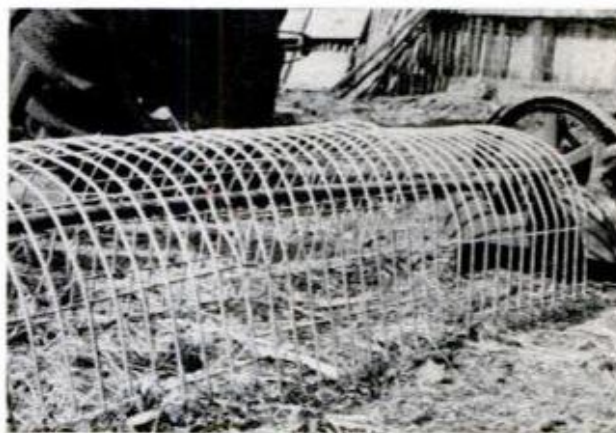
Walk-Through

You don't open this gate; you just walk through and that's how it gets its name. There's nothing to step over or climb over, nothing to unlatch. The two wings projecting from the fence row form an angle just sharp enough to prevent livestock from attempting to make the turn which is necessary to pass through the opening between the line posts. One person passes through easily but a group would have to take it single file. This same walk-through can also be built into a wire fence.



Spider-Web Guard

No matter what you have to use to cover that dangerous tumbling rod, it will cost less than a broken leg, or worse, which can happen in the wink of an eye if one should accidentally get a trouser leg caught in it. One way to guard the rod is to use sections of steel crib ventilators, placed end to end, with the half-round sections anchored to the ground on each side of the rod as pictured. The guard should extend far enough over the ends of the rod to cover the universals, which are just as lethal as the rod itself.—A. W. Ranniger



Self-Unloader

When it was designed, a truck-type lime-spreading box was intended only for handling limestone. But with a few simple changes, such as adding a swinging endgate and side and end boards to increase capacity, it can be used to handle shelled corn, any of the small grains, and even ear corn. The built-in drags can be arranged for power-takeoff drive so that when parked at the elevator the box will unload itself without any necessity of elevating the front end with a wagon jack. The hinged rear endgate is a necessary addition in order to control the flow of grain to the elevator hopper.

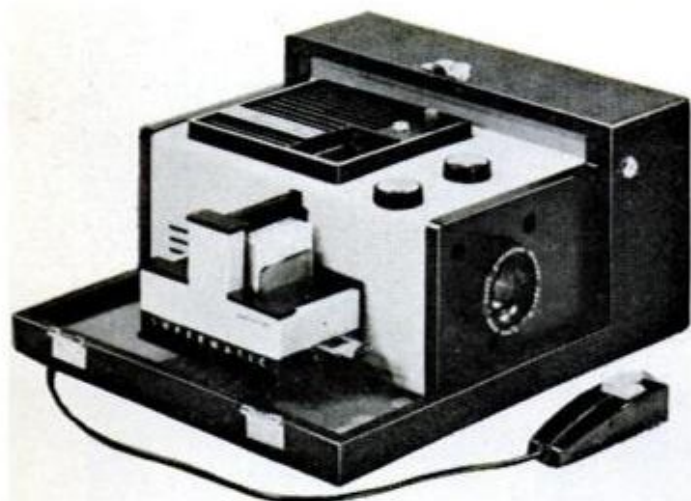
—Paul D. Andre





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Heating With Electricity

Q—We're planning on building next year and are considering heating our new house with electricity. Is this type of heating system practical?—J. S., Wash.

A—Yes, electric radiant heating is certainly practical. For new construction, especially, it has many advantages. The local electric rates, of course, must be low enough to compete with other heating fuels, but even in relatively high-cost areas some homeowners willingly pay extra to enjoy the convenience of electric heating.

Many electric utility companies are now promoting electric heating by offering reduced rates in order to use up the surplus which is available during winter months when air conditioners are not in use.

In roomy old uninsulated houses heating by electricity generally is considered too expensive. But in new construction the use of extra insulation reduces the number of kilowatts needed to heat a house.

Ceilings, for example, should be insulated with at least six inches of mineral wool and outer walls with a minimum of three inches. All standard construction methods are used, of course, to insure a tightly constructed house, including double-glazed windows, weather stripping and caulking around door and window frames.

Installing and maintaining a radiant resistance heating system is less expensive

than other systems. Rooms may also be independently heated and controlled by room thermostats. In a room warmed by radiant heat one feels comfortable at lower temperatures than with convection heating systems. It's a clean, odorless heat with no drafts. The space needed for ducts, registers and heating plant is eliminated, since wires are embedded in ceilings and walls.

In an older home with an inadequate heating system one or two electric radiant units with independent thermostats may easily be added to furnish additional heat.

Squeaky Floors

Q—Our hardwood floors in the living room and upstairs hall squeak in several places whenever we walk on them. The living room subflooring is open to the basement, but the subflooring in the hall cannot be reached. What should we do to stop these annoying squeaks?—W. A., Ohio



A—Where floors are squeaking, chances are the carpenter goofed and didn't use enough nails to nail down the flooring. If subflooring is exposed in the basement, you can correct the condition easily. Sometimes only two or three small wedges, inserted between the joists and subflooring, will be sufficient to stop the annoyance. If this fails, you can drill several holes through the subflooring into the top flooring and pull boards together with screws which are long enough to reach into the top flooring.

But in the upstairs hall it will be necessary to work from above. Where appearance is important, several round plugs should be cut from scraps of matching flooring, or precut plugs may be purchased. Blind holes are drilled in the upper flooring to the depth and diameter of the plugs. Screw holes are then drilled and flathead screws used to stiffen the flooring. Repair is completed by gluing plugs in the holes.

If appearance is not a prime consideration, finishing nails may be driven at an angle through the tongue and groove joints, the nail heads set below the surface and holes filled with wood putty.





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(Continued from page 190)

best to work one side first then take the adjacent side, Fig. 17, left-hand details A and B. When applying clear coatings or stain in an inside corner each side should be coated separately to obtain an even coating.

Areas not to be painted, such as door and window trim, can be shielded with pieces of cardboard of suitable size, which are moved along with the gun, Fig. 16, A. Wall areas adjacent to trim can be covered by paper masks held with tape as in detail B. Window panes are similarly covered.

When it is necessary to tilt a gun, as for spraying table tops, ceilings, and the underside of shelving, the cup should not be more than half full. It then can be tilted up to 60 degrees without getting paint on the lid. See details A to D, Fig. 17. On most guns the position of the fluid tube can be changed to work special jobs. Where considerable spraying of horizontal surfaces is to be done, an angle nozzle, Fig. 17, detail D, can be used.

Distorted spray patterns: When spray patterns are distorted, Fig. 18, heavy at the top or bottom or are crescent shaped, either the air cap or fluid is partially clogged, and requires cleaning. A heavy center pattern may be due to too low a setting on a spreader-adjustment valve; too low an atomizing pressure on a twin-jet cap, paint too thick, too much fluid pressure (with pressure-feed guns) or an excess flow of liquid beyond the normal capacity of the air cap.

A split or narrow-center spray pattern is caused by improper balance between air and fluid. This is remedied by reducing the width of the spray pattern or increasing the fluid pressure. A fluttering spray is caused by air getting into the fluid line, which happens when the cup becomes empty or the gun is tilted so the fluid tube is only partly submerged. It also can be caused by a loose fluid tube that allows entrance of air. On a suction-feed gun, jerky spraying can result from using too thick liquid, a clogged vent hole in the lid, a loose coupling nut on the lid, or a loose needle packing at the fluid valve.

Furniture finishing: In furniture finishing, a small spray pattern from 3 to 5-in. wide is best as it permits close control of overspray. For easy handling and accessibility to all parts, the work should be placed on a turntable, and spraying done in a ventilated and illuminated spray booth, Fig. 19.

To minimize spray dust on areas already

(Continued to page 198)

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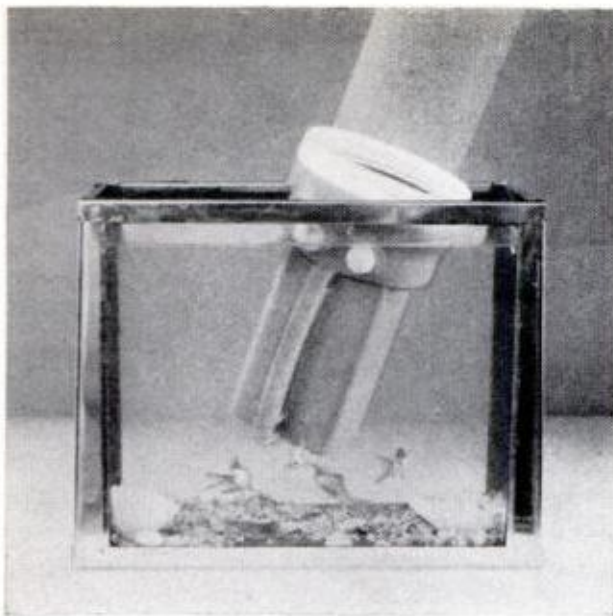
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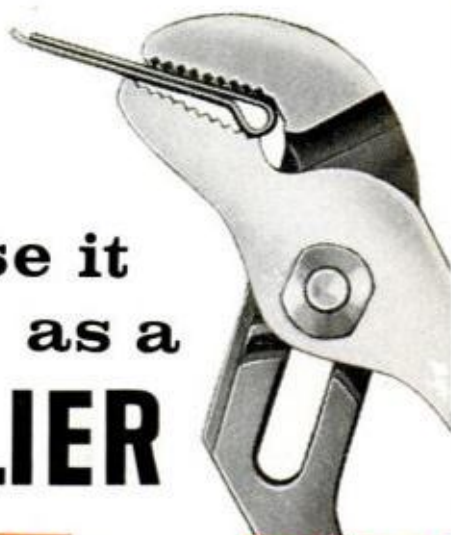
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coated, edges and out-of-way places are done first. Turnings such as table legs should be sprayed with vertical strokes and a horizontal spray pattern slightly wider than the legs. When spray-finishing a small table, Fig. 19, the legs are done first from the inside. For square legs, two sides of each can be sprayed from one position of the gun, the table being rotated for each leg. For round legs, all are first sprayed from the inside, then each is finished separately. Next, the edges of the table top are done, then the underside of the extending top and the apron and the outside of the legs. The table top comes last. On cabinets and casework, the inside is done first, then the outside.

Cleaning spray guns: Always clean your spray gun thoroughly and immediately after using it. Fill an extra paint cup about one-quarter full of solvent used for the particular paint sprayed. Usually pint-size fruit jars make ideal extra cups for suction-feed guns, but metal cups should be used on pressure-feed guns. Solvents are as follows: water for water-base paints, turpentine for most paints and varnishes, alcohol for shellac, and lacquer thinner for lacquer.

With the compressor turned off, allow the fluid tube to drip a few seconds before wiping off excess paint from the tube and inside of the cap. Now turn on the compressor and spray solvent through the gun four or five times for two-second durations, against a newspaper or cloth to catch the spray. Then hold a cloth tightly against the nozzle and pull the trigger a few times to agitate the solvent violently inside of the cup and fluid tube. Next, wipe the cap and outside of the gun. Empty the remaining solvent into the paint cup to clean this. Be sure to get paint residue from the threaded portions of both cup and cover if these screw together. Remove the air cap, fluid tip and needle, submerging these in solvent. Don't use a caustic alkaline cleaner as this can damage aluminum parts. ★★

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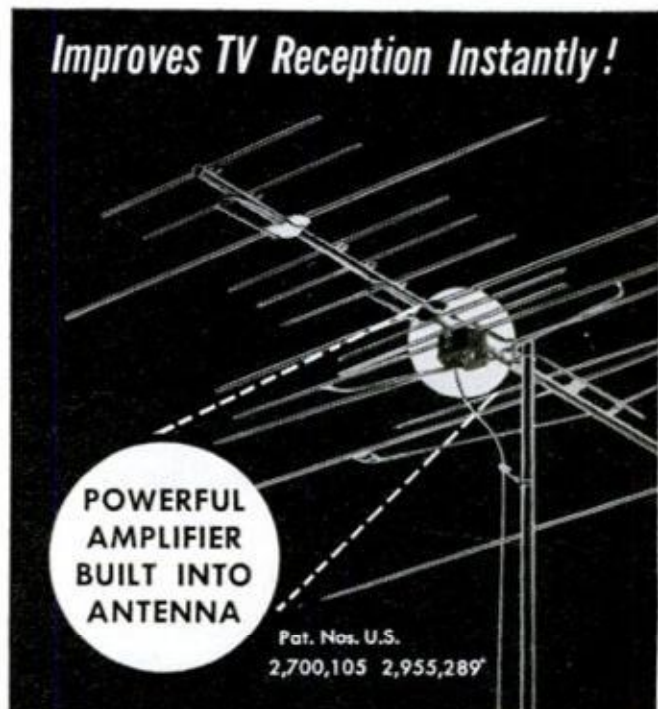
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Triple-Top Fun Table

(Continued from page 145)

as in the sectional detail in Fig. 7. Note the $\frac{1}{16} \times \frac{1}{16}$ -in. rabbet that is made along the outer edge. This serves as a parting line at the joint so there is no chance of chipping the finish when it is necessary to lift off the top rail at a future date. Clamping blocks are glued temporarily on each side of the mitered joints as before, Fig. 6, and splines are cut from solid stock with the grain running crosswise. Now you can glue and clamp the joints. Pocket openings in the rail itself are laid out and cut after the glue is dry, the corner pockets being scribed as in Fig. 9. When placed over the tongue, or tenon, on the side-wall members, the rail should come flush with the outside surfaces.

Part II next month will describe the fitting of the filler blocks at the pockets, cutting the cushion rails and the steps in covering both the bed and the rubber cushions with pool-table cloth. ★ ★ ★

MATERIALS LIST

(All dimensions actual sizes in inches)

2 pcs.	$\frac{3}{4} \times 7\frac{1}{2} \times 92$	Side rails
2 pcs.	$\frac{3}{4} \times 7\frac{1}{2} \times 48$	End rails
2 pcs.	$\frac{3}{4} \times 5\frac{1}{4} \times 86\frac{1}{4}$	Side wall of tunnel—sides
2 pcs.	$\frac{3}{4} \times 5\frac{1}{4} \times 36\frac{1}{2}$	Side wall of tunnel—ends
1 pc.	$\frac{3}{4} \times 4\frac{1}{4} \times 36\frac{1}{2}$	Unused tunnel bottom—end
2 pcs.	$\frac{3}{4} \times 4\frac{1}{4} \times 86\frac{1}{4}$	Side tunnel bottoms
1 pc.	$\frac{3}{4} \times 4\frac{1}{4} \times 46\frac{1}{2}$	Bottom-ball return bottom
2 pcs.	$\frac{3}{4} \times 1\frac{3}{4} \times 91\frac{1}{4}$	Bed—shelf—sides
2 pcs.	$\frac{3}{4} \times 1\frac{3}{4} \times 43\frac{3}{4}$	Bed—shelf—ends
2 pcs.	$\frac{3}{4} \times 1 \times 80\frac{1}{2}$	Cleats for table support—sides
2 pcs.	$\frac{3}{4} \times 1 \times 35$	Cleats for table support—ends
1 pc.	48x96 (Particle boards)	—Playing bed
1 pc.	$\frac{3}{4} \times 3\frac{1}{2} \times 80\frac{1}{2}$	Center brace under bed
4 pcs.	$\frac{3}{4} \times 1\frac{1}{2} \times 3\frac{1}{2}$	Center-brace glue blocks
4 pcs.	$\frac{3}{4} \times 2\frac{5}{8} \times 43\frac{3}{4}$	Support slats under bed
2 pcs.	$\frac{3}{4} \times 2\frac{1}{4} \times 48$	Top rail—ends
2 pcs.	$\frac{3}{4} \times 2\frac{1}{4} \times 92$	Top rail—sides
4 pcs.	$\frac{3}{4} \times \frac{5}{8} \times 8$	Splines for side rails
2	$\frac{1}{2} \times \frac{3}{4} \times 5$	Support blocks for ball return
4	$\frac{1}{4} \times 1 \times 3\frac{3}{4}$	Splines for top rail

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Oceans Running Out of Fish

All countries must cooperate toward the most effective use of the ocean's food, for careless use is taking a toll of ocean life, says Dr. Robert Cushman Murphy, American Museum of Natural History zoologist.

He says new ways of harvesting the ocean must be discovered to feed the mushrooming world population, but that these new sources could be quickly exhausted through man's own carelessness or lack of planning.

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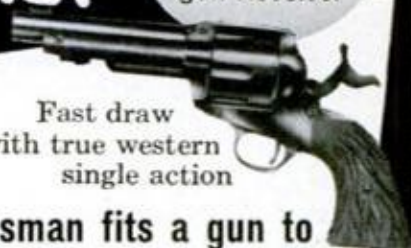
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"Next!"

Seattle's Floating Prowl Car

(Continued from page 131)

mile-an-hour wind was blowing. A seacock broke loose, the bilge filled with water and the boat tipped over. Seven persons drowned, some while trying to swim to shore. A Navy helicopter plus help from the Coast Guard and Harbor Police saved six others, including a two-month-old baby.

"They'd have been better off to stick with the boat," Stevenson said and cited an example of a person who had followed this procedure in another accident. The police were called to go to the aid of a capsized 16-footer. There was no sign of life. Then came a muffled call from beneath the boat. A policeman dived under and brought up a gasping woman. She had been clinging to a seat and holding her head in an air pocket.

As we talked, a call squawked over the radio: "... Three kids on a raft. The raft is just some inner tubes tied together."

Two officers scrambled into a patrol boat and roared off.

Outdoing Huckleberry Finn

"Kids sometimes will ride things today that even Huck Finn wouldn't have considered," Stevenson said. "We recently picked up some boys astride a timber in rough water. They had stolen the timber—it was 12 by 12 inches thick and about 25 feet long—and had attached an outboard motor to it. They were lucky we caught them before they drowned."

Ordinarily, Seattle's fire department fights all fires at docks with high-powered fire boats. In the last couple of years though, police boats have played major roles in answering emergency calls.

There was, for example, a fire at Renton, a nearby city. It started with the burning of a scrap pile of timber. Wind fanned the flames toward a shipyard. Land-based pumpers sped toward the scene, but couldn't get at the fire. A fast police boat with a pumper got the fire under control. Then, only a stone's throw from the Ballard dock station, fire broke out at the Seattle Cedar Mill. Again the police roared into action. The damage was kept to a minimum.

In both cases the police boat, with its equipment limited in power, had to approach dangerously close to the flames. Windows on the boat cracked from heat and two men were badly burned. The police are justly proud of a bronze plaque that hangs in the Ballard station. It is for heroism in fire fighting and comes from a group of men not easily impressed—the Maritime Press Association.

"It's careless smoking on a boat—especially during refueling—that usually brings a call for our fire-fighting equipment," said Stevenson.

Modern Pirates

With all the boats in the many coves around Seattle, thefts are surprisingly few. Police, however, will long remember a crew of four juvenile pirates. Small boats started disappearing from moorings on Lake Washington. The total reached seven. At the same time, dock warehouses were being broken into at night and seafaring equipment stolen. There was no clue to the robbers, except that most operations would have required use of a boat.

Then came a big theft—a 26-foot sailing ketch. You just don't hide a boat that size easily so the police started combing every inlet. Finally, a police boat nosed among the bullrushes in a little-traversed section of Lake Washington. There was the ketch; four boys were working on it. The seven boats were hidden there also, along with much of the loot from the warehouse. There was a ninth boat, and it was the most interesting. It was a rowboat they had used in boarding other craft and in slipping up to warehouses. Its sides were covered with rubber hosing to eliminate thumping and other noises as it moved into congested dock areas at night. The pirates were, of course, punished.

"Modern developments make it easier to cope with the trickiest situations encountered because of the increase in boating," said Capt. Stevenson.

"Now, with our helicopter, we have added air coverage to the waterfront. Suppose a man collapses from a heart attack in his boat during the night. We couldn't spot his boat easily from water, but the helicopter can find it, drop a flare. Or a diver can leap from the 'copter and swim to the boat.

"No," he concluded, "I wouldn't want to be back on highway patrol. It's too interesting here." ★ ★ ★

QUOTE:

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Add a Boston Rocker

(Continued from page 159)

rest to prevent whipping of the long back posts when turning. Finally, cut the rockers to contour from $\frac{3}{4}$ -in. stock.

Assemble a spindle-bending jig, or rack, as in Fig. 12 for bending the back spindles as in Fig. 13. Place the spindles in a wash boiler or any other suitable receptacle and add enough water to cover them completely. Allow to soak overnight. Then bring the water to a rolling boil and continue for fifteen or twenty minutes. Remove spindles from the water immediately and slide each into the bending jig as in Fig. 13. Allow to dry before removing from the jig.

Final Sanding

Now sand all parts, except the turnings which should be sanded while still in the lathe, to finish smoothness. Round all exposed edges slightly and then make a trial assembly, beginning with the legs and rungs and proceeding as in Figs. 11, 14 and 16. To make sure that you get the bent back spindles in the correct positions when making the final assembly saw a strip from $\frac{3}{8}$ -in. stock to the same curvature as that of the back rail and drill a pattern of slightly oversize holes through the strip, the holes on the same centers as those in the back rail. Set the back spindles and posts in place as in Fig. 14 and place the strip over the ends. Locate the strip at the same height as the bottom edge of the back rail in the finished chair. Now, using a yardstick or any suitable straightedge, you can adjust each spindle so that the bends are in the correct position. Once they are positioned, make registering marks on each spindle and on the seat, also number the spindles and posts. This will enable you to return them to position when making the final assembly with glue in the joints.

You'll undoubtedly have to do some hand fitting of parts in the trial assembly in order to make sure they will all fit together properly when you make the final assembly. Note in Fig. 9 that the arm-rest posts, I, are slotted for wedges and that the arms are doweled to the back posts, also that the rockers are pinned to the legs. Spread glue in the holes and tap the parts into place, using a soft hammer or mallet as in Figs. 10 and 16.

What kind of wood to use? You have a choice of maple, birch and cherry. The first two can be stained a brown or ruddy maple color and cherry can be finished in the natural color with a clear finishing material. Or the chair can be painted a dull black or a medium red. Rub the final coat down with fine steel wool. ★ ★ ★

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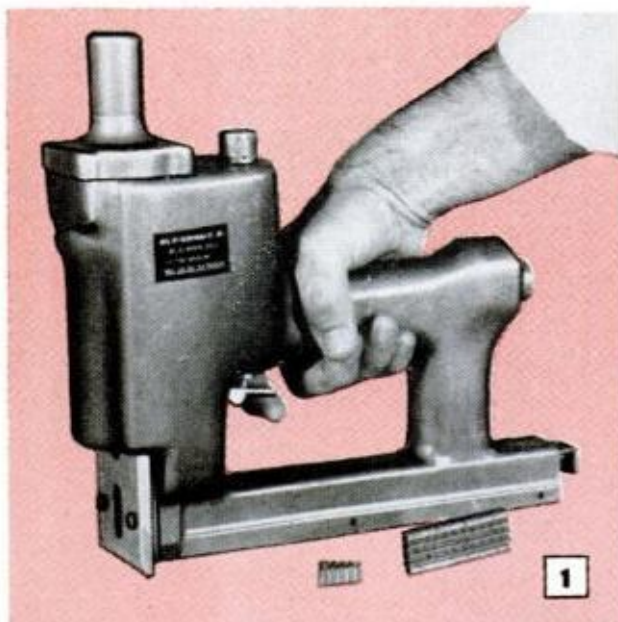
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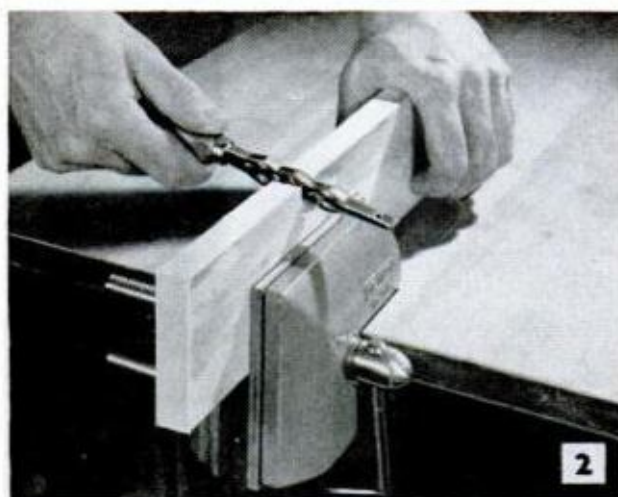
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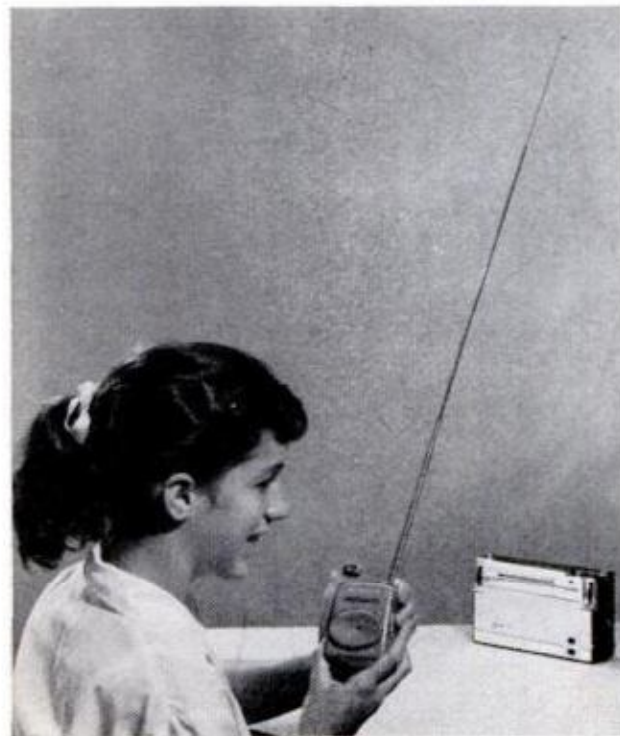


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Table-Top Racing

(Continued from page 95)

cars two inches long. Two-lane roadway comes in curved or straight sections of black plastic, and in an assortment of lengths and diameters so that four lanes of traffic can be achieved by running track sections in parallel. Pairs of nickel silver strips are imbedded lengthwise in the center of each lane, carrying current via transformer and rheostat to two contact pickups under the vehicles. Miniature spark-gap motors about the size of three stacked dimes drive rubber-tired wheels (less than half an inch in diameter) fast enough so that cars achieve scale speeds up to 150 miles an hour. One outfit even makes a speed control with built-in dial which provides a continuous scale speed readout.

The fact is that table-top car racing has begun to sweep the country the same way electric trains did in the early 1900's. A group of Dodge executives recently called the new baby cars "the ultimate in compacts," and tipped their hats to them in a significant discussion of the new craze. "There may be more than 300,000 of these little electric-powered cars in use before the end of the year," they predicted. "Model trains took 30 years to become a \$100,000,000-a-year business. Model automobiles may match them in five years."

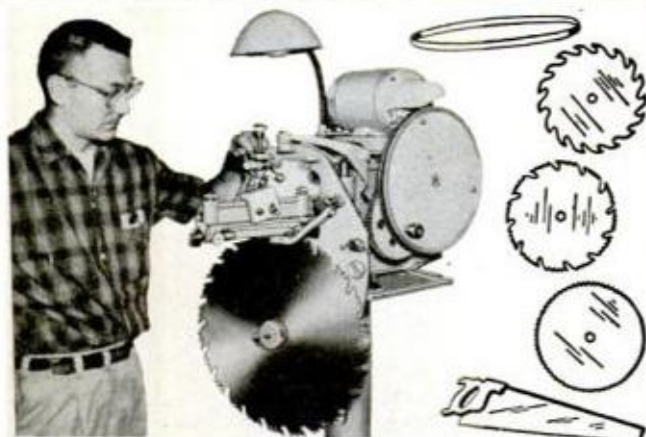
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DEPT. W-6



EMERSON ELECTRIC of St. Louis
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Those Baseball Changes

(Continued from page 84)

and 12 verified game balls from 1909 to 1937, loaned and donated by PM readers.

For the tests, a batting machine was designed and built by the Armour staff under project engineer Bernard Juskie. It was designed to swing a mounted bat at controllable speeds, then to place a test ball in its path with a solenoid-operated mechanism built to deliver the ball to the same spot on the bat each time. After the impact, the ball was driven through two photoelectric screens six feet apart, then on into a soft backstop. The speed of the bat in its arc and the speed of the ball through the traps were registered and photographed on an oscilloscope for positive, accurate measurement. At the same time, a Fastex motion picture camera recorded the impact at 5000 frames per second for studies of the ball's performance.

Two types of batting device were used. With the first, a whole bat was mounted in live rubber to simulate a hand-held bat and to minimize any effects of a rigid "hammer." The second used a split bat mounted on a steel I-beam. The rigid I-beam mounting was found to be more desirable for consistent results.

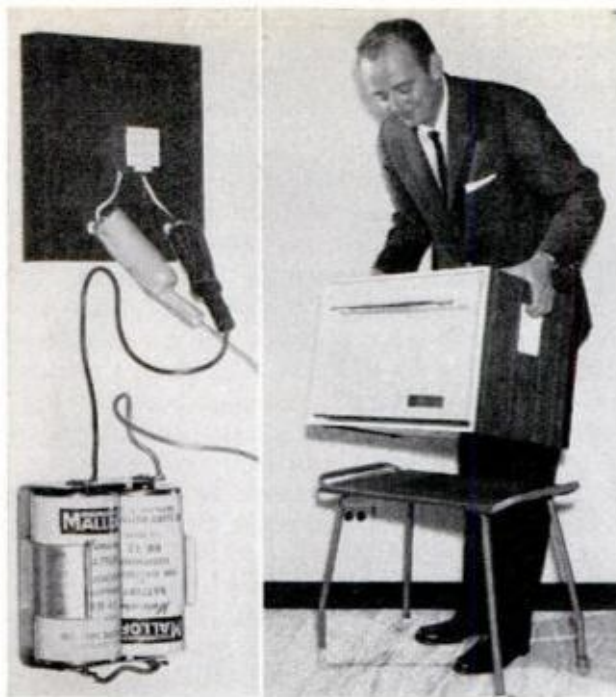
What is "Lively"?

The impact tests were set up to measure the "coefficient of restitution" of the test balls—their ability to rebound from a blow, or in one word, their liveliness. The mathematical equation is $V_b = (1 + e) V_h$; V_b is the velocity of the ball, V_h is the velocity of the "hammer," and e is the coefficient of restitution.

The first puzzling discovery was that, though our 12 sample 1961 balls were all from the same carton, their coefficients of restitution varied from .50 to .68; enough variation to account for a 12 percent difference in distance when hit by a bat at the same speed. While the older balls showed a similar tendency to vary, the 1927 balls tested had less variation than the modern balls tested.

The results of the impact tests were as surprising as those of the wind-tunnel tests. Though individual performance varied widely, a trend showed up which held through the entire impact series: The 1927 (and other, older) balls showed almost exactly the same coefficient of restitution as the new balls at high bat speeds. The curves on our graphs are identical at high bat speeds. *But at lower bat speeds, the 1961 balls were much "bouncier" than the older samples, and the slower the bat speed,*

(Continued to page 212)



SAMPLE MODULE (left, above) is covered with layer of frost, seconds after being connected to battery. Portability of unit is demonstrated by lifting. Total weight of entire refrigerator, only 37 pounds

Thermoelectric Refrigerator

A wide assortment of shapes and sizes in the new thermoelectric refrigerators is now available. The units operate either from a.c. line voltage, or can operate, in the case of the picnic chest, from rechargeable wet cells. The picnic chest features a thermostatic control, provides up to 50 hours refrigeration on one battery charging.

The new units require no liquid refrigerant, nor mechanical compression for operation, but depend, instead, on transistorized solid-state thermoelectric modules. The portables, those which operate from a.c. lines, can be placed on shelves, mounted on roll-around tables, or built into existing furniture.

Two ice-cube trays are furnished, and freezing time is comparable to a standard home refrigerator.

The picnic chest can be recharged by plugging into a.c. household current or 12-volt car or boat battery. The refrigerator operates only on standard house current.

Picnic chest \$99.95, Portable refrigerator \$129.95. Wright Mfg. Co., 2902 W. Thomas Rd., Phoenix, Arizona.

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What's New in High Fidelity

by Fred Honig

High Fidelity in a Closet

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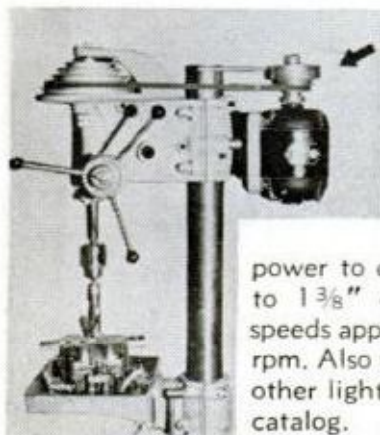


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the greater the difference. So the light
hitter, not the home run king, is the one
who should really be profiting from a
livelier ball. That might partially explain
the home run exploits of some of the lighter
men who've cropped up in recent years,
and the larger number of home runs being
hit in the major leagues over-all.

A statistical survey of the number of
home runs hit by individuals, teams and
leagues showed that, with the exception of
Roger Maris' 61 homers this year, the gen-
eral trend in home runs required to lead
either league is down since the Ruth era.
At the same time, batting averages, both
individual and team, are down from the
"golden twenties." But six times as many
home runs are being hit today as were hit
at the turn of the century, and twice as
many as were hit during the Babe's heyday
in the twenties. But Ruth's season record
stood until this year, and still hasn't been
beaten in 154 games.

Maybe it adds up. The ball isn't much
livelier for the "home run king" types like
Ruth and Mantle and Maris. But it re-
sponds better to the lesser efforts of light-
er, less powerful players. Coupled with the
other factors that affect home run hitting,
this low-speed liveliness could explain the
increase in over-all home run hitting while,
at the same time, individual performance
has not improved.

What other factors? There are several.
Perhaps the most important is that baseball
management, recognizing the crowd-draw-
ing power of the Ruths and Mantles and
Marises, are paying more for long balls
than for batting averages. Ralph Kiner,
asked by a newsman why he didn't choke
up on his bat and swing for singles and a
good batting average, answered, "because
the Cadillacs are at the end of the bat."
And he was right.

Today's players are using lighter, shorter
bats, which more players can swing fast
enough to hit the ball out of the park. Even
the big hitters are following this trend.

Players themselves are bigger and
stronger than they were in 1927—or in
1957, for that matter. Their training is bet-
ter, and their understanding of batting
techniques has grown yearly. Columnist
Dick Hackenberg wrote "if Ruth had Man-
tle's training and exercise program back in
1927, he might have hit 100."

Baseballs, whatever changes have taken
place, are fresher at any given moment,
simply because more balls (about 50) are
used in each game. A fresh ball is more
resilient than one that has been hit a great
many times.

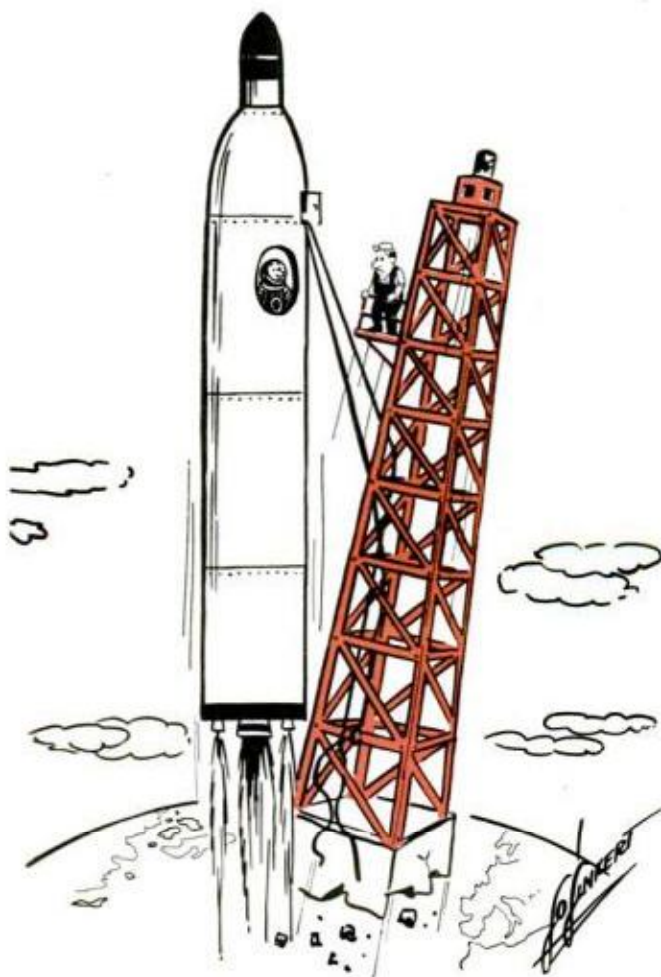
Pitching has suffered, both from the re-
(Continued to page 214)



Pyramid for University

Pointing skyward on the campus of Gakushuin University, Tokyo, is a pyramid-shaped building designed to hold 700 students for lectures.

The base is roughly 100 feet square and the height of the lecture hall is some 80 feet. One unusual feature of construction is that no vertical columns were used in the construction. All columns are angled. The pyramid is part of a new University project.



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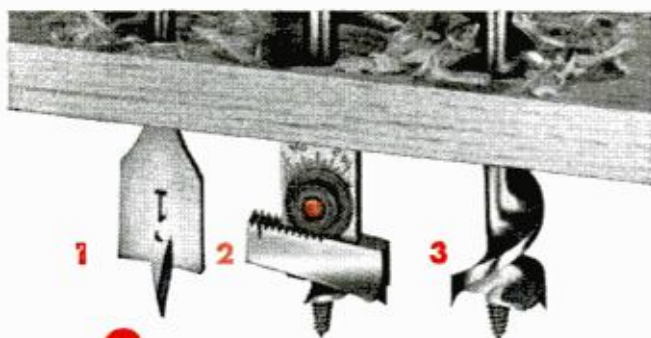
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striction against trick pitches like the spitball and from dilution of talent because of new teams in both leagues.

Even the umpire gets into the act, according to the pitchers and managers who complain that the strike zone has shrunk in the last few years, forcing the pitcher to stay away from the corners and put it down the middle.

Short parks have added to the number of homers, too, though temporarily in most cases. Many parks show fields hopefully designed to favor the strong pull hitter—even Yankee stadium, "the House that Ruth Built."

So everything has changed, including the baseball itself. And there is a ball that will go greater distances and does help less-powerful hitters substantially. Maybe that will settle the argument for a while. Or maybe it'll start a new one.

We hope that the Baseball Commissioner and the league officials will take note, since they've been involved in the controversy as much as anyone. Perhaps they can take some kind of action to tighten up the allowable tolerances in size, weight and resiliency of the big-league ball in the future, to eliminate the arguments.

EDITORS' NOTE: PM's baseball tests could never have taken place without the cooperation of the nation's news media, who generously publicized our request for old baseballs, or their and our many readers who loaned or donated souvenir baseballs or assistance for the tests. Our thanks, especially, go to these friends:

Mr. George ("Rube") Walberg, Miami, Florida

Mr. E. H. Wyman, Pittsburgh, Pennsylvania

Miss Madeleine Thiess, Maywood, Illinois

Mr. Jim Devero, Chicago, Illinois

Mr. Flynn McGuire, Chicago, Illinois

Mr. Frank Vrchota, Chicago, Illinois

Mr. Fred Rappuano, Weehawken, New Jersey

Mr. Bernard Long, Chicago, Illinois

Mr. Bill Madigan, Middletown, New York
Mr. Rudie Schaffer, Business Manager, Chicago White Sox

Dr. Caroline Miller, Armour Research Foundation

Dr. Robert A. Eubanks, Armour Research Foundation

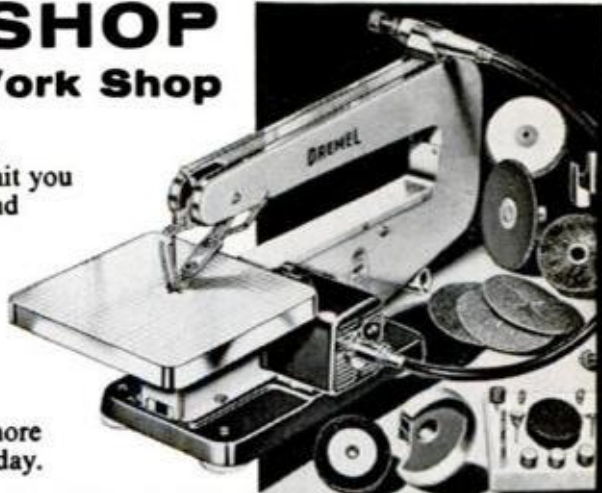
Mr. Bernard Juskie, Armour Research Foundation

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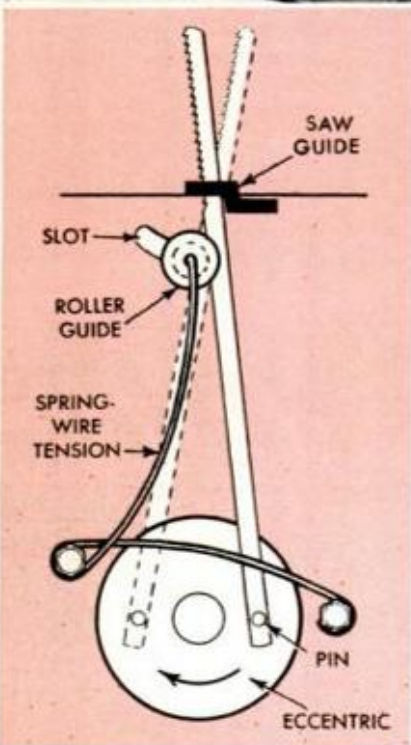
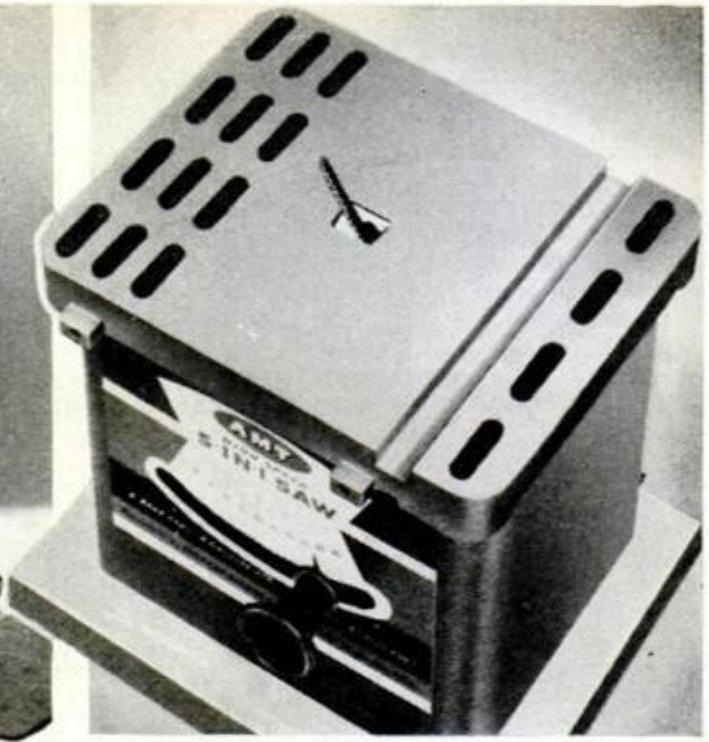
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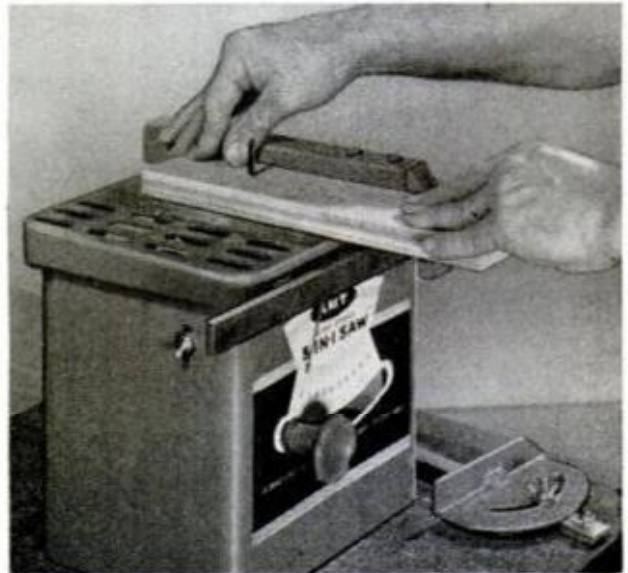
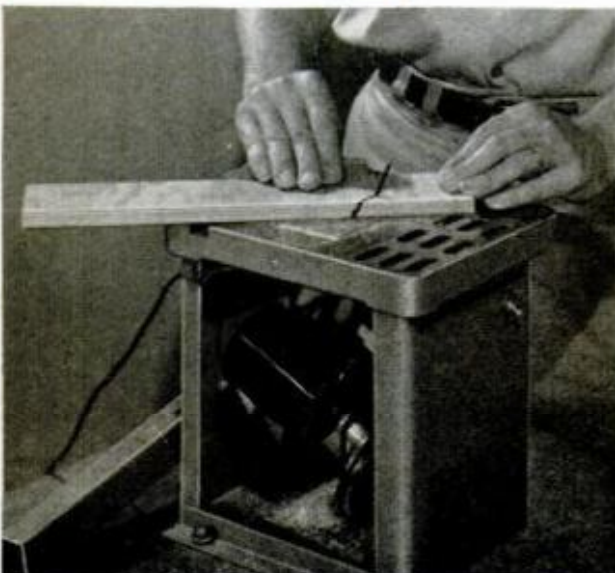
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The Wankel-Engine Car

(Continued from page 73)

camshaft or connecting rods. The engine has a single combustion chamber (a slightly flattened circle in cross section), faintly resembling a cell about to divide. This chamber, or cylinder if you will, is closed at both ends by plates which contain the valve ports.

Inside this chamber is one of the engine's two moving parts, a rotor with the shape of an equilateral triangle. The other moving part is the crankshaft around which the rotor is fitted. The rotor makes an eccentric orbit inside the chamber so that its three corners are in contact with the chamber sides at all times.

An inset metal strip at each corner of the rotor acts as a piston ring. As the rotor's tips pass around the walls of the combustion chamber the three cavities formed between them and the chamber's walls increase and decrease in displacement in accord with the eccentric action of the rotor revolving about the shaft.

As a given cavity expands or contracts it parallels the working cycle of a four-stroke piston engine. The mixture is drawn in as a cavity expands while passing an intake port in the end wall. As the rotor turns further the cavity is closed and compressed. Then it passes a recessed spark plug and enlarges again to absorb the expanding force of the mixture during the power stroke.

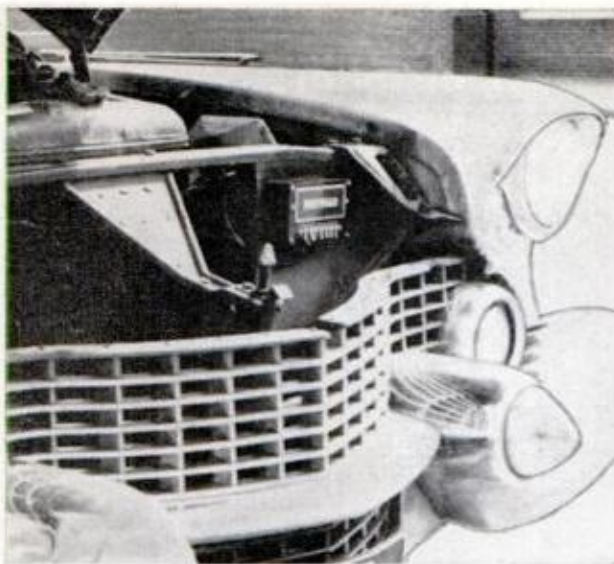
Finally, the cavity is compressed as it passes the open exhaust port in the opposite end of the combustion chamber. Thus, it becomes clear that there are three firing or power strokes per revolution of the rotor. This makes for a very smooth and fast engine, a fact confirmed by this performance report. ★ ★ ★

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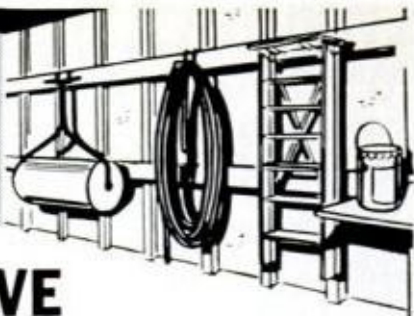


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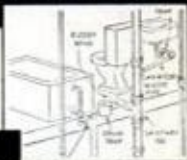


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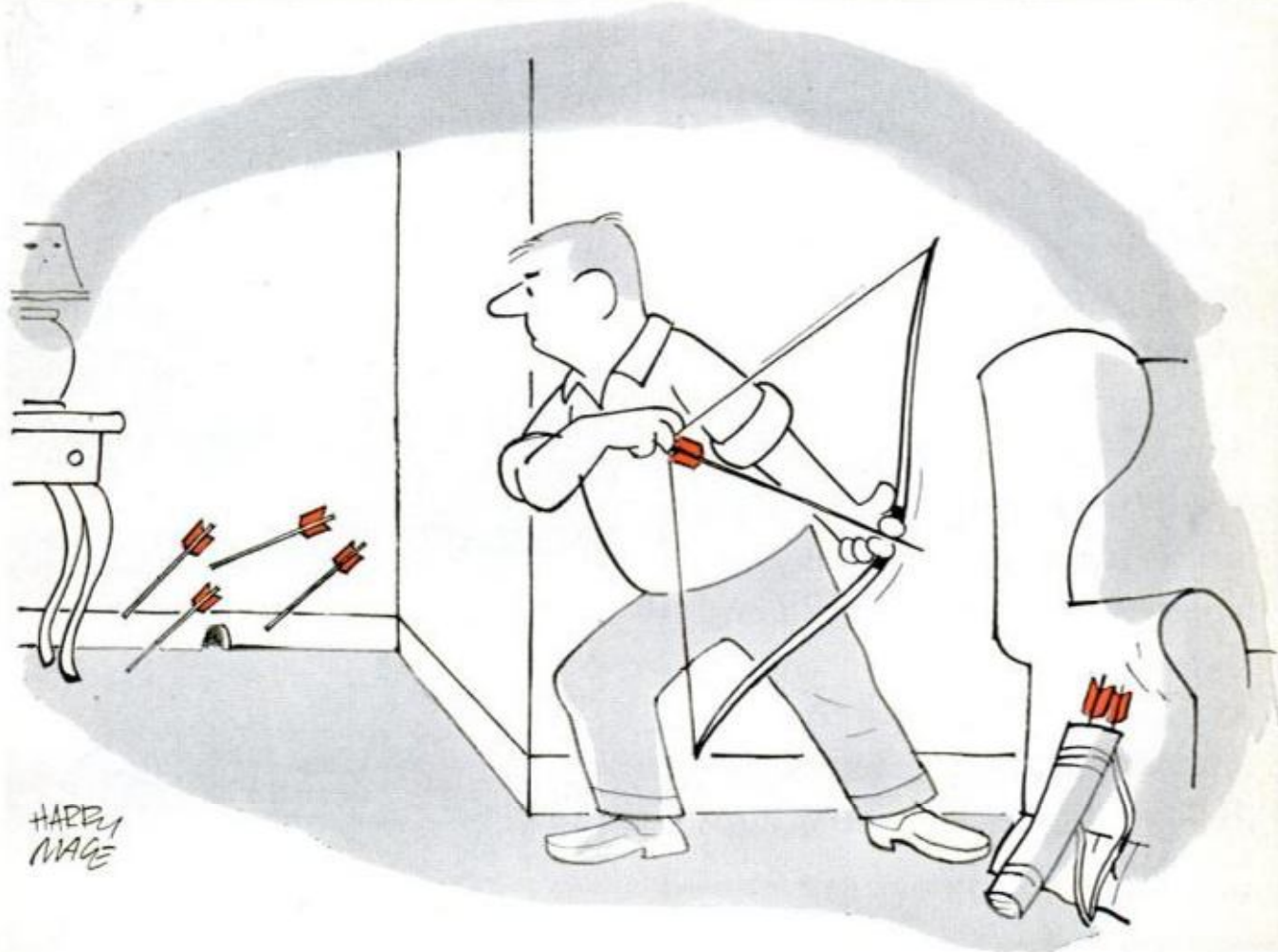
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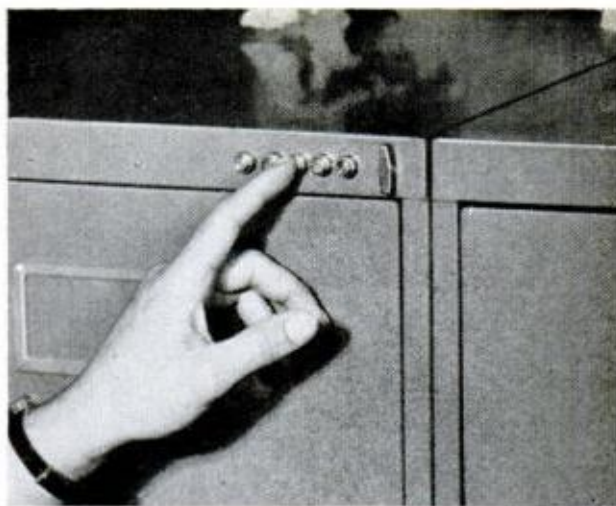
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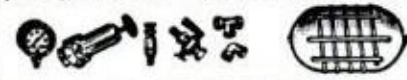
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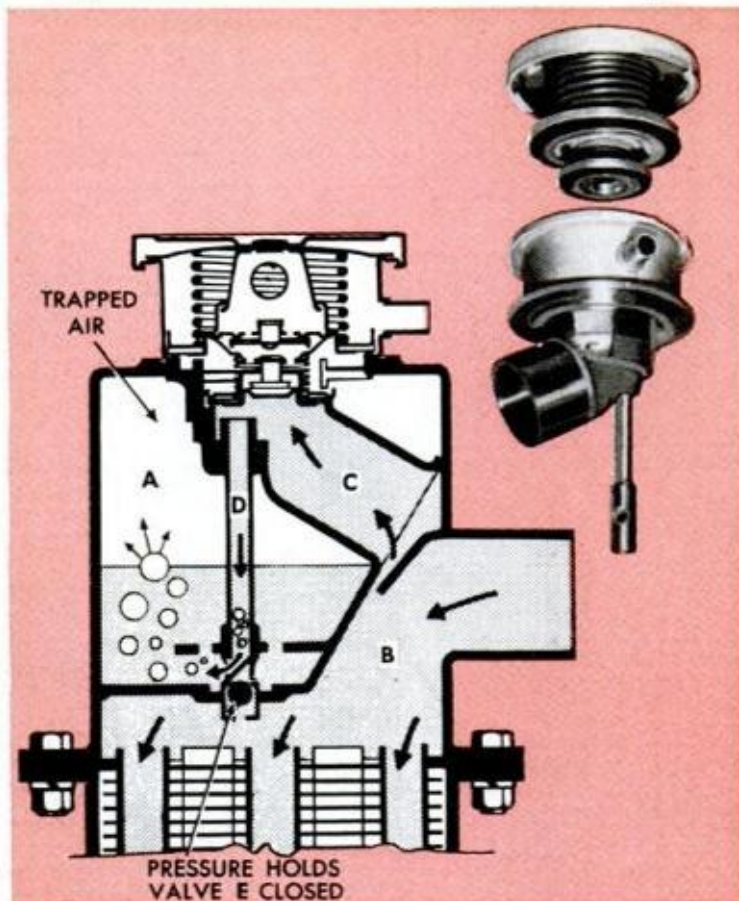
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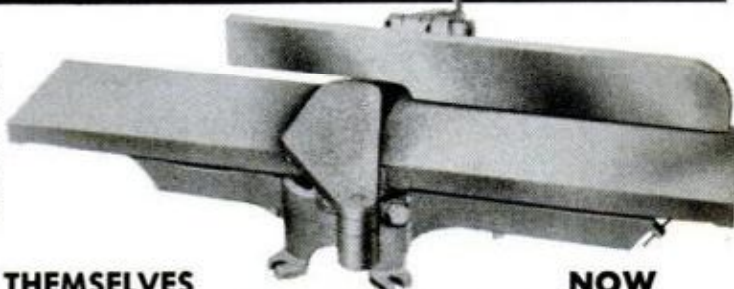
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